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Text Part Number: 78EE117C99-2982683950

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1.314 has-flag 4.0.0

1.314.1 Available under license

1.315 @types/hast 3.0.4

1.315.1 Available under license

1.316 termenv 0.15.1

1.316.1 Available under license

1.317 go-immutable-radix 1.3.1

1.317.1 Available under license

1.318 libpwquality 1.4.4-8.el9

1.318.1 Available under license

1.319 typedarray 0.0.6

1.319.1 Available under license

1.320 psmisc 23.4-3.el9

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1.321 ewma 1.2.0

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1.322 pango 1.48.7-3.el9

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1.323 libqb 2.0.8-1.el9

1.323.1 Available under license

1.324 iptables 1.8.10-11.el9_5

1.324.1 Available under license

1.325 glibc 2.39-0ubuntu8.4

1.325.1 Available under license

1.326 go-flags 1.6.1

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1.327 humanize-ms 1.2.1

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1.328 libnma 1.8.40-1.el9

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1.329 read-pkg-up 7.0.1

1.329.1 Available under license

1.330 runtime-tools 0.9.1-0.20221107090550-2e043c6bd626

1.330.1 Available under license

1.331 hashstructure 1.1.0

1.331.1 Available under license

1.332 hunspell 1.7.0-11.el9

1.332.1 Available under license

1.333 glob 0.2.3

1.333.1 Available under license

1.334 atlas 3.10.3-17.el9

1.334.1 Available under license

1.335 clipboard 0.1.4

1.335.1 Available under license

1.336 is-number 7.0.0

1.336.1 Available under license

1.337 auto-sdk 1.1.0

1.337.1 Available under license

1.338 pigz 2.8-1.el9

1.338.1 Available under license

1.339 colorette 2.0.19

1.339.1 Available under license

1.340 expand-template 2.0.3

1.340.1 Available under license

1.341 ding-libs 0.1.5-53.el9

1.341.1 Available under license

1.342 zfs 2.0.0-rc.0

1.342.1 Available under license

1.343 rkit 0.11-29.el9

1.343.1 Available under license

1.344 nats-io-jsm.go 0.2.4

1.344.1 Available under license

1.345 libreport 2.15.2-6.el9.alma

1.345.1 Available under license

1.346 types-yargs-parser 21.0.3

1.346.1 Available under license

1.347 zod-to-json-schema 3.21.4

1.347.1 Available under license

1.348 @ungap/structured-clone 1.3.0

1.348.1 Available under license

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1.350 infer-owner 1.0.4

1.350.1 Available under license

1.351 ignore-walk 8.0.0

1.351.1 Available under license

1.352 commons-io 1.3.2

1.352.1 Available under license

1.353 regexp2 1.11.5

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1.354 plugin 1.0.0

1.354.1 Available under license

1.355 dmidecode 3.5

1.355.1 Available under license

1.356 asm 8.0.1

1.356.1 Available under license

1.357 ecdsa-sig-formatter 1.0.11

1.357.1 Available under license

1.358 libcomps 0.1.18-1.el9

1.358.1 Available under license

1.359 shebang-command 2.0.0

1.359.1 Available under license

1.360 ice 4.0.8

1.360.1 Available under license

1.361 iotop 0.6-30.el9

1.361.1 Available under license

1.362 gsm 1.0.19-6.el9

1.362.1 Available under license

1.363 opencensus-proto 0.4.1

1.363.1 Available under license

1.364 idna 2.10

1.364.1 Available under license

1.365 pretty-format 29.6.3

1.365.1 Available under license

1.366 style-to-object 0.4.2

1.366.1 Available under license

1.367 libatasmart 0.19-22.el9

1.367.1 Available under license

1.368 @babel/helper-validator-identifier 7.28.5

1.368.1 Available under license

1.369 socket 0.5.1

1.369.1 Available under license

1.370 css-what 6.2.2

1.370.1 Available under license

1.371 langtable 0.0.54-4.el9

1.371.1 Available under license

1.372 kubernetes 1.33.5

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1.373 packaging 21.0

1.373.1 Available under license

1.374 webtransport-go 0.8.1-0.20241018022711-4ac2c9250e66

1.374.1 Available under license

1.375 libtap 1.4.1

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1.376 find-up 4.1.0

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1.377 supports-color 10.2.2

1.377.1 Available under license

1.378 lsof 4.94.0-3.el9

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1.379 liburcu 0.12.1-6.el9

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1.380 go-telebot-telebot 3.3.8

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1.381 picocolors 1.1.1

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1.382 otel-sdk-metric 1.38.0

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1.383 totem-pl-parser 3.26.6-2.el9

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1.384 tracker-miners 3.1.2-4.el9_3

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1.385 statuses 2.0.2

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1.386 reselect 4.1.8

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1.387 glibc 2.36-9+deb12u13

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1.388 @babel/generator 7.22.15

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1.389 unique-slug 2.0.2

1.389.1 Available under license

1.390 fastrand 1.1.0

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1.391 thrift 0.13.0

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1.392 imurmurhash 0.1.4

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1.393 genproto-googleapis-rpc 0.0.0-20250313205543-e70fdf4c4cb4

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1.394 y18n 5.0.8

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1.395 minipass-collect 1.0.2

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1.396 indent-string 4.0.0

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1.397 oniguruma 6.9.6-1.el9.6

1.397.1 Available under license

1.398 possible-typed-array-names 1.1.0

1.398.1 Available under license

1.399 distribution 2.8.3+incompatible

1.399.1 Available under license

1.400 jakarta-validation-api 3.1.1

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1.401 mapstructure 2.3.0

1.401.1 Available under license

1.402 which 2.0.2

1.402.1 Available under license

1.403 @jridgewell/trace-mapping 0.3.19

1.403.1 Available under license

1.404 iso-codes 4.6.0-3.el9

1.404.1 Available under license

1.405 gojay 1.2.13

1.405.1 Available under license

1.406 realmd 0.17.1-2.el9

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1.407 arptables 1.8.10

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1.408 libpcap 14:1.10.0-4.el9

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1.409 x-exp 0.0.0-20250717185816-542afb5b7346

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1.410 govalidator 0.0.0-20230301143203-a9d515a09cc2

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1.411 fs-constants 1.0.0

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1.412 gookit-color 1.1.6

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1.413 websockets 15.0.1

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1.414 has 1.0.3

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1.415 uniseg 0.4.7

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1.416 jakarta-inject-api 2.0.1

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1.417 @babel/runtime 7.22.15

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1.418 checkpointctl 1.3.0

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1.419 color-convert 2.0.1

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1.420 wrappy 1.0.2

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1.421 libxmu 1.1.3-8.el9

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1.422 blivet 3.6.0

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1.423 quic-go 0.50.1

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1.425 @octokit/endpoint 9.0.6

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1.426 libmnl 1.0.5-r2

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1.427 libgsm 1.0.19-6.el9

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1.428 @babel/helper-validator-option 7.27.1

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1.429 libnotify 0.7.9-8.el9

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1.430 exporter-toolkit 0.14.1

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1.431 @octokit/auth-token 6.0.0

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1.432 @types/ms 2.1.0

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1.433 libxv 1.0.11-16.el9

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1.434 pycparser 2.20

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1.437 is-string 1.1.1

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1.438 perl 5.32.1-481.1.el9_6

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1.439 nghttp2 1.43.0-6.el9

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1.440 servlet-api 4.0.0

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1.443 gpt-fdisk 1.0.7-5.el9

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1.444 types-unist 3.0.3

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1.445 glob-parent 5.1.2

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1.446 jackson-databind 2.15.3

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1.447 libpciaccess 0.16-7.el9

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1.448 figures 3.2.0

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1.449 libmodulemd 2.13.0-2.el9

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1.450 ding-libs 0.1.5-53.el9

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1.451 libxklavier 5.4-20.el9

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1.452 content-disposition 0.5.4

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1.453 aws-sdk-go-base 2.0.0-beta.65

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1.454 datadog-sketches-go 1.4.7

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1.455 es-object-atoms 1.1.1

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1.456 fastest-levenshtein 1.0.16

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1.457 protoc-gen-validate 1.2.1

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1.458 santhosh-tekuri-jsonschema 6.0.2

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1.459 reflectwalk 1.0.1

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1.460 @emotion/react 11.11.1

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1.461 pkg-dir 4.2.0

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1.462 color-name 1.1.4

1.462.1 Available under license

1.463 generic-list-go 0.2.0

1.463.1 Available under license

1.464 @ampproject/remapping 2.2.1

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1.465 pretty 1.2.0

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1.466 validator 10.15.4

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1.467 azure-sdk-for-go 68.0.0+incompatible

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1.468 kr-pretty 0.3.1

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1.469 python-productmd 1.31-3.el9

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1.470 @fidm/asn1 1.0.4

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1.473 opus 1.3.1-10.el9

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1.474 libtirpc 1.3.3-9.el9

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1.475 prop-types/node_modules/react-is 16.13.1

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1.476 stun 3.0.0

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1.477 json-glib 1.6.6-1.el9

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1.478 pixman 0.40.0-6.el9_3

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1.479 @emotion/utils 1.2.1

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1.480 contrib-instrumentation-github.com-emicklei-go-restful-otelrestful 0.42.0

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1.481 nats 1.44.0

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1.482 sif 2.21.1

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1.483 gofuzz 1.2.0

1.483.1 Available under license

1.484 snake-yaml 2.5

1.484.1 Available under license

1.485 go-playground-locales 0.14.1

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1.486 @babel/helper-hoist-variables 7.22.5

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1.488 sound-theme-freedesktop 0.8-17.el9

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1.489 oklog-run 1.2.0

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1.490 sql-migrate 1.8.0

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1.491 berkeley-db 5.3.28+dfsg2-7

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1.492 ca-certificates 20241121-r1

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1.493 c-ares 1.19.1-2.el9_4

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1.494 helmet 7.2.0

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1.495 usbutils 017-1.el9

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1.496 ini 4.1.1

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1.497 object.assign 4.1.7

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1.498 attr 2.5.1-3.el9

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1.499 libseccomp 2.5.2-2.el9

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1.500 cbor 2.8.0

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1.501 channels 1.1.0

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1.502 woff2 1.0.2-15.el9

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1.503 jquery 3.7.1

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1.504 safe-buffer 5.2.1

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1.505 mitchellh-mapstructure 1.5.0

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1.506 icu 72.1-3

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1.507 escape-html 1.0.3

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1.508 homeport-dyff 1.10.2

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1.509 libp2p-go-flow-metrics 0.2.0

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1.510 python-six 1.15.0-9.el9

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1.511 jsonreference 0.21.0

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1.513 ipcalc 1.0.0-5.el9

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1.514 fuse 3.10.2-9.el9

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1.515 docker-credential-helpers 0.7.0

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1.516 httpcache 0.0.0-20190611155906-901d90724c79

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1.517 pyparted 3.12.0

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1.518 node-gyp 8.4.1

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1.519 micromark-extension-gfm 3.0.0

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1.520 zap-exp 1.27.0

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1.521 setup 2.13.7-10.el9

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1.522 syslinux 6.04-0.20.el9

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1.523 outcaste-io-ristretto 0.2.3

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1.524 easyjson 0.9.0

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1.526 apimachinery 0.32.0

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1.527 ding-libs 0.5.0-53.el9

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1.528 groff 1.22.4-10.el9

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1.529 type-fest 0.8.1

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1.530 tracker 3.1.2-3.el9_1

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1.531 adobe-source-code-pro-fonts 2.030.1.050-12.el9.1

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1.532 libxcomposite 0.4.5-7.el9

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1.533 etcd-raft 3.5.21

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1.534 continuity 0.4.5

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1.535 netlabel-tools 0.30.0-13.el9

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1.536 activation-api 2.1.4

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1.537 @octokit/core 5.2.2

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1.539 etcd-client 3.5.17

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1.541 libfido2 1.13.0-2.el9

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1.542 libjcat 0.1.6-3.el9

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1.543 front-matter 4.0.2

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1.544 jsesc 3.1.0

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1.546 istack-commons 4.1.2

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1.547 kubernetes-apiserver 0.33.5

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1.548 sigstore 1.9.5

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1.549 ieee754 1.2.1

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1.550 util-linux 2.37.4-21.el9

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1.551 x-term 0.31.0

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1.552 libp2p-go-yamux 5.0.0

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1.553 apiserver-network-proxy-konnectivity-client 0.31.2

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1.554 pgx 5.7.5

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1.555 domutils 3.1.0

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1.556 go-md2man 2.0.5

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1.557 binary-extensions 2.3.0

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1.558 chalk 2.4.2

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1.559 @emotion/sheet 1.2.2

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1.560 commons-codec 1.19.0

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1.561 https-proxy-agent 5.0.1

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1.562 etag 1.8.1

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1.563 libreswan 4.15-8.el9

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1.564 mkdirp 1.0.4

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1.565 lzo 2.10-7.el9

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1.566 regenerator-runtime 0.14.0

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1.567 convert-source-map 2.0.0

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1.568 libtasn 4.19.0-3ubuntu0.24.04.1

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1.570 seahash 4.1.0

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1.572 yargs-parser 20.2.9

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1.576 require-main-filename 2.0.0

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1.578 extism-go-sdk 1.7.1

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1.583 sys-symlink 0.3.0

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1.584 @emotion/unitless 0.8.1

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1.593 enchant2 2.2.15-6.el9

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1.594 dejavu-fonts 2.37-18.el9

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1.595 jspecify 1.0.0

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1.596 libteam 1.31-16.el9_1

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1.597 rechoir 0.8.0

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1.599 google-go-cmp 0.6.0

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1.600 resolve 1.22.4

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1.614 python-pip 21.3.1-1.el9

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1.616 exporter-prometheus 0.1.0

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1.619 libshout 2.4.3-7.el9

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1.620 libxml2 2.9.13-12.el9_6

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1.621 @babel/helper-string-parser 7.27.1

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1.622 xid 1.6.0

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1.623 libgudev 237-1.el9

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1.627 seelog 0.0.0-20170130134532-f561c5e57575

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1.628 which 5.0.0

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1.629 go-multihash 0.2.3

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1.630 zlib 1.3.0.1

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1.631 fcoe-utils 1.0.34-0.git14ef0d2.el9

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1.632 pycairo 1.20.1

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1.633 go-sql-driver-mysql 1.9.3

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1.634 ipset 7.11-11.el9_5

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1.635 hosted-git-info 4.1.0

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1.636 go.mongodb.org-mongo-driver 1.14.0

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1.637 file-uri-to-path 1.0.0

1.637.1 Available under license

1.638 libarchive 3.5.3-6.el9_6

1.638.1 Available under license

1.639 @jridgewell/remapping 2.3.5

1.639.1 Available under license

1.640 camelcase 5.3.1

1.640.1 Available under license

1.641 glew 1:1.3.4-1.el9

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1.642 kubernetes-mount-utils 0.32.4

1.642.1 Available under license

1.643 rimraf 3.0.2

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1.644 geoip2-golang 1.13.0

1.644.1 Available under license

1.645 python-pam 2.0.2

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1.646 dario.cat-mergo 1.0.2

1.646.1 Available under license

1.647 initial-setup 0.3.90.2-2.el9.alma

1.647.1 Available under license

1.648 sepolicy 3.6

1.648.1 Available under license

1.649 low-memory-monitor 2.1-4.el9

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1.650 audit 3.1.5-7.el9

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1.651 hostname 3.23-6.el9

1.651.1 Available under license

1.652 gopsutil 3.23.1

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1.653 @octokit/plugin-request-log 4.0.1

1.653.1 Available under license

1.654 inf 0.9.1

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1.655 file-entry-cache 6.0.1

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1.656 go-restful 3.12.2

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1.657 commons-beanutils 1.9.4

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1.658 tunnel-agent 0.6.0

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1.659 slang 2.3.2-11.el9

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1.660 kr-text 0.2.0

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1.661 unique-filename 1.1.1

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1.662 words 3.0-39.el9

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1.663 slang 2.3.2-11.el9

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1.664 bbolt 1.4.2

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1.665 stargz-snapshotter-estargz 0.16.3

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1.666 atk 2.38.0-4.el9

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1.667 kustomize-api 0.18.0

1.667.1 Available under license

1.668 gnupg 2.4.4-2ubuntu17.2

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1.669 @emotion/cache 11.11.0

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1.670 mtools 4.0.26-4.el9_0

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1.671 xz 5.2.5-8.el9_0

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1.672 libxslt 1.1.34-13.el9_6

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1.673 readline 8.2.13-r0

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1.674 image 5.36.2

1.674.1 Available under license

1.675 gopacket-gopacket 1.3.1

1.675.1 Available under license

1.676 nspr 4.36

1.676.1 Available under license

1.677 go-autorest-autorest-adal 0.9.22

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1.678 go-runewidth 0.0.19

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1.679 stateless4j 2.5.0

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1.680 apimachinery 0.33.5

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1.681 python-kmod 0.9-32.el9

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1.682 tweetnacl 1.0.3

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1.683 qpack 0.5.1

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1.684 systemd-python 234

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1.685 escape-string-regexp 1.0.5

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1.686 go-playground-universal-translator 0.18.1

1.686.1 Available under license

1.687 hard-rejection 2.1.0

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1.688 babel-plugin-polyfill-corejs3 0.8.3

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1.689 erikdubbelboer-gspt 0.0.0-20190125194910-e68493906b83

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1.690 go-kmsg-parser 2.0.0+incompatible

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1.691 go-base36 0.2.0

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1.692 busybox 1.37.0-r14

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1.693 doctrine 3.0.0

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1.694 python-chardet 4.0.0-5.el9

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1.695 coreutils 9.4-3ubuntu6

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1.696 etcd-api 3.5.17

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1.697 critbitgo 1.4.0

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1.698 vfile 6.0.3

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1.699 devlop 1.1.0

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1.700 modern-go-concurrent 0.0.0-20180306012644-bacd9c7ef1dd

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1.701 x3270 4.0ga14-2.el9

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1.701.2 Available under license

1.702 docker-go-metrics 0.0.1

1.702.1 Available under license

1.703 redux 4.2.1

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1.704 @babel/core/node_modules/semver 6.3.1

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1.705 bash 5.2.21-2ubuntu4

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1.706 ret 0.1.15

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1.707 systemd 255.4-1ubuntu8.6

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1.708 strace 6.12-1.el9

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1.709 color 1.18.0

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1.710 jakarta-annotation-api 3.0.0

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1.713 mergo 0.3.9

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1.714 cffi 1.14.5

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1.715 @octokit/request 8.4.1

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1.716 libpsl 0.21.1-5.el9

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1.717 libxi 1.7.10-8.el9

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1.718 maxminddb-golang 1.13.0

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1.719 jsonpatch 4.12.0

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1.720 speex 1.2.0-11.el9

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1.721 grpc-go 1.72.2

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1.726 iptables 1.8.11-r1

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1.728 speakeasy 0.2.0

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1.730 go-errors-errors 1.4.2

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1.731 jwalterweatherman 1.1.0

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1.735 events-to-array 1.1.2

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1.736 package-hash 4.0.0

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1.737 json-stable-stringify-without-jsonify 1.0.1

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1.744 go-openapi-validate 0.24.0

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1.765 h11 0.16.0
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1.778 simpleline 1.8.3

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1.780 @babel/helper-validator-option 7.22.15

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1.787 caller 1.1.0

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1.788 zipkin-go-opentracing 0.5.0

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1.793 ethernet 0.0.0-20220221185849-529eae5b6118

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1.797 is-set 2.0.3

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1.801 libtool 2.4.6-46.el9

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1.802 go-hclog 1.6.3

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1.803 go.uber.org-fx 1.23.0

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1.804 grpc-websocket-proxy 0.0.0-20220101234140-673ab2c3ae75

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1.805 buffer-equal-constant-time 1.0.1

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1.806 discontinuous-range 1.0.0

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1.807 gopsutil 4.25.9

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1.808 are-we-there-yet 3.0.1

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1.809 go-base32 0.1.0

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1.810 queue 1.1.0

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1.814 libnftnl 1.2.6-4.el9_4

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1.815 pq 1.10.9

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1.816 x-net 0.41.0

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1.817 @jridgewell/sourcemap-codec 1.5.5

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1.818 python-distro 1.5.0-7.el9

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1.820 proto-otlp 1.5.0

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1.821 pipewire 1.0.1-1.el9

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1.823 grpc-go 1.74.2

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1.824 concat-map 0.0.1

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1.825 libxrandr 1.5.2-8.el9

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1.826 datadog-datadog-agent-pkg-proto 0.66.1

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1.827 javax-annotation-api 1.3.2

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1.828 go-autorest-autorest 0.11.30

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1.829 fsnotify 1.8.0

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1.830 tracker 3.1.2-4.el9_3

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1.832 python-pysocks 1.7.1-12.el9

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1.839 fs-minipass 2.1.0

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1.840 libutempter 1.2.1-6.el9

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1.841 @jsep-plugin/assignment 1.3.0

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1.842 libpsl 0.21.1-5.el9

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1.863 ccid 1.5.2-1.el9

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1.864 x-time-rate 0.12.0

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1.865 braces 3.0.3

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1.866 @jridgewell/resolve-uri 3.1.1

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1.870 sprintf-js 1.0.3

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1.888 retry 0.3.1

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1.894 ibus 1.5.25-6.el9

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1.963 go-metrics 0.4.1

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1.967 sg3-utils 1.47-10.el9

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1.968 kustomize-kyaml 0.19.0

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1.969 @jridgewell/gen-mapping 0.3.13

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1.2734 @sigstore/verify 3.1.0

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1.3289 pacote 21.5.0

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1.3291 openjdk 17.0.18-r3

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1.3301 libcrypto3 3.6.1-r3

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1.3302 bash 5.3-r6

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1.3303 bare-os 3.8.0

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1.3306 jackson-core 3.0.2

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1.3313 @babel/helpers 7.29.2

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1.3314 zlib 1.3.2-r2

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1.3318 libpng 2:1.6.37-12.el9_7.2

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1.3319 libnpmdiff 8.1.5

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1.3320 cacache 20.0.4

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1.3321 @sigstore/tuf 4.0.2

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1.3322 libnpmexec 10.2.5

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1.3323 libnpmfund 7.0.19

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1.3324 @sigstore/sign 4.1.1

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1.3325 @npmcli/arborist 9.4.2

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1.3326 @gar/promise-retry 1.0.3

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1.3327 @sigstore/core 3.2.0

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1.3428 chartjs 4.4.0

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1.3437 @commitlint/read 20.5.0

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1.3440 @commitlint/rules 20.5.0

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1.3441 @simple-libs/child-process-utils 1.0.2

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1.3442 htmlparser2 9.0.0

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1.3443 electron-to-chromium 1.5.321

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1.3444 @mui/icons-material 5.14.8

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1.3445 @iarna/toml 3.0.0

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1.3451 @mui/utils 5.14.8

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1.3452 node-releases 2.0.36

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1.3453 railroad-diagrams 1.0.0

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1.3454 @hello-pangea/dnd 16.3.0

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1.3456 @commitlint/load 20.5.0

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1.3457 node-preload 0.2.1

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1.3458 @babel/traverse 7.22.15

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1.3459 git-raw-commits 5.0.1

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1.3460 require-inject 1.4.4

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1.3462 @mui/x-data-grid-pro 6.12.1

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1.3463 @mui/core-downloads-tracker 5.14.8

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1.3466 @commitlint/parse 20.5.0

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1.3467 opener 1.5.2

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1.3468 @xmldom/xmldom 0.8.12

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1.3469 @types/react 18.2.21

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1.3470 fast-json-stable-stringify 2.1.0

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1.3471 @npmcli/smoke-tests-max-listeners 1.0.0

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1.3472 minify-registry-metadata 4.0.0

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1.3473 parse-github-repo-url 1.4.1

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1.3474 @conventional-changelog/git-client 2.6.0

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1.3475 eslint-visitor-keys 3.4.3

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1.3476 string-prototype-trimend 1.0.9

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1.3477 @mui/private-theming 5.14.8

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1.3478 @babel/core/node_modules/@babel/code-frame 7.22.13

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1.3479 @commitlint/config-validator 20.5.0

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1.3480 @commitlint/is-ignored 20.5.0

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1.3481 @conventional-commits/parser 0.4.1

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1.3482 moo 0.5.3

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1.3483 babel-plugin-transform-runtime 7.22.15

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1.3484 @fullcalendar/core 6.1.8

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1.3486 array-ify 1.0.0

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1.3487 @actions/exec 2.0.0

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1.3488 remark 15.0.1

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1.3489 @commitlint/message 20.4.3

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1.3490 @octokit/plugin-request-log 6.0.0

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1.3491 @commitlint/format 20.5.0

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1.3492 es-abstract 1.24.1

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1.3494 type-fest 3.13.1

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1.3495 @mui/system 5.14.8

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1.3503 include-media 2.0.0

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1.3504 proxy 2.2.0

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1.3505 @csstools/css-syntax-patches-for-csstree 1.0.29

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1.3506 tar 7.5.11

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1.3507 @fullcalendar/daygrid 6.1.8

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1.3508 reflect.getprototypeof 1.0.10

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1.3509 floatthead 2.2.5

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1.3511 global-directory 4.0.1

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1.3517 platform 1.3.6

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1.3520 is-regex 1.2.1

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1.3521 tinymce 6.7.0

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1.3522 chartjs-adapter-date-fns 3.0.0

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1.3526 mousetrap 1.6.5

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1.3527 @npmcli/eslint-config 5.1.0

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1.3528 xmlchars 2.2.0

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1.3532 @commitlint/config-conventional 20.5.0

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version 1.2.7, May 2nd, 2012

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Jean-loup Gailly Mark Adler
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*/

```
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------------------------------------------------------------------------------
```

1.2 zlib 1.2.11

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```
/* zlib.h -- interface of the 'zlib' general purpose compression library
 version 1.2.11, January 15th, 2017

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*/
```

1.3 icu 67.1

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## Commands to generate dependency files
GEN_DEPS.c= $(CC) -E -MM $(DEFS) $(CPPFLAGS)
```

```
GEN_DEPS.cc= $(CXX) -E -MM $(DEFS) $(CPPFLAGS)

## Flags for position independent code
SHAREDLIBCFLAGS = -fPIC
SHAREDLIBCXXFLAGS = -fPIC
SHAREDLIBCPPFLAGS = -DPIC

## Additional flags when building libraries and with threads
THREADSCPPFLAGS = -D_REENTRANT
LIBCPPFLAGS =

## Compiler switch to embed a runtime search path
LD_RPATH=
LD_RPATH_PRE= -Wl,-rpath,

## Compiler switch to embed a library name
LD_SONAME = -Wl,-soname -Wl,$(notdir $(MIDDLE_SO_TARGET))

## Shared library options
LD_SOOPTIONS= -Wl,-Bsymbolic

## Shared object suffix
SO = so
## Non-shared intermediate object suffix
STATIC_O = ao

## Compilation
 rules
%.$(STATIC_O): $(srcdir)/%.c
 $(COMPILE.c) $(STATICCPPFLAGS) $(STATICCFLAGS) -o $@ $<
%.o: $(srcdir)/%.c
 $(COMPILE.c) $(DYNAMICCPPFLAGS) $(DYNAMICCFLAGS) -o $@ $<

%.$(STATIC_O): $(srcdir)/%.cpp
 $(COMPILE.cc) $(STATICCPPFLAGS) $(STATICCXXFLAGS) -o $@ $<
%.o: $(srcdir)/%.cpp
 $(COMPILE.cc) $(DYNAMICCPPFLAGS) $(DYNAMICCXXFLAGS) -o $@ $<


## Dependency rules
%.d: $(srcdir)/%.c
 @echo "generating dependency information for $<"
 @$(SHELL) -ec '$(GEN_DEPS.c) $< \
  | sed '\"s/\($*\)\.o[ :]*/\1.o $@ : /g'\" > $@; \
  [ -s $@ ] || rm -f $@'

%.d: $(srcdir)/%.cpp
 @echo "generating dependency information for $<"
```

```
 @$(SHELL) -ec '$(GEN_DEPS.cc) $< \
  | sed '\"s/\($*\)\.o[ :]*/\1.o $@ : /g'\" > $@; \
  [ -s $@ ] || rm -f $@'

## Versioned libraries rules

%.$(SO).$(SO_TARGET_VERSION_MAJOR): %.$(SO).$(SO_TARGET_VERSION)
 $(RM) $@ && ln -s ${<F} $@
%.$(SO): %.$(SO).$(SO_TARGET_VERSION_MAJOR)
 $(RM) $@ && ln -s ${*F}.$(SO).$(SO_TARGET_VERSION) $@

##  Bind internal references

# LDflags that pkgdata will use
BIR_LDFLAGS= -Wl,-Bsymbolic

# Dependencies [i.e. map files] for the final library
BIR_DEPS=

## Remove shared library 's'
STATIC_PREFIX_WHEN_USED =
STATIC_PREFIX =

## End BSD-specific setup
```

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1.8 opencore-amr 0.1.5-1

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   <ns1:copyrightText>Copyright 2013-2017 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</ns1:copyrightText>
   <ns1:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
   <ns1:fileName>./examples/guide/processlines.c</ns1:fileName>
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  <ns1:fileName>./config/genconfig.py</ns1:fileName>
  <ns1:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
  <ns1:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <ns1:checksum rdf:nodeID="N11d8e358dd81420694d745ad31b1e8af"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <ns1:copyrightText>Copyright 2013-2017 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</ns1:copyrightText>
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  <ns1:checksum rdf:nodeID="N64ed73dd5e834b11bea98bb09f1e57fe"/>
  <ns1:copyrightText>Copyright 2013-2017 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</ns1:copyrightText>
  <ns1:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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  <ns1:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
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  <ns1:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
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 </rdf:Description>
</rdf:RDF>
```


==========

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==========

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  xmlns:_3="http://spdx.org/rdf/terms#"
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
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 </rdf:Description>
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   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
   <_3:checksum rdf:nodeID="svBMzJkP102"/>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
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  </rdf:Description>
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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distributable)</_3:copyrightText>
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   <_3:licenseListVersion>1.20</_3:licenseListVersion>
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distributable)</_3:copyrightText>
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  <_3:copyrightText>Copyright
```

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<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
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distributable)</_3:copyrightText>
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distributable)</_3:copyrightText>
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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(see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
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distributable)</_3:copyrightText>
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   <_3:fileName>./src-separate/duk_debug_heap.c</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
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   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
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distributable)</_3:copyrightText>
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   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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distributable)</_3:copyrightText>
   <_3:checksum rdf:nodeID="svBMzJkP444"/>
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  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP70"/>
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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distributable)</_3:copyrightText>
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  <_3:fileName>./src-separate/duk_api_object.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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distributable)</_3:copyrightText>
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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distributable)</_3:copyrightText>
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
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   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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distributable)</_3:copyrightText>
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distributable)</_3:copyrightText>
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<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
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<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
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<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>

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distributable)</_3:copyrightText>
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distributable)</_3:copyrightText>
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distributable)</_3:copyrightText>
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  <_3:checksumValue>8015d14ffbc7a4a4b93d654f093aa48ec17fce4e</_3:checksumValue>
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</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP117">
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  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP118"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./examples/eventloop/curses-timers.js</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP404"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_strings.h</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP183">
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP184"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./examples/debug-trans-dvalue/duk_trans_dvalue.c</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
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  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>a8c0b54002a3a7d8c69d385e7fbcf4b70d1efc70</_3:checksumValue>
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  <_3:checksumValue>c81b68018e3d6f1b93683f7ead8761c01f2ca760</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP445">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
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<_3:fileName>./src-separate/duk_heap_stringcache.c</_3:fileName>
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</rdf:Description>
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<_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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<_3:checksum rdf:nodeID="svBMzJkP470"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./config/README.rst</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP232">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>fd24ca07cfd8fd37f3e70d10ad078ee5f149c9ce</_3:checksumValue>
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</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP29">
<_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP30"/>

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  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./Makefile.dukdebug</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
 </rdf:Description>
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   <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP436"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_replacements.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP188">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>22046b9dfc552ed692193d1bf5e3d0e182111ae5</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP283">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP284"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_api_internal.h</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP399">
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP400"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_js_executor.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
  <rdf:Description rdf:nodeID="svBMzJkP481">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP482"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./licenses/lua.txt</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
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  <_3:checksumValue>e023af5c2fb4b1efab74a230c552f1eb1b37fc10</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
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<rdf:Description rdf:nodeID="svBMzJkP127">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile
rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP128"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./examples/dummy-date-provider/README.rst</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
</rdf:Description>
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  <_3:checksumValue>54a05944602f4a24864001a40d770591c6800daf</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
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  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>4e41e7165a8d6e3bd370bc4536b16835a7204cf6</_3:checksumValue>
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  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>a23d89e3ff8fe247e09338af7b38bdab41da5c3e</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP358"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_tval.h</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP336">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
   <_3:checksumValue>821b268a1d4339ea2b309bdb6f527aa61bdb6b23</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP192">
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</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP260">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>063133679b6d072efc1c27f3a510101744ffde0c</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
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<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP186">
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<_3:checksumValue>7e2674dd72227576375a80f6ddbb11320f5b987a</_3:checksumValue>
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</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP160">
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<_3:checksumValue>83b27494e6b257ab09828b0a4a1cf907686778a5</_3:checksumValue>
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</rdf:Description>
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<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP368"/>
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<_3:fileName>./src-separate/duk_bi_boolean.c</_3:fileName>
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</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP42">
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<_3:checksumValue>829c4239ff43a1e15aa08bbbab41e7fba9207859</_3:checksumValue>
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<rdf:Description rdf:nodeID="svBMzJkP125">
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<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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<_3:checksum rdf:nodeID="svBMzJkP126"/>
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</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP392">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
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<_3:checksum rdf:nodeID="svBMzJkP144"/>
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</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP282">
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<_3:checksumValue>786369a33cccbadc3d2efba613a43fdd638971fc</_3:checksumValue>
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<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP220"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./src-separate/duk_api_debug.c</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
</rdf:Description>

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  <_3:checksumValue>881f1b114c9fbba139044ddcbbc5398243185d10</_3:checksumValue>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP63">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP64"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./debugger/duk_opcodes.yaml</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP216">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>3fa5d72893eb3e1d42d07c8effc8bb1443f87dd6</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP248">
   <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>105dd2e79d90b96b6b1ae419bff31ed6a0273af6</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
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  <_3:checksumValue>48eafa3f368fc879bfb79c2b2a30846a0b5d9b42</_3:checksumValue>
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</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP264">
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  <_3:checksumValue>3f2b3b6b16cc969631b9980bc67aa6cc2c872048</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
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  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile
rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP314"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_error_augment.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
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  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
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<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
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<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
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<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP410">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>457df68e290e23da40cac39a7cc35d6d6b4257c6</_3:checksumValue>
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<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
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<_3:fileName>./debugger/duk_classnames.yaml</_3:fileName>
<_3:fileType
rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP164">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>a4e2dfaee71b2316f2c3d149b4a507250b54dd96</_3:checksumValue>

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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
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  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_jmpbuf.h</_3:fileName>
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 <rdf:Description rdf:nodeID="svBMzJkP460">
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  <_3:checksumValue>089c395fca3cedceec09fd38d32d0c77dc8658f4</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
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 <rdf:Description rdf:nodeID="svBMzJkP328">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>3f640daaa5e9d226a04fe419cb5eb1c07d06d346</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
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 <rdf:Description rdf:nodeID="svBMzJkP47">
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP48"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./debugger/duk_debugerrors.yaml</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
 </rdf:Description>
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP370"/>
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  <_3:fileName>./src-separate/duk_error_macros.c</_3:fileName>
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  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>4239a907720cf3620bd0b03eb43981e7182e305a</_3:checksumValue>
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    <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
    <_3:checksum rdf:nodeID="svBMzJkP294"/>
    <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
    <_3:fileName>./src-separate/duk_hthread_builtins.c</_3:fileName>
    <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
  </rdf:Description>
  <rdf:Description rdf:nodeID="svBMzJkP75">
    <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
    <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
    <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
    <_3:checksum rdf:nodeID="svBMzJkP76"/>
    <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
     <_3:fileName>./examples/coffee/mandel.coffee</_3:fileName>
    <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
  </rdf:Description>
  <rdf:Description rdf:nodeID="svBMzJkP296">
    <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
    <_3:checksumValue>6988aac432dcc185c2967732e21947ea0696377f</_3:checksumValue>
    <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
  </rdf:Description>
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    <_3:checksumValue>7b167c1ea560de7ac67e217c1fdff8912f8b677d</_3:checksumValue>
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  <rdf:Description rdf:nodeID="svBMzJkP422">
    <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
    <_3:checksumValue>521f29841ddeb9be08ff9f7e2db06277da31bd47</_3:checksumValue>
    <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
   </rdf:Description>
  <rdf:Description rdf:nodeID="svBMzJkP155">
    <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
    <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
    <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
    <_3:checksum rdf:nodeID="svBMzJkP156"/>
    <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
    <_3:fileName>./examples/alloc-torture/duk_alloc_torture.c</_3:fileName>
    <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
  </rdf:Description>
  <rdf:Description rdf:nodeID="svBMzJkP157">
    <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
    <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
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<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP72"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./debugger/static/index.html</_3:fileName>
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</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP356">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
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<_3:sourceInfo>Official duktape.org release built from GitHub repo https://github.com/svaarala/duktape.</_3:sourceInfo>
<_3:downloadLocation rdf:datatype="http://www.w3.org/2001/XMLSchema#anyURI">http://duktape.org/duktape-1.5.2.tar.xz</_3:downloadLocation>
<_3:licenseDeclared rdf:resource="http://spdx.org/licenses/MIT"/>
<_3:supplier>Organization: duktape.org</_3:supplier>
<_3:packageVerificationCode rdf:nodeID="svBMzJkP5"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Package"/>
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<_3:licenseComments>Duktape is copyrighted by its authors and licensed under the MIT license. MurmurHash2 is used internally, it is also under the MIT license. Duktape module loader is based on the CommonJS module loading specification (without sharing any code), CommonJS is under the MIT license.</_3:licenseComments>
<_3:originator>Organization: duktape.org</_3:originator>
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<_3:hasFile rdf:nodeID="svBMzJkP181"/>
<_3:hasFile rdf:nodeID="svBMzJkP315"/>
<_3:hasFile rdf:nodeID="svBMzJkP179"/>
<_3:hasFile rdf:nodeID="svBMzJkP399"/>
<_3:hasFile rdf:nodeID="svBMzJkP153"/>

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  <_3:packageFileName>duktape-1.5.2.tar.xz</_3:packageFileName>
  <_3:name>Duktape</_3:name>
  <_3:homePage
rdf:datatype="http://www.w3.org/2001/XMLSchema#anyURI">http://duktape.org/</_3:homePage>
  <_3:versionInfo>1.5.2</_3:versionInfo>
   <_3:summary>Duktape Ecmascript interpreter</_3:summary>
  <_3:licenseInfoFromFiles rdf:resource="http://spdx.org/licenses/MIT"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP80">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>af6b0cd61c02efa575b9106682606297d26f013b</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP430">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>ddcaaa8f260ff00f22e09d7fb4b4b7ca94858f30</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP176">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>bdb9243b436ef5c70967bddd16d0cc9e74971b1c</_3:checksumValue>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP12">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>cb09ad82ed76b6fcaf0ac32db698c1ce50e0a508</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP412">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>b3919a740c97b1d3ceb4e03c9ae53456916222a4</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP368">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>a20231719c1f9b97ea38fbc42dd8af1e21d74879</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP406">
   <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>62b2d820f9a27df439cd24ac8766e680d27a95da</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP272">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>95a06fb24eca405019eb7b7d535179245eda6099</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
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<rdf:Description rdf:nodeID="svBMzJkP78">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>ea413ed7d47cf27c6f3ffe25956b1370b653c200</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP54">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
   <_3:checksumValue>0bba41f542f2279b6bfa297ba4e7ee824e3ebd78</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP421">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP422"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_js_ops.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP7">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst
 in the Duktape distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP8"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./LICENSE.txt</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP60">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>50a3349a079123b6bddf3db507df0dd9e877e246</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP299">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP300"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
   <_3:fileName>./src-separate/duk_bi_logger.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP112">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>64566ae0bdc1c3e1017604b6b45d515c30d976eb</_3:checksumValue>
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  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP463">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP464"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./polyfills/console-minimal.js</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP223">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP224"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_bi_global.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP194">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>2c86a9ed51255ba3b0b225e48c093851a78cae71</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP196">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
   <_3:checksumValue>742635fda10ef9775864077e647b59442768a69c</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP249">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP250"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_api_call.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP397">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>

 <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
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  <_3:checksum rdf:nodeID="svBMzJkP398"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_bi_regexp.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP163">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP164"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./examples/cmdline/duk_cmdline_ajduk.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP411">
   <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP412"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_heaphdr.h</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP362">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>5ab84f0ff2ed8c4b4a2daa5957d2a20447887103</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP444">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>8483a2211d6323480efa605ee646959695b742c6</_3:checksumValue>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP200">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>fba891f21dc0b80d282f16d39c37007965adcd04</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP396">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>47e1001460004f53dfc350355e02bf56f18b0398</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP113">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst
in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP114"/>
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<_3:fileName>./examples/eventloop/fileio.c</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP306">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>d529a6faac560def1e5b2cdb991713a6d70b0e26</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP434">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>b7be4a3a943099fdf318480615d1c130be87a841</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP358">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>a9493898a19810a5450d2442d1ff1dfb4ff76d1c</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP220">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>ee1f62688128fef0954cc9b93e41c199212e5a82</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP65">
<_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP66"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./debugger/merge_debug_meta.py</_3:fileName>
<_3:fileType
rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP44">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>bc9d119b5e66085e7e4219685fd351fb3f68d800</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP195">
<_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>

```
  <_3:checksum rdf:nodeID="svBMzJkP196"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./examples/alloc-logging/duk_alloc_logging.h</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP452">
   <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>aa1f72e7a2b4891ec1f445eb031dfba69bdc85de</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP270">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>1f430f45a3e52e4327eb17b2213a6f473dc1f6d2</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP206">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>9b7de9f9f25d095dfcffbf2d7629cd772fe632f0</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP401">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile
 rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP402"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_bi_date_windows.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP479">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP480"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./licenses/murmurhash2.txt</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
  </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP120">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>88ab1d060886393d94b6fb7c6054a0189117340b</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP314">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
```

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  <_3:checksumValue>d32ab97622eaf870648dfdf8e5b9cb034740affa</_3:checksumValue>
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 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP398">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>2e9dca0919a92c68ed30593292b3fe7140480062</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP378">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
   <_3:checksumValue>d5f1184bc60b9049b0dbf1e51ae6a5fe7e5e3192</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP18">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>f3ed5c785b60b0f39a74cc3f5b73b0c6e24287c3</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP425">
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP426"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_bi_object.c</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP203">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP204"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_unicode_support.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP159">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>

 <_3:checksum rdf:nodeID="svBMzJkP160"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./examples/hello/hello.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
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 </rdf:Description>
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   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
   <_3:checksum rdf:nodeID="svBMzJkP492"/>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
   <_3:fileName>./src/duktape.h</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP391">
   <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
    <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
   <_3:checksum rdf:nodeID="svBMzJkP392"/>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
   <_3:fileName>./src-separate/duk_bi_duktape.c</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
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   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
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   <_3:fileName>./Makefile.eventloop</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
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   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
   <_3:checksum rdf:nodeID="svBMzJkP312"/>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
   <_3:fileName>./src-separate/duk_selftest.h</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP115">
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   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
   <_3:checksum rdf:nodeID="svBMzJkP116"/>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
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  <_3:fileName>./examples/eventloop/ecma_eventloop.js</_3:fileName>
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 </rdf:Description>
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  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>01138dd2786346a159c06e43f094d07f002df881</_3:checksumValue>
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 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP405">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP406"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_api_buffer.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
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  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP142"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./examples/guide/processlines.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP236">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>c763ffca7e15df01f44cf89518eb870380b03ee8</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
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  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP100"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./examples/jxpretty/jxpretty.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP132">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>29b1960bc40607c2cf496465068611b2ffc4de87</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
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<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP334"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./src-separate/duk_debug_vsnprintf.c</_3:fileName>
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<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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<_3:checksum rdf:nodeID="svBMzJkP22"/>
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<_3:checksum rdf:nodeID="svBMzJkP212"/>
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<_3:fileName>./src-separate/duk_numconv.h</_3:fileName>
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<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP414"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./src-separate/duk_bi_proxy.c</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP184">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>0783cf4f48c9baf2b3820a36ab276b01e2102600</_3:checksumValue>

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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP130"/>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./examples/dummy-date-provider/dummy_date_provider.c</_3:fileName>
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 <rdf:Description rdf:nodeID="svBMzJkP139">
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP140"/>
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  <_3:fileName>./examples/guide/README.rst</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
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  <_3:checksumValue>7edf7600e1a6f09d1e4a0e2f9be418b59fff7c52</_3:checksumValue>
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP96"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./examples/codepage-conv/duk_codepage_conv.h</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP22">
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  <_3:checksumValue>61043b4a6f3cf86375ea6e34ebf83b550a1935b2</_3:checksumValue>
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  </rdf:Description>
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  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>13e6591c152934ace923d9e49cc52872c8a515b9</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
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  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
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distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP262"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
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 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP48">
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   <_3:checksumValue>ca9e1a8f73c5dcbe2e8c45d25ce9865cd93866e6</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP416">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>e17ef51b2a16cee731cf341ce08d04690da095ce</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP267">
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP268"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_js_call.c</_3:fileName>
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  </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP104">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>07a167411a356aebfbe987353846a9c711998f20</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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distributable)</_3:copyrightText>
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  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
 </rdf:Description>
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<_3:fileName>./src-separate/duk_hnativefunction.h</_3:fileName>
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</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP472">
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</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP156">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>9a31edd2028d39d24aa9bfdbd2b70ce2a64b8493</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
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</rdf:Description>
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<_3:checksum rdf:nodeID="svBMzJkP176"/>
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<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP230"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./src-separate/duk_util.h</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP23">

<_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
<_3:licenseInfoInFile
rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP24"/>
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<_3:fileName>./Makefile.codepage</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
</rdf:Description>
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<_3:checksumValue>9bcb9de5ed729ecc7093ab48e4f5c04e9704bb30</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
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<_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP38"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./src-noline/metadata.json</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP302">
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<_3:checksumValue>494667f18c30e4fd36245e6c4e27f93fcf9df87d</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
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<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP394"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./src-separate/duk_heap_memory.c</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP295">
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<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP296"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./src-separate/duk_hobject_class.c</_3:fileName>

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 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP36">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>f88d68880f451267e7e2eca4b6c4191e8c3fe011</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP36"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./Makefile.jxpretty</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP222">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>714e6fe76e2aed0bbb54f6c5e3674472813e4382</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP297">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP298"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_bi_protos.h</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP171">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP172"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./examples/debug-trans-socket/duk_trans_socket_unix.c</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP467">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP468"/>
```

```
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./config/genconfig.py</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP350">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>0ec3478b1e5713ffdbe7eb45cd5bb96c1a8a774b</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP442">
   <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>7c438de1ba7ca2ef226340d28ec0071ece1c9e43</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP116">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>4db4ca2d7ce3f076fd195372d53e8bc5714d2597</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP84">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>a8f8cf615ef79337a83eb791477dc9ed2c22822c</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP124">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>d869c0f8797a659124b3ba31c75f494b15bea5e6</_3:checksumValue>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP273">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP274"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_hobject_pc2line.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP389">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst
 in the Duktape distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP390"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_debugger.h</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
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 </rdf:Description>
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   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
   <_3:checksum rdf:nodeID="svBMzJkP282"/>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
   <_3:fileName>./src-separate/duk_util_bitdecoder.c</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP380">
   <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
    <_3:checksumValue>5bf6196d028d10a8f2f8e3da67b7d59bb8fd9eff</_3:checksumValue>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP301">
   <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
   <_3:checksum rdf:nodeID="svBMzJkP302"/>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
   <_3:fileName>./src-separate/duk_unicode_tables.c</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP324">
   <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
   <_3:checksumValue>29be453689679c9bab977c0b333a4a224d9f02e6</_3:checksumValue>
    <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP110">
   <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
   <_3:checksumValue>d535c4e27319a5db6026553a801e8a5ef0e6fe88</_3:checksumValue>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP215">
   <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
   <_3:checksum rdf:nodeID="svBMzJkP216"/>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
   <_3:fileName>./src-separate/duk_hobject_misc.c</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP280">
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<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>fcdae530da6f6dfafd21219de294c547b91dd866</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP274">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>8521b45dcbc72d66c2b4e3f0db9e1dbfb75b45f5</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP83">
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<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP84"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./examples/alloc-hybrid/duk_alloc_hybrid.h</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP26">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>3b8236810650f4e28bd84984b3c7e55029f241b0</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP453">
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<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP454"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./polyfills/duktape-error-setter-writable.js</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP278">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>cd7bd1908b56fe13dc63ac64b53ca793221f9359</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP337">
<_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP338"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./src-separate/duk_heap_markandsweep.c</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>

```
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP465">
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    <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
   <_3:checksum rdf:nodeID="svBMzJkP466"/>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
   <_3:fileName>./polyfills/performance-now.js</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP303">
   <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
   <_3:checksum rdf:nodeID="svBMzJkP304"/>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
   <_3:fileName>./src-separate/duk_exception.h</_3:fileName>
   <_3:fileType
 rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP187">
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   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
   <_3:checksum rdf:nodeID="svBMzJkP188"/>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
   <_3:fileName>./examples/sandbox/sandbox.c</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP109">
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   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
   <_3:checksum rdf:nodeID="svBMzJkP110"/>
    <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
   <_3:fileName>./examples/eventloop/c_eventloop.c</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP17">
   <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
   <_3:checksum rdf:nodeID="svBMzJkP18"/>
```

```
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./mandel.js</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP395">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright
2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP396"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_hbufferobject.h</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP470">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>6d5f56a1b76f9dcc9bb68d62ad0df958bd4d38ec</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP162">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>10c24a17c2f5f82d8c1a8fab8673c0c9075c1817</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description
rdf:nodeID="svBMzJkP288">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>14ec83aeef66a38c6a4c48a175a544f66d319413</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP320">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>2c508fbc7eb127f6793cfe62bf947879668983a4</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP172">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>01d4eb01e522172282a4a0ea3aa06f33ce7bec3c</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP93">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile
rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP94"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
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```
  <_3:fileName>./examples/codepage-conv/test.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
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  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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distributable)</_3:copyrightText>
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  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
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    <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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distributable)</_3:copyrightText>
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  </rdf:Description>
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  </rdf:Description>
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  </rdf:Description>
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    <_3:licenseInfoInFile
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distributable)</_3:copyrightText>
    <_3:checksum rdf:nodeID="svBMzJkP14"/>
    <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
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    <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
  </rdf:Description>
  <rdf:Description rdf:nodeID="svBMzJkP384">
    <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
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distributable)</_3:copyrightText>
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  <_3:referencesFile rdf:nodeID="svBMzJkP181"/>
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  <_3:referencesFile rdf:nodeID="svBMzJkP179"/>
  <_3:referencesFile rdf:nodeID="svBMzJkP399"/>
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  <_3:dataLicense rdf:resource="http://spdx.org/licenses/CC0-1.0"/>
  <_3:creationInfo rdf:nodeID="svBMzJkP3"/>
  <_3:describesPackage rdf:nodeID="svBMzJkP4"/>
  <_3:specVersion>SPDX-1.2</_3:specVersion>
</rdf:Description>
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    <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
    <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
    <_3:checksum rdf:nodeID="svBMzJkP382"/>
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    <_3:fileName>./src-separate/duk_api_codec.c</_3:fileName>
    <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
  </rdf:Description>
  <rdf:Description rdf:nodeID="svBMzJkP233">
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    <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
    <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
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  </rdf:Description>
  <rdf:Description rdf:nodeID="svBMzJkP235">
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    <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
    <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
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    <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
    <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst
 in the Duktape distributable)</_3:copyrightText>
    <_3:checksum rdf:nodeID="svBMzJkP208"/>
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    <_3:fileName>./src-separate/duk_regexp_executor.c</_3:fileName>
    <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
  </rdf:Description>
  <rdf:Description rdf:nodeID="svBMzJkP478">
    <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
    <_3:checksumValue>d49c1cdb51b3a4fdd823c13831617a1f0a93edd1</_3:checksumValue>
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  </rdf:Description>
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    <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
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   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP124"/>
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP310"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_util_hashprime.c</_3:fileName>
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   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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distributable)</_3:copyrightText>
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   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
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   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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distributable)</_3:copyrightText>
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   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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distributable)</_3:copyrightText>
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   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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distributable)</_3:copyrightText>
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   <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
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distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP82"/>
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  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
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distributable)</_3:copyrightText>
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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distributable)</_3:copyrightText>
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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distributable)</_3:copyrightText>
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
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<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
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  <_3:copyrightText>Copyright
 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
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  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
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  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./examples/codepage-conv/duk_codepage_conv.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP318">
   <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>62ecbef7a21dd5c49b38fbe344e2511c07f36261</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP266">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>030ac3c728cca19fe93d652a4b6b8758d739d9b9</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
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<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>09ee87b3ae8afe8b7c2295127835b05b00603b25</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP473">
<_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP474"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./config/duk_config.h-modular-static</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP254">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>4fae13370046b51fe87c60fa86eb14f2948fd143</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP262">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>c06e1c0dcc0c61e40f7337b40917df034f167e54</_3:checksumValue>
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</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP432">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>dfd71ae51277aae2fe511f4df732a20bc72ab75a</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP419">
<_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP420"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./src-separate/duk_bi_thread.c</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP170">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>641b29e08addaa543f37561f5a35689f5fba876e</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
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<rdf:Description rdf:nodeID="svBMzJkP286">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>fb9c2ff459fd84b4587f846fbd36219cf8f06931</_3:checksumValue>

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  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
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 <rdf:Description rdf:nodeID="svBMzJkP166">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>b1c899faac8f0a8b1f7844d8c773ce5e6d9262d1</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP191">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright
 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP192"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./examples/alloc-logging/duk_alloc_logging.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP158">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>d45e3fc443887261ce432a807aaebd2a1812264e</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP427">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
   <_3:checksum rdf:nodeID="svBMzJkP428"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_api_var.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP119">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP120"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./examples/eventloop/basic-test.js</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP205">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP206"/>
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```
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_builtins.h</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP94">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>c8ae046bda2c920b5d807dfa68c8159b655b0873</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP30">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>f20291ecae9e775ebac2a6ed24f5399c2b3a7883</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP385">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP386"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_heap_alloc.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
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  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>239011a773fbafa409c2f02b5e889bd5d28d16e1</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP118">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
   <_3:checksumValue>6a1500fea27ea278c4f0c64d908e16cc60df684b</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP471">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP472"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./config/duk_config.h-modular-dll</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP58">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>c33541d338ff3d8461dd1a8573a6372e19cb12e4</_3:checksumValue>
  <rdf:type
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<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP232"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./src-separate/duk_hstring_misc.c</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
</rdf:Description>
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<_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP90"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./examples/codepage-conv/README.rst</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP24">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>f396c6aec456b183ef77e33da1dfffc89c417056</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP326">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>a9db75839022e7dcf7e691ada7480a9b7c2715d0</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP212">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>a2c79a55a60f73e1a1567b96d584399571180ef5</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP484">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>92ce3decf72b10b0023116ac727a752e8749aa90</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP390">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>339f26c72e051cf531426a63fe6c35c476bad645</_3:checksumValue>
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</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP114">

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  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
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 </rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP34">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>fa85ee3394206d18c611b837e700257ba8336250</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP291">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP292"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_bi_json.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP86">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
   <_3:checksumValue>149fd21526c90d52b22e77b297f76e6da3e656ff</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP72">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>03cad085177f1e776be90afceef1f2160e6c8bf4</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP49">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP50"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./debugger/duk_debug_proxy.js</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP409">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP410"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_debugger.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
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 </rdf:Description>
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   <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
   <_3:checksum rdf:nodeID="svBMzJkP42"/>
    <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
   <_3:fileName>./src-noline/duktape.c</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP243">
   <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
   <_3:checksum rdf:nodeID="svBMzJkP244"/>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
   <_3:fileName>./src-separate/duk_strings.c</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP151">
   <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright
 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
   <_3:checksum rdf:nodeID="svBMzJkP152"/>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
   <_3:fileName>./examples/guide/prime.js</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP131">
   <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
   <_3:checksum rdf:nodeID="svBMzJkP132"/>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
   <_3:fileName>./examples/eval/README.rst</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP446">
   <_3:algorithm
 rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
   <_3:checksumValue>62a4483b185b620431e13ddb2b18555baa344937</_3:checksumValue>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP294">
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  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
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  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP27">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP28"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./AUTHORS.rst</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP259">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP260"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_regexp.h</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP287">
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  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum
 rdf:nodeID="svBMzJkP288"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_bi_math.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP284">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>a32730ebb239feb5599bcac3561b7a0acb3a1b94</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP317">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP318"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_hthread_stacks.c</_3:fileName>
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    <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
  </rdf:Description>
  <rdf:Description rdf:nodeID="svBMzJkP420">
    <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
    <_3:checksumValue>87018db6c5898305a7e5196d9590c5b42424a7ea</_3:checksumValue>
    <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
  </rdf:Description>
  <rdf:Description rdf:nodeID="svBMzJkP138">
    <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
    <_3:checksumValue>2df8e3d302a5c74ac385b0e1e110d0845a4aef35</_3:checksumValue>
    <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
  </rdf:Description>
  <rdf:Description rdf:nodeID="svBMzJkP40">
    <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
    <_3:checksumValue>5ab84f0ff2ed8c4b4a2daa5957d2a20447887103</_3:checksumValue>
    <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
   </rdf:Description>
  <rdf:Description rdf:nodeID="svBMzJkP106">
    <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
    <_3:checksumValue>484fb41d516abcbe8c97af5aa80b76c67dbfb0cb</_3:checksumValue>
    <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
  </rdf:Description>
  <rdf:Description rdf:nodeID="svBMzJkP489">
    <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
    <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
    <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
    <_3:checksum rdf:nodeID="svBMzJkP490"/>
    <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
    <_3:fileName>./src/duktape.c</_3:fileName>
    <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
  </rdf:Description>
  <rdf:Description rdf:nodeID="svBMzJkP199">
    <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
     <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
    <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
    <_3:checksum rdf:nodeID="svBMzJkP200"/>
    <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
    <_3:fileName>./src-separate/duk_bi_error.c</_3:fileName>
    <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
  </rdf:Description>
  <rdf:Description rdf:nodeID="svBMzJkP59">
    <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
    <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
    <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
    <_3:checksum rdf:nodeID="svBMzJkP60"/>
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<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./debugger/package.json</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP9">
<_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP10"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./duk_build_meta.json</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP431">
<_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP432"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./src-separate/duk_util_hashbytes.c</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP146">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>206ffd13c06208e85baba2b257fe3ddebb56a6c2</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP228">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>6b438afc07b9ac67fb6ea8bc9d4f01f3b362c9e1</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP330">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>73ff75213f392b6125c68ab6b430176dfad71269</_3:checksumValue>
<rdf:type
rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP451">
<_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP452"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./polyfills/duktape-error-setter-nonwritable.js</_3:fileName>

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  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP108">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>24a2346fa389c2294cc0e96427e0bd206dac10b9</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP394">
   <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>ff17cbc9cb84b86f83bb104a247e5c265a9fe5b5</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP488">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>5ab84f0ff2ed8c4b4a2daa5957d2a20447887103</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP5">
  <_3:packageVerificationCodeExcludedFile>./license.spdx</_3:packageVerificationCodeExcludedFile>
<_3:packageVerificationCodeValue>a60d2f27825f0294858de60a5ef8f35433967a27</_3:packageVerificationCode
Value>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP67">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP68"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./debugger/static/style.css</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP329">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP330"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_hcompiledfunction.h</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
  <rdf:Description rdf:nodeID="svBMzJkP241">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP242"/>
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<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./src-separate/duk_util_misc.c</_3:fileName>
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</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP450">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>036a814b2c1187af4c5c882095bd6b3d710cb79a</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP386">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>6fdfe8f7b5fc3226d83f0246079f76b33d4bcb9b</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP202">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>b381ea15009eb8140c0789203345cdcc2c6c1cd6</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP400">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>6c4bfae55df6a1fef08fd758e32bf465316cab9a</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP276">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>734560a1ac6155f124000b5a93569aae99149b6c</_3:checksumValue>
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</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP265">
<_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP266"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./src-separate/duk_bi_string.c</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP426">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>64edd8d85b88c69b5c2c686b85f19b350bef7880</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP182">

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  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>1c40a52fd54baf7ac334fce4829892d5d951401a</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP251">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP252"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_lexer.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP429">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP430"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_api_stack.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP224">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>fbe432d33d4ef75f30fa2d87f4f1a83f78b4811b</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP177">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
   <_3:checksum rdf:nodeID="svBMzJkP178"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./examples/debug-trans-dvalue/duk_trans_dvalue.h</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP492">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>bc9d119b5e66085e7e4219685fd351fb3f68d800</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP245">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
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distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP246"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./src-separate/duk_unicode.h</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP64">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>3da07a99a4ed68844140352133867b2857fab685</_3:checksumValue>
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<_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP476"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./config/genconfig_metadata.tar.gz</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP343">
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<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP344"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./src-separate/duk_api_memory.c</_3:fileName>
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</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP377">
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<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP378"/>
<rdf:type
rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./src-separate/duk_hobject.h</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP454">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>4392fa63e6e9174ec09ef2e3a4e4e3bd03e94126</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP340">

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  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>9b95f60e95f7da3773bdac1d2a436b3c5a662ab1</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP474">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>6985052d270ff2a00543b641115b946fc91ebf3a</_3:checksumValue>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP126">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>f9072f5c361c86887b57ce662b3cd7211b4ce346</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP190">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>5d593ae6316ed7a3ea6e7ed0a47267745d79d12d</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP88">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>ddbc206357dd4b97f3630b87bfdac148a5e8b190</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
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  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP258"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_hbuffer_alloc.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP43">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP44"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>

  <_3:fileName>./src-noline/duktape.h</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP51">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
```

```
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP52"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./debugger/README.rst</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP73">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
   <_3:checksum rdf:nodeID="svBMzJkP74"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./examples/README.rst</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP404">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>89a7d62e8ae337fca35cacbb4b4cc6f294daedc9</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP102">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>5f89525f75f61dd8c89e010cb62bc071d6d13170</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP268">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
   <_3:checksumValue>4396fb38f8a42bfc90ef1bc7c11c402074367343</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP238">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>ab29fe562681a0e6785515ef284fc51a20f0f7b5</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP304">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>ebaa68746ec59e01ef742f68aab11e053f882f63</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP387">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016
```

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<_3:checksum rdf:nodeID="svBMzJkP388"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./src-separate/duk_util_bitencoder.c</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP28">
<_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
<_3:checksumValue>8ddbeb97a1a5acc3bed35f4df60e3aa1f4267380</_3:checksumValue>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP97">
<_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP98"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./examples/jxpretty/README.rst</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP167">
<_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP168"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./examples/cmdline/README.rst</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP221">
<_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>

<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP222"/>
<rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
<_3:fileName>./src-separate/duk_error.h</_3:fileName>
<_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP193">
<_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
<_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
<_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape distributable)</_3:copyrightText>
<_3:checksum rdf:nodeID="svBMzJkP194"/>

```
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./examples/alloc-logging/log2gnuplot.py</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP77">
   <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP78"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./examples/coffee/hello.coffee</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP458">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>0125ebcabe62cef4923e75527d3128e8c48cdf1f</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP437">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP438"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_bi_number.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP230">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>c1685717742f3e9af9c901796a8bb5a08950461f</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP244">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>e172079513ed0c12550285bcbc4d6bfc83985676</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>

 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP173">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP174"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./examples/debug-trans-socket/duk_trans_socket.h</_3:fileName>
```

```
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP352">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>52b4480b68f7f8bf93543d3bb795cdc5ade66fba</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP464">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
   <_3:checksumValue>93573df8348a41adb790f59e39bf99d9a7bf3a3d</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP145">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP146"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./examples/guide/fib.js</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP256">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>127e52c8b193d777811c25ceaab2c97c26a2bdab</_3:checksumValue>
  <rdf:type
 rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP136">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>601a6783177c1c6140c12b42c0bedb0ee0079d16</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP346">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>02741b89fd8d8df210223a3da3a200d0f609d803</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP239">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum
 rdf:nodeID="svBMzJkP240"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./src-separate/duk_hobject_finalizer.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
```

```
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP16">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>44c9219558aba26dc69982a9f432028290707c36</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP85">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP86"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./examples/alloc-hybrid/README.rst</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP372">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>1289ac12dfcacbe472caea1333de3fbe70a5662c</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP100">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>3d700df1f765c39fc63bfd4e31a9d7da8d15c543</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP121">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
  <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
  <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst
in the Duktape distributable)</_3:copyrightText>
  <_3:checksum rdf:nodeID="svBMzJkP122"/>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
  <_3:fileName>./examples/eventloop/poll.c</_3:fileName>
  <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP456">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>e5a5f0db067ec56c6d2f7356f412222a8884dc92</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP10">
  <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
  <_3:checksumValue>46f70bf98738ea7c9e5b353490d3e8815c610aa6</_3:checksumValue>
  <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
</rdf:Description>
<rdf:Description rdf:nodeID="svBMzJkP201">
  <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
```

```
    <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
   <_3:checksum rdf:nodeID="svBMzJkP202"/>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
   <_3:fileName>./src-separate/duk_error_throw.c</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP181">
   <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
   <_3:checksum rdf:nodeID="svBMzJkP182"/>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
   <_3:fileName>./examples/debug-trans-dvalue/Makefile</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
  </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP361">
   <_3:licenseConcluded rdf:resource="http://spdx.org/licenses/MIT"/>
   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
distributable)</_3:copyrightText>
   <_3:checksum rdf:nodeID="svBMzJkP362"/>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
   <_3:fileName>./src-separate/duk_config.h</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_source"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP168">
   <_3:algorithm rdf:resource="http://spdx.org/rdf/terms#checksumAlgorithm_sha1"/>
   <_3:checksumValue>58c701ade28ee5a475dede84a6e771893e3fc40f</_3:checksumValue>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#Checksum"/>
 </rdf:Description>
 <rdf:Description rdf:nodeID="svBMzJkP153">
   <_3:licenseConcluded
 rdf:resource="http://spdx.org/licenses/MIT"/>
   <_3:licenseInfoInFile rdf:resource="http://spdx.org/rdf/terms#none"/>
   <_3:copyrightText>Copyright 2013-2016 Duktape authors (see AUTHORS.rst in the Duktape
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   <_3:checksum rdf:nodeID="svBMzJkP154"/>
   <rdf:type rdf:resource="http://spdx.org/rdf/terms#File"/>
   <_3:fileName>./examples/alloc-torture/README.rst</_3:fileName>
   <_3:fileType rdf:resource="http://spdx.org/rdf/terms#fileType_other"/>
 </rdf:Description>
</rdf:RDF>
```


CommonJS specification snapshots are included in the references/
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1.14 sqlite 3.44.2

1.14.1 Available under license :

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1.15 jq 2.3025850929940456840179914546843642076 01

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1.16 sqlite 3.45.1

1.16.1 Available under license :

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```
/*
** CAPI3REF: Configuration Options
** KEYWORDS: {configuration option}
**
** These constants are the available integer configuration options that
** can be passed as the first argument to the [sqlite3_config()] interface.
**
** Most of the configuration options for sqlite3_config()
** will only work if invoked prior to [sqlite3_initialize()] or after
** [sqlite3_shutdown()].  The few exceptions to this rule are called
** "anytime configuration options".
** ^Calling [sqlite3_config()] with a first argument that is not an
** anytime configuration option in between calls to [sqlite3_initialize()] and
** [sqlite3_shutdown()] is a no-op that returns SQLITE_MISUSE.
**
** The set of anytime configuration options can change (by insertions
** and/or deletions) from one release of SQLite to the next.
** As of SQLite version 3.42.0, the complete set of anytime configuration
** options is:
** <ul>
** <li> SQLITE_CONFIG_LOG
**
 <li> SQLITE_CONFIG_PCACHE_HDRSZ
** </ul>
**
** New configuration options may be added in future releases of SQLite.
** Existing configuration options might be discontinued.  Applications
** should check the return code from [sqlite3_config()] to make sure that
** the call worked.  The [sqlite3_config()] interface will return a
** non-zero [error code] if a discontinued or unsupported configuration option
** is invoked.
**
** <dl>
** [[SQLITE_CONFIG_SINGLETHREAD]] <dt>SQLITE_CONFIG_SINGLETHREAD</dt>
** <dd>There are no arguments to this option.  ^This option sets the
** [threading mode] to Single-thread.  In other words, it disables
** all mutexing and puts SQLite into a mode where it can only be used
** by a single thread.   ^If SQLite is compiled with
** the [SQLITE_THREADSAFE | SQLITE_THREADSAFE=0] compile-time option then
** it is not possible to change the [threading mode] from its default
```

```
** value of Single-thread and so [sqlite3_config()] will return
** [SQLITE_ERROR] if called
 with the SQLITE_CONFIG_SINGLETHREAD
** configuration option.</dd>
**
** [[SQLITE_CONFIG_MULTITHREAD]] <dt>SQLITE_CONFIG_MULTITHREAD</dt>
** <dd>There are no arguments to this option.  ^This option sets the
** [threading mode] to Multi-thread.  In other words, it disables
** mutexing on [database connection] and [prepared statement] objects.
** The application is responsible for serializing access to
** [database connections] and [prepared statements].  But other mutexes
** are enabled so that SQLite will be safe to use in a multi-threaded
** environment as long as no two threads attempt to use the same
** [database connection] at the same time.  ^If SQLite is compiled with
** the [SQLITE_THREADSAFE | SQLITE_THREADSAFE=0] compile-time option then
** it is not possible to set the Multi-thread [threading mode] and
** [sqlite3_config()] will return [SQLITE_ERROR] if called with the
** SQLITE_CONFIG_MULTITHREAD configuration option.</dd>
**
** [[SQLITE_CONFIG_SERIALIZED]] <dt>SQLITE_CONFIG_SERIALIZED</dt>
**
 <dd>There are no arguments to this option.  ^This option sets the
** [threading mode] to Serialized. In other words, this option enables
** all mutexes including the recursive
** mutexes on [database connection] and [prepared statement] objects.
** In this mode (which is the default when SQLite is compiled with
** [SQLITE_THREADSAFE=1]) the SQLite library will itself serialize access
** to [database connections] and [prepared statements] so that the
** application is free to use the same [database connection] or the
** same [prepared statement] in different threads at the same time.
** ^If SQLite is compiled with
** the [SQLITE_THREADSAFE | SQLITE_THREADSAFE=0] compile-time option then
** it is not possible to set the Serialized [threading mode] and
** [sqlite3_config()] will return [SQLITE_ERROR] if called with the
** SQLITE_CONFIG_SERIALIZED configuration option.</dd>
**
** [[SQLITE_CONFIG_MALLOC]] <dt>SQLITE_CONFIG_MALLOC</dt>
** <dd> ^(The SQLITE_CONFIG_MALLOC option
 takes a single argument which is
** a pointer to an instance of the [sqlite3_mem_methods] structure.
** The argument specifies
** alternative low-level memory allocation routines to be used in place of
** the memory allocation routines built into SQLite.)^ ^SQLite makes
** its own private copy of the content of the [sqlite3_mem_methods] structure
** before the [sqlite3_config()] call returns.</dd>
**
** [[SQLITE_CONFIG_GETMALLOC]] <dt>SQLITE_CONFIG_GETMALLOC</dt>
** <dd> ^(The SQLITE_CONFIG_GETMALLOC option takes a single argument which
```

```
** is a pointer to an instance of the [sqlite3_mem_methods] structure.
** The [sqlite3_mem_methods]
** structure is filled with the currently defined memory allocation routines.)^
** This option can be used to overload the default memory allocation
** routines with a wrapper that simulations memory allocation failure or
** tracks memory usage, for example. </dd>
**
** [[SQLITE_CONFIG_SMALL_MALLOC]] <dt>SQLITE_CONFIG_SMALL_MALLOC</dt>
** <dd> ^The SQLITE_CONFIG_SMALL_MALLOC
 option takes single argument of
** type int, interpreted as a boolean, which if true provides a hint to
** SQLite that it should avoid large memory allocations if possible.
** SQLite will run faster if it is free to make large memory allocations,
** but some application might prefer to run slower in exchange for
** guarantees about memory fragmentation that are possible if large
** allocations are avoided.  This hint is normally off.
** </dd>
**
** [[SQLITE_CONFIG_MEMSTATUS]] <dt>SQLITE_CONFIG_MEMSTATUS</dt>
** <dd> ^The SQLITE_CONFIG_MEMSTATUS option takes single argument of type int,
** interpreted as a boolean, which enables or disables the collection of
** memory allocation statistics. ^(When memory allocation statistics are
** disabled, the following SQLite interfaces become non-operational:
**   <ul>
**   <li> [sqlite3_hard_heap_limit64()]
**   <li> [sqlite3_memory_used()]
**   <li> [sqlite3_memory_highwater()]
**   <li> [sqlite3_soft_heap_limit64()]
**
   <li> [sqlite3_status64()]
**   </ul>)^
** ^Memory allocation statistics are enabled by default unless SQLite is
** compiled with [SQLITE_DEFAULT_MEMSTATUS]=0 in which case memory
** allocation statistics are disabled by default.
** </dd>
**
** [[SQLITE_CONFIG_SCRATCH]] <dt>SQLITE_CONFIG_SCRATCH</dt>
** <dd> The SQLITE_CONFIG_SCRATCH option is no longer used.
** </dd>
**
** [[SQLITE_CONFIG_PAGECACHE]] <dt>SQLITE_CONFIG_PAGECACHE</dt>
** <dd> ^The SQLITE_CONFIG_PAGECACHE option specifies a memory pool
** that SQLite can use for the database page cache with the default page
** cache implementation.
** This configuration option is a no-op if an application-defined page
** cache implementation is loaded using the [SQLITE_CONFIG_PCACHE2].
** ^There are three arguments to SQLITE_CONFIG_PAGECACHE: A pointer to
** 8-byte aligned memory (pMem), the size of each page cache line (sz),
```

```
** and the number of cache lines (N).
** The sz argument should be the size of the largest database page
** (a power
 of two between 512 and 65536) plus some extra bytes for each
** page header.  ^The number of extra bytes needed by the page header
** can be determined using [SQLITE_CONFIG_PCACHE_HDRSZ].
** ^It is harmless, apart from the wasted memory,
** for the sz parameter to be larger than necessary.  The pMem
** argument must be either a NULL pointer or a pointer to an 8-byte
** aligned block of memory of at least sz*N bytes, otherwise
** subsequent behavior is undefined.
** ^When pMem is not NULL, SQLite will strive to use the memory provided
** to satisfy page cache needs, falling back to [sqlite3_malloc()] if
** a page cache line is larger than sz bytes or if all of the pMem buffer
** is exhausted.
** ^If pMem is NULL and N is non-zero, then each database connection
** does an initial bulk allocation for page cache memory
** from [sqlite3_malloc()] sufficient for N cache lines if N is positive or
** of -1024*N bytes if N is negative, . ^If additional
** page cache memory is needed beyond
 what is provided by the initial
** allocation, then SQLite goes to [sqlite3_malloc()] separately for each
** additional cache line. </dd>
**
** [[SQLITE_CONFIG_HEAP]] <dt>SQLITE_CONFIG_HEAP</dt>
** <dd> ^The SQLITE_CONFIG_HEAP option specifies a static memory buffer
** that SQLite will use for all of its dynamic memory allocation needs
** beyond those provided for by [SQLITE_CONFIG_PAGECACHE].
** ^The SQLITE_CONFIG_HEAP option is only available if SQLite is compiled
** with either [SQLITE_ENABLE_MEMSYS3] or [SQLITE_ENABLE_MEMSYS5] and returns
** [SQLITE_ERROR] if invoked otherwise.
** ^There are three arguments to SQLITE_CONFIG_HEAP:
** An 8-byte aligned pointer to the memory,
** the number of bytes in the memory buffer, and the minimum allocation size.
** ^If the first pointer (the memory pointer) is NULL, then SQLite reverts
** to using its default memory allocator (the system malloc() implementation),
** undoing any prior invocation of [SQLITE_CONFIG_MALLOC].  ^If the
** memory pointer
 is not NULL then the alternative memory
** allocator is engaged to handle all of SQLites memory allocation needs.
** The first pointer (the memory pointer) must be aligned to an 8-byte
** boundary or subsequent behavior of SQLite will be undefined.
** The minimum allocation size is capped at 2**12. Reasonable values
** for the minimum allocation size are 2**5 through 2**8.</dd>
**
** [[SQLITE_CONFIG_MUTEX]] <dt>SQLITE_CONFIG_MUTEX</dt>
** <dd> ^(The SQLITE_CONFIG_MUTEX option takes a single argument which is a
** pointer to an instance of the [sqlite3_mutex_methods] structure.
```

```
** The argument specifies alternative low-level mutex routines to be used
** in place the mutex routines built into SQLite.)^  ^SQLite makes a copy of
** the content of the [sqlite3_mutex_methods] structure before the call to
** [sqlite3_config()] returns. ^If SQLite is compiled with
** the [SQLITE_THREADSAFE | SQLITE_THREADSAFE=0] compile-time option then
** the entire mutexing subsystem is omitted from the
 build and hence calls to
** [sqlite3_config()] with the SQLITE_CONFIG_MUTEX configuration option will
** return [SQLITE_ERROR].</dd>
**
** [[SQLITE_CONFIG_GETMUTEX]] <dt>SQLITE_CONFIG_GETMUTEX</dt>
** <dd> ^(The SQLITE_CONFIG_GETMUTEX option takes a single argument which
** is a pointer to an instance of the [sqlite3_mutex_methods] structure.  The
** [sqlite3_mutex_methods]
** structure is filled with the currently defined mutex routines.)^
** This option can be used to overload the default mutex allocation
** routines with a wrapper used to track mutex usage for performance
** profiling or testing, for example.   ^If SQLite is compiled with
** the [SQLITE_THREADSAFE | SQLITE_THREADSAFE=0] compile-time option then
** the entire mutexing subsystem is omitted from the build and hence calls to
** [sqlite3_config()] with the SQLITE_CONFIG_GETMUTEX configuration option will
** return [SQLITE_ERROR].</dd>
**
** [[SQLITE_CONFIG_LOOKASIDE]] <dt>SQLITE_CONFIG_LOOKASIDE</dt>
** <dd> ^(The SQLITE_CONFIG_LOOKASIDE
 option takes two arguments that determine
** the default size of lookaside memory on each [database connection].
** The first argument is the
** size of each lookaside buffer slot and the second is the number of
** slots allocated to each database connection.)^  ^(SQLITE_CONFIG_LOOKASIDE
** sets the <i>default</i> lookaside size. The [SQLITE_DBCONFIG_LOOKASIDE]
** option to [sqlite3_db_config()] can be used to change the lookaside
** configuration on individual connections.)^ </dd>
**
** [[SQLITE_CONFIG_PCACHE2]] <dt>SQLITE_CONFIG_PCACHE2</dt>
** <dd> ^(The SQLITE_CONFIG_PCACHE2 option takes a single argument which is
** a pointer to an [sqlite3_pcache_methods2] object.  This object specifies
** the interface to a custom page cache implementation.)^
** ^SQLite makes a copy of the [sqlite3_pcache_methods2] object.</dd>
**
** [[SQLITE_CONFIG_GETPCACHE2]] <dt>SQLITE_CONFIG_GETPCACHE2</dt>
** <dd> ^(The SQLITE_CONFIG_GETPCACHE2 option takes a single argument which
** is
 a pointer to an [sqlite3_pcache_methods2] object.  SQLite copies of
** the current page cache implementation into that object.)^ </dd>
**
** [[SQLITE_CONFIG_LOG]] <dt>SQLITE_CONFIG_LOG</dt>
** <dd> The SQLITE_CONFIG_LOG option is used to configure the SQLite
```

```
** global [error log].
** (^The SQLITE_CONFIG_LOG option takes two arguments: a pointer to a
** function with a call signature of void(*)(void*,int,const char*),
** and a pointer to void. ^If the function pointer is not NULL, it is
** invoked by [sqlite3_log()] to process each logging event.  ^If the
** function pointer is NULL, the [sqlite3_log()] interface becomes a no-op.
** ^The void pointer that is the second argument to SQLITE_CONFIG_LOG is
** passed through as the first parameter to the application-defined logger
** function whenever that function is invoked.  ^The second parameter to
** the logger function is a copy of the first parameter to the corresponding
** [sqlite3_log()] call and is intended to be a [result code] or
 an
** [extended result code].  ^The third parameter passed to the logger is
** log message after formatting via [sqlite3_snprintf()].
** The SQLite logging interface is not reentrant; the logger function
** supplied by the application must not invoke any SQLite interface.
** In a multi-threaded application, the application-defined logger
** function must be threadsafe. </dd>
**
** [[SQLITE_CONFIG_URI]] <dt>SQLITE_CONFIG_URI
** <dd>^(The SQLITE_CONFIG_URI option takes a single argument of type int.
** If non-zero, then URI handling is globally enabled. If the parameter is zero,
** then URI handling is globally disabled.)^ ^If URI handling is globally
** enabled, all filenames passed to [sqlite3_open()], [sqlite3_open_v2()],
** [sqlite3_open16()] or
** specified as part of [ATTACH] commands are interpreted as URIs, regardless
** of whether or not the [SQLITE_OPEN_URI] flag is set when the database
** connection is opened. ^If it is globally disabled, filenames are
** only interpreted as
 URIs if the SQLITE_OPEN_URI flag is set when the
** database connection is opened. ^(By default, URI handling is globally
** disabled. The default value may be changed by compiling with the
** [SQLITE_USE_URI] symbol defined.)^
**
** [[SQLITE_CONFIG_COVERING_INDEX_SCAN]] <dt>SQLITE_CONFIG_COVERING_INDEX_SCAN
** <dd>^The SQLITE_CONFIG_COVERING_INDEX_SCAN option takes a single integer
** argument which is interpreted as a boolean in order to enable or disable
** the use of covering indices for full table scans in the query optimizer.
** ^The default setting is determined
** by the [SQLITE_ALLOW_COVERING_INDEX_SCAN] compile-time option, or is "on"
** if that compile-time option is omitted.
** The ability to disable the use of covering indices for full table scans
** is because some incorrectly coded legacy applications might malfunction
** when the optimization is enabled.  Providing the ability to
** disable the optimization allows the older, buggy application code to work
** without change
 even with newer versions of SQLite.
**
```

```
** [[SQLITE_CONFIG_PCACHE]] [[SQLITE_CONFIG_GETPCACHE]]
** <dt>SQLITE_CONFIG_PCACHE and SQLITE_CONFIG_GETPCACHE
** <dd> These options are obsolete and should not be used by new code.
** They are retained for backwards compatibility but are now no-ops.
** </dd>
**
** [[SQLITE_CONFIG_SQLLOG]]
** <dt>SQLITE_CONFIG_SQLLOG
** <dd>This option is only available if sqlite is compiled with the
** [SQLITE_ENABLE_SQLLOG] pre-processor macro defined. The first argument should
** be a pointer to a function of type void(*)(void*,sqlite3*,const char*, int).
** The second should be of type (void*). The callback is invoked by the library
** in three separate circumstances, identified by the value passed as the
** fourth parameter. If the fourth parameter is 0, then the database connection
** passed as the second argument has just been opened. The third argument
** points to a buffer containing the name of the main database file. If the
** fourth parameter is 1,
 then the SQL statement that the third parameter
** points to has just been executed. Or, if the fourth parameter is 2, then
** the connection being passed as the second parameter is being closed. The
** third parameter is passed NULL In this case.  An example of using this
** configuration option can be seen in the "test_sqllog.c" source file in
** the canonical SQLite source tree.</dd>
**
** [[SQLITE_CONFIG_MMAP_SIZE]]
** <dt>SQLITE_CONFIG_MMAP_SIZE
** <dd>^SQLITE_CONFIG_MMAP_SIZE takes two 64-bit integer (sqlite3_int64) values
** that are the default mmap size limit (the default setting for
** [PRAGMA mmap_size]) and the maximum allowed mmap size limit.
** ^The default setting can be overridden by each database connection using
** either the [PRAGMA mmap_size] command, or by using the
** [SQLITE_FCNTL_MMAP_SIZE] file control.  ^(The maximum allowed mmap size
** will be silently truncated if necessary so that it does not exceed the
** compile-time maximum mmap size set by the
** [SQLITE_MAX_MMAP_SIZE]
 compile-time option.)^
** ^If either argument to this option is negative, then that argument is
** changed to its compile-time default.
**
** [[SQLITE_CONFIG_WIN32_HEAPSIZE]]
** <dt>SQLITE_CONFIG_WIN32_HEAPSIZE
** <dd>^The SQLITE_CONFIG_WIN32_HEAPSIZE option is only available if SQLite is
** compiled for Windows with the [SQLITE_WIN32_MALLOC] pre-processor macro
** defined. ^SQLITE_CONFIG_WIN32_HEAPSIZE takes a 32-bit unsigned integer value
** that specifies the maximum size of the created heap.
**
** [[SQLITE_CONFIG_PCACHE_HDRSZ]]
** <dt>SQLITE_CONFIG_PCACHE_HDRSZ
```

```
** <dd>^The SQLITE_CONFIG_PCACHE_HDRSZ option takes a single parameter which
** is a pointer to an integer and writes into that integer the number of extra
** bytes per page required for each page in [SQLITE_CONFIG_PAGECACHE].
** The amount of extra space required can change depending on the compiler,
** target platform, and SQLite version.
**
** [[SQLITE_CONFIG_PMASZ]]
** <dt>SQLITE_CONFIG_PMASZ
** <dd>^The
 SQLITE_CONFIG_PMASZ option takes a single parameter which
** is an unsigned integer and sets the "Minimum PMA Size" for the multithreaded
** sorter to that integer.  The default minimum PMA Size is set by the
** [SQLITE_SORTER_PMASZ] compile-time option.  New threads are launched
** to help with sort operations when multithreaded sorting
** is enabled (using the [PRAGMA threads] command) and the amount of content
** to be sorted exceeds the page size times the minimum of the
** [PRAGMA cache_size] setting and this value.
**
** [[SQLITE_CONFIG_STMTJRNL_SPILL]]
** <dt>SQLITE_CONFIG_STMTJRNL_SPILL
** <dd>^The SQLITE_CONFIG_STMTJRNL_SPILL option takes a single parameter which
** becomes the [statement journal] spill-to-disk threshold.
** [Statement journals] are held in memory until their size (in bytes)
** exceeds this threshold, at which point they are written to disk.
** Or if the threshold is -1, statement journals are always held
** exclusively in memory.
** Since many statement journals
 never become large, setting the spill
** threshold to a value such as 64KiB can greatly reduce the amount of
** I/O required to support statement rollback.
** The default value for this setting is controlled by the
** [SQLITE_STMTJRNL_SPILL] compile-time option.
**
** [[SQLITE_CONFIG_SORTERREF_SIZE]]
** <dt>SQLITE_CONFIG_SORTERREF_SIZE
** <dd>The SQLITE_CONFIG_SORTERREF_SIZE option accepts a single parameter
** of type (int) - the new value of the sorter-reference size threshold.
** Usually, when SQLite uses an external sort to order records according
** to an ORDER BY clause, all fields required by the caller are present in the
** sorted records. However, if SQLite determines based on the declared type
** of a table column that its values are likely to be very large - larger
** than the configured sorter-reference size threshold - then a reference
** is stored in each sorted record and the required column values loaded
** from the database as records are returned in sorted order.
 The default
** value for this option is to never use this optimization. Specifying a
** negative value for this option restores the default behavior.
** This option is only available if SQLite is compiled with the
```

```
** [SQLITE_ENABLE_SORTER_REFERENCES] compile-time option.
**
** [[SQLITE_CONFIG_MEMDB_MAXSIZE]]
** <dt>SQLITE_CONFIG_MEMDB_MAXSIZE
** <dd>The SQLITE_CONFIG_MEMDB_MAXSIZE option accepts a single parameter
** [sqlite3_int64] parameter which is the default maximum size for an in-memory
** database created using [sqlite3_deserialize()].  This default maximum
** size can be adjusted up or down for individual databases using the
** [SQLITE_FCNTL_SIZE_LIMIT] [sqlite3_file_control|file-control].  If this
** configuration setting is never used, then the default maximum is determined
** by the [SQLITE_MEMDB_DEFAULT_MAXSIZE] compile-time option.  If that
** compile-time option is not set, then the default maximum is 1073741824.
** </dl>
*/
/*
** The "printf" code that follows dates
 from the 1980's.  It is in
** the public domain.
**
**************************************************************************
**
** This file contains code for a set of "printf"-like routines.  These
** routines format strings much like the printf() from the standard C
** library, though the implementation here has enhancements to support
** SQLite.
*/
/*
** 2004 May 22
**
** The author disclaims copyright to this source code.  In place of
** a legal notice, here is a blessing:
**
**    May you do good and not evil.
**    May you find forgiveness for yourself and forgive others.
**    May you share freely, never taking more than you give.
**
***************************************************************************
**
** This file contains the VFS implementation for unix-like operating systems
** include Linux, MacOSX, *BSD, QNX, VxWorks, AIX, HPUX, and others.
**
** There are actually several different VFS implementations in this file.
** The differences are in the way that file
 locking is done.  The default
** implementation uses Posix Advisory Locks.  Alternative implementations
** use flock(), dot-files, various proprietary locking schemas, or simply
** skip locking all together.
**
```

```
** This source file is organized into divisions where the logic for various
** subfunctions is contained within the appropriate division.  PLEASE
** KEEP THE STRUCTURE OF THIS FILE INTACT.  New code should be placed
** in the correct division and should be clearly labelled.
**
** The layout of divisions is as follows:
**
**   *  General-purpose declarations and utility functions.
**   *  Unique file ID logic used by VxWorks.
**   *  Various locking primitive implementations (all except proxy locking):
**      + for Posix Advisory Locks
**      + for no-op locks
**      + for dot-file locks
**      + for flock() locking
**      + for named semaphore locks (VxWorks only)
**      + for AFP filesystem locks (MacOSX only)
**   *  sqlite3_file methods not associated with locking.
**
  *  Definitions of sqlite3_io_methods objects for all locking
**      methods plus "finder" functions for each locking method.
**   *  sqlite3_vfs method implementations.
**   *  Locking primitives for the proxy uber-locking-method. (MacOSX only)
**   *  Definitions of sqlite3_vfs objects for all locking methods
**      plus implementations of sqlite3_os_init() and sqlite3_os_end().
*/
/*
** Return a pointer to the "temporary page" buffer held internally
** by the pager.  This is a buffer that is big enough to hold the
** entire content of a database page.  This buffer is used internally
** during rollback and will be overwritten whenever a rollback
** occurs.  But other modules are free to use it too, as long as
** no rollbacks are happening.
*/
```

Found in path(s):
* /sqlite-amalgamation-3450100-zip/sqlite-amalgamation-3450100/sqlite3.c
No license file was found, but licenses were detected in source scan.

```
/*
** 2022-11-18
**
** The author disclaims copyright to this source code.  In place of
** a legal notice, here is a blessing:
**
**    May you do good and not evil.
**    May you find forgiveness for yourself and forgive others.
**    May you share freely, never taking more than you give.
**
```

```
*****************************************************************************
**
** This is a SQLite extension for converting in either direction
** between a (binary) blob and base64 text. Base64 can transit a
** sane USASCII channel unmolested. It also plays nicely in CSV or
** written as TCL brace-enclosed literals or SQL string literals,
** and can be used unmodified in XML-like documents.
**
** This is an independent implementation of conversions specified in
** RFC 4648, done on the above date by the author (Larry Brasfield)
** who thereby has the right to put this into the public domain.
**
** The conversions meet RFC 4648 requirements,
 provided that this
** C source specifies that line-feeds are included in the encoded
** data to limit visible line lengths to 72 characters and to
** terminate any encoded blob having non-zero length.
**
** Length limitations are not imposed except that the runtime
** SQLite string or blob length limits are respected. Otherwise,
** any length binary sequence can be represented and recovered.
** Generated base64 sequences, with their line-feeds included,
** can be concatenated; the result converted back to binary will
** be the concatenation of the represented binary sequences.
**
** This SQLite3 extension creates a function, base64(x), which
** either: converts text x containing base64 to a returned blob;
** or converts a blob x to returned text containing base64. An
** error will be thrown for other input argument types.
**
** This code relies on UTF-8 encoding only with respect to the
** meaning of the first 128 (7-bit) codes matching that of USASCII.
** It will fail miserably
 if somehow made to try to convert EBCDIC.
** Because it is table-driven, it could be enhanced to handle that,
** but the world and SQLite have moved on from that anachronism.
**
** To build the extension:
** Set shell variable SQDIR=<your favorite SQLite checkout directory>
** *Nix: gcc -O2 -shared -I$SQDIR -fPIC -o base64.so base64.c
** OSX: gcc -O2 -dynamiclib -fPIC -I$SQDIR -o base64.dylib base64.c
** Win32: gcc -O2 -shared -I%SQDIR% -o base64.dll base64.c
** Win32: cl /Os -I%SQDIR% base64.c -link -dll -out:base64.dll
*/
/*
** 2022-11-16
**
** The author disclaims copyright to this source code.  In place of
```

```
** a legal notice, here is a blessing:
**
**    May you do good and not evil.
**    May you find forgiveness for yourself and forgive others.
**    May you share freely, never taking more than you give.
**
***********************************************************************
**
** This is a utility for converting binary to base85 or vice-versa.
** It can be built as a standalone
 program or an SQLite3 extension.
**
** Much like base64 representations, base85 can be sent through a
** sane USASCII channel unmolested. It also plays nicely in CSV or
** written as TCL brace-enclosed literals or SQL string literals.
** It is not suited for unmodified use in XML-like documents.
**
** The encoding used resembles Ascii85, but was devised by the author
** (Larry Brasfield) before Mozilla, Adobe, ZMODEM or other Ascii85
** variant sources existed, in the 1984 timeframe on a VAX mainframe.
** Further, this is an independent implementation of a base85 system.
** Hence, the author has rightfully put this into the public domain.
**
** Base85 numerals are taken from the set of 7-bit USASCII codes,
** excluding control characters and Space ! " ' ( ) { | } ~ Del
** in code order representing digit values 0 to 84 (base 10.)
**
** Groups of 4 bytes, interpreted as big-endian 32-bit values,
** are represented as 5-digit base85 numbers with MS to LS digit
** order. Groups
 of 1-3 bytes are represented with 2-4 digits,
** still big-endian but 8-24 bit values. (Using big-endian yields
** the simplest transition to byte groups smaller than 4 bytes.
** These byte groups can also be considered base-256 numbers.)
** Groups of 0 bytes are represented with 0 digits and vice-versa.
** No pad characters are used; Encoded base85 numeral sequence
** (aka "group") length maps 1-to-1 to the decoded binary length.
**
** Any character not in the base85 numeral set delimits groups.
** When base85 is streamed or stored in containers of indefinite
** size, newline is used to separate it into sub-sequences of no
** more than 80 digits so that fgets() can be used to read it.
**
** Length limitations are not imposed except that the runtime
** SQLite string or blob length limits are respected. Otherwise,
** any length binary sequence can be represented and recovered.
** Base85 sequences can be concatenated by separating them with
** a non-base85 character; the conversion to binary
```

```
 will then
** be the concatenation of the represented binary sequences.

** The standalone program either converts base85 on stdin to create
** a binary file or converts a binary file to base85 on stdout.
** Read or make it blurt its help for invocation details.
**
** The SQLite3 extension creates a function, base85(x), which will
** either convert text base85 to a blob or a blob to text base85
** and return the result (or throw an error for other types.)
** Unless built with OMIT_BASE85_CHECKER defined, it also creates a
** function, is_base85(t), which returns 1 iff the text t contains
** nothing other than base85 numerals and whitespace, or 0 otherwise.
**
** To build the extension:
** Set shell variable SQDIR=<your favorite SQLite checkout directory>
** and variable OPTS to -DOMIT_BASE85_CHECKER if is_base85() unwanted.
** *Nix: gcc -O2 -shared -I$SQDIR $OPTS -fPIC -o base85.so base85.c
** OSX: gcc -O2 -dynamiclib -fPIC -I$SQDIR $OPTS -o base85.dylib base85.c
** Win32: gcc -O2
 -shared -I%SQDIR% %OPTS% -o base85.dll base85.c
** Win32: cl /Os -I%SQDIR% %OPTS% base85.c -link -dll -out:base85.dll
**
** To build the standalone program, define PP symbol BASE85_STANDALONE. Eg.
** *Nix or OSX: gcc -O2 -DBASE85_STANDALONE base85.c -o base85
** Win32: gcc -O2 -DBASE85_STANDALONE -o base85.exe base85.c
** Win32: cl /Os /MD -DBASE85_STANDALONE base85.c
*/
/* This will be more informative in a later version. */
```

Found in path(s):
* /sqlite-amalgamation-3450100-zip/sqlite-amalgamation-3450100/shell.c
No license file was found, but licenses were detected in source scan.

```
/*
** CAPI3REF: Configuration Options
** KEYWORDS: {configuration option}
**
** These constants are the available integer configuration options that
** can be passed as the first argument to the [sqlite3_config()] interface.
**
** Most of the configuration options for sqlite3_config()
** will only work if invoked prior to [sqlite3_initialize()] or after
** [sqlite3_shutdown()].  The few exceptions to this rule are called
** "anytime configuration options".
** ^Calling [sqlite3_config()] with a first argument that is not an
** anytime configuration option in between calls to [sqlite3_initialize()] and
** [sqlite3_shutdown()] is a no-op that returns SQLITE_MISUSE.
```

```
**
** The set of anytime configuration options can change (by insertions
** and/or deletions) from one release of SQLite to the next.
** As of SQLite version 3.42.0, the complete set of anytime configuration
** options is:
** <ul>
** <li> SQLITE_CONFIG_LOG
**
 <li> SQLITE_CONFIG_PCACHE_HDRSZ
** </ul>
**
** New configuration options may be added in future releases of SQLite.
** Existing configuration options might be discontinued.  Applications
** should check the return code from [sqlite3_config()] to make sure that
** the call worked.  The [sqlite3_config()] interface will return a
** non-zero [error code] if a discontinued or unsupported configuration option
** is invoked.
**
** <dl>
** [[SQLITE_CONFIG_SINGLETHREAD]] <dt>SQLITE_CONFIG_SINGLETHREAD</dt>
** <dd>There are no arguments to this option.  ^This option sets the
** [threading mode] to Single-thread.  In other words, it disables
** all mutexing and puts SQLite into a mode where it can only be used
** by a single thread.   ^If SQLite is compiled with
** the [SQLITE_THREADSAFE | SQLITE_THREADSAFE=0] compile-time option then
** it is not possible to change the [threading mode] from its default
** value of Single-thread and so [sqlite3_config()] will return
** [SQLITE_ERROR] if called
 with the SQLITE_CONFIG_SINGLETHREAD
** configuration option.</dd>
**
** [[SQLITE_CONFIG_MULTITHREAD]] <dt>SQLITE_CONFIG_MULTITHREAD</dt>
** <dd>There are no arguments to this option.  ^This option sets the
** [threading mode] to Multi-thread.  In other words, it disables
** mutexing on [database connection] and [prepared statement] objects.
** The application is responsible for serializing access to
** [database connections] and [prepared statements].  But other mutexes
** are enabled so that SQLite will be safe to use in a multi-threaded
** environment as long as no two threads attempt to use the same
** [database connection] at the same time.  ^If SQLite is compiled with
** the [SQLITE_THREADSAFE | SQLITE_THREADSAFE=0] compile-time option then
** it is not possible to set the Multi-thread [threading mode] and
** [sqlite3_config()] will return [SQLITE_ERROR] if called with the
** SQLITE_CONFIG_MULTITHREAD configuration option.</dd>
**
** [[SQLITE_CONFIG_SERIALIZED]] <dt>SQLITE_CONFIG_SERIALIZED</dt>
**
```

```
 <dd>There are no arguments to this option.  ^This option sets the
** [threading mode] to Serialized. In other words, this option enables
** all mutexes including the recursive
** mutexes on [database connection] and [prepared statement] objects.
** In this mode (which is the default when SQLite is compiled with
** [SQLITE_THREADSAFE=1]) the SQLite library will itself serialize access
** to [database connections] and [prepared statements] so that the
** application is free to use the same [database connection] or the
** same [prepared statement] in different threads at the same time.
** ^If SQLite is compiled with
** the [SQLITE_THREADSAFE | SQLITE_THREADSAFE=0] compile-time option then
** it is not possible to set the Serialized [threading mode] and
** [sqlite3_config()] will return [SQLITE_ERROR] if called with the
** SQLITE_CONFIG_SERIALIZED configuration option.</dd>
**
** [[SQLITE_CONFIG_MALLOC]] <dt>SQLITE_CONFIG_MALLOC</dt>
** <dd> ^(The SQLITE_CONFIG_MALLOC option
 takes a single argument which is
** a pointer to an instance of the [sqlite3_mem_methods] structure.
** The argument specifies
** alternative low-level memory allocation routines to be used in place of
** the memory allocation routines built into SQLite.)^ ^SQLite makes
** its own private copy of the content of the [sqlite3_mem_methods] structure
** before the [sqlite3_config()] call returns.</dd>
**
** [[SQLITE_CONFIG_GETMALLOC]] <dt>SQLITE_CONFIG_GETMALLOC</dt>
** <dd> ^(The SQLITE_CONFIG_GETMALLOC option takes a single argument which
** is a pointer to an instance of the [sqlite3_mem_methods] structure.
** The [sqlite3_mem_methods]
** structure is filled with the currently defined memory allocation routines.)^
** This option can be used to overload the default memory allocation
** routines with a wrapper that simulations memory allocation failure or
** tracks memory usage, for example. </dd>
**
** [[SQLITE_CONFIG_SMALL_MALLOC]] <dt>SQLITE_CONFIG_SMALL_MALLOC</dt>
** <dd> ^The SQLITE_CONFIG_SMALL_MALLOC
 option takes single argument of
** type int, interpreted as a boolean, which if true provides a hint to
** SQLite that it should avoid large memory allocations if possible.
** SQLite will run faster if it is free to make large memory allocations,
** but some application might prefer to run slower in exchange for
** guarantees about memory fragmentation that are possible if large
** allocations are avoided.  This hint is normally off.
** </dd>
**
** [[SQLITE_CONFIG_MEMSTATUS]] <dt>SQLITE_CONFIG_MEMSTATUS</dt>
** <dd> ^The SQLITE_CONFIG_MEMSTATUS option takes single argument of type int,
** interpreted as a boolean, which enables or disables the collection of
```

```
** memory allocation statistics. ^(When memory allocation statistics are
** disabled, the following SQLite interfaces become non-operational:
**   <ul>
**   <li> [sqlite3_hard_heap_limit64()]
**   <li> [sqlite3_memory_used()]
**   <li> [sqlite3_memory_highwater()]
**   <li> [sqlite3_soft_heap_limit64()]
**
   <li> [sqlite3_status64()]
**   </ul>)^
** ^Memory allocation statistics are enabled by default unless SQLite is
** compiled with [SQLITE_DEFAULT_MEMSTATUS]=0 in which case memory
** allocation statistics are disabled by default.
** </dd>
**
** [[SQLITE_CONFIG_SCRATCH]] <dt>SQLITE_CONFIG_SCRATCH</dt>
** <dd> The SQLITE_CONFIG_SCRATCH option is no longer used.
** </dd>
**
** [[SQLITE_CONFIG_PAGECACHE]] <dt>SQLITE_CONFIG_PAGECACHE</dt>
** <dd> ^The SQLITE_CONFIG_PAGECACHE option specifies a memory pool
** that SQLite can use for the database page cache with the default page
** cache implementation.
** This configuration option is a no-op if an application-defined page
** cache implementation is loaded using the [SQLITE_CONFIG_PCACHE2].
** ^There are three arguments to SQLITE_CONFIG_PAGECACHE: A pointer to
** 8-byte aligned memory (pMem), the size of each page cache line (sz),
** and the number of cache lines (N).
** The sz argument should be the size of the largest database page
** (a power
 of two between 512 and 65536) plus some extra bytes for each
** page header.  ^The number of extra bytes needed by the page header
** can be determined using [SQLITE_CONFIG_PCACHE_HDRSZ].
** ^It is harmless, apart from the wasted memory,
** for the sz parameter to be larger than necessary.  The pMem
** argument must be either a NULL pointer or a pointer to an 8-byte
** aligned block of memory of at least sz*N bytes, otherwise
** subsequent behavior is undefined.
** ^When pMem is not NULL, SQLite will strive to use the memory provided
** to satisfy page cache needs, falling back to [sqlite3_malloc()] if
** a page cache line is larger than sz bytes or if all of the pMem buffer
** is exhausted.
** ^If pMem is NULL and N is non-zero, then each database connection
** does an initial bulk allocation for page cache memory
** from [sqlite3_malloc()] sufficient for N cache lines if N is positive or
** of -1024*N bytes if N is negative, . ^If additional
** page cache memory is needed beyond
```

```
 what is provided by the initial
** allocation, then SQLite goes to [sqlite3_malloc()] separately for each
** additional cache line. </dd>
**
** [[SQLITE_CONFIG_HEAP]] <dt>SQLITE_CONFIG_HEAP</dt>
** <dd> ^The SQLITE_CONFIG_HEAP option specifies a static memory buffer
** that SQLite will use for all of its dynamic memory allocation needs
** beyond those provided for by [SQLITE_CONFIG_PAGECACHE].
** ^The SQLITE_CONFIG_HEAP option is only available if SQLite is compiled
** with either [SQLITE_ENABLE_MEMSYS3] or [SQLITE_ENABLE_MEMSYS5] and returns
** [SQLITE_ERROR] if invoked otherwise.
** ^There are three arguments to SQLITE_CONFIG_HEAP:
** An 8-byte aligned pointer to the memory,
** the number of bytes in the memory buffer, and the minimum allocation size.
** ^If the first pointer (the memory pointer) is NULL, then SQLite reverts
** to using its default memory allocator (the system malloc() implementation),
** undoing any prior invocation of [SQLITE_CONFIG_MALLOC].  ^If the
** memory pointer
 is not NULL then the alternative memory
** allocator is engaged to handle all of SQLites memory allocation needs.
** The first pointer (the memory pointer) must be aligned to an 8-byte
** boundary or subsequent behavior of SQLite will be undefined.
** The minimum allocation size is capped at 2**12. Reasonable values
** for the minimum allocation size are 2**5 through 2**8.</dd>
**
** [[SQLITE_CONFIG_MUTEX]] <dt>SQLITE_CONFIG_MUTEX</dt>
** <dd> ^(The SQLITE_CONFIG_MUTEX option takes a single argument which is a
** pointer to an instance of the [sqlite3_mutex_methods] structure.
** The argument specifies alternative low-level mutex routines to be used
** in place the mutex routines built into SQLite.)^  ^SQLite makes a copy of
** the content of the [sqlite3_mutex_methods] structure before the call to
** [sqlite3_config()] returns. ^If SQLite is compiled with
** the [SQLITE_THREADSAFE | SQLITE_THREADSAFE=0] compile-time option then
** the entire mutexing subsystem is omitted from the
 build and hence calls to
** [sqlite3_config()] with the SQLITE_CONFIG_MUTEX configuration option will
** return [SQLITE_ERROR].</dd>
**
** [[SQLITE_CONFIG_GETMUTEX]] <dt>SQLITE_CONFIG_GETMUTEX</dt>
** <dd> ^(The SQLITE_CONFIG_GETMUTEX option takes a single argument which
** is a pointer to an instance of the [sqlite3_mutex_methods] structure.  The
** [sqlite3_mutex_methods]
** structure is filled with the currently defined mutex routines.)^
** This option can be used to overload the default mutex allocation
** routines with a wrapper used to track mutex usage for performance
** profiling or testing, for example.   ^If SQLite is compiled with
** the [SQLITE_THREADSAFE | SQLITE_THREADSAFE=0] compile-time option then
** the entire mutexing subsystem is omitted from the build and hence calls to
```

```
** [sqlite3_config()] with the SQLITE_CONFIG_GETMUTEX configuration option will
** return [SQLITE_ERROR].</dd>
**
** [[SQLITE_CONFIG_LOOKASIDE]] <dt>SQLITE_CONFIG_LOOKASIDE</dt>
** <dd> ^(The SQLITE_CONFIG_LOOKASIDE
 option takes two arguments that determine
** the default size of lookaside memory on each [database connection].
** The first argument is the
** size of each lookaside buffer slot and the second is the number of
** slots allocated to each database connection.)^  ^(SQLITE_CONFIG_LOOKASIDE
** sets the <i>default</i> lookaside size. The [SQLITE_DBCONFIG_LOOKASIDE]
** option to [sqlite3_db_config()] can be used to change the lookaside
** configuration on individual connections.)^ </dd>
**
** [[SQLITE_CONFIG_PCACHE2]] <dt>SQLITE_CONFIG_PCACHE2</dt>
** <dd> ^(The SQLITE_CONFIG_PCACHE2 option takes a single argument which is
** a pointer to an [sqlite3_pcache_methods2] object.  This object specifies
** the interface to a custom page cache implementation.)^
** ^SQLite makes a copy of the [sqlite3_pcache_methods2] object.</dd>
**
** [[SQLITE_CONFIG_GETPCACHE2]] <dt>SQLITE_CONFIG_GETPCACHE2</dt>
** <dd> ^(The SQLITE_CONFIG_GETPCACHE2 option takes a single argument which
** is
 a pointer to an [sqlite3_pcache_methods2] object.  SQLite copies of
** the current page cache implementation into that object.)^ </dd>
**
** [[SQLITE_CONFIG_LOG]] <dt>SQLITE_CONFIG_LOG</dt>
** <dd> The SQLITE_CONFIG_LOG option is used to configure the SQLite
** global [error log].
** (^The SQLITE_CONFIG_LOG option takes two arguments: a pointer to a
** function with a call signature of void(*)(void*,int,const char*),
** and a pointer to void. ^If the function pointer is not NULL, it is
** invoked by [sqlite3_log()] to process each logging event.  ^If the
** function pointer is NULL, the [sqlite3_log()] interface becomes a no-op.
** ^The void pointer that is the second argument to SQLITE_CONFIG_LOG is
** passed through as the first parameter to the application-defined logger
** function whenever that function is invoked.  ^The second parameter to
** the logger function is a copy of the first parameter to the corresponding
** [sqlite3_log()] call and is intended to be a [result code] or
 an
** [extended result code].  ^The third parameter passed to the logger is
** log message after formatting via [sqlite3_snprintf()].
** The SQLite logging interface is not reentrant; the logger function
** supplied by the application must not invoke any SQLite interface.
** In a multi-threaded application, the application-defined logger
** function must be threadsafe. </dd>
**
** [[SQLITE_CONFIG_URI]] <dt>SQLITE_CONFIG_URI
```

```
** <dd>^(The SQLITE_CONFIG_URI option takes a single argument of type int.
** If non-zero, then URI handling is globally enabled. If the parameter is zero,
** then URI handling is globally disabled.)^ ^If URI handling is globally
** enabled, all filenames passed to [sqlite3_open()], [sqlite3_open_v2()],
** [sqlite3_open16()] or
** specified as part of [ATTACH] commands are interpreted as URIs, regardless
** of whether or not the [SQLITE_OPEN_URI] flag is set when the database
** connection is opened. ^If it is globally disabled, filenames are
** only interpreted as
 URIs if the SQLITE_OPEN_URI flag is set when the
** database connection is opened. ^(By default, URI handling is globally
** disabled. The default value may be changed by compiling with the
** [SQLITE_USE_URI] symbol defined.)^
**
** [[SQLITE_CONFIG_COVERING_INDEX_SCAN]] <dt>SQLITE_CONFIG_COVERING_INDEX_SCAN
** <dd>^The SQLITE_CONFIG_COVERING_INDEX_SCAN option takes a single integer
** argument which is interpreted as a boolean in order to enable or disable
** the use of covering indices for full table scans in the query optimizer.
** ^The default setting is determined
** by the [SQLITE_ALLOW_COVERING_INDEX_SCAN] compile-time option, or is "on"
** if that compile-time option is omitted.
** The ability to disable the use of covering indices for full table scans
** is because some incorrectly coded legacy applications might malfunction
** when the optimization is enabled.  Providing the ability to
** disable the optimization allows the older, buggy application code to work
** without change
 even with newer versions of SQLite.
**
** [[SQLITE_CONFIG_PCACHE]] [[SQLITE_CONFIG_GETPCACHE]]
** <dt>SQLITE_CONFIG_PCACHE and SQLITE_CONFIG_GETPCACHE
** <dd> These options are obsolete and should not be used by new code.
** They are retained for backwards compatibility but are now no-ops.
** </dd>
**
** [[SQLITE_CONFIG_SQLLOG]]
** <dt>SQLITE_CONFIG_SQLLOG
** <dd>This option is only available if sqlite is compiled with the
** [SQLITE_ENABLE_SQLLOG] pre-processor macro defined. The first argument should
** be a pointer to a function of type void(*)(void*,sqlite3*,const char*, int).
** The second should be of type (void*). The callback is invoked by the library
** in three separate circumstances, identified by the value passed as the
** fourth parameter. If the fourth parameter is 0, then the database connection
** passed as the second argument has just been opened. The third argument
** points to a buffer containing the name of the main database file. If the
** fourth parameter is 1,
 then the SQL statement that the third parameter
** points to has just been executed. Or, if the fourth parameter is 2, then
** the connection being passed as the second parameter is being closed. The
```

```
** third parameter is passed NULL In this case.  An example of using this
** configuration option can be seen in the "test_sqllog.c" source file in
** the canonical SQLite source tree.</dd>
**
** [[SQLITE_CONFIG_MMAP_SIZE]]
** <dt>SQLITE_CONFIG_MMAP_SIZE
** <dd>^SQLITE_CONFIG_MMAP_SIZE takes two 64-bit integer (sqlite3_int64) values
** that are the default mmap size limit (the default setting for
** [PRAGMA mmap_size]) and the maximum allowed mmap size limit.
** ^The default setting can be overridden by each database connection using
** either the [PRAGMA mmap_size] command, or by using the
** [SQLITE_FCNTL_MMAP_SIZE] file control.  ^(The maximum allowed mmap size
** will be silently truncated if necessary so that it does not exceed the
** compile-time maximum mmap size set by the
** [SQLITE_MAX_MMAP_SIZE]
 compile-time option.)^
** ^If either argument to this option is negative, then that argument is
** changed to its compile-time default.
**
** [[SQLITE_CONFIG_WIN32_HEAPSIZE]]
** <dt>SQLITE_CONFIG_WIN32_HEAPSIZE
** <dd>^The SQLITE_CONFIG_WIN32_HEAPSIZE option is only available if SQLite is
** compiled for Windows with the [SQLITE_WIN32_MALLOC] pre-processor macro
** defined. ^SQLITE_CONFIG_WIN32_HEAPSIZE takes a 32-bit unsigned integer value
** that specifies the maximum size of the created heap.
**
** [[SQLITE_CONFIG_PCACHE_HDRSZ]]
** <dt>SQLITE_CONFIG_PCACHE_HDRSZ
** <dd>^The SQLITE_CONFIG_PCACHE_HDRSZ option takes a single parameter which
** is a pointer to an integer and writes into that integer the number of extra
** bytes per page required for each page in [SQLITE_CONFIG_PAGECACHE].
** The amount of extra space required can change depending on the compiler,
** target platform, and SQLite version.
**
** [[SQLITE_CONFIG_PMASZ]]
** <dt>SQLITE_CONFIG_PMASZ
** <dd>^The
 SQLITE_CONFIG_PMASZ option takes a single parameter which
** is an unsigned integer and sets the "Minimum PMA Size" for the multithreaded
** sorter to that integer.  The default minimum PMA Size is set by the
** [SQLITE_SORTER_PMASZ] compile-time option.  New threads are launched
** to help with sort operations when multithreaded sorting
** is enabled (using the [PRAGMA threads] command) and the amount of content
** to be sorted exceeds the page size times the minimum of the
** [PRAGMA cache_size] setting and this value.
**
** [[SQLITE_CONFIG_STMTJRNL_SPILL]]
** <dt>SQLITE_CONFIG_STMTJRNL_SPILL
```

```
** <dd>^The SQLITE_CONFIG_STMTJRNL_SPILL option takes a single parameter which
** becomes the [statement journal] spill-to-disk threshold.
** [Statement journals] are held in memory until their size (in bytes)
** exceeds this threshold, at which point they are written to disk.
** Or if the threshold is -1, statement journals are always held
** exclusively in memory.
** Since many statement journals
 never become large, setting the spill
** threshold to a value such as 64KiB can greatly reduce the amount of
** I/O required to support statement rollback.
** The default value for this setting is controlled by the
** [SQLITE_STMTJRNL_SPILL] compile-time option.
**
** [[SQLITE_CONFIG_SORTERREF_SIZE]]
** <dt>SQLITE_CONFIG_SORTERREF_SIZE
** <dd>The SQLITE_CONFIG_SORTERREF_SIZE option accepts a single parameter
** of type (int) - the new value of the sorter-reference size threshold.
** Usually, when SQLite uses an external sort to order records according
** to an ORDER BY clause, all fields required by the caller are present in the
** sorted records. However, if SQLite determines based on the declared type
** of a table column that its values are likely to be very large - larger
** than the configured sorter-reference size threshold - then a reference
** is stored in each sorted record and the required column values loaded
** from the database as records are returned in sorted order.
 The default
** value for this option is to never use this optimization. Specifying a
** negative value for this option restores the default behavior.
** This option is only available if SQLite is compiled with the
** [SQLITE_ENABLE_SORTER_REFERENCES] compile-time option.
**
** [[SQLITE_CONFIG_MEMDB_MAXSIZE]]
** <dt>SQLITE_CONFIG_MEMDB_MAXSIZE
** <dd>The SQLITE_CONFIG_MEMDB_MAXSIZE option accepts a single parameter
** [sqlite3_int64] parameter which is the default maximum size for an in-memory
** database created using [sqlite3_deserialize()].  This default maximum
** size can be adjusted up or down for individual databases using the
** [SQLITE_FCNTL_SIZE_LIMIT] [sqlite3_file_control|file-control].  If this
** configuration setting is never used, then the default maximum is determined
** by the [SQLITE_MEMDB_DEFAULT_MAXSIZE] compile-time option.  If that
** compile-time option is not set, then the default maximum is 1073741824.
** </dl>
*/
```

Found in path(s):

* /sqlite-amalgamation-3450100-zip/sqlite-amalgamation-3450100/sqlite3.h

1.17 glibc 2.39

1.17.1 Available under license :

@c The GNU Lesser General Public License.
@center Version 2.1, February 1999

@c This file is intended to be included within another document,
@c hence no sectioning command or @node.

@display
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[This is the first released version of the Lesser GPL. It also counts
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@subheading Preamble

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the library.

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For example, on rare occasions, there may be a special need to
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library does the
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``work based on the library" and a ``work that uses the library". The
former
contains code derived from the library, whereas the latter must
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table, the facility still operates, and performs whatever part of
its purpose remains meaningful.

(For example, a function in a library to compute square roots has
a purpose that is entirely well-defined independent of the
application. Therefore, Subsection 2d requires that any
application-supplied function or table used by this function must
be optional: if the application does not supply it, the square
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@item
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it
contains portions of the Library), rather than a ``work that uses the library''. The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

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of these things:

@enumerate a
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and (2) will operate
properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

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@subheading END OF TERMS AND CONDITIONS

@page
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@var{signature of Ty Coon}, 1 April 1990
Ty Coon, President of Vice

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1.18 libuv 1.48.0

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1.19 websocketpp 0.8.3

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****** SHA1 Library (sha1/sha1.hpp) ******
sha1.hpp is a repackaging of the sha1.cpp and sha1.h files from the shallsha1 library (http://code.google.com/p/smallsha1/) into a single header suitable for use as a header only library. This conversion was done by Peter Thorson (webmaster@zaphoyd.com) in 2013. All modifications to the code are redistributed under the same license as the original, which is listed below.

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****** MD5 Library (common/md5.hpp) ******
md5.hpp is a reformulation of the md5.h and md5.c code from http://www.opensource.apple.com/source/cups/cups-59/cups/md5.c to allow it to function as a component of a header only library. This conversion

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L. Peter Deutsch
ghost@aladdin.com

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1.20 c-ares 1.36.4

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If distribution of object code is
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5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

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When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a

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For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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1.27 llvm 18.1.8

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```
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc < %s -mtriple=aarch64-- | FileCheck %s

; A shuffle mask with all undef elements is always legal.

define <4 x i32> @PR41535(<2 x i32> %p1, <2 x i32> %p2) {
; CHECK-LABEL: PR41535:
; CHECK:       // %bb.0:
; CHECK-NEXT:    ext v0.8b, v0.8b, v1.8b, #4
; CHECK-NEXT:    mov v0.d[1], v0.d[0]
; CHECK-NEXT:    ret
 %cat1 = shufflevector <2 x i32> %p1, <2 x i32> undef, <4 x i32> <i32 undef, i32 1, i32 undef, i32 undef>
 %cat2 = shufflevector <2 x i32> %p2, <2 x i32> undef, <4 x i32> <i32 0, i32 undef, i32 undef, i32 undef>
 %r = shufflevector <4 x i32> %cat1, <4 x i32> %cat2, <4 x i32> <i32 undef, i32 undef, i32 1, i32 4>
 ret <4 x i32> %r
}
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=amdgcn -mcpu=fiji < %s | FileCheck -enable-var-scope --check-prefixes=GCN,GCN-
SAFE,VI,VI-SAFE %s
; RUN: llc -enable-no-signed-zeros-fp-math -mtriple=amdgcn -mcpu=fiji < %s | FileCheck -enable-var-scope --
check-prefixes=GCN,GCN-NSZ,VI,VI-NSZ %s

; ---------------------------------------------------------------------------
; rcp tests
; ---------------------------------------------------------------------------

define half @v_fneg_rcp_f16(half %a) #0 {
; GCN-LABEL: v_fneg_rcp_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:    v_rcp_f16_e64 v0, -v0
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %rcp = call half @llvm.amdgcn.rcp.f16(half %a)
 %fneg = fneg half %rcp
 ret half %fneg
}

define half @v_fneg_rcp_fneg_f16(half %a) #0 {
; GCN-LABEL: v_fneg_rcp_fneg_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:
    v_rcp_f16_e32 v0, v0
; GCN-NEXT:    s_setpc_b64 s[30:31]
```

```
 %fneg.a = fneg half %a
 %rcp = call half @llvm.amdgcn.rcp.f16(half %fneg.a)
 %fneg = fneg half %rcp
 ret half %fneg
}

define { half, half } @v_fneg_rcp_store_use_fneg_f16(half %a) #0 {
; GCN-LABEL: v_fneg_rcp_store_use_fneg_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:    v_rcp_f16_e32 v2, v0
; GCN-NEXT:    v_xor_b32_e32 v1, 0x8000, v0
; GCN-NEXT:    v_mov_b32_e32 v0, v2
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %fneg.a = fneg half %a
 %rcp = call half @llvm.amdgcn.rcp.f16(half %fneg.a)
 %fneg = fneg half %rcp
 %insert.0 = insertvalue { half, half } poison, half %fneg, 0
 %insert.1 = insertvalue { half, half } %insert.0, half %fneg.a, 1
 ret { half, half } %insert.1
}

define { half, half } @v_fneg_rcp_multi_use_fneg_f16(half %a, half %c) #0 {
; GCN-LABEL: v_fneg_rcp_multi_use_fneg_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:
   v_rcp_f16_e32 v2, v0
; GCN-NEXT:    v_mul_f16_e64 v1, -v0, v1
; GCN-NEXT:    v_mov_b32_e32 v0, v2
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %fneg.a = fneg half %a
 %rcp = call half @llvm.amdgcn.rcp.f16(half %fneg.a)
 %fneg = fneg half %rcp
 %use1 = fmul half %fneg.a, %c
 %insert.0 = insertvalue { half, half } poison, half %fneg, 0
 %insert.1 = insertvalue { half, half } %insert.0, half %use1, 1
 ret { half, half } %insert.1
}

; ---------------------------------------------------------------------------
; sin tests
; ---------------------------------------------------------------------------

define half @v_fneg_amdgcn_sin_f16(half %a) #0 {
; GCN-LABEL: v_fneg_amdgcn_sin_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
```

```
; GCN-NEXT:    v_sin_f16_e64 v0, -v0
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %sin = call half @llvm.amdgcn.sin.f16(half %a)
 %fneg = fneg half %sin
 ret half %fneg
}

; ---------------------------------------------------------------------------
;
 vintrp tests
; ---------------------------------------------------------------------------

define { float, float } @v_fneg_interp_p1_f16(float %a, float %b) #0 {
; GCN-LABEL: v_fneg_interp_p1_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:    v_mul_f32_e64 v1, v0, -v1
; GCN-NEXT:    s_mov_b32 m0, 0
; GCN-NEXT:    s_setreg_imm32_b32 hwreg(HW_REG_MODE, 2, 2), 3
; GCN-NEXT:    v_interp_p1ll_f16 v0, v1, attr0.x
; GCN-NEXT:    v_interp_p1ll_f16 v1, v1, attr0.y
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %mul = fmul float %a, %b
 %fneg = fneg float %mul
 %intrp0 = call float @llvm.amdgcn.interp.p1.f16(float %fneg, i32 0, i32 0, i1 false, i32 0)
 %intrp1 = call float @llvm.amdgcn.interp.p1.f16(float %fneg, i32 1, i32 0, i1 false, i32 0)
 %insert.0 = insertvalue { float, float } poison, float %intrp0, 0
 %insert.1 = insertvalue { float, float } %insert.0, float %intrp1, 1
 ret { float, float } %insert.1
}

define
 { half, half } @v_fneg_interp_p2_f16(float %a, float %b) #0 {
; GCN-LABEL: v_fneg_interp_p2_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:    v_mul_f32_e64 v1, v0, -v1
; GCN-NEXT:    v_mov_b32_e32 v2, 4.0
; GCN-NEXT:    s_mov_b32 m0, 0
; GCN-NEXT:    s_setreg_imm32_b32 hwreg(HW_REG_MODE, 2, 2), 3
; GCN-NEXT:    v_interp_p2_f16 v0, v1, attr0.x, v2
; GCN-NEXT:    v_interp_p2_f16 v1, v1, attr0.y, v2
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %mul = fmul float %a, %b
 %fneg = fneg float %mul
 %intrp0 = call half @llvm.amdgcn.interp.p2.f16(float 4.0, float %fneg, i32 0, i32 0, i1 false, i32 0)
 %intrp1 = call half @llvm.amdgcn.interp.p2.f16(float 4.0, float %fneg, i32 1, i32 0, i1 false, i32 0)
 %insert.0 = insertvalue { half, half } poison, half %intrp0, 0
```

```
 %insert.1 = insertvalue { half, half } %insert.0, half %intrp1, 1
 ret { half, half } %insert.1
}

; ---------------------------------------------------------------------------
;
 arithmetic.fence tests
; ---------------------------------------------------------------------------

; FIXME: Legalization/promote is broken
define half @v_fneg_arithmetic_fence_f16(half %a) #0 {
; GCN-LABEL: v_fneg_arithmetic_fence_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    ;ARITH_FENCE
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:    v_xor_b32_e32 v0, 0x8000, v0
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %fence = call half @llvm.arithmetic.fence.f16(half %a)
 %fneg = fneg half %fence
 ret half %fneg
}

define half @v_fneg_arithmetic_fence_fmul_f16(half %a, half %b) #0 {
; GCN-LABEL: v_fneg_arithmetic_fence_fmul_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:    v_mul_f16_e32 v0, v0, v1
; GCN-NEXT:    ;ARITH_FENCE
; GCN-NEXT:    v_xor_b32_e32 v0, 0x8000, v0
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %mul = fmul half %a, %b
 %fence = call half @llvm.arithmetic.fence.f16(half %mul)
 %fneg = fneg half %fence
 ret half
 %fneg
}

declare half @llvm.amdgcn.rcp.f16(half) #1
declare half @llvm.amdgcn.sin.f16(half) #1
declare half @llvm.arithmetic.fence.f16(half) #1
declare float @llvm.amdgcn.interp.p1.f16(float, i32, i32, i1, i32) #0
declare half @llvm.amdgcn.interp.p2.f16(float, float, i32, i32, i1, i32) #0

attributes #0 = { nounwind "denormal-fp-math-f32"="preserve-sign,preserve-sign" }
attributes #1 = { nounwind readnone }
attributes #2 = { nounwind "unsafe-fp-math"="true" }
attributes #3 = { nounwind "no-signed-zeros-fp-math"="true" }
attributes #4 = { nounwind "amdgpu-ieee"="false" "denormal-fp-math-f32"="preserve-sign,preserve-sign" }
```

```
;; NOTE: These prefixes are unused and the list is autogenerated. Do not add tests below this line:
; GCN-NSZ: {{.*}}
; GCN-SAFE: {{.*}}
; VI: {{.*}}
; VI-NSZ: {{.*}}
; VI-SAFE: {{.*}}
; NOTE: Assertions have been autogenerated by utils/update_test_checks.py UTC_ARGS: --function-signature --check-attributes --check-globals
; RUN: opt -aa-pipeline=basic-aa -passes=attributor -attributor-manifest-internal  -attributor-annotate-decl-cs -S < %s | FileCheck %s --check-prefixes=CHECK,TUNIT
; RUN: opt -aa-pipeline=basic-aa -passes=attributor-cgscc -attributor-manifest-internal  -attributor-annotate-decl-cs -S < %s | FileCheck %s --check-prefixes=CHECK,CGSCC
; Test that we only promote arguments when the caller/callee have compatible
; function attrubtes.

target triple = "x86_64-unknown-linux-gnu"

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr %arg, ptr readonly %arg1) #0 {
;
; CHECK: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem: readwrite) uwtable
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512
; CHECK-SAME:
 (ptr noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[ARG:%.*]], <8 x i64> [[TMP0:%.*]]) #[[ATTR0:[0-9]+]] {
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[ARG1_PRIV:%.*]] = alloca <8 x i64>, align 64
; CHECK-NEXT:    store <8 x i64> [[TMP0]], ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]], align 64
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr %arg) #0 {
;
; TUNIT: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem: readwrite) uwtable
; TUNIT-LABEL: define {{[^@]+}}@avx512_legal512_prefer512_call_avx512_legal512_prefer512
; TUNIT-SAME: (ptr nocapture nofree writeonly [[ARG:%.*]]) #[[ATTR0]] {
; TUNIT-NEXT:  bb:
; TUNIT-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align
```

```
 32
; TUNIT-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 32
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5:[0-9]+]]
; TUNIT-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; TUNIT-NEXT:    call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], <8 x i64>
[[TMP0]]) #[[ATTR6:[0-9]+]]
; TUNIT-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; TUNIT-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; TUNIT-NEXT:    ret void
;
; CGSCC: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CGSCC-LABEL: define {{[^@]+}}@avx512_legal512_prefer512_call_avx512_legal512_prefer512
; CGSCC-SAME: (ptr nocapture
 nofree noundef nonnull writeonly align 2 dereferenceable(64) [[ARG:%.*]]) #[[ATTR0]] {
; CGSCC-NEXT:  bb:
; CGSCC-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 64
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5:[0-9]+]]
; CGSCC-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; CGSCC-NEXT:    call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], <8 x i64>
[[TMP0]]) #[[ATTR6:[0-9]+]]
; CGSCC-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; CGSCC-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; CGSCC-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void
 @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr %arg, ptr
readonly %arg1) #1 {
;
; CHECK: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256
```

```
; CHECK-SAME: (ptr noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64)
[[ARG:%.*]], <8 x i64> [[TMP0:%.*]]) #[[ATTR1:[0-9]+]] {
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[ARG1_PRIV:%.*]] = alloca <8 x i64>, align 64
; CHECK-NEXT:    store <8 x i64> [[TMP0]], ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x
 i64>, ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]], align 64
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr %arg) #1 {
;
; TUNIT: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; TUNIT-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal512_prefer256
; TUNIT-SAME: (ptr nocapture nofree writeonly [[ARG:%.*]]) #[[ATTR1]] {
; TUNIT-NEXT:  bb:
; TUNIT-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 32
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; TUNIT-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; TUNIT-NEXT:
    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr noalias nocapture
nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], <8 x i64> [[TMP0]]) #[[ATTR6]]
; TUNIT-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; TUNIT-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; TUNIT-NEXT:    ret void
;
; CGSCC: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CGSCC-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal512_prefer256
; CGSCC-SAME: (ptr nocapture nofree noundef nonnull writeonly align 2 dereferenceable(64) [[ARG:%.*]])
#[[ATTR1]] {
; CGSCC-NEXT:  bb:
; CGSCC-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 64
dereferenceable(64)
 [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; CGSCC-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; CGSCC-NEXT:    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr
```

```
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], <8 x i64>
[[TMP0]]) #[[ATTR6]]
; CGSCC-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; CGSCC-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; CGSCC-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr
 %arg, ptr readonly %arg1) #1 {
;
; CHECK: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64)
[[ARG:%.*]], <8 x i64> [[TMP0:%.*]]) #[[ATTR1]] {
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[ARG1_PRIV:%.*]] = alloca <8 x i64>, align 64
; CHECK-NEXT:    store <8 x i64> [[TMP0]], ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]], align 64
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr %arg) #0 {
;
; TUNIT: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind
 willreturn memory(argmem: readwrite) uwtable
; TUNIT-LABEL: define {{[^@]+}}@avx512_legal512_prefer512_call_avx512_legal512_prefer256
; TUNIT-SAME: (ptr nocapture nofree writeonly [[ARG:%.*]]) #[[ATTR0]] {
; TUNIT-NEXT:  bb:
; TUNIT-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 32
```

```
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; TUNIT-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; TUNIT-NEXT:    call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], <8 x i64>
[[TMP0]]) #[[ATTR6]]
; TUNIT-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; TUNIT-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; TUNIT-NEXT:
   ret void
;
; CGSCC: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CGSCC-LABEL: define {{[^@]+}}@avx512_legal512_prefer512_call_avx512_legal512_prefer256
; CGSCC-SAME: (ptr nocapture nofree noundef nonnull writeonly align 2 dereferenceable(64) [[ARG:%.*]])
#[[ATTR0]] {
; CGSCC-NEXT:  bb:
; CGSCC-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 64
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; CGSCC-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; CGSCC-NEXT:    call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], <8 x i64>
[[TMP0]]) #[[ATTR6]]
; CGSCC-NEXT:
   [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; CGSCC-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; CGSCC-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr %arg, ptr
readonly %arg1) #0 {
;
; CHECK: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512
; CHECK-SAME: (ptr noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64)
[[ARG:%.*]],
```

```
 <8 x i64> [[TMP0:%.*]]) #[[ATTR0]] {
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[ARG1_PRIV:%.*]] = alloca <8 x i64>, align 64
; CHECK-NEXT:    store <8 x i64> [[TMP0]], ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]], align 64
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr %arg) #1 {
;
; TUNIT: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; TUNIT-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal512_prefer512
; TUNIT-SAME: (ptr nocapture nofree writeonly [[ARG:%.*]]) #[[ATTR1]] {
; TUNIT-NEXT:  bb:
; TUNIT-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    call void @llvm.memset.p0.i64(ptr
 noalias nocapture nofree noundef nonnull writeonly align 32 dereferenceable(64) [[TMP]], i8 noundef 0, i64
noundef 32, i1 noundef false) #[[ATTR5]]
; TUNIT-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; TUNIT-NEXT:    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], <8 x i64>
[[TMP0]]) #[[ATTR6]]
; TUNIT-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; TUNIT-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; TUNIT-NEXT:    ret void
;
; CGSCC: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CGSCC-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal512_prefer512
; CGSCC-SAME: (ptr nocapture nofree noundef nonnull writeonly align 2 dereferenceable(64) [[ARG:%.*]])
#[[ATTR1]] {
; CGSCC-NEXT:  bb:
; CGSCC-NEXT:
   [[TMP:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 64
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; CGSCC-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; CGSCC-NEXT:    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], <8 x i64>
```

```
[[TMP0]]) #[[ATTR6]]
; CGSCC-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; CGSCC-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; CGSCC-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr
 %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should not promote
define internal fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr %arg, ptr
readonly %arg1) #1 {
;
; CHECK: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64)
[[ARG:%.*]], ptr noalias nocapture nofree noundef nonnull readonly align 64 dereferenceable(64) [[ARG1:%.*]])
#[[ATTR1]] {
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1]], align 64
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]], align 64
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
  ret void
}

define void @avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr %arg) #2 {
;
; TUNIT: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; TUNIT-LABEL: define {{[^@]+}}@avx512_legal256_prefer256_call_avx512_legal512_prefer256
; TUNIT-SAME: (ptr nocapture nofree writeonly [[ARG:%.*]]) #[[ATTR2:[0-9]+]] {
; TUNIT-NEXT:  bb:
; TUNIT-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 32
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
```

```
; TUNIT-NEXT:    call fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], ptr noalias
nocapture nofree noundef nonnull readonly align 64 dereferenceable(64)
 [[TMP]]) #[[ATTR6]]
; TUNIT-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; TUNIT-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; TUNIT-NEXT:    ret void
;
; CGSCC: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CGSCC-LABEL: define {{[^@]+}}@avx512_legal256_prefer256_call_avx512_legal512_prefer256
; CGSCC-SAME: (ptr nocapture nofree noundef nonnull writeonly align 2 dereferenceable(64) [[ARG:%.*]])
#[[ATTR2:[0-9]+]] {
; CGSCC-NEXT:  bb:
; CGSCC-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 64
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; CGSCC-NEXT:    call fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr
noalias
 nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], ptr noalias nocapture
nofree noundef nonnull readonly align 64 dereferenceable(64) [[TMP]]) #[[ATTR6]]
; CGSCC-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; CGSCC-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; CGSCC-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should not promote
define internal fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %arg, ptr
readonly %arg1) #2 {
;
; CHECK: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
;
 CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256
; CHECK-SAME: (ptr noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64)
[[ARG:%.*]], ptr noalias nocapture nofree noundef nonnull readonly align 64 dereferenceable(64) [[ARG1:%.*]])
#[[ATTR2:[0-9]+]] {
; CHECK-NEXT:  bb:
```

```
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1]], align 64
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]], align 64
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %arg) #1 {
;
; TUNIT: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; TUNIT-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal256_prefer256
; TUNIT-SAME: (ptr nocapture nofree writeonly [[ARG:%.*]]) #[[ATTR1]] {
; TUNIT-NEXT:  bb:
; TUNIT-NEXT:
   [[TMP:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 32
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; TUNIT-NEXT:    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], ptr noalias
nocapture nofree noundef nonnull readonly align 64 dereferenceable(64) [[TMP]]) #[[ATTR6]]
; TUNIT-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; TUNIT-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; TUNIT-NEXT:    ret void
;
; CGSCC: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CGSCC-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal256_prefer256
;
 CGSCC-SAME: (ptr nocapture nofree noundef nonnull writeonly align 2 dereferenceable(64) [[ARG:%.*]])
#[[ATTR1]] {
; CGSCC-NEXT:  bb:
; CGSCC-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 64
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; CGSCC-NEXT:    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], ptr noalias
nocapture nofree noundef nonnull readonly align 64 dereferenceable(64) [[TMP]]) #[[ATTR6]]
; CGSCC-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; CGSCC-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; CGSCC-NEXT:    ret void
;
bb:
```

```
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>,
 align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr %arg, ptr readonly
%arg1) #3 {
;
; CHECK: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CHECK-LABEL: define {{[^@]+}}@callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256
; CHECK-SAME: (ptr noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64)
[[ARG:%.*]], <8 x i64> [[TMP0:%.*]]) #[[ATTR3:[0-9]+]] {
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[ARG1_PRIV:%.*]] = alloca <8 x i64>, align 64
; CHECK-NEXT:    store <8 x i64> [[TMP0]], ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    [[TMP:%.*]]
 = load <8 x i64>, ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]], align 64
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr %arg) #4 {
;
; TUNIT: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; TUNIT-LABEL: define {{[^@]+}}@avx2_legal256_prefer256_call_avx2_legal512_prefer256
; TUNIT-SAME: (ptr nocapture nofree writeonly [[ARG:%.*]]) #[[ATTR3]] {
; TUNIT-NEXT:  bb:
; TUNIT-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 32
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; TUNIT-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
;
 TUNIT-NEXT:    call fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr noalias
nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], <8 x i64> [[TMP0]])
```

```
#[[ATTR6]]
; TUNIT-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; TUNIT-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; TUNIT-NEXT:    ret void
;
; CGSCC: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CGSCC-LABEL: define {{[^@]+}}@avx2_legal256_prefer256_call_avx2_legal512_prefer256
; CGSCC-SAME: (ptr nocapture nofree noundef nonnull writeonly align 2 dereferenceable(64) [[ARG:%.*]])
#[[ATTR3]] {
; CGSCC-NEXT:  bb:
; CGSCC-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 64
dereferenceable(64) [[TMP]],
 i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; CGSCC-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; CGSCC-NEXT:    call fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr noalias
nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], <8 x i64> [[TMP0]])
#[[ATTR6]]
; CGSCC-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; CGSCC-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; CGSCC-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr
 %arg, ptr readonly %arg1) #4 {
;
; CHECK: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CHECK-LABEL: define {{[^@]+}}@callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256
; CHECK-SAME: (ptr noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64)
[[ARG:%.*]], <8 x i64> [[TMP0:%.*]]) #[[ATTR3]] {
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[ARG1_PRIV:%.*]] = alloca <8 x i64>, align 64
; CHECK-NEXT:    store <8 x i64> [[TMP0]], ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]], align 64
```

```
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr %arg) #3 {
;
; TUNIT: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
 readwrite) uwtable
; TUNIT-LABEL: define {{[^@]+}}@avx2_legal512_prefer256_call_avx2_legal256_prefer256
; TUNIT-SAME: (ptr nocapture nofree writeonly [[ARG:%.*]]) #[[ATTR3]] {
; TUNIT-NEXT:  bb:
; TUNIT-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 32
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; TUNIT-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; TUNIT-NEXT:    call fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr noalias
nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], <8 x i64> [[TMP0]])
#[[ATTR6]]
; TUNIT-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; TUNIT-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; TUNIT-NEXT:    ret void
;
; CGSCC: Function
 Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem: readwrite) uwtable
; CGSCC-LABEL: define {{[^@]+}}@avx2_legal512_prefer256_call_avx2_legal256_prefer256
; CGSCC-SAME: (ptr nocapture nofree noundef nonnull writeonly align 2 dereferenceable(64) [[ARG:%.*]])
#[[ATTR3]] {
; CGSCC-NEXT:  bb:
; CGSCC-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 64
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; CGSCC-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; CGSCC-NEXT:    call fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr noalias
nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], <8 x i64> [[TMP0]])
#[[ATTR6]]
; CGSCC-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>,
 ptr [[TRUETMP2]], align 64
; CGSCC-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; CGSCC-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
```

```
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; Function Attrs: argmemonly nounwind
declare void @llvm.memset.p0.i64(ptr nocapture writeonly, i8, i64, i1) #5

attributes #0 = { inlinehint norecurse nounwind uwtable "target-features"="+avx512vl" "min-legal-vector-
width"="512" "prefer-vector-width"="512" }
attributes #1 = { inlinehint norecurse nounwind uwtable "target-features"="+avx512vl" "min-legal-vector-
width"="512" "prefer-vector-width"="256" }
attributes #2 = { inlinehint norecurse nounwind uwtable "target-features"="+avx512vl" "min-legal-vector-
width"="256"
 "prefer-vector-width"="256" }
attributes #3 = { inlinehint norecurse nounwind uwtable "target-features"="+avx2" "min-legal-vector-width"="512"
"prefer-vector-width"="256" }
attributes #4 = { inlinehint norecurse nounwind uwtable "target-features"="+avx2" "min-legal-vector-width"="256"
"prefer-vector-width"="256" }
attributes #5 = { argmemonly nounwind }
;.
; TUNIT: attributes #[[ATTR0]] = { inlinehint mustprogress nofree norecurse nosync nounwind willreturn
memory(argmem: readwrite) uwtable "min-legal-vector-width"="512" "prefer-vector-width"="512" "target-
features"="+avx512vl" }
; TUNIT: attributes #[[ATTR1]] = { inlinehint mustprogress nofree norecurse nosync nounwind willreturn
memory(argmem: readwrite) uwtable "min-legal-vector-width"="512" "prefer-vector-width"="256" "target-
features"="+avx512vl" }
; TUNIT: attributes #[[ATTR2]] = { inlinehint mustprogress nofree norecurse nosync nounwind willreturn
memory(argmem: readwrite) uwtable "min-legal-vector-width"="256" "prefer-vector-width"="256"
 "target-features"="+avx512vl" }
; TUNIT: attributes #[[ATTR3]] = { inlinehint mustprogress nofree norecurse nosync nounwind willreturn
memory(argmem: readwrite) uwtable "min-legal-vector-width"="512" "prefer-vector-width"="256" "target-
features"="+avx2" }
; TUNIT: attributes #[[ATTR4:[0-9]+]] = { nocallback nofree nounwind willreturn memory(argmem: write) }
; TUNIT: attributes #[[ATTR5]] = { nofree willreturn memory(write) }
; TUNIT: attributes #[[ATTR6]] = { nofree nosync nounwind willreturn }
;.
; CGSCC: attributes #[[ATTR0]] = { inlinehint mustprogress nofree norecurse nosync nounwind willreturn
memory(argmem: readwrite) uwtable "min-legal-vector-width"="512" "prefer-vector-width"="512" "target-
features"="+avx512vl" }
; CGSCC: attributes #[[ATTR1]] = { inlinehint mustprogress nofree norecurse nosync nounwind willreturn
memory(argmem: readwrite) uwtable "min-legal-vector-width"="512" "prefer-vector-width"="256" "target-
features"="+avx512vl" }
; CGSCC: attributes #[[ATTR2]]
```

```
 = { inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem: readwrite) uwtable "min-legal-vector-width"="256" "prefer-vector-width"="256" "target-features"="+avx512vl" }
; CGSCC: attributes #[[ATTR3]] = { inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem: readwrite) uwtable "min-legal-vector-width"="512" "prefer-vector-width"="256" "target-features"="+avx2" }
; CGSCC: attributes #[[ATTR4:[0-9]+]] = { nocallback nofree nounwind willreturn memory(argmem: write) }
; CGSCC: attributes #[[ATTR5]] = { nofree willreturn memory(write) }
; CGSCC: attributes #[[ATTR6]] = { nofree nounwind willreturn }
;.
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefix=RV64I
; RUN: llc -mtriple=riscv64 -mattr=+zbb -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefix=RV64ZBB

declare i32 @llvm.ctlz.i32(i32, i1)

define signext i32 @ctlz_i32(i32 signext %a) nounwind {
; RV64I-LABEL: ctlz_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    beqz a0, .LBB0_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 8
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:
   not a0, a0
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addi a2, a2, 1365
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addi a1, a1, 819
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srliw a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srliw a1, a0, 4
```

```
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 24
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
; RV64I-NEXT:  .LBB0_2:
; RV64I-NEXT:    li a0, 32
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: ctlz_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    clzw a0, a0
; RV64ZBB-NEXT:    ret
 %1 = call i32 @llvm.ctlz.i32(i32 %a, i1 false)
  ret i32 %1
}

define signext i32 @log2_i32(i32 signext %a) nounwind {
; RV64I-LABEL: log2_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    beqz a0, .LBB1_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 8
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addi a2, a2, 1365
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addi a1, a1, 819
```

```
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srliw a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:
   srliw a1, a0, 4
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 24
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    j .LBB1_3
; RV64I-NEXT:  .LBB1_2:
; RV64I-NEXT:    li a0, 32
; RV64I-NEXT:  .LBB1_3: # %cond.end
; RV64I-NEXT:    li a1, 31
; RV64I-NEXT:    subw a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: log2_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    clzw a0, a0
; RV64ZBB-NEXT:    li a1, 31
; RV64ZBB-NEXT:    subw a0, a1, a0
; RV64ZBB-NEXT:    ret
 %1 = call i32 @llvm.ctlz.i32(i32 %a, i1 false)
 %2 = sub i32 31, %1
 ret i32 %2
}

define signext i32 @log2_ceil_i32(i32 signext %a) nounwind {
; RV64I-LABEL: log2_ceil_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra,
 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    sd s0, 0(sp) # 8-byte Folded Spill
; RV64I-NEXT:    addiw a0, a0, -1
; RV64I-NEXT:    li s0, 32
; RV64I-NEXT:    li a1, 32
; RV64I-NEXT:    beqz a0, .LBB2_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    srliw a1, a0, 1
```

```
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 8
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addi a2, a2, 1365
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addi a1, a1, 819
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srliw a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:
  addw a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a1, a0, 24
; RV64I-NEXT:  .LBB2_2: # %cond.end
; RV64I-NEXT:    subw a0, s0, a1
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    ld s0, 0(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: log2_ceil_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    addi a0, a0, -1
; RV64ZBB-NEXT:    clzw a0, a0
; RV64ZBB-NEXT:    li a1, 32
; RV64ZBB-NEXT:    subw a0, a1, a0
; RV64ZBB-NEXT:    ret
 %1 = sub i32 %a, 1
 %2 = call i32 @llvm.ctlz.i32(i32 %1, i1 false)
 %3 = sub i32 32, %2
```

```
 ret i32 %3
}

define signext i32 @findLastSet_i32(i32 signext %a) nounwind {
; RV64I-LABEL: findLastSet_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
;
 RV64I-NEXT:    sd s0, 0(sp) # 8-byte Folded Spill
; RV64I-NEXT:    mv s0, a0
; RV64I-NEXT:    srliw a0, a0, 1
; RV64I-NEXT:    or a0, s0, a0
; RV64I-NEXT:    srliw a1, a0, 2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 8
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addi a2, a2, 1365
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addi a1, a1, 819
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srliw a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:
  addiw a1, a1, 257
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 24
; RV64I-NEXT:    xori a0, a0, 31
; RV64I-NEXT:    snez a1, s0
; RV64I-NEXT:    addiw a1, a1, -1
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
```

```
; RV64I-NEXT:    ld s0, 0(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: findLastSet_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    clzw a1, a0
; RV64ZBB-NEXT:    xori a1, a1, 31
; RV64ZBB-NEXT:    snez a0, a0
; RV64ZBB-NEXT:    addiw a0, a0, -1
; RV64ZBB-NEXT:    or a0, a0, a1
; RV64ZBB-NEXT:    ret
 %1 = call i32 @llvm.ctlz.i32(i32 %a, i1 true)
 %2 = xor i32 31, %1
 %3 = icmp eq i32 %a, 0
 %4 = select i1 %3, i32 -1, i32 %2
 ret i32 %4
}

define i32 @ctlz_lshr_i32(i32 signext %a) {
; RV64I-LABEL: ctlz_lshr_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a0, a0, 1
; RV64I-NEXT:    beqz a0, .LBB4_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    addi sp, sp,
 -16
; RV64I-NEXT:    .cfi_def_cfa_offset 16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    .cfi_offset ra, -8
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 8
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addi a2, a2, 1365
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addi a1, a1, 819
```

```
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srliw a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    and a0,
 a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 24
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
; RV64I-NEXT:  .LBB4_2:
; RV64I-NEXT:    li a0, 32
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: ctlz_lshr_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    srliw a0, a0, 1
; RV64ZBB-NEXT:    clzw a0, a0
; RV64ZBB-NEXT:    ret
 %1 = lshr i32 %a, 1
 %2 = call i32 @llvm.ctlz.i32(i32 %1, i1 false)
 ret i32 %2
}

declare i64 @llvm.ctlz.i64(i64, i1)

define i64 @ctlz_i64(i64 %a) nounwind {
; RV64I-LABEL: ctlz_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    beqz a0, .LBB5_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    srli a1, a0, 1
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srli a1, a0, 2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srli a1, a0, 4
; RV64I-NEXT:
    or a0, a0, a1
; RV64I-NEXT:    srli a1, a0, 8
```

```
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srli a1, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srli a1, a0, 32
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    srli a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addiw a2, a2, 1365
; RV64I-NEXT:    slli a3, a2, 32
; RV64I-NEXT:    add a2, a2, a3
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    sub a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addiw a1, a1, 819
; RV64I-NEXT:    slli a2, a1, 32
; RV64I-NEXT:    add a1, a1, a2
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srli a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srli a1, a0, 4
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    slli a2, a1, 32
; RV64I-NEXT:    add a1, a1, a2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:
   addiw a1, a1, 257
; RV64I-NEXT:    slli a2, a1, 32
; RV64I-NEXT:    add a1, a1, a2
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srli a0, a0, 56
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
; RV64I-NEXT:  .LBB5_2:
; RV64I-NEXT:    li a0, 64
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: ctlz_i64:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    clz a0, a0
; RV64ZBB-NEXT:    ret
 %1 = call i64 @llvm.ctlz.i64(i64 %a, i1 false)
 ret i64 %1
```

```
}

declare i32 @llvm.cttz.i32(i32, i1)

define signext i32 @cttz_i32(i32 signext %a) nounwind {
; RV64I-LABEL: cttz_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    beqz a0, .LBB6_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    negw a1, a0
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 30667
; RV64I-NEXT:    addiw a1, a1, 1329
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 27
;
 RV64I-NEXT:    lui a1, %hi(.LCPI6_0)
; RV64I-NEXT:    addi a1, a1, %lo(.LCPI6_0)
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lbu a0, 0(a0)
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
; RV64I-NEXT:  .LBB6_2:
; RV64I-NEXT:    li a0, 32
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: cttz_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    ctzw a0, a0
; RV64ZBB-NEXT:    ret
 %1 = call i32 @llvm.cttz.i32(i32 %a, i1 false)
 ret i32 %1
}

define signext i32 @cttz_zero_undef_i32(i32 signext %a) nounwind {
; RV64I-LABEL: cttz_zero_undef_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    negw a1, a0
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 30667
; RV64I-NEXT:    addiw a1, a1, 1329
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 27
```

```
; RV64I-NEXT:    lui a1, %hi(.LCPI7_0)
; RV64I-NEXT:    addi a1, a1, %lo(.LCPI7_0)
; RV64I-NEXT:
   add a0, a1, a0
; RV64I-NEXT:    lbu a0, 0(a0)
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: cttz_zero_undef_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    ctzw a0, a0
; RV64ZBB-NEXT:    ret
 %1 = call i32 @llvm.cttz.i32(i32 %a, i1 true)
 ret i32 %1
}

define signext i32 @findFirstSet_i32(i32 signext %a) nounwind {
; RV64I-LABEL: findFirstSet_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    sd s0, 0(sp) # 8-byte Folded Spill
; RV64I-NEXT:    mv s0, a0
; RV64I-NEXT:    negw a0, a0
; RV64I-NEXT:    and a0, s0, a0
; RV64I-NEXT:    lui a1, 30667
; RV64I-NEXT:    addiw a1, a1, 1329
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 27
; RV64I-NEXT:    lui a1, %hi(.LCPI8_0)
; RV64I-NEXT:    addi a1, a1, %lo(.LCPI8_0)
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lbu a0, 0(a0)
; RV64I-NEXT:    snez a1, s0
; RV64I-NEXT:
   addi a1, a1, -1
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    ld s0, 0(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: findFirstSet_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    ctzw a1, a0
; RV64ZBB-NEXT:    snez a0, a0
; RV64ZBB-NEXT:    addiw a0, a0, -1
```

```
; RV64ZBB-NEXT:    or a0, a0, a1
; RV64ZBB-NEXT:    ret
 %1 = call i32 @llvm.cttz.i32(i32 %a, i1 true)
 %2 = icmp eq i32 %a, 0
 %3 = select i1 %2, i32 -1, i32 %1
 ret i32 %3
}

define signext i32 @ffs_i32(i32 signext %a) nounwind {
; RV64I-LABEL: ffs_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    sd s0, 0(sp) # 8-byte Folded Spill
; RV64I-NEXT:    mv s0, a0
; RV64I-NEXT:    negw a0, a0
; RV64I-NEXT:    and a0, s0, a0
; RV64I-NEXT:    lui a1, 30667
; RV64I-NEXT:    addiw a1, a1, 1329
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:
   srliw a0, a0, 27
; RV64I-NEXT:    lui a1, %hi(.LCPI9_0)
; RV64I-NEXT:    addi a1, a1, %lo(.LCPI9_0)
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lbu a0, 0(a0)
; RV64I-NEXT:    addi a0, a0, 1
; RV64I-NEXT:    seqz a1, s0
; RV64I-NEXT:    addi a1, a1, -1
; RV64I-NEXT:    and a0, a1, a0
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    ld s0, 0(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: ffs_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    ctzw a1, a0
; RV64ZBB-NEXT:    addi a1, a1, 1
; RV64ZBB-NEXT:    seqz a0, a0
; RV64ZBB-NEXT:    addi a0, a0, -1
; RV64ZBB-NEXT:    and a0, a0, a1
; RV64ZBB-NEXT:    zext.h a0, a0
; RV64ZBB-NEXT:    ret
 %1 = call i32 @llvm.cttz.i32(i32 %a, i1 true)
 %2 = add i32 %1, 1
```

```
 %3 = icmp eq i32 %a, 0
 %4 = select i1 %3, i32 0, i32 %2
 ret i32 %4
}

declare i64 @llvm.cttz.i64(i64, i1)

define i64 @cttz_i64(i64
 %a) nounwind {
; RV64I-LABEL: cttz_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    beqz a0, .LBB10_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    neg a1, a0
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, %hi(.LCPI10_0)
; RV64I-NEXT:    ld a1, %lo(.LCPI10_0)(a1)
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srli a0, a0, 58
; RV64I-NEXT:    lui a1, %hi(.LCPI10_1)
; RV64I-NEXT:    addi a1, a1, %lo(.LCPI10_1)
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lbu a0, 0(a0)
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
; RV64I-NEXT:  .LBB10_2:
; RV64I-NEXT:    li a0, 64
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: cttz_i64:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    ctz a0, a0
; RV64ZBB-NEXT:    ret
 %1 = call i64 @llvm.cttz.i64(i64 %a, i1 false)
 ret i64 %1
}

declare i32 @llvm.ctpop.i32(i32)

define signext i32 @ctpop_i32(i32
 signext %a) nounwind {
; RV64I-LABEL: ctpop_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
```

```
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addi a2, a2, 1365
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addi a1, a1, 819
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srliw a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 24
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: ctpop_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    cpopw
 a0, a0
; RV64ZBB-NEXT:    ret
 %1 = call i32 @llvm.ctpop.i32(i32 %a)
 ret i32 %1
}

define signext i32 @ctpop_i32_load(ptr %p) nounwind {
; RV64I-LABEL: ctpop_i32_load:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addi a2, a2, 1365
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addi a1, a1, 819
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srliw a0, a0, 2
```

```
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 24
; RV64I-NEXT:    ld ra, 8(sp)
 # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: ctpop_i32_load:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    lw a0, 0(a0)
; RV64ZBB-NEXT:    cpopw a0, a0
; RV64ZBB-NEXT:    ret
 %a = load i32, ptr %p
 %1 = call i32 @llvm.ctpop.i32(i32 %a)
 ret i32 %1
}

declare i64 @llvm.ctpop.i64(i64)

define i64 @ctpop_i64(i64 %a) nounwind {
; RV64I-LABEL: ctpop_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    srli a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addiw a2, a2, 1365
; RV64I-NEXT:    slli a3, a2, 32
; RV64I-NEXT:    add a2, a2, a3
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    sub a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addiw a1, a1, 819
; RV64I-NEXT:    slli a2, a1, 32
; RV64I-NEXT:    add a1, a1, a2
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srli a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2,
```

```
 a0
; RV64I-NEXT:    srli a1, a0, 4
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    slli a2, a1, 32
; RV64I-NEXT:    add a1, a1, a2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    slli a2, a1, 32
; RV64I-NEXT:    add a1, a1, a2
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srli a0, a0, 56
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: ctpop_i64:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    cpop a0, a0
; RV64ZBB-NEXT:    ret
 %1 = call i64 @llvm.ctpop.i64(i64 %a)
 ret i64 %1
}

define signext i32 @sextb_i32(i32 signext %a) nounwind {
; RV64I-LABEL: sextb_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 56
; RV64I-NEXT:    srai a0, a0, 56
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: sextb_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    sext.b a0, a0
; RV64ZBB-NEXT:
   ret
 %shl = shl i32 %a, 24
 %shr = ashr exact i32 %shl, 24
 ret i32 %shr
}

define i64 @sextb_i64(i64 %a) nounwind {
; RV64I-LABEL: sextb_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 56
; RV64I-NEXT:    srai a0, a0, 56
```

```
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: sextb_i64:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    sext.b a0, a0
; RV64ZBB-NEXT:    ret
 %shl = shl i64 %a, 56
 %shr = ashr exact i64 %shl, 56
 ret i64 %shr
}

define signext i32 @sexth_i32(i32 signext %a) nounwind {
; RV64I-LABEL: sexth_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srai a0, a0, 48
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: sexth_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    sext.h a0, a0
; RV64ZBB-NEXT:    ret
 %shl = shl i32 %a, 16
 %shr = ashr exact i32 %shl, 16
 ret i32 %shr
}

define i64 @sexth_i64(i64 %a) nounwind {
; RV64I-LABEL: sexth_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srai a0, a0, 48
; RV64I-NEXT:
   ret
;
; RV64ZBB-LABEL: sexth_i64:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    sext.h a0, a0
; RV64ZBB-NEXT:    ret
 %shl = shl i64 %a, 48
 %shr = ashr exact i64 %shl, 48
 ret i64 %shr
}

define signext i32 @min_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: min_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    blt a0, a1, .LBB18_2
```

```
; RV64I-NEXT:  # %bb.1:
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:  .LBB18_2:
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: min_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    min a0, a0, a1
; RV64ZBB-NEXT:    ret
 %cmp = icmp slt i32 %a, %b
 %cond = select i1 %cmp, i32 %a, i32 %b
 ret i32 %cond
}

define i64 @min_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: min_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    blt a0, a1, .LBB19_2
; RV64I-NEXT:  # %bb.1:
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:  .LBB19_2:
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: min_i64:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    min a0, a0, a1
; RV64ZBB-NEXT:    ret
 %cmp = icmp
 slt i64 %a, %b
 %cond = select i1 %cmp, i64 %a, i64 %b
 ret i64 %cond
}

define signext i32 @max_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: max_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    blt a1, a0, .LBB20_2
; RV64I-NEXT:  # %bb.1:
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:  .LBB20_2:
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: max_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    max a0, a0, a1
; RV64ZBB-NEXT:    ret
 %cmp = icmp sgt i32 %a, %b
 %cond = select i1 %cmp, i32 %a, i32 %b
```

```
 ret i32 %cond
}

define i64 @max_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: max_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    blt a1, a0, .LBB21_2
; RV64I-NEXT:  # %bb.1:
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:  .LBB21_2:
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: max_i64:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    max a0, a0, a1
; RV64ZBB-NEXT:    ret
 %cmp = icmp sgt i64 %a, %b
 %cond = select i1 %cmp, i64 %a, i64 %b
 ret i64 %cond
}

define signext i32 @minu_i32(i32 signext
 %a, i32 signext %b) nounwind {
; RV64I-LABEL: minu_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    bltu a0, a1, .LBB22_2
; RV64I-NEXT:  # %bb.1:
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:  .LBB22_2:
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: minu_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    minu a0, a0, a1
; RV64ZBB-NEXT:    ret
 %cmp = icmp ult i32 %a, %b
 %cond = select i1 %cmp, i32 %a, i32 %b
 ret i32 %cond
}

define i64 @minu_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: minu_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    bltu a0, a1, .LBB23_2
; RV64I-NEXT:  # %bb.1:
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:  .LBB23_2:
; RV64I-NEXT:    ret
```

```
;
; RV64ZBB-LABEL: minu_i64:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    minu a0, a0, a1
; RV64ZBB-NEXT:    ret
 %cmp = icmp ult i64 %a, %b
 %cond = select i1 %cmp, i64 %a, i64 %b
 ret i64 %cond
}

define signext i32 @maxu_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: maxu_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    bltu a1,
 a0, .LBB24_2
; RV64I-NEXT:  # %bb.1:
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:  .LBB24_2:
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: maxu_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    maxu a0, a0, a1
; RV64ZBB-NEXT:    ret
 %cmp = icmp ugt i32 %a, %b
 %cond = select i1 %cmp, i32 %a, i32 %b
 ret i32 %cond
}

define i64 @maxu_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: maxu_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    bltu a1, a0, .LBB25_2
; RV64I-NEXT:  # %bb.1:
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:  .LBB25_2:
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: maxu_i64:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    maxu a0, a0, a1
; RV64ZBB-NEXT:    ret
 %cmp = icmp ugt i64 %a, %b
 %cond = select i1 %cmp, i64 %a, i64 %b
 ret i64 %cond
}

declare i32 @llvm.abs.i32(i32, i1 immarg)
```

```
define i32 @abs_i32(i32 %x) {
; RV64I-LABEL: abs_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sraiw a1, a0, 31
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL:
 abs_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    sraiw a1, a0, 31
; RV64ZBB-NEXT:    xor a0, a0, a1
; RV64ZBB-NEXT:    subw a0, a0, a1
; RV64ZBB-NEXT:    ret
 %abs = tail call i32 @llvm.abs.i32(i32 %x, i1 true)
 ret i32 %abs
}

define signext i32 @abs_i32_sext(i32 signext %x) {
; RV64I-LABEL: abs_i32_sext:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sraiw a1, a0, 31
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: abs_i32_sext:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    sraiw a1, a0, 31
; RV64ZBB-NEXT:    xor a0, a0, a1
; RV64ZBB-NEXT:    subw a0, a0, a1
; RV64ZBB-NEXT:    ret
 %abs = tail call i32 @llvm.abs.i32(i32 %x, i1 true)
 ret i32 %abs
}

declare i64 @llvm.abs.i64(i64, i1 immarg)

define i64 @abs_i64(i64 %x) {
; RV64I-LABEL: abs_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srai a1, a0, 63
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    sub a0, a0, a1
; RV64I-NEXT:    ret
;
```

```
; RV64ZBB-LABEL: abs_i64:
; RV64ZBB:
       # %bb.0:
; RV64ZBB-NEXT:    neg a1, a0
; RV64ZBB-NEXT:    max a0, a0, a1
; RV64ZBB-NEXT:    ret
 %abs = tail call i64 @llvm.abs.i64(i64 %x, i1 true)
 ret i64 %abs
}

define i32 @zexth_i32(i32 %a) nounwind {
; RV64I-LABEL: zexth_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srli a0, a0, 48
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: zexth_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    slli a0, a0, 48
; RV64ZBB-NEXT:    srli a0, a0, 48
; RV64ZBB-NEXT:    ret
 %and = and i32 %a, 65535
 ret i32 %and
}

define i64 @zexth_i64(i64 %a) nounwind {
; RV64I-LABEL: zexth_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srli a0, a0, 48
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: zexth_i64:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    zext.h a0, a0
; RV64ZBB-NEXT:    ret
 %and = and i64 %a, 65535
 ret i64 %and
}

declare i32 @llvm.bswap.i32(i32)

define signext i32 @bswap_i32(i32 signext %a) nounwind {
; RV64I-LABEL: bswap_i32:
;
 RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a1, a0, 8
```

```
; RV64I-NEXT:    lui a2, 16
; RV64I-NEXT:    addiw a2, a2, -256
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    srliw a3, a0, 24
; RV64I-NEXT:    or a1, a1, a3
; RV64I-NEXT:    and a2, a0, a2
; RV64I-NEXT:    slliw a2, a2, 8
; RV64I-NEXT:    slliw a0, a0, 24
; RV64I-NEXT:    or a0, a0, a2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: bswap_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    rev8 a0, a0
; RV64ZBB-NEXT:    srai a0, a0, 32
; RV64ZBB-NEXT:    ret
 %1 = tail call i32 @llvm.bswap.i32(i32 %a)
 ret i32 %1
}

; Similar to bswap_i32 but the result is not sign extended.
define void @bswap_i32_nosext(i32 signext %a, ptr %x) nounwind {
; RV64I-LABEL: bswap_i32_nosext:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a2, a0, 8
; RV64I-NEXT:    lui a3, 16
; RV64I-NEXT:    addi a3, a3, -256
; RV64I-NEXT:    and a2, a2, a3
; RV64I-NEXT:    srliw a4, a0, 24
; RV64I-NEXT:    or a2, a2, a4
; RV64I-NEXT:
  and a3, a0, a3
; RV64I-NEXT:    slli a3, a3, 8
; RV64I-NEXT:    slli a0, a0, 24
; RV64I-NEXT:    or a0, a0, a3
; RV64I-NEXT:    or a0, a0, a2
; RV64I-NEXT:    sw a0, 0(a1)
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: bswap_i32_nosext:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    rev8 a0, a0
; RV64ZBB-NEXT:    srli a0, a0, 32
; RV64ZBB-NEXT:    sw a0, 0(a1)
; RV64ZBB-NEXT:    ret
 %1 = tail call i32 @llvm.bswap.i32(i32 %a)
 store i32 %1, ptr %x
```

```
 ret void
}

declare i64 @llvm.bswap.i64(i64)

define i64 @bswap_i64(i64 %a) {
; RV64I-LABEL: bswap_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srli a1, a0, 40
; RV64I-NEXT:    lui a2, 16
; RV64I-NEXT:    addiw a2, a2, -256
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    srli a3, a0, 56
; RV64I-NEXT:    or a1, a1, a3
; RV64I-NEXT:    srli a3, a0, 24
; RV64I-NEXT:    lui a4, 4080
; RV64I-NEXT:    and a3, a3, a4
; RV64I-NEXT:    srli a5, a0, 8
; RV64I-NEXT:    srliw a5, a5, 24
; RV64I-NEXT:    slli a5, a5, 24
; RV64I-NEXT:    or a3, a5, a3
; RV64I-NEXT:
   or a1, a3, a1
; RV64I-NEXT:    and a4, a0, a4
; RV64I-NEXT:    slli a4, a4, 24
; RV64I-NEXT:    srliw a3, a0, 24
; RV64I-NEXT:    slli a3, a3, 32
; RV64I-NEXT:    or a3, a4, a3
; RV64I-NEXT:    and a2, a0, a2
; RV64I-NEXT:    slli a2, a2, 40
; RV64I-NEXT:    slli a0, a0, 56
; RV64I-NEXT:    or a0, a0, a2
; RV64I-NEXT:    or a0, a0, a3
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: bswap_i64:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    rev8 a0, a0
; RV64ZBB-NEXT:    ret
 %1 = call i64 @llvm.bswap.i64(i64 %a)
 ret i64 %1
}
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefix=RV64I
; RUN: llc -mtriple=riscv64 -mattr=+zbkb -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefix=RV64ZBKB
```

```
define signext i32 @pack_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: pack_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srli a0, a0, 48
; RV64I-NEXT:    slliw a1, a1, 16
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: pack_i32:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    packw a0, a0, a1
; RV64ZBKB-NEXT:    ret
 %shl = and i32 %a, 65535
 %shl1 = shl i32 %b, 16
 %or = or i32 %shl1, %shl
 ret i32 %or
}

define signext i32 @pack_i32_2(i16 zeroext %a, i16 zeroext %b) nounwind {
; RV64I-LABEL: pack_i32_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slliw
 a1, a1, 16
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: pack_i32_2:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    packw a0, a0, a1
; RV64ZBKB-NEXT:    ret
 %zexta = zext i16 %a to i32
 %zextb = zext i16 %b to i32
 %shl1 = shl i32 %zextb, 16
 %or = or i32 %shl1, %zexta
 ret i32 %or
}

; Test case where we don't have a sign_extend_inreg after the or.
define signext i32 @pack_i32_3(i16 zeroext %0, i16 zeroext %1, i32 signext %2) {
; RV64I-LABEL: pack_i32_3:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    addw a0, a0, a2
; RV64I-NEXT:    ret
;
```

```
; RV64ZBKB-LABEL: pack_i32_3:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    packw a0, a1, a0
; RV64ZBKB-NEXT:    addw a0, a0, a2
; RV64ZBKB-NEXT:    ret
 %4 = zext i16 %0 to i32
 %5 = shl nuw i32 %4, 16
 %6 = zext i16 %1 to i32
 %7 = or i32 %5, %6
 %8 = add i32 %7, %2
 ret i32 %8
}

define i64 @pack_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: pack_i64:
;
 RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: pack_i64:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    pack a0, a0, a1
; RV64ZBKB-NEXT:    ret
 %shl = and i64 %a, 4294967295
 %shl1 = shl i64 %b, 32
 %or = or i64 %shl1, %shl
 ret i64 %or
}

define i64 @pack_i64_2(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: pack_i64_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: pack_i64_2:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    pack a0, a0, a1
; RV64ZBKB-NEXT:    ret
 %zexta = zext i32 %a to i64
 %zextb = zext i32 %b to i64
```

```
 %shl1 = shl i64 %zextb, 32
 %or = or i64 %shl1, %zexta
 ret i64 %or
}

define i64 @pack_i64_3(ptr %0, ptr %1) {
; RV64I-LABEL: pack_i64_3:
; RV64I:       #
 %bb.0:
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    lwu a1, 0(a1)
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: pack_i64_3:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    lw a0, 0(a0)
; RV64ZBKB-NEXT:    lwu a1, 0(a1)
; RV64ZBKB-NEXT:    pack a0, a1, a0
; RV64ZBKB-NEXT:    ret
 %3 = load i32, ptr %0, align 4
 %4 = zext i32 %3 to i64
 %5 = shl i64 %4, 32
 %6 = load i32, ptr %1, align 4
 %7 = zext i32 %6 to i64
 %8 = or i64 %5, %7
 ret i64 %8
}

define signext i32 @packh_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: packh_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    andi a0, a0, 255
; RV64I-NEXT:    slli a1, a1, 56
; RV64I-NEXT:    srli a1, a1, 48
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: packh_i32:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    packh a0, a0, a1
; RV64ZBKB-NEXT:    ret
 %and = and i32 %a, 255
 %and1 = shl i32 %b, 8
 %shl = and i32 %and1, 65280
 %or = or
```

```
 i32 %shl, %and
 ret i32 %or
}

define i32 @packh_i32_2(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: packh_i32_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    andi a0, a0, 255
; RV64I-NEXT:    andi a1, a1, 255
; RV64I-NEXT:    slliw a1, a1, 8
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: packh_i32_2:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    packh a0, a0, a1
; RV64ZBKB-NEXT:    ret
 %and = and i32 %a, 255
 %and1 = and i32 %b, 255
 %shl = shl i32 %and1, 8
 %or = or i32 %shl, %and
 ret i32 %or
}

define i64 @packh_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: packh_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    andi a0, a0, 255
; RV64I-NEXT:    slli a1, a1, 56
; RV64I-NEXT:    srli a1, a1, 48
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: packh_i64:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    packh a0, a0, a1
; RV64ZBKB-NEXT:    ret
 %and = and i64 %a, 255
 %and1 = shl i64 %b, 8
 %shl = and i64 %and1, 65280
 %or = or i64 %shl,
 %and
 ret i64 %or
}

define i64 @packh_i64_2(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: packh_i64_2:
; RV64I:       # %bb.0:
```

```
; RV64I-NEXT:    andi a0, a0, 255
; RV64I-NEXT:    andi a1, a1, 255
; RV64I-NEXT:    slli a1, a1, 8
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: packh_i64_2:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    packh a0, a0, a1
; RV64ZBKB-NEXT:    ret
 %and = and i64 %a, 255
 %and1 = and i64 %b, 255
 %shl = shl i64 %and1, 8
 %or = or i64 %shl, %and
 ret i64 %or
}

define zeroext i16 @packh_i16(i8 zeroext %a, i8 zeroext %b) nounwind {
; RV64I-LABEL: packh_i16:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slliw a1, a1, 8
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: packh_i16:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    packh a0, a0, a1
; RV64ZBKB-NEXT:    ret
 %zext = zext i8 %a to i16
 %zext1 = zext i8 %b to i16
 %shl = shl i16 %zext1, 8
 %or = or i16 %shl, %zext
 ret i16 %or
}

define zeroext i16 @packh_i16_2(i8
 zeroext %0, i8 zeroext %1, i8 zeroext %2) {
; RV64I-LABEL: packh_i16_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    slli a0, a0, 8
; RV64I-NEXT:    or a0, a0, a2
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srli a0, a0, 48
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: packh_i16_2:
; RV64ZBKB:       # %bb.0:
```

```
; RV64ZBKB-NEXT:    add a0, a1, a0
; RV64ZBKB-NEXT:    packh a0, a2, a0
; RV64ZBKB-NEXT:    ret
 %4 = add i8 %1, %0
 %5 = zext i8 %4 to i16
 %6 = shl i16 %5, 8
 %7 = zext i8 %2 to i16
 %8 = or i16 %6, %7
 ret i16 %8
}

define i64 @pack_i64_allWUsers(i32 signext %0, i32 signext %1, i32 signext %2) {
; RV64I-LABEL: pack_i64_allWUsers:
; RV64I:       # %bb.0:
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    slli a2, a2, 32
; RV64I-NEXT:    srli a2, a2, 32
; RV64I-NEXT:    or a0, a0, a2
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: pack_i64_allWUsers:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    add a0, a1, a0
; RV64ZBKB-NEXT:
    pack a0, a2, a0
; RV64ZBKB-NEXT:    ret
 %4 = add i32 %1, %0
 %5 = zext i32 %4 to i64
 %6 = shl i64 %5, 32
 %7 = zext i32 %2 to i64
 %8 = or i64 %6, %7
 ret i64 %8
}

define signext i32 @pack_i32_allWUsers(i16 zeroext %0, i16 zeroext %1, i16 zeroext %2) {
; RV64I-LABEL: pack_i32_allWUsers:
; RV64I:       # %bb.0:
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    slliw a0, a0, 16
; RV64I-NEXT:    or a0, a0, a2
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: pack_i32_allWUsers:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    add a0, a1, a0
; RV64ZBKB-NEXT:    packw a0, a2, a0
; RV64ZBKB-NEXT:    ret
```

```
 %4 = add i16 %1, %0
 %5 = zext i16 %4 to i32
 %6 = shl i32 %5, 16
 %7 = zext i16 %2 to i32
 %8 = or i32 %6, %7
 ret i32 %8
}

define i64 @pack_i64_imm() {
; RV64I-LABEL: pack_i64_imm:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 65793
; RV64I-NEXT:    addiw a0, a0, 16
; RV64I-NEXT:    slli a1, a0, 32
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL:
 pack_i64_imm:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    lui a0, 65793
; RV64ZBKB-NEXT:    addi a0, a0, 16
; RV64ZBKB-NEXT:    pack a0, a0, a0
; RV64ZBKB-NEXT:    ret
 ret i64 1157442765409226768 ; 0x0101010101010101
}
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -riscv-disable-using-constant-pool-for-large-ints -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefixes=RV64I,RV64-NOPOOL
; RUN: llc -mtriple=riscv64 -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefixes=RV64I,RV64I-POOL
; RUN: llc -mtriple=riscv64 -riscv-disable-using-constant-pool-for-large-ints -mattr=+zba \
; RUN:   -riscv-experimental-rv64-legal-i32 -verify-machineinstrs < %s | FileCheck %s -check-prefix=RV64IZBA
; RUN: llc -mtriple=riscv64 -riscv-disable-using-constant-pool-for-large-ints -mattr=+zbb \
; RUN:   -riscv-experimental-rv64-legal-i32 -verify-machineinstrs < %s | FileCheck %s -check-prefix=RV64IZBB
; RUN: llc -mtriple=riscv64 -riscv-disable-using-constant-pool-for-large-ints -mattr=+zbs \
; RUN:   -riscv-experimental-rv64-legal-i32 -verify-machineinstrs < %s | FileCheck
 %s -check-prefix=RV64IZBS
; RUN: llc -mtriple=riscv64 -riscv-disable-using-constant-pool-for-large-ints -mattr=+xtheadbb \
; RUN:   -riscv-experimental-rv64-legal-i32 -verify-machineinstrs < %s | FileCheck %s -check-
prefix=RV64IXTHEADBB

; Materializing constants

; TODO: It would be preferable if anyext constant returns were sign rather
; than zero extended. See PR39092. For now, mark returns as explicitly signext
; (this matches what Clang would generate for equivalent C/C++ anyway).
```

```
define signext i32 @zero() nounwind {
; RV64I-LABEL: zero:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, 0
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: zero:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, 0
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: zero:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, 0
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: zero:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a0, 0
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: zero:
; RV64IXTHEADBB:       # %bb.0:
;
 RV64IXTHEADBB-NEXT:    li a0, 0
; RV64IXTHEADBB-NEXT:    ret
 ret i32 0
}

define signext i32 @pos_small() nounwind {
; RV64I-LABEL: pos_small:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, 2047
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: pos_small:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, 2047
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: pos_small:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, 2047
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: pos_small:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a0, 2047
```

```
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: pos_small:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, 2047
; RV64IXTHEADBB-NEXT:    ret
 ret i32 2047
}

define signext i32 @neg_small() nounwind {
; RV64I-LABEL: neg_small:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, -2048
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: neg_small:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, -2048
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL:
 neg_small:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, -2048
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: neg_small:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a0, -2048
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: neg_small:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, -2048
; RV64IXTHEADBB-NEXT:    ret
 ret i32 -2048
}

define signext i32 @pos_i32() nounwind {
; RV64I-LABEL: pos_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 423811
; RV64I-NEXT:    addiw a0, a0, -1297
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: pos_i32:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 423811
```

```
; RV64IZBA-NEXT:    addiw a0, a0, -1297
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: pos_i32:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 423811
; RV64IZBB-NEXT:    addiw a0, a0, -1297
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: pos_i32:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 423811
; RV64IZBS-NEXT:    addiw a0, a0, -1297
; RV64IZBS-NEXT:
    ret
;
; RV64IXTHEADBB-LABEL: pos_i32:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 423811
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1297
; RV64IXTHEADBB-NEXT:    ret
 ret i32 1735928559
}

define signext i32 @neg_i32() nounwind {
; RV64I-LABEL: neg_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 912092
; RV64I-NEXT:    addiw a0, a0, -273
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: neg_i32:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 912092
; RV64IZBA-NEXT:    addiw a0, a0, -273
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: neg_i32:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 912092
; RV64IZBB-NEXT:    addiw a0, a0, -273
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: neg_i32:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 912092
; RV64IZBS-NEXT:    addiw a0, a0, -273
; RV64IZBS-NEXT:    ret
```

```
;
; RV64IXTHEADBB-LABEL: neg_i32:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 912092
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -273
;
 RV64IXTHEADBB-NEXT:    ret
 ret i32 -559038737
}

define signext i32 @pos_i32_hi20_only() nounwind {
; RV64I-LABEL: pos_i32_hi20_only:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 16
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: pos_i32_hi20_only:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 16
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: pos_i32_hi20_only:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 16
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: pos_i32_hi20_only:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 16
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: pos_i32_hi20_only:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 16
; RV64IXTHEADBB-NEXT:    ret
 ret i32 65536 ; 0x10000
}

define signext i32 @neg_i32_hi20_only() nounwind {
; RV64I-LABEL: neg_i32_hi20_only:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 1048560
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: neg_i32_hi20_only:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0,
```

```
 1048560
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: neg_i32_hi20_only:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 1048560
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: neg_i32_hi20_only:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 1048560
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: neg_i32_hi20_only:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 1048560
; RV64IXTHEADBB-NEXT:    ret
 ret i32 -65536 ; -0x10000
}

; This can be materialized with ADDI+SLLI, improving compressibility.

define signext i32 @imm_left_shifted_addi() nounwind {
; RV64I-LABEL: imm_left_shifted_addi:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 32
; RV64I-NEXT:    addiw a0, a0, -64
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_left_shifted_addi:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 32
; RV64IZBA-NEXT:    addiw a0, a0, -64
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_left_shifted_addi:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 32
;
 RV64IZBB-NEXT:    addiw a0, a0, -64
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_left_shifted_addi:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 32
; RV64IZBS-NEXT:    addiw a0, a0, -64
; RV64IZBS-NEXT:    ret
;
```

```
; RV64IXTHEADBB-LABEL: imm_left_shifted_addi:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 32
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -64
; RV64IXTHEADBB-NEXT:    ret
 ret i32 131008 ; 0x1FFC0
}

; This can be materialized with ADDI+SRLI, improving compressibility.

define signext i32 @imm_right_shifted_addi() nounwind {
; RV64I-LABEL: imm_right_shifted_addi:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 524288
; RV64I-NEXT:    addiw a0, a0, -1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_right_shifted_addi:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 524288
; RV64IZBA-NEXT:    addiw a0, a0, -1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_right_shifted_addi:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 524288
; RV64IZBB-NEXT:
    addiw a0, a0, -1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_right_shifted_addi:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 524288
; RV64IZBS-NEXT:    addiw a0, a0, -1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_right_shifted_addi:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 524288
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1
; RV64IXTHEADBB-NEXT:    ret
 ret i32 2147483647 ; 0x7FFFFFFF
}

; This can be materialized with LUI+SRLI, improving compressibility.

define signext i32 @imm_right_shifted_lui() nounwind {
; RV64I-LABEL: imm_right_shifted_lui:
```

```
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 56
; RV64I-NEXT:    addiw a0, a0, 580
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_right_shifted_lui:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 56
; RV64IZBA-NEXT:    addiw a0, a0, 580
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_right_shifted_lui:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 56
; RV64IZBB-NEXT:
    addiw a0, a0, 580
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_right_shifted_lui:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 56
; RV64IZBS-NEXT:    addiw a0, a0, 580
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_right_shifted_lui:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 56
; RV64IXTHEADBB-NEXT:    addiw a0, a0, 580
; RV64IXTHEADBB-NEXT:    ret
 ret i32 229956 ; 0x38244
}

define i64 @imm64_1() nounwind {
; RV64I-LABEL: imm64_1:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, 1
; RV64I-NEXT:    slli a0, a0, 31
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm64_1:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, 1
; RV64IZBA-NEXT:    slli a0, a0, 31
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm64_1:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, 1
```

```
; RV64IZBB-NEXT:    slli a0, a0, 31
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm64_1:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    bseti a0, zero, 31
; RV64IZBS-NEXT:    ret
;
;
 RV64IXTHEADBB-LABEL: imm64_1:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, 1
; RV64IXTHEADBB-NEXT:    slli a0, a0, 31
; RV64IXTHEADBB-NEXT:    ret
 ret i64 2147483648 ; 0x8000_0000
}

define i64 @imm64_2() nounwind {
; RV64I-LABEL: imm64_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, -1
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm64_2:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, -1
; RV64IZBA-NEXT:    srli a0, a0, 32
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm64_2:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, -1
; RV64IZBB-NEXT:    srli a0, a0, 32
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm64_2:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a0, -1
; RV64IZBS-NEXT:    srli a0, a0, 32
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm64_2:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, -1
; RV64IXTHEADBB-NEXT:    srli a0, a0, 32
; RV64IXTHEADBB-NEXT:    ret
 ret i64 4294967295 ;
```

```
 0xFFFF_FFFF
}

define i64 @imm64_3() nounwind {
; RV64I-LABEL: imm64_3:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, 1
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm64_3:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, 1
; RV64IZBA-NEXT:    slli a0, a0, 32
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm64_3:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, 1
; RV64IZBB-NEXT:    slli a0, a0, 32
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm64_3:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    bseti a0, zero, 32
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm64_3:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, 1
; RV64IXTHEADBB-NEXT:    slli a0, a0, 32
; RV64IXTHEADBB-NEXT:    ret
 ret i64 4294967296 ; 0x1_0000_0000
}

define i64 @imm64_4() nounwind {
; RV64I-LABEL: imm64_4:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, -1
; RV64I-NEXT:    slli a0, a0, 63
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm64_4:
; RV64IZBA:
    # %bb.0:
; RV64IZBA-NEXT:    li a0, -1
; RV64IZBA-NEXT:    slli a0, a0, 63
; RV64IZBA-NEXT:    ret
```

```
;
; RV64IZBB-LABEL: imm64_4:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, -1
; RV64IZBB-NEXT:    slli a0, a0, 63
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm64_4:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    bseti a0, zero, 63
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm64_4:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, -1
; RV64IXTHEADBB-NEXT:    slli a0, a0, 63
; RV64IXTHEADBB-NEXT:    ret
 ret i64 9223372036854775808 ; 0x8000_0000_0000_0000
}

define i64 @imm64_5() nounwind {
; RV64I-LABEL: imm64_5:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, -1
; RV64I-NEXT:    slli a0, a0, 63
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm64_5:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, -1
; RV64IZBA-NEXT:    slli a0, a0, 63
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm64_5:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, -1
; RV64IZBB-NEXT:
    slli a0, a0, 63
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm64_5:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    bseti a0, zero, 63
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm64_5:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, -1
```

```
; RV64IXTHEADBB-NEXT:    slli a0, a0, 63
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -9223372036854775808 ; 0x8000_0000_0000_0000
}

define i64 @imm64_6() nounwind {
; RV64I-LABEL: imm64_6:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 9321
; RV64I-NEXT:    addi a0, a0, -1329
; RV64I-NEXT:    slli a0, a0, 35
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm64_6:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 9321
; RV64IZBA-NEXT:    addi a0, a0, -1329
; RV64IZBA-NEXT:    slli a0, a0, 35
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm64_6:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 9321
; RV64IZBB-NEXT:    addi a0, a0, -1329
; RV64IZBB-NEXT:    slli a0, a0, 35
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm64_6:
;
 RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 9321
; RV64IZBS-NEXT:    addi a0, a0, -1329
; RV64IZBS-NEXT:    slli a0, a0, 35
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm64_6:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 9321
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1329
; RV64IXTHEADBB-NEXT:    slli a0, a0, 35
; RV64IXTHEADBB-NEXT:    ret
 ret i64 1311768464867721216 ; 0x1234_5678_0000_0000
}

define i64 @imm64_7() nounwind {
; RV64I-LABEL: imm64_7:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, 7
```

```
; RV64I-NEXT:    slli a0, a0, 36
; RV64I-NEXT:    addi a0, a0, 11
; RV64I-NEXT:    slli a0, a0, 24
; RV64I-NEXT:    addi a0, a0, 15
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm64_7:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, 7
; RV64IZBA-NEXT:    slli a0, a0, 36
; RV64IZBA-NEXT:    addi a0, a0, 11
; RV64IZBA-NEXT:    slli a0, a0, 24
; RV64IZBA-NEXT:    addi a0, a0, 15
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm64_7:
; RV64IZBB:       #
 %bb.0:
; RV64IZBB-NEXT:    li a0, 7
; RV64IZBB-NEXT:    slli a0, a0, 36
; RV64IZBB-NEXT:    addi a0, a0, 11
; RV64IZBB-NEXT:    slli a0, a0, 24
; RV64IZBB-NEXT:    addi a0, a0, 15
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm64_7:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a0, 7
; RV64IZBS-NEXT:    slli a0, a0, 36
; RV64IZBS-NEXT:    addi a0, a0, 11
; RV64IZBS-NEXT:    slli a0, a0, 24
; RV64IZBS-NEXT:    addi a0, a0, 15
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm64_7:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, 7
; RV64IXTHEADBB-NEXT:    slli a0, a0, 36
; RV64IXTHEADBB-NEXT:    addi a0, a0, 11
; RV64IXTHEADBB-NEXT:    slli a0, a0, 24
; RV64IXTHEADBB-NEXT:    addi a0, a0, 15
; RV64IXTHEADBB-NEXT:    ret
 ret i64 8070450532432478223 ; 0x7000_0000_0B00_000F
}

; TODO: it can be preferable to put constants that are expensive to materialise
; into the constant pool, especially for -Os.
define i64 @imm64_8() nounwind {
```

```
; RV64-NOPOOL-LABEL: imm64_8:
; RV64-NOPOOL:
      # %bb.0:
; RV64-NOPOOL-NEXT:    lui a0, 583
; RV64-NOPOOL-NEXT:    addiw a0, a0, -1875
; RV64-NOPOOL-NEXT:    slli a0, a0, 14
; RV64-NOPOOL-NEXT:    addi a0, a0, -947
; RV64-NOPOOL-NEXT:    slli a0, a0, 12
; RV64-NOPOOL-NEXT:    addi a0, a0, 1511
; RV64-NOPOOL-NEXT:    slli a0, a0, 13
; RV64-NOPOOL-NEXT:    addi a0, a0, -272
; RV64-NOPOOL-NEXT:    ret
;
; RV64I-POOL-LABEL: imm64_8:
; RV64I-POOL:       # %bb.0:
; RV64I-POOL-NEXT:    lui a0, %hi(.LCPI17_0)
; RV64I-POOL-NEXT:    ld a0, %lo(.LCPI17_0)(a0)
; RV64I-POOL-NEXT:    ret
;
; RV64IZBA-LABEL: imm64_8:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 596523
; RV64IZBA-NEXT:    addi a0, a0, 965
; RV64IZBA-NEXT:    slli.uw a0, a0, 13
; RV64IZBA-NEXT:    addi a0, a0, -1347
; RV64IZBA-NEXT:    slli a0, a0, 12
; RV64IZBA-NEXT:    addi a0, a0, -529
; RV64IZBA-NEXT:    slli a0, a0, 4
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm64_8:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 583
; RV64IZBB-NEXT:    addiw
 a0, a0, -1875
; RV64IZBB-NEXT:    slli a0, a0, 14
; RV64IZBB-NEXT:    addi a0, a0, -947
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, 1511
; RV64IZBB-NEXT:    slli a0, a0, 13
; RV64IZBB-NEXT:    addi a0, a0, -272
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm64_8:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 583
; RV64IZBS-NEXT:    addiw a0, a0, -1875
; RV64IZBS-NEXT:    slli a0, a0, 14
```

```
; RV64IZBS-NEXT:    addi a0, a0, -947
; RV64IZBS-NEXT:    slli a0, a0, 12
; RV64IZBS-NEXT:    addi a0, a0, 1511
; RV64IZBS-NEXT:    slli a0, a0, 13
; RV64IZBS-NEXT:    addi a0, a0, -272
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm64_8:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 583
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1875
; RV64IXTHEADBB-NEXT:    slli a0, a0, 14
; RV64IXTHEADBB-NEXT:    addi a0, a0, -947
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    addi a0, a0, 1511
; RV64IXTHEADBB-NEXT:    slli a0, a0, 13
; RV64IXTHEADBB-NEXT:
    addi a0, a0, -272
; RV64IXTHEADBB-NEXT:    ret
 ret i64 1311768467463790320 ; 0x1234_5678_9ABC_DEF0
}

define i64 @imm64_9() nounwind {
; RV64I-LABEL: imm64_9:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, -1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm64_9:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, -1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm64_9:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, -1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm64_9:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a0, -1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm64_9:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, -1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -1
```

```
}

; Various cases where extraneous ADDIs can be inserted where a (left shifted)
; LUI suffices.

define i64 @imm_left_shifted_lui_1() nounwind {
; RV64I-LABEL: imm_left_shifted_lui_1:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 262145
; RV64I-NEXT:    slli a0, a0, 1
;
 RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_left_shifted_lui_1:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 262145
; RV64IZBA-NEXT:    slli a0, a0, 1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_left_shifted_lui_1:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 262145
; RV64IZBB-NEXT:    slli a0, a0, 1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_left_shifted_lui_1:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 262145
; RV64IZBS-NEXT:    slli a0, a0, 1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_left_shifted_lui_1:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 262145
; RV64IXTHEADBB-NEXT:    slli a0, a0, 1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 2147491840 ; 0x8000_2000
}

define i64 @imm_left_shifted_lui_2() nounwind {
; RV64I-LABEL: imm_left_shifted_lui_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 262145
; RV64I-NEXT:    slli a0, a0, 2
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_left_shifted_lui_2:
; RV64IZBA:
```

```
 # %bb.0:
; RV64IZBA-NEXT:    lui a0, 262145
; RV64IZBA-NEXT:    slli a0, a0, 2
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_left_shifted_lui_2:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 262145
; RV64IZBB-NEXT:    slli a0, a0, 2
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_left_shifted_lui_2:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 262145
; RV64IZBS-NEXT:    slli a0, a0, 2
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_left_shifted_lui_2:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 262145
; RV64IXTHEADBB-NEXT:    slli a0, a0, 2
; RV64IXTHEADBB-NEXT:    ret
 ret i64 4294983680 ; 0x1_0000_4000
}

define i64 @imm_left_shifted_lui_3() nounwind {
; RV64I-LABEL: imm_left_shifted_lui_3:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 4097
; RV64I-NEXT:    slli a0, a0, 20
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_left_shifted_lui_3:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 4097
; RV64IZBA-NEXT:    slli a0, a0, 20
;
 RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_left_shifted_lui_3:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 4097
; RV64IZBB-NEXT:    slli a0, a0, 20
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_left_shifted_lui_3:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 4097
```

```
; RV64IZBS-NEXT:    slli a0, a0, 20
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_left_shifted_lui_3:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 4097
; RV64IXTHEADBB-NEXT:    slli a0, a0, 20
; RV64IXTHEADBB-NEXT:    ret
 ret i64 17596481011712 ; 0x1001_0000_0000
}

; Various cases where extraneous ADDIs can be inserted where a (right shifted)
; LUI suffices, or where multiple ADDIs can be used instead of a single LUI.

define i64 @imm_right_shifted_lui_1() nounwind {
; RV64I-LABEL: imm_right_shifted_lui_1:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 983056
; RV64I-NEXT:    srli a0, a0, 16
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_right_shifted_lui_1:
; RV64IZBA:
     # %bb.0:
; RV64IZBA-NEXT:    lui a0, 983056
; RV64IZBA-NEXT:    srli a0, a0, 16
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_right_shifted_lui_1:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 983056
; RV64IZBB-NEXT:    srli a0, a0, 16
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_right_shifted_lui_1:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 983056
; RV64IZBS-NEXT:    srli a0, a0, 16
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_right_shifted_lui_1:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 983056
; RV64IXTHEADBB-NEXT:    srli a0, a0, 16
; RV64IXTHEADBB-NEXT:    ret
 ret i64 281474976706561 ; 0xFFFF_FFFF_F001
}
```

```
define i64 @imm_right_shifted_lui_2() nounwind {
; RV64I-LABEL: imm_right_shifted_lui_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 1044481
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    srli a0, a0, 24
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_right_shifted_lui_2:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:
   lui a0, 1044481
; RV64IZBA-NEXT:    slli a0, a0, 12
; RV64IZBA-NEXT:    srli a0, a0, 24
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_right_shifted_lui_2:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 1044481
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    srli a0, a0, 24
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_right_shifted_lui_2:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 1044481
; RV64IZBS-NEXT:    slli a0, a0, 12
; RV64IZBS-NEXT:    srli a0, a0, 24
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_right_shifted_lui_2:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 1044481
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    srli a0, a0, 24
; RV64IXTHEADBB-NEXT:    ret
 ret i64 1099511623681 ; 0xFF_FFFF_F001
}

; We can materialize the upper bits with a single (shifted) LUI, but that option
; can be missed due to the lower bits, which aren't just 1s or just 0s.

define i64 @imm_decoupled_lui_addi() nounwind
 {
; RV64I-LABEL: imm_decoupled_lui_addi:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 4097
; RV64I-NEXT:    slli a0, a0, 20
```

```
; RV64I-NEXT:    addi a0, a0, -3
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_decoupled_lui_addi:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 4097
; RV64IZBA-NEXT:    slli a0, a0, 20
; RV64IZBA-NEXT:    addi a0, a0, -3
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_decoupled_lui_addi:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 4097
; RV64IZBB-NEXT:    slli a0, a0, 20
; RV64IZBB-NEXT:    addi a0, a0, -3
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_decoupled_lui_addi:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 4097
; RV64IZBS-NEXT:    slli a0, a0, 20
; RV64IZBS-NEXT:    addi a0, a0, -3
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_decoupled_lui_addi:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 4097
; RV64IXTHEADBB-NEXT:    slli a0, a0, 20
; RV64IXTHEADBB-NEXT:    addi a0, a0, -3
; RV64IXTHEADBB-NEXT:
    ret
 ret i64 17596481011709 ; 0x1000_FFFF_FFFD
}

; This constant can be materialized for RV64 with LUI+SRLI+XORI.

define i64 @imm_end_xori_1() nounwind {
; RV64I-LABEL: imm_end_xori_1:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 983040
; RV64I-NEXT:    srli a0, a0, 3
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_end_xori_1:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 983040
; RV64IZBA-NEXT:    srli a0, a0, 3
```

```
; RV64IZBA-NEXT:    not a0, a0
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_end_xori_1:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 983040
; RV64IZBB-NEXT:    srli a0, a0, 3
; RV64IZBB-NEXT:    not a0, a0
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_end_xori_1:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 983040
; RV64IZBS-NEXT:    srli a0, a0, 3
; RV64IZBS-NEXT:    not a0, a0
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_end_xori_1:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:
  lui a0, 983040
; RV64IXTHEADBB-NEXT:    srli a0, a0, 3
; RV64IXTHEADBB-NEXT:    not a0, a0
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -2305843009180139521 ; 0xE000_0000_01FF_FFFF
}

; This constant can be materialized for RV64 with ADDI+SLLI+ADDI+ADDI.

define i64 @imm_end_2addi_1() nounwind {
; RV64I-LABEL: imm_end_2addi_1:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, -2047
; RV64I-NEXT:    slli a0, a0, 39
; RV64I-NEXT:    addi a0, a0, -2048
; RV64I-NEXT:    addi a0, a0, -1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_end_2addi_1:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, -2047
; RV64IZBA-NEXT:    slli a0, a0, 39
; RV64IZBA-NEXT:    addi a0, a0, -2048
; RV64IZBA-NEXT:    addi a0, a0, -1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_end_2addi_1:
; RV64IZBB:       # %bb.0:
```

```
; RV64IZBB-NEXT:    li a0, -2047
; RV64IZBB-NEXT:    slli a0, a0, 39
; RV64IZBB-NEXT:    addi a0, a0, -2048
; RV64IZBB-NEXT:    addi a0, a0, -1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_end_2addi_1:
;
 RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a0, -2047
; RV64IZBS-NEXT:    slli a0, a0, 39
; RV64IZBS-NEXT:    addi a0, a0, -2048
; RV64IZBS-NEXT:    addi a0, a0, -1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_end_2addi_1:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, -2047
; RV64IXTHEADBB-NEXT:    slli a0, a0, 39
; RV64IXTHEADBB-NEXT:    addi a0, a0, -2048
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -1125350151030785 ; 0xFFFC_007F_FFFF_F7FF
}

; This constant can be more efficiently materialized for RV64 if we use two
; registers instead of one.

define i64 @imm_2reg_1() nounwind {
; RV64I-LABEL: imm_2reg_1:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 74565
; RV64I-NEXT:    addiw a0, a0, 1656
; RV64I-NEXT:    slli a1, a0, 57
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_2reg_1:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 74565
; RV64IZBA-NEXT:    addiw a0, a0, 1656
; RV64IZBA-NEXT:
   slli a1, a0, 57
; RV64IZBA-NEXT:    add a0, a0, a1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_2reg_1:
; RV64IZBB:       # %bb.0:
```

```
; RV64IZBB-NEXT:    lui a0, 74565
; RV64IZBB-NEXT:    addiw a0, a0, 1656
; RV64IZBB-NEXT:    slli a1, a0, 57
; RV64IZBB-NEXT:    add a0, a0, a1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_2reg_1:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 74565
; RV64IZBS-NEXT:    addiw a0, a0, 1656
; RV64IZBS-NEXT:    slli a1, a0, 57
; RV64IZBS-NEXT:    add a0, a0, a1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_2reg_1:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 74565
; RV64IXTHEADBB-NEXT:    addiw a0, a0, 1656
; RV64IXTHEADBB-NEXT:    slli a1, a0, 57
; RV64IXTHEADBB-NEXT:    add a0, a0, a1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -1152921504301427080 ; 0xF000_0000_1234_5678
}

; FIXME: This should use a single ADDI for the immediate.
define void @imm_store_i16_neg1(ptr %p) nounwind {
; RV64I-LABEL: imm_store_i16_neg1:
;
 RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, -1
; RV64I-NEXT:    sh a1, 0(a0)
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_store_i16_neg1:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a1, -1
; RV64IZBA-NEXT:    sh a1, 0(a0)
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_store_i16_neg1:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a1, -1
; RV64IZBB-NEXT:    sh a1, 0(a0)
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_store_i16_neg1:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a1, -1
```

```
; RV64IZBS-NEXT:    sh a1, 0(a0)
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_store_i16_neg1:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a1, -1
; RV64IXTHEADBB-NEXT:    sh a1, 0(a0)
; RV64IXTHEADBB-NEXT:    ret
 store i16 -1, ptr %p
 ret void
}

; FIXME: This should use a single ADDI for the immediate.
define void @imm_store_i32_neg1(ptr %p) nounwind {
; RV64I-LABEL: imm_store_i32_neg1:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, -1
; RV64I-NEXT:
  sw a1, 0(a0)
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_store_i32_neg1:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a1, -1
; RV64IZBA-NEXT:    sw a1, 0(a0)
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_store_i32_neg1:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a1, -1
; RV64IZBB-NEXT:    sw a1, 0(a0)
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_store_i32_neg1:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a1, -1
; RV64IZBS-NEXT:    sw a1, 0(a0)
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_store_i32_neg1:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a1, -1
; RV64IXTHEADBB-NEXT:    sw a1, 0(a0)
; RV64IXTHEADBB-NEXT:    ret
 store i32 -1, ptr %p
 ret void
}
```

```
define i64 @imm_5372288229() {
; RV64I-LABEL: imm_5372288229:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 160
; RV64I-NEXT:    addiw a0, a0, 437
; RV64I-NEXT:    slli a0, a0, 13
; RV64I-NEXT:    addi a0, a0, -795
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_5372288229:
; RV64IZBA:
      # %bb.0:
; RV64IZBA-NEXT:    lui a0, 655797
; RV64IZBA-NEXT:    slli.uw a0, a0, 1
; RV64IZBA-NEXT:    addi a0, a0, -795
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_5372288229:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 160
; RV64IZBB-NEXT:    addiw a0, a0, 437
; RV64IZBB-NEXT:    slli a0, a0, 13
; RV64IZBB-NEXT:    addi a0, a0, -795
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_5372288229:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 263018
; RV64IZBS-NEXT:    addiw a0, a0, -795
; RV64IZBS-NEXT:    bseti a0, a0, 32
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_5372288229:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 160
; RV64IXTHEADBB-NEXT:    addiw a0, a0, 437
; RV64IXTHEADBB-NEXT:    slli a0, a0, 13
; RV64IXTHEADBB-NEXT:    addi a0, a0, -795
; RV64IXTHEADBB-NEXT:    ret
 ret i64 5372288229
}

define i64 @imm_neg_5372288229() {
; RV64I-LABEL: imm_neg_5372288229:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 1048416
; RV64I-NEXT:
```

```
   addiw a0, a0, -437
; RV64I-NEXT:    slli a0, a0, 13
; RV64I-NEXT:    addi a0, a0, 795
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_5372288229:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 611378
; RV64IZBA-NEXT:    addiw a0, a0, 265
; RV64IZBA-NEXT:    sh1add a0, a0, a0
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_neg_5372288229:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 1048416
; RV64IZBB-NEXT:    addiw a0, a0, -437
; RV64IZBB-NEXT:    slli a0, a0, 13
; RV64IZBB-NEXT:    addi a0, a0, 795
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_5372288229:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 785558
; RV64IZBS-NEXT:    addiw a0, a0, 795
; RV64IZBS-NEXT:    bclri a0, a0, 32
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_neg_5372288229:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 1048416
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -437
; RV64IXTHEADBB-NEXT:    slli a0, a0, 13
; RV64IXTHEADBB-NEXT:    addi a0, a0,
 795
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -5372288229
}

define i64 @imm_8953813715() {
; RV64I-LABEL: imm_8953813715:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 267
; RV64I-NEXT:    addiw a0, a0, -637
; RV64I-NEXT:    slli a0, a0, 13
; RV64I-NEXT:    addi a0, a0, -1325
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_8953813715:
```

```
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 437198
; RV64IZBA-NEXT:    addiw a0, a0, -265
; RV64IZBA-NEXT:    sh2add a0, a0, a0
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_8953813715:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 267
; RV64IZBB-NEXT:    addiw a0, a0, -637
; RV64IZBB-NEXT:    slli a0, a0, 13
; RV64IZBB-NEXT:    addi a0, a0, -1325
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_8953813715:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 88838
; RV64IZBS-NEXT:    addiw a0, a0, -1325
; RV64IZBS-NEXT:    bseti a0, a0, 33
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_8953813715:
; RV64IXTHEADBB:       # %bb.0:
;
 RV64IXTHEADBB-NEXT:    lui a0, 267
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -637
; RV64IXTHEADBB-NEXT:    slli a0, a0, 13
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1325
; RV64IXTHEADBB-NEXT:    ret
 ret i64 8953813715
}

define i64 @imm_neg_8953813715() {
; RV64I-LABEL: imm_neg_8953813715:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 1048309
; RV64I-NEXT:    addiw a0, a0, 637
; RV64I-NEXT:    slli a0, a0, 13
; RV64I-NEXT:    addi a0, a0, 1325
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_8953813715:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 611378
; RV64IZBA-NEXT:    addiw a0, a0, 265
; RV64IZBA-NEXT:    sh2add a0, a0, a0
; RV64IZBA-NEXT:    ret
;
```

```
; RV64IZBB-LABEL: imm_neg_8953813715:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 1048309
; RV64IZBB-NEXT:    addiw a0, a0, 637
; RV64IZBB-NEXT:    slli a0, a0, 13
; RV64IZBB-NEXT:    addi a0, a0, 1325
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_8953813715:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:
   lui a0, 959738
; RV64IZBS-NEXT:    addiw a0, a0, 1325
; RV64IZBS-NEXT:    bclri a0, a0, 33
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_neg_8953813715:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 1048309
; RV64IXTHEADBB-NEXT:    addiw a0, a0, 637
; RV64IXTHEADBB-NEXT:    slli a0, a0, 13
; RV64IXTHEADBB-NEXT:    addi a0, a0, 1325
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -8953813715
}

define i64 @imm_16116864687() {
; RV64I-LABEL: imm_16116864687:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 961
; RV64I-NEXT:    addiw a0, a0, -1475
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    addi a0, a0, 1711
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_16116864687:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 437198
; RV64IZBA-NEXT:    addiw a0, a0, -265
; RV64IZBA-NEXT:    sh3add a0, a0, a0
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_16116864687:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 961
; RV64IZBB-NEXT:    addiw a0, a0, -1475
; RV64IZBB-NEXT:
```

```
   slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, 1711
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_16116864687:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 961
; RV64IZBS-NEXT:    addiw a0, a0, -1475
; RV64IZBS-NEXT:    slli a0, a0, 12
; RV64IZBS-NEXT:    addi a0, a0, 1711
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_16116864687:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 961
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1475
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    addi a0, a0, 1711
; RV64IXTHEADBB-NEXT:    ret
 ret i64 16116864687
}

define i64 @imm_neg_16116864687() {
; RV64I-LABEL: imm_neg_16116864687:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 1047615
; RV64I-NEXT:    addiw a0, a0, 1475
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    addi a0, a0, -1711
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_16116864687:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 611378
; RV64IZBA-NEXT:
 addiw a0, a0, 265
; RV64IZBA-NEXT:    sh3add a0, a0, a0
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_neg_16116864687:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 1047615
; RV64IZBB-NEXT:    addiw a0, a0, 1475
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, -1711
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_16116864687:
```

```
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 1047615
; RV64IZBS-NEXT:    addiw a0, a0, 1475
; RV64IZBS-NEXT:    slli a0, a0, 12
; RV64IZBS-NEXT:    addi a0, a0, -1711
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_neg_16116864687:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 1047615
; RV64IXTHEADBB-NEXT:    addiw a0, a0, 1475
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1711
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -16116864687
}

define i64 @imm_2344336315() {
; RV64I-LABEL: imm_2344336315:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 143087
; RV64I-NEXT:
   slli a0, a0, 2
; RV64I-NEXT:    addi a0, a0, -1093
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_2344336315:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 143087
; RV64IZBA-NEXT:    slli a0, a0, 2
; RV64IZBA-NEXT:    addi a0, a0, -1093
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_2344336315:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 143087
; RV64IZBB-NEXT:    slli a0, a0, 2
; RV64IZBB-NEXT:    addi a0, a0, -1093
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_2344336315:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 143087
; RV64IZBS-NEXT:    slli a0, a0, 2
; RV64IZBS-NEXT:    addi a0, a0, -1093
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_2344336315:
```

```
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 143087
; RV64IXTHEADBB-NEXT:    slli a0, a0, 2
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1093
; RV64IXTHEADBB-NEXT:    ret
 ret i64 2344336315 ; 0x8bbbbbbb
}

define i64 @imm_70370820078523() {
; RV64-NOPOOL-LABEL: imm_70370820078523:
;
 RV64-NOPOOL:       # %bb.0:
; RV64-NOPOOL-NEXT:    lui a0, 256
; RV64-NOPOOL-NEXT:    addiw a0, a0, 31
; RV64-NOPOOL-NEXT:    slli a0, a0, 12
; RV64-NOPOOL-NEXT:    addi a0, a0, -273
; RV64-NOPOOL-NEXT:    slli a0, a0, 14
; RV64-NOPOOL-NEXT:    addi a0, a0, -1093
; RV64-NOPOOL-NEXT:    ret
;
; RV64I-POOL-LABEL: imm_70370820078523:
; RV64I-POOL:       # %bb.0:
; RV64I-POOL-NEXT:    lui a0, %hi(.LCPI37_0)
; RV64I-POOL-NEXT:    ld a0, %lo(.LCPI37_0)(a0)
; RV64I-POOL-NEXT:    ret
;
; RV64IZBA-LABEL: imm_70370820078523:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 256
; RV64IZBA-NEXT:    addiw a0, a0, 31
; RV64IZBA-NEXT:    slli a0, a0, 12
; RV64IZBA-NEXT:    addi a0, a0, -273
; RV64IZBA-NEXT:    slli a0, a0, 14
; RV64IZBA-NEXT:    addi a0, a0, -1093
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_70370820078523:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 256
; RV64IZBB-NEXT:    addiw a0, a0, 31
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, -273
;
 RV64IZBB-NEXT:    slli a0, a0, 14
; RV64IZBB-NEXT:    addi a0, a0, -1093
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_70370820078523:
```

```
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 506812
; RV64IZBS-NEXT:    addiw a0, a0, -1093
; RV64IZBS-NEXT:    bseti a0, a0, 46
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_70370820078523:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 256
; RV64IXTHEADBB-NEXT:    addiw a0, a0, 31
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    addi a0, a0, -273
; RV64IXTHEADBB-NEXT:    slli a0, a0, 14
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1093
; RV64IXTHEADBB-NEXT:    ret
 ret i64 70370820078523 ; 0x40007bbbbbbb
}

define i64 @imm_neg_9223372034778874949() {
; RV64I-LABEL: imm_neg_9223372034778874949:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 506812
; RV64I-NEXT:    addiw a0, a0, -1093
; RV64I-NEXT:    slli a1, a0, 63
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_9223372034778874949:
;
 RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 506812
; RV64IZBA-NEXT:    addiw a0, a0, -1093
; RV64IZBA-NEXT:    slli a1, a0, 63
; RV64IZBA-NEXT:    add a0, a0, a1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_neg_9223372034778874949:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 506812
; RV64IZBB-NEXT:    addiw a0, a0, -1093
; RV64IZBB-NEXT:    slli a1, a0, 63
; RV64IZBB-NEXT:    add a0, a0, a1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_9223372034778874949:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 506812
; RV64IZBS-NEXT:    addiw a0, a0, -1093
```

```
; RV64IZBS-NEXT:    bseti a0, a0, 63
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_neg_9223372034778874949:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 506812
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1093
; RV64IXTHEADBB-NEXT:    slli a1, a0, 63
; RV64IXTHEADBB-NEXT:    add a0, a0, a1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -9223372034778874949 ; 0x800000007bbbbbbb
}

define
 i64 @imm_neg_9223301666034697285() {
; RV64-NOPOOL-LABEL: imm_neg_9223301666034697285:
; RV64-NOPOOL:       # %bb.0:
; RV64-NOPOOL-NEXT:    lui a0, 917505
; RV64-NOPOOL-NEXT:    slli a0, a0, 8
; RV64-NOPOOL-NEXT:    addi a0, a0, 31
; RV64-NOPOOL-NEXT:    slli a0, a0, 12
; RV64-NOPOOL-NEXT:    addi a0, a0, -273
; RV64-NOPOOL-NEXT:    slli a0, a0, 14
; RV64-NOPOOL-NEXT:    addi a0, a0, -1093
; RV64-NOPOOL-NEXT:    ret
;
; RV64I-POOL-LABEL: imm_neg_9223301666034697285:
; RV64I-POOL:       # %bb.0:
; RV64I-POOL-NEXT:    lui a0, %hi(.LCPI39_0)
; RV64I-POOL-NEXT:    ld a0, %lo(.LCPI39_0)(a0)
; RV64I-POOL-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_9223301666034697285:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 917505
; RV64IZBA-NEXT:    slli a0, a0, 8
; RV64IZBA-NEXT:    addi a0, a0, 31
; RV64IZBA-NEXT:    slli a0, a0, 12
; RV64IZBA-NEXT:    addi a0, a0, -273
; RV64IZBA-NEXT:    slli a0, a0, 14
; RV64IZBA-NEXT:    addi a0, a0, -1093
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL:
 imm_neg_9223301666034697285:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 917505
; RV64IZBB-NEXT:    slli a0, a0, 8
```

```
; RV64IZBB-NEXT:    addi a0, a0, 31
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, -273
; RV64IZBB-NEXT:    slli a0, a0, 14
; RV64IZBB-NEXT:    addi a0, a0, -1093
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_9223301666034697285:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 506812
; RV64IZBS-NEXT:    addiw a0, a0, -1093
; RV64IZBS-NEXT:    bseti a0, a0, 46
; RV64IZBS-NEXT:    bseti a0, a0, 63
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_neg_9223301666034697285:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 917505
; RV64IXTHEADBB-NEXT:    slli a0, a0, 8
; RV64IXTHEADBB-NEXT:    addi a0, a0, 31
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    addi a0, a0, -273
; RV64IXTHEADBB-NEXT:    slli a0, a0, 14
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1093
; RV64IXTHEADBB-NEXT:    ret
  ret i64 -9223301666034697285 ; 0x800040007bbbbbbb
}

define i64 @imm_neg_2219066437() {
; RV64I-LABEL: imm_neg_2219066437:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 913135
; RV64I-NEXT:    slli a0, a0, 2
; RV64I-NEXT:    addi a0, a0, -1093
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_2219066437:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 913135
; RV64IZBA-NEXT:    slli a0, a0, 2
; RV64IZBA-NEXT:    addi a0, a0, -1093
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_neg_2219066437:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 913135
; RV64IZBB-NEXT:    slli a0, a0, 2
; RV64IZBB-NEXT:    addi a0, a0, -1093
```

```
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_2219066437:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 913135
; RV64IZBS-NEXT:    slli a0, a0, 2
; RV64IZBS-NEXT:    addi a0, a0, -1093
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_neg_2219066437:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 913135
; RV64IXTHEADBB-NEXT:
   slli a0, a0, 2
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1093
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -2219066437 ; 0xffffffff7bbbbbbb
}

define i64 @imm_neg_8798043653189() {
; RV64I-LABEL: imm_neg_8798043653189:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 917475
; RV64I-NEXT:    addiw a0, a0, -273
; RV64I-NEXT:    slli a0, a0, 14
; RV64I-NEXT:    addi a0, a0, -1093
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_8798043653189:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 917475
; RV64IZBA-NEXT:    addiw a0, a0, -273
; RV64IZBA-NEXT:    slli a0, a0, 14
; RV64IZBA-NEXT:    addi a0, a0, -1093
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_neg_8798043653189:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 917475
; RV64IZBB-NEXT:    addiw a0, a0, -273
; RV64IZBB-NEXT:    slli a0, a0, 14
; RV64IZBB-NEXT:    addi a0, a0, -1093
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_8798043653189:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 572348
; RV64IZBS-NEXT:
```

```
   addiw a0, a0, -1093
; RV64IZBS-NEXT:    bclri a0, a0, 43
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_neg_8798043653189:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 917475
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -273
; RV64IXTHEADBB-NEXT:    slli a0, a0, 14
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1093
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -8798043653189 ; 0xfffff7ff8bbbbbbb
}

define i64 @imm_9223372034904144827() {
; RV64I-LABEL: imm_9223372034904144827:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 572348
; RV64I-NEXT:    addiw a0, a0, -1093
; RV64I-NEXT:    slli a1, a0, 63
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_9223372034904144827:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 572348
; RV64IZBA-NEXT:    addiw a0, a0, -1093
; RV64IZBA-NEXT:    slli a1, a0, 63
; RV64IZBA-NEXT:    add a0, a0, a1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_9223372034904144827:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:
   lui a0, 572348
; RV64IZBB-NEXT:    addiw a0, a0, -1093
; RV64IZBB-NEXT:    slli a1, a0, 63
; RV64IZBB-NEXT:    add a0, a0, a1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_9223372034904144827:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 572348
; RV64IZBS-NEXT:    addiw a0, a0, -1093
; RV64IZBS-NEXT:    bclri a0, a0, 63
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_9223372034904144827:
```

```
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 572348
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1093
; RV64IXTHEADBB-NEXT:    slli a1, a0, 63
; RV64IXTHEADBB-NEXT:    add a0, a0, a1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 9223372034904144827 ; 0x7fffffff8bbbbbbb
}

define i64 @imm_neg_9223354442718100411() {
; RV64-NOPOOL-LABEL: imm_neg_9223354442718100411:
; RV64-NOPOOL:       # %bb.0:
; RV64-NOPOOL-NEXT:    lui a0, 524287
; RV64-NOPOOL-NEXT:    slli a0, a0, 6
; RV64-NOPOOL-NEXT:    addi a0, a0, -29
; RV64-NOPOOL-NEXT:    slli a0, a0, 12
; RV64-NOPOOL-NEXT:
    addi a0, a0, -273
; RV64-NOPOOL-NEXT:    slli a0, a0, 14
; RV64-NOPOOL-NEXT:    addi a0, a0, -1093
; RV64-NOPOOL-NEXT:    ret
;
; RV64I-POOL-LABEL: imm_neg_9223354442718100411:
; RV64I-POOL:       # %bb.0:
; RV64I-POOL-NEXT:    lui a0, %hi(.LCPI43_0)
; RV64I-POOL-NEXT:    ld a0, %lo(.LCPI43_0)(a0)
; RV64I-POOL-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_9223354442718100411:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 524287
; RV64IZBA-NEXT:    slli a0, a0, 6
; RV64IZBA-NEXT:    addi a0, a0, -29
; RV64IZBA-NEXT:    slli a0, a0, 12
; RV64IZBA-NEXT:    addi a0, a0, -273
; RV64IZBA-NEXT:    slli a0, a0, 14
; RV64IZBA-NEXT:    addi a0, a0, -1093
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_neg_9223354442718100411:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 524287
; RV64IZBB-NEXT:    slli a0, a0, 6
; RV64IZBB-NEXT:    addi a0, a0, -29
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, -273
; RV64IZBB-NEXT:    slli a0, a0, 14
; RV64IZBB-NEXT:
```

```
  addi a0, a0, -1093
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_9223354442718100411:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 572348
; RV64IZBS-NEXT:    addiw a0, a0, -1093
; RV64IZBS-NEXT:    bclri a0, a0, 44
; RV64IZBS-NEXT:    bclri a0, a0, 63
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_neg_9223354442718100411:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 524287
; RV64IXTHEADBB-NEXT:    slli a0, a0, 6
; RV64IXTHEADBB-NEXT:    addi a0, a0, -29
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    addi a0, a0, -273
; RV64IXTHEADBB-NEXT:    slli a0, a0, 14
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1093
; RV64IXTHEADBB-NEXT:    ret
 ret i64 9223354442718100411 ; 0x7fffefff8bbbbbbb
}

define i64 @imm_2863311530() {
; RV64I-LABEL: imm_2863311530:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 349525
; RV64I-NEXT:    addiw a0, a0, 1365
; RV64I-NEXT:    slli a0, a0, 1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_2863311530:
; RV64IZBA:
      # %bb.0:
; RV64IZBA-NEXT:    lui a0, 349525
; RV64IZBA-NEXT:    addiw a0, a0, 1365
; RV64IZBA-NEXT:    slli a0, a0, 1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_2863311530:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 349525
; RV64IZBB-NEXT:    addiw a0, a0, 1365
; RV64IZBB-NEXT:    slli a0, a0, 1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_2863311530:
```

```
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 349525
; RV64IZBS-NEXT:    addiw a0, a0, 1365
; RV64IZBS-NEXT:    slli a0, a0, 1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_2863311530:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 349525
; RV64IXTHEADBB-NEXT:    addiw a0, a0, 1365
; RV64IXTHEADBB-NEXT:    slli a0, a0, 1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 2863311530 ; #0xaaaaaaaa
}

define i64 @imm_neg_2863311530() {
; RV64I-LABEL: imm_neg_2863311530:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 699051
; RV64I-NEXT:    addiw a0, a0, -1365
; RV64I-NEXT:    slli a0,
 a0, 1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_2863311530:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 699051
; RV64IZBA-NEXT:    addiw a0, a0, -1365
; RV64IZBA-NEXT:    slli a0, a0, 1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_neg_2863311530:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 699051
; RV64IZBB-NEXT:    addiw a0, a0, -1365
; RV64IZBB-NEXT:    slli a0, a0, 1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_2863311530:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 699051
; RV64IZBS-NEXT:    addiw a0, a0, -1365
; RV64IZBS-NEXT:    slli a0, a0, 1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_neg_2863311530:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 699051
```

```
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1365
; RV64IXTHEADBB-NEXT:    slli a0, a0, 1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -2863311530 ; #0xffffffff55555556
}

define i64 @imm_2147486378() {
; RV64I-LABEL: imm_2147486378:
; RV64I:       # %bb.0:
; RV64I-NEXT:
    li a0, 1
; RV64I-NEXT:    slli a0, a0, 31
; RV64I-NEXT:    addi a0, a0, 1365
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_2147486378:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, 1
; RV64IZBA-NEXT:    slli a0, a0, 31
; RV64IZBA-NEXT:    addi a0, a0, 1365
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_2147486378:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, 1
; RV64IZBB-NEXT:    slli a0, a0, 31
; RV64IZBB-NEXT:    addi a0, a0, 1365
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_2147486378:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a0, 1365
; RV64IZBS-NEXT:    bseti a0, a0, 31
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_2147486378:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, 1
; RV64IXTHEADBB-NEXT:    slli a0, a0, 31
; RV64IXTHEADBB-NEXT:    addi a0, a0, 1365
; RV64IXTHEADBB-NEXT:    ret
 ret i64 2147485013
}

define i64 @imm_neg_2147485013() {
; RV64I-LABEL: imm_neg_2147485013:
; RV64I:       # %bb.0:
; RV64I-NEXT:
```

```
 lui a0, 524288
; RV64I-NEXT:    addi a0, a0, -1365
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_2147485013:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 524288
; RV64IZBA-NEXT:    addi a0, a0, -1365
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_neg_2147485013:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 524288
; RV64IZBB-NEXT:    addi a0, a0, -1365
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_2147485013:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 524288
; RV64IZBS-NEXT:    addi a0, a0, -1365
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_neg_2147485013:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 524288
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1365
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -2147485013
}

define i64 @imm_12900924131259() {
; RV64I-LABEL: imm_12900924131259:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 188
; RV64I-NEXT:    addiw a0, a0, -1093
; RV64I-NEXT:    slli a0, a0, 24
; RV64I-NEXT:    addi a0,
 a0, 1979
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_12900924131259:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 768955
; RV64IZBA-NEXT:    slli.uw a0, a0, 12
; RV64IZBA-NEXT:    addi a0, a0, 1979
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_12900924131259:
```

```
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 188
; RV64IZBB-NEXT:    addiw a0, a0, -1093
; RV64IZBB-NEXT:    slli a0, a0, 24
; RV64IZBB-NEXT:    addi a0, a0, 1979
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_12900924131259:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 188
; RV64IZBS-NEXT:    addiw a0, a0, -1093
; RV64IZBS-NEXT:    slli a0, a0, 24
; RV64IZBS-NEXT:    addi a0, a0, 1979
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_12900924131259:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 188
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1093
; RV64IXTHEADBB-NEXT:    slli a0, a0, 24
; RV64IXTHEADBB-NEXT:    addi a0, a0, 1979
; RV64IXTHEADBB-NEXT:    ret
 ret i64 12900924131259
}

define
 i64 @imm_50394234880() {
; RV64I-LABEL: imm_50394234880:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 188
; RV64I-NEXT:    addiw a0, a0, -1093
; RV64I-NEXT:    slli a0, a0, 16
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_50394234880:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 768955
; RV64IZBA-NEXT:    slli.uw a0, a0, 4
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_50394234880:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 188
; RV64IZBB-NEXT:    addiw a0, a0, -1093
; RV64IZBB-NEXT:    slli a0, a0, 16
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_50394234880:
```

```
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 188
; RV64IZBS-NEXT:    addiw a0, a0, -1093
; RV64IZBS-NEXT:    slli a0, a0, 16
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_50394234880:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 188
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1093
; RV64IXTHEADBB-NEXT:    slli a0, a0, 16
; RV64IXTHEADBB-NEXT:    ret
 ret
 i64 50394234880
}

define i64 @imm_12900936431479() {
; RV64I-LABEL: imm_12900936431479:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 192239
; RV64I-NEXT:    slli a0, a0, 2
; RV64I-NEXT:    addi a0, a0, -1093
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    addi a0, a0, 1911
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_12900936431479:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 768956
; RV64IZBA-NEXT:    addi a0, a0, -1093
; RV64IZBA-NEXT:    slli.uw a0, a0, 12
; RV64IZBA-NEXT:    addi a0, a0, 1911
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_12900936431479:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 192239
; RV64IZBB-NEXT:    slli a0, a0, 2
; RV64IZBB-NEXT:    addi a0, a0, -1093
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, 1911
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_12900936431479:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 192239
; RV64IZBS-NEXT:    slli a0, a0, 2
; RV64IZBS-NEXT:    addi a0, a0, -1093
```

```
; RV64IZBS-NEXT:
    slli a0, a0, 12
; RV64IZBS-NEXT:    addi a0, a0, 1911
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_12900936431479:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 192239
; RV64IXTHEADBB-NEXT:    slli a0, a0, 2
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1093
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    addi a0, a0, 1911
; RV64IXTHEADBB-NEXT:    ret
 ret i64 12900936431479
}

define i64 @imm_12900918536874() {
; RV64I-LABEL: imm_12900918536874:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 384477
; RV64I-NEXT:    addiw a0, a0, 1365
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    addi a0, a0, 1365
; RV64I-NEXT:    slli a0, a0, 1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_12900918536874:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 768955
; RV64IZBA-NEXT:    addi a0, a0, -1365
; RV64IZBA-NEXT:    slli.uw a0, a0, 12
; RV64IZBA-NEXT:    addi a0, a0, -1366
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_12900918536874:
;
 RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 384477
; RV64IZBB-NEXT:    addiw a0, a0, 1365
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, 1365
; RV64IZBB-NEXT:    slli a0, a0, 1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_12900918536874:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 384477
; RV64IZBS-NEXT:    addiw a0, a0, 1365
```

```
; RV64IZBS-NEXT:    slli a0, a0, 12
; RV64IZBS-NEXT:    addi a0, a0, 1365
; RV64IZBS-NEXT:    slli a0, a0, 1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_12900918536874:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 384477
; RV64IXTHEADBB-NEXT:    addiw a0, a0, 1365
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    addi a0, a0, 1365
; RV64IXTHEADBB-NEXT:    slli a0, a0, 1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 12900918536874
}

define i64 @imm_12900925247761() {
; RV64I-LABEL: imm_12900925247761:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 384478
; RV64I-NEXT:    addiw
 a0, a0, -1911
; RV64I-NEXT:    slli a0, a0, 13
; RV64I-NEXT:    addi a0, a0, -2048
; RV64I-NEXT:    addi a0, a0, -1775
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_12900925247761:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 768955
; RV64IZBA-NEXT:    addi a0, a0, 273
; RV64IZBA-NEXT:    slli.uw a0, a0, 12
; RV64IZBA-NEXT:    addi a0, a0, 273
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_12900925247761:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 384478
; RV64IZBB-NEXT:    addiw a0, a0, -1911
; RV64IZBB-NEXT:    slli a0, a0, 13
; RV64IZBB-NEXT:    addi a0, a0, -2048
; RV64IZBB-NEXT:    addi a0, a0, -1775
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_12900925247761:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 384478
; RV64IZBS-NEXT:    addiw a0, a0, -1911
```

```
; RV64IZBS-NEXT:    slli a0, a0, 13
; RV64IZBS-NEXT:    addi a0, a0, -2048
; RV64IZBS-NEXT:    addi a0, a0, -1775
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_12900925247761:
; RV64IXTHEADBB:
      # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 384478
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1911
; RV64IXTHEADBB-NEXT:    slli a0, a0, 13
; RV64IXTHEADBB-NEXT:    addi a0, a0, -2048
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1775
; RV64IXTHEADBB-NEXT:    ret
 ret i64 12900925247761
}

define i64 @imm_7158272001() {
; RV64I-LABEL: imm_7158272001:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 427
; RV64I-NEXT:    addiw a0, a0, -1367
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    addi a0, a0, 1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_7158272001:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 349525
; RV64IZBA-NEXT:    sh2add a0, a0, a0
; RV64IZBA-NEXT:    addi a0, a0, 1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_7158272001:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 427
; RV64IZBB-NEXT:    addiw a0, a0, -1367
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, 1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_7158272001:
; RV64IZBS:
    # %bb.0:
; RV64IZBS-NEXT:    lui a0, 427
; RV64IZBS-NEXT:    addiw a0, a0, -1367
; RV64IZBS-NEXT:    slli a0, a0, 12
; RV64IZBS-NEXT:    addi a0, a0, 1
```

```
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_7158272001:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 427
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1367
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    addi a0, a0, 1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 7158272001 ; 0x0000_0001_aaaa_9001
}

define i64 @imm_12884889601() {
; RV64I-LABEL: imm_12884889601:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 768
; RV64I-NEXT:    addiw a0, a0, -3
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    addi a0, a0, 1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_12884889601:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 349525
; RV64IZBA-NEXT:    sh3add a0, a0, a0
; RV64IZBA-NEXT:    addi a0, a0, 1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_12884889601:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:
   lui a0, 768
; RV64IZBB-NEXT:    addiw a0, a0, -3
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, 1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_12884889601:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 768
; RV64IZBS-NEXT:    addiw a0, a0, -3
; RV64IZBS-NEXT:    slli a0, a0, 12
; RV64IZBS-NEXT:    addi a0, a0, 1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_12884889601:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 768
```

```
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -3
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    addi a0, a0, 1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 12884889601 ; 0x0000_0002_ffff_d001
}

define i64 @imm_neg_3435982847() {
; RV64I-LABEL: imm_neg_3435982847:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 1048371
; RV64I-NEXT:    addiw a0, a0, 817
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    addi a0, a0, 1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_3435982847:
; RV64IZBA:
 # %bb.0:
; RV64IZBA-NEXT:    lui a0, 768955
; RV64IZBA-NEXT:    sh1add a0, a0, a0
; RV64IZBA-NEXT:    addi a0, a0, 1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_neg_3435982847:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 1048371
; RV64IZBB-NEXT:    addiw a0, a0, 817
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, 1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_3435982847:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 734001
; RV64IZBS-NEXT:    addiw a0, a0, 1
; RV64IZBS-NEXT:    bclri a0, a0, 31
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_neg_3435982847:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 1048371
; RV64IXTHEADBB-NEXT:    addiw a0, a0, 817
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    addi a0, a0, 1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -3435982847 ; 0xffff_ffff_3333_1001
}
```

```
define i64 @imm_neg_5726842879() {
; RV64I-LABEL: imm_neg_5726842879:
; RV64I:       # %bb.0:
; RV64I-NEXT:
   lui a0, 1048235
; RV64I-NEXT:    addiw a0, a0, -1419
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    addi a0, a0, 1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_5726842879:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 768945
; RV64IZBA-NEXT:    sh2add a0, a0, a0
; RV64IZBA-NEXT:    addi a0, a0, 1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_neg_5726842879:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 1048235
; RV64IZBB-NEXT:    addiw a0, a0, -1419
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, 1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_5726842879:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 698997
; RV64IZBS-NEXT:    addiw a0, a0, 1
; RV64IZBS-NEXT:    bclri a0, a0, 32
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_neg_5726842879:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 1048235
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1419
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:
   addi a0, a0, 1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -5726842879 ; 0xffff_fffe_aaa7_5001
}

define i64 @imm_neg_10307948543() {
; RV64I-LABEL: imm_neg_10307948543:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 1047962
```

```
; RV64I-NEXT:    addiw a0, a0, -1645
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    addi a0, a0, 1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_10307948543:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 768955
; RV64IZBA-NEXT:    sh3add a0, a0, a0
; RV64IZBA-NEXT:    addi a0, a0, 1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_neg_10307948543:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 1047962
; RV64IZBB-NEXT:    addiw a0, a0, -1645
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, 1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_10307948543:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 629139
; RV64IZBS-NEXT:    addiw a0, a0, 1
; RV64IZBS-NEXT:    bclri a0, a0, 33
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL:
 imm_neg_10307948543:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 1047962
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1645
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    addi a0, a0, 1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -10307948543 ; 0xffff_fffd_9999_3001
}

define i64 @li_rori_1() {
; RV64I-LABEL: li_rori_1:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, -17
; RV64I-NEXT:    slli a0, a0, 43
; RV64I-NEXT:    addi a0, a0, -1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: li_rori_1:
; RV64IZBA:       # %bb.0:
```

```
; RV64IZBA-NEXT:    li a0, -17
; RV64IZBA-NEXT:    slli a0, a0, 43
; RV64IZBA-NEXT:    addi a0, a0, -1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: li_rori_1:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, -18
; RV64IZBB-NEXT:    rori a0, a0, 21
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: li_rori_1:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a0, -17
; RV64IZBS-NEXT:    slli a0, a0, 43
; RV64IZBS-NEXT:    addi a0, a0,
 -1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: li_rori_1:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, -18
; RV64IXTHEADBB-NEXT:    th.srri a0, a0, 21
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -149533581377537
}

define i64 @li_rori_2() {
; RV64I-LABEL: li_rori_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, -5
; RV64I-NEXT:    slli a0, a0, 60
; RV64I-NEXT:    addi a0, a0, -6
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: li_rori_2:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, -5
; RV64IZBA-NEXT:    slli a0, a0, 60
; RV64IZBA-NEXT:    addi a0, a0, -6
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: li_rori_2:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, -86
; RV64IZBB-NEXT:    rori a0, a0, 4
; RV64IZBB-NEXT:    ret
;
```

```
; RV64IZBS-LABEL: li_rori_2:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a0, -5
; RV64IZBS-NEXT:    slli a0, a0, 60
; RV64IZBS-NEXT:    addi a0, a0, -6
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: li_rori_2:
; RV64IXTHEADBB:
  # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, -86
; RV64IXTHEADBB-NEXT:    th.srri a0, a0, 4
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -5764607523034234886
}

define i64 @li_rori_3() {
; RV64I-LABEL: li_rori_3:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, -17
; RV64I-NEXT:    slli a0, a0, 27
; RV64I-NEXT:    addi a0, a0, -1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: li_rori_3:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, -17
; RV64IZBA-NEXT:    slli a0, a0, 27
; RV64IZBA-NEXT:    addi a0, a0, -1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: li_rori_3:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, -18
; RV64IZBB-NEXT:    rori a0, a0, 37
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: li_rori_3:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a0, -17
; RV64IZBS-NEXT:    slli a0, a0, 27
; RV64IZBS-NEXT:    addi a0, a0, -1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: li_rori_3:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, -18
; RV64IXTHEADBB-NEXT:    th.srri a0,
```

```
 a0, 37
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -2281701377
}

; This used to assert when compiled with Zba.
define i64 @PR54812() {
; RV64I-LABEL: PR54812:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 1048447
; RV64I-NEXT:    addiw a0, a0, 1407
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: PR54812:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 872917
; RV64IZBA-NEXT:    sh1add a0, a0, a0
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: PR54812:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 1048447
; RV64IZBB-NEXT:    addiw a0, a0, 1407
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: PR54812:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 1045887
; RV64IZBS-NEXT:    bclri a0, a0, 31
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: PR54812:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 1048447
; RV64IXTHEADBB-NEXT:    addiw a0, a0, 1407
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:
    ret
 ret i64 -2158497792;
}

define signext i32 @pos_2048() nounwind {
; RV64I-LABEL: pos_2048:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, 1
; RV64I-NEXT:    slli a0, a0, 11
```

```
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: pos_2048:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, 1
; RV64IZBA-NEXT:    slli a0, a0, 11
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: pos_2048:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, 1
; RV64IZBB-NEXT:    slli a0, a0, 11
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: pos_2048:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    bseti a0, zero, 11
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: pos_2048:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, 1
; RV64IXTHEADBB-NEXT:    slli a0, a0, 11
; RV64IXTHEADBB-NEXT:    ret
 ret i32 2048
}

define i64 @imm64_same_lo_hi() nounwind {
; RV64I-LABEL: imm64_same_lo_hi:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 65793
; RV64I-NEXT:    addiw a0, a0, 16
; RV64I-NEXT:
   slli a1, a0, 32
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm64_same_lo_hi:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 65793
; RV64IZBA-NEXT:    addiw a0, a0, 16
; RV64IZBA-NEXT:    slli a1, a0, 32
; RV64IZBA-NEXT:    add a0, a0, a1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm64_same_lo_hi:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 65793
```

```
; RV64IZBB-NEXT:    addiw a0, a0, 16
; RV64IZBB-NEXT:    slli a1, a0, 32
; RV64IZBB-NEXT:    add a0, a0, a1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm64_same_lo_hi:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 65793
; RV64IZBS-NEXT:    addiw a0, a0, 16
; RV64IZBS-NEXT:    slli a1, a0, 32
; RV64IZBS-NEXT:    add a0, a0, a1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm64_same_lo_hi:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 65793
; RV64IXTHEADBB-NEXT:    addiw a0, a0, 16
; RV64IXTHEADBB-NEXT:    slli a1, a0, 32
; RV64IXTHEADBB-NEXT:    add a0, a0, a1
;
 RV64IXTHEADBB-NEXT:    ret
 ret i64 1157442765409226768 ; 0x0101010101010101
}

; Same as above with optsize. Make sure we use constant pool on RV64
define i64 @imm64_same_lo_hi_optsize() nounwind optsize {
; RV64-NOPOOL-LABEL: imm64_same_lo_hi_optsize:
; RV64-NOPOOL:       # %bb.0:
; RV64-NOPOOL-NEXT:    lui a0, 65793
; RV64-NOPOOL-NEXT:    addiw a0, a0, 16
; RV64-NOPOOL-NEXT:    slli a1, a0, 32
; RV64-NOPOOL-NEXT:    add a0, a0, a1
; RV64-NOPOOL-NEXT:    ret
;
; RV64I-POOL-LABEL: imm64_same_lo_hi_optsize:
; RV64I-POOL:       # %bb.0:
; RV64I-POOL-NEXT:    lui a0, %hi(.LCPI64_0)
; RV64I-POOL-NEXT:    ld a0, %lo(.LCPI64_0)(a0)
; RV64I-POOL-NEXT:    ret
;
; RV64IZBA-LABEL: imm64_same_lo_hi_optsize:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 65793
; RV64IZBA-NEXT:    addiw a0, a0, 16
; RV64IZBA-NEXT:    slli a1, a0, 32
; RV64IZBA-NEXT:    add a0, a0, a1
; RV64IZBA-NEXT:    ret
;
```

```
; RV64IZBB-LABEL: imm64_same_lo_hi_optsize:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui
 a0, 65793
; RV64IZBB-NEXT:    addiw a0, a0, 16
; RV64IZBB-NEXT:    slli a1, a0, 32
; RV64IZBB-NEXT:    add a0, a0, a1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm64_same_lo_hi_optsize:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 65793
; RV64IZBS-NEXT:    addiw a0, a0, 16
; RV64IZBS-NEXT:    slli a1, a0, 32
; RV64IZBS-NEXT:    add a0, a0, a1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm64_same_lo_hi_optsize:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 65793
; RV64IXTHEADBB-NEXT:    addiw a0, a0, 16
; RV64IXTHEADBB-NEXT:    slli a1, a0, 32
; RV64IXTHEADBB-NEXT:    add a0, a0, a1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 1157442765409226768 ; 0x0101010101010101
}
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck -check-prefix=RV64I %s

; Check indexed and unindexed, sext, zext and anyext loads

define void @lb(ptr %a, ptr %b) nounwind {
; RV64I-LABEL: lb:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lb a2, 1(a0)
; RV64I-NEXT:    lbu zero, 0(a0)
; RV64I-NEXT:    sw a2, 0(a1)
; RV64I-NEXT:    ret
 %1 = getelementptr i8, ptr %a, i32 1
 %2 = load i8, ptr %1
 %3 = sext i8 %2 to i32
 ; the unused load will produce an anyext for selection
 %4 = load volatile i8, ptr %a
 store i32 %3, ptr %b
 ret void
}
```

```
define void @lbu(ptr %a, ptr %b) nounwind {
; RV64I-LABEL: lbu:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lbu a0, 1(a0)
; RV64I-NEXT:    sw a0, 0(a1)
; RV64I-NEXT:    ret
 %1 = getelementptr i8, ptr %a, i32 1
 %2 = load i8, ptr %1
 %3 = zext i8 %2 to i32
 store i32 %3, ptr %b
 ret void
}

define void @lh(ptr
 %a, ptr %b) nounwind {
; RV64I-LABEL: lh:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lh a2, 2(a0)
; RV64I-NEXT:    lh zero, 0(a0)
; RV64I-NEXT:    sw a2, 0(a1)
; RV64I-NEXT:    ret
 %1 = getelementptr i16, ptr %a, i32 1
 %2 = load i16, ptr %1
 %3 = sext i16 %2 to i32
 ; the unused load will produce an anyext for selection
 %4 = load volatile i16, ptr %a
 store i32 %3, ptr %b
 ret void
}

define void @lhu(ptr %a, ptr %b) nounwind {
; RV64I-LABEL: lhu:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lhu a0, 2(a0)
; RV64I-NEXT:    sw a0, 0(a1)
; RV64I-NEXT:    ret
 %1 = getelementptr i16, ptr %a, i32 1
 %2 = load i16, ptr %1
 %3 = zext i16 %2 to i32
 store i32 %3, ptr %b
 ret void
}

define void @lw(ptr %a, ptr %b) nounwind {
; RV64I-LABEL: lw:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lw a2, 4(a0)
; RV64I-NEXT:    lw zero, 0(a0)
```

```
; RV64I-NEXT:    sd a2, 0(a1)
; RV64I-NEXT:    ret
 %1 = getelementptr i32, ptr %a, i64 1
 %2 = load i32, ptr %1
 %3 = sext i32 %2 to i64
 ; the unused load
 will produce an anyext for selection
 %4 = load volatile i32, ptr %a
 store i64 %3, ptr %b
 ret void
}

define void @lwu(ptr %a, ptr %b) nounwind {
; RV64I-LABEL: lwu:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lwu a0, 4(a0)
; RV64I-NEXT:    sd a0, 0(a1)
; RV64I-NEXT:    ret
 %1 = getelementptr i32, ptr %a, i64 1
 %2 = load i32, ptr %1
 %3 = zext i32 %2 to i64
 store i64 %3, ptr %b
 ret void
}
```

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```
* SUCH DAMAGE.
*
* @(#)COPYRIGHT 8.1 (Berkeley) 3/16/94
*/
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mcpu=skylake-avx512 -mattr=prefer-256-bit | FileCheck %s
--check-prefixes=CHECK,CHECK-SKX
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mcpu=skylake-avx512 -mattr=prefer-256-bit,avx512vbmi |
FileCheck %s --check-prefixes=CHECK,CHECK-SKX,CHECK-SKX-VBMI
; Make sure CPUs default to prefer-256-bit. avx512vnni isn't interesting as it just adds an isel peephole for
vpmaddwd+vpaddd
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mcpu=skylake-avx512 | FileCheck %s --check-
prefixes=CHECK,CHECK-AVX512
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mattr=-avx512vnni -mcpu=cascadelake | FileCheck %s --
check-prefixes=CHECK,CHECK-AVX512
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mattr=-avx512vnni -mcpu=cooperlake | FileCheck %s --
check-prefixes=CHECK,CHECK-AVX512
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mcpu=cannonlake | FileCheck %s --check-
prefixes=CHECK,CHECK-VBMI
;
 RUN: llc < %s -mtriple=x86_64-unknown-unknown -mattr=-avx512vnni -mcpu=icelake-client | FileCheck %s --
check-prefixes=CHECK,CHECK-VBMI
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mattr=-avx512vnni -mcpu=icelake-server | FileCheck %s --
check-prefixes=CHECK,CHECK-VBMI
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mattr=-avx512vnni -mcpu=tigerlake | FileCheck %s --check-
prefixes=CHECK,CHECK-VBMI

; This file primarily contains tests for specific places in X86ISelLowering.cpp that needed be made aware of the
legalizer not allowing 512-bit vectors due to prefer-256-bit even though AVX512 is enabled.

define dso_local void @add256(<16 x i32>* %a, <16 x i32>* %b, <16 x i32>* %c) "min-legal-vector-
width"="256" {
; CHECK-LABEL: add256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT:    vpaddd 32(%rsi), %ymm1, %ymm1
; CHECK-NEXT:    vpaddd (%rsi), %ymm0, %ymm0
; CHECK-NEXT:    vmovdqa %ymm0, (%rdx)
; CHECK-NEXT:
   vmovdqa %ymm1, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %d = load <16 x i32>, <16 x i32>* %a
 %e = load <16 x i32>, <16 x i32>* %b
 %f = add <16 x i32> %d, %e
 store <16 x i32> %f, <16 x i32>* %c
 ret void
```

```
}

define dso_local void @add512(<16 x i32>* %a, <16 x i32>* %b, <16 x i32>* %c) "min-legal-vector-
width"="512" {
; CHECK-LABEL: add512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa64 (%rdi), %zmm0
; CHECK-NEXT:    vpaddd (%rsi), %zmm0, %zmm0
; CHECK-NEXT:    vmovdqa64 %zmm0, (%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %d = load <16 x i32>, <16 x i32>* %a
 %e = load <16 x i32>, <16 x i32>* %b
 %f = add <16 x i32> %d, %e
 store <16 x i32> %f, <16 x i32>* %c
 ret void
}

define dso_local void @avg_v64i8_256(<64 x i8>* %a, <64 x i8>* %b) "min-legal-vector-width"="256" {
; CHECK-LABEL: avg_v64i8_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rsi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rsi), %ymm1
; CHECK-NEXT:    vpavgb (%rdi),
 %ymm0, %ymm0
; CHECK-NEXT:    vpavgb 32(%rdi), %ymm1, %ymm1
; CHECK-NEXT:    vmovdqu %ymm1, (%rax)
; CHECK-NEXT:    vmovdqu %ymm0, (%rax)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %1 = load <64 x i8>, <64 x i8>* %a
 %2 = load <64 x i8>, <64 x i8>* %b
 %3 = zext <64 x i8> %1 to <64 x i32>
 %4 = zext <64 x i8> %2 to <64 x i32>
 %5 = add nuw nsw <64 x i32> %3, <i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32
1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1>
 %6 = add nuw nsw <64 x i32> %5, %4
 %7 = lshr <64 x i32> %6, <i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
i32 1, i32
 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32
1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1>
 %8 = trunc <64 x i32> %7 to <64 x i8>
 store <64 x i8> %8, <64 x i8>* undef, align 4
 ret void
}
```

```
define dso_local void @avg_v64i8_512(<64 x i8>* %a, <64 x i8>* %b) "min-legal-vector-width"="512" {
; CHECK-LABEL: avg_v64i8_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa64 (%rdi), %zmm0
; CHECK-NEXT:    vpavgb (%rsi), %zmm0, %zmm0
; CHECK-NEXT:    vmovdqu64 %zmm0, (%rax)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %1 = load <64 x i8>, <64 x i8>* %a
 %2 = load <64 x i8>, <64 x i8>* %b
 %3 = zext <64 x i8> %1 to <64 x i32>
 %4 = zext <64 x i8> %2 to <64 x i32>
 %5 = add nuw nsw <64 x i32> %3, <i32 1, i32 1, i32 1, i32 1, i32 1, i32
 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32
1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
i32 1, i32 1, i32 1>
 %6 = add nuw nsw <64 x i32> %5, %4
 %7 = lshr <64 x i32> %6, <i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32
1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1>
 %8 = trunc <64 x i32> %7 to <64 x i8>
 store <64 x i8> %8, <64 x i8>* undef,
 align 4
 ret void
}

define dso_local void @pmaddwd_32_256(<32 x i16>* %APtr, <32 x i16>* %BPtr, <16 x i32>* %CPtr) "min-
legal-vector-width"="256" {
; CHECK-LABEL: pmaddwd_32_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT:    vpmaddwd 32(%rsi), %ymm1, %ymm1
; CHECK-NEXT:    vpmaddwd (%rsi), %ymm0, %ymm0
; CHECK-NEXT:    vmovdqa %ymm0, (%rdx)
; CHECK-NEXT:    vmovdqa %ymm1, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
  %A = load <32 x i16>, <32 x i16>* %APtr
  %B = load <32 x i16>, <32 x i16>* %BPtr
  %a = sext <32 x i16> %A to <32 x i32>
  %b = sext <32 x i16> %B to <32 x i32>
  %m = mul nsw <32 x i32> %a, %b
  %odd = shufflevector <32 x i32> %m, <32 x i32> undef, <16 x i32> <i32 0, i32 2, i32 4, i32 6, i32 8, i32 10, i32
```

```
12, i32 14, i32 16, i32 18, i32 20, i32 22, i32 24, i32 26, i32 28, i32 30>
  %even = shufflevector <32 x i32> %m, <32 x i32> undef, <16 x i32> <i32 1, i32 3, i32 5, i32
 7, i32 9, i32 11, i32 13, i32 15, i32 17, i32 19, i32 21, i32 23, i32 25, i32 27, i32 29, i32 31>
  %ret = add <16 x i32> %odd, %even
  store <16 x i32> %ret, <16 x i32>* %CPtr
  ret void
}

define dso_local void @pmaddwd_32_512(<32 x i16>* %APtr, <32 x i16>* %BPtr, <16 x i32>* %CPtr) "min-
legal-vector-width"="512" {
; CHECK-LABEL: pmaddwd_32_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa64 (%rdi), %zmm0
; CHECK-NEXT:    vpmaddwd (%rsi), %zmm0, %zmm0
; CHECK-NEXT:    vmovdqa64 %zmm0, (%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
  %A = load <32 x i16>, <32 x i16>* %APtr
  %B = load <32 x i16>, <32 x i16>* %BPtr
  %a = sext <32 x i16> %A to <32 x i32>
  %b = sext <32 x i16> %B to <32 x i32>
  %m = mul nsw <32 x i32> %a, %b
  %odd = shufflevector <32 x i32> %m, <32 x i32> undef, <16 x i32> <i32 0, i32 2, i32 4, i32 6, i32 8, i32 10, i32
12, i32 14, i32 16, i32 18, i32 20, i32 22, i32 24, i32 26, i32 28, i32 30>
  %even = shufflevector <32 x i32> %m, <32 x i32>
 undef, <16 x i32> <i32 1, i32 3, i32 5, i32 7, i32 9, i32 11, i32 13, i32 15, i32 17, i32 19, i32 21, i32 23, i32 25, i32
27, i32 29, i32 31>
  %ret = add <16 x i32> %odd, %even
  store <16 x i32> %ret, <16 x i32>* %CPtr
  ret void
}

define dso_local void @psubus_64i8_max_256(<64 x i8>* %xptr, <64 x i8>* %yptr, <64 x i8>* %zptr) "min-legal-
vector-width"="256" {
; CHECK-LABEL: psubus_64i8_max_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT:    vpsubusb 32(%rsi), %ymm1, %ymm1
; CHECK-NEXT:    vpsubusb (%rsi), %ymm0, %ymm0
; CHECK-NEXT:    vmovdqa %ymm0, (%rdx)
; CHECK-NEXT:    vmovdqa %ymm1, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %x = load <64 x i8>, <64 x i8>* %xptr
 %y = load <64 x i8>, <64 x i8>* %yptr
 %cmp = icmp ult <64 x i8> %x, %y
 %max = select <64 x i1> %cmp, <64 x i8> %y, <64 x i8> %x
```

```
 %res = sub <64 x i8> %max, %y
 store <64 x i8> %res, <64 x i8>* %zptr
 ret void
}

define
 dso_local void @psubus_64i8_max_512(<64 x i8>* %xptr, <64 x i8>* %yptr, <64 x i8>* %zptr) "min-legal-
vector-width"="512" {
; CHECK-LABEL: psubus_64i8_max_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa64 (%rdi), %zmm0
; CHECK-NEXT:    vpsubusb (%rsi), %zmm0, %zmm0
; CHECK-NEXT:    vmovdqa64 %zmm0, (%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %x = load <64 x i8>, <64 x i8>* %xptr
 %y = load <64 x i8>, <64 x i8>* %yptr
 %cmp = icmp ult <64 x i8> %x, %y
 %max = select <64 x i1> %cmp, <64 x i8> %y, <64 x i8> %x
 %res = sub <64 x i8> %max, %y
 store <64 x i8> %res, <64 x i8>* %zptr
 ret void
}

define dso_local i32 @_Z9test_charPcS_i_256(i8* nocapture readonly, i8* nocapture readonly, i32) "min-legal-
vector-width"="256" {
; CHECK-SKX-LABEL: _Z9test_charPcS_i_256:
; CHECK-SKX:       # %bb.0: # %entry
; CHECK-SKX-NEXT:    movl %edx, %eax
; CHECK-SKX-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-SKX-NEXT:    xorl %ecx, %ecx
; CHECK-SKX-NEXT:    vpxor %xmm1, %xmm1, %xmm1
;
 CHECK-SKX-NEXT:    vpxor %xmm2, %xmm2, %xmm2
; CHECK-SKX-NEXT:    .p2align 4, 0x90
; CHECK-SKX-NEXT:  .LBB8_1: # %vector.body
; CHECK-SKX-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-SKX-NEXT:    vpmovsxbw 16(%rdi,%rcx), %ymm3
; CHECK-SKX-NEXT:    vpmovsxbw (%rdi,%rcx), %ymm4
; CHECK-SKX-NEXT:    vpmovsxbw 16(%rsi,%rcx), %ymm5
; CHECK-SKX-NEXT:    vpmaddwd %ymm3, %ymm5, %ymm3
; CHECK-SKX-NEXT:    vpaddd %ymm2, %ymm3, %ymm2
; CHECK-SKX-NEXT:    vpmovsxbw (%rsi,%rcx), %ymm3
; CHECK-SKX-NEXT:    vpmaddwd %ymm4, %ymm3, %ymm3
; CHECK-SKX-NEXT:    vpaddd %ymm1, %ymm3, %ymm1
; CHECK-SKX-NEXT:    addq $32, %rcx
; CHECK-SKX-NEXT:    cmpq %rcx, %rax
; CHECK-SKX-NEXT:    jne .LBB8_1
```

```
; CHECK-SKX-NEXT:  # %bb.2: # %middle.block
; CHECK-SKX-NEXT:    vpaddd %ymm0, %ymm1, %ymm1
; CHECK-SKX-NEXT:    vpaddd %ymm0, %ymm2, %ymm0
; CHECK-SKX-NEXT:    vpaddd %ymm0, %ymm1, %ymm0
; CHECK-SKX-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:
   vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vpsrlq $32, %xmm0, %xmm1
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vmovd %xmm0, %eax
; CHECK-SKX-NEXT:    vzeroupper
; CHECK-SKX-NEXT:    retq
;
; CHECK-AVX512-LABEL: _Z9test_charPcS_i_256:
; CHECK-AVX512:       # %bb.0: # %entry
; CHECK-AVX512-NEXT:    movl %edx, %eax
; CHECK-AVX512-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    xorl %ecx, %ecx
; CHECK-AVX512-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-AVX512-NEXT:    vpxor %xmm2, %xmm2, %xmm2
; CHECK-AVX512-NEXT:    .p2align 4, 0x90
; CHECK-AVX512-NEXT:  .LBB8_1: # %vector.body
; CHECK-AVX512-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-AVX512-NEXT:    vpmovsxbw 16(%rdi,%rcx), %ymm3
; CHECK-AVX512-NEXT:    vpmovsxbw (%rdi,%rcx), %ymm4
; CHECK-AVX512-NEXT:    vpmovsxbw 16(%rsi,%rcx), %ymm5
; CHECK-AVX512-NEXT:    vpmaddwd %ymm3, %ymm5, %ymm3
; CHECK-AVX512-NEXT:    vpaddd %ymm2, %ymm3,
 %ymm2
; CHECK-AVX512-NEXT:    vpmovsxbw (%rsi,%rcx), %ymm3
; CHECK-AVX512-NEXT:    vpmaddwd %ymm4, %ymm3, %ymm3
; CHECK-AVX512-NEXT:    vpaddd %ymm1, %ymm3, %ymm1
; CHECK-AVX512-NEXT:    addq $32, %rcx
; CHECK-AVX512-NEXT:    cmpq %rcx, %rax
; CHECK-AVX512-NEXT:    jne .LBB8_1
; CHECK-AVX512-NEXT:  # %bb.2: # %middle.block
; CHECK-AVX512-NEXT:    vpaddd %ymm0, %ymm1, %ymm1
; CHECK-AVX512-NEXT:    vpaddd %ymm0, %ymm2, %ymm0
; CHECK-AVX512-NEXT:    vpaddd %ymm0, %ymm1, %ymm0
; CHECK-AVX512-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vpsrlq $32, %xmm0, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vmovd %xmm0, %eax
```

```
; CHECK-AVX512-NEXT:    vzeroupper
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI-LABEL: _Z9test_charPcS_i_256:
; CHECK-VBMI:       # %bb.0: # %entry
; CHECK-VBMI-NEXT:
   movl %edx, %eax
; CHECK-VBMI-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    xorl %ecx, %ecx
; CHECK-VBMI-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-VBMI-NEXT:    vpxor %xmm2, %xmm2, %xmm2
; CHECK-VBMI-NEXT:    .p2align 4, 0x90
; CHECK-VBMI-NEXT:  .LBB8_1: # %vector.body
; CHECK-VBMI-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-VBMI-NEXT:    vpmovsxbw 16(%rdi,%rcx), %ymm3
; CHECK-VBMI-NEXT:    vpmovsxbw (%rdi,%rcx), %ymm4
; CHECK-VBMI-NEXT:    vpmovsxbw 16(%rsi,%rcx), %ymm5
; CHECK-VBMI-NEXT:    vpmaddwd %ymm3, %ymm5, %ymm3
; CHECK-VBMI-NEXT:    vpaddd %ymm2, %ymm3, %ymm2
; CHECK-VBMI-NEXT:    vpmovsxbw (%rsi,%rcx), %ymm3
; CHECK-VBMI-NEXT:    vpmaddwd %ymm4, %ymm3, %ymm3
; CHECK-VBMI-NEXT:    vpaddd %ymm1, %ymm3, %ymm1
; CHECK-VBMI-NEXT:    addq $32, %rcx
; CHECK-VBMI-NEXT:    cmpq %rcx, %rax
; CHECK-VBMI-NEXT:    jne .LBB8_1
; CHECK-VBMI-NEXT:  # %bb.2: # %middle.block
; CHECK-VBMI-NEXT:    vpaddd %ymm0, %ymm1, %ymm1
; CHECK-VBMI-NEXT:    vpaddd %ymm0, %ymm2,
 %ymm0
; CHECK-VBMI-NEXT:    vpaddd %ymm0, %ymm1, %ymm0
; CHECK-VBMI-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[1,1,1,1]
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vmovd %xmm0, %eax
; CHECK-VBMI-NEXT:    vzeroupper
; CHECK-VBMI-NEXT:    retq
entry:
 %3 = zext i32 %2 to i64
 br label %vector.body

vector.body:
 %index = phi i64 [ %index.next, %vector.body ], [ 0, %entry ]
 %vec.phi = phi <32 x i32> [ %11, %vector.body ], [ zeroinitializer, %entry ]
 %4 = getelementptr inbounds i8, i8* %0, i64 %index
 %5 = bitcast i8* %4 to <32 x i8>*
```

```
 %wide.load = load <32 x i8>, <32 x i8>* %5, align 1
 %6 = sext <32 x i8> %wide.load to <32 x i32>
 %7 = getelementptr inbounds i8, i8* %1, i64 %index
 %8 = bitcast i8* %7 to <32 x i8>*
 %wide.load14 = load <32 x
 i8>, <32 x i8>* %8, align 1
 %9 = sext <32 x i8> %wide.load14 to <32 x i32>
 %10 = mul nsw <32 x i32> %9, %6
 %11 = add nsw <32 x i32> %10, %vec.phi
 %index.next = add i64 %index, 32
 %12 = icmp eq i64 %index.next, %3
 br i1 %12, label %middle.block, label %vector.body

middle.block:
 %rdx.shuf1 = shufflevector <32 x i32> %11, <32 x i32> undef, <32 x i32> <i32 16, i32 17, i32 18, i32 19, i32 20,
i32 21, i32 22, i32 23, i32 24, i32 25, i32 26, i32 27, i32 28, i32 29, i32 30, i32 31, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef>
 %bin.rdx1 = add <32 x i32> %11, %rdx.shuf1
 %rdx.shuf = shufflevector <32 x i32> %bin.rdx1, <32 x i32> undef, <32 x i32> <i32 8, i32 9, i32 10, i32 11, i32
12, i32 13, i32 14, i32 15, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef,
 i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef>
 %bin.rdx = add <32 x i32> %bin.rdx1, %rdx.shuf
 %rdx.shuf15 = shufflevector <32 x i32> %bin.rdx, <32 x i32> undef, <32 x i32> <i32 4, i32 5, i32 6, i32 7, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx32 = add <32 x i32> %bin.rdx, %rdx.shuf15
 %rdx.shuf17 = shufflevector <32 x i32> %bin.rdx32, <32 x i32> undef, <32 x i32> <i32 2, i32 3, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef,
 i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx18 = add <32 x i32> %bin.rdx32, %rdx.shuf17
 %rdx.shuf19 = shufflevector <32 x i32> %bin.rdx18, <32 x i32> undef, <32 x i32> <i32 1, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx20 = add <32 x i32> %bin.rdx18, %rdx.shuf19
 %13 = extractelement <32 x i32> %bin.rdx20, i32 0
 ret i32 %13
}

define dso_local i32 @_Z9test_charPcS_i_512(i8* nocapture readonly, i8* nocapture readonly, i32) "min-legal-
vector-width"="512" {
; CHECK-SKX-LABEL: _Z9test_charPcS_i_512:
```

```
; CHECK-SKX:       # %bb.0: # %entry
; CHECK-SKX-NEXT:    movl %edx, %eax
; CHECK-SKX-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-SKX-NEXT:    xorl %ecx,
 %ecx
; CHECK-SKX-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-SKX-NEXT:    .p2align 4, 0x90
; CHECK-SKX-NEXT:  .LBB9_1: # %vector.body
; CHECK-SKX-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-SKX-NEXT:    vpmovsxbw (%rdi,%rcx), %zmm2
; CHECK-SKX-NEXT:    vpmovsxbw (%rsi,%rcx), %zmm3
; CHECK-SKX-NEXT:    vpmaddwd %zmm2, %zmm3, %zmm2
; CHECK-SKX-NEXT:    vpaddd %zmm1, %zmm2, %zmm1
; CHECK-SKX-NEXT:    addq $32, %rcx
; CHECK-SKX-NEXT:    cmpq %rcx, %rax
; CHECK-SKX-NEXT:    jne .LBB9_1
; CHECK-SKX-NEXT:  # %bb.2: # %middle.block
; CHECK-SKX-NEXT:    vpaddd %zmm0, %zmm1, %zmm0
; CHECK-SKX-NEXT:    vextracti64x4 $1, %zmm0, %ymm1
; CHECK-SKX-NEXT:    vpaddd %zmm1, %zmm0, %zmm0
; CHECK-SKX-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vpsrlq $32, %xmm0, %xmm1
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:
   vmovd %xmm0, %eax
; CHECK-SKX-NEXT:    vzeroupper
; CHECK-SKX-NEXT:    retq
;
; CHECK-AVX512-LABEL: _Z9test_charPcS_i_512:
; CHECK-AVX512:       # %bb.0: # %entry
; CHECK-AVX512-NEXT:    movl %edx, %eax
; CHECK-AVX512-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    xorl %ecx, %ecx
; CHECK-AVX512-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-AVX512-NEXT:    .p2align 4, 0x90
; CHECK-AVX512-NEXT:  .LBB9_1: # %vector.body
; CHECK-AVX512-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-AVX512-NEXT:    vpmovsxbw (%rdi,%rcx), %zmm2
; CHECK-AVX512-NEXT:    vpmovsxbw (%rsi,%rcx), %zmm3
; CHECK-AVX512-NEXT:    vpmaddwd %zmm2, %zmm3, %zmm2
; CHECK-AVX512-NEXT:    vpaddd %zmm1, %zmm2, %zmm1
; CHECK-AVX512-NEXT:    addq $32, %rcx
; CHECK-AVX512-NEXT:    cmpq %rcx, %rax
; CHECK-AVX512-NEXT:    jne .LBB9_1
; CHECK-AVX512-NEXT:  # %bb.2: # %middle.block
```

```
; CHECK-AVX512-NEXT:    vpaddd %zmm0, %zmm1, %zmm0
; CHECK-AVX512-NEXT:    vextracti64x4 $1, %zmm0, %ymm1
; CHECK-AVX512-NEXT:    vpaddd
 %zmm1, %zmm0, %zmm0
; CHECK-AVX512-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vpsrlq $32, %xmm0, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vmovd %xmm0, %eax
; CHECK-AVX512-NEXT:    vzeroupper
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI-LABEL: _Z9test_charPcS_i_512:
; CHECK-VBMI:       # %bb.0: # %entry
; CHECK-VBMI-NEXT:    movl %edx, %eax
; CHECK-VBMI-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    xorl %ecx, %ecx
; CHECK-VBMI-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-VBMI-NEXT:    .p2align 4, 0x90
; CHECK-VBMI-NEXT:  .LBB9_1: # %vector.body
; CHECK-VBMI-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-VBMI-NEXT:    vpmovsxbw (%rdi,%rcx), %zmm2
; CHECK-VBMI-NEXT:    vpmovsxbw (%rsi,%rcx), %zmm3
; CHECK-VBMI-NEXT:    vpmaddwd %zmm2, %zmm3, %zmm2
;
 CHECK-VBMI-NEXT:    vpaddd %zmm1, %zmm2, %zmm1
; CHECK-VBMI-NEXT:    addq $32, %rcx
; CHECK-VBMI-NEXT:    cmpq %rcx, %rax
; CHECK-VBMI-NEXT:    jne .LBB9_1
; CHECK-VBMI-NEXT:  # %bb.2: # %middle.block
; CHECK-VBMI-NEXT:    vpaddd %zmm0, %zmm1, %zmm0
; CHECK-VBMI-NEXT:    vextracti64x4 $1, %zmm0, %ymm1
; CHECK-VBMI-NEXT:    vpaddd %zmm1, %zmm0, %zmm0
; CHECK-VBMI-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[1,1,1,1]
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vmovd %xmm0, %eax
; CHECK-VBMI-NEXT:    vzeroupper
; CHECK-VBMI-NEXT:    retq
entry:
 %3 = zext i32 %2 to i64
 br label %vector.body
```

```
vector.body:
 %index = phi i64 [ %index.next, %vector.body ], [ 0, %entry ]
 %vec.phi = phi <32 x i32> [ %11, %vector.body ], [ zeroinitializer, %entry ]
 %4 = getelementptr
 inbounds i8, i8* %0, i64 %index
 %5 = bitcast i8* %4 to <32 x i8>*
 %wide.load = load <32 x i8>, <32 x i8>* %5, align 1
 %6 = sext <32 x i8> %wide.load to <32 x i32>
 %7 = getelementptr inbounds i8, i8* %1, i64 %index
 %8 = bitcast i8* %7 to <32 x i8>*
 %wide.load14 = load <32 x i8>, <32 x i8>* %8, align 1
 %9 = sext <32 x i8> %wide.load14 to <32 x i32>
 %10 = mul nsw <32 x i32> %9, %6
 %11 = add nsw <32 x i32> %10, %vec.phi
 %index.next = add i64 %index, 32
 %12 = icmp eq i64 %index.next, %3
 br i1 %12, label %middle.block, label %vector.body

middle.block:
 %rdx.shuf1 = shufflevector <32 x i32> %11, <32 x i32> undef, <32 x i32> <i32 16, i32 17, i32 18, i32 19, i32 20,
i32 21, i32 22, i32 23, i32 24, i32 25, i32 26, i32 27, i32 28, i32 29, i32 30, i32 31, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef>
 %bin.rdx1 = add <32 x i32> %11, %rdx.shuf1
  %rdx.shuf = shufflevector <32 x i32> %bin.rdx1, <32 x i32> undef, <32 x i32> <i32 8, i32 9, i32 10, i32 11, i32
12, i32 13, i32 14, i32 15, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx = add <32 x i32> %bin.rdx1, %rdx.shuf
 %rdx.shuf15 = shufflevector <32 x i32> %bin.rdx, <32 x i32> undef, <32 x i32> <i32 4, i32 5, i32 6, i32 7, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx32 = add <32 x i32> %bin.rdx, %rdx.shuf15
 %rdx.shuf17 = shufflevector <32 x i32> %bin.rdx32, <32 x i32> undef,
 <32 x i32> <i32 2, i32 3, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef>
 %bin.rdx18 = add <32 x i32> %bin.rdx32, %rdx.shuf17
 %rdx.shuf19 = shufflevector <32 x i32> %bin.rdx18, <32 x i32> undef, <32 x i32> <i32 1, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx20 = add <32 x i32> %bin.rdx18, %rdx.shuf19
 %13 = extractelement <32 x i32> %bin.rdx20, i32 0
 ret i32 %13
}
```

```
@a = dso_local global [1024 x i8]
 zeroinitializer, align 16
@b = dso_local global [1024 x i8] zeroinitializer, align 16

define dso_local i32 @sad_16i8_256() "min-legal-vector-width"="256" {
; CHECK-SKX-LABEL: sad_16i8_256:
; CHECK-SKX:       # %bb.0: # %entry
; CHECK-SKX-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-SKX-NEXT:    movq $-1024, %rax # imm = 0xFC00
; CHECK-SKX-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-SKX-NEXT:    .p2align 4, 0x90
; CHECK-SKX-NEXT:  .LBB10_1: # %vector.body
; CHECK-SKX-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-SKX-NEXT:    vmovdqu a+1024(%rax), %xmm2
; CHECK-SKX-NEXT:    vpsadbw b+1024(%rax), %xmm2, %xmm2
; CHECK-SKX-NEXT:    vpaddd %ymm1, %ymm2, %ymm1
; CHECK-SKX-NEXT:    addq $4, %rax
; CHECK-SKX-NEXT:    jne .LBB10_1
; CHECK-SKX-NEXT:  # %bb.2: # %middle.block
; CHECK-SKX-NEXT:    vpaddd %ymm0, %ymm1, %ymm0
; CHECK-SKX-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-SKX-NEXT:
   vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vpsrlq $32, %xmm0, %xmm1
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vmovd %xmm0, %eax
; CHECK-SKX-NEXT:    vzeroupper
; CHECK-SKX-NEXT:    retq
;
; CHECK-AVX512-LABEL: sad_16i8_256:
; CHECK-AVX512:       # %bb.0: # %entry
; CHECK-AVX512-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    movq $-1024, %rax # imm = 0xFC00
; CHECK-AVX512-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-AVX512-NEXT:    .p2align 4, 0x90
; CHECK-AVX512-NEXT:  .LBB10_1: # %vector.body
; CHECK-AVX512-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-AVX512-NEXT:    vmovdqu a+1024(%rax), %xmm2
; CHECK-AVX512-NEXT:    vpsadbw b+1024(%rax), %xmm2, %xmm2
; CHECK-AVX512-NEXT:    vpaddd %ymm1, %ymm2, %ymm1
; CHECK-AVX512-NEXT:    addq $4, %rax
; CHECK-AVX512-NEXT:    jne .LBB10_1
; CHECK-AVX512-NEXT:  # %bb.2: # %middle.block
; CHECK-AVX512-NEXT:    vpaddd %ymm0, %ymm1, %ymm0
; CHECK-AVX512-NEXT:    vextracti128 $1, %ymm0, %xmm1
```

```
;
 CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vpsrlq $32, %xmm0, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vmovd %xmm0, %eax
; CHECK-AVX512-NEXT:    vzeroupper
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI-LABEL: sad_16i8_256:
; CHECK-VBMI:       # %bb.0: # %entry
; CHECK-VBMI-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    movq $-1024, %rax # imm = 0xFC00
; CHECK-VBMI-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-VBMI-NEXT:    .p2align 4, 0x90
; CHECK-VBMI-NEXT:  .LBB10_1: # %vector.body
; CHECK-VBMI-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-VBMI-NEXT:    vmovdqu a+1024(%rax), %xmm2
; CHECK-VBMI-NEXT:    vpsadbw b+1024(%rax), %xmm2, %xmm2
; CHECK-VBMI-NEXT:    vpaddd %ymm1, %ymm2, %ymm1
; CHECK-VBMI-NEXT:    addq $4, %rax
; CHECK-VBMI-NEXT:    jne .LBB10_1
; CHECK-VBMI-NEXT:  # %bb.2: # %middle.block
;
 CHECK-VBMI-NEXT:    vpaddd %ymm0, %ymm1, %ymm0
; CHECK-VBMI-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[1,1,1,1]
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vmovd %xmm0, %eax
; CHECK-VBMI-NEXT:    vzeroupper
; CHECK-VBMI-NEXT:    retq
entry:
 br label %vector.body

vector.body:
 %index = phi i64 [ 0, %entry ], [ %index.next, %vector.body ]
 %vec.phi = phi <16 x i32> [ zeroinitializer, %entry ], [ %10, %vector.body ]
 %0 = getelementptr inbounds [1024 x i8], [1024 x i8]* @a, i64 0, i64 %index
 %1 = bitcast i8* %0 to <16 x i8>*
 %wide.load = load <16 x i8>, <16 x i8>* %1, align 4
 %2 = zext <16 x i8> %wide.load to <16 x i32>
 %3 = getelementptr inbounds [1024 x i8], [1024 x i8]* @b, i64 0, i64 %index
 %4 = bitcast i8* %3 to <16 x i8>*
 %wide.load1
```

```
 = load <16 x i8>, <16 x i8>* %4, align 4
 %5 = zext <16 x i8> %wide.load1 to <16 x i32>
 %6 = sub nsw <16 x i32> %2, %5
 %7 = icmp sgt <16 x i32> %6, <i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -
1, i32 -1, i32 -1, i32 -1, i32 -1>
 %8 = sub nsw <16 x i32> zeroinitializer, %6
 %9 = select <16 x i1> %7, <16 x i32> %6, <16 x i32> %8
 %10 = add nsw <16 x i32> %9, %vec.phi
 %index.next = add i64 %index, 4
 %11 = icmp eq i64 %index.next, 1024
 br i1 %11, label %middle.block, label %vector.body

middle.block:
 %rdx.shuf = shufflevector <16 x i32> %10, <16 x i32> undef, <16 x i32> <i32 8, i32 9, i32 10, i32 11, i32 12, i32
13, i32 14, i32 15, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx = add <16 x i32> %10, %rdx.shuf
 %rdx.shuf2 = shufflevector <16 x i32> %bin.rdx, <16 x i32> undef, <16 x i32> <i32 4, i32 5, i32 6, i32 7, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef,
 i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx2 = add <16 x i32> %bin.rdx, %rdx.shuf2
 %rdx.shuf3 = shufflevector <16 x i32> %bin.rdx2, <16 x i32> undef, <16 x i32> <i32 2, i32 3, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef>
 %bin.rdx3 = add <16 x i32> %bin.rdx2, %rdx.shuf3
 %rdx.shuf4 = shufflevector <16 x i32> %bin.rdx3, <16 x i32> undef, <16 x i32> <i32 1, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef>
 %bin.rdx4 = add <16 x i32> %bin.rdx3, %rdx.shuf4
 %12 = extractelement <16 x i32> %bin.rdx4, i32 0
 ret i32 %12
}

define dso_local i32 @sad_16i8_512() "min-legal-vector-width"="512" {
; CHECK-SKX-LABEL: sad_16i8_512:
; CHECK-SKX:       # %bb.0: # %entry
; CHECK-SKX-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-SKX-NEXT:
    movq $-1024, %rax # imm = 0xFC00
; CHECK-SKX-NEXT:    .p2align 4, 0x90
; CHECK-SKX-NEXT:  .LBB11_1: # %vector.body
; CHECK-SKX-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-SKX-NEXT:    vmovdqu a+1024(%rax), %xmm1
; CHECK-SKX-NEXT:    vpsadbw b+1024(%rax), %xmm1, %xmm1
; CHECK-SKX-NEXT:    vpaddd %zmm0, %zmm1, %zmm0
; CHECK-SKX-NEXT:    addq $4, %rax
; CHECK-SKX-NEXT:    jne .LBB11_1
; CHECK-SKX-NEXT:  # %bb.2: # %middle.block
; CHECK-SKX-NEXT:    vextracti64x4 $1, %zmm0, %ymm1
```

```
; CHECK-SKX-NEXT:    vpaddd %zmm1, %zmm0, %zmm0
; CHECK-SKX-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vpsrlq $32, %xmm0, %xmm1
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vmovd %xmm0, %eax
; CHECK-SKX-NEXT:    vzeroupper
; CHECK-SKX-NEXT:    retq
;
; CHECK-AVX512-LABEL: sad_16i8_512:
; CHECK-AVX512:
   # %bb.0: # %entry
; CHECK-AVX512-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    movq $-1024, %rax # imm = 0xFC00
; CHECK-AVX512-NEXT:    .p2align 4, 0x90
; CHECK-AVX512-NEXT:  .LBB11_1: # %vector.body
; CHECK-AVX512-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-AVX512-NEXT:    vmovdqu a+1024(%rax), %xmm1
; CHECK-AVX512-NEXT:    vpsadbw b+1024(%rax), %xmm1, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %zmm0, %zmm1, %zmm0
; CHECK-AVX512-NEXT:    addq $4, %rax
; CHECK-AVX512-NEXT:    jne .LBB11_1
; CHECK-AVX512-NEXT:  # %bb.2: # %middle.block
; CHECK-AVX512-NEXT:    vextracti64x4 $1, %zmm0, %ymm1
; CHECK-AVX512-NEXT:    vpaddd %zmm1, %zmm0, %zmm0
; CHECK-AVX512-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vpsrlq $32, %xmm0, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:
   vmovd %xmm0, %eax
; CHECK-AVX512-NEXT:    vzeroupper
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI-LABEL: sad_16i8_512:
; CHECK-VBMI:       # %bb.0: # %entry
; CHECK-VBMI-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    movq $-1024, %rax # imm = 0xFC00
; CHECK-VBMI-NEXT:    .p2align 4, 0x90
; CHECK-VBMI-NEXT:  .LBB11_1: # %vector.body
; CHECK-VBMI-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-VBMI-NEXT:    vmovdqu a+1024(%rax), %xmm1
; CHECK-VBMI-NEXT:    vpsadbw b+1024(%rax), %xmm1, %xmm1
; CHECK-VBMI-NEXT:    vpaddd %zmm0, %zmm1, %zmm0
```

```
; CHECK-VBMI-NEXT:    addq $4, %rax
; CHECK-VBMI-NEXT:    jne .LBB11_1
; CHECK-VBMI-NEXT:  # %bb.2: # %middle.block
; CHECK-VBMI-NEXT:    vextracti64x4 $1, %zmm0, %ymm1
; CHECK-VBMI-NEXT:    vpaddd %zmm1, %zmm0, %zmm0
; CHECK-VBMI-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:
    vpshufd {{.*#+}} xmm1 = xmm0[1,1,1,1]
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vmovd %xmm0, %eax
; CHECK-VBMI-NEXT:    vzeroupper
; CHECK-VBMI-NEXT:    retq
entry:
 br label %vector.body

vector.body:
 %index = phi i64 [ 0, %entry ], [ %index.next, %vector.body ]
 %vec.phi = phi <16 x i32> [ zeroinitializer, %entry ], [ %10, %vector.body ]
 %0 = getelementptr inbounds [1024 x i8], [1024 x i8]* @a, i64 0, i64 %index
 %1 = bitcast i8* %0 to <16 x i8>*
 %wide.load = load <16 x i8>, <16 x i8>* %1, align 4
 %2 = zext <16 x i8> %wide.load to <16 x i32>
 %3 = getelementptr inbounds [1024 x i8], [1024 x i8]* @b, i64 0, i64 %index
 %4 = bitcast i8* %3 to <16 x i8>*
 %wide.load1 = load <16 x i8>, <16 x i8>* %4, align 4
 %5 = zext <16 x i8> %wide.load1 to <16 x i32>
 %6 = sub nsw <16 x i32> %2, %5
 %7 = icmp sgt <16 x i32> %6, <i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -
1, i32 -1, i32 -1, i32
 -1, i32 -1>
 %8 = sub nsw <16 x i32> zeroinitializer, %6
 %9 = select <16 x i1> %7, <16 x i32> %6, <16 x i32> %8
 %10 = add nsw <16 x i32> %9, %vec.phi
 %index.next = add i64 %index, 4
 %11 = icmp eq i64 %index.next, 1024
 br i1 %11, label %middle.block, label %vector.body

middle.block:
 %rdx.shuf = shufflevector <16 x i32> %10, <16 x i32> undef, <16 x i32> <i32 8, i32 9, i32 10, i32 11, i32 12, i32
13, i32 14, i32 15, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx = add <16 x i32> %10, %rdx.shuf
 %rdx.shuf2 = shufflevector <16 x i32> %bin.rdx, <16 x i32> undef, <16 x i32> <i32 4, i32 5, i32 6, i32 7, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef>
 %bin.rdx2 = add <16 x i32> %bin.rdx, %rdx.shuf2
```

```
 %rdx.shuf3 = shufflevector <16 x i32> %bin.rdx2, <16 x i32> undef, <16 x i32> <i32 2, i32 3, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef,
 i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx3 = add <16 x i32> %bin.rdx2, %rdx.shuf3
 %rdx.shuf4 = shufflevector <16 x i32> %bin.rdx3, <16 x i32> undef, <16 x i32> <i32 1, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef>
 %bin.rdx4 = add <16 x i32> %bin.rdx3, %rdx.shuf4
 %12 = extractelement <16 x i32> %bin.rdx4, i32 0
 ret i32 %12
}

define dso_local void @sbto16f32_256(<16 x i16> %a, <16 x float>* %res) "min-legal-vector-width"="256" {
; CHECK-LABEL: sbto16f32_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovw2m %ymm0, %k0
; CHECK-NEXT:    kshiftrw $8, %k0, %k1
; CHECK-NEXT:    vpmovm2d %k1, %ymm0
; CHECK-NEXT:    vcvtdq2ps %ymm0, %ymm0
; CHECK-NEXT:    vpmovm2d %k0, %ymm1
; CHECK-NEXT:    vcvtdq2ps %ymm1, %ymm1
; CHECK-NEXT:    vmovaps %ymm1, (%rdi)
; CHECK-NEXT:    vmovaps %ymm0, 32(%rdi)
; CHECK-NEXT:
    vzeroupper
; CHECK-NEXT:    retq
 %mask = icmp slt <16 x i16> %a, zeroinitializer
 %1 = sitofp <16 x i1> %mask to <16 x float>
 store <16 x float> %1, <16 x float>* %res
 ret void
}

define dso_local void @sbto16f32_512(<16 x i16> %a, <16 x float>* %res) "min-legal-vector-width"="512" {
; CHECK-LABEL: sbto16f32_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovw2m %ymm0, %k0
; CHECK-NEXT:    vpmovm2d %k0, %zmm0
; CHECK-NEXT:    vcvtdq2ps %zmm0, %zmm0
; CHECK-NEXT:    vmovaps %zmm0, (%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %mask = icmp slt <16 x i16> %a, zeroinitializer
 %1 = sitofp <16 x i1> %mask to <16 x float>
 store <16 x float> %1, <16 x float>* %res
 ret void
}

define dso_local void @sbto16f64_256(<16 x i16> %a, <16 x double>* %res)  "min-legal-vector-width"="256" {
```

```
; CHECK-LABEL: sbto16f64_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovw2m %ymm0, %k0
; CHECK-NEXT:    kshiftrw $8, %k0, %k1
; CHECK-NEXT:    vpmovm2d %k1, %ymm0
; CHECK-NEXT:
   vcvtdq2pd %xmm0, %ymm1
; CHECK-NEXT:    vextracti128 $1, %ymm0, %xmm0
; CHECK-NEXT:    vcvtdq2pd %xmm0, %ymm0
; CHECK-NEXT:    vpmovm2d %k0, %ymm2
; CHECK-NEXT:    vcvtdq2pd %xmm2, %ymm3
; CHECK-NEXT:    vextracti128 $1, %ymm2, %xmm2
; CHECK-NEXT:    vcvtdq2pd %xmm2, %ymm2
; CHECK-NEXT:    vmovaps %ymm2, 32(%rdi)
; CHECK-NEXT:    vmovaps %ymm3, (%rdi)
; CHECK-NEXT:    vmovaps %ymm0, 96(%rdi)
; CHECK-NEXT:    vmovaps %ymm1, 64(%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %mask = icmp slt <16 x i16> %a, zeroinitializer
 %1 = sitofp <16 x i1> %mask to <16 x double>
 store <16 x double> %1, <16 x double>* %res
 ret void
}

define dso_local void @sbto16f64_512(<16 x i16> %a, <16 x double>* %res)  "min-legal-vector-width"="512" {
; CHECK-LABEL: sbto16f64_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovw2m %ymm0, %k0
; CHECK-NEXT:    vpmovm2d %k0, %zmm0
; CHECK-NEXT:    vcvtdq2pd %ymm0, %zmm1
; CHECK-NEXT:    vextracti64x4 $1, %zmm0, %ymm0
; CHECK-NEXT:    vcvtdq2pd
 %ymm0, %zmm0
; CHECK-NEXT:    vmovaps %zmm0, 64(%rdi)
; CHECK-NEXT:    vmovaps %zmm1, (%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %mask = icmp slt <16 x i16> %a, zeroinitializer
 %1 = sitofp <16 x i1> %mask to <16 x double>
 store <16 x double> %1, <16 x double>* %res
 ret void
}

define dso_local void @ubto16f32_256(<16 x i16> %a, <16 x float>* %res) "min-legal-vector-width"="256" {
; CHECK-LABEL: ubto16f32_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovw2m %ymm0, %k0
```

```
; CHECK-NEXT:    kshiftrw $8, %k0, %k1
; CHECK-NEXT:    vpmovm2d %k1, %ymm0
; CHECK-NEXT:    vpsrld $31, %ymm0, %ymm0
; CHECK-NEXT:    vcvtdq2ps %ymm0, %ymm0
; CHECK-NEXT:    vpmovm2d %k0, %ymm1
; CHECK-NEXT:    vpsrld $31, %ymm1, %ymm1
; CHECK-NEXT:    vcvtdq2ps %ymm1, %ymm1
; CHECK-NEXT:    vmovaps %ymm1, (%rdi)
; CHECK-NEXT:    vmovaps %ymm0, 32(%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %mask = icmp slt <16 x i16> %a, zeroinitializer
 %1 = uitofp <16 x i1> %mask to <16 x float>
  store <16 x float> %1, <16 x float>* %res
 ret void
}

define dso_local void @ubto16f32_512(<16 x i16> %a, <16 x float>* %res) "min-legal-vector-width"="512" {
; CHECK-LABEL: ubto16f32_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovw2m %ymm0, %k0
; CHECK-NEXT:    vpmovm2d %k0, %zmm0
; CHECK-NEXT:    vpsrld $31, %zmm0, %zmm0
; CHECK-NEXT:    vcvtdq2ps %zmm0, %zmm0
; CHECK-NEXT:    vmovaps %zmm0, (%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %mask = icmp slt <16 x i16> %a, zeroinitializer
 %1 = uitofp <16 x i1> %mask to <16 x float>
 store <16 x float> %1, <16 x float>* %res
 ret void
}

define dso_local void @ubto16f64_256(<16 x i16> %a, <16 x double>* %res) "min-legal-vector-width"="256" {
; CHECK-LABEL: ubto16f64_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovw2m %ymm0, %k0
; CHECK-NEXT:    kshiftrw $8, %k0, %k1
; CHECK-NEXT:    vpmovm2d %k1, %ymm0
; CHECK-NEXT:    vpsrld $31, %ymm0, %ymm0
; CHECK-NEXT:    vcvtdq2pd %xmm0, %ymm1
; CHECK-NEXT:    vextracti128
 $1, %ymm0, %xmm0
; CHECK-NEXT:    vcvtdq2pd %xmm0, %ymm0
; CHECK-NEXT:    vpmovm2d %k0, %ymm2
; CHECK-NEXT:    vpsrld $31, %ymm2, %ymm2
; CHECK-NEXT:    vcvtdq2pd %xmm2, %ymm3
; CHECK-NEXT:    vextracti128 $1, %ymm2, %xmm2
```

```
; CHECK-NEXT:    vcvtdq2pd %xmm2, %ymm2
; CHECK-NEXT:    vmovaps %ymm2, 32(%rdi)
; CHECK-NEXT:    vmovaps %ymm3, (%rdi)
; CHECK-NEXT:    vmovaps %ymm0, 96(%rdi)
; CHECK-NEXT:    vmovaps %ymm1, 64(%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %mask = icmp slt <16 x i16> %a, zeroinitializer
 %1 = uitofp <16 x i1> %mask to <16 x double>
 store <16 x double> %1, <16 x double>* %res
 ret void
}

define dso_local void @ubto16f64_512(<16 x i16> %a, <16 x double>* %res) "min-legal-vector-width"="512" {
; CHECK-LABEL: ubto16f64_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovw2m %ymm0, %k0
; CHECK-NEXT:    vpmovm2d %k0, %zmm0
; CHECK-NEXT:    vpsrld $31, %zmm0, %zmm0
; CHECK-NEXT:    vcvtdq2pd %ymm0, %zmm1
; CHECK-NEXT:    vextracti64x4 $1, %zmm0, %ymm0
; CHECK-NEXT:
   vcvtdq2pd %ymm0, %zmm0
; CHECK-NEXT:    vmovaps %zmm0, 64(%rdi)
; CHECK-NEXT:    vmovaps %zmm1, (%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %mask = icmp slt <16 x i16> %a, zeroinitializer
 %1 = uitofp <16 x i1> %mask to <16 x double>
 store <16 x double> %1, <16 x double>* %res
 ret void
}

define <16 x i16> @test_16f32toub_256(<16 x float>* %ptr, <16 x i16> %passthru) "min-legal-vector-
width"="256" {
; CHECK-LABEL: test_16f32toub_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vcvttps2dq (%rdi), %ymm1
; CHECK-NEXT:    vpslld $31, %ymm1, %ymm1
; CHECK-NEXT:    vpmovd2m %ymm1, %k0
; CHECK-NEXT:    vcvttps2dq 32(%rdi), %ymm1
; CHECK-NEXT:    vpslld $31, %ymm1, %ymm1
; CHECK-NEXT:    vpmovd2m %ymm1, %k1
; CHECK-NEXT:    kunpckbw %k0, %k1, %k1
; CHECK-NEXT:    vmovdqu16 %ymm0, %ymm0 {%k1} {z}
; CHECK-NEXT:    retq
 %a = load <16 x float>, <16 x float>* %ptr
 %mask = fptoui <16 x float> %a to <16 x i1>
```

```
 %select = select <16 x i1> %mask, <16 x i16> %passthru,
 <16 x i16> zeroinitializer
 ret <16 x i16> %select
}

define <16 x i16> @test_16f32toub_512(<16 x float>* %ptr, <16 x i16> %passthru) "min-legal-vector-
width"="512" {
; CHECK-LABEL: test_16f32toub_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vcvttps2dq (%rdi), %zmm1
; CHECK-NEXT:    vpslld $31, %zmm1, %zmm1
; CHECK-NEXT:    vpmovd2m %zmm1, %k1
; CHECK-NEXT:    vmovdqu16 %ymm0, %ymm0 {%k1} {z}
; CHECK-NEXT:    retq
 %a = load <16 x float>, <16 x float>* %ptr
 %mask = fptoui <16 x float> %a to <16 x i1>
 %select = select <16 x i1> %mask, <16 x i16> %passthru, <16 x i16> zeroinitializer
 ret <16 x i16> %select
}

define <16 x i16> @test_16f32tosb_256(<16 x float>* %ptr, <16 x i16> %passthru) "min-legal-vector-
width"="256" {
; CHECK-LABEL: test_16f32tosb_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vcvttps2dq (%rdi), %ymm1
; CHECK-NEXT:    vpmovd2m %ymm1, %k0
; CHECK-NEXT:    vcvttps2dq 32(%rdi), %ymm1
; CHECK-NEXT:    vpmovd2m %ymm1, %k1
; CHECK-NEXT:    kunpckbw %k0, %k1, %k1
; CHECK-NEXT:
    vmovdqu16 %ymm0, %ymm0 {%k1} {z}
; CHECK-NEXT:    retq
 %a = load <16 x float>, <16 x float>* %ptr
 %mask = fptosi <16 x float> %a to <16 x i1>
 %select = select <16 x i1> %mask, <16 x i16> %passthru, <16 x i16> zeroinitializer
 ret <16 x i16> %select
}

define <16 x i16> @test_16f32tosb_512(<16 x float>* %ptr, <16 x i16> %passthru) "min-legal-vector-
width"="512" {
; CHECK-LABEL: test_16f32tosb_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vcvttps2dq (%rdi), %zmm1
; CHECK-NEXT:    vpmovd2m %zmm1, %k1
; CHECK-NEXT:    vmovdqu16 %ymm0, %ymm0 {%k1} {z}
; CHECK-NEXT:    retq
 %a = load <16 x float>, <16 x float>* %ptr
 %mask = fptosi <16 x float> %a to <16 x i1>
```

```
 %select = select <16 x i1> %mask, <16 x i16> %passthru, <16 x i16> zeroinitializer
 ret <16 x i16> %select
}

define dso_local void @mul256(<64 x i8>* %a, <64 x i8>* %b, <64 x i8>* %c) "min-legal-vector-width"="256" {
; CHECK-SKX-VBMI-LABEL: mul256:
; CHECK-SKX-VBMI:       # %bb.0:
; CHECK-SKX-VBMI-NEXT:    vmovdqa
 (%rdi), %ymm0
; CHECK-SKX-VBMI-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-SKX-VBMI-NEXT:    vmovdqa (%rsi), %ymm2
; CHECK-SKX-VBMI-NEXT:    vmovdqa 32(%rsi), %ymm3
; CHECK-SKX-VBMI-NEXT:    vpunpckhbw {{.*#+}} ymm4 =
ymm3[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-SKX-VBMI-NEXT:    vpunpckhbw {{.*#+}} ymm5 =
ymm1[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-SKX-VBMI-NEXT:    vpmullw %ymm4, %ymm5, %ymm4
; CHECK-SKX-VBMI-NEXT:    vpunpcklbw {{.*#+}} ymm3 =
ymm3[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-SKX-VBMI-NEXT:    vpunpcklbw {{.*#+}} ymm1 =
ymm1[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-SKX-VBMI-NEXT:    vpmullw %ymm3, %ymm1, %ymm1
; CHECK-SKX-VBMI-NEXT:    vmovdqa {{.*#+}} ymm3 =
[0,2,4,6,8,10,12,14,32,34,36,38,40,42,44,46,16,18,20,22,24,26,28,30,48,50,52,54,56,58,60,62]
;
 CHECK-SKX-VBMI-NEXT:    vpermt2b %ymm4, %ymm3, %ymm1
; CHECK-SKX-VBMI-NEXT:    vpunpckhbw {{.*#+}} ymm4 =
ymm2[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-SKX-VBMI-NEXT:    vpunpckhbw {{.*#+}} ymm5 =
ymm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-SKX-VBMI-NEXT:    vpmullw %ymm4, %ymm5, %ymm4
; CHECK-SKX-VBMI-NEXT:    vpunpcklbw {{.*#+}} ymm2 =
ymm2[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-SKX-VBMI-NEXT:    vpunpcklbw {{.*#+}} ymm0 =
ymm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-SKX-VBMI-NEXT:    vpmullw %ymm2, %ymm0, %ymm0
; CHECK-SKX-VBMI-NEXT:    vpermt2b %ymm4, %ymm3, %ymm0
; CHECK-SKX-VBMI-NEXT:    vmovdqa %ymm0, (%rdx)
; CHECK-SKX-VBMI-NEXT:    vmovdqa %ymm1, 32(%rdx)
; CHECK-SKX-VBMI-NEXT:    vzeroupper
; CHECK-SKX-VBMI-NEXT:    retq
;
; CHECK-AVX512-LABEL: mul256:
; CHECK-AVX512:
      # %bb.0:
; CHECK-AVX512-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-AVX512-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-AVX512-NEXT:    vmovdqa (%rsi), %ymm2
```

```
; CHECK-AVX512-NEXT:    vmovdqa 32(%rsi), %ymm3
; CHECK-AVX512-NEXT:    vpunpckhbw {{.*#+}} ymm4 =
ymm3[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-AVX512-NEXT:    vpunpckhbw {{.*#+}} ymm5 =
ymm1[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-AVX512-NEXT:    vpmullw %ymm4, %ymm5, %ymm4
; CHECK-AVX512-NEXT:    vpbroadcastw {{.*#+}} ymm5 =
[255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255]
; CHECK-AVX512-NEXT:    vpand %ymm5, %ymm4, %ymm4
; CHECK-AVX512-NEXT:    vpunpcklbw {{.*#+}} ymm3 =
ymm3[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-AVX512-NEXT:    vpunpcklbw {{.*#+}} ymm1 =
ymm1[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
;
 CHECK-AVX512-NEXT:    vpmullw %ymm3, %ymm1, %ymm1
; CHECK-AVX512-NEXT:    vpand %ymm5, %ymm1, %ymm1
; CHECK-AVX512-NEXT:    vpackuswb %ymm4, %ymm1, %ymm1
; CHECK-AVX512-NEXT:    vpunpckhbw {{.*#+}} ymm3 =
ymm2[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-AVX512-NEXT:    vpunpckhbw {{.*#+}} ymm4 =
ymm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-AVX512-NEXT:    vpmullw %ymm3, %ymm4, %ymm3
; CHECK-AVX512-NEXT:    vpand %ymm5, %ymm3, %ymm3
; CHECK-AVX512-NEXT:    vpunpcklbw {{.*#+}} ymm2 =
ymm2[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-AVX512-NEXT:    vpunpcklbw {{.*#+}} ymm0 =
ymm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-AVX512-NEXT:    vpmullw %ymm2, %ymm0, %ymm0
; CHECK-AVX512-NEXT:    vpand %ymm5, %ymm0, %ymm0
; CHECK-AVX512-NEXT:    vpackuswb %ymm3, %ymm0, %ymm0
; CHECK-AVX512-NEXT:
   vmovdqa %ymm0, (%rdx)
; CHECK-AVX512-NEXT:    vmovdqa %ymm1, 32(%rdx)
; CHECK-AVX512-NEXT:    vzeroupper
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI-LABEL: mul256:
; CHECK-VBMI:       # %bb.0:
; CHECK-VBMI-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-VBMI-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-VBMI-NEXT:    vmovdqa (%rsi), %ymm2
; CHECK-VBMI-NEXT:    vmovdqa 32(%rsi), %ymm3
; CHECK-VBMI-NEXT:    vpunpckhbw {{.*#+}} ymm4 =
ymm3[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-VBMI-NEXT:    vpunpckhbw {{.*#+}} ymm5 =
ymm1[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-VBMI-NEXT:    vpmullw %ymm4, %ymm5, %ymm4
; CHECK-VBMI-NEXT:    vpunpcklbw {{.*#+}} ymm3 =
```

```
ymm3[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-VBMI-NEXT:    vpunpcklbw {{.*#+}} ymm1 =
ymm1[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
;
 CHECK-VBMI-NEXT:    vpmullw %ymm3, %ymm1, %ymm1
; CHECK-VBMI-NEXT:    vmovdqa {{.*#+}} ymm3 =
[0,2,4,6,8,10,12,14,32,34,36,38,40,42,44,46,16,18,20,22,24,26,28,30,48,50,52,54,56,58,60,62]
; CHECK-VBMI-NEXT:    vpermt2b %ymm4, %ymm3, %ymm1
; CHECK-VBMI-NEXT:    vpunpckhbw {{.*#+}} ymm4 =
ymm2[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-VBMI-NEXT:    vpunpckhbw {{.*#+}} ymm5 =
ymm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-VBMI-NEXT:    vpmullw %ymm4, %ymm5, %ymm4
; CHECK-VBMI-NEXT:    vpunpcklbw {{.*#+}} ymm2 =
ymm2[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-VBMI-NEXT:    vpunpcklbw {{.*#+}} ymm0 =
ymm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-VBMI-NEXT:    vpmullw %ymm2, %ymm0, %ymm0
; CHECK-VBMI-NEXT:    vpermt2b %ymm4, %ymm3, %ymm0
; CHECK-VBMI-NEXT:    vmovdqa %ymm0, (%rdx)
;
 CHECK-VBMI-NEXT:    vmovdqa %ymm1, 32(%rdx)
; CHECK-VBMI-NEXT:    vzeroupper
; CHECK-VBMI-NEXT:    retq
 %d = load <64 x i8>, <64 x i8>* %a
 %e = load <64 x i8>, <64 x i8>* %b
 %f = mul <64 x i8> %d, %e
 store <64 x i8> %f, <64 x i8>* %c
 ret void
}

define dso_local void @mul512(<64 x i8>* %a, <64 x i8>* %b, <64 x i8>* %c) "min-legal-vector-width"="512" {
; CHECK-SKX-VBMI-LABEL: mul512:
; CHECK-SKX-VBMI:       # %bb.0:
; CHECK-SKX-VBMI-NEXT:    vmovdqa64 (%rdi), %zmm0
; CHECK-SKX-VBMI-NEXT:    vmovdqa64 (%rsi), %zmm1
; CHECK-SKX-VBMI-NEXT:    vpunpckhbw {{.*#+}} zmm2 =
zmm1[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31,40,40,41,41,4
2,42,43,43,44,44,45,45,46,46,47,47,56,56,57,57,58,58,59,59,60,60,61,61,62,62,63,63]
; CHECK-SKX-VBMI-NEXT:    vpunpckhbw {{.*#+}} zmm3 =
zmm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31,40,40,41,41,4
2,42,43,43,44,44,45,45,46,46,47,47,56,56,57,57,58,58,59,59,60,60,61,61,62,62,63,63]
;
 CHECK-SKX-VBMI-NEXT:    vpmullw %zmm2, %zmm3, %zmm2
; CHECK-SKX-VBMI-NEXT:    vpunpcklbw {{.*#+}} zmm1 =
zmm1[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23,32,32,33,33,34,34,35,35,36,3
6,37,37,38,38,39,39,48,48,49,49,50,50,51,51,52,52,53,53,54,54,55,55]
; CHECK-SKX-VBMI-NEXT:    vpunpcklbw {{.*#+}} zmm0 =
```

```
zmm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23,32,32,33,33,34,34,35,35,36,3
6,37,37,38,38,39,39,48,48,49,49,50,50,51,51,52,52,53,53,54,54,55,55]
; CHECK-SKX-VBMI-NEXT:    vpmullw %zmm1, %zmm0, %zmm0
; CHECK-SKX-VBMI-NEXT:    vmovdqa64 {{.*#+}} zmm1 =
[0,2,4,6,8,10,12,14,64,66,68,70,72,74,76,78,16,18,20,22,24,26,28,30,80,82,84,86,88,90,92,94,32,34,36,38,40,42,44,
46,96,98,100,102,104,106,108,110,48,50,52,54,56,58,60,62,112,114,116,118,120,122,124,126]
; CHECK-SKX-VBMI-NEXT:    vpermi2b %zmm2, %zmm0, %zmm1
; CHECK-SKX-VBMI-NEXT:    vmovdqa64 %zmm1, (%rdx)
; CHECK-SKX-VBMI-NEXT:    vzeroupper
;
 CHECK-SKX-VBMI-NEXT:    retq
;
; CHECK-AVX512-LABEL: mul512:
; CHECK-AVX512:       # %bb.0:
; CHECK-AVX512-NEXT:    vmovdqa64 (%rdi), %zmm0
; CHECK-AVX512-NEXT:    vmovdqa64 (%rsi), %zmm1
; CHECK-AVX512-NEXT:    vpunpckhbw {{.*#+}} zmm2 =
zmm1[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31,40,40,41,41,4
2,42,43,43,44,44,45,45,46,46,47,47,56,56,57,57,58,58,59,59,60,60,61,61,62,62,63,63]
; CHECK-AVX512-NEXT:    vpunpckhbw {{.*#+}} zmm3 =
zmm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31,40,40,41,41,4
2,42,43,43,44,44,45,45,46,46,47,47,56,56,57,57,58,58,59,59,60,60,61,61,62,62,63,63]
; CHECK-AVX512-NEXT:    vpmullw %zmm2, %zmm3, %zmm2
; CHECK-AVX512-NEXT:    vpbroadcastw {{.*#+}} zmm3 =
[255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,2
55,255,255,255,255,255]
; CHECK-AVX512-NEXT:    vpandq %zmm3, %zmm2, %zmm2
; CHECK-AVX512-NEXT:    vpunpcklbw
 {{.*#+}} zmm1 =
zmm1[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23,32,32,33,33,34,34,35,35,36,3
6,37,37,38,38,39,39,48,48,49,49,50,50,51,51,52,52,53,53,54,54,55,55]
; CHECK-AVX512-NEXT:    vpunpcklbw {{.*#+}} zmm0 =
zmm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23,32,32,33,33,34,34,35,35,36,3
6,37,37,38,38,39,39,48,48,49,49,50,50,51,51,52,52,53,53,54,54,55,55]
; CHECK-AVX512-NEXT:    vpmullw %zmm1, %zmm0, %zmm0
; CHECK-AVX512-NEXT:    vpandq %zmm3, %zmm0, %zmm0
; CHECK-AVX512-NEXT:    vpackuswb %zmm2, %zmm0, %zmm0
; CHECK-AVX512-NEXT:    vmovdqa64 %zmm0, (%rdx)
; CHECK-AVX512-NEXT:    vzeroupper
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI-LABEL: mul512:
; CHECK-VBMI:       # %bb.0:
; CHECK-VBMI-NEXT:    vmovdqa64 (%rdi), %zmm0
; CHECK-VBMI-NEXT:    vmovdqa64 (%rsi), %zmm1
; CHECK-VBMI-NEXT:    vpunpckhbw {{.*#+}} zmm2 =
zmm1[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31,40,40,41,41,4
2,42,43,43,44,44,45,45,46,46,47,47,56,56,57,57,58,58,59,59,60,60,61,61,62,62,63,63]
```

```
;
 CHECK-VBMI-NEXT:    vpunpckhbw {{.*#+}} zmm3 =
zmm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31,40,40,41,41,4
2,42,43,43,44,44,45,45,46,46,47,47,56,56,57,57,58,58,59,59,60,60,61,61,62,62,63,63]
; CHECK-VBMI-NEXT:    vpmullw %zmm2, %zmm3, %zmm2
; CHECK-VBMI-NEXT:    vpunpcklbw {{.*#+}} zmm1 =
zmm1[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23,32,32,33,33,34,34,35,35,36,3
6,37,37,38,38,39,39,48,48,49,49,50,50,51,51,52,52,53,53,54,54,55,55]
; CHECK-VBMI-NEXT:    vpunpcklbw {{.*#+}} zmm0 =
zmm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23,32,32,33,33,34,34,35,35,36,3
6,37,37,38,38,39,39,48,48,49,49,50,50,51,51,52,52,53,53,54,54,55,55]
; CHECK-VBMI-NEXT:    vpmullw %zmm1, %zmm0, %zmm0
; CHECK-VBMI-NEXT:    vmovdqa64 {{.*#+}} zmm1 =
[0,2,4,6,8,10,12,14,64,66,68,70,72,74,76,78,16,18,20,22,24,26,28,30,80,82,84,86,88,90,92,94,32,34,36,38,40,42,44,
46,96,98,100,102,104,106,108,110,48,50,52,54,56,58,60,62,112,114,116,118,120,122,124,126]
;
 CHECK-VBMI-NEXT:    vpermi2b %zmm2, %zmm0, %zmm1
; CHECK-VBMI-NEXT:    vmovdqa64 %zmm1, (%rdx)
; CHECK-VBMI-NEXT:    vzeroupper
; CHECK-VBMI-NEXT:    retq
 %d = load <64 x i8>, <64 x i8>* %a
 %e = load <64 x i8>, <64 x i8>* %b
 %f = mul <64 x i8> %d, %e
 store <64 x i8> %f, <64 x i8>* %c
 ret void
}

; This threw an assertion at one point.
define <4 x i32> @mload_v4i32(<4 x i32> %trigger, <4 x i32>* %addr, <4 x i32> %dst) "min-legal-vector-
width"="256" {
; CHECK-LABEL: mload_v4i32:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vptestnmd %xmm0, %xmm0, %k1
; CHECK-NEXT:    vpblendmd (%rdi), %xmm1, %xmm0 {%k1}
; CHECK-NEXT:    retq
 %mask = icmp eq <4 x i32> %trigger, zeroinitializer
 %res = call <4 x i32> @llvm.masked.load.v4i32.p0v4i32(<4 x i32>* %addr, i32 4, <4 x i1> %mask, <4 x i32>
%dst)
 ret <4 x i32> %res
}
declare <4 x i32>
 @llvm.masked.load.v4i32.p0v4i32(<4 x i32>*, i32, <4 x i1>, <4 x i32>)

define <16 x i32> @trunc_v16i64_v16i32(<16 x i64>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v16i64_v16i32:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm1
```

```
; CHECK-NEXT:    vmovdqa 64(%rdi), %ymm2
; CHECK-NEXT:    vmovdqa 96(%rdi), %ymm3
; CHECK-NEXT:    vpmovqd %ymm0, %xmm0
; CHECK-NEXT:    vpmovqd %ymm1, %xmm1
; CHECK-NEXT:    vinserti128 $1, %xmm1, %ymm0, %ymm0
; CHECK-NEXT:    vpmovqd %ymm2, %xmm1
; CHECK-NEXT:    vpmovqd %ymm3, %xmm2
; CHECK-NEXT:    vinserti128 $1, %xmm2, %ymm1, %ymm1
; CHECK-NEXT:    retq
 %a = load <16 x i64>, <16 x i64>* %x
 %b = trunc <16 x i64> %a to <16 x i32>
 ret <16 x i32> %b
}

define <16 x i8> @trunc_v16i64_v16i8(<16 x i64>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v16i64_v16i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rdi),
 %ymm1
; CHECK-NEXT:    vmovdqa 64(%rdi), %ymm2
; CHECK-NEXT:    vmovdqa 96(%rdi), %ymm3
; CHECK-NEXT:    vpmovqb %ymm3, %xmm3
; CHECK-NEXT:    vpmovqb %ymm2, %xmm2
; CHECK-NEXT:    vpunpckldq {{.*#+}} xmm2 = xmm2[0],xmm3[0],xmm2[1],xmm3[1]
; CHECK-NEXT:    vpmovqb %ymm1, %xmm1
; CHECK-NEXT:    vpmovqb %ymm0, %xmm0
; CHECK-NEXT:    vpunpckldq {{.*#+}} xmm0 = xmm0[0],xmm1[0],xmm0[1],xmm1[1]
; CHECK-NEXT:    vpunpcklqdq {{.*#+}} xmm0 = xmm0[0],xmm2[0]
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %a = load <16 x i64>, <16 x i64>* %x
 %b = trunc <16 x i64> %a to <16 x i8>
 ret <16 x i8> %b
}

define <16 x i8> @trunc_v16i32_v16i8(<16 x i32>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v16i32_v16i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT:    vpmovdb %ymm1, %xmm1
; CHECK-NEXT:    vpmovdb %ymm0, %xmm0
; CHECK-NEXT:    vpunpcklqdq {{.*#+}} xmm0 = xmm0[0],xmm1[0]
; CHECK-NEXT:    vzeroupper
;
 CHECK-NEXT:    retq
 %a = load <16 x i32>, <16 x i32>* %x
```

```
 %b = trunc <16 x i32> %a to <16 x i8>
 ret <16 x i8> %b
}

define <8 x i8> @trunc_v8i64_v8i8(<8 x i64>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v8i64_v8i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT:    vpmovqb %ymm1, %xmm1
; CHECK-NEXT:    vpmovqb %ymm0, %xmm0
; CHECK-NEXT:    vpunpckldq {{.*#+}} xmm0 = xmm0[0],xmm1[0],xmm0[1],xmm1[1]
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %a = load <8 x i64>, <8 x i64>* %x
 %b = trunc <8 x i64> %a to <8 x i8>
 ret <8 x i8> %b
}

define <8 x i16> @trunc_v8i64_v8i16(<8 x i64>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v8i64_v8i16:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT:    vpmovqw %ymm1, %xmm1
; CHECK-NEXT:    vpmovqw %ymm0, %xmm0
; CHECK-NEXT:    vpunpcklqdq {{.*#+}} xmm0
 = xmm0[0],xmm1[0]
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %a = load <8 x i64>, <8 x i64>* %x
 %b = trunc <8 x i64> %a to <8 x i16>
 ret <8 x i16> %b
}

define <8 x i32> @trunc_v8i64_v8i32_zeroes(<8 x i64>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v8i64_v8i32_zeroes:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpsrlq $48, 32(%rdi), %ymm0
; CHECK-NEXT:    vpsrlq $48, (%rdi), %ymm1
; CHECK-NEXT:    vpackusdw %ymm0, %ymm1, %ymm0
; CHECK-NEXT:    vpermq {{.*#+}} ymm0 = ymm0[0,2,1,3]
; CHECK-NEXT:    retq
 %a = load <8 x i64>, <8 x i64>* %x
 %b = lshr <8 x i64> %a, <i64 48, i64 48, i64 48, i64 48, i64 48, i64 48, i64 48, i64 48>
 %c = trunc <8 x i64> %b to <8 x i32>
 ret <8 x i32> %c
}
```

```
define <16 x i16> @trunc_v16i32_v16i16_zeroes(<16 x i32>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v16i32_v16i16_zeroes:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm1
; CHECK-NEXT:    vmovdqa {{.*#+}} ymm0 = [1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31]
;
 CHECK-NEXT:    vpermi2w 32(%rdi), %ymm1, %ymm0
; CHECK-NEXT:    retq
 %a = load <16 x i32>, <16 x i32>* %x
 %b = lshr <16 x i32> %a, <i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32
16, i32 16, i32 16, i32 16, i32 16>
 %c = trunc <16 x i32> %b to <16 x i16>
 ret <16 x i16> %c
}

define <32 x i8> @trunc_v32i16_v32i8_zeroes(<32 x i16>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-SKX-VBMI-LABEL: trunc_v32i16_v32i8_zeroes:
; CHECK-SKX-VBMI:       # %bb.0:
; CHECK-SKX-VBMI-NEXT:    vmovdqa (%rdi), %ymm1
; CHECK-SKX-VBMI-NEXT:    vmovdqa {{.*#+}} ymm0 =
[1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61,63]
; CHECK-SKX-VBMI-NEXT:    vpermi2b 32(%rdi), %ymm1, %ymm0
; CHECK-SKX-VBMI-NEXT:    retq
;
; CHECK-AVX512-LABEL: trunc_v32i16_v32i8_zeroes:
; CHECK-AVX512:       # %bb.0:
; CHECK-AVX512-NEXT:    vpsrlw $8, 32(%rdi), %ymm0
; CHECK-AVX512-NEXT:    vpsrlw $8, (%rdi),
 %ymm1
; CHECK-AVX512-NEXT:    vpackuswb %ymm0, %ymm1, %ymm0
; CHECK-AVX512-NEXT:    vpermq {{.*#+}} ymm0 = ymm0[0,2,1,3]
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI-LABEL: trunc_v32i16_v32i8_zeroes:
; CHECK-VBMI:       # %bb.0:
; CHECK-VBMI-NEXT:    vmovdqa (%rdi), %ymm1
; CHECK-VBMI-NEXT:    vmovdqa {{.*#+}} ymm0 =
[1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61,63]
; CHECK-VBMI-NEXT:    vpermi2b 32(%rdi), %ymm1, %ymm0
; CHECK-VBMI-NEXT:    retq
 %a = load <32 x i16>, <32 x i16>* %x
 %b = lshr <32 x i16> %a, <i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8,
i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8>
 %c = trunc <32 x i16> %b to <32 x i8>
 ret <32 x i8> %c
}
```

```
define <8 x i32> @trunc_v8i64_v8i32_sign(<8 x i64>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v8i64_v8i32_sign:
; CHECK:
 # %bb.0:
; CHECK-NEXT:    vpsraq $48, 32(%rdi), %ymm0
; CHECK-NEXT:    vpsraq $48, (%rdi), %ymm1
; CHECK-NEXT:    vpackssdw %ymm0, %ymm1, %ymm0
; CHECK-NEXT:    vpermq {{.*#+}} ymm0 = ymm0[0,2,1,3]
; CHECK-NEXT:    retq
 %a = load <8 x i64>, <8 x i64>* %x
 %b = ashr <8 x i64> %a, <i64 48, i64 48, i64 48, i64 48, i64 48, i64 48, i64 48, i64 48>
 %c = trunc <8 x i64> %b to <8 x i32>
 ret <8 x i32> %c
}

define <16 x i16> @trunc_v16i32_v16i16_sign(<16 x i32>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v16i32_v16i16_sign:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm1
; CHECK-NEXT:    vmovdqa {{.*#+}} ymm0 = [1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31]
; CHECK-NEXT:    vpermi2w 32(%rdi), %ymm1, %ymm0
; CHECK-NEXT:    retq
 %a = load <16 x i32>, <16 x i32>* %x
 %b = ashr <16 x i32> %a, <i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32
16, i32 16, i32 16, i32 16, i32 16>
 %c = trunc <16 x i32> %b to <16
 x i16>
 ret <16 x i16> %c
}

define <32 x i8> @trunc_v32i16_v32i8_sign(<32 x i16>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-SKX-VBMI-LABEL: trunc_v32i16_v32i8_sign:
; CHECK-SKX-VBMI:       # %bb.0:
; CHECK-SKX-VBMI-NEXT:    vmovdqa (%rdi), %ymm1
; CHECK-SKX-VBMI-NEXT:    vmovdqa {{.*#+}} ymm0 =
[1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61,63]
; CHECK-SKX-VBMI-NEXT:    vpermi2b 32(%rdi), %ymm1, %ymm0
; CHECK-SKX-VBMI-NEXT:    retq
;
; CHECK-AVX512-LABEL: trunc_v32i16_v32i8_sign:
; CHECK-AVX512:       # %bb.0:
; CHECK-AVX512-NEXT:    vpsrlw $8, 32(%rdi), %ymm0
; CHECK-AVX512-NEXT:    vpsrlw $8, (%rdi), %ymm1
; CHECK-AVX512-NEXT:    vpackuswb %ymm0, %ymm1, %ymm0
; CHECK-AVX512-NEXT:    vpermq {{.*#+}} ymm0 = ymm0[0,2,1,3]
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI-LABEL: trunc_v32i16_v32i8_sign:
```

```
; CHECK-VBMI:       # %bb.0:
; CHECK-VBMI-NEXT:    vmovdqa (%rdi), %ymm1
; CHECK-VBMI-NEXT:    vmovdqa {{.*#+}} ymm0 =
[1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61,63]
;
 CHECK-VBMI-NEXT:    vpermi2b 32(%rdi), %ymm1, %ymm0
; CHECK-VBMI-NEXT:    retq
 %a = load <32 x i16>, <32 x i16>* %x
 %b = ashr <32 x i16> %a, <i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8,
i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8>
 %c = trunc <32 x i16> %b to <32 x i8>
 ret <32 x i8> %c
}

define dso_local void @zext_v16i8_v16i64(<16 x i8> %x, <16 x i64>* %y) nounwind "min-legal-vector-
width"="256" {
; CHECK-LABEL: zext_v16i8_v16i64:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovzxbw {{.*#+}} ymm1 =
xmm0[0],zero,xmm0[1],zero,xmm0[2],zero,xmm0[3],zero,xmm0[4],zero,xmm0[5],zero,xmm0[6],zero,xmm0[7],zer
o,xmm0[8],zero,xmm0[9],zero,xmm0[10],zero,xmm0[11],zero,xmm0[12],zero,xmm0[13],zero,xmm0[14],zero,xm
m0[15],zero
; CHECK-NEXT:    vpshufd {{.*#+}} xmm2 = xmm1[2,3,2,3]
; CHECK-NEXT:
    vpmovzxwq {{.*#+}} ymm2 =
xmm2[0],zero,zero,zero,xmm2[1],zero,zero,zero,xmm2[2],zero,zero,zero,xmm2[3],zero,zero,zero
; CHECK-NEXT:    vextracti128 $1, %ymm1, %xmm1
; CHECK-NEXT:    vpshufd {{.*#+}} xmm3 = xmm1[2,3,2,3]
; CHECK-NEXT:    vpmovzxwq {{.*#+}} ymm3 =
xmm3[0],zero,zero,zero,xmm3[1],zero,zero,zero,xmm3[2],zero,zero,zero,xmm3[3],zero,zero,zero
; CHECK-NEXT:    vpmovzxwq {{.*#+}} ymm1 =
xmm1[0],zero,zero,zero,xmm1[1],zero,zero,zero,xmm1[2],zero,zero,zero,xmm1[3],zero,zero,zero
; CHECK-NEXT:    vpmovzxbq {{.*#+}} ymm0 =
xmm0[0],zero,zero,zero,zero,zero,zero,zero,xmm0[1],zero,zero,zero,zero,zero,zero,zero,xmm0[2],zero,zero,zero,zer
o,zero,zero,zero,xmm0[3],zero,zero,zero,zero,zero,zero,zero
; CHECK-NEXT:    vmovdqa %ymm0, (%rdi)
; CHECK-NEXT:    vmovdqa %ymm1, 64(%rdi)
; CHECK-NEXT:    vmovdqa %ymm3, 96(%rdi)
; CHECK-NEXT:    vmovdqa %ymm2, 32(%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %a = zext <16 x i8> %x to <16 x i64>
 store <16 x i64> %a, <16 x i64>*
 %y
 ret void
}

define dso_local void @sext_v16i8_v16i64(<16 x i8> %x, <16 x i64>* %y) nounwind "min-legal-vector-
```

```
width"="256" {
; CHECK-LABEL: sext_v16i8_v16i64:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovsxbw %xmm0, %ymm1
; CHECK-NEXT:    vpshufd {{.*#+}} xmm2 = xmm1[2,3,2,3]
; CHECK-NEXT:    vpmovsxwq %xmm2, %ymm2
; CHECK-NEXT:    vextracti128 $1, %ymm1, %xmm1
; CHECK-NEXT:    vpshufd {{.*#+}} xmm3 = xmm1[2,3,2,3]
; CHECK-NEXT:    vpmovsxwq %xmm3, %ymm3
; CHECK-NEXT:    vpmovsxwq %xmm1, %ymm1
; CHECK-NEXT:    vpmovsxbq %xmm0, %ymm0
; CHECK-NEXT:    vmovdqa %ymm0, (%rdi)
; CHECK-NEXT:    vmovdqa %ymm1, 64(%rdi)
; CHECK-NEXT:    vmovdqa %ymm3, 96(%rdi)
; CHECK-NEXT:    vmovdqa %ymm2, 32(%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %a = sext <16 x i8> %x to <16 x i64>
 store <16 x i64> %a, <16 x i64>* %y
 ret void
}

define dso_local void @vselect_split_v8i16_setcc(<8 x i16> %s, <8 x i16> %t, <8 x i64>* %p, <8 x i64>* %q, <8
x i64>* %r) "min-legal-vector-width"="256"
 {
; CHECK-LABEL: vselect_split_v8i16_setcc:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rsi), %ymm2
; CHECK-NEXT:    vmovdqa 32(%rsi), %ymm3
; CHECK-NEXT:    vpcmpeqw %xmm1, %xmm0, %k1
; CHECK-NEXT:    kshiftrb $4, %k1, %k2
; CHECK-NEXT:    vmovdqa64 32(%rdi), %ymm3 {%k2}
; CHECK-NEXT:    vmovdqa64 (%rdi), %ymm2 {%k1}
; CHECK-NEXT:    vmovdqa %ymm2, (%rdx)
; CHECK-NEXT:    vmovdqa %ymm3, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %x = load <8 x i64>, <8 x i64>* %p
 %y = load <8 x i64>, <8 x i64>* %q
 %a = icmp eq <8 x i16> %s, %t
 %b = select <8 x i1> %a, <8 x i64> %x, <8 x i64> %y
 store <8 x i64> %b, <8 x i64>* %r
 ret void
}

define dso_local void @vselect_split_v8i32_setcc(<8 x i32> %s, <8 x i32> %t, <8 x i64>* %p, <8 x i64>* %q, <8
x i64>* %r) "min-legal-vector-width"="256" {
; CHECK-LABEL: vselect_split_v8i32_setcc:
```

```
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rsi), %ymm2
; CHECK-NEXT:    vmovdqa 32(%rsi), %ymm3
; CHECK-NEXT:    vpcmpeqd %ymm1,
 %ymm0, %k1
; CHECK-NEXT:    kshiftrb $4, %k1, %k2
; CHECK-NEXT:    vmovdqa64 32(%rdi), %ymm3 {%k2}
; CHECK-NEXT:    vmovdqa64 (%rdi), %ymm2 {%k1}
; CHECK-NEXT:    vmovdqa %ymm2, (%rdx)
; CHECK-NEXT:    vmovdqa %ymm3, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %x = load <8 x i64>, <8 x i64>* %p
 %y = load <8 x i64>, <8 x i64>* %q
 %a = icmp eq <8 x i32> %s, %t
 %b = select <8 x i1> %a, <8 x i64> %x, <8 x i64> %y
 store <8 x i64> %b, <8 x i64>* %r
 ret void
}

define dso_local void @vselect_split_v16i8_setcc(<16 x i8> %s, <16 x i8> %t, <16 x i32>* %p, <16 x i32>* %q,
<16 x i32>* %r) "min-legal-vector-width"="256" {
; CHECK-LABEL: vselect_split_v16i8_setcc:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rsi), %ymm2
; CHECK-NEXT:    vmovdqa 32(%rsi), %ymm3
; CHECK-NEXT:    vpcmpeqb %xmm1, %xmm0, %k1
; CHECK-NEXT:    kshiftrw $8, %k1, %k2
; CHECK-NEXT:    vmovdqa32 32(%rdi), %ymm3 {%k2}
; CHECK-NEXT:    vmovdqa32 (%rdi), %ymm2 {%k1}
; CHECK-NEXT:    vmovdqa %ymm2,
 (%rdx)
; CHECK-NEXT:    vmovdqa %ymm3, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %x = load <16 x i32>, <16 x i32>* %p
 %y = load <16 x i32>, <16 x i32>* %q
 %a = icmp eq <16 x i8> %s, %t
 %b = select <16 x i1> %a, <16 x i32> %x, <16 x i32> %y
 store <16 x i32> %b, <16 x i32>* %r
 ret void
}

define dso_local void @vselect_split_v16i16_setcc(<16 x i16> %s, <16 x i16> %t, <16 x i32>* %p, <16 x i32>*
%q, <16 x i32>* %r) "min-legal-vector-width"="256" {
; CHECK-LABEL: vselect_split_v16i16_setcc:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rsi), %ymm2
```

```
; CHECK-NEXT:    vmovdqa 32(%rsi), %ymm3
; CHECK-NEXT:    vpcmpeqw %ymm1, %ymm0, %k1
; CHECK-NEXT:    kshiftrw $8, %k1, %k2
; CHECK-NEXT:    vmovdqa32 32(%rdi), %ymm3 {%k2}
; CHECK-NEXT:    vmovdqa32 (%rdi), %ymm2 {%k1}
; CHECK-NEXT:    vmovdqa %ymm2, (%rdx)
; CHECK-NEXT:    vmovdqa %ymm3, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %x = load <16 x i32>, <16 x i32>* %p
 %y = load <16 x i32>,
 <16 x i32>* %q
 %a = icmp eq <16 x i16> %s, %t
 %b = select <16 x i1> %a, <16 x i32> %x, <16 x i32> %y
 store <16 x i32> %b, <16 x i32>* %r
 ret void
}

define <16 x i8> @trunc_packus_v16i32_v16i8(<16 x i32>* %p) "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_packus_v16i32_v16i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vpackusdw 32(%rdi), %ymm0, %ymm0
; CHECK-NEXT:    vpermq {{.*#+}} ymm0 = ymm0[0,2,1,3]
; CHECK-NEXT:    vpmovuswb %ymm0, %xmm0
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %a = load <16 x i32>, <16 x i32>* %p
 %b = icmp slt <16 x i32> %a, <i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32
255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255>
 %c = select <16 x i1> %b, <16 x i32> %a, <16 x i32> <i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32
255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255>
 %d = icmp sgt <16 x i32> %c, zeroinitializer
  %e = select <16 x i1> %d, <16 x i32> %c, <16 x i32> zeroinitializer
 %f = trunc <16 x i32> %e to <16 x i8>
 ret <16 x i8> %f
}

define dso_local void @trunc_packus_v16i32_v16i8_store(<16 x i32>* %p, <16 x i8>* %q) "min-legal-vector-
width"="256" {
; CHECK-LABEL: trunc_packus_v16i32_v16i8_store:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vpackusdw 32(%rdi), %ymm0, %ymm0
; CHECK-NEXT:    vpermq {{.*#+}} ymm0 = ymm0[0,2,1,3]
; CHECK-NEXT:    vpmovuswb %ymm0, (%rsi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
```

```
 %a = load <16 x i32>, <16 x i32>* %p
 %b = icmp slt <16 x i32> %a, <i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32
255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255>
 %c = select <16 x i1> %b, <16 x i32> %a, <16 x i32> <i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32
255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255>
 %d = icmp sgt <16
 x i32> %c, zeroinitializer
 %e = select <16 x i1> %d, <16 x i32> %c, <16 x i32> zeroinitializer
 %f = trunc <16 x i32> %e to <16 x i8>
 store <16 x i8> %f, <16 x i8>* %q
 ret void
}

define <64 x i1> @v64i1_argument_return(<64 x i1> %x) "min-legal-vector-width"="256" {
; CHECK-LABEL: v64i1_argument_return:
; CHECK:       # %bb.0:
; CHECK-NEXT:    retq
 ret <64 x i1> %x
}

define dso_local void @v64i1_shuffle(<64 x i8>* %x, <64 x i8>* %y) "min-legal-vector-width"="256" {
; CHECK-LABEL: v64i1_shuffle:
; CHECK:       # %bb.0: # %entry
; CHECK-NEXT:    vmovdqa (%rdi), %ymm1
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm0
; CHECK-NEXT:    vptestnmb %ymm1, %ymm1, %k0
; CHECK-NEXT:    kshiftrd $1, %k0, %k1
; CHECK-NEXT:    kshiftlq $63, %k0, %k2
; CHECK-NEXT:    kshiftrq $62, %k2, %k2
; CHECK-NEXT:    kshiftlq $63, %k1, %k1
; CHECK-NEXT:    kshiftrq $63, %k1, %k1
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-5, %rax
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1,
 %k1
; CHECK-NEXT:    kshiftrd $3, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $61, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-9, %rax
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $2, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $60, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-17, %rax
```

```
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $5, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $59, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-33, %rax
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $4, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $58, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-65, %rax
; CHECK-NEXT:    kmovq %rax, %k2
;
 CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $7, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $57, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-129, %rax
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $6, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $56, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-257, %rax # imm = 0xFEFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $9, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $55, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-513, %rax # imm = 0xFDFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $8, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $54, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
;
 CHECK-NEXT:    movq $-1025, %rax # imm = 0xFBFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $11, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
```

```
; CHECK-NEXT:    kshiftrq $53, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-2049, %rax # imm = 0xF7FF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $10, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $52, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-4097, %rax # imm = 0xEFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $13, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $51, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-8193, %rax # imm = 0xDFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $12, %k0, %k2
; CHECK-NEXT:
   kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $50, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-16385, %rax # imm = 0xBFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $15, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $49, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-32769, %rax # imm = 0xFFFF7FFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $14, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $48, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-65537, %rax # imm = 0xFFFEFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $17, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $47, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-131073, %rax # imm = 0xFFFDFFFF
;
```

```
 CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $16, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $46, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-262145, %rax # imm = 0xFFFBFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $19, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $45, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-524289, %rax # imm = 0xFFF7FFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $18, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $44, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-1048577, %rax # imm = 0xFFEFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $21, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:
   kshiftrq $43, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-2097153, %rax # imm = 0xFFDFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $20, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $42, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-4194305, %rax # imm = 0xFFBFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $23, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $41, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-8388609, %rax # imm = 0xFF7FFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $22, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $40, %k2, %k2
```

```
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-16777217, %rax # imm = 0xFEFFFFFF
; CHECK-NEXT:    kmovq
 %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $25, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $39, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-33554433, %rax # imm = 0xFDFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $24, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $38, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-67108865, %rax # imm = 0xFBFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $27, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $37, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-134217729, %rax # imm = 0xF7FFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $26, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq
 $36, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-268435457, %rax # imm = 0xEFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $29, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $35, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-536870913, %rax # imm = 0xDFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $28, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $34, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-1073741825, %rax # imm = 0xBFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
```

```
; CHECK-NEXT:    kshiftrd $31, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $33, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movabsq $-2147483649, %rax # imm = 0xFFFFFFFF7FFFFFFF
; CHECK-NEXT:
   kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k2
; CHECK-NEXT:    vptestnmb %ymm0, %ymm0, %k1
; CHECK-NEXT:    kshiftrd $30, %k0, %k0
; CHECK-NEXT:    kshiftlq $63, %k0, %k0
; CHECK-NEXT:    kshiftrq $32, %k0, %k0
; CHECK-NEXT:    korq %k0, %k2, %k0
; CHECK-NEXT:    movabsq $-4294967297, %rax # imm = 0xFFFFFFFEFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $1, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $31, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-8589934593, %rax # imm = 0xFFFFFFFDFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftlq $63, %k1, %k2
; CHECK-NEXT:    kshiftrq $30, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-17179869185, %rax # imm = 0xFFFFFFFBFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $3, %k1, %k2
; CHECK-NEXT:
    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $29, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-34359738369, %rax # imm = 0xFFFFFFF7FFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $2, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $28, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-68719476737, %rax # imm = 0xFFFFFFEFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $5, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $27, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
```

```
; CHECK-NEXT:    movabsq $-137438953473, %rax # imm = 0xFFFFFFDFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $4, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $26, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
;
 CHECK-NEXT:    movabsq $-274877906945, %rax # imm = 0xFFFFFFBFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $7, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $25, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-549755813889, %rax # imm = 0xFFFFFF7FFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $6, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $24, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-1099511627777, %rax # imm = 0xFFFFFEFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $9, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $23, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-2199023255553, %rax # imm = 0xFFFFFDFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
;
 CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $8, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $22, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-4398046511105, %rax # imm = 0xFFFFFBFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $11, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $21, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-8796093022209, %rax # imm = 0xFFFFF7FFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $10, %k1, %k2
```

```
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $20, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-17592186044417, %rax # imm = 0xFFFFEFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $13, %k1, %k2
; CHECK-NEXT:    kshiftlq
 $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $19, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-35184372088833, %rax # imm = 0xFFFFDFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $12, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $18, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-70368744177665, %rax # imm = 0xFFFFBFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $15, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $17, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-140737488355329, %rax # imm = 0xFFFF7FFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $14, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $16, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:
   movabsq $-281474976710657, %rax # imm = 0xFFFEFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $17, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $15, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-562949953421313, %rax # imm = 0xFFFDFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $16, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $14, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-1125899906842625, %rax # imm = 0xFFFBFFFFFFFFFFFF
```

```
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $19, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $13, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-2251799813685249, %rax # imm = 0xFFF7FFFFFFFFFFFF
; CHECK-NEXT:    kmovq
 %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $18, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $12, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-4503599627370497, %rax # imm = 0xFFEFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $21, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $11, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-9007199254740993, %rax # imm = 0xFFDFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $20, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $10, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-18014398509481985, %rax # imm = 0xFFBFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $23, %k1, %k2
;
 CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $9, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-36028797018963969, %rax # imm = 0xFF7FFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $22, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $8, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-72057594037927937, %rax # imm = 0xFEFFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $25, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
```

```
; CHECK-NEXT:    kshiftrq $7, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-144115188075855873, %rax # imm = 0xFDFFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $24, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $6, %k2, %k2
; CHECK-NEXT:
   korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-288230376151711745, %rax # imm = 0xFBFFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $27, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $5, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-576460752303423489, %rax # imm = 0xF7FFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $26, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $4, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-1152921504606846977, %rax # imm = 0xEFFFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $29, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $3, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-2305843009213693953, %rax # imm =
 0xDFFFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $28, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $2, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-4611686018427387905, %rax # imm = 0xBFFFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $31, %k1, %k2
; CHECK-NEXT:    kshiftlq $62, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $30, %k1, %k1
; CHECK-NEXT:    kshiftlq $1, %k0, %k0
; CHECK-NEXT:    kshiftrq $1, %k0, %k0
```

```
; CHECK-NEXT:    kshiftlq $63, %k1, %k1
; CHECK-NEXT:    korq %k1, %k0, %k1
; CHECK-NEXT:    vmovdqu8 %ymm1, (%rsi) {%k1}
; CHECK-NEXT:    kshiftrq $32, %k1, %k1
; CHECK-NEXT:    vmovdqu8 %ymm0, 32(%rsi) {%k1}
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
entry:
 %a = load <64 x i8>, <64 x i8>* %x
 %b = icmp eq <64 x i8> %a, zeroinitializer
 %shuf = shufflevector
 <64 x i1> %b, <64 x i1> undef, <64 x i32> <i32 1, i32 0, i32 3, i32 2, i32 5, i32 4, i32 7, i32 6, i32 9, i32 8, i32 11,
i32 10, i32 13, i32 12, i32 15, i32 14, i32 17, i32 16, i32 19, i32 18, i32 21, i32 20, i32 23, i32 22, i32 25, i32 24, i32
27, i32 26, i32 29, i32 28, i32 31, i32 30, i32 33, i32 32, i32 35, i32 34, i32 37, i32 36, i32 39, i32 38, i32 41, i32 40,
i32 43, i32 42, i32 45, i32 44, i32 47, i32 46, i32 49, i32 48, i32 51, i32 50, i32 53, i32 52, i32 55, i32 54, i32 57, i32
56, i32 59, i32 58, i32 61, i32 60, i32 63, i32 62>
 call void @llvm.masked.store.v64i8.p0v64i8(<64 x i8> %a, <64 x i8>* %y, i32 1, <64 x i1> %shuf)
 ret void
}
declare void @llvm.masked.store.v64i8.p0v64i8(<64 x i8>, <64 x i8>*, i32, <64 x i1>)

@mem64_dst = dso_local global i64 0, align 8
@mem64_src = dso_local global i64 0, align 8
define dso_local i32 @v64i1_inline_asm() "min-legal-vector-width"="256" {
; CHECK-LABEL: v64i1_inline_asm:
; CHECK:       # %bb.0:
; CHECK-NEXT:    kmovq mem64_src(%rip),
 %k0
; CHECK-NEXT:    #APP
; CHECK-NEXT:    #NO_APP
; CHECK-NEXT:    kmovq %k0, mem64_dst(%rip)
; CHECK-NEXT:    movl -{{[0-9]+}}(%rsp), %eax
; CHECK-NEXT:    retq
 %1 = alloca i32, align 4
 %2 = load i64, i64* @mem64_src, align 8
 %3 = call i64 asm "", "=k,k,~{dirflag},~{fpsr},~{flags}"(i64 %2)
 store i64 %3, i64* @mem64_dst, align 8
 %4 = load i32, i32* %1, align 4
 ret i32 %4
}

define dso_local void @cmp_v8i64_sext(<8 x i64>* %xptr, <8 x i64>* %yptr, <8 x i64>* %zptr) "min-legal-
vector-width"="256" {
; CHECK-LABEL: cmp_v8i64_sext:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rsi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rsi), %ymm1
; CHECK-NEXT:    vpcmpgtq 32(%rdi), %ymm1, %ymm1
```

```
; CHECK-NEXT:    vpcmpgtq (%rdi), %ymm0, %ymm0
; CHECK-NEXT:    vmovdqa %ymm0, (%rdx)
; CHECK-NEXT:    vmovdqa %ymm1, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %x = load <8 x i64>, <8 x i64>* %xptr
 %y = load <8 x i64>, <8 x i64>* %yptr
 %cmp = icmp slt <8 x i64> %x, %y
 %ext
 = sext <8 x i1> %cmp to <8 x i64>
 store <8 x i64> %ext, <8 x i64>* %zptr
 ret void
}

define dso_local void @cmp_v8i64_zext(<8 x i64>* %xptr, <8 x i64>* %yptr, <8 x i64>* %zptr) "min-legal-
vector-width"="256" {
; CHECK-LABEL: cmp_v8i64_zext:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rsi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rsi), %ymm1
; CHECK-NEXT:    vpcmpgtq 32(%rdi), %ymm1, %ymm1
; CHECK-NEXT:    vpcmpgtq (%rdi), %ymm0, %ymm0
; CHECK-NEXT:    vpsrlq $63, %ymm1, %ymm1
; CHECK-NEXT:    vpsrlq $63, %ymm0, %ymm0
; CHECK-NEXT:    vmovdqa %ymm0, (%rdx)
; CHECK-NEXT:    vmovdqa %ymm1, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %x = load <8 x i64>, <8 x i64>* %xptr
 %y = load <8 x i64>, <8 x i64>* %yptr
 %cmp = icmp slt <8 x i64> %x, %y
 %ext = zext <8 x i1> %cmp to <8 x i64>
 store <8 x i64> %ext, <8 x i64>* %zptr
 ret void
}

define <16 x i8> @var_rotate_v16i8(<16 x i8> %a, <16 x i8> %b) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: var_rotate_v16i8:
;
 CHECK:       # %bb.0:
; CHECK-NEXT:    vpandd {{\.?LCPI[0-9]+_[0-9]+}}(%rip){1to4}, %xmm1, %xmm1
; CHECK-NEXT:    vpxor %xmm2, %xmm2, %xmm2
; CHECK-NEXT:    vpunpckhbw {{.*#+}} xmm2 =
xmm1[8],xmm2[8],xmm1[9],xmm2[9],xmm1[10],xmm2[10],xmm1[11],xmm2[11],xmm1[12],xmm2[12],xmm1[13
],xmm2[13],xmm1[14],xmm2[14],xmm1[15],xmm2[15]
; CHECK-NEXT:    vpunpckhbw {{.*#+}} xmm3 = xmm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15]
; CHECK-NEXT:    vpsllvw %xmm2, %xmm3, %xmm2
; CHECK-NEXT:    vpsrlw $8, %xmm2, %xmm2
```

```
; CHECK-NEXT:    vpunpcklbw {{.*#+}} xmm0 = xmm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7]
; CHECK-NEXT:    vpmovzxbw {{.*#+}} xmm1 =
xmm1[0],zero,xmm1[1],zero,xmm1[2],zero,xmm1[3],zero,xmm1[4],zero,xmm1[5],zero,xmm1[6],zero,xmm1[7],zer
o
; CHECK-NEXT:    vpsllvw %xmm1, %xmm0, %xmm0
; CHECK-NEXT:    vpsrlw $8, %xmm0, %xmm0
; CHECK-NEXT:    vpackuswb %xmm2, %xmm0, %xmm0
; CHECK-NEXT:    retq
 %b8 = sub <16 x i8> <i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8,
 i8 8, i8 8, i8 8>, %b
 %shl = shl <16 x i8> %a, %b
 %lshr = lshr <16 x i8> %a, %b8
 %or = or <16 x i8> %shl, %lshr
 ret <16 x i8> %or
}

define <32 x i8> @var_rotate_v32i8(<32 x i8> %a, <32 x i8> %b) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: var_rotate_v32i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpandd {{\.?LCPI[0-9]+_[0-9]+}}(%rip){1to8}, %ymm1, %ymm1
; CHECK-NEXT:    vpxor %xmm2, %xmm2, %xmm2
; CHECK-NEXT:    vpunpckhbw {{.*#+}} ymm3 =
ymm1[8],ymm2[8],ymm1[9],ymm2[9],ymm1[10],ymm2[10],ymm1[11],ymm2[11],ymm1[12],ymm2[12],ymm1[13
],ymm2[13],ymm1[14],ymm2[14],ymm1[15],ymm2[15],ymm1[24],ymm2[24],ymm1[25],ymm2[25],ymm1[26],ym
m2[26],ymm1[27],ymm2[27],ymm1[28],ymm2[28],ymm1[29],ymm2[29],ymm1[30],ymm2[30],ymm1[31],ymm2[
31]
; CHECK-NEXT:    vpunpckhbw {{.*#+}} ymm4 =
ymm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-NEXT:    vpsllvw %ymm3, %ymm4, %ymm3
; CHECK-NEXT:    vpsrlw $8, %ymm3, %ymm3
; CHECK-NEXT:    vpunpcklbw
 {{.*#+}} ymm1 =
ymm1[0],ymm2[0],ymm1[1],ymm2[1],ymm1[2],ymm2[2],ymm1[3],ymm2[3],ymm1[4],ymm2[4],ymm1[5],ymm2[
5],ymm1[6],ymm2[6],ymm1[7],ymm2[7],ymm1[16],ymm2[16],ymm1[17],ymm2[17],ymm1[18],ymm2[18],ymm1[
19],ymm2[19],ymm1[20],ymm2[20],ymm1[21],ymm2[21],ymm1[22],ymm2[22],ymm1[23],ymm2[23]
; CHECK-NEXT:    vpunpcklbw {{.*#+}} ymm0 =
ymm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-NEXT:    vpsllvw %ymm1, %ymm0, %ymm0
; CHECK-NEXT:    vpsrlw $8, %ymm0, %ymm0
; CHECK-NEXT:    vpackuswb %ymm3, %ymm0, %ymm0
; CHECK-NEXT:    retq
 %b8 = sub <32 x i8> <i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8
8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8>, %b
 %shl = shl <32 x i8> %a, %b
 %lshr = lshr <32 x i8> %a, %b8
 %or = or <32 x i8> %shl, %lshr
 ret <32 x i8> %or
}
```

```
define <32 x i8> @splatvar_rotate_v32i8(<32 x i8> %a, <32 x i8> %b) nounwind "min-legal-vector-width"="256"
 {
; CHECK-LABEL: splatvar_rotate_v32i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpunpckhbw {{.*#+}} ymm2 =
ymm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-NEXT:    vpand {{\.?LCPI[0-9]+_[0-9]+}}(%rip), %xmm1, %xmm1
; CHECK-NEXT:    vpsllw %xmm1, %ymm2, %ymm2
; CHECK-NEXT:    vpsrlw $8, %ymm2, %ymm2
; CHECK-NEXT:    vpunpcklbw {{.*#+}} ymm0 =
ymm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-NEXT:    vpsllw %xmm1, %ymm0, %ymm0
; CHECK-NEXT:    vpsrlw $8, %ymm0, %ymm0
; CHECK-NEXT:    vpackuswb %ymm2, %ymm0, %ymm0
; CHECK-NEXT:    retq
 %splat = shufflevector <32 x i8> %b, <32 x i8> undef, <32 x i32> zeroinitializer
 %splat8 = sub <32 x i8> <i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8
8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8>, %splat
 %shl = shl <32 x i8>
 %a, %splat
 %lshr = lshr <32 x i8> %a, %splat8
 %or = or <32 x i8> %shl, %lshr
 ret <32 x i8> %or
}

define <32 x i8> @constant_rotate_v32i8(<32 x i8> %a) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: constant_rotate_v32i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpunpckhbw {{.*#+}} ymm1 =
ymm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-NEXT:    vpsllvw {{\.?LCPI[0-9]+_[0-9]+}}(%rip), %ymm1, %ymm1
; CHECK-NEXT:    vpsrlw $8, %ymm1, %ymm1
; CHECK-NEXT:    vpunpcklbw {{.*#+}} ymm0 =
ymm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-NEXT:    vpsllvw {{\.?LCPI[0-9]+_[0-9]+}}(%rip), %ymm0, %ymm0
; CHECK-NEXT:    vpsrlw $8, %ymm0, %ymm0
; CHECK-NEXT:    vpackuswb %ymm1, %ymm0, %ymm0
; CHECK-NEXT:    retq
 %shl = shl <32 x i8> %a, <i8 0, i8 1, i8 2, i8 3, i8 4, i8 5, i8 6, i8 7, i8 8, i8 7, i8 6, i8 5, i8 4, i8 3, i8 2, i8 1, i8 0, i8
1, i8 2, i8 3, i8 4, i8 5, i8 6, i8 7, i8
 8, i8 7, i8 6, i8 5, i8 4, i8 3, i8 2, i8 1>
 %lshr = lshr <32 x i8> %a, <i8 8, i8 7, i8 6, i8 5, i8 4, i8 3, i8 2, i8 1, i8 0, i8 1, i8 2, i8 3, i8 4, i8 5, i8 6, i8 7, i8 8,
i8 7, i8 6, i8 5, i8 4, i8 3, i8 2, i8 1, i8 0, i8 1, i8 2, i8 3, i8 4, i8 5, i8 6, i8 7>
 %or = or <32 x i8> %shl, %lshr
 ret <32 x i8> %or
}
```

```
define <32 x i8> @splatconstant_rotate_v32i8(<32 x i8> %a) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: splatconstant_rotate_v32i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpsllw $4, %ymm0, %ymm1
; CHECK-NEXT:    vpsrlw $4, %ymm0, %ymm0
; CHECK-NEXT:    vpternlogd $216, {{\.?LCPI[0-9]+_[0-9]+}}(%rip){1to8}, %ymm1, %ymm0
; CHECK-NEXT:    retq
 %shl = shl <32 x i8> %a, <i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8
4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4>
 %lshr = lshr <32 x i8> %a, <i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8
 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4>
 %or = or <32 x i8> %shl, %lshr
 ret <32 x i8> %or
}

define <32 x i8> @splatconstant_rotate_mask_v32i8(<32 x i8> %a) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: splatconstant_rotate_mask_v32i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpsllw $4, %ymm0, %ymm1
; CHECK-NEXT:    vpsrlw $4, %ymm0, %ymm0
; CHECK-NEXT:    vpternlogd $216, {{\.?LCPI[0-9]+_[0-9]+}}(%rip){1to8}, %ymm1, %ymm0
; CHECK-NEXT:    vpandd {{\.?LCPI[0-9]+_[0-9]+}}(%rip){1to8}, %ymm0, %ymm0
; CHECK-NEXT:    retq
 %shl = shl <32 x i8> %a, <i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8
4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4>
 %lshr = lshr <32 x i8> %a, <i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4,
i8 4, i8 4, i8 4, i8 4, i8
 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4>
 %rmask = and <32 x i8> %lshr, <i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55,
i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8
55>
 %lmask = and <32 x i8> %shl, <i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33,
i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8
33>
 %or = or <32 x i8> %lmask, %rmask
 ret <32 x i8> %or
}
```

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```
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefixes=CHECK,RV64I
; RUN: llc -mtriple=riscv64 -mattr=+zbs -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefixes=CHECK,RV64ZBS

define signext i32 @bclr_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: bclr_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sllw a1, a2, a1
; RV64I-NEXT:    not a1, a1
; RV64I-NEXT:    and a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclr_i32:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    andi a1, a1, 31
; RV64ZBS-NEXT:    bclr a0, a0, a1
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %and = and i32 %b, 31
 %shl = shl nuw i32 1, %and
 %neg = xor i32 %shl, -1
 %and1 = and i32 %neg, %a
 ret i32 %and1
}

define signext i32 @bclr_i32_no_mask(i32 signext %a,
```

```
 i32 signext %b) nounwind {
; RV64I-LABEL: bclr_i32_no_mask:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sllw a1, a2, a1
; RV64I-NEXT:    not a1, a1
; RV64I-NEXT:    and a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclr_i32_no_mask:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bclr a0, a0, a1
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %shl = shl i32 1, %b
 %neg = xor i32 %shl, -1
 %and1 = and i32 %neg, %a
 ret i32 %and1
}

define signext i32 @bclr_i32_load(ptr %p, i32 signext %b) nounwind {
; RV64I-LABEL: bclr_i32_load:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sllw a1, a2, a1
; RV64I-NEXT:    not a1, a1
; RV64I-NEXT:    and a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclr_i32_load:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    lw a0, 0(a0)
; RV64ZBS-NEXT:    bclr a0, a0, a1
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %a = load i32, ptr %p
 %shl = shl i32 1, %b
 %neg
 = xor i32 %shl, -1
 %and1 = and i32 %neg, %a
 ret i32 %and1
}

define i64 @bclr_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: bclr_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
```

```
; RV64I-NEXT:    sll a1, a2, a1
; RV64I-NEXT:    not a1, a1
; RV64I-NEXT:    and a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclr_i64:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bclr a0, a0, a1
; RV64ZBS-NEXT:    ret
 %and = and i64 %b, 63
 %shl = shl nuw i64 1, %and
 %neg = xor i64 %shl, -1
 %and1 = and i64 %neg, %a
 ret i64 %and1
}

define i64 @bclr_i64_no_mask(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: bclr_i64_no_mask:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sll a1, a2, a1
; RV64I-NEXT:    not a1, a1
; RV64I-NEXT:    and a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclr_i64_no_mask:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bclr a0, a0, a1
; RV64ZBS-NEXT:    ret
 %shl = shl i64 1, %b
 %neg = xor i64 %shl, -1
 %and1 = and i64 %neg, %a
 ret i64
 %and1
}

define signext i32 @bset_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: bset_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sllw a1, a2, a1
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bset_i32:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    andi a1, a1, 31
; RV64ZBS-NEXT:    bset a0, a0, a1
```

```
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %and = and i32 %b, 31
 %shl = shl nuw i32 1, %and
 %or = or i32 %shl, %a
 ret i32 %or
}

define signext i32 @bset_i32_no_mask(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: bset_i32_no_mask:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sllw a1, a2, a1
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bset_i32_no_mask:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bset a0, a0, a1
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %shl = shl i32 1, %b
 %or = or i32 %shl, %a
 ret i32 %or
}

define signext i32
 @bset_i32_load(ptr %p, i32 signext %b) nounwind {
; RV64I-LABEL: bset_i32_load:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sllw a1, a2, a1
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bset_i32_load:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    lw a0, 0(a0)
; RV64ZBS-NEXT:    bset a0, a0, a1
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %a = load i32, ptr %p
 %shl = shl i32 1, %b
 %or = or i32 %shl, %a
 ret i32 %or
}
```

```
; We can use bsetw for 1 << x by setting the first source to zero.
define signext i32 @bset_i32_zero(i32 signext %a) nounwind {
; RV64I-LABEL: bset_i32_zero:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 1
; RV64I-NEXT:    sllw a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bset_i32_zero:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bset a0, zero, a0
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %shl = shl i32 1, %a
 ret i32 %shl
}

define i64 @bset_i64(i64 %a,
 i64 %b) nounwind {
; RV64I-LABEL: bset_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sll a1, a2, a1
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bset_i64:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bset a0, a0, a1
; RV64ZBS-NEXT:    ret
 %conv = and i64 %b, 63
 %shl = shl nuw i64 1, %conv
 %or = or i64 %shl, %a
 ret i64 %or
}

define i64 @bset_i64_no_mask(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: bset_i64_no_mask:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sll a1, a2, a1
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bset_i64_no_mask:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bset a0, a0, a1
; RV64ZBS-NEXT:    ret
```

```
 %shl = shl i64 1, %b
 %or = or i64 %shl, %a
 ret i64 %or
}

; We can use bsetw for 1 << x by setting the first source to zero.
define signext i64 @bset_i64_zero(i64 signext %a) nounwind {
; RV64I-LABEL: bset_i64_zero:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li
 a1, 1
; RV64I-NEXT:    sll a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bset_i64_zero:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bset a0, zero, a0
; RV64ZBS-NEXT:    ret
 %shl = shl i64 1, %a
 ret i64 %shl
}

define signext i32 @binv_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: binv_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sllw a1, a2, a1
; RV64I-NEXT:    xor a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binv_i32:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    andi a1, a1, 31
; RV64ZBS-NEXT:    binv a0, a0, a1
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %and = and i32 %b, 31
 %shl = shl nuw i32 1, %and
 %xor = xor i32 %shl, %a
 ret i32 %xor
}

define signext i32 @binv_i32_no_mask(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: binv_i32_no_mask:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sllw a1, a2, a1
; RV64I-NEXT:    xor a0, a1, a0
```

```
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binv_i32_no_mask:
;
 RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    binv a0, a0, a1
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %shl = shl i32 1, %b
 %xor = xor i32 %shl, %a
 ret i32 %xor
}

define signext i32 @binv_i32_load(ptr %p, i32 signext %b) nounwind {
; RV64I-LABEL: binv_i32_load:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sllw a1, a2, a1
; RV64I-NEXT:    xor a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binv_i32_load:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    lw a0, 0(a0)
; RV64ZBS-NEXT:    binv a0, a0, a1
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %a = load i32, ptr %p
 %shl = shl i32 1, %b
 %xor = xor i32 %shl, %a
 ret i32 %xor
}

define i64 @binv_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: binv_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sll a1, a2, a1
; RV64I-NEXT:    xor a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binv_i64:
; RV64ZBS:       # %bb.0:
;
 RV64ZBS-NEXT:    binv a0, a0, a1
; RV64ZBS-NEXT:    ret
 %conv = and i64 %b, 63
```

```
 %shl = shl nuw i64 1, %conv
 %xor = xor i64 %shl, %a
 ret i64 %xor
}

define i64 @binv_i64_no_mask(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: binv_i64_no_mask:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sll a1, a2, a1
; RV64I-NEXT:    xor a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binv_i64_no_mask:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    binv a0, a0, a1
; RV64ZBS-NEXT:    ret
 %shl = shl nuw i64 1, %b
 %xor = xor i64 %shl, %a
 ret i64 %xor
}

define signext i32 @bext_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: bext_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srlw a0, a0, a1
; RV64I-NEXT:    andi a0, a0, 1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bext_i32:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    andi a1, a1, 31
; RV64ZBS-NEXT:    bext a0, a0, a1
; RV64ZBS-NEXT:    ret
 %and = and i32 %b, 31
 %shr = lshr i32 %a, %and
 %and1 = and i32
 %shr, 1
 ret i32 %and1
}

define signext i32 @bext_i32_no_mask(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: bext_i32_no_mask:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srlw a0, a0, a1
; RV64I-NEXT:    andi a0, a0, 1
; RV64I-NEXT:    ret
;
```

```
; RV64ZBS-LABEL: bext_i32_no_mask:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bext a0, a0, a1
; RV64ZBS-NEXT:    ret
 %shr = lshr i32 %a, %b
 %and1 = and i32 %shr, 1
 ret i32 %and1
}

; This gets previous converted to (i1 (truncate (srl X, Y)). Make sure we are
; able to use bext.
define void @bext_i32_trunc(i32 signext %0, i32 signext %1) {
; RV64I-LABEL: bext_i32_trunc:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srlw a0, a0, a1
; RV64I-NEXT:    andi a0, a0, 1
; RV64I-NEXT:    beqz a0, .LBB19_2
; RV64I-NEXT:  # %bb.1:
; RV64I-NEXT:    ret
; RV64I-NEXT:  .LBB19_2:
; RV64I-NEXT:    tail bar
;
; RV64ZBS-LABEL: bext_i32_trunc:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bext a0, a0, a1
; RV64ZBS-NEXT:    beqz a0, .LBB19_2
; RV64ZBS-NEXT:
  # %bb.1:
; RV64ZBS-NEXT:    ret
; RV64ZBS-NEXT:  .LBB19_2:
; RV64ZBS-NEXT:    tail bar
 %3 = shl i32 1, %1
 %4 = and i32 %3, %0
 %5 = icmp eq i32 %4, 0
 br i1 %5, label %6, label %7

6:                                        ; preds = %2
 tail call void @bar()
 br label %7

7:                                        ; preds = %6, %2
 ret void
}

declare void @bar()

define i64 @bext_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: bext_i64:
```

```
; RV64I:       # %bb.0:
; RV64I-NEXT:    srl a0, a0, a1
; RV64I-NEXT:    andi a0, a0, 1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bext_i64:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bext a0, a0, a1
; RV64ZBS-NEXT:    ret
 %conv = and i64 %b, 63
 %shr = lshr i64 %a, %conv
 %and1 = and i64 %shr, 1
 ret i64 %and1
}

define i64 @bext_i64_no_mask(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: bext_i64_no_mask:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srl a0, a0, a1
; RV64I-NEXT:    andi a0, a0, 1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL:
 bext_i64_no_mask:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bext a0, a0, a1
; RV64ZBS-NEXT:    ret
 %shr = lshr i64 %a, %b
 %and1 = and i64 %shr, 1
 ret i64 %and1
}

define signext i32 @bexti_i32(i32 signext %a) nounwind {
; RV64I-LABEL: bexti_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 58
; RV64I-NEXT:    srli a0, a0, 63
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bexti_i32:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bexti a0, a0, 5
; RV64ZBS-NEXT:    ret
 %shr = lshr i32 %a, 5
 %and = and i32 %shr, 1
 ret i32 %and
}
```

```
define i64 @bexti_i64(i64 %a) nounwind {
; RV64I-LABEL: bexti_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 58
; RV64I-NEXT:    srli a0, a0, 63
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bexti_i64:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bexti a0, a0, 5
; RV64ZBS-NEXT:    ret
 %shr = lshr i64 %a, 5
 %and = and i64 %shr, 1
 ret i64 %and
}

define signext i32 @bexti_i32_cmp(i32 signext %a) nounwind {
; CHECK-LABEL: bexti_i32_cmp:
;
 CHECK:       # %bb.0:
; CHECK-NEXT:    andi a0, a0, 32
; CHECK-NEXT:    snez a0, a0
; CHECK-NEXT:    ret
 %and = and i32 %a, 32
 %cmp = icmp ne i32 %and, 0
 %zext = zext i1 %cmp to i32
 ret i32 %zext
}

define i64 @bexti_i64_cmp(i64 %a) nounwind {
; RV64I-LABEL: bexti_i64_cmp:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 58
; RV64I-NEXT:    srli a0, a0, 63
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bexti_i64_cmp:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bexti a0, a0, 5
; RV64ZBS-NEXT:    ret
 %and = and i64 %a, 32
 %cmp = icmp ne i64 %and, 0
 %zext = zext i1 %cmp to i64
 ret i64 %zext
}

define signext i32 @bclri_i32_10(i32 signext %a) nounwind {
; CHECK-LABEL: bclri_i32_10:
```

```
; CHECK:       # %bb.0:
; CHECK-NEXT:    andi a0, a0, -1025
; CHECK-NEXT:    ret
 %and = and i32 %a, -1025
 ret i32 %and
}

define signext i32 @bclri_i32_11(i32 signext %a) nounwind {
; RV64I-LABEL: bclri_i32_11:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 1048575
; RV64I-NEXT:    addiw a1,
 a1, 2047
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclri_i32_11:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bclri a0, a0, 11
; RV64ZBS-NEXT:    ret
 %and = and i32 %a, -2049
 ret i32 %and
}

define signext i32 @bclri_i32_30(i32 signext %a) nounwind {
; RV64I-LABEL: bclri_i32_30:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 786432
; RV64I-NEXT:    addiw a1, a1, -1
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclri_i32_30:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bclri a0, a0, 30
; RV64ZBS-NEXT:    ret
 %and = and i32 %a, -1073741825
 ret i32 %and
}

define signext i32 @bclri_i32_31(i32 signext %a) nounwind {
; RV64I-LABEL: bclri_i32_31:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 33
; RV64I-NEXT:    srli a0, a0, 33
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclri_i32_31:
```

```
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bclri a0, a0, 31
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %and = and i32 %a,
 -2147483649
 ret i32 %and
}

define i64 @bclri_i64_10(i64 %a) nounwind {
; CHECK-LABEL: bclri_i64_10:
; CHECK:       # %bb.0:
; CHECK-NEXT:    andi a0, a0, -1025
; CHECK-NEXT:    ret
 %and = and i64 %a, -1025
 ret i64 %and
}

define i64 @bclri_i64_11(i64 %a) nounwind {
; RV64I-LABEL: bclri_i64_11:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 1048575
; RV64I-NEXT:    addiw a1, a1, 2047
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclri_i64_11:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bclri a0, a0, 11
; RV64ZBS-NEXT:    ret
 %and = and i64 %a, -2049
 ret i64 %and
}

define i64 @bclri_i64_30(i64 %a) nounwind {
; RV64I-LABEL: bclri_i64_30:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 786432
; RV64I-NEXT:    addiw a1, a1, -1
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclri_i64_30:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bclri a0, a0, 30
; RV64ZBS-NEXT:    ret
 %and = and i64 %a, -1073741825
 ret i64 %and
```

```
}

define
 i64 @bclri_i64_31(i64 %a) nounwind {
; RV64I-LABEL: bclri_i64_31:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 524288
; RV64I-NEXT:    addi a1, a1, -1
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclri_i64_31:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bclri a0, a0, 31
; RV64ZBS-NEXT:    ret
 %and = and i64 %a, -2147483649
 ret i64 %and
}

define i64 @bclri_i64_62(i64 %a) nounwind {
; RV64I-LABEL: bclri_i64_62:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, -1
; RV64I-NEXT:    slli a1, a1, 62
; RV64I-NEXT:    addi a1, a1, -1
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclri_i64_62:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bclri a0, a0, 62
; RV64ZBS-NEXT:    ret
 %and = and i64 %a, -4611686018427387905
 ret i64 %and
}

define i64 @bclri_i64_63(i64 %a) nounwind {
; RV64I-LABEL: bclri_i64_63:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 1
; RV64I-NEXT:    srli a0, a0, 1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL:
 bclri_i64_63:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bclri a0, a0, 63
; RV64ZBS-NEXT:    ret
```

```
 %and = and i64 %a, -9223372036854775809
 ret i64 %and
}

define i64 @bclri_i64_large0(i64 %a) nounwind {
; RV64I-LABEL: bclri_i64_large0:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 1044480
; RV64I-NEXT:    addiw a1, a1, -256
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclri_i64_large0:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    andi a0, a0, -256
; RV64ZBS-NEXT:    bclri a0, a0, 24
; RV64ZBS-NEXT:    ret
 %and = and i64 %a, -16777472
 ret i64 %and
}

define i64 @bclri_i64_large1(i64 %a) nounwind {
; RV64I-LABEL: bclri_i64_large1:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 1044464
; RV64I-NEXT:    addiw a1, a1, -1
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclri_i64_large1:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bclri a0, a0, 16
; RV64ZBS-NEXT:    bclri a0, a0, 24
; RV64ZBS-NEXT:    ret
 %and = and i64 %a,
 -16842753
 ret i64 %and
}

define signext i32 @bseti_i32_10(i32 signext %a) nounwind {
; CHECK-LABEL: bseti_i32_10:
; CHECK:       # %bb.0:
; CHECK-NEXT:    ori a0, a0, 1024
; CHECK-NEXT:    ret
 %or = or i32 %a, 1024
 ret i32 %or
}
```

```
define signext i32 @bseti_i32_11(i32 signext %a) nounwind {
; RV64I-LABEL: bseti_i32_11:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 1
; RV64I-NEXT:    slliw a1, a1, 11
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bseti_i32_11:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bseti a0, a0, 11
; RV64ZBS-NEXT:    ret
 %or = or i32 %a, 2048
 ret i32 %or
}

define signext i32 @bseti_i32_30(i32 signext %a) nounwind {
; RV64I-LABEL: bseti_i32_30:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 262144
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bseti_i32_30:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bseti a0, a0, 30
; RV64ZBS-NEXT:    ret
 %or = or i32 %a, 1073741824
 ret i32 %or
}

define signext i32
 @bseti_i32_31(i32 signext %a) nounwind {
; RV64I-LABEL: bseti_i32_31:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 524288
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bseti_i32_31:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bseti a0, a0, 31
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %or = or i32 %a, 2147483648
 ret i32 %or
}
```

```
define i64 @bseti_i64_10(i64 %a) nounwind {
; CHECK-LABEL: bseti_i64_10:
; CHECK:       # %bb.0:
; CHECK-NEXT:    ori a0, a0, 1024
; CHECK-NEXT:    ret
 %or = or i64 %a, 1024
 ret i64 %or
}

define i64 @bseti_i64_11(i64 %a) nounwind {
; RV64I-LABEL: bseti_i64_11:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 1
; RV64I-NEXT:    slli a1, a1, 11
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bseti_i64_11:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bseti a0, a0, 11
; RV64ZBS-NEXT:    ret
 %or = or i64 %a, 2048
 ret i64 %or
}

define i64 @bseti_i64_30(i64 %a) nounwind {
; RV64I-LABEL: bseti_i64_30:
;
 RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 262144
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bseti_i64_30:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bseti a0, a0, 30
; RV64ZBS-NEXT:    ret
 %or = or i64 %a, 1073741824
 ret i64 %or
}

define i64 @bseti_i64_31(i64 %a) nounwind {
; RV64I-LABEL: bseti_i64_31:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 1
; RV64I-NEXT:    slli a1, a1, 31
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
```

```
;
; RV64ZBS-LABEL: bseti_i64_31:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bseti a0, a0, 31
; RV64ZBS-NEXT:    ret
 %or = or i64 %a, 2147483648
 ret i64 %or
}

define i64 @bseti_i64_62(i64 %a) nounwind {
; RV64I-LABEL: bseti_i64_62:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 1
; RV64I-NEXT:    slli a1, a1, 62
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bseti_i64_62:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bseti a0, a0, 62
; RV64ZBS-NEXT:    ret
 %or = or i64 %a,
 4611686018427387904
 ret i64 %or
}

define i64 @bseti_i64_63(i64 %a) nounwind {
; RV64I-LABEL: bseti_i64_63:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, -1
; RV64I-NEXT:    slli a1, a1, 63
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bseti_i64_63:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bseti a0, a0, 63
; RV64ZBS-NEXT:    ret
 %or = or i64 %a, 9223372036854775808
 ret i64 %or
}

define signext i32 @binvi_i32_10(i32 signext %a) nounwind {
; CHECK-LABEL: binvi_i32_10:
; CHECK:       # %bb.0:
; CHECK-NEXT:    xori a0, a0, 1024
; CHECK-NEXT:    ret
 %xor = xor i32 %a, 1024
```

```
 ret i32 %xor
}

define signext i32 @binvi_i32_11(i32 signext %a) nounwind {
; RV64I-LABEL: binvi_i32_11:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 1
; RV64I-NEXT:    slliw a1, a1, 11
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binvi_i32_11:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    binvi a0, a0, 11
; RV64ZBS-NEXT:    ret
 %xor = xor i32 %a,
 2048
 ret i32 %xor
}

define signext i32 @binvi_i32_30(i32 signext %a) nounwind {
; RV64I-LABEL: binvi_i32_30:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 262144
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binvi_i32_30:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    binvi a0, a0, 30
; RV64ZBS-NEXT:    ret
 %xor = xor i32 %a, 1073741824
 ret i32 %xor
}

define signext i32 @binvi_i32_31(i32 signext %a) nounwind {
; RV64I-LABEL: binvi_i32_31:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 524288
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binvi_i32_31:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    binvi a0, a0, 31
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %xor = xor i32 %a, 2147483648
```

```
 ret i32 %xor
}

define i64 @binvi_i64_10(i64 %a) nounwind {
; CHECK-LABEL: binvi_i64_10:
; CHECK:       # %bb.0:
; CHECK-NEXT:    xori a0, a0, 1024
; CHECK-NEXT:    ret
 %xor = xor i64 %a, 1024
 ret i64 %xor
}

define i64 @binvi_i64_11(i64
 %a) nounwind {
; RV64I-LABEL: binvi_i64_11:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 1
; RV64I-NEXT:    slli a1, a1, 11
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binvi_i64_11:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    binvi a0, a0, 11
; RV64ZBS-NEXT:    ret
 %xor = xor i64 %a, 2048
 ret i64 %xor
}

define i64 @binvi_i64_30(i64 %a) nounwind {
; RV64I-LABEL: binvi_i64_30:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 262144
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binvi_i64_30:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    binvi a0, a0, 30
; RV64ZBS-NEXT:    ret
 %xor = xor i64 %a, 1073741824
 ret i64 %xor
}

define i64 @binvi_i64_31(i64 %a) nounwind {
; RV64I-LABEL: binvi_i64_31:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 1
```

```
; RV64I-NEXT:    slli a1, a1, 31
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binvi_i64_31:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    binvi
 a0, a0, 31
; RV64ZBS-NEXT:    ret
 %xor = xor i64 %a, 2147483648
 ret i64 %xor
}

define i64 @binvi_i64_62(i64 %a) nounwind {
; RV64I-LABEL: binvi_i64_62:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 1
; RV64I-NEXT:    slli a1, a1, 62
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binvi_i64_62:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    binvi a0, a0, 62
; RV64ZBS-NEXT:    ret
 %xor = xor i64 %a, 4611686018427387904
 ret i64 %xor
}

define i64 @binvi_i64_63(i64 %a) nounwind {
; RV64I-LABEL: binvi_i64_63:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, -1
; RV64I-NEXT:    slli a1, a1, 63
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binvi_i64_63:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    binvi a0, a0, 63
; RV64ZBS-NEXT:    ret
 %xor = xor i64 %a, 9223372036854775808
 ret i64 %xor
}

define i64 @xor_i64_large(i64 %a) nounwind {
; RV64I-LABEL: xor_i64_large:
; RV64I:       # %bb.0:
```

```
; RV64I-NEXT:    li a1, 1
; RV64I-NEXT:    slli
 a1, a1, 32
; RV64I-NEXT:    addi a1, a1, 1
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: xor_i64_large:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    binvi a0, a0, 0
; RV64ZBS-NEXT:    binvi a0, a0, 32
; RV64ZBS-NEXT:    ret
 %xor = xor i64 %a, 4294967297
 ret i64 %xor
}

define i64 @xor_i64_4099(i64 %a) nounwind {
; RV64I-LABEL: xor_i64_4099:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 1
; RV64I-NEXT:    addiw a1, a1, 3
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: xor_i64_4099:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    xori a0, a0, 3
; RV64ZBS-NEXT:    binvi a0, a0, 12
; RV64ZBS-NEXT:    ret
 %xor = xor i64 %a, 4099
 ret i64 %xor
}

define i64 @xor_i64_96(i64 %a) nounwind {
; CHECK-LABEL: xor_i64_96:
; CHECK:       # %bb.0:
; CHECK-NEXT:    xori a0, a0, 96
; CHECK-NEXT:    ret
 %xor = xor i64 %a, 96
 ret i64 %xor
}

define i64 @or_i64_large(i64 %a) nounwind {
; RV64I-LABEL: or_i64_large:
; RV64I:       # %bb.0:
; RV64I-NEXT:
    li a1, 1
; RV64I-NEXT:    slli a1, a1, 32
```

```
; RV64I-NEXT:    addi a1, a1, 1
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: or_i64_large:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bseti a0, a0, 0
; RV64ZBS-NEXT:    bseti a0, a0, 32
; RV64ZBS-NEXT:    ret
 %or = or i64 %a, 4294967297
 ret i64 %or
}

define i64 @xor_i64_66901(i64 %a) nounwind {
; RV64I-LABEL: xor_i64_66901:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 16
; RV64I-NEXT:    addiw a1, a1, 1365
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: xor_i64_66901:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    xori a0, a0, 1365
; RV64ZBS-NEXT:    binvi a0, a0, 16
; RV64ZBS-NEXT:    ret
 %xor = xor i64 %a, 66901
 ret i64 %xor
}

define i64 @or_i64_4099(i64 %a) nounwind {
; RV64I-LABEL: or_i64_4099:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 1
; RV64I-NEXT:    addiw a1, a1, 3
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: or_i64_4099:
; RV64ZBS:
      # %bb.0:
; RV64ZBS-NEXT:    ori a0, a0, 3
; RV64ZBS-NEXT:    bseti a0, a0, 12
; RV64ZBS-NEXT:    ret
 %or = or i64 %a, 4099
 ret i64 %or
}
```

```
define i64 @or_i64_96(i64 %a) nounwind {
; CHECK-LABEL: or_i64_96:
; CHECK:       # %bb.0:
; CHECK-NEXT:    ori a0, a0, 96
; CHECK-NEXT:    ret
 %or = or i64 %a, 96
 ret i64 %or
}

define i64 @or_i64_66901(i64 %a) nounwind {
; RV64I-LABEL: or_i64_66901:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 16
; RV64I-NEXT:    addiw a1, a1, 1365
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: or_i64_66901:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    ori a0, a0, 1365
; RV64ZBS-NEXT:    bseti a0, a0, 16
; RV64ZBS-NEXT:    ret
 %or = or i64 %a, 66901
 ret i64 %or
}

define signext i32 @bset_trailing_ones_i32_mask(i32 signext %a) nounwind {
; RV64I-LABEL: bset_trailing_ones_i32_mask:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, -1
; RV64I-NEXT:    sllw a0, a1, a0
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    ret
;
;
 RV64ZBS-LABEL: bset_trailing_ones_i32_mask:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    andi a0, a0, 31
; RV64ZBS-NEXT:    bset a0, zero, a0
; RV64ZBS-NEXT:    addiw a0, a0, -1
; RV64ZBS-NEXT:    ret
 %and = and i32 %a, 31
 %shift = shl nsw i32 -1, %and
 %not = xor i32 %shift, -1
 ret i32 %not
}

define signext i32 @bset_trailing_ones_i32_no_mask(i32 signext %a) nounwind {
```

```
; RV64I-LABEL: bset_trailing_ones_i32_no_mask:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, -1
; RV64I-NEXT:    sllw a0, a1, a0
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bset_trailing_ones_i32_no_mask:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bset a0, zero, a0
; RV64ZBS-NEXT:    addiw a0, a0, -1
; RV64ZBS-NEXT:    ret
 %shift = shl nsw i32 -1, %a
 %not = xor i32 %shift, -1
 ret i32 %not
}

define signext i64 @bset_trailing_ones_i64_mask(i64 signext %a) nounwind {
; RV64I-LABEL: bset_trailing_ones_i64_mask:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, -1
; RV64I-NEXT:    sll
 a0, a1, a0
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bset_trailing_ones_i64_mask:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bset a0, zero, a0
; RV64ZBS-NEXT:    addi a0, a0, -1
; RV64ZBS-NEXT:    ret
 %and = and i64 %a, 63
 %shift = shl nsw i64 -1, %and
 %not = xor i64 %shift, -1
 ret i64 %not
}

define signext i64 @bset_trailing_ones_i64_no_mask(i64 signext %a) nounwind {
; RV64I-LABEL: bset_trailing_ones_i64_no_mask:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, -1
; RV64I-NEXT:    sll a0, a1, a0
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bset_trailing_ones_i64_no_mask:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bset a0, zero, a0
```

```
; RV64ZBS-NEXT:    addi a0, a0, -1
; RV64ZBS-NEXT:    ret
 %shift = shl nsw i64 -1, %a
 %not = xor i64 %shift, -1
 ret i64 %not
}
```

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```
; RUN: opt -passes=consthoist -S -o - %s | FileCheck %s
target datalayout = "e-m:e-p:32:32-i64:64-v128:64:128-a:0:32-n32-S64"
target triple = "thumbv6m-none--musleabi"

; Check that for i8 type, the maximum legal offset is 31.
; Also check that an constant used as value to be stored rather than
; pointer in a store instruction is hoisted.
```

```
; CHECK: foo_i8
; CHECK-DAG:  %[[C1:const[0-9]?]] = bitcast i32 805874720 to i32
; CHECK-DAG:  %[[C2:const[0-9]?]] = bitcast i32 805874688 to i32
; CHECK-DAG:  %[[C3:const[0-9]?]] = bitcast i32 805873720 to i32
; CHECK-DAG:  %[[C4:const[0-9]?]] = bitcast i32 805873688 to i32
; CHECK:  %0 = inttoptr i32 %[[C2]] to ptr
; CHECK-NEXT:  %1 = load volatile i8, ptr %0
; CHECK-NEXT:  %[[M1:const_mat[0-9]?]] = add i32 %[[C2]], 4
; CHECK-NEXT:  %2 = inttoptr i32 %[[M1]] to ptr
; CHECK-NEXT:  %3 = load volatile i8, ptr %2
; CHECK-NEXT:  %[[M2:const_mat[0-9]?]] = add i32 %[[C2]], 31
; CHECK-NEXT:  %4 = inttoptr i32 %[[M2]] to ptr
; CHECK-NEXT:  %5 = load volatile
 i8, ptr %4
; CHECK-NEXT:  %6 = inttoptr i32 %[[C1]] to ptr
; CHECK-NEXT:  %7 = load volatile i8, ptr %6
; CHECK-NEXT:  %[[M3:const_mat[0-9]?]] = add i32 %[[C1]], 7
; CHECK-NEXT:  %8 = inttoptr i32 %[[M3]] to ptr
; CHECK-NEXT:  %9 = load volatile i8, ptr %8
; CHECK-NEXT:  %10 = inttoptr i32 %[[C4]] to ptr
; CHECK-NEXT:  store i8 %9, ptr %10
; CHECK-NEXT:  %[[M4:const_mat[0-9]?]] = add i32 %[[C4]], 31
; CHECK-NEXT:  %11 = inttoptr i32 %[[M4]] to ptr
; CHECK-NEXT:  store i8 %7, ptr %11
; CHECK-NEXT:  %12 = inttoptr i32 %[[C3]] to ptr
; CHECK-NEXT:  store i8 %5, ptr %12
; CHECK-NEXT:  %[[M5:const_mat[0-9]?]] = add i32 %[[C3]], 7
; CHECK-NEXT:  %13 = inttoptr i32 %[[M5]] to ptr
; CHECK-NEXT:  store i8 %3, ptr %13
; CHECK-NEXT:  %[[M6:const_mat[0-9]?]] = add i32 %[[C1]], 80
; CHECK-NEXT:  %14 = inttoptr i32 %[[M6]] to ptr
; CHECK-NEXT:  store ptr %14, ptr @goo

@goo = global ptr undef

define void @foo_i8() {
entry:
 %0 = load volatile i8, ptr inttoptr (i32 805874688 to ptr)
 %1 = load volatile
 i8, ptr inttoptr (i32 805874692 to ptr)
 %2 = load volatile i8, ptr inttoptr (i32 805874719 to ptr)
 %3 = load volatile i8, ptr inttoptr (i32 805874720 to ptr)
 %4 = load volatile i8, ptr inttoptr (i32 805874727 to ptr)
 store i8 %4, ptr inttoptr(i32 805873688 to ptr)
 store i8 %3, ptr inttoptr(i32 805873719 to ptr)
 store i8 %2, ptr inttoptr(i32 805873720 to ptr)
 store i8 %1, ptr inttoptr(i32 805873727 to ptr)
 store ptr inttoptr(i32 805874800 to ptr), ptr @goo
```

```
 ret void
}

; Check that for i16 type, the maximum legal offset is 62.
; CHECK: foo_i16
; CHECK-DAG: %[[C1:const[0-9]?]] = bitcast i32 805874752 to i32
; CHECK-DAG: %[[C2:const[0-9]?]] = bitcast i32 805874688 to i32
; CHECK: %0 = inttoptr i32 %[[C2]] to ptr
; CHECK-NEXT: %1 = load volatile i16, ptr %0, align 2
; CHECK-NEXT: %[[M1:const_mat[0-9]?]] = add i32 %[[C2]], 4
; CHECK-NEXT: %2 = inttoptr i32 %[[M1]] to ptr
; CHECK-NEXT: %3 = load volatile i16, ptr %2, align 2
; CHECK-NEXT: %[[M2:const_mat[0-9]?]] = add
 i32 %[[C2]], 32
; CHECK-NEXT: %4 = inttoptr i32 %[[M2]] to ptr
; CHECK-NEXT: %5 = load volatile i16, ptr %4, align 2
; CHECK-NEXT: %[[M3:const_mat[0-9]?]] = add i32 %[[C2]], 62
; CHECK-NEXT: %6 = inttoptr i32 %[[M3]] to ptr
; CHECK-NEXT: %7 = load volatile i16, ptr %6, align 2
; CHECK-NEXT: %8 = inttoptr i32 %[[C1]] to ptr
; CHECK-NEXT: %9 = load volatile i16, ptr %8, align 2
; CHECK-NEXT: %[[M4:const_mat[0-9]?]] = add i32 %[[C1]], 22
; CHECK-NEXT: %10 = inttoptr i32 %[[M4]] to ptr
; CHECK-NEXT: %11 = load volatile i16, ptr %10, align 2

define void @foo_i16() {
entry:
 %0 = load volatile i16, ptr inttoptr (i32 805874688 to ptr), align 2
 %1 = load volatile i16, ptr inttoptr (i32 805874692 to ptr), align 2
 %2 = load volatile i16, ptr inttoptr (i32 805874720 to ptr), align 2
 %3 = load volatile i16, ptr inttoptr (i32 805874750 to ptr), align 2
 %4 = load volatile i16, ptr inttoptr (i32 805874752 to ptr), align 2
 %5 = load volatile i16, ptr inttoptr (i32 805874774 to ptr), align
 2
 ret void
}

; Check that for i32 type, the maximum legal offset is 124.
; CHECK: foo_i32
; CHECK-DAG:  %[[C1:const[0-9]?]] = bitcast i32 805874816 to i32
; CHECK-DAG:  %[[C2:const[0-9]?]] = bitcast i32 805874688 to i32
; CHECK:  %0 = inttoptr i32 %[[C2]] to ptr
; CHECK-NEXT:  %1 = load volatile i32, ptr %0, align 4
; CHECK-NEXT:  %[[M1:const_mat[0-9]?]] = add i32 %[[C2]], 4
; CHECK-NEXT:  %2 = inttoptr i32 %[[M1]] to ptr
; CHECK-NEXT:  %3 = load volatile i32, ptr %2, align 4
; CHECK-NEXT:  %[[M2:const_mat[0-9]?]] = add i32 %[[C2]], 124
; CHECK-NEXT:  %4 = inttoptr i32 %[[M2]] to ptr
```

```
; CHECK-NEXT:  %5 = load volatile i32, ptr %4, align 4
; CHECK-NEXT:  %6 = inttoptr i32 %[[C1]] to ptr
; CHECK-NEXT:  %7 = load volatile i32, ptr %6, align 4
; CHECK-NEXT:  %[[M3:const_mat[0-9]?]] = add i32 %[[C1]], 8
; CHECK-NEXT:  %8 = inttoptr i32 %[[M3]] to ptr
; CHECK-NEXT:  %9 = load volatile i32, ptr %8, align 4
; CHECK-NEXT:  %[[M4:const_mat[0-9]?]] = add i32 %[[C1]], 12
; CHECK-NEXT:  %10 = inttoptr
 i32 %[[M4]] to ptr
; CHECK-NEXT:  %11 = load volatile i32, ptr %10, align 4

define void @foo_i32() {
entry:
 %0 = load volatile i32, ptr inttoptr (i32 805874688 to ptr), align 4
 %1 = load volatile i32, ptr inttoptr (i32 805874692 to ptr), align 4
 %2 = load volatile i32, ptr inttoptr (i32 805874812 to ptr), align 4
 %3 = load volatile i32, ptr inttoptr (i32 805874816 to ptr), align 4
 %4 = load volatile i32, ptr inttoptr (i32 805874824 to ptr), align 4
 %5 = load volatile i32, ptr inttoptr (i32 805874828 to ptr), align 4
 ret void
}
; RUN: llc -march=hexagon < %s
; REQUIRES: asserts

; The two loads based on %struct.0, loading two different data types
; cause LSR to assume type "void" for the memory type. This would then
; cause an assert in isLegalAddressingMode. Make sure we no longer crash.

target triple = "hexagon"

%struct.0 = type { ptr, i8, %union.anon.0 }
%union.anon.0 = type { ptr }

define hidden fastcc void @fred() unnamed_addr #0 {
entry:
 br i1 undef, label %while.end, label %while.body.lr.ph

while.body.lr.ph:                                 ; preds = %entry
 br label %while.body

while.body:                                       ; preds = %exit.2, %while.body.lr.ph
 %lsr.iv = phi ptr [ %cgep22, %exit.2 ], [ undef, %while.body.lr.ph ]
 switch i32 undef, label %exit [
   i32 1, label %sw.bb.i
   i32 2, label %sw.bb3.i
 ]

sw.bb.i:                                          ; preds = %while.body
```

```
 unreachable

sw.bb3.i:                                         ; preds = %while.body
 unreachable

exit:
                                                  ; preds = %while.body
 switch i32 undef, label %exit.2 [
   i32 1, label %sw.bb.i17
   i32 2, label %sw.bb3.i20
 ]

sw.bb.i17:                                        ; preds = %.exit
 %0 = load i32, ptr %lsr.iv, align 4
 unreachable

sw.bb3.i20:                                       ; preds = %exit
 %1 = load ptr, ptr %lsr.iv, align 4
 unreachable

exit.2:                                           ; preds = %exit
 %cgep22 = getelementptr %struct.0, ptr %lsr.iv, i32 1
 br label %while.body

while.end:                                        ; preds = %entry
 ret void
}

attributes #0 = { nounwind optsize "target-cpu"="hexagonv55" }
; NOTE: Assertions have been autogenerated by utils/update_test_checks.py UTC_ARGS: --include-generated-
funcs
; RUN: opt -S -passes=verify,iroutliner -ir-outlining-no-cost < %s | FileCheck %s
; FIXME: Disabled run-line after running into some turbulence with debuginfo-iterators
; run: opt -S -passes=verify,iroutliner -ir-outlining-no-cost < %s --try-experimental-debuginfo-iterators | FileCheck
%s

; This test checks that debug info is recognized as able to be extracted along
; with the other instructions, but is not included in the consolidated function.

define void @function1() !dbg !6 {
entry:
 %a = alloca i32, align 4, !dbg !17
 call void @llvm.dbg.value(metadata ptr %a, metadata !9, metadata !DIExpression()), !dbg !17
 %b = alloca i32, align 4, !dbg !18
 call void @llvm.dbg.value(metadata ptr %b, metadata !11, metadata !DIExpression()), !dbg !18
 %c = alloca i32, align 4, !dbg !19
 call void @llvm.dbg.value(metadata ptr %c, metadata !12, metadata !DIExpression()), !dbg !19
```

```
 store i32 2, ptr %a, align 4, !dbg !20
 store i32 3, ptr %b, align 4, !dbg !21
 store i32 4, ptr %c, align 4, !dbg !22
 %al = load i32, ptr %a, align 4, !dbg !23
 call void @llvm.dbg.value(metadata i32 %al, metadata !13, metadata !DIExpression()), !dbg !23
 %bl = load i32, ptr %b, align 4, !dbg !24
 call void @llvm.dbg.value(metadata i32 %bl, metadata !15, metadata !DIExpression()), !dbg !24
 %cl = load i32, ptr %c, align 4, !dbg !25
 call void @llvm.dbg.value(metadata i32 %cl, metadata !16, metadata !DIExpression()), !dbg !25
 ret void, !dbg !26
}

define void @function2() !dbg !27 {
entry:
 %a = alloca i32, align 4, !dbg !35
 call void @llvm.dbg.value(metadata ptr %a, metadata !29, metadata !DIExpression()), !dbg !35
 %b = alloca i32, align 4, !dbg !36
 call void @llvm.dbg.value(metadata ptr %b, metadata !30, metadata !DIExpression()), !dbg !36
 %c = alloca i32, align 4, !dbg !37
 call void @llvm.dbg.value(metadata ptr %c, metadata !31, metadata !DIExpression()), !dbg
 !37
 store i32 2, ptr %a, align 4, !dbg !38
 store i32 3, ptr %b, align 4, !dbg !39
 store i32 4, ptr %c, align 4, !dbg !40
 %al = load i32, ptr %a, align 4, !dbg !41
 call void @llvm.dbg.value(metadata i32 %al, metadata !32, metadata !DIExpression()), !dbg !41
 %bl = load i32, ptr %b, align 4, !dbg !42
 call void @llvm.dbg.value(metadata i32 %bl, metadata !33, metadata !DIExpression()), !dbg !42
 %cl = load i32, ptr %c, align 4, !dbg !43
 call void @llvm.dbg.value(metadata i32 %cl, metadata !34, metadata !DIExpression()), !dbg !43
 ret void, !dbg !44
}


; Function Attrs: nounwind readnone speculatable willreturn
declare void @llvm.dbg.value(metadata, metadata, metadata) #0

attributes #0 = { nounwind readnone speculatable willreturn }

!llvm.dbg.cu = !{!0}
!llvm.debugify = !{!3, !4}
!llvm.module.flags = !{!5}

!0 = distinct !DICompileUnit(language: DW_LANG_C, file: !1, producer: "debugify", isOptimized: true,
runtimeVersion: 0, emissionKind: FullDebug, enums: !2)
!1 = !DIFile(filename:
 "legal-debug.ll", directory: "/")
!2 = !{}
```

```
!3 = !{i32 20}
!4 = !{i32 12}
!5 = !{i32 2, !"Debug Info Version", i32 3}
!6 = distinct !DISubprogram(name: "function1", linkageName: "function1", scope: null, file: !1, line: 1, type: !7,
scopeLine: 1, spFlags: DISPFlagDefinition | DISPFlagOptimized, unit: !0, retainedNodes: !8)
!7 = !DISubroutineType(types: !2)
!8 = !{!9, !11, !12, !13, !15, !16}
!9 = !DILocalVariable(name: "1", scope: !6, file: !1, line: 1, type: !10)
!10 = !DIBasicType(name: "ty64", size: 64, encoding: DW_ATE_unsigned)
!11 = !DILocalVariable(name: "2", scope: !6, file: !1, line: 2, type: !10)
!12 = !DILocalVariable(name: "3", scope: !6, file: !1, line: 3, type: !10)
!13 = !DILocalVariable(name: "4", scope: !6, file: !1, line: 7, type: !14)
!14 = !DIBasicType(name: "ty32", size: 32, encoding: DW_ATE_unsigned)
!15 = !DILocalVariable(name: "5", scope: !6, file: !1, line: 8, type: !14)
!16 = !DILocalVariable(name: "6", scope: !6, file: !1, line: 9, type: !14)
!17
 = !DILocation(line: 1, column: 1, scope: !6)
!18 = !DILocation(line: 2, column: 1, scope: !6)
!19 = !DILocation(line: 3, column: 1, scope: !6)
!20 = !DILocation(line: 4, column: 1, scope: !6)
!21 = !DILocation(line: 5, column: 1, scope: !6)
!22 = !DILocation(line: 6, column: 1, scope: !6)
!23 = !DILocation(line: 7, column: 1, scope: !6)
!24 = !DILocation(line: 8, column: 1, scope: !6)
!25 = !DILocation(line: 9, column: 1, scope: !6)
!26 = !DILocation(line: 10, column: 1, scope: !6)
!27 = distinct !DISubprogram(name: "function2", linkageName: "function2", scope: null, file: !1, line: 11, type: !7,
scopeLine: 11, spFlags: DISPFlagDefinition | DISPFlagOptimized, unit: !0, retainedNodes: !28)
!28 = !{!29, !30, !31, !32, !33, !34}
!29 = !DILocalVariable(name: "7", scope: !27, file: !1, line: 11, type: !10)
!30 = !DILocalVariable(name: "8", scope: !27, file: !1, line: 12, type: !10)
!31 = !DILocalVariable(name: "9", scope: !27, file: !1, line: 13, type: !10)
!32 = !DILocalVariable(name: "10",
 scope: !27, file: !1, line: 17, type: !14)
!33 = !DILocalVariable(name: "11", scope: !27, file: !1, line: 18, type: !14)
!34 = !DILocalVariable(name: "12", scope: !27, file: !1, line: 19, type: !14)
!35 = !DILocation(line: 11, column: 1, scope: !27)
!36 = !DILocation(line: 12, column: 1, scope: !27)
!37 = !DILocation(line: 13, column: 1, scope: !27)
!38 = !DILocation(line: 14, column: 1, scope: !27)
!39 = !DILocation(line: 15, column: 1, scope: !27)
!40 = !DILocation(line: 16, column: 1, scope: !27)
!41 = !DILocation(line: 17, column: 1, scope: !27)
!42 = !DILocation(line: 18, column: 1, scope: !27)
!43 = !DILocation(line: 19, column: 1, scope: !27)
!44 = !DILocation(line: 20, column: 1, scope: !27)
; CHECK-LABEL: @function1(
; CHECK-NEXT:  entry:
```

```
; CHECK-NEXT:    [[A:%.*]] = alloca i32, align 4, !dbg [[DBG17:![0-9]+]]
; CHECK-NEXT:    call void @llvm.dbg.value(metadata ptr [[A]], metadata [[META9:![0-9]+]], metadata
!DIExpression()), !dbg [[DBG17]]
; CHECK-NEXT:    [[B:%.*]] = alloca
 i32, align 4, !dbg [[DBG18:![0-9]+]]
; CHECK-NEXT:    call void @llvm.dbg.value(metadata ptr [[B]], metadata [[META11:![0-9]+]], metadata
!DIExpression()), !dbg [[DBG18]]
; CHECK-NEXT:    [[C:%.*]] = alloca i32, align 4, !dbg [[DBG19:![0-9]+]]
; CHECK-NEXT:    call void @llvm.dbg.value(metadata ptr [[C]], metadata [[META12:![0-9]+]], metadata
!DIExpression()), !dbg [[DBG19]]
; CHECK-NEXT:    call void @outlined_ir_func_0(ptr [[A]], ptr [[B]], ptr [[C]]), !dbg [[DBG20:![0-9]+]]
; CHECK-NEXT:    ret void, !dbg [[DBG21:![0-9]+]]
;
;
; CHECK-LABEL: @function2(
; CHECK-NEXT:  entry:
; CHECK-NEXT:    [[A:%.*]] = alloca i32, align 4, !dbg [[DBG30:![0-9]+]]
; CHECK-NEXT:    call void @llvm.dbg.value(metadata ptr [[A]], metadata [[META24:![0-9]+]], metadata
!DIExpression()), !dbg [[DBG30]]
; CHECK-NEXT:    [[B:%.*]] = alloca i32, align 4, !dbg [[DBG31:![0-9]+]]
; CHECK-NEXT:    call void @llvm.dbg.value(metadata ptr [[B]], metadata [[META25:![0-9]+]], metadata
!DIExpression()), !dbg [[DBG31]]
;
 CHECK-NEXT:    [[C:%.*]] = alloca i32, align 4, !dbg [[DBG32:![0-9]+]]
; CHECK-NEXT:    call void @llvm.dbg.value(metadata ptr [[C]], metadata [[META26:![0-9]+]], metadata
!DIExpression()), !dbg [[DBG32]]
; CHECK-NEXT:    call void @outlined_ir_func_0(ptr [[A]], ptr [[B]], ptr [[C]]), !dbg [[DBG33:![0-9]+]]
; CHECK-NEXT:    ret void, !dbg [[DBG34:![0-9]+]]
;
;
; CHECK: @outlined_ir_func_0(ptr [[TMP0:%.*]], ptr [[TMP1:%.*]], ptr  [[TMP2:%.*]])
; CHECK:       entry_to_outline:
; CHECK-NEXT:    store i32 2, ptr [[TMP0]], align 4
; CHECK-NEXT:    store i32 3, ptr [[TMP1]], align 4
; CHECK-NEXT:    store i32 4, ptr [[TMP2]], align 4
; CHECK-NEXT:    [[AL:%.*]] = load i32, ptr [[TMP0]], align 4
; CHECK-NEXT:    [[BL:%.*]] = load i32, ptr [[TMP1]], align 4
; CHECK-NEXT:    [[CL:%.*]] = load i32, ptr [[TMP2]], align 4
; CHECK-NEXT:    br label [[ENTRY_AFTER_OUTLINE_EXITSTUB:%.*]]
;
; RUN: opt < %s -passes=argpromotion -S | FileCheck %s

; CHECK-LABEL: define i32 @foo() #0 {
; CHECK-NEXT:      %.val = load <32 x half>, ptr undef, align 4
; CHECK-NEXT:      call void @bar(<32 x half> %.val)
; CHECK-NEXT:      ret i32 0
; CHECK-NEXT:    }
```

```
; CHECK-LABEL: define internal void @bar(<32 x half> %.0.val) #0 {
; CHECK-NEXT:      ret void
; CHECK-NEXT:    }

; CHECK:    attributes #0 = { uwtable "min-legal-vector-width"="512" }

define i32 @foo() #0 {
 call void @bar(ptr undef)
 ret i32 0
}

define internal void @bar(ptr) #0 {
 %2 = load <32 x half>, ptr %0, align 4
 ret void
}

attributes #0 = { uwtable "min-legal-vector-width"="0" }
```

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```
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -mattr=+m -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefixes=CHECK,RV64I
; RUN: llc -mtriple=riscv64 -mattr=+m,+zba -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-
prefixes=CHECK,RV64ZBA,RV64ZBANOZBB
; RUN: llc -mtriple=riscv64 -mattr=+m,+zba,+zbb -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefixes=CHECK,RV64ZBA,RV64ZBAZBB

define i64 @slliuw(i64 %a) nounwind {
; RV64I-LABEL: slliuw:
; RV64I:       # %bb.0:
```

```
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 31
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: slliuw:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli.uw a0, a0, 1
; RV64ZBA-NEXT:    ret
 %conv1 = shl i64 %a, 1
 %shl = and i64 %conv1, 8589934590
 ret i64 %shl
}

define i128 @slliuw_2(i32 signext %0, ptr %1) {
; RV64I-LABEL:
 slliuw_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 28
; RV64I-NEXT:    add a1, a1, a0
; RV64I-NEXT:    ld a0, 0(a1)
; RV64I-NEXT:    ld a1, 8(a1)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: slliuw_2:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli.uw a0, a0, 4
; RV64ZBA-NEXT:    add a1, a1, a0
; RV64ZBA-NEXT:    ld a0, 0(a1)
; RV64ZBA-NEXT:    ld a1, 8(a1)
; RV64ZBA-NEXT:    ret
 %3 = zext i32 %0 to i64
 %4 = getelementptr inbounds i128, ptr %1, i64 %3
 %5 = load i128, ptr %4
 ret i128 %5
}

define i128 @slliuw_3(i32 signext %0, ptr %1) {
; RV64I-LABEL: slliuw_3:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi a0, a0, 1
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 28
; RV64I-NEXT:    add a1, a1, a0
; RV64I-NEXT:    ld a0, 0(a1)
; RV64I-NEXT:    ld a1, 8(a1)
; RV64I-NEXT:    ret
;
```

```
; RV64ZBA-LABEL: slliuw_3:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    addi a0, a0, 1
; RV64ZBA-NEXT:    slli.uw a0, a0, 4
; RV64ZBA-NEXT:
    add a1, a1, a0
; RV64ZBA-NEXT:    ld a0, 0(a1)
; RV64ZBA-NEXT:    ld a1, 8(a1)
; RV64ZBA-NEXT:    ret
 %add = add i32 %0, 1
 %3 = zext i32 %add to i64
 %4 = getelementptr inbounds i128, ptr %1, i64 %3
 %5 = load i128, ptr %4
 ret i128 %5
}

define i64 @adduw(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: adduw:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    srli a1, a1, 32
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: adduw:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    add.uw a0, a1, a0
; RV64ZBA-NEXT:    ret
 %and = and i64 %b, 4294967295
 %add = add i64 %and, %a
 ret i64 %add
}

define signext i8 @adduw_2(i32 signext %0, ptr %1) {
; RV64I-LABEL: adduw_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lb a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: adduw_2:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    add.uw a0, a0, a1
; RV64ZBA-NEXT:
    lb a0, 0(a0)
; RV64ZBA-NEXT:    ret
```

```
 %3 = zext i32 %0 to i64
 %4 = getelementptr inbounds i8, ptr %1, i64 %3
 %5 = load i8, ptr %4
 ret i8 %5
}

define signext i8 @adduw_3(i32 signext %0, ptr %1) {
; RV64I-LABEL: adduw_3:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi a0, a0, 1
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lb a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: adduw_3:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    addi a0, a0, 1
; RV64ZBA-NEXT:    add.uw a0, a0, a1
; RV64ZBA-NEXT:    lb a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %add = add i32 %0, 1
 %3 = zext i32 %add to i64
 %4 = getelementptr inbounds i8, ptr %1, i64 %3
 %5 = load i8, ptr %4
 ret i8 %5
}

define i64 @zextw_i64(i64 %a) nounwind {
; RV64I-LABEL: zextw_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: zextw_i64:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:
    zext.w a0, a0
; RV64ZBA-NEXT:    ret
 %and = and i64 %a, 4294967295
 ret i64 %and
}

; This makes sure targetShrinkDemandedConstant changes the and immmediate to
; allow zext.w or slli+srli.
define i64 @zextw_demandedbits_i64(i64 %0) {
```

```
; RV64I-LABEL: zextw_demandedbits_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    ori a0, a0, 1
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: zextw_demandedbits_i64:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    ori a0, a0, 1
; RV64ZBA-NEXT:    zext.w a0, a0
; RV64ZBA-NEXT:    ret
 %2 = and i64 %0, 4294967294
 %3 = or i64 %2, 1
 ret i64 %3
}

define signext i16 @sh1add(i64 %0, ptr %1) {
; RV64I-LABEL: sh1add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 1
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lh a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh1add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh1add a0, a0, a1
; RV64ZBA-NEXT:    lh a0, 0(a0)
; RV64ZBA-NEXT:
    ret
 %3 = getelementptr inbounds i16, ptr %1, i64 %0
 %4 = load i16, ptr %3
 ret i16 %4
}

define signext i32 @sh2add(i64 %0, ptr %1) {
; RV64I-LABEL: sh2add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 2
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh2add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh2add a0, a0, a1
; RV64ZBA-NEXT:    lw a0, 0(a0)
```

```
; RV64ZBA-NEXT:    ret
 %3 = getelementptr inbounds i32, ptr %1, i64 %0
 %4 = load i32, ptr %3
 ret i32 %4
}

define i64 @sh3add(i64 %0, ptr %1) {
; RV64I-LABEL: sh3add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 3
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    ld a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh3add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add a0, a0, a1
; RV64ZBA-NEXT:    ld a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = getelementptr inbounds i64, ptr %1, i64 %0
 %4 = load i64, ptr %3
 ret i64 %4
}

define signext i16 @sh1adduw(i32
 signext %0, ptr %1) {
; RV64I-LABEL: sh1adduw:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 31
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lh a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh1adduw:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh1add.uw a0, a0, a1
; RV64ZBA-NEXT:    lh a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = zext i32 %0 to i64
 %4 = getelementptr inbounds i16, ptr %1, i64 %3
 %5 = load i16, ptr %4
 ret i16 %5
}

define i64 @sh1adduw_2(i64 %0, i64 %1) {
; RV64I-LABEL: sh1adduw_2:
; RV64I:       # %bb.0:
```

```
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 31
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh1adduw_2:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh1add.uw a0, a0, a1
; RV64ZBA-NEXT:    ret
 %3 = shl i64 %0, 1
 %4 = and i64 %3, 8589934590
 %5 = add i64 %4, %1
 ret i64 %5
}

define signext i32 @sh2adduw(i32 signext %0, ptr %1) {
; RV64I-LABEL: sh2adduw:
; RV64I:
       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 30
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh2adduw:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh2add.uw a0, a0, a1
; RV64ZBA-NEXT:    lw a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = zext i32 %0 to i64
 %4 = getelementptr inbounds i32, ptr %1, i64 %3
 %5 = load i32, ptr %4
 ret i32 %5
}

define i64 @sh2adduw_2(i64 %0, i64 %1) {
; RV64I-LABEL: sh2adduw_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 30
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh2adduw_2:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh2add.uw a0, a0, a1
; RV64ZBA-NEXT:    ret
```

```
 %3 = shl i64 %0, 2
 %4 = and i64 %3, 17179869180
 %5 = add i64 %4, %1
 ret i64 %5
}

define i64 @sh3adduw(i32 signext %0, ptr %1) {
; RV64I-LABEL: sh3adduw:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:
 srli a0, a0, 29
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    ld a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh3adduw:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add.uw a0, a0, a1
; RV64ZBA-NEXT:    ld a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = zext i32 %0 to i64
 %4 = getelementptr inbounds i64, ptr %1, i64 %3
 %5 = load i64, ptr %4
 ret i64 %5
}

define i64 @sh3adduw_2(i64 %0, i64 %1) {
; RV64I-LABEL: sh3adduw_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 29
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh3adduw_2:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add.uw a0, a0, a1
; RV64ZBA-NEXT:    ret
 %3 = shl i64 %0, 3
 %4 = and i64 %3, 34359738360
 %5 = add i64 %4, %1
 ret i64 %5
}

; Type legalization inserts a sext_inreg after the first add. That add will be
; selected as sh2add which does not sign extend. SimplifyDemandedBits is unable
; to remove the sext_inreg because it has multiple uses.
```

```
 The ashr will use the
; sext_inreg to become sraiw. This leaves the sext_inreg only used by the shl.
; If the shl is selected as sllw, we don't need the sext_inreg.
define i64 @sh2add_extra_sext(i32 %x, i32 %y, i32 %z) {
; RV64I-LABEL: sh2add_extra_sext:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 2
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    sllw a1, a2, a0
; RV64I-NEXT:    sraiw a0, a0, 2
; RV64I-NEXT:    mul a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh2add_extra_sext:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh2add a0, a0, a1
; RV64ZBA-NEXT:    sllw a1, a2, a0
; RV64ZBA-NEXT:    sraiw a0, a0, 2
; RV64ZBA-NEXT:    mul a0, a1, a0
; RV64ZBA-NEXT:    ret
 %a = shl i32 %x, 2
 %b = add i32 %a, %y
 %c = shl i32 %z, %b
 %d = ashr i32 %b, 2
 %e = sext i32 %c to i64
 %f = sext i32 %d to i64
 %g = mul i64 %e, %f
 ret i64 %g
}

define i64 @addmul6(i64 %a, i64 %b) {
; RV64I-LABEL: addmul6:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 6
; RV64I-NEXT:    mul
 a0, a0, a2
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addmul6:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh1add a0, a0, a0
; RV64ZBA-NEXT:    sh1add a0, a0, a1
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 6
 %d = add i64 %c, %b
 ret i64 %d
}
```

```
define i64 @addmul10(i64 %a, i64 %b) {
; RV64I-LABEL: addmul10:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 10
; RV64I-NEXT:    mul a0, a0, a2
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addmul10:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh2add a0, a0, a0
; RV64ZBA-NEXT:    sh1add a0, a0, a1
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 10
 %d = add i64 %c, %b
 ret i64 %d
}

define i64 @addmul12(i64 %a, i64 %b) {
; RV64I-LABEL: addmul12:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 12
; RV64I-NEXT:    mul a0, a0, a2
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addmul12:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh1add a0, a0, a0
; RV64ZBA-NEXT:    sh2add
 a0, a0, a1
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 12
 %d = add i64 %c, %b
 ret i64 %d
}

define i64 @addmul18(i64 %a, i64 %b) {
; RV64I-LABEL: addmul18:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 18
; RV64I-NEXT:    mul a0, a0, a2
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addmul18:
; RV64ZBA:       # %bb.0:
```

```
; RV64ZBA-NEXT:    sh3add a0, a0, a0
; RV64ZBA-NEXT:    sh1add a0, a0, a1
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 18
 %d = add i64 %c, %b
 ret i64 %d
}

define i64 @addmul20(i64 %a, i64 %b) {
; RV64I-LABEL: addmul20:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 20
; RV64I-NEXT:    mul a0, a0, a2
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addmul20:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh2add a0, a0, a0
; RV64ZBA-NEXT:    sh2add a0, a0, a1
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 20
 %d = add i64 %c, %b
 ret i64 %d
}

define i64 @addmul24(i64 %a, i64 %b) {
; RV64I-LABEL: addmul24:
; RV64I:
    # %bb.0:
; RV64I-NEXT:    li a2, 24
; RV64I-NEXT:    mul a0, a0, a2
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addmul24:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh1add a0, a0, a0
; RV64ZBA-NEXT:    sh3add a0, a0, a1
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 24
 %d = add i64 %c, %b
 ret i64 %d
}

define i64 @addmul36(i64 %a, i64 %b) {
; RV64I-LABEL: addmul36:
; RV64I:       # %bb.0:
```

```
; RV64I-NEXT:    li a2, 36
; RV64I-NEXT:    mul a0, a0, a2
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addmul36:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add a0, a0, a0
; RV64ZBA-NEXT:    sh2add a0, a0, a1
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 36
 %d = add i64 %c, %b
 ret i64 %d
}

define i64 @addmul40(i64 %a, i64 %b) {
; RV64I-LABEL: addmul40:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 40
; RV64I-NEXT:    mul a0, a0, a2
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addmul40:
; RV64ZBA:       # %bb.0:
;
 RV64ZBA-NEXT:    sh2add a0, a0, a0
; RV64ZBA-NEXT:    sh3add a0, a0, a1
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 40
 %d = add i64 %c, %b
 ret i64 %d
}

define i64 @addmul72(i64 %a, i64 %b) {
; RV64I-LABEL: addmul72:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 72
; RV64I-NEXT:    mul a0, a0, a2
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addmul72:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add a0, a0, a0
; RV64ZBA-NEXT:    sh3add a0, a0, a1
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 72
```

```
 %d = add i64 %c, %b
 ret i64 %d
}

define i64 @mul96(i64 %a) {
; RV64I-LABEL: mul96:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 96
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul96:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh1add a0, a0, a0
; RV64ZBA-NEXT:    slli a0, a0, 5
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 96
 ret i64 %c
}

define i64 @mul160(i64 %a) {
; RV64I-LABEL: mul160:
; RV64I:       # %bb.0:
; RV64I-NEXT:
    li a1, 160
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul160:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh2add a0, a0, a0
; RV64ZBA-NEXT:    slli a0, a0, 5
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 160
 ret i64 %c
}

define i64 @mul288(i64 %a) {
; RV64I-LABEL: mul288:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 288
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul288:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add a0, a0, a0
; RV64ZBA-NEXT:    slli a0, a0, 5
```

```
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 288
 ret i64 %c
}

define i64 @zext_mul96(i32 signext %a) {
; RV64I-LABEL: zext_mul96:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 3
; RV64I-NEXT:    slli a1, a1, 37
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    mulhu a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: zext_mul96:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli.uw a0, a0, 5
; RV64ZBA-NEXT:    sh1add a0, a0, a0
; RV64ZBA-NEXT:    ret
 %b = zext
 i32 %a to i64
 %c = mul i64 %b, 96
 ret i64 %c
}

define i64 @zext_mul160(i32 signext %a) {
; RV64I-LABEL: zext_mul160:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 5
; RV64I-NEXT:    slli a1, a1, 37
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    mulhu a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: zext_mul160:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli.uw a0, a0, 5
; RV64ZBA-NEXT:    sh2add a0, a0, a0
; RV64ZBA-NEXT:    ret
 %b = zext i32 %a to i64
 %c = mul i64 %b, 160
 ret i64 %c
}

define i64 @zext_mul288(i32 signext %a) {
; RV64I-LABEL: zext_mul288:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 9
```

```
; RV64I-NEXT:    slli a1, a1, 37
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    mulhu a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: zext_mul288:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli.uw a0, a0, 5
; RV64ZBA-NEXT:    sh3add a0, a0, a0
; RV64ZBA-NEXT:    ret
 %b = zext i32 %a to i64
 %c = mul i64 %b, 288
 ret i64 %c
}

; We can't use slli.uw becaues
 the shift amount is more than 31.
; FIXME: The zext.w is unneeded.
define i64 @zext_mul12884901888(i32 signext %a) {
; RV64I-LABEL: zext_mul12884901888:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    li a1, 3
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: zext_mul12884901888:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    andi a0, a0, -1
; RV64ZBA-NEXT:    sh1add a0, a0, a0
; RV64ZBA-NEXT:    slli a0, a0, 32
; RV64ZBA-NEXT:    ret
 %b = zext i32 %a to i64
 %c = mul i64 %b, 12884901888
 ret i64 %c
}

; We can't use slli.uw becaues the shift amount is more than 31.
; FIXME: The zext.w is unneeded.
define i64 @zext_mul21474836480(i32 signext %a) {
; RV64I-LABEL: zext_mul21474836480:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    li a1, 5
; RV64I-NEXT:    slli a1, a1, 32
```

```
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:
    ret
;
; RV64ZBA-LABEL: zext_mul21474836480:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    andi a0, a0, -1
; RV64ZBA-NEXT:    sh2add a0, a0, a0
; RV64ZBA-NEXT:    slli a0, a0, 32
; RV64ZBA-NEXT:    ret
 %b = zext i32 %a to i64
 %c = mul i64 %b, 21474836480
 ret i64 %c
}

; We can't use slli.uw becaues the shift amount is more than 31.
; FIXME: The zext.w is unneeded.
define i64 @zext_mul38654705664(i32 signext %a) {
; RV64I-LABEL: zext_mul38654705664:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    li a1, 9
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: zext_mul38654705664:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    andi a0, a0, -1
; RV64ZBA-NEXT:    sh3add a0, a0, a0
; RV64ZBA-NEXT:    slli a0, a0, 32
; RV64ZBA-NEXT:    ret
 %b = zext i32 %a to i64
 %c = mul i64 %b, 38654705664
 ret i64 %c
}

define i64 @sh1add_imm(i64 %0) {
; CHECK-LABEL: sh1add_imm:
;
 CHECK:       # %bb.0:
; CHECK-NEXT:    slli a0, a0, 1
; CHECK-NEXT:    addi a0, a0, 5
; CHECK-NEXT:    ret
 %a = shl i64 %0, 1
 %b = add i64 %a, 5
 ret i64 %b
```

```
}

define i64 @sh2add_imm(i64 %0) {
; CHECK-LABEL: sh2add_imm:
; CHECK:       # %bb.0:
; CHECK-NEXT:    slli a0, a0, 2
; CHECK-NEXT:    addi a0, a0, -6
; CHECK-NEXT:    ret
 %a = shl i64 %0, 2
 %b = add i64 %a, -6
 ret i64 %b
}

define i64 @sh3add_imm(i64 %0) {
; CHECK-LABEL: sh3add_imm:
; CHECK:       # %bb.0:
; CHECK-NEXT:    slli a0, a0, 3
; CHECK-NEXT:    addi a0, a0, 7
; CHECK-NEXT:    ret
 %a = shl i64 %0, 3
 %b = add i64 %a, 7
 ret i64 %b
}

define i64 @sh1adduw_imm(i32 signext %0) {
; RV64I-LABEL: sh1adduw_imm:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 31
; RV64I-NEXT:    addi a0, a0, 11
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh1adduw_imm:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli.uw a0, a0, 1
; RV64ZBA-NEXT:    addi a0, a0, 11
; RV64ZBA-NEXT:    ret
 %a =
 zext i32 %0 to i64
 %b = shl i64 %a, 1
 %c = add i64 %b, 11
 ret i64 %c
}

define i64 @sh2adduw_imm(i32 signext %0) {
; RV64I-LABEL: sh2adduw_imm:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
```

```
; RV64I-NEXT:    srli a0, a0, 30
; RV64I-NEXT:    addi a0, a0, -12
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh2adduw_imm:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli.uw a0, a0, 2
; RV64ZBA-NEXT:    addi a0, a0, -12
; RV64ZBA-NEXT:    ret
 %a = zext i32 %0 to i64
 %b = shl i64 %a, 2
 %c = add i64 %b, -12
 ret i64 %c
}

define i64 @sh3adduw_imm(i32 signext %0) {
; RV64I-LABEL: sh3adduw_imm:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 29
; RV64I-NEXT:    addi a0, a0, 13
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh3adduw_imm:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli.uw a0, a0, 3
; RV64ZBA-NEXT:    addi a0, a0, 13
; RV64ZBA-NEXT:    ret
 %a = zext i32 %0 to i64
 %b = shl i64 %a, 3
 %c = add i64 %b, 13
 ret i64 %c
}

define i64
 @adduw_imm(i32 signext %0) nounwind {
; RV64I-LABEL: adduw_imm:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    addi a0, a0, 5
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: adduw_imm:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    zext.w a0, a0
; RV64ZBA-NEXT:    addi a0, a0, 5
; RV64ZBA-NEXT:    ret
```

```
 %a = zext i32 %0 to i64
 %b = add i64 %a, 5
 ret i64 %b
}

define i64 @mul258(i64 %a) {
; CHECK-LABEL: mul258:
; CHECK:       # %bb.0:
; CHECK-NEXT:    li a1, 258
; CHECK-NEXT:    mul a0, a0, a1
; CHECK-NEXT:    ret
 %c = mul i64 %a, 258
 ret i64 %c
}

define i64 @mul260(i64 %a) {
; CHECK-LABEL: mul260:
; CHECK:       # %bb.0:
; CHECK-NEXT:    li a1, 260
; CHECK-NEXT:    mul a0, a0, a1
; CHECK-NEXT:    ret
 %c = mul i64 %a, 260
 ret i64 %c
}

define i64 @mul264(i64 %a) {
; CHECK-LABEL: mul264:
; CHECK:       # %bb.0:
; CHECK-NEXT:    li a1, 264
; CHECK-NEXT:    mul a0, a0, a1
; CHECK-NEXT:    ret
 %c = mul i64 %a, 264
 ret i64
 %c
}

define i64 @imm_zextw() nounwind {
; RV64I-LABEL: imm_zextw:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, 1
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    addi a0, a0, -2
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: imm_zextw:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    li a0, -2
; RV64ZBA-NEXT:    zext.w a0, a0
```

```
; RV64ZBA-NEXT:    ret
 ret i64 4294967294 ; -2 in 32 bits.
}

define i64 @mul11(i64 %a) {
; RV64I-LABEL: mul11:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 11
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul11:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh2add a1, a0, a0
; RV64ZBA-NEXT:    sh1add a0, a1, a0
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 11
 ret i64 %c
}

define i64 @mul19(i64 %a) {
; RV64I-LABEL: mul19:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 19
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul19:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add a1, a0, a0
; RV64ZBA-NEXT:    sh1add a0,
 a1, a0
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 19
 ret i64 %c
}

define i64 @mul13(i64 %a) {
; RV64I-LABEL: mul13:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 13
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul13:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh1add a1, a0, a0
; RV64ZBA-NEXT:    sh2add a0, a1, a0
```

```
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 13
 ret i64 %c
}

define i64 @mul21(i64 %a) {
; RV64I-LABEL: mul21:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 21
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul21:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh2add a1, a0, a0
; RV64ZBA-NEXT:    sh2add a0, a1, a0
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 21
 ret i64 %c
}

define i64 @mul37(i64 %a) {
; RV64I-LABEL: mul37:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 37
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul37:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add a1, a0, a0
; RV64ZBA-NEXT:
    sh2add a0, a1, a0
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 37
 ret i64 %c
}

define i64 @mul25(i64 %a) {
; RV64I-LABEL: mul25:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 25
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul25:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh1add a1, a0, a0
```

```
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 25
 ret i64 %c
}

define i64 @mul41(i64 %a) {
; RV64I-LABEL: mul41:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 41
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul41:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh2add a1, a0, a0
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 41
 ret i64 %c
}

define i64 @mul73(i64 %a) {
; RV64I-LABEL: mul73:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 73
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul73:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add
 a1, a0, a0
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 73
 ret i64 %c
}

define i64 @mul27(i64 %a) {
; RV64I-LABEL: mul27:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 27
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul27:
; RV64ZBA:       # %bb.0:
```

```
; RV64ZBA-NEXT:    sh3add a0, a0, a0
; RV64ZBA-NEXT:    sh1add a0, a0, a0
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 27
 ret i64 %c
}

define i64 @mul45(i64 %a) {
; RV64I-LABEL: mul45:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 45
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul45:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add a0, a0, a0
; RV64ZBA-NEXT:    sh2add a0, a0, a0
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 45
 ret i64 %c
}

define i64 @mul81(i64 %a) {
; RV64I-LABEL: mul81:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 81
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul81:
; RV64ZBA:       # %bb.0:
;
 RV64ZBA-NEXT:    sh3add a0, a0, a0
; RV64ZBA-NEXT:    sh3add a0, a0, a0
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 81
 ret i64 %c
}

define i64 @mul4098(i64 %a) {
; RV64I-LABEL: mul4098:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a1, a0, 1
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
```

```
; RV64ZBA-LABEL: mul4098:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli a1, a0, 12
; RV64ZBA-NEXT:    sh1add a0, a0, a1
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 4098
 ret i64 %c
}

define i64 @mul4100(i64 %a) {
; RV64I-LABEL: mul4100:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a1, a0, 2
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul4100:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli a1, a0, 12
; RV64ZBA-NEXT:    sh2add a0, a0, a1
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 4100
 ret i64 %c
}

define i64 @mul4104(i64 %a) {
; RV64I-LABEL: mul4104:
; RV64I:       # %bb.0:
; RV64I-NEXT:
   slli a1, a0, 3
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul4104:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli a1, a0, 12
; RV64ZBA-NEXT:    sh3add a0, a0, a1
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 4104
 ret i64 %c
}

define signext i32 @mulw192(i32 signext %a) {
; CHECK-LABEL: mulw192:
; CHECK:       # %bb.0:
; CHECK-NEXT:    li a1, 192
```

```
; CHECK-NEXT:    mulw a0, a0, a1
; CHECK-NEXT:    ret
 %c = mul i32 %a, 192
 ret i32 %c
}

define signext i32 @mulw320(i32 signext %a) {
; CHECK-LABEL: mulw320:
; CHECK:       # %bb.0:
; CHECK-NEXT:    li a1, 320
; CHECK-NEXT:    mulw a0, a0, a1
; CHECK-NEXT:    ret
 %c = mul i32 %a, 320
 ret i32 %c
}

define signext i32 @mulw576(i32 signext %a) {
; CHECK-LABEL: mulw576:
; CHECK:       # %bb.0:
; CHECK-NEXT:    li a1, 576
; CHECK-NEXT:    mulw a0, a0, a1
; CHECK-NEXT:    ret
 %c = mul i32 %a, 576
 ret i32 %c
}

define i64 @add4104(i64 %a) {
; RV64I-LABEL: add4104:
; RV64I:
       # %bb.0:
; RV64I-NEXT:    lui a1, 1
; RV64I-NEXT:    addiw a1, a1, 8
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: add4104:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    li a1, 1026
; RV64ZBA-NEXT:    sh2add a0, a1, a0
; RV64ZBA-NEXT:    ret
 %c = add i64 %a, 4104
 ret i64 %c
}

define i64 @add8208(i64 %a) {
; RV64I-LABEL: add8208:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 2
```

```
; RV64I-NEXT:    addiw a1, a1, 16
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: add8208:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    li a1, 1026
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    ret
 %c = add i64 %a, 8208
 ret i64 %c
}

; Make sure we prefer LUI for the 8192 instead of using sh3add.
define signext i32 @add8192_i32(i32 signext %a) {
; CHECK-LABEL: add8192_i32:
; CHECK:       # %bb.0:
; CHECK-NEXT:    lui a1, 2
; CHECK-NEXT:    addw a0, a0, a1
; CHECK-NEXT:    ret
 %c = add i32 %a, 8192
 ret i32 %c
}

; Make sure we prefer LUI
 for the 8192 instead of using sh3add.
define i64 @add8192(i64 %a) {
; CHECK-LABEL: add8192:
; CHECK:       # %bb.0:
; CHECK-NEXT:    lui a1, 2
; CHECK-NEXT:    add a0, a0, a1
; CHECK-NEXT:    ret
 %c = add i64 %a, 8192
 ret i64 %c
}

define signext i32 @addshl32_5_6(i32 signext %a, i32 signext %b) {
; RV64I-LABEL: addshl32_5_6:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 5
; RV64I-NEXT:    slli a1, a1, 6
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addshl32_5_6:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh1add a0, a1, a0
; RV64ZBA-NEXT:    slliw a0, a0, 5
```

```
; RV64ZBA-NEXT:    ret
 %c = shl i32 %a, 5
 %d = shl i32 %b, 6
 %e = add i32 %c, %d
 ret i32 %e
}

define i64 @addshl64_5_6(i64 %a, i64 %b) {
; RV64I-LABEL: addshl64_5_6:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 5
; RV64I-NEXT:    slli a1, a1, 6
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addshl64_5_6:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:
   sh1add a0, a1, a0
; RV64ZBA-NEXT:    slli a0, a0, 5
; RV64ZBA-NEXT:    ret
 %c = shl i64 %a, 5
 %d = shl i64 %b, 6
 %e = add i64 %c, %d
 ret i64 %e
}

define signext i32 @addshl32_5_7(i32 signext %a, i32 signext %b) {
; RV64I-LABEL: addshl32_5_7:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 5
; RV64I-NEXT:    slli a1, a1, 7
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addshl32_5_7:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh2add a0, a1, a0
; RV64ZBA-NEXT:    slliw a0, a0, 5
; RV64ZBA-NEXT:    ret
 %c = shl i32 %a, 5
 %d = shl i32 %b, 7
 %e = add i32 %c, %d
 ret i32 %e
}

define i64 @addshl64_5_7(i64 %a, i64 %b) {
; RV64I-LABEL: addshl64_5_7:
```

```
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 5
; RV64I-NEXT:    slli a1, a1, 7
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addshl64_5_7:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh2add a0, a1, a0
; RV64ZBA-NEXT:    slli a0, a0, 5
; RV64ZBA-NEXT:    ret
 %c
 = shl i64 %a, 5
 %d = shl i64 %b, 7
 %e = add i64 %c, %d
 ret i64 %e
}

define signext i32 @addshl32_5_8(i32 signext %a, i32 signext %b) {
; RV64I-LABEL: addshl32_5_8:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 5
; RV64I-NEXT:    slli a1, a1, 8
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addshl32_5_8:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    slliw a0, a0, 5
; RV64ZBA-NEXT:    ret
 %c = shl i32 %a, 5
 %d = shl i32 %b, 8
 %e = add i32 %c, %d
 ret i32 %e
}

define i64 @addshl64_5_8(i64 %a, i64 %b) {
; RV64I-LABEL: addshl64_5_8:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 5
; RV64I-NEXT:    slli a1, a1, 8
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addshl64_5_8:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add a0, a1, a0
```

```
; RV64ZBA-NEXT:    slli a0, a0, 5
; RV64ZBA-NEXT:    ret
 %c = shl i64 %a, 5
 %d = shl i64 %b, 8
 %e = add i64 %c, %d
 ret i64 %e
}

; Make
 sure we use sext.h+slli+srli for Zba+Zbb.
; FIXME: The RV64I and Zba only cases can be done with only 3 shifts.
define zeroext i32 @sext_ashr_zext_i8(i8 %a) nounwind {
; RV64I-LABEL: sext_ashr_zext_i8:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 24
; RV64I-NEXT:    sraiw a0, a0, 31
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    ret
;
; RV64ZBANOZBB-LABEL: sext_ashr_zext_i8:
; RV64ZBANOZBB:       # %bb.0:
; RV64ZBANOZBB-NEXT:    slli a0, a0, 24
; RV64ZBANOZBB-NEXT:    sraiw a0, a0, 31
; RV64ZBANOZBB-NEXT:    zext.w a0, a0
; RV64ZBANOZBB-NEXT:    ret
;
; RV64ZBAZBB-LABEL: sext_ashr_zext_i8:
; RV64ZBAZBB:       # %bb.0:
; RV64ZBAZBB-NEXT:    sext.b a0, a0
; RV64ZBAZBB-NEXT:    sraiw a0, a0, 9
; RV64ZBAZBB-NEXT:    zext.w a0, a0
; RV64ZBAZBB-NEXT:    ret
 %ext = sext i8 %a to i32
 %1 = ashr i32 %ext, 9
 ret i32 %1
}

; Make sure we use sext.h+slli+srli for Zba+Zbb.
; FIXME: The RV64I and Zba only cases can be done with only 3 shifts.
define
 zeroext i32 @sext_ashr_zext_i16(i16 %a) nounwind {
; RV64I-LABEL: sext_ashr_zext_i16:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 16
; RV64I-NEXT:    sraiw a0, a0, 25
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
```

```
; RV64I-NEXT:    ret
;
; RV64ZBANOZBB-LABEL: sext_ashr_zext_i16:
; RV64ZBANOZBB:       # %bb.0:
; RV64ZBANOZBB-NEXT:    slli a0, a0, 16
; RV64ZBANOZBB-NEXT:    sraiw a0, a0, 25
; RV64ZBANOZBB-NEXT:    zext.w a0, a0
; RV64ZBANOZBB-NEXT:    ret
;
; RV64ZBAZBB-LABEL: sext_ashr_zext_i16:
; RV64ZBAZBB:       # %bb.0:
; RV64ZBAZBB-NEXT:    slli a0, a0, 48
; RV64ZBAZBB-NEXT:    srai a0, a0, 57
; RV64ZBAZBB-NEXT:    zext.w a0, a0
; RV64ZBAZBB-NEXT:    ret
 %ext = sext i16 %a to i32
 %1 = ashr i32 %ext, 9
 ret i32 %1
}

; This the IR you get from InstCombine if take the difference of 2 pointers and
; cast is to unsigned before using as an index.
define signext i16 @sh1adduw_ptrdiff(i64 %diff, ptr %baseptr) {
; RV64I-LABEL: sh1adduw_ptrdiff:
; RV64I:
   # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    slli a2, a2, 33
; RV64I-NEXT:    addi a2, a2, -2
; RV64I-NEXT:    and a0, a0, a2
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lh a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh1adduw_ptrdiff:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srli a0, a0, 1
; RV64ZBA-NEXT:    sh1add.uw a0, a0, a1
; RV64ZBA-NEXT:    lh a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %ptrdiff = lshr exact i64 %diff, 1
 %cast = and i64 %ptrdiff, 4294967295
 %ptr = getelementptr inbounds i16, ptr %baseptr, i64 %cast
 %res = load i16, ptr %ptr
 ret i16 %res
}

define signext i32 @sh2adduw_ptrdiff(i64 %diff, ptr %baseptr) {
```

```
; RV64I-LABEL: sh2adduw_ptrdiff:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    slli a2, a2, 34
; RV64I-NEXT:    addi a2, a2, -4
; RV64I-NEXT:    and a0, a0, a2
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh2adduw_ptrdiff:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:
   srli a0, a0, 2
; RV64ZBA-NEXT:    sh2add.uw a0, a0, a1
; RV64ZBA-NEXT:    lw a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %ptrdiff = lshr exact i64 %diff, 2
 %cast = and i64 %ptrdiff, 4294967295
 %ptr = getelementptr inbounds i32, ptr %baseptr, i64 %cast
 %res = load i32, ptr %ptr
 ret i32 %res
}

define i64 @sh3adduw_ptrdiff(i64 %diff, ptr %baseptr) {
; RV64I-LABEL: sh3adduw_ptrdiff:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    slli a2, a2, 35
; RV64I-NEXT:    addi a2, a2, -8
; RV64I-NEXT:    and a0, a0, a2
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    ld a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh3adduw_ptrdiff:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srli a0, a0, 3
; RV64ZBA-NEXT:    sh3add.uw a0, a0, a1
; RV64ZBA-NEXT:    ld a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %ptrdiff = lshr exact i64 %diff, 3
 %cast = and i64 %ptrdiff, 4294967295
 %ptr = getelementptr inbounds i64, ptr %baseptr, i64 %cast
 %res = load i64, ptr %ptr
 ret i64 %res
}
```

```
define signext
 i16 @srliw_1_sh1add(ptr %0, i32 signext %1) {
; RV64I-LABEL: srliw_1_sh1add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a1, a1, 1
; RV64I-NEXT:    slli a1, a1, 1
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lh a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srliw_1_sh1add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srliw a1, a1, 1
; RV64ZBA-NEXT:    sh1add a0, a1, a0
; RV64ZBA-NEXT:    lh a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i32 %1, 1
 %4 = zext i32 %3 to i64
 %5 = getelementptr inbounds i16, ptr %0, i64 %4
 %6 = load i16, ptr %5, align 2
 ret i16 %6
}

define i128 @slliuw_ptrdiff(i64 %diff, ptr %baseptr) {
; RV64I-LABEL: slliuw_ptrdiff:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    slli a2, a2, 36
; RV64I-NEXT:    addi a2, a2, -16
; RV64I-NEXT:    and a0, a0, a2
; RV64I-NEXT:    add a1, a1, a0
; RV64I-NEXT:    ld a0, 0(a1)
; RV64I-NEXT:    ld a1, 8(a1)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: slliuw_ptrdiff:
; RV64ZBA:       # %bb.0:
;
 RV64ZBA-NEXT:    srli a0, a0, 4
; RV64ZBA-NEXT:    slli.uw a0, a0, 4
; RV64ZBA-NEXT:    add a1, a1, a0
; RV64ZBA-NEXT:    ld a0, 0(a1)
; RV64ZBA-NEXT:    ld a1, 8(a1)
; RV64ZBA-NEXT:    ret
 %ptrdiff = lshr exact i64 %diff, 4
 %cast = and i64 %ptrdiff, 4294967295
 %ptr = getelementptr inbounds i128, ptr %baseptr, i64 %cast
 %res = load i128, ptr %ptr
```

```
 ret i128 %res
}

define signext i32 @srliw_2_sh2add(ptr %0, i32 signext %1) {
; RV64I-LABEL: srliw_2_sh2add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a1, a1, 2
; RV64I-NEXT:    slli a1, a1, 2
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srliw_2_sh2add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srliw a1, a1, 2
; RV64ZBA-NEXT:    sh2add a0, a1, a0
; RV64ZBA-NEXT:    lw a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i32 %1, 2
 %4 = zext i32 %3 to i64
 %5 = getelementptr inbounds i32, ptr %0, i64 %4
 %6 = load i32, ptr %5, align 4
 ret i32 %6
}

define i64 @srliw_3_sh3add(ptr
 %0, i32 signext %1) {
; RV64I-LABEL: srliw_3_sh3add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a1, a1, 3
; RV64I-NEXT:    slli a1, a1, 3
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ld a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srliw_3_sh3add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srliw a1, a1, 3
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    ld a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i32 %1, 3
 %4 = zext i32 %3 to i64
 %5 = getelementptr inbounds i64, ptr %0, i64 %4
 %6 = load i64, ptr %5, align 8
 ret i64 %6
}
```

```
define signext i32 @srliw_1_sh2add(ptr %0, i32 signext %1) {
; RV64I-LABEL: srliw_1_sh2add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a1, a1, 1
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    srli a1, a1, 30
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srliw_1_sh2add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srliw a1, a1, 1
; RV64ZBA-NEXT:    sh2add a0, a1, a0
;
 RV64ZBA-NEXT:    lw a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i32 %1, 1
 %4 = zext i32 %3 to i64
 %5 = getelementptr inbounds i32, ptr %0, i64 %4
 %6 = load i32, ptr %5, align 4
 ret i32 %6
}

define i64 @srliw_1_sh3add(ptr %0, i32 signext %1) {
; RV64I-LABEL: srliw_1_sh3add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a1, a1, 1
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    srli a1, a1, 29
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ld a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srliw_1_sh3add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srliw a1, a1, 1
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    ld a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i32 %1, 1
 %4 = zext i32 %3 to i64
 %5 = getelementptr inbounds i64, ptr %0, i64 %4
 %6 = load i64, ptr %5, align 8
 ret i64 %6
}

define i64 @srliw_2_sh3add(ptr %0, i32 signext %1) {
```

```
; RV64I-LABEL: srliw_2_sh3add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a1, a1, 2
; RV64I-NEXT:    slli a1, a1, 32
;
 RV64I-NEXT:    srli a1, a1, 29
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ld a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srliw_2_sh3add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srliw a1, a1, 2
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    ld a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i32 %1, 2
 %4 = zext i32 %3 to i64
 %5 = getelementptr inbounds i64, ptr %0, i64 %4
 %6 = load i64, ptr %5, align 8
 ret i64 %6
}

define signext i16 @srliw_2_sh1add(ptr %0, i32 signext %1) {
; RV64I-LABEL: srliw_2_sh1add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a1, a1, 2
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    srli a1, a1, 31
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lh a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srliw_2_sh1add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srliw a1, a1, 2
; RV64ZBA-NEXT:    sh1add a0, a1, a0
; RV64ZBA-NEXT:    lh a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i32 %1, 2
 %4 = zext i32 %3 to i64
 %5 = getelementptr
 inbounds i16, ptr %0, i64 %4
 %6 = load i16, ptr %5, align 2
 ret i16 %6
}
```

```
define signext i32 @srliw_3_sh2add(ptr %0, i32 signext %1) {
; RV64I-LABEL: srliw_3_sh2add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a1, a1, 3
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    srli a1, a1, 30
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srliw_3_sh2add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srliw a1, a1, 3
; RV64ZBA-NEXT:    sh2add a0, a1, a0
; RV64ZBA-NEXT:    lw a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i32 %1, 3
 %4 = zext i32 %3 to i64
 %5 = getelementptr inbounds i32, ptr %0, i64 %4
 %6 = load i32, ptr %5, align 4
 ret i32 %6
}

define i64 @srliw_4_sh3add(ptr %0, i32 signext %1) {
; RV64I-LABEL: srliw_4_sh3add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a1, a1, 4
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    srli a1, a1, 29
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ld a0, 0(a0)
; RV64I-NEXT:
    ret
;
; RV64ZBA-LABEL: srliw_4_sh3add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srliw a1, a1, 4
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    ld a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i32 %1, 4
 %4 = zext i32 %3 to i64
 %5 = getelementptr inbounds i64, ptr %0, i64 %4
 %6 = load i64, ptr %5, align 8
 ret i64 %6
}

define signext i32 @srli_1_sh2add(ptr %0, i64 %1) {
```

```
; RV64I-LABEL: srli_1_sh2add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a1, a1, 1
; RV64I-NEXT:    andi a1, a1, -4
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srli_1_sh2add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srli a1, a1, 1
; RV64ZBA-NEXT:    sh2add a0, a1, a0
; RV64ZBA-NEXT:    lw a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i64 %1, 1
 %4 = getelementptr inbounds i32, ptr %0, i64 %3
 %5 = load i32, ptr %4, align 4
 ret i32 %5
}

define i64 @srli_2_sh3add(ptr %0, i64 %1) {
; RV64I-LABEL: srli_2_sh3add:
; RV64I:       # %bb.0:
;
 RV64I-NEXT:    slli a1, a1, 1
; RV64I-NEXT:    andi a1, a1, -8
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ld a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srli_2_sh3add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srli a1, a1, 2
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    ld a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i64 %1, 2
 %4 = getelementptr inbounds i64, ptr %0, i64 %3
 %5 = load i64, ptr %4, align 8
 ret i64 %5
}

define signext i16 @srli_2_sh1add(ptr %0, i64 %1) {
; RV64I-LABEL: srli_2_sh1add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srli a1, a1, 1
; RV64I-NEXT:    andi a1, a1, -2
; RV64I-NEXT:    add a0, a0, a1
```

```
; RV64I-NEXT:    lh a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srli_2_sh1add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srli a1, a1, 2
; RV64ZBA-NEXT:    sh1add a0, a1, a0
; RV64ZBA-NEXT:    lh a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i64 %1, 2
 %4 = getelementptr inbounds i16, ptr %0, i64 %3
 %5 = load i16, ptr %4, align
 2
 ret i16 %5
}

define signext i32 @srli_3_sh2add(ptr %0, i64 %1) {
; RV64I-LABEL: srli_3_sh2add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srli a1, a1, 1
; RV64I-NEXT:    andi a1, a1, -4
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srli_3_sh2add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srli a1, a1, 3
; RV64ZBA-NEXT:    sh2add a0, a1, a0
; RV64ZBA-NEXT:    lw a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i64 %1, 3
 %4 = getelementptr inbounds i32, ptr %0, i64 %3
 %5 = load i32, ptr %4, align 4
 ret i32 %5
}

define i64 @srli_4_sh3add(ptr %0, i64 %1) {
; RV64I-LABEL: srli_4_sh3add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srli a1, a1, 1
; RV64I-NEXT:    andi a1, a1, -8
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ld a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srli_4_sh3add:
; RV64ZBA:       # %bb.0:
```

```
; RV64ZBA-NEXT:    srli a1, a1, 4
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    ld a0, 0(a0)
; RV64ZBA-NEXT:
   ret
 %3 = lshr i64 %1, 4
 %4 = getelementptr inbounds i64, ptr %0, i64 %3
 %5 = load i64, ptr %4, align 8
 ret i64 %5
}

define signext i16 @shl_2_sh1add(ptr %0, i32 signext %1) {
; RV64I-LABEL: shl_2_sh1add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a1, a1, 2
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    srli a1, a1, 31
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lh a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: shl_2_sh1add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli a1, a1, 2
; RV64ZBA-NEXT:    zext.w a1, a1
; RV64ZBA-NEXT:    sh1add a0, a1, a0
; RV64ZBA-NEXT:    lh a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = shl i32 %1, 2
 %4 = zext i32 %3 to i64
 %5 = getelementptr inbounds i16, ptr %0, i64 %4
 %6 = load i16, ptr %5, align 2
 ret i16 %6
}

define signext i32 @shl_16_sh2add(ptr %0, i32 signext %1) {
; RV64I-LABEL: shl_16_sh2add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a1, a1, 16
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    srli a1, a1, 30
;
 RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: shl_16_sh2add:
; RV64ZBA:       # %bb.0:
```

```
; RV64ZBA-NEXT:    slli a1, a1, 16
; RV64ZBA-NEXT:    zext.w a1, a1
; RV64ZBA-NEXT:    sh2add a0, a1, a0
; RV64ZBA-NEXT:    lw a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = shl i32 %1, 16
 %4 = zext i32 %3 to i64
 %5 = getelementptr inbounds i32, ptr %0, i64 %4
 %6 = load i32, ptr %5, align 4
 ret i32 %6
}

define i64 @shl_31_sh3add(ptr %0, i32 signext %1) {
; RV64I-LABEL: shl_31_sh3add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a1, a1, 31
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    srli a1, a1, 29
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ld a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: shl_31_sh3add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli a1, a1, 31
; RV64ZBA-NEXT:    zext.w a1, a1
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    ld a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = shl i32 %1, 31
 %4 = zext i32 %3
 to i64
 %5 = getelementptr inbounds i64, ptr %0, i64 %4
 %6 = load i64, ptr %5, align 8
 ret i64 %6
}

define i64 @pack_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: pack_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: pack_i64:
; RV64ZBA:       # %bb.0:
```

```
; RV64ZBA-NEXT:    slli a1, a1, 32
; RV64ZBA-NEXT:    add.uw a0, a0, a1
; RV64ZBA-NEXT:    ret
 %shl = and i64 %a, 4294967295
 %shl1 = shl i64 %b, 32
 %or = or i64 %shl1, %shl
 ret i64 %or
}

define i64 @pack_i64_2(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: pack_i64_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: pack_i64_2:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli a1, a1, 32
; RV64ZBA-NEXT:    add.uw a0, a0,
 a1
; RV64ZBA-NEXT:    ret
 %zexta = zext i32 %a to i64
 %zextb = zext i32 %b to i64
 %shl1 = shl i64 %zextb, 32
 %or = or i64 %shl1, %zexta
 ret i64 %or
}

define i64 @pack_i64_3(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: pack_i64_3:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi a0, a0, 1
; RV64I-NEXT:    addi a1, a1, 1
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: pack_i64_3:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    addi a0, a0, 1
; RV64ZBA-NEXT:    addi a1, a1, 1
; RV64ZBA-NEXT:    slli a1, a1, 32
; RV64ZBA-NEXT:    add.uw a0, a0, a1
```

```
; RV64ZBA-NEXT:    ret
 %adda = add i32 %a, 1
 %addb = add i32 %b, 1
 %zexta = zext i32 %adda to i64
 %zextb = zext i32 %addb to i64
 %shl1 = shl i64 %zextb, 32
 %or = or i64 %shl1, %zexta
 ret i64 %or
}
```

==========

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```
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -mattr=+zbb -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefix=RV64ZBB

declare i32 @llvm.riscv.orc.b.i32(i32)

define signext i32 @orcb32(i32 signext %a) nounwind {
```

```
; RV64ZBB-LABEL: orcb32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    orc.b a0, a0
; RV64ZBB-NEXT:    sext.w a0, a0
; RV64ZBB-NEXT:    ret
 %tmp = call i32 @llvm.riscv.orc.b.i32(i32 %a)
 ret i32 %tmp
}

define zeroext i32 @orcb32_zext(i32 zeroext %a) nounwind {
; RV64ZBB-LABEL: orcb32_zext:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    orc.b a0, a0
; RV64ZBB-NEXT:    ret
 %tmp = call i32 @llvm.riscv.orc.b.i32(i32 %a)
 ret i32 %tmp
}

; Second and+or is redundant with the first, make sure we remove them.
define signext i32 @orcb32_knownbits(i32 signext %a) nounwind {
; RV64ZBB-LABEL: orcb32_knownbits:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    lui a1, 1044480
; RV64ZBB-NEXT:
    and a0, a0, a1
; RV64ZBB-NEXT:    lui a1, 2048
; RV64ZBB-NEXT:    addi a1, a1, 1
; RV64ZBB-NEXT:    or a0, a0, a1
; RV64ZBB-NEXT:    orc.b a0, a0
; RV64ZBB-NEXT:    sext.w a0, a0
; RV64ZBB-NEXT:    ret
 %tmp = and i32 %a, 4278190080 ; 0xFF000000
 %tmp2 = or i32 %tmp, 8388609 ; 0x800001
 %tmp3 = call i32 @llvm.riscv.orc.b.i32(i32 %tmp2)
 %tmp4 = and i32 %tmp3, 4278190080 ; 0xFF000000
 %tmp5 = or i32 %tmp4, 16711935 ; 0xFF00FF
 ret i32 %tmp5
}

declare i64 @llvm.riscv.orc.b.i64(i64)

define i64 @orcb64(i64 %a) nounwind {
; RV64ZBB-LABEL: orcb64:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    orc.b a0, a0
; RV64ZBB-NEXT:    ret
 %tmp = call i64 @llvm.riscv.orc.b.i64(i64 %a)
 ret i64 %tmp
```

```
}

; Second and+or is redundant with the first, make sure we remove them.
define i64 @orcb64_knownbits(i64 %a) nounwind {
; RV64ZBB-LABEL: orcb64_knownbits:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    lui a1, 65535
; RV64ZBB-NEXT:    slli a1, a1, 12
; RV64ZBB-NEXT:    and a0, a0, a1
;
 RV64ZBB-NEXT:    lui a1, 256
; RV64ZBB-NEXT:    addiw a1, a1, 8
; RV64ZBB-NEXT:    slli a2, a1, 42
; RV64ZBB-NEXT:    add a1, a1, a2
; RV64ZBB-NEXT:    or a0, a0, a1
; RV64ZBB-NEXT:    orc.b a0, a0
; RV64ZBB-NEXT:    ret
 %tmp = and i64 %a, 1099494850560 ; 0x000000ffff000000
 %tmp2 = or i64 %tmp, 4611721202800525320 ; 0x4000200000100008
 %tmp3 = call i64 @llvm.riscv.orc.b.i64(i64 %tmp2)
 %tmp4 = and i64 %tmp3, 1099494850560 ; 0x000000ffff000000
 %tmp5 = or i64 %tmp4, 18374966855153418495 ; 0xff00ff0000ff00ff
 ret i64 %tmp5
}
```

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```
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -mattr=+zbc -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefix=RV64ZBC
```

```
declare i64 @llvm.riscv.clmulr.i64(i64 %a, i64 %b)

define i64 @clmul64r(i64 %a, i64 %b) nounwind {
; RV64ZBC-LABEL: clmul64r:
; RV64ZBC:       # %bb.0:
; RV64ZBC-NEXT:    clmulr a0, a0, a1
; RV64ZBC-NEXT:    ret
 %tmp = call i64 @llvm.riscv.clmulr.i64(i64 %a, i64 %b)
 ret i64 %tmp
}

declare i32 @llvm.riscv.clmulr.i32(i32 %a, i32 %b)

define signext i32 @clmul32r(i32 signext %a, i32 signext %b) nounwind {
; RV64ZBC-LABEL: clmul32r:
; RV64ZBC:       # %bb.0:
; RV64ZBC-NEXT:    slli a1, a1, 32
; RV64ZBC-NEXT:    slli a0, a0, 32
; RV64ZBC-NEXT:    clmulr a0, a0, a1
; RV64ZBC-NEXT:    srai a0, a0, 32
; RV64ZBC-NEXT:    ret
 %tmp = call i32 @llvm.riscv.clmulr.i32(i32 %a, i32 %b)
 ret i32 %tmp
}

; FIXME: We could avoid the slli instructions by using clmul+srli+sext.w
 since
; the inputs are zero extended.
define signext i32 @clmul32r_zext(i32 zeroext %a, i32 zeroext %b) nounwind {
; RV64ZBC-LABEL: clmul32r_zext:
; RV64ZBC:       # %bb.0:
; RV64ZBC-NEXT:    slli a1, a1, 32
; RV64ZBC-NEXT:    slli a0, a0, 32
; RV64ZBC-NEXT:    clmulr a0, a0, a1
; RV64ZBC-NEXT:    srai a0, a0, 32
; RV64ZBC-NEXT:    ret
 %tmp = call i32 @llvm.riscv.clmulr.i32(i32 %a, i32 %b)
 ret i32 %tmp
}
; RUN: opt %s -passes=inline -S | FileCheck %s

define internal void @innerSmall() "min-legal-vector-width"="128" {
 ret void
}

define internal void @innerLarge() "min-legal-vector-width"="512" {
 ret void
```

```
}

define internal void @innerNoAttribute() {
 ret void
}

; We should not add an attribute during inlining. No attribute means unknown.
; Inlining doesn't change the fact that we don't know anything about this
; function.
define void @outerNoAttribute() {
 call void @innerLarge()
 ret void
}

define void @outerConflictingAttributeSmall() "min-legal-vector-width"="128" {
 call void @innerLarge()
 ret void
}

define void @outerConflictingAttributeLarge() "min-legal-vector-width"="512" {
 call void @innerSmall()
 ret void
}

; We should remove the attribute after inlining since the callee's
; vector width requirements are unknown.
define void @outerAttribute() "min-legal-vector-width"="128" {
 call void @innerNoAttribute()
 ret void
}

; CHECK: define void @outerNoAttribute()
 {
; CHECK: define void @outerConflictingAttributeSmall() #0
; CHECK: define void @outerConflictingAttributeLarge() #0
; CHECK: define void @outerAttribute() {
; CHECK: attributes #0 = { "min-legal-vector-width"="512" }
; RUN: opt -mtriple=aarch64-linux-gnu -mattr=+sve -passes=scalarize-masked-mem-intrin -S < %s | FileCheck %s

; Testing that masked scatters operating on scalable vectors that are
; packed in SVE registers are not scalarized.

; CHECK-LABEL: @masked_scatter_nxv4i32(
; CHECK: call void @llvm.masked.scatter.nxv4i32
define void @masked_scatter_nxv4i32(<vscale x 4 x i32> %data, <vscale x 4 x ptr> %ptrs, <vscale x 4 x i1>
%masks) {
 call void @llvm.masked.scatter.nxv4i32(<vscale x 4 x i32> %data, <vscale x 4 x ptr> %ptrs, i32 0, <vscale x 4 x
i1> %masks)
```

```
 ret void
}

; Testing that masked scatters operating on scalable vectors of FP
; data that is packed in SVE registers are not scalarized.

; CHECK-LABEL: @masked_scatter_nxv2f64(
; CHECK: call void @llvm.masked.scatter.nxv2f64
define void @masked_scatter_nxv2f64(<vscale x 2 x double> %data, <vscale x 2 x ptr> %ptrs, <vscale x 2 x i1>
%masks) {
 call void @llvm.masked.scatter.nxv2f64(<vscale x 2 x double> %data, <vscale x 2 x ptr> %ptrs,
 i32 0, <vscale x 2 x i1> %masks)
 ret void
}

; Testing that masked scatters operating on scalable vectors of FP
; data that is unpacked in SVE registers are not scalarized.

; CHECK-LABEL: @masked_scatter_nxv2f16(
; CHECK: call void @llvm.masked.scatter.nxv2f16
define void @masked_scatter_nxv2f16(<vscale x 2 x half> %data, <vscale x 2 x ptr> %ptrs, <vscale x 2 x i1>
%masks) {
 call void @llvm.masked.scatter.nxv2f16(<vscale x 2 x half> %data, <vscale x 2 x ptr> %ptrs, i32 0, <vscale x 2 x
i1> %masks)
 ret void
}

; Testing that masked scatters operating on 64-bit fixed vectors are
; scalarized because NEON doesn't have support for masked scatter
; instructions.

; CHECK-LABEL: @masked_scatter_v2f32(
; CHECK-NOT: @llvm.masked.scatter.v2f32(
define void @masked_scatter_v2f32(<2 x float> %data, <2 x ptr> %ptrs, <2 x i1> %masks) {
 call void @llvm.masked.scatter.v2f32(<2 x float> %data, <2 x ptr> %ptrs, i32 0, <2 x i1> %masks)
 ret void
}

; Testing that masked scatters operating on 128-bit
 fixed vectors are
; scalarized because NEON doesn't have support for masked scatter
; instructions and because we are not targeting fixed width SVE.

; CHECK-LABEL: @masked_scatter_v4i32(
; CHECK-NOT: @llvm.masked.scatter.v4i32(
define void @masked_scatter_v4i32(<4 x i32> %data, <4 x ptr> %ptrs, <4 x i1> %masks) {
 call void @llvm.masked.scatter.v4i32(<4 x i32> %data, <4 x ptr> %ptrs, i32 0, <4 x i1> %masks)
 ret void
```

```
}

declare void @llvm.masked.scatter.nxv4i32(<vscale x 4 x i32> %data, <vscale x 4 x ptr> %ptrs, i32 %align,
<vscale x 4 x i1> %masks)
declare void @llvm.masked.scatter.nxv2f64(<vscale x 2 x double> %data, <vscale x 2 x ptr> %ptrs, i32 %align,
<vscale x 2 x i1> %masks)
declare void @llvm.masked.scatter.nxv2f16(<vscale x 2 x half> %data, <vscale x 2 x ptr> %ptrs, i32 %align,
<vscale x 2 x i1> %masks)
declare void @llvm.masked.scatter.v2f32(<2 x float> %data, <2 x ptr> %ptrs, i32 %align, <2 x i1> %masks)
declare void @llvm.masked.scatter.v4i32(<4 x i32> %data, <4 x
 ptr> %ptrs, i32 %align, <4 x i1> %masks)
//===-- ObjectContainerBSDArchive.h ----------------------------*- C++ -*-===//
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//
//===----------------------------------------------------------------------===//

#ifndef
LLDB_SOURCE_PLUGINS_OBJECTCONTAINER_BSD_ARCHIVE_OBJECTCONTAINERBSDARCHIVE_H
#define
LLDB_SOURCE_PLUGINS_OBJECTCONTAINER_BSD_ARCHIVE_OBJECTCONTAINERBSDARCHIVE_H

#include "lldb/Core/UniqueCStringMap.h"
#include "lldb/Symbol/ObjectContainer.h"
#include "lldb/Utility/ArchSpec.h"
#include "lldb/Utility/ConstString.h"
#include "lldb/Utility/FileSpec.h"

#include "llvm/Object/Archive.h"
#include "llvm/Support/Chrono.h"
#include "llvm/Support/Path.h"

#include <map>
#include <memory>
#include <mutex>

enum class ArchiveType { Invalid, Archive, ThinArchive };

class ObjectContainerBSDArchive : public lldb_private::ObjectContainer
 {
public:
 ObjectContainerBSDArchive(const lldb::ModuleSP &module_sp,
                           lldb::DataBufferSP &data_sp,
                           lldb::offset_t data_offset,
                           const lldb_private::FileSpec *file,
                           lldb::offset_t offset, lldb::offset_t length,
```

```
                    ArchiveType archive_type);

~ObjectContainerBSDArchive() override;

// Static Functions
static void Initialize();

static void Terminate();

static llvm::StringRef GetPluginNameStatic() { return "bsd-archive"; }

static llvm::StringRef GetPluginDescriptionStatic() {
  return "BSD Archive object container reader.";
}

static lldb_private::ObjectContainer *
CreateInstance(const lldb::ModuleSP &module_sp, lldb::DataBufferSP &data_sp,
             lldb::offset_t data_offset, const lldb_private::FileSpec *file,
             lldb::offset_t offset, lldb::offset_t length);

static size_t GetModuleSpecifications(const
lldb_private::FileSpec &file,
                              lldb::DataBufferSP &data_sp,
                              lldb::offset_t data_offset,
                              lldb::offset_t file_offset,
                              lldb::offset_t length,
                              lldb_private::ModuleSpecList &specs);

static ArchiveType MagicBytesMatch(const lldb_private::DataExtractor &data);

// Member Functions
bool ParseHeader() override;

size_t GetNumObjects() const override {
  if (m_archive_sp)
    return m_archive_sp->GetNumObjects();
  return 0;
}

lldb::ObjectFileSP GetObjectFile(const lldb_private::FileSpec *file) override;

// PluginInterface protocol
llvm::StringRef GetPluginName() override { return GetPluginNameStatic(); }

protected:
 struct Object {
   Object();
```

```
  void Clear();

  lldb::offset_t ExtractFromThin(const lldb_private::DataExtractor &data,

      lldb::offset_t offset,
                          llvm::StringRef stringTable);

  lldb::offset_t Extract(const lldb_private::DataExtractor &data,
                     lldb::offset_t offset);
  /// Object name in the archive.
  lldb_private::ConstString ar_name;

  /// Object modification time in the archive.
  uint32_t modification_time = 0;

  /// Object size in bytes in the archive.
  uint32_t size = 0;

  /// File offset in bytes from the beginning of the file of the object data.
  lldb::offset_t file_offset = 0;

  /// Length of the object data.
  lldb::offset_t file_size = 0;

  void Dump() const;
};

class Archive {
public:
  typedef std::shared_ptr<Archive> shared_ptr;
  typedef std::multimap<lldb_private::FileSpec, shared_ptr> Map;

  Archive(const lldb_private::ArchSpec &arch,
          const llvm::sys::TimePoint<> &mod_time, lldb::offset_t file_offset,
          lldb_private::DataExtractor &data, ArchiveType archive_type);

   ~Archive();

  static Map &GetArchiveCache();

  static std::recursive_mutex &GetArchiveCacheMutex();

  static Archive::shared_ptr FindCachedArchive(
      const lldb_private::FileSpec &file, const lldb_private::ArchSpec &arch,
      const llvm::sys::TimePoint<> &mod_time, lldb::offset_t file_offset);

  static Archive::shared_ptr ParseAndCacheArchiveForFile(
      const lldb_private::FileSpec &file, const lldb_private::ArchSpec &arch,
```

```
    const llvm::sys::TimePoint<> &mod_time, lldb::offset_t file_offset,
    lldb_private::DataExtractor &data, ArchiveType archive_type);

  size_t GetNumObjects() const { return m_objects.size(); }

  const Object *GetObjectAtIndex(size_t idx) {
    if (idx < m_objects.size())
      return &m_objects[idx];
    return nullptr;
  }

  size_t ParseObjects();

  Object *FindObject(lldb_private::ConstString object_name,
                     const llvm::sys::TimePoint<> &object_mod_time);

  lldb::offset_t
GetFileOffset() const { return m_file_offset; }

  const llvm::sys::TimePoint<> &GetModificationTime() {
    return m_modification_time;
  }

  const lldb_private::ArchSpec &GetArchitecture() const { return m_arch; }

  void SetArchitecture(const lldb_private::ArchSpec &arch) { m_arch = arch; }

  bool HasNoExternalReferences() const;

  lldb_private::DataExtractor &GetData() { return m_data; }

  ArchiveType GetArchiveType() { return m_archive_type; }

protected:
  typedef lldb_private::UniqueCStringMap<uint32_t> ObjectNameToIndexMap;
  // Member Variables
  lldb_private::ArchSpec m_arch;
  llvm::sys::TimePoint<> m_modification_time;
  lldb::offset_t m_file_offset;
  std::vector<Object> m_objects;
  ObjectNameToIndexMap m_object_name_to_index_map;
  lldb_private::DataExtractor m_data; ///< The data for this object container
                                      ///so we don't lose data if the .a files
                                      ///gets
modified
  ArchiveType m_archive_type;
};
```

```
 void SetArchive(Archive::shared_ptr &archive_sp);

 Archive::shared_ptr m_archive_sp;

 ArchiveType m_archive_type;
};

#endif //
LLDB_SOURCE_PLUGINS_OBJECTCONTAINER_BSD_ARCHIVE_OBJECTCONTAINERBSDARCHIVE_H
! RUN: %python %S/../test_errors.py %s %flang -fopenmp -Werror -pedantic
! OpenMP Version 5.0
! 2.19.4.4 firstprivate Clause
! 2.19.4.5 lastprivate Clause
! 2.19.6.1 copyin Clause
! 2.19.6.2 copyprivate Clause
! If the list item is a polymorphic variable with the allocatable attribute,
! the behavior is unspecified.

subroutine firstprivate()
 class(*), allocatable, save :: x

 !PORTABILITY: If a polymorphic variable with allocatable attribute 'x' is in FIRSTPRIVATE clause, the behavior
is unspecified
 !$omp parallel firstprivate(x)
   call sub()
 !$omp end parallel

end

subroutine lastprivate()
 class(*), allocatable, save :: x

 !PORTABILITY: If a polymorphic variable with allocatable attribute 'x' is in LASTPRIVATE clause, the behavior
is unspecified
 !$omp do lastprivate(x)
 do i = 1, 10
   call sub()
 enddo
 !$omp end do

end

subroutine copyin()
 class(*), allocatable, save :: x
 !$omp threadprivate(x)

 !PORTABILITY: If a polymorphic variable with allocatable attribute
```

```
 'x' is in COPYIN clause, the behavior is unspecified
 !$omp parallel copyin(x)
   call sub()
 !$omp end parallel

end

subroutine copyprivate()
 class(*), allocatable, save :: x
 !$omp threadprivate(x)

 !$omp single
   call sub()
 !PORTABILITY: If a polymorphic variable with allocatable attribute 'x' is in COPYPRIVATE clause, the behavior
is unspecified
 !$omp end single copyprivate(x)

end
```

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```
static_library("BSD-Archive") {
 output_name = "lldbPluginObjectContainerBSDArchive"
 configs += [ "//llvm/utils/gn/build:lldb_code" ]
 deps = [
   "//lldb/source/Core",
   "//lldb/source/Host",
   "//lldb/source/Symbol",
   "//llvm/lib/Support",
 ]
 sources = [ "ObjectContainerBSDArchive.cpp" ]
}
; RUN: opt -mtriple=aarch64-linux-gnu -mattr=+sve -passes=scalarize-masked-mem-intrin -S < %s | FileCheck %s

; Testing that masked gathers operating on scalable vectors that are
; packed in SVE registers are not scalarized.

; CHECK-LABEL: @masked_gather_nxv4i32(
; CHECK: call <vscale x 4 x i32> @llvm.masked.gather.nxv4i32
define <vscale x 4 x i32> @masked_gather_nxv4i32(<vscale x 4 x ptr> %ld, <vscale x 4 x i1> %masks, <vscale x 4
x i32> %passthru) {
 %res = call <vscale x 4 x i32> @llvm.masked.gather.nxv4i32(<vscale x 4 x ptr> %ld, i32 0, <vscale x 4 x i1>
%masks, <vscale x 4 x i32> %passthru)
 ret <vscale x 4 x i32> %res
}

; Testing that masked gathers operating on scalable vectors of FP data
; that is packed in SVE registers are not scalarized.

; CHECK-LABEL: @masked_gather_nxv2f64(
; CHECK: call <vscale x 2 x double> @llvm.masked.gather.nxv2f64
define <vscale x 2 x double> @masked_gather_nxv2f64(<vscale x 2 x ptr> %ld, <vscale x 2 x i1> %masks, <vscale
x 2 x double> %passthru)
 {
 %res = call <vscale x 2 x double> @llvm.masked.gather.nxv2f64(<vscale x 2 x ptr> %ld, i32 0, <vscale x 2 x i1>
%masks, <vscale x 2 x double> %passthru)
 ret <vscale x 2 x double> %res
}

; Testing that masked gathers operating on scalable vectors of FP data
; that is unpacked in SVE registers are not scalarized.
```

```
; CHECK-LABEL: @masked_gather_nxv2f16(
; CHECK: call <vscale x 2 x half> @llvm.masked.gather.nxv2f16
define <vscale x 2 x half> @masked_gather_nxv2f16(<vscale x 2 x ptr> %ld, <vscale x 2 x i1> %masks, <vscale x
2 x half> %passthru) {
 %res = call <vscale x 2 x half> @llvm.masked.gather.nxv2f16(<vscale x 2 x ptr> %ld, i32 0, <vscale x 2 x i1>
%masks, <vscale x 2 x half> %passthru)
 ret <vscale x 2 x half> %res
}

; Testing that masked gathers operating on 64-bit fixed vectors are
; scalarized because NEON doesn't have support for masked gather
; instructions.

; CHECK-LABEL: @masked_gather_v2f32(
; CHECK-NOT: @llvm.masked.gather.v2f32(
define <2 x float> @masked_gather_v2f32(<2
 x ptr> %ld, <2 x i1> %masks, <2 x float> %passthru) {
 %res = call <2 x float> @llvm.masked.gather.v2f32(<2 x ptr> %ld, i32 0, <2 x i1> %masks, <2 x float> %passthru)
 ret <2 x float> %res
}

; Testing that masked gathers operating on 128-bit fixed vectors are
; scalarized because NEON doesn't have support for masked gather
; instructions and because we are not targeting fixed width SVE.

; CHECK-LABEL: @masked_gather_v4i32(
; CHECK-NOT: @llvm.masked.gather.v4i32(
define <4 x i32> @masked_gather_v4i32(<4 x ptr> %ld, <4 x i1> %masks, <4 x i32> %passthru) {
 %res = call <4 x i32> @llvm.masked.gather.v4i32(<4 x ptr> %ld, i32 0, <4 x i1> %masks, <4 x i32> %passthru)
 ret <4 x i32> %res
}

declare <vscale x 4 x i32> @llvm.masked.gather.nxv4i32(<vscale x 4 x ptr> %ptrs, i32 %align, <vscale x 4 x i1>
%masks, <vscale x 4 x i32> %passthru)
declare <vscale x 2 x double> @llvm.masked.gather.nxv2f64(<vscale x 2 x ptr> %ptrs, i32 %align, <vscale x 2 x
i1> %masks, <vscale x 2 x double>
 %passthru)
declare <vscale x 2 x half> @llvm.masked.gather.nxv2f16(<vscale x 2 x ptr> %ptrs, i32 %align, <vscale x 2 x i1>
%masks, <vscale x 2 x half> %passthru)
declare <2 x float> @llvm.masked.gather.v2f32(<2 x ptr> %ptrs, i32 %align, <2 x i1> %masks, <2 x float>
%passthru)
declare <4 x i32> @llvm.masked.gather.v4i32(<4 x ptr> %ptrs, i32 %align, <4 x i1> %masks, <4 x i32> %passthru)
# RUN: llc -O0 -mtriple=m68k -start-after=prologepilog -verify-machineinstrs %s -o - | FileCheck %s

name: is-pcrel-register-operand-legal
body:             |
 bb.0.entry:
   ; CHECK: move.l  (0,%pc,%a0), (%a1)
```

; CHECK: move.l (%a0), (0,%pc,%a1)

MOV32jk $a1, 0, $a0, implicit-def $ccr
MOV32kj 0, $a1, $a0, implicit-def $ccr

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```
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc < %s -mtriple=x86_64-linux-android -mattr=+mmx -enable-legalize-types-checking | FileCheck %s
;
; D31946
; Check that we dont end up with the ""LLVM ERROR: Cannot select" error.
; Additionally ensure that the output code actually put fp128 values in SSE registers.

declare fp128 @llvm.fabs.f128(fp128)
declare fp128 @llvm.copysign.f128(fp128, fp128)

define fp128 @TestSelect(fp128 %a, fp128 %b) {
; CHECK-LABEL: TestSelect:
; CHECK:       # %bb.0:
; CHECK-NEXT:    pushq %rbx
; CHECK-NEXT:    .cfi_def_cfa_offset 16
; CHECK-NEXT:    subq $32, %rsp
; CHECK-NEXT:    .cfi_def_cfa_offset 48
; CHECK-NEXT:    .cfi_offset %rbx, -16
; CHECK-NEXT:    movaps %xmm1, {{[-0-9]+}}(%r{{[sb]}}p) # 16-byte Spill
; CHECK-NEXT:    movaps %xmm0, (%rsp) # 16-byte Spill
; CHECK-NEXT:    callq __gttf2@PLT
; CHECK-NEXT:    movl %eax, %ebx
; CHECK-NEXT:    movaps (%rsp), %xmm0 # 16-byte Reload
; CHECK-NEXT:    movaps {{[-0-9]+}}(%r{{[sb]}}p),
 %xmm1 # 16-byte Reload
; CHECK-NEXT:    callq __subtf3@PLT
; CHECK-NEXT:    testl %ebx, %ebx
; CHECK-NEXT:    jg .LBB0_2
; CHECK-NEXT:  # %bb.1:
```

```
; CHECK-NEXT:    xorps %xmm0, %xmm0
; CHECK-NEXT:  .LBB0_2:
; CHECK-NEXT:    addq $32, %rsp
; CHECK-NEXT:    .cfi_def_cfa_offset 16
; CHECK-NEXT:    popq %rbx
; CHECK-NEXT:    .cfi_def_cfa_offset 8
; CHECK-NEXT:    retq
 %cmp = fcmp ogt fp128 %a, %b
 %sub = fsub fp128 %a, %b
 %res = select i1 %cmp, fp128 %sub, fp128 0xL00000000000000000000000000000000
 ret fp128 %res
}

define fp128 @TestFabs(fp128 %a) {
; CHECK-LABEL: TestFabs:
; CHECK:       # %bb.0:
; CHECK-NEXT:    andps {{\.?LCPI[0-9]+_[0-9]+}}(%rip), %xmm0
; CHECK-NEXT:    retq
 %res = call fp128 @llvm.fabs.f128(fp128 %a)
 ret fp128 %res
}

define fp128 @TestCopysign(fp128 %a, fp128 %b) {
; CHECK-LABEL: TestCopysign:
; CHECK:       # %bb.0:
; CHECK-NEXT:    andps {{\.?LCPI[0-9]+_[0-9]+}}(%rip), %xmm1
; CHECK-NEXT:    andps {{\.?LCPI[0-9]+_[0-9]+}}(%rip), %xmm0
; CHECK-NEXT:
    orps %xmm1, %xmm0
; CHECK-NEXT:    retq
 %res = call fp128 @llvm.copysign.f128(fp128 %a, fp128 %b)
 ret fp128 %res
}

define fp128 @TestFneg(fp128 %a) {
; CHECK-LABEL: TestFneg:
; CHECK:       # %bb.0:
; CHECK-NEXT:    pushq %rax
; CHECK-NEXT:    .cfi_def_cfa_offset 16
; CHECK-NEXT:    movaps %xmm0, %xmm1
; CHECK-NEXT:    callq __multf3@PLT
; CHECK-NEXT:    xorps {{\.?LCPI[0-9]+_[0-9]+}}(%rip), %xmm0
; CHECK-NEXT:    popq %rax
; CHECK-NEXT:    .cfi_def_cfa_offset 8
; CHECK-NEXT:    retq
 %mul = fmul fp128 %a, %a
 %res = fsub fp128 0xL00000000000000008000000000000000, %mul
 ret fp128 %res
```

}
---
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```
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; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -mattr=+zbkb -verify-machineinstrs < %s \
; RUN:   | FileCheck %s -check-prefix=RV64ZBKB

declare i64 @llvm.riscv.brev8.i64(i64)

define i64 @brev8(i64 %a) nounwind {
; RV64ZBKB-LABEL: brev8:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    brev8 a0, a0
; RV64ZBKB-NEXT:    ret
 %val = call i64 @llvm.riscv.brev8.i64(i64 %a)
 ret i64 %val
}

; Test that rev8 is recognized as preserving zero extension.
define zeroext i16 @brev8_knownbits(i16 zeroext %a) nounwind {
; RV64ZBKB-LABEL: brev8_knownbits:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    brev8 a0, a0
; RV64ZBKB-NEXT:    ret
 %zext = zext i16 %a to i64
 %val = call i64 @llvm.riscv.brev8.i64(i64 %zext)
 %trunc = trunc i64 %val to i16
 ret i16 %trunc
}

declare i64 @llvm.bswap.i64(i64)

define i64 @rev8_i64(i64 %a) {
; RV64ZBKB-LABEL: rev8_i64:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    rev8 a0, a0
; RV64ZBKB-NEXT:    ret
  %1 = call i64 @llvm.bswap.i64(i64 %a)
 ret i64 %1
}

declare i32 @llvm.riscv.brev8.i32(i32)

define signext i32 @brev8_i32(i32 signext %a) nounwind {
; RV64ZBKB-LABEL: brev8_i32:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    brev8 a0, a0
; RV64ZBKB-NEXT:    sext.w a0, a0
; RV64ZBKB-NEXT:    ret
 %val = call i32 @llvm.riscv.brev8.i32(i32 %a)
```

```
 ret i32 %val
}

; Test that rev8 is recognized as preserving zero extension.
define zeroext i16 @brev8_i32_knownbits(i16 zeroext %a) nounwind {
; RV64ZBKB-LABEL: brev8_i32_knownbits:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    brev8 a0, a0
; RV64ZBKB-NEXT:    ret
 %zext = zext i16 %a to i32
 %val = call i32 @llvm.riscv.brev8.i32(i32 %zext)
 %trunc = trunc i32 %val to i16
 ret i16 %trunc
}

declare i32 @llvm.bswap.i32(i32)

define signext i32 @rev8_i32(i32 signext %a) {
; RV64ZBKB-LABEL: rev8_i32:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    rev8 a0, a0
; RV64ZBKB-NEXT:    srai a0, a0, 32
; RV64ZBKB-NEXT:    ret
 %1 = call i32 @llvm.bswap.i32(i32
 %a)
 ret i32 %1
}
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=amdgcn -mcpu=fiji < %s | FileCheck -check-prefixes=VI %s

; FIXME: This one should fold to rcp
define half @select_fneg_posk_src_rcp_f16(i32 %c, half %x, half %y) {
; VI-LABEL: select_fneg_posk_src_rcp_f16:
; VI:       ; %bb.0:
; VI-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; VI-NEXT:    v_rcp_f16_e64 v1, -v1
; VI-NEXT:    v_mov_b32_e32 v2, 0x4000
; VI-NEXT:    v_cmp_eq_u32_e32 vcc, 0, v0
; VI-NEXT:    v_cndmask_b32_e32 v0, v2, v1, vcc
; VI-NEXT:    s_setpc_b64 s[30:31]
 %cmp = icmp eq i32 %c, 0
 %rcp = call half @llvm.amdgcn.rcp.f16(half %x)
 %fneg = fneg half %rcp
 %select = select i1 %cmp, half %fneg, half 2.0
 ret half %select
}

declare half @llvm.amdgcn.rcp.f16(half) #0
```

```
attributes #0 = { nocallback nofree nosync nounwind speculatable willreturn memory(none) }
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; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefixes=CHECK,RV64I
; RUN: llc -mtriple=riscv64 -mattr=+zbb -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefixes=CHECK,RV64ZBB-ZBKB,RV64ZBB
; RUN: llc -mtriple=riscv64 -mattr=+zbkb -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefixes=CHECK,RV64ZBB-
ZBKB,RV64ZBKB

define signext i32 @andn_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: andn_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    not a1, a1
; RV64I-NEXT:    and a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: andn_i32:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    andn a0, a0, a1
; RV64ZBB-ZBKB-NEXT:    ret
 %neg = xor i32 %b, -1
 %and = and i32 %neg, %a
 ret i32 %and
}

define i64 @andn_i64(i64 %a, i64
 %b) nounwind {
; RV64I-LABEL: andn_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    not a1, a1
; RV64I-NEXT:    and a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: andn_i64:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    andn a0, a0, a1
; RV64ZBB-ZBKB-NEXT:    ret
 %neg = xor i64 %b, -1
 %and = and i64 %neg, %a
 ret i64 %and
}

define signext i32 @orn_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: orn_i32:
; RV64I:       # %bb.0:
```

```
; RV64I-NEXT:    not a1, a1
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: orn_i32:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    orn a0, a0, a1
; RV64ZBB-ZBKB-NEXT:    ret
 %neg = xor i32 %b, -1
 %or = or i32 %neg, %a
 ret i32 %or
}

define i64 @orn_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: orn_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    not a1, a1
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: orn_i64:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:
    orn a0, a0, a1
; RV64ZBB-ZBKB-NEXT:    ret
 %neg = xor i64 %b, -1
 %or = or i64 %neg, %a
 ret i64 %or
}

define signext i32 @xnor_i32(i32 signext %a, i32 signext %b) nounwind {
; CHECK-LABEL: xnor_i32:
; CHECK:       # %bb.0:
; CHECK-NEXT:    xor a0, a0, a1
; CHECK-NEXT:    not a0, a0
; CHECK-NEXT:    ret
 %neg = xor i32 %a, -1
 %xor = xor i32 %neg, %b
 ret i32 %xor
}

define i64 @xnor_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: xnor_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    ret
;
```

```
; RV64ZBB-ZBKB-LABEL: xnor_i64:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    xnor a0, a0, a1
; RV64ZBB-ZBKB-NEXT:    ret
 %neg = xor i64 %a, -1
 %xor = xor i64 %neg, %b
 ret i64 %xor
}

declare i32 @llvm.fshl.i32(i32, i32, i32)

define signext i32 @rol_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: rol_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    andi a2, a1, -1
; RV64I-NEXT:    sllw a1, a0, a1
; RV64I-NEXT:
    negw a2, a2
; RV64I-NEXT:    srlw a0, a0, a2
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: rol_i32:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    rolw a0, a0, a1
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = tail call i32 @llvm.fshl.i32(i32 %a, i32 %a, i32 %b)
 ret i32 %1
}

; Similar to rol_i32, but doesn't sign extend the result.
define void @rol_i32_nosext(i32 signext %a, i32 signext %b, ptr %x) nounwind {
; RV64I-LABEL: rol_i32_nosext:
; RV64I:       # %bb.0:
; RV64I-NEXT:    andi a3, a1, -1
; RV64I-NEXT:    sllw a1, a0, a1
; RV64I-NEXT:    negw a3, a3
; RV64I-NEXT:    srlw a0, a0, a3
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    sw a0, 0(a2)
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: rol_i32_nosext:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    rolw a0, a0, a1
; RV64ZBB-ZBKB-NEXT:    sw a0, 0(a2)
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = tail call i32 @llvm.fshl.i32(i32 %a, i32 %a, i32 %b)
```

```
 store i32 %1, ptr %x
 ret void
}

define signext
 i32 @rol_i32_neg_constant_rhs(i32 signext %a) nounwind {
; RV64I-LABEL: rol_i32_neg_constant_rhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    andi a1, a0, -1
; RV64I-NEXT:    li a2, -2
; RV64I-NEXT:    sllw a0, a2, a0
; RV64I-NEXT:    negw a1, a1
; RV64I-NEXT:    srlw a1, a2, a1
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: rol_i32_neg_constant_rhs:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    li a1, -2
; RV64ZBB-ZBKB-NEXT:    rolw a0, a1, a0
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = tail call i32 @llvm.fshl.i32(i32 -2, i32 -2, i32 %a)
 ret i32 %1
}

declare i64 @llvm.fshl.i64(i64, i64, i64)

define i64 @rol_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: rol_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sll a2, a0, a1
; RV64I-NEXT:    negw a1, a1
; RV64I-NEXT:    srl a0, a0, a1
; RV64I-NEXT:    or a0, a2, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: rol_i64:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    rol a0, a0, a1
; RV64ZBB-ZBKB-NEXT:
  ret
 %or = tail call i64 @llvm.fshl.i64(i64 %a, i64 %a, i64 %b)
 ret i64 %or
}

declare i32 @llvm.fshr.i32(i32, i32, i32)

define signext i32 @ror_i32(i32 signext %a, i32 signext %b) nounwind {
```

```
; RV64I-LABEL: ror_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    andi a2, a1, -1
; RV64I-NEXT:    srlw a1, a0, a1
; RV64I-NEXT:    negw a2, a2
; RV64I-NEXT:    sllw a0, a0, a2
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: ror_i32:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    rorw a0, a0, a1
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = tail call i32 @llvm.fshr.i32(i32 %a, i32 %a, i32 %b)
 ret i32 %1
}

; Similar to ror_i32, but doesn't sign extend the result.
define void @ror_i32_nosext(i32 signext %a, i32 signext %b, ptr %x) nounwind {
; RV64I-LABEL: ror_i32_nosext:
; RV64I:       # %bb.0:
; RV64I-NEXT:    andi a3, a1, -1
; RV64I-NEXT:    srlw a1, a0, a1
; RV64I-NEXT:    negw a3, a3
; RV64I-NEXT:    sllw a0, a0, a3
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:
  sw a0, 0(a2)
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: ror_i32_nosext:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    rorw a0, a0, a1
; RV64ZBB-ZBKB-NEXT:    sw a0, 0(a2)
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = tail call i32 @llvm.fshr.i32(i32 %a, i32 %a, i32 %b)
 store i32 %1, ptr %x
 ret void
}

define signext i32 @ror_i32_neg_constant_rhs(i32 signext %a) nounwind {
; RV64I-LABEL: ror_i32_neg_constant_rhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    andi a1, a0, -1
; RV64I-NEXT:    li a2, -2
; RV64I-NEXT:    srlw a0, a2, a0
; RV64I-NEXT:    negw a1, a1
; RV64I-NEXT:    sllw a1, a2, a1
```

```
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: ror_i32_neg_constant_rhs:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    li a1, -2
; RV64ZBB-ZBKB-NEXT:    rorw a0, a1, a0
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = tail call i32 @llvm.fshr.i32(i32 -2, i32 -2, i32 %a)
 ret i32 %1
}

declare i64 @llvm.fshr.i64(i64, i64, i64)

define i64 @ror_i64(i64 %a, i64 %b) nounwind {
;
 RV64I-LABEL: ror_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srl a2, a0, a1
; RV64I-NEXT:    negw a1, a1
; RV64I-NEXT:    sll a0, a0, a1
; RV64I-NEXT:    or a0, a2, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: ror_i64:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    ror a0, a0, a1
; RV64ZBB-ZBKB-NEXT:    ret
 %or = tail call i64 @llvm.fshr.i64(i64 %a, i64 %a, i64 %b)
 ret i64 %or
}

define signext i32 @rori_i32_fshl(i32 signext %a) nounwind {
; RV64I-LABEL: rori_i32_fshl:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    slliw a0, a0, 31
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: rori_i32_fshl:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    roriw a0, a0, 1
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = tail call i32 @llvm.fshl.i32(i32 %a, i32 %a, i32 31)
 ret i32 %1
}
```

```
; Similar to rori_i32_fshl, but doesn't sign extend the result.
define void @rori_i32_fshl_nosext(i32 signext %a, ptr %x) nounwind {
; RV64I-LABEL: rori_i32_fshl_nosext:
;
 RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a2, a0, 1
; RV64I-NEXT:    slli a0, a0, 31
; RV64I-NEXT:    or a0, a0, a2
; RV64I-NEXT:    sw a0, 0(a1)
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: rori_i32_fshl_nosext:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    roriw a0, a0, 1
; RV64ZBB-ZBKB-NEXT:    sw a0, 0(a1)
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = tail call i32 @llvm.fshl.i32(i32 %a, i32 %a, i32 31)
 store i32 %1, ptr %x
 ret void
}

define signext i32 @rori_i32_fshr(i32 signext %a) nounwind {
; RV64I-LABEL: rori_i32_fshr:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slliw a1, a0, 1
; RV64I-NEXT:    srliw a0, a0, 31
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: rori_i32_fshr:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    roriw a0, a0, 31
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = tail call i32 @llvm.fshr.i32(i32 %a, i32 %a, i32 31)
 ret i32 %1
}

; Similar to rori_i32_fshr, but doesn't sign extend the result.
define void @rori_i32_fshr_nosext(i32
 signext %a, ptr %x) nounwind {
; RV64I-LABEL: rori_i32_fshr_nosext:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a2, a0, 1
; RV64I-NEXT:    srliw a0, a0, 31
; RV64I-NEXT:    or a0, a0, a2
; RV64I-NEXT:    sw a0, 0(a1)
; RV64I-NEXT:    ret
;
```

```
; RV64ZBB-ZBKB-LABEL: rori_i32_fshr_nosext:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    roriw a0, a0, 31
; RV64ZBB-ZBKB-NEXT:    sw a0, 0(a1)
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = tail call i32 @llvm.fshr.i32(i32 %a, i32 %a, i32 31)
 store i32 %1, ptr %x
 ret void
}

; This test is similar to the type legalized version of the fshl/fshr tests, but
; instead of having the same input to both shifts it has different inputs. Make
; sure we don't match it as a roriw.
define signext i32 @not_rori_i32(i32 signext %x, i32 signext %y) nounwind {
; CHECK-LABEL: not_rori_i32:
; CHECK:       # %bb.0:
; CHECK-NEXT:    slliw a0, a0, 31
; CHECK-NEXT:    srliw a1, a1, 1
; CHECK-NEXT:    or a0, a0, a1
; CHECK-NEXT:    ret
 %a = shl
 i32 %x, 31
 %b = lshr i32 %y, 1
 %c = or i32 %a, %b
 ret i32 %c
}

; This is similar to the type legalized roriw pattern, but the and mask is more
; than 32 bits so the lshr doesn't shift zeroes into the lower 32 bits. Make
; sure we don't match it to roriw.
define i64 @roriw_bug(i64 %x) nounwind {
; CHECK-LABEL: roriw_bug:
; CHECK:       # %bb.0:
; CHECK-NEXT:    slli a1, a0, 31
; CHECK-NEXT:    andi a2, a0, -2
; CHECK-NEXT:    srli a0, a0, 1
; CHECK-NEXT:    or a0, a1, a0
; CHECK-NEXT:    sext.w a0, a0
; CHECK-NEXT:    xor a0, a2, a0
; CHECK-NEXT:    ret
 %a = shl i64 %x, 31
 %b = and i64 %x, 18446744073709551614
 %c = lshr i64 %b, 1
 %d = or i64 %a, %c
 %e = shl i64 %d, 32
 %f = ashr i64 %e, 32
 %g = xor i64 %b, %f ; to increase the use count on %b to disable SimplifyDemandedBits.
 ret i64 %g
```

```
}

define i64 @rori_i64_fshl(i64 %a) nounwind {
; RV64I-LABEL: rori_i64_fshl:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srli a1, a0, 1
; RV64I-NEXT:    slli a0, a0, 63
; RV64I-NEXT:
   or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: rori_i64_fshl:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    rori a0, a0, 1
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = tail call i64 @llvm.fshl.i64(i64 %a, i64 %a, i64 63)
 ret i64 %1
}

define i64 @rori_i64_fshr(i64 %a) nounwind {
; RV64I-LABEL: rori_i64_fshr:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a1, a0, 1
; RV64I-NEXT:    srli a0, a0, 63
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: rori_i64_fshr:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    rori a0, a0, 63
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = tail call i64 @llvm.fshr.i64(i64 %a, i64 %a, i64 63)
 ret i64 %1
}

define signext i32 @not_shl_one_i32(i32 signext %x) {
; RV64I-LABEL: not_shl_one_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 1
; RV64I-NEXT:    sllw a0, a1, a0
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: not_shl_one_i32:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    li a1,
 -2
; RV64ZBB-ZBKB-NEXT:    rolw a0, a1, a0
```

```
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = shl i32 1, %x
 %2 = xor i32 %1, -1
 ret i32 %2
}

define i64 @not_shl_one_i64(i64 %x) {
; RV64I-LABEL: not_shl_one_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 1
; RV64I-NEXT:    sll a0, a1, a0
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: not_shl_one_i64:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    li a1, -2
; RV64ZBB-ZBKB-NEXT:    rol a0, a1, a0
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = shl i64 1, %x
 %2 = xor i64 %1, -1
 ret i64 %2
}

define i8 @srli_i8(i8 %a) nounwind {
; CHECK-LABEL: srli_i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    slli a0, a0, 56
; CHECK-NEXT:    srli a0, a0, 62
; CHECK-NEXT:    ret
 %1 = lshr i8 %a, 6
 ret i8 %1
}

; We could use sext.b+srai, but slli+srai offers more opportunities for
; comppressed instructions.
define i8 @srai_i8(i8 %a) nounwind {
; RV64I-LABEL: srai_i8:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 24
; RV64I-NEXT:
    sraiw a0, a0, 29
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: srai_i8:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    slli a0, a0, 56
; RV64ZBB-NEXT:    srai a0, a0, 61
```

```
; RV64ZBB-NEXT:    ret
;
; RV64ZBKB-LABEL: srai_i8:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    slli a0, a0, 24
; RV64ZBKB-NEXT:    sraiw a0, a0, 29
; RV64ZBKB-NEXT:    ret
 %1 = ashr i8 %a, 5
 ret i8 %1
}

; We could use zext.h+srli, but slli+srli offers more opportunities for
; comppressed instructions.
define i16 @srli_i16(i16 %a) nounwind {
; CHECK-LABEL: srli_i16:
; CHECK:       # %bb.0:
; CHECK-NEXT:    slli a0, a0, 48
; CHECK-NEXT:    srli a0, a0, 54
; CHECK-NEXT:    ret
 %1 = lshr i16 %a, 6
 ret i16 %1
}

; We could use sext.h+srai, but slli+srai offers more opportunities for
; comppressed instructions.
define i16 @srai_i16(i16 %a) nounwind {
; RV64I-LABEL: srai_i16:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 16
; RV64I-NEXT:    sraiw a0, a0, 25
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: srai_i16:
;
 RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    slli a0, a0, 48
; RV64ZBB-NEXT:    srai a0, a0, 57
; RV64ZBB-NEXT:    ret
;
; RV64ZBKB-LABEL: srai_i16:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    slli a0, a0, 16
; RV64ZBKB-NEXT:    sraiw a0, a0, 25
; RV64ZBKB-NEXT:    ret
 %1 = ashr i16 %a, 9
 ret i16 %1
}
```

```
define i1 @andn_seqz_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: andn_seqz_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    seqz a0, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: andn_seqz_i32:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    andn a0, a1, a0
; RV64ZBB-ZBKB-NEXT:    seqz a0, a0
; RV64ZBB-ZBKB-NEXT:    ret
 %and = and i32 %a, %b
 %cmpeq = icmp eq i32 %and, %b
 ret i1 %cmpeq
}

define i1 @andn_seqz_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: andn_seqz_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    seqz a0, a0
; RV64I-NEXT:
    ret
;
; RV64ZBB-ZBKB-LABEL: andn_seqz_i64:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    andn a0, a1, a0
; RV64ZBB-ZBKB-NEXT:    seqz a0, a0
; RV64ZBB-ZBKB-NEXT:    ret
 %and = and i64 %a, %b
 %cmpeq = icmp eq i64 %and, %b
 ret i1 %cmpeq
}

define i1 @andn_snez_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: andn_snez_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    snez a0, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: andn_snez_i32:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    andn a0, a1, a0
```

```
; RV64ZBB-ZBKB-NEXT:    snez a0, a0
; RV64ZBB-ZBKB-NEXT:    ret
 %and = and i32 %a, %b
 %cmpeq = icmp ne i32 %and, %b
 ret i1 %cmpeq
}

define i1 @andn_snez_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: andn_snez_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    snez a0, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: andn_snez_i64:
;
 RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    andn a0, a1, a0
; RV64ZBB-ZBKB-NEXT:    snez a0, a0
; RV64ZBB-ZBKB-NEXT:    ret
 %and = and i64 %a, %b
 %cmpeq = icmp ne i64 %and, %b
 ret i1 %cmpeq
}
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck -check-prefix=RV64I %s
; RUN: llc -mtriple=riscv64 -mattr=+m -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck -check-prefix=RV64IM %s

define i32 @urem(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: urem:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    srli a1, a1, 32
; RV64I-NEXT:    call __umoddi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: urem:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    remuw a0, a0, a1
```

```
; RV64IM-NEXT:    ret
 %1 = urem i32 %a, %b
 ret i32 %1
}

define i32 @urem_constant_lhs(i32 %a) nounwind {
;
 RV64I-LABEL: urem_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a1, a0, 32
; RV64I-NEXT:    li a0, 10
; RV64I-NEXT:    call __umoddi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: urem_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    li a1, 10
; RV64IM-NEXT:    remuw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = urem i32 10, %a
 ret i32 %1
}

define i32 @srem(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: srem:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    sext.w a0, a0
; RV64I-NEXT:    sext.w a1, a1
; RV64I-NEXT:    call __moddi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: srem:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:
    remw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = srem i32 %a, %b
 ret i32 %1
}
```

```
define i32 @srem_pow2(i32 %a) nounwind {
; RV64I-LABEL: srem_pow2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sraiw a1, a0, 31
; RV64I-NEXT:    srliw a1, a1, 29
; RV64I-NEXT:    add a1, a0, a1
; RV64I-NEXT:    andi a1, a1, -8
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: srem_pow2:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    sraiw a1, a0, 31
; RV64IM-NEXT:    srliw a1, a1, 29
; RV64IM-NEXT:    add a1, a0, a1
; RV64IM-NEXT:    andi a1, a1, -8
; RV64IM-NEXT:    subw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = srem i32 %a, 8
 ret i32 %1
}

define i32 @srem_pow2_2(i32 %a) nounwind {
; RV64I-LABEL: srem_pow2_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sraiw a1, a0, 31
; RV64I-NEXT:    srliw a1, a1, 16
; RV64I-NEXT:    add a1, a0, a1
; RV64I-NEXT:    lui a2, 1048560
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: srem_pow2_2:
; RV64IM:
       # %bb.0:
; RV64IM-NEXT:    sraiw a1, a0, 31
; RV64IM-NEXT:    srliw a1, a1, 16
; RV64IM-NEXT:    add a1, a0, a1
; RV64IM-NEXT:    lui a2, 1048560
; RV64IM-NEXT:    and a1, a1, a2
; RV64IM-NEXT:    subw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = srem i32 %a, 65536
 ret i32 %1
}
```

```
define i32 @srem_constant_lhs(i32 %a) nounwind {
; RV64I-LABEL: srem_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    sext.w a1, a0
; RV64I-NEXT:    li a0, -10
; RV64I-NEXT:    call __moddi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: srem_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    li a1, -10
; RV64IM-NEXT:    remw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = srem i32 -10, %a
 ret i32 %1
}

define i64 @urem64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: urem64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    tail __umoddi3
;
; RV64IM-LABEL:
 urem64:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    remu a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = urem i64 %a, %b
 ret i64 %1
}

define i64 @urem64_constant_lhs(i64 %a) nounwind {
; RV64I-LABEL: urem64_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    mv a1, a0
; RV64I-NEXT:    li a0, 10
; RV64I-NEXT:    tail __umoddi3
;
; RV64IM-LABEL: urem64_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    li a1, 10
; RV64IM-NEXT:    remu a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = urem i64 10, %a
```

```
 ret i64 %1
}

define i64 @srem64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: srem64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    tail __moddi3
;
; RV64IM-LABEL: srem64:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    rem a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = srem i64 %a, %b
 ret i64 %1
}

define i64 @srem64_constant_lhs(i64 %a) nounwind {
; RV64I-LABEL: srem64_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    mv a1, a0
; RV64I-NEXT:    li a0, -10
; RV64I-NEXT:    tail __moddi3
;
; RV64IM-LABEL: srem64_constant_lhs:
;
 RV64IM:       # %bb.0:
; RV64IM-NEXT:    li a1, -10
; RV64IM-NEXT:    rem a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = srem i64 -10, %a
 ret i64 %1
}

define i8 @urem8(i8 %a, i8 %b) nounwind {
; RV64I-LABEL: urem8:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    andi a0, a0, 255
; RV64I-NEXT:    andi a1, a1, 255
; RV64I-NEXT:    call __umoddi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: urem8:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    andi a1, a1, 255
```

```
; RV64IM-NEXT:    andi a0, a0, 255
; RV64IM-NEXT:    remuw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = urem i8 %a, %b
 ret i8 %1
}

define i8 @urem8_constant_lhs(i8 %a) nounwind {
; RV64I-LABEL: urem8_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    andi a1, a0, 255
; RV64I-NEXT:
   li a0, 10
; RV64I-NEXT:    call __umoddi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: urem8_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    andi a0, a0, 255
; RV64IM-NEXT:    li a1, 10
; RV64IM-NEXT:    remuw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = urem i8 10, %a
 ret i8 %1
}


define i8 @srem8(i8 %a, i8 %b) nounwind {
; RV64I-LABEL: srem8:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a1, a1, 24
; RV64I-NEXT:    sraiw a1, a1, 24
; RV64I-NEXT:    slli a0, a0, 24
; RV64I-NEXT:    sraiw a0, a0, 24
; RV64I-NEXT:    call __moddi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: srem8:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a1, a1, 24
```

```
; RV64IM-NEXT:    sraiw a1, a1, 24
; RV64IM-NEXT:    slli a0, a0, 24
; RV64IM-NEXT:    sraiw
 a0, a0, 24
; RV64IM-NEXT:    remw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = srem i8 %a, %b
 ret i8 %1
}

define i8 @srem8_constant_lhs(i8 %a) nounwind {
; RV64I-LABEL: srem8_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 24
; RV64I-NEXT:    sraiw a1, a0, 24
; RV64I-NEXT:    li a0, -10
; RV64I-NEXT:    call __moddi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: srem8_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a0, a0, 24
; RV64IM-NEXT:    sraiw a0, a0, 24
; RV64IM-NEXT:    li a1, -10
; RV64IM-NEXT:    remw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = srem i8 -10, %a
 ret i8 %1
}


define i16 @urem16(i16 %a, i16 %b) nounwind {
; RV64I-LABEL: urem16:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    lui a2, 16
; RV64I-NEXT:
    addiw a2, a2, -1
; RV64I-NEXT:    and a0, a0, a2
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    call __umoddi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
```

```
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: urem16:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    lui a2, 16
; RV64IM-NEXT:    addi a2, a2, -1
; RV64IM-NEXT:    and a1, a1, a2
; RV64IM-NEXT:    and a0, a0, a2
; RV64IM-NEXT:    remuw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = urem i16 %a, %b
 ret i16 %1
}

define i16 @urem16_constant_lhs(i16 %a) nounwind {
; RV64I-LABEL: urem16_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srli a1, a0, 48
; RV64I-NEXT:    li a0, 10
; RV64I-NEXT:    call __umoddi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: urem16_constant_lhs:
; RV64IM:       # %bb.0:
;
 RV64IM-NEXT:    slli a0, a0, 48
; RV64IM-NEXT:    srli a0, a0, 48
; RV64IM-NEXT:    li a1, 10
; RV64IM-NEXT:    remuw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = urem i16 10, %a
 ret i16 %1
}

define i16 @srem16(i16 %a, i16 %b) nounwind {
; RV64I-LABEL: srem16:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a1, a1, 16
; RV64I-NEXT:    sraiw a1, a1, 16
; RV64I-NEXT:    slli a0, a0, 16
; RV64I-NEXT:    sraiw a0, a0, 16
```

```
; RV64I-NEXT:    call __moddi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: srem16:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a1, a1, 16
; RV64IM-NEXT:    sraiw a1, a1, 16
; RV64IM-NEXT:    slli a0, a0, 16
; RV64IM-NEXT:    sraiw a0, a0, 16
; RV64IM-NEXT:    remw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = srem i16 %a, %b
 ret i16 %1
}

define i16 @srem16_constant_lhs(i16 %a) nounwind {
; RV64I-LABEL: srem16_constant_lhs:
;
 RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 16
; RV64I-NEXT:    sraiw a1, a0, 16
; RV64I-NEXT:    li a0, -10
; RV64I-NEXT:    call __moddi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: srem16_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a0, a0, 16
; RV64IM-NEXT:    sraiw a0, a0, 16
; RV64IM-NEXT:    li a1, -10
; RV64IM-NEXT:    remw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = srem i16 -10, %a
 ret i16 %1
}
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=aarch64-apple-ios %s -o - | FileCheck %s

define <16 x double> @test_sitofp_fixed(<16 x i32> %in) {
; CHECK-LABEL: test_sitofp_fixed:
; CHECK:       ; %bb.0:
; CHECK-NEXT:    sshll2.2d v4, v0, #0
```

```
; CHECK-NEXT:    sshll.2d v0, v0, #0
; CHECK-NEXT:    sshll2.2d v5, v1, #0
; CHECK-NEXT:    sshll.2d v6, v1, #0
; CHECK-NEXT:    sshll.2d v7, v2, #0
; CHECK-NEXT:    sshll2.2d v16, v2, #0
; CHECK-NEXT:    sshll2.2d v17, v3, #0
; CHECK-NEXT:    sshll.2d v18, v3, #0
; CHECK-NEXT:    scvtf.2d v1, v4, #6
; CHECK-NEXT:    scvtf.2d v0, v0, #6
; CHECK-NEXT:    scvtf.2d v3, v5, #6
; CHECK-NEXT:    scvtf.2d v2, v6, #6
; CHECK-NEXT:    scvtf.2d v4, v7, #6
; CHECK-NEXT:    scvtf.2d v5, v16, #6
; CHECK-NEXT:    scvtf.2d v7, v17, #6
; CHECK-NEXT:    scvtf.2d v6, v18, #6
; CHECK-NEXT:    ret

 %flt = sitofp <16 x i32> %in to <16 x double>
 %res = fdiv <16 x double> %flt, <double 64.0, double 64.0, double 64.0,
 double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double
64.0, double 64.0, double 64.0, double 64.0, double 64.0>
 ret <16 x double> %res
}

; This one is small enough to satisfy isSimple, but still illegally large.
define <4 x double> @test_sitofp_fixed_shortish(<4 x i64> %in) {
; CHECK-LABEL: test_sitofp_fixed_shortish:
; CHECK:       ; %bb.0:
; CHECK-NEXT:    scvtf.2d v0, v0, #6
; CHECK-NEXT:    scvtf.2d v1, v1, #6
; CHECK-NEXT:    ret


 %flt = sitofp <4 x i64> %in to <4 x double>
 %res = fdiv <4 x double> %flt, <double 64.0, double 64.0, double 64.0, double 64.0>
 ret <4 x double> %res
}
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefix=RV64I

; These tests are each targeted at a particular RISC-V ALU instruction. Most
; other files in this folder exercise LLVM IR instructions that don't directly
; match a RISC-V instruction.

; Register-immediate instructions.

define i32 @addi(i32 %a) nounwind {
```

```
; RV64I-LABEL: addi:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addiw a0, a0, 1
; RV64I-NEXT:    ret
 %1 = add i32 %a, 1
 ret i32 %1
}

define i32 @slti(i32 %a) nounwind {
; RV64I-LABEL: slti:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sext.w a0, a0
; RV64I-NEXT:    slti a0, a0, 2
; RV64I-NEXT:    ret
 %1 = icmp slt i32 %a, 2
 %2 = zext i1 %1 to i32
 ret i32 %2
}

define i32 @sltiu(i32 %a) nounwind {
; RV64I-LABEL: sltiu:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sext.w a0, a0
; RV64I-NEXT:    sltiu a0, a0, 3
; RV64I-NEXT:
   ret
 %1 = icmp ult i32 %a, 3
 %2 = zext i1 %1 to i32
 ret i32 %2
}

define i32 @xori(i32 %a) nounwind {
; RV64I-LABEL: xori:
; RV64I:       # %bb.0:
; RV64I-NEXT:    xori a0, a0, 4
; RV64I-NEXT:    ret
 %1 = xor i32 %a, 4
 ret i32 %1
}

define i32 @ori(i32 %a) nounwind {
; RV64I-LABEL: ori:
; RV64I:       # %bb.0:
; RV64I-NEXT:    ori a0, a0, 5
; RV64I-NEXT:    ret
 %1 = or i32 %a, 5
 ret i32 %1
}
```

```
define i32 @andi(i32 %a) nounwind {
; RV64I-LABEL: andi:
; RV64I:       # %bb.0:
; RV64I-NEXT:    andi a0, a0, 6
; RV64I-NEXT:    ret
 %1 = and i32 %a, 6
 ret i32 %1
}

define i32 @slli(i32 %a) nounwind {
; RV64I-LABEL: slli:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slliw a0, a0, 7
; RV64I-NEXT:    ret
 %1 = shl i32 %a, 7
 ret i32 %1
}

define i32 @srli(i32 %a) nounwind {
; RV64I-LABEL: srli:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a0, a0, 8
; RV64I-NEXT:    ret
 %1 = lshr i32 %a, 8
 ret i32 %1
}

define i32 @srai(i32 %a) nounwind {
; RV64I-LABEL: srai:
; RV64I:
   # %bb.0:
; RV64I-NEXT:    sraiw a0, a0, 9
; RV64I-NEXT:    ret
 %1 = ashr i32 %a, 9
 ret i32 %1
}

; Register-register instructions

define i32 @add(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    ret
 %1 = add i32 %a, %b
 ret i32 %1
}
```

```
define i32 @sub(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: sub:
; RV64I:       # %bb.0:
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    ret
 %1 = sub i32 %a, %b
 ret i32 %1
}

define i32 @sub_negative_constant_lhs(i32 %a) nounwind {
; RV64I-LABEL: sub_negative_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, -2
; RV64I-NEXT:    subw a0, a1, a0
; RV64I-NEXT:    ret
 %1 = sub i32 -2, %a
 ret i32 %1
}

define i32 @sll(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: sll:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sllw a0, a0, a1
; RV64I-NEXT:    ret
 %1 = shl i32 %a, %b
 ret i32 %1
}

; Make sure we don't emit instructions to zero extend the shift amount to i64.
define
 i32 @sll_shamt_zext(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: sll_shamt_zext:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi a1, a1, 1
; RV64I-NEXT:    sllw a0, a0, a1
; RV64I-NEXT:    ret
 %shamt = add i32 %b, 1
 %1 = shl i32 %a, %shamt
 ret i32 %1
}

define i32 @sll_negative_constant_lhs(i32 %a) nounwind {
; RV64I-LABEL: sll_negative_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, -1
; RV64I-NEXT:    sllw a0, a1, a0
; RV64I-NEXT:    ret
```

```
 %1 = shl i32 -1, %a
 ret i32 %1
}

define i32 @slt(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: slt:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sext.w a1, a1
; RV64I-NEXT:    sext.w a0, a0
; RV64I-NEXT:    slt a0, a0, a1
; RV64I-NEXT:    ret
 %1 = icmp slt i32 %a, %b
 %2 = zext i1 %1 to i32
 ret i32 %2
}

define i32 @sltu(i32 %a, i32 %b) nounwind {
;
; RV64I-LABEL: sltu:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sext.w a1, a1
; RV64I-NEXT:    sext.w a0, a0
; RV64I-NEXT:    sltu a0, a0, a1
; RV64I-NEXT:    ret
 %1 = icmp ult i32 %a,
 %b
 %2 = zext i1 %1 to i32
 ret i32 %2
}

define i32 @xor(i32 %a, i32 %b) nounwind {
;
; RV64I-LABEL: xor:
; RV64I:       # %bb.0:
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    ret
 %1 = xor i32 %a, %b
 ret i32 %1
}

define i32 @srl(i32 %a, i32 %b) nounwind {
;
; RV64I-LABEL: srl:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srlw a0, a0, a1
; RV64I-NEXT:    ret
 %1 = lshr i32 %a, %b
 ret i32 %1
```

```
}

; Make sure we don't emit instructions to zero extend the shift amount to i64.
define i32 @srl_shamt_zext(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: srl_shamt_zext:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi a1, a1, 1
; RV64I-NEXT:    srlw a0, a0, a1
; RV64I-NEXT:    ret
 %shamt = add i32 %b, 1
 %1 = lshr i32 %a, %shamt
 ret i32 %1
}

define i32 @srl_negative_constant_lhs(i32 %a) nounwind {
;
; RV64I-LABEL: srl_negative_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, -1
; RV64I-NEXT:    srlw a0, a1, a0
; RV64I-NEXT:    ret
 %1 = lshr i32 -1, %a
 ret i32 %1
}

define
 i32 @sra(i32 %a, i32 %b) nounwind {
;
; RV64I-LABEL: sra:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sraw a0, a0, a1
; RV64I-NEXT:    ret
 %1 = ashr i32 %a, %b
 ret i32 %1
}

; Make sure we don't emit instructions to zero extend the shift amount to i64.
define i32 @sra_shamt_zext(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: sra_shamt_zext:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi a1, a1, 1
; RV64I-NEXT:    sraw a0, a0, a1
; RV64I-NEXT:    ret
 %shamt = add i32 %b, 1
 %1 = ashr i32 %a, %shamt
 ret i32 %1
}
```

```
define i32 @sra_negative_constant_lhs(i32 %a) nounwind {
;
; RV64I-LABEL: sra_negative_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 524288
; RV64I-NEXT:    sraw a0, a1, a0
; RV64I-NEXT:    ret
 %1 = ashr i32 2147483648, %a
 ret i32 %1
}

define i32 @or(i32 %a, i32 %b) nounwind {
;
; RV64I-LABEL: or:
; RV64I:       # %bb.0:
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
 %1 = or i32 %a, %b
 ret i32 %1
}

define i32 @and(i32 %a, i32 %b) nounwind {
;
; RV64I-LABEL:
 and:
; RV64I:       # %bb.0:
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    ret
 %1 = and i32 %a, %b
 ret i32 %1
}
; NOTE: Assertions have been autogenerated by utils/update_test_checks.py UTC_ARGS: --include-generated-
funcs
; RUN: opt -S -passes=verify,iroutliner -ir-outlining-no-cost < %s | FileCheck %s

; This test checks that we do outline indirect calls when it is not specified
; that we should not.

declare void @f1(ptr, ptr);
declare void @f2(ptr, ptr);

define void @function1(ptr %func) {
entry:
 %a = alloca i32, align 4
 %b = alloca i32, align 4
 %c = alloca i32, align 4
 store i32 2, ptr %a, align 4
 store i32 3, ptr %b, align 4
```

```
 store i32 4, ptr %c, align 4
 call void %func()
 %al = load i32, ptr %a
 %bl = load i32, ptr %b
 %cl = load i32, ptr %c
 ret void
}

define void @function2(ptr %func) {
entry:
 %a = alloca i32, align 4
 %b = alloca i32, align 4
 %c = alloca i32, align 4
 store i32 2, ptr %a, align 4
 store i32 3, ptr %b, align 4
 store i32 4, ptr %c, align 4
 call void %func()
 %al = load i32, ptr %a
 %bl = load i32, ptr %b
 %cl = load i32, ptr %c
 ret void
}
;
 CHECK-LABEL: @function1(
; CHECK-NEXT:  entry:
; CHECK-NEXT:    [[A:%.*]] = alloca i32, align 4
; CHECK-NEXT:    [[B:%.*]] = alloca i32, align 4
; CHECK-NEXT:    [[C:%.*]] = alloca i32, align 4
; CHECK-NEXT:    call void @outlined_ir_func_0(ptr [[A]], ptr [[B]], ptr [[C]], ptr [[FUNC:%.*]])
; CHECK-NEXT:    ret void
;
;
; CHECK-LABEL: @function2(
; CHECK-NEXT:  entry:
; CHECK-NEXT:    [[A:%.*]] = alloca i32, align 4
; CHECK-NEXT:    [[B:%.*]] = alloca i32, align 4
; CHECK-NEXT:    [[C:%.*]] = alloca i32, align 4
; CHECK-NEXT:    call void @outlined_ir_func_0(ptr [[A]], ptr [[B]], ptr [[C]], ptr [[FUNC:%.*]])
; CHECK-NEXT:    ret void
;
;
; CHECK-LABEL: define internal void  @outlined_ir_func_0(
; CHECK-NEXT:  newFuncRoot:
; CHECK-NEXT:    br label [[ENTRY_TO_OUTLINE:%.*]]
; CHECK:       entry_to_outline:
; CHECK-NEXT:    store i32 2, ptr [[TMP0:%.*]], align 4
; CHECK-NEXT:    store i32 3, ptr [[TMP1:%.*]], align 4
; CHECK-NEXT:    store i32 4, ptr [[TMP2:%.*]], align 4
```

```
; CHECK-NEXT:
   call void [[TMP3:%.*]]()
; CHECK-NEXT:    [[AL:%.*]] = load i32, ptr [[TMP0]], align 4
; CHECK-NEXT:    [[BL:%.*]] = load i32, ptr [[TMP1]], align 4
; CHECK-NEXT:    [[CL:%.*]] = load i32, ptr [[TMP2]], align 4
; CHECK-NEXT:    br label [[ENTRY_AFTER_OUTLINE_EXITSTUB:%.*]]
; CHECK:       entry_after_outline.exitStub:
; CHECK-NEXT:    ret void
;
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefix=RV64I
; RUN: llc -mtriple=riscv64 -mattr=+xtheadbb -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefix=RV64XTHEADBB

declare i32 @llvm.ctlz.i32(i32, i1)

define signext i32 @ctlz_i32(i32 signext %a) nounwind {
; RV64I-LABEL: ctlz_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    beqz a0, .LBB0_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 8
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:
   not a0, a0
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addi a2, a2, 1365
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addi a1, a1, 819
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srliw a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srliw a1, a0, 4
```

```
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 24
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
; RV64I-NEXT:  .LBB0_2:
; RV64I-NEXT:    li a0, 32
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: ctlz_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.extu a0, a0, 31, 0
; RV64XTHEADBB-NEXT:    th.ff1 a0,
 a0
; RV64XTHEADBB-NEXT:    addi a0, a0, -32
; RV64XTHEADBB-NEXT:    ret
 %1 = call i32 @llvm.ctlz.i32(i32 %a, i1 false)
 ret i32 %1
}

define signext i32 @log2_i32(i32 signext %a) nounwind {
; RV64I-LABEL: log2_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    beqz a0, .LBB1_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 8
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addi a2, a2, 1365
; RV64I-NEXT:    and a1, a1, a2
```

```
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addi a1, a1, 819
; RV64I-NEXT:
 and a2, a0, a1
; RV64I-NEXT:    srliw a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 24
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    j .LBB1_3
; RV64I-NEXT:  .LBB1_2:
; RV64I-NEXT:    li a0, 32
; RV64I-NEXT:  .LBB1_3: # %cond.end
; RV64I-NEXT:    li a1, 31
; RV64I-NEXT:    subw a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: log2_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.extu a0, a0, 31, 0
; RV64XTHEADBB-NEXT:    th.ff1 a0, a0
; RV64XTHEADBB-NEXT:    addi a0, a0, -32
; RV64XTHEADBB-NEXT:    li a1, 31
; RV64XTHEADBB-NEXT:    subw a0, a1, a0
; RV64XTHEADBB-NEXT:    ret
 %1 = call i32 @llvm.ctlz.i32(i32
 %a, i1 false)
 %2 = sub i32 31, %1
 ret i32 %2
}

define signext i32 @log2_ceil_i32(i32 signext %a) nounwind {
; RV64I-LABEL: log2_ceil_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    sd s0, 0(sp) # 8-byte Folded Spill
; RV64I-NEXT:    addiw a0, a0, -1
```

```
; RV64I-NEXT:    li s0, 32
; RV64I-NEXT:    li a1, 32
; RV64I-NEXT:    beqz a0, .LBB2_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 8
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addi a2, a2, 1365
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:
   lui a1, 209715
; RV64I-NEXT:    addi a1, a1, 819
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srliw a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a1, a0, 24
; RV64I-NEXT:  .LBB2_2: # %cond.end
; RV64I-NEXT:    subw a0, s0, a1
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    ld s0, 0(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: log2_ceil_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    addi a0, a0, -1
; RV64XTHEADBB-NEXT:    slli a0, a0, 32
; RV64XTHEADBB-NEXT:    srli a0, a0, 32
```

```
; RV64XTHEADBB-NEXT:    th.ff1 a0, a0
; RV64XTHEADBB-NEXT:    addi a0, a0, -32
; RV64XTHEADBB-NEXT:
   li a1, 32
; RV64XTHEADBB-NEXT:    subw a0, a1, a0
; RV64XTHEADBB-NEXT:    ret
 %1 = sub i32 %a, 1
 %2 = call i32 @llvm.ctlz.i32(i32 %1, i1 false)
 %3 = sub i32 32, %2
 ret i32 %3
}

define signext i32 @findLastSet_i32(i32 signext %a) nounwind {
; RV64I-LABEL: findLastSet_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    sd s0, 0(sp) # 8-byte Folded Spill
; RV64I-NEXT:    mv s0, a0
; RV64I-NEXT:    srliw a0, a0, 1
; RV64I-NEXT:    or a0, s0, a0
; RV64I-NEXT:    srliw a1, a0, 2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 8
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addi a2, a2, 1365
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:
   lui a1, 209715
; RV64I-NEXT:    addi a1, a1, 819
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srliw a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
```

```
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 24
; RV64I-NEXT:    xori a0, a0, 31
; RV64I-NEXT:    snez a1, s0
; RV64I-NEXT:    addiw a1, a1, -1
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    ld s0, 0(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: findLastSet_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.extu a1, a0, 31, 0
; RV64XTHEADBB-NEXT:    th.ff1 a1, a1
; RV64XTHEADBB-NEXT:    addiw a1, a1, -32
; RV64XTHEADBB-NEXT:    xori a1, a1,
 31
; RV64XTHEADBB-NEXT:    snez a0, a0
; RV64XTHEADBB-NEXT:    addiw a0, a0, -1
; RV64XTHEADBB-NEXT:    or a0, a0, a1
; RV64XTHEADBB-NEXT:    ret
 %1 = call i32 @llvm.ctlz.i32(i32 %a, i1 true)
 %2 = xor i32 31, %1
 %3 = icmp eq i32 %a, 0
 %4 = select i1 %3, i32 -1, i32 %2
 ret i32 %4
}

define i32 @ctlz_lshr_i32(i32 signext %a) {
; RV64I-LABEL: ctlz_lshr_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a0, a0, 1
; RV64I-NEXT:    beqz a0, .LBB4_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    .cfi_def_cfa_offset 16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    .cfi_offset ra, -8
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 8
; RV64I-NEXT:    or a0, a0, a1
```

```
; RV64I-NEXT:    srliw a1, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    not
 a0, a0
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addi a2, a2, 1365
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addi a1, a1, 819
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srliw a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 24
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
; RV64I-NEXT:  .LBB4_2:
; RV64I-NEXT:    li a0, 32
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: ctlz_lshr_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    srliw a0, a0, 1
; RV64XTHEADBB-NEXT:    th.ff1 a0, a0
; RV64XTHEADBB-NEXT:
    addi a0, a0, -32
; RV64XTHEADBB-NEXT:    ret
 %1 = lshr i32 %a, 1
 %2 = call i32 @llvm.ctlz.i32(i32 %1, i1 false)
 ret i32 %2
}

declare i64 @llvm.ctlz.i64(i64, i1)

define i64 @ctlz_i64(i64 %a) nounwind {
; RV64I-LABEL: ctlz_i64:
; RV64I:       # %bb.0:
```

```
; RV64I-NEXT:    beqz a0, .LBB5_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    srli a1, a0, 1
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srli a1, a0, 2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srli a1, a0, 4
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srli a1, a0, 8
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srli a1, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srli a1, a0, 32
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    srli a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addiw a2, a2, 1365
; RV64I-NEXT:    slli a3, a2, 32
; RV64I-NEXT:    add a2, a2,
 a3
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    sub a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addiw a1, a1, 819
; RV64I-NEXT:    slli a2, a1, 32
; RV64I-NEXT:    add a1, a1, a2
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srli a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srli a1, a0, 4
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    slli a2, a1, 32
; RV64I-NEXT:    add a1, a1, a2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    slli a2, a1, 32
; RV64I-NEXT:    add a1, a1, a2
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srli a0, a0, 56
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
```

```
; RV64I-NEXT:    ret
; RV64I-NEXT:  .LBB5_2:
; RV64I-NEXT:    li a0, 64
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: ctlz_i64:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:
    th.ff1 a0, a0
; RV64XTHEADBB-NEXT:    ret
 %1 = call i64 @llvm.ctlz.i64(i64 %a, i1 false)
 ret i64 %1
}

declare i32 @llvm.cttz.i32(i32, i1)

define signext i32 @cttz_i32(i32 signext %a) nounwind {
; RV64I-LABEL: cttz_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    beqz a0, .LBB6_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    negw a1, a0
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 30667
; RV64I-NEXT:    addiw a1, a1, 1329
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 27
; RV64I-NEXT:    lui a1, %hi(.LCPI6_0)
; RV64I-NEXT:    addi a1, a1, %lo(.LCPI6_0)
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lbu a0, 0(a0)
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
; RV64I-NEXT:  .LBB6_2:
; RV64I-NEXT:    li a0, 32
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: cttz_i32:
; RV64XTHEADBB:       #
 %bb.0:
; RV64XTHEADBB-NEXT:    beqz a0, .LBB6_2
; RV64XTHEADBB-NEXT:  # %bb.1: # %cond.false
; RV64XTHEADBB-NEXT:    addi sp, sp, -16
; RV64XTHEADBB-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64XTHEADBB-NEXT:    negw a1, a0
```

```
; RV64XTHEADBB-NEXT:    and a0, a0, a1
; RV64XTHEADBB-NEXT:    lui a1, 30667
; RV64XTHEADBB-NEXT:    addiw a1, a1, 1329
; RV64XTHEADBB-NEXT:    call __muldi3
; RV64XTHEADBB-NEXT:    srliw a0, a0, 27
; RV64XTHEADBB-NEXT:    lui a1, %hi(.LCPI6_0)
; RV64XTHEADBB-NEXT:    addi a1, a1, %lo(.LCPI6_0)
; RV64XTHEADBB-NEXT:    add a0, a1, a0
; RV64XTHEADBB-NEXT:    lbu a0, 0(a0)
; RV64XTHEADBB-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64XTHEADBB-NEXT:    addi sp, sp, 16
; RV64XTHEADBB-NEXT:    ret
; RV64XTHEADBB-NEXT:  .LBB6_2:
; RV64XTHEADBB-NEXT:    li a0, 32
; RV64XTHEADBB-NEXT:    ret
; RV64ZBB-LABEL: cttz_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    ctzw a0, a0
; RV64ZBB-NEXT:    ret
 %1 = call i32 @llvm.cttz.i32(i32 %a, i1 false)
 ret i32 %1
}

define
 signext i32 @cttz_zero_undef_i32(i32 signext %a) nounwind {
; RV64I-LABEL: cttz_zero_undef_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    negw a1, a0
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 30667
; RV64I-NEXT:    addiw a1, a1, 1329
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 27
; RV64I-NEXT:    lui a1, %hi(.LCPI7_0)
; RV64I-NEXT:    addi a1, a1, %lo(.LCPI7_0)
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lbu a0, 0(a0)
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: cttz_zero_undef_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    addi sp, sp, -16
; RV64XTHEADBB-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64XTHEADBB-NEXT:    negw a1, a0
```

```
; RV64XTHEADBB-NEXT:    and a0, a0, a1
; RV64XTHEADBB-NEXT:    lui a1, 30667
; RV64XTHEADBB-NEXT:    addiw a1, a1, 1329
; RV64XTHEADBB-NEXT:
   call __muldi3
; RV64XTHEADBB-NEXT:    srliw a0, a0, 27
; RV64XTHEADBB-NEXT:    lui a1, %hi(.LCPI7_0)
; RV64XTHEADBB-NEXT:    addi a1, a1, %lo(.LCPI7_0)
; RV64XTHEADBB-NEXT:    add a0, a1, a0
; RV64XTHEADBB-NEXT:    lbu a0, 0(a0)
; RV64XTHEADBB-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64XTHEADBB-NEXT:    addi sp, sp, 16
; RV64XTHEADBB-NEXT:    ret
 %1 = call i32 @llvm.cttz.i32(i32 %a, i1 true)
 ret i32 %1
}

define signext i32 @findFirstSet_i32(i32 signext %a) nounwind {
; RV64I-LABEL: findFirstSet_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    sd s0, 0(sp) # 8-byte Folded Spill
; RV64I-NEXT:    mv s0, a0
; RV64I-NEXT:    negw a0, a0
; RV64I-NEXT:    and a0, s0, a0
; RV64I-NEXT:    lui a1, 30667
; RV64I-NEXT:    addiw a1, a1, 1329
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 27
; RV64I-NEXT:    lui a1, %hi(.LCPI8_0)
; RV64I-NEXT:    addi a1, a1, %lo(.LCPI8_0)
; RV64I-NEXT:
   add a0, a1, a0
; RV64I-NEXT:    lbu a0, 0(a0)
; RV64I-NEXT:    snez a1, s0
; RV64I-NEXT:    addi a1, a1, -1
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    ld s0, 0(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: findFirstSet_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    addi sp, sp, -16
; RV64XTHEADBB-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64XTHEADBB-NEXT:    sd s0, 0(sp) # 8-byte Folded Spill
```

```
; RV64XTHEADBB-NEXT:    mv s0, a0
; RV64XTHEADBB-NEXT:    negw a0, a0
; RV64XTHEADBB-NEXT:    and a0, s0, a0
; RV64XTHEADBB-NEXT:    lui a1, 30667
; RV64XTHEADBB-NEXT:    addiw a1, a1, 1329
; RV64XTHEADBB-NEXT:    call __muldi3
; RV64XTHEADBB-NEXT:    srliw a0, a0, 27
; RV64XTHEADBB-NEXT:    lui a1, %hi(.LCPI8_0)
; RV64XTHEADBB-NEXT:    addi a1, a1, %lo(.LCPI8_0)
; RV64XTHEADBB-NEXT:    add a0, a1, a0
; RV64XTHEADBB-NEXT:    lbu a0, 0(a0)
; RV64XTHEADBB-NEXT:
   snez a1, s0
; RV64XTHEADBB-NEXT:    addi a1, a1, -1
; RV64XTHEADBB-NEXT:    or a0, a1, a0
; RV64XTHEADBB-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64XTHEADBB-NEXT:    ld s0, 0(sp) # 8-byte Folded Reload
; RV64XTHEADBB-NEXT:    addi sp, sp, 16
; RV64XTHEADBB-NEXT:    ret
 %1 = call i32 @llvm.cttz.i32(i32 %a, i1 true)
 %2 = icmp eq i32 %a, 0
 %3 = select i1 %2, i32 -1, i32 %1
 ret i32 %3
}

define signext i32 @ffs_i32(i32 signext %a) nounwind {
; RV64I-LABEL: ffs_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    sd s0, 0(sp) # 8-byte Folded Spill
; RV64I-NEXT:    mv s0, a0
; RV64I-NEXT:    negw a0, a0
; RV64I-NEXT:    and a0, s0, a0
; RV64I-NEXT:    lui a1, 30667
; RV64I-NEXT:    addiw a1, a1, 1329
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 27
; RV64I-NEXT:    lui a1, %hi(.LCPI9_0)
; RV64I-NEXT:    addi a1, a1, %lo(.LCPI9_0)
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:
   lbu a0, 0(a0)
; RV64I-NEXT:    addi a0, a0, 1
; RV64I-NEXT:    seqz a1, s0
; RV64I-NEXT:    addi a1, a1, -1
; RV64I-NEXT:    and a0, a1, a0
; RV64I-NEXT:    slli a0, a0, 32
```

```
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    ld s0, 0(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: ffs_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    addi sp, sp, -16
; RV64XTHEADBB-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64XTHEADBB-NEXT:    sd s0, 0(sp) # 8-byte Folded Spill
; RV64XTHEADBB-NEXT:    mv s0, a0
; RV64XTHEADBB-NEXT:    negw a0, a0
; RV64XTHEADBB-NEXT:    and a0, s0, a0
; RV64XTHEADBB-NEXT:    lui a1, 30667
; RV64XTHEADBB-NEXT:    addiw a1, a1, 1329
; RV64XTHEADBB-NEXT:    call __muldi3
; RV64XTHEADBB-NEXT:    srliw a0, a0, 27
; RV64XTHEADBB-NEXT:    lui a1, %hi(.LCPI9_0)
; RV64XTHEADBB-NEXT:    addi a1, a1, %lo(.LCPI9_0)
; RV64XTHEADBB-NEXT:    add a0, a1, a0
;
 RV64XTHEADBB-NEXT:    lbu a0, 0(a0)
; RV64XTHEADBB-NEXT:    addi a0, a0, 1
; RV64XTHEADBB-NEXT:    seqz a1, s0
; RV64XTHEADBB-NEXT:    addi a1, a1, -1
; RV64XTHEADBB-NEXT:    and a0, a1, a0
; RV64XTHEADBB-NEXT:    slli a0, a0, 32
; RV64XTHEADBB-NEXT:    srli a0, a0, 32
; RV64XTHEADBB-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64XTHEADBB-NEXT:    ld s0, 0(sp) # 8-byte Folded Reload
; RV64XTHEADBB-NEXT:    addi sp, sp, 16
; RV64XTHEADBB-NEXT:    ret
 %1 = call i32 @llvm.cttz.i32(i32 %a, i1 true)
 %2 = add i32 %1, 1
 %3 = icmp eq i32 %a, 0
 %4 = select i1 %3, i32 0, i32 %2
 ret i32 %4
}

declare i64 @llvm.cttz.i64(i64, i1)

define i64 @cttz_i64(i64 %a) nounwind {
; RV64I-LABEL: cttz_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    beqz a0, .LBB10_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    addi sp, sp, -16
```

```
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    neg a1, a0
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, %hi(.LCPI10_0)
; RV64I-NEXT:
   ld a1, %lo(.LCPI10_0)(a1)
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srli a0, a0, 58
; RV64I-NEXT:    lui a1, %hi(.LCPI10_1)
; RV64I-NEXT:    addi a1, a1, %lo(.LCPI10_1)
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lbu a0, 0(a0)
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
; RV64I-NEXT:  .LBB10_2:
; RV64I-NEXT:    li a0, 64
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: cttz_i64:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    beqz a0, .LBB10_2
; RV64XTHEADBB-NEXT:  # %bb.1: # %cond.false
; RV64XTHEADBB-NEXT:    addi a1, a0, -1
; RV64XTHEADBB-NEXT:    not a0, a0
; RV64XTHEADBB-NEXT:    and a0, a0, a1
; RV64XTHEADBB-NEXT:    th.ff1 a0, a0
; RV64XTHEADBB-NEXT:    li a1, 64
; RV64XTHEADBB-NEXT:    sub a0, a1, a0
; RV64XTHEADBB-NEXT:    ret
; RV64XTHEADBB-NEXT:  .LBB10_2:
; RV64XTHEADBB-NEXT:    li a0, 64
; RV64XTHEADBB-NEXT:    ret
 %1 = call i64 @llvm.cttz.i64(i64 %a, i1 false)
 ret i64 %1
}

define signext
 i32 @sextb_i32(i32 signext %a) nounwind {
; RV64I-LABEL: sextb_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 56
; RV64I-NEXT:    srai a0, a0, 56
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: sextb_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.ext a0, a0, 7, 0
```

```
; RV64XTHEADBB-NEXT:    ret
 %shl = shl i32 %a, 24
 %shr = ashr exact i32 %shl, 24
 ret i32 %shr
}

define i64 @sextb_i64(i64 %a) nounwind {
; RV64I-LABEL: sextb_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 56
; RV64I-NEXT:    srai a0, a0, 56
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: sextb_i64:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.ext a0, a0, 7, 0
; RV64XTHEADBB-NEXT:    ret
 %shl = shl i64 %a, 56
 %shr = ashr exact i64 %shl, 56
 ret i64 %shr
}

define signext i32 @sexth_i32(i32 signext %a) nounwind {
; RV64I-LABEL: sexth_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srai a0, a0, 48
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL:
 sexth_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.ext a0, a0, 15, 0
; RV64XTHEADBB-NEXT:    ret
 %shl = shl i32 %a, 16
 %shr = ashr exact i32 %shl, 16
 ret i32 %shr
}

define signext i32 @no_sexth_i32(i32 signext %a) nounwind {
; RV64I-LABEL: no_sexth_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 17
; RV64I-NEXT:    sraiw a0, a0, 16
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: no_sexth_i32:
; RV64XTHEADBB:       # %bb.0:
```

```
; RV64XTHEADBB-NEXT:    slli a0, a0, 17
; RV64XTHEADBB-NEXT:    sraiw a0, a0, 16
; RV64XTHEADBB-NEXT:    ret
 %shl = shl i32 %a, 17
 %shr = ashr exact i32 %shl, 16
 ret i32 %shr
}

define i64 @sexth_i64(i64 %a) nounwind {
; RV64I-LABEL: sexth_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srai a0, a0, 48
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: sexth_i64:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.ext a0, a0, 15, 0
; RV64XTHEADBB-NEXT:    ret
 %shl = shl i64 %a, 48
 %shr = ashr
 exact i64 %shl, 48
 ret i64 %shr
}

define i64 @no_sexth_i64(i64 %a) nounwind {
; RV64I-LABEL: no_sexth_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 49
; RV64I-NEXT:    srai a0, a0, 48
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: no_sexth_i64:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    slli a0, a0, 49
; RV64XTHEADBB-NEXT:    srai a0, a0, 48
; RV64XTHEADBB-NEXT:    ret
 %shl = shl i64 %a, 49
 %shr = ashr exact i64 %shl, 48
 ret i64 %shr
}

define i32 @zexth_i32(i32 %a) nounwind {
; RV64I-LABEL: zexth_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srli a0, a0, 48
; RV64I-NEXT:    ret
```

```
;
; RV64XTHEADBB-LABEL: zexth_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.extu a0, a0, 15, 0
; RV64XTHEADBB-NEXT:    ret
 %and = and i32 %a, 65535
 ret i32 %and
}

define i64 @zexth_i64(i64 %a) nounwind {
; RV64I-LABEL: zexth_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srli a0, a0, 48
; RV64I-NEXT:
    ret
;
; RV64XTHEADBB-LABEL: zexth_i64:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.extu a0, a0, 15, 0
; RV64XTHEADBB-NEXT:    ret
 %and = and i64 %a, 65535
 ret i64 %and
}

define i64 @zext_bf_i64(i64 %a) nounwind {
; RV64I-LABEL: zext_bf_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 47
; RV64I-NEXT:    srli a0, a0, 48
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: zext_bf_i64:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.extu a0, a0, 16, 1
; RV64XTHEADBB-NEXT:    ret
 %1 = lshr i64 %a, 1
 %and = and i64 %1, 65535
 ret i64 %and
}

define i64 @zext_i64_srliw(i64 %a) nounwind {
; RV64I-LABEL: zext_i64_srliw:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a0, a0, 16
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: zext_i64_srliw:
```

```
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    srliw a0, a0, 16
; RV64XTHEADBB-NEXT:    ret
 %1 = lshr i64 %a, 16
 %and = and i64 %1, 65535
 ret i64 %and
}

declare i32 @llvm.bswap.i32(i32)

define signext
 i32 @bswap_i32(i32 signext %a) nounwind {
; RV64I-LABEL: bswap_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a1, a0, 8
; RV64I-NEXT:    lui a2, 16
; RV64I-NEXT:    addiw a2, a2, -256
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    srliw a3, a0, 24
; RV64I-NEXT:    or a1, a1, a3
; RV64I-NEXT:    and a2, a0, a2
; RV64I-NEXT:    slliw a2, a2, 8
; RV64I-NEXT:    slliw a0, a0, 24
; RV64I-NEXT:    or a0, a0, a2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: bswap_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.revw a0, a0
; RV64XTHEADBB-NEXT:    ret
 %1 = tail call i32 @llvm.bswap.i32(i32 %a)
 ret i32 %1
}

; Similar to bswap_i32 but the result is not sign extended.
define void @bswap_i32_nosext(i32 signext %a, ptr %x) nounwind {
; RV64I-LABEL: bswap_i32_nosext:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a2, a0, 8
; RV64I-NEXT:    lui a3, 16
; RV64I-NEXT:    addi a3, a3, -256
; RV64I-NEXT:    and a2, a2, a3
; RV64I-NEXT:    srliw
 a4, a0, 24
; RV64I-NEXT:    or a2, a2, a4
; RV64I-NEXT:    and a3, a0, a3
; RV64I-NEXT:    slli a3, a3, 8
```

```
; RV64I-NEXT:    slli a0, a0, 24
; RV64I-NEXT:    or a0, a0, a3
; RV64I-NEXT:    or a0, a0, a2
; RV64I-NEXT:    sw a0, 0(a1)
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: bswap_i32_nosext:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.revw a0, a0
; RV64XTHEADBB-NEXT:    sw a0, 0(a1)
; RV64XTHEADBB-NEXT:    ret
 %1 = tail call i32 @llvm.bswap.i32(i32 %a)
 store i32 %1, ptr %x
 ret void
}

declare i64 @llvm.bswap.i64(i64)

define i64 @bswap_i64(i64 %a) {
; RV64I-LABEL: bswap_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srli a1, a0, 40
; RV64I-NEXT:    lui a2, 16
; RV64I-NEXT:    addiw a2, a2, -256
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    srli a3, a0, 56
; RV64I-NEXT:    or a1, a1, a3
; RV64I-NEXT:    srli a3, a0, 24
; RV64I-NEXT:    lui a4, 4080
; RV64I-NEXT:    and a3, a3, a4
; RV64I-NEXT:    srli a5, a0, 8
; RV64I-NEXT:    srliw a5, a5, 24
; RV64I-NEXT:    slli
 a5, a5, 24
; RV64I-NEXT:    or a3, a5, a3
; RV64I-NEXT:    or a1, a3, a1
; RV64I-NEXT:    and a4, a0, a4
; RV64I-NEXT:    slli a4, a4, 24
; RV64I-NEXT:    srliw a3, a0, 24
; RV64I-NEXT:    slli a3, a3, 32
; RV64I-NEXT:    or a3, a4, a3
; RV64I-NEXT:    and a2, a0, a2
; RV64I-NEXT:    slli a2, a2, 40
; RV64I-NEXT:    slli a0, a0, 56
; RV64I-NEXT:    or a0, a0, a2
; RV64I-NEXT:    or a0, a0, a3
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
```

```
;
; RV64XTHEADBB-LABEL: bswap_i64:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.rev a0, a0
; RV64XTHEADBB-NEXT:    ret
 %1 = call i64 @llvm.bswap.i64(i64 %a)
 ret i64 %1
}
; RUN: llc < %s -mtriple=s390x-linux-gnu -mcpu=zEC12 -verify-machineinstrs | FileCheck %s
;
; Test that early if conversion produces LOCR with operands of the right
; register classes.

define void @autogen_SD4739(ptr) {
; CHECK-NOT: Expected a GR32Bit register, but got a GRX32Bit register
BB:
 %L34 = load i8, ptr %0
 %Cmp56 = icmp sgt i8 undef, %L34
 br label %CF246

CF246:                                    ; preds = %CF246, %BB
 %Sl163 = select i1 %Cmp56, i8 %L34, i8 undef
 br i1 undef, label %CF246, label %CF248

CF248:                                    ; preds = %CF248, %CF246
 store i8 %Sl163, ptr %0
 br label %CF248
}
; RUN: llc -march=hexagon -hexagon-hvx-widen=32 < %s | FileCheck %s

; Truncating a type-to-be-widenened to a legal type (v8i8).
; Check that this compiles successfully.
; CHECK-LABEL: f0:
; CHECK: dealloc_return

target datalayout = "e-m:e-p:32:32:32-a:0-n16:32-i64:64:64-i32:32:32-i16:16:16-i1:8:8-f32:32:32-f64:64:64-
v32:32:32-v64:64:64-v512:512:512-v1024:1024:1024-v2048:2048:2048"
target triple = "hexagon"

define dllexport void @f0(ptr %a0) local_unnamed_addr #0 {
b0:
 %v0 = load i8, ptr undef, align 1
 %v1 = zext i8 %v0 to i16
 %v2 = add i16 0, %v1
 %v3 = icmp sgt i16 %v2, 1
 %v4 = select i1 %v3, i16 %v2, i16 1
 %v5 = udiv i16 -32768, %v4
 %v6 = zext i16 %v5 to i32
```

```
 %v7 = insertelement <8 x i32> undef, i32 %v6, i32 0
 %v8 = shufflevector <8 x i32> %v7, <8 x i32> undef, <8 x i32> zeroinitializer
 %v9 = load <8 x i16>, ptr undef, align 2
 %v10 = sext <8 x i16> %v9 to <8 x i32>
 %v11 = mul nsw <8 x i32> %v8, %v10
 %v12 = add nsw <8 x i32> %v11, <i32 16384, i32 16384, i32 16384,
 i32 16384, i32 16384, i32 16384, i32 16384, i32 16384>
 %v13 = lshr <8 x i32> %v12, <i32 15, i32 15, i32 15, i32 15, i32 15, i32 15, i32 15, i32 15>
 %v14 = trunc <8 x i32> %v13 to <8 x i8>
 %v15 = getelementptr inbounds i8, ptr %a0, i32 undef
 store <8 x i8> %v14, ptr %v15, align 1
 ret void
}

attributes #0 = { "target-features"="+hvx,+hvx-length128b" }
; RUN: llc -O3 -mtriple=powerpc-unknown-linux-gnu -mcpu=e500 -mattr=spe < %s | FileCheck %s

; PowerPC SPE is a rare in-tree target that has the FP_TO_SINT node marked
; as Legal.

; Verify that fptosi(42.1) isn't simplified when the rounding mode is
; unknown.
; Verify that no gross errors happen.
; CHECK-LABEL: @f20
; COMMON: cfdctsiz
define i32 @f20(double %a) strictfp {
entry:
 %result = call i32 @llvm.experimental.constrained.fptosi.i32.f64(double 42.1,
                                    metadata !"fpexcept.strict")
                                    strictfp
 ret i32 %result
}

@llvm.fp.env = thread_local global i8 zeroinitializer, section "llvm.metadata"
declare i32 @llvm.experimental.constrained.fptosi.i32.f64(double, metadata)
```

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; NOTE: Assertions have been autogenerated by utils/update_analyze_test_checks.py
; RUN: opt < %s -passes="print<cost-model>" 2>&1 -disable-output -mtriple=x86_64-apple-macosx10.8.0 -mattr=+avx2 | FileCheck %s --check-prefixes=VEC256,AVX
; RUN: opt < %s -passes="print<cost-model>" 2>&1 -disable-output -mtriple=x86_64-apple-macosx10.8.0 -mattr=+avx512vl,+prefer-256-bit | FileCheck %s --check-prefixes=VEC256,AVX512VL256
; RUN: opt < %s -passes="print<cost-model>" 2>&1 -disable-output -mtriple=x86_64-apple-macosx10.8.0 -mattr=+avx512vl,-prefer-256-bit | FileCheck %s --check-prefixes=AVX512VL512
; RUN: opt < %s -passes="print<cost-model>" 2>&1 -disable-output -mtriple=x86_64-apple-macosx10.8.0 -mattr=+avx512vl,+avx512bw,+avx512dq,+prefer-256-bit | FileCheck %s --check-prefixes=VEC256,SKX256
; RUN: opt < %s -passes="print<cost-model>" 2>&1 -disable-output -mtriple=x86_64-apple-macosx10.8.0 -mattr=+avx512vl,+avx512bw,+avx512dq,-prefer-256-bit | FileCheck %s --check-prefixes=SKX512

define
 void @zext256() "min-legal-vector-width"="256" {
; AVX-LABEL: 'zext256'
; AVX-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %A = zext <8 x i16> undef to <8 x i64>
; AVX-NEXT: Cost Model: Found an estimated cost of 5 for instruction: %B = zext <8 x i32> undef to <8 x i64>
; AVX-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %C = zext <16 x i8> undef to <16 x i32>
; AVX-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %D = zext <16 x i16> undef to <16 x i32>
; AVX-NEXT: Cost Model: Found an estimated cost of 5 for instruction: %E = zext <32 x i8> undef to <32 x i16>
; AVX-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL256-LABEL: 'zext256'
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %A = zext <8 x i16> undef to <8 x i64>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %B = zext <8 x i32> undef to <8 x i64>
; AVX512VL256-NEXT: Cost
 Model: Found an estimated cost of 2 for instruction: %C = zext <16 x i8> undef to <16 x i32>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %D = zext <16 x i16> undef to <16 x i32>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %E = zext <32 x i8> undef to <32 x i16>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL512-LABEL: 'zext256'
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %A = zext <8 x i16> undef to <8 x i64>

```
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = zext <8 x i32> undef to
<8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = zext <16 x i8> undef to
<16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = zext <16 x i16> undef to
<16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction:
 %E = zext <32 x i8> undef to <32 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX256-LABEL: 'zext256'
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %A = zext <8 x i16> undef to <8 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %B = zext <8 x i32> undef to <8 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %C = zext <16 x i8> undef to <16 x
i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %D = zext <16 x i16> undef to <16 x
i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %E = zext <32 x i8> undef to <32 x
i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX512-LABEL: 'zext256'
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = zext <8 x i16> undef to <8 x
i64>
; SKX512-NEXT:  Cost Model: Found an estimated
 cost of 1 for instruction: %B = zext <8 x i32> undef to <8 x i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = zext <16 x i8> undef to <16 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = zext <16 x i16> undef to <16 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %E = zext <32 x i8> undef to <32 x
i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
 %A = zext <8 x i16> undef to <8 x i64>
 %B = zext <8 x i32> undef to <8 x i64>
 %C = zext <16 x i8> undef to <16 x i32>
 %D = zext <16 x i16> undef to <16 x i32>
 %E = zext <32 x i8> undef to <32 x i16>
 ret void
}

define void @zext512() "min-legal-vector-width"="512" {
; AVX-LABEL: 'zext512'
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %A = zext <8 x i16> undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %B = zext <8 x i32>
```

```
 undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %C = zext <16 x i8> undef to <16 x i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %D = zext <16 x i16> undef to <16 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %E = zext <32 x i8> undef to <32 x i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL256-LABEL: 'zext512'
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = zext <8 x i16> undef to
<8 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = zext <8 x i32> undef to
<8 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = zext <16 x i8> undef to
<16 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = zext <16 x i16> undef to
<16 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost
 of 3 for instruction: %E = zext <32 x i8> undef to <32 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL512-LABEL: 'zext512'
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = zext <8 x i16> undef to
<8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = zext <8 x i32> undef to
<8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = zext <16 x i8> undef to
<16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = zext <16 x i16> undef to
<16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %E = zext <32 x i8> undef to
<32 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX256-LABEL: 'zext512'
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = zext <8 x i16> undef to <8
 x i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = zext <8 x i32> undef to <8 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = zext <16 x i8> undef to <16 x
i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = zext <16 x i16> undef to <16 x
i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %E = zext <32 x i8> undef to <32 x
i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX512-LABEL: 'zext512'
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = zext <8 x i16> undef to <8 x
```

```
i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = zext <8 x i32> undef to <8 x
i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = zext <16 x i8> undef to <16 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = zext <16
 x i16> undef to <16 x i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %E = zext <32 x i8> undef to <32 x
i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
 %A = zext <8 x i16> undef to <8 x i64>
 %B = zext <8 x i32> undef to <8 x i64>
 %C = zext <16 x i8> undef to <16 x i32>
 %D = zext <16 x i16> undef to <16 x i32>
 %E = zext <32 x i8> undef to <32 x i16>
 ret void
}

define void @sext256() "min-legal-vector-width"="256" {
; AVX-LABEL: 'sext256'
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %B = sext <8 x i16> undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %C = sext <8 x i32> undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %D = sext <16 x i8> undef to <16 x i32>
; AVX-NEXT:  Cost Model: Found
 an estimated cost of 3 for instruction: %E = sext <16 x i16> undef to <16 x i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %F = sext <32 x i8> undef to <32 x i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL256-LABEL: 'sext256'
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %A = sext <8 x i8> undef to <8
x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %B = sext <8 x i16> undef to
<8 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %C = sext <8 x i32> undef to
<8 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %D = sext <16 x i8> undef to
<16 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %E = sext <16 x i16> undef to
<16 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %F = sext <32 x i8> undef
 to <32 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL512-LABEL: 'sext256'
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = sext <8 x i8> undef to <8
x i64>
```

```
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = sext <8 x i16> undef to
<8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = sext <8 x i32> undef to
<8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = sext <16 x i8> undef to
<16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %E = sext <16 x i16> undef to
<16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %F = sext <32 x i8> undef to
<32 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX256-LABEL: 'sext256'
; SKX256-NEXT:  Cost Model: Found an
 estimated cost of 2 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %B = sext <8 x i16> undef to <8 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %C = sext <8 x i32> undef to <8 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %D = sext <16 x i8> undef to <16 x
i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %E = sext <16 x i16> undef to <16 x
i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %F = sext <32 x i8> undef to <32 x
i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX512-LABEL: 'sext256'
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = sext <8 x i16> undef to <8 x
i64>
; SKX512-NEXT:  Cost
 Model: Found an estimated cost of 1 for instruction: %C = sext <8 x i32> undef to <8 x i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = sext <16 x i8> undef to <16 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %E = sext <16 x i16> undef to <16 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %F = sext <32 x i8> undef to <32 x
i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
 %A = sext <8 x i8> undef to <8 x i64>
 %B = sext <8 x i16> undef to <8 x i64>
 %C = sext <8 x i32> undef to <8 x i64>
 %D = sext <16 x i8> undef to <16 x i32>
 %E = sext <16 x i16> undef to <16 x i32>
 %F = sext <32 x i8> undef to <32 x i16>
 ret void
```

```
}

define void @sext512() "min-legal-vector-width"="512" {
; AVX-LABEL: 'sext512'
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found
 an estimated cost of 4 for instruction: %B = sext <8 x i16> undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %C = sext <8 x i32> undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %D = sext <16 x i8> undef to <16 x i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %E = sext <16 x i16> undef to <16 x i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %F = sext <32 x i8> undef to <32 x i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL256-LABEL: 'sext512'
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = sext <8 x i8> undef to <8
x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = sext <8 x i16> undef to
<8 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = sext <8 x i32> undef to
<8 x i64>
; AVX512VL256-NEXT:
  Cost Model: Found an estimated cost of 1 for instruction: %D = sext <16 x i8> undef to <16 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %E = sext <16 x i16> undef to
<16 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %F = sext <32 x i8> undef to
<32 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL512-LABEL: 'sext512'
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = sext <8 x i8> undef to <8
x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = sext <8 x i16> undef to
<8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = sext <8 x i32> undef to
<8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = sext <16 x i8> undef to
<16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost
 of 1 for instruction: %E = sext <16 x i16> undef to <16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %F = sext <32 x i8> undef to
<32 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX256-LABEL: 'sext512'
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = sext <8 x i16> undef to <8 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = sext <8 x i32> undef to <8 x
```

```
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = sext <16 x i8> undef to <16 x
i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %E = sext <16 x i16> undef to <16 x
i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %F = sext <32 x i8> undef to <32 x
i16>
; SKX256-NEXT:  Cost
 Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX512-LABEL: 'sext512'
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = sext <8 x i16> undef to <8 x
i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = sext <8 x i32> undef to <8 x
i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = sext <16 x i8> undef to <16 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %E = sext <16 x i16> undef to <16 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %F = sext <32 x i8> undef to <32 x
i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
 %A = sext <8 x i8> undef to <8 x i64>
 %B = sext <8 x i16> undef to <8 x i64>
 %C = sext <8 x i32> undef to <8 x i64>
 %D = sext <16 x i8>
 undef to <16 x i32>
 %E = sext <16 x i16> undef to <16 x i32>
 %F = sext <32 x i8> undef to <32 x i16>
 ret void
}

define void @trunc256() "min-legal-vector-width"="256" {
; VEC256-LABEL: 'trunc256'
; VEC256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %A = trunc <8 x i64> undef to <8 x
i32>
; VEC256-NEXT:  Cost Model: Found an estimated cost of 10 for instruction: %B = trunc <8 x i64> undef to <8 x
i16>
; VEC256-NEXT:  Cost Model: Found an estimated cost of 8 for instruction: %C = trunc <8 x i64> undef to <8 x
i8>
; VEC256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %D = trunc <16 x i32> undef to <16 x
i16>
; VEC256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %E = trunc <16 x i32> undef to <16 x
i8>
; VEC256-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %F = trunc <32 x i16> undef to <32 x
i8>
```

```
; VEC256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL512-LABEL: 'trunc256'
;
 AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = trunc <8 x i64> undef to
<8 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %B = trunc <8 x i64> undef to
<8 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %C = trunc <8 x i64> undef to
<8 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %D = trunc <16 x i32> undef
to <16 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %E = trunc <16 x i32> undef to
<16 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 8 for instruction: %F = trunc <32 x i16> undef to
<32 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX512-LABEL: 'trunc256'
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = trunc <8 x i64> undef to <8 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated
 cost of 2 for instruction: %B = trunc <8 x i64> undef to <8 x i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %C = trunc <8 x i64> undef to <8 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %D = trunc <16 x i32> undef to <16 x
i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %E = trunc <16 x i32> undef to <16 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %F = trunc <32 x i16> undef to <32 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
 %A = trunc <8 x i64> undef to <8 x i32>
 %B = trunc <8 x i64> undef to <8 x i16>
 %C = trunc <8 x i64> undef to <8 x i8>
 %D = trunc <16 x i32> undef to <16 x i16>
 %E = trunc <16 x i32> undef to <16 x i8>
 %F = trunc <32 x i16> undef to <32 x i8>
 ret void
}

define i32 @zext256_vXi1() "min-legal-vector-width"="256" {
; AVX-LABEL: 'zext256_vXi1'
; AVX-NEXT:  Cost Model: Found
 an estimated cost of 1 for instruction: %V2i64 = zext <2 x i1> undef to <2 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V4i64 = zext <4 x i1> undef to <4 x
i64>
```

```
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V8i64 = zext <8 x i1> undef to <8 x
i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i32 = zext <2 x i1> undef to <2 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i32 = zext <4 x i1> undef to <4 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V8i32 = zext <8 x i1> undef to <8 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V16i32 = zext <16 x i1> undef to <16 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i16 = zext <2 x i1> undef to <2 x
i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i16 = zext <4 x i1> undef to <4 x
i16>
; AVX-NEXT:
  Cost Model: Found an estimated cost of 1 for instruction: %V8i16 = zext <8 x i1> undef to <8 x i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i16 = zext <16 x i1> undef to <16 x
i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V32i16 = zext <32 x i1> undef to <32 x
i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i8 = zext <2 x i1> undef to <2 x i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i8 = zext <4 x i1> undef to <4 x i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i8 = zext <8 x i1> undef to <8 x i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i8 = zext <16 x i1> undef to <16 x
i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V32i8 = zext <32 x i1> undef to <32 x
i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V64i8 = zext <64 x i1> undef
 to <64 x i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; AVX512VL256-LABEL: 'zext256_vXi1'
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i64 = zext <2 x i1> undef
to <2 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i64 = zext <4 x i1> undef
to <4 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %V8i64 = zext <8 x i1> undef
to <8 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i32 = zext <2 x i1> undef
to <2 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i32 = zext <4 x i1> undef
to <4 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = zext <8 x i1> undef
to <8 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V16i32 = zext <16 x i1>
undef to <16 x i32>
; AVX512VL256-NEXT:
```

Cost Model: Found an estimated cost of 5 for instruction: %V2i16 = zext <2 x i1> undef to <2 x i16>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 5 for instruction: %V4i16 = zext <4 x i1> undef to <4 x i16>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 5 for instruction: %V8i16 = zext <8 x i1> undef to <8 x i16>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 12 for instruction: %V16i16 = zext <16 x i1> undef to <16 x i16>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 24 for instruction: %V32i16 = zext <32 x i1> undef to <32 x i16>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 6 for instruction: %V2i8 = zext <2 x i1> undef to <2 x i8>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 6 for instruction: %V4i8 = zext <4 x i1> undef to <4 x i8>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 6 for instruction: %V8i8 = zext <8 x i1> undef to <8 x i8>
; AVX512VL256-NEXT: Cost Model: Found an estimated
cost of 12 for instruction: %V16i8 = zext <16 x i1> undef to <16 x i8>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 25 for instruction: %V32i8 = zext <32 x i1> undef to <32 x i8>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 50 for instruction: %V64i8 = zext <64 x i1> undef to <64 x i8>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; AVX512VL512-LABEL: 'zext256_vXi1'
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V2i64 = zext <2 x i1> undef to <2 x i64>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V4i64 = zext <4 x i1> undef to <4 x i64>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V8i64 = zext <8 x i1> undef to <8 x i64>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V2i32 = zext <2 x i1> undef to <2 x i32>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of
2 for instruction: %V4i32 = zext <4 x i1> undef to <4 x i32>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = zext <8 x i1> undef to <8 x i32>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V16i32 = zext <16 x i1> undef to <16 x i32>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %V2i16 = zext <2 x i1> undef to <2 x i16>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %V4i16 = zext <4 x i1> undef to <4 x i16>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %V8i16 = zext <8 x i1> undef to <8 x i16>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %V16i16 = zext <16 x i1> undef to <16 x i16>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 9 for instruction: %V32i16 = zext <32 x i1> undef to <32 x i16>

; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %V2i8
 = zext <2 x i1> undef to <2 x i8>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %V4i8 = zext <4 x i1> undef to <4 x i8>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %V8i8 = zext <8 x i1> undef to <8 x i8>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %V16i8 = zext <16 x i1> undef to <16 x i8>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 9 for instruction: %V32i8 = zext <32 x i1> undef to <32 x i8>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 19 for instruction: %V64i8 = zext <64 x i1> undef to <64 x i8>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; SKX256-LABEL: 'zext256_vXi1'
; SKX256-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V2i64 = zext <2 x i1> undef to <2 x i64>
; SKX256-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V4i64 = zext <4 x i1> undef to <4 x i64>
;
 SKX256-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %V8i64 = zext <8 x i1> undef to <8 x i64>
; SKX256-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V2i32 = zext <2 x i1> undef to <2 x i32>
; SKX256-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V4i32 = zext <4 x i1> undef to <4 x i32>
; SKX256-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = zext <8 x i1> undef to <8 x i32>
; SKX256-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %V16i32 = zext <16 x i1> undef to <16 x i32>
; SKX256-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V2i16 = zext <2 x i1> undef to <2 x i16>
; SKX256-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V4i16 = zext <4 x i1> undef to <4 x i16>
; SKX256-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V8i16 = zext <8 x i1> undef to <8 x i16>
; SKX256-NEXT: Cost Model: Found an estimated cost of 2 for instruction:
 %V16i16 = zext <16 x i1> undef to <16 x i16>
; SKX256-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %V32i16 = zext <32 x i1> undef to <32 x i16>
; SKX256-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V2i8 = zext <2 x i1> undef to <2 x i8>
; SKX256-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V4i8 = zext <4 x i1> undef to <4 x i8>
; SKX256-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V8i8 = zext <8 x i1> undef to <8 x i8>
; SKX256-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V16i8 = zext <16 x i1> undef to <16 x i8>

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; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V32i8 = zext <32 x i1> undef to <32
x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V64i8 = zext <64 x i1> undef to <64
x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; SKX512-LABEL: 'zext256_vXi1'
; SKX512-NEXT:  Cost
 Model: Found an estimated cost of 2 for instruction: %V2i64 = zext <2 x i1> undef to <2 x i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i64 = zext <4 x i1> undef to <4 x
i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i64 = zext <8 x i1> undef to <8 x
i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i32 = zext <2 x i1> undef to <2 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i32 = zext <4 x i1> undef to <4 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = zext <8 x i1> undef to <8 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i32 = zext <16 x i1> undef to
<16 x i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i16 = zext <2 x i1> undef to <2 x
i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i16 = zext
 <4 x i1> undef to <4 x i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i16 = zext <8 x i1> undef to <8 x
i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i16 = zext <16 x i1> undef to
<16 x i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V32i16 = zext <32 x i1> undef to
<32 x i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i8 = zext <2 x i1> undef to <2 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i8 = zext <4 x i1> undef to <4 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i8 = zext <8 x i1> undef to <8 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i8 = zext <16 x i1> undef to <16
x i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V32i8 = zext <32 x i1> undef to <32
x i8>
; SKX512-NEXT:  Cost Model: Found an estimated
 cost of 2 for instruction: %V64i8 = zext <64 x i1> undef to <64 x i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
 %V2i64 = zext <2 x i1> undef to <2 x i64>
 %V4i64 = zext <4 x i1> undef to <4 x i64>
 %V8i64 = zext <8 x i1> undef to <8 x i64>
```

```
 %V2i32 = zext <2 x i1> undef to <2 x i32>
 %V4i32 = zext <4 x i1> undef to <4 x i32>
 %V8i32 = zext <8 x i1> undef to <8 x i32>
 %V16i32 = zext <16 x i1> undef to <16 x i32>

 %V2i16 = zext <2 x i1> undef to <2 x i16>
 %V4i16 = zext <4 x i1> undef to <4 x i16>
 %V8i16 = zext <8 x i1> undef to <8 x i16>
 %V16i16 = zext <16 x i1> undef to <16 x i16>
 %V32i16 = zext <32 x i1> undef to <32 x i16>

 %V2i8 = zext <2 x i1> undef to <2 x i8>
 %V4i8 = zext <4 x i1> undef to <4 x i8>
 %V8i8 = zext <8 x i1> undef to <8 x i8>
 %V16i8 = zext <16 x i1> undef to <16 x i8>
 %V32i8 = zext <32 x i1> undef to <32 x i8>
 %V64i8 = zext <64 x i1> undef to <64 x i8>

 ret i32 undef
}

define i32 @sext256_vXi1()
 "min-legal-vector-width"="256" {
; AVX-LABEL: 'sext256_vXi1'
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I64 = sext i1 undef to i64
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i64 = sext <2 x i1> undef to <2 x
i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V4i64 = sext <4 x i1> undef to <4 x
i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V8i64 = sext <8 x i1> undef to <8 x
i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I32 = sext i1 undef to i32
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i32 = sext <2 x i1> undef to <2 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i32 = sext <4 x i1> undef to <4 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V8i32 = sext <8 x i1> undef to <8 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost
 of 4 for instruction: %V16i32 = sext <16 x i1> undef to <16 x i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I16 = sext i1 undef to i16
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i16 = sext <2 x i1> undef to <2 x
i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i16 = sext <4 x i1> undef to <4 x
i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i16 = sext <8 x i1> undef to <8 x
i16>
```

```
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i16 = sext <16 x i1> undef to <16 x i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V32i16 = sext <32 x i1> undef to <32 x i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I8 = sext i1 undef to i8
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i8 = sext <2 x i1> undef to <2 x i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for
 instruction: %V4i8 = sext <4 x i1> undef to <4 x i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i8 = sext <8 x i1> undef to <8 x i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i8 = sext <16 x i1> undef to <16 x i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V32i8 = sext <32 x i1> undef to <32 x i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V64i8 = sext <64 x i1> undef to <64 x i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; AVX512VL256-LABEL: 'sext256_vXi1'
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I64 = sext i1 undef to i64
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i64 = sext <2 x i1> undef to <2 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i64 = sext <4 x i1> undef to <4 x i64>
; AVX512VL256-NEXT:
  Cost Model: Found an estimated cost of 3 for instruction: %V8i64 = sext <8 x i1> undef to <8 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I32 = sext i1 undef to i32
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i32 = sext <2 x i1> undef to <2 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i32 = sext <4 x i1> undef to <4 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i32 = sext <8 x i1> undef to <8 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i32 = sext <16 x i1> undef to <16 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I16 = sext i1 undef to i16
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V2i16 = sext <2 x i1> undef to <2 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction:
 %V4i16 = sext <4 x i1> undef to <4 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V8i16 = sext <8 x i1> undef to <8 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 10 for instruction: %V16i16 = sext <16 x i1> undef to <16 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 20 for instruction: %V32i16 = sext <32 x i1> undef to <32 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I8 = sext i1 undef to i8
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %V2i8 = sext <2 x i1> undef to <2 x i8>
```

; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 5 for instruction: %V4i8 = sext <4 x i1> undef to <4 x i8>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 5 for instruction: %V8i8 = sext <8 x i1> undef to <8 x i8>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 10 for instruction: %V16i8 = sext <16 x i1> undef to <16 x i8>
;
 AVX512VL256-NEXT: Cost Model: Found an estimated cost of 21 for instruction: %V32i8 = sext <32 x i1> undef to <32 x i8>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 42 for instruction: %V64i8 = sext <64 x i1> undef to <64 x i8>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; AVX512VL512-LABEL: 'sext256_vXi1'
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %I64 = sext i1 undef to i64
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %V2i64 = sext <2 x i1> undef to <2 x i64>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %V4i64 = sext <4 x i1> undef to <4 x i64>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %V8i64 = sext <8 x i1> undef to <8 x i64>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %I32 = sext i1 undef to i32
; AVX512VL512-NEXT: Cost Model: Found an estimated
 cost of 1 for instruction: %V2i32 = sext <2 x i1> undef to <2 x i32>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %V4i32 = sext <4 x i1> undef to <4 x i32>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %V8i32 = sext <8 x i1> undef to <8 x i32>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %V16i32 = sext <16 x i1> undef to <16 x i32>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %I16 = sext i1 undef to i16
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %V2i16 = sext <2 x i1> undef to <2 x i16>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %V4i16 = sext <4 x i1> undef to <4 x i16>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %V8i16 = sext <8 x i1> undef to <8 x i16>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %V16i16 =
 sext <16 x i1> undef to <16 x i16>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 7 for instruction: %V32i16 = sext <32 x i1> undef to <32 x i16>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %I8 = sext i1 undef to i8
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %V2i8 = sext <2 x i1> undef to <2 x i8>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %V4i8 = sext <4 x i1> undef to <4 x i8>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %V8i8 = sext <8 x i1> undef to <8 x i8>

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; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V16i8 = sext <16 x i1> undef
to <16 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 7 for instruction: %V32i8 = sext <32 x i1> undef
to <32 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 15 for instruction: %V64i8 = sext <64 x i1>
undef to <64 x i8>
; AVX512VL512-NEXT:
  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; SKX256-LABEL: 'sext256_vXi1'
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I64 = sext i1 undef to i64
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i64 = sext <2 x i1> undef to <2 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i64 = sext <4 x i1> undef to <4 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i64 = sext <8 x i1> undef to <8 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I32 = sext i1 undef to i32
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i32 = sext <2 x i1> undef to <2 x
i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i32 = sext <4 x i1> undef to <4 x
i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i32 = sext <8 x i1> undef
 to <8 x i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i32 = sext <16 x i1> undef to
<16 x i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I16 = sext i1 undef to i16
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i16 = sext <2 x i1> undef to <2 x
i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i16 = sext <4 x i1> undef to <4 x
i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i16 = sext <8 x i1> undef to <8 x
i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i16 = sext <16 x i1> undef to
<16 x i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V32i16 = sext <32 x i1> undef to
<32 x i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I8 = sext i1 undef to i8
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i8
 = sext <2 x i1> undef to <2 x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i8 = sext <4 x i1> undef to <4 x
i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i8 = sext <8 x i1> undef to <8 x
i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i8 = sext <16 x i1> undef to <16
x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V32i8 = sext <32 x i1> undef to <32
x i8>
```

```
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V64i8 = sext <64 x i1> undef to <64
x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; SKX512-LABEL: 'sext256_vXi1'
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I64 = sext i1 undef to i64
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i64 = sext <2 x i1> undef to <2 x
i64>
; SKX512-NEXT:  Cost Model: Found an estimated
 cost of 1 for instruction: %V4i64 = sext <4 x i1> undef to <4 x i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i64 = sext <8 x i1> undef to <8 x
i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I32 = sext i1 undef to i32
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i32 = sext <2 x i1> undef to <2 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i32 = sext <4 x i1> undef to <4 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i32 = sext <8 x i1> undef to <8 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i32 = sext <16 x i1> undef to
<16 x i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I16 = sext i1 undef to i16
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i16 = sext <2 x i1> undef to <2 x
i16>
; SKX512-NEXT:  Cost Model:
 Found an estimated cost of 1 for instruction: %V4i16 = sext <4 x i1> undef to <4 x i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i16 = sext <8 x i1> undef to <8 x
i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i16 = sext <16 x i1> undef to
<16 x i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V32i16 = sext <32 x i1> undef to
<32 x i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I8 = sext i1 undef to i8
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i8 = sext <2 x i1> undef to <2 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i8 = sext <4 x i1> undef to <4 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i8 = sext <8 x i1> undef to <8 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i8 = sext <16 x i1> undef to <16
x i8>
;
 SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V32i8 = sext <32 x i1> undef to <32
x i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V64i8 = sext <64 x i1> undef to <64
x i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
```

```
 %I64 = sext i1 undef to i64
 %V2i64 = sext <2 x i1> undef to <2 x i64>
 %V4i64 = sext <4 x i1> undef to <4 x i64>
 %V8i64 = sext <8 x i1> undef to <8 x i64>

 %I32 = sext i1 undef to i32
 %V2i32 = sext <2 x i1> undef to <2 x i32>
 %V4i32 = sext <4 x i1> undef to <4 x i32>
 %V8i32 = sext <8 x i1> undef to <8 x i32>
 %V16i32 = sext <16 x i1> undef to <16 x i32>

 %I16 = sext i1 undef to i16
 %V2i16 = sext <2 x i1> undef to <2 x i16>
 %V4i16 = sext <4 x i1> undef to <4 x i16>
 %V8i16 = sext <8 x i1> undef to <8 x i16>
 %V16i16 = sext <16 x i1> undef to <16 x i16>
 %V32i16 = sext <32 x i1> undef to <32 x i16>

 %I8 = sext i1 undef to i8
 %V2i8 = sext <2
 x i1> undef to <2 x i8>
 %V4i8 = sext <4 x i1> undef to <4 x i8>
 %V8i8 = sext <8 x i1> undef to <8 x i8>
 %V16i8 = sext <16 x i1> undef to <16 x i8>
 %V32i8 = sext <32 x i1> undef to <32 x i8>
 %V64i8 = sext <64 x i1> undef to <64 x i8>

 ret i32 undef
}

define i32 @trunc_vXi1() "min-legal-vector-width"="256" {
; AVX-LABEL: 'trunc_vXi1'
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V2i64 = trunc <2 x i64> undef to <2 x
i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V4i64 = trunc <4 x i64> undef to <4 x
i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 9 for instruction: %V8i64 = trunc <8 x i64> undef to <8 x
i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 11 for instruction: %V16i64 = trunc <16 x i64> undef to
<16 x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i64 = trunc <32 x i64> undef to <32
x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V64i64
 = trunc <64 x i64> undef to <64 x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i32 = trunc <2 x i32> undef to <2 x
i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V4i32 = trunc <4 x i32> undef to <4 x
i1>
```

; AVX-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = trunc <8 x i32> undef to <8 x i1>
; AVX-NEXT: Cost Model: Found an estimated cost of 8 for instruction: %V16i32 = trunc <16 x i32> undef to <16 x i1>
; AVX-NEXT: Cost Model: Found an estimated cost of 0 for instruction: %V32i32 = trunc <32 x i32> undef to <32 x i1>
; AVX-NEXT: Cost Model: Found an estimated cost of 0 for instruction: %V64i32 = trunc <64 x i32> undef to <64 x i1>
; AVX-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %V2i16 = trunc <2 x i16> undef to <2 x i1>
; AVX-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %V4i16 = trunc <4 x i16> undef to <4 x i1>
; AVX-NEXT: Cost Model: Found an estimated
 cost of 0 for instruction: %V8i16 = trunc <8 x i16> undef to <8 x i1>
; AVX-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %V16i16 = trunc <16 x i16> undef to <16 x i1>
; AVX-NEXT: Cost Model: Found an estimated cost of 0 for instruction: %V32i16 = trunc <32 x i16> undef to <32 x i1>
; AVX-NEXT: Cost Model: Found an estimated cost of 0 for instruction: %V64i16 = trunc <64 x i16> undef to <64 x i1>
; AVX-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %V2i8 = trunc <2 x i8> undef to <2 x i1>
; AVX-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %V4i8 = trunc <4 x i8> undef to <4 x i1>
; AVX-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %V8i8 = trunc <8 x i8> undef to <8 x i1>
; AVX-NEXT: Cost Model: Found an estimated cost of 0 for instruction: %V16i8 = trunc <16 x i8> undef to <16 x i1>
; AVX-NEXT: Cost Model: Found an estimated cost of 0 for instruction: %V32i8 = trunc <32 x i8> undef to <32 x i1>
; AVX-NEXT:
  Cost Model: Found an estimated cost of 0 for instruction: %V64i8 = trunc <64 x i8> undef to <64 x i1>
; AVX-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; AVX512VL256-LABEL: 'trunc_vXi1'
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V2i64 = trunc <2 x i64> undef to <2 x i1>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V4i64 = trunc <4 x i64> undef to <4 x i1>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 9 for instruction: %V8i64 = trunc <8 x i64> undef to <8 x i1>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 11 for instruction: %V16i64 = trunc <16 x i64> undef to <16 x i1>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 0 for instruction: %V32i64 = trunc <32 x i64> undef to <32 x i1>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 0 for instruction: %V64i64 = trunc <64 x i64> undef to <64 x i1>
; AVX512VL256-NEXT: Cost Model:
 Found an estimated cost of 2 for instruction: %V2i32 = trunc <2 x i32> undef to <2 x i1>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V4i32 = trunc <4 x i32> undef to <4 x i1>

```
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = trunc <8 x i32>
undef to <8 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V16i32 = trunc <16 x i32>
undef to <16 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 8 for instruction: %V32i32 = trunc <32 x i32>
undef to <32 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 16 for instruction: %V64i32 = trunc <64 x i32>
undef to <64 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V2i16 = trunc <2 x i16>
undef to <2 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V4i16 = trunc <4 x i16>
undef to <4 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an
 estimated cost of 3 for instruction: %V8i16 = trunc <8 x i16> undef to <8 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 8 for instruction: %V16i16 = trunc <16 x i16>
undef to <16 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 16 for instruction: %V32i16 = trunc <32 x i16>
undef to <32 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 32 for instruction: %V64i16 = trunc <64 x i16>
undef to <64 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V2i8 = trunc <2 x i8> undef
to <2 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V4i8 = trunc <4 x i8> undef
to <4 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V8i8 = trunc <8 x i8> undef
to <8 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 8 for instruction: %V16i8 = trunc <16 x i8>
undef to <16 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of
 0 for instruction: %V32i8 = trunc <32 x i8> undef to <32 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V64i8 = trunc <64 x i8>
undef to <64 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; AVX512VL512-LABEL: 'trunc_vXi1'
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i64 = trunc <2 x i64>
undef to <2 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i64 = trunc <4 x i64>
undef to <4 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i64 = trunc <8 x i64>
undef to <8 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 11 for instruction: %V16i64 = trunc <16 x i64>
undef to <16 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i64 = trunc <32 x i64>
undef to <32 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction:
 %V64i64 = trunc <64 x i64> undef to <64 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i32 = trunc <2 x i32>
```

undef to <2 x i1>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V4i32 = trunc <4 x i32> undef to <4 x i1>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = trunc <8 x i32> undef to <8 x i1>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V16i32 = trunc <16 x i32> undef to <16 x i1>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %V32i32 = trunc <32 x i32> undef to <32 x i1>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 8 for instruction: %V64i32 = trunc <64 x i32> undef to <64 x i1>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %V2i16 = trunc <2 x i16> undef to <2 x i1>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 3 for instruction:
 %V4i16 = trunc <4 x i16> undef to <4 x i1>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %V8i16 = trunc <8 x i16> undef to <8 x i1>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %V16i16 = trunc <16 x i16> undef to <16 x i1>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 0 for instruction: %V32i16 = trunc <32 x i16> undef to <32 x i1>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 0 for instruction: %V64i16 = trunc <64 x i16> undef to <64 x i1>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %V2i8 = trunc <2 x i8> undef to <2 x i1>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %V4i8 = trunc <4 x i8> undef to <4 x i1>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %V8i8 = trunc <8 x i8> undef to <8 x i1>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %V16i8 = trunc <16 x
 i8> undef to <16 x i1>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 0 for instruction: %V32i8 = trunc <32 x i8> undef to <32 x i1>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 0 for instruction: %V64i8 = trunc <64 x i8> undef to <64 x i1>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; SKX256-LABEL: 'trunc_vXi1'
; SKX256-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V2i64 = trunc <2 x i64> undef to <2 x i1>
; SKX256-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V4i64 = trunc <4 x i64> undef to <4 x i1>
; SKX256-NEXT: Cost Model: Found an estimated cost of 9 for instruction: %V8i64 = trunc <8 x i64> undef to <8 x i1>
; SKX256-NEXT: Cost Model: Found an estimated cost of 11 for instruction: %V16i64 = trunc <16 x i64> undef to <16 x i1>
; SKX256-NEXT: Cost Model: Found an estimated cost of 0 for instruction: %V32i64 = trunc <32 x i64> undef to <32 x i1>

```
; SKX256-NEXT:
  Cost Model: Found an estimated cost of 0 for instruction: %V64i64 = trunc <64 x i64> undef to <64 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i32 = trunc <2 x i32> undef to <2
x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i32 = trunc <4 x i32> undef to <4
x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = trunc <8 x i32> undef to <8
x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V16i32 = trunc <16 x i32> undef to
<16 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i32 = trunc <32 x i32> undef to
<32 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V64i32 = trunc <64 x i32> undef to
<64 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i16 = trunc <2 x i16> undef to <2
x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction:
 %V4i16 = trunc <4 x i16> undef to <4 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i16 = trunc <8 x i16> undef to <8
x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i16 = trunc <16 x i16> undef to
<16 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V32i16 = trunc <32 x i16> undef to
<32 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 8 for instruction: %V64i16 = trunc <64 x i16> undef to
<64 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i8 = trunc <2 x i8> undef to <2 x
i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i8 = trunc <4 x i8> undef to <4 x
i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i8 = trunc <8 x i8> undef to <8 x
i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i8 = trunc <16 x i8> undef to
<16 x i1>
; SKX256-NEXT:
  Cost Model: Found an estimated cost of 2 for instruction: %V32i8 = trunc <32 x i8> undef to <32 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V64i8 = trunc <64 x i8> undef to
<64 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; SKX512-LABEL: 'trunc_vXi1'
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i64 = trunc <2 x i64> undef to <2
x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i64 = trunc <4 x i64> undef to <4
x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i64 = trunc <8 x i64> undef to <8
x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 11 for instruction: %V16i64 = trunc <16 x i64> undef to
```

<16 x i1>
; SKX512-NEXT: Cost Model: Found an estimated cost of 0 for instruction: %V32i64 = trunc <32 x i64> undef to <32 x i1>
; SKX512-NEXT: Cost Model: Found an estimated cost of 0 for instruction:
 %V64i64 = trunc <64 x i64> undef to <64 x i1>
; SKX512-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V2i32 = trunc <2 x i32> undef to <2 x i1>
; SKX512-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V4i32 = trunc <4 x i32> undef to <4 x i1>
; SKX512-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = trunc <8 x i32> undef to <8 x i1>
; SKX512-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V16i32 = trunc <16 x i32> undef to <16 x i1>
; SKX512-NEXT: Cost Model: Found an estimated cost of 0 for instruction: %V32i32 = trunc <32 x i32> undef to <32 x i1>
; SKX512-NEXT: Cost Model: Found an estimated cost of 0 for instruction: %V64i32 = trunc <64 x i32> undef to <64 x i1>
; SKX512-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V2i16 = trunc <2 x i16> undef to <2 x i1>
; SKX512-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V4i16 = trunc <4 x i16> undef to <4 x i1>
;
 SKX512-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V8i16 = trunc <8 x i16> undef to <8 x i1>
; SKX512-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V16i16 = trunc <16 x i16> undef to <16 x i1>
; SKX512-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V32i16 = trunc <32 x i16> undef to <32 x i1>
; SKX512-NEXT: Cost Model: Found an estimated cost of 4 for instruction: %V64i16 = trunc <64 x i16> undef to <64 x i1>
; SKX512-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V2i8 = trunc <2 x i8> undef to <2 x i1>
; SKX512-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V4i8 = trunc <4 x i8> undef to <4 x i1>
; SKX512-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V8i8 = trunc <8 x i8> undef to <8 x i1>
; SKX512-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V16i8 = trunc <16 x i8> undef to <16 x i1>
; SKX512-NEXT: Cost Model: Found an estimated cost of 2 for
 instruction: %V32i8 = trunc <32 x i8> undef to <32 x i1>
; SKX512-NEXT: Cost Model: Found an estimated cost of 2 for instruction: %V64i8 = trunc <64 x i8> undef to <64 x i1>
; SKX512-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
 %V2i64 = trunc <2 x i64> undef to <2 x i1>
 %V4i64 = trunc <4 x i64> undef to <4 x i1>
 %V8i64 = trunc <8 x i64> undef to <8 x i1>
 %V16i64 = trunc <16 x i64> undef to <16 x i1>

```
 %V32i64 = trunc <32 x i64> undef to <32 x i1>
 %V64i64 = trunc <64 x i64> undef to <64 x i1>

 %V2i32 = trunc <2 x i32> undef to <2 x i1>
 %V4i32 = trunc <4 x i32> undef to <4 x i1>
 %V8i32 = trunc <8 x i32> undef to <8 x i1>
 %V16i32 = trunc <16 x i32> undef to <16 x i1>
 %V32i32 = trunc <32 x i32> undef to <32 x i1>
 %V64i32 = trunc <64 x i32> undef to <64 x i1>

 %V2i16 = trunc <2 x i16> undef to <2 x i1>
 %V4i16 = trunc <4 x i16> undef to <4 x i1>
 %V8i16 = trunc <8 x i16> undef to <8 x i1>
 %V16i16 = trunc <16 x i16> undef to
 <16 x i1>
 %V32i16 = trunc <32 x i16> undef to <32 x i1>
 %V64i16 = trunc <64 x i16> undef to <64 x i1>

 %V2i8 = trunc <2 x i8> undef to <2 x i1>
 %V4i8 = trunc <4 x i8> undef to <4 x i1>
 %V8i8 = trunc <8 x i8> undef to <8 x i1>
 %V16i8 = trunc <16 x i8> undef to <16 x i1>
 %V32i8 = trunc <32 x i8> undef to <32 x i1>
 %V64i8 = trunc <64 x i8> undef to <64 x i1>

 ret i32 undef
}
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -mattr=+m -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefix=RV64

;
; Get the actual value of the overflow bit.
;
define zeroext i1 @saddo1.i32(i32 signext %v1, i32 signext %v2, ptr %res) {
; RV64-LABEL: saddo1.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addw a3, a0, a1
; RV64-NEXT:    slt a0, a3, a0
; RV64-NEXT:    slti a1, a1, 0
; RV64-NEXT:    xor a0, a1, a0
; RV64-NEXT:    sw a3, 0(a2)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.sadd.with.overflow.i32(i32 %v1, i32 %v2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
```

```
 ret i1 %obit
}

; Test the immediate version.
define zeroext i1 @saddo2.i32(i32 signext %v1, ptr %res) {
; RV64-LABEL: saddo2.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addiw a2, a0, 4
; RV64-NEXT:    slt a0, a2, a0
; RV64-NEXT:
    sw a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.sadd.with.overflow.i32(i32 %v1, i32 4)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

; Test negative immediates.
define zeroext i1 @saddo3.i32(i32 signext %v1, ptr %res) {
; RV64-LABEL: saddo3.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addiw a2, a0, -4
; RV64-NEXT:    slt a0, a2, a0
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    sw a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.sadd.with.overflow.i32(i32 %v1, i32 -4)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

; Test immediates that are too large to be encoded.
define zeroext i1 @saddo4.i32(i32 signext %v1, ptr %res) {
; RV64-LABEL: saddo4.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    lui a2, 4096
; RV64-NEXT:    addi a2, a2, -1
; RV64-NEXT:    addw a2, a0, a2
; RV64-NEXT:    slt
 a0, a2, a0
; RV64-NEXT:    sw a2, 0(a1)
; RV64-NEXT:    ret
```

```
entry:
 %t = call {i32, i1} @llvm.sadd.with.overflow.i32(i32 %v1, i32 16777215)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @saddo1.i64(i64 %v1, i64 %v2, ptr %res) {
; RV64-LABEL: saddo1.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    add a3, a0, a1
; RV64-NEXT:    slt a0, a3, a0
; RV64-NEXT:    slti a1, a1, 0
; RV64-NEXT:    xor a0, a1, a0
; RV64-NEXT:    sd a3, 0(a2)
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.sadd.with.overflow.i64(i64 %v1, i64 %v2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @saddo2.i64(i64 %v1, ptr %res) {
; RV64-LABEL: saddo2.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addi a2, a0, 4
; RV64-NEXT:    slt a0, a2, a0
; RV64-NEXT:    sd a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1}
 @llvm.sadd.with.overflow.i64(i64 %v1, i64 4)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @saddo3.i64(i64 %v1, ptr %res) {
; RV64-LABEL: saddo3.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addi a2, a0, -4
; RV64-NEXT:    slt a0, a2, a0
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    sd a2, 0(a1)
```

```
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.sadd.with.overflow.i64(i64 %v1, i64 -4)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @uaddo.i32(i32 signext %v1, i32 signext %v2, ptr %res) {
; RV64-LABEL: uaddo.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addw a1, a0, a1
; RV64-NEXT:    sltu a0, a1, a0
; RV64-NEXT:    sw a1, 0(a2)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.uadd.with.overflow.i32(i32 %v1, i32 %v2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32,
 i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @uaddo.i32.constant(i32 signext %v1, ptr %res) {
; RV64-LABEL: uaddo.i32.constant:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addiw a2, a0, -2
; RV64-NEXT:    sltu a0, a2, a0
; RV64-NEXT:    sw a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.uadd.with.overflow.i32(i32 %v1, i32 -2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @uaddo.i32.constant_one(i32 signext %v1, ptr %res) {
; RV64-LABEL: uaddo.i32.constant_one:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addiw a2, a0, 1
; RV64-NEXT:    seqz a0, a2
; RV64-NEXT:    sw a2, 0(a1)
; RV64-NEXT:    ret
entry:
```

```
 %t = call {i32, i1} @llvm.uadd.with.overflow.i32(i32 %v1, i32 1)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @uaddo.i64(i64 %v1, i64 %v2, ptr
 %res) {
; RV64-LABEL: uaddo.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    add a1, a0, a1
; RV64-NEXT:    sltu a0, a1, a0
; RV64-NEXT:    sd a1, 0(a2)
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.uadd.with.overflow.i64(i64 %v1, i64 %v2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @uaddo.i64.constant_one(i64 %v1, ptr %res) {
; RV64-LABEL: uaddo.i64.constant_one:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addi a2, a0, 1
; RV64-NEXT:    seqz a0, a2
; RV64-NEXT:    sd a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.uadd.with.overflow.i64(i64 %v1, i64 1)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @ssubo1.i32(i32 signext %v1, i32 signext %v2, ptr %res) {
; RV64-LABEL: ssubo1.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    sgtz a3, a1
; RV64-NEXT:    subw a1,
 a0, a1
; RV64-NEXT:    slt a0, a1, a0
; RV64-NEXT:    xor a0, a3, a0
; RV64-NEXT:    sw a1, 0(a2)
; RV64-NEXT:    ret
```

```
entry:
 %t = call {i32, i1} @llvm.ssub.with.overflow.i32(i32 %v1, i32 %v2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @ssubo2.i32(i32 signext %v1, ptr %res) {
; RV64-LABEL: ssubo2.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addiw a2, a0, 4
; RV64-NEXT:    slt a0, a2, a0
; RV64-NEXT:    sw a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.ssub.with.overflow.i32(i32 %v1, i32 -4)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @ssubo.i64(i64 %v1, i64 %v2, ptr %res) {
; RV64-LABEL: ssubo.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    sgtz a3, a1
; RV64-NEXT:    sub a1, a0, a1
; RV64-NEXT:    slt a0, a1, a0
; RV64-NEXT:    xor a0, a3, a0
; RV64-NEXT:    sd a1,
 0(a2)
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.ssub.with.overflow.i64(i64 %v1, i64 %v2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @usubo.i32(i32 signext %v1, i32 signext %v2, ptr %res) {
; RV64-LABEL: usubo.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    subw a1, a0, a1
; RV64-NEXT:    sltu a0, a0, a1
; RV64-NEXT:    sw a1, 0(a2)
; RV64-NEXT:    ret
```

```
entry:
 %t = call {i32, i1} @llvm.usub.with.overflow.i32(i32 %v1, i32 %v2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @usubo.i32.constant.rhs(i32 signext %v1, ptr %res) {
; RV64-LABEL: usubo.i32.constant.rhs:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addiw a2, a0, 2
; RV64-NEXT:    sltu a0, a0, a2
; RV64-NEXT:    sw a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.usub.with.overflow.i32(i32 %v1, i32 -2)

 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @usubo.i32.constant.lhs(i32 signext %v1, ptr %res) {
; RV64-LABEL: usubo.i32.constant.lhs:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    li a2, -2
; RV64-NEXT:    subw a2, a2, a0
; RV64-NEXT:    addi a0, a2, 1
; RV64-NEXT:    seqz a0, a0
; RV64-NEXT:    sw a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.usub.with.overflow.i32(i32 -2, i32 %v1)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @usubo.i64(i64 %v1, i64 %v2, ptr %res) {
; RV64-LABEL: usubo.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    sub a1, a0, a1
; RV64-NEXT:    sltu a0, a0, a1
; RV64-NEXT:    sd a1, 0(a2)
; RV64-NEXT:    ret
```

```
entry:
 %t = call {i64, i1} @llvm.usub.with.overflow.i64(i64 %v1, i64 %v2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t,
 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @smulo.i32(i32 signext %v1, i32 signext %v2, ptr %res) {
; RV64-LABEL: smulo.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    mul a1, a0, a1
; RV64-NEXT:    srai a0, a1, 32
; RV64-NEXT:    sraiw a3, a1, 31
; RV64-NEXT:    xor a0, a0, a3
; RV64-NEXT:    snez a0, a0
; RV64-NEXT:    sw a1, 0(a2)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.smul.with.overflow.i32(i32 %v1, i32 %v2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @smulo2.i32(i32 signext %v1, ptr %res) {
; RV64-LABEL: smulo2.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    li a2, 13
; RV64-NEXT:    mul a2, a0, a2
; RV64-NEXT:    srai a0, a2, 32
; RV64-NEXT:    sraiw a3, a2, 31
; RV64-NEXT:    xor a0, a0, a3
; RV64-NEXT:    snez a0, a0
; RV64-NEXT:    sw a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.smul.with.overflow.i32(i32 %v1, i32
 13)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @smulo.i64(i64 %v1, i64 %v2, ptr %res) {
```

```
; RV64-LABEL: smulo.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    mulh a3, a0, a1
; RV64-NEXT:    mul a1, a0, a1
; RV64-NEXT:    srai a0, a1, 63
; RV64-NEXT:    xor a0, a3, a0
; RV64-NEXT:    snez a0, a0
; RV64-NEXT:    sd a1, 0(a2)
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.smul.with.overflow.i64(i64 %v1, i64 %v2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @smulo2.i64(i64 %v1, ptr %res) {
; RV64-LABEL: smulo2.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    li a2, 13
; RV64-NEXT:    mulh a3, a0, a2
; RV64-NEXT:    mul a2, a0, a2
; RV64-NEXT:    srai a0, a2, 63
; RV64-NEXT:    xor a0, a3, a0
; RV64-NEXT:    snez a0, a0
; RV64-NEXT:    sd a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call
 {i64, i1} @llvm.smul.with.overflow.i64(i64 %v1, i64 13)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @umulo.i32(i32 signext %v1, i32 signext %v2, ptr %res) {
; RV64-LABEL: umulo.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    slli a1, a1, 32
; RV64-NEXT:    slli a0, a0, 32
; RV64-NEXT:    mulhu a1, a0, a1
; RV64-NEXT:    srai a0, a1, 32
; RV64-NEXT:    snez a0, a0
; RV64-NEXT:    sw a1, 0(a2)
; RV64-NEXT:    ret
entry:
```

```
 %t = call {i32, i1} @llvm.umul.with.overflow.i32(i32 %v1, i32 %v2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @umulo2.i32(i32 signext %v1, ptr %res) {
; RV64-LABEL: umulo2.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    li a2, 13
; RV64-NEXT:    slli a2, a2, 32
; RV64-NEXT:    slli a0, a0, 32
; RV64-NEXT:    mulhu a2, a0, a2
; RV64-NEXT:    srli a0, a2, 32
; RV64-NEXT:
   snez a0, a0
; RV64-NEXT:    sw a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.umul.with.overflow.i32(i32 %v1, i32 13)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

; Similar to umulo.i32, but storing the overflow and returning the result.
define signext i32 @umulo3.i32(i32 signext %0, i32 signext %1, ptr %2) {
; RV64-LABEL: umulo3.i32:
; RV64:       # %bb.0:
; RV64-NEXT:    slli a1, a1, 32
; RV64-NEXT:    slli a0, a0, 32
; RV64-NEXT:    mulhu a0, a0, a1
; RV64-NEXT:    srai a1, a0, 32
; RV64-NEXT:    snez a1, a1
; RV64-NEXT:    sext.w a0, a0
; RV64-NEXT:    sw a1, 0(a2)
; RV64-NEXT:    ret
 %4 = tail call { i32, i1 } @llvm.umul.with.overflow.i32(i32 %0, i32 %1)
 %5 = extractvalue { i32, i1 } %4, 1
 %6 = extractvalue { i32, i1 } %4, 0
 %7 = zext i1 %5 to i32
 store i32 %7, ptr %2, align 4
 ret i32 %6
}

define zeroext i1 @umulo.i64(i64 %v1, i64 %v2, ptr %res) {
```

```
; RV64-LABEL: umulo.i64:
;
 RV64:       # %bb.0: # %entry
; RV64-NEXT:    mulhu a3, a0, a1
; RV64-NEXT:    snez a3, a3
; RV64-NEXT:    mul a0, a0, a1
; RV64-NEXT:    sd a0, 0(a2)
; RV64-NEXT:    mv a0, a3
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.umul.with.overflow.i64(i64 %v1, i64 %v2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @umulo2.i64(i64 %v1, ptr %res) {
; RV64-LABEL: umulo2.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    li a3, 13
; RV64-NEXT:    mulhu a2, a0, a3
; RV64-NEXT:    snez a2, a2
; RV64-NEXT:    mul a0, a0, a3
; RV64-NEXT:    sd a0, 0(a1)
; RV64-NEXT:    mv a0, a2
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.umul.with.overflow.i64(i64 %v1, i64 13)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}


;
; Check the use of the overflow bit in combination with a select instruction.
;
define i32 @saddo.select.i32(i32
 signext %v1, i32 signext %v2) {
; RV64-LABEL: saddo.select.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addw a2, a0, a1
; RV64-NEXT:    slt a2, a2, a0
; RV64-NEXT:    slti a3, a1, 0
; RV64-NEXT:    bne a3, a2, .LBB28_2
; RV64-NEXT:  # %bb.1: # %entry
```

```
; RV64-NEXT:    mv a0, a1
; RV64-NEXT:  .LBB28_2: # %entry
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.sadd.with.overflow.i32(i32 %v1, i32 %v2)
 %obit = extractvalue {i32, i1} %t, 1
 %ret = select i1 %obit, i32 %v1, i32 %v2
 ret i32 %ret
}

define i1 @saddo.not.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: saddo.not.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addw a2, a0, a1
; RV64-NEXT:    slt a0, a2, a0
; RV64-NEXT:    slti a1, a1, 0
; RV64-NEXT:    xor a0, a1, a0
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.sadd.with.overflow.i32(i32 %v1, i32 %v2)
 %obit = extractvalue {i32, i1} %t, 1
 %ret = xor i1 %obit, true
 ret i1 %ret
}

define i64 @saddo.select.i64(i64
 %v1, i64 %v2) {
; RV64-LABEL: saddo.select.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    add a2, a0, a1
; RV64-NEXT:    slt a2, a2, a0
; RV64-NEXT:    slti a3, a1, 0
; RV64-NEXT:    bne a3, a2, .LBB30_2
; RV64-NEXT:  # %bb.1: # %entry
; RV64-NEXT:    mv a0, a1
; RV64-NEXT:  .LBB30_2: # %entry
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.sadd.with.overflow.i64(i64 %v1, i64 %v2)
 %obit = extractvalue {i64, i1} %t, 1
 %ret = select i1 %obit, i64 %v1, i64 %v2
 ret i64 %ret
}

define i1 @saddo.not.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: saddo.not.i64:
; RV64:       # %bb.0: # %entry
```

```
; RV64-NEXT:    add a2, a0, a1
; RV64-NEXT:    slt a0, a2, a0
; RV64-NEXT:    slti a1, a1, 0
; RV64-NEXT:    xor a0, a1, a0
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.sadd.with.overflow.i64(i64 %v1, i64 %v2)
 %obit = extractvalue {i64, i1} %t, 1
 %ret = xor i1 %obit, true
 ret i1 %ret
}

define i32 @uaddo.select.i32(i32 signext %v1,
 i32 signext %v2) {
; RV64-LABEL: uaddo.select.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addw a2, a0, a1
; RV64-NEXT:    bltu a2, a0, .LBB32_2
; RV64-NEXT:  # %bb.1: # %entry
; RV64-NEXT:    mv a0, a1
; RV64-NEXT:  .LBB32_2: # %entry
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.uadd.with.overflow.i32(i32 %v1, i32 %v2)
 %obit = extractvalue {i32, i1} %t, 1
 %ret = select i1 %obit, i32 %v1, i32 %v2
 ret i32 %ret
}

define i1 @uaddo.not.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: uaddo.not.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addw a1, a0, a1
; RV64-NEXT:    sltu a0, a1, a0
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.uadd.with.overflow.i32(i32 %v1, i32 %v2)
 %obit = extractvalue {i32, i1} %t, 1
 %ret = xor i1 %obit, true
 ret i1 %ret
}

define i64 @uaddo.select.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: uaddo.select.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    add a2, a0, a1
```

```
; RV64-NEXT:
 bltu a2, a0, .LBB34_2
; RV64-NEXT:  # %bb.1: # %entry
; RV64-NEXT:    mv a0, a1
; RV64-NEXT:  .LBB34_2: # %entry
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.uadd.with.overflow.i64(i64 %v1, i64 %v2)
 %obit = extractvalue {i64, i1} %t, 1
 %ret = select i1 %obit, i64 %v1, i64 %v2
 ret i64 %ret
}

define i1 @uaddo.not.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: uaddo.not.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    add a1, a0, a1
; RV64-NEXT:    sltu a0, a1, a0
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.uadd.with.overflow.i64(i64 %v1, i64 %v2)
 %obit = extractvalue {i64, i1} %t, 1
 %ret = xor i1 %obit, true
 ret i1 %ret
}

define i32 @ssubo.select.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: ssubo.select.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    sgtz a2, a1
; RV64-NEXT:    subw a3, a0, a1
; RV64-NEXT:    slt a3, a3, a0
; RV64-NEXT:    bne a2, a3, .LBB36_2
; RV64-NEXT:  # %bb.1: # %entry
; RV64-NEXT:    mv a0,
 a1
; RV64-NEXT:  .LBB36_2: # %entry
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.ssub.with.overflow.i32(i32 %v1, i32 %v2)
 %obit = extractvalue {i32, i1} %t, 1
 %ret = select i1 %obit, i32 %v1, i32 %v2
 ret i32 %ret
}

define i1 @ssubo.not.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: ssubo.not.i32:
```

```
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    sgtz a2, a1
; RV64-NEXT:    subw a1, a0, a1
; RV64-NEXT:    slt a0, a1, a0
; RV64-NEXT:    xor a0, a2, a0
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.ssub.with.overflow.i32(i32 %v1, i32 %v2)
 %obit = extractvalue {i32, i1} %t, 1
 %ret = xor i1 %obit, true
 ret i1 %ret
}

define i64 @ssubo.select.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: ssubo.select.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    sgtz a2, a1
; RV64-NEXT:    sub a3, a0, a1
; RV64-NEXT:    slt a3, a3, a0
; RV64-NEXT:    bne a2, a3, .LBB38_2
; RV64-NEXT:  # %bb.1: # %entry
; RV64-NEXT:    mv a0, a1
; RV64-NEXT:
 .LBB38_2: # %entry
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.ssub.with.overflow.i64(i64 %v1, i64 %v2)
 %obit = extractvalue {i64, i1} %t, 1
 %ret = select i1 %obit, i64 %v1, i64 %v2
 ret i64 %ret
}

define i1 @ssub.not.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: ssub.not.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    sgtz a2, a1
; RV64-NEXT:    sub a1, a0, a1
; RV64-NEXT:    slt a0, a1, a0
; RV64-NEXT:    xor a0, a2, a0
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.ssub.with.overflow.i64(i64 %v1, i64 %v2)
 %obit = extractvalue {i64, i1} %t, 1
 %ret = xor i1 %obit, true
 ret i1 %ret
}
```

```
define i32 @usubo.select.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: usubo.select.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    subw a2, a0, a1
; RV64-NEXT:    bltu a0, a2, .LBB40_2
; RV64-NEXT:  # %bb.1: # %entry
; RV64-NEXT:    mv a0, a1
; RV64-NEXT:  .LBB40_2: # %entry
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.usub.with.overflow.i32(i32
 %v1, i32 %v2)
 %obit = extractvalue {i32, i1} %t, 1
 %ret = select i1 %obit, i32 %v1, i32 %v2
 ret i32 %ret
}

define i1 @usubo.not.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: usubo.not.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    subw a1, a0, a1
; RV64-NEXT:    sltu a0, a0, a1
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.usub.with.overflow.i32(i32 %v1, i32 %v2)
 %obit = extractvalue {i32, i1} %t, 1
 %ret = xor i1 %obit, true
 ret i1 %ret
}

define i64 @usubo.select.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: usubo.select.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    sub a2, a0, a1
; RV64-NEXT:    bltu a0, a2, .LBB42_2
; RV64-NEXT:  # %bb.1: # %entry
; RV64-NEXT:    mv a0, a1
; RV64-NEXT:  .LBB42_2: # %entry
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.usub.with.overflow.i64(i64 %v1, i64 %v2)
 %obit = extractvalue {i64, i1} %t, 1
 %ret = select i1 %obit, i64 %v1, i64 %v2
 ret i64 %ret
}
```

```
define
 i1 @usubo.not.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: usubo.not.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    sub a1, a0, a1
; RV64-NEXT:    sltu a0, a0, a1
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.usub.with.overflow.i64(i64 %v1, i64 %v2)
 %obit = extractvalue {i64, i1} %t, 1
 %ret = xor i1 %obit, true
 ret i1 %ret
}

define i32 @smulo.select.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: smulo.select.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    mul a2, a0, a1
; RV64-NEXT:    srai a3, a2, 32
; RV64-NEXT:    sraiw a2, a2, 31
; RV64-NEXT:    bne a3, a2, .LBB44_2
; RV64-NEXT:  # %bb.1: # %entry
; RV64-NEXT:    mv a0, a1
; RV64-NEXT:  .LBB44_2: # %entry
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.smul.with.overflow.i32(i32 %v1, i32 %v2)
 %obit = extractvalue {i32, i1} %t, 1
 %ret = select i1 %obit, i32 %v1, i32 %v2
 ret i32 %ret
}

define i1 @smulo.not.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL:
 smulo.not.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    mul a0, a0, a1
; RV64-NEXT:    srai a1, a0, 32
; RV64-NEXT:    sraiw a0, a0, 31
; RV64-NEXT:    xor a0, a1, a0
; RV64-NEXT:    snez a0, a0
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.smul.with.overflow.i32(i32 %v1, i32 %v2)
 %obit = extractvalue {i32, i1} %t, 1
 %ret = xor i1 %obit, true
```

```
 ret i1 %ret
}

define i64 @smulo.select.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: smulo.select.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    mulh a2, a0, a1
; RV64-NEXT:    mul a3, a0, a1
; RV64-NEXT:    srai a3, a3, 63
; RV64-NEXT:    bne a2, a3, .LBB46_2
; RV64-NEXT:  # %bb.1: # %entry
; RV64-NEXT:    mv a0, a1
; RV64-NEXT:  .LBB46_2: # %entry
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.smul.with.overflow.i64(i64 %v1, i64 %v2)
 %obit = extractvalue {i64, i1} %t, 1
 %ret = select i1 %obit, i64 %v1, i64 %v2
 ret i64 %ret
}

define i1 @smulo.not.i64(i64 %v1, i64 %v2) {
; RV64-LABEL:
 smulo.not.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    mulh a2, a0, a1
; RV64-NEXT:    mul a0, a0, a1
; RV64-NEXT:    srai a0, a0, 63
; RV64-NEXT:    xor a0, a2, a0
; RV64-NEXT:    snez a0, a0
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.smul.with.overflow.i64(i64 %v1, i64 %v2)
 %obit = extractvalue {i64, i1} %t, 1
 %ret = xor i1 %obit, true
 ret i1 %ret
}

define i32 @umulo.select.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: umulo.select.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    slli a2, a1, 32
; RV64-NEXT:    slli a3, a0, 32
; RV64-NEXT:    mulhu a2, a3, a2
; RV64-NEXT:    srai a2, a2, 32
; RV64-NEXT:    bnez a2, .LBB48_2
; RV64-NEXT:  # %bb.1: # %entry
```

```
; RV64-NEXT:    mv a0, a1
; RV64-NEXT:  .LBB48_2: # %entry
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.umul.with.overflow.i32(i32 %v1, i32 %v2)
 %obit = extractvalue {i32, i1} %t, 1
 %ret = select i1 %obit, i32 %v1, i32 %v2
 ret i32 %ret
}

define
 i1 @umulo.not.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: umulo.not.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    slli a1, a1, 32
; RV64-NEXT:    slli a0, a0, 32
; RV64-NEXT:    mulhu a0, a0, a1
; RV64-NEXT:    srai a0, a0, 32
; RV64-NEXT:    snez a0, a0
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.umul.with.overflow.i32(i32 %v1, i32 %v2)
 %obit = extractvalue {i32, i1} %t, 1
 %ret = xor i1 %obit, true
 ret i1 %ret
}

define i64 @umulo.select.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: umulo.select.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    mulhu a2, a0, a1
; RV64-NEXT:    bnez a2, .LBB50_2
; RV64-NEXT:  # %bb.1: # %entry
; RV64-NEXT:    mv a0, a1
; RV64-NEXT:  .LBB50_2: # %entry
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.umul.with.overflow.i64(i64 %v1, i64 %v2)
 %obit = extractvalue {i64, i1} %t, 1
 %ret = select i1 %obit, i64 %v1, i64 %v2
 ret i64 %ret
}

define i1 @umulo.not.i64(i64 %v1, i64 %v2)
 {
; RV64-LABEL: umulo.not.i64:
; RV64:       # %bb.0: # %entry
```

```
; RV64-NEXT:    mulhu a0, a0, a1
; RV64-NEXT:    snez a0, a0
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.umul.with.overflow.i64(i64 %v1, i64 %v2)
 %obit = extractvalue {i64, i1} %t, 1
 %ret = xor i1 %obit, true
 ret i1 %ret
}


;
; Check the use of the overflow bit in combination with a branch instruction.
;
define zeroext i1 @saddo.br.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: saddo.br.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addw a2, a0, a1
; RV64-NEXT:    slt a0, a2, a0
; RV64-NEXT:    slti a1, a1, 0
; RV64-NEXT:    beq a1, a0, .LBB52_2
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB52_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.sadd.with.overflow.i32(i32 %v1, i32 %v2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 br i1
 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @saddo.br.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: saddo.br.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    add a2, a0, a1
; RV64-NEXT:    slt a0, a2, a0
; RV64-NEXT:    slti a1, a1, 0
```

```
; RV64-NEXT:    beq a1, a0, .LBB53_2
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB53_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.sadd.with.overflow.i64(i64 %v1, i64 %v2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @uaddo.br.i32(i32 %v1, i32 %v2) {
; RV64-LABEL: uaddo.br.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addw a1, a0, a1
; RV64-NEXT:    sext.w a0, a0
; RV64-NEXT:    bgeu a1, a0, .LBB54_2
; RV64-NEXT:  # %bb.1: # %overflow
;
 RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB54_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.uadd.with.overflow.i32(i32 %v1, i32 %v2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @uaddo.br.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: uaddo.br.i64:
```

```
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    add a1, a0, a1
; RV64-NEXT:    bgeu a1, a0, .LBB55_2
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB55_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.uadd.with.overflow.i64(i64 %v1, i64 %v2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @ssubo.br.i32(i32
 signext %v1, i32 signext %v2) {
; RV64-LABEL: ssubo.br.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    sgtz a2, a1
; RV64-NEXT:    subw a1, a0, a1
; RV64-NEXT:    slt a0, a1, a0
; RV64-NEXT:    beq a2, a0, .LBB56_2
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB56_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.ssub.with.overflow.i32(i32 %v1, i32 %v2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}
```

```
define zeroext i1 @ssubo.br.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: ssubo.br.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    sgtz a2, a1
; RV64-NEXT:    sub a1, a0, a1
; RV64-NEXT:    slt a0, a1, a0
; RV64-NEXT:    beq a2, a0, .LBB57_2
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB57_2: # %continue
;
 RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.ssub.with.overflow.i64(i64 %v1, i64 %v2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @usubo.br.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: usubo.br.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    subw a1, a0, a1
; RV64-NEXT:    bgeu a0, a1, .LBB58_2
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB58_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.usub.with.overflow.i32(i32 %v1, i32 %v2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false
```

```
continue:
 ret i1 true
}

define zeroext i1 @usubo.br.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: usubo.br.i64:
;
 RV64:       # %bb.0: # %entry
; RV64-NEXT:    sub a1, a0, a1
; RV64-NEXT:    bgeu a0, a1, .LBB59_2
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB59_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.usub.with.overflow.i64(i64 %v1, i64 %v2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @smulo.br.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: smulo.br.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    mul a0, a0, a1
; RV64-NEXT:    srai a1, a0, 32
; RV64-NEXT:    sraiw a0, a0, 31
; RV64-NEXT:    beq a1, a0, .LBB60_2
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB60_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.smul.with.overflow.i32(i32
 %v1, i32 %v2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 br i1 %obit, label %overflow, label %continue
```

```
overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @smulo.br.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: smulo.br.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    mulh a2, a0, a1
; RV64-NEXT:    mul a0, a0, a1
; RV64-NEXT:    srai a0, a0, 63
; RV64-NEXT:    beq a2, a0, .LBB61_2
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB61_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.smul.with.overflow.i64(i64 %v1, i64 %v2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @smulo2.br.i64(i64 %v1) {
; RV64-LABEL: smulo2.br.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    li a1, -13
; RV64-NEXT:
  mulh a2, a0, a1
; RV64-NEXT:    mul a0, a0, a1
; RV64-NEXT:    srai a0, a0, 63
; RV64-NEXT:    beq a2, a0, .LBB62_2
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB62_2: # %continue
; RV64-NEXT:    li a0, 1
```

```
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.smul.with.overflow.i64(i64 %v1, i64 -13)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @umulo.br.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: umulo.br.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    slli a1, a1, 32
; RV64-NEXT:    slli a0, a0, 32
; RV64-NEXT:    mulhu a0, a0, a1
; RV64-NEXT:    srai a0, a0, 32
; RV64-NEXT:    beqz a0, .LBB63_2
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB63_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call
 {i32, i1} @llvm.umul.with.overflow.i32(i32 %v1, i32 %v2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @umulo.br.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: umulo.br.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    mulhu a0, a0, a1
; RV64-NEXT:    beqz a0, .LBB64_2
; RV64-NEXT:  # %bb.1: # %overflow
```

```
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB64_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.umul.with.overflow.i64(i64 %v1, i64 %v2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @umulo2.br.i64(i64 %v1) {
; RV64-LABEL: umulo2.br.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    add a1, a0, a0
; RV64-NEXT:    bgeu a1, a0,
 .LBB65_2
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB65_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.umul.with.overflow.i64(i64 %v1, i64 2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @uaddo.i64.constant(i64 %v1, ptr %res) {
; RV64-LABEL: uaddo.i64.constant:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addi a2, a0, 2
; RV64-NEXT:    sltu a0, a2, a0
```

```
; RV64-NEXT:    sd a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.uadd.with.overflow.i64(i64 %v1, i64 2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @uaddo.i64.constant_2048(i64 %v1, ptr %res) {
; RV64-LABEL: uaddo.i64.constant_2048:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:
    addi a2, a0, 2047
; RV64-NEXT:    addi a2, a2, 1
; RV64-NEXT:    sltu a0, a2, a0
; RV64-NEXT:    sd a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.uadd.with.overflow.i64(i64 %v1, i64 2048)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @uaddo.i64.constant_2049(i64 %v1, ptr %res) {
; RV64-LABEL: uaddo.i64.constant_2049:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addi a2, a0, 2047
; RV64-NEXT:    addi a2, a2, 2
; RV64-NEXT:    sltu a0, a2, a0
; RV64-NEXT:    sd a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.uadd.with.overflow.i64(i64 %v1, i64 2049)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define i64 @uaddo.i64.constant_setcc_on_overflow_flag(ptr %p) {
; RV64-LABEL: uaddo.i64.constant_setcc_on_overflow_flag:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    ld a1, 0(a0)
;
```

```
 RV64-NEXT:    addi a0, a1, 2
; RV64-NEXT:    bltu a0, a1, .LBB69_2
; RV64-NEXT:  # %bb.1: # %IfOverflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:  .LBB69_2: # %IfNoOverflow
; RV64-NEXT:    ret
entry:
 %v1 = load i64, ptr %p
 %t = call {i64, i1} @llvm.uadd.with.overflow.i64(i64 %v1, i64 2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 br i1 %obit, label %IfNoOverflow, label %IfOverflow
IfOverflow:
 ret i64 0
IfNoOverflow:
 ret i64 %val
}

declare {i32, i1} @llvm.sadd.with.overflow.i32(i32, i32) nounwind readnone
declare {i64, i1} @llvm.sadd.with.overflow.i64(i64, i64) nounwind readnone
declare {i32, i1} @llvm.uadd.with.overflow.i32(i32, i32) nounwind readnone
declare {i64, i1} @llvm.uadd.with.overflow.i64(i64, i64) nounwind readnone
declare {i32, i1} @llvm.ssub.with.overflow.i32(i32, i32) nounwind readnone
declare {i64, i1} @llvm.ssub.with.overflow.i64(i64, i64) nounwind readnone
declare {i32, i1} @llvm.usub.with.overflow.i32(i32, i32) nounwind readnone
declare
 {i64, i1} @llvm.usub.with.overflow.i64(i64, i64) nounwind readnone
declare {i32, i1} @llvm.smul.with.overflow.i32(i32, i32) nounwind readnone
declare {i64, i1} @llvm.smul.with.overflow.i64(i64, i64) nounwind readnone
declare {i32, i1} @llvm.umul.with.overflow.i32(i32, i32) nounwind readnone
declare {i64, i1} @llvm.umul.with.overflow.i64(i64, i64) nounwind readnone
==============================================================================
```

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```
add_lldb_library(lldbPluginObjectContainerBSDArchive PLUGIN
 ObjectContainerBSDArchive.cpp

 LINK_LIBS
   lldbCore
   lldbHost
   lldbSymbol
 LINK_COMPONENTS
   Support
 )
```
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```
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck -check-prefix=RV64I %s
; RUN: llc -mtriple=riscv64 -mattr=+m -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck -check-prefix=RV64IM %s

define i32 @udiv(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: udiv:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    srli a1, a1, 32
```

```
; RV64I-NEXT:    call __udivdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: udiv:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    divuw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = udiv i32 %a, %b
 ret i32 %1
}

define i32 @udiv_constant(i32 %a) nounwind {
; RV64I-LABEL:
 udiv_constant:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    li a1, 5
; RV64I-NEXT:    call __udivdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: udiv_constant:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a0, a0, 32
; RV64IM-NEXT:    lui a1, 838861
; RV64IM-NEXT:    addi a1, a1, -819
; RV64IM-NEXT:    slli a1, a1, 32
; RV64IM-NEXT:    mulhu a0, a0, a1
; RV64IM-NEXT:    srli a0, a0, 34
; RV64IM-NEXT:    ret
 %1 = udiv i32 %a, 5
 ret i32 %1
}

define i32 @udiv_pow2(i32 %a) nounwind {
; RV64I-LABEL: udiv_pow2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a0, a0, 3
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: udiv_pow2:
; RV64IM:       # %bb.0:
```

```
; RV64IM-NEXT:    srliw a0, a0, 3
; RV64IM-NEXT:    ret
 %1 = udiv i32 %a, 8
 ret i32 %1
}

define i32 @udiv_constant_lhs(i32
 %a) nounwind {
; RV64I-LABEL: udiv_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a1, a0, 32
; RV64I-NEXT:    li a0, 10
; RV64I-NEXT:    call __udivdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: udiv_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    li a1, 10
; RV64IM-NEXT:    divuw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = udiv i32 10, %a
 ret i32 %1
}

define i64 @udiv64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: udiv64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    tail __udivdi3
;
; RV64IM-LABEL: udiv64:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    divu a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = udiv i64 %a, %b
 ret i64 %1
}

define i64 @udiv64_constant(i64 %a) nounwind {
; RV64I-LABEL: udiv64_constant:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 5
; RV64I-NEXT:
```

```
    tail __udivdi3
;
; RV64IM-LABEL: udiv64_constant:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    lui a1, 838861
; RV64IM-NEXT:    addiw a1, a1, -819
; RV64IM-NEXT:    slli a2, a1, 32
; RV64IM-NEXT:    add a1, a1, a2
; RV64IM-NEXT:    mulhu a0, a0, a1
; RV64IM-NEXT:    srli a0, a0, 2
; RV64IM-NEXT:    ret
 %1 = udiv i64 %a, 5
 ret i64 %1
}

define i64 @udiv64_constant_lhs(i64 %a) nounwind {
; RV64I-LABEL: udiv64_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    mv a1, a0
; RV64I-NEXT:    li a0, 10
; RV64I-NEXT:    tail __udivdi3
;
; RV64IM-LABEL: udiv64_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    li a1, 10
; RV64IM-NEXT:    divu a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = udiv i64 10, %a
 ret i64 %1
}

define i8 @udiv8(i8 %a, i8 %b) nounwind {
; RV64I-LABEL: udiv8:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    andi a0, a0, 255
; RV64I-NEXT:    andi a1, a1, 255
; RV64I-NEXT:    call
 __udivdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: udiv8:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    andi a1, a1, 255
; RV64IM-NEXT:    andi a0, a0, 255
```

```
; RV64IM-NEXT:    divuw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = udiv i8 %a, %b
 ret i8 %1
}

define i8 @udiv8_constant(i8 %a) nounwind {
; RV64I-LABEL: udiv8_constant:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    andi a0, a0, 255
; RV64I-NEXT:    li a1, 5
; RV64I-NEXT:    call __udivdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: udiv8_constant:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    andi a0, a0, 255
; RV64IM-NEXT:    li a1, 205
; RV64IM-NEXT:    mul a0, a0, a1
; RV64IM-NEXT:    srliw a0, a0, 10
; RV64IM-NEXT:    ret
 %1 = udiv i8 %a, 5
 ret i8 %1
}

define i8 @udiv8_pow2(i8 %a) nounwind
 {
; RV64I-LABEL: udiv8_pow2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 56
; RV64I-NEXT:    srli a0, a0, 59
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: udiv8_pow2:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a0, a0, 56
; RV64IM-NEXT:    srli a0, a0, 59
; RV64IM-NEXT:    ret
 %1 = udiv i8 %a, 8
 ret i8 %1
}

define i8 @udiv8_constant_lhs(i8 %a) nounwind {
; RV64I-LABEL: udiv8_constant_lhs:
```

```
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    andi a1, a0, 255
; RV64I-NEXT:    li a0, 10
; RV64I-NEXT:    call __udivdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: udiv8_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    andi a0, a0, 255
; RV64IM-NEXT:    li a1, 10
; RV64IM-NEXT:    divuw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = udiv i8 10, %a
 ret i8 %1
}

define i16 @udiv16(i16 %a, i16 %b) nounwind {
; RV64I-LABEL: udiv16:
;
 RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    lui a2, 16
; RV64I-NEXT:    addiw a2, a2, -1
; RV64I-NEXT:    and a0, a0, a2
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    call __udivdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: udiv16:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    lui a2, 16
; RV64IM-NEXT:    addi a2, a2, -1
; RV64IM-NEXT:    and a1, a1, a2
; RV64IM-NEXT:    and a0, a0, a2
; RV64IM-NEXT:    divuw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = udiv i16 %a, %b
 ret i16 %1
}

define i16 @udiv16_constant(i16 %a) nounwind {
```

```
; RV64I-LABEL: udiv16_constant:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srli a0, a0, 48
; RV64I-NEXT:    li a1, 5
; RV64I-NEXT:    call __udivdi3
; RV64I-NEXT:    ld ra, 8(sp)
 # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: udiv16_constant:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    lui a1, 52429
; RV64IM-NEXT:    slli a1, a1, 4
; RV64IM-NEXT:    slli a0, a0, 48
; RV64IM-NEXT:    mulhu a0, a0, a1
; RV64IM-NEXT:    srliw a0, a0, 18
; RV64IM-NEXT:    ret
 %1 = udiv i16 %a, 5
 ret i16 %1
}

define i16 @udiv16_pow2(i16 %a) nounwind {
; RV64I-LABEL: udiv16_pow2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srli a0, a0, 51
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: udiv16_pow2:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a0, a0, 48
; RV64IM-NEXT:    srli a0, a0, 51
; RV64IM-NEXT:    ret
 %1 = udiv i16 %a, 8
 ret i16 %1
}

define i16 @udiv16_constant_lhs(i16 %a) nounwind {
; RV64I-LABEL: udiv16_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srli a1, a0, 48
```

```
; RV64I-NEXT:
    li a0, 10
; RV64I-NEXT:    call __udivdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: udiv16_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a0, a0, 48
; RV64IM-NEXT:    srli a0, a0, 48
; RV64IM-NEXT:    li a1, 10
; RV64IM-NEXT:    divuw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = udiv i16 10, %a
 ret i16 %1
}

define i32 @sdiv(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: sdiv:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    sext.w a0, a0
; RV64I-NEXT:    sext.w a1, a1
; RV64I-NEXT:    call __divdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    divw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = sdiv i32 %a, %b
 ret i32 %1
}

define i32 @sdiv_constant(i32 %a) nounwind {
; RV64I-LABEL: sdiv_constant:
;
 RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    sext.w a0, a0
; RV64I-NEXT:    li a1, 5
; RV64I-NEXT:    call __divdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
```

```
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv_constant:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    sext.w a0, a0
; RV64IM-NEXT:    lui a1, 419430
; RV64IM-NEXT:    addiw a1, a1, 1639
; RV64IM-NEXT:    mul a0, a0, a1
; RV64IM-NEXT:    srli a1, a0, 63
; RV64IM-NEXT:    srai a0, a0, 33
; RV64IM-NEXT:    addw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = sdiv i32 %a, 5
 ret i32 %1
}

define i32 @sdiv_pow2(i32 %a) nounwind {
; RV64I-LABEL: sdiv_pow2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sraiw a1, a0, 31
; RV64I-NEXT:    srliw a1, a1, 29
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    sraiw a0, a0, 3
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv_pow2:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    sraiw a1, a0,
 31
; RV64IM-NEXT:    srliw a1, a1, 29
; RV64IM-NEXT:    add a0, a0, a1
; RV64IM-NEXT:    sraiw a0, a0, 3
; RV64IM-NEXT:    ret
 %1 = sdiv i32 %a, 8
 ret i32 %1
}

define i32 @sdiv_pow2_2(i32 %a) nounwind {
; RV64I-LABEL: sdiv_pow2_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sraiw a1, a0, 31
; RV64I-NEXT:    srliw a1, a1, 16
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    sraiw a0, a0, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv_pow2_2:
```

```
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    sraiw a1, a0, 31
; RV64IM-NEXT:    srliw a1, a1, 16
; RV64IM-NEXT:    add a0, a0, a1
; RV64IM-NEXT:    sraiw a0, a0, 16
; RV64IM-NEXT:    ret
 %1 = sdiv i32 %a, 65536
 ret i32 %1
}

define i32 @sdiv_constant_lhs(i32 %a) nounwind {
; RV64I-LABEL: sdiv_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    sext.w a1, a0
; RV64I-NEXT:    li a0, -10
; RV64I-NEXT:    call __divdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded
 Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    li a1, -10
; RV64IM-NEXT:    divw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = sdiv i32 -10, %a
 ret i32 %1
}

define i64 @sdiv64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: sdiv64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    tail __divdi3
;
; RV64IM-LABEL: sdiv64:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    div a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = sdiv i64 %a, %b
 ret i64 %1
}

define i64 @sdiv64_constant(i64 %a) nounwind {
; RV64I-LABEL: sdiv64_constant:
; RV64I:       # %bb.0:
```

```
; RV64I-NEXT:    li a1, 5
; RV64I-NEXT:    tail __divdi3
;
; RV64IM-LABEL: sdiv64_constant:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    lui a1, %hi(.LCPI21_0)
; RV64IM-NEXT:    ld a1, %lo(.LCPI21_0)(a1)
; RV64IM-NEXT:    mulh a0, a0, a1
; RV64IM-NEXT:    srli a1, a0, 63
; RV64IM-NEXT:    srai a0, a0, 1
; RV64IM-NEXT:    add a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = sdiv i64 %a,
 5
 ret i64 %1
}

define i64 @sdiv64_constant_lhs(i64 %a) nounwind {
; RV64I-LABEL: sdiv64_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    mv a1, a0
; RV64I-NEXT:    li a0, 10
; RV64I-NEXT:    tail __divdi3
;
; RV64IM-LABEL: sdiv64_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    li a1, 10
; RV64IM-NEXT:    div a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = sdiv i64 10, %a
 ret i64 %1
}

; Although this sdiv has two sexti32 operands, it shouldn't compile to divw on
; RV64M as that wouldn't produce the correct result for e.g. INT_MIN/-1.

define i64 @sdiv64_sext_operands(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: sdiv64_sext_operands:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sext.w a0, a0
; RV64I-NEXT:    sext.w a1, a1
; RV64I-NEXT:    tail __divdi3
;
; RV64IM-LABEL: sdiv64_sext_operands:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    sext.w a0, a0
; RV64IM-NEXT:    sext.w a1, a1
; RV64IM-NEXT:    div a0, a0, a1
```

```
; RV64IM-NEXT:    ret
 %1 = sext i32 %a to i64
 %2 = sext i32 %b to
 i64
 %3 = sdiv i64 %1, %2
 ret i64 %3
}

define i8 @sdiv8(i8 %a, i8 %b) nounwind {
; RV64I-LABEL: sdiv8:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a1, a1, 24
; RV64I-NEXT:    sraiw a1, a1, 24
; RV64I-NEXT:    slli a0, a0, 24
; RV64I-NEXT:    sraiw a0, a0, 24
; RV64I-NEXT:    call __divdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv8:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a1, a1, 24
; RV64IM-NEXT:    sraiw a1, a1, 24
; RV64IM-NEXT:    slli a0, a0, 24
; RV64IM-NEXT:    sraiw a0, a0, 24
; RV64IM-NEXT:    divw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = sdiv i8 %a, %b
 ret i8 %1
}

define i8 @sdiv8_constant(i8 %a) nounwind {
; RV64I-LABEL: sdiv8_constant:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 24
; RV64I-NEXT:
   sraiw a0, a0, 24
; RV64I-NEXT:    li a1, 5
; RV64I-NEXT:    call __divdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
```

```
; RV64IM-LABEL: sdiv8_constant:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a0, a0, 24
; RV64IM-NEXT:    sraiw a0, a0, 24
; RV64IM-NEXT:    li a1, 103
; RV64IM-NEXT:    mul a0, a0, a1
; RV64IM-NEXT:    sraiw a1, a0, 9
; RV64IM-NEXT:    slli a0, a0, 48
; RV64IM-NEXT:    srli a0, a0, 63
; RV64IM-NEXT:    addw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = sdiv i8 %a, 5
 ret i8 %1
}

define i8 @sdiv8_pow2(i8 %a) nounwind {
; RV64I-LABEL: sdiv8_pow2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a1, a0, 24
; RV64I-NEXT:    sraiw a1, a1, 24
; RV64I-NEXT:    slli a1, a1, 49
; RV64I-NEXT:    srli a1, a1, 61
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    slli a0, a0, 24
; RV64I-NEXT:    sraiw a0, a0, 27
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv8_pow2:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a1, a0,
 24
; RV64IM-NEXT:    sraiw a1, a1, 24
; RV64IM-NEXT:    slli a1, a1, 49
; RV64IM-NEXT:    srli a1, a1, 61
; RV64IM-NEXT:    add a0, a0, a1
; RV64IM-NEXT:    slli a0, a0, 24
; RV64IM-NEXT:    sraiw a0, a0, 27
; RV64IM-NEXT:    ret
 %1 = sdiv i8 %a, 8
 ret i8 %1
}

define i8 @sdiv8_constant_lhs(i8 %a) nounwind {
; RV64I-LABEL: sdiv8_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 24
```

```
; RV64I-NEXT:    sraiw a1, a0, 24
; RV64I-NEXT:    li a0, -10
; RV64I-NEXT:    call __divdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv8_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a0, a0, 24
; RV64IM-NEXT:    sraiw a0, a0, 24
; RV64IM-NEXT:    li a1, -10
; RV64IM-NEXT:    divw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = sdiv i8 -10, %a
 ret i8 %1
}

define i16 @sdiv16(i16 %a, i16 %b) nounwind {
; RV64I-LABEL:
 sdiv16:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a1, a1, 16
; RV64I-NEXT:    sraiw a1, a1, 16
; RV64I-NEXT:    slli a0, a0, 16
; RV64I-NEXT:    sraiw a0, a0, 16
; RV64I-NEXT:    call __divdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv16:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a1, a1, 16
; RV64IM-NEXT:    sraiw a1, a1, 16
; RV64IM-NEXT:    slli a0, a0, 16
; RV64IM-NEXT:    sraiw a0, a0, 16
; RV64IM-NEXT:    divw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = sdiv i16 %a, %b
 ret i16 %1
}

define i16 @sdiv16_constant(i16 %a) nounwind {
; RV64I-LABEL: sdiv16_constant:
; RV64I:       # %bb.0:
```

```
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 16
; RV64I-NEXT:    sraiw a0, a0, 16
; RV64I-NEXT:    li a1, 5
; RV64I-NEXT:    call __divdi3
; RV64I-NEXT:
    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv16_constant:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a0, a0, 16
; RV64IM-NEXT:    sraiw a0, a0, 16
; RV64IM-NEXT:    lui a1, 6
; RV64IM-NEXT:    addi a1, a1, 1639
; RV64IM-NEXT:    mul a0, a0, a1
; RV64IM-NEXT:    srliw a1, a0, 31
; RV64IM-NEXT:    sraiw a0, a0, 17
; RV64IM-NEXT:    addw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = sdiv i16 %a, 5
 ret i16 %1
}

define i16 @sdiv16_pow2(i16 %a) nounwind {
; RV64I-LABEL: sdiv16_pow2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a1, a0, 16
; RV64I-NEXT:    sraiw a1, a1, 16
; RV64I-NEXT:    slli a1, a1, 33
; RV64I-NEXT:    srli a1, a1, 61
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    slli a0, a0, 16
; RV64I-NEXT:    sraiw a0, a0, 19
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv16_pow2:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a1, a0, 16
; RV64IM-NEXT:    sraiw a1, a1, 16
; RV64IM-NEXT:    slli a1, a1, 33
;
 RV64IM-NEXT:    srli a1, a1, 61
; RV64IM-NEXT:    add a0, a0, a1
; RV64IM-NEXT:    slli a0, a0, 16
; RV64IM-NEXT:    sraiw a0, a0, 19
```

```
; RV64IM-NEXT:    ret
 %1 = sdiv i16 %a, 8
 ret i16 %1
}

define i16 @sdiv16_constant_lhs(i16 %a) nounwind {
; RV64I-LABEL: sdiv16_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 16
; RV64I-NEXT:    sraiw a1, a0, 16
; RV64I-NEXT:    li a0, -10
; RV64I-NEXT:    call __divdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv16_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a0, a0, 16
; RV64IM-NEXT:    sraiw a0, a0, 16
; RV64IM-NEXT:    li a1, -10
; RV64IM-NEXT:    divw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = sdiv i16 -10, %a
 ret i16 %1
}
```

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```
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck -check-prefix=RV64I %s

; Check indexed and unindexed, sext, zext and anyext loads

define dso_local i64 @lb(ptr %a) nounwind {
; RV64I-LABEL: lb:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lb a1, 1(a0)
; RV64I-NEXT:    lbu zero, 0(a0)
; RV64I-NEXT:    mv a0, a1
```

```
; RV64I-NEXT:    ret
 %1 = getelementptr i8, ptr %a, i32 1
 %2 = load i8, ptr %1
 %3 = sext i8 %2 to i64
 ; the unused load will produce an anyext for selection
 %4 = load volatile i8, ptr %a
 ret i64 %3
}

define dso_local i64 @lh(ptr %a) nounwind {
; RV64I-LABEL: lh:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lh a1, 4(a0)
; RV64I-NEXT:    lh zero, 0(a0)
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:    ret
 %1 = getelementptr i16, ptr %a, i32 2
 %2 = load i16, ptr %1
 %3 = sext i16 %2 to i64
 ; the unused load will produce an anyext for selection
  %4 = load volatile i16, ptr %a
 ret i64 %3
}

define dso_local i64 @lw(ptr %a) nounwind {
; RV64I-LABEL: lw:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lw a1, 12(a0)
; RV64I-NEXT:    lw zero, 0(a0)
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:    ret
 %1 = getelementptr i32, ptr %a, i32 3
 %2 = load i32, ptr %1
 %3 = sext i32 %2 to i64
 ; the unused load will produce an anyext for selection
 %4 = load volatile i32, ptr %a
 ret i64 %3
}

define dso_local i64 @lbu(ptr %a) nounwind {
; RV64I-LABEL: lbu:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lbu a1, 4(a0)
; RV64I-NEXT:    lbu a0, 0(a0)
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    ret
 %1 = getelementptr i8, ptr %a, i32 4
 %2 = load i8, ptr %1
```

```
 %3 = zext i8 %2 to i64
 %4 = load volatile i8, ptr %a
 %5 = zext i8 %4 to i64
 %6 = add i64 %3, %5
 ret i64 %6
}

define dso_local i64 @lhu(ptr %a) nounwind {
; RV64I-LABEL: lhu:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lhu a1, 10(a0)
; RV64I-NEXT:    lhu a0, 0(a0)
; RV64I-NEXT:
    add a0, a1, a0
; RV64I-NEXT:    ret
 %1 = getelementptr i16, ptr %a, i32 5
 %2 = load i16, ptr %1
 %3 = zext i16 %2 to i64
 %4 = load volatile i16, ptr %a
 %5 = zext i16 %4 to i64
 %6 = add i64 %3, %5
 ret i64 %6
}

define dso_local i64 @lwu(ptr %a) nounwind {
; RV64I-LABEL: lwu:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lwu a1, 24(a0)
; RV64I-NEXT:    lwu a0, 0(a0)
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    ret
 %1 = getelementptr i32, ptr %a, i32 6
 %2 = load i32, ptr %1
 %3 = zext i32 %2 to i64
 %4 = load volatile i32, ptr %a
 %5 = zext i32 %4 to i64
 %6 = add i64 %3, %5
 ret i64 %6
}

; 64-bit loads and stores

define dso_local i64 @ld(ptr %a) nounwind {
; RV64I-LABEL: ld:
; RV64I:       # %bb.0:
; RV64I-NEXT:    ld a1, 80(a0)
; RV64I-NEXT:    ld zero, 0(a0)
; RV64I-NEXT:    mv a0, a1
```

```
; RV64I-NEXT:    ret
 %1 = getelementptr i64, ptr %a, i32 10
 %2 = load i64, ptr %1
 %3 = load volatile i64, ptr %a
 ret i64 %2
}

define dso_local void @sd(ptr %a, i64 %b)
 nounwind {
; RV64I-LABEL: sd:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sd a1, 0(a0)
; RV64I-NEXT:    sd a1, 88(a0)
; RV64I-NEXT:    ret
 store i64 %b, ptr %a
 %1 = getelementptr i64, ptr %a, i32 11
 store i64 %b, ptr %1
 ret void
}

; Check load and store to an i1 location
define dso_local i64 @load_sext_zext_anyext_i1(ptr %a) nounwind {
; RV64I-LABEL: load_sext_zext_anyext_i1:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lbu a1, 1(a0)
; RV64I-NEXT:    lbu a2, 2(a0)
; RV64I-NEXT:    lbu zero, 0(a0)
; RV64I-NEXT:    sub a0, a2, a1
; RV64I-NEXT:    ret
 ; sextload i1
 %1 = getelementptr i1, ptr %a, i32 1
 %2 = load i1, ptr %1
 %3 = sext i1 %2 to i64
 ; zextload i1
 %4 = getelementptr i1, ptr %a, i32 2
 %5 = load i1, ptr %4
 %6 = zext i1 %5 to i64
 %7 = add i64 %3, %6
 ; extload i1 (anyext). Produced as the load is unused.
 %8 = load volatile i1, ptr %a
 ret i64 %7
}

define dso_local i16 @load_sext_zext_anyext_i1_i16(ptr %a) nounwind {
; RV64I-LABEL: load_sext_zext_anyext_i1_i16:
;
 RV64I:       # %bb.0:
; RV64I-NEXT:    lbu a1, 1(a0)
```

```
; RV64I-NEXT:    lbu a2, 2(a0)
; RV64I-NEXT:    lbu zero, 0(a0)
; RV64I-NEXT:    subw a0, a2, a1
; RV64I-NEXT:    ret
 ; sextload i1
 %1 = getelementptr i1, ptr %a, i32 1
 %2 = load i1, ptr %1
 %3 = sext i1 %2 to i16
 ; zextload i1
 %4 = getelementptr i1, ptr %a, i32 2
 %5 = load i1, ptr %4
 %6 = zext i1 %5 to i16
 %7 = add i16 %3, %6
 ; extload i1 (anyext). Produced as the load is unused.
 %8 = load volatile i1, ptr %a
 ret i16 %7
}

; Check load and store to a global
@G = dso_local global i64 0

define dso_local i64 @ld_sd_global(i64 %a) nounwind {
; RV64I-LABEL: ld_sd_global:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a2, %hi(G)
; RV64I-NEXT:    ld a1, %lo(G)(a2)
; RV64I-NEXT:    addi a3, a2, %lo(G)
; RV64I-NEXT:    sd a0, %lo(G)(a2)
; RV64I-NEXT:    ld zero, 72(a3)
; RV64I-NEXT:    sd a0, 72(a3)
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:    ret
 %1 = load volatile i64, ptr @G
 store i64 %a, ptr @G
 %2 = getelementptr
 i64, ptr @G, i64 9
 %3 = load volatile i64, ptr %2
 store i64 %a, ptr %2
 ret i64 %1
}

define i64 @lw_near_local(ptr %a)  {
; RV64I-LABEL: lw_near_local:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi a0, a0, 2047
; RV64I-NEXT:    ld a0, 9(a0)
; RV64I-NEXT:    ret
 %1 = getelementptr inbounds i64, ptr %a, i64 257
```

```
 %2 = load volatile i64, ptr %1
 ret i64 %2
}

define void @st_near_local(ptr %a, i64 %b)  {
; RV64I-LABEL: st_near_local:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi a0, a0, 2047
; RV64I-NEXT:    sd a1, 9(a0)
; RV64I-NEXT:    ret
 %1 = getelementptr inbounds i64, ptr %a, i64 257
 store i64 %b, ptr %1
 ret void
}

define i64 @lw_sw_near_local(ptr %a, i64 %b)  {
; RV64I-LABEL: lw_sw_near_local:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi a2, a0, 2047
; RV64I-NEXT:    ld a0, 9(a2)
; RV64I-NEXT:    sd a1, 9(a2)
; RV64I-NEXT:    ret
 %1 = getelementptr inbounds i64, ptr %a, i64 257
 %2 = load volatile i64, ptr %1
 store i64 %b, ptr %1
 ret i64 %2
}

define
 i64 @lw_far_local(ptr %a)  {
; RV64I-LABEL: lw_far_local:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 8
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ld a0, -8(a0)
; RV64I-NEXT:    ret
 %1 = getelementptr inbounds i64, ptr %a, i64 4095
 %2 = load volatile i64, ptr %1
 ret i64 %2
}

define void @st_far_local(ptr %a, i64 %b)  {
; RV64I-LABEL: st_far_local:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a2, 8
; RV64I-NEXT:    add a0, a0, a2
; RV64I-NEXT:    sd a1, -8(a0)
; RV64I-NEXT:    ret
```

```
 %1 = getelementptr inbounds i64, ptr %a, i64 4095
 store i64 %b, ptr %1
 ret void
}

define i64 @lw_sw_far_local(ptr %a, i64 %b)  {
; RV64I-LABEL: lw_sw_far_local:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a2, 8
; RV64I-NEXT:    add a2, a0, a2
; RV64I-NEXT:    ld a0, -8(a2)
; RV64I-NEXT:    sd a1, -8(a2)
; RV64I-NEXT:    ret
 %1 = getelementptr inbounds i64, ptr %a, i64 4095
 %2 = load volatile i64, ptr %1
 store i64 %b, ptr %1
 ret i64 %2
}

; Make sure we don't fold the addiw
 into the load offset. The sign extend of the
; addiw is required.
define i64 @lw_really_far_local(ptr %a)  {
; RV64I-LABEL: lw_really_far_local:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 524288
; RV64I-NEXT:    addiw a1, a1, -2048
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ld a0, 0(a0)
; RV64I-NEXT:    ret
 %1 = getelementptr inbounds i64, ptr %a, i64 268435200
 %2 = load volatile i64, ptr %1
 ret i64 %2
}

; Make sure we don't fold the addiw into the store offset. The sign extend of
; the addiw is required.
define void @st_really_far_local(ptr %a, i64 %b)  {
; RV64I-LABEL: st_really_far_local:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a2, 524288
; RV64I-NEXT:    addiw a2, a2, -2048
; RV64I-NEXT:    add a0, a0, a2
; RV64I-NEXT:    sd a1, 0(a0)
; RV64I-NEXT:    ret
 %1 = getelementptr inbounds i64, ptr %a, i64 268435200
 store i64 %b, ptr %1
 ret void
```

```
}

; Make sure we don't fold the addiw into the load/store offset. The sign extend
; of the addiw is required.
define
 i64 @lw_sw_really_far_local(ptr %a, i64 %b)  {
; RV64I-LABEL: lw_sw_really_far_local:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a2, 524288
; RV64I-NEXT:    addiw a2, a2, -2048
; RV64I-NEXT:    add a2, a0, a2
; RV64I-NEXT:    ld a0, 0(a2)
; RV64I-NEXT:    sd a1, 0(a2)
; RV64I-NEXT:    ret
 %1 = getelementptr inbounds i64, ptr %a, i64 268435200
 %2 = load volatile i64, ptr %1
 store i64 %b, ptr %1
 ret i64 %2
}

%struct.quux = type { i32, [0 x i8] }

; Make sure we don't remove the addi and fold the C from
; (add (addi FrameIndex, C), X) into the store address.
; FrameIndex cannot be the operand of an ADD. We must keep the ADDI.
define void @addi_fold_crash(i64 %arg) nounwind {
; RV64I-LABEL: addi_fold_crash:
; RV64I:       # %bb.0: # %bb
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    addi a1, sp, 4
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    sb zero, 0(a0)
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:    call snork
; RV64I-NEXT:
    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
bb:
 %tmp = alloca %struct.quux, align 8
 %tmp1 = getelementptr inbounds %struct.quux, ptr %tmp, i64 0, i32 1
 %tmp2 = getelementptr inbounds %struct.quux, ptr %tmp, i64 0, i32 1, i64 %arg
 store i8 0, ptr %tmp2, align 1
 call void @snork(ptr %tmp1)
 ret void
}
```

```
declare void @snork(ptr)
; NOTE: Assertions have been autogenerated by utils/update_test_checks.py UTC_ARGS: --function-signature --
scrub-attributes
; RUN: opt -S -passes=argpromotion < %s | FileCheck %s
; Test that we only promote arguments when the caller/callee have compatible
; function attrubtes.

target triple = "x86_64-unknown-linux-gnu"

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr %arg, ptr
readonly %arg1) #0 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512
; CHECK-SAME: (ptr [[ARG:%.*]], <8 x i64> [[ARG1_VAL:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    store <8 x i64> [[ARG1_VAL]], ptr [[ARG]]
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr %arg) #0 {
; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer512_call_avx512_legal512_prefer512
; CHECK-SAME:
 (ptr [[ARG:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    call void @llvm.memset.p0.i64(ptr align 32 [[TMP]], i8 0, i64 32, i1 false)
; CHECK-NEXT:    [[TMP_VAL:%.*]] = load <8 x i64>, ptr [[TMP]]
; CHECK-NEXT:    call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr
[[TMP2]], <8 x i64> [[TMP_VAL]])
; CHECK-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 32
; CHECK-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CHECK-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}
```

```
; This should promote
define
 internal fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr %arg, ptr readonly
%arg1) #1 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]], <8 x i64> [[ARG1_VAL:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    store <8 x i64> [[ARG1_VAL]], ptr [[ARG]]
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr %arg) #1 {
; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    call void @llvm.memset.p0.i64(ptr align 32 [[TMP]], i8 0, i64 32, i1 false)
; CHECK-NEXT:    [[TMP_VAL:%.*]] = load <8 x i64>, ptr [[TMP]]
; CHECK-NEXT:    call fastcc
 void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr [[TMP2]], <8 x i64>
[[TMP_VAL]])
; CHECK-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 32
; CHECK-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CHECK-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr %arg, ptr
readonly %arg1) #1 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]], <8 x i64> [[ARG1_VAL:%.*]])
; CHECK-NEXT:  bb:
```

```
; CHECK-NEXT:    store <8 x i64> [[ARG1_VAL]],
 ptr [[ARG]]
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr %arg) #0 {
; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer512_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    call void @llvm.memset.p0.i64(ptr align 32 [[TMP]], i8 0, i64 32, i1 false)
; CHECK-NEXT:    [[TMP_VAL:%.*]] = load <8 x i64>, ptr [[TMP]]
; CHECK-NEXT:    call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr
[[TMP2]], <8 x i64> [[TMP_VAL]])
; CHECK-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 32
; CHECK-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CHECK-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align
 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr %arg, ptr
readonly %arg1) #0 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512
; CHECK-SAME: (ptr [[ARG:%.*]], <8 x i64> [[ARG1_VAL:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    store <8 x i64> [[ARG1_VAL]], ptr [[ARG]]
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
```

```
}

define void @avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr %arg) #1 {
; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal512_prefer512
; CHECK-SAME: (ptr [[ARG:%.*]])
; CHECK-NEXT:
  bb:
; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    call void @llvm.memset.p0.i64(ptr align 32 [[TMP]], i8 0, i64 32, i1 false)
; CHECK-NEXT:    [[TMP_VAL:%.*]] = load <8 x i64>, ptr [[TMP]]
; CHECK-NEXT:    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr
[[TMP2]], <8 x i64> [[TMP_VAL]])
; CHECK-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 32
; CHECK-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CHECK-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should not promote
define internal fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr
 %arg, ptr readonly %arg1) #1 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]], ptr readonly [[ARG1:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1]]
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]]
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr %arg) #2 {
; CHECK-LABEL: define {{[^@]+}}@avx512_legal256_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
```

```
; CHECK-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    call void @llvm.memset.p0.i64(ptr align 32 [[TMP]], i8 0, i64 32, i1 false)
; CHECK-NEXT:    call fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr
 [[TMP2]], ptr [[TMP]])
; CHECK-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 32
; CHECK-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CHECK-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should not promote
define internal fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %arg, ptr
readonly %arg1) #2 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]], ptr readonly [[ARG1:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1]]
; CHECK-NEXT:    store <8 x i64>
 [[TMP]], ptr [[ARG]]
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %arg) #1 {
; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal256_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    call void @llvm.memset.p0.i64(ptr align 32 [[TMP]], i8 0, i64 32, i1 false)
; CHECK-NEXT:    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr
[[TMP2]], ptr [[TMP]])
; CHECK-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 32
; CHECK-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CHECK-NEXT:    ret void
;
```

```
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64
 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr %arg, ptr readonly
%arg1) #3 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]], <8 x i64> [[ARG1_VAL:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    store <8 x i64> [[ARG1_VAL]], ptr [[ARG]]
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr %arg) #4 {
; CHECK-LABEL: define {{[^@]+}}@avx2_legal256_prefer256_call_avx2_legal512_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:
   [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    call void @llvm.memset.p0.i64(ptr align 32 [[TMP]], i8 0, i64 32, i1 false)
; CHECK-NEXT:    [[TMP_VAL:%.*]] = load <8 x i64>, ptr [[TMP]]
; CHECK-NEXT:    call fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr
[[TMP2]], <8 x i64> [[TMP_VAL]])
; CHECK-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 32
; CHECK-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CHECK-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
```

```
 ret void
}

; This should promote
define internal fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr %arg, ptr readonly
%arg1) #4 {
;
 CHECK-LABEL: define {{[^@]+}}@callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]], <8 x i64> [[ARG1_VAL:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    store <8 x i64> [[ARG1_VAL]], ptr [[ARG]]
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr %arg) #3 {
; CHECK-LABEL: define {{[^@]+}}@avx2_legal512_prefer256_call_avx2_legal256_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    call void @llvm.memset.p0.i64(ptr align 32 [[TMP]], i8 0, i64 32, i1 false)
; CHECK-NEXT:    [[TMP_VAL:%.*]] = load <8 x i64>, ptr [[TMP]]
; CHECK-NEXT:    call fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr
[[TMP2]], <8 x i64> [[TMP_VAL]])
; CHECK-NEXT:    [[TMP4:%.*]] = load
 <8 x i64>, ptr [[TMP2]], align 32
; CHECK-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CHECK-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; If the arguments are scalar, its ok to promote.
define internal i32 @scalar_callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr %X, ptr %Y)
#2 {
; CHECK-LABEL: define
```

```
{{[^@]+}}@scalar_callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (i32 [[X_VAL:%.*]], i32 [[Y_VAL:%.*]])
; CHECK-NEXT:    [[C:%.*]] = add i32 [[X_VAL]], [[Y_VAL]]
; CHECK-NEXT:    ret i32 [[C]]
;
 %A = load i32, ptr %X
 %B = load i32, ptr %Y
 %C = add i32 %A, %B
 ret i32 %C
}

define i32 @scalar_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr
 %B) #2 {
; CHECK-LABEL: define {{[^@]+}}@scalar_avx512_legal256_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr [[B:%.*]])
; CHECK-NEXT:    [[A:%.*]] = alloca i32
; CHECK-NEXT:    store i32 1, ptr [[A]]
; CHECK-NEXT:    [[A_VAL:%.*]] = load i32, ptr [[A]]
; CHECK-NEXT:    [[B_VAL:%.*]] = load i32, ptr [[B]]
; CHECK-NEXT:    [[C:%.*]] = call i32
@scalar_callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(i32 [[A_VAL]], i32 [[B_VAL]])
; CHECK-NEXT:    ret i32 [[C]]
;
 %A = alloca i32
 store i32 1, ptr %A
 %C = call i32 @scalar_callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr %A, ptr %B)
 ret i32 %C
}

; If the arguments are scalar, its ok to promote.
define internal i32 @scalar_callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %X, ptr %Y)
#2 {
; CHECK-LABEL: define
{{[^@]+}}@scalar_callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256
; CHECK-SAME: (i32 [[X_VAL:%.*]],
 i32 [[Y_VAL:%.*]])
; CHECK-NEXT:    [[C:%.*]] = add i32 [[X_VAL]], [[Y_VAL]]
; CHECK-NEXT:    ret i32 [[C]]
;
 %A = load i32, ptr %X
 %B = load i32, ptr %Y
 %C = add i32 %A, %B
 ret i32 %C
}

define i32 @scalar_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %B) #2 {
; CHECK-LABEL: define {{[^@]+}}@scalar_avx512_legal512_prefer256_call_avx512_legal256_prefer256
; CHECK-SAME: (ptr [[B:%.*]])
```

```
; CHECK-NEXT:    [[A:%.*]] = alloca i32
; CHECK-NEXT:    store i32 1, ptr [[A]]
; CHECK-NEXT:    [[A_VAL:%.*]] = load i32, ptr [[A]]
; CHECK-NEXT:    [[B_VAL:%.*]] = load i32, ptr [[B]]
; CHECK-NEXT:    [[C:%.*]] = call i32
@scalar_callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(i32 [[A_VAL]], i32 [[B_VAL]])
; CHECK-NEXT:    ret i32 [[C]]
;
 %A = alloca i32
 store i32 1, ptr %A
 %C = call i32 @scalar_callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %A, ptr %B)
 ret i32 %C
}

; Function Attrs: argmemonly nounwind
declare void @llvm.memset.p0.i64(ptr
 nocapture writeonly, i8, i64, i1) #5

attributes #0 = { inlinehint norecurse nounwind uwtable "target-features"="+avx512vl" "min-legal-vector-
width"="512" "prefer-vector-width"="512" }
attributes #1 = { inlinehint norecurse nounwind uwtable "target-features"="+avx512vl" "min-legal-vector-
width"="512" "prefer-vector-width"="256" }
attributes #2 = { inlinehint norecurse nounwind uwtable "target-features"="+avx512vl" "min-legal-vector-
width"="256" "prefer-vector-width"="256" }
attributes #3 = { inlinehint norecurse nounwind uwtable "target-features"="+avx2" "min-legal-vector-width"="512"
"prefer-vector-width"="256" }
attributes #4 = { inlinehint norecurse nounwind uwtable "target-features"="+avx2" "min-legal-vector-width"="256"
"prefer-vector-width"="256" }
attributes #5 = { argmemonly nounwind }
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -mattr=+zbc -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefix=RV64ZBC-ZBKC
; RUN: llc -mtriple=riscv64 -mattr=+zbkc -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefix=RV64ZBC-ZBKC

declare i64 @llvm.riscv.clmul.i64(i64 %a, i64 %b)

define i64 @clmul64(i64 %a, i64 %b) nounwind {
; RV64ZBC-ZBKC-LABEL: clmul64:
; RV64ZBC-ZBKC:       # %bb.0:
; RV64ZBC-ZBKC-NEXT:    clmul a0, a0, a1
; RV64ZBC-ZBKC-NEXT:    ret
 %tmp = call i64 @llvm.riscv.clmul.i64(i64 %a, i64 %b)
 ret i64 %tmp
}

declare i64 @llvm.riscv.clmulh.i64(i64 %a, i64 %b)
```

```
define i64 @clmul64h(i64 %a, i64 %b) nounwind {
; RV64ZBC-ZBKC-LABEL: clmul64h:
; RV64ZBC-ZBKC:       # %bb.0:
; RV64ZBC-ZBKC-NEXT:    clmulh a0, a0, a1
; RV64ZBC-ZBKC-NEXT:    ret
 %tmp = call i64 @llvm.riscv.clmulh.i64(i64 %a, i64 %b)
 ret i64 %tmp
}

declare
 i32 @llvm.riscv.clmul.i32(i32 %a, i32 %b)

define signext i32 @clmul32(i32 signext %a, i32 signext %b) nounwind {
; RV64ZBC-ZBKC-LABEL: clmul32:
; RV64ZBC-ZBKC:       # %bb.0:
; RV64ZBC-ZBKC-NEXT:    clmul a0, a0, a1
; RV64ZBC-ZBKC-NEXT:    sext.w a0, a0
; RV64ZBC-ZBKC-NEXT:    ret
 %tmp = call i32 @llvm.riscv.clmul.i32(i32 %a, i32 %b)
 ret i32 %tmp
}

declare i32 @llvm.riscv.clmulh.i32(i32 %a, i32 %b)

define signext i32 @clmul32h(i32 signext %a, i32 signext %b) nounwind {
; RV64ZBC-ZBKC-LABEL: clmul32h:
; RV64ZBC-ZBKC:       # %bb.0:
; RV64ZBC-ZBKC-NEXT:    slli a1, a1, 32
; RV64ZBC-ZBKC-NEXT:    slli a0, a0, 32
; RV64ZBC-ZBKC-NEXT:    clmulh a0, a0, a1
; RV64ZBC-ZBKC-NEXT:    srai a0, a0, 32
; RV64ZBC-ZBKC-NEXT:    ret
 %tmp = call i32 @llvm.riscv.clmulh.i32(i32 %a, i32 %b)
 ret i32 %tmp
}

; FIXME: We could avoid the slli instructions by using clmul+srai since the
; inputs are zero extended.
define signext i32 @clmul32h_zext(i32 zeroext %a, i32 zeroext %b) nounwind {
;
 RV64ZBC-ZBKC-LABEL: clmul32h_zext:
; RV64ZBC-ZBKC:       # %bb.0:
; RV64ZBC-ZBKC-NEXT:    slli a1, a1, 32
; RV64ZBC-ZBKC-NEXT:    slli a0, a0, 32
; RV64ZBC-ZBKC-NEXT:    clmulh a0, a0, a1
; RV64ZBC-ZBKC-NEXT:    srai a0, a0, 32
; RV64ZBC-ZBKC-NEXT:    ret
 %tmp = call i32 @llvm.riscv.clmulh.i32(i32 %a, i32 %b)
```

```
 ret i32 %tmp
}
```

1.28 iptables 1.8.11

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1.29 shim 15.8

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1.30 golang 1.23.5

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1.31 golang 1.24.2

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package copyright

import (
 "bytes"
 "internal/testenv"
 "io"
 "io/fs"
 "os"
 "path/filepath"
 "testing"
)

var copyright = []byte("Copyright")

var permitted = [][]byte{
 []byte("// Code generated by "),
 []byte("// Code generated from "),
 []byte("// Created by cgo -cdefs"),
 []byte("// DO NOT EDIT\n// generated by:"),
 []byte("// Empty assembly file"),
 []byte("// Generated using cgo"),
 []byte("// Original source:\n//\thttp://www.zorinaq.com/papers/md5-amd64.html"), // public domain crypto/md5
 []byte("// created by cgo -cdefs"),
 []byte("// go run mkasm.go"),
 []byte("// mkerrors"),
 []byte("// mksys"),
 []byte("// run\n// Code generated by"), // cmd/compile/internal/test/constFold_test.go
}

func TestCopyright(t *testing.T) {
 buf := make([]byte, 2048)
 filepath.WalkDir(filepath.Join(testenv.GOROOT(t), "src"), func(path string,
```

```
 d fs.DirEntry, err error) error {
  if d.IsDir() && (d.Name() == "testdata" || d.Name() == "vendor") {
   return filepath.SkipDir
  }
  switch filepath.Ext(d.Name()) {
  default:
   return nil
  case ".s", ".go":
   // check
  }

  f, err := os.Open(path)
  if err != nil {
   t.Error(err)
   return nil
  }
  defer f.Close()
  n, err := f.Read(buf)
  if err != nil && err != io.EOF {
   t.Error(err)
   return nil
  }
  b := buf[:n]
  if bytes.Contains(b, copyright) {
   return nil
  }
  for _, ok := range permitted {
   if bytes.HasPrefix(b, ok) {
    return nil
   }
  }
  t.Errorf("%s: missing copyright notice", path)
  return nil
 })
}
```

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When we speak of free software, we are referring to freedom of use, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish); that you receive source code or can get it if you want it; that you can change the software and use pieces of it in new free programs; and that you are informed that you can do these things.

To protect your rights, we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights. These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it.

For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link other code with the library, you must provide complete object files to the recipients, so that they can relink them with the library after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

We protect your rights with a two-step method: (1) we copyright the library, and (2) we offer you this license, which gives you legal permission to copy, distribute and/or modify the library.

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Finally, software patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder. Therefore, we insist that any patent license obtained for a version of the library must be

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Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the @dfn{Lesser} General Public License because it does @emph{Less} to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and

modification follow. Pay close attention to the difference between a
``work based on the library'' and a ``work that uses the library''. The
former
 contains code derived from the library, whereas the latter must
be combined with the library in order to run.

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(which use some of those functions and data) to form executables.

 The ``Library'', below, refers to any such software library or work
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included without limitation in the term ``modification''.)

 ``Source code'' for a work means the preferred form of the work for
making modifications to it. For a library, complete source code means
all the source code for all modules it contains, plus any associated
interface definition files, plus the scripts used to control compilation
and installation of the library.

 Activities other than copying, distribution and modification are not
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writing it). Whether that is true depends on what the Library does
and what the program that uses the Library does.

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above, provided that you also meet all of these conditions:

@enumerate a
@item
The modified work must itself be a software library.

@item
You must cause the files modified to carry prominent notices
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@item
You must
cause the whole of the work to be licensed at no
charge to all third parties under the terms of this License.

@item
If a facility in the modified Library refers to a function or a
table of data to be supplied by an application program that uses
the facility, other than as an argument passed when the facility
is invoked, then you must make a good faith effort to ensure that,
in the event an application does not supply such function or
table, the facility still operates, and performs whatever part of
its purpose remains meaningful.

(For example, a function in a library to compute square roots has
a purpose that is entirely well-defined independent of the
application. Therefore, Subsection 2d requires that any
application-supplied function or table used by this function must
be optional: if the application does not supply it, the square
root function must still compute square roots.)
@end enumerate

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entire whole, and thus to each and every part regardless of who wrote
it.

Thus, it is not the intent of this section to claim rights or contest
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exercise the right to control the distribution of derivative or
collective works based on the Library.

In addition, mere aggregation of another work not based on the Library
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these notices.

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subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of
the Library into a program that is not a library.

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under the terms of Sections 1 and
2 above provided that you accompany
it with the complete corresponding machine-readable source code, which
must be distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

If distribution of object code is made by offering access to copy

from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

@item
A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a ``work that uses the Library''. Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a ``work that uses the Library'' with the Library creates an executable that is a derivative of the Library (because it
contains portions of the Library), rather than a ``work that uses the library''. The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a ``work that uses the Library'' uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise,
if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

@item
As an exception to the Sections above, you may also combine or link a ``work that uses the Library'' with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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Library is used in it and that the Library and its use are covered by
this License. You must supply a copy of this License. If the work
during execution displays copyright notices, you must include the
copyright notice for the Library among them, as well as a reference
directing the user to the copy of
 this License. Also, you must do one
of these things:

@enumerate a
@item
Accompany the work with the complete corresponding
machine-readable source code for the Library including whatever
changes were used in the work (which must be distributed under
Sections 1 and 2 above); and, if the work is an executable linked
with the Library, with the complete machine-readable ``work that
uses the Library'', as object code and/or source code, so that the
user can modify the Library and then relink to produce a modified
executable containing the modified Library. (It is understood
that the user who changes the contents of definitions files in the
Library will not necessarily be able to recompile the application
to use the modified definitions.)

@item
Use a suitable shared library mechanism for linking with the Library. A
suitable mechanism is one that (1) uses at run time a copy of the
library already present on the user's computer system, rather than
copying library functions into the executable,
 and (2) will operate
properly with a modified version of the library, if the user installs
one, as long as the modified version is interface-compatible with the
version that the work was made with.

@item
Accompany the work with a written offer, valid for at
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@item
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from a designated place, offer equivalent access to copy the above
specified materials from the same place.

@item
Verify that the user has already received a copy of these
materials or that you have already sent this user a copy.
@end enumerate

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Library" must include any data and utility programs needed for
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which the executable runs, unless that component itself accompanies the
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It may happen that this requirement contradicts the license
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accompany the operating system. Such a contradiction means you cannot
use both them and the Library together in an executable that you
distribute.

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@enumerate a
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uncombined with any other library
facilities. This must be distributed under the terms of the
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@item
Give prominent notice with the combined library of the fact
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@end enumerate

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@end enumerate

@subheading END OF TERMS AND CONDITIONS

@page
@subheading How to Apply These Terms to Your New Libraries

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@var{signature of Ty Coon}, 1 April 1990
Ty Coon, President of Vice
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entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest
your rights to work written entirely by you; rather, the intent is to
exercise the right to control the distribution of derivative or
collective works based on the Program.

In addition, mere aggregation of another work not based on the Program
with the Program (or with a work based on the Program) on a volume of
a storage or distribution medium does not bring the other work under
the scope of this License.

3. You may copy and distribute the Program (or a work based on it,
under Section 2) in object code or executable form under the terms of
Sections 1 and 2 above provided that you also do one of the following:

a) Accompany it with the complete corresponding machine-readable
source code, which must be distributed under the terms of Sections
1 and 2 above on a medium customarily used for software interchange; or,

b) Accompany it with a written offer, valid for at least three
years, to give any third party, for a charge no more than your

cost of physically performing source distribution, a complete machine-readable copy of the corresponding source code, to be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,

c) Accompany it with the information you received as to the offer to distribute corresponding source code. (This alternative is allowed only for noncommercial distribution and only if you received the program in object code or executable form with such an offer, in accord with Subsection b above.)

The source code for a work means the preferred form of the work for making modifications to it. For an executable work, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the executable. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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1.34 sqlite 3.49.2

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autosetup - A build environment "autoconfigurator"

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1.35 golang 1.24.4

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package copyright

import (
 "bytes"
 "internal/testenv"
 "io"
 "io/fs"
 "os"
 "path/filepath"
 "testing"
)

var copyright = []byte("Copyright")

var permitted = [][]byte{
 []byte("// Code generated by "),
 []byte("// Code generated from "),
 []byte("// Created by cgo -cdefs"),
 []byte("// DO NOT EDIT\n// generated by:"),
 []byte("// Empty assembly file"),
 []byte("// Generated using cgo"),
 []byte("// Original source:\n//\thttp://www.zorinaq.com/papers/md5-amd64.html"), // public domain crypto/md5
 []byte("// created by cgo -cdefs"),
 []byte("// go run mkasm.go"),
 []byte("// mkerrors"),
 []byte("// mksys"),
 []byte("// run\n// Code generated by"), // cmd/compile/internal/test/constFold_test.go
}

func TestCopyright(t *testing.T) {
 buf := make([]byte, 2048)
 filepath.WalkDir(filepath.Join(testenv.GOROOT(t), "src"), func(path string,
 d fs.DirEntry, err error) error {
  if d.IsDir() && (d.Name() == "testdata" || d.Name() == "vendor") {
   return filepath.SkipDir
```

```
  }
  switch filepath.Ext(d.Name()) {
  default:
   return nil
  case ".s", ".go":
   // check
  }

  f, err := os.Open(path)
  if err != nil {
   t.Error(err)
   return nil
  }
  defer f.Close()
  n, err := f.Read(buf)
  if err != nil && err != io.EOF {
   t.Error(err)
   return nil
  }
  b := buf[:n]
  if bytes.Contains(b, copyright) {
   return nil
  }
  for _, ok := range permitted {
   if bytes.HasPrefix(b, ok) {
    return nil
   }
  }
  t.Errorf("%s: missing copyright notice", path)
  return nil
 })
}
```

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1.39 golang 1.24.5

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```
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package copyright

import (
 "bytes"
 "internal/testenv"
 "io"
 "io/fs"
 "os"
 "path/filepath"
 "testing"
)

var copyright = []byte("Copyright")

var permitted = [][]byte{
 []byte("// Code generated by "),
 []byte("// Code generated from "),
 []byte("// Created by cgo -cdefs"),
 []byte("// DO NOT EDIT\n// generated by:"),
 []byte("// Empty assembly file"),
 []byte("// Generated using cgo"),
 []byte("// Original source:\n//\thttp://www.zorinaq.com/papers/md5-amd64.html"), // public domain crypto/md5
 []byte("// created by cgo -cdefs"),
 []byte("// go run mkasm.go"),
```

```
 []byte("// mkerrors"),
 []byte("// mksys"),
 []byte("// run\n// Code generated by"), // cmd/compile/internal/test/constFold_test.go
}

func TestCopyright(t *testing.T) {
 buf := make([]byte, 2048)
 filepath.WalkDir(filepath.Join(testenv.GOROOT(t), "src"), func(path string,
 d fs.DirEntry, err error) error {
  if d.IsDir() && (d.Name() == "testdata" || d.Name() == "vendor") {
   return filepath.SkipDir
  }
  switch filepath.Ext(d.Name()) {
  default:
   return nil
  case ".s", ".go":
   // check
  }

  f, err := os.Open(path)
  if err != nil {
   t.Error(err)
   return nil
  }
  defer f.Close()
  n, err := f.Read(buf)
  if err != nil && err != io.EOF {
   t.Error(err)
   return nil
  }
  b := buf[:n]
  if bytes.Contains(b, copyright) {
   return nil
  }
  for _, ok := range permitted {
   if bytes.HasPrefix(b, ok) {
    return nil
   }
  }
  t.Errorf("%s: missing copyright notice", path)
  return nil
 })
}
```

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1.42 golang 1.24.6

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```
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package copyright

import (
 "bytes"
 "internal/testenv"
 "io"
 "io/fs"
 "os"
 "path/filepath"
 "testing"
)

var copyright = []byte("Copyright")

var permitted = [][]byte{
 []byte("// Code generated by "),
 []byte("// Code generated from "),
 []byte("// Created by cgo -cdefs"),
 []byte("// DO NOT EDIT\n// generated by:"),
 []byte("// Empty assembly file"),
 []byte("// Generated using cgo"),
 []byte("// Original source:\n//\thttp://www.zorinaq.com/papers/md5-amd64.html"), // public domain crypto/md5
 []byte("// created by cgo -cdefs"),
 []byte("// go run mkasm.go"),
 []byte("// mkerrors"),
 []byte("// mksys"),
 []byte("// run\n// Code generated by"), // cmd/compile/internal/test/constFold_test.go
}

func TestCopyright(t *testing.T) {
 buf := make([]byte, 2048)
 filepath.WalkDir(filepath.Join(testenv.GOROOT(t), "src"), func(path string,
 d fs.DirEntry, err error) error {
  if d.IsDir() && (d.Name() == "testdata" || d.Name() == "vendor") {
   return filepath.SkipDir
  }
  switch filepath.Ext(d.Name()) {
  default:
   return nil
  case ".s", ".go":
   // check
  }
```

```
  f, err := os.Open(path)
  if err != nil {
   t.Error(err)
   return nil
  }
  defer f.Close()
  n, err := f.Read(buf)
  if err != nil && err != io.EOF {
   t.Error(err)
   return nil
  }
  b := buf[:n]
  if bytes.Contains(b, copyright) {
   return nil
  }
  for _, ok := range permitted {
   if bytes.HasPrefix(b, ok) {
    return nil
   }
  }
  t.Errorf("%s: missing copyright notice", path)
  return nil
 })
}
```

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1.44 golang 1.24.7

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```
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package copyright

import (
```

```
 "bytes"
 "internal/testenv"
 "io"
 "io/fs"
 "os"
 "path/filepath"
 "testing"
)

var copyright = []byte("Copyright")

var permitted = [][]byte{
 []byte("// Code generated by "),
 []byte("// Code generated from "),
 []byte("// Created by cgo -cdefs"),
 []byte("// DO NOT EDIT\n// generated by:"),
 []byte("// Empty assembly file"),
 []byte("// Generated using cgo"),
 []byte("// Original source:\n//\thttp://www.zorinaq.com/papers/md5-amd64.html"), // public domain crypto/md5
 []byte("// created by cgo -cdefs"),
 []byte("// go run mkasm.go"),
 []byte("// mkerrors"),
 []byte("// mksys"),
 []byte("// run\n// Code generated by"), // cmd/compile/internal/test/constFold_test.go
}

func TestCopyright(t *testing.T) {
 buf := make([]byte, 2048)
 filepath.WalkDir(filepath.Join(testenv.GOROOT(t), "src"), func(path string,
 d fs.DirEntry, err error) error {
  if d.IsDir() && (d.Name() == "testdata" || d.Name() == "vendor") {
   return filepath.SkipDir
  }
  switch filepath.Ext(d.Name()) {
  default:
   return nil
  case ".s", ".go":
   // check
  }

  f, err := os.Open(path)
  if err != nil {
   t.Error(err)
   return nil
  }
  defer f.Close()
  n, err := f.Read(buf)
  if err != nil && err != io.EOF {
```

```
  t.Error(err)
  return nil
 }
 b := buf[:n]
 if bytes.Contains(b, copyright) {
  return nil
 }
 for _, ok := range permitted {
  if bytes.HasPrefix(b, ok) {
   return nil
  }
 }
 t.Errorf("%s: missing copyright notice", path)
 return nil
})
}
```

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1.45 v8 13.8.258.26

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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see https://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property.
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1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
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2.1.1	2.1+2.0.1	2001	PSF	yes
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ISC

```
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// found in the LICENSE file.

#ifndef V8_COMPILER_TURBOSHAFT_COPYING_PHASE_H_
#define V8_COMPILER_TURBOSHAFT_COPYING_PHASE_H_

#include <algorithm>
#include <cstddef>
#include <cstdint>
#include <optional>
#include <utility>

#include "src/base/iterator.h"
#include "src/base/logging.h"
#include "src/base/small-vector.h"
#include "src/base/vector.h"
#include "src/codegen/optimized-compilation-info.h"
#include "src/codegen/source-position.h"
#include "src/compiler/node-origin-table.h"
#include "src/compiler/turboshaft/assembler.h"
#include "src/compiler/turboshaft/graph.h"
#include "src/compiler/turboshaft/index.h"
#include "src/compiler/turboshaft/operations.h"
#include "src/compiler/turboshaft/phase.h"
#include "src/compiler/turboshaft/reducer-traits.h"
#include "src/compiler/turboshaft/representations.h"
#include "src/compiler/turboshaft/snapshot-table.h"
#include
 "src/compiler/turboshaft/variable-reducer.h"
#include "src/zone/zone-containers.h"

namespace v8::internal::compiler::turboshaft {

using MaybeVariable = std::optional<Variable>;

V8_EXPORT_PRIVATE int CountDecimalDigits(uint32_t value);
struct PaddingSpace {
 int spaces;
};
V8_EXPORT_PRIVATE std::ostream& operator<<(std::ostream& os,
                                           PaddingSpace padding);
```

```
template <typename Next>
class ReducerBaseForwarder;
template <typename Next>
class WasmRevecReducer;

template <typename Derived, typename Base>
class OutputGraphAssembler : public Base {
#define FRIEND(op) friend struct op##Op;
 TURBOSHAFT_OPERATION_LIST(FRIEND)
#undef FRIEND
 template <size_t I, class D>
 friend struct FixedArityOperationT;

 OpIndex Map(OpIndex index) { return derived_this()->MapToNewGraph(index); }

 OptionalOpIndex Map(OptionalOpIndex index) {
   return derived_this()->MapToNewGraph(index);
 }

 template <size_t N>
 base::SmallVector<OpIndex,
 N> Map(base::Vector<const OpIndex> indices) {
   return derived_this()->template MapToNewGraph<N>(indices);
 }

public:
#define ASSEMBLE(operation)                                    \
 OpIndex AssembleOutputGraph##operation(const operation##Op& op) { \
   return op.Explode(                                      \
       [a = assembler()](auto... args) {                       \
         return a->Reduce##operation(args...);                   \
       },                                                      \
       *this);                                                 \
 }
 TURBOSHAFT_OPERATION_LIST(ASSEMBLE)
#undef ASSEMBLE

private:
 Derived* derived_this() { return static_cast<Derived*>(this); }
 Assembler<typename Base::ReducerList>* assembler() {
   return &derived_this()->Asm();
 }
};

template <class AfterNext>
class GraphVisitor : public OutputGraphAssembler<GraphVisitor<AfterNext>,
                                                 VariableReducer<AfterNext>>
```

```
 {
 template <typename N>
 friend class ReducerBaseForwarder;
 template <typename N>
 friend class WasmRevecReducer;

public:
 using Next = VariableReducer<AfterNext>;
 TURBOSHAFT_REDUCER_BOILERPLATE(CopyingPhase)

 GraphVisitor()
     : input_graph_(Asm().modifiable_input_graph()),
       current_input_block_(nullptr),
       op_mapping_(Asm().input_graph().op_id_count(), OpIndex::Invalid(),
                   Asm().phase_zone(), &Asm().input_graph()),
       block_mapping_(Asm().input_graph().block_count(), nullptr,
                      Asm().phase_zone()),
       blocks_needing_variables_(Asm().input_graph().block_count(),
                                 Asm().phase_zone()),
       old_opindex_to_variables(Asm().input_graph().op_id_count(),
                                Asm().phase_zone(), &Asm().input_graph()),
       blocks_to_clone_(Asm().phase_zone()) {
   Asm().output_graph().Reset();
 }

 // `trace_reduction` is a template parameter
 to avoid paying for tracing at
 // runtime.
 template <bool trace_reduction>
 void VisitGraph() {
   Asm().Analyze();

   // Creating initial old-to-new Block mapping.
   for (Block& input_block : Asm().modifiable_input_graph().blocks()) {
     block_mapping_[input_block.index()] = Asm().output_graph().NewBlock(
         input_block.IsLoop() ? Block::Kind::kLoopHeader : Block::Kind::kMerge,
         &input_block);
   }

   // Visiting the graph.
   VisitAllBlocks<trace_reduction>();

   Finalize();
 }

 void Bind(Block* block) {
   Next::Bind(block);
   block->SetOrigin(current_input_block());
```

```
}

void Finalize() {
  // Updating the source_positions.
  if (!Asm().input_graph().source_positions().empty()) {
    for (OpIndex index : Asm().output_graph().AllOperationIndices()) {
      OpIndex origin = Asm().output_graph().operation_origins()[index];
      Asm().output_graph().source_positions()[index] =
          origin.valid() ? Asm().input_graph().source_positions()[origin]
                         : SourcePosition::Unknown();
    }
  }
  // Updating the operation origins.
  NodeOriginTable* origins = Asm().data()->node_origins();
  if (origins) {
    for (OpIndex index : Asm().output_graph().AllOperationIndices()) {
      OpIndex origin = Asm().output_graph().operation_origins()[index];
      if (origin.valid()) {
        origins->SetNodeOrigin(index.id(), origin.id());
      }
    }
  }

  input_graph_.SwapWithCompanion();
}

const Block* current_input_block() { return current_input_block_; }

bool* turn_loop_without_backedge_into_merge() {
  return &turn_loop_without_backedge_into_merge_;
}

// Emits a Goto to a cloned version of {input_block}, assuming that the only
// predecessor of this cloned copy will be the current block. {input_block} is
// not cloned right away (because this would recursively call VisitBlockBody,
// which could cause stack overflows), and is instead added to
the
// {blocks_to_clone_} stack, whose blocks will be cloned once the current
// block has been fully visited.
void CloneBlockAndGoto(const Block* input_block) {
  Block* new_block =
      Asm().output_graph().NewBlock(input_block->kind(), input_block);

  // Computing which input of Phi operations to use when visiting
  // {input_block} (since {input_block} doesn't really have predecessors
  // anymore).
  int added_block_phi_input = input_block->GetPredecessorIndex(
      Asm().current_block()->OriginForBlockEnd());
```

```
  // There is no guarantees that {input_block} will be entirely removed just
  // because it's cloned/inlined, since it's possible that it has predecessors
  // for which this optimization didn't apply. As a result, we add it to
  // {blocks_needing_variables_}, so that if it's ever generated
  // normally, Variables are used when emitting its content, so that
  // they can later be merged when control flow merges with the current
  //
 version of {input_block} that we just cloned.
  blocks_needing_variables_.Add(input_block->index().id());

  Asm().Goto(new_block);

  blocks_to_clone_.push_back({input_block, added_block_phi_input, new_block});
 }

 // Visits and emits {input_block} right now (ie, in the current block). This
 // should not be called recursively in order to avoid stack overflow (ie,
 // processing {input_block} should never lead to calling CloneAndInlingBlock).
 void CloneAndInlineBlock(const Block* input_block) {
  if (Asm().generating_unreachable_operations()) return;

#ifdef DEBUG
  // Making sure that we didn't call CloneAndInlineBlock recursively.
  DCHECK(!is_in_recursive_inlining_);
  ScopedModification<bool> recursive_guard(&is_in_recursive_inlining_, true);
#endif

  // Computing which input of Phi operations to use when visiting
  // {input_block} (since {input_block} doesn't really have predecessors
  // anymore).
  int added_block_phi_input = input_block->GetPredecessorIndex(
      Asm().current_block()->OriginForBlockEnd());

  // There is no guarantees that {input_block} will be entirely removed just
  // because it's cloned/inlined, since it's possible that it has predecessors
  // for which this optimization didn't apply. As a result, we add it to
  // {blocks_needing_variables_}, so that if it's ever generated
  // normally, Variables are used when emitting its content, so that
  // they can later be merged when control flow merges with the current
  // version of {input_block} that we just cloned.
  blocks_needing_variables_.Add(input_block->index().id());

  ScopedModification<bool> set_true(&current_block_needs_variables_, true);
  VisitBlockBody<CanHavePhis::kYes, ForCloning::kYes, false>(
     input_block, added_block_phi_input);
 }
```

```
// {InlineOp} introduces two limitations unlike {CloneAndInlineBlock}:
// 1. The input operation must not be emitted anymore as part of its
// regular input block;
// 2.
{InlineOp} must not be used multiple times for the same input op.
bool InlineOp(OpIndex index, const Block* input_block) {
  return VisitOpAndUpdateMapping<false>(index, input_block);
}

template <bool can_be_invalid = false>
OpIndex MapToNewGraph(OpIndex old_index, int predecessor_index = -1) {
  DCHECK(old_index.valid());
  OpIndex result = op_mapping_[old_index];

  if (!result.valid()) {
    // {op_mapping} doesn't have a mapping for {old_index}. The
    // VariableReducer should provide the mapping.
    MaybeVariable var = GetVariableFor(old_index);
    if constexpr (can_be_invalid) {
      if (!var.has_value()) {
        return OpIndex::Invalid();
      }
    }
    DCHECK(var.has_value());
    if (predecessor_index == -1) {
      result = Asm().GetVariable(var.value());
    } else {
      result = Asm().GetPredecessorValue(var.value(), predecessor_index);
    }
  }

  DCHECK_IMPLIES(!can_be_invalid, result.valid());
  return result;
 }

template <bool can_be_invalid = false, typename T>
V<T> MapToNewGraph(V<T> old_index, int predecessor_index = -1) {
  return V<T>::Cast(MapToNewGraph<can_be_invalid>(
      static_cast<OpIndex>(old_index), predecessor_index));
}

Block* MapToNewGraph(const Block* block) const {
  Block* new_block = block_mapping_[block->index()];
  DCHECK_NOT_NULL(new_block);
  return new_block;
}

template <typename FunctionType>
```

```
OpIndex ResolvePhi(const PhiOp& op, FunctionType&& map,
                   RegisterRepresentation rep) {
  if (op.input_count == 1) {
    // If, in the previous CopyingPhase, a loop header was turned into a
    // regular blocks, its PendingLoopPhis became Phis with a single input. We
    // can now just get rid of these Phis.
    return map(op.input(0), -1);
  }

  OpIndex ig_index = Asm().input_graph().Index(op);
  if (Asm().current_block()->IsLoop()) {
    DCHECK_EQ(op.input_count, 2);
    OpIndex og_index = map(op.input(0),
-1);
    if (ig_index == op.input(PhiOp::kLoopPhiBackEdgeIndex)) {
      // Avoid emitting a Loop Phi which points to itself, instead
      // emit it's 0'th input.
      return og_index;
    }
    return Asm().PendingLoopPhi(og_index, rep);
  }

  base::Vector<const OpIndex> old_inputs = op.inputs();
  base::SmallVector<OpIndex, 64> new_inputs;
  int predecessor_count = Asm().current_block()->PredecessorCount();
  Block* old_pred = current_input_block_->LastPredecessor();
  Block* new_pred = Asm().current_block()->LastPredecessor();
  // Control predecessors might be missing after the optimization phase. So we
  // need to skip phi inputs that belong to control predecessors that have no
  // equivalent in the new graph.

  // We first assume that the order if the predecessors of the current block
  // did not change. If it did, {new_pred} won't be nullptr at the end of this
  // loop, and we'll instead fall back to the slower code below to compute
the
  // inputs of the Phi.
  int predecessor_index = predecessor_count - 1;
  int old_index = static_cast<int>(old_inputs.size()) - 1;
  for (OpIndex input : base::Reversed(old_inputs)) {
    if (new_pred && new_pred->OriginForBlockEnd() == old_pred) {
      // Phis inputs have to come from predecessors. We thus have to
      // MapToNewGraph with {predecessor_index} so that we get an OpIndex that
      // is from a predecessor rather than one that comes from a Variable
      // merged in the current block.
      new_inputs.push_back(map(input, predecessor_index, old_index));
      new_pred = new_pred->NeighboringPredecessor();
      predecessor_index--;
    }
```

```
    old_pred = old_pred->NeighboringPredecessor();
    old_index--;
  }
  DCHECK_IMPLIES(new_pred == nullptr, old_pred == nullptr);

  if (new_pred != nullptr) {
    // If {new_pred} is not nullptr, then the order of the predecessors
    // changed. This should only happen with blocks
 that were introduced in
    // the previous graph. For instance, consider this (partial) dominator
    // tree:
    //
    //      7
    //       8
    //       10
    //      9
    //      11
    //
    // Where the predecessors of block 11 are blocks 9 and 10 (in that order).
    // In dominator visit order, block 10 will be visited before block 9.
    // Since blocks are added to predecessors when the predecessors are
    // visited, it means that in the new graph, the predecessors of block 11
    // are [10, 9] rather than [9, 10].
    // To account for this, we reorder the inputs of the Phi, and get rid of
    // inputs from blocks that vanished.

#ifdef DEBUG
    // To check that indices are set properly, we zap them in debug builds.
    for (auto& block : Asm().modifiable_input_graph().blocks()) {
      block.clear_custom_data();
    }
#endif
    uint32_t pos = current_input_block_->PredecessorCount() - 1;
    for (old_pred = current_input_block_->LastPredecessor();
         old_pred != nullptr; old_pred = old_pred->NeighboringPredecessor()) {
      // Store the current index of the {old_pred}.
      old_pred->set_custom_data(pos--, Block::CustomDataKind::kPhiInputIndex);
    }

    // Filling {new_inputs}: we iterate the new predecessors, and, for each
    // predecessor, we check the index of the input corresponding to the old
    // predecessor, and we put it next in {new_inputs}.
    new_inputs.clear();
    predecessor_index = predecessor_count - 1;
    for (new_pred = Asm().current_block()->LastPredecessor();
         new_pred != nullptr; new_pred = new_pred->NeighboringPredecessor()) {
      const Block* origin = new_pred->OriginForBlockEnd();
      DCHECK_NOT_NULL(origin);
```

```
      old_index =
          origin->get_custom_data(Block::CustomDataKind::kPhiInputIndex);
      OpIndex input = old_inputs[old_index];
      // Phis inputs have to come from predecessors. We thus have to
       // MapToNewGraph with {predecessor_index} so that we get an OpIndex that
      // is from a predecessor rather than one that comes from a Variable
      // merged in the current block.
      new_inputs.push_back(map(input, predecessor_index, old_index));
      predecessor_index--;
    }
  }

  DCHECK_EQ(new_inputs.size(), Asm().current_block()->PredecessorCount());

  if (new_inputs.size() == 1) {
    // This Operation used to be a Phi in a Merge, but since one (or more) of
    // the inputs of the merge have been removed, there is no need for a Phi
    // anymore.
    return new_inputs[0];
  }

  std::reverse(new_inputs.begin(), new_inputs.end());
  return Asm().ReducePhi(base::VectorOf(new_inputs), rep);
}

// The block from the input graph that corresponds to the current block as a
// branch destination. Such a block might not exist, and this function uses a
// trick to compute such a block in almost all cases, but might rarely fail

// and return `nullptr` instead.
const Block* OriginForBlockStart(Block* block) const {
  // Check that `block->origin_` is still valid as a block start and was not
  // changed to a semantically different block when inlining blocks.
  const Block* origin = block->origin_;
  if (origin && MapToNewGraph(origin) == block) return origin;
  return nullptr;
}

// Clone all of the blocks in {sub_graph} (which should be Blocks of the input
// graph). If `keep_loop_kinds` is true, the loop headers are preserved, and
// otherwise they are marked as Merge. An initial GotoOp jumping to the 1st
// block of `sub_graph` is always emitted. The output Block corresponding to
// the 1st block of `sub_graph` is returned.
template <class Set>
Block* CloneSubGraph(Set sub_graph, bool keep_loop_kinds,
                     bool is_loop_after_peeling = false) {
  // The BlockIndex of the blocks of `sub_graph` should be sorted so that
  // visiting them in order is correct (all
```

```
 of the predecessors of a block
  // should always be visited before the block itself).
  DCHECK(std::is_sorted(sub_graph.begin(), sub_graph.end(),
                        [](const Block* a, const Block* b) {
                          return a->index().id() <= b->index().id();
                        }));

  // 1. Create new blocks, and update old->new mapping. This is required to
  // emit multiple times the blocks of {sub_graph}: if a block `B1` in
  // {sub_graph} ends with a Branch/Goto to a block `B2` that is also in
  // {sub_graph}, then this Branch/Goto should go to the version of `B2` that
  // this CloneSubGraph will insert, rather than to a version inserted by a
  // previous call to CloneSubGraph or the version that the regular
  // VisitAllBlock function will emit.
  ZoneVector<Block*> old_mappings(sub_graph.size(), Asm().phase_zone());
  for (auto&& [input_block, old_mapping] :
      base::zip(sub_graph, old_mappings)) {
    old_mapping =
 block_mapping_[input_block->index()];
    Block::Kind kind = keep_loop_kinds && input_block->IsLoop()
                       ? Block::Kind::kLoopHeader
                       : Block::Kind::kMerge;
    block_mapping_[input_block->index()] =
        Asm().output_graph().NewBlock(kind, input_block);
  }

  // 2. Visit block in correct order (begin to end)

  // Emit a goto to 1st block.
  Block* start = block_mapping_[(*sub_graph.begin())->index()];
#ifdef DEBUG
  if (is_loop_after_peeling) start->set_has_peeled_iteration();
#endif
  Asm().Goto(start);
  // Visiting `sub_graph`.
  for (const Block* block : sub_graph) {
    blocks_needing_variables_.Add(block->index().id());
    VisitBlock<false>(block);
    ProcessWaitingCloningAndInlining<false>();
  }

  // 3. Restore initial old->new mapping
  for (auto&& [input_block, old_mapping] :
      base::zip(sub_graph, old_mappings)) {
    block_mapping_[input_block->index()] = old_mapping;
   }

  return start;
```

```
  }

  template <bool can_be_invalid = false>
  OptionalOpIndex MapToNewGraph(OptionalOpIndex old_index,
                                int predecessor_index = -1) {
    if (!old_index.has_value()) return OptionalOpIndex::Nullopt();
    return MapToNewGraph<can_be_invalid>(old_index.value(), predecessor_index);
  }

  template <size_t expected_size>
  base::SmallVector<OpIndex, expected_size> MapToNewGraph(
      base::Vector<const OpIndex> inputs) {
    base::SmallVector<OpIndex, expected_size> result;
    for (OpIndex input : inputs) {
      result.push_back(MapToNewGraph(input));
    }
    return result;
  }

 private:
  template <bool trace_reduction>
  void VisitAllBlocks() {
    base::SmallVector<const Block*, 128> visit_stack;

    visit_stack.push_back(&Asm().input_graph().StartBlock());
    while (!visit_stack.empty()) {
      const Block* block = visit_stack.back();
      visit_stack.pop_back();
      VisitBlock<trace_reduction>(block);
      ProcessWaitingCloningAndInlining<trace_reduction>();

       for (Block* child = block->LastChild(); child != nullptr;
           child = child->NeighboringChild()) {
        visit_stack.push_back(child);
      }
    }
  }

  template <bool trace_reduction>
  void VisitBlock(const Block* input_block) {
    if (tick_counter_) tick_counter_->TickAndMaybeEnterSafepoint();
    Asm().SetCurrentOrigin(OpIndex::Invalid());
    current_block_needs_variables_ =
        blocks_needing_variables_.Contains(input_block->index().id());
    if constexpr (trace_reduction) {
      std::cout << "\nold " << PrintAsBlockHeader{*input_block} << "\n";
      std::cout << "new "
                << PrintAsBlockHeader{*MapToNewGraph(input_block),
```

```
                              Asm().output_graph().next_block_index()}
            << "\n";
  }
  Block* new_block = MapToNewGraph(input_block);
  if (Asm().Bind(new_block)) {
    VisitBlockBody<CanHavePhis::kYes, ForCloning::kNo, trace_reduction>(

 input_block);
    if constexpr (trace_reduction) TraceBlockFinished();
  } else {
    if constexpr (trace_reduction) TraceBlockUnreachable();
  }

  // If we eliminate a loop backedge, we need to turn the loop into a
  // single-predecessor merge block.
  if (!turn_loop_without_backedge_into_merge_) return;
  const Operation& last_op = input_block->LastOperation(Asm().input_graph());
  if (auto* final_goto = last_op.TryCast<GotoOp>()) {
    if (final_goto->destination->IsLoop()) {
      if (input_block->index() >= final_goto->destination->index()) {
        Asm().FinalizeLoop(MapToNewGraph(final_goto->destination));
      } else {
        // We have a forward jump to a loop, rather than a backedge. We
        // don't need to do anything.
      }
    }
  }
}

enum class CanHavePhis { kNo, kYes };
enum class ForCloning { kNo, kYes };

template <CanHavePhis can_have_phis, ForCloning for_cloning,
          bool trace_reduction>
void VisitBlockBody(const
Block* input_block,
                    int added_block_phi_input = -1) {
  DCHECK_NOT_NULL(Asm().current_block());
  current_input_block_ = input_block;

  // Phis could be mutually recursive, for instance (in a loop header):
  //
  //     p1 = phi(a, p2)
  //     p2 = phi(b, p1)
  //
  // In this case, if we are currently unrolling the loop and visiting this
  // loop header that is now part of the loop body, then if we visit Phis
  // and emit new mapping (with CreateOldToNewMapping) as we go along, we
```

```
  // would visit p1 and emit a mapping saying "p1 = p2", and use this
  // mapping when visiting p2, then we'd map p2 to p2 instead of p1. To
  // overcome this issue, we first visit the Phis of the loop, emit the new
  // phis, and record the new mapping in a side-table ({new_phi_values}).
  // Then, we visit all of the operations of the loop and commit the new
  // mappings: phis were emitted before using the old mapping, and all of

  // the other operations will use the new mapping (as they should).
  //
  // Note that Phis are not always at the begining of blocks, but when they
  // aren't, they can't have inputs from the current block (except on their
  // backedge for loop phis, but they start as PendingLoopPhis without
  // backedge input), so visiting all Phis first is safe.

  // Visiting Phis and collecting their new OpIndices.
  base::SmallVector<OpIndex, 64> new_phi_values;
  if constexpr (can_have_phis == CanHavePhis::kYes) {
    for (OpIndex index : Asm().input_graph().OperationIndices(*input_block)) {
      if (ShouldSkipOperation(Asm().input_graph().Get(index))) continue;
      DCHECK_NOT_NULL(Asm().current_block());
      if (Asm().input_graph().Get(index).template Is<PhiOp>()) {
        OpIndex new_index;
        if constexpr (for_cloning == ForCloning::kYes) {
          // When cloning a block, it only has a single predecessor, and Phis
          // should therefore
be removed and be replaced by the input
          // corresponding to this predecessor.
          DCHECK_NE(added_block_phi_input, -1);
          // This Phi has been cloned/inlined, and has thus now a single
          // predecessor, and shouldn't be a Phi anymore.
          new_index = MapToNewGraph(
              Asm().input_graph().Get(index).input(added_block_phi_input));
        } else {
          new_index =
              VisitOpNoMappingUpdate<trace_reduction>(index, input_block);
        }
        new_phi_values.push_back(new_index);
        if (!Asm().current_block()) {
          // A reducer has detected, based on the Phis of the block that were
          // visited so far, that we are in unreachable code (or, less likely,
          // decided, based on some Phis only, to jump away from this block?).
          return;
        }
      }
    }
  }
  DCHECK_NOT_NULL(Asm().current_block());
```

```
  // Visiting everything, updating Phi mappings,
and emitting non-phi
  // operations.
  int phi_num = 0;
  bool stopped_early = false;
  for (OpIndex index : base::IterateWithoutLast(
          Asm().input_graph().OperationIndices(*input_block))) {
    if (ShouldSkipOperation(Asm().input_graph().Get(index))) continue;
    const Operation& op = Asm().input_graph().Get(index);
    if constexpr (can_have_phis == CanHavePhis::kYes) {
      if (op.Is<PhiOp>()) {
        CreateOldToNewMapping(index, new_phi_values[phi_num++]);
        continue;
      }
    }
    // Blocks with a single predecessor (for which CanHavePhis might be kNo)
    // can still have phis if they used to be loop header that were turned
    // into regular blocks.
    DCHECK_IMPLIES(op.Is<PhiOp>(), op.input_count == 1);

    if (!VisitOpAndUpdateMapping<trace_reduction>(index, input_block)) {
      stopped_early = true;
      break;
    }
  }
  // If the last operation of the loop above (= the one-before-last operation
   // of the block) was lowered to an unconditional deopt/trap/something like
  // that, then current_block will now be null, and there is no need visit the
  // last operation of the block.
  if (stopped_early || Asm().current_block() == nullptr) return;

  // The final operation (which should be a block terminator) of the block
  // is processed separately, because if it's a Goto to a block with a
  // single predecessor, we'll inline it. (we could have had a check `if (op
  // is a Goto)` in the loop above, but since this can only be true for the
  // last operation, we instead extracted it here to make things faster).
  const Operation& terminator =
      input_block->LastOperation(Asm().input_graph());
  DCHECK(terminator.IsBlockTerminator());
  VisitBlockTerminator<trace_reduction>(terminator, input_block);
}

template <bool trace_reduction>
bool VisitOpAndUpdateMapping(OpIndex index, const Block* input_block) {
  if (Asm().current_block() ==
nullptr) return false;
  OpIndex new_index =
      VisitOpNoMappingUpdate<trace_reduction>(index, input_block);
```

```
  const Operation& op = Asm().input_graph().Get(index);
  if (CanBeUsedAsInput(op) && new_index.valid()) {
    CreateOldToNewMapping(index, new_index);
  }
  return true;
}

template <bool trace_reduction>
OpIndex VisitOpNoMappingUpdate(OpIndex index, const Block* input_block) {
  Block* current_block = Asm().current_block();
  DCHECK_NOT_NULL(current_block);
  Asm().SetCurrentOrigin(index);
  current_block->SetOrigin(input_block);
  OpIndex first_output_index = Asm().output_graph().next_operation_index();
  USE(first_output_index);
  const Operation& op = Asm().input_graph().Get(index);
  if constexpr (trace_reduction) TraceReductionStart(index);
  if (ShouldSkipOperation(op)) {
    if constexpr (trace_reduction) TraceOperationSkipped();
    return OpIndex::Invalid();
  }
  OpIndex new_index;
  switch (op.opcode) {
#define EMIT_INSTR_CASE(Name)
                                        \
 case Opcode::k##Name:                                          \
  if (MayThrow(Opcode::k##Name)) return OpIndex::Invalid();             \
  new_index = Asm().ReduceInputGraph##Name(index, op.Cast<Name##Op>()); \
  break;
    TURBOSHAFT_OPERATION_LIST(EMIT_INSTR_CASE)
#undef EMIT_INSTR_CASE
  }
  if constexpr (trace_reduction) {
    if (CanBeUsedAsInput(op) && !new_index.valid()) {
      TraceOperationSkipped();
    } else {
      TraceReductionResult(current_block, first_output_index, new_index);
    }
  }
#ifdef DEBUG
  DCHECK_IMPLIES(new_index.valid(),
                 Asm().output_graph().BelongsToThisGraph(new_index));
  if (V8_UNLIKELY(v8_flags.turboshaft_verify_reductions)) {
    if (new_index.valid()) {
      const Operation& new_op = Asm().output_graph().Get(new_index);
      if (!new_op.Is<TupleOp>()) {
        // Checking that the outputs_rep of the new operation
```

```
 are the same as
        // the old operation. (except for tuples, since they don't have
        // outputs_rep)
        DCHECK_EQ(new_op.outputs_rep().size(), op.outputs_rep().size());
        for (size_t i = 0; i < new_op.outputs_rep().size(); ++i) {
          DCHECK(new_op.outputs_rep()[i].AllowImplicitRepresentationChangeTo(
              op.outputs_rep()[i],
              Asm().output_graph().IsCreatedFromTurbofan()));
        }
      }
      Asm().Verify(index, new_index);
    }
  }
#endif  // DEBUG
  return new_index;
 }

 template <bool trace_reduction>
 void VisitBlockTerminator(const Operation& terminator,
                           const Block* input_block) {
  if (Asm().CanAutoInlineBlocksWithSinglePredecessor() &&
      terminator.Is<GotoOp>()) {
    Block* destination = terminator.Cast<GotoOp>().destination;
    if (destination->PredecessorCount() == 1) {
      block_to_inline_now_ = destination;
      return;
    }
  }
  //
 Just going through the regular VisitOp function.
  OpIndex index = Asm().input_graph().Index(terminator);
  VisitOpAndUpdateMapping<trace_reduction>(index, input_block);
 }

 template <bool trace_reduction>
 void ProcessWaitingCloningAndInlining() {
  InlineWaitingBlock<trace_reduction>();
  while (!blocks_to_clone_.empty()) {
    BlockToClone item = blocks_to_clone_.back();
    blocks_to_clone_.pop_back();
    DoCloneBlock<trace_reduction>(
        item.input_block, item.added_block_phi_input, item.new_output_block);
    InlineWaitingBlock<trace_reduction>();
  }
 }

 template <bool trace_reduction>
 void InlineWaitingBlock() {
```

```
  while (block_to_inline_now_) {
    Block* input_block = block_to_inline_now_;
    block_to_inline_now_ = nullptr;
    ScopedModification<bool> set_true(&current_block_needs_variables_, true);
    if constexpr (trace_reduction) {
      std::cout << "Inlining " << PrintAsBlockHeader{*input_block} << "\n";
    }
    VisitBlockBody<CanHavePhis::kNo,
ForCloning::kNo, trace_reduction>(
        input_block);
  }
}

template <bool trace_reduction>
void DoCloneBlock(const Block* input_block, int added_block_phi_input,
                  Block* output_block) {
  DCHECK_EQ(output_block->PredecessorCount(), 1);
  if constexpr (trace_reduction) {
    std::cout << "\nCloning old " << PrintAsBlockHeader{*input_block} << "\n";
    std::cout << "As new "
              << PrintAsBlockHeader{*output_block,
                                    Asm().output_graph().next_block_index()}
              << "\n";
  }

  ScopedModification<bool> set_true(&current_block_needs_variables_, true);

  Asm().BindReachable(output_block);
  VisitBlockBody<CanHavePhis::kYes, ForCloning::kYes, trace_reduction>(
      input_block, added_block_phi_input);

  if constexpr (trace_reduction) TraceBlockFinished();
}

void TraceReductionStart(OpIndex index) {
  std::cout << " o" << index.id() << ": "
            << PaddingSpace{5 - CountDecimalDigits(index.id())}
            << OperationPrintStyle{Asm().input_graph().Get(index), "#o"}
            << "\n";
}
void TraceOperationSkipped() { std::cout << "> skipped\n\n"; }
void TraceBlockUnreachable() { std::cout << "> unreachable\n\n"; }
void TraceReductionResult(Block* current_block, OpIndex first_output_index,
                          OpIndex new_index) {
  if (new_index < first_output_index) {
    // The operation was replaced with an already existing one.
    std::cout << "> #n" << new_index.id() << "\n";
  }
```

```
  bool before_arrow = new_index >= first_output_index;
  for (const Operation& op : Asm().output_graph().operations(
          first_output_index, Asm().output_graph().next_operation_index())) {
    OpIndex index = Asm().output_graph().Index(op);
    const char* prefix;
    if (index == new_index) {
      prefix = ">";
      before_arrow = false;
    } else if (before_arrow) {

   prefix = "  ";
    } else {
      prefix = "   ";
    }
    std::cout << prefix << " n" << index.id() << ": "
              << PaddingSpace{5 - CountDecimalDigits(index.id())}
              << OperationPrintStyle{Asm().output_graph().Get(index), "#n"}
              << "\n";
    if (op.IsBlockTerminator() && Asm().current_block() &&
        Asm().current_block() != current_block) {
      current_block = &Asm().output_graph().Get(
          BlockIndex(current_block->index().id() + 1));
      std::cout << "new " << PrintAsBlockHeader{*current_block} << "\n";
    }
  }
  std::cout << "\n";
}
void TraceBlockFinished() { std::cout << "\n"; }

// These functions take an operation from the old graph and use the assembler
// to emit a corresponding operation in the new graph, translating inputs and
// blocks accordingly.
V8_INLINE OpIndex AssembleOutputGraphGoto(const GotoOp& op) {
  Block* destination = MapToNewGraph(op.destination);
  if (op.is_backedge)
{
    DCHECK(destination->IsBound());
    DCHECK(destination->IsLoop());
    FixLoopPhis(op.destination);
  }
  // It is important that we first fix loop phis and then reduce the `Goto`,
  // because reducing the `Goto` can have side effects, in particular, it can
  // modify affect the SnapshotTable of `VariableReducer`, which is also used
  // by `FixLoopPhis()`.
  Asm().ReduceGoto(destination, op.is_backedge);
  return OpIndex::Invalid();
}
V8_INLINE OpIndex AssembleOutputGraphBranch(const BranchOp& op) {
```

```
  Block* if_true = MapToNewGraph(op.if_true);
  Block* if_false = MapToNewGraph(op.if_false);
  return Asm().ReduceBranch(MapToNewGraph(op.condition()), if_true, if_false,
                            op.hint);
}
OpIndex AssembleOutputGraphSwitch(const SwitchOp& op) {
  base::SmallVector<SwitchOp::Case, 16> cases;
  for (SwitchOp::Case c : op.cases) {
    cases.emplace_back(c.value, MapToNewGraph(c.destination), c.hint);
  }

 return Asm().ReduceSwitch(
      MapToNewGraph(op.input()),
      Asm().graph_zone()->CloneVector(base::VectorOf(cases)),
      MapToNewGraph(op.default_case), op.default_hint);
}
OpIndex AssembleOutputGraphPhi(const PhiOp& op) {
  return ResolvePhi(
      op,
      [this](OpIndex ind, int predecessor_index, int old_index = 0) {
        return MapToNewGraph(ind, predecessor_index);
      },
      op.rep);
}
OpIndex AssembleOutputGraphPendingLoopPhi(const PendingLoopPhiOp& op) {
  UNREACHABLE();
}
V8_INLINE OpIndex AssembleOutputGraphFrameState(const FrameStateOp& op) {
  auto inputs = MapToNewGraph<32>(op.inputs());
  return Asm().ReduceFrameState(base::VectorOf(inputs), op.inlined, op.data);
}
OpIndex AssembleOutputGraphCall(const CallOp& op) {
  V<CallTarget> callee = MapToNewGraph(op.callee());
  OptionalV<FrameState> frame_state = MapToNewGraph(op.frame_state());
  auto arguments = MapToNewGraph<16>(op.arguments());
  return Asm().ReduceCall(callee,
frame_state, base::VectorOf(arguments),
                        op.descriptor, op.Effects());
}
OpIndex AssembleOutputGraphDidntThrow(const DidntThrowOp& op) {
  const Operation& throwing_operation =
      Asm().input_graph().Get(op.throwing_operation());
  OpIndex result;
  switch (throwing_operation.opcode) {
#define CASE(Name)                                          \
 case Opcode::k##Name:                                      \
  result = Asm().ReduceInputGraph##Name(                    \
      op.throwing_operation(), throwing_operation.Cast<Name##Op>()); \
```

```
  break;
    TURBOSHAFT_THROWING_OPERATIONS_LIST(CASE)
#undef CASE
    default:
      UNREACHABLE();
  }
  return result;
}

V<None> AssembleOutputGraphCheckException(const CheckExceptionOp& op) {
  Graph::OpIndexIterator it(op.didnt_throw_block->begin(),
                            &Asm().input_graph());
  Graph::OpIndexIterator end(op.didnt_throw_block->end(),
                             &Asm().input_graph());
  // To translate `CheckException` to the new graph, we reduce the throwing
  // operation (actually it's `DidntThrow` operation, but that triggers the
  // actual reduction) with a catch scope. If the reduction replaces the
  // throwing operation with other throwing operations, all of them will be
  // connected to the provided catch block. The reduction should automatically
  // bind a block that represents non-throwing control flow of the original
  // operation, so we can inline the rest of the `didnt_throw` block.
  {
    CatchScope scope(Asm(), MapToNewGraph(op.catch_block));
    DCHECK(Asm().input_graph().Get(*it).template Is<DidntThrowOp>());
    if (!Asm().InlineOp(*it, op.didnt_throw_block)) {
      return V<None>::Invalid();
    }
    ++it;
  }
  for (; it != end; ++it) {
    // Using `InlineOp` requires that the inlined operation is not emitted
    // multiple
times. This is the case here because we just removed the
    // single predecessor of `didnt_throw_block`.
    if (!Asm().InlineOp(*it, op.didnt_throw_block)) {
      break;
    }
  }
  return V<None>::Invalid();
}

OpIndex AssembleOutputGraphParameter(const ParameterOp& param) {
  // Calling the AssemblerOpInterface rather than the first Reduce method
  // in order to make use of the Parameter cache.
  return Asm().Parameter(param.parameter_index, param.rep, param.debug_name);
}

void CreateOldToNewMapping(OpIndex old_index, OpIndex new_index) {
```

```
  DCHECK(old_index.valid());
  DCHECK(Asm().input_graph().BelongsToThisGraph(old_index));
  DCHECK_IMPLIES(new_index.valid(),
                 Asm().output_graph().BelongsToThisGraph(new_index));

  if (current_block_needs_variables_) {
    MaybeVariable var = GetVariableFor(old_index);
    if (!var.has_value()) {
      MaybeRegisterRepresentation rep =
          Asm().input_graph().Get(old_index).outputs_rep().size()
== 1
              ? static_cast<const MaybeRegisterRepresentation&>(
                  Asm().input_graph().Get(old_index).outputs_rep()[0])
              : MaybeRegisterRepresentation::None();
      var = Asm().NewLoopInvariantVariable(rep);
      SetVariableFor(old_index, *var);
    }
    Asm().SetVariable(*var, new_index);
    return;
  }

  DCHECK(!op_mapping_[old_index].valid());
  op_mapping_[old_index] = new_index;
}

MaybeVariable GetVariableFor(OpIndex old_index) const {
  return old_opindex_to_variables[old_index];
}

void SetVariableFor(OpIndex old_index, MaybeVariable var) {
  DCHECK(!old_opindex_to_variables[old_index].has_value());
  old_opindex_to_variables[old_index] = var;
}

void FixLoopPhis(Block* input_graph_loop) {
  DCHECK(input_graph_loop->IsLoop());
  Block* output_graph_loop = MapToNewGraph(input_graph_loop);
  DCHECK(output_graph_loop->IsLoop());
  for (const Operation& op : Asm().input_graph().operations(
            input_graph_loop->begin(), input_graph_loop->end())) {
    if (auto* input_phi = op.TryCast<PhiOp>()) {
      OpIndex phi_index =
          MapToNewGraph<true>(Asm().input_graph().Index(*input_phi));
      if (!phi_index.valid() || !output_graph_loop->Contains(phi_index)) {
        // Unused phis are skipped, so they are not be mapped to anything in
        // the new graph. If the phi is reduced to an operation from a
        // different block, then there is no loop phi in the current loop
        // header to take care of.
```

```
      continue;
    }
    Asm().FixLoopPhi(*input_phi, phi_index, output_graph_loop);
  }
 }
}

Graph& input_graph_;
OptimizedCompilationInfo* info_ = Asm().data()->info();
TickCounter* const tick_counter_ = info_ ? &info_->tick_counter() : nullptr;

const Block* current_input_block_;

// Mappings from old OpIndices to new OpIndices.
FixedOpIndexSidetable<OpIndex> op_mapping_;

// Mappings
from old blocks to new blocks.
FixedBlockSidetable<Block*> block_mapping_;

// {current_block_needs_variables_} is set to true if the current block should
// use Variables to map old to new OpIndex rather than just {op_mapping}. This
// is typically the case when the block has been cloned.
bool current_block_needs_variables_ = false;

// When {turn_loop_without_backedge_into_merge_} is true (the default), when
// processing an input block that ended with a loop backedge but doesn't
// anymore, the loop header is turned into a regular merge. This can be turned
// off when unrolling a loop for instance.
bool turn_loop_without_backedge_into_merge_ = true;

// Set of Blocks for which Variables should be used rather than
// {op_mapping}.
BitVector blocks_needing_variables_;

// Mapping from old OpIndex to Variables.
FixedOpIndexSidetable<MaybeVariable> old_opindex_to_variables;

// When the last operation of a Block is a Goto to a Block with a single
//
predecessor, we always inline the destination into the current block. To
// avoid making this process recursive (which could lead to stack overflows),
// we set the variable {block_to_inline_now_} instead. Right after we're done
// visiting a Block, the function ProcessWaitingCloningAndInlining will inline
// {block_to_inline_now_} (if it's set) in a non-recursive way.
Block* block_to_inline_now_ = nullptr;

// When a Reducer wants to clone a block (for instance,
```

```
 // BranchEliminationReducer, in order to remove Phis or to replace a Branch by
 // a Goto), this block is not cloned right away, in order to avoid recursion
 // (which could lead to stack overflows). Instead, we add this block to
 // {blocks_to_clone_}. Right after we're done visiting a Block, the function
 // ProcessWaitingCloningAndInlining will actually clone the blocks in
 // {blocks_to_clone_} in a non-recursive way.
 struct BlockToClone {
   const Block* input_block;
   int added_block_phi_input;
    Block* new_output_block;
 };
 ZoneVector<BlockToClone> blocks_to_clone_;

#ifdef DEBUG
 // Recursively inlining blocks is still allowed (mainly for
 // LoopUnrollingReducer), but it shouldn't be actually recursive. This is
 // checked by the {is_in_recursive_inlining_}, which is set to true while
 // recursively inlining a block. Trying to inline a block while
 // {is_in_recursive_inlining_} is true will lead to a DCHECK failure.
 bool is_in_recursive_inlining_ = false;
#endif
};

template <template <class> class... Reducers>
class TSAssembler;

template <template <class> class... Reducers>
class CopyingPhaseImpl {
public:
 static void Run(PipelineData* data, Graph& input_graph, Zone* phase_zone,
                 bool trace_reductions = false) {
   TSAssembler<GraphVisitor, Reducers...> phase(
       data, input_graph, input_graph.GetOrCreateCompanion(), phase_zone);
#ifdef DEBUG
   if (trace_reductions) {
     phase.template VisitGraph<true>();
   } else {
     phase.template
 VisitGraph<false>();
   }
#else
   phase.template VisitGraph<false>();
#endif  // DEBUG
 }
};

template <template <typename> typename... Reducers>
class CopyingPhase {
```

```
public:
 static void Run(PipelineData* data, Zone* phase_zone) {
   Graph& input_graph = data->graph();
   CopyingPhaseImpl<Reducers...>::Run(
       data, input_graph, phase_zone,
       data->info()->turboshaft_trace_reduction());
 }
};

}  // namespace v8::internal::compiler::turboshaft

#endif  // V8_COMPILER_TURBOSHAFT_COPYING_PHASE_H_
```

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1.47 open-ldap 2.6.10-r5

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1.48 osquery 5.3.0

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1.49 luajit 2.1.1753364724

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LuaJIT -- a Just-In-Time Compiler for Lua. https://luajit.org/

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==========

1.50 golang 1.25.3

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```
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package copyright

import (
 "bytes"
 "internal/testenv"
 "io"
 "io/fs"
 "os"
 "path/filepath"
 "testing"
)

var copyright = []byte("Copyright")

var permitted = [][]byte{
 []byte("// Code generated by "),
 []byte("// Code generated from "),
 []byte("// Created by cgo -cdefs"),
 []byte("// DO NOT EDIT\n// generated by:"),
 []byte("// Empty assembly file"),
 []byte("// Generated using cgo"),
 []byte("// Original source:\n//\thttp://www.zorinaq.com/papers/md5-amd64.html"), // public domain crypto/md5
 []byte("// created by cgo -cdefs"),
 []byte("// go run mkasm.go"),
 []byte("// mkerrors"),
```

```
 []byte("// mksys"),
 []byte("// run\n// Code generated by"), // cmd/compile/internal/test/constFold_test.go
}

func TestCopyright(t *testing.T) {
 buf := make([]byte, 2048)
 filepath.WalkDir(filepath.Join(testenv.GOROOT(t), "src"), func(path string,
 d fs.DirEntry, err error) error {
  if d.IsDir() && (d.Name() == "testdata" || d.Name() == "vendor") {
   return filepath.SkipDir
  }
  switch filepath.Ext(d.Name()) {
  default:
   return nil
  case ".s", ".go":
   // check
  }

  f, err := os.Open(path)
  if err != nil {
   t.Error(err)
   return nil
  }
  defer f.Close()
  n, err := f.Read(buf)
  if err != nil && err != io.EOF {
   t.Error(err)
   return nil
  }
  b := buf[:n]
  if bytes.Contains(b, copyright) {
   return nil
  }
  for _, ok := range permitted {
   if bytes.HasPrefix(b, ok) {
    return nil
   }
  }
  t.Errorf("%s: missing copyright notice", path)
  return nil
 })
}
```

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1.51 libidn 2.3.8-r3

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```
/* Extract the last component (base name) of a file name.

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#ifndef _BASENAME_LGPL_H
#define _BASENAME_LGPL_H

/* This file uses _GL_ATTRIBUTE_PURE.  */
#if !_GL_CONFIG_H_INCLUDED
#error "Please include config.h first."
#endif

#include <stddef.h>

#ifndef
 DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif


/* Return the address of the last file name component of FILENAME.
   If FILENAME has some trailing slash(es), they are considered to be
   part of the last component.
   If FILENAME has no relative file name components because it is a file
   system root, return the empty string.
```

```
  Examples:
            FILENAME      RESULT
            "foo.c"       "foo.c"
            "foo/bar.c"   "bar.c"
            "/foo/bar.c"  "bar.c"
            "foo/bar/"    "bar/"
            "foo/bar//"   "bar//"
            "/"           ""
            "//"          ""
            ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(),
 defined in <string.h>, does
      not consider trailing slashes to be part of the component:
            FILENAME      RESULT
            "foo/bar/"    ""
            "foo/bar//"   ""
    * The 'basename' command eliminates trailing slashes and for a root
      produces a non-empty result:
            FILENAME      RESULT
            "foo/bar/"    "bar"
            "foo/bar//"   "bar"
            "/"           "/"
            "//"          "/"
*/
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;


#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
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                  Version 3, 29 June 2007

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1.55 bcpkix-fips 1.0.3

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```
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   * Base constructor.
   * <p>
   * The authorizer attempts to perform matching (including the use of the wildcard) in accordance with RFC 6125.
   * </p>
   * <p>
   * Known suffixes is a list of public domain suffixes that can't be used as wild cards for
   * example *.com, or c*c.com, as a dns wildcard could match every/most .com domains if a registrar were issue it.
   * If *.com is in the known suffixes list will not be allowed to match.
   * </p>
   *
   * @param knownSuffixes a set of suffixes that cannot be wild-carded, e.g. { ".com", ".net", ".org" }
   */
```

Found in path(s):
* /bcpkix-fips-1-0-3-sources-1-jar/org/bouncycastle/est/jcajce/JsseDefaultHostnameAuthorizer.java

1.56 prop-types 15.8.1

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1.57 x-term 0.30.0

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1.58 cast 1.7.0

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1.59 go-jump 0.0.0-20211018200510-ba001c3ffce0

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1.60 go-osstat 0.2.5

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1.61 go-ps 1.0.0

1.61.1 Available under license :

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1.62 mdns 2.0.7

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1.63 etcd-client-pkg 3.6.4

1.63.1 Available under license :

Features

This document provides an overview of etcd features and general development guidelines for adding and deprecating them. The project maintainers can override these guidelines per the need of the project following the project governance.

Overview

The etcd features fall into three stages, experimental, stable, and unsafe.

Experimental

Any new feature is usually added as an experimental feature. An experimental feature is characterized as below:
- Might be buggy due to a lack of user testing. Enabling the feature may not work as expected.
- Disabled by default when added initially.
- Support for such a feature may be dropped at any time without notice
  - Feature-related issues may be given lower priorities.
  - It can be removed in the next minor or major release without following the feature deprecation policy unless it graduates to a stable future.

Stable

A stable feature is characterized as below:
- Supported as part of the supported releases of etcd.
- May be enabled by default.
- Discontinuation of support must follow the feature deprecation policy.

Unsafe

Unsafe features are rare and listed under the `Unsafe feature:` section in the etcd usage documentation. By default, they are disabled. They should be used with caution following documentation. An unsafe feature can be removed in the next minor or major release without following the feature deprecation policy.

Development Guidelines

Adding a new feature

Any new enhancements to the etcd are typically added as an experimental feature. The general development requirements are listed below. They can be somewhat flexible depending on the scope of the feature and review discussions and will evolve over time.
- Open an issue
  - It must provide a clear need for the proposed feature.
  - It should list development work items as checkboxes. There must be one work item towards future graduation to a stable future.
  - Label the issue with `type/feature` and `experimental`.
  - Keep the issue open for tracking purposes until a decision is made on graduation.
- Open a Pull Request (PR)
  - Provide unit tests. Integration tests are also recommended as possible.
  - Provide robust e2e test coverage. If the feature being added is complicated or quickly needed, maintainers can decide to go with e2e tests for basic coverage initially and have robust coverage added at a later time before the feature graduation to the stable feature.
  - Provide logs for proper debugging.
  - Provide metrics and benchmarks as needed.
  - The Feature should be disabled by default.
  - Any configuration flags related to the implementation of the feature must be prefixed with `experimental` e.g. `--experimental-feature-name`.
  - Add a CHANGELOG entry.
- At least two maintainers must approve feature requirements and related code changes.

Graduating an Experimental feature to Stable

It is important that experimental features don't get stuck in that stage.
They should be revisited and moved to the stable stage following the graduation steps as described here.

Locate graduation candidate
Decide if an experimental feature is ready for graduation to the stable stage.
- Find the issue that was used to enable the experimental feature initially. One way to find such issues is to search for issues with `type/feature` and `experimental` labels.
- Fix any known open issues against the feature.
- Make sure the feature was enabled for at least one previous release. Check the PR(s) reference from the issue to see when the feature-related code changes were merged.

Provide implementation
If an experimental feature is found ready for graduation to the stable stage, open a Pull Request (PR) with the

following changes.
- Add robust e2e tests if not already provided.
- Add a new stable feature flag identical to the experimental feature flag but without the `--experimental` prefix.
- Deprecate the experimental feature following the [feature deprecation
 policy](#Deprecating-a-feature).
- Implementation must ensure that both the graduated and deprecated experimental feature flags work as expected. Note that both these flags will co-exist for the timeframe described in the feature deprecation policy.
- Enable the graduated feature by default if needed.

At least two maintainers must approve the work. Patch releases should not be considered for graduation.

Deprecating a feature

Experimental
An experimental feature deprecates when it graduates to the stable stage.
- Add a deprecation message in the documentation of the experimental feature with a recommendation to use a related stable feature. e.g. `DEPRECATED. Use <feature-name> instead.`
- Add a `deprecated` label in the issue that was initially used to enable the experimental feature.

Stable
As the project evolves, a stable feature may sometimes need to be deprecated and removed. Such a situation should be handled using the steps below:
- Create an issue for tracking
 purposes.
- Add a deprecation message in the feature usage documentation before a planned release for feature deprecation. e.g. `To be deprecated in <release>.`. If a new feature replaces the `To be deprecated` feature, then also provide a message saying so. e.g. `Use <feature-name> instead.`.
- Deprecate the feature in the planned release with a message as part of the feature usage documentation. e.g. `DEPRECATED`. If a new feature replaces the deprecated feature, then also provide a message saying so. e.g. `DEPRECATED. Use <feature-name> instead.`.
- Add a `deprecated` label in the related issue.

Remove the deprecated feature in the following release. Close any related issue(s). At least two maintainers must approve the work. Patch releases should not be considered for deprecation.
Set up the local cluster

For testing and development deployments, the quickest and easiest way is to configure a local cluster. For a production deployment, refer to the [clustering][clustering] section.

Local standalone cluster

Starting a cluster

Run the following to deploy an etcd cluster as a standalone cluster:

```
$ ./etcd
...
```

```

If the `etcd` binary is not present in the current working directory, it might be located either at `$GOPATH/bin/etcd` or at `/usr/local/bin/etcd`. Run the command appropriately.

The running etcd member listens on `localhost:2379` for client requests.

### Interacting with the cluster

Use `etcdctl` to interact with the running cluster:

1. Store an example key-value pair in the cluster:

   ```
   $ ./etcdctl put foo bar
   OK
   ```

   If OK is printed, storing the key-value pair is successful.

2. Retrieve the value of `foo`:

   ```
   $ ./etcdctl get foo
   bar
   ```

   If `bar` is returned, interaction with the etcd
 cluster is working as expected.

Local multi-member cluster

Starting a cluster

A `Procfile` at the base of the etcd git repository is provided to easily configure a local multi-member cluster. To start a multi-member cluster, navigate to the root of the etcd source tree and perform the following:

1. Install `goreman` to control Procfile-based applications:

   ```
   $ go install github.com/mattn/goreman@latest
   ```
  The installation will place executables in the $GOPATH/bin. If $GOPATH environment variable is not set, the tool will be installed into the $HOME/go/bin. Make sure that $PATH is set accordingly in your environment.

2. Start a cluster with `goreman` using etcd's stock Procfile:

   ```

```
$ goreman -f Procfile start
```

The members start running. They listen on `localhost:2379`, `localhost:22379`, and `localhost:32379` respectively for client requests.

Interacting with the cluster

Use `etcdctl` to interact with the running cluster:

1. Print the list of members:

```
$ etcdctl --write-out=table --endpoints=localhost:2379 member list
```

The list of etcd members is displayed as follows:

```
+------------------+---------+--------+------------------------+------------------------+
|       ID         | STATUS  |  NAME  |       PEER ADDRS       |      CLIENT ADDRS      |
+------------------+---------+--------+------------------------+------------------------+
| 8211f1d0f64f3269 | started | infra1 | http://127.0.0.1:2380  | http://127.0.0.1:2379  |
| 91bc3c398fb3c146 | started | infra2 | http://127.0.0.1:22380 | http://127.0.0.1:22379 |
| fd422379fda50e48 | started | infra3 | http://127.0.0.1:32380 | http://127.0.0.1:32379 |
+------------------+---------+--------+------------------------+------------------------+
```

2. Store an example key-value pair in the cluster:

```
$ etcdctl put foo bar
OK
```

If OK is printed, storing the key-value pair is successful.

Testing fault tolerance

To exercise etcd's fault tolerance, kill a member and attempt to retrieve the key.

1. Identify the process name of the member to be stopped.

The `Procfile` lists the properties of the multi-member cluster. For example, consider the member with the process name, `etcd2`.

2. Stop the member:

```
# kill etcd2
$ goreman run stop etcd2
```

3. Store a key:

```
$ etcdctl put key hello
OK
```

4. Retrieve the key that is stored in the previous step:

```
$ etcdctl get key
hello
```

5. Retrieve a key from the stopped member:

```
$ etcdctl --endpoints=localhost:22379 get key
```

The command should display an error caused by connection failure:

```
2017/06/18 23:07:35 grpc: Conn.resetTransport failed to create client transport: connection error: desc =
"transport: dial tcp 127.0.0.1:22379: getsockopt: connection refused"; Reconnecting to "localhost:22379"
Error:  grpc:
timed out trying to connect
```

6. Restart the stopped member:

```
$ goreman run restart etcd2
```

7. Get the key from the restarted member:

```
$ etcdctl --endpoints=localhost:22379 get key
hello
```

Restarting the member re-establishs the connection. `etcdctl` will now be able to retrieve the key successfully. To

learn more about interacting with etcd, read [interacting with etcd section][interacting].

[clustering]: https://etcd.io/docs/latest/op-guide/clustering/
[interacting]: https://etcd.io/docs/latest/dev-guide/interacting_v3/
Issue triage guidelines

Purpose

Speed up issue management.

The `etcd` issues are listed at <https://github.com/etcd-io/etcd/issues> and are identified with labels. For example, an issue that is identified as a bug will be set to the label `type/bug`.

The etcd project uses labels to indicate common attributes such as `area`, `type`, and `priority` of incoming issues.

New issues will often start without any labels, but typically `etcd` maintainers, reviewers, and members will add labels by following these triage guidelines. The detailed list of labels can be found at <https://github.com/etcd-io/etcd/labels>.

Scope

This document serves as the primary guidelines for triaging incoming issues in `etcd`.

All contributors are encouraged and welcome to help manage issues which will help reduce the burden on project maintainers, though the work and responsibilities discussed in this document are created with `etcd` project reviewers and members in mind as these individuals will have
 triage access to the etcd project which is a requirement for actions like applying labels or closing issues.

Refer to [etcd community membership](https://github.com/etcd-io/etcd/blob/main/Documentation/contributor-guide/community-membership.md) for guidance on becoming an etcd project member or reviewer.

Step 1 - Find an issue to triage

To get started you can use the following recommended issue searches to identify issues that are in need of triage:

* [Issues that have no labels](https://github.com/etcd-io/etcd/issues?q=is%3Aissue+is%3Aopen+sort%3Aupdated+no%3Alabel)
* [Issues created recently](https://github.com/etcd-io/etcd/issues?q=is%3Aissue+is%3Aopen+)
* [Issues not assigned but linked pr](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+no%3Aassignee+linked%3Apr)
* [Issues with no comments](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+comments%3A0+)
* [Issues with help wanted](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+label%3A%22help+wanted%22+)

##
 Step 2 - Check the issue is valid

Before we start adding labels or trying to work out a priority, our first triage step needs to be working out if the issue

actually belongs to the etcd project and is not a duplicate.

Issues that don't belong to etcd

Sometimes issues are reported that belong to other projects that `etcd` use. For example, `grpc` or `golang` issues. Such issues should be addressed by asking the reporter to open issues in the appropriate other projects.

These issues can generally be closed unless a maintainer and issue reporter see a need to keep it open for tracking purposes. If you have triage permissions please close it, alternatively mention the @etcd-io/members group to request a member with triage access to close the issue.

Duplicate issues

If an issue is a duplicate, add a comment stating so along with a reference for the original issue and if you have triage permissions please close it, alternatively mention the @etcd-io/members
group to request a member with triage access close the issue.

Step 3 - Apply the appropriate type of label

Adding a `type` label to an issue helps create visibility on the health of the project and helps contributors identify potential priorities, i.e. addressing existing bugs or test flakes before implementing new features.

Support requests

As a general rule, the focus for etcd support is to address common themes in a broad way that helps all users, i.e. through channels like known issues, frequently asked questions, and high-quality documentation. To make the best use of project members time we should avoid providing 1:1 support if a broad approach is available.

Some people mistakenly use our GitHub bug report or feature request templates to file support requests. Usually, they are asking for help operating or configuring some aspect of etcd. Support requests for etcd should instead be raised as [discussions](https://github.com/etcd-io/etcd/discussions).

Common
types of support requests are:

1. Questions about configuring or operating existing well-documented etcd features, for example, <https://github.com/etcd-io/etcd/issues/15945>. Note - If an existing feature is not well documented please apply the `area/documentation` label and propose documentation improvements that would prevent future users from stumbling on the problem again.

2. Bug reports or questions about unsupported versions of etcd, for example <https://github.com/etcd-io/etcd/issues/15796>. When responding to these issues please refer to our [supported versions documentation](https://etcd.io/docs/latest/op-guide/versioning) and encourage the reporter to upgrade to a recent patch release of a supported version as soon as possible. We should limit the effort supporting users that do not make the effort to run a supported version of etcd or ensure their version is patched.

3. Bug reports that do not provide a complete list of steps to reproduce the issue and/or contributors

are not able to reproduce the issue, for example, <https://github.com/etcd-io/etcd/issues/15740>. We should limit the effort we put into reproducing issues ourselves and motivate users to provide the necessary information to accept the bug report.

4. General questions that are filed using feature request or bug report issue templates, for example, <https://github.com/etcd-io/etcd/issues/15914>. Note - These types of requests may surface good additions to our [frequently asked questions](https://etcd.io/docs/v3.5/faq).

If you identify that an issue is a support request please:

1. Add the `type/support` or `type/question` label.

2. Add the following comment to inform the issue creator that discussions should be used instead and that this issue will be converted to a discussion.

> Thank you for your question, this support issue will be moved to our [Discussion Forums](https://github.com/etcd-io/etcd/discussions).
>
> We are trying to consolidate the channels to which questions for help/support are posted so that we can improve our efficiency in responding to your requests, and make it easier for you to find answers to frequently asked questions and how to address common use cases.
>
> We regularly see messages posted in multiple forums, with the full response thread only in one place or, worse, spread across multiple forums. Also, the large volume of support issues on GitHub is making it difficult for us to use issues to identify real bugs.
>
> Members of the etcd community use Discussion Forums to field support requests. Before posting a new question, please search these for answers to similar questions, and also familiarize yourself with:
>
> 1. [user documentation](https://etcd.io/docs/latest)
> 2. [frequently asked questions](https://etcd.io/docs/v3.5/faq)
>
> Again, thanks for using etcd and raising this question.
>
> The etcd team

3. Finally, click `Convert to discussion` on the right-hand panel, selecting the appropriate discussion category.

Bug reports

If an issue has been raised as a bug it should already have the `type/bug` label, however, if this is missing for an issue you determine to be a bug please add the label manually.

The next step is to validate if the issue is indeed a bug. If not, add a comment with the findings and close the trivial issue. For non-trivial issues, wait to hear back from the issue reporter and see if there is any objection. If the issue reporter does not reply in 30 days, close the issue.

If the problem can not be reproduced or requires more information, leave a comment for the issue reporter as soon as possible while the issue is fresh for the issue reporter.

Feature requests

New feature requests should be created via the etcd feature request template and in theory already have the `type/feature` label, however, if this is missing for an issue you determine to be a feature please add the label manually.

Test flakes

Test flakes
 are a specific type of bug that the etcd project tracks separately as these are a priority to address. These should be created via the test flake template and in theory already have the `type/flake` label, however, if this is missing for an issue you determine to be related to a flaking test please add the label manually.

Step 4 - Define the areas impacted

Adding an `area` label to an issue helps create visibility on which areas of the etcd project require attention and helps contributors find issues to work on relating to their particular skills or knowledge of the etcd codebase.

If an issue crosses multiple domains please add additional `area` labels to reflect that.

Below is a brief summary of the area labels in active use by the etcd project along with any notes on their use:

Label	Notes
area/external	Tracking label for issues raised that are external to etcd.
area/community	
area/raft	
area/clientv3	
area/performance	
area/security	
area/tls	
area/auth	
area/etcdctl	
area/etcdutl	
area/contrib	Not to be confused with `area/community` this label is specifically used for issues relating to community-maintained scripts or files in the `contrib/` directory which aren't part of the core etcd project.
area/documentation	
area/tooling	Generally used in relation to the third party / external utilities or tools that are used in various stages of the etcd build, test, or release process, for example, tooling to create sboms.
area/testing	
area/robustness-testing	

Step 5 - Prioritise the issue

If an issue lacks a priority label it has not been formally prioritized yet.

Adding a `priority` label helps the etcd project understand what is important and should be worked on now, and conversely, what is not as important and is on the project backlog.

Priority label	What it means	Examples
`priority/critical-urgent`
Maintainers are responsible for making sure that these issues (in their area) are being actively worked oni.e., drop what you're doing. The stuff is burning. These should be fixed before the next release.	user-visible critical bugs in core features broken builds on tier1 supported platforms tests and critical security issues
`priority/important-soon`	Must be staffed and worked on either currently or very soonideally in time for the next release.	
`priority/important-longterm`	Important over the long term, but may not be currently staffed and/or may require multiple releases to complete.	
`priority/backlog`	General agreement that this is a nice-to-have, but no one's available to work on it anytime soon. Community contributions would be most welcome in the meantime, though it might take a while to get them reviewed if reviewers are fully occupied with higher-priority issuesfor example, immediately before a release.	
`priority/awaiting-more-evidence`
Possibly useful, but not yet enough support to actually get it done.	Mostly placeholders for potentially good ideas, so that they don't get completely forgotten, and can be referenced or deduped every time they come up

Step 6 - Support new contributors

As part of the `etcd` triage process once the `kind` and `area` have been determined, please consider if the issue would be suitable for a less experienced contributor. The `good first issue` label is a subset of the `help wanted` label, indicating that members have committed to providing extra assistance for new contributors. All `good first issue` items also have the `help wanted` label.

Help wanted

Items marked with the `help wanted` label need to ensure that they meet these criteria:

* **Low Barrier to Entry** - It should be easy for new contributors.

* **Clear** - The task is agreed upon and does not require further discussions in the community.

* **Goldilocks priority** - The priority
 should not be so high that a core contributor should do it, but not too low that it isnt useful enough for a core contributor to spend time reviewing it, answering questions, helping get it into a release, etc.

Good first issue

Items marked with `good first issue` are intended for first-time contributors. It indicates that members will keep an eye out for these pull requests and shepherd it through our processes.

New contributors should not be left to find an approver, ping for reviews, decipher test commands, or identify that

their build failed due to a flake. It is important to make new contributors feel welcome and valued. We should assure them that they will have an extra level of help with their first contribution.

After a contributor has successfully completed one or two `good first issue` items, they should be ready to move on to `help wanted` items.

* **No Barrier to Entry** - The task is something that a new contributor can tackle without advanced setup or domain knowledge.

* **Solution Explained** - The recommended solution is clearly described in the issue.

* **Gives Examples** - Link to examples of similar implementations so new contributors have a reference guide for their changes.

* **Identifies Relevant Code** - The relevant code and tests to be changed should be linked in the issue.

* **Ready to Test** - There should be existing tests that can be modified, or existing test cases fit to be copied. If the area of code doesnt have tests, before labeling the issue, add a test fixture. This prep often makes a great help wanted task!

Step 7 - Follow up

Once initial triage has been completed, issues need to be re-evaluated over time to ensure they don't become stale incorrectly.

Track important issues

If an issue is at risk of being closed by the stale bot in the future, but is an important issue for the etcd project, then please apply the `stage/tracked` label and remove any `stale` labels that exist. This will ensure the project does not lose sight of the issue.

Close incomplete issues

Issues that lack enough information from the issue reporter should be closed if the issue reporter does not provide information in 30 days. Issues can always be re-opened at a later date if new information is provided.

Check for incomplete work

If an issue owned by a developer has no pull request created in 30 days, contact the issue owner and kindly ask about the status of their work, or to release ownership on the issue if needed.
Branch management

Guide

* New development occurs on the [main branch][main].
* The main branch should always have a green build!
* Backwards-compatible bug fixes should target the main branch and subsequently be ported to stable branches.

* Once the main branch is ready for release, it will be tagged and become the new stable branch.

The etcd team has adopted a *rolling release model* and supports two stable versions of etcd.

Main branch

The `main` branch is our development branch. All new features land here first.

To try new and experimental features, pull `main` and play with it. Note that `main` may not be stable because new features may introduce bugs.

Before the release of the next stable version, feature PRs will be frozen. A [release manager](./release.md#release-management) will be assigned to the major/minor version and will lead the etcd community in testing, bug-fix, and documentation of the release for one to two weeks.

Stable branches

All branches with
 the prefix `release-` are considered _stable_ branches.

After every minor release (semver.org), we will have a new stable branch for that release, managed by a [patch release manager](./release.md#release-management). We will keep fixing the backward-compatible bugs for the latest two stable releases. A _patch_ release to each supported release branch, incorporating any bug fixes, will be once every two weeks, given any patches.

[main]: https://github.com/etcd-io/etcd/tree/main
PR management

Purpose

Speed up PR management.

The `etcd` PRs are listed at https://github.com/etcd-io/etcd/pulls
A PR can have various labels, milestones, reviewers, etc. The detailed list of labels can be found at https://github.com/kubernetes/kubernetes/labels

Following are a few example searches on PR for convenience:
* [Open PRS for milestone etcd-v3.6](https://github.com/etcd-io/etcd/pulls?utf8=%E2%9C%93&q=is%3Apr+is%3Aopen+milestone%3Aetcd-v3.6)
* [PRs under investigation](https://github.com/etcd-io/etcd/labels/Investigating)

Scope

These guidelines serve as a primary document for managing PRs in `etcd`. Everyone is welcome to help manage PRs but the work and responsibilities discussed in this document are created with `etcd` maintainers and active contributors in mind.

Ensure tests are run

The etcd project use Kubernetes Prow and GitHub Actions to run tests. To ensure all required tests run if a pull request is ready for testing and still has the `needs-ok-to-test`
label then please comment on the pull request `/ok-to-test`.

Handle inactive PRs
Poke PR owner if review comments are not addressed in 15 days. If the PR owner does not reply in 90 days, update the PR with a new commit if possible. If not, inactive PR should be closed after 180 days.

Poke reviewer if needed

Reviewers are responsive in a timely fashion, but considering everyone is busy, give them some time after requesting a review if a quick response is not provided. If the response is not provided in 10 days, feel free to contact them via adding a comment in the PR or sending an email or message on Slack.

Verify important labels are in place

Make sure that appropriate reviewers are added to the PR. Also, make sure that a milestone is identified. If any of these or other important labels are missing, add them. If a correct label cannot be decided, leave a comment for the maintainers to do so as needed.
Roadmap

etcd uses GitHub milestones to track all tasks in each major or minor release. The `roadmap.md` file only records the
most important tasks for each release. The list is based on the current maintainer capacity that may shift over time. Proposed milestones are what we think we can deliver with the people we have. If we have more support on the important
stuff, we could pick up more items from the backlog. Note that etcd will continue to mainly focus on technical debt over
the next few major or minor releases.

Each item has an assigned priority. Refer to [priority definitions](https://github.com/etcd-io/etcd/blob/main/Documentation/contributor-guide/triage_issues.md#step-5---prioritise-the-issue).

v3.6.0

For a full list of tasks in `v3.6.0`, please see [milestone etcd-v3.6](https://github.com/etcd-io/etcd/milestone/38).

Title	Priority	Status	Note
[Support downgrade](https://github.com/etcd-io/etcd/issues/11716)	priority/important-soon	In progress	etcd will support downgrade starting from 3.6.0. But it will also support offline downgrade from 3.5 to 3.4.
[StoreV2 deprecation](https://github.com/etcd-io/etcd/issues/12913)	priority/important-soon	In progress	This task will be covered in both 3.6 and 3.7.

[Release raft 3.6.0](https://github.com/etcd-io/raft/issues/89)	priority/important-soon	Not started	etcd 3.6.0 will depends on raft 3.6.0
[Release bbolt 1.4.0](https://github.com/etcd-io/bbolt/issues/553)	priority/important-soon	Not started	etcd 3.6.0 will depends on bbolt 1.4.0
[Support /livez and /readyz endpoints](https://github.com/etcd-io/etcd/issues/16007)	priority/important-longterm	In progress	It provides clearer APIs, and can also work around the stalled writes issue
[Bump gRPC](https://github.com/etcd-io/etcd/issues/16290)	priority/important-longterm	Completed	It isn't guaranteed to be resolved in 3.6, and might be postponed to 3.7 depending on the effort and risk.
[Deprecate grpc-gateway or bump it](https://github.com/etcd-io/etcd/issues/14499)	priority/important-longterm	Completed	It isn't guaranteed to be resolved in 3.6, and might be postponed to 3.7 depending on the effort and risk.
[bbolt: Add logger into bbolt](https://github.com/etcd-io/bbolt/issues/509)	priority/important-longterm	Completed	It's important to diagnose bbolt issues
[bbolt: Add surgery commands](https://github.com/etcd-io/bbolt/issues/370)	priority/important-longterm	Completed	Surgery commands are important for fixing corrupted db files
[Evaluate and (Gradulate or deprecate/remove) experimental features](https://github.com/etcd-io/etcd/issues/16292)	priority/backlog	Not started	This task will be covered in both 3.6 and 3.7.

v3.7.0

For a full list of tasks in `v3.7.0`, please see [milestone etcd-v3.7](https://github.com/etcd-io/etcd/milestone/39).

Title	Priority	Note
[StoreV2 deprecation](https://github.com/etcd-io/etcd/issues/12913)	P0	Finish the remaining tasks 3.7.
[Refactor lease: Lease might be revoked by mistake by old leader](https://github.com/etcd-io/etcd/issues/15247)	P1	to be investigated & discussed
[Integrate raft's new feature (async write) into etcd](https://github.com/etcd-io/etcd/issues/16291)	P1	It should improve the performance
[bbolt: Support customizing the bbolt rebalance threshold](https://github.com/etcd-io/bbolt/issues/422)	P2	It may get rid of etcd's defragmentation. Both bbolt and etcd need to be changed.
[Evaluate and (graduate or deprecate/remove) experimental features](https://github.com/etcd-io/etcd/issues/16292)	P2	Finish the remaining tasks 3.7.

Backlog (future releases)

| Title | Priority | Note |

|---|---|---|
| [Remove the dependency on
 grpc-go's experimental API](https://github.com/etcd-io/etcd/issues/15145) | | |
[Protobuf: cleanup both golang/protobuf and gogo/protobuf](https://github.com/etcd-io/etcd/issues/14533)		
[Proposals should include a merkle root](https://github.com/etcd-io/etcd/issues/13839)		
[Add Distributed Tracing using OpenTelemetry](https://github.com/etcd-io/etcd/issues/12460)		
[Support CA rotation](https://github.com/etcd-io/etcd/issues/11555)		
[bbolt: Migrate all commands to cobra style commands](https://github.com/etcd-io/bbolt/issues/472)		
[raft: enhance the configuration change validation](https://github.com/etcd-io/raft/issues/80)		

Release

The guide talks about how to release a new version of etcd.

The procedure includes some manual steps for sanity checking, but it can probably be further scripted. Please keep this document up-to-date if making changes to the release process.

Release management

The following pool of release candidates manages the release of each etcd major/minor version as well as manages patches
to each stable release branch. They are responsible for communicating the timelines and status of each release and for ensuring the stability of the release branch.

- Benjamin Wang [@ahrtr](https://github.com/ahrtr)
- James Blair [@jmhbnz](https://github.com/jmhbnz)
- Marek Siarkowicz [@serathius](https://github.com/serathius)
- Sahdev Zala [@spzala](https://github.com/spzala)
- Wenjia Zhang [@wenjiaswe](https://github.com/wenjiaswe)

All release version numbers follow the format of [semantic versioning 2.0.0](http://semver.org/).

Major, minor version release, or its pre-release

- Ensure
 the relevant [milestone](https://github.com/etcd-io/etcd/milestones) on GitHub is complete. All referenced issues should be closed or moved elsewhere.
- Ensure the latest [upgrade documentation](https://etcd.io/docs/next/upgrades) is available.
- Bump [hardcoded MinClusterVerion in the repository](https://github.com/etcd-io/etcd/blob/v3.4.15/version/version.go#L29), if necessary.
- Add feature capability maps for the new version, if necessary.

Patch version release

- To request a backport, developers submit cherry-pick PRs targeting the release branch. The commits should not include merge commits. The commits should be restricted to bug fixes and security patches.
- The cherrypick PRs should target the appropriate release branch (`base:release-<major>-<minor>`). The k8s infra

cherry pick robot `/cherrypick <branch>` PR chatops command may be used to automatically generate cherrypick PRs.
- The release patch manager reviews the cherrypick PRs. Please discuss carefully what is backported to the patch release. Each patch release should be strictly better than its predecessor.
- The release patch manager will cherry-pick these commits starting from the oldest one into stable branch.

Write a release note

- Write an introduction for the new release. For example, what major bug we fix, what new features we introduce, or what performance improvement we make.
- Put `[GH XXXX]` at the head of the change line to reference the Pull Request that introduces the change. Moreover, add a link on it to jump to the Pull Request.
- Find PRs with the `release-note` label and explain them in the `NEWS` file, as a straightforward summary of changes for end-users.

Patch release criteria

The etcd project aims to release a new patch version if any of the following conditions are met:

- Fixed one or more major CVEs (>=7.5).
- Fixed one or more critical bugs.
- Fixed three or more major bugs.
- Fixed five or more minor bugs.

Release guide

Prerequisites

There are some prerequisites, which should be done before the release process. These are one-time operations, which don't need to be executed before releasing each version.
1. Generate a GPG key and add it to your GitHub account. Refer to the links on [settings](https://github.com/settings/keys).
2. Ensure you have a Linux machine, on which the git, Golang, and docker have been installed.
   - Ensure the Golang version matches the version defined in `.go-version` file.
   - Ensure non-privileged users can run docker commands, refer to the [Linux postinstall](https://docs.docker.com/engine/install/linux-postinstall/).
   - Ensure there is at least 5GB of free space on your Linux machine.
3. Install gsutil, refer to [gsutil_install](https://cloud.google.com/storage/docs/gsutil_install). When asked about cloud project to use, pick `etcd-development`.
4. Authenticate the image registry, refer to [Authentication methods](https://cloud.google.com/container-registry/docs/advanced-authentication).
  - `gcloud auth login`
  - `gcloud auth configure-docker`
5. Install gh, refer to [GitHub's documentation](https://github.com/cli/cli#installation). Ensure that running `gh auth login` succeeds for the GitHub account you use to contribute to etcd, and that `gh auth status` has a clean exit and doesn't show any issues.

Release steps

1. Raise an issue to publish the release plan, e.g. [issues/17350](https://github.com/etcd-io/etcd/issues/17350).
2. Raise a `kubernetes/org` pull request to temporarily elevate permissions for the GitHub release team.
3. Once permissions are elevated, temporarily relax [branch protections](https://github.com/etcd-io/etcd/settings/branches) to allow pushing changes directly to `release-*` branches in GitHub.
4. Verify you can pass the authentication to the image registries,
  - `docker login gcr.io`
  - `docker login quay.io`
    - If the release person doesn't have access to 1password, one of the owners (@ahrtr, @ivanvc, @jmhbnz, @serathius) needs
 to share the password with them per [this guide](https://support.1password.com/share-items/). See rough steps below,
      - [Sign in](https://team-etcd.1password.com/home) to your account on 1password.com.
      - Click `Your Vault Items` on the right side.
      - Select `Password of quay.io`.
      - Click `Share` on the top right, and set expiration as `1 hour` and only available to the release person using his/her email.
      - Click `Copy Link` then send the link to the release person via slack or email.
5. Clone the etcd repository and checkout the target branch,
  - `git clone --branch release-3.X git@github.com:etcd-io/etcd.git`
6. Run the release script under the repository's root directory, replacing `${VERSION}` with a value without the `v` prefix, i.e. `3.5.13`.
  - `DRY_RUN=false ./scripts/release.sh ${VERSION}`
  - **NOTE:** When doing a pre-release (i.e., a version from the main branch, 3.6.0-alpha.2), you will need to explicitly set the branch to main:

  ```
    DRY_RUN=false BRANCH=main ./scripts/release.sh ${VERSION}
    ```

  It generates all release binaries under the directory `/tmp/etcd-release-${VERSION}/etcd/release/` and images. Binaries are pushed to the Google Cloud bucket
  under project `etcd-development`, and images are pushed to `quay.io` and `gcr.io`.
7. Publish the release page on GitHub
  - Open the **draft** release URL shown by the release script
  - Click the pen button at the top right to edit the release
  - Review that it looks correct, reviewing that the bottom checkboxes are checked depending on the
    release version (v3.4 no checkboxes, v3.5 has the set as latest release checkbox checked,
    v3.6 has the set as pre-release checkbox checked)
  - Then, publish the release
8. Announce to the etcd-dev googlegroup

  Follow the format of previous release emails sent to etcd-dev@googlegroups.com, see an example below. After sending out the email, ask one of the mailing list maintainers to approve the
 email from the pending list. Additionally, label the release email as `Release`.

```text
Hello,

etcd v3.4.30 is now public!

https://github.com/etcd-io/etcd/releases/tag/v3.4.30

Thanks to everyone who contributed to the release!

etcd team
```

9. Update the changelog to reflect the correct release date.
10. Paste the release link to the issue raised in Step 1 and close the issue.
11. Restore standard branch protection settings and raise a follow-up `kubernetes/org` pull request to return to least privilege permissions.
12. Crease a new stable branch through `git push origin release-${VERSION_MAJOR}.${VERSION_MINOR}` if this is a new major or minor stable release.
13. Re-generate a new password for quay.io if needed (e.g. shared to a contributor who isn't in the release team, and we should rotate the password at least once every 3 months).

Release known issues

1. Timeouts pushing binaries - If binaries fail to fully upload to Google Cloud storage, the script must be re-run using the same command. Any artifacts that are already pushed will be overwritten to ensure they are correct. The storage bucket does not use object versioning so incorrect files cannot remain.

2. Timeouts pushing images - It is rare, although possible for connection timeouts to occur when publishing etcd release images to `quay.io` or `gcr.io`. If this occurs, it is known to be safe to rerun the release script command appending the `--no-upload` flag, and image uploads will gracefully resume.

3. GPG vs SSH signing - The release scripts assume that git tags will be signed with a GPG key. Since 2022 GitHub has supported [signing commits and tags using ssh](https://github.blog/changelog/2022-08-23-ssh-commit-verification-now-supported). Until further release script updates are completed you will need to disable this feature in your `~/.gitconfig` and revert to signing via GPG to perform etcd releases.
Golang modules

The etcd project (since version 3.5) is organized into multiple
[golang modules](https://golang.org/ref/mod) hosted in a [single repository](https://golang.org/ref/mod#vcs-dir).

![modules graph](modules.svg)

There are the following modules:

- **go.etcd.io/etcd/api/v3** - contains API definitions
(like protos & proto-generated libraries) that defines communication protocol
between etcd clients and servers.

- **go.etcd.io/etcd/pkg/v3** - a collection of utility packages used by etcd
without being specific to etcd itself. A package belongs here
only if it could possibly be moved out into its own repository in the future.
Please avoid adding here code that has a lot of dependencies on its own, as
they automatically become dependencies of the client library
(that we want to keep lightweight).

- **go.etcd.io/etcd/client/v3** - client library used to contact etcd over
the network (grpc). Recommended for all new usage of etcd.

- **go.etcd.io/raft/v3**
- implementation of distributed consensus
protocol. Should have no etcd specific code. Hosted in a separate repository:
https://github.com/etcd-io/raft.

- **go.etcd.io/etcd/server/v3** - etcd implementation.
The code in this package is internal to etcd and should not be consumed
by external projects. The package layout and API can change within the minor versions.

- **go.etcd.io/etcd/etcdctl/v3** - a command line tool to access and manage etcd.

- **go.etcd.io/etcd/tests/v3** - a module that contains all integration tests of etcd.
  Notice: All unit tests (fast and not requiring cross-module dependencies)
  should be kept in the local modules of the code under the test.

- **go.etcd.io/bbolt** - implementation of persistent b-tree.
  Hosted in a separate repository: https://github.com/etcd-io/bbolt.

Operations

1. All etcd modules should be released in the same versions, e.g.
  `go.etcd.io/etcd/client/v3@v3.5.10` must depend on `go.etcd.io/etcd/api/v3@v3.5.10`.

  The consistent updating of versions can be performed using:
  ```shell script
  % DRY_RUN=false TARGET_VERSION="v3.5.10" ./scripts/release_mod.sh update_versions
  ```
2. The released modules should be tagged according to https://golang.org/ref/mod#vcs-version rules,
  i.e. each module should get its own tag.
  The tagging can be performed using:
  ```shell script
  % DRY_RUN=false REMOTE_REPO="origin" ./scripts/release_mod.sh push_mod_tags
  ```

3. All etcd modules should depend on the same versions of underlying dependencies.
  This can be verified using:
  ```shell script
  ```

```
% PASSES="dep" ./test.sh
```

4. The go.mod files must not contain dependencies not being used and must
  conform to `go mod tidy` format.
  This is being verified by:
  ```
  % PASSES="mod_tidy" ./test.sh
  ```

5. To trigger actions across all modules (e.g. auto-format all files), please
  use/expand the following script:
  ```shell script
  % ./scripts/fix.sh
  ```

###
 Future

As a North Star, we would like to evaluate etcd modules towards the following model:

![modules graph](modules-future.svg)

This assumes:
 - Splitting etcdmigrate/etcdadm out of etcdctl binary.
   Thanks to this etcdctl would become clearly a command-line wrapper
   around network client API,
   while etcdmigrate/etcdadm would support direct physical operations on the
   etcd storage files.
 - Splitting etcd-proxy out of ./etcd binary, as it contains more experimental code
   so carries additional risk & dependencies.
 - Deprecation of support for v2 protocol.
Reporting bugs

If any part of the etcd project has bugs or documentation mistakes, please let us know by [opening an issue][etcd-issue]. We treat bugs and mistakes very seriously and believe no issue is too small. Before creating a bug report, please check that an issue reporting the same problem does not already exist.

To make the bug report accurate and easy to understand, please try to create bug reports that are:

- Specific. Include as many details as possible: which version, what environment, what configuration, etc. If the bug is related to running the etcd server, please attach the etcd log (the starting log with the etcd configuration is especially important).

- Reproducible. Include the steps to reproduce the problem. We understand some issues might be hard to reproduce, please include the steps that might lead to the problem. If possible, please attach the affected etcd data dir and stack trace to the bug report.

- Isolated. Please try to isolate and reproduce the bug with
 minimum dependencies. It would significantly slow down the speed to fix a bug if too many dependencies are involved in a bug report. Debugging external systems that rely on etcd is out of scope, but we are happy to provide guidance in the right direction or help with using etcd itself.

- Unique. Do not duplicate existing bug reports.

- Scoped. One bug per report. Do not follow up with another bug inside one report.

It may be worthwhile to read [Elika Etemads article on filing good bug reports][filing-good-bugs] before creating a bug report.

We might ask for further information to locate a bug. A duplicated bug report will be closed.

Frequently asked questions

How to get a stack trace

```` bash
$ kill -QUIT $PID
```

### How to get the etcd version

```` bash
$ etcd --version
```

### How to get etcd configuration and log when it runs as systemd service etcd2.service

```` bash
$ sudo systemctl cat etcd2
$ sudo journalctl -u etcd2
```

Due to an upstream systemd bug, journald
 may miss the last few log lines when its processes exit. If journalctl says etcd stopped without a fatal or panic message, try `sudo journalctl -f -t etcd2` to get the full log.

[etcd-issue]: https://github.com/etcd-io/etcd/issues/new
[filing-good-bugs]: http://fantasai.inkedblade.net/style/talks/filing-good-bugs/
# Community membership

This doc outlines the various responsibilities of contributor roles in etcd.

| Role | Responsibilities | Requirements | Defined by |
|---|---|---|---

----------|
| Member | Active contributor in the community | Sponsored by 2 reviewers and multiple contributions | etcd GitHub org member |
| Reviewer | Review contributions from other members | History of review and authorship | [OWNERS] file reviewer entry |
| Maintainer | Set direction and priorities for the project | Demonstrated responsibility and excellent technical judgement | [OWNERS] file approver entry |

## New contributors

New contributors should be welcomed to the community by existing members, helped with PR workflow, and directed to relevant documentation and communication channels.

## Established community members

Established community members are expected to demonstrate their adherence to the principles in this document, familiarity with project organization, roles, policies, procedures, conventions, etc., and technical and/or writing ability. Role-specific expectations, responsibilities, and requirements are enumerated below.

## Member

Members are continuously active contributors to the community. They can have issues and PRs assigned to them. Members are expected to remain active contributors to the community.

**Defined by:** Member of the etcd GitHub organization.

### Requirements

- Enabled [two-factor authentication] on their GitHub account
- Have made multiple contributions to the project or community. Contribution may include, but is not limited to:
  - Authoring or reviewing PRs on GitHub. At least one PR must be **merged**.
  - Filing or commenting on issues on GitHub
  - Contributing to community discussions (e.g. meetings, Slack, email discussion forums, Stack Overflow)
- Subscribed to [etcd-dev@googlegroups.com](https://groups.google.com/g/etcd-dev)
- Have read the [contributor guide]
- Sponsored by two active maintainers or reviewers.
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
  - With no objections from other maintainers
- Open a [membership nomination] issue against the `kubernetes/org` repo
  - Ensure your sponsors are @mentioned on the issue
  - Make sure that the list of contributions included is representative of your work on the project.

- Members can be removed by a supermajority of the maintainers or can resign by notifying the maintainers.

### Responsibilities and privileges

- Responsive to issues and PRs assigned to them
- Granted "triage access" to etcd project
- Active owner of code they have contributed (unless ownership is explicitly transferred)
  - Code is well-tested
  - Tests consistently pass
  - Addresses bugs or issues discovered after code is accepted

**Note:** Members who frequently contribute code are expected to proactively perform code reviews and work towards becoming a *reviewer*.

## Reviewers

Reviewers are contributors who have demonstrated greater skill in reviewing the code from other contributors. They are knowledgeable about both the codebase and software engineering principles. Their LGTM counts towards merging a code change into the project. A reviewer is generally on the ladder towards maintainership.

**Defined by:** *reviewers* entry in the [OWNERS] file.

### Requirements

- member for at least 3 months.
- Primary reviewer for at least 5 PRs to the codebase.
- Reviewed or contributed at least 20 substantial PRs to the codebase.
- Knowledgeable about the codebase.
- Sponsored by two active maintainers.
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
  - With no objections from other maintainers
- Reviewers can be removed by a supermajority of the maintainers or can resign by notifying the maintainers.

### Responsibilities and privileges

- Code reviewer status may be a precondition to accepting large code contributions
- Responsible for project quality control via code reviews
  - Focus on code quality and correctness, including testing and factoring
  - May also review for more holistic issues, but not a requirement
- Expected to be responsive to review requests
- Assigned PRs to review related to area of expertise
- Assigned test bugs related to area of expertise
- Granted "triage access" to etcd project

## Maintainers

Maintainers are first and foremost contributors who have shown they
are committed to the long-term success of a project. Maintainership is about building
trust with the current maintainers and being a person that they can
depend on to make decisions in the best interest of the project in a consistent
manner.

**Defined by:** *approvers* entry in the [OWNERS] file.

### Requirements

- Deep understanding of the technical goals and direction of the project
- Deep understanding of the technical domain of the project
- Sustained contributions to design and direction by doing all of:
  - Authoring and reviewing proposals
  - Initiating, contributing, and resolving discussions (emails, GitHub issues, meetings)
  - Identifying subtle or complex issues in the designs and implementation of PRs
- Directly contributed to the project through implementation and/or review
- Sponsored by two active maintainers and elected by supermajority
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
- To become a maintainer send an email with your candidacy to etcd-maintainers-private@googlegroups.com
  - Ensure your sponsors are @mentioned in the email
  - Include a list of contributions representative of your work on the project.
  -
Existing maintainers vote will privately and respond to the email with either acceptance or feedback for suggested improvement.
- With your membership approved you are expected to:
- Open a PR and add an entry to the [OWNERS] file
- Subscribe to etcd-maintainers@googlegroups.com and etcd-maintainers-private@googlegroups.com
- Request to join [etcd-maintainer teams of etcd organization of GitHub](https://github.com/orgs/etcd-io/teams/maintainers-etcd)
- Request to join the private slack channel for etcd maintainers on [kubernetes slack](http://slack.kubernetes.io/)
- Request access to etcd-development GCP project where we publish releases
- Request access to passwords shared between maintainers

### Responsibilities and privileges

- Make and approve technical design decisions
- Set technical direction and priorities
- Define milestones and releases
- Mentor and guide reviewers, and contributors to the project.
- Participate when called upon in the [security disclosure and
release process]
- Ensure the continued health of the project
  - Adequate test coverage to confidently release
  - Tests are passing reliably (i.e. not flaky) and are fixed when they fail

- Ensure a healthy process for discussion and decision-making is in place.
- Work with other maintainers to maintain the project's overall health and success holistically

### Retiring

Life priorities, interests, and passions can change. Maintainers can retire and move to [emeritus maintainers]. If a maintainer needs to step down, they should inform other maintainers and, if possible, help find someone to pick up the related work. At the very least, ensure the related work can be continued. Afterward, they can remove themselves from the list of existing maintainers.

If a maintainer has not been performing their duties for 12 months, they can be removed by other maintainers. In that case, the inactive maintainer will be first notified via an email. If the situation doesn't improve, they will be removed.
If an emeritus maintainer wants to regain an active role, they can do so by renewing their contributions. Active maintainers should welcome such a move. Retiring other maintainers or regaining the status should require the approval of at least two active maintainers.

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# Logging Conventions

etcd uses the [zap][zap] library for logging application output categorized into *levels*. A log message's level is determined according to these conventions:

* Debug: Everything is still fine, but even common operations may be logged, and less helpful but more quantity of notices. Usually not used in production.
 * Examples:
  * Send a normal message to a remote peer
  * Write a log entry to disk

* Info: Normal, working log information, everything is fine, but helpful notices for auditing or common operations. Should rather not be logged more frequently than once per a few seconds in a normal server's operation.
 * Examples:
  * Startup configuration
  * Start to do a snapshot

* Warning: (Hopefully) Temporary conditions that may cause errors, but may work fine. A replica disappearing (that may reconnect) is a warning.
 * Examples:
  * Failure to send a raft message to a remote peer
  * Failure to receive heartbeat message within the configured election
 timeout

* Error: Data has been lost, a request has failed for a bad reason, or a required resource has been lost.
 * Examples:
  * Failure to allocate disk space for WAL

* Panic: Unrecoverable or unexpected error situation that requires stopping execution.
 * Examples:
  * Failure to create the database

* Fatal: Unrecoverable or unexpected error situation that requires immediate exit. Mostly used in the test.
 * Examples:
  * Failure to find the data directory
  * Failure to run a test function

[zap]: https://github.com/uber-go/zap
# Dependency management

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## Main branch

The dependabot is enabled & [configured](https://github.com/etcd-io/etcd/blob/main/.github/dependabot.yml) to manage dependencies for etcd `main` branch. But dependabot doesn't work well for multi-module repository like `etcd`,
see [dependabot-core/issues/6678](https://github.com/dependabot/dependabot-core/issues/6678).
Usually, human intervention is required
each time when dependabot automatically opens some PRs to bump dependencies.
Please see the guidance below.

### Dependencies used in workflows

The PRs that automatically bump dependencies (see examples below) used in workflows are fine and can be approved & merged directly as long as all checks are successful.

- [build(deps): bump github/codeql-action from 2.2.11 to 2.2.12](https://github.com/etcd-io/etcd/pull/15736)
- [build(deps): bump actions/checkout from 3.5.0 to 3.5.2](https://github.com/etcd-io/etcd/pull/15735)
- [build(deps): bump ossf/scorecard-action from 2.1.2 to 2.1.3](https://github.com/etcd-io/etcd/pull/15607)

### Bumping order

When multiple etcd modules depend on the same package, please bump the package version for all the modules in the correct order. The rule is simple:
if module A depends on module B, then bump the dependency for module B before module A. If the two modules do not depend on each other, then
it doesn't matter to bump which module first. For
example, multiple modules depend on `github.com/spf13/cobra`, so we need to bump the dependency
in the following order,

- go.etcd.io/etcd/pkg/v3
- go.etcd.io/etcd/server/v3
- go.etcd.io/etcd/etcdctl/v3
- go.etcd.io/etcd/etcdutl/v3
- go.etcd.io/etcd/tests/v3
- go.etcd.io/etcd/v3
- go.etcd.io/etcd/tools/v3

For more details about etcd Golang modules, please check <https://etcd.io/docs/next/dev-internal/modules>

Note the module `go.etcd.io/etcd/tools/v3` doesn't depend on any other modules, nor by any other modules, so it doesn't matter when to bump dependencies for it.

### Steps to bump a dependency

Use the `github.com/spf13/cobra` as an example, follow the steps below to bump it from 1.6.1 to 1.7.0 for module `go.etcd.io/etcd/etcdctl/v3`,

```bash
cd ${ETCD_ROOT_DIR}/etcdctl
go get github.com/spf13/cobra@v1.7.0
go mod tidy
cd ..
./scripts/fix.sh
```

Execute the same steps for all other modules. When you finish bumping the dependency for all modules, then commit the change,

```bash
git
 add .
git commit --signoff -m "dependency: bump github.com/spf13/cobra from 1.6.1 to 1.7.0"
```

Please close the related PRs which were automatically opened by dependabot.

When you bump multiple dependencies in one PR, it's recommended to create a separate commit for each dependency. But it isn't a must; for example,
you can get all dependencies bumping for the module `go.etcd.io/etcd/tools/v3` included in one commit.

#### Troubleshooting

In an event of bumping the version of protoc, protoc plugins or grpc-gateway, it might change `*.proto` file which can result in the following error:

```bash
[0;31mFAIL: 'genproto' FAILED at Wed Jul 31 07:09:08 UTC 2024
make: *** [Makefile:134: verify-genproto] Error 255
```

To fix the above error, run the following script from the root of etcd repository:

```bash
./scripts/genproto.sh
```

### Indirect dependencies

Usually, we don't bump a dependency if all modules just indirectly depend on it, such as `github.com/go-logr/logr`.

If
an indirect dependency (e.g. `D1`) causes any CVE or bugs that affect etcd, usually the module (e.g. `M1`, not part of etcd, but used by etcd)
which depends on it should bump the dependency (`D1`), and then etcd just needs to bump `M1`. However, if the module (`M1`) somehow doesn't
bump the problematic dependency, then etcd can still bump it (`D1`) directly following the same steps above. But as a long-term solution, etcd should
try to remove the dependency on such module (`M1`) that lack maintenance.

For mixed cases, in which some modules directly while others indirectly depend on a dependency, we have multiple options,

- Bump the dependency for all modules, no matter it's direct or indirect dependency.
- Bump the dependency only for modules that directly depend on it.

We should try to follow the first way, and temporarily fall back to the second one if we run into any issue on the first way. Eventually we
should fix the issue and ensure all modules depend on the same version of the
dependency.

### Known incompatible dependency updates

#### arduino/setup-protoc

Please refer to [build(deps): bump arduino/setup-protoc from 1.3.0 to 2.0.0](https://github.com/etcd-io/etcd/pull/16016)

### Rotation worksheet

The dependabot scheduling interval is weekly; it means dependabot will automatically raise a bunch of PRs per week.
Usually, human intervention is required each time. We have a [rotation worksheet](https://docs.google.com/spreadsheets/d/1jodHIO7Dk2VWTs1IRnfMFaRktS9IH8XRyifOnPdSY8I/edit#gid=1394774387),
and everyone is welcome to participate; you just need to register your name in the worksheet.

## Stable branches

Usually, we don't proactively bump dependencies for stable releases unless there are any CVEs or bugs that affect etcd.

If we have to do it, then follow the same guidance above. Note that there is no `./scripts/fix.sh` in release-3.4, so no need to
execute it for 3.4.

## Golang versions

The etcd project aims to maintain a development branch that
is on the latest [Go version](https://go.dev/dl), ideally, this will align with the Go version in use for Kubernetes project development. For an example of how to update etcd to a new minor release of Go refer to issue <https://github.com/etcd-io/etcd/issues/16393> and the linked pull requests.

Suggested steps for performing a minor version upgrade for the etcd development branch:

1. Carefully review new Go version release notes and potentially related blog posts for any deprecations, performance impacts, or other considerations.
2. Create a GitHub issue to signal intent to upgrade and invite discussion, for example, <https://github.com/etcd-io/etcd/issues/16393>.
3. Complete the upgrade locally in your development environment by editing `.go-version` and running `make fix`.
4. Run performance benchmarks locally to compare before and after.
5. Raise a pull request for the changes, for example, <https://github.com/etcd-io/etcd/pull/16394>.

Stable etcd release branches will be maintained
to stay on the latest patch release of a supported Go version. Upgrading minor versions will be completed before the minor version in use currently is no longer supported. Refer to the [Go release
policy](https://go.dev/doc/devel/release).

For an example of how to update etcd to a new patch release of Go refer to issue <https://github.com/etcd-io/etcd/issues/16343> and the linked pull requests.

References:

- <https://github.com/kubernetes/sig-release/blob/master/release-engineering/handbooks/go.md>

## Core dependencies mappings

[bbolt](https://github.com/etcd-io/bbolt) and [raft](https://github.com/etcd-io/raft) are two core dependencies of etcd.

Both etcd 3.4.x and 3.5.x depend on bbolt 1.3.x, and etcd 3.6.x (`main` branch) depends on bbolt 1.4.x.

raft is included in the etcd repository for release-3.4 and release-3.5 branches, so etcd 3.4.x and 3.5.x do not depend on any
external raft module. We moved raft into [a separate repository](https://github.com/etcd-io/raft) starting
from 3.6 (`main` branch), and the first raft
release will be v3.6.0, so etcd 3.6.x will depend on raft 3.6.x.

Please see the table below:

| etcd versions | bbolt versions | raft versions |
|---|---|---|
| 3.4.x | v1.3.x | N/A |

| 3.5.x | v1.3.x | N/A |
| 3.6.x | v1.4.x | v3.6.x |

# 1.64 bind-obj-methods 3.0.0

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# 1.66 docker-image-spec 1.3.1

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# 1.67 clockwork 0.5.0

## 1.67.1 Available under license :

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Found in path(s):
* /clockwork-0-5-0-2-gem/data-tar-gz/README.md

# 1.68 arraybuffer.prototype.slice 1.0.4

## 1.68.1 Available under license :

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# 1.69 ulikunitz-xz 0.5.12

## 1.69.1 Available under license :

```
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package main

import (
 "bufio"
 "bytes"
 "flag"
 "fmt"
 "io"
 "log"
 "os"
 "path/filepath"
 "strings"
)

const crUsageString = `xb copyright [options] <path>....

The xb copyright command adds a copyright remark to all go files below path.

 -h  prints this message and exits
`

func crUsage(w io.Writer) {
 fmt.Fprint(w, crUsageString)
}

const copyrightText = `
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license that can be found in the LICENSE file.
`

func goComment(text string) string {
 buf := new(bytes.Buffer)
 scanner := bufio.NewScanner(strings.NewReader(text))
 var err error
 for scanner.Scan() {
  s := strings.TrimSpace(scanner.Text())
  if len(s) == 0 {
   continue
  }
  if _, err = fmt.Fprintln(buf, "//", s); err != nil {
   panic(err)
  }
```

```
 }
 if err
 = scanner.Err(); err != nil {
  panic(err)
 }
 if _, err = fmt.Fprintln(buf); err != nil {
  panic(err)
 }
 return buf.String()
}

var goCopyright = goComment(copyrightText)

func addCopyright(path string) (err error) {
 log.Printf("adding copyright to %s", path)
 src, err := os.Open(path)
 if err != nil {
  return err
 }
 defer func() {
  cerr := src.Close()
  if cerr != nil && err == nil {
   err = cerr
  }
 }()
 newPath := path + ".new"
 dst, err := os.Create(newPath)
 if err != nil {
  return err
 }
 defer func() {
  cerr := dst.Close()
  if cerr != nil && err == nil {
   err = cerr
  }
 }()
 out := bufio.NewWriter(dst)
 fmt.Fprint(out, goCopyright)
 scanner := bufio.NewScanner(src)
 line := 0
 del := false
 for scanner.Scan() {
  line++
  txt := scanner.Text()
  if line == 1 && strings.Contains(txt, "Copyright") {
   del = true
   continue
  }
```

```
 if del {
  s := strings.TrimSpace(txt)
  if len(s) == 0 {
   del = false
  }
  continue
 }
 fmt.Fprintln(out, txt)
}
if err = scanner.Err();
err != nil {
 return err
}
if err = out.Flush(); err != nil {
 return
}
err = os.Rename(newPath, path)
return
}

func walkCopyrights(path string, info os.FileInfo, err error) error {
 if err != nil {
  return err
 }
 if info.IsDir() {
  return nil
 }
 if !strings.HasSuffix(info.Name(), ".go") {
  return nil
 }
 return addCopyright(path)
}

func copyright() {
 cmdName := os.Args[0]
 log.SetPrefix(fmt.Sprintf("%s: ", cmdName))
 log.SetFlags(0)

 flag.CommandLine = flag.NewFlagSet(cmdName, flag.ExitOnError)
 flag.Usage = func() { crUsage(os.Stderr); os.Exit(1) }

 help := flag.Bool("h", false, "")

 flag.Parse()

 if *help {
  crUsage(os.Stdout)
  os.Exit(0)
```

```
 }

 for _, path := range flag.Args() {
  fi, err := os.Stat(path)
  if err != nil {
   log.Print(err)
   continue
  }
  if !fi.IsDir() {
   log.Printf("%s is not a directory", path)
   continue
  }
  if err = filepath.Walk(path, walkCopyrights); err != nil {
   log.Fatalf("%s error %s", path, err)
  }
 }
}
```

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`

# 1.70 go.szostok.io-version 1.2.0

## 1.70.1 Available under license :

# Upgrade notice

![](../../assets/examples/screen-upgrade-notice-cobra-version.png)

!!! tip ""

  Currently, the upgrade notice works only for GitHub releases.

The upgrade notice is disabled by default. You can easily enable it based on your usage:

- Printer

```go
p := printer.New(
    printer.WithUpgradeNotice("mszostok", "codeowners-validator", upgradeOpts...),
)
```

It prints the notice to the standard error channel ([`stderr`](<https://en.wikipedia.org/wiki/Standard_streams#Standard_error_(stderr)>)). As a result, output processing, such as executing `<cli> -ojson | jq .gitCommit`, works properly even if the upgrade notice is displayed.

- Cobra CLI

```go
extension.NewVersionCobraCmd(
    // 2. Explicit turn on upgrade notice
    extension.WithUpgradeNotice("mszostok", "codeowners-validator"),
),
```

It prints the notice on standard error channel ([`stderr`](<https://en.wikipedia.org/wiki/Standard_streams#Standard_error_(stderr)>)). As a result, output processing, such as executing `<cli> version -ojson | jq .gitCommit`, works properly even if the upgrade notice is displayed.

- Standalone

```go
notice := upgrade.NewGitHubDetector("mszostok", "codeowners-validator")
err := notice.PrintIfFoundGreater(os.Stderr, "0.5.4")
```

Once enabled, each execution checks for new releases. If a newer version has been found, it displays an upgrade notice for each output format to the standard
error channel ([`stderr`](<https://en.wikipedia.org/wiki/Standard_streams#Standard_error_(stderr)>)).

You can customize almost all aspects of the upgrade check:

- Set maximum duration time for the update check operation (default: `10s`):

```go
upgrade.WithUpdateCheckTimeout(30*time.Second)
```

- Set a custom function to compare release versions (default: [SemVer](https://semver.org/) check):

```go
upgrade.WithIsVersionGreater(func(current string, new string) bool {
  //.. compare current with new ..
  return true
})
```

-
Set the minimum time that must elapse before checking for a new release (default: `0min`):

```go
upgrade.WithMinElapseTimeForRecheck(time.Second)
```

- Change formatting:

```go
upgrade.WithFormatting(&style.Formatting{
  Header: style.Header{},
  Key:    style.Key{},
  Val:    style.Val{},
  Date:   style.Date{},
 })
```

- Change [layout](./layout.md):

```go
upgrade.WithLayout(&style.Layout{
   GoTemplate: forBoxLayoutGoTpl,
  })
```

- Change both formatting and [layout](./layout.md):

```go
upgrade.WithStyle(&style.Config{})
```

- Define a [custom renderer](./custom-renderer.md):

```go
upgrade.WithRenderer(func(in *upgrade.Info, isSmartTerminal bool) (string, error) {
 return fmt.Sprintf(`
  Version            %q
  New Version        %q
 `, in.Version, in.NewVersion), nil
})
```

- Add a post-render hook:

```go
upgrade.WithPostRenderHook(func(body string, isSmartTerminal bool) (string, error) {
 return body + "\ncustom
footer", nil
})
```

- Change config directory where cache is stored:

```go
upgrade.WithConfigDir("~/.config"),
```

- Change file name for state file:

```go
upgrade.WithStateFileName("foo-upgrade-state.yaml")
```

# Upgrade notice

![](../assets/examples/screen-upgrade-notice-cobra-version.png)

!!! tip ""

Currently, the upgrade notice works only for GitHub releases.

!!! tip

Want to try? See the [upgrade notice](../../examples#cobra-upgrade-notice) examples!

The upgrade notice is disabled by default. You can easily enable it based on your usage:

- Printer

```go
p := printer.New(
  printer.WithUpgradeNotice("mszostok", "codeowners-validator", upgradeOpts...),
)
```

It prints the notice to the standard error channel ([`stderr`](<https://en.wikipedia.org/wiki/Standard_streams#Standard_error_(stderr)>)). As a result, output processing, such as executing `<cli> -ojson | jq .gitCommit`, works properly even if the upgrade notice is displayed.

- Cobra CLI

```go
extension.NewVersionCobraCmd(
    // 2. Explicit turn on upgrade notice
    extension.WithUpgradeNotice("mszostok", "codeowners-validator"),
),
```

It prints the notice on standard error channel ([`stderr`](<https://en.wikipedia.org/wiki/Standard_streams#Standard_error_(stderr)>)).
As a result, output processing, such as executing `<cli> version -ojson | jq .gitCommit`, works properly even if the upgrade notice is displayed.

- Standalone

```go
notice := upgrade.NewGitHubDetector("mszostok", "codeowners-validator")
err := notice.PrintIfFoundGreater(os.Stderr, "0.5.4")
```

Once enabled, each execution checks for new releases but only once every 24 hours. If a newer version has been found, it displays an upgrade notice for each output format to the standard error channel ([`stderr`](<https://en.wikipedia.org/wiki/Standard_streams#Standard_error_(stderr)>)).

You can customize almost all aspects of the upgrade check. See [customization](../../customization/upgrade-notice) for more details.

```
package main

import (
 "log"
 "os"

 "go.szostok.io/version"
 "go.szostok.io/version/style"
 "go.szostok.io/version/upgrade"
)

var layoutGoTpl = `
  A new release is available: {{ .Version | Red }}  {{ .NewVersion | Green }}
  {{ .ReleaseURL  | Underline | Blue }}
`

func main() {
 upgradeOpts := []upgrade.Options{
  upgrade.WithLayout(&style.Layout{
   // Learn more at https://version.szostok.io/customization/upgrade-notice/layout/
   GoTemplate: layoutGoTpl,
  }),
 }

 ghUpgrade := upgrade.NewGitHubDetector(
  "mszostok", "codeowners-validator",
  upgradeOpts...,
 )

 // it's good to print on stderr as user can still grep the output without dealing with adhoc upgrade message
 err := ghUpgrade.PrintIfFoundGreater(os.Stderr, version.Get().Version)
 if err != nil {
  log.Fatal(err)
 }
}
package main

import (
 "os"
 "time"

 "github.com/spf13/cobra"

 "go.szostok.io/version"
 "go.szostok.io/version/extension"
 "go.szostok.io/version/style"
 "go.szostok.io/version/upgrade"
)
```

```
var layoutGoTpl = `
  A new release is available: {{ .Version | Red }}  {{ .NewVersion | Green }}
  {{ .ReleaseURL  | Underline | Blue }}

  {{ "Resolved from cache:" | Italic }} {{ .IsFromCache | FmtBool | Italic }}
`

func NewVersionWithCheck() *cobra.Command {
 verCmd := extension.NewVersionCobraCmd()

 verCmd.AddCommand(&cobra.Command{
  Use:   "check",
  Short: "Check GitHub for a new release",
  RunE: func(cmd *cobra.Command, args []string) error {
   ghUpgrade := upgrade.NewGitHubDetector(
    "mszostok", "codeowners-validator",
    upgrade.WithMinElapseTimeForRecheck(30*time.Second),
    upgrade.WithLayout(&style.Layout{
     // Learn more at https://version.szostok.io/customization/upgrade-notice/layout/
     GoTemplate: layoutGoTpl,
    }),
   )
   return ghUpgrade.PrintIfFoundGreater(cmd.ErrOrStderr(),
 version.Get().Version)
  },
 })

 return verCmd
}

// NewRoot returns a root cobra.Command for the whole CLI.
func NewRoot() *cobra.Command {
 cmd := &cobra.Command{
  Use:   "example",
  Short: "An example CLI built with github.com/spf13/cobra",
 }

 cmd.AddCommand(
  NewVersionWithCheck(),
 )

 return cmd
}

func main() {
 if err := NewRoot().Execute(); err != nil {
  os.Exit(1)
```

```
 }
}
package main

import (
 "os"

 "github.com/spf13/cobra"

 "go.szostok.io/version/extension"
)

// NewRoot returns a root cobra.Command for the whole CLI.
func NewRoot() *cobra.Command {
 cmd := &cobra.Command{
  Use:   "example",
  Short: "An example CLI built with github.com/spf13/cobra",
 }

 cmd.AddCommand(
  // 1. Register 'version' command
  extension.NewVersionCobraCmd(
   // 2. Explicit turn on upgrade notice
   extension.WithUpgradeNotice("mszostok", "codeowners-validator"),
  ),
 )

 return cmd
}

func main() {
 if err := NewRoot().Execute(); err != nil {
  os.Exit(1)
 }
}
```

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SOFTWARE.
# Add `version check` sub-command

![](../../assets/examples/screen-upgrade-notice-sub-cmd-version_check.png)

You can create a dedicated sub-command that will check if there is a new release on GitHub.

For a complete example, see [`upgrade-notice-sub-
cmd`](https://github.com/mszostok/version/tree/main/examples/upgrade-notice-sub-cmd/main.go)!
# Layout

!!! note ""

   Layout focuses on structured arrangement of pretty version data.

To define the layout, use [Go templating](https://pkg.go.dev/html/template). You can use also the [version package's built-in functions](https://github.com/mszostok/version/blob/main/style/go-tpl-funcs.go). All helper functions defined by the [Sprig template library](https://masterminds.github.io/sprig/) are also available.

These are the fields that you can access in your Go template definition:

| Key | Description |
| --- | --- |
| `.Version` | Binary version |
| `.NewVersion` | New binary version taken from the latest GitHub release |
| `.ReleaseURL` | GitHub release URL |

## Go

!!! tip

   Want to try? See the [custom layout](../../../examples/#printer-upgrade-notice) example!

Example usage:

```go
var
 forBoxLayoutGoTpl = heredoc.Doc(`
A new release is available: {{ .Version }}  {{ .NewVersion | Green }}
{{ .ReleaseURL  | Underline | Blue }}`)
```

```
func main() {
 upgradeOpts := []upgrade.Options{
  upgrade.WithLayout(&style.Layout{
   GoTemplate: forBoxLayoutGoTpl,
  }),
  upgrade.WithPostRenderHook(func(body string, isSmartTerminal bool) (string, error) {
   return body + "\n footer", nil
  }),
 }

 notice := upgrade.NewGitHubDetector("mszostok", "codeowners-validator", upgradeOpts...)
 err := notice.PrintIfFoundGreater(os.Stderr, "0.5.4")
 if err != nil {
  log.Fatal(err)
 }
}
```

```
package main

import (
 "fmt"
 "os"
 "time"

 "github.com/spf13/cobra"

 "go.szostok.io/version"
 "go.szostok.io/version/term"
 "go.szostok.io/version/upgrade"
)

const recheckInterval = 30 * time.Second

func NewRoot() *cobra.Command {
 cmd := &cobra.Command{
  Use:   "example",
  Short: "An example CLI built with github.com/spf13/cobra",
  PersistentPostRunE: func(cmd *cobra.Command, args []string) error {
   gh := upgrade.NewGitHubDetector(
    "mszostok", "codeowners-validator",
    upgrade.WithMinElapseTimeForRecheck(recheckInterval),
   )

   rel, err := gh.LookForGreaterRelease(upgrade.LookForGreaterReleaseInput{
    CurrentVersion: version.Get().Version,
   })
   if err != nil {
```

```
    return err
   }

   if !rel.Found {
    // no new version available
    return nil
   }

   if rel.ReleaseInfo.IsFromCache {
    // The time for re-checking for a new release has not elapsed yet,
    // so the cached version is returned.
    //
    // NOTE: This check is run for all CLI commands. You
  can display it, but it can be quite spammy.
    // For example, the GitHub CLI `gh` displays an upgrade notice only once per 24h,
    // so it acts more like a "reminder".
    // However, IT'S ALWAYS YOUR CALL :)
    // You can even display information if it was from cache or not, see:
    //   https://github.com/mszostok/version/blob/main/examples/upgrade-notice-sub-cmd/main.go
    return nil
   }

   // NOTE:
   // 1. Print the upgrade notice on a standard error channel (stderr).
   //    As a result, output processing for a given command works properly even if the upgrade notice is displayed.
   //
   // 2. Use 'term.IsSmart' so that the renderer can disable colored output for non-tty output streams.
   out, err := gh.Render(rel.ReleaseInfo, term.IsSmart(cmd.OutOrStderr()))
   if err != nil {
    return err
   }

   _, err = fmt.Fprint(cmd.OutOrStderr(), out)
   return err
  },
 }

 return cmd
}

func main() {
 cmd := NewRoot()

 // Register example commands, the upgrade notice should
 be displayed only once per 30s.
 // It doesn't matter which command you will run.
 cmd.AddCommand(
  NewHelloWorld(),
```

```
  NewHakunaMatata(),
 )

 if err := cmd.Execute(); err != nil {
  os.Exit(1)
 }
}

func NewHelloWorld() *cobra.Command {
 return &cobra.Command{
  Use:   "hello [name]",
  Short: "Greets to the given arg",
  Args:  cobra.ExactArgs(1),
  Run: func(cmd *cobra.Command, args []string) {
   fmt.Printf("Hello %s\n", args[0])
  },
 }
}

func NewHakunaMatata() *cobra.Command {
 return &cobra.Command{
  Use:   "hakuna",
  Short: "Says hakuna matata",
  Run: func(cmd *cobra.Command, args []string) {
   fmt.Println("Hakuna Matata!")
  },
 }
}
```

# Custom Renderer

If the custom formatting and [layout](./layout.md) don't meet you needs, you can simply specify your own rendering function:

```go linenums="1" hl_lines="19-22"
// NewRoot returns a root cobra.Command for the whole CLI.
func NewRoot() *cobra.Command {
 cmd := &cobra.Command{
  Use:   "example",
  Short: "An example CLI built with github.com/spf13/cobra",
 }

 opts := []upgrade.Options{
  upgrade.WithRenderer(func(in *upgrade.Info, isSmartTerminal bool) (string, error) {
   return fmt.Sprintf(`
    Version            %q
    New Version        %q
  `, in.Version, in.NewVersion), nil
  }),
```

```
 }

 cmd.AddCommand(
  // 1. Register the 'version' command
  extension.NewVersionCobraCmd(
   // 2. Explicitly enable the upgrade notice
   extension.WithUpgradeNotice("mszostok", "codeowners-validator", opts...),
  ),
 )

 return cmd
}
```
```
package main

import (
 "log"
 "os"

 "github.com/Delta456/box-cli-maker/v2"
 "github.com/MakeNowJust/heredoc/v2"
 "github.com/gookit/color"
 "github.com/muesli/reflow/indent"
 "github.com/spf13/pflag"

 "go.szostok.io/version/printer"
 "go.szostok.io/version/style"
 "go.szostok.io/version/upgrade"
)

func main() {
 upgradeOpts := []upgrade.Options{
  upgrade.WithLayout(&style.Layout{
   GoTemplate: forBoxLayoutGoTpl,
  }),
  upgrade.WithPostRenderHook(SprintInBox),
 }

 p := printer.New(
  printer.WithUpgradeNotice("mszostok", "codeowners-validator", upgradeOpts...),
 )
 p.RegisterPFlags(pflag.CommandLine) // register `--output/-o` flag
 pflag.Parse()

 if err := p.Print(os.Stdout); err != nil {
  log.Fatal(err)
 }
}
```

```
var forBoxLayoutGoTpl = heredoc.Doc(`
A new release is available: {{ .Version | Red }}  {{ .NewVersion | Green }}
{{ .ReleaseURL  | Underline | Blue }}`)

func SprintInBox(body string, isSmartTerminal bool) (string, error) {
 cfg := box.Config{Px: 1, Py: 0, Type: "Round",
 Color: "Yellow", ContentAlign: "Left"}
 boxed := box.New(cfg)

 body = boxed.String("", body)
 body = indent.String(body, 2)
 if !isSmartTerminal {
  body = color.ClearCode(body)
 }
 return body, nil
}
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object-assign
(c) Sindre Sorhus
@license MIT
*/

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```

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# 1.75 almalinux-logos 90.6-2.el9

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# 1.76 go-grpc-middleware-providers-prometheus 1.1.0

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module _ // Auto generated by https://github.com/bwplotka/bingo. DO NOT EDIT

go 1.16

require github.com/efficientgo/tools/copyright v0.0.0-20210326193628-425a09c04e05

# 1.77 jsonpatch 2.4.0

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# 1.85 mdast-util-gfm-task-list-item 2.0.0

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# 1.88 itchyny-gojq 0.12.16

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# 1.94 cross-spawn 7.0.6

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# 1.96 whatwg-encoding 3.1.1

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# 1.100 simple-concat 1.0.1

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distribute the source code, even though third parties are not
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# 1.104 dnslib 0.9.26

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# 1.105 libxi 1.1.4-10.el9

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# 1.106 base64-js 1.5.1

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# 1.108 httpsnoop 1.0.4

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# 1.109 go-pkcs11uri 0.0.0-20230803200340-78284954bff6

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RF on Limited Terms  requires all Obligated Parties to license their Essential Claims using the RF licensing elements described in Sections 10.2.1 and 10.2.3.
Non-Assertion  requires all Obligated Parties to provide an OASIS Non-Assertion Covenant as described in Section 10.3.
A TC may not change its IPR Mode without closing and submitting a new charter.

5. CONTRIBUTIONS

5.1 General

At the time of submission of a Contribution for consideration by an OASIS Technical Committee, each named co-Contributor (and its respective Affiliates) is deemed to agree to the following terms and conditions and to make the following representations (based on the actual knowledge
of the TC Member(s) making the Contribution, with respect to items 3  5 below, inclusive):

OASIS has no duty to publish or otherwise use or disseminate any Contribution.
OASIS may reference the name(s) of the Contributor(s) for the purpose of acknowledging and publishing the Contribution.
The Contribution properly identifies any holders of copyright interests in the Contribution.
No information in the Contribution is confidential, and OASIS may freely disclose any information in the

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There are no limits to the Contributors ability to make the grants, acknowledgments, and agreements required by this Policy with respect to such Contribution.
5.2 Copyright Licenses

To the extent that a Contributor holds a copyright interest in its Contribution, such Contributor grants to OASIS a perpetual, irrevocable, non-exclusive, royalty-free, worldwide copyright license, with the right to directly and indirectly sublicense, to copy, publish, and distribute the Contribution in any
way, and to prepare derivative works that are based on or incorporate all or part of the Contribution solely for the purpose of developing and promoting the OASIS Deliverable and enabling (subject to the rights of the owners of any Essential Claims) the implementation of the same by Licensees or Beneficiaries.
To the extent that a Contribution is subject to copyright by parties that are not Contributors, the submitter(s) must provide OASIS with a signed Copyright License Grant (Appendix B) from each such copyright owner whose permission would be required to permit OASIS to exercise the rights described in Appendix B.
5.3 Trademarks

Trademarks or service marks that are not owned by OASIS shall not be used by OASIS, except as approved by the OASIS Board of Directors, to refer to work conducted at OASIS, including the use in the name of an OASIS TC, an OASIS Deliverable, or incorporated into such work.
No OASIS Party may use an OASIS trademark or service mark in connection with an OASIS
Deliverable or otherwise, except in compliance with such license and usage guidelines as OASIS may from time to time require.
6. LIMITED PATENT COVENANT FOR DELIVERABLE DEVELOPMENT

To permit TC Members and their TC Parties to develop implementations of OASIS Standards Draft Deliverables being developed by a TC, each TC Party represented by a TC Member in a TC, at such time that the TC Member joins the TC, grants to each other TC Party in that TC automatically and without further action on its part, and on an ongoing basis, a limited covenant not to assert any Essential Claims required to implement such OASIS Standards Draft Deliverable and covering making or using (but not selling or otherwise distributing) an implementation of such OASIS Standards Draft Deliverable, solely for the purpose of testing and developing such deliverable and only until either the OASIS Standards Draft Deliverable is approved as an OASIS Standards Final Deliverable or the Technical Committee is closed.

7.
FEEDBACK

OASIS encourages Feedback to OASIS Deliverables from both OASIS Parties who are not TC Parties and the public at large. Feedback will be accepted only under the Feedback License (Appendix A).
OASIS will require that submitters of Feedback agree to the terms of the Feedback License before transmitting submitted Feedback to the Technical Committee.
8. DISCLOSURE

Disclosure Obligations  Each TC Party shall disclose to OASIS in writing the existence of all patents and/or patent applications owned or claimed by such TC Party that are actually known to the TC Member directly participating in the TC, and which such TC Member believes may contain any Essential Claims or claims that might become Essential Claims upon approval of an OASIS Standards Final Deliverable as such document then exists (collectively, Disclosed Claims).
Disclosure of Third Party Patent Claims  Each TC Party whose TC Members become aware of patents or patent

applications owned or claimed by a third party that
contain claims that might become Essential Claims upon approval of an OASIS Standards Final Deliverable should disclose them, provided that such disclosure is not prohibited by any confidentiality obligation binding upon them. It is understood that any TC Party that discloses third party patent claims to OASIS does not take a position on the essentiality or relevance of the third party claims to the OASIS Standards Final Deliverable in its then-current form. In both cases (Sections 8.1 and 8.2), it is understood and agreed that such TC Party(s) TC Member(s) do not represent that they know of all potentially pertinent claims of patents and patent applications owned or claimed by the TC Party or any third parties. For the avoidance of doubt, while the disclosure obligation under Sections 8.1 and 8.2 applies directly to all TC Parties, this obligation is triggered based on the actual knowledge of the TC Partys TC Members regarding the TC Partys patents or patent applications that may contain
Essential Claims.

Disclosure Requests Disclosure requests will be included as described in Section 12 with all public review copies of OASIS Standards Final Deliverables. All OASIS Parties are encouraged to review such OASIS Standards Final Deliverables and make appropriate disclosures.
Limitations A disclosure request and the obligation to disclose set forth above do not imply any obligations on the recipients of disclosure requests (collectively or individually) or on any OASIS Party to perform or conduct patent searches. Nothing in this Policy nor the act of receiving a disclosure request for an OASIS Standards Final Deliverable, regardless of whether it is responded to, shall be construed or otherwise interpreted as any kind of express or implied representation with respect to the existence or non-existence of patents or patent applications which contain Essential Claims, other than that such TC Party has acted in good faith with respect to its disclosure obligations.
Information
Any disclosure of Disclosed Claims shall include (a) in the case of issued patents and published patent applications, the patent or patent application publication number, the associated country and, as reasonably practicable, the relevant portions of the applicable OASIS Standards Final Deliverable; and (b) in the case of unpublished patent applications, the existence of the unpublished application and, as reasonably practicable, the relevant portions of the applicable OASIS Standards Final Deliverable.
9. TYPES OF OBLIGATIONS

9.1 Contribution Obligation

A TC Party has a Contribution Obligation, which arises at the time the Contribution is submitted to a TC, to license or provide under non-assertion covenants as appropriate for the IPR mode described in Section 10, any claims under its patents or patent applications that become Essential Claims when such Contribution is incorporated (either in whole or in part) into (a) the OASIS Standards Final Deliverable produced by the TC
that received the Contribution, or (b) any Final Maintenance Deliverable with respect to that OASIS Standards Final Deliverable.

9.2 Participation Obligation

A TC Party has a Participation Obligation to license or provide under non-assertion covenant as appropriate for the IPR mode, as described in Section 10, any claims under its patents or patent applications that would be Essential Claims in the then current OASIS Standards Draft Deliverable, if that draft subsequently becomes an OASIS Standards Final Deliverable, even if the TC Party is not a Contributor, when all of the following conditions are met:

An OASIS Standards Final Deliverable is finally approved that incorporates such OASIS Standards Draft Deliverable, either in whole or in part;

The TC Party has been on, or has been represented by TC Member(s) on such TC for a total of sixty (60) calendar days, which need not be continuous;
The TC Party is on, or is represented by TC Member(s) on such TC after a period of seven (7) calendar days after the ballot to approve such OASIS Standards Draft Deliverable has elapsed.
Once the foregoing conditions are met, that TC Partys Participation Obligation so to license or provide a non-assertion covenant continues with respect to that OASIS Standards Final Deliverable, and any Final Maintenance Deliverable subsequently approved with respect to that OASIS Standards Final Deliverable.

For organizational TC Parties, the membership threshold is met by one or more employees or organizational designees of such Parties having been a TC Member on any 60 calendar days, although any given calendar day is only one day of membership, regardless of the number of participants on that day.

Each time a new OASIS Standards Draft Deliverable is approved by the TC, the Participation Obligation adjusts to encompass the material in the latest OASIS Standards Draft Deliverable seven days after such draft has been approved for publication.

10. LICENSING REQUIREMENTS

10.1 RAND Mode TC Requirements

For an OASIS Standards Final Deliverable developed by a RAND Mode TC, except where a Licensee has a separate, signed agreement under which the Essential Claims are licensed to such Licensee on more favorable terms and conditions than set forth in this section (in which case such separate signed agreement shall supersede this Limited Patent License), each Obligated Party in such TC hereby covenants that, upon request and subject to Section 11, it will grant to any OASIS Party or third party: a nonexclusive, worldwide, non-sublicensable, perpetual patent license (or an equivalent non-assertion covenant) under its Essential Claims covered by its Contribution Obligations or Participation Obligations on fair, reasonable, and non-discriminatory terms to make, have made, use, market, import, offer to sell, and sell, and to otherwise directly or indirectly distribute (a) Licensed Products that implement such OASIS Standards Final Deliverable, and (b) Licensed Products that implement any Final Maintenance Deliverable with respect to that OASIS Standards Final Deliverable. Such license need not extend to features of a Licensed Product that are not required to comply with the Normative Portions of such OASIS Standards Final Deliverable or Final Maintenance Deliverable. For the sake of clarity, the rights set forth above include the right to directly or indirectly authorize a third party to make unmodified copies of the Licensees Licensed Products and to license (optionally under the third partys license) the Licensees Licensed Products within the scope of, and subject to the terms of, the Obligated Partys license.

At the election of the Obligated Party, such license may include a term requiring the Licensee to grant a reciprocal license to its Essential Claims (if any) covering the same OASIS Standards Final Deliverable and any such Final Maintenance Deliverable. Such term may require the Licensee to grant licenses to all implementers of such deliverable. The Obligated Party may also include a term providing that such license may be suspended with respect to the Licensee if that Licensee first sues the Obligated Party for infringement by the Obligated Party of any of the Licensees Essential Claims covering the same OASIS Standards Final Deliverable or any such Final Maintenance Deliverable.

License terms that are fair, reasonable, and non-discriminatory beyond those specifically mentioned above are left to the Licensees and Obligated Parties involved.

10.2 RF Mode TC Requirements

10.2.1 Common

For an OASIS Standards Final Deliverable developed by an RF Mode TC, except where a Licensee has a separate, signed agreement under which the Essential Claims are licensed to such Licensee on more favorable terms and conditions than set forth in this section (in which case such separate signed agreement shall supersede this Limited Patent License), each Obligated Party in such TC hereby covenants that, upon request and subject to Section 11, it will
grant to any OASIS Party or third party: a nonexclusive, worldwide, non-sublicensable, perpetual patent license (or an equivalent non-assertion covenant) under its Essential Claims covered by its Contribution Obligations or Participation Obligations without payment of royalties or fees, and subject to the applicable Section 10.2.2 or 10.2.3, to make, have made, use, market, import, offer to sell, and sell, and to otherwise directly or indirectly distribute (a) Licensed Products that implement such OASIS Standards Final Deliverable, and (b) Licensed Products that implement any Final Maintenance Deliverable with respect to that OASIS Standards Final Deliverable. Such license need not extend to features of a Licensed Product that are not required to comply with the Normative Portions of such OASIS Standards Final Deliverable or Final Maintenance Deliverable. For the sake of clarity, the rights set forth above include the right to directly or indirectly authorize a third party to make unmodified
copies of the Licensees Licensed Products and to license (optionally under the third partys license) the Licensees Licensed Products, within the scope of, and subject to the terms of, the Obligated Partys license.

At the election of the Obligated Party, such license may include a term requiring the Licensee to grant a reciprocal license to its Essential Claims (if any) covering the same OASIS Standards Final Deliverable and any such Final Maintenance Deliverable. Such term may require the Licensee to grant licenses to all implementers of such deliverable. The Obligated Party may also include a term providing that such license may be suspended with respect to the Licensee if that Licensee first sues the Obligated Party for infringement by the Obligated Party of any of the Licensees Essential Claims covering the same OASIS Standards Final Deliverable and any such Final Maintenance Deliverable.

10.2.2 RF on RAND Terms

With TCs operating under the RF on RAND Terms IPR Mode, license
terms that are fair, reasonable, and non-discriminatory beyond those specifically mentioned in Section 10.2.1 may also be included, and such additional RAND terms are left to the Licensees and Obligated Parties involved.

10.2.3 RF on Limited Terms

With TCs operating under the RF on Limited Terms IPR Mode, Obligated Parties may not impose any further conditions or restrictions beyond those specifically mentioned in Section 10.2.1 on the use of any technology or intellectual property rights, or other restrictions on behavior of the Licensee, but may include reasonable, customary terms relating to operation or maintenance of the license relationship, including the following: choice of law and dispute resolution.

10.3. Non-Assertion Mode TC Requirements

10.3.1. For an OASIS Standards Final Deliverable developed by a Non-Assertion Mode TC, and any Final Maintenance Deliverable with respect to that OASIS Standards Final Deliverable, each Obligated Party in such TC hereby makes the following

world-wide OASIS Non-Assertion Covenant.

Each Obligated Party in a Non-Assertion Mode TC irrevocably covenants that, subject to Section 10.3.2 and Section 11 of the OASIS IPR Policy, it will not assert any of its Essential Claims covered by its Contribution Obligations or Participation Obligations against any OASIS Party or third party for making, having made, using, marketing, importing, offering to sell, selling, and otherwise distributing Covered Products that implement an OASIS Standards Final Deliverable developed by that TC and Covered Products that implement any Final Maintenance Deliverable with respect to that OASIS Standards Final Deliverable.

10.3.2. The covenant described in Section 10.3.1 may be suspended or revoked by the Obligated Party with respect to any OASIS Party or third party if that OASIS Party or third party asserts an Essential Claim in a suit first brought against, or attempts in writing to assert an Essential Claim against, a Beneficiary with respect to a Covered Product that implements the same OASIS Standards Final Deliverable or any such Final Maintenance Deliverable.

11. WITHDRAWAL AND TERMINATION

A TC Party may withdraw from a TC at any time by notifying the OASIS TC Administrator in writing of such decision to withdraw. Withdrawal shall be deemed effective when such written notice is sent.

11.1 Withdrawal from a Technical Committee

A TC Party that withdraws from an OASIS Technical Committee shall have Continuing Licensing or Non-Assertion Obligations based on its Contribution Obligations and Participation Obligations as follows:

A TC Party that has incurred neither a Contribution Obligation nor a Participation Obligation prior to withdrawal has no licensing or non-assertion obligations for OASIS Standards Final Deliverable(s) originating from that OASIS TC.
A TC Party that has incurred a Contribution Obligation prior to withdrawal continues to be subject to its Contribution Obligation.
A TC Party that has incurred a Participation Obligation prior to withdrawal continues to be subject to its Participation Obligation but only with respect to OASIS Standards Draft Deliverable(s) approved more than seven (7) calendar days prior to its withdrawal.
11.2 Termination of an OASIS Membership

An OASIS Party that terminates its OASIS membership (voluntarily or involuntarily) is deemed to withdraw from all TCs in which that OASIS Party has TC Member(s) representing it, and such OASIS Party remains subject to Continuing Licensing or Non-Assertion Obligations for each such TC based on its Obligated Party status in that TC on the date that its membership termination becomes effective.

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OASIS assumes no responsibility to compile, confirm,
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13.1.2. Provide for the perpetual existence of a website or other
public means of accessing OASIS Standards Final Deliverables; nor
13.1.3. Maintain the public availability of any given OASIS Standards Final Deliverable that has been retired or superseded, or which is no longer being actively utilized in the marketplace.
13.2. Where any copyrights, trademarks, patents, patent applications, or other proprietary rights are known, or claimed, with respect to any OASIS Deliverable and are formally brought to the attention of the OASIS TC Administrator, OASIS shall consider appropriate action, which may include disclosure of the existence of such rights, or claimed rights. The OASIS Technical Committee Process shall prescribe the method for providing this information.

13.2.1. OASIS disclaims any responsibility for identifying the existence of or for evaluating the applicability of any claimed copyrights, trademarks, patents, patent applications, or other rights, and will make no assurances on the validity or scope of any such rights.
13.2.2. Where the OASIS
TC Administrator is formally notified of rights, or claimed rights under Section 8.8 with respect to entities other than Obligated Parties, the OASIS President shall attempt to obtain from the claimant of such rights a written assurance that any Licensee will be able to obtain the right to utilize, use, and distribute the technology or works when implementing, using, or distributing technology based upon the specific OASIS Standards Final Deliverable (or, in the case of an OASIS Standards Draft Deliverable, that any Licensee will then be able to obtain such a right) under terms that are consistent with this Policy. All such information will be made available to the TC that produced such deliverable, but the failure to obtain such written assurance shall not prevent votes from being conducted, except that the OASIS TC Administrator may defer approval for a reasonable period of time where a delay may facilitate the obtaining of such assurances. The results will, however, be recorded

by the OASIS TC Administrator, and made available to the public. The OASIS Board of Directors may also direct that a summary of the results be included in any published OASIS Standards Final Deliverable.
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13.3. Solely for purposes of Section 365(n) of Title 11, United States Bankruptcy Code, and any equivalent law in any foreign jurisdiction, the promises under Section 10 will be treated as if they were a license and any OASIS Party or third-party may elect to retain its rights under this promise if Obligated Party, as a debtor in possession, or a bankruptcy trustee in a case under the United States Bankruptcy Code, rejects any obligations stated in Section 10.

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14.1 Documents

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Deliverable shall include the following notices replacing [copyright year] with the year or range of years of publication (bracketed language, other than the date, need only appear in OASIS Standards Final Deliverable documents):

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OASIS Party or any other party that believes it has patent claims that would necessarily be infringed by implementations of this OASIS Standards Final Deliverable, to notify OASIS TC Administrator and provide an indication of its willingness to grant patent licenses to such patent claims in a manner consistent with the IPR Mode

of the OASIS Technical Committee that produced this deliverable.]

[OASIS invites any party to contact the OASIS TC Administrator if it is aware of a claim of ownership of any patent claims that would necessarily be infringed by implementations of this OASIS Standards Final Deliverable by a patent holder that is not willing to provide a license to such patent claims in a manner consistent with the IPR Mode of the OASIS Technical Committee that produced this OASIS Standards Final Deliverable. OASIS may include such claims on its website, but disclaims any obligation to do so.]

[OASIS takes no position regarding the validity or scope of any intellectual property or other rights that might be claimed to pertain to the implementation or use of the technology described in this OASIS Standards Final Deliverable or the extent to which any license under such rights might or might not be available; neither does it represent that it has made any effort to identify any such rights. Information on OASIS procedures with respect to rights in any document or deliverable produced by an OASIS Technical Committee can be found on the OASIS website. Copies of claims of rights made available for publication and any assurances of licenses to be made available, or the result of an attempt made to obtain a general license or permission for the use of such proprietary rights by implementers or users of this OASIS Standards Final Deliverable, can be obtained from the OASIS TC Administrator. OASIS makes no representation that any information or list of intellectual property rights will at any time be complete, or that any claims in such list are, in fact, Essential Claims.]

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14.3 Additional Copyright Notices

Additional copyright notices identifying Contributors may also be included with the OASIS copyright notice.

Appendix A. Feedback License

The OASIS _____ Technical Committee is developing technology (the OASIS _____ Deliverable) as defined by its charter and welcomes input, suggestions and other feedback (Feedback) on the OASIS _____ Deliverable. By the act of submitting, you (on behalf of yourself if you are an individual, and your organization and its Affiliates if you are providing Feedback on behalf of that organization) agree to the following terms (all capitalized terms are defined in the OASIS Intellectual Property Rights (IPR) Policy, see http://www.oasis-open.org/who/intellectualproperty.php):

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Assent of the Undersigned: By: _____ (Signature) Name: _____
Title: _____ Organization: _____ Date: _____ Email: _____

# 1.110 smithy-go 1.22.1

## 1.110.1 Available under license :

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# 1.122 libsemanage-common 3.6-5.el9_6

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That's all there is to it!

# 1.123 etcd-client 3.6.4

## 1.123.1 Available under license :

# Features

This document provides an overview of etcd features and general development guidelines for adding and deprecating them. The project maintainers can override these guidelines per the need of the project following the project governance.

## Overview

The etcd features fall into three stages, experimental, stable, and unsafe.

### Experimental

Any new feature is usually added as an experimental feature. An experimental feature is characterized as below:
- Might be buggy due to a lack of user testing. Enabling the feature may not work as expected.
- Disabled by default when added initially.
- Support for such a feature may be dropped at any time without notice
  - Feature-related issues may be given lower priorities.
  - It can be removed in the next minor or major release without following the feature deprecation policy unless it graduates to a stable future.

### Stable

A stable feature is characterized as below:
- Supported as part of the supported releases of etcd.
-
 May be enabled by default.
- Discontinuation of support must follow the feature deprecation policy.

### Unsafe

Unsafe features are rare and listed under the `Unsafe feature:` section in the etcd usage documentation. By default, they are disabled. They should be used with caution following documentation. An unsafe feature can be removed in the next minor or major release without following the feature deprecation policy.

## Development Guidelines

### Adding a new feature

Any new enhancements to the etcd are typically added as an experimental feature. The general development requirements are listed below. They can be somewhat flexible depending on the scope of the feature and review discussions and will evolve over time.

- Open an issue
  - It must provide a clear need for the proposed feature.
  - It should list development work items as checkboxes. There must be one work item towards future graduation to a stable future.
  - Label the issue with `type/feature` and `experimental`.
  - Keep the issue open for tracking purposes until a decision is made on graduation.
- Open a Pull Request (PR)
  - Provide unit tests. Integration tests are also recommended as possible.
  - Provide robust e2e test coverage. If the feature being added is complicated or quickly needed, maintainers can decide to go with e2e tests for basic coverage initially and have robust coverage added at a later time before the feature graduation to the stable feature.
  - Provide logs for proper debugging.
  - Provide metrics and benchmarks as needed.
  - The Feature should be disabled by default.
  - Any configuration flags related to the implementation of the feature must be prefixed with `experimental` e.g. `--experimental-feature-name`.
  - Add a CHANGELOG entry.
- At least two maintainers must approve feature requirements and related code changes.

### Graduating an Experimental feature to Stable

It is important that experimental features don't get stuck in that stage.
They should be revisited and moved to the stable stage following the graduation steps as described here.

#### Locate graduation candidate

Decide if an experimental feature is ready for graduation to the stable stage.

- Find the issue that was used to enable the experimental feature initially. One way to find such issues is to search for issues with `type/feature` and `experimental` labels.
- Fix any known open issues against the feature.
- Make sure the feature was enabled for at least one previous release. Check the PR(s) reference from the issue to see when the feature-related code changes were merged.

#### Provide implementation

If an experimental feature is found ready for graduation to the stable stage, open a Pull Request (PR) with the following changes.

- Add robust e2e tests if not already provided.
- Add a new stable feature flag identical to the experimental feature flag but without the `--experimental` prefix.
- Deprecate the experimental feature following the [feature deprecation policy](#Deprecating-a-feature).
- Implementation must ensure that both the graduated and deprecated experimental feature flags work as expected. Note that both these flags will co-exist for the timeframe described in the feature deprecation policy.
- Enable the graduated feature by default if needed.

At least two maintainers must approve the work. Patch releases should not be considered for graduation.

### Deprecating a feature

#### Experimental
An experimental feature deprecates when it graduates to the stable stage.
- Add a deprecation message in the documentation of the experimental feature with a recommendation to use a related stable feature. e.g. `DEPRECATED. Use <feature-name> instead.`
- Add a `deprecated` label in the issue that was initially used to enable the experimental feature.

#### Stable
As the project evolves, a stable feature may sometimes need to be deprecated and removed. Such a situation should be handled using the steps below:
- Create an issue for tracking
 purposes.
- Add a deprecation message in the feature usage documentation before a planned release for feature deprecation. e.g. `To be deprecated in <release>.`. If a new feature replaces the `To be deprecated` feature, then also provide a message saying so. e.g. `Use <feature-name> instead.`.
- Deprecate the feature in the planned release with a message as part of the feature usage documentation. e.g. `DEPRECATED`. If a new feature replaces the deprecated feature, then also provide a message saying so. e.g. `DEPRECATED. Use <feature-name> instead.`.
- Add a `deprecated` label in the related issue.

Remove the deprecated feature in the following release. Close any related issue(s). At least two maintainers must approve the work. Patch releases should not be considered for deprecation.
# Set up the local cluster

For testing and development deployments, the quickest and easiest way is to configure a local cluster. For a production deployment, refer to the [clustering][clustering] section.

## Local standalone cluster

### Starting a cluster

Run the following to deploy an etcd cluster as a standalone cluster:

```
$ ./etcd
...
```

If the `etcd` binary is not present in the current working directory, it might be located either at `$GOPATH/bin/etcd` or at `/usr/local/bin/etcd`. Run the command appropriately.

The running etcd member listens on `localhost:2379` for client requests.

### Interacting with the cluster

Use `etcdctl` to interact with the running cluster:

1. Store an example key-value pair in the cluster:

```
$ ./etcdctl put foo bar
OK
```

If OK is printed, storing the key-value pair is successful.

2. Retrieve the value of `foo`:

```
$ ./etcdctl get foo
bar
```

If `bar` is returned, interaction with the etcd cluster is working as expected.

## Local multi-member cluster

### Starting a cluster

A `Procfile` at the base of the etcd git repository is provided to easily configure a local multi-member cluster. To start a multi-member cluster, navigate to the root of the etcd source tree and perform the following:

1. Install `goreman` to control Procfile-based applications:

```
$ go install github.com/mattn/goreman@latest
```

The installation will place executables in the $GOPATH/bin. If $GOPATH environment variable is not set, the tool will be installed into the $HOME/go/bin. Make sure that $PATH is set accordingly in your environment.

2. Start a cluster with `goreman` using etcd's stock Procfile:

```
$ goreman -f Procfile start
```

The members start running. They listen on `localhost:2379`, `localhost:22379`, and `localhost:32379` respectively for client requests.

### Interacting with the cluster

Use `etcdctl` to interact with the running cluster:

1. Print
 the list of members:

```
$ etcdctl --write-out=table --endpoints=localhost:2379 member list
```
The list of etcd members is displayed as follows:

```
+------------------+---------+--------+------------------------+------------------------+
|       ID         | STATUS  |  NAME  |       PEER ADDRS       |      CLIENT ADDRS      |
+------------------+---------+--------+------------------------+------------------------+
| 8211f1d0f64f3269 | started | infra1 | http://127.0.0.1:2380  | http://127.0.0.1:2379  |
| 91bc3c398fb3c146 | started | infra2 | http://127.0.0.1:22380 | http://127.0.0.1:22379 |
| fd422379fda50e48 | started | infra3 | http://127.0.0.1:32380 | http://127.0.0.1:32379 |
+------------------+---------+--------+------------------------+------------------------+
```

2. Store an example key-value pair in the cluster:

```
$ etcdctl put foo bar
OK
```

If OK is printed, storing the key-value pair is successful.

###
 Testing fault tolerance

To exercise etcd's fault tolerance, kill a member and attempt to retrieve the key.

1. Identify the process name of the member to be stopped.

The `Procfile` lists the properties of the multi-member cluster. For example, consider the member with the process name, `etcd2`.

2. Stop the member:

```
# kill etcd2
$ goreman run stop etcd2
```

3. Store a key:

```
```

```
$ etcdctl put key hello
OK
```

4. Retrieve the key that is stored in the previous step:

```
$ etcdctl get key
hello
```

5. Retrieve a key from the stopped member:

```
$ etcdctl --endpoints=localhost:22379 get key
```

The command should display an error caused by connection failure:

```
2017/06/18 23:07:35 grpc: Conn.resetTransport failed to create client transport: connection error: desc = "transport: dial tcp 127.0.0.1:22379: getsockopt: connection refused"; Reconnecting to "localhost:22379"
Error:  grpc:
timed out trying to connect
```

6. Restart the stopped member:

```
$ goreman run restart etcd2
```

7. Get the key from the restarted member:

```
$ etcdctl --endpoints=localhost:22379 get key
hello
```

Restarting the member re-establishs the connection. `etcdctl` will now be able to retrieve the key successfully. To learn more about interacting with etcd, read [interacting with etcd section][interacting].

[clustering]: https://etcd.io/docs/latest/op-guide/clustering/
[interacting]: https://etcd.io/docs/latest/dev-guide/interacting_v3/
# Issue triage guidelines

## Purpose

Speed up issue management.

The `etcd` issues are listed at <https://github.com/etcd-io/etcd/issues> and are identified with labels. For example, an issue that is identified as a bug will be set to the label `type/bug`.

The etcd project uses labels to indicate common attributes such as `area`, `type`, and `priority` of incoming issues.

New issues will often start without any labels, but typically `etcd` maintainers, reviewers, and members will add labels by following these triage guidelines. The detailed list of labels can be found at <https://github.com/etcd-io/etcd/labels>.

## Scope

This document serves as the primary guidelines for triaging incoming issues in `etcd`.

All contributors are encouraged and welcome to help manage issues which will help reduce the burden on project maintainers, though the work and responsibilities discussed in this document are created with `etcd` project reviewers and members in mind as these individuals will have
 triage access to the etcd project which is a requirement for actions like applying labels or closing issues.

Refer to [etcd community membership](https://github.com/etcd-io/etcd/blob/main/Documentation/contributor-guide/community-membership.md) for guidance on becoming an etcd project member or reviewer.

## Step 1 - Find an issue to triage

To get started you can use the following recommended issue searches to identify issues that are in need of triage:

* [Issues that have no labels](https://github.com/etcd-io/etcd/issues?q=is%3Aissue+is%3Aopen+sort%3Aupdated+no%3Alabel)
* [Issues created recently](https://github.com/etcd-io/etcd/issues?q=is%3Aissue+is%3Aopen+)
* [Issues not assigned but linked pr](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+no%3Aassignee+linked%3Apr)
* [Issues with no comments](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+comments%3A0+)
* [Issues with help wanted](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+label%3A%22help+wanted%22+)

## Step 2 - Check the issue is valid

Before we start adding labels or trying to work out a priority, our first triage step needs to be working out if the issue actually belongs to the etcd project and is not a duplicate.

### Issues that don't belong to etcd

Sometimes issues are reported that belong to other projects that `etcd` use. For example, `grpc` or `golang` issues. Such issues should be addressed by asking the reporter to open issues in the appropriate other projects.

These issues can generally be closed unless a maintainer and issue reporter see a need to keep it open for tracking purposes. If you have triage permissions please close it, alternatively mention the @etcd-io/members group to

request a member with triage access to close the issue.

### Duplicate issues

If an issue is a duplicate, add a comment stating so along with a reference for the original issue and if you have triage permissions please close it, alternatively mention the @etcd-io/members
group to request a member with triage access close the issue.

## Step 3 - Apply the appropriate type of label

Adding a `type` label to an issue helps create visibility on the health of the project and helps contributors identify potential priorities, i.e. addressing existing bugs or test flakes before implementing new features.

### Support requests

As a general rule, the focus for etcd support is to address common themes in a broad way that helps all users, i.e. through channels like known issues, frequently asked questions, and high-quality documentation. To make the best use of project members time we should avoid providing 1:1 support if a broad approach is available.

Some people mistakenly use our GitHub bug report or feature request templates to file support requests. Usually, they are asking for help operating or configuring some aspect of etcd. Support requests for etcd should instead be raised as [discussions](https://github.com/etcd-io/etcd/discussions).

Common
types of support requests are:

1. Questions about configuring or operating existing well-documented etcd features, for example, <https://github.com/etcd-io/etcd/issues/15945>. Note - If an existing feature is not well documented please apply the `area/documentation` label and propose documentation improvements that would prevent future users from stumbling on the problem again.

2. Bug reports or questions about unsupported versions of etcd, for example <https://github.com/etcd-io/etcd/issues/15796>. When responding to these issues please refer to our [supported versions documentation](https://etcd.io/docs/latest/op-guide/versioning) and encourage the reporter to upgrade to a recent patch release of a supported version as soon as possible. We should limit the effort supporting users that do not make the effort to run a supported version of etcd or ensure their version is patched.

3. Bug reports that do not provide a complete list of steps to reproduce the issue and/or contributors
are not able to reproduce the issue, for example, <https://github.com/etcd-io/etcd/issues/15740>. We should limit the effort we put into reproducing issues ourselves and motivate users to provide the necessary information to accept the bug report.

4. General questions that are filed using feature request or bug report issue templates, for example, <https://github.com/etcd-io/etcd/issues/15914>. Note - These types of requests may surface good additions to our [frequently asked questions](https://etcd.io/docs/v3.5/faq).

If you identify that an issue is a support request please:

1. Add the `type/support` or `type/question` label.

2. Add the following comment to inform the issue creator that discussions should be used instead and that this issue will be converted to a discussion.

> Thank you for your question, this support issue will be moved to our [Discussion Forums](https://github.com/etcd-io/etcd/discussions).
>
> We are trying to consolidate the channels to which questions for help/support are posted so that we can improve our efficiency in responding to your requests, and make it easier for you to find answers to frequently asked questions and how to address common use cases.
>
> We regularly see messages posted in multiple forums, with the full response thread only in one place or, worse, spread across multiple forums. Also, the large volume of support issues on GitHub is making it difficult for us to use issues to identify real bugs.
>
> Members of the etcd community use Discussion Forums to field support requests. Before posting a new question, please search these for answers to similar questions, and also familiarize yourself with:
>
> 1. [user documentation](https://etcd.io/docs/latest)
> 2. [frequently asked questions](https://etcd.io/docs/v3.5/faq)
>
> Again, thanks for using etcd and raising this question.
>
> The etcd team

3. Finally, click `Convert to discussion` on the right-hand panel, selecting the appropriate discussion category.

### Bug reports

If an issue has been raised as a bug it should already have the `type/bug` label, however, if this is missing for an issue you determine to be a bug please add the label manually.

The next step is to validate if the issue is indeed a bug. If not, add a comment with the findings and close the trivial issue. For non-trivial issues, wait to hear back from the issue reporter and see if there is any objection. If the issue reporter does not reply in 30 days, close the issue.

If the problem can not be reproduced or requires more information, leave a comment for the issue reporter as soon as possible while the issue is fresh for the issue reporter.

### Feature requests

New feature requests should be created via the etcd feature request template and in theory already have the `type/feature` label, however, if this is missing for an issue you determine to be a feature please add the label manually.

### Test flakes

Test flakes
are a specific type of bug that the etcd project tracks separately as these are a priority to address. These should be created via the test flake template and in theory already have the `type/flake` label, however, if this is missing for an issue you determine to be related to a flaking test please add the label manually.

## Step 4 - Define the areas impacted

Adding an `area` label to an issue helps create visibility on which areas of the etcd project require attention and helps contributors find issues to work on relating to their particular skills or knowledge of the etcd codebase.

If an issue crosses multiple domains please add additional `area` labels to reflect that.

Below is a brief summary of the area labels in active use by the etcd project along with any notes on their use:

| Label | Notes |
|---|---|
| area/external | Tracking label for issues raised that are external to etcd. |
| area/community | |
| area/raft | |
| area/clientv3 | |
| area/performance | |
| area/security | |
| area/tls | |
| area/auth | |
| area/etcdctl | |
| area/etcdutl | |
| area/contrib | Not to be confused with `area/community` this label is specifically used for issues relating to community-maintained scripts or files in the `contrib/` directory which aren't part of the core etcd project. |
| area/documentation | |
| area/tooling | Generally used in relation to the third party / external utilities or tools that are used in various stages of the etcd build, test, or release process, for example, tooling to create sboms. |
| area/testing | |
| area/robustness-testing | |

## Step 5 - Prioritise the issue

If an issue lacks a priority label it has not been formally prioritized yet.

Adding a `priority` label helps the etcd project understand what is important and should be worked on now, and conversely, what is not as important and is on the project backlog.

|Priority label|What it means|Examples|
|---|---|---|
| `priority/critical-urgent`

| Maintainers are responsible for making sure that these issues (in their area) are being actively worked oni.e., drop what you're doing. The stuff is burning. These should be fixed before the next release. | user-visible critical bugs in core features <br> broken builds on tier1 supported platforms <br> tests and critical security issues |
| `priority/important-soon` | Must be staffed and worked on either currently or very soonideally in time for the next release. | |
| `priority/important-longterm` | Important over the long term, but may not be currently staffed and/or may require multiple releases to complete. | |
| `priority/backlog`  | General agreement that this is a nice-to-have, but no one's available to work on it anytime soon. Community contributions would be most welcome in the meantime, though it might take a while to get them reviewed if reviewers are fully occupied with higher-priority issuesfor example, immediately before a release.| |
| `priority/awaiting-more-evidence`
| Possibly useful, but not yet enough support to actually get it done. | Mostly placeholders for potentially good ideas, so that they don't get completely forgotten, and can be referenced or deduped every time they come up |

## Step 6 - Support new contributors

As part of the `etcd` triage process once the `kind` and `area` have been determined, please consider if the issue would be suitable for a less experienced contributor. The `good first issue` label is a subset of the `help wanted` label, indicating that members have committed to providing extra assistance for new contributors. All `good first issue` items also have the `help wanted` label.

### Help wanted

Items marked with the `help wanted` label need to ensure that they meet these criteria:

* **Low Barrier to Entry** - It should be easy for new contributors.

* **Clear** - The task is agreed upon and does not require further discussions in the community.

* **Goldilocks priority** - The priority
should not be so high that a core contributor should do it, but not too low that it isnt useful enough for a core contributor to spend time reviewing it, answering questions, helping get it into a release, etc.

### Good first issue

Items marked with `good first issue` are intended for first-time contributors. It indicates that members will keep an eye out for these pull requests and shepherd it through our processes.

New contributors should not be left to find an approver, ping for reviews, decipher test commands, or identify that their build failed due to a flake. It is important to make new contributors feel welcome and valued. We should assure them that they will have an extra level of help with their first contribution.

After a contributor has successfully completed one or two `good first issue` items, they should be ready to move on to `help wanted` items.

* **No Barrier to Entry** - The task is something that a new contributor can tackle without advanced setup or domain knowledge.

*
 **Solution Explained** - The recommended solution is clearly described in the issue.

* **Gives Examples** - Link to examples of similar implementations so new contributors have a reference guide for their changes.

* **Identifies Relevant Code** - The relevant code and tests to be changed should be linked in the issue.

* **Ready to Test** - There should be existing tests that can be modified, or existing test cases fit to be copied. If the area of code doesnt have tests, before labeling the issue, add a test fixture. This prep often makes a great help wanted task!

## Step 7 - Follow up

Once initial triage has been completed, issues need to be re-evaluated over time to ensure they don't become stale incorrectly.

### Track important issues

If an issue is at risk of being closed by the stale bot in the future, but is an important issue for the etcd project, then please apply the `stage/tracked` label and remove any `stale` labels that exist. This will ensure the project does not lose sight of the issue.

### Close incomplete issues

Issues that lack enough information from the issue reporter should be closed if the issue reporter does not provide information in 30 days. Issues can always be re-opened at a later date if new information is provided.

### Check for incomplete work

If an issue owned by a developer has no pull request created in 30 days, contact the issue owner and kindly ask about the status of their work, or to release ownership on the issue if needed.
# Branch management

## Guide

* New development occurs on the [main branch][main].
* The main branch should always have a green build!
* Backwards-compatible bug fixes should target the main branch and subsequently be ported to stable branches.
* Once the main branch is ready for release, it will be tagged and become the new stable branch.

The etcd team has adopted a *rolling release model* and supports two stable versions of etcd.

### Main branch

The `main` branch is our development branch. All new features land here first.

To try new and experimental features, pull `main` and play with it. Note that `main` may not be stable because new

features may introduce bugs.

Before the release of the next stable version, feature PRs will be frozen. A [release manager](./release.md#release-management) will be assigned to the major/minor version and will lead the etcd community in testing, bug-fix, and documentation of the release for one to two weeks.

### Stable branches

All branches with
 the prefix `release-` are considered _stable_ branches.

After every minor release ([semver.org](https://semver.org/)), we will have a new stable branch for that release, managed by a [patch release manager](./release.md#release-management). We will keep fixing the backward-compatible bugs for the latest two stable releases. A _patch_ release to each supported release branch, incorporating any bug fixes, will be once every two weeks, given any patches.

[main]: https://github.com/etcd-io/etcd/tree/main
# PR management

## Purpose

Speed up PR management.

The `etcd` PRs are listed at https://github.com/etcd-io/etcd/pulls
A PR can have various labels, milestones, reviewers, etc. The detailed list of labels can be found at https://github.com/kubernetes/kubernetes/labels

Following are a few example searches on PR for convenience:
* [Open PRS for milestone etcd-v3.6](https://github.com/etcd-io/etcd/pulls?utf8=%E2%9C%93&q=is%3Apr+is%3Aopen+milestone%3Aetcd-v3.6)
* [PRs under investigation](https://github.com/etcd-io/etcd/labels/Investigating)

## Scope

These guidelines serve as a primary document for managing PRs in `etcd`. Everyone is welcome to help manage PRs but the work and responsibilities discussed in this document are created with `etcd` maintainers and active contributors in mind.

## Ensure tests are run

The etcd project use Kubernetes Prow and GitHub Actions to run tests. To ensure all required tests run if a pull request is ready for testing and still has the `needs-ok-to-test`
 label then please comment on the pull request `/ok-to-test`.

## Handle inactive PRs
Poke PR owner if review comments are not addressed in 15 days. If the PR owner does not reply in 90 days, update the PR with a new commit if possible. If not, inactive PR should be closed after 180 days.

## Poke reviewer if needed

Reviewers are responsive in a timely fashion, but considering everyone is busy, give them some time after requesting a review if a quick response is not provided. If the response is not provided in 10 days, feel free to contact them via adding a comment in the PR or sending an email or message on Slack.

## Verify important labels are in place

Make sure that appropriate reviewers are added to the PR. Also, make sure that a milestone is identified. If any of these or other important labels are missing, add them. If a correct label cannot be decided, leave a comment for the maintainers to do so as needed.
# Roadmap

etcd uses GitHub milestones to track all tasks in each major or minor release. The `roadmap.md` file only records the
most important tasks for each release. The list is based on the current maintainer capacity that may shift over time. Proposed milestones are what we think we can deliver with the people we have. If we have more support on the important
stuff, we could pick up more items from the backlog. Note that etcd will continue to mainly focus on technical debt over
the next few major or minor releases.

Each item has an assigned priority. Refer to [priority definitions](https://github.com/etcd-io/etcd/blob/main/Documentation/contributor-guide/triage_issues.md#step-5---prioritise-the-issue).

## v3.6.0

For a full list of tasks in `v3.6.0`, please see [milestone etcd-v3.6](https://github.com/etcd-io/etcd/milestone/38).

| Title | Priority | Status | Note |
|---|---|---|---|
| [Support downgrade](https://github.com/etcd-io/etcd/issues/11716) | priority/important-soon | In progress | etcd will support downgrade starting from 3.6.0. But it will also support offline downgrade from 3.5 to 3.4. |
| [StoreV2 deprecation](https://github.com/etcd-io/etcd/issues/12913) | priority/important-soon | In progress | This task will be covered in both 3.6 and 3.7. |
| [Release raft 3.6.0](https://github.com/etcd-io/raft/issues/89) | priority/important-soon | Not started | etcd 3.6.0 will depends on raft 3.6.0 |
| [Release bbolt 1.4.0](https://github.com/etcd-io/bbolt/issues/553) | priority/important-soon | Not started | etcd 3.6.0 will depends on bbolt 1.4.0 |
| [Support /livez and /readyz endpoints](https://github.com/etcd-io/etcd/issues/16007) | priority/important-longterm | In progress | It provides clearer APIs, and can also work around the stalled writes issue |
| [Bump gRPC](https://github.com/etcd-io/etcd/issues/16290) | |

priority/important-longterm | Completed | It isn't guaranteed to be resolved in 3.6, and might be postponed to 3.7 depending on the effort and risk. |
| [Deprecate grpc-gateway
or bump it](https://github.com/etcd-io/etcd/issues/14499) | priority/important-longterm | Completed | It isn't guaranteed to be resolved in 3.6, and might be postponed to 3.7 depending on the effort and risk. |
| [bbolt: Add logger into bbolt](https://github.com/etcd-io/bbolt/issues/509) | priority/important-longterm | Completed | It's important to diagnose bbolt issues |
| [bbolt: Add surgery commands](https://github.com/etcd-io/bbolt/issues/370) | priority/important-longterm | Completed | Surgery commands are important for fixing corrupted db files |
| [Evaluate and (Gradulate or deprecate/remove) experimental features](https://github.com/etcd-io/etcd/issues/16292) | priority/backlog | Not started | This task will be covered in both 3.6 and
3.7. |

## v3.7.0

For a full list of tasks in `v3.7.0`, please see [milestone etcd-v3.7](https://github.com/etcd-io/etcd/milestone/39).

| Title | Priority | Note |
|---|---|---|
| [StoreV2 deprecation](https://github.com/etcd-io/etcd/issues/12913) | P0 | Finish the remaining tasks 3.7. |
| [Refactor lease: Lease might be revoked by mistake by old leader](https://github.com/etcd-io/etcd/issues/15247) | P1 | to be investigated & discussed |
| [Integrate raft's new feature (async write) into etcd](https://github.com/etcd-io/etcd/issues/16291) | P1 | It should improve the performance |
| [bbolt: Support customizing the bbolt rebalance threshold](https://github.com/etcd-io/bbolt/issues/422) | P2 | It may get rid of etcd's defragmentation. Both bbolt and etcd need to be changed. |
| [Evaluate and (graduate or deprecate/remove) experimental features](https://github.com/etcd-io/etcd/issues/16292) | P2 | Finish the remaining tasks 3.7. |

## Backlog (future releases)

| Title | Priority | Note |
|---|---|---|
| [Remove the dependency on
grpc-go's experimental API](https://github.com/etcd-io/etcd/issues/15145) | | |
| [Protobuf: cleanup both golang/protobuf and gogo/protobuf](https://github.com/etcd-io/etcd/issues/14533) | | |
| [Proposals should include a merkle root](https://github.com/etcd-io/etcd/issues/13839) | | |
| [Add Distributed Tracing using OpenTelemetry](https://github.com/etcd-io/etcd/issues/12460) | | |
| [Support CA rotation](https://github.com/etcd-io/etcd/issues/11555) | | |
| [bbolt: Migrate all commands to cobra style commands](https://github.com/etcd-io/bbolt/issues/472) | | |

|
| [raft: enhance the configuration change validation](https://github.com/etcd-io/raft/issues/80) | | |
# Release

The guide talks about how to release a new version of etcd.

The procedure includes some manual steps for sanity checking, but it can probably be further scripted. Please keep this document up-to-date if making changes to the release process.

## Release management

The following pool of release candidates manages the release of each etcd major/minor version as well as manages patches
to each stable release branch. They are responsible for communicating the timelines and status of each release and for ensuring the stability of the release branch.

- Benjamin Wang [@ahrtr](https://github.com/ahrtr)
- James Blair [@jmhbnz](https://github.com/jmhbnz)
- Marek Siarkowicz [@serathius](https://github.com/serathius)
- Sahdev Zala [@spzala](https://github.com/spzala)
- Wenjia Zhang [@wenjiaswe](https://github.com/wenjiaswe)

All release version numbers follow the format of [semantic versioning 2.0.0](http://semver.org/).

### Major, minor version release, or its pre-release

- Ensure
 the relevant [milestone](https://github.com/etcd-io/etcd/milestones) on GitHub is complete. All referenced issues should be closed or moved elsewhere.
- Ensure the latest [upgrade documentation](https://etcd.io/docs/next/upgrades) is available.
- Bump [hardcoded MinClusterVerion in the repository](https://github.com/etcd-io/etcd/blob/v3.4.15/version/version.go#L29), if necessary.
- Add feature capability maps for the new version, if necessary.

### Patch version release

- To request a backport, developers submit cherry-pick PRs targeting the release branch. The commits should not include merge commits. The commits should be restricted to bug fixes and security patches.
- The cherrypick PRs should target the appropriate release branch (`base:release-<major>-<minor>`). The k8s infra cherry pick robot `/cherrypick <branch>` PR chatops command may be used to automatically generate cherrypick PRs.
- The release patch manager reviews the cherrypick PRs. Please discuss carefully what is backported
 to the patch release. Each patch release should be strictly better than its predecessor.
- The release patch manager will cherry-pick these commits starting from the oldest one into stable branch.

## Write a release note

- Write an introduction for the new release. For example, what major bug we fix, what new features we introduce, or

what performance improvement we make.
- Put `[GH XXXX]` at the head of the change line to reference the Pull Request that introduces the change. Moreover, add a link on it to jump to the Pull Request.
- Find PRs with the `release-note` label and explain them in the `NEWS` file, as a straightforward summary of changes for end-users.

## Patch release criteria

The etcd project aims to release a new patch version if any of the following conditions are met:

- Fixed one or more major CVEs (>=7.5).
- Fixed one or more critical bugs.
- Fixed three or more major bugs.
- Fixed five or more minor bugs.

## Release guide

### Prerequisites

There are some
 prerequisites, which should be done before the release process. These are one-time operations,
which don't need to be executed before releasing each version.
1. Generate a GPG key and add it to your GitHub account. Refer to the links on
[settings](https://github.com/settings/keys).
2. Ensure you have a Linux machine, on which the git, Golang, and docker have been installed.
   - Ensure the Golang version matches the version defined in `.go-version` file.
   - Ensure non-privileged users can run docker commands, refer to the [Linux
postinstall](https://docs.docker.com/engine/install/linux-postinstall/).
   - Ensure there is at least 5GB of free space on your Linux machine.
3. Install gsutil, refer to [gsutil_install](https://cloud.google.com/storage/docs/gsutil_install). When asked about cloud project to use, pick `etcd-development`.
4. Authenticate the image registry, refer to [Authentication methods](https://cloud.google.com/container-registry/docs/advanced-authentication).
  - `gcloud
 auth login`
  - `gcloud auth configure-docker`
5. Install gh, refer to [GitHub's documentation](https://github.com/cli/cli#installation). Ensure that running
  `gh auth login` succeeds for the GitHub account you use to contribute to etcd,
  and that `gh auth status` has a clean exit and doesn't show any issues.

### Release steps

1. Raise an issue to publish the release plan, e.g. [issues/17350](https://github.com/etcd-io/etcd/issues/17350).
2. Raise a `kubernetes/org` pull request to temporarily elevate permissions for the GitHub release team.
3. Once permissions are elevated, temporarily relax [branch protections](https://github.com/etcd-io/etcd/settings/branches) to allow pushing changes directly to `release-*` branches in GitHub.
4. Verify you can pass the authentication to the image registries,
  - `docker login gcr.io`

- `docker login quay.io`
  - If the release person doesn't have access to 1password, one of the owners (@ahrtr, @ivanvc, @jmhbnz, @serathius) needs
 to share the password with them per [this guide](https://support.1password.com/share-items/). See rough steps below,
    - [Sign in](https://team-etcd.1password.com/home) to your account on 1password.com.
    - Click `Your Vault Items` on the right side.
    - Select `Password of quay.io`.
    - Click `Share` on the top right, and set expiration as `1 hour` and only available to the release person using his/her email.
    - Click `Copy Link` then send the link to the release person via slack or email.
5. Clone the etcd repository and checkout the target branch,
  - `git clone --branch release-3.X git@github.com:etcd-io/etcd.git`
6. Run the release script under the repository's root directory, replacing `${VERSION}` with a value without the `v` prefix, i.e. `3.5.13`.
  - `DRY_RUN=false ./scripts/release.sh ${VERSION}`
  - **NOTE:** When doing a pre-release (i.e., a version from the main branch, 3.6.0-alpha.2), you will need to explicitly set the branch to main:

  ```
    DRY_RUN=false BRANCH=main ./scripts/release.sh ${VERSION}
    ```

  It generates all release binaries under the directory `/tmp/etcd-release-${VERSION}/etcd/release/` and images. Binaries are pushed to the Google Cloud bucket
  under project `etcd-development`, and images are pushed to `quay.io` and `gcr.io`.
7. Publish the release page on GitHub
  - Open the **draft** release URL shown by the release script
  - Click the pen button at the top right to edit the release
  - Review that it looks correct, reviewing that the bottom checkboxes are checked depending on the
    release version (v3.4 no checkboxes, v3.5 has the set as latest release checkbox checked,
    v3.6 has the set as pre-release checkbox checked)
  - Then, publish the release
8. Announce to the etcd-dev googlegroup

  Follow the format of previous release emails sent to etcd-dev@googlegroups.com, see an example below. After sending out the email, ask one of the mailing list maintainers to approve the
 email from the pending list. Additionally, label the release email as `Release`.

```text
Hello,

etcd v3.4.30 is now public!

https://github.com/etcd-io/etcd/releases/tag/v3.4.30

Thanks to everyone who contributed to the release!
```

etcd team
```

9. Update the changelog to reflect the correct release date.
10. Paste the release link to the issue raised in Step 1 and close the issue.
11. Restore standard branch protection settings and raise a follow-up `kubernetes/org` pull request to return to least privilege permissions.
12. Crease a new stable branch through `git push origin release-${VERSION_MAJOR}.${VERSION_MINOR}` if this is a new major or minor stable release.
13. Re-generate a new password for quay.io if needed (e.g. shared to a contributor who isn't in the release team, and we should rotate the password at least once every 3 months).

#### Release known issues

1. Timeouts pushing binaries - If binaries fail to fully upload to Google Cloud storage, the script must be re-run using the same command. Any artifacts that are already pushed will be overwritten to ensure they are correct. The storage bucket does not use object versioning so incorrect files cannot remain.

2. Timeouts pushing images - It is rare, although possible for connection timeouts to occur when publishing etcd release images to `quay.io` or `gcr.io`. If this occurs, it is known to be safe to rerun the release script command appending the `--no-upload` flag, and image uploads will gracefully resume.

3. GPG vs SSH signing - The release scripts assume that git tags will be signed with a GPG key. Since 2022 GitHub has supported [signing commits and tags using ssh](https://github.blog/changelog/2022-08-23-ssh-commit-verification-now-supported). Until further release script updates are completed you will need to disable this feature in your `~/.gitconfig` and revert to signing via GPG to perform etcd releases.
# Golang modules

The etcd project (since version 3.5) is organized into multiple
[golang modules](https://golang.org/ref/mod) hosted in a [single repository](https://golang.org/ref/mod#vcs-dir).

![modules graph](modules.svg)

There are the following modules:

- **go.etcd.io/etcd/api/v3** - contains API definitions
(like protos & proto-generated libraries) that defines communication protocol
between etcd clients and servers.

- **go.etcd.io/etcd/pkg/v3** - a collection of utility packages used by etcd
without being specific to etcd itself. A package belongs here
only if it could possibly be moved out into its own repository in the future.
Please avoid adding here code that has a lot of dependencies on its own, as
they automatically become dependencies of the client library
(that we want to keep lightweight).

- **go.etcd.io/etcd/client/v3** - client library used to contact etcd over
the network (grpc). Recommended for all new usage of etcd.
```

- **go.etcd.io/raft/v3**
- implementation of distributed consensus
protocol. Should have no etcd specific code. Hosted in a separate repository:
https://github.com/etcd-io/raft.

- **go.etcd.io/etcd/server/v3** - etcd implementation.
The code in this package is internal to etcd and should not be consumed
by external projects. The package layout and API can change within the minor versions.

- **go.etcd.io/etcd/etcdctl/v3** - a command line tool to access and manage etcd.

- **go.etcd.io/etcd/tests/v3** - a module that contains all integration tests of etcd.
  Notice: All unit tests (fast and not requiring cross-module dependencies)
  should be kept in the local modules of the code under the test.

- **go.etcd.io/bbolt** - implementation of persistent b-tree.
  Hosted in a separate repository: https://github.com/etcd-io/bbolt.

### Operations

1. All etcd modules should be released in the same versions, e.g.
  `go.etcd.io/etcd/client/v3@v3.5.10` must depend on `go.etcd.io/etcd/api/v3@v3.5.10`.

  The consistent updating of versions can be performed using:
  ```shell script
  % DRY_RUN=false TARGET_VERSION="v3.5.10" ./scripts/release_mod.sh update_versions
  ```
2. The released modules should be tagged according to https://golang.org/ref/mod#vcs-version rules,
  i.e. each module should get its own tag.
  The tagging can be performed using:
  ```shell script
  % DRY_RUN=false REMOTE_REPO="origin" ./scripts/release_mod.sh push_mod_tags
  ```

3. All etcd modules should depend on the same versions of underlying dependencies.
  This can be verified using:
  ```shell script
  % PASSES="dep" ./test.sh
  ```

4. The go.mod files must not contain dependencies not being used and must
  conform to `go mod tidy` format.
  This is being verified by:
  ```
  % PASSES="mod_tidy" ./test.sh
  ```

5. To trigger actions across all modules (e.g. auto-format all files), please
  use/expand the following script:
  ```shell script
  % ./scripts/fix.sh
  ```

###
 Future

As a North Star, we would like to evaluate etcd modules towards the following model:

![modules graph](modules-future.svg)

This assumes:
 - Splitting etcdmigrate/etcdadm out of etcdctl binary.
   Thanks to this etcdctl would become clearly a command-line wrapper
   around network client API,
   while etcdmigrate/etcdadm would support direct physical operations on the
   etcd storage files.
 - Splitting etcd-proxy out of ./etcd binary, as it contains more experimental code
   so carries additional risk & dependencies.
 - Deprecation of support for v2 protocol.
# Reporting bugs

If any part of the etcd project has bugs or documentation mistakes, please let us know by [opening an issue][etcd-issue]. We treat bugs and mistakes very seriously and believe no issue is too small. Before creating a bug report, please check that an issue reporting the same problem does not already exist.

To make the bug report accurate and easy to understand, please try to create bug reports that are:

- Specific. Include as many details as possible: which version, what environment, what configuration, etc. If the bug is related to running the etcd server, please attach the etcd log (the starting log with the etcd configuration is especially important).

- Reproducible. Include the steps to reproduce the problem. We understand some issues might be hard to reproduce, please include the steps that might lead to the problem. If possible, please attach the affected etcd data dir and stack trace to the bug report.

- Isolated. Please try to isolate and reproduce the bug with
 minimum dependencies. It would significantly slow down the speed to fix a bug if too many dependencies are involved in a bug report. Debugging external systems that rely on etcd is out of scope, but we are happy to provide guidance in the right direction or help with using etcd itself.

- Unique. Do not duplicate existing bug reports.

- Scoped. One bug per report. Do not follow up with another bug inside one report.

It may be worthwhile to read [Elika Etemads article on filing good bug reports][filing-good-bugs] before creating a bug report.

We might ask for further information to locate a bug. A duplicated bug report will be closed.

## Frequently asked questions

### How to get a stack trace

```bash
$ kill -QUIT $PID
```

### How to get the etcd version

```bash
$ etcd --version
```

### How to get etcd configuration and log when it runs as systemd service etcd2.service

```bash
$ sudo systemctl cat etcd2
$ sudo journalctl -u etcd2
```

Due to an upstream systemd bug, journald
may miss the last few log lines when its processes exit. If journalctl says etcd stopped without a fatal or panic message, try `sudo journalctl -f -t etcd2` to get the full log.

[etcd-issue]: https://github.com/etcd-io/etcd/issues/new
[filing-good-bugs]: http://fantasai.inkedblade.net/style/talks/filing-good-bugs/
# Community membership

This doc outlines the various responsibilities of contributor roles in etcd.

| Role | Responsibilities | Requirements | Defined by |
|---|---|---|---|
| Member | Active contributor in the community | Sponsored by 2 reviewers and multiple contributions | etcd GitHub org member |
| Reviewer | Review contributions from other members | History of review and authorship | [OWNERS] file reviewer entry |
| Maintainer | Set direction and priorities for the project | Demonstrated responsibility and excellent technical judgement | [OWNERS] file approver entry |

## New contributors

New contributors should be welcomed to the community by existing members, helped with PR workflow, and directed to relevant documentation and communication channels.

## Established community members

Established community members are expected to demonstrate their adherence to the principles in this document, familiarity with project organization, roles, policies, procedures, conventions, etc., and technical and/or writing ability. Role-specific expectations, responsibilities, and requirements are enumerated below.

## Member

Members are continuously active contributors to the community. They can have issues and PRs assigned to them. Members are expected to remain active contributors to the community.

**Defined by:** Member of the etcd GitHub organization.

### Requirements

- Enabled [two-factor authentication] on their GitHub account
- Have made multiple contributions to the project or community. Contribution may include, but is not limited to:
  - Authoring or reviewing PRs on GitHub. At least one PR must be **merged**.
  - Filing or commenting on issues on GitHub
  - Contributing to community discussions (e.g. meetings, Slack, email discussion forums, Stack Overflow)
- Subscribed to [etcd-dev@googlegroups.com](https://groups.google.com/g/etcd-dev)
- Have read the [contributor guide]
- Sponsored by two active maintainers or reviewers.
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
  - With no objections from other maintainers
- Open a [membership nomination] issue against the `kubernetes/org` repo
  - Ensure your sponsors are @mentioned on the issue
  - Make sure that the list of contributions included is representative of your work on the project.
- Members can be removed by a supermajority of the maintainers or can resign by notifying the maintainers.

### Responsibilities and privileges

- Responsive to issues and PRs assigned to them
- Granted "triage access" to etcd project
- Active owner of code they have contributed (unless ownership is explicitly transferred)

- Code is well-tested
- Tests consistently pass
- Addresses bugs or issues discovered after code is accepted

**Note:** Members who frequently contribute code are expected to proactively perform code reviews and work towards becoming a *reviewer*.

## Reviewers

Reviewers are contributors who have demonstrated greater skill in reviewing the code from other contributors. They are knowledgeable about both the codebase and software engineering principles. Their LGTM counts towards merging a code change into the project. A reviewer is generally on the ladder towards maintainership.

**Defined by:** *reviewers* entry in the [OWNERS] file.

### Requirements

- member for at least 3 months.
- Primary reviewer for at least 5 PRs to the codebase.
- Reviewed or contributed at least 20 substantial PRs to the codebase.
- Knowledgeable about the codebase.
- Sponsored by two active maintainers.
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
  - With no objections from other maintainers
- Reviewers can be removed by a supermajority of the maintainers or can resign by notifying the maintainers.

### Responsibilities and privileges

- Code reviewer status may be a precondition to accepting large code contributions
- Responsible for project quality control via code reviews
  - Focus on code quality and correctness, including testing and factoring
  - May also review for more holistic issues, but not a requirement
- Expected to be responsive to review requests
- Assigned PRs to review related to area of expertise
- Assigned test bugs related to area of expertise
- Granted "triage access" to etcd project

## Maintainers

Maintainers are first and foremost contributors who have shown they are committed to the long-term success of a project. Maintainership is about building trust with the current maintainers and being a person that they can depend on to make decisions in the best interest of the project in a consistent

manner.

**Defined by:** *approvers* entry in the [OWNERS] file.

### Requirements

- Deep understanding of the technical goals and direction of the project
- Deep understanding of the technical domain of the project
- Sustained contributions to design and direction by doing all of:
  - Authoring and reviewing proposals
  - Initiating, contributing, and resolving discussions (emails, GitHub issues, meetings)
  - Identifying subtle or complex issues in the designs and implementation of PRs
- Directly contributed to the project through implementation and/or review
- Sponsored by two active maintainers and elected by supermajority
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
- To become a maintainer send an email with your candidacy to etcd-maintainers-private@googlegroups.com
  - Ensure your sponsors are @mentioned in the email
  - Include a list of contributions representative of your work on the project.
  -

Existing maintainers vote will privately and respond to the email with either acceptance or feedback for suggested improvement.

- With your membership approved you are expected to:
- Open a PR and add an entry to the [OWNERS] file
- Subscribe to etcd-maintainers@googlegroups.com and etcd-maintainers-private@googlegroups.com
- Request to join [etcd-maintainer teams of etcd organization of GitHub](https://github.com/orgs/etcd-io/teams/maintainers-etcd)
- Request to join the private slack channel for etcd maintainers on [kubernetes slack](http://slack.kubernetes.io/)
- Request access to etcd-development GCP project where we publish releases
- Request access to passwords shared between maintainers

### Responsibilities and privileges

- Make and approve technical design decisions
- Set technical direction and priorities
- Define milestones and releases
- Mentor and guide reviewers, and contributors to the project.
- Participate when called upon in the [security disclosure and release process]
- Ensure the continued health of the project
  - Adequate test coverage to confidently release
  - Tests are passing reliably (i.e. not flaky) and are fixed when they fail
- Ensure a healthy process for discussion and decision-making is in place.
- Work with other maintainers to maintain the project's overall health and success holistically

### Retiring

Life priorities, interests, and passions can change. Maintainers can retire and move to [emeritus maintainers]. If a maintainer needs to step down, they should

inform other maintainers and, if possible, help find someone to pick up the related work. At the very least, ensure the related work can be continued. Afterward, they can remove themselves from the list of existing maintainers.

If a maintainer has not been performing their duties for 12 months, they can be removed by other maintainers. In that case, the inactive maintainer will be first notified via an email. If the situation doesn't improve, they will be removed.
If an emeritus maintainer wants to regain an active role, they can do so by renewing their contributions. Active maintainers should welcome such a move. Retiring other maintainers or regaining the status should require the approval of at least two active maintainers.

## Acknowledgements

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# Logging Conventions

etcd uses the [zap][zap] library for logging application output categorized into *levels*. A log message's level is determined according to these conventions:

* Debug: Everything is still fine, but even common operations may be logged, and less helpful but more quantity of notices. Usually not used in production.
 * Examples:
   * Send a normal message to a remote peer
   * Write a log entry to disk

* Info: Normal, working log information, everything is fine, but helpful notices for auditing or common operations. Should rather not be logged more frequently than once per a few seconds in a normal server's operation.
 * Examples:
   * Startup configuration
   * Start to do a snapshot

* Warning: (Hopefully) Temporary conditions that may cause errors, but may work fine. A replica disappearing (that may reconnect) is a warning.
 * Examples:
   * Failure to send a raft message to a remote peer
   * Failure to receive heartbeat message within the configured election
 timeout

* Error: Data has been lost, a request has failed for a bad reason, or a required resource has been lost.
 * Examples:
   * Failure to allocate disk space for WAL

* Panic: Unrecoverable or unexpected error situation that requires stopping execution.
 * Examples:
   * Failure to create the database

* Fatal: Unrecoverable or unexpected error situation that requires immediate exit. Mostly used in the test.
 * Examples:
   * Failure to find the data directory
   * Failure to run a test function

[zap]: https://github.com/uber-go/zap
# Dependency management

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## Main branch

The dependabot is enabled & [configured](https://github.com/etcd-io/etcd/blob/main/.github/dependabot.yml) to manage dependencies for etcd `main` branch. But dependabot doesn't work well for multi-module repository like `etcd`,
see [dependabot-core/issues/6678](https://github.com/dependabot/dependabot-core/issues/6678).
Usually, human intervention is required
each time when dependabot automatically opens some PRs to bump dependencies.
Please see the guidance below.

### Dependencies used in workflows

The PRs that automatically bump dependencies (see examples below) used in workflows are fine and can be approved & merged directly as long as all checks are successful.

- [build(deps): bump github/codeql-action from 2.2.11 to 2.2.12](https://github.com/etcd-io/etcd/pull/15736)
- [build(deps): bump actions/checkout from 3.5.0 to 3.5.2](https://github.com/etcd-io/etcd/pull/15735)
- [build(deps): bump ossf/scorecard-action from 2.1.2 to 2.1.3](https://github.com/etcd-io/etcd/pull/15607)

### Bumping order

When multiple etcd modules depend on the same package, please bump the package version for all the modules in the correct order. The rule is simple:
if module A depends on module B, then bump the dependency for module B before module A. If the two modules do not depend on each other, then
it doesn't matter to bump which module first. For
example, multiple modules depend on `github.com/spf13/cobra`, so we need to bump the dependency
in the following order,

- go.etcd.io/etcd/pkg/v3
- go.etcd.io/etcd/server/v3
- go.etcd.io/etcd/etcdctl/v3
- go.etcd.io/etcd/etcdutl/v3
- go.etcd.io/etcd/tests/v3
- go.etcd.io/etcd/v3
- go.etcd.io/etcd/tools/v3
For more details about etcd Golang modules, please check <https://etcd.io/docs/next/dev-internal/modules>

Note the module `go.etcd.io/etcd/tools/v3` doesn't depend on any other modules, nor by any other modules, so it doesn't matter when to bump dependencies for it.

### Steps to bump a dependency

Use the `github.com/spf13/cobra` as an example, follow the steps below to bump it from 1.6.1 to 1.7.0 for module

`go.etcd.io/etcd/etcdctl/v3`,

```bash
cd ${ETCD_ROOT_DIR}/etcdctl
go get github.com/spf13/cobra@v1.7.0
go mod tidy
cd ..
./scripts/fix.sh
```

Execute the same steps for all other modules. When you finish bumping the dependency for all modules, then commit the change,

```bash
git
 add .
git commit --signoff -m "dependency: bump github.com/spf13/cobra from 1.6.1 to 1.7.0"
```

Please close the related PRs which were automatically opened by dependabot.

When you bump multiple dependencies in one PR, it's recommended to create a separate commit for each dependency. But it isn't a must; for example,
you can get all dependencies bumping for the module `go.etcd.io/etcd/tools/v3` included in one commit.

#### Troubleshooting

In an event of bumping the version of protoc, protoc plugins or grpc-gateway, it might change `*.proto` file which can result in the following error:

```bash
[0;31mFAIL: 'genproto' FAILED at Wed Jul 31 07:09:08 UTC 2024
make: *** [Makefile:134: verify-genproto] Error 255
```

To fix the above error, run the following script from the root of etcd repository:

```bash
./scripts/genproto.sh
```

### Indirect dependencies

Usually, we don't bump a dependency if all modules just indirectly depend on it, such as `github.com/go-logr/logr`.

If
 an indirect dependency (e.g. `D1`) causes any CVE or bugs that affect etcd, usually the module (e.g. `M1`, not part of etcd, but used by etcd)

which depends on it should bump the dependency (`D1`), and then etcd just needs to bump `M1`. However, if the module (`M1`) somehow doesn't
bump the problematic dependency, then etcd can still bump it (`D1`) directly following the same steps above. But as a long-term solution, etcd should
try to remove the dependency on such module (`M1`) that lack maintenance.

For mixed cases, in which some modules directly while others indirectly depend on a dependency, we have multiple options,

- Bump the dependency for all modules, no matter it's direct or indirect dependency.
- Bump the dependency only for modules that directly depend on it.

We should try to follow the first way, and temporarily fall back to the second one if we run into any issue on the first way. Eventually we
should fix the issue and ensure all modules depend on the same version of the
dependency.

### Known incompatible dependency updates

#### arduino/setup-protoc

Please refer to [build(deps): bump arduino/setup-protoc from 1.3.0 to 2.0.0](https://github.com/etcd-io/etcd/pull/16016)

### Rotation worksheet

The dependabot scheduling interval is weekly; it means dependabot will automatically raise a bunch of PRs per week.
Usually, human intervention is required each time. We have a [rotation worksheet](https://docs.google.com/spreadsheets/d/1jodHIO7Dk2VWTs1IRnfMFaRktS9IH8XRyifOnPdSY8I/edit#gid=1394774387),
and everyone is welcome to participate; you just need to register your name in the worksheet.

## Stable branches

Usually, we don't proactively bump dependencies for stable releases unless there are any CVEs or bugs that affect etcd.

If we have to do it, then follow the same guidance above. Note that there is no `./scripts/fix.sh` in release-3.4, so no need to
execute it for 3.4.

## Golang versions

The etcd project aims to maintain a development branch that
is on the latest [Go version](https://go.dev/dl), ideally, this will align with the Go version in use for Kubernetes project development. For an example of how to update etcd to a new minor release of Go refer to issue <https://github.com/etcd-io/etcd/issues/16393> and the linked pull requests.

Suggested steps for performing a minor version upgrade for the etcd development branch:

1. Carefully review new Go version release notes and potentially related blog posts for any deprecations, performance impacts, or other considerations.
2. Create a GitHub issue to signal intent to upgrade and invite discussion, for example, <https://github.com/etcd-io/etcd/issues/16393>.
3. Complete the upgrade locally in your development environment by editing `.go-version` and running `make fix`.
4. Run performance benchmarks locally to compare before and after.
5. Raise a pull request for the changes, for example, <https://github.com/etcd-io/etcd/pull/16394>.

Stable etcd release branches will be maintained
 to stay on the latest patch release of a supported Go version. Upgrading minor versions will be completed before the minor version in use currently is no longer supported. Refer to the [Go release
policy](https://go.dev/doc/devel/release).

For an example of how to update etcd to a new patch release of Go refer to issue <https://github.com/etcd-io/etcd/issues/16343> and the linked pull requests.

References:

- <https://github.com/kubernetes/sig-release/blob/master/release-engineering/handbooks/go.md>

## Core dependencies mappings

[bbolt](https://github.com/etcd-io/bbolt) and [raft](https://github.com/etcd-io/raft) are two core dependencies of etcd.

Both etcd 3.4.x and 3.5.x depend on bbolt 1.3.x, and etcd 3.6.x (`main` branch) depends on bbolt 1.4.x.

raft is included in the etcd repository for release-3.4 and release-3.5 branches, so etcd 3.4.x and 3.5.x do not depend on any
external raft module. We moved raft into [a separate repository](https://github.com/etcd-io/raft) starting
 from 3.6 (`main` branch), and the first raft
release will be v3.6.0, so etcd 3.6.x will depend on raft 3.6.x.

Please see the table below:

| etcd versions | bbolt versions | raft versions |
|---|---|---|
| 3.4.x | v1.3.x | N/A |
| 3.5.x | v1.3.x | N/A |
| 3.6.x | v1.4.x | v3.6.x |

# 1.124 miglayout 3.5.5

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# 1.126 function.prototype.name 1.1.8

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THE BASIC LIBRARY FUNCTIONS
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Written by: Philip Hazel
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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see https://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

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Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |

| | | | | |
|---|---|---|---|---|
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
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# 1.137 lumberjack 2.0.0+incompatible

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# 1.140 balanced-match 1.0.2

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# 1.141 before-after-hook 4.0.0

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# 1.144 go-multierror 1.1.0

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# 1.147 otel-exporters-otlp-otlpmetric-otlpmetricgrpc 1.38.0

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# 1.148 libestr 0.1.11-4.el9

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# 1.149 activation-api 1.2.0

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```

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# 1.150 intern 1.0.0

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# 1.152 wolfi-base 1-r7

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package:
name: go-licenses
version: 1.6.0

```
 epoch: 28
 description: A lightweight tool to report on the licenses used by a Go package and its dependencies. Highlight!
Versioned external URL to licenses can be found at the same time.
 copyright:
   - license: Apache-2.0

pipeline:
 - uses: git-checkout
   with:
     repository: https://github.com/google/go-licenses
     tag: v${{package.version}}
     expected-commit: 5348b744d0983d85713295ea08a20cca1654a45e

 - uses: patch
   with:
     patches: go-git.patch

 - uses: go/bump
   with:
     deps: |-
       github.com/cloudflare/circl@v1.6.1
       github.com/go-git/go-git/v5@v5.13.0
       golang.org/x/crypto@v0.35.0
       golang.org/x/net@v0.38.0
     modroot: .

 - uses: go/build
   with:
     modroot: .
     packages: .
     output: go-licenses

update:
 enabled: true
 github:
   identifier: google/go-licenses
   strip-prefix: v

test:
 pipeline:
   # AUTOGENERATED
   - runs: |
       go-licenses --help
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```
package:
 name: py3-license-expression
 version: "30.4.4"
 epoch: 1
 description: license-expression is a comprehensive utility library to parse, compare, simplify and normalize license
expressions (such as SPDX license expressions) using boolean logic.
 copyright:
   - license: Apache-2.0
 dependencies:
   provider-priority: 0

vars:
 pypi-package: license-expression
 import: license_expression

data:
 - name: py-versions
   items:
     3.10: '310'
     3.11: '311'
     3.12: '312'
     3.13: '313'

environment:
 contents:
   packages:
     - py3-supported-build-base

pipeline:
 - uses: git-checkout
   with:
     repository: https://github.com/nexB/license-expression
     tag: v${{package.version}}
     expected-commit: a3c00c09986bcca1240afd5b1844b56de3f581c1
```

```
subpackages:
 - range: py-versions
   name: py${{range.key}}-${{vars.pypi-package}}
   description: python${{range.key}} version of ${{vars.pypi-package}}
   dependencies:
     provider-priority: ${{range.value}}
      provides:
       - ${{package.name}}
       - py3-${{vars.pypi-package}}
     runtime:
       - py${{range.key}}-boolean.py
   pipeline:
     - uses: py/pip-build-install
       with:
         python: python${{range.key}}
     - uses: strip
   test:
     pipeline:
       - uses: python/import
         with:
           python: python${{range.key}}
           imports: |
             import ${{vars.import}}

 - name: py3-supported-${{vars.pypi-package}}
   description: meta package providing ${{vars.pypi-package}} for supported python versions.
   dependencies:
     runtime:
       - py3.10-${{vars.pypi-package}}
       - py3.11-${{vars.pypi-package}}
       - py3.12-${{vars.pypi-package}}
       - py3.13-${{vars.pypi-package}}
   test:
     pipeline:
       - uses: test/metapackage

test:
 pipeline:
   - uses: python/import
     with:
       imports: |
         import ${{vars.import}}

update:
 enabled: true
 github:
   identifier: nexB/license-expression
```

```
    strip-prefix: v
package:
 name: libart-lgpl
 version: 2.3.21
 epoch: 2
 description: A library for high-performance 2D graphics
 copyright:
   - license: LGPL-2.0-or-later

environment:
 contents:
   packages:
     - autoconf
     - automake
     - build-base
     - busybox
     - ca-certificates-bundle
     - libtool

pipeline:
 - uses: fetch
   with:
     expected-sha256: fdc11e74c10fc9ffe4188537e2b370c0abacca7d89021d4d303afdf7fd7476fa
     uri: https://download.gnome.org/sources/libart_lgpl/2.3/libart_lgpl-${{package.version}}.tar.bz2

 - runs: |
     libtoolize --force && aclocal && autoconf --force && automake --add-missing

 - runs: autoreconf -vif

 - uses: autoconf/configure
   with:
     opts: |
       --disable-static

 - uses: autoconf/make

 - uses: autoconf/make-install

 - uses: strip

subpackages:
 - name: libart-lgpl-dev
   pipeline:
     - uses: split/dev
   dependencies:
     runtime:
       - libart-lgpl
```

```
  description: libart-lgpl dev
  test:

   pipeline:
     - runs: |
         libart2-config --version
     - uses: test/pkgconf
     - uses: test/tw/ldd-check

update:
 enabled: true
 release-monitor:
   identifier: 21864

test:
 pipeline:
   - uses: test/tw/ldd-check
issuer: https://accounts.google.com

# staging-enforce: ci-license-checka7daalc99klekq@staging-enforce-cd1e.iam.gserviceaccount.com
(111508570611001124410)
# prod-images: TODO
subject_pattern: "(111508570611001124410)"

permissions:
 checks: write
 pull_requests: write # need to comment on PRs
```

# 1.153 zlib 1.2.11-40.el9

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# 1.154 stack-generator 2.0.10

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# 1.155 spf13-pflag 1.0.6

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# 1.156 bzip2 1.0.8-5.1build0.1

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Julian Seward, jseward@acm.org
bzip2/libbzip2 version 1.0.8 of 13 July 2019

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# 1.157 golang-lru 2.0.7

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---
layout: docs
page_title: Automated license utilization reporting
description: >-
Learn what data HashiCorp collects to meter Enterprise license utilization. Enable or disable reporting. Review sample payloads and logs.
---

# Automated license utilization reporting

@include 'alerts/enterprise-only.mdx'

Automated license utilization reporting sends license utilization data to

HashiCorp without requiring you to manually collect and report them. It also lets you review your license usage with the monitoring solution you already use (for example Splunk, Datadog, or others) so you can optimize and manage your deployments. Use these reports to understand how much more you can deploy under your current contract, protect against overutilization, and budget for predicted consumption.

Automated reporting shares the minimum data required to validate license utilization as defined in our contracts. They consist of mostly computed metrics and will never contain Personal Identifiable Information (PII) or other sensitive information. Automated reporting shares the data with HashiCorp using a secure, unidirectional HTTPS API and makes an auditable record in the product logs each time it submits a report. The reports are submitted once every 24 hours.

## Enable automated reporting

To enable automated reporting, you need to make sure that outbound network traffic is configured correctly and upgrade your enterprise product to a version that supports it. If your installation is air-gapped or network settings are not in place, automated reporting will not work.

### 1. allow outbound HTTPS traffic on port 443

Make sure that your network allows HTTPS egress on port 443 to https://reporting.hashicorp.services by allow-listing the following IP addresses:

- 100.20.70.12
- 35.166.5.222
- 23.95.85.111
- 44.215.244.1

### 2. upgrade

Upgrade to a release that supports license utilization reporting. These releases include:

- [Vault Enterprise 1.14.0](https://releases.hashicorp.com/vault/) and later
- [Vault Enterprise 1.13.4](https://releases.hashicorp.com/vault/) and later 1.13.x versions
- [Vault Enterprise 1.12.8](https://releases.hashicorp.com/vault/) and later 1.12.x versions
- [Vault Enterprise 1.11.12](https://releases.hashicorp.com/vault/)

### 3. check logs

Automatic license utilization reporting will start sending data within 24 hours.

Check the server logs for records that the data sent successfully.

You will find log entries similar to the following:

<CodeBlockConfig hideClipboard>

```
[DEBUG] core.reporting: beginning snapshot export
[DEBUG] core.reporting: creating payload
[DEBUG] core.reporting: marshalling payload to json
[DEBUG] core.reporting: generating authentication headers
[DEBUG] core.reporting: creating request
[DEBUG] core.reporting: sending request
[DEBUG] core.reporting: performing request: method=POST url=https://reporting.hashicorp.services
[DEBUG] core.reporting: recording audit record
[INFO]  core.reporting: Report sent:
auditRecord="{\"payload\":{\"payload_version\":\"1\",\"license_id\":\"97afe7b4-b9c8-bf19-bf35-
b89b5cc0efea\",\"product\":\"vault\",\"product_version\":\"1.14.0-rc1+ent\",\"export_timestamp\":\"2023-06-
01T09:34:44.215133-
04:00\",\"snapshots\":[{\"snapshot_version\":1,\"snapshot_id\":\"0001J7H7KMEDRXKM5C1QJGBXV3\",\"proces
s_id\":\"01H1T45CZK2GN9WR22863W2K32\",\"timestamp\":\"2023-06-01T09:34:44.215001-
04:00\",\"schema_version\":\"1.0.0\",\"service\":\"vault\",\"metrics\":{\"clientcount.current_month_estimate\":{\"key
\":\"clientcount.current_month_estimate\",\"kind\":\"sum\",\"mode\":\"write\",\"labels\":{\"type\":{\"entity\":20,\"no
nentity\":11}}},\"clientcount.previous_month_complete\":{\"key\":\"clientcount.previous_month_complete\",\"kind\
":\"sum\",\"mode\":\"write\",\"labels\":{\"type\":{\"entity\":10,\"nonentity\":11}}}}}],\"metadata\":{\"vault\":{\"billi
ng_start\":\"2023-03-01T00:00:00Z\",\"cluster_id\":\"a8d95acc-ec0a-6087-d7f6-4f054ab2e7fd\"}}}}"
[DEBUG]
 core.reporting: completed recording
 audit record
[DEBUG] core.reporting: export finished successfully
```

</CodeBlockConfig>

If your installation is air-gapped or your network doesnt allow the correct
egress, logs will show an error.

<CodeBlockConfig hideClipboard>

```
[DEBUG] core.reporting: beginning snapshot export
[DEBUG] core.reporting: creating payload
[DEBUG] core.reporting: marshalling payload to json
[DEBUG] core.reporting: generating authentication headers
[DEBUG] core.reporting: creating request
[DEBUG] core.reporting: sending request
[DEBUG] core.reporting: performing request: method=POST url=https://reporting.hashicorp.services
[DEBUG] core.reporting: error status code received: statusCode=403
```

```

</CodeBlockConfig>

In this case, reconfigure your network to allow egress and check back in 24
hours.

## Opt out

If your installation is air-gapped or you want to manually collect and report on
the same license utilization metrics, you can opt-out of automated reporting.

Manually reporting these
 metrics can be time consuming. Opting out of automated
reporting does not mean that you also opt out from sending license utilization
metrics. Customers who opt out of automated reporting will still be required to
manually collect and send license utilization metrics to HashiCorp.

If you are considering opting out because youre worried about the data, we
strongly recommend that you review the [example payloads](#example-payloads)
before opting out. If you have concerns with any of the automatically-reported
data please bring them to your account manager.

You have two options to opt out of automated reporting:

- HCL configuration (recommended)
- Environment variable (requires restart)


#### HCL configuration

Opting out in your products configuration file doesnt require a system
restart, and is the method we recommend. Add the following block to your server
configuration file (e.g. `vault-config.hcl`).

```hcl
reporting {
 license {
  enabled = false
  }
}
```

<Warning>

When
 you have a cluster, each node must have the reporting stanza in its
configuration to be consistent. In the event of leadership change, nodes will
```

use its server configuration to determine whether or not to opt-out the automated reporting. Inconsistent configuration between nodes will change the reporting status upon active unseal.

</Warning>

You will find the following entries in the server log.

<CodeBlockConfig hideClipboard>

```
[DEBUG] core: reloading automated reporting
[INFO]  core: opting out of automated reporting
[DEBUG] activity: there is no reporting agent configured, skipping counts reporting
```

</CodeBlockConfig>

#### Environment variable

If you need to, you can also opt out using an environment variable, which will provide a startup message confirming that you have disabled automated reporting. This option requires a system restart.

<Note>

If the reporting stanza exists in the configuration file, the `OPTOUT_LICENSE_REPORTING` value overrides the configuration.

</Note>

Set
 the following environment variable.

```shell-session
$ export OPTOUT_LICENSE_REPORTING=true
```

Now, restart your [Vault servers](/vault/docs/commands/server) from the shell where you set the environment variable.

You will find the following entries in the server log.

<CodeBlockConfig hideClipboard>

```
[INFO]  core: automated reporting disabled via environment variable: env=OPTOUT_LICENSE_REPORTING
```

```
[INFO]  core: opting out of automated reporting
[DEBUG] activity: there is no reporting agent configured, skipping counts reporting
```

</CodeBlockConfig>

Check your product logs 24 hours after opting out to make sure that the system isnt trying to send reports.

If your configuration file and environment variable differ, the environment variable setting will take precedence.

## Example payloads

HashiCorp collects the following utilization data as JSON payloads:

- `payload_version` - The version of this payload schema
- `license_id` - The license ID for this product
- `product` - The product that this contribution is for
- `product_version` - The product version this contribution is for
- `export_timestamp`- The date and time for this contribution
- `snapshots` - An array of snapshot details. A snapshot is a structure that represents a single data collection
  - `snapshot_version` - The version of the snapshot package that produced this snapshot
  - `snapshot_id` - A unique identifier for this particular snapshot
  - `process_id` - An identifier for the system that produced this snapshot
  - `timestamp` - The date and time for this snapshot
  - `schema_version` - The version of the schema associated with this snapshot
  - `service` - The service that produced this snapshot (likely to be product name)
  - `metrics` - A map of representations of snapshot metrics contained within this snapshot
    - `key` - The key name associated with this metric
    - `kind` - The kind of metric (feature, counter, sum, or mean)

    - `mode` - The mode of operation associated with this metric (write or collect)
    - `labels` - The labels associated with each collected metric
      - `entity` - The sum of tokens generated for a unique client identifier
      - `nonentity` - The sum of tokens without an entity attached
- `metadata` - Optional product-specific metadata
  - `billing_start` - The billing start date associated with the reporting cluster (license start date if not configured)
  - `cluster_id` - The cluster UUID as shown by `vault status` on the reporting cluster

<CodeBlockConfig hideClipboard>

```json
{
 "payload_version": "1",
 "license_id": "97afe7b4-b9c8-bf19-bf35-b89b5cc0efea",
 "product": "vault",
 "product_version": "1.14.0-rc1+ent",
 "export_timestamp": "2023-06-01T11:39:00.76643-04:00",
 "snapshots": [
   {
     "snapshot_version": 1,
     "snapshot_id": "0001J7HEWM1PEHPMF5YZT8EV65",
     "process_id": "01H1VSQMNYAP77R566F1Y03GE6",
     "timestamp": "2023-06-01T11:39:00.766099-04:00",
      "schema_version": "1.0.0",
     "service": "vault",
     "metrics": {
       "clientcount.current_month_estimate": {
         "key": "clientcount.current_month_estimate",
         "kind": "sum",
         "mode": "write",
         "labels": {
           "type": {
             "entity": 20,
             "nonentity": 11
           }
         }
       },
       "clientcount.previous_month_complete": {
         "key": "clientcount.previous_month_complete",
         "kind": "sum",
         "mode": "write",
         "labels": {
           "type": {
             "entity": 10,
             "nonentity": 11
           }
         }
       }
     }
   }
 ],
 "metadata": {
   "vault": {
     "billing_start": "2023-03-01T00:00:00Z",
     "cluster_id": "a8d95acc-ec0a-6087-d7f6-4f054ab2e7fd"
   }
```

```
 }
}
```

</CodeBlockConfig>

## Pre-1.9 counts

When upgrading Vault from 1.8 (or earlier) to 1.9 (or later), utilization reporting will only
 include the [non-entity tokens](/vault/docs/concepts/client-count#non-entity-tokens) that are used after the upgrade.

Starting in Vault 1.9, the activity log records and de-duplicates non-entity tokens by using the namespace and token's policies to generate a unique identifier. Because Vault did not create identifiers for these tokens before 1.9, the activity log cannot know whether this token has been seen pre-1.9. To prevent inaccurate and inflated counts, the activity log will ignore any counts of non-entity tokens that were created before the upgrade and only the non-entity tokens from versions 1.9 and later will be counted.

See the client count [overview](/vault/docs/concepts/client-count) and [FAQ](/vault/docs/concepts/client-count/faq) for more information.

```
---
layout: docs
page_title: license get - Command
description: |-
 The "license get" command reports on the license in use.
---

# license get

The `license get` command reports on the license in use.  With the `-signed`
flag, it will return the actual license string, but only if the license
is stored, as opposed to [autoloaded](/vault/docs/enterprise/license/autoloading).

## Examples

Describe current license:

```shell-session
$ vault license get
Key                     Value
---                     -----
expiration_time         2022-05-17T23:59:59Z
features                [HSM Performance Replication DR Replication MFA Sentinel Seal Wrapping Control Groups Performance Standby Namespaces KMIP Entropy Augmentation Transform Secrets Engine Lease Count Quotas Key Management Secrets Engine Automated Snapshots]
license_id              060d7820-fa59-f95c-832b-395db0aeb9ba
performance_standby_count    9999
start_time              2021-05-17T00:00:00Z
termination_time
```
```

```
            2031-05-17T23:59:59Z
```

Get stored license string:

```shell-session
$ vault license get -signed
02MV4UU43BK5H...
```

Try to get stored license string when using autoloading:

```shell-session
$ vault license get -signed
License not found or using a temporary license.
```

## Usage

The following flags are available in addition to the [standard set of flags](/vault/docs/commands) included on all commands.

### Command options

- `-signed` `(bool: false)` - Return the signed license string when using a stored license.

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Exhibit B - "Incompatible With Secondary Licenses" Notice

This Source Code Form is "Incompatible
With Secondary Licenses", as defined by
the Mozilla Public License, v. 2.0.

---
layout: api
page_title: /sys/license/status - HTTP API
description: |-
 The `/sys/license/status` endpoint is used to view the license used in
 Vault.
---

# `/sys/license/status`

@include 'alerts/enterprise-only.mdx'

The `/sys/license/status` endpoint is used to view update the license used in
Vault.

## License status

This endpoint returns information about licensing. See [license
autoloading](/vault/docs/enterprise/license/autoloading) for additional background.

In the response:

- `autoloading_used` will be true if an autoloaded license was provided to the
 node, false otherwise. This should always be true from Vault 1.11.0 onward.
- `autoloaded` is the autoloaded license if autoloading_used is true.
- `persisted_autoload` is the autoloaded license the active node last wrote to
 storage; this is only used to detect inconsistently licensed nodes in the
 cluster. It cannot be used as a license itself.

- `stored` was used for the stored license prior to Vault 1.11.0. Stored licenses are no longer supported.

`autoloaded`, and `persisted_autoload` will both have the same structure.

| Method | Path | |
| :----- | :---------- |
| `GET` | `/sys/license/status` |

### Sample request

```shell-session
$ curl \
   --header "X-Vault-Token: ..." \
   http://127.0.0.1:8200/v1/sys/license/status
```

### Sample response

```json
{
 "data": {
   "autoloading_used": true,
   "autoloaded": {
     "expiration_time": "2022-05-17T23:59:59Z",
     "features": [
       "HSM",
       "Performance Replication",
       "DR Replication",
       "MFA",
       "Sentinel",
       "Seal Wrapping",
       "Control Groups",
       "Performance Standby",
       "Namespaces",
       "KMIP",
       "Entropy Augmentation",
       "Transform Secrets Engine",
       "Lease Count Quotas",
       "Key Management Secrets Engine",
       "Automated Snapshots"
     ],
     "license_id": "060d7820-fa59-f95c-832b-395db0aeb9ba",
     "performance_standby_count":
 9999,
     "start_time": "2021-05-17T00:00:00Z",
     "termination_time": "2031-05-17T23:59:59Z"
   },
```

```
  "persisted_autoload": {
    "expiration_time": "2022-05-17T23:59:59Z",
    "features": [
      "HSM",
      "Performance Replication",
      "DR Replication",
      "MFA",
      "Sentinel",
      "Seal Wrapping",
      "Control Groups",
      "Performance Standby",
      "Namespaces",
      "KMIP",
      "Entropy Augmentation",
      "Transform Secrets Engine",
      "Lease Count Quotas",
      "Key Management Secrets Engine",
      "Automated Snapshots"
    ],
    "license_id": "060d7820-fa59-f95c-832b-395db0aeb9ba",
    "performance_standby_count": 9999,
    "start_time": "2021-05-17T00:00:00Z",
    "termination_time": "2031-05-17T23:59:59Z"
  }
 }
}
```



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IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

```
<LicenseInfo
 @startTime={{this.model.startTime}}
 @expirationTime={{this.model.expirationTime}}
 @licenseId={{this.model.licenseId}}
 @features={{this.model.features}}
 @autoloaded={{this.model.autoloaded}}
 @performanceStandbyCount={{this.model.performanceStandbyCount}}
/>
---
layout: docs
page_title: Frequently Asked Questions (FAQ)
description: An overview of license.
---
```

# License FAQ

This FAQ section is for license changes and updates introduced for Vault Enterprise.

- [Q: How do the license termination changes affect upgrades?](#q-how-do-the-license-termination-changes-affect-upgrades)
- [Q: What impact on upgrades do the license termination behavior changes pose?](#q-what-impact-on-upgrades-do-the-license-termination-behavior-changes-pose)
- [Q: Will these license changes impact HCP Vault?](#q-will-these-license-changes-impact-hcp-vault)
- [Q: Do these license changes impact all Vault customers/licenses?](#q-do-these-license-changes-impact-all-vault-customers-licenses)
- [Q: What is the product behavior change introduced by the licensing changes?](#q-what-is-the-product-behavior-change-introduced-by-the-licensing-changes)
- [Q: How will Vault behave at startup when a license expires or terminates?](#q-how-will-vault-behave-at-startup-when-a-license-expires-or-terminates)
- [Q: What is the impact on evaluation licenses due to this change?](#q-what-is-the-impact-on-evaluation-licenses-due-to-this-change)
- [Q: Are there any changes to existing methods for manual license loading (API or CLI)?](#q-are-there-any-changes-to-existing-methods-for-manual-license-loading-api-or-cli)
- [Q: Is there a grace period when evaluation licenses expire?](#q-is-there-a-grace-period-when-evaluation-licenses-expire)
- [Q: Does this affect clients?](#q-does-this-affect-clients)
- [Q: Are the license files locked to a specific cluster?](#q-are-the-license-files-locked-to-a-specific-cluster)
- [Q: Will a EULA check happen every time a Vault restarts?](#q-will-a-eula-check-happen-every-time-a-vault-restarts)
- [Q: What scenarios should a customer plan for due to these license changes?](#q-what-scenarios-should-a-customer-plan-for-due-to-these-license-changes)
- [Q: What is the migration path for customers who want to migrate from their existing license-as-applied-via-the-CLI flow to the license on disk flow?](#q-what-is-the-migration-path-for-customers-who-want-to-migrate-from-their-existing-license-as-applied-via-the-cli-flow-to-the-license-on-disk-flow)
- [Q: What is the path for customers who want to downgrade/rollback from Vault 1.11 or later (auto-loaded license

mandatory) to a pre-Vault 1.11 (auto-loading not mandatory, stored license supported)?](#q-what-is-the-path-for-customers-who-want-to-downgrade-rollback-from-vault-1-11-or-later-auto-loaded-license-mandatory-to-a-pre-vault-1-11-auto-loading-not-mandatory-stored-license-supported)
- [Q: Is there a limited time for support of licenses that are in storage?](#q-is-there-a-limited-time-for-support-of-licenses-that-are-in-storage)
- [Q: What are the steps to upgrade from one autoloaded license to another autoloaded license?](#q-what-are-the-steps-to-upgrade-from-one-autoloaded-license-to-another-autoloaded-license)
- [Q: What are the Vault ADP module licensing changes introduced in 1.8?](#q-what-are-the-vault-adp-module-licensing-changes-introduced-in-1-8)
- [Q: How can the new ADP modules be purchased and what features are customer entitled to as part of that purchase?](#q-how-can-the-new-adp-modules-be-purchased-and-what-features-are-customer-entitled-to-as-part-of-that-purchase)
- [Q: What is the impact to customers based on these ADP module licensing changes?](#q-what-is-the-impact-to-customers-based-on-these-adp-module-licensing-changes)

### Q: what is the product behavior change introduced by the licensing changes?

Per the [feature deprecation plans](/vault/docs/deprecation), Vault will no longer support licenses in storage. An [auto-loaded license](/vault/docs/enterprise/license/autoloading) must be used instead. If you are using stored licenses, you must migrate to auto-loaded licenses prior to upgrading to Vault 1.11

Vault 1.12 will also introduce different termination behavior for evaluation licenses versus non-evaluation licenses. An evaluation license will include a 30-day trial period after which a running Vault server will terminate. Vault servers using a non-evaluation license will not terminate.

### Q: how do the license termination changes affect upgrades?
Vault 1.12 will introduce changes to the license termination behavior. Upgrades when using expired licenses will now be limited.
Vault will not startup if the build date of the binary is _after_ the expiration date of a license. License expiration date and binary build date compatibility can be verified using the [Check for Autoloaded License](/vault/docs/commands/operator/diagnose#check-for-autoloaded-license) check performed by the `vault operator diagnose` command.
The build date of a binary can also be found using the [vault version](/vault/docs/commands/version#version) command.

A user can expect the following to occur based on the following scenarios:

**Evaluation or non-evaluation license is valid:**
Vault will start normally

**Evaluation or non-evaluation license is expired, binary build date _before_ license expiry date:**
Vault will start normally

**Evaluation or non-evaluation license is expired, binary build date _after_ license expiry date:**
Vault will not start

**Evaluation license is terminated:**
Vault will not start independent of the binary's build date

**Non-evaluation license is terminated, binary build date _before_ license expiry date:**
Vault will start normally

**Non-evaluation license is terminated, binary build date _after_ license expiry date:**
Vault will not start

The Vault support team can issue you a temporary evaluation license to allow for security upgrades if your license has expired.

### Q: will these license changes impact HCP Vault?

No, these changes will not impact HCP Vault.

### Q: do these license changes impact all Vault customers/licenses?

| Customer/licenses | Impacted? |
| --- | --- |
| ENT binaries (evaluation or non-evaluation downloaded from [releases.hashicorp.com](https://releases.hashicorp.com/vault/)) | Yes |
| Business-Source (BSL) | No |

### Q: what is the product behavior change introduced by the licensing changes?

With Vault 1.11, the use of an [auto-loaded license](/vault/docs/enterprise/license/autoloading) is required for Vault to start successfully.

### Q: how will Vault behave at startup when a license expires or terminates?

When a license expires, Vault continues to function until the license terminates. This behavior exists today and remains unchanged in Vault 1.11. The grace period, defined as the time between license expiration and license termination, is one day for evaluation licenses (as of 1.8), and ten years for non-evaluation licenses.
Customers must provide a valid license before the grace period expires. This license is required to be [auto-loaded](/vault/docs/enterprise/license/autoloading). When license terminates (upon grace period expiry), Vault will seal itself and customers will need a valid license in order to successfully bring-up Vault. If a valid license was not installed after license expiry, customers will need to provide one, and this license will need to be auto-loaded.

Vault 1.12 changes the license expiration and termination behavior. Evaluation licenses include a 30-day trial period after which a running Vault server will terminate. Non-evaluation licenses, however, will no longer terminate. When a non-evaluation license expires, Vault will continue to function but upgrades will be limited. The build date of the upgrade binary must be before the expiration date of the license.
Vault will not start when attempting to use an expired license and binary with a build date _after_ the license expiration date. Attempting to [reload](/vault/api-docs/system/config-reload#reload-license-file) an expired license will result in an error if the build date of the running Vault server is _after_ the license

expiration date.

License expiration date and binary build date compatibility can be verified using the [Check for Autoloaded License](/vault/docs/commands/operator/diagnose#check-for-autoloaded-license) check performed by the `vault operator diagnose` command. The build date of a binary can also be found using the [vault version](/vault/docs/commands/version#version) command.

### Q: what is the impact on evaluation licenses due to this change?

As of Vault 1.8, any Vault cluster deployed must have a valid [auto-loaded](/vault/docs/enterprise/license/autoloading) license.

Vault 1.12 introduces [expiration and termination behavior changes](#q-how-will-vault-behave-at-startup-when-a-license-expires-or-terminates) for non-evaluation licenses. Evaluation licenses will continue to have a 1-day grace period upon license expiry after which they will terminate. Vault will seal itself and shutdown once an evaluation license terminates.

### Q: are there any changes to existing methods for manual license loading (API or CLI)?

The [`/sys/license`](/vault/api-docs/v1.10.x/system/license#install-license) and [`/sys/license/signed`](/vault/api-docs/v1.10.x/system/license#read-signed-license) endpoints have been removed as of Vault 1.11. With that said, it is no longer possible to provide a license via the `/sys/license` endpoint. License [auto-loading](/vault/docs/enterprise/license/autoloading) must be used instead.
The [`/sys/config/reload/license`](/vault/api-docs/system/config-reload#reload-license-file) endpoint can be used to reload an auto-loaded license provided as a path via an environment variable or configuration.

### Q: is there a grace period when evaluation licenses expire?

Evaluation licenses have a 1-day grace period. The grace period is the time until the license expires. Upon expiration, Vault will seal and will require a valid license to unseal and function properly.

### Q: are the license files locked to a specific cluster?

The changes to licenses apply to all nodes in a cluster. The license files are not locked to a cluster, but are independently applied to the appropriate clusters.

### Q: will a EULA check happen every time a Vault restarts?

Yes, starting with Vault 1.8, ENT binaries will be subjected to a EULA check. The release of Vault 1.8 introduces the EULA check for evaluation licenses (non-evaluation licenses are evaluated with a EULA check during contractual agreement) .
Although the agreement to a EULA occurs only once (when the user receives their license), Vault will check for the presence of a valid license every time a node is restarted.

Starting Vault 1.11, when customers deploy new Vault clusters, or upgrade existing Vault clusters, a valid [auto-loaded](/vault/docs/enterprise/license/autoloading)

license must exist for the upgrade to be successful.

### Q: what scenarios should a customer plan for due to these license changes?

- **New Cluster Deployment**: When a customer deploys new clusters to Vault 1.11 or later, a valid license must exist to successfully deploy. This valid license must be on-disk ([auto-loaded](/vault/docs/enterprise/license/autoloading)).

- **Eventual Migration**: Vault 1.11 removes support for in-storage licenses. Migrating to an auto-loaded license is required for Vault to start successfully using version 1.11 or greater. Pre-existing license storage entries will be automatically removed from storage upon startup.

### Q: what is the migration path for customers who want to migrate from their existing license-as-applied-via-the-CLI flow to the license on disk flow?

If a Vault cluster using a stored license is planned to be upgraded to Vault 1.11 or greater, the operator must migrate to using an auto-loaded license. The [`vault license get -signed`](/vault/docs/v1.10.x/commands/license/get) command (or underlying [`/sys/license/signed`](/vault/api-docs/v1.10.x/system/license#read-signed-license) endpoint) can be used to retrieve the license from storage in a running cluster.
It is not necessary to remove the stored license entry. That will occur automatically upon startup in Vault 1.11 or greater. Prior to completing the [recommended upgrade steps](/vault/docs/upgrading), perform the following to ensure your license is properly configured:

1. Use the command `vault license get -signed` to retrieve the license from storage of your running cluster.
2. Put the license on disk
3. Configure license auto-loading by specifying the [`license_path`](/vault/docs/configuration#license_path) config option or setting the [`VAULT_LICENSE`](/vault/docs/commands#vault_license) or [`VAULT_LICENSE_PATH`](/vault/docs/commands#vault_license_path) environment variable.

### Q: what is the path for customers who want to downgrade/rollback from Vault 1.11 or later (auto-loaded license mandatory) to a pre-Vault 1.11 (auto-loading not mandatory, stored license supported)?

The downgrade procedure remains the same for Vault customers who are currently on Vault 1.11 or later, have a license installed via auto-loading, and would like to downgrade their cluster to a pre-1.11 version. Please refer to the [upgrade procedures](/vault/tutorials/standard-procedures/sop-upgrade) that remind the customers that they must take a snapshot before the upgrade. Customers will need to restore their version from the snapshot, apply the pre-1.11 enterprise binary version they wish to roll back, and bring up the clusters.

### Q: is there a limited time for support of licenses that are in storage?

The support of licenses installed by alternative means often leads to difficulties providing the appropriate support. To provide the support expected by our customers, as we have announced in [Vault feature deprecations and plans](/vault/docs/deprecation) we are removing support for licenses in storage with Vault 1.11. This implies licensing endpoints that deal with licenses in storage will be removed, and Vault will no longer check for valid licenses in storage. This change requires that all customers have [auto-loaded](/vault/docs/enterprise/license/autoloading) licenses to upgrade to

1.11(+) successfully.

### Q: what are the steps to upgrade from one autoloaded license to another autoloaded license?

Follow these steps to migrate from one autoloaded license to another autoloaded license.

1. Use the [`vault license inspect`](/vault/docs/commands/license/inspect) command to compare the new license against the output of the [`vault license get`](/vault/docs/commands/license/get) command. This is to ensure that you have the correct license.
1. Backup the old license file in a safe location.
1. Replace the old license file on each Vault server with the new one.
1. Invoke the [reload command](/vault/api-docs/system/config-reload#reload-license-file) on each individual Vault server, starting with the standbys and doing the leader last. Invoking in this manner reduces possible disruptions if something was performed incorrectly with the above steps. You can either use the [reload command](/vault/api-docs/system/config-reload#reload-license-file) or send a SIGHUP.
1. On each node, ensure that the new license is in use by using the [`vault license get`](/vault/docs/commands/license/get) command and/or checking the logs.

# ADP licensing

This FAQ section is for the Advanced Data Protection (ADP) license changes introduced in Vault Enterprise 1.8.

### Q: what are the Vault ADP module licensing changes introduced in 1.8?

As of Vault Enterprise 1.8, the functionality formerly sold as the Vault ADP module is now separated between two new modules:

**ADP-KM** includes:

- [Key Management Secrets Engine (KMSE)](/vault/docs/secrets/key-management)
- [Key Management Interoperability (KMIP)](/vault/docs/secrets/kmip)
- [MSSQL Transparent Data Encryption (TDE)](https://www.hashicorp.com/blog/enabling-transparent-data-encryption-for-microsoft-sql-with-vault)

**ADP-Transform** includes:

- [Transform Secrets Engine (TSE)](/vault/docs/secrets/transform)

### Q: how can the new ADP modules be purchased and what features are customer entitled to as part of that purchase?

**ADP-KM includes**:

- This is the first Vault Enterprise module that can be purchased standalone. This means it can be purchased without the purchase of a Vault Enterprise Standard license.
- ADP-KM still requires a Vault Enterprise binary. The Vault Enterprise Standard license is automatically included with the ADP-KM module, but customers are contractually prohibited from using any features besides those in

Vault Community Edition and ADP-KM (KMSE and KMIP).

**ADP-Transform includes**:

- This module cannot be purchased as a standalone. It requires a Vault Enterprise binary, and customers must purchase the base Vault Enterprise Standard
 license (at least) to use the corresponding Enterprise features.
- The ADP-Transform SKU can be applied as an add-on. This workflow is similar to the consolidated ADP SKU.

### Q: what is the impact to customers based on these ADP module licensing changes?

Customers need to be aware of the following as a result of these changes:

- **New customers** may choose to purchase either or both of these modules. The old (consolidated) module is not available to them as an option.
- **Existing customers** may continue with the consolidated Vault ADP module uninterrupted. They will only be converted to one or both new ADP modules the next time they make a change to their licensing details (i.e. contract change).
---
layout: docs
page_title: Vault Enterprise License
description: An overview of license.
---

# Vault license

@include 'alerts/enterprise-only.mdx'

Licenses and EULA enhancements have been introduced in Vault 1.8 release. Please refer to the [FAQ](/vault/docs/enterprise/license/faq) for common questions concerning these changes.

The [Install a HashiCorp Enterprise License](/vault/tutorials/enterprise/hashicorp-enterprise-license) tutorial provides the instruction to load your Vault license.
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WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
SOFTWARE.

```
{{#if (and this.licenseExpired (not this.expiredDismissed))}}
 <div class="license-banner-wrapper" data-test-license-banner data-test-license-banner-expired>
   <AlertBanner
     @type="danger"
     @title="License expired"
     @message="Your Vault license expired on {{date-format
       @expiry
       'MMM d, yyyy'
     }}. Add a new license to your configuration and restart Vault."
     class="message-marginless"
   >
     <DocLink @path="/vault/tutorials/enterprise/hashicorp-enterprise-license">
       <Icon @name="learn-link" />
       Read documentation
     </DocLink>
     <button type="button" class="close-button" {{on "click" (fn this.dismissBanner "expired")}} data-test-dismiss-
expired>
       <Icon @name="x" aria-label="dismiss license expired warning" />
     </button>
   </AlertBanner>
 </div>
{{else if (and (lte this.licenseExpiringInDays 30) (not this.warningDismissed))}}
 <div class="license-banner-wrapper" data-test-license-banner data-test-license-banner-warning>
    <AlertBanner
     @type="warning"
     @title="Vault license expiring"
     @message="Your Vault license will expire in {{this.licenseExpiringInDays}} days at {{date-format
       @expiry
       'hh:mm:ss a'
     }} on {{date-format @expiry 'MMM d, yyyy'}}. {{if
       @autoloaded
       'Add a new license to your configuration.'
       'Keep in mind that your next license will need to be autoloaded'
     }}"
     class="message-marginless"
   >
     <DocLink @path="/vault/tutorials/enterprise/hashicorp-enterprise-license">
       <Icon @name="learn-link" />
       Read documentation
     </DocLink>
     <button type="button" class="close-button" {{on "click" (fn this.dismissBanner "warning")}} data-test-dismiss-
```

```
warning>
      <Icon @name="x" aria-label="dismiss license expire soon warning" />
    </button>
  </AlertBanner>
 </div>
{{/if}}
<PageHeader as |p|>
 <p.levelLeft>
  <h1 class="title is-3">License</h1>
 </p.levelLeft>
</PageHeader>

<section class="box is-sideless is-marginless is-shadowless is-fullwidth">
 <span class="title is-5">Details</span>
 <div class="field box is-fullwidth is-shadowless is-paddingless is-marginless">
  <InfoTableRow @label="License ID" @value={{@licenseId}} data-test-detail-row />
  <InfoTableRow @label="Valid from" @value={{@startTime}} data-test-detail-row>
    {{date-format @startTime "MMM dd, yyyy hh:mm:ss a"}}
    to
    {{date-format @expirationTime "MMM dd, yyyy hh:mm:ss a"}}
  </InfoTableRow>
  <InfoTableRow @label="License state" @value={{"Autoloaded"}} data-test-detail-row />
 </div>
</section>

<section class="box is-sideless is-marginless is-shadowless is-fullwidth">
 <span class="title is-5">Features</span>
 <div class="field box is-fullwidth is-shadowless is-paddingless is-marginless">
  {{#each this.featuresInfo as |info|}}
    <InfoTableRow @label={{info.name}}
 @value={{if info.active "Active" "Not Active"}} data-test-feature-row>
      {{#if info.active}}
        <Icon @name="check-circle" class="icon-true" />
        <span data-test-feature-status>
          Active
          {{#if info.count}}&mdash; {{info.count}} standby nodes allotted{{/if}}
        </span>
      {{else}}
        <Icon @name="x-circle" class="icon-false" />
        <span data-test-feature-status>Not Active</span>
      {{/if}}
    </InfoTableRow>
  {{/each}}
 </div>
</section>
# Copyright (c) HashiCorp, Inc.
# SPDX-License-Identifier: MPL-2.0
```

```
variable "file_name" {}

output "license" {
 value = file(var.file_name)
}
/**
* Copyright (c) HashiCorp, Inc.
* SPDX-License-Identifier: MPL-2.0
*/

.license-banner-wrapper {
 width: 100%;
 max-width: 1344px;
 margin: $spacing-l auto 0;
 padding: 0 1.5rem;
}
---
layout: docs
page_title: License Autoloading
description: An overview of license autoloading.
---

# License autoloading

@include 'alerts/enterprise-only.mdx'

Prior to Vault 1.8, Vault Enterprise would be licensed using special binaries
that contained embedded licenses, or via a license written into Vault storage
using the [POST sys/license API](/vault/api-docs/system/license#install-license).

As of Vault 1.8 those options still exist but are deprecated, and the recommended
mechanism for managing licenses is called License Autoloading. New clusters are
required to use the autoloading method.

License Autoloading can be done using one of these mechanisms, in decreasing order
of priority (i.e. `VAULT_LICENSE` takes precedence over `VAULT_LICENSE_PATH`, which
takes precedence over `license_path` in config.)

- [VAULT_LICENSE environment variable](/vault/docs/commands#vault_license)
- [VAULT_LICENSE_PATH environment variable](/vault/docs/commands#vault_license_path)
- [license_path in
 config](/vault/docs/configuration#license_path)

Nodes within a cluster should be consistently licensed. All nodes in a cluster
should use autoloading, or none should. If autoloading is used, all nodes should
use the same license string. Warnings will be written to the log when there
are discrepancies.
```

If autoloading is used, any existing stored license will be ignored. The presence
of a stored license in conjunction with an autoloaded license will also result in
logged warnings, which may require a service restart to clear.
---
layout: docs
page_title: license inspect - Command
description: |-
 The "license inspect" command describes the contents of a signed license string.
---

# license inspect

The `license inspect` command describes the contents of a signed license string.

## Examples

Describe license in the environment (either `VAULT_LICENSE` for a raw value
or `VAULT_LICENSE_PATH` for the path to a file containing the value):

```shell-session
$ vault license inspect
Source: /Users/ncc/vaults/license
Product: vault
License ID: 060d7820-fa59-f95c-832b-395db0aeb9ba
Customer ID: 5401ae3b-136b-3e47-3b43-432927fa03e7
Installation ID: *
Issue Time: 2021-05-17 19:33:47.93981585 +0000 UTC
Start Time: 2021-05-17 00:00:00 +0000 UTC
Expiration Time: 2022-05-17 23:59:59.999 +0000 UTC
Termination Time: 2031-05-17 23:59:59.999 +0000 UTC
{"license_id":"060d7820-fa59-f95c-832b-395db0aeb9ba","customer_id":"5401ae3b-136b-3e47-3b43-432927fa03e7","installation_id":"*","issue_time":"2021-05-17T19:33:47.93981585Z","start_time":"2021-05-17T00:00:00Z","expiration_time":"2022-05-17T23:59:59.999Z","flags":{"modules":["multi-dc-scale","governance-policy","advanced-data-protection"]},"features":["HSM","Performance
 Replication","DR Replication","MFA","Sentinel","Seal Wrapping","Control Groups","Performance
Standby","Namespaces","KMIP","Entropy Augmentation","Transform Secrets Engine","Lease Count Quotas","Key
Management Secrets Engine","Automated Snapshots"],"performance_standby_count":9999}

License is valid
```

Describe license at given path:

```shell-session
$ vault license inspect ~/vaults/license
Source: /Users/ncc/vaults/license
Product: vault
License ID: 060d7820-fa59-f95c-832b-395db0aeb9ba
```

Customer ID: 5401ae3b-136b-3e47-3b43-432927fa03e7
Installation ID: *
Issue Time: 2021-05-17 19:33:47.93981585 +0000 UTC
Start Time: 2021-05-17 00:00:00 +0000 UTC
Expiration Time: 2022-05-17 23:59:59.999 +0000 UTC
Termination Time: 2031-05-17 23:59:59.999 +0000 UTC
{"license_id":"060d7820-fa59-f95c-832b-395db0aeb9ba","customer_id":"5401ae3b-136b-3e47-3b43-432927fa03e7","installation_id":"*","issue_time":"2021-05-17T19:33:47.93981585Z","start_time":"2021-05-17T00:00:00Z","expiration_time":"2022-05-17T23:59:59.999Z","flags":{"modules":["multi-dc-scale","governance-policy","advanced-data-protection"]},"features":["HSM","Performance
Replication","DR Replication","MFA","Sentinel","Seal Wrapping","Control Groups","Performance Standby","Namespaces","KMIP","Entropy Augmentation","Transform Secrets Engine","Lease Count Quotas","Key Management Secrets Engine","Automated Snapshots"],"performance_standby_count":9999}

License is valid
```

## Usage

The following flags are available in addition to the [standard set of
flags](/vault/docs/commands) included on all commands.

### Command options

- `-installation-id` `(string: "")` - Installation ID to validate the license against
### Enterprise licenses

In versions 1.2.6, 1.3.9, 1.4.5, and 1.5.2, the enterprise licenses were not incorporated correctly
into the build and we have issued patch releases (x.y.z.1) for enterprise customers containing the
proper license. As the previous builds were both not working and causing confusion, we have removed
the binaries.
// Copyright (c) HashiCorp, Inc.
// SPDX-License-Identifier: MPL-2.0

package license

// Features is a bitmask of feature flags
type Features uint

const FeatureNone Features = 0

func (f Features) HasFeature(flag Features) bool {
 return false
}
### vault.core.license.expiration_time_epoch ((#vault-core-license-expiration_time_epoch))

Metric type | Value | Description
---------- | --------- | ----------
```

gauge | timestamp | Epoch time (seconds since 1970-01-01) at which the license will expire
---
layout: docs
page_title: license - Command
description: |-
 The "license" command groups subcommands for interacting with Vault licenses.
---

# license

The `license` command groups subcommands for interacting with Vault licenses

For more information, please see the [license documentation](/vault/docs/enterprise/license)

## Examples

Query current license in use by a node:

```shell-session
$ vault license get
Key                     Value
---                     -----
expiration_time         2022-05-17T23:59:59.999Z
features                [HSM Performance Replication DR Replication MFA Sentinel Seal Wrapping Control Groups Performance Standby Namespaces KMIP Entropy Augmentation Transform Secrets Engine Lease Count Quotas Key Management Secrets Engine Automated Snapshots]
license_id              060d7820-fa59-f95c-832b-395db0aeb9ba
performance_standby_count    9999
start_time              2021-05-17T00:00:00Z
```

Inspect a license string:

```shell-session
$
 vault license inspect ~/vaults/license
Source: /Users/ncc/vaults/license
Product: vault
License ID: 060d7820-fa59-f95c-832b-395db0aeb9ba
Customer ID: 5401ae3b-136b-3e47-3b43-432927fa03e7
Installation ID: *
Issue Time: 2021-05-17 19:33:47.93981585 +0000 UTC
Start Time: 2021-05-17 00:00:00 +0000 UTC
Expiration Time: 2022-05-17 23:59:59.999 +0000 UTC
{"license_id":"060d7820-fa59-f95c-832b-395db0aeb9ba","customer_id":"5401ae3b-136b-3e47-3b43-432927fa03e7","installation_id":"*","issue_time":"2021-05-17T19:33:47.93981585Z","start_time":"2021-05-17T00:00:00Z","expiration_time":"2022-05-17T23:59:59.999Z","flags":{"modules":["multi-dc-scale","governance-policy","advanced-data-protection"]},"features":["HSM","Performance Replication","DR
```

Replication","MFA","Sentinel","Seal Wrapping","Control Groups","Performance Standby","Namespaces","KMIP","Entropy Augmentation","Transform Secrets Engine","Lease Count Quotas","Key Management Secrets Engine","Automated Snapshots"],"performance_standby_count":9999}

License
 is valid

```

## Usage

```text
Usage: vault license <subcommand> [options] [args]

 # ...

Subcommands:
   get      Query Vault's license
   inspect  View the contents of a license string
```

For more information, examples, and usage about a subcommand, click on the name of the subcommand in the sidebar.

# 1.161 snowball-stemmer 0-18.585svn.el9

## 1.161.1 Available under license :

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```

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# 1.162 supports-color 5.5.0

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# 1.163 multiformats-go-multiaddr 0.15.0

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# 1.164 path-is-absolute 1.0.1

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# 1.165 go-events 0.0.0-20190806004212-e31b211e4f1c

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# 1.166 meow 13.2.0

## 1.166.1 Available under license :

Name: yargs-parser
Version: 21.1.1
License: ISC
Private: false
Description: the mighty option parser used by yargs
Repository: https://github.com/yargs/yargs-parser.git
Author: Ben Coe <ben@npmjs.com>
License Copyright:
===

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---

Name: map-obj
Version: 5.0.0
License:
MIT
Private: false
Description: Map object keys and values into a new object
Repository: undefined
Author: Sindre Sorhus <sindresorhus@gmail.com> (https://sindresorhus.com)
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---

Name: camelcase
Version: 8.0.0
License: MIT
Private: false
Description: Convert a dash/dot/underscore/space separated string to camelCase or PascalCase: `foo-bar` `fooBar`
Repository: undefined
Author: Sindre Sorhus <sindresorhus@gmail.com> (https://sindresorhus.com)
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---

Name: quick-lru
Version: 6.1.2
License: MIT
Private: false
Description: Simple Least Recently Used (LRU) cache
Repository: undefined
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---

Name: camelcase-keys
Version: 9.1.3
License: MIT
Private: false
Description: Convert object keys to camel case
Repository: undefined
Author: Sindre Sorhus <sindresorhus@gmail.com> (https://sindresorhus.com)
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---

Name: trim-newlines
Version: 5.0.0
License: MIT
Private: false
Description: Trim newlines from the start and/or end of a string
Repository: undefined
Author: Sindre Sorhus <sindresorhus@gmail.com> (https://sindresorhus.com)
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---

Name: min-indent
Version: 1.0.1
License: MIT
Private: false
Description: Get the shortest leading whitespace from lines in a string
Repository: undefined
Author: James Kyle <me@thejameskyle.com>
(thejameskyle.com)
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Name: strip-indent
Version: 4.0.0
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Private: false
Description: Strip leading whitespace from each line in a string
Repository: undefined
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---

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Version: 5.0.0
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Private: false
Description: Indent each line in a string
Repository: undefined
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Name: redent
Version: 4.0.0
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Private:
false
Description: Strip redundant indentation and indent the string
Repository: undefined
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---

Name: semver
Version: 7.6.0
License: ISC
Private: false
Description: The semantic version parser used by npm.
Repository: https://github.com/npm/node-semver.git
Author: GitHub Inc.
License Copyright:
===

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---

Name: spdx-license-ids
Version: 3.0.16
License: CC0-1.0
Private: false
Description: A list of SPDX license identifiers
Repository: undefined
Author: Shinnosuke Watanabe (https://github.com/shinnn)

---

Name: spdx-exceptions
Version: 2.4.0
License: CC-BY-3.0
Private: false
Description: list of SPDX standard license exceptions
Repository: undefined
Author: The Linux Foundation
Contributors:
Kyle E. Mitchell <kyle@kemitchell.com> (https://kemitchell.com/)

---

Name: spdx-expression-parse
Version: 3.0.1
License: MIT
Private: false
Description: parse SPDX license expressions
Repository: undefined
Author: Kyle E. Mitchell <kyle@kemitchell.com> (https://kemitchell.com)
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Name: spdx-correct
Version: 3.2.0
License: Apache-2.0
Private: false
Description: correct invalid SPDX expressions
Repository: undefined
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---

Name: validate-npm-package-license
Version: 3.0.4
License: Apache-2.0
Private: false
Description: Give me a string and I'll tell you if it's a valid npm package license string
Repository: undefined
Author: Kyle E. Mitchell <kyle@kemitchell.com> (https://kemitchell.com)
Contributors:
Mark Stacey <markjstacey@gmail.com>
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---

Name: lru-cache
Version: 10.2.0
License: ISC
Private: false
Description: A cache object that deletes the least-recently-used items.
Repository: git://github.com/isaacs/node-lru-cache.git
Author: Isaac Z. Schlueter <i@izs.me>
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Version: 7.0.1
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Private: false
Description: Provides metadata and conversions from repository urls for GitHub, Bitbucket and GitLab
Repository: https://github.com/npm/hosted-git-info.git
Homepage: https://github.com/npm/hosted-git-info
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---

Name: function-bind
Version: 1.1.2
License: MIT
Private: false
Description: Implementation of Function.prototype.bind
Repository: https://github.com/Raynos/function-bind.git
Homepage: https://github.com/Raynos/function-bind
Author: Raynos <raynos2@gmail.com>
Contributors:
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Name: hasown
Version: 2.0.0
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Private: false
Description: A robust, ES3 compatible, "has own property" predicate.
Repository: git+https://github.com/inspect-js/hasOwn.git
Homepage:
https://github.com/inspect-js/hasOwn#readme
Author: Jordan Harband <ljharb@gmail.com>
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---

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Version: 2.13.1
License: MIT
Private: false
Description: Is this specifier a node.js core module?
Repository: git+https://github.com/inspect-js/is-core-module.git

Homepage: https://github.com/inspect-js/is-core-module
Author: Jordan Harband <ljharb@gmail.com>
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Version: 6.0.0
License: BSD-2-Clause
Private: false
Description: Normalizes data that can be found in package.json files.
Repository: https://github.com/npm/normalize-package-data.git
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---

Name: find-up-simple
Version: 1.0.0
License: MIT
Private: false
Description: Find a file or directory by walking up parent directories  Zero dependencies
Repository: undefined
Author: Sindre Sorhus <sindresorhus@gmail.com> (https://sindresorhus.com)
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---

Name: @babel/code-frame
Version: 7.23.5
License: MIT
Private: false
Description: Generate errors that contain a code frame that point to source locations.
Repository: https://github.com/babel/babel.git
Homepage: https://babel.dev/docs/en/next/babel-code-frame
Author: The Babel Team (https://babel.dev/team)
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---

Name: @babel/highlight
Version: 7.23.4

License: MIT
Private: false
Description: Syntax highlight JavaScript strings for output in terminals.
Repository: https://github.com/babel/babel.git
Homepage: https://babel.dev/docs/en/next/babel-highlight
Author: The Babel Team (https://babel.dev/team)
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---

Name: js-tokens
Version: 4.0.0
License: MIT
Private: false
Description: A regex that tokenizes JavaScript.
Repository: undefined
Author: Simon Lydell
License Copyright:
===

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---

Name: @babel/helper-validator-identifier
Version: 7.22.20
License: MIT
Private: false
Description: Validate identifier/keywords name
Repository: https://github.com/babel/babel.git
Author:
 The Babel Team (https://babel.dev/team)
License Copyright:
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---

Name: chalk
Version: 2.4.2
License: MIT
Private: false
Description: Terminal string styling done right
Repository: undefined
License Copyright:
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---

Name: escape-string-regexp
Version: 1.0.5
License: MIT

Private: false
Description: Escape RegExp special characters
Repository: undefined
Author: Sindre Sorhus <sindresorhus@gmail.com> (sindresorhus.com)
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---

Name: ansi-styles
Version: 3.2.1
License: MIT
Private: false
Description: ANSI escape codes for styling strings in the terminal
Repository: undefined
Author: Sindre
Sorhus <sindresorhus@gmail.com> (sindresorhus.com)
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---

Name: color-convert
Version: 1.9.3
License: MIT
Private: false
Description: Plain color conversion functions
Repository: undefined
Author: Heather Arthur <fayearthur@gmail.com>
License Copyright:
===

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---

Name: color-name
Version: 1.1.3
License: MIT
Private: false
Description: A list of color names and its values
Repository: git@github.com:dfcreative/color-name.git
Homepage: https://github.com/dfcreative/color-name
Author: DY <dfcreative@gmail.com>
License Copyright:
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---

Name: has-flag
Version: 3.0.0
License: MIT
Private: false
Description: Check if argv has a specific flag
Repository: undefined
Author: Sindre Sorhus <sindresorhus@gmail.com>
(sindresorhus.com)
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---

Name: supports-color
Version: 5.5.0
License: MIT
Private: false
Description: Detect whether a terminal supports color
Repository: undefined
Author: Sindre Sorhus <sindresorhus@gmail.com> (sindresorhus.com)
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---

Name: index-to-position
Version: 0.1.2
License: MIT
Private: false
Description: Convert a string index to its line and column position
Repository: undefined
Author: Sindre Sorhus <sindresorhus@gmail.com> (https://sindresorhus.com)
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---

Name: parse-json
Version: 8.1.0
License: MIT
Private: false
Description: Parse JSON with more helpful

errors
Repository: undefined
Author: Sindre Sorhus <sindresorhus@gmail.com> (https://sindresorhus.com)
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---

Name: unicorn-magic
Version: 0.1.0
License: MIT
Private: false
Description: Some useful utilities I often need
Repository: undefined
Author: Sindre Sorhus <sindresorhus@gmail.com> (https://sindresorhus.com)
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---

Name: read-pkg
Version: 9.0.1
License: MIT
Private: false
Description: Read a package.json file
Repository: undefined
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---

Name: read-package-up
Version: 11.0.0
License: MIT
Private:
false
Description: Read the closest package.json file
Repository: undefined
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---

Name: decamelize
Version: 6.0.0
License: MIT
Private: false
Description: Convert a camelized string into a lowercased one with a custom separator: unicornRainbow unicorn_rainbow
Repository: undefined
Author: Sindre Sorhus <sindresorhus@gmail.com> (https://sindresorhus.com)
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Version: 4.1.0
License: MIT
Private: false
Description: Pretty options for minimist
Repository: undefined
Author: Vadim Demedes <vdemedes@gmail.com>
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---

Name: is-plain-obj
Version: 1.1.0
License: MIT
Private: false
Description: Check if a value is a plain object
Repository: undefined
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---

Name: arrify
Version: 1.0.1
License: MIT
Private: false

Description: Convert a value to an array
Repository: undefined
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---

Name: kind-of
Version: 6.0.3
License: MIT
Private: false
Description: Get the native type of a value.
Repository: undefined
Homepage: https://github.com/jonschlinkert/kind-of
Author: Jon Schlinkert (https://github.com/jonschlinkert)
Contributors:
David Fox-Powell (https://dtothefp.github.io/me)
James (https://twitter.com/aretecode)
Jon Schlinkert (http://twitter.com/jonschlinkert)
Ken Sheedlo (kensheedlo.com)
laggingreflex (https://github.com/laggingreflex)
Miguel Mota (https://miguelmota.com)
Peter deHaan (http://about.me/peterdehaan)

tunnckoCore (https://i.am.charlike.online)
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---

Name: decamelize-keys
Version: 2.0.1
License: MIT
Private: false
Description: Convert object keys from camel case
Repository: undefined
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(For example, a function in a library to compute square roots has

a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be
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# 1.190 libmspack 0.10.1-0.7.alpha.el9

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# 1.198 grep 3.6-5.el9

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_Peter_Code_winapi_rs_x86_64_lib_libwinapi_oemlicense_a

```
#!/usr/bin/env bash
# MIT licenses will each have a unique MD5 sum since they contain a unique copyright.
# This script will read the license file into memory, strip out the copyright, and then
# generate an MD5 that is not unique and can be matched against a known MIT MD5 sum.
set -e

calculate_md5_sum() {
 local FILE="$1"

 # Read the contents of the file into a variable
 local raw_license_text=$(<"$FILE")

 # Convert to lowercase
 local lowercase_license_text="${raw_license_text,,}"

 # Remove anything before the beginning of the license
 local stripped_license_text=$(awk '/permission is hereby granted,/{p=1} p' <<< "$lowercase_license_text")

 # Replace line breaks (Windows or Linux) with a single space
 local replaced_linebreaks=$(tr '\r\n' ' ' <<< "$stripped_license_text")

 # Replace multiple spaces with a single space
 local normalized_license_text=$(tr -s ' ' <<< "$replaced_linebreaks")

 # Strip away any non-printable, non-whitespace characters
 local clean_unprintable_license_text=$(tr
 -cd '[:print:][:space:]' <<< "$normalized_license_text")

 # Remove punctuation and special characters
 local clean_license_text=$(echo "$clean_unprintable_license_text" | sed 's/[^a-zA-Z ]//g')

 # Calculate the MD5 sum of the cleaned license text
 local MD5SUM=$(echo -n "$clean_license_text" | md5sum | awk '{print $1}')
```

```
 # Output the MD5 sum
 echo "$MD5SUM"
}

# Check if the FILE argument is provided
if [ -z "$1" ]; then
 echo "Please provide a FILE as an argument."
 exit 1
fi

# Invoke the function with the provided FILE argument
calculate_md5_sum "$1"
```

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# 1.211 @jridgewell/gen-mapping 0.3.3

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# 1.212 etcd-api 3.6.4

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# Features

This document provides an overview of etcd features and general development guidelines for adding and deprecating them. The project maintainers can override these guidelines per the need of the project following the project governance.

## Overview

The etcd features fall into three stages, experimental, stable, and unsafe.

### Experimental

Any new feature is usually added as an experimental feature. An experimental feature is characterized as below:
- Might be buggy due to a lack of user testing. Enabling the feature may not work as expected.
- Disabled by default when added initially.
- Support for such a feature may be dropped at any time without notice

- Feature-related issues may be given lower priorities.
  - It can be removed in the next minor or major release without following the feature deprecation policy unless it graduates to a stable future.

### Stable

A stable feature is characterized as below:
- Supported as part of the supported releases of etcd.
-
 May be enabled by default.
- Discontinuation of support must follow the feature deprecation policy.

### Unsafe

Unsafe features are rare and listed under the `Unsafe feature:` section in the etcd usage documentation. By default, they are disabled. They should be used with caution following documentation. An unsafe feature can be removed in the next minor or major release without following the feature deprecation policy.

## Development Guidelines

### Adding a new feature

Any new enhancements to the etcd are typically added as an experimental feature. The general development requirements are listed below. They can be somewhat flexible depending on the scope of the feature and review discussions and will evolve over time.
- Open an issue
  - It must provide a clear need for the proposed feature.
  - It should list development work items as checkboxes. There must be one work item towards future graduation to a stable future.
  - Label the issue with `type/feature` and `experimental`.
  - Keep the issue open for tracking purposes until a decision is made on graduation.
- Open a Pull Request (PR)
  - Provide unit tests. Integration tests are also recommended as possible.
  - Provide robust e2e test coverage. If the feature being added is complicated or quickly needed, maintainers can decide to go with e2e tests for basic coverage initially and have robust coverage added at a later time before the feature graduation to the stable feature.
  - Provide logs for proper debugging.
  - Provide metrics and benchmarks as needed.
  - The Feature should be disabled by default.
  - Any configuration flags related to the implementation of the feature must be prefixed with `experimental` e.g. `--experimental-feature-name`.
  - Add a CHANGELOG entry.
- At least two maintainers must approve feature requirements and related code changes.

### Graduating an Experimental feature to Stable

It is important that experimental features don't get stuck in that stage.

They should be revisited and moved to the stable stage following the graduation steps as described here.

#### Locate graduation candidate
Decide if an experimental feature is ready for graduation to the stable stage.
- Find the issue that was used to enable the experimental feature initially. One way to find such issues is to search for issues with `type/feature` and `experimental` labels.
- Fix any known open issues against the feature.
- Make sure the feature was enabled for at least one previous release. Check the PR(s) reference from the issue to see when the feature-related code changes were merged.

#### Provide implementation
If an experimental feature is found ready for graduation to the stable stage, open a Pull Request (PR) with the following changes.
- Add robust e2e tests if not already provided.
- Add a new stable feature flag identical to the experimental feature flag but without the `--experimental` prefix.
- Deprecate the experimental feature following the [feature deprecation
policy](#Deprecating-a-feature).
- Implementation must ensure that both the graduated and deprecated experimental feature flags work as expected. Note that both these flags will co-exist for the timeframe described in the feature deprecation policy.
- Enable the graduated feature by default if needed.

At least two maintainers must approve the work. Patch releases should not be considered for graduation.

### Deprecating a feature

#### Experimental
An experimental feature deprecates when it graduates to the stable stage.
- Add a deprecation message in the documentation of the experimental feature with a recommendation to use a related stable feature. e.g. `DEPRECATED. Use <feature-name> instead.`
- Add a `deprecated` label in the issue that was initially used to enable the experimental feature.

#### Stable
As the project evolves, a stable feature may sometimes need to be deprecated and removed. Such a situation should be handled using the steps below:
- Create an issue for tracking
purposes.
- Add a deprecation message in the feature usage documentation before a planned release for feature deprecation. e.g. `To be deprecated in <release>.`. If a new feature replaces the `To be deprecated` feature, then also provide a message saying so. e.g. `Use <feature-name> instead.`.
- Deprecate the feature in the planned release with a message as part of the feature usage documentation. e.g. `DEPRECATED`. If a new feature replaces the deprecated feature, then also provide a message saying so. e.g. `DEPRECATED. Use <feature-name> instead.`.
- Add a `deprecated` label in the related issue.

Remove the deprecated feature in the following release. Close any related issue(s). At least two maintainers must approve the work. Patch releases should not be considered for deprecation.
# Set up the local cluster

For testing and development deployments, the quickest and easiest way is to configure a local cluster. For a production deployment, refer to the [clustering][clustering] section.

## Local standalone cluster

### Starting a cluster

Run the following to deploy an etcd cluster as a standalone cluster:

```
$ ./etcd
...
```

If the `etcd` binary is not present in the current working directory, it might be located either at `$GOPATH/bin/etcd` or at `/usr/local/bin/etcd`. Run the command appropriately.

The running etcd member listens on `localhost:2379` for client requests.

### Interacting with the cluster

Use `etcdctl` to interact with the running cluster:

1. Store an example key-value pair in the cluster:

   ```
   $ ./etcdctl put foo bar
   OK
   ```

   If OK is printed, storing the key-value pair is successful.

2. Retrieve the value of `foo`:

   ```
   $ ./etcdctl get foo
   bar
   ```

   If `bar` is returned, interaction with the etcd
 cluster is working as expected.

## Local multi-member cluster

### Starting a cluster

A `Procfile` at the base of the etcd git repository is provided to easily configure a local multi-member cluster. To start a multi-member cluster, navigate to the root of the etcd source tree and perform the following:

1. Install `goreman` to control Procfile-based applications:

```
$ go install github.com/mattn/goreman@latest
```

The installation will place executables in the $GOPATH/bin. If $GOPATH environment variable is not set, the tool will be installed into the $HOME/go/bin. Make sure that $PATH is set accordingly in your environment.

2. Start a cluster with `goreman` using etcd's stock Procfile:

```
$ goreman -f Procfile start
```

The members start running. They listen on `localhost:2379`, `localhost:22379`, and `localhost:32379` respectively for client requests.

### Interacting with the cluster

Use `etcdctl` to interact with the running cluster:

1. Print
the list of members:

```
$ etcdctl --write-out=table --endpoints=localhost:2379 member list
```

The list of etcd members is displayed as follows:

```
+------------------+---------+--------+------------------------+------------------------+
|       ID         | STATUS  |  NAME  |       PEER ADDRS       |      CLIENT ADDRS      |
+------------------+---------+--------+------------------------+------------------------+
| 8211f1d0f64f3269 | started | infra1 | http://127.0.0.1:2380  | http://127.0.0.1:2379  |
| 91bc3c398fb3c146 | started | infra2 | http://127.0.0.1:22380 | http://127.0.0.1:22379 |
| fd422379fda50e48 | started | infra3 | http://127.0.0.1:32380 | http://127.0.0.1:32379 |
+------------------+---------+--------+------------------------+------------------------+
```

2. Store an example key-value pair in the cluster:

```
$ etcdctl put foo bar
OK
```

If OK is printed, storing the key-value pair is successful.

###
Testing fault tolerance

To exercise etcd's fault tolerance, kill a member and attempt to retrieve the key.

1. Identify the process name of the member to be stopped.

The `Procfile` lists the properties of the multi-member cluster. For example, consider the member with the process name, `etcd2`.

2. Stop the member:

```
# kill etcd2
$ goreman run stop etcd2
```

3. Store a key:

```
$ etcdctl put key hello
OK
```

4. Retrieve the key that is stored in the previous step:

```
$ etcdctl get key
hello
```

5. Retrieve a key from the stopped member:

```
$ etcdctl --endpoints=localhost:22379 get key
```

The command should display an error caused by connection failure:

```
2017/06/18 23:07:35 grpc: Conn.resetTransport failed to create client transport: connection error: desc = "transport: dial tcp 127.0.0.1:22379: getsockopt: connection refused"; Reconnecting to "localhost:22379"
Error:  grpc:
timed out trying to connect
```

6. Restart the stopped member:

```
$ goreman run restart etcd2
```

7. Get the key from the restarted member:

```
$ etcdctl --endpoints=localhost:22379 get key
hello
```

Restarting the member re-establishs the connection. `etcdctl` will now be able to retrieve the key successfully. To learn more about interacting with etcd, read [interacting with etcd section][interacting].

[clustering]: https://etcd.io/docs/latest/op-guide/clustering/
[interacting]: https://etcd.io/docs/latest/dev-guide/interacting_v3/
# Issue triage guidelines

## Purpose

Speed up issue management.

The `etcd` issues are listed at <https://github.com/etcd-io/etcd/issues> and are identified with labels. For example, an issue that is identified as a bug will be set to the label `type/bug`.

The etcd project uses labels to indicate common attributes such as `area`, `type`, and `priority` of incoming issues.

New issues will often start without any labels, but typically `etcd` maintainers, reviewers, and members will add labels by following these triage guidelines. The detailed list of labels can be found at <https://github.com/etcd-io/etcd/labels>.

## Scope

This document serves as the primary guidelines for triaging incoming issues in `etcd`.

All contributors are encouraged and welcome to help manage issues which will help reduce the burden on project maintainers, though the work and responsibilities discussed in this document are created with `etcd` project reviewers and members in mind as these individuals will have
 triage access to the etcd project which is a requirement for actions like applying labels or closing issues.

Refer to [etcd community membership](https://github.com/etcd-io/etcd/blob/main/Documentation/contributor-guide/community-membership.md) for guidance on becoming an etcd project member or reviewer.

## Step 1 - Find an issue to triage

To get started you can use the following recommended issue searches to identify issues that are in need of triage:

* [Issues that have no labels](https://github.com/etcd-

io/etcd/issues?q=is%3Aissue+is%3Aopen+sort%3Aupdated+no%3Alabel)
* [Issues created recently](https://github.com/etcd-io/etcd/issues?q=is%3Aissue+is%3Aopen+)
* [Issues not assigned but linked pr](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+no%3Aassignee+linked%3Apr)
* [Issues with no comments](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+comments%3A0+)
* [Issues with help wanted](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+label%3A%22help+wanted%22+)

## Step 2 - Check the issue is valid

Before we start adding labels or trying to work out a priority, our first triage step needs to be working out if the issue actually belongs to the etcd project and is not a duplicate.

### Issues that don't belong to etcd

Sometimes issues are reported that belong to other projects that `etcd` use. For example, `grpc` or `golang` issues. Such issues should be addressed by asking the reporter to open issues in the appropriate other projects.

These issues can generally be closed unless a maintainer and issue reporter see a need to keep it open for tracking purposes. If you have triage permissions please close it, alternatively mention the @etcd-io/members group to request a member with triage access to close the issue.

### Duplicate issues

If an issue is a duplicate, add a comment stating so along with a reference for the original issue and if you have triage permissions please close it, alternatively mention the @etcd-io/members group to request a member with triage access close the issue.

## Step 3 - Apply the appropriate type of label

Adding a `type` label to an issue helps create visibility on the health of the project and helps contributors identify potential priorities, i.e. addressing existing bugs or test flakes before implementing new features.

### Support requests

As a general rule, the focus for etcd support is to address common themes in a broad way that helps all users, i.e. through channels like known issues, frequently asked questions, and high-quality documentation. To make the best use of project members time we should avoid providing 1:1 support if a broad approach is available.

Some people mistakenly use our GitHub bug report or feature request templates to file support requests. Usually, they are asking for help operating or configuring some aspect of etcd. Support requests for etcd should instead be raised as [discussions](https://github.com/etcd-io/etcd/discussions).

Common types of support requests are:

1. Questions about configuring or operating existing well-documented etcd features, for example,

<https://github.com/etcd-io/etcd/issues/15945>. Note - If an existing feature is not well documented please apply the `area/documentation` label and propose documentation improvements that would prevent future users from stumbling on the problem again.

2. Bug reports or questions about unsupported versions of etcd, for example <https://github.com/etcd-io/etcd/issues/15796>. When responding to these issues please refer to our [supported versions documentation](https://etcd.io/docs/latest/op-guide/versioning) and encourage the reporter to upgrade to a recent patch release of a supported version as soon as possible. We should limit the effort supporting users that do not make the effort to run a supported version of etcd or ensure their version is patched.

3. Bug reports that do not provide a complete list of steps to reproduce the issue and/or contributors are not able to reproduce the issue, for example, <https://github.com/etcd-io/etcd/issues/15740>. We should limit the effort we put into reproducing issues ourselves and motivate users to provide the necessary information to accept the bug report.

4. General questions that are filed using feature request or bug report issue templates, for example, <https://github.com/etcd-io/etcd/issues/15914>. Note - These types of requests may surface good additions to our [frequently asked questions](https://etcd.io/docs/v3.5/faq).

If you identify that an issue is a support request please:

1. Add the `type/support` or `type/question` label.

2. Add the following comment to inform the issue creator that discussions should be used instead and that this issue will be converted to a discussion.

> Thank you for your question, this support issue will be moved to our [Discussion Forums](https://github.com/etcd-io/etcd/discussions).
>
> We are trying to consolidate the channels to which questions for help/support are posted so that we can improve our efficiency in responding to your requests, and make it easier for you to find answers to frequently asked questions and how to address common use cases.
>
> We regularly see messages posted in multiple forums, with the full response thread only in one place or, worse, spread across multiple forums. Also, the large volume of support issues on GitHub is making it difficult for us to use issues to identify real bugs.
>
> Members of the etcd community use Discussion Forums to field support requests. Before posting a new question, please search these for answers to similar questions, and also familiarize yourself with:
>
> 1. [user documentation](https://etcd.io/docs/latest)
> 2. [frequently asked questions](https://etcd.io/docs/v3.5/faq)
>
> Again, thanks for using etcd and raising this question.
>
> The etcd team

3. Finally, click `Convert to discussion` on the right-hand panel,

selecting the appropriate discussion category.

### Bug reports

If an issue has been raised as a bug it should already have the `type/bug` label, however, if this is missing for an issue you determine to be a bug please add the label manually.

The next step is to validate if the issue is indeed a bug. If not, add a comment with the findings and close the trivial issue. For non-trivial issues, wait to hear back from the issue reporter and see if there is any objection. If the issue reporter does not reply in 30 days, close the issue.

If the problem can not be reproduced or requires more information, leave a comment for the issue reporter as soon as possible while the issue is fresh for the issue reporter.

### Feature requests

New feature requests should be created via the etcd feature request template and in theory already have the `type/feature` label, however, if this is missing for an issue you determine to be a feature please add the label manually.

### Test flakes

Test flakes
are a specific type of bug that the etcd project tracks separately as these are a priority to address. These should be created via the test flake template and in theory already have the `type/flake` label, however, if this is missing for an issue you determine to be related to a flaking test please add the label manually.

## Step 4 - Define the areas impacted

Adding an `area` label to an issue helps create visibility on which areas of the etcd project require attention and helps contributors find issues to work on relating to their particular skills or knowledge of the etcd codebase.

If an issue crosses multiple domains please add additional `area` labels to reflect that.

Below is a brief summary of the area labels in active use by the etcd project along with any notes on their use:

| Label | Notes |
| --- | --- |
| area/external | Tracking label for issues raised that are external to etcd. |
| area/community | |
| area/raft | |
| area/clientv3 | |
| area/performance | |
| area/security | |
| area/tls | |
| area/auth | |
| area/etcdctl | |

| area/etcdutl | |
| area/contrib | Not to be confused with `area/community` this label is specifically used for issues relating to community-maintained scripts or files in the `contrib/` directory which aren't part of the core etcd project. |
| area/documentation | |
| area/tooling | Generally used in relation to the third party / external utilities or tools that are used in various stages of the etcd build, test, or release process, for example, tooling to create sboms. |
| area/testing | |
| area/robustness-testing | |

## Step 5 - Prioritise the issue

If an issue lacks a priority label it has not been formally prioritized yet.

Adding a `priority` label helps the etcd project understand what is important and should be worked on now, and conversely, what is not as important and is on the project backlog.

|Priority label|What it means|Examples|
|---|---|---|
| `priority/critical-urgent` | Maintainers are responsible for making sure that these issues (in their area) are being actively worked oni.e., drop what you're doing. The stuff is burning. These should be fixed before the next release. | user-visible critical bugs in core features <br> broken builds on tier1 supported platforms <br> tests and critical security issues |
| `priority/important-soon` | Must be staffed and worked on either currently or very soonideally in time for the next release. | |
| `priority/important-longterm` | Important over the long term, but may not be currently staffed and/or may require multiple releases to complete. | |
| `priority/backlog` | General agreement that this is a nice-to-have, but no one's available to work on it anytime soon. Community contributions would be most welcome in the meantime, though it might take a while to get them reviewed if reviewers are fully occupied with higher-priority issuesfor example, immediately before a release.| |
| `priority/awaiting-more-evidence` | Possibly useful, but not yet enough support to actually get it done. | Mostly placeholders for potentially good ideas, so that they don't get completely forgotten, and can be referenced or deduped every time they come up |

## Step 6 - Support new contributors

As part of the `etcd` triage process once the `kind` and `area` have been determined, please consider if the issue would be suitable for a less experienced contributor. The `good first issue` label is a subset of the `help wanted` label, indicating that members have committed to providing extra assistance for new contributors. All `good first issue` items also have the `help wanted` label.

### Help wanted

Items marked with the `help wanted` label need to ensure that they meet these criteria:

* **Low Barrier to Entry** - It should be easy for new contributors.

* **Clear** - The task is agreed upon and does not require further discussions in the community.

* **Goldilocks priority** - The priority
should not be so high that a core contributor should do it, but not too low that it isnt useful enough for a core contributor to spend time reviewing it, answering questions, helping get it into a release, etc.

### Good first issue

Items marked with `good first issue` are intended for first-time contributors. It indicates that members will keep an eye out for these pull requests and shepherd it through our processes.

New contributors should not be left to find an approver, ping for reviews, decipher test commands, or identify that their build failed due to a flake. It is important to make new contributors feel welcome and valued. We should assure them that they will have an extra level of help with their first contribution.

After a contributor has successfully completed one or two `good first issue` items, they should be ready to move on to `help wanted` items.

* **No Barrier to Entry** - The task is something that a new contributor can tackle without advanced setup or domain knowledge.

*
**Solution Explained** - The recommended solution is clearly described in the issue.

* **Gives Examples** - Link to examples of similar implementations so new contributors have a reference guide for their changes.

* **Identifies Relevant Code** - The relevant code and tests to be changed should be linked in the issue.

* **Ready to Test** - There should be existing tests that can be modified, or existing test cases fit to be copied. If the area of code doesnt have tests, before labeling the issue, add a test fixture. This prep often makes a great help wanted task!

## Step 7 - Follow up

Once initial triage has been completed, issues need to be re-evaluated over time to ensure they don't become stale incorrectly.

### Track important issues

If an issue is at risk of being closed by the stale bot in the future, but is an important issue for the etcd project, then please apply the `stage/tracked` label and remove any `stale` labels that exist. This will ensure the project does
not lose sight of the issue.

### Close incomplete issues

Issues that lack enough information from the issue reporter should be closed if the issue reporter does not provide information in 30 days. Issues can always be re-opened at a later date if new information is provided.

### Check for incomplete work

If an issue owned by a developer has no pull request created in 30 days, contact the issue owner and kindly ask about the status of their work, or to release ownership on the issue if needed.
# Branch management

## Guide

* New development occurs on the [main branch][main].
* The main branch should always have a green build!
* Backwards-compatible bug fixes should target the main branch and subsequently be ported to stable branches.
* Once the main branch is ready for release, it will be tagged and become the new stable branch.

The etcd team has adopted a *rolling release model* and supports two stable versions of etcd.

### Main branch

The `main` branch is our development branch. All new features land here first.

To try new and experimental features, pull `main` and play with it. Note that `main` may not be stable because new features may introduce bugs.

Before the release of the next stable version, feature PRs will be frozen. A [release manager](./release.md#release-management) will be assigned to the major/minor version and will lead the etcd community in testing, bug-fix, and documentation of the release for one to two weeks.

### Stable branches

All branches with
 the prefix `release-` are considered _stable_ branches.

After every minor release ([semver.org](https://semver.org/)), we will have a new stable branch for that release, managed by a [patch release manager](./release.md#release-management). We will keep fixing the backward-compatible bugs for the latest two stable releases. A _patch_ release to each supported release branch, incorporating any bug fixes, will be once every two weeks, given any patches.

[main]: https://github.com/etcd-io/etcd/tree/main
# PR management

## Purpose

Speed up PR management.

The `etcd` PRs are listed at https://github.com/etcd-io/etcd/pulls
A PR can have various labels, milestones, reviewers, etc. The detailed list of labels can be found at https://github.com/kubernetes/kubernetes/labels

Following are a few example searches on PR for convenience:

* [Open PRS for milestone etcd-v3.6](https://github.com/etcd-io/etcd/pulls?utf8=%E2%9C%93&q=is%3Apr+is%3Aopen+milestone%3Aetcd-v3.6)
* [PRs under investigation](https://github.com/etcd-io/etcd/labels/Investigating)

## Scope

These guidelines serve as a primary document for managing PRs in `etcd`. Everyone is welcome to help manage PRs but the work and responsibilities discussed in this document are created with `etcd` maintainers and active contributors in mind.

## Ensure tests are run

The etcd project use Kubernetes Prow and GitHub Actions to run tests. To ensure all required tests run if a pull request is ready for testing and still has the `needs-ok-to-test`
label then please comment on the pull request `/ok-to-test`.

## Handle inactive PRs
Poke PR owner if review comments are not addressed in 15 days. If the PR owner does not reply in 90 days, update the PR with a new commit if possible. If not, inactive PR should be closed after 180 days.

## Poke reviewer if needed

Reviewers are responsive in a timely fashion, but considering everyone is busy, give them some time after requesting a review if a quick response is not provided. If the response is not provided in 10 days, feel free to contact them via adding a comment in the PR or sending an email or message on Slack.

## Verify important labels are in place

Make sure that appropriate reviewers are added to the PR. Also, make sure that a milestone is identified. If any of these or other important labels are missing, add them. If a correct label cannot be decided, leave a comment for the maintainers to do so as needed.
# Roadmap

etcd uses GitHub milestones to track all tasks in each major or minor release. The `roadmap.md` file only records the
most important tasks for each release. The list is based on the current maintainer capacity that may shift over time. Proposed milestones are what we think we can deliver with the people we have. If we have more support on the important
stuff, we could pick up more items from the backlog. Note that etcd will continue to mainly focus on technical debt over
the next few major or minor releases.

Each item has an assigned priority. Refer to [priority definitions](https://github.com/etcd-io/etcd/blob/main/Documentation/contributor-guide/triage_issues.md#step-5---prioritise-the-issue).

## v3.6.0

For a full list of tasks in `v3.6.0`, please see [milestone etcd-v3.6](https://github.com/etcd-io/etcd/milestone/38).

| Title | Priority | Status | Note |
|---|---|---|---|
| [Support downgrade](https://github.com/etcd-io/etcd/issues/11716) | priority/important-soon | In progress | etcd will support downgrade starting from 3.6.0. But it will also support offline downgrade from 3.5 to 3.4. |
| [StoreV2 deprecation](https://github.com/etcd-io/etcd/issues/12913) | priority/important-soon | In progress | This task will be covered in both 3.6 and 3.7. |
| [Release raft 3.6.0](https://github.com/etcd-io/raft/issues/89) | priority/important-soon | Not started | etcd 3.6.0 will depends on raft 3.6.0 |
| [Release bbolt 1.4.0](https://github.com/etcd-io/bbolt/issues/553) | priority/important-soon | Not started | etcd 3.6.0 will depends on bbolt 1.4.0 |
| [Support /livez and /readyz endpoints](https://github.com/etcd-io/etcd/issues/16007) | priority/important-longterm | In progress | It provides clearer APIs, and can also work around the stalled writes issue |
| [Bump gRPC](https://github.com/etcd-io/etcd/issues/16290) | priority/important-longterm | Completed | It isn't guaranteed to be resolved in 3.6, and might be postponed to 3.7 depending on the effort and risk. |
| [Deprecate grpc-gateway or bump it](https://github.com/etcd-io/etcd/issues/14499) | priority/important-longterm | Completed | It isn't guaranteed to be resolved in 3.6, and might be postponed to 3.7 depending on the effort and risk. |
| [bbolt: Add logger into bbolt](https://github.com/etcd-io/bbolt/issues/509) | priority/important-longterm | Completed | It's important to diagnose bbolt issues |
| [bbolt: Add surgery commands](https://github.com/etcd-io/bbolt/issues/370) | priority/important-longterm | Completed | Surgery commands are important for fixing corrupted db files |
| [Evaluate and (Gradulate or deprecate/remove) experimental features](https://github.com/etcd-io/etcd/issues/16292) | priority/backlog | Not started | This task will be covered in both 3.6 and 3.7. |

## v3.7.0

For a full list of tasks in `v3.7.0`, please see [milestone etcd-v3.7](https://github.com/etcd-io/etcd/milestone/39).

| Title | Priority | Note |
|---|---|---|
| [StoreV2 deprecation](https://github.com/etcd-io/etcd/issues/12913) | P0 | Finish the remaining tasks 3.7. |
| [Refactor lease: Lease might be revoked by mistake by old leader](https://github.com/etcd-io/etcd/issues/15247) | P1 | to be investigated & discussed |

|
| [Integrate raft's new feature (async write) into etcd](https://github.com/etcd-io/etcd/issues/16291) | P1 | It should improve the performance |
| [bbolt: Support customizing the bbolt rebalance threshold](https://github.com/etcd-io/bbolt/issues/422) | P2 | It may get rid of etcd's defragmentation. Both bbolt and etcd need to be changed. |
| [Evaluate and (graduate or deprecate/remove) experimental features](https://github.com/etcd-io/etcd/issues/16292) | P2 | Finish the remaining tasks 3.7. |

## Backlog (future releases)

| Title | Priority | Note |
|---|---|---|
| [Remove the dependency on grpc-go's experimental API](https://github.com/etcd-io/etcd/issues/15145) | | |
| [Protobuf: cleanup both golang/protobuf and gogo/protobuf](https://github.com/etcd-io/etcd/issues/14533) | | |
| [Proposals should include a merkle root](https://github.com/etcd-io/etcd/issues/13839) | | |
| [Add Distributed Tracing using OpenTelemetry](https://github.com/etcd-io/etcd/issues/12460) | | |
| [Support CA rotation](https://github.com/etcd-io/etcd/issues/11555) | | |
| [bbolt: Migrate all commands to cobra style commands](https://github.com/etcd-io/bbolt/issues/472) | | |
| [raft: enhance the configuration change validation](https://github.com/etcd-io/raft/issues/80) | | |

# Release

The guide talks about how to release a new version of etcd.

The procedure includes some manual steps for sanity checking, but it can probably be further scripted. Please keep this document up-to-date if making changes to the release process.

## Release management

The following pool of release candidates manages the release of each etcd major/minor version as well as manages patches
to each stable release branch. They are responsible for communicating the timelines and status of each release and for ensuring the stability of the release branch.

- Benjamin Wang [@ahrtr](https://github.com/ahrtr)
- James Blair [@jmhbnz](https://github.com/jmhbnz)
- Marek Siarkowicz [@serathius](https://github.com/serathius)
- Sahdev Zala [@spzala](https://github.com/spzala)
- Wenjia Zhang [@wenjiaswe](https://github.com/wenjiaswe)

All release version numbers follow the format of [semantic versioning 2.0.0](http://semver.org/).

### Major, minor version release, or its pre-release

- Ensure

the relevant [milestone](https://github.com/etcd-io/etcd/milestones) on GitHub is complete. All referenced issues should be closed or moved elsewhere.
- Ensure the latest [upgrade documentation](https://etcd.io/docs/next/upgrades) is available.
- Bump [hardcoded MinClusterVerion in the repository](https://github.com/etcd-io/etcd/blob/v3.4.15/version/version.go#L29), if necessary.
- Add feature capability maps for the new version, if necessary.

### Patch version release

- To request a backport, developers submit cherry-pick PRs targeting the release branch. The commits should not include merge commits. The commits should be restricted to bug fixes and security patches.
- The cherrypick PRs should target the appropriate release branch (`base:release-<major>-<minor>`). The k8s infra cherry pick robot `/cherrypick <branch>` PR chatops command may be used to automatically generate cherrypick PRs.
- The release patch manager reviews the cherrypick PRs. Please discuss carefully what is backported to the patch release. Each patch release should be strictly better than its predecessor.
- The release patch manager will cherry-pick these commits starting from the oldest one into stable branch.

## Write a release note

- Write an introduction for the new release. For example, what major bug we fix, what new features we introduce, or what performance improvement we make.
- Put `[GH XXXX]` at the head of the change line to reference the Pull Request that introduces the change. Moreover, add a link on it to jump to the Pull Request.
- Find PRs with the `release-note` label and explain them in the `NEWS` file, as a straightforward summary of changes for end-users.

## Patch release criteria

The etcd project aims to release a new patch version if any of the following conditions are met:

- Fixed one or more major CVEs (>=7.5).
- Fixed one or more critical bugs.
- Fixed three or more major bugs.
- Fixed five or more minor bugs.

## Release guide

### Prerequisites

There are some prerequisites, which should be done before the release process. These are one-time operations, which don't need to be executed before releasing each version.
1. Generate a GPG key and add it to your GitHub account. Refer to the links on [settings](https://github.com/settings/keys).
2. Ensure you have a Linux machine, on which the git, Golang, and docker have been installed.
   - Ensure the Golang version matches the version defined in `.go-version` file.
   - Ensure non-privileged users can run docker commands, refer to the [Linux

postinstall](https://docs.docker.com/engine/install/linux-postinstall/).
  - Ensure there is at least 5GB of free space on your Linux machine.
3. Install gsutil, refer to [gsutil_install](https://cloud.google.com/storage/docs/gsutil_install). When asked about cloud project to use, pick `etcd-development`.
4. Authenticate the image registry, refer to [Authentication methods](https://cloud.google.com/container-registry/docs/advanced-authentication).
  - `gcloud
 auth login`
  - `gcloud auth configure-docker`
5. Install gh, refer to [GitHub's documentation](https://github.com/cli/cli#installation). Ensure that running
  `gh auth login` succeeds for the GitHub account you use to contribute to etcd,
  and that `gh auth status` has a clean exit and doesn't show any issues.

### Release steps

1. Raise an issue to publish the release plan, e.g. [issues/17350](https://github.com/etcd-io/etcd/issues/17350).
2. Raise a `kubernetes/org` pull request to temporarily elevate permissions for the GitHub release team.
3. Once permissions are elevated, temporarily relax [branch protections](https://github.com/etcd-io/etcd/settings/branches) to allow pushing changes directly to `release-*` branches in GitHub.
4. Verify you can pass the authentication to the image registries,
  - `docker login gcr.io`
  - `docker login quay.io`
    - If the release person doesn't have access to 1password, one of the owners (@ahrtr, @ivanvc, @jmhbnz, @serathius) needs
 to share the password with them per [this guide](https://support.1password.com/share-items/). See rough steps below,
      - [Sign in](https://team-etcd.1password.com/home) to your account on 1password.com.
      - Click `Your Vault Items` on the right side.
      - Select `Password of quay.io`.
      - Click `Share` on the top right, and set expiration as `1 hour` and only available to the release person using his/her email.
      - Click `Copy Link` then send the link to the release person via slack or email.
5. Clone the etcd repository and checkout the target branch,
  - `git clone --branch release-3.X git@github.com:etcd-io/etcd.git`
6. Run the release script under the repository's root directory, replacing `${VERSION}` with a value without the `v` prefix, i.e. `3.5.13`.
  - `DRY_RUN=false ./scripts/release.sh ${VERSION}`
  - **NOTE:** When doing a pre-release (i.e., a version from the main branch, 3.6.0-alpha.2), you will need to explicitly set the branch to main:

  ```
    DRY_RUN=false BRANCH=main ./scripts/release.sh ${VERSION}
    ```

  It generates all release binaries under the directory `/tmp/etcd-release-${VERSION}/etcd/release/` and images. Binaries are pushed to the Google Cloud bucket
  under project `etcd-development`, and images are pushed to `quay.io` and `gcr.io`.
7. Publish the release page on GitHub

- Open the **draft** release URL shown by the release script
- Click the pen button at the top right to edit the release
- Review that it looks correct, reviewing that the bottom checkboxes are checked depending on the release version (v3.4 no checkboxes, v3.5 has the set as latest release checkbox checked, v3.6 has the set as pre-release checkbox checked)
- Then, publish the release

8. Announce to the etcd-dev googlegroup

Follow the format of previous release emails sent to etcd-dev@googlegroups.com, see an example below. After sending out the email, ask one of the mailing list maintainers to approve the email from the pending list. Additionally, label the release email as `Release`.

```text
Hello,

etcd v3.4.30 is now public!

https://github.com/etcd-io/etcd/releases/tag/v3.4.30

Thanks to everyone who contributed to the release!

etcd team
```

9. Update the changelog to reflect the correct release date.
10. Paste the release link to the issue raised in Step 1 and close the issue.
11. Restore standard branch protection settings and raise a follow-up `kubernetes/org` pull request to return to least privilege permissions.
12. Crease a new stable branch through `git push origin release-${VERSION_MAJOR}.${VERSION_MINOR}` if this is a new major or minor stable release.
13. Re-generate a new password for quay.io if needed (e.g. shared to a contributor who isn't in the release team, and we should rotate the password at least once every 3 months).

#### Release known issues

1. Timeouts pushing binaries - If binaries fail to fully upload to Google Cloud storage, the script must be re-run using the same command. Any artifacts that are already pushed will be overwritten to ensure they are correct. The storage bucket does not use object versioning so incorrect files cannot remain.

2. Timeouts pushing images - It is rare, although possible for connection timeouts to occur when publishing etcd release images to `quay.io` or `gcr.io`. If this occurs, it is known to be safe to rerun the release script command appending the `--no-upload` flag, and image uploads will gracefully resume.

3. GPG vs SSH signing - The release scripts assume that git tags will be signed with a GPG key. Since 2022 GitHub has supported [signing commits and tags using ssh](https://github.blog/changelog/2022-08-23-ssh-commit-verification-now-supported). Until further release script updates are completed you will need to disable this feature in your `~/.gitconfig` and revert to signing via GPG to perform etcd releases.

# Golang modules

The etcd project (since version 3.5) is organized into multiple
[golang modules](https://golang.org/ref/mod) hosted  in a [single repository](https://golang.org/ref/mod#vcs-dir).

![modules graph](modules.svg)

There are the following modules:

- **go.etcd.io/etcd/api/v3** - contains API definitions
(like protos & proto-generated libraries) that defines communication protocol
between etcd clients and servers.

- **go.etcd.io/etcd/pkg/v3** - a collection of utility packages used by etcd
without being specific to etcd itself. A package belongs here
only if it could possibly be moved out into its own repository in the future.
Please avoid adding here code that has a lot of dependencies on its own, as
they automatically become dependencies of the client library
(that we want to keep lightweight).

- **go.etcd.io/etcd/client/v3** - client library used to contact etcd over
the network (grpc). Recommended for all new usage of etcd.

- **go.etcd.io/raft/v3**
- implementation of distributed consensus
protocol. Should have no etcd specific code. Hosted in a separate repository:
https://github.com/etcd-io/raft.

- **go.etcd.io/etcd/server/v3** - etcd implementation.
The code in this package is internal to etcd and should not be consumed
by external projects. The package layout and API can change within the minor versions.

- **go.etcd.io/etcd/etcdctl/v3** - a command line tool to access and manage etcd.

- **go.etcd.io/etcd/tests/v3** - a module that contains all integration tests of etcd.
  Notice: All unit tests (fast and not requiring cross-module dependencies)
  should be kept in the local modules of the code under the test.

- **go.etcd.io/bbolt** - implementation of persistent b-tree.
  Hosted in a separate repository: https://github.com/etcd-io/bbolt.

### Operations

1. All etcd modules should be released in the same versions, e.g.
  `go.etcd.io/etcd/client/v3@v3.5.10` must depend on `go.etcd.io/etcd/api/v3@v3.5.10`.

The consistent updating of versions can be performed using:
```shell script
% DRY_RUN=false TARGET_VERSION="v3.5.10" ./scripts/release_mod.sh update_versions
```

2. The released modules should be tagged according to https://golang.org/ref/mod#vcs-version rules,
i.e. each module should get its own tag.
The tagging can be performed using:
```shell script
% DRY_RUN=false REMOTE_REPO="origin" ./scripts/release_mod.sh push_mod_tags
```

3. All etcd modules should depend on the same versions of underlying dependencies.
This can be verified using:
```shell script
% PASSES="dep" ./test.sh
```

4. The go.mod files must not contain dependencies not being used and must
conform to `go mod tidy` format.
This is being verified by:
```
% PASSES="mod_tidy" ./test.sh
```

5. To trigger actions across all modules (e.g. auto-format all files), please
use/expand the following script:
```shell script
% ./scripts/fix.sh
```

###
Future

As a North Star, we would like to evaluate etcd modules towards the following model:

![modules graph](modules-future.svg)

This assumes:
- Splitting etcdmigrate/etcdadm out of etcdctl binary.
  Thanks to this etcdctl would become clearly a command-line wrapper
  around network client API,
  while etcdmigrate/etcdadm would support direct physical operations on the
  etcd storage files.
- Splitting etcd-proxy out of ./etcd binary, as it contains more experimental code
  so carries additional risk & dependencies.
- Deprecation of support for v2 protocol.

# Reporting bugs

If any part of the etcd project has bugs or documentation mistakes, please let us know by [opening an issue][etcd-issue]. We treat bugs and mistakes very seriously and believe no issue is too small. Before creating a bug report, please check that an issue reporting the same problem does not already exist.

To make the bug report accurate and easy to understand, please try to create bug reports that are:

- Specific. Include as many details as possible: which version, what environment, what configuration, etc. If the bug is related to running the etcd server, please attach the etcd log (the starting log with the etcd configuration is especially important).

- Reproducible. Include the steps to reproduce the problem. We understand some issues might be hard to reproduce, please include the steps that might lead to the problem. If possible, please attach the affected etcd data dir and stack trace to the bug report.

- Isolated. Please try to isolate and reproduce the bug with
 minimum dependencies. It would significantly slow down the speed to fix a bug if too many dependencies are involved in a bug report. Debugging external systems that rely on etcd is out of scope, but we are happy to provide guidance in the right direction or help with using etcd itself.

- Unique. Do not duplicate existing bug reports.

- Scoped. One bug per report. Do not follow up with another bug inside one report.

It may be worthwhile to read [Elika Etemads article on filing good bug reports][filing-good-bugs] before creating a bug report.

We might ask for further information to locate a bug. A duplicated bug report will be closed.

## Frequently asked questions

### How to get a stack trace

```bash
$ kill -QUIT $PID
```

### How to get the etcd version

```bash
$ etcd --version
```

### How to get etcd configuration and log when it runs as systemd service etcd2.service

```bash
$ sudo systemctl cat etcd2
$ sudo journalctl -u etcd2
```

Due to an upstream systemd bug, journald
may miss the last few log lines when its processes exit. If journalctl says etcd stopped without a fatal or panic message, try `sudo journalctl -f -t etcd2` to get the full log.

[etcd-issue]: https://github.com/etcd-io/etcd/issues/new
[filing-good-bugs]: http://fantasai.inkedblade.net/style/talks/filing-good-bugs/
# Community membership

This doc outlines the various responsibilities of contributor roles in etcd.

| Role | Responsibilities | Requirements | Defined by |
|---|---|---|---|
| Member | Active contributor in the community | Sponsored by 2 reviewers and multiple contributions | etcd GitHub org member |
| Reviewer | Review contributions from other members | History of review and authorship | [OWNERS] file reviewer entry |
| Maintainer | Set direction and priorities for the project | Demonstrated responsibility and excellent technical judgement | [OWNERS] file approver entry |

## New contributors

New contributors should be welcomed to the community by existing members,
helped with
PR workflow, and directed to relevant documentation and
communication channels.

## Established community members

Established community members are expected to demonstrate their adherence to the
principles in this document, familiarity with project organization, roles,
policies, procedures, conventions, etc., and technical and/or writing ability.
Role-specific expectations, responsibilities, and requirements are enumerated
below.

## Member

Members are continuously active contributors to the community. They can have
issues and PRs assigned to them. Members are expected to remain active
contributors to the community.

**Defined by:** Member of the etcd GitHub organization.

### Requirements

- Enabled [two-factor authentication] on their GitHub account

- Have made multiple contributions to the project or community.  Contribution may include, but is not limited to:
  - Authoring or reviewing PRs on GitHub. At least one PR must be **merged**.
  - Filing or commenting on issues on
GitHub
  - Contributing to community discussions (e.g. meetings, Slack, email discussion
    forums, Stack Overflow)
- Subscribed to [etcd-dev@googlegroups.com](https://groups.google.com/g/etcd-dev)
- Have read the [contributor guide]
- Sponsored by two active maintainers or reviewers.
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
  - With no objections from other maintainers
- Open a [membership nomination] issue against the `kubernetes/org` repo
  - Ensure your sponsors are @mentioned on the issue
  - Make sure that the list of contributions included is representative of your work on the project.
- Members can be removed by a supermajority of the maintainers or can resign by notifying
the maintainers.

### Responsibilities and privileges

- Responsive to issues and PRs assigned to them
- Granted "triage access" to etcd project
- Active owner of code they have contributed (unless ownership is explicitly transferred)
  - Code is well-tested
  - Tests consistently pass
  - Addresses bugs or issues discovered after code is accepted

**Note:** Members who frequently contribute code are expected to proactively
perform code reviews and work towards becoming a *reviewer*.

## Reviewers

Reviewers are contributors who have demonstrated greater skill in
reviewing the code from other contributors. They are knowledgeable about both
the codebase and software engineering principles. Their LGTM counts towards
merging a code change into the project. A reviewer is generally on the ladder towards
maintainership.

**Defined by:** *reviewers* entry in the [OWNERS] file.

### Requirements

- member for at least 3 months.
- Primary reviewer for at least 5 PRs to the codebase.
- Reviewed or contributed at least 20 substantial PRs to the codebase.
- Knowledgeable about the codebase.
- Sponsored by two active maintainers.
  - Sponsors must be from multiple member companies to demonstrate integration across the

community.
  - With no objections from other maintainers
- Reviewers can be removed by a supermajority of the maintainers or can resign by notifying the maintainers.

### Responsibilities and privileges

- Code reviewer status may be a precondition to accepting large code contributions
- Responsible for project quality control via code reviews
  - Focus on code quality and correctness, including testing and factoring
  - May also review for more holistic issues, but not a requirement
- Expected to be responsive to review requests
- Assigned PRs to review related to area of expertise
- Assigned test bugs related to area of expertise
- Granted "triage access" to etcd project

## Maintainers

Maintainers are first and foremost contributors who have shown they are committed to the long-term success of a project. Maintainership is about building trust with the current maintainers and being a person that they can depend on to make decisions in the best interest of the project in a consistent manner.

**Defined by:** *approvers* entry in the [OWNERS] file.

### Requirements

- Deep understanding of the technical goals and direction of the project
- Deep understanding of the technical domain of the project
- Sustained contributions to design and direction by doing all of:
  - Authoring and reviewing proposals
  - Initiating, contributing, and resolving discussions (emails, GitHub issues, meetings)
  - Identifying subtle or complex issues in the designs and implementation of PRs
- Directly contributed to the project through implementation and/or review
- Sponsored by two active maintainers and elected by supermajority
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
- To become a maintainer send an email with your candidacy to etcd-maintainers-private@googlegroups.com
  - Ensure your sponsors are @mentioned in the email
  - Include a list of contributions representative of your work on the project.
  -
Existing maintainers vote will privately and respond to the email with either acceptance or feedback for suggested improvement.
- With your membership approved you are expected to:
 - Open a PR and add an entry to the [OWNERS] file
 - Subscribe to etcd-maintainers@googlegroups.com and etcd-maintainers-private@googlegroups.com
 - Request to join [etcd-maintainer teams of etcd organization of GitHub](https://github.com/orgs/etcd-io/teams/maintainers-etcd)

- Request to join the private slack channel for etcd maintainers on [kubernetes slack](http://slack.kubernetes.io/)
- Request access to etcd-development GCP project where we publish releases
- Request access to passwords shared between maintainers

### Responsibilities and privileges

- Make and approve technical design decisions
- Set technical direction and priorities
- Define milestones and releases
- Mentor and guide reviewers, and contributors to the project.
- Participate when called upon in the [security disclosure and release process]
- Ensure the continued health of the project
  - Adequate test coverage to confidently release
  - Tests are passing reliably (i.e. not flaky) and are fixed when they fail
- Ensure a healthy process for discussion and decision-making is in place.
- Work with other maintainers to maintain the project's overall health and success holistically

### Retiring

Life priorities, interests, and passions can change. Maintainers can retire and move to [emeritus maintainers]. If a maintainer needs to step down, they should inform other maintainers and, if possible, help find someone to pick up the related work. At the very least, ensure the related work can be continued. Afterward, they can remove themselves from the list of existing maintainers.

If a maintainer has not been performing their duties for 12 months, they can be removed by other maintainers. In that case, the inactive maintainer will be first notified via an email. If the situation doesn't improve, they will be removed.
If an emeritus maintainer wants to regain an active role, they can do so by renewing their contributions. Active maintainers should welcome such a move. Retiring other maintainers or regaining the status should require the approval of at least two active maintainers.

## Acknowledgements

Contributor roles and responsibilities were written based on [Kubernetes community membership]

[OWNERS]: /OWNERS
[contributor guide]: /CONTRIBUTING.md
[membership nomination]: https://github.com/kubernetes/org/issues/new?assignees=&labels=area%2Fgithub-membership&projects=&template=membership.yml&title=REQUEST%3A+New+membership+for+%3Cyour-GH-handle%3E
[Kubernetes community membership]: https://github.com/kubernetes/community/blob/master/community-membership.md
[emeritus maintainers]: /README.md#etcd-emeritus-maintainers
[security disclosure and release process]: /security/README.md

[two-factor authentication]: https://docs.github.com/en/authentication/securing-your-account-with-two-factor-authentication-2fa/about-two-factor-authentication

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# Logging Conventions

etcd uses the [zap][zap] library for logging application output categorized into *levels*. A log message's level is determined according to these conventions:

* Debug: Everything is still fine, but even common operations may be logged, and less helpful but more quantity of notices. Usually not used in production.
  * Examples:
    * Send a normal message to a remote peer
    * Write a log entry to disk

* Info: Normal, working log information, everything is fine, but helpful notices for auditing or common operations. Should rather not be logged more frequently than once per a few seconds in a normal server's operation.
  * Examples:
    * Startup configuration
    * Start to do a snapshot

* Warning: (Hopefully) Temporary conditions that may cause errors, but may work fine. A replica disappearing (that may reconnect) is a warning.
  * Examples:
    * Failure to send a raft message to a remote peer
    * Failure to receive heartbeat message within the configured election
timeout

* Error: Data has been lost, a request has failed for a bad reason, or a required resource has been lost.
  * Examples:
    * Failure to allocate disk space for WAL

* Panic: Unrecoverable or unexpected error situation that requires stopping execution.
 * Examples:
   * Failure to create the database

* Fatal: Unrecoverable or unexpected error situation that requires immediate exit. Mostly used in the test.
 * Examples:
   * Failure to find the data directory
   * Failure to run a test function

[zap]: https://github.com/uber-go/zap
# Dependency management

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## Main branch

The dependabot is enabled & [configured](https://github.com/etcd-io/etcd/blob/main/.github/dependabot.yml) to manage dependencies for etcd `main` branch. But dependabot doesn't work well for multi-module repository like `etcd`,
see [dependabot-core/issues/6678](https://github.com/dependabot/dependabot-core/issues/6678).
Usually, human intervention is required
 each time when dependabot automatically opens some PRs to bump dependencies.
Please see the guidance below.

### Dependencies used in workflows

The PRs that automatically bump dependencies (see examples below) used in workflows are fine and can be approved & merged directly as long as all checks are successful.

- [build(deps): bump github/codeql-action from 2.2.11 to 2.2.12](https://github.com/etcd-io/etcd/pull/15736)
- [build(deps): bump actions/checkout from 3.5.0 to 3.5.2](https://github.com/etcd-io/etcd/pull/15735)
- [build(deps): bump ossf/scorecard-action from 2.1.2 to 2.1.3](https://github.com/etcd-io/etcd/pull/15607)

### Bumping order

When multiple etcd modules depend on the same package, please bump the package version for all the modules in the correct order. The rule is simple:
if module A depends on module B, then bump the dependency for module B before module A. If the two modules do not depend on each other, then
it doesn't matter to bump which module first. For
example, multiple modules depend on `github.com/spf13/cobra`, so we need to bump the dependency
in the following order,

- go.etcd.io/etcd/pkg/v3
- go.etcd.io/etcd/server/v3
- go.etcd.io/etcd/etcdctl/v3
- go.etcd.io/etcd/etcdutl/v3
- go.etcd.io/etcd/tests/v3
- go.etcd.io/etcd/v3
- go.etcd.io/etcd/tools/v3

For more details about etcd Golang modules, please check <https://etcd.io/docs/next/dev-internal/modules>

Note the module `go.etcd.io/etcd/tools/v3` doesn't depend on any other modules, nor by any other modules, so it doesn't matter when to bump dependencies for it.

### Steps to bump a dependency

Use the `github.com/spf13/cobra` as an example, follow the steps below to bump it from 1.6.1 to 1.7.0 for module `go.etcd.io/etcd/etcdctl/v3`,

```bash
cd ${ETCD_ROOT_DIR}/etcdctl
go get github.com/spf13/cobra@v1.7.0
go mod tidy
cd ..
./scripts/fix.sh
```

Execute the same steps for all other modules. When you finish bumping the dependency for all modules, then commit the change,

```bash
git
 add .
git commit --signoff -m "dependency: bump github.com/spf13/cobra from 1.6.1 to 1.7.0"
```

Please close the related PRs which were automatically opened by dependabot.

When you bump multiple dependencies in one PR, it's recommended to create a separate commit for each dependency. But it isn't a must; for example,
you can get all dependencies bumping for the module `go.etcd.io/etcd/tools/v3` included in one commit.

#### Troubleshooting

In an event of bumping the version of protoc, protoc plugins or grpc-gateway, it might change `*.proto` file which can result in the following error:

```bash
[0;31mFAIL: 'genproto' FAILED at Wed Jul 31 07:09:08 UTC 2024
make: *** [Makefile:134: verify-genproto] Error 255
```

To fix the above error, run the following script from the root of etcd repository:

```bash
./scripts/genproto.sh
```

### Indirect dependencies

Usually, we don't bump a dependency if all modules just indirectly depend on it, such as `github.com/go-logr/logr`.

If
an indirect dependency (e.g. `D1`) causes any CVE or bugs that affect etcd, usually the module (e.g. `M1`, not part of etcd, but used by etcd)
which depends on it should bump the dependency (`D1`), and then etcd just needs to bump `M1`. However, if the module (`M1`) somehow doesn't
bump the problematic dependency, then etcd can still bump it (`D1`) directly following the same steps above. But as a long-term solution, etcd should
try to remove the dependency on such module (`M1`) that lack maintenance.

For mixed cases, in which some modules directly while others indirectly depend on a dependency, we have multiple options,

- Bump the dependency for all modules, no matter it's direct or indirect dependency.
- Bump the dependency only for modules that directly depend on it.

We should try to follow the first way, and temporarily fall back to the second one if we run into any issue on the first way. Eventually we
should fix the issue and ensure all modules depend on the same version of the
dependency.

### Known incompatible dependency updates

#### arduino/setup-protoc

Please refer to [build(deps): bump arduino/setup-protoc from 1.3.0 to 2.0.0](https://github.com/etcd-io/etcd/pull/16016)

### Rotation worksheet

The dependabot scheduling interval is weekly; it means dependabot will automatically raise a bunch of PRs per week.
Usually, human intervention is required each time. We have a [rotation worksheet](https://docs.google.com/spreadsheets/d/1jodHIO7Dk2VWTs1IRnfMFaRktS9IH8XRyifOnPdSY8I/edit#gid=1394774387),
and everyone is welcome to participate; you just need to register your name in the worksheet.

## Stable branches

Usually, we don't proactively bump dependencies for stable releases unless there are any CVEs or bugs that affect etcd.

If we have to do it, then follow the same guidance above. Note that there is no `./scripts/fix.sh` in release-3.4, so no need to
execute it for 3.4.

## Golang versions

The etcd project aims to maintain a development branch that
is on the latest [Go version](https://go.dev/dl), ideally, this will align with the Go version in use for Kubernetes project development. For an example of how to update etcd to a new minor release of Go refer to issue <https://github.com/etcd-io/etcd/issues/16393> and the linked pull requests.

Suggested steps for performing a minor version upgrade for the etcd development branch:

1. Carefully review new Go version release notes and potentially related blog posts for any deprecations, performance impacts, or other considerations.
2. Create a GitHub issue to signal intent to upgrade and invite discussion, for example, <https://github.com/etcd-io/etcd/issues/16393>.
3. Complete the upgrade locally in your development environment by editing `.go-version` and running `make fix`.
4. Run performance benchmarks locally to compare before and after.
5. Raise a pull request for the changes, for example, <https://github.com/etcd-io/etcd/pull/16394>.

Stable etcd release branches will be maintained
to stay on the latest patch release of a supported Go version. Upgrading minor versions will be completed before the minor version in use currently is no longer supported. Refer to the [Go release policy](https://go.dev/doc/devel/release).

For an example of how to update etcd to a new patch release of Go refer to issue <https://github.com/etcd-io/etcd/issues/16343> and the linked pull requests.

References:

- <https://github.com/kubernetes/sig-release/blob/master/release-engineering/handbooks/go.md>

## Core dependencies mappings

[bbolt](https://github.com/etcd-io/bbolt) and [raft](https://github.com/etcd-io/raft) are two core dependencies of etcd.

Both etcd 3.4.x and 3.5.x depend on bbolt 1.3.x, and etcd 3.6.x (`main` branch) depends on bbolt 1.4.x.

raft is included in the etcd repository for release-3.4 and release-3.5 branches, so etcd 3.4.x and 3.5.x do not depend on any
external raft module. We moved raft into [a separate repository](https://github.com/etcd-io/raft) starting
 from 3.6 (`main` branch), and the first raft
release will be v3.6.0, so etcd 3.6.x will depend on raft 3.6.x.

Please see the table below:

| etcd versions | bbolt versions | raft versions |
|---|---|---|
| 3.4.x | v1.3.x | N/A |
| 3.5.x | v1.3.x | N/A |
| 3.6.x | v1.4.x | v3.6.x |

# 1.213 nftables 1.1.1-r0

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Pablo Neira Ayuso <pablo@netfilter.org>

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline

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# 1.223 to-fast-properties 2.0.0

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# 1.229 chalk 5.6.2

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# 1.236 is-buffer 1.1.6

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# 1.238 @babel/helper-environment-visitor 7.22.5

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# 1.239 parent-module 1.0.1

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# 1.243 loads 0.22.0

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# 1.244 genproto-googleapis-rpc 0.0.0-20250528174236-200df99c418a

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# 1.245 pciutils 3.7.0-7.el9

## 1.245.1 Available under license :

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# 1.246 escape-string-regexp 4.0.0

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# 1.247 anaconda-user-help 1:9.2.1-1.el9.alma

## 1.247.1 Available under license :

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Found in path(s):
* /anaconda-user-help-9.2.1-1.el9.alma.src.rpm-cosi-expand-archive-5jJvwNfv/anaconda-user-help.spec
No license file was found, but licenses were detected in source scan.

```
diff -Naur anaconda-user-help-9.2.1/rhel/anaconda-gui.json anaconda-user-help-9.2.1.alma/rhel/anaconda-gui.json
--- anaconda-user-help-9.2.1/rhel/anaconda-gui.json 2023-04-24 17:11:44
+++ anaconda-user-help-9.2.1.alma/rhel/anaconda-gui.json 2023-04-24 17:12:50
@@ -34,10 +34,6 @@
    "file": "anaconda-help.xml",
    "anchor": "configuring-installation-source_configuring-software-settings"
  },
-  "subscription-configuration": {
```

```
-    "file": "anaconda-help.xml",
-    "anchor": "connect-to-red-hat_configuring-system-settings"
-  },
  "network-configuration": {
    "file": "anaconda-help.xml",
    "anchor": "network-hostname_configuring-system-settings"
diff -Naur anaconda-user-help-9.2.1/rhel/en-US/anaconda-help.xml anaconda-user-help-9.2.1.alma/rhel/en-US/anaconda-help.xml
--- anaconda-user-help-9.2.1/rhel/en-US/anaconda-help.xml 2023-01-24 19:51:42
+++ anaconda-user-help-9.2.1.alma/rhel/en-US/anaconda-help.xml 2023-04-24
 17:35:48
@@ -2,11 +2,11 @@
<info>
<title>Customizing your installation</title>
<date>2023-01-24</date>
-<orgname>Red Hat</orgname>
+<orgname>AlmaLinux OS Foundation</orgname>
</info>
<preface>
<title/>
-<simpara role="_abstract">When installing Red Hat Enterprise Linux, you can customize location, software, and system settings and parameters, using the <emphasis role="strong">Installation Summary</emphasis> window.</simpara>
+<simpara role="_abstract">When installing AlmaLinux, you can customize location, software, and system settings and parameters, using the <emphasis role="strong">Installation Summary</emphasis> window.</simpara>
<simpara>The <emphasis role="strong">Installation Summary</emphasis> window contains the following categories:</simpara>
<variablelist>
<varlistentry>
@@ -18,7 +18,7 @@
<varlistentry>
<term>SOFTWARE</term>
<listitem>
-<simpara>You can configure Connect to Red Hat, Installation Source, and Software Selection.</simpara>
+<simpara>You
 can configure Installation Source and Software Selection.</simpara>
</listitem>
</varlistentry>
<varlistentry>
@@ -61,39 +61,39 @@
<note>
<simpara>A warning message is displayed at the bottom of the <emphasis role="strong">Installation Summary</emphasis> window and the <emphasis role="strong">Begin Installation</emphasis> button is disabled until you configure all of the required categories.</simpara>
</note>
-<simpara>This section contains information about customizing your Red Hat Enterprise Linux installation using the Graphical User Interface (GUI). The GUI is the preferred method of installing Red Hat Enterprise Linux when you boot the system from a CD, DVD, or USB flash drive, or from a network using
```

PXE.</simpara>
+<simpara>This section contains information about customizing your AlmaLinux installation using the Graphical User Interface (GUI). The GUI is the preferred method of installing AlmaLinux when you boot the system from a CD, DVD, or
 USB flash drive, or from a network using PXE.</simpara>
</preface>
-<chapter xml:id="installing-rhel-using-anaconda_graphical-installation">
+<chapter xml:id="installing-almalinux-using-anaconda_graphical-installation">
<title>Configuring language and location settings</title>
<simpara role="_abstract">The installation program uses the language that you selected during installation.</simpara>
<orderedlist numeration="arabic">
<title>Prerequisites</title>
<listitem>
-<simpara>You created installation media. See <link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-single/performing_a_standard_rhel_9_installation/index#making-an-installation-cd-or-dvd_assembly_creating-a-bootable-installation-medium">Creating a bootable DVD or CD</link></simpara>
+<simpara>You created installation media.</simpara>
</listitem>
<listitem>
-<simpara>You specified an installation source if you are using the Boot ISO image file. See <link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-single/performing_a_standard_rhel_9_installation/index#prepare-installation-source_installing-RHEL">Preparing
 an installation source</link></simpara>
+<simpara>You specified an installation source if you are using the Boot ISO image file.</simpara>
</listitem>
<listitem>
-<simpara>You booted the installation. See <link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-single/performing_a_standard_rhel_9_installation/index#booting-the-installer_installing-RHEL">Booting the installer</link></simpara>
+<simpara>You booted the installation.</simpara>
</listitem>
</orderedlist>
<orderedlist numeration="arabic">
<title>Procedure</title>
<listitem>
-<simpara>From the left-hand pane of the <emphasis role="strong">Welcome to Red Hat Enterprise Linux</emphasis> window, select a language. Alternatively, type your preferred language into the <emphasis role="strong">Search</emphasis> field.</simpara>
+<simpara>From
 the left-hand pane of the <emphasis role="strong">Welcome to AlmaLinux</emphasis> window, select a language. Alternatively, type your preferred language into the <emphasis role="strong">Search</emphasis> field.</simpara>
<note>
<simpara>A language is pre-selected by default. If network access is configured, that is, if you booted from a network server instead of local media, the pre-selected language is determined by the automatic location detection feature of the <emphasis role="strong">GeoIP</emphasis> module. If you used the <literal role="option">inst.lang=</literal> option on the boot command line or in your PXE server configuration, then the language that you define with the boot option is selected.</simpara>

```
</note>
</listitem>
<listitem>
-<simpara>From the right-hand pane of the <emphasis role="strong">Welcome to Red Hat Enterprise
Linux</emphasis> window, select a location specific to your region.</simpara>
+<simpara>From the right-hand pane of the
 <emphasis role="strong">Welcome to AlmaLinux</emphasis> window, select a location specific to your
region.</simpara>
</listitem>
<listitem>
<simpara>Click <guibutton>Continue</guibutton> to proceed to the <link linkend="graphical-
installation_graphical-installation">Graphical installations</link> window.</simpara>
</listitem>
<listitem>
-<simpara>If you are installing a pre-release version of Red Hat Enterprise Linux, a warning message
is displayed about the pre-release status of the installation media.</simpara>
+<simpara>If you are installing a pre-release version of AlmaLinux, a warning message is displayed about the pre-
release status of the installation media.</simpara>
<orderedlist numeration="loweralpha">
<listitem>
<simpara>To continue with the installation, click <guibutton>I want to proceed</guibutton>, or</simpara>
@@ -104,12 +104,6 @@
</orderedlist>
</listitem>
</orderedlist>
-<itemizedlist role="_additional-resources">
-<title>Additional resources</title>
-<listitem>
-<simpara><link
 xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-
single/performing_a_standard_rhel_9_installation/index#configuring-localization-settings_graphical-
installation">Configuring localization settings</link></simpara>
-</listitem>
-</itemizedlist>
</chapter>
<chapter xml:id="configuring-localization-settings_graphical-installation">
<title>Configuring localization options</title>
@@ -119,8 +113,8 @@
</important>
<note>
<title>Configuring keyboard, language, and time and date settings</title>
-<simpara>Keyboard, Language, and Time and Date Settings are configured by default as part of <link
xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-
single/performing_a_standard_rhel_9_installation/index#installing-rhel-using-anaconda_graphical-
installation">Installing RHEL using Anaconda</link>.
-To change any of the settings, complete the following steps, otherwise proceed to <link
xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-
single/performing_a_standard_rhel_9_installation/index#configuring-software-settings_graphical-
```

installation">Configuring
 software settings</link>.</simpara>
+<simpara>Keyboard, Language, and Time and Date Settings are configured by default as part of <link
xl:href="https://wiki.almalinux.org/documentation/installation-guide">Installing AlmaLinux using
Anaconda</link>.
+To change any of the settings, complete the following steps.</simpara>
</note>
<orderedlist numeration="arabic">
<title>Procedure</title>
@@ -128,7 +122,7 @@
<simpara>Configure keyboard settings:</simpara>
<orderedlist numeration="loweralpha">
<listitem>
-<simpara>From the <emphasis role="strong">Installation Summary</emphasis> window, click <emphasis
role="strong">Keyboard</emphasis>. The default layout depends on the option selected in <link
linkend="installing-rhel-using-anaconda_graphical-installation">Installing RHEL using
Anaconda</link>.</simpara>
+<simpara>From
 the <emphasis role="strong">Installation Summary</emphasis> window, click <emphasis
role="strong">Keyboard</emphasis>. The default layout depends on the option selected in <link
linkend="installing-almalinux-using-anaconda_graphical-installation">Installing AlmaLinux using
Anaconda</link>.</simpara>
</listitem>
<listitem>
<simpara>Click <guibutton>+</guibutton> to open the <emphasis role="strong">Add a Keyboard
Layout</emphasis> window and change to a different layout.</simpara>
@@ -173,8 +167,8 @@
<listitem>
<simpara>From the <emphasis role="strong">Installation Summary</emphasis> window, click <emphasis
role="strong">Time & Date</emphasis>. The <emphasis role="strong">Time & Date</emphasis>
window opens.</simpara>
<note>
-<simpara>The <emphasis role="strong">Time & Date</emphasis> settings are configured by default based on
the settings you selected in <link linkend="installing-rhel-using-anaconda_graphical-installation">Installing
 RHEL using Anaconda</link>.</simpara>
-<simpara>The list of cities and regions come from the Time Zone Database (<literal
role="package">tzdata</literal>) public domain that is maintained by the Internet Assigned Numbers Authority
(IANA). Red Hat can not add cities or regions to this database. You can find more information at the <link
xl:href="http://www.iana.org/time-zones">IANA official website</link>.</simpara>
+<simpara>The <emphasis role="strong">Time & Date</emphasis> settings are configured by default based
on the settings you selected in <link linkend="installing-almalinux-using-anaconda_graphical-
installation">Installing AlmaLinux using Anaconda</link>.</simpara>
+<simpara>The list of cities and regions come from the Time Zone Database (<literal
role="package">tzdata</literal>) public domain that is maintained by the Internet Assigned Numbers Authority
(IANA). AlmaLinux OS Foundation can not add cities or regions to this database. You can find more information at
the
 <link xl:href="http://www.iana.org/time-zones">IANA official website</link>.</simpara>
</note>

</listitem>
<listitem>
@@ -207,9 +201,9 @@
<simpara>This section contains information about configuring Installation Destination, KDUMP, Network and Host Name, and Security Policy.</simpara>
<section xml:id="configuring-system-settings_configuring-system-settings">
<title>Configuring installation destination</title>
-<simpara role="_abstract">Use the <emphasis role="strong">Installation Destination</emphasis> window to configure the storage options, for example, the disks that you want to use as the installation target for your Red Hat Enterprise Linux installation. You must select at least one disk.</simpara>
+<simpara role="_abstract">Use the <emphasis role="strong">Installation Destination</emphasis> window to configure the storage options, for example, the disks that you want to use as the installation target for your AlmaLinux installation. You must select at least one
 disk.</simpara>
<warning>
-<simpara>Back up your data if you plan to use a disk that already contains data. For example, if you want to shrink an existing Microsoft Windows partition and install Red Hat Enterprise Linux as a second system, or if you are upgrading a previous release of Red Hat Enterprise Linux. Manipulating partitions always carries a risk. For example, if the process is interrupted or fails for any reason data on the disk can be lost.</simpara>
+<simpara>Back up your data if you plan to use a disk that already contains data. For example, if you want to shrink an existing Microsoft Windows partition and install AlmaLinux as a second system, or if you are upgrading a previous release of AlmaLinux. Manipulating partitions always carries a risk. For example, if the process is interrupted or fails for any reason data on the disk can be lost.</simpara>
</warning>
<important>
<itemizedlist>
@@ -219,10 +213,10 @@
If you choose to partition your system
 automatically, you should manually edit your <literal>/boot</literal> partition.</simpara>
</listitem>
<listitem>
-<simpara>To configure the Red Hat Enterprise Linux boot loader to <emphasis>chain load</emphasis> from a different boot loader, you must specify the boot drive manually by clicking the <emphasis role="strong">Full disk summary and bootloader</emphasis> link from the <emphasis role="strong">Installation Destination</emphasis> window.</simpara>
+<simpara>To configure the AlmaLinux boot loader to <emphasis>chain load</emphasis> from a different boot loader, you must specify the boot drive manually by clicking the <emphasis role="strong">Full disk summary and bootloader</emphasis> link from the <emphasis role="strong">Installation Destination</emphasis> window.</simpara>
</listitem>
<listitem>
-<simpara>When you install Red Hat Enterprise Linux on a system with both multipath and non-multipath storage devices, the automatic partitioning layout in the installation
 program creates volume groups that contain a mix of multipath and non-multipath devices. This defeats the purpose of multipath storage. It is recommended that you select either multipath or non-multipath devices on the <emphasis role="strong">Installation Destination</emphasis> window. Alternatively, proceed to manual partitioning.</simpara>

+<simpara>When you install AlmaLinux on a system with both multipath and non-multipath storage devices, the automatic partitioning layout in the installation program creates volume groups that contain a mix of multipath and non-multipath devices. This defeats the purpose of multipath storage. It is recommended that you select either multipath or non-multipath devices on the <emphasis role="strong">Installation Destination</emphasis> window. Alternatively, proceed to manual partitioning.</simpara>
</listitem>
</itemizedlist>
</important>
@@ -238,7 +232,7 @@
<listitem>
<simpara>From the <emphasis role="strong">Local Standard Disks</emphasis>
 section, select the storage device that you require; a white check mark indicates your selection. Disks without a white check mark are not used during the installation process; they are ignored if you choose automatic partitioning, and they are not available in manual partitioning.</simpara>
<note>
-<simpara>All locally available storage devices (SATA, IDE and SCSI hard drives, USB flash and external disks) are displayed under <emphasis role="strong">Local Standard Disks</emphasis>. Any storage devices connected after the installation program has started are not detected. If you use a removable drive to install Red Hat Enterprise Linux, your system is unusable if you remove the device.</simpara>
+<simpara>All locally available storage devices (SATA, IDE and SCSI hard drives, USB flash and external disks) are displayed under <emphasis role="strong">Local Standard Disks</emphasis>. Any storage devices connected after the installation program has started are not detected.
 If you use a removable drive to install AlmaLinux, your system is unusable if you remove the device.</simpara>
</note>
</listitem>
<listitem>
@@ -265,11 +259,10 @@
<simpara>Optional: Under <emphasis role="strong">Storage Configuration</emphasis>, select the <emphasis role="strong">Automatic</emphasis> radio button.</simpara>
<important>
<simpara>Automatic partitioning is the <emphasis role="strong">recommended</emphasis> method of partitioning your storage.</simpara>
-<simpara>You can also configure custom partitioning, for more details see <link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-single/performing_a_standard_rhel_9_installation/index#manual-partitioning_graphical-installation">Configuring manual partitioning</link></simpara>
</important>
</listitem>
<listitem>
-<simpara>Optional: To reclaim space from an existing partitioning layout, select the <emphasis role="strong">I would like to make additional space available</emphasis>
 check box. For example, if a disk you want to use already contains a different operating system and you want to make this system’s partitions smaller to allow more room for Red Hat Enterprise Linux.</simpara>
+<simpara>Optional: To reclaim space from an existing partitioning layout, select the <emphasis role="strong">I would like to make additional space available</emphasis> check box. For example, if a disk you want to use already contains a different operating system and you want to make this system’s partitions smaller to allow more room for AlmaLinux.</simpara>

</listitem>
<listitem>
<simpara>Optional: Select <emphasis role="strong">Encrypt my data</emphasis> to encrypt all partitions except the ones needed to boot the system (such as <literal>/boot</literal>) using <emphasis>Linux Unified Key Setup</emphasis> (LUKS). Encrypting your hard drive is recommended.</simpara>
@@ -283,7 +276,7 @@
<listitem>
<simpara>Click <guibutton>Save Passphrase</guibutton>
 to complete disk encryption.</simpara>
<warning>
-<simpara>If you lose the LUKS passphrase, any encrypted partitions and their data is completely inaccessible. There is no way to recover a lost passphrase. However, if you perform a Kickstart installation, you can save encryption passphrases and create backup encryption passphrases during the installation. See the <link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-single/performing_an_advanced_rhel_9_installation/index/"><emphasis>Performing an advanced RHEL 9 installation</emphasis></link> document for information.</simpara>
+<simpara>If you lose the LUKS passphrase, any encrypted partitions and their data is completely inaccessible. There is no way to recover a lost passphrase. However, if you perform a Kickstart installation, you can save encryption passphrases and create backup encryption passphrases during the installation.</simpara>
</warning>
</listitem>
</orderedlist>
@@ -292,7 +285,6
 @@
</listitem>
<listitem>
<simpara>Optional: Click the <emphasis role="strong">Full disk summary and bootloader</emphasis> link in the lower left-hand side of the window to select which storage device contains the boot loader.</simpara>
-<simpara>For more information, see <link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-single/performing_a_standard_rhel_9_installation/index#boot-loader-installation_configuring-system-settings">Boot loader installation</link>.</simpara>
<note>
<simpara>In most cases it is sufficient to leave the boot loader in the default location. Some configurations, for example, systems that require chain loading from another boot loader require the boot drive to be specified manually.</simpara>
</note>
@@ -301,7 +293,7 @@
<simpara>Click <guibutton>Done</guibutton>.</simpara>
<orderedlist numeration="loweralpha">
<listitem>
-<simpara>If you selected <emphasis role="strong">automatic partitioning</emphasis> and
 <emphasis role="strong">I would like to make additional space available</emphasis>, or if there is not enough free space on your selected hard drives to install Red Hat Enterprise Linux, the <emphasis role="strong">Reclaim Disk Space</emphasis> dialog box opens when you click <guibutton>Done</guibutton>, and lists all configured disk devices and all partitions on those devices. The dialog box displays information about how much space the system needs for a minimal installation and how much space you have reclaimed.</simpara>
+<simpara>If you selected <emphasis role="strong">automatic partitioning</emphasis> and <emphasis role="strong">I would like to make additional space available</emphasis>, or if there is not enough free space on

your selected hard drives to install AlmaLinux, the <emphasis role="strong">Reclaim Disk Space</emphasis> dialog box opens when you click <guibutton>Done</guibutton>, and lists all configured disk devices and all partitions on those devices. The
 dialog box displays information about how much space the system needs for a minimal installation and how much space you have reclaimed.</simpara>
<warning>
<simpara>If you <emphasis role="strong">delete</emphasis> a partition, all data on that partition is lost. If you want to preserve your data, use the <emphasis role="strong">Shrink</emphasis> option, not the <emphasis role="strong">Delete</emphasis> option.</simpara>
</warning>
@@ -312,11 +304,11 @@
<listitem>
<simpara>To reclaim space, select a disk or partition, and click either the <guibutton>Delete</guibutton> button to delete that partition, or all partitions on a selected disk, or click <guibutton>Shrink</guibutton> to use free space on a partition while preserving the existing data.</simpara>
<note>
-<simpara>Alternatively, you can click <guibutton>Delete all</guibutton>, this deletes all existing partitions on all disks and makes this space available to Red Hat Enterprise Linux. Existing data on all disks is
 lost.</simpara>
+<simpara>Alternatively, you can click <guibutton>Delete all</guibutton>, this deletes all existing partitions on all disks and makes this space available to AlmaLinux. Existing data on all disks is lost.</simpara>
</note>
</listitem>
<listitem>
-<simpara>Click <guibutton>Reclaim space</guibutton> to apply the changes and return to <link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-single/performing_a_standard_rhel_9_installation/index#graphical-installation_graphical-installation">Graphical installations</link>.</simpara>
+<simpara>Click <guibutton>Reclaim space</guibutton> to apply the changes and return installations</simpara>
</listitem>
</orderedlist>
</listitem>
@@ -333,13 +325,13 @@
</section>
<section xml:id="boot-loader-installation_configuring-system-settings">
<title>Configuring boot loader</title>
-<simpara role="_abstract">Red Hat Enterprise Linux uses GRand Unified Bootloader version 2 (<emphasis
 role="strong"><phrase role="application">GRUB2</phrase></emphasis>) as the boot loader for AMD64 and Intel 64, IBM Power Systems, and ARM. For 64-bit IBM Z, the <emphasis role="strong">zipl</emphasis> boot loader is used.</simpara>
+<simpara role="_abstract">AlmaLinux uses GRand Unified Bootloader version 2 (<emphasis role="strong"><phrase role="application">GRUB2</phrase></emphasis>) as the boot loader for AMD64 and Intel 64, IBM Power Systems, and ARM. For 64-bit IBM Z, the <emphasis role="strong">zipl</emphasis> boot loader is used.</simpara>
<simpara>The boot loader is the first program that runs when the system starts and is responsible for loading and transferring control to an operating system. <emphasis role="strong"><phrase role="application">GRUB2</phrase></emphasis> can boot any compatible operating system (including Microsoft

Windows) and can also use chain loading to transfer control to other boot loaders for unsupported operating systems.</simpara>
<warning>
 <simpara>Installing <emphasis role="strong"><phrase role="application">GRUB2</phrase></emphasis> may overwrite your existing boot loader.</simpara>
</warning>
-<simpara>If an operating system is already installed, the Red Hat Enterprise Linux installation program attempts to automatically detect and configure the boot loader to start the other operating system. If the boot loader is not detected, you can manually configure any additional operating systems after you finish the installation.</simpara>
-<simpara>If you are installing a Red Hat Enterprise Linux system with more than one disk, you might want to manually specify the disk where you want to install the boot loader.</simpara>
+<simpara>If an operating system is already installed, the AlmaLinux installation program attempts to automatically detect and configure the boot loader to start the other operating system. If the boot loader is not detected, you can manually configure any additional operating systems
 after you finish the installation.</simpara>
+<simpara>If you are installing a AlmaLinux system with more than one disk, you might want to manually specify the disk where you want to install the boot loader.</simpara>
<orderedlist numeration="arabic">
<title>Procedure</title>
<listitem>
@@ -378,7 +370,7 @@
</orderedlist>
</listitem>
<listitem>
-<simpara>Click <guibutton>Done</guibutton> to apply the settings and return to <link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-single/performing_a_standard_rhel_9_installation/index#graphical-installation_graphical-installation">Graphical installations</link>.</simpara>
+<simpara>Click <guibutton>Done</guibutton> to apply the settings and return to installation</simpara>
</listitem>
</orderedlist>
<note>
@@ -404,7 +396,7 @@
<note>
<itemizedlist>
<listitem>
-<simpara>There are several types of network device naming standards used to identify network devices with persistent names, for example,
 <literal>em1</literal> and <literal>wl3sp0</literal>. For information about these standards, see the <link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-single/configuring_and_managing_networking/index/"><emphasis>Configuring and managing networking</emphasis></link> document.</simpara>
+<simpara>There are several types of network device naming standards used to identify network devices with persistent names, for example, <literal>em1</literal> and <literal>wl3sp0</literal>.</simpara>
</listitem>
</itemizedlist>
</note>

@@ -432,7 +424,7 @@
<simpara>The host name can either be a fully qualified domain name (FQDN) in the format <literal><emphasis>hostname.domainname</emphasis></literal>, or a short host name without the domain. Many networks have a Dynamic Host Configuration Protocol (DHCP) service that automatically supplies connected systems with a domain name. To allow the DHCP service to assign the domain name to this system, specify only the short host name.</simpara>
</listitem>
<listitem>
-<simpara>When using static IP and host name configuration, it depends on the planned system use case whether to use a short name or FQDN. Red Hat Identity Management configures FQDN during provisioning but some 3rd party software products may require short name. In either case, to ensure availability of both forms in all situations, add an entry for the host in <literal>/etc/hosts`</literal> in the format <literal>IP FQDN short-alias</literal>.</simpara>
+<simpara>When using static IP and host name configuration, it depends on the planned system use case whether to use a short name or FQDN. AlmaLinux Identity Management configures FQDN during provisioning but some 3rd party software products may require short name. In either case, to ensure availability of both forms in all situations, add an entry for the host in <literal>/etc/hosts`</literal> in the format <literal>IP FQDN short-alias</literal>.</simpara>
</listitem>
<listitem>
<simpara>The value <literal>localhost</literal> means that no specific static host name for the target system is configured, and the actual host name of the installed system is configured during the processing of the network configuration, for example, by NetworkManager using DHCP or DNS.</simpara>
@@ -471,7 +463,7 @@
</listitem>
<listitem>
<simpara><emphasis role="strong">Team</emphasis>: NIC Teaming, a new implementation to aggregate links, designed to provide a small kernel driver to implement the fast handling of packet flows, and various applications to do everything else in user space.</simpara>
-<simpara>Network teaming is deprecated in Red Hat Enterprise Linux 9. Consider using the network bonding driver as an alternative. For details, see <link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html/configuring_and_managing_networking/configuring-network-bonding_configuring-and-managing-networking">Configuring network bonding</link>.</simpara>
+<simpara>Network teaming is deprecated in AlmaLinux 9. Consider using the network bonding driver as an alternative.</simpara>
</listitem>
<listitem>
<simpara><emphasis role="strong">Vlan</emphasis> (<emphasis>Virtual LAN</emphasis>): A method to create multiple distinct broadcast domains which are mutually isolated.</simpara>
@@ -481,7 +473,6 @@
</listitem>
<listitem>
<simpara>Select the interface type and click <guibutton>Add</guibutton>. An editing interface dialog box opens, allowing you to edit any available settings for your chosen interface type.</simpara>
-<simpara>For more information see <link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-single/performing_a_standard_rhel_9_installation/index#editing-network-

interface-configuration_network-hostname">Editing network interface</link>.</simpara>
</listitem>
<listitem>
<simpara>Click <guibutton>Save</guibutton> to confirm the virtual interface settings
 and return to the <emphasis role="strong">Network & Host name</emphasis> window.</simpara>
@@ -521,7 +512,7 @@
<important>
<itemizedlist>
<listitem>
-<simpara>When enabled on a wired connection, the system automatically connects during startup or reboot. On a wireless connection, the interface attempts to connect to any known wireless networks in range. For further information about NetworkManager, including the <literal>nm-connection-editor</literal> tool, see the <link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-single/configuring_and_managing_networking/index?lb_target=production"><emphasis>Configuring and managing networking</emphasis></link> document.</simpara>
+<simpara>When enabled on a wired connection, the system automatically connects during startup or reboot. On a wireless connection, the interface attempts to connect to any known wireless networks in range.</simpara>
</listitem>
<listitem>
<simpara>You can enable or
 disable all users on the system from connecting to this network using the <emphasis role="strong">All users may connect to this network</emphasis> option. If you disable this option, only <literal role="systemitem">root</literal> will be able to connect to this network.</simpara>
@@ -593,377 +584,13 @@
</listitem>
</orderedlist>
</section>
-<section xml:id="_additional_resources" role="_additional-resources">
-<title>Additional resources</title>
-<itemizedlist>
-<listitem>
-<simpara><link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-single/configuring_and_managing_networking/index/"><emphasis>Configuring and managing networking</emphasis></link></simpara>
-</listitem>
-</itemizedlist>
</section>
-</section>
-<section xml:id="connect-to-red-hat_configuring-system-settings">
-<title>Configuring Connect to Red Hat</title>
-<simpara>The Red Hat Content Delivery Network (CDN), available from cdn.redhat.com, is a geographically distributed series
 of static web servers that contain content and errata that is consumed by systems. The content can be consumed directly, such as using a system registered to Red Hat Subscription Management. The CDN is protected by x.509 certificate authentication to ensure that only valid users have access. When a system is registered to Red Hat Subscription Management, the attached subscriptions govern which subset of the CDN the system can access.</simpara>
-<simpara>Registering and installing RHEL from the CDN provides the following benefits:</simpara>

-<itemizedlist>
-<listitem>
-<simpara>The CDN installation method supports the Boot ISO and the DVD ISO image files. However, the use of the smaller Boot ISO image file is recommended as it consumes less space than the larger DVD ISO image file.</simpara>
-</listitem>
-<listitem>
-<simpara>The CDN uses the latest packages resulting in a fully up-to-date system right after installation. There is no requirement to install package updates immediately
after installation as is often the case when using the DVD ISO image file.</simpara>
-</listitem>
-<listitem>
-<simpara>Integrated support for connecting to Red Hat Insights and enabling System Purpose.</simpara>
-</listitem>
-</itemizedlist>
-<section xml:id="system_purposes-adoc_connect-to-red-hat">
-<title>Introduction to System Purpose</title>
-<simpara role="_abstract">System Purpose is an optional but recommended feature of the Red Hat Enterprise Linux installation. You use System Purpose to record the intended use of a Red Hat Enterprise Linux 9 system, and ensure that the entitlement server auto-attaches the most appropriate subscription to your system.</simpara>
-<simpara>Benefits include:</simpara>
-<itemizedlist>
-<listitem>
-<simpara>In-depth system-level information for system administrators and business operations.</simpara>
-</listitem>
-<listitem>
-<simpara>Reduced overhead when determining why a system was procured and its intended purpose.</simpara>
-</listitem>
-<listitem>
-<simpara>Improved
customer experience of Subscription Manager auto-attach as well as automated discovery and reconciliation of system usage.</simpara>
-</listitem>
-</itemizedlist>
-<simpara>You can enter System Purpose data in one of the following ways:</simpara>
-<itemizedlist>
-<listitem>
-<simpara>During image creation</simpara>
-</listitem>
-<listitem>
-<simpara>During a GUI installation when using the <emphasis role="strong">Connect to Red Hat</emphasis> screen to register your system and attach your Red Hat subscription</simpara>
-</listitem>
-<listitem>
-<simpara>During a Kickstart installation when using Kickstart automation scripts</simpara>
-</listitem>
-<listitem>

-<simpara>After installation using the <literal>subscription-manager syspurpose</literal> command-line (CLI) tool</simpara>
-</listitem>
-</itemizedlist>
-<simpara>To record the intended purpose of your system, you can configure the following components of System Purpose. The selected
values are used by the entitlement server upon registration to attach the most suitable subscription for your system.</simpara>
-<itemizedlist>
-<listitem>
-<simpara><emphasis role="strong">Role</emphasis></simpara>
-<itemizedlist>
-<listitem>
-<simpara>Red Hat Enterprise Linux Server</simpara>
-</listitem>
-<listitem>
-<simpara>Red Hat Enterprise Linux Workstation</simpara>
-</listitem>
-<listitem>
-<simpara>Red Hat Enterprise Linux Compute Node</simpara>
-</listitem>
-</itemizedlist>
-</listitem>
-<listitem>
-<simpara><emphasis role="strong">Service Level Agreement</emphasis></simpara>
-<itemizedlist>
-<listitem>
-<simpara>Premium</simpara>
-</listitem>
-<listitem>
-<simpara>Standard</simpara>
-</listitem>
-<listitem>
-<simpara>Self-Support</simpara>
-</listitem>
-</itemizedlist>
-</listitem>
-<listitem>
-<simpara><emphasis role="strong">Usage</emphasis></simpara>
-<itemizedlist>
-<listitem>
-<simpara>Production</simpara>
-</listitem>
-<listitem>
-<simpara>Development/Test</simpara>
-</listitem>
-<listitem>
-<simpara>Disaster

Recovery</simpara>
-</listitem>
-</itemizedlist>
-</listitem>
-</itemizedlist>
-<itemizedlist role="_additional-resources">
-<title>Additional resources</title>
-<listitem>
-<simpara><link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-single/composing_a_customized_rhel_system_image/index/">Composing a customized RHEL system image</link></simpara>
-</listitem>
-<listitem>
-<simpara><link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-single/performing_an_advanced_rhel_9_installation/index/">Performing an advanced RHEL 9 installation</link></simpara>
-</listitem>
-<listitem>
-<simpara><link xl:href="https://access.redhat.com/documentation/en-us/red_hat_subscription_management/1/html-single/rhsm/index/">Using and Configuring Red Hat Subscription Manager</link></simpara>
-</listitem>
-</itemizedlist>
-</section>
-<section xml:id="configuring-connect-to-redhat_connect-to-red-hat">
-<title>Configuring
Connect to Red Hat options</title>
-<simpara role="_abstract">Use the following procedure to configure the Connect to Red Hat options in the GUI.</simpara>
-<note>
-<simpara>You can register to the CDN using either your Red Hat account or your activation key details.</simpara>
-</note>
-<orderedlist numeration="arabic">
-<title>Procedure</title>
-<listitem>
-<simpara>Click <emphasis role="strong">Account</emphasis>.</simpara>
-<orderedlist numeration="loweralpha">
-<listitem>
-<simpara>Enter your Red Hat Customer Portal username and password details.</simpara>
-</listitem>
-</orderedlist>
-</listitem>
-<listitem>
-<simpara>Optional: Click <emphasis role="strong">Activation Key</emphasis>.</simpara>
-<orderedlist numeration="loweralpha">
-<listitem>
-<simpara>Enter your organization ID and activation key. You can enter more than one activation key, separated by a comma, as long as the activation keys are registered to your subscription.</simpara>

-</listitem>
-</orderedlist>
-</listitem>
-<listitem>
-<simpara>Select
 the <emphasis role="strong">Set System Purpose</emphasis> check box. System Purpose enables the entitlement server to determine and automatically attach the most appropriate subscription to satisfy the intended use of Red Hat Enterprise Linux 9 system.</simpara>
-<orderedlist numeration="loweralpha">
-<listitem>
-<simpara>Select the required <emphasis role="strong">Role</emphasis>, <emphasis role="strong">SLA</emphasis>, and <emphasis role="strong">Usage</emphasis> from the corresponding drop-down lists.</simpara>
-</listitem>
-</orderedlist>
-</listitem>
-<listitem>
-<simpara>The <emphasis role="strong">Connect to Red Hat Insights</emphasis> check box is enabled by default. Clear the check box if you do not want to connect to Red Hat Insights.</simpara>
-<note>
-<simpara>Red Hat Insights is a Software-as-a-Service (SaaS) offering that provides continuous, in-depth analysis of registered Red Hat-based systems to
 proactively identify threats to security, performance and stability across physical, virtual and cloud environments, and container deployments.</simpara>
-</note>
-</listitem>
-<listitem>
-<simpara>Optional: Expand <emphasis role="strong">Options</emphasis>.</simpara>
-<orderedlist numeration="loweralpha">
-<listitem>
-<simpara>Select the <emphasis role="strong">Use HTTP proxy</emphasis> check box if your network environment only allows external Internet access or access to content servers through an HTTP proxy. Clear the <emphasis role="strong">Use HTTP proxy</emphasis> check box if an HTTP proxy is not used.</simpara>
-</listitem>
-<listitem>
-<simpara>If you are running Satellite Server or performing internal testing, select the <emphasis role="strong">Satellite URL</emphasis> and  <emphasis role="strong">Custom base URL</emphasis> check boxes and enter the required details.</simpara>
-<important>
-<itemizedlist>
-<listitem>
-<simpara>RHEL 9 is supported only with Satellite 6.11 or
 later. Check the version prior attempting to register the system.</simpara>
-</listitem>
-<listitem>
-<simpara>The <emphasis role="strong">Satellite URL</emphasis> field does not require the HTTP protocol, for example <literal>nameofhost.com</literal>. However, the <emphasis role="strong">Custom base URL</emphasis> field requires the HTTP protocol.</simpara>

-</listitem>
-<listitem>
-<simpara>To change the <emphasis role="strong">Custom base URL</emphasis> after registration, you must unregister, provide the new details, and then re-register.</simpara>
-</listitem>
-</itemizedlist>
-</important>
-</listitem>
-</orderedlist>
-</listitem>
-<listitem>
-<simpara>Click <guibutton>Register</guibutton> to register the system. When the system is successfully registered and subscriptions are attached, the <emphasis role="strong">Connect to Red Hat</emphasis> window displays the attached subscription details.</simpara>
-<note>
-<simpara>Depending on the amount of subscriptions, the registration
 and attachment process might take up to a minute to complete.</simpara>
-</note>
-</listitem>
-<listitem>
-<simpara>Click <guibutton>Done</guibutton> to return to the <emphasis role="strong">Installation Summary</emphasis> window.</simpara>
-<orderedlist numeration="loweralpha">
-<listitem>
-<simpara>A <emphasis>Registered</emphasis> message is displayed under <emphasis role="strong">Connect to Red Hat</emphasis>.</simpara>
-</listitem>
-</orderedlist>
-</listitem>
-</orderedlist>
-</section>
-<section xml:id="how-the-default-installation-repo-works-in-cdn_connect-to-red-hat">
-<title>Installation source repository after system registration</title>
-<simpara role="_abstract">The installation source repository used after system registration is dependent on how the system was booted.</simpara>
-<variablelist>
-<varlistentry>
-<term>System booted from the Boot ISO or the DVD ISO image file</term>
-<listitem>
-<simpara>If you booted the RHEL installation using either the <literal>Boot ISO</literal>
 or the <literal>DVD ISO</literal> image file with the default boot parameters, the installation program automatically switches the installation source repository to the CDN after registration.</simpara>
-</listitem>
-</varlistentry>
-<varlistentry>
-<term>System booted with the <literal>inst.repo=<URL></literal> boot parameter</term>
-<listitem>
-<simpara>If you booted the RHEL installation with the <literal>inst.repo=<URL></literal> boot parameter,

the installation program does not automatically switch the installation source repository to the CDN after registration. If you want to use the CDN to install RHEL, you must manually switch the installation source repository to the CDN by selecting the <emphasis role="strong">Red Hat CDN</emphasis> option in the <emphasis role="strong">Installation Source</emphasis> window of the graphical installation. If you do not manually switch to the CDN, the installation program installs the packages from the repository specified
 on the kernel command line.</simpara>
-</listitem>
-</varlistentry>
-</variablelist>
-<important>
-<itemizedlist>
-<listitem>
-<simpara>You can switch the installation source repository to the CDN using the <literal>rhsm</literal> Kickstart command only if you do not specify an installation source using <literal>inst.repo=</literal> on the kernel command line or the <literal>url</literal> command in the Kickstart file. You must use <literal>inst.stage2=<URL></literal> on the kernel command line to fetch the installation image, but not specify the installation source.</simpara>
-</listitem>
-<listitem>
-<simpara>An installation source URL specified using a boot option or included in a Kickstart file takes precedence over the CDN, even if the Kickstart file contains the <literal>rhsm</literal> command with valid credentials.  The system is registered, but it is installed from the URL installation source. This ensures that earlier installation processes operate as normal.</simpara>
-</listitem>
-</itemizedlist>
-</important>
-</section>
-<section
 xml:id="verifying-registration-from-cdn-using-gui_connect-to-red-hat">
-<title>Verifying your system registration from the CDN</title>
-<simpara role="_abstract">Use this procedure to verify that your system is registered to the CDN using the GUI.</simpara>
-<warning>
-<simpara>You can only verify your registration from the CDN if you have <emphasis role="strong">not</emphasis> clicked the <emphasis role="strong">Begin Installation</emphasis> button from the <emphasis role="strong">Installation Summary</emphasis> window. Once the <emphasis role="strong">Begin Installation</emphasis> button is clicked, you cannot return to the Installation Summary window to verify your registration.</simpara>
-</warning>
-<itemizedlist>
-<title>Prerequisite</title>
-<listitem>
-<simpara>You have completed the registration process as documented in the <link linkend="register-and-install-from-cdn-using-gui_register-and-install-from-cdn">Register
 and install from CDN using GUI</link> and <emphasis>Registered</emphasis> is displayed under <emphasis role="strong">Connect to Red Hat</emphasis> on the <emphasis role="strong">Installation Summary</emphasis> window.</simpara>
-</listitem>

-</itemizedlist>
-<orderedlist numeration="arabic">
-<title>Procedure</title>
-<listitem>
-<simpara>From the <emphasis role="strong">Installation Summary</emphasis> window, select <emphasis role="strong">Connect to Red Hat</emphasis>.</simpara>
-</listitem>
-<listitem>
-<simpara>The window opens and displays a registration summary:</simpara>
-<variablelist>
-<varlistentry>
-<term>Method</term>
-<listitem>
-<simpara>The registered account name or activation keys are displayed.</simpara>
-</listitem>
-</varlistentry>
-<varlistentry>
-<term>System Purpose</term>
-<listitem>
-<simpara>If set, the role, SLA, and usage details are displayed.</simpara>
-</listitem>
-</varlistentry>
-<varlistentry>
-<term>Insights</term>
-<listitem>
-<simpara>If enabled,
 the Insights details are displayed.</simpara>
-</listitem>
-</varlistentry>
-<varlistentry>
-<term>Number of subscriptions</term>
-<listitem>
-<simpara>The number of subscriptions attached are displayed. Note: In the simple content access mode, no subscription being listed is a valid behavior.</simpara>
-</listitem>
-</varlistentry>
-</variablelist>
-</listitem>
-<listitem>
-<simpara>Verify that the registration summary matches the details that were entered.</simpara>
-</listitem>
-</orderedlist>
-<itemizedlist role="_additional-resources">
-<title>Additional resources</title>
-<listitem>
-<simpara><link xl:href="https://access.redhat.com/articles/simple-content-access">Simple Content Access</link></simpara>
-</listitem>

-</itemizedlist>
-</section>
-<section xml:id="unregistering-your-system-from-cdn-using-gui_connect-to-red-hat">
-<title>Unregistering your system from the CDN</title>
-<simpara role="_abstract">Use this procedure to unregister your system from the CDN using the GUI.</simpara>
-<warning>
-<itemizedlist>
-<listitem>
-<simpara>You can unregister from the CDN if you have <emphasis role="strong">not</emphasis> clicked the <guibutton>Begin Installation</guibutton> button from the <emphasis role="strong">Installation Summary</emphasis> window. Once the <guibutton>Begin Installation</guibutton> button is clicked, you cannot return to the Installation Summary window to unregister your registration.</simpara>
-</listitem>
-<listitem>
-<simpara>When unregistering, the installation program switches to the first available repository, in the following order:</simpara>
-<orderedlist numeration="loweralpha">
-<listitem>
-<simpara>The URL used in the inst.repo=<URL> boot parameter on the kernel command line.</simpara>
-</listitem>
-<listitem>
-<simpara>An automatically detected repository on the installation media (USB or DVD).</simpara>
-</listitem>
-</orderedlist>
-</listitem>
-</itemizedlist>
-</warning>
-<itemizedlist>
-<title>Prerequisite</title>
-<listitem>
-<simpara>You have completed the registration process as documented in the <link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-single/performing_a_standard_rhel_9_installation/index#register-and-install-from-cdn-using-gui_register-and-install-from-cdn">Registering and installing RHEL from the CDN</link> and <emphasis>Registered</emphasis> is displayed under <emphasis role="strong">Connect to Red Hat</emphasis> on the <emphasis role="strong">Installation Summary</emphasis> window.</simpara>
-</listitem>
-</itemizedlist>
-<orderedlist numeration="arabic">
-<title>Procedure</title>
-<listitem>
-<simpara>From the <emphasis role="strong">Installation Summary</emphasis> window, select <emphasis role="strong">Connect to Red Hat</emphasis>.</simpara>
-</listitem>
-<listitem>
-<simpara>The <emphasis role="strong">Connect to Red Hat</emphasis> window opens and displays a registration

summary:</simpara>
-<variablelist>
-<varlistentry>
-<term>Method</term>
-<listitem>
-<simpara>The
 registered account name or activation keys used are displayed.</simpara>
-</listitem>
-</varlistentry>
-<varlistentry>
-<term>System Purpose</term>
-<listitem>
-<simpara>If set, the role, SLA, and usage details are displayed.</simpara>
-</listitem>
-</varlistentry>
-<varlistentry>
-<term>Insights</term>
-<listitem>
-<simpara>If enabled, the Insights details are displayed.</simpara>
-</listitem>
-</varlistentry>
-<varlistentry>
-<term>Number of subscriptions</term>
-<listitem>
-<simpara>The number of subscriptions attached are displayed. Note: In the simple content access mode, no subscription being listed is a valid behavior.</simpara>
-</listitem>
-</varlistentry>
-</variablelist>
-</listitem>
-<listitem>
-<simpara>Click <guibutton>Unregister</guibutton> to remove the registration from the CDN. The original registration details are displayed with a <emphasis role="strong">Not registered</emphasis> message displayed in the lower-middle part of the
 window.</simpara>
-</listitem>
-<listitem>
-<simpara>Click <guibutton>Done</guibutton> to return to the <emphasis role="strong">Installation Summary</emphasis> window.</simpara>
-</listitem>
-<listitem>
-<simpara><emphasis role="strong">Connect to Red Hat</emphasis> displays a <emphasis>Not registered</emphasis> message, and <emphasis role="strong">Software Selection</emphasis> displays a <emphasis>Red Hat CDN requires registration</emphasis> message.</simpara>
-</listitem>
-</orderedlist>
-<note>
-<simpara>After unregistering, it is possible to register your system again. Click <emphasis role="strong">Connect

to Red Hat</emphasis>. The previously entered details are populated. Edit the original details, or update the fields based on the account, purpose, and connection. Click <guibutton>Register</guibutton> to complete.</simpara>
-</note>
-</section>
-<section xml:id="related-information-connect-to-red-hat" role="_additional-resources">
-<title>Additional resources</title>
-<itemizedlist>
-<listitem>
-<simpara>For
 information about Red Hat Insights, see the <link xl:href="https://access.redhat.com/documentation/en-us/red_hat_insights/"><emphasis>Red Hat Insights product documentation</emphasis></link>.</simpara>
-</listitem>
-<listitem>
-<simpara>For information about Activation Keys, see the <link xl:href="https://access.redhat.com/documentation/en-us/red_hat_subscription_management/1/html/using_red_hat_subscription_management/activation_keys_con"><emphasis>Understanding Activation Keys</emphasis></link> chapter of the <emphasis>Using Red Hat Subscription Management</emphasis> document.</simpara>
-</listitem>
-<listitem>
-<simpara>For information about how to set up an HTTP proxy for Subscription Manager, see the <link xl:href="https://access.redhat.com/documentation/en-us/red_hat_subscription_management/1/html-single/rhsm/index#repos-proxy"><emphasis>Using an HTTP proxy</emphasis></link> chapter of the <emphasis>Using and Configuring Red Hat Subscription Manager</emphasis>
 document.</simpara>
-</listitem>
-</itemizedlist>
-</section>
-</section>
<section xml:id="security-policy_configuring-system-settings">
<title>Installing System Aligned with a Security Policy</title>
-<simpara>This section contains information about applying Red Hat Enterprise Linux 9 security policy during installation and how to configure it for use on your system before the first boot.</simpara>
+<simpara>This section contains information about applying AlmaLinux 9 security policy during installation and how to configure it for use on your system before the first boot.</simpara>
<section xml:id="about-security-policy_security-policy">
<title>About security policy</title>
-<simpara role="_abstract">The Red Hat Enterprise Linux includes OpenSCAP suite to enable automated configuration of the system in alignment with a particular security policy. The policy is implemented using the Security Content Automation Protocol (SCAP) standard. The packages are
 available in the AppStream repository. However, by default, the installation and post-installation process does not enforce any policies and therefore does not involve any checks unless specifically configured.</simpara>
+<simpara role="_abstract">The AlmaLinux includes OpenSCAP suite to enable automated configuration of the system in alignment with a particular security policy. The policy is implemented using the Security Content Automation Protocol (SCAP) standard. The packages are available in the AppStream repository. However, by default, the installation and post-installation process does not enforce any policies and therefore does not involve any checks unless specifically configured.</simpara>
<simpara>Applying a security policy is not a mandatory feature of the installation program. If you apply a security

policy to the system, it is installed using restrictions and recommendations defined in the profile that you selected. The <literal role="package">openscap-scanner</literal>
 and <literal role="package">scap-security-guide</literal> packages are added to your package selection, providing a preinstalled tool for compliance and vulnerability scanning.</simpara>
<simpara>When you select a security policy, the Anaconda GUI installer requires the configuration to adhere to the policy’s requirements. There might be conflicting package selections, as well as separate partitions defined. Only after all the requirements are met, you can start the installation.</simpara>
<simpara>At the end of the installation process, the selected OPenSCAP security policy automatically hardens the system and scans it to verify compliance, saving the scan results to the <literal>/root/openscap_data</literal> directory on the installed system.</simpara>
@@ -1019,9 +646,6 @@
<listitem>
<simpara><literal role="literal">scap-security-guide(8)</literal> - The manual page for the <literal role="literal">scap-security-guide</literal> project contains information about SCAP security
 profiles, including examples on how to utilize the provided benchmarks using the OpenSCAP utility.</simpara>
</listitem>
-<listitem>
-<simpara>Red Hat Enterprise Linux security compliance information is available in the <link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-single/security_hardening/index/"><emphasis>Security hardening</emphasis></link> document.</simpara>
-</listitem>
</itemizedlist>
</section>
</section>
@@ -1031,17 +655,17 @@
<simpara>This section contains information about configuring your installation source and software selection settings, and activating a repository.</simpara>
<section xml:id="configuring-installation-source_configuring-software-settings">
<title>Configuring installation source</title>
-<simpara role="_abstract">Complete the steps in this procedure to configure an installation source from either auto-detected installation media, Red Hat CDN, or the network.</simpara>
+<simpara role="_abstract">Complete
 the steps in this procedure to configure an installation source from either auto-detected installation media or the network.</simpara>
<note>
-<simpara>When the <emphasis role="strong">Installation Summary</emphasis> window first opens, the installation program attempts to configure an installation source based on the type of media that was used to boot the system. The full Red Hat Enterprise Linux Server DVD configures the source as local media.</simpara>
+<simpara>When the <emphasis role="strong">Installation Summary</emphasis> window first opens, the installation program attempts to configure an installation source based on the type of media that was used to boot the system. The full AlmaLinux Server DVD configures the source as local media.</simpara>
</note>
<itemizedlist>
<title>Prerequisites</title>
<listitem>
-<simpara>You have downloaded the full installation image. <link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-

single/performing_a_standard_rhel_9_installation/index#downloading-beta-installation-images_installing-RHEL">Downloading
 a RHEL installation ISO image</link></simpara>
+<simpara>You have downloaded the full installation image.</simpara>
</listitem>
<listitem>
-<simpara>You have created a bootable physical media. <link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-single/performing_a_standard_rhel_9_installation/index#making-an-installation-cd-or-dvd_assembly_creating-a-bootable-installation-medium">Creating a bootable CD or DVD</link></simpara>
+<simpara>You have created a bootable physical media.</simpara>
</listitem>
<listitem>
<simpara>The <emphasis role="strong">Installation Summary</emphasis> window is open.</simpara>
@@ -1066,7 +690,7 @@
<simpara><emphasis role="strong">No additional configuration is necessary as the BaseOS and AppStream repositories are installed as part of the full installation image.</emphasis></simpara>
 </listitem>
<listitem>
-<simpara><emphasis role="strong">Do not disable the AppStream repository check box if you want a full Red Hat Enterprise Linux 9 installation.</emphasis></simpara>
+<simpara><emphasis role="strong">Do not disable the AppStream repository check box if you want a full AlmaLinux 9 installation.</emphasis></simpara>
</listitem>
</itemizedlist>
</important>
@@ -1074,17 +698,14 @@
</orderedlist>
</listitem>
<listitem>
-<simpara>Optional: Select the <emphasis role="strong">Red Hat CDN</emphasis> option to register your system, attach RHEL subscriptions, and install RHEL from the Red Hat Content Delivery Network (CDN). For more information, see the <emphasis>Registering and installing RHEL from the CDN</emphasis> section.</simpara>
-</listitem>
-<listitem>
<simpara>Optional: Select the <emphasis role="strong">On the network</emphasis> option to download and install packages from a network location instead of local media.</simpara>
<note>
<itemizedlist>
 <listitem>
-<simpara>If you do not want to download and install additional repositories from a network location, proceed to <link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-single/performing_a_standard_rhel_9_installation/index#configuring-software-selection_configuring-software-settings">Configuring software selection</link>.</simpara>
+<simpara>If you do not want to download and install additional repositories from a network location, proceed to Configuring software selection</simpara>
</listitem>
<listitem>
-<simpara>This option is available only when a network connection is active. See <link

xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-single/performing_a_standard_rhel_9_installation/index#network-hostname_configuring-system-settings">Configuring network and host name options</link> for information about how to configure network connections in the GUI.</simpara>
+<simpara>This option is
 available only when a network connection is active.</simpara>
</listitem>
</itemizedlist>
</note>
@@ -1154,18 +775,17 @@
</listitem>
</itemizedlist>
<simpara>Use a predefined environment and additional software to customize your system. However, in a standard installation, you cannot select individual packages to install. To view the packages contained in a specific environment, see the <literal role="filename"><emphasis>repository</emphasis>/repodata/*-comps-<emphasis>repository</emphasis>.<emphasis>architecture</emphasis>.xml</literal> file on your installation source media (DVD, CD, USB). The XML file contains details of the packages installed as part of a base environment. Available environments are marked by the <literal><environment></literal> tag, and additional software packages are marked by the <literal><group></literal> tag.</simpara>
-<simpara>If you are unsure about which packages to install, Red Hat recommends that you select the <emphasis role="strong">Minimal
 Install</emphasis> base environment. Minimal install installs a basic version of Red Hat Enterprise Linux with only a minimal amount of additional software. After the system finishes installing and you log in for the first time, you can use the <emphasis role="strong">DNF package manager</emphasis> to install additional software.
-For more information about DNF package manager, see the <link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-single/configuring_basic_system_settings/index/"><emphasis>Configuring basic system settings</emphasis></link> document.</simpara>
+<simpara>If you are unsure about which packages to install, AlmaLinux OS Foundation recommends that you select the <emphasis role="strong">Minimal Install</emphasis> base environment. Minimal install installs a basic version of AlmaLinux with only a minimal amount of additional software. After the system finishes installing and you log in for the first time, you can
 use the <emphasis role="strong">DNF package manager</emphasis> to install additional software.</simpara>
<note>
<itemizedlist>
<listitem>
-<simpara>The <literal>dnf group list</literal> command lists all package groups from dnf repositories. See the <link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-single/configuring_basic_system_settings/index/"><emphasis>Configuring basic system settings</emphasis></link> document for more information.</simpara>
+<simpara>The <literal>dnf group list</literal> command lists all package groups from dnf repositories.</simpara>
</listitem>
<listitem>
-<simpara>If you need to control which packages are installed, you can use a Kickstart file and define the packages in the <literal>%packages</literal> section. See the <link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-single/performing_an_advanced_rhel_9_installation/index/"><emphasis>Performing an advanced RHEL 9

installation</emphasis></link>
 document for information about installing Red Hat Enterprise Linux using Kickstart.</simpara>
+<simpara>If you need to control which packages are installed, you can use a Kickstart file and define the packages in the <literal>%packages</literal> section.</simpara>
</listitem>
<listitem>
-<simpara>By default, RHEL 9 does not install the TuneD package. You can manually install the TuneD package using the <literal>dnf install tuned</literal> command.</simpara>
+<simpara>By default, AlmaLinux 9 does not install the TuneD package. You can manually install the TuneD package using the <literal>dnf install tuned</literal> command.</simpara>
</listitem>
</itemizedlist>
</note>
@@ -1203,7 +823,7 @@
</chapter>
<chapter xml:id="storage-devices_graphical-installation">
<title>Configuring storage devices</title>
-<simpara>You can install Red Hat Enterprise Linux on a large variety of storage devices. You can configure basic, locally accessible,
 storage devices in the <emphasis role="strong">Installation Destination</emphasis> window. Basic storage devices directly connected to the local system, such as hard disk drives and solid-state drives, are displayed in the <emphasis role="strong">Local Standard Disks</emphasis> section of the window.
+<simpara>You can install AlmaLinux on a large variety of storage devices. You can configure basic, locally accessible, storage devices in the <emphasis role="strong">Installation Destination</emphasis> window. Basic storage devices directly connected to the local system, such as hard disk drives and solid-state drives, are displayed in the <emphasis role="strong">Local Standard Disks</emphasis> section of the window.
On 64-bit IBM Z, this section contains activated Direct Access Storage Devices (DASDs).</simpara>
<warning>
<simpara>A known issue prevents DASDs configured as HyperPAV aliases from being automatically attached to the system after the installation is complete. These storage
 devices are available during the installation, but are not immediately accessible after you finish installing and reboot. To attach HyperPAV alias devices, add them manually to the <literal>/etc/dasd.conf</literal> configuration file of the system.</simpara>
@@ -1413,7 +1033,7 @@
<simpara>Type the 4 digit hexadecimal device number in the <emphasis role="strong">Device number</emphasis> field.</simpara>
</listitem>
<listitem>
-<simpara>When installing RHEL-9.0 or older releases or if the <literal>zFCP</literal> device is not configured in NPIV mode, or when <literal>auto LUN</literal> scanning is disabled by the
<literal>zfcp.allow_lun_scan=0</literal> kernel module parameter, provide the following values:</simpara>
+<simpara>When installing AlmaLinux-9.0 or older releases or if the <literal>zFCP</literal> device is not configured in NPIV mode, or when <literal>auto LUN</literal> scanning is disabled by the
<literal>zfcp.allow_lun_scan=0</literal> kernel module parameter, provide
 the following values:</simpara>
<orderedlist numeration="loweralpha">
<listitem>
<simpara>Type the 16 digit hexadecimal World Wide Port Number (WWPN) in the <emphasis

role="strong">WWPN</emphasis> field.</simpara>
@@ -1445,10 +1065,10 @@
</section>
<section xml:id="installing-to-a-nvdimm-device_storage-devices">
<title>Installing to an NVDIMM device</title>
-<simpara>Non-Volatile Dual In-line Memory Module (NVDIMM) devices combine the performance of RAM with disk-like data persistence when no power is supplied. Under specific circumstances, Red Hat Enterprise Linux 9 can boot and run from NVDIMM devices.</simpara>
+<simpara>Non-Volatile Dual In-line Memory Module (NVDIMM) devices combine the performance of RAM with disk-like data persistence when no power is supplied. Under specific circumstances, AlmaLinux 9 can boot and run from NVDIMM devices.</simpara>
<section xml:id="criteria-for-using-an-nvdimm-device-as-an-installation-target_installing-to-a-nvdimm-device">
<title>Criteria
 for using an NVDIMM device as an installation target</title>
-<simpara role="_abstract">You can install Red Hat Enterprise Linux 9 to Non-Volatile Dual In-line Memory Module (NVDIMM) devices in sector mode on the Intel 64 and AMD64 architectures, supported by the <emphasis role="strong">nd_pmem</emphasis> driver.</simpara>
+<simpara role="_abstract">You can install AlmaLinux 9 to Non-Volatile Dual In-line Memory Module (NVDIMM) devices in sector mode on the Intel 64 and AMD64 architectures, supported by the <emphasis role="strong">nd_pmem</emphasis> driver.</simpara>
<formalpara>
<title>Conditions for using an NVDIMM device as storage</title>
<para>To use an NVDIMM device as storage, the following conditions must be satisfied:</para>
@@ -1486,7 +1106,7 @@
</section>
<section xml:id="configuring-an-nvdimm-device-using-anaconda_installing-to-a-nvdimm-device">
<title>Configuring an NVDIMM device using the graphical installation mode</title>
-<simpara role="_abstract">A
 Non-Volatile Dual In-line Memory Module (NVDIMM) device must be properly configured for use by Red Hat Enterprise Linux 9 using the graphical installation.</simpara>
+<simpara role="_abstract">A Non-Volatile Dual In-line Memory Module (NVDIMM) device must be properly configured for use by AlmaLinux 9 using the graphical installation.</simpara>
<warning>
<simpara>Reconfiguration of a NVDIMM device process destroys any data stored on the device.</simpara>
</warning>
@@ -1541,11 +1161,11 @@
</chapter>
<chapter xml:id="manual-partitioning_graphical-installation">
<title>Configuring manual partitioning</title>
-<simpara>You can use manual partitioning to configure your disk partitions and mount points and define the file system that Red Hat Enterprise Linux is installed on.</simpara>
+<simpara>You can use manual partitioning to configure your disk partitions and mount points and define the file system that AlmaLinux is installed on.</simpara>
<note>
-<simpara>Before
 installation, you should consider whether you want to use partitioned or unpartitioned disk devices. For more information on the advantages and disadvantages to using partitioning on LUNs, either directly or with LVM, see the article at <link

xl:href="https://access.redhat.com/solutions/163853">https://access.redhat.com/solutions/163853</link>.</simpara
>
+<simpara>Before installation, you should consider whether you want to use partitioned or unpartitioned disk devices.</simpara>
</note>
-<simpara>An installation of Red Hat Enterprise Linux requires a minimum of one partition but Red Hat recommends using at least the following partitions or volumes: <literal>/</literal>, <literal>/home</literal>, <literal>/boot</literal>, and <literal>swap</literal>. You can also create additional partitions and volumes as you require.</simpara>
+<simpara>An installation of AlmaLinux requires a minimum of one partition but AlmaLinux OS Foundation recommends using at least
 the following partitions or volumes: <literal>/</literal>, <literal>/home</literal>, <literal>/boot</literal>, and <literal>swap</literal>. You can also create additional partitions and volumes as you require.</simpara>
<warning>
<simpara>To prevent data loss it is recommended that you back up your data before proceeding. If you are upgrading or creating a dual-boot system, you should back up any data you want to keep on your storage devices.</simpara>
</warning>
@@ -1608,7 +1228,7 @@
<simpara>The dialog has a check box that you can use to remove all other partitions used by the system to which the deleted partition belongs.</simpara>
</listitem>
<listitem>
-<simpara>If there are no existing partitions and you want to create the recommended set of partitions as a starting point, select your preferred partitioning scheme from the left pane (default for Red Hat Enterprise Linux is LVM) and click the <emphasis role="strong">Click here to create them automatically</emphasis>
 link.</simpara>
+<simpara>If there are no existing partitions and you want to create the recommended set of partitions as a starting point, select your preferred partitioning scheme from the left pane (default for AlmaLinux is LVM) and click the <emphasis role="strong">Click here to create them automatically</emphasis> link.</simpara>
<simpara>A <literal>/boot</literal> partition, a <literal>/</literal> (root) volume, and a <literal>swap</literal> volume proportionate to the size of the available storage are created and listed in the left pane. These are the recommended file systems for a typical installation, but you can add additional file systems and mount points.</simpara>
</listitem>
</itemizedlist>
@@ -1663,7 +1283,7 @@
<note>
<itemizedlist>
<listitem>
-<simpara>Btfrs support has been removed in Red Hat Enterprise Linux 9.</simpara>
+<simpara>Btfrs support has been removed in AlmaLinux 9.</simpara>
</listitem>
<listitem>
<simpara>The <literal>/boot</literal>
 partition is always located on a standard partition, regardless of the value selected.</simpara>
@@ -1765,23 +1385,23 @@

</section>
<section xml:id="preserving-the-home-directory_manual-partitioning">
<title>Preserving the /home directory</title>
-<simpara role="_abstract">In a Red Hat Enterprise Linux 9 graphical installation, you can preserve the <literal role="filename">/home</literal> directory that was used on your RHEL 8 system.</simpara>
+<simpara role="_abstract">In a AlmaLinux 9 graphical installation, you can preserve the <literal role="filename">/home</literal> directory that was used on your AlmaLinux 8 system.</simpara>
<warning>
-<simpara>Preserving <literal role="filename">/home</literal> is only possible if the <literal role="filename">/home</literal> directory is located on a separate <literal>/home</literal> partition on your RHEL 8 system.</simpara>
+<simpara>Preserving <literal role="filename">/home</literal> is only possible if the <literal role="filename">/home</literal>
 directory is located on a separate <literal>/home</literal> partition on your AlmaLinux 8 system.</simpara>
</warning>
-<simpara>Preserving the <literal role="filename">/home</literal> directory that includes various configuration settings, makes it possible that the GNOME Shell environment on the new Red Hat Enterprise Linux 9 system is set in the same way as it was on your RHEL 8 system.
-Note that this applies only for users on Red Hat Enterprise Linux 9 with the same user name and ID as on the previous RHEL 8 system.</simpara>
-<simpara>Complete this procedure to preserve the <literal role="filename">/home</literal> directory from your RHEL 8 system.</simpara>
+<simpara>Preserving the <literal role="filename">/home</literal> directory that includes various configuration settings, makes it possible that the GNOME Shell environment on the new AlmaLinux 9 system is set in the same way as it was on your AlmaLinux 8 system.
+Note that this applies
 only for users on AlmaLinux 9 with the same user name and ID as on the previous AlmaLinux 8 system.</simpara>
+<simpara>Complete this procedure to preserve the <literal role="filename">/home</literal> directory from your AlmaLinux 8 system.</simpara>
<itemizedlist>
<title>Prerequisites</title>
<listitem>
-<simpara>RHEL 8 system is installed on your computer.</simpara>
+<simpara>AlmaLinux 8 system is installed on your computer.</simpara>
</listitem>
<listitem>
-<simpara>The <literal role="filename">/home</literal> directory is located on a separate <literal>/home</literal> partition on your RHEL 8 system.</simpara>
+<simpara>The <literal role="filename">/home</literal> directory is located on a separate <literal>/home</literal> partition on your AlmaLinux 8 system.</simpara>
</listitem>
<listitem>
-<simpara>The Red Hat Enterprise Linux 9 <literal>Installation Summary</literal> window is currently displayed.</simpara>
+<simpara>The AlmaLinux 9 <literal>Installation
 Summary</literal> window is currently displayed.</simpara>
</listitem>
</itemizedlist>

<orderedlist numeration="arabic">
@@ -1799,7 +1419,7 @@
<simpara>Choose the <literal>/home</literal> partition, fill in <literal>/home</literal> under <literal>Mount Point:</literal> and clear the <emphasis role="strong">Reformat</emphasis> check box.</simpara>
</listitem>
<listitem>
-<simpara>. Optional: You can also customize various aspects of the <literal>/home</literal> partition required for your Red Hat Enterprise Linux 9 system as described in <link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-single/performing_a_standard_rhel_9_installation/index#customizing-a-partition-or-volume_manual-partitioning">Customizing a mount point file system</link>. However, to preserve <literal>/home</literal> from your RHEL 8 system, it is necessary to clear the <emphasis role="strong">Reformat</emphasis> check box.</simpara>
+<simpara>. Optional: You can
 also customize various aspects of the <literal>/home</literal> partition required for your AlmaLinux 9 system. However, to preserve <literal>/home</literal> from your AlmaLinux 8 system, it is necessary to clear the <emphasis role="strong">Reformat</emphasis> check box.</simpara>
</listitem>
<listitem>
<simpara>After you customized all partitions according to your requirements, click <guibutton>Done</guibutton>. The <emphasis role="strong">Summary of changes</emphasis> dialog box opens.</simpara>
@@ -1858,12 +1478,6 @@
<simpara>Click <guibutton>Done</guibutton> to apply the settings to return to the <emphasis role="strong">Installation Summary</emphasis> window.</simpara>
</listitem>
</orderedlist>
-<itemizedlist role="_additional-resources">
-<title>Additional resources</title>
-<listitem>
-<simpara><link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html/configuring_and_managing_logical_volumes/assembly_configure-mange-raid-configuring-and-managing-logical-volumes#creating-a-raid-lv-with-dm-integrity_configuring-raid-logical-volumes">Creating
 a RAID LV with DM integrity</link></simpara>
-</listitem>
-</itemizedlist>
</section>
<section xml:id="creating-lvm-logical-volume_manual-partitioning">
<title>Creating an LVM logical volume</title>
@@ -1882,16 +1496,10 @@
<listitem>
<simpara>Click the <emphasis role="strong">Device Type</emphasis> drop-down menu and select <literal>LVM</literal>. The <emphasis role="strong">Volume Group</emphasis> drop-down menu is displayed with the newly-created volume group name.</simpara>
<note>
-<simpara>You cannot specify the size of the volume group’s physical extents in the configuration dialog. The size is always set to the default value of 4 MiB. If you want to create a volume group with different physical extents, you must create it manually by switching to an interactive shell and using the <literal

role="command">vgcreate</literal> command, or use a Kickstart file with the
 <literal role="command">volgroup --pesize=<emphasis>size</emphasis></literal> command. See the <link
xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-
single/performing_an_advanced_rhel_9_installation/index/"><emphasis>Performing an advanced RHEL 9
installation</emphasis></link> document for more information about Kickstart.</simpara>
+<simpara>You cannot specify the size of the volume group’s physical extents in the configuration dialog.
The size is always set to the default value of 4 MiB. If you want to create a volume group with different physical
extents, you must create it manually by switching to an interactive shell and using the <literal
role="command">vgcreate</literal> command, or use a Kickstart file with the <literal role="command">volgroup --
pesize=<emphasis>size</emphasis></literal> command.</simpara>
</note>
</listitem>
</orderedlist>
-<itemizedlist role="_additional-resources">
-<title>Additional resources</title>
-<listitem>
-<simpara><link
 xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-
single/configuring_and_managing_logical_volumes/index">Configuring and managing logical
volumes</link></simpara>
-</listitem>
-</itemizedlist>
</section>
<section xml:id="configuring-lvm-logical-volume_manual-partitioning">
<title>Configuring an LVM logical volume</title>
@@ -1911,7 +1519,7 @@
<simpara>Click <guibutton>Modify</guibutton> to configure the newly-created volume group.</simpara>
<simpara>The <emphasis role="strong">Configure Volume Group</emphasis> dialog box opens.</simpara>
<note>
-<simpara>You cannot specify the size of the volume group’s physical extents in the configuration dialog.
The size is always set to the default value of 4 MiB. If you want to create a volume group with different physical
extents, you must create it manually by switching to an interactive shell and using the <literal
role="command">vgcreate</literal> command, or use a Kickstart
 file with the <literal role="command">volgroup --pesize=<emphasis>size</emphasis></literal> command. See the
<link xl:href="https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/9/html-
single/performing_an_advanced_rhel_9_installation/index/"><emphasis>Performing an advanced RHEL 9
installation</emphasis></link> document for more information about Kickstart.</simpara>
+<simpara>You cannot specify the size of the volume group’s physical extents in the configuration dialog.
The size is always set to the default value of 4 MiB. If you want to create a volume group with different physical
extents, you must create it manually by switching to an interactive shell and using the <literal
role="command">vgcreate</literal> command, or use a Kickstart file with the <literal role="command">volgroup --
pesize=<emphasis>size</emphasis></literal> command.</simpara>
</note>
</listitem>
<listitem>
@@ -2098,4 +1706,4 @@
</listitem>
</orderedlist>

```
</chapter>
-</book>
\ No newline
 at end of file
+</book>
diff -Naur anaconda-user-help-9.2.1/rhel/en-US/rhel_help_placeholder.txt anaconda-user-help-9.2.1.alma/rhel/en-US/rhel_help_placeholder.txt
--- anaconda-user-help-9.2.1/rhel/en-US/rhel_help_placeholder.txt 2023-01-24 19:51:20
+++ anaconda-user-help-9.2.1.alma/rhel/en-US/rhel_help_placeholder.txt 2023-04-24 17:13:09
@@ -1 +1 @@
-Help content for this screen is not yet available. See the installation instructions available online at https://access.redhat.com.
+Help content for this screen is not yet available. See the installation instructions available online at https://wiki.almalinux.org.
diff -Naur anaconda-user-help-9.2.1/rhel/en-US/rhel_help_placeholder.xml anaconda-user-help-9.2.1.alma/rhel/en-US/rhel_help_placeholder.xml
--- anaconda-user-help-9.2.1/rhel/en-US/rhel_help_placeholder.xml 2023-01-24 19:51:20
+++ anaconda-user-help-9.2.1.alma/rhel/en-US/rhel_help_placeholder.xml 2023-04-24 17:13:31
@@ -1 +1 @@
-<section><para><emphasis role="bold">Help content
 for this screen is not yet available. See the installation instructions available online at <ulink
url="https://access.redhat.com/">https://access.redhat.com/</ulink>.</emphasis></para></section>
+<section><para><emphasis role="bold">Help content for this screen is not yet available. See the installation instructions available online at <ulink
url="https://wiki.almalinux.org/">https://wiki.almalinux.org/</ulink>.</emphasis></para></section>

Found in path(s):
* /anaconda-user-help-9.2.1-1.el9.alma.src.rpm-cosi-expand-archive-5jJvwNfv/anaconda-user-help-almalinux-branding.patch
```

# 1.248 setools 4.4.4-1.el9

## 1.248.1 Available under license :

```
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# 1.251 conc 0.3.0

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# 1.258 x-xerrors 0.0.0-20231012003039-104605ab7028

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# 1.260 @asamuzakjp/nwsapi 2.3.9

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# 1.261 side-channel 1.1.0

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# 1.262 sig-storage-lib-external-provisioner 10.0.1

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This option is useful when you wish to copy part of the code of
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from a designated place, then offering equivalent access to copy the
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# 1.265 inline-style-parser 0.1.1

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Julian Seward, jseward@bzip.org
bzip2/libbzip2 version 1.0.6 of 6 September 2010

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# 1.270 dosfs-tools 4.2-3.el9

## 1.270.1 Available under license :

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Version 3, 29 June 2007

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# 1.272 python-inotify 0.9.6-25.el9

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# 1.274 psmisc 23.4-3.el9

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the work with the complete corresponding
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// Original can be found at:
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// Modifications by Joshua Bell inexorabletash@gmail.com
// https://github.com/inexorabletash/polyfill

// ES3/ES5 implementation of the Krhonos Typed Array Specification
// Ref: http://www.khronos.org/registry/typedarray/specs/latest/
// Date: 2011-02-01
//
// Variations:
// * Allows typed_array.get/set() as alias for subscripts (typed_array[])

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# 1.321 ewma 1.2.0

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# 1.323 libqb 2.0.8-1.el9

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==========

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# 1.336 is-number 7.0.0

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# 1.337 auto-sdk 1.1.0

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package version

// Collection is a type that implements the sort.Interface interface

```
// so that versions can be sorted.
type Collection []*Version

func (v Collection) Len() int {
 return len(v)
}

func (v Collection) Less(i, j int) bool {
 return v[i].LessThan(v[j])
}

func (v Collection) Swap(i, j int) {
 v[i], v[j] = v[j], v[i]
}
```

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```
package version

import (
```

```
 "reflect"
 "sort"
 "testing"
)

func TestCollection(t *testing.T) {
 versionsRaw := []string{
  "1.1.1",
  "1.0",
  "1.2",
  "2",
  "0.7.1",
 }

 versions := make([]*Version, len(versionsRaw))
 for i, raw := range versionsRaw {
  v, err := NewVersion(raw)
  if err != nil {
   t.Fatalf("err: %s", err)
  }

  versions[i] = v
 }

 sort.Sort(Collection(versions))

 actual := make([]string, len(versions))
 for i, v := range versions {
  actual[i] = v.String()
 }

 expected := []string{
  "0.7.1",
  "1.0.0",
  "1.1.1",
  "1.2.0",
  "2.0.0",
 }

 if !reflect.DeepEqual(actual, expected) {
  t.Fatalf("bad: %#v", actual)
 }
}
name: go-tests

on: [push]

env:
```

```
 TEST_RESULTS: /tmp/test-results

jobs:

 go-tests:
   runs-on: ubuntu-latest
   strategy:
     matrix:
       go-version: [ 1.15.3, 1.19 ]

   steps:
     - name: Setup go
       uses: actions/setup-go@41dfa10bad2bb2ae585af6ee5bb4d7d973ad74ed # v5.1.0
       with:
         go-version: ${{ matrix.go-version }}

     - name: Checkout code
       uses: actions/checkout@11bd71901bbe5b1630ceea73d27597364c9af683 # v4.2.2

     - name: Create test directory
       run: |
         mkdir -p ${{ env.TEST_RESULTS }}

     - name: Download go modules
       run: go mod download

     - name: Cache / restore go modules
       uses: actions/cache@1bd1e32a3bdc45362d1e726936510720a7c30a57 # v4.2.0
       with:
         path: |
           ~/go/pkg/mod
         key: ${{ runner.os }}-go-${{ hashFiles('**/go.sum') }}
         restore-keys: |
           ${{ runner.os }}-go-

     # Check go fmt output because it does not report
 non-zero when there are fmt changes
     - name: Run gofmt
       run: |
         go fmt ./...
         files=$(go fmt ./...)
           if [ -n "$files" ]; then
             echo "The following file(s) do not conform to go fmt:"
             echo "$files"
             exit 1
           fi

     # Install gotestsum with go get for 1.15.3; otherwise default to go install
```

```
    - name: Install gotestsum
      run: |
        GTS="gotest.tools/gotestsum@v1.8.2"
        # We use the same error message prefix in either failure case, so just define it once here.
        ERROR="Failed to install $GTS"
        # First try to 'go install', if that fails try 'go get'...
        go install "$GTS" || go get "$GTS" || { echo "$ERROR: both 'go install' and 'go get' failed"; exit 1; }
        # Check that the gotestsum command was actually installed in the path...
        command -v gotestsum > /dev/null 2>&1 || { echo "$ERROR: gotestsum command not installed"; exit
1; }
        echo "OK: Command 'gotestsum' installed ($GTS)"

    - name: Run go tests
      run: |
        PACKAGE_NAMES=$(go list ./...)
        gotestsum --format=short-verbose --junitfile $TEST_RESULTS/gotestsum-report.xml --
$PACKAGE_NAMES

    # Save coverage report parts
    - name: Upload and save artifacts
      uses: actions/upload-artifact@b4b15b8c7c6ac21ea08fcf65892d2ee8f75cf882 # v4.4.3
      with:
        name: Test Results
        path: ${{ env.TEST_RESULTS }}
```

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# Versioning Library for Go

![Build Status](https://github.com/hashicorp/go-version/actions/workflows/go-tests.yml/badge.svg)
[![GoDoc](https://godoc.org/github.com/hashicorp/go-version?status.svg)](https://godoc.org/github.com/hashicorp/go-version)

go-version is a library for parsing versions and version constraints,
and verifying versions against a set of constraints. go-version

can sort a collection of versions properly, handles prerelease/beta
versions, can increment versions, etc.

Versions used with go-version must follow [SemVer](http://semver.org/).

## Installation and Usage

Package documentation can be found on
[GoDoc](http://godoc.org/github.com/hashicorp/go-version).

Installation can be done with a normal `go get`:

```
$ go get github.com/hashicorp/go-version
```

#### Version Parsing and Comparison

```go
v1, err := version.NewVersion("1.2")
v2, err := version.NewVersion("1.5+metadata")

// Comparison example. There is also GreaterThan, Equal, and just
// a simple Compare
 that returns an int allowing easy >=, <=, etc.
if v1.LessThan(v2) {
   fmt.Printf("%s is less than %s", v1, v2)
}
```

#### Version Constraints

```go
v1, err := version.NewVersion("1.2")

// Constraints example.
constraints, err := version.NewConstraint(">= 1.0, < 1.4")
if constraints.Check(v1) {
 fmt.Printf("%s satisfies constraints %s", v1, constraints)
}
```

#### Version Sorting

```go
versionsRaw := []string{"1.1", "0.7.1", "1.4-beta", "1.4", "2"}
versions := make([]*version.Version, len(versionsRaw))
for i, raw := range versionsRaw {
```

```
  v, _ := version.NewVersion(raw)
  versions[i] = v
}

// After this, the versions are properly sorted
sort.Sort(version.Collection(versions))
```

## Issues and Contributing

If you find an issue with this library, please report an issue. If you'd
like, we welcome any contributions. Fork this library and submit a pull
request.

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```
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package version

import (
 "encoding/json"
 "fmt"
 "reflect"
 "testing"
)

func TestNewVersion(t *testing.T) {
 cases := []struct {
  version string
  err     bool
 }{
  {"", true},
  {"1.2.3", false},
  {"1.0", false},
  {"1", false},
  {"1.2.beta", true},
  {"1.21.beta", true},
  {"foo", true},
  {"1.2-5", false},
  {"1.2-beta.5", false},
  {"\n1.2", true},
  {"1.2.0-x.Y.0+metadata", false},
  {"1.2.0-x.Y.0+metadata-width-hyphen", false},
  {"1.2.3-rc1-with-hyphen", false},
  {"1.2.3.4", false},
  {"1.2.0.4-x.Y.0+metadata", false},
  {"1.2.0.4-x.Y.0+metadata-width-hyphen", false},
  {"1.2.0-X-1.2.0+metadata~dist", false},
  {"1.2.3.4-rc1-with-hyphen", false},
  {"1.2.3.4", false},
  {"v1.2.3", false},
  {"foo1.2.3", true},
  {"1.7rc2", false},
  {"v1.7rc2", false},
  {"1.0-", false},
 }

 for _, tc := range cases {
  _, err := NewVersion(tc.version)
```

```
 if tc.err && err == nil {
  t.Fatalf("expected error for version:
%q", tc.version)
 } else if !tc.err && err != nil {
  t.Fatalf("error for version %q: %s", tc.version, err)
 }
}
}

func TestNewSemver(t *testing.T) {
 cases := []struct {
  version string
  err     bool
 }{
  {"", true},
  {"1.2.3", false},
  {"1.0", false},
  {"1", false},
  {"1.2.beta", true},
  {"1.21.beta", true},
  {"foo", true},
  {"1.2-5", false},
  {"1.2-beta.5", false},
  {"\n1.2", true},
  {"1.2.0-x.Y.0+metadata", false},
  {"1.2.0-x.Y.0+metadata-width-hyphen", false},
  {"1.2.3-rc1-with-hyphen", false},
  {"1.2.3.4", false},
  {"1.2.0.4-x.Y.0+metadata", false},
  {"1.2.0.4-x.Y.0+metadata-width-hyphen", false},
  {"1.2.0-X-1.2.0+metadata~dist", false},
  {"1.2.3.4-rc1-with-hyphen", false},
  {"1.2.3.4", false},
  {"v1.2.3", false},
  {"foo1.2.3", true},
  {"1.7rc2", true},
  {"v1.7rc2", true},
  {"1.0-", true},
 }

 for _, tc := range cases {
  _, err := NewSemver(tc.version)
  if tc.err && err == nil {
   t.Fatalf("expected error for version: %q", tc.version)
  } else
 if !tc.err && err != nil {
   t.Fatalf("error for version %q: %s", tc.version, err)
  }
```

```
 }
}

func TestCore(t *testing.T) {
 cases := []struct {
  v1 string
  v2 string
 }{
  {"1.2.3", "1.2.3"},
  {"2.3.4-alpha1", "2.3.4"},
  {"3.4.5alpha1", "3.4.5"},
  {"1.2.3-2", "1.2.3"},
  {"4.5.6-beta1+meta", "4.5.6"},
  {"5.6.7.1.2.3", "5.6.7"},
 }

 for _, tc := range cases {
  v1, err := NewVersion(tc.v1)
  if err != nil {
   t.Fatalf("error for version %q: %s", tc.v1, err)
  }
  v2, err := NewVersion(tc.v2)
  if err != nil {
   t.Fatalf("error for version %q: %s", tc.v2, err)
  }

  actual := v1.Core()
  expected := v2

  if !reflect.DeepEqual(actual, expected) {
   t.Fatalf("expected: %s\nactual: %s", expected, actual)
  }
 }
}

func TestVersionCompare(t *testing.T) {
 cases := []struct {
  v1       string
  v2       string
  expected int
 }{
  {"1.2.3", "1.4.5", -1},
  {"1.2-beta", "1.2-beta", 0},
  {"1.2", "1.1.4", 1},
  {"1.2", "1.2-beta", 1},
  {"1.2+foo", "1.2+beta", 0},
  {"v1.2", "v1.2-beta",
```

```
 1},
  {"v1.2+foo", "v1.2+beta", 0},
  {"v1.2.3.4", "v1.2.3.4", 0},
  {"v1.2.0.0", "v1.2", 0},
  {"v1.2.0.0.1", "v1.2", 1},
  {"v1.2", "v1.2.0.0", 0},
  {"v1.2", "v1.2.0.0.1", -1},
  {"v1.2.0.0", "v1.2.0.0.1", -1},
  {"v1.2.3.0", "v1.2.3.4", -1},
  {"1.7rc2", "1.7rc1", 1},
  {"1.7rc2", "1.7", -1},
  {"1.2.0", "1.2.0-X-1.2.0+metadata~dist", 1},
 }

 for _, tc := range cases {
  v1, err := NewVersion(tc.v1)
  if err != nil {
   t.Fatalf("err: %s", err)
  }

  v2, err := NewVersion(tc.v2)
  if err != nil {
   t.Fatalf("err: %s", err)
  }

  actual := v1.Compare(v2)
  expected := tc.expected
  if actual != expected {
   t.Fatalf(
    "%s <=> %s\nexpected: %d\nactual: %d",
    tc.v1, tc.v2,
    expected, actual)
  }
 }
}

func TestVersionCompare_versionAndSemver(t *testing.T) {
 cases := []struct {
  versionRaw string
  semverRaw  string
  expected   int
 }{
  {"0.0.2", "0.0.2", 0},
  {"1.0.2alpha", "1.0.2-alpha", 0},
  {"v1.2+foo", "v1.2+beta", 0},
  {"v1.2", "v1.2+meta", 0},
  {"1.2",
```

```
"1.2-beta", 1},
 {"v1.2", "v1.2-beta", 1},
 {"1.2.3", "1.4.5", -1},
 {"v1.2", "v1.2.0.0.1", -1},
 {"v1.0.3-", "v1.0.3", -1},
}

for _, tc := range cases {
 ver, err := NewVersion(tc.versionRaw)
 if err != nil {
  t.Fatalf("err: %s", err)
 }

 semver, err := NewSemver(tc.semverRaw)
 if err != nil {
  t.Fatalf("err: %s", err)
 }

 actual := ver.Compare(semver)
 if actual != tc.expected {
  t.Fatalf(
   "%s <=> %s\nexpected: %d\n actual: %d",
   tc.versionRaw, tc.semverRaw, tc.expected, actual,
  )
 }
}
}

func TestVersionEqual_nil(t *testing.T) {
 mustVersion := func(v string) *Version {
  ver, err := NewVersion(v)
  if err != nil {
   t.Fatal(err)
  }
  return ver
 }
 cases := []struct {
  leftVersion  *Version
  rightVersion *Version
  expected     bool
 }{
  {mustVersion("1.0.0"), nil, false},
  {nil, mustVersion("1.0.0"), false},
  {nil, nil, true},
 }

 for _, tc := range cases {
  given := tc.leftVersion.Equal(tc.rightVersion)
```

```
 if given != tc.expected {
  t.Fatalf("expected
 Equal to nil to be %t", tc.expected)
 }
 }
}

func TestComparePreReleases(t *testing.T) {
 cases := []struct {
  v1       string
  v2       string
  expected int
 }{
  {"1.2-beta.2", "1.2-beta.2", 0},
  {"1.2-beta.1", "1.2-beta.2", -1},
  {"1.2-beta.2", "1.2-beta.11", -1},
  {"3.2-alpha.1", "3.2-alpha", 1},
  {"1.2-beta.2", "1.2-beta.1", 1},
  {"1.2-beta.11", "1.2-beta.2", 1},
  {"1.2-beta", "1.2-beta.3", -1},
  {"1.2-alpha", "1.2-beta.3", -1},
  {"1.2-beta", "1.2-alpha.3", 1},
  {"3.0-alpha.3", "3.0-rc.1", -1},
  {"3.0-alpha3", "3.0-rc1", -1},
  {"3.0-alpha.1", "3.0-alpha.beta", -1},
  {"5.4-alpha", "5.4-alpha.beta", 1},
  {"v1.2-beta.2", "v1.2-beta.2", 0},
  {"v1.2-beta.1", "v1.2-beta.2", -1},
  {"v3.2-alpha.1", "v3.2-alpha", 1},
  {"v3.2-rc.1-1-g123", "v3.2-rc.2", 1},
 }

 for _, tc := range cases {
  v1, err := NewVersion(tc.v1)
  if err != nil {
   t.Fatalf("err: %s", err)
  }

  v2, err := NewVersion(tc.v2)
  if err != nil {
   t.Fatalf("err: %s", err)
  }

  actual
 := v1.Compare(v2)
  expected := tc.expected
  if actual != expected {
   t.Fatalf(
```

```
    "%s <=> %s\nexpected: %d\nactual: %d",
    tc.v1, tc.v2,
    expected, actual)
  }
 }
}

func TestVersionMetadata(t *testing.T) {
 cases := []struct {
  version  string
  expected string
 }{
  {"1.2.3", ""},
  {"1.2-beta", ""},
  {"1.2.0-x.Y.0", ""},
  {"1.2.0-x.Y.0+metadata", "metadata"},
  {"1.2.0-metadata-1.2.0+metadata~dist", "metadata~dist"},
 }

 for _, tc := range cases {
  v, err := NewVersion(tc.version)
  if err != nil {
   t.Fatalf("err: %s", err)
  }

  actual := v.Metadata()
  expected := tc.expected
  if actual != expected {
   t.Fatalf("expected: %s\nactual: %s", expected, actual)
  }
 }
}

func TestVersionPrerelease(t *testing.T) {
 cases := []struct {
  version  string
  expected string
 }{
  {"1.2.3", ""},
  {"1.2-beta", "beta"},
  {"1.2.0-x.Y.0", "x.Y.0"},
  {"1.2.0-7.Y.0", "7.Y.0"},
  {"1.2.0-x.Y.0+metadata", "x.Y.0"},
  {"1.2.0-metadata-1.2.0+metadata~dist", "metadata-1.2.0"},
  {"17.03.0-ce",
 "ce"}, // zero-padded fields
 }
```

```
 for _, tc := range cases {
  v, err := NewVersion(tc.version)
  if err != nil {
   t.Fatalf("err: %s", err)
  }

  actual := v.Prerelease()
  expected := tc.expected
  if actual != expected {
   t.Fatalf("expected: %s\nactual: %s", expected, actual)
  }
 }
}

func TestVersionSegments(t *testing.T) {
 cases := []struct {
  version  string
  expected []int
 }{
  {"1.2.3", []int{1, 2, 3}},
  {"1.2-beta", []int{1, 2, 0}},
  {"1-x.Y.0", []int{1, 0, 0}},
  {"1.2.0-x.Y.0+metadata", []int{1, 2, 0}},
  {"1.2.0-metadata-1.2.0+metadata~dist", []int{1, 2, 0}},
  {"17.03.0-ce", []int{17, 3, 0}}, // zero-padded fields
 }

 for _, tc := range cases {
  v, err := NewVersion(tc.version)
  if err != nil {
   t.Fatalf("err: %s", err)
  }

  actual := v.Segments()
  expected := tc.expected
  if !reflect.DeepEqual(actual, expected) {
   t.Fatalf("expected: %#v\nactual: %#v", expected, actual)
  }
 }
}

func TestVersionSegments64(t *testing.T) {
 cases
 := []struct {
  version  string
  expected []int64
 }{
  {"1.2.3", []int64{1, 2, 3}},
```

```
 {"1.2-beta", []int64{1, 2, 0}},
 {"1-x.Y.0", []int64{1, 0, 0}},
 {"1.2.0-x.Y.0+metadata", []int64{1, 2, 0}},
 {"1.4.9223372036854775807", []int64{1, 4, 9223372036854775807}},
}

for _, tc := range cases {
 v, err := NewVersion(tc.version)
 if err != nil {
  t.Fatalf("err: %s", err)
 }

 actual := v.Segments64()
 expected := tc.expected
 if !reflect.DeepEqual(actual, expected) {
  t.Fatalf("expected: %#v\nactual: %#v", expected, actual)
 }

 {
  expected := actual[0]
  actual[0]++
  actual = v.Segments64()
  if actual[0] != expected {
   t.Fatalf("Segments64 is mutable")
  }
 }
}
}

func TestJsonMarshal(t *testing.T) {
 cases := []struct {
  version string
  err     bool
 }{
  {"1.2.3", false},
  {"1.2.0-x.Y.0+metadata", false},
  {"1.2.0-x.Y.0+metadata-width-hyphen", false},
  {"1.2.3-rc1-with-hyphen", false},
  {"1.2.3.4", false},
  {"1.2.0.4-x.Y.0+metadata", false},
  {"1.2.0.4-x.Y.0+metadata-width-hyphen",
 false},
  {"1.2.0-X-1.2.0+metadata~dist", false},
  {"1.2.3.4-rc1-with-hyphen", false},
  {"1.2.3.4", false},
 }

 for _, tc := range cases {
```

```
 v, err1 := NewVersion(tc.version)
 if err1 != nil {
  t.Fatalf("error for version %q: %s", tc.version, err1)
 }

 parsed, err2 := json.Marshal(v)
 if err2 != nil {
  t.Fatalf("error marshaling version %q: %s", tc.version, err2)
 }
 result := string(parsed)
 expected := fmt.Sprintf("%q", tc.version)
 if result != expected && !tc.err {
  t.Fatalf("Error marshaling unexpected marshaled content: result=%q expected=%q", result, expected)
 }
}
}

func TestJsonUnmarshal(t *testing.T) {
 cases := []struct {
  version string
  err     bool
 }{
  {"1.2.3", false},
  {"1.2.0-x.Y.0+metadata", false},
  {"1.2.0-x.Y.0+metadata-width-hyphen", false},
  {"1.2.3-rc1-with-hyphen", false},
  {"1.2.3.4", false},
  {"1.2.0.4-x.Y.0+metadata", false},
  {"1.2.0.4-x.Y.0+metadata-width-hyphen", false},
  {"1.2.0-X-1.2.0+metadata~dist",
 false},
  {"1.2.3.4-rc1-with-hyphen", false},
  {"1.2.3.4", false},
 }

 for _, tc := range cases {
  expected, err1 := NewVersion(tc.version)
  if err1 != nil {
   t.Fatalf("err: %s", err1)
  }

  actual := &Version{}
  err2 := json.Unmarshal([]byte(fmt.Sprintf("%q", tc.version)), actual)
  if err2 != nil {
   t.Fatalf("error unmarshaling version: %s", err2)
  }
  if !reflect.DeepEqual(actual, expected) {
   t.Fatalf("error unmarshaling, unexpected object content: actual=%q expected=%q", actual, expected)
```

```
  }
 }
}

func TestVersionString(t *testing.T) {
 cases := [][]string{
  {"1.2.3", "1.2.3"},
  {"1.2-beta", "1.2.0-beta"},
  {"1.2.0-x.Y.0", "1.2.0-x.Y.0"},
  {"1.2.0-x.Y.0+metadata", "1.2.0-x.Y.0+metadata"},
  {"1.2.0-metadata-1.2.0+metadata~dist", "1.2.0-metadata-1.2.0+metadata~dist"},
  {"17.03.0-ce", "17.3.0-ce"}, // zero-padded fields
 }

 for _, tc := range cases {
  v, err := NewVersion(tc[0])
  if err != nil {
   t.Fatalf("err: %s", err)
  }

  actual := v.String()
  expected
 := tc[1]
  if actual != expected {
   t.Fatalf("expected: %s\nactual: %s", expected, actual)
  }
  if actual := v.Original(); actual != tc[0] {
   t.Fatalf("expected original: %q\nactual: %q", tc[0], actual)
  }
 }
}

func TestEqual(t *testing.T) {
 cases := []struct {
  v1       string
  v2       string
  expected bool
 }{
  {"1.2.3", "1.4.5", false},
  {"1.2-beta", "1.2-beta", true},
  {"1.2", "1.1.4", false},
  {"1.2", "1.2-beta", false},
  {"1.2+foo", "1.2+beta", true},
  {"v1.2", "v1.2-beta", false},
  {"v1.2+foo", "v1.2+beta", true},
  {"v1.2.3.4", "v1.2.3.4", true},
  {"v1.2.0.0", "v1.2", true},
  {"v1.2.0.0.1", "v1.2", false},
```

```
 {"v1.2", "v1.2.0.0", true},
 {"v1.2", "v1.2.0.0.1", false},
 {"v1.2.0.0", "v1.2.0.0.1", false},
 {"v1.2.3.0", "v1.2.3.4", false},
 {"1.7rc2", "1.7rc1", false},
 {"1.7rc2", "1.7", false},
 {"1.2.0", "1.2.0-X-1.2.0+metadata~dist", false},
}

for _, tc := range cases {
 v1, err := NewVersion(tc.v1)
 if err != nil {
  t.Fatalf("err:
%s", err)
 }

 v2, err := NewVersion(tc.v2)
 if err != nil {
  t.Fatalf("err: %s", err)
 }

 actual := v1.Equal(v2)
 expected := tc.expected
 if actual != expected {
  t.Fatalf(
   "%s <=> %s\nexpected: %t\nactual: %t",
   tc.v1, tc.v2,
   expected, actual)
 }
}
}

func TestGreaterThan(t *testing.T) {
 cases := []struct {
  v1       string
  v2       string
  expected bool
 }{
  {"1.2.3", "1.4.5", false},
  {"1.2-beta", "1.2-beta", false},
  {"1.2", "1.1.4", true},
  {"1.2", "1.2-beta", true},
  {"1.2+foo", "1.2+beta", false},
  {"v1.2", "v1.2-beta", true},
  {"v1.2+foo", "v1.2+beta", false},
  {"v1.2.3.4", "v1.2.3.4", false},
  {"v1.2.0.0", "v1.2", false},
  {"v1.2.0.0.1", "v1.2", true},
```

```
 {"v1.2", "v1.2.0.0", false},
 {"v1.2", "v1.2.0.0.1", false},
 {"v1.2.0.0", "v1.2.0.0.1", false},
 {"v1.2.3.0", "v1.2.3.4", false},
 {"1.7rc2", "1.7rc1", true},
 {"1.7rc2", "1.7", false},
 {"1.2.0", "1.2.0-X-1.2.0+metadata~dist", true},
}

for _, tc := range cases {
 v1,
err := NewVersion(tc.v1)
 if err != nil {
  t.Fatalf("err: %s", err)
 }

 v2, err := NewVersion(tc.v2)
 if err != nil {
  t.Fatalf("err: %s", err)
 }

 actual := v1.GreaterThan(v2)
 expected := tc.expected
 if actual != expected {
  t.Fatalf(
   "%s > %s\nexpected: %t\nactual: %t",
   tc.v1, tc.v2,
   expected, actual)
 }
}
}

func TestLessThan(t *testing.T) {
 cases := []struct {
  v1       string
  v2       string
  expected bool
 }{
  {"1.2.3", "1.4.5", true},
  {"1.2-beta", "1.2-beta", false},
  {"1.2", "1.1.4", false},
  {"1.2", "1.2-beta", false},
  {"1.2+foo", "1.2+beta", false},
  {"v1.2", "v1.2-beta", false},
  {"v1.2+foo", "v1.2+beta", false},
  {"v1.2.3.4", "v1.2.3.4", false},
  {"v1.2.0.0", "v1.2", false},
  {"v1.2.0.0.1", "v1.2", false},
```

```
 {"v1.2", "v1.2.0.0", false},
 {"v1.2", "v1.2.0.0.1", true},
 {"v1.2.0.0", "v1.2.0.0.1", true},
 {"v1.2.3.0", "v1.2.3.4", true},
 {"1.7rc2", "1.7rc1", false},
 {"1.7rc2", "1.7", true},
 {"1.2.0", "1.2.0-X-1.2.0+metadata~dist",
false},
}

for _, tc := range cases {
 v1, err := NewVersion(tc.v1)
 if err != nil {
  t.Fatalf("err: %s", err)
 }

 v2, err := NewVersion(tc.v2)
 if err != nil {
  t.Fatalf("err: %s", err)
 }

 actual := v1.LessThan(v2)
 expected := tc.expected
 if actual != expected {
  t.Fatalf(
   "%s < %s\nexpected: %t\nactual: %t",
   tc.v1, tc.v2,
   expected, actual)
 }
}
}

func TestGreaterThanOrEqual(t *testing.T) {
 cases := []struct {
  v1       string
  v2       string
  expected bool
 }{
  {"1.2.3", "1.4.5", false},
  {"1.2-beta", "1.2-beta", true},
  {"1.2", "1.1.4", true},
  {"1.2", "1.2-beta", true},
  {"1.2+foo", "1.2+beta", true},
  {"v1.2", "v1.2-beta", true},
  {"v1.2+foo", "v1.2+beta", true},
  {"v1.2.3.4", "v1.2.3.4", true},
  {"v1.2.0.0", "v1.2", true},
  {"v1.2.0.0.1", "v1.2", true},
```

```
 {"v1.2", "v1.2.0.0", true},
 {"v1.2", "v1.2.0.0.1", false},
 {"v1.2.0.0", "v1.2.0.0.1", false},
 {"v1.2.3.0", "v1.2.3.4", false},
 {"1.7rc2", "1.7rc1", true},
 {"1.7rc2",
"1.7", false},
 {"1.2.0", "1.2.0-X-1.2.0+metadata~dist", true},
}

for _, tc := range cases {
 v1, err := NewVersion(tc.v1)
 if err != nil {
  t.Fatalf("err: %s", err)
 }

 v2, err := NewVersion(tc.v2)
 if err != nil {
  t.Fatalf("err: %s", err)
 }

 actual := v1.GreaterThanOrEqual(v2)
 expected := tc.expected
 if actual != expected {
  t.Fatalf(
   "%s >= %s\nexpected: %t\nactual: %t",
   tc.v1, tc.v2,
   expected, actual)
 }
}
}

func TestLessThanOrEqual(t *testing.T) {
 cases := []struct {
  v1       string
  v2       string
  expected bool
 }{
  {"1.2.3", "1.4.5", true},
  {"1.2-beta", "1.2-beta", true},
  {"1.2", "1.1.4", false},
  {"1.2", "1.2-beta", false},
  {"1.2+foo", "1.2+beta", true},
  {"v1.2", "v1.2-beta", false},
  {"v1.2+foo", "v1.2+beta", true},
  {"v1.2.3.4", "v1.2.3.4", true},
  {"v1.2.0.0", "v1.2", true},
  {"v1.2.0.0.1", "v1.2", false},
```

```
 {"v1.2", "v1.2.0.0", true},
 {"v1.2", "v1.2.0.0.1", true},
 {"v1.2.0.0", "v1.2.0.0.1", true},
 {"v1.2.3.0",
"v1.2.3.4", true},
 {"1.7rc2", "1.7rc1", false},
 {"1.7rc2", "1.7", true},
 {"1.2.0", "1.2.0-X-1.2.0+metadata~dist", false},
}

for _, tc := range cases {
 v1, err := NewVersion(tc.v1)
 if err != nil {
  t.Fatalf("err: %s", err)
 }

 v2, err := NewVersion(tc.v2)
 if err != nil {
  t.Fatalf("err: %s", err)
 }

 actual := v1.LessThanOrEqual(v2)
 expected := tc.expected
 if actual != expected {
  t.Fatalf(
   "%s <= %s\nexpected: %t\nactual: %t",
   tc.v1, tc.v2,
   expected, actual)
 }
}
}
```

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# 1.7.0 (May 24, 2024)

ENHANCEMENTS:

- Remove `reflect` dependency ([#91](https://github.com/hashicorp/go-version/pull/91))
- Implement the `database/sql.Scanner` and `database/sql/driver.Value` interfaces for `Version`
([#133](https://github.com/hashicorp/go-version/pull/133))

INTERNAL:

- [COMPLIANCE] Add Copyright and License Headers ([#115](https://github.com/hashicorp/go-version/pull/115))

- [COMPLIANCE] Update MPL-2.0 LICENSE ([#105](https://github.com/hashicorp/go-version/pull/105))
- Bump actions/cache from 3.0.11 to 3.2.5 ([#116](https://github.com/hashicorp/go-version/pull/116))
- Bump actions/checkout from 3.2.0 to 3.3.0 ([#111](https://github.com/hashicorp/go-version/pull/111))
- Bump actions/upload-artifact from 3.1.1 to 3.1.2 ([#112](https://github.com/hashicorp/go-version/pull/112))
- GHA Migration ([#103](https://github.com/hashicorp/go-version/pull/103))
- github: Pin external GitHub Actions to hashes ([#107](https://github.com/hashicorp/go-version/pull/107))
- SEC-090:
 Automated trusted workflow pinning (2023-04-05) ([#124](https://github.com/hashicorp/go-version/pull/124))
- update readme ([#104](https://github.com/hashicorp/go-version/pull/104))

# 1.6.0 (June 28, 2022)

FEATURES:

- Add `Prerelease` function to `Constraint` to return true if the version includes a prerelease field ([#100](https://github.com/hashicorp/go-version/pull/100))

# 1.5.0 (May 18, 2022)

FEATURES:

- Use `encoding` `TextMarshaler` & `TextUnmarshaler` instead of JSON equivalents ([#95](https://github.com/hashicorp/go-version/pull/95))
- Add JSON handlers to allow parsing from/to JSON ([#93](https://github.com/hashicorp/go-version/pull/93))

# 1.4.0 (January 5, 2022)

FEATURES:

- Introduce `MustConstraints()` ([#87](https://github.com/hashicorp/go-version/pull/87))
- `Constraints`: Introduce `Equals()` and `sort.Interface` methods ([#88](https://github.com/hashicorp/go-version/pull/88))

# 1.3.0 (March 31, 2021)

Please note that CHANGELOG.md does not exist in the source
 code prior to this release.

FEATURES:
- Add `Core` function to return a version without prerelease or metadata ([#85](https://github.com/hashicorp/go-version/pull/85))

# 1.2.1 (June 17, 2020)

BUG FIXES:
- Prevent `Version.Equal` method from panicking on `nil` encounter ([#73](https://github.com/hashicorp/go-version/pull/73))

# 1.2.0 (April 23, 2019)

FEATURES:
- Add `GreaterThanOrEqual` and `LessThanOrEqual` helper methods ([#53](https://github.com/hashicorp/go-version/pull/53))

# 1.1.0 (Jan 07, 2019)

FEATURES:
- Add `NewSemver` constructor ([#45](https://github.com/hashicorp/go-version/pull/45))

# 1.0.0 (August 24, 2018)

Initial release.
procfs provides functions to retrieve system, kernel and process
metrics from the pseudo-filesystem proc.

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```
version: 2
updates:
 - package-ecosystem: "gomod"
   directory: "/"
   schedule:
     interval: "daily"
   labels: ["dependencies"]

 - package-ecosystem: github-actions
   directory: /
   schedule:
     interval: monthly
   labels:
     - dependencies
   # only update HashiCorp actions, external actions managed by TSCCR
   allow:
     - dependency-name: hashicorp/*
   groups:
     github-actions-breaking:
       update-types:
         - major
     github-actions-backward-compatible:
       update-types:
         - minor
         - patch
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package version

import (
 "fmt"
 "regexp"
 "sort"
 "strings"
)

// Constraint represents a single constraint for a version, such as
```

```
// ">= 1.0".
type Constraint struct {
 f        constraintFunc
 op       operator
 check    *Version
 original string
}

func (c *Constraint) Equals(con *Constraint) bool {
 return c.op == con.op && c.check.Equal(con.check)
}

// Constraints is a slice of constraints. We make a custom type so that
// we can add methods to it.
type Constraints []*Constraint

type constraintFunc func(v, c *Version) bool

var constraintOperators map[string]constraintOperation

type constraintOperation struct {
 op operator
 f  constraintFunc
}

var constraintRegexp *regexp.Regexp

func init() {
 constraintOperators = map[string]constraintOperation{
  "":   {op: equal, f: constraintEqual},
  "=":  {op: equal, f: constraintEqual},
  "!=": {op: notEqual, f: constraintNotEqual},
  ">":  {op: greaterThan, f: constraintGreaterThan},
  "<":
  {op: lessThan, f: constraintLessThan},
  ">=": {op: greaterThanEqual, f: constraintGreaterThanEqual},
  "<=": {op: lessThanEqual, f: constraintLessThanEqual},
  "~>": {op: pessimistic, f: constraintPessimistic},
 }

 ops := make([]string, 0, len(constraintOperators))
 for k := range constraintOperators {
  ops = append(ops, regexp.QuoteMeta(k))
 }

 constraintRegexp = regexp.MustCompile(fmt.Sprintf(
  `^\s*(%s)\s*(%s)\s*$`,
  strings.Join(ops, "|"),
```

```
  VersionRegexpRaw))
}

// NewConstraint will parse one or more constraints from the given
// constraint string. The string must be a comma-separated list of
// constraints.
func NewConstraint(v string) (Constraints, error) {
 vs := strings.Split(v, ",")
 result := make([]*Constraint, len(vs))
 for i, single := range vs {
  c, err := parseSingle(single)
  if err != nil {
   return nil, err
  }

  result[i] = c
 }

 return Constraints(result), nil
}

// MustConstraints is a helper that wraps a call to a function
//
 returning (Constraints, error) and panics if error is non-nil.
func MustConstraints(c Constraints, err error) Constraints {
 if err != nil {
  panic(err)
 }

 return c
}

// Check tests if a version satisfies all the constraints.
func (cs Constraints) Check(v *Version) bool {
 for _, c := range cs {
  if !c.Check(v) {
   return false
  }
 }

 return true
}

// Equals compares Constraints with other Constraints
// for equality. This may not represent logical equivalence
// of compared constraints.
// e.g. even though '>0.1,>0.2' is logically equivalent
// to '>0.2' it is *NOT* treated as equal.
```

```
//
// Missing operator is treated as equal to '=', whitespaces
// are ignored and constraints are sorted before comaparison.
func (cs Constraints) Equals(c Constraints) bool {
 if len(cs) != len(c) {
  return false
 }

 // make copies to retain order of the original slices
 left := make(Constraints, len(cs))
 copy(left, cs)
 sort.Stable(left)
 right := make(Constraints, len(c))
 copy(right, c)
 sort.Stable(right)

 //
 compare sorted slices
 for i, con := range left {
  if !con.Equals(right[i]) {
   return false
  }
 }

 return true
}

func (cs Constraints) Len() int {
 return len(cs)
}

func (cs Constraints) Less(i, j int) bool {
 if cs[i].op < cs[j].op {
  return true
 }
 if cs[i].op > cs[j].op {
  return false
 }

 return cs[i].check.LessThan(cs[j].check)
}

func (cs Constraints) Swap(i, j int) {
 cs[i], cs[j] = cs[j], cs[i]
}

// Returns the string format of the constraints
func (cs Constraints) String() string {
```

```
 csStr := make([]string, len(cs))
 for i, c := range cs {
  csStr[i] = c.String()
 }

 return strings.Join(csStr, ",")
}

// Check tests if a constraint is validated by the given version.
func (c *Constraint) Check(v *Version) bool {
 return c.f(v, c.check)
}

// Prerelease returns true if the version underlying this constraint
// contains a prerelease field.
func (c *Constraint) Prerelease() bool {
 return len(c.check.Prerelease()) > 0
}

func (c *Constraint) String()
 string {
 return c.original
}

func parseSingle(v string) (*Constraint, error) {
 matches := constraintRegexp.FindStringSubmatch(v)
 if matches == nil {
  return nil, fmt.Errorf("Malformed constraint: %s", v)
 }

 check, err := NewVersion(matches[2])
 if err != nil {
  return nil, err
 }

 cop := constraintOperators[matches[1]]

 return &Constraint{
  f:        cop.f,
  op:       cop.op,
  check:    check,
  original: v,
 }, nil
}

func prereleaseCheck(v, c *Version) bool {
 switch vPre, cPre := v.Prerelease() != "", c.Prerelease() != ""; {
 case cPre && vPre:
```

```
  // A constraint with a pre-release can only match a pre-release version
  // with the same base segments.
  return v.equalSegments(c)

 case !cPre && vPre:
  // A constraint without a pre-release can only match a version without a
  // pre-release.
  return false

 case cPre && !vPre:
  // OK, except with the pessimistic operator
 case !cPre && !vPre:
  // OK
 }
 return true
}

//-----------------------------------------------------------------------
//
 Constraint functions
//-----------------------------------------------------------------------

type operator rune

const (
 equal            operator = '='
 notEqual         operator = ''
 greaterThan      operator = '>'
 lessThan         operator = '<'
 greaterThanEqual operator = ''
 lessThanEqual    operator = ''
 pessimistic      operator = '~'
)

func constraintEqual(v, c *Version) bool {
 return v.Equal(c)
}

func constraintNotEqual(v, c *Version) bool {
 return !v.Equal(c)
}

func constraintGreaterThan(v, c *Version) bool {
 return prereleaseCheck(v, c) && v.Compare(c) == 1
}

func constraintLessThan(v, c *Version) bool {
 return prereleaseCheck(v, c) && v.Compare(c) == -1
```

```
}

func constraintGreaterThanEqual(v, c *Version) bool {
 return prereleaseCheck(v, c) && v.Compare(c) >= 0
}

func constraintLessThanEqual(v, c *Version) bool {
 return prereleaseCheck(v, c) && v.Compare(c) <= 0
}

func constraintPessimistic(v, c *Version) bool {
 // Using a pessimistic
 constraint with a pre-release, restricts versions to pre-releases
 if !prereleaseCheck(v, c) || (c.Prerelease() != "" && v.Prerelease() == "") {
  return false
 }

 // If the version being checked is naturally less than the constraint, then there
 // is no way for the version to be valid against the constraint
 if v.LessThan(c) {
  return false
 }
 // We'll use this more than once, so grab the length now so it's a little cleaner
 // to write the later checks
 cs := len(c.segments)

 // If the version being checked has less specificity than the constraint, then there
 // is no way for the version to be valid against the constraint
 if cs > len(v.segments) {
  return false
 }

 // Check the segments in the constraint against those in the version. If the version
 // being checked, at any point, does not have the same values in each index of the
 // constraints segments, then it cannot be valid against the constraint.
 for i := 0; i < c.si-1; i++ {
  if v.segments[i] != c.segments[i]
  {
   return false
  }
 }

 // Check the last part of the segment in the constraint. If the version segment at
 // this index is less than the constraints segment at this index, then it cannot
 // be valid against the constraint
 if c.segments[cs-1] > v.segments[cs-1] {
  return false
 }
```

// If nothing has rejected the version by now, it's valid
return true
}
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---
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Files: internal/snapref/*

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---

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```
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package version

import (
 "fmt"
 "reflect"
 "sort"
 "testing"
)

func TestNewConstraint(t *testing.T) {
 cases := []struct {
  input string
  count int
  err   bool
 }{
  {">= 1.2", 1, false},
  {"1.0", 1, false},
  {">= 1.x", 0, true},
  {">= 1.2, < 1.0", 2, false},

  // Out of bounds
  {"1138777878078144567552950000000000000000", 0, true},
 }

 for _, tc := range cases {
  v, err := NewConstraint(tc.input)
  if tc.err && err == nil {
   t.Fatalf("expected error for input: %s", tc.input)
  } else if !tc.err && err != nil {
   t.Fatalf("error for input %s: %s", tc.input, err)
  }

  if len(v) != tc.count {
   t.Fatalf("input: %s\nexpected len: %d\nactual: %d",
    tc.input, tc.count, len(v))
  }
 }
}
```

```
func TestConstraintCheck(t *testing.T) {
 cases := []struct {
  constraint string
  version    string
  check      bool
 }{
  {">= 1.0, < 1.2", "1.1.5", true},
  {"< 1.0, < 1.2", "1.1.5", false},
  {"= 1.0", "1.1.5",
 false},
  {"= 1.0", "1.0.0", true},
  {"1.0", "1.0.0", true},
  {"~> 1.0", "2.0", false},
  {"~> 1.0", "1.1", true},
  {"~> 1.0", "1.2.3", true},
  {"~> 1.0.0", "1.2.3", false},
  {"~> 1.0.0", "1.0.7", true},
  {"~> 1.0.0", "1.1.0", false},
  {"~> 1.0.7", "1.0.4", false},
  {"~> 1.0.7", "1.0.7", true},
  {"~> 1.0.7", "1.0.8", true},
  {"~> 1.0.7", "1.0.7.5", true},
  {"~> 1.0.7", "1.0.6.99", false},
  {"~> 1.0.7", "1.0.8.0", true},
  {"~> 1.0.9.5", "1.0.9.5", true},
  {"~> 1.0.9.5", "1.0.9.4", false},
  {"~> 1.0.9.5", "1.0.9.6", true},
  {"~> 1.0.9.5", "1.0.9.5.0", true},
  {"~> 1.0.9.5", "1.0.9.5.1", true},
  {"~> 2.0", "2.1.0-beta", false},
  {"~> 2.1.0-a", "2.2.0", false},
  {"~> 2.1.0-a", "2.1.0", false},
  {"~> 2.1.0-a", "2.1.0-beta", true},
  {"~> 2.1.0-a", "2.2.0-alpha", false},
  {"> 2.0", "2.1.0-beta", false},
  {">= 2.1.0-a", "2.1.0-beta", true},
  {">= 2.1.0-a", "2.1.1-beta", false},
  {">= 2.0.0", "2.1.0-beta", false},
  {">= 2.1.0-a", "2.1.1", true},
  {">= 2.1.0-a", "2.1.1-beta",
 false},
  {">= 2.1.0-a", "2.1.0", true},
  {"<= 2.1.0-a", "2.0.0", true},
 }

 for _, tc := range cases {
  c, err := NewConstraint(tc.constraint)
```

```
  if err != nil {
   t.Fatalf("err: %s", err)
  }

  v, err := NewVersion(tc.version)
  if err != nil {
   t.Fatalf("err: %s", err)
  }

  actual := c.Check(v)
  expected := tc.check
  if actual != expected {
   t.Fatalf("Version: %s\nConstraint: %s\nExpected: %#v",
    tc.version, tc.constraint, expected)
  }
 }
}

func TestConstraintPrerelease(t *testing.T) {
 cases := []struct {
  constraint string
  prerelease bool
 }{
  {"= 1.0", false},
  {"= 1.0-beta", true},
  {"~> 2.1.0", false},
  {"~> 2.1.0-dev", true},
  {"> 2.0", false},
  {">= 2.1.0-a", true},
 }

 for _, tc := range cases {
  c, err := parseSingle(tc.constraint)
  if err != nil {
   t.Fatalf("err: %s", err)
  }

  actual := c.Prerelease()
  expected := tc.prerelease
  if actual != expected {
   t.Fatalf("Constraint: %s\nExpected: %#v",
    tc.constraint, expected)
  }
 }
}

func
```

```
TestConstraintEqual(t *testing.T) {
cases := []struct {
 leftConstraint  string
 rightConstraint string
 expectedEqual   bool
}{
 {
  "0.0.1",
  "0.0.1",
  true,
 },
 { // whitespaces
  " 0.0.1 ",
  "0.0.1",
  true,
 },
 { // equal op implied
  "=0.0.1 ",
  "0.0.1",
  true,
 },
 { // version difference
  "=0.0.1",
  "=0.0.2",
  false,
 },
 { // operator difference
  ">0.0.1",
  "=0.0.1",
  false,
 },
 { // different order
  ">0.1.0, <=1.0.0",
  "<=1.0.0, >0.1.0",
  true,
 },
}

for _, tc := range cases {
 leftCon, err := NewConstraint(tc.leftConstraint)
 if err != nil {
  t.Fatalf("err: %s", err)
 }
 rightCon, err := NewConstraint(tc.rightConstraint)
 if err != nil {
  t.Fatalf("err: %s", err)
 }
```

```
 actual := leftCon.Equals(rightCon)
 if actual != tc.expectedEqual {
  t.Fatalf("Constraints: %s vs %s\nExpected: %t\nActual: %t",
   tc.leftConstraint, tc.rightConstraint, tc.expectedEqual, actual)
 }
}
}

func TestConstraint_sort(t
 *testing.T) {
 cases := []struct {
  constraint          string
  expectedConstraints string
 }{
  {
   ">= 0.1.0,< 1.12",
   "< 1.12,>= 0.1.0",
  },
  {
   "< 1.12,>= 0.1.0",
   "< 1.12,>= 0.1.0",
  },
  {
   "< 1.12,>= 0.1.0,0.2.0",
   "< 1.12,0.2.0,>= 0.1.0",
  },
  {
   ">1.0,>0.1.0,>0.3.0,>0.2.0",
   ">0.1.0,>0.2.0,>0.3.0,>1.0",
  },
 }

 for i, tc := range cases {
  t.Run(fmt.Sprintf("%d", i), func(t *testing.T) {
   c, err := NewConstraint(tc.constraint)
   if err != nil {
    t.Fatalf("err: %s", err)
   }

   sort.Sort(c)

   actual := c.String()

   if !reflect.DeepEqual(actual, tc.expectedConstraints) {
    t.Fatalf("unexpected order\nexpected: %#v\nactual: %#v",
     tc.expectedConstraints, actual)
   }
  })
```

```
 }
}

func TestConstraintsString(t *testing.T) {
 cases := []struct {
  constraint string
  result     string
 }{
  {">= 1.0, < 1.2", ""},
  {"~> 1.0.7", ""},
 }

 for _, tc := range cases {
  c, err := NewConstraint(tc.constraint)
  if err != nil {
   t.Fatalf("err:
%s", err)
  }

  actual := c.String()
  expected := tc.result
  if expected == "" {
   expected = tc.constraint
  }

  if actual != expected {
   t.Fatalf("Constraint: %s\nExpected: %#v\nActual: %s",
    tc.constraint, expected, actual)
  }
 }
}
```

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Protocol Buffers for Go with Gadgets

Go support for Protocol Buffers - Google's data interchange format

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package version

import (
 "bytes"
 "database/sql/driver"

```
 "fmt"
 "regexp"
 "strconv"
 "strings"
)

// The compiled regular expression used to test the validity of a version.
var (
 versionRegexp *regexp.Regexp
 semverRegexp  *regexp.Regexp
)

// The raw regular expression string used for testing the validity
// of a version.
const (
 VersionRegexpRaw string = `v?([0-9]+(\.[0-9]+)*?)` +
  `(-([0-9]+[0-9A-Za-z\-~]*(\.[0-9A-Za-z\-~]+)*)|(-?([A-Za-z\-~]+[0-9A-Za-z\-~]*(\.[0-9A-Za-z\-~]+)*)))?` +
  `(\+([0-9A-Za-z\-~]+(\.[0-9A-Za-z\-~]+)*))?` +
  `?`

 // SemverRegexpRaw requires a separator between version and prerelease
 SemverRegexpRaw string = `v?([0-9]+(\.[0-9]+)*?)` +
  `(-([0-9]+[0-9A-Za-z\-~]*(\.[0-9A-Za-z\-~]+)*)|(-([A-Za-z\-~]+[0-9A-Za-z\-~]*(\.[0-9A-Za-z\-~]+)*)))?` +
  `(\+([0-9A-Za-z\-~]+(\.[0-9A-Za-z\-~]+)*))?` +
  `?`
)

// Version represents a single version.
type Version struct {
 metadata string
 pre
   string
 segments []int64
 si       int
 original string
}

func init() {
 versionRegexp = regexp.MustCompile("^" + VersionRegexpRaw + "$")
 semverRegexp = regexp.MustCompile("^" + SemverRegexpRaw + "$")
}

// NewVersion parses the given version and returns a new
// Version.
func NewVersion(v string) (*Version, error) {
 return newVersion(v, versionRegexp)
}
```

```
// NewSemver parses the given version and returns a new
// Version that adheres strictly to SemVer specs
// https://semver.org/
func NewSemver(v string) (*Version, error) {
 return newVersion(v, semverRegexp)
}

func newVersion(v string, pattern *regexp.Regexp) (*Version, error) {
 matches := pattern.FindStringSubmatch(v)
 if matches == nil {
  return nil, fmt.Errorf("Malformed version: %s", v)
 }
 segmentsStr := strings.Split(matches[1], ".")
 segments := make([]int64, len(segmentsStr))
 for i, str := range segmentsStr {
  val, err := strconv.ParseInt(str, 10, 64)
  if err != nil {
   return nil, fmt.Errorf(
    "Error parsing version:
%s", err)
  }

  segments[i] = val
 }

 // Even though we could support more than three segments, if we
 // got less than three, pad it with 0s. This is to cover the basic
 // default usecase of semver, which is MAJOR.MINOR.PATCH at the minimum
 for i := len(segments); i < 3; i++ {
  segments = append(segments, 0)
 }

 pre := matches[7]
 if pre == "" {
  pre = matches[4]
 }

 return &Version{
  metadata: matches[10],
  pre:      pre,
  segments: segments,
  si:       len(segmentsStr),
  original: v,
 }, nil
}

// Must is a helper that wraps a call to a function returning (*Version, error)
// and panics if error is non-nil.
```

```
func Must(v *Version, err error) *Version {
 if err != nil {
  panic(err)
 }

 return v
}

// Compare compares this version to another version. This
// returns -1, 0, or 1 if this version is smaller, equal,
// or larger than the other version, respectively.
//
// If you want boolean results, use the LessThan, Equal,
// GreaterThan, GreaterThanOrEqual or LessThanOrEqual
 methods.
func (v *Version) Compare(other *Version) int {
 // A quick, efficient equality check
 if v.String() == other.String() {
  return 0
 }

 // If the segments are the same, we must compare on prerelease info
 if v.equalSegments(other) {
  preSelf := v.Prerelease()
  preOther := other.Prerelease()
  if preSelf == "" && preOther == "" {
   return 0
  }
  if preSelf == "" {
   return 1
  }
  if preOther == "" {
   return -1
  }

  return comparePrereleases(preSelf, preOther)
 }

 segmentsSelf := v.Segments64()
 segmentsOther := other.Segments64()
 // Get the highest specificity (hS), or if they're equal, just use segmentSelf length
 lenSelf := len(segmentsSelf)
 lenOther := len(segmentsOther)
 hS := lenSelf
 if lenSelf < lenOther {
  hS = lenOther
 }
 // Compare the segments
```

```
 // Because a constraint could have more/less specificity than the version it's
 // checking, we need to account for a lopsided or jagged comparison
 for i := 0; i < hS; i++ {
  if i > lenSelf-1 {
   //
 This means Self had the lower specificity
   // Check to see if the remaining segments in Other are all zeros
   if !allZero(segmentsOther[i:]) {
    // if not, it means that Other has to be greater than Self
    return -1
   }
   break
  } else if i > lenOther-1 {
   // this means Other had the lower specificity
   // Check to see if the remaining segments in Self are all zeros -
   if !allZero(segmentsSelf[i:]) {
    // if not, it means that Self has to be greater than Other
    return 1
   }
   break
  }
  lhs := segmentsSelf[i]
  rhs := segmentsOther[i]
  if lhs == rhs {
   continue
  } else if lhs < rhs {
   return -1
  }
  // Otherwis, rhs was > lhs, they're not equal
  return 1
 }

 // if we got this far, they're equal
 return 0
}

func (v *Version) equalSegments(other *Version) bool {
 segmentsSelf := v.Segments64()
 segmentsOther := other.Segments64()

 if len(segmentsSelf) != len(segmentsOther) {
  return false
 }
 for i, v := range segmentsSelf {
  if v != segmentsOther[i]
  {
   return false
  }
```

```
 }
 return true
}

func allZero(segs []int64) bool {
 for _, s := range segs {
  if s != 0 {
   return false
  }
 }
 return true
}

func comparePart(preSelf string, preOther string) int {
 if preSelf == preOther {
  return 0
 }

 var selfInt int64
 selfNumeric := true
 selfInt, err := strconv.ParseInt(preSelf, 10, 64)
 if err != nil {
  selfNumeric = false
 }

 var otherInt int64
 otherNumeric := true
 otherInt, err = strconv.ParseInt(preOther, 10, 64)
 if err != nil {
  otherNumeric = false
 }

 // if a part is empty, we use the other to decide
 if preSelf == "" {
  if otherNumeric {
   return -1
  }
  return 1
 }

 if preOther == "" {
  if selfNumeric {
   return 1
  }
  return -1
 }

 if selfNumeric && !otherNumeric {
```

```
 return -1
} else if !selfNumeric && otherNumeric {
 return 1
} else if !selfNumeric && !otherNumeric && preSelf > preOther {
 return 1
} else if selfInt > otherInt {
 return 1
}

return -1
}

func comparePrereleases(v string, other string)
int {
// the same pre release!
if v == other {
 return 0
}

// split both pre releases for analyse their parts
selfPreReleaseMeta := strings.Split(v, ".")
otherPreReleaseMeta := strings.Split(other, ".")

selfPreReleaseLen := len(selfPreReleaseMeta)
otherPreReleaseLen := len(otherPreReleaseMeta)

biggestLen := otherPreReleaseLen
if selfPreReleaseLen > otherPreReleaseLen {
 biggestLen = selfPreReleaseLen
}

// loop for parts to find the first difference
for i := 0; i < biggestLen; i = i + 1 {
 partSelfPre := ""
 if i < selfPreReleaseLen {
  partSelfPre = selfPreReleaseMeta[i]
 }

 partOtherPre := ""
 if i < otherPreReleaseLen {
  partOtherPre = otherPreReleaseMeta[i]
 }

 compare := comparePart(partSelfPre, partOtherPre)
 // if parts are equals, continue the loop
 if compare != 0 {
  return compare
 }
```

```
 }

 return 0
}

// Core returns a new version constructed from only the MAJOR.MINOR.PATCH
// segments of the version, without prerelease or metadata.
func
 (v *Version) Core() *Version {
 segments := v.Segments64()
 segmentsOnly := fmt.Sprintf("%d.%d.%d", segments[0], segments[1], segments[2])
 return Must(NewVersion(segmentsOnly))
}

// Equal tests if two versions are equal.
func (v *Version) Equal(o *Version) bool {
 if v == nil || o == nil {
  return v == o
 }

 return v.Compare(o) == 0
}

// GreaterThan tests if this version is greater than another version.
func (v *Version) GreaterThan(o *Version) bool {
 return v.Compare(o) > 0
}

// GreaterThanOrEqual tests if this version is greater than or equal to another version.
func (v *Version) GreaterThanOrEqual(o *Version) bool {
 return v.Compare(o) >= 0
}

// LessThan tests if this version is less than another version.
func (v *Version) LessThan(o *Version) bool {
 return v.Compare(o) < 0
}

// LessThanOrEqual tests if this version is less than or equal to another version.
func (v *Version) LessThanOrEqual(o *Version) bool {
 return v.Compare(o) <= 0
}

// Metadata returns any metadata
 that was part of the version
// string.
//
// Metadata is anything that comes after the "+" in the version.
```

```
// For example, with "1.2.3+beta", the metadata is "beta".
func (v *Version) Metadata() string {
 return v.metadata
}

// Prerelease returns any prerelease data that is part of the version,
// or blank if there is no prerelease data.
//
// Prerelease information is anything that comes after the "-" in the
// version (but before any metadata). For example, with "1.2.3-beta",
// the prerelease information is "beta".
func (v *Version) Prerelease() string {
 return v.pre
}

// Segments returns the numeric segments of the version as a slice of ints.
//
// This excludes any metadata or pre-release information. For example,
// for a version "1.2.3-beta", segments will return a slice of
// 1, 2, 3.
func (v *Version) Segments() []int {
 segmentSlice := make([]int, len(v.segments))
 for i, v := range v.segments {
  segmentSlice[i] = int(v)
 }
 return segmentSlice
}

// Segments64 returns the
 numeric segments of the version as a slice of int64s.
//
// This excludes any metadata or pre-release information. For example,
// for a version "1.2.3-beta", segments will return a slice of
// 1, 2, 3.
func (v *Version) Segments64() []int64 {
 result := make([]int64, len(v.segments))
 copy(result, v.segments)
 return result
}

// String returns the full version string included pre-release
// and metadata information.
//
// This value is rebuilt according to the parsed segments and other
// information. Therefore, ambiguities in the version string such as
// prefixed zeroes (1.04.0 => 1.4.0), `v` prefix (v1.0.0 => 1.0.0), and
// missing parts (1.0 => 1.0.0) will be made into a canonicalized form
// as shown in the parenthesized examples.
```

```
func (v *Version) String() string {
 var buf bytes.Buffer
 fmtParts := make([]string, len(v.segments))
 for i, s := range v.segments {
  // We can ignore err here since we've pre-parsed the values in segments
  str := strconv.FormatInt(s, 10)
  fmtParts[i]
 = str
 }
 fmt.Fprintf(&buf, strings.Join(fmtParts, "."))
 if v.pre != "" {
  fmt.Fprintf(&buf, "-%s", v.pre)
 }
 if v.metadata != "" {
  fmt.Fprintf(&buf, "+%s", v.metadata)
 }

 return buf.String()
}

// Original returns the original parsed version as-is, including any
// potential whitespace, `v` prefix, etc.
func (v *Version) Original() string {
 return v.original
}

// UnmarshalText implements encoding.TextUnmarshaler interface.
func (v *Version) UnmarshalText(b []byte) error {
 temp, err := NewVersion(string(b))
 if err != nil {
  return err
 }

 *v = *temp

 return nil
}

// MarshalText implements encoding.TextMarshaler interface.
func (v *Version) MarshalText() ([]byte, error) {
 return []byte(v.String()), nil
}

// Scan implements the sql.Scanner interface.
func (v *Version) Scan(src interface{}) error {
 switch src := src.(type) {
 case string:
  return v.UnmarshalText([]byte(src))
```

```
 case nil:
  return nil
 default:
  return fmt.Errorf("cannot scan %T as Version", src)
 }
}

//
 Value implements the driver.Valuer interface.
func (v *Version) Value() (driver.Value, error) {
 return v.String(), nil
}
```

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# 1.338 pigz 2.8-1.el9

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# 1.339 colorette 2.0.19

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# 1.340 expand-template 2.0.3

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# 1.341 ding-libs 0.1.5-53.el9

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```
.if !defined(WITH_CTF)
WITH_CTF=1
.endif

.include <bsd.sys.mk>

SRCDIR=${.CURDIR}
INCDIR=${.CURDIR:H}/include

KMOD= openzfs

.PATH: ${SRCDIR}/avl \
 ${SRCDIR}/lua \
 ${SRCDIR}/nvpair \
 ${SRCDIR}/os/freebsd/spl \
 ${SRCDIR}/os/freebsd/zfs \
 ${SRCDIR}/unicode \
 ${SRCDIR}/zcommon \
 ${SRCDIR}/zfs \
 ${SRCDIR}/zstd \
 ${SRCDIR}/zstd/lib
```

```
CFLAGS+= -I${.OBJDIR:H}/include
CFLAGS+= -I${INCDIR}
CFLAGS+= -I${INCDIR}/os/freebsd
CFLAGS+= -I${INCDIR}/os/freebsd/spl
CFLAGS+= -I${INCDIR}/os/freebsd/zfs
CFLAGS+= -I${SRCDIR}/zstd/include
CFLAGS+= -include ${INCDIR}/os/freebsd/spl/sys/ccompile.h

CFLAGS+= -D__KERNEL__ -DFREEBSD_NAMECACHE -DBUILDING_ZFS  -D__BSD_VISIBLE=1 \
  -DHAVE_UIO_ZEROCOPY -DWITHOUT_NETDUMP -D__KERNEL -D_SYS_CONDVAR_H_ \
  -D_SYS_VMEM_H_ -DKDTRACE_HOOKS -DSMP -DHAVE_KSID -DCOMPAT_FREEBSD11

.if ${MACHINE_ARCH} == "amd64"
CFLAGS+= -DHAVE_AVX2 -DHAVE_AVX -D__x86_64 -DHAVE_SSE2 -DHAVE_AVX512F -
DHAVE_SSSE3
.endif

.if defined(WITH_DEBUG) && ${WITH_DEBUG} == "true"
CFLAGS+= -DZFS_DEBUG
 -g
.if defined(WITH_INVARIANTS) && ${WITH_INVARIANTS} == "true"
CFLAGS+= -DINVARIANTS -DWITNESS -DOPENSOLARIS_WITNESS
.endif
.if defined(WITH_O0) && ${WITH_O0} == "true"
CFLAGS+= -O0
.endif
.else
CFLAGS += -DNDEBUG
.endif

.if defined(WITH_VFS_DEBUG) && ${WITH_VFS_DEBUG} == "true"
# kernel must also be built with this option for this to work
CFLAGS+= -DDEBUG_VFS_LOCKS
.endif

.if defined(WITH_GCOV) && ${WITH_GCOV} == "true"
CFLAGS+=  -fprofile-arcs -ftest-coverage
.endif

DEBUG_FLAGS=-g

.if ${MACHINE_ARCH} == "i386" || ${MACHINE_ARCH} == "powerpc" || \
 ${MACHINE_ARCH} == "arm"
CFLAGS+= -DBITS_PER_LONG=32
.else
CFLAGS+= -DBITS_PER_LONG=64
.endif
```

```
SRCS= vnode_if.h device_if.h bus_if.h

# avl
SRCS+= avl.c

#lua
SRCS+= lapi.c \
 lauxlib.c \
 lbaselib.c \
 lcode.c \
 lcompat.c \
 lcorolib.c \
 lctype.c \
 ldebug.c \
 ldo.c \
 lfunc.c \
 lgc.c \
 llex.c \
 lmem.c \
 lobject.c \
 lopcodes.c \
 lparser.c \
 lstate.c \
 lstring.c \
 lstrlib.c \
 ltable.c \
 ltablib.c \
 ltm.c \
 lvm.c
 \
 lzio.c

#nvpair
SRCS+= nvpair.c \
 fnvpair.c \
 nvpair_alloc_spl.c \
 nvpair_alloc_fixed.c

#os/freebsd/spl
SRCS+= acl_common.c \
 btree.c \
 callb.c \
 list.c \
 spl_acl.c \
 spl_cmn_err.c \
 spl_dtrace.c \
 spl_kmem.c \
```

```
 spl_kstat.c \
 spl_misc.c \
 spl_policy.c \
 spl_string.c \
 spl_sunddi.c \
 spl_sysevent.c \
 spl_taskq.c \
 spl_uio.c \
 spl_vfs.c \
 spl_vm.c \
 spl_zone.c \
 sha256c.c \
 sha512c.c \
 spl_procfs_list.c \
 spl_zlib.c


.if ${MACHINE_ARCH} == "i386" || ${MACHINE_ARCH} == "powerpc" || \
 ${MACHINE_ARCH} == "arm"
SRCS+= spl_atomic.c
.endif

#os/freebsd/zfs
SRCS+= abd_os.c \
 crypto_os.c \
 dmu_os.c \
 hkdf.c \
 kmod_core.c \
 spa_os.c \
 sysctl_os.c \
 vdev_file.c \
 vdev_label_os.c \
 vdev_geom.c \
 zfs_acl.c \
 zfs_ctldir.c \
 zfs_dir.c \
 zfs_ioctl_compat.c \
 zfs_ioctl_os.c \
 zfs_log.c \
 zfs_replay.c \
 zfs_vfsops.c \
 zfs_vnops.c \
 zfs_znode.c \
 zio_crypt.c \
 zvol_os.c

#unicode
SRCS+= uconv.c \
```

```
 u8_textprep.c

#zcommon
SRCS+= zfeature_common.c \
 zfs_comutil.c
 \
 zfs_deleg.c \
 zfs_fletcher.c \
 zfs_fletcher_avx512.c \
 zfs_fletcher_intel.c \
 zfs_fletcher_sse.c \
 zfs_fletcher_superscalar.c \
 zfs_fletcher_superscalar4.c \
 zfs_namecheck.c \
 zfs_prop.c \
 zpool_prop.c \
 zprop_common.c

#zfs
SRCS+= abd.c \
 aggsum.c \
 arc.c \
 arc_os.c \
 blkptr.c \
 bplist.c \
 bpobj.c \
 cityhash.c \
 dbuf.c \
 dbuf_stats.c \
 bptree.c \
 bqueue.c \
 dataset_kstats.c \
 ddt.c \
 ddt_zap.c \
 dmu.c \
 dmu_diff.c \
 dmu_object.c \
 dmu_objset.c \
 dmu_recv.c \
 dmu_redact.c \
 dmu_send.c \
 dmu_traverse.c \
 dmu_tx.c \
 dmu_zfetch.c \
 dnode.c \
 dnode_sync.c \
 dsl_dataset.c \
 dsl_deadlist.c \
```

```
dsl_deleg.c \
dsl_bookmark.c \
dsl_dir.c \
dsl_crypt.c \
dsl_destroy.c \
dsl_pool.c \
dsl_prop.c \
dsl_scan.c \
dsl_synctask.c \
dsl_userhold.c \
fm.c \
gzip.c \
lzjb.c \
lz4.c \
metaslab.c \
mmp.c \
multilist.c \
objlist.c \
pathname.c \
range_tree.c \
refcount.c \
rrwlock.c \
sa.c \
sha256.c \
skein_zfs.c \
spa.c \
spa_boot.c
\
spa_checkpoint.c \
spa_config.c \
spa_errlog.c \
spa_history.c \
spa_log_spacemap.c \
spa_misc.c \
spa_stats.c \
space_map.c \
space_reftree.c \
txg.c \
uberblock.c \
unique.c \
vdev.c \
vdev_cache.c \
vdev_indirect.c \
vdev_indirect_births.c \
vdev_indirect_mapping.c \
vdev_initialize.c \
vdev_label.c \
vdev_mirror.c \
```

```
vdev_missing.c \
vdev_queue.c \
vdev_raidz.c \
vdev_raidz_math.c \
vdev_raidz_math_scalar.c \
vdev_rebuild.c \
vdev_raidz_math_avx2.c \
vdev_raidz_math_avx512bw.c \
vdev_raidz_math_avx512f.c \
vdev_raidz_math_sse2.c \
vdev_raidz_math_ssse3.c \
vdev_removal.c \
vdev_root.c \
vdev_trim.c \
zap.c \
zap_leaf.c \
zap_micro.c \
zcp.c \
zcp_get.c \
zcp_global.c \
zcp_iter.c \
zcp_set.c \
zcp_synctask.c \
zfeature.c \
zfs_byteswap.c \
zfs_debug.c \
zfs_file_os.c \
zfs_fm.c \
zfs_fuid.c \
zfs_ioctl.c \
zfs_onexit.c \
zfs_quota.c \
zfs_ratelimit.c \
zfs_rlock.c \
zfs_sa.c \
zil.c \
zio.c \
zio_checksum.c \
zio_compress.c
\
zio_inject.c \
zle.c \
zrlock.c \
zthr.c \
zvol.c

#zstd
SRCS+= zfs_zstd.c \
```

```
 zstd.c

beforeinstall:
.if ${MK_DEBUG_FILES} != "no"
 mtree -eu \
     -f /etc/mtree/BSD.debug.dist \
     -p ${DESTDIR}/usr/lib
.endif

.include <bsd.kmod.mk>


CFLAGS.gcc+= -Wno-pointer-to-int-cast

CFLAGS.lapi.c= -Wno-cast-qual
CFLAGS.lcompat.c= -Wno-cast-qual
CFLAGS.lobject.c= -Wno-cast-qual
CFLAGS.ltable.c= -Wno-cast-qual
CFLAGS.lvm.c= -Wno-cast-qual
CFLAGS.nvpair.c= -DHAVE_RPC_TYPES -Wno-cast-qual
CFLAGS.spl_string.c= -Wno-cast-qual
CFLAGS.spl_vm.c= -Wno-cast-qual
CFLAGS.spl_zlib.c= -Wno-cast-qual
CFLAGS.abd.c= -Wno-cast-qual
CFLAGS.zfs_log.c= -Wno-cast-qual
CFLAGS.zfs_vnops.c= -Wno-pointer-arith
CFLAGS.u8_textprep.c= -Wno-cast-qual
CFLAGS.zfs_fletcher.c= -Wno-cast-qual -Wno-pointer-arith
CFLAGS.zfs_fletcher_intel.c= -Wno-cast-qual -Wno-pointer-arith
CFLAGS.zfs_fletcher_sse.c= -Wno-cast-qual -Wno-pointer-arith
CFLAGS.zfs_fletcher_avx512.c= -Wno-cast-qual -Wno-pointer-arith
CFLAGS.zprop_common.c=
 -Wno-cast-qual
CFLAGS.ddt.c= -Wno-cast-qual
CFLAGS.dmu.c= -Wno-cast-qual
CFLAGS.dmu_traverse.c= -Wno-cast-qual
CFLAGS.dsl_dir.c= -Wno-cast-qual
CFLAGS.dsl_deadlist.c= -Wno-cast-qual
CFLAGS.dsl_prop.c= -Wno-cast-qual
CFLAGS.fm.c= -Wno-cast-qual
CFLAGS.lz4.c= -Wno-cast-qual
CFLAGS.spa.c= -Wno-cast-qual
CFLAGS.spa_misc.c= -Wno-cast-qual
CFLAGS.sysctl_os.c= -include ../zfs_config.h
CFLAGS.vdev_raidz.c= -Wno-cast-qual
CFLAGS.vdev_raidz_math.c= -Wno-cast-qual
CFLAGS.vdev_raidz_math_scalar.c= -Wno-cast-qual
CFLAGS.vdev_raidz_math_avx2.c= -Wno-cast-qual -Wno-duplicate-decl-specifier
```

```
CFLAGS.vdev_raidz_math_avx512f.c= -Wno-cast-qual -Wno-duplicate-decl-specifier
CFLAGS.vdev_raidz_math_sse2.c= -Wno-cast-qual -Wno-duplicate-decl-specifier
CFLAGS.zap_leaf.c= -Wno-cast-qual
CFLAGS.zap_micro.c= -Wno-cast-qual
CFLAGS.zcp.c= -Wno-cast-qual
CFLAGS.zfs_fm.c= -Wno-cast-qual
CFLAGS.zfs_ioctl.c= -Wno-cast-qual
CFLAGS.zil.c= -Wno-cast-qual
CFLAGS.zio.c= -Wno-cast-qual
CFLAGS.zrlock.c= -Wno-cast-qual
CFLAGS.zfs_zstd.c=
 -Wno-cast-qual -Wno-pointer-arith
CFLAGS.zstd.c= -fno-tree-vectorize -U__BMI__
Implementation of the Skein hash function.
Source code author: Doug Whiting, 2008.
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/*
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*/

#ifndef _SYS_ZPL_H
#define _SYS_ZPL_H

#include <sys/mntent.h>
#include <sys/vfs.h>
#include <linux/aio.h>
#include
```

```
 <linux/dcache_compat.h>
#include <linux/exportfs.h>
#include <linux/falloc.h>
#include <linux/parser.h>
#include <linux/task_io_accounting_ops.h>
#include <linux/vfs_compat.h>
#include <linux/writeback.h>
#include <linux/xattr_compat.h>

/* zpl_inode.c */
extern void zpl_vap_init(vattr_t *vap, struct inode *dir,
   umode_t mode, cred_t *cr);

extern const struct inode_operations zpl_inode_operations;
extern const struct inode_operations zpl_dir_inode_operations;
extern const struct inode_operations zpl_symlink_inode_operations;
extern const struct inode_operations zpl_special_inode_operations;
extern dentry_operations_t zpl_dentry_operations;

/* zpl_file.c */
extern ssize_t zpl_read_common(struct inode *ip, const char *buf,
   size_t len, loff_t *ppos, uio_seg_t segment, int flags,
   cred_t *cr);
extern ssize_t zpl_write_common(struct inode *ip, const char *buf,
   size_t len, loff_t *ppos, uio_seg_t segment, int flags,
   cred_t *cr);

extern const struct address_space_operations
 zpl_address_space_operations;
extern const struct file_operations zpl_file_operations;
extern const struct file_operations zpl_dir_file_operations;

/* zpl_super.c */
extern void zpl_prune_sb(int64_t nr_to_scan, void *arg);

extern const struct super_operations zpl_super_operations;
extern const struct export_operations zpl_export_operations;
extern struct file_system_type zpl_fs_type;

/* zpl_xattr.c */
extern ssize_t zpl_xattr_list(struct dentry *dentry, char *buf, size_t size);
extern int zpl_xattr_security_init(struct inode *ip, struct inode *dip,
   const struct qstr *qstr);
#if defined(CONFIG_FS_POSIX_ACL)
#if defined(HAVE_SET_ACL)
extern int zpl_set_acl(struct inode *ip, struct posix_acl *acl, int type);
#endif /* HAVE_SET_ACL */
extern struct posix_acl *zpl_get_acl(struct inode *ip, int type);
```

```
extern int zpl_init_acl(struct inode *ip, struct inode *dir);
extern int zpl_chmod_acl(struct inode *ip);
#else
static inline int
zpl_init_acl(struct inode *ip, struct inode
 *dir)
{
 return (0);
}

static inline int
zpl_chmod_acl(struct inode *ip)
{
 return (0);
}
#endif /* CONFIG_FS_POSIX_ACL */

extern xattr_handler_t *zpl_xattr_handlers[];

/* zpl_ctldir.c */
extern const struct file_operations zpl_fops_root;
extern const struct inode_operations zpl_ops_root;

extern const struct file_operations zpl_fops_snapdir;
extern const struct inode_operations zpl_ops_snapdir;
extern const struct dentry_operations zpl_dops_snapdirs;

extern const struct file_operations zpl_fops_shares;
extern const struct inode_operations zpl_ops_shares;

#if defined(HAVE_VFS_ITERATE) || defined(HAVE_VFS_ITERATE_SHARED)

#define ZPL_DIR_CONTEXT_INIT(_dirent, _actor, _pos) { \
 .actor = _actor,    \
 .pos = _pos,     \
}

typedef struct dir_context zpl_dir_context_t;

#define zpl_dir_emit  dir_emit
#define zpl_dir_emit_dot dir_emit_dot
#define zpl_dir_emit_dotdot dir_emit_dotdot
#define zpl_dir_emit_dots dir_emit_dots

#else

typedef struct zpl_dir_context {
 void *dirent;
```

```
 const filldir_t
 actor;
 loff_t pos;
} zpl_dir_context_t;

#define ZPL_DIR_CONTEXT_INIT(_dirent, _actor, _pos) { \
 .dirent = _dirent,    \
 .actor = _actor,    \
 .pos = _pos,     \
}

static inline bool
zpl_dir_emit(zpl_dir_context_t *ctx, const char *name, int namelen,
   uint64_t ino, unsigned type)
{
 return (!ctx->actor(ctx->dirent, name, namelen, ctx->pos, ino, type));
}

static inline bool
zpl_dir_emit_dot(struct file *file, zpl_dir_context_t *ctx)
{
 return (ctx->actor(ctx->dirent, ".", 1, ctx->pos,
     file_inode(file)->i_ino, DT_DIR) == 0);
}

static inline bool
zpl_dir_emit_dotdot(struct file *file, zpl_dir_context_t *ctx)
{
 return (ctx->actor(ctx->dirent, "..", 2, ctx->pos,
     parent_ino(file_dentry(file)), DT_DIR) == 0);
}

static inline bool
zpl_dir_emit_dots(struct file *file, zpl_dir_context_t *ctx)
{
 if (ctx->pos == 0) {
  if (!zpl_dir_emit_dot(file, ctx))
   return (false);
  ctx->pos = 1;
 }
 if (ctx->pos == 1) {
  if (!zpl_dir_emit_dotdot(file, ctx))
   return (false);
  ctx->pos
 = 2;
 }
 return (true);
}
```

```
#endif /* HAVE_VFS_ITERATE */

#if defined(HAVE_INODE_TIMESTAMP_TRUNCATE)
#define zpl_inode_timestamp_truncate(ts, ip) timestamp_truncate(ts, ip)
#elif defined(HAVE_INODE_TIMESPEC64_TIMES)
#define zpl_inode_timestamp_truncate(ts, ip) \
 timespec64_trunc(ts, (ip)->i_sb->s_time_gran)
#else
#define zpl_inode_timestamp_truncate(ts, ip) \
 timespec_trunc(ts, (ip)->i_sb->s_time_gran)
#endif

#endif /* _SYS_ZPL_H */
```

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ISC

# 1.352 commons-io 1.3.2

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* /asm-8-0-1-sources-6-jar/org/objectweb/asm/package.html
* /asm-8-0-1-sources-6-jar/org/objectweb/asm/signature/package.html

# 1.357 ecdsa-sig-formatter 1.0.11

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```
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# 1.362 gsm 1.0.19-6.el9

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# 1.364 idna 2.10

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Metadata-Version: 1.2
Name: idna
Version: 2.10
Summary: Internationalized Domain Names in Applications (IDNA)
Home-page: https://github.com/kjd/idna
Author: Kim Davies
Author-email: kim@cynosure.com.au
License: BSD-like
Description: Internationalized Domain Names in Applications (IDNA)
==========

Support for the Internationalised Domain Names in Applications
(IDNA) protocol as specified in `RFC 5891 <http://tools.ietf.org/html/rfc5891>`_.
This is the latest version of the protocol and is sometimes referred to as
“IDNA 2008”.

This library also provides support for Unicode Technical Standard 46,
`Unicode IDNA Compatibility Processing <http://unicode.org/reports/tr46/>`_.

This acts as a suitable replacement for the “encodings.idna” module that
comes with the Python standard library,
but only supports the
old, deprecated IDNA specification (`RFC 3490 <http://tools.ietf.org/html/rfc3490>`_).

Basic functions are simply executed:

.. code-block:: pycon

```
# Python 3
>>> import idna
>>> idna.encode('.')
b'xn--eckwd4c7c.xn--zckzah'
>>> print(idna.decode('xn--eckwd4c7c.xn--zckzah'))
.

# Python 2
>>> import idna
>>> idna.encode(u'.')
'xn--eckwd4c7c.xn--zckzah'
>>> print idna.decode('xn--eckwd4c7c.xn--zckzah')
.
```

Packages
--------

The latest tagged release version is published in the PyPI repository:

.. image:: https://badge.fury.io/py/idna.svg
  :target: http://badge.fury.io/py/idna


Installation
------------

To install this library,
you can use pip:

.. code-block:: bash

  $ pip install idna

Alternatively, you can install the package using the bundled setup script:

.. code-block:: bash

  $ python setup.py install

This library works with Python 2.7 and Python 3.4 or later.


Usage
-----

For typical usage, the ``encode`` and ``decode`` functions will take a domain
name argument and perform a conversion to A-labels or U-labels respectively.

.. code-block:: pycon

  # Python 3
  >>> import idna
  >>> idna.encode('.')
  b'xn--eckwd4c7c.xn--zckzah'
  >>> print(idna.decode('xn--eckwd4c7c.xn--zckzah'))
  .

You may use the codec encoding and decoding methods using the
``idna.codec`` module:

.. code-block:: pycon

```
 # Python 2
>>> import idna.codec
>>> print u'.'.encode('idna')
xn--80ahd1agd.xn--80akhbyknj4f
>>> print 'xn--80ahd1agd.xn--80akhbyknj4f'.decode('idna')
.
```

Conversions can be applied at a per-label basis using the ``ulabel`` or ``alabel``
functions if necessary:

.. code-block:: pycon

```
# Python 2
>>> idna.alabel(u'')
'xn--0zwm56d'
```

Compatibility Mapping (UTS #46)
++++++++++++++++++++++++++++++

As described in `RFC 5895 <http://tools.ietf.org/html/rfc5895>`_, the IDNA
specification no longer normalizes input from different potential ways a user
may input a domain name. This functionality, known as a “mapping”, is now
considered by the specification to be a local user-interface issue distinct
from IDNA conversion functionality.

This library provides one such mapping, that was developed by the Unicode
Consortium. Known as `Unicode IDNA Compatibility Processing <http://unicode.org/reports/tr46/>`_,
it provides for both a regular mapping for typical applications, as well as
a transitional mapping to help migrate from older IDNA 2003 applications.

For example, “Königsgäßchen” is not a permissible label as *LATIN CAPITAL
LETTER K* is not allowed (nor are capital letters in general). UTS 46 will
convert this into lower case prior to applying the IDNA conversion.

.. code-block:: pycon

```
# Python 3
>>> import idna
>>> idna.encode(u'Königsgäßchen')
...
idna.core.InvalidCodepoint: Codepoint U+004B at position 1 of 'Königsgäßchen' not allowed
>>> idna.encode('Königsgäßchen', uts46=True)
b'xn--knigsgchen-b4a3dun'
>>> print(idna.decode('xn--knigsgchen-b4a3dun'))
 königsgäßchen
```

Transitional processing provides conversions to help transition from the older

2003 standard to the current standard. For example, in the original IDNA specification, the *LATIN SMALL LETTER SHARP S* (ß) was converted into two *LATIN SMALL LETTER S* (ss), whereas in the current IDNA specification this conversion is not performed.

.. code-block:: pycon

```
# Python 2
>>> idna.encode(u'Königsgäßchen', uts46=True, transitional=True)
'xn--knigsgsschen-lcb0w'
```

Implementors should use transitional processing with caution, only in rare cases where conversion from legacy labels to current labels must be performed (i.e. IDNA implementations that pre-date 2008). For typical applications that just need to convert labels, transitional processing is unlikely to be beneficial and could produce unexpected incompatible results.

``encodings.idna`` Compatibility
++++++++++++++++++++++++++++++

Function calls from the Python built-in ``encodings.idna`` module are mapped to their IDNA 2008 equivalents using the ``idna.compat`` module. Simply substitute the ``import`` clause in your code to refer to the new module name.

Exceptions
---

All errors raised during the conversion following the specification should raise an exception derived from the ``idna.IDNAError`` base class.

More specific exceptions that may be generated as ``idna.IDNABidiError`` when the error reflects an illegal combination of left-to-right and right-to-left characters in a label; ``idna.InvalidCodepoint`` when a specific codepoint is an illegal character in an IDN label (i.e. INVALID); and ``idna.InvalidCodepointContext`` when the codepoint is illegal based on its positional context (i.e. it is CONTEXTO or CONTEXTJ but the contextual requirements are not satisfied.)

Building and Diagnostics
---

The IDNA and UTS 46 functionality relies upon pre-calculated lookup tables for performance. These tables are derived from computing against eligibility criteria in the respective standards. These tables are computed using the command-line script ``tools/idna-data``.

This tool will fetch relevant tables from the Unicode Consortium and perform the required calculations to identify eligibility. It has three main modes:

* ``idna-data make-libdata``. Generates ``idnadata.py`` and ``uts46data.py``, the pre-calculated lookup tables using for IDNA and UTS 46 conversions. Implementors who wish to track this library against a different Unicode version may use this tool to manually
generate a different version of the ``idnadata.py`` and ``uts46data.py`` files.

* ``idna-data make-table``. Generate a table of the IDNA disposition (e.g. PVALID, CONTEXTJ, CONTEXTO) in the format found in Appendix B.1 of RFC 5892 and the pre-computed tables published by `IANA <http://iana.org/>`_.

* ``idna-data U+0061``. Prints debugging output on the various properties associated with an individual Unicode codepoint (in this case, U+0061), that are used to assess the IDNA and UTS 46 status of a codepoint. This is helpful in debugging or analysis.

The tool accepts a number of arguments, described using ``idna-data -h``. Most notably, the ``--version`` argument allows the specification of the version of Unicode to use in computing the table data. For example, ``idna-data --version 9.0.0 make-libdata`` will generate library data against Unicode 9.0.0.

Note that this script requires Python 3, but all generated library data will work in Python 2.7.

Testing
---

The library has a test suite based on each rule of the IDNA specification, as well as tests that are provided as part of the Unicode Technical Standard 46, `Unicode IDNA Compatibility Processing <http://unicode.org/reports/tr46/>`_.

The tests are run automatically on each commit at Travis CI:

.. image:: https://travis-ci.org/kjd/idna.svg?branch=master
:target: https://travis-ci.org/kjd/idna

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Classifier: Programming Language :: Python :: 3.8
Classifier: Programming Language :: Python :: Implementation :: CPython
Classifier: Programming Language :: Python :: Implementation :: PyPy
Classifier: Topic :: Internet :: Name Service (DNS)
Classifier: Topic :: Software Development :: Libraries :: Python Modules
Classifier: Topic :: Utilities
Requires-Python: >=2.7, !=3.0.*, !=3.1.*, !=3.2.*, !=3.3.*

Found in path(s):
* /idna-2-10-1-tar-gz/idna-2.10/PKG-INFO
* /idna-2-10-1-tar-gz/idna-2.10/idna.egg-info/PKG-INFO
No license file was found, but licenses were detected in source scan.

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---

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```
"""
A library to support the Internationalised Domain Names in Applications
(IDNA) protocol as specified in RFC 5890 et.al. This new methodology,
known as IDNA 2008, can generate materially different results to the
previous standard. The library can act as a drop-in replacement for
the "encodings.idna" module.
"""

import io, sys
from setuptools import setup


def main():

  python_version = sys.version_info[:2]
  if python_version < (2,7):
     raise SystemExit("Sorry, Python 2.7 or newer required")

  package_data = {}
  exec(open('idna/package_data.py').read(), package_data)

  arguments = {
     'name': 'idna',
     'packages': ['idna'],
     'version': package_data['__version__'],
     'description': 'Internationalized Domain Names in Applications (IDNA)',
     'long_description': io.open("README.rst", encoding="UTF-8").read(),
     'author': 'Kim Davies',
     'author_email': 'kim@cynosure.com.au',
      'license': 'BSD-like',
     'url': 'https://github.com/kjd/idna',
     'classifiers': [
        'Development Status :: 5 - Production/Stable',
        'Intended Audience :: Developers',
        'Intended Audience :: System Administrators',
        'License :: OSI Approved :: BSD License',
```

```
        'Operating System :: OS Independent',
        'Programming Language :: Python',
        'Programming Language :: Python :: 2',
        'Programming Language :: Python :: 2.7',
        'Programming Language :: Python :: 3',
        'Programming Language :: Python :: 3.4',
        'Programming Language :: Python :: 3.5',
        'Programming Language :: Python :: 3.6',
        'Programming Language :: Python :: 3.7',
        'Programming Language :: Python :: 3.8',
        'Programming Language :: Python :: Implementation :: CPython',
        'Programming Language :: Python :: Implementation :: PyPy',
         'Topic :: Internet :: Name Service (DNS)',
        'Topic :: Software Development :: Libraries :: Python Modules',
        'Topic :: Utilities',
    ],
    'python_requires': '>=2.7, !=3.0.*, !=3.1.*, !=3.2.*, !=3.3.*',
  }

  setup(**arguments)

if __name__ == '__main__':
  main()
```

Found in path(s):
* /idna-2-10-1-tar-gz/idna-2.10/setup.py

# 1.365 pretty-format 29.6.3

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# 1.372 kubernetes 1.33.5

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```
package migration

import "fmt"

// Notice is a migration warning
type Notice struct {
 Plugin     string
 Option     string
 Severity   string // 'deprecated', 'removed', or 'unsupported'
```

```
 ReplacedBy string
 Additional string
 Version    string
}

func (n *Notice) ToString() string {
 s := ""
 if n.Option == "" {
  s += fmt.Sprintf(`Plugin "%v" `, n.Plugin)
 } else {
  s += fmt.Sprintf(`Option "%v" in plugin "%v" `, n.Option, n.Plugin)
 }
 if n.Severity == SevUnsupported {
  s += "is unsupported by this migration tool in " + n.Version + "."
 } else if n.Severity == SevNewDefault {
  s += "is added as a default in " + n.Version + "."
 } else {
  s += "is " + n.Severity + " in " + n.Version + "."
 }
 if n.ReplacedBy != "" {
  s += fmt.Sprintf(` It is replaced by "%v".`, n.ReplacedBy)
 }
 if n.Additional != "" {
  s += " " + n.Additional
 }
 return s
}

const (
 // The following statuses are used to indicate the state of support/deprecation in a given release.
 SevDeprecated  = "deprecated"
  // deprecated, but still completely functional
 SevIgnored     = "ignored"     // if included in the corefile, it will be ignored by CoreDNS
 SevRemoved     = "removed"     // completely removed from CoreDNS, and would cause CoreDNS to exit if present
in the Corefile
 SevNewDefault  = "newdefault"  // added to the default corefile.  CoreDNS may not function properly if it is not
present in the corefile.
 SevUnsupported = "unsupported" // the plugin/option is not supported by the migration tool

 // The following statuses are used for selecting/filtering notifications
 SevAll = "all" // show all statuses
)
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```

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==========
The common/types/pb/equal.go modification of proto.Equal logic
==========
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//
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type License struct {
 Name string `json:"name,omitempty"`
 URL  string `json:"url,omitempty"`
}
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==========
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# 1.373 packaging 21.0

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# 1.377 supports-color 10.2.2

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# 1.378 lsof 4.94.0-3.el9

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Notes for the distribution of lsof version 4

```
*********************************************************************
| The latest release of lsof is always available from
| https://github.com/lsof-org/lsof/releases
|
| From 4.92.1, git is introduced to manage changes.
| You can consult the details of changes with git.
*********************************************************************
```

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4.93.2 May 8, 2019

Dialects Supported
==========

Lsof (for LiSt Open Files) lists files opened by processes on selected Unix systems. Version 4 is a source reorganization of version 3, itself a major revision of version 2. Version 4 has been tested on:

Apple Darwin 9 and Mac OS X 10.[567]
FreeBSD 10.3, 11.0, 12.0 and 13.0 for AMD64-based systems
Solaris 9

(The pub/tools/unix/lsof/contrib directory on lsof.itap.purdue.edu contains information on other ports.)

If your favorite Unix dialect is not in the list, or if your version of it is more recent than the ones listed, please contact me at <abe@purdue.edu>.

Version 3 of lsof was tested on:

AIX 3.2.5, 4.1[.[1234]], and 4.2
BSDI BSD/OS 2.0, 2.0.1, and 2.1 for x86-based systems
DC/OSx 1.1 for Pyramid systems

Digital
UNIX (DEC OSF/1) 2.0, 3.0, 3.2, and 4.0
EP/IX 2.1.1 for the CDC 4680
FreeBSD 1.1.5.1, 2.0, 2.0.5, 2.1, 2.1.5 for x86-based
systems
HP-UX 8.x, 9.x, 10.01, 10.10, and 10.20
IRIX 5.2, 5.3, 6.0, 6.0.1, and 6.[124]
Linux through 2.0.27 for x86-based systems
NetBSD 1.0, 1.1, and 1.2 for x86 and SPARC-based
systems
NEXTSTEP 2.1 and 3.[0123]
OpenBSD 1.2 and 2.0 for x86-based systems
Reliant UNIX 5.43 for Pyramid systems
RISC/os 4.52 for MIPS R2000-based systems
SCO OpenServer Release 1.1, 3.0, and 5.0.x for x86-based
systems
SCO UnixWare 2.1 and 2.1.1 for x86-based systems
Sequent PTX 2.1.[1569], 4.0.[23], 4.1.[024], 4.2[.1],
and 4.3
Solaris 2.[12345], 2.5.1, and 2.6-Beta
SunOS 4.1.x
Ultrix 4.2, 4.3, 4.4, and 4.5

Version 3 and its predecessor, version 2, may be found at:

ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/OLD

How Lsof Works
==========

Using available kernel data access methods -- getproc(), getuser(),
kvm_*(), nlist(), pstat(), read(),
readx(), /proc -- lsof reads
process table entries, task table entries, user areas and file
pointers to reach the underlying structures that describe files
opened by processes.

Lsof interprets most file node structures -- advfsnodes, autonodes,
cnodes, cdrnodes, devnodes, fifonodes, gnodes, hsnodes, inodes,
mfsnodes, pcnodes, procnodes, rnodes, snodes, specnodes, s5inodes,
tmpnodes. It understands NFS connections. It recognizes FIFOs,
multiplexed files, Unix and Internet sockets. It knows about
streams. It understands /proc file systems for some dialects. On
many dialects it recognizes execution text and library references.
It knows about AFS on some Unix dialects.

Lsof Output
==========

The lsof output describes:

* the identification number of the process (PID) that has opened the file;

* the process group identification number (PGID) of the process (optional);

* the process identification number of the parent process (PPID) (optional);

* the command the process is executing;

* the owner of the process;

* for all files in use by the process, including the executing text file and the shared libraries it is using:

  * the file descriptor number of the file, if applicable;

  * the file's access mode;

  * the file's lock status;

  * the file's device numbers;

  * the file's inode number;

  * the file's size or offset;

  * the name of the file system containing the file;

  * any available components of the file's path name;

  * the names of the file's stream components;

  * the file's local and remote network addresses;

  * the TLI network (typically UDP) state of the file;

  * the TCP state, read queue length, and write queue length of the file;

  * the file's TCP window read and write lengths (Solaris only);

* other file or dialect-specific values.

## Getting Started Quickly

If you want to get started using
lsof quickly, or see some examples
of how lsof can be used, consult the 00QUICKSTART file of the lsof
distribution.

The 00QUICKSTART file won't help you build or install lsof, but it
will cut through the density of the lsof man page, giving you more
readily an idea of what you can do with lsof.

For information on building and installing lsof, consult the 00README
file of the lsof distribution.

## Limiting, Filtering, and Selecting Lsof Output

Lsof accepts options to limit, filter, and select its output.
These are the possible criteria:

* Process ID (PID) number -- to list the open files for a given
  process;

* Process Group ID (PGID) -- to list the open files for all
  the processes of a given process group;

* User ID number or login name -- to list the open files for
  all the processes of a given user;

* Internet address -- to list the open files using a given
  Internet address (host name), protocol,
or port (number or
  name); or to list all open Internet files;

* command name;

* file descriptor name or number;

* list all open NFS files;

* list all open Unix domain socket files;

* list all uses of a specific file;

* list all open files on a file system.

Selection options are normally ORed -- i.e., an open file meeting any of the criteria is listed. The selection options may be ANDed so that an open file will be listed only if it meets all the criteria.

In the absence of any selection criteria, lsof lists files open to all processes.

## Parsing Lsof Output with Another Program

The lsof -F option directs it to produce "field" output that can easily be parsed by another program. The lsof distribution contains sample awk, perl 4, and perl 5 scripts in its scripts subdirectory that show how to post-process field output.

## Repeat Mode

Lsof can be directed to produce output, delay for a specified time,
then repeat the output, cycling until stopped by an interrupt or quit signal. This mode is useful for monitoring the status of some file operation -- e.g., an ftp transfer or a tape backup operation.

Repeat mode is more efficient when combined with lsof's selection options, since they limit lsof overhead.

It's possible to use lsof's field output options to supply repeat mode output to another process for its manipulation. The scripts subdirectory of the lsof distribution has sample Perl scripts showing how to consume lsof repeat mode output from a pipe.

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3.
Altered versions must be plainly marked as such, and must not
be misrepresented as being the original software.

4. This notice may not be removed from or altered in the lsof source
files.

Cautions
========

Lsof is a tool that is closely tied to the Unix operating system
version. It uses header files that describe kernel structures and
reads kernel structures that typically change from OS version to
OS version.

DON'T TRY TO USE AN LSOF BINARY, COMPILED FOR ONE UNIX OS VERSION,
ON ANOTHER.

On some Unix dialects, notably SunOS and Solaris, lsof versions
may be even more restricted by architecture type. An lsof binary,
compiled for SunOS 4.1.3 on a sun4c machine, for example, won't
work on a sun4m machine.

AN LSOF BINARY, COMPILED FOR ONE SOLARIS 1.X ARCHITECTURE, ISN'T
GUARANTEED TO WORK ON A DIFFERENT SOLARIS 1.X ARCHITECTURE.

Distribution Contents
=====================

The lsof distribution is checked for completeness when it is
constructed and by the Inventory
script when you run the Configure
script. (See The Inventory Script section of the 00README file of
this distribution.)

Lsof is organized in these parts:

* The main lsof directory, containing common sources,
configuration and setup scripts and three subdirectories:
dialects/, lib/, and scripts/.

Lsof is compiled in the main lsof directory after configuration.

The selected dialect sources are copied or linked from the specified subdirectory. (Symbolic linking is the standard method.)

Common lsof definitions may be found in lsof.h; common function prototypes, proto.h; and common storage, store.c.

* The dialects/ subdirectory contains subdirectories with sources specific to UNIX dialect implementations -- e.g., the dialects/sun/ subdirectory contains sources for the SunOS (Solaris 1.x) and Solaris (2.x) implementations of lsof. The dialects subdirectories also contain Makefiles

and scripts for assisting dialect source configuration.

Dialect configuration definitions may be found in dlsof.h; other dialect definitions, dlsof.h; dialect prototypes, dproto.h; and dialect storage, dstore.c.

* The lib/ subdirectory contains sources for common lsof functions. Not all dialects use the functions -- some have their own versions of them. The lib/ functions are enabled and customized with #define's in the dialect machine.h header files.

* The scripts/ subdirectory contains sample scripts for processing lsof field (-F) output. The scripts are written in AWK, Perl 4, and Perl 5.

The 00PORTING file of the lsof distribution has more information on lsof components, configuration, and construction.

## Warranty
========

Lsof is provided as-is without any warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.
The entire risk as to the quality and performance of lsof is with you. Should lsof prove defective, you assume the cost of all necessary servicing, repair, or correction.

## Bug Reports
==========

Now that the obligatory disclaimer is out of the way, let me hasten
to add that I accept lsof bug reports and try hard to respond to
them. I will also consider and discuss requests for new features,
ports to new dialects, or ports to new OS versions.

PLEASE DON'T SEND A BUG REPORT ABOUT LSOF TO THE UNIX DIALECT
VENDOR.

At worst such a bug report will confuse the vendor; at best, the
vendor will forward the bug report to me.

Please send all bug reports, requests, etc. to me via email at
<abe@purdue.edu>.

## The lsof-l Mailing List

Information about lsof, including notices about the availability
of new revisions, may be found in mailings of the lsof-l listserv.
For more information about it, including instructions on how to
subscribe, read the 00LSOF-L
file of the lsof distribution.

## Version 3 Release Notes

See 00DIST in the last lsof 3 revision 3.88, for its complete
set of release notes. Lsof revision 3.88 may be found at:

ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/OLD

3.0 May 24, 1994
This is the first official release of lsof 3.

...

3.88 February 17, 1997

```
+=====================================+
| This is the last version 3 revision. |
+=====================================+
```

Added documentation files -- 00.README.FIRST[_<version>]
and 00RELEASE.SUMMARY_<version> -- to the distribution.

What's new in Version 4
==========

The main goal of version 4 was to eliminate the confusing common/ fragment source file technique. Changing the version number also provided an opportunity to restart the numbering, which at 3.88 had risen to a large value.

The sources that appeared in the dialects/common subdirectory of version 3 in fragment files have been incorporated into
the version
4 liblsof.a library as *.c files. This results in significant changes to many source files, scripts, and Makefiles of all dialect versions. It allows elimination of some source files -- ddev.c, dfile.c, dmnt.c -- for dialects now obtaining functions from liblsof.a that formerly came from making dialect source files by combining fragment files.

The version 4 liblsof.a sources are stored in the lib/ subdirectory of the main lsof directory. The liblsof.a functions are activated and conditioned in their source files by values #define'd in the dialect dlsof.h and machine.h header files.

Dialects that provide a private version of a library function refrain from #define'ing the symbol that would activate the library function code.

Version 4 Release Notes
==========

4.0 February 24, 1997

```
+=====================================+
| This is the first lsof 4 revision. |
+=====================================+
```

Reorganized sources: eliminated code fragment
files
and created a library in their place. Modified or
deleted many dialect source and header files.
Changed documentation accordingly.

Added a warning to sgi/Makefile and 00FAQ that advises
against using the IRIX C compiler -n32 option when
compiling lsof. Thanks go to Peter Ilieve
<peter@memex.co.uk> for bringing this to my attention.

Dropped IRIX 5.2 in mid-stream, because my 5.2 test
system was upgraded to 5.3.

4.01 March 3, 1997
Added TFS support for Pyramid dialects.

Added test to Configure and to the IRIX dnode.c
for the different cnode struct that appears in
<cachefs/cachefs_fs.h> on the 6.2 IMPACT distribution.
Heddy Boubaker <boubaker@amfou.cenatls.cena.dgac.fr>
alerted me to the cnode change and helped test this
lsof adjustment.

Shut down the lsof child process before doing a -r
sleep(). A comment from Dan Mercer <dam@mmm.com>
prompted this.

4.02 March 21, 1997

Based on a report from Pasi Kaara <Pasi.Kaara@atk.tpo.fi>,
disabled
HP-UX CCIT support in lsof for HP-UX
versions 10 and above. Pasi's report also led to
changes in the HP-UX machine.h to support use of
gcc to compile lsof for HP-UX 10.20 and warnings
against using `cc -Aa` or `gcc -ansi` to compile
lsof under HP-UX 10.x.

With help from Richard Allen <ra@hp.is> taught
HP-UX 10.x lsof to name file systems better by
using the virtual file system device number. Elias
Halldor Agustsson <elias@rhi.hi.is> provided a test
system.

Changed NEXTSTEP and UNIXWARE Makefiles to use
safer quoting when generating version.h. The change
was suggested by Bob Farmer <ucs_brf@unx1.shsu.edu>.

Added SHELL=/bin/sh string to all Makefiles.

Added support for Linux 2.1.28 on a test system,
kindly provided by Jonathan Sergent <sergent@purdue.edu>.
Configure tests the Linux 2.1.x's C library lseek()
function for proper handling of kernel offsets.
If lseek() appears suspect, Configure activates
the use of a private lseek() function.
Changed
the private nlist() function to nlist_private()

and taught it to use the query_module() syscall in
place of the deprecated get_kernel_syms() one.
Added rudimentary AX.25 support for Pierfrancesco
Caci <ik5pvx@infogroup.it> who helped test it.
Updated the old get_kernel_syms() code to recognize
and skip module name entries.

Prompted by Marty Leisner <leisner@sdsp.mc.xerox.com>,
eased the requirement that service name lookup for
the -i option be accompanied by a protocol name. The
name is not needed if both TCP and UDP names yield the
same port number.

Added xusers.awk script from Dan Mercer <damercer@mmm.com>
to the distribution scripts/ subdirectory.

Changed Configure script to use LSOF_VERS for all
UNIX dialect version numbers and to pass LSOF_VERS
to the dialect Mksrc functions. Also added the
ability for a dialect stanza to declare a different
dialect Makefile source. Modified dialect Mksrc
files -- e.g., linux and sun --
accordingly.

Added support for BSD/OS 3.0 with help from Jim
Reid <jim@mpn.cp.philips.com>. Terry Kennedy
<TERRY@spcvxa.spc.edu> kindly provided a test
system. During the port corrected a bug that
prevented proper handling of revoked files.

4.03 April 7, 1997
At the suggestion of Dan Mercer <damercer@mmm.com>,
made HP-UX building of lsof aware of differences
between the HP-UX bundled and unbundled C compilers.

Added the ability for the lsof builder to define the
default warning message issuance state. By default the
issuance of warning messages is disabled; defining
WARNINGSTATE in machine.h disables it. The Customize
script was updated to handle WARNINGSTATE. Dan Mercer
suggested this.

Eliminated compiler complaint about improperly cast
get_Nl_value() argument in ncache_load() in lib/rnch.c.

Corrected zeromem() argument error in SCO dproc.c.
Sped up parent directory cache lookup slightly.

Updated for PTX 4.4, including additional VxFS
(EFS)
file system support.

4.04 April 17, 1997
At the suggestion of Bela Lubkin <belal@sco.COM>
changed device cache handling to be more tolerant
of a device cache file whose [cm]times are older
than the ones on /dev or /devices. The change
required adding information to Solaris device cache
file clone lines, so the first time lsof 4.04 is
run under Solaris it will complain about a bad
cached clone device in a previous device cache
file, then regenerate it.

Added boot file path detection for SCO OSR 5 and
above, based on information supplied by Bela.

Fixed two bugs in DEC OSF/1 lsof -- an error in
reporting locks and a missing continue statement
in readdev() after a failure to open a directory.
Jan Ole Suhr <josuhr@informatik.tu-clausthal.de>
reported the second bug and supplied a fix.

Fixed XFS problems with IRIX 6.2 by abandoning the
idea that SGI will distribute XFS header files and
defining an lsof-private xfs_inode structure. John
Paul
Morrison <John.Paul.Morrison@MultiActive.com>
helped develop and test the 5.3 definition. John
R. Vanderpool <fish@daacdev1.gsfc.nasa.gov> helped
develop and test the 6.2 definition.

Remove obsolete comments about common/*.frag files.

Updated Linux lsof for Linux version 2.1.35.

4.04 April 18, 1997
Supplement Regenerated the 4.04 distribution to correct a non-
device-cache #define misplacement in the Solaris and
SunOS dlsof.h. Alexandre Oliva <oliva@dcc.unicamp.br>
reported the problem.

4.05 April 24, 1997
Corrected an error in 00DCACHE.

Made sure SCO /etc/ps/booted.systems is closed.

Based on an observation by Bela Lubkin <belal@sco.COM>
that the lsof child had needless file descriptors
open, closed all but the open pipes between the
lsof parent and child.

Decommissioned CDC EP/IX support; I no longer have a
test system.

Based on a suggestion from Patrick Connor
<connor@phreak.csd.sgi.com>, added -xansi to CFLAGS
for IRIX 5.3 and
6.[234].

Also at Patrick's suggestion changed Configure to
propagate exact SunOS 4.1.x version to the main
and library Makefiles. This allowed the sunos413
and sunos413cc Configure abbreviations to be
shortened to sunos and sunoscc.

Updated obsolete argument uses (-H changed to -n)
in count_pf.perl* and watch_a_file.perl scripts.

Adjusted Solaris 2.6 lsof for Beta_Update with tips
from Casper Dik <casper@holland.Sun.COM>.

Fixed a Solaris 2.4 TCP address reporting bug.

4.06 April 30, 1997
Added a step to the Makefile clean rules that does
a make clean in the lib subdirectory; suggested by
Casper Dik <casper@holland.Sun.COM>. (Configure's
-clean argument already did this.)

Fixed an incorrect awk argument in the sunos*)
Configure stanza, reported by Alexandre Oliva
<oliva@dcc.unicamp.br>.

Added CD9660 (aka ISO) file system support to
FreeBSD, NetBSD, and OpenBSD with mods and help
from Kenneth Stailey <kstailey@disclosure.com>.
(BSDI already
had CD9660 support.) While at it,
added file descriptor system support to BSDI and
FreeBSD.

Added /kern file system support to OpenBSD. The
support wasn't extended to BSDI, FreeBSD, or NetBSD,
because it requires Kenneth Stailey's changes to

/sys/miscfs/kernfs/kernfs.h.

Updated IRIX 6.3 support after getting access to
a test system, provided by John Paul Morrison
<John.Paul.Morrison@MultiActive.com>. Improved
the handling of IRIX 5.1 and greater FIFOs.

4.07 May 12, 1997
Based on AIX problem reports from David Capshaw
<David.Capshaw@SEMATECH.Org>, changed the aix*
Configure script stanza to avoid -bnolibpath for
gcc (which the GNU loader doesn't grok) and AIX
below 4.1.4 (where -bnolibpath hasn't been tested
or is known to be unimplemented), and to refuse to
use gcc for compiling lsof in AIX versions below
4.1 (because of possible structure alignment
problems). Updated 00FAQ appropriately.

Added OpenBSD support for EXT2FS. This support
has
yet to be tested.

Tested lsof under OpenBSD 2.1.

Activated /kern file system support for NetBSD when
Configure senses that /sys/miscfs/kernfs/kernfs.h
defines the kern_target structure. This support
has not been tested under NetBSD, although it has
been tested under OpenBSD.

Made some simple changes to the BSDI machine.h,
suggested by Jeffrey C. Honig <jch@bsdi.com>.

Improved handling of alternate dialect Configure
abbreviations -- aix and aixgcc, hpux and hpuxgcc,
solaris and solariscc, and sunos and sunoscc.

4.08 May 23, 1997
Cleaned up dialect Makefile's, staring with a suggestion
from Christopher Schanzle <chris@cam.nist.gov>.

Improved Configure's -clean processing.

Corrected bugs in Solaris lock reporting.

Changed NetBSD Configure stanza to put -I/usr/include
before -I/sys.

4.09 June 1, 1997
Adjusted for latest FreeBSD 3.0 release. This
required adding a new kernel name cache module for
reading BSD-form hashed kernel name
cache entries,
rnmh.c, to the lsof library, and adding a #define
to each machine.h to select it.

Activated rnmh.c for BSDI 2.1, BSDI 3.0, NetBSD
1.2, and OpenBSD 2.1.

4.10 June 8, 1997
Adjusted for Linux 2.1.x (x > 35) kernels with
hashed task structure pointers. Marty Leisner
<leisner@sdsp.mc.xerox.com> and Jonathan Sergent
<sergent@io.com> tested the adjustment.

Replaced readdev() stat() calls with lstat() to
reduce device table and cache entries with the same
device number and inode values. Added code to
remove all remaining duplicates. This fixes a
Linux problem reported by Jonathan Sergent and
makes device node name output predictable.

Corrected a bug in UnixWare stream file handling
that prevented searching for the stream file by
its associated character device name.

Added Pyramid code to determine Reliant UNIX clone
major device number differently from that of DC/OSx.

4.11 June 12, 1997
Changed Configure to sense that the PTX
inp_[fl]addr
members of the inpcb structure of <netinet/in_pcb.h>
have a struct type and set HASINADDRSTR for use in
PTX dnode.c and dsock.c tests.

Changed PTX version 4.1.4 tests to use 4.1.3 instead.
Carson Wilson <carson@mcs.com> reported the need
to do this and tested the change.

Fixed a block device table indexing bug in lib/rdev.c,
reported by Carson Wilson. The same bug was squashed
in pyramid/ddev.c.

Added code to the Pyramid Reliant UNIX kread()
function to compensate for an address boundary

error in the kernel's /dev/kmem driver.

Verified that lsof compiles and works under AIX 4.2.1. Added an AIX test for the presence of NFS header files, defined HAS_NFS and adjusted AIX dialect sources accordingly.

Based on a suggestion from Gaylord Holder <holder@phy.ucsf.EDU>, added DEC OSF/1 code to auto-detect the booted file, whence kernel symbol addresses are obtained.

4.12 June 24, 1997

Corrected a device number sign extension problem in the reading and writing of device cache file. The problem was reported by Bela Lubkin <belal@sco.com> and he suggested a fix.

Fixed an SCO stream device lookup problem. The report and solution came from Bela Lubkin

Enhanced the Configure script to enable cross-configuration of lsof, based on suggestions from Marty Leisner <leisner@sdsp.mc.xerox.com>. A new documentation file, 00XCONFIG, describes the process.

Made Pyramid OBJFS support conditional on the presence of supporting header files. Corrected the Pyramid MkKernOpts script so it generates the necessary -D's for the Nile/Jolt architecture. Richard Coley <rcoley@pyra.co.uk> helped.

Added another IRIX xfs_inode variant for 6.2, 32 bits, no XFS rollup patch.

Tested under UnixWare 2.1.2.

4.13 July 9, 1997

Taught Pyramid lsof to grok ttyfs vnodes with help from Richard Coley <rcoley@pyra.co.uk>. Fixed some minor bugs in Pyramid FIFO reporting. Eliminated use of the Pyramid UCB compatibility library at Richard's suggestion.

Eliminated reporting of "strange" inode numbers for SCO OSR 3.2v5.0.x HPPS files with help from

Bela Lubkin <belal@sco.com>

Modified port to service name lookup to use a small number of getservbyport() calls before reading the entire map with getservent(). Changed port reporting to represent a zero as `*' to be consistent with other prt number reporting tools like netstat. Casper Dik <casper@holland.Sun.COM> suggested these changes -- the getserv*() one to improve performance for large NIS service name maps.

Changed all readdev() functions to make the absence of block devices a warning instead of a fatal error after Brian Redman <ber@ms.com> reported his IRIX 6.4 system had no block devices. (It really did have block devices, but readdev()'s lstat() use caused it to miss them in a directory symbolically linked from /dev/dsk->/hw/disk.) Fixed Brian's real problem by changing the IRIX readdev() to use stat() on /dev nodes if a Configure test shows /hw is readable. Extended the potential to do the same to all readdev() functions.

For consistency and convenience changed some Configure abbreviations and dialect subdirectory names: "decosf" abbreviation and "osf" dialect subdirectory name to "du"; "netbsd" dialect subdirectory name to "n+obsd"; "next3" abbreviation and "next" dialect subdirectory name to "ns"; "sco" abbreviation and dialect subdirectory name to "osr"; "sgi" dialect subdirectory name to "irix"; and "unixware" abbreviation and dialect subdirectory name to "uw".

Added #if/#endif clauses to the AIX rmdupdev() function to avoid clone processing for AIX versions less than 4.1.4. The problem was reported by Toralf Foerster <toralf.foerster@io-warnemuende.de>, who supplied corrective code.

Added support for new style NetBSD inode with i_ffs and i_e2fs union members.

Improved Configure and 00FAQ information on Digital UNIX configuration subdirectory with suggestions from Brad Krebs <brad@EECS.Berkeley.EDU>.

4.14 July 22, 1997

Reorganized the Solaris handling of the inode structure header file, ufs_inode.h, to eliminate VxFS structure definition conflicts for Solaris 2.4, based on information from Greg Earle <earle@netbsd4me.jpl.nasa.gov>.

Cleaned up some typos and confusion in Configure's help output, based on comments from Bela Lubkin <belal@sco.com>

Added a 00DIALECTS file, containing UNIX dialect version numbers, that can be used by Configure and the man page.

4.15 August 15, 1997

Aligned `Configure -help` output better. Removed Configure's 2.6 Beta test adjustments.

Added improved Solaris VxFS configuration and handling, based on information from Greg Earle <earle@netbsd4me.jpl.nasa.gov>.

Added socket state -- TCO or TPI -- for socket files at the suggestion of Ian Fitchet <I.D.Fitchet@ftel.co.uk>.

4.16 September 25, 1997

Added reporting of TCP/TPI queue lengths and window sizes ala netstat to NAME column. Added -T option to select or de-select TCP/TPI info reporting. (Window sizes are only reported for Solaris.) Fixed anomalies along the way in SIZE/OFF processing for some dialects.

Fixed service name argument processor to allow minus signs as part of the name. Consequently this disallows names with embedded minus signs from being specified as the start of a range.

Added 00FAQ entries explaining why lsof won't find a file being edited with vi, why window sizes aren't reported for all dialects, and what the "no more information" message means.

Forced Pyramid CC to be /usr/ccs/bin/cc to avoid

accidental use of the BSD variant in /usr/ucb/cc.

Added support for Linux glibc2, including a Configure test; cross-Configure support (00XCONFIG); and much unfortunate and risky sleight-of-hand in lsof Linux dialect header and source files, forced upon lsof by incompatibilities between Linux kernel and glibc2 header files.

Included in scripts/identd.perl5 a Perl 5 implementation of an identd server, using lsof, provided by Kapil Chowksey <kchowksey@hss.hns.com>.

Updated IRIX 6.4 xfs_inode guess.

4.17 October 14, 1997

Added -V option for verbose search result reporting. Verbose reports are prepared for failure to locate file names, command names, Internet addresses or files, login names, NFS files, PIDs, PGIDs, and UIDs.

Augmented Linux NFS file test to cope with kernels whose NFS code is in a loadable module. Need for the test was pointed out by Jonathan Sergent <sergent@csociety.ecn.purdue.edu>. The change required that Linux have private dmnt.c source,

Completed a Linux 2.1.57 port on a system provided by Jonathan Sergent.

4.18 October 25, 1997

Eliminated memory leaks in alloc_lfile(), lkup_port(), and NEXTSTEP's process_text() function.

Added recognition of OpenBSD 2.2 in Configure, supplied by Kenneth Stailey <kstailey@disclosure.com>.

Consolidated print_file() functions to use the one in lib/prtf.c. Made it configurable and changed it to size print columns dynamically.

!!! WARNING !!!

WITH DYNAMICALLY SIZED PRINT COLUMNS LSOF 4.18 PRODUCES OUTPUT SIGNIFICANTLY DIFFERENT FROM THAT OF PREVIOUS REVISIONS. LINES ARE GENERALLY SHORTER

AND THERE IS GENERALLY LESS BLANK SPACE BETWEEN
COLUMNS AND THE ITEMS IN THEM. THERE ARE NO LONGER
ANY SPACES BETWEEN DEVICE NUMBER ELEMENTS, ONLY
COMMAS.

!!! WARNING !!!

Added special types and print specification modifiers
for file size and offset to handle UNIX dialects
with 64 bit sizes and offsets. Paul Eggert
<eggert@twinsun.com> reported the need for this
addition.

With Paul Eggert's help picked lint from the lsof
library, the main level lsof sources, and the Sun
dialect sources.

Added documentation, including the file 00LSOF-L,
about the lsof-l LISTSERV.

Added support for Reliant UNIX on the RM600. Bob
Passarella
<rmpassar@pyramid.com> supplied the
changes. Kevin Smith <kevin@pyramid.com> helped
arrange test systems. While incorporating Bob's
changes, modified lib/rnch.c to handle kernel ncache
structs whose name is accessed via a char *, rather
than in a char array.

Changed #include order of <sys/socketvar.h> for
Solaris 2.x. W. Richard Stevens <rstevens@kohala.com>
pointed out the need to do this.

4.19 October 30, 1997
Changed Pyramid Reliant RM600 proc scan to skip
SSYS (p_flag) processes, since they don't seem to
have a readable u_cdir vnode.

Enabled Pyramid Reliant UNIX kread() work-around
for DC/OSx, too, since its read(/dev/kmem) kernel
driver seems to share the page boundary bug this
work-around circumvents.

Changed SzOffFtm_d and SzOffFtm_dv (new formats at
4.18 to print size and offset) from signed to
unsigned. Setting them signed at 4.18 was an
oversight.

Plugged a memory leak that caused the loss of 130
bytes per repeat-mode
pass. Fixed it with a simple
work-around in main(). Lionel Cons <Lionel.Cons@cern.ch>
reported the leak.

4.20 November 11, 1997
Tested under BSDI 3.1.

Added support for Reliant UNIX Mesh IPC files with
help from Billy Ho <bho@pyramid.com>.

Added support to Digital UNIX lsof that uses the
libmsfs tag_to_path() function (when it exists) to
look up AdvFS path names. The idea and sample code
came from Dean Brock <brock@cs.unca.edu>. Converted
Dean's code into more general purpose support for
private name cache lookups via the HASPRIVNMCACHE
#define in the dialect machine.h file and code
conditional on it in the printname() function.

Taught Digital UNIX lsof to recognize NFS3 file
systems. Corrected Digital UNIX lsof DEVICE column
alignment.

4.21 December 1, 1997
Squashed bug, introduced at revision 4.18, that
resulted in double reporting of each selected PID
when terse mode (-t) was specified.

Corrected minor bug, also introduced at 4.18,
that
might cause an extra print_proc() pass when one
PID has been specified.

Added -R to lsof options in scripts/idrlogin.perl*.
The option should have been there -- it was supposed
to be mandatory for PGID reporting -- but a bug,
corrected in revision 4.18, previously made -R
unnecessary.

Enabled configuring for BSDI BSD/OS 4.0 per a
suggestion from Jeff Honig <jch@bsdi.com>.

Enabled replacement of scoff_t with off64_t (scoff_t
is used to type r_size and r_localsize in the rnode
struct) for IRIX 5.3 systems that have the NFS
kernel rollup patch (1477). This compensates for

SGI's failure to distribute an updated <sys/fs/rnode.h>
with their patch.

Validated under Linux 2.0.3[12], Linux 2.1.64, and
NetBSD 1.3.

Added FreeBSD root directory reporting, courtesy
of Dan Nelson <dnelson@emsphone.com>.

4.22 December 15, 1997
Made adjustments for Linux 2.1.7[02].

Improved NAME information for Linux UNIX domain
sockets.

Added option +|-M
to control the reporting of
portmapper registration information in square
brackets after the TCP or UDP port or service name.
Kenneth Stailey <kstailey@disclosure.com> suggested
the feature and provided sample code from OpenBSD.
Reporting is disabled by default in the distribution
and may be enabled with +M; if lsof is compiled
with HASPMAPENABLED (e.g., from machine.h), reporting
will be enabled by default and can be disabled with
-M.

Changed the -w option to +|-w to match the syntax
of the +|-M option and to eliminate any options
that flip meaning when a symbol is defined at
compile time. For both +|-M and +|-w, specifying
`-' when the default state is disabled or specifying
`+' when the default state is enabled causes no
problems.

!!!WARNING The -w option has changed in lsof 4.22. WARNING!!!

Made the +|- prefix legal for most options, but
didn't document it in the man page or help panel.
Most options that disable something -- e.g., -b,
-C,
-n, -P -- now disable when the prefix is `-'
and enable when it is `+'. Since the states these
options disable are enabled by default, I chose to
avoid documentation complexity and confusion by
not mentioning that they can be used with the `+'
prefix.

Condensed the help panel.

Made sure Digital UNIX Configure stanza puts normal
include path (e.g., /usr/include) before system
include paths.

Added IPX socket information reporting to Linux
with help from Jonathan Sergent <sergent@purdue.edu>.

4.23 January 16, 1998
Fixed conflict arising from the quondam replacement
of the Sun Solaris <netdb.h> with a BIND/BSD version.

With help from Jonathan Sergent <sergent@purdue.edu>
developed a /proc file system based Linux lsof.
It needs some Linux 2.1.x release to work -- I'm
not sure which, but I tested under 2.1.72, 2.1.76,
and 2.1.79. The Configure script selects special
sources for this lsof, so the full lsof distribution
now contains both /dev/kmem
and /proc based sources
for Linux lsof. An optional kernel mod, written
by Jonathan, enhances the /proc-based lsof ability
to recognize IPX socket files. Reorganized and
augmented the Linux sections in 00FAQ to explain
the two types of Linux lsof.

Defined DOSTAT_FUNCTION for dostat() in misc.c to
select the function, stat() or lstat(), it will use.
DOSTAT_FUNCTION is normally undefined, defaults to
lstat(), and is only defined for the /proc-based
Linux lsof in its dlsof.h.

Made conditional on the presence of IRIX 6.4 XFS
rollup patch #6 an XFS node change introduced in
revision 4.16. Identified the patch with help
from John R. Vanderpool <fish@daacdev1.gsfc.nasa.gov>.

Added NFS node compensation for NetBSD 1.3. The
code and suggestion for it was supplied by Jean-Luc
Richier <richier@imag.fr>.

Added diagnostic messages to the /dev/kmem-based
Linux Mksrc script to report errors during the
construction of the kernel name cache header
file,
kncache.h. Added 00FAQ information on kncache.h.

Added a new Linux test host, running 2.0.33 and
GlibC, provided by Steve Logue <stevel@mail.cdsnet.net>.

Ported to PTX 4.1.3 and 4.4.2. Adjusted lib/rnch.c
for 4.4.2 to allow customization f additional ncache
struct element names.

4.24 January 28, 1998
Changed /proc-based Linux lsof offset test to use "/"
instead of "/etc/passwd".

To assist Jim Mintha <jim@geog.ubc.ca> with the
packaging of lsof for Debian Linux, added a
DEBIAN_LINUX_LSOF #define to trigger the activation
of special system map file location code in the
/dev/kmem-based dproc.c.

Applied modification to dialects/bsdi/dlsof.h from
Ingimar Robertson <iar@skyrr.is>, enabling lsof to
compile for BSDI BSD/OS 2.0.

Corrected a documentation error in 00DCACHE, pointed
out by Thomas Anders <anders@hmi.de>. The error was
created when the -V option was added at lsof 4.17.

Made IRIX 5.3 through 6.3 lsof aware of IRIX SCSI
tape
devices (e.g., /dev/tape). Dave Olson of SGI
and Randolph J. Herber of FNAL provided valuable
advice, and Igor Schein <ischein@air-boston.com>
helped test.

Added a machine.h symbol (NEVER_HASDCACHE) that
prevents Customize from offering to change HASDCACHE.
The symbol may appear anywhere in machine.h --
e.g., in a comment. Included the symbol in a
comment of the HASDCACHE section of the /proc-based
Linux lsof machine.h, and accompanied it with
warnings against #define'ing HASDCACHE. Did the
same thing for WARNDEVACCESS (NEVER_WARNDEVACCESS
is the suppressant.)

4.25 February 7, 1998
Corrected an IRIX mis-cast of file offset (position).
Igor Schein <ischein@air-boston.com> reported the
problem. This was offered as a patch to 4.24.
Picked some lint Igor pointed out.

At Igor's suggestion added an optional decimal
digit size argument to the -o option. This argument
specifies how many file offset decimal digits can
follow "0t" before lsof switches
to a "0x..." form.
The argument size specification doesn't count the
two characters of the "0t". A size of 0 means
unlimited. The default is OFFDECDIG (8), preserving
compatibility with existing lsof output; it can be
changed by the lsof builder. When size is specified
with -o it does not force offset display; -o without
a size still must be used to do that.

Added an IRIX 6.2, 32 bit system, XFS node patch,
courtesy of Ulrich Bernhard <rzubu@rzu.unizh.ch>.

For my own convenience enabled Configure to use
/usr/local/bin/gcc for NEXTSTEP. This allows
circumvention of a gcc 2.8.0 ranlib problem on
my test 3.1 `040 cube.

Added flags recommended by the RISC/os and Ultrix
compilers for the updated (and longer) main.c.

Updated FreeBSD cd9660_node.h Configure test.

4.26 February 17, 1998
Added shared process group processing for IRIX 5.3,
and IRIX 6.1 and above, based on investigation of
a bug report from Igor Schein <ischein@air-boston.com>.
Igor
helped test this addition.

Improved handling of file system name arguments.
It's now done in a manner similar to fuser. The
-f argument forces path names to be considered as
simple files, rather than as file system names.
The +f flag forces them to be considered as file
system names. Normally path arguments are considered
file system names when they match a mounted-on
directory in the system's mount table, or when they
match a mounted file system's block device. Igor
Schein helped test this change.

Igor also suggests that the proper compilation of
the IRIX 6.4 proc structure after patch 2536 has
been installed may need -DPIOMEMOPS. So lsof's
MkKernOpts script was updated to propagate that

option from CCOPTS in /var/sysgen/system/irix.sm,
even though patch 2536 doesn't add -DPIOMEMOPS to
it. Added a 00FAQ item on this patch.

Added a fatal warning message about names forced
to be file system names (with +f) that have no
match in the
mount table.

Improved the -V message for files and file systems
for which no open files were found. Added reporting
of /proc file and file system search failures.

Did some code reorganization to combine the multiple
ck_file_arg() functions into one. Moved the new
function from the library to the top level and put
it in arg.c; moved the usage function from arg.c
to a new top-level source file, usage.c, to balance
top-level source file size. The new usage.c depends
on version.h; arg.c no longer does.

Added flag recommended by the DU compiler for the
updated (and longer) main.c.

4.27 March 6, 1998
At the request of Igor Schein <ischein@air-boston.com>
added a conditional repeat mode option, using the
`+' prefix to the `r' option. +r operates as does
-r with the exception that it exits the first time
no open files have been listed during a cycle.
The exit code will be zero when any open files have
been listed; one, if none were ever listed.

Ported
lsof to HP-UX 11.0 with the help of Richard
Allen. This port hasn't been tested on a 64 bit
kernel; I'm sure it won't work there without more
mods. It may not work on PA 2 architectures; I've
only tested it under PA 1 and a separate, busy
tester reported PA 2 problems that I've been unable
to investigate.

In anticipation of getting access to a 64 bit HP-UX
kernel and the pending start of the Solaris 2.7
Beta test (It will have 64 bit kernel addressing.),
started adding support for 64 bit kernel pointers.
This includes: ubiquitous use of the KA_T cast
for kernel pointers; a format to print them,

KA_T_FMT_X; a function to print them, print_kptr();
and modifications to most kernel-related functions
-- e.g., process_file(), process_node(),
process_socket(), readvfs() -- to process kernel
addresses as KA_T types.

Fixed minor bug in handling path name arguments
that end with a `/'.

Removed support for RISC/os; its test system is no
longer
available.

Made modifications to insure that lsof output
doesn't contain non-printable characters. All such
characters are now printed in the printf form
"\x%02x". Several new common functions were
installed in misc.c to support "safe" printing.
This second major modification in 4.27 to common
and dialect code could have introduced bugs not
yet detected.

4.28 March 10, 1998
Refined unprintable format to use \b, \f, \r, \n,
\t, and ^* (for CTRL) forms. Corrected omission
of safestrprt() use for field output command name.
These changes were offered as patches to 4.27.

Made space an unprintable character (\x20) in the
COMMAND column; printable elsewhere, including the
NAME column, field output, and error messages.

Made sure FD column is parseable as a single entity
-- i.e., has no embedded space. Thus, if the access
mode is unknown but there is a known lock mode, (a
very rare case) the access mode will be printed as
`-'.

Picked lint
with gcc 2.8.0 under Solaris 2.6.

With the help of Dave Olson of SGI identified a
proc struct element that should have been added to
<sys/proc.h> by IRIX 6.4 patch 2536. Added a
work-around for it to the lsof Configure script.
Igor Schein <ischein@air-boston.com> identified
that the patch caused a proc structure length
complaint from lsof. Removed an obsolete 00FAQ

item on the patch, installed at lsof 4.26, explaining
that no solution was yet available.

Added a 00FAQ item on how BIND installs its own
header files, including <netdb.h>, which may cause
the rpcent struct definition to vanish. Solaris
has an automatic lsof work-around, but that hasn't
been (and probably can't be) propagated to all
dialects supported by lsof. The 00FAQ item recommends
re-installation of the vendor header files that
BIND has replaced. (Others include <rpcent.h>,
<sys/bitypes.h>, and <sys/ctypes.h>.)

Made AIX AFS fixes.

4.29 March 26, 1998
Corrected bug in Internet
address matching. The
matching formerly stopped if the foreign address
matched, thus failing to check the local address
for a match. That led to a possible false "Internet
address not located" warning (i.e., in response to
-V) about the local address, when both foreign and
local addresses were specified with -i. This
correction was offered as a patch to 4.28.

Changed readmnt() usage in an attempt to defer
mount readlink() and stat() delays until they are
necessary.

Corrected two bugs in the Digital UNIX readdev()
function. Made the correction available as a patch
to 4.28 and regenerated the 4.28 DU binaries.

Added a missing argument to a print-kptr() call in
the HP-UX dsock.c. The missing argument causes a
fatal gcc error. The problem was reported by Eyal
Shaynis <eyal.shaynis@telrad.co.il>. The fix was
offered as a 4.28 patch.

Adjusted for Digital UNIX 4.0D; the spec_node
structure is now defined in <sys/specdev.h>. Kris
Chandrasekhar
<Kris.Chandrasekhar@digital.com>
identified the need for the adjustment.

Incorporated a bug fix from Brian McAllister
<mcallister@mit.edu> to the DU readmnt() function.

This fix was offered as a patch to 4.28.

Added "safe" printing to a SunOS clone device error message.

Corrected bug in tabling of Linux /proc-based lock info.

Corrected bug in handling of SunOS TLI streams. Dan Farmer <zen@trouble.org> reported the problem.

Added a Solaris 2.6 work-around to keep the BIND <sys/bitypes.h> from colliding with the Solaris <sys/int_types.h>.

Strengthened the Configure test for /proc-based Linux lsof, based on a report from Marty Leisner <leisner@sdsp.mc.xerox.com>.

Tested on OpenBSD 2.3.

Made AIX changes that allow use with 3.2.5. The changes were suggested and tested by Brett Hogden <hogden@rge.com>.

Added Solaris 2.6 AFS support. Disabled reporting of some node numbers for Solaris 2.5 and above open AFS files. The node number computation algorithms used for SunOS 4.1.x and Solaris less than 2.5 no longer always work under Solaris 2.5 and above.

4.30 April 9, 1998

Corrected a pid structure member naming error for UnixWare < 2.1.2. The problem was reported by Richard van Meurs <vanmeurs.anva@atriserv.nl>. He supplied the correction. This was offered as a patch to 4.29.

Had a report from Igor Schein <ischein@air-boston.com> that IRIX 6.4 patch 2839 is another SGI kernel patch, along with 2536, that changes the size of the proc structure in the kernel without changing the proc structure in <sys/proc.h>. Upon further investigation found that the effect of these patches on the proc structure is not consistent. Therefore, dropped the Configure patch test for IRIX 6.4 and made the code in irix/dproc.c slightly more tolerant

of proc structure size differences for IRIX 6.4.
Igor help test the change.

Corrected Solaris >= 2.5 AFS inode number generation.
Craig Everhart
<Craig_Everhart@transarc.com> helped
find the cause of the problem. This was offered as
a patch to 4.29.

Refined the Linux /dev/kmem-based glibc evasion
for the timeval structure to make it work with
glibc version 2.0.7. This required defining a new
global symbol, TIMEVAL_LSOF, default timeval, that
the /dev/kmem-based Linux lsof can set to its
private glibc timeval name, distinct from the kernel
timeval name.

Added support for Alpha to the /dev/kmem-based
Linux lsof. Alexandre Oliva <oliva@dcc.unicamp.br>
provided a test system. Added an item to 00FAQ
about lsof, the Alpha processor, and Linux.

Added a 00FAQ item about lsof year 2000 compliance.
Basically it says lsof is probably compliant,
because its only date or time computations are done
with time_t values, but I haven't done any specific
Y2K validation. I don't have plans to do any.

Added support for UnixWare 7. Chris Daniels
<chrisd@dlpco.com> provided a test system and Don
Draper
<dond@sco.COM> provided technical information.
Added BFS and SFS file system support to lsof for
UW 2.1.[12] and 7.

Updated Solaris VxFS support for VxFS 3.2.1. Greg
Earle <earle@netbsd4me.jpl.nasa.gov> reported the
need for the update. Greg and Roger Klorese
<rogerk@veritas.com> provided technical information.
Scott McClung <mcclung@primenet.com> tested.

Changed IRIX XFS patch detection in anticipation of
learning there are multiple XFS patches for IRIX 6.4
that require different versions of the lsof-invented
xfs_inode structure.

4.31 April 21, 1998
Added a VxFS #if/#endif wrap to a section of the

HP-UX dnode.c that wasn't properly protected. The
problem was reported by Peter Klosky <PKlosky@bdm.com>.
This was offered as a patch to 4.30.

Added support for Solaris 2.7 (first Beta release).
Mike Sullivan <Mike.Sullivan@Eng.Sun.COM> provided
technical advice and helped test. Charles Stephens
<cfs@jurassic.eng.Sun.COM> also helped
test.

Fixed bug in /proc-based Linux that caused it to
access /proc/mounts excessively. Marty Leisner
<leisner@sdsp.mc.xerox.com> provided a syscall
trace that identified the bug. The fix was offered
as a patch to 4.30.

Adjusted the IRIX 6.4 private structure definition
for the XFS node to accommodate patch 2970. Igor
Schein <ischein@air-boston.com> identified the
patch and the required adjustment.

4.32 May 11, 1998
Corrected Solaris 2.7 code for reporting PCFS
(floppy disk) node numbers. Casper Dik
<casper@holland.sun.com> supplied the fix. The
fix was offered as a patch to 4.31.

Corrected a bug in conditional repeat mode handling
pointed out by Igor Schein <ischein@air-boston.com>.
This was offered as a patch to 4.31.

Improved reporting of AIX open(/dev/memory device)
errors.

Corrected a Solaris < 2.5 KA_T declaration error,
pointed out by Robert Kiessling <robert@easynet.de>.
Changed KA_T from a #define to a typedef for all
dialects
to prevent future problems of this kind.

Changed the sample Perl 5 script big_brother.perl5
to report a four digit year from localtime().

Added support for AIX 4.3[.1]. Bill Pemberton
<wfp5p@tigger.itc.virginia.edu> provided a test
system. Andrew Kephart <akephart@austin.ibm.com>
and Tom Weaver <tvweaver@austin.ibm.com> provided
technical assistance. Niklas Edmundsson

<nikke@ing.umu.se> did 4.3.1 testing.

Added -qmaxmem option to CFLAGs for an AIX compilation
with an xlc version 4.x compiler.

Adjusted Linux socket handling for changes in the
AX25 members of the sock struct. Richard Green
<rtg@tir.com> pointed out the problem. Tested
/dev/kmem-based lsof under Linux 2.0.34.

4.33 May 22, 1998
Added generic IPv6 support to common lsof sources
and specific IPv6 support to AIX sources. Andrew
Kephart <akephart@austin.ibm.com> supplied the
additions and helped with testing. Bill Pemberton
<wfp5p@tigger.itc.virginia.edu> provided a test
system.
The modification affected sources for
every dialect, whether it supports IPv6 or not, by
changing the interfaces to the common Internet
address function ent_inaddr().

Added support for the NetBSD UVM virtual memory
system. Paul Kranenburg <pk@cs.few.eur.nl> supplied
technical details.

Bracketed HP-UX 11 use of <sys/spinlock.h> with
#if/#endif _KERNEL.

Corrected printing of PCB address in DEVICE column
for IRIX.

4.34 June 26, 1998
Updated 00FAQ to discuss TCP and UDP ports private
to the AIX kernel and 00README to describe how ACLs
can be used to give lsof permission to read the
kernel memory devices. Add information to 00FAQ
and 00README about other OpenBSD architectures
where lsof is reported to compile and run. Added
section to 00FAQ discussing how an incorrect loader
path environment variable value can prevent lsof
from loading correctly.

Improved Solaris namefs and doorfs support so that
it is now possible to search for
an open VDOOR file
by the path name of its fattached file system
object. Igor Schein <igor@txc.com> requested the

ability to do such a search.  Even with the change,
lsof can't always identify path names for open
VDOOR files.

Also at Igor's request, improved reporting of
information on open Solaris VCHR files that share
a common vnode, and Solaris UNIX domain socket
files.

Corrected print_kptr() argument error in PTX dnode.c,
reported by Mark Price <mprice@sequent.com>.
Compensated for ncache element naming differences,
introduced at PTX 4.4.2; Kurtis D. Rader
<krader@sequent.com> reported the problem.

Changed output column title from INODE to NODE to
better reflect the column's contents of node IDs
for more than just inodes.

Improved Configuration and processing for Solaris
AFS.  Corrected AIX AFS 3.4 afs_rwlock_t simulation.

Corrected a cast problem with two AIX knlist()
calls, thus quieting an AIX 4.2.1 compiler argument
type warning.
Jon Champlin <champlin@us.ibm.com>
reported the problem.

Added support to most dialect versions (exception:
/proc-based Linux) to warn when the identity of
the kernel where lsof was compiled doesn't match
the running identity.  The warning can be suppressed
with -w.  Note: determining AIX state requires
calling oslevel, a potentially slow operation.
Jon Champlin <champlin@us.ibm.com> suggested this
addition.

!!!! WARNING !!!!  !!!! WARNING !!!!  !!!! WARNING !!!!

Those using the lsof cross-configuration capability
(see 00XCONFIG), should be aware that the kernel
identity test feature introduces two new basic
cross configuration environment variables, LSOF_ARCH
and LSOF_VSTR.

!!!! WARNING !!!!  !!!! WARNING !!!!  !!!! WARNING !!!!

Identified a situation where a Solaris UNIX domain

socket name is known and can be searched for by
name; added the necessary code.

4.35 July 17, 1998
Made the kernel identity check an option with the
HASKERNIDCK
#define in machine.h. Enabled altering
of HASKERNIDCK with the Customize script. Added
a clause to the help output that indicates the
build-time HASKERNIDCK status.

Added more information to the NAME column for
Solaris UNIX domain sockets. Made them searchable
by their clone device path name. Igor Schein
<igor@txc.com> requested this.

Completed the HP-UX 11 port with support for its
optional 64 bit kernel. Rich Rauenzahn
<rrauenza@cup.hp.com> provided a test system.
Corrected errors with HP-UX 11 lock reporting and
private kernel structure and type definitions.
Added support for HP-UX NFS3 files.

Limited mount table warnings -- e.g., when -b is
used -- to one set per mount point.

Fixed some mount table scanning and usage bugs,
including one in Solaris, reported by Kjetil Torgrim
Homme <kjetilho@ifi.uio.no>.

4.36 August 4, 1998
Made corrections and additions to IPv6 support and
to AF_ROUTE socket handling, supplied by Jean-Luc
Richier
<Jean-Luc.Richier@imag.fr>. Jean-Luc's
additions provide IPv6 support for the Inria IPv6
implementations on FreeBSD and NetBSD.

Fixed two Solaris 2.5, 2.5.1, 2.6 and 2.7 TCP and
UDP host name or IP address reporting bugs, reported
by James Mathiesen <James-Mathiesen@deshaw.com>.
This fix was offered as a patch to 4.35.

Updated the Customize script to cause ENTER to use
all defaults. Amir J. Katz <amir@ndsoft.com>
suggested this and helped test the changes.

Updated Solaris ICMP and IP stream handling, based

on a report from Igor Schein <igor@txc.com>.

Fixed a bug in the Digital UNIX mount table handling, reported by Bob Ward <bward@thehartford.com>. While working on the bug, found and updated some obsolete AdvFS code. This fix was offered as a patch to 4.35.

4.37 September 15, 1998

Deactivated SGI IRIX support and archived revision 4.36 sources and binaries in pub/tools/unix/lsof/OLD.

Improved performance of FD searching. This was offered as a patch to 4.36.

Amir J. Katz <amir@ndsoft.com> pointed out that ranlib isn't needed for AIX or Solaris. Made appropriate Configure script changes.

Fixed a file offset reporting bug for HP-UX VCHR and VBLK device nodes located on a VxFS root. Doug Siebert <douglas-siebert@iowa.edu> reported the bug. The fix was offered as a patch to 4.36.

Resolved an HP-UX root device name reporting bug, partly caused by an out-dated local copy of the <sys/mount.h> mount structure, by generating a local header file with the structure that can be compiled without needing _KERNEL defined. Doug Siebert also reported this bug.

Changed some dialect source code -- Digital UNIX, Solaris, SunOS, and UnixWare -- to make more consistent with ps the user ID lsof reports in the USER column. Added a 00FAQ entry about it. Igor Schein <igor@txc.com> reported the Solaris and SunOS lsof inconsistencies with what ps(1) reports.

Ported lsof to Pyramid ReliantUNIX 5.44.

Added brackets as comments to case, do, done, else, endif, esac, if, and while statements in Configure to assist in navigating its clauses.

Added more Linux 2.0.x glibc work-arounds.

Added support for UnixWare 7.0.1.

Ralph Forsythe <ralph@contact-paging.com> provided
a new FreeBSD test system.

4.38 November 25, 1998
Added support for recent FreeBSD 3.0 distributions.
A 3.0 test system was provided by David O'Brien
<obrien@NUXI.com>. This was offered as a patch
to 4.37.

Updated the scripts/idrlogin.perl* files to look
for sshd processes in addition to rlogind and
telnetd ones.

Added support for DU 5.0 Beta. Berkley Shands
<berkley@cs.wustl.edu> provided a test system.

Added support for OpenBSD 2.4 with changes supplied
by Kenneth Stailey <kstailey@disclosure.com>.

Changed the Solaris 2.7 tests and documentation to
Solaris 7.

Made some changes to the header files for NEXTSTEP
3.3 and added support for OPENSTEP 4.x
with help
from Michael A. Hovan III <mhovan@BLaCKSMITH.com>
and Carl Lindberg <Carl_Lindberg@BLaCKSMITH.com>.
The combined dialect subdirectory is named n+os.
One of Carl's changes propagates RC_CFLAGS to the
library Makefile. Timothy J. Luoma <luomat@peak.org>
helped test under NEXTSTEP 3.3 and OPENSTEP 4.2.

Made UW 7.x version sensitive to the presence of
ptf7038. Added peer PCB address to Unix domain
socket Name column, even when a path name has been
located. Information for these changes was supplied
by Francis Le Bourse <flebourse@intelcom.fr>. Lee
Penn <lee@dlpco.com> provided a test system.

Tested lsof under OSR 5.0.5 on a test system also
provided by Lee Penn.

Made path name argument processing more tolerant
of errors per a suggestion from Julian Gordon
<julian@cadence.com>.

Acquired a new UnixWare 2.x test system, generously provided by Computer Classroom, Inc. -- Matthew Thurmaier <matt@compclass.com>, Ken Laing <ken@compclass.com>,
and Andrew Merril
<andrew@compclass.com>. Updated Configure to accept a UnixWare version of 2.1.3.

Updated kmem-based lsof for Linux 2.0.36.

Updated NetBSD sources for a change in a UVM virtual mapping header file.

Corrected a cache allocation bug in Sun format kernel name cache handling. The bug only shows up when the kernel name cache is inaccessible.

4.39 December 29, 1998
Corrected problems with large device number handling for 64 bit Solaris 7. The problems were reported by Steve Bellenot <bellenot@math.fsu.edu>. Steve helped test the fixes. The fixes were offered as two patches to lsof 4.38.

Improved FreeBSD Configure operations for header files that must be obtained from the kernel source tree, based on a suggestion from David O'Brien <obrien@NUXI.com>.

For Bela Lubkin <filbo@deepthought.armory.com> made optional with +f[cfn] the display of file structure address, shared use count, and node structure address. /proc-based
Linux doesn't implement this
feature, because it doesn't read kernel structures from kernel memory. Modified the PTX -X option to take advantage of the new file structure display option. Added shared.perl5 to the scripts/ subdirectory to provide an example of how +f[fn] might be used to track shared file descriptors and files.

Added more /dev/kmem-based Linux glibc evasions, provided by Jeff Johnson <jbj@redhat.com> and Maciej Lesniewski <nimir@kis.p.lodz.pl>. Jeff helped test them on various Linux architectures.

Tested on AIX 4.3.2; no changes were required.

Doug Crabill <dgc@purdue.edu> provided a test
system.

Fixed -c option to detect missing command name when
following option begins with `+'.

4.40 January 25, 1999
Added support for using the CDS compiler for Reliant
Unix 5.44 and above. Made Reliant Unix MIPC support
optional, dependent on the presence of <sys/mipc.h>.

Based on a report from Michael Schmitz <MSchmitz@lbl.gov>
that
/dev/kmem-based lsof misbehaves on a Linux
2.0.x m68k kernel without module support, made the
absence of query_module() or get_kernel_syms()
Linux kernel support a fatal error. Updated relevant
sections of 00FAQ to reflect the change.

Added the ability to force the Linux Configure
stanza to use the /proc or /dev/kmem source base
via a LINUX_BASE environment variable specification.
This is a cross-configuration assist.

Added "+D <dir>" and "+d <dir>" options for directory
searching. +D searches the entire tree, starting
at <dir>, including <dir>, its contents, and its
subdirectory branches; +d searches only <dir> and
its contents, but not its subdirectory branches.
Improved lsof's searching of the specified name
list to compensate for anticipated long lists from
+d and +D.

Made an egrep in the Solaris Configure stanza usable
by the standard and XPG4 egrep's. Kenneth Stailey
<kstailey@disclosure.com> pointed out the improvement.

Fixed bugs
in /dev/kmem-based Linux and UnixWare
Unix domain socket name searching.

Changed a Linux Alpha #include to be conditional
on the presence of its named header file, so that
lsof will compile on Red Hat 5.1 and 5.2 (Linux
kernel 2.0.35) where the header file is absent.
The problem was reported by Alexandre Oliva
<oliva@dcc.unicamp.br>.

Fixed an AIX 4.3+ bug in procinfo struct space
allocation, reported by Jeff Stewart <jws@purdue.edu>.
This was offered as a patch to 4.39.

Added an lstatsafely() function to offer the same
isolation for lstat() calls that statsafely() offers
for stat() calls. This made DOSTAT_FUNCTION no
longer necessary, so deleted it.

With help from Laurent P. Montaron <lpm@sequent.com>
ported lsof to PTX 4.4.4. Laurent did a monumental
job of identifying TCP/IP changes by their TCP
version, rather than by their PTX (With mix 'n
match PTX and TCP/IP versions, the PTX version
often has no bearing on the TCP/IP version.), and
changed
the Configure script and pre-processor
#if/#else/#endif blocks to match. He also updated
Unix domain socket handling for PTX TCP/IP versions
4.5 and above.

Updated CLIENT handle acquisition of fill_portmap()
in print.c to use the more modern RPC function
clnt_create() in place of clnttcp_create() where
possible. PTX 4.4.4 requires clnt_create().

4.41 February 27, 1999
Added FreeBSD 3.1 and and 4.0 support with help
from Sheldon Hearn <axl@iafrica.com>, David O'Brien
<obrien@NUXI.com>, and John Polstra <jdp@polstra.com>.

Corrected bungled AIX 4.3+ patch that went into
lsof 4.40.

Reorganized the Configure script to improve Makefile
construction. A specific impetus for this was to
allow FreeBSD system-wide make flags to be propagated
to the lsof Makefiles, but other goals were to make
sure that the DEBUG= make entry can over-ride
standard CFLAGS values, and to better manage the
identification of compilers and their versions.
Two
compiler-related values may now be supplied in
environment variables: 1) the compiler path in
LSOF_CC; and 2) the compiler version in LSOF_CCV.
00XCONFIG documents them.

Added support for Pyramid Reliant Unix bsdsfs,

msockfs, and sockfs file systems.

Added an optional LSOF_CINFO string to Configure, producing a CINFO string in selected Makefiles, producing a #define LSOF_CINFO in selected version.h header files. The purpose of this is to allow Configure the option to propagate information to the lsof -v output. It is now used for Linux to identify the code base, and for HP-UX 10.30 and 11.0 and Solaris 7 to identify the kernel bit size.

Added system information to NEXTSTEP and OPENSTEP -v output, from the second line of hostinfo's output.

Fixed a login name buffer overflow problem in the processing of -u option values. This was offered as a patch to 4.40. !!!THIS IS A SERIOUS STACK OVERFLOW BUG; A LINUX EXPLOIT EXISTS FOR IT THAT OPENS
A BASH SHELL WITH LSOF'S AUTHORITY -- E.G, SETGID(KMEM) POWER!!!

Improved the Solaris mount table filter so the volume manager's fake mount point, "/vol", is ignored and doesn't supplant "/" in NAME column path assemblies. Igor Schein <igor@txc.com> reported this bug and provided important help in finding it. This was offered as a patch to 4.40.

Changed the Linux /dev/kmem-based lock ownership test to answer a problem reported by Tom Christiansen <tchrist@jhereg.perl.com>. This was offered as a patch to 4.40.

Installed an HP-UX 11 patch, suggested by Kevin Vajk <kvajk@cup.hp.com>, that adjusts a private lsof kernel header file, derived via Q4, to correspond to an HP-UX patch bundle.

Made NetBSD 1.3I sockproto structure adjustment.

4.42 March 30, 1999

Fixed a typo in the HP-UX dfile.c that caused +fF and +fN output controls to swap effect.

Enabled for OpenBSD 2.5 per notice from Kenneth Stailey <kstailey@kstailey.tzo.com>

Made more VM
accommodations for FreeBSD 4.0.

Improved file system search reporting to include
path name components when they're available, instead
of mindlessly reporting the file system name in
the NAME column. Guy Dallaire <gdallair@geocities.com>
brought the need for this change to my attention.

Updated Solaris 2.6 VxFS for Veritas Oracle Database
Edition 2.0, VxFS version 3.3, and VxVm version
2.5.4, based on a report from Chris Kordish
<chris.kordish@East.Sun.COM>. Chris kindly provided
a test system.

Improved HP-UX ipc_s patch detection in Configure,
response in .../dialects/hpux/hpux11/ipc_s.h, and
documentation in 00FAQ, Kevin Vajk <kvajk@cup.hp.com>
helped test.

Added to Customize the option to suppress HASKERNIDCK
selection for specified dialects. Suppressed it
for /proc-based Linux lsof, and removed its test
and code from there. Tin Le <tin@netimages.com>
alerted me to the need for this update.

Ported to official Digital UNIX 5.0 release.

Changed
DU lsof to use the knlist(3) function when
no kernel file has been specified with -k. This
change was suggested by Erich Wimmer
<Erich.Wimmer@digital.com>.

Updated Configure for latest NetBSD (1.3I?) with
UVM support the default.

4.43 May 11, 1999
Corrected a typo in the Solaris gcc discussion in
00FAQ. Made changes to the Solaris 2.5[.1] private
tcp_s structure. Both changes were done in response
to reports from Igor Schein <igor@txc.com>, who
tested the Solaris 2.5 change.

Made more IPv6 adjustments to lsof for Tru64 UNIX
(Digital UNIX) 5.0, based on information obtained
from Compaq by Berkley Shands <berkley@cs.wustl.edu>.

Corrected HP-UX error message about HP-UX 11 q4 usage.
Amir Katz <amir@ndsoft.com> reported the correction.

Fixed a GlibC 2.1 conflict in /proc-based Linux lsof.

Fixed a man page typo reported by Vlad Harchev
<hvv@hippo.ru>.

Changed some Solaris 2.7 references to Solaris 7
in Configure and 00XPORTING.

Added
a Solaris example to the echo statements that
are the install rule in the SunOS/Solaris Makefile.

Added a field to the file structure output --
FILE-FLAG (file structure open flags, f_flag[s],
and process file flags, typically u_pofile)) --
enabled with +f[gG]. Its field output character
is 'G'.

Figured out another piece of the HP-UX 11 patched
ipc_s structure puzzle with the help of Keith Kalet
<KEITH_KALET@HP-USA-om41.om.hp.com>.

Fixed a PTX real vnode to real inode interpretation
bug.

Added link count to lsof output. Eric Dumazet
<dumazet@risgw.ris.fr> requested and helped test
it. The new +L option enables and filters it.
Its field output character is `k'.

Updated Configure script to recognize NetBSD 1.4.

Updated AFSConfig to handle default answers to
questions.

Incorporated patch from Jonathan Sergent <sergent@io.com>
that enables /proc-based Linux lsof to run on both
32 and 64 bit kernels.

Updated Configure script with
a patch from David
O'Brien <obrien@NUXI.com> that recognizes FreeBSD 3.2.

4.44 June 24, 1999

Corrected use of nlink member of hsnode for SunOS 4.1.x High Sierra File System files. John Dzubera <zube@tlaloc.stat.colostate.edu> reported the problem and helped test the fix. Also fixed a SunOS segmentation fault bug. These fixes were offered as a patch to 4.43.

Improved handling of /proc-based Linux UNIX PCB address.

Fixed a NEXTSTEP and OPENSTEP bug that made repeat option (-r) processing malfunction. This fix was offered as a patch to 4.43.

Fixed Configure so it doesn't use -O in the Cflags for the bundled HP-UX C compiler. Jim Ankenbrandt <jankenbrandt@penton.com> reported the problem.

Corrected output ordering of parent PID and process group ID when both -R and -g are specified.

Enhanced the pdev.c and pdvn.c library modules for wider use. These dialect versions use the new library modules: DEC OSF/1, Digital UNIX, and Tru64 UNIX;
Pyramid DC/OSx and Reliant UNIX; SCO OSR and UnixWare; and Sequent PTX.

Added basic clone device support to /dev/kmem-based HP-UX lsof for HP-UX 10.30 and higher.

Added raw socket support to /proc-based Linux lsof.

Changed NODE-ADDR column title to NODE-ID in anticipation of using more general identification information in the column.

Ported to UnixWare 7.1, using a test system kindly provided by Matt Thurmaier <matt@compclass.com> and Don Draper <dond@sco.com>.

Updated for NetBSD 1.4C VM changes, and a new current and root working directory structure.

Made minor adjustment for latest Tru64 UNIX 5.0 Beta release.

4.45 July 30, 1999

Fixed quoting problem in DEC OSF/1, Digital Unix,
and Tru64 UNIX Makefile's install rule. The problem
was reported by Berkley Shands <berkley@cs.wustl.edu>.
Fixed bug in Tru64 UNIX 4 lsof that caused FDs to
be skipped. These fixes were offered in a patch
to 4.44.

Fixed a repeat-mode /proc-based Linux lsof
bug,
reported by Sami Farin <sfarin@ratol.fi>. This
was offered as a patch to 4.44.

Picked lint, some reported by Sami Farin.

Corrected a 00DCACHE documentation error in a sample
shell script. The problem was reported by Chad R.
Larson <chad@larsons.org>. Changed commented-out
entries in machine.h files so they require more
thought and work when the comments are removed,
based on a remark by Chad.

Compensated for the practice of Solaris 7 and above
to record the dev= value in /etc/mnttab in 32 bit
mode, even on 64 bit systems. This was offered as
a patch to 4.44.

Added a C library test for /proc-based Linux lsof,
so that the #include files can be adjusted for a
non-GlibC environment. The need for this was
reported by Andrew Hill <andrewh@tirin.openworld.co.uk>.
This was offered as a patch to 4.44.

Added support for Auspex LFS 1.8.1 and 1.9.2 to
SunOS 4.1.4 lsof. The support was requested by
Quentin Fennessy <quentin@dvorak.amd.com>,
who
provided information and did testing.

Enabled IPv6 support code for NetBSD and OpenBSD,
conditional on Configure script tests. Wolfgang
Rupprecht <wolfgang@wsrcc.com> supplied the NetBSD
code and tested it. The OpenBSD code I constructed
has been compiled but not tested.

Updated the identd Perl 5 script, based on a report
from Wendy Lin <af5@taiyang.cc.purdue.edu> that
the space in its response line in front of the user
name violates RFC 1413.

Added IPv6 support to /proc-based Linux lsof.
Jonathan Sergent <sergent@ETLA.NET> and Andrew
Thomas Sydelko <sydelko@ecn.purdue.edu> kindly
provided a test system.

Updated man page description of AIX multiplexed
files to indicate that they might be /dev/ptc or
/dev/pts, depending on the AIX version. The
correction was suggested by Onno van der Linden
<onno@simplex.nl>.

Sylvain Robitaille <syl@alcor.concordia.ca> reports
lsof passes his Y2K tests.

4.46 October 23, 1999
Corrected /proc-based
Linux lsof to detect that an
IPv6 address is a mapped IPv4 address. The problem
was reported and analyzed by Arkadiusz Miskiewicz
<misiek@misiek.eu.org>, who also tested the fix.

Added a libc5 library /dev/kmem-based Linux lsof
circumvention, supplied by Jason Lingohr
<lingman@lucid.net.au>.

Corrected a bug in -t (terse) AIX output, reported
by Wendy Lin <af5@taiyang.cc.purdue.edu>. I
introduced the bug at revision 4.43 when adding
FILE_FLAG reporting. This was offered as a patch
to 4.45.

Added a work-around for a problem in the OpenBSD
2.3 <sys/pipe.h> header file. Volker Borchert
<bt@teknon.de> provided and tested it.

Improved description of cross-building lsof for a
64 bit Solaris 7 system on a 32 bit system with
suggestions from Phillip Edwards
<Philip.Edwards@sn.wpafb.af.mil>.

Fixed a gawk POSIX-mode pattern error in the Linux
/dev/kmem-based Mksrc script, based on a tip from
Ambrose C. Li <acli@mingpaoxpress.com>.

Fixed a
bug in the Tru64 UNIX IPv6 handling, courtesy
of a report from Casper Dik <casper@holland.sun.com>.

Enabled support for OpenBSD 2.6.

Enabled support for BSDI BSD/OS 4.1, based on a
report from Jeffrey C Honig <jch@bsdi.com> that
only a Configure script change is necessary.

Enabled Configure script to use gcc for building
lsof for a 64 bit Solaris 7 and 8 kernels, if the
gcc version is 2.95 or above.

Improved -i option handling for systems with IPv6
support so that it will search for a host name in
both IPv4 and IPv6 families, when that is possible.
As a companion modification, changed -V processing
to report a single error when a multiple host name
match is requested. Casper Dik <casper@holland.Sun.COM>
helped test.

Fixed a DEC OSF/1, Digital UNIX, Tru64 UNIX repeat
mode bug, reported by Mayer Ilovitz <mayer@cooper.edu>.
Mayer helped test the fix. The fix was offered as a
patch to 4.45.

Changed Solaris socket file recognition scheme, so
it
is (nearly) the same through Solaris 8, where the
previous clone device scheme no longer works.

With significant assistance from Casper Dik, added
support for Solaris 8 Beta and Beta refresh. The
IPv6 support in Solaris 8 is still in some flux,
so there are temporary compensations for the
differences between Beta IPv6 support and Beta
refresh IPv6 support. Casper and I hope those
differences disappear by FCS.

Improved the delivery of information on Solaris
2.5.1, 2.6, 7, and 8 door files.

Fixed a repeat mode bug that surfaces when /etc/passwd
changes between cycles. The bug report and diagnostic
help were supplied by Igor Schein <igor@txc.com>.
The fix was offered as a patch to 4.45.

Added support for INRIA IPv6 to NetBSD. Jean-Luc
Richier <Jean-Luc.Richier@imag.fr> provided patches
and a test system on which to verify them.

Added support for AIX 4.3.3. Jeff W. Stewart
<jws@anaconda.cc.purdue.edu> provided a test system.

Made adjustments
for FreeBSD 4.0-current.

Improved reporting of information for AIX sockets that
lack protocol control blocks.

4.47 November 29, 1999
Based on a query from Jean-Pierre Radley <jpr@jpr.com>,
changed the lsof top-level Makefile to propagate
CFGF to the library Makefile. (DEBUG was already
being propagated.) Added osrgcc and scogcc Configure
abbreviations (to use gcc) for Jean-Pierre.

In response to a query from Igor Schein <igor@txc.com>,
improved the Configure script test for Solaris 7
and 8 that decides if the compiler can produce 64
bit executables.

Made an ugly hack, based on making a private rnode
structure definition from q4 output, to compensate
for HP-UX 10.20 and lower recent NFS3 patches. HP
didn't supply an updated <nfs/rnode.h> with the
patches. The problem was reported by Will Partain
<partain@mekb2.sps.mot.com>. Elias Halldor Agustsson
<elias@hi.is> helped identify the patches as
PHNE_18173, PHNE_19426, PHNE_19937, and
PHNE_20091,
and provided a test system.

Switched BSDI test system from 2.1 and 3.1 to 4.0.1,
courtesy of Terry Kennedy <terry@tmk.com>.

Added some more dev_t hacks for Alpha FreeBSD 4.0.

Added support for IPv6 on BSD 4.x. The support hasn't
yet been tested, just compiled.

Added support for the mnt file system (mntfs or
/etc/mnttab) on Solaris 8. Tested on Solaris 8
BETA-Refresh.

Made selection of optional fields (e.g., PPID with
-FR) in a field output specification select the
optional field, too, so that the option selector

for the field (e.g., -R) isn't also required. This
change was made in response to an inquiry from John
DuBois <spcecdt@armory.com>. This may require some
revision to scripts that parse all field output;
two scripts in the lsof distribution's scripts/
subdirectory had to be updated.

Corrected handling of Linux IPv4 addresses mapped
in IPv6 addresses.

Tested under OpenBSD 2.6.

4.48 January 14, 2000
Modified -i argument
processing of colon-separated
IPv6 addresses to recognize an IPv4 address mapped
in an IPv6 address and handle it as an IPv4 address.
This was offered as a patch to 4.47.

Added a defined symbol (NOWARNBLKDEV) to control
(inhibit) the issuance of a warning when no block
devices are found. This was done anticipating its
need in FreeBSD 4.x, but that dialect version no
longer has any block devices, so HASBLKDEV was
disabled for it instead. NOWARNBLKDEV was left in
place for possible use in the future.

Enabled KAME IPv6 Configure support for FreeBSD
when <netinet6/in6.h> is found.

Disabled use of gcc to compile lsof for 64 bit
HP-UX 11.

Updated Configure to recognized FreeBSD 3.4.

Based on suggestions from Bernt Christandl
<beb@MPA-Garching.MPG.DE> improved AFS configuration
for AIX and Solaris, and updated AIX AFS 3.5 support.
Johannes Tax <tax@bluedog.oit.unc.edu>, Hung T.
Pham <hung_pham@unc.edu>, and Curt Freeland
<curt@grumpy.cse.nd.edu>
provided test systems.

Updated lsof's private rnode definition for AIX
4.3.3, since IBM still doesn't ship the
<oncplus/nfs/rnode.h> header file and the rnode
structure definition in <nfs/rnode.h> doesn't match
what the kernel uses. This was offered as a patch

to 4.47.

Weakened the test in the Linux /proc-based lsof of
the field count of data lines in /proc/net/{tcp,udp}.
It appears that recent 2.3.x Linux kernels have
added untitled fields to these files. The bug
report came from Gabor Liptak <gaborliptak@usa.net>.

Adjusted for a FreeBSD 4.0 change in the definition
of [_]KERNEL. David O'Brien <obrien@NUXI.com> reported
the problem and provided a test system.

Removed the HASPPID bracket from Fppid (the -R
option state variable) so that the field select
table will compile even when HASPPID is not defined.
This problem was introduced at revision 4.47 with
code that causes some field output characters to
set option states. The problem
was reported by
David Bacon <bacon@birch.eecs.lehigh.edu>.

4.49 April 3, 2000
Made clearer in man page that "Lxx" FDs are AIX
loader table references. Also updated the 00FAQ
discussion of the Stale Segment ID bug to include
AIX 4.3.x.

Modified support for NetBSD 1.4Q to include the
<sys/buf.h> header file to cope with an MFS change.

Added support for OpenBSD UVM virtual memory.

Added support for AIX systems with > 2GB of memory.
Chris Sylvain <csylvain@itg.ummc.umaryland.edu>
reported the problem and provided the solution.
Chris also supplied some minor code cleanup. This
was offered as a patch to 4.48.

Based on new information from Igor Schein <igor@txc.com>
made additional compensation in Configure script
for 64 bit Solaris 7 and 8 gcc.

Added some 00FAQ info on the effect ordering of
the +fg and -FG options has on output format.

Improved NetBSD IPv6 configuration, based on a
suggestion from Thomas Klausner
<wiz@danbala.ifoer.tuwien.ac.at>.

Added code to
convert IPv4-mapped-in-IPv6 addresses to IPv4
addresses.

Updated the information in 00FAQ and the HP-UX 11
binary directory README files on the HP-UX 11 ipis_s
patch with new information supplied by Eric McWhorter
<emcwhorter@xsis.xerox.com>.

Added documentation on changes to HASFSTYPE and
HASNCACHE, and the new HASPRIVPRIPP.

Adjusted Configure for FreeBSD 5.0. Made additional,
necessary changes to Configure and the BSDI sources
to eliminate load errors.

Added KAME IPv6 support to FreeBSD at the request
of Ollivier Robert <roberto@eurocontrol.fr>, who
provided a test system.

Corrected the script that generates the CHECKSUMS
files for binaries to correctly name the detached
PGP certificate. The documentation bug was reported
by Michael Hennecke <hennecke@rz.uni-karlsruhe.de>.

4.50 June 29, 2000
Added a NetBSD alpha test host, courtesy of Ray
Phillips <r.phillips@mailbox.uq.edu.au>. An lsof
4.49 binary, built
on Ray's 1.4.1 system was made
available prior to the 3.50 release.

Upgraded the system map file tests in /dev/kmem-based
Linux lsof, making the use of DEBIAN_LINUX_LSOF
unnecessary. Tested the changes on a system made
available by Vincent Kujala <kujala@geog.ubc.ca>
and Jim Mintha <jim@ic.uva.nl>.

Forced AIX to use the large-file-enabled versions
of lstat (lstat64) and stat (stat64) if <sys/stat.h>
contains stat64. This should allow lsof to stat()
AIX files > 2GB even when the builder has not
defined the "large file enabled programming
environment." Configure tests <sys/stat.h> and
puts -DHASSTAT64 in the Makefile's CFLAGS to make
this happen. Fernando A.B. Whitaker
<whitaker@cenapad.unicamp.br> reported the problem.
This was offered as a patch to 4.48.

Enabled Configure script to handle OpenBSD 2.7.
Angelos D. Keromytis <angelos@dsl.cis.upenn.edu>
reported the availability of OpenBSD 2.7 and supplied
the Configure script patch.

Improved
handling of DOOR and fattach()'d files in
Solaris.

Changed message about missing kernel symbol file
from "not yet determined" to "none found".

Updated FreeBSD, NetBSD, NEXTSTEP, OpenBSD, and
OPENSTEP support to report "no PCB" and the values
of the SO_CANTSENDMORE and SO_CANTRCVMORE state
flags when a socket structure has no inpcb pointer.
This modification was made to AIX lsof at revision
4.46. Added an entry to 00FAQ about sockets that
have no inpcb pointer.

Upgraded support for FreeBSD 5.0-CURRENT. Ben
Smithurst <ben@scientia.demon.co.uk> supplied
patches and did testing. David O'Brien <obrien@NUXI.com>
supplied a test system. The update included dropping
the Fctty part of file descriptor file system
support, conditional on a Configure script test.
I propagated those changes to BSDI, NetBSD, and
OpenBSD in anticipation of their having the
modification in the future. David also arranged
with Michael Haro <mharo@area51.fremont.ca.us>
for
a FreeBSD 3.4 test system.

In response to an lsof 3.72 bug report from Jim Mewes
<jim@corp.phone.com>, added more kernel address
filtering to the lsof function, kread(), that reads
Solaris kernel data.

In response to a report from Marc Duponcheel
<marc@offline.be>, added tests to the /proc-based
Linux lsof to ignore file systems of types "autofs"
and "pipfs".

Based on a report and information supplied by Casper
Dik <casper@holland.Sun.COM>, updated the ncache_load()
function in lib/rnch.c with new code that deals
with a post Solaris 8 change in kernel name cache

(DNLC) handling. Casper tested the update, which should be invisible to Solaris versions without the new DNLC code.

Added support for Solaris VxFS QIO files, based on a report from Kieran Broadfoot <kieran.broadfoot@gs.com>. Kieran help test the support.

Added support for PTX 4.4.6 and 4.5[.1] with help from the usual cast of good people at Sequent.

Added support for 64 bit file sizes and offsets on BSDI, FreeBSD, NetBSD, and OpenBSD, based on a report from Dan Nelson <dnelson@emsphone.com>. Dan supplied a patch and did FreeBSD testing.

Added Configure script recognition of NetBSD 1.5, based on a report from Andrew Brown <atatat@atatdot.net>. Thomas Klausner <wiz@danbala.ifoer.tuwien.ac.at> updated the NetBSD port package to use a pre-release of this addition.

At the last minute saw a notice via deja.com's UseNet search service that FreeBSD 3.5 had been released and lsof didn't grok it. Added recognition of 3.5 to lsof's Configure script, but didn't have the opportunity to test lsof on 3.5.

4.51 August 21, 2000

Added Configure script support for the upcoming Solaris 9 release based on suggestions from Casper Dik <Casper.Dik@holland.sun.com>.

Changed sample Perl scripts to assume that /usr/local/bin/perl is Perl 5 and Perl 4 may be found in /usr/local/bin/perl4.

Updated Configure to recognize FreeBSD 4.1 and made a FreeBSD pre-release distribution available.

Bela Lubkin <belal@sco.COM> tested lsof on the upcoming SCO OSR 5.0.6 release and reports that lsof appears to work properly.

Updated the AIX compiler test in Configure to recognize its version 5.

Updated AIX 4.3.3 support with automatic recognition
of the proper rnode structure, based on machine
bit width. Also added code to detect when processing
the -X option that lsof has been compiled with the
"other" AIX 4.3.3 user structure and to apply
compensations. When a compensation method works,
it's applied during subsequent -X processing; when
none works, further -X processing is disabled.

Added Tru64 UNIX 5.1 support. Updated Tru64 UNIX
library text file support to recognize new kernel
support for AdvFS library files. Berkley Shands
<berkley@cs.wustl.edu> and Klaus Saggerer USG
[saggerer@zk3.dec.com> helped put me in contact
with Chang Song <song@zk3.dec.com>, the developer
of 5.1's new
kernel name cache and he helped me
develop new code in lsof to access it.

Corrected reporting of PTX fattach()'d address.

Changed Configure and dlsof.h for NetBSD and OpenBSD
to use /usr/include/uvm header files when available.
Andrew Brown <atatat@atatdot.net>, Thomas Klausner
<wiz@danbala.ifoer.tuwien.ac.at>, and Wolfgang
Rupprecht <wolfgang@wsrcc.com> pointed out the need
to do this for NetBSD. Andrew provided access to
a NetBSD 1.5 system for verifying the changes.

Installed snprintf() support, including a private
version in the lsof library for those UNIX dialects
without the function. Changed all sources to use
it instead of sprintf() and strcpy().

Fixed a memory leak in the readvfs() functions of
BSDI, DEC/OSF1, Digital UNIX, FreeBSD, NetBSD,
OpenBSD, and Tru64 UNIX.

Tested on Linux 2.4.

Modified the Pyramid MkKernOpts script to compensate
for `uname -s` configuration alternatives. Robert
Dahlem <Robert.Dahlem@ffm2.siemens.de> supplied
the
modification.

Obtained access to an FCS Solaris 8 64 bit system

and built lsof on it, using Sun Workshop C 5.0 and
gcc 2.96 20000814 (experimental). Both compilers
produce a working lsof.

4.52 November 8, 2000

Completed work on an HP-UX 11.11 port that uses a
pstat(2) interface provided by HP. To distinguish
it from its predecessors for HP-UX, this lsof
version is called PSTAT-based and the predecessor
versions are now called /dev/kmem-based. I am
indebted to the far-sightedness and support of
these good people at HP for making PSTAT-based lsof
possible: Carl Davidson, Louis Huemiller, Rich
Rauenzahn, and Sailu Yallapragada. The PSTAT-based
sources are in lsof_4.52/dialects/hpux/pstat, the
/dev/kmem-based ones in lsof_4.52/dialects/hpux/kmem.

Ported to IBM Monterey for Merced|Itanium, aka AIX
5L. It configures via the Configure script's "aix"
abbreviation and has been tested on AIX 5L Beta 3.
Jay Beck, Steve Dibbell, Loc Le,
Nasser Momtaheni,
and Malcom Zung of IBM provided generous support.
Since AIX 5L is still in Beta testing, this port
can't be considered complete.

Added Configure support for OpenBSD 2.8. David
Mazieres <dm@cs.nyu.edu> provided a test system.

Based on a report from Marc Christensen
<marc@mecworks.com> added sockfs to the mount scan
exemption list for /proc-based Linux lsof.

Added large file, CDFS, and DOSFS for UnixWare 7.x.
Added UnixWare device memory mapping support. All
UnixWare changes were supplied by Eric Dumazet
<edumazet@cosmosbay.com> Eric also supplied some
miscellaneous bug fixes.

Deferred name cache loading until printname() needs
to use the name cache.

Terminated Pyramid, SunOS 4.1.x, and Ultrix support,
because test systems are no longer available.
Final Pyramid and Ultrix source code distributions
for lsof revision 4.51 may be found on lsof.itap.purdue.edu
in pub/tools/unix/lsof/OLD/src. The no longer

supported SunOS 4.1.x
source code is still distributed
with the Solaris source code.

Added code to set Solaris node address to real vnode
address, when applicable.

John Speno <speno@lopan.isc-net.upenn.edu> provided
information that enabled me to update the Tru64
AdvFS (MSFS) node definition for AdvFS version 5.

Added Tru64 5.x CFS support with help from Kris
Chandrasekhar <Kris.Chandrasekhar@compaq.com>,
Diane Lebel <lebel@zk3.dec.com>, and John Speno.
The support only provides information about cached
file attributes.

Installed a Configure patch for HP-UX 11 supplied by
Kenneth Stailey <kstailey@disclosure.com> that adds
another command to q4 input.

Tested on FreeBSD 4.2.

Will Day <willday@rom.oit.gatech.edu> and Frank
Winkler <frank.winkler@germany.sun.com> graciously
supplied Solaris 8 binaries.

Added Solaris 9 text file support, supplied by
Casper Dik <Casper.Dik@holland.sun.com>.

4.53 December 6, 2000
Added the AIX 5L j2_lock.h to the distribution
with
a Configure script step to use it when it's missing
from /usr/include/j2.

Removed SunOS 4.1.x support.

Removed Linux 2.0.x /dev/kmem support.

Fixed VBLK and VCHR special device file reporting
to handle /dev information more accurately.

Added a Apple Darwin / Mac OS X 1.2 port, provided
by Allan Nathanson <ajn@apple.com>. Allan also
arranged for a test system so I can maintain this
port. An additional test system was provided by
Dale Talcott.

Dropped claims of support for all UnixWare versions
except 7.1.0, since that is the only version on
which I can test lsof. Even though lsof 4.53 is
deprecated for UnixWare 2.1.3, installed a patch
for it with testing done by A. Channing Clark
<clark.channing@heb.com>.

Dropped claims of support for all SCO OpenServer
versions except 5.0.5, since that is the only
version on which I can test lsof.

4.54 January 19, 2001
Added compensation for a change that made the
FreeBSD mount structure invisible.
I can only test
back to 3.2 and the compensation works there, so
it's been #ifdef'd for 3.2 and above. David O'Brien
<obrien@FreeBSD.org> provided the necessary clue.

Based on a report from Valdis Kletnieks
<Valdis.Kletnieks@vt.edu>, changed all IPv6 support
to report a TYPE of IPv6 for sockets with IPv4
addresses mapped in IPv6 addresses. The previous
lsof behavior was to report their TYPE as IPv4.

Restored the Linux GlibC test to Configure, removed
at revision 4.53, based on a report from John Dzubera
<zube@cs.colostate.edu>, that RedHat Linux 6.0 still
needs the test.

Made setting of link count for Solaris more selective.

Limited Readlink() recursion to MAXSYMLINKS. The bug
was reported by Jan Dvorak <johnydog@go.cz>.

Dropped the *claim* that lsof runs on Solaris 2.5.1.
It may well do so, but I no longer have access to a
test system.

Fixed an #endif comment typo, reported by Igor Schein.

Fixed a typo in a cast for a Tru64 UNIX
5.1 function
and updated Configure for Tru64 UNIX 5.0 and 5.1 with
information from Jesse Perry <jesse.perry@compaq.com>.

Corrected non-fatal typos in the AdvFS support in

dnode.c for Tru64 UNIX.

Added msdos file system support for NetBSD and OpenBSD.
Andrew Brown <atatat@atatdot.net> requested and helped
test it.

4.55 February 15, 2001
Based on a report from Bernd Eckenfels <ecki@lina.inka.de>
added support in lsof for files in /proc/<PID>/maps
that have been deleted.

Changed PGRP output title to PGID, conforming to
the most common current abbreviation for Process
Group ID (PGID). While some systems continue to
use *pgrp for internal kernel variable names, most
systems that support the display of PGID via ps(1)
now title it PGID. The lsof -g and -Fg options
operations are unchanged in function; only titles
and descriptions have changed. Also changed internal
variable names from *PGRP and *pgrp to *PGID and
*pgid where possible.

Dropped
the *claim* that lsof runs on HP-UX 9.x.
It may well do so, but I no longer have access to
a test system.

In response to a suggestion from Jeff Howie
<jeff.howie@federated.ca> added support for command
name selection by regular expression. A new form
of the -c option value is use to identify and
specify a regular expression.

Restore the *claim* that lsof works on UnixWare
7.0, since I re-acquired a test system.

4.56 May 3, 2001
Corrected some problems Amir Katz <Amir_Katz@bmc.com>
found with Insure++, one in lib/dvch.c, the rest
in Solaris sources. Amir's report also helped me
find an error in an snpf() call that caused (the
unsupported) Solaris 2.5.1 lsof to crash. Wally
Winzer, Jr. <wally.winzer@ChampUSA.COM> helped test.

Added support for UnixWare 7.1.1 and above in-kernel
UNIX sockets. John Hughes <john@Calva.COM> kindly
provided code and access to a test system. John
also provided a test system and advice for adding

UnixWare 7.1.1
NonStop Cluster and CFS support.
More help with that effort came from Kurt Gollhardt
(SCO), Barbara Howe (SCO), Bela Lubkin (SCO), and
Dewan Rashid <Dewan.Rashid@ir.com>.

Archived a set of compilation hints (patches) from
Bill Melvin <Bill.Melvin@esc.edu> that make it
possible to compile the old, unsupported lsof 3.08
sources on UnixWare 1.x without NFS or CDFS support.

Installed support supplied by Allan Nathanson
<ajn@apple.com> for the Darwin "Gold Master" release,
Mac OS X 10.0 (aka Darwin 1.3 in its public source
version). Added Allan's CVS repository suggestions
to the script that gets additional header files
from an open source repository.

Tested an HP-UX 11.11 kernel patch from Sailu
Yallapragada that enables reporting of TCP/IP
information for telnetd processes that use the
telnet multiplexor. I don't yet know the kernel
patch ID.

Made the Solaris inclusion of <inet/mi.h> conditional
on the Solaris version. (It's apparently not
needed
at 2.6 and above.) Bill Watson <bill.watson@uk.sun.com>
brought this to my attention.

Added alternate Linux 2.4.x lock extent test, supplied
by Jim Mintha <jim@ic.uva.nl>.

Rearranged the lines and pre-processor tests in
regex.h, lib/regex.c, and lib/snpf.c so that unifdef
can be used to eliminate copyright and GPL statements
when the files aren't being used for a particular
dialect. (USE_LIB_* definitions in a dialect's
machine.h header file determine if one or more of
those three files are to be used.)

Added preliminary support for Solaris 8 with VxFS
3.4. This support will be refined as I get
information from Veritas about how they will
distribute the kernel header files lsof needs.
Those header files were omitted from the standard
VxFS 3.4 distribution. Technical assistance and
testing were provided by Calle Dybedahl <cdy@algonet.se>,

Gary Millen <gary.millen@veritas.com>, Rainer Orth
<ro@TechFak.Uni-Bielefeld.DE>, Peter C. Vernam
<pvernam@draper.com>,
and Donna Yobs
<Donna.Yobs@veritas.com>

Tested on FreeBSD 4.3-STABLE.

Dropped the *claim* that lsof works on UNIX dialects
where I no longer have test systems: BSDI 2.1,
3.[01] and 4.0; DEC OSF/1, Digital UNIX and True
64 UNIX 2.0 and 3.2; FreeBSD 2.1.[67], 2.2[.x],
3.[012345] and 4.[01]; HP-UX 10.20; NetBSD 1.[234];
SCO OpenServer 5.0.5; and SCO UnixWare 7.0

Tested on Solaris 9 BETA, s81_36.

4.57 July 19, 2001
Help (-h) and version (-v) output now have URLs
for the newly created and timeliest lsof FAQ
(00FAQ in the lsof distribution) at:

ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/FAQ

and the man page for the current lsof distribution
at:

ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/lsof_man

Based on a report from Steve Laubscher
<slaubs@woodward.com>, modified dlsof.h for PTX
4.6[.1] to avoid a temporary dnlc_t definition
needed at PTX 4.5.1.

Corrected test for old Linux kernels in Configure.
Henri
Karrenbeld <ishtar@cal044202.student.utwente.nl>
brought the error to my attention. Limited Linux
claims to 2.1.72 and above in the documentation.

Improved HP-UX 11 Configure stanza and stream socket
handling.

Constructed a work-around for the HP-UX 11 optional
OnlineJFS package. The work-around sadly requires
lsof to have a private version of the vx_inode
structure, since the OnlineJFS package doesn't
update <sys/fs/vx_inode.h>. Troyan Krastev

<Troyan.Krastev@ricoh-usa.com> brought the bug to
my attention and Michael Bracewell
<michael@ra.TSS.PeachNet.EDU> provided a test system
where I developed the work-around.

Added locale support to lsof's isprint() test,
based on a suggestion from Dan Mercer <damercer@mmm.com>.
Lsof will use setlocale(), when that function and
its supporting <locale.h> header file are available.

Added OpenBSD 2.9 support.

Based on a report from Aaron Rhodes <arhodes@psionic.com>
and with testing help from Aaron,
made the lsof
4.56 revision compile and work on OpenBSD 2.6.
While that OpenBSD version is no longer supported,
Aaron's report exposed a Configure script bug
affecting OpenBSD versions lsof does support.

Updated for FreeBSD 5.0-CURRENT. Szilveszter Adam
<sziszi@petra.hos.u-szeged.hu> help test. The lsof
FreeBSD ports packager, David O'Brien <obrien@FreeBSD.org>,
assisted.

Tested on AIX 5.1. Loc Le and Nasser Momtaheni of
IBM provided test systems.

4.58 September 13, 2001
Added options to safestrprt() and safestrprtn() to
surround the string with "" and to suppress the
printing of an ending '\n'. Use of these functions
in device cache file error message reporting answers
a suggestion for better error reporting from John
Jackson <jrj@purdue.edu>.

Fixed a Solaris 2.6 and above problem related to
searching for "large" (O_LARGEFILE) files by name;
lsof was using the wrong version of [l]stat(2).
The bug was reported by Daniel Trinkle
<trinkle@cs.purdue.edu>.

Added
AIX 4.1.4 and above XTI socket support.

Added OSR Xenix Shared Data and Semaphore file type
support with modifications supplied by Bela Lubkin.

Updated OPENSTEP support with modifications from Carl
E. Lindberg <lindberg@clindberg.org>. The changes
enable the correct reporting of executable and
library open files ("txt" type).

Limited claims of OpenServer support to the versions
where I currently test, 5.0.4 and 5.0.6. (Lsof
probably works on 5.0.5.)

Enabled processing of -C option for PSTAT-based HP-UX
lsof.

Enabled and tested on FreeBSD 4.4.

Corrected a file system test example in 00QUICKSTART,
based on a report from Jun Biao WANG <wangjunb@cn.ibm.com>.

Made available for re-distribution a user-contributed
port of lsof 4.51 to Reliant UNIX 5.45. Thomas
Mauterer <Thomas.Mauterer@philosys.de> contributed
the port.

4.59 October 20, 2001
With the closing of the Sequent Synergy Links Lab
by IBM, terminated lsof
support for PTX. The last
tested PTX lsof revision, 4.58, is available on
lsof.itap.purdue.edu in .../lsof/OLD/src.

Adjusted for FreeBSD 5.0-CURRENT NFS header file
changes, based on a report from Jos Backus
<josb@cncdsl.com>.

Corrected a bug in the way Linux lsof identifies
the owner of a process. Lionel Cons <lionel.cons@cern.ch>
reported the problem and tested the fix. Added
code to avoid stat(2) calls on regular Linux files
whenever possible. Lionel reported the need to do
this (AFS files) and tested the new code.

Added new output field for raw device number in
hex. The field is identified with 'r'. This field
is NOT selected when -F or -F0 is specified so that
its appearance won't disturb existing scripts that
process field output.

Added support for OpenUNIX 8. A test system was
provided by Larry Rosenman <ler@lerctr.org>.

Matthew Thurmaier <matt@compclass.com> and many
people from Caldera provided technical assistance.

Added
an additional UVM test to the NetBSD Configure
stanza. Andrew Brown <atatat@atatdot.net> supplied
the test; it recognizes NetBSD 1.5Y UVM changes to
the vnode structure recently committed by Chuck
Silvers.

Applied Configure and get-xnu-headers.sh script
changes suppled by Allan Nathanson <ajn@apple.com>
for Darwin 1.4.

Added for Bela Lubkin <belal@mammoth.ca.caldera.com>
OSR-specific environment variables to supply values
to the Configure script. The variables are described
in 00XCONFIG.

Added an IP version selector to the -i option
parameters.

4.60 November 9, 2001
Added special handling to and corrected bugs in
the matching of IPv4 in IPv6 addresses to -i6:<...>
selectors.

Made 00FAQ corrections and updates, based on
discussions with Igor Schein <igor@txc.com>.

Modified Configure script to detect a 64 bit capable
gcc compiler and permit it to be used to build 64
bit (PA-RISC 2) lsof for HP-UX 11.00. Tested with
HP's gcc package,
which Rich Rauenzahn of HP kindly
installed on a test system at HP. Stefan Marquardt
<stefan.marquardt@hagebau.de> helped test.

Made lsof's method of killing its child process
more robust, based on a suggestion from Bela Lubkin
<belal@caldera.com>.

Modified all dialect Makefile segments to accept
select -v #define's from the environment -- a
builder's comment, host, logname, system information
and user name. This was done for Bela Lubkin, so
he can "tune" the -v output when he packages lsof
in the upcoming Caldera OSR 5.0.7 release.

Changed Perl scripts in scripts/ to put the lsof
path consistently in $LSOF. Also added a fix from
Bela Lubkin to scripts/big_brother.perl5 that allows
it to tolerate SCO OSR "ago" clauses in open UDP
file information. Strengthened emphasis in
scripts/00README that the scripts are examples that
shouldn't be expected to run on all UNIX dialects
without modification.

At Bela Lubkin's suggestion changed the device
cache
file format examples in 00DCACHE and 00FAQ
to avoid "%U%". That's an SCCS escape sequence.

Added support for OpenBSD 3.0.

Added +DAportable to CFLAGS for 32 bit HP-UX 11.
Amir Katz <Amir_Katz@bmc.com> suggested the addition.

4.61 January 22, 2002
Updated field output example Perl scripts in the
scripts/ subdirectory to discover the lsof path,
starting at .. and proceeding through the PATH
environment variable's directories.

Added minor OSR Configure script fixes, provided
by Bela Lubkin <belal@caldera.com>.

In response to a report from Joshua Wright
<Joshua.Wright@jwu.edu> modified NetBSD and OpenBSD
Configure stanzas and sources so that lsof can be
built when there is no system source tree (e.g.,
/usr/src/sys).

In response to a report from Peter Valchev
<pvalchev@openbsd.org> improved the UVM test in
the OpenBSD Configure stanza.

Updated Configure script to recognize FreeBSD 4.5.
Updated for FreeBSD 5.0 procfs and pseudofs changes.

Updated
HP-UX stanza to see if the compiler named
in the LSOF_CC environment variable is the bundled
compiler. If it is, "-O" is omitted from the
compiler flags.

Updated Digital UNIX 4.x and Tru64 UNIX error message
related to kernel name list failures. Added an FAQ
section about how a kloadsrv daemon failure can cause
knlist(3) to fail. The condition was reported by
Douglas B. Jones <douglas@gpc.peachnet.edu>

Based on a report from Mark W. Eichin <eichin@thok.org>
made Linux lsof capable of handling and reporting
file sizes greater than 32 bits.

Tested on Solaris 9 BETA-Refresh.

Corrected a bug in the matching of IPv4 addresses,
mapped in IPv6 addresses, to an IPv4 parameter to
an -i option.

Ported to 64 bit Power AIX 5.1 kernel with advice
from David Clissold <cliss@austin.ibm.com> and Marc
Stephenson <marc@austin.ibm.com>, and on a test
system provided by Loc Le <lple@us.ibm.com>.

4.62 March 7, 2002
Updated 00README to reflect
the usefulness of gcc
for building AIX lsof. Documented a report from
Brian L. Gentry <BGentry@nationsrent.com> of success
on AIX 4.3.3. I documented my success on 32 bit
Power AIX 5.1 and my lack of success on ia64 AIX
5.1 and 64 bit Power AIX 5.1.

Improved UnixWare >=7.1.1 reporting of UNIX socket
NAME field information for NonStop Cluster systems
with a patch provided by John Hughes <john@Calva.COM>.
Offered John's improvement as a patch to lsof 4.61.

Corrected bugs in handling of open files on block
devices by OSR lsof. The bugs were reported by
Bela Lubkin <filbo@deepthought.armory.com>.

Fixed bug in writing >32 bit device numbers for
block devices to the device cache file.

Added support for reporting block special nodes
not in /dev (or /devices). That required "like
device special" be changed to "like block special"
and "like character special". (00FAQ was updated.)

Based on a report from Peter Valchev <pvalchev@openbsd.org>

improved
the definition of the source for NetBSD
and OpenBSD kernel symbols (the nlist() source
file). NetBSD now defaults to getbootfile(3) if
it is available, /netbsd otherwise. OpenBSD now
defaults to /dev/ksyms if it is available, /bsd
otherwise.

Made possible compilation under BSD/OS (BSDI) 5.0
with changes to Configure, dialects/bsdi/dlsof,
dialects/bsdi/dproc.c and lib/rnmh.c. The changes
were suggested by Steven Hinkle <hinkle@bsdi.com>.
Note that these changes do not substantiate a claim
that lsof works on BSDI 5.0, because I haven't
tested it there.

Updated OpenUNIX private <sys/fs/memfs_mnode.h>,
based on a report from Larry Rosenman <ler@lerctr.org>
that it had been updated by Caldera patch OU800PK3.
Unfortunately the patch only corrects some of the
problems with the header file, so it is still
necessary to distribute a private patched version
of it with the lsof sources.

Applied a man page correction reported by Frederic
Delanoy
<max_ok@yahoo.com>.

Corrected cast bugs related to using the HP-UX
bundled C compiler on HP-UX 11.11.

4.63 April 23, 2002
Added HPUX_BOOTFILE environment variable for use
by the Configure script in determining HP-UX kernel
configuration information -- e.g., the state of
the ipis_s structure in the HP-UX 11 kernel. The
change was suggested by Marc Bejarano <beej@alum.mit.edu>.
Marc also suggested some changes to the HP-UX
section in 00FAQ that discusses Configure's use of
q4 for HP-UX 11.

Fixed a bug in the Solaris lsof file system matching
code. It was not reporting that VCHR files in
/devices were in / when /devices was in /, too.

Corrected bugs in device number, file size, file
offset, and raw device number field output generation.

Added recognition of OpenBSD 3.1 to the Configure
script with a suggestion from Peter Valchev
<pvalchev@sightly.net>. Note that this change does
not constitute a claim that lsof works on OpenBSD
3.1, because
I haven't tested it there.

Built an automated test suite. (See 00TEST and
the tests/ sub-directory of the lsof main directory).
Bela Lubkin requested it. Dale Talcott, John
Hughes, and Larry Rosenman helped me validate it
on their systems.

During the development of the test suite I discovered
the following lsof bugs or missing features, and
corrected or supplied them.

* Corrected the reporting of locks for:
  o Digital UNIX 4.0d and Tru64 Unix 5.[01];
  o HP-UX 10.30 and 11.00;
  o OpenUNIX 8;
  o UnixWare 7.1.1.

* Enabled HP-UX 10.30 and 11.00 to report open NFS
  file link counts.

* Corrected the reporting of UNIX domain socket
  names for Apple Darwin, FreeBSD 4.5 and above,
  NetBSD 1.4.1 and above, and for OpenBSD 3.0 and
  above.

* Enabled HP-UX 11.11 to stat(2) large files.

* Fixed handling of combination 32 and 64 bit
  device numbers in AIX 64 bit architectures.

Updated the AIX 4.3.3 NFS rnode recognition code,
first
installed at revision 4.51. It looks like
some IBM update has restored a single rnode structure
independent of the machine bit width.

Updated the NetBSD and OpenBSD sources so NetBSD
can process DTYPE_PIPE files, as OpenBSD was already
able to do.

Updated Darwin get-xnu-headers.sh script to reflect
information about a recent reorganization of the

Darwin CVS hierarchy, supplied by Allan Nathanson
<ajn@apple.com>.

Added defense against the standard I/O descriptor
attack.

4.64 June 26, 2002
Corrected some FreeBSD pre-processor directives.
David O'Brien <obrien@NUXI.com> pointed them out.

Updated lsof's main() function to: 1) close all
open file descriptors above 2 before starting; and
2) to set a non-interfering umask. Moved GET_MAX_FD
test from misc.c to proto.h, so that main() could
use it. Added multiple-include protection to
proto.h.

Moved FAQ's test suite Q's & A's to a more appropriate
section. Added a Q&A on HASSECURITY option
and
its affect on searching for open files. (That was
already in the man page.)

Updated hpux/kmem/dnode.c for HP-UX < 11 compilation
with information from John Dzubera <Zube@CS.ColoState.EDU>.
While lsof doesn't support HP-UX < 11 any more, I
try to avoid disabling it there when possible, and
a locking fix for HP-UX >= 11 in lsof 4.63
inadvertently disabled compilation of lsof for
HP-UX < 11. Fixed long-standing bug in HP-UX 10.20
lock reporting.

Removed language from the test suite programs that
requires an ANSI-C compiler. This allowed the test
suite to be validated with cc and gcc on the un-
supported HP-UX 10.20.

At the suggestion of Manuel Bouyer <bouyer@antioche.eu.org>
switched NetBSD and OpenBSD lsof from using nlist()
to using kvm_nlist(). Made the same change for
BSDI, Darwin, and FreeBSD.

Validated test suite on OPENSTEP 4.2.

In response to a suggestion from Jeff Stoner
<jstoner@blackboard.com> enhanced support for the
FD

list of the -d option to allow it to be either
an exclusion or inclusion list, using the '^' prefix
to denote exclusions.

Made adjustments for FreeBSD 4.6 and 5.0-CURRENT.
Fixed a FreeBSD /etc/make.conf CFLAGS extraction
bug, reported by Kris Kennaway <kris@obsecurity.org>,
and new a bug in the fix, reported by Eric Cronin
<ecronin@eecs.umich.edu>

Added nullfs support for FreeBSD, NetBSD, and OpenBSD
at the request of Andrew Brown <atatat@atatdot.net>.

Modified all readmnt() functions to ignore mounted-on
directory names that don't begin with '/'.

Tested on NetBSD 1.6A and OpenBSD 3.1.

Upgraded to Solaris 9 FCS with two changes to the
BETA-Refresh support: 1) an adjustment to dnode.c
for a change in the so_so (sonode) structure; and
2) addition of Solaris 9 FCS specific DNLC code.
David Comay <David.Comay@Eng.Sun.COM> sent me the
dnode.c change and Casper Dik <Casper.Dik@sun.com>
helped with the new DNLC support code.

Applied OpenUNIX changes
that permit lsof to compile
and run on the upcoming 8.0.1 release. The changes
were supplied by Robert Lipe <robertl@caldera.com>.
Larry Rosenman <ler@lerctr.org> provided a test
system.

Added Solaris fd file system support.

4.65 October 10, 2002
Adjusted for change in FreeBSD 5.0-CURRENT inode
structure, reported by David O'Brien <obrien@NUXI.com>.
Adjusted for changes in FreeBSD 5.0-CURRENT <sys/vnode.h>.
One change was reported by Anders Nordby
<anders@FreeBSD.org>. Adjusted for FreeBSD 5.0-CURRENT
on sparc64 architecture.

Enhanced the error reporting of Solaris lsof when
it detects a kvm_open() failure, and added a 00FAQ
entry on the cause, based on a report from Peter
J. Bertoncini <pjb@anl.gov>.

Enabled compiling of lsof for NetBSD 1.5 with the
NULL file system, using a patch from Andrew Brown
<atatat@atatdot.net>.

Removed a hack in the LTbigf test program that was
once needed when it was compiled on Solaris 9 BETA-
Refresh with
gcc. The hack isn't needed on Solaris
9 FCS. Janet Hempstead <jan@library.carleton.ca>
brought the need for this change to my attention.

Applied a patch, supplied by Andrew Brown
<atatat@atatdot.net>, that updates lsof for NetBSD
version 1.6F. Corrected handling of the NetBSD
nullfs.

Updated to BSDI BSD/OS 4.3 on a test system kindly
provided by Terry Kennedy <terry@tmk.com>.

Updated to FreeBSD 4.7.

Updated to Apple Darwin 1.5, 5.x and 6.x with
patches supplied by Allan Nathanson <ajn@apple.com>.
The patches include IPv6 support.

Updated Configure to use the -bnolibpath loader
option when building lsof on a PowerPC, running
AIX 5 or greater. Valdis Kletnieks
<Valdis.Kletnieks@vt.edu> informed me this was
needed. Lsof for AIX 5.x was initially developed
on the IA64, where -bnolibpath can't be used and
I didn't think to restore it to PowerPC loads when
AIX 5.x became available for that architecture.

Updated to UnixWare 7.1.3 on a test
system provided
by Larry Rosenman <ler@lerctr.org>. Removed claims
that lsof works on OpenUNIX 8.0.1, because UnixWare
7.1.3 is the release name of OpenUNIX 8.0.1.

Based on a comment that his e-mail address was
wrong in the lsof distribution from Kenneth Stailey
<kstailey@disclosure.com>, removed all e-mail
addresses from lsof documentation files except this
one, 00DIST. The addresses in 00DIST are used to
send revision release notices to those who contributed
to a revision, but the addresses in this file for
previous revisions and in other documentation files

sometimes grow stale and are never validated.

4.66 December 22, 2002

Acquired Solaris 7 and 8 test systems, courtesy of John Dzubera <Zube@CS.ColoState.EDU>. Updated 00TEST and tests/TestDB accordingly.

Clarified FreeBSD 5.0 architecture claims at the suggestion of David O'Brien <obrien@NUXI.com>. Also implemented David's suggestion to change Intel to x86.

Installed changes to DNLC handling in OSR lsof in preparation for handling changes in the OSR 5.0.7 DNLC cache. Information about the changes and patches to handle them were supplied by Bela Lubkin <filbo@deepthought.armory.com>.

Upgraded True 64 UNIX support to the 5.1B release on a test system provided by Berkley Shands <berkley@cse.wustl.edu> Had to used relaxed ANSI compilation because of an error in a system header file and other lsof source usages.

Implemented the HASNOSOCKSECURITY compile-time option. When it and HASSECURITY are defined, lsof will be built to list only the user's open files, but will also list anyone else's open socket files, provided the "-i" option selects their listing. Updated the Customize script to ask about setting HASNOSOCKSECURITY. Left it undefined in all dialect machine.h header files. This change was requested by Kenneth Stailey <kstailey@speakeasy.net> for use with ntop.

Added support for OpenBSD 3.2 and its kernel trace file.

Improved lsof help (-h) and version (-v) information reporting.

Fixed a FreeBSD 4.7 and above off-by-two UNIX domain socket path termination bug, reported by Ken Stailey <kstailey@speakeasy.net>

4.67 March 27, 2003

Began the transition of the lsof ftp server host
name from vic.cc.purdue.edu to lsof.itap.purdue.edu.
That reflects Purdue organizational changes. This
first step makes the new name an alias to the old
one. The old name, vic.cc.purdue.edu, will remain
usable for an extended period.

Corrected a revision number reference in section
17.17 of 00FAQ on the appearance of Solaris negative
DNLC caching handing.

Updated 00FAQ discussion of compilers for 64 bit
Solaris.

Validated test suite for 64 bit Solaris 8 and gcc.

At the request of Alek O. Komarnitsky <alek@komar.org>
added the "+c <width>" option to enable optional
changing of the COMMAND column output maximum width
from the default to <width>. The default maximum
width
remains CMDL, as defined in lsof.h.

Fixed three AIX kernel bit size detection bugs,
one in the AIX Configure script stanza, the second
and third in the AIX dproc.c get_kernel_access()
function. The bugs were reported by Pierre-Yves
Fontaniere <pyf@cc.in2p3.fr>, who tested the fixes.

Added kernel event queue file support for FreeBSD,
NetBSD and OpenBSD. Andrew Brown <atatat@atatdot.net>
supplied the code.

Updated to AIX 5.2 on a test system provided by
Dale Talcott <dtalcott@purdue.edu>. Had to build
work-arounds for two missing AIX 5.2 header files,
<j2/j2_snapshot> and <proc/proc_public.h>. Corrected
an off-by-one UNIX socket addressing bug. Taught
AIX lsof to handle both jfs and jfs2 files at the
same time. Adjusted for an IBM mistake in the
sizing of the fdsinfo structure in <procinfo.h>
Toshiya Nakamura <TOSHIYAN@jp.ibm.com> helped test,

Updated to FreeBSD 4.8. Corrected another bug in
FreeBSD UNIX domain socket name handling.

Corrected

gcc build problems on HP-UX 11i, reported
by Yuliy Minchev <yuliy@mobiltel.bg>.

Updated BSDI BSD/OS support to 4.3.1.

Augmented a lock ID test on NetBSD to check if the
ID is an LWP pointer.

4.68 June 18, 2003
Enhanced Configure script's cleanup operations.

Added support for OpenBSD 3.3, based on a report
from Peter Valchev <pvalchev@sightly.net>.

Improved the description of the detached PGP
signature certificate file in the main lsof README
file, based on a suggestion from Diana Stockdale
<diana@mpl.ucsd.edu>.

Installed a work-around for FreeBSD 5.0-CURRENT on
Alpha to avoid a compiler register use complaint.

Corrected a 'c' option error message. Gnele
<blaadeleng@yahoo.com> reported the problem.

Upgraded EXT2FS and UFS support for NetBSD and
OpenBSD to handle new inode information, and the
fast UFS1 and UFS2 file systems.

With the help of Andrew Brown <atatat@atatdot.net>
determined the NetBSD snapshot (1.6F) at which
<sys/mount.h>
could be included under _KERNEL, thus
eliminating the lsof netexport.h hack. The same
change applies to OpenBSD versions 3.3 and above.

Applied a patch from Armin Gruner <ag@muc.de> that
corrects the use of the HASPROCFS definition in the
FreeBSD dialect sources.

Corrected spelling errors in 00FAQ and in the
generated 00.README.FIRST_<version> file of the
distribution archive. John Jackson <jrj@purdue.edu>
and Ray Phillips <r.phillips@jkmrc.uq.edu.au>
spotted and reported the errors.

Corrected a spelling error in a comment and incorrect
use of an alarm function in the LTsock test program.

At the suggestion of Stuart Anderson <sba@srl.caltech.edu>
added preliminary (and incomplete) SAM-FS file system
support to Solaris lsof. Completion awaits availability
of SAM-FS internals.

Fixed a Solaris device name printing bug, reported by
Ric Anderson <ric@tick.Telcom.Arizona.EDU>, only
visible when HASDCACHE is not defined. Ric helped
test
the fix.

Fixed an AIX kernel bit size handling bug related
to the NFS node (rnode) structure.

Corrected a print_kptr() function call error in the AIX
AFS code, reported by David Steiner
<david.r.steiner@Dartmouth.EDU>. Upon further reflection
and because I no longer have appropriate AIX AFS test
systems, disabled AIX AFS support in the Configure script
for AIX versions above 4.3.3.0 or AIX AFS versions above 3.5.

Added support for FreeBSD 5.1.

With advice from Allan Nathanson <ajn@apple.com> adjusted
the Darwin get-xnu-headers.sh script to access the kernel
header files needed by lsof from a new form of the Apple
open source repository.

Installed Linux and lsof library bug fixes and
improvements, supplied by Marian Jancar <mjancar@suse.cz>.
One Linux improvement handles mount strings that
have octal escapes in them, eg., \040 for embedded
blanks. Marian tested the changes.

4.69 October 16, 2003
Received and applied an OpenBSD patch from
Peter Valchev
<pvalchev@sightly.net> that replaces a ctob() call with
a sysconf() call. Peter claims sysconf() is needed for
OpenBSD on SPARC. (It is not needed for NetBSD on SPARC.)

With the upgrade of my only Solaris 7 test system
to, Solaris 8, dropped the *claim* that lsof works
on Solaris 7. That doesn't mean it won't work
there, so those who want lsof for Solaris 7 probably
should be able to build it there and it probably
will work there.

Revised lsof's DNLC handling for BSD derivatives,
including: BSDI; Darwin, DEC OSF/1, Digital UNIX
and Tru64 UNIX; FreeBSD; NetBSD; and OpenBSD. The
latest NetBSD distribution's dropping of the vnode
capability ID (v_id) required the revision.

Adjusted to the latest FreeBSD 5.1-CURRENT.

Added NetBSD support for using kvm_getproc2().

Added a patch from Andrew Brown <atatat@atatdot.net>
to handle NetBSD enum conflicts and changes in the
<miscfs/kernfs/kernfs.h> and <miscfs/procfs/procfs.h>
header
files.

Added a "#define _KERNEL" to the AIX dnode2.c source
file for compatibility with a new <j2/j2_inode.h>
AIX 5.2 header file version. The addition was
supplied by Dick Dunbar <Dick.Dunbar@Siebel.com>
and was offered as a patch to lsof 4.68/

Added support for a second type of Solaris SAMFS.
Stuart Anderson <sba@srl.caltech.edu> provided the
support. SAMFS support in lsof SOLARIS remains
scanty, because Sun won't release any details on
its kernel structures.

Dropped the *claim* that lsof works on AIX 4.3.3,
because I was unable to test it there. That doesn't
mean it won't work there, so those who want lsof
for AIX 4.3.3 probably should be able to build it
there and it probably will work there.

Updated for Solaris 10 on test systems provided by
Mike Miscevic <miscevic@hotpop.com>. Casper Dik
<casper@holland.sun.com> provided significant help.
During the Solaris 10 port found and fixed an lofs
handling bug that prevented reporting of open
lofs
file lock status.

Updated the DNLC test, LTdnlc, to provide a possible
explanation about file systems on which the test
might fail.

Modified the procedure for obtaining missing Darwin

XNU kernel header files. The new one requires more manual intervention, but is the best that can be done with the way Apple open sources are now organized. 00FAQ explains the new procedures for those not used to downloading Apple open source files.

Added support for Apple Darwin 7.0 (Mac OS X 10.3) with patches supplied by Allan Nathanson <ajn@apple.com>. Dropped the *claim* that lsof builds and works on Apple Darwin below 6.0.

Validated lsof on FreeBSD 4.9, using a test system provided by Ben Lewis <bl@purdue.edu>.

Validated lsof on FreeBSD 5.1-CURRENT for Amd64. David O'Brien <obrien@FreeBSD.org> provided a test system.

Changed the NetBSD Configure stanza to do header file searches in /usr/include by default. The LSOF_INCLUDE and NETBSD_SYS environment variables may still be used to specify other search paths. Discussions with Andrew Brown and Wolfgang S. Rupprecht <wolfgang@wsrcc.com> led to the change.

4.70 January 16, 2004

Improved shell-portability of the linux stanza of the Configure script with a patch from Paul Jarc <prj@po.cwru.edu>.

Added a "silent" rule to tests/Makefile for Paul. Updated, extended and clarified the test suite documentation in 00FAQ and 00TEST.

Fixed Solaris 10 dlsof.h typo, reported by Mike Miscevic <miscevic@hotpop.com>. The typo prevents lsof from loading cleanly in Solaris 10 builds past 40.

Fixed a Solaris HSFS node number reporting bug and added a structure definition work-around for Solaris 10.

Converted PGP signing to GPG. My previous PGP key can be used, but the gpg "--allow-non-selfsigned-uid" option may have to be used when it is imported into a GPG key ring.

Added bz2 compression.

Updated for OpenBSD 3.4.

Added a work-around for a
missing header file in the
s10_44 Solaris 10 build.

Added support for FreeBSD 5.2-BETA and 5.2-CURRENT.

Updated Linux AX25 support with modifications supplied
by Lutz Poetschulat <dl9cu@db0zwi.de>.

Added raw IPv6 support to Linux lsof.

Improved handling of parameters after "-i@".

Improved file name test in LTdnlc.c.

Added loop count controls to the reading of Solaris
lock chains. The change was implemented as a result of
a report from Steve Gonczi <steve@relicore.com>.

Based on a report from John Jackson <jrj@purdue.edu>,
enabled a Solaris 10 <sys/lgrp.h> work-around for
Solaris 9, too. (Patch 112233 installs an lgrp.h on
Solaris 9 that needs the work-around.)

With help from Andrew Brown <atatat@atatdot.net> and
John Heasley <heas@netbsd.org> added log-structured
file system (LFS) support for NetBSD and OpenBSD.

Added AMD64 to the list of FreeBSD 5.x-CURRENT
supported architectures. FreeBSD.org provides a test
system, courtesy of (I
believe) David O'Brien
<obrien@FreeBSD.org>.

Added a cast to lseek() in the HP-UX /dev/kmem-based
kread() function to make it work properly with the
bundled HP C compiler.

4.71 March 11, 2004
Added text file support to Apple Darwin lsof and
enabled the lsof executable portion of the LTbasic
test. Added support for Darwin kernel queue, POSIX
semaphore and POSIX shared memory files. Tested on

Darwin 7.2 (aka Mac OS 10.3.2).

Added process_kqueue() function prototypes for FreeBSD, NetBSD and OpenBSD.

Picked some lint in AIX sources, lib/rnmh.c and tests/LTsock.c.

Added "-x [fl]" cross-over option, which enables +d and +D processing to cross over symbolic links and|or file system mount points. Discussion with Johan Lindquist <johan@smilfinken.net> and Eric Williams (aka The Ghost In The Machine) <ewill3@earthlink.net> on Linux news groups revealed the need for the option.

Updated support for UnixWare 7.1.4.

Added support for the optional reporting of socket options, socket states and TCP flags for most currently supported dialects. John Smith <lbalbalba@hotmail.com> and Tristan Nefzger <tn@bhtrader.com> requested the information. The dialects and their versions for which this feature has become available include:

AIX 4.3.2 and 5.[12]
Apple Darwin 7.2
BSDI BSD/OS 4.3.1
Digital UNIX and Tru64 UNIX 4.0
FreeBSD 4.9 and 5.2
HP-UX 11 and 11.11 (aka 11i)
NetBSD 1.6ZH
OpenBSD 3.4
OPENSTEP 4.2
OpenUNIX 8
SCO OpenServer Release 5.0.6
Solaris 2.6, 8, 9 and 10
UnixWare 7.1.[134]

Modified the Configure stanza for HP-UX 11 with better q4 detection. Steve Bonds <3vhmxxm02@sneakemail.com> supplied the modification.

Applied a patch from Mike Miscevic <miscevic@hotpop.com> to enable lsof to compile with the zone support in the Solaris 10 s10_b51 release. Added information on lsof zone behavior to 00FAQ.

Added a "-z [z]" option
to Solaris 10 lsof. It enables
the listing of zone name and can also be used to select
the listing of processes and their files from specified
zones.

4.72 July 13, 2004
Corrected Solaris 10 ZONE column title display bug with
a patch from Joep Vesseur <Joep.Vesseur@Sun.COM>. Joep's
fix was offered as a patch to 4.71.

Based on a report from Jean-Pierre Radley <jpr@jpr.com>
about an unexpected GNU uname Configure interaction on
OSR, and working from information received from Bela
Lubkin, changed the OSR Configure stanza to use
/bin/uname instead of uname. Added an FAQ entry about
Configure version detection problems.

Added the +m and "+m m" options in response to a dialog
with Robert T. Brown <rbrown@netmentor.com>. The
options allow the creation of a mount table supplement
file which can be used on selected dialects to get
device numbers when stat(2) and lstat(2) can't deliver
them. (That's generally the result of an inaccessible
NFS server.)
Currently the new options are supported
only on Linux.

Made cpumask_t typedef _KERNEL compensation for FreeBSD
5.2-CURRENT. Refined it for 5.2.1-RELEASE with testing
help from Scott Ellentuch <tuc@ttsg.com>.

Added support for FreeBSD 4.10. Larry Rosenman
<ler@lerctr.org> kindly provided a test system.

Added support for NetBSD 2.0 with patches supplied by
Andrew Brown <atatat@atatdot.net>. Andrew also
provided two test systems.

Made handling of Linux maps file more robust, based on
a report from Jan Blunck <J.Blunck@tu-harburg.de>. As
a side benefit, made handling of generated stat(2)
information more flexible.

As a result of a discussion with Jason Fortezzo
<fortezza@mechanicalism.net>, adjusted lsof for Solaris
to obtain the maximum user name length from ut_name of
the utmpx structure, if <utmpx.h> exists.

Tested under OpenBSD 3.5.

Updated 00README information about using gcc (via the
Configure aixgcc abbrevisiation) to compile lsof
on
AIX. Ann Janssen <ajanssen@nebook.com> made me aware
the information was out of date.

Added an AIX SIGDANGER handler and some 00FAQ sections
on lsof memory usage after a discussion with Tom Qin
<tom.qin@citigroup.com> about lsof memory usage.

Added scripts/sort_res.perl5, contributed by Fabian
Frederick <fabian.frederick@gmx.fr>. The script
displays lsof output sorted by size and path name.

Improved handling of files on Linux NFS mount points
that use the root_squash option, based on discussions
with Paul Szabo <psz@maths.usyd.edu.au>.

Updated FreeBSD 5.2-CURRENT support, based on a problem
report from Filippo Natali <filippo@widestore.net>.

Corrected improper FreeeBSD 5.x-CURRENT #if condition,
reported by Kim Culhan <kimc@kim.net>.

Added a Configure script work-around for AIX 5.2 lsof
with JFS2, compiled by gcc >= 3.3. The work-around
was supplied by Florian M. Weps <fmw@hactrn.ch>.

4.73 October 21, 2004
Added an __XPG4_CHAR_CLASS__
#define before
#include'ing <ctype.h> on Solaris to restore lsof's
ability to display special characters such as acute-e.

Added wide-character (e.g., UTF-8) support where
possible, prompted by a request from Kyungjoon Lee
<kjoonlee@gmail.com>. Some older dialects -- e.g.,
NetBSD 1.4.1 -- don't support wide characters, so the
wide character support is enabled by definitions in
each dialect's machine.h. Dialects with wide-
character support are listed in 00FAQ.

Make a FreeBSD 5.2-CURRENT adjustment for <sys/pipe.h>,
supplied by Sergey A. Osokin <osa@FreeBSD.ORG>.

Implemented a Linux feature request made by Jakub
Jelinek <jakub@redhat.com> that enhances lsof's ability
to locate UNIX domain sockets whose paths are named as
arguments. Jakub supplied suggested code.

Dropped *claims* that lsof works on AIX below 5.1, SCO
Dropped *claims* that lsof works on AIX below 5.1, SCO
Openserver 5.0.4, Tru64 UNIX 5.0, and UnixWare below
7.1.4. Lsof will
probably build and work on those UNIX
dialect versions, but I no longer have any way to test
lsof on them.

Added support for FreeBSD 5.3 and 6.0. The FreeBSD
5.3 support hasn't been tested.

Added FD test code that will allow dialect versions to
test FD option selections. Used the new code in the
PSTAT-based HP-UX lsof to enable it to avoid scanning
the mount table when its information is not needed.
The addition was made in response to a query from
Harvey Garner <Harvey.Garner@championusa.com> about
lsof performance in a busy NFS environment.

Upgraded lsof's AIX support level to AIX 5.3, based on
a report from Dick Dunbar <Dick.Dunbar@Siebel.com>. (I
have not tested lsof under AIX 5.3.) Based on Dick's
recommendation and local testing changed the C for AIX
version 6 and higher -qmaxmem option value to -1.

Made LSOF_AR environment variable more useful and
documented it in 00XCONFIG.

Corrected the use of sum(1) to generate signatures for
the
lsof distribution and binaries to match the
documentation that claims it is sum -r output. Jin
Guojun <jin@george.lbl.gov> noticed and reported the
problem.

Tested under OpenBSD 3.6.

Added checksum and GPG certificate files for the bz2,
gz and Z lsof distribution archives. The new files
reside with the distribution archives and supplement
the signature information already inside the archives.

Validated on Solaris 10, i8xpc, build s10_63.

4.74 January 17, 2005

Fixed a Solaris segment fault bug on systems that lack a /dev/allkmem device. Offered the fix as a patch to lsof 4.73. The bug was reported by Donald Zoch <donald.zoch@amd.com>.

Updated lsof for FreeBSD 6.0 and higher for a change in <sys/vnode.h>, based on a report from Sergey A. Osokin <osa@FreeBSD.ORG>. Made the update available in a 4.74 'A' edition pre-release.

Filed an HP bug report about missing pstat(2) CWD info for LOFS on HP-UX 11.11 and higher. The missing CWD info was noticed by Ermin Borovac <e.borovac@bom.gov.au>. Added info to 00FAQ about the problem, which can cause the lsof test suite's LTbasic test to fail.

Updated the q4-generated tcp_s.h in the lsof distribution and added socket option support for HP-UX 11.00. Erwin Reyns <ereyns@europarl.eu.int> helped test.

Updated for Solaris 10, build s10_69, with a patch supplied by Mike Miscevic <miscevic@hotpop.com>.

Added v_path support to Solaris 10 lsof. That relieves it of having to read and decode the kernel DNLC, and delivers full paths more reliably.

Added specialized NFS4 support to Solaris 10 lsof.

Applied Solaris 10 patches to lsof supplied by Casper Dik <casper@holland.sun.com>.

Updated lsof for NetBSD 2.99.10 and tested it on a system provided by Andrew Brown <atatat@atatdot.net>.

Added support for the FreeBSD 6.0-CURRENT f_vnode pointer in the file structure.

Added BSDI, FreeBSD, NetBSD and OpenBSD support for the *effnlink member of the inode structure. This makes the lsof LTnlink test run faster on all modified dialects and correctly on OpenBSD.

Added ptyfs support for NetBSD, using modifications provided by Andrew Brown.

Changed the netbsd Configure stanza to look by default for system header files in both /usr/include and /usr/src. (The NETBSD_SYS environment variable can still be used to select an alternate for /usr/src.)

Corrects two FreeBSD 4.10 RPC/XDR type definitions.

Added an FAQ Q&A about setuid and setgid restrictions in HP-UX 11.11. The information in the answer was supplied by Frank Sanders <frank.sanders@siemens.com>.

Added abbreviations for AXI FCIO and FSNAPSHOT file flags. Holger VanKoll <Holger.VanKoll@swisscom.com> reported the missing FCIO.

Adjusted lsof's private AIX 64 bit rnode structure for 64 bit AIX 5.2 systems. (IBM doesn't distribute a correct <nfs/rnode.h> for it.)

Corrected a Linux socket inode printing bug reported by Igor Schein <igor@txc.com>.

Updated
for FreeBSD 4.11. The support compiles but hasn't been tested.

Back-ported a FreeBSD 6.0-CURRENT fix to FreeBSD 5.3-RELEASE-p1. That was done to solve a compilation problem reported by Radko Keves <rado@daemon.sk>.

4.75 May 16, 2005
Dropped the *claim* that lsof works on DEC OSF/1 and Digital UNIX, since my last 4.0 test system has been removed. The last tested distribution of lsof on DEC OSF/1 and Digital UNIX was revision 4.74. It has been archived on lsof.itap.purdue.edu in pub/tools/unix/lsof/OLD/src.

Added negation forms to the values in the -g (PGID) and -p (PID) lists. Negated PGID and PID values, like negated UID or login name values, are applied without ORing or ANDing and take effect before any other selection criteria are applied.

At the request of Marcin Gozdalik <gozdal@gmail.com> added a -X option for Linux. The option inhibits the

reading of the /proc/net/tcp* and /proc/net/udp*
files.

Based on a
report from David Gutierrez
<davegu1@hotmail.com> changed DEC OSF/1 process table
allocation to request memory in smaller increments.

Based on a report from jayjwa <jayjwa@atr2.ath.cx>
updated the Customize script to use "tail -n 1" where
possible.

Enabled support for FreeBSD 5.4.

Improved the BSDI, FreeBSD, NetBSD, OpenBSD and Solaris
kvm_open() and kvm_openfiles() error messages.

Enabled support for NetBSD 2.99.12.

Improved HP-UX Configure stanza with help from Piet
Starreveld <pstarrev@csc.com>. Picked some lint Piet
found.

Enabled IPv6 support for HP-UX > 11. Piet Starreveld
helped test it on 11.23, among others.

Updated for HP-UX 11.23 on the ia64 architecture.

Updated to latest FreeBSD 6.0-CURRENT, using a test
system provided by Andrzej Tobola <ato@iem.pw.edu.pl>.

Added support for SCO OSR 6.0.0 and UnixWare 7.1.4 with
help from Richard at SCO.

Corrected a Linux bug in NFS handling, reported by Karel Zak
<kzak@redhat.com>.
Karel supplied a patch.

Improved the code for accessing an AIX 3.2 and higher
sockaddr_un structure, thus eliminating a segmentation
fault possibility.

Updated for AIX 5.3.

Added preliminary (DEBUG) support for the AIX SANFS
file system.

Fixed a bug in the Solaris 10 processing of the vnode's

v_path pointer with code supplied by Edward Jajko
<ejajko@portal.com>. The fix was offered as a patch to
4.74.

Dropped support for OpenUNIX 8, since a test system is
no longer available. Archived an OpenUNIX-only
distribution of the last revision (4.74) tested on
OpenUNIX in pub/tools/unix/lsof/OLD/src.

Tested under Openbsd 3.7.

Tested under Darwin 7.7.0.

Enabled building on amd64 Solaris 10 with hints from
Marc Aurele La France <tsi@ualberta.ca>. Marc provided
a test system.

Supplied a missing quote in the FreeBSD Configure
stanza. Carl Cook <Info@quantum-sci.com> reported the
problem.

Removed "-O" option from tests/Makefile so that the
HP-UX
bundled compiler won't complain.

4.76 August 30, 2005
Corrected an example and spelling errors in man page.

Updated for Apple Darwin 8.x with changes supplied by
Allan Nathanson <ajn@apple.com>. Allan also provided a
test system.

Completed documentation of CLRLFILEADD in all machine.h
files.

At the request of Chris Markle <cmarkle@sendmail.com>
added partial listen queue length to socket options
displayed when -Tf is specified. Partial queue length
is not reported for all dialects. (00FAQ lists the
ones where it is reported.)

Updated for FreeBSD 7.0 with information supplied by
Andrzej Tobola <ato@iem.pw.edu.pl>.

Updated Solaris VxFS support for VxFS versions 4 and
above with technical advice from Craig Harmer
<craig_harmer@symantec.com>, Gary Millen
<gary_millen@symantec.com> and Chuck Silvers

<charles_silvers@symantec.com>. Testing help was
provided by Michael Antlitz <mantlitz@prophasys.com>,
Steve Ginsberg <steve@dhapdigital.com>
and Kenneth
Stailey <kstailey@yahoo.com>.

Fixed a Solaris address space map processing bug.
Janardhan Molumuri <mjanardhan@gmail.com> reported the
bug and help me identify it. Made the fix available as
a patch to 4.75.

Added support for Solaris 10 port and CTFS files. The
CTFS support is imcomplete, because I don't know how
to get inode number, size and link count. (There's
a new 00FAQ entry about that.)

Investigated a report from Christopher J Warweg
<warwegc@GAO.GOV> that the CHECKSUMS for the lsof 4.75
binary for 64 bit Solaris 8 was incorrect. It was my
packaging error. I rebuilt and repackaged the binary.

Enabled support for Linux map file names with embedded
spaces.

4.77 April 10, 2006
Added -X option support for Solaris 10 and above. When
-X is specified lsof will report cached v_node path
names for unlinked files, followed by "(deleted)".
Improved cached vnode path name handling by adding
"(?)" to the end of path names
of questionable accuracy.
Updated 00FAQ to reflect these changes.

Updated for FreeBSD 7.0-CURRENT.

Fixed name addition spacing bug, reported by Stuart
Anderson <anderson@ligo.caltech.edu>. Also updated
Solaris 10 SAMFS support at Stuart's request.

Added missing "break;" and another HASSTATVFS test to
the NetBSD and OpenBSD dnode.c. Bill Behr
<bbehr@networkstoragecorp.com> reported those needs.

Fixed an HP-UX 11 file descriptor "chunk" size problem,
reported by Per Allansson <per@appgate.com>. Per helped
devise the fix and tested it. This fix was offered as
a patch to lsof 4.76.

Updated for FreeBSD 6.0-STABLE and FreeBSD
6.1-PRERELEASE.

Updated scripts/sort_res.perl5 with changes supplied by
Frederick Fabian <fabian.frederick@skynet.be>, the
author of the script.

Corrected +|-M man page documentation error, reported
by Roger Cornelius <rac@tenzing.org>.

Improved FreeBSD user device random seed generation in
response to a problem report
from Danny Braniss
<danny@cs.huji.ac.il>.

Eliminated three syntax error bugs and other compiler
complaints from the PSTAT-based lsof. H. Merijn Brand
<h.m.brand@xs4all.nl> reported the problems and tested
the fixes.

Eliminated compiler complaints in the test suite.

Investigated problems with the building of lsof on
PA-RISC HP-UX 11.23, based on a report from John
Orndorff <John.Orndorff@sungard.com>. Found that
neither the HP bundled C compiler nor gcc would build
lsof, but the the HP unbundled ANSI C compiler would.
Concluded that HP bundled C compiler can't handle
<gssapi/gssapi.h>. Devised a work-around to gcc's
omission of the rpcent structure definition of
<netdb.h> that allows it to compile lsof's print.c, but
the resulting binary doesn't run reliably. Documented
the situation in 00FAQ.

Changed reporting of unknown file types. The number of
an unknown type is now reported as four octets. The
change was made in response to a Linux
lsof bug report
from Karel Zak <kzak@redhat.com>.

Dropped the *claim* that lsof works on BSDI BSD/OS
since my last test system has been removed. The last
tested distribution of lsof for BSDI BSD/OS was
revision 4.76. It has been archived on
lsof.itap.purdue.edu in pub/tools/unix/lsof/OLD/src.

As a result of discussing the lsof source tar's MD5
checksum with Andrew Bell <andrew.bell.ia@gmail.com>,

changed the description of a suitable MD5 tool in the
lsof distribution's documentation to name the openssl
"dgst" command.

Enabled compilation on Solaris 10 1/06 with a fix sent
by Jason Fortezzo <fortezza@mechanicalism.net>. Made
the fix available as a patch to 4.76.

Adjusted to FreeBSD 5.5-PRERELEASE.

Corrected a bug in the lsof library's process_file()
function to enable the locating of AIX XTI sockets by
their TCP/IP address values. The bug was reported by
Michel Dubois <Dubois@sears.ca>.

Based on a bug report from Karel Zak <kzak@redhat.com>
added
command name length checking to as many dialects
as possible (Linux for Karel) for the "-c c" option.

Updated for OpenBSD 3.[89]. Tested the 3.9 update on a
system provided by David Mazieres. I have not tested
on OpenBSD 3.8, but David reports lsof 4.76 worked
there.

Ended regression testing of lsof on 32 bit Solaris 8
with the ending of access to a test system. Lsof
continues to be tested on 64 bit Solaris 8.

4.78 April 24, 2007
Added more information to the lsof FAQ about missing
link counts and sizes on Linux files.

Simplified Linux stat() and lstat() usage.

Relocated #define's that prevent OpenBSD compilation on
systems without a /proc file system. Pieter Bowman
<bowman@math.utah.edu> reported the problem.

Added code to avoid processing Linux /proc/<PID>/maps
file entries with zero device and node numbers. Some
such entries now have names associated with them that
are not path names -- e.g., "[heap]", "[stack]" or
"[vdso]".
Scott Worley <sworley@chkno.net> reported
lsof's mishandling of such entries.

Added SELinux security context support, provided by

James Antill <james.antill@redhat.com>. I have not
tested this, but James and Karel Zak <kzak@redhat.com>
have.

Added the #include of <sys/types.h> to Solaris lsof to
enabled compilation on Solaris 10 6/06. Peter Harvey
Peter.Harvey@Sun.COM diagnosed the problem and supplied
a patch.

Added better support for JFS2 on AIX 5.2 and 5.3, based
on bug reports and help from Thomas Braunbeck
<BRAUNBEC@de.ibm.com> and Tom Whitty <TWHITTY@cerner.com>.

Documented that lsof supports AIX 5.3 only up through
maintenance level 1 (ML1).

Enabled Solaris lsof to locate the AFS vnode operation
address for OpenAFS 1.4.1. The fix was supplied by
Robert Jelinek <Robert.Jelinek@MorganStanley.com>.

Enabled support for Solaris 10 ZFS. If the necessary
ZFS header files aren't found, lsof offers the option
to drop ZFS support,
to use internal, possibly
inaccurate structure definitions, or to supply a path
to the missing header files. Horst Scheuermann
<Horst.Scheuermann@uni-trier.de> provided a development
system and helped test the support.

Corrected a typo in the man page, reported by Eric S.
Raymond <esr@thyrsus.com>.

Changed the spelling of macroes to macros in lsof
source and documentations files, based on a suggestion
from Josh Soref <timeless@gmail.com> and verification
with the OED.

The following dialects are no longer supported: 32 bit
AIX 5.2, HP-UX 11, OpenStep 4.2, Solaris 2.6, Solaris
8, True Unix 64 and UnixWare 7.1.4. Lsof may work on
them, but I no longer have test systems for them.
Support for OpenBSD ends at its version 3.9 for lack of
interest in the port.

4.79 April 15, 2008

********** IMPORTANT NOTE **********
* *

```
* Lsof support has been reduced to the following *
* dialects: AIX,
FreeBSD, Linux and Solaris, and *
* only in selected versions of those dialects.   *
* The selected versions are listed in this file  *
* and in other lsof documentation.              *
*                                               *
* I have made this move because of retirement    *
* and because I no longer have many test systems *
* available to me.                               *
*                                               *
* Vic Abell                                      *
*                                               *
*************************************************
```

Fixed a Solaris VXFS permission problem when accessing the VXFS inode offsets. The bug was reported by Gregory A. Ivanov <ivga@mts.ru>. Gregory tested the fix.

Moved an #include <string.h> later in FreeBSD dlsof.h to enable compilation on recent FreeBSD releases. The change was supplied by Roy Marples <uberlord@gentoo.org>.

Improved Linux /proc file stream reading speed by applying an expanded version of a patch from Eric Dumazet <dada1@cosmosbay.com> that allocates a page size buffer to each stream. Improved TCP, TCP6, UDP and UDP6 hashing by determining the hash bucket count from the /proc/net sockstat and sockstat6 files. The improvement was suggested by Eric and he provided sample code. Eric also tested both improvements.

Modified Configure script to build lsof on FreeBSD 6.2. Tested it on a system provided by Larry Rosenman <ler@lerctr.org>.

Fixed a Linux maps file processing bug that prevented path names from having an embedded colon. James Lingard <jchl@arastra.com> reported the bug and helped with its fix.

Based on reports from Eric Dumazet and Samuel Thibault <samuel.thibault@ens-lyon.org> added support for the Linux 2.6.22 kernel's /proc/<PID>/fdinfo files -- i.e., file offset and flags. Samuel Thibault provided a test system.

Fixed a Linux UNIX socket memory leak, reported by
Philip
Shin <pshin@xceedium.com>. Phillip supplied the
fix.

With generous assistance from HP added support for an HP-UX
11.23 patch that makes TLI/XTI socket address information
available.

Fixed a header file problem for FreeBSD 6.2 on the Alpha
architecture. The problem was reported by Pekka Honkanen
<phonkane@cc.hut.fi>. Pekka tested the fix.

Based on a report and using suggested fixes from Karel Zak
<kzak@redhat.com>, made these changes to Linux lsof: corrected
a getpidcon() error message; insured that inode numbers are
handled correctly for their unsigned long long type; and
improved SELinux handling. At the request of Alon Bar-Lev
<alonbl@gentoo.org> added the LINUX_HASSELINUX environment
variable to enable or inhibit SElinux support unconditionally.

Updated Configure for FreeBSD 8.0-CURRENT and tested lsof on
AMD64 there.

Added a patch provided by Oles Hnatkevych
<don_oles@able.com.ua> for FreeBSD systems where the root
file system is
on a CD9660 device.

Added compensation for the disappearance of FMARK and FDEFER
from the FreeBSD 8.0-CURRENT <sys/file.h>.

Updated FreeBSD lsof with ZFS support. Larry Rosenman
<ler@lerctr.org>, Erwin Lansing <erwin@FreeBSD.org>, Wesley
Shields <wxs@atarininja.org> and Dmitry Morozovsky
<marck@rinet.ru> provided test systems.

Fixed a socket file identification problem reported by
Pavol Rusnak <stick@gk2.sk>. Pavol also reported the
cause of the problem.

Added the ability to format the repeat mode marker line
with strftime(3), where the dialect supports the
localtime(3) and strftime(3) C library functions. The
addition was suggested by Mike Depot <mdepot@comcast.net>,
who also tested it. The addition required creating a new
main lsof source module, util.c, that contains functions

whose compilation conflicts with the general header file
tree defined by lsof.h and dlsof.h.

Based on reports from Andrei V. Lavreniyuk
<andy.lavr@reactor-xg.kiev.ua>
and Pav Lucistnik
<pav@FreeBSD.org> updated the FreeBSD 7.0 and above
file lock handling to use new locking structures. The
update requires a terrible hack to get a definition for
the lock owner structure from a kernel source module
into a local lsof header file.

4.80 May 12, 2008
Updated for a FreeBSD 7.0 and above byte level locking
change. The problem was reported by Conrad J. Sabatier
<conrads@cox.net>, who helped test the update. Wesley
Shields <wxs@FreeBSD.org> provided an 8.0-CURRENT test
system.

Propagated the FreeBSD 7.0 and above locking changes to
FreeBSD 6.x, based on a report from Edwin Groothuis
<edwin@FreeBSD.org>.

Added warnings for unsupported dialects or versions.

Added Linux support for the UDPLITE protocol. Eric
Dumazet <dada1@cosmosbay.com> supplied a patch.

Added a missing quote to the Configure script's
FreeBSD stanza.

Added a usage.o rule to the HP-UX PSTAT-based
Makefile. I mistakenly deleted the rule at
revision
4.79. The missing rule was reported by Kawaljeet Kaur
<kawaljeet.malviya@gmail.com> who tested the corrected
Makefile.

4.81 October 21, 2008
Updated the Darwin libproc sources with changes from
Allan Nathanson <ajn@apple.com>. Tested them on a iMac
mini, provided by Apple Inc.

Changed dummy declarations in library source files to
eliminate complaints about unused variables and empty
object files. This change may not work on dialects I
can no longer test; it has been tested on some versions
of AIX, Darwin, FreeBSD, Linux and Solaris.

At the request of Hal Brooks <hal@uga.edu> added support
for Linux /proc/net/packet files. Hal tested it.

Added socket file only performance enhancements to Linux
and PSTAT-based HPUX lsof.

Added htonl call around improper usage of INADDR_LOOPBACK;
report from an Apple engineer forwarded by Allan Nathanson
<ajn@apple.com>.

Adjusted for FreeBSD-8.0 change in device number handling.
The adjustment
should work for FreeBSD 5 and above, should
the 8.0 change be propagated downward. The problem was
reported by Pav Lucistnik <pav@FreeBSD.org>. An updated
test system was provided by Erwin Lansing <erwin@FreeBSD.org>.

Reduced AIX support to version 5.3, since test systems with
older versions are no longer available to me.

At the request of Marjo F. Mercado <mmercado@xceedium.com>
and Phil Shin <pshin@xceedium.com> applied some speed
improvements to lsof, particularly when the files of
interest are /Internet files -- i.e., selected with lsof's
"-i" option. Added a two new options to assist the
improvements: 1) "-c^<command>" to tell lsof to exclude the
named command(s); and 2) "-stcp|ud>:[^]state' to tell lsof
to include in its reporting or exclude ('^') from its
reporting Internet files in the named states (e.g., LISTEN,
^CLOSE_WAIT, IDLE, etc.) For the most part these changes
apply only to AIX, Darwin, FreeBSD, PSTAT-based HP-UX, Linux
and Solaris,
since those are the only places I could test
them. They are controlled by the HASTCPUDPSTATE definition
in each dialect's machine.h header file. Marjo and Phil
provided HP-UX 11.23 and 11.31 test systems.

Fixed a stat(2) problem on HP-UX 11.31 while testing the
speed improvements.

Adjusted for kernel header file changes in FreeBSD
8.0-CURRENT. Larry Rosenman <ler@lerctr.org> provided
a test system.

Added a warning for Solaris systems where VxFS node info
can't be obtained from the VxFS utility library. The
warning was requested by Tom Matthews <Tom.MATTHEWS@rbs.com>.

Corrected mishandling of file system path name arguments
that have trailing slashes, except, of course, the root
file system, "/". Allan Nathanson <ajn@apple.com> reported
the bug.

4.82 March 25, 2009
Corrected an over-zealous exclusion test that caused
lsof to report nothing when it was given no arguments
and built with HASSECURITY and HASNOSOCKSECURITY enabled.
Joshua
Kinard <kumba@gentoo.org> reported the bug and
supplied information for reproducing it.

Based on a report from Dan Trinkle <trinkle@cs.purdue.edu>
corrected use of <sys/utsname.h> for 32 bit Solaris 10
and above compilations. Simultaneously eliminated a
casting complaint in arg.c and updated Configure to use
the appropriate 64 bit compilation option (-xarch=v9 or
-m64) with the Solaris Sun C compiler.

Updated for FreeBSD 7.1-PRERELEASE with information
supplied by Larry Rosenman <ler@lerctr.org>.

Updated the Darwin libproc sources with changes from
Allan Nathanson <ajn@apple.com>. Tested them on a iMac
mini, provided by Apple Inc. Allan also provided man
page corrections.

Updated the FreeBSD Makefile to use the ${MAKE} variable
for ZFS dnode2.c module compilation, based on a suggestion
from Alexis Ballier <aballier@gentoo.org>.

Improved the Solaris VxFS library location test, based on a
suggestion from Jason Fortezzo <fortezza@mechanicalism.net>.
Jason
tested the change.

Updated Solaris 10 ZFS support for ZFS version 4 and ZFS
pool version 10, using a test system kindly provided by
Vladislav Nespor <vladislav.nespor@id.ethz.ch>. Renata
Maria Dart <renata@slac.stanford.edu> tested on ZFS
version 4, verifying that the update works there, too.
(ZFS pool version 10 is apparently the ZFS version shipped
with the 10/08 update to Solaris. The original ZFS
support targeted ZFS version 3.)

I still consider ZFS support in Solaris lsof a hack,

because it depends on a znode structure definition that
I developed using dbx. Sun is remiss in not distributing
the ZFS header files used to build the distributed kernel.

Because of the znode structure definition hack, I can't
guarantee that lsof ZFS support will work for any other
versions of ZFS.

Solaris 10: adjusted to a change in the way devices are
stored in the kernel; fixed a problem in zone handling;
and added rudimentary sharedfs support.
Carson Gaspar
<carson@taltos.org> reported the device number problem,
provided a test system, and tested the changes. Peter
Vines <psv2b@eservices.virginia.edu> reported the zone
handling problem and tested the fix.

Adapted to FreeBSD 8.0-CURRENT changes in device number
computation. Problem was reported by Erwin Lansing
<erwin@FreeBSD.org>. Larry Rosenman <ler@lerctr.org>
provided a test system.

Corrected Solaris Configure test for appropriate VxFS
library when using gcc to compile lsof.

Updated for loss of KAME IPv6 FreeBSD accommodations.

Adapted to FreeBSD 7.2. Made Configure script recognized
FreeBSD 6.3.

4.83 January 18, 2010
Converted Solaris 10 and above ZFS support to use the CTF
debugger library, libctf. Code was supplied by Robert
Byrnes <Robert.Byrnes@deshaw.com>.

Corrected a typo in the testing of the LINUX_HASSELINUX
environment variable in the Configure script. The error
was reported by Mike Frysinger <vapier@gentoo.org>.
At
Mike's request made Configure script accept LSOF_RANLIB
(ranlib command), LSOF_CFGF (additional configuration flags)
and LSOF_CFGL (additional library specifications) from the
environment.

Enabled complilation of Solaris 10 lsof after a recent Sun
patch which changed the PC file system's structure. Peter
Vernam <pvernam@draper.com> reported the problem and helped
with the fix.

Made the sort of configuration CFLAGS in the CkTestDB
script impervious to locale settings.

Ported to Solaris 11, using a test system kindly provided
by David Day <dday76@gmail.com>.

Adjusted to the disappearance of <nfs/rpcv2.h> in FreeBSD
8.0-BETA1.

Changed Solaris node type lookup to a hashed method and
added some ability for it to handle duplicate vnodeop names
in /dev/ksyms.

Updated for FreeBSD 9.0-CURRENT. Andrzej Tobola
<ato@iem.pw.edu.pl> provided a test system. Extends the
fix to FreeBSD 6.0 and above via a Configure test and a
compile-time definition.
The need for the extension was
reported by Erik Trulsson <ertr1013@student.uu.se>>

Made corrections to FAQ typographical errors, suggested
by Josh Soref <timeless@gmail.com>.

Added __UCLIBC__ test to Linux dlsof.h so lsof would compile
on an Intel ARM XScale processor. The addition was provided
by Doug Kehn <rdkehn@yahoo.com>.

Added test for <utmpx.h> to FreeBSD configuration. Improved
its use in lsof.h. The changes were supplied by Martin Wilke
<miwi@FreeBSD.org>.

4.84 July 29, 2010
Fixed a man page nroff command error with a correction
supplied by Josh Soref <timeless@gmail.com>.

Made Configure script recognize FreeBSD 7.3. Larry Rosenman
<ler@lerctr.org> provided a test system.

Improved task support, initially for Linux only, with help
provided by Jerome Marchand <jmarchan@redhat.com> and
Miklos Szeredi <mszeredi@suse.cz>. The support includes a
new compile-time definition, HASTASKS, and a new run time
option, "-K" to select task reporting.

While
adding help output support for "-K", reorganized the
printing of help columns to make it much easier to add a new

option description.

Updated the Solaris PC file system structure patch in revision 4.83 so it will compile with gcc.

Disabled the Solaris lgrp_root work-around in the Solaris machine.h so it won't cause compilation problems on Solaris 11. It no longer causes compilation problems on my Solaris 9 and 10 test systems, but some older Solaris 9 and 10 versions may still need it, so the work-around was left in the Sun machine.h and a FAQ entry was created about it.

Updated for Solaris 11 b134, using a test system kindly provided by Carson Gaspar <carson@taltos.org>. Made provisions for the next ZFS version. Added info about the failure of the LTnlink test on ZFS file systems.

Corrected typo in Configure script, reported by Dmitry Berezin <dmitryb@oit.rutgers.edu>.

4.85 September 27, 2011
John Dzubera <Zube@CS.ColoState.EDU>
kindly provided a patched
Solaris 9 test system with the lgrp_root conflict and I was able to devise an automatic work-around for the conflict. The special note in .../dialects/sun/machine.h was removed and the 17.28.1 FAQ entry was modified to reflect the update.

Added a Solaris 11 work-around for a typedef problem with <sys/mutex.h>. Carson Gaspar <carson@taltos.org> reported the problem and supplied the work-around.

Added support for FreeBSD 7.4 and 8.2; tested on systems provided by Larry Rosenman <ler@lerctr.org>.

Added support for 32 bit Solaris 11 lsof with mods supplied by Jan Wortelboer <J.H.P.Wortelboer@uva.nl>.

Added Solaris 11 support for using an alternate genunix location. Bill Goodridge <bill@its.brooklyn.cuny.edu> reported the alternate location.

Added further Linux cross configuration support to lsof's Configure script. The additional support was supplied by Grant Erickson <erick205@umn.edu>. See the descriptions of the
LINUX_* environmen variables in 00XCONFIG for more information. Tested lsof on Linux kernel 2.6.32 and picked

some lint that surfaced during the test.

Added fixes and changes for Apple Mac OS X 10.6, provided by
Allan Nathanson <ajn@apple.com>. Allan also provided a test
system.

Tested on FreeBSD 6.4 i386, using a test system provided by
Terry Kennedy <TERRY@tmk.com>. Updated for recent FreeBSD ZFS
changes on an 8.2 amd64 test system also provided by Terry.

Changed documentation to indicate FreeBSD 7.x is no longer
supported, since I no longer have a test system.

Made some changes to the lsof man page, suggested by Navid
<evi1m4chine@googlemail.com>.

Added compensation for Solaris 10 systems that have patch
144488-10. The patch requires that the new header file
<sys/socket_proto.h> be included while _KERNEL is defined.
Brett Bartick <Brett.bartick@nomura.com> reported the problem
first, followed by Stuart Anderson <anderson@ligo.caltech.edu>.
Michael
Hocke <michael.hocke@nyu.edu> suggested a work-around
which I refined to limit it to the specific Solaris 10 instance
and then tested on a system provided by Charles Stephens
<cfs@cowlabs.com>

Added the +|-e option for Linux. It exempts file systems
named by path from function calls that might block in the
kernel -- i.e., stat(2) and lstat(2), and when the +e form
is used, readlink (2). The new packager of lsof for the
Linux Fedora and RHEL distributions, Peter Schiffer
<pschiffe@redhat.com>, asked for the feature so it could
be used with Clearcase file systems, whose implementation
can block stat(2) calls. I consider this feature very risky
and easy to misuse -- e.g., specifying the file system as
'/' would exempt all file systems. I don't intend to
propagate this option to any other UNIX dialect that lsof
currently supports.

Made FreeBSD 9 adjustment.

Fixed a Linux bug that prevented the display of paths for
abstact UNIX sockets.
Masatake Yamato <yamato@redhat.com>
reported the bug and supplied a patch.

Added compensation for the removal of RPC header files from

GlibC 2.14 for Linux. Marek Behun <kabel@blackhole.sk> reported the problem and supplied a patch.

Added support for Linux Netlink protocol. Masatake Yamato requested the support and supplied a patch. Peter Schiffer <pschiffe@redhat.com> provided a test system.

Corrected Linux UDP6-lite path. The error was reported by Masatake Yamato and he also supplied a patch.

4.86 April 10, 2012

Lsof for AIX is no longer supported on any versions of that operating system.

Added information about the clang compiler for FreeBSD to the FAQ.

Corrected an arg.c bug in the accumulation of +|-e option values, reported by Peter Schiffer <pschiffe@redhat.com>. This correction was supplied as a patch to revision 4.85.

Enabled FreeBSD 10 support and tested it there on a system provided by Larry Rosenman <ler@lerctr.org>.

Updated
for latest Solaris 11 with patches supplied by
Carson Gaspar <carson@taltos.org>. Carson supplied a test system.

Adjusted Linux file system search method to compensate for NFS mounts that have duplicate device numbers. The problem was reported by Peter Schiffer <pschiffe@redhat.com>, who provided a test system.

At the request of Peter Schiffer <pschiffe@redhat.com>, added support for Linux SCTP socket files. Peter provided a test system. Applied a warning patch supplied by Peter.

Added support for Mac OS X 10.7 (Lion), provided by Allan Nathanson <ajn@apple.com>. Allan also supplied a test system.

Enabled FreeBSD 8.3 support and tested it there on a system provided by Larry Rosenman <ler@lerctr.org>.

Corrected the FAQ information on ZFS with Solaris 10 after Steven Blackmon <stblackm@cisco.com> and Prasad Jampala <jampalp@cisco.com> pointed out that it was incorrect --

i.e., outdated by the libctf changes at revision 4.83.

Added code
to handle a Linux NFS-mounted root. Jia He
<hejianet@linux.vnet.ibm.com> reported the need for this.

4.87 January 2, 2013
Added an entry to 00FAQ about lsof behavior when the
HASSECURITY and HASNOSOCKSECURITY options are defined.
Carson Gaspar <carson@taltos.org> pointed out the need
for this clarification.

Added a work-around for a missing definition of mach_port_t
in Darwin 9 (Mac OS/X 10.5.8). The work-around was supplied
by Jim Reid <jim@rfc1035.com>.

Added support for Linux anon_inodefs, provided by Masatake
YAMATO <yamato@redhat.com>.

Documented a Solaris 9 and 10 portmap reporting problem
(+M) in 00FAQ. The problem was reported by Clint
Roberts <Clint.Roberts@ttius.com>. I have no solution
to the problem, but discuss a possible work-around in
the answer to this 00FAQ question: "Why doesn't lsof
report portmap registrations for some Solaris versions?"

Added FreeBSD support for the oldnfs and newnfs file system
types. Daniel Braniss
<danny@cs.huji.ac.il> reported the
need for the addition.

Added ICMP socket support for Linux with code provided by
Masatake YAMATO <yamato@redhat.com>.

Corrected the reporting of process group ID for libproc
versions of Mac OS X with a patch from Jeff Trawick
<trawick@gmail.com>. The patch has not been applied to
Darwin kmem versions, because of little call for them
and inadequate test system access. The patch has been
tested on Mac OS X 10.8 (Mountain Lion), courtesy of a
test system provided by Allan Nathanson <ajn@apple.com>.

Added thread support to those FreeBSD versions that have
ki_numthreads in their kinfo_proc structure. This also
activates the -K option for those FreeBSD versions. Jeff
Trawick reported problems with FreeBSD lsof when threads
are present and this addition solves those problems.

Made changes to 00FAQ and the distribution, suggested by
Warren Young <warren@etr-usa.com>. The 00FAQ changes
center on sections that discuss
the -s option. The changes
to the distribution include a ChangeLog file that is either
a pointer to or a copy of 00DIST, the distribution notes.

Added support to FreeBSD for using the clang compiler.

Added Linux support for using the getxattr() call to obtain
socket protocol identification when it is can't be obtained
from the /proc/net files that lsof examines. Masatake YAMATO
<yamato@redhat.com> developed the kernel patch to getxattr()
and supplied the lsof patch.

4.88 October 13, 2014
Reduced to 50 the number of open file descriptors lsof
attempts to close while trying to protect itself from a
file descriptor exec() attack. This limits the overhead
lsof incurs on systems that have large file descriptor
limits, yet provides sufficient open descriptors for the
library functions lsof calls.

Updated for changes in FreeBSD 10 with advice from Eygene
Ryabinkin <rea@freebsd.org>. Taught Configure to recognize
FreeBSD 8.4.

Herein am noting that
lsof for Solaris 10 or 11 is no longer
supported. I no longer have test systems. Some support is
still available from Casper Dik <Casper.Dik@oracle.com> and a
Solaris 11 patch he provided is included in this revision.

Initialized local variables in the Linux process_id() function.
Jia He <jiakernel@gmail.com> reported the problem.

Added support for FreeBSD 11.

Updated FreeBSD ZFS Configure stanza to supply a dummy
opt_kdtrace.h when needed.

Added tmpfs file system support for FreeBSD.

Since a test system is no longer available, dropped the
claim of FreeBSD 4.9 support.

Added the +|-E options for Linux. -E displays endpoint info;
+E displays endpoint info and endpopint files. Masatake YAMATO

<yamato@redhat.com> requested this support and suggested code
to implement it.

Fixed a Linux bug handling processes whose command includes a
non-printing character, particularly a NEWLINE character, and
clarified printing of single '\\' characters in
command and
file names. Stephane Chazelas <stephane.chazelas@gmail.com>
reported the problem.

Added support for Linux RDMA and CRYPTO protocal names and UNIX
socket type with code from Masatake YAMATO <yamato@redhat.com>.

Fixed field output to insure that the field descriptor field is
always selected, since it identifies the file set. The bug was
reported by Gary Plewa <gary.m.plewa-1@lowes.com>.

4.89 July 7, 2015
Applied correction from Casper Dik <Casper.Dik@oracle.com> to
his patch for Solaris 11 that I applied incorrectly in revision
4.88.

Updated for latest version of FreeBSD 11.0-CURRENT.

Compensated for a missing FreeBSD 10.0 typedef of bool on the
i386 architecture. Allen Hewes <rallenh@hotmail.com> provided
a test system. Andrey Chernov <ache@freebsd.org> provided
useful advice.

Improved tests/Add2TestDB script with a patch from Peter
Schiffer <pschiffe@redhat.com>. Added patches from Peter to
eliminate Linux gcc warnings. Updated
Lsof.8 with improvements
supplied by Bjarni Ingi Gislason <bjarniig@rhi.hi.is>.

Changed FreeBSD global CFLAGS extraction per Terry Kennedy
<TERRY@tmk.com>. Also made sure -DNEEDS_BOOL_TYPEDEF is
#define'd when the resulting CFLAGS doesn't contain it. Terry
reported that need.

Improved Linux test for tcp.h in response to a report from
Cato Auestad <cato@cato.ninja>. Cato did the testing.

Fixed Linux UNIX socket search by name bug reported by
Stephane Chazelas <stephane.chazelas@gmail.com>.

Added Linux display of UNIX socket endpoint information with
code provided by Masatake YAMATO <yamato@redhat.com>. Peter

Schiffer <pschiffe@redhat.com> provided a test system.

Insured that type definitions from <vm/vm.h> were again made
visible to lsof on FreeBSD 11 after a system header file change
hid them.

4.90 February 14, 2018

```
!!!NOTE!!!
```

Installed a FreeBSD patch that prevents examining a TCP state structure during a race condition. The patch was supplied by Bryan Drewery <bdrewery@FreeBSD.org>.

Updated FreeBSD for new UFS inode structure that lacks an i_dev member in the most recent 12.0-CURRENT. Larry Rosenman <ler@lerctr.org> reported the problem
and provided a test
system.

Added "#define KLD_MODULE" to dlsof.h and dnode2.c to prevent <machine/cpuconf.h> from generating an "ARM_NARCH is 0" error. This is needed so lsof can access kernel structures. Larry Rosenman supplied the addition.

Added recognition of the FreeBSD 11 file system name "nullfs". Jamie Landeg-Jones <jamie@catflap.org> supplied the fix.

Added a patch from Larry Rosenman <ler@lerctr.org> that is needed on FreeBSD 12 so the lsof compilation can obtain the inpcb and tcpcb structures from their respective header files.

Updated FreeBSD dmnt.c for the ino64 changes.

Inserted a patch for Solaris 12.x to avoid compilation errors from <sys/aio_req.h>, based on information provided by Jorn Clausen <joern.clausen@uni-bielefeld.de>. Jorn tested the patch.

Added performance enhancement that uses the FreeBSD closefrom() and dup2() C library functions when available. The enhancement was supplied by Conrad Meyer <cem@freebsd.org>.

Corrected
FreeBSD lsof's gathering of ZFS file device numbers.

Updated lsof test library for FreeBSD.

Updated socket optons information collection from the socket structure per changes supplied by Gleb Smirnoff <glebius@FreeBSD.org>.

Added patch to dlsof.h that avoids a _KERNEL conflict with bzero. Mateusz Guzik <mjguzik@gmail.com> supplied the patch.

Corrected test library to handle 64 bit FreeBSD device numbers.

Added #defines for FreeBSD 12, src r324225, from Gleb Smirnoff

<glebius@FreeBSD.org>.

Incorporated Linux pseudoterminal endpoint processing (+|-E)
provided by Masatake YAMATO <yamato@redhat.com> with access to
test systems provided by Peter Schiffer <pschiffe@redhat.com>.

Corrected Linux command extraction for commands that include
parentheses -- e.g., "(sd-pam)".

4.91 March 26, 2018

A bug has been reported in the PTY endpoint processing of
Linux lsof 4.90 by Peter Wu <peter@lekensteyn.nl>, making it
necessary for me to release
another revision of lsof.

This revision applies two fixes that correct the Linux PTY
endpoint processing bug. Masatake YAMATO <yamato@redhat.com>
supplied the fixes.

4.92 July 14, 2018
THIS IS A FREEBSD-ONLY DISTRIBUTION!

Fixes Configure script section that creates the FreeBSD
lockf_owner.h header file; fixes <string.h> conflicts with
FreeBSD kernel header files. Mateusz Gusik supplied part of
the fix.

Released lsof to GitHub with Purdue releases documented in
support/GitHub-release.

Vic Abell <abe@purdue.edu>
July 14, 2018

4.92.1 May 6, 2019

```
!!!NOTE!!!
```

Many documentations are not updated yet.
URLs in -v output and -h output are updated.

4.93.0 May 7, 2019

[freebsd] Made FreeBSD 13 adjustment.
[darwin] Fix a typo causing a build error.
Fix a potential memory leak.
[linux] use tirpc for rpc if libc doesn't provide rpc.h.
Fix a typo in man page.
[linux] fix memory leaks detected by valgrind about unix
endpoint information.
Update the description about -fg and -fG options on linux.

4.93.1 May 7, 2019

Fix a broken symbolic link.

4.93.2 May 8, 2019

Update the version number embedded in lsof executable.

4.94.0 November 11, 2020

(All changes in this version are ported from
lsof-org/lsof-linux repository at GitHub).

Introduced a new test harness. The harness can run
test cases specific to a dialect. It is designed for
running test cases on CI environment like Travis-CI.
However,
it is runnable locally with following command
line:
$ ./check.sh DIALECT
after making lsof executable.

[linux] Fixed a bug +|-E options output for pipe.
If two processes use the same fd number for a pipe
connecting them, the option didn't print the
information about it.

[linux] Fixed a bug +|-E options output for PTY.
If two processes use the same fd number for a PTY
connecting them, the option didn't print the
information about it.

[linux] Fixed a bug +|-E options output for PTY.
The code for detecting a slave device was incorrect.

[linux] Fixed a potential bug +|-E options output for
PTY. A structure field for the feature was not
initialized.

[linux] Added a code for decoding O_PATH flag in +fg
option.

[linux] Added a code for decoding O_CLOEXEC flag as CX
in +fg option.

[linux] Added a code for decoding O_TMPFILE flag as
TMPF in +fg option.

[linux] Added Linux display of INET socket endpoint
information with
+|-E option. The option handles
INET sockets using IPC.

[linux] Added support for POSIX MQ of Linux
implementation.  A POSIX message queue (MQ) is
represented in a fd on Linux.  lsof reported it as a
regular file. lsof with this change reports it as a
file with PSXMQ type if mqueue file system is mounted.

[linux] Added Linux display of POSIX message queue
endpoint information with +|-E option. mqueue file system
must be mounted to display the information.

[linux] Added Linux display of INET6 socket endpoint
information with +|-E option. The option handles
INET6 sockets using IPC.

[FreeBSD] update to include <sys/_lock.h> on recent -CURRENT
since it is no longer implicitly included via header pollution.

[linux] Added Linux display of eventfd endpoint information
with +|-E option. The option handles eventfd using IPC.

[FreeBSD] include <stdbool.h> for recent change requiring
refcount(9).

Enhanced -r option. With `c<N>' specifier, lsof
can stop itself
when the number of iterations reaches at <N>.

[linux] Fixed accessing an uninitialized local variable.
Detected by valgrind.

[linux] fix a crash when printing the endpoint for unaccepted
unix socket with +E option.
This closes the github issue #74 reported by @jolmg.

[linux] abort execution when failing in memory allocation for
socket private data.

[linux] decode the name of DCCP socket type.

[linux] decode more netlink protocol numbers (RDMA, CRYPTO, and
SMC).

[linux] print the connection state of unix domain socket
Lsof can print the state of TCP socket like:

```
nc      22247 yamato    3u  IPv4 471409      0t0        TCP localhost:38802->localhost:9999 (ESTABLISHED)
```

This change exnteds this feature to support unix domain sockets.
LISTEN, UNCONNECTED, CONNECTING, CONNECTED, DISCONNECTING,
and UNKNOWN can be taken as a state.
An example of output:

```
evince    17333  yamato    1u  unix 0x0000000054183795      0t0  89141
type=STREAM (CONNECTED)
```

This feature is enabled by default.

To turn off printing state information, use -T option.

Don't display command usage even when a file (or directory) listed
in command line doesn't exist.
This closes the github issue #90 reported by @rowlap.

[FreeBSD] merge all the FreeBSD specific fixes from the FreeBSD sysutils/lsof port

[linux] allow reproducible builds
In a reproducible build all varied information is removed. This
change does so, by checking if the standard SOURCE_DATE_EPOCH
variable is set. If it is, we are attempting a reproducible build
and will strip varying information.
About the standard, see https://reproducible-builds.org/specs/source-date-epoch/
Provided in github pull request #93 by @T4cC0re.

[freebsd] update for r363214
- no user visible changes

Added the way to include (or exclude) all numbered file descriptors
in -d option. "fd" is a pseudo file descriptor name for the purpose.
See the following
output on Linux; lsof doesn't print cwd, rtd, txt,
and mem files.

```
# ./lsof -p $$ -a -d fd
COMMAND    PID USER   FD   TYPE DEVICE SIZE/OFF NODE NAME
bash    866421 root    0u   CHR  136,1      0t0    4 /dev/pts/1
bash    866421 root    1u   CHR  136,1      0t0    4 /dev/pts/1
bash    866421 root    2u   CHR  136,1      0t0    4 /dev/pts/1
bash    866421 root  255u   CHR  136,1      0t0    4 /dev/pts/1
```

docs: fixed minor grammatical error in instructions in Customize file
The change is provided by @hardikpnsp.

man page: improve phrasing and add examples
The change is provided by Martin D Kealey.

man page: improve explanation of -t implying -w
The change is provided by Martin D Kealey.

test cases, [linux]: fix tests for large inode-numbers (i >= 2^32)
The change is provided by Henry Peteet.

[linux] handle ffff:ffff in ipv6 addr correctly
The listen address and port of an AF_INET6 socket were not display if
the socket listened at
an ipv6 address including ffff:ffff.

Here is a command session demonstrating the bug:

```
# ip -6 addr add abcd:ef10:ffff:ffff:ffff:ffff:ffff:ff62 dev lo
# nc -6      -l  abcd:ef10:ffff:ffff:ffff:ffff:ffff:ff62 8888 &
[1] 6762
# ./lsof -p 6762 -a -d fd -P -n
COMMAND  PID   USER   FD   TYPE DEVICE SIZE/OFF    NODE NAME
nc      6762 yamato    0u   CHR  136,6      0t0       9 /dev/pts/6
nc      6762 yamato    1u   CHR  136,6      0t0       9 /dev/pts/6
nc      6762 yamato    2u   CHR  136,6      0t0       9 /dev/pts/6
nc      6762 yamato    3u  sock    0,9      0t0 5833594 protocol: TCPv6
```

The last line should be:

```
nc      6762 yamato    3u  IPv6 5833594      0t0  TCP [abcd:ef10:ffff:ffff:ffff:ffff:ffff:ff62]:8888 (LISTEN)
```

The original code decoding an ipv6 address uses UINT32_MAX constant
incorrect way.

@zhrf2020 reported this bug in #102.
@zhrf2020 provided the initial version of fix, #109.

man page,[linux]: enumerate
abbreviated flags printed with '+f g' option

Make -Fo option work
-Fo option is for printing file offset. For regular files,
the option didn't work.

Here is a command session demonstrating the fix:

```
# ./lsof -Fo -o0| grep ^o | sort | uniq -c
90586 o0t0
   87 o0t101
   84 o0t103
```

...
@JustAnotherArchivist reported this bug in #118.

man page: fix definition of the `o` field on programmatic output
The change is provided by @JustAnotherArchivist who reported
the original issue in #118.

[linux]: show the pid monitored by a pidfd
With this change, lsof prints pidfd in the following form:

```
[pidfd:%d]
```

where %d represents the pid monitored by the pidfd.

Example output:

```
# ./lsof -p 12573 -p 12710 | grep pidfd
dbus-brok 12573  jet   11u  a_inode          0,13       0    13312 [pidfd:12575]
dbus-brok 12710  jet   10u  a_inode          0,13       0    13312 [pidfd:12711]
```

fd 11 of pid 12573 monitors
pid 12575.
fd 10 of pid 12710 monitors pid 12711.
This change closed #116.

Don't select the file descriptor field by default.
The version 4.88 introduced the change for selecting the file
descriptor field by default. However, the change is not
suitable for users who wants to print only PID field.
@po5857 suggests the use case and the way to improve the man page.

[linux]: enumerate fds monitored by an eventpoll fd
With this change, lsof prints an eventpoll fd in the following form:

```
[eventpoll:<fd0>,<fd1>,...,<fdn>...]
```

Here fdX is a file descriptor monitored by the eventpoll fd.
If an eventpoll fd monitors too many file descriptors, lsof
truncates the list of fds. "..." at the end of list implies
the truncation.

Example output:

```
# sudo ./lsof -p 1 -a -d 10,11,12
```

```
COMMAND PID USER   FD      TYPE DEVICE SIZE/OFF  NODE NAME
systemd   1 root   10u  a_inode   0,13        0 11624 [eventpoll:11,12]
systemd   1 root   11r      REG    0,4
     0 17680 /proc/1/mountinfo
systemd   1 root   12r  a_inode   0,13        0 11624 inotify
```

systemd monitors fd 11 and fd 12 via eventpoll fd 10.

[linux]: implement "make check"
The target runs check.bash.

The lsof-org team at GitHub
November 11, 2020

Found in path(s):
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/00DIST
No license file was found, but licenses were detected in source scan.

```
/*
* Copyright 2002 Purdue Research Foundation, West Lafayette, Indiana
* 47907.  All rights reserved.
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* Written by V. Abell.
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*
* 3. Altered versions must be plainly marked as such, and must not be
*    misrepresented as being the original software.
*
*
 4. This notice may not be removed or altered.
*/
/*
```

```
* GetOpt() -- Local get option
*
* Borrowed from lsof's main.c source file.
*
* Liberally adapted from the public domain AT&T getopt() source,
* distributed at the 1985 UNIFORM conference in Dallas
*
* The modifications allow `?' to be an option character and allow
* the caller to decide that an option that may be followed by a
* value doesn't have one -- e.g., has a default instead.
*/
```

Found in path(s):
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/tests/LTlib.c
No license file was found, but licenses were detected in source scan.

```
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*
* 3. Altered versions must be plainly marked as such, and must not be
*    misrepresented as being the original software.
*
*
 4. This notice may not be removed or altered.
*/
/*
     * If this is a regular file with a non-numeric FD, it may be the
     * executable.
     */
```

Found in path(s):
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/tests/LTbasic.c
No license file was found, but licenses were detected in source scan.

# This code is in the public domain; do with it what you wish.

Found in path(s):
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/upstream2downstream.sh
No license file was found, but licenses were detected in source scan.

```
/*
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*    University must appear in documentation and sources.
*
* 3. Altered versions must be plainly marked as such, and must not be
*    misrepresented as being the original software.
 *
* 4. This notice may not be removed or altered.
*/
```

Found in path(s):
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/lsof.h
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/misc.c
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/store.c
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/node.c
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/proc.c

* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/OLD/lsof.h
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/lsof_fields.h
*
/lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/OLD/misc.c
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/proto.h
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/arg.c
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/OLD/main.c.old
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/OLD/proc.c
No license file was found, but licenses were detected in source scan.

Making and Installing lsof 4

```
************************************************************************
| The latest release of lsof is always available via anonymous ftp |
| from lsof.itap.purdue.edu.  Look in pub/tools/unix/lsof.         |
************************************************************************
```

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==========
Pre-built Lsof Binaries
==========

Avoid using pre-built lsof binaries if you can; build your own instead.

I do not support lsof binaries built and packaged by third parties nor lsof binaries built from anything but the latest lsof revision. (See the Bug Reports section for more information on the details of lsof support.)

One important reasone for those support restrictions is that when lsof

is built its Configure script tunes lsof to the features available on the building system, often embodied in supporting header files and libraries. If the building system doesn't have support for a particular feature, lsof won't be built to support the feature on any system.

The Veritas VxFS file system is a good example of a feature that requires build-time support.

UNIX dialect version differences -- Solaris 8 versus 9, AIX 4.3.3 vesus 5.2, etc. -- can also render a pre-built lsof binary useless on a different version. So can kernel bit size.

There are so many potential pitfalls to using an lsof binary improperly that I strongly recommend lsof be used only where it is built.

==========
Making Lsof
==========

```
$ cd <lsof source directory>
$ ./Configure <your dialect's abbreviation>
$ make
```

(Consult the 00FAQ and 00XCONFIG files of the lsof distribution for information about
using make command invocations and environment variables to override lsof default Makefile strings.)

This lsof distribution can be used with many UNIX dialects. However, it must be configured specifically for each dialect. Configuration is done in three ways: 1) by changing definitions in the machine.h header file of the UNIX dialect of interest; 2) by defining environment variable values prior to calling Configure (see the 00XCONFIG file, the Environment Variabls and Environment Variables Affecting the Configure Script sections of this file); and 3) by running the Configure shell script found in the top level of the distribution directory.

You may not need to change any machine.h definitions, but you might want to look at them anyway. Pay particular attention to the definitions that are discussed in the Security section of this file. Please read that section.

The Configure script calls three other scripts in the lsof distribution: AFSConfig; Inventory; and Customize. The

AFSConfig
script is called for selected dialects (AIX, HP-UX, NEXTSTEP, and Solaris) to locate AFS header files and determine the AFS version. See The AFSConfig Script section of this file for more information.

The Inventory script checks the completeness of the lsof distribution. Configure calls Inventory after it has accepted the dialect abbreviation, but before it configures the top-level directory for the dialect. See The Inventory Script section of this file for more information.

Configure calls the Customize script after it has configured the top-level lsof directory for the declared dialect. Customize helps you modify some of the important compile-time definitions of machine.h. See the The Customize Script section.

You should also think about where you will install lsof and its man page, and whom you will let execute lsof. Please read the Installing Lsof section of this file for information on installation considerations.

Once you have inspected the machine.h file for the
dialect for
which you want to build lsof, and made any changes you need, run the Configure script, supplying it with the abbreviation for the dialect. (See the following table.) Configure selects the appropriate options for the dialect and runs the Mksrc shell script in the dialect sub-directory to construct the appropriate source files in the top-level distribution directory.

Configure may also run the MkKernOpts script in the dialect sub-directory to propagate kernel build options to the dialect Makefile. This is done for only a few dialects -- e.g., DC/OSx, and Reliant UNIX.

Configure creates a dialect-specific Makefile. You may want to inspect or edit this Makefile to make it conform to local conventions. If you want the Makefile to install lsof and its man page, you will have to create an appropriate install rule.

Lsof may be configured using UNIX dialect abbreviations from the following table. Alternative abbreviations are indicated by a separating `|'. For example, for
SCO OpenServer you can use either
the ``osr'' or the ``sco'' abbreviation:

$ Configure osr
or

```
 $ Configure sco

Abbreviations  UNIX Dialect
-------------  ------------

   aix   IBM AIX 5.[23] and 5.3-ML1 using IBM's C Compiler
   aixgcc  IBM AIX 5.[12] and 5.3-ML1 using gcc
   darwin  Apple Darwin 7.x and 8.x for Power Macintosh systems
   decosf  DEC OSF/1, Digital UNIX, Tru64 UNIX 4.0 and 5.1
   digital_unix Digital UNIX, DEC OSF/1, Tru64 UNIX 4.0 and 5.1
   du   Digital UNIX, DEC OSF/1, Tru64 UNIX 4.0 and 5.1
   freebsd  FreeBSD 4.x, 4.1x, 5.x and [67].x
   hpux  HP-UX 11.00, 11.11 and 11.23, using HP's C
   Compiler, both /dev/kmem-based and PSTAT-based
   hpuxgcc  HP-UX 11.00, 11.11 and 11.23, using gcc, both
   /dev/kmem-based and PSTAT-based
   linux  Linux 2.1.72 and above for x86-based systems
   netbsd  NetBSD 1.[456], 2.x and 3.x
   next  NEXTSTEP 3.[13]
   nextstep  NEXTSTEP 3.[13]
   ns   NEXTSTEP 3.[13]
   nxt   NEXTSTEP 3.[13]
   openbsd  OpenBSD
 2.[89] and 3.[0-9]
   openstep  OPENSTEP 4.x
   os   OPENSTEP 4.x
   osr   SCO OpenServer Release 5.0.6, using the C compiler
   from the SCO developer's kit
   osrgcc  SCO OpenServer Release 5.0.6, using gcc
   osr6  SCO Openserver 6.0.0, using the SCO C compiler
   sco   SCO OpenServer Release 5.0.6, using the C compiler
   from the SCO developer's kit
   scogcc  SCO OpenServer Release 5.0.6, using gcc
   solaris  Solaris 2.x, 7, 8, 9 and 10 using gcc
   solariscc  Solaris 2.x, 7, 8, 9 and 10 using Sun's cc
   tru64  Tru64 UNIX, DEC OSF/1, Digital UNIX 4.0 and 5.1
   unixware  SCO|Caldera UnixWare 7.1.4
   uw   SCO|Caldera UnixWare 7.1.4

If you have an earlier version of a dialect not named in the above
list, lsof may still work on your system.  I have no way of testing
that myself.  Try configuring for the named dialect -- e.g., if
you're using Solaris 2.1, try configuring for Solaris 2.5.1.

After you have configured lsof for your UNIX dialect and have
selected options
 via the Customize script (See the The Customize
Script section.) , use the make command to build lsof -- e.g.,
```

```
$ make
```

## Other Configure Script Options

There are three other useful options to the Configure script besides the dialect abbreviation:

```
-clean      may be specified to remove all traces of
  a dialect configuration, including the
  Makefile, symbolic links, and library files.

-h          may be specified to obtain a list of
-help  Configure options, including dialect
  abbreviations.

-n          may be specified to stop the Configure
  script from calling the Customize and
  Inventory scripts.

  Caution: -n also suppresses the AFSConfig
  step.
```

## Environment Variables

Lsof configuration, building, and execution may be affected by environment variable settings. See the Definitions That Affect Compilation section in the 00PORTING file, the General Environment Variables section in the 00XCONFIG file, the Dialect-Specific Environment Variables section in the 00XCONFIG file, and the Environment Variables Affecting the Configure Script section of this file for more information.

Note in the General Environment Variables section of the 00XCONFIG file that there are five environment variables that can be used to pre-define values in lsof's -v output: LSOF_BLDCMT, LSOF_HOST, LSOF_LOGNAME, LSOF_SYSINFO, and LSOF_USER.

## Security

If the symbol HASSECURITY is defined, a security mode is enabled,
and lsof will allow only the root user to list all open files.
Non-root users may list only open files whose processes have the
same user ID as the real user ID of the lsof process (the one that
its user logged on with).

However, if HASNOSOCKSECURITY is also defined, anyone may list
anyone else's open socket files, provided their listing is enabled
with the "-i" option.

Lsof is distributed with the security mode disabled -- HASSECURITY
is not defined. (When HASSECURITY is not
defined, the definition
of HASNOSOCKSECURITY has no meaning.) You can enable the security
mode by defining HASSECURITY in the Makefile or in the machine.h
header file for the specific dialect you're using -- e.g.
dialects/aix/machine.h.

The Customize script, run by Configure when it has finished its
work, gives you the opportunity to define HASSECURITY and
HASNOSOCKSECURITY. (See the The Customize Script section.)

The lsof -h output indicates the state HASSECURITY and HASNOSOCKSECURITY
had when lsof was built, reporting:

"Only root can list all files;"
if HASSECURITY was defined and HASNOSOCKSECURITY wasn't
defined;

"Only root can list all files, but anyone can list socket files."
if HASSECURITY and HASNOSOCKSECURITY were both defined;

"Anyone can list all files;"
if HASSECURITY wasn't defined. (The definition of
HASNOSOCKSECURITY doesn't matter when HASSECURITY isn't
defined.)

You should carefully consider the implications of using the default
security mode.
When lsof is compiled in the absence of the
HASSECURITY definition, anyone who can execute lsof may be able to
see the presence of all open files. This may allow the lsof user
to observe open files -- e.g., log files used to track intrusions
-- whose presence you would rather not disclose.

As distributed, lsof writes a user-readable and user-writable device
cache file in the home directory of the real user ID executing
lsof. There are other options for constructing the device cache file

path, and they each have security implications.

The 00DCACHE file in the lsof distribution discusses device cache file path construction in great detail. It tells how to disable the various device cache file path options, or how to disable the entire device cache file feature by removing the HASDCACHE definition from the dialect's machine.h file. There is also information on the device cache file feature in the 00FAQ file. (The 00DCACHE and 00FAQ files are part of the lsof distribution package.)

The
Customize script, run by Configure after it has finished its work, gives you the opportunity to change the compile-time options related to the device cache file. (See The Customize Script section.)

Since lsof may need setgid or setuid-root permission (See the Setgid Lsof Dialects and Setuid-root Lsof Dialects sections.), its security should always be viewed with skepticism. Lest the setgid and setuid-root permissions allow lsof to read kernel name list or memory files, declared with the -k and -m options, that the lsof user can't normally access, lsof uses access(2) to establish its real user's authority to read such files when it can't surrender its power before opening them. This change was added at the suggestion of Tim Ramsey.

Lsof surrenders setgid permission on most dialects when it has gained access to the kernel's memory devices. There are exceptions to this rule, and some lsof implementations need to run setuid-root. (The Setgid Lsof Dialects and Setuid-root Lsof
Dialects sections
contains a list of lsof implementations and the permissions recommended in the distribution's Makefiles.)

The surrendering of setgid permission is controlled by the WILLDROPGID definition in the dialect machine.h header files.

In the end you must judge for yourself and your installation the risks that lsof presents and restrict access to it according to your circumstances and judgement.

## Run-time Warnings

Lsof can issue warning messages when it runs -- e.g., about the state of the device cache file, about an inability to access an NFS file system, etc. Issuance of warnings are enabled by default

in the lsof distribution.

Issuance or warnings may be disabled by default by defining
WARNINGSTATE in the dialect's machine.h. The Customize script may
also be used to change the default warning message issuance state.
(See The Customize Script section.)

The ``-w'' option description of the ``-h'' option (help) output
will indicate the default warning
issuance state. Whatever the
state may be, it can be reversed with ``-w''.

## Device Access Warnings

When lsof encounters a /dev (or /devices) directory, one of its
sub-directories, or one of their files that it cannot access with
opendir(3) or stat(2), it issues a warning message and continues.
Lsof will be more likely to issue such a warning when it has been
installed with setgid(<some group name>) permission; it won't have
trouble if it has been installed with setuid(root) permission or
is being run under the root login.

The lsof caller can inhibit or enable the warning with the -w
option, depending on the issuance state of run-time warnings. (See
the Run-time Warnings section.)

The warning messages do not appear when lsof obtains device
information from a device cache file that it has built and believes
to be current or when warning message issuance is disabled by
default. (See the "Caches -- Name and Device" section for more
information on the device
cache file.)

The lsof builder can inhibit the warning by disabling the definition
of WARNDEVACCESS in the dialect's machine.h or disable all warnings
by defining WARNINGSTATE. WARNDEVACCESS is defined by default for
most dialects. However, some dialects have some device directory
elements that are private -- e.g., HP-UX -- and it is more convenient
for the lsof user if warning messages about them are inhibited.

Output from lsof's -h option indicates the status of WARNDEVACCESS.
If it was defined when lsof was compiled, this message will appear:

```
/dev warnings = enabled
```

If WARNDEVACCESS was not defined when lsof was compiled, this

message will appear instead:

/dev warnings = disabled

The Customize script, run by Configure after it has finished its work, gives you the opportunity to change the WARNDEVACCESS definition. (See The Customize Script section.)

## NFS Blocks

Lsof is susceptible to NFS blocks when it tries to lstat() mounted file systems and when it does further processing -- lstat() and readlink() -- on its optional file and file system arguments.

Lsof tries to avoid being stopped completely by NFS blocks by doing the lstat() and readlink() functions in a child process, which returns the function response via a pipe. The lsof parent limits the wait for data to arrive in the pipe with a SIGALRM, and, if the alarm trips, terminates the child process with a SIGINT and a SIGKILL.

This is as reliable and portable a method for breaking NFS deadlocks as I have found, although it still fails under some combinations of NFS version, UNIX dialect, and NFS file system mount options. It generally succeeds when the "intr" or "soft" mount options are used; it generally fails when the "hard" mount option is used.

When lsof cannot kill the child process, a second timeout causes it to stop waiting for the killed child to complete. While the second timeout allows lsof to complete, it may leave behind a hung child process. Unless warnings are inhibited by default or with the -w option, lsof reports the possible hung child.

NFS block handling was updated with suggestions made by Andreas Stolcke. Andreas suggested using the alternate device numbers that appear in the mount tables of some dialects when it is not possible to stat(2) the mount points.

The -b option was added to direct lsof to avoid the stat(2) and readlink(2) calls that might block on NFS mount points and always use the alternate device numbers. If warning message issuance is enabled and you don't want warning messages about what lsof is doing, use the -w option, too.

The -O option directs lsof to avoid doing the potentially blocking operations in child processes. Instead, when -O is specified, lsof does them directly. While this consumes far less system overhead, it can cause lsof to hang, so I advise you to use -O sparingly.

## Caches -- Name and Device

Robert Ehrlich suggested that lsof obtain path name components for open files
from the kernel's name cache. Where possible, lsof dialect implementations do that. The -C option inhibits kernel name cache examination.

Since AFS apparently does not use the kernel's name cache, where lsof supports AFS it is unable to identify AFS files with path name components.

Robert also suggested that lsof cache the information it obtains via stat(2) for nodes in /dev (or /devices) to reduce subsequent running time. Lsof does that, too.

In the default distribution the device cache file is stored in .lsof_hostname, mode 0600, in the home directory of the login of the user ID that executes lsof. The suffix, hostname, is the first component of the host's name returned by gethostname(2). If lsof is executed by a user ID whose home directory is NFS-mounted from several hosts, the user ID's home directory may collect several device cache files, one for each host from which it was executed.

Lsof senses accidental or malicious damage to the device cache file with extensive integrity
checks, including the use of a 16 bit CRC.
It also tries to sense changes in /dev (or /devices) that indicate the device cache file is out of date.

There are other options for forming the device cache file path. Methods the lsof builder can use to control and employ them are documented in the separate 00DCACHE file of the lsof distribution.

## Raw Sockets

On many UNIX systems raw sockets use a separate network control block structure. Display of files for applications using raw sockets -- ping, using ICMP, for example -- need special support

for displaying their information.  This support is so dialect-specific
and information to provide it so difficult to find that not all
dialect revisions of lsof handle raw sockets completely.

## Other Compile-time Definitions

The machine.h and dlsof.h header files for each dialect contains
definitions that affect the compilation of lsof.  Check the
Definitions That Affect Compilation section of the
 00PORTING file
of the lsof distribution for their descriptions.  (Also see The
Customize Script section.)

## The AFSConfig Script

Lsof supports AFS on some combinations of UNIX dialect and AFS
version.  See the AFS section of this document for a list of
supported combinations.

When configuring for dialects where AFS is supported, the Configure
script calls the AFSConfig script to determine the location of AFS
header files and the AFS version.  Configure will not call AFSConfig,
even for the selected dialects, unless the file /usr/vice/etc/ThisCell
exists.

The AFS header file location is recorded in the AFSHeaders file;
version, AFSVersion.  Once these values have been recorded, Configure
can be told to skip the calling of AFSConfig by specifying its
(Configure's) -n option.

## The Inventory Script

The lsof distribution contains a script, called Inventory, that
checks the distribution for completeness.  It uses the file 00MANIFEST
in the distribution
 as a reference point.

After the Configure script has accepted the dialect abbreviation,
it normally calls the Inventory script to make sure the distribution
is complete.

After Inventory has run, it creates the file ".ck00MAN" in the

top-level directory to record for itself the fact that the inventory has been check. Should Inventory be called again, it senses this file and asks the caller if another check is in order, or if the check should be skipped.

The -n option may be supplied to Configure to make it bypass the calling of the Inventory script. (The option also causes Configure to avoid calling the Customize script.)

The lsof power user may want to define (touch) the file ".neverInv". Configure avoids calling the Inventory script when ".neverInv" exists.

## The Customize Script

Normally when the Configure script has finished its work, it calls another shell script in the lsof distribution called Customize. (You can tell Configure to bypass Customize with its -n option.)

Customize leads you through the specification of these important compile-time definitions for the dialect's machine.h header file:

```
 HASDCACHE  device cache file control
    HASENVDC  device cache file environment
   variable name
    HASPERSDC  personal device cache file path
   format
    HASPERSDCPATH name of environment variable that
   provides an additional component
   of the personal device cache file
   path
    HASSYSDC  system-wide device cache file path
 HASKERNIDCK  the build-time to run-time kernel
   identity check
 HASSECURITY  the security option
 HASNOSOCKSECURITY the open socket listing option whe
   HASSECURITY is defined
 WARNDEVACCESS  /dev (or /devices) warning message
   control
 WARNINGSTATE  warning message issuance state
```

The Customize script accompanies its prompting for entry of new values for these definitions with brief descriptions of each of them. More information on these definitions may be found in this file or

in the 00DCACHE and 00FAQ files of the lsof distribution.

You don't need to run Customize after Configure. You can run it later or you can edit machine.h directly.

The -n option may be supplied to Configure to make it bypass the calling of the Customize script. (The option also causes Configure to avoid calling the Inventory script.)

The lsof power user may want to define (touch) the file ".neverCust". Configure avoids calling the Customize script when ".neverCust" exists.

Customize CAUTION: the Customize script works best when it is applied to a newly configured lsof source base -- i.e., the machine.h header file has not been previously modified by the Customize script. If you have previously configured lsof, and want to rerun the Customize script, I recommend you clean out the previous configuration and create a new one:

```
$ Configure -clean
$ Configure <dialect_abbreviation>
...
Customize in response to the Customize script prompts.
```

Cautions
========

Lsof is a tool that is closely tied to the UNIX operating system version. It uses header files that describe kernel structures and reads kernel structures that typically change from OS version to OS version, and even within a version as vendor patches are applied.

DON'T TRY TO USE AN LSOF BINARY, COMPILED FOR ONE UNIX OS VERSION, ON ANOTHER. VENDOR PATCHES INFLUENCE THE VERSION IDENTITY.

On some UNIX dialects lsof versions may be even more restricted by architecture type.

The bottom line is use lsof where you built it. If you intend to use a common lsof binary on multiple systems, make sure all systems run exactly the same OS version and have exactly the same patches.

Warranty
========

Lsof is provided as-is without any warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. The entire risk as to the quality and performance of lsof is with you. Should lsof prove defective, you assume the cost of all necessary servicing, repair, or correction.

License
=======

Lsof has no license. Its use and distribution are subject to these terms and conditions, found in each lsof source file. (The copyright year in or format of the notice may vary slightly.)

```
/*
 * Copyright 2002 Purdue Research Foundation, West Lafayette,
 * Indiana 47907.  All rights reserved.
 *
 * Written by Victor A. Abell
 *
 * This software is not subject to any license of the American
 * Telephone and Telegraph Company or the Regents of the
 * University of California.
 *
 * Permission is granted to anyone to use this software for
 * any purpose on any computer system, and to alter it and
 * redistribute it freely, subject to the following
 * restrictions:
 *
 * 1. Neither the authors nor Purdue University are responsible
 *    for any consequences of the use of this software.
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 * 2. The origin of this software must not be misrepresented,
 *    either by explicit claim or by omission.  Credit to the
 *    authors and Purdue University must appear in documentation
 *    and sources.
 *
 * 3. Altered versions must be plainly marked as such, and must
 *    not be misrepresented as being the original software.
 *
 * 4. This notice may not be removed or altered.
 */
```

Bug Reports

==========

Now that the obligatory disclaimer is out of the way, let me hasten to
add that I accept lsof bug reports and try hard to respond to them. I
will also consider and discuss requests for new features, ports to new
dialects, or ports to new OS versions.

PLEASE DON'T SEND BUG REPORTS ABOUT LSOF TO THE UNIX DIALECT OR DIALECT
OPTION VENDOR.

At worst such bug reports will confuse the vendor; at best, the vendor
will forward the bug report to me.

PLEASE DON'T SEND BUG REPORTS ABOUT LSOF BINARIES BUILT OR DISTRIBUTED
BY SOMEONE ELSE, BECAUSE I CAN'T SUPPORT THEM.

Before you send me a bug report,
please do these things:

* Make sure you try the latest lsof revision.

  + Download the latest revision from:

  ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof

  + Verify the signatures of what you have downloaded;

  + While connected to lsof.itap.purdue.edu, check for patches:

  ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/patches

  + If patches exist, install them in the latest revision
  you just downloaded. Then build the latest revision and
  see if it fixes your bug.

* If you're having trouble compiling lsof with gcc, try the
  UNIX dialect vendor's compiler. I don't have access to gcc on
  all test systems, so my support for it is hit-and-miss, and so
  is my ability to respond to gcc compilation problem reports.

* Check the lsof frequently asked questions file, 00FAQ,
  to see if there's a question and answer relevant to your
  problem.

* Make sure you're running the lsof you think you are
by
  checking the path to it with which(1). When in doubt, use an
  absolute path to lsof. Make sure that lsof binary has

sufficient permissions to do what you ask, including internal permissions given it (e.g., restrictions on what files lsof may report for whom) during its build.

When you send a bug report, make sure you include output from your running of lsof's Configure script. If you were able to compile a running lsof, please also include:

* Output from which(1) that shows the absolute path to the lsof binary in question;

* Output from running lsof with its -h and -v options at lsof's absolute path;

* Output from "ls -l" directed to lsof's absolute path.

If you weren't able to compile a running lsof, please send me: the compiler error output; identification of the lsof revision you're using (contents of the lsof version.c file); identification of your system (full uname output or output from whatever other tool identifies the
system); and compiler identification (e.g., gcc -v output).

Either set of output will help me understand how lsof was configured and what UNIX dialect and lsof revision is involved.

Please send all bug reports, requests, etc. to me via e-mail at <abe@purdue.edu>. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

## The 00FAQ File

The lsof distribution contains an extensive frequently asked questions file on lsof features and problems. I recommend you consult it before sending me e-mail. Use your favorite editor or pager to search 00FAQ -- e.g., supplying as a search argument some fixed text from an lsof error message.

## The lsof-l Mailing List

Information about lsof, including notices about the availability of new revisions, may be found in mailings of the lsof-l listserv. For more information about it, including instructions on how to subscribe, read the 00LSOF-L file of

the lsof distribution.

## Field Output Example Scripts

Example AWK and Perl 4 or 5 scripts for post-processing lsof field output are locate in the scripts sub-directory of the lsof distribution. The scripts sub-directory contains a 00README file with information about the scripts.

## Field Output C Library

The lsof test suite (See "Testing Lsof."), checks basic lsof operations using field output. The test suite has its own library of C functions for common test program operations, including processing of field output. The library or selections of its functions could be adapted for use by C programs that want to process lsof field output. See the library in the file LTlib.c in the tests/ sub-directory

## Testing Lsof

Lsof has an automated test suite in the tests/ sub-directory that can be used to test some basic lsof features -- once lsof has been configured and made. Tests are arranged in three groups: basic tests that
should run on all dialects; standard tests that should run on all dialects; and optional tests that may not run on all dialects or may need special resources to run. See 00TEST for more information.)

CAUTION!!! Before you attempt to use the test suite make sure that the lsof you want to test can access the necessary kernel resources -- e.g., /dev/mem, /dev/kmem, /proc, etc. Usually you want to test the lsof you just built, so this is an important check. (See 00TEST.)

To run the basic and standard tests, using the lsof in the parent directory of tests/, do this:

```
$ cd tests
$ make test
  or $ make std
```

```
  or $ make standard
```

The basic and standard tests may be run as silently as possible, using the lsof in the parent directory of tests/, with:

```
 $ cd tests
 $ make auto
```

This is the "automatic" test mode, designed for use by scripts that build lsof. The caller is expected to test the make exit code to determine if the tests succeeded. The caller should divert standard output
 and standard error to /dev/null to suppress make's error exit message.

The optional tests may be run, using the lsof in the parent directory of tests/, with:

```
 $ cd tests
 $ make opt
  or $ make optional
```

It's possible to excute individual tests, too. See the 00TEST file of this distribution for more informaiton on the tests, what they do, and how to run and possibly customize each test.

It's possible to run the tests, using an lsof other than the one in the parent directory of /tests, too. See 00TEST for information about using the LT_LSOF_PATH environment variable to do that.

==========
Dialect Notes
==========

AFS
===

Lsof recognizes AFS files on the following combinations of UNIX dialect and AFS versions:

AIX 4.1.4 (AFS 3.4a)
Linux 1.2.13 (AFS 3.3)
NEXTSTEP 3.2 (AFS 3.3) (untested on recent lsof revisions)
Solaris 2.6 (AFS 3.4a)
Ultrix 4.2 RISC (AFS 3.2b) (no longer available)

Lsof has not been tested under other combinations -- e.g. HP-UX 10.10 and AFS 3.4a -- and probably won't even compile there. Often when a UNIX dialect version or AFS version changes, the new header files come into conflict, causing compiler objections.

AIX
===

Specify the aix Configure abbreviation for AIX 4.1.[45], 4.2[.1], 4.3[.123], 5L, and 5.[123].

Specify aixgcc on AIX above 4.1 to use the gcc compiler. (Gcc can't be used to compile lsof on AIX 4.1 and below because of kernel structure alignment differences between it and xlc.) Gcc results sometimes depend on the version of the gcc compiler that is used.

Compilation of lsof with gcc on AIX 4.3[.123], 5L, and 5.[123] has been sparsely tested with varying degrees of success: it has been reported to succeed on AIX 4.3.3 and 32 bit Power AIX 5.1; to fail on ia64 AIX 5.1 and 64 bit Power AIX 5.1; and to succeed on 32 and 64 bit Power AIX 5.2. Lsof compilation with gcc hasn't been tested on AIX 5.3.

At revision 4.61 and above lsof is configured and built to match the bit size of the kernel of Power architecture AIX 5.1 systems. Lsof binaries built for 32 and 64 bit kernels are not interchangeable. See 00FAQ for more information.

The Configure script uses /usr/bin/oslevel to determine the AIX version for AIX less than 5 and ``uname -rv'' for AIX 5 and higher. If /usr/bin/oslevel isn't executable on AIX less than 5, the Configure script issues a warning message and uses ``uname -rv'' to determine the AIX version.

When Configure must use ``uname -rv'' on AIX less than 5 to determine the AIX version, the result will lack a correct third component -- e.g., the `4' of ``4.1.4''. If your AIX less than 5 system lacks lacks an executable oslevel, I suggest you edit the Configure-produced Makefile and complete the _AIXV definition in the CFGF string.

By default lsof avoids using the kernel's readx() function, causing it to be unable to report information on some text and library file references. The ``-X'' option allows the lsof user to ask for the information readx() supplies.

Lsof avoids

readx() to avoid the possibility of triggering a kernel problem, known as the Stale Segment ID kernel bug. Kevin Ruderman reported this bug to me. The bug shows up when the kernel's dir_search() function hangs, hanging the application process that called it so completely that the application process can neither be killed nor stopped. The hang is the consequence of another process (perhaps lsof) making legitimate use of the kernel's readx() function to access the kernel memory that dir_search() is examining. IBM has indicated they have no plans to fix the bug.

A fuller discussion of this bug may be found in the 00FAQ file of the lsof distribution. There you will find a description of the Stale Segment ID bug, the APAR on it, and a discussion of the sequence of events that exposes it.

I added the ``-X" function so you can tell lsof to use readx(), but if you use ``-X", you should be alert to its possibly serious side effects. Although readx() is normally disabled, its state is controlled with the HASXOPT, HASXOPT_ROOT, and HASXOPT_VALUE definitions in dialects/aix/machine.h, and you can change its default state by changing those definitions. You can also change HASXOPT_ROOT via the Customize script.

You can also compile lsof with readx() use permanently enabled or disabled -- see the comments about the definitions in the dialects/aix/machine.h header file. You may want to permanently disable lsof's use of readx() if you plan to make lsof publicly executable. You can also restrict -X to processes whose real UID is root by defining HASXOPT_ROOT.

I have never seen lsof cause the Stale Segment ID bug to occur and haven't had a report that it has, but I believe there is a possibility it could.

AFS support for AIX was added with help help from Bob Cook and Jan Tax who provided test systems.

Henry Grebler and David J. Wilson helped with lsof for AIX 4.2.

Bill Pemberton provided an AIX 4.3 test system. Andrew Kephart and Tom Weaver provided AIX 4.3 technical assistance. Niklas Edmundsson did 4.3.1 testing. Doug Crabill provided an AIX 4.3.2 test system. Jeff W. Stewart provided an AIX 4.3.3 test system.

The SMT file type for AIX 4.1.[45], 4.2[.1], and 4.3[.12] is my fabrication. See the 00FAQ file more information on it.

Loc Le and Nasser Momtaheni of IBM provided test systems for AIX 5L and 5.1. Lsof for AIX 5L and 5.1 needs setuid-root permission to process the -X option on systems whose architecture type is ia64.

Dale Talcott of Purdue provided AIX 5.1 and 5.2 test systems. Dale and John Jackson of Purdue provided an AIX 5.3 test system.

## Apple Darwin

The Apple Darwin port was provided by Allan Nathanson for version 1.2. Allan also arranged for access to a test system for maintenance and regression testing. Dale Talcott provided a test system, too.

Allan supplied patches for updates to 1.4, 5.x, 6.x, 7.x and 8.x.

## BSDI BSD/OS

As of lsof revision 4.77 support for BSDI BSD/OS has been discontinued.
Lsof revision 4.76 with BSDI BSD/OS support may be found on lsof.itap.purdue.edu in pub/tools/unix/lsof/src.

## DEC OSF/1, Digital UNIX, Tru64 UNIX

Robert Benites, Dean Brock, Angel Li, Dwight McKay, Berkley Shands, Ron Young and Steve Wilson have kindly provided test systems. Jeffrey Mogul has provided technical assistance. Dave Morrison and Lawrence MacIntyre did Digital UNIX V3.2 testing.

Lsof supports the ADVFS/MSFS layered file system product. Lsof can locate all the open files of an ADVFS/MSFS file system when its path is specified, provided the file system is listed in /etc/fstab with an ``advfs'' type. (This /etc/fstab caveat applies only to Digital UNIX 2.0.) At Digital UNIX 4.0 and Tru64 UNIX, using code provided by David Brock, lsof 4.20 and above can locate ADVFS file paths.

Testing of lsof on DEC OSF/1 and Digital UNIX 4.0 ended with lsof revision 4.74. Hence, the lsof documentation has dropped the claim that it works there.

For a distribution of lsof 4.74 that was tested
on DEC OSF/1 and Digital UNIX 4.0, check pub/tools/unix/lsof/OLD/src
on the lsof ftp home, lsof.itap.purdue.edu.

Lsof revisions past 4.74 have only been tested on Tru64 UNIX 5.1.

## FreeBSD
=======

Bill Bormann of Purdue University provided access to several FreeBSD
test systems. Ade Barkah, John Clear, Ralph Forsythe, Michael
Haro, Kurt Jaeger, and William McVey have also provided FreeBSD
test systems.

The FreeBSD distribution header files are augmented by header files
in the dialects/freebsd/include directory.

Larry Rosenman maintains the lsof FreeBSD port package.

## HP-UX
=====

Lsof has two HP-UX bases: /dev/kmem for HP-UX 11.0 and earlier;
and PSTAT for HP-UX 11.11 and later. The lsof Configure script
will pick the appropriate base.

To use the CCITT x.25 socket support for HP-UX, you must have the
x.25 header files in /etc/conf/x25

Pasi Kaara helped with the HP-UX port, especially with its CCITT
x.25 socket support.

Richard
Allen provided HP-UX 10.x and 11.x test systems, as did
Mark Bixby, and Elias Halldor Agustsson. Marc Winkler helped test
the 10.20 port. Richard J. Rauenzahn provided a 64 bit HP-UX 11
test system and an HP-UX 11.11 development system.

AFS support for HP-UX was added thanks to help from Chaskiel Moses
Grundman, who provided a test system.

The /dev/kmem-based HP-UX 11.00 support is extremely fragile. It
depends on privately developed kernel structure definitions. (See
.../dialects/hpux/hpux11 for the header files making the definitions.)
Those header files and their definitions will not be updated by
HP-UX 11.00 patches, making it likely that any patch changing a

kernel structure critical to lsof will break lsof in some way.

It's possible to build a 64 bit lsof for 64 bit HP-UX 11.00 with
gcc, but you must have a gcc compiler capable of producing 64 bit
executables. See the 00FAQ file for more information.

The PSTAT-based lsof for HP-UX 11.11 and later is much more solid.
I
am indebted to the vision of HP for providing an lsof kernel API
through the PSTAT implementation. Specifically I appreciate the
help of HP staff members Carl Davidson, Louis Huemiller, Rich
Rauenzahn, and Sailu Yallapragada that made PSTAT-based HP-UX lsof
possible.

IPv6
====

Lsof has IPv6 support that has been tested for these UNIX dialects:
AIX 4.3.x; Apple Darwin 5.[12] and 6.0; the INRIA and KAME FreeBSD IPv6
implementations; PSTAT-based HP-UX; /proc-based Linux; the INRIA and
KAME NetBSD implementations; and Solaris 8 and 9. Lsof has IPv6
support that hasn't been tested for: OpenBSD (KAME); OpenUNIX 8; Tru64
Unix 5.[01]; and UnixWare 7.1.[34].

Please let me know if your UNIX dialect has IPv6 support and I'll
see if it can be supported by lsof.

Linux
=====

Tim Korb, Steve Logue, Joseph J. Nuspl Jr., and Jonathan Sergent
have provided Linux test systems.

Michael Shields helped add and test automatic handling of ELF/COFF
form names in /System.map, Marty Leisner and Keith
Parks have helped
test many lsof revisions. Marty has provided valuable suggestions,
Linux hints, and code, too.

The 00FAQ file gives some Linux tips, including information on
coping with system map file problems.

To determine the state of the Linux 2.1.x C library lseek() function,
the lsof Configure script runs a test program that must have
permission to read /dev/kmem. The test determines if the lseek()
function properly handles kernel offsets, which appear to be negative

because their high order bit is set.  If the lseek() test reveals
a faulty lseek(), Configure activates the use of a private lseek()
function for kernel offset positioning.  See the Linux problems
section of the 00FAQ file of the lsof distribution for more
information.

## NetBSD

Greg Earle  and Paul Kranenburg have assisted with the NetBSD ports.
Paul has provided test systems.  Ray Phillips provided a NetBSA
Alpha test system.  Andrew Brown also provided a test system.

The NetBSD dialect version of lsof
 is compiled using the dialect
sources it shares with OpenBSD in the n+obsd dialect sub-directory.

## NEXTSTEP and OPENSTEP

Virtual memory header files that allow lsof to display text references
were derived from the contents of /usr/include/vm of NEXTSTEP 2.0.
NeXT did not ship the virtual memory header files with other NEXTSTEP
or OPENSTEP versions.

You may use the RC_FLAGS environment variable to declare compiler
options outside the Makefile.  A common use of this variable is to
define the architecture types to be included in a "fat" executable.
See the comments in dialects/next/Makefile for an example.

## OpenBSD

David Mazieres has provided OpenBSD test systems.  The OpenBSD
dialect version of lsof is compiled using the dialect sources it
shares with NetBSD in the n+obsd dialect sub-directory.

Kenneth Stailey has provided OpenBSD testing and advice.

John Dzubera (Zube) reports, "lsof 4.33 compiles and runs on OpenBSD
2.3 for the pmax architecture
 (decstation 3100)."

I have not tested lsof on OpenBSD 3.8, but David Mazieres reports
revision 4.76 worked on OpenBSD 3.8.

Pyramid DC/OSx and Reliant UNIX
==========

As of lsof revision 4.52 support for all Pyramid dialects has been discontinued. Lsof revision 4.51 with Pyramid support may be obtained upon request. Send the request to abe@purdue.edu.

These two UNIX dialects are very similar and share dialect-specific source files from the pyramid sub-directory.

The Reliant Unix Pyramid C compiler issues warning messages that I haven't found a convenient way to suppress. You can ignore warning messages about casts and conversions that lose bits. The message "warning: undefining __STDC__" is intentionally caused by the lsof MkKernOpts configuration script to suppress warning messages about cast and conversion problems in standard system header files, such as <stdio.h> and <string.h>.

Bruce Beare and Kevin Smith provided test systems.

Caldera OpenUNIX
==========

Larry
Rosenman provided an OpenUNIX 8 test system. Matthew Thurmaier provided technical assistance, along with these people from Caldera: Jack Craig, Robert Lipe, and Bela Lubkin.

Robert Lipe supplied changes to lsof for OpenUNIX 8.0.1. Those changes were also incorporated in UnixWare 7.1.3 when it became the release name for OpenUNIX 8.0.1.

Support for lsof on OpenUNIX ended at lsof revision 4.74. The last lsof revision, 4.74, tested on OpenUNIX, may be found at the lsof "home" ftp site, lsof.itap.purdue.edu, in pub/tools/unix/lsof/OLD/src.

SCO OpenServer
==========

Dion Johnson, Bela Lubkin, and Nathan Peterson of SCO gave me copies of SCO OpenServer and the SCO OpenServer Development System 3.0 and provided technical advice for the lsof port.

Hugh Dickins, Bela Lubkin, Craig B. Olofson, and Nathan Peterson

provided version 5.0 and gave technical advice for porting lsof to it. Bela provided the 5.0.4 changes. D. Chris Daniels provided a 5.0.4 test system,
Lee Penn provided one for 5.0.5, and John Dubois for 5.0.6.

The <netdb.h> header file was accidentally omitted from some SCO OpenServer Development System releases. The Configure script will sense its absence and substitute an equivalent from the BSD distribution. The BSD <netdb.h> and the <sys/cdefs.h> header file it includes are located in the dialects/os/include sub-directory tree.

To compile lsof from its distribution sources you must have the TCP/IP and NSF headers in /usr/include. While those are optional OpenServer packages, I have access to no system that doesn't have them, so I'm unable to build lsof for such a configuration. However, it should be possible to modify the lsof Configure script and sources so lsof would compile and work without those optional packages.

If you have an OpenServer system configured without the TCP/IP and NFS packages, and want to tackle the job of building lsof for it, contact me via e-mail at <abe@purdue.edu>. I'll identify the Configure
script, header file, and source file changes you will need to make. (Caution: this is not a simple task, or I would have already done it.)

The optional osrgcc and scogcc Configure abbreviations construct Makefiles for compiling lsof with gcc.

The UnixWare 7.1.4 sources are used for OpenServer Release 6.0.0. Hence there is a separate Configure abbreviation for it, "osr6". Richard of SCO provided a test system and technical assistance.

## SCO|Caldera UnixWare

D. Chris Daniels, John Hughes, Ken Laing, Andrew Merril, Lee Penn, and Matthew Thurmaier provided test systems. Bela Lubkin provided technical assistance. Larry Rosenman provided 7.1.[34] test systems.

## Solaris 2.x, 7, 8, 9 and 10

SEE THE CAUTIONS SECTION OF THIS DOCUMENT.

The latest Solaris revision of lsof 4 might work under Solaris 2.[1-4] and 2.5[.1] and 7 but hasn't been tested there. I have no test systems for those Solaris versions.

Lsof will compile with gcc and the Sun C compiler under Solaris.
If you want to use the Sun compiler, use the solariscc Configure abbreviation. If you use a gcc version less than 2.8 on Solaris, make sure the gcc-specific includes have been updated for your version of Solaris -- i.e., run the gcc fixincludes script.

Solaris 7, 8, 9 and 10 support for 64 bit kernels depends on a Sun WorkShop or Forte C compiler version that supports the "-xarch=v9" flag -- usually 5.0 or greater. Gcc versions 2.95 and above *may* be configured and built for 64 bit support, but it takes some extra work, the resulting compiler may be fragile, and the gcc developers discourage it. I've built 64 bit capable gcc compilers for Solaris 7, 8 and 9 from gcc versions 2.95 through 3.0.1 and produced working lsof executables with them. More information on 64 bit gcc for Solaris may be found in the 00FAQ file.

Solaris 10 ZFS support is questionable, because Sun does not distribute the ZFS kernel structure definition header files. The lsof Configure script
and source code use some risky work-arounds. ZFS file system support was made possible with help from Horst Scheuermann.

Dave Curry and Steve Kirsch provided resources for Solaris 2.x ports. Casper Dik and Gerry Singleton consulted and provided valuable assistance.

Henry Katz, Joseph Kowalski, Charles Stephens, Mike Sullivan, and Mike Tracy provided technical assistance.

AFS support was added to Solaris lsof with help from Curt Freeland, Heidi Hornstein, Michael L. Lewis, Terry McCoy, Phillip Moore, and Sushila R. Subramanian.

Casper Dik provided valuable assistance for the Solaris 8 support.

Sun has graciously provided me access to BETA versions of Solaris 2.5, 2.6, 7, 8, and 9.

John Dzubera provided Solaris 7 and 8 test systems.

Mike Miscevic provided Solaris 10 test systems.

Ultrix
======

As of lsof revision 4.52 support for Ultrix is no longer available,
because I no longer have an Ultrix test system.

Terry Friedrichsen, Dwight McKay, and Jeffrey Mogul helped me
with
this port.

DECnet support was added to Ultrix lsof with the help of John
Beacom, who kindly provided a test system. The Configure script
decides that DECnet support is available if /usr/lib/libdnet.a and
/usr/include/netdnet/dn.h exist and are readable.

Veritas VxFS and VxVM
=====================

Lsof supports some versions of Veritas VxFS and VxVM on some UNIX
dialects. Consult the lsof Configure script for the specific
dialect, and consult the lsof dialect-specific source files for
the UNIX dialect of interest. Veritas support will usually be
found in a source file named dnode[1-9].c.

Since Veritas rarely has a version number that can be extracted
with shell commands, lsof doesn't use it. Instead, when lsof
supports Veritas, the Configure script will form compile-time
definitions starting with HASVXFS. Check the lsof 00PORTING
documentation file for more information.

Lsof Veritas support requires that the supporting Veritas header
files be installed -- e.g., in /usr/include/sys/fs.
(The location
will depend in the dialect's header file conventions.)

Some information on lsof support for Veritas extensions may be
found in the lsof 00DIST file. (The ChangeLog file points to
00DIST.)

Chris Kordish and Andy Thomas have provided Solaris VxFS test
systems.

==========
User-contributed Dialect Support

==========

There are some user-contributed dialect versions of lsof; more information on them can be found at:

ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/contrib

Check the 00INDEX file there for details.

==========
Dialects No Longer Supported
==========

Because I don't have access to test systems, these UNIX dialects are no longer supported by lsof:

CDC EP/IX
/dev/kmem-based Linux
MIPS RISC/os
Motorola V/88
Pyramid DC/OSx
Pyramid Reliant UNIX
Sequent DYNIX
SGI IRIX
SunOS 4.x
Ultrix
UnixWare below 7.0

Remnants of the support lsof once provided for these dialects may be found in:

ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/OLD/dialects

==========
Installing Lsof
==========

The distributed Makefiles do not have actions that will install lsof. I've come to the conclusion there is no standard for installing lsof or its man page, so I no longer distribute make rules for installing them. You should adjust the Makefile for your local preferences.

The Makefile does have an install rule that will cause lsof to compile by virtue of its dependency clause. Some Makefiles also

have a dependency that causes the production of a man page that is ready to install. However, the actions of the install rule will not cause the lsof executable or its man page to be installed in any UNIX system-wide directory.

Instead, after the compilation and optional man page production are completed, the install rule will produce a brief description of what actions you might add to the install rule. The description will suggest the possible modes, ownerships, permissions, and destinations your install rule might employ to install the lsof executable and man page.

As you form your install rule, keep in mind that lsof usually needs some type of special permission to do its job. That may be permission to read memory devices such as /dev/kmem, /dev/mem, or /dev/swap, or it may be authorization to read entries in the /proc file system.

Memory device access can usually be provided by setting the modes of the lsof executable so that it's effective group identifier when it runs is the same as the group that has permission to read the memory devices -- i.e., it is setgid-group. The privileged group is usually kmem, sys, or system.

Don't overlook using ACLs -- e.g., on AIX or Solaris 8 -- to give lsof permission to access memory devices. ACLs, coupled to a separate group like kmem, can be safer than giving lsof setgid authorization to a commonly used system group.

When lsof needs to read /proc file system entries, it must be installed with modes that make its effective user identifier root when it runs -- i.e., it must be setuid-root. If lsof must be installed setuid-root (only the AIX 5L, PSTAT-based HPUX, and /proc-based Linux, ports need such power.), then access to memory devices is automatic (or not needed in the case of /proc-based Linux).

Your choice of permissions for lsof may also be affected by your desire to allow anyone to use it or your need to restrict its usage to specific individuals. You will have to be guided by local policy and convention in this case.

The next two sections, Setgid Lsof Dialect Versions and Setuid-root Lsof Dialect Versions, list recommended install permissions.

The system directory where you install the lsof executable is also open to choice. A traditional place for a tool like lsof is

/usr/local/etc, but recent changes in directory structure organization
suggest that somewhere in /opt may be more suitable.

Bear one other factor in mind when choosing a location
for the lsof
executable -- it usually is a shared executable, requiring access
to shared libraries. Thus, locations like /sbin or /usr/sbin are
probably unsuitable.

Once you've chosen a location for the executable you may find that
the location for the man page follows -- e.g., if the executable
goes in /usr/local/etc, then the man page goes in /usr/local/man.
If the executable location doesn't imply a location for the man
page, you'll have to let local custom guide you.

Setuid-root Lsof Dialect Versions
==========

These dialect versions should be installed with setuid-root
permission -- i.e., the lsof binary should be owned by root and
its setuid execution bit (04000) should be set.

AIX 5L and above for full use of the -X option
Apple Darwin 8.x for Power Macintosh systems
PSTAT-based HP-UX 11.11 and 11.23
/proc-based Linux (generally 2.1.72 and above)

Setgid Lsof Dialect Versions
==========

These dialect versions should be installed
with setgid permission,
owned by the group that can read kernel memory devices such as
/dev/drum, /dev/kmem, /dev/ksyms, /dev/mem, /dev/swap. ACLs may
be another mechanism (e.g., under AIX or Solaris 8) you can use to
grant read permission to the kernel memory devices.

AIX 4.1.[45], 4.2[.1], and 4.3[.123]
Apple Darwin 7.x for Power Macintosh systems
DEC OSF/1, Digital UNIX, Tru64 UNIX 2.0, 3.2, 4.0, and 5.[01]
FreeBSD 2.1.6, 2.2[.x], 3.x, 4.x, 5.x, [6789].x and 1[012].x
NetBSD 1.[456], 2.x and 3.x
NEXTSTEP 3.[13]
OpenBSD 2.[89] and 3.[0-9]
OPENSTEP 4.x
Caldera OpenUNIX 8

SCO OpenServer 5.0.[46]
SCO UnixWare 7.0 and 7.1.[0134]
Solaris 2.6, 8, 9 and 10
Ultrix 4.2 (no longer available)

==========
Porting lsof 4 to a New UNIX Dialect
==========

If you're brave enough to consider this, look at the 00PORTING file. Please contact me before you start. I might be able to help you or even do the port myself.

Don't overlook
the contrib/ directory in pub/tools/unix/lsof on my ftp server, lsof.itap.purdue.edu. It contains user-contributed ports of lsof to dialects I don't distribute, because I can't test new revisions of lsof on them.

==========
Quick Start to Using lsof
==========

For information on how to get started quickly using lsof, consult the 00QUICKSTART file of the lsof distribution. It cuts past the formal density of the lsof man page to provide quick examples of using lsof to solve common open file display problems.

==========
Cross-configuring Lsof
==========

Using environment variables it is possible to Configure (and possibly build) lsof for one UNIX dialect on a different one -- e.g., you are running Configure on a Linux 2.3 system and you want to Configure and build lsof for Linux 2.4.

See the 00XCONFIG file of the lsof distribution for a discussion of how to do this.

==========
Environment
Variables Affecting the Configure Script
==========

Configure script actions can be modified by introducing values to
the script via environment variables.  In many cases the environment
variable values take the place of test operations the Configure
script makes.

For more information on environment variables that can affect
Configure, consult the 00XCONFIG file of the lsof distribution.
See the General Environment Variables sections for descriptions of
ones that affect all dialects.  Consult the Dialect-Specific
Environment Variables section for ones that might affect the dialect
you are trying to configure.

Vic Abell <abe@purdue.edu>
February 14, 2018

Found in path(s):
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/00README
No license file was found, but licenses were detected in source scan.

# This program/include file is free software; you can redistribute it and/or
# modify it under the terms of the GNU General Public License as published
# by the Free Software Foundation; either version 2 of the License, or
# (at your option) any later version.
# useful, but WITHOUT ANY WARRANTY; without even the implied warranty
# of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
# GNU General Public License for more details.
# You should have received a copy of the GNU General Public License
# along with this program (in the main directory of the Linux-NTFS

Found in path(s):
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/scripts/sort_res.perl5
No license file was found, but licenses were detected in source scan.

/*
* Copyright 2000 Purdue Research Foundation, West Lafayette, Indiana
* 47907.  All rights reserved.
*
* Written by Victor A. Abell
*
* This software is not subject to any license of the American Telephone
* and Telegraph Company or the Regents of the University of California.
*
* This software has been adapted from snprintf.c in sendmail 8.9.3.  It
* is subject to the sendmail copyright statements listed below, and the
* sendmail licensing terms stated in the sendmail LICENSE file comment

* section of this file.
*
* Permission is granted to anyone to use this software for any purpose on
* any computer system, and to alter it and redistribute it freely, subject
* to the following restrictions:
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* 1. Neither the authors nor Purdue University are responsible for any
*  consequences of the use of this software.
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* 2. The origin of this software must not be misrepresented, either by
*  explicit
 claim or by omission.  Credit to the authors and Purdue
*  University must appear in documentation and sources.
*
* 3. Altered versions must be plainly marked as such, and must not be
*  misrepresented as being the original software.
*
* 4. This notice may not be removed or altered.
*/
/* Definitions for data structures and routines for the regular
  expression library, version 0.12.
  Copyright (C) 1985,1989-1993,1995-1998, 2000 Free Software Foundation, Inc.

  This file is part of the GNU C Library.  Its master source is NOT part of
  the C library, however.  The master source lives in /gd/gnu/lib.

  The GNU C Library is free software; you can redistribute it and/or
  modify it under the terms of the GNU Library General Public License as
  published by the Free Software Foundation; either version 2 of the
  License, or (at your option) any later version.

  The GNU C Library is distributed in the hope that it will be useful,
  but WITHOUT ANY WARRANTY; without
 even the implied warranty of
  MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the GNU
  Library General Public License for more details.

  You should have received a copy of the GNU Library General Public
  License along with the GNU C Library; see the file COPYING.LIB.  If not,
  write to the Free Software Foundation, Inc., 59 Temple Place - Suite 330,
  Boston, MA 02111-1307, USA.  */

Found in path(s):
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/regex.h
No license file was found, but licenses were detected in source scan.

Frequently Asked Questions about lsof

```
************************************************************************
| The latest release of lsof is always available via anonymous ftp   |
| from lsof.itap.purdue.edu.  Look in pub/lsof.README for its        |
| location.                                                          |
************************************************************************
```

---

This file contains frequently asked questions about lsof and answers
to them.

Vic Abell <abe@purdue.edu>
October 13, 2014

---

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18.3.1 Why doesn't lsof report node numbers for all AFS volume files,
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## 1.0 General Concepts

### 1.1 Lsof -- what is it?

Lsof is a UNIX-specific tool. Its name stands for LiSt Open Files, and it does just that. It lists information about files that are open by the processes running on a UNIX system.

See the lsof man page, the 00DIST file, the 00QUICKSTART file, and the 00README file of the lsof distribution for more information.

### 1.2 Where do I get lsof?

Lsof is available via anonymous ftp from lsof.itap.purdue.edu. Look in the pub/tools/unix/lsof sub-directory.

ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof

Bzip2'd, compressed and gzip'd tar files with GPG certificates are available.

#### 1.2.1 Are there mirror sites?

On March 21, 2013 these sites appeared to have the lastest lsof revision:

ftp://ftp.fu-berlin.de/pub/unix/tools/lsof
ftp://sunsite.ualberta.ca/pub/Mirror/lsof
http://www.mirrorservice.org/sites/lsof.itap.purdue.edu/pub/tools/unix/lsof/
ftp://ftp.mirrorservice.org/sites/lsof.itap.purdue.edu/pub/tools/unix/lsof/
rsync://rsync.mirrorservice.org/lsof.itap.purdue.edu/pub/tools/unix/lsof/

1.2.2 Are lsof executables available?

Some lsof executables are available in the subdirectory
tree pub/tools/unix/lsof/binaries These are neither guaranteed
to be current nor cover
every dialect and machine architecture.

I don't recommend you use pre-compiled lsof binaries; I
recommend you obtain the sources and build your own binary.
Even if you're a Sun user without a Sun C compiler, you
can use gcc to compile lsof.

If you must use a binary file, please be conscious of the
security and configuration implications in using an executable
of unknown or different origin. The lsof binaries are
accompanied by GPG certificates. Please use them!

Three additional cautions apply to executables:

1. Don't try to use an lsof executable, compiled for one
   version of a UNIX dialect, on another. Patches can
   make the dialect version different.

2. If you want to use an lsof binary on multiple systems,
   they must be running the same dialect OS version and
   have the same patches and feature support.

1.2.3 How do I check the validity of an lsof distribution?

There are two ways to check the validity of an lsof
distribution:

1. Follow the
instructions in the CHECKSUMS_<revision>
   file found with the lsof distribution.

   Checking with GPG is the best method.

2. Follow the instructions in the "Security" section of the
   README.lsof_<revision> file found inside the lsof
   distribution.

Again, checking with GPG is the best method.

1.2.4 Why can't I get the sum(1) result reported in
README.lsof_<revision>?

The "Security" section of the README.lsof_<revision> file found
inside the lsof distribution gives md5, sum, and GPG certificate
information.

The simplest, the sum(1) signature, seems to be the trickiest.
That's because there are different sum(1) methods, BSD systems
usually have cksum(1) instead of sum(1), and different systems
compute the block size value differently.

First, the lsof sum results are computed with the old,
"alternate" algorithm. On newer systems, you can use sum's
"-r" option to get that computation result.

Second, on BSD systems you usually must use cksum(1) instead
of
sum(1), because they have no sum(1). To tell cksum(1)
to use the old, "alternate" algorithm, use its "-o1" option.

Third, the second value that sum reports, the block count, may
be computed differently on different systems -- usually block
size is considered to be 512 or 1,024. The lsof block counts
were computed on a system with a sum(1) option that considers
block size to be 512. The BSD system cksum(1) -o1 option
considers block size to be 1,024. If your sum(1) or cksum(1)
doesn't report a block count that matches the sum(1) signature
given in README.lsof_<revision>, check its man page to see what
block size it uses, then adjust its reported block count
appropriately.

1.2.5 Why won't gpg accept the lsof-signing PGP public key?

An older PGP key that once signed lsof distributions is
included in lsof revisions prior to 4.70. The PGP key is
indeed my key, but is incompatible with GPG. It was created
about ten years ago and is still acceptable to PGP versions
2.6.2
through 6.5.2.

Lsof revisions 4.70 and above are signed with a copy of my PGP
key that has been made acceptable for use with GPG by importing
it under GPG's "--allow-non-selfsigned-uid" option.

You can find my GPG compatible key in lsof revisions 4.70 and

above and at:

ftp://lsof.itap.purdue.edu/pub/Victor_A_Abell.gpg

If you have an older lsof revision with my PGP key, there are two possible ways to use it:

* Use it with a PGP version from 2.6.2 through 6.5.2.

* Use GPG's "--allow-non-selfsigned-uid" option when you import my PGP key into your GPG key ring.

```
$ gpg --allow-non-selfsigned-uid --import Victor_A_Abell.pgp
```

1.3 Where can I get more lsof documentation?

A significant set of documentation may be found in the lsof distribution (See "Where can I get lsof?). There is a manual page, copious documentation in files whose names begin with 00, and a copy of this FAQ in the file 00FAQ (perhaps slightly less recent than this file if you're reading
it via a web browser.)

Two URLs provide some documentation that appears in the lsof distribution:

FAQ: ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/FAQ

man page: ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/lsof_man

1.4 How do I report an lsof bug?

If you believe you have discovered a bug in lsof, you can report it via e-mail to <abe@purdue.edu>. Do NOT report lsof bugs to the UNIX dialect vendor. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

Before you send me a bug report, please read the "Bug Reports" section of the 00README file of the lsof distribution. It lists the steps you should take before and when reporting a suspected bug.

1.5 Where can I get the lsof FAQ?

This lsof FAQ is available in the file 00FAQ in the lsof distribution and at the URL:

ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/FAQ

1.5.1 How timely is the on-line FAQ?

The on-line FAQ is sometimes too timely. :-)

I
update it as soon as new information is available. That may
include information about support that won't appear in the lsof
source distribution until the next revision. If you encounter
something like that, please send me e-mail at <abe@purdue.edu>. I
may be able to point you at a pre-release distribution that contains
the support of interest. Make sure "lsof" appears in the "Subject:"
line so my e-mail filter won't classify your letter as Spam.

1.6 Is there a test suite?

Yes, as of lsof revision 4.63 there's an automated lsof
test suite in the tests/ sub-directory of the lsof top-level
directory.

More information on using the test suite, what it does,
how to use it and how to configure it may be found in the
00TEST file of the lsof distribution. That file also
explains where the test suite has been tested.

Frequently asked questions about the test suite will be
asked and answered here in the FAQ. (See "Test Suite
Problems.")

After lsof has been configured
with the Configure script,
lsof can be made and tested with:

```
$ make
$ cd tests
$ make
```

Under normal conditions -- i.e., unless the lsof tree has
been cleaned or purged severely -- all tests or individual
tests may be run by:

```
$ cd test
$ make
```
or
```
$ <run a single test> (See 00TEST.)
```

1.7 Is lsof vulnerable to the standard I/O descriptor attack?

Lsof revisions 4.63 and above are not vulnerable.

Lsof revisions 4.62 and below are vulnerable, but no damage scenarios have so far been demonstrated.

The standard I/O descriptor attack is a local programmed assault on setuid and setgid programs that tricks them into opening a sensitive file with write access on a standard descriptor, usually stderr (2), and writing error messages to stderr. If the attacker can control the content of the error message, the attacker may gain elevated privileges.

The attack was first described in Pine Internet Advisory PINE-CERT-20020401, available at:

http://www.pine.nl/advisories/pine-cert-20020401.txt

If you are using an lsof revision below 4.63, you should remove any setuid or setgid permissions you might have given its executable. Then you should upgrade to lsof revision 4.63.

1.8 Can I alter lsof's make(1) behavior?

Yes. There are at least two ways to do that.

You can put replacements for lsof Makefile strings in your environment. If you specify the -e make option, make will give environment variable values precedence over strings from the Makefile. For example, to change the compiler string CC from the environment, you might do this with the Bourne shell:

```
$ CC=foobar; export CC
$ make -e
```

You can also replace lsof Makefile strings in the make command invocation. Here's the previous example done that way:

```
$ make CC=foobar
```

Changing the CFGF, CFGL, and DEBUG strings used in lsof Makefiles, either from the environment or from the make invocation, can significantly alter lsof make(1) behavior.

I
commonly use DEBUG to change the -O option to -g so I
can build an lsof executable for debugging -- e.g.,

```
$ make DEBUG=-g
```

(Look for DEBUG in this FAQ for other examples of its use.)

Consult the Makefiles to see what CFGL, CFGL, and other
lsof Makefile strings contain, and to see what influence
their alteration might have on lsof make(1) behavior.

1.9 Is there an lsof license?

No.

The only restriction on the use or redistribution of lsof
is contained in this copyright statement, found in every
lsof source file. (The copyright year in or format of the
notice may vary slightly.)

```
/*
 * Copyright 2002 Purdue Research Foundation, West Lafayette,
 * Indiana 47907.  All rights reserved.
 *
 * Written by Victor A. Abell
 *
 * This software is not subject to any license of the American
 * Telephone and Telegraph Company or the Regents of the
 * University of California.
 *
 * Permission is granted to anyone to use this software for
 * any purpose on
any computer system, and to alter it and
 * redistribute it freely, subject to the following
 * restrictions:
 *
 * 1. Neither the authors nor Purdue University are responsible
 *    for any consequences of the use of this software.
 *
 * 2. The origin of this software must not be misrepresented,
 *    either by explicit claim or by omission.  Credit to the
 *    authors and Purdue University must appear in documentation
 *    and sources.
 *
 * 3. Altered versions must be plainly marked as such, and must
 *    not be misrepresented as being the original software.
 *
```

```
 * 4. This notice may not be removed or altered.
 */
```

## 1.10 Language locale support

### 1.10.1 Does lsof support language locales? How do I use the support?

Most UNIX dialect versions of lsof support 8 bit language locale characters -- e.g., the ability to print 8 bit characters that have accents and other marks over them.

See the answer to the "Does lsof support wide characters in language locales?" question for information on when lsof's language locale support covers characters wider than 8 bits.

To see if lsof supports language locales for your dialect, look in the dialect's machine.h header file for the HASSETLOCALE definition. If it is present and not disabled, then lsof has language locale support for the dialect.

To enable lsof's language locale support, you must specify in a locale environment variable (e.g., LANG) a language locale known to your system that supports the printing of marked characters -- e.g, en_US. (On some dialects locale(1) may be used to list the known language locales.)

Note that LANG=C and LANG=POSIX are NOT language locales that support the printing of marked characters.

If the language locale doesn't support the printing of marked characters, lsof's OUTPUT of them follows the rules for non-printable characters described in the OUTPUT section of lsof(8).

Consult your dialect's setlocale(3) man page for the names of environment variables other than LANG -- e.g., LC_ALL, LC_TYPE, etc. -- which may be used to define language locales.

### 1.10.2 Does lsof support wide characters in language locales?

When lsof's language locale support is enabled with the HASSETLOCALE definition, for selected dialects lsof will also print wide characters (e.g., from UTF-8) when iswprint(3) reports them to be printable.

Wide character support is available when HASWIDECHAR is defined

in a dialect's machine.h header file. As of this writing on July 22, 2004, the following dialect versions have wide character support:

AIX >= 4.3.2
Apple Darwin >= 7.3.0
FreeBSD >= 5.2
HP-UX >= 11.00
/proc-based Linux
NetBSD >= 1.6
SCO OpenServer >= 5.0.6
Solaris >= 2.6
Tru64 UNIX 5.1

1.11 Are any files in the lsof distribution copyrighted?

Yes. Most files carry the copyright of the Purdue Research Foundation and may be redistributed under the terms that accompany the copyright notice. Those terms may also be found in the answer to the question, "Is there an lsof license?")

A few files carry other copyright notices. Some are BSD notices and they explain the terms under which they are included in the lsof distribution.

Those that carry vendor copyright notices have been reproduced in their original or modified forms with permission from the copyright owners. That permission is indicated in the README files that accompany the files.

1.12 Are there other lsof-related resources?

There are other resources available, connected to lsof. Among them are FreeBSD and Linux packages whose products use lsof and two particularly interesting resources.

The two interesting resources are a Gnome Tool Kit (GTK) GUI for lsof and a Perl wrapper module.

The GTK GUI is called Glsof and was developed by Gnele. It can be found at:

http://www.sourceforge.net

The Perl wrapper module by Marc Beyer can be found at:

http://search.cpan.org/dist/Unix-Lsof/

1.13 What
does the "WARNING: unsupported dialect or version" mean?

The lsof configure script issues that message for UNIX dialects
or their versions where I have been unable to test the current
revision of lsof. The message doesn't mean that lsof won't
work, just that I have no direct evidence that it will.

If the COnfigure script succeeds, except for the warning, try
compiling) lsof. If that succeeds, try the lsof test suite.

2.0 Lsof Ports

2.1 What ports exist?

The pub/lsof.README file carries the latest port information:

AIX 5.[23] and 5.3
FreeBSD 4.9 and 6.4 for x86-based systems
FreeBSD 8.[234], 9.0, 10.0 and 11.0 for AMD64-based systems
Linux 2.1.72 and above for x86-based systems
Solaris 9, 10 and 11

In the above list the only UNIX dialects present are ones for
which I test the current lsof revision. Lsof may still support
unlisted dialect versions -- e.g., HP-UX 10.20, Solaris 7, etc.
-- but I don't have access to systems where I could
test lsof
on them, so I can't claim lsof works on them. If your dialect
isn't in the list, you should try building lsof on it anyway.

Lsof version 4 predecessors, versions 2 and 3, may support older
version of some dialects. Contact me via e-mail at <abe@purdue.edu>
if you're interested in their distributions. Make sure "lsof"
appears in the "Subject:" line so my e-mail filter won't classify
your letter as Spam.

2.2 What about a new port?

The 00PORTING file in the distribution gives hints on doing
a port. I will consider doing a port in exchange for
permanent access to a test host. I require permanent access
so I can test new lsof revisions, because I will not offer
distributions of dialect ports I cannot upgrade and test.

2.2.1 User-contributed Ports

Sometimes I receive contributions of ports of lsof to systems where I can't test future revisions of lsof. Hence, I don't incorporate these contributions into my lsof distribution.

However, I do make descriptions of these contributions available. You can find them in the 00INDEX and README files at:

ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/contrib

Consult the 00INDEX file in the contrib/ directory for a list of the available contributions and consult README there for information on how to obtain them.

2.3 Why isn't there an AT&T SVR4 port?

I haven't produced an AT&T SVR4 port because I haven't seen a UNIX dialect that is strictly limited to the AT&T System V, Release 4 source code. Every one I have seen is a derivative with vendor additions.

The vendor additions are significant to lsof because they affect the internal kernel structures with which lsof does business. While some vendor derivatives of SVR4 are similar, each one I have encounted so far has been different enough from its siblings to require special source code.

If you're interested in an SVR4 version of lsof, here are some existing ports you might consider:

DC/OSx (This obsolete port is only available upon special request.)
Reliant UNIX (This obsolete port is only available upon special request.)
SCO|Caldera UnixWare (This is the most likely choice.)
Solaris

2.4 Why isn't there an SGI IRIX port?

Lsof support for IRIX was terminated at lsof revision 4.36, because it had become increasingly difficult for me to obtain information on the IRIX kernel structures lsof needs to access.

At IRIX 6.5 I decided the obstacles were too large for me

to overcome, and I stopped supporting lsof on IRIX. I have sources to the last revision of lsof (4.36) for IRIX, but that version of lsof does not work on IRIX 6.5 and is vulnerable to the standard I/O descriptor attack. (See the "Is lsof vulnerable to the standard I/O descriptor attack?" Q&A for more information.) Contact me to discuss obtaining those sources.

If you wish to pursue the issue, don't contact me, contact SGI. This case was opened with SGI on the subject:

Case ID: 0982584

Category: Unix
Priority: 30-Moderate Impact

Problem Summary:
kernel structure header files needed for continued lsof support

Problem Description:
Email In 07/17/98 19:09:23

2.5 Why does lsof's Configure script report "WARNING: unsupported dialect or version"?

Lsof's Configure script issues this message when it encounters a dialect or its version that lsof once supported, but no longer does. Usually I drop support for a dialect or version when I can no longer test lsof on it.

However, it's worth trying to compile and use lsof. Be sure to run the test suite. (See the answer to the "Is there a test suite? question for information on the test suite.)

If you have problems with an unsupported dialect or version, contact me via e-mail at <abe@purdue.edu> and I may be able to help. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

3.0 Lsof Problems

3.1 Configuration Problems

3.1.1 Why can't Configure determine the UNIX dialect version?

The lsof Configure script uses UNIX shell commands, often in a command pipeline, to determine the UNIX dialect version. (Consult the dialect stanza in Configure to determine which commands are used.) If Configure can't determine the dialect version, probably one of the commands is not behaving as Configure expects.

Symptoms of the failure include Configure warning messages and incorrect version definitions in the Makefile CFLAGS.

If you suspect that the lsof Configure script is failing to determine the dialect version correctly, try running the commands from Configure stanza one at a time. That will usually reveal the source of the problem. Be particularly mindful that the PATH environment variable can cause commands to be executed from non-standard directories.

If you can't determine the source of the problem, there is a work-around. You can supply the UNIX dialect version in the LSOF_VSTR environment
variable. Use Configure as a guide to
forming what it expects in LSOF_VSTR. There is also some information on LSOF_VSTR in the 00XCONFIG documentation file of the lsof distribution.

## 3.2 Compilation Problems

### 3.2.1 Why does the compiler complain about missing header files?

When you use make to build lsof, the compiler may complain that it can't find header files -- e.g.,

```
$ make
(cd lib; make DEBUG="-O" CFGF="-DAIXA=0 -DAIXV=4330 \
-DLSOF_VSTR=\"4.3.3.0\"")
gcc  -DAIXA=0 -DAIXV=4330 -DLSOF_VSTR="4.3.3.0" -O \
-c ckkv.c
In file included from ckkv.c:33: ../machine.h:70: \
sys/types.h: A file or directory in the path name \
does not exist. \
```

That type of complaint doesn't represent an lsof problem. It represents a problem with a missing system header file that probably should be found in /usr/include or in the system source tree.

As a first step try using find(1) to locate the problem header file.

If it's a system header file and can't be
found, here are some possible causes:

1. The file set, RPM or package containing the header files
has not been installed. Instructions for doing that
are specific to the UNIX dialect and beyond the scope
of this document.

2. If the compiler is gcc, the private gcc header files:

* May not have been installed;

* May have been installed incorrectly;

* May not have been updated properly after the last
compiler or system update;

* Ones from a previous installation may not have been
removed.

A path leading to the gcc private header files can be
found with `gcc -v`. Consult the gcc documentation for
instructions on proper installation of the private gcc
header files.

3. On some dialects -- e.g., FreeBSD, NetBSD, OpenBSD --
lsof may need to use header files that are located in
the system source tree -- /sys or /usr/src/sys, for
example. Make sure
the system source tree has been
installed.

3.2.2 Why does gcc complain about the contents of header files
distributed by the system's vendor?

When you use make to build lsof and gcc to compile it, gcc
may complain that it finds errors in system header files
-- e.g.,

```
$ make
(cd lib; make DEBUG="-O" CFGF="-Dsolaris=80000 \
 -DHASPR_GWINDOWS -m64 -DHASIPv6 -DHAS_VSOCK \
 -DLSOF_VSTR=\"5.8\"")
 gcc -Dsolaris=80000  -DHASPR_GWINDOWS -m64 -DHASIPv6 \
 -DHAS_VSOCK -DLSOF_VSTR="5.8"  -O  -c  dvch.c
In file included from /usr/include/sys/proc.h:31, \
      from /homes/abe/gnu/gcc-3.2.1/lib/gcc-lib/sparcv9-sun-solaris2/ \
 3.2.1/include/sys/user.h:267, from /usr/include/kvm.h:13, \
```

```
from ../dlsof.h:53, from ../lsof.h:172, from dvch.c:43: \
/homes/abe/gnu/gcc-3.2.1/lib/gcc-lib/sparcv9-sun-solaris2/\
 3.2.1/include/sys/task.h:59: parse error before "uint_t"
```

Errors like the above are most likely not problems in the system's
header files, but in the private copies of them
that were created when gcc was made or installed. Note
the presense of
".../gcc-3.2.1/lib/gcc-lib/sparcv9-sun-solaris2/3.2.1/include/..."
in the paths for user.h and task.h. It indicates both
header files are gcc-specific.

To solve errors like this requires comparing the header
files in the vendor's /usr/include tree to the gcc-specific
ones in gcc's private gcc-lib/.../include tree. It may be
necessary to regenerate gcc-specific header files, correct
them or remove them. See the gcc distribution for the
appropriate tools.

A possible temporary work-around is to direct gcc to use
the vendor's header files instead of its temporary ones by
declaring -I/usr/include in the compilation flags.

### 3.2.3 Other header file problems

Don't overlook any vendor tools that might validate the
vendor header files installed on the system -- e.g., the
Solaris pkgchk tool can be used to check the header files
that were installed
from the SUNWhea package.

For other header file problems contact me at <abe@purdue.edu>.
Please follow the reporting guidelines in the "How do I
report an lsof bug?" section of this FAQ.

## 3.3 Why doesn't lsof report full path names?

Lsof reports the full path name when it is specified as a
search argument for open files that match the argument.
However, if the argument is a file system mounted-on
directory, and lsof finds additional path name components
from the kernel name cache, it will report them.

Lsof reports path name for file system types that have path
name lookup features -- e.g., some versions of AdvFS for
Digital and Tru64 UNIX. The Linux /proc-based lsof reports
full path names, because the Linux /proc file system provides

them.  Lsof on recent builds of Solaris 10 also report full path names, because those Solaris kernels record the full path name in the vnode structure.

Otherwise, lsof uses the kernel name cache, where it exists and can be accessed,
and reports some or all path name
components (e.g., the sys and proc.h components of /usr/include/sys/proc.h) for these dialects:

Apple Darwin
DC/OSx
FreeBSD
HP-UX, /dev/kmem and PSTAT based
Linux, /dev/kmem-based
NetBSD
NEXTSTEP
OpenBSD
OPENSTEP
Reliant UNIX
SCO OpenServer
SCO|Caldera UnixWare
Solaris 2.x, 7, 8 and 9 (except for some VxFS versions;
see the "Why doesn't Solaris
lsof report VxFS path name
components?" section for more
information)
Solaris 10 (early builds) Tru64 UNIX

As far as I can determine, AFS path lookups don't share in kernel name cache operations, so lsof can't identify open AFS path name components.  Apparently Solaris VxFS versions 4 and above don't share in kernel name cache operations, either, so lsof can't display path name components for those open files.

Since the size of the kernel name cache is limited and the cache is in constant flux, it does not always contain the names of all components
in an open file's path; sometimes it contains
none of them.

Lsof reports the file system directory name and whatever components of the file's path it finds in the cache, starting with the last component and working backwards through the directories that contain it.  If lsof finds no path components, lsof reports the file system device name instead.

When lsof does report some path components in the NAME

column, it prefixes them with the file system directory name, followed by " -- ", followed by the components -- e.g., /usr -- sys/path.h for /usr/include/sys/path.h. The " -- " is omitted when lsof finds all the path name components of a file's name.

The PSTAT-based HP-UX lsof relies on kernel name cache contents, too, even though its information comes to lsof via pstat() function calls. Consequently, PSTAT-based HP-UX lsof won't always report full paths, but may use the " -- " partial path name notation, or may occasionally report no path name at all but just the file system mounted-on directory and device names.

Lsof can't obtain path name components from the kernel name caches of the following dialects:

AIX

Only the Linux kernel records full path names in the structures it maintains about open files; instead, most kernels convert path names to device and node number doublets and use them for subsequent file references once files have been opened.

To convert the device and node number doublet into a complete path name, lsof would have to start at the root node (root directory) of the file system on which the node resides, and search every branch for the node, building possible path names along the way. That would be a time consuming operation and require access to the raw disk device (usually implying setuid-root permission).

If the prospect of all that local disk activity doesn't concern you, think about the cost when the device is NFS-mounted.

Try using the file system mount point and node number lsof reports
as parameters to find -- e.g.,

```
$ find <mount_point> -inum <node_number> -print
```

and you may get an appreciation of what a file system directory tree search would cost.

### 3.3.1 Why do lsof -r reports show different path names?

When you run lsof with its repeat (``-r'') option, you may notice that the extent to which it reports path names for the same files may vary from cycle to cycle. That happens because other processes are making kernel calls affecting the cache and causing entries to be removed from and added to it.

### 3.3.2 Why does lsof report the wrong path names?

Under some circumstances lsof may report an incorrect path name component, especially for files in a rapidly changing directory like /tmp.

In a rapidly changing directory, like /tmp, if the kernel doesn't clear the cache entry when it removes a file, a new file may be given the same keys and lead lsof to believe that the old cache entry with the same keys belongs to the new file.

Lsof tries
to avoid this error by purging duplicate entries
from its copy of the kernel name cache when they have the same device and inode number, but different names.

This error is less likely to occur in UNIX dialects where the keys to the name cache are node address and possibly a capability ID. The Apple Darwin, Digital UNIX, FreeBSD, HP-UX, NEXTSTEP, OPENSTEP, Solaris, Tru64 UNIX, and UnixWare dialects use node address. Apple Darwin, FreeBSD, NetBSD, OpenBSD, Tru64 UNIX, and also use a capability ID to further identify name cache entries.

### 3.3.3 Why doesn't lsof report path names for unlinked (rm'd) files?

When lsof gets path name components from the kernel's name cache, it does not report the path names of a file that has been unlinked from its parent directory -- e.g., deleted via rm, or the unlink() system call -- even when some process may still hold the file open; lsof reports only the file system's mounted-on directory and device. That's because path name components
are removed from the kernel name cache when the file is unlinked.

Unlinked open files are sometimes used by applications for temporary, but invisible storage (i.e., ls won't show them, and no other process can open them.) However, they may

occasionally consume disk space to excess and cause concern for a system administrator, who will be unable to locate them with find, ls, du, or other tools that rely on finding files by examining the directory tree.

By using lsof's +L option you can see the link count of open files -- in the NLINK column. An unlinked file will have an NLINK value of zero. By using the option +L1 you can tell lsof to display only files whose link count is less than one (i.e., zero).

There are some UNIX dialect-specific exceptions to lsof's inability to report unlinked path names. They are described in the answer to the "When will lsof report path names for deleted files?" question.

### 3.3.4 Why doesn't lsof report the "correct" hard linked file path name?

When lsof reports a rightmost path name component for a file with hard links, the component may come from the kernel's name cache. Since the key which connects an open file to the kernel name cache may be the same for each differently named hard link, lsof may report only one name for all open hard-linked files. Sometimes that will be "correct" in the eye of the beholder; sometimes it will not. Remember, the file identification keys significant to the kernel are the device and node numbers, and they're the same for all the hard linked names.

### 3.3.5 When will lsof report path names for deleted files?

Lsof will report path names for deleted files for two dialects: Linux and later builds of Solaris 10.

Deleted Linux path names are reported by default and have "(deleted)" at their ends.

The display of Solaris 10 deleted path names may be selected with the -X option. When selected they are also reported with "(deleted)" at their ends.

## 3.4 Why is lsof so slow?

Lsof may appear to be slow if network address to host name resolution is slow. This can happen, for example, when the

name server is unreachable, or when a Solaris PPP cache daemon is malfunctioning.

To see if name lookup is causing lsof to be slow, turn it off with the ``-n'' option.

Port service name lookup or portmap registration lookup may also be causes of slow-down. To suppress port service name lookup, specify the ``-P'' option.

Lsof doesn't usually make direct portmap calls -- only when +M is specified, or when HASPMAPENABLED is defined during lsof construction. (The lsof help panel, produced with `lsof -h` will display the default portmap registration reporting state.) The quickest first step in checking if lsof is slow because of the portmapper is to use lsof's ``-M'' option.

Lsof may be slow if UID to login name lookups are slow. Suppress them with ``-l''.

On dialects where lsof uses the kernel name cache, try disabling its use with ``-C''.
(You can tell if lsof uses the
kernel name cache by looking for ``-C'' in lsof's ``-h'' output.) Of course, disabling kernel name cache use will mean that lsof won't report full or partial path names, just file system and character device names.

If you're just interested in the open files of one process, try using the ``-p <Process-ID>'' option to limit lsof to that process. (The ``-p'' option may also be followed with a list of Process-IDs.)

If you're interested in including or excluding certain commands, try lsof's "-c[^]cmd" option.

If you're interested in certain Internet TCP and UDP states (e.g., ESTABLISHED) or in excluding some (e.g., CLOSE_WAIT), try lsof's "-s p:s" option, available where shown on the lsof help output, obtained with -h or -?. More information on it may be found in the answer to the "How are protocol state name exclusion and inclusion used?" question.

Your UNIX dialect may not support "-s p:s" and its associated performance improvments
to Internet-only file processing. You
can find more information on those topics in the answer to the "Why doesn't my dialect support state name exclusion and

inclusion?" question.

Older AIX lsof may be slow to start because of its oslevel identity comparison. (Newer AIX lsof uses uname(2).) See the "Why does AIX lsof start so slowly?" and "Why does lsof warn "compiled for x ... y; this is z.?" sections for more information.

3.5 Why doesn't lsof's setgid or setuid permission work?

If you install lsof on an NFS file system that has been mounted with the nosuid option, lsof may not be able to use the setgid or setuid permission you give it, complaining it can't open the kernel memory device -- e.g., /dev/kmem.

The only solution is to install lsof on a file system that doesn't inhibit setgid or setuid permission.

3.6 Does lsof have security problems?

I don't think so. However, lsof does usually start with setgid permission, and sometimes with setuid-root permission. Any
program that has setgid or setuid-root permission, should always be regarded with suspicion.

Lsof drops setgid power, holding it only while it opens access to kernel memory devices (e.g., /dev/kmem, /dev/mem, /dev/swap). That allows lsof to bypass the weaker security of access(2) in favor of the stronger checks the kernel makes when it examines the right of the lsof process to open files declared with -k and -m. Lsof also restricts some device cache file naming options when it senses the process has setuid-root power.

On a few dialects lsof requires setuid-root permission during its full execution in order to access files in the /proc file system. These dialects include:

DC/OSx 1.1 for Pyramid systems
Reliant UNIX 5.4[34] for Pyramid systems

When lsof runs with setuid-root permission it severely restricts all file accesses it might be asked to make with its options.

The device cache file (typically .lsof_hostname in the home directory

of the real user ID that executes lsof) has 0600
modes. (The suffix, hostname, is the first component of
the host's name returned by gethostname(2).) However, even
when lsof runs setuid-root, it makes sure the file's
ownerships are changed to that of the real user and group.
In addition, lsof checks the file carefully before using
it (See the question "How do I disable the device cache
file feature or alter it's behavior?" for a description of
the checks.); discards the file if it fails the scrutiny;
complains about the condition of the file; then rebuilds
the file.

See the 00DCACHE file of the lsof distribution for more
information about device cache file handling and the risks
associated with the file.

3.7 Will lsof show remote hosts using files via NFS?

No. Remember, lsof displays open files for the processes
of the host on which it runs. If the host on which lsof
is running is an NFS server, the remote NFS client processes
that are accessing files on the server
leave no process
records on the server for lsof to examine.

3.8 Why doesn't lsof report locks held on NFS files?

Generally lock information held by local processes on remote
NFS files is not recorded by the UNIX dialect kernel. Hence,
lsof can't report it.

One exception is some patch levels of Solaris 2.3, and all
versions of Solaris 2.4 and above. Lsof for those dialects
does report on locks held by local processes on remotely
mounted NFS files.

3.8.1 Why does lsof report a one byte lock on byte zero as a full
file lock?

When a process has a lock of length one, starting at byte
zero, lsof can't distinguish it from a full file lock.
That's because most UNIX dialects represent both locks the
same way in their file lock (flock or eflock) structures.

3.9 Why does lsof report different values for open files on the
same file system (the automounter phenomenon)?

On UNIX dialects where file systems may be mounted by an

automounter with the ``direct'' type, lsof may
sometimes
report difference DEVICE, SIZE/OFF, INODE and NAME values
when asked to report files open on the file system.

This happens because some files open on the file system --
e.g., the current directory of a shell that changed its
directory to the file system as the file system's first
reference -- may be characterized in the kernel with
temporary automounter node information. The cd doesn't
cause the file system to be mounted.

A subsequent reference to the file system -- e.g., an ls
of any place in it -- will cause the file system to be
mounted. Processes with files open to the mounted file
system are characterized in the kernel with data that
reflects the mounted file system's parameters.

Unfortunately some kernels (e.g., some versions of Solaris
2.x) don't revisit the process that did only a change-directory
for the purpose of updating the data associated with the
open directory file. The file continues to be characterized
with temporary automounter information
until it does another
directory change, even a trivial ``cd .''.

Lsof will report on both reference types, when supplied
the file system name as an argument, but the data lsof
reports will reflect what it finds in the kernel. For the
different types lsof will display different data, including
different major and minor device numbers in the DEVICE
column, different lengths in the SIZE/OFF column, different
node numbers in the INODE column, and slightly different
file system names in the NAME column.

In contrast, fuser, where available, can only report on
one reference type when supplied the file system name as
an argument. Usually it will report on the one that is
associated with the mounted file system information. If
the only reference type is the temporary automounter one,
fuser will often be silent about it.

3.10 Why don't lsof and netstat output match?

Lsof and netstat output don't match because lsof reports
the network information it finds in open
file system objects
-- e.g., socket files -- while netstat often gets its

information from separate kernel tables.

The information available to netstat may describe network activities never or no longer associated with open files, but necessary for proper network state machine operation.

For example, a TCP connection in the FIN_WAIT_[12] state may no longer have an associated open file, because the connection has been closed at the application layer and is now being closed at the TCP/IP protocol layer.

### 3.10.1 Why can't lsof find accesses to some TCP and UDP ports?

Lsof stands for LiSt Open Files. If there is no open file connected to a TCP or UDP port, lsof won't find it. That's the most common reason why lsof doesn't find a port netstat might report open.

One reason I've found on some UNIX dialects is that their kernels set aside TCP and UDP ports for communicating with support activities, running in application layer servers -- the automounter daemons, and the NFS biod and nfsd daemons are examples. Netstat may report the ports are in use, but lsof doesn't.

Another reason is that netstat may also be able to report a port is open on a particular dialect, because it uses a source of data different from what lsof uses -- e.g., netstat might examine kernel tables or use streams messages to MIB2, while lsof relies on the information it finds in open file structures and their descendants.

Sometimes it's possible to search the data netstat and lsof use. For example, on Linux /proc/tcp and /proc/udp can be examined. There might an entry there for a particular protocol and port, but if the line on which the port appears doesn't have an inode number that matches an inode number of an open file, lsof won't be able to identify the process using the port.

This is a tough question to which there is no easy answer.

### 3.11 Why does lsof update the device cache file?

At the end of the lsof output you may see the message:

```
lsof:
```

WARNING: /Homes/abe/.lsof_vic was updated.

In this message /Homes/abe/.lsof_vic is the path to the private device cache file for login abe. (See 00DCACHE.)

Lsof issues this message when it finds it necessary to recheck the system device directory (e.g., /dev or /devices) and rebuild the device cache file during the open file scan. Lsof may need to do these things it finds that a device directory node has changed, or if it cannot find a device in the cache.

3.12 Why doesn't lsof report state for UDP socket files?

Lsof reports UDP TPI connection state -- TS_IDLE (Idle), TS_BOUND (Bound), etc. -- for some, but not all dialects. TPI state is stream-based TCP/IP information that isn't available in many dialects.

A fairly weak general rule is if netstat(1) reports UDP TPI state, lsof may be able to report it, too. But don't be surprised if lsof fails to report UDP TPI state for your dialect. Other factors influence lsof's ability to report UDP TPI state, including the
availability of state number
data in kernel structures, and state number to state name conversion data.

3.13 I am editing a file with vi; why doesn't lsof find the file?

Classic implementations of vi usually don't keep open the file being edited. (Newer ones may do so in order to maintain an advisory lock.) Instead classic vi opens the file, makes a temporary copy (usually in /tmp or /usr/tmp), and does its work in that file. When you save the file being edited from a classic vi implementation, it reopens and rewrites the file.

During a classic vi session, except for the brief periods when vi is reading or rewriting the file, lsof won't find an open reference to the file from the vi process, because there is none.

3.14 Why doesn't lsof report TCP/TPI window and queue sizes for my dialect?

Lsof only reports TCP/TPI window sizes for Solaris, because only its netstat reports them. The intent of providing TCP/TPI information in lsof NAME column output is to make

it
easier to match netstat output to lsof output.

In general lsof only reports queue sizes for both TCP and UDP (TPI) connections on BSD-derived UNIX dialects, where both sets of values appear in kernel socket queue structures. SYSV-derived UNIX dialects whose TCP/IP implementations are based on streams generally provide only TCP queue sizes, not UDP (TPI) ones.

While you may find that netstat on some SYSV-derived UNIX dialects with streams TCP/IP may report UDP (TPI) queue sizes, you will probably also find that the sizes are always zero -- netstat supplies a constant zero for UDP (TPI) queue sizes to make its headers align the same for TCP and UDP (TPI) connections. Solaris seems to get it right -- i.e., its netstat does not report UDP (TPI) queue sizes.

When in doubt, I chose to avoid reporting UDP (TPI) queue sizes for UNIX dialects whose netstat-reported values I knew to be a constant zero or whose origin I couldn't determine. OSR is a dialect in this category.

3.14.1 Why
doesn't lsof report socket options, socket states, and TCP flags and values for my dialect?

The lsof -T argument, 'f', that selects the reporting of socket options, socket states and TCP flags was implemented at lsof revision 4.71 for the following UNIX dialects, providing the indicated information:

AIX 4.3.2 and 5.1 and above
All socket options and values, socket states, and TCP flags and values described in lsof(8) are reported.
Apple Darwin 7.2 and above
All socket options and values, socket states, and TCP flags and values described in lsof(8) are reported.
Digital UNIX and Tru64 UNIX 4.0
All socket options and values, socket states, and TCP flags and values described in lsof(8) are reported.
FreeBSD 4.9 and above
All socket options and values, socket states, and TCP flags and values described in lsof(8) are reported.
HP-UX 11.00 (/dev/kmem-based lsof)
All socket options and values are reported. No socket states

are reported. Only the TF_NODELAY TCP flag and
the TF_MSS value are reported.

HP-UX 11.11 and iiiv2 (PSTAT-based lsof)
All socket options and values, and socket states are
reported. No TCP flags or values are reported.

Linux
No socket options and values, socket states, or TCP
flags and values are reported. The support for "-Tf"
could not be added to Linux, because socket options,
socket states, and TCP flags and values are not
available via the /proc file system.

NetBSD 1.6G and above
All socket options and values, socket states, and TCP
flags and values described in lsof(8) are reported.

OpenBSD 3.4 and above
All socket options and values, socket states, and TCP
flags and values described in lsof(8) are reported.

OPENSTEP 4.2
All socket options and values, socket states, and TCP
flags and values described in lsof(8) are reported.

OpenUNIX 8
All socket options and values, socket states, and TCP
flags and values described
in lsof(8) are reported.

SCO OpenServer Release 5.0.6
All socket options and values, socket states, and TCP
flags and values described in lsof(8) are reported.

Solaris 2.6, 8 and above
The socket option display is limited to BROADCAST,
DEBUG, DGRAM_ERRIND, DONTROUTE and OOBINLINE. Socket
values are limited to KEEPALIVE and LINGER. No socket
states are reported. The TCP DELACK, NODELAY and
SENTFIN flags are reported. The TCP MSS value is
reported.

UnixWare 7.1.[134]
All socket options and values, socket states, and TCP
flags and values described in lsof(8) are reported.

3.14.2 Why doesn't lsof report the partial listen queue connection
count for my dialect?

The reporting of partial listen queue connections was added to
-Tf processing at lsof revision 4.76. Currently it is reported
for these dialects:

AIX 4.3.2
This dialect is no longer supported, so no attempt
was made to add partial listen queue length support

for it.
AIX 5.1
and above
Partial listen queue information is available.
Apple Darwin 7.2 and above
Partial listen queue information is available.
Digital UNIX 4.0
This dialect is no longer supported, so no attempt
was made to add partial listen queue length support
for it.
FreeBSD 4.9 and above
Partial listen queue information is available.
HP-UX 11.00 (/dev/kmem-based lsof)
No partial listen queue information is available.
HP-UX 11.11 and iiiv2 (PSTAT-based lsof)
No partial listen queue information is available.
Linux
No partial listen queue information is available.
NetBSD 1.6G and above
Partial listen queue information is available.
OpenBSD 3.4 and above
Partial listen queue information is available.
OPENSTEP 4.2
Partial listen queue information is available.
OpenUNIX 8
This dialect is no longer supported, so no attempt
was made to add partial listen queue length support
for it.
SCO OpenServer Release 5.0.6
No
partial listen queue information is available.
Solaris 2.6, 8 and above
Partial listen queue information is available.
Tru64 UNIX 5.0
This dialect is no longer supported, so no attempt
was made to add partial listen queue length support
for it.
Tru64 UNIX 5.1
Partial listen queue information is available.
UnixWare 7.1.[134]
Partial listen queue information is available.

3.15 What does "no more information" in the NAME column mean?

When lsof can find no successor structures -- a gnode,
inode, socket, or vnode -- connected to the file structure
of an open descriptor of a process, it reports "no more

information" in the NAME column. The TYPE, DEVICE, SIZE/OFF, and INODE columns will be blank.

Because the file structure is supposed to contain a pointer to the next structure of a file's processing support, if the pointer is NUL, lsof can go no further.

Some UNIX dialects have file structures for system processes -- e.g., the sched process -- that have no successor structure pointers. The "no more information" NAME will commonly appear for these processes in lsof output.

It may also be the case that lsof has read the file structure while it is being assembled and before a successor structure pointer value has been set. The "no more information" NAME will again result.

Unless lsof output is filled with "no more information" NAME column messages, the appearance of a few should be no cause for alarm.

3.16 Why doesn't lsof find a process that ps finds?

If lsof fails to display open files for a process that ps indicates exists, there may be several reasons for the difference.

The process may be a "zombie" for which ps displays the "(defunct)" state. In that case, the process has exited and has no open file information lsof can display. It does still have a process structure, sufficient for the needs of ps.

Another possible explanation is that kernel tables and structures may have been changing when lsof looked for the process, making lsof unable to find all relevant process structures. Try repeating the lsof request.

3.17 Why doesn't -V report a search failure?

The usual reason that -V won't report a search failure is that lsof located the search item, but was prevented from listing it by an option that doesn't participate in search failure reporting.

For example, this lsof invocation:

```
$ lsof -V -i TCP@foobar -a -d 999
```

won't report it can't find the Internet address TCP@foobar, even if there is an open file connected to that address, unless the open file also has a file descriptor number of 999 (the ``-a -d 999'' options).

Compile-time options can also affect -V results in much the same way. For example, if HASSECURITY and HASNOSOCKSECURITY are defined at compile time, this lsof invocation, run by a non-root user:

```
$ lsof -V -c inetd
```

won't report that it can't find the inetd command, even if there is a process running the inetd command, because the HASSECURITY and HASNOSOCKSECURITY options prevent the listing of all but the socket files of another user, and no socket file selector (e.g., "-i") was specified.

## 3.18 Portmap problems

### 3.18.1 Why isn't a name displayed for the portmap registration?

When portmap registration reporting is enabled, any time there is a registration for a local TCP or UDP port, lsof displays it in square brackets, following the port number or service name -- e.g., ``:1234[name]'' or ``:name[100083]''.

The TCP or UDP port number or service number (what follows the `:') is displayed under the control of the lsof -P option. The registration identity is held by the portmapper and may be a name or a number, depending on how the registration's owner declared it. Lsof reports what the port map holds and cannot derive a registration name from a registration number.

Lsof can be compiled with registration reporting enabled or disabled by default, under the control of the HASPMAPENABLED #define (usually in machine.h). The lsof help panel (`lsof -h`) will show the default. Lsof is distributed with reporting disabled by default.

### 3.18.2 How can I display only portmap registrations?

Lsof doesn't have an option that will display only TCP or UDP ports with portmap registrations. The +M option only enables the reporting of registration information when Internet socket files are displayed; +M doesn't select the displaying of Internet socket files -- the -i option does that.

This simple lsof pipe to grep will do the job:

```
$ lsof -i +M | grep "\["
```

This works because -i selects Internet socket files, +M enables portmap registration reporting, and only output lines with opening square brackets will have registrations.

When portmap registration reporting is enabled by default, because the lsof builder constructed it that way, +M is not necessary. (The lsof help panel, produced with `lsof -h` will display the default portmapper registration reporting state.)
However, specifying +M when reporting is already enabled is acceptable, as is specifying -M when reporting is already disabled.

Digression: lsof will accept `+' or `-' as a prefix to most options. (That isn't documented in the man page or help panel to reduce confusion and complexity.) The -i option is as acceptable as +i, so the above example could be written a little more tersely as:

```
$ lsof +Mi | grep "\["
```

But be careful to use the ``Mi'' ordering, since ``iM'' implies M is an address argument to `i'.

### 3.18.3 Why doesn't lsof report portmap registrations for some ports?

Lsof reports portmap registrations for local TCP and UDP ports only. It identifies local ports this way:

* The port appears in the local address section of the kernel structure that contains it.

* The port appears in the foreign address section of a kernel structure whose local and foreign Internet addresses are the same.

* The port appears in the foreign address section
of a
  kernel address structure whose Internet address is
  INADDR_LOOPBACK (127.0.0.1).

Following these rules, lsof ignores foreign portmapped
ports. That's done for reasons of efficiency and possible
security prohibitions. Contacting all remote portmappers
could take a long time and be blocked by network difficulties
(i.e., be inefficient). Many firewalls block portmapper
access for security reasons.

Lsof may occasionally ignore portmap registration information
for a legitimate local port by virtue of its local port
rules. This can happen when a port appears in the foreign
part of its kernel structure and the local and foreign
Internet addresses don't match (perhaps because they're on
different interfaces), and the foreign Internet address
isn't INADDR_LOOPBACK (127.0.0.1).

3.18.4 Why doesn't lsof report portmap registrations for some Solaris
versions?

In some versions of Solaris -- 9 and 10 are known to exhibit
this problem -- lsof is unable to display portmap
registrations.

This portmap registration reporting failure occurs when the
Solaris netconfig field (in /etc or etc/inet) has its first two
non-comment lines enabling tcp6 and udp6. When netconfig is
configured in that fashion, lsof's attempt to read the portmap
via an RPC function fails.

I don't have an explanation for the failure, but this comment
in the netconfig(4) man page appears to have some bearing on
the problem:

```
# The following two entries starting with udp6 and tcp6 are
# meant to be used for IPv6. If you have Ipv6 enabled on your
# machine then you can uncomment these two lines to enable
# RPC and NFS to use the Ipv6 stack.
...
#udp6  tpi_clts      v  inet6  udp  /dev/udp6  -
#tcp6  tpi_cots_ord  v  inet6  tcp  /dev/tcp6  - "
```

My interpretation of that comment is that there is a different
RPC interface to the portmap when IPv6 is enabled. However, I
can't find any documentation on it in the RPC man pages. If

anyone has
information on it, please send it to me at
<abe@purdue> and put "lsof Solaris portmap" in the subject
line.

A work-around may be to move the ucp6 and tcp6 lines after the
udp and tcxp lines in netconfig. I don't know if that change
has any unacceptable consequences, but it works for me on my
Solaris 9 test system, and I have a report that it also works
on Solaris 10.

3.19 Why is `lsof | wc` bigger than my system's open file limit?

There is a strong temptation to count open files by piping
lsof output to wc. If your purpose is to compare the number
you get to some Unix system parameter that defines the
number of open files your system can have, resist the
temptation.

One reason is that lsof reports a number of "files" that
don't occupy Unix file table space -- current working
directories, root directories, jail directories, text files,
library files, memory mapped files are some. Another reason
is that lsof can report a file shared by more than one
process that
itself occupies only one file table slot.

If you want to know the number of open files that occupy
file table slots, use the +ff option and process the lsof
output's FILE_ADDR column information with standard Unix
tools like cut, grep, sed, and sort.

You might also consider using use lsof's field output with
+ff, selecting the file struct address with -FF, and
processing the output with an AWK or Perl script. See the
list_fields.awk, list_fields.perl, and shared.perl5 scripts
in the scripts/ subdirectory of the lsof distribution for
hints on file struct post-processing filters.

3.20 Why doesn't lsof report file offset (position)?

Lsof won't report a file offset (position) value if the -s
option (without parameters) has been specified, or if the
dialect doesn't support the displaying of file offset
(position). (Note that on selected dialects the help output,
obtained with -h or -?, may show that the -s option can also be
supplied the "p:s" parameters; for more

information on that
addition, see the answer to the "How are protocol state name
exclusion and inclusion used?" question.)

That lsof is reporting only file size is indicated by the
fact that the appropriate column header says SIZE instead
of SIZE/OFF.

If lsof doesn't support the displaying of file offset
(position) -- e.g., for Linux /proc-based lsof -- the -h
or -? output panel won't list the -o option.

Sometimes the availability of file offset information
depends on the dialect's kernel. This is particularly true
for socket file offsets.

Maintenance of offsets for pseudo-terminal devices varies
by UNIX dialect and is related to how the dialect kernel
implements pseudo-terminal support. Kernels like AIX, for
example, that short-circuit the transfer of data between
socket and pseudo devices to reduce TCP/IP daemon interrupt
rates won't advance offsets in the TCP/IP daemon socket
files. Instead they will advance offsets in the open
standard I/O files of the shell
child precess where the
pseudo-terminal devices are used.

When in doubt about the behavior of lsof in reporting file
offset information, do some carefully measured experiments,
consult the lsof sources, or contact me at <abe@purdue.edu>
to discuss the matter. Please follow the reporting guidelines
in the "How do I report an lsof bug?" section of this FAQ.

3.20.1 What does lsof report for size when the file doesn't really have
one?

When a file has no true size -- e.g., it's a socket, a
FIFO, or a pipe -- lsof tries to report the information it
finds in the kernel that describes the contents of associated
kernel buffers.

Thus, for example, size for most TCP/IP files is socket
buffer size. The size of the socket read buffer is reported
for read-only files; the size of the write buffer for
write-only files; and the sum of the buffers sizes for
read-write files.

3.21 Problems with path name arguments

3.21.1 How do I ask lsof to search a file system?

You can ask
lsof to search for all open files on a file
system by specifying its mounted path name as an lsof
argument -- e.g.,

```
$ lsof /
```

Output of the mount command will show file system mounted
path names. It will also show the mounted-on device path
for the file system.

If the mounted-on device is a block device (the permission
field in output of `ls -l <device>` starts with a `b/),
you can specify it's name, too -- e.g.,

```
$ lsof /dev/sd0a
```

If the mounted-on device isn't a block device -- for example,
some UNIX dialects call a CD-ROM device a character device
(ls output starts with a `c') -- you can force lsof to
assume that the specified device names a file system with
the +f option -- e.g.,

```
$ lsof +f -- /dev/sd0a
```

(Note: you must use ``--" after +f or -f if a file name
follows immediately, because +f and -f can be followed by
characters that specify flag output selections.)

When you use +f and lsof can't match the device to a file
system, lsof will issue
a complaint.

The +f option may be used in some dialects to ask lsof to
search for an NFS file system by its server name and server
mount point. If the mount application reports an NFS file
system mounted-on value that way, then this sample lsof
request should work.

```
$ lsof +f -- fleet:/home/fleet/u5
```

Finally, you can use -f if you don't want a mounted file
system path name to be considered a request to report all
open files on the file system. This is useful when you
want to know if anyone is using the file system's mounted

path name.  This example directs lsof to report on open access to the `/' directory, including when it's being used as a current working or root directory.

```
$ lsof -f -- /
```

The lsof -f option performs the same function as -f does in some fuser implementations.  However, since the lsof -c option was chosen for another purpose before the `f' option was added to lsof, +f was selected as the analogue to the fuser -c option.  (Sorry for the potential confusion.)

### 3.21.2 Why doesn't lsof find all the open files in a file system?

Lsof may not find all the open files in a file system for several reasons.

First, some processes with files open on the file system may have been changing status when lsof examined the process table, and lsof "missed" them.  Remember, the kernel changes much faster than lsof can respond to the changes.

Second, be sure you have specified the file system correctly. Perhaps you specified a file instead.  You can use lsof's -V option to have lsof report in detail on what it couldn't find.  Make sure the report for the file system you specified says "file system."  Here's some -V output:

```
$ /lsof -V /tmp ./lsof.h ./lsof
COMMAND  PID USER   FD   TYPE DEVICE SIZE/OFF  INODE NAME
lsof    2688  abe  txt   VREG 18,1,7  1428583 226641 ./lsof
lsof    2689  abe  txt   VREG 18,1,7  1428583 226641 ./lsof
lsof: no file use located: ./lsof.h
```

You can also use lsof's +f option to force it to consider a path name as a file system.  If lsof can't find a file system by the specified name, it will issue a complaint -- e.g.,

```
$ lsof +f -- /usr
lsof: not a file system: /usr
```

(/usr is a directory in the / file system.)

### 3.21.3 Why does the lsof exit code report it didn't find open files when some files were listed?

Sometimes lsof will list some open files, yet return a non-zero exit code, suggesting it hasn't found all the specified files.

The first thing you should when you suspect lsof is incorrect is to repeat the request, adding the -V option. In the resulting report you may find that your file system specification really wasn't a file system specification, just a file specification.

Finally, if you specify two files or two file systems twice, lsof will credit all matches to the first of the two and believe that there were no matches for the second. It's possible to specify a single file system twice with different path names
by using both its mounted directory path name and mounted-one device name.

```
$ lsof +f -V spcuna:/sysprog /sysprog
COMMAND   PID USER   FD   TYPE DEVICE SIZE/OFF  INODE NAME
ksh     11092  abe  cwd   VDIR 39,0,1     1536 226562 /sysprog
(spcuna:/sysprog)
...
lsof: no file system use located: spcuna:/sysprog
```

All matches were credited to /sysprog; none to spcuna:/sysprog.

### 3.21.4 Why won't lsof find all the open files in a directory?

When you give lsof a simple directory path name argument (not a file system mounted-on name), you are asking it to search for processes that have the directory open as a file, or as a process-specific directory -- e.g., root or current working directory.

If you want to list instances of open files inside the directory, you need to specify the individual path names of those files, or use the lsof +D and +d options.

See the answer to the question "Why are the +D and +d options so slow?" before you use +D or +d casually.

See the answer to the question "Why do the +D and +d options produce warning messages?" for an explanation of some process authority limitations of +D and +d.

3.21.5 Why are the +D and +d options so slow?

The +D and +d options cause lsof to build a path name search list for a specified directory. +D causes lsof to descend the directory to its furthest subdirectory, while +d restricts it to the top level. In both cases, the specified directory itself is included in the search list. In both symbolic links are ignored.

Building such a search list can take considerable time, especially when the specified directory contains many files and subdirectories -- lsof must call the system readlink() and stat() functions for each file and directory. Storing the search list can cause lsof to use more than its normal amount of dynamic memory -- each file recorded in the search list consumes dynamic memory for its path name, characteristics, and search linkages. Using the list means lsof must search it for every open file in the system.

Building the search list for a directory specified on some file systems can be slow -- e.g., for an NFS directory with many files. Some file systems have special logging features that can introduce additional delays to the building of the search list -- e.g., NFS logging, or logging on a Solaris UFS file system. The bottom line is that slow search list construction may not be so much an lsof problem as a file system problem. (Hint: if you're using Solaris UFS logging, consider specifying the "logging,noatime" option pair to reduce the number of atime writes to the UFS logging queue and disk.)

A somewhat risky way to speed up lsof's building of the search list is to use lsof's ``-O" option. It forces lsof to do all system calls needed to build the search list directly, rather than in a child process. While direct system calls are much faster, they can block in the kernel -- e.g., when an NFS server stops responding -- stopping lsof until the kernel operation unblocks.

As an example of the load +D can impose, consider that an `lsof +D /` on a lightly loaded NeXT '040 cube with a 1GB root file system disk took 4+ minutes of real time. It also generated several hundred error messages about files and directories the lsof process didn't have permission to access with stat(2).

The bottom line is that +D and +d should be used cautiously.
+D is more costly than +d for deeply nested directory trees,
because of the full directory descent it causes. So use
+d where possible. And you might need to consider the
performance of the file system that holds the directory
you name with +d or +D.

In view of these warnings, when is it appropriate to use
+D or +d? Probably the most appropriate time is when you
would specify the directory's contents to lsof with a shell
globbing construct -- e.g., `lsof *`. If that's what you
need to do, `lsof +d .` is probably more
efficient than
having the shell produce a directory list, form it into an
argument vector, and pass the vector to lsof for it to
unravel.

See the answer to the question "Why do the +D and +d options
produce warning messages?" for an explanation of some
process authority limitations of +D and +d.

3.21.6 Why do the +D and +d options produce warning messages?

+D and +d option processing is limited by the authority of
the lsof process -- i.e., lsof can only examine (with
lstat(2) and stat(2)) files the owner of the process can
access.

If the ownership, group membership, or permissions of the
specified directory, file within it, or directory within
it prevents the owner of the lsof process from using lstat(2)
or stat(2) on it, lsof will issue a warning message, naming
the path and giving the system's (lstat(2's or stat(2)'s)
reason (errno explanation text) for refusing access.

As an example, assume user abc has a subdirectory in /tmp,
owned by abc and readable, writable
and searchable by only
its owner. If user def asks lsof to search for all /tmp
references with +D or +d, lsof will be unable to lstat(2)
or stat(2) anything in abc's private subdirectory, and will
issue an appropriate warning.

Lsof warnings can usually be suppressed with the -w option.
However, using -w with +D or +d means that there will be
no indication why lsof couldn't find an open reference to
a restricted directory or something contained in it.

Hint: if you need to use +D or +d and avoid authority warnings, and if you have super-user power, su and use lsof with +D or +d as root.

3.22 Why can't my C compiler find the rpcent structure definition?

When you try to compile lsof your compiler may complain that the rpcent structure is undefined. The complaints may look like this:

```
>print.c: In function `fill_portmap':
>print.c:213: dereferencing pointer to incomplete type
>...
```

The most likely cause is that someone has allowed a BIND installation
to update /usr/include/netdb.h (or perhaps /usr/include/rpc/netdb.h), removing the rpcent structure definition that lsof expects to find there.

Only Solaris has an automatic work-around. (See dlsof.h in dialects/sun.). The Solaris work-around succeeds because there is another header file, <rpc/rpcent.h>, with the rpcent structure definition, and there is a Solaris C pre-processor test that can tell when the BIND <netdb.h> is in place and hence <rpc/rpcent.h> must be included.

Doubtlessly there are similar work-arounds possible in other UNIX dialects whose header files have been "touched" by BIND, but in general I recommend restoration of the vendor's <netdb.h> and any other header files BIND might have replaced. (I think BIND replaces <resolv.h>, <sys/bitypes.h>, <sys/cdefs.h> -- and maybe others.)

3.23 Why doesn't lsof report fully on file "foo" on UNIX dialect "bar?"

Lsof sometimes won't report much information on a given file, or may even report an error message
in its NAME
column. That's usually because the file is of a special type -- e.g., in a file system specific to the UNIX dialect -- and I haven't used a system where the file appeared during my testing.

If you encounter such a situation, send me e-mail at <abe@purdue.edu> and we may be able to devise an addition to lsof that will report on the file in question. Please follow

the reporting guidelines in the "How do I report an lsof bug?"
section of this FAQ. Make sure "lsof" appears in the
"Subject:" line so my e-mail filter won't classify your letter
as Spam.

3.24 Why do I get a complaint when I execute lsof that some library
file can't be found?

On systems where the LIBPATH (or the equivalent) environment
variable is used to record the library search path in
executable files when they are built, an incorrect value
may make it impossible for the system to find the shared
libraries needed to load lsof for execution.

This may be particularly true on systems like
AIX >= 4.1.4,
where the lsof Makefile takes the precautionary step of
using the -bnolibpath loader flag to insure that the path
to the private static lsof library is not recorded in the
lsof binary. Should LIBPATH be invalid when lsof is built,
it will be recorded in the lsof binary as the default
library path search order and lead to an inability to find
libraries when lsof is executed.

So, if you get missing library complaints when you try to
execute lsof, check LIBPATH, or whatever environment variable
is used on your system to define library search order in
executable files. Use the tools at your disposal to look
at the library paths recorded in the lsof binary -- e.g.,
chatr on HP-UX, dump on AIX, ldd on Solaris.

Make sure, too, that when the correct library search path
has been recorded in the executable file, the required
library files exist at one or more of the search paths.

3.25 Why does lsof complain it can't open files?

When lsof begins execution,
unless it has been asked to
report only help or version information, typically it will
attempt to access kernel memory and symbol files -- e.g.,
/unix, /dev/kmem. Even though lsof needs only permission
to open these files for reading, read access to them might
be restricted by ownerships and permission modes.

So the first step to diagnosing lsof problems with opening
files is to use ls(1) to examine the ownerships and permission

modes of the files that lsof wants to open. You may find that lsof needs to be installed with some type of special ownership or permission modes to enable it to open the necessary files for reading. See the "Installing Lsof" section of 00README for more information.

3.26 Why does lsof warn "compiled for x ... y; this is z."?

Unless warnings are suppressed (with -w) or the kernel identity check symbol (HASKERNIDCK) definition has been deleted, all but one lsof dialect version (exception: /proc-based Linux lsof) compare the identity of the running
kernel to that of the one for which lsof was constructed. If the identities don't match, lsof issues a warning like this:

```
lsof: WARNING: compiled for Solaris release 5.7; this is 5.6.
```

Two kernel identity differences can generate this warning -- the version number and the release number.

Build and running identity differences are usually significant, because they usually indicate kernels whose structures are different -- kernel structures commonly change at dialect version releases. Since lsof reads data from the kernel in the form of structures, it is sensitive to changes in them. The general rule is that an lsof compiled for one UNIX dialect version will not work correctly when run on a different version.

There are three work-arounds: 1) use -w to suppress the warning -- and risk missing other warnings; 2) permanently disable the identity check by deleting the definition of HASKERNIDCK in the dialect's machine.h header file -- with the same risk;
or 3) rebuild lsof on the system where it is to be run. (Deleting HASKERNIDCK can be done with the Customize script or by editing machine.h.)

Generally checking kernel identity is a quick operation for lsof. However, it is potentially slow under AIX, where lsof must run /usr/bin/oslevel. To speed up lsof, use -w to suppress the /usr/bin/oslevel test. See "Why does AIX lsof start so slowly?" for more information.

3.27 How can I disable the kernel identity check?

The kernel identity check is controlled by the HASKERNIDCK definition. When it is defined, most dialects (exclusion: /proc-based Linux lsof) will compare the build-time kernel identity with the run-time one.

To disable the kernel identity check, disable the HASKERNIDCK definition in the dialect's machine.h header file. The Customize script can be used to do that in its section about the kernel identity check.

Caution: while disabling the kernel identity check may result in smaller lsof startup overhead, it comes with the risk of executing an lsof that may produce warning messages, error messages, incorrect output, or no output at all.

3.28 Why don't ps(1) and lsof agree on the owner of a process?

Generally the user ID lsof reports in its USER column is the process effective user ID, as found in the process structure. Sometimes that may not agree with what ps(1) reports for the same process.

There are sundry reasons for the difference. Sometimes ps(1) uses a different source for process information, e.g., the /proc file system or the psinfo structure. Sometimes the kernel is lax or confused (e.g., Solaris 2.5.1) about what ID to report as the effective user ID. Sometimes the system carries only one user ID in its process structure (some BSD derivatives), leaving lsof no choice.

The differences between lsof and ps(1) user identifications should be small and normally it will be apparent that the confusion is over a process whose application has changed to an effective user ID different from the real one.

3.29 Why doesn't lsof find an open socket file whose connection state is past CLOSE_WAIT?

TCP/IP connections in states past CLOSE_WAIT -- e.g., FIN_WAIT_1, CLOSING, LAST_ACK, FIN_WAIT_2, and TIME_WAIT -- don't always have open files associated with them. When they don't, lsof can't identify them. When the connection state advances from CLOSE_WAIT, sometimes the open file associated with the connection is deleted.

3.30 Why don't machine.h definitions work when the surrounding

comments are removed?

The machine.h header files in dialect subdirectories have
some commented-out definitions like:

```
/* #define HASSYSDC "/your/choice/of/path */
```

You can't simply remove the comments and expect the definition
to work. That's intended to make you think about what
value you are assigning to the symbol. The assigned value
might have a system-specific convention. HASSYSDC, for
example, might be /var/db/lsof.dc for FreeBSD, but it
might
be /var/adm/lsof.dc for Solaris.

Symbols defined in the lsof documentation are described in
00PORTING, other machine.h comments, and other lsof
documentation files. HASSYSDC, for example, is discussed
in 00DCACHE. When comments and documentation don't suffice,
consult the source code for hints on how the symbol is
used.

3.31 What do "can't read inpcb at 0x...", "no protocol control
block", "no PCB, CANTSENDMORE, CANTRCVMORE", etc. mean?

Sometimes lsof will report "can't read inpcb at 0x00000000",
"no protocol control block", "no PCB, CANTSENDMORE,
CANTRCVMORE" or a similar message in the NAME column for
open TCP socket files. These messages mean the file's socket
structure lacks a pointer to the INternet Protocol Control
Block (inpcb) where lsof expects to find connection addresses
-- local and foreign ports, local and foreign IP addresses.
The socket file has probably been submitted to the shutdown(2)
function for processing.

In some implementations lsof
issues the "no PCB, CANTSENDMORE,
CANTRCVMORE" message, which tries to explain the absence
of a protocol control block by showing the socket state
settings that have been made by the shutdown(2) function.

If a non-zero address follows the "0x" in the "can't read
inpcb" message, it means lsof couldn't read inpcb contents
from the indicated address in kernel memory.

3.32 What do the "unknown file system type" warnings mean?

Lsof may report a message similar to"

unknown file system type, v_op: 0x10472f10

in the NAME column for some files.

This means that lsof has encountered a vnode for the file whose operation switch address (from v_op) references a file system type for which there is no support in lsof. After lsof identifies the file system type, it uses pre-compiled code to locate the file system specific node for the file where lsof finds information like file size, device number, node number, etc.

To get some idea of what the file system type might be, use
nm on your kernel symbol file to locate the symbol name that corresponds to the v_op address -- e.g., on Solaris do:

```
$ nm -x /dev/ksyms | grep 0x10472f10
0x10472f10 ... |file_system_name_vnodeops
```

Where "file_system_name" is the clue to the unsupported file system.

Lsof doesn't use the v_op address to identify file system types on all dialects. Sometimes it uses an index number it finds in the vnode. It will translate that symbol to a short name in the warning message -- e.g., "nfs3" -- if possible.

## 3.33 Installation

### 3.33.1 How do I install lsof?

There is no "standard" way to install lsof. Too much depends on local conditions for me to be able to provide working install rules in the lsof make files. (The skeleton install rules you will find just give "hints.") See the "Installing Lsof" section of 00README for a fuller explanation.

To install lsof you will need to consider these questions:

* Who should be able to use lsof? (See HASSECURITY and

  HASNOSOCKSECURITY in the "Security" section of 00README.)

* Where should lsof be installed? This is a decision

mostly dictated by local conditions. Somewhere in
/usr/local -- etc/ or sbin/ -- is a common choice.

* What permissions should I give the lsof executable?
The answer to this varies by dialect. The make files
have install rules that give hints. The "Installing
Lsof" section of 00README gives information, too.

* What if I want to install lsof in a shared file system
for machines that require different lsof configurations?
See the next question and answer, "How do I install a
common lsof when I have machines that need differently
constructed lsof binaries?"

3.33.2 How do I install a common lsof when I have machines that
need differently constructed lsof binaries?

A dilemma that faces some system administrators when they
install lsof in a shared file system -- e.g., NFS -- is
that they must have different lsof executables
for different
systems.

The answer is to build an lsof wrapper script that is
executed in place of lsof. The script can use system
commands to determine which lsof binary should be executed.

Consider this example. You have HP-UX machines with 32
and 64 bit kernels that share the /usr/local/sbin directory
where you want to install lsof. Consequently, on each
system you must use a different lsof executable, built for
the system's bit size. (That's because lsof reads kernel
structures, sized by the kernel's bit size.)

One answer is to install three things in /usr/local/sbin:
1) a 32 bit lsof as lsof32; 2) a 64 bit lsof as lsof64;
and 3) an lsof script. The script might look like this
one, based on work by Amir J. Katz:

```
#!/bin/sh
x=`/usr/bin/getconf KERNEL_BITS`  # returns 32 or 64
if /usr/bin/test "X$x" = "X32"
then
  lsof32 $*
else
  if /usr/bin/test "X$x" = "X64"
  then
lsof64 $*
```

```
      else
 echo "Can't determine which
lsof executable to use;"
 echo "getconf KERNEL_BITS says: $x"
 exit 1
      fi
    fi
```

Solaris users should consult "How do I install lsof for Solaris 7, 8 or 9?" for information on a similar trick using the Solaris isaexec command.

Users of other dialects might be able to use a command like uname(1) that can identify a distinguishing feature of the system to be incorporated in pre-installed lsof executable names. For example, use `uname -r` and install binaries with suffixes that match `uname -r` output.

3.34 Why do lsof 4.53 and above reject device cache files built by earlier lsof revisions?

When lsof revisions 4.53 run and encounter a device cache file built by an earlier revision, it will reject the file and build a new one. The rejection will be advertised with these messages:

```
    lsof: WARNING: no /dev device in <name>: 2 sections
    ...
    lsof: WARNING: created device cache file: <name>
```

This happens because the header line of the device cache file
was changed at revision 4.53 to contain the number of the device on which the device directory resides. The old device cache file header line -- the "2 sections" line in the above warning message, node reads "2 sections, dev=600".

This is not a serious problem, since lsof automatically rebuilds the device cache file with the correct header line.

3.35 What do "like block special" and "like character special" mean in the NAME column?

When lsof comes across an open block or character file whose device, raw device and inode place it somewhere other than /dev (or /devices), lsof doesn't report the /dev (or /devices) name in the NAME column. Instead lsof reports

the file system name and device or path name in the NAME
column and parenthetically adds "like block special <path>"
or "like character special <path>".

The value for <path> will point to a block or character
device in /dev (or /devices) whose raw device number matches
that of the open file being reported, but
whose device
number or node number (or both) don't match.

Such an open file is connected to a device node that has
been created in a directory other than /dev (or /devices.)
See mknod(8) for information on how such nodes are created.
(Generally one needs root power to create device nodes with
mknod.)

3.36 Why does an lsof make fail because of undefined symbols?

When lsof is compiled via the `make` step and the final
load step fails because of missing symbols, the problem
may not be lsof. The problem may be that ld, called by
the compiler as part of the `make` step, can't find some
library that lsof needs.

First check the last compiler line of the make operation
-- e.g., the last line with cc or gcc in it before the
undefined symbol report -- for loader arguments, i.e.,
ones beginning with "-l". Except for "-llsof" the rest
name system libraries. ("-L./lib" precedes "-llsof" to
tell the loader its location.)

Check that all the named system libraries exist. Look
in
/lib and /usr/lib as a start, but that may not be the only
place system libraries live. Consult your dialect's
documentation, e.g., the compiler and loader man pages,
for other possible locations.

If some system library doesn't exist, that may mean it was
never installed or was removed. You'll have to re-install
the missing library.

You may find that all the system libraries lsof uses exist.
Your next step might be to use nm and grep to see if any
of them contain the undefined symbols.

```
$ nm library | grep symbol
```

If the undefined symbol exists in some library named by the lsof make step, then you might have a problem with some environment variable that controls the load step. The most common is LD_LIBRARY_PATH. It may have a setting that causes ld to ignore a directory containing a library lsof names. If this is the case, try unsetting LD_LIBRARY_PATH in the environment of the ld process -- e.g., do:

```
   $ unset LD_LIBRARY_PATH
or
   % unsetenv
LD_LIBRARY_PATH
```

Consult your ld man page for other environment variables that might affect library searching -- e.g., LIBPATH, LPATH, SHLIB_PATH, etc.

If the undefined function doesn't exist in any libraries lsof names, check other libraries. See if the function has a man page that names its library. If the latter is true, please let me know, because that is an lsof problem I need to fix.

If none of these solutions work for you, send me some documentation via e-mail at <abe@purdue.edu>. Include `uname -a` output, the output of the lsof `Configure ...` and `make` steps, and the contents of the environment in force when the `make` step was executed -- e.g., `env` or `printenv` output. If you've located the libraries lsof names, send me that information, too. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

## 3.37 Command Regular Expressions (REs)

### 3.37.1 What are basic and extended regular expressions?

Lsof's ``-c'' option allows the specification of regular expressions (REs), enclosed in two slash ('/') characters and followed by these modifiers:

```
   b the RE is a basic RE.
   i ignore case.
   x the RE is an extended RE (the default).
```

Note: the characters of the regular expression may need to be quoted to prevent their expansion by the shell.

Example: this RE is an extended RE that matches exactly
four characters, whose third may be an upper ('O') or lower
case ('o') oh:

```
-c /^..o.$/i
```

For simplicity's sake, an RE that is acceptable to egrep(1)
is usually called an extended RE.

REs suitable for the old line editor, ed(1), are often
called basic REs (and sometimes also called obsolete).

These are some ways basic REs usually differ from extended
REs. (There are other differences.)

* `|', `+', `?', '{', and '}' are ordinary characters.

* `^' is an ordinary character except at the beginning of
the RE.

* `$' is an ordinary character except at the end
of the
RE.

* `*' is an ordinary character if it appears at the
beginning of the RE.

For more information on REs and the distinction between
basic and extended REs, consult your dialect's man pages
for ed(1), egrep(1), sed(1), and possibly regex(5) or
regex(7).

3.37.2 Why can't I put a slash in a command regular expression?

Since a UNIX command name is the last part of a path to
the command's executable, the lsof command regular expression
(RE) syntax uses slash ('/') to mark the beginning and end
of an RE. Slash may not appear in the RE and the `\'
back-slash escape is ineffective for "hiding" it.

More likely than not, if you try to put a slash in an lsof
command RE, you'll get this response:

```
$ lsof -s/.\// ...
lsof: invalid regexp modifier: /
```

Lsof is complaining the the first character it found after
the second slash isn't an lsof command RE modifier -- 'b',

'i', or 'x'.

### 3.37.3 Why does lsof say my command regular expression wasn't found?

When
you use both forms of lsof's -c option --
``-c <command>" and ``-c /RE/[m]" -- and ask that lsof
do a verbose search (``-V"), you may be surprised that
lsof will say that the regular expression wasn't found.

This can happen if the ``-c <command>" form matches first,
because then the ``-c/RE/[m]" test will never have been
applied. For example:

```
$ ./lsof -clsof -c/^..o.$/ -V -adcwd
COMMAND  PID USER   FD   TYPE DEVICE SIZE/OFF  NODE NAME
lsof    7850  abe  cwd   VDIR    6,0     2048 96442 / (/dev/sd0a)
lsof: no command found for regex: ^..o.$
```

The ``-clsof" option matched first, so the ``-c/^..o.$/
option wasn't tested.

## 3.38 Why doesn't lsof report on shared memory segments?

Lsof reports on shared memory segments only if they're
associated with an open file. That's consistent with lsof's
mission -- to LiSt Open Files. Shared memory segments with
no file associations aren't open files.

That's not to say that a report on shared memory segments
and
their associated processes wouldn't be useful. But it
calls for a new tool, not more baggage for lsof.

## 3.39 Why does lsof report two instances of itself?

When you ask lsof to report all open files and it has
permission to do so, you may see two lsof processes in the
output. The processes are connected via pipes -- e.g.,
here's an HP-UX 11 example.

```
COMMAND     PID USER   FD   TYPE     DEVICE ...
...
lsof      29450  abe    7w  PIPE 0x48732408 ...
lsof      29450  abe    8r  PIPE 0x48970808 ...
...
lsof      29451  abe    6r  PIPE 0x48732408 ...
lsof      29451  abe    9w  PIPE 0x48970808 ...
```

The first process will usually be the lsof you initiated;
the second, an lsof child process that is used to isolate
its parent process from kernel functions that can block --
e.g., readlink() or stat().

Information to and from the kernel functions is exchanged
via the two pipes. When the parent process detects that
the child process has
become blocked, it attempts to kill
the child. Depending on the UNIX dialect that may succeed
or fail, but the parent won't be blocked in any event.

See the "BLOCKS AND TIMEOUTS" and "AVOIDING KERNEL BLOCKS"
sections of the lsof man page for more information on why
the child process is used and how you can specify lsof
options to avoid it. (Caution: that may be risky.)

3.40 Why does lsof report '\n' in device cache file error messages?

Lsof revisions prior to 4.58 may report '\n' in error
messages it delivers about problems in the device cache
file -- e.g.,

```
lsof: WARNING: no ...: 4 sections\n
```

That's deliberately done to show the exact contents of the
device cache file line about which lsof is complaining,
including its terminating NL (New Line) '\n' character.
In the above example the line in the device cache file
causing the lsof complaint contains "4 sections" and ends
with a '\n'.

At revision 4.58 and above, device cache error messages
like the one in
the above example have been changed to
read:

```
lsof: WARNING: no ...: line "4 sections"
```

The terminal '\n' is no longer reported, the line contents
are enclosed in double quote marks ("'"), and the word
"line" has been added as a prefix to denote that what
follows is a line from the device cache file.

3.41 Kernel Symbol and Address Problems

3.41.1 What does "lsof: WARNING: name cache hash size length error: 0"

mean?

When run on some systems, lsof may issue this warning:

```
lsof: WARNING: name cache hash size length error: 0
```

That is an example from a FreeBSD system where lsof reads
the kernel's _nchash variable and finds its value is zero.

Similar warnings include:

```
WARNING: kernel name cache size:
WARNING: can't read kernel's name cache:
WARNING: no name cache address
WARNING: name cache hash size length error:
WARNING: unusable name cache size:
```

These warnings are issued when lsof is attempting to read
the kernel's name cache information.
They are usually the
result of a mis-match between the addresses for kernel
symbols lsof gets via nlist(2) and the addresses in use by
the kernel.

Lsof usually gets kernel symbol addresses from what it
believes to be the kernel boot file. In FreeBSD, for
example, that's the path returned by getbootfile(3), usually
/kernel. The boot file can have other names in other UNIX
dialects -- /unix, /vmunix, /bsd, /netbsd, /mach, /stand/vmunix,
etc.

Lsof will get incorrect (mismatched) addresses from the
boot file if it has been replaced by a newer one which
hasn't yet been booted -- e.g., if this is done in FreeBSD:

```
# mv /kernel /kernel.OLD
# mv /kernel.NEW /kernel
```

Until the FreeBSD system is rebooted, the booted kernel is
/kernel.OLD, but getbootfile() says it is /kernel. If
symbol addresses important to lsof in /kernel.OLD and
/kernel don't match, the lsof WARNING messages result.

### 3.41.2 Why does lsof produce "garbage" output?

Kernel name cache warnings
may not be the only sign that
lsof is using incorrect symbol addresses to read kernel

values.  If there's no reasonable test lsof can make on
what it reads from the kernel, it may issue other warnings
or even report nonsensical results.

The warnings may appear on STDERR, such as:

```
lsof: can't read proc table info
```

Or the warnings may appear in the NAME column as messages
saying lsof can't read or interpret some kernel structure --
e.g.,

```
... NAME
... can't read file struct from 0x12345
```

One possible work-around is to point lsof's kernel symbol
address gathering at the proper boot file.  That can be
done with lsof's -k option -- e.g.,

```
$ lsof -k /kernel.OLD
```

The best work-around is to make sure the standard boot file
is properly sited -- e.g., if you've moved a new /kernel
in place, boot it.

3.42  Why does lsof report open files when run as super user that
it doesn't report when run with lesser privileges?

The most likely cause is that the HASSECURITY
option was
selected when the lsof executable was built.

If HASSECURITY is defined when lsof is built, and lsof is
run with the privileges of a non-ROOT user, it will only
list open files belonging to the user.  The same lsof
executable, when run with root user privileges, will list
all open files.

However, if HASSECURITY and HASNOSOCKSECURITY are both
defined when lsof is built, lsof will list open files
belonging to the user and will also list anyone else's open
socket files, provided their listing is selected with the
"-i" option.

So first ask yourself if the process whose open files lsof
won't list belong to a user other than the one under which
you're running lsof, and are not open socket files.  If
either is true, use lsof's help (-h or -?) option and look

for a line near the bottom of the help panel that says:

"... can list all files..."

If the leading "..." says "Only root" then HASSECURITY was
defined when lsof was built. If the trailing "..."
says
", but anyone can list socket files" then HASNOSOCKSECURITY
was also defined.

Should you want an lsof not built with HASSECURITY defined,
rerun the lsof Configure script. If you let Configure do
customization, make sure you answer 'n' when it asks if
you want to enable HASSECURITY and HASNOSOCKSECURITY. If
you don't need to do customization, you can rebuild lsof
with the "-n" option to Configure. Here's an example of
such a rebuild sequence:

```
$ Configure -clean
$ Configure -n <dialect-abbreviation>
$ make
```

More information on the HASSECURITY and HASNOSOCKSECURITY
options may be found in the "Security" section of the
00README file of the lsof distribution.

3.43 Test Suite Problems

3.43.1 Errors all tests can report:

3.43.1.1 Why do tests complain "ERROR!!! can't execute ../lsof"?

All tests in the test suite expect an executable lsof file
to exist in the tests parent directory, ../lsof.

If there's none there, the tests/Makefile has a rule
to
make it, but there are probably circumstances where that
rule may fail.

The work-around is to re-Configure and re-make lsof, then
run the test suite.

3.43.1.2 Why do tests complain "ERROR!!! can't find ..." a file?

Many tests create (or use from a supplied environment
variable path) a test file and use lsof to find it. When
lsof can't file the file, the tests report the error with

messages of the form:

```
   ERROR!!!  can't find ... : <some file path>
 or
   ERROR!!!  lsof couldn't find ...
```

These type of error messages mean that the lsof field output delivered to the test didn't contain a file that the test could identify as the one it intended lsof to find. It might also mean that the process information -- command name, PID or parent PID -- didn't match what the test expected.

This could imply a bug in the test or a bug in lsof. Try using lsof to find a known file that is open. For example, while in the tests sub-directory, do this:

```
   $ sleep 30 <
Makefile
   $ ../lsof Makefile
```

If lsof doesn't report that Makefile is open, then the fault may be with lsof. If lsof reports the file is open, search further in the test code for the failure cause.

3.43.1.3 Why do some tests fail to compile?

If a test suite program fails to compile, it may be because I've never had an opportunity to compile the test on the particular UNIX version you are using.

See Appendix B in 00TEST for a list of the UNIX dialects where the test suite has been validate.

3.43.1.4 Why do some tests always fail?

There are several tests in the optional group that have conflicting or special requirements:

LTbigf needs a dialect and file system that support large files.

LTlock won't work if the tests/ sub-directory is on an NFS file system.

LTnfs won't work if the tests/ sub-directory is not on an NFS file system.

So for two tests in particular, LTlock and LTnfs, one will
generally fail.

Some failing tests
can be run successfully by supplying to
them a path to the appropriate type of file system with
the -p option.

3.43.1.5 Why does the test suite say it hasn't been validated on
my dialect?

When you use the default rule of the test suite's Makefile,
it may issue this complaint:

```
$ cd tests
$ make
!!!WARNING!!!

This dialect or its particular version may not have
been validated with the lsof test suite.  Consequently
some tests may fail or may not even compile.

!!!WARNING!!!
```

You are then given the opportunity to answer 'y' to have
the test suite operation continue.

This message means that the tests/TestDB file in the tests
sub-directory doesn't show that the test suite has been
run with the combination of compiler flags found in
tests/config.cflags.  The tests might nor run; they may
encounter compiler failures.

See 00TEST for more information on the UNIX dialects where
the test suite has been validated and on the workings of
TestDB
and its supporting scripts.

When the tests/Makefile "auto" rule is used, the message
is more terse and the condition is fatal.

```
This suite has not been validated on:

<dialect_description>
```

No opportunity to continue is offered.

The tests/Makefile "silent" rule will skip checking for

the validation footprint.

3.43.1.6 Why do the tests complain they can't stat() or open() /dev/mem or /dev/kmem?

When the tests detect that lsof for the dialect reads its information from kernel memory (i.e., the LT_KMEM definition is present in tests/config.cflags), and when the lsof executable path is ../lsof, the tests make sure they can stat() and open() for read access the relevant kernel memory devices, /dev/kmem and possibly /dev/mem.

If those stat() or open() operations fail, the tests issue an error message and quit. The message explains why the system rejected the operation in terms of system "errno" symbols and messages. More often than not the explanation will
be that the process lacks permission to access the indicated device node.

One work-around is to give the lsof executable being tested the necessary permission -- e.g., via chgrp, chmod, etc. -- and set its path in the LT_LSOF_PATH environment variable. (See 00TEST.)

Another work-around is to make sure the process that runs the tests has the necessary permissions -- e.g., run it as root, or enable the process login to access the resources. For example, I can run the tests on my personal work-station because /dev/kmem and /dev/mem are readable by the "kmem" group and my login is in that group.

3.43.2 LTbigf test issues

3.43.2.1 Why does the LTbigf test say that the dialect doesn't support large files?

Large file support is defined dialect by dialect in the lsof source files and Configure script. If large file support isn't defined there, it isn't defined in the LTbigf test.

If you think that's wrong for a particular dialect, contact me via e-mail at <abe@purdue.edu>. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

3.43.2.2 Why does LTbigf complain about operations on its config.LTbigf* file?

The LTbigf must be able to write a large file test (size > 32 bits) and seek within it and the process file ulimit size must permit the operation. If the default location for the test file, tests/, isn't on a file system enabled for large file operations or if the process ulimit file block size is too small, lsof will get file operation errors, particularly when seeking

There may be a work-around. Specify the path to a file LTbigf can write in a file system enabled for large file operations a the -poption. Make sure that the ulimit file block size permits writing a large file. For example, presuming /scratch23 is large-file-enabled, and presuming you have permission to raise the ulimit file block size, this shell commands will allow the LTbigf test to run on AIX:

```
$
./LTbigf -p /scratch23/abe/bigfile
```

(Note: syntax for the ulimit command varies by dialect and by shell. Discovering the proper variant is left to the reader.)

More information on this subject can be found in the LTbigf description in the 00TEST file. If course, the LTbigf.c source file in tests/ is the ultimate source of information,

3.43.2.3 Why does LTbigf warn that lsof doesn't return file offsets?

On some dialects (e.g., Linux) lsof can't report file offsets, because the data access method underlying lsof doesn't provide them. If LTbigf knows that lsof can't report file offsets for the dialect, it issues this warning:

```
LTbigf ... WARNING!!! lsof can't return file offsets
for this dialect, so offset tests have
been disabled.
```

LTbigf then performs the size test and skips the offset tests.

For more information see 00TEST and the "Why doesn't /proc-based lsof report file offsets (positions)?" Q&A of

this file.

3.43.3 Why does the LTbasic test complain
"ERROR!!! lsof this ..."
and "ERROR!!!  lsof that ..."?

The LTbasic test program uses lsof to examine a running
lsof process.  It looks for the lsof current working
directory, executable (if possible), and kernel memory file
(if applicable).

Failures to find those things result in the LTbasic error
messages.  More information on how LTbasic produces the error
messages may be found in the LTbasic.c source file.

On HP-UX 11.11 and higher, for example, if the test's current
working directory is on a loopback (LOFS) file system, LTbasic
won't be able to find the current working directory of the lsof
process because of a bug in the HP-UX kernel.

The solution for that HP-UX problem is to install an HP-UX
patch.  See the answer to the "Why doesn't PSTAT-based lsof
report a CWD that is on a loopback (LOFS) file system?"
question for more information on the patch.

3.43.4 NFS test issues

3.43.4.1 Why does the LTnfs test complain "couldn't find NFS file ..."?

The LTnfs
test must work with an NFS test file.  After it
opens the file it asks lsof to find it on an NFS file system.
If the file isn't on an NFS file system, lsof won't find it,
and the NFS test script complains and fails.

The work-around is to use -p option to supply a path to a
regular NFS file (not a directory)  that is on an NFS file
system that LTnfs can read.  Presuming /share/bin/file is
such a file and can be opened for reading by the LTnfs
test, this sample shell command could be used to run the
LTnfs test successfully:

```
$ ./LTnfs -p /share/bin/file
```

(If the NFS file system is enabled for large files, the
NFS test will produce the error message described in the
following Q&A.)

### 3.43.5 LTnlink test issues

#### 3.43.5.1 Why does the LTnlink test complain that its test file is on an NFS file system?

The LTnlink test may complain:

```
LTnlink ... WARNING!!!  test file <path> is NFS mounted.
```

and then issue an explanation and a hint about using the -p option.

The LTnlist test does this because of the way NFS file links are managed when an NFS file is unlinked and the unlinking process still has the file open. Unlike with files on a local file system, when an NFS file that is still open is unlinked, its link count is not reduced.

The file name is changed to a name of the form .nfsxxxx and the link count is left unchanged until the process holding the file open closes it. That's done by NFS so it can keep proper track of the file on NFS clients and servers.

Since the link count isn't reduced when the LTnlink test program closes the NFS test file it still has open, lsof won't find it for LTnlink with a link count of zero. Consequently, LTnlink disables that test section and issues its warning.

The warning suggests that the unlink test section can be run by giving LTnlink a path to a test file with the -p option. That path must name a file LTnlink can write and unlink. Presuming /scratch23/abe/nlinkfile is on a local file system and the LTnlink test can write to it and unlink it, this sample shell command can be used to run the complete LTnlink test successfully:

```
$ LTnlink -p /scratch23/abe/nlinkfile
```

#### 3.43.5.2 Why does LTnlink delay and report "waiting for link count update: ..."?

On some UNIX dialects and file system combinations the updating of link count after a file has been unlinked can be delayed. Consequently, lsof won't be able to report the updated link count to LTnlink for a while.

When lsof doesn't report the proper link count to LTnlink, it sleeps and repeats the lsof call, using the "waiting for link count update: ..." message as a signal that it is waiting for the expected lsof response. The wait cycle duration is limited to approximately one minute.

3.43.5.3 Why does LTnlink fail because of an unlink error?

LTnlink may fail with an error similar to:

```
LTnlink ... ERROR!! unlink(<name>) failed: (Permission denied).
```

That message will be followed by a short explanation.

The error means that the kernel support for the file system on which the file <name> resides does not allow a process to unlink a file while it has the file open. (When LTnlink is run without the "-p path" option, it creates a <name> that begins with "./config.LTnlink" and ends with the LTnlink process ID number.)

An unlink failure of this type runs counter to original UNIX file system behavior, but it has been observed on some file system types, especially on the ZFS file system.

The work-around is to run LTnlink on a file system that allows a process to unlink a file it has open. Usually /tmp has that support. So, try running LTnlink this way:

```
$ ./LTnlink -p /tmp/<name>
```

where <name> is a unique name in /tmp of your choosing. To be safe, create a subdirectory in /tmp, named by your login:

```
$ rm -f /tmp/<login>
$ mkdir /tmp/<login>
$ ./LTnlink -p /tmp/<login>/<name>
```

3.43.6 LTdnlc test issues

3.43.6.1 Why won't the LTdnlc test run?

Lsof is unable to access the DNLC cache on AIX, because the kernel symbols for the DNLC aren't exported. Contact IBM to learn why that decision was made.

The LTdnlc test won't work on Apple Darwin because lsof can't obtain reliable DNLC information.

The LTdnlc test may fail on other dialects. Failure causes include: a busy system with a DNLC that is changing rapidly; path name components too large for the DNLC; a file system -- e.g., NFS, /tmp, loopback -- which doesn't fully participate in the DNLC; or DNLC limitations (Many DNLC implementations will only store path name components if they are 31 characters or less.)

If you suspect the file system doesn't fully participate in kernel DNLC processing, as a work-around rebuild and test lsof on one that does.

3.43.6.2 What does the LTdnlc test mean by "... <path> found: 100.00%"?

Even when it succeeds the LTdnlc test will report:

```
LTdnlc ... /export/home/abe/src/lsof4/tests found: 100.00%
```

This message means that the LTdnlc test asked lsof to find the file at the indicated path five times and lsof found the full path name in the indicated percentage of calls. The LTdnlc test considers it a failure if the percentage falls below 50.0%

3.43.6.3 Why does the DNLC test fail?

The DNLC test may fail when some component of the lsof tests/ sub-directory can't be cached by the kernel DNLC. Some kernels have a limit on the length of individual components (typically) 32.

3.43.7 Why hasn't the test suite been qualified for 64 bit HP-UX 11 when lsof is compiled with gcc?

When I attempted to qualify lsof for HP-UX 11, compiled with gcc 3.0, the LTsock test failed. I traced the failure to a gcc compilation error. Because LTsock is an important test, I didn't feel that the test suite was qualified if it failed.

LTsock compiles and runs correctly on 64 bit HP-UX 11 when compiled with HP's ANSI-C.

3.43.8 LTszoff test issues

3.43.8.1 Why does LTszoff warn that lsof doesn't return file offsets?

On
some dialects (e.g., Linux) lsof can't report file
offsets, because the data access method underlying lsof
doesn't provide them. If LTszoff knows that lsof can't
report file offsets for the dialect, it issues this warning:

```
LTszoff ... WARNING!!!  lsof can't return file offsets
for this dialect, so offset tests have
been disabled.
```

LTszoff then performs the size test and skips the offset
tests.

For more information see 00TEST and the "Why doesn't
/proc-based lsof report file offsets (positions)?" Q&A of
this file.

3.43.9 LTlock test issues

3.44 File descriptor list (the ``-d'' option) problems

3.44.1 Why does lsof reject a ``-d'' FD list?

Lsof rejects ``-d'' FD lists that contain both exclusions
and inclusions with messages like:

```
lsof: exclude in an include list: ^1
lsof: include in an exclude list: 2
```

That's because ``-d'' FD lists are processed as ORed lists,
so it makes no sense for them to contain both exclusions
and inclusions.

I.e.,,
if a ``-d'' FD list were to contain ``^cwd,1'', the
``^cwd'' member is useless, because the ``1'' member
dominates by saying "include only FD 1". That effectively
excludes ``cwd'' FD.

Note that lists may have multiple members of the same type,
exclude or include. They are processed as an ORed set.
If an FD isn't excluded by any member of an exclude list,
it is selected. If an FD is included by any member of an
include list, it is selected.

3.44.2 Why are file descriptors other than those in my FD list reported?

The FD list that follows ``-d'' excludes or includes file descriptors, but unless the ``-a'' (AND) option is specified, the FD list selections are ORed to the other selections.

For example, the following lsof command will cause all file descriptors to be listed for the lsof command, and all but the cwd descriptor for all other commands, probably not what was intended.

```
$ lsof -clsof -d^cwd
```

Hint: use ``-a'' -- e.g.,

```
$ lsof -clsof
-a -d^cwd
```

3.45 How can I supply device numbers for inaccessible NFS file systems?

When lsof can't get device numbers for inaccessible NFS file systems via stat(2) or lstat(2), it attempts to get them from the mount table's dev=xxx options. Successes are reported with a warning message that indicates the source of the device number and that output might be incomplete as a consequence of the warnings.

Some system mount tables -- e.g., Linux /proc/mounts -- don't have a dev=xxx option. In that case, and provided lsof for the dialect supports them, you can use the +m option to create a mount table supplement file and the "+m m" option to use it.

First check the lsof -h (help) output to see if the +m and "+m m" options are supported. If they are, use +m to create a mount table supplement file when all mounted file systems are accessible. Use "+m m" later to make the supplement available when some mounted file systems might not be available.

Here's an example that
creates a mount supplement file in
$HOME/mnt-sup and later makes it available to lsof.

```
$ rm -f $HOME/mnt-sup
$ lsof +m > $HOME/mnt-sup
...
```

```
$ lsof +m $HOME/mnt-sup <other lsof options>
```

If lsof has to get the device number from the supplement, it will issue an informative warning message. The warning can be suppressed with lsof's -w option.

Caution! Since the mount table supplement file is static, it is its supplier's responsibility to update it as file system mounts change.

For more information, consult the lsof man page. The "ALTERNATE DEVICE NUMBERS" section has useful information on how lsof acquires device numbers when stat(2) or lstat(2) fail.

3.46 Why won't lsof find open files on over-mounted file systems?

When a file system, /xyz for example, is mounted on the same mount point as another file system, /abc for example, running lsof with an argument of the path of the first file system's mount point -- the over-mounted one, /abc -- probably will not
reveal any files open on /abc.

That's because lsof looks for open files on a file system by looking for files with the file system's device number. The two file systems usually have different device numbers and lsof determines the device number search key from the supplied name of the second file system.

A general work-around exists only for Linux. On that UNIX dialect, when you know the over-mounted file system's mount point path, you can ask lsof to report on all open files and grep that output for the path of the over-mounted file system mount point.

3.47 What can be done when lsof reports no more space?

Many lsof methods cache information in memory, using the dialects malloc() library function. When malloc() can't allocate the requested amount of memory, lsof exits with warning messages similar to this AIX message:

```
lsof: no more dev-ch space at pid 2257750: 0x82a8e600
```

Lsof then exits immediately and produces no more output.

A possible work-around

is to increase the memory foot print
of the shell that runs lsof. That is often done with the
ulimit(1) shell command.

3.48 What if the lsof build encounters ar and ld problems?

The lsof main and library Makefiles use the library archiver,
ar, and the system loader, ld, applications. Improperly
located, installed or configured versions of them may cause the
lsof build to encounter errors with them.

The application producing the error should identify itself in
its error messages.

The first thing to check the path of the application that is
being used. Try `which ar` or `which ld` to see if perhaps the
PATH used during the build might be causing the wrong archiver
or loader to be used.

If the problem is with the use of the wrong archiver, and it's
not possible to correct the PATH to it, try using the LSOF_AR
environment variable to specify the path to and arguments for
the correct archiver. See 00XCONFIG for more information and
note that LSOF_AR must
specify the path to the archive
application and the arguments for it, less the terminating
library and module name arguments.

If the problem is with the loader, there is no lsof work-
around. That's because lsof calls the loader via the C
compiler, so the problem must be fixed at the compiler (system)
level.

3.49 Why does lsof -i report an open socket file for a process, but
lsof -p on that process' ID report nothing?

The lsof in use was probably built with the HASSECURITY and
HASNOSOCKSECURITY options and the process in question does not
belong to the user of lsof.

The HASSECURITY option limits lsof output to processes owned
by the user invoking lsof and the HASNOSOCKSECURITY option
weakens that slightly to allow output of open socket file
information for all processes.

For example, if process PID 12345 is owned by some user other
than the one invoking lsof, and lsof has been compiled with the
HASSECURITY and HASNOSOCKSECURITY options, the following lsof

command
will display the open socket files of process 12345:

```
$ lsof -p 12345 -a -i
```

This security restriction is described in the lsof(8) manual page.

## 4.0 AIX Problems

### 4.1 What is the Stale Segment ID bug and why is -X needed?

Kevin Ruderman reports that he has been informed by IBM that processes using the AIX 3.2.x, 4.1[.12345]], 4.2[.1], and 4.3.x kernel's readx() function can cause other AIX processes to hang because of what appears to be file system corruption.

This failure, known as the Stale Segment ID bug, is caused by an error in the AIX kernel's journaled segment memory handler that causes the kernel's dir_search() function erroneously to believe directory entries contain zeroes. The process using the readx() call need not be doing anything wrong. Usually the system must be under such heavy load that the segment ID being used in the readx() call has been freed and then reallocated to another process since it was obtained from kernel memory.

Lsof uses the readx() function to access library entry structures, based on the segment ID it finds in the proc structure of a process. Since IBM probably will never fix the kernel bug, I've added an AIX-specific option to lsof that controls its use of the readx() function.

By default lsof readx() use is disabled; specifying the ``-X'' option enables readx() use.

If you want to change the default readx() behavior of AIX lsof, change the HASXOPT, HASXOPT_ROOT, and HASXOPT_VALUE definitions in dialects/aix/machine.h. You can also use these definitions to enable or disable readx() -- consult the comments in machine.h. You may want to disable readx() use permanently if you plan to make lsof publicly executable.

When HASXOPT_ROOT is defined, lsof will restrict use of the -X option to processes whose real UID is root; if

HASXOPT_ROOT isn't defined, any user may specify the -X
option. The Customize script offers the option to change
HASXOPT_ROOT when HASXOPT is defined and HASXOPT_ROOT
is
named in any dialect's machine.h header file.

I have never seen lsof cause a problem with its use of
readx(), but I believe there is some chance it could, given
the right circumstances.

4.1.1 Stale Segment ID APAR

Here are the details of the Stale Segment ID bug and IBM's
response, provided by Kevin Ruderman.

```
AIX V3
  APAR=ix49183
      user process hangs forever in kernel due to file
      system corruption
  STAT=closed prs  TID=tx2527 ISEV=2 SEV=2
       (A "closed prs" is one closed with a Permanent
       ReStriction.)
  RCOMP=575603001 aix v3 for rs/6 RREL=r320

AIX V4  (internal defect, no apar #)
  prefix       p
  name         175671
  abstract     KERMP: loop for ever in dir_search()
```

Problem description:

1. Some user application -- e.g., lsof -- gets the segment
   ID (SID) for the process private segment of a target
   process from the process table.

2. The target process exits, deleting the process private
   segment.

3. The SID is
reallocated for use as a persistent segment.

4. The user application runs again and tries to read the
   user area structure from /dev/mem, using the SID it read
   from the process table.

5. The loads done by the driver for /dev/mem cause faults
   in the directory; new blocks are allocated; the size
   changed; and zero pages created.

6. The next application that looks for a file in the affected directory hangs in the kernel's dir_search() function because of the zero pages. This occurs because the kernel's dir_search() function loops through the variable length entries one at a time, moving from one to the next by adding the length of the current entry to its address to get the address of the next entry. This process should end when the current pointer passes the end of the known directory length.

However, while the directory length has increased, the entry length data has not, so when dir_search() reaches the zero pages, it
loops forever, adding a length of
zero to the current pointer, never passing the end of the directory length. The application process is hung; it can't be killed or stopped.

IBM closed the problem with a PRS code (Permanent ReStriction) under AIX Version 3 and had targeted a fix for AIX 4.2. They have recently (I became aware of it September 10, 1996) cancelled the defect report altogether and have indicated they are not going to fix the defect.

4.2 Gcc Work-around for AIX 4.1x

When gcc is used to compile lsof for AIX 4.1x, it doesn't align one element of the user structure correctly. Xlc sees the U_irss element as a type "long long" and aligns it on an 8 byte boundary. That's because the default mode of xlc is -qlonglong; when -qlonglong is enabled, the _LONG_LONG symbol is also defined.

Gcc sees U_irss as a two element array of type long, because _LONG_LONG isn't defined. Hence gcc aligns the U_irss element array on a 4 byte boundary, rather than an
8 byte
one, making the gcc incantation of the user structure 4 bytes shorter than xlc's.

When the length of gcc's user structure is supplied as argument 4 to the undocumented getuser() function of the AIX kernel, getuser() rejects it as an incorrect size and returns EINVAL.

Lsof has a work-around for this problem. It involves a special test in the Configure script when the "aixgcc"

Configure abbreviation is used -- e.g.,

```
$ Configure -n aixgcc
```

The test is to compile a small program with gcc and check the alignment of U_irss. If it's not aligned on an 8 byte boundary, the Configure script makes a special copy of <sys/user.h> in ./dialects/aix/aix<AIX_version> whose U_irss will align properly, and generates compile time options to use it.

While I have tested this work-around only with 4.1.4, it should work with earlier versions of AIX 4.1. It does not work for AIX 4.2; a different work-around is employed there. (See the next section.)

If you want to use this technique to compile other AIX 4.1x programs with gcc for using getuser(), check the Configure script.

Stuart D. Gathman identified this gcc AIX alignment problem.

4.3 Gcc and AIX 4.2[.1]

Alignment problems with gcc and AIX 4.2[.1] inside the user structure are more severe, because there are some new 64 bit types in AIX that gcc doesn't yet (as of 2.7.x) support. The <sys/user.h> U_irss element problem, discussed in 4.3 above, doesn't exist in 4.2[.1].

The AIX lsof machine.h header file has a work-around, provided by Henry Grebler, that bypasses gcc alignment problems. Later versions of gcc (e.g., 2.8.x) will probably bypass the problems as well.

4.4 Why won't lsof's Configure allow the use of gcc for AIX below 4.1?

Gcc can't reliably be used to compile lsof for AIX versions below AIX 4.1 because of possible kernel structure element alignment differences between it and xlc.

4.5 What is an AIX SMT file type?

When you run AIX X clients with the DISPLAY environment variable

set to ``:0.0'' they communicate with the AIX X
server via files whose kernel file structure has an undefined
type (f_type == 0xf) -- at least there's no definition for
it in <sys/file.h>.

These are Shared Memory Transport (SMT) sockets, an artifact
of AIXWindows, designed for more efficient data transfers
between the X server and its clients.

Henry Grebler and David J. Wilson alerted me to the existence
of these files. Mike Feldman and others helped me identify
them as SMT sockets.

The curious reader can find more about SMT sockets in
/usr/lpp/X11/README.SMT.

4.6 Why does AIX lsof start so slowly?

When AIX lsof starts it compares the running kernel's
identity to the one for which it was built, using
/usr/bin/oslevel. That comparison can sometimes take a
long time to complete, depending on the system's maintenance
level and how recently it was examined with oslevel.

AIX revisions 4.67 and above for AIX 5 and above don't use
oslevel to determine
the kernel identity. They use uname(2)
instead, and it is much faster.

You can skip the oslevel test by suppressing warning messages
with lsof's -w option. Doing that carries with it the risk
of missing other warning messages, however.

You can also disable the kernel identity check by disabling
the definition of the HASKERNIDCK symbol by editing AIX
machine.h header file or by using the Customize script to
disable it.

See the "Why does lsof warn "compiled for x ... y; this is
z.?" section for more information.

4.7 Why does exec complain it can't find libc.a[shr.o]?

When you try to execute lsof you may get this complaint:

```
exec(): 0509-036 Cannot load program ./lsof because of
    the following errors:
 0509-022 Cannot load library libc.a[shr.o].
```

0509-026 System error: A file or directory in
the path name does not exist.

This is probably the result of making lsof when the LIBPATH environment variable contained a directory path that doesn't contain
libc.a. You can see what LIBPATH contained when lsof was made by using the dump application on lsof. For example, if LIBPATH contained /foo/bar when lsof was made, you will see this (partial) dump output:

```
$ dump -H lsof
...
***Import File Strings***
INDEX  PATH                    BASE        ...
0      /foo/bar
```

To correct the problem, revisit the lsof source directory and remake lsof this way:

```
$ unset LIBPATH; make  (sh or ksh)
```

or

```
% unsetenv LIBPATH; make  (csh or tcsh)
```

4.8 What does lsof mean when it says, "no PCB, CANTSENDMORE, CANTRCVMORE" in a socket file's NAME column?

When an AIX application calls shutdown(2) on an open socket file, but hasn't called close(2) on the file, the file will remain visible to lsof as an open socket file without any extended protocol information.

Lsof reports that state in the NAME column by saying that there is "no PCB" (Protocol Control Block) for the protocol (e.g., TCP in the NODE
column). If the open socket file
has the state variables SO_CANTSENDMORE and SO_CANTRCVMORE set -- i.e., from the shutdown(2) call -- lsof reports them with the CANTSENDMORE and CANTRCVMORE notes in the NAME column.

4.9 When the -X option is used on AIX 4.3.3, why does lsof disable it, saying "WARNING: user struct mismatch; -X option disabled?"

The -X option causes lsof to read the loader information of the user structure from virtual memory via the readx() system call. It does that with the user structure definition from <sys/user.h> that was compiled into the lsof executable.

On AIX 4.3.3 there are two different user structure definitions in two separate <sys/user.h> header files, distributed at different times by IBM. If lsof was compiled with one and the kernel on which lsof is being run was compiled with the other, lsof normally won't get correct loader information when it calls readx().

In an attempt to compensate for that difference, lsof makes an independent
check of the loader information by getting
the user structure's open file count via readx() and comparing it to the open file count obtained independently via getprocs(). When the two counts don't match, lsof tries to read the count (and re-read the loader information) with two offsets, based on observed differences between the two user structures.

When one of the three attempts produces a correct open file count, lsof uses its corresponding offset on subsequent readings of the loader information.

When none of the three attempts produces a correct open file count, lsof issues the WARNING message and disables -X processing.

To eliminate this problem, obtain an lsof binary that matches the kernel of the AIX 4.3.3 system where you want to run lsof. Compiling lsof on the target system is the preferred way to get a matching binary.

4.10 Why doesn't the -X option work on my AIX 5L or 5.[123] system?

If your AIX 5L or 5.[123] system uses the ia64 architecture, lsof
needs setuid-root permission to be able to do the processing that -X requires.

Check the output of `uname -a` to determine the architecture type.

The work-around is to give lsof setuid-root permission.

4.11 Why doesn't /usr/bin/oslevel report the correct AIX version?

The oslevel man page says, "The oslevel command reports the level of the operating system using a subset of all filesets installed on your system."

You can see which fileset is below the expected level with
oslevel's -l option. For example, if you believe your
system is at AIX level 4.3.3, but oslevel reports 4.3.2,
use this oslevel command to find the filesets below 4.3.3:

```
$ /usr/bin/oslevel -l 4.3.3.0
```

If you don't know what level argument to supply to oslevel's
-l option, use oslevel's -q option first.

4.11.1 Why doesn't /usr/bin/oslevel report the correct AIX version
on AIX 5.1?

The subset list for oslevel on AIX 5.1 seems to include at
least two filesets, xlsmp.msg.en_US.rte and xlsmp.rte,
that
do not install from AIX 5.1 media with a 5.1.0.0 level.
Hence, oslevel reports 5.0.0.0 instead of the expected
5.1.0.0.

If either xlsmp.msg.en_US.rte or xlsmp.rte is installed,
lsof's Configure script and run-time tests will identify
the AIX version incorrectly. The run-time test will
issue a complaint message of this form:

```
lsof: WARNING: compiled for AIX version xxx; this is yyy.
```

You can correct the Configure test by pre-defining the
oslevel value, setting the correct value in the LSOF_VSTR
environment variable before running the Configure script
-- e.g., to pre-define AIX 5.1 when using ksh, do this:

```
$ LSOF_VSTR=5.1.0.0 Configure -n aix
```

You can't affect oslevel output without uninstalling
xlsmp.msg.en_US.rte and xlsmp.rte. If you can't do that,
you'll have to put up with the run-time complaint.

4.12 Why does lsof for AIX 5.1 or above Power architecture
complain about kernel bit size?

When you run an lsof binary on an AIX 5.1 or above Power
system,
it might complain:

```
lsof: FATAL: compiled for a 32 bit kernel.
The bit size of this kernel is 64.
```

or

```
exec: 0509-036 Cannot load program ./lsof because of
 the following errors:
     0509-032 Cannot run a 64-bit program on a 32-bit
 machine.
```

Starting at lsof revision 4.61, lsof binaries for Power architecture systems running AIX 5.1 or above are closely tied to the kernel bit size. Lsof must do that so it can read and understand kernel structures.

Lsof's Configure script tunes the lsof configuration so that the binary built in the make(1) step is adjusted to the kernel bit size.

An lsof binary knows the bit size for which it was constructed, tests the bit size of the kernel under which it is running, and objects if the two sizes don't match. To see the bit size for which lsof was constructed, run it with its -v option and look for these lines in the output:

```
   configuration info: 32 bit kernel
 or
   configuration info:
64 bit kernel
```

(Note: these lines will appear only in -v output for AIX 5.1 and above lsof binaries, built for Power architecture.)

You can see the kernel bit size test method in the aix stanza of the lsof Configure script and in the get_kernel_access() function of the lsof .../dialects/aix/dproc.c source file.

There is more information on pre-defining the kernel bit size when building lsof in Configure, 00PORTING, and 00XCONFIG.

The only work-around is to use an lsof binary built to match the running kernel bit size.

4.13 What can't gcc be used to compile lsof on the ia64 architecture for AIX 5 and above?

Gcc can't be used to compile lsof on the ia64 architecture for AIX 5 and above because I haven't had access to a system that has a working gcc compiler. The gcc compiler on my one and only ia64 AIX 5.1 test system, provided by IBM, didn't work at all.

4.14 Why does lsof get a segmentation fault when compiled with gcc for a 64 bit Power architecture AIX 5.1 kernel?

When lsof is configured with the lsof "aixgcc" Configure abbreviation, the resulting lsof executable may cause a segmentation violation when it is run. I've observed this with gcc version 2.9-aix43-010414-7.

As far as I have been able to tell, the segmentation fault is the result of a gcc compilation, loading, or library error. Watching lsof run with gcc's companion debugger, gdb, shows no error in the lsof source code that might explain the fault.

The only work-around I know is to use the IBM C compiler in place of gcc -- i.e., use the "aix" lsof Configure abbreviation.

4.15 Why does lsof ignore AFS on my AIX system?

The lsof Configure script quits on AIX when AFS is present, the AIX version is greater than 4.3.3.0 or the AFS version is greater than 3.5. That's because I have no test systems available for those AIX and AFS version combinations.

When the lsof Configure script detects an AIX and AFS version combination that is unsupported, it will report:

```
!!!FATAL: Lsof does not support AFS on this combination of
    AIX and AFS versions.  To disable AFS, set the
    value of the AIX_HAS_AFS environment variable to
    "no".
```

The only work-around is to set the AIX_HAS_AFS environment variable as explained in the error message:

```
$ AIX_HAS_NSF=no; export AIX_HAS_NFS
$ ./Configure -n aix
```

4.16 Why does lsof report "system paging space is low" and exit?

When AIX paging space runs low, the AIX kernel sends a SIGDANGER signal to processes, warning them that they should reduce their memory usage.

When lsof receives that signal, it issues the following fatal error message and exits:

```
lsof: FATAL: system paging space is low.
```

A possible work-around is to limit the amount of information lsof must cache in its process memory with the "-c", "-g", "-l" and "-p" options.

Also see the answer to the "What can be done when lsof reports no more space?" question.

### 4.17 Why does lsof have a compilation problem on AIX 5.3 above maintenance level 1?

On some AIX 5.3 systems with maintenance levels 2 and higher installed, lsof 4.77 and below may not compile properly. The compiler complains the snapshotObject structure definition, needed by <j2/j2_inode.h>, is missing.

That problem is fixed in the 4.78 revision.

## 5.0 Apple Darwin Problems

### 5.1 What do /dev/kmem-based and libproc-based mean?

Lsof for Apple Darwin currently uses /dev/kmem to read kernel data structures from which it gathers and reports open file information. That version of lsof is called /dev/kmem-based lsof.

At an upcoming release lsof will use a library called libproc to obtain information about open files. That version of lsof wil be called libproc-based lsof.

The /dev/kmem-based lsof sources may be found in the kmem subdirectory of the dialects/darwin branch of the lsof source tree. When the supporting version of Apple Darwin is released, the libproc-based lsof sources will be found in .../dialects/darwin/libproc.

### 5.2 /dev/kmem-based Apple Darwin Questions

#### 5.2.1 Why does Configure ask for a path to the Darwin XNU kernel header files?

When lsof was ported to Apple Darwin by Allan Nathanson at
revision 4.53, some kernel header files needed by lsof
weren't being exported by the developers. (That's still
true at lsof revision 4.76.)

At first a shell script that Allan provided would get the
missing header files by checking them out from the CVS
root. Although the script was updated from time to time,
eventually the re-organization of Darwin sources has made
it impossible to update the script to do an automatic
download of the missing header files.

At lsof revision 4.69 and above it is necessary for the Darwin
lsof builder to download the Darwin XNU kernel headers before
attempting to build lsof. The download my be done via a web
browser, starting at this URL:

    http://www.opensource.apple.com/darwinsource/index.html

Once there, select the link to the Mac OS
X version that
matches the one on the system where lsof is to be built.

Follow that link's "[ Source ]" link. Once there, select the
tar.gz link of the xnu* entry near the bottom of the page.
That entry should have a name that matches the xnu* name shown
by `uname -a` -- e.g., if uname reports:

```
$ uname -a
... root:xnu/xnu-517.7.21 ...
```

Then the appropriate xnu* entry is xnu-517.7.21. Clicking
its link should lead to an "Apple Open Source" page requesting
an Apple ID and password.

Enter them if they're available. If an Apple ID and password
are not available, get them by following the instructions on
the page -- i.e., follow the signin.apple.com link.

Once a valid Apple ID and its password have been entered,
the download will begin. Select the saving of the downloaded
xnu*.tar.gz file in an appropriate place on the Mac OS X
system.

Once the download completes, install it. Use gunzip to
decompress the download and tar to extract the archive -- e.g.,

```
$ gunzip -c xnu-517.7.21.tar.gz | tar xf -
```

Remember the absolute path to the extracted archive. That is its installed place. E.g., if the xnu-517.7.21.tar archive was extracted to the lsof builder's home directory, its full installation path will be something like:

```
~/xnu-517.7.21
```

Now run the lsof Configure script. When it asks for the path to the installed Darwin XNU kernel header files, supply the path to the gunzip'd and extracted xnu* archive -- e.g., ~/xnu-517.7.21.

The path to the Darwin XNU kernel headers may also be supplied to the Configure script in the DARWIN_XNUDIR environment variable, eliminating the need to enter it interactively -- e.g.,

```
$ DARWIN_XNUDIR=~/xnu-344.49 ./Configure -n darwin
```

5.2.1.1 Why does Configure complain that Darwin XNU kernel header files are missing?

These are some reasons why the lsof Configure script might claim that Darwin XNU header files are missing:

* The wrong path to them was specified.

* The files and directories in the path are not readable and searchable -- i.e., check the modes and ownerships.

* The downloaded archive doesn't match the Mac OS X version of the system.

If in doubt, revisit the Darwin XNU kernel header file download instructions in the answer to the question "Why does Configure ask for a path to the Darwin XNU kernel header files?"

If Configure still can't find Darwin XNU kernel header files, contact me via e-mail at <abe@purdue.edu> for help. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

5.2.2 Why doesn't Apple Darwin lsof report text file information?

At the first port of lsof to Apple Darwin, revision 4.53,
insufficient information was available -- logic and header
files -- to permit the installation of VM space scanning
for text files.  As of lsof 4.70 it is sill not available.

Text file support will be added to Apple Darwin lsof after
the necessary information
becomes available.

5.2.3 Why doesn't Apple Darwin lsof support IPv6?

At the first port of lsof to Apple Darwin, revision 4.53,
Apple Darwin lacked IPv6 support.  IPv6 became available
in Apple Darwin version 1.5 and support for it was added
to lsof then.

5.2.4 Why does lsof complain about a mismatch between the release
for which lsof was compiled and the booted Mac OS X release?

When lsof is started on the "Gold Master" Darwin release
(aka Mac OS X), it complains:

```
lsof: compiled for 1.0 release; this is 1.3.2.
```

This happens because the lsof binary released with Mac OS
X was built on a system whose release number (1.0) doesn't
match that of the released system -- usually 1.3.x  Lsof
makes this check because UNIX dialect OS changes are often
accompanied by header file changes that affect lsof.

In this specific case, this error can be ignored.  If you
don't want to do that, get the lsof distribution and build
lsof so its built-on and running-on Mac OS X
release numbers
match.

5.2.5 Why does lsof for Apple Darwin 8 and higher report
"stat(...): ..." in the NAME column?

Lsof for Apple Darwin 8 may report messages like these in the
NAME column:

```
stat(/private/var/run/asl_prune): No such file or directory
or
stat(/private/var/db/netinfo/local.nidb/Config): Permission denied
```

Those messages indicate that lsof was unable to collect open

file information for the paths enclosed in "stat(...)" with the stat(2) function, because the function encountered the reported error.

A work-around for the "Permission denied" error is to run lsof with elevated privileges -- e.g., when logged on as the super user.

If the stat(2) error message is "No such file or directory", the file probably has been unlinked (removed) and there is no lsof work-around.

5.2.6 What are the limitations of Apple Darwin lsof link count reporting?

Lsof for Apple Darwin cannot report link count information reliably.

For Apple Darwin below 8 link
count information is not always
available in the kernel node structures available to lsof.
When link count information is available, however, it includes link counts of zero. Thus, using lsof's +L1 option may result in the finding of some files whose link counts are zero.

Lsof can report only some link count information for Apple Darwin 8 and above. Link count information is only available for files where lsof can assemble the full file path and has permission to apply stat(2) to it. (See the answer to the "Why does lsof for Apple Darwin 8 and higher report "stat(...): ..." in the NAME column?" question for more information on stat(2) failures.)

Apple Darwin 8 and above files that have been unlinked and thus have a link count of zero cannot be found by stat(2) -- i.e., stat(2) returns a "No such file or directory" error. As a result lsof never displays link counts of zero and the use of lsof's +L1 option to find them always fails.

5.2.7 Why does Apple Darwin report
process group IDs incorrectly?"

The kmem version of lsof for Apple Darwin does not report process group IDs correctly when requested to do so with its ``-g" option. This is a bug that surfaced after the libproc version was released and access to kmem test systems has prevented patching the bug.

If you are using the kmem version and would like a fix for this problem, please send e-mail to me <abe@purdue.edu>. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

5.3 Libproc-based Apple Darwin Questions

6.0 BSD/OS BSDI Problems

6.0.5 Statement of deprecation

As of lsof revision 4.76 support for BSDI BSD/OS has been dropped. The 4.76 distribution of lsof for BSDI BSD/OS may be found on lsof.itap.purdue.edu in pub/tools/unix/lsof/OLD/src.

7.0 DEC OSF/1, Digital UNIX, and Tru64 UNIX Problems

7.1 Why does lsof complain about non-existent /dev/fd entries?

When you run lsof for Digital UNIX 3.2, lsof may complain:

```
lsof: can't lstat /dev/fd/xxx: No such file or directory
lsof: can't lstat /dev/fd/yyy: No such file or directory
```

(Or it may warn about other missing /dev/fd paths.) When you do an ``ls /dev/fd'' none of the missing paths are listed.

This is caused by a bug in the DEC library function getdirentries(). For some reason, when /dev/fd is a file system mount point, getdirentries() returns an incorrect size for it to readdir(). (Lsof calls readdir() in its ddev.c readdev() function.) Because of the incorrect size, readdir() goes past the end of the /dev/fd directory buffer, encounters random paths and returns them to lsof. Lsof then attempts to lstat(2) the random paths, gets error replies from lstat(2), and complains about the paths.

Duncan McEwan discovered this error and has reported it to DEC. Duncan also supplied an alternate readdir() function as a work-around. I've incorporated his readdir() in dialects/osf/ddev.c (as the static ReadDir() function) with
some slight modifications, and enabled its use when the USELOCALREADDIR symbol is defined.

The Configure script defines USELOCALREADDIR for Digital UNIX version and 3.2. If you don't want to use Duncan's local readdir() function, edit the Makefile and remove -DUSELOCALREADDIR from the CFGF string. When DEC releases a corrected getdirentries() function, I'll modify the Configure script to stop defining USELOCALREADDIR.

7.2 Why does the Digital UNIX V3.2 ld complain about Ots* symbols?

When you compile lsof on your Digital UNIX V3.2 system, ld may complain:

```
ld:
Unresolved:
knlist
_OtsRemainder32Unsigned
_OtsDivide64Unsigned
_OtsRemainder64Unsigned
_OtsDivide32Unsigned
_OtsMove
_OtsDivide32
_OtsRemainder32
*** Exit 1
```

Chris Eleveld reports this happens on Digital UNIX V3.2 systems after the Fortran compiler has been installed.

The best work-around seems to be to remove -lmld from the CFGL string in the Makefile produced by Configure -- i.e., change:

```
CFGL=    -lmld
```

to

```
CFGL=
```

According to the V3.2 man page for nlist(3), this shouldn't work, but my testing shows that it does. Although I haven't been able to test this second work-around, you might try adding -lots to CFGL, rather than removing -lmld -- i.e., change:

```
CFGL=    -lmld
```

to

```
CFGL=    -lmld -lots
```

WARNING: my testing also shows that the V2.0 nlist(3) man page means what it says when it calls for -lmld -- lsof

loaded without -mld under V2.0 can't locate the proc
(process) table address.

DON'T REMOVE -lmld FROM THE DIGITAL UNIX V2.0 MAKEFILE.

If you run into this problem, please let me know what
problem you encountered and how you solved it.

7.3 Why can't lsof locate named pipes (FIFOs) under V3.2?

While lsof for V3.2 can report on named pipes (FIFOs), it
can't find them by name. That appears to happen because
of the way the V3.2 kernel lstat(2) function reports named
pipe device numbers.

The
V3.2 kernel reports the device number as 0xffffffff,
while the kernel structures for named pipes that lsof
examines contain the device number of the file system on
which the named pipe resides.

Consequently, lsof can't match the device and inode number
pair it receives from applying lstat(2) to the named pipe
with any device and inode number pair it finds when scanning
kernel structures.

I don't have a work-around. You can, of course, ask for
full lsof output and use a post-processing filer (e.g.,
grep) to locate the named pipe of interest.

This problem doesn't exist under V2.0.

7.4 Why does lsof use the wrong configuration header files?
For example, why can't the lsof compilation find cpus.h?

DEC OSF/1, Digital UNIX, and Tru64 UNIX configuration header
files describe the hardware and software environment for
which your kernel boot file was constructed. For example,
/sys/<name>/cpus.h defines the number of CPUs in its NCPUS
#define.

Lsof searches for
the configuration header file subdirectory
in /sys (/usr/sys for Digital UNIX version 4.0 and Tru64
UNIX) by converting the first host name component to capital
letters -- e.g., TOMIS is derived from tomis.bio.purdue.edu.
If that subdirectory exists, lsof uses header files from
it. (Configure reports what subdirectory is being used.)

If Configure doesn't find a host-name derived subdirectory, it prompts you for the entry of a subdirectory name. If you can't find one, quit Configure and run the kernel generation process to create a proper configuration sub-directory. If you don't identify a proper configuration subdirectory and you try to compile lsof, the compiler will complain about missing header files -- e.g., a missing cpus.h.

Once you have located or generated a proper configuration subdirectory, rerun Configure. If you have generated a configuration subdirectory whose name is derived from the host name, Configure will find and use it. If not, you will
have to specify its name to Configure.

7.5 Why does lsof indicate incomplete paths with " -- " for Tru64 UNIX 5.1 files?

When lsof can't find a component of a path in the kernel's name cache (aka DNLC), or can't determine that the left-most component has as its parent the file system root, it uses an "incomplete path" notation. That notation begins with the file system root name, followed by " -- ", followed by the consecutive path name components lsof was able to find in the DNLC -- e.g., "/ -- init".

Because the DNLC was significantly redesigned in Tru64 UNIX 5.1, lsof's handling of the cache had to be completely redone. As part of the DNLC redesign a name cache entry parameter lsof formerly used to locate the file system root of a path was removed. With help from Chang Song I've been able to implement an alternate method for detecting the root of these file system types: AdvFS (MSFS), CDFS, DVDFS, FDFS, NFS, NFS3, and UFS.

When lsof doesn't know how to identify
the root for a file
system type, it will resort to the " -- " incomplete path notation.

7.6 Why doesn't lsof report link count, node number, and size for some Tru64 5.x CFS files?

Lsof reports link count, node number, and size for open CFS files as recorded in their kernel node structure's cached attributes. Sometimes not all attributes are cached

on the system where lsof runs, so lsof cannot report them.

### 7.7 Why does lsof say it can't read the kernel name list or proc table on Digital UNIX 4.x or Tru64 UNIX?

By default on Digital UNIX 4 and Tru64 UNIX lsof reads the addresses for kernel symbols with the knlist(3) function. That function can fail, for example, when the kloadsrv daemon isn't running or is malfunctioning. When that happens, lsof may abort with one of these error messages:

```
lsof: can't read kernel name list from knlist(3): ...
or
lsof: can't read proc table info
```

The first message suggests a complete knlist(3) or kloadsrv failure;
the second, a partial one.

If you know the name of the file from which the running system was booted, e.g., /vmunix, you can use lsof's -k option to direct it to read kernel symbol addresses from the name list of that file --

```
$ lsof -k /vmunix ...
```

If that works, then knlist(3) is malfunctioning and you need to fix it.

## 8.0 FreeBSD Problems

### 8.1 Why doesn't lsof report on open kernfs files?

Lsof doesn't report on open FreeBSD kernfs files because the structures lsof needs aren't defined in the kernfs.h header file in /sys/misc/kernfs.

### 8.2 Why doesn't lsof work on my FreeBSD system?

If lsof doesn't work on your FreeBSD system, first make sure you have the latest lsof revision. See the answer to the "Where do I get lsof?" question for information on how to get the latest lsof revision.

Once you have gotten the latest lsof revision, Configure and make it. If Configure fails -- e.g., it complains about an unknown FreeBSD version -- then lsof probably

hasn't
been ported to your FreeBSD version yet, and there's
no need to go any further. Follow the answer to the "How
do I report an lsof bug" to report the Configure complaint
to me.

If you are able to Configure and make lsof, run its test
suite. (See the answer to the "Is there a test suite?"
question for more information on how to use lsof's test
suite.)

If lsof still fails, make sure your kernel sources, kernel
header files, kernel boot file, standard header files and
libraries are synchronized. They should all be built from the
same CVS refresh. (Don't forget to do a "make buildworld"
followed by a "make installworld".) If they aren't, then the
KVM library or lsof may be using kernel structure definitions
that don't match the booted kernel; or lsof may fail to compile
properly because of header files in /usr/src/sys/sys and
/usr/include/sys that don't match.

If you have synchronized your kernel, header files and
libraries, and still can't get lsof to work, follow
the
steps in the answer to the "How do I report an lsof bug"
question to report the problem to me.

8.3 Why doesn't lsof work on the RELEASE version of CURRENT?

Lsof tracks the CURRENT release of the current leading edge
FreeBSD version, because my access to leading edge FreeBSD is
limited to FreeBDSD.org reference systems, all running the
CURRENT release.

Sometimes that tracking leads to changes in lsof that won't
work on an earlier RELEASE version of the current leading edge
version.

When that happens, please send e-mail to me <abe@purdue.edu>.
Make sure "lsof" appears in the "Subject:" line so my e-mail
filter won't classify your letter as Spam.

8.4 Why does kvm_open() complain it can't find some file?

If lsof issues this complaint:

```
lsof: kvm_open(execfile=/boot/kernel/kernel,
corefile=/dev/mem: No such file or directory
```

Your FreeBSD system might not have a /dev/mem device. If not, create one -- e.g., as root do:

```
# mknod /dev/mem c <major> 0

# chmod 440 /dev/mem
# chgrp kmem /dev/mem
```

For <major> use /dev/kmem's major device number.

You may have to run kldload, too -- again as root do:

```
# kldload mem
```

## 8.5 FreeBSD ZFS Problems

### 8.5.1 Why does FreeBSD lsof report "WARNING: no ZFS support has been defined."?

Lsof issues that message when it detects a file on a ZFS file system, but has not been built with support for ZFS. Lsof's Configure script detects support can be added for ZFS when it finds this file:

/usr/src/sys/contrib/opensolaris/uts/common/fs/zfs/sys/zfs_znode.h

That header file and others in the OpenSolaris files in /usr/src enable lsof to extract information about ZFS files from the kernel structures associated with them.

## 8.6 Why can't Configure create lsof_owner.h for FreeBSD 6 and above?

Lsof may report:

```
Creating ./lockf_owner.h from /usr/src/sys/kern/kern_lockf.c
FATAL ERROR: can't read /usr/src/sys/kern/kern_lockf.c
FATAL ERROR: ./lockf_owner.h creation failed (see
00FAQ)
```

or

```
Creating ./lockf_owner.h from /usr/src/sys/kern/kern_lockf.c
FATAL ERROR: ./lockf_owner.h creation failed (see 00FAQ)
```

Those messages mean that lsof's Configure script failed to create a local header file, ./lockf_owner.h, needed to use the new kernel file locking code of some versions of FreeBSD 6 and above.

The changes that implement that new locking code alter the lockf structure in <sys/lockf.h> and introduce a new structure, lockf_entry, to that header file. When Configure detects the presence of the lockf_entry definition in <sys/lockf.h>, it tries to construct the local header file, ./lockf_owner.h.

Configure has to do that because an unfortunate side effect of the new kernel file locking code is that <sys/lockf.h> doesn't contain the lockf_owner structure definition referenced in its own lockf structure. Lsof needs to access elements of that lockf_owner structure to determine if a lock belongs to the process that has a file open.

The missing lockf_owner structure definition is in the kernel source file, typically /usr/src/sys/kern/kern_lockf.c. Configure tries to extract the lockf_owner structure definition from kern_lockf.c into lsof's local header file, ./lockf_owner.h. If Configure can't do that, it reports:

```
FATAL ERROR: ./lockf_owner.h creation failed
```

If Configure can't even read kern_lockf.c, it first reports:

```
FATAL ERROR: can't read /usr/src/sys/kern/kern_lockf.c
```

The work-around for this problem is to update the FreeBSD kernel /usr/src tree (e.g., do a CVSup or csup) on the system where lsof is to be built and then do a "make buildworld" followed by a "make installworld".

### 8.6.1 Why are there lockf structure compiler errors for FreeBSD 6.0 and higher lsof?

If, when compiling lsof, the compiler complains with error messages like:

```
dnode.c: In function 'get_lock_state':
dnode.c:113: error: 'struct lockf' has no member named 'lf_flags'
dnode.c:115: error: 'struct lockf'
has no member named 'lf_id'
...
```

Then lsof is being built on a system that has new kernel file locking code and lsof's Configure script failed to build a local lockf_owner.h header file with a structure definition lsof needs.

See the "Why can't Configure create lsof_owner.h for FreeBSD 6 and above?" section for more information and a work-around.

8.6.2 Why don't /usr/src/sys/sys/lockf.h and /usr/include/sys/lockf.h match?

This mismatch can cause the errors explained in the answer to the "Why are there lockf structure compiler errors for FreeBSD 6.0 and higher lsof?" question.

If /usr/src/sys/sys/lockf.h has been updated with a CVSup or csup, the new lockf.h won't be propagated to /usr/include/sys until the "make buildworld" and "make installworld" steps have been completed.

8.7 FreeBSD and clang

As of lsof revision 4.87, lsof may be compiled with clang.

8.7.1 Why does clang complain about VOP_FSYNC?

There is an error in the Solaris ZFS compatibility
vnode.h
header file with use of VOP_FSYNC before it is defined. No work-around is possible that will eliminate the clang compile-time warning message about the invalid declaration of the VOP_FSYNC function.

9.0 HP-UX Problems

9.1 What do /dev/kmem-based and PSTAT-based mean?

Lsof for HP-UX 11.0 and below uses /dev/kmem to read kernel data structures from which it gathers and reports open file information. That version of lsof is called /dev/kmem-based lsof.

Starting with HP-UX 10.10, finding definitions for the necessary kernel structures became more difficult as HP no longer distributed header files in /usr/include that defined all kernel structures. So I started "inventing" structure definitions by using Q4 to display them.

By HP-UX 11, the process of invention became extremely intensive to support. Following a patch to the ipc_s structure in early 1999, my invented definition of that structure became incorrect. Although I was able to devise

a work-around
test for the patch with Q4, it was clear that
my inventions were bound to cause more problems.

Discussion with HP about the patch led to my proposing that
an lsof API in the HP-UX kernel was the proper solution.
Much to my surprise, HP agreed. I believe Carl Davidson
was the prime mover behind that decision, but I know others
participated, among them Louis Huemiller, Rich Rauenzahn,
and Sailu Yallapragada. I am indebted to these folks and
HP for their willingness to do this work.

The API was added to the PSTAT interface in a project named
PEGL, Pstat Enhancements for Glance and Lsof. Louis and
Sailu did the bulk of the design and implementation work
and testing began in March, 2000

HP-UX 11.11 is the first version that provides PSTAT support
for lsof. HP-UX versions in between 11.0 and 11.11 -- all
Beta versions as far as I can determine -- have no lsof
support.

See the "PSTAT-based HP-UX lsof Questions" section for
questions and answers specific to PSTAT-based
HP-UX lsof.
The next section, "Why doesn't a /dev/kmem-based HP-UX lsof
compilation use -O?" covers /dev/kmem-based HP-UX lsof.

The /dev/kmem-based lsof sources may be found in the kmem
subdirectory of the dialects/hpux branch of the lsof source
tree. The PSTAT-based lsof sources may be found in
.../dialects/hpux/pstat.

## 9.2 /dev/kmem-based HP-UX lsof Questions

The sources for /dev/kmem-based lsof for HP-UX may be found
in lsof_<revision>/dialects/hpux/kmem.

Lsof's Configure shell script decides to use these sources
when it finds that the /usr/include/sys/pstat subdirectory
doesn't exist.

Lsof can be forced to use the /dev/kmem sources by setting
"/dev/kmem" in the HPUX_BASE environment variable. Consult
the Configure shell script and 00XPORTING for more information.

### 9.2.1 Why doesn't a /dev/kmem-based HP-UX lsof compilation use -O?

If you only have the standard (bundled) HP-UX C compiler
and haven't purchased and installed the optional one, then
you can't use
cc's -O option. The HP-UX cc(1) man page
says this:

"Options
Note that in the following list, the cc and c89 options
-A , -G , -g , -O , -p , -v , -y , +z , and +Z are
not supported by the C compiler provided as part of
the standard HP-UX operating system. They are supported
by the C compiler sold as an optional separate product."

Lsof's Configure script tries to detect what C compiler
product you have installed by examining your compiler. If
that examination reveals a standard (bundled) compiler,
lsof avoids using -O.

If the Configure compiler test fails, the C compiler will
complain that it doesn't support -O. You can suppress that
complaint with this make invocation:

```
$ make DEBUG=""
```

9.2.2 Why doesn't the /dev/kmem-based CCITT support work under 10.x?

Pasi Kaara, who originally provided the HP-UX CCITT support,
reports that it no longer works under HP-UX 10.x.
Consequently, at lsof revision 4.02 it has been disabled.

9.2.3 Why
can't /dev/kmem-based lsof be compiled with `cc -Aa` or
`gcc -ansi` under HP-UX 10.x?

Some HP-UX 10.x header files, needed by lsof, can't be
compiled properly in ANSI_C mode; structure element definition
and alignment problems result. The f_offset member of the
file structure, for example, is incorrect.

This ANSI-C obstacle extends to using the -Aa option of
the HP C compiler and the -ansi option of gcc.

9.2.4 Why does /dev/kmem-based lsof complain about no C compiler?

Lsof's Configure script looks in /bin and /usr/ccs/bin for
an HP C compiler, because it needs to know if the compiler
is the standard (bundled) one or the optional separate
product. If it finds no compiler in either place, Configure

quits after complaining:

No executable cc in /bin or /usr/ccs/bin

If you don't have a C compiler in either of these standard
places, you should consider installing it. If you have
gcc installed, you can use it by declaring the ``hpuxgcc''
abbreviation to lsof's
Configure script.

If you have a C compiler in a non-standard location, you
can use the HPUX_CCDIR[12] environment variables to name
the path to it. Consult the 00XCONFIG file of the lsof
distribution for more information.

9.2.5 Why does Configure complain about q4 for /dev/kmem-based lsof
for HP-UX 11?

When you run Configure on an HP-UX 11 system, it may complain:

```
!!!ERROR!!!    !!!ERROR!!!    !!!ERROR!!!    !!!ERROR!!!
Configure can't use /usr/contrib/bin/q4 to examine the ipis_s
structure.  You must do that yourself, report the result in
the HPUX_IPC_S_PATCH environment variable, then repeat the
Configure step.  Consult the Configure script's use of
/usr/contrib/bin/q4 and the 00XCONFIG file for information
on ipis_s testing and the setting of HPUX_IPC_S_PATCH.
!!!ERROR!!!    !!!ERROR!!!    !!!ERROR!!!    !!!ERROR!!!
```

This message states that Configure cannot use q4 from
/usr/contrib/bin to examine the kernel's boot image for
the ipis_s
structure. Maybe q4 hasn't been installed, or
perhaps Configure can't execute it.

Lsof needs to gather information about ipis_s to determine
if the ipis_s structure is defined in the kernel boot image,
if the ipis_s structure of the kernel boot image has an
ipis_msgsqueued member, and if the ipc_s structure of the
kernel boot image uses has an ipc_ipis member.

The ipis_s structure isn't described in any header file
HP-UX releases with HP-UX 11. It appears in the private
lsof header file .../dialects/hpux/kmem/hpux11/ipc_s.h.
Lsof gets local and remote connection addresses (IP and
port numbers) from ipc_s, so an incorrect ipc_s definition
may cause incorrect reporting of TCP/IP connection addresses.
It definitely will cause incorrect reporting on 32 bit

kernels. In any case lsof should be compiled with a correct
ipc_s definition no matter the kernel bit size, so the
Configure script always tests for it when the HP-UX version
is 11.

For lsof's Configure script
to gather the necessary ipis_s
information q4 needs to be installed in /usr/contrib/bin
and the kernel boot image, /stand/vmunix, needs to have
been processed with pxdb. If either is untrue, lsof issues
the above error message, perhaps preceded by q4 messages.
(Note: lsof's use of q4 may also fail if q4 can't execute
nm -- e.g., it can't find /usr/bin/nm, or there is a
conflicting, private version of nm earlier in the path.)

If /stand/vmunix hasn't been processed by pxdb, the q4
messages will include:

```
   q4: (error) vmunix not pxdb'd
or
   q4: (warning) /stand/vmunix has not been processed by pxdb.
```

It's possible to make a suitable private copy of /stand/vmunix
for configuring lsof. That requires /opt/langtools/bin/pxdb
or the q4 version of pxdb from /usr/contrib/bin/q4pxdb.
The path to the result is supplied to the lsof Configure
script in the HPUX_BOOTFILE environment variable. Configure
still requires /usr/contrib/bin/q4.

The following sample Bourne shell
commands make a private
copy of /stand/vmunix in /tmp, process it with pxdb or
q4pxdb, and supply its path to lsof's Configure script in
HPUX_BOOTFILE.

```
   $ cp /stand/vmunix /tmp/vmunix.lsof

   $ /opt/langtools/bin/pxdb /tmp/vmunix.lsof
 or
   $ /usr/contrib/bin/q4pxdb /tmp/vmunix.lsof

   ... pxdb messages ...
   $ HPUX_BOOTFILE=/tmp/vmunix.lsof Configure -n hpux
```

It may also be necessary to use q4 outside the lsof Configure
script. In that case q4 can be to determine the state of
ipis_s and ipc_s with these q4 commands:

```
$ /usr/contrib/bin/q4 /stand/vmunix
...
q4> fields -c struct ipc_s
...
q4> fields -c struct ipis_s
```

Look in the q4 output for the ipc_ipis member of the ipc_s structure, and look in the q4 output for the ipis_s structure for the ipis_msgsqueued member. If ipc_s has ipc_ipis but ipis_s lacks ipis_msgsqueued, set HPUX_IPC_S_PATCH environment variable to "1". If ipc_s has ipc_ipis and ipis_s has ipis_msgsqueued, set HPUX_IPC_S_PATCH to "2" -- e.g.,

```
$ HPUX_IPC_S_PATCH=1 Configure -n hpux
```

or

```
$ HPUX_IPC_S_PATCH=2 Configure -n hpux
```

If ipc_s has no ipc_ipis member, set HPUX_IPC_S_PATCH to "N" -- e.g., use this Configure step:

```
$ HPUX_IPC_S_PATCH=N Configure -n hpux
```

9.2.6 When compiling /dev/kmem-based lsof for HP-UX 11 what do the "aCC runtime: ERROR..." messages mean?

When the lsof Makefile asks the HP-UX unbundled compiler to load lsof, it may complain:

```
/bin/cc -o lsof  -DHPUXV=1100 -DHASVXFS -DHPUXKERNBITS=64 \
-I/home/abe/src/lsof4/dialects/hpux/kmem/hpux11 +DD64 \
-DHAS_IPC_S_PATCH=2 -I/home/abe/src/lsof4/dialects/hpux/kmem \
-DLSOF_VSTR=\"B.11.00\"  -g dfile.o dmnt.o dnode.o dnode1.o \
dnode2.o dproc.o dsock.o  dstore.o  arg.o main.o misc.o \
node.o print.o proc.o store.o usage.o -L./lib -llsof  -lelf \
-lnsl
aCC runtime: ERROR: Unexpected use of shared libraries
aCC runtime: ERROR: Read aCC manpage, +A option
/usr/lib/nls/loc/locales.1//is_IS.iso88591
```

This is a bug in the HP-UX national language support. (Notice the last message with "locales" in it?) Complain to HP -- then use this work-around before executing make:

```
$ unset LANG
$ make
```

9.2.7 Why doesn't /dev/kmem-based lsof for HP-UX 11 report VxFS file link counts, node numbers, and sizes correctly?

This is usually the result of running an lsof binary whose revision number is less than 4.57 on a system that has OnlineJFS support installed. It can also happen with lsof 4.57 binaries when the OnlineJFS support with which they were built doesn't match the OnlineJFS status of the system on which they are run.

The OnlineJFS status of lsof 4.57 and higher binaries can be determined by running:

```
$ lsof -v 2>&1 | grep HASONLINEJFS
```

If that shell pipe produces output, lsof was compiled with OnlineJFS support enabled; no output, disabled.

If OnlineJFS is installed on an HP-UX 11 system the /sbin/fs/vxfs/subtype executable exists and outputs
"vxfs3.3"
when run.

The problem occurs because the optional OnlineJFS support installation doesn't update <sys/fs/vx_inode.h>. Consequently lsof can be compiled with an incorrect definition of the vx_inode structure and look for for link counts, node numbers, and sizes in the wrong places in the structure.

The current response I have gotten from HP is that no <sys/fs/vx_inode.h> update will be provided for OnlineJFS.

I've addressed this problem temporarily with a work-around (hack) in lsof revision 4.57.

9.2.8 Why can't /dev/kmem-based lsof be built with gcc for 64 bit HP-UX 11?

When Configure is given the "hpuxgcc" abbreviation, the HP-UX version is 11, and the kernel bit size is 64, the lsof Configure script may abort with the messages:

```
!!!!!!!!!!!!!!!!! FATAL ERROR !!!!!!!!!!!!!!!!!!

APPARENTLY GCC CANNOT BUILD 64 BIT EXECUTABLES.
A COMPILER MUST BE USED THAT CAN.  SEE 00FAQ
FOR MORE INFORMATION.
```

(This is the "more information" in 00FAQ.)

This
means the Configure script compiled a test program
with gcc the result wasn't an ELF-64 binary. Lsof tries
two gcc modes, one with no options and another with the
-mlp64 option, before it concludes gcc can't be used.

See the "How can I acquire a gcc for building lsof for 64
bit HP-UX 11?" answer for information on where you might
be able to get a gcc for HP-UX 11 that can produce ELF-64
executables.

9.2.8.1 How can I acquire a gcc for building lsof for 64 bit HP-UX 11?

Check this HP URL:

http://h21007.www2.hp.com/dspp/tech/tech_TechSoftwareDetailPage_IDX/1,1703,547,00.html

(That's one very long link; be careful you cut 'n paste it
all.)

In November 2001 that URL led to a web page whose title
was "gcc for hp-ux 11." The page offered a link for
downloading a 64 bit gcc 3.0 compiler for HP-UX 11.0 and
11i. Rich Rauenzahn of HP installed that compiler on an
HP test system he allows me to use and I successfully built
a 64 bit lsof with it.

The HP package
may install the 64 bit capable gcc in
/usr/local/pa20_64/bin/gcc, so you may have to adjust your
path or set the LSOF_CC environment variable to compensate.

9.2.9 Why does /dev/kmem-based lsof for HP-UX 11 report "unknown file
system type" for some open files?

The lsof binary being used probably doesn't have support for
the VxFS file system.

To confirm that, check `lsof -v` output for "-DHASVXFS". If
it's not present, lsof doesn't have VxFS support.

You also need to establish that lsof really is complaining
about VxFS files by checking the kernel boot file for the
symbol associated with the hexadecimal address reported in the
"unknown file system type" message -- e.g., "v_op: 0x8711c8."
Use nm(1) to do that:

```
$ nm -x /stand/vmunix | grep 8711c8
```

If nm reports the symbol associated with the address is vx_vnodeops, then lsof is complaining about an open VxFS file.

The solution in that case is to build lsof yourself (The bundled C compiler will do it.), making sure that lsof's Configure script detects the presence of VxFS. Configure does that by finding these two header files:

```
/usr/include/sys/fs/vx_hpux.h
/usr/include/sys/fs/vx_inode.h
```

If the system where you are building lsof doesn't have those header files, but does have VxFS, you might be able to install the header files by installing the HP JournalFS package from the CoreOS CD -- in particular the file set JournalFS.VXFS-PRG and its associated patch, PHKL_18543. (My thanks to Steve Bonds for that information.)

Finally, if you find that lsof isn't complaining about VxFS when it complains about an unknown file system type, send e-mail to me <abe@purdue.edu> for further assistance. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

9.2.10 Why does the ANSI-C compiler complain about comments in HP-UX 11 header files?

When compiling lsof on HP-UX 11, the HP ANSI-C compiler's pre-processor, cpp, may complain about comments in HP-UX header files -- e.g.,

```
cpp: "/usr/include/sys/cdfs.h", line 232: warning 2028:
Found comment inside comment started on line 232.
cpp: "/usr/include/sys/cdnode.h", line 196: warning 2028:
Found comment inside comment started on line 196.
cpp: "/usr/include/nfs/snode.h", line 30: warning 2028:
Found comment inside comment started on line 30
```

This is not a problem with lsof. It is a problem with the HP-UX header files; they have non-compliant ANSI-C comment sequences in them -- e.g.,

```
<sys/cdfs.h>: 232
```

/* struct  cdfs *cdfs_link;  /* linked list of file systems */

The initial "/*" is not terminated by an ending "*/" before the appearance of a second "/*".

9.2.11 Why does dnode1.c cause the HP-UX 11 compiler to complain that <sys/fs/vx_inode.h> is missing or incorrect?

If CFLAGS in the lsof Makefile for an HP-UX 11 compilation includes HASONLINEJFS, indicating the system has OnlineJFS support, lsof needs the <sys/fs/vx_inode.h> header file.
Sometimes it is missing from /usr/include/sys/fs.

<sys/fs/vx_inode.h> is a header file that must be obtained from Veritas. If that proves impossible, please contact me via e-mail at <abe@purdue.edu>. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

## 9.3 PSTAT-based HP-UX lsof Questions

The sources for PSTAT-based lsof for HP-UX may be found in lsof_<revision>/dialects/hpux/pstat.

Lsof's Configure shell script decides to use these sources when it finds that the /usr/include/sys/pstat subdirectory exists.

Lsof can be forced to use the PSTAT-based sources by setting "pstat" in the HPUX_BASE environment variable. Consult the Configure shell script and 00XPORTING for more information.

### 9.3.1 Why does PSTAT-based lsof complain about pst_static and other PSTAT structures?

When lsof starts it may issue one of these fatal error messages:

```
lsof: FATAL: can't determine PSTAT static size

lsof: FATAL: can't read <n> bytes of pst_static
lsof: FATAL: pst_static doesn't contain <name>_size
lsof: FATAL: <name>_size should be <n>
```

These messages indicate that lsof's tests for the proper level of PSTAT support have failed. The structure names,

given in <name>, and sizes, given in <n>, identify the support deficiency more precisely.

You may need to upgrade the PSTAT support in your kernel to be able to use PSTAT-based lsof.

9.3.2 Why does PSTAT-based lsof complain it can't read pst_* structures?

Lsof may put messages like the following in the NAME column of its output.

```
can't read cwd pst_filedetails: Permission denied
can't read mem pst_filedetails: Permission denied
can't read rtd pst_filedetails: Permission denied
can't read txt pst_filedetails: Permission denied
can't read pst_filedetails: Permission denied
can't read 3 stream structures: Permission denied
can't read pst_socket: Permission denied
```

These messages indicate that the lsof binary lacks the authority to read the name structures for processes other than ones belonging to the UID under which lsof is running. Authority to read the structures of other processes is limited to root processes -- i.e., lsof must have setuid-root permission if it is to list open files for arbitrary processes.

If you want to eliminate these errors, you must run lsof as root or install it with setuid-root permission.

9.3.3 Why does PSTAT-based lsof rebuild the device cache file after each reboot?

After each HP-UX rebuild, the first time a user runs lsof it will report:

```
lsof: WARNING: device cache mismatch: /dev/tun...
lsof: WARNING: created device cache file: /<user_path>
```

This happens because the device numbers on /dev/tun* device nodes are recalculated at each reboot. When lsof detects a change in the device number of a /dev/tun* file, it rebuilds its local device cache file.

9.3.4 Why doesn't PSTAT-based lsof report TCP addresses

for
telnetd's open socket files?

When lsof can't report TCP addresses for telnetd's open
socket files it is because an unpatched PSTAT kernel
interface doesn't report the addresses to lsof.

This has been addressed in PSTAT kernel patch PHKL_24047.
It is available from the HP IT Resource Center at:

http://itrc.hp.com

In the page's "maintenance / support" box select the
"individual patches" link. Once at its page, select the
"hp-ux" link. On that page select the "Series 800" or
"Series 700" radio button and select "11.11" from the
pull-down list to the right of the button. Under "search
or browse the path list" select "Search by Patch IDs" from
the pull down list, enter PHKL_24047 in the following text
box, and select search. That should lead to information
about PHKL_24047 and a link for downloading it. (You may
have to log in first and you may have to create a login
identity by registering before you can log in.)

Some time in March 2006 the PHKL_24047
patch was "lost"
by the HP-UX networking lab. It has been "found" again
in August 2006 and will be re-released as a GRO patch
"some time." I don't yet know when that will be. You
must contact HP to learn about the availability of the
GRO patch.

9.3.5 Why does PSTAT-based lsof cause an HP-UX 11.11 kernel panic?

When PSTAT-based lsof runs on some HP-UX 11.11 kernels,
the kernel may panic. Symptoms include:

```
Console message:
  0xFBE000301100EF00 00000000 0000EF00 -
  type 31 = legacy PA HEX chassis-code

/var/adm/syslog:
  ... vmunix: Trap Type 15 (Data page fault)
  ... vmunix:   Instruction Address (pcsq.pcoq) = 0x...
```

The panic is caused by a bug in the way PSTAT's pstat_getstream()
function obtains module names from streams managed by the
otsam stream driver (part of OSI Transport Services). Lsof

calls pstat_getstream() when it encounters an open otsam stream file. An HP-UX 11.11 system uses otsam if otsam appears in /stand/system.

HP-UX 11.11 patch PHKL_24507 (available some time after July 15, 2001) fixes the pstat_getstream() bug. See the information in the answer to the "Why doesn't PSTAT-based lsof report TCP addresses for telnetd's open socket files?" question for information on how to obtain the patch.

9.3.6 Why doesn't PSTAT-based lsof report a CWD that is on a loopback (LOFS) file system?

When PSTAT-based lsof reports on processes whose current working directory (CWD) is on a loopback file system, lsof can't report the open CWD file. The reason is that the HP-UX 11.11 and above kernel's loopback file system code is not passing the CWD file ID to the kernel's pstat(2) code. Hence lsof is given no information on the lofs CWD.

The problem was first reported to me by Ermin Borovac and an internal bug report was filed with the HP-UX file system group on October 26, 2004. That report has now been answered by the patch PHKL_33200 -- s700_800 11.11 lofs cumulative patch. The HP IT Resource Center (http://itrc.hp.com) is a source for the patch.

9.3.7 Why do some swinstall packages for PSTAT-based HP-UX 11.11 packages complain about setgid and setuid bits?

First, let me explain that I do not provide lsof swinstall packages for lsof. Others provide them and they should be contacted about problems with their packages.

However, I have become aware of a problem with one package about which I have some information I can share. The problem shows up in these swinstall messages:

```
ERROR:   Unknown owner and/or group for file
  "/usr/local/bin/lsof". SUID and/or SGID bit was
  not set.
ERROR:   Failed installing fileset "lsof.lsof-RUN,r=4.73".
  Check the above output for details.
```

The swpackage SUID/SGID functionality was restricted by changes for POSIX compliance, breaking backward compatibility. The

patch PHCO_27671 allows SUID/SGID for uid/gid of 0 only, as a compromise between backward compatibility and POSIX conformance.

If the setuid
bit is to be set on the executable, the UID and
GID of the executable must be 0 (zero).

9.3.8 Why won't the bundled C compiler build PSTAT-based lsof for PA-RISC HP-UX 11.23?

A PA-RISC HP-UX 11.23 bundled C compiler dated May 2005 or later will not build PSTAT-based lsof. It will deliver error messages related to the system's <gssapi/gssapi.h> header file.

There is nothing wrong with that header file or lsof. The problem is that the bundled C compiler can't cope with the gssapi.h header file.

The work-around is to use the HP ANSI C compiler. Using gcc is not a satisfactory work-around. See the answer to the "Why won't gcc build PSTAT-based lsof for PA-RISC HP-UX 11.23?" question for more information.

9.3.9 Why won't gcc build PSTAT-based lsof for PA-RISC HP-UX 11.23?

Gcc will not even compile PSTAT-based lsof revisions below 4.77 for PA-RISC HP-UX 11.23 dated May 2005 or later. It reports errors in lsof's print.c fill_portmap() function about missing members
of the rpcent structure. That happens because gcc defines _XOPEN_SOURCE_EXTENDED which disables the definition of the rpcent structure in <netdb.h>.

Using the HP bundled C compiler is not a viable work-around. That is explained in the answer to the "Why won't the bundled C compiler build PSTAT-based lsof for PA-RISC HP-UX 11.23?"

While an lsof revision 4.77 or higher can be compiled with gcc, the results are unreliable. Lsof will compile, but it occasionally produces segment faults when it runs. I have not been able to reproduce the failure reliably or locate a debugger that will work with the gcc-compiled lsof.

The only reliable work-around is to use the HP ANSI C compiler.

9.3.10 Why does PSTAT-based lsof complain, "FATAL: pst_stream_size

should be: 672; is 72" on HP-UX 11.11 and above?

This message indicates a mismatch between the PSTAT header
files used to build lsof (<sys/pstat.h> and those in the
/usr/include/sys/pstat subdirectory), and those that
built the
running kernel.

Unfortunately the June 2008 patch set for HP-UX 11.23 creates
this inconsistency, because it does not contain all the patches
needed to match the kernel with the PSTAT header files. Even
more serious is that the missing patches update the kernel's
PSTAT support to provide TCP/UDP endpoint information to lsof
from TCP/TLI streams.

The patch inconsistency comes about because, while the following
patch is installed,

PHKL_36577 1.0 PM-PSTAT section 2 manpage changes

other kernel patches are not.

The PHKL_36577 patch updates the PSTAT header files and manual
pages to match kernel changes that other patches with the
following numbers (or patches that contain or supersede them)
contain:

PHNE_36575 1.0 Cumulative STREAMS Patch
PHNE_37670 1.0 cumulative ARPA Transport patch
PHNE_37851 1.0 NFS cumulative patch

Those patches implement the kernel changes that support the
delivery of information promised in patch PHKL_36577.

The
work-around is to install the missing patches.

9.4 Why won't the HP-UX depot install?

I don't distribute lsof depots, so I can't support them.

From time to time depots prepared by various sites -- e.g.,
usually HP-UX software collection sites -- will contain errors
that cause installation of the depot to fail.

Do not contact me when this happens. Instead, contact the
administrator of the site that prepared the depot.

As should be clear from the bulk of the lsof documentation, I do not recommend you use pre-built lsof binaries in any form. Instead, I recommend you obtain the lsof source distribution and build lsof yourself.

## 10.0 Linux

### 10.1 What do /dev/kmem-based and /proc-based lsof mean?

At approximately Linux 2.1.72 and exactly at lsof revision 4.23 support for Linux forks. The first fork, containing the oldest lsof form is based on access to kernel memory structures, and is called /dev/kmem-based lsof. A /dev/kmem-based lsof is heavily intertwined with the Linux kernel version, its header files, and its system map file. Typically a /dev/kmem-based lsof needs only setgid permission to local all open file information.

After approximately Linux 2.1.72 and at revision 4.23 lsof obtains all its information from the /proc file system. That lsof is called the /proc-based lsof. A /proc-based lsof does not read kernel memory, needs neither kernel header files nor the system map file, and is less likely to be affected by Linux kernel changes. However, it does require setuid-root permission to list all open files, and it can't report file offsets (positions).

After revision 4.52 the /dev/kmem-based Linux sources for lsof are no longer distributed. Information about them may be found in the 00INDEX and README files at:

ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/OLD/src

### 10.2 /proc-based Linux lsof Questions

#### 10.2.1 Why doesn't /proc-based lsof report file offsets (positions)?

/proc-based lsof revisions 4.79 and above can only report file offsets (positions) for the files of Linux kernels 2.6.22 and above.

During its initialization /proc-based lsof tests to see if offset information can be obtained. If it cannot, lsof disables offset reporting. If the -o option was selected, lsof also issues this warning:

```
lsof: WARNING: can't report offset; disregarding -o.
```

10.2.2 Why does /proc-based lsof report "can't identify protocol" for some socket files?

/proc-based lsof may report:

```
COMMAND PID ... TYPE ... NODE NAME
pump    226 ... sock ...  309 can't identify protocol
```

This means that it can't identify the protocol (i.e., the AF_* designation) being used by the open socket file. Lsof identifies protocols by matching the node number associated with the /proc/<PID>/fd entry to the node numbers found in selected files of the /proc/net sub-directory. Currently /proc-based lsof examines these protocol files:

```
/proc/net/ax25  (untested)
/proc/net/icmp

/proc/net/ipx  (needs kernel patch)
/proc/net/netlink
/proc/net/packet
/proc/net/raw
/proc/net/raw6
/proc/net/sctp/assocs
/proc/net/sctp/eps
/proc/net/sockstat
/proc/net/sockstat6
/proc/net/tcp
/proc/net/tcp6
/proc/net/udp
/proc/net/udp6
/proc/net/udplite
/proc/net/udplite6
/proc/net/unix
```

If /proc-based lsof says it can't identify the protocol for an open socket file, you may be able to identify the protocol yourself by using grep to look for the specific node number in the files of /proc/net -- e.g.,

```
$ grep <node_number> /proc/net/*
```

You may not be able to find the desired node number, because not all kernel protocol modules fully support /proc/net

information.

If you find a matching node number in a /proc/net file that is not currently being processed by lsof, contact me via e-mail at <abe@purdue.edu>. I'll discuss adding support to /proc-based lsof for the protocol of the /proc/net file with you. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

The code that matches node numbers of open IPX protocol socket files to those in /proc/net/ipx requires Jonathan Sergent's Linux 2.1.79 patch to /usr/src/linux/net/ipx/af_ipx.c. The patch, suitable for input to Larry Wall's patch program, may be found in the lsof distribution file:

```
.../dialects/linux/proc/patches/net_ipx_af_ipx.c.patch
```

10.2.3 Why does /proc-based lsof warn about unsupported formats?

Lsof may issue the following warning:

```
lsof: WARNING: unsupported format: /proc/net/<file>
```

if the header line of the indicated <file> in /proc/net -- ax25, ipx, raw, tcp, udp, or unix -- doesn't match what lsof expects to find.

When the header line of a /proc/net file isn't what lsof expects, lsof probably can't parse the rest of the file correctly and doesn't try. As a result, lsof can't report any NAME column information (e.g., local and remote addresses) for socket files bound to the indicated network protocol.

If you get this warning, please send me e-mail at <abe@purdue.edu>. Include the contents of the file lsof claims has an unsupported format. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

10.2.4 Why does /proc-based lsof report "(deleted)" after a path name?

The "(deleted)" notation following a path name in /proc-based lsof's NAME column comes from the /proc/<PID>/fd/<FD> entry for the open file. It's the Linux kernel's way of indicating the file is open but has been unlinked (rm'd).

10.2.5 Why doesn't /proc-based lsof report full open file information

for all processes?

/proc-based lsof can only report on processes whose /proc files it has permission to read. /proc normally grants permission to read all its files only to root or to the owning user ID.

Without permission to read most /proc files, lsof can only report full information for processes belonging to the user who is running lsof. /proc-based lsof may be able to report some information for all processes, depending on the permissions of their associated /proc files, but usually /proc-based lsof won't be able to access the files in /proc/<PID>/fd/ that describe regular open files.

If you want /proc-based lsof to report on all processes, you must install it with setuid-root permission.

10.2.6 Why won't Customize offer to change HASDCACHE or WARNDEVACCESS for /proc-based lsof?

/proc-based lsof doesn't read device information from /dev or the device cache file, so it makes no sense to change the state of device cache processing or /dev node accessibility warnings.

10.2.7 /proc-based lsof Linux NFS questions

10.2.7.1 Why can't lsof find files on an accessible NFS file system?

On occasion lsof may be unable to identify that an open file is on an NFS file system. This is most likely the result of a bug in the way the Linux kernel supplies information to the reader of /proc/mounts (lsof) -- sometimes that pseudo-file is truncated by the kernel.

One way to see if this is the case is to search for the NFS file system in /proc/mounts -- e.g.,

```
$ grep <NFS_file_system_mount_point> /proc/mounts
```

If you get no output or the third word of the output isn't "nfs", then lsof won't consider the file system an NFS file system.

A second test is to look at the end of /proc/mounts --

e.g.,

```
$ tail /proc/mounts
```

If tail reports "# truncated" then /proc/mounts is incomplete because of a Linux kernel bug. The bug is documented at:

http://www.xss.co.at/sysinfo/mounts.html

The bug is fixed in Linux kernel 2.4.18, and possibly in some earlier Linux kernel versions.

10.2.7.2 Why can't lsof find files on an inaccessible NFS file system?

If lsof issues this message about a Linux file system, mounted from an NFS server:

```
lsof: WARNING: can't stat() nfs file system /xxx/yyy
```

Then lsof won't be able to find any open files on the file system.

That's because of an inadequacy in the Linux /proc file system. Its /proc/mounts file doesn't give the device doublet (major and minor numbers) of the file system as do many UNIX systems (e.g., Solaris). The only way lsof can get the device doublet for a Linux file system is to call stat(2) on the file system path, which fails if the NFS server isn't accessible.

When lsof doesn't know the device doublet of a file system, it can't find open files on the inaccessible file system, because it can't match the doublets of open files to the doublet of the inaccessible file system.

This topic is covered extensively in lsof(8) it its ALTERNATE DEVICE NUMBERS and BLOCKS AND TIMEOUTS sections.

10.2.8 Why doesn't /proc-based Linux lsof report socket options and values, socket state flags, and TCP options and values?

The Linux /proc file system doesn't report socket options and values, socket states, and TCP options and values to lsof.

10.2.9 Does

/proc-based Linux lsof use a device cache?

No. The Linux /proc/<PID>/fd/* entries provide device names to lsof via readlink(2). It is not necessary to enable device cache processing for /proc-based Linux lsof via the Customize script or modifications to the Linux machine.h header file.

10.2.10 Why doesn't /proc-based Linux lsof report any or all file structure values for its +fcfgGn option?

/proc-based lsof revisions 4.79 and above can only report some file structure values for Linux kernels below 2.6.22.

When running on Linux kernels at 2.6.22 and above lsof 4.79 can report some file flag values -- i.e., in response to the +fg or +fG options. The flag values are obtained from the /proc/<PID>/fdinfo/ files introduced at Linux kernel 2.6.22.

/proc-based Linux lsof tests its availability to obtain file flag values at initialization. If values are not available, lsof disables file flag reporting. If the flags were requested with +fg or +fG, lsof displays
this warning:

```
lsof: WARNING: can't report file flags; disregarding +f.
```

As a special note, when Linux lsof can report flag bits, it will not report 'R' for a read-only file. There is no read-only flag bit O_* symbol in <fcntl.h> (or <bits/fcntl.h>) and lsof reports only bits that are set. The absence of O_RDWR and O_WRONLY flag bits implies the file is read-only.

10.3 Special Linux file types

10.3.1 Why is ``DEL'' reported as a Linux file type?

Lsof usually reports entries from the Linux /proc/<PID>/maps file with ``mem'' in the TYPE column. However, when lsof can't stat(2) a path in the process' ``maps'' file and the ``maps'' file entry contains ``(deleted)'', indicating the file was deleted after it had been opened, lsof reports the file type as ``DEL''.

10.3.2 Why is ``unknown'' reported as a Linux file type?

Lsof may report a Linux file's type as ``unknown'' in the TYPE column when lsof can't obtain complete stat(2) results for the file.

Usually the NAME
column will contain a ``(stat: xxx)'' error
message, but that could have been suppressed with the lsof
``-w'' option.

## 10.4 Linux ``mem'' Entry Problems

### 10.4.1 What do ``path dev=xxx'' and ``path inode=yyy'' mean in the NAME column of Linux ``mem'' file types?

When the device or inode number in the process' ``maps'' file
entry doesn't match the stat(2) results from the file path,
lsof reports the inconsistent information from the stat(2) of
the path parenthetically after the path in the NAME column
in one of these forms:

(path dev=xxx) only the device number,
``xxx'', from a stat(2) of the
``maps'' file entry path
differs from the ``maps'' file
entry value reported in the
DEVICE column.

(path inode=yyy) only the inode number,
``yyy'', from a stat(2) of the
``maps'' file entry path
differs from the ``maps'' file
entry value reported in the
NODE column.

(path dev=xxx inode=yyy) Both device
and inode numbers
differ.

Lsof reports the ``maps'' file device number in the DEVICE
column and the inode number in the NODE column.

When device and inode mismatches occur, lsof suppresses the
reporting of link count and size. See the answer to the "Why
is neither link count nor size reported for some Linux ``DEL''
and ``mem'' file types?" question for more information.

Device and inode inconsistencies can occur when a file at a
``maps'' path is replaced after the process has started, or
when a different file system with similar path names is mounted
on top of the original file system.

The device inconsistency parenthetical messages can be suppressed with lsof's ``-w'' option.

10.4.2 Why is neither link count nor size reported for some Linux ``DEL'' and ``mem'' file types?

Link count and size are not reported for some entries from the process' ``maps'' file because a stat(2) of the entry file path failed or stat(2) delivered device or inode numbers that don't match
the ones in the ``maps'' entry.

When the stat(2) device or inode numbers don't match those in the ``maps'' file entry, it is likely that the stat(2) results don't apply to the file that was originally mapped by the process and whose path appears in the ``maps'' file entry, so lsof tries to avoid reporting possibly incorrect information.

See the answer to the "What do ``path dev=xxx'' and ``path inode=yyy'' mean in the NAME column of Linux ``mem'' file types?" for more information on how mismatched stat(2) device and inode numbers are reported.

10.5 Special Linux NAME column messages

10.5.1 What does ``(stat: xxx)'' mean in the NAME column of Linux files?

When lsof tried to stat(2) the path in the NAME column, the stat(2) system call failed and produced an error message of ``xxx''.

This situation usually occurs if the lsof process lacks permission to stat(2) the path -- e.g., the lsof executable lacks root permission, or lsof is attempting to stat(2) a path
on an NFS device mounted with the root_squash option.

The message can be suppressed with lsof's ``-w'' option.

10.5.2 What does ``(readlink: xxx)'' mean in the NAME column of Linux files?

When lsof tried to convert the /proc/<PID>/fd path, reported in the NAME column, to its full and more meaningful path, the readlink(2) system call used to do the conversion failed. The readlink(2) failure message is ``xxx''.

This situation usually occurs if the lsof process lacks permission to readlink(2) some part of the path -- e.g., the lsof executable lacks root permission, or lsof is attempting to stat(2) a path on an NFS device mounted with the root_squash option.

The message can be suppressed with lsof's ``-w'' option.

10.6 Why is ``NOFD'' reported as a Linux file type?

When lsof lacks permission to use opendir() on the fd/ subdirectory of a process' /proc/<PID> directory, it reports a single file of the type ``NOFD'' (for no file descriptors).

Lsof reports the the /proc/<PID>/path in the NAME column, followed by "(opendir: xxx)", where ``xxx'' is the error message returned by opendir().

The ``NOFD'' entry can be suppressed with lsof's ``-w'' option.

10.7 Why does Linux lsof report a NAME column value that begins with ``/proc''?

When lsof has problems processing a ``/proc/<PID>'' entry -- e.g., it can't convert the entry to a full and more meaningful path name, or it can't access the /proc/<PID>/fd subdirectory with opendir() -- it will report the /proc/<PID> path in the NAME column.

10.8 Linux /proc/net/tcp* and /proc/net/udp* issues

10.8.1 Why use the Linux -X option?

If you're not interested in TCP/IP socket information for a particular use of lsof, adding the -X option will make lsof run more quickly, because -X inhibits the reading of the /proc/net/tcp* and /proc/net/udp* files. For example, you may only be interested in knowing what process has a particular file open.

When the Linux system has a large number of open TCP/IP socket files, the time savings provided by -X can be significant.

10.8.2 Why does lsof say ``-i is useless when -X is specified''?

If -X is specified, lsof can't report much information on open

TCP/IP socket files. However, lsof's -i option requests that information. Hence, the two options conflict and can't be used together.

10.8.3 Why does lsof say ``can't identify protocol (-X specified)''?

If the Linux lsof -X option is specified and an open socket file can't be identified without accessing the /proc/net/tcp* and /proc/net/udp* files, lsof will report that it can't identify the socket's protocol and that the failure may be caused by the -X specification

11.0 NetBSD Problems

11.1 Why doesn't lsof report on open kernfs files?

Lsof doesn't report on open NetBSD kernfs files because the structures lsof needs aren't defined in the kernfs.h header file in /sys/misc/kernfs.

11.2 Why doesn't lsof report on open files on: file descriptor file systems; /proc
file systems; 9660 (CD-ROM) file systems;
MS-DOS (floppy disk) file systems; or kernel file systems?

Lsof is not able to report on open files on certain file system if /usr/src/sys/msdosfs didn't exist when the lsof Configure script ran and lsof was made. /usr/src/sys/msdosfs contains header files lsof needs for collecting data on certain file system files.

You can tell if an lsof executable above) lacks support for a file system if the following test of `lsof -v` produces nothing:

```
$ lsof -v 2>&1 | grep <support_enabled_definition>
```

The <support-enabled_definition> will be:

```
File System Type Definition Note
---------------- ---------- ----
File descriptor HASFDESCFS
/proc  HASPROCFS
9660  HAS9660FS
MS-DOS  HASMSDOSFS (lsof 4.61 and above)
Kernel  HASKERNFS
```

The work-around is to install /usr/src/sys, rerun the lsof Configure script, and remake lsof.

11.3 Why does lsof produce confusing results for nullfs file systems?

Consider
this report from /sbin/mount:

```
/usr/home on /home type null (local)
```

(According to /sbin/mount /usr/home is the mounted-on device and /home is the mounted-on directory.)

When lsof is asked to report on open files on /home, it will report them as files on /usr/home instead. That's an artifact of the NetBSD kernel's dynamic name lookup cache (DNLC) and the way the kernel handles nullfs mounted-on directories.

While lsof will report all open files on /home when given /home as a file system directory argument, even though reporting them as located on /usr/home, lsof will not find the same files when asked to report on all open files on /usr/home when given /usr/home as a file system device argument. That's because from the mount perspective /usr/home is equivalent to a device, but from the device perspective it is still a directory.

So, what this lsof command reports:

```
$ lsof /home
... NAME
... /usr/home/...
```

Won't be duplicated by this lsof
command:

```
$ lsof /usr/home
```

Another way to look at this confusing /home and /usr/home example is to consider what stat(2) reports. For /home stat(2) reports a device doublet that matches what lsof finds in open file node structures, while the device doublet stat(2) reports for /usr/home won't match what lsof finds. Nor does the mode reported by stat(2) indicate a block devices, as is the expected case.

There is no simple answer to this confusion, nor is there even a simple explanation. Simply be aware that when supplying file system arguments to lsof on NetBSD, use the mounted-on directory name for a nullfs as the lsof argument, and don't be surprised when the NAME column reports the mounted-on device name.

## 11.4 NetBSD header file problems

### 11.4.1 Why can't the compiler find some NetBSD header files?

If the compiler's pre-processor complains it can't find some header files when it compiles lsof source files, /usr/include and /usr/src may not have all the header files lsof needs.

As a work-around use the NETBSD_SYS environment variable to specify to lsof the location of the additional header files -- e.g.,

```
% setenv NETBSD_SYS /my_source
% ./Configure -n netbsd
```

or

```
$ NETBSD_SYS=/mys_source ./Configure -n netbsd
```

Caution: using this work-around may cause the lsof Configure script to activate or omit different features, depending on where it finds the header files that determine the state of the features.

### 11.4.2 Why does NetBSD lsof produce incorrect output?

If the NetBSD system's kernel was built from header files that don't match those in /usr/include -- e.g., //usr/src has the ones from which the kernel was built -- lsof may build, but won't produce correct output.

As a possible work-around, try directing the C compiler to select header files from /usr/src before it selects them from /usr/include. That can be done with the DEBUG make string -- e.g.,

```
$ make DEBUG="-I/usr/src -I/usr/include"
```

If that work-around fails, try using the LSOF_INCLUDE and NETBSD_SYS environment variables to swap /usr/include and

/usr/src when running the Configure script, then use the make DEBUG string when running make -- e.g.,

```
$ LSOF_INCLUDE=/usr/src; export LSOF_INCLUDE
$ NETBSD_SYS=/usr/include; export NETBSD_SYS
$ ./Configure -n netbsd
$ make DEBUG="-I/usr/src -I/usr/include"
```

### 11.5 Why isn't lsof feature xxx enabled for NetBSD?

Lsof's Configure script enables NetBSD features by locating and examining header files associated with the features, and based on what it finds, setting compile-time definitions in Makefiles. (See 00PORTING for a list of the definitions.)

When Configure doesn't find header files or doesn't find appropriate values in header files, that may mean the header file tree lsof is searching is incomplete or out of date.

Lsof normally looks for NetBSD header files in /usr/include. It can also be directed to look in other directories -- e.g.,
/sys -- if told to do so with the contents of the LSOF_INCLUDE and NETBSD_SYS environment variables.

To determine what header file enables a missing feature, check the NetBSD stanza in the Configure script. Then check the locations it checks for the indicated header files and contents.

See 00XCONFIG for more information on LSOF_INCLUDE and and NETBSD_SYS.

## 12.0 NEXTSTEP and OPENSTEP Problems

### 12.1 Why can't lsof report on 3.1 lockf() or fcntl(F_SETLK) locks?

Lsof has code to test for locks defined with lockf() or fcntl(F_SETLK) under NEXTSTEP 3.1, but that code has never been tested. I couldn't test it, because my NEXTSTEP 3.1 lockf() and fcntl(F_SETLK) functions return "Invalid argument" every way I have tried to invoke them.

If your NEXTSTEP 3.1 system does allow you to use lockf() and fcntl(F_SETLK) and lsof doesn't report locks set with them, then the code in .../dialects/next/dnode.c probably

isn't correct. Please contact me via e-mail at <abe@purdue.edu>
and
tell me how you got your lockf() and fcntl(F_SETLK) system
calls to work. Make sure "lsof" appears in the "Subject:" line
so my e-mail filter won't classify your letter as Spam.

12.2 Why doesn't lsof compile for NEXTSTEP with AFS?

I no longer have a NEXTSTEP test system that has AFS.
Changes to lsof since I once had a test system have caused
me to change the AFS code in NEXTSTEP without being able
to test the changes.

If you need AFS support for NEXTSTEP and can't get it to
compile, please contact me. Perhaps we can jointly fix
the problems.

13.0 OpenBSD Problems

13.1 Why doesn't lsof support kernfs on my OpenBSD system?

Lsof supports the kernel file system on OpenBSD versions
whose /sys/miscfs/kernfs/kernfs.h (or <miscfs/kernfs/kernfs.h>
header file correctly defines the kern_target structure.
The lsof Configure script's openbsd stanza checks for the
presence of the structure's kt_name element and activates
kernfs support for the CFLAGS -DHASKERNFS definition
only
when it finds kt_name.

The kernfs.h header file is scheduled to be updated in the
OpenBSD 2.1 release, according to Kenneth Stailey, who
authored its changes.

13.2 Will lsof work on OpenBSD on non-x86-based architectures?

I've not tested lsof on an OpenBSD system that uses a
non-x86-based architecture, but I've had one report that
lsof 4.33 compiles and works on OpenBSD for the pmax
architecture (decstation 3100).

13.3 <sys/pipe.h> problems

13.3.1 Why does the compiler claim nbpg isn't defined?

When compiling lsof on some (older) OpenBSD SPARC versions,
the compiler may complain:

```
In file included from ../dlsof.h:191,
    from ../lsof.h:166,
    from fino.c:52:
/usr/include/sys/pipe.h:83: `nbpg' undeclared here
(not in a function)
/usr/include/sys/pipe.h:83: size of array `ms' has
non-integer type
```

This happens because <sys/pipe.h> uses NBPG from <machine/param.h> to size the `ms' array, and some OpenBSD systems define
NBPG in terms of a kernel integer variable,
nbpg.

Lsof revisions 4.46 and above have a hack to dlsof.h, developed by Volker Borchert that avoids the compiler problem for SPARC OpenBSD 2.3. The hack might work for other OpenBSD SPARC versions, but hasn't been tested there.

If you want to enable the hack for your OpenBSD SPARC version, modify this code in .../dialects/n+obsd/dlsof.h:

```
# if    defined(OPENBSDV)
#  if   OPENBSDV==2030 && defined(__sparc__)
#   if  defined(nbpg)
#undef  nbpg
#   endif       /* defined(nbpg) */
#define nbpg    4096            /* WARNING!!!  ... */
#  endif        /* OPENBSDV==2030 && defined(__sparc__) */
#include <sys/pipe.h>
#endif  /* defined(OPENBSDV) */
```

You will probably want to change the second #if test to match your OpenBSD version. You may also want to change what value is assigned to nbpg. See the next section, "What value should I assign to nbpg?"

### 13.3.2 What value should I assign to nbpg?

If you need to enable the nbpg hack, described in "Why does the compiler claim nbpg isn't defined?", you may also need to assign a value other than 4096 to nbpg. 4096 works for the sun4c processor and should work for sun4m, but 8192 may be needed for sun4.

Check <machine/param.h> and other OpenBSD documentation to

determine the correct nbpg assignment.

13.4 Why doesn't lsof report on open MS-DOS file system (floppy disk) files?

Lsof is not able to report on open MS-DOS file system files if /usr/src/sys/msdosfs didn't exist when the lsof Configure script ran and lsof was made. /usr/src/sys/msdosfs contains header files lsof needs for collecting data on MS-DOS file system files.

You can tell if an lsof executable (revisions 4.61 and above) lacks MS-DOS file system support if the following command reports nothing:

```
$ lsof -v 2>&1 | grep HASMSDOSFS
```

The work-around is to install /usr/src/sys, rerun the lsof Configure script, and remake lsof.

13.5 Why isn't lsof feature xxx enabled for OpenBSD?

Lsof's Configure script enables OpenBSD features by locating and examining header files associated with the features, and based on what if finds, setting compile-time definitions in Makefiles. (See 00PORTING for a list of the definitions.)

When Configure doesn't find header files or doesn't find appropriate values in header files, that may mean the header file tree lsof is searching is incomplete or out of date.

Lsof normally looks for OpenBSD header files in /usr/include and /sys. It can also be directed to look in other directories if told to do so with the contents of the LSOF_INCLUDE and NETBSD_SYS environment variables.

To determine what header file enables a missing feature, check the OpenBSD stanza in the Configure script. Then check the locations it checks for the indicated header files and contents.

See 00XCONFIG for more information on LSOF_INCLUDE and and NETBSD_SYS.

14.0 Output Problems

14.1 Why do the lsof
column sizes change?

Lsof dynamically sizes its output columns each time it runs to make sure that each column takes the minimum space. Column parsing -- e.g., with awk -- is possible, because each column is guaranteed to be separated from the preceding one by at lease one space, and no column except the last (NAME) contains embedded spaces.

14.2 Why does the offset have ``0t' and ``0x" prefixes?

The offset value that appears in the SIZE/OFF column has ``0t' and ``0x" prefixes to distinguish it from size values that may appear in the same column.

Normally if the offset value is less than 100,000,000 (8 digits), it appears in decimal with a ``0t' prefix; over 99,999,999, in hexadecimal with a ``0x" prefix.

A decimal offset is handy, for example, when tracking the progress of an outbound ftp transfer. When lsof reports on the ftp process, it will report the size of the file being sent with its open descriptor; it will report the progress of the transfer via the
offset of the outbound
open ftp data socket descriptor.

The ``-o [n]" option may be used to specify the maximum number of decimal digits to be printed after ``0t" before lsof switches to the hexadecimal digits after `0x". As already noted, the default decimal digit count is 8.

14.3 What are the values printed in the FILE_FLAG column and why is 0x<value> sometimes included?

The two comma separated lists, separated by a semicolon, printed in the FILE-FLAG column (when the "+fg" option is specified), are short-hand names or hexadecimal values for the bits lsof finds in the f_flag or f_flags member of file structures for files (the first list, the one before the semicolon), and process open files flags found in various kernel structures, often named "pofile" (the second list, the one after the semicolon).

Lsof determines the short-hand names from symbols in the <fcntl.h>, <linux/fs.h>, <sys/fcntl.h>, <sys/fcntlcom.h>, o<sys/file.h>, and <sys/user.h> header files.

See
the discussion of FILE-FLAG in the OUTPUT section of
the lsof man page, and the FF_* and POF_* symbols in lsof.h
for a list of the names.

Bits with no names defined for them are represented by an
0x<value> member of the comma-separated list -- a hexadecimal
integer. When "+fG" is specified (instead of "+fg"), lsof
will list all flag values as two hexadecimal integers,
separated by a semicolon.

When "-FG" is specified to get the flags in an output field,
the format defaults to hexadecimal. You can get names
instead by following "-FG" with "+fg" -- e.g.,

```
$ lsof -FG +fg ...
```

However, when you precede "-FG" with "+fg" -- e.g.,

```
$ lsof +fg -FG
```

the format will be hexadecimal; order is important.

14.3.1 Why doesn't lsof display FILE_FLAG values for my dialect?

All versions of lsof except the /proc-based Linux lsof
report FILE-FLAG values. Lsof can't obtain FILE-FLAG
information from the Linux /proc interface.

14.4 Network Addresses

14.4.1 Why
does lsof's -n option cause IPv4 addresses, mapped to
IPv6, to be displayed in IPv6 notation?

When you use the -n option to tell lsof to display numeric
network addresses, and an IPv4 address has been mapped to
IPv6, lsof displays the address in IPv6 format and puts
"ipv4" in the TYPE column. That combination indicates the
IPv4 address has been mapped to IPv6.

For example, the IPv4 address 1.2.3.4, when mapped to an
IPv6 address, will be displayed by lsof as:

```
[::ffff:1.2.3.4]
```

The enclosing brackets are lsof's signal that this is an

IPv6 address. Inside the brackets is a standard IPv6 address, reported by inet_ntop(). The first two colons, signifying zeroes in the first 64 bits of the IPv6 address, and the hexadecimal ffff in the next 32 bits, indicate that the last 32 bits contains a mapped IPv4 address, which is then displayed in IPv4 dot notation.

14.5 Why does lsof output \x, ^x, or \xnn for characters sometimes?

Lsof displays only printable ASCII characters.
Lsof
considers a character printable if isprint(3) says it is. If isprint(3) says a character isn't printable, the lsof may page explains:

> "... Non-printable characters are printed in one of three forms: the C ``\[bfrnt]" form; the control character `^' form (e.g., ``^@"); or hexadecimal leading ``\x" form (e.g., ``\xab"). Space is non-printable in the COMMAND column (``\x20") and printable elsewhere."

14.5.1 Why is space considered a non-printable character in command names?

Space is considered an unprintable character in command names because it is sometimes possible to hide the full command name from scripts that parse ps(1) output by embedding a space in the name.

14.6 Why doesn't lsof print all the characters of a command name?

By default lsof prints the first nine characters of the names of commands associated with processes. If more characters are required, the "w" value of the "+c w" option may be used to specify
a larger width.

If "w" is zero ('0') lsof will print all characters of all command names up to the limit of the number of characters supplied by the particular UNIX dialect. When reporting command names, lsof replaces non-printable characters as discussed in the answer to " Why does lsof output \x, ^x, or \xnn for characters sometimes?"

See the answer to the "Why is space considered a non-printable character in command names?" question for an explanation of why

spaces are replaced by the ``\x20" representation in command
names.

The number of command name characters supplied to lsof by UNIX
dialects in files and structures varies by dialect. For
example, Linux 2.4.27 supplies lsof the first 15 characters of
command names and Solaris 9 supplies 16. Thus, even if "w" is
zero ('0'), lsof can't report more characters for command names
on those two UNIX dialects than they provide lsof.

14.7 Why does lsof reject some -c command names, saying their lengths
are "> what
system provides (nn)"?

The command name length that a specific system provides varies
from dialect to dialect. As noted in the answer to the "Why
doesn't lsof print all the characters of a command name?"
question, Linux and Solaris provide a limited number of command
name characters.

When more characters are specified in the parameter to the -c
option, lsof considers it an error and issues a fatal error
message -- e.g.,

lsof: "-c xxxxyyyy" length (8) > what system provides (7)

The only work-around is to specify no more characters to -c
that the system provides to lsof.

14.8 Why does lsof sometimes print TYPE numbers instead of names?

When lsof can't convert a type number to a name for printing in
the TYPE column, it will report the number as four octets.

14.9 Marker line format problems

14.9.1 Why won't lsof accept a marker line format?

Lsof's Configure script must find the localtime(3) and
strftime(3) functions in the dialect's C library in order to
enable
support for marker line formats.

Check the output of lsof's -v option for the presence of
-DHAS_STRFTIME in the compiler flags. If it isn't there,
Configure didn't find the necessary two C library functions.

If you think lsof should have found the functions, make a copy

of the C test program in the Configure script that it uses to find the functions. Then use the copy, or a more informative modification of it, to learn why Configure can't find the functions. You can find that program by searching for strftime.

### 14.9.2 Why does lsof reject the NL (%n) marker line format?

When repeat mode and field output (with -F) have both been specified, lsof won't allow new line (NL) formats to be specified with ``%n''. That's because the marker line is always guaranteed to be a single line.

There is no work-around to this restriction.

### 14.10 How are protocol state name exclusion and inclusion used?

Protocol state name inclusion and exclusion with the ``-s p:s'' option and
its arguments have some issues to consider. Note:
the ``-s p:s'' option is only available when the help output, obtained with -h or -?, shows it; it was a recent addition to lsof and is supported only on dialects where it could be tested.

First, there is the problem of determining what state names, if any, the dialect produces. Try running this lsof command to find them:

```
$ lsof -i
```

Knowing the state names of interest, the next problem is to decide on the lsof options and their parameters that will produce the desired output. Here some examples are probably the most useful.

To list only TCP socket files in LISTEN and CLOSE_WAIT states, use:

```
$ lsof -itcp -stcp:listen,close_wait
```
or
```
$ lsof -iTCP -sTCP:LISTEN,CLOSE_WAIT
```

Case isn't important to lsof in protocol and state names.

To exclude TCP socket files in CLOSE_WAIT state, use:

```
$ lsof -itcp -stcp:^close_wait
```

Note the `^' preceding close_wait; it selects exclusion. You
can mix included and
excluded names in a comma separated list,
but you may not include and exclude the same name for the same
protocol.

To list TCP files in LISTEN state and UDP files in Idle state,
use:

```
$ lsof -i -stcp:listen -sudp:idle
```

Note: if you don't accompany the ``-s p:s" list option and
argguments with the -i option, lsof will list all other regular
files, while applying the specified inclusion and exclusion
specifications to network files. Generally, then, you want to
use -i with -s.

### 14.10.1 Why doesn't my dialect support state name exclusion and inclusion?

When state name inclusion and exclusion was added, I had access
to test systems for AIX, Darwin, FreeBSD, Linux, PSTAT-based
HP-UX and Solaris.

Therefore, I was unable to add and test the support to any other
UNIX dialects.

If a dialect has the support, then the HASTCPUDPSTATE definition
in its machine.h header file will be active; if not, it will be
absent or commented out.

If your dialect doesn't have the support
and you want it added,
you will have to provide me Internet access to a test host, where
I can compile lsof and have the credentials to test the changes
the support requires. If that's possible for you, please contact
me via e-mail at <abe@purdue.edu>. Make sure "lsof" appears in
the "Subject:" line so my e-mail filter won't classify your letter
as Spam.

## 15.0 Pyramid Version Problems

### 15.0.5 Statement of deprecation

As of lsof revision 4.52 support for all Pyramid versions has
been dropped. Contact me via e-mail at <abe@purdue.edu> if you
are interested in obtaining the last lsof Pyramid distribution.

Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

## 16.0 SCO Problems

### 16.1 SCO OpenServer Problems

#### 16.1.1 How can I avoid segmentation faults when compiling lsof?

If you have an older SCO OpenServer compiler, it may get a segmentation fault when compiling some lsof modules. That appears to happen because of the -Ox optimization action requested in the lsof Makefile.

Try changing -Ox to -O with this make invocation:

```
$ make DEBUG=-O
```

Bela Lubkin supplied this tip and Steve Williams verified it.

#### 16.1.2 Where is libsocket.a?

If you compile lsof and the loader says it can't find the socket library, libsocket.a, called by the -lsocket option in the lsof compile flags, you probably are running an SCO OpenServer release earlier than 5.0 and don't have the TCP/IP Development System package installed.

You may have the necessary header files, because you have the TCP/IP run-time package installed, but if you don't have the TCP/IP Development System package installed, you won't have libsocket.a.

Your choices are to install the TCP/IP Development System package or upgrade to OpenServer Release 5.0. You will find libsocket.a in 5.0 -- you'll find all the libraries and header files there, in fact -- and you can use gcc to compile lsof if you don't want to install the 5.0 Development System package.

#### 16.1.3 Why do I get "warning C4200" messages when I compile lsof?

When you compile lsof under OSR 3.2v4.2 (and perhaps under earlier versions as well), you may get many compiler warning

messages of the form:

```
node.c(183) : warning C4200: previous declarator is not
compatible with default argument promotion
```

In my opinion this is a bug in the OSR compiler. Because the compiler cannot handle full ANSI-C prototypes, it assumes default types for function parameters as it encounters untyped in a function prototype -- e.g., in this function declaration from node.c,

```
    readrnode(ra, r)
 KA_T ra;
 struct rnode *r;
    {
    ...
```

the compiler assigns default int types to the ra and r arguments.

Then, when the compiler encounters the fully typed parameters after the function skeleton and sees parameters with types that don't match the assumptions it previously made, it whines about its own assumptions.

You can ignore these messages.

## 16.2 SCO|Caldera UnixWare Problems

### 16.2.1 Why doesn't lsof compile on my UnixWare 7.1.1 or above system?

When you Configure lsof with the "uw" abbreviation and try to compile it for UnixWare 7.1.1, you may get compiler error messages like this:

```
    UX:acomp: ERROR: "dproc.c", line 98:
 undefined struct/union member: p_pgidp
```

This suggest that you probably have a non-stop cluster UnixWare 7.1.1 system. Its <sys/proc.h> header file differs from the one on the system where I did the lsof port to UnixWare 7.1.1. I currently don't have access to a non-stop cluster system to be able to develop changes to lsof that would make it compile and work there.

If you have a non-stop cluster UnixWare 7.1.1 system, want lsof

for it, and can offer me a test account on the system, please contact me via e-mail at <abe@purdue.edu>. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

If you have a system with nsc_cfs and can offer me a test account on it, please contact me via e-mail at <abe@purdue.edu>. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

16.2.2 Why does lsof complain about node_self() on my UnixWare 7.1.1 or above system?

If lsof exits immediately after issuing this message:

```
can't identify process NSC node; node_self(): <message>
```

It means that lsof has been built to run on a NonStop Cluster (NSC) UnixWare 7.1.1 or higher system and can't get the number of the node on which it is running. Lsof uses the node number to determine the path to the kernel boot file.

You can tell if lsof has been built for NSC by looking for "-DHAS_UW_NSC" in lsof's "-v" option output.

If the system on which you're trying to run lsof isn't running an NSC kernel, you will need to build a non-NSC lsof.

16.2.3 Why does UnixWare 7.1.1 or above complain about -lcluster, node_self(), or libcluster.so?

When you build, compile, and load lsof for UnixWare 7.1.1 and above, ld may complain that it can't find the -lcluster library or that the node_self symbol is undefined. When you try to run an existing lsof binary it may complain that libcluster.so can't be found.

These messages mean the tests made by Configure on your system led it to believe your system is running a NonStop Cluster (NSC) kernel, or the lsof binary you're trying to use was built on a NonStop Cluster system. If an lsof binary was built for NSC, this shell command produces output:

```
$ strings <lsof_binary> | grep HAS_UW_NSC
```

If that's not the case, and you can rebuild lsof, set the UW_HAS_NSC environment variable to "N" and do this:

```
$ Configure -n clean
$ UW_HAS_NSC=N
$ export UW_HAS_NSC
$ Configure -n uw
$ make
```

You can also edit Makefile and lib/Makefile. Remove -DHAS_UW_NSC from the CFGF strings. Remove -lcluster from the CFGL strings. Then run make again.

If you have an existing NSC lsof binary and you want one for a non-NSC system, you will have to build lsof yourself on the system where you want to use it. (That's always a good idea anyway.)

### 16.2.4 Why does UnixWare 7.1.1 or above lsof complain it can't read the kernel name list?

If lsof complains:

```
can't read kernel name list from <path>
```

It means that lsof can't find the booted kernel image file at <path>. On NonStop Cluster (NSC) UnixWare 7.1.1 or higher systems lsof determines the booted file path by examining this file:

```
/stand/`node_self`/boot
```

If examining that file doesn't lead to an NSC path, lsof uses:

```
/stand/1/unix
```

On non-NSC systems lsof expects the booted kernel image to be in /stand/unix.

If your booted kernel image is in a different place, use lsof's "-k <path>" option to specify its path.

### 16.2.5 Why doesn't lsof report link count, node number, and size

for some UnixWare 7.1.1 or above CFS files?

Lsof reports link count, node number, and size for open
CFS files as recorded
in their kernel node structure's
cached attributes. Sometimes not all attributes are cached
on the node where lsof runs, so lsof cannot report them.

16.2.6 Why doesn't lsof report open files on all UnixWare 7.1.1
NonStop Cluster (NSC) nodes?

Lsof can only report on files open on the node on which it
runs, because the information lsof reports comes from the
private kernel memory of the node. This may mean that
asking lsof to find a specific open file, or use of a
specific Internet address or port, may not report all open
instances on nodes other than the one used to run lsof.

You can use the NSC onnode(1) command to run lsof on specific
nodes, or the onall(1) command to run lsof on all nodes --
e.g.,

```
   $ onall lsof [options] 2>&1 | less
 or
   $ onnode node-number lsof [options] 2>&1 | less
```

Note that, when lsof is run all nodes, the path name
component assembly results it reports in its NAME column
may vary, because the dynamic name cache from which lsof
gets
the components is private to the kernel of each node.

Also note the use of shell redirection in the examples to
merge the standard error file information from onnode and
onall with lsof's standard output file output. That will
put the onnode and onall node announcements in proper
sequence with lsof's output.

16.2.7 Why doesn't lsof report the UnixWare 7.1.1 NonStop Cluster
(NSC) node a process is using?

To induce lsof to report the node on which a process runs
would be a significant, non-standard modification to lsof.
It has much wider implications than merely the printing of
a number in an output column. I'm not currently (April
2001) prepared to undertake such a modification.

If you want node-specific NSC information about open files,

run lsof under the control of onall(1) or onnode(1).

```
$ onall lsof [options] 2>&1 | less
```

or

```
$ onnode node-number lsof [options] 2>&1 | less
```

16.2.8 Why does the compiler complain about missing UnixWare 2.1[.x] header files?

SCO|Caldera didn't ship the following header files with UnixWare 2.1 through 2.1.3:

```
<fs/proc/prdata.h>
<fs/procfs/prdata.h>
<sys/fs/fifonode.h>
<sys/fs/namenode.h>
```

Lsof needs those header files for its compilation. Contact SCO|Caldera to get copies of those header files.

If you can't get the header files from SCO|Caldera, please contact me via e-mail at <abe@purdue.edu>. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

17.0 Sun Problems

17.0.5 Statement of deprecation

Lsof support for SunOS 4.1.x was last tested at revision 4.51. Contact me via e-mail at <abe@purdue.edu> if you're interested in obtaining it. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

17.1 My Sun gcc-compiled lsof doesn't work -- why?

Gcc can be used to build lsof successfully. However, an improperly installed Sun gcc compiler will usually not produce a working lsof.

If your Sun gcc-compiled lsof doesn't report anything, or reports ``can't read proc table,'' or gcc refuses to compile lsof without error, check that the gcc step that "fixes" Sun header files was run on the system where you're using gcc to compile lsof. As an alternative, if you have the

SunPro C 5.0 compiler or later available, use it to compile
lsof -- e.g., use the solariscc Configure abbreviations.

17.2 How can I make lsof compile with gcc under Solaris 2.[456],
2.5.1, 7, 8 or 9?

Presuming your gcc-specific header files are wrong for
Solaris, edit the lsof Configure-generated Makefile and
lib/Makefile and make this change:

```
 CFGF=   -Dsolaris=20400 ...
to
 CFGF=   -Dsolaris=20400 -D__STDC__=0 -I/usr/include ...
```

or change:

```
 CFGF=   -Dsolaris=20500 ...
to
 CFGF=   -Dsolaris=20500 -D__STDC__=0 -I/usr/include ...
```

or change:

```
 CFGF=   -Dsolaris=20501 ...
to
 CFGF=   -Dsolaris=20501 -D__STDC__=0 -I/usr/include ...
```

This is only a temporary
work-around.  You really should
instruct gcc to to update your gcc-specific header files
or install a recent gcc (e.g., 3.2), which has no need for
private copies of Solaris include files.

17.3 Why does Solaris Sun C complain about system header files?

You're probably trying to use /usr/ucb/cc if you get compiler
complaints like:

```
cc -O -Dsun -Dsolaris=20300 ...
"/usr/include/sys/machsig.h", line 81: macro BUS_OBJERR
redefines previous macro at "/usr/ucbinclude/sys/signal.h",
line 444
```

Note the reference to "/usr/ucbinclude/sys/signal.h".  It
reveals that the BSD Compatibility Package C compiler is
in use.  Lsof requires the ANSI C version of the Solaris
C compiler, usually found in /usr/opt/bin/cc or
/opt/SUNWspro/bin/cc.

Try adding a CC string to the lsof Makefile that points to
the Sun ANSI C version of the Sun C compiler -- e.g.,

```
    CC= /usr/opt/bin/cc
or
    CC= /opt/SUNWspro/bin/cc.
```

17.4 Why doesn't lsof work under my Solaris 2.4 system?

If
lsof doesn't work under your Solaris 2.4 system -- e.g.,
it produces no output, little output, or the output is
missing command names or file descriptors -- you may have
a pair of conflicting Sun patches installed.

Solaris patch 101945-32 installs a kernel that was built
with a <sys/auxv.h> header file whose NUM_*_VECTORS
definitions don't match the ones in the <sys/auxv.h> updated
by Solaris patch 102303-02.

NUM_*_VECTORS in the kernel of patch 101945-32 are smaller
than the ones in the <sys/auxv.h> of patch 102303-02. The
consequence is that when lsof is compiled with the <sys/auxv.h>
whose NUM_*_VECTORS definitions are larger than the ones
used to compile the patched kernel, lsof's user structure
does not align with the one that the kernel employs.

If you have these two patches installed, contact Sun and
complain about the mis-match.

You may be able to work around the problem by editing
/usr/include/sys/auxv.h to have the following NUM_*_VECTORS
definitions:

```
   #define NUM_GEN_VECTORS 4
    #define NUM_SUN_VECTORS 8
```

The Configure script issues a prominent WARNING that you should
try the work-around.

I thank Leif Hedstrom for identifying the offending patches.

17.5 Where are the Solaris header files?

If you try to compile lsof under Solaris and get a compiler
complaint that it can't find system header files, perhaps
you forgot to add the header file package, SUNWhea.

17.6 Where is the Solaris /usr/src/uts/<architecture>/sys/machparam.h?

When you try to Configure lsof for Solaris 2.[23456], 2.5.1, and 7 -- e.g., on a `uname -m` == sun4m system -- Configure complains:

```
  grep: /usr/src/uts/sun4m/sys/machparam.h:
No such file or directory
  grep: /usr/src/uts/sun4m/sys/machparam.h:
No such file or directory
```

And when you try to compile the configured lsof, cc or gcc complains:

```
  dproc.c:530: `KERNELBASE' undeclared (first use this function)
```

The explanation is that somehow your Solaris system doesn't have
the header files in /usr/src/uts it should have. Perhaps someone removed the directory to save space. Perhaps you're using a gcc installation, copied from another system. In any event, you will have to load the header files from the SUNWhea package of your Solaris distribution.

KERNELBASE is an important symbol to lsof -- it keeps lsof from sending an illegal kernel value to kvm_read() where a segmentation violation might result (a bug in the kvm library). Lsof can get illegal kernel values because it reads kernel values slowly with kvm_read() calls that the kernel is changing rapidly.

Lsof doesn't need KERNELBASE at Solaris 2.5 and above, because it has a KERNELBASE value whose address lsof can find with /dev/ksyms and whose value it can read with kvm_read(). Under Solaris 2.5 /usr/src/uts has moved to /usr/platform.

17.7 Why does Solaris lsof say ``can't read proc table''?

When lsof collects data on processes, using the kvm_*() functions to scan the
kernel's proc structure table, it
checks to make sure it has identified a reasonable number of them -- a minimum of three. When lsof can't identify three processes during a scan, it repeats the scan.

When five scans fail to yield three processes, lsof issues

the fatal message:

lsof: can't read proc table

and exits.

Usually lsof fails to identify three processes during a scan because its idea of the form of the proc structure differs from that being used by the kernel. Since the proc structure is defined in <sys/proc.h> and other /usr/include header files, the root cause of a proc structure discrepancy usually can be found in the composition of /usr/include.

One common way that /usr/include header files can be incorrect is that gcc was used to compile lsof, gcc used its special (i.e., "fixed") header files instead of the ones in /usr/include, and the special gcc header files weren't updated when Solaris was. Answers to these questions:

My Sun gcc-compiled lsof doesn't work -- why?

How can I make lsof compile with gcc under Solaris 2.[456], 2.5.1, 7, 8 or 9?

Why does Solaris Sun C complain about system header files?

discuss the gcc header file problem and offer suggestions on how to fix it or work around it.

It may also be that you are trying to run a version of lsof that was compiled on an older version of Solaris. For example, an lsof executable, compiled for Solaris 2.4, will produce the ``can't read proc table'' message if you try to run it under Solaris 2.5. If you have compiled lsof under Solaris 2.5 and it still won't work, see if the header files in /usr/include have been updated to 2.5, or still represent a previous version of Solaris.

Another source of header file discrepancies to consider is the Solaris patch level and whether a binary kernel patch was not matched with a corresponding header file update. See the "Why doesn't lsof work under my Solaris 2.4 system?" question for an example of one in Solaris 2.4 -- there may be other such patch conflicts I don't know about.

17.8 Why does Solaris lsof complain about a bad cached clone device?

When lsof revisions below 4.04 have been run on a Solaris system and have been allowed to create a device cache file, the running of revisions 4.04 and above on the same systems may produce this complaint:

```
lsof: bad cached clone device: ...
lsof: WARNING: created device cache file: ...
```

This is the result of a change in the device cache file that took place at lsof revision 4.04. The change introduced a node number into the clone device lines of the device cache file and was done in such a way that lsof could detect device cache files whose clone lines don't have node numbers (lines created by previous lsof revisions) and recognize the need to regenerate the device cache file.

17.9 Why doesn't Solaris make generate .o files?

Solaris /usr/ccs/bin/make won't generate .o files from .c files if /usr/share/lib/make/make.rules is missing. It may be found in and installed from the SUNWsport package.

17.10 Why does lsof report some Solaris 2.3 and 2.4 lock types as `N'?

For Solaris 2.3 with patch P101318 installed at level 45 or above, and for all versions of Solaris 2.4, NFS locks are represented by a NFS-specific kernel lock structure that sometimes lacks a read or write lock type indicator. When lsof encounters such a lock structure, it reports the lock type as `N'.

17.11 Why does lsof Configure say "WARNING: no cc in ..."?

When lsof's Configure script is executed with the solariscc abbreviation it tries to make sure it's using the Sun C compiler and not the UCB substitute from /usr/ucb/cc. Thus, it looks for cc in the "standard" Sun compiler location, /opt/SUNWspro/bin.

If Configure can't find cc there, it issues the warning:

```
lsof: WARNING: no cc in /opt/SUNWspro/bin;
using cc without path.
```

and uses cc for the compiler name, letting the shell find cc with

its PATH environment variable.

You can tell Configure where to find your cc with the
SOLARIS_CCDIR cross-configuration environment variable.
(See 00XCONFIG for more information on SOLARIS_CCDIR).
For example, use this Configure shell command:

```
SOLARIS_CCDIR=/usr/special/bin Configure -n solariscc
```

(SOLARIS_CCDIR should be the full path to the directory
containing your cc.)

## 17.12 Solaris 7, 8 and 9 Problems

### 17.12.1 Why does lsof say the compiler isn't adequate for Solaris 7, 8 or 9?

Solaris 7, 8 and 9 kernels come in two flavors, 32 and 64
bit. 64 bit kernels run on machines that support the SPARC
v9 instruction set architecture. Separate executables for
some programs, -- e.g., ones using libkvm like lsof -- must
be built for 32 and 64 bit kernels.

Previous Sun (e.g., SC4.0) and earlier gcc compilers will
build lsof for 32 bit kernels, but they won't build it for
64 bit kernels. Compilers that will build lsof for 64 bit
Solaris 7, 8 and 9 kernels are the Sun
WorkShop Compilers
C 5.0 and above, and recent gcc versions, e.g., 3.2.

When given the ``-xarch=v9" flag, the C 5.0 compiler and
above, and associated loader and 64 bit libraries will
build a 64 bit lsof executable; when given the "-m64" or
"-mcpu=v9" (deprecated) flags, an appropriate gcc compiler
will build a 64 bit lsof executable.

When the lsof Configure script detects a 64 bit kernel is
in use (e.g., by executing `/bin/isainfo -kv`), and when
it finds that the specified compiler is inappropriate,
it complains with these messages:

For gcc:

```
"!!!WARNING!!!=========!!!WARNING!!!=========!!!WARNING!!!"
"!                                                        !"
"! LSOF NEEDS TO BE CONFIGURED FOR A 64 BIT KERNEL, BUT  !"
"! THIS GCC DOESN'T SUPPORT THE BUILDING OF 64 BIT       !"
"! SOLARIS EXECUTABLES.  LSOF WILL BE CONFIGURED FOR A   !"
```

```
"! 32 BIT echo KERNEL.                          !"
"!
                !"
"!!!WARNING!!!=========!!!WARNING!!!=========!!!WARNING!!!"
```

For Sun C:

```
!!!WARNING!!!==========!!!WARNING!!!==========!!!WARNING!!!
!                                        !
! LSOF NEEDS TO BE CONFIGURED FOR A 64 BIT KERNEL, BUT    |
! THE VERSION OF SUN C AVAILABLE DOESN'T SUPPORT THE      !
! -xarch=v9 FLAG.  LSOF WILL BE CONFIGURED FOR A 32 BIT   !
! KERNEL.                                  !
!                                        !
!!!WARNING!!!==========!!!WARNING!!!==========!!!WARNING!!!
```

17.12.2 Why does Solaris 7, 8 or 9 lsof say "FATAL: lsof was compiled for..."?

Solaris 7, 8 or 9 lsof may say:

```
lsof: FATAL: lsof was compiled for a xx bit kernel,
but this machine has booted a yy bit kernel.

Where: xx = 32 or 64
yy = 64 or 32

(xx and yy won't match.)
```

This message indicates that lsof was compiled for one size kernel and is being asked to execute on a different size one. That's not possible for programs like lsof that use libkvm.

Depending on the instruction sets for which you need Solaris 7, 8 or 9 lsof, you may need two or more versions of lsof, compiled for each kernel size, installed for use with /usr/lib/isaexec. See the "How do I install lsof for Solaris 7, 8 or 9?" section of this document for more information on that.

17.12.3 How do I build lsof for a 64 bit Solaris kernel under a 32 bit Solaris kernel?

If your Solaris system has an appropriate compiler (e.g., WorkShop Compilers C 5.0 and above, or a recent gcc like 3.2) and the 64 bit libraries have been installed, you can

force lsof's Configure script to build a 64 bit version of
lsof with:

```
$ SOLARIS_KERNBITS=64 Configure -n solariscc
```

The SOLARIS_KERNBITS environment variable is part of the
lsof cross-configuration support, described in the 00XCONFIG
file of the lsof distribution.

17.12.4 How do I install lsof for Solaris 7, 8 or
9?

If you are installing lsof where it will be used only under
the bit size kernel for which it was built, no special
installation is required.

If, however, you are installing different versions of lsof
for different bit sizes -- e.g., for use on a 64 bit NFS
server and from its 32 bit clients -- you should read the
man page for isaexec(3C) and install lsof according to its
instructions.

The executable at the directory where lsof is to be found
should be a hard link to /usr/lib/isaexec or a copy of it.
In the directory there must be instruction architecture
subdirectories -- e.g., .../sparc/ and .../sparcv9/. The
lsof for 64 bit size kernels is installed in the .../sparcv9/
subdirectory; the one for 32 bit size kernels, in .../sparc/.

For example, if you're installing 32 and 64 bit lsof
executables in /usr/local/etc, you would:

```
# cd /usr/local/etc
# ln /usr/lib/isaexec lsof
# mkdir sparc sparcv9
# install the 32 bit lsof as sparc/lsof
# install the 64
bit lsof as sparcv9/lsof
# chmod, chown, and chgrp sparc/lsof and
  sparcv9/lsof appropriately
```

Lsof permissions and ownerships are the same whether one
or more lsof executables are being installed, with or
without the /usr/lib/isaexec hard link.

17.12.5 Why does my Solaris 7, 8 or 9 system say it cannot execute
lsof?

When you attempt to execute lsof, your Solaris 7, 8 or 9
shell may complain:

```
ksh: ./lsof: cannot execute
```

If the lsof executable exists and has the proper execution
permissions, this error may be the result of trying to
execute an lsof, built for a 64 bit kernel, on a 32 bit
kernel.

This will tell you about the lsof executable:

```
$ file lsof
lsof: ELF 64-bit MSB executable SPARCV9 Version 1,
dynamically linked, not stripped
```

The "64-bit" notation indicates the binary was built for
a 64 bit kernel. To see the running kernel bit size, use
this command:

```
$ isainfo -kv
32-bit sparc kernel modules
```

The "32-bit" notation indicates
a 32 bit kernel has been
booted.

The only work-around is to obtain, or Configure and make,
an lsof for the appropriate kernel bit size. If you
Configure and make lsof on the kernel where you wish to
run it the proper compiler, the lsof Configure step will
generate Makefiles that can be used with make to build an
appropriate lsof executable.

To compile a 64 bit lsof, you must have an appropriate
compiler -- i.e., Sun WorkShop Compilers C 5.0 or higher
or a recent gcc like 3.2.

17.12.6 What gcc will produce 64 bit Solaris 7, 8 and 9 executables?
8 and 9 executables?

Properly built and installed recent gcc versions -- e.g.,
3.2 -- will build lsof for 64 bit Solaris kernels.

If you update your gcc version to 3.2 or later, make sure
the private gcc header files become current -- i.e., clear
out any private header files from a previous gcc or Solaris
installation before installing the new ones, or build to

a new --prefix root and replace the old root with it after
the
build and installation are complete.

17.12.7 Why does lsof on my Solaris 7, 8 or 9 system say, "can't read namelist from /dev/ksyms?"

You're probably trying to use an lsof executable built for an earlier Solaris release on a 64 bit Solaris 7, 8 or 9 kernel. The output from `lsof -v` will tell you the build environment of your lsof executable. You should also have gotten a warning message that lsof is compiled for a different Solaris version than the one under which it is running -- something like this:

```
lsof: WARNING: compiled for Solaris release X; this is Y
```

You need to build lsof on the system where you want to use it. For 64 bit Solaris 7, 8 and 9 you need a compiler that can generate 64 bit Solaris executables -- e.g., the Sun Workshop 5 C compiler or later, or a recent gcc version like 3.2. See the "Why does lsof say the compiler isn't adequate for Solaris 7, 8 or 9?" section and the ones following it for a discussion of building lsof for 64 bit Solaris
7, 8 or 9.

17.13 Solaris and COMMON

17.13.1 What does COMMON mean in the NAME column for a Solaris VCHR file?

When lsof puts COMMON or (COMMON) in the NAME column of a Solaris VCHR file, it means that the file is handled by the special file system functions of the kernel through a common vnode.

17.13.2 Why does a COMMON Solaris VCHR file sometimes seem to have an incorrect minor device number?

When lsof reports on an open file in a Solaris special file system that uses a COMMON vnode, and the file is a VCHR file, lsof tries to locate the associated device node by looking for matches on the major and minor device numbers first.

If no major and minor match results, lsof then looks for a match on pseudo and clone device files. (See /devices/pseudo.)

Those device nodes are matched specially by either their
major or minor device numbers, but not both. Hence, when
lsof finds a match under those special conditions, it may
report a value in its output DEVICE column
that differs
from one of the major and minor numbers of the device node.

Here's an example from a sun4m Solaris 7 system:

```
$ ls -li /devices/pseudo/pm@0:pm
151261 crw-rw-rw-   1 root     sys      117,  0 ...
$ lsof /devices/pseudo/pm@0:pm
COMMAND ... DEVICE ...   NODE NAME
powerd       117,1 ... 151261 /devices/pseudo/pm@0:pm (COMMON)
Xsun    ...  117,0 ... 151261 /devices/pseudo/pm@0:pm
```

Note that the DEVICE value for the file with (COMMON) in
its name field has a different minor device number (1) from
what ls reports (0), while the DEVICE value for the file
without (COMMON) matches the ls output exactly. Both match
on the major device number, 117. The minor device number
mis-match is a result of the way the Solaris kernel handles
special file system common vnodes, and it's the reason lsof
puts (COMMON) after the name to signal that a mis-match is
possible.

17.14 Why don't lsof and Solaris pfiles reports always match?

/usr/proc/bin/pfiles
for Solaris 2.6, 7, 8, and 9 also
reports information on open files for processes. Sometimes
the information it reports differs from what lsof reports.

There are several reasons why this might be true. First,
because pfiles is a Sun product, based on Sun kernel
features, its developers have a better chance of knowing
exactly how open file information is organized. I sometimes
have to guess at how kernel file structure linkages are
constructed by gleaning hints from header files.

Second, lsof is aimed at providing information, specifically
device and node numbers, that can be used to identify named
file system objects -- i.e., path names. Thus, lsof tries
to make sure its device and node numbers match those reported
by stat(2). Pfiles doesn't always report numbers that
match stat(2) -- e.g., for files using clone and pseudo
devices via common vnodes like the nlist() /dev/ksyms usage.

Here's the Solaris 7 COMMON VCHR example again with additional pfiles output:

```
$ ls -li /devices/pseudo/pm@0:pm
151261 crw-rw-rw-   1 root     sys      117,  0 ...
$ lsof /devices/pseudo/pm@0:pm
vic1: 10 = lsof /dev/pm
COMMAND ... DEVICE ...   NODE NAME
powerd  ...  117,1 ... 151261 /devices/pseudo/pm@0:pm (COMMON)
Xsun    ...  117,0 ... 151261 /devices/pseudo/pm@0:pm
$ pfiles ...
0: S_IFCHR ... dev:32,24 ino:61945 ... rdev:117,1
...
14: S_IFCHR ... dev:32,24 ino:151261 ... rdev:117,0
```

Note that the NODE number, reported by lsof, matches what ls(1) and stat(2) report, while the ino value pfiles reports doesn't. Lsof also indicates with the (COMMON) notation that the DEVICE number is a pseudo one, derived from the character device's value. The lsof DEVICE value matches the pfiles rdev value, correct behavior for a character device, but pfiles gives no sign that it's not possible to find that character device number in /devices with ls(1) or stat(2).

17.15 Why does lsof say, "kvm_open(namelist=default, core=default):
Permission denied?"

Lsof needs permission to read from the /dev/kmem and /dev/mem memory devices. Access to them is opened via a call to the kvm_open() library function and it reports the indicated message.

You must give lsof permission to read the memory devices. The super user can almost always do that, but other lsof users can do it if some group -- e.g., sys -- has permission to read the memory devices, and the lsof binary is installed with the group's ownership and with the setgid permission bit enabled.

17.16 Why is lsof slow on my busy Solaris UFS file system?

Lsof may be slow on a busy Solaris UFS file system when UFS logging has been enabled with the "logging" mount option. That option can significantly increase disk operations under certain conditions -- e.g., when a lot of

files are accessed quickly.

When only the "logging" option is specified to mount, all file accesses (atime updates) are logged to the UFS logging queue.
Each atime update requires two writes to the disk to complete it.

If you want to do UFS logging -- and there are reliability advantages to it -- consider using the "logging,noatime" mount options instead. That will shift atime updates from the logging queue to fewer and independent asynchronous operations, consequently making the UFS logging queue a smaller bottleneck.

Consult mount_ufs(1M) for more information on the logging and noatime options.

(My thanks to Casper Dik for this tip on improving the performance of UFS logging.)

17.17 Why is lsof so slow on my Solaris 8 or 9 system?

Solaris 8 has a post-release feature upgrade modifying kernel name cache (DNLC) handling that can slow lsof throughput dramatically. The feature, sometimes called negative DNLC caching, is standard in Solaris 9.

As best I can tell, when you install the Solaris 8 MU1 package, you get negative DNLC caching. If this pipe produces any output, your system has negative DNLC caching.

```
$ nm /dev/ksyms | grep negative_cache_vnode
```

The reason negative DNLC caching perturbs lsof is that a single vnode address (found in the negative_cache_vnode kernel variable) is used to mark entries in the DNLC that are not (the negative part) found on disk.

Since a single vnode address (the DNLC key lsof uses) can represent many (I've seen upwards of 30,000.) DNLC entries, their presence overloads lsof's internal DNLC hashing function. An overloaded hash function is a slow hash function, and lsof's slows to a crawl when it encounters thousands of keys that produce the same value when the lsof DNLC hash function is applied to them.

The solution is simple -- ignore negative DNLC cache keys.
They don't represent path name components lsof can use.
Lsof revisions 4.50 and above have an addition that ignores
them and the performance of those lsof revisions improves
significantly when presented with negative DNLC cache keys.

If you don't have an lsof revision at 4.51
or later, there's
a work-around. Use lsof's ``-C'' option. It disables
lsof's DNLC caching. Of course, that also inhibits the
reporting of any path name components from the kernel DNLC.
When ``-c'' is used, lsof will continue to report file
system and character device paths.

## 17.18 Solaris and VxFS

### 17.18.1 Why doesn't lsof support VxFS 3.4 on Solaris 2.6, and above?

Lsof will not support VxFS version 3.4 on Solaris 2.6 and above
unless some files from VxFS Update 2 have been installed. VxFS
3.4 FCS and VxFS 3.4 update 1 lack the header files lsof
normally uses to obtain information from the VxFS 3.4 kernel
node structure, vx_inode. VxFS 3.4 Update 2 provides a method
whereby lsof can obtain the necessary vx_inode information from
the vxfsu_get_ioffsets() function in Veritas utility
libraries.

The utility libraries (32 bit and 64 bit versions) may be
found in /opt/VRTSvxfs/lib. An ancillary header file may
be found in /opt/VRTSvxfs/include/sys/fs/vx_libutil.h.
Documentation
of the vxfsu_get_ioffsets(3) function may be
found in /opt/VRTS/man/man3/vxfsu_get_ioffsets.3.

Those files of VxFS 3.4 Update 2 may be downloaded from:

ftp://ftp.veritas.com/pub/support/vxfs_34.i64243.tar

The vxfs_34.i64243.tar archive will unpack into an i64243
directory containing these files:

```
$ ls i64243
README
libvxfsutil.sol26.sums
libvxfsutil.sol26.tar.Z
libvxfsutil.sol27.sums
libvxfsutil.sol27.tar.Z
libvxfsutil.sol28.sums
```

```
libvxfsutil.sol28.tar.Z
```

Read README. Select the *.tar.Z file appropriate for your Solaris version. Its contents will unpack into /opt/VRTS and /opt/VRTSvxfs, so you will need sufficient permission -- e.g., do it as root -- to unpack the uncompressed archive. Once you've done that, it's a good idea to compare the checksums of the archive you unpacked with the ones recorded in the appropriate *.sums file. Use `sum -r` to verify the checksums.

For example, if you want the Solaris 8 version, uncompress and unpack libvxfsutil.sol28.tar.Z -- e.g.,

```
$ su
...
# cd i6423
# zcat libvxfsutil.sol28.tar.Z | tar xf -
```

That should create these new files and subdirectories with the indicated checksums:

```
File or subdirectory   sum -r

/opt/VRTSvxfs/include/vxfsutil.h  03938
/opt/VRTSvxfs/lib/libvxfsutil.a  51794
/opt/VRTSvxfs/lib/sparcv9/
/opt/VRTSvxfs/lib/sparcv9/libvxfsutil.a 07420
/opt/VRTS/man/man3/
/opt/VRTS/man/man3/vxfsu_get_ioffsets.3 62480
```

Once these files are in place, run lsof's Configure script for the solaris or solariscc abbreviation. Configure will locate the appropriate VxFS 3.4 Update 2 files and set up for the making of an lsof that will properly display open VxFS 3.4 file information.

17.18.2 Why does lsof report "vx_inode: vxfsu_get_ioffsets error" for open Solaris 2.6 and above VxFS 3.4 and above files?

Even when lsof supports VxFS 3.4 and above on Solaris 2.6 and above, it may report "vx_inode: vxfsu_get_ioffsets error" in the NAME column for all VxFS files.

The usual cause is that lsof doesn't have permission to read the file at the end of the /dev/vxportal symbolic

link.  If, for example, lsof has been installed setgid(sys), then the /dev/vxportal symbolic link destination should be owned by the sys group and readable by it.

Update 2 for VxFS 3.4 sets the modes of the /dev/vxportal symbolic link destination to 0640 and the group ownership to sys.  But I have had a report that the modes are wrong in a VxFS 4.0 installation.

Another cause may be that the system has more than one version of VxFS installed (Only one can be active.), and lsof's Configure script did not choose the header files and libraries for the active VxFS version.  Configure opts for VxFS 4.0 and above header files and libraries (in /opt/VRTS) in preference to those for VxFS below 4.0 (in /opt/VRTSvxfs).

Look for the directories /opt/VRTS and /opt/VRTSvxfs.  If you have /opt/VRTS,
make sure its header and library symbolic links
point to those of the active VxFS version.

If you have both directories, look at the CFLAGS that Configure constructed for making lsof and see which directory path follows a -I option.  If that doesn't match the directory path of the active VxFS version, try pointing Configure at the correct directory with the SOLARIS_VXFSINCL environment variable -- e.g.,

```
$ SOLARIS_VXFSINCL=/opt/.../include ./Configure -n solaris
```

17.18.3 Why does Solaris Configure claim there is no VxFS library?

The lsof Configure script, when configuring for Solaris, may report:

```
FATAL: no VxFS .../libvxfsutil.a
```

That fatal error message indicates lsof has found the VxFS utility library's header files, but can't find the library itself in the expected location adjacent to the header files.

One possible cause is an incorrect symbolic link from /opt/VRTS/lib/sparcv9/libvxfsutil.a to the library's real location.  (Some VxFS distributions
declared the link
incorrectly.)  Use `ls -lL` on that path to see if it exists.
If it doesn't exist, the link may be missing an additional leading "../" component.

If the problem is a missing "../" from the library's link, you can correct the link or check with Veritas/Symantec for the patch that corrects it.

If the problem is not a missing "../", and you know the libvxfsutil.a location, you can define its path in the SOLARIS_VXFSLIB environment variable before running the lsof Configure script. (See 00XCONFIG for information about using the SOLARIS_VXFSLIB environment variable.)

If you have no libvxfsutil.a, you must obtain it from Veritas/Symantec or find it in your VxFS installation package.

17.18.4 Why doesn't Solaris lsof report VxFS path name components?

Solaris lsof will report path name components for VxFS versions that use the common Solaris Dynamic Name Lookup Cache (DNLC) or on some file systems of VxFS versions that support the VxFS Reverse Name Lookup
(RNL) facility.

VxFS versions 3.3 (approximately) and below use the common Solaris DNLC. (I haven't been able to determine exactly when VxFS stopped using the DNLC.) For versions above that boundary, but below 4.0, lsof can't report path name components.

At VxFS 4.0 and above, lsof can be compiled to use the VxFS RNL facility for reporting path names. If "-DHASVXFSRNL" appears in the compiler flags section of lsof "-v" option output, then the lsof Configure script detected the VxFS RNL facility and lsof has been compiled to use it.

Lsof's use of the RNL facility can fail when the VxFS file system disk layout version is below 6. In that case, lsof can report no path name components. For more information, see the vxfs_inotopath(3) manual page. any of the following commands will show the disk layout version for a VxFS file system, when supplied the block device or mount point on which the file system is mounted.

```
   fstyp -v <block_device>
 or
   mkfs -m
<block_device>
 or
   vxupgrade <mount_point>
```

You must have permission to read the block device -- e.g., be the root user.

You may also be able to upgrade an older disk layout to one that will work with the RNL. See the vxupgrade(1M) man page for more information on that.

When lsof can't report VxFS path name components, it reports the file system mount point and the path name of device on which it is mounted. The device path name is enclosed in parentheses.

17.18.5 Why does Solaris 10 lsof report scrambled VxFS paths?

Solaris 10 lsof may report a bogus, scrambled path for an open VxFS file, when lsof obtains the path from a vnode's cached path. Veritas/Symantec reports that their Solaris 10 implementation has bugs in the way it handles the Solaris 10 vnode cached path and those bugs will be fixed in an upcoming patch some time after August 15, 2005.

When Solaris 10 lsof reports a path for an open VxFs file obtained via the VxFS Reverse Name Lookup facility,
the path
will be correct.

Also see the answers to the questions "Why does Solaris 10 lsof sometimes report the wrong path name?" and "Why doesn't Solaris lsof report VxFS path name components?"

17.19 Large file problems

17.19.1 Why does lsof complain it can't stat(2) a Solaris 2.5.1 large file?

When given an argument that is the path to a Solaris 2.5.1 file, enable for large file operations with the O_LARGEFILE open(2) option, lsof complains that it can't stat(2) the file. That's because lsof isn't using a stat(2) call and associated structure enabled for large files.

This error has been fixed, starting at lsof revision 4.58 for Solaris 2.6 and above. That fix won't work on Solaris 2.5.1 and I no longer have access to a Solaris 2.5.1 test system to develop a separate fix.

The work-around is to avoid specifying a O_LARGEFILE path as an argument to lsof on Solaris 2.5.1. Instead use a

combination of lsof and grep to achieve the same results, albeit more clumsily.

17.20
Why does lsof get a segmentation fault on 64 bit Solaris 8 using NIS+?

I have received a report from Gary Craig that lsof produces a segmentation fault on his 64 bit Solaris 8 system using NIS+. Via an independent test program we have exonerated lsof and tracked the fault to the NIS+ __nis_server_name() function in the C name server library, -lnsl.

Lsof causes the __nis_server_name() NIS+ function to be called by calling getservent() to read entries of the port number to service name map.

The only Sun bug ID that appears to describe the problem is 4304244, although its text is unclear enough to leave room for doubt.

Until Sun eliminates the __nis_server_name() segmentation fault cause, a work-around for lsof is to use its "-P" option, causing lsof to avoid port to service name lookups.

17.21 Will lsof crash the Solaris kernel?

I've received and investigated one report that it has when the Sun hardware (a QME interface) was faulty. Today (May 23,
2002) I've learned that Sun has reports of kernel crashes caused by adb, lsof, and mdb.

The Sun investigation pinpointed a problem in the /dev/kmem kernel driver and there is a Sun bug report, 4344513, about the problem. There is a fix in Solaris 9, and patches for Solaris 7 and 8 (SPARC and x86).

To see if your Solaris system is fixed, look for a /devices/pseudo/*allkmem node.

Extensive address filtering was added to lsof revision 4.50 to forestall what I then (July 2001) believed to be only the possibility that lsof might crash Solaris. However, the filtering isn't perfect, since a filtered address might become invalid after lsof has filtered it but before lsof has delivered it to /dev/kmem. That filtering work is described in .../dialects/sun/solaris_kaddr_filters, also

available at:

ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/solaris_kaddr_filters

The best and safest work-around is to upgrade to Solaris
9 or install an appropriate patch or its equivalent
from
this list:

```
Solaris SPARC  x86
Version Patch  Patch
======= =====  =====
  7 106541-20 106542-20
  8 108528-14 108529-14
```

17.22 Why does lsof on Solaris 7, 8, or 9 report a kvm_open() failure?

When lsof is started on some Solaris 7, 8, and 9 systems
it may report:

```
lsof: kvm_open(namelist=default, corefile=default): \
No such file or directory
```

Lsof revisions 4.65 and later will first report:

```
lsof: cannot stat /dev/allkmem
```

The second message, not delivered in lsof revisions below
4.65, explains the cause of the kvm_open() failure; it
can't find /dev/allkmem.

/dev/allkmem is a device added to Solaris 7 and 8 in patches
and in the Solaris 9 FCS. See the preceding "Will lsof
crash the Solaris kernel?" section for more information on
/dev/allkmem and the patches.

The kvm_open(3KVM) function in the KVM library of patched
Solaris 7 and 8 systems and in Solaris 9 expects to find
/dev/allkmem and exits on error when it does
not.

If you have installed the patch that updated your KVM
library to a version that expects /dev/allkmem to be present
and it is not, you may need to reconfigure your system's
devices with devfsadm(1M) or enter "boot -r" to the OpenBoot
monitor's prompt (usually "ok").

## 17.23 Solaris and SAM-FS

### 17.23.1 Why does Solaris lsof report "(limited SAM-FS info)"?

Lsof 4.68 and above report "(limited SAM-FS info)" on Solaris in the NAME column after the path or file system name for all files it finds on SAM-FS file systems.

That's because no more information is known about the composition of the nodes that follow SAM-FS vnodes. If you can provide that information, please contact me via e-mail at <abe@purdue.edu>. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

### 17.23.2 Why can't lsof locate named SAM-GS files?

Solaris lsof 4.68 and above can't locate files on SAM-FS file systems when the files are named as lsof arguments because
lsof doesn't know how to locate open SAM-FS file device and node number information. (See also 'Why does Solaris lsof report "(limited SAM-FS info)?')

## 17.24 Lsof and Solaris 10 zones

### 17.24.1 How can I make lsof list the Solaris zone?

Use the lsof "-z [z]" option.

### 17.24.2 Why doesn't lsof work in a Solaris 10 zone?

When run from within a Solaris 10 zone, lsof will usually report:

```
lsof: can't stat(/devices): No such file or directory
```

That's because a Solaris zone usually has no /devices subdirectory, a restriction of the zone implementation intended to limit the ability of zone processes to control global system resources, including physical devices.

While a zone may have a /dev subdirectory, that subdirectory usually lacks the /dev/allkmem, /dev/mem and /dev/kmem devices lsof and the KVM library it uses require.

The work-around is to run lsof in the global zone. When it is run in a global zone lsof will be able to report on processes

running
in any zone, including the global zone.

17.24.3 Why does lsof complain it can't stat() Solaris 10 zone file systems?

When run from the global zone on Solaris 10 lsof may complain:

```
lsof: WARNING: can't stat() 15 zone file systems;
 using dev= options
```

The warning message means lsof found the reported number of file system entries in the mount table for which it didn't have permission to get stat(2) results, but which had "zone=" and "dev=" mount table options.

That is a normal restriction of Solaris 10 zones. Since the lsof warning message indicates it was able to find "dev=" options for the file systems, lsof will probably work correctly.

One work-around is to relax the restrictions on zone mount points, so that lsof can stat() them. While that may be possible by changing directory modes or group ownerships, it is probably not a good idea, because it weakens the restrictions zones are intended to provide.

Another work-around is to suppress the warning message with
lsof's "-w" option. The down side of that is that it causes the suppression of all warning messages, leading to the possibility that some non-stat() warning messages will be suppressed.

17.25 Solaris 10 problems

17.25.1 Why does Solaris 10 lsof sometimes report the wrong path name?

When a path name component is renamed -- e.g., with mv(1) -- Solaris 10 lsof may report the old component for an open file that used the component in its path before the rename. That's because Solaris 10 lsof reports the path name cached in the open file's vnode and the Solaris 10 kernel doesn't update the open vnode's cached path name when a component of it is changed.

When an open file is deleted -- e.g., with rm(1) -- the path name by which it was opened remains cached in the vnode. Lsof can be instructed to display that path name with the -X option.

The path name might be incorrect because of the rename problem
described above. See the answer to the 'What does "(deleted)"
mean
in the NAME column of a Solaris 10 open file?' question
for more information.

Lsof is sometimes able to detect that cached path name is
incorrect. In that case lsof may report only the mounted-on
directory and device of the file system or it may report that
the path name is of questionable accuracy by appending a
trailing "(?)" to it in the NAME column.

See the answer to the "Why does Solaris 10 lsof sometimes
report only the mounted-on directory and device?" and 'What
does "(?)" mean in the NAME column of a Solaris 10 open file?'
questions for more information.

17.25.2 Why does Solaris 10 lsof sometimes report only the mounted-on
directory and device?

For some regular open files lsof may report only the mounted-on
directory and device of the file system on which the file
resides. That's because lsof was able to determine that the
path name cached in the open file's vnode is incorrect.

Lsof detects the cached path name is incorrect by applying
stat(2)
to it, provided that no error was detected when stat(2)
was applied to the file system mounted-on directory during lsof
setup. If a mounted-on directory stat(2) error was detected
during setup, lsof does no cached path name analysis and simply
reports it.

When the application of stat(2) to the cached path name returns
a no-entry reply (the ENOENT error number), lsof concludes the
path no longer exists (i.e., has been unlinked) and reports the
mounted-on directory and device of the file system. That
behavior can be modified with the -X option in lsof revisions
4.77 and above. See the answer to the 'What does "(deleted)"
mean in the NAME column of a Solaris 10 open file?' for more
information.

When the application of stat(2) to the cached path name returns
a permission error reply (the EACCES or EPERM error numbers),
lsof reports the cached path name and adds a trailing "(?)" to
indicate the reported path name is of questionable accuracy.
See the answer to the question

'What does "(?)" mean in the
NAME column of a Solaris 10 open file?' for more information.

If the application of stat(2) to the cached path name yields
any other error reply, lsof reports the mounted-on directory
and device of the file system.

When the application of stat(2) to the cached path name
succeeds, lsof compares the reported device and node numbers to
what it has obtained for the open file from kernel structures.
If they match, lsof reports the cached path name. If they
don't match, lsof instead reports the mounted-on directory and
device of the file system.

A work-around that allows lsof to apply stat(2) successfully to
cached path names is to give lsof sufficient permission to do
it -- i.e., run lsof as the root user.

17.25.3 What does "(deleted)" mean in the NAME column of a Solaris 10
open file?

When the -X option is specified to Solaris 10 lsof, it will
report in its NAME column the path name cached for a deleted
file in its vnode. The path
name will be followed by
"(deleted)".

Note that the path name cached in a file's vnode is the path
name by which the file was opened. It is not updated by the
Solaris kernel when any path name component is changed. Hence,
it may not represent the final path name the open file had.

See the answer to the "Why does Solaris 10 lsof sometimes
report the wrong path name?" question for more information on
how changing a path name component affects the correctness of a
what lsof reports.

17.25.4 What does "(?)" mean in the NAME column of a Solaris 10 open
file?

When lsof encounters a path name cached in the open file's
vnode that stat(2) reports lsof lacks permission to access,
lsof adds "(?)" to the path name reported in the NAME column to
indicate the path name is of questionable accuracy.

See the answers to the "Why does Solaris 10 lsof sometimes
report the wrong path name?" and "Why does Solaris 10 lsof
sometimes report only the mounted-on directory and device?"

questions
for more information on why lsof may report a path
name of questionable accuracy.

A work-around that allows lsof to apply stat(2) successfully to
cached path names is to give lsof sufficient permission to do
it -- i.e., run lsof as the root user.

## 17.26 Solaris contract file problems

### 17.26.1 Why doesn't lsof report size, link count and node number for Solaris 10 contract files?

Lsof doesn't report size, link count or node number for Solaris
10 contract files because I don't know how to obtain them from
contract file kernel structures.

### 17.26.2 Why can't lsof locate a Solaris 10 contract file by path name?

Because lsof can't find the node number of Solaris contract
files, it can't match the device and node numbers it gets from
applying stat(2) to the contract file path name with what it
finds in kernel data.

## 17.27 Solaris 10 and above ZFS probblems

### 17.27.1 Why does Configure warn that ZFS support is not enabled?

To provide ZFS support it is necessary that lsof
have access to
the definitions of ZFS structures used by the kernel.  Those
definitions are made available to lsof when it runs by the
libctl library.

If lsof's Configure script finds that ZFS is indicated by the
presence of the <sys/fs/zfs.h> header file, but the libctl
library is not indicated via the <libctl.h> header file, the
script concludes that ZFS support is not possible and issues
the following warning:

```
WARNING: ZFS support not enabled; libctf.h missing.
```

Install libctf support to remedy this problem.

## 17.28 Problems with Solaris 9 and above

### 17.28.1 Why does the compiler complain about lgrp_root on Solaris 9

and above?

When compiling lsof 4.84 on later Solaris 9 and 10 systems, the compiler may report the following error:

```
/usr/include/sys/lgrp.h", line ...: identifier redeclared: lgrp_root
```

This error results from a conflict between usage of lgrp_root in both <sys/lgrp.h> and <sys/lgrp_user.h> when _KMEMUSER or _KERNEL is #define'd before <sys/lgrp.h> is #include'd. This problem is noted in Sunsolve bug ID 5064229.

The work-around is to use lsof revision 4.85 sources.

## 18.0 Lsof Features

### 18.1 Why doesn't lsof doesn't report on /proc entries on my system?

/proc file system support is generally available only for BSD, SYSV R4 dialects, and Tru64 UNIX (Digital UNIX, DEC OSF/1). It's also available for Linux, and Pyramid DC/OSx and Reliant UNIX.

Even on some SYSV R4 dialects I encountered many problems while trying to incorporate /proc file system support. The chief problem is that some vendors don't distribute the header file that describes the /proc file system node -- usually called prdata.h.

### 18.2 How do I disable the device cache file feature or alter it's behavior?

To disable the device cache file feature for a dialect, remove the HASDCACHE definition from the machine.h file of the dialect's machine.h header file. You can also use HASDCACHE to change the default prefix (``.lsof'') of the device cache file.

Be sure you consider disabling the device cache file feature carefully. Having a device cache file significantly reduces lsof startup overhead by eliminating a full scan of /dev (or /devices) once the device cache file has been created. That full scan also overloads the kernel's name cache with the names of the /dev (or /devices) nodes, reducing the

opportunity for lsof to find path name components of open files.

If you're worried about the presence of mode 0600 device cache files in the home directories of the real user IDs that execute lsof, consider these checks that lsof makes on the file before using it:

1. To read the device cache file, lsof must gain permission from access(2).

2. The device cache file's modes must be 0600 (0644 if lsof is reading a system-wide device cache file) and its size non-zero.

3. There must be a correctly formatted section count line at the beginning of the file.

4. Each section must have a header line with a count that properly numbers the lines in the section. Legal sections are device, clone, pseudo-device, and CRC.

5. The lines of a section must have the proper format.

6. All lines are included in a 16 bit CRC, and it is recorded in a non-checksummed section line at the end of the file.

7. The checksum computed when the file is read must match the checksum recorded when the file was written.

8. The checksum section line must be followed by end-of-information.

9. Lsof must be able to get matching results from stat(2) on a randomly chosen entry of the device section.

For more information on the device cache file, read the 00DCACHE file of the lsof distribution.

18.2.1 What's the risk with a perverted device cache file?

Even with the checks that lsof makes on the device cache file, it's conceivable that an intruder could modify it so

it would pass lsof's tests.

The only serious consequence I know of this
change is the
removal of a file whose major device number identifies a
socket from some user ID's device cache file. When such
a device has been removed from the device cache file, and
when lsof doesn't detect the removal, lsof may not be able
to identify socket files when executed by the affected user
ID. Only certain dialects are at risk to this attack --
e.g., SCO OpenServer and Solaris 2.x, 7, 8, and 9.

If you're tracking a network intruder with lsof, that could
be important to you. If you suspect that someone has
corrupted the device cache file you're using, I recommend
you use lsof's -Di option to tell it to ignore it and use
the contents of /dev (or /devices) instead; or remove the
device cache file (usually .lsof_hostname, where hostname
is the first component of the host's name returned by
gethostname(2)) from the user ID's home directory and let
lsof create a new one for you.

18.2.2 How do I put the full host name in a personal device cache file
path?

Lsof
constructs the personal device cache file path name
from a format specified in the HASPERSDC #define in the
dialect's machine.h header file. As distributed HASPERSDC
declares the path to be ``.lsof_'' plus the first component
of the host name with the format ``.lsof_%L''.

If you want to change the way lsof constructs the personal
device cache file path name, you can change the HASPERSDC
#define and recompile lsof. If, for example, you #define
HASPERSDC to be ``.lsof_%l'' (note the lower case `l'),
Configure and remake lsof, then the personal device cache
file path will be ``.lsof_'' plus the host name returned
by gethostname(2).

See the 00DCACHE file of the lsof distribution for more
information on the formation of the personal device cache
file path and the use of the HASPERSDC #define.

18.2.3 How do I put the personal device cache file in /tmp?

Change the HASPERSDC definition in your dialect's machine.h
header file.

When you redefine HASPERSDC, make sure
you put at least
one user identification conversion in it to keep separate
the device cache files for each user of lsof. Also give
some thought to including the ``%0'' conversion to define
an alternate path for setuid-root and root processes.

Here's a definition that puts a personal device cache file
in /tmp with the name ``.lsof_login_hostname_pers''.

```
#define HASPERSDC "/tmp/.lsof_%u_%l_pers"
```

Thus the /tmp personal device cache file path for login
"abe" on host "lsof.itap.purdue.edu" would be:

```
/tmp/.lsof_abe_lsof.itap.purdue.edu_pers
```

You can add the User ID (UID) with the "%U" conversion and
the first host name component with the ``%L'' conversion.

CAUTION: be careful using absolute paths like /tmp lest
lsof processes that are setuid-root or whose real UID is
root be used to exploit some security weakness via /tmp.
Elect instead to add an alternate path for those processes
with the ``%0'' conversion. Here's an extension of the
previous HASPERSDC format
for /tmp that declares an alternate
path:

```
#define HASPERSDC "/tmp/.lsof_%u_%l_pers%0%h/.lsof_%L"
```

When the lsof process is setuid-root or its real UID is
root, presuming root's home directory is `/' and the host's
name is ``lsof.itap.purdue.edu'', the extended format yields:

```
/.lsof_vic
```

18.3 Why doesn't lsof know about AFS files on my favorite dialect?

Lsof currently supports AFS for these dialects:

AIX 4.1.4 (AFS 3.4a)
Linux 1.2.13 (AFS 3.3)
NEXTSTEP 3.2 (AFS 3.3)
Solaris 2.[56] (AFS 3.4a)

It may recognize AFS files on other versions of these

dialects, but I have no way to test that. Lsof may report correct information for AFS files on other dialects, but I can't test that either.

AFS support must be custom crafted for each UNIX dialect and then tested. If lsof supports your favorite dialect, but doesn't recognize its AFS files, probably I don't have access to a test system. If you want AFS support badly for your dialect, consider helping me do the development and testing.

18.3.1 Why doesn't lsof report node numbers for all AFS volume files, or how do I reveal dynamic module addresses to lsof?

When AFS is implemented via dynamic kernel modules -- e.g., in NEXTSTEP -- lsof can't obtain the addresses of AFS variables in the kernel that it uses to identify AFS vnodes. It can guess that a vnode is assigned to an AFS file and it can obtain other information about AFS files, but it has trouble computing AFS volume node numbers.

To determine node numbers for AFS volumes other than the root volume, /afs, lsof needs access to a hashed volume structure pointer table. When it can't find the address of that table, because AFS support is implemented via dynamic kernel modules, lsof will return blanks in the INODE column for AFS volume files. Lsof can identify the root volume's node number (0), and can compute the node numbers for all other AFS files.

If you have a name list file that contains the addresses of
the AFS dynamic modules -- e.g., you saved module symbols when you created a loadable module kernel with modload(8) by specifying -sym -- lsof may be able to find the kernel addresses it needs in that file.

Lsof looks up AFS dynamic kernel addresses for these dialects at these default paths:

NEXTSTEP 3.2 /usr/vice/etc/afs_loadable

A different path to a name list file with AFS dynamic kernel addresses may be specified with the -A option, when the -A option description appears in lsof's -h or -? (help) output.

If any addresses appear in the -A name list file that also

appear in the regular kernel name list file -- e.g., /vmunix
-- they must match, or lsof will silently ignore the -A
addresses on the presumption that they are out of date.

Found in path(s):
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/00FAQ
No license file was found, but licenses were detected in source scan.

```
/*
* Copyright 1994 Purdue Research Foundation, West Lafayette, Indiana
* 47907.  All rights reserved.
*
* Written by Victor A. Abell
*
* This software is not subject to any license of the American Telephone
* and Telegraph Company or the Regents of the University of California.
*
* Permission is granted to anyone to use this software for any purpose on
* any computer system, and to alter it and redistribute it freely, subject
* to the following restrictions:
*
* 1. Neither the authors nor Purdue University are responsible for any
*    consequences of the use of this software.
*
* 2. The origin of this software must not be misrepresented, either by
*    explicit claim or by omission.  Credit to the authors and Purdue
*    University must appear in documentation and sources.
*
* 3. Altered versions must be plainly marked as such, and must not be
*    misrepresented as being the original software.
 *
* 4. This notice may not be removed or altered.
*/
/*
* GetOpt() -- Local get option
*
* Liberally adapted from the public domain AT&T getopt() source,
* distributed at the 1985 UNIFORM conference in Dallas
*
* The modifications allow `?' to be an option character and allow
* the caller to decide that an option that may be followed by a
* value doesn't have one -- e.g., has a default instead.
*/
```

Found in path(s):
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/OLD/main.c

* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/main.c
No license file was found, but licenses were detected in source scan.

License: zlib and Sendmail and LGPLv2+

Found in path(s):
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof.spec
No license file was found, but licenses were detected in source scan.

```
/*
* Copyright 1994 Purdue Research Foundation, West Lafayette, Indiana
* 47907.  All rights reserved.
*
* Written by Victor A. Abell
*
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* and Telegraph Company or the Regents of the University of California.
*
* Permission is granted to anyone to use this software for any purpose on
* any computer system, and to alter it and redistribute it freely, subject
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*
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 *
* 4. This notice may not be removed or altered.
*/
/*
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*
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* 3. All advertising materials mentioning features or use of this software
```

```
*    must display the following acknowledgement:
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*      California, Berkeley and its contributors.
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*    without specific prior written permission.
*
* THIS SOFTWARE IS PROVIDED BY THE REGENTS AND CONTRIBUTORS ``AS IS'' AND
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* OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION)
* HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT
* LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY
* OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF
* SUCH DAMAGE.
*/
```

Found in path(s):
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/OLD/print.c
*
 /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/print.c
No license file was found, but licenses were detected in source scan.

Notes for the distribution of lsof version 3

```
**********************************************************************
| The latest release of lsof is always available via anonymous ftp |
| from vic.cc.purdue.edu.  Look in pub/tools/unix/lsof.            |
**********************************************************************
```

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Dialects Supported
==========

Lsof (for LiSt Open Files) lists files opened
by processes on
selected Unix systems. It's a major revision of lsof version 2,
and has been tested on:

AIX 3.2.5, 4.1[.[1234]], the IBM RISC/System 6000
and 4.2
BSDI BSD/OS 2.0, 2.0.1, Intel-based systems
and 2.1
DC/OSx 1.1 Pyramid systems
EP/IX 2.1.1 the CDC 4680
FreeBSD 1.1.5.1, 2.0, Intel-based systems
2.0.5, 2.1, 2.1.5,
2.2, and 3.0
HP-UX 8.x, 9.x, 10.01, HP systems (some combinations)
10.10, and 10.20
IRIX 5.2, 5.3, 6.0, 6.0.1, SGI systems
and 6.[1234]
Linux through 2.0 Intel-based systems
NetBSD 1.0, 1.1, and 1.2 Intel and SPARC-based systems
NEXTSTEP 2.1 and 3.[0123] all NEXTSTEP architectures
OpenBSD 1.2 and 2.0 Intel-based systems
OSF/1 2.0, 3.0, 3.2, and the DEC Alpha
4.0-BETA
Reliant UNIX 5.43 Pyramid systems
RISC/os 4.52 MIPS R2000-based systems
SCO OpenServer 1.1, 3.0, Intel-based systems
and 5.[024]
SCO UnixWare 2.1 and 2.1.1 Intel-based systems
Sequent PTX 2.1.[1569], Sequent systems
4.0.[23],
4.1.[024],
4.2[.1], and 4.3
Solaris 2.[123456], 2.5.1, Sun 4 and i86pc systems
and 2.6-Beta
SunOS 4.1.[1234] Sun 3 and 4
Ultrix 4.2, 4.3, 4.4, DEC RISC and VAX
and 4.5

(The pub/tools/unix/lsof/contrib directory on vic.cc.purdue.edu
contains information on other ports.)

If your favorite Unix dialect is not in the list, or if your version
of it is more recent than the ones listed, please contact me at

<abe@vic.cc.purdue.edu>.

## How Lsof Works

Using available kernel data access methods -- getproc(), getuser(), kvm_*(), nlist(), pstat(), read(), readx(), /proc -- lsof reads process table entries, user areas and file pointers to reach the underlying structures that describe files opened by processes.

Lsof interprets most file node structures -- advfsnodes, autonodes, cnodes, cdrnodes, devnodes, fifonodes, gnodes, hsnodes, inodes, mfsnodes, pcnodes, procnodes, rnodes, snodes, specnodes, s5inodes, tmpnodes. It understands NFS connections. It recognizes FIFOs, multiplexed files, Unix and Internet sockets. It knows about streams. It understands /proc file systems for some dialects. On many dialects it recognizes execution text and library references. It knows about AFS on some Unix dialects.

## Lsof Output

The lsof output describes:

* the identification number of the process (PID) that has opened the file;

* the process group identification number (PGRP) of the process (optional);

* the process identification number of the parent process (PPID) (optional);

* the command the process is executing;

* the owner of the process;

* for all files in use by the process, including the executing text file and the shared libraries it is using:

  * the file descriptor number of the file, if applicable;

  * the file's access mode;

  * the file's lock status;

* the file's device numbers;

* the file's inode number;

* the file's size or
offset;

* the name of the file system containing the file;

* any available components of the file's path name;

* the names of the file's stream components;

* the file's local and remote network addresses;

* other file or dialect-specific values.

## Getting Started Quickly

If you want to get started using lsof quickly, or see some examples of how lsof can be used, consult the 00QUICKSTART file of the lsof distribution.

The 00QUICKSTART file won't help you build or install lsof, but it will cut through the density of the lsof man page, giving you more readily an idea of what you can do with lsof.

For information on building and installing lsof, consult the 00README file of the lsof distribution.

## Limiting, Filtering, and Selecting Lsof Output

Lsof accepts options to limit, filter, and select its output.
These are the possible criteria:

* Process ID (PID) number -- to list the
open files for a given
process;

* Process Group ID (PGRP) -- to list the open files for all
the processes of a given process group;

* User ID number or login name -- to list the open files for

all the processes of a given user;

* Internet address -- to list the open files using a given Internet address (host name), protocol, or port (number or name); or to list all open Internet files;

* command name;

* file descriptor name or number;

* list all open NFS files;

* list all open Unix domain socket files;

* list all uses of a specific file;

* list all open files on a file system.

Selection options are normally ORed -- i.e., an open file meeting any of the criteria is listed. The selection options may be ANDed so that an open file will be listed only if it meets all the criteria.

In the absence of any selection criteria, lsof lists files open to all processes.

## Parsing Lsof Output with Another Program

The lsof -F option directs it to produce "field" output that can easily be parsed by another program. The lsof distribution contains sample awk, perl 4, and perl 5 scripts in its scripts subdirectory that show how to post-process field output.

## Repeat Mode

Lsof can be directed to produce output, delay for a specified time, then repeat the output, cycling until stopped by an interrupt or quit signal. This mode is useful for monitoring the status of some file operation -- e.g., an ftp transfer or a tape backup operation.

Repeat mode is more efficient when combined with lsof's selection options, since they limit lsof overhead.

It's possible to use lsof's field output options to supply repeat
mode output to another process for its manipulation.  The scripts
subdirectory of the lsof distribution has sample Perl scripts
showing how to consume lsof repeat mode output from a pipe.

Distribution Restrictions
==========

Lsof may
 be used and distributed freely, subject to these limitations:

1. Neither the author nor Purdue University is responsible for
  any consequences of the use of this software.

2. The origin of this software must not be misrepresented, either
  by explicit claim or by omission.  Credit to the author and
  Purdue University must appear in documentation and sources.

3. Altered versions must be plainly marked as such, and must not
  be misrepresented as being the original software.

4. This notice may not be removed from or altered in the lsof source
  files.

Cautions
========

Lsof is a tool that is closely tied to the Unix operating system
version.  It uses header files that describe kernel structures and
reads kernel structures that typically change from OS version to
OS version.

DON'T TRY TO USE AN LSOF BINARY, COMPILED FOR ONE UNIX OS VERSION,
ON ANOTHER.

On some Unix dialects, notably SunOS and Solaris, lsof versions
may be even more restricted by architecture type.  An lsof
 binary,
compiled for SunOS 4.1.3 on a sun4c machine, for example, won't
work on a sun4m machine.  Although I have no evidence that they
exist, the potential for similar restrictions exists in Solaris
versions of lsof.

AN LSOF BINARY, COMPILED FOR ONE SOLARIS ARCHITECTURE, ISN'T
GUARANTEED TO WORK ON A DIFFERENT SOLARIS ARCHITECTURE.

Distribution Contents
==========

The lsof distribution is checked for completeness when it is constructed and by the Inventory script when you run the Configure script. (See The Inventory Script section of the 00README file of this distribution.)

If you're worried you don't have everything, run the Inventory script. Here's aan approximate picture of what you should have:

lsof_<version>:

```
00CREDITS    00PORTING     Customize  lsof_fields.h  proc.c
00DCACHE     00QUICKSTART  Inventory  main.c         proto.h
00DIST       00README      arg.c      misc.c         scripts/
00FAQ        AFSConfig     dialects/  node.c         store.c
00MANIFEST   Configure     lsof.h     print.c        version
```

lsof_<version>/dialects:

```
aix/       epix/      linux/     osf/       riscos/  sun/
bsdi/      freebsd/   netbsd/    ptx/       sco/     ultrix/
common/    hpux/      next/      pyramid/   sgi/     unixware/
```

lsof_<version>/dialects/common:

```
00Manifest  dvch.frag   lkud.frag   prtf.frag   rnam.frag
ckfa.frag   fchi.frag   pcdn.frag   rdev.frag   rnch.frag
cvfs.frag   isfn.frag   prfp.frag   rmnt.frag   rvfs.frag
```

Specific dialects sub-directories may differ slightly, depending on the needs of the dialect, but they should all contain:

lsof_<version>/dialects/next:

```
Makefile  ddev.c   dlsof.h  dnode.c  dproto.h  dstore.c
Mksrc*    dfile.c  dmnt.c   dproc.c  dsock.c   machine.h
```

lsof_<version>/scripts:

```
00MANIFEST          count_pf.perl*      list_fields.awk
00README            count_pf.perl5*     list_fields.perl*
big_brother.perl5   list_NULf.perl5*    watch_a_file.perl*
```

Warranty

========

Lsof
 is provided as-is without any warranty of any kind, either
expressed or implied, including, but not limited to, the implied
warranties of merchantability and fitness for a particular purpose.
The entire risk as to the quality and performance of lsof is with
you.  Should lsof prove defective, you assume the cost of all
necessary servicing, repair, or correction.

Bug Reports
==========

Now that the obligatory disclaimer is out of the way, let me hasten
to add that I accept lsof bug reports and try hard to respond to
them.  I will also consider and discuss requests for new features,
ports to new dialects, or ports to new OS versions.

PLEASE DON'T SEND A BUG REPORT ABOUT LSOF TO THE UNIX DIALECT
VENDOR.

At worst such a bug report will confuse the vendor; at best, the
vendor will forward the bug report to me.

Please send all bug reports, requests, etc. to me via email at
<abe@purdue.edu>.

What's new in Version 3
=======================

I had three goals in mind for version 3:

1. Make it faster.

Lsof 3 defers as many lookup operations -- /dev scan, mount
table scan, /etc/services scan -- until they're needed.

I used prof on lsof and used its information to reduce lsof's
overhead.

2.  Make it easier to maintain and port to other systems, and
eliminate complicated nestings of #if/#else/#endif
pre-processor statements.

3. Add a few features:

o  ANDing of options;

o  Sorting of output by Process ID;

o  Searching for Unix domain sockets by name -- to a limited extent.

o  Process group ID support.  (This was a late addition.)

As a result of goal 2, the organization of lsof version 3 differs greatly from version 2.  The main directory contains totally common functions, a dialect subdirectory contains subdirectories of code specific to each Unix dialect that is supported.  There is also a dialects/common subdirectory that contains code fragments that are used by more than one, but not all dialects.

A top-level Configure script constructs
 the complete set of sources
for a given dialect and the Makefile at the top-level.  Configure is self-documenting.  When it is finished, Configure calls a second script, Customize, that assists with the modification of a few important compile-time options.

Version 3 Release Notes
==========

3.0  May 24, 1994
  This is the first official release of lsof 3.

3.01  May 27, 1994
  Corrected the #ifdef condition for HASPWSTAYOPEN under Sequent Dynix 3.0.12.

  Fixed bug that prevented the display of current working and root directory path names under SunOS 4.1.x, even when the user area contained pointers to them.

  Changed the strategy for allocating space to the local proc table in EP/IX, NEXTSTEP, Solaris, and SunOS.

  Closed the distance between reading the Solaris proc structure and its companion pid structure in an effort to avoid using a stale pid structure pointer.  A stale pid structure pointer sometimes

causes a segmentation violation in
kvm_read().

Added code to the SunOS kread() function to filter
out non-kernel addresses that might lead kvm_read()
to a segmentation violation. The Configure script
was updated to create a header file, kernelbase.h,
with the necessary kernel memory boundary value;
and to remove the header file when the -clean option
is specified. The Configure script now passes the
target name to the Mksrc shell script. It's used
by sun/Mksrc to determine the source for kernelbase.h.

3.02 June 2, 1994
Added #if's to of kernelbase.h for Solaris and
SunOS. This eliminates a redeclaration complaint
from old versions of SunOS.

Added code to process_file() in all dialects to
display "no more information" when f_count in the
file structure is zero.

3.03 July 8, 1994
Added support for displaying process group IDs.
This includes two new options: -j to select PGRP
display; and -g<list> to specify a list of PGRPs
whose files are to be displayed. (-j was chosen
to
match a similar option in some ps(1)'s.)

Philippe-Andre Prindeville <philipp@res.enst.fr>
suggested this addition.

3.04 July 15, 1994
Corrected handling of port name component of -i
option on systems where htons() is required.

Corrected casting of UID arguments -- needed when
UID is a short and the compiler wants the minimum
argument size to be larger.

3.05 July 26, 1994
Added printing of DECnet socket information for
the Ultrix 4.2 and 4.3 dialects. John Beacom
<beacom@wisnud.physics.wisc.edu> kindly provided
the test system. A new Configure abbreviation,
ultrix42dn, must be used to activate the DECnet
support.

3.06 September 2, 1994

The major news in this revision are the V/88 R32V3 and R40V4.2 ports for Motorola M88K systems. Chance Neale <cneale@panix.com> kindly provided test systems and Mike Feldman <feldman@charm.urbana.mcd.mot.com> provided technical assistance.

Version 3.06 contains other, minor modifications:

* The Configure script has been isolated from the environment, thanks to a report of a CC=xlc problem from Johnny Tolliver <jxt@ca04.cad.ornl.gov>. Johnny also suggested a better form for the install commands in the Makefile's install rule. This change affected all the dialect Mksrc scripts.

  A new HP-UX abbreviation (hpuxx25) was added for systems that have the /etc/conf/x25 include files. The old HP-UX abbreviation (hpux) no longer references /etc/conf or defines HPUX_CCITT.

* The command "lsof `tty`" now works most places (maybe not always for SGI IRIX, but I tried) thanks to a bug report from Casper Dik <casper@fwi.uva.nl>.

* A mode has been added to disable forking when debugging. The V/88 R40V4.2 debugger needed that.

* Printing of stream NAMEs was standardized (IRIX was different) and an attempt was made to avoid stream NAMEs like /dev/ttyx4->/dev/ttyx4.

* A new documentation file, 00FAQ, accompanies the distribution. It contains frequently asked questions about lsof, and the best answers I can manage to give.

* I have a new HP-UX test system, courtesy of Dave Curry <davy@ecn.purdue.edu> and George Goble <ghg@ecn.purdue.edu> of Purdue's Engineering Computer Network. I want to thank J. Nelson Howell <nelson@zeus.mgmt.purdue.edu> of Purdue's School of Management for his prior support of lsof development under HP-UX.

3.07 September 8, 1994

This revision contains a small security enhancement. Tim Ramsey <tar@ksu.ksu.edu> pointed out that lsof's setgid or setuid power might allow it's user to read an alternate kernel name list or memory file via the -c and -k options that the real UID might not have authority to read. In revision 3.07 lsof uses access(2) to check the real UID's authority to read files named with -c and -k.

3.08 September 23, 1994

This revision contains support for Novell's UnixWare, versions 1.1, 1.1.1, and 1.1.2. Peter Lord <plord@novell.co.uk> made this possible by providing a copy of UnixWare and supplying technical advice. Binaries and sources for this version will be available from Novell sources. See the Novell UnixWare section of the distribution's 00README file for details.

This version adds /proc file system support to the dialects derived from SYSV R4 (except EP/IX 2.1.1): FreeBSD, IRIX 5.2, Solaris, UnixWare, and V/88 R40V4.2.

This version compiles under IRIX 4.0.5 again, correcting a problem introduced at version 3.06 in the "lsof `tty`" fix.

HP-UX now skips file systems whose mount type is "ignore". The presence of the -c option is now controlled by the HASCOPT definition in machine.h. The HASSWAPPORT option is now documented and implemented correctly. Hans Petter Christiansen <hpchr@dxcern.cern.ch> suggested these changes.

3.09 October 18, 1994

This revision recognizes the DEC Alpha OSF/1 V3.0, IBM AIX 4.1, and Solaris 2.4 dialects. It has support for the SunOS 4.1.3 PC file system and two bug fixes: an IRIX, V/88, and Solaris file argument processing bug; and a V/88 include error.

Alex Kreis <akreis@us.oracle.com> made the initial request for DEC OSF/1 V3.0 support and provided help with testing. Ron Young <ron@screamer.nevada.edu>

graciously provided a test host. James Woodward <woodward@zk3.dec.com> provided invaluable clues to V3.0 kernel organization. Others who read the alpha-osf-managers mailing list made generous offers of test facilities, and I thank them, too. The decosf3 abbreviation was added to the Configure script, and the script was modified to request the name of the system configuration subdirectory of /sys where the configuration-specific header files reside for the decosf1, decosf2, and decosf3 configuration abbreviations.

Mark Peek <mark_peek@taligent.com> provided and tested the AIX 4.1 changes.

Casper Dik <casper@fwi.uva.nl> provided and tested the Solaris 2.4 changes.

Friedel Loinger <friedel@wise.tau.ac.il> suggested the addition of support for the SunOS 4.1.3 PC file system ("pcfs").

Andreas Stolcke <stolcke@ICSI.Berkeley.EDU> supplied a fix to a file argument processing bug that causes lsof to crash when supplied the path of an NFS mounted file. The bug affects lsof versions for Motorola V/88 R40V4.2, SGI IRIX 5.2, and Solaris 2.[123].

Corrected an error in the path to include prdata.h in dlsof.h for Motorola V/88 R40V4.2.

3.10 October 21, 1994

This revision adds support for the cache and PC file systems to Solaris. It fixes these bugs: a problem with the display of Motorola V/88 R40V4.2 device numbers; and a failure of Readlink() to resolve symbolic links completely in all cases.

Some major internal restructuring was necessary to be able to display negative inode numbers for SunOS PC file system nodes, while displaying them as unsigned numbers for Solaris, hence all dialect versions were affected.

3.11 October 28, 1994

This revision adds support for Linux version 1.0.9.
Tim Korb <jtk@arthur.cs.purdue.edu> kindly provided
a development system in the Computer Science
Department at Purdue. It is likely that the Linux
revision will have to be adjusted for each installation,
and it is probable that this revision will not run
under later versions of Linux. See the 00FAQ and
00REAME files for more information on Linux tuning.

3.12 October 29, 1994
This revision supports Linux version 1.1.47 -- the
Yggdrasil Plug-and-Play Linux Fall '94 release.
Both Linux versions now obtain kernel symbol
addresses from the /zSystem.map file.

November 4, 1994
Hendrik G. Seliger <hank@Blimp.automat.uni-essen.de>
reports that lsof compiles and seems to work under
Linux 1.1.61. He used the linux1147 Configure
abbreviation. Marty Leisner <leisner@sdsp.mc.xerox.com>
reports that the linux1147 Configure abbreviation
produces
a working lsof for Linux 1.1.64, too.

3.13 November 11, 1994
This revision contains Pyramid DC/OSx support, provided
by Anthony Shortland <Anthony.Shortland@FMR.com>.

Marty Leisner <leisner@sdsp.mc.xerox.com> reported
a segmentation violation failure in Linux lsof.
In response I changed its task structure access to
use /dev/kmem instead of mmap'ing kernel memory.
This avoids a possible segmentation violation when
bad pointers are obtained from kernel memory. I
also enabled the setting of Linux INET and Unix
select flags so that the -n and -U options work --
I forgot to do that when I did the Linux port.

Marty Leisner reports that the lunix1147 Configure
abbreviation produces a working lsof for Linux
1.1.64, too.

Francois Pindard <pinard@iro.umontreal.ca> provided
a correction to the Linux install rule.

3.14 November 16, 1994
This revision adjusts the Configure script stanzas
for DEC OSF/1, Motorola V/88, Pyramid DC/OSx, and

Ultrix.
It also contains additional support for
DC/OSx and Ultrix.

Bruce Beare <bjb@pyramid.com> and Robert Vernon <bob@pyramid.com.au> helped me understand Pyramid nomenclature. Robert Vernon provided DC/OSx support for the RxFS file system and added machine series auto-detection to the Configure script. Alex Podlecki <a.podlecki@att.com> helped test the updated DC/OSx distribution.

Chris Timmons <skynyrd@tahoma.cwu.edu> provided information on RISC and VAX Ultrix 4.4 that led to correct prefixing of nlist() names. I updated the Configure script to detect Ultrix version, machine hardware type, and the presence of DECnet support.

I also updated the OSF/1 and V/88 Configure scripts to determine configuration parameters automatically.

3.15 November 25, 1994
Corrected DEC OSF/1 V2.0 support of the ADVFS file system.

Bernt Christandl <beb@mpe-garching.mpg.de> and Alex Kreis <akreis@us.oracle.com> helped test. No OSF/1 V1.x system with ADVFS
was available for testing.

3.16 December 2, 1994
Fixed some device number handling bugs in DEC OSF/1 V2.0 and V3.0 support.

3.17 January 25, 1994
lsof now supports SGI IRIX 5.3, thanks to changes supplied by Dave Olson <olson@anchor.engr.sgi.com>; and SCO OpenDesktop or OpenServer releases 1.1 and 3.0, thanks to support from Dion Johnson <dionj@sco.com>, Bela Lubkin <belal@sco.com>, and Nathan Peterson <nathanp@sco.com>.

Dave Olson pointed out an IRIX stream handling bug in sgi/dnode.c. When I investigated it, I found that it had implications wider than SGI IRIX. The eventual fix provided the display of inode numbers for character devices when the inode number must be obtained from /dev. IRIX, Solaris, and SunOS

benefit from the fix.

I added version detection to the Configure script,
so there is now just one Configure abbreviation
for IRIX versions 4.05, 5.2, and 5.3 -- ``irix''.
(The Configure abbreviation for the SCO dialect
``sco''.)

Ian
Darrow <ian@sq.com> pointed out that lsof
wouldn't Configure or work properly under Solaris
on an i86pc. Sorting out the difficulties made
clear that the HASSWAPPORT definition should be
removed from every machine.h file and that ntohs()
should be used in every dsock.c on every port
supplied to printinaddr().

Andreas Stolcke <stolcke@ICSI.Berkeley.EDU> pointed
out a method that sometimes allows lsof to report
on files open to a crashed or unavailable remote
NFS server. This led to the addition of code,
where possible, to estimate the device number of
mount points that cannot be stat()'d. The alternate
device number can come from /etc/mtab or /etc/mnttab,
or from the dialect's version of them. On systems
that use /etc/mtab or /etc/mnttab, it is sometimes
possible to add the device number manually to the
mount options field in the form ``dev=xxxx''. Some
internal changes in the way lsof handles device
numbers were necessary to prevent ones
whose dev_t
typedef is a signed short from causing sign extension
when promoted to integers as function arguments.

David Addison <addy@meiko.co.uk> and Robert Ehrlich
<Robert.Ehrlich@inria.fr> pointed out that lsof
errs when reporting device numbers and other node
information for some special Sun files. I rewrote
most of sun/dnode.c to correct the problem; Robert
rewrote it again; and I rewrote it once more.
David and Robert helped me test it under Solaris
2.[34] and SunOs 4.1.[23].

While using code from the Motorola V/88 port for
the SCO port, I found and fixed some NFS bugs in
the V/88 port.

3.18 January 31, 1995

I added the -b and -w options. The -b option causes
lsof to avoid the functions lstat(2), readlink(2),
and stat(2) that might block in the kernel -- e.g.,
when they reference an inaccessible NFS file system.
Instead it uses alternate device numbers obtained
from the mount table, where possible.

The -w option causes lsof to suppress
warning
messages -- e.g., when the -b option has been
specified. The suppression of warning messages
was formerly bundled into the -t option. The -t
option now selects -w.

I figured out how to make alternate AIX 3.2.5 device
numbers from the kernel mount structure. The new
-b option therefore works under AIX 3.2.5.

With the help of Chance Neale <cneale@panix.com>
I fixed bugs in the Motorola V/88 R32V3 NFS support.

I added a solariscc Configure abbreviation for those
who want to use Sun's C compiler.

3.19 February 10, 1995
Robert Ehrlich <Robert.Ehrlich@inria.fr> pointed out
that lsof might be able to gather more complete path
name information from the kernel's name cache. Name
cache access may be inhibited with the new -C option.
Revision 3.19 implements name cache access for:

DEC OSF/1 [23].0
Dynix (Purdue 3.0.12)
EP/IX 2.1.1
FreeBSD 1.1.5.1
HP-UX 9.01
Motorola V/88 R40V4.2
NEXTSTEP 3.1

SGI IRIX 5.3
Solaris 2.[34]
SunOS 4.1.x
Ultrix 2.2 and 4.2

Revision 3.19 does NOT implement name cache access for:
===

AIX The knlist() function won't

return cache addresses --
some IBM wisdom to "protect"
their customers.

Linux My only access is to 1.0.9,
and it doesn't seem to have
a kernel name cache.

Motorola V/88 It doesn't have a unified
R32V3 name cache.

Novell UnixWare I don't have a test system.

Pyramid DC/OSx I don't have a test system.

SCO OpenDesktop It doesn't have a unified
OpenServer name cache.

SGI IRIX 4.0.5H I saw no unified name cache
in the header files before
my 4.05H system was converted
to 5.2.

SGI IRIX 5.2 I don't have a test system.

Another Robert Ehrlich suggestion led to the
establishment of a device cache file feature. The
new -D option gives control of it. This feature
speeds lsof dramatically
on some dialects after
lsof has been called once and the cache has been
built. (Calling stat(2) on several hundred or
thousand /dev nodes can take a long time.) The
feature can be disabled or modified in the machine.h
header file and the dialects/*/ddev.c source file
when lsof is built.

3.20 February 23, 1995

Upgraded Linux socket handling for versions 1.1.75
or greater with help from Marty Leisner
<leisner@sdsp.mc.xerox.com> and Linus Torvalds
<Linus.Torvalds@cs.Helsinki.FI>. There is now a
single Configure script abbreviation for linux.

Updated for Motorola V/88 R40V4.3 with help from
Mike Feldman feldman@charm.urbana.mcd.mot.com>
and Chance Neale <cneale@panix.com>.

Updated for SGI IRIX 6.0 with help from Przemek Klosowski <przemek@rrdjazz.nist.gov and Dave Olson <olson@anchor.engr.sgi.com>.

Corrected access of device cache file that needs to be updated so that someone other than the file owner can rewrite it. Deleted the chmod() failure warning.

Updated Configure and the Sun Makefile to specify absolute paths to the Sun install program.

3.21 March 3, 1995

Removed BSDI BSD/386 support, because I no longer have a test system, and I needed to have separate sources for two of the three dialects (FreeBSD, and NetBSD) once served by the BSDI BSD/386 sources. FreeBSD sources are now in the freebsd subdirectory; NetBSD, in netbsd.

With the help of Greg Earle <earle@isolar.Tujunga.CA.US> and Paul Kranenburg <pk@cs.few.eur.nl> installed new NetBSD support for versions 1.0 and 1.0A. The NetBSD 0.9 support was removed. The 1.0A support has been tested on Intel and SPARC-based systems.

3.22 March 9, 1995

Fixed a bug in name cache handling that occasionally caused lsof to cause a segmentation violation on FreeBSD. Although the bug didn't do that anywhere else, recreated the binaries of all dialect versions that use the affected code from rnam.frag and rnch.frag.

3.23 March 24, 1995

Removed forgotten HASSWAPPORT reference from HP-UX machine.h and inserted ntohs() calls in the printinaddr() calls of dsock.c for HP-UX and NEXTSTEP.

Added support for NEXTSTEP 3.3, courtesy of Allan Nathanson <ajn@NeXT.com>

3.24 March 31, 1995

Changed Configure script to handle DEC OSF/1 V3.2. Removed leading zero from DEC OSF/1 and ADVFS version values. Added dialects/osf/dec_a/3.2 header file directory, courtesy of Dave Morrison

<dmorriso@us.oracle.com>, who also tested the 3.24
DEC/OSF1 V3.2 lsof.

3.25 April 5, 1995
Ported to RISC/os on a R2030 (R2000-based) system,
provided by Zdenko Tomasic <zdenko@harvey.cam.rice.edu>.

Tightened security on the device cache file; lsof
always tries to change its ownerships to the effective
IDs after creating it. This was suggested by Stefan
Kelm <kelm@cert.dfn.de>.

Ported to FreeBSD 2.0, starting with work done by
Kurt Jaeger <pi@complx.stgt.sub.org> on lsof revision
3.16. Ade Barkah <mbarkah@hemi.com>
and William
McVey <wam@cs.purdue.edu> provided test systems.

3.26 April 20, 1995
Ported to SCO OpenDesktop or OpenServer 5.0 (aka
Everest and 3.2v5.0.0). Hugh Dickins <hughd@sco.COM>,
Bela Lubkin <belal@sco.COM>, Craig B. Olofson
<craigo@sco.COM>, and Nathan Peterson <nathan@sco.com>,
provided me an early-release version of 3.2v5.0.0
and gave technical advice.

Added length checking of the Namech buffer to the
printinaddr() function.

3.27 May 2, 1995
Corrected typo in AIX install rule, courtesy of a
report from John Colgrave <colgrave@hursley.ibm.com>.

At the suggestion of Greg Earle
<earle@isolar.Tujunga.CA.US> added a function to
print the name of the unknown protocol (the AF_*
symbol), when there is no specific processing for
it in dsock.c. This change affected most dialects:
exceptions are DC/OSx, Linux, Motorola V/88, and
UnixWare.

3.28 May 26, 1995
Added support for Sequent PTX 2 and PTX 4. The
PTX 2.1.6 and PTX 4.0.2 test
systems and technical
advice were provided by Gerrit Huizenga
<gerrit@sequent.com>, Peter Jordan <petej@sequent.com>,
Kevin Smallwood <kcs@sequent.com>, and Mike Spitzer

<mks@sequent.com>. (Thomas A. Endo) <tendo@netcom.com>
and (David Putz). <PutzDW@PO1.LMB.unisys.com> tested
under PTX 2.1.5. Bob Foertsch <foertsch@uiuc.edu>
tested under PTX 4. Kevin Smallwood tested under
2.1.1. Others who helped include Shane Kenney
<shane@sequent.com>, Stephan Rossi <rossi@mtu.edu>,
Douglas R. Smith <drsmith@us.oracle.com>, and Joel
White <jdwhite@netcom.com>.

Changed the local dev structure's name to l_dev to
avoid conflicts with the PTX dev structure. Added
a common/rdev1.frag -- a variant of rdev.frag. It's
used by EP/IX, PTX, RISC/os, and V/88.

Changed printname() to check Namech first and print
it if it contains something. This eliminates some
hacks in the handling of names for streams, but
generates some duplicate device name look-up code
in
the dnode.c files of some dialects.

3.29 June 2, 1995
Added clone device support to Motorola V/88 R40V4.3.

Added a generic ``-X" option for dialect-specific
use. Used it in AIX to allow use of readx(). Lsof
no longer uses readx() by default, because its use
can cause an AIX 3.2.x and 4.1.x kernel error to
appear. Kevin Ruderman <rudi@acs.bu.edu> reported
this bug to me and the possibility that lsof might
trigger it.

The error, known as the Stale Segment ID bug, hangs
the kernel in its dir_search() function, thus
hanging the application process that called it so
tightly that the application process can neither
be killed nor stopped. The bug does not directly
affect lsof, but may cause the hang when the kernel
is searching directories for other processes.
00FAQ and 00README describe the Stale Segment ID
bug in more detail. Consult dialects/aix/machine.h
for options on enabling or disabling readx() by
default, or permanently enabling or disabling
it
with the HASXOPT and HASXOPT_VALUE definitions.

When not using readx(), AIX lsof may not report
fully on all text and loader references. Changes

to the kernel getuser() function in AIX 4.1.1 appear
to have eliminated the text file and loader file
reference information that once led lsof to use
readx(); of course, without that information, lsof
can no longer report on the executing text file or
shared libraries in 4.1.1.

Changed the Configure script to use a single
abbreviation, aix, for AIX. Configure now uses
/usr/bin/oslevel to determine the AIX version; in
the absence of /usr/bin/oslevel, Configure issues
a warning and assumes the version is 3.2.0. Source
code changes were made to dialects/aix/*.[ch] to
accommodate the new form of the _AIXV value.

3.30 June 8, 1995
Added -c to the installation of the man page in
the Ultrix Makefile's install rule. Thanks go to
Jules van Weerden <Jules.vanWeerden@let.ruu.nl>
for noticing this
omission.

Made FreeBSD 2.0 changes: 1) added automatic sensing
of the FreeBSD 2.0 boot file path, using the
getbootfile(3) function (suggested by Ade Barkah);
2) changed kvm_getprocs(3) function call to use
KERN_PROC_ALL symbol from <sys/sysctl.h>, thus
eliminating incorrect use of the <sys/kinfo.h> and
<sys/kinfo_proc.h> header files; and 3) removed
<sys/kinfo.h> and <sys/kinfo_proc.h> header files
from the dialects/freebsd/include/2/sys subdirectory
of distribution.

Tested under AIX 4.1.2.

3.31 June 16, 1995
Added the NOUSAGEONERR definition to allow lsof to
be compiled with the displaying of usage information
after option error messages disabled. Lsof is
distributed without the NOUSAGEONERR definition --
i.e., usage output is displayed after option error
messages.

Worked on documentation in the 00* files and the
man page, adding tables of contents, making usage
more consistent, trying to insure proper dialect
titles, and inserting some

notes about distribution
restrictions (few) and warranty (none).

Fixed Motorola V88 R32V3 bug in handling Internet files. This bug was introduced some time ago, but I have only recently been able to test under R32V3 again.

3.32 June 23, 1995

Added the ability to the Linux nlist() function to automatically detect that the kernel binary is COFF or ELF form. Also corrected the UID_ARG cast from int to u_int. These changes were suggested by Michael Shields <shields@tembel.org>. Joseph J. Nuspl Jr. <nuspl@nvwls.cc.purdue.edu> provided a test system.

Updated lsof for HP-UX 10. Richard Allen <ra@rhi.hi.is> provided a test system. The hpux stanza in the HP-UX configure script was updated to sense the HP-UX version automatically, and to sense the availability of CCITT header files in /etc/conf/x25.

3.33 June 28, 1994

Added options to select "field" output that can be parsed by a subsequent program. (The -f, -F, and -0 options form the selection set.) Provided sample awk and Perl scripts for parsing and displaying field output. This feature was suggested by Dan Bernstein <djb@silverton.berkeley.edu>.

Tested under PTX 4.0.3.

3.34 June 30, 1995

Changed display of file offset to decimal in the form "0t12345678" if it is less than 100,000,000. The offset is displayed in hexadecimal in the form "0x12abcdef" if it is larger than 99,999,999.

Changed inode field output from signed to unsigned decimal. Updated the list_fields.{awk,perl} and list_NULf.perl5 scripts.

Documented the truncated inode output form (leading `*' and 5 digits) for inodes that are too large for the output field; thanks go to Leonard Sitongia <sitongia@zia.hao.ucar.edu> for pointing out that

this wasn't documented.

3.35 July 9, 1995

Added loopback file system support to Solaris with advice from Casper Dik <casper@Holland.Sun.COM>.

Removed the NOUSAGEONERR compile option in favor of producing a shortened usage message when option errors are detected.

Marty Leisner <leisner@sdsp.mc.xerox.com> provided code to validate the Linux system map file (/System.map or /zSystem.map). If lsof detects that the system map file doesn't match the booted kernel, it complains and quits.

Updated host name cache to include dot forms -- e.g., when the host name can't be obtained via gethostbydddr(). This prevents subsequent lookup delays for the same address.

3.36 July 20, 1995

Updated kernel name cache handling to assume a default size for pointer-linked caches (DEC OSF/1, FreeBSD, NetBSD, and SGI IRIX 5.3) when the kernel's cache size variable has a value of zero. A warning is issued, but lsof proceeds to read and use the name cache.

Folded rdev1.frag into rdev.frag by supporting a HASDNAMLEN #define for those dialects whose DIRTYPE structure has a d_namlen definition.

Updated Linux distribution to avoid using d_namlen from struct dirent if the Linux version is 1.2.10 or greater. This avoidance might work on earlier version of Linux, too, but I have no way of telling.

Added support for FreeBSD 2.0.5. Ade Barkah <mbarkah@hemi.com> provided a test system.

Added WARNDEVACCESS definition to machine.h control the default issuance of device directory and subdirectory access errors.

Changed options:

-m (mount warning) option deleted

-c (core file) option changed to -m
-c option redesignated as command selector
-d (device warning) option deleted
-d option redesignated as file descriptor selector
-O (order) option changed to less-overhead option
-r option added to enable repeat mode

Added a repeat mode in which lsof will display output, sleep for the number of seconds defined by the repeat-mode option, -r <seconds>, and then display output again, doing this repetitively until it receives an interrupt or quit signal. This option is much more efficient for monitoring a file than calling lsof repeatedly from a shell script, since it entails only one set of lsof startup operations.

The CANDOCHILD compile-time option has been removed. The -O run-time option will do the same thing.

3.37 July 27, 1995

Fixed incorrect setting of low-overhead flag from -O option.

Marty Leisner reports that d_namlen is not needed under Linux 1.2.8. Changed the #if test that sets HASDNAMLEN accordingly.

Made more changes to option processing: combined -f, -F, and -0 into -F (-0 becomes a field identifier value for -F); now allow -F, -g, -r, and -S to have an optional value; made -F? (help) and -F0 (all fields plus NUL terminator) special forms of -F; and added support for --. These option processing changes are handled with a local getopt() function (named GetOpt() to avoid confusion).

Made yet another attempt to create "standard" install and deinstall SunOS/Solaris Makefile rules.

Corrected improper use of examine_lproc() when in repeat mode.

3.38 August 3, 1995

Modified Linux and PTX to show TCP's "send next" sequence number as the offset for TCP socket files.

Added some version tests for Linux 1.3.0, provided by
Roman Gollent <roman@portal.stwing.upenn.edu>.

Added some more PTX tests around code that shouldn't
be active when the NFS layered product is unavailable.
Mark Vasoll <vasoll@a.cs.okstate.edu> provided them.

3.39 August 10, 1995

Added generic support for dialect-specific elements
in the lfile structure. The HASLFILEADD and
SETLFILEADD macroes are used in lsof.h to define
the elements and in proc.c to preset them. Field
identifiers `1' through `9' are allocated to
dialect-specific files. The HASFIELDAP<x> strings
define the -F? help text for the FieldSel[] table
of store.c, and LISTLFILEAP<x> are macroes, used
in the print_proc() function of proc.c, to list
fields. (<x> is the field identifier.) Other
private element and field processing should be done
in dialect-specific
modules.

Used {HAS,SET}LFILEADD, HASFIELDAP[12], and
LISTLFILEAP[12] to define and list link count and
inode address lfile elements under PTX. Used the
-X option to control when the values are displayed.

3.40 August 25, 1995

Added support for Solaris 2.5-BETA, including
rudimentary support for door files and extensive
support for fattach'ed files with the help of Henry
Katz <hkatz@panix.com>, Joseph Kowalski
<jek3@jurassic.Eng.Sun.COM>, and Mike Tracy
<mtrac@jurassic-45.Eng.Sun.COM>.

Changed most dialects to use slightly safer fchown()
on the device cache file. Changed dvch.frag to
avoid creating a device cache file that is owned
by root. Cleared caches when reading of device
cache file fails and removed extra NL from device
cache error messages.

After receiving yet another complaint about Makefile
install rules, I decided to remove all install and
deinstall rules from the distribution Makefiles.
The Makefiles now contain a set

of comments (echo
commands) that describe what the install rule might
be. The lsof user is now free to construct install
and deinstall rules that meet local conventions
and preferences.

3.41 September 5, 1995
Changed Linux kernel symbol handling to avoid the
stripping of leading `_' characters that was
installed in revision 3.32. (Recent Linux kernels
have some symbols that are the same except for the
leading `_'.)

The Linux kernel loader format is now determined
by testing for "_system_utsname" (COFF) and
"system_utsname" (ELF) in the symbols returned by
the get_kernel_syms() syscall. If neither or both
symbols are present, a warning is issued and COFF
format is assumed. If the loader format is COFF,
then kernel symbols important to lsof are assumed
to have a leading `_'.

Because recent Linux releases add a parameter
hashing suffix to kernel symbols, lsof removes it
before comparing kernel symbol names and addresses
to those in /[z]System.map.

Marty
Leisner, Keith Parks <emkxp01@mtcc.demon.co.uk>,
and Michael Shields helped me with the Linux changes.

After much discussion of the security of the device
cache file on the bugtraq mailing list, I adopted
a suggestion from Dave Sill <de5@sws5.CTD.ORNL.GOV>.
His suggestion removes the world-writable device
cache file from /tmp and creates instead a mode
0600 device cache file in the home directory of
the real user ID that is executing lsof. Lsof
issues a warning message when it does this. (The
warning can be suppressed with -w.) The HASDCACHE
definition becomes a relative path. When lsof is
run from root, it will create a device cache file
in root's home directory, e.g., / or /root, but
the file will be readable and writable only by
root. This should make the device cache file much
more secure.

Added support for SGI IRIX 6.1. Dave Olson provided

technical support and Przemek Klosowski supplied
a test system. Since Przemek's
system formerly
supported my testing of lsof for IRIX 6.0, its
update to 6.1 means I have not tested lsof under
IRIX 6.0 since revision 3.39.

Changed name list structure element initialization
for V/88 to make gcc happy. Albert Chin-A-Young
<china@cig.mot.com> suggested this.

3.42 September 7, 1995
Changed device cache file naming process to add a
suffix formed of an underscore, followed by the
first component of the host name returned by
gethostname(2). This allows lsof to create separate
device cache files for each host from which it is
run for the same UID when the UID's home directory
is shared by the hosts via NFS.

3.43 September 12, 1995
Enabled SCO searching for stream files and Release
5.0 Unix domain socket files by name.

Defined HASDOPTPATH for dialects that can supply
a path with -Db, -Dr, and -Du. Defined it for all
but DC/OSx, UnixWare, and V/88. Used it in the
ctrl_dcache() function of arg.c to enable and
disable -Db,
-Dr, and -Du.

Used is_readable() in dvch.frag when opening the
device cache file for reading.

3.44 September 19, 1995
Added test for setuid-root state so that some
security-sensitive code now disabled by #define's
can by dynamically disabled.

Enhanced, extended, improved, secured, and documented
formation and use of the device cache file path.
More options, more carefully controlled are now
available. A separate documentation file, 00DCACHE,
accompanies the distribution to explain the device
cache file path handling.

Where possible, lsof now drops setgid permission
as soon as possible. Two exceptions are the Solaris

and SunOS versions of lsof which need to close and
re-open kvm access. Setuid-root lsof implementations
must retain that permission to access files in /proc.

Improved the README.lsof_<revision> file that
appears in the lsof wrapper tar file with help from
Jon A. Tankersley <tank@amoco.com>.

Added Veritas file system support
to the HP-UX
dialect port.

Albert Chin-A-Young tested lsof under Motorola V/88
R40V4.1 and provided #if/#else/#endif changes.

3.45 September 20, 1995
Enabled setgid permission surrender for Solaris
and SunOS dialects.

3.46 October 5, 1995
Added more conversions to HASPERSDC, based on
suggestions from John Gardiner Myers <jgm+@CMU.EDU>.
They make it possible to locate the personal device
cache file in /tmp, for example. A new -D function,
`?', reports device cache file name formation
information.

Gained access to AIX 4.1.3, compiled lsof there, and
found that it seems to work.

Tested lsof under FreeBSD 2.1.0-950726-SNAP. John
Clear <jac@dragonfly.vet.purdue.edu> kindly provided
a test system.

Added a Customize script that helps with the job
of modifying some important (e.g., security-related)
compile-time options. Configure calls Customize,
but can be told not to with the -n|-nocust options.

Fixed over-sensitivity to unexpected kernel
file
structure pointer values in HP-UX version that led
to premature exit. Lionel Cons <cons@dxcern.cern.ch>
pointed out the problem.

With the help of Leif Hedstrom <leif@infoseek.com>
identified a pair of conflicting Solaris 2.4 patches

that prevent lsof from working. A work-around is described in section 00FAQ.

3.47 October 16, 1995

Enabled suppression of an HP-UX pstat() warning message. Added big_brother.perl5 to field output scripts/ subdirectory. Both changes are courtesy of Lionel Cons <Lionel.Cons@cern.ch>.

Added a test for automount detritus in the SCO mount table.

Added kernel name cache support to SCO dialect. Modified most name cache support to report full path names without the intervening `` -- '' when possible.

Added an Inventory script to check the contents of the distribution, using a new file, 00MANIFEST. The Configure script normally calls Inventory. Changed the -n option to Configure to avoid calling the Customize
and Inventory scripts and dropped the -nocust option. The presence of .neverCust suppresses the calling of Customize; .neverInv, Inventory. The Inventory script creates .ck00MAN when it completes, so that subsequent calls to Inventory won't check the inventory again -- although the caller is given the opportunity to have the inventory rechecked.

Added PTX 4.1.0 support, courtesy of a test system supplied by Kevin Smallwood <kcs@sequent.com>.

Picked lint for gcc in the V/88 dproc.c from hints provided by Albert Chin-A-Young <chinay@cig.mot.com>.

3.48 October 20, 1995

Improved root directory detection during name cache lookup.

Remove the Novell UnixWare and Pyramid DC/OSx ports from the distribution, because I have not been able to test them for 40 or more revisions. Their pieces may now be found on vic.cc.purdue.edu in pub/tools/unix/lsof/OLD/{binaries,dialects}.

Corrected an error in Customize that caused it to

incorrectly redefine
HASSYSDC to HASSYSDCPATH. This
was reported by Michael Beirne <beirne@dcdsv0.fnal.gov>.

Made sure that lsof will compile when HASDCACHE is
undefined. A problem with a reference to the DChelp
symbol was reported by Vasco Pedro <vp@fct.unl.pt>
and resolved by always defining DChelp.

Corrected handling of -c and -m options.

Corrected the reading of the SCO /etc/mnttab. Bela
Lubkin <belal@sco.com> helped me understand its
special multi-line format. The "nothing/nowhere"
lines are continuations of the file system directory
and device names when either are > 31 characters.

Corrected SCO version list in Configure help output.

Update special SCO name cache code to make it more
robust.

Add support for IRIX 6.0.1 with the help of Eberhard
Mater <system@grzap1.rz.go.dlr.de>.

3.49 October 25, 1995
Removed need for dialects/sgi/irix601hdr subdirectory,
replacing it with one created by dialects/sgi/Mksrc
and composed of symbolic links to dialects/sgi/irix6hdr.
Eberhard
Mater did the testing.

Added file system inode number to the local file
structures of the DEC OSF/1, DYNIX, EP/IX, HP-UX,
NeXT, PTX, RISCos, SGI, Sun, and V/88 dialects.
Added code to name cache, node, and VFS functions
to set the file system inode number and use it for
faster recognition of files on the file system
mount point.

Added kernel name cache support to Linux. This
has been tested only under release 1.2.13.

3.50 October 31, 1995
Updated 00FAQ: reorganized and renumbered sections;
added some DEC OSF/1 sections; section about the
Solaris and SunOS Sun KERNELBASE.

Added an alternative readdir() function, called
ReadDir(), to dialects/osf/ddev.c  This function
was supplied by Duncan McEwan <duncan@comp.vuw.ac.nz>,
who discovered that the getdirentries() function
in DEC OSF/1 versions 3.[02] returns an incorrect
length for the /dev/fd directory when it is a file
system mount point.  Modified the Configure script
to
define USELOCALREADDIR for 3.[02] to enable
using this local function.

Modified the Solaris/SunOS Mksrc to create a dummy
(empty) kernelbase.h for Solaris 2.5 (5.5).

3.51  November 8, 1995
Modified the Configure script to declare the kernel
state definitions appropriate to IRIX 6.1 on IP21
and IP26 platforms.  News of the need for this came
from Kate Fissell <Kate.Fissell@IUS4.IUS.CS.CMU.EDU>
and Dave Olson <olson@anchor.engr.sgi.com>.

Modified the SGI IRIX dproc.c to provide more
information when the kernel's idea of the size of
a proc structure doesn't match sizeof(struct proc).
This mismatch can occur if the wrong kernel state
definitions are used to condition the header files
(e.g., <sys/proc.h>) included when compiling dproc.c.

Made the -i option with no arguments equivalent to
the -n option -- i.e., they both select the listing
of all open Internet files.

Supplied a missing "you" in the Customize script
introduction.  John Jackson <jrj@cc.purdue.edu>
noticed
the omission.

Modified the Customize script to put long messages
in here documents rather than echo statements, so
that changing and reformatting them is easier.
John Jackson offered this helpful suggestion.

Fixed a port number cast bug in Solaris 2.[45],
courtesy of information and code supplied by Allan
Black <allan@scotnet.co.uk>.

Automated the detection of Solaris 2.4 patches
101945-32 and 102303-02 that cause the installed

kernel's user structure to differ from the one
defined by <sys/user.h> because of a patch to
<sys/auxv.h> that wasn't applied when the kernel
was built. The Configure script invokes an alternate
auxv.h file and warns that it is doing so.

Fixed a problem with Inventory script that shows up
on systems where echo is not an sh built-in. The
bug was reported by Scott Ballew <smb@cc.purdue.edu>.

3.52 November 27, 1995
Added support for Linux versions 1.3.22 and above,
courtesy of changes supplied
by Keith Parks
<emkxp01@mtcc.demon.co.uk>.

Changed -d option processing to allow specification
of a comma-separated list of file descriptors.

Modified SCO support to allow NFS code to be optional
at the request of Dave Gilbert
<agere!dgilbert%peapod.com@zool.interaccess.com>.

Enabled HP-UX 10.x version to display device and
inode numbers for FIFOs. The problem was reported
by Jeff Earickson <jaearick@colby.edu>.

3.53 December 8, 1995
Enhanced NeXTSTEP FIFO reporting.

Fixed a formatting problem in the man page, reported
by Angel Li <angel@flipper.rsmas.miami.edu>.

Added support for DEC OSF/1 4.0-BETA. Angel Li
provided the test system.

Added a -v option to display lsof version information.
Marty Leisner <leisner@sdsp.mc.xerox.com> suggested
this.

Replaced touch with echo in Inventory script to avoid
DEC OSF/1 4.0 complaint.

Tested under PTX 4.1.2.

3.54 December 15, 1995
Added support for IRIX 6.2-BETA. The support for
older IRIX

versions changed considerably in the
process. Revision 3.54 has been tested under these
older IRIX versions: 5.3 and 6.1. Angel Li
<angel@flipper.rsmas.miami.edu> provided a test
system and Jim Brown <jim@guanabana.rsmas.miami.edu>
helped.

Tested under AIX 4.1.4.

Decommissioned the DYNIX port -- I no longer have
access to a test system.

Added the HASXOPT_ROOT define to allow the lsof
builder to restrict the use of the dialect-specific
X option (AIX and PTX currently) to processes whose
real user ID is root. Updated the Customize script
to provide an easy mechanism to change HASXOPT_ROOT.
AIX uses HASXOPT_ROOT; PTX does not. This change
was suggested by R. Lindsay Todd <toddr@rpi.edu>.

3.55 December 22, 1995
Eliminated need for modified DEC OSF/1 headers by
using #undef and #define statements. Chip Stettler
<STETTLERC@wlmpo1.wilm.ge.com> helped test.

Added quick start documentation file, 00QUICKSTART,
containing examples and explanations
of lsof use.

Verified that lsof works under the released Solaris
2.5.

3.56 January 2, 1996
Corrected lock reporting for Solaris 2.[345].

Corrected Linux malloc() kernel symbol handling bug,
reported by Keith Parks <emkxp01@mtcc.demon.co.uk>.

Corrected AIX loader text file selection bug; it
caused all process IDs to be listed when the -t
option and one file system name was specified.
The bug was reported by Christopher C. Evert
<cevert@waii.com>.

Made sure Solaris Kb variable is zeroed before
first use.

3.57 January 12, 1996

Updated SunOS port to obtain lock information from
v_filocks and the lock_list struct to which it
points.

Changed -H to -n. The function formerly performed
by -n can be done by using -i with no address.

Updated Linux FIFO support so that the display for FIFOs
contains device number, inode number, and NAME. Johannes
Kroeger <jkroeger@squirrel.owl.de> reported the lack of
these items in the Linux FIFO display.

Added
RCS identification to header files, Makefiles,
and common fragments.

Added BSDI BSD/OS support for 2.0, 2.0.1, and 2.1-BETA.
Terry Kennedy <terry@spcvxa.spc.edu> kindly provided a
2.1-BETA test system and did the 2.0.1 testing.

Modified the Inventory script to compensate for dialects
that have an expr that doesn't set its exit code when
string matches fail.

Converted internal representations of file offset and
size to unsigned long.

Corrected bug in NetBSD lock handling.

Corrected bug in FreeBSD file system type name handling.

Keith Parks <emkxp01@mtcc.demon.co.uk> reports lsof
3.57 compiles and runs under Linux 1.3.56.

3.58 February 7, 1996
Changed Solaris 2.3 configuration to pass the level
of patch 101318 to the source code. This allows
a Solaris 2.3 lock handling difference to be
accommodated.

Updated 00QUICKSTART to reflect -n and -H changes
made in revision 3.57. (Ooops!)

Changed Configure script to compile lsof for SCO
versions
beyond 3.2v5.0.0 as it is compiled for
3.2v5.0.0. Bill Campbell <bill@celestial.com>
reported he has done this successfully.

Added information to 00FAQ about a Linux kernel symbol problem (section 3.7.6) and included a <linux/random.h> patch to work around it. The patch was supplied by Keith Parks <emkxp01@mtcc.demon.co.uk>.

3.59 February 21, 1996

In response to a query from Louis Rayman <lou@asahi.ps.quotron.com>, added special support for Solaris "sockmod" streams, used for Unix domain sockets, that allows their file system device type and inode number to be displayed. It also allows lsof to search for them by name or type (-U).

Added range handling to -d argument.

Added the display of CDFS file size to DEC OSF/1 output.

Added an include of <rpc/xdr.h> to keep gcc on HP-UX 10 happy. Blair Zajac <blair@olympia.gps.caltech.edu> suggested it.

Added Ultrix 4.5 to support list, courtesy of a notification from Gregory Neil Shapiro <gshapiro@WPI.EDU>.

Added AFS support for Solaris 2.4 at the request of Michael L. Lewis <mlewis@morgan.com> and Phillip Moore <wpm@morgan.com>. Phillip helped me locate a test host, generously provided by Heidi Hornstein <heidi@cmf.nrl.navy.mil> with support from Chaskiel Moses Grundman <cg2v+@andrew.cmu.edu> and Sushila R. Subramanian <sushi@cmf.nrl.navy.mil>. Lsof is configured for AFS with a new script, AFSConfig.

Used a SunOS 4.1.4 test system, provided by Chaskiel, to extend Solaris AFS support to cover SunOS. Used another test system, provided by Chaskiel, to extend AFS support to NEXTSTEP 3.2.

Tested lsof under AFS on yet another Chaskiel-provided system, running Linux 1.2.13 and AFS 3.3, and found that lsof needed no changes to recognize its AFS files.

Used a test system, provided by Curt Freeland <curt@grumpy.cse.nd.edu> and Terry McCoy <terry@anubis.cc.nd.edu> to extend Solaris AFS support to Solaris 2.5 with AFS 3.4-Alpha.

Added
the [-A A] option for specifying the name list
file that contains dynamic kernel module addresses.
This is defined for the NEXTSTEP, SunOS, and Solaris
implementations.

Added stty isig handling (where appropriate) to
the Customize and Inventory scripts.

Added support to Solaris for the nfs3 file system
type. Its absence was reported by Patrick D.
Sullivan <pds@snt.bellsouth.com>.

In response to a report from Tigran Aivazian
<bs_s641@ceres.king.ac.uk)> corrected bug in Linux
local nlist() function and based the default kernel
loader format on a Configure test for CONFIG_KERNEL_ELF
in /usr/src/linux/include/linux/autoconf.h.

Fixed a bug in name cache exploration for BSD-derived
dialects -- e.g., FreeBSD.

Updated for NetBSD 1.1.

3.60 February 27, 1996
Improved Unix domain socket reporting for Solaris.
Louis Rayman <lou@asahi.ps.quotron.com> helped test.

Added warning messages about absence of Linux
CONFIG_MODULES definition in autoconf.h,
leading
to lack of get_kernel_syms() support. Tigran
Aivazian <bs_s641@ceres.king.ac.uk)> supplied the
information.

3.61 March 8, 1996
Added AFS support for AIX and HP-UX and verified
that the lsof Ultrix version needs no additions
for AFS. Chaskiel Moses Grundman <cg2v+@andrew.cmu.edu>
provided the HP-UX and Ultrix test systems. Jan
Tax <jan_tax@unc.edu> provided an AIX 4.1.4 test
system. Bob Cook <bobcook@SLAC.Stanford.EDU> provided
3.2.5 and 4.1.4 test systems.

Fixed minor problems and made improvements to
NEXTSTEP, Solaris, and SunOS AFS support. Changed
the AFSConfig script to ask for AFS version.

During the Hp-UX AFS work, added the hpuxgcc
abbreviation to the Configure script for configuring
lsof to be compiled with gcc under lsof.

Fixed a NetBSD mount structure array referencing
bug, reported by Peter Svensson <petersv@df.lth.se>.

Dropped support for Motorola V/88, because I no
longer have access to test systems.

Added rudimentary
support for the IRIX XFS file
system type, pending more information.

3.61 March 12, 1996
Corrected misuse of the LSOF_DINC shell variable
in the Configure script for HP-UX and Solaris.
Larry Rogers <lrr@cert.org> pointed out this problem.
Also removed an obsolete irix52 abbreviation from
Configure.

I didn't consider this change sufficient to warrant
a new version number, but just rebuilt the 3.61
distribution.

3.62 March 26, 1996
Updated AFS comments in 00README.

Supplied missing break statement in a N_VXFS case
clause in the HP-UX dnode.c.

Added Veritas file support to PTX, courtesy of code
supplied by Laurent Montaron <lpm@sequent.com> and
help from Kevin Smallwood <kcs@sequent.com>.
Created two new source modules (dnode[12].c) to
separate PTX header file node definitions and thus
eliminate symbol conflicts. Laurent did most of
the testing.

Added tests to BSDI, FreeBSD, HP-UX, IRIX, NetBSD,
NEXTSTEP, PTX, Solaris and SunOS lsof
versions that
allow them to report on unknown file system types.

Added IRIX 6.0.1 #if/#else/#endif support in response
to a report and suggested modifications from Scott
Presnell <srp@zgi.com>.

With the help of Dave Olson <olson@anchor.engr.sgi.com>
improved the IRIX 6.2-BETA XFS support.

3.62 March 27, 1996
Corrected SunOS incompatibility with last-minute
addition of Solaris MVFS support. The problem was
reported by Larry W. Virden <lvirden@cas.org>.

I didn't consider this change sufficient to warrant
a new version number, but just rebuilt the 3.62
distribution.

3.63 April 11, 1996
Upgraded Solaris MVFS support. In the process,
enlarged Solaris and SunOS DEVICE output column.

Changed SunOS 4.1.x Configure to make -DNOCONST
Makefile definition dependent on SC version.

At the suggestion of John DiMarco <jdd@cdf.toronto.edu>
suppressed two warning messages: the device cache
file creation warning when -Db has been specified;
and the one
issued when -D? is used with a non-writable
system-wide device cache file and there is no other
writable path. Also at John's suggestion redid
the manner in which child processes are used to
avoid kernel calls that might block; the net effect
of the change is that normally one child process
is required, rather than one per kernel call.

Refined the NetBSD test for <nfs/nfsproto.h> with
a Configure script change.

Modified Configure script to compute AIX version
with ``uname -rv'' when /usr/bin/oslevel can't be
executed. Stephen C. Woods <scw@seas.ucla.edu>
suggested this.

Disabled conflicting prototype definitions in the
local netdb.h used when the SCO 3.0 netdb.h is
missing. Disabled #include of <strings.h> unless
the SCO version is 5.0 or above. Don Kirouac
<dkirouac@minicom.com> pointed out these problems.

3.63 April 15, 1996
Improved Configure's SunOS 4.1.x CC test for compiler

support of the const keyword and avoided Configure's
``test
-f {Customize,Inventory}'' (because the
Ultrix test doesn't grok -x) in response to a report
from Larry Schwimmer <rosebud@cyclone.Stanford.EDU>.

I didn't consider this change sufficient to warrant
a new version number, but just rebuilt the 3.63
distribution.

3.64 April 26, 1996
Added a negate option for entries of the -u list.
Kurt Hillig <khillig@Chem.LSA.umich.edu> suggested
it.

Added a check for legal protocols in the -i option.

Adjusted the Configure and SGI MkKernOpts scripts
to handle more IRIX situations per instructions
from Dave Olson <olson@anchor.engr.sgi.com>.

Added support for HP-UX 10.10, courtesy of a test
system provided by Mark Bixby <markb@cccd.edu>.

3.65 May 20, 1995
Corrected errors, reported by Arne H. Juul
<arnej@pvv.unit.no>, in use of IRIX stat structure.

Added support for the IRIX 6.2 cachefs, following
a report from Peter Van Epp <vanepp@sfu.ca>.

Added clone support for AIX 4.1.4 and above.

Adjusted the
IRIX configuration to work properly
for 64 bit IRIX 6.2 systems. Richard Chycoski
<richard@sfu.ca> and Peter Van Epp <vanepp@sfu.ca>
provided a test system.

3.66 June 19, 1996
Improved the HP-UX VXFS test in the Configure
script, based on a report from Robert Hall
<rjh6810@misty.ca.boeing.com>.

Added SCO information to 00FAQ. Added information
about lsof slowness and nameserver.

Added an untested Configure abbreviation for Solaris

2.5.1.

Ambrose Li <ambrose@www.mingpaoxpress.com> supplied
a Linux change that avoids a conflict with the
d_namlen definition in versions 1.99.8 and above.

Added compiler version identification to the
Configure script for AIX and Solaris cc.

Added support for FreeBSD 2.2-960612-SNAP. Ade
Barkah <mbarkah@hemi.com> provided a test system.

3.67 Jult 1, 1996
Made miscellanous documentation corrections.

Added support for gcc under AIX 4.1 and above,
including an aixgcc Configure abbreviation, and a
work-around
for an long long alignment problem.
Stuart D. Gathman <stuart@bmsi.com> and Waldemar
Zurowski <bilbo@pwr.wroc.pl> helped me to understand
the gcc problem and devise the work-around.

3.68 July 17, 1996
Malgorzata Roos <groos@rzusun.unizh.ch>: pointed
out the AIX lsof didn't report the inode number
for named pipes (FIFOs) and wouldn't locate them
by name; _and_ supplied a fix. (Now _that's_ the
kind of bug report I like. :-)

Update Configure script to clean out aix41*
subdirectories created by the AIX gcc work-around.

Taught IRIX lsof how to report the correct device
number, inode number, and size for named NFS pipes.

Taught HP-UX 9.x lsof how to report size/offset
and inode number for named NFS pipes. (HP-UX 10.x
already knows.)

Taught DEC OSF/1 (errr, Digital Unix) lsof to report
device and inode numbers correctly for named pipes.
Because stat(2) under DEC OSF/1 V3.2 doesn't report
the device number correctly for named pipes, lsof
can't
locate them by name, but it can do that under
DEC OSF/1 V2.0.

Taught EP/IX 2.1.1 lsof to report device and inode numbers correctly for named pipes.

Taught versions of lsof for PTX 2.1.6 and 4.1.2 to report device and inode numbers correctly for named pipes.

Taught RISC/os 4.52 lsof to report device and inode numbers correctly for named pipes.

Taught versions of lsof for Ultrix 4.2 and above to report inode numbers and file systems names correctly for named pipes (FIFOs).

Added safety check when trying to get a sockaddr_un structure from a BSDI, FreeBSD, or NetBSD mbuf.

Improved documentation on install permissions in 00README at the suggestion of Paul Wickman <Paul.Wickman@amd.com>.

Installed support for the DTYPE_PIPE file structure in FreeBSD 2.2. Changed the FreeBSD version symbol from _FREEBSDV to FREEBSDV.

Added support for NetBSD 1.2.

3.69 July 30, 1996

Added block device name caching and reporting for all dialects.

Improved
(I think) IRIX 6.2 64 bit configuration.

Eliminated C name space pollution by removing the leading `_' from all dialect version symbols that had it: _AIXV, _BSDIV, _OSF1V, _ADVFSV, _EPIXV, _HPUXV, _IRIXV, _PTXV, _RISCOSV, and _SCOV.

Changed decosf stanza in Configure script to automatically detect the subdirectory of /sys (or /usr/sys) that contain's the configuration header files for the machine. Added a 00FAQ entry about this.

3.70 August 9, 1996

Set the execute bits on scripts/big_brother.perl5.
Changed -H in scripts/watch_a_file.perl to -n.

Retained all the command name characters that are available in the proc or user struct for field output. Improved sample install rules for BSDI and HP-UX. Strengthened HP-UX CCITT test in the Configure script. Gildas Perrot <perrot@francenet.fr> suggested these changes.

Improved Solaris local TCP address reporting, based on a bug report from John Caruso <jcaruso@csg.com>.

Improved HP-UX VFS handling, and corrected a bug in VFS handling, based on bug reports from David Capshaw <David.Capshaw@SEMATECH.Org>.

Added support to -i argument handling to allow port lists and ranges, and service name lists to be specified. John DuBois <spcecdt@armory.com> suggested this.

Dropped support for IRIX 4.0.5H. Revived support for IRIX 5.2, courtesy of a test system from Dan Trinkle <trinkle@cs.purdue.edu>.

3.71 August 15, 1996

Improved handling of port ranges specified with the -i option. Improved performance when the only option is -i.

3.72 August 28, 1996

Fixed bugs and typos in SCO mount table handling.

Added support for OpenBSD (only the i386 architecture type has been tested), using the NetBSD dialect sources. David Mazieres <dm@amsterdam.lcs.mit.edu> provided a test system.

Added fdesc file system support to FreeBSD, NetBSD and OpenBSD. Changed the way proc file system support is activated with additions to the Configure script and changes to the dialect machine.h files. Dropped the distribution of the Freebsd <procfs/procfs.h> header file.

Added support for PTX 4.1.4.

3.73 September 5, 1996

Added information to 00FAQ for missing CCITT HP-UX
header file x25L3.h. Pasi Kaara <ppk@atk.tpo.fi>
provided the information.

Changed AIX header file #include pattern to prevent
gcc's loader from complaining about multiply defined
etherbroadcastaddr[], fddi_broadcastaddr[], and
ie5_broadcastaddr[] CONST u_char arrays from
<net/net_globals.h>. (The AIX loader doesn't
complain.) David Capshaw <David.Capshaw@SEMATECH.Org>
reported this problem.

Removed the HASPWSTAYOPEN definition; it was only
used for two dialects that are no longer supported.

Corrected a bug in UID cacheing that appeared during
long repeat-mode (-r) operations. The bug was
reported by Peter Van Epp <vanepp@sfu.ca>. When
in repeat mode the UID cache will be cleared when
/etc/passwd changes.

Fixed a bug in
FreeBSD support that causes a
segmentation fault on VBAD vnodes.

Deleted ultrix22 from Configure and RHF from Ultrix
source files. Dropped 2.2 from support list.

3.74 September 6, 1996
Corrected a bug in FreeBSD's proc table handling,
reported by David O'Brien <obrien@Nuxi.cs.ucdavis.edu>.

3.75 September 9, 1996
Added FreeBSD proc table handling fix from revision
3.74 to BSDI, NetBSD, and OpenBSD dialects.

Improved Solaris VFS handling.

Added pipe handling to OpenBSD. Changed Configure
script to define OPENBSDV for OpenBSD and used that
definition to include the pipe support in the NetBSD
sources. The Configure script defines NETBSDV for
NetBSD. So far neither dialect has any #if/#else/#endif
blocks that depend on version number.

Added support for AIX 4.2.

3.76 September 21, 1996

Plugged a memory leak in command handling, introduced
in revision 3.70. The bug was reported by Peter
Van Epp <vanepp@sfu.ca>.

Fixed a bug in the reporting
of size for IRIX 5.3
EFS files, introduced in revision 3.69 by the name
space pollution abatement. The _IRIXV definition
was used in the IRIX 5.x private efs_inode.h header
file to configure the inode stricture for IRIX 5.3,
so I changed the tests to use IRIXV.

Changed information on the AIX Stale Segment ID bug
to reflect the fact that IBM now says they won't
fix it. They have closed the APAR.

Disabled the AIX gcc long long alignment hack under
AIX 4.2, because it doesn't work there. Installed
a fatal error message in Configure that gcc can't
be used to compile lsof under AIX 4.2 until a work-
around can be developed.

Upgraded BSDI, FreeBSD (2.0 and above), NetBSD
(1.1B and above), and OpenBSD lock reporting.
David Mazieres <dm@amsterdam.lcs.mit.edu> reported
the need for the upgrade.

Made similar lock reporting upgrades to (versions
tested are in parentheses): AIX (4.1.4 and 4.2);
DEC OSF/1 (2.0 and 3.2d); EP/IX (2.1.1); HP-UX (9.x
and
10.10); IRIX (5.2, 5.3, and 6.2); Linux; NEXTSTEP
(3.1); PTX (2.1.6 and 4.2); RISCos; SCO (releases
3.0 and 5.0); Solaris (2.5); SunOS (4.1.3); and
Ultrix (4.2).

Updated man page and 00FAQ with more information on
lock reporting.

Updated PTX lsof for 4.2. Upgraded HP-UX lsof for
10.20. Used a test system, provided by Richard
Allen <ra@rhi.hi.is>, and received testing assistance
from Marc Winkler <marc@healthchex.com>.

Changed handling of Internet addresses to avoid DNS
lookup operations when the address has clearly not
been selected. John DuBois <johnd@sco.COM> suggested
this.

3.77 October 2, 1996

Changed SCO Configure stanza to call nm by its full path, thus avoiding possible confusion. The change was suggested by Jean-Pierre Radley <jpr@jpr.com>.

Added changes to allow lsof to be compiled by gcc under AIX 4.2 -- enabled some gcc-specific typedef's in the AIX machine.h and disabled the Configure script's rejection of aixgcc for AIX 4.2. The typdef's were supplied by Henry Grebler <henryg@optimation.com.au>.

Based on information supplied by Henry and David J. Wilson <davidw@optimation.com.au>, invented a description and processing for an unknown file struct that is established by AIX 4.2 (at least) for X processes when DISPLAY=:0.0. For convenience I gave its type the DTYPE_PIPE definition, but that may be incorrect.

Fixed some Solaris 2.[34] errors in locking code, added at 3.76, that I couldn't test. Rainer Orth <ro@TechFak.Uni-Bielefeld.DE> reported the problem and supplied the fixes.

Made Configure script supply NeXTSTEP 3.x version in Makefile so that the shadow vnode locking code, introduced in 3.76, would be disabled for NeXTSTEP 3.0. Rainer Orth discovered this problem, too.

Added reporting of UNIX domain socket inode numbers for Linux version 2.0 and above. The addition was supplied by Matthew Burt <BurtM@poole.siemens.co.uk>.

Enhanced file searching to report all instances of references to automounted file systems, even when they're direct mounts not yet realized. Enhanced Solaris 2.5 lsof to grok autofs nodes. Victoria H. Lau <vlau@msmail2.hac.com> pointed out the need for these enhancements and helped test them.

Changed AIX lock length test so it will work with gcc under AIX 4.2.

Changed PTX HAS_VXFS symbol, indicating presence

of VxFS, to HASVXFS for consistency with the HP-UX
form of the symbol.

3.78 October 14, 1996
Changed strtol() call in private Linux nlist()
function to strtoul(). Linux kernel addresses at
2.1.0 have their top bit set and appear to be
negative to strtol(). This information was provided
by Marty Leisner <leisner@sdsp.mc.xerox.com>.
Marty also notes that other, unknown-as-of-yet
problems prevent lsof from working under 2.1. He
is investigating, since I don't have access to a
2.1 system.

Added definitions to machine.h for a private file
struct type (HASPRIVFILETYPE
and PRIVFILETYPE) that
can be accommodated without changing prfp.frag,
much as HASPIPEFN works for PIPE file struct types.

Used the new private file struct type support to
support the AIX f_type=0xf that DISPLAY=:0.0 causes.
Changed its output TYPE from PIPE to SMT; displayed
file size as buffer size less free bytes in buffer;
enabled recognizion under AIX 4.1.4. Mike Feldman
<feldman@charm.urbana.mcd.mot.com> and others helped
me identify this file as a Shared Memory Transport
(SMT) socket.

Corrected a function prototype in the HP-UX dnode.c
for HP-UX 10 and greater; gcc objected; HP's cc did
not. Christian Krackowizer <kra1@technodat.co.at>
reported the problem.

Made AFSConfig script more capable of locating the
cell's root directory. Updated AFS documentation
in 00FAQ and 00README. Both were suggested by
Timothy Miller <tsm@cs.brown.edu>.

Installed update to big_brother.perl5 script from
Lionel Cons <Lionel.Cons@cern.ch>.

3.79 October
29, 1996
Added support for IRIX 6.4, courtesy of a test
system provided by Angel Li <angel@rrsl.rsmas.miami.edu>.
Fixed FIFO and NFS3 bugs in IRIX 6.2 lsof in the
process. Lsof has not been tested under IRIX 6.3,

but the Configure script has a stanza for it.

Changed device functions to use stat() instead of lstat(). Used WARNDEVACCESS to suppress stat(2) failure messages.

Tested under OpenBSD 2.0.

3.80 November 8, 1996

Corrected comments in 00README about using the sunos413 and sunos413cc Configure abbreviations.

Made some Configure and Customize script changes, suggested by Bruce Jerrick <bruce@cse.ogi.edu>.

Added missing elements to definition of local Solaris 2.3 lock_descriptor structure so that dnode.c will compile and work properly under it. Corrected a bug in Solaris 2.[34] lock descriptor handling.

3.81 November 14, 1996

Corrected error in the "invented" HP-UX 10.20 proc struct. The erroneous struct definition named the set-UID
member as the UID member, resulting in occasional incorrect UID attributions in lsof output.

At the suggestion of Larry Schwimmer <schwim@cyclone.stanford.edu>, changed AFSConfig to use awk to get the cell name from /usr/etc/vice/ThisCell, thus avoiding a problem when the cell name line has more than one word.

Added -DSWASH to IRIX 6.2 options propagated from the kernel build CCOPTS to lsof's Makefile. Randolph J. Herber <herber@dcdrjh.fnal.gov> did the detective work that revealed the need for this. IRIX 6.2 patch 1488 added -DSWASH and its effects.

3.82 December 11, 1996

Updated Configure script for FreeBSD 3.0 and SCO OpenServer 5.0.[24]. FreeBSD Configure script change was supplied by David E. O'Brien <obrien@NUXI.com> and SCO Configure script change was supplied by Bela Lubkin <belal@sco.COM>.

Tested lsof under FreeBSD 3.0, courtesy of a test
system provided by Ade Barkah <mbarkah@hemi.com>.

Added changes to support SCO OpenServer
5.0.4
(Comet), supplied by Bela Lubkin <belal@sco.COM>.

Added support for UnixWare 2.1. D. Chris Daniels
<chrisd@dlpco.com> provided a test system and Bela
Lubkin provided technical assistance.

Added support for Pyramid DC/OSx 1.1 and Reliant
UNIX 5.43. Bruce Beare <bjb@pyramid.com> and Kevin
Smith <kevin@pyramid.com> provided test systems
and technical assistance. This dialect version
must run setuid-root, since it accesses proc and
user structures vic the /proc file system.

Tested under PTX 2.1.9 and added support for PTX
4.2.1.

At Bela Lubkin's suggestion added a commercial to
the lsof man page, -h option, and -v option output,
telling where to get the latest revision. This
entailed large scale rearrangement of the -h output
to keep it as short as possible. It also involved
shortening the -X explanation for PTX.

Made sure that address segment access errors didn't
incorrectly force the listing of a process. This
fix was needed
by the Sun, Pyramid, and UnixWare
ports.

Corrected bug in the way the local device table is
sorted.

3.83 December 30, 1996
Added support for Solaris 2.6 (Beta) with help from
Casper Dik <casper@holland.Sun.COM>, May Jackson
<methalya.jackson@eng.sun.com>, Joseph Kowalski
<jek3@Eng.Sun.COM>, and the Solaris 2.6 Beta test
program.

Fixed an inode file system type processing bug in
SCO OpenServ 5.0 and greater, reported by Robert
Lipe <robertl@arnet.com>.

Fixed bugs in SCO kernel name cache probing, courtesy
of code and suggestions from Bela Lubkin <belal@sco.COM>.

Revised kernel name list handling to remove the need
for changing two files (dlsof.h and dstore.c) when
altering, removing, or adding name list symbols.
All dialects were affected.

Added support for SCO OpenServer event "clones."
Robert Lipe need for their support and Bela Lubkin
provided technical assistance in identifying them.

Added display of bound name to Solaris UNIX
domain
socket file handling.

Correct bug in SunOS address space ("txt" file)
handling.

Tested under UnixWare 2.1.1.

Changed SGI IRIX lsof to use the kernel's proc
struct size when striding through its proc table
(IRIX versions below 6.4). The proc struct size
difference warning is still issued, and lsof still
uses the proc struct size and proc struct from
<sys/proc.h> to read and process proc table
information. Added a note to 00FAQ about this.

Deferred Internet host and port name lookups to
print time, thus avoiding lookups for files that
are not listed.

3.84 January 13, 1997
Updated the Pyramid private configuration script,
MkKernOpts, to propagate the R4000 definition for
DC/OSx systems so equipped. Anthony Shortland
<anthony.shortland@FMR.COM> pointed out the need
for this and Kevin Smith <kevin@pyramid.com> provided
access to a test system.

Added information to 00FAQ about UDP ports for
which lsof can't find users, because the
ports are
reserved to the kernel and aren't associated with
open files.

3.85 January 17, 1987

The DEC OSF/1 kernel name cache can be processed
as a simple table, rather than a linked list, so
changed the interface to rnam.frag accordingly.

Added a new optional output field, parent process
ID (PPID). The -R option (for paRent) selects it,
and the `R' field identifier labels it. Updated
some scripts to handle it and developed two new
scripts, idrlogin.perl and idrlogin.perl5, to
use it in locating nework (rlogind and telnetd)
source addresses for shell processes. Added some
information about the new scripts to 00QUICKSTART.

3.86 January 30, 1997
Add explanation of why device warning messages
disappear when the device cache file is used.

Changed Linux Configure stanza to check more
places for the [z]System.map file and warn if
the one located differs in date from /vmlinuz.
Bjorn S. Nilsson <NILSSON@nbivms.nbi.dk> suggested
this for easier configuration
at Linux 2.0.28.

Changed Linux Confifgure stanza to check for the
presence of fl_fd, fl_file, and fl_whence in the
file_lock structure of <linux.fs.h> and define
symbols appropriately.

Changed Linux lock testing to test task structure
pointer (fl_owner) from file_lock struct as well
as (possibly) the file struct pointer (fl_file) or
file decriptor number (fl_fd) to identify the lock
owner, depending on what HAS_FL_* symbols were
defined by Configure's file_lock structure examination.
Added section to Linux Problems in 00FAQ about this.

Corrected 00FAQ reference in Configure's Solaris
2.4 stanza.

3.87 February 11, 1997
Corrected setting of VxFS device number for HP-UX
and PTX.

Added VM map flag test #if/#else/#endif for recent
versions of FreeBSD 3.0, supplied by Chris Timmons
<skynyrd@opus.cts.cwu.edu>.

Added a #define that removes a conflict between a
signal() prototype in the IRIX 6.4 <sys/systm.h>
and one in its <sys/signal.h>,
exposed when cachefs
support is enabled. Wolfgang Hecht
<hecht@zedat.fu-berlin.de> identified the need for
this addition and helped test it. Refined IRIX
proc struct size test, warning, and use.

Revised Linux system map file handling (yet again)
to search for the file at execution time, rather
than in the Configure script. Marty Leisner
<leisner@sdsp.mc.xerox.com> suggested this.

Added VxFS support to Solaris lsof with help from
Peter Radig <radig@DresdnerBank.de>. Philip Kizer
<pckizer@tamu.edu> helped test.

Added support for PTX 4.3, thanks to access provided
by Peter Jordan <petej@sequent.com>.

3.87 February 11, 1997
supplement Updated FreeBSD kernel name list handling.

3.88 February 17, 1997
Added documentation files -- 00.README.FIRST[_<version>]
and 00RELEASE.SUMMARY_<version> -- to the distribution.

Vic Abell <abe@purdue.edu>
Purdue University Computing Center
February 17, 1997

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* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/lib/rnch.c
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/dialects/linux/dlsof.h
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/lib/cvfs.c
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/dialects/linux/dproc.c
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/dialects/linux/dstore.c
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* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/dialects/linux/machine.h
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/lib/ptti.c
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-

Edem39H7/lsof-4.94.0-rh/dialects/linux/dproto.h
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/dialects/linux/dfile.c
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/dialects/linux/dsock.c
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/lib/rmnt.c
*
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* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/dialects/linux/dmnt.c
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* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/lib/prfp.c
* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/lib/dvch.c
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* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/lib/lkud.c
*
/lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/lib/rdev.c
No license file was found, but licenses were detected in source scan.

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* /lsof-4.94.0-3.el9.src.rpm-cosi-expand-archive-FE19olUH/lsof-4.94.0-rh.tar.xz-cosi-expand-archive-Edem39H7/lsof-4.94.0-rh/tests/LsofTest.h

# 1.379 liburcu 0.12.1-6.el9

## 1.379.1 Available under license :

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That's all there is to it!
Mathieu Desnoyers
May 13th, 2009

IBM Corporation allowed LGPLv2.1+ licensing of their contribution to the
userspace RCU library in a patch submitted on May 8, 2009 from Paul E.
McKenney and reviewed by Steven L. Bennett:

https://lists.lttng.org/pipermail/lttng-dev/2009-May/012835.html

I (Mathieu Desnoyers) re-implemented ACCESS_ONCE(), likely(), unlikely() and
barrier() from scratch without reference to the original code.

commit id : 2dc5fa0f7cfbfb0a64a7a67b39626650e863f16a

Bert Wesarg <bert.wesarg@googlemail.com> approved LGPL relicensing of his
patch in an email dated May 13, 2009 :

http://lkml.org/lkml/2009/5/13/16

xchg() primitives has been rewritten from a MIT-licensed cmpxchg for Intel
and powerpc. They are MIT-licensed and therefore usable in LGPL code.
This cmpxchg code was obtained from the atomic_ops project:

http://www.hpl.hp.com/research/linux/atomic_ops/

I (Mathieu Desnoyers) wrote the remainder of the code.

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m4/ax_tls.m4

# 1.380 go-telebot-telebot 3.3.8

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# 1.381 picocolors 1.1.1

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# 1.382 otel-sdk-metric 1.38.0

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# 1.383 totem-pl-parser 3.26.6-2.el9

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The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and

modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

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0. This License Agreement applies to any software library which contains a notice placed by the copyright holder or other authorized party saying it may be distributed under the terms of this Library General Public License (also called "this License"). Each licensee is addressed as "you".

A "library" means a collection of software functions and/or data prepared
so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License;
they are outside its scope. The act of
running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an

appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of
it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in
a library to compute square roots has
a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote

it.

Thus, it is not the intent of this
section to claim rights or contest
your rights to work written entirely by you; rather, the intent is to
exercise the right to control the distribution of derivative or
collective works based on the Library.

In addition, mere aggregation of another work not based on the Library
with the Library (or with a work based on the Library) on a volume of
a storage or distribution medium does not bring the other work under
the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public
License instead of this License to a given copy of the Library. To do
this, you must alter all the notices that refer to this License, so
that they refer to the ordinary GNU General Public License, version 2,
instead of to this License. (If a newer version than version 2 of the
ordinary GNU General Public License has appeared, then you can specify
that version instead if you wish.) Do not make any other change in
these notices.

Once this change is made in a given copy,
it is irreversible for
that copy, so the ordinary GNU General Public License applies to all
subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of
the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or
derivative of it, under Section 2) in object code or executable form
under the terms of Sections 1 and 2 above provided that you accompany
it with the complete corresponding machine-readable source code, which
must be distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

If distribution of object code is made by offering access to copy
from a designated place, then offering equivalent access to copy the
source code from the same place satisfies the requirement to
distribute the source code, even though third parties are not
compelled to copy the source along with the object code.

5. A program that contains
no derivative of any portion of the
Library, but is designed to work with the Library by being compiled or
linked with it, is called a "work that uses the Library". Such a
work, in isolation, is not a derivative work of the Library, and

therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is
not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering
for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked

with the Library, with the complete machine-readable "work that
uses the Library", as object code and/or source code, so that the
user can modify the Library and then relink to produce a modified
executable containing the modified Library. (It
is understood
that the user who changes the contents of definitions files in the
Library will not necessarily be able to recompile the application
to use the modified definitions.)

b) Accompany the work with a written offer, valid for at
least three years, to give the same user the materials
specified in Subsection 6a, above, for a charge no more
than the cost of performing this distribution.

c) If distribution of the work is made by offering access to copy
from a designated place, offer equivalent access to copy the above
specified materials from the same place.

d) Verify that the user has already received a copy of these
materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the
Library" must include any data and utility programs needed for
reproducing the executable from it. However, as a special exception,
the source code distributed need not include anything that
is normally
distributed (in either source or binary form) with the major
components (compiler, kernel, and so on) of the operating system on
which the executable runs, unless that component itself accompanies
the executable.

It may happen that this requirement contradicts the license
restrictions of other proprietary libraries that do not normally
accompany the operating system. Such a contradiction means you cannot
use both them and the Library together in an executable that you
distribute.

7. You may place library facilities that are a work based on the
Library side-by-side in a single library together with other library
facilities not covered by this License, and distribute such a combined
library, provided that the separate distribution of the work based on
the Library and of the other library facilities is otherwise
permitted, and provided that you do these two things:

a) Accompany the combined library with a copy of the same work
based on the Library, uncombined
with any other library
facilities. This must be distributed under the terms of the

Sections above.

b) Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

8. You may not copy, modify, sublicense, link with, or distribute the Library except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense, link with, or distribute the Library is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

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11. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Library at all. For example, if a patent license would not permit royalty-free redistribution of the Library by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Library.

If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply,

and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

12. If the distribution and/or use of the Library is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Library under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

13. The Free Software Foundation may publish revised and/or new versions of the Library General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

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END OF TERMS AND CONDITIONS

Appendix: How to Apply These Terms to Your New Libraries

If you develop a new library, and you want it to be of the greatest possible use to the public, we recommend making it free software that everyone can redistribute and change. You can do so by permitting redistribution under these terms (or, alternatively, under the terms of the ordinary General Public License).

To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion
of warranty; and each file should have at least the
"copyright" line and a pointer to where the full notice is found.

<one line to give the library's name and a brief idea of what it does.>
Copyright (C) <year> <name of author>

This library is free software; you can redistribute it and/or
modify it under the terms of the GNU Library General Public
License as published by the Free Software Foundation; either
version 2 of the License, or (at your option) any later version.

This library is distributed in the hope that it will be useful,
but WITHOUT ANY WARRANTY; without even the implied warranty of
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Library General Public License for more details.

You should have received a copy of the GNU Library General Public
License along with this library; if not, write to the Free
Software Foundation, Inc., 675 Mass Ave, Cambridge, MA 02139, USA.

Also add information on how to
contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your
school, if any, to sign a "copyright disclaimer" for the library, if
necessary. Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the
library `Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

That's all there is to it!

# 1.384 tracker-miners 3.1.2-4.el9_3

## 1.384.1 Available under license :

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Version 2.1, February 1999

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[This is the first released version of the Lesser GPL. It also counts
as the successor of the GNU Library Public License, version 2, hence
the version number 2.1.]

Preamble

The licenses for most software are designed to take away your
freedom to share and change it. By contrast, the GNU General Public
Licenses are intended to guarantee your freedom to share and change
free software--to make sure the software is free for all its users.

This license, the Lesser General Public License, applies to some specially designated software packages--typically libraries--of the Free Software Foundation and other authors who decide to use it. You can use it too, but we suggest you first think carefully about whether this license or the ordinary General Public License is the better strategy to use in any particular case, based on the explanations below.

When we speak of free software, we are referring to freedom of use, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish); that you receive source code or can get it if you want it; that you can change the software and use pieces of it in new free programs; and that you are informed that you can do these things.

To protect your rights, we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights. These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it.

For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link other code with the library, you must provide complete object files to the recipients, so that they can relink them with the library after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

We protect your rights with a two-step method: (1) we copyright the library, and (2) we offer you this license, which gives you legal permission to copy, distribute and/or modify the library.

To protect each distributor, we want to make it very clear that there is no warranty for the free library. Also, if the library is modified by someone else and passed on, the recipients should know that what they have is not the original version, so that the original author's reputation will not be affected by problems that might be introduced by others.

Finally, software patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder. Therefore, we insist that

any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

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TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

0. This License Agreement applies to any software library or other program which contains a notice placed by the copyright holder or other authorized party saying it may be distributed under the terms of this Lesser General Public License (also called "this License"). Each licensee is addressed as "you".

A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact

all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that

uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly
with a modified version of the library, if
the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

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# 1.394 y18n 5.0.8

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# 1.399 distribution 2.8.3+incompatible

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# 1.400 jakarta-validation-api 3.1.1

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```
Manifest-Version: 1.0
Created-By: Apache Maven Bundle Plugin 5.1.9
Build-Jdk-Spec: 11
Bundle-Description: Jakarta Validation API
Bundle-DocURL: https://www.eclipse.org
Bundle-License: http://www.apache.org/licenses/LICENSE-2.0.txt
Bundle-ManifestVersion: 2
Bundle-Name: Jakarta Validation API
Bundle-SymbolicName: jakarta.validation.jakarta.validation-api
Bundle-Vendor: Eclipse Foundation
Bundle-Version: 3.1.1
Export-Package: jakarta.validation;version="3.1.1";uses:="jakarta.valida
tion.bootstrap,jakarta.validation.executable,jakarta.validation.metadat
a,jakarta.validation.spi,jakarta.validation.valueextraction",jakarta.va
lidation.bootstrap;version="3.1.1";uses:="jakarta.validation",jakarta.v
alidation.constraints;version="3.1.1";uses:="jakarta.validation",jakart
a.validation.constraintvalidation;version="3.1.1",jakarta.validation.ex
ecutable;version="3.1.1";uses:="jakarta.validation",jakarta.validation.
groups;version="3.1.1",jakarta.validation.metadata;version="3.1.1";uses
 :="jakarta.validation",jakarta.validation.spi;version="3.1.1";uses:="ja
karta.validation,jakarta.validation.valueextraction",jakarta.validation
.valueextraction;version="3.1.1";uses:="jakarta.validation"
Import-Package: jakarta.validation;version="[3.1,4)",jakarta.validation.
bootstrap;version="[3.1,4)",jakarta.validation.executable;version="[3.1
,4)",jakarta.validation.metadata;version="[3.1,4)",jakarta.validation.s
pi;version="[3.1,4)",jakarta.validation.valueextraction;version="[3.1,4
)"
Require-Capability: osgi.ee;filter:="(&(osgi.ee=JavaSE)(version=1.8))"
Tool: Bnd-6.3.1.202206071316
```

Found in path(s):
* /jakarta-validation-api-3-1-1-jar/META-INF/MANIFEST.MF
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 ~
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 -->

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* /jakarta-validation-api-3-1-1-jar/validation-mapping-1.1.xsd
* /jakarta-validation-api-3-1-1-jar/validation-mapping-2.0.xsd
* /jakarta-validation-api-3-1-1-jar/validation-mapping-3.1.xsd
* /jakarta-validation-api-3-1-1-jar/validation-configuration-1.1.xsd
* /jakarta-validation-api-3-1-1-jar/validation-mapping-3.0.xsd
* /jakarta-validation-api-3-1-1-jar/validation-configuration-1.0.xsd
* /jakarta-validation-api-3-1-1-jar/validation-configuration-3.0.xsd
* /jakarta-validation-api-3-1-1-jar/validation-mapping-1.0.xsd
* /jakarta-validation-api-3-1-1-jar/validation-configuration-2.0.xsd
* /jakarta-validation-api-3-1-1-jar/validation-configuration-3.1.xsd
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 ~
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 -->
<![CDATA[
Comments to: <a href="mailto:bean-validation-dev@eclipse.org">bean-validation-dev@eclipse.org</a>.<br>
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* /jakarta-validation-api-3-1-1-jar/META-INF/maven/jakarta.validation/jakarta.validation-api/pom.xml

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# 1.404 iso-codes 4.6.0-3.el9

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machine-readable source code, which
must be distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

If distribution of object code is made by offering access to copy
from a designated place, then offering equivalent access to copy the
source code from the same place satisfies the requirement to
distribute the source code, even though third parties are not
compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the
Library, but is designed to work with the Library by being compiled or
linked with it, is called a "work that uses the Library". Such a
work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library
creates an executable that is a derivative of the Library (because it
contains portions of the Library), rather than a "work that
uses the
library". The executable is therefore covered by this License.
Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be

linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the
object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany
the work with the complete corresponding
machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2)

will operate
properly with a modified version of the library, if
the user installs one, as long as the modified version is
interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at
least three years, to give the same user the materials
specified in Subsection 6a, above, for a charge no more
than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy
from a designated place, offer equivalent access to copy the above
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e) Verify that the user has already received a copy of these
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For an executable, the required form of the "work that uses the
Library" must include any data and utility programs needed for
reproducing the executable from it. However, as a special exception,
the materials to be distributed need not include anything that is
normally
distributed (in either source or binary form) with the major
components (compiler, kernel, and so on) of the operating system on
which the executable runs, unless that component itself accompanies
the executable.

It may happen that this requirement contradicts the license
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use both them and the Library together in an executable that you
distribute.

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facilities not covered by this License, and distribute such a combined
library, provided that the separate distribution of the work based on
the Library and of the other library facilities is otherwise
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facilities. This must be distributed under the terms of the
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# 1.405 gojay 1.2.13

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# 1.406 realmd 0.17.1-2.el9

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For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

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in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

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This option is useful when you wish to copy part of the code of

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4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

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When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

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For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally
distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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# 1.416 jakarta-inject-api 2.0.1

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# 1.417 @babel/runtime 7.22.15

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# 1.418 checkpointctl 1.3.0

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# 1.423 quic-go 0.50.1

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# 1.426 libmnl 1.0.5-r2

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# 1.434 pycparser 2.20

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pycparser -- A C parser in Python

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# 1.437 is-string 1.1.1

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# 1.438 perl 5.32.1-481.1.el9_6

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Date: Sun, 15 Mar 2015 21:22:10 -0600
Subject: Re: Pod::Html license
From: Tom Christiansen <tchrist53147@gmail.com>
To: Petr abata <contyk@redhat.com>
Cc: Tom Christiansen <tchrist@perl.com>, marcgreen@cpan.org,
jplesnik@redhat.com
MIME-Version: 1.0
Content-Transfer-Encoding: 8bit
Content-Type: text/plain; charset=utf-8

Yes, it was supposed to be licensed just like the rest of Perl.

Sent from my Sprint phone

Petr abata <contyk@redhat.com> wrote:

>Marc, Tom,
>
>I'm reviewing licensing of our perl package in Fedora and
>noticed Pod::HTML and its pod2html script are licensed under
>the Artistic license (only).
>
>This is an issue for us as this license isn't considered free by
>FSF [0]. Unless the license of this core component changes, we
>will have to drop it from the tarball and remove support for it

>from all the modules we ship that use it, such as Module::Build
>or Module::Install.
>
>What I've seen in the past is authors originally claiming their
>module was released under Artistic
 while what they actually meant
>was the common `the same as perl itself', i.e. `GPL+/Aristic' [1],
>an FSF free license.  Is it possible this is also the case
>of Pod::Html?
>
>Thanks,
>Petr
>
>(also CC'ing Jitka, the primary package maintainer in Fedora)
>
>[0] https://www.gnu.org/licenses/license-list.html#ArtisticLicense
>[1] https://www.gnu.org/licenses/license-list.html#PerlLicense
[name]
Uppercase license text

[input]
=head1 Uppercase License

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abstract: 'Build and install Perl modules'
author:
 - 'Ken Williams <kwilliams@cpan.org>'
 - "Development questions, bug reports, and patches should be sent to the\nModule-Build mailing list at <module-build@perl.org>."
build_requires:
 File::Temp: 0.15
 Test::Harness: 3.16
 Test::More: 0.49
generated_by: 'Module::Build version 0.3608'
license: gpl
meta-spec:
 url: http://module-build.sourceforge.net/META-spec-v1.4.html
 version: 1.4
name: Module-Build
resources:
 MailingList: mailto:module-build@perl.org
 license: http://dev.perl.org/licenses/
 repository: http://github.com/dagolden/module-build/
version: 3

---

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Julian Seward, jseward@acm.org
bzip2/libbzip2 version 1.0.8 of 13 July 2019

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 at assemblers) written by James Hacker.

 <signature of Ty Coon>, 1 April 1989
 Ty Coon, President of Vice

That's all there is to it!

```
#!perl

=head1 NAME

copyright.t

=head1 DESCRIPTION

Tests that the latest copyright years in the top-level README file and the
C<perl -v> output match each other.

If the test fails, update at least one of README and perl.c so that they match
reality.

Optionally you can pass the C<--now> option to check they are at the current
year. This isn't checked by default, so that it doesn't fail for people
working on older releases. It should be run before making a new release.

=cut

use strict;
use Config;
BEGIN { require './test.pl' }

if ( $Config{usecrosscompile} ) {
 skip_all( "Not all files are available during cross-compilation" );
}

my ($opt) = @ARGV;

my $readme_year = readme_year();
my $v_year = v_year();

# Check that both copyright dates are up-to-date, but only if requested, so
# that tests still pass for people intentionally working on older versions:
if ($opt eq '--now')
```

```
{
 my $current_year = (gmtime)[5] + 1900;
 is $v_year, $current_year, 'perl -v copyright includes current
 year';
 is $readme_year, $current_year, 'README copyright includes current year';
}

# Otherwise simply check that the two copyright dates match each other:
else
{
 is $readme_year, $v_year, 'README and perl -v copyright dates match';
}

done_testing;


sub readme_year
# returns the latest copyright year from the top-level README file
{

 open my $readme, '<', '../README' or die "Opening README failed: $!";

 # The copyright message is the first paragraph:
 local $/ = '';
 my $copyright_msg = <$readme>;

 my ($year) = $copyright_msg =~ /.*\b(\d{4,})/s
    or die "Year not found in README copyright message '$copyright_msg'";

 $year;
}


sub v_year
# returns the latest copyright year shown in perl -v
{

 my $output = runperl switches => ['-v'];
 my ($year) = $output =~ /copyright 1987.*\b(\d{4,})/i
    or die "Copyright statement not found in perl -v output '$output'";

 $year;
}
```

# 1.439 nghttp2 1.43.0-6.el9

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# 1.440 servlet-api 4.0.0

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```

Found in path(s):
* /servlet-api-4-0-0-sources-8-jar/org/xipki/http/servlet/TlsHelper.java
* /servlet-api-4-0-0-sources-8-jar/org/xipki/http/servlet/ServletURI.java
* /servlet-api-4-0-0-sources-8-jar/org/xipki/http/servlet/ServletURIPool.java
* /servlet-api-4-0-0-sources-8-jar/org/xipki/http/servlet/SimpleLruCache.java
* /servlet-api-4-0-0-sources-8-jar/org/xipki/http/servlet/HttpServlet.java
*
 /servlet-api-4-0-0-sources-8-jar/org/xipki/http/servlet/AbstractHttpServlet.java
* /servlet-api-4-0-0-sources-8-jar/org/xipki/http/servlet/package-info.java
* /servlet-api-4-0-0-sources-8-jar/org/xipki/http/servlet/SslReverseProxyMode.java
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```

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-->

Found in path(s):
* /servlet-api-4-0-0-sources-8-jar/META-INF/maven/org.xipki/servlet-api/pom.xml

# 1.441 pem 1.14.8

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# 1.442 musl 1.2.5-r9

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{
  "compilerOptions": {
    "module": "commonjs",
    "lib": [
      "es6"
    ],
    "noImplicitAny": true,
    "noImplicitThis": true,
    "strictNullChecks": true,
    "strictFunctionTypes": true,
    "baseUrl": "../",
    "typeRoots": [
      "../"
    ],
    "types": [],
    "noEmit": true,
    "forceConsistentCasingInFileNames": true
  },
  "files": [
    "index.d.ts",
    "license-checker-tests.ts"
```

```
  ]
}
{
  "compilerOptions": {
    "module": "commonjs",
    "lib": [
      "es6"
    ],
    "noImplicitAny": true,
    "noImplicitThis": true,
    "strictNullChecks": true,
    "strictFunctionTypes": true,
    "baseUrl": "../",
    "typeRoots": [
      "../"
    ],
    "types": [],
    "noEmit": true,
    "forceConsistentCasingInFileNames": true
  },
  "files": [
    "index.d.ts",
    "npm-license-crawler-tests.ts"
  ]
}
{
  "compilerOptions": {
    "module": "commonjs",
    "lib": [
      "es6"
    ],
    "noImplicitAny": true,
    "noImplicitThis": true,
    "strictNullChecks": true,
    "strictFunctionTypes": true,
    "baseUrl": "../",
    "typeRoots": [
      "../"
    ],
    "types": [],
    "noEmit": true,
    "forceConsistentCasingInFileNames": true
  },
  "files": [
    "index.d.ts",
    "license-checker-webpack-plugin-tests.ts"
  ]
}
```

```
{
  "files": [
    "index.d.ts",
    "angular-permission-tests.ts"
  ],
  "compilerOptions": {
    "module": "commonjs",
    "lib": [
      "es6",
      "dom"
    ],
    "noImplicitAny": true,
    "noImplicitThis": true,
    "strictNullChecks": false,
    "strictFunctionTypes": true,
    "baseUrl": "../",
    "typeRoots": [
      "../"
    ],
    "types": [],
    "noEmit": true,
    "forceConsistentCasingInFileNames": true
  }
}
{
  "compilerOptions": {
    "module": "commonjs",
    "lib": [
      "es6"
    ],
    "noImplicitAny": true,
    "noImplicitThis": true,
    "strictNullChecks": true,
    "strictFunctionTypes": true,
    "baseUrl": "../",
    "typeRoots": [
      "../"
    ],
    "types": [],
    "noEmit": true,
    "forceConsistentCasingInFileNames": true
  },
  "files": [
    "index.d.ts",
    "legal-eagle-tests.ts"
  ]
}
```

```
{
  "extends": "dtslint/dt.json",
  "rules": {
      "adjacent-overload-signatures": false,
      "array-type": false,
      "arrow-return-shorthand": false,
      "ban-types": false,
      "callable-types": false,
      "comment-format": false,
      "dt-header": false,
      "npm-naming": false,
      "eofline": false,
      "export-just-namespace": false,
      "import-spacing": false,
      "interface-name": false,
      "interface-over-type-literal": false,
      "jsdoc-format": false,
      "max-line-length": false,
      "member-access": false,
      "new-parens": false,
      "no-any-union": false,
      "no-boolean-literal-compare": false,
      "no-conditional-assignment": false,
      "no-consecutive-blank-lines": false,
      "no-construct": false,
      "no-declare-current-package": false,
      "no-duplicate-imports": false,
      "no-duplicate-variable": false,
      "no-empty-interface": false,
      "no-for-in-array":
 false,
      "no-inferrable-types": false,
      "no-internal-module": false,
      "no-irregular-whitespace": false,
      "no-mergeable-namespace": false,
      "no-misused-new": false,
      "no-namespace": false,
      "no-object-literal-type-assertion": false,
      "no-padding": false,
      "no-redundant-jsdoc": false,
      "no-redundant-jsdoc-2": false,
      "no-redundant-undefined": false,
      "no-reference-import": false,
      "no-relative-import-in-test": false,
      "no-self-import": false,
      "no-single-declare-module": false,
      "no-string-throw": false,
      "no-unnecessary-callback-wrapper": false,
```

```
    "no-unnecessary-class": false,
    "no-unnecessary-generics": false,
    "no-unnecessary-qualifier": false,
    "no-unnecessary-type-assertion": false,
    "no-useless-files": false,
    "no-var-keyword": false,
    "no-var-requires": false,
    "no-void-expression": false,
    "no-trailing-whitespace":
false,
    "object-literal-key-quotes": false,
    "object-literal-shorthand": false,
    "one-line": false,
    "one-variable-per-declaration": false,
    "only-arrow-functions": false,
    "prefer-conditional-expression": false,
    "prefer-const": false,
    "prefer-declare-function": false,
    "prefer-for-of": false,
    "prefer-method-signature": false,
    "prefer-template": false,
    "radix": false,
    "semicolon": false,
    "space-before-function-paren": false,
    "space-within-parens": false,
    "strict-export-declare-modifiers": false,
    "trim-file": false,
    "triple-equals": false,
    "typedef-whitespace": false,
    "unified-signatures": false,
    "void-return": false,
    "whitespace": false
  }
}
```

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```
{
  "compilerOptions": {
    "module": "commonjs",
    "lib": [
      "es6"
    ],
    "noImplicitAny": true,
    "noImplicitThis": true,
    "strictNullChecks": true,
    "strictFunctionTypes": true,
    "baseUrl": "../",
    "typeRoots": [
      "../"
    ],
    "types": [],
    "noEmit": true,
```

```
    "forceConsistentCasingInFileNames": true
  },
  "files": [
    "index.d.ts",
    "nodejs-license-file-tests.ts"
  ]
}
```

# 1.445 glob-parent 5.1.2

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# 1.446 jackson-databind 2.15.3

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It was originally written by Tatu Saloranta (tatu.saloranta@iki.fi), and has
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Version 3, 29 June 2007

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# 1.451 libxklavier 5.4-20.el9

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If such an object file uses only numerical parameters, data
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Any executables containing that work also fall under Section 6,
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6. As an exception to the Sections above, you may also compile or
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# 1.453 aws-sdk-go-base 2.0.0-beta.65

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complete corresponding
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# 1.477 json-glib 1.6.6-1.el9

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# 1.481 nats 1.44.0

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# 1.482 sif 2.21.1

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# 1.483 gofuzz 1.2.0

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# 1.484 snake-yaml 2.5

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# 1.485 go-playground-locales 0.14.1

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# 1.486 @babel/helper-hoist-variables 7.22.5

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Ekiga
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<snip>
The criteria for sound inclusion:
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. Appropriate length
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. Shorter than 5 seconds for a background sound (basically, startup/shutdown)
. Appropriate
sound
. Volume
. Normalized between samples
. Spectral range
. No extremes
. Good taste
. KISS
. General common sense (hah!)
</snip>

Of course, in addition to this the Theming Spec not only requires

normalized sounds, but those with with good perceived loudness as
described in:

http://replaygain.hydrogenaudio.org/calculationg_rg.html

PUT TOGETHER BY:
Lennart Poettering, 2008

Found in path(s):
* /sound-theme-freedesktop-tar-gz/freedesktop/README

# 1.489 oklog-run 1.2.0

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# 1.496 ini 4.1.1

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# 1.497 object.assign 4.1.7

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```

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```
_finishIntSlow();
private final void _finishIntSlow() throws IOException
return _fourBytesToIntSlow();
private final int _fourBytesToIntSlow()  throws IOException
```

Found in path(s):
* /jackson-dataformats-binary-2-8-zip/jackson-dataformats-binary-2.8/smile/src/main/java/com/fasterxml/jackson/dataformat/smile/SmileParser.java
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_skipVIntSlow();
protected void _skipVIntSlow() throws IOException
return _decodeVIntSlow();
int v = _decodeVIntSlow();
protected int _decodeVIntSlow() throws IOException

Found in path(s):
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# 1.501 channels 1.1.0

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# 1.504 safe-buffer 5.2.1

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# 1.505 mitchellh-mapstructure 1.5.0

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# 1.506 icu 72.1-3

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```
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## Commands to generate dependency files
GEN_DEPS.c= $(CC) -E -MM $(DEFS) $(CPPFLAGS)
GEN_DEPS.cc= $(CXX) -E -MM $(DEFS) $(CPPFLAGS)

## Flags for position independent code
SHAREDLIBCFLAGS = -fPIC
SHAREDLIBCXXFLAGS = -fPIC
SHAREDLIBCPPFLAGS = -DPIC

## Additional flags when building libraries and with threads
THREADSCPPFLAGS = -D_REENTRANT
LIBCPPFLAGS =
```

```
## Compiler switch to embed a runtime search path
LD_RPATH=
LD_RPATH_PRE= -Wl,-rpath,

## Compiler switch to embed a library name
LD_SONAME = -Wl,-soname -Wl,$(notdir $(MIDDLE_SO_TARGET))

## Shared library options
LD_SOOPTIONS= -Wl,-Bsymbolic

## Shared object suffix
SO = so
## Non-shared intermediate object suffix
STATIC_O = ao

## Compilation
 rules
%.$(STATIC_O): $(srcdir)/%.c
 $(COMPILE.c) $(STATICCPPFLAGS) $(STATICCFLAGS) -o $@ $<
%.o: $(srcdir)/%.c
 $(COMPILE.c) $(DYNAMICCPPFLAGS) $(DYNAMICCFLAGS) -o $@ $<

%.$(STATIC_O): $(srcdir)/%.cpp
 $(COMPILE.cc) $(STATICCPPFLAGS) $(STATICCXXFLAGS) -o $@ $<
%.o: $(srcdir)/%.cpp
 $(COMPILE.cc) $(DYNAMICCPPFLAGS) $(DYNAMICCXXFLAGS) -o $@ $<


## Dependency rules
%.d: $(srcdir)/%.c
 @echo "generating dependency information for $<"
 @$(SHELL) -ec '$(GEN_DEPS.c) $< \
  | sed '\"s/\($*\)\.o[ :]*/\1.o $@ : /g'\" > $@; \
  [ -s $@ ] || rm -f $@'

%.d: $(srcdir)/%.cpp
 @echo "generating dependency information for $<"
 @$(SHELL) -ec '$(GEN_DEPS.cc) $< \
  | sed '\"s/\($*\)\.o[ :]*/\1.o $@ : /g'\" > $@; \
  [ -s $@ ] || rm -f $@'

## Versioned libraries rules

%.$(SO).$(SO_TARGET_VERSION_MAJOR): %.$(SO).$(SO_TARGET_VERSION)
 $(RM) $@ && ln -s ${<F} $@
%.$(SO): %.$(SO).$(SO_TARGET_VERSION_MAJOR)
 $(RM) $@ && ln -s ${*F}.$(SO).$(SO_TARGET_VERSION) $@
```

```
##  Bind internal references

# LDflags that pkgdata will use
BIR_LDFLAGS= -Wl,-Bsymbolic

# Dependencies [i.e. map files] for the final library
BIR_DEPS=

## Remove shared library 's'
STATIC_PREFIX_WHEN_USED =
STATIC_PREFIX =

## End BSD-specific setup
```

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. The `grn' preprocessor, written by Barry Roitblat <barry@rentonww.com> and David Slattengren <slatteng@Xinet.COM>. These files have been part of the original Berkeley ditroff distribution, without AT&T code, and are in the public domain.

The original package can be found at
http://ftp.cs.wisc.edu/pub/misc/grn.tar.Z .

src/preproc/grn/gprint.h
src/preproc/grn/hdb.cpp
src/preproc/grn/hgraph.cpp
src/preproc/grn/hpoint.cpp
src/preproc/grn/main.cpp

. The `gxditview' output device. It is based on X11's `xditview' program
and thus has the X license.

src/devices/xditview/DESC.in
src/devices/xditview/Dvi.c
src/devices/xditview/Dvi.h
src/devices/xditview/DviP.h
src/devices/xditview/FontMap
src/devices/xditview/GXditview.ad
src/devices/xditview/Menu.h
src/devices/xditview/ad2c
src/devices/xditview/device.c
src/devices/xditview/device.h
src/devices/xditview/draw.c
src/devices/xditview/font.c
src/devices/xditview/gray1.bm
src/devices/xditview/gray2.bm
src/devices/xditview/gray3.bm
src/devices/xditview/gray4.bm
src/devices/xditview/gray5.bm
src/devices/xditview/gray6.bm
src/devices/xditview/gray7.bm
src/devices/xditview/gray8.bm
src/devices/xditview/gxditview.man
src/devices/xditview/lex.c
src/devices/xditview/page.c
src/devices/xditview/parse.c
src/devices/xditview/xdit.bm
src/devices/xditview/xdit_mask.bm
src/devices/xditview/xditview.c

src/include/DviChar.h
src/include/XFontName.h

src/libs/libxutil/DviChar.c
src/libs/libxutil/XFontName.c

Macro Packages

---

. The -mdoc macro set, using the BSD license.

tmac/doc.tmac
tmac/doc-old.tmac
tmac/doc-common
tmac/doc-ditroff
tmac/doc-nroff
tmac/doc-syms
tmac/groff_mdoc.man

. The -me macro set, using the BSD license.

tmac/e.tmac
tmac/groff_me.man
doc/meintro.me
doc/meintro_fr.me
doc/meref.me

Hyphenation Patterns
---

. The file `tmac/hyphen.us' is identical to the file `hyphen.tex', part of the TeX system written by Donald E. Knuth; the master file can be found at

ftp://labrea.stanford.edu/pub/tex/dist/lib/hyphen.tex .

It has been renamed for consistency, i.e., to make patterns available under the filenames `hyphen.<language>', e.g. `hyphen.de' or `hyphen.uk'.

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. The file `tmac/hyphen.fr' contains the same patterns as the file `frhyph.tex' (for TeX), which can be found at

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. The file `tmac/hyphen.sv' is identical to the file `svhyph.tex', which can be found at

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. The files `tmac/hyphen.det' and `tmac/hyphen.den' contain the same patterns as the files `dehypht-x-2017-03-31.pat' and `dehyphn-x-2017-03-31.pat' (for TeX), respectively, which can be found at

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. The file `tmac/hyphen.cs' contains the same patterns as the file `czhyphen.tex' (for TeX), which can be found in the archive

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# 1.547 kubernetes-apiserver 0.33.5

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# 1.549 ieee754 1.2.1

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```
NR START   END SECTORS SIZE NAME UUID
1    32  7679    7648 3.7M      8f8378c0-01
2  7680 16383    8704 4.3M      8f8378c0-02
5  7936 12799    4864 2.4M
6 12544 16127    3584 1.8M
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```
#ifndef UTIL_LINUX_PT_BSD_H
#define UTIL_LINUX_PT_BSD_H

#define BSD_MAXPARTITIONS 16
#define BSD_FS_UNUSED  0

#ifndef BSD_DISKMAGIC
# define BSD_DISKMAGIC     ((uint32_t) 0x82564557)
#endif

#define BSD_LINUX_BOOTDIR "/usr/ucb/mdec"

#if defined (__alpha__) || defined (__powerpc__) || \
   defined (__ia64__) || defined (__hppa__)
# define BSD_LABELSECTOR   0
# define BSD_LABELOFFSET   64
```

```
#else
# define BSD_LABELSECTOR   1
# define BSD_LABELOFFSET   0
#endif

#define BSD_BBSIZE        8192  /* size of boot area, with label */
#define BSD_SBSIZE        8192  /* max size of fs superblock */

struct bsd_disklabel {
 uint32_t d_magic;  /* the magic number */
 int16_t  d_type;   /* drive type */
 int16_t  d_subtype;  /* controller/d_type specific */
 char  d_typename[16];  /* type name, e.g. "eagle" */
 char  d_packname[16];  /* pack identifier */

   /* disk geometry: */
 uint32_t d_secsize;  /* # of bytes per sector */
 uint32_t d_nsectors;  /* # of data sectors per track */
 uint32_t d_ntracks;  /*
 # of tracks per cylinder */
 uint32_t d_ncylinders;  /* # of data cylinders per unit */
 uint32_t d_secpercyl;  /* # of data sectors per cylinder */
 uint32_t d_secperunit;  /* # of data sectors per unit */

 /*
  * Spares (bad sector replacements) below
  * are not counted in d_nsectors or d_secpercyl.
  * Spare sectors are assumed to be physical sectors
  * which occupy space at the end of each track and/or cylinder.
  */
 uint16_t d_sparespertrack; /* # of spare sectors per track */
 uint16_t d_sparespercyl;  /* # of spare sectors per cylinder */

 /*
  * Alternate cylinders include maintenance, replacement,
  * configuration description areas, etc.
  */
 uint32_t d_acylinders;  /* # of alt. cylinders per unit */

   /* hardware characteristics: */
 /*
  * d_interleave, d_trackskew and d_cylskew describe perturbations
  * in the media format used to compensate for a slow controller.
  * Interleave is physical sector interleave, set up by the formatter
  * or controller
 when formatting.  When interleaving is in use,
  * logically adjacent sectors are not physically contiguous,
  * but instead are separated by some number of sectors.
```

```
 * It is specified as the ratio of physical sectors traversed
 * per logical sector.  Thus an interleave of 1:1 implies contiguous
 * layout, while 2:1 implies that logical sector 0 is separated
 * by one sector from logical sector 1.
 * d_trackskew is the offset of sector 0 on track N
 * relative to sector 0 on track N-1 on the same cylinder.
 * Finally, d_cylskew is the offset of sector 0 on cylinder N
 * relative to sector 0 on cylinder N-1.
 */
uint16_t d_rpm;   /* rotational speed */
uint16_t d_interleave;  /* hardware sector interleave */
uint16_t d_trackskew;  /* sector 0 skew, per track */
uint16_t d_cylskew;  /* sector 0 skew, per cylinder */
uint32_t d_headswitch;  /* head switch time, usec */
uint32_t d_trkseek;  /* track-to-track seek, usec */
uint32_t d_flags;  /* generic flags */
uint32_t d_drivedata[5];  /*
drive-type specific information */
uint32_t d_spare[5];  /* reserved for future use */
uint32_t d_magic2;  /* the magic number (again) */
uint16_t d_checksum;  /* xor of data incl. partitions */

  /* filesystem and partition information: */
uint16_t d_npartitions;        /* number of partitions in following */
uint32_t d_bbsize;        /* size of boot area at sn0, bytes */
uint32_t d_sbsize;        /* max size of fs superblock, bytes */

struct bsd_partition  {  /* the partition table */
 uint32_t p_size;        /* number of sectors in partition */
 uint32_t p_offset;       /* starting sector */
 uint32_t p_fsize;        /* filesystem basic fragment size */
 uint8_t  p_fstype; /* filesystem type, see below */
 uint8_t  p_frag;  /* filesystem fragments per block */
 uint16_t p_cpg;        /* filesystem cylinders per group */
} __attribute__((packed)) d_partitions[BSD_MAXPARTITIONS]; /* actually may be more */
} __attribute__((packed));


/* d_type values:
 */
#define BSD_DTYPE_SMD  1  /* SMD, XSMD; VAX hp/up */
#define BSD_DTYPE_MSCP  2  /* MSCP */
#define BSD_DTYPE_DEC  3  /* other DEC (rk, rl) */
#define BSD_DTYPE_SCSI  4  /* SCSI */
#define BSD_DTYPE_ESDI  5  /* ESDI interface */
#define BSD_DTYPE_ST506  6  /* ST506 etc. */
#define BSD_DTYPE_HPIB  7  /* CS/80 on HP-IB */
#define BSD_DTYPE_HPFL  8  /* HP Fiber-link */
```

```
#define BSD_DTYPE_FLOPPY 10  /* floppy */

/* d_subtype values: */
#define BSD_DSTYPE_INDOSPART 0x8  /* is inside dos partition */
#define BSD_DSTYPE_DOSPART(s) ((s) & 3) /* dos partition number */
#define BSD_DSTYPE_GEOMETRY 0x10  /* drive params in label */

/*
* Filesystem type and version.
* Used to interpret other filesystem-specific
* per-partition information.
*/
#define BSD_FS_UNUSED 0  /* unused */
#define BSD_FS_SWAP     1  /* swap */
#define BSD_FS_V6       2  /* Sixth Edition */
#define BSD_FS_V7       3  /* Seventh Edition */
#define BSD_FS_SYSV     4  /* System V */
#define BSD_FS_V71K     5  /* V7
 with 1K blocks (4.1, 2.9) */
#define BSD_FS_V8       6  /* Eighth Edition, 4K blocks */
#define BSD_FS_BSDFFS 7  /* 4.2BSD fast file system */
#define BSD_FS_BSDLFS 9  /* 4.4BSD log-structured file system */
#define BSD_FS_OTHER 10  /* in use, but unknown/unsupported */
#define BSD_FS_HPFS 11  /* OS/2 high-performance file system */
#define BSD_FS_ISO9660 12  /* ISO-9660 filesystem (cdrom) */
#define BSD_FS_ISOFS BSD_FS_ISO9660
#define BSD_FS_BOOT 13  /* partition contains bootstrap */
#define BSD_FS_ADOS 14  /* AmigaDOS fast file system */
#define BSD_FS_HFS 15  /* Macintosh HFS */
#define BSD_FS_ADVFS 16  /* Digital Unix AdvFS */

/* this is annoying, but it's also the way it is :-( */
#ifdef __alpha__
#define BSD_FS_EXT2 8  /* ext2 file system */
#else
#define BSD_FS_MSDOS 8  /* MS-DOS file system */
#endif

/*
* flags shared by various drives:
*/
#define BSD_D_REMOVABLE 0x01  /* removable media */
#define BSD_D_ECC       0x02  /* supports ECC */
#define BSD_D_BADSECT 0x04  /* supports
 bad sector forw. */
#define BSD_D_RAMDISK 0x08  /* disk emulator */
#define BSD_D_CHAIN     0x10  /* can do back-back transfers */
#define BSD_D_DOSPART 0x20  /* within MSDOS partition */
```

#endif /* UTIL_LINUX_PT_BSD_H */
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# 1.553 apiserver-network-proxy-konnectivity-client 0.31.2

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// License information for the exposed API.
//
// For more information: http://goo.gl/8us55a#licenseObject
type License struct {
 Name string `json:"name,omitempty"`
 URL  string `json:"url,omitempty"`
}
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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

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machine-readable source code, which
must be distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

If distribution of object code is made by offering access to copy
from a designated place, then offering equivalent access to copy the
source code from the same place satisfies the requirement to
distribute the source code, even though third parties are not
compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the
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work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library
creates an executable that is a derivative of the Library (because it
contains portions of the Library), rather than a "work that
uses the
library". The executable is therefore covered by this License.
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that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the
object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany
the work with the complete corresponding
machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2)

will operate
properly with a modified version of the library, if
the user installs one, as long as the modified version is
interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at
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specified in Subsection 6a, above, for a charge no more
than the cost of performing this distribution.

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e) Verify that the user has already received a copy of these
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reproducing the executable from it. However, as a special exception,
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components (compiler, kernel, and so on) of the operating system on
which the executable runs, unless that component itself accompanies
the executable.

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restrictions of other proprietary libraries that do not normally
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A. HISTORY OF THE SOFTWARE
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Python was created in the early 1990s by Guido van Rossum at Stichting

Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

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| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.2 | 2.1.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
| 2.2.1 | 2.2 | 2002 | PSF | yes |
| 2.2.2 | 2.2.1 | 2002 | PSF | yes |
| 2.2.3 | 2.2.2 | 2003 | PSF | yes |
| 2.3 | 2.2.2 | 2002-2003 | PSF | yes |
| 2.3.1 | 2.3 | 2002-2003 | PSF | yes |
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# 1.587 dtls 3.0.4

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# 1.591 kingpin 2.4.0

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Manifest-Version: 1.0
Bundle-Description: An artifact of well-specified annotations to power
 static analysis checks and JVM language interop.
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Bundle-License: https://www.apache.org/licenses/LICENSE-2.0
Bundle-ManifestVersion: 2
Bundle-Name: JSpecify annotations
Bundle-SymbolicName: org.jspecify.jspecify
Bundle-Vendor: The JSpecify Authors
Bundle-Version: 1.0.0
Export-Package: org.jspecify.annotations;version="1.0.0"
Implementation-Version: 1.0.0
Import-Package: java.lang,java.lang.annotation
Multi-Release: true
Require-Capability: osgi.ee;filter:="(&(osgi.ee=JavaSE)(version=1.8))"

Found in path(s):
* /jspecify-1-0-0-jar/META-INF/MANIFEST.MF

# 1.596 libteam 1.31-16.el9_1

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# 1.610 go-units 0.5.0

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# 1.613 go-glob 1.0.0

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# 1.614 python-pip 21.3.1-1.el9

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Contributors
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- Chris McDonough, 2011/02/16
- Wichert Akkerman, 2012/02/02

This package contains a modified version of ca-bundle.crt:

ca-bundle.crt -- Bundle of CA Root Certificates

Certificate data from Mozilla as of: Thu Nov 3 19:04:19 2011#
This is a bundle of X.509 certificates of public Certificate Authorities

(CA). These were automatically extracted from Mozilla's root certificates
file (certdata.txt). This file can be found in the mozilla source tree:
http://mxr.mozilla.org/mozilla/source/security/nss/lib/ckfw/builtins/certdata.txt?raw=1#
It contains the certificates in PEM format and therefore
can be directly used with curl / libcurl / php_curl, or with
an Apache+mod_ssl webserver for SSL client authentication.
Just configure this file as the SSLCACertificateFile.#

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@(#) $RCSfile: certdata.txt,v $
$Revision: 1.80 $ $Date: 2011/11/03 15:11:58 $
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## A. HISTORY OF THE SOFTWARE

Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.2 | 2.1.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
| 2.2.1 | 2.2 | 2002 | PSF | yes |
| 2.2.2 | 2.2.1 | 2002 | PSF | yes |
| 2.2.3 | 2.2.2 | 2003 | PSF | yes |
| 2.3 | 2.2.2 | 2002-2003 | PSF | yes |
| 2.3.1 | 2.3 | 2002-2003 | PSF | yes |

| | | | | |
|---|---|---|---|---|
| 2.3.2 | 2.3.1 | 2002-2003 | PSF | yes |
| 2.3.3 | 2.3.2 | 2002-2003 | PSF | yes |
| 2.3.4 | 2.3.3 | 2004 | PSF | yes |
| 2.3.5 | 2.3.4 | 2005 | PSF | yes |
| 2.4 | 2.3 | 2004 | PSF | yes |
| 2.4.1 | 2.4 | 2005 | PSF | yes |
| 2.4.2 | 2.4.1 | 2005 | PSF | yes |
| 2.4.3 | 2.4.2 | 2006 | PSF | yes |
| 2.4.4 | 2.4.3 | 2006 | PSF | yes |
| 2.5 | 2.4 | 2006 | PSF | yes |
| 2.5.1 | 2.5 | 2007 | PSF | yes |
| 2.5.2 | 2.5.1 | 2008 | PSF | yes |
| 2.5.3 | 2.5.2 | 2008 | PSF | yes |
| 2.6 | 2.5 | 2008 | PSF | yes |
| 2.6.1 | 2.6 | 2008 | PSF | yes |
| 2.6.2 | 2.6.1 | 2009 | PSF | yes |
| 2.6.3 | 2.6.2 | 2009 | PSF | yes |
| 2.6.4 | 2.6.3 | 2009 | PSF | yes |
| 2.6.5 | 2.6.4 | 2010 | PSF | yes |
| 2.7 | 2.6 | 2010 | PSF | yes |

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A. HISTORY OF THE SOFTWARE
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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.2 | 2.1.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
| 2.2.1 | 2.2 | 2002 | PSF | yes |

| | | | | |
|---|---|---|---|---|
| 2.2.2 | 2.2.1 | 2002 | PSF | yes |
| 2.2.3 | 2.2.2 | 2003 | PSF | yes |
| 2.3 | 2.2.2 | 2002-2003 | PSF | yes |
| 2.3.1 | 2.3 | 2002-2003 | PSF | yes |
| 2.3.2 | 2.3.1 | 2002-2003 | PSF | yes |
| 2.3.3 | 2.3.2 | 2002-2003 | PSF | yes |
| 2.3.4 | 2.3.3 | 2004 | PSF | yes |
| 2.3.5 | 2.3.4 | 2005 | PSF | yes |
| 2.4 | 2.3 | 2004 | PSF | yes |
| 2.4.1 | 2.4 | 2005 | PSF | yes |
| 2.4.2 | 2.4.1 | 2005 | PSF | yes |
| 2.4.3 | 2.4.2 | 2006 | PSF | yes |
| 2.4.4 | 2.4.3 | 2006 | PSF | yes |
| 2.5 | 2.4 | 2006 | PSF | yes |
| 2.5.1 | 2.5 | 2007 | PSF | yes |
| 2.5.2 | 2.5.1 | 2008 | PSF | yes |
| 2.5.3 | 2.5.2 | 2008 | PSF | yes |
| 2.6 | 2.5 | 2008 | PSF | yes |
| 2.6.1 | 2.6 | 2008 | PSF | yes |
| 2.6.2 | 2.6.1 | 2009 | PSF | yes |
| 2.6.3 | 2.6.2 | 2009 | PSF | yes |
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| 2.6.5 | 2.6.4 | 2010 | PSF | yes |
| 3.0 | 2.6 | 2008 | PSF | yes |
| 3.0.1 | 3.0 | 2009 | PSF | yes |
| 3.1 | 3.0.1 | 2009 | PSF | yes |
| 3.1.1 | 3.1 | 2009 | PSF | yes |
| 3.1.2 | 3.1 | 2010 | PSF | yes |
| 3.2 | 3.1 | 2010 | PSF | yes |

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Thanks to the many outside volunteers who have worked under Guido's direction to make these releases possible.

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The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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# 1.620 libxml2 2.9.13-12.el9_6

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# 1.621 @babel/helper-string-parser 7.27.1

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# 1.622 xid 1.6.0

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# 1.623 libgudev 237-1.el9

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# 1.631 fcoe-utils 1.0.34-0.git14ef0d2.el9

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# 1.640 camelcase 5.3.1

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# 1.646 dario.cat-mergo 1.0.2

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```
{
  "import": "./thing.json",
  "fields": {
     "site": "string",
     "author": "updater"
  }
}
```

# 1.647 initial-setup 0.3.90.2-2.el9.alma

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```
<?xml version="1.0" encoding="UTF-8"?>
<interface>
 <!-- interface-requires gtk+ 3.6 -->
 <!-- interface-requires AnacondaWidgets 1.0 -->
 <object class="GtkTextBuffer" id="eulaBuffer">
   <property name="text">The license will go here</property>
 </object>
 <object class="AnacondaSpokeWindow" id="eulaWindow">
```

```
  <property name="can_focus">False</property>
  <property name="hexpand">True</property>
  <property name="vexpand">True</property>
  <property name="window_name" translatable="yes">License Information</property>
  <signal name="button-clicked" handler="on_back_clicked" swapped="no"/>
  <child internal-child="main_box">
    <object class="GtkBox" id="AnacondaSpokeWindow-main_box1">
      <property name="can_focus">False</property>
      <property name="orientation">vertical</property>
      <property name="spacing">6</property>
      <child internal-child="nav_box">
        <object class="GtkEventBox" id="AnacondaSpokeWindow-nav_box1">
          <property
name="can_focus">False</property>
          <child internal-child="nav_area">
            <object class="GtkGrid" id="AnacondaSpokeWindow-nav_area1">
              <property name="can_focus">False</property>
              <property name="margin_left">6</property>
              <property name="margin_right">6</property>
              <property name="margin_top">6</property>
            </object>
          </child>
        </object>
        <packing>
          <property name="expand">False</property>
          <property name="fill">False</property>
          <property name="position">0</property>
        </packing>
      </child>
      <child internal-child="alignment">
        <object class="GtkAlignment" id="AnacondaSpokeWindow-alignment1">
          <property name="can_focus">False</property>
          <property name="xscale">0.80000001192092896</property>
          <property name="yscale">0.80000001192092896</property>
          <child
internal-child="action_area">
            <object class="GtkBox" id="mainBox">
              <property name="can_focus">False</property>
              <property name="orientation">vertical</property>
              <child>
                <object class="GtkLabel" id="licenseAgreementLabel">
                  <property name="visible">True</property>
                  <property name="can_focus">False</property>
                  <property name="halign">start</property>
                  <property name="margin_top">24</property>
                  <property name="margin_bottom">6</property>
                  <property name="label" translatable="yes">License Agreement:</property>
                </object>
```

```
      <packing>
        <property name="expand">False</property>
        <property name="fill">True</property>
        <property name="position">0</property>
      </packing>
    </child>

  <child>
      <object class="GtkBox" id="eulaBox">
        <property name="visible">True</property>
        <property name="can_focus">False</property>
        <property name="hexpand">True</property>
        <property name="vexpand">True</property>
        <property name="orientation">vertical</property>
        <child>
          <object class="GtkScrolledWindow" id="eulaScrolledWindow">
            <property name="visible">True</property>
            <property name="can_focus">True</property>
            <property name="shadow_type">in</property>
            <child>
              <object class="GtkTextView" id="eulaView">
                <property name="visible">True</property>
                <property name="can_focus">True</property>
                <property name="margin_bottom">18</property>
                 <property name="hexpand">True</property>
                <property name="vexpand">True</property>
                <property name="vscroll_policy">natural</property>
                <property name="pixels_above_lines">12</property>
                <property name="editable">False</property>
                <property name="wrap_mode">word</property>
                <property name="left_margin">12</property>
                <property name="right_margin">12</property>
                <property name="cursor_visible">False</property>
                <property name="buffer">eulaBuffer</property>
              </object>
            </child>
          </object>
          <packing>
            <property name="expand">False</property>
            <property name="fill">True</property>
             <property name="position">0</property>
          </packing>
        </child>
        <child>
          <object class="GtkCheckButton" id="agreeCheckButton">
            <property name="label" translatable="yes">I _accept the license agreement.</property>
            <property name="visible">True</property>
            <property name="can_focus">True</property>
```

```
                <property name="receives_default">False</property>
                <property name="use_underline">True</property>
                <property name="xalign">0</property>
                <property name="draw_indicator">True</property>
                <signal name="toggled" handler="on_check_button_toggled" swapped="no"/>
              </object>
              <packing>
                <property name="expand">False</property>

 <property name="fill">True</property>
                <property name="position">2</property>
              </packing>
            </child>
          </object>
          <packing>
            <property name="expand">False</property>
            <property name="fill">True</property>
            <property name="position">1</property>
          </packing>
        </child>
      </object>
    </child>
  </object>
  <packing>
    <property name="expand">True</property>
    <property name="fill">True</property>
    <property name="position">1</property>
  </packing>
</child>
<child>
  <placeholder/>
</child>
</object>
</child>
</object>
</interface>
```


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# 1.648 sepolicy 3.6

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# 1.649 low-memory-monitor 2.1-4.el9

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that copy, so the ordinary GNU General Public License applies to all
subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of
the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or
derivative of it, under Section 2) in object code or executable form
under the terms of Sections 1 and 2 above provided that you accompany
it with the
complete corresponding machine-readable source code, which
must be distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

If distribution of object code is made by offering access to copy
from a designated place, then offering equivalent access to copy the
source code from the same place satisfies the requirement to
distribute the source code, even though third parties are not
compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the
Library, but is designed to work with the Library by being compiled or
linked with it, is called a "work that uses the Library". Such a
work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library
creates an executable that is a derivative of the Library (because it
contains portions of the Library), rather than a
"work that uses the
library". The executable is therefore covered by this License.
Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library. The

threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute
the object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.
^L
6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2)

will operate properly with a modified version of the library, if
the user installs one, as long as the modified version is
interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at
least three years, to give the same user the materials
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d) If distribution of the work is made by offering access to copy
from a designated place, offer equivalent access to copy the above
specified materials from the same place.

e) Verify that the user has already received a copy of these
materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the
Library" must include any data and utility programs needed for
reproducing the executable from it. However, as a special exception,
the materials to be distributed need not include anything
that is
normally distributed (in either source or binary form) with the major
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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

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c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License.

Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the
object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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a) Accompany
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b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

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For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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* /words-3.0-39.el9.src.rpm-cosi-expand-archive-H29vsAr3/mwords.tar.Z-cosi-expand-archive-hP67tLJH/mwords/113809of.fic
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QUICK START

17 May 93

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Moby (tm) Words II for the MSDOS operating system is compressed
and distributed on two 1.4MB double-sided diskettes. After
self-extraction, the vocabulary files included with this product
are in ordinary ASCII format with CRLF (ASCII 13/10) delimiters.

MOBY WORDS II CONTENTS

354,984 single words
Over 354,000 single words, excluding proper names, acronyms,
or compound words and phrases. This list does not exclude archaic
words or significant variant spellings.

256,772 compound words
Over 256,700 hyphenated or other entries containing more
than one word as well as all capitalized words and acronyms.
Phrases were considered 'common' if they or variations of them
occur in standard dictionaries or thesauruses.

113,809 official crosswords
A list of words permitted in crossword
games such as Scrabble(tm).
Compatible with the first edition of the Official Scrabble Players
Dictionary(tm). Since this list has all forms: -ing, -ed, -s, and so on
of words, it makes a good addition when building a custom spelling dictionary.

4,160 official crosswords delta

When combined with the 113,809 crosswords file, it produces the official crossword list compatible with the second edition of the Official Scrabble Players Dictionary. (Scrabble is a registered trademark of Milton-Bradley licensed to Merriam-Webster.)

74,550 common dictionary words
A list of words in common with two or more published dictionaries. This gives the developer of a custom spelling checker a good beginning pool of relatively common words.

21,986 names
This database contains the most common names used in the United States and Great Britain. Spelling checkers may want to supplement their basic word list with this one.

4,946 female names
frequent given names of females in English speaking countries

3,897
male names
frequent given names of males in English speaking countries

10,196 places
a large selection of place names in the United States

1,000 by frequency
This file consists of the 1,000 most frequently used English words from a wide variety of common texts listed in decreasing order of frequency

1,000 by frequency internet
This file consists of the 1,000 most frequently used English words as used on the Internet computer network in 1992.

6,213 acronyms
common acronyms & abbreviations

1,185 King James Version frequent substrings
The most frequently occurring 1,185 substrings in the King James Version Bible ranked and counted by order of frequency.

467 current fiction substrings
The most frequently occurring 467 substrings occurring in a best-selling novel by Amy Tan in 1990.

USA Constitution
The Constitution of the United States, including the Bill of Rights and all amendments current to 1993.

NOTE: Accents have been stripped from words, e.g., 'etude'
does not mark the
 accent on the initial 'e'.

Found in path(s):
* /words-3.0-39.el9.src.rpm-cosi-expand-archive-H29vsAr3/mwords.tar.Z-cosi-expand-archive-hP67tLJH/mwords/readme.txt
No license file was found, but licenses were detected in source scan.

$100-a-plate dinner
'tween deck
'tween-decks
-'s
-a
-ability
-able
-ably
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-acal
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-acean
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-adelphous
-ado
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-agogue
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-asis
-ast
-aster
-ate
-ated
-atic
-atile
-ation
-ative
-ator
-atory
-bashing
-biosis
-biotic
-blast
-blastic
-ble
-bodied
-branch
-by
-cade
-caine
-cardia
-carp
-carpic
-carpous
-cele
-cene
-centric
-cephalic
-cephalus
-cercal
-chore
-chrome
-chroous

-cidal
-cide
-clase
-cle
-clinal
-cline
-clinic
-clinous
-coccus
-coele
-colous
-cotyl
-cracy
-crat
-cula
-cule
-culus
-cy
-cyst
-cyte
-dactylous
-decker
-derm
-derma
-dermatous
-dermis
-diene
-dom
-drome
-dromous
-ean
-ectomy
-ed
-ee
-een
-eer
-ein
-el
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-eme
-emia
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-enchyma
-ency
-end
-ene
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-escence
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-est
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-eth
-etic
-ette
-ey
-facient
-faction
-factive
-favoured
-featured
-fer
-ferous
-fest
-fic
-fication
-fid
-florous
-fold
-footed
-form
-free
-fuge
-ful
-fy
-gaea
-gaited
-gamic
-gamous
-gamy
-gea
-gen
-gene
-genesis
-genetic
-genic
-genous
-geny
-gerous

-gnathous
-gnosis
-gon
-gonium
-gony
-grade
-gram
-graph
-grapher
-graphic
-graphist
-graphy
-gyne
-gynous
-gyny
-haemia
-haired
-handed
-head
-hearted
-hedral
-hedron
-hemia
-hippus
-hood
-hydric
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-ial
-ian
-iana
-iasis
-iatric
-iatrics
-iatry
-ibility
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-ically
-ice
-ician
-icity
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-idae
-idan

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-iform
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-in-law
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-ition
-itious
-itis
-itol
-itous
-ity
-ium
-ive
-ization
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-izer
-ji
-kin
-kinesis
-kins
-lalia
-lashed

-later
-latry
-le
-lent
-lepsy
-less
-let
-lewe
-like
-ling
-lings
-lipped
-lite
-lith
-lithic
-lived
-lock
-log
-loger
-logian
-logic
-logist
-logue
-logy
-long
-ly
-lysis
-lyte
-lytic
-lyze
-m
-machy
-mancy
-mane
-mania
-maniac
-mantic
-mas
-masted
-mastix
-meal
-ment
-mer
-mere
-merism
-merous
-meter
-metric

-metry
-mo
-mony
-more
-morph
-morphic
-morphism
-morphosis
-morphous
-morphy
-most
-motored
-mycete
-n
-n't
-nasty
-naut
-ness
-nik
-nomy
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-odontia
-ography
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-oid
-oidal
-oidea
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-opathy
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-opolis

-opsis
-opsy
-or
-oria
-orial
-orious
-orium
-ory
-ose
-osis
-osity
-ostosis
-ot
-ote
-otic
-our
-ous
-para
-parous
-path
-pathy
-ped
-pede
-person
-petal
-petalous
-phage
-phagia
-phagous
-phagy
-phane
-phany
-phasia
-phil
-phile
-philia
-philic
-philous
-phobe
-phobia
-phobic
-phone
-phony
-phore
-phoresis
-phorous
-phrenia
-phyll

-phyllous
-phyre
-phyte
-phytic
-plasia
-plasm
-plast
-plastic
-plasty
-plegia
-ploid
-pnea
-pod
-poda
-podite
-podium
-podous
-poiesis
-poietic
-pole
-polis
-pounder
-prone
-proof
-pterous
-red
-rel
-rhine
-rhiza
-rhoea
-rigged
-right
-rights
-rrhagia
-rrhea
-rrhine
-rrhiza
-rrhoea
-ry
-s
-s'
-saur
-scape
-scope
-scopy
-sect
-sepalous
-shaped

-ship
-sided
-sider
-sis
-some
-somic
-sophy
-sperm
-spermy
-sphere
-sporous
-spory
-st
-stasis
-stat
-ster
-stichous
-stome
-stomous
-stomy
-stress
-stylar
-stylous
-sy
-tactic
-taxis
-taxy
-teen
-termer
-th
-thecium
-theism
-theist
-ther
-therium
-therm
-thermy
-thymia
-tion
-tious
-to-be
-tome
-tomy
-tonia
-tress
-trice
-trices
-trichous

-trix
-tron
-trope
-trophic
-trophy
-tropic
-tropism
-tropous
-tropy
-tude
-ty
-type
-ular
-ule
-ulent
-ulose
-ulous
-uous
-ure
-uret
-urgy
-uria
-urient
-uronic
-urous
-valent
-ville
-visaged
-vorous
-ward
-wards
-way
-ways
-wick
-wise
-witted
-worthy
-y
-yer
-yl
-yne
-zoa
-zoic
-zoon
-zygous
-zyme
10

Downing Street
10-point
11-point
12-point
1200 hours
16-point
18-point
2,4,5-t
2,4-d
20-point
2D
3-D
3-D display
3-d
30-30
3D
3M
4-D
48-point
4GL
4H
5-T
5-point
6-point
7-point
8-point
9-point
A
A
& M
A & R
A B C powder
A C E mixture
A Luoi
A acid
A and M
A at Lloyd's
A battery
A board
A bond
A derrick
A horizon
A la marengo
A la maryland
A level
A major
A minor
A natural

A number
A number 1
A one
A per se
A pole
A powder
A power supply
A star
A string
A supply
A switchboard
A to Z
A to izzard
A&M
A&P
A'asia
A's
A-1
A-B station
A-OK
A-Z test
A-and-R
A-axes
A-axis
A-b-c book
A-b-c method
A-blast
A-bomb
A-bomb shelter
A-day
A-flat
A-flat major
A-frame
A-line
A-one
A-pole
A-scope
A-shaped
A-sharp
A-tent
A-war
A-weapons
A/C
A/F
A/O
A/P
A/V
A1

A1 at Lloyd's
A4
A5
AA
AA gun
AA radar
AA target rocket
AAA
AAAA
AAAAAA
AAAL
AAAS
AAE
AAEE
AAF
AAG
AAII
AAM
AAMSI
AAO
AAP
AAPSS
AARC
AARP
AAS
AAU
AAUP
AAUW
AAVSO
AAX
AB
ABA
ABATS
ABBR
ABC
ABC Powers
ABC's
ABCs
ABEL
ABEPP
ABFM
ABHC
ABI
ABLS
ABM
ABO system
ABPC
ABS

ABSBH
AC
AC arc
AC motor
AC welder
AC-DC
AC/DC
ACAA
ACAS
ACAWS
ACB
ACBL
ACC
ACCRA
ACCS
ACCT
ACD
ACDA
ACE
ACE mixture
ACF
ACGI
ACH
ACHEFT
ACK
ACL
ACLS
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ACM
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ACP
ACRNEMA
ACRV
ACS
ACSE
ACSNET
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ADSR
ADT
AE
AE
& P
AEA
AEC
AEF
AEGIS
AES
AET
AEU
AF
AF amplification
AF amplifier
AFA
AFACTS
AFADS
AFAM
AFATDS
AFB
AFC
AFC mixer
AFCAC
AFCC
AFGE
AFI

AFIPS
AFL
AFL-CIO
AFLCIO
AFM
AFNOR
AFP
AFS
AFSC
AFSCME
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AGC
AGCA
AGCA radar
AGCT
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AHE
AHL
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AIAA
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AICC
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AIDDE
AIDS
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AIF
AIH
AIM
AIME

AIMS
AIOD
AIPS
AIR
AIS
AISI
AISI steel
AIX
AInd
AJ
AJA
AJC
AK
AKA
AKA boat
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AL
ALA
ALAP
ALBM
ALBO
ALC
ALEXIS
ALFA
ALFE
ALGOL
ALI
ALIT
ALM
ALP
ALPO
ALRU
ALS
ALU
AM
AM broadcasting
AM receiver
AM signal
AM station
AM transmitter
AM tuner
AM-FM receiver
AM-FM tuner
AMA
AMACS
AMARC
AMASE
AMAT

AMATPS
AMBA
AMC
AMD
AMDG
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AMEDS
AMERITECH
AMEX
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AMICE
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AMIMechE
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AMPAS
AMPS
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AMROC
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AND circuit
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ANTA
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ANU
ANZUS
ANZUS Council
ANZUS Pact

ANZUS Treaty
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AOCS
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AOPA
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AOSS
AOU
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APA boat
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ARPANET
ARQ
ARRL
ARS
ARSA
ARSB
ARSM
ART
ARTCC
ARTEMIS
ARU
ARV
AS
ASA
ASA exposure index
ASA scale
ASA/BS
ASAIGAC
ASAP
ASC
ASCAP
ASCC
ASCII
ASCQ
ASDIC
ASDSP
ASEAN
ASG
ASHRAE
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ASIC
ASIO
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ASLEF
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ASPAC
ASPCA
ASPEN

ASR
ASRM
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ASTM
ASTMS
ASU
ASV
ASV radar
ASW
AT
AT&T
ATA
ATA missile
ATACC
ATB
ATC
ATDA
ATDRS
ATE
ATF
ATG rocket
ATH
ATI
ATIS
ATK
ATLAS
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ATMS
ATN
ATO
ATOMS
ATP
ATP2
ATPCO
ATR
ATR box
ATR switch
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Aargau
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Aaron Krickstein
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Abassieh
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Abatua
Abba
Abba Eban
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Abbai

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Abbottson
Abbottstown
Abboud
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Abbyville
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Abd-el-Kadir
Abd-el-Krim
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Abdel Hakim Amer
Abdel Rahman Hakki
Abdel Rahman Iriani
Abdel Salam Aref
Abdelhadi Boutaleb
Abdelkarim Gheraieb
Abdella
Abderhalden
Abderian
Abderite
Abderus
Abdias
Abdiel
Abdominales
Abdon

Abdou
Diouf
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Abdul Khaalis
Abdul Rahman Hourieh
Abdul-Aziz
Abdul-Hamid II
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Abdul-Mejid I
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Abdul-baha
Abdulla
Abdullah Al-Sallal
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Abe Lincoln in Illinois
Abe Pollin
Abebe Mekonnen
Abebi
Abednego
Abeid Karume
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Aberdeen Angus
Aberdeen terrier
Aberdeenshire
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Aberfan
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Abert
Aberystwyth
Abeu
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Abgatha
Abhidamma Pitaka
Abhorson
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Abiathar
Abib
Abidjan
Abie
Abies
Abietineae
Abiezer
Abigael
Abigail
Abigale
Abihu
Abijah
Abilene
Abilyne
Abimelech
Abineri
Abingdon
Abinger
Abington
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Abipon
Abiquiu
Abisag
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Abisia
Abitibi
Abiu
Abixah
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Abobra
Abolhassan Bani-Sadr
Abominable Snowman
Abongo
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Aboriginal
Aborigine
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Abott
Aboukir
Aboukir Bay
Abourezk
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Absa
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Abshier
Absi
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Abt system
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Abu Alam
Abu Daoud
Abu Dhabi
Abu EgeilaAbu Iyad
Abu Jihad
Abu Nidal
Abu Rudeis
Abu Simbel
Abu-Bekr
Abucay
Abukir
Abul Abbas
Abulfeda
Abuna
Abundantia
Abury
Abuta
Abutilon
Abydos
Abyla
Abyss
Abyssinia
Abyssinian
Abyssinian Church
Abyssinian banana
Abyssinian cat
Abyssinian well
Ac
Acacallis
Acacea
Acaceae
Acacia
Acacia Avenue
Acacian
Academic
Academus

Academy
Academy Award
Acadia
Acadia National Park
Acadian
Acadie
Acaena
Acalepha
Acalephae
Acalia
Acalypha
Acalypterae
Acalyptrata
Acalyptratae
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Acampo
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Acanthocephali
Acanthocereus
Acanthodea
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Acanthodini
Acantholimon
Acanthomeridae
Acanthopanax
Acanthophis
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Acanthopterygii
Acanthuridae
Acanthurus
Acapulco
Acapulco
de Juarez
Acapulco gold
Acarapis
Acarida
Acaridea
Acarina
Acarnan
Acarus
Acastus

Acca larentia
Accad
Accadian
Accalia
Accipiter
Accipitres
Accius
Accokeek
Accomac
Accoville
Accra
Accrington
Accutron
Ace
Ace bandage
Ace elastic bandage
Aceldama
Acemetae
Acemetic
Acephala
Acephali
Acephalina
Acephalite
Acer
Aceraceae
Acerae
Acerata
Acerates
Aceratherium
Acerbas
Acesius
Acessamenus
Acestes
Acetabularia
Acetaminophen
Acetes
Acetobacter
Acey
Achab
Achad
Achaea
Achaean
Achaean League
Achaean league
Achaemenes
Achaemenian
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Achaemenids
Achaenodon
Achaeta
Achaeus
Achagua
Achaia
Achaian
Achakzai
Achamoth
Achan
Achango
Achariaceae
Achariaceous
Acharnians
Achates
Achatina
Achatinella
Achatinidae
Achaz
Achelous
Achen
Acherman
Achernar
Acheron
Acheronian
Acherontic
Acherontical
Acheson
Achetidae
Acheulean
Acheulian
Achill
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Island
Achille
Achille Lauro
Achillea
Achillean
Achilleid
Achilles
Achilles and Patroclus
Achilles heel
Achilles reflex
Achilles tendon
Achilles' heel
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and Nicolette
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Audubon's warbler
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Augean task
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Augsburg Confession
Augusburg Confession
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August meteors
Augusta
Augustales

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Augustan Confession
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Auguste Marie Louis Nicolas
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Augustine Volcano
Augustine of Hippo
Augustine's summer
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Augustinian Hermit
Augustinian of the Assumption
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Augusto Bernardino
Augusto Cestedes
Augusto Pinochet
Augustus
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Clootie
Auld kirker
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Aunson

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Aunt jericho
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Austin Friar
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Australe
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Australia Day
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Australian Alps
Australian Antarctic Territory
Australian
Capital Territory
Australian English
Australian Rules
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Australian ballot
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Australian bluebell creeper
Australian crane
Australian crawl
Australian fan palm
Australian pea

Australian rye grass
Australian seal
Australian tea tree
Australian terrier
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Autaugaville

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Authon
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Ave Maria
Ave Mary
Ave Regina Coelorum
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Avila Camacho
Avilion
Avilla
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Aviston
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Avogadro's law
Avogadro's number
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Avon Lake
Avondale

Avonmore
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Avrit
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Awad Barakat
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Axminster carpet
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Ayahuca
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Ayatollah Beheshti
Ayatollah Khomeini

Ayatollah Sadegh Khalkhali
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Ayden
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Ayers Rock
Ayesha
Ayina
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Ayrton Senna
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Ayub Kalule
Ayub Khan
Ayubite
Ayudhya
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da Silveira
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B Special
B and B
B battery
B board
B complex
B horizon
B major
B mi
B minor
B natural
B powder
B power supply
B quadrum
B rotundum
B supply
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B-flat minor
B-girl
B-scope
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Baal Merodach
Baal Shem Tov
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Baal Shem-Tov
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Bad Godesberg
Bad Kreuznach
Bad Lands
Badacsonyi
Badaga
Badajoz
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Badarian
Badawi
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Badoeng
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Baez
Bafemi Awolowo
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Bahama grass
Bahama hemp
Bahama mahogany
Bahama redwood
Bahama tea
Bahama whitewood
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Bahaullah
Bahawalpur
Bahia
Bahia de los Cochinos
Bahia grass
Bahia piassava
Bahia powder
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Baldwinsville

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Balkan States
Balkan War
Balkan Wars
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Balthasar
Balthazar
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Brian Boru
Brian Dubois
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Bridgehampton
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Bridger
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Bridgewater
Bridgid
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Bridgton
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British Antarctic Territory
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British Cameroons
British Columbia
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British Commonwealth
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British East Africa
British Empire
British English
British Guiana
British Honduran
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British India
British Indian Ocean Territory
British Indian gum
British Interplanetary Society
British Isles
British Israelite
British Legion
British Malaya
British Museum
British New Guinea
British North America
British North Borneo
British Shorthair
British
Somaliland
British Standard Time
British Standards Institution
British Summer Time
British Union of Fascists
British Virgin Islands
British West Africa
British West Indies
British anti-lewisite
British antilewisite
British candle
British dollar
British gallon
British gum
British imperial dry measure
British imperial liquid measure

British money
British thermal unit
British warm
British-israel
Britisher
Britishhood
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Briton
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Britt
Britta
Brittain
Brittan
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Brittany
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Britte
Britten
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Brittne
Brittnee
Brittney
Brittni
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Brix
Brix scale
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Briza
Brize
Brizo
Brnaba
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Brno
Bro
Broad
Broad Church
Broad Churchman
Broadalbin
Broadbent

Broadbrim
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Broaddus
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Chesapeake
Chesapeake Bay
Chesapeake Bay retriever
Chesapeake and Delaware Canal
Chesapeake bugeye
Chesapeake canoe
Cheshire
Cheshire cat
Cheshire cheese
Cheshunt
Cheshvan
Cheslie
Chesna
Chesnee
Chesney
Chesnut
Chessa
Chessy
Chester
Chester White
Chesterfield
Chesterfieldian
Chesterland
Chesterton
Chestertown
Chesterville
Cheston
Cheswick
Cheswold
Chet
Chetek
Chetnik
Chetopa
Chetumal
Cheung
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Cheval blanc
Chevalier
Chevalier-Montrachet
Chevallier
Cheverly

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Cheviot
Cheviot Hills
Chevret
Chevrier
Chevrolet
Chevrotin
Chevy
Chevy Chase
Chew
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Chewsville
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Cheyne-Stokes
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Cheyney
Chhnang
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Chi Chi Rodriguez
Chi-Rho
Chi-Rhos
Chi-lin
Chi-rho monogram
Chi-tse
Chi-tzu
Chia-Chia
Chiaki
Chiam
Chian
Chian turpentine
Chiang
Chiang Ch'ing
Chiang Ching-kuo
Chiang Kai-shek
Chiangling
Chiangmai
Chianti
Chianti classico
Chiao Kuan-hua
Chiapanec
Chiapanecan

Chiapas
Chiaretto
Chiari
Chiarra
Chiasmodon
Chiasmodontidae
Chiasso
Chiayi
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Chicago Heights
Chicago Ridge
Chicago style
Chicagoan
Chicano
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Chichagof Island
Chichen Itz
Chichester
Chichester elm
Chichewa
Chichi Jima
Chichihaerh
Chichihar
Chichimec
Chichivache
Chick
Chickahominy
Chickamauga
Chickasaw
Chickasaws
Chickasha
Chicken Itsa
Chickie
Chicky
Chiclayo
Chico
Chicoine
Chicomecoatl
Chicopee
Chicora
Chicota
Chidester

Chief Education Officer
Chief Executive
Chief Justice
Chief Rabbi
Chief Secretary
Chief of Staff
Chiefland
Chiemsee
Chien
Chien ware
Chiengmai
Chiengrai
Chiffney bit
Chifley
Chignik
Chigwell
Chihli
Chihuahua
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Chikamatsu
Chikmagalur
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Chilcoot
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Child
Child's Garden of Verses, A
Childe
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Childermas
Childers
Childersburg
Children of Hercules
Children's Crusade
Children's Day
Children's Hour, The
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Childwold
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Chile hazel
Chile pine
Chile saltpeter
Chile saltpetre
Chilean
Chilean arborvitae

Chilean bellflower
Chilean guava
Chilean tarweed
Chilean wine
Chileanization
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Chilina
Chilinidae
Chilion
Chilkat
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Chilkoot Pass
Chill
Chillan
Chillicothe
Chilliwack
Chillon
Chilmark
Chilo
Chiloe Island
Chilognatha
Chilomastix
Chilomonas
Chilon
Chilopoda
Chilopsis
Chiloquin
Chilostoma
Chilostomata
Chilpancingo
Chilson
Chilt
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Chiltern Hills
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Chilung
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Chimaeridae
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Chimakuan
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Chimalakwe
Chimalapa
Chimane

Chimaphila
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Chimu
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Hills
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China
China Sea
China aster
China grass
China grass cloth
China ink
China oil
China plate
China rose
China silk
China tree
China wood oil
Chinagraph
Chinaman
Chinamen
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Chinchasuyu
Chinchilla cat
Chincoteague
Chindit
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Chinee
Chinese
Chinese Chippendale
Chinese Empire
Chinese Revolution
Chinese Turkestan

Chinese Wall
Chinese artichoke
Chinese banana
Chinese block
Chinese blue
Chinese boxer
Chinese boxing
Chinese cabbage
Chinese calendar
Chinese checkers
Chinese chequers
Chinese cinnamon
Chinese copy
Chinese crescent
Chinese date
Chinese eddo
Chinese evergreen
Chinese fan palm
Chinese fire drill
Chinese fleece-vine
Chinese forget-me-not
Chinese gelatin
Chinese glue
Chinese gooseberry
Chinese hibiscus
Chinese house
Chinese ink
Chinese isinglass
Chinese jujube
Chinese juniper
Chinese lacquer
Chinese landing
Chinese lantern
Chinese lantern plant
Chinese lug
Chinese pavilion
Chinese pistachio
Chinese potato
Chinese primrose
Chinese
puzzle
Chinese quince
Chinese red
Chinese remainder theorem
Chinese rug
Chinese sacred lily
Chinese scholar tree
Chinese snowball

Chinese tag
Chinese tree wax
Chinese trumpet creeper
Chinese vermilion
Chinese wall
Chinese water torture
Chinese watermelon
Chinese waterplant
Chinese wax
Chinese white
Chinese windlass
Chinese wisteria
Chinese wood oil
Chinese yam
Chinese-houses
Chinesery
Ching
Ching ming
Ching-t'u
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Chir River
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Cho Lin
Cho Lon
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Chretien
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Chris
Chris Chelios
Chris Heunis
Chris Kotsopolous
Chris Nilan
Chris Spielman
Chris Welp
Chrisman
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Chrisse
Chrissie
Chrissy
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Christ Jesus
Christ Within
Christ and the beloved disciple
Christ child
Christ follower
Christ
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Christ row
Christ's thorn
Christ's-thorn
Christ-borne
Christ-confessing
Christ-given
Christ-hymning
Christ-imitating
Christ-inspired
Christ-professing
Christ-taught
Christa
Christabel

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Christanna indian
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Christian Endeavor
Christian Era
Christian Fouchet
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Christian Ruutuu
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Christian Science Practitioner
Christian Scientist
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Christian existentialist
Christian healer

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Christmas factor
Christmas fern
Christmas gift
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Christmas present
Christmas pudding
Christmas rose
Christmas seal
Christmas shield fern
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Christmas stocking
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Christmasberry tree
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Chrystal
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Chu Kiang
Chu Lai

Chu Teh
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Church Father
Church Point
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Cindelyn
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Cingulum veneris
Cini
Cinna
Cinnamodendron
Cinnamomum
Cinnamon
Cinque Ports
Cinque port
Cinura
Cinyras
Cinzano
Cioban
Cioffred
Cipango
Ciprian
Cipus
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Circaean
Circaetus
Circassia
Circassian
Circassic
Circe

Circean
Circensian
Circini
Circinus
Circleville
Circlorama
Circosta
Circum-arean
Circum-cytherean
Circum-jovial
Circum-mercurial
Circum-neptunian
Circum-saturnal
Circum-saturnian
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Circumcellion
Circumcision
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Circus Maximus
Cirenaica
Cirencester
Ciri
Ciriaco de Mita
Cirilla
Cirillo
Cirilo
Ciro
Cirone
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Cirrhopetalum
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Cirrostomi
Cirsium
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Cisalpine
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Cisne
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Cissie
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Citigradae
Citizens' Band
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Citlaltepetl
Citlaltpetl
Cito Gaston
Citra
Citroen
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Citron
Citronelle
Citropsis
Citrullus
Citrus
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City
City Celestial
City Company
City Dionysia
City and Guilds Institute
City of Brotherly Love
City of David
City of God
City of God, The
City of Light
City of Seven Hills
City of Westminster
Ciudad
Ciudad Acuna
Ciudad Bolvar
Ciudad Jurez

Ciudad Madero
Ciudad Mante
Ciudad Real
Ciudad Trujillo
Ciudad Victoria
Ciudad del Carmen
Civia
Civil Aeronautics Administration
Civil Aeronautics
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Civil War
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Clacton
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Clair
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Claude Lorrain
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Cleveland Bay
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Francois Giuliani
Francois Guay

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Frank Caprice
Frank Carlucci
Frank Deford
Frank Iarossi
Frank Ikard
Frank Simonetti
Frank Viola
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Frankfurt horizontal
Frankfurter

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Franklin D Roosevelt
Franklin Lakes
Franklin Park
Franklin Square
Franklin cent
Franklin stove
Franklin tree
Franklin's gull
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Franz
Franz Ferdinand
Franz Josef
Franz Josef I

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Franz Joseph II
Franz Koenig
Franza
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Frascati
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Fraser
Frasera
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Fred
Fred Gehrke
Fred Ikle
Fred Manrique

Fred Moosally
Freda
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Frederica
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Frederick
Frederick Barbarossa
Frederick I
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Frederick III
Frederick
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Frederick William
Frederick William I
Frederick William II
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Free Church
Free French
Free Kirk
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Free kirk
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Freetown
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French bean
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French bulldog
French chalk
French chop
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French cricket
French cuff
French curve
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French door
French doors
French doughnut
French drain
French dressing
French endive
French fake
French flat
French foot
French fried potatoes
French fries
French gray
French harp
French heel
French honeysuckle
French
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French ice cream
French kid
French kiss
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French lilac
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French lug
French marigold
French mulberry
French mustard
French navy
French nettle
French nude
French pancake
French pastry
French pitch
French plague
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French police
French polish
French pox
French roll
French roof
French rose
French school
French seam
French shroud knot
French sixth
French stick
French stick loaf
French system
French tab
French tamarisk
French telephone
French toast
French truss
French twist
French vermouth
French window
French windows
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Friar Minor
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Friar Tuck
Friar minor
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Frontisek Klecka
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Fruma
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Fuller rose beetle
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Fydorova
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Fyn
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G
G clef
G star
G string
G suit
G's
G-flat
G-flat major
G-man
G-men
G-note
G-shaped
G-sharp
G-sharp minor
G-string
G-strophanthin
G-suit
G-type
G-type star
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Gastineau
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General American Speech
General Assembly
General Certificate of Education
General Court
General Post Office
General Postal Union
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General Synod
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Geoff Huston
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George Fox
George Grivas
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George Irvine
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German police dog
German shepherd
German shepherd dog
German short-haired pointer
German siding
German silver
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German text
German tinder
German wire-haired pointer
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God
God Almighty

God bless
God bless me
God bless you
God damn it
God forbid
God grant
God knows
God knows where
God only knows
God save
God the Father
God the Holy Ghost
God the Son
God tree
God willing
God's Word
God's acre
God's board
God's country
God's eldest daughter
God's
first creature
God's handwriting
God's image
God's kingdom
God's mark
God's penny
God's plenty
God's presence
God's residence
God's second mistake
God's throne
God's truth
God's will
God-adoring
God-awful
God-begot
God-begotten
God-beloved
God-bless
God-built
God-conscious
God-consciousness
God-created
God-cursed
God-descended
God-empowered
God-enlightened

God-entrusted
God-fearing
God-fearing man
God-forbidden
God-forgetting
God-forgotten
God-given
God-inspired
God-loved
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God-made
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Gymnodinium
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Gymnogyps
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Gymnolaemata
Gymnonoti
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Gymnorhina
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Gymnospermae
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Gymnosporangium
Gymnostomata
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H Shirley Amerasinghe
H beam
H hour
H's
H-bar
H-beam
H-blast
H-bomb
H-hinge
H-hour
H-steel
H-stretcher
H-war
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HCFA
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HDA
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HDLC
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HDX
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HERA
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HFDF
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HHFA
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Half-asiatic
Half-christian
Half-confederate
Half-creole
Half-elizabethan
Half-english
Half-french
Half-german
Half-grecized

Half-hessian
Half-irish
Half-latinized
Half-mexican
Half-mohammedan
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Half-scottish
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Hamburg
Hamburger
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Hamilton Jordan
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Hamito-semitic
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Hamlin
Hamm
Hammad

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Hampton boat
Hamptonville
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Han Fei Tzu
Han Xu
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Hana Mandlikova
Hanae
Hanafee

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Hanafite
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Hanalei
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Hanau
Hanbalite
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Hanni
Hannibal
Hannibalian
Hannibalic
Hannie
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Hanno
Hannon
Hannover
Hannu Jarvenpaa
Hannus
Hanny
Hano
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Hanoverianize
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Hans Dietrich Geuscher
Hans Paul Verhoef
Hans Werner
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Harcourt
Hardan
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Harday
Hardburly
Hardden
Hardecanute
Hardeeville
Hardej
Harden
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Harderian
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Hardicanute
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Hardigg
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Harding
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Harida nut
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Harmedio Arias Madrid
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Harpers Ferry
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Harvard chair
Harvard classification
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Harvardian
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Haryana
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Hasa
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Havana cigar
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Ho Chi Minh Trail
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Hoang Thi Cuc
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Alliance
Holy Ark
Holy Bible
Holy Church
Holy City
Holy Communion
Holy Family
Holy Father
Holy Ghost
Holy Grail
Holy Innocents' Day
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Holy Joe
Holy Lamb
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Holy Mary
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Holy Year
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Holy willie
Holyhead
Holyoake
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Holyrood
Holzman
Hom
Homadus
Homagyrius
Homalin
Homalocenchrus
Homalonotus
Homalopsinae
Homaloptera
Homalopterous
Homalosternii
Homam
Homans
Homaridae
Homarus
Homburg
Home
Home Burial
Home Counties
Home Guard
Home Office
Home Rule
Home Secretary
Homedale
Homer
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Homeric simile
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Homerville
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Homeworth
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Hominy
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Hon Gai
Hon Sec
Honaker

Honan
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Honduranian
Honduras
Honduras bark
Honduras cedar
Honduras mahogany
Honduras oak
Honduras rosewood
Hondurean
Hondurian
Honea Path
Honeapath
Honebein
Honecker
Honegger
Honeoye
Honesdale
Honest John
Honey
Honeybrook
Honeyman
Honeyville
Honeywell
Honeywood
Honfleur
Hong
Hong Kong
Hong Kong flu
Hong-Kong
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Honiara
Honig
Honiton
Honna
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Hooke
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Hooker
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Hookera
Hookerton
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Hortensa
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Hortense blue
Hortense de Beauharnais
Hortense violet
Hortensia
Hortensian
Hortensius
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Horvitz
Horwath
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Hosackia
Hosbein
Hoschton
Hose
Hosea
Hoseia
Hosein
Hosfmann
Hosford
Hoshana Rabbah

Hoshanah Rabbah
Hoshi
Hoskins
Hoskinson
Hoskinston
Hosmer
Hosni Mubarak
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Hottentotish
Hottentotism
Hottonia
Hotze
Hou T'u
Houck
Houdaille
Houdan
Houdini
Houdon
Houei Sai
Hough
Houghton
Houghton-le-Spring
Houlberg
Houlka
Houlton

Houma
Hound
Hound Dog
Hounslow
Houphouet-Boigny
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House of Assembly
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House of Commons
House of Councillors
House of Councilors
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House of Elders
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House of Peers
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Hoven
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Hovercraft
Hovey
Hovland
How
Howard
Howard Hjort
Howardstown

Howarth
Howe
Howe truss
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Howells
Howenstein
Howertons
Howes
Howey
Howie
Howison
Howlan
Howland
Howland Island
Howlend
Howlond
Howlyn
Howrah
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Howzell
Hoxeyville
Hoxha
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Hoyleton
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Hoytville
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Hradec Krlov
Hrault
Hrdlicka
Hreidmar
Hrimfaxi
Hrolf
Hrothgar
Hrozny
Hruska
Hrutkay

Hrvatska
Hs
Hsi
Hsi Wang Mu
Hsia
Hsia-men
Hsiamen
Hsian
Hsiang
Hsin-hai-lien
Hsingan
Hsingborg
Hsining
Hsinking
Hsiung Hsiang-hui
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Htindaw
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Hu Qili
Hu Yaobang
Hu Yaobanh
Hua Kuo-feng
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Huai
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Hualapai
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Hubbard
Hubbard squash
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Hubbardsville

Hubbell
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Hubble constant
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Hubert
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Hudson Bay seal
Hudson Falls
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Hudson seal
Hudson's Bay Company
Hudson's Bay blanket

Hudsonia
Hudsonian
Hudsonian curlew
Hudsonville
Hue
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Huesman
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Huey
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Huidobro
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Huila
Huitzilopochtli
Hujsak
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Hukbalahap
Hukill
Hula-Hoop
Hulbard
Hulbert
Hulbig
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Hulda
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Humberto Calderon Berti
Humberto Cayoja
Humberto Delgado
Humbird
Humble
Humboldt
Humboldt Current
Humboldt's
Sea
Humboldtianum
Hume
Humean
Humeston
Humfrey
Humfrid
Humfried
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Humiriaceous
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Hummel
Hummelstown
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Humorum
Hump
Humpage
Humperdinck
Humph
Humphrey
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Hung Yen
Hungaria
Hungarian
Hungarian brome grass
Hungarian goulash
Hungarian lilac
Hungary
Hungary blue
Hungary leather
Hungary water
Hunger
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Hungnam
Hungtow Island
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Hunkie
Hunkpapa
Hunley
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Hunnewell
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Hunnish
Hunnishness
Hunsinger
Hunt
Hunter
Hunterian
Hunters
Huntersville
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Hunting Dogs
Huntingburg
Huntingdon
Huntingdonshire
Huntington
Huntington Beach
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Huntington Station
Huntington Woods
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Huntingtown
Huntland

Huntlee
Huntley
Huntly
Hunts
Huntsburg
Huntsville
Hunyadi
Hunyady
Hunyak
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pine
Hupa
Hupeh
Huppert
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Hurd
Hurdland
Hurdsfield
Hurff
Hurlbut
Hurlee
Hurleigh
Hurless
Hurley
Hurleyville
Hurlock
Hurlow
Hurok
Huron
Huronian
Hurri
Hurrian
Hurris
Hurst
Hurstmonceux
Hurtsboro
Hurty
Hurwit
Hurwitz
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Husain
Husch
Husein
Husein ibn-Ali
Husha
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Huskamp

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Huskisson
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Hussein
Hussein I
Husseini Jamal
Husser
Husserl
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Hutsonville
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Hwajung
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Hwang Hai
Hwang Ho
Hwanghwatsun
Hwangmei
Hwelon
Hwu
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Hy-brasil
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Hyacintha
Hyacinthe
Hyacinthia
Hyacinthides
Hyacinthie
Hyacinthus
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Hyaenarctos
Hyaenidae
Hyaenodon
Hyakume
Hyalonema
Hyalospongia
Hyampom
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Hyannis
Hyannis
Port
Hyannisport
Hyatt

Hyattsville
Hyattville
Hybanthus
Hybla
Hyblaea
Hyblaean
Hyblan
Hybodus
Hydatina
Hyde
Hyde Park
Hyden
Hyder Ali
Hyderabad
Hydes
Hydesville
Hydetown
Hydeville
Hydnaceae
Hydnocarpus
Hydnora
Hydnoraceae
Hydnum
Hydra
Hydra-headed
Hydra-tainted
Hydrachna
Hydrachnidae
Hydractinia
Hydradephaga
Hydrangea
Hydrangeaceae
Hydrastis
Hydri
Hydrid
Hydriote
HydroDiuril
Hydrobates
Hydrobatidae
Hydrocaryaceae
Hydrocharidaceae
Hydrocharis
Hydrocharitaceae
Hydrochelidon
Hydrochoerus
Hydrocleis
Hydrocorallia
Hydrocorallinae

Hydrocores
Hydrocorisae
Hydrocortone
Hydrocotyle
Hydrocyon
Hydrodamalidae
Hydrodamalis
Hydrodictyaceae
Hydrodictyon
Hydrodromica
Hydrogenomonas
Hydroida
Hydroidea
Hydrolea
Hydroleaceae
Hydromatic
Hydromedusae
Hydrometridae
Hydromys
Hydroparastatae
Hydrophidae
Hydrophilidae
Hydrophinae
Hydrophis
Hydrophora
Hydrophyllaceae
Hydrophyllum
Hydropotes
Hydropterideae
Hydrozoa
Hydruntine
Hydrurus
Hydrus
Hye
Hyeres
Hygeia
Hygeian
Hyginus
Hyksos
Hyla
Hylaeus
Hylan
Hyland
Hylas
Hylidae
Hyllus
Hylobates
Hylocereus

Hylocichla
Hylocomium
Hylodes
Hylomys
Hylton
Hyman
Hymen
Hymenaea
Hymenaeus
Hymenaic
Hymenocallis
Hymenochaete
Hymenogaster
Hymenogastraceae
Hymenolepis
Hymenomycetes
Hymenophyllaceae
Hymenophyllites
Hymenophyllum
Hymenoptera
Hymera
Hymettian
Hymettic
Hymettius
Hymettus
Hymie
Hymir
Hynda
Hyndman
Hynek
Hynes
Hyo
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Hyolithidae
Hyoscyamus
Hyotherium
Hyozo
Hypanis
Hypapante
Hypatia
Hypatie
Hypenantron
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Hyper-calvinist
Hyper-calvinistic
Hyper-dorian
Hyper-ionian
Hyper-jacobean

Hyper-latinistic
Hyper-lydian
Hyper-phrygian
Hyper-romantic
Hyper-uranian
Hyperborean
Hypercheiria
Hyperenor
Hypergon
Hypericaceae
Hypericales
Hypericum
Hyperion
Hyperion
 to a satyr
Hypermnestra
Hyperoartia
Hyperoodon
Hyperotreta
Hyperotreti
Hypertherm
Hyphaene
Hyphomycetales
Hyphomycetes
Hypnaceae
Hypnos
Hypnum
Hypnus
Hypo-
Hypochaeris
Hypochnaceae
Hypochnus
Hypocreaceae
Hypocreales
Hypodermella
Hypodorian
Hypohippus
Hypolite
Hypolydian
Hypoparia
Hypopitys
Hypostomata
Hypostomides
Hypotheria
Hypotremata
Hypotricha
Hypotrichida
Hypoxis

Hypoxylon
Hypozoa
Hyps
Hypseus
Hypsilophodon
Hypsilophodontidae
Hypsiprymninae
Hypsiprymnodontinae
Hypsiprymnus
Hypsipyle
Hypsistarian
Hypsistus
Hyrachyus
Hyracidae
Hyracina
Hyracodon
Hyracodontidae
Hyracoidea
Hyracotheriinae
Hyracotherium
Hyrcan
Hyrcania
Hyrcanian
Hyrie
Hyrmina
Hyrnetho
Hyrtius
Hyrum
Hyrup
Hysham
Hyssopus
Hysteriales
Hysterocarpus
Hysterophyta
Hystricidae
Hystricinae
Hystricomorpha
Hystrix
Hz
I
I
Am
I Ching
I Claudius
I Mech E
I Min E
I am led to believe
I ask you

I beam
I beg you
I beg your pardon
I can't see
I couldn't care less
I daresay
I declare
I don't care
I don't have the first idea
I don't know what
I don't see how
I don't see why
I don't understand
I girder
I give up
I have it
I myself
I never
I pass
I refuse
I should fret
I should worry
I
 thank you
I thank you very much
I think not
I venture to say
I will no such thing
I will not
I won't
I won't buy it
I""d
I""ll
I""s
I'd
I'll
I'll be
I'll be damned if
I'll be hanged if
I'll be hanged if I will
I'll be jiggered
I'll be seeing you
I'll say
I'll see you in hell first
I'm
I'm not taking any
I's
I've

I-beam
I-bunga
I-go
I-ism
I-ness
I-railed
I-ship
I-spy
I/O
IA
IAA
IAB
IAD
IADB
IAEA
IAF
IAH
IAM
IANA
IAPPP
IAS
IATA
IATSE
IAU
IAUC
IB
IBA
IBEW
IBM
IBM machine
IBN
IBRD
IBTCWH
IC
IC analysis
ICA
ICAAAA
ICAN
ICAO
ICB
ICBM
ICBW
ICC
ICCC
ICCCM
ICD
ICE
ICFTU

ICI
ICJ
ICL
ICLID
ICM
ICMP
ICON
ICP
ICRC
ICS
ICSC
ICSH
ICST
ICT
IChemE
ICs
ID
ID card
IDA
IDB
IDC
IDDD
IDE
IDEA
IDF
IDI
IDL
IDM
IDN
IDP
IDP machine
IDS
IDV
IDVC
IE
IEC
IEE
IEEE
IEN
IESG
IETF
IF
IF amplification
IF amplifier
IF audio signal
IF oscillator
IF pulse
IF signal

IF transformer
IF video signal
IFB
IFC
IFF
IFF radar
IFIP
IFLA
IFLWU
IFO
IFR
IFRPS
IFS
IG
IGES
IGFET
IGM
IGMP
IGP
IGY
IHD
IHP
IHS
IIA
IIE
IIHF
IIL
IIN
IISPB
IJssel
IJsselmeer
IL
ILA
ILEA
ILGWU
ILO
ILP
ILS
ILV
ILWU
IM
IM
display
IMAP
IMAP3
IMAS
IMC
IMCO

IMD
IMF
IMHO
IMM
IMP
IMPACT
IMS
IMSA
IMSL
IMSO
IMSVS
IMT
IMTS
IMarE
IMunE
IN
INADS
INC
IND
INGRES
INH
INL
INMS
INN
INOC
INRI
INRIA
INS
INTAP
INTELSAT
INTUC
INWATS
IO
IO device
IOC
IOCC
IOD
IOF
IOM
IONL
IOOF
IOP
IOT
IOTA
IOU
IOW
IP
IPA

IPBM
IPC
IPCC
IPCE
IPCS
IPDU
IPE
IPI
IPL
IPLAN
IPM
IPMS
IPO
IPS
IPSE
IPT
IPX
IPY
IQ
IQ meter
IQ test
IQR
IQSY
IR
IRA
IRAF
IRAS
IRBM
IRC
IRD
IRDS
IRE
IRG
IRL
IRM
IRMS
IRN
IRO
IROR
IRQ
IRS
IRSG
IRTF
IS
ISA
ISAM
ISAS
ISBD

ISBN
ISC
ISCH
ISDN
ISDT
ISEE
ISF
ISFUG
ISH
ISI
ISIS
ISLM
ISLU
ISM
ISN
ISO
ISODE
ISOO
ISOP
ISPM
ISR
ISRG
ISS
ISSI
ISSN
IST
ISUP
ISV
ISY
IT
IT&T
ITA
ITC
ITCZ
ITM
ITO
ITS
ITSEC
ITSO
ITT
ITU
ITUSA
ITV
IU
IUD
IUE
IUS
IUV

IV
IVB
IVDT
IVP
IVTS
IW
IWBNI
IWC
IWS
IWW
IX
IXC
IXM
Ia
Ia Drang
Iacchic
Iacchos
Iacchus
Iache
Iachimo
Iaeger
Iago
Iain
Ialmenus
Ialysos
Ialysus
Iambe
Iams
Iamus
Ian
Iand
Ianteen
Ianthe
Ianthina
Ianus
Iapetus
Iapigia
Iapyges
Iapygian
Iapygii
Iapyx
Iarbas
Iardanus
Iaria
Iasi
Iasion
Iaso
Iasus

Iaverne
Ib
Iba
Ibad
Ibada
Ibadan
Ibadhi
Ibadite
Ibagu
Iban
Ibanag
Ibanez
Ibanez
Del Campo
Ibapah
Ibaraki
Ibarguen Herrara
Ibarruri
Ibbetson
Ibbie
Ibbison
Ibby
Iberes
Iberi
Iberia
Iberian
Iberian Peninsula
Iberic
Iberis
Iberism
Ibero-
Ibero-aryan
Ibero-celtic
Ibero-insular
Ibero-pictish
Ibert
Ibibio
Ibididae
Ibidinae
Ibidium
Ibilao
Ibiza
Iblis
Ibn
Ibn Hussein
Ibo
Ibos
Ibrahim

Ibrahim Abdel Hadi
Ibrahim Al Soleiman
Ibrahim Hakimi
Ibrahim Hashim
Ibrahim Hussein
Ibrahim Pasha
Ibrahim el Kassem
Ibsen
Ibsenian
Ibsenic
Ibsenish
Ibsenism
Ibsenite
Ibson
Ibycter
Ibycus
Ic
Ica
Icacinaceae
Icacorea
Icard
Icaria
Icarian
Icarian Sea
Icarianism
Icarius
Icarus
Ice
Ice Age
Ice Observation Service
Ice patrol
Icel
Iceland
Iceland crystal
Iceland dog
Iceland falcon
Iceland gull
Iceland lichen
Iceland moss
Iceland pony
Iceland poppy
Iceland sea grass
Iceland spar
Icelander
Icelandian
Icelandic
Icelidae
Icelus

Iceman Cometh, The
Iceni
Icenic
Icerya
Ichabod
Ichang
Ichinomiya
Ichiro
 Hatoyama
Ichneumia
Ichneumones
Ichneumonidae
Ichneumonides
Ichneumonoidea
Ichthyocentaur
Ichthyocephali
Ichthyodea
Ichthyodectidae
Ichthyoidea
Ichthyol
Ichthyomorpha
Ichthyopsida
Ichthyopterygia
Ichthyornis
Ichthyornithes
Ichthyornithidae
Ichthyornithiformes
Ichthyosauria
Ichthyosauridae
Ichthyosaurus
Ichthyotomi
Icken
Ickes
Ickesburg
Iconian
Iconium
Iconoscope
Icosandria
Icosteidae
Icosteus
Icteridae
Ictinus
Ictonyx
Id
Ida
Idabel
Idaea
Idaean

Idaean Dactyl
Idaean Mother
Idaho
Idaho cedar
Idaho white pine
Idahoan
Idaic
Idalia
Idalian
Idalina
Idaline
Idalla
Idalou
Idamay
Idanha
Idas
Idaville
Idden
Iddio
Iddo
Ide
Idea
Idean
Idel
Ideler
Idelia
Idell
Idelle
Idelson
Iden
Identikit
Ider
Ides of March
Idette
Idewild
Idhi
Idi Amin
Idiogastra
Idiom Neutral
Idiosepiidae
Idiosepion
Idiot, The
Idism
Idist
Idistic
Iditarod
Idledale
Idleman

Idlewild
Idmon
Ido
Idoism
Idoist
Idoistic
Idola
Idolah
Idolla
Idomeneo
Idomeneus
Idona
Idonah
Idonea
Idonna
Idotea
Idoteidae
Idothea
Idotheidae
Idou
Idoux
Idria
Idris
Idris
I
Idrisid
Idrisite
Idumaea
Idumaean
Idumea
Idumean
Idun
Iduna
Idylls of the King, The
Idyllwild
Idzik
Ieda
Ielene
Iene
Ieper
Ier
Ierna
Ierne
Ieso
Ietta
Iey
Ieyasu
If

Ife
Ifill
Ifni
Ifugao
Ifugaos
Igal
Igara
Igbira
Igbo
Igbos
Igdrasil
Igdyr
Igenia
Igerne
Iggdrasil
Iggie
Iggy
Igigi
Igino Cardinale
Iglau
Iglesias
Iglulirmiut
Ignace
Ignacia
Ignacio
Ignacius
Ignatia
Ignatian
Ignatianist
Ignatius
Ignatius Acheampong
Ignatius Loyola
Ignatius of Loyola Saint
Ignatz
Ignatzia
Ignaz
Ignazio
Ignorantine
Igo
Igor
Igor Larionov
Igorot
Igorots
Igot Gouzenko
Igraine
Iguac
Iguacor Iguass
Iguania

Iguanidae
Iguanodon
Iguanodontia
Iguanodontidae
Iguanodontoidea
Iguassu
Iguvine
Ihab
Ihei Aoki
Ihlat
Ihlen
Ihsan Caglayangil
Iiette
Iila
Iinde
Iinden
Iives
Ij
Ijamsville
Ijo
Ijore
Ikara
Ikaria
Ike
Ikeda
Ikeja
Ikey
Ikeya-Seki
Ikhnaton
Ikhwan
Ikkela
Il
Il Barbiere di Siviglia
Il Cortegiano
Il Messaggero
Il Penseroso
Il Trovatore
Ila
Ilaire
Ilam
Ilan
Ilana
Ilario
Ilarrold
Ilbert
Ile
Bizard
Ile du Diable

Ile-de-France
Ileana
Ileana Ros-Lehtinen
Ileane
Ileitis
Ilene
Iles Comores
Iles du Salut
Iles sous le Vent
Ilesha
Iletin
Ilford
Ilha
Ilheus
Ilia
Iliac
Iliad
Iliadic
Iliadist
Iliadize
Iliamna
Ilian
Ilicaceae
Iliff
Iligan
Iline
Ilio Bosi
Ilion
Ilione
Ilioneus
Ilisa
Ilise
Ilissus
Ilithyia
Ilium
Ilka
Ilke
Ilkeston
Ilkka Sinisalo
Ilkley
Ill
Illa
Illaenus
Illampu
Illano
Illanun
Illawarra
Illawarra ash

Illawarra pine
Ille-et-Vilaine
Illecebraceae
Illene
Illertissen
Illia
Illich
Illicium
Illimani
Illinoian
Illinois
Illinois gooseberry
Illinois nut
Illinoisan
Illinoisian
Illiopolis
Illipe
Illona
Illoricata
Illuminati
Illuminations Les
Illuminism
Illuministic
Illuminize
Illyes
Illyria
Illyrian
Illyric
Illyric-anatolian
Illyricum
Illyrius
Ilmarinen
Ilmen
Ilocano
Ilocanos
Iloilo
Ilokano
Ilokanos
Iloko
Ilona
Ilone
Ilongot
Ilonka
Ilorin
Ilotycin
Ilowell
Ilpirra
Ilsa

Ilse
Ilse Koch
Ilsedore
Ilwaco
Ilwain
Ilya
Ilya Ehrenburg
Ilysa
Ilysanthes
Ilyse
Ilysia
Ilysiidae
Ilyssa
Ilyushin
Im
Ima
Imalda
Imamite
Iman
Iman
Al Badr
Imantophyllum
Imari ware
Imbert Barrera
Imbler
Imboden
Imbrium
Imbrius
Imbros
Imelda
Imelida
Imena
Imer
Imerina
Imeritian
Imipramine
Imitation of Christ, The
Imitt
Imlay
Imlaystown
Imler
Immaculata
Immaculate Conception
Immaculate Heart
Immanes
Immanuel
Immelmann turn
Immigration and Nationality Act

Immingham
Immokalee
Immoralist, The
Immortals
Imnaha
Imo
Imogen
Imogene
Imojean
Imola
Imolinda
Imp
Impatiens
Impatientaceae
Impennes
Imperata
Imperforata
Imperia
Imperial
Imperial Beach
Imperial Highness
Imperial Holiday
Imperial Majesty
Imperial Valley
Imperial bushel
Impeyan
Imphal
Implacentalia
Importance of Being Earnest, The
Improperia
Imray
Imre
Imre Boka
Imre Fold
Imre Hollai
Imre Horvath
Imre Nagy
Imroz
Imtiaz
In
In Dubious Battle
In God We Trust
In Praise of Folly
Ina
Inachidae
Inachus
Inanna
Inari

Inarticulata
Inauguration Day
Inauguration day
Inavale
Inc
Inca
Inca bone
Inca dove
Incabloc
Incaic
Incan
Incaparina
Incarial
Incarnation
Incarvillea
Inchelium
Inchon
Incognito
Incorruptible
Increase
Incrocci
Incrustata
Ind
IndE
Indanthrene
Indecidua
Independence
Independence
Day
Independence Hall
Independence day
Independence hall
Independency
Independent
Independista
Index Librorum Prohibitorum
Index expurgatorius
Indi
India
India berry tree
India buff
India chintz
India cotton
India drugget
India gall
India gum
India ink
India malacca

India matting
India muslin
India paper
India pepper
India pink
India print
India proof
India red
India rubber
India scrim
India shawl
India silk
India tan
India tea
India tint
India wheat
India-cut
India-rubber tree
India-rubber vine
Indiahoma
Indiaman
Indiamen
Indian
Indian Claims Commission
Indian Desert
Indian Empire
Indian Hill
Indian Mutiny
Indian National Congress
Indian Ocean
Indian Runner
Indian States and Agencies
Indian Summer of a Forsyte
Indian Territory
Indian Wars
Indian agency
Indian agent
Indian apple
Indian balsam
Indian bison
Indian blanket
Indian bread
Indian
breadroot
Indian bridle
Indian buffalo
Indian cherry
Indian cholera

Indian club
Indian cobra
Indian corn
Indian cress
Indian cup
Indian currant
Indian drug
Indian elephant
Indian fig
Indian file
Indian gift
Indian giver
Indian giving
Indian grackle
Indian hawthorn
Indian header
Indian heat
Indian hemp
Indian hippo
Indian house
Indian ink
Indian jujube
Indian lettuce
Indian licorice
Indian liquorice
Indian list
Indian lotus
Indian madder
Indian mallow
Indian meal
Indian millet
Indian mode
Indian mulberry
Indian paintbrush
Indian pink
Indian pinkroot
Indian pipe
Indian pitcher
Indian pony
Indian potato
Indian pudding
Indian red
Indian reservation
Indian reserve
Indian rice
Indian rope-trick
Indian rug
Indian ruler

Indian salad
Indian sanicle
Indian sign
Indian silk
Indian summer
Indian sweater
Indian tea
Indian tobacco
Indian turnip
Indian weed
Indian wolf
Indian wrestling
Indian yellow
Indian-meal moth
Indiana
Indiana ballot
Indiana limestone
Indianan
Indianapolis
Indianapolis 500
Indianeer
Indianesque
Indianhead
Indianhood
Indianian
Indianisation
Indianise
Indianised
Indianising
Indianism
Indianist
Indianization
Indianize
Indianized
Indianizing
Indianola
Indiantown
Indic
Indicatoridae
Indicatorinae
Indices
Expurgatorii
Indienne
Indies
Indigenismo
Indigofera
Indihar
Indio

Indira
Indo-
Indo-Aryan
Indo-Chinese
Indo-European
Indo-Germanic
Indo-Hittite
Indo-Iranian
Indo-Pacific
Indo-afghan
Indo-african
Indo-aryan
Indo-australian
Indo-british
Indo-briton
Indo-burmese
Indo-celtic
Indo-chinese
Indo-dutch
Indo-egyptian
Indo-english
Indo-european
Indo-europeanist
Indo-french
Indo-gangetic
Indo-german
Indo-germanic
Indo-greek
Indo-hellenistic
Indo-hittite
Indo-iranian
Indo-malayan
Indo-malaysian
Indo-mohammedan
Indo-oceanic
Indo-pacific
Indo-portuguese
Indo-saracenic
Indo-scythian
Indo-spanish
Indo-sumerian
Indo-teutonic
Indochina
Indochina War
Indochinese
Indoeuropean
Indogaea
Indogaean

Indologian
Indologist
Indologue
Indology
Indone
Indonesia
Indonesian
Indophile
Indophilism
Indophilist
Indore
Indra
Indrani
Indre
Indre-et-Loire
Indris
Indus
Indus
Valley
Indus civilization
Indus valley civilization
Industrial Revolution
Industrial Workers of the World
Indy
Ineducabilia
Inejiro Asanuma
Ineri
Inermes
Inermi
Inermia
Inerney
Ines
Inesita
Ineslta
Inessa
Inez
Inf
Infeld
Inferi
Inferno
Infield
Informatica
Information Please Almanac
Infra-lias
Infundibulata
Infusoria
Ing
Inga

Ingaberg
Ingaborg
Ingaevones
Ingaevonic
Ingalls
Ingamar
Ingar
Inge
Ingeberg
Ingeborg
Ingelbert
Ingelow
Ingemar
Inger
Ingersoll
Ingham
Inghamite
Inghilois
Inghirami
Ingle
Inglebert
Ingleborough
Inglefield
Ingles
Ingleside
Inglewood
Inglis
Ingmar
Ingold
Ingolstadt
Ingomar
Ingra
Ingraham
Ingram
Ingres
Ingrid
Ingrid Kristiansen
Ingrim
Inguklimiut
Ingunna
Ingush
Ingvaeonic
Ingvar
Ingveonic
Ingwaeonic
Ingweonic
Inhambane
Inhiston

Inia
Inigo
Inin
Inina
Inine
Iniomi
Initial Teaching Alphabet
Injun
Inkerman
Inkom
Inkra
Inkster
Inland Revenue
Inland Sea
Inman
Inn
Inna
Inner
Inner Hebrides
Inner Light
Inner
Mongolia
Inner Temple
Inner Word
Innes
Inness
Innis
Innisfail
Inniskilling
Innocent I
Innocent II
Innocent III
Innocent IV
Innocent IX
Innocent V
Innocent VI
Innocent VII
Innocent VIII
Innocent X
Innocent XI
Innocent XII
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Innocents Abroad, The
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Inns of Court
Innsbruck
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Inocarpus
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Inonu
Inoperculata
Inoue
Inquilinae
Inquisition
Inquisitor-General
Insecta
Insectivora
Insessores
Insko
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Inst
Institutes
Institutes of Justinian
Insular Celtic
Insull
Int
Integropallialia
Integropalliata
Intelsat
Inter-american
Inter-andean
Inter-european
Inter-imperial
Intercidona
Intercourse
Interim
Interior
Interior and Insular Affairs
Interlachen
Interlaken
Interlingua
Interlochen
Internal Revenue Service
Internal Security
International
International Code
International Code of Signals
International Court of Justice
International Date Line
International Geophysical Year
International Gothic
International Grandmaster
International

Labor Organization
International Master
International Monetary Fund
International Orange
International Phonetic Alphabet
International Relations
International Style
International scale
Internationale
Interphone
Interpol
Interstate Commerce Commission
Interstate and Foreign Commerce
Intertropical Convergence Zone
Intertype
Intervale
Intimations of Immortality
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Intosh
Intracoastal Waterway
Introit
Intruder in the Dust
Intyre
Inuit
Invar
Invercargill
Inverness
Inverness cape
Invernessshire
Inverson
Invertebrata
Invincible Armada
Inwood
Iny
Inyanga
Inyokern
Io
Io moth
Ioab
Ioannides
Ioannina
Iobates
Iodama
Iodamoeba
Iodeosin B
Iodeosin b
Iodol

Iola
Iolande
Iolanthe
Iolaus
Iole
Iolenta
Ion
Iona
Iona cross
Ione
Ione formation
Ionesco
Iong
Ioni
Ionia
Ionian
Ionian Islands
Ionian Sea
Ionian mode
Ionian school
Ionic
Ionicism
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Ionicize
Ionidium
Ionism
Ionist
Ionization
Ionize
Ionornis
Ionoxalis
Iorgo
Iorgos
Iorio
Iormina
Iormungandr
Ios
Iosep
Ioskeha
Ioved
Iover
Ioves
Iow
Iowa
Iowan
Iowas
Ioxus
Ioyal

Ipalnemohuani
Ipava
Iphagenia
Iphianassa
Iphicles
Iphidamas
Iphigenia
Iphigenia
in Aulis
Iphigenia in Tauris
Iphigeniah
Iphimedia
Iphinoe
Iphis
Iphition
Iphitus
Iphlgenia
Iphthime
Ipiales
Ipidae
Ipiutak
Ipoctonus
Ipoh
Ipomoea
Ipsambul
Ipsus
Ipswich
Iqbal
Iquique
Iquitos
Ir
IrGael
Ira
Iraan
Irak
Iraki
Irakis
Iraklion
Iran
Irani
Iranian
Iranian Plateau
Iranic
Iranism
Iranist
Iranize
Irano-semite
Iraq

Iraqi
Iraqi Arabic
Iraqian
Iraqis
Irasburg
Irazu
Irbid
Irbil
Irby
Ire
Iredale
Iredell
Ireland
Irelander
Irena
Irenaeus
Irene
Iresine
Ireton
Irfan
Irgun
Irgun Zvai Leumi
Irgunist
Iri
Irian Barat
Irian Jaya
Iriartea
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Iricise
Iricised
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Iricized
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Iridaceae
Iridis
Iridissa
Iridomyrmex
Iridum
Irina
Irina Ratushinskaya
Iris
Irisa
Irish
Irish Christian Brother
Irish English
Irish Free State

Irish Gaelic
Irish Guards
Irish Mist
Irish Pale
Irish Republic
Irish Republican Army
Irish Sea
Irish boat
Irish bridge
Irish
bull
Irish coffee
Irish confetti
Irish daisy
Irish dividend
Irish elk
Irish green
Irish harp
Irish lord
Irish moss
Irish pennant
Irish potato
Irish setter
Irish soda bread
Irish stew
Irish terrier
Irish tweed
Irish water spaniel
Irish whiskey
Irish wolfhound
Irish yew
Irish-american
Irish-born
Irish-bred
Irish-canadian
Irish-english
Irish-grown
Irish-speaking
Irisher
Irishian
Irishise
Irishised
Irishising
Irishism
Irishize
Irishized
Irishizing
Irishly

Irishman
Irishmen
Irishness
Irishry
Irishwoman
Irishwomen
Irishy
Irita
Irja
Irklion
Irkutsk
Irl
Irma
Irme
Irmgard
Irmina
Irmine
Irminger Current
Irmo
Irob-saho
Iroha
Iron Age
Iron Age man
Iron Chancellor
Iron Cross
Iron Curtain
Iron Duke
Iron Gate
Iron Gates
Iron Guard
Iron Maiden of Nuremberg
Iron Mountain
Iron River
Iron age
Iron-Guard
Ironbelt
Irondale
Irondequoit
Ironia
Irons
Ironside
Ironsides
Ironton
Iroquoian
Iroquois
Irpex
Irra
Irrawaddy

Irredentism
Irredentist
Irrigon
Irrisoridae
Irritila
Irtish
Irtysh
Irtysh ostyak
Irus
Irv
Irvin
Irvine
Irving
Irvingesque
Irvingiana
Irvingism
Irvingite
Irvington
Irvona
Irwin
Irwinn
Irwinville
Is
Isa
Isaac
Isaacs
Isaacson
Isaak
Isaban
Isabea
Isabeau
Isabel
Isabel
Cueto
Isabela
Isabelita
Isabella
Isabella I
Isabelle
Isabelle Demongeot
Isabelline
Isac
Isacco
Isador
Isadora
Isadore
Isahella
Isai

Isaiah
Isaian
Isaianic
Isaias
Isak
Isamu
Isander
Isanti
Isar
Isaria
Isatis
Isauria
Isaurian
Isawa
Isbel
Isbella
Isborne
Iscariot
Iscariotic
Iscariotical
Iscariotism
Ischepolis
Ischia
Ischyodus
Ischys
Iseabal
Isegrim
Iselin
Isenheim Altarpiece
Isenland
Isenstein
Isere
Iseult
Iseum
Isfahan
Ish-bosheth
Ishan
Isherwood
Isherwood framing
Isherwood system
Ishihara test
Ishihara's test
Ishii
Ishmael
Ishmaelite
Ishmaelitic
Ishmaelitish
Ishmaelitism

Ishmul
Ishpeming
Ishtar
Ishum
Ishvara
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Isiac
Isiacal
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Isiahi
Isidae
Isidor
Isidora
Isidore
Isidore of Seville
Isidorean
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Isidro
Isimud
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Isis
Iskander Bey
Iskenderun
Isl
Isla
Isla de Pascua
Islaen
Islam
Islamabad
Islamic
Islamic
Republic of Mauritania
Islamic calendar
Islamisation
Islamise
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Islamising
Islamism
Islamist
Islamistic
Islamite
Islamitic
Islamitish

Islamization
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Islamizing
Islamorada
Island
Island Park
Island carib
Island of the Sun
Islands of the Blessed
Islandton
Islas Malvinas
Islay
Isle
Isle Royale
Isle of Capri
Isle of Man
Isle of Pines
Isle of Shoals boat
Isle of Wight
Islean
Isleana
Isleen
Islek
Isles of the Blessed
Islesboro
Islesford
Isleta
Isleton
Islington
Islip
Isma
Ismael
Ismael Galindez
Ismaelism
Ismaelite
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Ismaelitical
Ismaelitish
Ismail Fahmy
Ismail Pasha
Ismail el Azhari
Ismaili
Ismailia
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Isman

Ismarus
Ismay
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Ismenus
Ismet
Ismet Inonu
Isnardia
Isobel
Isocardia
Isocardiidae
Isocrates
Isoetaceae
Isoetales
Isoetes
Isokontae
Isola
Isolda
Isolde
Isoloma
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Isomera
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Isonville
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Isoprinosine
Isoptera
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Isotria
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Israfil
Issachar
Issacharite
Issaquah
Issayeff

Issedoi
Issedones
Issei
Issi
Issiah
Issie
Issus
Issy
Issy-les-Molineux
Issyk-Kul
Istachatta
Istanbul
Isth
Isthmia
Isthmian
Isthmian Games
Istiophoridae
Istiophorus
Istria
Istrian
Istvaeones
Istvan
Istvan Dobi
Isuridae
Isurus
Isus
Iswara
It
It is a beauteous evening
Ita
Itabuna
Itagaki
Itajai
Ital
Itala
Itali
Italia
Italia Bolzano
Italia irredenta
Italian
Italian East Africa
Italian Somaliland
Italian Wars of Independence
Italian aster
Italian blue
Italian bob
Italian bread
Italian clover

Italian corn salad
Italian cypress
Italian dressing
Italian earth
Italian greyhound
Italian hand
Italian honeysuckle
Italian ice
Italian jasmine
Italian leprosy
Italian ocher
Italian paste
Italian pink
Italian pox
Italian reed
Italian rye grass
Italian school
Italian sixth
Italian sonnet
Italian vermouth
Italian vote
Italianate
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Italianately
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Italianation
Italianesque
Italianisation
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Italo-celt
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Italo-grecian
Italo-greek
Italo-hellenic
Italo-hispanic
Italo-serb
Italo-slav
Italo-swiss
Italo-turkish
Italomania
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Italophil
Italophile
Italy
Itapetininga
Itasca
Itaves
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Iteaceae
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Ithacensian
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Ithomiidae
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Ithunn
Ithuriel's-spear
Ithyphallus
Itin
Itinerarium
Itmann
Itnez

Ito
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sukashi
Itoism
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Itoland
Itonama
Itonaman
Itonia
Itonididae
Itonius
Ittabena
Ituraean
Iturbi
Iturbide
Ituri River
Itylus
Itys
Itza
Itzhak
Iuka
Iuliu Maniu
Iulus
Iva
Ivah
Ivan
Ivan Georgiev
Ivan III
Ivan IV
Ivan Lendl
Ivana
Ivanah
Ivanhoe
Ivanna
Ivanoe Bonomi
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Ivanovce
Ivanovo
Ivar
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Ivatan
Ivatts
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Ivekovic
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Ivis
Iviza
Ivo
Ivo Andric
Ivon
Ivonne
Ivor
Ivory
Ivory Coast
Ivoryton
Ivry-la-Bataille
Ivy
Ivy League
Ivy Leaguer
Ivydale
Ivyton
Iwao
Iwo
Iwo Jima
Iwu
Ixelles
Ixia
Ixiaceae
Ixiama
Ixil
Ixion
Ixion's wheel
Ixionian
Ixodes
Ixodidae
Ixonia
Ixora
Ixtaccihuatl
Ixtacihuatl
Iy
Iyang
Iyar

Iyeyasu
Iynx
Iyre
Iyyar
Iz
Izaak
Izabel
Izak
Izanagi
Izanami
Izar
Izard
Izawa
Izcateco
Izdubar
Izhevsk
Izmir
Izmit
Iznik
Iztaccihuatl
Izu Peninsula
Izvestia
Izy
Izyum
Izzak
Izzeddin Qalag
Izzy
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J's
J-scope
J/A Banking
JA
JAC
JACM
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JAL
JANET
JATO
JBS
JC
JCA
JCAC
JCAE
JCB
JCD
JCEE
JCET
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JD
JDS
JECC
JEIDA
JEM
JES
JESUS
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JFET
JFIF
JFK
JFMIP
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JHS
JHVH
JHWH
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JILA
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JISC
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JMP
JMS
JMX
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JOAT
JOVE
JOVIAL
JP
JPEG
JPL
JRC
JSC
JSD
JSN
JSRC
JST
JSW
JTIDS
JTM
JUD

JUGFET
JUNET
JV
JVNC
JWV
Ja
Jaafar Sharif Enami
Jaal
Jaala
Jaalin
Jaan
Jabal
Jabalpur
Jaban
Jabarite
Jabberwock
Jabberwockies
Jabberwocky
Jabe
Jaber
Al Almed
Jabez
Jabin
Jabir
Jabir ibn Hayyan
Jablochkoff candle
Jablochkoff lamp
Jablon
Jablonsky
Jabon
Jabrud
Jac
Jacalin
Jacalinne
Jacaltec
Jacalteca
Jacalyn
Jacamaralcyon
Jacamerops
Jacana
Jacanidae
Jacaranda
Jacarta
Jacenta
Jacey
Jachin
Jacie
Jacinda

Jacinta
Jacinth
Jacintha
Jacinthe
Jacinto
Jack
Jack Ferreira
Jack Frost
Jack Ketch
Jack Nies
Jack Schalow
Jack Sheppard
Jack Tar
Jack mormon
Jack nasty
Jack rose
Jack the Ripper
Jack-a-lent
Jack-fool
Jack-go-to-bed-at-noon
Jack-the-rags
Jackelyn
Jackfield ware
Jackhorn
Jacki
Jackie
Jackie Ickx
Jackies
Jacklin
Jacklyn
Jackman
Jackquelin
Jackqueline
Jacksboro
Jackson
Jackson Day
Jackson vine
Jackson's Birthday
Jacksonboro
Jacksonburg
Jacksonia
Jacksonian
Jacksonian Age
Jacksonian epilepsy
Jacksonism
Jacksonite
Jacksonport
Jacksontown

Jacksonville
Jacky
Jaclin
Jaclyn
Jacmel
Jaco
Jacob
Jacob Javits
Jacob's ladder
Jacob's staff
Jacob's-ladder
Jacoba
Jacobah
Jacobba
Jacobean
Jacobethan
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Rebellion
Jacobite glass
Jacobitely
Jacobitiana
Jacobitic
Jacobitical
Jacobitically
Jacobitish
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Jacobitism
Jacobo

Jacobo Arbenz Guzman
Jacobs
Jacobsburg
Jacobsen
Jacobsohn
Jacobson
Jacobus
Jacobus Hendricus
Jacoby
Jacopo
Jacquard
Jacquard card
Jacquard harness
Jacquard head motion
Jacquard loom
Jacquard weave
Jacquel
Jacquelin
Jacqueline
Jacquely
Jacquelyn
Jacquelynn
Jacqueminot
Jacquenetta
Jacquenette
Jacquerie
Jacques
Jacques Brichant
Jacques Chaban-Delmas
Jacques Chirac
Jacques Cloutier
Jacques Delors
Jacques Martin
Jacquet
Jacquetta
Jacquette
Jacqui
Jacquie
Jacumba
Jacunda
Jacuzzi
Jacy
Jacynth
Jada
Jadd
Jadda
Jaddan
Jaddo

Jade
Jadotville
Jadwiga
Jadwin
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Jaeger
Jaehne
Jael
Jaela
Jaella
Jaen
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Jaffa
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Jaffrey
Jaga
Jaganmati
Jagannath
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Jagello
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Jagellos
Jagganath
Jagger
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Jagiellos
Jagielon
Jagir
Jago
Jaguey Grande
Jahangir
Jahdai
Jahdal
Jahdiel
Jahdol
Jahel
Jahn
Jahncke
Jahrum

Jahrzeit
Jahve
Jahveh
Jahvism
Jahvist
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Jahwe
Jahweh
Jahwism
Jahwist
Jahwistic
Jai Alai
Jai Hind
Jailsco
Jaime
Jaime Fillol
Jaime Torres Bodet
Jaime Yzaga
Jaimie
Jain
Jaina
Jaine
Jainism
Jainist
Jaipur
Jaipuri
Jair
Jairia
Jajapura
Jajawijaja
Jakarta
Jake
Jakie
Jakin
Jakob
Jakob Hlasek
Jakoba
Jakobson
Jakop
Jakun
Jal
Jala
Jalalabad
Jalalaean
Jalapa
Jalbert
Jalgaon
Jalisco

Jallier
Jam
Jamaal
Jamaica
Jamaica gin
Jamaica ginger
Jamaica gold fern
Jamaica honeysuckle
Jamaica rum
Jamaica shorts
Jamaican
Jamal
Jamal ud-Din
Jamalpur
Jambi
Jambos
Jamel
James
James Bay
James Bere
James Buchli
James Callaghan
James Cicconi
James Denike
James Gilkes
James I
James II
James III
James Iococca
James VI
James VII
James
the Great
James the Less
Jamesburg
Jamesian
Jamesina
Jameson
Jamesport
Jamesstore
Jamestown
Jamesville
Jamesy
Jamey
Jami
Jamie
Jamie Macoun
Jamieson

Jamil
Jamil Baroody
Jamila
Jamill
Jamilla
Jamille
Jamima
Jamin
Jamison
Jammal
Jammie
Jammin
Jammu
Jammu and Kashmir
Jamnagar
Jamnes
Jamnia
Jamnis
Jamshedpur
Jamshid
Jamshid Amouzegar
Jamshyd
Jamul
Jamuna River
Jan
Jan Cools
Jan Cwiklinski
Jan Eliasson
Jan Hajdukiewicz
Jan Hus
Jan Kodes
Jan Ludvig
Jan Mayen
Jana
Jana Novotna
Jana Sangh
Janacek
Janata
Janaya
Janaye
Jandel
Jandy
Jane
Jane Doe
Jane Geddes
Janean
Janeczka
Janeen

Janeiro
Janek
Janel
Janela
Janelew
Janella
Janelle
Janene
Janenna
Janerich
Janessa
Janesville
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Janeva
Janey
Janghey
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Jania
Janice
Janicki
Janiculan
Janiculum
Janie
Janifer
Janiform
Janik
Janina
Janine
Janis
Janissarian
Janissaries
Janissary
Janissary music
Janith
Janiuszck
Janizarian
Janizaries
Janizary
Janizary music
Janka
Jankell
Jankey
Jann
Janna
Jannel

Jannelle
Jannery
Janok
Janos
Janos
Gyongyosi
Janos Kadar
Janot
Jansen
Jansenism
Jansenist
Jansenistic
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Jansenize
Janson
Janssen
Jansson
Janthina
Janthinidae
Januaries
Januarius
January
Januisz
Janus
Janus cloth
Janus green
Janus-face
Janus-faced
Janus-headed
Janus-like
Januslike
Janusz Bolonek
Jany
Janye
Janys
Janyte
Jap
Japan
Japan Current
Japan Stream
Japan cedar
Japan clover
Japan plum
Japan tallow
Japan tea
Japan wax
Japanee
Japanese

Japanese andromeda
Japanese anemone
Japanese arborvitae
Japanese artichoke
Japanese barberry
Japanese bath
Japanese beetle
Japanese black pine
Japanese burnet
Japanese cedar
Japanese cherry
Japanese chestnut
Japanese clematis
Japanese crab
Japanese deities
Japanese flowering cherry
Japanese garden
Japanese gelatin
Japanese holly
Japanese honeysuckle
Japanese isinglass
Japanese ivy
Japanese lantern
Japanese larch
Japanese laurel
Japanese lawn grass
Japanese leaf
Japanese lily
Japanese maple
Japanese morning-glory
Japanese pagoda tree
Japanese paper
Japanese pear
Japanese
persimmon
Japanese quince
Japanese red
Japanese river fever
Japanese silk
Japanese slippers
Japanese spaniel
Japanese spurge
Japanese stranglehold
Japanese tree peony
Japanese wisteria
Japanese wolf
Japanese yew
Japanesque

Japanesquely
Japanesquery
Japanesy
Japanicize
Japanism
Japanization
Japanize
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Japannish
Japanolatry
Japanologist
Japanology
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Japanophobe
Japanophobia
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Jaquelin
Jaqueline
Jaquelyn
Jaquenetta
Jaquenette
Jaques
Jaques-Dalcroze
Jaquesian
Jaquiss
Jaquith
Jara
Jarabub

Jarad
Jarales
Jarash
Jarbidge
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Jardena
Jareb
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Jari Kurri
Jariah
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Jarietta
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Jarl
Jarlath
Jarlathus
Jarlen
Jarnagin
Jaromir
Jaromir Vejvoda
Jaroslav
Jaroslav Burec
Jaroslav Kohout
Jaroso
Jarrad
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Jarreau
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Jarrett
Jarrettsville
Jarrid
Jarrod
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Jarvisburg
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Jascha

Jascha
Heifetz
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Jasione
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Jasmine
Jasminum
Jason
Jason Lafreniere
Jasonville
Jasper
Jasper National Park
Jasper Park
Jasper dip
Jaspers
Jassidae
Jassy
Jastrzebie
Jasun
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Jataka
Jateorhiza
Jatki
Jatni
Jatropha
Jatulian
Jauch
Jaunita
Jaur
Jaures
Jav
Java
Java Sea
Java almond
Java black rot
Java canvas
Java coca
Java cotton
Java fig
Java man
Java sparrow
Java willow
Javahai

Javakishvili
Javan
Javanee
Javanese
Javari
Javary
Javed
Javel green
Javel water
Javelle water
Javier
Javier Frana
Javier Perez de Cuellar
Javier Sotomayor
Javitero
Javler
Jawaharlal
Jawan
Jawann Oldham
Jawara
Jawlensky
Jaworski
Jaxartes
Jay
Jay Hebert
Jay Schrodeder
Jay Treaty
Jay's Treaty
Jayawardena
Jaycee
Jaye
Jayem
Jayess
Jayhawker
Jayhawker State
Jaylene
Jayme
Jaymee
Jaymie
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Jayne
Jaynell
Jaynes
Jaynne
Jayprakash Narayan
Jayson
Jayton
Jayuya

Jazmin
Jazyges
Jazz Age
Jbeil
Jcanette
Jdavie
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Jea
Jeames
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Jean
Caujolle
Jean Chauvel
Jean Harlow
Jean Helleu
Jean Jadot
Jean Kibwe
Jean Lafitte
Jean Paul
Jean Perron
Jean Pierre Jabouille
Jean Valjean
Jean de Meung
Jean-Claude
Jean-Loup Chretien
Jean-Pierre Hallet
Jeana
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Jeanelle
Jeanerette
Jeanette
Jeanie
Jeanine
Jeanna
Jeanne
Jeanne d'Arc
Jeannetta
Jeannette
Jeannie
Jeannine
Jeannye
Jeanpaulia
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Jeavons
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Jebel Musa

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Jedediah
Jedidiah
Jedlicka
Jedthus
Jeeps
Jeff
Jeff Chychrun
Jeff Hornacek
Jeff Pico
Jeff Snedeker
Jeffcott
Jefferey
Jeffers
Jefferson
Jefferson City
Jefferson Day
Jeffersonia
Jeffersonian
Jeffersonianism
Jeffersonton
Jeffersontown
Jeffersonville
Jeffery
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Jeffrey
Jeffrey pine
Jeffreys
Jeffries
Jeffry
Jeffy
Jegar
Jeggar

Jegger
Jeh
Jehan
Jehangir
Jehanna
Jehiah
Jehial
Jehias
Jehiel
Jehius
Jehoash
Jehoiada
Jehol
Jehoshaphat
Jehovah
Jehovah God
Jehovah's Witness
Jehovah's Witnesses
Jehovic
Jehovism
Jehovist
Jehovistic
Jehu
Jehudah
Jekyll
and Hyde
Jelena
Jelene
Jelks
Jell-O
Jell-O salad
Jelle
Jellico
Jellicoe
Jelm
Jelsma
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Jemappes
Jemena
Jemez
Jemie
Jemima
Jemimah
Jemina
Jeminah
Jemine
Jemison
Jemlah goat

Jemma
Jemmie
Jemmy
Jempty
Jemy
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Jena
Jena-Auerstedt
Jenda
Jenei
Jenelle
Jenesia
Jenette
Jenghis Khan
Jenghiz Khan
Jeni
Jenica
Jenice
Jeniece
Jenifer
Jeniffer
Jenilee
Jenin
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Jenison
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Jenkins
Jenkinsburg
Jenkinson
Jenkinsville
Jenkintown
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Jennee
Jenner
Jennerstown
Jenness
Jennette
Jenni
Jennica
Jennie
Jennifer
Jennilee
Jennine
Jennings
Jenny

Jenny wood
Jeno
Jenoe Fock
Jens
Jensen
Jenson
Jentoft
Jenufa
Jephte
Jephthah
Jephum
Jepson
Jepum
Jequie
Jer
Jerad
Jerahmeel
Jerahmeelites
Jerald
Jeraldine
Jeralee
Jeramey
Jeramie
Jerash
Jerba
Jere
Jere Goyan
Jereld
Jereme
Jeremiah
Jeremiah Chirau
Jeremian
Jeremianic
Jeremias
Jeremie
Jeremy
Jeres
Jerez
Jerez de la Frontera
Jeri
Jericho
Jeris
Jeritah
Jeritza
Jermain
Jermaine
Jerman
Jermayne

Jermyn
Jeroboam
Jerol
Jerold
Jeroma
Jerome
Jeromesville
Jeromian
Jeromy
Jeronima
Jeronymite
Jerre
Jerri
Jerrie
Jerries
Jerrilee
Jerrilyn
Jerrine
Jerrol
Jerrold
Jerroll
Jerrome
Jerry
Jerry
Adair
Jerry Cipriano
Jerry Colangelo
Jerry Reuss
Jerry Sichting
Jerrylee
Jersey
Jersey City
Jersey Lily
Jersey Shore
Jersey centaury
Jersey cloth
Jersey cream
Jersey elm
Jersey fir
Jersey lightning
Jersey white giant
Jerseyan
Jerseyite
Jerseyman
Jerseyville
Jerubbaal
Jerubbal
Jerusalem

Jerusalem Bible
Jerusalem Delivered
Jerusalem artichoke
Jerusalem cherry
Jerusalem corn
Jerusalem cross
Jerusalem date
Jerusalem oak
Jerusalem sage
Jerusalemite
Jervis
Jervis Bay
Jerz
Jes
Jesh
Jesher
Jesmine
Jespersen
Jess
Jessa
Jessabell
Jessalin
Jessalyn
Jessamine
Jessamyn
Jesse
Jesse James
Jesse tree
Jesse window
Jessean
Jessee
Jesselton
Jesselyn
Jessen
Jessey
Jessi
Jessica
Jessie
Jessieville
Jessika
Jessore
Jessup
Jessy
Jestude
Jesu
Jesuate
Jesuit
Jesuit bark

Jesuit berry
Jesuit style
Jesuit ware
Jesuited
Jesuitess
Jesuitic
Jesuitical
Jesuitically
Jesuitisation
Jesuitise
Jesuitised
Jesuitish
Jesuitising
Jesuitism
Jesuitist
Jesuitization
Jesuitize
Jesuitized
Jesuitizing
Jesuitocracy
Jesuitry
Jesuits'
resin
Jesup
Jesus
Jesus Christ
Jesus Haddad
Jesus Maria Castro Leon
Jesus bug
Jesus day
Jesus freak
Jesus of Nazareth
Jet Age
Jet Liner
Jetersville
Jeth
Jethra
Jethro
Jethronian
Jetmore
Jetson
Jettie
Jeu
Jeune Parque, La
Jeunesse
Jeuz
Jevon
Jevons

Jew
Jew lizard
Jew monkey
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Kerrville
Kerry
Kerry Hill
Kerry blue terrier
Kersey
Kershaw
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Kerwin
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Kevin Appier
Kevin Hermening
Kevin Loughery
Kevin Lowe
Kevina
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Kewadin
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Khalid
Khalid ibn Abdul Aziz
Khalifa Hamaas
Khalifat
Khalil

Khalil Abu Hamad
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Kigensetsu
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Kiichi Aichi
Kiirun
Kika de la Garza
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Kikelia
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Kikuyu grass
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Kilian
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Killanin
Killarney
Killarney fern
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Killawog
Killbuck
Killduff
Killeen
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Killy
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Kilmarx
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Kim Il Sung
Kim Jae-kyu
Kim Jong-pil
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Knowlesville

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Knox system
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Koellia
Koelreuteria
Koeltztown
Koenig
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Koepang
Koeppel
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Koerlin
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Koestler
Koetke
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Kofe Island
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Koffman
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Koh-i-noor
Kohanim
Kohathite
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Kohima
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Kohistan
Kohistani
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Kohlan
Kohler
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Kohn
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Koiari
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Koipato
Koirala
Koitapu
Kojiki
Kok-Sagyz
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Kolnick
Kolnos
Koloa
Kolodgie
Kolomak
Kolombangara
Kolomea
Kolomna
Kolosick
Koloski
Kolozsv
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Koluschan
Kolush
Kolva
Kolwezi
Kolyma
Kolyma
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Komara
Komarek
Komati
Kome
Komi
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Kommunarsk
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Komura
Kon Tiki
Kona
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Konkani
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Konoye
Konrad
Konstance
Konstantin
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Konyn
Konzentrationslager
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Kooning
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Korff

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Krasnodar

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Kriss kringle
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Kristi Yamaguchi
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Kristiansand

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Kristofer
Kristoffer
Kristofor
Kristoforo
Kristopher
Kristos
Kristy
Kristyn
Krita Yuga
Krita yuga
Krithia
Krivoi Rog
Krivoy Rog
Krock
Kroeber
Krogh
Kroll
Kronach
Kronecker
Kronecker delta
Kronfeld
Krongold
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Kronstadt
Kroo
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Krucik
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Krugerism
Krugerite

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Krugersdorp
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Kruman
Krummholz
Krupp
Krupskaya
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Kruse
Krusenstern
Krutch
Krute
Kruter
Krutz
Krylon
Krym
Krys
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Krysta
Krystal
Krystalle
Krystin
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Krystyna
Kshatriya
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Ku Klux
Ku Klux Klan
Ku Klux Klanner
Ku Kluxer
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Ku Kluxism
Ku klux klanner
Ku-Klux
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Ku-kluxism
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Kuala Lumpur
Kualapuu
Kuan

Kuan Ti
Kuan Yin
Kuan hua
Kuan yin
Kuan-tung
Kuangchou
Kuantan
Kuar
Kuba
Kubachi
Kuban
Kubango
Kubanka
Kubelik
Kubera
Kubetz
Kubiak
Kubilai Khan
Kubis
Kubla Khan
Kublai Khan
Kubrick
Kuch Bihar
Kuchean
Kuching
Kucik
Kudrun
Kudur-lagamar
Kudva
Kuebbing
Kuehn
Kuehnel
Kuehneola
Kuei Hsing
Kuenlun
Kufa
Kufic
Kuhio Day
Kuhlman
Kuhn
Kuhnau
Kuhnia
Kui
Kuibyshev
Kuki
Kuki-Chin
Kuki-chin
Kuksu

Kuku Nor
Kukulcan
Kukuruku
Kula
Kulah
Kulanapan
Kulda
Kuli
Kulla
Kullani
Kullervo
Kulm
Kulpmont
Kulpsville
Kulseth
Kulsrud
Kultur
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Kumamoto
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Kunia
Kunin
Kunio Hawamoto
Kuniyoshi
Kunkle
Kunkletown
Kunlun

Kunming
Kunmiut
Kunowsky
Kunst-lied
Kunstlied
Kunstlieder
Kuntsevo
Kunz
Kuo
Kuomintang
Kuopio
Kupffer cell
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Kuranko
Kurd
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Kurma
Kurman
Kurmi
Kuroki
Kuropatkin
Kurosawa
Kuroshio
Kurr
Kursaal
Kursh
Kursk
Kurt
Kurt Debus
Kurt Nimphius
Kurt Waldheim
Kurten
Kurth
Kurthwood
Kurtis

Kurtistown
Kurtz
Kurtzig
Kurtzman
Kuruba
Kurukh
Kurumba
Kurume azalea
Kurus
Kurusu
Kurys
Kurzawa
Kurzeme
Kus
Kusan
Kusch
Kush
Kushner
Kushshu
Kusin
Kuska
Kuskokwim
Kuskwogmiut
Kussell
Kustanai
Kustenau
Kuster
Kutais
Kutaisi
Kutch
Kutchin
Kutchins
Kutenai
Kutenay
Kuth
Kuttawa
Kutuzov
Kutzenco
Kutzer
Kutztown
Kuvera
Kuwait
Kuwaiti
Kuyp
Kuznetsk Basin
Kval
Kwa
Kwabena

Kwajalein
Kwajalein-Eniwetok
Kwakiutl
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Kwame
Kwan
Kwang
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Kwangju
Kwangsi-Chuang Autonomous Region
Kwangtung
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Kwapa
Kwapong
Kwara
Kwarteng
Kwasi
Kwazulu
Kwei
Kweichow
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Kweilin
Kweisui
Kweiyang
Kwethluk
Kwigillingok
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Kylander
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Kyle Wieche
Kylen
Kylertown
Kylie
Kylila

Kylstra
Kylynn
Kym
Kymric
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Kynan
Kyne
Kynewulf
Kynthia
Kyoga
Kyongsong
Kyoto
Kyphosidae
Kyprianou
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Kyrie eleison
Kyrstin
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Kythera
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Kyurin
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Kyushu
Kyzyl
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L
L acid
L bar
L beam
L block
L electron
L sill
L wave
L'Age d'or
L'Allegro
L'Aquila
L'Avare
L'Enfant
L'Esprit des Lois
L'Etranger
L'Hospital
L'Immoraliste
L'Otage

L'Ouverture
L's
L'vov
L-D converter
L-P
L-dopa
L-head cylinder
L-line
L-radiation
L-series
L-shell
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L/Cpl
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LAVC
LAW radar

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LCVP
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LSAP
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La
La Belle Dame Sans Merci
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La Bruy
La Casa de Bernarda Alba
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La Celestina
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La Chartreuse de Parme
La Chute
La Condition Humaine
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Lag bomer
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Lahouari Godih
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Lainey

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Laissez faire
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Lajos Dinnyes
Lajose
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Lake Agassiz
Lake Amin
Lake Aral
Lake Arthur
Lake Bluff
Lake Carmel
Lake Charles
Lake Country
Lake District
Lake Erie
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Los
Angelean
Los Angeleno
Los Angeles
Los Banos
Los Gatos
Los Mochis
Los angelean
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Lossa
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Lost Generation
Lost Pleiad
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Lot's wife
Lot-et-Garonne
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Lothair
Lothair I
Lothair II
Lothaire
Lothar
Lotharingian
Lothario
Lotharios
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Lothian Region
Lothians
Lothringen
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Lottie
Lottsburg
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Lotuko
Lotus
Lotus of the Good Law
Lotus of the True Law
Lotz
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Lou
Lou Franceschetti
Lou Gehrig's disease
Lou Nanne
Louann
Louanna

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Loudonville
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Louellen
Lough
Loughborough
Lougheed
Loughlin
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Louis
Louis Boutet de Montvel
Louis Frey
Louis Hubert Gonzalve
Louis I
Louis II
Louis II de Bourbon
Louis IV
Louis IX
Louis Joseph
Louis Napoleon
Louis Philippe
Louis Quatorze
Louis Quinze
Louis Seize
Louis Seymour Bazett
Louis Sleigher
Louis Treize
Louis V
Louis Victor
Louis XI
Louis XII
Louis XIII
Louis XIV
Louis XV
Louis XVI
Louis XVII
Louis XVIII
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Louisburg
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Louisette

Louisiana
Louisiana French
Louisiana Purchase
Louisiana grass
Louisiana heron
Louisiana tanager
Louisianan
Louisianian
Louisville
Louisvillian
Louls
Lounge
Lounsbury
Loup
Lourdes
Lourenco Marques
Lourie
Louth
Loutitia
Louvain
Louvale
Louvertie
Louviers
Louvre
Loux
Louys
Lovash
Lovato
Love
Love for Love
Love's Labour's Lost
Lovejoy
Lovel
Lovelace
Lovelaceville
Lovelady
Loveland
Lovell
Lovelock
Lovely
Lover
Loveridge
Lovering
Loves Park
Lovett
Lovettsville
Loveville
Lovich

Lovie
Lovilia
Loving
Lovingston
Lovington
Lovmilla
Low
Low Archipelago
Low Church
Low Churchman
Low Countries
Low German
Low Latin
Low Mass
Low Sunday
Low church
Low sunday
Low-Churchism
Low-Churchman
Low-churchism
Low-churchist
Low-churchman
Low-churchmanship
Lowake
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Lowder
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Lowell
Lowellville
Lowenstein
Lowenstern
Lower
Lower Austria
Lower Burma
Lower California
Lower Canada
Lower Carboniferous
Lower Chinook
Lower Cretaceous
Lower Depths, The
Lower Egypt
Lower
Hutt
Lower Lakes
Lower Merion
Lower Michigan
Lower Palaeolithic

Lower Palatinate
Lower Peninsula
Lower Saxony
Lower Slobbovia
Lower Tertiary
Lowery
Lowes
Lowestoft
Lowestoft ware
Lowesville
Lowis
Lowitz arc
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Lowland scotch
Lowlander
Lowlands
Lowman
Lowmansville
Lowmoor
Lowndes
Lowndesboro
Lowndesville
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Lowville
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Loxiinae
Loxley
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Loxodonta
Loxolophodon
Loxomma
Loxosoma
Loxosomidae
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Loyalist
Loyall
Loyalton
Loyalty Day
Loyang
Loyce
Loyde

Loydie
Loyola
Loyolism
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Loysville
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Lt Gen
Lt Gov
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Lu-Wang school
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Luanda
Luane
Luang Prabang
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Luanne
Luanni
Luba
Lubang Islands
Lubba
Lubberland
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Lubiniezky
Lubitsch
Lubke
Lublin
Lubow

Lubumbashi
Luby
Luc Robitaille
Luca
Luca della
Lucais
Lucama
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Lucania
Lucanidae
Lucanus
Lucas
Lucas van Leyden
Lucas's type
Lucasville
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Lucite paint
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Lucius I
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Lucius Quintus Cincinnatus
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Lucrezia Borgia
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Ludolphian
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Ludvig
Ludwig
Ludwig Ehrhard
Ludwig II
Ludwig Mies
Ludwigg
Ludwigsburg
Ludwigshafen
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Peninsula
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Luis Aguayo
Luis Aquino
Luis Corvalan
Luis Echeverria
Luis Ferre
Luis Herrera Campins
Luis Jacome Chavez
Luis Quinones
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Luise
Luiseno
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Lukasz
Lukaszewicz
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Luke's summer
Lukeville
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Lulie

Luling
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Lumbricus
Lumbye
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Lumpur
Lumumba
Luna
Luna moth
Lunar Orbiter
Lunaria
Luncheon on the Grass
Lund
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Lundale
Lundberg
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Lundy's Lane
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Lutesville
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Luthersville
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Lutianidae
Lutianus

Lutine bell
Lutjanidae
Lutjanus
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Lyon Office of Arms
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M
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M Econ
M electron
M radiation
M roof
M saw
M series
M star
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M'Taggart
M's
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M-1
M-1 rifle
M-14
M-16
M-day
M-line
M-series
M-shaped
M-swahili
M-type star
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MacDonell
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MacDowell
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MacIlroy
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Macrorhamphosus
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Madagascar
Madagascar arrowroot

Madagascar bean
Madagascar jasmine
Madagascar periwinkle
Madagascarian
Madagass
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Madalena
Madalyn
Madalynne
Madam Butterfly
Madame
Madame Bovary
Madame Butterfly
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Madariaga
Madawaska
Maddalena
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Madecase
Madegassy
Madeira
Madeira cake
Madeira chair
Madeira cockroach
Madeira topaz
Madeiran
Madeiravine
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Madeleine Bassil
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Madelyn
Mademoiselle Fifi
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Madhya Bharat
Madhya Pradesh
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Madinensor
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Madison Avenue
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Madisonville
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Madras gram
Madras hemp
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National Academy of Sciences
National Assembly
National Aviation Day
National Bureau of Standards
National Charter
National Congress
National Convention
National Council
National Country Party
National Covenant
National Enterprise Board
National Front
National Gallery
National Guard
National Health Service
National Industrial Recovery Act
National Labor Relations Act
National Labor Relations Board
National Liberation Front
National Mediation Board
National People's Congress
National Republican Party
National Science Foundation
National Security Council
National Socialism
National Socialist
National Trust
National Union Catalog
National War Labor Board
National Wildlife Service
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New Windsor
New World
New World monkey
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New York
New York Bay
New York City
New York Curb Exchange
New York State
New York State Barge Canal
New York State wine
New York Stock Exchange
New York aster
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New York's finest
New Yorkese
New Zealand

New Zealand flax
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New Zealand wineberry
New england
New englander
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New hampshire
New hampshirean
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Nguyen Lyong Bang
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Nikaniki
Nikaria
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Nike Hercules
Nike Zeus
Nike of Samothrace
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Nikita Khrushchev
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Nikkie
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Nikola Ignatov
Nikola Kavaja
Nikolai

Nikolai Bulganin
Nikolai Ryzhkov
Nikolainkaupunki
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Nikolaus
Nikolayer
Nikolayev
Nikoletta
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Nile River
Nile blue
Nile green
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Nilgiri Hills
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Nippon daisy
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Nissensohn
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Nixie tube
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Nizhni Novgorod
Nizhni Tagil
Njord
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Nnamidi Azikiwe
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Noah's ark
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Noami
Noank boat
Noank sloop
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Nobel prize
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Nobleboro
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Nobleton
Noboyuke Abe
Noburu Takeshita
Nobusuke
Nobusuke Kishi
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Nodosaria
Nodus secundus
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Noelyn
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Nolde

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Noletta
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Non-christian
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Non-congressional
Non-cymric

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Non-hibernian
Non-hindu
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Non-magyar
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Non-negro
Non-nicene
Non-norman
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Non-pali
Non-paninean
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Non-polish
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Non-pythagorean
Non-quaker
Non-riemannian
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Non-russian
Non-sanskritic
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Non-unitarian

Non-universalist
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North Belmont
North Bend
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North Borneo
North Brabant
North Brookfield
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North Carolinian
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North Country
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North Germanic
North Haledon
North Highlander
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North Holland
North Island
North Korea
North Little Rock
North Manchester
North Mankato
North Miami
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North Muskegon
North New Hyde Park
North Ogden
North Olmsted
North Pacific current
North Palm Beach
North Pelham
North Pole
North Rhine-Westphalia
North Richland Hills
North Riding
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North Syracuse
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Norway maple
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Nullstellensatz
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O Lord

O gauge
O level
O my soul
O star
O station
O wild West Wind
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O'Shee
O'Sullivan
O'Toole
O's
O-O gauge

O-gee
O-shaped
O-type star
O-wave
O/D Banking
O/S
O/S Banking
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Proto-matthew
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Proto-semitic

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Pseudo-junker
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Q clearance
Q factor
Q fever
Q gauge
Q signal
Q value
Q wedge
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Q-celt
Q-celtic
Q-factor
Q-fever
Q-group
Q-language
Q-shaped
Q-ship
Q-wedge compensation
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Qiao Shi
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Quaker green
Quaker gun
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Quaker-colored
Quaker-gray
Quaker-ladies
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Quakerishness
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Quantico
Quantrill
Quantz
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Quarryville
Quarta
Quartana

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Quasi spaniard
Quasi spanish
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Quasi-jewish
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Quasqueton
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Quatre Bras
Quatsino
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Quebec
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Quebeck
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Anne
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Queen Anne's lace
Queen Beatrix

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Queen's Counsel
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Queen's Proctor
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Queen's Scout
Queen's counsel
Queen's highway
Queen's pattern
Queen's proctor
Queen's speech
Queen's-flower
Queen-Anne
Queena
Queenanne
Queenborough in Sheppey
Queenie
Queens
Queensberry rules
Queensland
Queensland lungfish
Queensland nut
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Queer Street
Quelea
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Quelpart
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Quemoy
Quenby
Queneau
Quenemo

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Quennie
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Quentin
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Quercus
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Querendy
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Quertaro
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Quesnel
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Queston
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City
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Quiangan
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Quickel
Quickman
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Quintus
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Quivira
Quixote
Qulin
Qulllon
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Qumran
Qung
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Qur'an
Quran
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R and D establishment
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 and D worker
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R star
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RAAF
RAC

RACE
RACEP
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RADAR
RADIO
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RBHC
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RC oscillator
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RCAF
RCAS
RCB
RCC
RCCh
RCF
RCH

RCI
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RCLDN
RCM
RCMAC
RCMP
RCN
RCO
RCP
RCS
RCSC
RCT
RCU
RCVR
RCVS
RD
RDA
RDBMS
RDC
RDES
RDF
RDF station
RDL
RDM
RDP
RDS
RDT
RDTE
RDX
RE
REA
REC
RECON
REGIS
REM
REM sleep
REME
REMOBS
REN
REO
REQSPEC
RETMA
REX
REXX
RF
RF amplification
RF amplifier
RF echoes

RF pulse
RF signal
RF stage
RFA
RFC
RFD
RFE
RFI
RFP
RFQ
RFS
RFT
RGB
RGBI
RGP
RGS
RGU
RH
RHA
RHC
RHG
RHS
RHV
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RIACS
RIAS
RIBA
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RNWMP
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ROM
RONA
RONABIT
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ROSAT
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ROSPA
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ROYGBIV
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RSB
RSC
RSCS
RSE
RSFSR
RSGB
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RSPB
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RSTSE
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RT
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transmitter
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RTAC
RTC
RTF
RTFM
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RTL
RTLS
RTM
RTMP
RTR
RTS
RTSE
RTSL
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RTTY
RTU
RU
RUC
RUM
RV
RVSVP
RW
RWA
RWC
RWE
RWM
RX
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Raab
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Rabush
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Radbun
Radburn
Radcliff
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Saad Jumaa
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Saadoun Hammadi
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Sabbath day
Sabbath dress
Sabbath school
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Sabine Lake
Sabine River
Sabinian
Sabino
Sabinsville
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Sabri Assali
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Sabrina work
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Sacculina
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Sacher tortes
Sacheverell
Sachi
Sachiko
Sachs
Sachsen
Sachsse
Sacian
Sacken
Sackey
Sackman
Sacks
Sacksen
Sackville
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Sacra Romana Rota
Sacra romana rota
Sacrament Sunday
Sacrament sunday
Sacrament, the

Sacramentarian
Sacramentary
Sacramento
Sacramento cat
Sacramento perch
Sacramento pike
Sacramento sturgeon
Sacre du Printemps, Le
Sacred College
Sacred College of Cardinals
Sacred Heart
Sacred Roman Rota
Sacred Writ
Sacrificati
Sacripant
Sacrobosco
Sacs
Sacttler
Sacul
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Sada
Sadachbia
Sadalmelik
Sadalsuud
Sadat
Saddam Hussein
Saddegh Ghotbzadeh
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Sadducean
Sadducee
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Sadek el-Mahdi
Sadella
Sadhu Ittyavirah
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Sadi dervish
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Sadie
Sadie Hawkins Day
Sadieville
Sadira
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Saehrimnir
Saeima
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Safavid
Safavis
Safawid
Safety
Islands
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Safford
Saffren
Safi
Safid Rud
Safier
Safine
Safini
Safir
Safire
Safko
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Sagai tatar
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Sagaponack
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Sagerman
Saghalien

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Saguia el Hamra
Sagunto
Saguntum
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Sahaptin
Sahara
Saharan
Saharanpur
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Saharic
Sahib
Sahibah
Sahidic
Sahitya Akademi
Saho
Sahuarita
Said Aouita
Said Hamami
Saida
Saidee
Saidel
Saideman
Saidi
Saied
Saiff
Saigon
Sailesh
Sailing to Byzantium
Saimon
Sainfoin

Saint
Saint Agnes's Eve
Saint Albans
Saint Anthony's Cross
Saint Anthony's Fire
Saint Anthony's cross
Saint Anthony's fire
Saint Augustine
Saint Austell
Saint Bartholomew's Day Massacre
Saint Benoit
Saint Bernard
Saint Bernard Pass
Saint Catharines
Saint Christopher
Saint Christopher-Nevis-Anguilla
Saint Clair
Saint Croix
Saint
Croix River
Saint David's
Saint David's Day
Saint Elias Mountains
Saint Elmo's fire
Saint Gall
Saint George's
Saint George's Channel
Saint George's Cross
Saint Gotthard
Saint Helena
Saint Helens
Saint Helier
Saint James's Palace
Saint Joan
Saint John
Saint John's
Saint John's bread
Saint John's wort
Saint Kilda
Saint Kitts
Saint Kitts-Nevis-Anguilla
Saint Laurent
Saint Lawrence
Saint Lawrence Seaway
Saint Leger
Saint Leonard
Saint Louis
Saint Lucia

Saint Luke's summer
Saint Martin
Saint Martin's summer
Saint Moritz
Saint Nicholas
Saint Nick
Saint Patrick's Day
Saint Paul
Saint Paul's
Saint Peter's
Saint Petersburg
Saint Pierre
Saint Pierre and Miquelon
Saint Pten
Saint Swithin's Day
Saint Thomas
Saint Valentine's Day
Saint Vincent
Saint Vitus's dance
Saint andrew
Saint bell
Saint bernard
Saint michael
Saint simon
Saint-Agathon
Saint-Brieuc
Saint-Cloud
Saint-Denis
Saint-Etienne
Saint-Exupery
Saint-Florentin
Saint-Gaudens
Saint-Just
Saint-L
Saint-Laurent
Saint-Louis
Saint-Marcellin
Saint-Maur-des-Foss
Saint-Maure
Saint-Mihiel
Saint-Nazaire
Saint-Nectaire
Saint-Ouen
Saint-Pierre
Saint-Quentin
Saint-Sa
Saint-Simon
Saint-Simonian

Saint-Simonianism
Saint-Simonism
Saint-emilion
Saint-estephe
Saint-julien
Saint-milion
Saint-simonianism
Saint-simonism
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Sainte
Foy
Sainte-Beuve
Saintpaulia
Saintsbury
Saionji
Saipan
Saiph
Sair
Saire
Sais
Saishu
Saishuto
Saison en Enfer Une
Saite
Saitic
Saitis
Saito
Saiva
Saivism
Sajovich
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Sakai
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Sakha
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Sakhalin fir
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Sakhuja
Saki
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Sakovich

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Salamandrina
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Salchunas
Saldee
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Salisbury
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Sallisaw

Sallust
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Sally Lunn
Sally Wattle
Sally lunn
Sally nixon
Sallyann
Sallyanne
Sallybloom
Sallye
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Salman Rushdie
Salmanazar
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Salvador Dali
Salvador Laurel
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Salvadoraceae
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Salvadore
Salvadorian
Salvarsan
Salvation Army
Salvation Army bonnet
Salvation army
Salvationist
Salvator
Salvatore
Salvatore Briguglio
Salvay
Salve Regina
Salvelinus
Salvia
Salvidor
Salvini

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Salzhauer
Sam
Sam Bowie
Sam Browne belt
Sam Jankovich
Sam Wyche
Sam hill
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Sama-veda
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Samal laut
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Samani
Samanid
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Samhain eve
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Samia
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Samian ware
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Sampson post
Sampson snakeroot
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Samson Agonistes
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Samson post
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Samuela
Samuele
Samuella
Samuelson
Samul
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San
San Antonio
San Bernardino
San Bernardino Pass
San Blas
San Buenaventura
San Cristbal
San Diego
San Fernando
San Fernando de Apure
San Franciscan
San Francisco
San Francisco Bay
San Ildefonso

San Jacinto
San Jacinto Day
San Jos
San Jose
San Jose de Cucuta
San Jose scale
San Juan
San Juan Bautista
San Juan Hill
San Juan Islands
San Juan Mountains
San Juan de la Cruz
San Luis Potos
San Marco
San Marino
San Mart
San Mateo
San Miguel
San Pablo
San Pablo Bay
San Pedro Sula
San
Remo
San Saba
San Salvador
San Salvador Island
San Sebasti
San Stefano
San blas
San blas indian
San carlos apache
San ildefonso indian
San jacinto day
San juan indian
San kuo
San sebastian
San thome
San'a
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Sancerre
Sancha

Sanchez
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Sancho Panza
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Sanctus
Sanctus bell
Sancus
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Sandor
Sandpoint
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Sandra Cecchini
Sandrakottos
Sandringham
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Sandwich Islands
Sandwich glass

Sandwich tern
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Sanhita
Sanicula
Sanjay
Sanjiv
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Sankaran
Sankey
Sankhya
Sankt Gallen
Sankt Polten
Sanmicheli
Sannoisian
Sanpoil

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Sanson-Flamsteed projection
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Santa Ana
Santa Anna
Santa Barbara Islands
Santa Catalina
Santa Catarina
Santa Clara
Santa Clara Valley
Santa Claus
Santa Cruz
Santa Cruz de Tenerife
Santa Fe
Santa Fe Springs
Santa Fe Trail
Santa Fean
Santa Gertrudis
Santa Isabel
Santa Klaus
Santa Maria
Santa Marta
Santa Maura
Santa Rosa
Santa Rosa de Cop
Santa ana indian
Santa casa
Santa clara indian
Santa claus
Santa fe locomotive

Santa gertrudis
Santa hermandad
Santa maria
Santa maria tree
Santa sophia
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Santaria
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Santee
Santeria
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de Chile
Santiago de Compostela
Santiago de Cuba
Santiago de los Caballeros
Santiago del Estero
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Santo Domingo
Santo domingan
Santo domingo indian
Santolina
Santorin earth
Santoro
Santos
Santos-Dumont
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Sanyakoan
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Sao Paulo de Loanda
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Sara Aldrete
Sara-Ann
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Saragosa
Saragossa
Sarah

Sarahann
Sarahsville
Saraiya
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Sarajevo
Sarakolet
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Saratoga chop
Saratoga trunk
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Sargent palm
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Sarilda
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Sarum office
Sarum rubric
Sarum use
Sarvarthasiddha
Sarven hub
Sarver
Sarvodaya
Sarzan

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Saskatchewan
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Sasser
Sasserides
Sassetta
Sassoon
Sastean
Sat
Sat-chit-ananda
Sat-cit-ananda
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Satan worshiper
Satanael
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Satanist
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Satanology
Satanophanic
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Satanship
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Satcitananda
Sateia
Sathrum
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Satieno
Satin Slipper, The
Sato
Satrae
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Tynemouth
Tyner
Tyneside
Tyngsboro
Tynwald
Typees
Typewriter
Typha

Typhaceae
Typhlomolge
Typhlopidae
Typhlops
Typhoean
Typhoeus
Typhoid Mary
Typhon
Typhonian
Typhonic
Typhula
Typotheria
Typotheriidae
Tyr
Tyra
Tyranni
Tyrannidae
Tyrannides
Tyranninae
Tyrannosaurus
Tyrannus
Tyre
Tyree
Tyrian
Tyrian dye
Tyrian purple
Tyro
Tyroglyphidae
Tyroglyphus
Tyrol
Tyrolean
Tyrolese
Tyrolienne
Tyroliennes
Tyrone
Tyrone Fahner
Tyronza
Tyrr
Tyrrell
Tyrrhene
Tyrrheni
Tyrrhenian
Tyrrhenian Sea
Tyrrhenum
Tyrrheus
Tyrrhus
Tyrsenoi
Tyrtaean

Tyrtaeus
Tyrus
Tyson
Tyto
Tytonidae
Tyty
Tyumen
Tyzine
Tzaam
Tzanis Tzannetakis
Tzapotec
Tzekung
Tzendal
Tzental
Tzigane
Tziganies
Tzigany
Tzong
Tzotzil
Tzu-chou
Tzu-po
Tzutuhil
U
U Nu
U Thant
U bolt
U magnet
U pin
U plate
U rail
U section
U trap
U tube
U valley
U's
U-boat
U-boot
U-cut
U-shaped
U-stirrup
U-turn
U/S
UA
UAB
UAE
UAM
UAPDU
UAR

UARS
UART
UAW
UB
UBA
UBC
UBM
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UCAR
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UCCA
UCD
UCI
UCL
UCLA
UCR
UCSB
UCSC
UCSD
UCSF
UDA
UDB
UDC
UDI
UDMH
UDP
UDR
UDT
UEC
UEL
UFC
UFO
UFS
UG
UGC
UH
UHF
UI
UIC
UID
UIL
UIMS
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UITP
UIUC
UK

UKST
UL
ULANA
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UMW
UN
UNCIO
UNCLE
UNCTAD
UNDRO
UNEF
UNESCO
UNHCR
UNICEF
UNICS
UNIDO
UNISTAR
UNIVAC
UNIX
UNMA
UNO
UNRRA
UNRWA
UP
UPC
UPDS
UPI
UPS
UPU
UPWA
UR
URC
UREP
US
US
Air Force
US Air Force Academy
US Air Force Reserve
US Army Air Force
US Army Reserve
US Cabinet
US Coast Guard Academy
US Coast Guard Reserve
US Customs Service
US Marine Corps Reserve
US Merchant Marine Academy
US Military Academy
US National Air Service

US Naval Academy
US Naval Reserve
US agency
US attorney
US cavalry saddle
US dry measure
US highway
US liquid measure
US money
USA
USAAF
USAC
USAF
USAFA
USAN
USAR
USB
USC
USC&GS
USCA
USCG
USD
USDA
USE
USECC
USES
USFL
USG
USGA
USGS
USHA
USHGA
USIA
USIS
USITA
USL
USLTA
USM
USMA
USMC
USMP
USN
USNA
USNAS
USO
USOC
USP
USPHS

USPO
USPS
USPTO
USR
USRC
USS
USSB
USSCt
USSR
USSS
USTC
USV
USW
UT
UTC
UTE
UTP
UTQGS
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UTWA
UU
UUCICO
UUCP
UUG
UUM
UUT
UV
UVS
UW
UWCSA
UWS
Uaraycu
Uarekena
Uaupe
Ubald
Uball
Ubana
Ubangi
Ubangi-Shari
Ubbenite
Ubbonite
Ube
Ubermensch
Ubii
Ubiquarian
Ubiquist
Ubiquitarian
Ubiquitarianism

Ubiquitism
Ubiquitist
Ubly
Ubu
Roi
Uca
Ucal
Ucalegon
Ucayale
Ucayali
Uccello
Uchean
Uchee
Uchida
Uchish
Ucon
Ud
Uda
Udaipur
Udale
Udall
Udela
Udele
Udell
Udella
Udelle
Udi
Udic
Udine
Udish
Udolphoish
Uds
Uehling
Uel
Uela
Uele
Uella
Ueueteotl
Ufa
Uffizi
Uganda
Ugandan
Ugarit
Ugaritian
Ugaritic
Ugarono
Ugo
Ugrian

Ugric
Ugro-Finnic
Ugro-altaic
Ugro-aryan
Ugro-finn
Ugro-finnic
Ugro-finnish
Ugro-slavonic
Ugro-tatarian
Ugroid
Uhde
Uhland
Uhrichsville
Uhro-rusinian
Uighur
Uigur
Uigurian
Uiguric
Uinta
Uinta Mountains
Uintatheriidae
Uintatherium
Uird
Uirina
Uis
Uitlander
Uitotan
Uitzilopochtli
Ujiji
Ujjain
Ujpest
Ujung Pandang
Uke
Ukiah
Ukr
Ukraina
Ukraine
Ukrainer
Ukrainian
Ul
Ula
Ulah
Ulan
Ulan Bator
Ulan Ude
Ulan-Ude
Ulane
Ulani

Ulberto
Ulbricht
Ulda
Ule
Uledi
Uleki
Ulen
Ulex
Ulfila
Ulfilas
Ulick
Ulidia
Ulidian
Ulises
Ulita
Ull
Ulla
Ulland
Uller
Ullin
Ullman
Ullr
Ullswater
Ullund
Ullur
Ullyot
Ulm
Ulmaceae
Ulman
Ulmaria
Ulmer
Ulmus
Uloboridae
Uloborus
Ulonata
Ulophocinae
Ulothrix
Ulotrichaceae
Ulotrichales
Ulotriches
Ulotrichi
Ulphi
Ulphia
Ulphiah
Ulpian
Ulric
Ulrica
Ulrich

Ulrick
Ulrika
Ulrikaumeko
Ulrike
Ulrike
 Maier
Ulster
Ulster Defence Association
Ulsterian
Ulsterite
Ulsterman
Ultan
Ultann
Ultima
Ultima Thule
Ultonian
Ultor
Ultra-anglican
Ultra-byronic
Ultra-byronism
Ultra-calvinist
Ultra-christian
Ultra-english
Ultra-englishUltra-french
Ultra-french
Ultra-gallican
Ultra-gangetic
Ultra-german
Ultra-julian
Ultra-lutheran
Ultra-lutheranism
Ultra-martian
Ultra-neptunian
Ultra-pauline
Ultra-pecksniffian
Ultra-pluralism
Ultra-pluralist
Ultra-presbyterian
Ultra-puritan
Ultra-puritanical
Ultra-romanist
Ultra-tory
Ultra-toryism
Ultra-whig
Ultrasuede
Ultun
Ulu
Ulu-juz

Ulua
Ulund
Ulva
Ulvaceae
Ulvales
Ulvan
Ulyanovsk
Ulyssean
Ulysses
Uma
Umatilla
Umaua
Umayyad
Umbarger
Umbellales
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Umbellula
Umbellularia
Umbellulidae
Umberto
Umberto
I
Umbilicaria
Umbra
Umbria
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Umbrian school
Umbriel
Umbro-etruscan
Umbro-florentine
Umbro-latin
Umbro-oscan
Umbro-roman
Umbro-sabellian
Umbro-samnite
Umbro-sienese
Umbundu
Ume
Umea
Umeh
Umeko
Ummersen
Umont
Umpqua
Umtali
Un
Un Ballo in Maschera
Un-african

Un-american
Un-americanism
Un-americanization
Un-americanize
Un-anacreontic
Un-anglican
Un-anglicized
Un-asiatic
Un-athenian
Un-attic
Un-augean
Un-australian
Un-babylonian
Un-biblical
Un-biblically
Un-bostonian
Un-brahminic
Un-brazilian
Un-british
Un-buddhist
Un-chinese
Un-christlike
Un-christlikeness
Un-christliness
Un-christly
Un-christmaslike
Un-dominican
Un-doric
Un-egyptian
Un-elizabethan
Un-english
Un-englished
Un-englishmanlike
Un-etruscan
Un-european
Un-fenian
Un-finnish
Un-flemish
Un-florentine
Un-franciscan
Un-french
Un-georgian
Un-german
Un-germanic
Un-germanize
Un-grandisonian
Un-grecian
Un-greek

Un-gregorian
Un-hamitic
Un-hebraic
Un-hebrew
Un-hellenic
Un-hibernically
Un-hindu
Un-homeric
Un-horatian
Un-iberian
Un-icelandic
Un-indian
Un-indianlike
Un-ionic
Un-iranian
Un-irish
Un-irishly
Un-italian
Un-italianate
Un-jacobean
Un-japanese
Un-jeffersonian
Un-johnsonian
Un-judaize
Un-kantian
Un-korean
Un-lacedaemonian
Un-latin
Un-lutheran
Un-machiavellian
Un-magyar
Un-malay
Un-maltese
Un-manichaeanize
Un-mediterranean
Un-methodize
Un-mexican
Un-miltonic
Un-mohammedan
Un-mongolian
Un-moorish
Un-mormon
Un-mosaic
Un-moslem
Un-moslemlike
Un-neapolitan
Un-norman
Un-norwegian

Un-olympian
Un-ovidian
Un-parisian
Un-parisianized
Un-peloponnesian
Un-persian
Un-petrarchan
Un-philadelphian
Un-pindaric
Un-pindarical
Un-pindarically
Un-platonic
Un-platonically
Un-polish
Un-portuguese
Un-presbyterian
Un-protestant
Un-protestantlike
Un-prussian
Un-prussianized
Un-pythagorean
Un-roman
Un-romanize
Un-romanized
Un-saracenic
Un-saxon
Un-scotch
Un-scottish
Un-scripturality
Un-semitic
Un-serbian
Un-shakespearean
Un-siberian
Un-sicilian
Un-slavic
Un-socratic
Un-southern
Un-spaniardized
Un-spanish
Un-spartan
Un-spenserian
Un-sundaylike
Un-swedish
Un-swiss
Un-teutonic
Un-thespian
Un-tudor
Un-turkish

Un-tuscan
Un-vedic
Un-venetian
Un-vergilian
Un-victorian
Un-viennese
Un-virgilian
Un-virginian
Un-voltairian
Un-wagnerian
Un-washingtonian
Un-welsh
Un-wordsworthian
Un-yankee
Una
Una
boat
Unadilla
Unakhotana
Unalachtigo
Unalaska
Unalaska Island
Unami
Unamuno
Uncaria
Uncasville
Uncinaria
Uncinata
Uncinula
Uncle
Uncle Remus
Uncle Sam
Uncle Sugar
Uncle Tom
Uncle Tom's Cabin
Uncle Vanya
Uncompahgre
Unders
Underwood
Undine
Undis
Undry
Undset
Une
Une Saison En Enfer
Uneeda
Unesco
Unfederated Malay States

Ungava
Unger
Ungley
Unguiculata
Ungulata
Uni
Uniat
Uniat Rites
Uniate
Uniate Rites
Uniatism
Unicoi
Unifolium
Uniform Code of Military Justice
Uniformity Act
Unimak Island
Unio
Uniola
Union
Union Day
Union Flag
Union Jack
Union List of Serials
Union flag
Union of Burma
Union of South Africa
Uniondale
Unionhall
Unionidae
Unionism
Unionist
Unionist Party
Unionport
Uniontown
Unionville
Uniopolis
Uniroyal
Unit
Unit
Citation
Unitarian
Unitarianism
Unitarianize
Unitas Fratrem
United
United Arab Emirates
United Arab Republic
United Arab States

United Brethren
United Church of Christ
United Empire Loyalist
United Kingdom
United Mexican States
United Nations
United Nations Children's Fund
United Nations Day
United Nations Educational
United Nations troops
United Party
United Presbyterian
United Press International
United Provinces
United Reformed Church
United States
United States Army
United States District Court
United States Employment Service
United States Information Agency
United States Marine Corps
United States Navy
United States Postal Service
United States Ship
United States Supreme Court
United States Tariff Commission
United States Tax Court
United States attorney
United States of America
United states
United-states-man
United-statesian
Unity
Unityhouse
Unityville
Univ
Univac
Universal Postal Union
Universal Product Code
Universal Soul
Universal
Time
Universalian
Universalism
Universalist
Universalistic
University
University Heights

University Park
University Wits
Unix
Unjewish
Unkelos
Unknowable
Unknown American
Unknown Sea
Unknown Soldier
Unknown Warrior
Unni
Uno
Unona
Unrra
Unrussian
Unter den Linden
Untermeyer
Unterricht's disease
Unterseeboot
Unterwalden
Unuk al h
Unuk al hay
Unungun
Up-country
Up-state
Up-stater
Upali
Upanishad
Updike
Upham
Uphemia
Upington
Upis
Upland
Upolu
Upper Arlington
Upper Austria
Upper Burma
Upper Canada
Upper Chinook
Upper Cretaceous
Upper Egypt
Upper Michigan
Upper Palaeolithic
Upper Palatinate
Upper Peninsula
Upper Sandusky
Upper Silesia

Upper Tertiary
Upper Tunguska
Upper Volta
Upperco
Upperville
Uppsala
Upsala
Upshaw
Upson
Upton
Upupa
Upupidae
Ur
Ur of the Chaldees
Ur-Nammu
Uragoga
Ural
Ural Mountains
Ural-Altaic
Ural-altaian
Ural-altaic
Uralian
Uralian emerald
Uralic
Uralo-altaian
Uralo-altaic
Uralo-caspian
Uralo-finnic
Uran
Urana
Urania
Urania blue
Uranian
Uranicentric
Uranie
Uraniidae
Uranoscopidae
Uranoscopus
Uranus
Urartaean
Urartian
Urartic
Urata
Uravan
Urba
Urbai
Urbain
Urban

Urban
I
Urban II
Urban III
Urban IV
Urban V
Urban VI
Urban VII
Urban VIII
Urbana
Urbani
Urbanist
Urbanna
Urbannai
Urbannal
Urbano
Urbanus
Urbas
Urbicolae
Urceolina
Urd
Urdar
Urdu
Urdummheit
Urdur
Uredinales
Uredineae
Urediniopsis
Uredo
Urena
Urey
Urfa
Urga
Urgel
Urginea
Urgonian
Urho Kekkonen
Uri
Uria
Uriah
Uriah Heep
Urial
Urian
Urias
Urich
Uriel
Urien
Uriia

Uriiah
Uriisa
Urim and Thummim
Urina
Urion
Uris
Urissa
Urita
Urmia
Urmston
Uro
Urocerata
Uroceridae
Urochorda
Urocoptidae
Urocoptis
Urocyon
Urocystis
Urodela
Uroglena
Uromastix
Uromyces
Uromycladium
Uropeltidae
Urophlyctis
Uropsilus
Uropygi
Urquhart
Ursa
Ursa Major
Ursa Minor
Ursae Majoris
Ursae Minoris
Ursae minorids
Ursal
Ursala
Ursas
Ursel
Ursi
Ursid
Ursidae
Ursina
Ursola
Urson
Ursprache
Ursula
Ursulette
Ursulina

Ursuline
Ursus
Urta-juz
Urtext
Urtica
Urticaceae
Urticales
Urticastrum
Uru
Uruapan
Uruguaiana
Uruguay
Uruguayan
Uruk
Urukuena
Urumchi
Urumtsi
Urundi
Ury
Usanis
Usbeg
Usbegs
Usbek
Usbeks
Ushak
Ushant
Ushas
Usheen
Usher
Usherian
Ushijima
Usipetes
Usk
Uskara
Uskdar
Uskok
Uskub
Uskudar
Usnach
Usnea
Usneaceae
Uspallata
Pass
Uspanteca
Ussher
Ussuri
Ust-Kamenogorsk
Ustarana

Ustashi
Ustbem
Ustilaginaceae
Ustilaginales
Ustilaginoidea
Ustilago
Ustinov
Ustulina
Ustyurt
Usumbura
Usun
Ut
Uta
Utah
Utahan
Utamaro
Utas
Ute
Utes
Utgard
Utgard-Loki
Utham
Uther
Uther Pendragon
Uthrop
Utica
Uticas
Utimer
Utley
Utman khel
Utnapishtim
Uto-Aztecan
Uto-aztecan
Utopia
Utopian
Utopianize
Utopianizer
Utraquism
Utraquist
Utrecht
Utrecht velvet
Utricularia
Utriculariaceae
Utrillo
Utsunomiya
Utta
Uttar Pradesh
Uttara Mimamsa

Uttasta
Utter
Uttica
Uttu
Utu
Utuado
Uuge
Uund
Uva-ursi
Uvalda
Uvalde
Uvedale
Uvella
Uvularia
Uwchland
Uwe Blab
Uwe Krupp
Uwton
Ux base
Uxbridge
Uxmal
Uyekawa
Uzbak
Uzbeg
Uzbegs
Uzbek
Uzbekistan
Uzia
Uzial
Uziel
Uzzi
Uzzia
Uzziah
Uzzial
Uzziel
V
V Rev
V bend
V block
V bob
V connection
V crowder
V croze
V curve
V
formation
V neck
V point

V scraper
V section
V sign
V tail
V thread
V tool
V vat
V weld
V winding
V's
V-1
V-2
V-Day
V-E Day
V-I-P
V-J Day
V-blouse
V-bottom
V-eight
V-engine
V-formed
V-girl
V-grooved
V-mail
V-neck sweater
V-necked
V-particle
V-shaped
V-shaped comb
V-sign
V-type engine
V-weapon
V/STOL
V6
V8
VA
VA hospital
VAB
VABIS
VAC
VAD
VADS
VAFB
VAN
VANS
VAP
VAR
VASCAR

VASI
VAST
VAT
VAV
VAX
VAXBI
VB
VC
VCCI
VCM
VCO
VCR
VCS
VCU
VD
VDC
VDE
VDFM
VDI
VDM
VDT
VDU
VE
VEEGA
VEU
VEX
VF
VFEA
VFO
VFR
VFS
VFW
VFY
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VGA
VGF
VGI
VHD
VHDL
VHF
VHS
VHSIC
VI
VIC
VIFRED
VILE
VINE
VINES

VIP
VIR
VISTA
VITA
VIU
VJ
VL
VLA
VLBA
VLBI
VLF
VLIW
VLSI
VLT
VM
VMC
VMCF
VMCMS
VMD
VME
VMM
VMOS
VMR
VMRS
VMS
VMSP
VMTP
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VNF
VNL
VNLF
VNY
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VODAS
VOIR
VOIS
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VOQ
VOR
VORT
VP
VPF
VPISU
VPN
VR
VRC
VRI

VRM
VRS
VS
VSAM
VSAT
VSB
VSE
VSO
VSOP
VSP
VSR
VSS
VSSP
VSX
VT
VT fuse
VT fuze
VTAM
VTC
VTI
VTO
VTOC
VTOL
VTP
VTR
VTS
VTVM
VU
VUIT
VUP
VV
VVSS
VW
VWS
VXI
Va
Vaal
Vaalpens
Vaas
Vaasa
Vaasta
Vacation Bible School
Vacaville
Vaccaria
Vacciniaceae
Vaccinium
Vachel
Vachell

Vachellia
Vacherie
Vacherin
Vachil
Vachill
Vacla
Vaclav
Vaclav
Havel
Vaclava
Vacuna
Vacuva
Vada
Vaden
Vader
Vadim
Vadim Medvedev
Vadis
Vadito
Vadnee
Vadodara
Vadso
Vaduz
Vaenfila
Vafio
Vaginicola
Vagnera
Vahe
Vai
Vai Sikahema
Vaiden
Vaidic
Vaientina
Vail
Vaios
Vaish
Vaisheshika
Vaishnava
Vaishnavism
Vaishnavite Hinduism
Vaisya
Vaja
Vajrayana Buddhism
Val
Val lace
Val-d'Oise
Val-de-Marne
Vala

Valadon
Valais
Valaree
Valaria
Valaskjalf
Valatie
Valborg
Valcour Island
Valda
Valdai Hills
Valdas
Valdemar
Valdemar I
Valdepeas
Valders
Valdes
Valdese
Valdez
Valdimir Kryuchkov
Valdis
Valdivia
Valdosta
Vale
Valeda
Valenay
Valenba
Valence
Valencia
Valencia orange
Valencian
Valenciennes
Valenciennes lace
Valene
Valenka
Valens
Valenta
Valente
Valentia
Valentide
Valentijn
Valentin
Valentina
Valentine
Valentine Day
Valentine's Day
Valentines
Valentinian
Valentinian I

Valentinian II
Valentinian III
Valentinianism
Valentinianus I
Valentino
Valentinus
Valenza
Valer
Valera
Valeria
Valerian
Valeriana
Valerianaceae
Valerianales
Valerianella
Valerianoides
Valerie
Valerio
Valeriu
Georgescu
Valerlan
Valerle
Valery
Valery Giscard d'Estaing
Valerye
Valeta
Valetta
Valhalla
Vali
Valiant
Valida
Valier
Valina
Valium
Valkyr
Valkyria
Valkyrian
Valkyrie
Valladolid
Valle
Valle d'Aosta
Valleau
Vallecito
Vallecitos
Vallejo
Vallenar
Vallery
Valletta

Valley
Valley Center
Valley Forge
Valley Park
Valley Stream
Valley of Ten Thousand Smokes
Valleys of Andorra
Valli
Valliant
Vallie
Valliscaulian
Vallisneria
Vallisneriaceae
Vallo
Vallombrosa
Vallombrosan
Vallonia
Vallota
Vally
Valma
Valmeyer
Valmid
Valmiki
Valmy
Valois
Valona
Valonia
Valoniaceae
Valoniah
Valora
Valorie
Valparaiso
Valpolicella
Valrico
Valry
Valsa
Valsaceae
Valsalvan
Valtellina
Valtin
Valvata
Valvatidae
Valyermo
Vamacharin Hinduism
Vaman
Vampyrella
Vampyrellidae
Vampyrum

Van
Van Allen belt
Van Allen radiation belt
Van Buren
Van Devanter
Van Diemen Gulf
Van Diemen's Land
Van Dyck
Van Gogh
Van
de Graaff generator
Van der Waal's forces
VanAtta
VanHook
Vanaheim
Vanalstyne
Vanbrugh
Vance
Vanceboro
Vanceburg
Vancourt
Vancouver
Vancouveria
Vanda
Vandal
Vandalia
Vandalic
Vandemere
Vandemonian
Vandemonianism
Vanden
Vandenberg
Vander
Vanderbilt
Vandergrift
Vanderhoek
Vanderpoel
Vanderpool
Vandervelde
Vandervoort
Vandiemenian
Vandiver
Vanduser
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Churchill
Winston-Salem
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Winter Haven
Winter Olympic Games
Winter Olympics
Winter Park
Winter Sea
Winter War
Winter banana
Winter nelis
Winter's bark
Winteraceae
Winteranaceae
Winterbottom
Winterport
Winterreise Die
Winters
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Wintersville
Winterthur
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Wisconsin
Wisconsin Rapids

Wisconsin cheese
Wisconsinite
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Wisdom of Jesus
Wisdom of Solomon
Wise
Wise Men of the East
Wiseman
Wishek
Wishoskan
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Wislany Zalew
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Wladyslaw Gomulka
Wobblies
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Wodenism
Woehick
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Wogulian
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Wojak
Wojciech Jaruselski
Wojciech Jaruzelski
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Wojtek Fibak
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Wolcottville
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Wolf Cub
Wolf-Rayet star
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Wolfeboro
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Wolffian body
Wolffianism
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Wolfgram
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Wolfram von Eschenbach
Wolfsburg
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Wolftown
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Wollongong
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Wolpert
Wolseley
Wolsey
Wolsky
Wolverhampton
Wolverine
Wolverine State
Wolverton
Womack
Womelsdorf
Women in Love
Women's Air Force
Women's Air Force Service Pilots
Women's Army Auxiliary Corps
Women's
Army Corps
Women's Auxiliary Air Force
Women's Institute

Women's Liberation
Women's Royal Air Force
Women's Royal Army Corps
Women's Royal Naval Corps
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Wooldridge
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Woolford
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Woop Woop
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Worcester china
Worcester sauce
Worcester ware
Worcestershire

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Wordsworth
Wordsworthian
Wordsworthianism
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Works Progress Administration
Works and Days
Worksop
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Worland
World Almanac
World Bank
World Bank Group
World Council of Churches
World Court
World Cup
World Day of Prayer
World Federalism
World Health Organization
World Reason
World Series
World War I
World War II
World calendar
World war
World's Series
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Worlock
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Woulfe bottle
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Wrangel
Wrangel Island
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Wrangell Mountains
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Wyoming Day
Wyoming Valley
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Wyon
Wyrd
Wysox

Wystand
Wytheville
Wytopitlock
X
X axis
X chromosome
X radiation
X ray
X's
X-chromosome
X-rated movie
X-ray
X-ray cancer
X-ray diffraction camera
X-ray diffraction tube
X-ray dosimetry
X-ray eye
X-ray machine
X-ray microscope
X-ray movie
X-ray photograph
X-ray photographer
X-ray photography
X-ray
 photometry
X-ray spectrograph
X-ray spectrometer
X-ray spectrometry
X-ray spectrum
X-ray technician
X-ray therapy
X-ray tube
X-ray-proof
X-shaped
X-type engine
X-wave
X25
XA
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XBT
XCF
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XDMCP
XDR
XFE
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XIM
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XPORT
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XSECT
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XWSDS
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Xantippe
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Xavier Mcdaniel
Xavier Suarez
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Xenarthra
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Xenoclea
Xenocratean
Xenocrates
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Xenomi
Xenomorpha
Xenopeltidae
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Xenorhynchus
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Xiphium iris
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Xiphodontidae
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Y axis
Y box
Y branch
Y bridge
Y chromosome
Y connection
Y cross
Y current
Y curve
Y joint
Y level
Y ligament
Y moth
Y point
Y potential
Y theodolite
Y track
Y tube
Y winding
Y's
Y-chromosome
Y-gun
Y-level

Y-potential
Y-shaped
YA
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YMCathA
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Yajnavalkya
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Yalonda
Yalta
Yalu
Yalu River

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Yang Shangkun
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Yangtze Kiang
Yangtze-Kiang
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Yankee Doodle
Yankee horse trader
Yankee-doodle
Yankee-doodledom
Yankee-doodleism
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Yankeetown
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Yasser Arafat
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Yasuhiro Nakasone
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Yefremov
Yegor Ligachev
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Yeh Chien-ying
Yehudi
Yehudit
Yeisk
Yekaterinburg
Yekaterinodar
Yekaterinoslav
Yelena

Yelich
Yelisavetgrad
Yelisavetpol
Yellow Hats
Yellow Pages
Yellow River
Yellow Sea
Yellow Springs
Yellowknife
Yellowstone
Yellowstone Falls
Yellowstone National Park
Yellville
Yelm
Yelmene
Yemane
Yemassee
Yemen
Yemen Arab
Republic
Yemeni
Yemenic
Yemenite
Yen
Yen Lo
Yenakiyero
Yenan
Yengee
Yengeese
Yenisei
Yenisei ostyak
Yeniseian
Yentai
Yeo
Yeoman of the Royal Guard
Yeorgi
Yerava
Yeraver
Yerba de para
Yerevan
Yerga
Yerington
Yerkes
Yerkovich
Yermo
Yerwa-Maiduguri
Yerxa
Yesenin

Yeshibah
Yeshiva
Yesil Irmak
Yesilk
Yesilkoy
Yesima
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Yevgeny Chazov
Yevtushenko
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Ygdrasil
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Yiddish
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Yiddishism
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Yigael Hurvitz
Yigal Allon
Yigdal
Yikirgaulit
Yila
Yildun
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Yin and Yang
Yin-Yang School
Yinchuan
Yingkow
Yirinec
Yitzhak Rabin
Yitzhak Shamir
Yizkor

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Yo-Yos
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Yoho
Yojuane
Yokkaichi
Yoko
Yokohama
Yokohama bean
Yokosuka
Yokoyama
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Yolanda
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Yom Kippur
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Yonah
Yonatan
Yoncalla
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Yorke
Yorke Peninsula
Yorker
Yorkish
Yorkist
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Yorks
Yorkshire
Yorkshire Dales
Yorkshire bond
Yorkshire pudding
Yorkshire terrier
Yorkshire tyke
Yorkshireism
Yorkshireman
Yorksppings
Yorkton
Yorktown
Yorkville
Yoruba
Yorubaland
Yoruban
Yorubas
Yosef Burg
Yosemite
Yosemite Falls
Yosemite National Park
Yoshi
Yoshihito
Yoshiko
Yoshio
Yoshkar-Ola
Yost
You Can't Go Home Again
You Can't Take It With You
Youlou
Youlton

Young
Young Ireland
Young Italy
Young Lonigan
Young Pretender
Young Turk
Young plan
Young's modulus
Younger
Younger Edda
Younglove
Youngman
Youngran
Youngstown
Youngsville
Youngtown
Youngwood
Yountville
Your Excellency
Your Highness
Your Ladyship
Your Lordship
Your Majesty
Yousaf Abu Hantash
Youskevitch
Yousuf
Yovonnda
Yponomeuta
Yponomeutid
Yponomeutidae
Ypres
Ypsilanti
Ypurinan
Yquem
Yreka
Ysabel
Ysaye
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Yseulta
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Yule log
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Yuri Andropov
Yuri Churbanov
Yuri Dubynin
Yuri Gagarin
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Z axis
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Z chromosome
Z rail
Z twist
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Zadokite
Zagazig
Zaghlul
Pasha
Zaglossus
Zagreb
Zagreus
Zagros Mountains
Zagut
Zahara
Zahavi
Zahedan
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Zailer
Zaire
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Zaki Hashem
Zakir Husain
Zaklohpakap
Zakynthos
Zalambdodonta
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Zanesville
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Zanthorrhiza
Zanthoxylaceae
Zanthoxylum
Zantiot
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Zaporogian
Zaporogue
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Zaragoza
Zarah
Zaramo
Zarathustra
Zarathustrian
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Zarema
Zaremski
Zarga
Zarger
Zaria

Zarla
Zarpanit
Zashin
Zaslow
Zasuwa
Zaurak
Zauschneria
Zavala
Zavalla
Zavijava
Zavras
Zawde
Zbigniew Brzezinski
Zbigniew Bujak
Zea
Zealand
Zealander
Zealot
Zearing
Zeb
Zeba
Zebada
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Zebe
Zebedee
Zeboim
Zebrina
Zebulen
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Zech
Zechariah
Zechstein
Zeculon
Zed
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Zeeba
Zeebrugge
Zeeland
Zeelander
Zeeman
Zeeman effect
Zeena
Zeffirelli
Zeguha
Zehe

Zeidae
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Zeiss
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Zeitgeist
Zeitler
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Zelig
Zelikow
Zeljko Franulovic
Zelkova
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Zellamae
Zelle
Zellerbach
Zellner
Zellwood
Zelma
Zelmira
Zelos
Zelten
Zeltinger
Zemstrom
Zen
Zen Buddhism
Zena
Zenaga
Zenaida
Zenaidinae
Zenaidura
Zenas
Zend
Zend-Avesta
Zend-avesta
Zend-avestaic
Zenda
Zendah

Zendic
Zenelophon
Zener diode
Zenger
Zenia
Zenic
Zenist
Zennas
Zennie
Zeno
Zeno
of Citium
Zeno of Elea
Zeno the Stoic
Zenobia
Zenon Kliszko
Zenonian
Zenonic
Zeoidei
Zeona
Zep
Zeph
Zephan
Zephaniah
Zephyr
Zephyranthes
Zephyrhills
Zephyrinus
Zephyrus
Zeppelin
Zeralda
Zerelda
Zerk
ZerlaZerlina
Zerline
Zerma
Zermatt
Zermelo's axiom
Zernike
Zero-zero
Zerol gear
Zerubbabel
Zervan
Zervanism
Zervanite
Zeta
Zetana
Zetes

Zethar
Zethus
Zetland
Zetta
Zeuctocoelomata
Zeuglodon
Zeuglodonta
Zeuglodontia
Zeuglodontidae
Zeugobranchia
Zeugobranchiata
Zeus
Zeuxian
Zeuxis
Zeuzera
Zeuzeridae
Zhang
Zhang Aiping
Zhang Chungqiao
Zhao Ziyang
Zhdanov
Zhitomir
Zhivkov
Zhmud
Zhukov
Zia
Zia ul Haq
Ziagos
Ziaur Rahman
Zicarelli
Zidkijah
Ziegfeld
Ziegler
Ziegler catalyst
Zieglerville
Zielsdorf
Zif
Zigeuner
Zigmund
Zigrang
Ziguard
Ziguinchor
Zilber
Zildjian
Zilla
Zillah
Zilpah
Zilvia

Zim
Zima
Zimbabwe
Zimbalist
Zimmer
Zimmerman
Zimmermann
Zimmerwaldian
Zimmerwaldist
Zina
Zinah
Zincalo
Zinck
Zinder
Zindman
Zinfandel
Zingale
Zingg
Zingiber
Zingiberaceae
Zinjanthropus
Zink
Zinn
Zinnes
Zinnia
Zino
Zinoviev
Zinovievsk
Zins
Zinsser
Zinzar
Zinzendorf
Zinziberaceae
Zion
Zion
National Park
Zionism
Zionist
Zionistic
Zionite
Zionless
Zionsville
Zionville
Zionward
Zip
Zipa
Zipah
Zipangu

Ziphiidae
Ziphiinae
Ziphius
Zipnick
Zippel
Zipper
Zippora
Zipporah
Zips
Zirak
Zirbanit
Zirconia
Zirian
Zirianian
Zirkle
Zischke
Ziska
Zita
Zitah
Zitella
Zitvaa
Ziusudra
Ziv
Ziwiye
Ziwot
Zizania
Zizia
Zizyphus
Zkinthos
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Zlatoust
Zmudz
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Znaniecki
Zoa
Zoan
Zoanthacea
Zoantharia
Zoanthidae
Zoanthidea
Zoanthus
Zoar
Zoara
Zoarah
Zoarces
Zoarite
Zoba
Zobe

Zobias
Zobkiw
Zoe
Zoeller
Zoellick
Zoes
Zoffany
Zogu I
Zoha
Zohak
Zohar
Zohara
Zoharist
Zoharite
Zoi
Zoie
Zoila
Zoilean
Zoilism
Zoilist
Zoilla
Zoilus
Zola
Zolaesque
Zolaism
Zolaist
Zolaistic
Zolaize
Zoldi
Zoller
Zollernia
Zollie
Zollner
Zollner illusion
Zollverein
Zolly
Zolnay
Zolner
Zoltai
Zoltan Gombos
Zomba
Zona
Zonaria
Zond
Zonda
Zondra
Zongora
Zonian

Zonites
Zonitidae
Zonitoides
Zonnya
Zonoplacentalia
Zonotrichia
Zonta
Zonta
Club
Zonta club
Zontian
Zonuridae
Zonurus
Zoochlorella
Zoomastigina
Zoomastigoda
Zoophaga
Zoophagineae
Zoophyta
Zootoca
Zophar
Zoque
Zoquean
Zora
Zorah
Zorana
Zoraptera
Zorillinae
Zorina
Zorine
Zorn
Zorn's lemma
Zoroaster
Zoroastrian
Zoroastrianism
Zoroastrism
Zorobabel
Zorotypus
Zortman
Zosema
Zoser
Zosi
Zosima
Zosimus
Zosma
Zostera
Zosteraceae
Zosteria

Zosteropinae
Zosterops
Zouave
Zouave jacket
Zoubek
Zoug
Zoysia
Zr
Zrich
Zrike
Zsa
Zsa Zsa
Zsa Zsa Gabor
Zsazsa
Zsigmondy
Zsolway
Ztopek
Zu'lkadah
Zu-zu
Zuben el genubi
Zubeneschamali
Zubird
Zubkoff
Zuccari
Zuccaro
Zucchero
Zucker
Zuckerman
Zug
Zui
Zuian
Zuider Zee
Zuidholland
Zulch
Zuleika
Zulema
Zulfikar Ali Bhutto
Zulhijjah
Zulinde
Zulkadah
Zullinger
Zullo
Zuloaga
Zulu
Zulu-kaffir
Zuludom
Zuluize
Zululand

Zulus
Zumbrota
Zumstein
Zumwalt
Zungaria
Zuni
Zunian
Zupus
Zurbar
Zurbaran
Zurek
Zurheide
Zurich
Zurkow
Zurn
Zurvan
Zusman
Zutugil
Zuyder Zee
Zuzana
Zviad Gamsakhurdia
Zwart
Zweig
Zwick
Zwickau
Zwicky
Zwieback
Zwiebel
Zwingle
Zwingli
Zwinglian
Zwinglianism
Zwinglianist
Zwolle
Zworykin
Zygadenus
Zygaena
Zygaenidae
Zygnema
Zygnemaceae
Zygnemales
Zygnemataceae
Zygnematales
Zygobranchia
Zygobranchiata
Zygocactus
Zygodactylae
Zygodactyli

Zygomycetes
Zygophyceae
Zygophyllaceae
Zygophyllum
Zygoptera
Zygopteraceae
Zygopterides
Zygopteris
Zygosaccharomyces
Zyrenian
Zyrian
Zyryan
Zysk
Zythia
Zyzomys
Zyzzogeton
Zz
a
 Chinaman's chance
a Roland for an Oliver
a bad penny
a barren waste
a bas
a base
a battery
a being
a belief
a beneplacito
a better place
a bill of goods
a billion
a bit
a bit different
a bit much
a bit previous
a bit thick
a bit thin
a blanc
a bon marche
a brain-spattering
a breath
a broken reed
a bum rap
a bundle of nerves
a capite ad calcem
a cappella
a capriccio
a car in every garage

a card up your sleeve
a certain
a certain number
a cheval
a chicken in every pot
a comedy to those who think
a continental
a contre cour
a corner on
a corps perdu
a corpse upon the road of night
a couple of
a couvert
a
 crore
a crown of glory
a curse
a cut above
a damn
a dark illimitable ocean
a darn
a datu
a deal
a debt we all must pay
a decent sort of fellow
a demain
a deux
a diet of cake
a dime a dozen
a discretion
a disgrace to your name
a divinity that shapes our ends
a dog's life
a dome of many-colored glass
a drawing toward
a drop in the bucket
a drop in the ocean
a due
a fabulous
a fair field and no favor
a far cry
a far cry from
a fat chance
a fat lot
a fatal complaint
a feather in your cap
a few
a few words of wisdom

a finder of occasions
a fire-red cherubim's face
a fond
a fool
a form of catharsis
a form of genius
a fortiori
a fortiori reasoning
a game of circles
a game two can play
a gentleman and a scholar
a ghost of a chance
a globe burnt out
a god in ruins
a gogo
a good hand at
a good ways off
a great deal
a greater number
a habit
a hall
a hand at
a hand for
a handicraft in flower
a handmaid to religion
a hard
a hieroglyphic
a high
a hit below the belt
a hive of glass
a hog for
a hoot
a
huis clos
a hundred to one
a jillion
a kind of praise
a knave
a l'allemande
a l'americaine
a l'anglaise
a l'aurore
a l'espagnole
a l'estragon
a l'etouffee
a l'improviste
a l'italienne
a la

a la Chateaubriand
a la Crecy
a la Croissy
a la Maintenon
a la Marengo
a la Maryland
a la Newburg
a la Perigord
a la Soubise
a la bearnaise
a la bonne femme
a la bordelaise
a la bourgeoise
a la carte
a la casserole
a la cocotte
a la coque
a la creole
a la dauphine
a la dauphinoise
a la derobee
a la diable
a la francaise
a la godiveau
a la grecque
a la jardiniere
a la julienne
a la king
a la lyonnaise
a la macedoine
a la maitre d'hotel
a la matelote
a la mire
a la mode
a la mode de Caen
a la mort
a la napolitaine
a la normande
a la parisienne
a la polonaise
a la printaniere
a la ravigote
a la reine
a la russe
a la serviette
a la sourdine
a la suisse
a la tartare

a la vinaigrette
a lac
a lakh
a lamp unto my feet
a leg up
a lick and a promise
a life of dignified otiosity
a lily-livered
a little
a little
at a time
a little learning
a little one-eyed
a little sleep
a little slumber
a little thing
a little too thick
a load off your mind
a long cry to
a long lesson in humility
a long pull
a long time ago
a long way off
a long while ago
a lot
a lot alike
a lot going for one
a lot on the ball
a lot to do with
a lot to say about
a man
a man among men
a mass of
a mensa et thoro
a mile long
a mile off
a million
a mind of your own
a minor form of despair
a mite different
a moment standing still for ever
a monster begot upon itself
a month of Sundays
a myriad
a necessary evil
a new lease on life
a nickname of Providence
a nipping and an eager air

a noble and expressive language
a nobody
a nonillion
a nose for news
a nothing
a novice at
a number
a number of times
a outrance
a pack of lies
a paltry thing
a party to
a pas de geant
a pat on the back
a per se
a person of low taste
a perte de vue
a piacere
a pick a back
a piece of cake
a piece of the action
a place in the sun
a placing over against
a
 plague upon
a play for time
a play of passion
a plomb
a poco
a poem without words
a poor
a posteriori
a posteriori reasoning
a pox upon
a prendre
a preparation
a pretty mocking of the life
a pretty penny
a priori
a priori knowledge
a priori principle
a priori reasoning
a priori truth
a propos
a punta d'arco
a pure and grandfather moss
a putting or inflicting upon
a putting or lying between

a quadrillion
a quarter after
a quarter of
a quarter past
a quarter to
a quo
a radical change
a rascal
a rascally yeaforsooth knave
a reasoning animal
a rebours
a reckoning of
a reculons
a rivederci
a robbery
a ruined world
a runout powder
a sadder and a wiser man
a sandpile we run our fingers in
a screw loose
a seat where gods might dwell
a set of lies agreed upon
a short life and a merry one
a short time ago
a single separate person
a slipper and subtle knave
a sort of second nature
a sound mind in a sound body
a stitch in time
a stranger to
a string to it
a stroke above
a strong brown god
a strong
pull
a sucker
a tale told by an idiot
a tale-bearing animal
a tall order
a tattered coat upon a stick
a temple sacred by birth
a tempo
a tergo
a theft
a thing for
a thing that shades
a thing to be desired
a thinking reed

a third something
a thousand
a thousand and one
a thousandfold
a thrusting away
a tinker's damn
a tool-making animal
a tool-using animal
a tooth for a tooth
a toute a l'heure
a toute outrance
a tragedy to those who feel
a transient madness
a turn to the right-about
a tyrant
a tyro at
a vast
a verray parfit gentil knight
a vinculo matrimonii
a vol
a votre sante
a way back
a whoreson
a wild of sand
a will of your own
a wise passiveness
a world of
a world-without-end bargain
a year and a day
a young person
a zillion
a-
a-be
a-bomb
a-borning
a-c
a-clock
a-coast
a-cock-bill
a-cock-horse
a-compass
a-cry
a-dance
a-dangle
a-dead
a-deep
a-doors
a-flicker

a-game
a-glimmer
a-glucosidase
a-good
a-gore-blood
a-height
a-hey
a-high
a-high-lone
a-hold
a-horizon
a-horseback
a-hunt
a-morrow
a-pieces
a-pinch
a-plenty
a-poop
a-quarter
a-quiver
a-rake
a-riot
a-ripple
a-roar
a-room
a-root
a-row
a-sale
a-sea
a-seethe
a-seity
a-shake
a-shine
a-shipboard
a-shiver
a-simmer
a-slug
a-smear
a-smoulder
a-snort
a-soak
a-south
a-sparkle
a-spout
a-sprawl
a-spread
a-sprout
a-squat

a-squirm
a-starboard
a-stare
a-start
a-stay
a-stays
a-straddle
a-strain
a-strand
a-strut
a-sudden
a-swarm
a-swash
a-sway
a-sweat
a-swim
a-swing
a-swoon
a-temporal
a-thrill
a-throb
a-throng
a-tiptoe
a-tolyl
a-tremble
a-trip
a-try
a-tumble
a-twain
a-twist
a-twitter
a-two
a-v
a-weather
a-week
a-west
a-wheels
a-whet
a-whiles
a-whir
a-whirl
a-wing
a-wink
a-wobble
a-work
a-wrack
a-wreak
a-year

a-yelp
a/cs
 pay
a/cs rec
ab aeterno
ab extra
ab initio
ab intra
ab origine
ab ovo
ab ovo usque ad mala
ab urbe condita
ab-
abacus major
abacus pythagoricus
abalone shell
abandon hope
abandon the world
abandoned person
abandoned thing
abase bemean
abase yourself
abatement of differences
abb wool
abbey counter
abbey laird
abbey
 lands
abbey lubber
abbot cloth
abbreviated number
abc soil
abdominal epilepsy
abdominal hernia
abdomino-uterotomy
abducens nerve
abducent nerve
abelian group
aberdeen angus
aberrant duct
aberration constant
abide by
abide in
abide with
abide your time
abiding place
abietic acid
abject apology

abject defeat
abject fear
ablative absolute
ablative operation
able rating
able seaman
able to adapt
able to bend without breaking
able to pay
able to roll with the punches
able to walk the chalk
able to walk the chalk line
able to walk the chalk mark
able-bodied
able-bodied seaman
able-bodiedness
able-minded
able-mindedness
ablution room
abnormal psychology
abo group
abo system
aboard the bandwagon
abode of the blessed
abode of the damned
abode of the dead
aboli fruit
abominable snowman
abortive attempt
abound with
abounding in riches
about face
about it and about
about ship
about the bush
about this size
about to
about to be
about to happen
about to piss your pants
about turn
about-face
about-faced
about-facing
about-ship
about-shipped
about-shipping
about-sledge

about-turn
above
all
above all that
above and beyond
above board
above par
above stairs
above suspicion
above the line
above the pitch
above water
above your head
above-board
above-cited
above-found
above-given
above-mentioned
above-named
above-quoted
above-reported
above-said
above-water
above-written
abraham-man
abraum salts
abraxas stone
abreast of
abreast of the times
abruptly acuminate
abruptly pinnate
abs-
abscisic acid
absciss layer
abscission layer
abscission zone
absence flag
absence of assignable cause
absence of authority
absence of charge
absence of color
absence of mind
absence of motion
absence state
absence without leave
absent flag
absent treatment
absent voter

absent without leave
absent yourself
absent yourself from
absent-minded
absent-mindedly
absent-mindedness
absente reo
absentee ballot
absentee landlord
absentee vote
absentee voter
absentee voting
absinthe green
absinthe oil
absit omen
absolute
 alcohol
absolute altimeter
absolute altitude
absolute angstrom
absolute ceiling
absolute certainty
absolute complement
absolute contradiction
absolute convergence
absolute credibility
absolute ego
absolute fact
absolute free will
absolute humidity
absolute idea
absolute idealism
absolute idealist
absolute impediment
absolute index of refraction
absolute indication
absolute interest
absolute likeness
absolute magnitude
absolute majority
absolute master
absolute maximum
absolute minimum
absolute monarch
absolute monarchy
absolute music
absolute permeability
absolute permittivity

absolute pitch
absolute power
absolute realism
absolute ruler
absolute scale
absolute space
absolute spirit
absolute temperature
absolute unit
absolute value
absolute veto
absolute viscosity
absolute zero
absolutely no
absolutely right
absorb the attention
absorb the shock
absorb the thought
absorb the thoughts
absorbed attention
absorbed by
absorbed in
absorbed in thought
absorbed interest
absorbed with
absorbent
cotton
absorber oil
absorbing well
absorption and regurgitation
absorption band
absorption bands
absorption circuit
absorption coefficient
absorption current
absorption discontinuity
absorption dynamometer
absorption edge
absorption factor
absorption limit
absorption lines
absorption pipette
absorption screen
absorption spectrum
absorption system
abstain from
abstinence from food
abstinence theory

abstract algebra
abstract art
abstract classicism
abstract classicist
abstract expressionism
abstract expressionist
abstract group
abstract idea
abstract mathematics
abstract mechanics
abstract noun
abstract of title
abstract space
abstract thought
abstract yourself
absurd idea
abundance declaree
abundant number
abundant year
aburachan seed
abuse a privilege
abuse of office
abuse of terms
abuse your rights
abuse yourself
abut on
abut upon
abutment arch
abutment pier
abutting joint
abyssal rock
abyssal zone
abyssinian cat
ac-
ac-globulin
acacia veld
academic choctaw
academic costume
academic
dean
academic degree
academic degrees
academic discipline
academic disputation
academic dress
academic freedom
academic gown
academic hood

academic institution
academic psychology
academic rank
academic robe
academic specialty
academic year
academy blue
academy board
academy figure
academy of music
acajou balsam
acanth-
acantho-
acanthosis nigricans
acanthus family
acanthus leaf
acaroid gum
acaroid resin
acaroid resins
accede to
accede to prejudice
accede to the throne
acceleration coefficient
acceleration due to gravity
acceleration note
acceleration of free fall
acceleration of gravity
acceleration principle
accelerator globulin
accelerator nerve
accent mark
accentual meter
accept Christ
accept a challenge
accept advice
accept for gospel
accept implicitly
accept obligation
accept responsiblity
accept the responsibility
accept unquestioningly
accept your fate
accept your lot
acceptable person
acceptance bill
acceptance house
acceptance race
acceptance sampling

acceptance speech
acceptance
 supra protest
accepted conduct
accepted fact
accepted masons
accepted meaning
acceptor atom
acceptor impurity
acceptor supra protest
access road
access time
accession book
accession number
accession service
accession to power
accessory adjunct
accessory after the fact
accessory before the fact
accessory chromosome
accessory fruit
accessory nerve
accident boat
accident insurance
accident neurosis
accident prone
accident tout
accident-prone
accidental discovery
acclamation medal
acclimation fever
accommodate distribution
accommodate to
accommodate with
accommodate yourself to
accommodated to
accommodation acceptance
accommodation address
accommodation bill
accommodation draft
accommodation group
accommodation ladder
accommodation line
accommodation paper
accommodation train
accommodation works
accompaniment figure
accompanying fire

accomplice in crime
accomplished fact
accord a blank check
accord respect to
accord to
according as
according to
according to Hoyle
according to
circumstances
according to custom
according to expectation
according to law
according to regulations
according to reports
according to rule
according to rumor
according to the agreement
according to the bargain
according to the contract
according to the dictates of Mrs
according to the evidence
according to the letter
according to this reading
according to use
according to your lights
accordion pleat
accordion pleats
account as
account book
account current
account day
account days
account duty
account entry
account executive
account for
account of
account payable
account receivable
account render
account rendered
account sales
account stated
account with
accountant general
accounted as
accounting for

accounting period
accounts current
accounts payable
accounts payable ledger
accounts receivable
accounts receivable ledger
accredit with
accrete to
accretion borer
accretion cutting
accroach to yourself
accroides gum
accrual basis
accrue from
accrue to
accrued dividend
accrued dividends
accrued
 interest
accrued liability
accumulated dividends
accumulation factor
accumulation point
accusative-dative
accuse of
accuse yourself
accustom yourself to
ace in the hole
ace point
ace-high
acet-
acetal phosphatide
acetate green
acetate nitrate
acetate rayon
acetic acid
acetic acid amide
acetic anhydride
aceto-
acetoacetic acid
acetone alcohol
acetone body
acetone chloroform
acetone oil
acetous fermentation
acetyl benzoyl peroxide
acetyl bromide
acetyl carbinol

acetyl chloride
acetyl group
acetyl index
acetyl number
acetyl oxide
acetyl radical
acetyl value
acetylene acid
acetylene alcohol
acetylene black
acetylene burner
acetylene dichloride
acetylene dinitrile
acetylene gas
acetylene generator
acetylene linkage
acetylene series
acetylene tetrabromide
acetylene tetrachloride
acetylene torch
acetylene urea
acetylene welder
acetylene welding
acetylformic acid
acetylsalicylic acid
acey-deucy
ach-y-fi
ache for
ache to
achemon sphinx
aches and pains
achieve inner harmony
achieve orgasm
achieve
 satisfaction
achieve success
achieve your purpose
achievement age
achievement quotient
achievement test
achilles tendon
achilles' heel
aching for
aching heart
aching to
aching void
achingly sweet
achromat-

achromatic color
achromatic colour
achromatic lens
achromatic prism
achromatic vision
achroo-
achylia gastrica
acid albumin
acid albuminate
acid alizarin black
acid alizarin red
acid amide
acid anhydride
acid anthracene brown
acid azide
acid bath
acid bessemer process
acid black
acid blast
acid blower
acid boiler
acid bronze
acid brown
acid burner
acid casein
acid cell
acid color
acid concentrator
acid dipper
acid drop
acid dye
acid dyspepsia
acid egg
acid ester
acid freak
acid fuchsine
acid gloss
acid green
acid halide
acid honey
acid hydrolysis
acid kiln
acid metaprotein
acid nitrile
acid number
acid oil
acid phosphate
acid ponceau

acid precipitation
acid process
acid purifier
acid radical
acid reaction
acid reserve
acid resist
acid rock
acid salt
acid sludge
acid sodium
carbonate
acid soil
acid steel
acid test
acid test ratio
acid tide
acid value
acid violet
acid wood
acid worker
acid works
acid yellow
acid-ash diet
acid-base metabolism
acid-binding
acid-fast
acid-fastness
acid-forming
acid-head
acid-mordant dye
acid-treat
acidity coefficient
acidophilus milk
ack emma
ack-ack
ack-pirate
acknowledge defeat
acknowledge receipt of
aclinic line
acme harrow
acme of perfection
acme screw thread
acme thread
acne vulgaris
aconite violet
acorn barnacle
acorn chair

acorn clock
acorn cup
acorn duck
acorn moth
acorn shell
acorn spoon
acorn squash
acorn sugar
acorn tube
acorn valve
acorn weevil
acorn worm
acorn-shell
acouchi resin
acoustic feature
acoustic gramophone
acoustic impedance
acoustic inertance
acoustic mass
acoustic meatus
acoustic mine
acoustic nerve
acoustic ohm
acoustic phonetics
acoustic reactance
acoustic resistance
acoustic tile
acoustic wave
acoustical cloud
acoustical engineer
acoustical network
acoustical phenomenon
acoustico-
acquaint yourself
with
acquainted with
acquiesce in
acquire information about
acquire intelligence about
acquired character
acquired characteristic
acquired epilepsy
acquired immunity
acquired syphilis
acquired taste
acquired tolerance
acquisition of knowledge
acquit yourself

acquit yourself of
acquittance roll
acr-
acre-dale
acre-foot
acre-inch
acridine dye
acridine dyes
acridine yellow
acriflavine hydrochloride
acro-
acrobatic evolutions
acrobatic maneuvers
across the board
across the grain
across the sea
across-the-board
acrylate resin
acrylic acid
acrylic acid series
acrylic aldehyde
acrylic ester
acrylic fiber
acrylic fibre
acrylic paint
acrylic painting
acrylic resin
acrylyl group
acrylyl radical
act a part
act a role
act all over the stage
act as
act as a cathartic
act as feeder
act as foil
act beneath yourself
act between
act call
act curtain
act drop
act for
act holier than thou
act in concert
act in opposition to
act in the interests of
act in the place of
act like

act like a tonic
act like a
 trouper
act of God
act of accomplishing
act of contrition
act of courtesy
act of faith
act of folly
act of god
act of grace
act of kindness
act of love
act of lowering
act of politeness
act of rising
act of thought
act of war
act on
act on behalf of
act on the spur of the moment
act on your own responsibility
act opposite
act out
act psychology
act the fool
act the grand seigneur
act the hypocrite
act the part of
act the traitor
act together
act toward
act tune
act up
act up to
act upon
act warning
act well
act with
act with regard to
act your age
act your part
act-wait
actin-
acting area
acting company
acting corporal
acting device

acting school
acting sergeant
acting-out
actinic light
actinic radiation
actinic ray
actinide series
actinium emanation
actinium series
actino-
actinouranium series
action and reaction
action busher
action consciousness
action current
action extension
action filer
action finisher
action forger
action freer
action jointer
action machiner
action noun
action
 painter
action painting
action potential
action rail
action regulator
action replay
action sermon
action stations
action theory
action time
action viewer
action-taking
action-taking knave
activated alumina
activated carbon
activated charcoal
activated epilepsy
activated sludge
activated-sludge process
activation energy
active algolagnia
active carbon
active communications satellite
active current

active duty
active fancy
active immunity
active layer
active list
active market
active operations
active principle
active reason
active securities
active service
active stock
active treatment
active use
active voice
active-bodied
active-limbed
active-minded
activist art
activity coefficient
activity stream
activity theory
actor's agent
actor's lines
actor-manager
actor-proof
actual cautery
actual cost
actual energy
actual fact
actual grace
actual presence
actual price
actual sin
actual thing
actuality theory
actuarial calculation
actuarial prediction
actuarial table
acute accent
acute alcoholism
acute
 angle
acute anterior poliomyelitis
acute arch
acute arthritis
acute articular rheumatism
acute bisectrix

acute bronchitis
acute condition
acute conjunctivitis
acute disease
acute inflammation
acute leukemia
acute pain
acute sense of hearing
acute sight
acute-angled
acute-angled triangle
acuti-
acuto-
acuyari palm
acuyari wood
acyclic co-ordinates
acyclic terpene
acyl group
acyl radical
ad Kalendas Graecas
ad arbitrium
ad astra per aspera
ad captandum vulgus
ad esse
ad eundem
ad extremum
ad fin
ad gloriam
ad hoc
ad hoc committee
ad hoc measure
ad hominem
ad hominem attack
ad in
ad inf
ad infinitum
ad init
ad initium
ad int
ad interim
ad lib
ad libitum
ad limina
ad litem
ad litteram
ad loc
ad majorem Dei gloriam
ad nauseam

ad out
ad patres
ad quem
ad rem
ad utrumque paratus
ad val
ad valorem
ad valorem duty
ad valorem tax
ad verbum
ad vitam
ad vivum
ad-
ad-lib
ad-libbed
ad-libber
ad-libbing
adam's apple
adam's needle
adam-and-eve
adapt to
adapted to
adaptive radiation
adar sheni
add
 a codicil
add fuel to the fire
add fuel to the flame
add gas
add insult to injury
add to
add up
add up to
add-add
added sixth
added sixth chord
added to
addendum circle
adder bead
adder fly
adder gem
adder pike
adder stone
adder's fern
adder's violet
adder's-grass
adder's-meat
adder's-mouth

adder's-mouths
adder's-tongue
adders-tongue
addict yourself to
addicted to
addicted to drink
addictive drug
adding machine
addison's disease
addition algebra
addition axiom
addition compound
addition logarithm
addition polymer
addition polymerization
addition product
addition table
addition theorem
additive color
additive group
additive inverse
additive primary
additive process
addle egg
addle the wits
address a warning to
address book
address the four walls
address to
address yourself to
addressing machine
adduce evidence
adductor canal
adductor impressions
aden-
adeno-
adenohypophyseal luteotropin
adenosine diphosphate
adenosine phosphate
adenosine triphosphatase
adenosine triphosphate
adenosinediphosphoric
acid
adenosinetriphosphoric acid
adenylic acid
adenylpyrophosphoric acid
adept in
adequate supply

ader wax
adhere to
adhere to your principles
adherence to the old and tried
adherent noun
adhesive cell
adhesive compress
adhesive factor
adhesive inflammation
adhesive plaster
adhesive tape
adiabatic absorption
adiabatic chart
adiabatic demagnetization
adiabatic diagram
adiabatic expansion
adipic acid
adipose fin
adipose tissue
adjacent angles
adjectival phrase
adjective equivalent
adjective pronoun
adjoint curve
adjoint differential equation
adjunct Logic
adjust to
adjust yourself to
adjustable propeller
adjustable spanner
adjustable wrench
adjustable-pitch
adjusted to
adjustive reaction
adjustment bond
adjustment mortgage
adjutant bird
adjutant crane
adjutant general
adjutant general corps
adjutant stork
adjutant-general
adjutants general
adjuvant treatment
administer Communion
administer a sacrament
administer absolution
administer an oath

administer extreme unction
administer
justice
administer rites
administer the Eucharist
administer to
administration of justice
administration, the
administrative county
administrative engineer
administrator ad litem
admiral of the fleet
admiral shell
admiralty alloy
admiralty bond
admiralty brass
admiralty bronze
admiralty cloth
admiralty law
admiralty metal
admiralty mile
admiration mark
admission fee
admission of light
admit everything
admit exceptions
admit of
admit of comparison
admit of no doubt
admit of no option
admitted fact
admitting no denial
admitting no dispute
admitting no doubt
admitting no exception
admitting no question
admitting that
adobe bug
adobe flat
adobe house
adobe lily
adobe tick
adolescent beard
adolescent stream
adopt a belief
adopt the cause of
adorer le veau d'or
adp-

adq-
adren-
adrenal gland
adrenal insufficiency
adrenocorticotrophic hormone
adrenocorticotropic hormone
adsorption compound
adsorption isotherm
adsuki bean
adult education
adulterous affair
advance against
advance agent
advance
base
advance fee
advance guard
advance man
advance note
advance notice
advance party
advance payment
advance poll
advance sheets
advance signal
advance to the rear
advance tracks
advance upon
advanced age
advanced degree
advanced gas-cooled reactor
advanced guard
advanced in life
advanced in years
advanced standing
advanced trainer
advanced work
advanced years
advancing color
advantage ground
advantageous purchase
advection fog
advent sunday
adventure playground
adventure story
adverb equivalent
adverbial noun
adverbial phrase

adversative asyndeton
adversative conjunction
adverse circumstances
adverse criticism
adverse party
adverse possession
adverse to
advert to
advertise of
advertise yourself
advertisement canvasser
advertisement contractor
advertising account
advertising agency
advertising man
advertising matter
advertising writer
advice boat
advise collogue
advise with
advise with your pillow
advisory body
advisory council
advisory opinion
advocacy journalism
advocatus diaboli
advocatus
 ecclesiae
adz block
adz eye
adzuki bean
ae-
aeolian harp
aeolian lyre
aeolo-
aeons ago
aequo animo
aer-
aerating root
aere perennius
aeri-
aerial bomb
aerial combat
aerial heights
aerial infection
aerial ladder
aerial mine
aerial mosaic

aerial navigation
aerial perspective
aerial photograph
aerial photographer
aerial photography
aerial pingpong
aerial railway
aerial reconnaissance camera
aerial survey
aerial tactics
aerial torpedo
aerial tramway
aerial warfare
aero arrow
aero engine
aero-
aero-otitis
aero-otitis media
aerobic bacteria
aerobic organism
aerodynamic center
aerodynamic pitch
aerodynamic trajectory
aerodynamic volume
aerodynamic wave drag
aerogenic tuberculosis
aerological instrument
aeronautical chart
aeronautical engineer
aeronautical engineering
aeronautical meteorology
aeronautical relay
aerootitis media
aeroplane cloth
aeroplane spin
aerosol bomb
aerosol therapy
aerospace engineer
aerospace engineering
aerospace medicine
aerospace research
aerospace science
aerospace
technology
aerostatic lift
aerothermodynamic duct
aerotitis media
aesthesio-

aesthetic distance
aesthetic form
aesthetic judgment
aesthetic proportions
aesthetic taste
aesthetically appealing
aestho-physiology
aetatis suae
aethiops mineral
af-
afar off
afebrile delirium
aff loof
affair of honor
affair of the heart
affaire d'amour
affaire d'honneur
affaire de coeur
affaires d'amour
affaires d'honneur
affaires de coeur
affect emotionally
affect epilepsy
affect memory
affect the guise of
affect the interest
affect the manner of
affect your mind
affectedly nice
affectionate name
affective faculty
affective meaning
afferent neuron
affiliate to
affiliate with
affiliated stations
affiliation order
affiliation proceedings
affine connection
affine geometry
affine group
affine transformation
affinity constant
affirmative action
affirmative attitude
affirmative expression
affirmative flag
affirmative voice

affirmative vote
affirmative-action
affirming gun
afford hope
afford proof of
afford
 support
afford to pay
afford you pleasure
affording no hope
afghan hound
afghan stitch
afghani rupee
afoot and lighthearted
afore-acted
afore-cited
afore-coming
afore-decried
afore-given
afore-going
afore-granted
afore-heard
afore-known
afore-mentioned
afore-planned
afore-quoted
afore-running
afore-seeing
afore-seen
afore-spoken
afore-stated
afore-told
afoul of
afr-
afraid of your shadow
african violet
afro-american
afro-asiatic languages
aft the fantail
after a fashion
after a time
after a while
after all
after all is said and done
after bridge
after death
after deck
after mast

after shroud
after that
after the Fall
after the fact
after the flood
after the manner of men
after the war
after this
after this fashion
after time
after which
after your fancy
after your heart
after your own heart
after-
after-acquired
after-born
after-course
after-described
after-designed
after-dinner
after-dinner speaker
after-dinner speech
after-game
after-grass
after-guard
after-hours joint
after-image
after-life
after-mentioned
after-named
after-pain
after-shave
lotion
after-specified
after-stampable
after-supper
after-theater
after-theatre
after-wit
after-written
afterbirth weed
afternoon lady
afternoon tea
afternoon watch
aftershave lotion
ag lug
ag-

again and again
again and yet again
again-
against all expectation
against order and discipline
against the
against the clock
against the grain
against the law
against the new and untried
against the sun
against the tide
against the time when
against the wind
against time
against your grain
against your will
agal-agal
agar-agar
agaric acid
agaric mineral
agaricic acid
agate glass
agate gray
agate jasper
agate line
agate opal
agate shell
agate snail
agatho-
agave cactus
age class
age coating
age distribution
age grade
age group
age hardening
age limit
age norm
age of Aquarius
age of consent
age of discretion
age of growing pains
age of ignorance
age of matured powers
age of responsibility
age of retirement
age score

age society
age-adorning
age-bent
age-coeval
age-cracked
age-despoiled
age-dispelling
age-encrusted
age-enfeebled
age-group
age-harden
age-honored
age-lasting
age-long
age-old
age-peeled
age-struck
age-weary
age-weathered
age-worn
agee-jawed
agency
 shop
agent de bourse
agent intellect
agent noun
agent of production
agent officer
agent provocateur
agent-general
agents provocateurs
ageratum blue
ages ago
agger nasi
aggravated assault
aggravated larceny
aggregate fruit
aggregate polarization
aggregate to
aggregato-
aggressive mimicry
aggressive self-confidence
aggressively self-confident
aggressor nation
agile wit
agin the government
agitator feed
agnus castus

agnus dei
agogic accent
agonic line
agonize over
agonizing pain
agony column
agony of mind
agony of spirit
agony of suspense
agrarian economics
agrarian economy
agree for the sake of argument
agree in opinion
agree in principle
agree on
agree on a verdict
agree on terms
agree provisionally
agree to
agree to anything
agree to differ
agree to disagree
agree
 upon
agree with
agreeable rattle
agreeable to
agreeable-sounding
agreeably to
agreed case
agreed on all hands
agreement in principle
agreement of all
agreement to disagree
agricultural agent
agricultural ant
agricultural chemical
agricultural deities
agricultural engineer
agricultural geology
agricultural region
agriculture divinity
agrimony bark
agrimony water hemp
agro-
ague bark
ague cake
ague drop

ague grass
ague tree
ague-faced
ague-plagued
ague-rid
ague-sore
ague-struck
aguja volador
ahead both motors
ahead full
ahead of
ahead of its time
ahead of the game
ahead of time
ahead one-third
ahead standard
ahead two-thirds
ahoy there
aid and abet
aid and comfort
aid for the blind
aid grant
aid prayer
aid station
aid to dependent children
aid to navigation
aid to the blind
aid-de-camp
aide-de-camp
aide-de-campship
aide-memoire
aide-mmoire
aides-de-camp
aids-de-camp
aigre-doux
aigue-marine
ailanthus family
ailanthus moth
ailanthus silkworm
aileron angle
aileron roll
aim a blow
at
aim at
aim at a pigeon and kill a crow
aim high
aim to
aimed at

aiming point
ain't it the truth
air a grievance
air age
air alert
air ambulance
air arm
air armada
air attack
air bag
air base
air bath
air bed
air bell
air belt
air bends
air billow
air bladder
air blast
air blow
air blue
air box
air brake
air breather
air brick
air bridge
air brush
air bubble
air bump
air bus
air cadet
air car
air cargo
air carrier
air casing
air castle
air cataract
air cavalry
air cell
air chamber
air chest
air chief marshal
air chuck
air circuit breaker
air cleaner
air coach
air cock
air combat

air command
air commodore
air compressor
air condenser
air conditioner
air conditioning
air conduction
air consignment note
air control
air controlman
air controls
air cooler
air cooling
air corps
air corridor
air course
air cover
air crash
air crew
air crossing
air cruiser
air current
air curtain
air cushion
air cushion car
air cylinder
air discharge
air division
air drain
air drainage
air drill
air duct
air
ejector
air embolism
air engine
air express
air filter
air fleet
air float
air flow
air force
air freight
air furnace
air gap
air gas
air gauge
air glow

air gun
air hammer
air harbor
air hoist
air hole
air horn
air hostess
air hunger
air injection
air injector
air intake
air jack
air jacket
air lance
air lane
air law
air layering
air leak
air legs
air letter
air level
air lift
air line
air liner
air lock
air log
air machine
air mail
air maneuver
air map
air marshal
air mass
air mattress
air medal
air medicine
air meter
air mile
air motor
air navigation
air observer
air out
air oven
air passage
air philately
air photograph
air photography
air pillow
air pilot

air piracy
air pirate
air pistol
air plant
air plot
air plug
air pocket
air police
air pollution
air pore
air post
air potato
air power
air pressure
air propeller
air pump
air race
air raid
air raid warden
air raider
air ram
air remover
air rifle
air right
air route
air sac
air scoop
air scout
air scuttle
air separation
air service
air
 serviceman
air shaft
air shovel
air show
air shuttle
air sleeve
air sock
air space
air spade
air speed
air spray
air sprayer
air spring
air stack
air station
air stone

air stove
air strainer
air stream
air strike
air support
air survey
air switch
air system
air taxi
air tee
air terminal
air thermometer
air thread
air traffic
air train
air transport
air trap
air travel
air trumpet
air trunk
air tube
air turbine
air twist
air umbrella
air university
air valve
air varie
air vent
air vesicle
air vice-marshal
air volcano
air volume
air war
air warden
air warfare
air washer
air waybill
air well
air wood
air zone
air-balloon
air-bind
air-blasted
air-blown
air-born
air-borne
air-bound
air-braked

air-braving
air-break switch
air-breathe
air-breathed
air-breather
air-breathing
air-bred
air-built
air-chambered
air-cheeked
air-clear
air-clutch reverse
air-condition
air-conditioned
air-conditioning
air-conscious
air-conveying
air-cool
air-cooled
air-core
air-core coil
air-cure
air-cured
air-cushion
 vehicle
air-defiling
air-drawn
air-dried
air-driven
air-dry
air-drying
air-earth current
air-embraced
air-express
air-faring
air-filled
air-floated
air-formed
air-hardened steel
air-hardening
air-hardening steel
air-heating
air-insulated
air-intake
air-lance
air-lanced
air-lancing
air-line

air-logged
air-mail
air-mass shower
air-minded
air-mindedness
air-pervious
air-raid
air-raid alarm
air-raid shelter
air-raid warden
air-sea rescue
air-sea rescue amphibian
air-sea rescue plane
air-season
air-seasoned
air-shy
air-slake
air-slaked
air-slaking
air-speed head
air-speed indicator
air-spray
air-sprayed
air-spun
air-stirring
air-swallowing
air-threatening
air-to-air
air-to-ground
air-to-surface
air-traffic control
air-traffic controller
air-trampling
air-twisted
air-vessel
air-wall ionization chamber
air-wise
air-wiseness
airborne controls
airborne infection
airborne intercept radar
airborne operations
airborne particles
airborne radar
airborne radioactivity
airborne rocket
airborne

tactics
aircraft carrier
aircraft cloth
aircraft division
aircraft engine
aircraft engines
aircraft fabric
aircraft hydraulics
aircraft mechanic
aircraft observer
aircraft section
aircraft station
aircraft tender
airle-penny
airline hostess
airline stewardess
airline travel
airman basic
airman third class
airplane carrier
airplane cloth
airplane flare
airplane heading
airplane hijacker
airplane hijacking
airplane parts
airplane spin
airplane spotter
airport beacon
airport surveillance radar
airs and graces
airs of
airship parts
airship shed
airship station
airspeed indicator
airtight secrecy
airway beacon
airy hope
airy nothing
airy sign
airy texture
airy-fairy
aisle seat
aitch-bone
ajax the less
ajowan oil
akamushi mite

akinetic epilepsy
al Marsala
al burro
al dente
al fine
al fresco
al limone
al piacere
al segno
al-
al-Fustat
al-Lat
al-Mamoun
al-Sahih
al-Uzza
alamo vine
alang grass
alang-alang
alant camphor
alant starch
alar cartilages
alar ligaments
alar septum
alar thoracic artery
alarm
 bell
alarm bird
alarm clock
alarm fire
alarm gauge
alarm post
alarm reaction
alarm signal
alarm valve
alarm watch
alarums and excursions
alaska time
alaskan malamute
albatross around your neck
albatross cloth
albedo unguis
albert-type
albite law
album board
album paper
albumen plate
albumin color
albumin tannate

albumino-
albuminoid ammonia
alchim-
alchym-
alco-ometer
alco-ometric
alco-ometrical
alco-ometry
alcohol acid
alcohol engine
alcohol stove
alcohol tax
alcohol torch
alcoholic addict
alcoholic addiction
alcoholic beverage
alcoholic drink
alcoholic meningitis
alcoholic psychosis
alcool blanc
alcresta ipecac
aldehyde ammonia
aldehyde collidine
aldehyde group
aldehyde resin
alder blight
alder buckthorn
alder dogwood
alder fly
alder flycatcher
alder-
alder-leaved
alderman lizard
aldol condensation
ale brewer
ale brewing
ale drinker
ale drinking
ale feast
ale gallon
ale garland
ale glass
ale pitcher
ale seller
ale selling
ale stain
ale tun
ale vinegar

ale-blown
ale-born
ale-fed
ale-swilling
ale-washed
ale-wife
aleatory
 music
aleichem shalom
alekey trout
aleph-null
aleph-zero
alert for
aleurone grains
aleurone layer
alexander's foot
alfalfa butterfly
alfalfa caterpillar
alfalfa hopper
alfalfa looper
alfalfa meal
alfalfa valve
alfalfa weevil
alfresco meal
alg-
algae layer
algae zone
algal disease
algal fungus
algal-algal
algarroba bean
algebra of classes
algebra of relations
algebra of sets
algebraic conjugate
algebraic equation
algebraic extension
algebraic geometry
algebraic number
algebraic topology
algebraically closed field
algid cholera
algid fever
algin fiber
alginic acid
algo-
algorithmic language
ali-

alias dictus
alias writ
alibi out of
alien corporation
alien enemy
alien priory
alien property custodian
alien water
alienable right
alienate yourself
alienation of affections
alienation office
alieni generis
alieni juris
alight on
alight upon
alighting gear
align with
align your march
align yourself
align yourself with
aligning punch
alignment chart
alike
 as two peas in a pod
alimentary canal
aliquot part
aliquot tone
alis volat propriis
alive and kicking
alive to
alive with
alizarin black s
alizarin blue black s
alizarin blue s
alizarin brown
alizarin crimson
alizarin cyanine
alizarin cyanine green
alizarin dye
alizarin red
alizarin saphirol
alizarin yellow
alk gum
alk gum tree
alkali albumin
alkali blue
alkali cellulose

alkali chlorosis
alkali disease
alkali flat
alkali grass
alkali heath
alkali metal
alkali metals
alkali metaprotein
alkali mustard
alkali reserve
alkali rock
alkali soil
alkali waste
alkali weed
alkali yellow r
alkaline cell
alkaline earth
alkaline earth metal
alkaline earths
alkaline metal
alkaline reaction
alkaline tide
alkaline water
alkaline-ash diet
alkaline-earth metal
alkaline-earth metals
alkane series
alkene series
alkyd paint
alkyd resin
alkyl cyanide
alkyl group
alkyl halide
alkyl hydrosulphide
alkyl radical
alkyne series
all aboard
all about
all abroad
all agog
all agreeing
all alone
all along
all along
the line
all and some
all and sundry
all animate nature

all aquiver
all around
all at once
all ataunto
all atingle
all atwitter
all being
all bets off
all but
all by your lonesome
all clear
all comers
all creation
all depend
all ears
all engines
all engines ahead
all eyes
all eyes and ears
all fives
all flesh is grass
all fool's day
all fools' day
all for
all for one
all for the best
all fours
all get out
all get-out
all gone
all good go with you
all hail
all hands
all hollow
all hopped up about
all hot and bothered
all ills that men endure
all in
all in a dither over
all in all
all in good time
all in hand
all in the day's work
all in the mind
all in the wind
all included
all jaw
all joking apart

all joking aside
all kinds of
all nerves
all night
all of
all of a flutter
all of a heap
all of a sudden
all of a twitter
all off
all on
all on one side
all one
all out
all over
all over but the shouting
all over hell
all over the lot
all over the map
all over the place
all over the shop
all
over the town
all over the world
all over with
all over yourself
all present and accounted for
all put together
all ready
all right
all right already
all round
all said and done
all saints
all saints' day
all serene
all set
all set for
all shook up
all sorts
all sorts of
all souls
all souls' day
all square
all squares
all standing
all straight
all tears

all that
all that is
all that is coming to one
all that lives
all the
all the best
all the better
all the better for
all the comforts of home
all the cry
all the day long
all the days of your life
all the heart can desire
all the ills that men endure
all the more
all the more so
all the rage
all the same
all the thing
all the time
all the way
all the way to
all the while
all the world
all the worse for
all the year round
all there
all things considered
all things counter
all threes
all through
all through the night
all thumbs
all to
all to pieces
all to the good
all together
all told
all two
all up
all up with
all wet
all who love
all
 wool and a yard wide
all work
all wound up in
all wrapped up in yourself

all wrong
all you can bear
all you can do
all you can manage
all you can stand
all you can take
all your born days
all your got
all your natural life
all' ottava
all's well
all-
all-American
all-a-mort
all-abhorred
all-able
all-absorbing
all-accomplished
all-acting
all-admired
all-admiring
all-advised
all-affecting
all-afflicting
all-aged
all-air
all-amazed
all-american
all-appaled
all-appointing
all-approved
all-approving
all-armed
all-around
all-arraigning
all-arranging
all-assistless
all-atoning
all-attempting
all-availing
all-bearing
all-beauteous
all-beautiful
all-beholding
all-bestowing
all-binding
all-bitter
all-black

all-blasting
all-blessing
all-bounteous
all-bountiful
all-bright
all-brilliant
all-changing
all-cheering
all-collected
all-colored
all-comfortless
all-commander
all-commanding
all-compelling
all-complying
all-composing
all-comprehending
all-comprehensive
all-comprehensiveness
all-concealing
all-conceiving
all-concerning
all-confounding
all-conquering
all-conscious
all-considering
all-constant
all-constraining
all-consuming
all-content
all-controlling
all-convincing
all-convincingly
all-covering
all-creating
all-creator
all-crop
harvester
all-curing
all-daring
all-day
all-dazzling
all-deciding
all-defiance
all-defying
all-depending
all-designing
all-desired

all-despising
all-destroyer
all-destroying
all-devastating
all-devouring
all-dimming
all-directing
all-discerning
all-discovering
all-disgraced
all-dispensing
all-disposer
all-disposing
all-divine
all-divining
all-dreaded
all-dreadful
all-drowsy
all-earnest
all-eating
all-efficacious
all-efficient
all-eloquent
all-embracing
all-embracingness
all-encompasser
all-encompassing
all-ending
all-enduring
all-engrossing
all-engulfing
all-enlightened
all-enlightening
all-enraged
all-envied
all-essential
all-evil
all-excellent
all-expense
all-expenses-paid
all-eyed
all-fair
all-filling
all-fired
all-firedest
all-firedly
all-flaming
all-flotation

all-flower-water
all-flying
tail
all-foreseeing
all-forgetful
all-forgetting
all-forgiving
all-forgotten
all-fullness
all-gas
all-giver
all-glorious
all-golden
all-governing
all-gracious
all-grasping
all-great
all-guiding
all-hallow
all-hallowed
all-happy
all-healing
all-hearing
all-heeding
all-helping
all-hiding
all-holy
all-honored
all-hoping
all-hurting
all-idolizing
all-illuminating
all-imitating
all-important
all-impressive
all-in
all-in-one
all-including
all-inclusive
all-inclusiveness
all-infolding
all-informing
all-interesting
all-interpreting
all-invading
all-involving
all-jarred
all-judging

all-just
all-justifying
all-kind
all-knavish
all-knowing
all-knowingness
all-land
all-lavish
all-licensed
all-lovely
all-loving
all-maintaining
all-maker
all-making
all-maturing
all-meaningness
all-merciful
all-metal
all-might
all-miscreative
all-murdering
all-night
all-night vigil
all-noble
all-nourishing
all-obedient
all-obeying
all-oblivious
all-obscuring
all-oil
all-or-none
all-or-none
law
all-ordering
all-out
all-out campaign
all-out war
all-over
all-overish
all-overishness
all-overpowering
all-overs
all-overtopping
all-panting
all-parent
all-pass
all-patient
all-peaceful

all-penetrating
all-peopled
all-perceptive
all-perfect
all-perfection
all-perfectness
all-perficient
all-persuasive
all-pervading
all-pervadingness
all-pervasive
all-pervasiveness
all-piercing
all-pitiless
all-pitying
all-pondering
all-possessed
all-potency
all-potent
all-potential
all-power
all-powerful
all-powerful ruler
all-powerfully
all-powerfulness
all-praised
all-praiseworthy
all-presence
all-present
all-prevailing
all-prevailingness
all-prevalency
all-prevalent
all-preventing
all-prolific
all-protecting
all-provident
all-providing
all-puissant
all-pure
all-purpose
all-quickening
all-rail
all-rapacious
all-reaching
all-red
all-redeeming
all-relieving

all-rending
all-righteous
all-round
all-round price
all-roundedness
all-rounder
all-rubber
all-ruling
all-sacred
all-sanctifying
all-satiating
all-satisfying
all-saving
all-sayer
all-sea
all-searching
all-seeing
all-seeingly
all-seeingness
all-seer
all-shaking
all-shamed
all-shaped
all-shrouding
all-shunned
all-sided
all-silent
all-sized
all-sliming
all-soothing
all-sorts
all-soul
all-spreading
all-star
all-stars
all-steel
all-strangling
all-subduing
all-submissive
all-substantial
all-sufficiency
all-sufficient
all-sufficiently
all-sufficing
all-surpassing
all-surrounding
all-surveying
all-sustainer

all-sustaining
all-swallowing
all-swaying
all-telling
all-terrible
all-thorny
all-time
all-time
great
all-tolerating
all-transcending
all-triumphing
all-truth
all-turned
all-turning
all-understanding
all-unwilling
all-upholder
all-upholding
all-various
all-vast
all-watched
all-water
all-wave receiver
all-weak
all-weather
all-weather fighter
all-weight
all-whole
all-wisdom
all-wise
all-wisely
all-wiseness
all-wondrous
all-wood
all-wool
all-working
all-worshiped
all-worthy
all-wrongness
all-year
alla bolognese
alla breve
alla
cacciatore
alla capella
alla diavola
alla fiorentina

alla marcia
alla marinara
alla milanese
alla parmigiana
alla pizzaiola
alla prima
alla romana
alla siciliana
alla veneziana
alla vostra salute
allan hawk
allantoic membrane
allee couverte
allegation of facts
allege in support
allege in vindication
allegheny spurge
allemande sauce
aller sans dire
aller-retour
allergic disease
allergic disorder
allergic gastritis
allergic rhinitis
allergic shock
allergy diet
alley cat
alley-oop
allez-vous-en
allice shad
alligation alternate
alligation medial
alligator apple
alligator bonnets
alligator buttons
alligator cacao
alligator clip
alligator fish
alligator forceps
alligator gar
alligator head
alligator jaw
alligator juniper
alligator lizard
alligator pear
alligator pepper
alligator shear
alligator shears

alligator snapper
alligator snapping turtle
alligator squeezer
alligator terrapin
alligator tree
alligator turtle
alligator wampee
alligator weed
alligator wrench
alliterative meter
allo-
allo-octaploid
allow
 for
allow the occasion to go by
allow yourself to hope
allowance account
allowance race
allowed time
allowing that
alloy balance
alloy charge
alloy iron
alloy steel
alloyed junction
allspice oil
allspice tree
allude to
alluring gland
alluvial cone
alluvial fan
alluvial plain
allways fuze
ally-ally out'n free
allyl alcohol
allyl aldehyde
allyl caproate
allyl chloride
allyl group
allyl isothiocyanate
allyl mercaptan
allyl mustard oil
allyl radical
allyl resin
allyl sulfide
allyl sulphide
allyl thiocarbamide
alma mater

alma-materism
almain-rivets
almenn turma
almes se
almighty dollar
almond black
almond brown
almond cake
almond extract
almond eye
almond family
almond green
almond kernel
almond meal
almond milk
almond oil
almond paste
almond peach
almond tumbler
almond willow
almond-eyed
almond-furnace
almond-leaved
almond-leaved willow
almond-shaped
almoner's cupboard
almost entirely
almost everywhere
almost periodic function
almost unheard-of
alms bag
alms basin
alms
basket
alms box
alms bread
alms chest
alms dish
alms fee
alms gate
alms land
alms penny
alms priest
alms purse
alms-dealing
alms-fed
alms-house
almucantar staff

aloe creole
aloe hemp
aloe lace
aloe malgache
aloe-emodin
aloes green
aloes wood
aloft there
along by
along in years
along of
along the side of
along the way
along these lines
along toward
along with
alongside of
aloof from
alopecia areata
alopecia celsi
alopecia circumscripta
alouchi resin
alow and aloft
alpha and omega
alpha brass
alpha decay
alpha iron
alpha particle
alpha privative
alpha pulse analyzer
alpha radiation
alpha radiator
alpha ray
alpha rhythm
alpha score
alpha test
alpha-amylase
alpha-beta brass
alpha-cellulose
alpha-eucaine
alpha-hypophamine
alpha-naphthol
alpha-naphthyl group
alpha-naphthyl radical
alpha-naphthylamine
alpha-naphthylthiourea
alpha-particle scattering
alpha-stannic acid

alpha-tocopherol
alpha-truxilline
alphabet book
alphabet code
alphabet method
alphabet plant
alphabet soup
alphabetic character
alphabetic
 data
alphabetic symbol
alphabetical printer
alphanumeric code
alpine anemone
alpine aster
alpine azalea
alpine bartsia
alpine beardtongue
alpine bent grass
alpine birch
alpine bistort
alpine brook saxifrage
alpine campion
alpine catchfly
alpine chough
alpine clover
alpine cress
alpine eyebright
alpine fir
alpine fireweed
alpine forget-me-not
alpine garden
alpine geranium
alpine glacier
alpine goldenrod
alpine hemlock
alpine holy grass
alpine lady fern
alpine larch
alpine lousewort
alpine molewort
alpine oat grass
alpine poppy
alpine rice grass
alpine rock cress
alpine rose
alpine sedge
alpine spring beauty

alpine spruce
alpine strawberry
alpine tundra
alpine umbrella plant
alpine whitebark pine
alpine whorl grass
alpine woodsia
alps on alps
already in sight
alsike clover
also not
also-ran
alta vox
altar board
altar boy
altar bread
altar call
altar card
altar carpet
altar chime
altar cloth
altar desk
altar dues
altar facing
altar front
altar hearse
altar mound
altar of
 prothesis
altar of repose
altar plate
altar rail
altar side
altar slab
altar stair
altar stand
altar stead
altar stole
altar stone
altar tomb
altar wine
altazimuth mounting
alter ego
alter idem
alter into
alter your course
altered chord
alternate angles

alternate choice
alternate plumage
alternate school
alternate straight
alternate-leaved
alternating current
alternating current motor
alternating group
alternating light
alternating personality
alternating series
alternating voltage
alternating-current circuit
alternating-current servo
alternating-gradient focusing
alternation of generations
alternative school
alternative vote
alterni-
alti-
alti-rilievi
altitude dial
altitude mixture control
altitude of flight
altitude peak
altitude pressure
altitude sickness
alto clarinet
alto clef
alto flute
alto horn
alto saxhorn
alto viol
alto-
alto-cumulus
alto-cumulus-castellatus
alto-relievo
alto-relievos
alto-rilievo
alto-stratus
altocumulus castellanus
altocumulus castellatus
altocumulus floccus
altocumulus
lenticularis
altocumulus stratiformis
altogether, the
altruistic ethics

aluchi resin
aludel furnace
alum cake
alum carmine
alum cochineal
alum flower
alum glass
alum haematoxylin
alum meal
alum rock
alum schist
alum shale
alum stone
alum-hypo toning process
alumina cement
alumina cream
alumina trihydrate
aluminio-
aluminium hydroxide
aluminium oxide
aluminium sulphate
alumino-
aluminous cake
aluminum acetate
aluminum ammonium sulfate
aluminum borate
aluminum borohydride
aluminum brass
aluminum bronze
aluminum carbide
aluminum chloride
aluminum family
aluminum fluosilicate
aluminum foil
aluminum gold
aluminum hydrate
aluminum hydroxide
aluminum monostearate
aluminum nitrate
aluminum oxide
aluminum paint
aluminum potassium sulfate
aluminum silicate
aluminum sulfate
aluminum sulphate
alun-alun
alva marina
alveolar arch

alveolar process
alveolar ridge
alveolo-
alveololabial sulci
alveololingual sulci
always and everywhere
always trot out
alyce clover
amalgam arc
amalgam gilding
amalgamation
process
amande amere
amande douce
amande pralinee
amandes mondees
amanita hemolysin
amanita toxin
amarant family
amaranth family
amaranth pink
amaranth-purple
amaryllis family
amassing evidence
amateur athlete
amateur band
amateur radio operator
amateur standing
amateur station
amateur status
amateur theatricals
amateur transmitter
amazing thing
amazon ant
ambary hemp
ambassador-at-large
ambassadors-at-large
amber brown
amber forest
amber jack
amber light
amber malt
amber mica
amber miner
amber oil
amber opal
amber pear
amber seed

amber snail
amber tree
amber yellow
amber-clear
amber-colored
amber-days
amber-dropping
amber-dropping hair
amber-headed
amber-hued
amber-locked
amber-tinted
amber-tipped
amber-weeping
amber-white
amber-yielding
ambi-
ambient phenomena
ambient temperature
ambiguous expression
ambil-anak
ambit piousness
ambitious for self
ambivalence of impulse
ambretta seed
ambrette seed
ambrette-seed oil
ambrosia beetle
ambs-ace
ambulacral foot
ambulance
 chaser
ambulance chasing
ambulatory plague
ambuling communion
ambush bug
ame damnee
amebic dysentery
amen corner
amende honorable
amende profitable
amende-honorable
amendes honorables
american chameleon
american cheese
american cowslip
american english
american indian

american ivy
american plan
american revised version
american sable
american saddle horse
american standard version
american trotter
americo-
ames-ace
amethyst cutter
amethyst violet
amiable weakness
amicable number
amici curiae
amicus curiae
amicus humani generis
amicus usque ad aras
amid the blaze of noon
amid-
amide powder
amido-
amido-urea
amidonaphthol red
amin-
amino acid
amino acids
amino azobenzene
amino group
amino nitrogen
amino radical
amino resin
amino-
amino-oxypurin
aminoacetic acid
aminobenzoic acid
aminoquin naphthoate
aminosuccinic acid
ammo dump
ammo-
ammonia alum
ammonia condenser
ammonia gelatin
ammonia liquor
ammonia meter
ammonia nitrogen
ammonia process
ammonia soda
ammonia soda ash

ammonia soda process
ammonia
solution
ammonia turpeth
ammonia valve
ammonia water
ammoniac plant
ammoniacal liquor
ammoniaco-
ammonio-
ammonioferric oxalate
ammonium acetate
ammonium alum
ammonium amalgam
ammonium base
ammonium bicarbonate
ammonium bifluoride
ammonium binoxalate
ammonium bromide
ammonium carbamate
ammonium carbonate
ammonium chloride
ammonium chrome alum
ammonium chromic sulfate
ammonium cyanate
ammonium hydrosulphide
ammonium hydroxide
ammonium lactate
ammonium molybdate
ammonium nitrate
ammonium oxalate
ammonium persulphate
ammonium phosphate
ammonium purpurate
ammonium salt
ammonium selenate
ammonium stearate
ammonium sulfate
ammonium sulphate
ammonium sulphide
ammonium thiocyanate
ammonium thiosulfate
ammono acid
ammono base
ammono salt
ammunition box
ammunition bread
ammunition chest

ammunition depot
ammunition hoist
ammunition legs
ammunition scuttle
ammunition ship
ammunition shoes
amnesic aphasia
amnestic aphasia
amniotic fluid
amniotic sac
amobarbital sodium
amoeba disease
amoebean
 verse
amoebic dysentery
among other things
among the blest
among the living
among us
amor patriae
amorous dalliance
amorous looks
amorous pursuit
amorpho-
amorphous ergotinine
amorphous phosphorus
amount at risk
amount due
amount limit
amount of money
amount of stock
amount to
amount to something
amour propre
amour-propre
amparo blue
amparo purple
ampere arc
ampere balance
ampere turn
ampere-foot
ampere-hour
ampere-hour meter
ampere-minute
ampere-second
ampere-turn
amperometric titration
amphetamine sulfate

amphetamine sulphate
amphetamine withdrawal symptoms
amphi-
amphibian tractor
amphibian transport
amphibious attack
amphibious operations
amphibious warfare
amphibole group
ample scope
ample sufficiency
amplification factor
amplifier chain
amplifier circuit
amplifying circuit
amplifying generator
amplitude compass
amplitude control
amplitude factor
amplitude modulation
amply endowed
ampullar sense
ampus-and
amrad gum
amuse yourself
amusement arcade
amusement device
amusement park
amusement
 ride
amusement tax
amygdalic acid
amygdalo-uvular
amygdaloid nucleus
amygdonitrile glucoside
amyl acetate
amyl alcohol
amyl ether
amyl group
amyl isovalerate
amyl nitrite
amyl oxide
amyl propionate
amyl radical
amyl salicylate
amyl sulfide
amyl-
amyl-acetate lamp

amylacetic ether
amylene hydrate
amylo-
amyloid degeneration
amylum body
amylum center
amylum grain
amylum star
amyotrophic lateral sclerosis
amyris oil
an O without a figure
an arm and a leg
an arrant
an average
an awfully big adventure
an ear for
an eater of broken meats
an echo of the invisible world
an emblem
an epidemic insanity
an error
an eternity
an existence
an eye for
an eye for an eye
an in
an incurable disease
an inhabiting
an instant arrested in eternity
an intelligence served by organs
an itch for the praise of fools
an old dog at
an old hand at
an uncertainty
an unfathomable Somewhat
an unhappy crossbreed
an universal wolf
an-
an-end
ana-
anabolic steroid
anacardium nut
anaconda gourd
anadama bread
anaerobic
 bacteria
anaerobic organism
anak kuching

anal canal
anal character
anal fin
anal intercourse
anal sex
anal vein
analcite basalt
analog computer
analog feedback control
analog process
analog-digital converter
analogue computer
analogy test
analysis of variance
analysis situs
analytic continuation
analytic faculty
analytic geometry
analytic philosopher
analytic philosophy
analytic power
analytic psychology
analytical balance
analytical chemistry
analytical control unit
analytical cubism
analytical cubist
analytical geometry
analytical mechanics
analytical psychology
analytical spectrometer
analytico-architectural
analyze your motives
analyzed rhyme
anamite yeast
anamorphic lens
ananas oil
anaphylactic antibody
anaphylactic shock
anarcho-syndicalism
anarcho-syndicalist
anastomotic operation
anathema maranatha
anatomic diagnosis
anatomic medicine
anatomical pathology
anatomical snuffbox
anatomico-

ance errand
ancestor worship
ancestral halls
ancestral spirits
anchieta bark
anchor
 ball
anchor bar
anchor bed
anchor bell
anchor bend
anchor bolt
anchor box
anchor buoy
anchor chain
anchor chock
anchor dart
anchor deck
anchor drag
anchor escapement
anchor hold
anchor hoy
anchor ice
anchor knot
anchor lift
anchor light
anchor lining
anchor link
anchor log
anchor man
anchor money
anchor nurse
anchor plant
anchor plate
anchor pocket
anchor ring
anchor rocket
anchor rod
anchor rode
anchor shackle
anchor shot
anchor space
anchor span
anchor tee
anchor watch
anchor watchman
anchor well
anchor-shaped

anchorage ground
anchorite monasticism
anchoritic monasticism
anchors aweigh
anchovy pear
ancien regime
ancien rgime
ancienne noblesse
ancient history
ancient language
ancient literature
ancient manuscript
ancient times
ancient wisdom
and Cultural Organization
and God knows what
and Harry
and Holy Ghost
and I don't know what
and Ireland
and Robinson
and Slovenes
and Welfare
and a light unto my path
and a pull all together
and all
and all like that
and all that
and all that sort
of thing
and also
and an eminently contagious one
and ancient as the sun
and arithmetic
and barrel
and be merry
and blue
and bobtail
and built by hands divine
and candle
and circuit
and circumstance
and collected
and crack your cheeks
and delivered
and dissolve itself
and everything else
and everywhere

and fish
and flesh of my flesh
and handsome
and happy
and hates them for it
and heaven knows what
and jump
and keep your powder dry
and listen
and making it five
and many more
and more of the same
and night
and no mistake
and not
and nothing but the truth
and of Night
and off the hinges
and other things
and others
and pence
and pine
and portents and evils imminent
and pursue it
and quarter
and quit yourselves like men
and running over
and shaken together
and sinker
and so
and so forth
and so on
and strengt
and stuff like that
and suchlike
and tell them
and the blind
and the fish of the sea
and the following
and the like
and the post
and the pursuit of happiness
and the queen of sleep
and
the rest
and the seeing of blind
and the waste of life
and then some

and unprofitable
and weep with them that weep
and what have you
and what not
and-
anda oil
anda-assu
anda-assu oil
andante moderato
andante tempo
andr-
andro-
androgenital syndrome
anem-
anemia lymphatica
anemo-
anemone camphor
anemone fish
anemone-flowered dahlia
aneroid barograph
aneroid barometer
aneroid capsule
anesthetic ether
ang-khak
angel bed
angel cake
angel fish
angel food
angel food cake
angel gold
angel light
angel of death
angel of light
angel of love
angel red
angel shark
angel shot
angel sleeve
angel tree
angel water
angel's footstool
angel's tears
angel's-trumpet
angel-borne
angel-bright
angel-builded
angel-eyed
angel-faced

angel-guarded
angel-heralded
angel-noble
angel-seeming
angel-warned
angelic host
angelica tree
angelica-root
angelin seeds
angels' tears
angels-on-horseback
angi-
angico gum
angina pectoris
angio-
angioneurotic edema
angle away
angle bar
angle bead
angle beam
angle board
angle brace
angle
bracket
angle brackets
angle brick
angle bulb
angle capital
angle chair
angle cleat
angle clip
angle collar
angle for
angle gear
angle iron
angle measurement
angle meter
angle of attack
angle of bank
angle of climb
angle of dead rise
angle of deviation
angle of dip
angle of heel
angle of incidence
angle of lag
angle of lead
angle of pitch

angle of polarization
angle of reflection
angle of refraction
angle of repose
angle of roll
angle of sideslip
angle of stabilizer setting
angle of view
angle of vision
angle of wing setting
angle of yaw
angle off
angle plate
angle rafter
angle reflector
angle rib
angle set
angle shaft
angle shear
angle staff
angle steel
angle tie
angle with a silver hook
angle-off
angle-rack tool
angled draft
angled-toothed
angler fish
anglo-
anglo-catholic
anglo-french
anglo-indian
anglo-norman
anglo-saxon
angora cat
angora goat
angora rabbit
angostura bark
angostura bitters
angry clouds
angry look
angry young man
angry young woman
angry-eyed
angry-looking
angstrom
unit
angstrom unit Angstrom

angular acceleration
angular data
angular dispersion
angular displacement
angular frequency
angular geometric
angular geometric figures
angular leaf spot
angular magnification
angular momentum
angular momentum quantum number
angular motion
angular perspective
angular velocity
angular-toothed
angular-winged katydid
angulated sail
angulato-
angulo-
anguloso-
angusti-
anhalonium alkaloid
anharmonic ratio
anhydro base
anhydro-
anidian monster
aniline black
aniline blue
aniline dye
aniline hydrochloride
aniline oil
aniline purple
aniline salt
aniline yellow
anima aloes
anima bruta
anima humana
anima mundi
animadvert on
animadvert upon
animal abode
animal and vegetable kingdom
animal black
animal capable of reason
animal carver
animal cell
animal cellulose
animal charcoal

animal charge
animal color
animal comfort
animal cracker
animal culture
animal cunning
animal disease
animal diseases
animal dyestuff
animal electricity
animal enclosure
animal faith
animal
fiber
animal flower
animal force
animal handler
animal heat
animal husbandman
animal husbandry
animal hypnosis
animal kingdom
animal life
animal like types
animal magnetism
animal mechanics
animal mound
animal nature
animal noise
animal oat
animal oil
animal oils
animal physiologist
animal physiology
animal pleasure
animal pole
animal psychology
animal raiser
animal raising
animal rearing
animal rouge
animal science
animal scientist
animal size
animal soul
animal sound
animal spirit
animal spirits

animal starch
animal stuffer
animal stuffing
animal unit
animal worship
animal worshiper
animal young
animal-sized
animate existence
animate matter
animated cartoon
animated oat
animating force
animating power
animating principle
animating spirit
animation photography
animis opibusque parati
animistic spirit
animus cancellandi
animus capiendi
animus derelinquendi
animus furandi
animus injuriandi
animus lucrandi
animus manendi
animus possidendi
animus recipiendi
animus remanendi
animus revertendi
animus
revocandi
animus testandi
anionic detergent
anis-
anise camphor
anise hyssop
anise oil
anise plant
anise-scented goldenrod
aniseed fox
aniseed oil
aniseed star
aniseed tree
anisic alcohol
anisic aldehyde
aniso-
anisyl acetate

anisyl alcohol
ankle boot
ankle clonus
ankle cutter
ankle jerk
ankle ring
ankle sock
ankle strap
ankle tie
ankle-deep
ankle-jacked
annatto tree
anni mirabiles
annihilation radiation
anno Domini
anno Hejirae
anno aetatis suae
anno domini
anno hegirae
anno mundi
anno regni
anno urbis conditae
annotated bibliography
announce with beat of drum
announced motive
annual bibliography
annual bluegrass
annual epact
annual holiday
annual parallax
annual percentage rate
annual period
annual ring
annual wage
annuit coeptis
annuities certain
annuity bond
annuity certain
annuity gift
annul a marriage
annular clock
annular eclipse
annular ligament
annular muscle
annunciator system
annus magnus
annus mirabilis
ano-

anode dark space
anode glow
anode ray
anode rays
anode
 resistance
anodized aluminum
anodyne necklace
anointed king
anomalistic month
anomalistic year
anomalo-
anomalous zeeman effect
anomo-
anorexia nervosa
anorthite-basalt
another crack
another go
another kettle of fish
another shot
another time
another try
another-gates
another-guess
another-guise
anoxic anoxia
anp-
ansa hypoglossi
ansa subclavia
ansate cross
anserine skin
answer back
answer book
answer conclusively
answer for
answer the call of duty
answer the helm
answer the purpose
answer to
answer to a problem
answer to no man
answer-back
answerable for
answerable to
answering pennant
answering service
ant acacia
ant bear

ant bird
ant catcher
ant cattle
ant cow
ant egg
ant fly
ant heap
ant hill
ant hillock
ant king
ant lion
ant pipit
ant plant
ant rice
ant shrike
ant thrush
ant tree
ant worm
ant wren
ant-
ant-eater
ant-pipit
ant-thrush
antarctic beech
antarctic circle
antarctic circumpolar current
ante Christum
ante bellum
ante meridiem
ante mortem
ante partum
ante up
ante-
ante-Christum
ante-Nicaean
ante-Nicene
ante-Nicene
Fathers
ante-acted
ante-ambulo
ante-bellum
ante-chapel
ante-ecclesiastical
ante-eternity
ante-mortem
ante-mortem clot
ante-orbital
ante-partum

ante-room
ante-temple
antecedent right
antecedent used in
antediluvian patriarch
antelope brush
antelope chipmunk
antelope squirrel
antenna array
antenna circuit
antenna filter
antenna grounding switch
antenna inductance
antenna mine
antenna resistance
antenna switch
antenna tower
antennae sword
antennal gland
antennal lobe
antenuptial contract
antenuptial settlement
anterior pituitary
anterior pituitary luteotropin
anterior tooth
antero-
anterograde amnesia
anterograde memory
anth-
anthelic arcs
anther cell
anther lobe
anther sac
anther smut
antho-
anthra-
anthracene brown
anthracene oil
anthracene yellow
anthracite black
anthracite coal
anthraquinone dye
anthrax vaccine
anthrop-
anthropo-
anthropoid ape
anti-
anti-American

anti-Arab
anti-Aristotelian
anti-Aristotelianism
anti-Australian
anti-Austria
anti-Austrian
anti-Bible
anti-Biblical
anti-Biblically
anti-Bolshevik
anti-Bolshevism
anti-Bolshevist
anti-Bolshevistic
anti-British
anti-Calvinism
anti-Calvinist
anti-Calvinistic
anti-Calvinistical
anti-Catholic
anti-Catholicism
anti-Darwin
anti-Darwinian
anti-Darwinism
anti-Darwinist
anti-English
anti-Europe
anti-European
anti-Europeanism
anti-France
anti-French
anti-Freud
anti-Freudian
anti-Freudianism
anti-G
suit
anti-German
anti-Germanic
anti-Germanism
anti-Germanization
anti-Greece
anti-Greek
anti-Irish
anti-Italian
anti-Italianism
anti-Japanese
anti-Jesuit
anti-Jesuitic
anti-Jesuitical

anti-Jesuitically
anti-Jesuitism
anti-Jesuitry
anti-Jewish
anti-Judaic
anti-Judaism
anti-Judaist
anti-Judaistic
anti-Latin
anti-Latinism
anti-Malthusian
anti-Malthusianism
anti-Mexican
anti-Negro
anti-Negroes
anti-Negroism
anti-Nordic
anti-Oriental
anti-Orientalism
anti-Orientalist
anti-Plato
anti-Platonic
anti-Platonically
anti-Platonism
anti-Platonist
anti-Polish
anti-Populist
anti-Protestant
anti-Protestantism
anti-Puritan
anti-Puritanism
anti-Roman
anti-Romanist
anti-Russia
anti-Russian
anti-Scandinavia
anti-Scripture
anti-Scripturist
anti-Semite
anti-Semitic
anti-Semitism
anti-Serb
anti-Slav
anti-Slavic
anti-Socrates
anti-Socratic
anti-Soviet
anti-Spain

anti-Spanish
anti-Sweden
anti-Swedish
anti-Teuton
anti-Teutonic
anti-Trinitarian
anti-Trinitarianism
anti-Turkish
anti-Zionism
anti-Zionist
anti-acid
anti-aircraft
anti-attrition
anti-birmingham
anti-christian
anti-depressant
anti-emetic
anti-ethmc
anti-federalist
anti-gallic
anti-gallican
anti-gallican
hitch
anti-gallicanism
anti-god
anti-guggler
anti-hero
anti-heroic
anti-hog-cholera
anti-icer
anti-icteric
anti-idealism
anti-idealist
anti-idealistic
anti-idealistically
anti-idolatrous
anti-immigration
anti-immigrationist
anti-immune
anti-imperialism
anti-imperialist
anti-imperialistic
anti-incrustator
anti-indemnity
anti-induction
anti-inductive
anti-inductively
anti-inductiveness

anti-infallibilist
anti-infantal
anti-innovationist
anti-intellectual
anti-intellectualism
anti-intellectualist
anti-intellectuality
anti-intermediary
anti-isolation
anti-isolationism
anti-isolationist
anti-isolysin
anti-jacobin
anti-jacobinism
anti-laissez-faire
anti-leaguer
anti-lecomption
anti-lecomptom
anti-maniacal
anti-mony-yellow
anti-nebraska
anti-nicaean
anti-novel
anti-novelist
anti-odontalgic
anti-open-shop
anti-orgastic
anti-over
anti-pre-existentiary
anti-roman
anti-semite
anti-sub
rocket
anti-submarine rocket
anti-trade
anti-worlds
antiaircraft artillery
antiaircraft barrage
antiaircraft fire
antiaircraft gun
antiaircraft gun positioner
antiaircraft radar
antiaircraft rocket
antiballistic missile
antiballistic-missile system
antiberi-beri factor
antiblackout suit
antiblastic immunity

antic wit
anticipate a blessed event
anticipating a blessed event
anticrepuscular arch
antidote cacoon
antidote lily
antidrag wire
antifouling paint
antifriction bearing
antifriction curve
antifriction metal
antifriction wheels
antigen
 treatment
antigen-antibody product
antilift wire
antimine rocket
antimissile missile
antimonic acid
antimonioso-
antimonous hydride
antimony blende
antimony bloom
antimony chloride
antimony cinnabar
antimony crocus
antimony crude
antimony glance
antimony glass
antimony hydride
antimony ocher
antimony orange
antimony oxide
antimony oxychloride
antimony pentachloride
antimony pentasulfide
antimony pentasulphide
antimony pentoxide
antimony potassium tartrate
antimony red
antimony regulus
antimony rubber
antimony saffron
antimony salt
antimony sulfate
antimony sulfide
antimony sulphide
antimony tetroxide

antimony trichloride
antimony trifluoride
antimony trioxide
antimony trisulfide
antimony trisulphide
antimony vermilion
antimony white
antimony yellow
antimonyl potassium tartrate
antinoise microphone
antiophthalmic factor
antiophthalmic vitamin
antipernicious anemia factor
antipersonnel bomb
antipersonnel mine
antiphonal chanting
antiphonal singing
antipodal points
antiquated expression
antiquated
person
antiquated word
antique brass
antique bronze
antique brown
antique cloth
antique collector
antique crown
antique dealer
antique drab
antique glass
antique gold
antique green
antique plane
antique red
antique store
antique-car collector
antiradar rocket
antiseptic surgery
antisocial attitudes
antisocial personality
antisocial sentiments
antisterility factor
antisubmarine bomb
antisubmarine mortar
antisubmarine patrol
antisubmarine plane
antisubmarine projector

antisubmarine radar
antisymmetrical tensor
antitank gun
antitank mine
antitank rifle
antitank rocket
antitorque rotor
antitoxic globulin
antitoxic serum
antitwilight arch
antixerophthalmic vitamin
antler moth
antlion fly
ants in your pants
antsy-pantsy
anvil block
anvil chisel
anvil cloud
anvil cupper
anvil cutter
anvil dross
anvil forger
anvil maker
anvil top
anvil vise
anvil-drilling
anvil-faced
anvil-facing
anvil-headed
anxiety equivalent
anxiety hysteria
anxiety neurosis
anxiety reaction
anxiety state
anxious
 bench
anxious concern
anxious for
anxious seat
anxioused up
any Tom
any color
any day
any he
any hour
any minute
any moment
any more

any old way
any one
any road
any time
any time now
any which way
any-kyn
anything but
anything like
anything soever which
anywhere near
ao dai
aoi tsuba
aortic arch
aortic incompetence
aortic insufficiency
aortic stenosis
aortic valve
ap proving
ap-
apache dance
apar-
apart from
apartment building
apartment hotel
apartment house
ape about
ape fissure
ape hand
ape man
ape over
ape-headed
ape-man
ape-men
apel-
apen-
aper-
aperiodic discharge
aperture card
aperture ratio
aperture stop
aperture vignette
apet-
apex beat
apex rule
aph-
aphid lion
aphid rosette

aphid-lion
aphis fly
aphis foot
aphis lion
aphis wolf
aphis-lion
aphlogistic lamp
aphthous fever
aphthous stomatitis
apical meristem
apico-alveolar
apico-dental
aplastic anemia
apo-
apocha trium annorum
apocrine gland
apologize for
apoplectic stroke
aposematic mimicry
apostle bird
apostle jug
apostle
 spoon
apostles' creed
apostolic age
apostolic brief
apostolic church
apostolic delegate
apostolic faith
apostolic father
apostolic orders
apostolic succession
apostolic vicar
apothecaries' measure
apothecaries' weight
apothecary jar
apothecary's shop
appalachian tea
apparatus belli
apparatus criticus
apparent candlepower
apparent character
apparent destiny
apparent fate
apparent heir
apparent horizon
apparent magnitude
apparent soundness

apparent time
apparent wind
apparently sound
appeal motion
appeal to
appeal to a higher court
appeal to arms
appeal to the country
appeal to the law
appeal to the sword
appeal to you for
appeal to your better feelings
appear for
appear in print
appear like
appear on the horizon
appear on the scene
appear on the stage
appear to be
appear to your eyes
appear unexpectedly
appearance money
appearances are in favor of
appellate court
appellate division
appellate jurisdiction
appendico-enterostomy
appendicular skeleton
appendix vermiformis
apperception mass
apperception
test
appertain to
appetizing store
appian way
applaud to the very echo
apple anthracnose
apple aphid
apple banana
apple bee
apple blight
apple blossom
apple blotch
apple box
apple brandy
apple bucculatrix
apple butter
apple canker

apple cheese
apple curculio
apple dumpling
apple essence
apple family
apple fly
apple fritter
apple geranium
apple grain aphid
apple green
apple grunt
apple gum
apple haw
apple juice
apple knocker
apple leaf
apple maggot
apple mildew
apple mint
apple moss
apple moth
apple of discord
apple of your eye
apple oil
apple pandowdy
apple pie
apple polisher
apple pox
apple psylla
apple rosette
apple rust
apple sauce
apple scab
apple scald
apple scale
apple shell
apple slump
apple snail
apple sucker
apple tart
apple toddy
apple tree
apple tree borer
apple turnover
apple weevil
apple wine
apple worm
apple-cheeked

apple-eating
apple-faced
apple-fallow
apple-john
apple-pie
apple-pie bed
apple-pie order
apple-polish
apple-polisher
apple-polishing
apple-scented
apple-shaped
apple-stealing
apple-twig
apple-twig
beetle
apple-twig borer
applejack brandy
apples and pears
appleton layer
appletree borer
applicate number
application for retrial
application lace
applied chemistry
applied kinematics
applied linguistics
applied mathematics
applied mechanics
applied physics
applied psychology
applied science
applied tactics
applique lace
apply for
apply margin
apply paint
apply pressure
apply reason
apply the attention to
apply the match to
apply the mind
apply the mind to
apply the torch to
apply the yardstick to
apply to
apply yourself
apply yourself to

applying color
appoint yourself
appointed lot
appointment calendar
appointment schedule
apportionment bill
apposition beach
appositive genitive
appraisal clause
appreciate differences
appreciation bond
appreciation of differences
appreciation of excellence
appreciative of
apprentice printer
apprentice seaman
apprentice teacher
apprentice work
apprentice yourself to
apprised of
approach anchorage
approach
 leg
approach light
approach of time
approach path
approach shot
approach trench
appropriate for
appropriate to
appropriation bill
approval book
approval sheet
approve of
approved school
apricot brandy
apricot palm
apricot plum
apricot scale
apricot sour
apricot vine
apricot wine
apricot yellow
apricot-kernal
april fool
april fools' day
apron conveyer
apron lining

apron man
apron piece
apron plate
apron roll
apron shield
apron stage
apron string
apron wall
apron-squire
apron-string
apropos of
apse aisle
apse line
apt to
aptitude test
aqua ammonia
aqua ammoniae
aqua aromatica
aqua bromata
aqua bulliens
aqua caelestis
aqua camphirae
aqua chlorata
aqua fortis
aqua green
aqua labyrinthi
aqua marina
aqua mirabilis
aqua phagedaenica nigra
aqua pura
aqua regia
aqua rosae
aqua tofana
aqua vitae
aqua-vitae
aquamarine chrysolite
aquamarine topaz
aquatic plant
aqueduct bridge
aqueduct of Sylvius
aqueo-
aqueous ammonia
aqueous humor
aqueous humour
aquiline-nosed
aquo-ion
ar-
arabian coffee

arabic
numeral
arabica coffee
arable land
arachidic acid
arachis oil
arachnoid granulation
arachnoid membrane
arba kanfoth
arbiter elegantiae
arbiter elegantiarum
arbiter of fashion
arbiter of taste
arbitrament of the sword
arbitrated par
arbitration bar
arbitration treaty
arbor day
arbor press
arbor shaft
arbor vine
arbor vitae
arborization block
arborvitae leaf miner
arc column
arc cosecant
arc cosine
arc cotangent
arc discharge
arc flame
arc furnace
arc generator
arc lamp
arc light
arc lighting
arc pitch
arc process
arc secant
arc sine
arc spectrum
arc tangent
arc transmitter
arc weld
arc welder
arc welding
arc-back
arc-boutant
arc-jet engine

arc-over
arc-shaped
arcane meaning
arcanum arcanorum
arch aurora
arch bar
arch barrel
arch beam
arch board
arch brace
arch brick
arch bridge
arch buttress
arch dam
arch head
arch order
arch over
arch press
arch ring
arch solid
arch spring
arch stone
arch support
arch-
arch-brahman
arch-butler
arch-buttress
arch-chanter
arch-christendom
arch-christianity
arch-enemy
arch-fiend
arch-flamen
arch-foe
arch-gravity
 dam
arch-heretic
arch-poet
arch-prelate
arch-presbyter
arch-protestant
arch-sea
arch-traitor
arch-villain
arch-whig
archae-
archaeo-
archaic smile

archaic white race
arched roof
arched truss
archepiscopal cross
archery ground
arches-court
archetypal idea
archetypal image
archetypal myth
archetypal pattern
archetypal symbol
archetypal world
archi-
archiepiscopal cross
archil extract
archil liquor
archimedes' screw
archippus butterfly
architect's table
architectural bronze
architectural capitals
architectural draftsman
architectural engineer
architectural ornamentation
architectural ornamentations
architectural sculpture
architectural topping
architectural toppings
architecture styles
arcing contact
arcing jaws
arcs-boutants
arctic char
arctic circle
arctic fox
arctic rescue helicopter
arctic sea smoke
arctic seal
arctic smoke
arctic tern
arctic timothy
arctico-altaic
arcus senilis
arcwise connected set
ardent friend
ardent
friendship
ardent imagination

ardent spirits
ardor urinae
area bombing
area code
area gate
area graph
area measure
area measures
area opaca
area pellucida
area rule
area sneak
area study
area vasculosa
area vector
area vitellina
area wall
area-moment method
areal linguistics
areca catechu
areca nut
areca palm
arena theater
arena theatre
arenaceo-
arenoso-
areo-
areolate mildew
argan oil
argan tree
argemone oil
argent-vive
argentella lace
argentine thistle
argento-
argento-cuprous sulfide
argillaceo-
argillo-
arginine phosphagen
argle-bargie
argle-bargle
argon lamp
argon potassium dating
argue at the bar
argue down
argue for
argue insincerely
argue into

argue to no purpose
argue your case
argue-bargue
argument by analogy
argument from design
argument principle
argumentMaths
arguments at the bar
argumentum a fortiori
argumentum ad baculum
argumentum ad captandum
argumentum ad captandum vulgus
argumentum ad hominem
argumentum ad rem
argumentum baculinum
argus brown
argus pheasant
argus
 shell
argus tortoise beetle
argus-eyed
argy-bargied
argy-bargies
argy-bargy
argy-bargying
argyr-
arh-
aria buffa
aria cantabile
aria d'agilita
aria d'imitazione
aria da capo
aria da chiesa
aria di bravura
aria di coloratura
aria fugata
aria parlante
aria singer
arias da capo
arid region
ariel gazelle
ariel petrel
ariel toucan
arise and go to
arise from
arising from
aristo-
aristocratic disdain

aristocratic presumption
arithmetic mean
arithmetic progression
arithmetic series
arithmetical progression
arithmetical proportion
arithmetico-geometric
arithmetico-geometrical
arithmo-
arjun wax
ark shell
arkwright furniture
arle penny
arles penny
arm band
arm board
arm coil
arm garter
arm gear
arm guard
arm in arm
arm of the law
arm of the sea
arm of the service
arm stake
arm viol
arm wrestling
arm-chair
arm-great
arm-headed
arm-hole
arm-in-arm
arm-linked
arm-shaped
armadillo shell
armature assembler
armature bander
armature binder
armature reaction
armature winder
armature winding
armchair authority
armchair
philosopher
armed and ready
armed assault
armed at all points
armed bullhead

armed cap-a-pie
armed combat
armed conflict
armed force
armed forces
armed guard
armed neutrality
armed robbery
armed service
armed to the teeth
armed with patience
armes parlantes
armillary sphere
arming cap
arming chest
arming doublet
armistice day
armless chair
armor belt
armor grating
armor plate
armor plating
armor-bearer
armor-clad
armor-piercing
armor-plate
armor-plated
armored cable
armored car
armored combat
armored corps
armored cruiser
armored dinosaur
armored forces
armored heart
armored scale
armored tactics
armored vessel
armorial bearings
armour plate
armour-bearer
armour-clad
armour-piercing
armour-plate
armoured car
armoured troops
arms of Morpheus
arms race

army ant
army area
army brat
army brown
army corps
army cutworm
army engineer
army engineering
army group
army nurse corps
army of occupation
army reserves
army service corps
army troops
army worm
arnica bud
aroint thee
aromatic
 compound
aromatic gum
aromatic spirits of ammonia
aromatic water
aromatized wine
around the bush
around the clock
around-the-clock
arouse notice
arouse the memory
arouse your enthusiasm
arouse your passion
arrange a match
arrange evidence
arrange for
arrange in layers
arrange in levels
arrange in strata
arrange in tiers
arrange itself
arrange matters
arrange your ideas
arrange your thoughts
arrant coward
arras-wise
arrear-guard
arrear-ward
arrest attention
arrest of judgment
arrest the thoughts

arrest your notice
arrested development
arresting gear
arrestor hook
arriere fee
arriere tenant
arriere vassal
arriere-ban
arriere-pensee
arris fillet
arris gutter
arris piece
arris rail
arrive at
arrive at a conclusion
arrive at an agreement
arrive in
arrive upon
arrogate to yourself
arrow aimed at your heart
arrow arum
arrow cane
arrow for
arrow grass
arrow horn
arrow maker
arrow making
arrow mehl
arrow release
arrow rest
arrow shot
arrow snake
arrow stave
arrow straightener
arrow-back
arrow-back
chair
arrow-bearing
arrow-grass
arrow-grass family
arrow-head
arrow-leaved
arrow-root
arrow-shaped
arrow-slain
arrow-smitten
arrow-toothed
arrow-wood

arrow-wounded
arrowroot family
arroyo grape
arroyo willow
arroz con pollo
ars est celare artem
ars gratia artis
ars longa vita brevis
ars nova
ars poetica
arse licker
arsen-
arsenic acid
arsenic antidote
arsenic bloom
arsenic calciner
arsenic disulfide
arsenic eater
arsenic eating
arsenic glass
arsenic green
arsenic mirror
arsenic mold
arsenic monosulfide
arsenic orange
arsenic refiner
arsenic smelter
arsenic trichloride
arsenic trioxide
arsenic yellow
arsenic-
arsenical babbitt
arsenical pyrite
arsenio-
arsenious acid
arsenious oxide
arseniuretted hydrogen
arseno group
arseno radical
arseno-
arsenous acid
arsenous anhydride
arsenous oxide
arsha rite
arsino group
arsino radical
arson investigator
arsy-varsiness

arsy-varsy
arsy-versy
art autre
art brown
art brut
art center
art column
art composition
art critic
art criticism
art dealer
art
deco
art department
art design
art director
art editor
art equipment
art exhibition
art expression
art film
art form
art gallery
art glass
art gray
art green
art guild
art league
art lining
art manual
art museum
art music
art nouveau
art object
art of public speaking
art of reason
art of war
art paper
art period
art school
art schools
art shade
art song
art square
art student
art styles
art supervisor
art teacher

art theater
art union
art work
art-colored
art-conscious
art-like
art-minded
artemisia green
arteri-
arterial aneurism
arterial blood
arterial highway
arterial street
arterial transfusion
arterial varix
arterio-
arteriosclerotic psychosis
artery forceps
artesian borer
artesian well
artful dodge
artful endearments
arthr-
arthritis deformans
arthritis fungosa
arthritis pauperum
arthro-
artichoke bottom
artichoke green
article of commerce
article of faith
article of merchandise
article of virtu
article writer
articled clerk
articles of association
articles of faith
articles
 of religion
articulated locomotive
articulated lorry
articulatory phonetics
artificer branch
artificial aids
artificial antenna
artificial blond
artificial dye
artificial feedback kidney

artificial feel
artificial fiber
artificial heart
artificial horizon
artificial immunity
artificial insemination
artificial intelligence
artificial isotope
artificial kidney
artificial lake
artificial language
artificial languages
artificial leech
artificial magnet
artificial nucleation
artificial pacemaker
artificial person
artificial radioactivity
artificial respiration
artificial satellite
artificial satellites
artificial selection
artificial sweetener
artificial turf
artificial voice
artillery hub
artillery park
artillery plant
artillery train
artillery wagon
artillery wheel
artisan work
artist lithography
artist's model
artist's proof
artist-in-residence
artiste-peintre
artistic administrator
artistic director
artistic flair
artistic imagination
artistic invention
artistic judgment
artistic production
artistic
 quality
artistic school
artistic skill

artistic style
artistic taste
artistic temperament
artists' canvas
arts and crafts
arts college
arts of design
arts-man
arts-master
artsy-craftsiness
artsy-craftsy
arty-craftiness
arty-crafty
arum family
arum lily
aryl group
aryl radical
aryteno-
aryteno-epiglottic
arytenoid cartilages
as I live and breathe
as a body
as a bonus
as a case in point
as a consequence
as a cover
as a cover-up
as a gift
as a guess
as a joke
as a matter of course
as a matter of fact
as a matter of form
as a pretext
as a profession
as a replacement for
as a result
as a result of
as a rough guess
as a rule
as a substitute for
as a vocation
as a whole
as agreed upon
as all creation
as all get-out
as an alibi
as an alternative

as an alternative to
as an approximation
as an example
as an excuse
as an instance
as attested by
as bad as bad can be
as bad as they come
as bad as they make 'em
as best as you can
as big as life
as boundless as the sea
as broad as
long
as can be
as chaste as Diana
as chaste as unsunn'd snow
as clear as day
as close as a vise
as cold as any stone
as compared with
as compensation
as contracted for
as destiny wills
as earnest
as every schoolboy knows
as expected
as far as
as far as I am concerned
as far as possible
as far as the eye can see
as far as you can see
as far as you can tell
as far as you desire
as far as you know
as fate wills
as firm as a stone
as fit as a fiddle
as for
as full as a tick
as good as
as good as good can be
as good as they come
as good as they make 'em
as good as your word
as hard as nails
as here defined
as here interpreted

as how
as if
as ill luck would have it
as in duty bound
as is
as is fitting
as is just
as is only fair
as is only right
as is proper
as is right
as is the custom
as is usual
as is your due
as is your right
as is your wont
as it chanced
as it has been said
as it is
as it is said
as it may be
as it may chance
as it may happen
as it may turn out
as it may turn up
as it ought
to be
as it pleases yourself
as it seems
as it seems best
as it seems good
as it should be
as it suits yourself
as it was said of old
as it were
as large as life
as lief
as lief as not
as lies in your power
as like as can be
as like as eggs
as like as two peas in a pod
as lissome as a hazel wand
as little as may be
as long as
as long as your arm
as luck wills
as luck would have it

as matters stand
as may be
as may be expected
as merry as the day is long
as much again
as much as
as much as in one lies
as much as lieth in you
as much as to say
as near as makes no difference
as near as no matter
as new
as no one would have predicted
as of
as of a chapter
as of now
as often as can be
as often as not
as often as you like
as often as you wish
as one
as one goes
as one man
as ordered
as our guest
as per usual
as plain as a pikestaff
as plain as plain can be
as promised
as proud as Punch
as proxy for
as red
as regards
as representing
as required
as respects
as safe as houses
as seen
as soon
as
soon as
as such
as sure as I live and breathe
as the case may be
as the crow flies
as the day is long
as the fellow says
as the matter stands

as the saying goes
as the saying is
as the sparks fly upward
as the story goes
as the story runs
as the tree falls
as the world goes
as they say
as things are
as things go
as things may fall
as things turn out
as things worked out
as thou wilt
as though
as tightfisted as a kulak
as times go
as to
as transient as the clouds
as usual
as well
as well as
as well as can be said
as who should say
as wide asunder as pole and pole
as yet
as you may have suspected
as you might suppose
as you might think
as you please
as you say
as you sees it
as you think best
as you will
as you wish
as-
asa dulcis
asafetida oil
asarum camphor
asarum oil
asbestos blanket
asbestos board
asbestos braid
asbestos carder
asbestos cement
asbestos cloth
asbestos covering
asbestos crusher

asbestos curtain
asbestos doubler
asbestos felt
asbestos fiber
asbestos filter
asbestos
 flooring
asbestos lagging
asbestos lining
asbestos listing
asbestos lumber
asbestos paper
asbestos porcelain
asbestos rock
asbestos tile
asbestos toaster
asbestos weaver
asbestos wood
asbestos-coated
asbestos-corrugated
asbestos-covered
asbestos-packed
asbestos-protected
asbestos-welded
asc-
ascend the throne
ascending aorta
ascending colon
ascending node
ascension day
ascetical theology
asclepias butterfly
asco-
ascorbic acid
ascot tan
ascot tie
ascribe importance to
ascribe to
ascus fruit
aseptic surgery
asexual generation
asexual reproduction
ash barrel
ash bin
ash blond
ash bread
ash bud
ash cake

ash can
ash canker
ash cart
ash chute
ash collector
ash color
ash cone
ash furnace
ash gray
ash heap
ash hopper
ash key
ash leaf
ash oven
ash pile
ash pole
ash pone
ash pumpkin
ash rock
ash spear
ash staff
ash tray
ash tree
ash wednesday
ash wood
ash-bellied
ash-blond
ash-blue
ash-colored
ash-free
ash-gray
ash-gray blister beetle
ash-leaved
ash-leaved maple
ash-looking
ash-staved
ash-throated
ash-wednesday
ash-white
ashamed
 of yourself
ashen-hued
ashes in the mouth
ashes to ashes and dust to dust
ashlar brick
ashlar line
ashlar veneer
asian influenza

asiatic cholera
aside from
aside from de
ask a question
ask about
ask after
ask and give no quarter
ask bids for
ask for
ask for it
ask for pity
ask for your hand
ask forgiveness
ask in exchange
ask leave of no man
ask no favors
ask no quarter
ask offers for
ask questions
ask the impossible
asked price
asking bid
asking price
asleep at the switch
asleep in Jesus
asleep in the Lord
asleep on the job
asleep on your feet
asp viper
asparagic acid
asparaginic acid
asparagus bean
asparagus beetle
asparagus broccoli
asparagus fern
asparagus lettuce
asparagus pea
asparagus stone
aspartic acid
aspect ratio
aspen poplar
asphalt cement
asphalt grout
asphalt jungle
asphalt macadam
asphalt mastic
asphalt oil
asphalt paint

asphalt paper
asphalt rock
asphalt tile
asphalt-base
asphalt-base oil
asphodel green
asphyxia neonatorum
asphyxiating
 gas
aspirating stroke
aspiration pneumonia
aspire after
aspire to
ass between two bundles of hay
ass in lion's skin
ass over elbows
ass parsley
ass-backwards
ass-chewing
ass-ear
ass-head
ass-headed
ass-kisser
ass-kissing
ass-licker
ass-licking
ass-reaming
ass-ship
assai palm
assail the ear
assail the nostrils
assassin bug
assault and battery
assault and robbery
assault boat
assault line
assault sexually
assault the ear
assault transport
assault-troop plane
assay balance
assay bar
assay beam
assay crucible
assay cup
assay flask
assay foot
assay furnace

assay groove
assay mill
assay office
assay oven
assay pound
assay ton
assay-office bar
assembling mark
assembly conveyer
assembly district
assembly hall
assembly language
assembly line
assembly plant
assembly room
assembly routine
assembly-line housing
assembly-line production
assent grudgingly
assent to
assent under protest
assented bond
assert a claim to
assert a right to
assert a title to
assert the contrary
assert under oath
assert
 yourself
assertiveness training
asses' bridge
assess a tax upon
assessable stock
assessed valuation
assessment company
assessment insurance
assessment on default
assessment work
asset currency
asset-stripping
assets and liabilities
assign lessons
assign to
assign to a place
assignation house
assigned counsel
assigned risk
assigned task

assigned to
assignment of cause
assimilate to
assimilate with
assistant agent
assistant auditor
assistant barber
assistant bookkeeper
assistant buyer
assistant cashier
assistant chemist
assistant chief
assistant clerk
assistant deputy
assistant director
assistant driver
assistant druggist
assistant editor
assistant engineer
assistant examiner
assistant foreman
assistant guard
assistant housekeeper
assistant inspector
assistant janitor
assistant janitress
assistant librarian
assistant manager
assistant professor
associate professor
associate with
associate yourself with
associated statehood
association area
association book
association by contiguity
association
by similarity
association by sound
association copy
association fiber
association football
association neuron
association neurosis
association of ideas
association psychology
association test
association time

associative algebra
associative anamnesis
associative neuron
assort with
assume airs
assume command
assume the
assume the guise of
assume the identity of
assume the offensive
assumed bond
assumed name
assumed position
assuming that
assumption of superiority
assure yourself
assured faith
assured of success
assured probity
astable circuit
astasia-abasia
astatic galvanometer
aster daisy
aster family
aster purple
aster ray
aster yellows
asterias swallowtail
asthma herb
asthma paper
asthma weed
asthmatic cigarette
asthmatic wheeze
astigmatic lens
astonishing thing
astr-
astragal Architect
astrakhan cloth
astral body
astral crown
astral influences
astral lamp
astral plane
astral projection
astral ray
astral spirit
astringent bitters
astro hatch

astro station
astro-
astro-inertial
guidance
astro-meteorology
astronomical almanac
astronomical calendar
astronomical chart
astronomical clock
astronomical day
astronomical distance
astronomical frame of reference
astronomical longitude
astronomical number
astronomical observatory
astronomical refraction
astronomical telescope
astronomical twilight
astronomical unit
astronomical year
asymmetric carbon atom
asymmetric time
asymmetric transmission
asymmetry potential
at a bargain
at a blow
at a clip
at a declining rate
at a disadvantage
at a discount
at a distance
at a first approximation
at a funeral pace
at a glance
at a good clip
at a great rate
at a halt
at a high price
at a later time
at a loose end
at a loss
at a low ebb
at a low price
at a nonplus
at a premium
at a price
at a profit
at a reduction

at a sacrifice
at a slant
at a snail's pace
at a stand
at a standstill
at a stretch
at a stroke
at a subsequent time
at a tangent
at a turtle's pace
at a venture
at a word
at about
at all
at all accounts
at all costs
at
all events
at all hazards
at all points
at all risks
at all times
at an advanced age
at an angle
at an end
at an impasse
at anchor
at another time
at any cost
at any price
at any rate
at any sacrifice
at any straw
at any time
at arm's length
at attention
at auction
at bar
at bat
at bay
at bayonet point
at best
at bottom
at budget prices
at choice
at close hand
at close quarters
at cockcrow

at concert pitch
at cost
at cost price
at cross-purposes
at cross-purposes with
at daggers
at daggers drawn
at dawn
at dawn of day
at death's door
at demand
at discretion
at each other's throat
at ease
at ease and lighthearted
at enmity
at established periods
at every turn
at fault
at feud
at fever pitch
at first
at first blush
at first hand
at first light
at first sight
at first view
at fixed periods
at flank speed
at flood
at full
at full blast
at full drive
at full length
at full pelt
at full speed
at full throttle
at gaze
at grade
at great cost
at great expense
at grips
at gunpoint
at hack
at half
cock
at hand
at haphazard

at haven
at hazard
at heart
at heavy cost
at heel
at home
at home in
at home with
at infrequent intervals
at intervals
at irregular intervals
at issue
at it
at just the wrong time
at large
at last
at law
at least
at leisure
at length
at liberty
at loggerheads
at long last
at loose ends
at mid-day
at most
at next hand
at night
at no
at no great distance
at no hand
at no time
at noon
at odd times
at odds
at odds with
at once
at once and on the spot
at one
at one and the same time
at one blow
at one fell swoop
at one jump
at one stroke
at one swoop
at one time
at one with
at opposite extremes

at outcry
at outs
at par
at peace
at piggy-bank prices
at pleasure
at present
at prime cost
at public auction
at public outcry
at random
at reduced rates
at regular intervals
at rest
at right angles
at rock bottom
at sea
at second hand
at short notice
at sight
at sixes and sevens
at small cost
at some other time
at square
at stake
at stated times
at straws
at strife
at sunrise
at
swords' points
at that
at that instant
at that moment
at that rate
at that time
at the bar
at the base of
at the beck and call of
at the bottom
at the bottom of
at the bottom of the heap
at the bottom of the scale
at the bound
at the breast
at the bursting point
at the conclusion
at the core

at the crack of dawn
at the dip
at the double
at the drop of a handkerchief
at the drop of a hat
at the eleventh hour
at the end
at the end of your rope
at the end of your tether
at the expense of
at the feet of
at the first blush
at the first go-off
at the first opportunity
at the foot of
at the gun
at the hand
at the hand of
at the hands of
at the head
at the heart of
at the height
at the helm
at the instance of
at the last
at the last extremity
at the last gasp
at the last minute
at the latest
at the least
at the limit
at the mercy of
at the most
at the nadir
at the option of
at the outside
at the peak
at the periphery
at the pinnacle
at the pitch of your breath
at the point of
at the point
of a gun
at the point of death
at the point of the bayonet
at the point of the gun
at the point of the sword
at the portals of death

at the present time
at the reins
at the same instant
at the same moment that
at the same time
at the same time as
at the same time that
at the start
at the summit
at the threshold
at the threshold of
at the time of
at the time that
at the top
at the top of the ladder
at the top of the tree
at the top of your bent
at the top of your lungs
at the top of your voice
at the wheel
at the word of command
at the zenith
at this instant
at this juncture
at this moment
at this point
at this time
at this time of day
at times
at twelve-o'clock sharp
at variance
at variance with
at variance with the facts
at various times
at war
at war 'twixt will and will not
at war with
at what price
at what time
at whatever time
at which
at which instant
at which moment
at which time
at wholesale
at will
at work
at worst

at wt
at your beck and call
at your best
at your bidding
at
your call
at your command
at your convenience
at your discretion
at your disposal
at your door
at your ease
at your elbow
at your feet
at your fingertips
at your heels
at your last gasp
at your leisure
at your mercy
at your nod
at your orders
at your own discretion
at your own sweet time
at your own sweet will
at your pleasure
at your service
at your side
at your will
at your will and pleasure
at your wit's end
at your wits' end
at-
at-home
at-homeish
at-homeishness
at-homeness
at-large
atamasco lily
ate-
atef crown
atef-crown
atelets sauce
atelo-
ater-
athanasian creed
athel tree
athlete's foot
athlete's heart

athletic coach
athletic equipment
athletic field
athletic heart
athletic socks
athletic support
athletic supporter
athwart the hawse
atka mackerel
atlantic time
atlanto-
atlas folio
atlee gall
atlo-
atlo-odontoid
atloido-occipital
atmo-
atmospheric attenuation
atmospheric boundary layer
atmospheric braking
atmospheric condition
atmospheric electricity
atmospheric engine
atmospheric
layer
atmospheric perspective
atmospheric pressure
atmospheric tides
atmospheric visibility
atom blast
atom bomb
atom counter
atom gun
atom model
atom smasher
atom soul
atom war
atom-bomb
atom-chipping
atom-rocket
atom-smashing
atom-tagger
atom-tagging
atom-tracing spectrometer
atomic accelerator
atomic age
atomic arsenal
atomic attack

atomic battery
atomic beam
atomic bomb
atomic cannon
atomic chemistry
atomic clock
atomic cluster
atomic cocktail
atomic constants
atomic decay
atomic disintegration
atomic energy
atomic energy plant
atomic engine
atomic explosion
atomic furnace
atomic gun
atomic heat
atomic hydrogen torch
atomic hydrogen welding
atomic hypothesis
atomic mass
atomic mass unit
atomic model
atomic nucleus
atomic number
atomic particle
atomic particles
atomic pile
atomic power
atomic power plant
atomic project
atomic radiation
atomic ray
atomic reaction
atomic research
atomic science
atomic scientist
atomic structure
atomic submarine
atomic theory
atomic units
atomic
units and constants
atomic volume
atomic war
atomic warfare
atomic warhead

atomic weapons
atomic weight
atomic-powered submarine
atone for
atrial fibrillation
atrioventricular block
atrioventricular bundle
atrioventricular node
atro-
atrocious pain
atrocity story
atrophic arthritis
atrophic inflammation
attacca subito
attach a condition
attach a proviso
attach importance to
attach little importance to
attach some weight to
attach to
attach too much importance to
attach yourself to
attache case
attached to
attachment disk
attachment plug
attack bomber
attack in force
attack like lightning
attack of illness
attack of nerves
attack plane
attack squadron
attack time
attack transport
attain fulfillment
attain majority
attain mastery of
attain to
attain your objective
attar of roses
attempt the impossible
attempt to
attend Communion
attend Mass
attend classes
attend closely to
attend on

attend rites
attend school
attend to
attend to business
attend to orders
attend to your work
attend upon
attendance
 allowance
attendance centre
attendance officer
attendant godling
attendant spirit
attended by
attended with danger
attending physician
attention signal
attention span
attention to detail
attention to fact
attention-getting
attenuation charge
attested copy
attic order
attic room
attic story
attitude art
attitude-control rocket
atto-
attorney general
attorney generals
attorney in fact
attorney-at-law
attorney-generalship
attorney-in-fact
attorneys general
attorneys-at-law
attorneys-in-fact
attract attention
attract notice
attract your interest
attracted to
attracted-disk
attraction cone
attraction sphere
attractive nuisance
attributable to
attribute to

attributed to
atypical pneumonia
au beurre fondu
au beurre noire
au beurre roux
au bleu
au contraire
au courant
au fait
au fond
au fromage
au gras
au gratin
au jus
au kirsch
au lait
au maigre
au naturel
au pair
au pair girl
au pied de la lettre
au reste
au revoir
au vert pre
au vin blanc
au vol
aubergine purple
auburn-haired
auction
agent
auction block
auction bridge
auction euchre
auction hearts
auction off
auction pinochle
auction pitch
auction pool
auction room
auction sale
aucuba green
aucuba mosaic
audibility meter
audience chamber
audience court
audience room
audience success
audience-proof

audio amplifier
audio channel
audio detector
audio devices
audio distortion
audio frequency
audio monitor
audio signal
audio sound system
audio transmitter
audio truck
audio-
audio-IF oscillator
audio-frequency
audio-frequency amplification
audio-frequency amplifier
audio-frequency circuit
audio-frequency detector
audio-frequency oscillator
audio-frequency tube
audio-visual
audio-visual aids
audio-visually
audit ale
audit book
audit certificate
audit date
audit house
audit office
audit room
auditor-general
auditors-general
auditory amnesia
auditory aphasia
auditory apparatus
auditory canal
auditory effect
auditory impairment
auditory meatus
auditory nerve
auditory organ
auditory ossicles
auditory phenomenon
auditory
phonetics
auditory range
auditory sense
auditory stimulus

auditory tube
auditory vesicle
auf Wiedersehen
auf wiedersehen
augen-gabbro
augen-gneiss
auger bit
auger box
auger crank
auger drill
auger feed
auger handle
auger hole
auger lathe
auger machine
auger press
auger shell
auger stem
auger tongue
auger worm
auger-nose
auger-type
augite-porphyrite
augite-porphyry
augmented interval
augmented sixth
augmented triad
augur well
auld lang syne
auld-farran
auld-farrand
auld-farrant
auld-warld
auln-
aunc-
auntie man
aur-
aural examination
aural sense
aurea mediocritas
aurene glass
aureolin yellow
auri-iodide
auricula purple
auricular appendage
auricular confession
auricular fibrillation
auriculo-infraorbital

auriculo-occipital
auro-
aurora australis
aurora borealis
aurora glory
aurora orange
aurora particle
aurora particle counter
aurora particles
aurora polaris
aurora sauce
aurora trout
aurora yellow
auspicium melioris aevi
aussage test
austenitic stainless steel
austerity program
austr-
australia
 day
australian ballot
australian terrier
aut Caesar
aut nihil
aut-
auteur theory
authentic cadence
authentic mode
author catalog
author catalogue
author mark
author number
author's alteration
author's copy
author's proof
author-created
author-entry
author-publisher
author-ridden
authoritative in
authorities, the
authority on money and banking
authorized absence
authorized capital
authorized capital stock
authorized version
autistic distortion
autistic thinking

auto antenna
auto carrier
auto court
auto laundry
auto lift
auto lorry
auto mechanic
auto mechanics
auto part
auto parts
auto pilot
auto polish
auto radio
auto sacramental
auto show
auto-
auto-alarm
auto-audible
auto-da-f
auto-da-fe
auto-dafe
auto-infection
auto-inoculability
auto-inoculable
auto-inoculation
auto-objective
auto-observation
auto-omnibus
auto-ophthalmoscope
auto-ophthalmoscopy
auto-oxidation
auto-oxidize
auto-rickshaw
auto-rifle
autoconvection gradient
autodyne reception
autogenous vaccine
autographic recorder
autoignition
point
autokinetic effect
autokinetic illusion
autokinetic phenomenon
autolysate-precipitate
automanual system
automated factory
automated satellite
automatic analyzer

automatic analyzers
automatic block signal
automatic boost control
automatic choke
automatic control
automatic control engineering
automatic control system
automatic data processing
automatic detector
automatic detectors
automatic device
automatic devices
automatic dishwasher
automatic drill
automatic drive
automatic electronic navigation
automatic electronics
automatic engineering
automatic exchange
automatic factory
automatic feed mechanism
automatic frequency control
automatic gain control
automatic guidance
automatic gun
automatic gun director
automatic heater
automatic indicating scale
automatic indicator
automatic indicators
automatic iron
automatic laundry
automatic machine
automatic piano
automatic pilot
automatic pinspotter
automatic pistol
automatic plotter
automatic premium loan
automatic printer
automatic
range finder
automatic reaction
automatic response
automatic rifle
automatic screw machine
automatic sight
automatic sprinkler

automatic stability
automatic stop
automatic switch
automatic technician
automatic technology
automatic telegraph
automatic telephone
automatic telephone exchange
automatic telephone system
automatic tracking
automatic transmission
automatic trip
automatic typesetting
automatic washer
automatic washer-dryer
automatic writing
automatic-weapons fire
automation technology
automobile board
automobile insurance
automobile liabilitity insurance
automobile race
automobile racing
automobile registration tax
automobile showroom
automobile sled
automorphic-granular
automotive engineer
automotive engineering
autonomic epilepsy
autonomic nervous system
autonomic reaction
autos sacramentales
autoserum therapy
autotransformer starter
autotrophic organism
autotuberculin test
autourine test
autoxidation-reduction
autre chose
autre vie
autres temps autres murs
autumn
 bellflower
autumn blond
autumn catchfly
autumn crocus
autumn green

autumn leaf
autumn mange
autumn oak
autumn of your days
autumn snowflake
autumn squill
autumn violet
autumn willow
autumn-brown
autumn-spring
autumnal equinox
autumnal point
aux abois
aux aguets
aux armes
aux fines herbes
auxiliary boat
auxiliary equation
auxiliary language
auxiliary note
auxiliary power unit
auxiliary rafter
auxiliary tone
auxiliary verb
av-
avail nothing
avail yourself of
available funds
available gain
available light
available means
available resources
avalanche conduction
avalanche lily
avalanche wind
avant-
avant-courier
avant-garde
avant-garde jazz
avant-gardism
avant-gardist
avant-propos
avarice on stilts and masked
ave maria
avec plaisir
avellan cross
avenging spirit
aver-

average adjuster
average book
average clause
average deviation
average down
average life
average man
average out
average person
average revenue
average run
average stater
average up
average-life period
averse to
aversion therapy
avert
 the eyes
avian diphtheria
avian leukosis
avian pneumoencephalitis
avian pox
avian pseudoplague
avian spirochetosis
aviation badge
aviation beacon
aviation beacons
aviation cadet
aviation field
aviation gasoline
aviation instrument
aviation insurance
aviation medicine
aviation radar
aviation radio
aviation technology
aviation wings
aviator glasses
avignon berry
avion-canon
avocado fat
avocado green
avocado oil
avocado pear
avocado weevil
avoid both Scylla and Charybdis
avoid excess
avoid extremes

avoid the limelight
avoid your gaze
avoidance mechanism
avoidance play
avoidance reaction
avoiding reaction
avoirdupois pound
avoirdupois weight
avowed Communist
aw-
awake a doubt
awake a suspicion
awake the dead
awake the echoes
awake to
awake to life immortal
awaken the memory
awaken the mind
awaken the thoughts
awaken to
award wage
award winner
aware of
away back
away from
away from home
away from the point
away off
away with you
away-going
away-going crop
awe-awakening
awe-band
awe-bound
awe-commanding
awe-compelling
awe-filled
awe-inspired
awe-inspiring
awe-inspiringly
awe-stricken
awe-strike
awe-struck
awful
 silence
awful-eyed
awful-gleaming
awful-looking

awful-voiced
awkward age
awkward person
awkward squad
awl bird
awl-fruited
awl-leaved
awl-shaped
awn grass
awned wheat grass
awning cloth
awning deck
awning window
awnless brome grass
ax eye
ax grinder
ax handle
ax helve
ax maker
ax sheath
ax wedge
ax, the
ax-adz
ax-shaped
axe-breaker
axial flow compressor
axial motion
axial pencil
axial skeleton
axial-flow
axial-flow turbine
axial-flow turbojet
axial-flow unit
axial-type engine
axiological ethics
axiom of choice
axiom of countability
axis cylinder
axis cylinder process
axis deer
axis of abscissas
axis of ordinates
axis of revolution
axis of symmetry
axle adjuster
axle arm
axle assembler
axle bar

axle bearing
axle bender
axle bolt
axle box
axle bush
axle cap
axle case
axle centerer
axle cutter
axle dresser
axle ender
axle filer
axle finisher
axle forger
axle
grease
axle grinder
axle guard
axle guide
axle hammer
axle hammerman
axle hardener
axle hook
axle journal
axle lagger
axle lathe
axle load
axle oiler
axle packer
axle pin
axle pinner
axle press
axle rougher
axle saddle
axle seat
axle setter
axle shaft
axle sleeve
axle slotter
axle spindle
axle stool
axle straightener
axle tooth
axle turner
axle wad
axle worker
axle-bending
axle-boring

axle-centering
axle-forging
axle-tooth
axle-tree
axletree arm
axonometric projection
ay-
ay-green
aye-aye
aye-ceaseless
aye-during
aye-dwelling
aye-lasting
aye-living
aye-remaining
aye-renewed
aye-restless
aye-rolling
aye-running
aye-sought
aye-troubled
aye-turning
aye-varied
aye-welcome
ayenbite of inwit
ayer-ayer
ayr stone
ayurvedic medicine
az-
aza-
azido group
azido radical
azimuth bar
azimuth circle
azimuth co-ordinate
azimuth compass
azimuth dial
azimuth distance
azimuth error
azimuthal equidistant projection
azimuthal projection
azimuthal quantum number
azine dye
azo blue
azo dye
azo group
azo radical
azo-

azo-orange
azo-orchil
azo-orseilline
azoic
 dye
azomethine group
azon bomb
azonal soil
azonium base
azonium salt
azoxy group
azure-blazoned
azure-blue
azure-canopied
azure-circled
azure-colored
azure-domed
azure-eyed
azure-footed
azure-inlaid
azure-mantled
azure-penciled
azure-plumed
azure-tinted
azure-vaulted
azure-veined
azurite blue
azygo-
b Physics
b and b
b battery
b complex
b-horizon
b/d Book-keeping
baal kore
baal marriage
baba au rhum
baba-koto
babas au rhum
babassu oil
babbit-metal
babbitt metal
babbitting jig
babcock test
babe in the wood
babe in the woods
babe-faced
babies'-breath

baby act
baby beef
baby bird
baby blue
baby blue-eyes
baby blues
baby bond
baby bonus
baby boom
baby buggy
baby bunting
baby carriage
baby clothes
baby eyes
baby face
baby farm
baby farmer
baby farming
baby fern
baby grand
baby grand piano
baby heathberry
baby jib topsail
baby kisser
baby lace
baby linen
baby orchid
baby pin
baby pink
baby primrose
baby rambler
baby ribbon
baby seal
baby
sitter
baby snatcher
baby split
baby spot
baby spotlight
baby step
baby talk
baby tears
baby threader
baby tooth
baby walker
baby's breath
baby's-breath
baby's-slippers

baby-blue-eyes
baby-browed
baby-doll
baby-face
baby-faced
baby-featured
baby-kissing
baby-sat
baby-sit
baby-sitter
baby-sitting
baby-sized
baby-snatching
baby-tears
bacalao bird
baccalaureate sermon
baccalaureate service
bach it
bachelor button
bachelor chest
bachelor girl
bachelor party
bachelor perch
bachelor's button
bachelor's degree
bachelor's gown
bachelor's-button
bachelor's-buttons
bachelor-at-arms
bachelors-at-arms
bacillary dysentery
bacillary white diarrhoea
back action
back air pipe
back airing
back anchor
back and fill
back and forth
back answer
back away
back balance
back band
back bar
back beam
back bench
back bender
back block
back boiler

back bond
back center
back check
back choir
back clearance
back cloth
back comb
back country
back crawl
back current
back debts
back dive
back door
back down
back draft
back
 eccentric
back electromotive force
back end
back entry
back fat
back file
back fillet
back focus
back formation
back four
back full
back gear
back green
back hair
back head
back home
back judge
back letter
back line
back liner
back lining
back link
back list
back lot
back maker
back marker
back matter
back molding
back number
back o' Bourke
back o' beyond
back of

back of beyond
back off
back one-third
back order
back out
back out of
back overman
back pack
back page
back painting
back passage
back paternoster
back payments
back pitch
back plastering
back play
back pressure
back projection
back rest
back road
back rod
back room
back run
back sail
back saw
back scatter
back scene
back score
back scratcher
back scratching
back seat
back shaft
back shop
back shutter
back side
back sinew
back slang
back staff
back stairs
back step
back stop
back straight
back strapper
back stream
back street
back stretch
back swath
back swimmer

back talk
back tendon
back the wrong horse
back to back
back
 track
back trail
back turn
back two-thirds
back up
back vent
back venting
back water
back way
back when
back yard
back-
back-acting
back-acting steam engine
back-action steam engine
back-alley
back-and-forth
back-angle
back-bencher
back-berend
back-biting
back-blocker
back-blowing
back-board
back-breaking
back-breathing
back-broken
back-burner
back-check
back-cloth
back-cloths
back-coming
back-connected
back-connected switch
back-country
back-door
back-drawing
back-drawn
back-end
back-face
back-facing
back-fanged
back-fence gossip

back-filleted
back-fire
back-flowing
back-flung
back-focused
back-formation
back-geared
back-glancing
back-going
back-hand
back-handed
back-handed compliment
back-hander
back-lash
back-leaning
back-light
back-lighted
back-lighting
back-list
back-lit
back-log
back-looking
back-lying
back-making
back-number
back-paddle
back-paint
back-palm
back-pedal
back-pedaled
back-pedaling
back-pedalled
back-pedalling
back-piece
back-plaster
back-plate
back-pressure arm-lift
method
back-pressure valve
back-pulling
back-putty
back-racket
back-raking
back-scratcher
back-scratching
back-seat driver
back-set
back-set bed

back-settler
back-sey
back-slang
back-slanging
back-slapping
back-spiker
back-staff
back-starting
back-stepping
back-stitch
back-stope
back-strapped
back-streeter
back-stroke
back-surging
back-sword
back-talk
back-tan
back-titrate
back-titration
back-to-back
back-to-back switching circuit
back-to-front
back-trailer
back-trip
back-up
back-up light
back-ward
back-way
backache brake
backache root
backbreaking work
backdoor trots
backed-off
backer-up
backers-up
backflap hinge
backflow valve
background detail
background music
background projection
background radiation
backhand rent
backing angle
backing bar
backing jointer
backing light
backing metal

backing off
backing out
backing paper
backing store
backing strip
backing striplight
backing up
backing wind
backing-off
backing-off lathe
backpacking tent
backpedaling brake
backseat driver
backspace
 key
backstairs influence
backstay stools
backup light
backup man
backward and forward
backward blessing
backward change
backward deviation
backward motion
backward step
backwards and forwards
backwater valve
bacon and eggs
bacon beetle
bacon hog
bacon-and-eggs
bacon-lettuce-tomato sandwich
bacteri-
bacteria bed
bacterial blight
bacterial canker
bacterial disease
bacterial plaque
bacterial therapy
bacterial vaccine
bacterial wilt
bacterio-
bacterio-opsonic
bacterio-opsonin
bacteriological warfare
baculo-metry
bad actor
bad behavior

bad blood
bad books
bad boy
bad break
bad breath
bad case
bad cess
bad character
bad check
bad child
bad condition
bad conduct discharge
bad copy
bad debt
bad debts
bad deed
bad dream
bad ear
bad egg
bad example
bad eyesight
bad fairy
bad faith
bad feeling
bad for
bad fortune
bad graces
bad grammar
bad guy
bad habit
bad hand
bad handwriting
bad hat
bad humor
bad influence
bad job
bad language
bad light
bad likeness
bad liquor
bad lot
bad luck
bad man
bad
manners
bad money
bad move
bad name

bad news
bad notices
bad odor
bad off
bad people
bad peri
bad person
bad poet
bad poetry
bad policy
bad press
bad quality or effect
bad report
bad reputation
bad repute
bad smell
bad spelling
bad spirit
bad taste
bad temper
bad time
bad times
bad turn
bad will
bad woman
bad writing
bad-headed
bad-hearted
bad-humored
bad-looking
bad-minded
bad-mouth
bad-order freight
bad-smelling
bad-tempered
badge of infamy
badge of office
badger baiting
badger bird
badger dog
badger game
badger plane
badger skunk
badger-legged
badging hook
badly off
badminton court
badminton cup

bae-
baeberry bark
baffle board
baffle description
baffle gate
baffle painting
baffle plate
baffling problem
baffling wind
bag and baggage
bag bearer
bag beater
bag boom
bag bundler
bag cap
bag clasp
bag cleaner
bag cutter
bag dryer
bag feeder
bag filler
bag filter
bag fitter
bag folder
bag fox
bag frame
bag framer
bag holder
bag house
bag loader
bag machinist
bag maker
bag marker
bag mender
bag
net
bag of bones
bag of tricks
bag of wind
bag packer
bag picker
bag printer
bag rack
bag repairer
bag riveter
bag sewer
bag sleeve
bag sorter

bag stacker
bag stitcher
bag table
bag twine
bag work
bag worker
bag wrinkle
bag-bearing
bag-bedded
bag-bundling
bag-cheeked
bag-closing
bag-cutting
bag-filling
bag-flower
bag-folding
bag-printing
bag-reef
bag-sewing
bag-shaped
bag-wig
baggage agent
baggage car
baggage cart
baggage check
baggage clerk
baggage inspector
baggage man
baggage porter
baggage rack
baggage room
baggage train
baggage van
baggage wagon
baggage-smasher
bags I
bagworm moths
baib grass
bail bond
bail out
bail up
bail you out
bail-dock
bail-out
bailer shell
bailey bridge
bain-marie
bains-marie

bait and switch
bait bug
bait casting
bait set
bait the hook
baited trap
bake cart
bake kettle
bake sale
bake-meat
bake-off
baked Alaska
baked beans
baked goods
baked meat
baked sheep's head
baked-apple
baken by surprise
baker bird
baker sheet
baker's cheese
baker's dozen
baker's
legs
baker-knee
baker-kneed
baker-leg
baker-legged
bakers' yeast
bakery moth
bakery proofer
baking powder
baking soda
bal costume
bal masque
balaclava helmet
balance accounts
balance adjuster
balance arm
balance beam
balance bob
balance bridge
balance clerk
balance cock
balance coil
balance crane
balance dock
balance electrometer

balance fish
balance frame
balance gate
balance in hand
balance income with outgo
balance level
balance link
balance lug
balance maker
balance of nature
balance of payments
balance of power
balance of precision
balance of trade
balance pin
balance piston
balance pit
balance plane
balance rail
balance reef
balance ring
balance rope
balance rudder
balance rynd
balance screw
balance sheet
balance spring
balance staff
balance step
balance the books
balance valve
balance watch
balance weight
balance wheel
balanced diet
balanced fund
balanced line
balanced personality
balanced rudder
balanced sentence
balanced step
balanced ticket
balanced valve
balancer set
balancing
band
balancing coil
balancing condenser

balancing flap
balancing link
balancing ring
balancing set
balancing ways
balanitis gangrenosa
balanophore wax
balas ruby
balata belt duck
balata gum
bald as a coot
bald as an egg
bald coot
bald cypress
bald eagle
bald fact
bald-faced
bald-faced hornet
bald-headed
bald-headedness
bald-pated
bald-patedness
balder-brae
balder-herb
bale band
bale breaker
bale buckle
bale conveyor
bale feeder
bale goods
bale hook
bale jumper
bale marker
bale opener
bale out
bale stick
bale stitcher
bale strap
bale tie
bale tier
bale-fire
baleen whale
baling machine
balk at
balk day
balk line
balk-line game
balky horse

ball and chain
ball and ring
ball bearing
ball boy
ball breaker
ball cactus
ball cartridge
ball caster
ball clay
ball club
ball cock
ball fern
ball foot
ball game
ball gentle
ball grinder
ball gudgeon
ball handle
ball indicator
ball ironstone
ball joint
ball lever
ball lightning
ball mill
ball moss
ball mustard
ball of fire
ball of wax
ball park
ball
peen
ball peen hammer
ball pen
ball point pen
ball python
ball reamer
ball rest
ball rose
ball sage
ball screw
ball seater
ball smut
ball snake
ball stitch
ball tap
ball the jack
ball thistle
ball top

ball turret
ball up
ball valve
ball-and-claw foot
ball-and-socket joint
ball-bearing
ball-carrier
ball-flower
ball-hooter
ball-jasper
ball-park
ball-peen hammer
ball-planting
ball-point
ball-point pen
ball-shaped
ball-thrombus
ball-turret gun
ballad horn
ballad maker
ballad making
ballad measure
ballad meter
ballad metre
ballad opera
ballad poetry
ballad reciter
ballad rhyme
ballad singer
ballad singing
ballad stanza
ballad style
ballad writer
ballast brakesman
ballast car
ballast cleaner
ballast crusher
ballast engine
ballast fin
ballast ganger
ballast heaver
ballast hole
ballast inspector
ballast line
ballast loader
ballast master
ballast plant
ballast port

ballast pump
ballast regulator
ballast spreader
ballast stone
ballast tank
ballast tipper
ballast track
ballast trimmer
ballast
 tube
ballast unloader
ballast-cleaning
ballast-crushing
ballast-loading
balled up
balled-up
ballet blanc
ballet d'action
ballet dancer
ballet dancing
ballet divertissement
ballet girl
ballet master
ballet mistress
ballet music
ballet shoes
ballet skirt
ballet slipper
ballet slippers
ballet suite
ballets blancs
balli buntl
ballibuntl hat
balling furnace
balling gun
balling head
balling iron
ballistic camera
ballistic capsule
ballistic galvanometer
ballistic missile
ballistic pendulum
ballistic trajectory
ballistic wind
ballon d'essai
ballon-sonde
ballonet ceiling
ballons d'essai

balloon ball
balloon barrage
balloon bed
balloon chuck
balloon clock
balloon cloth
balloon fabric
balloon feather
balloon foresail
balloon frame
balloon framing
balloon in
balloon jib
balloon sail
balloon seat
balloon sickness
balloon sleeve
balloon tire
balloon trainshed
balloon tyre
balloon vine
balloon-berries
balloon-berry
ballooning in
ballooning spider
ballot box
ballot paper
ballot-box stuffer
ballot-box
 stuffing
balloting place
ballpoint pen
ballroom dance
ballroom dancer
ballroom dancing
ballroom music
balls-up
bally gum
ballyhoo man
balm apple
balm cottonwood
balm cricket
balm dew
balm fir
balm leaf
balm mint
balm of Gilead
balm of gilead

balm oil
balm pine
balm shrub
balm tea
balm wine
balm-apple
balm-breathing
balm-cricket
balm-leaved
balm-shed
balmy sleep
balsa raft
balsam apple
balsam bog
balsam capivi
balsam copaiba
balsam cucumber
balsam fig
balsam fir
balsam flowers
balsam groundsel
balsam herb
balsam hickory
balsam of Mecca
balsam of Peru
balsam of fir
balsam of peru
balsam of tolu
balsam pear
balsam poplar
balsam shrub
balsam spruce
balsam spurge
balsam tree
balsam vine
balsam-tree family
balto-slavic
baluster column
baluster measure
baluster shaft
baluster stem
bambara butter
bamboo brier
bamboo curtain
bamboo fern
bamboo fish
bamboo grass
bamboo money

bamboo oyster
bamboo palm
bamboo partridge
bamboo rat
bamboo reed
bamboo screen
bamboo shade
bamboo shoot
bamboo shoots
bamboo
 sugar
bamboo turning
bamboo vine
bamboo ware
bambui butter
bambuk butter
banana bean
banana belt
banana bird
banana boa
banana eater
banana family
banana fish
banana flour
banana fly
banana freckle
banana liquid
banana moth
banana oil
banana quit
banana republic
banana root borer
banana seat
banana shrub
banana solution
banana split
banana water lily
banana weevil
banana wilt
band bracelet
band brake
band chain
band concert
band conveyer
band course
band creaser
band cutter
band driver

band filter
band iron
band leader
band major
band maker
band mill
band plant
band pulley
band resaw
band saw
band screen
band shell
band spectrum
band steel
band theory of solids
band together
band wagon
band wheel
band-aid
band-gala
band-pass filter
band-saw file
band-sawing
band-sawyer
band-shaped
band-tailed
band-tailed pigeon
bandage compress
bandar-log
banded anteater
banded purple
banded rattlesnake
banded rudderfish
banded together
bandied about
bandle linen
bandoleer fruit
bandtailed pigeon
bandy
about
bandy leg
bandy legsbow-legged
bandy with
bandy words
bandy-bandy
bandy-legged
baneful dire
bang away at

bang beggar
bang into
bang off
bang on
bang up
bang's disease
bang-bang
bang-tail
bang-up
bangalore torpedo
banged-up
bangle ear
bangtail muster
banister back
banister-back
banjo clock
banjo eyes
banjo frame
banjo signal
banjo-picker
banjo-uke
banjo-ukulele
banjo-zither
bank acceptance
bank account
bank accountant
bank agent
bank annuities
bank annuity
bank assets
bank assistant
bank auditor
bank balance
bank barn
bank beaver
bank bill
bank bird
bank book
bank boss
bank brakesman
bank call
bank card
bank cashier
bank charter
bank check
bank claim
bank clearings
bank clerk

bank cod
bank court
bank credit
bank cress
bank deposit
bank deposit insurance
bank discount
bank draft
bank engine
bank examiner
bank fish
bank fisher
bank fisheries
bank footman
bank foreman
bank gravel
bank guaranty
bank guard
bank head
bank heading
bank holiday
bank indicator
bank inspector
bank jug
bank
 laborer
bank ledger
bank letter
bank loan
bank manager
bank martin
bank messenger
bank molder
bank money
bank night
bank note
bank oddman
bank of issue
bank officer
bank on
bank overman
bank paper
bank post bill
bank president
bank ranger
bank rate
bank receipt
bank receiver

bank reference
bank repairer
bank report
bank reserve
bank return
bank robber
bank robbery
bank roll
bank run
bank shot
bank sill
bank smack
bank statement
bank stock
bank superintendent
bank swallow
bank teller
bank tender
bank the fire
bank thistle
bank up
bank upon
bank vole
bank walker
bank water
bank weigher
bank winding
bank woman
bank-and-turn indicator
bank-bill
bank-book
bank-full
bank-high
bank-note
bank-riding
bank-side
bank-sided
bank-wound
banker's acceptance
banker's bill
banker's card
banker's check
banker's order
banker-mark
banker-out
banking account
banking doctrine
banking executive

banking file
banking indicator
banking pin
banking principle
banking screw
banking stud
banking wax
banking-house
banko
 ware
bankrupt in
bankrupt law
banksia rose
bankul nut
banner bearer
banner cloth
banner cloud
banner cry
banner head
banner headline
banner line
banner name
banner painter
banner plant
banner pole
banner pompano
banner screen
banner staff
banner stone
banner-fashioned
banner-shaped
bannock fluke
bannock stick
banns of matrimony
banquet of the soul
banquette slope
banquette tread
banyan day
banyan tree
banzai attack
banzai charge
baptism for the dead
baptism in the spirit
baptism of fire
baptismal dress
baptismal font
baptismal gown
baptismal name

baptismal regeneration
baptismal robe
bar beat
bar bell
bar billiards
bar bit
bar cent
bar chart
bar chuck
bar code
bar discharger
bar fee
bar fly
bar foot
bar gemel
bar girl
bar gown
bar graph
bar iron
bar joist
bar keel
bar line
bar magnet
bar mitzvah
bar mizvah
bar money
bar movement
bar opal
bar out
bar parlor
bar pin
bar plate
bar point
bar rigging
bar roller
bar screen
bar share
bar shoe
bar shot
bar sight
bar sinister
bar soap
bar
spade
bar stall
bar stool
bar tack
bar the gate

bar tin
bar tracery
bar winding
bar-
bar-and-grill
bar-goose
bar-headed goose
bar-share plow
bar-stock lathe
bar-tailed
bar-wound
bara-picklet
barb bolt
barb the dart
barba amarilla
barba amarillas
barbaric splendor
barbary ape
barbecue sauce
barbecued beef
barbecued spareribs
barbed cat
barbed tributary
barbed wire
barbed-wire entanglement
barbed-wire grass
barber bug
barber chair
barber college
barber pole
barber's basin
barber's chair
barber's itch
barber's pole
barber's shop
barber-bug fever
barber-surgeon
barberry family
barberry fig
barberry rust
barbershop chords
barbershop harmony
barbette carriage
barbette gun
barbital sodium
barbiturate addiction
barbiturate pill
barbituric acid

bare as the back of your hand
bare cupboard
bare fact
bare fallow
bare flesh
bare minimum
bare necessities
bare of
bare pole
bare possibility
bare skin
bare subsistence
bare sufficiency
bare suggestion
bare your fangs
bare-ankled
bare-armed
bare-ass
bare-assed
bare-backed
bare-bitten
bare-boned
bare-bosomed
bare-branched
bare-breasted
bare-chested
bare-clawed
bare-faced
bare-fingered
bare-gnawn
bare-handed
bare-headed
bare-kneed
bare-legged
bare-necked
bare-picked
bare-ribbed
bare-skinned
bare-skulled
bare-throated
bare-toed
bare-walled
bare-worn
bareback
rider
bareboat charter
bareface tenon
barefaced lie

barefaced tenon
barefoot tea
barely audible
barely have a chance
barely see
barely sufficient
barely touching
bargain and sale
bargain away
bargain basement
bargain counter
bargain day
bargain driver
bargain for
bargain hunter
bargain on
bargain penny
bargain price
bargain prices
bargain sale
bargain table
bargain work
bargain-basement
bargain-counter
bargain-hunting
bargained for
bargaining session
bargaining unit
barge boom
barge canal
barge couple
barge course
barge in
barge into
barge rig
barge spike
barge stone
barge-board
barge-couple
barge-course
barge-laden
barge-rigged
barge-stone
baritone clef
barium bromate
barium carbonate
barium

chloride
barium chromate
barium chrome
barium dioxide
barium enema
barium hydrate
barium hydroxide
barium meal
barium monoxide
barium nitrate
barium oxide
barium peroxide
barium protoxide
barium stearate
barium sulfate
barium sulfide
barium sulphate
barium sulphide
barium thiosulfate
barium yellow
bark at
bark at the moon
bark beetle
bark blazer
bark canker
bark chopper
bark cloth
bark conveyer
bark crusher
bark disease
bark dryer
bark extract
bark feeder
bark gouge
bark grafting
bark grinder
bark house
bark liquor
bark louse
bark maple
bark mark
bark mill
bark parenchyma
bark picker
bark pit
bark scaler
bark shredder
bark spud

bark spudder
bark stripper
bark tree
bark up the wrong tree
bark-bared
bark-cutting
bark-formed
bark-galled
bark-galling
bark-grinding
bark-shredding
bark-tanned
barkhausen effect
barking bill
barking deer
barking drum
barking frog
barking iron
barley broth
barley cake
barley candy
barley carrier
barley cleaner
barley clipper
barley coal
barley crusher
barley
flour
barley fork
barley grass
barley mill
barley reel
barley scald
barley scourer
barley smut
barley straw
barley stripe
barley sugar
barley water
barley wine
barley-break
barley-bree
barley-broo
barley-cap
barley-clipping
barley-corn
barley-fed
barley-grinding

barley-hood
barley-hulling
barley-sugar
barm cake
barmy beer
barn boards
barn dance
barn door
barn door skate
barn fowl
barn gallon
barn grass
barn gun
barn lantern
barn owl
barn raising
barn sash
barn swallow
barn-brack
barn-door
barn-door fowl
barn-door hanger
barn-door roller
barn-door skate
barn-door stay
barn-raising
barnacle goose
barnacle grass
barnacle scale
barnacle-back
barnacle-eater
barney-clapper
barns-breaking
barnyard fowl
barnyard golf
barnyard grass
barnyard millet
baro-
barograph camera
barometer gauge
barometer paper
barometric error
barometric gradient
barometric pressure
barometric switch
barometric wind rose
baron bailie
baron court

baron et femme
baron of beef
baroque formalism
baroque formalist
baroque
organ
barrack emperors
barrack roof
barracks bag
barracks lawyer
barrage balloon
barrage receiver
barrage reception
barrage rocket
barred owl
barred spiral
barred spiral galaxy
barred spiral nebula
barrel amalgamation
barrel arch
barrel bolt
barrel bulk
barrel cactus
barrel chair
barrel chest
barrel contractor
barrel copper
barrel cuff
barrel distortion
barrel drain
barrel driver
barrel engine
barrel fish
barrel gentian
barrel header
barrel helm
barrel hoop
barrel house
barrel knot
barrel maker
barrel of money
barrel organ
barrel packer
barrel palm
barrel pen
barrel pier
barrel process
barrel quartz

barrel repairer
barrel roll
barrel roof
barrel saw
barrel scale
barrel sewer
barrel shackle
barrel stave
barrel tile
barrel tree
barrel vault
barrel-back chair
barrel-bellied
barrel-boring
barrel-branding
barrel-chested
barrel-driving
barrel-heading
barrel-packing
barrel-roll
barrel-shaped
barrel-vaulted
barren brome grass
barren land
barrer-off
barrette file
barrier beach
barrier
berg
barrier cream
barrier gate
barrier ice
barrier of secrecy
barrier pillar
barrier reef
barrier tactics
barrier treaty
barring out
barrio-dwellers
barrister-at-law
barrow boy
barrow tram
barrow truck
barrow-boy
barrow-man
barrow-men
barry-bendy
barry-nebuly

barry-pily
barry-wavy
bars gemels
barter economy
barter unit
barycentric coordinate system
baryon number
baryta feldspar
baryta paper
baryta water
baryta white
baryta yellow
baryto-
bas bleu
bas bleus
bas mitzvah
bas-fond
bas-relief
basal anaesthesia
basal body
basal conglomerate
basal ganglia
basal ganglion
basal metabolic rate
basal metabolism
basal ridge
basal-cell carcinoma
basal-nerved
basalt glass
basalt quarrier
basalt-porphyry
bascine case
bascule bridge
bascule escapement
base angle
base animals
base bend
base block
base box
base broom
base bullion
base burner
base camp
base cinnamon
base circle
base clef
base coin
base component

base course
base current
base depot
base estate
base exchange
base fee
base fuse
base hit
base
horehound
base hospital
base knob
base level
base line
base load
base map
base metal
base metals
base net
base of operations
base oil
base on
base on balls
base pay
base period
base piece
base plate
base plug
base point
base price
base rate
base resistance
base right
base ring
base rocker
base rocket
base runner
base running
base salary
base signal current
base signal voltage
base speed
base stone
base tenant
base tree
base vervain
base wage
base wallah

base-ball
base-begged
base-begot
base-born
base-burner
base-court
base-forming
base-level plain
base-mettled
base-minded
base-mindedly
base-mindedness
base-souled
base-spirited
base-spiritedness
base-witted
baseball bat
baseball cap
baseball field
baseball glove
baseball mitt
baseball rounders
baseball season
based on
basedow's disease
basement complex
basement house
basement membrane
bases on balls
bash up
bashi-bazouk
bashi-bazoukery
basi-
basic English
basic airman
basic anhydride
basic conductor physics
basic dichromate
basic
 dress
basic dye
basic education
basic english
basic facts
basic fuchsin
basic fuchsine
basic iron
basic lead carbonate

basic load
basic magenta
basic plumage
basic process
basic proposition
basic rate
basic salary
basic slag
basic substance weight
basic trainer
basic training
basic wage
basic weight
basic-lined
basil balm
basil mint
basil penny royal
basil thyme
basilar membrane
basilic vein
basin range
basing point
basing tariff
basis bundle
basis for belief
basis rate
basis weight
bask in
bask in the sun
bask in the sunshine
basket ash
basket beagle
basket bearer
basket boat
basket button
basket capital
basket carriage
basket case
basket cells
basket chair
basket clause
basket clerk
basket cloth
basket couching
basket elm
basket fern
basket fish
basket flower

basket grass
basket hare
basket hilt
basket hoop
basket maker
basket mast
basket oak
basket osier
basket palm
basket plant
basket salt
basket star
basket stitch
basket tree
basket weave
basket willow
basket withe
basket-ball
basket-bearing
basket-handle
arch
basket-hilted
basket-of-gold
basket-star
basketball court
basketball season
basking shark
bass broom
bass bug
bass clef
bass deafness
bass drum
bass fiber
bass fiddle
bass flute
bass fly
bass guitar
bass hogfish
bass horn
bass killy
bass oboe
bass passage
bass player
bass reflex
bass response
bass saxophone
bass staff
bass sunfish

bass viol
bass violinist
bass-bar
bass-horn
bass-relief
bass-viol
bass-wood
basse danse
basse-taille
basses danses
basset griffon
basset horn
basset hound
basset oboe
basset table
basset-horn
bassi cantanti
bassi profundi
bassi-rilievi
basso buffo
basso cantante
basso continuo
basso da camera
basso ostinato
basso profundo
basso rilievo
basso-relievo
basso-relievos
basso-rilievo
bassra locust
bast cell
bast fiber
bast palm
bast parenchyma
bast ray
bast tree
bast vessel
bastard acacia
bastard agrimony
bastard alkanet
bastard aloe
bastard amber
bastard apple
bastard ash
bastard ashlar
bastard asphodel
bastard baldmoney
bastard balm

bastard
bar
bastard blue gum
bastard box
bastard bryony
bastard bullet tree
bastard canna
bastard cedar
bastard cherry
bastard chestnut
bastard chickweed
bastard child
bastard chinaroot
bastard cinnamon
bastard clover
bastard cork tree
bastard cress
bastard culverin
bastard cusk
bastard daisy
bastard dittany
bastard dogwood
bastard dory
bastard eigne
bastard elder
bastard elm
bastard fallow
bastard feverfew
bastard fig
bastard file
bastard gemsbok
bastard gentian
bastard gidgee
bastard goosefoot
bastard grain
bastard granite
bastard gromwell
bastard gunter
bastard halibut
bastard hartebeest
bastard hawkweed
bastard hellbore
bastard hemp
bastard horehound
bastard hyssop
bastard indigo
bastard ipecac
bastard ironwood

bastard jarrah
bastard jasmine
bastard jute
bastard lignum vitae
bastard locust
bastard locust tree
bastard lupine
bastard mahogany
bastard manchineel
bastard margaret
bastard marjoram
bastard measles
bastard mouse-ear
bastard myall
bastard nettle
bastard nightshade
bastard
olive
bastard parsley
bastard pellitory
bastard pennyroyal
bastard pimpernel
bastard pine
bastard plantain
bastard plover
bastard pointing
bastard quartz
bastard quince
bastard rhubarb
bastard rocket
bastard rosewood
bastard saffron
bastard sago palm
bastard sandalwood
bastard schooner
bastard sea grape
bastard senna
bastard sensitive plant
bastard service tree
bastard snapper
bastard speedwell
bastard spikenard
bastard spruce
bastard strangles
bastard sugar
bastard sycamore
bastard tamarind
bastard teak

bastard thread
bastard title
bastard toadflax
bastard tree
bastard trefoil
bastard trout
bastard trumpeter
bastard tuck pointing
bastard turtle
bastard type
bastard vervain
bastard vetchling
bastard weakfish
bastard windflower
bastard wing
bastard wormwood
bastard yellowlegs
bastard yellowwood
bastard-cut
bastard-saw
bastard-sawed
bastard-sawing
bastard-sawn
bastel house
bastel-house
bastille day
bastille house
bastle house
bat about
bat around
bat bolt
bat bomb
bat boy
bat dance
bat
ear
bat in
bat mitzvah
bat money
bat of an eye
bat out
bat out of hell
bat printing
bat ray
bat stingray
bat the breeze
bat the eyes
bat the eyes at

bat tick
bat tree
bat-eared
bat-fowl
bat-minded
bat-mindedness
bat-mule
batch loaf
batch processing
batch together
batcher plant
bateau bridge
bateau neck
bateau neckline
bated breath
bateleur eagle
batement light
bath asparagus
bath brick
bath brush
bath bun
bath cabinet
bath chair
bath cube
bath mat
bath mitzvah
bath salts
bath slipper
bath soap
bath sponge
bath towel
bath-
bath-loving
bathe with light
bathed in sweat
bathed in tears
bathed with light
bathing beach
bathing beauty
bathing belle
bathing cap
bathing costume
bathing girl
bathing gown
bathing hut
bathing machine
bathing place
bathing sandal

bathing shoe
bathing suit
bathing trunks
bathing-machine
batho-
bathroom tissue
bathtub gin
bathy-
bathyal zone
batiator root
batracho-
bats in one's belfry
bats in the belfry
bats-in-the-belfry
batswing burner
batswing coral
battalia pie
batten
door
batten down
batten down the hatches
batten ends
batten on
batten plate
batten pocket
batten upon
batter board
batter brace
batter bread
batter pile
batter post
batter pudding
batter rule
batter stick
batter-out
battered baby
battered child syndrome
battering ram
battering train
battering-ram
battery acid
battery cable
battery case
battery cell
battery charger
battery chart
battery eliminator
battery jar

battery lamp
battery maker
battery mud
battery radio
battery supply voltage
battery tester
battery wagon
battery water
battery-charging
battery-powered
battery-testing
batting average
batting block
batting eye
batting hammer
batting order
battle array
battle brand
battle call
battle clasp
battle club
battle cruiser
battle cry
battle din
battle fatigue
battle flag
battle fleet
battle front
battle gaff
battle game
battle group
battle horn
battle hymn
battle it out
battle jacket
battle lantern
battle line
battle piece
battle place
battle plane
battle police
battle position
battle
 quoit
battle range
battle royal
battle shield
battle shout

battle sight
battle site
battle smoke
battle song
battle star
battle station
battle twig
battle wagon
battle word
battle-ax
battle-axe
battle-fallen
battle-scarred
battle-slain
battle-spent
battle-writhen
battled embattled
battledore and shuttlecock
battleship gray
batule board
batwing burner
batwing chair
batwing sleeve
baulk line
baum marten
bauple nut
bauson-faced
bawdy house
bawl out
bawling-out
bawsay fern
bay antler
bay at the moon
bay bar
bay bean
bay bird
bay camphor
bay cat
bay cedar
bay coot
bay floe
bay goose
bay grass
bay holly
bay hops
bay ice
bay lambs
bay laurel

bay lavender
bay leaf
bay lynx
bay mackerel
bay mahogany
bay mare
bay myrtle
bay oak
bay oil
bay plum
bay point
bay poplar
bay rum
bay rum tree
bay salt
bay snipe
bay stall
bay stater
bay stone
bay tree
bay willow
bay winders
bay window
bay yarn
bay-bay
bay-breasted
bay-cedar family
bay-colored
bay-head bar
bay-leaf willow
bay-rum tree
bay-salt
bay-top
palmetto
bay-window
bay-winged
bayacura root
bayamo winds
bayberry bark
bayberry candle
bayberry family
bayberry oil
bayberry wax
bayeux tapestry
bayonet base
bayonet clasp
bayonet joint
bayonet leg

bayonet legs
bayonet plant
bayonet socket
bayou bass
bayou lake
bazooka rocket
bc soil
bcg vaccine
bchamel sauce
bd ft
be Greek to
be OK
be a bargain
be a bear for
be a cold fish
be a coward
be a dark horse
be a deal
be a deputy
be a dupe
be a fast study
be a father to
be a feature of
be a flop
be a gas
be a gasbag
be a gasser
be a go
be a good investment
be a good sport
be a good trencherman
be a graphic artist
be a hit
be a law to
be a law unto yourself
be a logical impossibility
be a man
be a man of heart
be a man of sentiment
be a member
be a mother to
be a must for
be a paradox
be a parasite
be a party to
be a patsy
be a pawn of
be a plaything of

be a prey to anxiety
be a prey to your feelings
be a printmaker
be a quality of
be a reproach to
be a sideliner
be a sign of
be a slow study
be
a spectator
be a stretch of the imagination
be a success
be a sucker
be a thing of the past
be a timeserver
be a trait of
be a waste of time
be a windbag
be a yes man
be able
be about
be about to
be about to be borning
be above
be absent
be absentminded
be absorbed in
be abstracted
be accepted
be accepted for
be accountable for
be accurate
be acquainted with
be active
be added
be admitted
be admitted to the bar
be advised by
be affected
be affected with
be afraid
be after
be against
be agin
be agitated
be agreeable
be agreeable to
be ahead

be ahead of time
be airborne
be alert
be alive
be alive with
be all ears
be all eyes
be all heart
be all one to
be all over
be all over with
be all thumbs
be all up with
be allowed
be along
be amazed
be ambitious
be an
be an accessory to
be an easy mark
be an icicle
be an imperative for
be an impossibility
be an incubus to
be an indication of
be angry
be animate
be annihilated
be answerable for
be antipathetic
be apodictic
be apparent
be appreciative
of
be apprised
be apprised of
be aromatic
be around
be arrogant
be as expected
be as good as
be as good as your word
be as one looked for
be as one thought
be ashamed
be asleep at the switch
be asleep with the Lord
be astonished

be astounded
be at
be at a standstill
be at cross-purposes
be at ease
be at fault
be at home
be at home in
be at home to
be at one with
be at peace among yourselves
be at sea
be at the bottom of
be at the conn
be at the controls
be at the head of
be at the helm
be at the mercy of
be at the rudder
be at the tiller
be at the wheel
be at variance
be at work on
be at your service
be at your wit's end
be attractive
be aware of
be axiomatic
be based on
be before
be beforehand
be begotten
be behind
be behindhand
be believed
be benevolent
be benighted
be bereaved of
be bereft of
be beside yourself
be betimes
be beyond one
be big
be blessed-eventing
be blind
be blind to
be blinded by your own glory
be blooded

be bombastic
be born
be born for
be born out of wedlock
be
born so
be born to trouble
be born under an evil star
be born unto trouble
be bound
be bound to pay
be bounded by
be brewing
be brief
be bright
be brilliant
be broad-minded
be brought down
be built that way
be buoyed up
be burnt into your memory
be busy
be called
be capricious
be careful
be caught napping
be caught out
be caught short
be caught with your pants down
be cautious
be certain
be champing at the bit
be changed
be characteristic
be cheap
be cheek by jowl with
be cheerful
be chopfallen
be clear
be clobbered
be close friends with
be closeted with
be coerced
be coextensive with
be cognizant of
be cold
be cold as ice
be comfortable

be comforted
be commensurable
be comparable
be compelled
be comprised in
be concave
be conceived
be concerned
be concise
be conditional on
be confident
be confined
be conscious of
be conservative
be considerate
be consistent
be conspicuous
be constituted by
be construed as
be consumed
be consumed with desire
be contained in
be contemptuous of
be content
be
content with
be contiguous
be contingent
be contingent on
be continuous
be contrary to
be conversant with
be converted
be converted into
be convicted
be convinced
be convincing
be convulsed with laughter
be correct
be courteous
be covetous of
be credulous
be crestfallen
be crowned with success
be cruel to be kind
be crushed
be curious
be damaged

be damned
be damp
be dark
be dated
be dead
be dead and gone
be deaf
be death on
be deceived
be defeated
be demonstrable
be dependent on
be deserving
be desirous of
be despaired of
be desperately in love
be despondent
be destined
be destined for one
be destined for you
be destroyed
be determined
be diagnostic of
be difficult
be diffident
be dilatory
be disagreeable
be disappointed
be disappointing
be discovered
be discriminating
be disenchanted
be disgraced
be dishonest
be disillusioned
be disorderly
be disposed to
be disrespectful
be dissonant
be distant
be distasteful
be distinct
be distinguished
be doing
be done for
be doomed
be doubly

punished
be doubtful
be down on
be downbeat
be dressed in
be driven
be driven into a corner
be drunk
be dry
be dubious
be due
be due to
be dumb with grief
be dying for
be dying to
be eager
be eager about
be earless
be earlier
be early
be easy
be easy in your mind about
be easy of belief
be easy of persuasion
be easy on
be easy to recall
be easy with
be eaten away
be eating someone
be effective
be effortless
be elastic
be eloquent
be embarrassed
be employed
be employed in
be energetic
be enfeoffed of
be enfranchised
be engaged
be engaged in
be engrossed in
be enthusiastic
be entitled to
be envious of
be equal to
be eradicated
be erect

be ever the same
be evident
be excitable
be excited
be expectant
be expected
be expecting
be expedient
be experienced
be expert
be expert at
be expert in
be exposed
be exposed to
be extant
be extirpated
be eyeball to eyeball
be fair
be faithful to
be false
be famous
be far from your thoughts
be fashionable
be fastidious
be fat
be fated
be featured
be fed
up
be feeling no pain
be felled
be financially committed
be firm
be fit to be compared
be fitted
be fitting
be fond of
be foolish
be for it
be forced
be forgetful
be forgotten
be formed
be fortunate
be found
be found guilty
be found wanting
be fragrant

be frank
be free
be frequent
be fresh in your memory
be friends
be frightened
be fruitful
be full of beans
be full of emotion
be full of ginger
be full of pep
be full of piss and vinegar
be full of zip
be gainful
be game
be garrulous
be gathered to your fathers
be generous
be generous with
be getting along
be given a jar
be given a jolt
be given a start
be given a turn
be glimpsed
be gone
be good
be good enough
be good for
be good to
be grateful
be gravid
be great with child
be green
be green in your memory
be guided by
be guilty
be had
be half-blind
be hand in glove with
be handy
be hanged
be hard on
be hard put
be hard to believe
be hard to please
be hard up
be harmonious

be heading for a fall
be healthy
be heard
be heavy
be heavy on
one
be heavy on you
be heavy upon
be hell on
be hep to
be here again
be high
be holier than the Pope
be honest
be hopeful
be hopeless
be hostile
be hostile to
be hot
be humiliated
be hurting for
be hypocritical
be idle
be ignorant
be ill-humored
be illegitimate
be imbued with the spirit of
be imminent
be impatient
be imperfect
be imperturbable
be implicated in
be important
be impossible
be impotent
be impressed with yourself
be imprisoned
be improbable
be in
be in a brown study
be in a certain state
be in a dilemma
be in a hurry
be in a quandary
be in a rut
be in a speech situation
be in a state
be in accord with

be in action
be in bloom
be in cahoots
be in cahoots with
be in commission
be in concert
be in connection
be in contact
be in danger
be in desperate case
be in dissent
be in earnest
be in effect
be in error
be in existence
be in favor of
be in flower
be in for
be in for it
be in force
be in front
be in harmony with
be in heat
be in heaven
be in hopes
be in intercourse
be in it
be
in league
be in line for
be in love with
be in luck
be in mortal dread of
be in need of
be in no hurry
be in office
be in on the decisions
be in operation
be in opposition to
be in paradise
be in peril
be in phase
be in process
be in progress
be in receipt of
be in rut
be in service with
be in seventh heaven

be in stitches
be in store
be in suspense
be in the best of health
be in the books
be in the cards
be in the dark
be in the debt of
be in the driver's seat
be in the family way
be in the fire
be in the future
be in the hopper
be in the neighborhood of
be in the pink
be in the pipeline
be in the prime of life
be in the running
be in the saddle
be in the van
be in the vanguard
be in the vicinity of
be in the way of
be in the works
be in the wrong
be in time
be in touch
be in tune
be in tune with
be in want
be in your dotage
be in your estimation
be in your mind
be in your second childhood
be in your thoughts
be inattentive
be incarnated
be inclined to think
be incognito
be incommunicado
be
incomplete
be incomprehensible
be incredible
be incredulous
be incumbent on
be incumbent upon
be incurious

be indebted
be independent
be indicated
be indicative of
be indifferent
be indifferent to
be indiscreet
be industrious
be ineffective
be infanticipating
be inferior
be infinite
be infinitely repetitive
be influential
be informed
be inharmonious
be inhospitable
be inimical
be innocent of
be innocent of forethought
be inquisitive
be insane
be inscribed
be inseparable
be insolent
be inspired
be instated
be instrumental
be insufficient
be intelligent
be intelligible
be intemperate
be intimate
be into
be intoxicated
be invisible
be involved
be irrefutable
be irreligious
be irresolute
be it so
be jealous
be jealous of your good name
be jealous of your repute
be jobber for
be joined
be judged
be judgmental

be judicious
be just
be just like one
be just like you
be just right
be just the thing
be just the ticket
be just what the doctor ordered
be keen
be kept waiting
be killed
be
kind
be knocked up
be known as
be known by
be lacking
be laid by the heels
be last off the mark
be late
be late off the mark
be latent
be lawless
be learned
be learned in
be led to believe
be left
be left at the post
be left at the starting gate
be left behind
be left over
be lengthy
be lenient
be let down
be liable
be liable for
be liberal with
be light
be like
be likely
be limited by
be listened to
be livid
be loaded
be located
be logical
be long
be long in the tooth

be long of the market
be loquacious
be lost
be lost in thought
be loving
be low
be lucky
be made one
be made public
be magnetic
be manifest
be master
be master of
be master of the situation
be meaningless
be merry with
be met with
be misguided
be misled
be missed
be mistaken
be moderate
be modest
be more than a match for
be moved
be mute
be nailed to the cross
be nauseated
be near
be near the truth
be necessary
be neglectful
be negligent
be nervous
be neutral
be nice
be nice to
be no more
be no revelation
be no secret
be
nobody's fool
be noisy
be not all there
be not your day
be noticeable
be numerous
be nuts about

be obligated
be obligated for
be obliged
be obliged for
be observant
be obsessed with
be obstinate
be occupied with
be of advantage to
be of another mind
be of favorable disposition
be of good cheer
be of good hope
be of like mind
be of no importance
be of one
be of one mind
be of one mind with
be of service
be of service to
be of some help
be of the opinion
be of the same
be of the same order
be of two minds
be of use
be off
be off and running
be off the track
be off your guard
be on
be on a collision course
be on a collision course with
be on an ego trip
be on cloud nine
be on deck
be on everyone's lips
be on good terms
be on hand
be on her beam ends
be on pins and needles
be on pleasure bent
be on the
be on the alert
be on the anvil
be on the back of
be on the ball
be on the fence

be on the lookout
be on the lookout for
be on the point of
be on the right scent
be on the rolls
be on the
safe side
be on the same wavelength
be on the skids
be on the spot
be on the watch
be on the watch for
be on to
be on your best behavior
be on your feet
be on your good behavior
be on your guard
be on your last legs
be on your mettle
be on your mind
be on your uppers
be on your way
be one all over
be open to
be operative
be opposed to
be opposite
be optimistic
be ordained
be ostentatious
be otherwise occupied
be out for blood
be out of all patience
be out of it
be out of line
be out of step
be out of the running
be out of the woods
be out of your depth
be out of your mind
be outdistanced
be outrun
be over
be overdue
be overfamiliar with
be overpossessive
be overpriced
be pacifistic

be paid
be painless
be painstaking
be parallel
be paralyzed with fear
be parsimonious
be partial to
be partners in
be past
be patient
be pensioned
be pensioned off
be permissive
be permitted
be persuaded
be persuasive
be pessimistic
be pinched
be pious
be pissed
be plain
be pleased
be pleased with
be pliant
be
poised
be poleaxed
be poor
be possessed of
be possessed of the devil
be possessive
be possible
be practical
be precise
be predicated on
be predisposed
be pregnant
be prejudiced
be preoccupied
be prepared
be present
be present at
be present in
be printed
be prior
be probable
be prodigal with
be productive

be profitable
be prolonged
be prominent
be promiscuous
be promising
be proof against
be prosperous
be proud
be proud of
be proved
be pungent
be punished
be pushed to the wall
be put out of countenance
be put out to pasture
be put to the blush
be put to your wit's end
be putty in the hands of
be qualified
be quiet
be quits
be quits with
be rash
be ravenous
be ready
be ready and waiting
be ready for
be realized
be reasonable
be received
be reckless
be recognized
be reconciled to
be redolent of
be reflected
be regarded
be regarded as
be regulated by
be relaxed
be relieved
be relieved of choice
be religious
be remembered
be reminiscent of
be remunerated
be renewed
be repeated
be resentful

be
resolute
be resolved
be responsible
be responsible for
be revealed
be rich
be right
be rightly served
be robbed of choice
be ruined
be safe
be salaried
be sanctimonious
be satisfactory
be satisfied
be seasick
be seated
be secluded
be secure in the belief
be security for
be seen
be seen in its true colors
be seen no more
be seen with half an eye
be seized by
be seized of
be seized with wonder
be self-consistent
be selfish
be sensible of
be sent back
be separated
be servile
be set by the current
be shamed
be sharp
be short
be short of the market
be sick
be significant of
be silent
be single
be situated
be skeptical
be skillful
be slow off the mark
be slow to accept

be slow to believe
be smitten
be so
be so good as to
be so in fact
be sociable
be sold
be somebody
be something
be somewhere else
be sorry for
be sought after
be spared
be spent
be sphinxlike
be spliced
be spoiling for
be sponsor for
be staggered
be stamped on your memory
be startled
be still
be stingy
be stood up
be straight
be
 straight man for
be strapped
be stricken
be stricken by
be strict
be striken drunk
be strong
be strong in
be struck down
be stuck on yourself
be stuck-up
be stupid
be subject to
be subjected to
be successful
be such
be suicidal
be superannuated
be superseded
be superstitious
be surprised
be swallowed

be sweet on
be swept off your feet
be symptomatic of
be tactful
be taken aback
be taken as
be taken by death
be taken by surprise
be taken in
be taken unawares
be tasteful
be taught
be taught a lesson
be tedious
be telegraphic
be temperate
be thankful
be that as it may
be the bellwether
be the case
be the cause of
be the death of
be the death of one
be the death of you
be the decisive factor
be the duty of
be the effect of
be the equivalent of
be the fashion
be the front-runner
be the goat
be the incumbent
be the making of
be the mark of
be the matter
be the omen of
be the one that counts
be the patsy
be the plaything of
be the prey of
be the puppet of
be the rage
be the rule
be
the saving of
be the sign of
be the soul of discretion
be the sport of

be the sport of winds and waves
be the style
be the thing
be the very image of
be the worse for
be the worse for wear
be theatrical
be there
be there for all to see
be thorough
be thoroughly grounded in
be thought of
be thoughtful of
be threatened
be thrilled
be thus
be timely
be tired
be to be
be to come
be to windward of
be to your liking
be told
be too deep
be too deep for
be too good for
be too much for
be touch and go
be touched
be tough
be transient
be transparent
be traumatized
be true
be truthful
be turbulent
be turned off by
be turned on by
be turned on to
be ugly
be unable to comprehend
be unable to get into your head
be unable to recall
be unable to recollect
be unable to retain
be unable to see
be unastonished
be unbelievable

be uncertain
be unchaste
be uncommunicative
be uncritical
be under an obligation
be under the impression
be under the necessity of
be under the sea
be under way
be understandable
be
understood
be undesirable
be undiscriminating
be unexpected
be unfaithful
be unflappable
be ungrateful
be unguarded
be uniform with
be unimportant
be unintelligent
be uninteresting
be unintersting
be unjust
be unmarried
be unmindful of
be unmoved
be unorthodox
be unpleasant
be unprepared
be unproductive
be unready
be unregretful
be unseen
be unselfish
be unsociable
be unsuccessful
be unsure
be untruthful
be unwary
be unwilling
be up against it
be up and doing
be up and stirring
be up on
be up to
be up to something

be upbeat
be uppermost in the mind
be uppermost in your thoughts
be used to
be used up
be vain
be vain as a peacock
be victorious
be vigilant
be vigorous
be virtuous
be visible
be vital
be wafted
be warm
be watchful
be weak
be wedded to a belief
be well-informed
be wholesaler for
be widely reputed
be willing
be wiped out
be wise as a serpent
be wise as an owl
be wise to
be with child
be with it
be with one
be with young
be without end
be wont
be worth your while
be worthwhile
be
worthy of
be worthy of comparison
be wreathed in smiles
be wrong
be your charge
be your due
be your fate
be your funeral
be your mission
be your office
be your outlook
be your own boss
be your own man

be your probable destiny
be your probable fate
be your prospect
be your responsibility
be yourself
be yourself again
be-
be-all
be-all and end-all
be-east
be-smut
be-smutch
beach apple
beach aster
beach bag
beach ball
beach bird
beach boat
beach buggy
beach bum
beach clam
beach crab
beach cusp
beach drifting
beach flea
beach goldenrod
beach grass
beach heather
beach pea
beach plant
beach plover
beach plum
beach ridge
beach robin
beach strawberry
beach tan
beach umbrella
beach wagon
beach wormwood
beach-la-mar
beach-sap
beaching gear
beacon boat
beacon fire
beacon lights
beacon station
bead and reel
bead edging

bead furnace
bead lightning
bead molding
bead plane
bead plant
bead slick
bead snake
bead tree
bead-eyed
bead-hook
bead-like
bead-roll
bead-rubies
bead-ruby
bead-shaped
beaded
brow
beaded lizard
beaded with sweat
beaded-edge
beading plane
beading tool
beads of sweat
beady-eyed
beak flute
beak molding
beak rush
beak sedge
beak wattles
beak willow
beak-bearing
beak-head
beak-iron
beak-like
beak-nosed
beak-shaped
beaked salmon
beaked whale
beaker culture
beaker folk
beakhorn stake
beaking joint
beam aerial
beam anchor
beam antenna
beam arm
beam board
beam brick

beam bridge
beam caliper
beam center
beam clamp
beam compass
beam engine
beam fill
beam filling
beam hole
beam knee
beam knife
beam light
beam maker
beam mill
beam net
beam of light
beam plate
beam pump
beam reach
beam riding
beam roll
beam sea
beam tetrode
beam texture
beam transmission
beam trawl
beam trawler
beam trawling
beam tree
beam well
beam wind
beam-bending
beam-end
beam-ends
beam-power tube
beam-straightening
beam-switching tube
beam-tree
beaming knife
beaming machine
bean anthracnose
bean aphid
bean aphis
bean ball
bean beetle
bean blight
bean blower
bean cake

bean caper
bean clover
bean crake
bean
curd
bean cutworm
bean dolphin
bean flour
bean goose
bean harvester
bean hole
bean honey
bean house
bean king
bean ladybird
bean leaf beetle
bean leaf roller
bean louse
bean mildew
bean mosaic
bean oil
bean picker
bean planter
bean pole
bean polisher
bean pot
bean rick
bean rust
bean shot
bean sprout
bean sprouts
bean thresher
bean tree
bean trefoil
bean tressel
bean vine
bean weevil
bean-bag
bean-caper family
bean-cleaning
bean-crushing
bean-feast
bean-fed
bean-planting
bean-pod borer
bean-polishing
bean-shaped
bear a child

bear a grudge
bear a hand
bear a helping hand
bear account
bear against
bear animalcule
bear arms
bear away
bear brush
bear bush
bear cap
bear cat
bear caterpillar
bear clover
bear corn
bear cub
bear date
bear down
bear down on
bear down on it
bear down upon
bear false witness
bear festival
bear for
bear fruit
bear garden
bear good will
bear grape
bear grass
bear hard upon
bear huckleberry
bear hug
bear ill will
bear in mind
bear in with
bear leader
bear malice
bear
market
bear mat
bear more than your share
bear moss
bear no resemblance
bear no resemblance to
bear oak
bear off
bear off the land
bear on

bear out
bear pack
bear panic
bear pig
bear pit
bear plum
bear pool
bear raid
bear reign
bear resemblance
bear sail
bear skeiters
bear the brunt
bear the cost
bear the expense
bear the market
bear the name of
bear the palm
bear to leeward
bear to port
bear to starboard
bear to windward
bear trap
bear up
bear up against
bear up for
bear up to
bear up under
bear upon
bear warden
bear whortleberry
bear with
bear with composure
bear witness
bear witness against
bear you company
bear young
bear your cross
bear yourself
bear yourself with credit
bear's-breech
bear's-ear
bear's-foot
bear's-foots
bear's-paw
bear-baiting
bear-lead
bear-leader

bear-trap dam
bear-tree
beard grass
beard lichen
beard moss
beard plant
beard the lion in his den
beard tree
bearded darnel
bearded lizard
bearded tit
bearded vulture
bearding line
bearding machine
bearer bar
bearer
 bond
bearer certificate
bearer of glad tidings
bearer plate
bearer security
bearer-off
bearing arms
bearing arrow
bearing bar
bearing block
bearing bow
bearing brass
bearing bronze
bearing cloth
bearing door
bearing gear
bearing in mind
bearing metal
bearing neck
bearing note
bearing out
bearing pile
bearing plate
bearing rail
bearing rein
bearing ring
bearing robe
bearing steel
bearing sword
bearing timber
bearing wall
bearish market

bearish prices
bearnaise sauce
bearskin gray
bearskin jobber
bearskin rug
beast epic
beast fable
beast fly
beast god
beast of burden
beast of prey
beast tale
beasts of field
beasts of prey
beasts of venery
beat a dead horse
beat a devil's tattoo
beat a retreat
beat a ruffle
beat a tattoo
beat about
beat about for
beat about the bush
beat against
beat all hollow
beat an alarm
beat around
beat around the bush
beat back
beat black and blue
beat block
beat board
beat by a nose
beat down
beat generation
beat hollow
beat into
beat into your head
beat it
beat
man
beat note
beat off
beat one
beat out
beat pin
beat poet
beat reception

beat signal
beat the Dutch
beat the air
beat the bounds
beat the bushes
beat the drum
beat the drum for
beat the drums
beat the game
beat the gums
beat the rap
beat the shit out of
beat the system
beat the tar out of
beat time
beat to a jelly
beat to the draw
beat to windward
beat tone
beat up
beat up against
beat your brains
beat your brains out
beat your breast
beat your gums
beat your swords into plowshares
beat your way
beat-beat
beat-frequency oscillator
beat-up
beaten biscuit
beaten egg
beaten path
beaten proof
beaten track
beaten up
beaten work
beater press
beater-out
beater-up
beaters-up
beatific vision
beatified soul
beating heart
beating machine
beating orders
beating reed
beating-up

beatrix antelope
beau brummell
beau garcon
beau geste
beau ideal
beau ideals
beau monde
beau sabreur
beau-ideal
beau-idealize
beau-monde
beau-pleader
beau-pot
beaufort scale
beaumont root
beaus ideal
beautiful friendship
beautiful
man
beautiful people
beautiful person
beautiful thing
beautiful woman
beauty bush
beauty contest
beauty contest winner
beauty culture
beauty culturist
beauty of holiness
beauty parlor
beauty pin
beauty plaster
beauty queen
beauty salon
beauty shop
beauty sleep
beauty spot
beauty treatment
beauty unadorned
beauty wash
beauty-beaming
beauty-berry
beauty-blind
beauty-blooming
beauty-blushing
beauty-breathing
beauty-bright
beauty-bush

beauty-clad
beauty-fruit
beauty-loving
beauty-parlor chitchat
beauty-proof
beauty-waning
beaux arts
beaux esprits
beaux gestes
beaux ideal
beaux yeux
beaux-arts
beaux-esprits
beaver board
beaver brown
beaver cloth
beaver dam
beaver eater
beaver finish
beaver lily
beaver poison
beaver rat
beaver stones
beaver top
beaver tree
beaver-tree
beavertail beam
beavertail reflector
beazor nuts
bec et ongles
because of
because of that
because of this
bechamel sauce
beche-de-mer
beche-le-mar
beck and call
becket bend
becket knot
becking hammerman
beckoning
crab
become a habit
become a member
become acquainted with
become adept in
become airborne
become alive to

become an appendage of
become an individual
become angry
become attached to
become awake to
become aware of
become bankrupt
become bound to
become conscious of
become conversant with
become defunct
become disordered
become enamored
become engaged
become excited
become exhausted
become extinct
become familiar with
become fashionable
become fixed
become higher
become informed
become insolvent
become known
become larger
become lost to sight
become manifest
become nervous
become obsolete
become of
become old
become one
become overweight
become popular
become public
become pulverized
become red
become shallow
become sick
become sponsor for
become suicidal
become the rage
become unintoxicated
become versed in
become visible
become void
become weak
become well-versed in

becquerel ray
becuiba fat
bed ale
bed and board
bed and breakfast
bed bolt
bed chair
bed check
bed curtain
bed down
bed
 fuel
bed head
bed hinge
bed in
bed jacket
bed joint
bed lamp
bed lathe
bed light
bed linen
bed maker
bed mold
bed molding
bed moulding
bed of Procrustes
bed of roses
bed on
bed pad
bed piece
bed place
bed plane
bed reach
bed rest
bed rot
bed sandwort
bed sheet
bed shoes
bed slat
bed sore
bed steps
bed stone
bed tea
bed timber
bed tray
bed vein
bed wagon
bed warmer

bed-clothes
bed-davenport
bed-fere
bed-head
bed-maker
bed-sitter
bed-sitting room
bed-sitting-room
bed-wetting
bedbug hunter
bedda nut
bedding block
bedding course
bedding fault
bedding plane
bedding plant
beddy-bye
bedford cord
bedlam beggar
bedlam cowslip
bedlington terrier
bedridden invalid
bedrock valley
bedroom eyes
bedroom slipper
bedroom suburb
bedside manner
bedsitting room
bedspring type
bedstead fitter
bedstead wrench
bedstraw bellflower
bedtime prayer
bedtime story
bee balm
bee beetle
bee bird
bee block
bee brush
bee candy
bee cellar
bee culture
bee eater
bee escape
bee feed
bee fly
bee glue
bee gum

bee hawk
bee in
the bonnet
bee in the head
bee in your bonnet
bee killer
bee kite
bee larkspur
bee laurel
bee louse
bee martin
bee milk
bee moth
bee nettle
bee orchid
bee orchis
bee plant
bee sage
bee scap
bee smoker
bee space
bee tree
bee wine
bee wolf
bee's knees
bee-butt
bee-eater
bee-headed
bee-loud
beech agaric
beech cherry
beech coal
beech family
beech fern
beech leaf snake
beech marten
beech mast
beech oil
beech tree
beech wheat
beech-green
beech-seedling mildew
beechnut oil
beechwood creosote
beef Bourguignon
beef Bourguignonne
beef Wellington
beef apple

beef bouillon
beef bread
beef cattle
beef dodger
beef extract
beef ham
beef juice
beef marrow
beef road
beef stearin
beef stroganoff
beef tallow
beef tea
beef up
beef's blood
beef-brained
beef-eating
beef-faced
beef-steak
beef-suet tree
beef-witted
beef-wittedly
beef-wittedness
beef-wood
beefed-up
beefing-up
beefsteak begonia
beefsteak fungus
beefsteak geranium
beefsteak plant
beefsteak saxifrage
beefwood family
beehive coke
beehive house
beehive
 kiln
beehive oven
beehive shelf
beehive tomb
beehive-shaped
beena marriage
beer and skittles
beer barrel
beer bottle
beer bottler
beer brewer
beer cellar
beer chiller

beer drinker
beer engine
beer fall
beer gallon
beer garden
beer glass
beer grains
beer hall
beer heart
beer keg
beer maker
beer money
beer mug
beer parlor
beer pump
beer scale
beer stone
beer vat
beer vinegar
beer yeast
beer-up
bees and honey
bees-wax
beeswax flint
beet army worm
beet blight
beet blocker
beet greens
beet harvester
beet heart rot
beet leafhopper
beet lifter
beet puller
beet root
beet rot
beet scab
beet sugar
beet webworm
beet-red
beetle brow
beetle over
beetle-browed
beetle-crusher
beetle-green
beetle-headed
beetling machine
befit the occasion
befit the season

befit the time
before Christ
before all
before an audience
before everything
before its time
before long
before noon
before now
before one
before the Christian Era
before the Common Era
before the Fall
before the Flood
before the bar
before the
 bench
before the court
before the fact
before the footlights
before the house
before the judge
before the mast
before the war
before the wind
before your eyes
before your face
before your time
before your very eyes
before-cited
before-created
before-delivered
before-going
before-known
before-mentioned
before-named
before-noticed
before-recited
before-said
before-tasted
before-thought
before-told
before-warned
before-written
beg a truce
beg for mercy
beg for your life
beg forgiveness

beg indulgence
beg leave
beg leave to doubt
beg off
beg pardon
beg the ear of
beg the question
beg to differ
beg, borrow, or steal
beggar boy
beggar brushes
beggar description
beggar girl
beggar maid
beggar's chicken
beggar's-lice
beggar's-tick
beggar's-ticks
beggar-lice
beggar-my-neighbor
beggar-my-neighbour
beggar-patched
beggar-tick
beggar-ticks
beggarly fellow
begging hermit
begging hermits
begging the question
begin again
begin to
beginner's luck
beginning and end
beginning of the end
begonia family
begonia
 rose
beguile of
beguile out of
beguile the time
behave ill
behave self-destructively
behave toward
behave yourself
behavior modification
behavior pattern
behavior psychology
behavior therapist
behavior therapy

behavioral norm
behavioral science
behaviorial scientist
behavioristic psychology
behaviour therapy
behavioural science
behen oil
behenic acid
behenolic acid
behind bars
behind closed doors
behind the curtain
behind the eight ball
behind the eightball
behind the scenes
behind the times
behind the veil
behind the veil of secrecy
behind time
behind your back
behind your defenses
behind-the-scenes influence
behind-the-scenes operator
behind-the-scenes pressure
beholden to
beignet aux pommes
being ahead
being alive
being as how
being at rest
being brought to bed
being done
being here
being there
being uninteresting
bel canto
bel esprit
bel-accoil
bel-esprit
belay that
belay there
belaying cleat
belaying pin
belgian hare
belie-ve
believe anything
believe at the drop of a hat
believe

in
believe without reservation
belittle yourself
bell animalcule
bell arch
bell beaker
bell book
bell borer
bell buoy
bell button
bell cage
bell canopy
bell captain
bell caster
bell casting
bell chasuble
bell chime
bell chuck
bell cord
bell cot
bell cote
bell cow
bell crank
bell crater
bell deck
bell founder
bell founding
bell frog
bell gable
bell gamba
bell glass
bell harp
bell heather
bell horse
bell jar
bell kite
bell ling
bell loft
bell magpie
bell maker
bell mare
bell metal
bell moth
bell olive tree
bell pepper
bell polyp
bell pull
bell punch

bell push
bell ringer
bell ringing
bell rope
bell salt
bell scraper
bell screw
bell seat
bell sheep
bell tent
bell the cat
bell thistle
bell toad
bell tower
bell transformer
bell trap
bell tree
bell vine
bell whistle
bell wire
bell-alarm switch
bell-bearer
bell-bird
bell-bottom
bell-bottomed
bell-bottoms
bell-cranked
bell-crowned
bell-faced
bell-flower
bell-flowered
bell-hanger's bit
bell-hooded
bell-house
bell-less
bell-like
bell-magpie
bell-metal
bell-metal
ore
bell-mouthed
bell-nosed
bell-ringer
bell-shaped
bell-tongue
bell-up
bell-wether
belladonna lily

belladonna ointment
belle epoque
belle poque
belle tournure
belles lettres
belles-lettres
bellflower family
belli causa
bellow like a bull
bellow out
bellows blower
bellows boy
bellows engine
bellows fish
bellows maker
bellows mender
bellows pneumatic
bellows treader
bells of Ireland
belly ache
belly board
belly brace
belly buster
belly button
belly dance
belly dancer
belly dancing
belly doublet
belly flop
belly flopper
belly friend
belly gunner
belly guy
belly landing
belly laugh
belly offal
belly out
belly rail
belly roll
belly stay
belly tank
belly truss
belly whop
belly whopper
belly worshiper
belly-band
belly-beaten
belly-blind

belly-bound
belly-bumper
belly-cheer
belly-devout
belly-fed
belly-flop
belly-flopped
belly-flopping
belly-ful
belly-god
belly-gulled
belly-gun
belly-helve
belly-laden
belly-land
belly-landing
belly-naked
belly-piece
belly-pinched
belly-proud
belly-sprung
belly-timber
belly-wash
belly-whop
belly-whopped
belly-whopping
belly-worshiping
belong
to
belong to by nature
belong to the past
beloved object
below contempt
below deck
below par
below stairs
below standard
below the belt
below the limen of hearing
below the line
below the mark
below the salt
below the threshold of hearing
below zero
belt awl
belt carrier
belt clamp
belt conveyer

belt coupler
belt course
belt cutter
belt fork
belt highway
belt hoist
belt idler
belt in
belt insulation
belt knitter
belt lacing
belt line
belt maker
belt man
belt out
belt pulley
belt punch
belt railroad
belt sander
belt saw
belt shifter
belt shipper
belt slip
belt speeder
belt tenter
belt up
belt-coupled
belt-cutting
belt-driven
belt-folding
belt-repairing
belt-sanding
belt-sewing
belt-tightening
belted bias tire
belted kingfisher
belted knight
belted radial tire
belted sandfish
belter-skelter
beltsville small white
ben chervil
ben nut
ben oil
ben trovato
ben-teak
bench clamp
bench dog

bench
drill
bench hardening
bench holdfast
bench hook
bench jockey
bench key
bench knife
bench lathe
bench mark
bench plane
bench press
bench root
bench scales
bench screw
bench show
bench stamper
bench stop
bench strip
bench table
bench terrace
bench test
bench tester
bench warmer
bench warrant
bench winder
bench-hardened
bench-kneed
bench-legged
bench-made
bench-mark
bench-warmer
benching iron
bend an ear
bend an ear to
bend attention to
bend back
bend dexter
bend leather
bend might and main
bend over
bend over backward
bend over backwards
bend pipe
bend sinister
bend the elbow
bend the eyes
bend the head

bend the knee
bend the knee to
bend the mind
bend the mind to
bend the mind upon
bend the neck
bend the thoughts to
bend the truth
bend to
bend to your will
bend to your yoke
bend your course
bend your ear
bend your effort
bend your steps
bend your steps for
bend your steps to
bending moment
bending press
bending punch
bending shackle
bending the knee
bending works
bends, the
bendy
 tree
bendy-wavy
bene vale
beneath contempt
beneath notice
beneath one
beneath the sky
beneath the sod
beneath your dignity
beneath your station
benefice-holder
beneficial interest
beneficiary heir
benefit association
benefit club
benefit from
benefit of clergy
benefit performance
benefit society
benefits forgot
benevolent despotism
benevolent disposition
bengal light

benign tumor
benjamin bush
benjamin tree
benjamin-bush
benne oil
benneting time
benni cake
bent grass
bent land
bent on
bent on pleasure
bent with age
bent-taildog
benthic zone
bentu de soli
benz-
benzal chloride
benzal group
benzal radical
benzalkonium chloride
benzene hexachloride
benzene nucleus
benzene ring
benzene series
benzenecarboxylic acid
benzenesulfonic acid
benzethonium chloride
benzidine colors
benzidine dye
benzidine rearrangement
benzine cup
benzo fast scarlet
benzo orange
benzo paradiazine
benzo paroxazine
benzo-
benzoate of soda
benzoic acid
benzoic aldehyde
benzoic sulphinide
benzol distiller
benzol extractor
benzoyl
 acetyl peroxide
benzoyl chloride
benzoyl green
benzoyl group
benzoyl hydride

benzoyl peroxide
benzoyl radical
benzyl acetate
benzyl alcohol
benzyl benzoate
benzyl bromide
benzyl butyrate
benzyl chloride
benzyl cyanide
benzyl dichloride
benzyl fluoride
benzyl fumarate
benzyl group
benzyl isoamyl ether
benzyl radical
benzyl succinate
benzyl thiocyanate
benzylidene acetone
benzylidene chloride
berberine tree
berberonic acid
berbice chair
bereave of life
bereaved of
bereft of
bereft of life
bereft of light
bereft of reason
berenice's hair
berg adder
berg crystal
berg ice
berg till
berg wind
bergamot camphor
bergamot mint
bergamot oil
bergamot orange
bergy bit
beriberi heart
bering time
berlin eye
berlin head
berlin wool
berlin-landaulet
berline-landaulet
bermuda grass
bermuda rig

bermuda shorts
bernese mountain dog
bernicle goose
berry alder
berry cone
berry ladle
berry patch
berry pepper
berry pie
berry spoon
berry tree
berry-bearing
berry-brown
berry-formed
berry-on-bone
berry-shaped
berrybone
 fish
berth cargo
berth deck
bertillon system
beryl blue
beryl green
beryl-blue
beryl-green
beryllium bronze
beryllium copper
beryllium oxide
bes antler
bes-
bes-antler
beset with danger
besetting sin
beside the mark
beside the point
beside the question
beside yourself
beside yourself with joy
besom moss
bessemer converter
bessemer process
best bet
best bib and tucker
best bower
best clothes
best end
best friend
best girl

best love
best man
best part
best people
best regards
best room
best seller
best type
best wishes
best, the
best-able
best-abused
best-accomplished
best-agreeable
best-armed
best-ball
best-ball foursome
best-ball match
best-beloved
best-bred
best-built
best-clad
best-conditioned
best-conducted
best-considered
best-consulted
best-cultivated
best-dressed
best-established
best-esteemed
best-formed
best-graced
best-grounded
best-hated
best-humored
best-informed
best-intentioned
best-known
best-laid
best-learned
best-liked
best-loved
best-made
best-managed
best-meaning
best-meant
best-minded
best-natured

best-nourishing
best-paid
best-paying
best-pleasing
best-preserved
best-principled
best-read
best-resolved
best-selling
best-sighted
best-skilled
best-tempered
best-trained
bestir
yourself
bestow consideration upon
bestow honor upon
bestow on
bestow thought upon
bestow your affections on
bestow your hand upon
bet against
bet on
bet upon
bet your boots
bet your bottom dollar
bet your bottom dollar on
beta brass
beta decay
beta function
beta globulin
beta iron
beta particle
beta radiation
beta radiator
beta ray
beta rhythm
beta test
beta transformation
beta-amylase
beta-eucaine
beta-glucose
beta-indoleacetic acid
beta-naphthol
beta-naphthyl
beta-naphthyl benzoate
beta-naphthyl group
beta-naphthyl radical

beta-naphthyl salicylate
beta-naphthylamine
beta-orcin
beta-orcinol
beta-ray spectrograph
beta-ray spectrometer
betake yourself
betake yourself to
bete noire
betel nut
betel palm
betel pepper
betel phenol
bethink yourself
bethink yourself
of
betray a confidence
betray itself
betray yourself
betrayed hope
better days
better for
better half
better off
better part
better self
better sort
better than nothing
better thoughts
better world
better yourself
better-advised
better-affected
better-balanced
better-becoming
better-behaved
better-born
better-bred
better-considered
better-disposed
better-dressed
better-humored
better-informed
better-knowing
better-known
better-liked
better-liking
better-meant

better-natured
better-omened
better-principled
better-regulated
better-seasoned
better-taught
better-witted
betterment tax
betting house
betting machine
betting parlor
betting ring
betting shop
betting system
betula camphor
betula oil
between Scylla and Charybdis
between acts
between brain
between decks
between halves
between now and then
between ourselves
between periods
between the hammer and the anvil
between the lines
between the teeth
between two fires
between two stools
between us
between wind and water
between you
between
you and me
between your teeth
between-deck
between-decks
between-maid
between-whiles
betwixt and between
betwixt sleep and waking
beurre blanc
beurre fondu
beurre noir
bevel bearing
bevel edge
bevel gauge
bevel gear

bevel gearing
bevel joint
bevel pinion
bevel protractor
bevel siding
bevel square
bevel washer
bevel wheel
bevel-edged
bevel-faced hammer
beveling edge
beverage room
beyond a doubt
beyond a shade of doubt
beyond a shadow of doubt
beyond all bounds
beyond all expectation
beyond all limits
beyond all praise
beyond all question
beyond belief
beyond compare
beyond comparison
beyond control
beyond doubt
beyond expectation
beyond measure
beyond need
beyond one
beyond price
beyond question
beyond reach
beyond reason
beyond recall
beyond remedy
beyond seas
beyond the bounds
beyond the bounds of possibility
beyond the bounds of reason
beyond the call of duty
beyond the pale
beyond the shadow of a doubt
beyond understanding
beyond your ability
beyond your capacity
beyond your comprehension
beyond

your control
beyond your depth
beyond your fondest dreams
beyond your means
beyond your power
beyond, the
bez antler
bez tine
bez-antler
bezoar antelope
bezoar goat
bezoar mineral
bezoar stone
bhut-bali
bi-
bi-bivalent
bi-guy
bi-iliac
bi-ischiadic
bi-ischiatic
bi-tri-
bialystok roll
bias binding
bias tire
bias your judgment
bib and brace
bib and tucker
bib nozzle
bib pout
bibble-babble
bible-christian
bible-clerk
biblico-
biblio-
bibliography of bibliographies
bicameral legislature
bicarbonate of soda
bice blue
bice green
bichloride of mercury
bichromate cell
bichromate filter
bick-iron
bicker over
bicolor lespedeza
bicuspid valve
bicycle chain
bicycle clip

bicycle path
bicycle pump
bicycle race
bicycle racing
bicycle saddle
bicycle seat
bicycle-built-for-two
bicyclic terpene
bid Godspeed
bid a long farewell to
bid ale
bid at auction
bid bond
bid come
bid defiance
bid defiance to
bid euchre
bid fair
bid fair to
bid farewell
bid for
bid good day
bid good morning
bid good-bye
bid
 hello
bid in
bid prayer
bid price
bid time return
bid to combat
bid up
bid well
bid you welcome
bid-a-bid
bid-ale
bid-and-asked prices
biddery ware
bidding prayer
biddy-bid
biddy-biddy
bide the issue
bide your time
bidgee-widgee
biding place
bien cuit
bien entendu
bier right

bifurcation theory
big Chief
big Daddy
big White Chief
big as you please
big baby
big bag of wind
big band
big bang theory
big battalions
big bedbug
big ben
big bluestem
big boss
big boy
big brother
big bruiser
big bug
big business
big businessman
big casino
big cat
big cheese
big chief
big deal
big dipper
big drink
big drunk
big end
big game
big game hunter
big gun
big hand
big heart
big hit
big hook
big house
big idea
big laurel
big league
big lie
big man
big man on campus
big marigold
big mouth
big name
big noise
big operator

big person
big price tag
big screen
big shot
big sister
big skate
big smoke
big stick
big talk
big talker
big time
big toe
big top
big top, the
big tree
big wheel
big wind
big with
child
big with meaning
big with young
big word
big-antlered
big-armed
big-bang theory
big-bearded
big-bellied
big-bodied
big-boned
big-bosomed
big-breasted
big-bulked
big-chested
big-city man
big-cone pine
big-cone spruce
big-eared
big-endian
big-eyed
big-footed
big-framed
big-gaited
big-handed
big-headed
big-hearted
big-hoofed
big-jawed
big-laden

big-leaf ivy
big-leaf laurel
big-leaf maple
big-league
big-leaguer
big-leaved
big-leaved magnolia
big-looking
big-mouthed
big-name
big-nosed
big-note
big-rich
big-souled
big-sounding
big-swollen
big-ticket
big-time
big-time operator
big-time spender
big-timer
big-voiced
big-waisted
bigeye scad
bigger half
biggest frog in the pond
bighorn sheep
biglip sucker
bigmouth buffalofish
bihar tree
biik tooling
bilateral symmetry
bile acid
bile cyst
bile duct
bile pigment
bile salt
bile vessel
bilge block
bilge board
bilge coad
bilge keel
bilge keelson
bilge log
bilge piece
bilge pump
bilge rail
bilge saw

bilge strake
bilge water
bilge ways
bilge well
bilge-hoop
bilge-keel
bilge-water
bili-
biliary
 calculus
biliment lace
bilinear form
bilinear transformation
bilingual dictionary
bilingual edition
bilingual text
bilious cholera
bill and coo
bill book
bill broker
bill case
bill clerk
bill collector
bill discounter
bill discounting
bill file
bill of account
bill of adventure
bill of attainder
bill of complaint
bill of draft
bill of entry
bill of exchange
bill of fare
bill of goods
bill of health
bill of indictment
bill of lading
bill of mortality
bill of particulars
bill of rights
bill of sale
bill-and-cooers
bill-broker
bill-hook
bill-like
bill-patched
bill-shaped

billet at
billet boy
billet breaker
billet car
billet chipper
billet cutter
billet heater
billet man
billet piler
billet rolls
billet wheeler
billet worker
billet-doux
billets-doux
billiard ball
billiard cloth
billiard cue
billiard green
billiard match
billiard parlor
billiard player
billiard room
billiard table
billing and cooing
billing machine
billion-dollar grass
billow
 cloud
billowy cloud
billy check
billy club
billy fairplay
billy gar
billy gate
billy goat
billy owl
billy playfair
billy tea
billy-button
billy-goat
billy-goat weed
billycock hat
bimetallic balance
bimetallic strip
bin-
bin-burn
binary arithmetic
binary cell

binary code
binary digit
binary fission
binary form
binary notation
binary number
binary operation
binary opposition
binary scale
binary star
binary system
binary-coded decimal
binary-coded decimal system
binaural broadcasting
binaural system
bind day
bind off
bind over
bind rail
bind up
bind yourself to
bind-days
binder board
binder course
binder pulley
binder twine
binder's board
binder's cloth
binder's title
bindi-eye
binding agreement
binding arbitration
binding course
binding edge
binding energy
binding off
binding over
binding post
binding rafter
binding receipt
binding screw
binding stone
binding strake
binding tape
binding twine
bindle stiff
bindweed nightshade
binet-simon scale

binnacle list
binocular fusion
binocular microscope
binodal
 quartic
binomial coefficient
binomial distribution
binomial name
binomial nomenclature
binomial series
binomial theorem
bio-
bio-aeration
bio-assay
bio-economic
bio-electric
bio-electrogenesis
bio-energetics
bio-osmosis
bio-osmotic
biochemical oxygen demand
biographical dictionary
biographical material
biographical records
biographical sketch
biological adjustive reactions
biological classification
biological clock
biological control
biological death
biological diagnosis
biological evolution
biological method
biological oxygen demand
biological product
biological science
biological sociology
biological species
biological stain
biological supplies
biological taxonomy
biological urge
biological vector
biological warfare
biological weapons
biotic potential
bipartisan policy
biphenyl rearrangement

birch beech
birch beer
birch borer
birch camphor
birch family
birch oil
birch partridge
birch skeletonizer
birch wine
birch-bark call
birch-bark oil
birch-leaf mahogany
birch-leaf
 skeletonizer
birch-tar oil
bird augury
bird bell
bird bolt
bird brier
bird cactus
bird cage
bird call
bird cherry
bird colonel
bird dog
bird duffer
bird eagles
bird eye
bird fancier
bird flower
bird fly
bird font
bird food
bird grape
bird grass
bird group
bird in hand
bird in the hand
bird knotgrass
bird life
bird louse
bird malaria
bird mite
bird net
bird of Jove
bird of Juno
bird of Minerva
bird of another feather

bird of ill omen
bird of night
bird of paradise
bird of passage
bird of peace
bird of prey
bird pepper
bird pest
bird plant
bird pox
bird preserver
bird rattle
bird refuge
bird sanctuary
bird seed
bird shop
bird shot
bird skin
bird snake
bird song
bird sound
bird spider
bird strike
bird stuffer
bird table
bird thistle
bird tick
bird vetch
bird watcher
bird whistle
bird young
bird's beak
bird's egg
bird's mouth
bird's nest
bird's nest soup
bird's-eye
bird's-eye maple
bird's-eye primrose
bird's-eye view
bird's-eyes
bird's-foot
bird's-foot fern
bird's-foot trefoil
bird's-foot
violet
bird's-foots
bird's-nest

bird's-nest fern
bird's-nest fungus
bird's-nest orchid
bird's-nest soup
bird-batting
bird-brained
bird-cage
bird-dog
bird-dogged
bird-dogging
bird-egg pea
bird-eyed
bird-faced
bird-fingered
bird-foot
bird-foots
bird-in-the-bush
bird-lime
bird-nest
bird-nesting
bird-of-paradise bush
bird-of-paradise flower
bird-ridden
bird-voiced tree frog
bird-watch
bird-watcher
bird-witted
birdcage clock
birding piece
birds of a feather
birds-in-the-bush
birdseed grass
birdseed rape
birth canal
birth certificate
birth control
birth control device
birth control pill
birth controller
birth date
birth defect
birth flower
birth gift
birth hour
birth month
birth name
birth pain
birth palsy

birth pang
birth pangs
birth phantasy
birth rate
birth sin
birth theory
birth throe
birth throes
birth trauma
birth year
birth-control pill
birthday cake
birthday gift
birthday present
birthday suit
birthwort family
bis-
biscuit bag
biscuit baker
biscuit baking
biscuit beetle
biscuit box
biscuit
 china
biscuit clay
biscuit cutter
biscuit drawer
biscuit fire
biscuit fireman
biscuit firing
biscuit kilnman
biscuit leaves
biscuit oven
biscuit painter
biscuit pan
biscuit plant
biscuit porcelain
biscuit pottery
biscuit tortoni
biscuit ware
biscuit warehouse
biscuit weevil
biscuit worm
biscuit-brained
biscuit-colored
biscuit-fired
biscuit-shaped
bisecting compass

bisecting dividers
bishop bird
bishop coadjutor
bishop cotton
bishop pine
bishop ray
bishop sleeve
bishop stool
bishop suffragan
bishop's mitre
bishop's palace
bishop's purple
bishop's ring
bishop's weed
bishop's-cap
bishop's-weed
bismuth blende
bismuth chromate
bismuth glance
bismuth ocher
bismuth oxychloride
bismuth oxynitrate
bismuth spar
bismuth subchloride
bismuth subnitrate
bismuth tribromphenate
bismuth white
bismuth yellow
bismuthyl chloride
bissextile day
bissextile year
bistable circuit
bister green
bit by bit
bit gauge
bit key
bit much, a
bit of your mind
bit part
bit pincers
bit player
bit stop
bit, a
bit-by-bit
bit-weight
control
bit-wise
bitch box

bitch chain
bitch goddess
bitch up
bitch-kitty
bitched up
bite back
bite in
bite off more than you can chew
bite plate
bite the bullet
bite the dust
bite the hand that feeds one
bite the hand that feeds you
bite the thumb at
bite the tongue
bite your head off
bite your lip
bite your nails
bite your nose off
bite your tongue
bite-sheep
bite-tongue
biting angle
biting housefly
biting louse
biting midge
biting wind
biting your nails
bito tree
bitt pin
bitten-leaf disease
bitter almond
bitter almond oil
bitter apple
bitter as gall
bitter cassava
bitter chocolate
bitter cold
bitter cress
bitter cup
bitter defeat
bitter disappointment
bitter dock
bitter draft
bitter draught
bitter end
bitter enemy
bitter feeling

bitter herb
bitter lake
bitter lemon
bitter orange
bitter pill
bitter principle
bitter resentment
bitter rot
bitter weather
bitter wood
bitter words
bitter-
bitter-almond oil
bitter-biting
bitter-end
bitter-ender
bitter-enderism
bitter-endism
bitter-orange
 oil
bitter-rinded
bitter-sweet
bitter-sweeting
bitter-tasting
bitter-tongued
bitterly cold
bitterly disappointed
bitterness of spirit
bitumen process
bituminous coal
bituminous macadam
biuret reaction
biuret test
bivalvate Biology
biw-
blab out
blab school
black Angus
black Minorca
black Orpington
black Spanish
black Sumatra
black acacia
black alder
black and blue
black and tan
black and white
black ant

black arm
black art
black art, the
black as a crow
black as coal
black as ebony
black as ink
black as midnight
black as night
black as pitch
black balsam
black basaltes
black bass
black bead
black bean
black bear
black beast
black beetle
black belt
black bent
black bile
black bindweed
black blizzard
black board
black body
black book
black bottom
black box
black brant
black bread
black bryony
black buck
black buffalo
black buran
black butter
black calla
black cap
black carpet beetle
black cat
black chaff
black cherry
black chokeberry
black clouds
black cod
black cohosh
black
comedy
black copper

black cosmos
black crappie
black currant
black death
black despondency
black diamond
black diamonds
black disease
black dog
black drop
black duck
black durgon
black earth
black eye
black face
black face Highland
black fever
black fish
black flag
black flux
black fly
black fog
black foot
black fox
black friar
black frost
black game
black gang
black ghetto
black gnat
black gold
black gown
black gram
black grouse
black guillemot
black gum
black hand
black haw
black heat
black hellebore
black henbane
black hole
black horehound
black huckleberry
black humor
black ice
black ink
black ivory

black jack
black kite
black knot
black lead
black letter
black light
black liquor
black list
black locust
black look
black looks
black lung
black magic
black mail
black man
black maple
black margate
black maria
black mark
black mark to
black market
black marketeer
black marketer
black marten
black mass
black measles
black medic
black medick
black mercuric sulfide
black mold
black
 molly
black monday
black monk
black moor
black mould
black mulberry
black mustard
black nickel oxide
black nightshade
black nob
black oak
black opal
black or white
black out
black paternoster
black pepper
black perch

black pewter
black pit
black plague
black poplar
black powder
black power
black prince
black pudding
black quarter
black race
black raspberry
black rat
black ring
black rod
black root rot
black rot
black rudderfish
black ruff
black rust
black sable
black sage
black salts
black saltwort
black sand
black sap
black scoter
black sea bass
black selenium
black shank
black sheep
black skimmer
black snake
black snakeroot
black soap
black spot
black spruce
black squall
black squirrel
black stem
black stick
black storm
black studies
black stuff
black stump
black sucker
black supremacy
black swallowtail
black swan

black tea
black tie
black titi
black tracker
black treacle
black turnstone
black velvet
black vomit
black vote
black vulture
black walnut
black wash
black wattle
black whale
black
widow
black widow spider
black witch
black-a-viced
black-a-visaged
black-a-vised
black-and-blue
black-and-blue mark
black-and-tan
black-and-tan terrier
black-and-white
black-and-white film
black-and-white photograph
black-and-white television
black-aproned
black-back flounder
black-backed
black-backed gull
black-ball
black-banded
black-bark pine
black-bearded
black-bellied
black-bellied plover
black-belt
black-berried
black-billed
black-billed cuckoo
black-billed magpie
black-blooded
black-blue
black-bodied
black-boding

black-bordered
black-boughed
black-breasted
black-browed
black-brown
black-bulb thermometer
black-bundle disease
black-capped
black-capped chickadee
black-chinned
black-clad
black-coat worker
black-coated
black-colored
black-cornered
black-crested
black-crowned
black-currant rust
black-eared
black-ears
black-edged
black-eye bean
black-eye sunfish
black-eyed
black-eyed Susan
black-eyed pea
black-eyed susan
black-faced
black-favored
black-feathered
black-figure
black-figured
black-fin
snapper
black-footed
black-footed ferret
black-fruited
black-gowned
black-hafted
black-haired
black-head
black-headed
black-headed fireworm
black-headed gull
black-hearted
black-hilted
black-hole
black-hooded

black-hoofed
black-leg
black-legged
black-letter
black-letter day
black-lidded
black-lipped
black-locked
black-looking
black-maned
black-margined
black-market
black-marketeer
black-mouth
black-mouthed
black-neb
black-necked
black-necked stork
black-nosed
black-out
black-peopled
black-plumed
black-pot
black-red
black-robed
black-rooted
black-sander
black-shouldered
black-skinned
black-snake
black-spot canker
black-spotted
black-stoled
black-tail
black-tailed
black-tailed deer
black-thorn
black-throated
black-tie
black-toed
black-tongued
black-tressed
black-tufted
black-varnish tree
black-veiled
black-visaged
black-wash
black-whiskered

black-wood
blackback flounder
blackbanded sunfish
blackbelly rosefish
blackberry bark
blackberry lily
blackberry token
blackberry
 wine
blackbird bindweed
blackboy gum
blackcrowned night heron
blacken your good name
blacker than black synchronizing
blackest dye
blackfin cisco
blackfish oil
blackhead Persian
blackhead disease
blackhead grass
blackhead minnow
blackheart plover
blackjack oak
blackjack pine
blackland plow
blackout skit
blackpoll warbler
blacksmith shop
blacksmith welding
blacksmith's hammer
blacksmith's shop
blackstrap molasses
blacktail deer
blackwall hitch
blackwater fever
blad apple
bladder campion
bladder catchfly
bladder cherry
bladder fern
bladder fucus
bladder green
bladder herb
bladder kelp
bladder ketmia
bladder ketmie
bladder plum
bladder sedge

bladder senna
bladder snout
bladder tangle
bladder tree
bladder worm
bladder wrack
bladdernut family
bladderwort family
blade angle
blade apple
blade buffer
blade grader
blade harrow
blade roast
blade-point
blah feeling
blah-blah
blame for
blame on
blame upon
blame yourself
blame-shifting
blanc d'Espagne
blanc d'argent
blanc de blancs
blanc de fard
blanc
de noirs
blanc fixe
blanch farm
blanch over
blanched almonds
blanco perch
bland diet
blank cartridge
blank check
blank cheque
blank despondency
blank determination
blank endorsement
blank flange
blank future
blank mind
blank out
blank shell
blank verse
blank wall
blank-eyed

blank-looking
blank-minded
blanket alga
blanket ballot
blanket binder
blanket binding
blanket chest
blanket cloth
blanket deposit
blanket drill
blanket fish
blanket holder
blanket leaf
blanket maker
blanket mortgage
blanket moss
blanket policy
blanket rate
blanket roll
blanket scum
blanket sheet
blanket stiff
blanket stitch
blanket washer
blanket weaver
blanket weaving
blanket-flower
blanket-stitch
blankety blank
blankety-blank
blanking amplifier
blanking die
blanking press
blanking punch
blanking signal
blanquette de veau
blare abroad
blare forth
blarney stone
blast away
blast bloomery
blast engine
blast fan
blast freezing
blast furnace
blast lamp
blast neurosis
blast off

blast pipe
blast propulsion
blast
 roasting
blast the ear
blast wave
blast your hope
blast-
blast-borne
blast-freeze
blast-freezing
blast-frozen
blast-furnace
blast-off
blasted expectation
blasting cap
blasting cartridge
blasting circuit
blasting detonator
blasting fuse
blasting gelatin
blasting machine
blasting mat
blasting needle
blasting oil
blasting paper
blasting powder
blasting spoon
blasting tools
blasting tube
blasto-
blatti family
blaze a trail
blaze about
blaze abroad
blaze current
blaze of glory
blaze of light
blaze of temper
blaze the trail
blaze up
blazing fire
blazing light
blazing star
blazon about
blazon abroad
blazon forth
bleach liquor

bleach out
bleach process
bleach wax
bleached blond
bleached out
bleached white
bleached-blond
bleaching agent
bleaching clay
bleaching croft
bleaching earth
bleaching engine
bleaching field
bleaching green
bleaching ground
bleaching powder
bleaching substance
bleaching tank
bleak outlook
bleak prognosis
bleak prospect
bleak weather
blear the eyes of
blear-eyed
blear-eyedness
blear-witted
bleary-eyed
bled
white
bleed for
bleed nipple
bleed valve
bleed white
bleeder pipe
bleeder resistor
bleeder tile
bleeder's disease
bleeding disease
bleeding heart
bleeding-heart pigeon
bleeper Informal
blend in with
blend into
blend-word
blended whiskey
blending inheritance
blenno-
blennorrhagic arthritis

blephar-
blepharo-
bles mole
bles-bok
bless His holy name
bless my heart
bless out
bless the Lord
bless with
bless your stars
blessed event
blessed release
blessed sacrament
blessed thistle
blessed with
blessed with luck
bleu celeste
bleu cheese dressing
blight canker
blight your hope
blighted area
blighted hope
blighted neighborhood
blighted section
blighting glance
blind Chance
blind Justice
blind alley
blind and naked Ignorance
blind as a bat
blind as a mole
blind as an owl
blind bargain
blind bombing
blind casing
blind coal
blind copy
blind date
blind door
blind drunk
blind faith
blind fish
blind flange
blind flight
blind floor
blind flying
blind guess
blind gut

blind
 header
blind hookey
blind impulse
blind instinct
blind landing
blind leaders of the blind
blind man
blind man's buff
blind man's holiday
blind man's rule
blind man's watch
blind nailing
blind pig
blind poker
blind pool
blind rage
blind salamander
blind seed
blind side
blind snake
blind spot
blind spots
blind staggers
blind stamping
blind the eyes
blind tiger
blind to
blind tooling
blind trust
blind window
blind your eyes
blind yourself
blind yourself to
blind, the
blind-alley
blind-head
blind-loaded
blind-man's-buff
blind-nail
blind-nettle
blind-pigger
blind-pigging
blind-punch
blind-stamp
blind-stamped
blind-tool
blind-tooled

blind-worm
blind-your-eyes
blindfold chess
blindfolded Justice
blinding light
blindman's bluff
blindman's buff
blink aside
blink at
blink away
blink beer
blink comparator
blink microscope
blink-eyed
blinker lamp
blinker light
blinker tube
blinking light
blinking sort o' place
bliss body
blister beetle
blister blight
blister bush
blister canker
blister canopy
blister
 cone
blister copper
blister flower
blister fly
blister gas
blister mite
blister pearl
blister plant
blister plaster
blister rust
blister spot
blister steel
blithe-looking
blithering idiocy
blithering idiot
blitz can
blitzkrieg tactics
blo doper
bloat clover
bloat colic
bloat herring
bloated aristocrat

bloated plutocrat
bloated with pride
bloater whitefish
blobber lip
blobber-lipped
block and block
block and fall
block and falls
block and tackle
block anesthesia
block ball
block bond
block book
block booking
block brake
block capital
block chain
block chords
block coal
block coefficient
block colors
block core
block diagram
block diamond
block faulting
block flute
block foot
block front
block furnace
block grant
block hole
block in
block in course bond
block irrigation
block lava
block letter
block line
block maker
block mast
block model
block mold
block mountain
block off
block out
block party
block pattern
block plan
block plane

block print
block printing
block punch
block
 rate
block release
block signal
block signaling
block signals
block sugar
block system
block teeth
block the light
block tin
block up
block vote
block-book
block-caving
block-in-course bond
block-printed
block-saw
block-serifed
block-signal system
blockade-runner
blockade-running
blocked shoe
blocked-out
blocker-out
blockhead board
blocking back
blocking condenser
blocking course
blocking drive
blocking hammer
blocking out
blocking press
blocking process
blocking the light
blond-haired
blond-headed
blonde lace
blood albumin
blood and thunder
blood bank
blood baptism
blood bath
blood blister
blood bond

blood bread
blood brother
blood brotherhood
blood carcake
blood cast
blood cell
blood clam
blood clot
blood corpuscle
blood count
blood covenant
blood crisis
blood crystals
blood culture
blood cup
blood disease
blood diseases
blood disk
blood dock
blood donor
blood donor center
blood dust
blood feud
blood fine
blood flour
blood fluke
blood geranium
blood gill
blood gland
blood glue
blood
groove
blood group
blood grouping
blood guilt
blood heat
blood horse
blood islands
blood knot
blood lily
blood lust
blood mare
blood meal
blood mole
blood money
blood orange
blood pheasant
blood picture

blood pink
blood plant
blood plasma
blood platelet
blood plum
blood poisoning
blood pressure
blood pudding
blood purge
blood rain
blood red
blood refiner
blood relation
blood relationship
blood relative
blood revenge
blood rite
blood royal
blood sacrifice
blood sausage
blood seller
blood serum
blood sister
blood spavin
blood sport
blood spot
blood strain
blood stream
blood substitute
blood sugar
blood test
blood ties
blood transfusion
blood tree
blood type
blood typing
blood vengeance
blood vessel
blood vine
blood-albumin glue
blood-and-guts
blood-and-thunder
blood-bedabbled
blood-bespotted
blood-besprinkled
blood-boltered
blood-bought
blood-cemented

blood-colored
blood-consuming
blood-defiled
blood-discolored
blood-drenched
blood-drop emlets
blood-drunk
blood-dyed
blood-extorting
blood-faced
blood-filled
blood-fired
blood-flecked
blood-frozen
blood-guilty
blood-gushing
blood-heat
blood-hot
blood-hued
blood-letter
blood-letting
blood-loving
blood-lye
 salt
blood-mad
blood-money
blood-plashed
blood-polluted
blood-polluting
blood-raw
blood-red
blood-relation
blood-root
blood-scrawled
blood-shaken
blood-shot
blood-shotten
blood-sized
blood-spattered
blood-spavin
blood-stain
blood-stirring
blood-stirringness
blood-stone
blood-strange
blood-suck
blood-sucker
blood-swelled

blood-swoln
blood-tinctured
blood-type
blood-vascular
blood-vessel
blood-warm
blood-wite
blood-won
blood-worm
blood-wort
bloodless operation
bloodless revolution
bloodless surgery
bloodwort family
bloody butchers
bloody flux
bloody hands
bloody mary
bloody mess
bloody murder
bloody noun
bloody shirt
bloody your hands with
bloody-back
bloody-bones
bloody-eyed
bloody-faced
bloody-handed
bloody-hearted
bloody-minded
bloody-mindedness
bloody-mouthed
bloody-nosed
bloody-red
bloody-sceptered
bloody-veined
bloom
boy
bloom bud
bloom conveyer
bloom cutter
bloom heater
bloom hook
bloom late
bloom loader
bloom mill
bloom oil
bloom poison

bloom runner
bloom saw
bloom shearer
bloom shears
bloom side
bloom slinger
bloom smithy
bloom swinger
bloom tongs
bloom yard
bloom-colored
bloom-fell
bloom-shearing
bloomer girl
bloomer pit
blooming mill
blooming oil
blooming rolls
bloomy-down
blossom blight
blossom bud
blossom withy
blossom-bearing
blossom-billed
blossom-bordered
blossom-crested
blossom-end rot
blossom-faced
blossom-headed
blossom-laden
blossom-nosed
blot in your escutcheon
blot in your scutcheon
blot on your escutcheon
blot on your scutcheon
blot out
blot out your sins
blot up
blotch printing
blotch-shaped
blotting book
blotting case
blotting out
blotting pad
blotting paper
blow a fuse
blow a gasket
blow a horn

blow a hurricane
blow a kiss
blow a safe
blow about
blow accordion
blow away
blow case
blow down
blow for blow
blow great guns
blow hard
blow hot and cold
blow in
blow into
blow it
blow
job
blow me down
blow milk
blow mold
blow molding
blow moulding
blow off
blow off steam
blow off the lid
blow on
blow open
blow out
blow over
blow post
blow sky-high
blow snake
blow the bugle
blow the chance
blow the clarion
blow the coals
blow the horn
blow the lid off
blow the tank
blow the trumpet
blow the whistle
blow the whistle on
blow through
blow to
blow to bits
blow to kingdom come
blow to pieces
blow tube

blow up
blow up a storm
blow up the fire
blow upon
blow valve
blow wash
blow your brains out
blow your cool
blow your cover
blow your lines
blow your mind
blow your own horn
blow your own trumpet
blow your stack
blow your top
blow yourself to
blow-
blow-bies
blow-by
blow-by-blow
blow-dry
blow-fly
blow-hard
blow-hole
blow-in
blow-iron
blow-molded
blow-pipe
blow-through
blow-up
blow-wave
blower-up
blowing charge
blowing cylinder
blowing engine
blowing fan
blowing furnace
blowing hot and cold
blowing iron
blowing machine
blowing mold
blowing pipe
blowing tube
blowing up
blown glass
blown
over
blown up

blown up out of all proportion
blown-in-the-bottle
blown-mold
blown-molded
blown-out
blown-up
blowout grass
blowout magnet
blowpipe analysis
blowpipe reaction
blubber cask
blubber chopper
blubber fork
blubber grass
blubber lamp
blubber oil
blubber ship
blubber spade
blubber stove
blubber-cheeked
blubber-fed
blue Andalusian
blue Johnnies
blue Monday
blue Orpington
blue alert
blue angel
blue asbestos
blue baby
blue bag
blue bed
blue bell
blue belt
blue bird
blue black
blue blazing star
blue blindness
blue blood
blue bloods
blue bonnet
blue book
blue bottle
blue buck
blue bull
blue butcher
blue cat
blue cheese
blue chip

blue chip stock
blue coat
blue cohosh
blue colors and pigments
blue comb
blue copperas
blue coral
blue crab
blue crane
blue curls
blue daisy
blue dandelion
blue darter
blue dawn-flower
blue devil
blue devils
blue dicks
blue dogwood
blue dyer
blue ensign
blue eye
blue false indigo
blue fish
blue flag
blue flash
blue fox
blue funk
blue gas
blue goose
blue
gown
blue grama
blue grosbeak
blue ground
blue grouse
blue gum
blue heaven
blue huckleberry
blue in the face
blue iron earth
blue jasmine
blue jay
blue jeans
blue john
blue joke
blue language
blue law
blue laws

blue lily-turf
blue line
blue lips
blue lobelia
blue lotus
blue mangler
blue marguerite
blue marlin
blue mass
blue melilot
blue mill
blue mixer
blue mockingbird
blue mold
blue moon
blue mould
blue movie
blue mud
blue myrtle
blue note
blue ointment
blue onyx
blue pencil
blue penguin
blue peter
blue phlox
blue pickerel
blue pigeon
blue pike
blue pikeperch
blue pill
blue plate
blue point
blue pointer
blue powder
blue presser
blue pressman
blue racer
blue ribband
blue ribbon
blue rockfish
blue ruin
blue runner
blue shark
blue sheep
blue shift
blue sky
blue spirea

blue spruce
blue star grass
blue stellar object
blue stem
blue stone
blue story
blue streak
blue succory
blue thistle
blue tit
blue trucker
blue turquoise
blue velvet
blue verditer
blue vervain
blue vitriol
blue walleye
blue
 water
blue whale
blue with cold
blue wood aster
blue ynde
blue, the
blue-annealed
blue-aproned
blue-arc phenomenon
blue-backed
blue-banded
blue-bellied
blue-belt
blue-berried
blue-billed
blue-bird
blue-black
blue-blackness
blue-blind
blue-blooded
blue-blossom
blue-bloused
blue-bottle
blue-breasted
blue-breasted darter
blue-brick university
blue-cap
blue-checked
blue-cheeked
blue-chip

blue-coated
blue-collar
blue-collar worker
blue-colored
blue-crested
blue-cross
blue-cross gas
blue-cross shell
blue-curls
blue-devilage
blue-devilism
blue-eared
blue-eye
blue-eyed
blue-eyed Mary
blue-eyed boy
blue-eyed grass
blue-eyed soul
blue-faced
blue-fish
blue-flowered
blue-footed
blue-fronted
blue-glancing
blue-glimmering
blue-gray
blue-gray gnatcatcher
blue-green
blue-green alga
blue-green algae
blue-green flame
blue-gum leaves
blue-haired
blue-headed
blue-headed vireo
blue-hearts
blue-hot
blue-john
blue-leaved
blue-lined
blue-mantled
blue-molded
blue-molding
blue-mottled
blue-mouthed
blue-nose
blue-nosed
blue-pencil

blue-penciled
blue-penciling
blue-pencilled
blue-pencilling
blue-rayed
blue-red
blue-ribbon
blue-ribbon
jury
blue-ribbon panel
blue-ribboner
blue-ribbonism
blue-ribbonist
blue-roan
blue-rolled
blue-sailors
blue-sighted
blue-sky
blue-sky law
blue-slate
blue-spotted
blue-stained
blue-starry
blue-stemmed
blue-stocking
blue-striped
blue-tailed
blue-throated
blue-tinted
blue-tongued
blue-veined
blue-washed
blue-water
blue-water school
blue-wattled
blue-white
blue-winged
blue-winged teal
blue-yellow
blue-yellow blindness
blue-yellow-blind
blueback mullet
blueback salmon
blueback trout
blueberry ash
blueberry cornel
blueberry maggot
blueberry root

blueberry tree
bluebottle fly
bluebrick university
bluecoat boys
bluecoat school
bluefin tuna
bluehead sucker
bluejack oak
blueprint paper
blues singer
blues song
bluethroat pikeblenny
bluewater sailor
bluff formation
bluff off
bluff-bowed
bluff-headed
bluish-green
blunder away
blunder into
blunder on
blunder upon
blunders
round about a meaning
blunt-angled
blunt-edged
blunt-ended
blunt-faced
blunt-headed
blunt-leaved
blunt-lobed
blunt-nosed
blunt-pointed
blunt-spoken
blunt-witted
blur circle
blur distinctions
blurred speech
blurred vision
blurring the eyes
blurt out
blush rose
blush unseen
blush up to the eyes
blush-colored
blush-compelling
blush-faced
blush-suffused

blush-tinted
blushing bride
blushing honors
bluster and bluff
bluster into
bluster out of
bo tree
bo-peep
bo-tree
boa constrictor
boa-constrictor
boar dog
boar grunt
boar hunt
boar stag
boar thistle
boar tree
boar-fish
boar-hunting
board and batten
board and board
board and room
board chairman
board check
board chopper
board cloth
board combiner
board company
board cover
board fence
board foot
board game
board liner
board lot
board maker
board measure
board of aldermen
board of commissioners
board of directors
board of education
board of elections
board of estimate
board of health
board of regents
board of supervisors
board of trade
board

of trustees
board of visitors
board rack
board room
board rubber
board rule
board scale
board school
board side
board wages
board work
board worker
board-and-roomer
board-and-shingle
board-school
board-wages
boarder-up
boarding house
boarding nettings
boarding officer
boarding pike
boarding ramp
boarding school
boarding-out system
boards, the
boast of
boasting chisel
boat ax
boat bed
boat boy
boat bridge
boat bug
boat chock
boat club
boat crane
boat deck
boat drill
boat falls
boat hand
boat hire
boat hook
boat line
boat livery
boat nail
boat neck
boat neckline
boat pan
boat patch

boat people
boat race
boat seaplane
boat show
boat song
boat spike
boat steerer
boat train
boat truck
boat-bill
boat-billed heron
boat-fly
boat-green
boat-handler
boat-lowering
boat-race
boat-shaped
boat-tailed
boat-tailed grackle
boat-woman
boatswain bird
boatswain's call
boatswain's chair
boatswain's mate
boatswain's pipe
boatswain's stores
bob a curtsy
bob and wheel
bob down
bob for
bob runner
bob skate
bob
 skates
bob up
bob veal
bob wheel
bob wig
bob wire
bob-cherry
bob-haired
bob-sled
bob-tail
bob-white
bob-wig
bobbery pack
bobbin and fly frame
bobbin barreler

bobbin board
bobbin borer
bobbin boy
bobbin carrier
bobbin chucker
bobbin cleaner
bobbin filler
bobbin lace
bobbin maker
bobbin making
bobbin net
bobbin polisher
bobbin riveter
bobbin shifter
bobbin sinker
bobbin stripper
bobbin tester
bobbin tier
bobbin-net
bobby calf
bobby pin
bobby socks
bobby soxer
bobby-dazzler
bobby-socker
bobby-soxer
bobsy-die
bobtail drawbridge
bobtail flush
bobtail straight
bobtailed arrow
bobwhite quail
bock beer
bodd-
bodhi tree
bodice maker
bodies seven
bodily appetite
bodily charm
bodily comfort
bodily discharge
bodily grace
bodily love
bodily pleasure
bodily size
bodkin beard
body Brussels
body English

body and blood of Christ
body armor
body axis
body bag
body blight
body blow
body brace
body building
body cavity
body cell
body centrode
body check
body cloth
body clothes
body clothing
body coat
body
 color
body colour
body constituent
body corporate
body count
body curer
body designer
body ease
body erector
body fat
body finisher
body fluid
body former
body forth
body garment
body girth
body gripper
body harness
body heat
body height
body ill
body image
body ironer
body language
body linen
body lining
body loop
body louse
body maker
body mounter
body odor

body of Christ
body of Christians
body of advisers
body of affiliates
body of evidence
body of ideas
body of knowledge
body of law
body of learning
body of retainers
body of the crime
body of theory
body of water
body pain
body physician
body pigment
body plague
body plan
body plasm
body politic
body post
body scent
body servant
body shirt
body shop
body slam
body slave
body snatcher
body snatching
body stealing
body stocking
body suit
body surface
body track
body type
body varnish
body washer
body weight
body white
body whorl
body-breaking
body-build
body-centered
body-centred
body-guard
body-killing
body-line
body-line bowling

body-mind
body-snatching
boeuf
 a la bourguignonne
boeuf bourguignon
bofors gun
bog arum
bog asphodel
bog bean
bog bilberry
bog birch
bog blitter
bog blueberry
bog bull
bog bulrush
bog butter
bog cotton
bog cutting
bog deal
bog down
bog earth
bog featherfoil
bog fern
bog gale
bog garden
bog gentian
bog glede
bog grass
bog hay
bog hop
bog in
bog iron
bog iron ore
bog jumper
bog lemming
bog lime
bog manganese
bog mine
bog mold
bog moss
bog myrtle
bog nut
bog oak
bog onion
bog orchid
bog orchis
bog ore
bog peat

bog pimpernel
bog pine
bog pink
bog plant
bog rhubarb
bog rose
bog rosemary
bog rush
bog spavin
bog spruce
bog stalker
bog star
bog stitchwort
bog strawberry
bog timber
bog torch
bog trefoil
bog turf
bog violet
bog whortleberry
bog willow
bog-bred
bog-down
bog-eyed
bog-hoose
bog-iron ore
bog-rush
bog-trot
bog-trotter
bogey hole
bogey man
bogey-hole
boggle-dy-botch
bogie engine
bogie roll
bogus money
bohemian bob
bohemian brethren
bohr theory
bohun upas
boil away
boil down
boil off
boil
over
boil smut
boil up
boil-off

boiled dinner
boiled dressing
boiled eggs
boiled meat
boiled oil
boiled shirt
boiled sweet
boiler alarm
boiler blower
boiler cleaner
boiler compound
boiler coverer
boiler factory
boiler fitter
boiler fixer
boiler flue
boiler head
boiler horsepower
boiler inspector
boiler iron
boiler plate
boiler room
boiler scale
boiler shell
boiler shop
boiler suit
boiler tenter
boiler tube
boiler tuber
boiler-cleaning
boiler-off
boiler-out
boiler-testing
boiler-washing
boilermaker's hammer
boiling chip
boiling over
boiling point
boiling process
boiling spring
boiling stone
boiling water
boiling-house
boiling-point constant
boiling-water reactor
bois de vache
bois-brl
boite de nuit

bok choy
bold as a lion
bold as brass
bold conjecture
bold face
bold front
bold hand
bold ignorance
bold imagination
bold relief
bold stroke
bold-beating
bold-face
bold-faced
bold-facedly
bold-facedness
bold-following
bold-looking
bold-minded
bold-spirited
boldo family
boletic acid
boll
 hull
boll rot
boll weevil
bollard timber
bollix up
bollixed up
bolly cotton
bolo punch
bolo-bolo
bologna sausage
bolster plate
bolster up
bolt action
bolt auger
bolt boat
bolt chisel
bolt down
bolt forger
bolt from the blue
bolt hole
bolt hook
bolt in
bolt knife
bolt maker
bolt of lightning

bolt out of the blue
bolt rope
bolt strake
bolt the door
bolt threader
bolt upright
bolt upsetter
bolt-action
bolt-action rifle
bolt-cutting
bolt-forging
bolt-head
bolt-hole
bolt-pointing
bolt-rope
bolt-shaped
bolt-threading
bolt-turning
bolter-down
bolter-up
bolters-down
bolters-up
bolting cloth
bolting house
bolting hutch
bolting tub
bolus alba
bomah nut
bomahnut oil
bomb bay
bomb calorimeter
bomb ketch
bomb lance
bomb out
bomb plane
bomb rack
bomb release
bomb run
bomb shelter
bomb site
bomb thrower
bomb tube
bomb vessel
bomb-ketch
bomb-proof
bomb-shell
bomb-throwing
bombaje palm

bombanassa palm
bombardier beetle
bombardment emission
bombardment rocket
bombardment squadron
bombardment weapons
bombastic
person
bombay duck
bombe glacee
bomber jacket
bomber pilot
bombing locator
bombing machine
bombing mission
bombing run
bombing sap
bon ami
bon appetit
bon chretien
bon gre mal gre
bon jour
bon mot
bon soir
bon ton
bon vivant
bon viveur
bon voyage
bon-accord
bon-bon
bon-ton
bon-vivant
bona activa
bona fide
bona fide holder
bona fide purchaser
bona fideness
bona fides
bona roba
bona vacantia
bona-fide
bona-roba
bonace tree
bonaci arara
bonaci cardenal
bonaci gato
bonadventure mast
bonadventure mizzen

bonae fidei
bonaventure mast
bonaventure mizzen
bonbon spoon
bond anticipation note
bond coat
bond course
bond crowd
bond debt
bond issue
bond of matrimony
bond paper
bond servant
bond service
bond timber
bond washing
bond-land
bond-servant
bonded warehouse
bonded whiskey
bonding electron
bonds of harmony
bonduc nut
bone ash
bone bed
bone black
bone bleacher
bone boiler
bone breccia
bone brown
bone cartilage
bone carver
bone cell
bone char
bone charcoal
bone china
bone conduction
bone
corpuscle
bone crusher
bone cutter
bone dust
bone earth
bone fat
bone forceps
bone glass
bone grinder
bone heap

bone house
bone idle
bone jack
bone lace
bone meal
bone mill
bone of contention
bone of my bones
bone oil
bone pain
bone phosphate
bone pitch
bone plombe
bone polisher
bone porcelain
bone pot
bone precipitate
bone shark
bone sorter
bone spavin
bone spirit
bone tallow
bone tankage
bone tar
bone to pick
bone turquoise
bone up
bone waste
bone whale
bone white
bone yard
bone-ace
bone-breaking
bone-bred
bone-bruising
bone-carving
bone-chilling wind
bone-crushing
bone-dry
bone-dryness
bone-eater
bone-grinding
bone-hard
bone-idle
bone-lace
bone-laced
bone-lazy
bone-piercing

bone-rotting
bone-setter
bone-tired
bone-weary
bone-white
bone-wort
bonehead into it
bonehead play
bonehead trick
bongo drum
bonheur-du-jour
bonheurs-du-jour
bonne amie
bonne bouche
bonne foi
bonne nuit
bonnes amies
bonnes bouches
bonnet glass
bonnet gourd
bonnet grass
bonnet laird
bonnet limpet
bonnet macaque
bonnet
monkey
bonnet pepper
bonnet piece
bonnet rouge
bonnet shark
bonnet shell
bonnet skate
bonnet top
bonnet-headed
bonnethead shark
bonnets rouges
bonny-clabber
bons amis
bons mots
bons vivants
bont tick
bonus issue
bonus system
bony fish
bony labyrinth
boo at
boo-boo
boo-boos

boob stunt
boob tube
booby gannet
booby hatch
booby hutch
booby prize
booby trap
booby-trap
booby-trapped
booby-trapping
boodle bag
boogie-woogie
book account
book agent
book burning
book canvasser
book card
book clamp
book clasp
book cloth
book club
book collecting
book collector
book corner
book cover
book credit
book debt
book end
book fair
book fell
book gill
book hand
book house
book in
book into
book inventory
book isinglass
book jacket
book knowledge
book learning
book list
book lore
book louse
book lung
book machine
book madness
book manufacturing
book match

book muslin
book name
book notice
book of account
book of common prayer
book of fate
book of hours
book of original entry
book of verse
book out
book
 packet
book palm
book part
book post
book postage
book printer
book printing
book production
book profit
book publisher
book publishing
book review
book reviewer
book reviewing
book salesman
book scorpion
book size
book society
book stamp
book stitcher
book support
book table
book tile
book token
book tray
book truck
book value
book wagon
book-case
book-craft
book-fed
book-fell
book-flat
book-folder
book-keeper
book-keeping
book-latin

book-leaf trachea
book-learned
book-learning
book-lined
book-lore
book-loving
book-maker
book-match
book-minded
book-plate
book-read
book-sewer
book-sewing
book-stealer
book-stitching
book-taught
book-ways
book-wing
book-wise
book-work
book-worm
booking agent
booking clerk
booking hall
booking office
bookish person
booklet leaf
booklet pane
books of account
bookstall keeper
boolean algebra
boom brace
boom foresail
boom hoist
boom iron
boom jigger
boom mainsail
boom pole
boom rat
boom sail
boom shot
boom stay
boom tackle
boom town
boom vang
boom yard
boom-and-bust
boom-ended

booming
economy
booming market
boon companion
boon companionship
boon day
boon earth
boon loaf
boon work
boost your pay
booster amplifiers
booster battery
booster charge
booster dose
booster pump
booster rocket
booster rocket unit
booster shot
booster stations
booster unit
boot camp
boot cleaner
boot closer
boot cloth
boot crimp
boot dressing
boot hill
boot hook
boot ironer
boot maker
boot needle
boot out
boot polish
boot polisher
boot powder
boot socks
boot spur
boot stretcher
boot the
boot top
boot tree
boot-cleaning
boot-hale
boot-leg
boot-topping
booted and spurred
booting out
bootlace worm

bootle-blade
bootleg liquor
bootleg play
bootleg sucker
bootless errand
boots and all
boots and saddles
booze fighter
booze up
booze-up
bor-
borage family
borax bead
borax carmine
borax glass
borax honey
borax pentahydrate
borax usta
bord gate
bord-and-pillar
bord-land
bord-lode
bordeaux mixture
border ballads
border ground
border irrigation
border light
border line
border
on
border pen
border service
border stone
border terrier
border upon
border world
border-land
bordering on
bordering upon
borderline case
bore bit
bore meal
bore out of all patience
bore out of your life
bore stiff
bore to death
bore to distraction
bore to extinction

bore to tears
boreal blast
bored stiff
bored to death
bored to extinction
bored to tears
boric acid
boring bar
boring block
boring head
boring journal
boring machine
boring mill
boring pain
boring person
boring rod
boring tool
boring tube
born again
born before your time
born days
born fool
born for
born in Poland
born leader
born on itself
born out of wedlock
born to the purple
born under a bad sign
born under a lucky star
born under an evil star
born within sound of Bow bells
born yesterday
borne out
borning day
bornyl acetate
bornyl alcohol
bornyl formate
boro-
boron carbide
boron counter
boron nitride
borosilicic acid
borough council
borough english
borough reeve
borough-English
borough-english

borough-holder
borough-man
borough-master
borough-reeve
borough-town
borracha
 entrefina
borracha fina
borracha grossa
borrow pit
borrow the loan of
borrow trouble
borrowed plumes
borrowed stock
borrowed time
borrowed word
borrower's card
borrowing capacity
borrowing days
borrowing power
borsch circuit
borscht belt
borscht circuit
borstal boy
borstal institution
borstal school
boskop man
bosom bar
bosom buddy
bosom friend
bosom friendship
bosom ironer
bosom knee
bosom maker
bosom making
bosom piece
bosom plate
bosom staff
bosom-breathing
bosom-deep
bosom-felt
bosom-folded
bosom-stricken
boss cocky
boss plate
boss-eyed
bossa nova
boston bag

boston bull
boston cream pie
boston fern
boston ivy
boston terrier
botanical garden
botano-
botany bay
botched writing
botched-up
both-handed
both-handedness
both-hands
bott hammer
bottery tree
bottle baby
bottle blower
bottle boot
bottle brush
bottle bump
bottle cap
bottle capper
bottle carrier
bottle cleaner
bottle club
bottle coaster
bottle cod
bottle corker
bottle feeding
bottle
fern
bottle filler
bottle gentian
bottle glass
bottle gourd
bottle grass
bottle green
bottle heath
bottle imp
bottle in
bottle jack
bottle jaw
bottle kiln
bottle labeler
bottle labeling
bottle maker
bottle mold
bottle molder

bottle nose
bottle opener
bottle ore
bottle palm
bottle party
bottle pool
bottle rinser
bottle screw
bottle slider
bottle soaker
bottle sterilizer
bottle stopper
bottle sucker
bottle swallow
bottle tit
bottle tree
bottle turning
bottle up
bottle washer
bottle-assed type
bottle-bellied
bottle-blowing
bottle-brush
bottle-brush buckeye
bottle-butted
bottle-capping
bottle-carrying
bottle-cleaning
bottle-corking
bottle-fed
bottle-feed
bottle-filling
bottle-gas stove
bottle-green
bottle-head
bottle-holder
bottle-nose
bottle-nosed
bottle-nosed dolphin
bottle-nosed whale
bottle-o
bottle-rinsing
bottle-shaped
bottle-soaking
bottle-sterilizing
bottle-tailed
bottle-tight
bottle-washer

bottle-washing
bottled gas
bottled in bond
bottlenose dolphin
bottlenose oil
bottlenose
whale
bottling up
bottling works
bottom boards
bottom bolt
bottom canch
bottom disease
bottom dog
bottom dollar
bottom drawer
bottom fermentation
bottom gear
bottom glade
bottom grass
bottom heat
bottom house
bottom ice
bottom land
bottom line
bottom line, the
bottom of the barrel
bottom of the heart
bottom of the sea
bottom on
bottom out
bottom plate
bottom price
bottom rake
bottom rot
bottom round
bottom sawyer
bottom side
bottom side up
bottom stope
bottom tool
bottom up
bottom water
bottom waters
bottom yeast
bottom-dump bucket
bottom-road bridge
bottom-set

bottoming hole
bottoming out
bottoming tap
bottomless depths
bottomless pit
bottomless purse
bottomry bond
bottoms up
bottoms up!
botulismus toxin
boudoir cap
boudoir chair
boudoir dress
boudoir photograph
bough-pot
bought note
bought ready-to-wear
bougie decimale
bouillon cube
bouillon cup
bouillon spoon
bouillotte lamp
bouillotte table
boulder bast
boulder belt
boulder clay
boulder fern
boulder flat
boulder gravel
boulder
 raspberry
boulder train
boulder-stone
boulder-strewn
bouldering stone
boulevard stop
bounce back
bounce drill
bounce upon
bounced check
bouncing Bess
bouncing Bet
bouncing baby
bouncing bess
bouncing bet
bouncing check
bouncing-pin indicator
bound and determined

bound back
bound bailiff
bound book
bound charge
bound electron
bound foot
bound form
bound morpheme
bound over
bound to
bound up
bound up in
bound up with
bound variable
boundary condition
boundary layer
boundary light
boundary line
boundary point
boundary rider
boundary stone
boundary value problem
boundary-marking
bounden duty
bounden to
bounding bow
boundless pit
bounty hunter
bounty jumper
bounty jumping
bounty-fed
bouquet garni
bouquet larkspur
bouquets garnis
bourbon and branch water
bourbon rose
bourbon whiskey
bourbon whisky
bourdon lace
bourgeois gentilhomme
bourgeois taste
bouton pearl
bouts-rimes
bovine animal
bovine trichomoniasis
bovine vaccine
bovver boots
bow and arrow

bow and scrape
bow back
bow bearer
bow bells
bow
 brace
bow cap
bow chaser
bow chasing
bow collector
bow compass
bow divider
bow down
bow down and worship
bow down before
bow drill
bow dye
bow fast
bow file
bow front
bow hair
bow hand
bow legs
bow light
bow line
bow maker
bow net
bow oar
bow out
bow pen
bow pencil
bow pulpit
bow rudder
bow saw
bow stiffener
bow submission
bow the head
bow thistle
bow tie
bow to
bow to your will
bow trolley
bow wave
bow weight
bow window
bow your head
bow-and-quarter line
bow-back

bow-back chair
bow-backed
bow-beaked
bow-bearer
bow-bell
bow-bending
bow-compass
bow-draught
bow-dye
bow-dyer
bow-hand
bow-houghd
bow-iron
bow-legged
bow-less
bow-necked
bow-net
bow-shaped
bow-spring compass
bow-street
bow-string
bow-window
bow-windowed
bow-wow
bowed down
bowed-down
bowel movement
bowel-hive grass
bowels of compassion
bowels of mercy
bowels of the earth
bower anchor
bower plant
bower-bird
bowhead bird
bowie knife
bowie-knife
bowing acquaintance
bowing and scraping
bowing down
bowing stone
bowl a bosey
bowl
 a googly
bowl a wrong 'un
bowl along
bowl down
bowl game

bowl over
bowl spirit
bowl-shaped
bowled down
bowled over
bowline bridle
bowline cringle
bowline knot
bowling alley
bowling average
bowling ball
bowling crease
bowling green
bowling on the green
bowling stump
bowman's root
bows on
bows under
bowsprit bed
bowsprit cap
bowsprit shroud
bowstring beam
bowstring bridge
bowstring creeper
bowstring girder
bowstring hemp
bowstring roof
bowstring truss
bowtie antenna
bowwow theory
box barberry
box barrage
box barrow
box beam
box bed
box bill
box bolt
box bridge
box brier
box buggy
box caisson
box calf
box camera
box canyon
box chisel
box chronometer
box chuck
box clip

box cloth
box coat
box column
box cooper
box coot
box cornice
box couch
box coupling
box coverer
box crab
box cutter
box day
box dolly
box drain
box dresser
box edging
box elder
box end
box family
box frame
box front
box gauge
box girder
box grave
box green
box groove
box gutter
box hardening
box heading
box hedge
box
hinging
box holder
box holly
box hook
box house
box huckleberry
box in
box iron
box jig
box junction
box keel
box key
box kite
box level
box lid
box loom
box maker

box metal
box midge
box myrtle
box nail
box nailer
box nut
box oak
box of cigarettes
box of cigars
box off
box office
box on the ear
box opener
box oyster
box pew
box plait
box plaiter
box plaiting
box pleat
box poison
box press
box respirator
box room
box scald
box scene
box score
box seat
box set
box settle
box sextant
box shook
box shop
box shutter
box sill
box sleigh
box spanner
box spring
box springs
box stair
box stall
box staple
box stew
box stoop
box stove
box strap
box stretcher
box strike
box string

box tail
box taler
box tenon
box the compass
box the ears
box toe
box tool
box tortoise
box trap
box tree
box truck
box turtle
box up
box valve
box waggon
box wagon
box wrench
box-bordered
box-branding
box-calf
box-cleating
box-covering
box-edged
box-elder aphid
box-elder bug
box-haul
box-leaved
box-locking
box-nailing
box-office
box-plaited
box-shaped
box-strapping
box-top
mission
box-tree
box-trimming
box-turning
boxed cornice
boxed in
boxed-in
boxer shorts
boxer's ear
boxer-off
boxer-up
boxing blow
boxing day
boxing glove

boxing gloves
boxing match
boxing ring
boxing shutter
boxing weight
boxing-day
boxing-in
boy bishop
boy friend
boy oh boy
boy scout
boy wonder
boy's love
boy-meets-girl
boyar palm
boyish bob
boys' haircuts
boys' room
brab tree
brace a yard fore and aft
brace and bit
brace bit
brace block
brace box
brace bumpkin
brace comb
brace game
brace head
brace in
brace jack
brace molding
brace pendant
brace piece
brace root
brace table
brace up
brace wire
brace wrench
brace yourself
braced arch
braced frame
bracelet tie
bracelet wood
brachialis anticus
brachio-
brachio-cephalic
brachisto-
brachy-

bracken sickness
bracket capital
bracket clock
bracket crab
bracket foot
bracket fungus
bracket plate
bracket saw
bracket trail
bracketed blenny
bract scale
brad punch
brady-
brag about
brag yourself
up
braid bonnet
braid fern
braid wool
braided rope
braided stream
brain box
brain cactus
brain case
brain cavity
brain cell
brain cells
brain child
brain coral
brain damage
brain death
brain disease
brain drain
brain fag
brain fever
brain nerve
brain power
brain sand
brain specialist
brain stem
brain storm
brain surgery
brain teaser
brain trust
brain truster
brain tumor
brain twister
brain vesicle

brain wash
brain washing
brain wave
brain waves
brain-begot
brain-born
brain-breaking
brain-bred
brain-child
brain-cracked
brain-crazed
brain-crumpled
brain-damaged
brain-fever bird
brain-fevered
brain-fretting
brain-injured
brain-purging
brain-smoking
brain-spattering
brain-spun
brain-strong
brain-teaser
brain-tire
brain-trust
brain-wash
brain-washing
brains trust
brainstone coral
brake assembler
brake band
brake bar
brake beam
brake block
brake chain
brake chute
brake clevis
brake compartment
brake cylinder
brake drum
brake examiner
brake fitter
brake fluid
brake gear
brake hanger
brake
harrow
brake horsepower

brake hose
brake lever
brake light
brake lining
brake maker
brake meter
brake operator
brake parachute
brake pedal
brake pipe
brake power
brake repairer
brake rod
brake shoe
brake spring
brake stripper
brake tester
brake valve
brake van
brake wheel
brake-testing
brake-van
braking parachute
braking power
braking ratio
bramble finch
bramble rose
bramble shark
bramble worm
bran boil
bran drench
bran duster
bran mash
bran steep
bran tub
bran-deer
bran-new
branch bank
branch banking
branch bar
branch circuit
branch cut
branch depot
branch gap
branch grass
branch herring
branch line
branch mark

branch of knowledge
branch of learning
branch of service insignia
branch of study
branch of the service
branch off
branch office
branch officer
branch out
branch point
branch trace
branch water
branch wilt
branch-bearing
branch-building
branch-charmed
branch-climber
branch-embellished
branch-rent
branch-strewn
branched chain
branches of
branches of medicine
branchial arch
branchial
cleft
branchial groove
branching off
branching out
branchio-
branchiostegal ray
brand goose
brand iron
brand-goose
brand-mark
brand-new
brand-newness
brand-spanking new
branding iron
brandy Alexander
brandy and soda
brandy ball
brandy bottle
brandy butter
brandy mazzard
brandy mint
brandy smash
brandy snap

brandy snifter
brandy sour
brandy-bottle
brandy-burnt
brandy-faced
brandy-pawnee
brank-new
brank-ursine
brant bird
brant fox
brant goose
brant snipe
brant-fox
bras-dessus-bras-dessous
brash bearing
brass ankle
brass band
brass buffer
brass buttons
brass choir
brass farthing
brass finisher
brass fitter
brass founder
brass hat
brass instrument
brass knuckles
brass knucks
brass molder
brass pounder
brass quintet
brass section
brass spinner
brass tacks
brass turner
brass wind
brass, the
brass-armed
brass-bold
brass-browed
brass-cheeked
brass-colored
brass-eyed
brass-finishing
brass-fitted
brass-footed
brass-fronted
brass-handled

brass-headed
brass-hilted
brass-hooved
brass-lined
brass-melting
brass-mounted
brass-plated
brass-renting
brass-shapen
brass-smith
brass-tipped
brass-visaged
brass-wind
instrument
brass-working
brattice cloth
brave face
brave front
brave person
brave show
brave west winds
brave-horsed
brave-looking
brave-minded
brave-sensed
brave-showing
brave-souled
brave-spirited
brave-spiritedness
braze-jointed
brazen boldness
brazen it out
brazen law of wages
brazen out
brazen through
brazen-barking
brazen-browed
brazen-clawed
brazen-colored
brazen-face
brazen-faced
brazen-facedly
brazen-fisted
brazen-floored
brazen-footed
brazen-fronted
brazen-gated
brazen-headed

brazen-hilted
brazen-hoofed
brazen-imaged
brazen-leaved
brazen-lunged
brazen-mailed
brazen-mouthed
brazen-pointed
brazil nut
brazil wood
brazing alloy
bre kekekex
breach of contract
breach of faith
breach of friendship
breach of law
breach of privilege
breach of promise
breach of public trust
breach of the peace
breach of trust
breach the law
bread and butter
bread and water
bread and wine
bread
 bag
bread baker
bread beetle
bread bin
bread corn
bread crumb
bread crumber
bread crust
bread cutter
bread flour
bread grain
bread knife
bread line
bread maker
bread mold
bread mould
bread pan
bread plate
bread pudding
bread rack
bread sauce
bread slicer

bread stick
bread stuff
bread toaster
bread tray
bread tree
bread wheat
bread wrapper
bread-and-butter
bread-and-butter model
bread-and-butter pickle
bread-baking
bread-basket
bread-corn
bread-crumb
bread-crumbing
bread-crust bomb
bread-cutting
bread-eating
bread-faced
bread-fruit
bread-liner
bread-stitch
bread-stuff
bread-tree
bread-winner
bread-wrapping
breadth extreme
breadth index
breadth molded
break Priscian's head
break a lance with
break a strike
break and entry
break away
break back
break bean
break boundary
break bounds
break bread
break bread with
break bulk
break camp
break cover
break down
break down and confess
break down and cry
break even
break faith

break flour
break for
break forth
break free
break front
break ground
break
 in
break in on
break in the market
break in upon
break into
break into a smile
break into music
break into pieces
break into smithereens
break iron
break it off
break it to
break it up
break jail
break jaws
break joint
break lathe
break line
break loose
break no bones
break of
break of day
break of serve Tennis
break off
break off combat
break on the wheel
break open
break out
break out a flag
break out ballast
break out in a rash
break out in a sweat
break out the anchor
break out with
break pin
break point
break prison
break sheer
break shock
break silence
break step

break the back of
break the back of something
break the bank
break the charm
break the fall
break the habit
break the ice
break the law
break the neck of
break the news
break the pattern
break the peace
break the record
break the seal
break the sound barrier
break the spell
break the thread
break the trail
break through
break to harness
break to pieces
break to smithereens
break up
break van
break water
break
wind
break with
break with the past
break you up
break your back
break your bonds
break your chains
break your eyes away
break your fast
break your fetters
break your heart
break your heart over
break your neck
break your promise
break your word
break yourself away
break-
break-back
break-circuit
break-down
break-even
break-even point

break-front
break-in
break-neck
break-off
break-promise
break-through
break-up
breakaway group
breakbone fever
breakdown lights
breakdown of authority
breakdown van
breakdown voltage
breaker card
breaker strip
breaker-down
breaker-off
breaker-up
breakers ahead
breakeven chart
breakfast bacon
breakfast bell
breakfast food
breakfast knife
breakfast nook
breakfast plate
breakfast room
breakfast set
breakfast table
breakfast time
breaking and entering
breaking down
breaking engine
breaking joint
breaking load
breaking loose
breaking off of negotiations
breaking out
breaking piece
breaking plough
breaking plow
breaking point
breaking strength
breaking up
breaking
water
breaking-in
breakoff point

breaks, the
breakthrough weapons
breakup switch
breakup value
breast auger
breast backstay
breast beam
breast board
breast collar
breast cut
breast cylinder
breast drill
breast fast
breast feathers
breast harness
breast hoe
breast hole
breast in
breast kerchief
breast knee
breast laws
breast line
breast milk
breast molding
breast of lamb
breast of veal
breast off
breast pang
breast pocket
breast pump
breast roll
breast stoping
breast strap
breast stroke
breast tea
breast the current
breast the flood
breast the tide
breast the wave
breast timber
breast wall
breast wheel
breast-beam
breast-beater
breast-beating
breast-board
breast-deep
breast-fed

breast-feed
breast-feeding
breast-high
breast-hook
breast-plate
breast-plough
breast-rending
breast-wheel
breasting knife
breastwork log
breath glide
breath group
breath of air
breath of life
breath of your nostrils
breath test
breath-bereaving
breath-blown
breath-giving
breath-stopping
breath-sucking
breath-tainted
breath-taking
breathe
again
breathe down your neck
breathe easier
breathe easily
breathe easy
breathe fire and fury
breathe freely
breathe hard
breathe heavily
breathe in
breathe life into
breathe more freely
breathe new life into
breathe out
breathe the air of freedom
breathe vengeance
breathe your last
breather pipe
breathing apparatus
breathing capacity
breathing hole
breathing mark
breathing place
breathing pore

breathing space
breathing spell
breathing stress
breathing time
breathless adoration
breathless awe
breathless impatience
breathless wonder
breathy voice
bred in the bone
bred-in-the-bone
breech action
breech birth
breech bolt
breech delivery
breech mechanism
breech piece
breech pin
breech plug
breech screw
breech sight
breech-loader
breech-loading
breechblock plunger
breeches buoy
breeches money
breeches part
breeches pipe
breeching body
breeching loop
breeching strap
breed in and in
breed true
breeder reactor
breeder tulip
breeding ground
breeding place
breeding
 plumage
breeding sore
breeds of
breeds of cats
breeds of cattle
breeds of chickens
breeds of dogs
breeds of horses
breeds of sheep
breeds of swine

breeze along
breeze block
breeze box
breeze burner
breeze carrier
breeze concrete
breeze filler
breeze fly
breeze in
breeze into
breeze loader
breeze oven
breeze picker
breeze plant
breeze riddler
breeze tallyman
breeze up
breeze washer
breeze wheeler
breeze-borne
breeze-fanned
breeze-lifted
breeze-shaken
breeze-swept
breeze-wooing
brent goose
brent-new
brepho-
brest summer
bret-full
breu-
breve rest
brevet d'invention
brevi manu
brevi-
brewer's yeast
briar pipe
briar-hopper
bribe broker
bribe money
bribe-devouring
bribe-free
bribery and corruption
bribery oath
bric-a-brac
bric-a-brackery
brick arch
brick archer

brick ax
brick beam
brick burner
brick carrier
brick cheese
brick chipper
brick chisel
brick clay
brick cutter
brick drier
brick dust
brick earth
brick factory
brick hammer
brick hod
brick machine
brick machinist
brick mold
brick molder
brick
nog
brick nogging
brick oven
brick paver
brick pointer
brick press
brick presser
brick red
brick sorter
brick stamp
brick stitch
brick tea
brick trimmer
brick trowel
brick wall
brick wheeler
brick-barred
brick-bound
brick-building
brick-built
brick-burning
brick-colored
brick-cutting
brick-drying
brick-dust
brick-dust deposit
brick-earth
brick-field

brick-fronted
brick-grinding
brick-hemmed
brick-kiln
brick-nogged
brick-paved
brick-red
brick-testing
brick-walled
bricklayer's hammer
bricks and mortar
bridal hymn
bridal outfit
bridal saddle
bridal suite
bridal wreath
bride and groom
bride duck
bride price
bride-ale
bride-cup
bride-lace
bride-to-be
bridge bar
bridge between
bridge bird
bridge bracket
bridge circuit
bridge coupler
bridge crane
bridge deck
bridge engineer
bridge engineering
bridge fluting
bridge grafting
bridge guard
bridge house
bridge islet
bridge joint
bridge lamp
bridge lock
bridge maker
bridge money
bridge over
bridge passage
bridge pewee
bridge piece
bridge

rail
bridge seat
bridge sign
bridge stay
bridge stone
bridge table
bridge tower
bridge train
bridge wall
bridge whist
bridge-house
bridle bar
bridle bridge
bridle cable
bridle chain
bridle gate
bridle hand
bridle iron
bridle joint
bridle part
bridle path
bridle port
bridle rein
bridle road
bridle rod
bridle stricture
bridle tape
bridle trail
bridle up
bridle way
bridle wire
bridle-wise
brief bag
brief case
brief of title
brief span
brief success
brier bamboo
brier bush
brier rose
brier stitch
brig-rigged
brigade major
brigadier general
brigadier generals
bright and early
bright and fair
bright and shining

bright and sunny
bright color
bright days
bright diffuse nebula
bright eyes
bright idea
bright light
bright lights
bright outlook
bright prospect
bright rose
bright sentinels of the sky
bright side
bright smile
bright thought
bright wanderer
bright with promise
bright wool
bright young man
bright's disease
bright-bloomed
bright-cheeked
bright-colored
bright-dyed
bright-eyed
bright-eyed
 and bushy-tailed
bright-faced
bright-featured
bright-field
bright-flaming
bright-haired
bright-headed
bright-hued
bright-leaved
bright-line spectrum
bright-minded
bright-robed
bright-spotted
bright-striped
bright-studded
bright-tinted
bright-witted
brighten up
brightline spectrum
brightness equation
brightness temperature
brill's disease

brilliant cut
brilliant idea
brilliant light
brilliant success
brilliant-cut
brim over
brimming eyes
brimstone acid
brimstone butterfly
brimstone yellow
brindled gnu
brine fly
brine gauge
brine pan
brine pit
brine pump
brine pumper
brine shrimp
brine worm
brine-bound
brine-cooler
brine-cooling
brine-dripping
brine-pumping
brine-soaked
brinell hardness
brinell number
bring a case before the bar
bring a case before the court
bring about
bring about a detente
bring accusation
bring action against
bring around
bring back
bring back to the memory
bring bad luck
bring balm to your sorrow
bring before
bring before the public
bring by the lee
bring by the wind
bring
charges
bring crashing down
bring down
bring down about your ears
bring down around your ears

bring down the house
bring down the sun
bring down upon
bring down upon one
bring down upon you
bring down upon your head
bring down upon yourself
bring face to face with
bring forth
bring forward
bring glad tidings
bring home the bacon
bring home to
bring in
bring in a verdict
bring in a verdict of not guilty
bring in an indictment
bring in question
bring in the wind
bring into analogy
bring into being
bring into comparison
bring into court
bring into discredit
bring into existence
bring into focus
bring into play
bring into question
bring into relation with
bring into the limelight
bring into the open
bring into the wind
bring into the world
bring into view
bring low
bring near
bring off
bring off the wind
bring on
bring on the wind
bring out
bring out in bold relief
bring out in high relief
bring out in strong relief
bring over
bring pressure to bear upon
bring reason to bear
bring

round
bring shame upon
bring suit
bring the anchor home
bring the mind to bear upon
bring through
bring to
bring to a happy issue
bring to a head
bring to a stand
bring to a standstill
bring to a stop
bring to account
bring to an end
bring to an understanding
bring to attention
bring to bay
bring to bear
bring to bear upon
bring to birth
bring to book
bring to completion
bring to effect
bring to fruition
bring to justice
bring to life
bring to light
bring to maturity
bring to mind
bring to naught
bring to nothing
bring to notice
bring to nought
bring to pass
bring to reason
bring to recollection
bring to ruin
bring to tears
bring to terms
bring to test
bring to the bar
bring to the block
bring to the boiling point
bring to the fore
bring to the front
bring to the gallows
bring to trial
bring to view

bring to your notice
bring to your senses
bring together
bring trouble
bring tumbling down
bring under the hammer
bring under your notice
bring up
bring up by hand
bring up for investigation
bring
up short
bring up the rear
bring up to date
bring up todate
bring upon
bring upon yourself
bring word
bring you back to earth
bring you down
bring you to your knees
bring you up short
bring-and-buy sale
bringer-up
bringing back to earth
bringing forth
bringing in
bringing into disorder
bringing into question
bringing of charges
bringing out
bringing to book
bringing to fruition
bringing to light
bringing to the ground
bringing together
bringing-up
brise-soleil
brisk market
brisket disease
bristle cell
bristle fern
bristle grass
bristle moss
bristle picker
bristle rat
bristle up
bristle with

bristle worm
bristle-faced
bristle-grass
bristle-pointed
bristle-pointed oat
bristle-stalked
bristle-tailed
bristle-thighed
bristle-thighed curlew
bristle-toothed
bristlecone fir
bristlecone pine
bristlewort family
bristling with arms
bristly foxtail grass
bristly sarsaparilla
britannia metal
britannia ware
british english
brittany spaniel
brittle as glass
brittle fern
brittle star
brittle-star
brix
scale
broach post
broach spire
broach to
broach turner
broad accent
broad arrow
broad as the world
broad awake
broad bean
broad church
broad comedy
broad day
broad daylight
broad gage
broad gauge
broad glass
broad grin
broad hatchet
broad hint
broad humor
broad in the beam
broad jump

broad jumper
broad lines
broad mind
broad of beam
broad on the beam
broad on the bow
broad on the quarter
broad pendant
broad reach
broad seal
broad side foremost
broad spectrum
broad-arrow
broad-axe
broad-backed
broad-based
broad-beamed
broad-bean weevil
broad-billed
broad-bladed
broad-blown
broad-bodied
broad-bosomed
broad-bottomed
broad-boughed
broad-bowed
broad-breasted
broad-brim
broad-brimmed
broad-built
broad-chested
broad-chinned
broad-crested
broad-eared
broad-eyed
broad-faced
broad-flapped
broad-fronted
broad-gage
broad-gaged
broad-gauge
broad-gauge person
broad-gauged
broad-guage
broad-handed
broad-headed
broad-hoofed
broad-horned

broad-jump
broad-leafed
broad-leaved
broad-leaved bottle
tree
broad-leaved maple
broad-limbed
broad-lipped
broad-listed
broad-margined
broad-minded
broad-minded person
broad-mindedly
broad-mindedness
broad-mouthed
broad-nosed
broad-piece
broad-ribbed
broad-roomed
broad-set
broad-shouldered
broad-skirted
broad-souled
broad-spectrum
broad-spectrum antibiotic
broad-spectrum drug
broad-spoken
broad-spreading
broad-sterned
broad-striped
broad-tailed
broad-thighed
broad-tired
broad-toed
broad-toothed
broad-wayed
broad-wheeled
broad-winged
broad-winged hawk
broadbill dipper
broadcast band
broadcast channel
broadcast drama
broadcast journalism
broadcast loop
broadcasting regulation
broaden the mind
broadening the mind

broadleaf tree
broadloom carpet
broadly speaking
broadside aspect
broadside ballad
broadside on
broadtail cloth
broccoli brown
brock-faced
broderie anglaise
brogue hole
broil n
broiler house
broiling sun
broken accents
broken arch
broken chord
broken circuit
broken coal
broken color
broken dose
broken fortune
broken ground
broken heart
broken
home
broken in
broken line
broken lot
broken marriage
broken mirror
broken off
broken pediment
broken record
broken speech
broken thread
broken to harness
broken tones
broken voice
broken water
broken wind
broken-arched
broken-backed
broken-bellied
broken-check
broken-down
broken-ended
broken-footed

broken-fortuned
broken-handed
broken-headed
broken-hearted
broken-heartedly
broken-heartedness
broken-hipped
broken-hoofed
broken-in
broken-kneed
broken-legged
broken-minded
broken-mouthed
broken-nosed
broken-paced
broken-record
broken-shanked
broken-spirited
broken-winded
broken-winged
broker's agent
broker's loan
brokerage house
brokerage office
brolly-hop
brom-
brome grass
bromic acid
bromide paper
bromine pentafluoride
bromine water
bromo-
bromoil process
bromoil transfer
bronch-
bronchial asthma
bronchial pneumonia
bronchial tube
bronchial tubes
bronchio-
broncho-
bronco grass
bronx cheer
bronze age
bronze caster
bronze diabetes
bronze medal
bronze smelter

bronze star medal
bronze-bearing
bronze-bound
bronze-brown
bronze-casting
bronze-clad
bronze-colored
bronze-covered
bronze-foreheaded
bronze-gilt
bronze-gleaming
bronze-golden
bronze-haired
bronze-purple
bronze-shod
bronze-winged
bronze-yellow
bronzed
diabetes
bronzed grackle
brood above
brood bud
brood cell
brood chamber
brood gemma
brood mare
brood matron
brood nest
brood over
brood patch
brood pouch
brooder house
broody coop
broody hen
brook bean
brook betony
brook celandine
brook feather
brook lamprey
brook lobelia
brook mink
brook mint
brook no
brook no denial
brook pimpernel
brook runner
brook silk
brook sunflower

brook tongue
brook trout
broom birch
broom brush
broom clover
broom corn
broom crowberry
broom cypress
broom goosefoot
broom grass
broom handle
broom heath
broom hickory
broom maker
broom millet
broom moss
broom palm
broom pine
broom sage
broom sedge
broom straw
broom tea tree
broom toadflax
broom tops
broom tree
broom twine
broom wattle
broom-leaved
broom-sewing
broomcorn millet
broomrape
family
broomstick marriage
brother-german
brother-in-arms
brother-in-law
brotherly love
brothers under the skin
brothers-in-law
brougham-landaulet
brought about
brought down
brought in from nowhere
brought low
brought to notice
brought to your knees
brow ague
brow antler

brow point
brow tine
brow-bent
brow-wreathed
brown Bess
brown Betty
brown alga
brown algae
brown as a berry
brown bagging
brown bear
brown belt
brown bent
brown bess
brown betty
brown bill
brown bread
brown bullhead
brown butter
brown canker
brown coal
brown coat
brown creeper
brown george
brown gravy
brown hackle
brown heart
brown hematite
brown hyena
brown lung disease
brown madder
brown man
brown of dusk
brown off
brown out
brown race
brown rat
brown recluse spider
brown rice
brown rot
brown sauce
brown snake
brown soap
brown spot
brown stem rot
brown study
brown sugar
brown swiss

brown thrasher
brown thrush
brown trout
brown-armed
brown-backed
brown-banded
brown-barreled
brown-bearded
brown-berried
brown-colored
brown-complexioned
brown-eyed
brown-eyed
Susan
brown-faced
brown-green
brown-haired
brown-headed
brown-leaved
brown-locked
brown-nose
brown-nosed
brown-noser
brown-nosing
brown-purple
brown-red
brown-roofed
brown-sailed
brown-skinned
brown-sleeve
brown-spotted
brown-state
brown-stemmed
brown-strained
brown-tail moth
brown-tailed
brown-washed
browned off
browned-off
brownian motion
brownian movement
browning solution
browning trowel
brownish-red
brownish-yellow
brownstone front
browsing room
bruit about

bruited about
bruiting about
brumbo pulley
brunch coat
brunch-word
brush ape
brush apple
brush aside
brush ax
brush back
brush borer
brush boring
brush box
brush breaker
brush bronzewing
brush broom
brush by
brush case
brush cherry
brush coating
brush cut
brush deal
brush deer
brush discharge
brush drag
brush driller
brush drilling
brush fashioner
brush fiber
brush filler
brush fire
brush hand
brush harrow
brush heap
brush holder
brush hook
brush kangaroo
brush keeper
brush maker
brush myrtle
brush
off
brush on paint
brush ore
brush pile
brush polisher
brush puller
brush rabbit

brush sawyer
brush scythe
brush shunt
brush stick
brush stock
brush trimmer
brush turkey
brush turner
brush up
brush up on
brush varnisher
brush wheel
brush wolf
brush yoke
brush-breaking
brush-fire
brush-footed
brush-footed butterfly
brush-off
brush-shaped
brush-tail
brush-tailed
brush-tongued
brush-treat
brusher-off
brusher-up
brushfire war
brussels carpet
brussels lace
brussels sprout
brut champagne
brut concrete
brutal act
brutal fact
brutal task
brute creation
brute force
brute matter
brute strength
bruzz iron
bry-
brys-
bton de commandement
buaze fiber
bubble and squeak
bubble bath
bubble canopy
bubble car

bubble chamber
bubble dance
bubble dancer
bubble glass
bubble gum
bubble hood
bubble nest
bubble over
bubble sextant
bubble shell
bubble tower
bubble tube
bubble up
bubble-and-squeak
bubble-bow
bubbling over
bubbly-jock
bubonic plague
buccinator novi temporis
bucco camphor
buchu camphor
buchu
 oil
buck ague
buck and wing
buck basket
buck bean
buck fat
buck fever
buck finch
buck fleece
buck for
buck grass
buck in
buck knee
buck law
buck moth
buck off
buck passer
buck private
buck rabbit
buck rake
buck sail
buck scraper
buck sheet
buck slip
buck thistle
buck up

buck's horn plantain
buck's turn
buck's-horn
buck-and-wing
buck-bean
buck-bean family
buck-eye
buck-eyed
buck-horn
buck-hound
buck-jump
buck-mast
buck-one
buck-passing
buck-shot
buck-stall
buck-tooth
buck-toothed
buck-washing
bucker-up
bucket about
bucket bench
bucket brigade
bucket carrier
bucket conveyer
bucket down
bucket dredge
bucket hook
bucket hooker
bucket ladder
bucket maker
bucket orchid
bucket out
bucket pump
bucket rope
bucket seat
bucket shop
bucket snapper
bucket up
bucket well
bucket wheel
bucket-eyed
bucket-shaped
bucket-shop
buckeye rot
buckhorn brake
buckhorn plantain
buckhorn sight

bucking board
bucking bronco
bucking hammer
bucking kier
bucking plate
buckle bobber
buckle burnisher
buckle chain
buckle
coverer
buckle down
buckle down to
buckle finisher
buckle forger
buckle into
buckle maker
buckle mounter
buckle on your armor
buckle presser
buckle rollerer
buckle stamper
buckle to
buckle tongue
buckle tonguer
buckle under
buckle yourself
buckle-beggar
buckler fern
buckler maker
buckler mustard
buckler play
buckler player
buckler-fern
buckler-headed
buckler-shaped
bucks-beard
buckshot pattern
buckthorn brown
buckthorn family
buckwheat cake
buckwheat coal
buckwheat family
buckwheat flour
buckwheat sage
buckwheat tree
buckwheat vine
bucolic caesura
bud brush

bud from
bud grafting
bud gum
bud moth
bud mutation
bud rot
bud sage
bud scale
bud sport
bud stick
bud variation
bud variety
bud vase
buddy sap
buddy system
buddy up
buddy-boy
buddy-buddy
budge bachelor
budge barrel
budge-barrel
budget account
budget items
budget of news
budget plan
budget prices
buenas noches
buenos dias
buff Orpington
buff coat
buff leather
buff nor stye
buff stick
buff top
buff wheel
buff, the
buff-backed
buff-bare
buff-breasted
buff-citrine
buff-colored
buff-orange
buff-tipped
buff-washed
buff-yellow
buffalo
apple
buffalo berry

buffalo bird
buffalo bug
buffalo bur
buffalo bush
buffalo carpet beetle
buffalo chips
buffalo cholera
buffalo cloth
buffalo clover
buffalo cod
buffalo currant
buffalo dance
buffalo disease
buffalo fish
buffalo fly
buffalo gnat
buffalo gourd
buffalo grass
buffalo jack
buffalo mange
buffalo moth
buffalo nut
buffalo pea
buffalo robe
buffalo sunfish
buffalo thorn
buffalo tree
buffalo tree hopper
buffalo wallow
buffalo weed
buffalo wolf
buffalo-headed
buffer bar
buffer beam
buffer block
buffer salt
buffer solution
buffer state
buffer therapy
buffer value
buffer zone
buffered aspirin
buffet car
buffet lunch
buffet supper
buffet the waves
buffing apparatus
buffing head

buffing wheel
buffle duck
buffle-headed
buffo bass
buffy coat
bug agaric
bug bomb
bug in the ear
bug juice
bug light
bug off
bug word
bug-eyed
bug-eyes
bug-juice
bug-word
bugger about
bugger off
bugger
up
buggered up
bugging machine
buggy cultivator
buggy plow
bugle call
bugle corps
bugle horn
bugle-horn
bugle-weed
bugloss cowslip
bugs on
buhl clock
build a fire
build a house of cards
build castles in the air
build in
build into
build on
build the stately rime
build up
build up a stock
build up an inventory
build your house upon a rock
build-up
builder's knot
building anchor
building and loan association
building block

building blocks
building code
building construction
building contractor
building cradle
building inspector
building iron
building law
building lease
building line
building lot
building material
building mover
building paper
building permit
building rigger
building slip
building society
building surveyor
building trade
building trades
built for comfort
built like a brick shithouse
built on sand
built-in
built-up
built-up mast
bukk-
bulb angle
bulb bar
bulb fly
bulb iron
bulb keel
bulb mite
bulb plate
bulb rectifier
bulb rot
bulb scale
bulb-tee
bulbo-
bulbo-urethral
bulbourethral
gland
bulbous bow
bulbous buttercup
bulbous crowfoot
bulbous-rooted
bulge hoop

bulging purse
bulk large
bulk line
bulk mail
bulk modulus
bulk out
bulk up
bulk-material conveyer
bulk-pile
bulkhead deck
bulkhead in
bulkhead line
bulky color
bull account
bull apple
bull bait
bull band
bull bay
bull birch
bull bit
bull block
bull brier
bull buttercup
bull chain
bull cook
bull daisy
bull dike
bull ditcher
bull donkey
bull dust
bull dyke
bull earing
bull fiddle
bull float
bull gear
bull grape
bull grass
bull gun
bull header
bull horn
bull in a china shop
bull kelp
bull mackerel
bull market
bull mastiff
bull meat
bull moose
bull neck

bull net
bull nettle
bull nose
bull oak
bull peep
bull pen
bull pine
bull plum
bull point
bull pool
bull press
bull pump
bull quartz
bull raid
bull rattle
bull redfish
bull ring
bull riveter
bull rope
bull session
bull shark
bull snake
bull stag
bull stretcher
bull terrier
bull the market
bull thistle
bull tongue
bull train
bull trout
bull wheel
bull's
 nose
bull's-eye
bull's-eye lantern
bull's-eye mirror
bull's-eye rot
bull's-eye squall
bull's-eyed
bull's-eyes
bull-
bull-bait
bull-baiter
bull-baiting
bull-bearing
bull-beggar
bull-bitch
bull-bragging

bull-browed
bull-dog
bull-dose
bull-faced
bull-fight
bull-frog
bull-fronted
bull-god
bull-grip
bull-headed
bull-horn
bull-horn acacia
bull-like
bull-man
bull-mastiff
bull-mouthed
bull-necked
bull-nosed
bull-nosed bow
bull-roarer
bull-roaring
bull-run
bull-running
bull-terrier
bull-tongue
bull-tongued
bull-tonguing
bull-trout
bull-voiced
bull-whack
bull-whip
bulla tympani
bullace grape
bulldog ant
bulldog bat
bulldog clip
bulldog courage
bulldog edition
bulldog forceps
bulldog pipe
bulldog spear
bulldog tenacity
bulldog wrench
bullen nail
bullen-bullen
bullet bolt
bullet catch
bullet compass

bullet hawk
bullet maker
bullet money
bullet screw
bullet shell
bullet tree
bullet wood
bullet-head
bullet-hole
bullet-resisting glass
bulletin board
bulletproof vest
bullhead kelp
bullhead lily
bullhead
 shark
bulling bar
bullion balance
bullion fringe
bullion lace
bullion melter
bullion point
bullion smelter
bullion stitch
bullish market
bullish prices
bullit grape
bullnose header
bullnose step
bullnose stretcher
bullnose tool
bullock block
bullock cart
bullock heart
bullock's heart
bullock's-heart
bullshit artist
bully beef
bully tree
bully-off
bully-rock
bulrush millet
bulwark plating
bum a ride
bum around
bum steer
bum's rush
bum's rush, the

bum-
bumble-bee
bumble-puppy
bumblebee coot
bumblebee hawk moth
bumblebee root
bump against
bump ball
bump heads
bump into
bump joint
bump off
bump start
bump up
bump-off
bump-start
bumper bag
bumper beam
bumper car
bumper crop
bumper guard
bumper jack
bumper spring
bumper sticker
bumping bag
bumping hammer
bumping post
bumping race
bumping-off
bumpy ash
bun fight
bun foot
bun ochra
bunch bean
bunch evergreen
bunch grape
bunch grass
bunch light
bunch oyster
bunch peanut
bunch pink
bunch plum
bunch together
bunch up
bunch-backed
bunch-word
buncher

resonator
bunchflower family
bunchy top
bunco artist
bunco game
bunco steerer
bunder boat
bundle away
bundle branch
bundle branch block
bundle browning
bundle burial
bundle of His
bundle of isoglosses
bundle off
bundle out
bundle pillar
bundle sheath
bundle up
bundle work
bundle-rooted
bundu bashing
bung start
bung up
bung-full
bungalow tent
bunghole oil
bungup and bilge-free
bunji-bunji
bunk bed
bunk chain
bunk fence
bunker coal
bunker oil
bunko artist
bunko steerer
bunny brown
bunny girl
bunny hop
bunny hug
bunny rabbit
bunsen burner
bunt glut
bunter dog
bunting crow
bunting iron
bunting lark
buntline cloth

bunya-bunya
buon fresco
buon giorno
buona notte
buona sera
buono fresco
buoy boat
buoy up
buoy-tender
buoyancy force
buoyant force
buoyant market
buoyant mine
buoyed up
buoyed-up
buprestid beetle
bur artichoke
bur chervil
bur clover
bur cucumber
bur gherkin
bur grass
bur marigold
bur oak
bur parsley
bur reed
bur sage
bur thistle
bur vervain
bur-reed
buratto lace
burble point
burd-alone
burden
adjustment
burden of care
burden of expenditure
burden of proof
burden stitch
burden the memory
burden the mind
burden the mind with
burden with
burdened with debt
burdened with sorrow
burdock grass
bureau company
bureau of investigation

bureau system
bureaucratic delay
burg-bryce
burgess-ship
burgh-english
burghal-penny
burglar alarm
burglary insurance
burial at sea
burial case
burial chamber
burial customs
burial ground
burial jar
burial mound
burial peal
burial place
burial service
burial tree
burial urn
burial vault
burial yard
burial-ground
burial-place
buried in
buried in oblivion
buried in thought
buried treasure
burlesque act
burlesque queen
burlesque show
burlesque theater
burly-boned
burly-faced
burly-headed
burmannia family
burmese cat
burn a hole in your pocket
burn at the stake
burn blue
burn daylight
burn down
burn in
burn in effigy
burn in your pocket
burn off
burn on
burn out

burn the candle at both ends
burn the midnight oil
burn to
burn to a cinder
burn
 to ashes
burn to death
burn to the ground
burn up
burn up your mortgage
burn with curiosity
burn with love
burn you up
burn your boats
burn your bridges
burn your fingers
burn yourself out
burn-
burn- ing
burn-beat
burn-nose
burn-nose bark
burn-the-wind
burn-up
burned down
burned out
burned to the ground
burned-out
burned-over
burner gas
burner-off
burnet bloodwort
burnet clover
burnet moth
burnet rose
burnet saxifrage
burning at the stake
burning bush
burning ember
burning ghat
burning glass
burning hot
burning issue
burning mirror
burning mountain
burning oil
burning out
burning pain

burning point
burning question
burning rage
burning shame
burning spot
burning up
burning with curiosity
burning with excitement
burning-bush
burning-glass
burning-in tool
burning-wood
burnished-gold
burnishing die
burnt Italian earth
burnt Roman ocher
burnt ale
burnt almond
burnt almonds
burnt carmine
burnt cork
burnt crimson lake
burnt lake
burnt lime
burnt line
burnt ocher
burnt offering
burnt orange
burnt
 rose
burnt sienna
burnt umber
burnt up
burnt-child
burnt-out
burnt-umber
burnt-up
burp gun
burr chisel
burr-pump
burr-stone
burras-pipe
burrel fly
burrel shot
burrel-fly
burrel-shot
burring machine
burro deer

burro-back
burrow duck
burrow-duck
burrowing blenny
burrowing owl
burrows-town
burst forth
burst in
burst into bloom
burst into flame
burst into laughter
burst into song
burst into tears
burst like a bubble
burst like a thunderbolt
burst like a thunderclap
burst of applause
burst of laughter
burst of light
burst of rain
burst of speed
burst on the ear
burst out
burst out laughing
burst the bubble
burst upon
burst upon one
burst upon the view
burst with
burst with energy
burst with health
burst with laughter
burst-cow
bursting at the seams
bursting charge
bursting of the bubble
bursting out
bursting point
bursting strength
bursting to
bursting with happiness
bursting with health
bury the hatchet
bury the tomahawk
bury your head in the sand
bury yourself in
burying beetle
burying

ground
burying place
burying-ground
burying-place
bus bar
bus boy
bus conductor
bus driver
bus girl
bus line
bus rod
bus shelter
bus stop
bush baby
bush basil
bush bean
bush broom
bush canary
bush cat
bush cinquefoil
bush clover
bush coat
bush country
bush cow
bush cranberry
bush disease
bush doe
bush dog
bush dove
bush flying
bush forest
bush fruit
bush goat
bush grape
bush hammer
bush harrow
bush hawk
bush honeysuckle
bush hook
bush house
bush huckleberry
bush jacket
bush lark
bush lawyer
bush league
bush leaguer
bush lot
bush maple

bush marrow
bush metal
bush morning-glory
bush nut
bush oak
bush oyster
bush parole
bush pea
bush pepper
bush pig
bush pilot
bush poppy
bush pumpkin
bush quail
bush rat
bush rice grass
bush robin
bush scythe
bush shrike
bush sickness
bush soul
bush swamp
bush tamarind
bush tea
bush telegraph
bush tit
bush trefoil
bush up
bush vetch
bush warbler
bush wren
bush-fighter
bush-grown
bush-haired
bush-hammer
bush-harrow
bush-head
bush-headed
bush-league
bush-ranger
bush-rope
bush-shrike
bush-skirted
bush-tailed
busheled
iron
bushy aster
bushy-bearded

bushy-browed
bushy-eared
bushy-haired
bushy-headed
bushy-legged
bushy-tailed
bushy-whiskered
bushy-wigged
business English
business affairs
business agent
business arithmetic
business at hand
business car
business card
business chemistry
business college
business correspondence
business cycle
business deal
business dealings
business directory
business district
business double
business education
business end
business establishment
business ethics
business fluctuations
business index
business interruption insurance
business is business
business jet
business law
business leader
business letter
business life insurance
business machine
business paper
business pass
business relations
business reply card
business reply envelope
business school
business section
business suit
business transaction
business unionism

businessman's bounce
businessman's trip
busman's holiday
buss the clouds
busser-in
bust
 a gut
bust hammer
bust in
bust out
bust up
bust your ass
bust-up
bustamente furnace
bustard quail
bustle pipe
busy Lizzie
busy as a beaver
busy as a bee
busy bee
busy signal
busy yourself
busy yourself with
busy-brained
busy-fingered
busy-headed
busy-idle
busy-tongued
but breath and shadow
but for
but go at once
but good
but now
but piece
but then
but what
but-
but-and-ben
but-end
butacaine sulfate
butane lighter
butane stove
butane torch
butch haircut
butcher bird
butcher knife
butcher linen
butcher paper

butcher rayon
butcher shop
butcher's broom
butcher's meat
butcher's saw
butcher's-broom
butcher-bird
butcher-row
butea gum
butea kino
butea seed
butenedioic acid
butler's pantry
butler's sideboard
buts-and-bens
butt against
butt block
butt bolt
butt chain
butt chisel
butt cut
butt end
butt fitter
butt handler
butt haulier
butt head
butt hinge
butt in
butt joint
butt knuckle
butt leather
butt lifter
butt on
butt out
butt packer
butt plate
butt puller
butt roller
butt rot
butt saw
butt
shaft
butt shooting
butt sling
butt strap
butt striker
butt weld
butt welding

butt-headed
butt-in
butt-stock
butter ale
butter basket
butter bean
butter blender
butter boat
butter carrier
butter chip
butter clam
butter color
butter cooler
butter cress
butter crock
butter cutter
butter daisy
butter dealer
butter dipper
butter dish
butter dock
butter duck
butter firkin
butter grinder
butter kit
butter knife
butter maker
butter merchant
butter mold
butter muslin
butter of arsenic
butter of zinc
butter oil
butter packer
butter pat
butter pear
butter pick
butter plate
butter plum
butter print
butter roller
butter salve
butter sauce
butter server
butter shop
butter spreader
butter tooth
butter tree

butter tub
butter up
butter weight
butter yellow
butter your bread on both sides
butter-and-egg man
butter-and-eggs
butter-billed
butter-box
butter-bump
butter-colored
butter-cutting
butter-fingered
butter-mouthed
butter-nut
butter-print
butter-rigged
butter-rose
butter-smooth
butter-toothed
butterboat-bill
butterboat-billed
buttercup
family
buttercup yellow
buttered eggs
buttered rum
butterfly agama
butterfly bomb
butterfly bush
butterfly chair
butterfly dam
butterfly damper
butterfly dance
butterfly dock
butterfly fish
butterfly flower
butterfly lily
butterfly map
butterfly net
butterfly nut
butterfly orchid
butterfly orchis
butterfly pea
butterfly plant
butterfly ray
butterfly roof
butterfly table

butterfly tail
butterfly tulip
butterfly valve
butterfly wedge
butterfly weed
butterfly-flower
butterfly-pea
butternut squash
buttery bar
buttery hatch
butting in
butting-in
butting-joint
buttock line
buttock mail
button aster
button balance
button blank
button borer
button bottomer
button burnisher
button cactus
button chrysanthemum
button clamper
button cleaner
button clover
button coverer
button cutter
button day
button die
button dipper
button disease
button driller
button ear
button fastener
button finisher
button flower
button gauge
button grass
button head
button hole
button
lac
button maker
button making
button man
button mangrove
button mottler

button pearl
button piercer
button polisher
button quail
button sage
button saw
button scar
button seal
button sedge
button sewer
button shank
button shanker
button shoe
button shoes
button snakeroot
button snakeweed
button sorter
button stamper
button stick
button strike
button switch
button thistle
button tree
button turner
button up
button up your pockets
button willow
button worker
button your lip
button-covering
button-down
button-down collar
button-eared
button-fastening
button-headed
button-hold
button-holder
button-hole
button-sewing
button-shaped
button-slitting
button-tufting
buttoner-up
buttonhead rivet
buttonhole stitch
buttonwood shrub
buttress pier
buttress root

buttress thread
buttress tower
butts and bounds
butty lark
butyl alcohol
butyl aldehyde
butyl group
butyl oxalate
butyl radical
butyl-chloral
butylene group
butylene radical
butyr-
butyric acid
butyric ether
butyro-
butyryl group
butyryl
 radical
buy a piece of
buy a pig in a poke
buy a share of
buy and sell
buy at a bargain
buy at cost
buy at wholesale prices
buy back
buy boat
buy dirt cheap
buy for a mere nothing
buy for a song
buy for nickels and dimes
buy in
buy in futures
buy into
buy it
buy off
buy on credit
buy on the cuff
buy on the installment plan
buy out
buy time
buy up
buyer four
buyer resistance
buyer ten
buyer's strike
buyers' market

buyers' strike
buying and selling
buying in
buying option
buying power
buying right
buying up
buzz about
buzz along
buzz bomb
buzz off
buzz planer
buzz saw
buzz session
buzz track
buzz word
buzzard clock
buzzard curlew
buzzard grass
by a fluke
by a great deal
by a hair
by a jot
by a long chalk
by a long shot
by a long way
by a nose
by a piece of luck
by a side door
by a side wind
by a strong arm
by a whit
by accident
by acclamation
by agent
by airmail
by airplane
by all manner of means
by all means
by all odds
by an ace
by an iota
by and by
by and large
by any chance
by any
 manner of means
by any means

by any possibility
by auction
by authority of
by birth
by bits and pieces
by brute force
by bus
by cable
by cards
by catches
by categories
by chance
by choice
by command
by common consent
by common report
by comparison with
by consensus
by contraries
by cracky
by degrees
by design
by destiny
by dint of
by disposition
by divisions
by ear
by easy stages
by election
by express
by eyeball
by fair means or foul
by far
by fits
by fits and starts
by foot
by force
by force of arms
by force of habit
by forced marches
by freight
by general consent
by good fortune
by guess and by God
by half
by half measures
by halves
by hand

by hazard
by heart
by his lane
by hit and miss
by hook or by crook
by hook or crook
by horse
by ill hap
by ill luck
by inches
by inchmeal
by installments
by instinct
by interpretation
by intervals
by intuition
by itself
by jerks
by land
by law
by leaps and bounds
by little and little
by long odds
by mail
by main force
by marriage
by me
by means
of
by memory
by merest chance
by my halidom
by name
by nature
by necessity
by night
by no manner of means
by no means
by odds
by one
by order
by ordinary
by parol
by parts
by preference
by proxy
by quarters
by rail

by reason of
by reason of that
by reflex
by remote control
by request
by return mail
by right
by rights
by rote
by rule of thumb
by sea
by sections
by sight
by skips
by slow degrees
by snatches
by some means
by special delivery
by speech or action
by stages
by stealth
by steamer
by storm
by stress of
by suffrage
by surprise
by telegraph
by temperament
by the act of
by the agency of
by the aid of
by the board
by the book
by the by
by the bye
by the clock
by the good offices of
by the lee
by the logic of character
by the logic of temperament
by the numbers
by the people
by the rules of logic
by the run
by the same sign
by the same token
by the side of
by the skin of your teeth

by the stern
by the sweat of your brow
by the way
by the way of
by the wind
by this time
by transfer
by
 trial and error
by tricks
by trolley
by turns
by two
by types
by use of
by virtue of
by virtue of mind-set
by vote
by water
by way of
by way of example
by way of hypothesis
by way of opposition
by way of parenthesis
by what means
by what mode
by what name
by whatever name
by wholesale
by word of mouth
by your leave
by your lonesome
by your own petard
by yourself
by-
by-alley
by-altar
by-and-by
by-and-large
by-bid
by-bidder
by-bidding
by-blow
by-boat
by-channel
by-child
by-chop
by-cock

by-common
by-corner
by-day
by-dependency
by-design
by-doing
by-doingby-drinking
by-drinking
by-dweller
by-effect
by-election
by-end
by-fellow
by-fellowship
by-form
by-gold
by-hour
by-interest
by-issue
by-job
by-land
by-lane
by-law
by-lead
by-line
by-live
by-matter
by-motive
by-name
by-office
by-pass
by-pass capacitor
by-pass condenser
by-passage
by-passed
by-passer
by-passing
by-past
by-path
by-paths
by-place
by-play
by-plot
by-product
by-product oven
by-purpose
by-reaction
by-respect

by-result
by-road
by-room
by-route
by-sitter
by-speech
by-spel
by-stake
by-street
by-stroke
by-talk
by-term
by-the-bye
by-the-way
by-thing
by-throw
by-thrust
by-time
by-tone
by-track
by-trail
by-turning
by-view
by-walk
by-walking
by-wash
by-water
by-way
by-west
by-wipe
by-wood
by-word
by-work
by-your-leave
bye-blow
bye-bye
bye-byes
bye-election
bye-low
bye-stake
bye-turn
bye-water
bye-wood
bygone
days
bygone times
bypass burner
bypass condenser

bypass engine
bypass ratio
bypaths and crooked ways
byre-man
byre-men
byword of reproach
c & b
c battery
c clef
c ration
c'est autre chose
c'est bien
c'est ca
c'est la guerre
c'est la vie
c'est selon
c-axes
c-axis
c-horizon
c-mitosis
c/-
cS
ca canny
ca sa
ca' canny
ca'-thro'
ca'ing-whale
ca-ca
caaing whale
cab fare
cab hire
cabana set
cabaret tax
cabbage aphis
cabbage bark
cabbage bug
cabbage butterfly
cabbage lettuce
cabbage moth
cabbage palm
cabbage palmetto
cabbage repeatedly
cabbage root fly
cabbage rose
cabbage tree
cabbage white
cabbage-leaf miner
cabbage-root

maggot
cabbage-tree
cabbage-tree hat
cabbaging press
cabin boat
cabin boy
cabin camp
cabin car
cabin class
cabin court
cabin cruiser
cabin deck
cabin hook
cabin plane
cabin tent
cabin-class
cabinet beetle
cabinet cherry
cabinet member
cabinet minister
cabinet picture
cabinet pudding
cabinet scraper
cabinet wine
cabinet-maker
cable address
cable bend
cable buoy
cable car
cable crane
cable length
cable molding
cable railroad
cable railway
cable release
cable road
cable ship
cable stitch
cable television
cable tramway
cable's length
cable-car
cable-laid
cable-stitch
cabriole leg
cac-
cacao bean
cacao butter

cache-cache
cachectic fever
cachou de Laval
cack-handed
caco-
caco-zeal
cacoa bean
cacodyl group
cacodyl radical
cacodylic acid
cacoethes scribendi
cactus alkaloid
cactus dahlia
cactus family
cactus geranium
cactus wren
caddie bag
caddie car
caddie cart
caddis bait
caddis case
caddis fly
caddis worm
caddy spoon
cadency mark
cadet blue
cadet cloth
cadet gray
cadet grey
cadge a ride
cadmium
 bronze
cadmium carmine
cadmium cell
cadmium green
cadmium orange
cadmium poisoning
cadmium red
cadmium standard cell
cadmium sulfide
cadmium sulphate
cadmium sulphide
cadmium vermilion
cadmium yellow
cae-
caen-
caen-stone
caesarian section

caesium clock
cafe au lait
cafe chantant
cafe concert
cafe dansant
cafe noir
cafe society
cafe-society
caffoy paper
cag-handed
cage antenna
cage bird
cage zone melting
cager-on
caging knob
cahinca root
cahoun palm
caiman lizard
cain law
caiper-callie
cairn tangle
cairn terrier
cairn-headed
caisson body
caisson disease
caisson limber
cajeput oil
caju rains
cajuput oil
cake baker
cake eater
cake flour
cake griddle
cake make-up
cake maker
cake pan
cake-eater
cake-mixing
caked breast
caked lac
cakes and ale
caking coal
calaba tree
calabar bean
calabar-bean
calabash nutmeg
calabash tree
calabur tree

calamander wood
calamine blue
calamine brass
calamint balm
calamity howler
calamondin orange
calamus oil
calc-
calc-aphanite
calc-sinter
calc-spar
calc-tufa
calc-tuff
calcaneocuboid
 ligament
calcareo-
calcareous tufa
calce-scence
calci-
calcined baryta
calcined lime
calcio-
calcium arsenate
calcium bisulphite
calcium carbide
calcium carbonate
calcium caseinate
calcium chloride
calcium creosotate
calcium cyanamide
calcium cyanide
calcium cyclamate
calcium cyclohexylsulfamate
calcium dibromobehenate
calcium fluoride
calcium hydrate
calcium hydroxide
calcium hypochlorite
calcium iodobehenate
calcium lactate
calcium lamp
calcium light
calcium nitrate
calcium oxide
calcium oxych
calcium oxychloride
calcium permanganate
calcium phosphate

calcium propionate
calcium soap
calcium sulfide
calcium sulphate
calcium sulphite
calco-
calculate on
calculate upon
calculate your position
calculated deception
calculated distortion
calculated risk
calculated to
calculating machine
calculus of differences
calculus of finite differences
calculus of individuals
calculus of pleasure
calculus of variations
caldo verde
caldron bottom
calendar art
calendar clock
calendar
 day
calendar maker
calendar month
calendar of bills
calendar stone
calendar watch
calendar year
calendar-making
calenture of the brain
calf feed
calf leather
calf love
calf's brains
calf's head
calf's liver
calf's tongue
calf's-foot
calf's-foot jelly
calf-skin
cali-
caliatour wood
caliber compass
calibrated scale
calibrating circuit

calibrating terminal
calibrating unit
calico ash
calico aster
calico bass
calico bug
calico bush
calico cat
calico clam
calico crab
calico flower
calico pony
calico printing
calico scale
calico tree
california laurel
california poppy
california rosebay
caliper compass
caliper gauge
caliper rule
caliph willow
calisaya bark
calk weld
call a break
call a halt
call a halt to
call a recess
call a spade a spade
call a strike
call all bets off
call an intermission
call attention to
call away
call back
call back yesterday
call bell
call bird
call box
call card
call down
call down curses on the head of
call down evil upon
call for
call for help
call forth
call

girl
call heads or tails
call heaven to witness
call house
call in
call in question
call into being
call into existence
call into play
call into question
call it a day
call it quits
call letters
call loan
call mark
call market
call money
call names
call number
call of duty
call off
call on
call on the carpet
call on the phone
call on you for
call option
call out
call over
call price
call rate
call sign
call slip
call spirits from the vasty deep
call the play
call the roll
call the shots
call the signals
call the tune
call the turn
call time
call time-out
call to
call to account
call to active duty
call to arms
call to mind
call to notice
call to order

call to quarters
call to the colors
call to witness
call together
call up
call up spirits
call upon
call upon you for
call upon you to
call your bluff
call your own
call your shot
call your shots
call-back pay
call-board
call-down
call-fire
call-in pay
call-off
call-out
call-over
call-up
calla green
calla lily
calla-
callable bond
callable
 securities
callcedra wood
called for
called home
called on
calli-
calling a spade a spade
calling before the mind's eye
calling card
calling crab
calling forth
calling party
calling to the mind's eye
calling-down
calling-over
calliope hummingbird
calliper compasses
calliper rule
calliper splint Med
callis sand
callis-sand

callithumpian band
callosal convolution
callosal gyrus
calm acceptance
calm and free
calm as a mill pond
calm before the storm
calm disposition
calm down
calm mind
calm of mind
calm weather
calm yourself
calm-eyed
calm-minded
calm-throated
calming hand
calo-
calomel electrode
calore sore
calorie chart
calorie counter
calorie engine
calorie-counting
calorific value
calorimeter bomb
calumet dance
calvary cross
calyx drill
calyx spray
calyx teeth
calyx tube
cam chain
cam cleat
cam contactor
cam engine
cam press
cam squeezer
cam switch
cam wheel
cam-contactor switch
cam-cutting machine
cam-wood
camadula seed
camara nutmeg
camass rat
camb sizer
cambe wood

camber
arch
camber beam
camber piece
camber slip
camber-keeled
camberwell beauty
cambric grass
cambric muslin
cambric tea
camel back
camel caravan
camel driver
camel grass
camel hay
camel insect
camel litter
camel saddle
camel's hair
camel's hair rug
camel's-hair
camel-backed
camel-faced
camel-grazing
camel-hair
camel-haired
camel-kneed
camel-shaped
camel-yarn
camelback truss
cameline oil
cameo blue
cameo conch
cameo encrustation
cameo glass
cameo pink
cameo role
cameo stamper
cameo ware
camera angle
camera assembler
camera booth
camera deflection generator
camera lucida
camera obscura
camera tube
camera tubes
camera-eye

camera-ready copy
camera-shy
camino real
caminos reales
camomile oil
camp ball
camp bed
camp bird
camp car
camp ceiling
camp chair
camp circle
camp color
camp disease
camp fever
camp fire girl
camp flux
camp follower
camp hospital
camp it up
camp meeting
camp on the trail of
camp out
camp robber
camp root
camp royal
camp sheathing
camp site
camp stove
camp trailer
camp-fight
camp-meeting
camp-out
camp-shedding
camp-shot
camp-site
campaign
book
campaign button
campaign chair
campaign chest
campaign commitments
campaign contribution
campaign dinner
campaign for
campaign fund
campaign hat
campaign medal

campaign oratory
campaign promises
campaign ribbon
campaign wig
campeachy wood
campernelle jonquil
campfire girl
camph-
camphane group
camphor ball
camphor glass
camphor gum
camphor ice
camphor laurel
camphor liniment
camphor oil
camphor tree
camphor water
camphor weed
camphorated oil
campi santi
camping bus
camping ground
camping site
campo pea
campo santo
campos santos
campus shoes
campus university
camra stylo
can buoy
can burnisher
can calm
can capper
can carrier
can coverer
can crimper
can do
can faucet
can filler
can floater
can frame
can header
can hook
can it
can it be
can jacket
can key

can liner
can not
can of worms
can opener
can plug
can press
can sealer
can solderer
can sterilizer
can such things be
can system
can washer
can you beat that
can you
 feature that
can't be avoided
can't be helped
can't complain
can't help
can't keep from
can-beading
can-boxing
can-buoy
can-burnishing
can-can
can-capping
can-cleaning
can-closing
can-crimping
can-dock
can-filling
can-flanging
can-heading
can-hook
can-labeling
can-lacquering
can-lining
can-marking
can-opener
can-opening
can-polishing
can-quaffing
can-salting
can-scoring
can-sealing
can-seaming
can-slitting
can-soldering

can-squeezing
can-stamping
can-sterilizing
can-testing
can-washing
can-weighing
can-wiping
can-wrapping
cana brava
cana espina
canada balsam
canada lynx
canada thistle
canadian french
canal barge
canal boat
canal cell
canal coal
canal lock
canal ray
canal rays
canal system
canal-bone
canal-built
cananga oil
canard sauvage
canary bird
canary creeper
canary flower
canary glass
canary grass
canary moss
canary nut
canary seed
canary stone
canary vine
canary weed
canary wine
canary wood
canary yellow
canary-bird
canary-bird flower
canary-yellow
canarybird flower
canarybird
 vine
cancel out
canceled check

canceled type
cancellation clause
cancellation law
cancer cell
cancer eye
cancer jalap
cancer parasite
cancer stick
cancrinite-syenite
cancrum oris
candelabra lamp holder
candelabra plant
candelabrum tree
candelilla wax
candid camera
candid photograph
candid photography
candied apple
candle alder
candle anemone
candle auction
candle bearer
candle cactus
candle case
candle end
candle ends
candle fly
candle gleam
candle grease
candle hour
candle larkspur
candle lumen
candle mold
candle molder
candle paper
candle plant
candle power
candle rush
candle shade
candle snuff
candle snuffer
candle tree
candle tube
candle wicking
candle-beam
candle-bearing
candle-branch
candle-dipper

candle-end
candle-foot
candle-holder
candle-hour
candle-lighter
candle-meter
candle-rent
candle-shaped
candle-snuff
candle-snuff fungus
candle-tapering
candle-tree
candle-waster
candle-wood
candleberry bark
candleberry myrtle
candleberry tree
candlenut oil
candlestick lily
candlewick bedspread
candlewood
pine
candy cane
candy carrot
candy corn
candy grass
candy kitchen
candy pull
candy pulling
candy store
candy stripe
candy striper
candy thermometer
candy-striped
cane apple
cane ash
cane blight
cane borer
cane bottoming
cane brimstone
cane cactus
cane chair
cane crusher
cane cutter
cane field
cane fruit
cane gall
cane grass

cane gun
cane killer
cane knife
cane mill
cane osier
cane palm
cane piece
cane press
cane rat
cane reed
cane rush
cane rust
cane seat
cane seating
cane splicer
cane sugar
cane syrup
cane trash
cane weaver
cane webbing
cane withy
cane-backed
cane-bottomed
cane-phorus
cane-seated
canebrake rattler
canebrake rattlesnake
canella alba
canella bark
canella-bark family
cangica-wood
canicola fever
canicular days
canine appetite
canine distemper
canine leptospirosis
canine madness
canine tooth
canine typhus
canis major
canis minor
canister shot
canker bloom
canker blossom
canker lettuce
canker rash
canker rose
canker sore

canker violet
canker-bit
canker-bitten
canker-eaten
canker-hearted
canker-mouthed
canker-toothed
cankerworm
of care
canna family
canna-down
cannabis indica
cannabis resin
canned foods
canned goods
canned heat
canned show
cannel coal
cannel-bone
cannon ball
cannon bit
cannon bone
cannon cracker
cannon curl
cannon fodder
cannon metal
cannon off
cannon pinion
cannon shot
cannon stove
cannon-ball
cannon-ball fruit
cannon-ball tree
cannon-proof
cannon-royal
cannon-shot
cannonball express
cannot choose but
cannot do otherwise
cannot help but
canoe adz
canoe birch
canoe burial
canoe cedar
canoe gum
canoe tent
canoe yacht
canoe yawl

canon bit
canon form
canon law
canon lawyer
canon regular
canonical age
canonical books
canonical form
canonical hour
canonical hours
canonical prayers
canonical writings
canonized mortal
canons regular
canopic jar
canopy of heaven
canopy switch
cant across
cant block
cant body
cant chisel
cant dog
cant file
cant frame
cant hook
cant molding
cant purchase
cant ribband
cant round
cant spar
cant strip
cant
timber
canted column
canterbury bell
cantharid luster
cantharides cerate
cantilever bridge
cantilever foundation
cantilever spring
canting arms
canting coat
canting hypocrite
canting quoin
cantle bar
canto fermo
cantocanto fermo
canton blue

canton crepe
canton flannel
canton ginger
cantorial side
cantus figuratus
cantus firmus
cantus planus
canvas baster
canvas board
canvas dam
canvas dresser
canvas maker
canvas primer
canvas quilter
canvas shoe
canvas stitch
canvas stitcher
canvas stitching
canvas work
canvas worker
canvas-back
canvas-covered
canvasback duck
canyon gooseberry
canyon grape
canyon live oak
canyon wind
canyon wren
cap and bells
cap and gown
cap bolt
cap cell
cap cloud
cap flashing
cap fungus
cap gun
cap in hand
cap jib
cap maker
cap nut
cap octavo
cap of darkness
cap of dignity
cap of estate
cap of maintenance
cap paper
cap piece
cap pistol

cap rhymes
cap rock
cap screw
cap scuttle
cap spinning
cap square
cap the climax
cap verses
cap-a-pie
cap-case
cap-flash
cap-in-hand
cap-paper
cap-stone
capable
of
capable of life
capable of living
capable of solution
capable of survival
capacitive coupling
capacitive reactance
capacitor microphone
capacitor motor
capacitor speaker
capacity coupling
capacity factor
capacity for
capacity load
capacity load factor
capacity reactance
cape chisel
cape cod cottage
cape crawfish
cape doctor
cape gooseberry
cape parvum
cape-merchant
caper berry
caper family
caper sauce
caper spurge
caper tea
caper tree
caper-cut
capeseed oil
capful of wind
capillary action

capillary analysis
capillary attraction
capillary capacity
capillary chemistry
capillary electrometer
capillary potential
capillary pyrites
capillary tube
capillary water
capital account
capital accounts
capital asset
capital assets
capital bonus
capital budget
capital city
capital crime
capital expenditure
capital fellow
capital gain
capital gains
capital gains distribution
capital gains tax
capital goods
capital investment
capital joke
capital levy
capital loss
capital
market
capital operation
capital punishment
capital ship
capital stock
capital stock n
capital structure
capital style
capital styles
capital sum
capital surplus
capital transfer tax
capitalist economy
capitalistic economy
capitalistic system
capitalization issue
capitalize on
capitate bone
capitation grant

capitation tax
capo tasto
capoor cutchery
cappa magna
capped elbow
capped hock
capped pawn
capping fee
capping plane
capple-faced
capric acid
capricorn beetle
caprifig wasp
caproic acid
caprylic acid
capsicum wool
capsizing moment
capstan bar
capstan bolt
capstan lathe
capstan screw
capstan table
capstan tool rest
capstan-headed
capsuli-
captain ball
captain general
captain glass
captain lieutenant
captain of industry
captain's biscuit
captain's chair
captain's mast
captain's table
captain's walk
captain-generalcy
captain-lieutenant
captaincy general
captains general
captious critic
captive audience
captive balloon
captive bolt
captive nation
captive test
capture on film
capture

theory
captured-air bubble
captured-air vehicle
capuchin capers
capucine buff
capucine lake
capucine madder
capucine orange
capucine red
capucine yellow
caput mortuum
car accounting
car bit
car brake
car card
car coat
car coupler
car coupling
car dumper
car ferry
car float
car frame
car framer
car greaser
car heater
car knocker
car line
car lot
car mileage
car movement
car of Jagannath
car of Juggernaut
car park
car pool
car rail
car replacer
car retarder
car ride
car sealer
car service
car shed
car sickness
car starter
car step
car track
car wash
car wheel
car wheeler

car-borne
car-dumping
car-mile
car-replacing
car-tunnel kiln
caramel cream
caramel cutter
carap nut
carap oil
carap tree
carap wood
carapa nut
carapa oil
carapa tree
carapa wood
carat grain
carat grains
caravan boiler
caraway oil
caraway seed
caraway seeds
caraway-seed fern
carb-
carbamate insecticide
carbamic acid
carbazotic acid
carbo-
carbo-hydrate
carbocyclic compound
carbolic acid
carbolic oil
carbon 14
carbon
 arc
carbon bisulfide
carbon bisulphide
carbon black
carbon copy
carbon cycle
carbon dating
carbon diamond
carbon dichloride
carbon dioxide
carbon dioxide snow
carbon disulfide
carbon disulphide
carbon fibre
carbon flame

carbon knock
carbon lamp
carbon light
carbon microphone
carbon monoxide
carbon oxide
carbon oxychloride
carbon paper
carbon paper n
carbon pencil
carbon point
carbon process
carbon silicide
carbon spot
carbon star
carbon steel
carbon sulphochloride
carbon telephone
carbon tet
carbon tetrachloride
carbon tissue
carbon transfer
carbon transmitter
carbon trichloride
carbon tube
carbon- dating
carbon-14 dating
carbon-dioxide foam
carbon-dioxide recorder
carbon-dioxide snow
carbonated water
carbonic acid
carbonic acid gas
carbonic anhydride
carbonic-acid gas
carbonium ion
carbonization process
carbonyl chloride
carbonyl group
carbonyl radical
carborundum cloth
carboxyl group
carboxyl radical
carboxylic acid
carbro process
carbureted-hydrogen gas
carburetor altitude control
carcass

beef
carcass flooring
carcass roofing
carcin-
carcinogenic substance
card bends
card brusher
card case
card catalog
card catalogue
card cheating
card cleaner
card cloth
card clothier
card clothing
card compass
card cutter
card doffer
card drawer
card dresser
card end
card ender
card feeder
card fettler
card field
card file
card filler
card game
card games
card gatherer
card grinder
card index
card ledger
card magnetic compass
card measurer
card parer
card punch
card reader
card roller
card setter
card sorter
card strip
card stripper
card table
card teasel
card tenter
card thistle
card tray

card up your sleeve
card vote
card voting
card winder
card wire
card writer
card-carrier
card-carrying
card-carrying Communist
card-carrying member
card-counting
card-cut
card-cutting
card-devoted
card-index
card-perforating
card-printing
card-setting machine
card-sorting
cardamom oil
carder bee
cardi-
cardiac arrest
cardiac cycle
cardiac epilepsy
cardiac glucoside
cardiac glycoside
cardiac hormone
cardiac
 infarction
cardiac insufficiency
cardiac neurosis
cardiac output
cardiac pacemaker
cardiac shock
cardiac stenosis
cardiac tamponade
cardiac thrombosis
cardigan jacket
cardigan sweater
cardinal archbishop
cardinal beetle
cardinal bird
cardinal bishop
cardinal climber
cardinal cloth
cardinal deacon
cardinal dean

cardinal fish
cardinal flower
cardinal grosbeak
cardinal humour
cardinal number
cardinal numeral
cardinal point
cardinal points
cardinal priest
cardinal red
cardinal system
cardinal virtue
cardinal virtues
cardinal vowel
cardinal's hat
cardinal-bishop
cardinal-deacon
cardinal-flower
cardinal-priest
cardinal-red
carding hair
carding machine
carding thistle
carding wool
cardio-
cardio-aortic
cardio-inhibitory
cardiogenic shock
cardioid microphone
cardiovascular disease
cards and spades
care a snap
care a snap of your fingers for
care about
care for
care for truth
care naught for
care nothing about
care nothing for
care of souls
care sunday
care-bewitching
care-bringing
care-charmer
Sleep
care-charming
care-cloth
care-crazed

care-crossed
care-defying
care-dispelling
care-eluding
care-encumbered
care-fraught
care-killing
care-laden
care-lined
care-scorched
care-taker
care-tired
care-tuned
care-wounded
career building
career diplomat
career girl
career man
career politics
career soldiers
careers master
careful consideration
carefully ignore
careless abandon
caress the ear
cargo boat
cargo carrier
cargo checker
cargo clerk
cargo cluster
cargo coal
cargo cult
cargo dock
cargo handler
cargo lighter
cargo liner
cargo mast
cargo mill
cargo plane
cargo reflector
cargo ship
cargo transport
cargo worker
caribou moss
caricature plant
caring fair
carking care
carl hemp

carline thistle
carline wife
carload lot
carload rate
carmine crabapple
carmine lake
carnage trade
carnal abuse
carnal delight
carnal desire
carnal knowledge
carnal nature
carnal passion
carnal-minded
carnal-mindedness
carnation grass
carnation red
carnation rose
carnation rust
carnation-red
carnauba
 wax
carnegie unit
carnelian red
carnival glass
carnival lace
carnoso-
carob bean
carob brown
carob gum
carob tree
caroline hat
carom ball
carom into
carotid artery
carotid body
carotid gland
carotid sinus
carp at
carp louse
carp sucker
carp-
carpal tunnel syndrome
carpe diem
carpenter ant
carpenter bee
carpenter bird
carpenter grass

carpenter moth
carpenter's hammer
carpenter's square
carpet alterer
carpet beating
carpet bed
carpet bedding
carpet beetle
carpet binding
carpet bombing
carpet braid
carpet broom
carpet brush
carpet bug
carpet chair
carpet cleaner
carpet cleaning
carpet dance
carpet dealer
carpet drive
carpet dyer
carpet fastener
carpet filler
carpet fillings
carpet finisher
carpet fitter
carpet fixer
carpet folder
carpet grass
carpet hemmer
carpet knight
carpet lining
carpet loom
carpet machinist
carpet maker
carpet mill
carpet moth
carpet needle
carpet opener
carpet picker
carpet pink
carpet planner
carpet printer
carpet printing
carpet rags
carpet renovator
carpet

repairer
carpet rod
carpet sewer
carpet shark
carpet shell
carpet shredder
carpet slipper
carpet snake
carpet sorter
carpet stitch
carpet stretcher
carpet sweeper
carpet tack
carpet thread
carpet twisting
carpet weaver
carpet weaving
carpet wool
carpet yarn
carpet-bag
carpet-bagger
carpet-covered
carpet-cut
carpet-knight
carpet-smooth
carpet-sweeper
carpetweed family
carpo-
carpo-olecranal
carriage apron
carriage blind
carriage body
carriage bolt
carriage boot
carriage bow
carriage bridge
carriage builder
carriage building
carriage cleaner
carriage cleaning
carriage company
carriage coupler
carriage coupling
carriage dog
carriage drive
carriage driver
carriage entrance
carriage forward

carriage free
carriage gate
carriage guard
carriage harness
carriage head
carriage horse
carriage house
carriage hub
carriage iron
carriage ironer
carriage joiner
carriage lady
carriage lamp
carriage lampman
carriage maker
carriage making
carriage paid
carriage painter
carriage piece
carriage pole
carriage
porch
carriage rider
carriage road
carriage searcher
carriage seat
carriage setter
carriage shackle
carriage shaft
carriage shed
carriage spring
carriage springer
carriage step
carriage strap
carriage top
carriage trade
carriage trimmer
carriage trimming
carriage washer
carriage way
carriage wheel
carriage works
carriage wrench
carriage-free
carrick bend
carrick bitt
carrick bitts
carrick head

carried away
carried by acclamation
carrier amplifier
carrier bag
carrier courier
carrier fighter
carrier frequency
carrier pigeon
carrier ring
carrier shell
carrier snail
carrier suppression
carrier wave
carrier-based plane
carrier-current system
carrier-free
carrier-pigeon
carriers of
carrion beetle
carrion buzzard
carrion crow
carrion flower
carrion fly
carrion fungus
carrion hawk
carron oil
carrot beetle
carrot eating
carrot family
carrot fern
carrot orange
carrot pudding
carrot red
carrot rust fly
carrot soft rot
carrot tree
carrot-colored
carrot-head
carrot-headed
carrot-pated
carrot-shaped
carrot-top
carry
 a card
carry a tune
carry all before one
carry all before you
carry arms

carry authority
carry away
carry back
carry back in recollection
carry bag
carry by storm
carry coals to Newcastle
carry conviction
carry forward
carry in your thoughts
carry into effect
carry into execution
carry it
carry lee helm
carry off
carry on
carry on a business
carry on a conversation
carry on a propaganda
carry on a trade
carry on an inquiry
carry on business
carry on hostilities
carry on over
carry on something scandalous
carry on war
carry on your books
carry out
carry out the anchor
carry over
carry sail
carry the
carry the ball
carry the banner of
carry the day
carry the mail
carry through
carry to
carry to completion
carry to excess
carry too far
carry too much sail
carry weather helm
carry weight
carry you off your feet
carry young
carry your point
carry your thoughts back

carry yourself
carry-all
carry-back
carry-forward
carry-in
carry-log
carry-on
carry-over
carry-tale
carrying
 a fetus
carrying an embryo
carrying arms
carrying capacity
carrying charge
carrying cost
carrying distance
carrying out
carrying place
carrying through
carrying trade
carrying-on
carrying-out
carryings-on
carse deposit
cart aver
cart away
cart driver
cart horse
cart ladder
cart leather
cart maker
cart off
cart road
cart rope
cart track
cart wheel
cart whip
cart-rutted
cart-track plant
cart-wheel
cartage contractor
carte blanche
carte d'entree
carte de visite
carte du jour
carte-de-visite
cartel ship

cartes blanches
cartes de visite
cartes du jour
cartesian coordinate
cartilage bone
cartilage cell
cartilage pit
cartilaginous fish
cartilaginous quittor
carton of cigarettes
carton-pierre
cartridge annealer
cartridge bag
cartridge belt
cartridge blocker
cartridge box
cartridge brass
cartridge buff
cartridge case
cartridge clip
cartridge filler
cartridge fuse
cartridge gauge
cartridge heater
cartridge loader
cartridge loading
cartridge maker
cartridge making
cartridge paper
cartridge pen
cartridge
primer
cartridge priming
carve out
carve up
carve your way
carvel joint
carvel work
carvel-built
carvel-planked
carving fork
carving knife
cary-
caryo-
casaba melon
casagha pine
casca bark
cascade amplification

cascade connection
cascade control
cascade converter
cascade method
cascade screen
cascade system
cascade transformer
cascade-connect
cascara amarga
cascara buckthorn
cascara sagrada
cascarilla bark
cascarilla oil
case bay
case binding
case bolt
case bottle
case card
case count
case ending
case furniture
case glass
case goods
case grammar
case gun
case hammer
case harden
case hardening
case history
case in point
case in question
case knife
case law
case lawyer
case made
case method
case of need
case of nerves
case oil
case phrase
case record
case shot
case springs
case stake
case study
case system
case tablet
case the

case work
case worker
case-bearer
case-bound
case-harden
case-hardened
case-hardened steel
case-knife
case-shot
case-weed
case-worker
case-worm
cased book
cased
 glass
casein glue
casein paint
casein plastic
casemaking clothes moth
casement cloth
casement door
casement window
caser-in
cash account
cash advance
cash assets
cash audit
cash basis
cash capital
cash carrier
cash clerk
cash contract
cash credit
cash crop
cash customer
cash desk
cash discount
cash dividend
cash down
cash drawer
cash flow
cash in
cash in hand
cash in on
cash in your checks
cash in your chips
cash journal
cash letter

cash line
cash money
cash on delivery
cash on the barrelhead
cash on the nail
cash payment
cash price
cash purchase
cash railway
cash ratio
cash register
cash remittance
cash reserves
cash sale
cash store
cash supply
cash surrender value
cash tenant
cash terms
cash up
cash value
cash-and-carry
cash-book
cash-refund annuity
cashed up
cashew apple
cashew bird
cashew family
cashew lake
cashew nut
cashier's check
cashmere shawl
cashmere sweater
casing cutter
casing dog
casing head
casing knife
casing nail
casing shoe
casing spear
casing splitter
casing
 spool
casing swab
casing-head gas
casing-head gasoline
casing-in
casinghead gas

casino pink
cask marker
cask-shaped
cassava wood
casse paper
casse-tete
casserole fish
cassia bark
cassia bud
cassia fistula
cassia flask
cassia lignea
cassia nut
cassia oil
cassia pod
cassia pods
cassia pulp
cassia tree
cassia-bark tree
cassia-stick tree
cassie paper
cassiopeia's chair
cassowary tree
cast a ballot
cast a glance
cast a gloom over
cast a gloom upon
cast a horoscope
cast a laggen-gird
cast a nativity
cast a pall upon
cast a reproach upon
cast a shadow
cast a slur on
cast a slur upon
cast a spell
cast a traverse
cast about
cast about for
cast anchor
cast aside
cast aspersions on
cast at
cast away
cast back
cast blame upon
cast coquettish glances
cast down

cast envious eyes
cast forth
cast gear
cast in a different mold
cast in prison
cast in the eye
cast in the same mold
cast in your lot with
cast in your teeth
cast into hell
cast iron
cast light upon
cast loose
cast lots
cast naked upon the naked
earth
cast of characters
cast of countenance
cast of the dice
cast off
cast on
cast out
cast out devils
cast pearls before swine
cast plastic
cast plow
cast reflection upon
cast reflections on
cast reproach upon
cast scrap
cast sheep's eyes at
cast steel
cast the evil eye
cast the eyes back
cast the eyes on
cast the eyes over
cast the eyes upon
cast the first stone
cast the gorge
cast the lead
cast their shadows before
cast to the dogs
cast to the winds
cast up
cast up accounts
cast your bread upon the waters
cast your eye
cast your eyes down

cast your fortune
cast your hook
cast your net
cast your vote
cast your vote for
cast-back
cast-by
cast-iron
cast-iron-plant
cast-me-down
cast-off
cast-steel
cast-weld
castana nut
caste mark
caste-ridden
castellated beam
castellated nut
caster sugar
caster-off
castile soap
casting away
casting bottle
casting box
casting couch
casting counter
casting director
casting down
casting line
casting lots
casting net
casting on
casting table
casting voice
casting
 vote
casting wax
casting weight
casting wheel
casting your ballot
castle ditch
castle earth
castle gate
castle gilliflower
castle in Spain
castle in spain
castle in the air
castle in the skies

castle in the sky
castle nut
castle top
castle town
castle wall
castle-builder
castle-building
castle-built
castle-buttressed
castle-crowned
castle-guard
castle-guarded
castoff skin
castor aralia
castor bean
castor cake
castor gray
castor oil
castor pomace
castor seed
castor sugar
castor tree
castor wheel
castor-bean
castor-bean meal
castor-bean tick
castor-oil plant
castration complex
castrator mine
casual acquaintance
casual clothes
casual discovery
casual dress
casual house
casual laborer
casual remark
casual suit
casual ward
casual water
casualty insurance
casualty list
casualty ward
casualty-evacuation plane
casus belli
cat and dog
cat and mouse
cat and rat
cat around

cat back
cat beam
cat block
cat brier
cat burglar
cat castle
cat chain
cat cracker
cat cradle
cat davit
cat distemper
cat
 fever
cat fit
cat flea
cat food
cat grape
cat hair
cat ham
cat haw
cat hip
cat hole
cat hook
cat house
cat ice
cat ladder
cat man
cat nap
cat o'mountain
cat owl
cat pea
cat pine
cat plague
cat purchase
cat rig
cat salt
cat schooner
cat shark
cat silver
cat sleep
cat snake
cat spruce
cat squirrel
cat stopper
cat strip
cat suit
cat tackle
cat the anchor

cat thyme
cat tree
cat typhoid
cat whisker
cat yawl
cat's cradle
cat's ear
cat's foot
cat's paw
cat's tail
cat's whisker
cat's whiskers
cat's-claw
cat's-cradle
cat's-ear
cat's-eye
cat's-eyes
cat's-feet
cat's-foot
cat's-head
cat's-paw
cat's-tail
cat's-tail speedwell
cat-a-mountain
cat-and-dog
cat-and-dog life
cat-and-dog weather
cat-and-doggish
cat-bed
cat-built
cat-chop
cat-clover
cat-eyed
cat-fish
cat-foot
cat-hammed
cat-harpin
cat-harpings
cat-head
cat-hole
cat-lap
cat-like
cat-locks
cat-o'-mountain
cat-o'-nine-tails
cat-o-nine-tails
cat-rigged
cat-scratch disease

cat-scratch fever
cat-stick
cat-train
cat-whistles
cat-witted
cata-
cataleptic
hypnosis
catalog buying
catalog card
catalog goods
catalog selling
catalogue raisonn
catalogue raisonne
catalpa sphinx
catalytic agent
catalytic converter
catalytic cracker
catamenial discharge
catapult flight
catapult fruit
cataract bird
catarrhal fever
catarrhal inflammation
catarrhal pneumonia
catastrophe hazard
catastrophe reserve
catastrophe risk
catastrophic change
catatonic schizophrenia
catatonic stupor
catawba rhododendron
catawba rose bay
catawba tree
catbird grape
catbird seat
catch a Tartar
catch a crab
catch a glimpse of
catch a likeness
catch a lobster
catch a ride
catch a smell of
catch a train
catch a turn
catch a wink
catch as catch can
catch asleep at the switch

catch at
catch at straws
catch basin
catch boom
catch box
catch cold
catch colt
catch crop
catch cropping
catch drain
catch fire
catch flat-footed
catch hell
catch hold of
catch in
catch in a trap
catch in the act
catch it
catch it in the neck
catch line
catch meadow
catch napping
catch off base
catch
off side
catch off your guard
catch off-guard
catch on
catch on fire
catch on to
catch out
catch phrase
catch pit
catch points
catch question
catch red-handed
catch short
catch siding
catch sight of
catch stitch
catch the attention
catch the drift
catch the ear
catch the eye
catch the flame
catch the infection
catch the scent of
catch the thoughts

catch title
catch tripping
catch unawares
catch up
catch up in
catch up with
catch with your pants down
catch you flatfooted
catch your breath
catch your death
catch your death of cold
catch your eye
catch-
catch-22
catch-all
catch-as-catch-can
catch-cord
catch-up
catcher resonator
catchfly grass
catchment area
catchment basin
catchwater drain
catchword entry
catclaw acacia
catechetical method
catechetical school
categoric contact
categorical imperative
categorical proposition
categorical syllogism
categorically reject
categorically true
catenary furnace
catenary system
cater to
cater trey
cater-corner
cater-cornered
cater-cousin
cater-cousinship
catercorner
ar catty-corner
catercorner kitty-corner
caterpillar catcher
caterpillar fern
caterpillar fungus
caterpillar gate

caterpillar hunter
caterpillar plant
caterpillar tractor
caterpillar tread
catfoot poplar
cath-
catharine wheel
cathead chuck
cathead stopper
cathectic energy
cathedral builder
cathedral ceiling
cathedral chimes
cathedral church
cathedral close
cathedral dome
cathedral glass
cathedral music
cathedral service
cathedral tower
cathedral town
cathedral walk
cathedral-like
catherine wheel
catheter fever
cathode current
cathode dark space
cathode drop
cathode glow
cathode luminescence
cathode particle
cathode ray
cathode rays
cathode-ray oscillograph
cathode-ray oscilloscope
cathode-ray tube
cathodic protection
cathodo-luminescent
catholico-
cation detergent
cation-active
cationic detergent
catjang pea
cats and dogs
cattail family
cattail flag
cattail fungus
cattail grass

cattail millet
cattail rush
cattle boat
cattle breeder
cattle breeding
cattle buyer
cattle
 camp
cattle car
cattle crossing
cattle dealer
cattle dehorner
cattle dog
cattle drover
cattle egret
cattle farcy
cattle farm
cattle farmer
cattle feed
cattle feeder
cattle feeding
cattle float
cattle floater
cattle grub
cattle guard
cattle horn
cattle leader
cattle lifting
cattle loader
cattle louse
cattle mange
cattle marker
cattle marking
cattle pass
cattle pen
cattle plague
cattle pump
cattle raising
cattle ranch
cattle range
cattle run
cattle rustler
cattle rustling
cattle scab
cattle ship
cattle shipper
cattle show
cattle stall

cattle station
cattle stealing
cattle steamer
cattle tender
cattle thief
cattle tick
cattle trade
cattle trader
cattle train
cattle truck
cattle wire
cattle-grid
cattle-guard
cattle-plague
cattle-ranching
cattle-specked
cattley guava
cattleya fly
catty-co
catty-corner
catty-cornered
caucus nomination
cauda galli
cauda-galli grit
caudal anesthesia
caudal appendage
caudal fin
caudal peduncle
caudle cup
caught in your own trap
caught napping
caught off
 balance
caught off base
caught short
caught tripping
caught up in
caught with your pants down
caul board
caul fat
cauliflower cheese
cauliflower disease
cauliflower ear
cauliflower excrescence
cauliflower ware
cauliflower-eared
caulk off
caulking chisel

caulking cotton
caulking iron
caulking tool
caulo-
causa causans
causa finalis
causa sine qua non
causal body
causal glance
causal sequence
causal treatment
cause and effect
cause celebre
cause clbre
cause dislike
cause for alarm
cause in court
cause list
cause pain
cause the mind to stray
cause the mind to wander
cause to
cause to believe
cause to go out of your way
cause to resign
cause trouble
cause trouble for
cause unpleasantness
cause vertigo
cause-and-effect
caused by
causeway grass
causing cause
caustic alcohol
caustic baryta
caustic critic
caustic curve
caustic lime
caustic potash
caustic remark
caustic soda
caustic surface
caution card
caution light
caution money
cavalier battery
cavalier projection
cavalier servant

cavalier servente
cavalier
 servitude
cavaliere servente
cavalieri serventi
cavalry bone
cavalry horse
cavalry saddle
cavalry tactics
cavalry twill
cave art
cave bear
cave beetle
cave canem
cave cricket
cave drawing
cave dweller
cave dwelling
cave earth
cave fish
cave hunter
cave hyena
cave in
cave lion
cave man
cave of Trophonius
cave of despair
cave painting
cave pearl
cave period
cave rat
cave right
cave tomb
cave-guarded
cave-in
cave-keeping
cave-lodged
cave-loving
caveat emptor
cavi-relievi
cavi-rilievi
caviar to the general
caviare to the general
caving system
cavity block
cavity magnetron
cavity resonator
cavity source

cavity wall
caviuna wood
cavo-relievo
cavo-relievos
cavo-rilievo
cayenne pepper
cayenne whist
cease fire
cease hostilities
cease not
cease resistance
cease to be
cease to exist
cease to live
cease to use
cease-and-desist order
cease-fire
cecropia moth
cedant arma togae
cedar apple
cedar bird
cedar camphor
cedar chest
cedar elm
cedar grass
cedar green
cedar leaf
cedar maker
cedar
 manna
cedar moss
cedar nut
cedar of Lebanon
cedar pine
cedar rust
cedar swamp
cedar tree
cedar waxwing
cedar-brown
cedar-colored
cedarwood oil
cedr-
cee spring
ceiling balloon
ceiling board
ceiling fixture
ceiling floor
ceiling hook

ceiling joist
ceiling light
ceiling piece
ceiling plate
ceiling price
ceiling projector
ceiling unlimited
ceiling zero
ceiling-height indicator
ceilinged roof
cela saute aux yeux
cela va sans dire
celadon green
celandine green
celandine poppy
celebrate Mass
celery blight
celery cabbage
celery family
celery grass
celery mosaic
celery oil
celery pine
celery root
celery salt
celery seed
celery yellows
celery-leaved
celery-topped
celestial being
celestial beings
celestial blue
celestial body
celestial chart
celestial crown
celestial equator
celestial globe
celestial guidance
celestial hierarchy
celestial horizon
celestial kingdom
celestial latitude
celestial longitude
celestial marriage
celestial mechanics
celestial meridian
celestial navigation
celestial

pole
celestial spaces
celestial sphere
celestial throne
celiac disease
celiac plexus
cell body
cell bridge
cell cavity
cell charger
cell cleavage
cell count
cell cup
cell division
cell doctrine
cell family
cell house
cell kernel
cell membrane
cell multiplication
cell nest
cell nucleus
cell organ
cell physiology
cell plasm
cell plate
cell product
cell proliferation
cell sap
cell substance
cell tester
cell theory
cell wall
cell-blockade
cell-like
cell-shaped
cellar book
cellar door
cellar pipe
cellar sash
cellophane tape
cellular kite
cellular tissue
cellulo-
cellulocutaneous plague
celluloid collar
cellulose acetate
cellulose ether

cellulose flour
cellulose nitrate
cellulose plastic
cellulose triacetate
cellulose xanthate
celo-navigation
celtic cross
celto-
cembal damore
cembra nut
cembra pine
cement a union
cement conveyer
cement disease
cement dusting
cement filler
cement gauger
cement gland
cement grinder
cement hardener
cement kiln
cement layer
cement maker
cement mill
cement miller
cement
 mixer
cement of friendship
cement organ
cement paver
cement pulverizer
cement rod
cement sprayer
cement steel
cement tester
cement-coated
cement-covered
cement-drying
cement-faced
cement-forming
cement-lined
cement-lining
cement-temper
cen-
cendres blue
censer bearer
censer box
censer pot

census report
census returns
census taker
census tract
centauro-triton
center about
center anchor
center back
center bit
center circle
center drill
center field
center fielder
center gambit
center gauge
center halfback
center in
center jam
center jump
center line
center mold
center of action
center of activity
center of area
center of attention
center of attraction
center of authority
center of buoyancy
center of consciousness
center of curvature
center of displacement
center of effort
center of figure
center of flotation
center of gravity
center of immersed bulk
center of immersion
center of inertia
center of interest
center of inversion
center of lateral resistance
center of life
center of manufacture
center
of mass
center of origin
center of oscillation
center of ossification

center of percussion
center of pressure
center of projection
center of similitude
center of suspension
center of symmetry
center of the mind
center of volume
center on
center punch
center reamer
center round
center seal
center spider
center spread
center square
center staff
center tester
center valve
center wheel
center zone
center-fire
center-freeze system
center-of-pressure coefficiency
center-sawed
center-second
centerboard damper
centerboard trunk
centered dot
centerhole guitar
centering machine
centering square
centi-
centigrade scale
centigrade thermal unit
centigrade thermometer
centimeter-gram
centimeter-gram-second
centimetre-gram-second
centimetre-gramme-second
centipede grass
centipede legs
centipede locomotive
centipede plant
centr-
central administration
central angle
central apparatus

central bank
central body
central city
central cylinder
central dogma
central eclipse
central heating
central
 limit theorem
central moment
central nervous system
central office
central position
central processing unit
central projection
central reserve
central school
central station
central sulcus
central tendency
central time
central-fire
centralized school
centrally heated
centre bit
centre forward
centre half
centre of curvature
centre of gravity
centre of mass
centre of pressure
centre punch
centre section
centre spread
centre three-quarter
centre-fire
centred dot
centri-
centrifugal action
centrifugal box
centrifugal casting
centrifugal force
centrifugal pot
centrifugal pump
centrifugal spinning
centripetal action
centripetal force
centro-

centum languages
centuple calorie
century aloe
century plant
cephal-
cephalic index
cephalo-
cephalopelvic disproportion
ceramic cartridge
ceramic engineer
ceramic engineering
ceramic material
ceramic microphone
ceramic pickup
ceramic ware
cerat-
cerato-
cercis-leaf
cereal bowl
cereal plant
cerebellar hemispheres
cerebello-olivary
cerebr-
cerebral
 accident
cerebral cortex
cerebral dominance
cerebral hemisphere
cerebral hemispheres
cerebral meningitis
cerebral palsied
cerebral palsy
cerebral rheumatism
cerebral shock
cerebral tabes
cerebral tuberculosis
cerebro-
cerebro-ocular
cerebro-spinal
cerebrospinal fever
cerebrospinal fluid
cerebrospinal meningitis
cerebrospinal nervous system
cerebrovascular accident
ceremonial attire
ceremonial tea
ceric oxide
cerinic acid

cerium dioxide
cerium metal
cerium metals
cerium oxide
cero-
ceroso-
cerotic acid
cerre-tree
cerro green
certain knowledge
certain person
certainly not
certifiable case
certificate of admeasurement
certificate of character
certificate of deposit
certificate of enrollment
certificate of incorporation
certificate of indebtedness
certificate of insurance
certificate of invention
certificate of origin
certificate of proficiency
certificate of registry
certificate of stock
certified check
certified copy
certified mail
certified milk
certified public accountant
certified
teacher
cerulean blue
cerulean warbler
ceruleo-
cervical smear
cervico-
cervico-occipital
cervico-orbicular
ceryl alcohol
cessation of combat
cessation of life
cessio bonorum
cestui que trust
cestui que use
cet-
cetane number
cetane rating

cetera desunt
ceteris paribus
cetyl alcohol
cetyl palmitate
cetylic acid
cetylic alcohol
cevitamic acid
cgs units
cha-cha
cha-cha-cha
cha-chaed
cha-chaing
cha-chas
chac-chac
chack-bird
chafe at the bit
chafe iron
chafe-wax
chaff scale
chaff-flower
chaff-weed
chaffer whale
chaffeur-ship
chafing dish
chafing gear
chafing pan
chagas' disease
chagual gum
chai meu
chai vai
chain argument
chain armor
chain banking
chain belt
chain bit
chain block
chain boat
chain bolt
chain brake
chain cable
chain cent
chain closure
chain conveyer
chain coral
chain coupling
chain creeper
chain discount
chain dog

chain drill
chain drive
chain driving
chain fall
chain feed
chain fern
chain gang
chain gear
chain gearing
chain grab
chain grate
chain guard
chain harrow
chain hoist
chain
hook
chain isomerism
chain joiner
chain jointer
chain knot
chain letter
chain lightning
chain line
chain link fence
chain linker
chain locker
chain mail
chain maker
chain mark
chain measure
chain mechanism
chain of being
chain of cause and effect
chain of circumstances
chain of command
chain of evidence
chain of ideas
chain of office
chain of thought
chain pickerel
chain pillar
chain pin
chain pipe
chain plate
chain printer
chain pulley
chain pump
chain reaction

chain reactor
chain reasoning
chain reflex
chain riveting
chain rule
chain saw
chain shot
chain smoker
chain smoking
chain snake
chain splice
chain stitch
chain store
chain survey
chain syllogism
chain tape
chain tongs
chain towing
chain twist
chain victory to your car
chain wale
chain warper
chain welder
chain well
chain wheel
chain whip
chain winding
chain wrench
chain-bag
chain-bridge
chain-driven
chain-drooped
chain-grate stoker
chain-mail armor
chain-pull lamp holder
chain-pull switch
chain-pump
chain-react
chain-reacting
chain-reacting
pile
chain-shaped
chain-shot
chain-smoke
chain-smoked
chain-smoker
chain-smoking
chain-spotted

chain-stitch
chain-stitching
chain-swung
chain-testing
chain-wale
chain-welding
chain-work
chaining pin
chair arm
chair back
chair bed
chair binder
chair bottom
chair bottomer
chair cane
chair car
chair leg
chair lift
chair of English
chair organ
chair rail
chair seat
chair seater
chair shaper
chair table
chair turner
chair, the
chair-fast
chair-mortising
chair-shaped
chair-warmer
chairman of the board
chaise cart
chaise d'or
chaise longue
chaise longues
chaise lounge
chaise-longue
chaise-marine
chaises longues
chakazzi copal
chalcedony yellow
chalcid fly
chalcid wasp
chalcis fly
chalco-
chalice cell
chalice flower

chalice moss
chalice veil
chalice vine
chalk and talk
chalk burner
chalk cliff
chalk down
chalk dust
chalk engraving
chalk flint
chalk hill
chalk lime
chalk line
chalk maple
chalk mixture
chalk out
chalk pit
chalk plant
chalk process
chalk quarry
chalk stripe
chalk
talk
chalk talker
chalk up
chalk-eating
chalk-eyed
chalk-plate process
chalk-stone
chalk-talk
chalk-white
challenge comparison
challenge cup
chamber acid
chamber barrister
chamber blast
chamber chorus
chamber composer
chamber concert
chamber council
chamber counsel
chamber fellow
chamber filter
chamber gas
chamber horse
chamber kiln
chamber master
chamber mastering

chamber music
chamber of commerce
chamber of horrors
chamber opera
chamber orchestra
chamber organ
chamber pot
chamber practice
chamber process
chamber sonata
chamber stool
chamber study
chamber train
chamber vessel
chamber-deacon
chamber-master
chambered nautilus
chameleon grass
chameleon mineral
chameleon tree frog
chamfer bit
chamfer plane
chamois cloth
chamois leather
chamois skin
chamois yellow
champ at the bit
champaca oil
champagne cider
champagne cocktail
champagne cup
champaign country
champing at the bit
champion oak
champion tooth
champleve enamel
chance arrival
chance at odds
chance bairn
chance child
chance
discovery
chance event
chance hit
chance it
chance on
chance upon
chance-dropped

chance-hit
chance-hurt
chance-medley
chance-met
chance-poised
chance-shot
chance-sown
chance-taken
chance-won
chancel organ
chancel screen
chancel table
chancellor of the exchequer
chancery court
chancery hand
chancery law
chandelier tree
chang awn
change back
change bowler
change color
change course
change down
change for
change for the better
change for the worse
change front
change gear
change hands
change house
change into
change key
change of allegiance
change of commitment
change of conviction
change of heart
change of life
change of loyalty
change of mind
change of one thing for another
change of pace
change of venue
change off
change over
change ownership
change place
change places with
change point

change ratio
change residence
change ringing
change round
change sides
change the bearing
change the heading
change the preponderance
change to a former state
change to something different
change up
change
 wheel
change with the times
change your allegiance
change your colors
change your identity
change your mind
change your note
change your song
change your tune
change your ways
change-case key
change-house
change-over
change-over switch
change-ringing
change-speed gear
change-up
changed for the better
changement de pied
changements de pied
changer-off
changing bag
changing note
changing tone
channel bar
channel bass
channel board
channel bolt
channel cat
channel filter
channel goose
channel iron
channel patch
channel plate
channel rail
channel selector

channel steel
channel stone
channel-back chair
chanson de geste
chansons de geste
chant du cygne
chante-fable
chante-fables
chantry priest
chaotic heart
chap-book
chap-fallen
chap-money
chaparral bird
chaparral broom
chaparral cock
chaparral lily
chaparral pea
chaparral snapdragon
chapeau bras
chapel child
chapel de fer
chapel of ease
chapel royal
chapel text
chapels de fer
chapter and verse
chapter head
chapter house
chapter of
 accidents
chapter ring
char-
char-a-banc
char-a-bancs
character actor
character assassination
character dance
character dancing
character disorder
character dress
character group
character loan
character man
character part
character piece
character reference
character sketch

character study
character type
character witness
character woman
characteristic curve
characteristic equation
characteristic function
characteristic polynomial
characteristic root
characteristic subgroup
characteristic value
characteristic vector
characteristic velocity
characteristic x-ray
charcoal black
charcoal burner
charcoal drawing
charcoal fire
charcoal furnace
charcoal gray
charcoal grey
charcoal iron
charcoal oven
charcoal paper
charcoal pencil
charcoal pit
charcoal plate
charcoal point
charcoal powder
charcoal rot
charcoal tree
charcoal wood
charcoal-burner
charcoal-gray
charga-plate
charge account
charge book
charge card
charge carrier
charge conjugation
charge d'affaires
charge density
charge for
charge
 hand
charge in
charge nurse
charge of quarters

charge off
charge on
charge plate
charge sheet
charge the jury
charge to
charge to experience
charge to the jury
charge to your account
charge up
charge upon
charge weigher
charge with
charge-a-plate
charge-exchange accelerator
charge-house
charge-off
chargeable to
charged moment
charged up
charges forward
charging of the jury
charging order
charging rate
charging stick
chariot driver
chariot driving
chariot plane
chariot pole
chariot race
chariot racer
chariot side
chariot wheel
chariot-shaped
charismatic figure
charismatic gift
charismatic leader
charismatic movement
charismatic renewal
charity ball
charity bazaar
charity boy
charity case
charity commission
charity girl
charity house
charity school
charity stamp

charity ward
charity work
charity worker
charles's wain
charley horse
charlotte russe
charm school
charm the birds out of the trees
charm-bound
charm-built
charm-engirdled
charm-struck
charmed circle
charmed life
charnel house
chart
 a course
chart house
chart room
charter colony
charter hand
charter hold
charter land
charter member
charter party
charter school
charter-party
chartered accountant
chartered bus
chartreuse green
chartreuse tint
chartreuse yellow
chase after
chase away
chase gun
chase halter
chase hoop
chase mortise
chase mortised
chase off
chase out
chase piece
chase port
chase ring
chase up a stump
chase up a tree
chase women
chase your tail

chase-hooped
chase-hooping
chase-mortised
chaser hob
chasing lathe
chasse-maree
chassis fitter
chassis painter
chaste and fair
chaste as morning dew
chaste tree
chastity belt
chat show
chat up
chateau gray
chateau wine
chaton foil
chattel house
chattel interest
chattel mortgage
chattel slave
chattels personal
chattels real
chatter mark
chatter water
chatterbox tree
chattering of the teeth
chaud-froid
chaud-melle
chaulmoogra oil
chaun-
chaw-bacon
chaw-stick
che sara sara
che-choy
cheadle dock
cheap as dirt
cheap at half the price
cheap at the price
cheap item
cheap
money
cheap rates
cheap shot
cheap skate
cheap-jack
cheap-john
cheat death

cheat on
cheat the undertaker
check a parameter
check and doublecheck
check binding
check boy
check brace
check chamber
check collar
check endorser
check exchange
check folio
check gauge
check girl
check in
check in and out
check in full career
check key
check line
check list
check lock
check mark
check nut
check of
check off
check on
check out
check over
check over and through
check punch
check puncher
check rail
check ring
check roller
check sheet
check side
check stamp
check stamper
check stopper
check system
check the growth of
check the helm
check through
check up
check up and down
check up on
check valve
check washer

check your speech
check-
check-canceling
check-endorsing
check-flood
check-in
check-out
check-out pilot
check-over
check-perforating
check-roll
check-stone
check-string
check-writing
checked out
checked-out
checker plate
checker tree
checker-berry
checker-brick
checker-roll
checker-up
checkered
 lily
checkered plate
checking account
checking signals
checks and balances
cheddar pink
chee-chee
cheek block
cheek by cheek
cheek by jowl
cheek cut
cheek knee
cheek pouch
cheek strap
cheek to cheek
cheek tooth
cheek-by-jowl
cheer on
cheer pine
cheer the inner man
cheer to the very echo
cheer up
cheer-up
cheerful consent
cheerful expectation

cheerful fire
cheerful giver
cheerful outlook
cheerful readiness
cheery mood
cheery vein
cheese bail
cheese basket
cheese blintz
cheese block
cheese bolt
cheese cake
cheese cement
cheese chandler
cheese color
cheese cutter
cheese dream
cheese finger
cheese fly
cheese grater
cheese hoop
cheese it
cheese knife
cheese maggot
cheese maker
cheese making
cheese mite
cheese mold
cheese pitch
cheese plate
cheese press
cheese rack
cheese rennet
cheese running
cheese scoop
cheese skipper
cheese souffle
cheese straw
cheese toaster
cheese trier
cheese tub
cheese vat
cheese wring
cheese-head
cheese-headed
cheese-paring
cheesebox seat
cheesed off

cheeseparings
 and candle ends
chef d' oeuvre
chef d'oeuvre
chef d'ouvre
chef de cuisine
chef salad
chef-d'
chef-d'oeuvre
chefs de cuisine
chefs-d'oeuvre
cheil-
cheir-
cheiro-
chem-
chemic mixer
chemical analysis
chemical apparatus
chemical bond
chemical closet
chemical corps
chemical detector
chemical dictionary
chemical dynamics
chemical element
chemical elements
chemical engineer
chemical engineering
chemical equation
chemical fertilizer
chemical fuse
chemical lead
chemical physics
chemical potential
chemical reaction
chemical rocket
chemical solution
chemical sympathectomy
chemical toilet
chemical warfare
chemically pure
chemico-
chemin de fer
chemist's shop
chemo-
chemosynthetic bacteria
chenille Axminster
chenille carpet

chenille plant
chenille rug
chenopodium oil
cheoplastic metal
cheque card
chequer-chamber
chequer-wise
chequer-work
chequered flag
cherchez la femme
cherish a belief
cherish a feeling
cherish an idea
cherish at the heart's core
cherish the hope
cherish the memory of
cherokee
 rose
cheroonjie nut
cherry aphid
cherry apple
cherry bay
cherry birch
cherry bird
cherry bomb
cherry bounce
cherry brandy
cherry chopper
cherry coal
cherry coffee
cherry cordial
cherry country
cherry crab
cherry crush
cherry currant
cherry fair
cherry finch
cherry fruit fly
cherry fruit sawfly
cherry grader
cherry gum
cherry holly
cherry laurel
cherry leaf beetle
cherry leaf spot
cherry maggot
cherry mildew
cherry orange

cherry pepper
cherry picker
cherry pie
cherry pit
cherry pitter
cherry plum
cherry red
cherry rum
cherry scab
cherry scale
cherry seeder
cherry slug
cherry smash
cherry stone
cherry stoner
cherry sucker
cherry tomato
cherry wine
cherry-bob
cherry-cheeked
cherry-colored
cherry-crimson
cherry-flavored
cherry-laurel oil
cherry-lipped
cherry-merry
cherry-pie
cherry-red
cherry-ripe
cherry-rose
cherry-tree gum
cherry-wood
chert quarrier
chesapeake bay retriever
cheshire cat
cheshire cheese
chess apple
chess clock
chess notation
chess opening
chess rook
chess-apple
chess-men
chess-playing
machine
chess-tree
chessylite blue
chest X-ray

chest expander
chest founder
chest foundering
chest lid
chest lock
chest maker
chest measurer
chest note
chest of drawers
chest of viols
chest protector
chest register
chest tone
chest voice
chest wall
chest weight
chest-deep
chest-foundered
chest-on-chest
chested arrow
chester white
chestnut bean
chestnut blight
chestnut borer
chestnut bottle
chestnut brown
chestnut bud
chestnut clam
chestnut coal
chestnut extract
chestnut flour
chestnut oak
chestnut roaster
chestnut sedge
chestnut shell
chestnut stuffing
chestnut timber worm
chestnut tongue
chestnut tree
chestnut weevil
chestnut-backed
chestnut-bark disease
chestnut-bellied
chestnut-brown
chestnut-collared
chestnut-colored
chestnut-crested
chestnut-crowned

chestnut-red
chestnut-roan
chestnut-sided
chestnut-winged
cheval de bataille
cheval de frise
cheval glass
cheval screen
cheval-de-frise
cheval-glass
chevalier bird
chevalier crab
chevaux de bataille
chevaux-de-frise
chevron-shaped
chew
ass
chew out
chew over
chew the cud
chew the fat
chew the rag
chew the scenery
chew up
chew up the scenery
chew your
chewing gum
chewing louse
chewing tobacco
chewing-out
chez soi
chi-lin
chi-rho
chi-square
chi-square distribution
chi-square test
chi-squared test
chian turpentine
chica red
chick-pea
chickasaw plum
chicken Cacciatore
chicken Kiev
chicken Marengo
chicken Tetrazzini
chicken and dumplings
chicken bird
chicken breast

chicken broth
chicken cholera
chicken colonel
chicken coop
chicken corn
chicken fancier
chicken farm
chicken farmer
chicken farming
chicken feed
chicken foot
chicken grape
chicken gumbo
chicken halibut
chicken hawk
chicken hazard
chicken heart
chicken house
chicken ladder
chicken liver
chicken louse
chicken mite
chicken out
chicken paprikas
chicken pepper
chicken pest
chicken plover
chicken pox
chicken ranch
chicken roost
chicken salad
chicken septicemia
chicken snake
chicken soup
chicken switch
chicken thief
chicken tick
chicken tortoise
chicken
turtle
chicken wire
chicken yard
chicken-billed
chicken-brained
chicken-breasted
chicken-breastedness
chicken-farming
chicken-hazard

chicken-hearted
chicken-heartedly
chicken-heartedness
chicken-livered
chicken-liveredness
chicken-meat
chicken-spirited
chicken-toed
chickens-toes
chickling vetch
chickweed family
chickweed phlox
chickweed wintergreen
chicle bleeder
chicle gum
chico mamey
chicory family
chief constable
chief cook
chief engineer
chief executive
chief executive officer
chief justice
chief justiceship
chief librarian
chief master sergeant
chief mate
chief of police
chief of staff
chief of state
chief of the deadly sins
chief officer
chief petty officer
chief pilot
chief rabbi
chief thing
chief warrant officer
chief-justiceship
chief-pledge
chiefly Austral
chiff chaff
chiff-chaff
chignon bob
chigoe flea
chigoe-poison
chih hsien
child actor
child benefit

child born out of wedlock
child care
child guidance
child labor
child labour
child life
child mind
child minder
child
 of nature
child prodigy
child psychiatry
child psychology
child rearing
child welfare
child's play
child-bearing
child-bereft
child-birth
child-fashion
child-god
child-hearted
child-heartedness
child-loving
child-minded
child-mindedness
childbed fever
childhood's careless days
childish scrawl
childish treble
children of Israel
children of darkness
children of the devil
children's book
children's dictionary
children's hospital
children's librarian
children's magazine
children's shop
children's wear
chile con carne
chile niter
chile saltpeter
chile sauce
chili and beans
chili con carne
chili pepper
chili powder

chili sauce
chili vinegar
chilio-
chill along the spine
chill casting
chill mold
chill plow
chill to the bone
chill to the marrow
chill your spine
chill-cast
chilled to the bone
chilli con carne
chilli pepper
chilli powder
chilli sauce
chilling wind
chills of fear
chills of terror
chilo-
chime hoop
chime in
chime in with
chime of bells
chime whistle
chiming bell
chimley neuck
chimney
 bar
chimney bellflower
chimney board
chimney breast
chimney cap
chimney corner
chimney flute
chimney glass
chimney hook
chimney jack
chimney lug
chimney money
chimney piece
chimney pink
chimney plant
chimney pot
chimney repairer
chimney rock
chimney stack
chimney stalk

chimney swallow
chimney sweep
chimney sweeper
chimney swift
chimney tax
chimney throat
chimney top
chimney tun
chimney wheel
chimney wing
chimney-piece
chimney-pot hat
chin cough
chin fly
chin music
chin rest
chin shield
chin stay
chin strap
chin whiskers
chin-bearded
chin-bone
chin-chin
chin-chinned
chin-chinning
chin-deep
chin-high
chin-up
chin-wag
china aster
china bark
china cabinet
china clay
china closet
china decorator
china painter
china painting
china rose
china shop
china stone
china tree
china-mania
chinaberry tree
chinar tree
chinbeak molding
chinch bug
chine gall
chine hoop

chinese cabbage
chinese chestnut
chinese date
chinese lacquer
chinese lantern
chinese puzzle
chinese wall
chinese white
chinic acid
chink
 in your armor
chink-backed
chinked back
chinking course
chinless wonder
chino-
chinook jargon
chinook salmon
chinook wind
chinquapin oak
chip ax
chip basket
chip bird
chip board
chip break
chip budding
chip carving
chip in
chip log
chip of
chip of the old block
chip off
chip off the old block
chip on the shoulder
chip on your shoulder
chip pan
chip ring
chip shot
chip-hat palm
chip-proof
chipped beef
chipper-up
chipping ax
chipping bit
chipping chisel
chipping hammer
chipping piece
chipping sparrow

chipping squirrel
chiquichiqui palm
chir pine
chir-
chirk up
chiro-
chirp like a cricket
chisel bit
chisel grinder
chisel in
chisel maker
chisel making
chisel point
chisel steel
chisel temper
chisel tooth
chisel-cut
chisel-edged
chisel-pointed
chisel-shaped
chit-chat
chitino-arenaceous
chito melon
chittam bark
chittem bark
chitter-chatter
chittim bark
chitty-face
chive garlic
chlor-
chloracetic acid
chloral hydrate
chloramine-T
chloric acid
chloric ether
chloride of lime
chloride paper
chlorinated
 lime
chlorine azide
chlorine dioxide
chlorine family
chlorine peroxide
chlorine water
chloro-
chloroacetic acid
chlorobromid paper
chlorobromide paper

chloroformyl chloride
chlorophenol red
chlorophyll a
chlorophyll b
chlorophyll body
chloroplatinic acid
chlorosulfonic acid
chlorous acid
choc-ice
chock cheese
chock stone
chock-a-block
chock-full
chocolate bar
chocolate brown
chocolate cake
chocolate candy
chocolate chip cookie
chocolate corn
chocolate coverer
chocolate dipper
chocolate drop
chocolate eclair
chocolate family
chocolate milk
chocolate mill
chocolate mixer
chocolate mold
chocolate molder
chocolate molding
chocolate mousse
chocolate packer
chocolate pudding
chocolate sifter
chocolate soldier
chocolate tree
chocolate wrapper
chocolate-box
chocolate-brown
chocolate-coated
chocolate-colored
chocolate-flower
chocolate-red
choctaw-root
choice bit of dirt
choice morsel
choice of Hercules
choice of words

choice reaction
choice-drawn
choir aisle
choir chaplain
choir invisible
choir
loft
choir manual
choir member
choir organ
choir rail
choir school
choir screen
choir stall
choir wall
choke apple
choke back
choke coil
choke collar
choke off
choke on
choke out
choke pear
choke point
choke up
choke-
choke-bore
choke-full
choked off
choked up
choked voice
choker setter
choking coil
choking off
chol-
cholane series
chole-
cholera horn
cholera infantum
cholera morbus
cholera nostras
cholic acid
choline esterase
cholo-
chomp at the bit
chondr-
chondro-
chondro-osseous

chondroitin-sulphuric
chondrotrophic hormone
choo-choo
choo-choo train
choo-chooed
choo-chooing
choof off
choose out
choose rather
choose to
choose up
chop and change
chop chop
chop dollar
chop down
chop logic
chop mark
chop sooy
chop stroke
chop suey
chop-cherry
chop-chop
chop-church
chop-fallen
chop-house
chop-logic
chop-stick
chop-suey
chopped steak
chopped-off
chopper cot
chopper tool
chopping block
chopping knife
chopping sea
choppy sea
chor bishop
choral conductor
choral dancer
choral dancing
choral
director
choral fantasy
choral group
choral music
choral service
choral singer
choral singing

choral society
choral speaking
choral symphony
chorale prelude
chord chart
chord of the sixth
chord organ
chord packing
chord pitch
chord symbol
chorda dorsalis
chorda tendinea
chorda tympani
chordae tendineae
chore boy
chorea minor
choreo-
chori-
chorioallantoic membrane
chorionic gonadotrophin
chorionic gonadotropin
choroid coat
choroid membrane
choroid plexus
chorus boy
chorus frog
chorus girl
chorus man
chorus of cheers
chorus reed
chorus show
chorus singer
chose in possession
chose local
chose transitory
chosen freeholder
chosen kind
chosen people
chosen sort
choses in action
choses in possession
choses local
choses transitory
chota hazri
chou moellier
chou paste
chou pastry
chou-fleur

chouse out of
choux pastry
chow chow
chow down
chow line
chow mein
chow-chow
chrisom child
christ's-thorn
christ-cross
christ-cross-row
christ-like
christ-tide
christcross-row
christian brother
christian
 dor
christian era
christian name
christian reformed
christian science
christiano-
christmas tree
christo-
christy minstrel
chrom-
chroma-blind
chromat-
chromatic aberration
chromatic circle
chromatic color
chromatic colour
chromatic scale
chromatic semitone
chromatic sign
chromatic spectrum
chromatic tetrachord
chromaticity coordinate
chromaticity coordinates
chromaticity diagram
chromatin strands
chromato-
chrome acetate
chrome alum
chrome aventurine
chrome black
chrome brick
chrome green

chrome iron
chrome iron ore
chrome leather
chrome lemon
chrome liquor
chrome orange
chrome oxide green
chrome primrose
chrome red
chrome scarlet
chrome sole
chrome spinel
chrome steel
chrome tanning
chrome vermillion
chrome yellow
chrome-nickel
chrome-nickel steel
chrome-tanned
chrome-vanadium steel
chromic acetate
chromic acid
chromic chloride
chromic fluoride
chromium acetate
chromium ammonium sulfate
chromium chloride
chromium family
chromium green
chromium oxide
chromium plate
chromium
potassium sulfate
chromium sesquioxide
chromium steel
chromium trioxide
chromium yellow
chromium-plate
chromium-plated
chromo-
chromo-arsenate
chromosome complement
chromosome number
chromyl chloride
chron-
chronic alcoholic
chronic alcoholism
chronic bronchitis

chronic condition
chronic disease
chronic drunk
chronic ill health
chronic infectious arthritis
chronic inflammation
chronic leukemia
chronic pauperism
chronic poor
chronic poverty area
chronicle drama
chronicle history
chronicle play
chronique scandaleuse
chroniques scandaleuses
chrono-
chronological error
chronometer escapement
chrys-
chrysalis oil
chrysanthemum dog
chrysanthemum rust
chryso-
chrysolite green
chrysoprase green
chthonian worship
chub mackerel
chub sucker
chub-faced
chubby-faced
chuck and toss
chuck at
chuck farthing
chuck in
chuck it
chuck out
chuck plate
chuck rib
chuck roast
chuck steak
chuck under the chin
chuck up
chuck wagon
chuck-a-luck
chuck-farthing
chuck-full
chuck-luck
chuck-will's-widow

chucker-out
chuckers-out
chucking
 lathe
chucking out
chucking reamer
chucky-chuck
chucky-chucky
chug on
chug-a-lug
chug-chug
chukar partridge
chukka boot
chukka boots
chukker brown
chulan family
chum salmon
chum together
chum with
chump end
chupa-chupa
church bell
church book
church calendar
church council
church dignitary
church door
church father
church feast
church furnishing
church house
church invisible
church key
church member
church militant
church mode
church mouse
church music
church of england
church office
church organ
church parade
church part
church rate
church school
church seat
church service
church slavic

church suffering
church text
church triumphant
church vessel
church visible
church wedding
church work
church worker
church year
church-ale
church-chopper
church-door
church-gang
church-garth
church-government
church-papist
church-scot
church-soken
church-ward
churchyard cross
churidar pyjamas
churn drill
churn molding
churn out
churn supper
churn up
churn-butted
churr-owl
churr-worm
chute
 system
chute the chute
chute the chutes
chute-the-chute
chute-the-chutes
chylo-
chym-
chymo-
ci-
ci-devant
ciba blue
cicada killer
cicatricial tissue
cich-pea
cider brandy
cider cup
cider gum
cider jack

cider maker
cider making
cider mill
cider press
cider tree
cider vinegar
cider wine
cigar beetle
cigar binder
cigar box
cigar case
cigar case-bearer
cigar clipper
cigar cutter
cigar holder
cigar lighter
cigar machine
cigar machinist
cigar maker
cigar making
cigar mold
cigar molder
cigar packer
cigar roller
cigar rolling
cigar smoker
cigar sorter
cigar spot
cigar store
cigar-box cedar
cigar-flower
cigar-loving
cigar-shaped
cigar-smoker
cigar-store Indian
cigarette beetle
cigarette break
cigarette butt
cigarette card
cigarette case
cigarette drain
cigarette end
cigarette factory
cigarette girl
cigarette holder
cigarette lighter
cigarette machine
cigarette maker

cigarette making
cigarette paper
cigarette roller
cigarette smuggling
cigarette sorter
cigarette tobacco
cigarette-smoker
ciliary
 body
ciliary muscle
ciliary process
ciliate-leaved
ciliate-toothed
cilo-spinal
cinch bill
cinch up
cinchona bark
cinder block
cinder breaker
cinder concrete
cinder cone
cinder frame
cinder gray
cinder mill
cinder notch
cinder patch
cinder path
cinder pig
cinder pit
cinder tap
cinder track
cine camera
cine film
cine-
cinema operator
cinema red
cinema theater
cinema verite
cinerary urn
cineres clavellati
cingulate gyrus
cinma vrit
cinnabar green
cinnabar red
cinnamic acid
cinnamic alcohol
cinnamic aldehyde
cinnamon apple

cinnamon bark
cinnamon bear
cinnamon brown
cinnamon fern
cinnamon flower
cinnamon honeysuckle
cinnamon oak
cinnamon oil
cinnamon rose
cinnamon sedge
cinnamon stone
cinnamon teal
cinnamon vine
cinnamon water
cinnamon-bark oil
cinnamon-leaf oil
cinnamoyl group
cinnamoyl radical
cinnamyl acetate
cinnamyl group
cinnamyl radical
cinque point
cinque ports
cinque-spotted
cipher disk
cipher up
circassian walnut
circle brick
circle cutter
circle driller
circle finisher
circle
geometry
circle graph
circle in
circle of confusion
circle of convergence
circle of curvature
circle of least confusion
circle of the sphere
circle out
circle setter
circle shear
circle shears
circle squarer
circle theater
circle tour
circle trowel

circle-branching
circle-in
circle-out
circle-shearing
circle-squaring
circle-wise
circled about
circling boy
circling disease
circling-in
circling-out
circuit analysis
circuit analyzer
circuit binding
circuit breaker
circuit court
circuit court of appeals
circuit drive
circuit edges
circuit judge
circuit justice
circuit network
circuit rider
circuit training
circuit-riding
circuital field
circular argument
circular constant
circular error
circular error probable
circular function
circular knitting
circular letter
circular light
circular measure
circular mil
circular note
circular pitch
circular plane
circular polarization
circular probable error
circular sailing
circular saw
circular triangle
circular velocity
circular-cut
circular-cut

file
circular-knit
circulate a petition
circulating capital
circulating capital goods
circulating decimal
circulating equation
circulating library
circulating medium
circulatory collapse
circulatory disease
circulatory system
circum-
circum-meridian
circumflex accent
circumscribed by
circumstantial evidence
circumvent the law
circus artist
circus make-up
circus movement
circus performer
circus rider
circus tent
circus troupe
cire perdue
cire-perdue
cirl bunting
cirque-couchant
cirr-
cirrh-
cirrhosis of the liver
cirrhotic inflammation
cirro-
cirro-cumular
cirro-cumulative
cirro-cumulous
cirro-cumulus
cirro-fillum
cirro-filum
cirro-macula
cirro-nebula
cirro-stome
cirro-strative
cirro-stratous
cirro-stratus
cirro-velum
cirrocumulus castellanus

cirrocumulus castellatus
cirrocumulus floccus
cirrocumulus lenticularis
cirrocumulus stratiformis
cirrostratus fibratus
cirrostratus filosus
cirrostratus nebulosus
cirrus castellanus
cirrus castellatus
cirrus cloud
cirrus densus
cirrus fibratus
cirrus
floccus
cirrus haze
cirrus intortus
cirrus nothus
cirrus spissatus
cirrus stripe
cirrus uncinus
cis-
cis-Elizabethan
cis-elysian
cis-polyisoprene rubber
cis-trans
cis-trans test
cist grave
cistern barometer
cite a case in point
cite a particular
cite cases in point
cite on several counts
cite particulars
citizen by adoption
citizen of the world
citizens band
citizenship by adoption
citizenship by birth
citizenship by naturalization
citizenship paper
citizenship papers
cito disp
citr-
citra-
citrate of magnesia
citric acid
citric acid cycle
citricola scale

citron butterfly
citron green
citron melon
citron water
citron wood
citron yellow
citron-colored
citron-yellow
citronella circuit
citronella grass
citronella oil
citrovorum factor
citrus anthracnose
citrus belt
citrus black fly
citrus blast
citrus canker
citrus fruit
citrus nematode
citrus rust mite
citrus scab
citrus white fly
city block
city blues
city board
city center
city chicken
city company
city council
city councilman
city
court
city crop
city desk
city directory
city district
city dweller
city edition
city editor
city father
city gas
city hall
city man
city manager
city mission
city missionary
city of the dead
city plan

city planner
city planning
city room
city slicker
city ward
city-born
city-bound
city-bred
city-commonwealth
city-god
city-manager plan
city-state
city-wide
civet bean
civet cat
civet fruit
civet-cat
civette green
civic centre
civic crown
civic garland
civic wreath
civic-minded
civic-mindedly
civic-mindedness
civil affairs
civil architect
civil architecture
civil ceremony
civil code
civil court
civil day
civil death
civil defence
civil defense
civil disobedience
civil disorder
civil engineer
civil engineering
civil government
civil jurisdiction
civil law
civil liberties
civil liberty
civil list
civil marriage
civil rights
civil servant

civil service
civil time
civil war
civil wedding
civil year
civil-law
civil-rights
civilian clothes
civilian dress
civilized behavior
civilized taste
clabber
up
clack box
clack door
clack goose
clack valve
clado-
claim agent
claim as your right
claim attention
claim jumper
claim sanctuary
claim squatter's right
claim to be
claim your mind
claim your pound of flesh
claim your thoughts
claim-jumper
claim-jumping
claiming race
clair de lune
clair-obscure
clam chowder
clam digger
clam diggers
clam shell
clam up
clamber up
clammy azalea
clammy honeysuckle
clammy locust
clamor for
clamp bushing
clamp cell
clamp connection
clamp coupling
clamp dog

clamp down
clamp down on
clamp jig
clamp rail
clamp truck
clamping down
clamshell brake
clamshell bucket
clamshell door
clamshell doors
clan tartan
clan totemism
clandestine behavior
clang association
clang color
clang tint
clap eyes on
clap hands
clap hands on
clap hold of
clap in jail
clap in prison
clap of thunder
clap on
clap on ratlines
clap on sail
clap on the back
clap sill
clap spurs to your horse
clap the hands
clap together
clap up
clap-net
clap-stick
clapped out
clapper block
clapper
box
clapper bridge
clapper rail
clapper valve
clapper-claw
clapping of hands
clare-obscure
claret brown
claret cup
claret dun
claret red

claribel flute
clarified butter
clarin trumpet
clarinet flute
clarion call
clarion-voiced
claro obscuro
clash gear
clash in color
clash of arms
clash with
clashing colors
clashingly colored
clasp hook
clasp knife
clasp lock
clasp nut
clasping-leaved
class boat
class bond
class conflict
class consciousness
class day
class dialect
class distinction
class hatred
class inclusion
class interval
class leader
class list
class lottery
class mark
class meaning
class meeting
class name
class number
class prejudice
class publication
class rate
class ring
class structure
class struggle
class war
class warfare
class-cleavage
class-conscious
classic blues
classic example

classic purity
classical Nahuatl
classical Sanskrit
classical abstraction
classical ballet
classical college
classical conditioning
classical economics
classical economist
classical education
classical
 guitar
classical guitarist
classical language
classical mechanics
classical music
classical physics
classical pitch
classical purity
classical scholarship
classical tragedy
classico-
classico-lombardic
classification schedule
classification society
classification track
classification yard
classified ad
classified advertisement
classified advertising
classified catalog
classified directory
classified information
classroom building
clatter about
clause boundary
clause terminal
claustral prior
claver grass
clavicembal damour
claviculo-humeral
claw back
claw balk
claw bar
claw clutch
claw fern
claw foot
claw hammer

claw hand
claw hatchet
claw nut
claw off
claw setting
claw sickness
claw skyward
claw to windward of
claw your way up
claw-and-ball foot
claw-footed
claw-hammer coat
claw-tailed
clay agitator
clay band
clay burner
clay burning
clay court
clay crusher
clay digger
clay drab
clay drier
clay eater
clay fever
clay flour
clay grinder
clay iron
clay loam
clay marl
clay mill
clay
 miner
clay mineral
clay mixer
clay model
clay modeler
clay pan
clay pigeon
clay pipe
clay pit
clay press
clay pressman
clay pugger
clay pulverizer
clay sculpture
clay shale
clay slate
clay soil

clay stacker
clay stone
clay temperer
clay washer
clay works
clay worsted
clay-bound
clay-built
clay-cold
clay-colored
clay-colored sparrow
clay-digging
clay-dimmed
clay-drying
clay-faced
clay-filtering
clay-forming
clay-grinding
clay-lined
clay-mixing
clay-tempering
clay-washing
clay-wrapped
clayver-grass
clean as a hound's tooth
clean as a new penny
clean as a whistle
clean bill of health
clean bomb
clean forget
clean forgotten
clean full
clean hands
clean house
clean out
clean profit
clean room
clean rum
clean slate
clean sweep
clean up
clean up on
clean-
clean-appearing
clean-armed
clean-boled
clean-bred
clean-built

clean-complexioned
clean-cut
clean-faced
clean-feeding
clean-fingered
clean-grained
clean-handed
clean-legged
clean-limbed
clean-lived
clean-living
clean-looking
clean-made
clean-minded
clean-moving
clean-sailing
clean-saying
clean-seeming
clean-shanked
clean-shaped
clean-shaved
clean-shaven
clean-skin
clean-skinned
clean-smelling
clean-souled
clean-speaking
clean-sweeping
clean-thinking
clean-timbered
clean-washed
cleaned
up
cleaner cell
cleaner tooth
cleaner-off
cleaner-out
cleaner-up
cleaning agent
cleaning crop
cleaning devices
cleaning fluid
cleaning hinge
cleaning lady
cleaning man
cleaning out
cleaning shoe
cleaning solvent

cleaning up
cleaning woman
cleanly habits
cleanse away
cleanse yourself of guilt
cleansing away
cleansing cream
cleansing tissue
clear and distinct
clear as crystal
clear as day
clear as ditch water
clear as glass
clear as mud
clear as the nose on your face
clear away
clear coast
clear conscience
clear course
clear eyes
clear for action
clear hawse
clear obscure
clear of
clear off
clear off old scores
clear out
clear plastic
clear profit
clear road
clear sailing
clear shellac
clear sight
clear soup
clear space
clear stage
clear text
clear
the air
clear the board
clear the decks
clear the hurdle
clear the land
clear the mind
clear the mind of
clear the path for
clear the road for
clear the skirts of

clear the throat
clear the trade
clear the way
clear thinking
clear to hell and gone
clear up
clear varnish
clear wax
clear your name
clear-air turbulence
clear-boled
clear-channel station
clear-cole
clear-complexioned
clear-crested
clear-cut
clear-cutness
clear-cutting
clear-eye
clear-eyed
clear-eyes
clear-faced
clear-featured
clear-hawse breeches
clear-hawse pendant
clear-headed
clear-minded
clear-mindedness
clear-obscure
clear-sighted
clear-sightedly
clear-sightedness
clear-skinned
clear-spirited
clear-starch
clear-starcher
clear-stemmed
clear-story
clear-sunned
clear-throated
clear-tinted
clear-toned
clear-up
clear-visioned
clear-voiced
clear-walled
clear-witted
clearance angle

clearance car
clearance fit
clearance loan
clearance papers
clearance sale
clearance size
clearance space
clearer fabric
clearing agent
clearing
bank
clearing bath
clearing bearing
clearing house
clearing lease
clearing loan
clearing mark
clearing nut
clearing of the track
clearing of your name
clearing out
clearing pole
clearing the decks
clearing up
clearinghouse agent
clearinghouse stock
clearly visible
clearwing moth
cleat work
cleavage cavity
cleavage cell
cleavage crystal
cleavage nucleus
cleave to
cleave to the line
cleave to the thought of
cleft grafting
cleft lip
cleft palate
cleft sentence
cleft weld
cleft-footed
cleft-graft
cleido-mastoid
cleido-occipital
cleidoic egg
clench your fist at
clench-built

clergy house
clerical collar
clerical error
clerical garments
clerical insignia
clerical order
clerico-
clerico-political
clerk in holy orders
clerk of the HouseBrit
clerk of the works
clerk regular
clerk vicar
clerk-ale
clerks regular
clero-
clever Dick
clever reply
clever retort
clever-clever
clever-handed
clevis bolt
clew down
clew garnet
clew iron
clew jigger
clew line
clew ring
clew rope
clew up
cliche-ridden
click
 beetle
click catch
click hook
click iron
click pulley
click wheel
click-clack
clickety-clack
clickety-click
client's indemnity
client-centered therapy
cliff brake
cliff dweller
cliff dwelling
cliff edge
cliff elm

cliff face
cliff hanger
cliff path
cliff rose
cliff ruin
cliff swallow
cliff top
cliff wall
cliff-bound
cliff-chafed
cliff-girdled
cliff-hanger
cliff-hanging
cliff-marked
cliff-worn
climactic arthritis
climate of opinion
climatic bubo
climatic chart
climax basket
climax forest
climb Parnassus
climb down
climb indicator
climb milling
climb on
climb over
climb up
climb your frame
climb-down
climbing bittersweet
climbing fern
climbing fish
climbing frame
climbing fumitory
climbing hempweed
climbing hydrangea
climbing iron
climbing irons
climbing perch
climbing rose
climbing ylang-ylang
clin-
clinch joint
clinch nail
clinch work
clinch-built
clincher tire

clincher work
clincher-built
clinching iron
cling like a burr
cling like a winkle
cling like ivy
cling to
cling to the hope
cling-rascal
clinging
 vine
clinical death
clinical dextran
clinical diagnosis
clinical medicine
clinical pathology
clinical psychologist
clinical psychology
clinical surgery
clinical thermometer
clink shell
clink-clank
clinker beech
clinker boat
clinker brick
clinker plating
clinker strake
clinker work
clinker-built
clinker-laid plating
clinkety-clink
clinkum bell
clino-
clintonite group
clip bond
clip hook
clip joint
clip off
clip plate
clip the wings
clip the wings of
clip tongs
clip yoke
clip your words
clip-clop
clip-edged
clip-fed
clip-marked

clip-on
clip-winged
clipped form
clipped word
clipper bow
clipper ship
clipper sled
clipper-built
clippety-clop
clipping bureau
clipping time
clique with
clish-clash
clish-ma-claver
cloaca maxima
cloacae maximae
cloak baster
cloak dealer
cloak fern
cloak fitter
cloak hanger
cloak ironer
cloak maker
cloak operator
cloak pin
cloak presser
cloak trimming
cloak yourself
cloak yourself with
cloak-and-dagger
cloak-and-dagger operative
cloak-and-dagger
work
cloak-and-suiter
cloak-and-sword
cloak-fashion
cloak-room
cloaked in darkness
clock card
clock chart
clock correction
clock error
clock golf
clock in
clock jack
clock meter
clock movement
clock off

clock on
clock out
clock plant
clock radio
clock setter
clock spring
clock stamp
clock star
clock tower
clock up
clock watch
clock watcher
clock winder
clock winding
clock-hour
clock-making
clock-minded
clock-watcher
clock-watching
clock-work
clockface method
clockwork regularity
clod crusher
clod crushing
clod fender
clod poll
clod pulverizer
clod roller
clod smasher
clod-brown
clod-hopper
clod-pate
clod-poll
clod-tongued
clodding press
clog almanac
clog dance
clog dancer
clog dancing
clog maker
clog up
clogged up
cloisonne enamel
cloister garth
cloister text
cloister vault
cloistered monasticism
cloistered monk

cloistered nun
cloistered vault
clonic spasm
clop-clop
close about
close acquaintance
close arrest
close at hand
close attention
close borough
close by
close call
close communion
close
communionist
close company
close copy
close corporation
close down
close facsimile
close fighting
close fit
close formation
close friend
close gauntlet
close grips
close harmony
close helmet
close imitation
close in
close in on
close inquiry
close juncture
close likeness
close line
close main vents
close match
close of day
close off
close on
close or watchful attention
close out
close position
close quarters
close quote
close quotes
close range
close reach

close replica
close reproduction
close resemblance
close season
close secrecy
close shave
close shop
close shot
close squeak
close string
close study
close the books
close the circle
close the conning tower hatch
close the door on
close the eyes to
close the hand
close the jaws of the pincers
close the jaws of the trap
close the light
close the purse
close the shutters
close tight
close to
close to the wind
close to your chest
close to your heart
close up
close up like a clam
close upon
close with
close with the land
close
 your ears
close your eyes
close your eyes to
close your mind
close your mouth
close-annealed
close-at-hand
close-banded
close-barred
close-bitten
close-bodied
close-bred
close-buttoned
close-by
close-clad

close-clapped
close-clipped
close-coifed
close-compacted
close-connected
close-couched
close-coupled
close-cropped
close-curled
close-curtained
close-cut
close-drawn
close-eared
close-fertilization
close-fertilize
close-fibered
close-fights
close-fisted
close-fitting
close-gleaning
close-grain
close-grained
close-grated
close-handed
close-haul
close-hauled
close-headed
close-herd
close-hooded
close-in
close-jointed
close-kept
close-knit
close-latticed
close-legged
close-lipped
close-lying
close-meshed
close-minded
close-mouthed
close-order drill
close-out
close-packed
close-partnered
close-pent
close-piled
close-pressed
close-reef

close-reefed
close-ribbed
close-rounded
close-set
close-shanked
close-shaven
close-shut
close-soled
close-standing
close-sticking
close-stool
close-talking
 microphone
close-tempered
close-textured
close-thinking
close-tongued
close-up
close-visaged
close-winded
close-woven
close-written
closed arc
closed book
closed chain
closed circle
closed circuit
closed company
closed cornice
closed corporation
closed couplet
closed forever to
closed fracture
closed game
closed gentian
closed loop
closed meeting
closed mind
closed mortgage
closed primary
closed scholarship
closed sentence
closed sequence
closed shell
closed shop
closed sphere
closed string
closed system

closed to
closed traverse
closed union
closed-circuit
closed-circuit cell
closed-circuit grinding
closed-circuit telegraphy
closed-circuit television
closed-circuit winding
closed-coil
closed-coil armature
closed-door
closed-end
closed-end fund
closed-end investment company
closed-in
closed-loop system
closed-minded
closed-out
closely related
closet cynic
closet drama
closet queen
closet yourself with
closeup lens
closing costs
closing error
closing machine
closing off
closing price
closing
 time
closing up
closing-out sale
closure by compartment
closure rail
clot-bird
clot-bur
clot-poll
cloth baler
cloth beam
cloth beetler
cloth binding
cloth board
cloth brusher
cloth cap
cloth carbonizer
cloth cleaner

cloth clipper
cloth coat
cloth cutter
cloth doubler
cloth dresser
cloth drier
cloth finisher
cloth folder
cloth fuller
cloth hall
cloth lapper
cloth maker
cloth measure
cloth measurer
cloth mercer
cloth miller
cloth napper
cloth numberer
cloth of gold
cloth oil
cloth packer
cloth paper
cloth piecer
cloth plate
cloth press
cloth presser
cloth printer
cloth prover
cloth red
cloth roll
cloth scourer
cloth shearer
cloth shrinker
cloth slitter
cloth sorter
cloth stamper
cloth stitch
cloth stretcher
cloth tape
cloth tenter
cloth tester
cloth warper
cloth weaver
cloth weigher
cloth yard
cloth yard shaft
cloth-backed
cloth-calendering

cloth-covered
cloth-cropping
cloth-cutting
cloth-drying
cloth-dyeing
cloth-eared
cloth-faced
cloth-finishing
cloth-folding
cloth-inserted
cloth-laying
cloth-lined
cloth-maker
cloth-measuring
cloth-of-gold
cloth-shearing
cloth-shrinking
cloth-smoothing
cloth-sponger
cloth-spreading
cloth-stamping
cloth-testing
cloth-weaving
cloth-winding
cloth-yard
clothbound
book
clothe in words
clothe with power
clothed in darkness
clothed with authority
clothes beater
clothes bin
clothes chest
clothes closet
clothes hamper
clothes hanger
clothes louse
clothes maid
clothes maiden
clothes moth
clothes peg
clothes pole
clothes post
clothes presser
clothes rack
clothes screen
clothes spoiling

clothes stick
clothes stop
clothes tree
clothes wringer
clothes-conscious
clothes-consciousness
clothes-drier
clothes-drying
clothes-peg
clothes-press
clothes-washing
clothing merchant
clothing store
clothing wool
clotted cream
clotting factor
cloture by compartment
cloud band
cloud bank
cloud banner
cloud belt
cloud burst
cloud cap
cloud chamber
cloud city
cloud cover
cloud drift
cloud forest
cloud funnel
cloud grass
cloud gray
cloud layer
cloud mass
cloud
nine
cloud of words
cloud over
cloud physics
cloud point
cloud rack
cloud ring
cloud seeder
cloud seeding
cloud shapes
cloud stone
cloud street
cloud study
cloud up

cloud-ascending
cloud-barred
cloud-born
cloud-built
cloud-capped
cloud-capped peak
cloud-compacted
cloud-compeller
cloud-compelling
cloud-covered
cloud-crammed
cloud-crossed
cloud-cuckoo-land
cloud-curtained
cloud-dispelling
cloud-dividing
cloud-drowned
cloud-eclipsed
cloud-enveloped
cloud-flecked
cloud-girt
cloud-headed
cloud-hidden
cloud-kissing
cloud-laden
cloud-led
cloud-piercing
cloud-rocked
cloud-scaling
cloud-seeding
cloud-shaped
cloud-surmounting
cloud-surrounded
cloud-topped
cloud-topped peak
cloud-touching
cloud-woven
cloud-wrapped
clouded mind
clouded over
clouded sulfur
cloudless sulphur
clouds on the horizon
clout nail
clout shoot
clout shot
clout-shoe
clove brown

clove carnation
clove cassia
clove cinnamon
clove currant
clove gillyflower
clove hitch
clove hook
clove nutmeg
clove oil
clove pepper
clove pink
clove
tree
clove-gillyflower
clove-strip
cloven foot
cloven hoof
cloven-footed
cloven-footedness
cloven-hoofed
clover aphid
clover bloom
clover blossom
clover broom
clover broomrape
clover cent
clover dodder
clover fern
clover grass
clover hay
clover hay worm
clover head
clover honey
clover leaf
clover mite
clover root
clover root borer
clover rot
clover seed
clover stubble
clover weevil
clover wilt
clover worm
clover-grass
clover-leaf midge
clover-leaf roll
clover-seed midge
clover-sick

clover-sickness
cloverleaf aerial
clovis point
clow-gilofre
clown around
clown white
club car
club chair
club cheese
club compass
club coupe
club fighter
club foot
club fungus
club grass
club hand
club head
club law
club link
club lounge chair
club mold
club moss
club mosses
club palm
club plane
club root
club rush
club sandwich
club shell
club skate
club soda
club sofa
club steak
club together
club tooth
club topsail
club wheat
club-armed
club-ended
club-fist
club-foot
club-footed
club-footed jib
club-haul
club-headed
club-high
club-law
club-man

club-moss
club-moss
family
club-riser
club-rush
club-shaped
clubfoot moss
clumber spaniel
clump block
clump foot
clump-head grass
clumsy performance
clumsy-fisted
cluster bean
cluster cup
cluster fig
cluster fir
cluster flower
cluster fly
cluster leg
cluster pine
cluster point
cluster variable
cluster wheat
cluster-cup lichen
cluster-cup stage
clusterhead pink
clutch bag
clutch shaft
clydesdale terrier
clypeo-
cn-
co-
co-adaptation
co-adjust
co-adventure
co-afforest
co-agency
co-allied
co-ally
co-appear
co-aration
co-assessor
co-assist
co-attest
co-ax
co-bishop
co-brother

co-clause
co-conspirator
co-defendant
co-driver
co-ed
co-education
co-effect
co-efficacy
co-equate
co-establishment
co-estate
co-executor
co-exist
co-feoffee
co-guardian
co-infinite
co-inhabit
co-inhere
co-inheritor
co-labourer
co-latitude
co-lessee
co-life
co-mart
co-martyr
co-mate
co-nominee
co-obligant
co-oblige
co-obligor
co-occupant
co-occupy
co-occurrence
co-omnipotent
co-omniscient
co-op
co-operable
co-operancy
co-operant
co-operate
co-operation
co-operationist
co-operative
co-operatively
co-operativeness
co-operator
co-operculum
co-opt

co-optate
co-optation
co-optative
co-option
co-optive
co-ordain
co-ordainer
co-order
co-ordinacy
co-ordinal
co-ordinance
co-ordinancy
co-ordinate
co-ordinately
co-ordinateness
co-ordination
co-ordination
formula
co-ordination number
co-ordinative
co-ordinator
co-ordinatory
co-organize
co-origin
co-original
co-originality
co-orthogonal
co-orthotomic
co-ossification
co-ossify
co-owner
co-ownership
co-patriot
co-presence
co-radicate
co-regent
co-relation
co-religionist
co-respondent
co-rival
co-sentient
co-signatory
co-signer
co-sovereign
co-star
co-starred
co-starring
co-subordinate

co-supreme
co-sureties
co-surety
co-tenant
co-tidal
co-trustee
co-une
co-unite
co-use
co-versed
co-walker
co-widow
co-wife
co-winner
co-work
co-worker
co-working
co-worship
coach box
coach carver
coach coat
coach dog
coach driver
coach
driving
coach guard
coach hire
coach horse
coach house
coach maker
coach painter
coach road
coach screw
coach-and-four
coach-box
coach-built
coach-whip
coaching glass
coaching house
coaching inn
coachwhip bird
coachwhip snake
coadjutor bishop
coae-
coagulated protein
coal backer
coal backing
coal ball

coal barge
coal barrow
coal basket
coal bin
coal blacking
coal blende
coal boat
coal brass
coal breaker
coal bucket
coal bunker
coal car
coal cart
coal cartman
coal cellar
coal checker
coal chute
coal cleaner
coal contractor
coal conveyer
coal crusher
coal cutter
coal depot
coal digger
coal discharger
coal dredger
coal drill
coal dump
coal dust
coal elevator
coal field
coal flap
coal fleet
coal furnace
coal gas
coal goose
coal grinder
coal hauler
coal hawker
coal heat
coal heaver
coal hewer
coal hod
coal hoist
coal hole
coal kiln
coal labeler
coal leveler

coal loader
coal lumper
coal measures
coal mine
coal miner
coal mining
coal oil
coal operator
coal passer
coal picker
coal pipe
coal
pit
coal plant
coal pocket
coal pot
coal producer
coal pulverizer
coal refiner
coal scoop
coal screen
coal screener
coal scuttle
coal shaker
coal ship
coal shovel
coal shoveler
coal sieve
coal sorter
coal spreader
coal sprinkler
coal stacker
coal storage
coal stove
coal tallyman
coal tar
coal tipper
coal tipple
coal tit
coal tongs
coal trimmer
coal truck
coal unloader
coal wagon
coal washer
coal washery
coal weigher
coal wharf

coal wharfinger
coal workings
coal works
coal-bearing
coal-black
coal-blue
coal-boring
coal-breaking
coal-burning
coal-cutting
coal-dark
coal-dumping
coal-elevating
coal-eyed
coal-faced
coal-fired
coal-fish
coal-gas
coal-handling
coal-house
coal-laden
coal-leveling
coal-loading
coal-man
coal-measure
coal-meter
coal-miner's lung
coal-picking
coal-pit
coal-producing
coal-pulverizing
coal-sack
coal-scuttle
coal-sifting
coal-stone
coal-tar
coal-tar creosote
coal-tar crude
coal-tar dye
coal-tar pitch
coal-tester
coal-tit
coal-whipper
coal-whipping
coal-works
coaling
station
coalition government

coarse fish
coarse texture
coarse-featured
coarse-fibered
coarse-grained
coarse-grainedness
coarse-haired
coarse-handed
coarse-lipped
coarse-minded
coarse-skinned
coarse-spoken
coarse-spun
coarse-textured
coarse-tongued
coarse-toothed
coarse-wrought
coarseness of grain
coarseness of intellect
coast artillery
coast belt
coast fever
coast grass
coast guard
coast guard cutter
coast jointweed
coast lily
coast live oak
coast nutmeg
coast patrol
coast pilot
coast rat
coast redwood
coast rhododendron
coast seal
coast station
coast trade
coast trillium
coast-fishing
coast-guard cutter
coast-to-coast hookup
coastal navigation
coastal plain
coaster brake
coasting flight
coasting lead
coasting trade
coasting wagon

coastwise navigation
coat armor
coat armour
coat arms
coat card
coat flower
coat hanger
coat money
coat of arms
coat of mail
coat of paint
coat shirt
coat-armour
coat-card
coat-money
coat-of-mail shell
coat-of-plates construction
coat-tail
coated lens
coati-mondi
coati-mundi
coating
 paper
coaxial cable
coaxial network
coaxial propellers
coaxial speaker
cob cactus
cob coal
cob loaf
cob meal
cob money
cob swan
cob wall
cob-iron
cob-nut
cob-swan
cobalt 60
cobalt bloom
cobalt blue
cobalt bomb
cobalt bronze
cobalt chloride
cobalt crust
cobalt glance
cobalt glass
cobalt green
cobalt hydroxide

cobalt potassium nitrite
cobalt red
cobalt sulphate
cobalt therapy
cobalt ultramarine
cobalt violet
cobalt violet deep
cobalt violet light
cobalt vitriol
cobalt yellow
cobalti-
cobaltiferous wad
cobalto-
cobaltous hydroxide
cobble coal
cobble gravel
cobble rammer
cobble-stone
cobbler's wax
cobra de capello
cobra plant
cobra-hooded
cobras de capello
coburg loaf
cobweb bird
cobweb houseleek
cobweb micrometer
cobwebs of antiquity
cocaine family
cocaine plant
cocaine sniffer
coccidioidal granuloma
cocculus indicus
coccy-
coccygeo-anal
coccygeo-mesenteric
coccygo-
cochil sapota
cochin china
cochin oil
cochin-china
cochineal cactus
cochineal fig
cochineal insect
cochineal
plant
cochit zapotl
cochlear duct

cochleariform process
cochon de lait
cochylis moth
cock a snook
cock a snook at
cock ale
cock and pie
cock bead
cock bread
cock broth
cock crowing
cock feather
cock metal
cock of the walk
cock of the woods
cock penny
cock robin
cock schnapper
cock sorrel
cock sparrow
cock the ears
cock the eye
cock up
cock's head hinge
cock's-comb
cock's-foot
cock's-head
cock-a
cock-a-doodle
cock-a-doodle--dooed
cock-a-doodle--dooing
cock-a-doodle-doo
cock-a-doodle-doos
cock-a-hoop
cock-a-hooping
cock-a-hoopish
cock-a-hoopness
cock-a-leekie
cock-a-whoop
cock-and-bull
cock-and-bull story
cock-and-bull-story
cock-and-pinch
cock-as-hoop
cock-awhoop
cock-bill
cock-boat
cock-brain

cock-brained
cock-crow
cock-crowing
cock-eye
cock-eyed
cock-feathered
cock-feathering
cock-fight
cock-fighting
cock-horse
cock-laird
cock-loft
cock-master
cock-match
cock-nest
cock-of-the-rock
cock-paddle
cock-penny
cock-road
cock-shut
cock-shy
cock-sparrowish
cock-stride
cock-sure
cock-tailed
cock-throppled
cock-up
cockatoo
bush
cockatoo farmer
cockatoo fence
cockatoo fish
cockatoo grass
cockatoo orchis
cockatoo parakeet
cocked hat
cocker spaniel
cocket center
cocket centering
cockeye bob
cockeye pilot
cockeyed bob
cockeyed drunk
cockie-leekie
cocking cart
cockle button
cockle garden
cockle hat

cockle oast
cockle stairs
cockle stove
cockle strewer
cockle wheat
cockle-bread
cockle-headed
cockle-shell
cockles of the heart
cockles of your heart
cocks-of-the-rock
cockscomb grass
cocksfoot grass
cockspur flower
cockspur grass
cockspur hawthorn
cockspur rye
cockspur thorn
cockspur vine
cocktail chair
cocktail dress
cocktail glass
cocktail hour
cocktail lounge
cocktail party
cocktail sauce
cocktail shaker
cocktail stick
cocktail table
cocktail-party chitchat
cocky-leeky
cockyolly bird
cockyoly bird
coco de mer
coco grass
coco palm
coco plum
coco sedge
coco-plum
cocoa bean
cocoa beans
cocoa brown
cocoa butter
cocoa plant
cocoa presser
cocoa red
cocoa sedge
cocoa shell

cocoa
tea
cocoa-brown
cocoa-colored
coconut beetle
coconut brown
coconut bud rot
coconut butter
coconut cake
coconut crab
coconut cream
coconut ice
coconut jelly
coconut matting
coconut meal
coconut mealy bug
coconut milk
coconut oil
coconut palm
coconut shy
coconut tree
coconut walk
coconut water
coconut-palm rot
cod end
cod line
cod liver
cod net
cod oil
cod war
cod-bait
cod-fish
cod-liver meal
cod-liver oil
cod-piece
cod-smack
coda mark
coddle yourself
coddled eggs
coddy-moddy
code book
code duello
code flag
code of ethics
code of laws
code of morals
code of oral communication
code pennant

code state
code word
coded message
codeine cough syrup
codex rescriptus
codfish aristocracy
codfish balls
codfish cakes
codlin moth
codling moth
codlins-and-cream
coeducational school
coefficient component
coefficient of acceleration
coefficient of elasticity
coefficient of expansion
coefficient of fineness
coefficient of friction
coefficient of mutual induction
coefficient of performance
coefficient of
restitution
coefficient of self-induction
coefficient of viscosity
coel-
coelanaglyphic sculpture
coeliac disease
coeliac plexus
coelio-
coelo-
coen-
coeno-
coercive force
coff-fronted
coffee bag
coffee bar
coffee bean
coffee beans
coffee berry
coffee blight
coffee borer
coffee bread
coffee break
coffee cake
coffee cherry
coffee corn
coffee cream
coffee cup

coffee disease
coffee fern
coffee grinder
coffee house
coffee klatch
coffee klatsch
coffee maker
coffee mill
coffee morning
coffee nib
coffee nut
coffee party
coffee pea
coffee plant
coffee planter
coffee ring
coffee roaster
coffee royale
coffee senna
coffee shell
coffee shop
coffee spoon
coffee stall
coffee strainer
coffee table
coffee tree
coffee urn
coffee wit
coffee-and
coffee-blending
coffee-brown
coffee-cleaning
coffee-color
coffee-colored
coffee-faced
coffee-grading
coffee-grinder winch
coffee-grinding
coffee-house
coffee-imbibing
coffee-klatsch
coffee-making
coffee-planter
coffee-planting
coffee-polishing
coffee-roasting
coffee-room
coffee-scented

coffee-table
book
coffer-dam
coffer-work
cofferdam bulkhead
coffin block
coffin boat
coffin bone
coffin carrier
coffin corner
coffin finisher
coffin handle
coffin joint
coffin maker
coffin nail
coffin plate
coffin spark
coffin text
coffin trimmer
coffin-end spoon
coffin-fashioned
coffin-headed
coffin-joint lameness
coffin-shaped
cog locomotive
cog railroad
cog railway
cog the dice
cog-wheel
cog-wood
cogent argument
cogged joint
cogging mill
cognac oil
cognate object
cognitive dissonance
cognitive psychology
cognizant of
cogswell chair
cogwheel ore
cogwheel respiration
coherence theory
coherent light
cohune fat
cohune nut
cohune oil
cohune palm
coign of vantage

coil bobbin
coil box
coil former
coil pottery
coil spring
coil-filling
coil-testing
coil-winding
coiler can
coiler plate
coin a phrase
coin assorter
coin bag
coin box
coin case
coin changer
coin check
coin collector
coin counter
coin envelope
coin fancier
coin glass
coin gold
coin guard
coin holder
coin
laundry
coin lock
coin machine
coin money
coin nickel
coin of the realm
coin planchet
coin pouch
coin ringer
coin sack
coin shell
coin silver
coin slot
coin sorter
coin stamper
coin telephone
coin tester
coin tray
coin weight
coin wrapper
coin-clipper
coin-clipping

coin-controlled
coin-counting
coin-made
coin-op
coin-operated
coin-operated laundry
coin-operated machine
coin-operating
coin-separating
coin-shaped
coin-weighing
coinage bronze
coinage of the brain
coinage ratio
coincidence counter
coined liberty
coining press
coining punch
coinsurance clause
coital exanthema
coitus interrupti
coitus interruptus
coitus reservatus
coke breeze
coke dust
coke iron
coke oven
coke plate
coke tin
coke tower
coke-bottle fuselage
coker-sack
col legno
col-
cola nut
cola seed
colatitude circle
colcannon night
colchicum root
cold abcess
cold as a welldigger's ass
cold as a witch's kiss
cold as a witch's tit
cold as charity
cold as death
cold as ice
cold as marble
cold blast

cold blood
cold cash
cold cathode
cold
cathode tube
cold cautery
cold chisel
cold color
cold comfort
cold cream
cold creeps
cold cuts
cold deck
cold drink
cold duck
cold fact
cold feet
cold fish
cold frame
cold front
cold heart
cold light
cold light of reality
cold meat
cold of heart
cold pack
cold patch
cold place
cold pole
cold purgatorial fires
cold rubber
cold sauces
cold season
cold sector
cold sensation
cold shivers
cold short
cold shoulder
cold shower
cold shut
cold snap
cold sober
cold sore
cold sores
cold spell
cold steel
cold storage
cold straightener

cold sweat
cold therapy
cold turkey
cold type
cold war
cold warrior
cold water
cold wave
cold weather
cold wind
cold work
cold-blooded
cold-bloodedly
cold-bloodedness
cold-braving
cold-catching
cold-chisel
cold-chiseled
cold-chiseling
cold-chiselled
cold-chiselling
cold-complexioned
cold-cream
cold-draw
cold-drawing
cold-drawn
cold-drew
cold-engendered
cold-faced
cold-finch
cold-flow
cold-forge
cold-hammer
cold-hammered
cold-head
cold-hearted
cold-heartedly
cold-heartedness
cold-meat
fork
cold-natured
cold-nipped
cold-pack
cold-pack method
cold-patch
cold-pated
cold-press
cold-producing

cold-roll
cold-rolled
cold-saw
cold-short
cold-shortness
cold-shoulder
cold-shut
cold-slain
cold-spirited
cold-storage
cold-store
cold-swage
cold-sweat
cold-taking
cold-type
cold-type proof
cold-type typesetting
cold-water
cold-water cure
cold-water flat
cold-water glue
cold-water paint
cold-wave flag
cold-weld
cold-white
cold-work
cold-working
cole slaw
cole titmouse
cole-goose
cole-prophet
cole-rake
cole-slaw
cole-staff
cole-tit
colen-bell
colewort green
coliform bacillus
coliform bacteria
coliform bacterium
colinear beam antenna
coliseum ivy
coll' arco
coll-
colla tempestada
collagen disease
collapse breccia
collapse of authority

collapse ring
collapse therapy
collapsed lung
collapsing tap
collar bag
collar beam
collar bearing
collar blight
collar bolt
collar box
collar button
collar buttoner
collar case
collar cell
collar cutter
collar day
collar disease
collar
edger
collar fastener
collar finisher
collar fungus
collar gauge
collar girdle
collar iron
collar ironer
collar machinist
collar maker
collar making
collar nut
collar pad
collar point
collar polisher
collar rot
collar shaper
collar starcher
collar stitcher
collar stud
collar tie
collar tree
collar work
collar-bone
collar-bound
collar-cutting
collar-shaping
collar-to-collar
collar-wearing
collard greens

collared dove
collared lizard
collared peccary
collateral circulation
collateral descendant
collateral evidence
collateral loan
collateral relative
collateral security
collateral trust bond
collateral warranty
collating mark
collect a duty on
collect a tax on
collect call
collect for your services
collect knowledge
collect learning
collect of the Communion
collect of the Mass
collect on delivery
collect oneself
collect your thoughts
collect yourself
collected edition
collected sayings
collected works
collecting battalion
collecting hair
collecting tubule
collection agency
collection
agent
collective action
collective agreement
collective agreements
collective bargaining
collective behavior
collective enterprise
collective farm
collective farm worker
collective fruit
collective memory
collective noun
collective ownership
collective pitch lever
collective security
collective unconscious

collectivized economy
collector current
collector electrode
collector junction capacitance
collector of internal revenue
collector resistance
collector ring
collector signal current
collector signal voltage
colleen deas
colleen donn
college board
college boy
college cap
college church
college dictionary
college editor
college girl
college graduate
college ice
college man
college of Laputa
college of advanced technology
college of architecture
college of arms
college of dramatic arts
college of education
college of engineering
college of general studies
college of liberal arts
college of music
college ofeducation
college pheasant
college pudding
college student
college try
college
widow
college year
college-bred
college-preparatory
collegiate church
collegiate institute
collegium musicum
collet chuck
collet foot
collier's purchase
colliery manager

collimating eyepiece
collimating lens
collimation axis
collimation error
collimation line
collimation plane
collision bulkhead
collision clause
collision course
collision density
collision diameter
collision emission
collision insurance
collision mat
collision-proof
collo-
collodio-
collodion cotton
collodion process
colloid carcinoma
colloid chemistry
colloid mill
colloidal solution
colloidal suspension
colloquial English
colloquial discourse
colloquial language
colloquial speech
colloquial usage
colo-
cologne plant
cologne spirits
cologne water
colon bacillus
colonel blimp
colonel commandant
colonel general
colonel-commandantship
colonial bent
colonial dollar
colonial experience
colonial government
colonial siding
colonialist threat
coloph-
color analysis
color analyzer
color arrangement

color balance
color bar
color
base
color blender
color blindness
color blocker
color blower
color box
color brush
color camera
color card
color cell
color changeling
color chart
color checker
color chest
color cinematography
color circle
color clash
color company
color compatibility
color cone
color constant
color contrast
color control
color cycle
color design
color designer
color diagram
color dimension
color doctor
color dominance
color dry sifter
color dryer
color drying
color dyer
color emissivity
color etcher
color film
color filter
color gamut
color gauge
color gelatin
color grinder
color guard
color harmony
color hearing

color index
color instrument
color instruments
color intensity
color kinescope
color line
color matcher
color measurement
color mill
color miller
color mixer
color mixture
color mixture curve
color mixture function
color music
color musician
color negative film
color organ
color party
color patterns
color phase
color photograph
color photography
color point
color print
color printing
color
proof
color purity
color quality
color ratio
color reversal film
color salute
color scale
color scheme
color screen
color sense
color sentinel
color separation
color sergeant
color slab
color solid
color spectrum
color spreader
color striker
color system
color target
color television

color temperature
color tone
color top
color tree
color triangle
color up
color vision
color wash
color weakness
color wheel
color with emotion
color zone
color-ball pool
color-bearer
color-blind
color-fading
color-free
color-grinding
color-matching
color-mixture curve
color-sensitize
color-testing
color-washed
colorado loco vetch
coloratura soprano
colored glasses
colored person
colored spectacles
colored stone
colorful imagination
colorful language
colorimetric quality
coloring book
coloring matter
coloring tool
colors in patches
colors of rhetoric
colossal order
colossus of knowledge
colour bar
colour code
colour filter
colour guard
colour index
colour line
colour phase
colour scheme
colour sergeant

colour
 supplement
colour-blind
colour-box
colpach heifer
colpo-
colt ale
colt distemper
colt evil
colt's tail
colt's-tail
colt-herb
colt-pixie
coltsfoot snakeroot
columbine blue
columbium pentoxide
columbo wood
columbus day
columella auris
columella cranii
column bone
column chromatography
column formula
column inch
column krater
column lathe
column rule
column shaper
column still
column vector
columna caelata
columna rostrata
columnae caelatae
columnar epithelium
columnar jointing
columnar structure
columnar tactics
colza oil
com-
coma berenices
coma vigil
comb back
comb bearer
comb case
comb disease
comb duck
comb fern
comb foundation

comb grain
comb holder
comb honey
comb jelly
comb marbling
comb morion
comb out
comb pot
comb pottery
comb rat
comb speedwell
comb ware
comb wheat grass
comb-back
comb-back chair
comb-broach
comb-brush
comb-building
comb-footed
comb-footed spider
comb-fringed grass
comb-grained
comb-out
comb-shaped
comb-toothed shark
combat area
combat boot
combat boots
combat
car
combat ceiling
combat command
combat duty
combat engineer
combat fatigue
combat flight
combat group
combat high-explosive rocket
combat intelligence
combat jacket
combat neurosis
combat pilot
combat plane
combat post
combat practice
combat rehearsal
combat rocket
combat service

combat team
combat train
combat unit
combat zone
combative reaction
combed ware
combed yarn
comber board
combination analysis
combination button
combination car
combination center drill
combination chuck
combination consolidation
combination crossing
combination cut
combination door
combination frame
combination fuse
combination jig
combination last
combination lathe
combination lock
combination longwall
combination microphone
combination note
combination pedal
combination piston
combination plane
combination plate
combination plow
combination principle
combination rate
combination room
combination rubber
combination salad
combination shot
combination square
combination tone
combinatorial analysis
combinatorial
mathematics
combinatorial topology
combinatory logic
combine harvester
combine in
combined effort
combined experience table

combined operation
combined operations
combing hair
combing machine
combing wool
combining form
combining weight
combust way
combustible material
combustion cell
combustion chamber
combustion engine
combustion engineer
combustion engineering
combustion furnace
combustion lag
combustion method
combustion motor
combustion spoon
combustion train
combustion tube
come a cropper
come about
come across
come across with
come afoul of
come after
come again
come again and again
come alive
come along
come among
come and get it
come and go
come apart
come apart at the seams
come around
come around to
come as a shock
come as a surprise
come as no surprise
come as you are
come at
come at your call
come away
come back
come back at
come barging in

come before
come behind
come between
come breezing in
come busting in
come by
come by chance
come by your own
come clean
come
close
come close on the heels of
come closer
come crashing down
come down
come down a peg
come down a peg or two
come down in buckets
come down in price
come down in sheets
come down in torrents
come down on
come down on the side of
come down on your marrowbones
come down out of the clouds
come down squarely in the middle
come down to earth
come down upon
come down with
come down with the needful
come face to face with
come first
come forth
come forward
come foul of
come from
come from an unexpected quarter
come from behind
come full circle
come hat in hand
come hell or high water
come home
come home to
come home to roost
come in
come in conflict with
come in contact
come in for

come in for a landing
come in for a share
come in its turn
come in like a lion
come in sight
come in through a side door
come in view
come into
come into being
come into collision
come into existence
come into man's estate
come into money
come into possession
come into the world
come into vogue
come into
 years of discretion
come into your head
come into your own
come last
come like a thunderbolt
come like a thunderclap
come near
come nearer
come next
come of
come of age
come off
come off it
come off second best
come on
come on bended knee
come out
come out first
come out in the open
come out in the wash
come out into the open
come out of
come out of it
come out on top
come out on top of the heap
come out with
come over
come rain or shine
come right back at
come round
come round again

come round to
come short
come sick
come sta
come through
come through with
come through with flying colors
come to
come to a center
come to a conclusion
come to a dead stop
come to a decision
come to a determination
come to a focus
come to a full stop
come to a grinding halt
come to a halt
come to a head
come to a parting of the ways
come to a point
come to a screaming halt
come to a shuddering halt
come to a stand
come to a standstill
come to a stop
come to a violent end
come to an agreement
come to an
end
come to an understanding
come to an untimely end
come to anchor
come to attention
come to be
come to blows
come to close quarters
come to cold steel
come to dust
come to fruition
come to grief
come to grips with
come to hand
come to know
come to land
come to life
come to light
come to man's estate
come to maturity

come to mind
come to naught
come to no good
come to nothing
come to one
come to pass
come to pieces
come to terms
come to terms with yourself
come to the aid of
come to the fore
come to the front
come to the point
come to the rescue
come to the scratch
come to your ear
come to your ears
come to your journey's end
come to your knowledge
come to your senses
come to yourself
come together
come true
come tumbling down
come unawares
come under
come undone
come unstuck
come up
come up again
come up against
come up fighting
come up for more
come up short
come up smiling
come up to
come up to scratch
come up with
come upon
come upon the stage
come upon unexpectedly
come upon without
warning
come uppermost
come what may
come with child
come your way
come-all-ye

come-along
come-at-ability
come-at-able
come-at-ableness
come-back
come-between
come-by-chance
come-down
come-hither
come-hither look
come-hithery
come-off
come-on
come-on man
come-out
come-outer
comedie bouffe
comedie larmoyante
comedie rosse
comedy ballet
comedy drama
comedy of character
comedy of humors
comedy of ideas
comedy of intrigue
comedy of manners
comedy of situation
comedy prop
comedy relief
comely-featured
comers and goers
comet aster
comet finder
comet seeker
comfort room
comfort station
comfort zone
comfortable circumstances
comfortably situated
comic bass
comic book
comic muse
comic novel
comic opera
comic relief
comic section
comic strip
comic supplement

comic-iambic
comico-
coming after
coming and going
coming apart
coming ashore
coming between
coming by
coming from
coming in
coming into being
coming near
coming out
coming short
coming shy
coming to
coming to be
coming to pass
coming to
terms
coming together
coming toward
coming unstuck
coming with child
coming-forth
coming-on
coming-out party
comings in
comity of nations
comma bacillus
comma blunder
comma butterfly
comma fault
comma splice
command a view of
command and general staff school
command car
command function
command guidance
command module
command money
command of idiom
command of language
command of money
command of words
command paper
command performance
command pilot

command post
command pulses
command respect
commander in chief
commanders in chief
commanding officer
comme ci comme ca
comme d'habitude
comme deux gouttes d'eau
comme il faut
commedia dell'arte
commedia dell'artes
commedias dell'arte
commedie dell'arte
commelina blue
commence firing
commencement exercises
commend to attention
commendation ninepence
comment allez-vous
comment ca va
comment upon
commerce destroyer
commerce raider
commerce raiding
commerce with
commercial affairs
commercial agency
commercial agent
commercial announcement
commercial
arithmetic
commercial art
commercial artist
commercial attache
commercial aviation
commercial bank
commercial code
commercial college
commercial complex
commercial credit
commercial engineer
commercial engineering
commercial enterprise
commercial fertilizer
commercial law
commercial letter of credit
commercial paper

commercial pilot
commercial program
commercial relations
commercial school
commercial transaction
commercial transport
commercial traveler
commercial traveller
commercial vehicle
comminuted fracture
commissary clerk
commissary court
commissary general
commissary steward
commission agent
commission day
commission house
commission merchant
commission officer
commission pennant
commission plan
commission-manager plan
commissioned officer
commissioner for oaths
commissioner-general
commit a
commit a crime
commit a gaffe
commit a solecism
commit adultery
commit an assault upon
commit an atrocity
commit an outrage
commit burglary
commit carnage
commit genocide
commit hara-kiri
commit
 mass destruction
commit mass murder
commit murder
commit robbery
commit sacrilege
commit sin
commit suicide
commit to an institution
commit to memory
commit to prison

commit to writing
commit yourself
commit yourself to
commitment to memory
committee consideration
committee of correspondence
committee of one
committee of the whole
committee stage
commode step
commodity dollar
commodity exchange
commodity money
commodity paper
common alum
common ancestry
common assent
common belief
common bond
common brad
common carotid
common carotid artery
common carrier
common case
common chord
common coke
common cold
common consent
common cost
common council
common councilman
common denominator
common descent
common divisor
common effort
common endeavor
common enterprise
common factor
common fee
common fraction
common gender
common good
common ground
common iliac artery
common informer
common knowledge
common laborer
common law

common logarithm
common man
common market
common measure
common
men
common meter
common metre
common multiple
common nail
common name
common noun
common oak
common occurrence
common of turbary
common opal
common ownership
common people
common person
common phrase
common pitcher plant
common pleas
common practice
common prayer
common property
common rafter
common reed
common rhythm
common room
common ruck
common run
common run of things
common salt
common saying
common school
common scold
common seal
common seaman
common sennit
common sense
common snipe
common soldier
common sort
common source
common speech
common stock
common sulfur
common talk

common tannin
common tern
common time
common topaz
common touch
common variety
common weal
common wheat
common year
common-law
common-law court
common-law estoppel
common-law jurisdiction
common-law lien
common-law marriage
common-law trust
common-law wife
common-room
common-variety
commonly known
commonplace book
commonplace expression
commonsense philosopher
commonsense philosophy
commonsense realism
commonsense
realist
commonwealth day
communal effort
communal enterprise
communal marriage
commune with
commune with God
commune with the spirits
communicate orally
communicate verbally
communicate with
communication cord
communication engineering
communication explosion
communication leak
communication room
communication satellite
communication technology
communication theory
communication trench
communications engineer
communications industry

communications media
communications medium
communications net
communications network
communications receiver
communications relay satellite
communications revolution
communications satellite
communications ship
communications theory
communications zone
communion cloth
communion cup
communion hymn
communion in both kinds
communion in one kind
communion of saints
communion plate
communion rail
communion table
communist front
community at large
community center
community centre
community chest
community church
community college
community home
community
hospital
community house
community nurse
community of interest
community of interests
community property
community school
community sentiment
community sing
community singing
community supervision
community theater
community trust
commutating pole
commutation ticket
commutative algebra
commutative contract
commutative law
commutator filling

commutator group
commutator motor
commutator pitch
commutator shell
commutator subgroup
compact car
compact of
companion bills amendment
companion cell
companion crop
companion cropping
companion flange
companion hatch
companion hatchway
companion ladder
companion piece
companion set
companion star
companionate marriage
company headquarters
company man
company officer
company reserve line
company secretary
company sergeant-major
company store
company town
company union
comparative anatomy
comparative degree
comparative estimate
comparative ethics
comparative government
comparative grammar
comparative judgment
comparative linguist
comparative linguistics
comparative
literature
comparative medicine
comparative method
comparative musicology
comparative philology
comparative psychology
comparative relation
comparative religion
comparative scrutiny
comparative statement

compare and contrast
compare notes
compare point by point
compare to
compare with
compared to
compared with
comparison lamp
comparison microscope
comparison of variables
comparison shopper
comparison shopping
comparison slip
comparison spectrum
comparison star
comparison test
compass about
compass bearing
compass board
compass bowl
compass brick
compass calipers
compass card
compass corrector
compass course
compass deviation
compass deviation card
compass dial
compass direction
compass direction or course
compass error
compass flower
compass heading
compass jellyfish
compass key
compass needle
compass north
compass of mind
compass plane
compass plant
compass rafter
compass reading
compass roof
compass rose
compass saw
compass timber
compass weed
compass window

compass-headed
compensate
for
compensated balance
compensated ionization chamber
compensated motor
compensating balance
compensating gear
compensating operation
compensation act
compensation balance
compensation bar
compensation insurance
compensation law
compensation neurosis
compensation pendulum
compensation water
compensatory damages
compensatory interest
compensatory reaction
compensatory spending
compete against
compete with
competitive market
compilation film
compiling routine
complain against
complain loudly
complain of
complement deviation
complement fixation
complement fixation test
complement-binding
complement-fixing
complementary angle
complementary angles
complementary cells
complementary color
complementary colour
complementary distribution
complementary wavelength
complete a purchase
complete answer
complete circuit
complete fertilizer
complete fracture
complete quadrilateral
complete works

completely normal space
completely regular space
completing the square
completion test
complex
 algebra
complex circularity
complex cone
complex conjugate
complex control system
complex fraction
complex idea
complex integer
complex machine
complex number
complex plane
complex salt
complex sentence
complex variable
complexity of meaning
complicate matters
complimentary close
complimentary closing
complimentary remark
complimentary ticket
compliments of the season
comply with
comport yourself
compos mentis
compose oneself
compose poetry
compose your differences
compose your features
compose yourself
composed matter
composed of
composed throughout
composing frame
composing room
composing rule
composing stick
composite arch
composite balance
composite function
composite number
composite photograph
composite reading
composite sailing

composite school
composite shot
composite text
composite-built
composition carver
composition cloth
composition face
composition factor
composition formula
composition metal
composition of differences
composition of forces
composition pedal
composition
 piston
composition roofing
composition series
compost heap
compound centrifugal force
compound engine
compound eye
compound flower
compound for
compound fraction
compound fracture
compound function
compound interest
compound interval
compound leaf
compound lens
compound magnet
compound measure
compound microscope
compound motor
compound number
compound ovary
compound pendulum
compound radical
compound sentence
compound time
compound winding
compound words
compound-complex
compound-complex sentence
compound-wound
compregnated wood
comprehensive examination
comprehensive school

compressed air
compressed petroleum gas
compressed score
compressed-air drill
compressibility drag
compression bib
compression coupling
compression cup
compression ignition
compression member
compression ratio
compression spring
compression stroke
compression tap
compression wave
compression-ignition
compression-ignition engine
compromise formation
compromise joint
compromise rail
compromise yourself
compte
rendu
compte-rendu critique
comptes rendus
compulsion neurosis
compulsive character
compulsive gambler
compulsory arbitration
compulsory military service
compulsory purchase
compulsory referendum
compulsory servitude
computational linguistics
computer code
computer data
computer engineer
computer hardware
computer language
computer memory
computer part
computer parts
computer printout
computer program
computer programmer
computer proof
computer revolution
computer routine

computer software
computer technician
computer technologist
computer technology
computer typesetting
computer unit
computerized typesetting
computing machine
computing scale
comrade in arms
comrade-in-arms
con affetto
con agilita
con agitazione
con amore
con anima
con artist
con brio
con dolore
con espressione
con fuoco
con game
con man
con moto
con over
con rod
con sordino
con spirito
con your part
con-
conario-
concatenation control
concatenation of events
concatenation system
concave lens
concave mirror
concavo-
concavo-concave
concavo-convex
concavo-convex
lens
conceal your motive with
conceal yourself
conceded fact
conceit yourself
conceivably possible
conceive a dislike to
concentrate on

concentrate sprayer
concentrate the mind
concentrate the thoughts
concentrate upon
concentration camp
concentration cell
concentration ring
concentric cable
conceptual art
conceptual artist
conceptual crudity
conceptual realism
conceptual realist
conceptually crude
concern oneself
concern yourself with
concert artist
concert band
concert border
concert etude
concert flute
concert grand
concert grand piano
concert guitar
concert hall
concert music
concert overture
concert party
concert performance
concert pitch
concert season
concert tour
concerted action
concerti grossi
concertina action
concertina movement
concertina table
concerto grosso
concerto grossos
concession road
conch hat
conch shell
conch-
concho grass
conciliation court
concluding line
conclusive argument
conclusive evidence

concours d'lgance
concrete
 art
concrete block
concrete identity
concrete layer
concrete mixer
concrete music
concrete noun
concrete number
concrete paint
concrete poetry
concrete universal
concurrent jurisdiction
concurrent resolution
concurring opinion
concussion bellows
concussion bomb
concussion fuse
concussion grenade
concussional concussant
condemn to death
condemn to eternal punishment
condemn to hell
condemn yourself
condemned cell
condensation point
condensation polymerization
condensation trail
condensed milk
condensed version
condenser antenna
condenser microphone
condensing engine
condensing hygrometer
condensing lens
condictio triticaria
condign punishment
conditio sine qua non
condition of things
conditional convergence
conditional probability
conditional sale
conditioned reflex
conditioned response
conditioned stimulus
condole with
conduce to

conduce to health
conducive to
conduct a funeral
conduct a poll
conduct a trial
conduct an inquiry
conduct money
conduct pleadings
conduct to
conduct
 unbecoming a gentleman
conduct yourself
conduct yourself in the face of
conduct yourself toward
conduct yourself vis-a-vis
conduct-money
conduction current
conduction electron
conductometric titration
conductor head
conductor plug
conductor rail
conductor's baton
conduit box
conduit pipe
conduit railway
conduit system
cone adaptation
cone anchor
cone bearing
cone bit
cone brake
cone center
cone chuck
cone clutch
cone compass
cone coupling
cone delta
cone friction clutch
cone gamba
cone joint
cone key
cone lathe
cone mandrel
cone mill
cone number
cone of a complex
cone of silence

cone off
cone pepper
cone plate
cone pulley
cone shaver
cone shell
cone snail
cone speaker
cone tree
cone valve
cone vision
cone wheat
cone wheel
cone-billed
cone-headed
cone-in-cone
cone-nose
cone-shaped
conehead rivet
conehead toggle
coney leopard
coney mole
coney parsley
confabulate the breeze
confectioners' sugar
confectionery decorator
confederate memorial day
confederate rose
confer a benefit
confer a blessing
upon
confer citizenship
confer distinction on
confer honor upon
confer with
conference at the summit
conference room
conference table
confession equality
confession of faith
confide in
confide to
confidence game
confidence interval
confidence limits
confidence man
confidence trick
confidential communication

confidential information
confirm in
confirmation class
confirmed bachelor
confirmed liar
conflict of interest
conflict of laws
conflict of sounds
conflict with
confluence of minds
confluent stream
conform map projection
conform representation
conform to
conform to fact
conform with
conformable to
conformal projection
conformation other-direction
conformity to fact or reality
confound it
confront each other
confront with
confrontation politics
confrontation therapy
confused flour beetle
confusion of sounds
confusion of tongues
confusion worse confounded
conga drum
congee house
congenital defect
congenital disease
congenital heart disease
congenital hypophosphatasia
congenital idiot
congenital
immunity
congenital syphilis
conger doust
conger eel
conger-eel
congestive heart failure
conglobate gland
conglomerate corporation
congo dye
congo eel
congo red

congo snake
congratulate yourself
congregational christian
congress boot
congress gaiter
congress shoe
congressional caucus
congressional district
congressional election
congressional immunity
congressional investigation
congressional medal
congressman-at-large
congressmen-at-large
congruence sign
congruent with
conic projection
conic section
conic sections
conical pendulum
conical-shaped
conico-
conico-cylindrical
conico-elongate
conico-hemispherical
conico-ovate
conico-ovoid
conico-subhemispherical
conico-subulate
coniferyl alcohol
coning angle
conjoint therapy
conjugal bond
conjugal knot
conjugal love
conjugal right
conjugal tie
conjugate axis
conjugate numbers
conjugate solution
conjugated protein
conjugation canal
conjugation cell
conjugato-
conjugato-palmate
conjugato-pinnate
conjunction-reduction
conjunctive

adverb
conjuncture of events
conjure man
conjure spirits
conjure up
conjure up a vision
conjure up spirits
conk out
connate-perfoliate
connect couple
connect up
connect with
connecting link
connecting rod
connection angle
connection bar
connection with
connective tissue
conning tower
conning tower hatch
conniption fit
connive at
connoisseur of food
connoisseur of wine
conoido-hemispherical
conoido-rotundate
conquering hero
conscience clause
conscience money
conscience-proof
conscience-smitten
conscience-stricken
conscience-striken
conscientious objector
conscious of
conscious of your place
conscious self
consciousness raising
consciousness-expanding
consciousness-expansion
conscript fathers
consecrate to
consecrated bread
consecrated elements
consecutive intervals
consensus gentium
consensus of opinion
consensus omnium

consensus politics
consent by implication
consent decree
consent rule
consent to
consent to silently
consenting adult
consequent stream
conservation of angular momentum
conservation
 of charge
conservation of energy
conservation of linear momentum
conservation of mass
conservation of mass and energy
conservation of matt
conservation of matter
conservation of momentum
conservation of parity
conservative treatment
consider every angle
consider pro and con
consider the circumstances
consider the source
consign to a place
consign to hell
consign to oblivion
consign to the grave
consign to the scrap heap
consigned to oblivion
consignment marketing
consignment note
consist in
consist of
consist with
consistent with
consisting of
consolation game
consolation match
consolation prize
console table
consolidated annuities
consolidated fund
consolidated school
consolidated stock
consolidating company
consonant chord
consonant shift

consonant shifting
consonant system
consonantal alliteration
consort with
conspicuous by its absence
conspicuous consumption
conspicuous gallantry
conspicuous waste
constable glass
constant attention
constant flow
constant friend
constant
 of gravitation
constant of integration
constant pressure
constant thrust
constant-chord-rotor helicopter
constantly recur to
constantly revert to
constitute a whole
constituted authority
constitutional amendment
constitutional convention
constitutional freedom
constitutional government
constitutional guarantees
constitutional law
constitutional lawyer
constitutional medicine
constitutional monarch
constitutional monarchy
constitutional psychology
constitutional referendum
constitutional rights
constitutional syphilis
constitutional therapy
constitutional validity
constrain yourself
constrict your views
construct form
construct state
construction bond
construction engineer
construction engineering
construction modifier
construction paper
constructional homonymity

constructive change
constructive imagination
constructive interference
consul general
consular agent
consular service
consulate general
consulates general
consuls general
consult with
consult with your pillow
consult your
 own wishes
consult your pillow about
consultation room
consultative assembly
consulting room
consume away
consume time
consumed by fire
consumed with curiosity
consumed with desire
consumer cooperative
consumer credit
consumer economy
consumer goods
consumer items
consumer power
consumer preference study
consumer price index
consumer research
consumer resistance
consumer sovereignty
consumer strike
consumer survey
consumer's strike
consumer-preference survey
consummate liar
consummate lie
consumption goods
consumption weed
cont-line
contact a debt
contact action
contact agent
contact dermatitis
contact flight
contact flying

contact infection
contact lens
contact maker
contact making
contact man
contact metamorphism
contact microphone
contact mine
contact paper
contact poison
contact potential
contact print
contact printing
contact process
contact therapy
contact with reality
contactor switch
contageous disease
contagious abortion
contagious ecthyma
contagious epithelio
contagious epithelioma
contagious
magic
contain yourself
contained in
container board
container car
container ship
contango day
conte-crayon
contemplate in the imagination
contemplation of the past
contemplative life
contemporary literature
contempt of Congress
contend about
contend against
contend for
contend with
content analysis
content subject
content word
content yourself with
contents page
contest a seat
contest of fleetness
contest of speed

contested election
contextual definition
continent-wide
continental breakfast
continental climate
continental code
continental divide
continental drift
continental island
continental quilt
continental shelf
continental slope
continental stitch
continental system
contingency fund
contingency method
contingency reserve
contingency table
contingent beneficiary
contingent fee
contingent fund
contingent interest
contingent liability
contingent on
contingent reserve
continuance in action
continuation day
continuation school
continue the same
continue to be
continue
 to exist
continued fever
continued fraction
continued proportion
continuing education
continuity clerk
continuity equation
continuity girl
continuity writer
continuous brake
continuous casting
continuous creation
continuous creation theory
continuous miner
continuous spectrum
continuous stationery
continuous tenure

continuous tone
continuous wave oscillator
continuous wave radar
continuous waves
continuous-expansion engine
continuous-wave transmitter
continuum hypothesis
continuum theory
contour bob
contour chair
contour check
contour curtain
contour curve
contour farming
contour feather
contour feathers
contour follower
contour integration
contour interval
contour line
contour map
contour ploughing
contour plowing
contour sheet
contra bassoon
contra bonos mores
contra trombone
contra-
contra-acting
contra-approach
contra-dance
contra-guide rudder
contra-indicant
contra-indicate
contra-indication
contra-ion
contra-lode
contra-propeller construction
contra-related
contra-remonstrant
contra-rotating
airscrews
contra-rotation
contraband of war
contraceptive foam
contract a habit
contract an engagement
contract bond

contract bridge
contract by deed
contract for
contract matrimony
contract of record
contract out
contract practice
contract quasi
contract yourself
contractile cell
contraction fit
contraction joint
contraction rule
contraction theory
contradict itself
contraria contrariis curantur
contrarotating propeller
contrary assertion
contrary motion
contrary terms
contrary to
contrary to all expectation
contrary to fact
contrary to law
contrary to order and discipline
contrary to reason
contrary, the
contrary-minded
contrast bath
contrast control
contrast medium
contrast with
contrastive juxtaposition
contrate wheel
contre-
contre-dance
contre-partie
contribute to
contribution clause
contributory negligence
control account
control action
control agent
control assay
control board
control center
control chart
control column

control desk
control electrode
control element
control
engineer
control experiment
control feelings
control grid
control group
control indicator
control mark
control means
control mechanism
control mechanisms
control panel
control relay
control resistor
control rod
control room
control signals
control station
control stick
control surface
control survey
control system
control the carnal man
control the fleshly lusts
control the old Adam
control the price of
control tower
control transformer
control valve
control wires
control your appetites
control yourself
controllable-pitch
controlled access highway
controlled association
controlled association test
controlled experiment
controlled price
controlled quantity
controller general
controlling account
controlling depth
controversial point
conus medullaris
conval lily

convalescent home
convalescent hospital
convected heat
convection current
convective activity
convective discharge
convector heat
convenience food
convenient to
convent cloth
convent school
convention hall
conventional
 phrase
conventional representation
conventional symbol
conventional usage
conventional war
conventional warfare
conventional weapons
conventual prior
convergence frequency
convergence of events
convergency factor
convergent evolution
convergent squint
convergent strabismus
convergent thinking
converging lens
conversant with
conversation chair
conversation piece
conversational English
conversational partner
conversational quality
converse in
converse motion
converse with
conversion cost
conversion factor
conversion hysteria
conversion neurosis
conversion ratio
conversion reaction
conversion table
conversion value
convert into cash
convert to

convert to use
converted steel
converter reactor
convertible bond
convertible coupe
convertible debenture
convertible preferred stock
convertible securities
convertible sedan
convertible top
convex hull
convex lens
convex mirror
convex point set
convex polygon
convex-concave
convexo-
convexo-concave
convexo-convex
convexo-plane
convey an impression
of
conveyor belt
conveyor chain
convict goods
convict yourself
convince to the contrary
convince yourself
convolvulus moth
convulsion root
convulsive therapy
cony-catch
coo-coo
cooch dance
cooch show
coochie show
coochin york
cooee bird
cook accounts
cook off
cook out
cook stove
cook up
cook wrasse
cook your goose
cook-general
cook-out
cooked-up

cookery book
cookery stove
cookie cutter
cookie press
cooking-range
cooks-general
cooky cutter
cool acceptance
cool as a cucumber
cool bag
cool breeze
cool color
cool down
cool head
cool it
cool jazz
cool judgment
cool million
cool off
cool off the economy
cool out
cool the economy
cool your heels
cool-headed
cool-headedly
cool-headedness
cooling breeze
cooling degree-day
cooling down
cooling of the economy
cooling off
cooling off of the economy
cooling system
cooling-card
cooling-off
cooling-off period
coom-ceiled
coon bear
coon cat
coon dog
coon's age
coonskin cap
coop in
coop up
cooped-in
cooper's-wood
cooperative apartment
cooperative apartment

house
cooperative bank
cooperative credit union
cooperative farm
cooperative society
cooperative store
coopered joint
coordinate bond
coordinate clause
coordinate geometry
coordinate paper
coordinate system
coordinated operations
coordinated panel
coordinating conjunction
coordination complex
coordination compound
coordination number
coot-footed
cooter grass
cootie garage
cop a plea
cop out
cop-out
cop-rose
copaiba balsam
copaiba oil
copaiba resin
copaiva oil
copaiye wood
copal ether
cope chisel
cope cutter
cope with
cope-stone
copen blue
copenhagen blue
coping saw
coping stone
copper acetate
copper acetoarsenite
copper arsenite
copper barilla
copper beech
copper bender
copper brazer
copper caster
copper cyanide

copper engraver
copper extractor
copper foil
copper hydroxide
copper iris
copper mill
copper millman
copper mine
copper miner
copper mining
copper pyrites
copper red
copper refiner
copper refinery
copper smelter
copper spot
copper sulfate
copper sulphate
copper worker
copper-alloyed
copper-bearing
copper-bellied
copper-belly
copper-bottomed
copper-coated
copper-colored
copper-covered
copper-faced
copper-fastened
copper-headed
copper-leaf
copper-leaves
copper-lined
copper-melting
copper-plate
copper-red
copper-skinned
copper-smelting
copper-smith
copper-toed
copper-worm
copperas
black
copperplate engraving
copperplate hand
copperplate press
copperplate print
coppery-tailed

coppice oak
coppice shoot
coppice-feathered
coppice-topped
copple-crown
copple-crowned
copple-stone
copr-
copra oil
copro-
cops and robbers
copse cutter
copse-clad
copse-covered
copulative asyndeton
copulative conjunction
copy after
copy camera
copy chief
copy desk
copy edit
copy editor
copy out
copy paper
copy taster
copy typist
copy-edit
copybook hand
copying ink
copying machine
copying machines
copying paper
copying press
copyright deposit library
copyright infringer
copyright page
coq au vin
coq de bruyere
coquet with
coquet with the idea
coquette bob
coquettish glances
coquilla
nut
coquille lens
coquilles Saint-Jacques
coquimbo owl
coquito palm

cor adiposum
cor anglais
cor arteriosum
cor biloculare
cor blimey
cor bovinum
cor juvenum
cor pseudotriloculare biatriatum
cor pulmonale
cor sinistrum
cor triatriatum
cor triloculare biatriatum
cor triloculare biventriculare
cor villosum
cor-
coraco-
coral bead
coral bean
coral bells
coral fern
coral grinder
coral head
coral heads
coral honeysuckle
coral island
coral jasmine
coral lily
coral pink
coral plant
coral reef
coral root
coral snake
coral stitch
coral tree
coral vine
coral-bead tree
coral-beaded
coral-bound
coral-built
coral-buttoned
coral-colored
coral-fishing
coral-girt
coral-making
coral-plant
coral-producing
coral-red
coral-rooted

coral-secreting
coral-snake
coral-tree
coral-wood
coram judice
coram nobis
coram non judice
coram populo
corbel arch
corbel out
corbel step
corbel table
corbel vault
corbie gable
corbie-step
corbin bone
cord conductor
cord connector
cord foot
cord grass
cord maker
cord-connector
 body
cordage tree
cordate-amplexicaul
cordate-lanceolate
cordate-oblong
cordate-sagittate
cordeau detonant
cordeau fuse
corded pahoehoe
cordia pulmonalia
cordial friendship
cordial understanding
cordial welcome
cordon bleu
cordon off
cordon sanitaire
cordoned off
cordoning off
cordons bleus
cordons sanitaire
corduroy road
cordwood saw
core bar
core barrel
core binder
core boring

core builder
core curriculum
core drawing
core flour
core of your being
core sand
core store
core tester
core time
core vent
core wire
core-
core-baking
core-box plane
core-cutting
core-drying
core-jarring
coriander oil
coriander seed
coriolis effect
coriolis force
cork borer
cork cambium
cork cutter
cork jacket
cork oak
cork puller
cork shredder
cork sorter
cork tile
cork tree
cork up
cork-bark elm
cork-barked
cork-bearing
cork-boring
cork-cutting
cork-forming
cork-grinding
cork-heeled
cork-lined
cork-tipped
corking pin
corking up
corking-pin
corkscrew flower
corkscrew grass
corkwood cotton

corky-headed
corky-winged
cormo-
corn
belt
corn borer
corn bread
corn bunting
corn cackle
corn cake
corn cleaner
corn cockle
corn color
corn crake
corn dab
corn dodger
corn drier
corn earworm
corn exchange
corn factor
corn field
corn flakes
corn flour
corn fritter
corn god
corn grass
corn grinder
corn grits
corn huller
corn law
corn lily
corn liquor
corn marigold
corn mayweed
corn meal
corn mint
corn muffin
corn oil
corn on the cob
corn picker
corn picking
corn pit
corn pone
corn popper
corn poppy
corn root aphid
corn rose
corn row

corn salad
corn shock
corn shocker
corn shredder
corn shuck
corn shucking
corn silk
corn smut
corn snake
corn snow
corn spirit
corn stack
corn stubble
corn sugar
corn syrup
corn tash
corn tester
corn thresher
corn whiskey
corn whisky
corn-beads
corn-cob
corn-colored
corn-cracker
corn-crake
corn-devouring
corn-ear worm
corn-eater
corn-exporting
corn-fed
corn-feeding
corn-flag
corn-flour
corn-flower
corn-growing
corn-husk
corn-law
corn-master
corn-picker
corn-planting
corn-producing
corn-rent
corn-salad
corn-snake
corn-stalk
corncob
pipe
corne de vache

cornea lens
corneal reflex
corneal transplant
corned beef
corned beef and cabbage
corned beef hash
corned beef sandwich
cornelian cherry
corneo-
corner accessory
corner bead
corner block
corner cabinet
corner chair
corner chisel
corner cupboard
corner in
corner man
corner of the eye
corner of the memory
corner on the market
corner reflector
corner table
corner the market
corner trowel
corner-man
corner-stone
cornes de vache
cornet a pistons
cornet-a-pistons
cornfield ant
cornfield pea
cornflower blue
cornice brake
corno di caccia
corno flute
cornstalk disease
cornstalk pine
cornstarchy airs
cornu ammonis
cornucopia leg
cornucopia sofa
corny joke
coro-
corolla limb
corolla tube
coromandel wood
corona australis

corona borealis
corona discharge
corona lucis
corona radiata
coronae radiatae
coronal roots
coronal suture
coronary artery
coronary band
coronary cushion
coronary heart disease
coronary insufficiency
coronary
 occlusion
coronary ring
coronary thrombosis
coronation oath
coroner's inquest
coroner's jury
coronet braid
coronet of rank
corozo nut
corpora allata
corpora callosa
corpora cardiaca
corpora lutea
corpora striata
corporal punishment
corporal's guard
corporate arms
corporate body
corporate bond
corporate headquarters
corporate image
corporate stock
corporation cock
corporation law
corporation lawyer
corporation securities
corporation stock
corporation stop
corporation tax
corporeal hereditament
corps area
corps d'armee
corps d'elite
corps de ballet
corps de garde

corps diplomatique
corps of advisers
corps of cadets
corps of engineers
corps of signals
corps troops
corpse candle
corpse gate
corpse reviver
corpse-candle
corpulent person
corpus allatum
corpus callosum
corpus cardiacum
corpus christi
corpus delicti
corpus juris
corpus luteum
corpus luteum hormone
corpus striatum
corpus vile
corpuscular theory
correct English
correct copy
correct deportment
correct ear
correct in your behavior
correct
in your manners
correcting plate
correcting signals
correction line
correction of error
corrective action
corrector plate
correlation coefficient
correlation ratio
correlative conjunction
correspond to
correspond with
correspondence column
correspondence course
correspondence principle
correspondence school
correspondence theory
corridor of time
corridors of time
corroboratory evidence

corrosion borders
corrosive mercury chloride
corrosive sublimate
corrugated iron
corrugated paper
corrugation irrigation
corrupt administration
corrupt politician
corrupt practices act
corruption of blood
corruption of speech
corset cover
corset designer
corsetior corsetier
cortex parenchyma
cortical epilepsy
cortical tissue
cortico-
corydalis green
cos lettuce
cosine circle
cosmetic dermatitis
cosmetic operation
cosmetic surgery
cosmic constant
cosmic dust
cosmic evolution
cosmic noise
cosmic particle
cosmic particles
cosmic philosopher
cosmic philosophy
cosmic radiation
cosmic ray
cosmic
ray bombardment
cosmic ray counter
cosmic rays
cosmic space
cosmic static
cosmic stepping-stone
cosmic time
cosmical geology
cosmico-natural
cosmo-
cosmological argument
cosmological proof
cossack green

cossack hat
cost a packet
cost a pretty penny
cost accountant
cost accounting
cost an arm and a leg
cost and freight
cost benefit analysis
cost card
cost center
cost insurance and freight
cost keeper
cost keeping
cost ledger
cost little
cost money
cost much
cost next to nothing
cost nothing
cost of living
cost out
cost plus
cost sheet
cost system
cost unit
cost what it may
cost you
cost-account
cost-accounting system
cost-effective
cost-free
cost-of-living allowance
cost-of-living index
cost-plus
cost-push inflation
costal margin
costal vein
costal-nerved
costard-monger
costing-out
costless thing
costo-
costume designer
costume drama
costume jewellery
costume jewelry
costume party
costume piece

costus oil
cosy along
cot bar
cot case
cot death
cotarnine hydrochloride
cote-hardie
cotelette
 de mouton
cotelette de porc frais
cotelette de veau
cotta grass
cottage bonnet
cottage cheese
cottage china
cottage fried potatoes
cottage hospital
cottage industry
cottage loaf
cottage piano
cottage pie
cottage pudding
cottage tulip
cottage window
cotter drill
cotter file
cotter mill
cotter pin
cotter slot
cotter way
cottier system
cotton anthracnose
cotton aphid
cotton back
cotton bagging
cotton baller
cotton batting
cotton belt
cotton bill
cotton boll
cotton bollworm
cotton broker
cotton bush
cotton buyer
cotton cake
cotton cambric
cotton candy
cotton chiffon

cotton chopper
cotton cleaner
cotton comber
cotton coverer
cotton crepe
cotton cutter
cotton damask
cotton dryer
cotton duck
cotton dyer
cotton factor
cotton factory
cotton feeder
cotton fern
cotton field
cotton filler
cotton flannel
cotton floater
cotton gin
cotton ginner
cotton grass
cotton grower
cotton gum
cotton harvester
cotton jenny
cotton lint
cotton linters
cotton lord
cotton mill
cotton mixer
cotton moth
cotton mouse
cotton
mouth
cotton mouths
cotton mule
cotton netting
cotton oil
cotton on
cotton opener
cotton packer
cotton picker
cotton plant
cotton plantation
cotton planter
cotton plugger
cotton plush
cotton pongee

cotton powder
cotton preparer
cotton press
cotton print
cotton printer
cotton raiser
cotton rat
cotton rock
cotton root rot
cotton rose
cotton rush
cotton rust
cotton sampler
cotton seed
cotton shipper
cotton sled
cotton sorter
cotton speeder
cotton spinner
cotton spooler
cotton stainer
cotton stripper
cotton sugar
cotton sweep
cotton tapestry
cotton teal
cotton teaser
cotton thistle
cotton thread
cotton tie
cotton to
cotton tree
cotton twist
cotton twister
cotton wadding
cotton warehouseman
cotton warp
cotton waste
cotton weigher
cotton wick
cotton wicking
cotton wilt
cotton winder
cotton wool
cotton works
cotton worm
cotton yarn
cotton-backed

cotton-baling
cotton-bleaching
cotton-clad
cotton-covered
cotton-dyeing
cotton-ginning
cotton-growing
cotton-knitting
cotton-picking
cotton-planting
cotton-printing
cotton-producing
cotton-root
 bark
cotton-sampling
cotton-sick
cotton-spinning
cotton-weaving
cotton-wicked
cottonseed cake
cottonseed feed
cottonseed flour
cottonseed meal
cottonseed oil
cottonseed tree
cottontail rabbit
cottony cloud
cottony jujube
cottony-cushion scale
cotyl-
cou-cou
couch bed
couch grass
couch in terms
couch maker
couch roll
couch wheat
couch your lance
couch, the
couched harp
couching stitch
cough drop
cough drops
cough medicine
cough mixture
cough sirup
cough syrup
cough up

could be
could sink through the floor
couldn't care less about
coulee cricket
couleur de rose
coulomb meter
coumarone resin
coumarone resins
coumarone-indene
coumarone-indene resin
council bill
council board
council fire
council house
council of ministers
council of state
council of war
council school
council table
council tool
council-manager plan
counsel of perfection
counsel-keeper
counselor-at-law
counselors-at-law
count against
count book
count calories
count down
count
for
count heads
count hook
count in
count me out
count noses
count noun
count number
count of
count off
count on
count out
count palatine
count plate
count sheep
count the beats
count ties
count up

count upon
count votes
count wheel
count-rate meter
countably additive function
countably compact set
counted on
counter apse
counter borer
counter check
counter electromotive force
counter image
counter jumper
counter relief
counter scale
counter septum
counter service
counter stern
counter table
counter timber
counter to
counter to your preferences
counter tube
counter wall
counter word
counter-
counter-acquittance
counter-agency
counter-approach
counter-arch
counter-attraction
counter-barry
counter-battery
counter-beam
counter-bill
counter-bore
counter-boulle
counter-brace
counter-carte
counter-cast
counter-caster
counter-chevroned
counter-claim
counter-clockwise
counter-coloured
counter-company
counter-couchant
counter-culture

counter-current
counter-deed
counter-disengage
counter-drain
counter-draw
counter-earth
counter-embattled
counter-embowed
counter-ermine
counter-evidence
counter-extension
counter-faced
counter-faller
counter-fessed
counter-fissure
counter-force
counter-gauge
counter-gear
counter-guard
counter-hem
counter-indication
counter-influence
counter-ion
counter-irritant
counter-jumper
counter-lath
counter-letter
counter-lode
counter-marque
counter-motion
counter-move
counter-naiant
counter-nebule
counter-off
counter-opening
counter-paled
counter-parade
counter-parole
counter-party
counter-passant
counter-pawn
counter-penalty
counter-pole
counter-potent
counter-pressure
counter-price
counter-proof
counter-quartered

counter-raguled
counter-rampant
counter-reformation
counter-revolution
counter-revolutionary
counter-riposte
counter-roll
counter-round
counter-salient
counter-scale
counter-scuffle
counter-sea
counter-seal
counter-secure
counter-spell
counter-statement
counter-step
counter-taste
counter-tendency
counter-tenor
counter-tide
counter-tierce
counter-time
counter-trench
counter-tripping
counter-turn
counter-vote
counter-wait
counter-wall
counter-weight
counter-worker
counterfeit
money
counterintelligence agent
counterpoint rhythm
counterrotating propeller
counterscarp gallery
countersink bit
countertenor clef
counterweight system
counties palatine
counting glass
counting heads
counting house
counting machine
counting noses
counting number
counting on the fingers

counting room
counting scales
counting tube
counting-out rhyme
countless as the sands
countless as the stars
countre-
country almond
country bank
country bishop
country blues
country borage
country bumpkin
country club
country cousin
country damage
country dance
country dancer
country dancing
country day school
country doctor
country fig
country gentleman
country gooseberry
country hide
country house
country jake
country licorice
country mallow
country mile
country music
country party
country peach
country pepper
country rock
country seat
country store
country town
country
 wallah
country walnut
country, the
country-and-western
country-and-western music
country-and-western singer
country-born
country-bred
country-dance

country-fashion
country-made
country-style
country-wide
counts palatine
county agent
county attorney
county board
county borough
county building
county clerk
county college
county commissioner
county constabulary
county convention
county council
county court
county courthouse
county fair
county farm
county home
county house
county library
county mutual
county palatine
county police
county rate
county road
county seat
county site
county supervisor
county town
county-wide
coup d'Oeil
coup d'essai
coup d'etat
coup d'oeil
coup d'oil
coup d'tat
coup de foudre
coup de gr
coup de grace
coup de main
coup de maitre
coup de plume
coup de poing
coup de soleil
coup de thatre

coup de theatre
coup feather
coup-cart
coupe-gorge
couple dancing
couple up
couple with
couple-beggar
couple-close
coupled roof
coupled with
coupler socket
coupling box
coupling
circuit
coupling coefficient
coupling pin
coupling rein
coupling rod
coupling strap
coupon bond
coupon clipper
coupon clippers
coupon off
coupon on
coupon rate
coups d'essai
coups de main
coups de plume
coups de poing
cour d'honneur
courage fou
courageous act
courbaril copal
coureur de bois
coureurs de bois
courge green
cours d'honneur
course ahead
course light
course of action
course of study
course of things
course of time
course protractor
coursing joint
court Christian
court bond

court bouillon
court calendar
court card
court cards
court christian
court circular
court cupboard
court dance
court danger
court day
court destruction
court dress
court fool
court game
court gray
court guide
court hand
court leet
court martial
court of admiralty
court of appeals
court of arbitration
court of assize
court of attachments
court of chancery
court of claims
court of common pleas
court of conscience
court of domestic relations
court of dustyfoot
court of equity
court of errors
court of first
instance
court of guard
court of honor
court of honour
court of inquiry
court of justice
court of last resort
court of law
court of love
court of piepoudre
court of probate
court of record
court of requests
court of review
court of sessions

court of wards
court of wards and liveries
court party
court plaster
court reporter
court roll
court shoe
court tennis
court-appointed lawyer
court-baron
court-bouillon
court-cupboard
court-customary
court-dress
court-house
court-leet
court-mantle
court-martial
court-martials
court-noue
court-plaster
court-tialed
court-tialing
court-tialled
court-tialling
court-yard
courtesy card
courtesy light
courtesy title
courting chair
courting disaster
courting glass
courting mirror
courtly love
courtly politeness
courts Christian
courts-martial
courtship-and-matrimony
cousin once removed
cousin twice removed
cousin-german
cousin-in-law
cousins-german
couvre-feu
covalent bond
cove lighting
cove oyster
cove stripe

cove trowel
coved vault
coven-tree
covenant
 of indemnity
covenant of salt
covenant of warranty
cover charge
cover crop
cover design
cover girl
cover glass
cover ground
cover memory
cover note
cover paper
cover plate
cover point
cover slip
cover stone
cover story
cover title
cover up
cover up for
cover up your tracks
cover version
cover with excuses
cover your path
cover your short
cover yourself with
cover-point
cover-shame
cover-shoulder
cover-slut
cover-up
covered smut
covered waggon
covered wagon
covered way
covering board
covering letter
covering material
covering materials
covering shorts
covering up
coversed sine
covert cloth
covert coat

covert way
covert-baron
covin-tree
cow ant
cow barn
cow basil
cow bean
cow beet
cow blackbird
cow bunting
cow byre
cow chervil
cow chips
cow clover
cow cocky
cow college
cow corn
cow creamer
cow cress
cow flops
cow garlic
cow grass
cow hand
cow hock
cow keeper
cow killer
cow lily
cow oak
cow parsley
cow parsnip
cow pats
cow pillow
cow pilot
cow plant
cow poison
cow pony
cow rattle
cow shark
cow
 sorrel
cow testing
cow thistle
cow town
cow tree
cow vetch
cow's tail
cow-bane
cow-boy

cow-cutting horse
cow-eyed
cow-fat
cow-fish
cow-goddess
cow-headed
cow-hide
cow-hitch
cow-hocked
cow-itch
cow-lice
cow-mumble
cow-nosed
cow-pox
cow-stealing
cow-tongue
cowboy boot
cowboy boots
cowboy hat
cowboy pool
cowboy saddle
cowboys and Indians
cowhage cherry
cowl lamp
cowl neckline
cowl-shaped
cowled night
cowpea weevil
cowpea wilt
cowper's gland
cowrie pine
cowry bird
cowslip wine
coxo-femoral
coxsackie virus
coy Spring
coy duck
coyote blast
coyote weed
coyote-brush
coyote-bush
cozy chat
cozy fire
crab Louis
crab apple
crab cactus
crab canon
crab claw

crab float
crab grass
crab harrow
crab locomotion
crab locomotive
crab louse
crab meat
crab nut
crab oil
crab plover
crab pot
crab reel locomotive
crab spider
crab stock
crab thistle
crab tree
crab winch
crab yaws
crab-eating
crab-faced
crab-fish
crab-grass
crab-harrow
crab-plover
crab-shed
crab-sidle
crabbed age
crabbed hand
crabbing machine
crabeater
seal
crack a book
crack a crib
crack a joke
crack a safe
crack a smile
crack down
crack down on
crack of dawn
crack of doom
crack off
crack on
crack on sail
crack open
crack shot
crack the whip
crack up
crack willow

crack wise
crack your brains
crack your invention
crack-
crack-loo
crack-off
crack-the-whip
crack-up
crack-willow
cracked on
cracked voice
cracked-wheat bread
cracker bonbon
cracker jack
cracker mill
cracker-barrel
cracker-off
cracker-on
cracker-open
crackers-on
cracking still
cracklin' bread
crackling bread
crackling fire
cradle bar
cradle book
cradle cannon
cradle holding
cradle maker
cradle orchid
cradle roll
cradle roof
cradle scythe
cradle snatcher
cradle snatching
cradle vault
cradle-shaped
cradle-to-grave security
craft guild
craft paper
craft union
craft unionist
crafty rascal
crag martin
crag swallow
crag-and-tail
crag-bound
crag-built

crag-carven
crag-covered
crag-fast
crake-needles
cram down your throat
cram in
cram the mind
cram the mind with
cram
up
cram with facts
cram-full
crambo clink
crambo jingle
crammed full
cramp bark
cramp bone
cramp iron
cramp ring
cramp your style
cramp-iron
cramped hand
cramped ideas
cranberry blast
cranberry bog
cranberry bush
cranberry gall
cranberry glass
cranberry gourd
cranberry marsh
cranberry sauce
cranberry scald
cranberry tree
cranberry worm
crance iron
crane driver
crane fly
crane gray
crane line
crane the neck
crane your neck
crane's-bill
crane-fly
cranging hook
crani-
cranial index
cranial nerve
cranio-

cranio-acromial
cranio-aural
craniosacral nervous system
cranium amulet
crank arm
crank axle
crank brace
crank chain
crank disk
crank handle
crank hanger
crank in
crank letter
crank path
crank pit
crank plane
crank press
crank shaper
crank throw
crank up
crank web
crank wheel
crank-driven
crank-sided
crap around
crap game
crap grass
crap out
crap shooter
crap shooting
crap table
crapaud stone
crapaudine door
crape fern
crape jasmine
crape myrtle
crape needle
crape ring
crape-fish
crappit
head
crappit-head
crash barrier
crash boat
crash cymbal
crash dive
crash helmet
crash in

crash into
crash land
crash landing
crash of thunder
crash out
crash pad
crash program
crash the gates
crash wagon
crash wall
crash-dive
crash-dived
crash-diving
crash-dove
crash-land
crash-landing
crashing bore
crass ignorance
cratch cradle
crate maker
crater basin
crater-shaped
crave after
craw-craw
crawfish out
crawl after
crawl box
crawl in
crawl into your shell
crawl out of
crawl space
crawl with
crawl-a-bottom
crawl-up
crawler tractor
crawling peg
crayon board
crayon engraving
crazed-headed
crazier than a bedbug
crazier than a coot
crazier than a loon
crazy about
crazy bone
crazy fancy
crazy for
crazy house
crazy idea

crazy like a fox
crazy over
crazy pavement
crazy paving
crazy quilt
crazy to
crazy top
crazy-drunk
crazy-headed
crazy-looking
crazy-mad
crazy-pate
crazy-paving
crazy-work
cream beige
cream buff
cream bush
cream buyer
cream caustic
cream cheese
cream cooler
cream cracker
cream dipper
cream
freezer
cream gatherer
cream gauge
cream ice
cream ladle
cream nut
cream of society
cream of tartar
cream of the crop
cream of the jest
cream pail
cream pitcher
cream puff
cream puff paste
cream puff pasted
cream puff pastry
cream sauce
cream separator
cream sherry
cream soda
cream soup
cream stirrer
cream tea
cream tester

cream tube
cream whip
cream whipper
cream-cheese
cream-color
cream-colored
cream-faced
cream-flowered
cream-slice
cream-soup cup
cream-soup spoon
cream-white
cream-yellow
crease-resistant
create a character
create a disturbance
create a riot
create a role
created being
created nature
created universe
creatine phosphate
creating again
creating once more
creating over
creation of the brain
creative ability
creative artist
creative effort
creative evolution
creative imagination
creative power
creative thought
creative writer
creative writing
creature comfort
creature comforts
creature of habit
creature of the imagination
crebri-
credence shelf
credence table
credentials
committee
credenza bookcase
credenza buffet
credibility gap
credit account

credit agency
credit card
credit currency
credit hour
credit instrument
credit insurance
credit life insurance
credit limit
credit line
credit man
credit manager
credit memo
credit memorandum
credit money
credit rating
credit slip
credit squeeze
credit standing
credit to
credit to your account
credit union
credit with
credulous person
creedal statement
creek bed
creek broadbill
creek chub
creek duck
creek fern
creek grass
creek gum
creek maple
creek nettle
creek sedge
creek thatch
creep feeder
creep in
creep into a corner
creep into the good graces of
creep out of
creep up on
creep with
creep-fed
creep-feed
creep-feeding
creeper fowl
creeper tractor
creepie-peepie

creeping Charlie
creeping Jennie
creeping barberry
creeping barrage
creeping bent
creeping bent grass
creeping buttercup
creeping cinquefoil
creeping eruption
creeping fescue
creeping flesh
creeping forget-me-not
creeping juniper
creeping like
snail
creeping lily-turf
creeping myrtle
creeping of the flesh
creeping sheet
creeping sickness
creeping snowberry
creeping socialism
creeping thing
creeping thistle
creeping thyme
creepy-crawly
creme Yvette
creme d'amande
creme de cacao
creme de cassis
creme de la creme
creme de menthe
creme de moka
creme de noyau
cremorne bolt
crenate-leaved
crenate-toothed
crenato-
crenelated molding
creole dialect
creole language
creole-fish
creole-fishes
creolized language
creosote bush
creosote carbonate
creosote oil
crepe Suzette

crepe de Chine
crepe de chine
crepe hair
crepe lisse
crepe marocain
crepe meteor
crepe myrtle
crepe paper
crepe rubber
crepe suzette
crepe wool
crepe-backed
crepe-paper
crepuscular light
crepuscular ray
crescendo pedal
crescent moon
crescent operation
crescent roll
crescent spot
crescent truss
crescent-formed
crescent-lit
crescent-pointed
crescent-shaped
crescit eundo
cresol iodide
cresol red
cress family
cress green
cress rocket
crest cloud
crest coronet
crest factor
crest
rail
crest table
crest tile
crest voltmeter
crest-fallen
crested auklet
crested dog's-tail
crested flycatcher
crested hair grass
crested iris
crested lizard
crested poppy
crested swift

crested tit
cresylic acid
cretaceo-
crevalle jack
crew chief
crew compartment
crew cut
crew haircut
crew list
crew neck
crew neckline
crew socks
crew trainer
crew-cropped
crew-neck sweater
crew-necked
crewel needle
crewel stitch
crewel yarn
crewel-work
cri de coeur
cri de guerre
cri du cour
crib biting
crib death
crib strap
crib-bit
crib-bite
crib-biter
crib-biting
crib-bitten
cribbage board
crick-crack
cricket ball
cricket bat
cricket bird
cricket chair
cricket frog
cricket ground
cricket table
cricket teal
cricket-bat willow
crico-
cried up
crim con
crime against humanity
crime against nature
crime of passion

crime passionel
crime sheet
crime wave
criminal act
criminal anthropology
criminal assault
criminal cohabitation
criminal congress
criminal contempt
criminal conversation
criminal court
criminal
investigation
criminal jurisdiction
criminal law
criminal lawyer
criminal psychology
criminal syndicalism
criminal syndicalist
criminal tendency
crimping brake
crimping house
crimping iron
crimping machine
crimping pin
crimpy-haired
crimson clover
crimson flag
crimson madder
crimson sage
crimson-banded
crimson-barred
crimson-billed
crimson-carmine
crimson-colored
crimson-dyed
crimson-fronted
crimson-lined
crimson-petaled
crimson-purple
crimson-scarfed
crimson-spotted
crimson-tipped
crimson-veined
crimson-violet
crinc-
cringe to
cringle-crangle

crini-
crinkle leaf
crinkle-crankle
crinkly-haired
crinkum-crankum
crinoline stretcher
crinum lily
crio-
cripple rafter
cripple stopper
crippling attack
cris de guerre
crisis theologian
crisis theology
crisp-leaved
crisped-leaved
crisping iron
crisping pin
criss-cross
crissal thrasher
crisscross inheritance
crisscross-row
critical altitude
critical angle
critical angle of attack
critical apparatus
critical bibliography
critical constant
critical
constants
critical density
critical discernment
critical edition
critical idealism
critical journal
critical juncture
critical mass
critical moment
critical niceness
critical notice
critical path analysis
critical period
critical philosophy
critical point
critical pressure
critical ratio
critical realism
critical region

critical review
critical state
critical success
critical tem
critical temperature
critical volume
critically ill
criticize severely
critico-
critico-analytically
critico-historical
critico-poetical
critico-theological
cro-magnon
croaking sac
crochet file
crochet hook
crochet needle
crochet work
crockery cement
crocodile bird
crocodile shears
crocodile squeezer
crocodile tears
crocus antimonii
crocus bag
crocus cloth
crocus martis
crocus metallorum
crocus sack
croissant demi-sel
croix de guerre
croker sack
crook an elbow
crook rafter
crook the elbow
crook-backed
crooked dice
crooked politician
crooked-backed
crooked-billed
crooked-branched
crooked-clawed
crooked-eyed
crooked-foot
crooked-legged
crooked-limbed
crooked-lined

crooked-lipped
crooked-nosed
crooked-pated
crooked-shouldered
crooked-stemmed
crooked-toothed
crooked-winged
crooked-wood
crookes
 tube
croon song
crop drier
crop duster
crop grass
crop herbs
crop hide
crop index
crop of hair
crop out
crop pasture
crop rotation
crop seed
crop shear
crop up
crop-bound
crop-dust
crop-duster
crop-dusting
crop-ear
crop-eared
crop-farming
crop-full
crop-haired
crop-headed
crop-nosed
crop-producing
crop-shaped
crop-sick
crop-tailed
croquet ball
croquet ground
croquet lawn
croquignole wave
crosier back
cross action
cross agglutination
cross aisle
cross ancre

cross axle
cross bearings
cross bedding
cross birth
cross bit
cross bitt
cross bond
cross botonee
cross bourdonee
cross brace
cross bracing
cross break
cross bridging
cross buck
cross bun
cross complaint
cross correspondence
cross counter
cross cylinder
cross drawing
cross education
cross estoile
cross facet
cross fault
cross field
cross file
cross
fire
cross fitche
cross fleury
cross flute
cross flux
cross forked
cross formee
cross fourchee
cross fox
cross gammadion
cross grain
cross grignolee
cross guard
cross hair
cross hairs
cross heading
cross hilt
cross index
cross keelson
cross keys
cross kick

cross liability
cross license
cross lock
cross lode
cross mint
cross modulation
cross moline
cross multiplication
cross multiply
cross of Calvary
cross of Cleves
cross of Lorraine
cross of St Lazarus
cross of lorraine
cross off
cross order
cross out
cross over
cross patee
cross peen
cross peen hammer
cross pommee
cross potent
cross press
cross product
cross ratio
cross recercelee
cross reference
cross relation
cross remainder
cross rhythm
cross sea
cross seat
cross section
cross sighting
cross signal
cross slide
cross spider
cross springer
cross strap
cross street
cross stroke
cross swords
cross swords with
cross tag
cross talk
cross the Rubicon
cross the Stygian ferry

cross the path of
cross the threshold
cross turret
cross up
cross
 vault
cross vaulting
cross vein
cross vine
cross whitefish
cross wind
cross wire
cross wires
cross your heart
cross your heart and hope to die
cross your mind
cross your palm
cross your palm with
cross your path
cross-
cross-adoring
cross-aisle
cross-appeal
cross-armed
cross-banded
cross-banding
cross-bar
cross-beak
cross-beam
cross-bearer
cross-bearing
cross-bearings
cross-beat escapement
cross-bedded
cross-bedding
cross-bench
cross-benched
cross-benchedness
cross-bencher
cross-bias
cross-biased
cross-biassed
cross-bill
cross-bind
cross-bombard
cross-bond
cross-bones
cross-bow

cross-bred
cross-breed
cross-bridge
cross-brush
cross-bun
cross-buttock
cross-buttocker
cross-carve
cross-channel
cross-check
cross-church
cross-claim
cross-cloth
cross-compound
cross-connect
cross-country
cross-country flying
cross-country mill
cross-country race
cross-course
cross-cousin
cross-cousin marriage
cross-crosslet
cross-crosslets
cross-curve
cross-cut
cross-datable
cross-date
cross-dating
cross-days
cross-disciplinary
cross-disciplinary
knowledge
cross-division
cross-drain
cross-dye
cross-dyeing
cross-elbowed
cross-examination
cross-examine
cross-examined
cross-examiner
cross-examining
cross-eye
cross-eyed
cross-eyedness
cross-eyes
cross-face

cross-fade
cross-faded
cross-fading
cross-feed
cross-ferred
cross-ferring
cross-fertile
cross-fertilizable
cross-fertilization
cross-fertilize
cross-fertilized
cross-fertilizing
cross-fiber
cross-file
cross-filed
cross-filing
cross-finger
cross-fingered
cross-fire
cross-fire treatment
cross-firing
cross-fish
cross-fissured
cross-fixed
cross-flower
cross-folded
cross-fox
cross-fur
cross-gagged
cross-garnet
cross-gartered
cross-grain
cross-grained
cross-grainedly
cross-grainedness
cross-handed
cross-handled
cross-hatch
cross-hatcher
cross-hatching
cross-head
cross-headed
cross-hilted
cross-immunity
cross-immunization
cross-index
cross-interrogate
cross-interrogation

cross-interrogator
cross-interrogatory
cross-invite
cross-jack
cross-jack
 yard
cross-joined
cross-jostle
cross-laced
cross-laminated
cross-land
cross-lap
cross-lap joint
cross-latticed
cross-leaved
cross-legged
cross-leggedly
cross-leggedness
cross-level
cross-license
cross-licensed
cross-licensing
cross-lift
cross-light
cross-link
cross-locking
cross-lot bracing
cross-lot strut
cross-lots
cross-magnetizing field
cross-marked
cross-mate
cross-mated
cross-mating
cross-multiplication
cross-out
cross-out test
cross-over
cross-patch
cross-pawl
cross-peal
cross-piece
cross-piled
cross-plough
cross-plow
cross-ply
cross-point
cross-pollen

cross-pollenize
cross-pollinate
cross-pollinated
cross-pollinating
cross-pollination
cross-pollinize
cross-post
cross-purpose
cross-purposes
cross-question
cross-questionable
cross-questioner
cross-questioning
cross-ratio
cross-ratio group
cross-reaction
cross-reading
cross-refer
cross-reference
cross-remainder
cross-road
cross-row
cross-ruff
cross-sail
cross-section
cross-section paper
cross-sectional
cross-shaped
cross-shave
cross-slide
cross-spale
cross-spall
cross-springer
cross-staff
cross-staffs
cross-star
cross-staves
cross-sterile
cross-sterility
cross-stitch
cross-stitch
canvas
cross-stitching
cross-stone
cross-stratification
cross-stratified
cross-striated
cross-string

cross-stringed
cross-stringing
cross-striped
cross-strung
cross-sue
cross-surge
cross-tail
cross-tine
cross-town
cross-tree
cross-validation
cross-vault
cross-vaulted
cross-vaulting
cross-vein
cross-veined
cross-ventilate
cross-ventilation
cross-vine
cross-voting
cross-way
cross-wind
cross-wind force
cross-worder
cross-wrapped
crossbar micrometer
crossbar shot
crossbar switching
crossbolt lock
crosscut chisel
crosscut file
crosscut method
crosscut saw
crosscut-saw file
crosse check
crossed fingers
crossed in love
crossed-h
crossed-out
crossing file
crossing over
crossing over and under
crossing sweeper
crossing the bar
crossing-out
crossing-over
crossjack brace
crossjack lift

crossjack yard
crossover network
crossword puzzle
crotch chain
crotch
 tongue
crotch veneer
croton bug
croton oil
croton-bug
croton-chloral hydrate
crotonic acid
crouch before
crouch ware
crouch-ware
croup kettle
croupous pneumonia
croupy down
crow blackbird
crow call
crow corn
crow duck
crow fig
crow flight
crow garlic
crow like a cock
crow like a rooster
crow ling
crow needle
crow onion
crow over
crow pea
crow pheasant
crow poison
crow sheaf
crow shrike
crow step
crow tit
crow to pick
crow to pluck
crow to pull
crow's foot
crow's nest
crow's nest model
crow's-feet
crow's-foot
crow's-nest
crow's-nest model

crow-bar
crow-bill
crow-flower
crow-garlic
crow-leek
crow-pheasant
crow-quill
crow-silk
crow-soap
crow-step
crow-stone
crow-toe
crow-tread
crow-victuals
crowberry family
crowd grass
crowd in
crowd of sail
crowd on sail
crowd out
crowd puller
crowd sail
crowd your luck
crowd-pleasing argument
crowding engine
crowfoot family
crowfoot grama
crowfoot grass
crowfoot violet
crown aloes
crown and anchor
crown animalcule
crown antler
crown bar
crown block
crown
 brace
crown cam
crown canker
crown canopy
crown cap
crown class
crown colony
crown cork
crown court
crown cutter
crown daisy
crown debt

crown density
crown escapement
crown filler
crown fire
crown gall
crown gate
crown gear
crown glass
crown gold
crown graft
crown grafting
crown green
crown gum
crown head
crown imperial
crown jewels
crown knot
crown land
crown law
crown lawyer
crown leather
crown lens
crown living
crown molding
crown monkey
crown octavo
crown of thorns
crown office
crown palm
crown paper
crown piece
crown pigeon
crown plate
crown post
crown prince
crown princess
crown prosecutor
crown pulley
crown quarto
crown roast
crown rot
crown rust
crown saw
crown scab
crown sheet
crown shell
crown side
crown sparrow

crown system
crown tax
crown tile
crown vallary
crown vent
crown vetch
crown wart
crown wheel
crown with
crown with laurel
crown with success
crown-capping machine
crown-glass
crown-land
crown-of-jewels
crown-of-thorns
crown-paper
crown-piece
crown-post
crown-rump
length
crown-scab
crown-shaped
crown-wheel
crown-wheel escapement
crown-work
crowned head
crowned with laurel
crowned with success
crowning achievement
crowning of the edifice
crowning touch
crownwort family
cruces ansatae
crucial moment
crucial period
crucial point
crucial test
cruciato-
crucible furnace
crucible steel
crucifixion thorn
crude oil
crude petroleum
crude rubber
crude stuff
crudeness of intellect
crudity of intellect

cruel and unusual punishment
cruel disappointment
cruel-hearted
cruet stand
cruise car
cruise missile
cruise ship
cruiser stern
cruiser weight
cruising missile
cruising radius
cruising speed
crumb brush
crumb of comfort
crumble into dust
crumble to dust
crupper bone
crusade for
crush bar
crush barrier
crush breccia
crush conglomerate
crush hat
crush one
crush plane
crush under an iron heel
crush your hope
crush zone
crusher sand
crushing burden
crushing defeat
crushing rejoinder
crushing rolls
crusily-fitchy
crust fold
crust fracture
crust roan
crust-hunt
crust-hunter
crust-hunting
crutch
paralysis
crutch stake
crutch-cross
crutch-stick
crux ansata
crux capitata
crux commisa

crux decussata
crux gammata
crux immissa
crux ordinaria
cry aloud
cry at the top of your voice
cry back
cry back to
cry craven
cry down
cry for
cry for joy
cry for quarter
cry for the moon
cry havoc
cry of wolf
cry off
cry on
cry out
cry out against
cry out for
cry out on
cry out upon
cry over spilled
cry over spilled milk
cry pax
cry quits
cry shame upon
cry sour grapes
cry stinking fish
cry to
cry up
cry upon
cry wolf
cry your eyes
cry your eyes out
cry yourself blind
cry-
crying evil
crying shame
cryo-
cryo-aerotherapy
cryo-pump
cryolite glass
crypt-
cryptic mimicry
crypto-
cryptogenic epilepsy

cryptogenic infection
crystal ball
crystal carbonate
crystal class
crystal counter
crystal detector
crystal flower
crystal form
crystal gazer
crystal gazing
crystal glass
crystal gray
crystal habit
crystal lattice
crystal malt
crystal microphone
crystal pickup
crystal
 rectifier
crystal sand
crystal set
crystal system
crystal tea
crystal vinegar
crystal violet
crystal vision
crystal water
crystal-clear
crystal-clearness
crystal-dropping
crystal-flowing
crystal-gazer
crystal-girded
crystal-lattice constant
crystal-leaved
crystal-palace blue
crystal-palace green
crystal-producing
crystal-smooth
crystal-streaming
crystal-winged
crystalline lens
crystallo-
crystallographic axis
cteno-
cub hunting
cub reporter
cub scout

cub shark
cub-drawn
cub-hunting
cuban heel
cubbridge head
cube ore
cube root
cube spar
cube steak
cube sugar
cube-shaped
cubeb camphor
cubeb oil
cubed steak
cubi-
cubic foot
cubic measure
cubic meter
cubic unit
cubic yard
cubical atom
cubist poetry
cubit arm
cubital furrow
cubito-
cubo-
cubo-octahedral
cubo-octahedron
cuboidal epithelium
cuck-stool
cucking stool
cucking-stool
cuckold dock
cuckold's knot
cuckold's neck
cuckoo bee
cuckoo clock
cuckoo clover
cuckoo dove
cuckoo falcon
cuckoo fly
cuckoo froth
cuckoo gillyflower
cuckoo grass
cuckoo
 hawk
cuckoo lamb
cuckoo orchis

cuckoo owl
cuckoo ray
cuckoo shoe
cuckoo shrike
cuckoo sorrel
cuckoo spit
cuckoo wasp
cuckoo wrasse
cuckoo's meat
cuckoo-babies
cuckoo-bread
cuckoo-bud
cuckoo-button
cuckoo-flower
cuckoo-fly
cuckoo-fool
cuckoo-meat
cuckoo-pint
cuckoo-pintle
cuckoo-shrike
cuckoo-spit
cuckoo-spittle
cucumber beetle
cucumber family
cucumber fish
cucumber flea beetle
cucumber fly
cucumber green
cucumber melon
cucumber mildew
cucumber mosaic
cucumber root
cucumber scab
cucumber tree
cucurbit mosaic
cucurbit wilt
cud-chewing
cuddle up
cuddy heel
cudgel play
cudgel your brains
cudweed mugwort
cue ball
cue bid
cue owl
cue rest
cue sheet
cue word

cue-bid
cue-bidden
cue-bidding
cue-owl
cuff button
cuff ironer
cuff link
cui bono
cui-ui
cuir-bouilli
cul de lampe
cul-de-four
cul-de-lampe
cul-de-sac
culilawan bark
culinary art
culinary artist
culinary concoction
culinary masterpiece
culinary preparation
culinary science
cull board
cull out
cullin stone
culm dump
culm measures
culpable
 negligence
culpably negligent
culs de lampe
cult-title
cultivate the friendship of
cultivate the soil
cultivated land
cultivated taste
cultivation of the mind
cultivator shield
cultural anthropologist
cultural anthropology
cultural change
cultural community
cultural drift
cultural lag
cultural-nomadic
culture area
culture center
culture complex
culture conflict

culture contact
culture drift
culture epoch
culture factor
culture flask
culture fluid
culture hero
culture lag
culture medium
culture mixing
culture myth
culture organism
culture pattern
culture pearl
culture phenomenon
culture plate
culture sequence
culture shock
culture stage
culture system
culture trait
culture vulture
culture word
cultured pearl
cultus cod
cultus image
cultus-cod
culver hole
cum coupon
cum dividend
cum grano salis
cum laude
cum multis aliis
cum warrants
cumara nut
cumin oil
cummin oil
cumu-cirro-stratus
cumul-
cumular-spherulite
cumulative distribution function
cumulative dividend
cumulative evidence
cumulative
preferred stock
cumulative scoring
cumulative system
cumulative voting

cumulato-
cumulo-
cumulo-cirro-stratus
cumulo-cirrus
cumulo-nimbus
cumulo-stratus
cumulo-volcano
cumulonimbus calvus
cumulonimbus capillatus
cumulus cloud
cumulus congestus
cumulus fractus
cumulus humilis
cumulus mediocris
cumulus oophorus
cuneate lobe
cuneo-
cunning as a fox
cunning as a serpent
cunning person
cup and ball
cup and cover
cup barometer
cup bell
cup coral
cup custard
cup drill
cup escutcheon
cup fern
cup fungus
cup grease
cup hole
cup hook
cup joint
cup leather
cup lichen
cup maker
cup marker
cup moss
cup mushroom
cup nutseed
cup of Elijah
cup of bitterness
cup of tea
cup packing leather
cup plant
cup sculpture
cup set

cup shake
cup sponge
cup tie
cup turning
cup valve
cup washer
cup-and-saucer vine
cup-bearer
cup-headed
cup-mark
cup-marked
cup-moss
cup-shake
cup-shaped
cup-shot
cup-tied
cup-tossing
cupboard love
cupboard lover
cupid cake
cupid's bow
cupid's-bow
cupola builder
cupola charger
cupola
 feeder
cupola fettler
cupola furnace
cupola liner
cupola potman
cupola rammer
cupola smelter
cupola tapper
cupola tenter
cupola-capped
cupola-roofed
cupping glass
cuprammonium rayon
cuprea bark
cupreo-
cupric hydroxide
cupric sulfate
cupro-
cuproso-
cuprous cyanide
curate's egg
curative measures
curb ball

curb bit
curb box
curb broker
curb chain
curb exchange
curb key
curb market
curb pin
curb roof
curb sender
curb service
curb string
curb yourself
curb-plate
curb-roof
curb-sending
curb-stone
curbing trowel
curcas oil
curcuma paper
curcuma starch
curd cheese
curd soap
curdle the
curdle the blood
cure of souls
cure yourself of
cure-all
curie point
curious as a cat
curious mind
curious person
curl cloud
curl up
curl upwards
curl your lip
curl your lip at
curl-flowered
curled mallow
curled-leaved
curlew bug
curlew jack
curlew sandpiper
curlie-wurlie
curling die
curling dies
curling iron
curling irons

curling machine
curling paper
curling pins
curling press
curling punch
curling stone
curling
 tongs
curly clematis
curly grass
curly palm
curly top
curly-coated
curly-coated retriever
curly-haired
curly-headed
curly-locked
curly-pate
curly-pated
curly-polled
curly-toed
currant aphid
currant borer
currant bush
currant clearwing
currant fruit fly
currant leaf spot
currant moth
currant red
currant rust
currant sawfly
currant spanworm
currant stem girdler
currant tomato
currant tree
currant wine
currant worm
currant-leaf
currency bond
currency doctrine
currency metals
currency note
currency principle
current account
current assets
current breaker
current cost
current density

current electricity
current expenses
current gain
current gauge
current income bond
current indicator
current intensity
current liabilities
current limiter
current mark
current meter
current mill
current of air
current of events
current of fashion
current of ideas
current of thought
current of time
current price
current pulse
current quotation
current ratio
current regulator
current relay
current ripple
current
 saying
current tap
current transformer
current wheel
current yield
current-control circuit
current-limiting reactor
currente calamo
curricula vitae
curriculum vitae
curry favor
curry powder
curry puff
curry sauce
curry-comb
curry-favel
curry-leaf tree
currycomb file
curse and swear
curse up hill and down dale
curse with bell
curse word

curse your folly
curse, the
cursing stone
cursing well
cursive epilepsy
cursive hand
cursory inspection
curt-hose
curtail expenses
curtail step
curtail-step
curtain angle
curtain aurora
curtain board
curtain call
curtain dam
curtain dryer
curtain drying
curtain fire
curtain folder
curtain frame
curtain framer
curtain hook
curtain knitter
curtain lecture
curtain lifter
curtain light
curtain line
curtain music
curtain net
curtain pin
curtain pole
curtain raiser
curtain ring
curtain rod
curtain roller
curtain shutter
curtain speech
curtain stretcher
curtain tune
curtain wall
curtain-raiser
curtains of fog and iron
curtal ax
curtal axe
curtal-ax
curtesy

initiate
curtle ax
curule chair
curvature invariant
curvature of field
curvature tensor
curve ball
curve fitting
curve of buoyancy
curve of displacement
curve of flotation
curve of loads
curve of resistance
curve of weights
curve-ball
curve-billed
curve-drawing meter
curve-fruited
curve-veined
curved-fruited
curved-horned
curved-veined
curvi-
curvilinear coordinate system
cusco bark
cusco china
cusco-bark
cuscus oil
cush-cush
cushew-bird
cushing's disease
cushion aloe
cushion block
cushion capital
cushion carom
cushion cut
cushion dance
cushion felt
cushion filler
cushion fillings
cushion head
cushion iris
cushion maker
cushion pink
cushion plant
cushion rafter
cushion scale
cushion shot

cushion sole
cushion spurge
cushion star
cushion stitch
cushion tire
cushion-footed
cushion-shaped
cushion-tired
cusk eel
cusk-eel
cusk-eels
cusp locus
cusp-shaped
cusparia bark
cuspidate tooth
cuss like a sailor
cuss out
cuss word
cussing-out
custard apple
custard cup
custard glass
custard pie
custard
powder
custard-cups
custodes morum
custom builder
custom hatching
custom house
custom mill
custom tailor
custom work
custom worker
custom-built
custom-cut
custom-house
custom-made
custom-tailored
customer agent
customer ownership
customer's broker
customer's man
customhouse broker
customs bond
customs broker
customs duty
customs house

customs union
customs-exempt
customs-house
custos morum
custos rotulorum
cut a caper
cut a corner
cut a crab
cut a dash
cut a dido
cut a feather
cut a figure
cut a figure in society
cut a lobster
cut a melon
cut a rug
cut a swath
cut across
cut adrift
cut along
cut and dried
cut and run
cut and thrust
cut and try
cut apart
cut at
cut away
cut back
cut both ways
cut capers
cut corners
cut crosswise
cut dead
cut diagonally
cut direct
cut down
cut down expenses
cut down on
cut down to size
cut drop
cut fine
cut glass
cut hunter
cut ice
cut in
cut in two
cut into
cut it

cut it fine
cut it out
cut loose
cut lots
cut nail
cut no ice
cut of your jib
cut
off
cut off short
cut off with a shilling
cut off without a cent
cut off your spurs
cut open
cut out
cut out for
cut out of your will
cut plug
cut price
cut prices
cut rate
cut short
cut some ice
cut stone
cut string
cut the Gordian knot
cut the cards
cut the deck
cut the first turf
cut the ground from under
cut the ground from under one
cut the hair
cut the knot
cut the matter short
cut the melon
cut the mustard
cut the pie
cut the throat
cut through
cut time
cut to
cut to pieces
cut to ribbons
cut to the heart
cut to the quick
cut transversely
cut under
cut up

cut up bad
cut up nasty
cut up root and branch
cut up rough
cut velvet
cut work out for
cut you short
cut your eyeteeth
cut your eyeteeth on
cut your losses
cut your own throat
cut your teeth
cut your teeth on
cut your throat
cut your wisdom teeth
cut-and-cover
cut-and-dried
cut-and-dry
cut-and-try
cut-away
cut-back
cut-card work
cut-down
cut-finger
cut-flight conveyer
cut-glass
cut-grass
cut-in
cut-leaf
cut-leaved
cut-off
cut-out
cut-paper
cut-price
cut-rate
cut-through
cut-toothed
cut-under
cut-up
technique
cut-work
cutaneous quittor
cutaneous sense
cutaway coat
cute as a bug's ear
cute chick
cute trick
cutes verae

cuticula dentis
cutie pie
cutis anserina
cutis vera
cutlass fish
cutleaf blackberry
cutlery buffer
cutlips minnow
cutoff drainage
cutoff point
cutoff saw
cutoff valve
cutout switch
cutter arbor
cutter bar
cutter block
cutter brig
cutter gig
cutter rig
cutter sloop
cutter yacht
cutter-built
cutter-down
cutter-gig
cutter-off
cutter-out
cutter-rigged
cutter-up
cutthroat competition
cutthroat contract
cutthroat grass
cutthroat razor
cutthroat trout
cutting almond
cutting angle
cutting blowpipe
cutting board
cutting compound
cutting die
cutting drift
cutting edge
cutting fluid
cutting grass
cutting horse
cutting in two
cutting lubricant
cutting machine
cutting of supply lines

cutting oil
cutting out
cutting pliers
cutting press
cutting punch
cutting remark
cutting rule
cutting sand
cutting shoe
cutting
 stage
cutting the pie
cutting torch
cutting words
cutting your losses
cutting-off tool
cuttle-bone
cuttle-fish
cutty sark
cutty stool
cutty-stool
cutwater bow
cutwork lace
cy pres
cya-
cyan blue
cyan-
cyan-blue
cyanamide process
cyani flower
cyanic acid
cyanide gas
cyanide mill
cyanide process
cyanine blue
cyano group
cyano radical
cyano-
cyanogen bromide
cyanogen chloride
cyanuric acid
cybernated factory
cybernetic control
cybernetic technologist
cycad fern
cycas family
cycl-
cyclamen aldehyde

cyclamen mite
cycle billing
cycle form
cycle of erosion
cycle of indiction
cyclic AMP
cyclic GMP
cyclic group
cyclic neutropenia
cyclic pitch lever
cyclic shift
cyclical stock
cyclical unemployment
cyclo-
cyclo-cross
cycloid personality
cycloidal gear
cycloidal propulsion
cyclone cellar
cyclone center
cyclone collector
cyclone furnace
cyclone juice
cyclone separator
cyclone-proof
cyclopean concrete
cyclothymic personality
cylinder block
cylinder bore
cylinder desk
cylinder escapement
cylinder
front
cylinder gate
cylinder glass
cylinder grinder
cylinder head
cylinder machine
cylinder metal
cylinder mill
cylinder oil
cylinder planer
cylinder press
cylinder pressman
cylinder reamer
cylinder saw
cylinder scale
cylinder seal

cylinder sinker
cylinder slasher
cylinder snake
cylinder splitter
cylinder-bored
cylinder-boring
cylinder-dried
cylinder-grinding
cylinder-shaped
cylindric-campanulate
cylindric-fusiform
cylindric-oblong
cylindric-ovoid
cylindric-subulate
cylindrical coefficient
cylindrical coordinates
cylindrical projection
cylindro-
cyma recta
cyma reversa
cyne-
cynic spasm
cyno-
cypress grass
cypress green
cypress knee
cypress koromiko
cypress lawn
cypress moss
cypress oil
cypress pine
cypress spurge
cypress thatch
cypress vine
cypress-leaf oil
cyprus black as e'er was crow
cyprus cat
cyrilla family
cyrto-
cyst-
cysti-
cystic fibrosis
cysto-
cyt-
cyto-
cytochrome reductase
cytochrome system
cytomegalic inclusion disease

d day
d layer
d region
d'Albert
d'Alembert
d'Alembert's
 test
d'Arblay
d'Holbach
d'Indy
d-
d-c
d-glucose
dB
dBV
dBW
dBa
dBm
dBm/m
dBrn
da Vinci
da capo
dab hand
daber locks
dactyl-
dactylic hexameter
dactylio-
dactylo-
dad-blamed
dad-blasted
dad-burned
daddy longlegs
daddy-long-legs
daddy-longlegs
daddynut tree
dado head
dado in
dado plane
dado rail
daer-stock
daffodil garlic
daffodil lily
daffodil yellow
daft days
dag-lock
dag-tailed
dagger board
dagger cocklebur

dagger fern
dagger knee
dagger money
dagger moth
dagger plank
dagger plant
dagger wood
dagger-shaped
daggle-tail
daghesh forte
daghesh lene
dahl sauce
dahlia carmine
dahlia purple
dahlia sugar
dahlia sunflower
dahlia wartlet
dahoon holly
dai-sho
dai-sho-no-soroimono
dail eireann
daily and hourly
daily bread
daily communicant
daily double
daily dozen
daily grind
daily newspaper
daily round
daily routine
daily-breader
dainty-eared
dainty-fingered
dainty-limbed
dainty-mouthed
dainty-tongued
dainty-toothed
dairy barn
dairy breed
dairy butter
dairy cattle
dairy cheese
dairy cooler
dairy
country
dairy cow
dairy cows
dairy farm

dairy farmer
dairy farming
dairy house
dairy husbandry
dairy lunch
dairy milk
dairy product
dairy products
dairy room
dairy salt
dairy school
dairy society
dairy truck
dairy wagon
dairy-cooling
dairy-farming
dairy-fed
dairy-made
daisy bush
daisy chain
daisy cutter
daisy fleabane
daisy ham
daisy tree
daisy-blossomed
daisy-clipping
daisy-cutter
daisy-cutting
daisy-dappled
daisy-dimpled
daisy-painted
daisy-spangled
dak boat
dak bungalow
daker hen
daker-hen
dal segno
dalai lama
dale end
dale head
dale land
dale lander
dale-backed
dall sheep
dallis grass
dally away
dam up
dam-brod

damage feasant
damage your good name
damage-feasant
damascus steel
damask carpet
damask rose
damask steel
damask stitch
dame school
dame's rocket
dame's violet
dame's-violet
dame-school
dammar pine
damn it
damn with faint praise
damnant quod non intelligunt
damned if I know
damned little difference
damned spirits
damned, the
damning evidence
damning with faint praise
damp
 box
damp course
damp down
damp off
damp sap
damp the spirits
damp-proof course
damp-stained
damp-worn
dampen the spirits
damper action
damper block
damper crank
damper head
damper pedal
damper rail
damper spoon
damper stop
damper valve
damper winding
damping constant
damping factor
damping machine
damping off

damping-off
damsel fly
damsel-errant
damson cheese
damson pie
damson plum
damson wine
dan buoy
dance attendance
dance attendance on
dance attendance upon
dance band
dance critic
dance drama
dance favor
dance floor
dance fly
dance for joy
dance form
dance hall
dance house
dance leader
dance music
dance notation
dance of death
dance on a hot griddle
dance on air
dance on the razor's edge
dance palace
dance pantomime
dance program
dance rhythm
dance society
dance song
dance step
dance steps
dance the war dance
dance to another tune
dance tune
dance upon nothing
dance-loving
dancing assembly
dancing dervish
dancing disease
dancing floor
dancing girl
dancing hall
dancing lesson

dancing
light
dancing mania
dancing master
dancing match
dancing mistress
dancing partner
dancing party
dancing pavilion
dancing room
dancing school
dancing step
dancing winder
dancing-girl
dancing-girls
dandelion digger
dandelion greens
dandelion puller
dandelion wine
dandelion-leaved
dandie dinmont
dandy brush
dandy cart
dandy fever
dandy roll
dandy roller
dandy-brush
dandy-cock
dandy-hen
dandy-horse
dandy-line
dandy-roller
dane-law
danes'-blood
danger angle
danger ball
danger bearing
danger flag
danger instinct
danger line
danger money
danger point
danger sign
danger signal
danger to health
danger whistle
danger zone
danger-fearing

danger-fraught
danger-free
danger-loving
danger-teaching
dangerous drug
dangerous ground
dangle before one
dangle before the eyes
dangling modifier
dangling participle
danish pastry
danke schon
danse du ventre
danse macabre
danses du ventre
danseur noble
danseurs nobles
daoine sithe
dap joint
dap-dap
daphne pink
daphne red
dapple-bay
dapple-gray
dapple-grey
dappled-gray
darby
 and joan
dare not
dare to
dare-base
dare-devil
daring imagination
dariole mould
dark Cornish
dark adaptation
dark age
dark ages
dark and gloomy
dark as a wolf's mouth
dark as night
dark as pitch
dark beer
dark bread
dark chocolate
dark cloud
dark clouds
dark comedy

dark corner
dark depths
dark glasses
dark horse
dark lantern
dark lightning
dark meat
dark mineral
dark nebula
dark of night
dark of the moon
dark reaction
dark secret
dark segment
dark shade
dark skinned
dark star
dark-adapted
dark-bearded
dark-blue
dark-bosomed
dark-boughed
dark-breasted
dark-browed
dark-closed
dark-colored
dark-complexioned
dark-embrowned
dark-eyed
dark-eyed night
dark-featured
dark-field
dark-field illumination
dark-field microscope
dark-fired
dark-flowing
dark-fringed
dark-glancing
dark-gray
dark-green
dark-grown
dark-haired
dark-hued
dark-hulled
dark-lantern
dark-leaved
dark-line spectrum
dark-minded

dark-orange
dark-prisoned
dark-red
dark-rolling
dark-shining
dark-sighted
dark-skinned
dark-splendid
dark-stemmed
dark-suited
dark-trace
 tube
dark-veiled
dark-veined
dark-visaged
dark-working
darken over
darken your door
darkened mind
darkling beetle
darkness visible
darkness which may be felt
darkroom timer
darktrace tube
darn ar durn
darning ball
darning cotton
darning egg
darning gourd
darning needle
darning silk
darning stitch
darning work
darning worsted
daroo tree
darrein presentment
darrein resort
dart ahead
dart grass
dart gun
dart snake
dart thrower
dart to and fro
darting pain
dartwaza band
das Ewig-Weibliche
dash ahead
dash at

dash down
dash for
dash into
dash lamp
dash light
dash of the pen
dash off
dash on
dash the cup from your lips
dash to your hopes
dash your brains out
dash your hope
dash-board
dashed hope
dashed hopes
dasher block
data analyzer
data bank
data capture
data processing
data processor
data reduction
data retrieval
data set
data storage
data system
data transmission
data-gathering
data-handling system
data-input system
data-interpreting
system
data-reduction system
date at
date bar
date brandy
date coffee
date fever
date fig
date from
date grove
date line
date mussel
date of record
date palm
date plum
date shell
date slip

date stamp
date sugar
date tree
date wine
date-bearing
date-stamp
date-stamping
dating nail
dative bond
datum line
datum plane
datum point
daughter element
daughter of Eve
daughter of joy
daughter of the dawn
daughter-in-law
daughters-in-law
davenport table
davy jones
davy jones's locker
davy lamp
dawn chorus
dawn dew
dawn goddess
dawn on
dawn patrol
dawn redwood
dawn upon one
dawn-illumined
dawn-tinted
day after day
day and night
day bed
day bell
day blindness
day boy
day breeze
day by day
day camp
day clock
day clothes
day coach
day degree
day drift
day fireman
day fishing
day gang

day gate
day glow
day god
day gown
day guest
day hand
day hater
day haul
day hour
day house
day in
day in and day out
day in court
day in day out
day jasmine
day journeying
day labor
day laborer
day labour
day letter
day
 lily
day loan
day man
day name
day nettle
day neutral
day nurse
day nursery
day of atonement
day of doom
day of festivities
day of reckoning
day of rest
day off
day out
day owl
day rate
day reflection
day release
day return
day room
day rule
day scholar
day school
day servant
day shape
day shift

day sight
day sleeper
day slumber
day tank
day task
day trip
day vision
day waiter
day watchman
day water
day wind
day's work
day's-work
day-and-night
day-appearing
day-bed
day-blindness
day-bright
day-by-day
day-care center
day-clean
day-clear
day-dawn
day-day
day-detesting
day-devouring
day-dispensing
day-distracting
day-dream
day-eyed
day-fever
day-flower
day-fly
day-flying
day-hating
day-hired
day-lasting
day-lily
day-lived
day-loving
day-mare
day-net
day-neutral
day-peep
day-rawe
day-rule
day-shining
day-sight

day-spring
day-star
day-tale
day-time
day-to-day
day-to-day loan
day-to-day money
day-tripper
day-wearied
day-woman
day-writ
daylight blue
daylight factor
daylight glass
daylight lamp
daylight
projection
daylight robbery
daylight saving
daylight saving time
daylight vision
daylight-saving time
days beyond recall
days gone by
days of grace
days of old
days of yore
daytime serial
dazzle painting
dazzle system
dazzling light
de Beauvoir
de Broglie
de Broglie equation
de Broglie wave
de Broglie waves
de Gaulle
de Gaullism
de Kooning
de Lesseps
de Moivre
de Moivre's theorem
de Sica
de Valera
de Villiers
de Wint
de bene esse
de bonis non administratis

de bonne volonte
de die in diem
de facto
de fide
de fond en comble
de gaullism
de gustibus non est disputandum
de haut en bas
de jure
de longue haleine
de los Angeles
de luxe
de mal en pis
de mortuis nil nisi bonum
de novo
de plano
de profundis
de proprio motu
de rerum natura
de rien
de rigueur
de stijl
de trop
de-
de- prestige
de-Stalinization
de-Stalinize
de-Stalinized
de-Stalinizing
de-aerate
de-aereate
de-afforest
de-articulate
de-articulation
de-christianize
de-educate
de-electrify
de-electrization
de-electrize
de-emanate
de-emanation
de-emphases
de-emphasis
de-emphasize
de-emphasized
de-emphasizing
de-emulsibility
de-emulsify

de-emulsivity
de-energize
de-escalate
de-escalation
de-ethicization
de-ethicize
de-excite
de-excited
de-exciting
de-ice
de-icer
de-insularize
de-ossify
de-pauperize
de-russianize
de-saxonize
de-semiticize
dea-nettle
deacon
 seat
dead above the ears
dead against
dead ahead
dead and buried
dead and done for
dead and gone
dead as a doornail
dead as a herring
dead as mutton
dead asleep
dead band
dead beat
dead between the ears
dead blackout
dead body
dead calm
dead center
dead centre
dead certainty
dead circuit
dead colour
dead duck
dead end
dead firing
dead flat
dead force
dead from the neck up
dead giveaway

dead hand
dead hand of the past
dead heat
dead in the Lord
dead language
dead leaf
dead letter
dead level
dead lift
dead load
dead lock
dead loss
dead low tide
dead low water
dead mail
dead man
dead man's control
dead man's fingers
dead man's hand
dead man's handle
dead march
dead
matter
dead men
dead metal
dead muzzler
dead of night
dead on your feet
dead palsy
dead pan
dead past
dead pay
dead person
dead persons
dead pledge
dead point
dead reckoning
dead right
dead ringer
dead run
dead sea
dead season
dead set
dead set at
dead set on
dead sheave
dead shot
dead slow

dead soldier
dead space
dead spindle
dead spot
dead stand
dead stick
dead stock
dead stop
dead storage
dead straight
dead sure
dead time
dead to
dead to rights
dead to shame
dead to the world
dead wall
dead water
dead weight
dead well
dead woman
dead wood
dead zone
dead-afraid
dead-air
dead-air space
dead-alive
dead-alivism
dead-and-alive
dead-anneal
dead-arm
dead-ball line
dead-blanched
dead-born
dead-bright
dead-burn
dead-center
dead-centre
dead-cold
dead-color
dead-colored
dead-dip
dead-doing
dead-drifting
dead-drunk
dead-drunkenness
dead-end
dead-end street

dead-eye
dead-face
dead-front
dead-frozen
dead-grown
dead-hand
dead-hearted
dead-heat
dead-heater
dead-heavy
dead-kill
dead-leaf
dead-letter
dead-light
dead-line
dead-live
dead-man
control
dead-man's float
dead-melt
dead-nettle
dead-point
dead-rise
dead-rise line
dead-roast
dead-seeming
dead-set
dead-sick
dead-smooth
dead-soft
dead-stick
dead-stick landing
dead-stick loop
dead-still
dead-stroke
dead-stroke hammer
dead-struck
dead-sure thing
dead-tired
dead-tongue
dead-weight
dead-weight safety valve
dead-work
deadbeat escapement
deaden the pain
deadly nightshade
deadly pale
deadly pallor

deadly sin
deadly sin of envy
deadly sins
deadly weapons
deadweight capacity
deadweight tonnage
deadwood fence
deaf and dumb
deaf as a door
deaf as a doorknob
deaf as a doornail
deaf as a post
deaf as a stone
deaf as an adder
deaf ears
deaf to
deaf to reason
deaf-and-dumb
deaf-and-dumb alphabet
deaf-and-dumb person
deaf-dumb
deaf-dumbness
deaf-eared
deaf-minded
deaf-mute
deaf-muteness
deaf-mutism
deal a blow
deal a blow at
deal a check to
deal a crushing defeat
deal a deathblow
deal a deathblow to
deal a knockout blow to
deal a smashing
defeat
deal board
deal by
deal carrier
deal destruction
deal hard measure to
deal hardly with
deal harshly with
deal illicitly
deal in
deal in abstractions
deal in commercial paper
deal in futures

deal in generalities
deal in money
deal in the marvelous
deal merchant
deal off
deal off the bottom of the deck
deal out
deal porter
deal runner
deal someone in
deal table
deal with
deal worker
deal yard
deal-board
dealer acceptance
dealer allowance
dealer help
dealing box
dealing death
dealing in commercial paper
dealings of providence
dean of guild
dean of men
dean of the faculty
dean of women
dean's list
dear as the apple of your eye
dear at any price
dear joy
dear me
dear one
dear to your heart
dear-bought
dear-cut
dearest wish
dearly beloved
dearly love
dearly love to
dearth of ideas
death adder
death agonies
death agony
death alder
death angel
death angle
death bell
death benefit

death bill
death blast
death bolt
death bone
death by your own hand
death camas
death camass
death candle
death
cap
death cell
death certificate
death chair
death chamber
death chime
death cloth
death cord
death cry
death cup
death damp
death dance
death defiance
death demon
death dew
death dirge
death drink
death drum
death duty
death examiner
death feint
death feud
death fire
death flame
death grant
death grapple
death grip
death groan
death herb
death hour
death house
death hymn
death instinct
death knell
death light
death list
death mask
death note
death notice

death of the heart
death of the soul
death pang
death peal
death penalty
death penny
death point
death prayer
death rate
death rattle
death ray
death roll
death rope
death row
death ruckle
death seat
death sentence
death shriek
death sleep
death song
death stab
death stroke
death struggle
death sweat
death symbol
death tax
death thirst
death throe
death throes
death tick
death toll
death trance
death vacancy
death warrant
death weight
death wish
death wraith
death's bright angel
death's-face
death's-head
death's-head moth
death's-herb
death-bearing
death-bed
death-begirt
death-bell
death-bird
death-black

death-blow
death-boding
death-braving
death-bringing
death-cold
death-come-quickly
death-counterfeiting
death-darting
death-day
death-deaf
death-deafened
death-dealing
death-deep
death-defying
death-devoted
death-dewed
death-divided
death-divining
death-doing
death-doom
death-due
death-fire
death-laden
death-marked
death-pale
death-polluted
death-practiced
death-shadowed
death-sheeted
death-sick
death-stiffening
death-stricken
death-struck
death-subduing
death-swimming
death-threatening
death-throe
death-warrant
death-watch
death-weary
death-winged
death-worm
death-worthy
death-wound
death-wounded
deathbed
deed
deathbed repentance

deathlike calm
deathlike silence
deathly hue
deathly pale
deathly pallor
deathwatch beetle
debase yourself
debating point
debenture bond
debenture stock
debit ticket
debonis non
debris glacier
debt book
debt limit
debt of honor
debt of honour
debt of nature
debt service
debt slave
debt
 slavery
debtor and creditor account
debtor's prison
debts recovery court
debutante bob
deca-
decade ring
decanal side
decanedioic acid
decanoic acid
decapod locomotive
decarbonized iron
decay coefficient
decay of memory
decay series
deceased, the
decedent estate
deceive yourself
deceleration parachute
decem-
deception bed
deception table
deceptive cadence
deci-
decide against
decide between
decide upon

decided resemblance
decided upon
deciding vote
deciduous plant
deciduous tooth
decimal candle
decimal classification
decimal currency
decimal fraction
decimal place
decimal point
decimal system
decimo-sexto
decision procedure
decision-making
decisive defeat
decisive moment
deck beam
deck block
deck board
deck bolt
deck boy
deck bridge
deck car
deck cargo
deck chair
deck curb
deck department
deck elevator
deck feather
deck floor
deck gang
deck gun
deck hand
deck hook
deck horse
deck iron
deck key
deck kicker
deck light
deck load
deck log
deck molding
deck nail
deck of cigarettes
deck
officer
deck out

deck over
deck passage
deck passenger
deck pipe
deck plate
deck plating
deck pump
deck quoits
deck roof
deck seat
deck sheet
deck steward
deck stool
deck stopper
deck stringer
deck tackle
deck tennis
deck transom
deck turret
deck up
deck watch
deck-piercing
deck-piercing shell
decked out
decking chain
deckle edge
deckle strap
deckle-edged
declaim against
declaration of faith
declaration of policy
declaration of war
declaratory judgment
declare a dividend
declare a moratorium
declare a recess
declare lawful
declare null and void
declare off
declare roundly
declare to God
declare war
declare yourself
declare yourself a party
declare yourself against
declaring yourself in
declination axis
declination circle

declination compass
declination parallel
decline and fall
decline of day
decline of life
decline politely
decline to accept
decline with thanks
declined with thanks
declining market
declining years
decoction process
decoding servomechanism
decomposition potential
decompression
chamber
decompression sickness
decorated hero
decoration of honor
decorative composition
decorative lighting
decorative painting
decorative sculpture
decorative style
decorative surgery
decorator color
decoy duck
decoy-duck
decrease in size
decrease in temperature
decree absolute
decree dative
decree law
decree nisi
decree of nullity
decree-law
decrescent moon
decret loi
decubitus ulcer
decuman gate
dedendum circle
dedicate onself to
dedicate to
dedicate yourself to
dedication to duty
deductible clause
deductive power
deductive reasoning

deed of arrangemeant
deed of indemnity
deed of release
deed of trust
deed over
deed poll
deed without a name
deem trustworthy
deep as China
deep as a well
deep as hell
deep as the ocean
deep as the sea
deep asleep
deep bass
deep black
deep fat
deep floor
deep freeze
deep freezing
deep fryer
deep future
deep in debt
deep into
deep kiss
deep knowledge
deep mourning
deep night
deep sea
deep secret
deep sense
deep sensibility
deep six
deep sleep
deep
space
deep structure
deep study
deep therapy
deep thought
deep water
deep, the
deep-affected
deep-affrighted
deep-asleep
deep-bellied
deep-biting
deep-blue

deep-bodied
deep-bosomed
deep-brained
deep-breasted
deep-breathing
deep-brooding
deep-browed
deep-buried
deep-chested
deep-colored
deep-contemplative
deep-crimsoned
deep-cut
deep-damasked
deep-discerning
deep-discount bond
deep-dish
deep-dish pie
deep-domed
deep-down
deep-downness
deep-draw
deep-drawing
deep-drawn
deep-drenched
deep-drew
deep-drinking
deep-drunk
deep-dye
deep-dyed
deep-dyed falsehood
deep-echoing
deep-embattled
deep-engraven
deep-etch plate
deep-eyed
deep-faced
deep-felt
deep-fermenting
deep-fetched
deep-fixed
deep-flewed
deep-freeze
deep-freezed
deep-freezer
deep-freezing
deep-fried
deep-froze

deep-frozen
deep-fry
deep-frying
deep-going
deep-green
deep-groaning
deep-grounded
deep-grown
deep-kiss
deep-laden
deep-laid
deep-laid plot
deep-laid scheme
deep-level mine
deep-lunged
deep-lying
deep-mouthed
deep-musing
deep-naked
deep-persuading
deep-piled
deep-pitched
deep-pointed
deep-pondering
deep-premeditated
deep-questioning
deep-reaching
deep-read
deep-revolving
deep-rooted
deep-rooted
belief
deep-rootedness
deep-rooting
deep-sea
deep-sea diver
deep-sea diving
deep-sea lead
deep-sea line
deep-sea man
deep-sea smelt
deep-searching
deep-seated
deep-seatedness
deep-set
deep-settled
deep-sided
deep-sighted

deep-sinking
deep-six
deep-skirted
deep-sore
deep-sounding
deep-space ship
deep-stapled
deep-sunk
deep-sunken
deep-sweet
deep-sworn
deep-tangled
deep-thinking
deep-thoughted
deep-thrilling
deep-throated
deep-toned
deep-transported
deep-trenching
deep-troubled
deep-uddered
deep-vaulted
deep-versed
deep-voiced
deep-waisted
deep-water
deep-worn
deep-wounded
deepest feelings
deepest mind
deepest recesses
deeply involved
deeply involved in debt
deepwater sailor
deer brush
deer cabbage
deer call
deer cart
deer fence
deer fern
deer fly
deer fly fever
deer foot
deer forest
deer grass
deer hide
deer

keeper
deer laurel
deer lick
deer mouse
deer park
deer tick
deer tiger
deer vine
deer's-tongue
deer-coloured
deer-eyed
deer-fly fever
deer-hair
deer-hound
deer-lick
deer-mouse
deer-neck
deer-staiker
deer-stealer
deerhorn cactus
deerwort boneset
defamation of character
defeat expectation
defeat hope
defeat of time
defeat time
defeat utterly
defeated candidate
defect of sight
defect of vision
defective eye
defective eyes
defective number
defective verb
defective vision
defective year
defence mechanism
defend tooth and nail
defender of the bond
defender of the marriage bond
defending line
defense bond
defense counsel
defense in depth
defense mechanism
defense of a thesis
defense plant
defense reaction

defense test
defensive lineman
defensive stock
defensive strategy
defensive warfare
defer to
defer to your duty
deferential regard
deferred annuity
deferred assets
deferred bond
deferred income
deferred payments
deferred sentence
deferred share
deferred stock
defervescing plague
defiance of
 authority
defiance of time
deficiency account
deficiency anemia
deficiency bill
deficiency disease
deficiency judgment
deficiency statement
deficient number
deficit financing
deficit spending
definite article
definite integral
definite odor
definite-proportions law
definite-time
definitely right
definitive bond
definitive host
definitive plumage
definitive work
deflagrating spoon
deflationary gap
deflationary spiral
deflecting bar
deflecting force
deflecting torque
deflection angle
deflection generator
deflection method

deflection offset
deflection scale
deflection yoke
deflection-modulated display
deformation curve
deformation ellipsoid
deformed bar
defray expenses
deft-fingered
defy authority
defy danger
defy time
degenerate state
degenerate states
degeneration disease
degenerative arthritis
degenerative change
degenerative disease
degenerative joint disease
degradation of energy
degrade yourself
degree day
degree of freedom
degree of frost
degree of variance
degree-cut
degree-day
degree-granting
institution
degrees of comparison
dehydrated alcohol
dehydrated foods
dei gratia
dei plenus
deion circuit breaker
deisel engine
deities of fertility
deities of justice
deities of the household
deities of the nether world
deity of nether world
deja vu
dejeuner a la fourchette
deka-
del Sarto
del credere
del credere agent
delay line

delay screen
delay-action
delayed action
delayed alpha particle
delayed drop
delayed neutron
delayed reaction
delayed speech
delayed-action
delayed-action bomb
delayed-action fuse
delaying action
deleb palm
delegated authority
delenda est Carthago
delft blue
delft ware
deliberate aggravation
deliberate over
deliberate stages
deliberate upon
deliberately provoked
deliberative assembly
deliberative body
delicate distinction
delicate health
delicate issue
delicate-handed
delicately weak
delight in
delight the palate
delimited field
delineating in the imagination
delirium alcoholicum
delirium ebriositatis
delirium mussitans
delirium tremens
deliver
 a lecture
deliver an address
deliver an ultimatum
deliver judgment
deliver over
deliver up your arms
deliver your charge to the jury
deliver yourself
deliver yourself from
delivered price

delivery boy
delivery order
delivery price
delivery room
delivery ticket
delivery truck
delivery van
della Robbia
della crusca
delph blue
delta connection
delta current
delta function
delta iron
delta plain
delta plateau
delta potential
delta ray
delta rhythm
delta winding
delta wing
delta-planform jet
delta-shaped
delude yourself
deluded belief
deluge set
delusion of grandeur
delusion of persecution
delusion of reference
delve for
delve into
demand attention
demand bid
demand bill
demand curve
demand deposit
demand draft
demand for
demand limiter
demand loan
demand meter
demand note
demand payment
demand rate
demand-load limiter
demand-pull inflation
demean yourself
dementia a potu

dementia paralytica
dementia praecox
demerit mark
demesne farm
demi-
demi-batn
demi-cannon
demi-culverin
demi-hunter
demi-incognito
demi-island
demi-islander
demi-jour
demi-lance
demi-landau
demi-mondaine
demi-monde
demi-ostade
demi-paradise
demi-pension
demi-pique
demi-puppet
demi-rep
demi-sang
demi-season
demi-sec
demi-sel
demi-semi
demi-sheath
demi-vill
demilitarized
 zone
demipirouette volt
demo-
democrat wagon
democratic centralism
democratic-republican
demoiselle crane
demolition bomb
demolition derby
demolition rocket
demon star
demon worship
demon worshiper
demonic energy
demono-
demonstrable existence
demonstrable fact

demonstrate against
demonstrate respect for
demonstrate your ability
demotic character
demy octavo
demy quarto
den chief
den dad
den mother
den of iniquity
den of thieves
den of vice
den-tree
denatured alcohol
dendr-
dendritic drainage pattern
dendro-
dene-hole
dengue fever
denial of due credit
denial of proper credit
denied due credit
denied proper credit
denied to
denim jacket
denizen of the deep
denizens of hell
denizens of the air
denizens of the forest
denizens of the jungle
denizens
of the wild
denominate number
denominational school
dense body
dense-flowered
dense-headed
dense-minded
dense-wooded
density altitude
density control
density current
density function
density indicator
density rule
dent corn
dent-
dental bridge

dental corps
dental floss
dental gold
dental hygiene
dental hygienist
dental length
dental lisp
dental orthopaedics
dental plaque
dental plate
dental pulp
dental surgeon
dental surgery
dental technician
dentary-splenial
dentate-ciliate
dentate-crenate
dentate-serrate
dentate-sinuate
dentato-
denti-
dentil band
dentist's chair
dento-
denuded of
denumerative geometry
deny yourself
deny yourself not at all
deny yourself nothing
deny yourself to
deo volente
deodorant soap
deontological ethics
deoxy-
deoxyribonucleic acid
depart from
depart from the prepared text
depart this life
departed spirit
departed this life
departed, the
department hospital
department of investigation
department of knowledge
department store
departmental store
depend on
depend

upon
dependence on
dependent clause
dependent on
dependent variable
depending on
depending on circumstances
dephlogisticated air
dephosphorizing process
depicting in the imagination
depletion allowance
deponent verb
deport yourself
deported population
deposit account
deposit banking
deposit copy
deposit currency
deposit margin
deposit money
deposit of faith
deposit premium company
deposit slip
depot ship
depraved appetite
deprecate yourself
depreciate yourself
depreciation charge
depress the scales
depressed arch
depressed area
depressed class
depressed population
depressed-bed
depressed-bed method
depression of spirit
depression range finder
depression slide
depression spring
depressive reaction
depressor nerve
deprivation of freedom
deprive of
deprive of freedom
deprive of life
deprive of office
deprive of sight
deprive you of

deprived of
deprived of reason
depriving of sight
depth bomb
depth charge
depth gauge
depth indicator
depth indicators
depth interview
depth measure
depth
 measurement
depth of field
depth of focus
depth of hold
depth of misery
depth of thought
depth of winter
depth perception
depth psychology
depth sounder
depth sounding
depth table
depth-charge
depth-charged
depth-charging
depthing tool
depths of space
depths of your being
deputy collector
deputy commissioner
deputy sheriff
der Tag
der-doing
derailing switch
derb fine
dereistic thinking
derivable from
derivation from
derivative action
derivative title
derive from
derive pleasure from
derived authority
derived curve
derived four-channel system
derived function
derived set

derived unit
deriving from
derm-
dermat-
dermato-
dermato-autoplasty
dermo-
dermoid cyst
dernier cn
dernier cri
dernier ressort
derogate from
derrick block
derrick boat
derrick boatman
derrick car
derrick chain
derrick crab
derrick crane
derrick elevator
derrick engine
derrick floor
derrick floorman
derrick forge
derrick fork
derrick hoist
derrick hoistderrick lamp
derrick lamp
derrick maker
derrick making
derrick
 mast
derrick master
derrick sheaves
derrick sill
derrick skid
derrick skip
derrick spring
derrick stacker
derrick stool
derrick stove
derrick timber
derrick tower
derrick truck
derrick wheel
derring do
derring-do
derry-down

des-
descant clef
descant viol
descend from
descend on
descend to particulars
descend upon
descending node
descension theory
descent cast
descent on
descent upon
describe a circle
descriptive clause
descriptive geometry
descriptive grammar
descriptive linguistics
desert boots
desert cat
desert cooler
desert fathers
desert fox
desert iguana
desert island
desert kumquat
desert lark
desert lemon
desert lily
desert lynx
desert oak
desert of time
desert palm
desert pea
desert plant
desert poisonbush
desert polish
desert rat
desert rod
desert saints
desert she-oak
desert ship
desert soil
desert trumpet flower
desert trumpeter
desert under fire
desert varnish
desert weed
desert willow

desert your principles
desert-bred
desert-locked
desert-wearied
desertion of principle
desertion
 under fire
deserts of vast eternity
deserve punishment
design bedding
design body
design load
designate a proxy
designate an agent
desire body
desire concentration
desire for knowledge
desire for yourself
desire guidance
desires of the flesh
desiring water
desirous of
desirous to
desist from
desistquit it
desk calendar
desk clerk
desk dictionary
desk jobber
desk lamp
desk light
desk pad
desk room
desk sweater
desk telephone
desk work
desm-
desmo-
desoxy-
desoxyribonucleic acid
despair of
despaired of
desperate criminal
despite that
despoiled of
despotic monarch
despotic monarchy
dessert fork

dessert knife
dessert plate
dessert spoon
dessert wine
destiny's darling
destitute of
destitute of life
destroyer escort
destroyer leader
destroyer tender
destroyer wheel
destroying angel
destruct line
destruction of life
destructive criticism
destructive distillation
destructive interference
detach for service
detached escapement
detached retina
detached service
detail drawing
detail man
detectable
 odor
detective novel
detective story
detective work
detective yarn
detent escapement
detention camp
detention centre
detention home
detention hospital
determinant rank
determinate cleavage
determinate growth
determinative clause
determine once for all
determine upon
determined upon
deterrent capacity
deterrent example
detonating fuse
detonating powder
detonating tube
detonation indicator
detract attention

detract from
detritus tank
deuce game
deuce point
deuce set
deuce shot
deuce-ace
deuces wild
deus ex machina
deut-
deuter-
deuterium oxide
deutero-
deutero-malayan
deuterocanonical books
deuto-
deutsche mark
devastating attack
develop into
develop late
developed thought
developing dye
developing tank
developing-out paper
development section
development theory
developmental change
developmental psychology
deviate from
deviate from the path of virtue
deviate from the truth
deviation card
deviation factor
deviation warranty
devil bolt
devil carriage
devil chaser
devil dance
devil
dancer
devil dancing
devil dog
devil dogs
devil grass
devil incarnate
devil lore
devil murder
devil of a

devil ray
devil take
devil to pay, the
devil worship
devil worshiper
devil worshiping
devil's advocate
devil's bit
devil's bones
devil's books
devil's claw
devil's coach-horse
devil's darning needle
devil's dung
devil's dust
devil's food cake
devil's grip
devil's guts
devil's ivy
devil's mark
devil's milk
devil's own luck
devil's paintbrush
devil's tattoo
devil's-bit
devil's-bones
devil's-ivy
devil's-pincushion
devil's-tongue
devil's-walking-stick
devil-born
devil-devil
devil-diver
devil-dodger
devil-fish
devil-giant
devil-god
devil-haired
devil-in-the-bush
devil-inspired
devil-like
devil-may-care
devil-may-careness
devil-porter
devil-ridden
devil-tender
deviled eggs
devils' chorus

devils-on-horseback
devoid of
devoid of truth
devolve on
devolve upon
devote the mind to
devote the thoughts to
devote to
devote yourself
devote yourself to
devoted friend
devoted friendship
devoted to
devoted
 to studies
devotee of Bacchus
devotion to duty
devoured by
devoured by desire
devouring element
dew bit
dew bow
dew cap
dew cell
dew grass
dew plant
dew point
dew pond
dew snail
dew worm
dew-beat
dew-beater
dew-bedabbled
dew-bediamonded
dew-bent
dew-berry
dew-bespangled
dew-bespattered
dew-besprinkled
dew-boine
dew-bolne
dew-bright
dew-clad
dew-claw
dew-cold
dew-dabbled
dew-drenched
dew-dripped

dew-dropping
dew-drunk
dew-fall
dew-fed
dew-gemmed
dew-laden
dew-lipped
dew-lit
dew-pearled
dew-point
dew-point deficit
dew-point depression
dew-point hygrometer
dew-point spread
dew-point temperature
dew-pond
dew-ret
dew-sprent
dew-sprinkled
dew-worm
dewar flask
dewey decimal classification
dewy morn
dewy-bright
dewy-dark
dewy-eyed
dewy-feathered
dewy-feathered sleep
dewy-fresh
dewy-pinioned
dextr-
dextrinogenic enzyme
dextro camphor
dextro propoxyphene
dextro-
dextro-glucose
dextroamphetamine sulfate
dextronic acid
dh-
dhobi itch
dhobie itch
dhobie tongs
dhu'l-hijja
dhu'l-qa'dah
di grado
in grado
di majores
di minores

di-
di-adapan
di-allyl
di-decahedral
di-do decahedral
di-hexa hedron
di-iodide
di-tri-
dia-
diabase-porphyrite
diabetes insipidus
diabetes mellitus
diabetes sugar
diabetes weed
diabetic diet
diabol-
diacetyl morphine
diachronic linguistics
diacritical mark
diacritical marks
diacritical sign
diadem lemur
diadem spider
diagnostic picture
diagonal bond
diagonal cloth
diagonal engine
diagonal line
diagonal matrix
diagonal-built
diagonal-cut
diagram factor
dial bird
dial enameler
dial feed
dial foot
dial gauge
dial press
dial recorder
dial telegraph
dial telephone
dial tone
dial train
dial work
dial-plate
dialect atlas
dialect dictionary
dialect geographer

dialect geography
dialectical materialism
dialectical materialist
dialectical theology
dialing globe
dialling tone
diallyl sulfide
diallylbarbituric acid
dialogical theology
dialy-
dialysis machine
dialytic method
diameter tape
diametrically opposite
diamido-
diamine dye
diamine oxidase
diamond anniversary
diamond
bed
diamond beetle
diamond bird
diamond black
diamond borer
diamond boron
diamond bort
diamond breaker
diamond broker
diamond cement
diamond chisel
diamond couching
diamond crossing
diamond cut diamond
diamond dash
diamond die
diamond digger
diamond digging
diamond dresser
diamond drill
diamond dust
diamond edition
diamond factory
diamond field
diamond fig
diamond file
diamond flounder
diamond flower
diamond gauge

diamond gravel
diamond green
diamond groove
diamond hammer
diamond hitch
diamond in the rough
diamond jubilee
diamond knot
diamond linen
diamond merchant
diamond mill
diamond mine
diamond mortar
diamond panel
diamond paste
diamond pencil
diamond photograph
diamond plant
diamond plate
diamond plow
diamond point
diamond polisher
diamond powder
diamond rattlesnake
diamond ring
diamond ring effect
diamond saw
diamond setter
diamond skin disease
diamond snake
diamond sparrow
diamond splitter
diamond stitching
diamond tool
diamond tooth
diamond trade
diamond truer
diamond
twist
diamond wedding
diamond weevil
diamond wheel
diamond-back
diamond-backed
diamond-beetle
diamond-boring
diamond-bright
diamond-cut

diamond-cutter
diamond-headed
diamond-leaf laurel
diamond-matched
diamond-paned
diamond-point
diamond-point spoon
diamond-pointed
diamond-producing
diamond-shaped
diamond-skin disease
diamond-snake
diamond-tiled
diamond-tipped
diamondback moth
diamondback rattlesnake
diamondback terrapin
diamondback watersnake
diamyl sulfide
diapason diapente
diapason ditone
diapason normal
diapason normal pitch
diapason pitch
diaper pattern
diaper rash
diaper service
diaphragm current
diaphragm gauge
diaphragm motor valve
diaphragm process
diaphragm pump
diaphragm shutter
diaphragm valve
diarrhea of the mouth
diaspore clay
diastolic hypertension
diathermic treatment
diathermy machine
diatomaceous earth
diatonic interval
diatonic scale
diatonic semitone
diaz-oxide
diazo dye
diazo group
diazo process
diazo radical

diazo reaction
diazo-
diazoamino group
diazoamino radical
diazonium
 compound
diazonium salt
dib-hole
dibasic sodium phosphate
dibbuks dibbukim
dibutyl oxalate
dibutylamino-propanol
dicarbo-
dicarboxylic acid
dice coal
dice cup
dice roll
dice throws
dice-box
dice-top
dich-
dichloramine-t
dichlorodiethyl formal
dichlorodiethyl sulfide
dichloroethyl formal
dichloroethyl sulphide
dichlorophenoxyacetic acid
dicho-
dichro-
dichromatic vision
dichromic acid
dicing board
dick test
dickey box
dicky bow
dictate peace
dictates of Mrs
dictates of society
dictating machine
dictatorship of the proletariat
dictionary catalog
dictionary catalogue
dictionary editor
dictionary meaning
dictionary of quotations
dictionary-proof
dicty-
dicyclopentadienyl metal

did you ever
didactic poetry
diddle away
diddle-
diddle-daddle
diddle-dee
die a natural death
die a violent death
die at your post
die away
die away from the memory
die by your own hand
die cast
die caster
die casting
die chaser
die chuck
die cutter
die cutting
die down
die engraver
die fighting
die filing
die
fitter
die fitting
die for your country
die forger
die forging
die game
die grinder
die hammer
die hard
die hardener
die head
die hob
die holder
die in harness
die in the Lord
die in the attempt
die in the last ditch
die in your boots
die is cast, the
die kicker
die laughing
die like a man
die miller
die mold

die off
die on the vine
die out
die planer
die plate
die polisher
die polishing
die press
die presser
die proof
die reamer
die screw plate
die set
die shaper
die sharpening
die shoe
die spotter
die spotting
die spring
die stamper
die standing up
die steel
die stock
die stripper
die stripping
die tap
die temper
die trying
die turner
die wedge
die with delight
die with pleasure
die with your boots on
die-away
die-back
die-cast
die-casting
die-cut
die-hard
die-hardism
die-square
dielectric constant
dielectric current
dielectric displacement current
dielectric heat
dielectric heater
dielectric heating
dielectric loss

dielectric preheater
dielectric strength
dies funestis
dies
irae
dies non
dies non juridicus
diesel cycle
diesel engine
diesel fuel
diesel oil
diesel propulsion
diesel-driven
diesel-electric
diesel-electric propulsion
diesel-engined
diesel-hydraulic
diesel-powered
diesel-propelled
diesinking machine
diet book
diet kitchen
dietary deficiency
dietary law
dietetic treatment
diethene-
diethyl ether
diethyl malonate
diethyl oxide
diethyl sulfide
diethylbarbituric acid
diethylene dioxide
dif-
differ from
differ in opinion
difference chart
difference engine
difference equation
difference gauge
difference limen
difference of form
difference of opinion
difference product
difference quotient
difference ring
difference table
difference threshold
difference tone

different breed of cat
different story
different thing
differential analyzer
differential anesthetic
differential calculus
differential coefficient
differential diagnosis
differential equation
differential gap
differential gear
differential gearing
differential geometry
differential ionization chamber
differential
 leveling
differential operator
differential pressure gauge
differential psychology
differential purchase
differential quotient
differential rate
differential recorder
differential tackle
differential tone
differential weathering
differential windlass
difficult thing
difficulty score
diffracted wave
diffraction disk
diffraction grating
diffraction spectroscope
diffraction spectrum
diffuse inflammation
diffuse light
diffuse nebula
diffuse reflection
diffuse-porous
diffused junction
diffused lighting
diffusing screen
diffusion air pump
diffusion battery
diffusion chamber
diffusion coefficient
diffusion juice
diffusion process

diffusionist theory
dig around for
dig at
dig for
dig in
dig in your heels
dig into
dig out
dig up
dig up the past
dig you in the ribs
dig your heels in
dig your own grave
digest medium
digest of law
digested securities
digester tankage
digestive biscuit
digestive gland
digestive juice
digestive secretion
digestive secretions
digestive system
digger
 wasp
digging weight
digital clock
digital computer
digital data reducing system
digital differential analyzer
digital examination
digital feedback control
digital general purpose computer
digital graph plotter
digital process
digital watch
digitato-palmate
digitato-pinnate
digiti-
digito-
diglycolic acid
diglycollic acid
dihedral angle
dihydric alcohol
diisobutyl phthalate
dik-dik
dika bread
dika butter

dika nut
dike hopper
dike out
dike rock
dike up
dike-grave
dike-louper
dike-reeve
dilate on
dilate upon
dill oil
dill pickle
dill water
dilly bag
dilly-dally
dilute acid
dim eyes
dim light
dim out
dim past
dim recollection
dim view
dim-brooding
dim-browed
dim-colored
dim-discovered
dim-eyed
dim-felt
dim-gleaming
dim-gray
dim-lettered
dim-lighted
dim-lit
dim-litten
dim-out
dim-remembered
dim-seen
dim-sensed
dim-sheeted
dim-sighted
dim-sightedness
dim-visioned
dim-witted
dim-wittedness
dim-yellow
dime a dozen
dime museum
dime novel

dime store
dime-a-dozen
dime-store
dimension control
dimension
 lumber
dimension stone
dimethyl arsinic acid
dimethyl sulfate
dimethyl sulfoxide
diminish yourself
diminished dovetail
diminished responsibility
diminished seventh chord
diminished stile
diminishing returns
diminishing rule
diminishing stile
dimissorial letter
dimissory letter
din in the ear
dine not wisely but too well
dine out
dine with Duke Humphrey
diner-out
dinette set
dinette table
ding an sich
ding off
ding-a-ling
ding-dong
dingdong theory
dinge an sich
dinghy anchor
dingle-dangle
dining car
dining chair
dining compartment
dining hall
dining room
dining saloon
dining table
dining utensils
dinitro-
dinitrogen tetroxide
dinkel wheat
dinking die
dinkum oil

dinky-di
dinner audience
dinner bell
dinner call
dinner card
dinner chimes
dinner clothes
dinner club
dinner coat
dinner dance
dinner dress
dinner fork
dinner gong
dinner gown
dinner hour
dinner jacket
dinner knife
dinner napkin
dinner pail
dinner party
dinner plate
dinner ring
dinner room
dinner service
dinner set
dinner table
dinner
 wagon
dinner-dance
dinner-getting
diocesan conference
diocesan court
diophantine equation
diorite-porphyrite
dip a flag
dip circle
dip down
dip fault
dip into
dip needle
dip out
dip pipe
dip rider
dip rope
dip sector
dip shift
dip slip
dip snuff

dip switch
dip the beak
dip the colors
dip the ensign
dip the pen in gall
dip trap
dip your hands into
dip-dye
dip-grained
dip-needling
diphen-
diphenyl black
diphenyl ether
diphenyl ketone
diphenylene-methane
diphenylhydantoin sodium
diphosphoglycergic acid
diphtheria bacillus
diphtheria toxoid
diphy-
diphyo-
dipl-
diplo-
diploid number
diploma mill
diploma piece
diplomatic agent
diplomatic body
diplomatic code
diplomatic corps
diplomatic courier
diplomatic immunity
diplomatic mission
diplomatic pouch
diplomatic service
diplomatic staff
diplomatic text
dipodic rhythm
dipole aerial
dipole antenna
dipole moment
dipper clam
dipper dredge
dipper gourd
dipper interrupter
dipper-in
dipping acid
dipping basket

dipping bath
dipping battery
dipping
chair
dipping compass
dipping elevator
dipping enamel
dipping frame
dipping furnace
dipping hook
dipping house
dipping ladle
dipping lug
dipping lugsail
dipping needle
dipping oil
dipping paint
dipping pan
dipping paper
dipping process
dipping rack
dipping rod
dipping room
dipping table
dipping tank
dipping the colors
dipping the ensign
dipping tub
dipping tube
dipping works
dipping-needle
dipsey lead
dipsey line
dipsy-doodle
dire necessity
dire wolf
direct access
direct action
direct actionist
direct apprehension
direct attention to
direct black
direct blue
direct broadcast
direct brown
direct communication
direct costs
direct cotton dye

direct current
direct current motor
direct democracy
direct discourse
direct distance dialing
direct dye
direct evidence
direct examination
direct fire
direct grant school
direct infection
direct initiative
direct intuition
direct labor
direct lighting
direct line
direct mail
direct method
direct nomination
direct object
direct order
direct positive
direct
primary
direct product
direct proportion
direct question
direct ratio
direct relationship
direct signal
direct speech
direct sum
direct tax
direct the eyes
direct the mind upon
direct tide
direct to
direct to the attention
direct transfusion
direct variation
direct yellow
direct your attention to
direct your course
direct your course for
direct your course to
direct yourself
direct-acting
direct-acting engine

direct-acting press
direct-actionist
direct-connected
direct-coupled
direct-current
direct-current circuit
direct-current converter
direct-current servo
direct-driven
direct-examine
direct-examined
direct-examining
direct-geared
direct-grant school
direct-indirect radiator
direct-mail
direct-mail advertising
direct-mail selling
direct-reading computer
direct-reading spectrometer
direct-reading spectroscope
direct-viewing tube
direct-vision prism
direct-vision spectroscope
direct-writing company
directed verdict
directing circle
directing piece
directing plane
directing
point
direction angle
direction constant
direction cosine
direction dial
direction finder
direction finding
direction indicator
direction line
direction number
direction post
direction ratio
direction switch
direction tensor
direction test
direction theodolite
direction transmission
direction-finder station

directional antenna
directional derivative
directional gyro
directional signal
directional stability
directive therapy
director circle
director curve
director general
director plane
director regulus
director sphere
director's chair
director-general
directors general
directory arrangement
directory canvasser
dirigible balloon
dirigible torpedo
dirigo-motor
diriment impediment
dirk knife
dirt band
dirt bed
dirt cheap
dirt dauber
dirt eating
dirt farm
dirt farmer
dirt farming
dirt groove
dirt poor
dirt road
dirt wagon
dirt-besmeared
dirt-born
dirt-cheap
dirt-fast
dirt-flinging
dirt-free
dirt-grimed
dirt-incrusted
dirt-line
dirt-rotten
dirt-smirched
dirt-soaked
dirty allan
dirty bomb

dirty
 crack
dirty deal
dirty dig
dirty hands
dirty joke
dirty language
dirty liar
dirty lie
dirty look
dirty movie
dirty name
dirty old man
dirty politician
dirty politics
dirty pool
dirty sea
dirty shame
dirty sky
dirty story
dirty talk
dirty trick
dirty up
dirty water
dirty weather
dirty wind
dirty word
dirty work
dirty-colored
dirty-faced
dirty-handed
dirty-minded
dirty-shirted
dirty-souled
dis aliter visum
dis-
dis-byronize
dis-element
dis-turk
disability clause
disability insurance
disablement benefit
disaccord with
disaccustom yourself
disadvantaged, the
disagree with
disappearing act
disappoint your expectations

disapprove of
disapproved place
disaster area
disastrous defeat
disazo dye
disburden you of
disburden your conscience
disburden your heart
disburden your mind
disc brake
disc flower
disc harrow
disc jockey
disc wheel
disc-
discar- nate
discernment of excellence
discharge lamp
discharge potential
discharge printing
discharge the duties of
discharge the functions of
discharge
 the office of
discharge tube
discharge valve
discharge your duty
discharge your function
discharger cup
discharging arch
discharging cargo
discharging freight
discharging pallet
disciples of Christ
disciplinary action
disciplinary measures
discipline yourself
disco-
disconnecting switch
discontinuance wage
discontinuity layer
discord with
discount bond
discount broker
discount company
discount house
discount market
discount notes

discount rate
discount store
discount ticket
discount yourself
discourse about
discourse of reason
discourse upon
discourse with
discover itself
discover serendipitously
discover yourself
discovered check
discovery procedure
discrete atom
discrete four-channel system
discretionary account
discretionary income
discriminant function
discriminate against
discriminating relay
discriminating taste
discrimination learning
discrimination time
discursive reason
discursive reasoning
discus thrower
discuss with
discussion group
disdain grammar
disease germ
disease
 symptom
disease-causing
disease-causing agent
disease-producing
disease-producing microorganism
disease-resisting
disease-spreading
diseased mind
diseases of
disembodied spirit
disen-
disengagement governor
disgrace yourself
disguise yourself
disguised as a virtue
disgustingly rich
dish bearer

dish cleaner
dish cover
dish designer
dish drainer
dish feed
dish fit for a king
dish gravy
dish it out
dish maker
dish mop
dish mustard
dish night
dish out
dish plate
dish rack
dish reflector
dish the dirt
dish top
dish towel
dish truck
dish up
dish wagon
dish warmer
dish-crowned
dish-faced
dish-headed
dish-shaped
dishcloth gourd
dished keel
dishonest person
dishonorable discharge
dishonored bill
dishpan hands
disinclination to believe
disinclination to communicate
disincline from
disinclined to believe
disinclined to communicate
disinfecting candle
disintegration series
disjecta membra
disjoin yourself
disjunctive conjunction
disk armature
disk barrow
disk bit
disk brake
disk brakes

disk clutch
disk
crank
disk cultivator
disk drill
disk dynamo
disk engine
disk floret
disk flower
disk furrower
disk go-devil
disk harrow
disk hiller
disk jockey
disk memory
disk meter
disk pack
disk photometer
disk pile
disk plow
disk ridge buster
disk sander
disk signal
disk stove
disk system
disk telegraph
disk valve
disk weeder
disk wheel
disk winding
disk-bearing
disk-seal tube
disk-shaped
dismiss all doubt
dismiss from the mind
dismiss from the thoughts
dismiss from your thoughts
dismiss with a laugh
dismissal wage
dismissed out of hand
disobey the law
disodium phosphate
disordered mind
disordered personality
disordered reason
disorderly conduct
disorderly house
disorderly person

disparaging remark
dispatch boat
dispatch box
dispatch case
dispatch money
dispatch note
dispatch rider
dispatch tube
dispatch writer
dispatch writing
dispatch-bearer
dispatch-bearing
dispatch-rider
dispel your illusions
dispensations of providence
dispense from
dispense with
dispensed with
dispersal prison
disperse
 system
dispersion hardening
dispersion medium
dispersive power
displaced person
displaced population
displacement activity
displacement current
displacement hull
displacement pump
displacement ton
displacement tonnage
display ad
display advertising
display art
display bracket
display card
display case
display cover
display figure
display form
display pipe
display room
display sign
display station
display type
display window
display work

disposable income
disposable resources
disposal of the dead
dispose of
disposed of
disposed to
disposed to doubt
disposition to believe
dispossessed of
disputed election
disregard the law
disreputable person
disruptive discharge
dissecting microscope
dissecting table
dissector tube
dissel-boom
disseminated sclerosis
disseminated tuberculosis
dissent from
dissenting opinion
dissipate your illusions
dissipation trail
dissociate yourself from
dissociation coefficient
dissociation constant
dissociation of personality
dissociation reaction
dissolution of
marriage
dissolve in tears
dissolve into chaos
dissolve marriage
dissolve out
dissolved in tears
dissolving agent
dissolving view
dissonant chord
dissonant sounds
distaff kin
distaff side
distaff thistle
distal convoluted tubule
distance across
distance between
distance circle
distance crossways
distance crosswise

distance flag
distance language
distance made good
distance medley
distance of time
distance post
distance receptor
distance ring
distance scale
distance through
distant early warning
distant early warning line
distant future
distant past
distant perspective
distant prospect
distant relation
distantly and broadly
distantly related
distended belly
distilled essence
distilled water
distilling flask
distilling tube
distinction without a difference
distinctive feature
distinguish between
distinguished flying cross
disto-occlusion
distorted conception
distorted image
distorting mirror
distract attention from
distract the attention
distress call
distress flag
distress frequency
distress
gun
distress merchandise
distress sale
distress signal
distressed area
distributed costs
distributed term
distribution board
distribution curve
distribution difference

distribution function
distribution ratio
distributive education
distributor bar
district attorney
district council
district court
district judge
district leader
district man
district nurse
district parish
district school
district superintendent
districts of
distrust yourself
disturbed mind
disturbed personality
disulpho-
disulphuric acid
dit-da artist
dita bark
ditat Deus
ditch crowfoot
ditch fern
ditch grass
ditch hand
ditch machine
ditch millet
ditch moss
ditch reed
ditch rider
ditch spade
ditch stonecrop
ditch sunflower
ditch-delivered
ditch-drawn
ditch-moss
ditching car
ditching machine
ditching scoop
dithering grass
dithionic acid
dithionous acid
ditto machine
ditto mark
ditto marks
ditty bag

ditty box
ditty-bag
diurnal arc
diurnal circle
diurnal epilepsy
diurnal parallax
diva blue
divaricate from
dive bomber
dive
 bombing
dive brake
dive in
dive into
dive-bomb
dive-bombing
dive-dap
dive-dapper
diver's palsy
diverge from
divergence theorem
divergent squint
divergent strabismus
divergent thinking
diverging lens
divers-colored
diverse control
diverse-colored
diverse-natured
diverse-shaped
diversi-
diversified corporation
diversified economy
diversion chamber
diversion cut
diversionary attack
diversionary movement
diversity factor
diversity of colors
divert attention
divert the mind
divert the thoughts
divest of freedom
divest of office
divi-divi
divide by four
divide et impera
divide in thirds

divide in three
divide into four
divide into shares
divide on
divide up
divide with
divided attention
divided highway
divided spectacles
dividend off
dividend on
dividend warrant
dividing engine
dividing head
dividing line
dividing plate
dividing ridge
dividing sinker
dividing wall
divine afflatus
divine attribute
divine breath
divine discontent
divine function
divine healer
divine healing
divine inspiration
divine
liturgy
divine office
divine revelation
divine right
divine right of kings
divine service
divine spark
divine tobacco
divine-human
diving beetle
diving bell
diving bird
diving bladder
diving board
diving boat
diving chamber
diving dress
diving duck
diving engine
diving equipment

diving float
diving goggles
diving helmet
diving hood
diving machine
diving mask
diving platform
diving raft
diving rudder
diving suit
diving togs
divining rod
divining stick
divinity calf
divinity circuit
divinity circuit binding
divinity fudge
divinity school
divinity student
divinyl ether
division algebra
division algorithm
division center
division engineer
division in the camp
division line
division lobby
division mark
division of labor
division ring
division sign
division superintendent
divorce court
divorce mill
divorced man
divorced person
divorced woman
divvy up
divvy up with
divvying up
dixieland band
dizzy heights
dizzy round
dj-
djati tree
do a bit
do a bunk
do a comparative study

do a deal
do
 a disservice
do a fade-out
do a favor
do a flip-flop
do a good deed
do a good turn
do a grave injustice
do a great wrong
do a gross injustice
do a hand's turn
do a hitch
do a kind deed
do a kindness
do a land-office business
do a lick of work
do a mischief
do a number on
do a repeat
do a right-about-face
do a service
do a slow burn
do a stint
do a strip-tease
do a tour
do a tour of duty
do a turn to the right-about
do a vanishing act
do a world of good
do active duty
do again
do all in your power
do all right by yourself
do all the talking
do all you can
do amiss
do an about-face
do an about-turn
do an ill office to
do an impression of
do anyhow
do as much as in one lies
do as others do
do as well as you can
do as you please
do as you say
do as you would be done by

do at the bidding of
do at your convenience
do at your leisure
do at your own peril
do at your own risk
do at your pleasure
do away with
do away with yourself
do battle
do business
do business with
do by
do by halves
do
carelessly
do chars
do credit to
do credit to someone
do double duty
do down
do down to the ground
do duty
do easily
do everything you can
do evil
do for
do for yourself
do good
do harm
do homage
do homage to
do honor
do honor to
do ill
do in
do in a pinch
do in a slipshod fashion
do in any old way
do in your own sweet way
do independently
do it
do it according to Hoyle
do it by the book
do it or break a leg
do it or bust a gut
do it up brown
do justice
do justice to

do like
do no evil
do no harm
do not give it a second thought
do not give it another thought
do nothing
do nothing in excess
do obeisance
do of your own accord
do of your own free choice
do of your own free will
do of your own volition
do offhand
do on an average
do on your own
do on your own hook
do on your own initiative
do on your own say-so
do or die
do out
do out of
do over
do over again
do penance
do proud
do right
do right by
do service
do service for
do service to
do some heavy thinking
do someone credit
do someone
dirt
do something
do something about
do suit and service
do superfluously
do svidanye
do tell
do the best you can
do the best you know how
do the chores
do the crazy act
do the crazy bit
do the crazy shtick
do the deadman's float
do the dirty work of

do the disappearing act
do the fair thing
do the goose step
do the handsome thing
do the heart good
do the honors
do the job
do the lock step
do the needful
do the proper thing
do the right thing
do the right thing by
do the spadework
do the trick
do the unexpected
do the will of
do time
do to
do to a T
do to a frazzle
do to a turn
do to death
do to perfection
do too many things at once
do up
do up brown
do violence to
do voluntarily
do well
do what is expected
do what is right
do what lies in your power
do what you are told
do what you can
do what you choose
do what you have to do
do what you like
do what you set out to do
do what you wish
do with
do with both eyes shut
do without
do wonders
do wrong
do wrong by
do wrong to
do you a wrong
do

you an injustice
do you proud
do your best
do your bidding
do your bit
do your damndest
do your darndest
do your duty
do your heart good
do your level best
do your number
do your office
do your part
do your share
do your stuff
do your thing
do your utmost
do your worst to
do yourself proud
do-all
do-dad
do-funny
do-good
do-gooder
do-goodism
do-it-yourself
do-it-yourselfer
do-little
do-naught
do-nothing
do-nothing adj
do-nothing policy
do-nothingism
do-nothingness
do-nought
do-or-die
do-over
do-re-mi
do-si-do
do-up
dob in
dobber-in
dobbin cart
dobby loom
dobby weave
dobell's solution
doberman pinscher
dobson fly

doch-an-dorrach
doch-an-dorris
doch-an-dorroch
dock boss
dock bur
dock charge
dock cooper
dock crane
dock cress
dock crew
dock derrick
dock dues
dock foreman
dock gate
dock hand
dock hoist
dock inspector
dock laborer
dock light
dock nettle
dock port
dock porter
dock receipt
dock rent
dock screw
dock shunter
dock sill
dock sorrel
dock space
dock spike
dock superintendent
dock
trade
dock warehouse
dock warrant
dock-leaved
dock-tailed
dock-walloper
dock-walloping
docking bridge
docking cradle
docking keel
docking maneuver
docking pilot
docking plan
docking telegraph
doctor accounts
doctor blade

doctor file
doctor fish
doctor up
doctor's degree
doctor's gown
doctor's oral
doctoral candidate
doctrinal statement
doctrinal theology
doctrine of descent
doctrine of inference
doctrine of terms
doctrine of the judgment
document bill
documentary drama
documentary evidence
documentary film
dodder family
dodder grass
doddy mitten
dodeca-
dodecanoic acid
dodecuple scale
dodecyl aldehyde
dodge ball
dodge chain
dodging tool
dodo split
doegling oil
doeskin brown
doff your cap to
doffing comb
doffing cylinder
doffing knife
dog Latin
dog ape
dog bee
dog belt
dog bent
dog biscuit
dog blanket
dog box
dog bramble
dog breeder
dog bur
dog button
dog cabbage
dog cake

dog camomile
dog carrier
dog chain
dog chart
dog cherry
dog clipper
dog clutch
dog collar
dog cracker
dog crate
dog
curtain
dog daisy
dog dandelion
dog days
dog disease
dog dollar
dog elder
dog family
dog fancier
dog fennel
dog flea
dog flesh
dog flower
dog food
dog fox
dog grass
dog grate
dog harness
dog hip
dog hobble
dog hood
dog hook
dog hospital
dog hysteria
dog in the manger
dog iron
dog it
dog kennel
dog laurel
dog leech
dog letter
dog license
dog lichen
dog life
dog lily
dog louse
dog lover

dog meat
dog mercury
dog mint
dog muzzle
dog nail
dog nap
dog nettle
dog owl
dog owner
dog paddle
dog parsley
dog plum
dog poison
dog pound
dog race
dog racing
dog reed
dog robber
dog robbing
dog rose
dog rowan tree
dog salmon
dog screw
dog seal
dog shark
dog show
dog sled
dog sledge
dog sleigh
dog snapper
dog soap
dog spike
dog standard
dog star
dog stealing
dog stinkhorn
dog tag
dog tansy
dog tapeworm
dog tax
dog tent
dog the footsteps of
dog thistle
dog thorn
dog tick
dog tongue
dog town
dog track

dog train
dog trainer
dog training
dog tree
dog tune
dog violet
dog wagon
dog warden
dog warp
dog watch
dog
 wheat
dog wheel
dog whelk
dog whip
dog whistle
dog winkle
dog wrench
dog's age
dog's chance
dog's letter
dog's life, a
dog's-bane
dog's-ear
dog's-eared
dog's-meat
dog's-tail
dog's-tail grass
dog's-tongue
dog's-tooth
dog's-tooth check
dog's-tooth violet
dog-banner
dog-bitten
dog-bramble
dog-brier
dog-cart
dog-catcher
dog-cheap
dog-day cicada
dog-days
dog-draw
dog-drawn
dog-driven
dog-ear
dog-eared
dog-eat-dog
dog-end

dog-eyed
dog-faced
dog-fennel
dog-fish
dog-fisher
dog-fly
dog-footed
dog-fox
dog-gnawn
dog-gone
dog-grass
dog-head
dog-head hammer
dog-head spike
dog-headed
dog-hole
dog-hook
dog-hungry
dog-hutch
dog-in-the-manger
dog-keeping
dog-lame
dog-latin
dog-lean
dog-leaved
dog-leech
dog-leg
dog-leg fence
dog-leg hole
dog-leg stair
dog-legged
dog-legged stair
dog-mad
dog-nail
dog-owning
dog-paddle
dog-paddled
dog-paddling
dog-plum
dog-poor
dog-rose
dog-shore
dog-sick
dog-skin
dog-sleep
dog-star
dog-stone
dog-stopper

dog-tired
dog-toes
dog-tongue wampee
dog-tooth
dog-toothed
dog-tree
dog-trick
dog-trot
dog-vane
dog-violet
dog-watch
dog-weary
dog-whelk
dogbane
family
dogberry tree
dogged perseverance
dogleg fence
dogmatic theology
dogtooth check
dogtooth spar
dogtooth star grass
dogtooth violet
dogtown grass
dogwood family
dogwood poisonbush
doing business
doing nicely
dolce far niente
dolce vita
dole cupboard
dole meadow
dole out
dolich-
doling out
doll baby
doll carriage
doll hospital
doll maker
doll out
doll up
doll's house
doll-faced
doll-like
dollar acceptance
dollar averaging
dollar bill
dollar bond

dollar chaser
dollar cost averaging
dollar crisis
dollar debenture
dollar deficit
dollar diplomacy
dollar exchange
dollar gap
dollar imperialism
dollar loan
dollar mark
dollar shortage
dollar-a-year man
dollars to doughnuts
dolled up
dolly bar
dolly bird
dolly drop
dolly mixture
dolly shop
dolly shot
dolly varden
dolly-head
dolly-mop
dolman jacket
dolman sleeve
dolomite marble
dolorous tirade
dolphin fly
dolphin oil
dolphin striker
dolphin-flower
dolphin-striker
boom
dom pedro
domain of integrity
dome car
dome tomb
dome top
dome whistle
dome-shaped
domes-booke
domesday book
domestic animal
domestic animals
domestic cat
domestic cattle
domestic comedy

domestic drudge
domestic economy
domestic fowl
domestic management
domestic prelate
domestic relations law
domestic science
domestic servant
domestic shorthair cat
domestic tragedy
domestic wine
domestic-relations court
domiciliary visit
dominant character
dominant chord
dominant estate
dominant note
dominant seventh chord
dominant tenement
dominant wavelength
dominate the field
domine dirige nos
domineer over
dominical altar
dominical letter
dominion day
dominion rule
domino effect
domino mask
domino paper
domino theory
domino whist
domitae naturae
don juan
don quixote
don't I know it
don't hold your breath
don't kid yourself
don't know
don't lose any sleep over it
don't make waves
don't rock the boat
don't spare the horses
donate to
donation land
donation party
done for
done in

done to a turn
done
 to perfection
done up
done with
donjon keep
donkey boiler
donkey boy
donkey crosshead
donkey derby
donkey doctor
donkey ears
donkey engine
donkey hoist
donkey jacket
donkey pump
donkey puncher
donkey sled
donkey tender
donkey topsail
donkey vote
donkey's ears
donkey's years
donkey's years ago
donkey-drawn
donkey-eared
donkey-work
donnybrook fair
doob grass
doom palm
doom ring
doom to
doom to perdition
doom tree
doomed hope
doomed hopes
doon-head-clock
door bed
door chain
door check
door closer
door fastener
door finisher
door fitter
door furniture
door grass
door handle
door hanger

door hasp
door hinge
door jack
door key
door knocker
door latch
door lock
door maker
door mat
door matting
door money
door opener
door prize
door scraper
door spring
door stile
door strap
door switch
door to door
door track
door trap
door trapper
door-roller
door-shaped
door-to-door
door-to-door salesman
dooryard grass
dooryard plantain
dop doctor
dopa reaction
dope fiend
dope off
dope out
dope pusher
dope
 sheet
dope smuggling
dope story
dope up
dope, the
doppler effect
dor bee
dor bug
dor fly
dor-fly
dorcas gazelle
dore bullion
dore furnace

dormant partner
dormer beam
dormer window
dormer-windowed
dormitory suburb
dormouse phalanger
dorothy perkins
dors-
dors-umbonal
dorsal airdome
dorsal blister
dorsal fin
dorsal lip
dorsal region
dorsal root
dorsal-root ganglion
dorset horn
dorsi-
dorsi-ventral
dorso-
dorso-occipital
dorso-ulnar
dorsum ephippii
dory skiff
dos and don'ts
dos gris
dos nominata
dos rationabilis
dos-
dos-a-dos
dosage compensation
dosage meter
dose of clap
dose of claps
dose of strap oil
dose with
dosimetric medicine
dosing apparatus
dosing siphon
dosing tank
doss down
doss house
dot down
dot figure
dot map
dot product
dot the i's and cross the t's
dot your i's and cross your t's

dot-dash line
dot-sequential
dot-sequential color television
dote on
dote upon
dotted line
dotted swiss
dotterel dun
dottle pin
douay version
double Blackwall hitch
double Dutch
double Gloucester
double
 Spanish burton
double a point
double achievement
double acrostic
double action engine
double agent
double algebra
double altar
double back
double bar
double bass
double bassoon
double batten
double bed
double bill
double bind
double block
double blossom
double boiler
double bond
double bridle
double bunk
double centering
double check
double chin
double cloth
double coconut
double concerto
double contingency
double contraoctave
double corposant
double counterpoint
double cream
double crochet

double cross
double crown
double cup
double dagger
double dare
double date
double decomposition
double demy
double diode
double dome
double dot
double double cap
double dresser
double drift
double dummy
double eagle
double elephant
double end
double ender
double entendre
double entendres
double entente
double entry
double exposure
double fault
double feature
double first
double flat
double flower
double foolscap
double for
double fueler
double fugue
double genitive
double glazing
double
 half-round file
double harness
double helix
double hitch
double hyphen
double image
double in brass
double indemnity
double integral
double jeopardy
double jump
double luff tackle

double magnum
double march
double meaning
double monastery
double mordent
double negative
double obelisk
double or mutual change
double or nothing
double or quits
double orange daisy
double over
double paddle
double pair royal
double pedal point
double personality
double piece
double play
double pneumonia
double possessive
double post
double precision
double predestination
double prime
double print
double purchase
double quatrefoil
double quotes
double reed
double reference
double refraction
double rhyme
double royal
double salt
double sap
double saucepan
double sawbuck
double scull
double sculls
double sharp
double shuffle
double sideband
double sight
double solitaire
double space
double spinnaker
double spread
double sprit

double standard
double star
double steal
double stem
double stitch
double stop
double
 summer time
double tackle
double take
double talk
double tape
double ten
double tide
double time
double triode
double truck
double up
double vision
double whip
double whole note
double wicket
double wing
double wingback formation
double your fist at
double-O
double-Os
double-acting
double-acting engine
double-action
double-action harrow
double-armed
double-armed bolt
double-aspect theory
double-bank
double-banked
double-banker
double-barred
double-barrel
double-barreled
double-barrelled
double-bass
double-battalioned
double-beat valve
double-bedded
double-bell euphonium
double-benched
double-biting

double-bitt
double-bitted
double-bladed
double-blind
double-blossomed
double-bodied
double-bond isomerism
double-bottom
double-bottomed
double-branch
double-branched
double-break switch
double-breasted
double-breasted jacket
double-breasted suit
double-brooded
double-bubble
double-button carbon microphone
double-buttoned
double-chain sling
double-charge
double-check
double-chinned
double-clasping
double-claw
double-clutch
double-coated
film
double-concave
double-convex
double-creme
double-crested
double-crested cormorant
double-crop
double-cropped
double-cropping
double-cross
double-crosser
double-crossing
double-cup insulator
double-cupped
double-current generator
double-current signaling
double-cut
double-cut file
double-cut saw
double-cylinder planer
double-dare

double-date
double-dated
double-dating
double-dealer
double-dealing
double-deck
double-decked
double-decker
double-decker sandwich
double-declutch
double-disk
double-disk harrow
double-distilled
double-ditched
double-dodge
double-dog dare
double-dome
double-doored
double-dot display
double-dotted
double-duty
double-dye
double-dyed
double-edged
double-end saw file
double-ended
double-ended bolt
double-ender
double-ender file
double-engined
double-entry accounting
double-entry bookkeeping
double-entry system
double-entry table
double-eyed
double-face
double-faced
double-facedly
double-facedness
double-fault
double-feature
double-flowered
double-flowering
double-fold
double-footed
double-framed
double-fronted
double-ganger

double-gilt
double-handed
double-harness
double-hatched
double-head
double-headed
double-header
double-hearted
double-helical
double-helical
gear
double-horned
double-hung
double-image micrometer
double-image prism
double-image telescope
double-ironed
double-jointed
double-keeled
double-knit
double-language theory
double-leaded
double-liability stock
double-line
double-lived
double-livedness
double-loaded
double-loathed
double-lock
double-lunged
double-magnum
double-manned
double-measure door
double-milled
double-minded
double-mindedly
double-mindedness
double-mouthed
double-name paper
double-natured
double-opposed
double-or-nothing
double-page spread
double-park
double-parted and fretty
double-pedal
double-piled
double-pipe condenser

double-pointed
double-pole switch
double-pored
double-ported
double-printing
double-prop
double-queue
double-quick
double-quick time
double-quirked
double-reed
double-reed
family
double-reed instrument
double-reef
double-reefed
double-refined
double-refracting
double-ripper
double-rivet
double-riveted
double-roller escapement
double-rooted
double-row radial engine
double-runner
double-scull
double-seated valve
double-seater
double-seeing
double-sensed
double-shear steel
double-shed insulator
double-shot
double-sided
double-sidedness
double-sighted
double-slide
double-soled
double-space
double-spaced
double-spacing
double-spun
double-starred
double-stemmed
double-stitch
double-stitched
double-stop
double-stopped

double-stopping
double-strength
double-struck
double-sunk
double-sunk dial
double-surfaced
double-swing door
double-swing joint
double-sworded
double-system sound recording
double-tailed
double-talk
double-team
double-think
double-thong
double-thread
double-threaded
double-throw switch
double-time
double-timed
double-timing
double-tongue
double-tongued
double-tonguing
double-tooth
double-track
double-trenched
double-trouble
double-truck
heading
double-twisted
double-u
double-visaged
double-voiced
double-windowed
double-winged
double-work
double-worked
doubleness of heart
doubles ententes
doublet pattern
doubt not
doubt the truth of
doubt your word
doubt yourself
doubt-beset
doubt-cherishing
doubt-dispelling

doubt-excluding
doubt-harboring
doubt-ridden
doubt-sprung
doubt-troubled
doubting Thomas
doubting mania
doubting thomas
douceur de vivre
douche bag
dough bird
dough brake
dough kneader
dough mixer
dough stage
dough-baked
dough-bird
dough-boy
dough-colored
dough-dividing
dough-face
dough-faced
dough-kneading
dough-mixing
dough-trough
doughnut tire
douglas fir
doum palm
dousing chock
dousing-chock
dove blue
dove color
dove dock
dove gray
dove hawk
dove of peace
dove plant
dove pox
dove tick
dove-colored
dove-eyed
dove-gray
dove-shaped
dover grass
dover's powder
dovetail cramp
dovetail halving
dovetail hinge

dovetail joint
dovetail molding
dovetail plane
dovetail saw
dovetail slide
dovetail-shaped
dowdy
 frumpish
dowel bit
dowel jig
dowel maker
dowel pin
dowel plate
dowel pointer
dowel rod
dowel screw
dowel sharpener
dowel spoke
dowel stick
dower chest
dower house
down East
down along
down and out
down at heel
down at heels
down at the heel
down at the heels
down bed
down below
down by the head
down card
down cushion
down feather
down grade
down helm
down home
down in the mouth
down in the world
down left
down on
down on your luck
down on your uppers
down pat
down payment
down picker
down pillow
down pipe

down plucker
down plumage
down right
down runner
down south
down the alley
down the drain
down the hatch
down the pipe
down the rathole
down the spout
down the wind
down thistle
down time
down to bedrock
down to the ground
down to your last cent
down to your last penny
down tree
down trip
down under
down weight
down wool
down your arms
down-and-out
down-and-outer
down-at-heel
down-at-heels
down-at-the-heel
down-at-the-heels
down-beater
down-bow
down-charge
down-coast
down-covered
down-crier
down-curving
down-drag
down-draught
down-easter
down-gyved
down-hip
down-house
down-in-the-mouth
down-lead
down-lying
down-market
down-payment

down-reaching
down-river
down-soft
down-talk
down-the-line
down-to-date
down-to-earth
down-to-earthness
down-trending
down-valley
down-wash
downat-the-heel
downdraft
 kiln
downfeed system
downing of arms
downside-up
downward mobility
downward motion
downward trend
downwash angle
downwind leg
downy mildew
downy oat grass
downy sleep
downy woodpecker
downy-cheeked
downy-clad
downy-feathered
downy-fruited
downy-winged
dowse for water
dowse sail
dowsing chock
dowsing rod
doze off
dr ap
drab-breeched
drab-coated
drab-colored
drab-tinted
drabble in the mud
dracaena palm
draco lizard
draconic month
draft act
draft allowance
draft animal

draft beer
draft board
draft box
draft call
draft chair
draft dodger
draft engine
draft evener
draft gauge
draft gear
draft horse
draft lottery
draft mark
draft mill
draft net
draft off
draft pin
draft rein
draft
rod
draft scale
draft tube
draft-exempt
drafted man
drafting board
drafting paper
drafting room
drafting yard
drag a lengthening chain
drag along
drag anchor
drag at your chariot wheel
drag axis
drag before the public
drag boat
drag box
drag bucket
drag bunt
drag cart
drag chain
drag classifier
drag component
drag conveyer
drag crank
drag direction
drag down
drag fold
drag force

drag from
drag harrow
drag hook
drag horse
drag hunt
drag in
drag in by the heels
drag in the mud
drag into
drag into court
drag into the limelight
drag iron
drag its slow length along
drag link
drag mill
drag on
drag out
drag out of
drag over the coals
drag parachute
drag race
drag racer
drag racing
drag rake
drag ratio
drag sail
drag scraper
drag seine
drag sheet
drag spring
drag step
drag strip
drag strut
drag through the mud
drag tooth
drag twist
drag up
drag washer
drag wire
drag your feet
drag-chain
drag-down
drag-hook
drag-out
drag-staff
drag-stone mill
dragged into
dragged out

dragged-out
dragger-down
dragger-out
dragger-up
dragging
 beam
dragging down
dragging of the feet
dragging pace
dragging piece
dragging-out
draggle-haired
draggle-tail
draggle-tailed
dragline crane
dragline dredge
dragline excavator
dragnet clause
dragon arum
dragon balloon
dragon beam
dragon claw
dragon fish
dragon gum
dragon lizard
dragon piece
dragon plant
dragon tie
dragon tree
dragon turnip
dragon withe
dragon's blood
dragon's head
dragon's tail
dragon's-tongue
dragon-eyed
dragon-faced
dragon-fly
dragon-mouthed
dragon-ridden
dragon-root
dragon-tree
dragon-winged
dragoon bird
drain arm
drain away
drain cleaner
drain cock

drain cup
drain digger
drain exhauster
drain faucet
drain grate
drain inlet
drain layer
drain of color
drain of resources
drain off
drain out
drain pit
drain pump
drain repairer
drain rocket
drain spade
drain tester
drain the cup
drain trap
drain tube
drain valve
drain well
drainage area
drainage basin
drainage benefit
drainage canal
drainage coefficient
drainage cycle
drainage district
drainage
gate
drainage inlet
drainage inspector
drainage level
drainage pipe
drainage pit
drainage pump
drainage shaft
drainage system
drainage theory
drainage tile
drainage trap
drainage tube
drainage tunnel
drainage well
drainage wind
drained of color
draining board

draining tile
drake fly
drake foot
drake green
dram apothecaries'
dram avoirdupois
dram filler
dram glass
drama critic
drama league
drama production
drama-writing
dramatic art
dramatic form
dramatic irony
dramatic lyric
dramatic monologue
dramatic overture
dramatic play
dramatic poetry
dramatic series
dramatic soprano
dramatic stroke
dramatic structure
dramatico-musical
dramatis personae
drap d'or
drap-de-berry
drape yourself
drapers teasel
draught off
draught-bridge
dravidian languages
draw a bead on
draw a blank
draw a comparison
draw a conclusion
draw a deep breath
draw a gun on
draw a long breath
draw a parallel
draw a picture
draw a straight furrow
draw ahead
draw an inference
draw and quarter
draw aside
draw away

draw
back
draw blank
draw boundaries
draw breath
draw chain
draw cock
draw curtain
draw distinctions
draw dock
draw down
draw first blood
draw forth
draw from
draw game
draw gear
draw hole
draw in
draw in your claws
draw in your horns
draw into
draw it fine
draw lots
draw man
draw near
draw nigh
draw off
draw off the attention
draw on
draw on futurity
draw on the future
draw out
draw over
draw pin
draw play
draw poker
draw press
draw profit
draw rein
draw runner
draw shot
draw slate
draw slip
draw step
draw straws
draw string
draw tab
draw table

draw taper
draw taut
draw tears
draw the attention
draw the breath of life
draw the color line
draw the curtain on
draw the curtains
draw the fangs
draw the fangs of
draw the line
draw the line at
draw the longbow
draw the purse strings
draw the sword against
draw the teeth
draw the teeth of
draw the veil
draw to a close
draw to a head
draw to a peak
draw together
draw top
draw towards
draw up
draw up a plan
draw up a will
draw wages
draw yourself
up
draw-
draw-arch
draw-bar
draw-boy
draw-bridge
draw-cut
draw-file
draw-glove
draw-knife
draw-latch
draw-loom
draw-net
draw-out table
draw-plate
draw-sheet
draw-top table
draw-water
draw-well

drawback collet
drawback lock
drawbar horsepower
drawbar load
drawbar pull
drawcut shaper
drawer dovetail
drawer pull
drawer-down
drawer-in
drawer-off
drawer-out
drawer-up
drawing account
drawing awl
drawing bench
drawing block
drawing board
drawing book
drawing card
drawing chalk
drawing chisel
drawing compasses
drawing crayon
drawing desk
drawing die
drawing forth
drawing frame
drawing glove
drawing in
drawing ink
drawing instrument
drawing knife
drawing lots
drawing machine
drawing office
drawing out
drawing paper
drawing pen
drawing pencil
drawing pin
drawing pliers
drawing power
drawing press
drawing punch
drawing room
drawing rooms
drawing shave

drawing slate
drawing string
drawing table
drawing thread
drawing too thin
drawing-in
drawing-knife
drawing-master
drawing-out
drawing-room
drawing-room
car
drawing-roomy
drawings-in
drawn butter
drawn butter sauce
drawn out
drawn to
drawn work
drawn-out
drawn-thread work
drawn-work
dray horse
dread rattling thunder
dread-bolted
dread-bolted thunder
dream allegory
dream analysis
dream book
dream dance
dream girl
dream life
dream light
dream name
dream of
dream of other things
dream on
dream state
dream stuff
dream symbolism
dream time
dream up
dream vision
dream wish
dream work
dream world
dream-blinded
dream-born

dream-built
dream-created
dream-footed
dream-found
dream-haunted
dream-haunting
dream-hole
dream-perturbed
dream-stricken
dreamer of dreams
dreamless sleep
dreamlike thinking
dreamy abstraction
dreamy-eyed
dreamy-minded
dreamy-souled
dreamy-voiced
drear-nighted
drear-white
dreary-eyed
dreary-looking
dreary-minded
dreary-souled
dredge belt
dredge boat
dredge box
dredge bucket
dredge can
dredge chain
dredge gear
dredge hoist
dredge hopperman
dredge hull
dredge ladder
dredge malt
dredge net
dredge out
dredge pipe
dredge
pontoon
dredge pump
dredge rope
dredge up
dredger bucket
dredging box
dredging bucket
dredging machine
dree-draw

dregs of society
drenched with sweat
drenching rain
dress blues
dress cap
dress circle
dress coat
dress designer
dress down
dress face
dress form
dress goods
dress in
dress out
dress parade
dress rehearsal
dress sheers
dress shield
dress ship
dress shirt
dress shop
dress suit
dress the hair
dress the house
dress the wounds
dress tie
dress to kill
dress uniform
dress up
dress whites
dress-coated
dress-maker
dress-making
dress-up
dressed fit to kill
dressed to advantage
dressed to kill
dressed to the nines
dressed to the teeth
dressed up
dresser cutter
dresser set
dresser spindle
dresser spooler
dresser top
dresser trunk
dressing case
dressing down

dressing forceps
dressing glass
dressing gown
dressing jacket
dressing room
dressing sack
dressing ship
dressing station
dressing table
dressing-board
dressing-case
dressing-down
dressmaker's model
dribble away
driblet cone
dribs
 and drabs
dried beef
dried milk
dried up
dried-fruit beetle
dried-up
drier-down
drift along
drift anchor
drift angle
drift avalanche
drift away
drift boat
drift bottle
drift copper
drift fisher
drift ice
drift indicator
drift keel
drift lead
drift map
drift meter
drift mine
drift mining
drift net
drift netter
drift off course
drift plug
drift sail
drift sight
drift slide
drift transistor

drift tube
drift wire
drift with the current
drift-ice
drift-netter
drift-wood
driggle-draggle
drill attachment
drill barrel
drill barrow
drill bit
drill block
drill book
drill bow
drill bushing
drill cartridge
drill case
drill changer
drill chuck
drill clamp
drill cleaner
drill cloth
drill collar
drill collet
drill corps
drill cutter
drill cylinder
drill day
drill drift
drill driver
drill engine
drill extension
drill extractor
drill feeder
drill file
drill fluter
drill gauge
drill grinder
drill ground
drill hall
drill hardener
drill harrow
drill holder
drill hole
drill instructor
drill jar
drill jig
drill

lubricato
drill maker
drill making
drill mounting
drill pin
drill pipe
drill plow
drill point
drill pointer
drill press
drill rack
drill ratchet
drill regulation
drill rest
drill room
drill sergeant
drill shank
drill sharpener
drill ship
drill sleeve
drill socket
drill speeder
drill spring
drill stand
drill steel
drill straightener
drill team
drill tester
drill tower
drill track
drill twister
drill worker
drill yard
drill-like
drilling bit
drilling fluid
drilling hammer
drilling jig
drilling journal
drilling machine
drilling mud
drilling stem
drilling track
drink a stirrup cup
drink a toast to
drink bottoms-up
drink deep
drink hard

drink in
drink in with rapt attention
drink like a fish
drink mixer
drink money
drink off
drink offering
drink seriously
drink the health of
drink to
drink up
drink-hael
drink-hail
drinker moth
drinking age
drinking bout
drinking cup
drinking fountain
drinking glass
drinking horn
drinking house
drinking mug
drinking place
drinking saloon
drinking song
drinking
straw
drinking time
drinking trough
drinking vessel
drinking vessels
drinking water
drinking-up time
drip band
drip board
drip box
drip cap
drip cock
drip coffee
drip coffee maker
drip cup
drip grind
drip groove
drip joint
drip loop
drip molding
drip oil
drip pan

drip pipe
drip pocket
drip primrose
drip sheet
drip tank
drip tip
drip transfusion
drip tray
drip treatment
drip trough
drip valve
drip-dried
drip-drip
drip-drop
drip-dry
drip-drying
drip-ground
dripping pan
dripping point
dripping wet
drive a bargain
drive a hard bargain
drive a roaring trade
drive ahead
drive an entering wedge
drive animals
drive at
drive away
drive back
drive crazy
drive dull care away
drive fit
drive from your thoughts
drive home to
drive in
drive insane
drive into a corner
drive into the open
drive into your head
drive mad
drive nozzle
drive off
drive on
drive out
drive screw
drive shaft
drive shoe
drive stakes

drive the pen
drive the pencil
drive to despair
drive to desperation
drive to leeward
drive
 to ruin
drive to the bad
drive to the dogs
drive to the wall
drive together
drive train
drive up the wall
drive wheel
drive whist
drive you hard
drive you mad
drive yourself
drive-
drive-in
drive-in restaurant
drive-in theater
drivel away
driveling idiot
driven from pillar to post
driven snow
driver ant
driver mast
driver's license
driver's seat
driving age
driving and striking force
driving axle
driving band
driving barrel
driving bit
driving board
driving box
driving chain
driving clock
driving dog
driving drum
driving face
driving fit
driving force
driving gear
driving horn
driving horse

driving iron
driving licence
driving mashie
driving mirror
driving out
driving park
driving plate
driving power
driving punch
driving rain
driving range
driving sail
driving shaft
driving snow
driving spring
driving wagon
driving wheel
driving-box
driving-wheel
drizzle-drozzle
drizzling mist
drof-land
drogue chute
droit des gens
droit du seigneur
droits des gens
dromedary corps
dromos tomb
drone
 bass
drone bee
drone cell
drone fly
drongo cuckoo
drongo shrike
droop-eared
droop-headed
droop-nosed
drooping spirits
drop a bomb
drop a brick
drop a hint
drop a letter
drop a line
drop a tear
drop all idea of
drop anchor
drop arch

drop asleep
drop away
drop bar
drop behind
drop biscuit
drop black
drop bolt
drop bomb
drop bottom
drop box
drop by
drop by drop
drop cannon
drop chalk
drop chronograph
drop cloth
drop cooky
drop cord
drop curtain
drop dead
drop down
drop ear
drop elbow
drop ell
drop fly
drop folio
drop forge
drop forging
drop frame
drop from sight
drop from the clouds
drop from your thoughts
drop front
drop game
drop girt
drop glass
drop goal
drop guide
drop hammer
drop hammerman
drop handle
drop hanger
drop head
drop in
drop in on
drop in temperature
drop in the bucket
drop in the ocean

drop in your tracks
drop initial
drop into a good thing
drop it
drop jaw
drop keel
drop key
drop kick
drop lamp
drop leaf
drop letter
drop like a hot potato
drop line
drop number
drop off
drop
on
drop out
drop out of society
drop panel
drop pass
drop pit
drop press
drop roller
drop rudder
drop scene
drop scone
drop screen
drop seat
drop serene
drop shipment
drop shipper
drop shot
drop shutter
drop siding
drop stitch
drop strake
drop stroke
drop sulphur
drop table
drop tank
drop tee
drop testing machine
drop the ball
drop the curtain
drop the handkerchief
drop the hook
drop the mooring

drop the subject
drop to pieces
drop valve
drop vie
drop weight
drop window
drop wire
drop worm
drop your eyes
drop your gaze
drop your guard
drop zinc
drop-
drop-away
drop-bottom bucket
drop-center rim
drop-eared
drop-forge
drop-forged
drop-forger
drop-forging
drop-forging die
drop-front
drop-kick
drop-kicker
drop-leaf
drop-leaf table
drop-leg
drop-letter
drop-meal
drop-off
drop-out
drop-out current
drop-out voltage
drop-scene
drop-shaped
drop-stich
drophead coup
droplet fall
droplet infection
dropped egg
dropped eggs
dropped from the clouds
dropped girt
dropped scone
dropped seat
dropper

fly
dropper-on
dropping anchor
dropping angle
dropping bottle
dropping out
dropsy plant
dropsy-dry
dropsy-sick
drought-parched
drought-resisting
drought-stricken
drove chisel
drove work
drove-road
drown care
drown out
drown your sorrows
drowned coast
drowned valley
drowning rain
drowse off
drug abuser
drug addict
drug addiction
drug beetle
drug bottler
drug carriage
drug clerk
drug compounder
drug culture
drug dependence
drug dose
drug fiend
drug grinder
drug habit
drug ice
drug in the market
drug mixer
drug on the market
drug packet
drug pulverizer
drug pusher
drug rash
drug seller
drug store
drug treatment
drug trip

drug user
drug weigher
drug-addicted
drug-damned
drug-grinding
drug-mixing
drug-pulverizing
drug-selling
drug-using
drugged sleep
drugged with sleep
drugstore beetle
drugstore complexion
drugstore cowboy
druid stone
drum armature
drum brake
drum clock
drum controller
drum corps
drum dam
drum escapement
drum feed
drum language
drum major
drum majorette
drum malt
drum memory
drum
music
drum out
drum paneling
drum puller
drum sander
drum saw
drum scale
drum screen
drum sieve
drum slide
drum spool
drum stuffing
drum switch
drum table
drum up
drum washer
drum wheel
drum winding
drum-major

drum-major's baton
drum-shaped
drum-type elevator
drum-up
drum-wound
drumble-drone
drumhead cabbage
drumhead court-martial
drumhead justice
drumming out
drummond light
drumstick tree
drunk as a fiddler
drunk as a lord
drunk as a piper
drunk as an owl
drunkard's chair
drunken brawl
drunken carousal
drunken plant
drunken revelry
drunken rye grass
drunken saw
dry air
dry ammunition
dry as a bone
dry as dust
dry battery
dry beater
dry bed
dry behind the ears
dry bone
dry bones
dry cell
dry cereal
dry cleaner
dry cleaning
dry compass
dry cooper
dry distillation
dry dock
dry farm
dry farmer
dry farming
dry fire
dry fly
dry fog
dry freeze

dry fresco
dry gangrene
dry garden
dry goods
dry goods dealer
dry goods store
dry hole
dry ice
dry kiln
dry lake
dry land
dry law
dry martini
dry
 measure
dry milk
dry miller
dry mixer
dry mop
dry nurse
dry offset
dry out
dry pint
dry pipe
dry plate
dry pleurisy
dry point
dry puddling
dry quart
dry rent
dry rot
dry run
dry sailing
dry sailor
dry season
dry socket
dry spinner
dry steam
dry sterile thunder without rain
dry storage
dry up
dry wash
dry well
dry wine
dry wit
dry womb
dry-air pump
dry-as-dust

dry-beat
dry-blowing
dry-bone ore
dry-boned
dry-bones
dry-brush
dry-bulb thermometer
dry-burnt
dry-clean
dry-cleanse
dry-cleansed
dry-cleansing
dry-cure
dry-curing
dry-dock
dry-dye
dry-eared
dry-eyed
dry-farm
dry-fine
dry-fist
dry-fly
dry-fly fishing
dry-foot
dry-footed
dry-footing
dry-founder
dry-fruited
dry-grind
dry-gulch
dry-handed
dry-heat cure
dry-ki
dry-land blueberry
dry-land farming
dry-leaved
dry-lipped
dry-looking
dry-mouthed
dry-nurse
dry-nursed
dry-nursing
dry-paved
dry-pick
dry-pipe system
dry-pipe valve
dry-plate process
dry-powder extinguisher

dry-press
dry-press process
dry-roasted
dry-rot
dry-rotted
dry-rub
dry-sail
dry-salt
dry-salted
dry-scrubbed
dry-shave
dry-shod
dry-shoot
dry-skinned
dry-soled
dry-stone
dry-tamp
 machine
dry-throated
dry-tongued
dry-weather flow
dry-weather vine
drying blotter
drying cabinet
drying chamber
drying fan
drying floor
drying frame
drying house
drying kiln
drying loft
drying oil
drying oven
drying pan
drying paper
drying rack
drying room
drying shed
drying tray
drying tube
drying up
drying yard
dryland farming
dryness fraction
du Bellay
du Cerceau
du Nouy tensiometer
du Vigneaud

du jour
dual carriageway
dual citizenship
dual controls
dual highway
dual nationality
dual personality
dual pricing
dual purpose fund
dual space
dual-control trainer
dual-purpose
dub bright
dub in
duc de Rivoli
duces tecum
duchesse bed
duchesse lace
duck acorn
duck and drake
duck and run
duck ant
duck blue
duck breeder
duck bumps
duck call
duck duty
duck egg
duck fit
duck foot
duck grass
duck green
duck gun
duck hawk
duck hunter
duck joint
duck keeper
duck mole
duck moss
duck oak
duck
on a rock
duck on drake
duck on the rock
duck out
duck pass
duck pen
duck potato

duck rearer
duck responsibility
duck ring
duck sauce
duck shot
duck sickness
duck snipe
duck soup
duck table
duck the issue
duck wheat
duck willow
duck's arse
duck's bill
duck's egg
duck's meat
duck-bill
duck-billed
duck-billed dinosaur
duck-billed platypus
duck-egg
duck-egg blue
duck-footed
duck-hawk
duck-legged
duck-retter
duck-toed
duckbill cat
duckbill gar
duckbill platypus
ducking stool
ducking-pond
ducking-stool
ducks and drakes
ducktail haircut
duckweed family
duct keel
ductless gland
dudder grass
dude ranch
dude up
due bill
due course
due course of law
due date
due north
due process
due process of law

due punishment
due reward
due season
due sense of
due to
dueling pistol
dues-paying member
duff up
duffel bag
duffel coat
duffle coat
dug-out
dug-up
duke cherry
dukey rider
dulcimer harpsichord
dull as dish water
dull as dishwater
dull as ditchwater
dull bitterness of cold
dull hearing
dull of hearing
dull
 of mind
dull the pain
dull thud
dull tool
dull-brained
dull-browed
dull-colored
dull-eared
dull-edged
dull-eyed
dull-head
dull-headed
dull-headedness
dull-lived
dull-looking
dull-pated
dull-pointed
dull-red
dull-scented
dull-sighted
dull-sightedness
dull-sounding
dull-spirited
dull-surfaced
dull-toned

dull-tuned
dull-voiced
dull-witted
dull-wittedness
dulse dealer
dulse-green
duly constituted
dum spiro spero
dum vivimus vivamus
dumb Dora
dumb ague
dumb animal
dumb barge
dumb barter
dumb bid
dumb bunny
dumb cane
dumb cluck
dumb compass
dumb creature
dumb friend
dumb rabies
dumb sheave
dumb show
dumb stricken
dumb struck
dumb thing to do
dumb trick
dumb up
dumb with grief
dumb-bell
dumb-bird
dumb-cane
dumb-show
dumb-struck
dumb-waiter
dumble-
dumdum bullet
dumdum fever
dummy antenna
dummy block
dummy car
dummy cartridge
dummy cop
dummy experiment
dummy index
dummy joint
dummy pass

dummy share
dummy up
dummy variable
dummy whist
dummy-head torpedo
dump altitude
dump body
dump car
dump
 heap
dump hook
dump on
dump pile
dump rake
dump scow
dump truck
dump wagon
dumping bucket
dumping car
dumping cart
dumping device
dumping duty
dumping grate
dumping ground
dumping machine
dumping place
dumping press
dumping truck
dumping wagon
dumpling cactus
dumpy level
dun crow
dun diver
dun fly
dun-belted
dun-bird
dun-brown
dun-colored
dun-diver
dun-drab
dun-driven
dun-haunted
dun-olive
dun-plagued
dun-racked
dun-red
dun-white
dun-yellow

dun-yellowish
duncan phyfe
dunce cap
dunce's cap
dundathu pine
dundrea- ries
dune buggy
dune dweller
dune forest
dune grass
dune heath
dune land
dune marsh
dune plant
dune sand
dung bath
dung beetle
dung cart
dung chafer
dung fly
dung fork
dung heap
dung pit
dung worm
dung-cart
dung-fork
dunga-runga
dunghill fowl
dunk tree
duo-
duodecim-
duodecimal system
duodecuple scale
duoden-
duodenal ulcer
duodiode-triode
dupable person
duple measure
duple ratio
duple rhythm
duple time
duplex apartment
duplex bed
duplex boiler
duplex escapement
duplex house
duplex

lock
duplex oxygenator
duplex process
duplex pump
duplex purchase
duplex telegraphy
duplex-numeric index
duplexity theory
duplicate bridge
duplicate plate
duplicate-pinnate
duplicating machine
duplication of effort
duplication of the cube
duplicato-
duplicato-dentate
duplicato-serrate
duplicato-ternate
duplicity principle
duplicity theory
dura mater
durable goods
durable press
durance vile
durango root
durante vita
durfa grass
durfee grass
during the interval
during the time
during the time that
during which time
durry-dandy
durum wheat
dusk dark
dusk-down
dusky grouse
dusky shark
dusky-browed
dusky-colored
dusky-faced
dusky-mantled
dusky-raftered
dusky-sandaled
dust ball
dust band
dust bin
dust bowl

dust brush
dust cap
dust cart
dust chamber
dust cloak
dust cloud
dust coat
dust count
dust counter
dust cover
dust devil
dust down
dust exhaust
dust extractor
dust furrow
dust gun
dust heap
dust in the eyes
dust infection
dust jacket
dust louse
dust mop
dust mulch
dust of ages
dust
off
dust process
dust remover
dust ruffle
dust seal
dust shot
dust storm
dust thrown in the eye
dust trunk
dust well
dust whirl
dust your jacket
dust-bath
dust-begrimed
dust-box
dust-brand
dust-colored
dust-counter
dust-covered
dust-dry
dust-gray
dust-laden
dust-laying

dust-point
dust-polluting
dust-producing
dust-soiled
dust-throwing
dust-tight
dust-up
duster coat
duster-off
dusting brush
dusting colors
dusting powder
dusting-powder
dusty clover
dusty death
dusty miller
dutch clover
dutch courage
dutch door
dutch elm disease
dutch hoe
dutch lunch
dutch oven
dutch treat
dutch uncle
duties and responsibilities
duty calls you to
duty officer
duty visit
duty-bound
duty-free
duty-free shop
dvi-manganese
dwarf Japanese quince
dwarf Juneberry
dwarf alder
dwarf banana
dwarf bean
dwarf chestnut
dwarf cornel
dwarf crested iris
dwarf door
dwarf fan palm
dwarf ginseng
dwarf goldenrod
dwarf laurel
dwarf mallow
dwarf meadow grass

dwarf morning-glory
dwarf nasturtium
dwarf palmetto
dwarf poinciana
dwarf
star
dwarf sumac
dwell in
dwell in your memory
dwell on
dwell upon
dwelling house
dwelling place
dwelling upon
dy-
dyadic system
dyakis-dodecahedron
dycrete process
dye bag
dye base
dye bath
dye boiler
dye box
dye bucket
dye grinder
dye in the wool
dye maker
dye mixer
dye pine
dye pot
dye remover
dye sensitizing
dye tank
dye therapy
dye transfer
dye tub
dye vat
dye works
dye your hands in blood
dyed in the wool
dyed-in-the-wool
dyer's furze
dyer's greenweed
dyer's rocket
dyer's woodruff
dyer's-broom
dyer's-greenweed
dyer's-weed

dyewood clipper
dyewood cutter
dyewood extract
dyewood grinder
dyewood liquor
dyewood miller
dying away
dying breath
dying day
dying down
dying for
dying hour
dying off
dying to
dying word
dying words
dynam-
dynamic economics
dynamic electricity
dynamic energy
dynamic geology
dynamic lift
dynamic markings
dynamic meteorology
dynamic microphone
dynamic pressure
dynamic psychology
dynamic speaker
dynamic stability
dynamic symmetry
dynamic wind rose
dynamical
astronomy
dynamical stability
dynamite bomb
dynamite cap
dynamite glycerin
dynamite gun
dynamite maker
dynamite mixer
dynamite thawer
dynamo belting
dynamo brush
dynamo casting
dynamo commutator
dynamo erector
dynamo lubricator
dynamo winder

dynamo-
dynamometric governor
dynatron oscillator
dyne centimeter
dyne-seven
dys-
dysenteric arthritis
dysentery root
dzera-a-rabry pik
dzera-a-torky pik
e layer
e pluribus unum
e region
e-
eV
each and all
each and every
each and every one
each in its turn
each one
each other
each to each
each-where
eager assent
eager attention
eager beaver
eager-eyed
eager-hearted
eager-looking
eager-minded
eager-seeming
eagle bird
eagle boat
eagle claw
eagle eye
eagle feather
eagle fern
eagle flower
eagle gull
eagle hawk
eagle lectern
eagle owl
eagle plume
eagle ray
eagle rock
eagle scout
eagle vulture
eagle wing

eagle-billed
eagle-eyed
eagle-flighted
eagle-hawk
eagle-headed
eagle-pinioned
eagle-seeing
eagle-sighted
eagle-winged
eagle-wood
ear conch
ear cornet
ear
 coverts
ear crystal
ear drops
ear dust
ear flap
ear fly
ear for music
ear for, an
ear fungus
ear guard
ear index
ear leaf
ear lobe
ear mold
ear muff
ear of corn
ear off
ear piercer
ear reach
ear rot
ear sand
ear shell
ear snail
ear specialist
ear stone
ear tag
ear tick
ear tree
ear trumpet
ear wagon
ear, nose, and throat specialist
ear-ache
ear-brisk
ear-cockie
ear-deafening

ear-filling
ear-leaved
ear-mark
ear-minded
ear-mindedness
ear-piercing
ear-rending
ear-rent
ear-ring
ear-splitting
ear-to-ear grin
ear-trumpet
ear-wax
ear-witness
eardrop tree
eared seal
earl duck
earl marshal
earl marshall
earl palatine
earless lizard
earless seal
earlier state
earliest inhabitant
earls palatine
early bird
early blight
early closing
early comer
early death
early edition
early enough
early grave
early hour
early meadow grass
early meadow rue
early mesquite
early on
early purple orchid
early renaissance
early riser
early saxifrage
early stage
early symptom
early times
early warning
early warning

system
early wood
early years
early-type star
early-warning radar
earn a bad name
earn a livelihood
earn a living
earn your keep
earned income
earned run
earned run average
earned surplus
earnest money
earnest-penny
earning grass
ears more deaf than adders
earth almond
earth apple
earth art
earth artist
earth auger
earth battery
earth bob
earth bread
earth cell
earth chestnut
earth circuit
earth closet
earth club
earth color
earth colour
earth crab
earth crust
earth current
earth division
earth dweller
earth flax
earth flea
earth foam
earth goddesses
earth hog
earth hole
earth house
earth hunger
earth induction compass
earth inductor compass
earth ivy

earth life
earth lodge
earth louse
earth metal
earth metals
earth moss
earth mother
earth movement
earth orbit
earth owl
earth pig
earth pillar
earth pitch
earth plate
earth plum
earth quadrant
earth science
earth smoke
earth spirit
earth spring
earth stopper
earth table
earth tide
earth tilting
earth tone
earth tremor
earth up
earth wave
earth
 wax
earth wire
earth wolf
earth's crust
earth-apple
earth-ball
earth-board
earth-born
earth-bound
earth-boundness
earth-convulsing
earth-delving
earth-destroying
earth-devouring
earth-din
earth-dwelling
earth-eating
earth-engendered
earth-fed

earth-god
earth-goddess
earth-homing
earth-light
earth-lit
earth-mad
earth-moving
earth-nut
earth-old
earth-refreshing
earth-rending
earth-shaking
earth-sounds
earth-sprung
earth-stained
earth-strewn
earth-vexing
earth-wide
earth-wrecking
earthly minded
earthly-minded
earthly-mindedness
earthly-wise
earthnut oil
earthquake insurance
earthquake-proof
ease in
ease matters
ease of belief
ease off
ease one of
ease out
ease the helm
ease the rudder
ease up
ease up to
ease your load
ease yourself
ease-off
ease-up
easel-picture
easement curve
easier said than done
easily attained
easily first
easily reached
easily taken in
easily understood

easing of relations
easing of the load
easing of the way
easing sparrow
east Greenland current
east by north
east
 by south
east india
east indian
east indies
east wind
east-country
east-end
east-northeast
east-northeastward
east-northeastwardly
east-sider
east-southeast
east-southeastward
east-southeastwardly
east-windy
easter egg
easter lily
easter monday
easter-day
easterly wave
eastern coral snake
eastern crown
eastern diamondback rattlesnake
eastern hemisphere
eastern hemlock
eastern kingbird
eastern orthodox
eastern red cedar
eastern time
easting down
easy aces
easy as falling off a log
easy as pie
easy chair
easy circumstances
easy come
easy come, easy go
easy death
easy does it
easy end
easy game

easy go
easy going
easy lay
easy mark
easy mind
easy money
easy of belief
easy on the eyes
easy pickings
easy prices
easy purse strings
easy rider
easy slope
easy street
easy target
easy temper
easy thing
easy to be seen
easy to get along with
easy to speak to
easy to understand
easy victory
easy virtue
easy winner
easy woman
easy-fitting
easy-flowing
easy-going
easy-hearted
easy-humored
easy-mannered
easy-minded
easy-natured
easy-paced
easy-rising
easy-running
easy-spoken
eat
away
eat crow
eat dirt
eat heartily
eat hearty
eat high off the hog
eat humble pie
eat in
eat into
eat like a bird

eat like a horse
eat off the same trencher
eat out
eat out of house and home
eat out of your hand
eat sparingly
eat the bread of idleness
eat the dust of
eat the wind out of
eat to live
eat to windward
eat to windward of
eat up
eat up the road
eat up the track
eat you out of house and home
eat your fill
eat your head off
eat your heart out
eat your terms
eat your words
eat, drink, and be merry
eat-all
eaten up
eaten up with curiosity
eaten-leaf
eater-out
eating house
eating tobacco
eating up
eau de Cologne
eau de Javelle
eau de cologne
eau de jasmin
eau de lavande
eau de nil
eau de rose
eau de toilette
eau de vie
eau de vie de marc
eau forte
eau minerale
eau-de-vie
eaux minerales
eave trough
eaves catch
eaves swallow
eaves trough

eavy-soled
ebb anchor
ebb and flow
ebb of life
ebb sleeper
ebb
 tide
eboe light
eboe oil
ebony family
ebony spleenwort
ec-
ecaille work
ecca leobion
ecce homo
ecce signum
eccle grass
ecclesi-
ecclesiastical calendar
ecclesiastical council
ecclesiastical court
ecclesiastical insignia
ecclesiastical law
ecclesiastical mode
ecclesiastical society
ecclesiastico-military
ecclesiastico-secular
eccrine gland
echelette grating
echelle grating
echelon grating
echelon lens
echin-
echino-
echo attachment
echo back
echo chamber
echo organ
echo pulse
echo signal
echo sounder
echo sounding
echoic word
eclectic medicine
eclipse breeze
eclipse plumage
eclipsing binary
eclipsing variable

eco-
ecological niche
ecological psychology
economic authority
economic blindness
economic class
economic community
economic cycle
economic determinism
economic determinist
economic expansion
economic expert
economic geography
economic geology
economic good
economic growth
economic man
economic planning
economic poison
economic rent
economic science
economic self-sufficiency
economic
stagnation
economic strike
economic support
economic system
economic warfare
economical of words
economics in action
economy class
economy coil
economy of assumption
economy of language
economy of means
economy of words
economy prices
economy size
economy wall
ecrevisse de mer
ecru silk
ect-
ecto-
ectopic pregnancy
ecumenical council
ecumenical movement
ecumenical patriarch
ecumenical patriarchate

ed-
eddy chamber
eddy current
eddy-current brake
eddy-wind
edge effect
edge in
edge iron
edge joint
edge molding
edge off
edge out
edge plane
edge tool
edge tools
edge up to
edge-bone
edge-grain
edge-grained
edge-tool
edge-ways
edging grinder
edging lobelia
edible oil
edit out
edited text
edited version
editio princeps
edition bindery
edition binding
edition time
editiones principes
editor in chief
editor-in-chief
editorial writer
editorial-writing
editors in chief
educated class
educated language
educated man
educated speech
educational administrator
educational film
educational institution
educational
psychology
educational television
eel cat

eel fork
eel netting
eel-back flounder
eel-backed
eel-bed
eel-catching
eel-fare
eel-pout
eel-shaped
eel-skin
eel-spear
eentsy-weentsy
eeny meeny miney moe
ef-
efface from the memory
efface yourself
effect a sale
effect of
effect your escape
effective current
effective electromotive force
effective force
effective horsepower
effective pitch
effective rejoinder
effective resistance
effective sound pressure
effective style
effector organ
effeminate male
efferent neuron
efficiency apartment
efficiency engineer
efficiency engineering
efficiency expert
efficient cause
effigy mound
efflux tube
effort syndrome
effusion balance
effusive rock
efwatakala grass
egads button
egg albumen
egg albumin
egg and anchor
egg and dart
egg and spoon race

egg and tongue
egg apparatus
egg cell
egg coal
egg cozy
egg cream
egg cup
egg drop soup
egg flip
egg foo yong
egg glass
egg in your beer
egg on
egg roll
egg rolling
egg salad sandwich
egg sauce
egg
 sleeker
egg slice
egg spoon
egg stone
egg tempera
egg timer
egg tooth
egg white
egg whites
egg-and-spoon race
egg-bound
egg-nog
egg-plant
egg-shaped
egg-shell
egg-white
egg-white injury
eggdrop soup
eggs Benedict
eggshell blue
eggshell china
eggshell porcelain
eggy-hot
ego defense
ego defenses
ego ideal
ego trip
ego-id conflict
ego-involve
ego-libido

ego-trip
egoistic ethics
egoistic hedonism
egregious ass
egressAstronomy
egret monkey
egyptian cotton
egypto-
eider down
eider duck
eider yarn
eider-down
eidetic image
eidetic imagery
eidetic memory
eigen-
eight ball
eight bells
eight cut
eight o'clock
eight-angled
eight-armed
eight-ball antenna
eight-celled
eight-cylinder
eight-day
eight-flowered
eight-gauge
eight-hour
eight-oar
eight-oared
eight-ply
eight-quarter cap
eight-spot
eight-square
eight-wheeler
eighter from Decatur
eightfold way
eighth note
eighth rest
eighth stock
eightsome reel
eighty-eight
eighty-eighth
eighty-fifth
eighty-first
eighty-five
eighty-four

eighty-fourth
eighty-nine
eighty-niner
eighty-ninth
eighty-one
eighty-second
eighty-seven
eighty-seventh
eighty-six
eighty-sixth
eighty-third
eighty-three
eighty-two
eis
 wool
either or
either-or
ejection capsule
ejection seat
ejector seat
eka-aluminum
eka-iodine
eke out
eke out a living
eke out an existence
eke-name
el dorado
elaeo-
elan vital
elao-
elastic anklet
elastic axis
elastic band
elastic bandage
elastic binder
elastic braid
elastic cement
elastic center
elastic currency
elastic deformation
elastic gel
elastic hosier
elastic hosiery
elastic kneecap
elastic limit
elastic loom
elastic modulus
elastic money

elastic object
elastic paper
elastic rubber
elastic stocking
elastic substance
elastic tape
elastic thread
elastic tissue
elastic varnish
elastic veiling
elastic wave
elastic-seeming
elastic-sided
elbow bender
elbow board
elbow catch
elbow cop
elbow crooker
elbow grease
elbow in
elbow in the ribs
elbow length
elbow rail
elbow telescope
elbow-shaped
elder bark
elder blossom
elder blow
elder fungus
elder
hand
elder statesman
elder wine
elder-born
elder-brother
elder-leaved
elder-sister
elderberry wine
eldest hand
eldest of things
eldest-born
elec cement
elected by acclamation
election board
election district
election fraud
election returns
elective operation

electoral college
electoral district
electoral vote
electr-
electra complex
electric arc
electric attraction
electric beaver
electric blanket
electric blue
electric brougham
electric cable
electric candle
electric capacitance
electric car
electric chair
electric charge
electric circuit
electric clock
electric column
electric conduction
electric constant
electric cooker
electric cord
electric current
electric detonator
electric dipole moment
electric discharge
electric drill
electric driller
electric eel
electric exploder
electric eye
electric fan
electric field
electric field intensity
electric field strength
electric fish
electric flow
electric frying pan
electric furnace
electric fuse
electric gain
electric glow
electric
guitar
electric hammer
electric hare

electric heat
electric heater
electric heating
electric horsepower
electric intensity
electric iron
electric lamp
electric light
electric light bulb
electric lighting
electric meter
electric meters
electric mole
electric motor
electric needle
electric organ
electric pad
electric polarity
electric potential
electric power
electric railway
electric range
electric ray
electric razor
electric reactor
electric refrigeration
electric refrigerator
electric repulsion
electric resistance
electric riveter
electric roaster
electric sander
electric saw
electric seal
electric shaver
electric shock
electric soldering iron
electric spark
electric storm
electric stove
electric stream
electric switch
electric telegraph
electric thermometer
electric toaster
electric torch
electric train
electric typewriter

electric unit
electric units
electric wave
electric welder
electric wind
electric wire
electric-arc furnace
electric-arc lamp
electric-discharge lamp
electric-discharge
tube
electric-drive
electric-heat
electric-heated
electric-lighted
electric-powered
electrical capacity altimeter
electrical communication
electrical degree
electrical device
electrical engineer
electrical engineering
electrical governor
electrical part
electrical parts
electrical parts and devices
electrical scanning
electrical science
electrical storm
electrical transcription
electricity meter
electro-
electro-biology
electro-discharge machining
electro-magnet
electro-optical effect
electro-organic chemistry
electro-osmosis
electro-osmotic
electro-osmotically
electro-pneumatic organ
electro-ultrafiltration
electrocaloric effect
electrochemical series
electroconvulsive therapy
electrode conductance
electrode potential
electrode resistance

electrodeless discharge
electrodynamic speaker
electrohydraulic steering gear
electroless plating
electrolier switch
electrolytic capacitor
electrolytic cell
electrolytic conductor
electrolytic dissociation
electrolytic gas
electrolytic interrupter
electrolytic
machining
electrolytic protection
electromagnetic field
electromagnetic induction
electromagnetic interaction
electromagnetic lifting magnet
electromagnetic moment
electromagnetic pump
electromagnetic radiation
electromagnetic speaker
electromagnetic spectrum
electromagnetic tape
electromagnetic unit
electromagnetic wave
electromechanical controller
electromotive force
electromotive series
electron accelerator
electron affinity
electron beam
electron camera
electron capture
electron cloud
electron diffraction
electron dynamics
electron emission
electron flow
electron gas
electron gun
electron layers
electron lens
electron magnetic spectroscope
electron micrograph
electron microscope
electron microscopy
electron movement

electron multiplier
electron optics
electron pair
electron physics
electron probe microanalysis
electron ray
electron shells
electron shower
electron spin
electron spin resonance
electron state
electron stream
electron telescope
electron theory
electron
 theory of atoms
electron theory of electricity
electron theory of solids
electron transfer
electron transport
electron tube
electron tubes
electron volt
electron-beam tube
electron-diffraction camera
electron-image projector
electron-image tube
electron-positron pair
electron-ray tube
electron-volt
electron-wave tube
electronic Bohr magneton
electronic air conditioner
electronic air filter
electronic altimeter
electronic battery
electronic brain
electronic carillon
electronic chronometer
electronic circuit
electronic clock
electronic communication
electronic communications
electronic comparator
electronic computer
electronic computers
electronic control
electronic cop

electronic counter
electronic data processing
electronic detector
electronic device
electronic devices
electronic drum
electronic effect
electronic emission
electronic engineering
electronic fix
electronic flash
electronic fuel gauge
electronic hearing aid
electronic heater
electronic heating
electronic limit gauge
electronic
meter
electronic meters
electronic music
electronic navigation
electronic nutcracker
electronic organ
electronic oscillator
electronic pilot
electronic potentiometer
electronic precipitator
electronic recorder
electronic refrigeration
electronic refrigerator
electronic revolution
electronic scanning
electronic servo
electronic stenciling machine
electronic stethoscope
electronic surveillance
electronic switch
electronic switching
electronic testing
electronic testing equipment
electronic timer
electronic tube
electronic typewriter
electronic voltmeter
electronic-flash unit
electronic-mechanical control
electronics dictionary
electronics engineer

electronics king
electronics physicist
electropneumatic transducer
electroshock therapy
electrostatic field
electrostatic generator
electrostatic inductio
electrostatic induction
electrostatic lens
electrostatic machine
electrostatic precipitation
electrostatic precipitator
electrostatic printing
electrostatic speaker
electrostatic spraying
system
electrostatic storage unit
electrostatic tube of force
electrostatic unit
electrotherapeutic treatment
electrotype press
electrovalent bond
elegant penmanship
elegant variation
elegant writer
elegiac couplet
elegiac distich
elegiac pentameter
elegiac poetry
elegiac stanza
elegiac verse
eleme figs
elemental area
elemental spirit
elementary algebra
elementary arithmetic
elementary dictionary
elementary education
elementary instruction
elementary mathematics
elementary metal
elementary metals
elementary particle
elementary process
elementary quantum of action
elementary school
elementary unit
elemi figs

eleolite syenite
elephant apple
elephant beetle
elephant bird
elephant driver
elephant fish
elephant grass
elephant gun
elephant seal
elephant shrew
elephant's trunk
elephant's trunk snake
elephant's-ear
elephant's-foot
elephant's-foots
elephant-ear fern
elephant-hide pahoehoe
eleuthera bark
eleuthero-
elevate your mood
elevated railroad
elevated railway
elevating rudder
elevation
Astronomy
elevator angle
elevator boy
elevator car
elevator conductor
elevator conveyer
elevator dredge
elevator girl
elevator man
elevator operator
elevator shaft
elevator shaftelevator signal
elevator signal
elevator starter
eleven o'clock
eleven-oclock-lady
eleven-plus
eleven-year period
eleventh chord
eleventh hour
eleventh-hour
elf arrow
elf child
elf dance

elf kind
elf kindred
elf knight
elf owl
elf queen
elf-god
elf-lock
elf-shoot
elf-shot
elf-stricken
elf-struck
elf-taken
elfin-tree
eligible paper
elimination contest
elisor jury
elite corps
elite group
elite or long primer
elite troops
elixir of life
elixir vitae
elk bark
elk clover
elk nut
elk-grass
ell-broad
ell-long
ell-wand
ell-wide
ellipsoidal basalt
ellipsoidal lava
elliptic function
elliptic geometry
elliptic integral
elliptic spring
elliptic velocity
elliptic-lanceolate
elliptic-leaved
elliptical function
elliptical galaxy
elliptical light
elliptical polarization
elliptically polarized
elm balsam
elm bark
elm bark

beetle
elm blight
elm calligrapha
elm leaf beetle
elm phloem necrosis
elm-leaved
elongato-conical
elongato-ovate
eloquent tongue
elude one
elution process
elytr-
em dash
em pica
em quad
em space
em-
emanate a smell
emanate from
embalm in the memory
embalmed corpse
embalming fluid
embark in
embark on
embark upon
embarkation deck
embarras de choix
embarras de richesses
embarrassed circumstances
embarrassing position
embarrassing situation
embattled grady
embed itself in the mind
ember day
ember goose
emblem book
emblem of authority
embodied in
embody in words
embol-
embossing plate
embrace a belief
embrace reality
embroidery floss
embroidery frame
embroidery needle
embry-
embryo bearer

embryo sac
embryon-
embryonic disk
embryonic layer
embryonic membrane
emerald copper
emerald cut
emerald green
emerald toucanet
emerald-green
emerge from
emergency barrage
emergency boat
emergency brake
emergency control
emergency exit
emergency landing field
emergency landing gear
emergency light
emergency
man
emergency money
emergency operation
emergency rations
emergent evolution
emeritus status
emery belt
emery board
emery cloth
emery file
emery paper
emery powder
emery rock
emery surfacer
emery wheel
emeto-cathartic
eminence grise
eminent domain
emission current
emission spectrum
emission theory
emit a smell
emit a sound
emitter current
emitter junction capacitance
emitter resistance
emitter signal current
emitter signal voltage

emotional appeal
emotional capacity
emotional charge
emotional deadness
emotional disorder
emotional dissociation
emotional health
emotional instability
emotional instability reaction
emotional insulation
emotional life
emotional nuance
emotional numbness
emotional outburst
emotional paralysis
emotional release
emotional response
emotional shade
emotional shock
emotional support
emotional symptom
emotionally dead
emotionally numb
emotionally paralyzed
emotionally respond
emotionally unstable
emotionally unstable personality
emotive meaning
empathize with
emperor
 boa
emperor butterfly
emperor moth
emperor penguin
empire builder
empire building
empire cloth
empire day
empire-builder
empiric treatment
empirical existence
empirical fact
empirical formula
empirical politics
employ the time
employ time
employ your time in
employ yourself in

employ yourself upon
employer-owned
employment agency
employment agent
employment bureau
employment contract
employment exchange
empress cloth
empress of silence
empress tree
emptiness of mind
empty ceremony
empty claim
empty formality
empty gesture
empty hands
empty morph
empty name
empty of
empty out
empty pocket
empty purse
empty sound
empty space
empty stomach
empty threat
empty title
empty view
empty word
empty words
empty-armed
empty-barreled
empty-bellied
empty-cell process
empty-fisted
empty-handed
empty-handedness
empty-headed
empty-headedness
empty-looking
empty-minded
empty-mindedness
empty-mouthed
empty-noddled
empty-paneled
empty-pated
empty-skulled
empty-stomached

empty-vaulted
empty-voiced
emu
 apple
emu bush
emu grass
emu-wren
emulsion colloid
emulsion paint
en attendant
en avant
en bloc
en brochette
en brosse
en cabochon
en casserole
en clair
en dash
en deshabille
en echelon
en effet
en f
en face
en famille
en garde
en grand seigneur
en grande tenue
en grande toilette
en loge
en masse
en papillote
en passant
en pension
en plein
en plein air
en plein jour
en plus
en prise
en quad
en rapport
en regle
en revanche
en route
en route to
en soleil
en space
en suite
en tapinois

en-
enabling act
enact laws
enacting clause
enamel bud
enamel cell
enamel kiln
enamored of
enb-
encased heart
encaustic cerography
encaustic painting
encephal-
encephalitis lethargica
encephalo-
enchanter's nightshade
encircling movement
enclosed order
enclosed space
enclosure act
enclosure wall
encompass with shadow
encounter danger
encounter group
encounter therapy
encroach upon
encyclical letter
encyclopedic knowledge
end around
end artery
end bell
end bulb
end burner
end for end
end game
end in smoke
end
in view
end line
end man
end matter
end mill
end of burning
end of debate
end of life
end of steel
end of the earth
end of the line

end of your rope
end of your tether
end off
end on
end organ
end paper
end pin
end plate
end play
end point
end product
end result
end rhyme
end run
end sheet
end stop
end stopping
end stress
end table
end the life of
end to end
end up
end up in smoke
end use
end wrench
end your days
end your life
end zone
end-
end-all
end-blown
end-grain
end-lap joint
end-match
end-measure
end-of-day glass
end-point control
end-rack
end-shrink
end-stopped
end-to-end
end-ways
endeavor to
endeca-
endemic disease
ender-on
ender-up
endgate seeder

endive blue
endless belt
endless chain
endless duration
endless round
endless supply
endless task
endless time
endo salt
endo-
endocentric compound
endocentric construction
endocrine disease
endocrine gland
endoderm disc
endoderm lamella
endogamous group
endomersion lens
endomersion objective
endomorphism ring
endoplasmic reticulum
endorsement
 in blank
endoscopic camera
endotheli-
endotherm knife
endow with
endow with life
endowed with
endowed with beauty
endowed with life
endowment assurance
endowment insurance
endurance limit
endurance race
endurance ratio
endurance strength
endure forever
endwise coil
enemy aircraft
enemy alien
enemy atrocities
enemy line
enemy lines
energy band
energy charge
energy component
energy level

energy metabolism
energy meter
energy state
energy surface density
energy voltage
energy-consuming
energy-producing
enfant perdu
enfant terrible
enfants perdus
enfants terribles
enforce economies
enforce upon
enforce your claim
enforced respite
engage attention
engage in
engage in a conversation
engage in battle
engage in hostilities
engage in marriage
engage in personalities
engage the attention
engage the mind
engage the thoughts
engage with
engage yourself
engage yourself with
engaged column
engaged in thought
engaged tone
engagement book
engagement ring
engine builder
engine cleaner
engine
company
engine control
engine controls
engine cultivator
engine department
engine driver
engine fitter
engine gauge
engine house
engine lathe
engine maker
engine making

engine parts
engine pilot
engine rod
engine room
engine shop
engine size
engine smith
engine space
engine tender
engine turning
engine work
engine worker
engine yard
engine-driven
engine-room officer
engine-room telegraph
engine-sized
engine-sizer
engine-turned
engine-turner
engine-type generator
engineer corps
engineer's chain
engineer's hammer
engineering chemistry
engineering school
engines of war
english breakfast tea
english foxhound
english horn
english muffin
english rabbit
english setter
english shepherd
english sonnet
english springer
english toy spaniel
english walnut
engorgement colic
engrave on
engraved invitation
engraver beetle
engraver's proof
engraver's trick
engraving process
engraving tool
engross the mind
engross the thoughts

engrossed in
engrossed in thought
enharmonic chord
enharmonic diesis
enharmonic
interval
enharmonic modulation
enharmonic note
enharmonic scale
enharmonic tetrachord
enharmonic tie
enigma canon
enigmatic canon
enigmatic question
enigmato-
enjoy a certain position
enjoy friendly relations with
enjoy good health
enjoy good relations with
enjoy prosperity
enjoy single blessedness
enjoy the use of
enjoy your own company
enjoy yourself
enjoying health
enjoyment of property
enlarge the mind
enlarge upon
enlist into service
enlist under the banner of
enlisted man
enlisted woman
enmeshed in
ennea-eteric
enol form
enol-keto isomerism
enough and then some
enough and to spare
enough in all conscience
enough said
enough to drive you mad
enough to get by on
enough to make a preacher swear
enough to provoke a saint
enough to wake the dead
enp-
enroll a jury
ens realissimum

ensemble music
ensemble singing
enshrine in the memory
ensign armorial
ensign fly
ensign staff
ensign-bearer
ensue from
ent-
entangled in
entente cordiale
enter a protest
enter into
enter into competition
with
enter into detail
enter into possession
enter into the feelings of
enter into the ideas of
enter into the spirit of
enter into your view
enter into your views
enter on
enter the arena
enter the arena with
enter the lists
enter the ring with
enter upon
enter with a will
enter your mind
enter-
entered hound
entered through another gate
enteric fever
entering wedge
entero-
entertain a belief
entertain a dislike to
entertain a feeling
entertain a theory
entertain an opinion
entertain doubts
entertain guests
entertain ideas
entertain respect for
entertain suspicions
entertain the hope
entertain the idea of

entertain the inner man
entertain thoughts of
entertainment industry
enthrone your own will
enthusiastic about
entire function
entire horse
entire performance
entire satisfaction
entire-leaved
entire-wheat
entitled to
ento-
ento-ectad
entom-
entomo-
entrail pahoehoe
entrance certificate
entrance cone
entrance examination
entrance fee
entrance hall
entrance money
entrance pallet
entrance
 pupil
entrance-denying
entre deux ages
entre nous
entrenching tool
entrust with information
entry card
enula campana
envelope addresser
envelope bander
envelope case
envelope clasp
envelope designer
envelope die
envelope folder
envelope gummer
envelope holder
envelope maker
envelope moistener
envelope opener
envelope printer
envelope sealer
envelope table

envelope top
envelope weigher
environing circumstances
environing phenomena
environmental conservation
environmental disease
environmental diseases
environmental pollution
environmental resistance
envoy extraordinary
enwrap the thoughts
enwrapped in mystery
enzootic ataxia
eo nomine
eo-
eol-
eolian deposit
eolithic man
ep-
epacris family
epana-
epater le bourgeois
epaulet bat
epaulet sleeve
epaulette tree
epenthetic vowel
eph-
ephemeris second
ephemeris time
epi-
epic machinery
epic poet
epic poetry
epic simile
epic theater
epic verse
epicanthic fold
epicyclic train
epicycloidal gear
epicycloidal wheel
epidemic cholera
epidemic
disease
epidemic encephalitis
epidemic meningitis
epidemic parotitis
epidemic pleurodynia
epiderm-

epididymo-orchitis
epidote group
epidural anaesthesia
epiglotto-hyoidean
epilepsia gravior
epilepsia major
epilepsia minor
epilepsia mitior
epilepsia nutans
epilepsia tarda
epilept-
epiphysis cerebri
episcopal ring
episcopal sandal
episcopal vestments
epistemological idealism
epistemological logic
epistemological realism
epistemological realist
epistle side
epistolary communication
epistolary intercourse
epistolary novel
epitaxial transistor
epitheli-
epithelial pearl
epizootic aphtha
epoch-forming
epoch-making
epoch-marking
epoxy resin
epsilon-delta
epsilon-neighborhood
epsom salt
epsom salts
equal opportunity employer
equal share
equal sign
equal temperament
equal to
equal-angled
equal-aqual
equal-area
equal-area projection
equal-armed
equal-balanced
equal-blooded
equal-eyed

equal-glumed millet
equal-handed
equal-headed
equal-limbed
equal-poised
equal-sided
equal-souled
equal-weighted
equaling
file
equalization fee
equalization fund
equalization period
equalizer brake
equalizer set
equalizing bar
equalizing dynamo
equalizing file
equalizing gear
equalizing pipe
equalizing pulse
equally pinnate
equals sign
equation clock
equation division
equation movement
equation of state
equation of time
equation price
equation solver
equator coordinates
equatorial telescope
equatorial tide
equatorial trough
equestrian director
equi-
equi-gram-molar
equiangular hyperbola
equilateral hyperbola
equilateral triangle
equilibrium isomerism
equilibrium pressure
equilibrium sense
equilibrium valve
equine distemper
equine encephalomyelitis
equine infectious anaemia
equine infectious anemia

equinoctial circle
equinoctial colure
equinoctial hour
equinoctial line
equinoctial point
equinoctial rains
equinoctial storm
equinoctial year
equipartition of energy
equipment bond
equipment note
equipment trust
equipment trust bond
equipment trust certificate
equipoise rudder
equitable estate
equitable
 interest
equitable jurisdiction
equitime point
equity capital
equity court
equity of redemption
equity security
equity side
equivalence class
equivalence reaction
equivalence relation
equivalent algebras
equivalent circuit
equivalent focal length
equivalent monoplane
equivalent odds
equivalent weight
era of prosperity
erase all doubt
erase from the memory
erasing shield
erce-
erd shrew
ere long
ere then
erecting prism
erection mark
erector spinae
erg-
ergo proper hoc
ergo propter hoc

ergo sum
ergo-
eristic school
erl-king
erlenmeyer flask
ermine moth
ern-bleater
ern-fern
erosion cycle
erosion surface
eroso-
erotic art
erotic literature
erotic novel
erotic poetry
eroto-
errand boy
errand girl
errare humanum est
erring sister
error corrector
error detector
error in judgment
error in speech
error of closure
error signals
error-blasted
error-darkened
error-prone
error-proof
error-stricken
error-tainted
error-teaching
eruptive fever
erythema induratum
erythema nodosum
erythr-
erythredema
 polyneuropathy
erythro-
erythroblastosis fetalis
erythroblastosis neonatorum
erythrol tetranitrate
es-
escalator clause
escalator plan
escalier derobe
escallop-shell

escape artist
escape attention
escape by the skin of your teeth
escape clause
escape cock
escape earth
escape hatch
escape into fantasy
escape mechanism
escape notice
escape one
escape pipe
escape prison
escape road
escape route
escape shaft
escape the memory
escape valve
escape velocity
escape wheel
escape with a whole skin
escape without penalty
escape your lips
escapement error
escaping tendency
escort carrier
escort fighter
escort vessel
escort wagon
escutcheon of pretence
escutcheon plate
esemplastic imagination
esemplastic power
eskimo dog
eso-
esophagal ulcer
esophageal speech
esophageo-cutaneous
esophago-enterostomy
esoteric meaning
esoteric reality
esparto grass
espionage agent
espouse a belief
espouse a theory
espouse nonviolence
espouse the cause of
esprit d'escalier

esprit de corps
esprit fort
esquire based
esquisse-esquisse
essay-writing
esse
est percipi
esse quam videri
essence d'orient
essence of bergamot
essence of life
essence of mirbane
essence of myrbane
essential amino acid
essential epilepsy
essential facts
essential hypertension
essential matter
essential nature
essential oil
essoin day
essoin roll
est modus in rebus
establish connection
establish residence
established church
established fact
established way
establishing shot
estate agent
estate and effects
estate at sufferance
estate at will
estate car
estate duty
estate for life
estate for years
estate in expectancy
estate in fee
estate in possession
estate in tail
estate manager
estate of freehold
estate of the realm
estate pour autre vie
estate rubber
estate tail
estate tax

estate waggon
estate wagon
ester gum
ester value
esthesio-
estivo-autumnal
esto perpetua
estragon oil
estral cycle
estrangelo alphabet
estrous cycle
estuarine area
et al
et alii
et cetera
et hoc genus omne
et id genus omne
et seq
et seqq
et sequens
et sic
de similibus
et sqq
et tu
etain blue
etalon post
etaoin shrdlu
etch indelibly in the mind
etched glass
etching ball
etching ground
etching needle
etching point
etching silk
etching stitch
etching varnish
eternal damnation
eternal home
eternal life
eternal object
eternal re-creation
eternal recurrence
eternal rest
eternal return
eternal sleep
eternal triangle
eternal universal
eternal verities

eternal youth
eternally the same
eternity ring
eth-
ethane dinitrile
ethanedioic acid
ether drift
ether extract
ether space
ether value
etheric body
etheric double
etheric self
etherin theory
ethical code
ethical drug
ethical formalism
ethical hedonism
ethical nihilism
ethical nihilist
ethical philosophy
ethical relativism
ethical relativist
ethical self
ethical system
ethico-
ethiops martial
ethiops mineral
ethmo-
ethmoid bone
ethnic community
ethnic group
ethnic joke
ethnic music
ethnic vote
ethno-
ethyl acetate
ethyl acetoacetate
ethyl acetone
ethyl alcohol
ethyl aminobenzoate
ethyl butanoate
ethyl
butyrate
ethyl caproate
ethyl capronate
ethyl carbamate
ethyl cellulose

ethyl chloride
ethyl ester
ethyl ether
ethyl gas
ethyl group
ethyl hexanoate
ethyl hexoate
ethyl hydride
ethyl malonate
ethyl mercaptan
ethyl methyl ketone
ethyl nitrate
ethyl nitrite
ethyl nitrite spirit
ethyl oenanthate
ethyl oxide
ethyl radical
ethyl sulfide
ethyl urethan
ethyl urethane
ethylene alcohol
ethylene bromide
ethylene chloride
ethylene dibromide
ethylene dichloride
ethylene glycol
ethylene group
ethylene oxide
ethylene radical
ethylene series
ethylidene diethyl ether
ethynyl group
ethynyl radical
eton collar
eton jacket
etymological dictionary
eu-
eu-form
eu-type
eucalyptene hydrochloride
eucalyptus green
eucalyptus gum
eucalyptus oil
eucaryotic cell
eudemis moth
eugenic acid
euglenoid movement
eunuch flute

euonymus scale
eupatorium purple
eupeptic mien
euphoric mien
eur-
eureka red
euro-boreal
europaeo-
european plan
european red mite
eury-
eustachian tube
evacuation ambulance
evacuation hospital
evacuation
 plane
evacuation station
evade responsibility
evade the issue
evaluative criticism
evans-root
evaporated milk
evaporation gauge
evaporation pan
evaporation tank
evasion of responsibility
evasive action
evasive reasoning
evasive reply
eve-churr
eve-jar
eve-star
even break
even chance
even lot
even money
even now
even number
even odds
even off
even out
even pace
even permutation
even so
even stephen
even temper
even tenor
even the score

even trade
even up
even with
even-
even-bell system
even-christian
even-edged
even-handed
even-handedly
even-handedness
even-minded
even-mindedness
even-money
even-numbered
even-old
even-paged
even-pleached
even-set
even-spun
even-star
even-steven
even-tempered
even-tenored
even-toed
even-toothed
even-up
even-wayed
evener-up
evening bag
evening campion
evening class
evening damp
evening devotions
evening dress
evening dun
evening emerald
evening flower
evening gown
evening grosbeak
evening lychnis
evening market
evening mist
evening of the score
evening
 of your days
evening prayer
evening prayers
evening primrose

evening rose
evening school
evening services
evening shirt
evening star
evening stock
evening trumpet flower
evening up
evening watch
evening's calm and holy hour
evening's close
evening-dressed
evening-glory
evening-primrose family
evening-snow
event horizon
events-per-unit-time meter
ever and again
ever and always
ever and anon
ever less
ever more
ever since
ever so
ever so little
ever so many
ever so much
ever the same
ever-abiding
ever-active
ever-admiring
ever-angry
ever-bearing
ever-being
ever-beloved
ever-blazing
ever-blessed
ever-blooming
ever-burning
ever-celebrated
ever-changeful
ever-changing
ever-circling
ever-conquering
ever-constant
ever-craving
ever-dear
ever-deepening

ever-dripping
ever-drizzling
ever-dropping
ever-durable
ever-during
ever-during dark
ever-duringness
ever-dying
ever-echoing
ever-endingly
ever-esteemed
ever-expanding
ever-faithful
ever-fast
ever-fertile
ever-fresh
ever-friendly
ever-glooming
ever-goading
ever-going
ever-growing
ever-happy
ever-honored
ever-increasing
ever-living
ever-loving
ever-mingling
ever-moving
ever-new
ever-noble
ever-normal
granary
ever-present
ever-prompt
ever-ready
ever-recurrent
ever-recurring
ever-renewing
ever-smiling
ever-strong
ever-thrilling
ever-varying
ever-victorious
ever-wearing
ever-white
ever-widening
ever-willing
ever-wise

ever-young
everglade kite
everglade palm
evergreen beech
evergreen bittersweet
evergreen blackberry
evergreen blueberry
evergreen cherry
evergreen clematis
evergreen elm
evergreen grape
evergreen grass
evergreen magnolia
evergreen millet
evergreen oak
evergreen privet
evergreen snakeroot
evergreen thorn
evergreen trumpet flower
evergreen winterberry
evergreen wood fern
everlasting fire
everlasting flower
everlasting moment
everlasting pea
everlasting thorn
everlasting torment
every bit
every bit a
every day
every hour
every inch
every inch a king
every man Jack
every man jack
every moment
every mother's son
every
 now and then
every once in a while
every one
every one in his turn
every other
every so often
every which way
every whit
every-way
everybody and his uncle

everybody's fool
everything being equal
everything but the kitchen sink
everything that is
everywhere-dense
evet e
eviction clause
evidence in chief
evidence-proof
evil child
evil courses
evil day
evil dispensation
evil disposition
evil eye
evil fortune
evil genius
evil hour
evil humor
evil intent
evil man
evil nature
evil person
evil reputation
evil repute
evil speaking
evil spirit
evil spirits
evil star
evil woman
evil-affected
evil-affectedness
evil-boding
evil-complexioned
evil-disposed
evil-doing
evil-eyed
evil-faced
evil-fashioned
evil-favored
evil-favoredly
evil-favoredness
evil-favoured
evil-featured
evil-fortuned
evil-gotten
evil-headed
evil-hued

evil-humored
evil-impregnated
evil-looking
evil-loved
evil-mannered
evil-minded
evil-mindedly
evil-mindedness
evil-mouthed
evil-ordered
evil-pieced
evil-qualitied
evil-savored
evil-shaped
evil-shapen
evil-smelling
evil-sounding
evil-sown
evil-spun
evil-starred
evil-taught
evil-tempered
evil-thewed
evil-thoughted
evil-tongued
evil-weaponed
evil-willed
evil-won
evoke
 a response
evoke from the dead
evoked potential
evolutionary change
evolve into
ewe bramble
ewe lamb
ewe teg
ewe-daisy
ewe-gowan
ewe-neck
ewe-necked
ex adverso
ex aequo et bono
ex animo
ex ante
ex cathedra
ex coupon
ex div

ex div<
ex dividend
ex facie
ex facto
ex gratia
ex hypothesi
ex int
ex lege
ex lib
ex libris
ex maleficio
ex more
ex natura rei
ex new
ex nihilo nihil fit
ex off
ex officio
ex opere operato
ex parte
ex parte evidence
ex pede Herculem
ex post
ex post facto
ex post facto examination
ex post facto law
ex pro brate
ex professo
ex promission
ex propriate
ex rights
ex ship tackles
ex silentio
ex store
ex voto
ex voto offering
ex warrants
ex works
ex-
ex-army
ex-cathedra
ex-consul
ex-convict
ex-czar
ex-directory
ex-emperor
ex-employee
ex-enemy
ex-governor

ex-holder
ex-invalid
ex-judge
ex-kaiser
ex-king
ex-libres
ex-librism
ex-librist
ex-mayor
ex-minister
ex-official
ex-officio
ex-pier
ex-praetor
ex-president
ex-quay
ex-rights
ex-service
ex-serviceman
ex-servicemen
ex-ship
ex-voto
exa-
exact
counterpart
exact description
exact differential
exact from
exact likeness
exact mates
exact measure
exact science
exactly alike
exaggerate your own merits
exaggerated lengths
exaggerated respect
exalt to the skies
examination by ear
examination of conscience
examination school
examine by ear
examine cursorily
examine point by point
examine side by side
examine the books
examine thoroughly
examine your conscience
examine-in-chief

examining post
examining room
examining side by side
excel at
excel in
excellent accommodations
excellent citizen
excellent companion
excellent manners
excelsior knife
except for
except that
exception taken of
excess demand
excess fare
excess insurance
excess profits tax
excess reinsurance
excess sound pressu
excess sound pressure
excess supply
excess-loss
excess-profits
tax
excessive in your praise
excessive interest
excessive irritability
excessive praise
exchange blows
exchange broker
exchange cap
exchange colors
exchange editor
exchange equalization fund
exchange fisticuffs
exchange floor
exchange force
exchange greetings
exchange letters
exchange observations
exchange of blows
exchange of views
exchange opinions
exchange professor
exchange rate
exchange reaction
exchange shots
exchange stabilization fund

exchange student
exchange ticket
exchange transfusion
exchange views
exchangeable base
exchequer bill
exchequer bond
exchequer-chamber
excise tax
excite easily
excite interest
excite notice
excite pity
excite your interest
excited atom
excited imagination
excited state
excited-field speaker
exciter lamp
exciting current
excito-motory
exclaim against
exclamation mark
exclamation point
exclamatory adjective
exclamatory noun
exclude from
exclusion clause
exclusion principle
exclusive disjunction
exclusive jurisdiction
exclusive of
exclusive
or
exclusive possession
exclusive representation
excruciating pain
excursion steamer
excursion ticket
excuse-me
excused absence
excusing the liberty
exdebito justitiae
exdebito natural
execute a
execute a maneuver
execute a will
execute by firing squad

executive agreement
executive arm
executive branch
executive committee
executive council
executive director
executive editor
executive function
executive hierarchy
executive office
executive officer
executive order
executive plane
executive privilege
executive role
executive secretary
executive session
executive veto
executor dative
exegi monumentum aere perennius
exemplary citizen
exemplary damages
exempli causa
exempli gratia
exempt carrier
exempt from
exemption from hostilities
exercise bone
exercise book
exercise care
exercise device
exercise discrimination
exercise influence
exercise judgment
exercise of memory
exercise of the intellect
exercise self-control
exercise self-restraint
exercise skill
exercise tact
exercise the
duties of
exercise the elbow
exercise the functions of
exercise the judgment
exercise the mind
exercise the office of
exercise the right of angary

exercise your option
exert influenceexert pressure
exert strength
exert yourself
exeunt omnes
exh-
exhaust box
exhaust cowl
exhaust draft
exhaust every move
exhaust fan
exhaust gas
exhaust head
exhaust horn
exhaust jacket
exhaust lap
exhaust pipe
exhaust port
exhaust price
exhaust pump
exhaust silencer
exhaust steam
exhaust valve
exhaust velocity
exhaust-suction stroke
exhaustive study
exhibit the form of
exhibit your wares
exhibition game fowl
exhibition hall
exhibition room
exigi facias
exile tree
exist in
existential operator
existential philosopher
existential philosophy
existential psychology
existential quantifier
existential theology
existential vacuum
existential woe
existing conditions
existing situation
exit card
exit pallet
exit pupil
exo-

exo-condensation
exocentric compound
exocrine gland
exophthalmic goiter
exophthalmic goitre
exorbitant
 demand
exorbitant interest
exorbitant price
exotic dancer
expand your consciousness
expanded metal
expanding bullet
expanding economy
expanding universe
expanding universe theory
expansion ammeter
expansion attic
expansion bend
expansion bit
expansion bolt
expansion cam
expansion chamber
expansion coupling
expansion curve
expansion engine
expansion fit
expansion gear
expansion joint
expansion pipe
expansion plate
expansion pulley
expansion ring
expansion sleeve
expansion slide
expansion trunk
expansion valve
expansion wave
expansion wheel
expansive bit
expansive classification
expect it of
expect to
expectant treatment
expectant waiting
expectation neurosis
expectation of life
expected of

expected value
expedite your affair
expend your anger on
expense account
experience imaginatively
experience meeting
experience rate
experience religion
experience table
experience vicariously
experienced hand
experiential philosophy
experiment station
experiment upon
experimental animal
experimental
design
experimental engineer
experimental engineering
experimental film
experimental logic
experimental medicine
experimental method
experimental proof
experimental psychology
experimental sample
experimental science
experimental scientist
experimental theater
experimental verification
experimenter effect
expert at
expert consultant
expert in
expert in decor
expert rifleman
expert witness
experto credite
expiatory offering
expiatory sacrifice
explain away
explain yourself
explanato-
explanatory remark
explementary angle
explication de texte
explications de texte
explicit function

exploded view
exploding star
exploit your position
exploratory examination
exploratory operation
exploratory ship
explorer tent
exploring element
explosion bomb
explosion engine
explosion insurance
explosion shot
explosion wave
explosion-proof
explosive D
explosive bullet
explosive charge
explosive d
explosive noise
explosive rivet
exponent proposition
exponential distribution
exponential horn
export
bar
export credit
export declaration
export point
export reject
export tax
expose itself
expose to infamy
expose to view
expose yourself
expose yourself to
exposed nerve
exposed to
exposed to view
exposed-tube boiler
expository prose
expository scene
expository writing
exposure hazard
exposure index
exposure meter
express a wish for
express an opinion
express belief

express boiler
express buggy
express by words
express car
express delivery
express general agreement
express in words
express intention
express letter
express prejudice
express regret
express rifle
express sympathy for
express the belief
express train
express wagon
express your appreciation
expressed almond oil
expressed desire
expression mark
expression of ideas
expressionistic abstraction
expressionistic abstractionist
expulsion fuse
expunge all doubt
exquisite manners
exsanguination transfusion
exsanguino transfusion
extend an invitation
extend credit
extend out
extend over
extend the right of fellowship
extend the
right of friendship
extend throughout
extend to
extend to the side
extend to the sides
extended bond
extended complex plane
extended coverage
extended family
extended order
extended play
extended real number system
extended term insurance
extended-play

extending everywhere
extension bit
extension bolt
extension courses
extension field
extension ladder
extension lathe
extension of time
extension phone
extension rule
extension spring
extension table
extension-gap lathe
extensive knowledge
extensive study
extensor thrust
extenuating circumstances
exter-marriage
exterior angle
exterior ballistics
exterior paint
exteriorized protoplasm
exterminate with
external account
external acoustic meatus
external affairs
external angle
external appearance
external auditory meatus
external brake
external capsule
external carotid
external ear
external evidence
external frustration
external hemorrhoid
external iliac artery
external jugular vein
external loan
external relation
external respiration
external
secretion
external-combustion
external-combustion engine
externally-quenched counter
extinction coefficient
extinction meter

extortionate demand
extortionate price
extra added attraction
extra cover
extra cover point
extra current
extra dash
extra dividend
extra edition
extra pay
extra point
extra sec
extra time
extra-
extra-acinous
extra-alimentary
extra-ammotic
extra-analogical
extra-anthropic
extra-articular
extra-artistic
extra-atmospheric
extra-axillar
extra-axillary
extra-base hit
extra-binding
extra-bound
extra-britannic
extra-condensed
extra-dry
extra-european
extra-fare
extra-fine
extra-foraneous
extra-good
extra-hazardous
extra-illustrate
extra-illustration
extra-large
extra-long
extra-mild
extra-parochial
extra-size folio
extra-special
extra-strong
extra-university
extra-urban
extra-uterine pregnancy

extracorporeal dialysis
extract from
extract information
extract printing
extract roots
extract wool
extracted material
extracted matter
extraction of roots
extraction thimble
extraction
turbine
extraction wax
extractor fan
extracurricular relations
extracurricular sex
extragalactic nebula
extrajudicial oath
extramarital relations
extramarital sex
extranuclear electrons
extraordinarily like
extraordinary jubilee
extraordinary ray
extraordinary wave
extraordinary worth
extrapolation ionization chamber
extrasensory perception
extraterrestrial visitor
extratropical cyclone
extrauterine pregnancy
extreme clipper
extreme cold
extreme heat
extreme height
extreme innerness
extreme left
extreme left wing
extreme left-wing
extreme left-winger
extreme limit
extreme right
extreme right wing
extreme right-winger
extreme rightism
extreme temperatures
extreme tension
extreme unction

extremely high frequency
extrinsic evidence
extrinsic factor
extro-
extruded plastic
extruding press
extrusive rock
exudation pressure
exudative inflammation
exude cheerfulness
exult in
ey st
eye agate
eye appeal
eye askance
eye bank
eye bath
eye bone
eye cap
eye catcher
eye color
eye defect
eye
dialect
eye disease
eye doctor
eye dotter
eye draft
eye drops
eye fold
eye for an eye, an
eye for eye
eye ground
eye hungrily
eye lens
eye liner
eye memory
eye nut
eye of a needle
eye of day
eye of the mind
eye opener
eye patch
eye point
eye rhyme
eye shadow
eye socket
eye speculum

eye splice
eye stub
eye to
eye tube
eye wattle
eye worm
eye-appealing
eye-ball
eye-beam
eye-bedewing
eye-beguiling
eye-bewildering
eye-bewitching
eye-blinking
eye-blurred
eye-bold
eye-bolt
eye-bree
eye-brightening
eye-casting
eye-catcher
eye-catching
eye-charmed
eye-checked
eye-conscious
eye-dazzling
eye-delighting
eye-devouring
eye-distracting
eye-draught
eye-ear plane
eye-ear-nose-throat specialist
eye-earnestly
eye-filling
eye-glass
eye-glutting
eye-lash
eye-lotion
eye-minded
eye-mindedness
eye-offending
eye-opener
eye-opening
eye-overflowing
eye-peep
eye-pit
eye-pleasing
eye-popper

eye-popping
eye-rejoicing
eye-rolling
eye-searing
eye-seen
eye-servant
eye-server
eye-service
eye-shot
eye-sick
eye-splice
eye-spotted
eye-starting
eye-string
eye-tooth
eye-trying
eye-watering
eye-weariness
eye-wink
eye-winking
eye-witness
eyeball
 inspection
eyeball to eyeball
eyeball-to-eyeball
eyeball-to-eyeball encounter
eyebrow pencil
eyeglass cloth
eyelet hole
eyelet punch
eyelet-hole
eyepiece micrometer
eyes bigger than the stomach
eyes front
eyes left
eyes only
eyes right
eyes upon
f clef
f layer
f number
f region
f value
f-hole
f-number
f-stop
f1 layer
f2 layer

fa la
fa-la
fable book
fable forger
fable play
fable teller
fable-framing
fabric spring
fabric tire
fabrication tax
fabulous formless darkness
face about
face ague
face angle
face bath
face bone
face bow
face brick
face card
face cards
face chuck
face cleat
face cloth
face cog
face cord
face cover
face cream
face down
face dresser
face dressing
face enamel
face gear
face guard
face hammer
face joint
face lathe
face lifting
face mask
face massage
face milling
face mite
face mold
face molder
face of brass
face out
face pack
face paint
face

painter
face painting
face par
face pit
face powder
face presentation
face rouge
face side
face spanner
face specialist
face sponge
face stone
face string
face that would stop a clock
face the music
face to face
face to face with
face to the right-about
face toward
face towel
face up
face up to
face upon
face urn
face validity
face value
face wall
face wheel
face with
face-about
face-ache
face-arbor
face-bedded
face-centered
face-centred
face-harden
face-lift
face-lifting
face-off
face-on
face-saving
face-to-face
faced-lined
faceplate coupling
faceplate jaw
facia board
facial angle
facial appearance

facial expression
facial index
facial massage
facial nerve
facial neuralgia
facial tissue
facies Hippocratica
facies-suite
facile princeps
facilis descensus Averno
facility in writing
facility of speech
facing death
facing distance
facing hammer
facing head
facing lathe
facing sand
facing slip
facing tool
facing-point lock
facing-point switch
facsimile broadcasting
facsimile telegraph
fact
distribution
fact of experience
fact of life
fact-finding
factor analysis
factor cost
factor group
factor of adhesion
factor of production
factor of safety
factor theorem
factorial stop system
factory belt
factory burden
factory committee
factory cost
factory district
factory farm
factory ledger
factory lumber
factory manager
factory ship
factory system

factory tar
factory town
factory worker
factory-new
facts and figures
facts of life
factual base
factual information
facultative referendum
faculty adviser
faculty members
faculty psychology
faculty theory
fad word
fade away
fade away from the memory
fade in
fade into the distance
fade like a dream
fade like a shadow
fade out
fade-in
fade-out
fade-proof
faded rose
faery-fair
faery-frail
fag end
fag out
fag-end
fagged out
faggot-vote
fagot cinnamon
fagot iron
fagot vote
fagot worm
fail ignominiously
fail in
fail in health
fail in your duty
fail miserably
fail of
fail of success
fail of your ambitions
fail of your hopes
fail safe
fail someone
fail

spot
fail to appear
fail to pull out
fail to remember
fail-safe
failed expectation
failing student
failure of memory
failure of nerve
failure to pay
fain of
fain to
faint heart
faint hope
faint likelihood
faint praise
faint resemblance
faint sound
faint-blue
faint-gleaming
faint-glimmering
faint-green
faint-heard
faint-heart
faint-hued
faint-lined
faint-lipped
faint-ruled
faint-run
faint-sounding
faint-spoken
faint-voiced
faint-warbled
fainting fit
faintly like
faintness of sound
fair and pleasant
fair and square
fair as is the rose in May
fair ball
fair catch
fair copy
fair coquette of Heaven
fair day
fair employment
fair expectation
fair field
fair game

fair green
fair hand
fair housing
fair isle
fair lead
fair list
fair maid
fair name
fair or foul
fair play
fair prospect
fair sex
fair shake
fair stitching
fair to middling
fair trade
fair trader
fair weather
fair whites
fair wind
fair words
fair-born
fair-breasted
fair-browed
fair-cheeked
fair-colored
fair-complexioned
fair-conditioned
fair-copy
fair-days
fair-eyed
fair-faced
fair-favored
fair-featured
fair-fortuned
fair-fronted
fair-haired
fair-haired
boy
fair-horned
fair-hued
fair-lead
fair-leader
fair-leading
fair-maid
fair-maned
fair-minded
fair-mindedness

fair-natured
fair-reputed
fair-sized
fair-skinned
fair-sounding
fair-spoken
fair-spokenness
fair-stitch
fair-stitcher
fair-tongued
fair-trade
fair-trade agreement
fair-trade law
fair-trade price
fair-traded
fair-trader
fair-trading
fair-tressed
fair-visaged
fair-water cap
fair-weather
fair-weather cumulus
fair-weather friend
fair-weather sailor
fairbody draft
faire les yeux doux
fairing box
fairly well
fairness doctrine
fairwater cap
fairwater cone
fairwater sleeve
fairy arrow
fairy bell
fairy bird
fairy bluebird
fairy book
fairy butter
fairy candle
fairy cap
fairy circle
fairy club
fairy court
fairy creeper
fairy cup
fairy cycle
fairy fan
fairy finger

fairy flax
fairy gift
fairy glove
fairy godmother
fairy grass
fairy green
fairy haunt
fairy hillock
fairy
king
fairy lamp
fairy lily
fairy lint
fairy lore
fairy man
fairy martin
fairy money
fairy pageant
fairy penguin
fairy play
fairy pool
fairy primrose
fairy prion
fairy queen
fairy ring
fairy rose
fairy shrimp
fairy smoke
fairy song
fairy stone
fairy story
fairy swallow
fairy tale
fairy tern
fairy tree
fairy wallflower
fairy wand
fairy water lily
fairy woman
fairy-born
fairy-ring
fairy-ring mushroom
fairy-ring spot
fairy-tale
fait accompli
faites vos jeux
faith cure
faith curer

faith healer
faith healing
faith of our fathers
faith-breaking
faith-confirming
faith-curist
faith-infringing
faith-keeping
faithful copy
faithful friend
faithful love
faithful servant
faithful translation
faits accomplis
fake book
fake buyer
fake out
fake up
faker-out
faking box
fal la
fal-lal
fal-lalery
fal-lalish
fal-lalishly
falcon-beaked
falcon-eyed
falcon-gentle
fald silver
fall a cropper
fall a victim to
fall aboard
fall about
fall across
fall afoul of
fall again into
fall all over
fall all over yourself
fall
among
fall army worm
fall asleep
fall aster
fall astern
fall at the feet of
fall at your feet
fall away
fall back

fall back on
fall back to
fall back to prepared positions
fall back upon
fall behind
fall behindhand
fall between two stools
fall block
fall by the wayside
fall chronometer
fall dandelion
fall dead
fall down
fall down before
fall down dead
fall down on the job
fall down on your knees
fall duck
fall due
fall flat
fall flat as a pancake
fall flat on your ass
fall flat on your face
fall flower
fall for
fall foul
fall foul of
fall from grace
fall from the lips
fall from the mouth
fall from your high estate
fall front
fall grape
fall guy
fall head and ears in love
fall head over heels in love
fall headlong
fall herring
fall in
fall in a faint
fall in line
fall in love
fall in price
fall in the way of
fall in together
fall in with
fall into
fall into a brown study

fall into a habit
fall into decay
fall into despair
fall into disrepute
fall into disuse
fall into error
fall
into line
fall into oblivion
fall into order
fall into place
fall into rank
fall into raptures
fall into series
fall into your hands
fall lettuce
fall line
fall meadow rue
fall of Adam
fall of day
fall of man
fall of the cards
fall of the curtain
fall of the dice
fall of the leaf
fall of the year
fall off
fall on
fall on deaf ears
fall on evil days
fall on the ear
fall on your ass
fall on your face
fall on your feet
fall on your knees
fall on your knees before
fall on your knees to
fall out
fall over
fall phonometer
fall poison
fall prostrate
fall rope
fall rose
fall senseless
fall short
fall shy
fall silent

fall snipe
fall star grass
fall stillborn
fall through
fall to
fall to a low ebb
fall to dust
fall to loggerheads
fall to one
fall to pieces
fall to the ground
fall to work
fall to your lot
fall to your share
fall under
fall under your notice
fall upon
fall webworm
fall wheat
fall wind
fall'n into the sere
fall-board
fall-down
fall-in
fall-off
fall-out
fall-plow
fall-sow
fall-trap
fallen
 angel
fallen arch
fallen countenance
fallen from grace
fallen humanity
fallen nature
fallen state
fallen woman
falling action
falling back
falling band
falling barometer
falling diphthong
falling door
falling down and worshiping
falling glass
falling home
falling leaf

falling loosely
falling off
falling rhythm
falling short
falling shy
falling sickness
falling star
falling terminal
falling-away
falling-ball clock
falling-off
falling-out
falling-outs
fallings-out
fallopian tube
fallout shelter
fallow chat
fallow deer
fallow finch
fallow mind
fallow-deer
false Jerusalem cherry
false Solomon's-seal
false acacia
false air
false alarm
false aloe
false appearance
false arrest
false bedding
false beechdrops
false belief
false bottom
false bread-fruit
false breadfruit
false brome grass
false buckthorn
false buffalo grass
false cadence
false card
false cast
false cheek
false cirrus
false claim
false color
false coloring
false colors
false colours

false dawn
false dew
false dice
false
doctrine
false echoes
false economy
false face
false foxglove
false friend
false front
false fruit
false god
false goldenrod
false grass
false guinea grass
false hair
false hellebore
false horizon
false image
false imprisonment
false ipecac
false keel
false labor
false light
false lily of the valley
false loosestrife
false map turtle
false memory
false mildew
false modesty
false money
false move
false music
false name
false nettle
false oat
false pains
false piety
false pile
false position
false pretences
false pretense
false pretenses
false pretension
false proscenium
false rafter
false reasoning

false redtop
false relation
false representation
false rib
false ribs
false rice
false ridgepole
false saffron
false shade line
false show
false step
false sunflower
false swearing
false teacher
false teeth
false title
false topaz
false vampire
false vocal cord
false vocal cords
false wheat
false witness
false-bedded
false-boding
false-bottomed
false-card
false-dealing
false-derived
false-eyed
false-face
false-face
society
false-faced
false-fingered
false-fronted
false-gotten
false-heart
false-hearted
false-heartedly
false-heartedness
false-mermaid family
false-nerved
false-packed
false-plighted
false-principled
false-purchased
false-spoken
false-sworn

false-tongued
false-visored
false-written
falsehood-free
falsify accounts
famble-crop
fame-achieving
fame-blazed
fame-crowned
fame-ennobled
fame-giving
fame-loving
fame-preserving
fame-seeking
fame-sung
fame-thirsting
fame-thirsty
fame-worthy
familia rustica
familial immunity
familiar as household words
familiar friend
familiar friendship
familiar spirit
familiar tune
familiar with
family Bible
family allowance
family altar
family bible
family circle
family compact
family connection
family contract
family counselor
family court
family doctor
family expense
family fare
family favor
family grouping
family homestead
family income policy
family jewels
family likeness
family living
family maintenance policy
family man

family meeting
family
name
family of curves
family party
family physician
family plan
family planning
family relationship
family reunion
family romance
family room
family size
family skeleton
family style
family tie
family training
family tree
family wage
family way
family-conscious
family-fare plan
famine bread
famine fever
famine price
famous person
famous persons
fan Fink truss
fan belt
fan blade
fan blower
fan brake
fan club
fan consonant
fan coral
fan cricket
fan dance
fan dancer
fan delta
fan fitter
fan guard
fan heater
fan jet
fan letter
fan magazine
fan maidenhair
fan mail
fan maker

fan marker
fan mill
fan out
fan painter
fan palm
fan pulley
fan pump
fan roof
fan scale
fan shell
fan system
fan tan
fan the embers
fan the fire
fan the flame
fan tracery
fan training
fan tree
fan truss
fan vault
fan vaulting
fan wheel
fan window
fan worm
fan-back chair
fan-bearing
fan-crested
fan-fashion
fan-jet
fan-jet engine
fan-leaved
fan-light
fan-nerved
fan-pleated
fan-shape
fan-shaped
fan-tail
fan-tailed
fan-tailed
darter
fan-tan
fan-veined
fan-wing fly
fancied up
fancy Dan
fancy ball
fancy clouds where no clouds be
fancy dive

fancy diver
fancy diving
fancy dog
fancy dress
fancy dress ball
fancy geranium
fancy goods
fancy house
fancy lady
fancy man
fancy price
fancy talk
fancy that
fancy trimmer
fancy up
fancy woman
fancy work
fancy-baffled
fancy-blest
fancy-born
fancy-borne
fancy-bred
fancy-built
fancy-caught
fancy-dress ball
fancy-driven
fancy-fed
fancy-feeding
fancy-formed
fancy-framed
fancy-free
fancy-guided
fancy-led
fancy-loose
fancy-raised
fancy-shaped
fancy-stirring
fancy-struck
fancy-stung
fancy-weaving
fancy-woven
fancy-wrought
fandango bird
fang bolt
fanleaf palm
fanning machine
fanning mill
fanning out

fanny adams
fantail joint
fantail stern
fantasize about
fantastic notion
far afield
far ahead
far and away
far and near
far and wide
far away
far be it from me
far cry
far from it
far goer
far gone
far gone on
far horizon
far off
far on
far other
far out
far past
far piece
far
point
far seer
far traveler
far-about
far-advanced
far-aloft
far-away
far-back
far-between
far-borne
far-branching
far-called
far-come
far-cost
far-darting
far-discovered
far-distant
far-down
far-downer
far-driven
far-eastern
far-embracing
far-extended

far-extending
far-famed
far-fet
far-fetch
far-fetched
far-flashing
far-flown
far-flung
far-flying
far-foamed
far-forth
far-gleaming
far-going
far-gone
far-heard
far-horizoned
far-looking
far-looming
far-northern
far-off
far-offness
far-out
far-parted
far-passing
far-point
far-projecting
far-ranging
far-reaching
far-reachingness
far-removed
far-resounding
far-seeing
far-seen
far-shooting
far-sight
far-sighted
far-sought
far-sounding
far-southern
far-spread
far-spreading
far-stretched
far-stretching
far-traveled
far-western
faradic electricity
farce comedy
farcy bud

farcy button
farcy pipe
fardel-bound
fare forth
fare well
fare-free
fare-thee-well
fare-ye-well
fare-you-well
farewell performance
farewell-summer
farewell-to-spring
farfetched
story
farinaceous plant
farm belt
farm bloc
farm bureau
farm club
farm country
farm economics
farm economy
farm elevator
farm hand
farm interests
farm laborer
farm level
farm loan association
farm loan bank
farm loan bond
farm machine
farm machinery
farm management
farm manager
farm out
farm pond
farm team
farm tractor
farm-bred
farm-engro
farm-house
farm-stead
farm-yard
farmer cheese
farmer drill
farmer in the dell
farmer's lung
farmer-general

farmer-generalship
farmers cooperative
farmers-general
farmhouse loaf
faro bank
faro banker
fart around
farthest bound
farthest off
farthest out
farthest outpost
farthing dip
farthingale chair
farting around
fascia board
fascinated attention
fascine choker
fashion book
fashion designer
fashion gray
fashion house
fashion piece
fashion plate
fashion plate stem
fashion show
fashion writer
fashion-fancying
fashion-fettered
fashion-following
fashion-led
fashion-monger
fashion-setting
fashionable society
fashioning needle
fast and loose
fast asleep
fast
 boat
fast break
fast by
fast day
fast deal
fast dye
fast food
fast freight line
fast friend
fast friendship
fast groove

fast motion
fast neutron
fast one
fast pace
fast pile
fast rate
fast reactor
fast spiral
fast talk
fast telegram
fast time
fast worker
fast-anchored
fast-bound
fast-breaking
fast-breeder reactor
fast-cleaving
fast-darkening
fast-dye
fast-dyed
fast-fading
fast-falling
fast-feeding
fast-fettered
fast-fleeting
fast-flowing
fast-food chain
fast-footed
fast-gathering
fast-grounded
fast-growing
fast-handed
fast-joint hinge
fast-knit
fast-mass
fast-moving
fast-plighted
fast-rooted
fast-rootedness
fast-running
fast-sailing
fast-settled
fast-stepping
fast-talk
fast-tied
fasten a quarrel on
fasten down
fasten itself on the mind

fasten on
fasten onto
fasten the eyes upon
fasten up
fasten upon
fasten yourself upon
fastening-penny
fastens-een
faster than sound
fastidious person
fat acid
fat as a fool
fat as a hog
fat as a pig
fat as a pork hog
fat as a porpoise
fat as a
 quail
fat as bacon
fat as brawn
fat as butter
fat back
fat box
fat cat
fat cell
fat chance
fat corpuscle
fat depot
fat gland
fat granule
fat heart
fat hen
fat liquor
fat man
fat mouse
fat of the land
fat oil
fat part
fat pork
fat purse
fat series
fat stock
fat-assed
fat-backed
fat-barked
fat-bellied
fat-bodied
fat-cheeked

fat-choy
fat-edged
fat-engendering
fat-faced
fat-faced type
fat-fed
fat-fleshed
fat-free
fat-head
fat-hen
fat-hipped
fat-legged
fat-necrosis
fat-paunched
fat-reducing
fat-rumped sheep
fat-shunning
fat-soluble
fat-tailed
fat-tailed sheep
fat-witted
fata morgana
fatal accident
fatal blow
fatal hour
fatal-boding
fatal-looking
fatal-plotted
fatal-seeming
fate line
fate worse than death
fate-bowed
fate-denouncing
fate-dogged
fate-environed
fate-foretelling
fate-furrowed
fate-menaced
fate-scorning
fate-stricken
fateful moment
fathead minnow
father abbot
father christmas
father complex
father confessor
father family
father figure

father fixation
father image
father in Christ
father
 jesuit
father lasher
father longlegs
father love
father of the chapel
father right
father rule
father sib
father superior
father surrogate
father symbol
father upon
father's day
father-confessor
father-in-law
father-lasher
father-long-legs
fathers-in-law
fathom-deep
fatigue call
fatigue cap
fatigue clothes
fatigue curve
fatigue disease
fatigue dress
fatigue duty
fatigue life
fatigue limit
fatigue party
fatigue ratio
fatten on
fatten up
fatten upon
fattening grass
fatti maschii
fatty acid
fatty degeneration
fatty heart
fatty oil
fatty tumor
faucet joint
fault bar
fault block
fault breccia

fault conglomerate
fault current
fault lamp
fault line
fault localizer
fault plane
fault rock
fault rubble
fault scarp
fault surface
fault terrace
fault vent
fault-find
fault-finding
fault-line scarp
fault-slip
faulty comparison
faulty coordination
faulty eyesight
faulty grammar
faulty punctuation
faulty reference
faulty subordination
faulty syntax
faun-colored
faunus butterfly
fause-house
faute
de mieux
faux jour
faux pas
faux rondelette
faux-bourdon
faux-na
fava bean
favor with
favorable attention
favorable disposition
favorable opportunity
favorable prospect
favorable regard
favorable vote
favorable wind
favorably disposed
favorably impressed with
favorably inclined
favoring wind
favorite of the gods

favorite son
favors of office
fawn brown
fawn lily
fawn upon
fawn-color
fawn-colored
fawn-colour
faying surface
fear God
fear and trembling
fear holding on a minute longer
fear into the heart of
fear of God
fear that has said its prayers
fear-babe
fear-broken
fear-created
fear-depressed
fear-free
fear-froze
fear-inspiring
fear-palsied
fear-pursued
fear-shaken
fear-stricken
fear-struck
fear-tangled
fear-taught
fearsome-looking
feast and famine
feast day
feast of the soul
feast on
feast upon
feast-or-famine
feather alum
feather an oar
feather ball
feather banding
feather beater
feather bed
feather bleacher
feather boa
feather boarding
feather bolster
feather bonnet
feather brush

feather
cleanser
feather cloth
feather columbine
feather crotch
feather curler
feather dresser
feather drier
feather driver
feather duster
feather dyer
feather fan
feather fern
feather finisher
feather geranium
feather grass
feather hyacinth
feather in your cap
feather joint
feather key
feather mail
feather maker
feather making
feather mattress
feather merchant
feather mosaic
feather moss
feather ore
feather out
feather palm
feather part
feather picker
feather pillow
feather pink
feather plume
feather poke
feather renovator
feather scrape
feather sewer
feather shot
feather spring
feather staccato
feather star
feather steamer
feather tick
feather tip
feather tract
feather tree

feather trimmer
feather type
feather valve
feather worm
feather your nest
feather'd rain
feather-bed
feather-covered
feather-duster worm
feather-edge
feather-fleece
feather-footed
feather-head
feather-heeled
feather-leaved
feather-legged
feather-stitch
feather-tail glider
feather-tongue
feather-veined
feather-weight
feather-weighted
feather-work
featherbed
rule
feathered songster
featheredge file
feathering float
feathering paddle wheel
feathering screw
featherleaf cedar
feathertail glider
feathertop grass
feature attraction
feature editor
feature story
feature-length
feature-writing
febri-
febrifuge plant
fed to the gills
fed to the teeth
fed up
fed-up
fed-upedness
fed-upness
federal agent
federal assembly

federal district
federal government
federal home loan bank
federal intermediate credit bank
federal land bank
federal medicine
federal prison
federal reserve bank
federal tax
federated church
fee farm
fee farmer
fee fief
fee grief
fee position
fee simple
fee simple absolute
fee simple conditional
fee simple defeasible
fee simple determinable
fee splitting
fee tail
fee-farm
fee-faw-fum
fee-simple
fee-splitter
fee-splitting
fee-tail
feeble person
feeble-bodied
feeble-eyed
feeble-lunged
feeble-minded
feeble-mindedly
feeble-mindedness
feeble-voiced
feeble-winged
feeble-wit
feed bag
feed boiler
feed
case
feed cooker
feed crusher
feed cutter
feed gear
feed grinder
feed guide

feed hand
feed heater
feed heating
feed hopper
feed line
feed lot
feed mill
feed mixer
feed motion
feed on
feed packer
feed pipe
feed plate
feed pump
feed rack
feed reel
feed rod
feed roll
feed screw
feed stable
feed store
feed tank
feed the fire
feed the fish
feed trough
feed truck
feed tube
feed upon
feed valve
feed water
feed wheat
feed wheel
feed wire
feed-and-reflector unit
feed-back coil
feed-water heater
feedback amplifier
feedback circuit
feedback conductance
feedback control
feedback inhibition
feedback loop
feedback pulses
feedback signals
feedback system engineer
feedback system engineering
feeder airline
feeder cable

feeder ear
feeder line
feeder plant
feeder reactor
feeder road
feeder-in
feeder-up
feeding bottle
feeding cup
feeding head
feeding point
feeding rod
feeding root
feeding standard
feeing market
feel about it
feel acutely
feel anxious
feel around
feel ashamed of yourself
feel at home
feel
 at liberty
feel awful
feel better about it
feel cheap
feel confident
feel contempt for
feel creepy
feel deeply
feel disgust
feel easy
feel emotion
feel fine
feel for
feel free
feel funny
feel good
feel happy
feel hungry
feel hurt
feel ill
feel in your bones
feel in your breast
feel in your guts
feel in your viscera
feel intuitively
feel like

feel like a million
feel like the walking dead
feel like yourself
feel no obligation
feel of
feel out
feel pain
feel relief
feel resentment
feel small
feel something terrible
feel sore
feel sorrow for
feel sorry for
feel superior to
feel sure
feel the pangs
feel the pulse
feel the want of
feel under an obligation
feel under the weather
feel unsure
feel up
feel up to
feel with
feel with the fingertips
feel your ground
feel your oats
feel your way
feel yourself
feel yourself again
feeler gauge
feeling awful
feeling cold
feeling evil
feeling faint
feeling for
feeling for language
feeling for words
feeling in your bones
feeling low
feeling of identity
feeling
of kinship
feeling of relief
feeling out
feeling something terrible
feeling the pinch

feeling tone
feeling your oats
feery-fary
feet first
feet foremost
feet of clay
feg Dialect
feigned belief
feline agranulocytosis
feline distemper
feline enteritis
fell-fare
fell-field
fell-land
felling wedge
fellow actor
fellow american
fellow apprentice
fellow being
fellow boarder
fellow captive
fellow caucasian
fellow christian
fellow citizen
fellow collegian
fellow commoner
fellow communicant
fellow companion
fellow conspirator
fellow convict
fellow countryman
fellow craftsman
fellow creature
fellow criminal
fellow delegate
fellow disciple
fellow emigrant
fellow employee
fellow exile
fellow explorer
fellow feeling
fellow feeling in suffering
fellow guest
fellow heir
fellow helper
fellow idler
fellow immigrant
fellow laborer

fellow listener
fellow lodger
fellow man
fellow member
fellow mortal
fellow passenger
fellow patriot
fellow pedestrian
fellow plotter
fellow prisoner
fellow pupil
fellow
servant
fellow sinner
fellow soldier
fellow student
fellow sufferer
fellow townsman
fellow traveler
fellow traveller
fellow tribesman
fellow victim
fellow villager
fellow worker
fellow workman
fellow worshiper
fellow-commoner
fellow-creature
fellow-feel
fellow-feeling
fellow-heir
fellow-man
fellow-men
fellow-servant rule
fellow-soldier
fellowship porter
felo de se
felo-de-se
felon grass
felon herb
felones-de-se
felony murder
felos-de-se
felsite-porphyry
felt conditioner
felt cutter
felt dauber
felt drier

felt fern
felt former
felt fuller
felt grain
felt hat
felt knife
felt maker
felt oiler
felt packer
felt roller
felt roofer
felt roofing
felt rust
felt sewer
felt side
felt washer
felt weaver
felt worker
felt-jacketed
felt-lined
felt-shod
felt-tip pen
female animal
female being
female gamete
female impersonator
female line
female organ
female organs
female rhyme
female sex
female suffrage
feme covert
feme sole
feme-sole merchant
feme-sole trader
femes covert
femes sole
feminine
cadence
feminine caesura
feminine ending
feminine rhyme
feminist therapy
femme de chambre
femme fatale
femmes de chambre
femmes fatales

femoral artery
femto-
fen cress
fen duck
fen farmer
fen farming
fen fever
fen fire
fen grape
fen groundsel
fen lentil
fen orchis
fen rue
fen skate
fen skater
fen skating
fen thrush
fen-born
fen-bred
fen-sucked
fen-ting
fence arbor
fence balk
fence builder
fence in
fence lizard
fence maker
fence month
fence off
fence post
fence puller
fence rail
fence season
fence splicer
fence stretcher
fence tightener
fence-off
fence-sitter
fence-sitting
fence-straddler
fence-straddling
fenced-in
fencer's mask
fencing foils
fencing mask
fencing master
fencing match
fencing school

fencing stick
fencing-in
fend for yourself
fend off
fender bar
fender beam
fender bolt
fender boom
fender pile
fender post
fender skid
fender spar
fender stool
fender wall
fenestration operation
fennel giant
fennel oil
fennel seed
fennel water
fennel-leaved
fer-de-lance
fer-de-moline
ferae naturae
feriae
jova
ferling-noble
fermentation alcohol
fermentation gum
fermentation lock
fermentation tube
fern ally
fern asparagus
fern ball
fern bracken
fern bush
fern clubmoss
fern covert
fern cycad
fern green
fern hook
fern meadowbur
fern moss
fern owl
fern palm
fern preserver
fern scale
fern scrub
fern seed

fern tree
fern weevil
fern-clad
fern-crowned
fern-fringed
fern-leaved
fern-owl
fern-seed
fern-thatched
ferret badger
ferret out
ferret-badger
ferret-eyed
ferretto zone
ferri-
ferric ammonium oxalate
ferric chloride
ferric dimethyldithiocarbamate
ferric oxide
ferric sodium oxalate
ferricyanic acid
ferris wheel
ferrite-rod aerial
ferro-
ferro-carbon-titanium
ferro-concrete
ferro-uranium
ferrocyanic acid
ferroso-
ferrotype tin
ferrous oxide
ferrous sulfate
ferrous sulphate
ferruginous duck
ferry bell
ferry bridge
ferry captain
ferry car
ferry craft
ferry incline
ferry master
ferry pole
ferry rack
ferry rocket
ferry slip
ferry steamer
ferry ticket
ferry warden

ferry-boat
fertile imagination
fertile
 material
fertile mind
fertile-flowered
fertile-fresh
fertile-headed
fertility cult
fertility god
fertility goddess
fertility spirit
fertility symbol
fertilization cone
fertilization tube
fertilizer ammonia
fertilizer chemical
fertilizer crusher
fertilizer distributor
fertilizer divider
fertilizer drill
fertilizer hand
fertilizer maker
fertilizer making
fertilizer meal
fertilizer mill
fertilizer mixer
fertilizer phosphate
fertilizer plant
fertilizer press
fertilizer sampler
fertilizer spreader
fertilizer tank
fertilizer-crushing
fervent hope
fervent imagination
fescue grass
fess point
fess up
fesse point
festal board
festina lente
festival day
festival of lights
festive occasion
festoon cloud
festoon lighting
festoon pine

festooned pahoehoe
fetal diagnosis
fetal position
fetch a blow
fetch about
fetch and carry
fetch away
fetch breath
fetch candle
fetch down
fetch headway
fetch rod
fetch sternway
fetch up
fetch up all standing
fetch up at
fetch-
fetch-candle
fetch-light
fetched-on
fetching-up
fete
 champetre
fete day
fete-champetre
feti-
fetid air
fetlock joint
fetlock-deep
fetter bone
feu annual
feu charter
feu d'artifice
feu de joie
feu duty
feu farm
feu farmer
feu-farm
feudal estate
feudal investiture
feudal system
feuille-morte
feux d'artifice
feux de joie
fever bark
fever bird
fever blister
fever chart

fever curve
fever flash
fever fly
fever heat
fever of excitement
fever pill
fever pitch
fever plant
fever reducer
fever sore
fever therapy
fever thermometer
fever treatment
fever tree
fever twig
fever ward
fever-cooling
fever-destroying
fever-haunted
fever-lurden
fever-maddened
fever-reducer
fever-ridden
fever-shaken
fever-sick
fever-smitten
fever-stricken
fever-troubled
fever-warm
fever-weakened
few and far between
few, a
few-acred
few-celled
few-flowered
few-flowered oat grass
few-fruited
few-seeded
few-toothed
fiat justitia ruat caelum
fiat lux
fiat money
fibble-fable
fiber boilerman
fiber bundle
fiber carder
fiber comber
fiber crimper

fiber drafter
fiber
dresser
fiber filler
fiber glass
fiber graphite
fiber hackler
fiber mixer
fiber optics
fiber plant
fiber plaster
fiber saturation point
fiber sorter
fiber stitch
fiber turner
fiber wax
fiber-faced
fiber-glass boat
fiber-shaped
fible-fable
fibr-
fibre optics
fibrin ferment
fibrino-
fibrinous pneumonia
fibro-
fibro-osteoma
fibroid heart
fibroid inflammation
fibroid phthisis
fibrous grass
fibrous-coated
fibrous-rooted
fickle Chance
fickle finger of fate
fickle-fancied
fickle-headed
fickle-minded
fickle-mindedly
fickle-mindedness
fiction of the mind
fictional form
fictitious name
fictitious person
fid hole
fiddle away
fiddle back
fiddle beetle

fiddle block
fiddle bow
fiddle brace back
fiddle case
fiddle dock
fiddle flower
fiddle head
fiddle maker
fiddle making
fiddle pattern
fiddle with
fiddle-back
fiddle-brained
fiddle-de-dee
fiddle-faced
fiddle-faddle
fiddle-faddled
fiddle-faddler
fiddle-faddling
fiddle-flanked
fiddle-head
fiddle-lipped
fiddle-neck
fiddle-scraping
fiddle-shaped
fiddle-string
fiddle-waist
fiddleback
chasuble
fiddler crab
fiddler duck
fiddley house
fiddley opening
fidei-commissum
fideicommissary heir
fidelity bond
fidelity insurance
fidget with
fiduciary bond
fiduciary heir
fiduciary issue
fidus Achates
fie-fie
field armor
field army
field arrow
field artillery
field ash

field bag
field balm
field balsam
field basil
field battery
field bean
field bed
field bee
field beet
field bellwort
field betony
field bindweed
field book
field boot
field bugloss
field camomile
field capacity
field captain
field chickweed
field clerk
field coil
field company
field control
field conventicle
field corn
field cress
field cricket
field crop
field crowfoot
field current
field cypress
field daisy
field day
field dodder
field dog
field driver
field duck
field emission
field event
field fortification
field frame
field garlic
field glass
field glasses
field goal
field grade
field gray
field gromwell

field guidance
field guide
field gun
field hand
field hockey
field
holler
field horsetail
field hospital
field house
field ice
field intensity
field ion microscope
field jacket
field judge
field kale
field kitchen
field lark
field larkspur
field lens
field lily
field line
field madder
field magnet
field maneuver
field marigold
field mark
field marshal
field martin
field master
field meeting
field milkwort
field mint
field mouse
field mushroom
field music
field nigelweed
field night
field oak
field of battle
field of blood
field of bloodshed
field of force
field of fractions
field of honor
field of honour
field of inquiry
field of quotients

field of slaughter
field of study
field of view
field of vision
field officer
field order
field park
field pea
field penny-cress
field pine
field plotter
field plover
field poa grass
field poppy
field preaching
field probable error
field range
field ration
field rations
field rivet
field rush
field salad
field scabious
field scorpion grass
field service
field shoes
field soapwort
field soapwortfield sorrel
field sorrel
field
southernwood
field spaniel
field sparrow
field speedwell
field spider
field spirit
field spool
field sports
field staff
field station
field stop
field strength
field system
field telegraph
field telephone
field tent
field theory
field thistle

field thyme
field tiller
field titling
field train
field training
field trial
field trip
field vole
field winding
field work
field wormwood
field woundwort
field yam-root
field-bed
field-book
field-control converter
field-controlled
field-conventicle
field-conventicler
field-cornet
field-cornetcy
field-day
field-discharge switch
field-effect transistor
field-emission X-ray tube
field-glass
field-holler
field-marshal
field-meeting
field-strength meter
field-strip
field-stripped
field-stripping
field-stript
field-transfer switch
field-work
fielded panel
fielder's choice
fielding average
fields of Aalu
fiend from hell
fierce temper
fierce-eyed
fierce-faced
fierce-looking
fierce-minded
fierce-natured
fieri facias

fiery cross
fiery furnace
fiery
imagination
fiery ordeal
fiery temper
fiery-bright
fiery-cross
fiery-crowned
fiery-eyed
fiery-faced
fiery-fierce
fiery-flaming
fiery-footed
fiery-helmed
fiery-hoofed
fiery-hot
fiery-kindled
fiery-liquid
fiery-mouthed
fiery-pointed
fiery-rash
fiery-seeming
fiery-shining
fiery-spangled
fiery-sparkling
fiery-spirited
fiery-sworded
fiery-tempered
fiery-tressed
fiery-twinkling
fiery-veined
fiery-visaged
fiery-wheeled
fiery-winged
fiesta de toros
fiesta flower
fiesta taurina
fiestas de toros
fiestas taurinas
fife rail
fife-rail
fifteen-pounder
fifth column
fifth columnist
fifth monarchy
fifth position
fifth venereal disease

fifth wheel
fifth-column
fifth-column activity
fifty cents
fifty percent
fifty-acre
fifty-dollar bill
fifty-eight
fifty-eighth
fifty-fifth
fifty-fifty
fifty-first
fifty-five
fifty-four
fifty-fourth
fifty-mile
fifty-nine
fifty-ninth
fifty-one
fifty-second
fifty-seven
fifty-seventh
fifty-six
fifty-sixth
fifty-third
fifty-three
fifty-two
fifty-year
fiftyty-fifty
fig banana
fig
 bar
fig bean
fig dust
fig faun
fig finch
fig insect
fig leaf
fig marigold
fig moth
fig out
fig parrot
fig paste
fig soap
fig up
fig wart
fig wasp
fig wax

fig-bird
fig-leaf
fig-shaped
fig-tree
fig-tree wax
fig-wort
figaro sauce
fige de froid
fight a delaying action
fight a duel
fight a holding action
fight against
fight fire with fire
fight for
fight hand-to-hand
fight it out
fight like devils
fight off
fight over
fight shy
fight shy of
fight the good fight
fight the good fight for
fight to the death
fight to the last ditch
fight tooth and nail
fight with
fight with windmills
fight your battles over again
fight your way
fight-off
fighter pilot
fighter-bomber
fighter-interceptor
fighting chair
fighting chance
fighting cock
fighting fish
fighting force
fighting machine
fighting mad
fighting man
fighting ship
fighting top
fighting weight
fights, the
figment of the imagination
figurate number

figurative language
figuratively speaking
figure caster
figure dance
figure dancer
figure eight
figure
 in
figure of comparison
figure of eight
figure of fun
figure of speech
figure on
figure out
figure skate
figure skater
figure skates
figure skating
figure stone
figure to yourself
figure up
figure work
figure-caster
figure-flinger
figure-four trap
figure-ground
figure-head
figure-of-eight knot
figured bass
figured glass
figured style
figures of
figures of speech
figuring in the mind
figwort family
filament battery
filament lamp
filamentary transistor
filbert brown
filbert mouse
file a claim
file and forget
file away
file band
file bottom
file card
file cleaner
file clerk

file closer
file cutter
file dresser
file dust
file finishing
file fire
file firing
file folder
file for
file forger
file grinder
file leader
file maker
file off
file setter
file sharpener
file signal
file snake
file suit for divorce
file tempering
file-fish
file-hard
file-soft
filet lace
filet mignon
filets mignons
fili-
filial generation
filial love
filiate to
filing box
filing card
filing case
filing clerk
filing
system
filius nullius
filius populi
filix-mas
fill an office
fill and stand on
fill away
fill cap
fill horse
fill in
fill in for
fill out
fill the air

fill the bill
fill the measure of
fill the mind
fill time
fill to overflowing
fill to the brim
fill up
fill with doubt
fill you in
fill your pockets
fill your shoes
fill-belly
fill-dike
fill-in
fill-paunch
fill-space
fill-up
fille d'honneur
fille de chambre
fille de joie
filled gold
filled milk
filled out
filled to overflowing
filled-system thermometer
filler cap
filler vase
filler wall
filler-in
filler-out
filler-up
filles d'honneur
filles de chambre
filles de joie
fillet cross
fillet head
fillet steak
fillet weld
filletster plane
filli-
filling knitting
filling station
fillister head
fillister plane
fillister screwhead
filly tail
filly-folly
film base

film camera
film caption
film case
film clip
film color
film cutter
film data
film developer
film editor
film evaporator
film exposure
film fern
film gate
film gatefilm gauge
film
joiner
film library
film maker
film pack
film paper
film pickup
film play
film printer
film production
film rating
film recorder
film repairer
film sizing
film speed
film star
film strip
film studio
film window
film-eyed
film-free
film-struck
filmy fern
filmy-eyed
filo-
filter bed
filter candle
filter center
filter factor
filter flask
filter in
filter leaf
filter out
filter paper

filter passer
filter plate
filter press
filter pump
filter tip
filter-passing
filter-tipped
filterable virus
filtering flask
filth disease
filth ferment
filth receptacle
filth-borne
filth-created
filth-fed
filth-sodden
filthy humor
filthy language
filthy lucre
filthy person
filthy place
filthy rich
filthy weed
filthy-handed
filum aquae
fin boom
fin colter
fin cutter
fin de siecle
fin fold
fin keel
fin ray
fin whale
fin-backed
fin-fold theory
fin-footed
fin-shaped
fin-spined
fin-stabilized rocket
fin-tailed
fin-toed
fin-winged
final cause
final draft
final examination
final extremity
final hour
final instructions

final
lot
final notice
final offer
final proposal
final result
final solution
final stroke
final summons
final touch
final twitch
final warning
final whistle
final words
finance bill
finance capitalism
finance capitalist
finance company
finance corporation
financial assistance
financial backing
financial commitment
financial condition
financial credit
financial crisis
financial district
financial expert
financial interests
financial officer
financial remuneration
financial support
financial year
finback whale
finch falcon
finch-backed
find a clue to
find a husband for
find a loophole
find a mate for
find a phrase for
find a way
find a wife for
find against
find an indictment against
find an opening
find credence
find fault
find favor

find favor with
find for
find guilty
find hard to believe
find herself
find it hard going
find means
find out
find out about
find refuge
find sanctuary
find the answer
find the key of
find the key to
find the solution
find time
find vent
find words to
express
find your
find your account in
find your advantage in
find your heart
find your position
find your tongue
find your way into
find yourself
find yourself at
finder switch
finder telescope
finder-point punch
finding list
finding out
finding store
finding-out
fine Italian hand
fine and dandy
fine art
fine art of living
fine arts
fine chemicals
fine distinction
fine feather
fine fettle
fine flavor
fine gentleman
fine hand
fine how-do-you-do

fine kettle of fish
fine lady
fine linen
fine nail
fine palate
fine point
fine print
fine print at the bottom
fine sewer
fine shape
fine structure
fine talk
fine texture
fine whack
fine writer
fine writing
fine-appearing
fine-ax
fine-bore
fine-bred
fine-count
fine-cut
fine-dividing
fine-draw
fine-drawer
fine-drawing
fine-drawn
fine-dressed
fine-drew
fine-eyed
fine-feathered
fine-featured
fine-feeling
fine-fleeced
fine-furred
fine-graded
fine-grain
fine-grained
fine-grainedness
fine-haired
fine-headed
fine-leaved
fine-leaved heath
fine-looking
fine-mouthed
fine-nosed
fine-set
fine-sifted

fine-skinned
fine-spirited
fine-spoken
fine-spun
fine-still
fine-tapering
fine-threaded
fine-timbered
fine-toned
fine-tongued
fine-tooth
fine-tooth
comb
fine-tooth-comb
fine-toothcomb
fine-toothed
fine-toothed comb
fine-tricked
fine-wrought
fineness of grain
fineness ratio
finer feelings
finery furnace
finery hearth
fines herbes
finger alphabet
finger bar
finger board
finger bowl
finger brush
finger clamp
finger coral
finger cutting
finger cymbals
finger exercise
finger fern
finger food
finger fracture
finger gate
finger gauge
finger grass
finger grip
finger guard
finger herb
finger hole
finger joint
finger lake
finger lime

finger man
finger mark
finger nut
finger of death
finger or two
finger paint
finger painter
finger painting
finger patch
finger pillory
finger plate
finger post
finger reading
finger ring
finger shell
finger sponge
finger steel
finger tight
finger wave
finger with
finger's breadth
finger's width
finger-ache
finger-and-toe
finger-comb
finger-comb
grass
finger-cone
finger-cone pine
finger-cut
finger-end
finger-foxed
finger-marked
finger-paint
finger-pointing
finger-post
finger-shaped
finger-stall
finger-stone
fingers all thumbs
fingertip caress
fingertip coat
fingle-fangle
finis coronat opus
finish in front
finish off
finish up
finish-bore

finish-cut
finish-form
finish-grind
finish-machine
finish-mill
finish-plane
finish-ream
finish-shape
finish-stock
finish-stock change
finish-turn
finished up
finished version
finisher card
finishing change
finishing chisel
finishing nail
finishing school
finishing stove
finishing stroke
finishing tap
finishing touch
finite intersection property
finite number
finite verb
finite-dimensional
finitely additive function
fink out
finnan haddie
finnan haddock
finno-ugric
fippenny bit
fippenny piece
fipple flute
fipple pipe
fir apple
fir ball
fir balsam
fir club moss
fir cone
fir green
fir moss
fir needle
fir parrot
fir pine
fir rape
fir rope
fir wood

fir wool
fir-bordered
fir-built
fir-crested
fir-scented
fir-topped
fir-tree
fire
 a salute
fire a shot at
fire a volley
fire adjuster
fire alarm
fire altar
fire and brimstone
fire and fury
fire ant
fire apparatus
fire appliance
fire area
fire arrow
fire assay
fire at
fire away
fire balloon
fire bar
fire barrel
fire barrier
fire basket
fire bay
fire bean
fire beater
fire bed
fire beetle
fire bell
fire belt
fire bill
fire blast
fire blight
fire block
fire blower
fire bomb
fire boss
fire break
fire breather
fire bridge
fire brigade
fire bucket

fire buff
fire builder
fire bush
fire cage
fire chamber
fire cherry
fire chief
fire churn
fire clay
fire cock
fire command
fire commander
fire company
fire control
fire cross
fire curtain
fire cut
fire cutoff
fire dance
fire department
fire direction
fire division wall
fire door
fire drill
fire drilling
fire effect
fire engine
fire escape
fire exit
fire extinguisher
fire fan
fire festival
fire fiend
fire fight
fire fighter
fire fighting
fire finch
fire finder
fire flag
fire
fungus
fire gilding
fire gilt
fire gilting
fire glass
fire gong
fire grass
fire grate

fire hangbird
fire hat
fire hazard
fire hearth
fire hook
fire hose
fire hydrant
fire inspector
fire insurance
fire iron
fire irons
fire kiln
fire ladder
fire lane
fire lily
fire line
fire loss
fire main
fire maker
fire making
fire mark
fire marshal
fire mist
fire net
fire of demolition
fire of genius
fire off
fire office
fire opal
fire pail
fire patrol
fire patrolman
fire pike
fire pink
fire pit
fire plant
fire point
fire police
fire polishing
fire pot
fire power
fire prevention
fire quencher
fire raft
fire raid
fire raiser
fire red
fire red toner

fire reel
fire resistance
fire retardant
fire retarder
fire risk
fire room
fire root
fire salamander
fire sale
fire salvage
fire sand
fire saw
fire scarlet
fire screen
fire set
fire setting
fire ship
fire shovel
fire shutter
fire slash
fire spirit
fire station
fire step
fire stick
fire stink
fire stop
fire storm
fire support
fire swab
fire tactics
fire temple
fire
test
fire the blood
fire thorn
fire tongs
fire tower
fire tree
fire trench
fire tube
fire underwriter
fire up
fire upon
fire walk
fire walking
fire wall
fire warden
fire watcher

fire weather
fire window
fire worker
fire worship
fire worshiper
fire your imagination
fire-
fire-and-brimstone
fire-angry
fire-arm
fire-backed pheasant
fire-ball
fire-baptized
fire-bearing
fire-bellied
fire-bird
fire-boot
fire-born
fire-box
fire-brand
fire-breathing
fire-breeding
fire-burning
fire-burnt
fire-chaser
fire-clad
fire-cracked
fire-crested
fire-cross
fire-crowned
fire-cure
fire-cured
fire-curing
fire-damp
fire-darting
fire-detecting
fire-drake
fire-eater
fire-eating
fire-endurance
fire-endurance test
fire-engine
fire-exit bolt
fire-extinguisher
fire-extinguishing
fire-eyed
fire-fang
fire-flaught

fire-float
fire-flowing
fire-fly
fire-foaming
fire-footed
fire-free
fire-gilded
fire-god
fire-hardened
fire-hoofed
fire-hook
fire-hot
fire-hunt
fire-hunting
fire-iron
fire-leaves
fire-light
fire-lighted
fire-lilies
fire-lily
fire-lipped
fire-marked
fire-master
fire-mouthed
fire-new
fire-pan
fire-pitted
fire-place
fire-plow
fire-polish
fire-pot
fire-proof
fire-protection
engineer
fire-quenching
fire-raiser
fire-raising
fire-red
fire-resistant
fire-resistant material
fire-resisting
fire-resisting material
fire-resistive
fire-resistive material
fire-retardant
fire-retardant material
fire-retarded
fire-ring

fire-robed
fire-safeness
fire-scarred
fire-scathed
fire-screen
fire-seamed
fire-ship
fire-souled
fire-spirited
fire-spitting
fire-sprinkling
fire-stone
fire-strong
fire-swart
fire-swift
fire-tailed
fire-tight
fire-tube boiler
fire-warmed
fire-wheeled
fire-winged
fire-work
fire-worker
fireburn bush
firecracker flower
fireless cooker
fireless heater
fireplace fitter
fireproof material
fireworks rocket
firing area
firing battery
firing charge
firing data
firing glass
firing iron
firing line
firing order
firing party
firing pin
firing ring
firing squad
firing step
firing table
firing test
firing
tread
firing tube

firm as Gibraltar
firm belief
firm friendship
firm ground
firm hand
firm hold
firm price
firm resolve
firm up
firm-based
firm-braced
firm-chinned
firm-compacted
firm-footed
firm-framed
firm-jawed
firm-joint
firm-minded
firm-nerved
firm-paced
firm-planted
firm-rooted
firm-set
firm-sinewed
firm-textured
firm-written
firmament blue
firmer chisel
firmer gouge
firmly established
firmness of mind
firmness of spirit
firred plywood
first aid
first among equals
first and foremost
first and last
first appearance
first approach
first arrival
first axiom of countability
first base
first baseman
first blush
first blush of the morning
first brightening
first category
first cause

first choice
first class
first comer
first cousin
first crack
first crack out of the box
first derivative
first derived curve
first division
first draft
first edition
first estate
first family
first floor
first flush of the morning
first fruits
first glance
first hand
first harmonic
first impression
first
inning
first intention
first lady
first lap
first law of motion
first law of thermodynamics
first lieutenant
first light
first line
first line of battle
first line of defense
first main track
first mate
first mortgage
first mortgage bond
first motion
first move
first name
first night
first of all
first off
first offender
first officer
first option
first or last
first order
first paper

first papers
first person
first philosophy
first place
first position
first post
first principle
first principles
first prize
first quarter
first rate
first reader
first reading
first refusal
first round
first school
first sergeant
first sight
first speed
first stage
first step
first steps
first stomach
first stone
first story
first string
first team
first thing
first tragedian
first violinist
first water
first-aid
first-aider
first-begot
first-begotten
first-born
first-bred
first-built
first-cause argument
first-chop
first-class
first-class mail
first-conceived
first-created
first-day
first-day
cover
first-degree burn

first-done
first-endeavoring
first-expressed
first-famed
first-floor
first-foot
first-footer
first-formed
first-found
first-framed
first-fruit
first-gendered
first-generation
first-gotten
first-grown
first-hand
first-in
first-in first-out
first-invented
first-known
first-line
first-loved
first-made
first-mentioned
first-mining
first-mortgage
first-mortgage bond
first-name
first-named
first-night
first-nighter
first-order reaction
first-out
first-page
first-past-the-post
first-preferred
first-rate
first-rately
first-rateness
first-rater
first-ripe
first-run
first-seen
first-strike capacity
first-string
first-told
first-written
fiscal agent

fiscal period
fiscal year
fise dog
fish and chips
fish ball
fish beam
fish begonia
fish belly
fish blanket
fish boom
fish bowl
fish breeder
fish breeding
fish cake
fish carrier
fish carver
fish checker
fish coop
fish crane
fish crow
fish culture
fish davit
fish day
fish dinner
fish doctor
fish duck
fish eagle
fish eggs
fish essence
fish
eye
fish factory
fish flake
fish flour
fish fly
fish for
fish for compliments
fish fork
fish fry
fish fungus
fish geranium
fish globe
fish glue
fish grass
fish guano
fish hatcher
fish hatchery
fish hawk

fish in troubled waters
fish inspector
fish joint
fish kettle
fish killer
fish knife
fish ladder
fish lead
fish louse
fish manure
fish maw
fish meal
fish mint
fish mold
fish moth
fish net
fish oil
fish or cut bait
fish out
fish out of water
fish owl
fish pearl
fish pendant
fish plank
fish poison
fish pole
fish pomace
fish salt
fish scale
fish scrap
fish slice
fish soup
fish splice
fish stick
fish story
fish tackle
fish tail
fish tape
fish tapeworm
fish to fry
fish tongue
fish torpedo
fish up
fish warden
fish wheel
fish wire
fish young
fish-and-chip shop

fish-and-chips
fish-backed
fish-bellied
fish-belly rail
fish-blooded
fish-canning
fish-cultural
fish-culturist
fish-day
fish-eating
fish-eating bird
fish-eye lens
fish-eyed
fish-fag
fish-fed
fish-feeding
fish-flaking
fish-gig
fish-god
fish-goddess
fish-hatching
fish-hook
fish-producing
fish-scale
fish-scaling
fish-selling
fish-shaped
fish-skin
fish-slitting
fish-tail
fishbone
thistle
fishbone tree
fisher-cat
fisherman's bend
fisherman's reef
fisherman's ring
fisherman's staysail
fisherman's sweater
fishery salt
fisheye lens
fishhook cactus
fishhook money
fishing banks
fishing boat
fishing breeze
fishing cat
fishing club

fishing craft
fishing dory
fishing duck
fishing expedition
fishing fleet
fishing float
fishing gear
fishing ground
fishing hook
fishing license
fishing line
fishing net
fishing pole
fishing question
fishing reel
fishing rod
fishing schooner
fishing smack
fishing spear
fishing tackle
fishing vessel
fishing worm
fishskin disease
fishtail bit
fishtail burner
fishtail cutter
fishtail down
fishtail drapery
fishtail landing
fishtail palm
fishtail wind
fishtail-shaped
fishy transaction
fissi-
fission alga
fission bomb
fission fungus
fission particles
fission products
fission reaction
fission reactor
fission-fusion
bomb
fissionable material
fissure of Rolando
fissure of Sylvius
fissure vein
fist hatchet

fist law
fist mate
fistulous withers
fit and fine
fit as a fiddle
fit for
fit for a gourmet
fit for a king
fit for sea
fit for society
fit for the dust hole
fit for the junk yard
fit for the wastepaper basket
fit in
fit of abstraction
fit of anger
fit of crying
fit of laughter
fit of temper
fit out
fit plant
fit strip
fit the pattern
fit to be tied
fit to bust
fit to kill
fit to live in
fit together
fit up
fitchy at the foot
fitful sleep
fitness for society
fits and starts
fitted coat
fitted for
fitted out
fitted sheet
fittie-lan
fitting change
fitting out
fitting room
fitting strip
five C's
five W's
five all
five and twenty
five back
five bucks

five cents
five centuries
five dollars
five hundred
five hundred dollars
five hundred rummy
five percenter
five rayed
five senses
five spice powder
five stones
five-acre
five-act
five-and-dime
five-and-ten
five-and-ten-cent store
five-barred
five-barred
gate
five-beaded
five-branched
five-by-five
five-card
five-chambered
five-corn
five-cornered
five-corners
five-cut
five-day
five-day fever
five-day week
five-dollar bill
five-dollar gold piece
five-eighth
five-em space
five-faced bishop
five-figure
five-finger
five-fingered
five-fingers
five-flowered
five-foiled
five-foot
five-gaited
five-guinea
five-horned
five-hour
five-hundred-dollar bill

five-inch
five-leaf
five-leafed
five-leaved
five-legged
five-line
five-lined
five-lobed
five-master
five-mile
five-minute
five-minute gun
five-nerved
five-nine
five-o'clock shadow
five-o'clock tea
five-page
five-part
five-part time
five-parted
five-percenter
five-ply
five-pointed
five-pointed star
five-pound
five-quart
five-rater
five-reel
five-reeler
five-ribbed
five-room
five-shooter
five-sisters
five-spot
five-spotted
five-star
five-star general
five-story
five-stringed
five-toed
five-toothed
five-twenty
five-valved
five-volume
five-week
five-year
five-year plan
fivepenny morris

fix
a limit
fix in the memory
fix in the mind
fix on
fix the blame for
fix the burden of
fix the date
fix the eyes upon
fix the mind on
fix the mind upon
fix the paternity of
fix the price of
fix the responsibility for
fix the thoughts on
fix the thoughts upon
fix the time
fix to
fix together
fix up
fix upon
fix your attention
fix your gaze
fix your position
fix your thoughts
fix-it shop
fixation abscess
fixation neurosis
fixation pause
fixation point
fixative varnish
fixed and flashing light
fixed arch
fixed asset
fixed assets
fixed belief
fixed capital
fixed charge
fixed charges
fixed cost
fixed costs
fixed feast
fixed idea
fixed in the mind
fixed investment trust
fixed liability
fixed light
fixed mind

fixed oil
fixed opinion
fixed point
fixed price
fixed purpose
fixed regard
fixed resolve
fixed satellite
fixed star
fixed stars
fixed station
fixed trust
fixed upon
fixed-bar
fixed-do
fixed-do system
fixed-focus camera
fixed-head coup
fixed-head coupe
fixed-hub
fixed-hub axle
fixed-income
fixed-point
representation
fixed-temperature
fixed-wing aircraft
fixing bath
fixity of purpose
fizz out
fizzle out
fl dr
fl oz
flabby-cheeked
flabelli-
flag captain
flag day
flag down
flag fall
flag flower
flag halyard
flag hoister
flag lieutenant
flag list
flag of convenience
flag of truce
flag officer
flag post
flag rank

flag salute
flag seat
flag signal
flag smut
flag station
flag stop
flag waver
flag waving
flag-bearer
flag-bedizened
flag-man
flag-officer
flag-root
flag-ship
flag-staff
flag-stone
flag-waver
flag-waving
flagellate yourself
flageolet tone
flagging iron
flagon-shaped
flagrant falsehood
flagrante delicto
flail at
flail away at
flail joint
flak jacket
flak ship
flak suit
flak train
flak vest
flake figure
flake manna
flake off
flake out
flake stand
flake tragacanth
flake white
flaked-out
flaky pastry
flambor flamb
flame azalea
flame blue
flame bridge
flame cell
flame color
flame cultivator

flame gun
flame holder
flame ignition
flame lamp
flame lily
flame lousewort
flame
 manometer
flame microphone
flame nettle
flame out
flame projector
flame reaction
flame red
flame scarlet
flame spectrum
flame standard
flame stitch
flame test
flame tetra
flame thrower
flame trap
flame tree
flame up
flame vine
flame-breasted
flame-breathing
flame-colored
flame-colour
flame-cut
flame-darting
flame-devoted
flame-eyed
flame-faced
flame-feathered
flame-fusion process
flame-haired
flame-of-the-forest
flame-of-the-woods
flame-out
flame-red
flame-robed
flame-shaped
flame-snorting
flame-sparkling
flame-thrower
flame-tight
flame-tipped

flame-tree
flame-uplifted
flame-winged
flames-of-the-woods
flaming torch
flamingo flower
flamingo-flower
flammable material
flan ring
flange bushing
flange coupling
flange joint
flange nut
flange plate
flange pulley
flange rail
flange steel
flange tile
flange union
flank attack
flank company
flank defense
flank file
flank fire
flank guard
flank march
flank movement
flank patrol
flank speed
flank steak
flanker back
flanking angle
flannel cake
flannel
flower
flannel moth
flannel plant
flannelmouth catfish
flannelmouth sucker
flap door
flap hinge
flap the memory
flap tile
flap valve
flap-dragon
flap-ear'd knave
flap-eared
flapper dock

flapper skate
flapper-bag
flapping angle
flare light
flare out
flare path
flare rocket
flare star
flare up
flare-out
flare-up
flare-up light
flash across one's mind
flash across the mind
flash back
flash boiler
flash bulb
flash burn
flash butt welding
flash camera
flash card
flash color
flash fire
flash flood
flash gear
flash generator
flash gun
flash in the pan
flash lamp
flash method
flash of light
flash of lightning
flash of wit
flash on the mind
flash pasteurization
flash photography
flash photolysis
flash picture
flash pipe
flash point
flash powder
flash price
flash set
flash spectrum
flash synchronizer
flash test
flash tube
flash up

flash upon one
flash valve
flash welding
flash wheel
flash-board
flash-house
flash-lock
flash-man
flash-pasteurize
flashed brick
flashed glass
flashing block
flashing
light
flashing point
flashover voltage
flask-shaped
flask-shaped heart
flat aft
flat and unprofitable
flat arch
flat as a billiard table
flat as a board
flat as a bowling green
flat as a cake
flat as a flounder
flat as a pancake
flat as a tennis court
flat back
flat broke
flat bug
flat calm
flat cap
flat coat
flat contradiction
flat country
flat drill
flat failure
flat fish
flat foot
flat glass
flat in
flat key
flat knit
flat knitting
flat knot
flat market
flat on your back

flat on your belly
flat on your nose
flat out
flat palm
flat pass
flat point lace
flat press
flat race
flat racing
flat rate
flat refusal
flat roof
flat sage
flat sennit
flat silver
flat sour
flat spin
flat tire
flat wash
flat-armed
flat-backed
flat-beaked
flat-bed
flat-bed cylinder press
flat-bed press
flat-billed
flat-boat
flat-bosomed
flat-bottom
flat-bottomed
flat-breasted
flat-browed
flat-cap
flat-cheeked
flat-chested
flat-coated retriever
flat-compound
flat-crowned
flat-decked
flat-ended
flat-faced
flat-floored
flat-fold
flat-foot
flat-footed
flat-footedly
flat-footedness
flat-fronted

flat-grained
flat-handled
flat-hat
flat-hatted
flat-hatter
flat-hatting
flat-head
flat-headed
flat-heeled
flat-hoofed
flat-horned
flat-iron
flat-joint
 pointing
flat-knit
flat-minded
flat-mouthed
flat-nose
flat-nosed
flat-out
flat-out speed
flat-packed
flat-plate keel
flat-plate printing
flat-ribbed
flat-ring
flat-ring armature
flat-roofed
flat-saw
flat-sawed
flat-sawing
flat-sawn
flat-shouldered
flat-sided
flat-slab construction
flat-soled
flat-sour
flat-toothed
flat-top
flat-topped
flat-turret lathe
flat-visaged
flat-waisted
flat-ways
flat-woven
flatbed cylinder press
flatbed press
flathead cat

flathead catfish
flatheaded apple tree borer
flatheaded borer
flattail mullet
flatten in
flatten out
flatten yourself
flattened-strand rope
flattening oven
flattening stone
flatter the palate
flatter yourself
flatter-blind
flattering remark
flattering tongue
flatting furnace
flatting mill
flatting oil
flattop antenna
flatuous
melancholia
flatwork ironer
flavo-
flavor control
flavoring extract
flaw in an argument
flax bellflower
flax blue
flax brake
flax buncher
flax bundler
flax canker
flax comb
flax dodder
flax dresser
flax family
flax hackler
flax lily
flax olive
flax plant
flax retter
flax ripple
flax rust
flax snapdragon
flax spinner
flax star
flax straw
flax vine

flax wheel
flax wilt
flax winder
flax-colored
flax-flower blue
flax-leaved
flax-polled
flax-seed
flax-sick
flaxen-colored
flaxen-haired
flaxen-headed
flaxen-wigged
flaxseed cake
flaxseed coal
flaxseed oil
flea beetle
flea bug
flea collar
flea fair
flea hopper
flea in the ear
flea in your ear
flea in your nose
flea louse
flea market
flea mint
flea weevil
flea-bane
flea-bite
flea-bitten
flea-lugged
fleabane mullet
fleam tooth
fleche de lard
flector tuning
fleece vine
fleece wool
fleece-lined
fleece-vine
fleece-white
fleecy cloud
fleecy-looking
fleecy-white
fleecy-winged
fleer at
fleet admiral
fleet engineer

fleet insurance
fleet milk
fleet
 street
fleet submarine
fleet-foot
fleet-footed
fleeting impulse
flench-gut
flesh and blood
flesh color
flesh crow
flesh eater
flesh flea
flesh fly
flesh fork
flesh glove
flesh hoop
flesh ocher
flesh out
flesh pink
flesh red
flesh show
flesh side
flesh tint
flesh tone
flesh worm
flesh wound
flesh-bearing
flesh-color
flesh-colored
flesh-colour
flesh-consuming
flesh-devouring
flesh-eater
flesh-eating
flesh-fallen
flesh-fly
flesh-pink
flesh-pot
fleshing knife
fleshly delight
fleshly lust
fleshly-minded
fleshpots of Egypt
fleshy fruit
fleshy-fruited
fleur de luce

fleur de lys
fleur-de-lis
fleur-de-lys
fleurs-de-lis
fleurs-de-lys
fleury counterfleury
flex point
flex wing
flex your muscles
flexible shaft
flexible supports
flexible-shaft drill
flexuoso-
flexure plate scale
flick knife
flick of the eyelash
flick you on the raw
flicker of an eye
flicker photometer
flicker photometry
flickering flame
flickering light
flier-out
flight arrow
flight attendant
flight bag
flight control
flight
crew
flight deck
flight engineer
flight feather
flight feathers
flight formation
flight indicator
flight instrument
flight leader
flight lieutenant
flight line
flight muscle
flight nurse
flight of fancy
flight of ideas
flight of steps
flight of time
flight of wit
flight officer
flight operation

flight path
flight path angle
flight pay
flight plan
flight reaction
flight recorder
flight shooter
flight shooting
flight simulator
flight song
flight status
flight strip
flight surgeon
flight test
flight tester
flight training
flight-shooting
flight-shot
flight-test
flightless bird
flim-flam
flimflam man
flincher-mouse
flinders grass
fling at
fling down
fling down the gage
fling down the gauntlet
fling down the glove
fling off
fling out
flinging-tree
flint age
flint and steel
flint clay
flint corn
flint glass
flint gray
flint mill
flint miller
flint milling
flint paper
flint paring
flint skinning
flint sponge
flint wheat
flint-dried
flint-glass

flint-lock
flip a coin
flip chart
flip glass
flip
 of a coin
flip of the coin
flip out
flip side
flip side, the
flip through
flip through the pages
flip your lid
flip your wig
flip-flap
flip-flop
flip-flop circuit
flip-flopped
flip-flopping
flip-flops
flip-up
flipper turns
flipperty-flopperty
flippity-flop
flirt with
flirt with death
flirt with the idea
flirt-gill
flirtation-proof
flirting with death
flitch beam
flitch girder
flitch plate
flitter-mouse
float a bond issue
float a loan
float bowl
float bridge
float builder
float carburetor
float chamber
float copper
float fescue
float fishing
float foxtail
float glass
float grass
float high

float in a sea of doubt
float in space
float in the air
float key
float net
float on your back
float ore
float plane
float pump
float road
float seaplane
float stick
float switch
float tank
float trap
float up
float valve
float whey
float with the current
float with the stream
float work
float-boat
float-cut
float-cut file
float-feed
float-feed carburetor
float-iron
float-stone
floating anchor
floating
assets
floating battery
floating bridge
floating capital
floating charge
floating debt
floating dock
floating dry dock
floating drydock
floating fescue
floating foundation
floating foxtail
floating gang
floating grass
floating heart
floating hotel
floating inspector
floating island

floating light
floating manna grass
floating mine
floating palace
floating partition
floating point
floating policy
floating rib
floating screed
floating soap
floating stage
floating stock
floating supply
floating vote
floating-point representation
flocculent precipitate
flock book
flock dot
flock duck
flock mating
flock paper
flock pigeon
flock to
flock together
flock-meal
floe rat
flog a dead horse
flog yourself
flogging chisel
flogging hammer
flood anchor
flood control
flood dam
flood fallowing
flood insurance
flood lamp
flood main ballast
flood negative
flood of light
flood of tears
flood plain
flood pounds in after trim
flood the market
flood the market with
flood the tank
flood the tanks
flood tide
flood

with light
flood-gate
flood-hatch
flood-tide
floodable length
flooded with light
floodlight projector
floor arch
floor beam
floor board
floor boarding
floor broker
floor chisel
floor clamp
floor cleaner
floor cleaning
floor covering
floor dresser
floor dressing
floor enamel
floor finish
floor furnace
floor hanger
floor joist
floor knob
floor lamp
floor leader
floor line
floor manager
floor mat
floor model
floor mop
floor oil
floor oiler
floor paint
floor pit
floor plan
floor plate
floor play
floor plug
floor pocket
floor polish
floor polisher
floor price
floor push
floor sample
floor sander
floor scraper

floor show
floor slab
floor stain
floor switch
floor system
floor tile
floor timber
floor trader
floor wax
floor waxing
floor-cloth
floor-length
floor-load
floor-walker
flooring beam
flooring block
flooring board
flooring brad
flooring clamp
flooring grating
flooring hatchet
flooring joist
flooring lumber
flooring nail
flooring plank
flooring plaster
flooring saw
flooring stone
flooring
 timber
flop down
flop forging
flop-eared
flop-top
flora and fauna
floral clock
floral decoration
floral decorator
floral emblem
floral envelope
floral leaf
flores sulphuris
flori-
florid passage
florid phrase
florid style
flory counter-flory
flos ferri

flos-ferri
flosh silk
floss hole
floss silk
floss thread
floss-silk
floss-silk tree
flossflower blue
flotation blanket
flotation cell
flotation gear
flotsam and jetsam
flounce off
flounce out
flounder-man
flour bag
flour barrel
flour beetle
flour bin
flour blend
flour blender
flour blending
flour bolt
flour bolter
flour bolting
flour copper
flour corn
flour grinder
flour hopper
flour maker
flour mill
flour miller
flour milling
flour mite
flour mixer
flour moth
flour packer
flour paste
flour sack
flour sifter
flour sifting
flour slick
flour weevil
flour weigher
flour worm
flourish of rhetoric
flourish of trumpets
flourishing condition

flourishing thread
flow back
flow bean
flow breccia
flow calorimeter
flow chart
flow cleavage
flow
control
flow diagram
flow from
flow gate
flow in
flow moss
flow nipple
flow of air
flow of blood
flow of ideas
flow of thought
flow of time
flow of words
flow on
flow out
flow over
flow sheet
flow texture
flow together
flow valve
flow-blue
flow-control system
flow-on
flowage texture
flower arrangement
flower basket
flower bed
flower beetle
flower boat
flower bowl
flower box
flower bud
flower bug
flower child
flower concrete
flower cup
flower fence
flower fly
flower garden
flower gardening

flower girl
flower grower
flower head
flower maker
flower making
flower nymph
flower of age
flower of life
flower outbloom
flower painter
flower painting
flower paintress
flower part
flower piece
flower power
flower pride
flower scissors
flower seller
flower shop
flower show
flower spike
flower stalk
flower time
flower tree
flower-bearing
flower-bespangled
flower-besprinkled
flower-breeding
flower-crowned
flower-cup fern
flower-de-luce
flower-decked
flower-embroidered
flower-enameled
flower-enwoven
flower-faced
flower-gentle
flower-growing
flower-hung
flower-infolding
flower-inwoven
flower-kirtled
flower-of-Jove
flower-of-an-hour
flower-pecker
flower-pot
flower-scented
flower-shaped

flower-sprinkled
flower-strewn
flower-sucking
flower-sweet
flower-teeming
flowering
currant
flowering dogwood
flowering flax
flowering maple
flowering moss
flowering plant
flowering quince
flowering raspberry
flowering rush
flowering spurge
flowering time
flowering tobacco
flowering wintergreen
flowering-rush family
flowers of rhetoric
flowers of speech
flowers of sulfur
flowers of zinc
flowers-of-Jove
flowery language
flowery style
flowery-kirtled
flowery-mantled
flowing locks
flowing periods
flowing stream
flowing tongue
flowing toward
flowing tresses
flowing-robed
flucti-
fluctuation-proof
flue bridge
flue cleaner
flue pipe
flue plate
flue stop
flue stopper
flue surface
flue-cure
flue-cured
flue-curing

fluent tongue
fluff your lines
fluff-gib
fluffy-haired
fluffy-minded
fluid assets
fluid clutch
fluid
 compression
fluid coupling
fluid die
fluid drachm
fluid dram
fluid drive
fluid dynamics
fluid extract
fluid flywheel
fluid friction
fluid mechanics
fluid motion
fluid movement
fluid operations
fluid ounce
fluid pressure
fluid-compressed
flump down
flunk out
fluo-
fluoboric acid
fluophosphoric acid
fluor spar
fluor-
fluor-spar
fluorescence microscope
fluorescent lamp
fluorescent light
fluorescent lighting
fluorescent paint
fluorescent tube
fluoric acid
fluorine dating
fluorite green
fluorite violet
fluoro-
fluorocarbon plastic
fluorophosphoric acid
fluosilicic acid
flush box

flush coat
flush deck
flush girt
flush of money
flush out
flush rim
flush tank
flush with money
flush-bound
flush-cut
flush-deck vessel
flush-decked
flush-decked vessel
flush-decker
flush-head rivet
flush-headed
flush-jointed
flush-plate filter
flush-plated
flushed with anger
flushed with joy
flushed with pride
flushed with success
flushed with victory
flushing out
flushing rim
flute glass
flute shrike
flute stop
flute-douce
flute-shaped
fluting
iron
flutter kick
flutter the dovecotes
flutter tonguing
flutter valve
flutter wheel
flutter-headed
fluttering the eyelids
fluvio-aeolian
flux and reflux
flux de bouche
flux de mots
flux de paroles
flux density
flux function
flux gate

flux linkage
flux of time
flux of words
flux turn
flux valve
fluxing lime
fly a kite
fly about
fly agaric
fly aloft
fly anchor
fly apart
fly ash
fly at
fly back
fly ball
fly bar
fly blind
fly blister
fly block
fly book
fly by the seat of your pants
fly cap
fly casting
fly cop
fly dope
fly down
fly drill
fly finisher
fly finishing
fly fishing
fly floor
fly frame
fly front
fly fungus
fly gallery
fly governor
fly half
fly high
fly honeysuckle
fly in formation
fly in the face of
fly in the face of facts
fly in the face of reason
fly in the face of the law
fly in the ointment
fly in the teeth of
fly into a passion

fly into a rage
fly into a temper
fly into the face of danger
fly left seat
fly line
fly loft
fly low
fly mold
fly
 mushroom
fly net
fly nut
fly oat
fly off
fly off at a tangent
fly off the handle
fly on instruments
fly open
fly orchid
fly out
fly page
fly phalanger
fly poison
fly powder
fly press
fly rail
fly right seat
fly rod
fly rollway
fly rope
fly sheet
fly snapper
fly spray
fly spring
fly stone
fly storm warnings
fly swatter
fly tent
fly the beam
fly the coop
fly tick
fly tip
fly title
fly to
fly to the assistance of
fly to the sword
fly up
fly wagon

fly water
fly way
fly weevil
fly whisk
fly-away
fly-bane
fly-bitten
fly-blow
fly-blown
fly-boat
fly-boy
fly-by-night
fly-catcher
fly-catching
fly-catching warbler
fly-dung
fly-fish
fly-fisher
fly-fisherman
fly-fishing
fly-flap
fly-free
fly-killing
fly-leaf
fly-net
fly-past
fly-rail
fly-sheet
fly-specked
fly-spleckled
fly-strike
fly-stuck
fly-swarmed
fly-up
fly-wheel
fly-yrap
flyaway grass
flying banana
flying bathtub
flying bedspring
flying bedstead
flying boat
flying bomb
flying bond
flying boxcar
flying bridge
flying buttress
flying cadet

flying
circus
flying classroom
flying colors
flying colours
flying column
flying crow's nest
flying deck
flying doctor
flying dragon
flying dutchman
flying field
flying fish
flying flame
flying fortress
flying fox
flying frog
flying gangway
flying gurnard
flying horses
flying jib
flying jib boom
flying jib guy
flying jib martingale
flying jib stay
flying jump
flying kite
flying kites
flying lemur
flying lessons
flying lizard
flying machine
flying mare
flying marmot
flying moor
flying motorcycle
flying mouse
flying nightingale
flying officer
flying phalanger
flying platform
flying range
flying ring
flying robin
flying rumor
flying sap
flying saucer
flying shear

flying skysail
flying speed
flying spot
flying squad
flying squadron
flying squirrel
flying start
flying tackle
flying tank
flying tanker
flying torpedo
flying wing
flywheel effect
flywheel efficiency
flywheel-explosion
foam at the mouth
foam extinguisher
foam glass
foam rubber
foam-beat
foam-born
foam-crested
foam-flanked
foam-flecked
foam-girt
foam-lit
foam-painted
foam-rubber
 mattress
foam-white
foaming at the mouth
fob chain
fob off
fob on
focal distance
focal epilepsy
focal infection
focal inflammation
focal length
focal plane
focal point
focal ratio
focal-plane shutter
focus lamp
focus of attention
focus of interest
focus on
focus the attention

focus the mind on
focus the thoughts on
focus tube
focus upon
focus your thoughts
focusing cloth
focusing glass
foe-encompassed
foe-reaped
foe-subduing
foeti-
fog alarm
fog bank
fog bell
fog belt
fog buoy
fog circle
fog drip
fog forest
fog gong
fog grass
fog gun
fog lamp
fog level
fog light
fog screen
fog signal
fog up
fog whistle
fog-bank
fog-beset
fog-blue
fog-born
fog-bred
fog-hidden
fog-logged
fog-ridden
fog-signal
foie de veau
foie gras
foist in
foist on
foist yourself upon
fold dike
fold in
fold over
fold soke
fold to the heart

fold up
fold your arms
fold-away bed
folded dipole
folded sleep
folder-up
folding bed
folding bicycle
folding camera
folding chair
folding
door
folding fin
folding ladder
folding machine
folding money
folding press
folding table
folding wing
foliage brown
foliage carver
foliage green
foliage leaf
foliage plant
foliate Architect
foliated joint
foliato-
folic acid
folie a deux
folie de grandeur
folie du doute
folinic acid
folio letterheads
folio noteheads
folio post
folio verso
folk air
folk art
folk ballad
folk ballads
folk belief
folk carol
folk custom
folk dance
folk dancing
folk dialect
folk drama
folk ethics

folk etymology
folk guitarist
folk hero
folk lay
folk literature
folk medicine
folk melody
folk memory
folk mind
folk motif
folk music
folk myth
folk nation
folk play
folk poetry
folk psychologist
folk psychology
folk rock
folk school
folk singer
folk singing
folk society
folk song
folk songs
folk speech
folk state
folk story
folk tale
folk theater
folk tune
folk weave
folk-dancer
folk-etymological
folk-lore
folk-music festival
folk-rock
folk-rock singer
folk-sing
follicle mite
follicle-stimulating hormone
follow
 a clew
follow a clue
follow a course
follow a trade
follow advice
follow after
follow as a matter of course

follow as an occupation
follow at heel
follow block
follow board
follow close upon
follow dies
follow from
follow implicitly
follow in a series
follow in the footprints of
follow in the footsteps of
follow in the steps of
follow in the trail of
follow in the wake of
follow in your footsteps
follow like sheep
follow on
follow on the heels of
follow out
follow peace with all men
follow protocol
follow rest
follow shot
follow strong drink
follow suit
follow the
follow the beam
follow the beaten path
follow the book
follow the crowd
follow the example of
follow the fashion
follow the hounds
follow the lead of
follow the leader
follow the party line
follow the rule
follow the rules
follow the scent of
follow the sea
follow the spoor of
follow the straight and narrow
follow the trail of
follow the trail to
follow through
follow to a conclusion
follow up
follow up an inquiry

follow
 up the attack
follow your nose
follow-focus shot
follow-my-leader
follow-on
follow-through
follow-up
follower plate
follower rest
follower-up
followers of Christ
following the letter
following wind
folly-bent
folly-blind
folly-drenched
folly-fallen
folly-fed
folly-maddened
folly-painting
folly-snared
folly-stricken
fond hope
fond illusion
fond of
fond of society
fond plow
fond-blind
fond-conceited
fond-hardy
fond-sparkling
fondness for society
fondue Bourguignonne
fons et origo
font name
foo yong
foo yoong
foo-foo
food allowance
food analyst
food and drink
food ball
food cabinet
food canal
food card
food cart
food chain

food chemist
food color
food container
food cycle
food faddist
food fish
food for powder
food for thought
food for worms
food freezing
food grain
food grower
food inspector
food items
food of the gods
food package
food packer
food plant
food poisoning
food preservative
food reserve
food shop
food store
food supply
food tax
food tube
food value
food waste
food web
food
yolk
food-gathering
food-processing
food-producing
food-productive
food-providing
food-sick
food-size
fool around
fool around with
fool away
fool away time
fool duck
fool hay
fool hen
fool mistake
fool notion
fool plow

fool trick
fool with
fool's cap
fool's coat
fool's errand
fool's gold
fool's paradise
fool's parsley
fool's trick
fool's-cap
fool's-parsley
fool-bold
fool-born
fool-frequented
fool-frighting
fool-happy
fool-hasty
fool-headed
fool-heady
fool-large
fool-proof
fooling around
foolish act
foolish guillemot
foolish thing
foolish-bold
foolish-looking
foolish-wise
foolish-witty
foolscap octavo
foolscap quarto
foot accelerator
foot at
foot base
foot bath
foot bellows
foot bone
foot brake
foot by foot
foot candle
foot carpet
foot correctionist
foot cushion
foot dangle
foot dirt
foot doctor
foot drop
foot fault

foot for foot
foot front
foot guard
foot iron
foot it
foot jaw
foot level
foot lever
foot lift
foot line
foot mange
foot mantle
foot match
foot measure
foot page
foot pan
foot
 passenger
foot pavement
foot post
foot pump
foot race
foot racer
foot racing
foot rail
foot road
foot rot
foot rule
foot scab
foot score
foot scraper
foot screw
foot soldier
foot specialist
foot stove
foot the bill
foot tour
foot track
foot trail
foot traveler
foot tubercle
foot up
foot valve
foot waling
foot walker
foot warmer
foot washing
foot-acted

foot-and-mouth disease
foot-binding
foot-breadth
foot-candle
foot-candle meter
foot-cloth
foot-dragger
foot-dragging
foot-faring
foot-firm
foot-free
foot-grain
foot-grain per second
foot-guard
foot-hook
foot-hot
foot-lambert
foot-lame
foot-length
foot-licking
foot-loose
foot-mantle
foot-mark
foot-note
foot-pale
foot-payh
foot-pound
foot-pound-second
foot-poundal
foot-power
foot-running
foot-second
foot-slog
foot-sore
foot-tiring
foot-ton
foot-up
foot-wall
foot-weary
football field
football pools
football season
footed arrow
foothill death camas
foothill pine
foothill yellow pine
footing ale
footing beam

footing it
footing piece
footing
 stone
footloose and fancy-free
footman moth
footmen's gallery
footplate man
footstep bearing
footwear merchant
for FC
for God's sake
for a certainty
for a consideration
for a coon's age
for a dog's age
for a fact
for a lifetime
for a little while
for a long time
for a mere song
for a moment
for a month of Sundays
for a rainy day
for a season
for a short time
for a song
for a time
for a wonder
for ages
for ages of ages
for all me
for all practical purposes
for all that
for all the world
for all the world like
for all time
for all to see
for all you are worth
for all you know
for all your natural life
for always
for amusement
for an age
for and
for anything you knows
for aught one cares
for aught one knows

for aye
for better or for worse
for certain
for crying out loud
for dear life
for donkey's years
for each
for effect
for ever
for ever and ever
for ever so long
for evermore
for example
for fear of
for fear that
for fete
for foehn
for form's sake
for free
for fun
for good
for good and
all
for good measure
for goodness sake
for heaven's sake
for hire
for instance
for it
for keeps
for kicks
for lack of something better
for lagniappe
for laughs
for life
for long
for love
for many a long day
for mercy's sake
for money
for my part
for nickels and dimes
for no other ears
for nothing
for others
for pennies
for practical purposes
for professional services

for public consumption
for real
for rent
for sale
for services rendered
for short
for show
for some reason
for sport
for sure
for that
for that cause
for that reason
for the asking
for the best
for the better
for the birds
for the cause that
for the devil of it
for the duration
for the fun of it
for the heck of it
for the hell of it
for the life of you
for the love of
for the meantime
for the moment
for the most part
for the nonce
for the people
for the period of
for the purpose of
for the reason that
for the record
for the sake of
for the term of your days
for the time
for the time being
for this cause
for this occasion
for
this reason
for two
for want of
for what reason
for whatever reason
for which
for which reason

for why
for years on end
for your benefit
for your ears only
for your health
for your life
for your money
for your part
for yourself
for-
forage acre
forage cap
forage grass
forage poisoning
forage press
foraging ant
foramen magnum
foramen ovale
forasmuch as
forbid it Heaven
forbidden fruit
forbidden love
forbidding countenance
force attack
force bed
force by
force feed
force feeding
force fit
force from
force function
force in
force into a mold
force main
force majeure
force of arms
force of friction
force of gravity
force of habit
force of inertia
force of life
force of viscosity
force on
force open
force out
force out of place
force play
force polygon

force pump
force to the wall
force upon
force your hand
force your thoughts from
force your way
force-closed
force-fed
force-feed
force-feeding
force-meat
force-out
force-pump
force-put
force-ripe
forced coding
forced draft
forced landing
forced
 march
forced marriage
forced resignation
forced sale
forced separation
forced-labor camp
forceps-shaped
forces majeures
forces of nature
forcible feeble
forcible removal
forcible seizure
forcible shift
forcible-feeble
forcing bed
forcing bid
forcing engine
forcing fit
forcing house
forcing on
forcing out
forcing pit
forcing system
forcing-pump
fore and aft
fore bow
fore edge
fore gaff-topsail
fore jack

fore lift
fore part
fore plane
fore rent
fore rider
fore sey
fore tooth
fore topgallant sail
fore wing
fore-
fore-adapt
fore-age
fore-alleged
fore-and-aft
fore-and-aft axis
fore-and-aft rig
fore-and-aft rigged
fore-and-aft sail
fore-and-aft schooner
fore-and-aft tackle
fore-and-aft-rigged
fore-and-after
fore-appoint
fore-axle
fore-being
fore-cabin
fore-check
fore-cited
fore-court
fore-dated
fore-deck
fore-edge
fore-edge painting
fore-elder
fore-elders
fore-end
fore-exercise
fore-foot
fore-game
fore-glide
fore-gut
fore-hammer
fore-handed
fore-hearth
fore-judge
fore-lie
fore-mean
fore-mention

fore-notice
fore-oath
fore-part
fore-piece
fore-possess
fore-purpose
fore-quote
fore-rank
fore-reach
fore-read
fore-recited
fore-rider
fore-run
fore-sail
fore-say
fore-set
beds
fore-sheet
fore-skysail
fore-skysail backstay
fore-skysail brace
fore-skysail lift
fore-skysail mast
fore-skysail shroud
fore-skysail stay
fore-skysail yard
fore-staff
fore-stage
fore-stay
fore-stick
fore-tack
fore-tooth
fore-topgallant
fore-topgallant backstay
fore-topgallant brace
fore-topgallant lift
fore-topgallant mast
fore-topgallant shroud
fore-topgallant stay
fore-topgallant studding sail
fore-topgallant yard
fore-topmast
fore-topmast backstay
fore-topmast stay
fore-topmast staysail
fore-topmast staysail stay
fore-topmast studding sail
fore-topmast-studding-sail boom

fore-topsail
fore-topsail lift
fore-topsail yard
fore-trysail gaff
fore-trysail peak halyard
fore-trysail vang
fore-uard
fore-vouched
fore-wind
fore-wit
forearm smash
forecastle deck
forecastle hand
forecastle hatch
forecastle head
forecastle
netting
forecastle rail
forecastle scuttle
forecastle watch
foredoomed hope
foregone conclusion
foreground detail
forehand shaft
forehand shooting
foreign accent
foreign affairs
foreign aid
foreign bill
foreign body
foreign correspondent
foreign devil
foreign element
foreign exchange
foreign influx
foreign intruder
foreign intrusion
foreign legion
foreign loan
foreign minister
foreign ministry
foreign mission
foreign money
foreign office
foreign policy
foreign secretary
foreign securities
foreign service

foreign service officer
foreign threat
foreign-aid
foreign-appearing
foreign-born
foreign-bred
foreign-built
foreign-flag
foreign-language dictionary
foreign-language study
foreign-looking
foreign-made
foreign-manned
foreign-owned
foreign-speaking
forelock hook
foreman of the jury
forenoon watch
forensic address
forensic chemistry
forensic jurisprudence
forensic medicine
forensic psychiatry
foreroyal backstay
foreroyal brace
foreroyal lift
foreroyal mast
foreroyal shroud
foreroyal
stay
foreroyal studding sail
foreroyal yard
foreroyal-studding-sail boom
forest conservation
forest court
forest cover
forest dweller
forest fire
forest fire fighter
forest floor
forest fly
forest god
forest gods
forest green
forest gum
forest horse
forest keeper
forest land

forest mahogany
forest management
forest oak
forest officer
forest peat
forest pig
forest preserve
forest pygmy
forest ranger
forest red gum
forest reserve
forest school
forest sheriff
forest spirit
forest tent caterpillar
forest tupelo
forest type
forest warden
forest white
forest-belted
forest-born
forest-bosomed
forest-bound
forest-bred
forest-clad
forest-covered
forest-crowned
forest-dwelling
forest-felling
forest-frowning
forest-grown
forest-rustling
forever and a day
forever and aye
forfeit your good opinion
forge ahead
forge blower
forge furnace
forge furnaceman
forge hammerman
forge pressman
forge roller
forge shearer
forge slinger
forge smith
forge water
forge welding
forgery bond

forgery-proof
forget
 about it
forget it
forget nothing
forget the odds
forget to remember
forget your own name
forget your place
forget yourself
forget-me-not
forget-me-not blue
forgetful of self
forgetting nothing
forging press
forgive and forget
fork beam
fork cross
fork cutler
fork forger
fork grinder
fork hafter
fork lightning
fork luncheon
fork maker
fork molder
fork out
fork over
fork splitter
fork truck
fork-carving
fork-end
fork-filled
fork-head
fork-lift truck
fork-pronged
fork-ribbed
fork-shaped
fork-tail
fork-tailed
fork-tined
fork-tongued
forked chain
forked lightning
forked tongue
forked-headed
forked-tailed
forklift truck

forlorn hope
forlorn of
form a conviction
form a line
form a mental picture of
form a part of
form a series
form a unity
form a whole
form an estimate
form an opinion
form board
form class
form drag
form factor
form four
form fours
form genus
form ideas
form letter
form master
form of address
form of government
form of service
form of speech
form of worship
form quotient
form
species
form squares
form stop
form the foundation of
form word
form-
form-establishing
form-fitting
form-function unit
form-giving
form-giving cause
form-relieve
form-revealing
formal agreement
formal cause
formal clothes
formal contract
formal contrast
formal dress
formal fallacy

formal language
formal logic
formal observance
formal speech
formal visit
formal written language
formatio reticularis
formation flying
formative element
formed of
former times
formic acid
formic aldehyde
formidable defenses
forming a part of
forming die
forming press
forming punch
formless darkness
formo-
formolite number
formolite reaction
forms of
forms of divination
formulated belief
formyl group
formyl radical
forsake the world
forsaking of the world
forswear speaking
forswear speech
forswear violence
forswear yourself
fort royal
forte-piano
fortes fortuna juvat
forth of
forth putting
fortification agate
fortified flour
fortified milk
fortified tunnel
fortified wine
fortunate outcome
fortune cookie
fortune
hunter
fortune's child

fortune's favor
fortune's favorite
fortune's fool
fortune-hunter
fortune-hunting
fortune-tell
fortune-teller
fortune-telling
forty hours
forty machine
forty ways from Sunday
forty winks
forty-acre
forty-eight
forty-eighth
forty-eightmo
forty-eightmos
forty-fifth
forty-first
forty-five
forty-foot
forty-four
forty-fourth
forty-knot
forty-legged
forty-mile
forty-nine
forty-niner
forty-ninth
forty-one
forty-pound
forty-second
forty-seven
forty-seventh
forty-six
forty-sixth
forty-skewer
forty-spot
forty-third
forty-three
forty-ton
forty-two
forty-year
forward bias
forward bridge
forward deck
forward delivery
forward echelon

forward exchange
forward look
forward motion
forward observer
forward pass
forward quotation
forward roll
forward transfer resistance
forward-bearing
forward-creeping
forward-flowing
forward-looking
forward-pressing
forward-turned
forwarding agent
fossil copal
fossil footprint
fossil fuel
fossil gum
fossil ivory
fossil man
fossil mud crack
fossil
oil
fossil ore
fossil print
fossil resin
fossil resins
fossil sea water
fossil turquoise
fossil wax
fossil word
foster a belief
foster an idea
foster babe
foster brother
foster care
foster child
foster dam
foster daughter
foster father
foster home
foster in the mind
foster land
foster milk
foster mother
foster nurse
foster parent

foster sire
foster sister
foster son
foster the hope
foster-brother
foster-child
foster-father
foster-mother
foster-nurse
foster-sister
foster-son
foul anchor
foul ball
foul breath
foul invective
foul language
foul line
foul matter
foul odor
foul out
foul play
foul pole
foul shot
foul the anchor
foul tip
foul up
foul weather
foul wind
foul your own nest
foul-breathed
foul-browed
foul-faced
foul-handed
foul-looking
foul-minded
foul-mindedness
foul-mouthed
foul-reeking
foul-smelling
foul-spoken
foul-tasting
foul-tongued
foul-up
foul-weather suit
fouled anchor
fouled up
fouled-up
found object

found on
found wanting
foundation course
foundation cream
foundation
 garment
foundation plate
foundation stone
foundation stop
founded on
founded upon a rock
founder's type
founders' shares
founders' type
founding father
foundling hospital
foundry facing
foundry iron
foundry press
foundry proof
foundry scrap
foundry type
fountain grass
fountain moss
fountain of youth
fountain pen
fountain plant
fountain runner
fountain shell
fountain syringe
fountain tree
four and twenty
four bits
four corners of the earth
four flush
four freedoms
four horsemen
four hundred
four o' clock
four o'cat
four o'clock
four of a kind
four old cat
four questions
four-a-cat
four-acre
four-bagger
four-ball

four-ball match
four-bit
four-bottom plow
four-cant
four-cent
four-centered
four-centered arch
four-channel stereo system
four-color
four-color press
four-color problem
four-color process
four-colored
four-colour
four-cornered
four-coupled
four-cutter
four-cycle
four-cylinder
four-cylindered
four-day
four-deal bridge
four-deck
four-decked
four-decker
four-dimensional
four-dimensional
geometry
four-dimensional space
four-dimensioned
four-dollar
four-edged
four-em space
four-eyed
four-eyed fish
four-eyed opossum
four-eyes
four-faced
four-figured
four-fingered
four-flowered
four-flush
four-flusher
four-flushing
four-foot
four-foot octave
four-foot stop
four-footed

four-footed butterfly
four-footer
four-four time
four-gallon
four-grain
four-gram
four-gun
four-hand
four-handed
four-hander
four-headed
four-horned
four-horse
four-horsed
four-hour
four-hours
four-hundred-day clock
four-in-hand
four-in-hand coach
four-in-hand etc
four-in-hand tie
four-inch
four-leaf
four-leaf clover
four-leafed
four-leaved
four-leaved grass
four-legged
four-letter
four-letter word
four-lettered
four-line
four-line octave
four-lined
four-lobed
four-masted
four-masted bark
four-masted brig
four-master
four-minute
four-minute man
four-month
four-o'clock
four-oar
four-oared
four-oclock
four-oclock family
four-ounce

four-part
four-part diaphony
four-part flask
four-part harmony
four-part
time
four-percenter
four-phase
four-place
four-ply
four-post
four-posted
four-poster
four-poster bed
four-pound
four-quarter
four-rayed
four-ring
four-roomed
four-rowed
four-rowed barley
four-second
four-shilling
four-sided
four-spined
four-spot
four-spotted
four-square
four-star general
four-storied
four-story
four-stranded
four-stringed
four-striped
four-striper
four-stroke
four-stroke cycle engine
four-stroke-cycle
four-tailed bandage
four-three-two-one rule
four-time
four-times-accented
four-tined
four-toed
four-toes
four-ton
four-tooth
four-up etc

four-way
four-way cock
four-way switch
four-week
four-wheel
four-wheel drive
four-wheeled
four-wheeler
four-winged
four-yard
four-year
four-year college
four-year-old
four-year-older
fourfold block
fourfold purchase
fourfold tackle
fourier series
fourpence hapenny
fourscore and ten
fourth class
fourth dimension
fourth estate
fourth of july
fourth part
fourth person
fourth position
fourth stomach
fourth wall
fourth-born
fourth-class
fourth-class
mail
fourth-dimensional
fourth-form
fourth-hand
fourth-rate
fourth-rateness
fourth-rater
fourth-year
fovea centralis
fowl cherry
fowl cholera
fowl grass
fowl leukemia
fowl leukosis
fowl meadow grass
fowl mite

fowl paralysis
fowl part
fowl pest
fowl pox
fowl spirochaetosis
fowl spirochetosis
fowl tick
fowl typhoid
fowling piece
fowling-piece
fowls of the air
fox and geese
fox bat
fox bolt
fox brush
fox docken
fox dog
fox fire
fox geranium
fox goose
fox grape
fox grass
fox hair
fox hunt
fox hunter
fox hunting
fox key
fox lathe
fox light
fox moth
fox plum
fox poison
fox rose
fox shark
fox snake
fox sparrow
fox squirrel
fox terrier
fox trot
fox wedge
fox wolf
fox-colored
fox-faced
fox-fire
fox-flove
fox-fur
fox-furred
fox-hunt

fox-hunting
fox-like
fox-nosed
fox-skinned
fox-trot
fox-trotted
fox-trotting
fox-visaged
foxglove beardtongue
foxtail cactus
foxtail grass
foxtail lily
foxtail millet
foxtail pine
foxtail saw
foxtail wedge
foxtail wedging
foxter-leaves
fps units
fra diavolo
fractional
currency
fractional distillation
fractional lot
fractional note
fractional-pitch
fractocumulus cloud
fracture one
fragile health
fragmentation bomb
fragmentation grenade
fragrance control
fragrant as new-mown hay
fragrant sumac
fragrant weed
fraid-cat
fraidy-cat
frail health
frail humanity
frail sister
frail-bodied
frame aerial
frame assembler
frame bar
frame bend
frame boat
frame brazer
frame breaker

frame breaking
frame bridge
frame builder
frame building
frame cleaner
frame construction
frame cottage
frame dam
frame door
frame doubler
frame dresser
frame driller
frame dwelling
frame finisher
frame fitter
frame gate
frame house
frame line
frame lumber
frame maker
frame making
frame molding
frame of mind
frame of reference
frame plate
frame saw
frame sawyer
frame set
frame space
frame structure
frame stud
frame timber
frame trestle
frame turner
frame up
frame vise
frame wall
frame worker
frame-house
frame-made
frame-up
frame-work
frames of reference
framing chisel
framing
number
framing square
framing table

fran tireur
franc-archer
franc-tireur
franchise clause
franchise tax
franco-
francs-archers
francs-tireurs
frangible booster
frangula emodin
frank almonage
frank chase
frank-almoign
frank-faced
frank-fee
frank-ferm
frank-law
frank-marriage
frank-pledge
frank-spoken
frank-tenement
frankfurt sausage
frankincense pine
franklin stove
frater house
fraternal feeling
fraternal insurance
fraternal order
fraternal society
fraternal twin
fraternal twins
fraternity house
fraternity man
fraternize with
fraud order
fraudulent voter
fraught with danger
fraught with doom
fraught with significance
frayed nerves
frazzled nerves
freak accident
freak of nature
freak out
freak out on
freak show
freak-out
freaked out

freaked-out
freakish inspiration
freckle-faced
freckled-faced
fred-stole
free abstraction
free abstractionist
free admission
free agent
free air
free alongside ship
free alongside vessel
free alternating current
free and clear
free and common socage
free
 and easy
free as a bird
free as air
free as the wind
free ascent
free association
free association test
free atmosphere
free balloon
free ballooning
free bench
free bid
free capital
free choice
free church
free churchman
free citizen
free city
free coinage
free companion
free company
free competition
free cost
free course
free decision
free delivery
free diver
free diving
free economy
free electron
free electron theory of metals
free energy

free enterprise
free enthalpy
free expansion
free expressionism
free expressionist
free fall
free flight
free for nothing
free for the asking
free form
free from
free gift
free giver
free gold
free goods
free gratis
free gratis for nothing
free hand
free house
free kick
free labour
free lance
free list
free liver
free living
free love
free lover
free lunch
free milling
free morpheme
free nation
free of
free of charge
free of cost
free of expense
free on board
free on rail
free pass
free person
free perspective
free play
free port
free press
free
radical
free reach
free reaching
free ride

free rider
free school
free scope
free silver
free silverism
free silverite
free socage
free soi
free soil
free speech
free spirit
free state
free thought
free throw
free throw line
free ticket
free time
free trade
free trade area
free trader
free translation
free up
free variable
free variation
free verse
free vote
free will
free with your money
free world
free yourself
free yourself from
free zone
free-acting
free-air ionization chamber
free-armed
free-associate
free-associated
free-associating
free-banking
free-bestowed
free-blown
free-board
free-boot
free-bored
free-born
free-bred
free-burning
free-denizen

free-enterprise
free-enterprise economy
free-enterprise system
free-falling
free-floating
free-floating anxiety
free-flowering
free-flowing
free-footed
free-for-all
free-form
free-going
free-grown
free-hand
free-handed
free-handedly
free-handedness
free-hearted
free-lance
free-lance worker
free-lance writer
free-lancer
free-liver
free-living
free-lovism
free-machining
free-minded
free-mindedly
free-mindedness
free-mouthed
free-moving
free-quarter
free-quarterer
free-range
free-reed
free-rider
free-select
free-silver
free-soil
free-soiler
free-soilism
free-space
aerial
free-speaking
free-spending
free-spirited
free-spoken
free-spokenly

free-spokenness
free-standing
free-stone
free-swimmer
free-swimming
free-tailed
free-thinker
free-throw
free-tongued
free-trade
free-trader
free-trading
free-tradist
free-versifier
free-willed
free-willer
free-working
freeboard deck
freeboard length
freedom abused
freedom fighter
freedom from fear
freedom from illusion
freedom from want
freedom from war
freedom of speech
freedom of speech and expression
freedom of the city
freedom of the press
freedom of the seas
freedom of worship
freedom ride
freedom rider
freehand drawing
freeing port
freewill baptist
freewill offering
freeze on
freeze out
freeze over
freeze solid
freeze the blood
freeze to
freeze to death
freeze your balls off
freeze-dried
freeze-dry
freeze-drying

freeze-out
freeze-up
freezer
burn
freezer locker
freezer ship
freezing cold
freezing drizzle
freezing machine
freezing mixture
freezing point
freezing process
freezing rain
freezing weather
freezing wind
freezing works
freight agent
freight bill
freight boat
freight broker
freight canvasser
freight car
freight clerk
freight conductor
freight density
freight elevator
freight engine
freight forwarder
freight handler
freight house
freight insurance
freight locomotive
freight mileage
freight note
freight rate
freight receipt
freight room
freight shed
freight steamer
freight tariff
freight ton
freight traffic
freight train
freight transport
freight truck
freight vessel
freight wagon
freight with

freight-mile
freighted with doom
freighted with significance
french bulldog
french chalk
french chop
french crown
french door
french dressing
french endive
french fry
french heel
french horn
french leave
french pastry
french polish
french telephone
french toast
french
window
french-like
frenzy of desire
frenzy of lust
frequency band
frequency changer
frequency control
frequency converter
frequency curve
frequency distribution
frequency divider
frequency doubler
frequency histogram
frequency indicator
frequency meter
frequency modulation
frequency multiplier
frequency polygon
frequency recorder
frequency relay
frequency spectrum
frequency swing
frequency width
frequency-modulated
frequent as a customer
fresco painting
fresco secco
fresh air
fresh as April

fresh as a daisy
fresh as a rose
fresh as the morning dew
fresh breeze
fresh foods
fresh gale
fresh start
fresh up
fresh water
fresh wind
fresh-baked
fresh-boiled
fresh-caught
fresh-cleaned
fresh-coined
fresh-colored
fresh-complexioned
fresh-cooked
fresh-cropped
fresh-cut
fresh-drawn
fresh-faced
fresh-fallen
fresh-killed
fresh-laid
fresh-leaved
fresh-looking
fresh-made
fresh-painted
fresh-picked
fresh-run
fresh-slaughtered
fresh-washed
fresh-water
fresh-water drum
fresh-water nymph
fresh-water sailor
fresh-watered
freshen
the air
freshen up
freshman week
freshman year
freshwater drum
freshwater lake
freshwater stay
fresno scraper
fret and fume

fret at
fret saw
fret-sawing
friar rush
friar skate
friar's balsam
friar's chair
friar's lantern
fribble away
friction ball
friction band
friction belt
friction block
friction board
friction brake
friction breccia
friction clamp
friction clutch
friction composition
friction cone
friction disk
friction drill
friction drive
friction electricity
friction factor
friction fremitus
friction fuse
friction gear
friction gearing
friction glazing
friction head
friction horsepower
friction layer
friction loss
friction machine
friction match
friction pile
friction powder
friction primer
friction pulley
friction ring
friction roller
friction rub
friction saw
friction slip
friction socket
friction sound
friction tape

friction test
friction top
friction tube
friction washer
friction wheel
friction-head
friction-saw
friction-sawed
friction-sawing
friction-sawn
friction-tight
frictional
electricity
frictional resistance
frictional rustling
fried eggs
fried rice
friend at court
friend in court
friend in need
friend indeed
friend of the court
friend of your bosom
friendly chat
friendly relations
friendly society
friendly talk
friendly with
friends with
frieze board
frieze coat
frieze rail
frieze-coated
frigate bird
frigate mackerel
frigate pelican
frigate-built
fright disease
fright neurosis
frighten from your propriety
frighten off
frighten out of your senses
frighten out of your wits
frightened out of your wits
frightening off
frightful bore
frightfully rich
frigid purgatorial fires

frigid zone
frill shark
frill-bark
frill-barking
frill-like
frilled lizard
frills and furbelows
fringe area
fringe benefit
fringe benefits
fringe bush
fringe cup
fringe moss
fringe tree
fringe-bell
fringe-toed lizard
fringe-tree bark
fringed brome
fringed galax
fringed gentian
fringed orchis
fringing forest
fringing reef
frise aileron
frit fly
frit-fly
frith-guild
frith-stool
fritter
away
fritter away time
fritto misto
frivol away
frivolity-proof
frizzle disease
frizzle fowl
frock coat
frock-coat
frog boot
frog cheese
frog clock
frog crab
frog fly
frog grass
frog hair
frog kick
frog legs
frog lily

frog number
frog pad
frog plant
frog shell
frog spawn
frog spit
frog spittle
frog's-bit
frog-belly
frog-bit
frog-eyed
frog-fish
frog-march
frog-mouth
frog-spawn
frogbit family
from A to Z
from A to izzard
from Dan to Beersheba
from Missouri
from afar
from age to age
from all points of the compass
from all quarters
from away back
from bad to worse
from beginning to end
from better to worse
from clew to earing
from cover to cover
from day to day
from door to door
from egg to apples
from end to end
from everlasting to everlasting
from every quarter
from everywhere
from first to last
from force of habit
from habit
from hand to hand
from hand to mouth
from head to foot
from hell to breakfast
from here in
from here on
from here out
from here to eternity

from
here to the back of beyond
from his own mouth
from home
from hour to hour
from information received
from interested motives
from me to you
from memory
from necessity
from notice given
from now on
from now on in
from now till doomsday
from on high
from out in left field
from pillar to post
from pole to pole
from rags to riches
from scratch
from selfish motives
from side to side
from soup to nuts
from stem to stern
from that cause
from that time
from the beginning
from the bottom of your heart
from the cradle to the grave
from the first
from the foundations
from the four winds
from the ground up
from the heart
from the horse's mouth
from the housetops
from the lips of
from the rolls
from the sticks
from the womb to the tomb
from the word 'go'
from then on
from this moment on
from this point
from this time
from this time forward
from time immemorial
from time out of mind

from time to time
from top to bottom
from top to toe
from what cause
from what you can gather
from your angle
from
your book
from your heart
from your standpoint
from your viewpoint
fromage a la pie
fromage blanc
front a front
front bench
front court
front crawl
front door
front elevation
front foot
front for
front line
front man
front matter
front money
front of house
front office
front ofice
front on
front page
front position
front rank
front room
front runner
front scene
front view
front window
front-connected
front-fanged
front-focus
front-focused
front-foot
front-page
front-paged
front-paging
front-porch campaign
front-rank
front-ranker

front-runner
front-wheel
frontal assault
frontal attack
frontal bone
frontal convolution
frontal cyclone
frontal gyrus
frontal lobe
frontier post
frontiers of knowledge
fronto-
frost bearer
frost blow
frost feathers
frost flowers
frost grape
frost gray
frost heave
frost heaving
frost insurance
frost lamp
frost line
frost mist
frost over
frost plant
frost point
frost ring
frost signal
frost smoke
frost snipe
frost snow
frost valve
frost-beaded
frost-bit
frost-bite
frost-bitten
frost-blite
frost-bound
frost-burnt
frost-chequered
frost-concocted
frost-congealed
frost-covered
frost-crack
frost-fettered
frost-firmed
frost-free

frost-hardy
frost-hoar
frost-kibed
frost-nip
frost-nipped
frost-pure
frost-rent
frost-ridge
frost-riven
frost-tempered
frost-work
frosted
 glass
frosted heart
frosted lens
frosted shake
frostweed aster
frosty green
frosty mildew
frosty-face
frosty-faced
frosty-mannered
frosty-natured
frosty-spirited
frosty-whiskered
froth at the mouth
froth flotation
froth fly
froth hopper
froth insect
froth spit
froth worm
froth-becurled
froth-born
froth-clad
froth-faced
froth-foamy
frothing at the mouth
frou-frou
frown at
frown down
frown upon
frowned-upon behavior
frowns of fortune
frowzy-headed
frozen assets
frozen custard
frozen daiquiri

frozen dessert
frozen fog
frozen food
frozen foods
frozen in
frozen music
frozen out
frozen pudding
frozen solid
frozen to death
frozen water
frozen-food locker
fructose intolerance
frugal to excess
fruit
 acid
fruit bar
fruit bark beetle
fruit barrel
fruit basket
fruit bat
fruit bearing
fruit belt
fruit blight
fruit blossom
fruit body
fruit bowl
fruit bud
fruit bug
fruit bush
fruit buyer
fruit cake
fruit can
fruit cane
fruit canner
fruit canning
fruit chafer
fruit cocktail
fruit compote
fruit crate
fruit crow
fruit culture
fruit cup
fruit dealer
fruit dish
fruit dot
fruit eater
fruit envelope

fruit ether
fruit evaporator
fruit farm
fruit farmer
fruit farming
fruit flavor
fruit fly
fruit garden
fruit grader
fruit jar
fruit jelly
fruit juice
fruit knife
fruit loft
fruit machine
fruit package
fruit packer
fruit packing
fruit peddler
fruit peel
fruit picker
fruit picking
fruit pigeon
fruit pit
fruit pitter
fruit preservative
fruit preserver
fruit pudding
fruit raiser
fruit raising
fruit ranch
fruit rot
fruit salad
fruit seller
fruit set
fruit shipper
fruit shop
fruit show
fruit sirup
fruit slicer
fruit sorter
fruit soup
fruit spot
fruit sprayer
fruit spur
fruit stall
fruit stand
fruit

strainer
fruit sugar
fruit tart
fruit tree
fruit vendor
fruit vinegar
fruit wood
fruit-bringing
fruit-candying
fruit-drying
fruit-eating
fruit-eating bird
fruit-evaporating
fruit-grower
fruit-growing
fruit-paring
fruit-producing
fruit-tree bark beetle
fruit-tree leaf roller
fruiting body
fruits and vegetables
frustum of a pyramid
fry cook
fry-cooker
fry-pan
frying pan
frying-pan
ft-lb
ft-pdl
fu-yang
fuchsia purple
fuchsia red
fuchsia tree
fuchsia-flowered
fuck about
fuck up
fuddle-brained
fuddling cup
fuddling glass
fuddy-duddies
fuddy-duddiness
fuddy-duddy
fudge edge
fudge in
fudge together
fudge up
fudge wheel
fuel additive

fuel cell
fuel dope
fuel element
fuel engineer
fuel engineering
fuel filter
fuel injection
fuel injector
fuel oil
fuel quantity indicator
fuel ship
fuel up
fuel-flow meter
fugae warrant
fugie warrant
fugue form
fugue state
fulfill a short sale
fulfill your duty
fulfill your military obligation
fulfill your role
fulgurant pain
full age
full and by
full authority
full
beard
full binding
full blast
full blood
full bloom
full board
full bottom
full bridle
full circle
full color
full consent
full cousin
full denture
full development
full dress
full feather
full fig
full flavor
full force
full frame
full gainer
full gallop

full growth
full hand
full house
full length
full linear group
full load
full lot
full many
full many a time
full many a time and oft
full meal
full measure
full moon
full mouthed
full name
full nelson
full of
full of Dutch courage
full of beans
full of business
full of enthusiasm
full of fight
full of go
full of hate
full of hatred
full of holes
full of hope
full of incident
full of integrity
full of life
full of life and vigor
full of meaning
full of mischief
full of pep
full of piss and vinegar
full of point
full of promise
full of remorse
full of risk
full of sound and fury
full of substance
full of sweet days and roses
full of yourself
full particulars
full permission
full pitch
full power
full powered

full pratique
full professor
full
purse
full radiator
full rhyme
full sail
full scope
full score
full sentence
full shot
full size
full skirt
full speed
full speed ahead
full speed astern
full stop
full sun
full swing
full term
full tide
full tilt
full time
full to bursting
full toss
full trailer
full twist
full vowel
full wine
full word
full-accomplished
full-acorned
full-adjusted
full-annealing
full-armed
full-assembled
full-assured
full-attended
full-banked
full-beaming
full-bearded
full-bearing
full-bellied
full-blood
full-blooded
full-bloodedness
full-bloomed
full-blossomed

full-blown
full-bodied
full-bodied flavor
full-boled
full-bore
full-born
full-bosomed
full-bottom
full-bottomed
full-bound
full-bowed
full-brained
full-breasted
full-brimmed
full-buckramed
full-built
full-busted
full-buttocked
full-cell
full-celled
full-centered
full-charge
full-charged
full-cheeked
full-chested
full-chilled
full-clustered
full-colored
full-crammed
full-cream
full-crew
full-crown
full-cut
full-depth
full-diamond
full-diesel
full-digested
full-distended
full-draught
full-drawn
full-dress
full-dress
suit
full-dress uniform
full-dressed
full-dug
full-eared
full-edged

full-exerted
full-extended
full-eyed
full-faced
full-fashioned
full-fashioned stockings
full-fatted
full-feathered
full-fed
full-feed
full-feeding
full-felled
full-fidelity speaker
full-figured
full-finished
full-fired
full-flanked
full-flavored
full-fledged
full-fleshed
full-floating
full-flocked
full-flowering
full-flowing
full-foliaged
full-form
full-formed
full-fortuned
full-fraught
full-freight
full-freighted
full-frontal
full-fronted
full-fruited
full-glowing
full-gorged
full-grown
full-haired
full-hand
full-handed
full-happinessed
full-hard
full-haunched
full-headed
full-hearted
full-hipped
full-hot
full-jeweled

full-jointed
full-known
full-laden
full-leather
full-leaved
full-length
full-leveled
full-licensed
full-limbed
full-lined
full-lipped
full-load
full-made
full-manned
full-measured
full-minded
full-moon
full-moon maple
full-mouthed
full-mouthedly
full-natured
full-necked
full-nerved
full-opening
full-orbed
full-out
full-page
full-paid
full-panoplied
full-paunched
full-personed
full-pitch
full-pitch
winding
full-plumed
full-power
full-powered
full-proportioned
full-pulsing
full-rayed
full-resounding
full-rigged
full-rigged ship
full-rigger
full-ripe
full-ripened
full-roed
full-run

full-sailed
full-scale
full-scantling vessel
full-sensed
full-sharer
full-shouldered
full-shroud
full-size
full-sized
full-skirted
full-souled
full-speed
full-sphered
full-spread
full-stage
full-statured
full-stomached
full-strained
full-streamed
full-strength
full-stuffed
full-summed
full-swelling
full-term
full-throated
full-tide
full-time
full-time worker
full-timed
full-timer
full-to-full
full-toned
full-top
full-trimmed
full-tuned
full-turn stair
full-tushed
full-uddered
full-value
full-voiced
full-volumed
full-wave
full-wave rectification
full-wave rectifier
full-wave rectifier tube
full-way
full-weight
full-weighted

full-whiskered
full-winged
full-witted
fuller's
earth
fuller's teasel
fullering tool
fulling mill
fulling stock
fullness of time
fully developed
fully fashioned
fully fledged
fully realized
fulminate against
fulminating compound
fulminating mercury
fulminating powder
fulminic acid
fulvous tree duck
fumaric acid
fumble-fist
fume chamber
fume cupboard
fumed oak
fumes of fancy
fuming nitric acid
fuming sulfuric acid
fuming sulphuric acid
fumitory family
fun and games
fun fair
fun house
fun-fair
fun-filled
fun-loving
fun-seeking
function as
function class
function shift
function space
function word
functional analysis
functional calculus
functional design
functional disease
functional furniture
functional group

functional housing
functional illiteracy
functional illiterate
functional load
functional nervous disorder
functional psychology
functional psychosis
functional representation
functional shift
functional yield
functionally illiterate
functions of
fund-raising dinner
fundamental bass
fundamental
colors
fundamental frequency
fundamental idea
fundamental law
fundamental note
fundamental particle
fundamental sequence
fundamental theorem of algebra
fundamental theorem of calculus
fundamental tone
fundamental unit
funded debt
funding system
funeral car
funeral chapel
funeral church
funeral coach
funeral customs
funeral director
funeral establishment
funeral home
funeral march
funeral oration
funeral parlor
funeral parlour
funeral pile
funeral procession
funeral pyre
funeral ring
funeral rites
funeral sermon
funeral service
funeral song

funeral urn
funeral vessel
funerary customs
funerary urn
funerary vessel
fungi-
fungiform papillae
fungo bat
fungus body
fungus bug
fungus disease
fungus gall
fungus gnat
fungus stone
fungus tinder
fungus-covered
fungus-digesting
fungus-proof
funicular railway
funk hole
funk out
funky chicken
funnel breast
funnel chest
funnel cloud
funnel maker
funnel setter
funnel tube
funnel twister
funnel-breasted
funnel-chested
funnel-fashioned
funnel-formed
funnel-necked
funnel-shaped
funnel-web
funny
bone
funny business
funny car
funny farm
funny feeling
funny paper
funny story
funny thing
fur bearer
fur beater
fur blocker

fur blower
fur breeder
fur brigade
fur brusher
fur buyer
fur coat
fur farm
fur farmer
fur farming
fur lining
fur salon
fur seal
fur tanner
fur trader
fur trapper
fur trapping
fur trimming
fur-bearing
fur-capped
fur-clad
fur-coated
fur-collared
fur-cuffed
fur-gowned
fur-lined
fur-lined coat
fur-touched
fur-trimmed
fur-trimmed coat
furbish up
furious rabies
furious rage
furious-faced
furl in a body
furl in the bunt
furnace bricklayer
furnace builder
furnace cadmium
furnace calciner
furnace charger
furnace charging
furnace engineer
furnace erector
furnace feeder
furnace fireman
furnace heating
furnace keeper
furnace liner

furnace lining
furnace maker
furnace mounter
furnace oil
furnace regulator
furnace repairer
furnace stoker
furnace tender
furnace tenter
furnace watcher
furnish accommodations
furnish evidence
furnish
support
furniture arrangement
furniture broker
furniture carving
furniture designer
furniture enameler
furniture finisher
furniture fitter
furniture japanner
furniture maker
furniture mover
furniture packer
furniture painter
furniture polish
furniture polisher
furniture porter
furniture repairer
furniture store
furniture turning
furniture van
furor epilepticus
furor loquendi
furor uterinus
furr-ahin
furring brick
furring strip
furrow drain
furrow drainage
furrow draining
furrow irrigation
furrow pan
furrow weed
furrow-cloven
furrow-faced
furrow-fronted

furry creatures
further education
further look
further yourself
fury of desire
fury of lust
fury-driven
fury-haunted
fury-moving
furze lark
furze wren
furze-clad
fusarium wilt
fusco-
fusco-ferruginous
fusco-piceous
fusco-testaceous
fuse block
fuse box
fuse gauge
fuse link
fuse metal
fused quartz
fused silica
fusel oil
fusi-
fusible alloy
fusible metal
fusing disk
fusion bomb
fusion point
fusion reaction
fusion reactor
fusion welding
fuss
 and feathers
fuss at
fuss up
fuss-budget
fuss-budgety
fusty-framed
fusty-looking
fusty-rusty
futtock band
futtock chain
futtock hoop
futtock plate
futtock shroud

futtock staff
futtock stave
future event
future grain
future life
future perfect
future price
future prospects
future state
future tense
future time
future-minded
futures contract
futurity race
futurity stakes
fuzz cut
fuzz up
fuzz-ball
fuzzy memory
fuzzy-guzzy
fuzzy-haired
fuzzy-headed
fuzzy-legged
fuzzy-wuzzy
g clef
g sol re ut
g suit
g-cal
g-man
g-string
gab pin
gabbro-porphyrite
gaberlunzie-man
gable end
gable roof
gable wall
gable window
gable-bottom
gable-bottom car
gable-end
gable-ended
gable-roofed
gable-shaped
gable-walled
gable-windowed
gaboon mahogany
gad about
gad so

gad-bee
gad-fly
gadget bag
gaff sail
gaff topsail
gaff-headed sail
gaff-rigged
gaff-topsail
gaff-topsail catfish
gaff-topsail pompano
gag law
gag on
gag order
gag press
gag rein
gag resolution
gag rule
gag runner
gag swivel
gag writer
gag-bit
gag-check
gag-reined
gag-tooth
gaga
 over
gage green
gage of battle
gain a footing
gain a good knowledge of
gain a hearing
gain a hold upon
gain a thorough knowledge of
gain admittance
gain altitude
gain by
gain command of
gain entree
gain ground
gain influence
gain knowledge
gain knowledge of
gain on
gain over
gain recognition
gain sharing
gain strength
gain the ascendancy

gain the confidence of
gain the day
gain the friendship of
gain the upper hand
gain the whip hand
gain time
gain to windward of
gain understanding of
gain upon
gain weight
gain your end
gain your ends
gain your liberty
gain-
gain-giving
gaining altitude
gaining head
gaining machine
gaining twist
gaited horse
gaiter tree
gaiter-in
gal Friday
gala affair
gala day
galact-
galactic circle
galactic cluster
galactic coordinates
galactic distance
galactic equator
galactic latitude
galactic longitude
galactic nebula
galactic noise
galactic plane
galactic pole
galactic poles
galactic space
galacto-
galam butter
galanga root
galanty
show
gale day
gale warning
gale-driven
galena glaze

gales of laughter
galimeta wood
gall and wormwood
gall bag
gall bladder
gall cyst
gall duct
gall fig
gall gnat
gall midge
gall mite
gall oak
gall passage
gall pipe
gall sickness
gall sickness bush
gall wasp
gall wind
gall-fly
gall-less
gall-like
gall-nut
gall-stone
galla ox
gallant soldier
gallantry under fire
gallery forest
gallery gods
gallery organ
gallery road
galleta grass
galley chase
galley foist
galley halfpenny
galley press
galley proof
galley punt
galley slave
galley slice
galley slug
galley stove
galley worm
galley-fashion
galley-man
galley-slave
galley-tile
galley-west
gallic acid

gallo-
gallo-tannate
gallo-tannic
gallop rhythm
galloper gun
galloping dandruff
galloping dominoes
gallow pulley
gallow tree
gallows balk
gallows bird
gallows bitts
gallows frame
gallows humor
gallows humour
gallows tree
gallows-bird
gallows-grass
gallows-tree
gally tile
galois theory
galvanic battery
galvanic cell
galvanic circle
galvanic circuit
galvanic
couple
galvanic current
galvanic electricity
galvanic pile
galvanic shock
galvanic skin response
galvanized iron
galvano-
gam-
gama grass
gamba bass
gamba goose
gamba stop
gamben bass
gamble away
gamble on
gamble with
gambling chance
gambling debt
gambling den
gambling device
gambling hall

gambling hell
gambling house
gambling odds
gambling table
gambling wheel
gambo goose
gambo hemp
gamboge yellow
gambrel roof
gambrel stick
gambrel-roofed
game act
game bag
game beast
game bird
game cart
game chips
game debt
game dog
game farmer
game fish
game fowl
game hawk
game hunter
game hunting
game law
game laws
game loser
game of chance
game of skill
game pie
game plan
game point
game preserve
game refuge
game reserve
game room
game sanctuary
game season
game shooting
game theory
game to the backbone
game to the end
game to the last
game warden
game-cock
game-destroying
game-fowl

game-law
gamelan orchestra
games all
games master
games mistress
games of chance
games theory
games-player
gamet-
gameto-
gaming
 contract
gaming house
gaming room
gaming table
gaming-proof
gamma acid
gamma decay
gamma distribution
gamma function
gamma globulin
gamma infinity
gamma iron
gamma moth
gamma nasal
gamma radiation
gamma radiator
gamma ray
gamma ray counter
gamma rays
gammon iron
gammon-faced
gammon-visaged
gamo-
gander month
gander pull
gandy dancer
gang along
gang around
gang cask
gang center
gang cultivator
gang drill
gang edger
gang hook
gang mill
gang plough
gang plow

gang press
gang punch
gang saw
gang sawyer
gang switch
gang tool
gang tooth
gang up
gang up on
gang up with
gang war
gang warfare
gang week
gang-board
gang-cask
gang-days
gang-flower
gang-plank
gang-week
ganging plea
gangle-shanked
gangli-
ganglion cell
ganglion crest
ganglionic blocking agent
gangway board
gangway ladder
gannet paper
gantry crane
gantry scaffold
gaol delivery
gap lathe
gap-frame press
gap-toothed
gape for
gape-gaze
gape-seed
gaping chasm
gaping depths
gapped scale
gar pike
gar-pike
garab tree
garage
sale
garam masala
garand rifle
garb willow

garbage barrel
garbage burner
garbage can
garbage cart
garbage collector
garbage conveyer
garbage destructor
garbage digestor
garbage drier
garbage dump
garbage grease
garbage incinerator
garbage man
garbage pail
garbage plant
garbage reducer
garbage tank
garbage tankage
garbage truck
garbage wagon
garble accounts
garboard plank
garboard strake
garbutt rod
garde du corps
garde-collet
garde-du-corps
garde-feu
garde-feux
garde-manger
garde-reins
garden apartment
garden balm
garden balsam
garden bond
garden bugloss
garden burnet
garden buttercup
garden camomile
garden cart
garden catchfly
garden celandine
garden centre
garden chafer
garden chair
garden cicely
garden city
garden columbine

garden cress
garden culture
garden cypress
garden egg
garden flea
garden flea hopper
garden fly honeysuckle
garden frame
garden garth
garden geranium
garden ginger
garden glass
garden heliotrope
garden hoe
garden hose
garden house
garden huckleberry
garden
hyssop
garden lemon
garden mint
garden mold
garden nasturtium
garden nightshade
garden of the Gods
garden of the Hesperides
garden orach
garden orpine
garden party
garden path
garden patience
garden pepper
garden pepper cress
garden peppergrass
garden persicary
garden phlox
garden pink
garden plague
garden plow
garden poppy
garden portulaca
garden purslane
garden rocket
garden roller
garden sage
garden sauce
garden sculpture
garden seat

garden snail
garden sorrel
garden spade
garden speedwell
garden spider
garden spot
garden spurge
garden suburb
garden syringa
garden tickseed
garden trowel
garden truck
garden valerian
garden variety
garden verbena
garden violet
garden wall
garden warbler
garden webworm
garden white
garden-gate
garden-house
garden-seated
garden-variety
garden-wall bond
gardener bird
gardenwall bond
gardes du corps
gardez la foi
gare-fowl
garget plant
garget root
garland chrysanthemum
garland crab
garland crab apple
garland flower
garland larkspur
garlic bread
garlic butter
garlic
germander
garlic mustard
garlic oil
garlic pear
garlic powder
garlic sage
garlic salt
garlic shrub

garlic tree
garment center
garment maker
garment making
garment parts
garment presser
garner of facts and fancies
garner up
garnet brown
garnet hinge
garnet jade
garnet lac
garnet paper
garnet-breasted
garnet-colored
garnet-red
garnish bolt
garnishee order
garrison cap
garrison finish
garrison flag
garrison house
garrison prisoner
garrison rations
garrison school
garrison state
garter belt
garter blue
garter snake
garter stitch
garter stockings
garter-blue
garth cress
gas analyzer
gas attack
gas bacillus
gas balloon
gas battery
gas bender
gas black
gas bladder
gas bomb
gas buoy
gas burner
gas cap
gas carbon
gas cell
gas chamber

gas chromatography
gas coal
gas coke
gas company
gas concrete
gas conduction
gas constant
gas counter
gas cutting
gas detector
gas disease
gas electrode
gas engine
gas engineer
gas engineering
gas equation
gas explosion
gas field
gas filler
gas fitter
gas
fitting
gas fittings
gas fixture
gas focusing
gas furnace
gas gangrene
gas generator
gas grenade
gas harmonicon
gas heat
gas heater
gas heating
gas helmet
gas jet
gas lamp
gas law
gas laws
gas lighter
gas lime
gas liquor
gas log
gas machine
gas main
gas mantle
gas mask
gas meter
gas motor

gas oil
gas oven
gas phlegmon
gas phototube
gas pipe
gas plant
gas plate
gas pliers
gas poker
gas polarization
gas producer
gas propulsion
gas range
gas refrigeration
gas refrigerator
gas ring
gas sand
gas separator
gas shaft
gas shell
gas spectrum
gas spurts
gas station
gas stove
gas tank
gas tap
gas tar
gas thermometer
gas thread
gas trap
gas tube
gas turbine
gas turbine engine
gas turbine jet engine
gas up
gas vent
gas warfare
gas washer
gas water
gas welder
gas welding
gas well
gas zone
gas-absorbing
gas-bag
gas-burning
gas-charged
gas-check

gas-cooled reactor
gas-delivering
gas-discharge lamp
gas-driven
gas-electric
gas-filled
gas-filled tube
gas-fired
gas-fitter
gas-fitting
gas-heat
gas-heated
gas-laden
gas-lampy
gas-light
gas-liquid
chromatography
gas-operated
gas-oxygen
gas-plant
gas-producing
gas-propelled
gas-resisting
gas-retort
gas-shaft hood
gas-testing
gaseous envelope
gaseous environment
gaseous medium
gaseous nebula
gaseous state
gash vein
gash-gabbit
gaslight paper
gasoline engine
gasoline gas
gasoline lantern
gasoline locomotive
gasoline propulsion
gasoline shovel
gasoline stove
gasoline tax
gasoline truck
gasoline-electric
gasoline-propelled
gaster-
gastr-
gastraea theory

gastric antacid
gastric digestion
gastric glands
gastric juice
gastric lavage
gastric ulcer
gastro-
gastro-omental
gastrocolic omentum
gastrohepatic omentum
gastrointestinal disease
gastrointestinal tract
gat-toothed
gate bill
gate channel
gate hinge
gate leg
gate money
gate net
gate pin
gate receipts
gate road
gate shear
gate shears
gate table
gate tower
gate valve
gate wheel
gate, the
gate-crash
gate-crasher
gate-keeper
gate-leg
gate-leg table
gate-legged
gate-legged table
gate-netting
gate-post
gateleg
 table
gatelegged table
gather around
gather courage
gather flesh
gather head
gather in
gather into barns
gather knowledge

gather learning
gather materials
gather to yourself
gather together
gather up
gather way
gather your thoughts
gathered to his fathers
gathering clouds
gathering coal
gathering evidence
gathering hoop
gathering iron
gathering locomotive
gathering machine
gathering of the clouds
gathering pallet
gathering peat
gathering place
gathering reel
gathering ring
gathering rod
gathering shot
gathering table
gatling gun
gaub line
gaude lake
gaudy-day
gaudy-green
gaufre iron
gauge block
gauge board
gauge cock
gauge concussion
gauge die
gauge door
gauge glass
gauge increment
gauge knife
gauge lath
gauge lathe
gauge line
gauge notch
gauge pile
gauge pin
gauge plate
gauge point
gauge saw

gauge stick
gauge stuff
gauge tolerance
gauge weir
gauge wheel
gauged pile
gauging plaster
gaultheria oil
gaunt-bellied
gauze ring
gauze tree
gauze weave
gauze-winged
gavel bread
gavel
 corn
gavel earth
gavel swine
gay as a lark
gay dance
gay deceiver
gay dog
gay liberation
gay-beseen
gay-chirping
gay-colored
gay-feather
gay-flowered
gay-glancing
gay-green
gay-hued
gay-humored
gay-looking
gay-motleyed
gay-painted
gay-seeming
gay-smiling
gay-spent
gay-spotted
gay-tailed
gay-throned
gaze at
gaze open-mouthed
gaze upon
gaze-hound
gazelle brown
gazelle hound
gazelle-boy

gazelle-eyed
gazer-on
gazetted officer
gazing ball
gazing-stock
ge-
gear box
gear brusher
gear case
gear cutter
gear down
gear fitter
gear forger
gear hobber
gear lever
gear maker
gear miller
gear oiler
gear pump
gear ratio
gear roller
gear shaper
gear shifter
gear to
gear train
gear up
gear wheel
gear-cutting
gear-driven
gear-operated
gear-wheel pump
geared-head lathe
gearing chain
gearless traction
gee ho
gee pole
gee string
gee up
gee up!
gee whillikins
gee whiz
gee whizz
gee-gee
gee-haw
gee-throw
gee-up
gefillte fish
gefilte fish

gefullte fish
gefulte fish
gegen-ion
gehockte leber
geigen principal
geiger
 counter
geiger tree
geiger-muller tube
geil fine
geisha girl
gel filtration
gel mineral
gelada baboon
gelatin dynamite
gelatin emulsion
gelatin filter
gelatin maker
gelatin molder
gelatin process
gelatin slide
gelatin-coated
gelatino silver bromide
gelatino-
gem carver
gem cutter
gem cutting
gem designer
gem engraver
gem fancier
gem grinder
gem jade
gem list
gem of the first water
gem peg
gem setter
gem stick
gem stone
gem stones
gem-bearing
gem-bedewed
gem-bedizened
gem-bespangled
gem-bright
gem-cutting
gem-decked
gem-engraving
gem-faced

gem-fruit
gem-grinding
gem-set
gem-spangled
gemel bar
gemel bottle
gemel hinge
gemel ring
gemel window
gemma cup
gen up
gen-
genappe yarn
gendarme blue
gene complex
gene flow
gene frequency
gene mutation
gene pool
gene-string
genealogical tree
general acclamation
general adaptation syndrome
general agent
general agreement
general anaesthetic
general anesthetic
general assembly
general aviation
general belief
general confession
general consent
general
court
general court-martial
general delivery
general demurrer
general dentistry
general dictionary
general discharge
general education
general election
general expenses
general headquarters
general hospital
general idea
general information
general knowledge

general lien
general linguistics
general medicine
general mortgage bond
general obligation bond
general of the air force
general of the armies
general of the army
general officer
general order
general orders
general paralysis
general paralysis of the insane
general paresis
general partner
general partnership
general post office
general practice
general practitioner
general precession
general principle
general prior
general public
general reconnaissance
general reference map
general rule
general run
general semantics
general servant
general sessions
general solution
general staff
general store
general strike
general studies
general surgery
general theory of relativity
general truth
general uprising
general voice
general war
general
will
general-duty nurse
general-purpose
generalized coordinates
generalized other
generalized proposition

generally accepted
generally admitted
generally capable
generally speaking
generate electricity
generating station
generating tone
generation gap
generation of man
generative cell
generative grammar
generative semantics
generator gas
generator unit
generic name
generic resemblance
generous-hearted
genethliac astrology
genetic code
genetic disease
genetic drift
genetic engineering
genetic fallacy
genetic individual
genetic method
genetic psychology
genetically related
geneva bands
geneva convention
geneva cross
geneva gown
genio-
genitive absolute
genito-
genius domus
genius familiae
genius for
genius loci
genius tutelae
geno-
genoa foresail
genoa jib
genre painter
genre painting
gens d'armerie
genteel comedian
genteel comedy
genteel poverty

gentian blue
gentian family
gentian root
gentian violet
gentianic acid
gentile-falcon
gentility manners
gentill-
gentisic acid
gentle art
gentle
 as a lamb
gentle breeze
gentle contact
gentle craft
gentle hint
gentle melancholy
gentle sex
gentle sleep
gentle slope
gentle wind
gentle-born
gentle-bred
gentle-browed
gentle-eyed
gentle-handed
gentle-handedly
gentle-handedness
gentle-looking
gentle-mannered
gentle-manneredly
gentle-manneredness
gentle-minded
gentle-mindedly
gentle-mindedness
gentle-natured
gentle-naturedly
gentle-naturedness
gentle-spoken
gentle-spokenly
gentle-spokenness
gentle-voiced
gentle-voicedly
gentle-voicedness
gentleman farmer
gentleman friend
gentleman of fortune
gentleman of leisure

gentleman of the press
gentleman of the road
gentleman's agreement
gentleman's gentleman
gentleman's lounge
gentleman's roo
gentleman-adventurer
gentleman-agent
gentleman-at-arms
gentleman-beggar
gentleman-cadet
gentleman-commoner
gentleman-covenanter
gentleman-dependent
gentleman-digger
gentleman-farmer
gentleman-jailer
gentleman-jockey
gentleman-lackey
gentleman-lodger
gentleman-murderer
gentleman-pensioner
gentleman-porter
gentleman-priest
gentleman-ranker
gentleman-recusant
gentleman-rider
gentleman-scholar
gentleman-sewer
gentleman-tradesman
gentleman-usher
gentleman-vagabond
gentleman-volunteer
gentleman-waiter
gentlemen's
agreement
gentlemen-at-arms
gentlemen-commoners
gentlemen-farmers
gentlemen-pensioners
gentoo penguin
genu valgum
genuine object
genus Homo
geo probe
geo-
geo-navigation
geocentric longitude

geocentric parallax
geodesic dome
geodesic geometry
geodesic line
geodetic engineer
geodetic engineering
geodetic longitude
geodetic satellite
geodetic survey
geodetic surveying
geographic determinism
geographic environment
geographic longitude
geographic range
geographical determinism
geographical dictionary
geographical mile
geographically limited
geoid-spheroid
geoid-spheroid balance
geologic time
geological chemistry
geological dictionary
geological engineer
geological engineering
geological time periods
geometric figure
geometric isomerism
geometric mean
geometric pace
geometric progression
geometric
proportion
geometric ratio
geometric series
geometrical horizon
geometrical lathe
geometrical optics
geometrical pace
geometrical pitch
geometrical progression
geometrical stair
geophysical satellite
georgia pine
geostrophic wind
geotectonic geology
geranium creeper
geranium family

geranium lake
geranium oil
geranium pink
geriatric disease
germ breeder
germ cell
germ destroyer
germ disease
germ disk
germ gland
germ layer
germ nucleus
germ pathology
germ peg
germ plasm
germ plasma
germ pore
germ spot
germ stock
germ theory
germ track
germ tube
germ warfare
germ-forming
german baptist brethren
german cotillion
german measles
german shepherd
german silver
germander chickweed
germander sage
germander speedwell
germanium crystal triode
germanium oxide
germanium triode
germano-
germicidal lamp
germinal area
germinal disc
germinal disk
germinal imagination
germinal vesicle
germinate from
geront-
geronto-
gerrymandered district
gerund grinder
gerund grindery

gerund grinding
gerund
phrase
ges-warp
gestalt psychology
gestalt therapy
gestatorial chair
gesture calligraphist
gesture calligraphy
gesture language
gesture painting
get a bang out of
get a bead on
get a boot out of
get a break
get a bun on
get a charge out of
get a corner on
get a cropper
get a fix
get a foothold
get a footing
get a glimpse of
get a good pennyworth
get a head start
get a hold on
get a hustle on
get a kick out of
get a leg up on
get a lift out of
get a load of
get a loan
get a move on
get a navigational fix
get a noseful of
get a purchase
get a reaction
get a reading
get a response
get a rise out of
get a sense
get a sounding
get a stranglehold on
get a whiff of
get a wiggle on
get a wrong impression
get about
get abroad

get acquainted
get acquire
get across
get afloat
get ahead
get ahead of
get all balled up
get all bollixed up
get all in a lather
get all snarled up
get all tangled up
get all wound up
get along
get along in years
get along on
get along with
get along with you
get along
without
get an agent
get an earful
get an eyeful of
get an impression
get an income
get anywhere
get around
get at
get at the ear of
get away
get away from
get away with
get away with it
get away with murder
get back
get back at
get back in shape
get back to earth
get before
get behind
get better
get bogged down
get busy
get by
get by heart
get by hook or by crook
get by on
get by osmosis
get by rote

get chummy with
get clear of
get cold feet
get cozy with
get cracking
get cutting
get done
get down
get down cold
get down from your high horse
get down on your hunkers
get down on your knees
get down on your marrowbones
get down pat
get down to brass tacks
get down to business
get down to cases
get down to nuts and bolts
get drunk
get even
get even with
get excited
get excited about
get exposure
get for free
get for your pains
get free
get free of
get fresh
get from
get funny
get going
get heads together
get hep to
get hers
get high
get high on
get his
get hitched
get hold of
get hold
of an idea
get hold of yourself
get home free
get hot under the collar
get huffy
get hung up
get in

get in a bind
get in a box
get in a hole
get in a jam
get in a mess
get in a pincers
get in a rut
get in a word edgewise
get in back of
get in behind
get in connection with
get in contact with
get in formation
get in front of
get in good with
get in hot water
get in line
get in on the ground floor
get in the act
get in the family way
get in the good graces of
get in the harvest
get in the soup
get in the swim
get in there
get in touch with
get in with
get in wrong
get in your hair
get in your own way
get income
get into
get into a dither
get into a pucker
get into a scrape
get into a stew
get into a swivet
get into a tizzy
get into debt
get into favor
get into harness
get into line
get into mischief
get into the way of
get into trouble
get into your clutches
get into your grasp
get into your head

get into your hold
get into your possession
get into your thick head
get it
get it coming and
going
get it in the neck
get it into your head
get it off your chest
get it off your mind
get it out of your system
get it out on
get it over
get it over with
get justice
get killed
get knowledge
get left
get letter-perfect
get leverage
get loose
get lost
get mad
get married
get miffed
get mired
get mired down
get moving
get next to
get next to someone
get no better fast
get no place fast
get nowhere
get off
get off a joke
get off cheap
get off on the right
get off scot-free
get off the ground
get off the subject
get off the track
get off to a good start
get off your back
get on
get on credit
get on film
get on good terms with
get on in the world

get on in years
get on out
get on swimmingly
get on the ball
get on the bandwagon
get on the cuff
get on the good side of
get on the in with
get on the job
get on the right side of
get on the wagon
get on the water wagon
get on tick
get on to
get on top
get on trust
get on well
get on well with
get on with
get on your high horse
get on your
nerves
get one wrong
get onto
get organized
get out
get out a sheet-anchor
get out of
get out of bed
get out of commission
get out of gear
get out of here
get out of joint
get out of kelter
get out of kilter
get out of line
get out of order
get out of the way of
get out of whack
get out of your depth
get over
get over the ground
get over with
get pickled
get plastered
get quit of
get quits with
get ready

get ready to
get red in the face
get religion
get rich
get rid of
get right
get round
get satisfaction
get scent of
get sea room
get set
get set for
get shet of
get shut of
get sidetracked
get smart
get some air
get some sack time
get some shut-eye
get something out of your system
get sore
get square with
get squared away
get taped
get the advantage
get the air
get the ax
get the best of
get the better of
get the breaks
get the control of
get the drift
get the drop on
get the ear of
get the edge on
get the facts
get the floor
get the gate
get the hang of
get the hell out
get the idea
get
the impression
get the jump on
get the knack of
get the lay of the land
get the lead out
get the lead out of your ass

get the lie of the land
get the mastery of
get the meaning of
get the picture
get the power into your hands
get the show on the road
get the start
get the upper hand
get the works
get the worst of it
get there
get things into proportion
get through
get through to
get through with
get through your head
get through your thick head
get tired
get to
get to be
get to do
get to first base
get to know one another
get to the bottom of
get to the core
get to the essence
get to the nub
get to your feet
get together
get together with
get too big for your breeches
get top billing
get under way
get under your skin
get up
get up and go
get up early
get up in
get up late
get up nerve
get up on
get up steam
get used to
get warm
get well
get well out of
get what is coming to one
get wind of

get wind up
get wise to
get with child
get with it
get with young
get worse
get wrong
get you
down
get you gone
get your Irish up
get your ass in a bind
get your ass in gear
get your back up
get your bearings
get your blood up
get your comeuppance
get your credentials
get your dander up
get your deserts
get your dues
get your feet on the ground
get your feet wet
get your fingers on
get your goat
get your gorge up
get your hands on
get your hopes up
get your mad up
get your money's worth
get your monkey up
get yourself a deal
get yourself in a sulk
get-at-ability
get-at-able
get-at-ableness
get-away
get-away speed
get-off
get-out
get-together
get-tough
get-up
get-up-and-get
get-up-and-go
getah wax
getet out
getting along

getting along in years
getting around
getting even
getting hold of
getting on
getting on in years
getting rid of
getting round
getting the hell out
getting with child
geyser basin
geyser cone
gharry-wallah
ghatti gum
ghetto-dwellers
ghost candle
ghost crab
ghost daemon
ghost dance
ghost edition
ghost food
ghost god
ghost gum
ghost hole
ghost line
ghost lodge
ghost
lore
ghost moth
ghost name
ghost of a great name
ghost plant
ghost shrimp
ghost soul
ghost story
ghost town
ghost word
ghost world
ghost writer
ghost-fearing
ghost-filled
ghost-haunted
ghost-ridden
ghost-weed
ghost-writer
giallo antico
giant arrowhead
giant bamboo

giant bass
giant cane
giant chinquapin
giant crab
giant daisy
giant fennel
giant fescue
giant fulmar
giant garlic
giant granadilla
giant ground sloth
giant holly fern
giant hornet
giant killer
giant lily
giant lizard
giant of learning
giant order
giant panda
giant parsnip
giant petrel
giant planet
giant powder
giant ragweed
giant reed
giant rye grass
giant schnauzer
giant sea bass
giant sequoia
giant silkworm moth
giant size
giant slalom
giant sloth
giant snowdrop
giant star
giant step
giant steps
giant stride
giant sunflower
giant tortoise
giant water bug
giant-like
giant-sized
gib fish
gib plate
gib-cat
gib-head
gib-head key

gibbed cat
gibber bird
gibberelic acid
gibberellic acid
gibbet law
gibbet tree
gibble-gabble
gibble-gabbler
gibboso-
gibbous
 moon
gibby stick
gibe at
gibing retort
giblet-check
giblet-checked
giblet-cheek
gibus hat
giddy as a goose
giddy-brained
giddy-drunk
giddy-go-round
giddy-headed
giddy-paced
giddy-pated
giddy-witted
gier-eagle
giff-gaff
gift balsam
gift certificate
gift for
gift of expression
gift of gab
gift of the gab
gift of tongues
gift rope
gift shop
gift tax
gift with
gift wrap
gift wrapping
gift-rope
gift-wrap
gift-wrapped
gift-wrapper
gift-wrapping
gift-wrapt
gifted child

gifted person
gig lamp
gig machine
gig mill
gig-lamp
gig-mill
giga-
gigaelectron volt
gigant-
giggle house
gigot sleeve
gila monster
gild the lily
gild the pill
gilding metal
gilding wax
gilgai soil
gill arch
gill bailer
gill bar
gill basket
gill book
gill box
gill cavity
gill chamber
gill cleft
gill comb
gill cover
gill filament
gill frame
gill fungus
gill helix
gill net
gill plume
gill pouch
gill rake
gill raker
gill rod
gill scoop
gill slit
gill-ale
gill-book
gill-cup
gill-flirt
gill-less
gill-like
gill-netter
gill-over-the-ground

gill-run
gill-shaped
gillie-wetfoot
gillie-whitefoot
gilling
 machine
gilling thread
gilt-edge
gilt-edged
gilt-edged securities
gilt-handled
gilt-head
gilt-headed
gilt-knobbed
gilt-robed
gilt-tail
gim peg
gimbal joint
gimbal ring
gimlet bit
gimlet eye
gimlet-eyed
gimmer hog
gimmer lamb
gimp lapper
gimp nail
gin and tonic
gin block
gin drinker's liver
gin fizz
gin mill
gin palace
gin pole
gin race
gin rickey
gin ring
gin rummy
gin sling
gin wagon
gin wheel
gin yard
gin-mill
gin-palace
gin-run
gin-saw
gin-saw file
gin-shop
gin-sling

gingelly oil
ginger ale
ginger beer
ginger bleacher
ginger bread
ginger buyer
ginger extract
ginger family
ginger grass
ginger group
ginger jar
ginger lily
ginger nut
ginger oil
ginger pine
ginger plant
ginger pop
ginger punch
ginger quill
ginger root
ginger snap
ginger spice
ginger tea
ginger up
ginger wine
ginger-beer
ginger-beery
ginger-color
ginger-colored
ginger-faced
ginger-grass oil
ginger-hackled
ginger-haired
ginger-pop
ginger-red
gingerbread
man
gingerbread nut
gingerbread palm
gingerbread plum
gingerbread tree
gingili oil
gingiv-
ginkgo nut
ginny carriage
ginny-carriage
ginseng family
gipsy capstan

gipsy moth
gipsy winch
giraffe camel
girandole clock
girasol thorn
gird up your loins
gird your loins
girder bridge
girder erector
girder rail
girder riveter
girder stay
girder tool
girdle band
girdle bone
girdle pain
girdle sensation
girdle the globe
girdle wheel
girdle-tailed lizard
girl Friday
girl Fridays
girl friday
girl friend
girl guide
girl next door
girl scout
girl show
girl-o
girl-os
girl-shy
girl-watcher
girls' room
girly show
girt-line
girth web
girth-web
give 'em hell
give a
give a Roland for an Oliver
give a bad name
give a bad time to
give a bawling out
give a beating
give a big hand
give a bit of your mind
give a black eye
give a black mark

give a blank check
give a boost
give a boost to
give a bouquet
give a briefing
give a bum steer
give a buzz
give a cheer
give a color to
give a cursory
look
give a damn
give a darn
give a dekko
give a direct order
give a dirty look
give a dog a bad name
give a dose of birch oil
give a dose of hazel oil
give a dose of hickory oil
give a dose of strap oil
give a dressing-down
give a fair shake
give a false alarm
give a false coloring
give a false idea
give a false impression
give a figure to
give a fillip to
give a fling
give a for-instance
give a free course to
give a free hand
give a free translation
give a go
give a going-over
give a good
give a good account of yourself
give a guess
give a hand
give a hearing to
give a helping hand
give a hint
give a job to
give a knockdown
give a leg up
give a lesson
give a lesson to

give a lick and a promise
give a lift
give a loose translation
give a miss to
give a nod of assent
give a party
give a performance
give a piece of advice
give a piece of your mind
give a pointer to
give a posy
give a promise
give a quick look
give a quid pro quo
give a rap on the knuckles
give a raw deal
give a report
give
a reprieve
give a ring
give a shout of laughter
give a show
give a shriek of laughter
give a sidelong look
give a signal
give a square deal
give a start
give a suggestion
give a surprise party
give a talk
give a thrashing
give a thrill
give a tone to society
give a transfusion
give a trial to
give a try
give a tryout
give a turn to
give a twist to
give a warm reception to
give a whammy
give a whipping
give a whirl
give a wide berth
give a wide berth to
give a willing ear
give a workout
give a write-up

give a wrong idea
give absolution
give acknowledgment
give admittance to
give advance notice
give air to
give an account of
give an alarm
give an appreciation
give an assignment
give an assist
give an ear
give an encore
give an entree
give an examination
give an exclamation
give an idea of
give an impetus
give an impression of
give an impulse to
give an inch and take an ell
give an inkling of
give an introduction
give an obolus to Charon
give an open mandate
give an opinion
give
an order
give and take
give answer
give as a gift
give as an excuse
give as good as was sent
give as good as you get
give as much as you take
give assent
give attention
give audience to
give away
give back
give battle
give being to
give benediction
give birth
give birth to
give bridle to
give by way of information
give care to

give carte blanche
give chase
give cheerfully
give comfort
give concern
give confidential information
give consent
give credence to
give credit
give credit to
give danger a wide berth
give directions
give directions to
give dispensation from
give ear
give ear to
give emphasis to
give encouragement
give entrance to
give evidence
give expression
give expression to
give fair warning
give faith to
give for free
give forgiveness
give forth
give forth a sound
give free course to
give free play to the emotions
give free rein to
give freely
give full authority
give full particulars
give full play
give full power
give good reasons for
give good returns
give greater draft
fore and aft
give ground
give ground for expecting
give hail Columbia
give heed
give heed to
give hell
give help
give her beans

give her less rudder
give her more rudder
give homework
give honor to
give hope
give importance to
give in
give in charge
give in exchange
give in kind
give in marriage
give in return
give in trust
give indication of
give instruction
give instructions
give it a go
give it a second thought
give it all your got
give it no more thought
give it the gas
give it the gun
give it to
give it your all
give leave
give lessons in
give life to
give light
give line
give lip service
give little weight to
give measure for measure
give mind to
give momentum
give moral support to
give more matter and less art
give more than your share
give mouth honor
give new life to
give no cheer
give no comfort
give no credence to
give no credit to
give no heed
give no joy
give no pleasure
give no quarter
give no trouble

give notice
give notification
give occasion to
give of
give of your substance
give
of yourself
give off
give off waves of heat
give offense
give offense to
give official sanction
give official warrant
give one a scare
give one a turn
give one line
give onto
give or take a little
give origin to
give out
give out a smell
give out with
give over
give over to
give pain
give pause
give permission
give place
give place to
give pleasure
give power
give prominence
give prospect of
give publicity
give quarter
give reason for
give recognition
give refuge to
give rein to
give release
give relief
give respite
give rise to
give rope enough to
give salvation
give sanctuary to
give satisfaction
give security

give shelter to
give sign
give someone a dose
give someone enough rope
give someone his due
give someone the eye
give someone the slip
give someone your hand on
give something the gun
give sorrow words
give special attention to
give support
give surcease
give texture
give thanks
give the
give the Bronx cheer
give the Devil his due
give the air
give the asking price
give
the ax
give the ax to
give the battle cry
give the benefit of the doubt
give the bird
give the bum's rush
give the business
give the chuck to
give the coat off your back
give the cold shoulder
give the cold shoulder to
give the come-on
give the cue
give the deuce
give the devil
give the evil eye
give the eye
give the facts
give the feeling of
give the finishing strokes
give the finishing touches
give the freedom of
give the gate
give the glad eye
give the glad hand
give the go-ahead
give the go-by

give the good word
give the green light
give the guy to
give the high sign
give the hook
give the imprimatur
give the kiss of death to
give the lie to
give the meaning
give the mind to
give the nod
give the old heave-ho
give the once-over
give the pink slip
give the quietus
give the quietus to
give the raspberry
give the reins to
give the run of
give the runaround
give the sack to
give the shirt off your back
give the shoulder
give the show away
give the silent treatment
give the slip
give
the stick
give the word
give the word of command
give the works
give thought to
give thumbs up
give tick
give tidings of
give tit for tat
give title to
give to
give to the world
give token
give tongue
give top billing to
give umbrage
give until it hurts
give up
give up all expectation
give up all hope
give up hope

give up the crown
give up the ghost
give up your post
give upon
give utterance
give vent to
give voice
give warning
give way
give way to
give way to tears
give what-for
give with an open hand
give with both hands
give witness
give word
give word for word
give words to
give you
give you a bad time
give you a bang
give you a bellyful
give you a blank check
give you a boot
give you a charge
give you a fright
give you a hard time
give you a kick
give you a lift
give you a pain
give you a revelation
give you a scare
give you a send-off
give you a swift pain in the ass
give you a tip
give you a turn
give you a whammy
give you another chance
give you carte blanche
give you gooseflesh
give
you his gruel
give you his head
give you his walking papers
give you leeway
give you room
give you rope
give you scope

give you short shrift
give you space
give you the evil eye
give you the glad eye
give you the lie
give you the lie direct
give you the lie in your throat
give you the lip
give you the run-around
give you the slip
give you the works
give you tit for tat
give you to understand
give you trouble
give you what is coming to you
give you your comeuppance
give you your deserts
give your best
give your best regards
give your blessing
give your blessing to
give your compliments
give your countenance to
give your eyeteeth
give your eyeteeth for
give your fair share
give your hand to
give your kingdom in hell for
give your life for your country
give your love
give your mind to
give your parole
give your regards
give your share
give your support to
give your thanks
give your undivided attention
give your voice for
give your word
give your word of honor
give yourself airs
give
yourself for
give yourself over to
give yourself over to pleasure
give yourself up
give yourself up to
give yourself up to reverie

give-and-take
give-up
giveaway show
given a jar
given a jolt
given a turn
given birth
given fact
given name
given to
given to drink
given up
given up for dead
giver-out
giving back
giving birth
giving in
giving out
giving over
giving up
giving way
gizzard shad
gizzard trout
glacial acetic acid
glacial boulder
glacial deposit
glacial epoch
glacial lake
glacial meal
glacial milk
glacial movement
glacial period
glacier bear
glacier cataract
glacier lily
glacier milk
glacier table
glacier theory
glacis plate
glad eye
glad hand
glad hand, the
glad rags
glad tidings
glad to see you
glad-cheered
glad-flowing
glad-hand

glad-handed
glad-hander
glad-sad
glad-surviving
glade lily
glade mallow
glamour girl
glamour issue
glamour puss
glance at
glance coal
glance cobalt
glance copper
glance of the eye
glance off
glance over
glance pitch
glance through
glance upon
glancing
angle
glancing boom
glancing light
gland disease
glandular fever
glandular plague
glandular therapy
glans clitoridis
glans penis
glare ice
glare-eyed
glaring light
glaring look
glass bead
glass block
glass blower
glass blowing
glass brick
glass burner
glass cement
glass coach
glass curtain
glass cutter
glass cutting
glass decorator
glass eye
glass gall
glass harmonica

glass house
glass jaw
glass lizard
glass of time
glass painting
glass pot
glass pox
glass printing
glass sculpture
glass snail
glass snake
glass soap
glass string
glass tank
glass wool
glass-blower
glass-blowing
glass-bottomed
glass-bottomed boat
glass-built
glass-cabin launch
glass-cloth
glass-coach
glass-coated
glass-colored
glass-covered
glass-cutter
glass-cutting
glass-eater
glass-eyed
glass-faced
glass-fronted
glass-glazed
glass-green
glass-hard
glass-house
glass-lined
glass-maker
glass-man
glass-paneled
glass-paper
glass-topped
glass-work
glassed-in
glasses case
glassy-eyed
glauber's salt
glaucous blue

glaucous
gray
glaucous green
glaucous gull
glaucous-green
glaucous-winged
glaze frost
glaze ice
glaze kiln
glaze wheel
glazed doughnut
glazed frost
glazed ware
glazier's point
glazing bar
glazing bead
glazing brad
glazing-bar
gleam of hope
gleam of light
gleaming smile
glean knowledge
glean learning
glebe house
glebe land
glee club
glee-eyed
glen nymph
glengarry bonnet
gleno-
glial cells
glib tongue
glib-gabbet
glib-tongued
glide bomb
glide consonant
glide into
glide landing
glide path
glide plane
glide vowel
glide-bomb
glide-bombing
glider bomb
glider train
gliding angle
gliding boat
gliding joint

gliding machine
glimmer gowk
glimmer of hope
glimmering goal
glitter ice
glittering generality
gloat on
gloat over
gloating pleasure
global rule
global war
globe amaranth
globe animalcule
globe artichoke
globe crowfoot
globe daisy
globe dollar
globe hyacinth
globe joint
globe lightning
globe lily
globe mallow
globe ranunculus
globe sight
globe thistle
globe tulip
globe valve
globe-girdler
globe-girdling
globe-shaped
globe-trot
globe-trotter
globe-trotting
globigerina
ooze
globo-cumulus
globular cluster
globular lightning
globus hystericus
globus pallidus
glom on to
gloomy Gus
gloomy outlook
gloomy-browed
gloomy-faced
glor-fat
glorify the Lord
glory be

glory be to
glory be to God
glory be to God in the highest
glory bower
glory box
glory flower
glory hole
glory in
glory lily
glory pea
glory to God
glory tree
glory vine
glory-hole
glory-of-the-snow
glory-of-the-snows
glory-of-the-sun
glory-of-the-suns
glory-pea
gloss of novelty
gloss oil
gloss over
gloss-
glosso-
glossopalatine arch
glossopalatine nerve
glossopharyngeal nerve
glossopharyngeal neuralgia
glossy snake
glossy-black
glossy-leaved
glossy-white
glost fire
glost fireman
glost firing
glost oven
glost placer
glost-fired
glott-
glottal stop
glotto-
glove box
glove compartment
glove contest
glove grain
glove maker
glove money
glove puppet

glove silk
glove silver
glove sponge
glove stitch
glover's stitch
glow beetle
glow discharge
glow
 discharge tube
glow lamp
glow light
glow lighting
glow meter
glow plug
glow tube
glow-discharge microphone
glow-worm
glowering look
glowing health
glowing smile
gloze over
glucaric acid
gluck-gluck
gluckliche Reise
gluconic acid
glucose sirup
glucose vinegar
glucuronic acid
glue boiler
glue bottle
glue brush
glue cell
glue maker
glue on
glue plant
glue sniffer
glue stock
glue the mind to
glue water
glue-pot
glued-up
gluing-off
glut herring
glut on the market
glut-
glutamic acid
glutaminic acid
gluteal region

glutei maximi
gluten bread
gluten feed
gluten flour
gluten meal
gluteus maximus
gluteus medius
gluteus minimus
glutton bird
glyc-
glycer-
glyceria wax
glyceric acid
glyceric aldehyde
glycerin jelly
glycerin lye
glycerin soap
glycero-
glycerol nitrate
glyceryl ester
glyceryl esters
glyceryl group
glyceryl monoacetate
glyceryl nitrate
glyceryl radical
glyceryl trinitrate
glyceryl trioleate
glyceryl tripalmitate
glyco-
glycogen disease
glycogenic acid
glycolic acid
glycollic
acid
glyconic acid
glycuronic acid
glycyrrhizae composita
glyoxyl urea
glyptic artist
glyptographic artist
gnamma hole
gnash your teeth
gnashing of teeth
gnat hawk
gnath-
gnathic index
gnaw at the root of
gnaw away

gnawing of the bowels
gnawing pain
gneissoid-granite
gnome owl
gnomonic projection
gnothi seauton
gnu goat
go AWOL
go Dutch
go a journey
go aboard
go about
go about your business
go abroad
go across
go adrift
go after
go against
go against the grain
go aground
go ahead
go ahead of
go all colors
go all lengths
go all out
go all the way
go aloft
go along
go along with
go along with the crowd
go alongside
go amiss
go and
go and do
go and get
go and hang yourself
go ape
go ape over
go around
go around and around
go around in circles
go as
go as the crow flies
go as you please
go ashore
go ass over elbows
go astern
go astray

go astray from
go at
go at a snail's pace
go at flank speed
go at full blast
go at full steam
go at full tilt
go at it ass-backwards
go at large
go at liberty
go
 at the double
go away
go awol
go awry
go back
go back on
go back on your word
go back over
go back to
go backwards
go bad
go bail
go bail for
go bananas
go bankrupt
go beddy-bye
go before
go begging
go behind
go below
go berserk
go beside
go between
go beyond
go beyond reason
go beyond the bounds of reason
go blind
go broke
go bush
go by
go by air
go by airline
go by fits and starts
go by plane
go by rail
go by ship
go by the board

go by the name of
go bye-bye
go cahoots
go cahoots with
go camping
go cap in hand to
go chase yourself
go contrary to
go counter to
go crabwise
go crackers
go crazy
go dead
go dead slow
go deaf
go deep
go deep into
go directly
go down
go down in the world
go down like a stone
go down on your knees to
go down the drain
go down to the sea in ships
go down with flying colors
go downhill
go easily
go easy
go easy on
go even stephen
go even stephen with
go far
go far afield
go fast
go fetch
go fifty-fifty
go fifty-fifty with
go fish
go fishing
go flat out
go
fly a kite
go for
go for a Sunday drive
go for a burton
go for a drive
go for a ride
go for a spin

go for a walk
go for an airing
go for an outing
go for broke
go for the deck
go foreign
go forth
go forward
go free
go from bad to worse
go from home
go from push to shove
go full speed ahead
go full speed astern
go full steam ahead
go full tilt at
go gauge
go get
go great guns
go gunning for
go halvers
go halvers with
go halves
go hand in hand
go hand in hand with
go hard with
go haywire
go head over heels
go hell-bent for election
go home
go home feet first
go hungry
go hunting
go ill with
go in
go in advance
go in bathing
go in business for yourself
go in cahoot with
go in cahoots
go in debt
go in for
go in harm's way
go in hock
go in hock for
go in one ear and out the other
go in opposition to
go in partners

go in partnership
go in peace
go in pursuit of
go in search of
go in swimming
go in the face of
go in the lead
go in the rear of
go in wading
go in with
go into
go into a funk
go
into a huddle
go into a tail spin
go into a tailspin
go into a tantrum
go into convulsions
go into decay
go into detail
go into heart and soul
go into hiding
go into hysterics
go into litigation
go into mourning
go into orbit
go into outer space
go into partnership with
go into raptures
go into receivership
go into retirement
go into reverse
go into seclusion
go into shock
go into the money market
go into training
go into your pocket
go it alone
go jump in the lake
go kaput
go lame
go light
go like
go like a bat out of hell
go like a flash
go like a shot
go like a streak of lightning
go like clockwork

go like greased lightning
go like hot cakes
go like lightning
go like the wind
go long
go mad
go maku
go marketing
go native
go near
go night-night
go off
go off at a tangent
go off at half cock
go off half-cocked
go off in all directions at once
go off on a tangent
go off soundings
go off the air
go off the deep end
go off the track
go off the trolley
go off to sleep
go off your head
go
off your nut
go off your rocker
go on
go on a bat
go on a bender
go on a binge
go on a bust
go on a crusade
go on a crusade against
go on a diet
go on a drunk
go on a honeymoon
go on a journey
go on a pilgrimage
go on a rampage
go on a rip
go on a sight-seeing trip
go on a spending spree
go on a spree
go on a tear
go on a toot
go on a trip
go on a voyage

go on a wartime footing
go on a wild-goose chase
go on a wrong tack
go on about
go on all fours
go on all fours with
go on an ego trip
go on an expedition
go on and on
go on bended knee to
go on board
go on forever
go on furlough
go on hands and knees
go on horseback
go on in the old jog-trot way
go on leave
go on over
go on parade
go on record
go on safari
go on shipboard
go on strike
go on the air
go on the blink
go on the bum
go on the defensive
go on the fritz
go on the heel and toe
go on the merry-go-round
go on the road
go on the rocks
go on the shoals
go on the stump
go on the town
go on the warpath
go on tick
go on tiptoe
go
on welfare
go on with
go on with the show
go on your beat
go once over lightly
go one better
go onto
go onwards and upwards
go out

go out for
go out like a lamb
go out like a light
go out of bounds
go out of business
go out of line
go out of style
go out of the way
go out of use
go out of your depth
go out of your skull
go out of your way
go out on a limb
go out on strike
go out the window
go out with
go out with the ebb
go out with the tide
go over
go over again and again
go over and over
go over big
go over like a lead balloon
go over step by step
go over the board
go over the ground
go over the hill
go over the same ground
go over the side
go over the top
go over the wall
go over to the enemy
go over to the great majority
go over to the majority
go over your head
go overboard
go overseas
go partners
go peddle your fish
go phut
go pitapat
go pitter-patter
go places
go places and do things
go public
go right through
go roll your hoop
go round

go round Robin Hood's barn
go round about
go
round like a horse in a mill
go scot free
go separate ways
go shares
go shopping
go short
go sideways
go sit on a tack
go slow
go slowly
go slumming
go snack
go soak your head
go soft
go soft at the edges
go steady
go step by step
go straight
go straight on
go straight to the point
go the dizzy rounds
go the limit
go the long way around
go the other way
go the round
go the rounds
go the route
go the same round
go the vole
go the way of all earth
go the way of all flesh
go the whole hog
go the whole length
go the whole way
go through
go through a change
go through channels
go through fire and water
go through hell and high water
go through one
go through one's head
go through phases
go through the motions
go through with
go through with it

go through your paces
go through your part
go to
go to Abraham's bosom
go to Canossa
go to Davy Jones's locker
go to a better land
go to a better life
go to a better place
go to a better world
go to a watery grave
go to all lengths
go to an extreme
go
to and fro
go to any length
go to any lengths
go to bat for
go to bed
go to bed with
go to do
go to extremes
go to foreign places
go to foreign shores
go to get
go to glory
go to grass
go to great lengths
go to great pains
go to ground
go to hell
go to it
go to kingdom come
go to law
go to loggerheads
go to perdition
go to pieces
go to pot
go to press
go to rack and manger
go to rack and ruin
go to rest
go to ruin
go to school
go to sea
go to sea in a sieve
go to seed
go to shivers

go to show
go to sleep
go to smash
go to smithereens
go to the bad
go to the bathroom
go to the bitter end
go to the bottom
go to the country
go to the deuce
go to the devil
go to the dogs
go to the electorate
go to the front for
go to the happy hunting grounds
go to the mat with
go to the trouble
go to the voters
go to the wall
go to town
go to town on
go to war
go to waste
go to windward
go to wrack and ruin
go to your glory
go to your head
go to your heart
go to your last home
go to your long account
go
to your rest
go to your reward
go together
go too far
go treat
go under
go under a false name
go under an alias
go under an assumed name
go under false colors
go under false pretenses
go under the knife
go under the name of
go underground
go unrestrained
go up
go up and up

go up blind alleys
go up in smoke
go up in your lines
go up on your lines
go up the nose
go up the spout
go up the wall
go up to with hat in hand
go uphill
go upon
go well
go west
go whole hog
go with
go with the current
go with the party
go with the stream
go with the tide
go without
go without saying
go wonder
go woolgathering
go wrong
go your own way
go your rounds
go your way
go-about
go-ahead
go-as-you-please
go-ashore
go-away bird
go-back
go-between
go-by
go-cart
go-devil
go-down
go-getter
go-getterism
go-getting
go-go
go-go dancer
go-kart
go-moku
go-off
go-quick
go-slow policy
go-to-itiveness

go-to-meeting
goa powder
goad on
goal area
goal crease
goal judge
goal kick
goal line
goal minder
goal net
goal post
goal
posts
goal stick
goal tender
goal tending
goal-post mast
goat antelope
goat chaffer
goat cheese
goat fig
goat god
goat grass
goat hair
goat marjoram
goat milker
goat moth
goat nut
goat owl
goat pepper
goat pox
goat rue
goat's hair
goat's-beard
goat's-rue
goat-bearded
goat-drunk
goat-eyed
goat-footed
goat-headed
goat-herd
goat-hoofed
goat-horned
goat-keeping
goat-kneed
goat-pox
goat-toothed
goatsfoot convolvulus

gob line
gob rope
gob-line
gobar numerals
gobble down
gobble up
gobe-mouches
goblet cell
goblin fish
goblin scarlet
goblin shark
god head
god of evil
god of justice
god of lightning
god of trade
god's acre
god's penny
god's-penny
god-a-mercy
god-almighty
god-child
god-damn
god-daughter
god-fearing
god-horse
god-king
god-mamma
god-man
god-papa
god-parent
god-phere
god-speed
goddam it
goddess of evil
goddess of justice
goddess-like
goddesses of discord
godforsaken place
godly-learned
godly-minded
godly-mindedness
gods of
gods of commerce
gods of evil
gods of marriage
gods

of the nether world
goer-by
gofferor gauffer
goggle eyes
goggle-eye
goggle-eye scad
goggle-eyed
goggle-eyes
goggle-nose
going about
going afoot
going against the current
going ahead
going along with
going around
going around in circles
going ashore
going away
going barrel
going behind
going between
going down of the sun
going for broke
going forth
going fusee
going light
going off
going on
going on all fours
going on foot
going out
going over
going price
going strong
going through
going to Jerusalem
going to happen
going to pieces
going to the polls
going train
going wheel
going-concern
going-concern value
going-out-of-business sale
going-over
goings on
goings-on
goings-over

goiter stick
gold apple
gold assayer
gold bank
gold bar
gold basis
gold bass
gold beating
gold beetle
gold beryl
gold blocker
gold blocking
gold bond
gold book
gold brick
gold bronze
gold brown
gold bullion standard
gold carp
gold certificate
gold chloride
gold clause
gold democrat
gold depository
gold digger
gold
digging
gold diggings
gold driver
gold dust
gold fever
gold field
gold foil
gold lace
gold leaf
gold maker
gold making
gold medal
gold melter
gold mine
gold miner
gold mining
gold monochloride
gold note
gold nugget
gold of pleasure
gold orange
gold pan

gold panner
gold piece
gold plate
gold point
gold refiner
gold reserve
gold rush
gold seeker
gold solder
gold spinner
gold standard
gold star
gold stick
gold therapy
gold tooth
gold topaz
gold trichloride
gold warden
gold washer
gold washing
gold working
gold-and-silver plant
gold-ball
gold-banded
gold-basket
gold-bearing
gold-beater
gold-beating
gold-bloom
gold-bound
gold-braided
gold-breasted
gold-brick
gold-bright
gold-broidered
gold-bug
gold-bullion standard
gold-ceiled
gold-chain
gold-clasped
gold-colored
gold-containing
gold-crested
gold-daubed
gold-decked
gold-dig
gold-digger
gold-dust

gold-dust tree
gold-edged
gold-embossed
gold-embroidered
gold-enwoven
gold-exchange
gold-exchange standard
gold-field
gold-fields
gold-filled
gold-finder
gold-fish
gold-foil
gold-framed
gold-fringed
gold-graved
gold-green
gold-haired
gold-headed
gold-hilted
gold-inlaid
gold-laced
gold-laden
gold-leaf
gold-lit
gold-mine
gold-mounted
gold-of-pleasure
gold-plate
gold-plated
gold-plating
gold-red
gold-ribbed
gold-rimmed
gold-robed
gold-rolling
gold-rush
gold-seeking
gold-star
gold-striped
gold-strung
gold-studded
gold-tail
moth
gold-testing
gold-washer
gold-weight
gold-winged

gold-work
gold-wrought
gold-yellow
goldbeater's skin
golden age
golden aster
golden bamboo
golden bantam corn
golden beryl
golden boy
golden buck
golden calf
golden calla lily
golden chain
golden clematis
golden coreopsis
golden crest
golden crown
golden crownbeard
golden currant
golden disc
golden dream
golden eagle
golden eardrop
golden era
golden exhalations of the dawn
golden feather
golden fizz
golden flax
golden fleece
golden glow
golden goose
golden gram
golden handshake
golden horde
golden jubilee
golden loosestrife
golden marguerite
golden mean
golden millet
golden
mole
golden nematode
golden number
golden oat
golden opportunity
golden oriole
golden pheasant

golden plover
golden polypody
golden potto
golden queen
golden ragwort
golden rain
golden retriever
golden rose
golden rule
golden sable
golden saying
golden season of life
golden section
golden shower
golden silence
golden slumbers
golden spider lily
golden star
golden stars
golden syrup
golden thistle
golden time
golden touch, the
golden trout
golden tuft
golden vision
golden warbler
golden wattle
golden wedding
golden wedding anniversary
golden years, the
golden yellow
golden-ager
golden-banded
golden-banded lily
golden-bearded
golden-breasted
golden-brown
golden-cheeked
golden-chestnut
golden-colored
golden-crested
golden-crowned
golden-crowned kinglet
golden-cup
golden-cup oak
golden-eared
golden-eye

golden-eyed
golden-eyed fly
golden-eyed grass
golden-feather yellow
golden-fettered
golden-fingered
golden-footed
golden-fruited
golden-gleaming
golden-glowing
golden-green
golden-haired
golden-headed
golden-hilted
golden-hued
golden-leaved
golden-locked
golden-mouthed
golden-rain
tree
golden-rayed
golden-rod
golden-spotted
golden-throned
golden-tipped
golden-toned
golden-tongued
golden-tressed
golden-voiced
golden-winged
golden-yellow
goldenrain tree
goldenrod tree
goldfish bowl
goldsmith beetle
golf bag
golf ball
golf cart
golf club
golf course
golf green
golf hose
golf links
golf red
golf shoe
golf widow
golgi apparatus
golgi body

goliath beetle
goliath crane
goliath frog
goliath heron
golo-shoe
gom-paauw
gombeen-man
gombeen-men
gombroon ware
gomoku-zogan
gomuti palm
gon-
gondang wax
gondola back
gondola car
gone arrow
gone away
gone bad
gone begging
gone by
gone feeling
gone for a burton
gone glimmering
gone goose
gone off
gone on
gone out
gone out of your head
gone out of your recollection
gone the way of all flesh
gone to a better land
gone to a better place
gone to a better world
gone to dust
gone to glory
gone to kingdom come
gone to pot
gone to rack
and ruin
gone to seed
gone to the bad
gone to the dogs
gone to waste
gone to wrack and ruin
gone west
gone-by
gong bell
gong buoy

gong drum
gong-gong
goni-
gono-
gonococcal arthritis
gonorrheal arthritis
gonorrheal rheumatism
goo-goo
goo-goo eyes
goober pea
good Christian
good English
good Joe
good Samaritan
good afternoon
good and
good and mad
good and ready
good and tired
good angel
good appearance
good arvo
good as gold
good at
good at the price
good auspices
good behavior
good book
good boy good girl
good boygood girl
good break
good breeding
good buy
good case
good chance
good character
good cheap
good cheer
good child
good citizen
good citizenship
good clothes
good company
good condition
good constitution
good cry
good day
good deal

good deed
good deportment
good digestion
good disposition
good effect
good egg
good enough
good estate of body
good even
good evening
good example
good faith
good features
good feeling
good fellow
good figure
good fist
good flavor
good folk, the
good
footing
good for
good for a laugh
good for you
good form
good fortune
good friday
good friend
good full
good genius
good graces
good gracious
good guy
good hair
good hand
good health
good hearing
good heavens
good hope
good humor
good humour
good idea
good influence
good judge
good judgment
good lack
good life
good life, the

good looker
good looks
good loser
good lot
good luck
good man
good management
good manners
good marrow
good measure
good memory
good mixer
good morning
good morrow
good name
good nature
good neighbor
good news
good night
good night's sleep
good now
good odor
good offices
good oil
good old days
good old summertime
good old times
good omen
good one
good opportunity
good palate
good pennyworth
good people
good person
good points
good possibility
good price
good prognosis
good proportions
good prospect
good quality or effect
good question
good reason
good reasoning
good report
good reputation
good repute
good riddance

good sense
good shape
good shot
good show
good side
of, the
good society
good soldier
good sooth
good sort
good speed
good spirits
good sport
good sportsmanship
good state of health
good stewardship
good story
good sum
good supply
good sword
good taste
good temper
good templar
good terms
good thing
good things of life
good time
good times
good to eat
good trim
good turn
good understanding
good usage
good use
good vibes
good vibrations
good ways
good weather
good will
good will to man
good will toward man
good wishes
good woman
good word
good works
good writing
good-by
good-bye

good-bye-summer
good-daughter
good-den
good-doer
good-faith
good-father
good-fellow
good-fellowhood
good-fellowish
good-fellowship
good-for
good-for-naught
good-for-nothing
good-for-nothingness
good-hearted
good-humored
good-humoredly
good-humoredness
good-humoured
good-humouredly
good-humouredness
good-liking
good-looker
good-looking
good-lookingness
good-luck charm
good-luck piece
good-mannered
good-morning-spring
good-mother
good-natured
good-natured banter
good-naturedly
good-naturedness
good-neighbor
good-neighbor
policy
good-neighbourhood
good-night
good-o
good-oh
good-plucked
good-sister
good-size
good-sized
good-tasting
good-tempered
good-temperedly

good-temperedness
good-time
goodness gracious
goodness of fit
goodness of heart
goods and chattels
goods dollar
goods engine
goods for sale
goods train
goods waggon
goods wagon
goods yard
goods, the
goody good-good
goody gumdrops
goody-good
goody-goodies
goody-goodiness
goody-goodness
goody-goody
goody-goodyism
goody-goodyness
goof around
goof off
goof up
goof-off
goof-off time
goof-up
goofing off
googly-eyed
goon squad
gooney bird
goose barnacle
goose bumps
goose call
goose chase
goose club
goose corn
goose egg
goose file
goose flesh
goose grass
goose gray
goose grease
goose gull
goose pen
goose pimples

goose plant
goose plum
goose quill
goose rump
goose skin
goose step
goose tansy
goose teal
goose tree
goose walk
goose-beak whale
goose-bill
goose-cackle
goose-egg
goose-flesh
goose-fleshy
goose-foot
goose-footed
goose-grass
goose-grease
goose-headed
goose-neck
goose-pimple
goose-pimply
goose-quill
goose-shaped
goose-skin
goose-step
goose-stepped
goose-stepper
goose-stepping
goose-wing
gooseberry
bush
gooseberry family
gooseberry fool
gooseberry fruitworm
gooseberry gourd
gooseberry mildew
gooseberry moth
gooseberry picker
gooseberry pie
gooseberry rust
gooseberry sawfly
gooseberry spanworm
gooseberry stone
gooseberry tomato
gooseberry tree

gooseberry wine
gooseberry-eyed
goosefoot family
goosefoot maple
gooseneck lamp
gooseneck slicker
goosewing jibe
gopher apple
gopher ball
gopher drift
gopher frog
gopher hole
gopher plant
gopher plum
gopher snake
gopher tortoise
gopher turtle
gopher wood
gopher-hole blast
gora log
gordian knot
gordon setter
gordura grass
gore strake
gore-fish
goreng pisang
gorge circle
gorge hook
gorge on
gorge wind
gorge yourself
gorgon plant
gorgon-headed
goring cloth
gorse duck
gorse hatcher
gos-lettuce
gosh-awful
gosh-darn
gosling color
gosling grass
gosling
green
gospel music
gospel oath
gospel side
gospel truth
gospel-true

gosport tube
gossamer fern
gossamer spider
gossip column
gossip columnist
gossip made tedious by morality
got to
gothic arch
gothic section
gouden reaal
gouge carving
gouge out
gouge shell
gourd cup
gourd family
gourd melon
gourd towel
gourd tree
gourd-shaped
gourdhead buffalo
gourdseed buffalo
gourmet quality
gout fly
gout ivy
gout of rain
gout tree
gouty arthritis
gouty stool
gouv-
governess-ship
governing board
governing body
government archives
government bar
government bond
government building
government control
government depository
government hospital
government insurance
government issue
government man
government mark
government note
government of the people
government paper
government papers
government securities

government stamp
government-general
government-in-exile
government-owned
governmental leadership
governor general
governor generals
governor's council
governor's mansion
governor-elect
governor-general
governor-generalship
governors
general
gowk storm
gown boy
gown-fashion
gr wt
gr-s
graafian follicle
grab at
grab bag
grab bar
grab barrel
grab box
grab bucket
grab dredge
grab hold of
grab line
grab link
grab machine
grab off
grab one
grab rope
grab skipper
grab the thoughts
grab-all
grabbot gin
grace cup
grace drink
grace hoop
grace note
grace of expression
grace period
grace with
grace-and-favor
grace-and-favour
grace-cup

graceful gesture
gracious life
gracious living
grade bar
grade by grade
grade cricket
grade crossing
grade insignia
grade line
grade peg
grade school
grade schooler
grade separation
grade stake
graded post
graded school
gradient microphone
gradient post
gradient wind
gradual change
graduate assistant
graduate education
graduate nurse
graduate school
graduate student
graduate-professional
graduate-professional education
graduated scale
graduated student
graduated tape
graduated taxation
graduating engine
graduation exercises
graeco-
graft hybrid
graft-hybridism
graft-hybridization
grafting
wax
graham bread
graham cracker
graham flour
graham wafer
grain alcohol
grain aphid
grain beetle
grain bill
grain bin

grain binder
grain borer
grain broker
grain carrier
grain cleaner
grain cradle
grain crusher
grain drill
grain elevator
grain farm
grain farmer
grain farming
grain founder
grain glove
grain gold
grain grower
grain growth
grain harvester
grain huller
grain lac
grain leather
grain louse
grain mark
grain mash
grain merchant
grain miller
grain moth
grain musk
grain of salt
grain of sand
grain oil
grain pan
grain refiner
grain rust
grain sack
grain sacker
grain sampler
grain screen
grain screener
grain shipper
grain side
grain smut
grain soap
grain sorghum
grain thresher
grain tin
grain traveler
grain weevil

grain weigher
grain-burnt
grain-carrying
grain-cleaning
grain-cut
grain-eater
grain-eating
grain-fed
grain-growing
grain-laden
grain-wagon hitch
grains d'orge
grains of paradise
gram atom
gram calorie
gram degree
gram equivalent
gram
equivalent weight
gram ion
gram molecule
gram's method
gram-atomic weight
gram-centimeter
gram-meter
gram-molar
gram-molecular
gram-molecular weight
gram-negative
gram-negative bacteria
gram-positive
gram-positive bacteria
gram-variable
grama grass
gramicidin D
graminaceous plant
gramineous plant
grammar college
grammar school
grammar-school
grammatical accent
grammatical analysis
grammatical error
grammatical form
grammatical gender
grammatical meaning
grammatical point
grammatical theory

grammatico-allegorical
gramophone record
gran cassa
gran torismo
grana cheese
granadilla tree
granary weevil
grand air
grand ballroom
grand chain
grand chop
grand climacteric
grand cordon
grand council fire
grand coup
grand dame
grand dragon
grand drapery
grand duchess
grand duchy
grand duke
grand feu
grand final
grand finale
grand fir
grand guignol
grand inquisitor
grand jete
grand juror
grand jury
grand juryman
grand lama
grand larceny
grand mal
grand march
grand master
grand monde
grand old man
grand
opera
grand passion
grand pian
grand piano
grand prior
grand quarter
grand seigneur
grand seignior
grand serjeanty

grand sicle
grand signior
grand slam
grand sonnerie
grand tactics
grand theft
grand total
grand tour
grand vicar
grand vizier
grand-
grand-aunt
grand-dad
grand-daughter
grand-ducal
grand-juror
grand-juryman
grand-nephew
grand-niece
grand-scale
grand-slammer
grand-uncle
grande dame
grande passion
grandes dames
grandes passions
grandfather chair
grandfather clause
grandfather clock
grandfather graybeard
grandfather longlegs
grandfather's chair
grandfather's clock
grandmother clock
grandmother's clock
grandstand play
grandstand player
granger laws
grani-
granite blue
granite gray
granite paper
granite porphyry
granite quarrier
granite-dispersing
granite-gneiss
granite-gruss
granite-sprinkled

granny flat
granny glasses
granny knot
granny's bend
granny's knot
granny-thread
grano-
grant a decree of nullity
grant a divorce
grant a final decree
grant a reprieve
grant amnesty
to
grant an annulment
grant bail to
grant citizenship
grant exemption
grant forgiveness
grant immunity
grant of probate
grant remission
grant-in-aid
grants-in-aid
granul-
granular snow
granular texture
granulated soap
granulated sugar
granulation tissue
granule cell
granule gravel
granulo-
granuloma inguinale
granuloma venereum
grape cane borer
grape cherry
grape curculio
grape cure
grape disease
grape family
grape fern
grape green
grape grower
grape growing
grape hoe
grape hopper
grape hyacinth
grape juice

grape leaf folder
grape leaf hopper
grape louse
grape mildew
grape moth
grape pear
grape phylloxera
grape picker
grape picking
grape ranch
grape rootworm
grape rot
grape rust
grape scale
grape seed
grape sugar
grape tomato
grape tree
grape weevil
grape wine
grape worm
grape-bearing
grape-berry moth
grape-eater
grape-hued
grape-leaved
grape-seed oil
grape-shaped
grape-shot
grape-sized
grape-stone
grape-vine
grapefruit juice
grapefruit league
grapefruit spoon
grapes of wrath
grapevine
fidia
grapevine flea beetle
grapevine leaf hopper
grapevine phylloxera
grapevine telegraph
grapevine thrips
graph paper
graphic accent
graphic account
graphic algebra
graphic art

graphic artist
graphic arts
graphic granite
graphic panel
graphic scale
graphic-texture
graphite steel
grapho-
grapier cement
grapnel plant
grappier cement
grapple bucket
grapple dredge
grapple fork
grapple ground
grapple iron
grapple plant
grapple shot
grapple with
grappling hook
grappling iron
grasp at a straw
grasp the meaning
grasping organ
grasping organs
grass bass
grass box
grass bur
grass carp
grass cattle
grass character
grass cloth
grass cold
grass comber
grass court
grass drake
grass earth
grass family
grass fern
grass finch
grass frog
grass green
grass guard
grass gum
grass hand
grass hockey
grass ill
grass lamb

grass land
grass lawn
grass lily
grass linen
grass mildew
grass moor
grass moth
grass owl
grass paper
grass parakeet
grass pea
grass pickerel
grass pink
grass plover
grass poly
grass pondweed
grass
porgy
grass rockfish
grass roots
grass rug
grass sandwort
grass savanna
grass shears
grass skirt
grass snake
grass snipe
grass sorghum
grass spider
grass sponge
grass staggers
grass steppe
grass style
grass swine
grass table
grass tetany
grass tree
grass veld
grass vetch
grass warbler
grass webworm
grass widow
grass widower
grass wrack
grass-blade
grass-carpeted
grass-clad
grass-cloth

grass-cloth plant
grass-covered
grass-cushioned
grass-cutting
grass-eater
grass-eating
grass-embroidered
grass-fed
grass-green
grass-growing
grass-grown
grass-hook
grass-killing
grass-leaved
grass-mowing
grass-of-Parnassus
grass-plat
grass-roofed
grass-roots
grass-roots campaign
grass-roots movement
grass-tree
grass-tree gum
grass-woven
grass-wren
grasshopper engine
grasshopper escapement
grasshopper gauge
grasshopper lark
grasshopper lobster
grasshopper mouse
grasshopper sparrow
grasshopper warbler
grassland buttercup
grassland daisy
grassy-green
grassy-leaved
grate coal
grate on
grate room
grate
 surface
grate upon the ear
grated cheese
grateful dead
gratia dei
gratify yourself
gratuitous contract

gravamen of a charge
grave accent
grave as an undertaker
grave clothes
grave harmonic
grave injustice
grave marker
grave mixture
grave plant
grave robber
grave robbing
grave sin
grave wax
grave-born
grave-bound
grave-browed
grave-clothes
grave-colored
grave-digger
grave-digging
grave-faced
grave-looking
grave-riven
grave-robbing
grave-toned
grave-visaged
grave-wax
gravel chickweed
gravel plant
gravel road
gravel shooter
gravel train
gravel-bind
gravel-blind
gravel-blindness
gravel-grass
gravel-pit
gravel-stone
gravel-walk
graven image
graves' disease
graves's disease
graveside oration
gravestone cutter
graveyard shift
graveyard vote
graveyard watch
graveyard weed

gravi-
gravimetric analysis
graving dock
graving piece
graving tool
gravitate toward
gravitation battery
gravitation constant
gravitational astronomy
gravitational collapse
gravitational constant
gravitational field
gravitational
 interaction
gravitational mass
gravitational wave
gravity battery
gravity cell
gravity clock
gravity conveyer
gravity dam
gravity escapement
gravity fault
gravity feed
gravity hinge
gravity knife
gravity meter
gravity pendulum
gravity plane
gravity railroad
gravity stamp
gravity star
gravity ventilation
gravity wave
gravity wind
gravity-circulation
gravity-fed
gravity-operated railway
gravo-
gravure microscope
gravure press
gravy boat
gravy eye
gravy soup
gravy train
gray birch
gray body
gray colors and pigments

gray dogwood
gray duck
gray eminence
gray fox
gray goldenrod
gray goods
gray gum
gray hair
gray hairs
gray hen
gray iron
gray manganese ore
gray market
gray marketeer
gray matter
gray mold
gray mullet
gray of the evening
gray orchis
gray out
gray ox
gray parrot
gray pine
gray scale
gray sea eagle
gray skate
gray snapper
gray sour
gray squirrel
gray trout
gray whale
gray with age
gray with fear
gray wolf
gray-barked
gray-bearded
gray-bellied
gray-black
gray-blue
gray-bordered
gray-boughed
gray-breasted
gray-brindled
gray-brown
gray-cheeked
gray-cheeked
thrush
gray-clad

gray-colored
gray-crowned
gray-drab
gray-eyed
gray-faced
gray-gowned
gray-green
gray-grown
gray-haired
gray-haired person
gray-headed
gray-headed person
gray-headed woodpecker
gray-hooded
gray-hued
gray-leaf
gray-leaf pine
gray-leaved
gray-lit
gray-mantled
gray-moldering
gray-mustached
gray-necked
gray-speckled
gray-spotted
gray-tailed
gray-tailed cardinal
gray-tinted
gray-toned
gray-twigged
gray-veined
gray-white
gray-winged
grayback beetle
grayback herring
graybeard tree
graying temples
grayish-brown
graylag goose
graze by
graze the surface
grazing country
grazing region
grease bucket
grease cup
grease extractor
grease gun
grease job

grease joint
grease mold
grease monkey
grease moth
grease nipple
grease paint
grease pit
grease rack
grease ring
grease the hand
grease the palm
grease the ways
grease the wheels
grease trap
grease wool
grease your palm
grease-heel
grease-heels
grease-nut
greased
lightning
greasing of the wheels
greasy grind
greasy spoon
greasy-headed
great Neptune's ocean
great abundance
great ado
great age
great anteater
great ape
great auk
great barracuda
great basinet
great bear
great beauty
great big
great black-backed gull
great blue heron
great blue shark
great bunch grass
great bustard
great calorie
great cause
great circle
great compass
great cost
great council

great crested grebe
great dane
great deal
great distance
great divide
great doings
great doxology
great effort
great expectations
great foot
great friend
great fun
great go
great grandfather
great gray owl
great gross
great gun
great guns
great heart
great helm
great honor
great horned owl
great hundred
great lady
great laurel
great lobelia
great man
great mullein
great nettle
great northern diver
great octave
great of heart
great of soul
great one for
great organ
great pace
great pastern bone
great plenty
great point
great power
great pox
great price
great primer
great pyrenees
great
ragweed
great reach
great reed

great respect
great rhododendron
great rosebay
great russian
great sallow
great satisfaction
great scale
great scope
great sea
great seal
great skua
great soil group
great soul
great success
great talker
great tit
great toe
great tuna
great unwashed, the
great value
great wheel
great white heron
great white shark
great white trillium
great wind
great with child
great with young
great work
great wrong
great year
great, the
great-
great-armed
great-aunt
great-bellied
great-boned
great-children
great-circle
great-circle chart
great-circle course
great-circle sailing
great-circle track
great-coat
great-crested
great-eared
great-eyed
great-footed
great-footed hawk

great-grand daughter
great-grandaunt
great-grandchild
great-grandchildren
great-granddaughter
great-grandfather
great-grandmother
great-grandnephew
great-grandniece
great-grandparent
great-grandson
great-granduncle
great-great-
great-grown
great-head
great-headed
great-hearted
great-hipped
great-leaved
great-lipped
great-minded
great-mindedly
great-mindedness
great-nephew
great-niece
great-nosed
great-sized
great-souled
great-sounding
great-spirited
great-stemmed
great-tailed
great-tailed
grackle
great-uncle
great-witted
greater Bairam
greater Ionic
greater and greater
greater celandine
greater city
greater doxology
greater litany
greater multangular bone
greater omentum
greater prairie chicken
greater shearwater
greater weever

greater yellowlegs
greatest common divisor
greatest lower bound
greatest-integer function
greatly daring
greatness of heart
greatness of soul
grebe cloth
greco-
greedy as a hog
greedy eater
greedy guts
greedy-gut
greek catholic
greek cross
greek fire
greek orthodox
green Chartreuse
green June beetle
green alga
green algae
green apple
green as grass
green bag
green ball
green bass
green bean
green belt
green blindness
green book
green card
green cheese
green cloth
green color
green copperas
green corn
green crab
green dragon
green earth
green fee
green fingers
green
flash
green foxtail
green frog
green gland
green glass
green gold

green goods
green goose
green gram
green grass
green head
green heron
green in the eye
green lead ore
green leekgreen light
green light
green man
green manure
green mint
green mold
green monkey
green mould
green mountain boy
green ocher
green oil
green old age
green onion
green osier
green paper
green pea
green pepper
green pigeon grass
green plover
green pound
green revolution
green rot
green salad
green salt
green sauce
green sea
green segment
green sickness
green snake
green soap
green strength
green stuff
green tea
green thumb
green turtle
green valley-grass
green vegetable
green vegetables
green verditer
green vitriol

green wattle
green way
green with envy
green with jealousy
green woodpecker
green-back herring
green-back trout
green-backed
green-backed goldfinch
green-bag
green-banded
green-barked
green-barked acacia
green-belt
green-black
green-blind
green-blue
green-bodied
green-boled
green-bordered
green-bottle
fly
green-boughed
green-breasted
green-breasted pheasant
green-clad
green-crested
green-cross gas
green-cross shell
green-curtained
green-decked
green-ear disease
green-edged
green-embroidered
green-eyed
green-eyed jealousy
green-eyed monster
green-faced
green-feathered
green-fish
green-flowered
green-fly
green-fringed
green-garbed
green-gilled
green-glazed
green-gold
green-gray

green-grown
green-haired
green-headed
green-headed widgeon
green-house
green-hued
green-leaved
green-legged
green-mantled
green-peak
green-recessed
green-ribbed
green-room
green-rotted
green-salted
green-sand
green-seeded
green-shaving
green-sheathed
green-shining
green-skinned
green-sleeves
green-stained
green-stone
green-striped
green-suited
green-tail
green-tail fly
green-tailed
green-throated
green-tinted
green-tip spray
green-tipped
green-twined
green-veined
green-winged
green-winged teal
green-yard
green-yellow
greenbottle fly
greenhouse effect
greenhouse stone cricket
greenhouse thrips
greening
weed
greenish-blue
greenish-flowered
greenish-yellow

greens fee
greensand process
greenstick fracture
greenwich time
greet the day
greet with a kiss
greet with skepticism
greeting card
gregorian calendar
gregorian chant
gregory-powder
grenade launcher
grenadine pink
grenadine red
grenz ray
gresham's law
gretna green
grey area
grey eminence
grey fox
grey friar
grey goose
grey heron
grey lag
grey market
grey matter
grey mullet
grey plover
grey squirrel
grey whale
grey wolf
grey-back
grey-cheeked
grey-coat
grey-eyed morn
grey-headed
grey-hen
grey-state
greyhound racing
greylag goose
grid battery
grid bias
grid capacitor
grid circuit
grid condenser
grid conductance
grid current
grid declination

grid emission
grid leak
grid line
grid metal
grid modulation
grid road
grid variation
grid voltage
grid-bias battery
grid-dip meter
grid-dip oscillator
grid-glow tube
grid-seal tube
griddle cake
griddle valve
gridiron drainage
gridiron pendulum
gridiron valve
gridiron-tailed lizard
grief dulled
grief
 oppressed
grief-bowed
grief-distraught
grief-exhausted
grief-inspired
grief-scored
grief-shot
grief-stricken
grief-worn
grievance committee
grieve for
grieve over
grieve with
grievous bodily harm
griffin-beaked
griffin-guarded
griffin-winged
griffon vulture
griffon-vulture
grigri man
grilled cheese sandwich
grim reality
grim reaper
grim-cheeked
grim-eyed
grim-faced
grim-featured

grim-frowning
grim-grinning
grim-looking
grim-set
grim-visaged
grimace at
grimm's law
grimy-handed
grin and abide
grin and bear it
grin at
grin like a Cheshire cat
grin like a chessy-cat
grind down
grind on
grind organ
grind to dust
grind to powder
grind whale
grind your teeth
grindery warehouse
grinding halt
grinding mill
grinding organ
grinding pain
grinding poverty
grinding stone
grinding wheel
grindle stone
grinning skull
grip block
grip car
grip of steel
grip sheave
grip tape
grip wheel
gripe piece
gripe water
gripe's egg
gripping instrument
gripping instruments
gripple-handed
gris-amber
gris-de-lin
gris-gris
grist
 to the mill
grist to your mill

grit cell
grit your teeth
grizzly bear
grizzly-bear cactus
groaning board
groaning cake
groaning chair
groans of roaring wind and rain
grocery store
grog blossom
grog lifter
groin point
groin rib
groin vault
grommet nut
groo-groo
groom's cake
groom-porter
groove board
groove on
groove-billed
grooving plane
grooving saw
grope for
grope in the dark
gros de Londres
gros de Tours
gros de naples
gros grain
gros point
gros points
gros tournois
gross amount
gross behavior
gross body
gross credulity
gross domestic product
gross falsehood
gross ignorance
gross income
gross injustice
gross interest
gross lift
gross national product
gross out
gross profit
gross receipts
gross register ton

gross register tonnage
gross ton
gross tonnage
gross up
gross weight
gross-beak
gross-bodied
gross-brained
gross-featured
gross-fed
gross-headed
gross-jawed
gross-lived
gross-mannered
gross-minded
gross-money
gross-money pool
gross-natured
gross-pated
gross-witted
grossly
overpriced
grotto blue
ground alert
ground almond
ground angling
ground annual
ground annualer
ground ash
ground bait
ground ball
ground bass
ground beam
ground beef
ground beetle
ground birch
ground box
ground bridge
ground bundle
ground burnut
ground cable
ground cedar
ground centaury
ground chain
ground cherry
ground chestnut
ground chuck
ground circuit

ground cistus
ground clamp
ground cloth
ground clutter
ground coat
ground cock
ground color
ground combat
ground connection
ground control
ground control of aircraft
ground cover
ground crew
ground cricket
ground cuckoo
ground current
ground cypress
ground detector
ground dove
ground down
ground effect machine
ground elder
ground elevation
ground fern
ground finch
ground fir
ground fire
ground flax
ground flea
ground floor
ground fog
ground forces
ground form
ground game
ground gas
ground glass
ground gold-flower
ground goldenrod
ground goldflower
ground grue
ground hard and fast
ground hemlock
ground hog
ground holly
ground honeysuckle
ground
ice
ground itch

ground ivory flower
ground ivy
ground jasmine
ground joist
ground juniper
ground lag
ground landlord
ground lark
ground laurel
ground layer
ground lead
ground lease
ground lemon
ground level
ground lily
ground line
ground liverwort
ground lizard
ground log
ground loop
ground mahogany
ground mail
ground mallow
ground maple
ground meristem
ground mine
ground mold
ground moss
ground net
ground noise
ground note
ground oak
ground observer
ground on
ground out
ground owl
ground parakeet
ground parrot
ground pea
ground pearl
ground pig
ground pigeon
ground pike
ground pine
ground pink
ground pistachio
ground plan
ground plane

ground plate
ground plum
ground provisions
ground puppy
ground radar
ground raspberry
ground rat
ground rattan
ground rattler
ground rent
ground rent insurance
ground robin
ground roller
ground rope
ground round
ground row
ground rule
ground rules
ground saligot
ground school
ground sea
ground seal
ground shark
ground shield
ground skidder
ground
sloth
ground sluice
ground snake
ground sparrow
ground speed
ground squirrel
ground staff
ground starling
ground state
ground strake
ground stroke
ground substance
ground sweet
ground swell
ground table
ground tackle
ground test
ground tester
ground thistle
ground thrush
ground tier
ground timbers

ground tissue
ground tit
ground tone
ground tow
ground track
ground troops
ground vine
ground warbler
ground water
ground wave
ground ways
ground willow
ground wire
ground worm
ground wren
ground yew
ground your arms
ground zero
ground-ash
ground-attack fighter
ground-bait
ground-bird
ground-cherry
ground-control approach
ground-controlled approach
ground-down
ground-effect machine
ground-fast
ground-floor
ground-hog
ground-hog day
ground-ice
ground-ivy
ground-line
ground-man
ground-nut
ground-pea
ground-pine
ground-plan
ground-plate
ground-plot
ground-rent
ground-sea
ground-sheet
ground-sluicer
ground-squirrel
ground-squirrel pea
ground-support aircraft

ground-swell
ground-tackle
ground-to-air
ground-to-ground
ground-water
level
grounded on
groundhog day
grounding connection
groundless rumor
groundnut oil
grounds for belief
grounds for war
grounds keeper
groundsel bush
groundsel tree
group agglutination
group analysis
group annuity
group ascendancy
group breaker
group captain
group drive
group dynamics
group flashing light
group insurance
group life insurance
group marriage
group medicine
group method
group mind
group mixture
group occulting light
group of advisers
group payment
group policy
group practice
group pressure
group psychology
group psychotherapy
group rate
group relations training
group representation
group sensitivity training
group shot
group test
group theory
group therapy

group velocity
group will
group with operators
group work
group-connect
group-conscious
grouper pea
groups of languages
grouse disease
grouse locust
grout box
grout-head
groutlock brick
grove mast
grove palm
grove spar
grove tree
grow better
grow bright
grow cold
grow dark
grow dim
grow
 fat
grow from
grow hair
grow into
grow larger
grow light
grow like a weed
grow lush
grow old
grow on
grow on one
grow out of
grow over
grow pale
grow rank
grow red
grow rich
grow thick
grow to
grow together
grow up
grow weaker
grow weary
grow worse
growing degree-day

growing like a mushroom
growing lush
growing old
growing pains
growing point
growing rank
growing season
growing up
growl at
grown man
grown old
grown up
grown woman
grown-up
grown-upness
growth factor
growth force
growth form
growth fund
growth hormone
growth regulator
growth ring
growth shares
growth stock
grozing iron
grozing-iron
gru-gru
grub ax
grub beam
grub hoe
grub hook
grub out
grub plank
grub saw
grub screw
grub street
grub up
grub's on
grub-
grub-prairie
grub-street
grudging consent
grudging thanks
grugru beetle
grugru grub
grugru nut
grugru palm
grugru worm

grundy-swallow
grunt and sweat
grunting ox
gry-
guadalupe plum
guaiac reaction
guaiac test
guaiacol benzoate
guaiacol carbonate
guaiacum wood
guanay cormorant
guar
 gum
guarantee association
guarantee company
guarantee engineer
guaranteed annual income
guaranteed annual wage
guaranteed bond
guaranteed day
guaranteed day rate
guaranteed income
guaranteed income plan
guaranteed stock
guaranteed wage
guard against
guard band
guard boat
guard book
guard brush
guard cartridge
guard cell
guard chamber
guard dog
guard duty
guard flag
guard hair
guard line
guard lock
guard mount
guard mounting
guard of honor
guard pin
guard plate
guard report
guard ring
guard room
guard ship

guard wire
guard your honor
guard's van
guard-boat
guard-fish
guard-house
guard-rail
guard-room
guard-ship
guarda-costa
guarded secret
guardhouse lawyer
guardian ad litem
guardian angel
guardian spirit
guardroom table
guava apple
guayabera shirt
guayule rubber
gucki grand
gucki nullo
gudgeon pin
guelder rose
guelder-rose
guerre a mort
guerre a outrance
guerre de plume
guerrilla tactics
guerrilla theater
guerrilla warfare
guess right
guess-rope
guess-warp
guess-work
guest
 flag
guest house
guest of honor
guest pass
guest right
guest room
guest rope
guest ticket
guest-chamber
guest-rope
guest-warp
guet-apens
guide block

guide card
guide center
guide dog
guide flag
guide fossil
guide left
guide meridian
guide mill
guide one's ear
guide pennant
guide pulley
guide rail
guide right
guide rope
guide word
guide yourself
guide-book
guide-post
guided control
guided missile
guided missile cruiser
guided wave
guider-in
guiding light
guiding principle
guiding principles
guiding star
guiding telescope
guild merchant
guild socialism
guild socialist
guild tree
guild-brother
guild-hall
guild-socialistic
guillotine amputation
guillotine shears
guilt offering
guilt-feelings
guilty act
guilty conscience
guilty verdict
guilty-cup
guinea cock
guinea flower
guinea fowl
guinea gold
guinea goose

guinea grains
guinea grass
guinea hen
guinea pepper
guinea pig
guinea rush
guinea sorrel
guinea trade
guinea worm
guinea-cock
guinea-fowl
guinea-hen
guinea-hen flower
guinea-hen weed
guinea-man
guinea-pea
guinea-pig
guipure
 lace
guise dancer
guit-guit
guitar fiddle
guitar mandolin
guitar plant
guitar wood
guitar-picker
guitar-shaped
gulf rupee
gulf stream
gulf-weed
gull chaser
gull grass
gull gray
gull teaser
gull wing
gull-billed
gull-like
gull-wing
gullet plate
gullet worm
gulleting file
gullible person
gully erosion
gully knife
gully root
gully washer
gully-raker
gulp down

gulper eel
gum acacia
gum acaroides
gum accroides
gum acid
gum acroides
gum aloes
gum ammoniac
gum angico
gum anime
gum animi
gum arabic
gum archipin
gum benjamin
gum benzoin
gum boot
gum bush
gum butea
gum camphor
gum cistus
gum copal
gum dammar
gum disease
gum dragon
gum duct
gum elastic
gum elemi
gum euphorbium
gum flux
gum foam
gum galbanum
gum gattie
gum guaiac
gum guaiacam
gum guaiacum
gum guttae
gum hashab
gum juniper
gum kauri
gum kino
gum labdanum
gum mastic
gum mogador
gum myrrh
gum nut
gum olibanum
gum opoponax
gum plant

gum pocket
gum rash
gum resin
gum resins
gum rosin
gum sagapenum
gum
 sandarac
gum savakin
gum shellac
gum shiraz
gum silk
gum soap
gum spirit
gum spirits
gum spot
gum stick
gum storax
gum succory
gum sugar
gum thus
gum tragacanth
gum tree
gum turpentine
gum up
gum up the works
gum water
gum-bichromate
gum-dichromate
gum-gum
gum-lac
gum-lac insect
gum-myrtle
gum-resinous
gum-saline
gum-shrub
gum-top
gum-top tree
gum-tree
gumbo grass
gumbo lily
gumbo limbo
gumbo soil
gumbo-limbo
gumbo-limbos
gumby bird
gummed up
gumming disease

gumming spade
gummy-legged
gumshoe man
gun assembler
gun barrel
gun bearer
gun boat
gun bore
gun breech
gun brig
gun captain
gun carriage
gun chamber
gun crew
gun deck
gun director
gun dog
gun down
gun emplacement
gun fight
gun fighter
gun fighting
gun firing
gun for
gun forger
gun forging
gun glaze
gun iron
gun lathe
gun loader
gun locksmith
gun makes
gun metal
gun moll
gun money
gun mount
gun park
gun parts
gun pendulum
gun pit
gun platform
gun power
gun room
gun sight
gun slide
gun tackle
gun-barrel lathe
gun-boat

gun-carrying
gun-cleaning
gun-cotten
gun-deck
gun-directing
radar
gun-equipped
gun-man
gun-metal
gun-metal gray
gun-mounted
gun-rivet
gun-room
gun-shot
gun-shy
gun-shyness
gun-stock
gun-testing
gun-toting
gunboat diplomacy
gunboat system
gunebo lily
gung ho
gung-ho
gunk hole
gunnery mission
gunnery oficer
gunnery sergeant
gunny bag
gunny cloth
gunny sack
gunny-bag
gunong api
gunpowder hammer
gunpowder tea
guns and launchers
gunstock stile
gunter iron
gunter lug
gunter rig
gunter's chain
gurgeon stopper
gurgina balsam
guri bori
gurjun balsam
guru nut
gush out
gush over

gushing rain
gusset plate
gusset stay
gussied up
gussy up
gustatory cell
gustatory delightfulness
gut course
gut reaction
gut response
gut spinner
gut with fire
gut-ache
gute Nacht
guten Abend
guten Morgen
guten Tag
gutless wonder
gutta balata
gutta dujan
gutta gamba
gutta gerip
gutta hangkang
gutta jangkar
gutta jelutong
gutta ketapang
gutta percha
gutta puan
gutta rosacea
gutta rosea
gutta sangei
gutta semarum
gutta serena
gutta
siak
gutta singarip
gutta soh
gutta sundek
gutta sundik
gutta susu
gutta taban puteh
gutta-gum
gutta-gum tree
gutta-percha
guttae band
gutter press
gutter stick
gutter tree

gutter-blood
gutter-bred
gutter-grubbing
gutter-snipe
guttering trowel
gutturo-
guy cap
guy fawkes day
guy rope
gy-
gyle-fat
gym pants
gym shoe
gym shoes
gym suit
gymm-
gymnastic exercises
gymno-
gyn-
gynaeco-
gynandro-
gynec-
gyneco-
gyno-
gynocardia oil
gyp artist
gyp joint
gyp-room
gypsum burner
gypsum pink
gypsum plaster
gypsy capstan
gypsy moth
gypsy scale
gypsy setting
gypsy winch
gypsy-like
gyr-
gyre carline
gyre carling
gyre upward
gyring up
gyro horizon
gyro mechanism
gyro pelorus
gyro repeater
gyro-
gyromagnetic ratio

gyroscopic compass
gyroscopic pilot
gyroscopic stabilizer
gyrostatic compass
h and c
h-bar
h-bomb
ha ha
ha-Nasi
ha-ha
hab-nab
habeas corpora
habeas corpus
habeas corpus ad prosequendum
habeas corpus ad subjiciendum
habeas corpus ad testificandum
habeas corpus cum causa
habere facias possessionem
habere
 facias seisinam
habit pattern
habit shirt
habit spasm
habit-forming
habitat form
habitat group
habitual criminal
habitual drunkenness
habitual liar
habitual offender
habitual smoking
hack board
hack file
hack hammer
hack house
hack it
hack out a deal
hack saw
hack watch
hack writer
hack-
hack-me-tack
hack-work
hacking coat
hacking jacket
hacking knife
hacking out a deal
hackle fly

hackney carriage
hackney chair
hackney coach
hackney pony
hackney-carriage
hackney-chair
hackney-coach
hackney-man
hackneyed expression
hackneyed saying
hacksaw fern
had best
had better
had it
had rather
haem-
haema-
haemat-
haemato-
haemato-crystallin
haemato-globulin
haemo-
haemorrhagic measles
hag clog
hag moth
hag-boat
hag-ridden
hag-taper
hagi-
hagio-
haikwan tael
hail and speak
hail fellow
hail from
hail insurance
hail mary
hail-fellow
hail-fellow well met
hail-fellow-well-met
hail-shot
hailing distance
hair ball
hair bleacher
hair braid
hair bramble
hair brown
hair cap moss
hair carder

hair
cell
hair clipper
hair color
hair compass
hair crimper
hair curler
hair drawer
hair dye
hair dyeing
hair dyer
hair eel
hair fern
hair follicle
hair glove
hair grass
hair grip
hair hygrometer
hair kiln
hair lacquer
hair mattress
hair moss
hair moth
hair net
hair of the dog
hair of the dog that bit one
hair of the dog that bit you
hair oil
hair orchid
hair palm
hair pencil
hair powder
hair pyrites
hair remover
hair restorer
hair ribbon
hair salt
hair seal
hair sheep
hair shirt
hair sieve
hair slide
hair snake
hair sofa
hair sorter
hair space
hair straightener
hair stroke

hair stylist
hair tonic
hair trigger
hair trunk
hair wash
hair washer
hair waver
hair's-breadth
hair-branch tree
hair-check
hair-checking
hair-drawn
hair-drier
hair-fibered
hair-grass
hair-lace
hair-line
hair-lip
hair-powder
hair-raiser
hair-raising
hair-shirt
hair-sieve
hair-splitter
hair-splitting
hair-stemmed
hair-streak
hair-stroke
hair-trigger
hair-waving
hair-worm
hairbreadth escape
hairbrush cactus
haircap moss
hairpin
bend
hairpin megaron
hairpin turn
hairs-breadth
hairy frog
hairy heart
hairy vetch
hairy wattle
hairy willowherb
hairy woodpecker
hairy-armed
hairy-chested
hairy-clad

hairy-dog story
hairy-eared
hairy-faced
hairy-foot
hairy-footed
hairy-fruited
hairy-handed
hairy-headed
hairy-legged
hairy-looking
hairy-skinned
hairy-tailed mole
hairytail mole
hal-
halade mystai
halberd fern
halberd-headed
halberd-leaved
halberd-shaped
halcyon bird
halcyon days
hale and hearty
hale bind
hale into court
hale old age
hale water
hale-nut
half G
half Wellington
half a C
half a chance
half a dozen
half a gale
half a hundred
half a jiffy
half a mo
half a second
half a shake
half after
half an eye
half an idea
half anatropous
half angel
half armor
half asleep
half aunt
half ball
half believe

half binding
half bird
half bishop
half block
half blood
half board
half boot
half boots
half brau
half broad
half brother
half bull
half butt
half cadence
half cent
half chronometer
half circle
half close
half cloth
half
cock
half column
half cone
half court
half cousin
half cross stitch
half crown
half curlew
half cushion
half davit
half deck
half dime
half diphthong
half dollar
half eagle
half facet
half frame
half gainer
half galley
half gerund
half grand
half header
half hitch
half holiday
half hose
half hour
half hunter
half island

half joe
half landing
half large
half leather
half life
half line
half mask
half measure
half measures
half mile
half model
half mourning
half nelson
half nephew
half niece
half noble
half note
half nut
half past
half pay
half pint
half plane
half points
half port
half principal
half rations
half ray
half relief
half rest
half rhyme
half ring
half ripsaw
half royal
half rupee
half scholar
half seal
half seas over
half sheave
half shell
half shirt
half shoe
half sir
half sister
half size
half small
half snipe
half sol
half sole

half sovereign
half space
half speed
half step
half stitch
half stock
half story
half stuff
half term
half tide
half timber
half time
half
 tint
half title
half tone
half trap
half twist
half uncial
half uncle
half volley
half vowel
half year
half-
half-American
half-Americanized
half-Anglicized
half-Aristotelian
half-Asian
half-Asiatic
half-Beaufort scale
half-Christian
half-Confederate
half-Creole
half-Dacron
half-Elizabethan
half-English
half-French
half-German
half-Greek
half-Hessian
half-Irish
half-Italian
half-Latinized
half-Mexican
half-Mohammedan
half-Moslem
half-Muhammadan

half-Muslim
half-Russian
half-Scottish
half-Semitic
half-Shakespearean
half-Spanish
half-a-crown
half-a-dollar
half-abandoned
half-accustomed
half-acquainted
half-acquiescent
half-acquiescently
half-acre
half-addressed
half-admiring
half-admiringly
half-admitted
half-admittedly
half-adream
half-affianced
half-afloat
half-afraid
half-agreed
half-alike
half-alive
half-altered
half-and-half
half-and-half measures
half-angrily
half-angry
half-annoyed
half-annoying
half-annoyingly
half-ape
half-armed
half-armor
half-ashamed
half-ashamedly
half-asleep
half-assed
half-awake
half-backed
half-baked
half-bald
half-ball
half-banked
half-baptize

half-barbarian
half-bare
half-barrel
half-beak
half-beam
half-begging
half-begun
half-belief
half-believed
half-believing
half-bent
half-binding
half-bleached
half-blind
half-blind
joint
half-blindly
half-blood
half-blooded
half-blown
half-blue
half-board
half-boiled
half-boiling
half-boot
half-bound
half-bowl
half-breadth plan
half-bred
half-breed
half-brilliant cut
half-broken
half-brother
half-buried
half-burned
half-burning
half-bushel
half-butt
half-calf
half-cap
half-carried
half-caste
half-cell
half-cent
half-centuries
half-century
half-chanted
half-cheek

half-civil
half-civilized
half-civilly
half-clad
half-cleaned
half-clear
half-clearly
half-climbing
half-closed
half-closing
half-clothed
half-coaxing
half-coaxingly
half-cock
half-cocked
half-colored
half-completed
half-concealed
half-concealing
half-confessed
half-congealed
half-conquered
half-conscious
half-consciously
half-conservative
half-conservatively
half-consonant
half-consumed
half-consummated
half-contemptuous
half-contemptuously
half-contented
half-contentedly
half-convicted
half-convinced
half-convincing
half-convincingly
half-cooked
half-cordate
half-corrected
half-cotton
half-counted
half-courtline
half-cousin
half-covered
half-cracked
half-crazed
half-crazy

half-critical
half-critically
half-crown
half-crumbled
half-crumbling
half-cured
half-cut
half-dark
half-day
half-dazed
half-dead
half-dead
escapement
half-deaf
half-deafened
half-deafening
half-decade
half-deck
half-decked
half-decker
half-defiant
half-defiantly
half-deified
half-demented
half-democratic
half-demolished
half-denuded
half-deprecating
half-deprecatingly
half-deserved
half-deservedly
half-destroyed
half-developed
half-digested
half-dime
half-discriminated
half-discriminating
half-disposed
half-divine
half-divinely
half-dollar
half-done
half-door
half-dozen
half-dram
half-dressed
half-dressedness
half-dried

half-drowned
half-drowning
half-drunk
half-drunken
half-dug
half-dying
half-eagle
half-earnest
half-earnestly
half-eaten
half-ebb
half-educated
half-embraced
half-embracinghalf-embracingly
half-enamored
half-enforced
half-erased
half-evaporated
half-evaporating
half-evergreen
half-expectant
half-expectantly
half-exploited
half-exposed
half-face
half-face
view
half-faced
half-false
half-famished
half-farthing
half-fascinated
half-fascinating
half-fascinatingly
half-fed
half-feminine
half-fertile
half-fertilely
half-fictitious
half-fictitiously
half-filled
half-finished
half-firkin
half-fish
half-flattered
half-flattering
half-flatteringly
half-flood

half-florin
half-folded
half-foot
half-forgiven
half-forgotten
half-formed
half-forward
half-frowning
half-frowningly
half-frozen
half-fulfilled
half-fulfilling
half-full
half-furnished
half-gallon
half-gill
half-god
half-great
half-grown
half-guinea
half-hard
half-hardy
half-harvested
half-headed
half-healed
half-heard
half-hearted
half-heathen
half-hidden
half-hitch
half-holiday
half-hollow
half-horse
half-hour
half-hour
glass
half-hourly
half-human
half-hungered
half-hunter
half-hypnotized
half-imperial
half-important
half-importantly
half-inch
half-inclined
half-indignant
half-indignantly

half-inferior
half-informed
half-informing
half-informingly
half-ingenious
half-ingeniously
half-ingenuous
half-ingenuously
half-inherited
half-insinuated
half-insinuating
half-insinuatingly
half-instinctive
half-instinctively
half-intellectual
half-intellectually
half-intelligible
half-intelligibly
half-intoned
half-intoxicated
half-invalid
half-invalidly
half-iron
half-island
half-jack
half-jelled
half-joking
half-jokingly
half-justified
half-knot
half-know
half-languaged
half-languishing
half-lap joint
half-lapped
half-lattice girder
half-latticed
half-learned
half-learnedly
half-learning
half-leather
half-left
half-length
half-liberal
half-liberally
half-life
half-life period
half-light

half-lined
half-linen
half-liter
half-lived
half-lives
half-long
half-looper
half-lop
half-lunatic
half-lunged
half-mad
half-made
half-madly
half-madness
half-marked
half-marrow
half-mast
half-masticated
half-matured
half-meant
half-measure
half-melted
half-mental
half-mentally
half-merited
half-miler
half-minded
half-minute
half-minute
glass
half-miseducated
half-misunderstood
half-mitten
half-monitor
half-monthly
half-moon
half-moral
half-mourning
half-mumbled
half-mummified
half-naked
half-nelson
half-nephew
half-niece
half-noble
half-normal
half-normally
half-note

half-numb
half-nylon
half-obliterated
half-offended
half-on
half-one
half-open
half-opened
half-oriental
half-orphan
half-oval
half-oxidized
half-pace
half-pay
half-peck
half-petrified
half-pike
half-pint
half-pipe
half-pitch
half-plane
half-plate
half-playful
half-playfully
half-pleased
half-pleasing
half-plucked
half-port
half-pound
half-pounder
half-praised
half-praising
half-present
half-price
half-profane
half-professed
half-profile
half-proletarian
half-protested
half-protesting
half-proved
half-proven
half-provocative
half-quarter
half-quartern
half-quarterpace
half-questioning
half-questioningly

half-quire
half-quixotic
half-quixotically
half-radical
half-radically
half-rater
half-raw
half-rayon
half-reactionary
half-read
half-reasonable
half-reasonably
half-reasoning
half-rebellious
half-rebelliously
half-reclaimed
half-reclined
half-reclining
half-refined
half-regained
half-reluctant
half-reluctantly
half-remonstrant
half-repentant
half-republican
half-retinal
half-revealed
half-reversed
half-rhyme
half-right
half-ripe
half-ripened
half-roasted
half-rod
half-romantic
half-romantically
half-rotted
half-rotten
half-round
half-round
file
half-rueful
half-ruefully
half-ruined
half-run
half-russia
half-sagittate
half-savage

half-savagely
half-saved
half-seal
half-seas over
half-seas-over
half-second
half-section
half-seen
half-sensed
half-serious
half-seriously
half-severed
half-shade
half-shamed
half-share
half-shared
half-sheathed
half-shoddy
half-shot
half-shouted
half-shroud
half-shrub
half-shrubby
half-shut
half-shy
half-shyly
half-sib
half-sibling
half-sighted
half-sightedly
half-sightedness
half-silk
half-sinking
half-sister
half-size
half-sleeve
half-sleeved
half-slip
half-smile
half-smiling
half-smilingly
half-smothered
half-snipe
half-sole
half-soled
half-solid
half-soling
half-souled

half-sovereign
half-spoonful
half-spun
half-squadron
half-staff
half-starved
half-starving
half-step
half-sterile
half-stock
half-stocking
half-stopped
half-strain
half-strained
half-stroke
half-strong
half-stuff
half-subdued
half-submerged
half-successful
half-successfully
half-succulent
half-suit
half-sung
half-sunk
half-sunken
half-swing
half-sword
half-syllabled
half-taught
half-tearful
half-tearfully
half-teaspoonful
half-tented
half-terete
half-term
half-theatrical
half-thickness
half-thought
half-tide
half-tide
dock
half-timber
half-timbered
half-time
half-time intermission
half-timer
half-title

half-title page
half-tone
half-tongue
half-track
half-tracked
half-trained
half-training
half-translated
half-true
half-truth
half-truths
half-turn
half-turn
stair
half-turned
half-turning
half-understood
half-undone
half-used
half-utilized
half-value layer
half-veiled
half-vellum
half-verified
half-vexed
half-visibility
half-visible
half-volley
half-volleyed
half-volleyer
half-volleying
half-vowelish
half-waking
half-wave rectification
half-wave rectifier
half-way
half-whispered
half-whisperingly
half-white
half-wicket
half-wild
half-wildly
half-willful
half-willfully
half-winged
half-wit
half-witted
half-wittedly

half-wittedness
half-womanly
half-won
half-woolen
half-word
half-world
half-worsted
half-woven
half-written
half-year
half-yearly
halfhead bedstead
halfhearted thanks
halfpenny post
halftone engraving
halfway covenant
halfway file
halfway house
halfway in the middle
halfway mark
halfway measures
halfway place
halfway point
halfway station
halibut-liver oil
haling hands
hall bedroom
hall of residence
hall stand
hall tree
hall-door
hall-mark
hall-of-famer
hallelujah
meter
hallow-e'en
hallow-tide
hallowed be Thy Name
hallucinatory painting
hallux valgus
halo blight
halo spot
halo-
halo-bright
halo-crowned
halo-girt
halogen gas
halter-sack

halter-wise
halting meters
halve together
ham actor
ham and eggs
ham it up
ham operator
ham rig
ham sandwich
ham shack
ham station
ham steak
ham transmitter
ham-fisted
ham-handed
ham-handedness
hamadryas baboon
hamber line
hamber-line
hamburg steak
hamburger stand
hame tug
hamitic languages
hamito-semitic
hamito-semitic languages
hammer and sickle
hammer and tongs
hammer at
hammer away
hammer away at
hammer ax
hammer beam
hammer blow
hammer break
hammer butt
hammer cap
hammer crane
hammer drill
hammer dulcimer
hammer gun
hammer into your head
hammer lock
hammer maker
hammer mill
hammer molding
hammer out
hammer out a deal
hammer oyster

hammer pick
hammer pike
hammer pond
hammer price
hammer rail
hammer scale
hammer sedge
hammer shank
hammer shell
hammer slag
hammer spring
hammer
tail
hammer throw
hammer thrower
hammer throwing
hammer tongs
hammer welding
hammer-beam
hammer-cloth
hammer-hard
hammer-harden
hammer-head
hammer-proof
hammer-refined
hammer-shaped
hammer-strong
hammer-weld
hammer-welded
hammer-wrought
hammered work
hammerhead shark
hammerheaded shark
hammering glass
hammering out a deal
hamming up
hammock batten
hammock berthing
hammock clew
hammock cloth
hammock netting
hammy acting
hance arch
hancing piece
hand a sail
hand alphabet
hand and foot
hand and glove

hand ax
hand baggage
hand bell
hand blocker
hand brake
hand brush
hand camera
hand cannon
hand cheese
hand clapping
hand cleaner
hand composition
hand cream
hand director
hand down
hand drill
hand driller
hand dynamometer
hand embroidery
hand feeder
hand firer
hand fishing
hand flail
hand for hand
hand forward
hand gallop
hand gear
hand glass
hand goniometer
hand graver
hand grenade
hand guard
hand gun
hand hoe
hand hoer
hand hook
hand horn
hand in
hand in glove
hand in hand
hand in your
checks
hand in your chips
hand in your resignation
hand infection
hand iron
hand ironer
hand it to

hand job
hand knitter
hand labor
hand laborer
hand language
hand laundry
hand lead
hand lens
hand letter
hand level
hand line
hand list
hand log
hand loom
hand lotion
hand luggage
hand mast
hand mill
hand miller
hand milling machine
hand miner
hand mirror
hand mixer
hand molder
hand money
hand mule
hand of death
hand of friendship
hand of glory
hand of writ
hand off
hand on
hand orchis
hand organ
hand out
hand over
hand over fist
hand over hand
hand over head
hand over your sword
hand paper
hand pitching
hand planer
hand plant
hand plate
hand play
hand plow
hand polisher

hand press
hand print
hand promise
hand pump
hand pumper
hand punch
hand riveter
hand roller
hand rope
hand running
hand screw
hand scroll
hand set
hand sewer
hand signal
hand spar
hand spinning
hand splicer
hand stitcher
hand sweep
hand tap
hand tight
hand tissue
hand to hand
hand to mouth
hand tool
hand tooling
hand towel
hand
 tree
hand trimmer
hand truck
hand turner
hand up an indictment
hand vote
hand weaver
hand weeder
hand worker
hand your name down to posterity
hand's turn
hand's-breadth
hand-ax
hand-ball
hand-barrow
hand-beaten
hand-blocked
hand-blown
hand-bound

hand-broad
hand-broken
hand-built
hand-canter
hand-carry
hand-cart
hand-carve
hand-chase
hand-churn drill
hand-clasp
hand-clean
hand-closed
hand-colored
hand-comb
hand-crushed
hand-culverin
hand-cut
hand-dress
hand-drill
hand-drop
hand-dug
hand-embroidered
hand-fed
hand-feed
hand-feeding
hand-fill
hand-filled
hand-fire
hand-fives
hand-fold
hand-footed
hand-glass
hand-grenade
hand-habend
hand-held
hand-hewn
hand-hidden
hand-high
hand-in
hand-in-glove
hand-in-hand
hand-knit
hand-knitted
hand-knitting
hand-knotted
hand-labour
hand-lettered
hand-line

hand-liner
hand-list
hand-loom
hand-lopped
hand-made
hand-me-down
hand-me-downs
hand-mill
hand-minded
hand-mindedness
hand-mix
hand-mold
hand-off
hand-operated
hand-organist
hand-out
hand-packed
hand-pick
hand-picked
hand-pitched
hand-play
hand-pollinate
hand-pollination
hand-power
hand-presser
hand-pressman
hand-printing
hand-pump
hand-rail
hand-rear
hand-reared
hand-rinse
hand-rivet
hand-roll
hand-rub
hand-rubbed
hand-sent
hand-sew
hand-sewn
hand-shackled
hand-sort
hand-splice
hand-split
hand-spun
hand-staff
hand-stamp
hand-stamped
hand-stitch

hand-stuff
hand-tailor
hand-tailored
hand-taut
hand-thrown
hand-tied
hand-tight
hand-to-hand
hand-to-hand
combat
hand-to-hand fight
hand-to-mouth
hand-to-mouth existence
hand-tooled
hand-treat
hand-trim
hand-turn
hand-vice
hand-wash
hand-weave
hand-weed
hand-worked
hand-woven
hand-wrist
hand-wrought
handed down
handflower tree
handful of thumbs
handicap race
handicapped person
handicapped, the
handicraft economy
handie-talkie
handing over
handkerchief table
handle bar
handle bars
handle blank
handle it just right
handle to your name
handle with gloves
handle with kid gloves
handle with velvet gloves
handle yourself
handle yourself well
handle-bar
mustache
handlebar moustache

handmaid moth
handrail bolt
hands down
hands of
hands-down
hands-off
hands-off policy
handsome fortune
handsome-featured
handwriting expert
handwriting on the wall
handy at
handy man
handy-andies
handy-andy
handy-billy
handy-dandy
handy-pandy
handy-spandy
hang about
hang about at
hang around
hang around at
hang around with
hang back
hang behind
hang by a thread
hang by the eyelids
hang by the neck
hang crepe
hang down
hang fire
hang glider
hang heavy on your hands
hang in
hang in doubt
hang in effigy
hang in space
hang in suspense
hang in the balance
hang in there
hang it
hang like a millstone
hang net
hang off
hang on
hang on for dear life
hang on like a bulldog

hang on like a leech
hang on the lips
hang on the lips of
hang on the skirts of
hang on the sleeve of
hang on to
hang on your words
hang one on
hang open
hang out
hang out at
hang out with
hang out your shingle
hang over
hang over your head
hang something on
hang the expense
hang the
jury
hang together
hang tough
hang up
hang up your hat
hang up your shingle
hang up your spurs
hang upon
hang upon the skirts of
hang your head
hang your lip
hang-
hang-back
hang-by
hang-choice
hang-dog
hang-down
hang-fair
hang-glider
hang-head
hang-nail
hang-over
hang-up
hangdog look
hanger board
hanger bolt
hanger-back
hanger-on
hanger-up
hangers-on

hanging buttress
hanging by a thread
hanging compass
hanging fixture
hanging gardens
hanging indention
hanging lie
hanging on
hanging out
hanging over your head
hanging post
hanging rail
hanging scroll
hanging step
hanging stile
hanging valley
hanging wall
hanging-drop culture
hangman's hands
hangman's knot
hangman's rope
hank-type antenna
hanker after
hankey-pankey
hanky-panky
hanse house
hansen's disease
hansom cab
hapax legomena
hapax legomenon
hapl-
haplo-
haploid number
happen along
happen as expected
happen by
happen by chance
happen on
happen over and over
happen to be
happen together
happen upon
happen what may
happy as a baby boy
happy
 as a clam at high water
happy as a king
happy as a lark

happy as the day is long
happy chance
happy expectation
happy family
happy fortune
happy hour
happy hunting ground
happy landing
happy medium
happy thought
happy warrior
happy-go-luckiness
happy-go-lucky
happy-go-luckyism
hara-kin
hara-kiri
harbinger-of-spring
harbingers-of-spring
harbor a design
harbor a feeling
harbor an idea
harbor deck
harbor doubts
harbor due
harbor furl
harbor gasket
harbor log
harbor master
harbor of refuge
harbor pilot
harbor porpoise
harbor resentment
harbor revenge
harbor seal
harbor stow
harbor suspicions
harbor the hope
harbor watch
harbour master
harbour seal
hard alee
hard and fast
hard and fast rule
hard aport
hard as a rock
hard as nails
hard astarboard
hard at it

hard at work
hard aweather
hard bargain
hard binding
hard blow
hard book
hard bop
hard by
hard candy
hard cash
hard chancre
hard cheese
hard cider
hard clam
hard coal
hard copy
hard core
hard court
hard currency
hard dinkum
hard drink
hard
drinker
hard drug
hard fact
hard feelings
hard fern
hard fescue
hard frost
hard goods
hard grass
hard grind
hard ground
hard hat
hard head
hard heart
hard image
hard information
hard job
hard knocks
hard labor
hard labour
hard landing
hard lay
hard lead
hard life
hard line
hard lines

hard liquor
hard look
hard lot
hard luck
hard man with a buck
hard maple
hard market
hard mass
hard masse
hard master
hard money
hard news
hard nut to crack
hard oat grass
hard of belief
hard of hearing
hard of heart
hard on
hard on the eyes
hard over
hard palate
hard paste
hard pinch
hard pressed
hard pull
hard put
hard put to it
hard resin
hard resins
hard road to travel
hard rock
hard roe
hard roll
hard row of stumps
hard row to hoe
hard rubber
hard sauce
hard sell
hard shadow
hard shell
hard shoulder
hard sign
hard solder
hard stuff
hard tick
hard times
hard to believe
hard to please

hard to understand
hard tube
hard up
hard upon
hard usage
hard use
hard water
hard weather
hard wheat
hard winter
hard
 word
hard words
hard work
hard-acquired
hard-and-fast
hard-and-fastness
hard-bake
hard-baked
hard-barked
hard-beating
hard-bill
hard-billed
hard-biting
hard-bitted
hard-bitten
hard-bittenness
hard-boil
hard-boiled
hard-boiledness
hard-boned
hard-bought
hard-bred
hard-coated
hard-contested
hard-cooked
hard-core
hard-core pornography
hard-cover book
hard-cured
hard-drawn
hard-dried
hard-drinking
hard-driven
hard-driving
hard-drying
hard-earned
hard-edge

hard-edged
hard-eyed
hard-faced
hard-fated
hard-favored
hard-favoredness
hard-favoured
hard-favouredness
hard-feathered
hard-featured
hard-featuredness
hard-fed
hard-fighting
hard-finished
hard-fired
hard-fisted
hard-fistedness
hard-fleshed
hard-fought
hard-gained
hard-got
hard-grained
hard-haired
hard-handed
hard-handled
hard-hat
hard-headed
hard-heart
hard-hearted
hard-hit
hard-hitting
hard-hitting campaign
hard-iron
hard-laid
hard-learned
hard-line
hard-living
hard-looking
hard-luck guy
hard-minded
hard-mouthed
hard-natured
hard-nosed
hard-nosedness
hard-of-hearing
hard-of-hearing
aid
hard-pan

hard-paste porcelain
hard-plucked
hard-pressed
hard-pushed
hard-ridden
hard-riding
hard-rock geology
hard-run
hard-set
hard-shell
hard-shell clam
hard-shell crab
hard-shelled
hard-skinned
hard-spirited
hard-spun
hard-surface
hard-surfaced
hard-swearing
hard-tack
hard-timbered
hard-trotting
hard-tube pulser
hard-upness
hard-uppishness
hard-used
hard-visaged
hard-wearing
hard-witted
hard-won
hard-wooded
hard-worked
hard-working
hard-wrought
hard-wrung
harden off
harden up
harden your heart
hardening of the arteries
hardhead sponge
hardly a chance
hardly any
hardly anything
hardly ever
hardly expect
hardly like
hardly possible
hardly the thing

hardly touch
hardly wait
hardness of hearing
hardness of heart
hardness scale
hardtop convertible
hardware cloth
hardware store
hardwood tree
hardy ageratum
hardy amaryllis
hare and hounds
hare family
hare's-ear
hare's-foot
hare's-foot clover
hare's-foot fern
hare-brain
hare-brained
hare-eyed
hare-finder
hare-lip
hare-mad
harebrained
idea
harem girl
hari-kari
hariali grass
haricot vert
hark back
hark back to
hark ye
harken to
harlequin bug
harlequin ca
harlequin cabbage bug
harlequin duck
harlequin glasses
harlequin opal
harlequin snake
harlequin table
harmless teasing
harmonic analysis
harmonic close
harmonic conjugates
harmonic flute
harmonic interval
harmonic mean

harmonic minor
harmonic minor scale
harmonic motion
harmonic progression
harmonic proportion
harmonic series
harmonic tone
harmonious relationship
harmonize with
harmony of the spheres
harness bull
harness cask
harness eye
harness hitch
harness horse
harness leather
harness maker
harness making
harness plate
harness race
harness racer
harness racing
harness tub
harness up
harness-bearer
harness-cask
harnessed antelope
harp groat
harp guitar
harp on
harp seal
harp shell
harp shilling
harp upon
harp upon one string
harp upon the same string
harp-shaped
harping-iron
harpoon fork
harpoon gun
harpoon log
harpoon
rocket
harpy bat
harpy eagle
harpy-bat
harpy-eagle
harpy-footed

harrier eagle
harrier hawk
harrow the ear
harry out
harry to destruction
harsh and shrill sounds
harsh sound
harsh-blustering
harsh-featured
harsh-grating
harsh-looking
harsh-mannered
harsh-sounding
harsh-syllabled
harsh-tongued
harsh-voiced
hart beest
hart clover
hart thorn
hart's tongue
hart's-tongue
harts-tongue
hartshorn bush
hartshorn plant
hartshorn plantain
harum-scarum
harum-scarumness
harvest bell
harvest bug
harvest dinner
harvest doll
harvest festival
harvest fish
harvest fly
harvest home
harvest lady
harvest lily
harvest lord
harvest louse
harvest mite
harvest month
harvest moon
harvest mother
harvest mouse
harvest queen
harvest spider
harvest supper
harvest tick

harvest time
harvest work
harvest worker
harvest yarn
harvest-bug
harvest-field
harvest-lice
harvester ant
harvester-thresher
harvesting ant
has-been
hash house
hash mark
hash over
hash up
hash-slinger
hashab tree
hashed up
hasp lock
hassock grass
hasta
la vista
hasta luego
hasta manana
hastato-
hasten off
hasten on
hasty conviction
hasty pudding
hasty retreat
hat blocker
hat carder
hat check
hat cleaner
hat dance
hat dyer
hat homage
hat hook
hat in hand
hat leather
hat lining
hat maker
hat money
hat palm
hat piece
hat pin
hat plant
hat rack

hat roller
hat shop
hat stand
hat tree
hat trick
hat trimming
hat-in-hand
hat-money
hat-shag
hat-shaped
hatch a plot
hatch boat
hatch box
hatch coamings
hatch deck
hatch mast
hatch money
hatch tackle
hatch up
hatch-boat
hatchet cactus
hatchet door
hatchet face
hatchet job
hatchet man
hatchet planimeter
hatchet stake
hatchet vetch
hatchet-faced
hatchet-shaped
hatching spine
hatching station
hate sheet
hate yourself for your actions
hated thing
hatha-yoga
hatted kit
haughty airs
haul around
haul down
haul down your colors
haul down your flag
haul in with
haul into court
haul off
haul over the coals
haul round
haul the wind

haul to
haul up
haul your wind
haulage incline
hauling down
haunch
bone
haunch-bone
haunt the memory
haunt your thoughts
haunted with fear
hausse-col
haut couture
haut monde
haut-gout
haut-pas
haut-relief
haut-ton
hautbois strawberry
haute cole
haute couture
haute cuisine
haute ecole
haute mal
haute vulgarisation
haute-feuillite
haute-piece
have a BM
have a baby
have a bad time
have a bad time of it
have a ball
have a bee in your bonnet
have a bellyful
have a bellyful of
have a bent for
have a bias
have a big bazoo
have a big mouth
have a big nose
have a blind side
have a blind spot
have a bone in your neck
have a bone in your throat
have a bone to pick
have a bone to pick with
have a bone to pick with someone
have a bowel movement

have a brush with
have a bump for
have a cake in the oven
have a canary
have a care
have a case
have a case on
have a cat fit
have a catch
have a certain sameness
have a certain state
have a chance
have a chance at
have a change of heart
have a charmed life
have a chill
have a chip on your shoulder
have a clean bill of health
have
a clear conscience
have a comedown
have a conniption
have a conniption fit
have a cozy chat
have a crow to pick
have a crow to pick with
have a crow to pluck
have a crow to pluck with
have a crow to pull with
have a crush on
have a demon
have a devil
have a devil in one
have a devil in you
have a disaffinity for
have a dram
have a drink
have a drop too much
have a dry run
have a duck fit
have a faculty for
have a falling-out
have a fancy for
have a feeling
have a fine time of it
have a finger in
have a finger in the pie
have a flair for

have a fling at
have a fondness for
have a free hand
have a free mind
have a friendly chat
have a funny feeling
have a gargle
have a gift for
have a go
have a go at
have a gold mine
have a good appetite
have a good chance
have a good head for
have a good knowledge of
have a good mind to
have a good time
have a good time of it
have a good word for
have a great mind to
have a guzzle
have a hand in
have a handful of thumbs
have a hard time of it
have
 a head on your shoulders
have a healthy lead
have a heart
have a heart of stone
have a heart-to-heart talk
have a hemorrhage
have a high opinion of
have a hold over
have a hunch
have a jag on
have a job
have a joker
have a joker in the deck
have a kicker
have a lech for
have a leg to stand on
have a little learning
have a little talk
have a long nose
have a look at
have a looksee
have a lot to do with
have a lot to say about

have a mash on
have a memory like a sieve
have a mind like a sieve
have a mind of your own
have a mind to
have a mint
have a misery
have a mishap
have a monkey on your back
have a mortgage-burning party
have a mote in the eye
have a near miss
have a nerve
have a nervous breakdown
have a nest egg
have a nice trip
have a nip
have a part in
have a partiality
have a percentage of
have a picture of
have a piece of
have a premonition
have a presentiment
have a rehearsal
have a relapse
have a relish of
have a right to
have a rightful claim to
have a rightful claim upon
have
a run
have a run of luck
have a screw loose
have a sensation
have a short attention span
have a short fuse
have a short memory
have a short memory span
have a shot at
have a show of hands
have a skinful
have a slight chance
have a small chance
have a snootful
have a soft place in your heart
have a soft spot in your heart
have a stake in

have a storm in a teacup
have a storm in a teapot
have a string attached
have a stroke of luck
have a strong effect
have a swelled head
have a talent for
have a talk with
have a tantrum
have a tapeworm
have a taste for
have a temper
have a temper tantrum
have a tempest in a teacup
have a tempest in a teapot
have a tendency
have a tender heart
have a test run
have a theory
have a thick skin
have a thing about
have a thorough knowledge of
have a tiger by the tail
have a title to
have a tongue in your head
have a turn for
have a very red face
have a voice in
have a way with one
have a way with you
have a weakness for
have a will of your own
have a willing
heart
have a wolf in your stomach
have a word with
have a yellow streak
have a yen for
have about enough of
have accounts to settle
have all the earmarks of
have all the features of
have all the luck
have all the money in the world
have all the signs of
have all to yourself
have all you can stand
have all you can take

have all your eyes about one
have all your eyes about you
have all your marbles
have all your wits about one
have all your wits about you
have alook at
have an account with
have an ague
have an alias
have an anchor to windward
have an attraction
have an ax to grind
have an ear for
have an ear to the ground
have an edge
have an edge on
have an entree
have an eye for
have an eye to
have an idea
have an idea of
have an impression
have an in
have an in with
have an income of
have an inkling
have an intimation
have an opportunity
have an overdose of
have an understanding
have an upright carriage
have and hold
have another crack
have another go
have another shot
have another
think coming
have another try
have ants in your pants
have as a fulcrum
have as a guest
have as a lodger
have as many phases as the moon
have as your master
have at
have at a disadvantage
have at heart
have at it

have at your command
have at your disposal
have at your disposition
have at your elbow
have at your fingers' ends
have at your fingers' tips
have at your pleasure
have bats in the belfry
have bats in your belfry
have been around
have been through the mill
have being
have better things to do
have birth
have blood in your eyes
have by heart
have by rote
have charisma
have chilblains
have childlike faith in
have clean hands
have clout
have cold feet
have coming
have coming in
have confidence
have confidence in
have connection with
have consideration for
have constantly in your thoughts
have control of
have conversations
have courage
have currency
have cut your eyeteeth
have cut your wisdom teeth
have dead to rights
have dealings with
have deep feelings
have designs on
have difficulty
have
done
have done with
have doubts
have down cold
have down pat
have drag

have duck bumps
have eating out of your hand
have effect
have energy
have enough
have every appearance of
have every indication of
have every intention
have every intention of
have every sign of
have everything going your way
have everything to learn
have evidence
have exclusive possession of
have exclusive rights to
have eyes for
have eyes only for
have faith
have faith in
have favorable odds
have for your own
have for your very own
have foreboding
have free play
have free scope
have full play
have fun
have good prospects
have goose bumps
have goose pimples
have goosebumps
have gooseflesh
have got
have got to
have green in the eye
have had it
have had its day
have had your day
have half a mind to
have hallucinations
have high visibility
have hot pants for
have in
have in contemplation
have in hand
have in mind
have in prospect
have in reserve

have in sight
have in store
have in store for
have in view
have
in your eye
have in your grasp
have in your grip
have in your head
have in your mind
have in your possession
have in your power
have independent means
have influence
have influence over
have information about
have intercourse
have it
have it all over
have it all your own way
have it all your way
have it bad
have it both ways at once
have it break good for one
have it coming
have it easy
have it in for
have it made
have it out
have it out of
have it reported
have it soft
have it taped
have it up to here
have its place
have its seat in
have its slot
have its time
have knowledge
have knowledge of
have leverage
have life
have little in common
have little recall
have little to say
have little weight
have lots of laughs
have magnetism

have many irons in the fire
have means
have mercy upon
have money
have money to burn
have more than you can hold
have much ado with
have need to
have nine lives like a cat
have no alternative
have no association with
have no attention span
have no bounds
have
no business
have no chance
have no choice
have no claim upon
have no conception
have no desire for
have no diffidence
have no doubt
have no ears
have no end
have no expectation
have no false modesty
have no fight left
have no hand in
have no idea
have no kick coming
have no liking for
have no limit
have no limits
have no lower to go
have no measures with
have no misgivings
have no more
have no notion
have no objection
have no opportunity
have no option but
have no patience with
have no plan
have no qualms
have no recollection of
have no regrets
have no relish for
have no remembrance of

have no reservations
have no right to
have no scruple of
have no second thoughts
have no secrets
have no self-doubt
have no shame
have no taste for
have no term
have no thought of
have no time for
have no time to lose
have no time to spare
have no title to
have no truck with
have no turning
have no use for
have no words for
have not a hope
have not a prayer
have nothing but time
have nothing in common
have
nothing on
have nothing to do
have nothing to do with
have occasion for
have on
have on the brain
have on the edge of your memory
have on the hip
have on the tip of the tongue
have on the tip of your tongue
have on your hands
have on your mind
have on your shoulders
have one foot in the grave
have one for the road
have one to know
have origin
have other fish to fry
have other things to do
have out
have patience and endure
have peace one with another
have permission
have personality
have pity

have place
have play
have plenty of time
have plenty on the ball
have power
have power over
have preference
have prestige
have priority
have proof
have pull
have qualms
have quite enough
have rather
have recourse to
have regard for
have repercussions
have reservations
have run its course
have run out
have savvy
have scruples
have second thoughts
have seen better days
have seen your best days
have seen your day
have sex
have sexual relations
have simple faith in
have smarts
have someone on
have
something
have something laid by
have something on
have something on the ball
have something on the brain
have something to draw on
have sown your wild oats
have sternway on
have subject
have suction
have suffrage
have suspicions
have tenure
have tenure of
have tenure of appointment
have that or nothing

have the advantage of
have the appearance of
have the ascendancy
have the audacity
have the bar sinister
have the best of
have the chances against one
have the chances against you
have the cheek
have the cold creeps
have the cold shivers
have the conn
have the creeps
have the deed for
have the drop on
have the ear of
have the facts
have the fidgets
have the flavor of
have the floor
have the force of
have the friendship of
have the function of
have the gall
have the game in your hands
have the game in your own hands
have the gift of gab
have the golden touch
have the goodness
have the goods on
have the grace to
have the guts
have the hang of it
have the idea
have the impression
have the
inside track
have the jitters
have the job of
have the jump on
have the knack
have the last laugh on
have the last word
have the latchstring out
have the law of
have the law on
have the look of
have the makings of

have the mastery of
have the mission of
have the nerve
have the odds against one
have the odds against you
have the opinion
have the power
have the prerequisites
have the qualifications
have the right
have the role of
have the run of
have the say
have the say-so
have the sense of
have the shakes
have the start
have the sway
have the top place
have the top spot
have the touch
have the upper hand
have the use of
have the wherewithal
have the whip hand
have the wind of
have the world at your feet
have the worst of it
have thoughts about
have tied to your apron strings
have time
have time enough
have time to spare
have title to
have to
have to answer for
have to do with
have to fall back upon
have to hand it to
have to run for it
have to your name
have too many irons in the fire
have
too much
have too much of a good thing
have trouble
have truck with
have two minds

have two strings to your bow
have under control
have undertaken
have up
have up your sleeve
have way upon
have weight
have well in hand
have what it takes
have what you say go
have words
have words with
have you on the ropes
have young
have your back to the wall
have your blood on your head
have your blood up
have your cake and eat it too
have your credit good for
have your doubts
have your ear
have your eye on
have your fill
have your fling
have your hand in the till
have your hands full
have your hands in
have your hands tied
have your head screwed on right
have your heart bleed for
have your heart in your mouth
have your heart set against
have your heart set on
have your innings
have your measure
have your moments
have your monkey up
have your name in lights
have your nerve
have your nose out of joint
have your number
have your options eliminated
have your options reduced
have your own way
have
your period
have your place in the sun
have your revenge

have your say
have your time
have your way
have your will
have your wits about you
have-been
have-not
have-nots
have-nots, the
haven cap
haver-corn
haves, the
havey-cavey
havildar major
having a baby
having a block for a head
having a part
having a share
having a voice
having and holding
having cotton between the ears
having life
having title to
haw tree
haw-haw
hawaii time
hawaiian guitar
hawe-bake
hawk bell
hawk call
hawk cuckoo
hawk eagle
hawk fly
hawk moth
hawk nose
hawk owl
hawk parrot
hawk swallow
hawk's nest model
hawk's-beard
hawk's-bell
hawk's-bill
hawk's-eye
hawk-beaked
hawk-billed
hawk-eyed
hawk-faced
hawk-headed

hawk-moth
hawk-nose
hawk-nosed
hawk-owl
hawk-tailed
hawking voice
hawksbill turtle
hawse bag
hawse bolster
hawse hook
hawse timber
hawse-fallen
hawse-full
hawser bend
hawser clamp
hawser fastening
hawser-laid
hawsing iron
hawthorn china
hawthorn pattern
hawthorn tingis
hawthorn wine
hay asthma
hay bacillus
hay
 baler
hay barrack
hay binder
hay conditioner
hay cutter
hay fern
hay fever
hay hook
hay jack
hay knife
hay loader
hay plant
hay press
hay rig
hay road
hay saffron
hay sweep
hay tedder
hay tit
hay wagon
hay worm
hay-asthma
hay-bird

hay-bote
hay-cock
hay-color
hay-colored
hay-de-guy
hay-fed
hay-fever
hay-field
hay-fork
hay-mow
hay-rack
hay-rake
hay-rick
hay-scented
hay-seed
hay-tallat
haystack thorn
hazard a conjecture
hazard of the die
hazard side
hazard warning device
hazel alder
hazel brown
hazel crottles
hazel grouse
hazel hen
hazel mouse
hazel oil
hazel pine
hazel tree
hazel worm
hazel-eyed
hazel-gray
hazel-grouse
hazel-hen
hazel-hooped
hazel-leaved
hazel-nut
hazel-wood
hazelnut oil
hazy idea
hazy recollection
he-all
he-balsam
he-broom
he-cabbage-tree
he-goat
he-he!

he-heather
he-holly
he-huckleberries
he-huckleberry
he-man
he-mannish
he-men
he-oak
head and front of your offending
head and head
head and shoulders
head arrangement
head away from
head betony
head blight
head block
head
 butt
head cold
head collar
head count
head covering
head deformation
head earing
head fast
head flume
head fold
head for
head for blue water
head for the bottom
head form
head gate
head harness
head house
head index
head into
head joint
head kidney
head knee
head lamp
head lettuce
head log
head louse
head maggot
head matter
head metal
head mistress
head mold

head molding
head money
head motion
head netting
head of hair
head of household
head of state
head of the river
head off
head office
head on
head over heels
head over heels in
head over heels in debt
head over heels in love
head pin
head register
head resistance
head sample
head scab
head sea
head shaping
head shrinker
head smut
head space
head spar
head spin
head start
head stool
head straight for
head strapper
head swell
head table
head tax
head the board
head the line
head the table
head to leeward
head to wind
head to windward
head tone
head toward
head tree
head up
head veil
head voice
head waiter
head water

head wind
head
 windward
head word
head yard
head-aching
head-and-tail light
head-and-tail-light fish
head-block
head-board
head-cloth
head-court
head-dress
head-flattening
head-foremost
head-gear
head-hanging
head-high
head-hunt
head-hunter
head-hunting
head-line
head-load
head-man
head-money
head-note
head-on
head-on attack
head-over-heels
head-pan
head-penny
head-piece
head-plate
head-race
head-rail
head-rope
head-sail
head-shaking
head-splitting
head-stall
head-tire
head-tossing
head-turned
head-voice
headache plant
headache powder
headache tree
headache wafer

headache weed
headed for
headed group
header bond
header tank
header-up
heading bond
heading course
heading joint
heading machine
heading stone
heading sword
heading tool
heading toward
heading-machine
headline attraction
headlong plunge
headlong rush
headmistress-ship
heads or tails
heads up
heads-up
headwater erosion
heal itself
heal over
heal the breach
heal-all
heal-bite
heal-dog
heald knitter
healing agent
healing art
healing arts
healing
 blade
healing by first intention
healing by second intention
healing herb
healing leaf
healing ointment
healing quality
healing virtue
health centre
health examination
health food
health food store
health foods
health hazard

health insurance
health officer
health physicist
health physics
health resort
health salts
health spa
health visitor
health-enhancing
health-preserving
healthy body
healthy constitution
healthy economy
healthy glow
healthy hue
healthy meal
healthy mind
healthy-minded
healthy-mindedly
healthy-mindedness
heap coals of fire on your head
heap dirt upon
heap leaching
heap roasting
heap up
heap upon
heaped-up
heaps of gold
hear a different drummer
hear confession
hear it for
hear nothing
hear of
hear out
hear say
hear shots fired in anger
hear tell of
hear to
hear ye
hearing aid
hearing impairment
hearing loss
hearing-aid battery
hearken to
hearsay evidence
hearsay rule
heart action
heart amulet

heart and soul
heart attack
heart back
heart block
heart bond
heart cam
heart
cherry
heart clam
heart clot
heart clover
heart cockle
heart complaint
heart condition
heart cup
heart disease
heart failure
heart flower
heart line
heart liver
heart liverleaf
heart medic
heart murmur
heart of gold
heart of grace
heart of hearts
heart of oak
heart of stone
heart out
heart pine
heart point
heart rot
heart sac
heart shell
heart shock
heart snakeroot
heart starter
heart stimulant
heart strain
heart surgery
heart tamponade
heart transplant
heart trefoil
heart trouble
heart urchin
heart wall
heart yarn
heart's blood

heart's core
heart's desire
heart's-ease
heart-ache
heart-affecting
heart-angry
heart-back
heart-blood
heart-bond
heart-bound
heart-break
heart-bred
heart-broken
heart-burdened
heart-burning
heart-cheering
heart-chilled
heart-chilling
heart-corroding
heart-deadened
heart-dulling
heart-eating
heart-expanding
heart-fallen
heart-fashioned
heart-felt
heart-flowered
heart-flowered orchid
heart-free
heart-freezing
heart-fretting
heart-gnawing
heart-gripping
heart-happy
heart-hardened
heart-hardening
heart-heaviness
heart-heavy
heart-hungry
heart-ill
heart-leaved
heart-leaved
aster
heart-leaved willow
heart-lung machine
heart-melting
heart-moving
heart-piercing

heart-purifying
heart-quake
heart-ravishing
heart-rending
heart-rendingly
heart-robbing
heart-searching
heart-shaking
heart-shaped
heart-shed
heart-sick
heart-sore
heart-sorrowing
heart-spoon
heart-stirring
heart-stricken
heart-strickenly
heart-strike
heart-strings
heart-struck
heart-swelling
heart-swollen
heart-tearing
heart-thrilling
heart-throb
heart-throbbing
heart-tickling
heart-to-heart
heart-to-heart talk
heart-warm
heart-warming
heart-weariness
heart-weary
heart-whole
heart-wholeness
heart-wise
heart-wood
heart-wounded
heart-wounding
heart-wringing
heart-wrung
heartfelt apology
heartfelt grief
hearth and home
hearth cricket
hearth money
hearth tax
hearth-money

hearth-penny
hearth-rug
hearth-stead
hearth-tax
hearts and flowers
hearts-and-flowers
hearty assent
hearty enjoyment
hearty
laugh
hearty meal
hearty welcome
heat absorber
heat apoplexy
heat asphyxia
heat balance
heat barrier
heat canker
heat capacity
heat center
heat conduction
heat conductivity
heat content
heat death
heat detector
heat devil
heat energy
heat engine
heat engineer
heat engineering
heat equation
heat equator
heat equivalent
heat exchange
heat exchanger
heat exhaustion
heat factor
heat fever
heat lamp
heat lightning
heat nodules
heat of condensation
heat of fusion
heat of solidification
heat of sublimation
heat of vaporization
heat potential
heat prostration

heat pump
heat rash
heat ray
heat regulator
heat reservoir
heat rigor
heat science
heat seeker
heat shield
heat sink
heat spectrum
heat spot
heat sum
heat the economy
heat therapy
heat treating
heat treatment
heat unit
heat up
heat up the economy
heat wave
heat weight
heat-absorbing
heat-conducting
heat-cracked
heat-drop
heat-engine cycle
heat-forming
heat-full fire
heat-giving
heat-island
heat-killed
heat-laden
heat-loving
heat-oppressed
heat-power
engineer
heat-power engineering
heat-producing
heat-radiating
heat-reducing
heat-regulating
heat-resistant
heat-resisting
heat-softened
heat-spot
heat-tempering
heat-treat

heat-treated
heat-treating
heat-treatment
heat-wave
heated imagination
heated up
heater cord
heater piece
heater-shaped
heath aster
heath bell
heath box
heath bramble
heath cock
heath cypress
heath family
heath fern
heath grass
heath grouse
heath hen
heath honeysuckle
heath moss
heath mulberry
heath pea
heath peat
heath poult
heath rush
heath scrub
heath wren
heath-bell
heath-berry
heath-bird
heath-clad
heath-cock
heath-hen
heath-pea
heathen god
heather bell
heather cat
heather grass
heather purple
heather whin
heather wool
heather-bell
heather-bleat
heather-blutter
heating coil
heating degree-day

heating duct
heating element
heating furnace
heating pad
heating pipe
heating plant
heating-up
heauto-
heave a sigh of relief
heave aloft
heave alongside
heave and awash
heave apeak
heave at
heave down
heave
ho
heave in sight
heave in together
heave offering
heave out
heave out a sail
heave overboard
heave round
heave short
heave shoulder
heave the gorge
heave the lead
heave the log
heave to
heave-ho
heave-off hinge
heave-offering
heave-shouldered
heaven above
heaven disturber
heaven of heavens
heaven on earth
heaven tree
heaven worshiper
heaven's artillery
heaven's ebon vault
heaven's high city
heaven-accepted
heaven-aspiring
heaven-assailing
heaven-begot
heaven-bent

heaven-born
heaven-bred
heaven-built
heaven-clear
heaven-controlled
heaven-daring
heaven-dear
heaven-defying
heaven-descended
heaven-devoted
heaven-directed
heaven-erected
heaven-fallen
heaven-forsaken
heaven-gate
heaven-gifted
heaven-given
heaven-guided
heaven-high
heaven-inspired
heaven-instructed
heaven-kissing
heaven-lighted
heaven-lit
heaven-made
heaven-prompted
heaven-protected
heaven-reaching
heaven-rending
heaven-sent
heaven-sprung
heaven-sweet
heaven-taught
heaven-threatening
heaven-touched
heaven-warring
heaven-wide
heavenly
bamboo
heavenly being
heavenly body
heavenly fruit
heavenly hierarchy
heavenly host
heavenly kingdom
heavenly-minded
heavenly-mindedness
heavens and earth

heavenward tree
heaver-off
heaver-out
heaver-over
heavier-than-air
heavier-than-air craft
heaviness of heart
heaving aloft
heaving pile
heaving up
heaving-line bend
heaviside layer
heavy artillery
heavy as lead
heavy blow
heavy bomber
heavy chemicals
heavy cream
heavy cruiser
heavy demand
heavy dew
heavy dragoon
heavy drinker
heavy drinking
heavy earth
heavy eyelids
heavy field artillery
heavy force fit
heavy hand
heavy harmony
heavy heart
heavy hydrogen
heavy lead
heavy meal
heavy metal
heavy mineral oil
heavy nitrogen
heavy object
heavy oil
heavy on
heavy oxygen
heavy particle
heavy particle counter
heavy pine
heavy platinum group
heavy purse
heavy rain
heavy right foot

heavy sea
heavy sin
heavy sky
heavy sledding
heavy sleep
heavy smoker
heavy solution
heavy spar
heavy swell
heavy thinking
heavy transport
heavy water
heavy
 weather
heavy wet
heavy wine
heavy with child
heavy with meaning
heavy with significance
heavy with sleep
heavy with young
heavy-armed
heavy-bearded
heavy-blossomed
heavy-bodied
heavy-boned
heavy-booted
heavy-boughed
heavy-drinking
heavy-duty
heavy-eared
heavy-eyed
heavy-faced
heavy-featured
heavy-fisted
heavy-fleeced
heavy-footed
heavy-footedness
heavy-fruited
heavy-gaited
heavy-handed
heavy-handedly
heavy-handedness
heavy-head
heavy-headed
heavy-hearted
heavy-heartedly
heavy-heartedness

heavy-heeled
heavy-jawed
heavy-laden
heavy-leaved
heavy-lidded
heavy-limbed
heavy-lipped
heavy-looking
heavy-mettled
heavy-mouthed
heavy-paced
heavy-scented
heavy-seeming
heavy-set
heavy-shotted
heavy-shouldered
heavy-shuttered
heavy-smelling
heavy-soled
heavy-tailed
heavy-timbered
heavy-weight
heavy-winged
heavy-witted
heavy-wooded
heb-sed
hebe-
hebephrenic schizophrenia
heck-how
hect-
hectic fever
hectic flush
hecto-
hecto-ampere
hectograph copy
heddle brusher
heddle knitter
hedge about
hedge
 accentor
hedge apple
hedge bedstraw
hedge bells
hedge bird
hedge cactus
hedge carpenter
hedge chanter
hedge crocus

hedge fumitory
hedge garlic
hedge grape
hedge hyssop
hedge in
hedge laurel
hedge layer
hedge marriage
hedge priest
hedge rose
hedge sparrow
hedge stake
hedge trimmer
hedge your bets
hedge-bird
hedge-bound
hedge-creeper
hedge-hyssop
hedge-pig
hedge-priest
hedge-school
hedge-sparrow
hedged about
hedged about by
hedged by
hedged in
hedged-in
hedgehog aloe
hedgehog cactus
hedgehog caterpillar
hedgehog coneflower
hedgehog gourd
hedgehog grass
hedgehog transformer
hedging your bets
hedging-in
hedonic calculus
hedonistic calculus
hee-haw
hee-hee
hee-hee!
heebie jeebies
heebie-jeebies
heedless hap
heel bar
heel block
heel blocker
heel bone

heel breast
heel builder
heel chain
heel clamp
heel cutter
heel fly
heel in
heel jigger
heel nailer
heel of Achilles
heel pad
heel padder
heel ring
heel rope
heel seat
heel seater
heel splitter
heel spur
heel stay
heel tapper
heel tool
heel trimmer
heel
 wedge
heel-and-toe
heel-and-toe dancer
heel-attaching
heel-ball
heel-bone
heel-breast
heel-breaster
heel-fast
heel-piece
heel-plate
heel-post
heel-rope
heel-tap
heel-way
heeling tank
heels over head
hefty eater
heh deity
heidelberg man
heigh ho
heigh-ho
height block
height board
height district

height finder
height gauge
height measure
height measurement
height of fashion
height of land
height pressure
height to paper
height to surface
height-to-paper
heir apparency
heir apparent
heir at law
heir by destination
heir expectant
heir general
heir in tail
heir of entail
heir of inventory
heir of line
heir of provision
heir of the body
heir portioner
heir presumptive
heir whatsoever
heir-at-law
heiress-ship
heirs apparent
heirs at law
heirs presumptive
held back
held dear
held in awe
held in consideration
held in esteem
held in favor
held in pledge
held in regard
held in reserve
held in respect
held in trust
held out
held up
helen of troy
heli-
heliacal rising
helianthine B
helic-

helical
gear
helical rack
helico-
helicoidal saw
helicopter gun ship
helicopter gunship
helio-
heliocentric longitude
heliocentric parallax
heliographic chart
heliotrope gray
helium group
helix angle
hell around
hell bomb
hell broke loose
hell for leather
hell gate
hell hole
hell let loose
hell mouth
hell of a
hell to pay
hell upon earth
hell week
hell's bells
hell's half-acre
hell's kitchen
hell-begotten
hell-bent
hell-bent for election
hell-bent on
hell-bind
hell-black
hell-born
hell-bound
hell-bred
hell-brewed
hell-cat
hell-dark
hell-deep
hell-devil
hell-diver
hell-doomed
hell-driver
hell-engendered
hell-fire

hell-fired
hell-for-leather
hell-gate
hell-hard
hell-hatched
hell-haunted
hell-hound
hell-like
hell-raiser
hell-raker
hell-red
hell-vine
hellebore green
hellebore red
hellish host
hello girl
hello there
helm alee
helm aport
helm astraboard
helm aweather
helm port
helm wind
helm-wind
helmet liner
helmet of hair
helmet quail
helmet shell
helmet-crest
helmet-shaped
helmet-wearing
helmeted
 guinea fowl
helminth-
help a lame dog over a stile
help along
help bear your grief
help decide
help in time of need
help on its way
help out
help to
help up
help yourself to
helped by
helping along
helping hand
helter-skelter

helter-skelteriness
helve hammer
hem and haw
hem in
hem-
hem-stitch
hema-
hemat-
hematin crystals
hematin paste
hematite red
hemato-
hematocrit value
hematogenic shock
hemi-
hemi-elytrum
hemi-type
hemispherico-conical
hemispherico-conoid
hemlock fir
hemlock parsley
hemlock pitch
hemlock spruce
hemlock-leaved
hemmed in
hemmed-in
hemming-in
hemo-
hemolymph gland
hemolytic anemia
hemophilia A
hemophilia B
hemophilia C
hemophilic arthritis
hemorrhagic measles
hemorrhagic plague
hemorrhagic septicemia
hemp agrimony
hemp nettle
hemp oil
hemp palm
hemp tree
hemp-agrimony
hemp-nettle
hempen bridle
hempen collar
hempen necktie
hempen tippet

hempseed oil
hen and chickens
hen clam
hen coop
hen curlew
hen flea
hen frigate
hen gorse
hen harrier
hen hawk
hen louse
hen
 mold
hen party
hen pepper
hen plant
hen run
hen scratches
hen track
hen tracks
hen turkey
hen's-foot
hen-and-chickens
hen-coop
hen-driver
hen-egg
hen-fat
hen-feathered
hen-feathering
hen-harrier
hen-hawk
hen-hearted
hen-house
hen-peck
hen-pecked
hen-roost
hen-tailed
hench-boy
hendeca-
hens-and-chickens
hep to
hepar calcis
hepat-
hepato-
hepato-pancreas
hepped up
hepped up over
hepta-

heptadecanoic acid
her infinite variety
her native ornament of hair
herabol myrrh
herald abroad
herald angel
herald's college
herald's trick
herald's trumpet
heraldic device
heraldic heiress
heraldic insignia
heraldic knot
heraldic official
heraldic officials
heralds' college
herb Christopher
herb Gerard
herb Paris
herb Robert
herb bennet
herb doctor
herb john
herb of grace
herb paris
herb patience
herb robert
herb-grace
herb-woman
herbaceous border
herbs Paris
herbs Robert
herbs patience
hercules beetle
hercules' club
hercules'-club
herd instinct
herd together
herd's grass
herd's-grass
herd-book
herd-boy
herd-grass
herd-groom
here
 and now
here and there
here and there in

here and there on
here below
here lies
here today and gone tomorrow
here's good luck
here's how
here's looking at you
here's mud in your eye
here's to absent friends
here's to you
here-hence
hereafter, the
hereditary character
hereditary disease
heriot service
herky-jerky
hermaphrodite brig
hermaphrodite caliper
hermaphrodite duct
hermaphrodite schooner
hermes trismegistus
hermetically sealed
hermit crab
hermit crow
hermit order
hermit thrush
hermit warbler
hermo-
hermosa pink
hernio-
hero sandwich
hero worship
hero-shiped
hero-shiping
hero-shipped
hero-shipping
hero-worship
hero-worshiper
hero-worshiping
heroi-comic
heroic act
heroic age
heroic couplet
heroic deed
heroic legend
heroic myth
heroic poetry
heroic stanza

heroic tenor
heroic verse
heron's-bill
herpes facialis
herpes labialis
herpes simplex
herpes zoster
herpet-
herr-ban
herring buss
herring gull
herring hog
herring king
herring oil
herring pond
herring salad
herring
 work
herring-bone
herring-kale
herring-pond
herring-shaped
herringbone bond
herringbone bridging
herringbone gear
herringbone stitch
herringbone strutting
hertzian wave
hesitant approach
hesitate over
hesitation waltz
hesper-
hesperid-
hessian boot
hessian fly
het up
heter-
hetero-
heterogeneous reactor
heterogeneous system
heterogenous vaccine
heterolytic fission
heterotrophic organism
hew down
hew-hole
hex doctor
hex mark
hex sign

hex-
hexa-
hexacosanoic acid
hexadecanoic acid
hexadecimal notation
hexadecimal system
hexaethyl tetraphosphate
hexagon-drill
hexakis-
hexanedioic acid
hexanoic acid
hexoic acid
hexose sugar
hexyl group
hexyl radical
hey rube
hey-day
hey-day guise
hey-ho
heyday of the blood
heyday of youth
hi ya
hi-fi
hi-fi fan
hiatal hernia
hiatus hernia
hiatus of learning
hiberno-
hic et nunc
hic et ubique
hic jacet
hic-cough
hiccius doccius
hiccup-nut
hick joint
hick town
hick-joint pointing
hickory acacia
hickory aphid
hickory borer
hickory cloth
hickory elm
hickory
girdler
hickory moth
hickory nut
hickory oak
hickory oil

hickory phylloxera
hickory pine
hickory poplar
hickory shad
hickory shirt
hickory stripe
hickory twig girdler
hickory wattle
hidden danger
hidden hand
hidden meaning
hidden out
hidden-fruited
hidden-veined
hide away
hide beetle
hide nor hair
hide or hair
hide out
hide rope
hide splitter
hide under
hide your face
hide your hand
hide your head
hide your head in the sand
hide your light under a bushel
hide your trail
hide yourself
hide-and-go-seek
hide-and-seek
hide-out
hidebound disease
hidey hole
hidey-hole
hiding place
hiding power
hidro-
hidy-hole
hie on
hie to
hie yourself to
hielaman tree
hier-
hiera picra
hieratic symbol
hiero-
hig taper

higgledy-piggledy
high aim
high altar
high analysis
high and dry
high and low
high and mighty
high as a kite
high as a steeple
high bar
high beam
high birth
high blood pressure
high blower
high brass
high bunt
high by-pass ratio engine
high camp
high celebration
high chair
high chief
high
church
high collar
high color
high comedy
high command
high commissioner
high cost
high court
high cranberry
high day
high descent
high diver
high diving
high dudgeon
high energy physics
high explosive
high fashion
high feather
high fidelity
high finance
high flavor
high fog
high frequency
high fulham
high german
high glee

high goal
high grade
high growth rate
high hand
high hat
high heaven
high holiday
high hopes
high horse
high hurdles
high ideals
high income
high iron
high jinks
high jump
high jumper
high king
high life
high light
high liver
high living
high lope
high mass
high mightiness
high milling
high muck-a-muck
high noon
high old time
high on the hog
high order
high pitch
high place
high places
high point
high polymer
high pressure
high price
high price tag
high prices
high priest
high priesthood
high principles
high proof
high purpose
high rank
high regard
high relief
high renaissance

high repute
high road
high rod
high roller
high school
high schooler
high sea
high seas
high
season
high seat
high sign
high society
high specific activity
high spirits
high spot
high standard of living
high steel
high street
high summer
high table
high tax bracket
high tea
high tech
high tide
high time
high treason
high up
high value
high visibility
high voice
high water
high wind
high wine
high wines
high wire
high wire artist
high words
high yellow
high-aimed
high-aiming
high-altitude bombing
high-altitude flying
high-altitude research aircraft
high-altitude research rocket
high-altitude rocket
high-and-mightiness
high-and-mighty

high-angle fire
high-angle gun
high-angled
high-arched
high-aspiring
high-backed
high-binder
high-blazing
high-blessed
high-blooded
high-blower
high-blown
high-bodiced
high-boiling
high-boned
high-born
high-breasted
high-bred
high-brow
high-browed
high-browish
high-browishly
high-browism
high-built
high-button shoes
high-caliber
high-calorie diet
high-camp
high-case
high-caste
high-ceiled
high-ceilinged
high-churchman
high-class
high-climber
high-climbing
high-collared
high-colored
high-coloured
high-complexioned
high-compression
high-count
high-crested
high-crowned
high-cut
high-density
high-duty
high-elbowed

high-embowed
high-energy
particle
high-explosive
high-explosive charge
high-explosive shell
high-falutin
high-faluting
high-fated
high-feathered
high-fed
high-fidelity
high-fidelity speaker
high-fidelity system
high-flavored
high-flier
high-flowing
high-flown
high-flown diction
high-flushed
high-flyer
high-flying
high-flying tippler
high-foreheaded
high-frequency
high-frequency amplification
high-frequency cable
high-frequency current
high-frequency direction finder
high-frequency heater
high-frequency pulse
high-frequency speaker
high-frequency telephony
high-frequency treatment
high-frequency wave
high-gazing
high-geared
high-grade
high-grade bond
high-grade ore
high-grade stock
high-grown
high-handed
high-handedly
high-handedness
high-hat
high-hat cymbals
high-hatted

high-hattedness
high-hatter
high-hattiness
high-hatting
high-hatty
high-headed
high-heaped
high-hearted
high-heel
high-heeled
high-hoe
high-holder
high-hole
high-horned
high-hung
high-intensity
 lamp
high-judging
high-key
high-keyed
high-level
high-level language
high-level talk
high-lineaged
high-lived
high-living
high-lone
high-low
high-low-jack
high-lows
high-lying
high-mettled
high-minded
high-mindedly
high-mindedness
high-motived
high-mounted
high-mounting
high-mu tube
high-muck-a
high-muck-a-muck
high-muckety-muck
high-necked
high-nosed
high-notioned
high-octane
high-octane gas
high-pass

high-pass filter
high-peaked
high-pitch
high-pitched
high-placed
high-pointing
high-pooped
high-potency
high-potential
high-power
high-powered
high-pressure
high-pressure area
high-pressure cylinder
high-pressure methods
high-pressure salesmanship
high-pressured
high-pressuring
high-priced
high-principled
high-priority
high-prized
high-proof
high-protein diet
high-quality
high-raised
high-ranking
high-reaching
high-reared
high-resolved
high-rigger
high-rise
high-rise
 apartment building
high-riser
high-roofed
high-runner
high-school
high-sea
high-seasoned
high-seated
high-set
high-shoe
high-shouldered
high-sided
high-sighted
high-soaring
high-society

high-soled
high-souled
high-sounding
high-sounding words
high-speed
high-speed data handling
high-speed digit computer
high-speed embosser
high-speed memory
high-speed steel
high-speed turn
high-spirited
high-spiritedly
high-spiritedness
high-stepper
high-stepping
high-stomached
high-strung
high-sulphur
high-swelling
high-swollen
high-swung
high-tail
high-tasted
high-temperature cement
high-tempered
high-tension
high-test
high-thoughted
high-throned
high-thundering
high-tide
high-tone
high-toned
high-topped
high-topped shoes
high-tory
high-towered
high-tuned
high-up
high-ups
high-vacuum phototube
high-vaulted
high-velocity
high-vitamin diet
high-voltage
high-voltage probe
high-waisted

high-walled
high-warp
high-water
high-water mark
high-water pants
high-water shrub
high-wing monoplane
high-wire
 artist
high-wrought
highball glass
highbush blueberry
highbush huckleberry
higher algebra
higher apsis
higher arithmetic
higher criticism
higher echelons
higher education
higher fungus
higher mathematics
higher-up
higher-ups
highest category
highest common factor
highest degree
highest pitch
highest point
highest type
highest-ranking
highfalutin ways
highfaluting ways
highland cranberry
highland cudweed
highland fling
highlight halftone
highly colored imagination
highly considered
highly emotional
highly esteemed
highly regarded
highly reputed
highly respectable
highly satisfied
highly strung
highly touted
highly-wrought
highs sounding

hightail it
highty-tighty
highwall tent
highway engineer
highway engineering
highway marker
highway patrol
highway robber
highway robbery
highway trailer
highways and byways
hike out
hike up
hiking trail
hilaro-tragedy
hill clematis
hill climb
hill climber
hill country
hill folk
hill fox
hill grub
hill heaped upon hill
hill myna
hill oat
hill
 of beans
hill palm
hill partridge
hill planter
hill station
hill tit
hill-altar
hill-dwelling
hill-fort
hill-girdled
hill-girt
hill-man
hill-side
hill-surrounded
hill-top
hillbilly music
hillock tree
hillside plow
hilly-billy
hinc illae lacrimae
hind end
hind kidney

hind leg
hind legs
hind part
hind shank
hind wing
hind-calf
hind-foremost
hind-gut
hind-head
hind-sight
hinder part
hinge fault
hinge joint
hinge line
hinge on
hinge plate
hinge strap
hinge tooth
hinge upon
hinge-pole
hinged joint
hinging on
hinging post
hinoki cypress
hint at
hip and thigh
hip bath
hip boot
hip boots
hip brier
hip disease
hip flask
hip girdle
hip joint
hip knob
hip lock
hip molding
hip pocket
hip rafter
hip roll
hip roof
hip rose
hip straps
hip tile
hip vertical
hip-and-valley roof
hip-bone
hip-girdle

hip-gout
hip-huggers
hip-joint
hip-roof
hip-roofed
hip-shot
hipo-
hipp-
hipped on
hipped roof
hippety-hop
hippety-hoppety
hippo-
hippocampal convolution
hippocampal gyrus
hippocras bag
hippocratic oath
hirdie-girdie
hirdum-dirdum
hire
 on
hire out
hire purchase
hire purchase plan
hire-purchase
hire-purchase system
hired applauder
hired car
hired girl
hired gun
hired hand
hired help
hired killer
hired limousine
hired man
hiri Motu
hiring hall
hirse grass
hirsuto-rufous
his heels
his honor
his lordship
his nibs
his phoenix down
his self
his worship
hispano-
hissing sounds

hist-
histamine shock
histo-
historic episcopate
historical documents
historical error
historical geology
historical linguistics
historical materialism
historical materialist
historical method
historical novel
historical painter
historical painting
historical present
historical present tense
historical records
historical school
historical truth
historico-
historico-ethical
history is bunk
history is merely gossip
history of ideas
history of printing
histrionic art
hit a clinker
hit a clip
hit a nerve
hit a slump
hit a sour note
hit a streak of luck
hit against
hit and miss
hit and run
hit at
hit back at
hit batsman
hit
below the belt
hit bottom
hit for
hit home
hit it
hit it big
hit it off
hit it off with
hit it on the nose

hit like lightning
hit man
hit off
hit off on
hit on
hit one for
hit or miss
hit out
hit pay dirt
hit rock bottom
hit show
hit the ball
hit the booze
hit the bottle
hit the brake pedal
hit the campaign trail
hit the ceiling
hit the deck
hit the eye
hit the hay
hit the high spots
hit the jackpot
hit the mark
hit the nail on the head
hit the road
hit the sack
hit the sauce
hit the silk
hit the skids
hit the spot
hit the trail
hit town
hit tune
hit up
hit upon
hit upon a solution
hit you in the eye
hit you where you live
hit-and-miss
hit-and-miss window
hit-and-run
hit-and-run attack
hit-and-run driver
hit-in
hit-off
hit-or-miss
hit-or-missness
hit-run

hit-skip
hitch a ride
hitch and hike
hitch angle
hitch kick
hitch on
hitch pin
hitch rides
hitch up
hitch your wagon to a star
hitch-hiker
hitching post
hitching your wagon to a star
hither and thither
hither and yon
hitting the booze
hitting
 the bottle
hitting the sauce
hitting-up
hitty-missy
hive bee
hive body
hive dross
hive of industry
hive off
hive sirup
hive vine
ho, hum
ho-bird
ho-ho
ho-hum
hoar-frost
hoar-frosted
hoar-stone
hoard up
hoary age
hoary cress
hoary eld
hoary hair
hoary-eyed
hoary-feathered
hoary-haired
hoary-headed
hoary-headed joke
hoary-leaved
hoary-white
hob ferret

hob tap
hob-and-nob
hob-nob
hob-thrush
hobble skirt
hobble-bush
hobbling pilot
hobby shop
hobby-horse
hobnail glass
hobnailed shoes
hobnob with
hobo camp
hobo jungle
hobson's choice
hobson-jobson
hoc anno
hoc est
hock a tchainik
hock cockle
hock leg
hock shop
hock-cart
hock-day
hockey cart
hockey gloves
hockey skate
hockey skates
hockey stick
hocking ale
hocus-pocus
hocus-pocused
hocus-pocusing
hocus-pocussed
hocus-pocussing
hod carrier
hoddy-doddy
hodge-podge
hodge-pudding
hodgkin's disease
hoe culture
hoe drill
hoe in
hoe into
hoe-cake
hoe-plough
hog ape
hog apple

hog badger
hog brake
hog call
hog caterpillar
hog chain
hog cholera
hog
 deer
hog flu
hog for, a
hog frame
hog gum
hog hair
hog hook
hog in armour
hog jowl
hog lard
hog louse
hog mane
hog millet
hog money
hog peanut
hog piece
hog plum
hog pox
hog score
hog sheer
hog stave
hog sucker
hog truss
hog turn
hog wallow
hog wire
hog's back
hog's bean
hog's fennel
hog's pudding
hog's-back
hog- wash
hog-backed
hog-brace
hog-cote
hog-deer
hog-faced
hog-fat
hog-fish
hog-frame
hog-louse

hog-maned
hog-mouthed
hog-necked
hog-nose
hog-nose snake
hog-nosed
hog-nut
hog-plum
hog-raising
hog-reeve
hog-score
hog-skin
hog-tie
hog-tied
hog-tight
hog-trough
hog-wash
hog-wild
hogen mogen
hogger pump
hogging-frame
hognose snake
hognosed skunk
hohl-flute
hoi polloi
hoisin sauce
hoist a banner
hoist by
hoist by your own petard
hoist loader
hoist sail
hoist the blue Peter
hoist the white flag
hoist with
hoist-
hoisting gaff
hoisting machine
hoisting yard
hoity-toitiness
hoity-toity
hoity-toityism
hoity-toityness
hoke act
hoke comic
hoke up
hoker moker
hokey cokey
hokey-pokey

hokum
act
hokum comic
hol-
hold a brief for
hold a candle to
hold a card
hold a close wind
hold a conversation
hold a course
hold a funeral
hold a heading
hold a high opinion of
hold a loose rein
hold a low opinion of
hold a meeting
hold a middle course
hold a post
hold a press conference
hold a seance
hold a session
hold a sitting
hold a tight hand upon
hold aces
hold against
hold aloof
hold aloof from
hold an idea
hold as
hold at bay
hold at your beck and call
hold away from
hold back
hold beam
hold beneath contempt
hold beneath one
hold by
hold captive
hold cheap
hold communication
hold conference
hold control
hold court
hold dear
hold down
hold down a job
hold everything
hold fast

hold for
hold for ransom
hold forth
hold forth without interruption
hold good
hold hands
hold in
hold in abomination
hold in bondage
hold in captivity
hold in check
hold in consideration
hold in contempt
hold in custody
hold in derision
hold in esteem
hold in fee simple
hold in hand
hold in leading strings
hold
in leash
hold in low esteem
hold in mind
hold in restraint
hold in reverence
hold in solution
hold in subjection
hold in swaddling clothes
hold in the thoughts
hold in thrall
hold in view
hold it
hold it against
hold jubilee
hold membership
hold no brief for
hold off
hold office
hold on
hold on a course
hold on like a bulldog
hold on the course
hold on to
hold opposite views
hold out
hold out a helping hand
hold out against
hold out an expectation

hold out hope
hold out on
hold out promise
hold out the hand
hold out the olive branch
hold out the right of fellowship
hold out the right of friendship
hold over
hold over your head
hold prisoner
hold spellbound
hold steady
hold steady for
hold the attention
hold the bag
hold the belief
hold the course
hold the field
hold the fort
hold the helm
hold the interest
hold the line
hold the market
hold the memory of
hold the mirror up to nature
hold the phone
hold the prerogative
hold the promptbook
hold the proxy of
hold the purse strings
hold
the reins
hold the ring of truth
hold the sack
hold the scales
hold the stage
hold the thought
hold the wire
hold tight
hold to
hold together
hold true
hold under close arrest
hold under house arrest
hold up
hold up in the wash
hold up the hand
hold up the mirror to

hold up to public ridicule
hold up to public scorn
hold up to public shame
hold up to reprobation
hold up to shame
hold up to view
hold up your hand
hold up your head
hold water
hold with
hold yard
hold your breath
hold your course
hold your end up
hold your eye
hold your gaze
hold your ground
hold your hand
hold your head above water
hold your head high
hold your horses
hold your jaw
hold your lip
hold your nose in the air
hold your own
hold your path
hold your peace
hold your sides
hold your tongue
hold your way
hold yourself aloof
hold yourself apart
hold yourself erect
hold yourself in readiness
hold yourself stiff
hold yourself straight
hold-all
hold-back
hold-clear
hold-down
hold-off
hold-up
hold-up bill
holder of
 the legal estate
holder-forth
holder-on
holder-up

holding back
holding company
holding furnace
holding ground
holding in
holding in remembrance
holding paddock
holding pattern
holding together
holding-out partner
holdup job
holdup man
hole card
hole in one
hole in the heart
hole in the wall
hole out
hole to creep out of
hole up
hole-and-comer
hole-and-corner
hole-high
hole-in-corner
holes in
holey dollar
holiday camp
holiday-maker
holiday-making
holier than the Pope
holier-than-thou
holistic approach
holistic medicine
hollandaise sauce
holler out
hollo after
hollow back
hollow heart
hollow horn
hollow hunger
hollow man
hollow mockery
hollow newel
hollow organ
hollow out
hollow pretense
hollow sea
hollow shell
hollow threat

hollow truce
hollow ware
hollow-back
hollow-backed
hollow-billed
hollow-cheeked
hollow-chested
hollow-eyed
hollow-footed
hollow-forge
hollow-forged
hollow-forging
hollow-fronted
hollow-ground
hollow-hearted
hollow-horned
hollow-jawed
hollow-pointed
hollow-root
hollow-toned
hollow-toothed
hollow-vaulted
hollow-voiced
hollow-ware
holly
 fern
holly green
holly oak
holly-green
holly-leaved
hollyhock anthracnose
hollyhock fungus
hollyhock rust
hollywood bed
holm cock
holm oak
holm thrush
holm tree
holm-oak
holm-tree
holo-
holocrine gland
holographic will
holstein-friesian
holster pipe
holus-bolus
holy Christ
holy Christmas

holy Moses
holy bread
holy cats
holy city
holy clover
holy communion
holy cow
holy cross
holy day
holy day of obligation
holy days
holy dollar
holy father
holy fire
holy ghost
holy grail
holy grass
holy hour
holy innocents' day
holy joe
holy land
holy mackerel
holy man
holy matrimony
holy mess
holy of holies
holy office
holy oil
holy order
holy orders
holy place
holy rite
holy roller
holy roman empire
holy rood
holy saturday
holy see
holy shit
holy smoke
holy spirit
holy stone
holy synod
holy table
holy terror
holy thistle
holy thursday
holy tide
holy war

holy water
holy water sprinkle
holy water sprinkler
holy wedlock
holy week
holy
well
holy writ
holy year
holy-day
holy-minded
holy-mindedness
holy-water basin
holy-water font
holy-water sprinkler
holy-water stoup
hom-
home address
home appliance
home base
home brew
home builder
home circle
home defense army
home dweller
home economics
home economist
home free
home fried potatoes
home fries
home front
home furnishings
home guard
home in on
home is where you start
home life
home mission
home missionary
home office
home on
home permanent
home place
home plate
home range
home reserve
home reserves
home roof
home room

home rule
home ruler
home run
home sheltered
home signal
home station
home stretch
home study
home sweet home
home teacher
home thrust
home tie
home town
home towner
home truth
home-
home-abiding
home-along
home-baked
home-born
home-bred
home-brew
home-brewed
home-bringing
home-building
home-built
home-come
home-coming
home-driven
home-dwelling
home-faring
home-fed
home-felt
home-going
home-growing
home-grown
home-keeping
home-killed
home-loving
home-made
home-owning
home-raised
home-reared
home-sailing
home-sent
home-sick
home-sickness
home-staying

home-thrust
home-woven
homeless
 waif
homely as a mud fence
homely enough to sour milk
homely enough to stop a clock
homeo-
homeopathic dose
homeopathic magic
homestead law
homeward bound
homeward-bound
homeward-bounder
homicidal maniac
homing device
homing guidance
homing pigeon
homing rocket
homing torpedo
hominy grits
homme de cour
homme moyen sensuel
homo faber
homo sapiens
homo signorum
homo-
homo-hetero-analysis
homo-organ
homoeo-
homogeneous coordinates
homogeneous reactor
homogenized milk
homogentisic acid
homoi-
homoio-
homologous chromosomes
homologous vaccine
homolographic projection
homolosine projection
homolytic fission
homonymous construction
homosexual marriage
homosexual neurosis
homothetic transformation
hone for
honest as the day is long
honest injun

honest man
honest person
honest sweat
honest woman
honest-to-God
honey ant
honey badger
honey bag
honey ball
honey balm
honey
bear
honey beige
honey bell
honey bird
honey blond
honey bottle
honey bread
honey bunch
honey buzzard
honey cake
honey cherry
honey child
honey clover
honey creeper
honey crisp
honey eater
honey extractor
honey fly
honey fungus
honey garlic
honey gilding
honey gland
honey grass
honey guide
honey jack
honey kite
honey locust
honey lotus
honey maker
honey making
honey mesquite
honey moth
honey mouse
honey mushroom
honey palm
honey plant
honey ratel

honey sac
honey stomach
honey tree
honey tube
honey up
honey vine
honey weasel
honey whip
honey yellow
honey-bear
honey-bearing
honey-bee
honey-bird
honey-blond
honey-bloom
honey-buzzard
honey-color
honey-colored
honey-dew
honey-drop
honey-dropping
honey-eater
honey-eating
honey-flower
honey-flowing
honey-gathering
honey-guide
honey-heavy
honey-laden
honey-loaded
honey-month
honey-mouthed
honey-pot
honey-secreting
honey-stalks
honey-steeped
honey-stone
honey-stored
honey-storing
honey-sweet
honey-tasting
honey-tongued
honey-voiced
honey-yielding
honeycomb
coral
honeycomb isinglass
honeycomb moth

honeycomb radiator
honeycomb ringworm
honeycomb sponge
honeycomb stitch
honeycomb stomach
honeycomb tripe
honeycomb work
honeydew melon
honeyed phrases
honeyed tongue
honeyed words
honeymoon bridge
honeysuckle apple
honeysuckle clover
honeysuckle family
honeysuckle grass
honeysuckle ornament
honeysuckle tree
honi soit qui mal y pense
honk the horn
honky-tonk
honor a bill
honor be to
honor before
honor bright
honor card
honor guard
honor man
honor medal
honor point
honor price
honor roll
honor society
honor system
honor trick
honor-bound
honor-fired
honor-giving
honor-owing
honor-thirsty
honorable descent
honorable discharge
honorable mention
honorable ordinary
honorary canon
honorary member
honoris causa
honors course

honors of war
honour school
honourable discharge
honours list
honours of war
hoo-ha
hooch hound
hood cap
hood clock
hood end
hood molding
hood mould
hood-crowned
hood-mould
hood-shaped
hooded barley
hooded crow
hooded
grass
hooded matweed
hooded seal
hooded top
hooded warbler
hoodie crow
hoodman-blind
hoof foot
hoof it
hoof-and-mouth disease
hoof-bound
hoof-cast
hoof-cut
hoof-plowed
hoof-printed
hoof-shaped
hoofed animal
hook a ride
hook and butt
hook and eye
hook and ladder
hook bolt
hook check
hook climber
hook gauge
hook in
hook into
hook it
hook ladder
hook maker

hook money
hook pin
hook rug
hook scarf
hook screw
hook shot
hook slide
hook spanner
hook squid
hook up
hook up with
hook wrench
hook, line, and sinker
hook-and-ladder
hook-and-ladder company
hook-and-ladder truck
hook-armed
hook-backed
hook-beaked
hook-bill
hook-billed
hook-collector transistor
hook-handed
hook-headed
hook-nose
hook-nosed
hook-shaped
hook-shouldered
hook-snouted
hook-tipped
hook-up
hooked into
hooked on
hooked rug
hookem-snivey
hooker-off
hooker-on
hooker-out
hooker-over
hooker-up
hookup wire
hookworm disease
hooky-crooky
hoop ash
hoop back
hoop bundler
hoop iron
hoop petticoat

hoop pine
hoop shell
hoop skirt
hoop snake
hoop
 tension
hoop tree
hoop willow
hoop withe
hoop-back
hoop-coop plant
hoop-la
hoop-petticoat
hoop-petticoat narcissus
hoop-shaped
hoop-stick
hooping-cough
hoopla campaign
hoosier town
hoot owl
hoot toot
hootchie-kootchie
hootchy-kootch
hootchy-kootchies
hootchy-kootchy
hootchy-kootchy show
hoover apron
hop along
hop aphid
hop back
hop borer
hop clover
hop dog
hop flea beetle
hop flour
hop fly
hop froth fly
hop gland
hop grub
hop hornbeam
hop in
hop into
hop jack
hop kiln
hop looper
hop louse
hop meal
hop merchant

hop mildew
hop mold
hop moth
hop off
hop oil
hop plant
hop plant borer
hop sack
hop sacking
hop step and jump
hop to it
hop tree
hop trefoil
hop up
hop-about
hop-garden
hop-o'-my-thumb
hop-o-my-thumb
hop-picker
hop-sack
hop-sacking
hop-shaped
hop-yard
hope against hope
hope and pray
hope chest
hope deferred
hope for
hope for the best
hope in
hope to God
hope to die
hoped-for
hopeful prognosis
hopeless case
hoping against hope
hoplo-
hopped up
hopped-up
hopper barge
hopper
car
hopper casement
hopper closet
hopper dredge
hopper frame
hopper light
hopper salt

hopper vent
hopper window
hopper-bottom car
hopper-shaped
hopping John
hopping mad
hopvine moth
hopvine thecla
horehound motherwort
horizon blue
horizon distance
horizon glass
horizontal axis
horizontal bar
horizontal deflector
horizontal engine
horizontal fault
horizontal fire
horizontal line
horizontal mobility
horizontal parallax
horizontal plane
horizontal projection
horizontal stabilizer
horizontal synchronizer
horizontal synchronizing pulse
horizontal union
hormic psychology
hormic theory
horn alligator
horn arrester
horn balance
horn bar
horn bowsprit
horn bug
horn chestnut
horn die
horn fly
horn gap
horn gate
horn in
horn knot
horn lead
horn of Amalthea
horn of plenty
horn ore
horn player
horn poppy

horn pout
horn pox
horn reflector
horn silver
horn timber
horn-book
horn-eyed
horn-fish
horn-footed
horn-mad
horn-madness
horn-owl
horn-plate
horn-rimmed
horn-rimmed glasses
horn-rims
horn-shaped
horn-silver
horn-wood
hornbill
 cuckoo
hornblende schist
hornblende-gabbro
horned dinosaur
horned lark
horned lizard
horned owl
horned poppy
horned pout
horned rattlesnake
horned screamer
horned snake
horned toad
horned viper
horned whiff
hornet comb
hornet fly
hornet's nest
hornless cow
horns of a dilemma
horny coral
horny-fingered
horny-fisted
horny-hoofed
horny-knuckled
horny-nibbed
horny-toad
horror picture

horror vacui
horror-crowned
horror-fraught
horror-inspiring
horror-loving
horror-stricken
horror-struck
hors concours
hors d'oeuvre
hors d'oeuvres
hors de combat
horse aloes
horse ant
horse around
horse artillery
horse bean
horse blanket
horse block
horse boat
horse boot
horse bot
horse bow
horse box
horse brass
horse brier
horse chanter
horse chestnut
horse clipper
horse conch
horse coper
horse courser
horse dam
horse dealer
horse devil
horse doctor
horse drench
horse driver
horse duck
horse elder
horse emmet
horse fiddle
horse fly
horse gentian
horse gentler
horse ginseng
horse
godmother
horse gowan

horse guard
horse hoe
horse iron
horse latitudes
horse laugh
horse litter
horse louse
horse mackerel
horse marine
horse master
horse mint
horse mushroom
horse nettle
horse nop
horse of a different color
horse of another color
horse opera
horse parlor
horse pick
horse pistol
horse plum
horse post
horse race
horse racer
horse racing
horse railroad
horse railway
horse rake
horse rasp
horse rough
horse savin
horse scraper
horse sense
horse show
horse sickness
horse soldier
horse sugar
horse tail
horse thistle
horse tick
horse timber
horse towel
horse trade
horse trader
horse trading
horse trainer
horse training
horse wrangler

horse's ass
horse's neck
horse-and-buggy
horse-back
horse-bitten
horse-block
horse-boat
horse-box
horse-boy
horse-bread
horse-breaker
horse-car
horse-chestnut
horse-collar
horse-coper
horse-corser
horse-course
horse-dealing
horse-drawn
horse-eye
horse-faced
horse-fair
horse-fish
horse-flesh
horse-fly
horse-foot
horse-godmother
horse-guard
horse-head
horse-hoe
horse-hoof
horse-hour
horse-jockey
horse-laugh
horse-leech
horse-litter
horse-load
horse-loving
horse-mackerel
horse-marine
horse-master
horse-matcher
horse-mill
horse-mint
horse-nail
horse-owning
horse-play
horse-plum

horse-pond
horse-power
horse-pox
horse-race
horse-radish
horse-scorser
horse-sense
horse-tail
horse-taming
horse-trade
horse-traded
horse-trading
horseback
 rider
horseback riding
horseflesh ore
horsefoot snipe
horsehair worm
horseless carriage
horsepower-hour
horsepower-year
horseshoe arch
horseshoe back
horseshoe bat
horseshoe crab
horseshoe kidney
horseshoe magnet
horseshoe nail
horseshoe snake
horseshoe-shaped
horsetail agaric
horsetail mushroom
horsetail tree
horsing around
hortatory address
hortus clusus
hortus siccus
hose cart
hose cock
hose company
hose down
hose duck
hose grass
hose hook
hose jacket
hose reel
hose truck
hose-in-hose

hose-net
hosing down
hospital administrator
hospital bed
hospital cleanliness
hospital corner
hospital fever
hospital
 gangrene
hospital light
hospital lock
hospital room
hospital service contract
hospital ship
hospital staff
hospital station
hospital steward
hospital train
hospital window
hospitalization insurance
host of heaven
host of hell
host plant
hostages to fortune
hostel school
hostess gown
hostess house
hostess-ship
hostile criticism
hostile expedition
hostile personality
hostile reaction
hostile witness
hot about
hot air
hot as blazes
hot as fire
hot as hell
hot as pepper
hot as the hinges of hell
hot atom
hot bath
hot bed
hot blast
hot blood
hot box
hot buttered rum
hot cake

hot cereal
hot chisel
hot chocolate
hot circuit
hot cockles
hot cold-working
hot corner
hot cross bun
hot day
hot diggety
hot dog
hot economy
hot enough to roast an ox
hot flash
hot for
hot galvanizing
hot goods
hot head
hot iron
hot issue
hot items
hot jazz
hot lead
hot lick
hot light
hot line
hot luncheon
hot metal
hot money
hot number
hot off the fire
hot off the griddle
hot off the press
hot off the spit
hot on
hot
pack
hot pack method
hot pants
hot pepper
hot place
hot plate
hot pot
hot potato
hot press
hot pursuit
hot roast beef sandwich
hot rod

hot rodder
hot sauces
hot seat
hot shot
hot shower
hot spot
hot spring
hot stuff
hot switch
hot tear
hot temper
hot tip
hot toddy
hot trimmer
hot type
hot under the collar
hot up
hot war
hot water
hot wave
hot weather
hot well
hot wind
hot ziggety
hot-air
hot-air artist
hot-air balloon
hot-air engine
hot-air heat
hot-air heating
hot-air treatment
hot-air-heat
hot-air-heated
hot-blast
hot-blast system
hot-blooded
hot-bloodedness
hot-brain
hot-breathed
hot-bright
hot-broached
hot-bulb engine
hot-cathode tube
hot-cold
hot-deck
hot-dip coating
hot-dipped
hot-dog

hot-dog stand
hot-draw
hot-drawing
hot-drawn
hot-drew
hot-dry
hot-eyed
hot-foot
hot-forged
hot-galvanize
hot-gospeller
hot-headed
hot-hoof
hot-house
hot-house plant
hot-humid
hot-livered
hot-metal typesetting
hot-mettled
hot-mix
hot-moist
hot-pot
hot-press
hot-presser
hot-punched
hot-roll
hot-rolled
hot-short
hot-shortness
hot-shot
hot-spirited
hot-spot
hot-spotted
hot-spotting
hot-stomached
hot-stove
 league
hot-swage
hot-tempered
hot-vulcanized
hot-water bag
hot-water bottle
hot-water cylinder
hot-water fit
hot-water heater
hot-water heating
hot-water pipe
hot-water-heat

hot-water-heated
hot-windy
hot-wire
hot-wire meter
hot-wire microphone
hot-work
hot-work steel
hotbed sash
hotel broker
hotel detective
hotel lock
hotel manager
hotel rack
hothouse lamb
hotsy-totsy
hotted up
hough-sinew
hound dog
hound on
hound to destruction
hound's tooth
hound's-tongue
hound's-tooth
hound's-tooth check
hound-dog
hound-fish
hound-marked
hounds-berry
houndstooth check
hour after hour
hour angle
hour bell
hour book
hour by hour
hour circle
hour hand
hour line
hour plate
hour stroke
hour watch
hour wheel
hour-circle
hour-glass
hour-long
hourglass figure
hourglass of time
hourglass screw
hourglass spider

hourglass spring
hourglass stomach
hourglass worm
hourglass-shaped
house agent
house and grounds
house
 and lot
house ant
house arrest
house barge
house built on sand
house car
house cat
house centipede
house chambermaid
house cleaner
house counsel
house crow
house curtain
house decorator
house detective
house dick
house divided against itself
house doctor
house dog
house dove
house drain
house dress
house duty
house factor
house farmer
house finch
house flag
house furnisher
house furnishing
house furnishings
house god
house guest
house holly fern
house in
house jobber
house knacker
house lights
house manager
house martin
house mosquito
house mouse

house mover
house moving
house of God
house of assembly
house of assignation
house of burgesses
house of cards
house of commons
house of correction
house of death
house of delegates
house of detention
house of ill fame
house of ill repute
house of joy
house of life
house of lords
house of prayer
house of prostitution
house of representatives
house of worship
house organ
house painter
house party
house physician
house place
house plan
house
plant
house servant
house slipper
house snake
house sparrow
house staff
house steward
house surgeon
house tax
house track
house trailer
house trap
house trim
house wagon
house wrecker
house wren
house-boat
house-broken
house-builder
house-cap

house-craft
house-dog
house-dove
house-father
house-headship
house-mother
house-place
house-proud
house-raising
house-room
house-search
house-to-house
house-to-house combat
house-top
house-train
house-warming
housed string
household ammonia
household art
household cavalry
household effects
household franchise
household goddess
household gods
household goods
household name
household suffrage
household troop
household troops
household word
household words
household-stuff
housemaid's knee
housey-housey
housing bill
housing development
housing estate
housing problem
housing project
housing scheme
hove to
hover fly
hover hawk
hover over
hovering accent
hovering act
how about that
how are you

how come
how do
how do you do
how does she head
how far
how
 goes it
how is it that
how is your rudder
how it goes
how it is
how now
how should I know
how the land lies
how the wind blows
how they fall
how things are
how things stack up
how things stand
how you doin'
how's every little thing
how's the world treating you
how's things
how's tricks
how-d'ye-do
how-de-do
how-do-ye
how-do-ye-do
how-do-you-do
how-to
how-to book
howdy-do
however that may be
howgozit curve
howl down
howl like all the devils of hell
howler monkey
howling monkey
howling success
howling wilderness
howling wind
hoyle shooting
hr factor
hr-
hub a dub
hub borer
hub brake
hub braking

hub driller
hub dynamometer
hub maker
hub odometer
hub of industry
hub turner
hub-band
hub-bander
hub-banding
hub-boring
hub-deep
hub-turning
hubba hubba
hubble-bubble
huckle-bone
hudder-mudder
huddle on
hudson seal
hue and cry
hue cycle
huff and puff
huff-cap
huff-duff
huff-shouldered
huff-snuff
hug the coast
hug the earth
hug the land
hug the shore
hug yourself
hug-me-tight
huge-armed
huge-bellied
huge-bodied
huge-boned
huge-built
huge-grown
huge-horned
huge-jawed
huge-limbed
huge-looking
huge-proportioned
huge-tongued
hugger-mugger
hugger-muggeries
hugger-muggery
hula

girl
hula hoop
hula skirt
hula-hula
hull balance
hull down
hull efficiency
hull girder
hull insurance
hull up
hull-less
hull-less oat
hulling line
hully gully
hum and haw
hum note
hum tone
hum-bird
human being
human dynamo
human ecology
human engineering
human equation
human error
human factor
human family
human form
human frailty
human geography
human interest
human mountain
human nature
human paleontology
human race
human rights
human sacrifice
human species
human weakness
human wreck
human-headed
human-interest story
humane letters
humane society
humanistic scholarship
humanistic therapy
humanized vaccine
humanly possible
humanum est errare

humble apology
humble pie
humble plant
humble yourself
humble yourself before
humble-bee
humble-looking
humble-mannered
humble-minded
humble-mindedly
humble-mindedness
humble-spirited
humble-visaged
humbled
pride
humbug-proof
humeral veil
humero-
humero-olecranal
humic acid
humid weather
humidity control
humidity indicator
humidity instrument
humidity wind rose
humidity-proof
humiliate yourself
humite group
hummel corn
humming top
humming-bird
hummingbird moth
hump it
hump speed
hump yard
hump yourself
hump-backed
hump-shaped
hump-shoulder
hump-shouldered
humpback bridge
humpback whale
humpbacked salmon
humped cattle
humpty dumpty
humpty-dumpty
hunch down
hundred days

hundred per cent
hundred's place
hundred-dollar
hundred-dollar bill
hundred-eyed
hundred-feathered
hundred-footed
hundred-handed
hundred-headed
hundred-leaf
hundred-leaved
hundred-legged
hundred-legs
hundred-mile
hundred-percent
hundred-percent American
hundred-percenter
hundred-pound
hundred-pounder
hundred-to-one shot
hundred-yard dash
hundred-year
hundreds and thousands
hundredth's place
hung jury
hung over
hung up
hung up on
hung-up
hunger after
hunger belt
hunger for
hunger grass
hunger
 march
hunger marcher
hunger strike
hunger striker
hunger-bit
hunger-bitten
hunger-driven
hunger-mad
hunger-pressed
hunger-starve
hunger-stricken
hunger-stung
hunger-worn
hungry as a bear

hungry mouth
hungry rice
hunk of a man
hunker down
hunky-dory
hunt and peck
hunt board
hunt box
hunt button
hunt down
hunt for
hunt in couples
hunt out
hunt table
hunt the slipper
hunt through
hunt up
hunt's-up
hunter green
hunter trials
hunter's green
hunter's moon
hunter's pink
hunter's robe
hunter-killer submarine
hunting box
hunting cap
hunting case
hunting cat
hunting chair
hunting cry
hunting dog
hunting expedition
hunting ground
hunting horn
hunting knife
hunting leopard
hunting license
hunting lodge
hunting miter
hunting shirt
hunting spider
hunting sword
hunting trip
hunting watch
hunting-ground
huntsman's-cup
hurdle race

hurdle racer
hurdle work
hurdles, the
hurdy-gurdies
hurdy-gurdist
hurdy-gurdy
hurdy-gurdy man
hurdy-gurdyist
hurl a brickbat
hurl against
hurl at
hurl at the head of
hurl
 defiance
hurl forth
hurl-bone
hurley stick
hurley-hacket
hurly burly
hurly-burlies
hurly-burly
hurr-bur
hurrah campaign
hurricane bird
hurricane deck
hurricane globe
hurricane house
hurricane hunter
hurricane lamp
hurricane lantern
hurricane signal
hurricane tracking
hurricane warning
hurricane-decked
hurricane-force wind
hurricane-hunter aircraft
hurricane-proof
hurry about
hurry along
hurry away
hurry call
hurry off
hurry on
hurry through
hurry up
hurry-burry
hurry-scurried
hurry-scurry

hurry-scurrying
hurry-skurried
hurry-skurry
hurry-skurrying
hurry-up
hurst beech
hurt the feelings
husband and wife
husband your resources
husband-to-be
hush as death
hush money
hush my mouth
hush of night
hush puppy
hush ship
hush shop
hush tube
hush up
hush your mouth
hush-boat
hush-hush
hush-money
hush-up
hushed attention
hushed-up
husk corn
husk tomato
husk-tomato
husking bee
husking glove
husking peg
husky eater
hustings court
hustle out
hustle up
hustle-cap
hut circle
hut-keep
hut-shaped
hutch
 table
hutia carabali
hutia conga
hw-
hy-spy
hyacinth bacteriosis
hyacinth bean

hyacinth blue
hyacinth red
hyacinth squill
hyacinth violet
hyacinth-flowered
hyal-
hyaline cartilage
hyaline degeneration
hyaline membrane disease
hyalo-
hyaloid membrane
hyaluronic acid
hybern-
hybrid computer
hybrid corn
hybrid perpetual
hybrid perpetual rose
hybrid stop
hybrid tea
hybrid tea rose
hybrid vigor
hybrid vigour
hybrid word
hydatid cyst
hydatid mole
hydnocarpic acid
hydr-
hydrangea blue
hydrargyri subchloridum
hydrated alumina
hydrated lime
hydration number
hydraulic accumulator
hydraulic brake
hydraulic coupling
hydraulic engine
hydraulic engineer
hydraulic fluid
hydraulic jump
hydraulic lift
hydraulic machinery
hydraulic mining
hydraulic motor
hydraulic organ
hydraulic pile
hydraulic power
hydraulic press
hydraulic radius

hydraulic ram
hydraulic servo
hydraulic suspension
hydraulic tailgate
hydraulic torque converter
hydraulic-fill dam
hydraulico-
hydrazo group
hydrazo radical
hydrazoic
 acid
hydriodic acid
hydro-
hydro-aeroplane
hydro-airplane
hydro-electric
hydro-jet
hydro-pneumatic
hydro-ski
hydro-ureter
hydrobromic acid
hydrocarbon cement
hydrochloric acid
hydrocinnamic aldehyde
hydrocinnamoyl group
hydrocinnamoyl radical
hydrocinnamyl group
hydrocinnamyl radical
hydrocyanic acid
hydroelectric plant
hydroelectric power
hydrofluoric acid
hydrogen arsenide
hydrogen blast
hydrogen bomb
hydrogen bond
hydrogen bromide
hydrogen carbonate
hydrogen chloride
hydrogen cyanide
hydrogen dioxide
hydrogen electrode
hydrogen fluoride
hydrogen iodide
hydrogen ion
hydrogen oxide
hydrogen peroxide
hydrogen selenide

hydrogen silicide
hydrogen sulfide
hydrogen sulphate
hydrogen sulphide
hydrogen sulphite
hydrogen tartrate
hydrogen telluride
hydrogen-bomb
hydrogenated fat
hydrographic chart
hydrographic oceanographic
hydrologic cycle
hydromellitic acid
hydrometric pendulum
hydronium ion
hydrophobia cat
hydrostatic balance
hydrostatic head
hydrosulfurous acid
hydrosulphurous acid
hydrotelluric
 acid
hydrothermal water
hydroxide ion
hydroxonium ion
hydroxy acid
hydroxy aldehyde
hydroxy ketone
hydroxy-
hydroxyacetic acid
hydroxybenzoic acid
hydroxybutyric acid
hydroxyl group
hydroxyl radical
hydroxysuccinic acid
hyena poison
hyena-dog
hyet-
hyetal wind rose
hyeto-
hygr-
hygro-
hyl-
hylo-
hymeneal rites
hymeno-
hymn book
hymn maker

hymn making
hymn of praise
hymn singer
hymn singing
hymn tune
hymn writer
hymn writing
hymn-loving
hymn-tune
hymnal stanza
hyo-
hyodeoxycholic acid
hyodesoxycholic acid
hyoid bone
hyp-
hypabyssal rock
hyped up
hyper-
hyper-Dorian
hyperbaric therapy
hyperbolic function
hyperbolic geometry
hyperboreal blast
hyperborean blast
hyperchromic anemia
hypercomplex number
hyperemesis gravidarum
hyperesthesia theory
hyperfine structure
hyperfocal distance
hypergeometric distribution
hypergeometric equation
hypergeometric function
hyperplastic inflammation
hypersonic speed
hypertensive heart disease
hypertrophic arthritis
hypertrophic inflammation
hyphenated
American
hypn-
hypnagogic image
hypno-
hypnotic sleep
hypnotic somnolence
hypnotic suggestion
hypnotic trance
hypo ionian mode

hypo-
hypo-alum
hypo-ovarianism
hypoaeolian mode
hypoantimonic acid
hypochlorous acid
hypochromic anemia
hypocotyl arch
hypocrite plant
hypodermic injection
hypodermic needle
hypodermic syringe
hypodermic tablet
hypodorian mode
hypodynamia cordis
hypogastric artery
hypoglossal nerve
hypoglycemic shock
hypoglycemic shock therapy
hypoid gear
hypoionian mode
hypolocrian mode
hypolydian mode
hypomixolydian mode
hyponitrous acid
hypophosphoric acid
hypophosphorous acid
hypophrygian mode
hypophysis cerebri
hypoplastic anemia
hypospray injection
hyposulfurous acid
hyposulphurous acid
hypothecated stock
hypothesis ad hoc
hypothesis and verification
hypothetical imperative
hypothetico-disjunctive
hyps-
hypsi-
hypso-
hyraci-
hyson skin
hyssop loosestrife
hyssop oil
hyssop skullcap
hyssop spurge
hyssop violet

hyssop-leaved
hyst-
hyster-
hysteresis coefficient
hysteresis
curve
hysteresis loop
hysteresis loss
hysteresis meter
hysteria libidinosa
hysteria-proof
hysterical aphonia
hysterical epilepsy
hysterical fever
hysterical mutism
hystero-
hystero-epilepsy
hystero-epileptic
hystero-epileptogenic
hystero-oophorectomy
hystero-salpingostomy
hysteron proteron
hysteron-proteron
i beam
i-
i-come
i-cried
i-fere
i-type semiconductor
ia-
iambic pentameter
iatro-
iatrogenic disease
ibn-Batuta
ibn-Rushd
ibn-Saud
ibn-Sina
ice age
ice anchor
ice apron
ice ax
ice axe
ice bag
ice banner
ice barrier
ice beam
ice bear
ice belt

ice bird
ice bridge
ice bucket
ice bulletin
ice calorimeter
ice canoe
ice cap
ice cave
ice chest
ice chipper
ice chopper
ice claw
ice code
ice collar
ice color
ice concrete
ice cream
ice creeper
ice crusher
ice crystal
ice crystals
ice cube
ice cuber
ice cubes
ice cutter
ice dealer
ice dike
ice dock
ice drag
ice duck
ice feathers
ice fern
ice field
ice fish
ice fishing
ice floe
ice flower
ice flowers
ice fog
ice foot
ice fork
ice fox
ice front
ice
glass
ice gorge
ice gull
ice gush

ice hockey
ice hook
ice house
ice island
ice jam
ice lance
ice lead
ice line
ice lolly
ice machine
ice maker
ice making
ice master
ice milk
ice nail
ice needle
ice over
ice pack
ice pail
ice paper
ice partridge
ice pellets
ice period
ice petrel
ice pick
ice pillar
ice pilot
ice pink
ice pinnacle
ice plant
ice plow
ice point
ice raft
ice rain
ice rampart
ice rink
ice river
ice run
ice scraper
ice shaver
ice shed
ice sheet
ice shelf
ice ship
ice show
ice skate
ice skates
ice skating

ice sky
ice spar
ice spur
ice stick
ice storm
ice stream
ice ton
ice tongs
ice tongue
ice up
ice water
ice whale
ice yacht
ice yachting
ice yachtsman
ice-bird
ice-blind
ice-boat
ice-bolt
ice-bound
ice-breaker
ice-breaking
ice-brook
ice-built
ice-cap
ice-capped
ice-chipping
ice-clad
ice-cold
ice-cool
ice-cooled
ice-covered
ice-cream
ice-cream cone
ice-cream fork
ice-cream freezer
ice-cream soda
ice-cream sundae
ice-crushing
ice-crusted
ice-cube
ice-cube machine
ice-cubing
ice-cutting
ice-encrusted
ice-enveloped
ice-fall
ice-field

ice-floe
ice-foot
ice-free
ice-green
ice-hill
ice-hook
ice-house
ice-imprisoned
ice-island
ice-laid
ice-locked
ice-master
ice-mountain
ice-plant
ice-plough
ice-scoured
ice-sheet
ice-skate
ice-skated
ice-skating
ice-stream
ice-work
iceberg
 lettuce
icebox cake
iced coffee
iced tea
iced-tea spoon
iceland moss
iceland poppy
iceland spar
ich dien
ichn-
ichneumon fly
ichneumon-
ichthy-
ichthyo-
ichthyophthirius disease
icing sugar
icon-
iconic memory
icono-
icos-
icterus index
icy blasts
icy calm
icy clutch of dread
icy fingers of dread

icy nerves
icy pole
icy wind
icy-cold
id est
idea afloat
idea man
idea of pure reason
idea of reference
idea, the
ideal element
ideal gas
ideal gas equation or law
ideal gas law
ideal of pure reason
ideal point
ideal specific impulse
ideal type
idee fixe
idee-force
idee-maitresse
identical equation
identical proposition
identical rhyme
identical same
identical twin
identical twins
identification badge
identification
bracelet
identification light
identification mark
identification parade
identification space
identification tag
identification thread
identified as
identify with
identify yourself with
identity card
identity crisis
identity matrix
identity theory of mind
ideo-
ideo-unit
ideogrammatic character
ideogrammatic symbol
ideogrammic character

ideogrammic symbol
ideographic character
ideographic symbol
ideopathic epilepsy
ides of March
idio-
idiom dictionary
idiomorphic-granular
idiot board
idiot box
idiot card
idiot savant
idiot savants
idiot sheet
idiot stitch
idiot work
idiot's delight
idiotic grin
idiots savants
idle away
idle away time
idle chat
idle chatter
idle chatterer
idle current
idle fancy
idle gear
idle gossip
idle hands
idle hours
idle pulley
idle rich
idle talk
idle threat
idle wheel
idle-brained
idle-handed
idle-headed
idle-looking
idle-minded
idle-pated
idle-witted
idler gear
idler pulley
idler wheel
idol breaker
idol worship
idol worshiper

idol worshiping
idolo-
idols
 of the cave
idols of the forum
idols of the market place
idols of the theater
idols of the tribe
idonic acid
ie-
ier-oe
if and only if
if and when
if at all
if ever
if humanly possible
if it be so
if it be true that
if it should happen that
if it so happens
if it turns out
if necessary
if need be
if not
if only
if possible
if worst comes to worst
if you please
if you wish
if-clause
ife hemp
ignatius' bean
igneous rock
ignes fatui
igni-
ignis fatuous
ignis fatuus
ignition cable
ignition cap
ignition charge
ignition key
ignition point
ignition temperature
ignition tube
ignobile vulgus
ignominious defeat
ignoratio elenchi
ignore grammar

ignore it
ignore opportunity's knock
ignotum per ignotius
ikrar-namah
il Duce
il-
ilang-ilang
ile-
ileo-
ileo-ileostomy
iliac artery
ilio-
ilio-inguinal
iliotibial band
ill at ease
ill blood
ill breeding
ill disposition
ill done-by
ill fame
ill feeling
ill fortune
ill hap
ill health
ill house
ill humor
ill humored
ill humour
ill luck
ill manners
ill
 nature
ill off
ill repute
ill service
ill success
ill temper
ill turn
ill usage
ill use
ill will
ill wind
ill-
ill-according
ill-accoutered
ill-accustomed
ill-achieved
ill-acquired

ill-acted
ill-adapted
ill-adventured
ill-advised
ill-advisedly
ill-affected
ill-affectedly
ill-affectedness
ill-agreeable
ill-agreeing
ill-annexed
ill-armed
ill-arranged
ill-assimilated
ill-assorted
ill-assorted marriage
ill-at-ease
ill-balanced
ill-balanced sentences
ill-befitting
ill-begotten
ill-behaved
ill-being
ill-beseeming
ill-bested
ill-boding
ill-born
ill-borne
ill-breathed
ill-bred
ill-bred fellow
ill-built
ill-calculating
ill-cared
ill-celebrated
ill-cemented
ill-chosen
ill-clad
ill-cleckit
ill-coined
ill-colored
ill-come
ill-comer
ill-composed
ill-concealed
ill-conceived
ill-concerted
ill-conditioned

ill-conditionedness
ill-conducted
ill-considered
ill-consisting
ill-contented
ill-contenting
ill-contrived
ill-cured
ill-customed
ill-deedy
ill-defined
ill-definedness
ill-devised
ill-digested
ill-directed
ill-disciplined
ill-disposed
ill-disposedness
ill-dissembled
ill-doing
ill-done
ill-drawn
ill-dressed
ill-educated
ill-effaceable
ill-equipped
ill-erected
ill-executed
ill-famed
ill-fardeled
ill-faring
ill-faringly
ill-fashioned
ill-fated
ill-fated
life
ill-fatedness
ill-favor
ill-favored
ill-favoredly
ill-favoredness
ill-favoured
ill-favouredly
ill-favouredness
ill-featured
ill-fed
ill-fitted
ill-fitting

ill-flavored
ill-foreseen
ill-formed
ill-found
ill-founded
ill-friended
ill-furnished
ill-gauged
ill-gendered
ill-given
ill-got
ill-gotten
ill-gotten gains
ill-governed
ill-greeting
ill-grounded
ill-hap
ill-headed
ill-health
ill-housed
ill-humor
ill-humored
ill-humored person
ill-humored woman
ill-humoredly
ill-humoredness
ill-humoured
ill-humouredly
ill-humouredness
ill-imagined
ill-informed
ill-intentioned
ill-invented
ill-joined
ill-judge
ill-judged
ill-judging
ill-kempt
ill-kept
ill-knotted
ill-less
ill-lighted
ill-limbed
ill-lit
ill-lived
ill-looked
ill-looking
ill-lookingness

ill-made
ill-manageable
ill-managed
ill-mannered
ill-manneredly
ill-manneredness
ill-mannerly
ill-marked
ill-matched
ill-mated
ill-meant
ill-met
ill-minded
ill-mindedly
ill-mindedness
ill-natured
ill-naturedly
ill-naturedness
ill-neighboring
ill-noised
ill-nurtured
ill-observant
ill-occupied
ill-omened
ill-omenedness
ill-paid
ill-perfuming
ill-persuaded
ill-placed
ill-pleased
ill-proportioned
ill-provided
ill-qualified
ill-regulated
ill-requite
ill-requited
ill-resounding
ill-rewarded
ill-roasted
ill-ruled
ill-satisfied
ill-savored
ill-scented
ill-seasoned
ill-seen
ill-served
ill-set
ill-shaped

ill-smelling
ill-sorted
ill-sounding
ill-spent
ill-spun
ill-starred
ill-strung
ill-succeeding
ill-suited
ill-suiting
ill-supported
ill-tasted
ill-taught
ill-tempered
ill-temperedly
ill-temperedness
ill-time
ill-timed
ill-tongued
ill-treat
ill-treated
ill-treater
ill-treatment
ill-tuned
ill-turned
ill-understood
ill-usage
ill-use
ill-used
ill-using
ill-ventilated
ill-weaved
ill-wedded
ill-willed
ill-willer
ill-willie
ill-willing
ill-willy
ill-wish
ill-wisher
ill-won
ill-worded
ill-written
ill-wrought
ill-yoked
illegal
 commerce
illegal operations

illegal traffic
illegible handwriting
illegitimate business
illegitimate child
illicit business
illicit businessman
illicit love
illipe butter
illiterate speech
ills the flesh is heir to
illuminating engineer
illuminating engineering
illuminating gas
illuminating oil
illuminating projectile
illupi oil
illusion-proof
im-
image breaker
image breaking
image converter
image dissector
image iconoscope
image intensifier
image orthicon
image space
image tube
image worship
image-breaker
image-breaking
image-maker
image-matched input resistance
image-matched output resistance
image-worship
imageless thought
imagery study
imaginal bud
imaginal disk
imaginal type
imaginary axis
imaginary invalid
imaginary number
imaginary part
imaginary unit
imagination-proof
imaginative exercise
imagist verse
imagistic poetry

imb-
imbibition process
imbricato-
imbue
 with life
imbued with
imbued with life
imide chloride
imido group
imido radical
imino ester
imino group
imino radical
imitation doublet
imitation fur
imitation leather
imitation vermillion
imitation-proof
imitative magic
immaculate conception
immanent cause
immature personality
immaturity reaction
immediate annuity
immediate cause
immediate cognition
immediate communication
immediate constituent
immediate constituent analysis
immediate dislike
immediate foreground
immediate future
immediate neighbor
immediate prospect
immediate purpose
immediate resources
immediately if not sooner
immemorial usage
immense number
immersed in
immersed in thought
immersion foot
immersion heater
immersion lens
immersion scale
immolate before
immortal hand
immortal name

immovable feast
immune body
immune globulin
immune serum
immunity theory
immunization therapy
immuno-
immunosuppressive drug
imou pine
imp gal
imp-pole
impact area
impact parameter
impact pressure
impact test
impact theory
impaired
 hearing
impairment of motor function
impairment of speech
impanel a jury
impartial arbitrator
impatient of
impatient of control
impatient of discipline
impedance coil
impedance component
impedance drop
impedance matching
impedance ratio
impedient impediment
impelling force
impend over
imperceptible duration
imperfect cadence
imperfect competition
imperfect contrition
imperfect flower
imperfect fungus
imperfect knowledge
imperfect number
imperfect rhyme
imperfect speech
imperfect usufruct
imperfect vision
imperfectly spoken
imperial Brussels
imperial eagle

imperial elephant
imperial gallon
imperial jade
imperial mammoth
imperial moth
imperial octavo
imperial purple
imperial quarto
imperialist threat
imperially slim
imperium in imperio
impersonal verb
impervious to
impervious to light
impervious to persuasion
imperviousness to light
impinge on the eye
impinge on your consciousness
impingement attack
impious person
implant in
implantation cone
implicate yourself
implicated in
implicit
 belief
implicit consent
implicit differentiation
implicit function
implicit function theorem
implied contract
implied meaning
implied threat
implore counsel
implore mercy
import credit
import tax
important person
important persons
important point
important thing
imported currantworm
imported wine
impose a penalty on
impose on
impose on you for
impose upon
impose your will

imposing an onus
imposing stone
imposing table
imposition of hands
impost block
impress forcibly
impress on the mind
impress upon
impress upon the memory
impress upon the mind
impressed by
impressed with
impressed with yourself
improper fraction
improper integral
improper suggestion
improve each shining hour
improve on
improve the mind
improve the occasion
improve the shining hour
improve upon
improve your mind
improvement lease
improvement purchase
improving the mind
improvisational drama
imprudent step
impudent person
impulse buying
impulse duct engine
impulse excitation
impulse face
impulse movement
impulse of
life
impulse recorder
impulse roller
impulse transformer
impulse turbine
impurity atom
impute shame to
impute to
in Abraham's bosom
in Argolis
in Davy Jones's locker
in Dutch
in God's good time

in Indian file
in NW Africa
in Queer Street
in Sunday best
in Technicolor
in a backwater
in a bad humor
in a bad way
in a beeline
in a big way
in a bind
in a bit
in a blaze
in a blue funk
in a body
in a bondman's key
in a bother
in a botheration
in a box
in a capsule
in a chain
in a chorus
in a circle
in a class by itself
in a cloud
in a corner
in a crescendo
in a dark corner
in a daze
in a dead calm
in a delicate condition
in a different manner
in a dilemma
in a direct line
in a dither
in a fair manner
in a fair way
in a fair way to
in a fashion
in a ferment
in a fever
in a few words
in a fix
in a flash
in a flurry
in a fluster
in a flutter
in a fog

in a foofaraw
in a frenzy of desire
in a fright
in a fume
in a funk
in a fury
in a fury of desire
in a glow
in a good
in a good mood
in a good state
of preservation
in a groove
in a haze
in a hole
in a hole-and-corner way
in a huddle
in a huff
in a hurry
in a jam
in a jiff
in a jiffy
in a jumble
in a lather
in a lather of haste
in a line
in a line for
in a little bit
in a little while
in a manner
in a manner of speaking
in a maze
in a measure
in a mess
in a minute
in a mist
in a moment
in a muck of a sweat
in a muddle
in a nice pickle
in a nutshell
in a panic
in a passion
in a pet
in a pickle
in a pig's eye
in a position to
in a pother

in a predicament
in a pretty pass
in a pretty pickle
in a pucker
in a quandary
in a quiver
in a rage
in a reverie
in a roundabout way
in a row
in a rush
in a rut
in a scrape
in a second
in a sense
in a series
in a shake
in a shocking humor
in a short time
in a short while
in a small compass
in a small way
in a smart-alecky way
in a smart-ass fashion
in a sorry plight
in a sound sleep
in a spin
in a spot
in a squirrel cage
in a stable state
in a state
in a state of nature
in a state of suspense
in a
stew
in a straight line
in a stupor
in a sweat
in a sweat of haste
in a swivet
in a temper
in a tight spot
in a tizzy
in a trance
in a transport
in a transport of delight
in a trice
in a tumble

in a turmoil
in a twink
in a twinkling
in a twitter
in a watery bier
in a watery grave
in a wax
in a way
in a while
in a whirl
in a whisper
in a wink
in a word
in abeyance
in absentia
in abstracto
in abundance
in accord
in accordance
in accordance with
in action
in actuality
in addition
in addition to
in adjustment
in admiration
in advance
in advance of
in advance of your age
in adverse circumstances
in aeternum
in aftertime
in agreement
in agreement with
in aid of
in alarm
in all
in all ages
in all conscience
in all creation
in all directions
in all directions at once
in all fairness
in all haste
in all its intensity and color
in all likelihood
in all manner of ways
in all places

in all probability
in all quarters
in all reason
in all respects
in all seriousness
in all soberness
in all your born
days
in alt
in altissimo
in amazement
in ambuscade
in ambush
in amends
in an aside
in an evil hour
in an instant
in an uncertain state
in an undertone
in an unguarded moment
in an uproar
in ancient times
in and in
in and out
in anger
in another way
in answer
in anticipation
in anticipation of
in antis
in any case
in any event
in any possible way
in any way
in apple-pie order
in apposition
in armor
in arms
in arrear
in arrears
in articulo mortis
in ascendancy
in association
in association with
in astonishment
in at the death
in atonement
in authority

in awe
in awe of
in back of
in bad
in bad humor
in bad odor
in bad odor with
in bad repute
in bad spirits
in bad taste
in bad with
in balance
in balk
in ballast
in banc
in banco
in base
in battle array
in bed
in bedrock
in behalf of
in being
in bend
in between
in bewilderment
in bits
in bits and pieces
in black and white
in bloom
in blossom
in blue water
in board
in bold relief
in bondage
in bonds
in brief
in brief compass
in broad daylight
in
broad terms
in brodo
in buckram
in bud
in bulk
in cahoot
in cahoots
in camera
in captivity

in case
in case of
in case that
in cash
in chains
in chambers
in chancery
in character
in charge
in charge of
in check
in chevron
in chief
in childbed
in chorus
in circles
in circulation
in closed meeting
in clover
in cold blood
in collaboration
in collision
in collusion
in color
in column
in combat
in comfort
in command
in commemoration
in commemoration of
in commendam
in commission
in common
in company
in company with
in comparison with
in compensation
in competition
in complete steel
in compliance with
in complicity
in concert
in concert with
in conclave
in conclusion
in concord
in condition
in conference

in confidence
in confinement
in confirmation
in conflict with
in conformity with
in conformity with the evidence
in conformity with the facts
in confrontation
in confusion
in conjunction
in conjunction with
in connection with
in conscience
in consequence
in consequence of
in consideration
in
consideration of
in consternation
in consultation
in contact
in contact with
in contemplation of
in contempt
in contempt of
in contradiction
in contrast with
in control
in cooperation
in cooperation with
in corpore
in correspondence to
in corroboration of
in costume
in council
in course of preparation
in court
in crowds
in curve
in custody
in danger
in danger imminent
in danger of
in darkness
in days of yore
in debate
in debt
in deep

in deep water
in default
in default of
in defense
in deference to
in defiance of
in demand
in denial
in depth
in despair
in desperate case
in desperate straits
in despite of
in detail
in detention
in diapers
in difficulties
in difficulty
in disagreement
in disagreement with
in disarray
in discredit
in disdain
in disfavor
in disgrace
in disguise
in dishabille
in disorder
in dispute
in disrepair
in disrepute
in distress
in double harness
in double time
in double-quick time
in doubt
in driblets
in dribs and drabs
in dubio
in due course
in due form
in due
season
in due time
in dumb show
in duplicate
in durance vile
in duty bound

in earnest
in ease
in eclipse
in ecstasies
in ecstasy
in effect
in either case
in embarrassed circumstances
in embryo
in epitome
in equal shares
in equilibrio
in equilibrium
in equipoise
in equity
in error
in escrow
in esse
in essence
in every clime
in every direction
in every hole and corner
in every instance
in every nook and cranny
in every place
in every quarter
in every region
in every respect
in every your mouth
in everyone's mouth
in evidence
in excess
in excess of
in exchange
in executive session
in exercise
in existence
in expectation
in explanation
in extenso
in extremis
in extremities
in fact
in faith
in fashion
in fault
in favor
in favor of

in fear
in fear and trembling
in fear of your life
in fee
in fee simple
in fess
in file
in fine
in fine feather
in fine fettle
in fine shape
in fine whack
in fits and starts
in flagrante delicto
in flames
in flat opposition
in flight
in flood
in flower
in focus
in
 for it
in force
in foreign parts
in forma pauperis
in frame
in front
in front of
in full
in full bloom
in full cry
in full dress
in full feather
in full force
in full measure
in full sail
in full swing
in full view
in fun
in funds
in furtherance of
in future
in futuro
in gear
in general
in general terms
in glory
in glowing terms

in good case
in good condition
in good earnest
in good faith
in good form
in good health
in good heart
in good odor
in good part
in good season
in good set terms
in good shape
in good spirits
in good supply
in good taste
in good time
in good trim
in good truth
in good with
in great measure
in grief
in half
in half a jiffy
in half a mo
in half a shake
in half measures
in halves
in hand
in harbor
in harmony
in harmony with
in harness
in haste
in haste like a snail
in health
in heaps
in heat
in heaven
in hell
in hellfire
in hiding
in hidlings
in high
in high dudgeon
in high esteem
in high estimation
in high favor
in high feather

in high gear
in high relief
in
high spirits
in historic times
in hoc
in hoc signo vinces
in hock
in hold
in holes and corners
in holy orders
in honor of
in hopes
in hospital
in hostile array
in hot blood
in hot haste
in hot pursuit
in hot water
in hysterics
in idea
in ignorance of
in imitation of
in infinitum
in installments
in irons
in its entirety
in its infancy
in its own way
in its place
in its stead
in itself
in jeopardy
in jest
in joke
in justice
in juxtaposition
in keeping
in keeping with
in kelter
in kilter
in kind
in large
in layers
in leading strings
in leaf
in league
in leash

in length
in less than no time
in letters of fire
in lieu
in lieu of
in like manner
in limine
in line
in line of duty
in line with
in liquor
in litigation
in little
in loc cit
in lock-step with
in loco
in loco parentis
in longhand
in lots
in love
in love with
in low gear
in low relief
in low spirits
in luck
in lure
in luxury
in majority
in many instances
in march time
in measure
in medias res
in medium
in mem
in memoriam
in memory of
in
 mesh
in mid
in mid-progress
in miniature
in mint condition
in moderation
in mortal fear
in mothballs
in motion
in mourning
in must

in naked beauty more adorned
in name only
in nappies
in narrow circumstances
in native buff
in nature's garb
in need
in need of rest
in negligee
in no case
in no long time
in no place
in no respect
in no time
in no uncertain terms
in no way
in no wise
in nomine
in nothing flat
in numbers
in obedience to
in olden times
in omnia paratus
in one way or another
in one word
in open court
in operation
in opposition
in opposition to
in order
in order that
in order to
in orders
in ordinary
in orle
in other respects
in other ways
in other words
in our time
in outline
in ovo
in pain
in pais
in pale
in pantomime
in paradise
in parallel
in pari delicto

in part
in partibus
in particular
in partnership
in passage to
in passing
in pawn
in pectore
in pendentive
in penury
in peril
in perpetual remembrance
in perpetuity
in perpetuum
in person
in personam
in petto
in phase
in
pieces
in place
in place of
in places
in plain English
in plain sight
in plain style
in plain terms
in plain view
in plain words
in play
in plenty
in point
in point of
in point of fact
in poor health
in poor taste
in port
in position
in posse
in possession of
in possession of your faculties
in possession of your senses
in posthaste
in power
in practice
in praesenti
in preference
in preference to

in prehistoric times
in preparation
in preparation for
in pretense
in principle
in print
in prison
in privacy
in private
in private conference
in privy
in process
in production
in profusion
in progress
in proper season
in proper time
in proportion
in propria persona
in prose
in prospect
in public
in public view
in purdah
in puris naturalibus
in pursuance of
in pursuit
in pursuit of
in quantities
in quantity
in quest of
in question
in quick succession
in rags
in range
in rapid succession
in rapport
in raptures
in re
in readiness
in ready state
in reality
in reason
in rebuttal
in receivership
in
reciprocation
in recompense

in red letters
in reduced circumstances
in reference to
in regard to
in relation to
in relation with
in relief
in rem
in remembrance
in remembrance of
in remission
in repair
in reparation
in reply
in reprisal
in requital
in rerum natura
in reserve
in residence
in respect of
in respect that
in respect to
in response
in restitution
in retaliation
in retirement
in retreat
in retribution
in retrospect
in return
in revenge
in reverse
in reward
in rhythm
in rivalry
in rotation
in round numbers
in round terms
in ruins
in russet mantle clad
in rut
in sackcloth and ashes
in saecula saeculorum
in safety
in sail
in scorn
in search of
in season

in season and out of season
in seclusion
in secrecy
in secret
in secret meeting
in seed
in seeming
in seisin
in self-defense
in sequence
in series
in service
in session
in set form
in set phrases
in set terms
in seven-league boots
in seventh heaven
in shape
in shards
in shelter
in shore
in short
in short order
in short supply
in
shorthand
in shreds
in sickness and in health
in sight
in silence
in single file
in sinu Abraham
in situ
in slavery
in slow motion
in slow tempo
in small doses
in smithereens
in snatches
in so far
in so far as
in so many words
in society
in solido
in solidum
in solitude
in solution

in some measure
in some place
in some such way
in some way
in some way or other
in sooth
in soundings
in spades
in spate
in specie
in spite
in spite of
in spite of yourself
in spitting distance
in sport
in spots
in statu quo
in step
in step with
in stir
in stock
in store
in straitened circumstances
in strict confidence
in strong relief
in stud
in style
in subjection
in substance
in succession
in such wise
in sum
in summary
in supply
in support of
in suspense
in suspension
in swaddling clothes
in swarms
in sync
in synchronization
in tails
in tatters
in tears
in tempo
in terror
in terrorem
in terrorem clause

in that
in that case
in that event
in that instance
in that neighborhood
in that place
in that vicinity
in
that way
in the Christian Era
in the Common Era
in the absence of
in the abstract
in the act
in the act of
in the affirmative
in the aftermath
in the age of
in the aggregate
in the air
in the aisle
in the altogether
in the arms of Morpheus
in the ascendant
in the background
in the bag
in the balance
in the beginning
in the best taste
in the black
in the blood
in the bloom of youth
in the bosom of the lodge
in the bosom of your family
in the bud
in the buff
in the can
in the cannon's mouth
in the cards
in the care of
in the center of
in the chains
in the charge of
in the chips
in the circumstances
in the clear
in the clouds
in the clover

in the clutches
in the cold
in the contingency that
in the course of
in the course of business
in the course of things
in the course of time
in the cradle
in the crib
in the dark
in the dark of night
in the dead of night
in the depths
in the direction of
in the distance
in the doghouse
in the doldrums
in the doleful dumps
in the driver's seat
in
the dumps
in the dust
in the era of
in the event of
in the event that
in the extreme
in the eye of the wind
in the eyes of
in the eyes of the law
in the face of
in the face of day
in the face of death
in the face of heaven
in the family way
in the field
in the fire
in the first place
in the flesh
in the flower of youth
in the forefront
in the foreground
in the fourth place
in the front
in the fullness of time
in the future
in the gaseous state
in the glare of publicity
in the good old days

in the grand style
in the grave
in the grave six feet under
in the groove
in the gross
in the gutter
in the habit of
in the hands of
in the heart
in the heat of passion
in the highest degree
in the hole
in the hopper
in the humor
in the immediate future
in the interest
in the interim
in the intervening time
in the jaws of death
in the know
in the land of Nod
in the land of the living
in the lap of Morpheus
in the large
in the latest mode
in the latest style
in the lead
in the light of
in the limelight
in
the limits of
in the line of duty
in the long run
in the lump
in the main
in the majority
in the making
in the market
in the market for
in the marketplace
in the marts of trade
in the mass
in the matter of
in the mean
in the meantime
in the meanwhile
in the melting mood
in the memory of man

in the middle
in the middle of
in the middle of the road
in the midst of
in the midst of battle
in the mind
in the mode
in the money
in the mood
in the morning
in the name of
in the natural way of things
in the near future
in the negative
in the neighborhood
in the neighborhood of
in the news
in the nick of time
in the night
in the nursery
in the offing
in the old days
in the olden time
in the open
in the open air
in the opinion of
in the oven
in the past
in the pink
in the pink of condition
in the pipeline
in the place of
in the plenitude of power
in the presence of
in the process of
in the process of time
in the public eye
in the raw
in the rear
in the red
in the remote distance
in the right
in
the rough
in the saddle
in the same boat
in the same breath
in the same category

in the same manner
in the same way as
in the same words
in the second instance
in the second place
in the secret
in the semblance of
in the sequel
in the service of
in the shade
in the shadow of a rock
in the singular
in the small
in the soup
in the spotlight
in the state of nature
in the stead of
in the sweet by-and-by
in the swim
in the teeth of
in the teeth of the wind
in the thick of
in the thick of combat
in the thick of the fray
in the third place
in the thoughts
in the time of
in the train of
in the twinkling of an eye
in the usual course
in the van
in the vein
in the very act
in the very grain
in the vicinity
in the vicinity of
in the wake of
in the way
in the white
in the whole wide world
in the wide world
in the wind
in the wind's eye
in the wings
in the womb of time
in the works
in the world
in the worst way

in the wrong
in the wrong box
in the wrong pew
in the wrong place
in the year of our
Lord
in theory
in there with
in these days
in this day and age
in this place
in this vicinity
in this way
in those parts
in throngs
in time
in times gone by
in times past
in torment
in toto
in tow
in trans
in transit
in transit to
in transitu
in trim
in triplicate
in triumph
in trouble
in trust
in truth
in tune
in turn
in turns
in twain
in two
in two shakes
in two shakes of a lamb's tail
in two words
in uniformity with
in unison
in unison with
in use
in utero
in vacuo
in vain
in various places
in velvet

in very sooth
in very truth
in view
in view of
in view of the fact that
in vino veritas
in violation of law
in virtue of
in vitro
in vivo
in vogue
in want
in want of
in way of
in what condition
in what manner
in what period
in what place
in what way
in which place
in which time
in white tie and tails
in with
in wonder
in words of one syllable
in words to that effect
in working order
in writing
in years
in your armor
in your bad books
in your behalf
in your best bib and tucker
in your birthday
suit
in your black books
in your book
in your books
in your charge
in your chest
in your clutches
in your control
in your cups
in your element
in your employ
in your estimation
in your eye
in your favor

in your good
in your good books
in your good graces
in your grasp
in your grip
in your hands
in your heart of hearts
in your inmost thoughts
in your opinion
in your own hand
in your own interest
in your own person
in your own right
in your own sweet way
in your own way
in your pay
in your place
in your pocket
in your possession
in your power
in your prime
in your right mind
in your second childhood
in your shell
in your shirt sleeves
in your shirt-sleeves
in your shoes
in your sleeve
in your sober senses
in your stead
in your stocking feet
in your teens
in your thinking
in your tracks
in-
in-and-in
in-and-out
in-and-out bond
in-and-outer
in-beaming
in-being
in-between
in-bond shop
in-book
in-breeding
in-built
in-calf
in-car

in-clearer
in-clearing
in-clerk
in-co-ordinate
in-co-ordinated
in-co-ordination
in-crowd
in-dimension
in-fighting
in-flight
in-flight
 refueling
in-flight refueling tanker
in-flight training
in-goal
in-going
in-group
in-house
in-knee
in-kneed
in-law
in-laws
in-lb
in-lean
in-line
in-line engine
in-lot
in-marriage
in-migrant
in-migrate
in-migration
in-off
in-patient
in-phase
in-plant
in-quarto
in-sail
in-service
in-service training
in-the-wool
in-to-out
in-toed
in-tray
inability to believe
inactive market
inactive stock
inactive war
inadequate personality

inalienable right
inanimate matter
inasmuch as
inaugural address
inauguration day
inboard profile
inboard-outboard motor
inboard-rigged
inborn aptitude
inborn capacity
inborn predisposition
inborn proclivity
inborn susceptibility
inborn tendency
incandescent body
incandescent electric lamp
incandescent lamp
incandescent light
incandescent lighting
incandescent mantle
incandescent point
incapable of
incapable of life
incarnations of
incasement theory
incendiary antiaircraft rocket
incendiary
bomb
incendiary grenade
incendiary rocket
incense boat
incense burner
incense cedar
incense juniper
incense resin
incense shrub
incense tree
incense wood
incense-breathing
incense-breathing morn
incentive pay
incentive wage
inch along
inch by inch
inch forward
inch mast
inch of mercury
inch plant

inch rule
inch your way up
inch-deep
inch-high
inch-long
inch-pound
inch-thick
inch-ton
inch-wide
incidence wire
incident light
incident light meter
incident to
incidental information
incidental music
incidental note
incidental power
incidental remark
incidental to
inciso-
incisor foramen
incito-motor
inclination compass
inclination of the balance
inclination of the head
inclination to believe
inclinatory needle
incline an ear to
incline plane
incline the head
incline toward
incline towards
incline your ear
inclined engine
inclined plane
inclined railway
inclined to
inclined to believe
inclined to forget
inclined toward
inclined-plane clock
inclining toward
include in
include me out
include out
inclusion
body
inclusion map

inclusion-exclusion
inclusive disjunction
inclusive of
inclusive or
inco-ordinate
inco-ordination
income account
income after deductions
income after taxes
income basis
income bond
income fund
income group
income sheet
income stock
income tax
income-tax
incoming population
incomplete antibody
incomplete fracture
incontestable clause
incontrovertible evidence
incorporated bar
incorporeal being
incorporeal entity
incorporeal hereditament
increase in size
increase of temperature
increase the chances
increase the temperature
increase twist
increment borer
incremental plotter
incremental recorder
incremental repetition
increscent moon
incriminate yourself
incriminating evidence
incubation patch
incubation period
incubator baby
incubator bird
incumbent on
incumbent upon
incur a debt
incur a responsibility
incur costs
incur danger

incur discredit
incur disesteem
incur disgrace
incur dishonor
incur expenses
incur loss
ind-
indanthrene blue
inde blue
indebted to
indecent
 assault
indecent exposure
indecent proposal
indefinite article
indefinite integral
indefinite number
indefinite pronoun
indefinite quantities
indefinite space
indelibly impressed
indelibly impressed on the mind
indelicate language
indemnity bond
indentured servant
independence day
independence of path
independent assortment
independent clause
independent of
independent of your will
independent school
independent variable
independent-seconds watch
independently rich
independently wealthy
indeterminacy principle
indeterminate sentence
index bar
index card
index center
index correction
index crank
index error
index expurgatorius
index finger
index forest
index fossil

index glass
index hand
index head
index mark
index notation
index number
index of refraction
index per cent
index pin
index plane
index plate
index sector
index set
index-linked
indi-
india ink
india paper
india rubber
india-rubber
indian club
indian corn
indian fig
indian file
indian giver
indian hemp
indian ink
indian
licorice
indian meal
indian paintbrush
indian pipe
indian pudding
indian red
indian sign
indian summer
indian tobacco
indian turnip
indicated horsepower
indicating control switch
indicator card
indicator diagram
indicator plant
indicator telegraph
indicator tube
indices Librorum Prohibitorum
indicial equation
indignant displeasure
indignation meeting

indignation-proof
indigo auxiliary
indigo bird
indigo blue
indigo broom
indigo brown
indigo bunting
indigo bush
indigo carmine
indigo copper
indigo dyer
indigo extract
indigo finch
indigo grinder
indigo maker
indigo plant
indigo printing
indigo snake
indigo thorn
indigo weed
indigo white
indigo-bearing
indigo-bird
indigo-blue
indigo-dyed
indigo-grinding
indigo-plant
indigo-producing
indigo-white
indigo-yielding
indirect authority
indirect costs
indirect course
indirect discourse
indirect evidence
indirect infection
indirect initiative
indirect labor
indirect lighting
indirect object
indirect power
indirect primary
indirect proof
indirect
question
indirect speech
indirect tax
indisposed to believe

indisposed to communicate
indisposed to talk
indisposition to speak
indisputable evidence
indisputable fact
indistinct speech
individual essence
individual identity
individual liberty
individual medley
individual psychology
individual responsibility
individual retirement account
individual speech competence
individual speech habits
individual speech performance
indo-
indo-aryan
indo-chinese
indo-european
indo-european languages
indo-german
indo-germanic
indo-hittite
indo-iranian
indoleacetic acid
indolebutyric acid
indomitable sea
indoor baseball
indoor-outdoor carpeting
indorse, indorsement
induced current
induced drag
induced radioactivity
induced topology
inductance coil
inductance factor
induction accelerator
induction balance
induction bridge
induction coil
induction compass
induction current
induction furnace
induction generator
induction hardening
induction heat
induction heater

induction heating
induction heating machine
induction
 instrument
induction machine
induction meter
induction motor
induction regulator
induction top
inductive capacity
inductive method
inductive reactance
inductive reasoning
inducto-
inductor alternator
inductor compass
inductor generator
indulge in
indulge in easy vices
indulge in wish-fulfillment
indulge with
indulge your appetite
indulge your appetites
indulge yourself
indurated clay
industrial action
industrial archaeology
industrial art
industrial arts
industrial chemistry
industrial design
industrial designer
industrial disease
industrial economy
industrial engineer
industrial engineering
industrial estate
industrial instrumentation
industrial insurance
industrial life insurance
industrial medicine
industrial park
industrial psychologist
industrial psychology
industrial relations
industrial revolution
industrial school
industrial store

industrial union
industrial worker
industrial zone
inequi-
inert gas
inertia ellipsoid
inertia governor
inertia selling
inertia transmission
inertia-reel
 seat-belt
inertial guidance
inertial guidance system
inertial mass
inertial navigation
inertial navigation system
inertial reference frame
inertial space
inertial system
inescapable fact
inevitable accident
inevitably narrative
inexpiable sin
inextensive deformation
infant prodigy
infant school
infant-school
infantile amnesia
infantile fixation
infantile paralysis
infantile sexuality
infantry combat
infantry tactics
infants' school
infants' wear
infatuated with
infection hypha
infection period
infection thread
infectional arthritis
infectious disease
infectious ectromelia
infectious granuloma
infectious hepatitis
infectious keratitis
infectious laryngotracheitis
infectious mononucleosis
infectious myxomatosis

inferior article
inferior court
inferior goods
inferior horse
inferior maxillary
inferior personality
inferior planet
inferiority complex
infernal machine
infernal pit
infernal regions
infero-
infield fly
infiltration gallery
infiltration vein
infinite baffle
infinite
duration
infinite goodness
infinite integral
infinite justice
infinite love
infinite mercy
infinite power
infinite product
infinite regress
infinite series
infinite space
infinite spirit
infinite truth
infinite wisdom
infinitely continuous
infinitely extended
infinitesimal calculus
infinitive clause
infinitive marker
infinitive phrase
infinito-
infinito-absolute
infinito-infinitesimal
infinity plug
infirm of purpose
infirm of will
infirm old age
infirmity of age
infirmity of purpose
infirmity of will
inflame with love

inflammable material
inflammatory rheumatism
inflatable slide
inflate prices
inflationary gap
inflationary pressure
inflationary prices
inflationary spiral
inflationary trend
inflationist period
inflection of voice
inflection point
inflexible will
inflict a penalty on
inflict capital punishment
inflict on
inflict pain
inflict upon
influence machine
influence peddler
influence peddling
influence user
influential person
influential persons
inform against
inform on
informa
pauperis
informal English
informal agreement
informal language
informal school
informal speech
informal standard speech
informal vote
information against
information center
information explosion
information machine
information media
information medium
information retrieval
information science
information storage
information theory
informatory double
informed in
informed of

informing gun
infra dig
infra dignitatem
infra indignitatem
infra praesidia
infra-
infra-anal
infra-angelic
infra-auricular
infra-axillary
infra-esophageal
infra-red
infra-umbilical
infrared beam projector
infrared broiler
infrared cooker
infrared gas and liquid analyzer
infrared heater
infrared lamp
infrared photography
infrared ray
infrared spectroscopy
infrared telescope
infrared therapy
infraroentgen ray
infringe a copyright
infringement of copyright
infuse life into
infusion process
infusorial earth
ingle cheek
ingle nook
ingle-bred
inglorious defeat
ingot chipper
ingot cutter
ingot forger
ingot heater
ingot
 iron
ingot lathe
ingot maker
ingot weigher
ingrain carpet
ingratiate yourself
ingratiate yourself with
inguino-
inhabitants of Pandemonium

inhalation tuberculosis
inhale snuff
inhale spasmodically
inharmonious harmony
inhere in
inherent authority
inherent immunity
inherent power
inherent stability
inherent vice
inheritance factor
inheritance tax
inherited immunity
inhibit your desires
inhibiting antibody
initial rhyme
initial stability
initiation fee
inject in
inject yourself into
injection grid
injection method
injection-gneiss
injure your reputation
injury benefit
injury of your reputation
injury time
injury to your reputation
injury-proof
ink bag
ink ball
ink bell
ink black
ink bottle
ink bottler
ink cap
ink cartridge
ink disease
ink eradicator
ink eraser
ink fountain
ink gall
ink grinder
ink in
ink knife
ink maker
ink malady
ink marble

ink mixer
ink mushroom
ink nut
ink pad
ink plant
ink printer
ink roller
ink sac
ink spiller
ink spilling
ink up
ink-berry
ink-black
ink-blurred
ink-cap
ink-carrying
ink-colored
ink-distributing
ink-dropping
ink-slab
ink-spotted
ink-stained
ink-wasting
ink-writing
ink-written
inkblot
test
inkhorn term
inking bell
inking roller
inky cap
inky-black
inland bill
inland marine insurance
inland sea
inland waters
inlay graft
inlying picket
inmost heart
inmost mind
inmost recesses of the memory
inmost soul
inmost thoughts
inn of court
innate aptitude
innate idea
innate immunity
innate proclivity

innato-
inner arbiter
inner automorphism
inner bar
inner barrister
inner circle
inner city
inner ear
inner essence
inner form
inner jib
inner landscape
inner life
inner light
inner man
inner mechanism
inner mission
inner nature
inner planet
inner product
inner reality
inner recess
inner recesses of the heart
inner recesses of the mind
inner self
inner space
inner station
inner tube
inner workings
inner-city
inner-directed
inner-directed person
inner-directedness
inner-direction
innermost being
innermost recesses
innermost recesses of the heart
innerspring
 mattress
innocent as a lamb
innocent person
innocent tumor
innocent within
innominate artery
innominate bone
innominate vein
innovation-proof
ino-

inofficious testament
inofficious will
inordinate desire
inorganic chemical
inorganic chemistry
inorganic fertilizer
inorganic matter
inorganic substance
inorganized matter
inositol-hexaphosphoric
inositolhexaphosphoric acid
inp-
inpatient clinic
input conductance
input current
input data
input oscillation
input quantity
input resistance
input voltage
input-output analysis
input-output device
inquire after
inquire for
inquire into
inquire of
inquire onto
inquiring mind
inquiry agent
inquiry into
inquiry into first causes
ins and outs
insane asylum
insanity curing
insanity-proof
insatiable desire
inscribe in the memory
inscribe yourself
insculp'd upon
insect bed
insect flower
insect lime
insect orchis
insect powder
insect sound
insect wax
insect-eating
insect-eating bird

insectivorous bat
insensible to
insensible to the past
inseparable
 friend
insert in
inset initial
inside and out
inside clinch
inside dope
inside forward
inside information
inside job
inside loop
inside man
inside of
inside out
inside parts
inside straight
inside track
inside wire
inside-out
insigne cum laude
insignia of arm
insignia of branch
insignia of rank
insincere argument
insinuate in
insinuate yourself
insinuate yourself into
insist on
insist upon
insistent demand
insofar as
insolvency statute
insolvent debtor
insomnia-proof
insomuch as
inspect the books
inspection chamber
inspection gauge
inspector general
inspector of taxes
inspire belief
inspire confidence
inspire hope
inspire respect
inspired leader

inspiriting force
inspiriting power
inspiriting principle
instability line
installment bond
installment buying
installment credit
installment loan
installment mortgage
installment plan
installment selling
instance court
instance side
instant replay
instantaneous sound pressure
instead of
instinct for
instinct with life
institute an inquiry
institute
 of technology
institution of higher learning
instruction card
instruction-proof
instrument board
instrument carrier
instrument flight
instrument flight rules
instrument flying
instrument in proof
instrument instrumentality
instrument lamp
instrument landing
instrument landing system
instrument light
instrument of execution
instrument of punishment
instrument of torture
instrument panel
instrument rocket
instrument servo
instrument transformer
instrumental conditioning
instrumental logic
instrumental music
instrumental score
instruments of
instruments of destruction

insubstantial image
insufficiency of the valves
insufficient funds
insulating tape
insulation resistance
insulin reaction
insulin shock
insulin shock therapy
insurance adjuster
insurance agent
insurance auditor
insurance broker
insurance canvasser
insurance clerk
insurance collector
insurance company
insurance examiner
insurance man
insurance messenger
insurance patrol
insurance policy
insurance reserve
insurance
salesman
insurance solicitor
insurance tester
insurance traveler
insurance underwriter
insuring clause
insusceptible of change
intaglio printing
intaglio rilevato
intaglio rilievo
intake manifold
intake valve
intangible assets
integer vitae
integrable group
integral calculus
integral cover
integral curvature
integral curve
integral cylinder head
integral domain
integral equation
integral function
integral humanism
integral photography

integral test
integral unit
integral whole
integrated bar
integrated circuit
integrated data proces
integrated data processing
integrated personality
integrated system
integrating factor
integrating flowmeter
integrating ionization chamber
integration by parts
integration of personality
integrative power
intellectual acquirement
intellectual acquisition
intellectual attainment
intellectual childishness
intellectual climate
intellectual curiosity
intellectual elite
intellectual exercise
intellectual faculty
intellectual genius
intellectual gifts
intellectual
grasp
intellectual immaturity
intellectual inertia
intellectual object
intellectual pleasure
intellectual power
intellectual prodigy
intellectual talents
intellectual weakness
intellectually childish
intellectually immature
intelligence agency
intelligence agent
intelligence bureau
intelligence department
intelligence office
intelligence officer
intelligence quotient
intelligence service
intelligence test
intelligence testing

intelligence work
intelligent being
intemperate person
intend to
intense cold
intense darkness
intense heat
intensity of illumination
intensity-modulated display
intensive care
intensive farming
intent on
intent upon
inter alia
inter alios
inter nos
inter se
inter vivos
inter-
inter-'varsity
inter-Allied
inter-American
inter-Andean
inter-European
inter-agent
inter-brain
inter-plane
inter-varsity
intercalary meristem
intercardinal point
interception radar
interchange of speech
interchange of views
interchangeable bond
intercommunication system
intercosmic space
interdict
list
interdiction bombing
interdiction fire
interdisciplinary knowledge
interesse termini
interest group
interest in
interest inventory
interest lottery
interest payment
interest rate

interests of
interfacial tension
interfaith marriage
interfere with
interference color
interference drag
interference figure
interference fit
interference microscope
interference microscopy
interference pattern
interference phenomenon
interference spectrum
interference-proof
intergalactic distance
intergalactic matter
intergalactic space
interim bond
interim certificate
interim dividend
interior angle
interior ballistics
interior decorating
interior decoration
interior decorator
interior design
interior designer
interior drainage
interior man
interior mapping
interior monologue
interior paint
interior planet
interior point
interior polygon
interior side
interior slope
interior-sprung
interjection point
interlaced scanning
interlacing arcade
interlibrary loan
interline rate
interlinear translation
interlocking
directorate
interlocking directorates
interlocutory decree

intermediate agent
intermediate card
intermediate frequency
intermediate host
intermediate period
intermediate pile
intermediate school
intermediate schooler
intermediate space
intermediate trainer
intermediate vessel
intermediate-frequency amplifier
intermediate-frequency pulse
intermediate-frequency signal
intermediate-frequency tube
intermediate-value theorem
intermedio-lateral
intermeshing rotors
intermeshing-rotor helicopter
intermetallic compound
intermittent claudication
intermittent current
intermittent duct engine
intermittent fever
intermittent movement
internal auditory meatus
internal conversion
internal ear
internal energy
internal evidence
internal friction
internal frustration
internal gear
internal hemorrhoid
internal iliac artery
internal jugular vein
internal medicine
internal reality
internal reconstruction
internal relation
internal respiration
internal revenue
internal revenue agent
internal
revenue tax
internal rhyme
internal secretion
internal selector

internal stress
internal-combustion
internal-combustion engine
international Morse code
international agreement
international air mile
international alphabet flag
international angstrom
international bank
international banking
international candle
international carat
international date line
international fixed calendar
international law
international nautical mile
international numeral pennant
international organization
international pitch
international radio silence
international relations
international securities
international temperature scale
international unit
international-minded
internment camp
interno-
internuncial neuron
interpersonal theory
interplanetary explorer
interplanetary rocket
interplanetary space
interplanetary travel
interpretation clause
interpretation of dreams
interpretative dance
interpretive semantics
interquartile range
interracial marriage
interrogation mark
interrogation point
interrogator-responsor
interrupted
 cadence
interrupted fern
interrupted screw
interrupted sequence
intersecting arcade

intersection locus
intersection of minds
interstate highway
interstellar distance
interstellar space
interstitial irradiation therapy
intertidal zone
interval of convergence
interval operation
interval training
intervening space
intervertebral disc
intervertebral disk
intervertebral substance
intestinal digestion
intestinal flora
intestinal fortitude
intestinal juice
intimate acquaintance
intimate borrowing
intimate friend
intimate friendship
intimate with
intimately related
into arrears
into commission
into high gear
into irons
into it
into question
into the background
into the bargain
into the dust
into the ground
into the past
into the shoes of
into the wind
into the wind's eye
into thin air
into with both feet
into your hands
intolerant person
intonation contour
intonation of voice
intonation pattern
intoxicating liquor
intra muros
intra vires

intra vitam
intra-
intra-abdominal
intra-abdominally
intra-acinous
intra-alveolar
intra-appendicular
intra-arachnoid
intra-arterial
intra-articular
intra-atomic
intra-atrial
intra-aural
intra-auricular
intra-mercurial
intra-urban
intra-urethral
intra-uterine
intra-vitam
intracranial
cast
intracutaneous test
intransitive relation
intransitive verb
intrauterine device
intravenous drip
intravenous therapy
intrazonal soil
intrenching tool
intrinsic evidence
intrinsic factor
intrinsic semiconductor
intro-
introduce in
introduce new blood
introductory phrase
introductory study
intrusive rock
intuitional geometry
intuitive impression
intuitive knowledge
intuitive reason
invalid claim
invalid linking
invalid title
invalidity benefit
invariant subalgebra
inveigh against

inventory-clearance sale
inverse cosecant
inverse cosine
inverse cotangent
inverse feedback
inverse function
inverse geometry
inverse image
inverse peak voltage
inverse proportion
inverse ratio
inverse relationship
inverse secant
inverse sine
inverse square law
inverse
tangent
inversion casting
inversion center
inversion point
inversion temperature
inversion transconductance
invert soap
invert sugar
inverted comma
inverted cross
inverted engine
inverted flight
inverted king post truss
inverted mordent
inverted normal loop
inverted pleat
inverted snob
inverted spin
inverted turn
invertible counterpoint
inverting telescope
invest in
invest with power
investigation into first causes
investigative agency
investigative bureau
investment bank
investment banker
investment banking
investment banking house
investment bill
investment broker

investment casting
investment company
investment credit
investment mold
investment reserve
investment securities
investment trust
investors on the sidelines
invisible balance
invisible glass
invisible hand
invisible helper
invisible ink
invisible painting
invisible radiation
invisible shadow
invitation to combat
invitational race
invite attention
invite ridicule
invocation of saints
invocatory plea
invocatory prayer
invoke
 benefits upon
involuntary cooperation
involuntary impulse
involuntary muscle
involuntary presence
involuntary servitude
involute teeth
involute-leaved
involutional melancholia
involutional psychosis
involve in
involve the interest
involve with
involve yourself
involved in
involved in debt
inward light
inward monitor
inward-bound
inward-flow turbine
io moth
io-
iod-
iodic acid

iodine absorption
iodine bush
iodine pentoxide
iodine scarlet
iodine value
iodine weed
iodo-
iodobehenic acid
ion chamber
ion counter
ion engine
ion exchange
ion propulsion
ion propulsior
ion rocket
ionic bond
ionic conduction
ionization chamber
ionization constant
ionization current
ionization gauge
ionization potential
ionizing event
ionizing radiation
ionospheric wave
iota subscript
ipecac spurge
ippi-appa
ipse dixit
ipsissima verba
ipsissimis verbis
ipso facto
ipso jure
ir-
irid-
iridescent seaweed
iridium black
irido-
iris blue
iris diaphragm
iris family
iris green
iris mauve
iris shutter
iris stop
iris-in
iris-out
irish

bull
irish coffee
irish moss
irish setter
irish terrier
irish water spaniel
irish wolfhound
irish-gaelic
iron age
iron alum
iron ammonium oxalate
iron bacteria
iron blue
iron boot
iron brick
iron brown
iron buff
iron bullet
iron calker
iron carbide
iron carbonate
iron caster
iron cement
iron chloride
iron citrate
iron clay
iron coating
iron concrete
iron corer
iron crow
iron curtain
iron deficiency anemia
iron discharger
iron dog
iron family
iron filing
iron fitter
iron forger
iron founder
iron foundry
iron gang
iron glance
iron grass
iron gray
iron grey
iron grip
iron gum
iron hand

iron hat
iron heater
iron heel
iron horse
iron hydroxide
iron law of wages
iron liquor
iron loss
iron lung
iron maiden
iron maker
iron man
iron manufacturer
iron miner
iron mining
iron minium
iron mold
iron molder
iron nerves
iron oak
iron ore
iron out
iron oxide
iron perchloride
iron planer
iron plate
iron plater
iron prospector
iron protosulphate
iron puddler
iron putty
iron pyrites
iron
 ration
iron rations
iron red
iron roller
iron roofer
iron rust
iron sand
iron scale
iron scrap
iron shearer
iron sickness
iron sodium oxalate
iron spinel
iron sponge
iron stand

iron stretcher
iron sulfate
iron sulphate
iron sulphide
iron tree
iron trichloride
iron trimmer
iron vit
iron vitriol
iron will
iron yellow
iron-banded
iron-bark
iron-barred
iron-black
iron-blue dun
iron-blue spinner
iron-bound
iron-boweled
iron-braced
iron-branded
iron-burnt
iron-calked
iron-capped
iron-cased
iron-clenched
iron-coated
iron-colored
iron-core transformer
iron-cored
iron-curtain country
iron-enameled
iron-faced
iron-fastened
iron-forged
iron-founder
iron-free
iron-gloved
iron-grated
iron-gray
iron-grey
iron-guarded
iron-handed
iron-hard
iron-hearted
iron-heartedly
iron-heartedness
iron-heeled

iron-hooped
iron-jawed
iron-jointed
iron-knotted
iron-lined
iron-man
iron-marked
iron-mine
iron-mold
iron-mooded
iron-mould
iron-nailed
iron-nerved
iron-ore
iron-oxide red
iron-pated
iron-railed
iron-red
iron-ribbed
iron-riveted
iron-sand
iron-sceptered
iron-sheathed
iron-sick
iron-souled
iron-spotted
iron-stained
iron-strapped
iron-studded
iron-tipped
iron-tired
iron-toothed
iron-tree
iron-vane
meter
iron-visaged
iron-willed
iron-winged
iron-witted
iron-worded
ironbark acacia
ironbark box
ironbound coast
ironbound security
ironclad agreement
ironclad oath
ironclad proof
ironclad ram

ironclad reasoning
ironer-up
ironic implication
ironic juxtaposition
ironic suggestion
ironing board
irons in the fire
ironstone china
irony-proof
irradiation therapy
irrational number
irreducible and stubborn facts
irreducible content
irrefutable logic
irregular motion
irregular warfare
irrepressible optimist
irresistible force
irresistible impulse
irresolute person
irrespective of
irrigating shovel
irrigation ditch
irrigation engineer
irrigation engineering
irritable bowel syndrome
irritable heart
irritable man
irritable temper
irritation fever
irritation-proof
is-
is-it
isamine blue
isat-
ischemic heart disease
ischio-
ising-star
island
 arc
island base
island chain
island continent
island group
island myrtle
island of Langerhans
island of Reil
island universe

island-belted
island-born
island-contained
island-dotted
island-dweller
island-hop
island-strewn
island-studded
islet of Langerhans
islet of langerhans
islets of Langerhans
iso-
iso-octane
iso-osmotic
iso-urea
iso-uretine
iso-uric
isoamyl acetate
isoamyl benzoate
isoamyl benzyl ether
isoamyl group
isoamyl nitrite
isoamyl radical
isoamyl salicylate
isobaric line
isobutyl propionate
isoclinal line
isoclinic line
isocyanic acid
isocyano group
isocyano radical
isoelectric point
isoganal line
isogonal line
isogonic line
isoionic point
isolate yourself
isolating language
isolation booth
isolation hospital
isolation ward
isomagnetic line
isometric drawing
isometric exercises
isometric line
isometric projection
isonicotinic acid hydrazide
isophthalic acid

isopiestic line
isoplastic graft
isoporic line
isopropyl alcohol
isopropyl ether
isopropyl
group
isopropyl meprobamate
isopropyl radical
isosceles triangle
isothermal line
isothermal process
isothermal region
isothiocyano group
isothiocyano radical
isotope therapy
isotopic isobar
isoxylic acid
issue a blank check
issue a caveat
issue a command
issue a manifesto
issue a position paper
issue a prohibitory injunction
issue a statement
issue a white paper
issue a writ
issue an injunction
issue an injunction against
issue an invitation
issue an ultimatum
issue forth
issue from
issue par
issue price
issue securities
issue stock
issued capital stock
issuing company
isthmus of the fauces
it beats me
it beats the Dutch
it being provided
it can be supposed
it cannot be helped
it does not matter
it does not signify
it follows that

it has me guessing
it is all the same
it is certain
it is fated
it is for a fact
it is necessary
it is of no consequence
it is of no importance
it is proven
it is said
it is that
it is written
it makes no difference
it matters not
it may be
it might be
thought
it must be
it must follow
it must have its way
it must needs be
it needs must be
it stands to reason
it will all come out in the wash
it will be
it would appear
it's God's will
it's Greek to me
it's all one to me
it's all the same to me
it's beyond me
it's in the cards
it's no go
it's too deep for me
ita-palm
itaconic acid
italian sonnet
italo-
itch for
itch for knowledge
itch louse
itch mite
itch to
itch tree
itching for
itching palm
itching to
itchwood tree

item by item
item of evidence
item on the agenda
item veto
itemized bill
iterated integral
its last legs
its way
itsy-bitsy
itsy-witsy
itty-bitty
iu-
ivied halls
ivory black
ivory bleacher
ivory board
ivory brown
ivory carver
ivory carving
ivory cutter
ivory engraver
ivory fluter
ivory gull
ivory hunter
ivory hunting
ivory nut
ivory palm
ivory paper
ivory plant
ivory plum
ivory polisher
ivory porcelain
ivory rounder
ivory slabber
ivory sorter
ivory thumper
ivory tickler
ivory tower
ivory tree
ivory yellow
ivory-backed
ivory-beaked
ivory-billed
ivory-billed
woodpecker
ivory-black
ivory-bound
ivory-carving

ivory-faced
ivory-finished
ivory-hafted
ivory-handled
ivory-headed
ivory-hilted
ivory-studded
ivory-tinted
ivory-toned
ivory-tower
ivory-towered
ivory-towerish
ivory-towerishness
ivory-towerism
ivory-towerist
ivory-towerite
ivory-type
ivory-white
ivory-wristed
ivy League
ivy bush
ivy geranium
ivy green
ivy gum
ivy league
ivy tree
ivy vine
ivy-bush
ivy-green
j'y suis j'y reste
jaal goat
jaal-goat
jab at
jacaranda brown
jacitara palm
jack Mormon
jack afloat
jack arch
jack baker
jack bean
jack block
jack boot
jack bowl
jack chain
jack cheese
jack crosstree
jack crosstrees
jack crow

jack curlew
jack dog
jack field
jack frost
jack fruit
jack head
jack hern
jack in
jack johnson
jack ketch
jack ladder
jack lagging
jack lamp
jack lantern
jack light
jack line
jack mackerel
jack nicker
jack oak
jack of all trades
jack pigeon
jack pin
jack pine
jack pit
jack plane
jack plum
jack post
jack pot
jack press
jack rabbit
jack
 rafter
jack rib
jack rod
jack roll
jack rope
jack saddle
jack salmon
jack shave
jack spinner
jack spring
jack staff
jack stop
jack stretcher
jack stringer
jack timber
jack towel
jack tree

jack truss
jack up
jack worm
jack yard
jack-a-dandies
jack-a-dandy
jack-a-dandyism
jack-a-lent
jack-at-a-pinch
jack-boot
jack-booted
jack-boy
jack-by-the-hedge
jack-chain
jack-frame
jack-fruit
jack-in-a-box
jack-in-a-boxes
jack-in-office
jack-in-the-box
jack-in-the-boxes
jack-in-the-green
jack-in-the-pulpit
jack-in-the-pulpits
jack-knife
jack-line
jack-o'-lantern
jack-o-lantern
jack-of-all-trades
jack-plane
jack-pudding
jack-rabbit
jack-screw
jack-snipe
jack-spaniard
jack-staff
jack-stone
jack-straw
jack-tar
jack-yarder
jackal buzzard
jackass bark
jackass brig
jackass clover
jackass copal
jackass deer
jackass fish
jackass gunter

jackass hare
jackass kingfisher
jackass penguin
jackass rig
jackass-rigged
jackdaw in peacock's feathers
jacket crown
jackhead pit
jacking engine
jacking-up
jackknife
 clam
jackknife-fish
jackknife-fishes
jackleg lawyer
jackleg politician
jacko bush
jacks-of-all-trades
jackson day
jacky winter
jacob's ladder
jacob's membrane
jacob's staff
jacobean lily
jade green
jade plant
jade-green
jade-stone
jag bolt
jag spear
jag spike
jagged-toothed
jagger spring
jaggery palm
jagging iron
jaguar-man
jai alai
jail delivery
jail fever
jail-bird
jail-delivery
jail-fever
jake leg
jalee work
jam in
jam nut
jam riveter
jam session

jam through
jam up
jam weld
jam-full
jam-pack
jam-packed
jam-up
jamaica ginger
jamaica rum
jamais de la vie
jamb shaft
jambe de mouton
jamestown-weed
janca tree
jane doe
jane-of-apes
jangada fiber
jangada tree
jangle the nerves
jangled nerves
januis clausis
janus geminus
japan allspice
japan clover
japan drier
japan wax
japanese beetle
japanese iris
japanese millet
japanese mink
japanese persimmon
japanese plum
japanese quince
japanese spurge
japanic acid
jar on
jar upon the ear
jar with
jar-bird
jar-burial
jar-owl
jara-assu
jardin anglais
jardin
chinois
jardin des plantes
jardins anglais
jardins chinois

jargon aphasia
jargon word
jarring of sounds
jasmine oil
jasmine tea
jasper gray
jasper green
jasper opal
jasper pink
jasper red
jasper ware
jato unit
jaundice berry
jaundice tree
jaundice-eyed
jaundiced eye
jaundiced yellow
jaunting car
jaunting-car
jaunty car
java man
java sparrow
javelin bat
javelin man
javelin throw
javelin thrower
javelin-man
javelle water
jaw bit
jaw clutch
jaw coupling
jaw crusher
jaw jerk
jaw lizard
jaw rope
jaw slide
jaw wrench
jaw's-harp
jaw-bone
jaw-cracking
jaw-fall
jaw-fallen
jaw-locked
jaw-tied
jaw-twister
jaws of death
jay bird
jay blue

jay teal
jay-bird
jay-hawker
jay-vee
jazz band
jazz festival
jazz musician
jazz singer
jazz stick
jazz up
jazzed up
je ne sais quoi
je vous en prie
je vous remercie beaucoup
je-te
jealous-hood
jealous-pated
jealousy-proof
jecoric acid
jedding ax
jeep carrier
jeepers creepers
jeer at
jeer capstan
jefferson davis's birthday
jefferson day
jeffrey pine
jehovah's
 witnesses
jejun-
jejuno-colostomy
jejuno-ileostomy
jejuno-jejunostomy
jekyll and hyde
jell-o
jellied gasoline
jelly baby
jelly bag
jelly bean
jelly boiler
jelly doughnut
jelly egg
jelly lichen
jelly nut
jelly plant
jelly poke
jelly powder
jelly roll

jelly-fish
jennie harp
jenny ass
jenny cutthroat
jenny howlet
jenny scaffold
jenny winch
jenny wren
jenny yard
jeopardy assessment
jequirity bean
jequirity beans
jerboa kangaroo
jerboa mouse
jerboa rat
jerk back
jerk line
jerk off
jerk pump
jerk up
jerk-off
jerkin-head
jerking off
jerkinhead roof
jerkwater town
jerm-
jerry can
jerry hat
jerry shop
jerry-build
jerry-builder
jerry-building
jerry-built
jersey giant
jerusalem artichoke
jerusalem cherry
jerusalem cricket
jerusalem thorn
jest-book
jet airplane
jet black
jet blast
jet bomber
jet break
jet coal
jet condenser
jet d'eau
jet engine

jet engineer
jet engineering
jet exhaust
jet fighter
jet flight
jet fuel
jet injection
jet interrupter
jet jockey
jet lag
jet motor
jet pilot
jet pipe
jet
 plane
jet pod
jet power
jet propeller
jet propulsion
jet pump
jet rock
jet set
jet setter
jet stream
jet tanker
jet thrust
jet transport
jet wash
jet-assisted takeoff
jet-black
jet-enamelled ware
jet-pile
jet-propelled
jet-propulsion
jet-set
jet-setter
jeu d'esprit
jeu de mots
jeu de theatre
jeune fille
jeune premier
jeune premiere
jeunes filles
jeunes premiers
jeunesse dor
jeunesse doree
jeux d'esprit
jeux de mots

jew crow
jew down
jew nail
jew's harp
jew's-ear
jew's-harp
jew-fish
jewel block
jewel box
jewel case
jewel smuggling
jewel thief
jewel-block
jewel-bright
jewel-colored
jewel-enshrined
jewel-gleaming
jewel-headed
jewel-house
jewel-loving
jewel-proof
jewel-studded
jeweler's putty
jeweler's rouge
jewelers' putty
jewelers' rouge
jeweller's rouge
jewelry store
jewelweed family
jewish calendar
jews' harp
jews' stone
jews' trump
jib boom
jib cat
jib crane
jib door
jib guy
jib iron
jib martingale
jib netting
jib pole
jib sheet
jib stay
jib topsail
jib traveler
jib-boom
jib-door

jib-headed
jib-header
jib-o-jib
jibber
jib
jibber the kibber
jibe all standing
jibe at
jig borer
jig brow
jig bushing
jig button
jig indicator
jig saw
jig-back
jig-drill
jig-file
jig-jig
jig-jog
jig-joggy
jig-saw
jigger boom
jigger flea
jigger mast
jigger pump
jigger saw
jigger weed
jiggery-pokery
jigog ring
jigsaw puzzle
jill-flirt
jim crow
jim crowism
jim dash
jim-crow
jim-dandy
jim-dandy peach
jim-jam
jimson weed
jimson-weed
jin ricksha
jingle bell
jingle shell
jingle stick
jingle-jangle
jingling John
jingling Johnny
jinny road

jitney driver
jiu-jitsu
jive talk
jnana-marga
jo-darter
job action
job analysis
job card
job case
job classification
job costing
job description
job font
job lot
job of work
job order
job press
job printer
job printing
job ticket
job type
job watch
job work
job's comforter
job's tears
job-order costing
jobbing printer
jock strap
jockey backstay
jockey bar
jockey boot
jockey box
jockey cap
jockey club
jockey coat
jockey gear
jockey pulley
jockey saddle
jockey weight
jockey
 wheel
jodhpur boot
jodhpur boots
jodhpur shoe
joe rocker
joe-pye weed
joey glass
jog along

jog on
jog the memory
jog trot
jog-jog
jog-trot
joggle beam
joggle piece
joggle plating
joggle post
joggling plank
john barleycorn
john bull
john doe
john dory
john hancock
john henry
john-a-nokes
john-a-stiles
john-apple
johnny cake
johnny house
johnny reb
johnny-cake
johnny-jump-up
johnny-on-the-spot
johnson grass
joie de vivre
join Maths
join battle
join battle with
join forces
join fortunes with
join hands
join hands with
join in
join in a conversation
join in fellowship
join in holy wedlock
join in marriage
join in the chorus
join issue
join issue upon
join the angels
join the choir invisible
join the great majority
join the majority
join the opposition
join the parade

join together
join up
join up with
join with
join your ancestors
join your fortunes with
join yourself to
join yourself with
join-
joiner bulkhead
joiner door
joiner hardware
joiner work
joining of forces
joining-hand
joint
 account
joint and last survivor annuity
joint bar
joint bond
joint box
joint chair
joint chairmanship
joint clay
joint committee
joint control
joint density function
joint discussion
joint effort
joint filler
joint fir
joint gap
joint grass
joint heir
joint hinge
joint ill
joint life annuity
joint life insurance
joint making
joint operation
joint operations
joint ownership
joint pin
joint rate
joint resolution
joint return
joint runner
joint rust

joint sensation
joint sense
joint session
joint snake
joint stock
joint stool
joint tenancy
joint wire
joint-bedded
joint-ring
joint-stock association
joint-stock company
joint-stockism
joint-stool
joint-tenant
joint-worm
jointer plane
jointing plane
joke with whiskers
joke writer
joking-relative
jolly bean
jolly boat
jolly fellow
jolly jumper
jolly roger
jolly-boat
jolt head
jolt-wagon
jolter-head
jonah crab
jonquil yellow
jook joint
jordan almond
joseph's coat
joshua tree
joss flower
joss house
joss paper
joss pidgin
joss stick
jostling
 of sounds
jot down
jour maigre
journal bearing
journal box
journal bronze

journal intime
journal turbine
journal voucher
journal-book
journalism school
journaux intimes
journey weight
journey's end
journey-work
journeyman work
jouvence blue
joy girl
joy powder
joy ride
joy rider
joy riding
joy stick
joy-bereft
joy-bright
joy-bringing
joy-deserted
joy-dispelling
joy-encompassed
joy-inspiring
joy-juice
joy-killer
joy-mixed
joy-rapt
joy-resounding
joy-ridden
joy-ride
joy-riding
joy-rode
joy-wrung
ju-jitsu
ju-ju
jubilant display
jubilee indulgence
judaeo-
judas hole
judas tree
judas window
judas-tree
judeo-spanish
judex ordinarius
judex pedaneus
judge advocate
judge advocate general

judge advocate general corps
judge advocate generals
judge advocates
judge advocates general
judge amiss
judge before the evidence is in
judge beforehand
judge delegate
judge not
judge of assize
judge ordinary
judge prematurely
judge's gown
judge's robe
judge-made
judged beforehand
judged prematurely
judges'
rules
judgment book
judgment cap
judgment creditor
judgment day
judgment debt
judgment debtor
judgment hall
judgment lien
judgment note
judgment rate
judgment seat
judgment summons
judgment-day
judgment-hall
judgment-proof
judgment-seat
judicial astrology
judicial circuit
judicial conference
judicial murder
judicial oath
judicial process
judicial punishment
judicial review
judicial separation
judo expert
jug band
jug plant
jug wine

jug-bitten
jug-handle
jug-jug
jugal bone
jugal furrow
jugal point
jugged hare
juggler's trick
jugular vein
juice extractor
juice pear
juice up
juicy morsel
jujitsu expert
jujube plum
juke house
juke joint
julian calendar
jumbee bean
jumble sale
jumble together
jumbo jet
jump Computer technol
jump a claim
jump a mile
jump aboard
jump about
jump all over
jump all over someone
jump area
jump at
jump at the bidding of
jump bail
jump ball
jump bid
jump dial
jump discontinuity
jump down your throat
jump frog
jump head
jump in
jump into
jump jet
jump joint
jump
 leads
jump line
jump off

jump on
jump on the bandwagon
jump out
jump out of your skin
jump over
jump pass
jump ring
jump rope
jump saw
jump scrape
jump seat
jump ship
jump shot
jump spark
jump stroke
jump suit
jump the gun
jump to a conclusion
jump to it
jump turn
jump up
jump weld
jump wire
jump-
jump-hop
jump-off
jump-shift
jump-spark coil
jump-start
jump-up
jumped-up
jumper cable
jumper lead
jumper sled
jumper stay
jumper wire
jumping bean
jumping disease
jumping jack
jumping mouse
jumping pain
jumping plant louse
jumping spider
jumping-off place
jumping-off-place
jumpy as a cat on a hot tin roof
junction box
junction transistor

juncture of events
june beetle
jungle ballot
jungle bear
jungle bendy
jungle bunny
jungle cat
jungle cock
jungle fever
jungle fowl
jungle geranium
jungle green
jungle gym
jungle hen
jungle juice
jungle ox
jungle rice
jungle rot
jungle sheep
jungle warfare
jungle-clad
jungle-covered
jungle-traveling
jungle-walking
jungle-worn
junior barister
junior chamber of
commerce
junior college
junior common room
junior counsel
junior high
junior high school
junior leaguer
junior lightweight
junior middleweight
junior miss
junior officer
junior school
junior securities
junior varsity
junior welterweight
juniper bay
juniper berries
juniper berry
juniper cedar
juniper gum tree
juniper oil

juniper tree
juniper webworm
juniper-berry oil
juniper-tar oil
juniperic acid
junk bottle
junk collector
junk dealer
junk food
junk heap
junk jewelry
junk mail
junk peddler
junk ring
junk room
junk shop
junk yard
junk-bottle
jupiter's beard
jure divino
jure humano
juridical days
juristic act
juristic person
jury box
jury chancellor
jury fixing
jury list
jury mast
jury of inquest
jury of matrons
jury of the vicinage
jury of women
jury of your peers
jury panel
jury process
jury room
jury selection
jury skid
jury trial
jury wheel
jury-
jury-fixer
jury-mast
jury-packing
jury-rig
jury-rigged
jury-rigged expedient

jury-rigging
jury-shy
jury-squaring
jus canonicum
jus civile
jus
 commune
jus divinum
jus ecclesiasticum
jus gentium
jus inter gentes
jus naturae
jus naturale
jus postliminii
jus primae noctis
jus publicum
jus sanguinis
jus scriptum
jus soli
just a bit
just about
just across the street
just alike
just around the corner
just as predicted
just as you thought
just be
just being
just dandy
just deserts
just do
just enough
just expectation
just folks
just here
just imagine
just in case
just in time
just intonation
just know
just like one
just like that
just next door
just noticeable difference
just now
just once
just opposite
just out

just plain nuts
just right
just see
just so
just the opposite
just the other way
just the other way around
just the reverse
just the same
just then
just this once
just to be doing
just under the wire
just what the doctor ordered
juste-milieu
juste-milieux
justice box
justice court
justice in eyre
justice of assize
justice of the peace
justice seat
justice's warrant
justice-dealing
justice-loving
justice-proof
justice-slighting
justices
 in eyre
justifiable abortion
justifiable expectation
justifiable homicide
justification by faith
justification by works
justification space
justify hope
justify one in supposing
justifying space
justitia omnibus
jut out
jut over
jute board
jute butts
jute crusher
jute opener
jute tier
juvenal plumage
juvenile book

juvenile court
juvenile delinquency
juvenile delinquent
juvenile dictionary
juvenile editor
juvenile hormone
juvenile lead
juvenile officer
juxta-ampullar
juxta-articular
juxtapose in opposition
k ration
k'ai shu
k-meson
kA
kCi
kG
kHz
kJ
kMc
kOe
kV
kVA
kVAH
kVAr
kW
kWh
ka-
kaawi yam
kabuto gane
kachang puteh
kachina doll
kad-
kaffee klatsch
kaffir beer
kaffir corn
kafir corn
kai-kai
kailyard school
kainic acid
kairotic moment
kairotic time
kaiser brown
kaiser roll
kaju apple
kako-
kala azar
kala-azar

kalamein work
kale brose
kale gully
kale runt
kale worm
kale-
kaleyard school
kamashimo zashi
kambing utan
kamehameha day
kamic body
kamoot tree
kana-majiri
kanal
rays
kangaroo acacia
kangaroo apple
kangaroo bear
kangaroo beetle
kangaroo closure
kangaroo cloture
kangaroo court
kangaroo feathers
kangaroo grass
kangaroo hare
kangaroo jerboa
kangaroo mouse
kangaroo paw
kangaroo rat
kangaroo thorn
kangaroo vine
kangaroo-rat
kans grass
kanya butter
kanya tree
kapok oil
kapok tree
kappa meson
karate expert
karma-marga
karri-tree
karroo bush
kary-
karyo-
kashgar tamarisk
kashmir goat
kat-
kata-

katabatic wind
katsura tree
kauri copal
kauri gum
kauri pine
kauri resin
kava gum
kaw-
kayo punch
keV
kedani fever
kedani mite
kedge anchor
kedge off
kedge-anchor
keekwilee-house
keel and keelson
keel arch
keel batten
keel line
keel over
keel petal
keel rail
keel rope
keel up
keel vessel
keel-boat
keel-bully
keeled snake
keelson rider
keen about
keen desire
keen eye
keen interest
keen on
keen pleasure
keen satisfaction
keen sight
keen-biting
keen-eared
keen-edged
keen-eyed
keen-nosed
keen-o
keen-o-peachy
keen-scented
keen-sighted
keen-witted

keen-wittedness
keena
nuts
keep a check of
keep a check on
keep a civil tongue in your head
keep a course
keep a firm hand on
keep a firm hold upon
keep a good leeway
keep a good lookout
keep a good lookout for
keep a good margin
keep a good offing
keep a happy medium
keep a light in the window
keep a middle course
keep a nose to the wind
keep a sharp eye on
keep a sharp eye upon
keep a sharp lookout
keep a sharp lookout for
keep a stiff upper lip
keep a straight face
keep a tight hand on
keep a tight hand upon
keep a tight rein on
keep a watch
keep a weather eye open
keep abreast of the times
keep account of
keep accounts
keep afloat
keep alert
keep alive
keep alive in your thoughts
keep aloof
keep aloof from
keep an account with
keep an ace up your sleeve
keep an ear to the ground
keep an eye on
keep an eye out for
keep an eye upon
keep an idea
keep an open house
keep an open mind
keep apart

keep as a nest egg
keep aside
keep at
keep at a distance
keep at a respectful distance
keep at arm's length
keep
at bay
keep at it
keep at your beck and call
keep awake
keep away
keep away from
keep bachelor quarters
keep back
keep banker's hours
keep between us
keep body and soul together
keep books
keep both feet on the ground
keep busy
keep buttoned up
keep by one
keep calm
keep clear of
keep close
keep close to
keep coming
keep company
keep company with
keep cool
keep count of
keep dark
keep doggedly at
keep down
keep driving
keep everyone waiting
keep faith
keep faith with
keep fit
keep fresh
keep from
keep from harm
keep from laughing
keep from spreading
keep going
keep guard
keep hands off

keep her so
keep her steady
keep hidden
keep hold of
keep hold of the land
keep hope alive
keep hoping
keep house
keep in
keep in bounds
keep in check
keep in contact with
keep in countenance
keep in custody
keep in detention
keep in formation
keep in hand
keep in ignorance
keep in line
keep in memory
keep in mind
keep in order
keep in practice
keep in reserve
keep in sight
keep in step
keep in store
keep
in suspense
keep in the background
keep in the dark
keep in the middle of the road
keep in the right path
keep in touch
keep in touch with
keep in view
keep in with
keep informed
keep intact
keep inviolate
keep it a deep
keep it under your hat
keep kosher
keep late hours
keep moving
keep mum
keep off
keep off and on

keep on
keep on good terms
keep on hand
keep on the go
keep on the safe side
keep open house
keep out
keep out of harm's way
keep out of mischief
keep out of sight
keep out of the way
keep out of the way of
keep pace with
keep pointed
keep posted
keep quiet
keep remote from
keep safe
keep score
keep secret
keep shady
keep silence
keep silent
keep snug
keep something for a rainy day
keep station
keep step
keep step with
keep still
keep subject
keep tab
keep tab on
keep tabs
keep tabs on
keep tally
keep the ball rolling
keep the change
keep the course
keep the door open
keep the ears on the ground
keep the ears to the ground
keep the even tenor of your way
keep the eyes upon
keep
the faith
keep the field
keep the golden mean
keep the heading

keep the lid on
keep the memory alive
keep the peace
keep the pot boiling
keep the wolf from the door
keep the wound open
keep time
keep to
keep to the middle
keep to the middle path
keep to the middle way
keep to yourself
keep together
keep track of
keep troth
keep trying
keep under
keep under control
keep under cover
keep under lock and key
keep under observation
keep under wraps
keep under your thumb
keep up
keep up a correspondence
keep up a fast pace
keep up a killing pace
keep up appearances
keep up on
keep up the good work
keep up the memory of
keep up to date
keep up to standard
keep up with
keep up with the Joneses
keep up your courage
keep uppermost in your thought
keep vigil
keep watch
keep watch and ward
keep watch over
keep within
keep within bounds
keep within compass
keep within limits
keep within these walls
keep within your budget
keep within your means

keep you guessing
keep you on edge
keep you on
pins and needles
keep you on tenterhooks
keep you posted
keep your chin up
keep your cool
keep your course
keep your distance
keep your ear to the ground
keep your ears open
keep your esthetic distance
keep your eye on the ball
keep your eye peeled
keep your eyes on the stars
keep your eyes open
keep your eyes peeled
keep your eyes skinned
keep your fingers crossed
keep your footing
keep your freedom
keep your hand in
keep your head
keep your head above water
keep your mouth shut
keep your nose out of this
keep your nose to the grindstone
keep your own counsel
keep your pecker up
keep your place
keep your powder dry
keep your promise
keep your shirt on
keep your spirits up
keep your sword in its sheath
keep your temper
keep your trap shut
keep your weather eye open
keep your word
keep your yap shut
keep yourself to yourself
keep yourself under control
keeper hook
keeper ring
keeping apart
keeping flocks and herds
keeping in

keeping in mind
keeping room
keeping secret
keeping-room
keg
fig
keg spring
kei-apple
kekuna oil
kelp ash
kelp crab
kelp goose
kelp greenling
kelp gull
kelp hen
kelp pigeon
kelp plover
kelp raft
kemiri nut
kemp-haired
kendal green
kennel club
kennelly-heaviside layer
kenny method
keno goose
kent cap
kente cloth
kentucky coffee tree
kephalo-
kept down
kept in
kept in remembrance
kept in reserve
kept mistress
kept under
kept woman
kera-
kerat kamel
kerat-
kerato-
kerb drill
kerb market
kerb weight
kerb-stone
kerbstone market
kermes mineral
kermes oak
kern counter

kernel sentence
kernel smut
kernel spot
kerosene heater
kerosene stove
kerry blue terrier
kestner plant
ket-
ketch-rigged
keto form
keto-
keto-enol isomerism
keto-enol tautomerism
ketone alcohol
ketone body
ketone group
ketone radical
kettle base
kettle hat
kettle hole
kettle maker
kettle moraine
kettle net
kettle of fish
kettle stitch
kettle-bottom
kettle-bottomed
kettle-stitch
kew tree
kewpie doll
key bed
key bit
key block
key bolt
key bugle
key case
key chord
key club
key desk
key drift
key
file
key filer
key frame
key fruit
key harp
key holder
key horizon

key industry
key line
key man
key money
key move
key of the Nile
key pad
key pattern
key pin
key pipe
key plate
key plug
key punch
key ring
key rocker
key scarf
key seat
key sentence
key signature
key size
key station
key stop
key to
key to the city
key tone
key trait
key trumpet
key up
key word
key-bugle
key-cold
key-drawing
key-note
key-seat rule
keyed up
keyed-up
keyhole limpet
keyhole saw
keyhole urchin
keyman insurance
keynote address
keynote speech
keystone joist
keystone sack
keyway caliper
keyway drill
kg-m
khaki bush

khaki campbell
khaki weed
khaki-clad
khaki-clothed
khaki-colored
khaki-hued
kheu tree
khus-khus
ki-yi
kiabooca wood
kick about
kick against
kick against the pricks
kick around
kick back
kick down the ladder
kick downstairs
kick in
kick in the teeth
kick off
kick off an attack
kick out
kick over
kick over the traces
kick plait
kick plate
kick pleat
kick start
kick starter
kick the air
kick the
beam
kick the bucket
kick the clouds
kick the habit
kick the wind
kick turn
kick up
kick up a dust
kick up a hullabaloo
kick up a racket
kick up a row
kick up a shindy
kick up dust
kick up your heels
kick upstairs
kick wheel
kick you in the teeth

kick your habit
kick your heels
kick yourself
kick-about
kick-off
kick-sled
kick-start
kick-up
kickie-wickie
kicking coil
kicking downstairs
kicking out
kicking strap
kicking tackle
kicking upstairs
kicking-colt
kicking-horses
kicksey-winsey
kicksie-wicksie
kicksy-wicksy
kid along
kid around
kid brother
kid glove
kid gloves
kid out of
kid point
kid sister
kid stuff
kid yourself
kid-glove
kid-glove orange
kid-glove politics
kid-gloved
kid-skin
kiddie car
kidding around
kiddy car
kidney basin
kidney bean
kidney beans
kidney corpuscle
kidney cotton
kidney disease
kidney liverleaf
kidney machine
kidney oil
kidney ore

kidney pie
kidney stone
kidney transplant
kidney vetch
kidney worm
kidney-bean tree
kidney-leaved
kidney-shaped
kids' stuff
kikuyu
 grass
kill by inches
kill en masse
kill off
kill the fatted calf
kill the slain
kill time
kill two birds with one stone
kill with kindness
kill yourself
kill-
kill-courtesy
kill-cow
kill-crazy
kill-crazy animal
kill-devil
kill-joy
kill-kid
kill-time
kill-wart
killdeer plover
killed bowl
killed spirits
killed-virus vaccine
killer boat
killer whale
killer-diller
killing bottle
killing frost
killing ground
killing pace
killing site
killing time
killy hawk
kiln evaporator
kiln foreman
kiln run brick
kiln scum

kiln-burnt
kiln-dried
kiln-dry
kiln-drying
kilo-
kilo-oersted
kiloelectron volt
kilogram calorie
kilogram-calorie
kilogram-force
kilogram-meter
kilogramme-metre
kilovar-hour
kilovolt-ampere
kilovolt-ampere-hour
kilowatt-hour
kilt pleat
kim-kam
kimono sleeve
kind Nature's signal of retreat
kind deed
kind of
kind offices
kind regards
kind remembrances
kind words and comfortable
kind-hearted
kind-mannered
kindest regards
kindle down
kindling wood
kindly act
kindly disposition
kindly-disposed
kindred
soul
kindred spirit
kinds of
kinematic pair
kinematic viscosity
kinesi-
kinesthetic memory
kinetic art
kinetic energy
kinetic potential
kinetic theory
kinetic theory of gases
kinetic theory of heat

kinetic theory of matter
kineto-
king at arms
king auk
king ball
king bee
king bridge
king card
king carp
king closer
king closure
king clover
king cobra
king conch
king crab
king crow
king devil
king eagle
king eider
king fern
king james version
king leg
king lory
king mackerel
king monkey
king mullet
king nut
king of arms
king of beasts
king of the castle
king of the forest
king of the herrings
king of the hill
king of the mountain
king ortolan
king parakeet
king penguin
king plank
king plant
king post
king prawn
king quail
king rail
king rod
king row
king salmon
king size
king snake

king sora
king spoke
king tody
king truss
king vulture
king's English
king's bench
king's birthday
king's blue
king's colour
king's colours
king's counsel
king's english
king's evidence
king's evil
king's
 highway
king's man
king's pattern
king's peace
king's purple
king's ransom
king's scout
king's shilling
king's weather
king's yellow
king's-pawn openings
king-bird
king-bolt
king-crab
king-craft
king-cup
king-emperor
king-fish
king-hit
king-killer
king-maker
king-of-arms
king-of-the-herrings
king-of-the-salmon
king-piece
king-pin
king-post
king-post truss
king-ridden
king-size
king-size bed
king-sized

king-whiting
king-whitings
kingdom come
kingdom of God
kingdom of ends
kingdom of glory
kingdom of heaven
kingfisher daisy
kings-of-arms
kink in one's horn
kino gum
kinship group
kip down
kip-ft
kipper-nut
kippered herring
kippered salmon
kirby hook
kirk master
kirk session
kirk skail
kirk-shot
kirn baby
kirn cut
kislar aga
kiss and make up
kiss cheeks
kiss curl
kiss good-bye
kiss hands
kiss of death
kiss of life
kiss of peace
kiss off
kiss one's feet
kiss the book
kiss the hem of your garment
kiss the rod
kiss your ass
kiss your feet
kiss-me
kiss-me-quick
kiss-off
kissing and making
up
kissing bug
kissing cousin
kissing crust

kissing dance
kissing disease
kissing gate
kissing gourami
kissing kin
kissing strings
kit and boodle
kit and caboodle
kit bag
kit fiddle
kit fox
kit out
kit violin
kit-cat
kit-fox
kitchen bob
kitchen boiler
kitchen cabinet
kitchen fee
kitchen garden
kitchen gardener
kitchen ground
kitchen kaffir
kitchen match
kitchen midden
kitchen police
kitchen range
kitchen rose
kitchen saw
kitchen servant
kitchen sink
kitchen space
kitchen stuff
kitchen table
kitchen tea
kitchen work
kitchen-midden
kite balloon
kite bar
kite eagle
kite falcon
kite fighting
kite sausage
kite track
kite winder
kite-tailed
kite-wind
kited check

kith and kin
kitten moth
kitten-breeches
kittly-benders
kitty needy
kitty witch
kitty wren
kitty-cat
kitty-corner
kitty-cornered
kl-
kleig light
klept-
klieg eyes
klieg light
klook-klook
kn-
knap-bottle
knapsack sprayer
knave-child
kneaded butter
kneading-trough
knee action
knee bend
knee bone
knee brace
knee breeches
knee colter
knee
cop
knee drill
knee drop
knee grass
knee guard
knee halter
knee holly
knee holm
knee jerk
knee joint
knee pants
knee pine
knee plate
knee puff
knee punch
knee rafter
knee roof
knee socks
knee strap

knee swell
knee timber
knee tool
knee viol
knee-bent
knee-bowed
knee-braced
knee-breeched
knee-cap
knee-crooking
knee-deep
knee-high
knee-high to a grasshopper
knee-hole
knee-joint
knee-jointed
knee-length
knee-pan
knee-shaking
knee-shaped
knee-sprung
knee-tied
knee-timber
knee-worn
kneed grass
kneel to
kneeling rafter
kneeling stool
knell-like
knick-knack
knife acacia
knife and fork
knife bar
knife bayonet
knife box
knife colter
knife edge
knife file
knife grass
knife grinder
knife key
knife lanyard
knife money
knife plait
knife plaiting
knife pleat
knife poised at your throat
knife rest

knife stone
knife switch
knife tool
knife-backed
knife-bladed
knife-board
knife-edge
knife-edged
knife-featured
knife-grinder
knife-handle
knife-jawed
knife-plaited
knife-point
knife-shaped
knife-stripped
knifing
tool
knight adventure
knight bachelor
knight bachelors
knight banneret
knight baronet
knight commander
knight cross
knight errant
knight errantry
knight grand commander
knight grand cross
knight marshal
knight of columbus
knight of the pen
knight of the plume
knight of the post
knight of the quill
knight of the road
knight service
knight templar
knight's fee
knight's-spur
knight-adventurer
knight-errant
knight-errantries
knight-errantry
knight-errantship
knight-head
knight-service
knighthood-errant

knightly skill
knights adventurers
knights bachelors
knights bannerets
knights baronets
knights commanders
knights grand commanders
knights grand cross
knights marshals
knights-errant
knit goods
knit the brow
knitting case
knitting machine
knitting needle
knitting pin
knitting sheath
knitting stick
knitting wire
knob celery
knob latch
knob lock
knob-billed
knob-nosed
knobbling fire
knobbling roll
knobcone pine
knock about
knock against
knock around
knock back
knock cold
knock
dead
knock down
knock for a loop
knock galley-west
knock in
knock in the head
knock into a cocked hat
knock into your head
knock it off
knock off
knock on the head
knock on wood
knock out
knock out of the box
knock over

knock rummy
knock senseless
knock stiff
knock the bottom out of
knock the chip off your shoulder
knock the chocks
knock the chocks out from under
knock the props out from under
knock together
knock unconscious
knock under
knock up
knock you off your perch
knock your brains out
knock your eyes out
knock your head against
knock yourself out
knock-
knock-about
knock-down
knock-down-and-drag
knock-down-and-drag-out
knock-down-and-drag-out fight
knock-down-and-drag-out quarrel
knock-down-drag-out
knock-knee
knock-kneed
knock-knees
knock-me-down
knock-on
knock-out
knockdown argument
knocked flat
knocked out
knocked silly
knocked up
knocked-down
knocker-off
knocker-up
knocking-shop
knockout blow
knockout drop
knockout drops
knol-khol
knop yarn
knot bindweed
knot clipper
knot gall

knot
 garden
knot porter
knot stitch
knot tier
knot-grass
knot-jointed
knot-jointed rice grass
knot-portering
knotgrass spurge
knotroot grass
knotted score
knotter bill
knotter hook
knotting bill
knotty pine
knotty point
knotty question
knotty rhatany
knotty-leaved
knotty-pated
knotweed spurge
know a hawk from a handsaw
know a little
know a thing or two
know a trick worth two of that
know again
know all the answers
know all the ins and outs
know all the moves of the game
know all the tricks
know all the tricks of the trade
know backwards
know backwards and forwards
know beforehand
know by heart
know by rote
know by sight
know damn well
know darn well
know down to the ground
know for certain
know from A to Z
know from alpha to omega
know from nothing
know from the ground up
know full well
know inside out

know instinctively
know it all
know it-all
know like a book
know like the back of your hand
know no bounds
know no end
know no wrong
know not
know not what
know nothing
know nothing
of
know the
know the ropes
know the score
know the ways of the world
know well
know what it's all about
know what's what
know when you have had enough
know which is which
know your ass from your elbow
know your onions
know your own mind
know your stuff
know your way about
know-all
know-how
know-it-all
know-little
know-nothing
know-nothingism
know-nothingness
knowledge of the world
knowledge without reason
knowledge without thought
knowledge-gap
known as
known by every schoolboy
known by measurement
known by the name of
known quantity
knuckle ball
knuckle bow
knuckle down
knuckle down to
knuckle gear

knuckle gearing
knuckle guard
knuckle joint
knuckle line
knuckle molding
knuckle pin
knuckle post
knuckle timber
knuckle tip
knuckle to
knuckle tooth
knuckle under
knuckle under to
knuckle-bone
knuckle-deep
knuckle-duster
knuckle-dusters
knuckle-joint
knuckle-joint press
knuckle-kneed
knurl toe
ko-katana
koa finch
koda millet
koh-i-noor
koi-kopal
kok-saghyz
kokra wood
kokum butter
kokum oil
kol
nidre
kola nut
kola tree
koloa mapu
koloa moha
komma-ichi-da
kona cyclone
kona storm
konker tree
koppel flute
kosam seeds
kosher soap
kosher wine
kottabos kataktos
kousso flower
kow-tow
kraft paper

kraft process
kraut grass
krebs cycle
krems lead
krenging hook
kriss kringle
kriya-sakti
kriya-shakti
krym-saghyz
kryo-
ku klux klan
ku kluxer
ku-klux
kudzu vine
kugel granite
kujira shaku
kung chih
kung chin
kung ching
kung fen
kung fu
kung-fu
kungu cake
kuo-yu
kuping tael
kurchee bark
kuroshio extension
kuroshio system
kurrol's salt
kuteera gum
kutira gum
kwe-bird
kyano-
kyrie eleison
l'istesso tempo
l'union fait la force
l-
l-arterenol
l-glucose
l-noradrenaline
l-norepinephrine
la carte
la grippe
la guerre
la mode
la patrie
la recherche du temps perdu
la ronde

la tene
la-de-da
la-di-da
la-la
laap insect
laap insects
label stop
labeled atom
labeled element
labia majora
labia minora
labial pipe
labio-
labium majus
labium minus
labium minus pudendi
labor against
labor and bring forth
labor
 bank
labor camp
labor caucus
labor contract
labor costs
labor day
labor exchange
labor force
labor in behalf of
labor in darkness
labor in vain
labor in your vocation
labor interests
labor lost
labor market
labor movement
labor of Sisyphus
labor of love
labor omnia vincit
labor organizer
labor pains
labor relations
labor room
labor spy
labor strike
labor the obvious
labor turnover
labor under
labor under a disadvantage

labor under a false impression
labor under difficulties
labor union
labor unionist
labor value theory
labor-saving
labor-saving device
laborare est orare
laboratory animal
laboratory apparatus
laboratory assistant
laboratory camera
laboratory chemist
laboratory course
laboratory diagnosis
laboratory equipment
laboratory experiment
laboratory method
laboratory microscope
laboratory school
laboratory table
laboratory technician
laboratory technique
laboratory test
laboratory work
laboratory worker
labored breathing
laboring man
laboring oar
labors of Hercules
labour camp
labour
exchange
labour-saving
labrador retriever
labyrinth fish
labyrinth packing
lac dye
lac insect
lac lake
lac resin
lac resins
lac sulphuris
lac sumac
lac tree
lac virginis
lac wax
lace bug

lace coral
lace curtain
lace edging
lace fern
lace finisher
lace fly
lace glass
lace grass
lace into
lace lizard
lace maker
lace paper
lace piece
lace pigeon
lace pillow
lace plant
lace shoes
lace stitch
lace tree
lace trimming
lace up
lace vine
lace-bordered
lace-covered
lace-curtain
lace-curtained
lace-edged
lace-fern
lace-finishing
lace-fronted
lace-leaf
lace-leaves
lace-piece
lace-trimmed
lace-vine
lace-winged
lacerate the ear
lacerate the heart
lacertus fibrosus
lacewing fly
lachryma Christi
lachryma christi
lachrymal bone
lachrymatory gas
lacing course
lack force
lack in
lack of affect

lack of agreement
lack of appetite
lack of bite
lack of charisma
lack of charm
lack of claim
lack of color
lack of concord
lack of contact
lack of depth
lack of eagerness
lack of enthusiasm
lack of feeling
lack
of feeling tone
lack of feelings
lack of finish
lack of food
lack of force
lack of foresight
lack of forethought
lack of hindrance
lack of incisiveness
lack of influence
lack of information
lack of integrity
lack of interest
lack of magnetism
lack of meaning
lack of message
lack of parallelism
lack of personality
lack of pleasure
lack of polish
lack of power
lack of preparation
lack of refinement
lack of respect
lack of self-confidence
lack of self-reliance
lack of sentimentality
lack of sheen
lack of sparkle
lack of title
lack of touch
lack of vision
lack of weight
lack of zeal

lack regularity
lack-all
lack-beard
lack-brain
lack-fettle
lack-latin
lack-learning
lack-linen
lack-love
lack-lustre
lack-pity
lacquer red
lacquer tree
lacquer ware
lacrim-
lacrimal bone
lacrimal duct
lacrimal gland
lacrimal sac
lacrosse stick
lact-
lactate dehydrogenase
lacteal gland
lactic acid
lacto-
lactogenic hormone
lactose intolerance
lacunar amnesia
lacustrine dweller
lacustrine dwelling
lacustrine
 inhabitant
lad's love
ladder back
ladder beetle
ladder braid
ladder chain
ladder company
ladder jack
ladder pipe
ladder road
ladder shell
ladder stitch
ladder tournament
ladder track
ladder truck
ladder-back
ladder-back chair

ladder-backed
laden with doom
laden with significance
laden with sorrow
ladies' fingers
ladies' gallery
ladies' man
ladies' room
ladies' wear
ladies'-tobacco
ladies'-tobaccoes
ladies'-tobaccos
ladies'-wear shop
ladies-in-waiting
ladies-of-the-night
ladies-tresses
ladle board
ladle out
lady apple
lady beetle
lady bountiful
lady bracken
lady brake
lady chair
lady chapel
lady court
lady crab
lady cracker
lady day
lady fair
lady fern
lady friend
lady grass
lady hair grass
lady killer
lady love
lady mayoress
lady of pleasure
lady of the bedchamber
lady of the evening
lady of the house
lady pea
lady superior
lady whin
lady woman
lady wrack
lady's bedstraw
lady's cushion

lady's finger
lady's glove
lady's laces
lady's maid
lady's man
lady's mantle
lady's slipper
lady's
 thumb
lady's traces
lady's-eardrop
lady's-mantle
lady's-slipper
lady's-smock
lady's-thistle
lady's-thumb
lady's-tresses
lady-bird
lady-cow
lady-fish
lady-help
lady-in-waiting
lady-killer
lady-killing
lady-love
lady-of-the-night
lady-slipper
lady-smock
ladybird beetle
laetare sunday
laevo-
lag b'omer
lag behind
lag bolt
lag fault
lag line
lag screw
lag-bed tractor
lager beer
laggen-gird
lagging load
lah-di-dah
laid aside
laid bare
laid batonne
laid deck
laid embroidery
laid low

laid off
laid on the shelf
laid paper
laid up
laid wool
laisser aller
laisser faire
laisser passer
laisser-aller
laisser-faire
laissez aller
laissez faire
laissez passer
laissez-aller
laissez-faire
laissez-faireism
laissez-passer
lait d'amandes
lake basin
lake bass
lake breeze
lake carp
lake chub
lake cress
lake duck
lake dweller
lake dwelling
lake fever
lake fly
lake front
lake herring
lake lawyer
lake minnow
lake of fire and brimstone
lake perch
lake perches
lake pitch
lake plover
lake salmon
lake shad
lake sheepshead
lake
shore
lake sturgeon
lake trout
lake water cress
lake whitefish
lake-bound

lake-colored
lake-girt
lake-land
lake-moated
lake-reflected
lake-resounding
lake-surrounded
lakeland terrier
lamb down
lamb lily
lamb mint
lamb pie
lamb plant
lamb tail
lamb's ears
lamb's lettuce
lamb's tails
lamb's tongue
lamb's wool
lamb's-quarters
lamb's-wool
lamb-like
lambda particle
lambdoidal suture
lambent flame
lame and impotent conclusion
lame brains
lame duck
lame excuse
lame verses
lame-born
lame-brain
lame-footed
lame-horsed
lame-legged
lamell-
lamella roof
lamellar vector
lamelli-
lament for
lamin-
laminar flow
laminar-flow system
laminar-flow-control plane
laminated glass
laminated safety glass
laminated wood
lamini-

lamp bearer
lamp cage
lamp chimney
lamp fitter
lamp holder
lamp house
lamp jack
lamp maker
lamp oil
lamp oiler
lamp shade
lamp shell
lamp socket
lamp standart
lamp trimmer
lamp-bearing
lamp-bedecked
lamp-black
lamp-blown
lamp-decked
lamp-foot
lamp-heated
lamp-hour
lamp-iron
lamp-lined
lamp-oil
lamp-post
lamp-warmed
lamper
 eel
lamper-eel
lamprey eel
lampro-
lana dye
lance bucket
lance corporal
lance head
lance of courtesy
lance rest
lance sergeant
lance snake
lance tooth
lance-acuminated
lance-breaking
lance-fashion
lance-headed snake
lance-jack
lance-knight

lance-leaved
lance-linear
lance-oblong
lance-oval
lance-ovate
lance-pierced
lance-shaped
lance-worn
lancet arch
lancet architecture
lancet clock
lancet fish
lancet window
lancinating pain
land agency
land agent
land bank
land battleship
land board
land breeze
land bridge
land broker
land caltrop
land certificate
land chain
land cod
land crab
land crake
land cress
land crocodile
land drake
land dreadnought
land dredge
land end
land fast
land flowing with milk and honey
land force
land forces
land girl
land grant
land hunger
land lane
land law
land lead
land league
land leech
land line
land mail

land measure
land mile
land mine
land of Nod
land of Prester John
land of dreams
land of enchantment
land of
faerie
land of heart's desire
land of milk and honey
land of plenty
land of promise
land of the gods
land office
land on
land on like a ton of bricks
land on your feet
land otter
land patent
land pike
land pirate
land pitch
land plaster
land power
land rail
land rat
land reform
land rock
land scale
land scrip
land scurvy
land seal
land service
land settlement
land shark
land side
land snail
land sole
land spring
land station
land steward
land surveyor
land tax
land tenure
land tie
land tortoise
land trash

land trust
land up
land urchin
land warfare
land warrant
land wheel
land wind
land with
land yard
land-bank
land-born
land-bred
land-breeze
land-cast
land-crab
land-damn
land-devouring
land-eating
land-flood
land-gavel
land-girt
land-grabber
land-grabbing
land-grant bond
land-grant college
land-grant road
land-holder
land-horse
land-hungry
land-law
land-leaper
land-line
land-loper
land-lubber
land-measure
land-mere
land-meter
land-metster
land-obsessed
land-office business
land-poor
land-rat
land-rover
land-service
land-sheltered
land-side
land-slater
land-spring

land-surrounded
land-surveying
land-tag
land-tax
land-taxer
land-tie
land-value
land-visiting
land-water
land-wind
landed
 estate
landed gentry
landed interests
landed person
landed property
landfall light
landfall mark
landing angle
landing beach
landing beam
landing card
landing chair
landing clerk
landing craft
landing crew
landing deck
landing edge
landing field
landing flap
landing force
landing gear
landing light
landing lights
landing line
landing net
landing pad
landing party
landing pattern
landing place
landing run
landing ship
landing signalman
landing skis
landing speed
landing stage
landing strake
landing strip

landing surveyor
landing tee
landing waiter
landing wire
landing-direction light
landing-place
landing-waiter
landlocked salmon
landlocked water
landmark beacon
landmark decision
landscape architect
landscape architecture
landscape gardener
landscape gardening
landscape marble
landscape
 mirror
landscape painting
landslide victory
lane route
lane snapper
lang lay
lang syne
lang-kail
langrage shot
langrel shot
language arts
language laboratory
language study
language style
langue d'o
langue d'oc
langue d'oil
langue de boeuf
langue de chat
langues de boeuf
languish for
lank-bellied
lank-blown
lank-cheeked
lank-eared
lank-haired
lank-jawed
lank-lean
lank-sided
lank-winged
lantern bellows

lantern carrier
lantern clock
lantern fish
lantern flounder
lantern fly
lantern gear
lantern gurnard
lantern jack
lantern jaw
lantern jaws
lantern keg
lantern light
lantern lily
lantern pinion
lantern ring
lantern shell
lantern slide
lantern sprat
lantern tree
lantern wheel
lantern-jawed
lanthanide series
lanyard knot
lap box coupling
lap dissolve
lap dog
lap dovetail
lap dovetail joint
lap dovetailing
lap game
lap joint
lap link
lap microphone
lap of honour
lap of luxury
lap over
lap pack
lap plate
lap ring
lap riveting
lap robe
lap shaver
lap siding
lap table
lap up
lap weld
lap winding
lap-butted

lap-chart
lap-dog
lap-jointed
lap-lap
lap-love
lap-rivet
lap-streak
laparo-
laparo-uterotomy
laparotomy
pack
lapel button
lapel microphone
lapel mike
lapel pin
lapidary bee
lapidary mill
lapis lazuli
lapis lazuli blue
lapis lazuli ware
lapp owl
lapped joint
lapped-butt joint
lappet caterpillar
lappet loom
lappet moth
lappet weaving
lappet wheel
lapse back
lapse from grace
lapse into
lapse into disorder
lapse of memory
lapse of time
lapse rate
lapsed from grace
lapsed nature
lapsed state
lapsus calami
lapsus linguae
lapsus memoriae
lapwing gull
larboard watch
larch agaric
larch canker
larch pine
larch sawfly
larch turpentine

lard compound
lard insect
lard oil
lard pig
lard refiner
lard stearin
lard stone
lard type
lard-assed
lardaceous degeneration
larder beetle
lardy cake
lardy-dardy
lares and penates
lares compitales
lares familiaris
lares permarini
lares praestites
lares viales
large amount
large animal
large as life
large black
large calorie
large cane
large cranberry
large
 heart
large intestine
large meal
large number
large order
large periwinkle
large person
large size
large sum
large thing
large white
large-acred
large-ankled
large-bayed
large-billed
large-bodied
large-boned
large-bore
large-bracted
large-browed
large-built

large-caliber
large-celled
large-crowned
large-diameter
large-drawn
large-eared
large-eyed
large-finned
large-flowered
large-footed
large-framed
large-fronded
large-fruited
large-grained
large-grown
large-handed
large-handedness
large-headed
large-hearted
large-heartedness
large-hipped
large-horned
large-leaved
large-leaved cucumber tree
large-lettered
large-limbed
large-looking
large-lunged
large-minded
large-mindedly
large-mindedness
large-molded
large-natured
large-necked
large-nostriled
large-petaled
large-rayed
large-scale
large-scaled
large-size
large-sized
large-souled
large-spaced
large-stomached
large-tailed
large-thoughted
large-throated
large-toothed

large-trunked
large-type
large-utteranced
large-viewed
large-wheeled
large-wristed
largemouth
 bass
larger than life
lariat loop
larixinic acid
lark bunting
lark finch
lark plover
lark sparrow
lark-colored
lark-heel
lark-heeled
larspur violet
larum-bell
larval epilepsy
larval plague
larvi-
laryng-
laryngeal epilepsy
laryngis stridulus
laryngo-
laser photography
laser surgery
lash and carry
lash and tie
lash back
lash comb
lash into
lash into a frenzy
lash into a fury
lash into fury
lash line
lash out
lash out at
lash rail
lash the waves
lash up
lash-up
lasso cell
lasso harness
last act
last agony

last breath
last dab
last days
last debt
last ditch
last duty
last expedient
last extremity
last forever
last gasp
last home
last honors
last inning
last lap
last lick
last long
last maker
last making
last marin
last mile
last minute
last muster
last name
last off the mark
last offices
last out
last post
last quarter
last resort
last resource
last rest
last rites
last round
last roundup
last service
last shift
last sleep
last stage
last stop
last straw
last stroke
last
supper
last survivor annuity
last thing
last things
last touch
last trumpet

last will and testament
last word
last word, the
last words
last-born
last-cited
last-cyclic
last-ditch
last-ditch fight
last-ditcher
last-erected
last-in
last-in first-out
last-made
last-mentioned
last-minute
last-minute lie
last-named
lastage-free
lasting fame
lasting friendship
latch bolt
latch circuit
latch locking
latch needle
latch on
latch onto
latch-key
latch-string
latchkey child
late arrival
late blight
late bloomer
late developer
late greek
late hour
late in the day
late lamented
late latin
late off the mark
late riser
late wood
late-begun
late-betrayed
late-blooming
late-born
late-built
late-coined

late-come
late-comer
late-cruising
late-disturbed
late-embarked
late-filled
late-flowering
late-found
late-imprisoned
late-kissed
late-lamented
late-lingering
late-lost
late-met
late-model
late-protracted
late-ripening
late-sacked
late-taken
late-transformed
late-type star
late-wake
late-won
lateen
 sail
lateen-rigged
latency period
latent content
latent epilepsy
latent heat
latent image
latent learning
latent meaning
latent meaningfulness
latent period
latent strabismus
latent syphilis
latent violence
later than
later time
latera recta
lateral axis
lateral canal
lateral chain
lateral circuit
lateral drift
lateral fissure
lateral line

lateral line system
lateral lisp
lateral magnification
lateral meristem
lateral moraine
lateral pass
lateral plane
lateral resistance
lateral stability
lateral system
lateral tangent arc
lateral thinking
lateri-
latero-
latest fad
latest fashion
latest thing
latest thing, the
latest wrinkle
latest-born
latex paint
latex paper
lath and plaster
lath brick
lath cutter
lath maker
lath making
lath nail
lath nailer
lath puncher
lath splitter
lath tier
lath trimmer
lath-backed
lath-legged
lathe chuck
lathe-bore
lather up
lathered up
lathering up
lathing hammer
lathing hatchet
lati-
latin cross
latin quarter
latin square
latissimi dorsi
latissimus dorsi

latitude
 and longitude
latitude sailing
latrine lawyer
latrine rumor
latter end
latter-day
latter-day saint
lattice bar
lattice beam
lattice bridge
lattice girder
lattice moss
lattice plant
lattice stitch
lattice strut
lattice truss
lattice-leaf
lattice-leaves
lattice-plant family
lattice-window
lattice-work
latus rectum
lau lau
laudator temporis acti
laugh at
laugh away
laugh down
laugh fit to burst
laugh fit to bust
laugh in
laugh in your beard
laugh in your face
laugh in your sleeve
laugh it up
laugh off
laugh on the other
laugh out of court
laugh outright
laugh to scorn
laugh up
laugh up your sleeve
laugh yourself limp
laugh yourself sick
laugh yourself silly
laughing academy
laughing gas
laughing gull

laughing hyena
laughing jackass
laughing muscle
laughing stock
laughing-stock
laughter holding both his sides
laughter-dimpled
laughter-lighted
laughter-lit
laughter-loving
laughter-provoking
laughter-stirring
launch a holy war on
launch a vendetta
launch an attack
launch forth
launch
into
launch into eternity
launch out against
launch pad
launch upon
launch vehicle
launch window
launch-ways
launched into eternity
launching base
launching gear
launching mortar
launching pad
launching platform
launching rack
launching ramp
launching shoe
launching tower
launching tube
launching vehicle
launching way
launching ways
laundry cart
laundry room
laundry soap
laurel bay
laurel butter
laurel camphor
laurel cherry
laurel family
laurel green

laurel hawthorn
laurel oak
laurel oil
laurel pink
laurel sumac
laurel thyme
laurel-bearing
laurel-browed
laurel-crowned
laurel-decked
laurel-leaf
laurel-leaf oil
laurel-leaved
laurel-locked
laurel-worthy
laurel-wreathed
lauric acid
lauric aldehyde
lauroyl group
lauroyl radical
lauryl alcohol
lauryl aldehyde
laus Deo
lauter tub
lava cone
lava-capped
lava-lava
lava-lit
lava-paved
lavaliere microphone
lavatory pan
lavatory paper
lave net
lavender blue
lavender cotton
lavender grass
lavender oil
lavender water
lavender-blue
lavender-flowered
lavender-scented
lavender-tinted
lavender-water
laver
 bread
lavish care on
lavish feast
lavish upon

lavish with
lavish yourself on
law French
law agent
law and order
law binding
law buckram
law centre
law code
law court
law enforcement agency
law enforcement agent
law hand
law member
law member of a court-martial
law merchant
law of Dulong and Petit
law of Malus
law of action and reaction
law of additiv
law of additive pressures
law of averages
law of conservation of charge
law of conservation of energy
law of conservation of mass
law of contradiction
law of cosines
law of definite composition
law of definite proportions
law of equivalent retaliation
law of excluded middle
law of exponents
law of general application
law of gravitation
law of identity
law of large numbers
law of mass action
law of moses
law of motion
law of multiple proportion
law of multiple proportions
law of nations
law of nature
law of parity
law of parsimony
law of partial pressures
law of reflection
law of refraction

law
of retaliation
law of sines
law of succession
law of the domicile
law of the forum
law of the jungle
law of the land
law of the mean
law of the place
law of thermodynamics
law of thought
law of trichotomy
law of universal gravitation
law office
law officer
law sakes
law school
law stationer
law term
law, the
law-abiding
law-abidingness
law-beaten
law-book
law-borrow
law-breaker
law-bred
law-condemned
law-day
law-fettered
law-hand
law-honest
law-learned
law-learnedness
law-loving
law-magnifying
law-maker
law-merchant
law-reckoning
law-revering
law-ridden
law-stationer
law-worthy
lawful authority
lawful possession
lawless person
lawn billiards

lawn bowling
lawn cart
lawn chair
lawn grass
lawn green
lawn meet
lawn mower
lawn party
lawn pennywort
lawn sleeves
lawn tennis
lawn-roller
lawn-sleeved
lawn-tennis
lawn-tractor
lawyer bush
lawyer cane
lawyer palm
lawyer reference
lawyer vine
lax stewardship
lax-flowered
lay a course
lay a course for
lay a duty on
lay a false scent
lay a fart
lay
 a hand on
lay a heavy hand on
lay a plot
lay a trap for
lay a wager
lay a wet blanket on
lay abbot
lay aboard
lay about
lay about one
lay aloft
lay an egg
lay an embargo on
lay analyst
lay anchor
lay aside
lay at
lay at the door of
lay at your door
lay at your feet

lay away
lay away from
lay baptism
lay bare
lay before
lay before the public
lay blame upon
lay board
lay boat
lay brother
lay by
lay by the heels
lay chalice
lay charges
lay claim to
lay clerk
lay close
lay day
lay days
lay down
lay down a plan
lay down the law
lay down your arms
lay down your tools
lay eggs
lay elder
lay emphasis upon
lay eyes on
lay fee
lay figure
lay flat
lay for
lay forward etc
lay ghosts
lay hands on
lay heads together
lay hold of
lay in
lay in a stock
lay in a store
lay in a supply
lay in provisions
lay in ruins
lay in store
lay in the earth
lay in the grave
lay in the lap of the gods
lay in the scales

lay intermediary
lay into
lay it on
lay it on the line
lay it on thick
lay it on with a trowel
lay
 judge
lay level
lay level with the ground
lay lord
lay low
lay me down to sleep
lay money on
lay of the land
lay of the land, the
lay off
lay off from
lay on
lay on a color
lay on color
lay on one
lay on the line
lay on the rack
lay on the table
lay one's hand on
lay open
lay out
lay out a course
lay out money
lay out on
lay over
lay plans
lay reader
lay shaft
lay siege to
lay sister
lay stress upon
lay the ax to the root of
lay the blame on
lay the dust
lay the first stone
lay the foundation
lay the groundwork
lay the land
lay to
lay to heart
lay to rest

lay to the oars
lay to your charge
lay to your door
lay together
lay under an interdict
lay under an interdiction
lay under restraint
lay under the sod
lay up
lay up a store
lay up for
lay upon
lay vicar
lay violent hands on
lay wait
lay wait for
lay waste
lay your cards on the table
lay your course for
lay your finger on
lay your fingers on
lay your hands on
lay your money down
lay your shoulder to the wheel
lay yourself open
lay
 yourself open to
lay yourself out
lay-by
lay-day
lay-down
lay-fee
lay-land
lay-man
lay-minded
lay-off
lay-on
lay-out
lay-over
lay-shaft
lay-up
layaway plan
layer board
layer cake
layer tint
layer-on
layer-out
layer-over

layer-up
layers-out
laying bare
laying duck
laying of charges
laying on
laying on of hands
laying open
laying over
laying press
laying top
laying waste
layout chart
lazar house
lazar-house
lazuli bunting
lazy Susan
lazy bar
lazy crab
lazy daisy stitch
lazy eight
lazy eye
lazy guy
lazy halyard
lazy jack
lazy painter
lazy person
lazy stream
lazy susan
lazy tack
lazy tongs
lb ap
lb av
lb t
le dernier cri
le drapeau tricolore
le genre humain
le pas
le premier pas
le roi est mort vive le roi
le roi le veut
le sport
le style c'est l'homme
le tout ensemble
lea oak
lea rig
lea-land
lea-rig

lead a charmed life
lead a cloistered life
lead a dog's life
lead a retired life
lead acetate
lead acid cell
lead an easy life
lead arming
lead arsenate
lead ash
lead astray
lead azide
lead
back
lead block
lead bullion
lead by the nose
lead captive
lead carbonate
lead chloride
lead chromate
lead colic
lead color
lead curve
lead dioxide
lead foil
lead glass
lead glaze
lead gray
lead into captivity
lead item
lead line
lead mill
lead mining
lead monoxide
lead nitrate
lead ocher
lead off
lead on
lead one a dance
lead one a merry chase
lead out
lead oxide
lead oxychloride
lead palsy
lead pencil
lead peroxide
lead pilot

lead pipe cinch
lead poisoning
lead rammer
lead role
lead runner
lead screw
lead sheet
lead singer
lead soap
lead someone a chase
lead spar
lead sulphate
lead sulphide
lead tetraethyl
lead the dance
lead the mind astray
lead the way
lead time
lead to
lead to believe
lead to the altar
lead tolerance
lead track
lead tree
lead up
lead up the garden path
lead up to
lead vinegar
lead vitriol
lead weed
lead white
lead you a chase
lead you a pretty dance
lead you to
lead you to expect
lead you to gather
lead you up the garden path
lead-acid battery
lead-blue
lead-burn
lead-burned
lead-burner
lead-burning
lead-chamber
process
lead-clad
lead-coated
lead-colored

lead-covered
lead-encased
lead-filled
lead-free gas
lead-gray
lead-hardening
lead-headed
lead-in
lead-in wire
lead-lapped
lead-lead
lead-lined
lead-melting
lead-off
lead-pipe cinch
lead-pulverizing
lead-ruled
lead-sheathed
lead-smelting
lead-tempering
lead-up
leaded bronze
leaded glass
leaden flycatcher
leaden-blue
leaden-colored
leaden-eyed
leaden-footed
leaden-headed
leaden-heeled
leaden-hued
leaden-natured
leaden-paced
leaden-skulled
leaden-soled
leaden-souled
leaden-spirited
leaden-thoughted
leaden-weighted
leaden-willed
leaden-winged
leaden-witted
leader block
leader cable
leader head
leader of fashion
leader of men
leader of the opposition

leader pipe
leader writer
leading aircraftman
leading article
leading bar
leading block
leading card
leading coefficient
leading edge
leading her mother
leading idea
leading lady
leading light
leading man
leading mark
leading note
leading question
leading
 reins
leading strings
leading to
leading tone
leading wheel
leading wind
leading wire
leading woman
leadpipe cinch
leaf beet
leaf beetle
leaf bite
leaf blade
leaf blender
leaf blight
leaf blotch
leaf bud
leaf bug
leaf coral
leaf curl
leaf cutting
leaf fall
leaf fat
leaf gold
leaf green
leaf insect
leaf lard
leaf lettuce
leaf metal
leaf metals

leaf miner
leaf mold
leaf monkey
leaf mould
leaf mustard
leaf out
leaf picker
leaf roll
leaf roller
leaf rust
leaf scald
leaf sight
leaf sorter
leaf spot
leaf spring
leaf stripper
leaf through
leaf warbler
leaf-bearing
leaf-clad
leaf-climber
leaf-climbing
leaf-curl fungus
leaf-cutter
leaf-cutting ant
leaf-cutting bee
leaf-eared
leaf-eating
leaf-footed
leaf-forming
leaf-fringed
leaf-gold
leaf-hopper
leaf-laden
leaf-lard
leaf-nose
leaf-nosed
leaf-nosed bat
leaf-shaded
leaf-shaped
leaf-sheltered
leaf-strewn
leafcutter ant
leafcutter bee
leafy-stemmed
league together
league with
leaguer lass

leak away
leak in
leak out
leakage coefficient
leakage
 conductance
leakage conductor
leakage flux
leaking purse
leaky wave-guide antenna
lean and hungry look
lean as a rake
lean limbed
lean on
lean on a broken reed
lean on it
lean over
lean over backward
lean over backwards
lean toward
lean towards
lean upon
lean-cheeked
lean-eared
lean-face
lean-faced
lean-fleshed
lean-headed
lean-horned
lean-jawed
lean-limbed
lean-looking
lean-minded
lean-necked
lean-ribbed
lean-souled
lean-to
lean-to roof
lean-to tent
lean-tos
lean-witted
leaning thread
leaning toward
leaning tower
leap before you look
leap day
leap in the dark
leap into the breach

leap like a startled gazelle
leap over
leap over the wall
leap to the eye
leap up
leap year
leap-frog
leaping head
leaping spider
leaping weir
lear board
learn a lesson
learn about
learn all about
learn by doing
learn by experience
learn by heart
learn by rote
learn from
learn the ins and outs
learn the ropes
learn to live in your own skin
learn verbatim
learn word for word
learned clerk
learned man
learned
 profession
learner's permit
learning by heart
lease and release
lease out
lease rod
lease system
lease-back
lease-lend
lease-pardle
lease-purchase
leasehold insurance
leasehold mortgage
least bittern
least common denominator
least common multiple
least flycatcher
least killifish
least of all
least sandpiper
least shrew

least significant digit
least squares
least upper bound
least weasel
leather beetle
leather brown
leather carp
leather cloth
leather dresser
leather enameler
leather fern
leather goods
leather goods store
leather jack
leather maker
leather paper
leather star
leather-backed
leather-bound
leather-colored
leather-covered
leather-cushioned
leather-cutting
leather-faced
leather-hard
leather-headed
leather-jacket
leather-lined
leather-lunged
leather-necked
leather-winged
leatherback turtle
leathery turtle
leave a loose thread
leave alone
leave an aching void
leave be
leave behind
leave flat
leave flatfooted
leave go
leave half-done
leave holding the bag
leave home
leave in
leave
 in the dark
leave in the lurch

leave it to one
leave it to you
leave looking
leave loose ends
leave no avenue unexplored
leave no chance
leave no escape
leave no loose ends
leave no option
leave no room for error
leave no stone unturned
leave no trace
leave no void
leave not a rack behind
leave nothing hanging
leave nothing to chance
leave nothing to say
leave nothing undone
leave of absence
leave off
leave out
leave out in the cold
leave out nothing
leave out of account
leave out of your calculation
leave over
leave remaining
leave standing
leave taking
leave the atmosphere
leave the beaten path
leave the country
leave the door open
leave the earth behind
leave the ground
leave the nest
leave the scene
leave the stage
leave the straight and narrow
leave the way open
leave things as they are
leave to chance
leave to luck
leave to your own devices
leave to yourself
leave unavenged
leave undone
leave unsatisfied

leave well enough alone
leave word
leave you cold
leave you to gather
leave
 your card
leave your mark
leave yourself wide open
leave-taking
leaving aside
leaving life
leaving much to chance
leaving no room for error
leaving no stone unturned
leaving out
leaving out nothing
leaving the earth behind
leaving the ground
lebbek tree
lechosos opal
lecture hall
lecture room
lecture-demonstration
led astray
led by the nose
led captain
led farm
ledge stone
ledged door
ledgement table
ledger bait
ledger bark
ledger beam
ledger blade
ledger board
ledger line
ledger paper
ledger plate
ledger strip
ledger tackle
ledger-book
ledum camphor
lee anchor
lee gauge
lee helm
lee sheet
lee shore
lee side

lee tack
lee tide
lee wave
lee wheel
lee wheelsman
lee's birthday
lee-board
lee-bow
lee-way
leech line
leech rope
leech worm
leech-book
leek green
leek-green
leer at
leering look
leeward tide
left a mile behind
left bank
left bower
left field
left fielder
left five degrees rudder
left full rudder
left half rudder
left hand
left handsomely
left heart
left of center
left out
left
 out in the cold
left pedro
left rudder
left side
left stage
left standard rudder
left ten degrees rudder
left undone
left wing
left winger
left-bank
left-brained
left-eyed
left-eyed flounder
left-eyedness
left-foot

left-footed
left-footedness
left-footer
left-hand
left-hand buoy
left-hand dagger
left-hand engine
left-hand side
left-handed
left-handed compliment
left-handed marriage
left-handedly
left-handedness
left-hander
left-handiness
left-laid
left-lay
left-legged
left-leggedness
left-luggage office
left-off
left-over
left-sided
left-wing
left-wing extremism
left-wing extremist
left-winger
left-wingish
left-wingism
lefteye flounder
leg armor
leg art
leg bail
leg band
leg before
leg before wicket
leg boot
leg break
leg bye
leg drop
leg hit
leg iron
leg it
leg man
leg of lamb
leg of mutton
leg show
leg stump

leg to stand on
leg trap
leg up
leg viol
leg-bail
leg-break
leg-breaker
leg-harness
leg-iron
leg-o'-mutton
leg-of-mutton
leg-of-mutton sail
leg-of-mutton spanker
leg-pull
leg-puller
leg-weary
legacy
 duty
legal action
legal adviser
legal age
legal agreement
legal aid
legal aid association
legal aid society
legal argument
legal assessor
legal authority
legal bucketing
legal cap
legal case
legal chemistry
legal claim
legal contract
legal counsellor
legal counselor
legal decision
legal document
legal estate
legal ethics
legal evidence
legal expert
legal fiction
legal flaw
legal form
legal geology
legal heir
legal holiday

legal inability
legal incapacity
legal instrument
legal irregularity
legal jointure
legal medicine
legal murder
legal order
legal paper
legal plea
legal possession
legal power
legal practitioner
legal proceedings
legal process
legal profession
legal remedy
legal reserve
legal restraint
legal right
legal right of use
legal rights
legal science
legal securities
legal separation
legal statement
legal summons
legal system
legal tender
legal tribunal
legal weight
legal-size paper
legal-tender note
legalis homo
legally separated
leger line
leghorn straw
legion
 of honor
legion of merit
legionary ant
legislative assembly
legislative bill
legislative body
legislative caucus
legislative chamber
legislative clause
legislative council

legislative immunity
legislative investigation
legislative lobby
legislative motion
legislative procedure
legislative veto
legitimate drama
legitimate portion
legitimate stage
legitimate succession
legitimate theater
lego-literary
lei day
leio-
leip-
leisure class
leisure suit
leisurely gait
lekai salmon
lem-
lemming mouse
lemon balm
lemon cheese
lemon chrome
lemon cucumber
lemon day lily
lemon drop
lemon geranium
lemon grass
lemon kali
lemon lily
lemon mint
lemon oil
lemon scurvy grass
lemon sole
lemon squash
lemon squeezer
lemon verbena
lemon vine
lemon yellow
lemon-color
lemon-colored
lemon-faced
lemon-flavored
lemon-grass oil
lemon-green
lemon-scented
lemon-scented gum

lemon-tinted
lemon-yellow
lemonade sumac
lend a color to
lend a hand
lend a helping hand
lend a willing ear
lend an ear
lend an ear to
lend
 one aid
lend substance to
lend support
lend wings to
lend your backing to
lend your countenance to
lend your favor to
lend your name to
lend your offices
lend your support to
lend yourself to
lend-lease
lend-leased
lend-leasing
lending at interest
lending institution
lending library
length and breadth
length between perpendiculars
length of time
length over all
lengthen out
leni-lenape
leno brocade
leno weave
lens cell
lens cover
lens hood
lens maker
lens making
lens opening
lens screen
lens turret
lens-mount
lens-shaped
lent lily
lenticular cloud
lenticular nucleus

lenticular process
lenticular truss
lenticulo-optic
lentil cut
lentil tare
lentil weevil
leonine partnership
leonine rhyme
leontiasis ossea
leopard cat
leopard flower
leopard frog
leopard lily
leopard lionne
leopard lizard
leopard moth
leopard seal
leopard's bane
leopard's spots
leopard's-bane
leopard-man
leper house
lepid-
lepido-
lepra arabum
lepto-
lepto-form
lepto-type
lepton number
lerp insects
lese majesty
lese-majesty
less
 advanced
less and less
less semitone
less than
less than no time
lesser Bairam
lesser Ionic
lesser anteater
lesser bear
lesser celandine
lesser dog
lesser doxology
lesser litany
lesser multangular bone
lesser nobility

lesser omentum
lesser panda
lesser star grass
lesser weever
lesser wintergreen
lesser yellowlegs
let 'em have it
let a fart
let alone
let be
let blood
let bygones be bygones
let dangle
let daylight in
let down
let down easy
let down your defenses
let down your guard
let down your side
let drive
let drive at
let drop
let fall
let fall into desuetude
let fall into disuse
let fall the shadow of mine eyes
let flow through your fingers
let fly
let fly at
let get around
let get by
let get past
let go
let go by
let go by default
let go free
let go the anchor
let go with
let go your own way
let have
let have it
let her out
let in
let in on
let in on the know
let in to
let into
let into the secret

let it all hang out
let it be understood
let it go
let it have its way
let
it pass
let it stand
let it take its course
let know
let loose
let loose of
let money be no object
let next to
let off
let off a shot at
let off steam
let on
let on like
let or hindrance
let out
let out on bail
let pass
let ride
let rip
let sleeping dogs lie
let slide
let slip
let slip the dogs of war
let slip through your fingers
let someone have it
let take its course
let the air out of
let the cat out of the bag
let the devil take the hindmost
let the matter stand
let the mind lie fallow
let the portcullis down
let the wound heal
let things take their course
let tomorrow take care of itself
let up
let up on
let well enough alone
let wind
let you go at will
let you have his head
let you have your own way
let you off easy

let you off this time
let your angry passions rise
let your attention wander
let your breath out
let your hair down
let your imagination riot
let your imagination run riot
let your imagination run wild
let your light shine
let your mind wander
let your thoughts wander
let
 your voice be heard
let your wits go bird's nesting
let yourself go
let yourself in for
let-alone
let-alone doctrine
let-alone policy
let-alone principle
let-off
let-out
let-pass
let-up
lethal blow
lethal chamber
lethal dose
lethal factor
lethal gene
lethargic encephalitis
lethargic hypnosis
letter avocatory
letter bag
letter board
letter bomb
letter book
letter box
letter card
letter carrier
letter carver
letter caster
letter cutter
letter drop
letter engraver
letter file
letter founding
letter foundry
letter from Uncle Sam

letter hand
letter learning
letter lichen
letter messenger
letter missive
letter name
letter of advice
letter of credence
letter of credit
letter of delegation
letter of introduction
letter of marque
letter of marque and reprisal
letter paper
letter plant
letter porter
letter post
letter press
letter scales
letter sheet
letter sorter
letter stamper
letter stock
letter telegram
letter weigher
letter writer
letter writing
letter-bound
letter-card
letter-copying
letter-duplicating
letter-erasing
letter-fed
letter-folding
letter-high
letter-learned
letter-opener
letter-perfect
letter-press
letter-winged
lettering
pen
letterpress photoengraving
letters credential
letters dimissory
letters missive
letters of administration
letters of credence

letters of marque
letters of marque and reprisal
letters of request
letters of the alphabet
letters overt
letters pacifical
letters patent
letters rogatory
letters testamentary
letterwinged kite
letting down
letting go
letting out
lettre de cachet
lettre de change
lettre de creance
lettres de cachet
lettres de change
lettuce bird
lettuce green
lettuce mildew
lettuce opium
lettuce saxifrage
leuc-
leucite basalt
leucite-basanite
leucite-tephrite
leuco base
leuco-
leucoturic acid
leukemic reticuloendotheliosis
leuko-
leukocyt-
leuna saltpeter
lev-
levari facias
levee en masse
level as a plain
level at
level crossing
level curve
level curves
level head
level instrument
level land
level landing
level line
level

of stress
level off
level pegging
level plane
level premium
level staff
level surfaces
level with
level-coil
level-headed
level-headedness
level-jawed
level-off
level-wind
leveling head
leveling instrument
leveling rod
leveling screw
leveling stand
leveling support
levelling screw
levels of meaning
lever action
lever engine
lever escapement
lever pilot
lever safety valve
lever scales
lever shears
lever tumbler
lever watch
lever-action
lever-action rifle
levin bolt
levin brand
levo camphor
levo-
levo-pinene
levulinic acid
levy a distress
levy blackmail
levy court
levy en masse
levy in mass
levy war on
lew-warm
lewis bolt
lewis gun

lewis iron
lex domicilii
lex fori
lex generalis
lex loci
lex mercatoria
lex mercatorum
lex non scripta
lex scripta
lex situs
lex talionis
lex terrae
lexical form
lexical insertion
lexical item
lexical meaning
lexigraphic character
lexigraphic symbol
ley line
ley pewter
leyden jar
leze majesty
liability insurance
liability limit
liability to error
liable to
liable
 to error
liaise with
liaison plane
liar of the first magnitude
liber cell
liberal arts
liberal education
liberal studies
liberal-arts college
liberal-minded
liberal-mindedness
liberty abused
liberty boat
liberty bodice
liberty cap
liberty green
liberty hall
liberty horse
liberty in tranquillity
liberty of speech
liberty of the press

liberty pole
liberty ship
liberty tea
liberty tree
libidinal energy
libido arrest
libido fixation
libra mayor
library binding
library card
library case
library catalog
library director
library edition
library paste
library school
library science
library steps
library table
libration in latitude
libration in longitude
libration of the moon
libretto-writing
license bond
license fee
license plate
license tax
licensed pilot
licensed practical nurse
licensed victualer
lich bird
lich fowl
lich gate
lich owl
lich path
lich stone
lich-gate
lich-house
lich-owl
lichen fungus
lichen green
lichen islandicus
lichen primus
lichen tropicus
lichen-clad
lichen-crusted
lichen-grown
lichen-laden

lichenic
acid
lick into shape
lick of work
lick one's shoes
lick the dust
lick the feet of
lick the plate
lick the platter
lick to a frazzle
lick your ass
lick your boots
lick your chops
lick your shoes
lick your wounds
lick-dish
lick-finger
lick-foot
lick-ladle
lick-platter
lick-spigot
lick-spittle
licker-in
lickety-brindle
lickety-cut
lickety-split
licking disease
licking stone
licorice fern
licorice powder
licorice root
licorice stick
licorice sugar
licorice vetch
licorice vine
licorice weed
lid cell
lid slit
lidless eye
lidless vigil
lie a course
lie across
lie ahead
lie ahull
lie along
lie along the shore
lie around
lie at the heart

lie at the root of
lie at your door
lie athwart
lie back on your record
lie beam on to the seas
lie beneath
lie by
lie close
lie close to the wind
lie detector
lie doggo
lie dormant
lie down
lie down and roll over for
lie down on the job
lie fallow
lie flat
lie flatly
lie hard upon
lie heavy
lie heavy upon
lie hid
lie hidden
lie
 idle
lie in
lie in Abraham's bosom
lie in ambush
lie in state
lie in the grave
lie in wait
lie in wait for
lie in your course
lie in your power
lie in your throat
lie like a trooper
lie limply
lie low
lie near the wind
lie of the land
lie off
lie off the land
lie on
lie on a level
lie on a level with
lie on the shelf
lie on the surface
lie on your back

lie on your face
lie on your head
lie opposite
lie out of
lie over
lie prone
lie prostrate
lie snug
lie still
lie supine
lie through your teeth
lie to
lie under
lie under a necessity
lie under an obligation
lie under the surface
lie up
lie upon
lie upon your oars
lie with
lie-abed
lie-by
lie-bys
lie-down
lied form
lieder singer
liege lord
liege man
liege poustie
liege subject
liege woman
liege-manship
lieno-
lieu commun
lieue marine
lieutenant colonel
lieutenant commander
lieutenant general
lieutenant governor
lieutenant junior grade
lieutenant-colonelcy
lieutenant-general
lieutenant-governorship
life after death
life and letters
life
annuity
life arrow

life assurance
life belt
life beyond the grave
life breath
life buoy
life car
life cast
life cycle
life essence
life estate
life expectancy
life float
life force
life guard
life hangs by a thread
life history
life instinct
life insurance
life interest
life jacket
life line
life mask
life member
life net
life of Riley
life of Riley, the
life of ease
life of riley
life of the party
life peer
life plant
life preserver
life principle
life process
life raft
life records
life ring
life rocket
life savings
life science
life seen through a temperament
life sentence
life size
life space
life span
life story
life style
life table

life to come
life upon the larger scale
life vest
life zone
life's duration
life's guide
life's work
life-abhorring
life-and-death
life-and-death struggle
life-bearing
life-beaten
life-begetting
life-bereft
life-blood
life-breathing
life-bringing
life-consuming
life-creating
life-crowded
life-deserted
life-destroying
life-devouring
life-diffusing
life-ending
life-enriching
life-force
life-giver
life-giving
life-guard
life-guardsman
life-hugging
life-infatuate
life-infusing
life-invigorating
life-lengthened
life-like
life-lorn
life-lost
life-maintaining
life-or-death
life-or-death
struggle
life-outfetching
life-penetrated
life-poisoning
life-preserver
life-preserving

life-prolonging
life-quelling
life-rendering
life-renewing
life-restoring
life-sapping
life-saver
life-serving
life-size
life-sized
life-spent
life-style
life-support system
life-sustaining
life-sweet
life-teeming
life-thirsting
life-tide
life-timer
life-weariness
life-weary
life-while
life-worthy
life-yielding
lifeless matter
lifeless matter found in nature
lifelike image
liferent escheat
lifesaving boat
lifesaving service
lift a finger
lift a hand
lift a hand against
lift bolt
lift bridge
lift component
lift direction
lift force
lift gate
lift hammer
lift off
lift pump
lift ram
lift ratio
lift span
lift temporarily
lift tenter
lift the curtain on

lift the hat
lift the
 veil
lift truck
lift up
lift up the eyes
lift up the heart
lift up the voice
lift valve
lift van
lift wall
lift wire
lift your hand against
lift your voice
lift-drag ratio
lift-off
lift-off hinge
lift-slab
lifter rod
lifting body
lifting bolt
lifting bridge
lifting day
lifting eye
lifting foot
lifting head
lifting irons
lifting jack
lifting plan
lifting plate
lifting pump
lifting sail
lig-by
ligamentum nuchae
light adaptation
light air
light and shade
light and shade surface
light artillery
light as a feather
light as air
light as any wind that blows
light as day
light as gossamer
light baffle
light battery
light beer
light bob

light bomber
light box
light bread
light breeze
light bridge
light bulb
light colonel
light comedian
light comedy
light cream
light cruiser
light curve
light displacement
light draft
light dragoon
light engine
light equation
light face
light filter
light fingers
light fixture
light flyweight
light globe
light gunmetal
light harmony
light harness
light headed
light
heart
light heavyweight
light holder
light holders
light horse
light horseman
light housekeeping
light infantryman
light into
light line
light load line
light lock
light lunch
light machine gun
light magnesia
light meal
light measure
light meat
light metals
light meter

light middleweight
light mineral
light mineral oil
light music
light of day
light of heel
light of love
light of your eye
light of your life
light oil
light on
light opera
light out
light pen
light plot
light purse
light quantum
light railroad
light reaction
light red
light repast
light shield
light show
light sleep
light socket
light source
light texture
light the fuse
light the way
light touch
light tower
light transport
light trap
light treatment
light unit
light up
light upon
light valve
light verse
light weight
light welterweight
light whiskey
light wind
light wine
light year
light-adapted
light-armed
light-beam telephone

light-bearded
light-bellied
light-blue
light-bluish
light-bob
light-bodied
light-borne
light-bounding
light-brained
light-built
light-causing
light-century
light-charged
light-cheap
light-clad
light-colored
light-complexioned
light-creating
light-diffusing
light-disposed
light-drab
light-draft
light-embroidered
light-faced
light-fast
light-fingered
light-fingered
gentry
light-fingeredness
light-foot
light-footed
light-footedly
light-footedness
light-gilded
light-giving
light-grasp
light-grasping
light-gray
light-green
light-haired
light-handed
light-handedly
light-handedness
light-harnessed
light-hating
light-headed
light-headedly
light-headedness

light-hearted
light-heartedly
light-heartedness
light-heeled
light-horseman
light-horsemen
light-hued
light-intensity control
light-intensity indicator
light-leaved
light-legged
light-limbed
light-loaded
light-locked
light-marching
light-minded
light-mindedly
light-mindedness
light-o'-love
light-o'love
light-of-love
light-pervious
light-poised
light-producing
light-proof
light-reactive
light-refracting
light-refractive
light-robed
light-rooted
light-rootedness
light-scattering
light-sensitive
light-skinned
light-skirts
light-spirited
light-spreading
light-struck
light-thoughted
light-timbered
light-tongued
light-treaded
light-veined
light-waved
light-weight
light-winged
light-witted
light-year

light-years
light-yellow
lighten
one of
lightening hole
lighter discharger
lighter staff
lighter than air
lighter than vanity
lighter-than-air
lighter-than-air aviation
lighter-than-air craft
lighthouse clock
lighthouse coffeepot
lighthouse keeper
lighthouse tube
lighting off
lighting up
lighting-up time
lightish-blue
lightly touching
lightning arrester
lightning attack
lightning beetle
lightning bug
lightning conductor
lightning discharge
lightning express
lightning file
lightning gods
lightning pains
lightning protector
lightning rod
lightning saw
lightning speed
lightning stone
lightning switch
lightning tooth
lightning tube
lightning war
lightning-like
lights out
lights-out
lign-
lign-aloes
lignaloe oil
ligni-
ligninsulphonic

acid
lignite wax
ligno-
lignosulphonic acid
lignum aloes
lignum vitae
ligulate-flowered
liguli-
like Niobe
like Swiss cheese
like a bat out of hell
like a blue streak
like a bolt from the blue
like a book
like a bulldog
like a coward
like a drowned rat
like a fish out of water
like a flash
like a furnace
like a horse in a mill
like a house afire
like a lamb
like a leech
like a lord
like a man
like a prune
like a scared rabbit
like a shot
like a shot out of hell
like a soldier
like a streak
like a streak of lightning
like a thief in the night
like a thunderbolt
like a thunderclap
like a trooper
like all creation
like all forty
like all get-out
like an oven
like anything
like as not
like best
like better
like blazes
like buckets in a well
like cats and dogs

like clockwork
like crazy
like dough
like enough
like figures
like for like
like fun
like fury
like grains of sand
like greased lightning
like hell I will
like it is
like lightning
like mad
like new
like no other
like nothing
like
 one possessed
like parchment
like putty
like putty in your hands
like sardines in a can
like shooting fish in a barrel
like sin
like sixty
like so
like sweet bells jangled
like taking candy from a baby
like that
like the rock of Gibraltar
like this
like to
like two drops of water
like water
like wax
like wildfire
like---but oh how different
like-eyed
like-fashioned
like-featured
like-looking
like-made
like-minded
like-mindedly
like-mindedness
like-natured
like-persuaded

like-sex
like-shaped
like-sized
liked to
likely lad
likely story
likely to
liken to
likes of
lilac gray
lilac mildew
lilac-banded
lilac-blue
lilac-colored
lilac-flowered
lilac-headed
lilac-mauve
lilac-pink
lilac-purple
lilac-tinted
lilac-violet
lilies of the valley
lilly-low
lilly-pilly
lily bell
lily bellflower
lily bind
lily family
lily flower
lily grass
lily green
lily iron
lily leek
lily liver
lily of the valley
lily pad
lily palm
lily pink
lily thorn
lily-cheeked
lily-clear
lily-cradled
lily-crowned
lily-fingered
lily-flower
lily-liver
lily-livered
lily-liveredness

lily-paved
lily-pot
lily-robed
lily-shaped
lily-shining
lily-tongued
lily-trotter
lily-white
lily-whiteness
lily-wristed
lima
 bean
limb-meal
limber as a dishrag
limber board
limber chest
limber hole
limber pine
limber rope
limber up
limber-neck
limber-twig pine
limbic lobe
limbic system
limbo patrum
limbs of Satan
lime anthracnose
lime boil
lime buffer
lime burner
lime epidote
lime feldspar
lime glass
lime grass
lime green
lime harmotome
lime hydrate
lime juice
lime liniment
lime mesotype
lime nitrogen
lime pit
lime plant
lime soap
lime sulfur
lime tree
lime twig
lime uranite

lime-ash
lime-boiled
lime-burner
lime-juicer
lime-kiln
lime-pit
lime-rod
lime-soda mesotype
lime-sulphur
lime-twig
lime-water
lime-white
limette oil
limit condition
limit control
limit gauge
limit man
limit of patience
limit of proportionality
limit of resolution
limit of vision
limit point
limit switch
limit system
limit yourself
limit, the
limit-setting
limited
 company
limited divorce
limited edition
limited fee simple
limited liability
limited monarchy
limited negative
limited nuclear weapons
limited number
limited owner
limited partner
limited partnership
limited payment insurance
limited policy
limited veto
limited war
limited-liability company
limiting adjective
limiting condition
limiting factor

limiting point
limousine-landaulet
limp as a dishrag
limp-cover book
limpet mine
limping meters
limping standard
limu-eleele
limu-kohu
lin ft
lin tree
lin-lan-lone
linalyl acetate
linch-pin
linden borer
linden family
linden green
linden inchworm
linden leaf beetle
linden yellow
lindy hop
line ahead
line block
line breaker
line breeding
line buck
line caster
line chief
line co-ordinates
line copy
line cut
line displacement
line drawing
line drive
line drop
line engraver
line engraving
line equation
line gale
line gauge
line geometry
line hunter
line integral
line letter
line loss
line microphone
line of action
line of apsides

line of battle
line
 of business
line of circumvallation
line of credit
line of defense
line of demarcation
line of departure
line of descent
line of direction
line of duty
line of endeavor
line of fire
line of flight
line of force
line of goods
line of induction
line of march
line of position
line of scrimmage
line of sight
line of sighting
line of site
line of succession
line of thrust
line of type
line of vision
line of work
line officer
line out
line printer
line radio
line relay
line riding
line space
line spectrum
line squall
line storm
line switch
line symmetry
line test
line up
line up with
line vector
line voltage
line your pockets
line-bred
line-breed

line-bucker
line-casting
line-engraving
line-firing
line-haul
line-hunting
line-of-battle ship
line-out
line-roll conveyer
line-sequential
line-sequential color television
line-throwing rocket
line-up
lineal measure
lineal promotion
lineal rank
lineal relation
linear accelerator
linear algebra
linear calibrations
linear chromatism
linear chromatist
linear
coefficient
linear combination
linear complex
linear content
linear dependence
linear differential equation
linear differential form
linear equation
linear fractional transformation
linear function
linear functional
linear graph
linear independence
linear lead
linear manifold
linear measure
linear measures
linear micrometer
linear motor
linear operation
linear operator
linear perspective
linear polarization
linear problem
linear programming

linear projection
linear segment
linear set
linear space
linear substitution
linear system
linear tactics
linear transformation
linear-acute
linear-attenuate
linear-awled
linear-elliptical
linear-elongate
linear-ensate
linear-filiform
linear-lanceolate
linear-leaved
linear-ligulate
linear-oblong
linear-obovate
linear-setaceous
linear-shaped
linear-subulate
linearly ordered set
lined blade
lined gold
lined up
linen closet
linen draper
linen draperess
linen drapery
linen floss
linen fold
linen machine
linen panel
linen paper
linen pattern
linen
 wedding
linen-armourer
lines drawing
lines plan
ling cod
ling pink
linga sharira
linger behind
linger on
lingoa wood

lingu-
lingua crioula
lingua franca
lingua francas
lingua geral
lingua rustica
lingua vulgaris
linguae francae
lingual artery
lingual bone
lingual delirium
lingual gyrus
lingual hemorrhoid
lingual nerve
lingual protrusion lisp
lingual ribbon
lingual titubation
linguistic act
linguistic ambience
linguistic analysis
linguistic area
linguistic atlas
linguistic behavior
linguistic borrowing
linguistic community
linguistic finesse
linguistic form
linguistic geographer
linguistic geography
linguistic intercourse
linguistic island
linguistic scholar
linguistic science
linguistic scientist
linguistic stock
linguistic structure
linguistic tact
linguo-
lining cloth
lining sight
lining stitcher
lining-out
lining-up
link block
link motion
link polygon
link up
link verb

link with
link-boy
link-up
linkage formula
linkage group
linkage groups
linked rhyme
linked to
linked verse
linking
r
linking verb
linnet hole
lino tile
lino-typist
linoleic acid
linolenic acid
linoleum block
linoleum knife
linoleum-block print
linoleum-block printing
linolic acid
linotype operator
linseed cake
linseed meal
linseed oil
linseed tea
linsey-woolsey
linsey-woolseys
lint bells
lint bow
lint index
lint-white
lion ant
lion dollar
lion dragon
lion leopard
lion lizard
lion monkey
lion poisson
lion tamer
lion's share
lion-bold
lion-color
lion-drunk
lion-footed
lion-guarded
lion-haunted

lion-headed
lion-heart
lion-hearted
lion-hided
lion-hued
lion-like
lion-maned
lion-mettled
lion-tailed
lion-tailed macaque
lion-tailed monkey
lion-tawny
lion-thoughted
lion-toothed
lip bit
lip comfort
lip comforter
lip devotion
lip fern
lip homage
lip labor
lip loyalty
lip microphone
lip molding
lip plug
lip praise
lip reader
lip reading
lip reverence
lip rouge
lip server
lip service
lip stop
lip strike
lip wisdom
lip worship
lip worshiper
lip-
lip-back
lip-bearded
lip-blushing
lip-born
lip-deep
lip-good
lip-labour
lip-learned
lip-licking
lip-open

lip-read
lip-reading
lip-red
lip-round
lip-rounding
lip-smacking
lip-spreading
lip-teeth
lipid
 histiocytosis
lipo-
lipoid pneumonia
liquefied petroleum gas
liqueur glass
liquid absolute
liquid air
liquid apiol
liquid assets
liquid assets ratio
liquid coal
liquid compass
liquid conduction
liquid crystal
liquid crystal display
liquid extract
liquid fire
liquid fuel
liquid glass
liquid gold
liquid helium
liquid measure
liquid nitrogen
liquid oxygen
liquid paraffin
liquid petrolatum
liquid pint
liquid quart
liquid soap
liquid storax
liquid-fuel rocket
liquid-level control
liquid-level indicator
liquid-level sensor
liquidating dividend
liquidity preference
liquidity ratio
liquidus curve
liquor dealer

liquor maker
liquor merchant
liquor store
liquor store owner
liquor tax
liquor up
liquor-drinking
liquor-loving
liquorice allsorts
lira da braccio
liras da braccio
lire da braccio
lis pendens
lisle hose
lisle thread
lisp in numbers
list of
list of agenda
list
 pot
list price
list system
listed building
listed securities
listen at
listen in
listen to
listen to reason
listen with both ears
listener-in
listening cam
listening in
listening post
lister cultivator
lister drill
lister planter
lister plough
lister plow
listing machine
lit de justice
lit to the gills
lit up
litany stool
litchi nut
literacy test
literae humaniores
literae scriptae
literal error

literal meaning
literal translation
literal-minded
literalists of the imagination
literary agent
literary artefact
literary artifact
literary artisan
literary artist
literary artistry
literary composition
literary craftsman
literary critic
literary criticism
literary elegance
literary flair
literary hack
literary inelegance
literary journeyman
literary language
literary man
literary piracy
literary pirate
literary power
literary production
literary remains
literary style
literary talent
literature of the field
lith-
lithia emerald
lithia mica
lithia water
lithic acid
lithium aluminum
hydride
lithium chloride
lithium fluoride
lithium oxide
lithium stearate
litho purple
litho-
lithographic stone
litis contestatio
litmus milk
litmus paper
litmus test
litter lout

litter-bearer
litterae humaniores
little Joe
little Mary
little Miss Fixit
little angel
little auk
little bear
little bit
little bite
little black ant
little blue heron
little bluestem
little boys' room
little brain
little brother
little brown jug
little bugger
little businessman
little by little
little casino
little chance
little cherub
little darling
little devil
little doll
little egret
little end
little expectation
little fellow
little finger
little game
little girls' room
little good
little grebe
little green man
little gull
little guy
little guys
little hours
little house
little innocent
little kids
little known
little leaf
little magazine
little man
little master

little millet
little missy
little monkey
little office
little one
little ones
little opportunity
little owl
little people
little people, the
little
person
little pitcher with big ears
little problem
little quaking grass
little rascal
little recall
little red schoolhouse
little retentivity
little shaver
little slam
little smack
little spotted cat
little squirt
little summer of St
little tad
little talk
little terror
little theater
little theatre
little thing
little toe
little tot
little voice
little ways
little while
little white lie
little woman
little, a
little-able
little-bitsy
little-bitty
little-boukit
little-branched
little-by-little
little-ease
little-footed
little-girlish

little-girlishness
little-go
little-haired
little-headed
little-known
little-loved
little-minded
little-mindedness
little-prized
little-read
little-regarded
little-statured
little-trained
little-traveled
little-used
little-worth
littleneck clam
littoral zone
liturgical east
liturgical garments
liturgical music
liturgical north
liturgical south
liturgical west
litz wire
live a cat-and-dog life
live a life of ease
live again
live alone
live and breathe
live
 and learn
live and let live
live apart
live as man and wife
live at
live beyond your means
live by your wits
live center
live centre
live circuit
live coal
live down
live fast
live for the day
live forever
live from hand to mouth
live frugally

live hard
live high
live high off the hog
live high on the hog
live in
live in a glass house
live in clover
live in hopes
live in peace
live in retirement
live in your memory
live it up
live like a pig
live like cat and dog
live like the grasshopper
live load
live matter
live oak
live off of
live off the fat of the land
live on
live on the fat of the land
live on velvet
live one
live or die
live outside the law
live parking
live peaceably with all men
live plainly
live show
live simply
live spindle
live steam
live stock
live temperately
live the life of Riley
live through
live through it
live to a ripe old age
live to eat
live to fight another day
live together
live trap
live up
live up to
live upon
live upon nothing
live well

live wire
live
with
live with it
live within your income
live-bearer
live-bearing
live-box
live-ever
live-forever
live-front switchboard
live-in maid
live-in-idleness
live-oak
live-out maid
live-sawed
live-virus vaccine
lived-in
lively imagination
lively interest
lively market
lively pace
liven vivificate
liver and lights
liver and onions
liver balsam
liver brown
liver chestnut
liver death
liver disease
liver extract
liver fluke
liver fluke disease
liver fungus
liver lily
liver maroon
liver of sulfur
liver of sulphur
liver rot
liver salts
liver sausage
liver sausage tree
liver shark
liver spots
liver-brown
liver-colored
liver-hued
liver-moss

liver-rot
liver-white
liveried servant
liverwort lettuce
livery colors
livery company
livery cupboard
livery servant
livery stable
livery-man
livery-stable
livestock insurance
livid brown
livid pink
livid purple
livid violet
livid with rage
livid-brown
living being
living death
living force
living fossil
living hall
living image
living in
living issue
living language
living
machine
living matter
living nature
living picture
living pledge
living quarters
living rock
living room
living sapphires
living soul
living space
living thing
living trust
living wage
livre jaune
livre parisis
livre tournois
lizard bronze
lizard fish
lizard flower

lizard green
lizard seeker
lizard's-tail
lizards-tail
lizardtail grass
llama hair
lm-hr
lm/W
lo and behold
loa loa
load chart
load control
load displacement
load draft
load factor
load fund
load indicator
load line
load line mark
load of money
load resistance
load shedding
load the dice
load the mind
load the mind with
load water line
load water plane
load waterline
load with care
load with ornament
load with reproaches
load-indicating resistor
load-line disk
load-line mark
load-water-line
loaded cane
loaded dice
loaded for
loaded for bear
loaded moment
loaded with doom
loaded with shame
loaded with significance
loading coil
loading donkey
loading down
loading inductance
loaf of bread

loaf sugar
loaf-sugar
loam
board
loan agent
loan collection
loan farm
loan form
loan god
loan office
loan officer
loan shark
loan translation
loan value
loan word
loan-office
loan-shark
loan-sharking
loaned stock
loaves and fishes
lob's pound
lob-
lob-worm
lobar pneumonia
lobato-
lobato-digitate
lobato-divided
lobato-foliaceous
lobato-partite
lobato-ramulose
lobby pine
lobby through
lobed-leaved
lobelia blue
lobelia family
lobelia violet
loblolly bay
loblolly boy
loblolly pine
loblolly sweetwood
loblolly tree
lobster Newburg
lobster Newburgh
lobster Thermidor
lobster caterpillar
lobster crab
lobster flower
lobster moth

lobster newburg
lobster pot
lobster roll
lobster shift
lobster thermidor
lobster tour
lobster trap
lobster trick
lobster-horns
lobster-red
lobster-tail
lobster-tail helmet
lobster-tailed
lobsters-claw
lobular pneumonia
lobular pump
loc cit
local anaesthetic
local anesthetic
local authority
local call
local case
local color
local colour
local dialect
local economy
local examinations
local express
local
government
local horizon
local law
local maximum
local minimum
local office
local option
local optioner
local optionism
local optionist
local oscillator
local oscillator signal
local road
local stamp
local tax
local time
local union
local wind
local yokel

local-option law
local-oscillator tube
locally Euclidean space
locally compact space
locally finite set
loci classici
loci sigilli
lock bay
lock forward
lock gate
lock horns
lock hospital
lock in
lock nut
lock off
lock on
lock on to
lock out
lock plate
lock rail
lock saw
lock seam
lock seat
lock step
lock stitch
lock the door
lock turtle
lock up
lock washer
lock, stock, and barrel
lock-a-daisy
lock-grained
lock-hair fern
lock-jaw
lock-out
lock-up
locked in
locked jaw
locked up
locked-up page
locked-wire rope
locker box
locker paper
locker plant
locker room
locking face
locking gauntlet
locking in

locking on
locking pallet
locking piece
locking plate
locking ring
locking signals
locking up
locking wheel
lockup safety valve
loco citato
loco
 disease
loco parentis
loco supra citato
loco vetch
loco-descriptive
loco-foco
locomotive boiler
locomotive engine
locomotor ataxia
locoprimo citato
loctal base
locum tenens
locum tenentes
locum-tenency
locus classicus
locus communis
locus in quo
locus sigilli
locus standi
locust bean
locust beetle
locust bird
locust eater
locust lobster
locust mite
locust moth
locust plant
locust pod
locust sawfly
locust shrimp
locust tree
locust-kernel gum
locust-tree
lode claim
loden coat
loden green
lodge a complaint

lodge a plaint
lodge in the mind
lodged in your mind
lodgepole pine
lodger bee
lodger franchise
lodging house
lodging knee
lodging place
lodging turn
lodh bark
loft-dried
lofting iron
lofty affectations
lofty airs
lofty ambition
lofty mountains
lofty peak
lofty-browed
lofty-headed
lofty-humored
lofty-looking
lofty-minded
lofty-notioned
lofty-peaked
lofty-plumed
lofty-roofed
lofty-sounding
log bunk
log cabin
log canoe
log carriage
log chip
log deck
log dog
log drive
log driver
log
driving
log fixer
log frame
log glass
log jack
log jam
log kicker
log line
log loader
log measure

log peeler
log perch
log reel
log rule
log run
log runner
log scale
log scaler
log ship
log slate
log tooth
log turner
log-
log-book
log-log
log-roll
log-roller
log-rolling
logan apple
logan stone
logan-stone
loganberry wine
logarithmic curve
logarithmic function
loggan stone
loggerhead shrike
loggerhead sponge
loggerhead turtle
logging car
logging locomotive
logging sled
logging stone
logging wheels
logic circuit
logic-chopper
logic-chopping
logical analysis
logical circle
logical construction
logical discussion
logical empiricism
logical empiricist
logical fallacy
logical impossibility
logical operation
logical order
logical outcome
logical positivism

logical positivist
logical presumption
logical sequence
logical sum
logical syntax
logical thought
logically impossible
logico-metaphysical
logistic curve
logistic line
logo-
logographic character
logographic symbol
logos Christology
logos
theology
logothete-
logwood black
logwood blue
logwood paper
loin end
loiter about
loiter around
loiter away the time
loiter behind
loiter out the time
loll around
loll shraub
loll-shraub
lollop around
lolly water
lombard street
lombard-street
lomi-lomi
london pride
lone hand
lone pair
lone wolf
lone woman
lonely end
lonely heart
lonesome end
long accent
long account
long ago
long arm
long ballot
long bill

long bob
long bone
long card
long chair
long chalk
long clam
long cloth
long coat
long cross
long distance
long division
long dozen
long drink of water
long duration
long ess
long face
long fake
long for
long gallery
long game
long green
long haul
long home
long hop
long horn
long horse
long house
long hundred
long hundredweight
long in the tooth
long interest
long iron
long jenny
long johns
long jump
long life
long life to
long mane
long mark
long market
long measure
long metre
long mordent
long moss
long odds
long on looks
long pants
long pennant

long pig
long play
long pooper
long
primer
long pull
long purse
long range
long range aid to navigation
long rifle
long road
long robe
long rod
long rope
long run
long shanks
long shot
long side
long sight
long since
long splice
long standing
long step
long stock
long sufferance
long suit
long sweetening
long sword
long tether
long time
long tin
long to
long tom
long ton
long tongue
long topgallant mast
long trail
long trousers
long underwear
long vacation
long view
long vowel
long wave
long way
long while
long word
long-
long-accustomed

long-acre
long-agitated
long-ago
long-and-short work
long-arm
long-arm balance
long-armed
long-awaited
long-awned
long-axed
long-backed
long-barreled
long-beaked
long-bearded
long-bellied
long-berried
long-billed
long-boat
long-bodied
long-borne
long-bow
long-bracted
long-branched
long-breathed
long-buried
long-celled
long-chained
long-clawed
long-coated
long-coats
long-contended
long-continued
long-continuing
long-coupled
long-crested
long-cycle
long-cycled
long-dated
long-day
long-dead
long-delayed
long-descending
long-deserted
long-desired
long-destroying
long-distance
long-distance

call
long-docked
long-drawn
long-drawn-out
long-eared
long-eared owl
long-enduring
long-established
long-exerted
long-expected
long-experienced
long-extended
long-eyed sharp
long-faced
long-faded
long-favored
long-fed
long-fiber
long-fibered
long-fin tunny
long-fingered
long-finned
long-flaked coil
long-fleeced
long-flowered
long-footed
long-forgotten
long-fronted
long-fruited
long-gown
long-gowned
long-grassed
long-hair
long-haired
long-haired griffon
long-hand
long-handed
long-handled
long-head
long-headed
long-headedness
long-heeled
long-hid
long-horned
long-horned beetle
long-horned grasshopper
long-jawed
long-jointed

long-journey
long-kept
long-lacked
long-lasting
long-lastingness
long-leaved
long-leaved bent
long-leaved pine
long-leg
long-legged
long-limbed
long-line
long-lined
long-liner
long-lining
long-lived
long-livedness
long-living
long-locked
long-lost
long-lunged
long-memoried
long-nebbed
long-neck
clam
long-necked
long-nosed
long-off
long-on
long-parted
long-past
long-pasterned
long-pending
long-period variable
long-planned
long-playing
long-plumed
long-pod
long-podded
long-possessed
long-projected
long-protracted
long-quartered
long-range
long-range attack aircraft
long-range bomber
long-range forecasting
long-range heavy bomber

long-range medium bomber
long-range patrol bomber
long-range plan
long-range planning
long-range radar
long-range rocket
long-reaching
long-resounding
long-ribbed
long-ridged
long-robed
long-roofed
long-rooted
long-saved
long-settled
long-shaded
long-shadowed
long-shafted
long-shanked
long-shaped
long-shore
long-shut
long-sighted
long-sightedness
long-skulled
long-sleeved
long-snouted
long-sought
long-span
long-spine
long-spined
long-spun
long-spurred
long-staffed
long-stalked
long-standing
long-staple
long-staple isinglass
long-stapled
long-stemmed
long-stocked
long-streaming
long-stretched
long-stroke
long-styled
long-succeeding
long-sufferance
long-suffered

long-suffering
long-sufferingly
long-sundered
long-tail
long-tailed
long-tailed
chat
long-tailed tit
long-term
long-term bond
long-term loan
long-term memory
long-termer
long-thinking
long-threatened
long-time
long-timed
long-toed
long-toed stint
long-tongue
long-tongued
long-toothed
long-traveled
long-visaged
long-waisted
long-wandered
long-wandering
long-wave
long-wedded
long-winded
long-windedly
long-windedness
long-winged
long-wire aerial
long-wire antenna
long-wished
long-withdrawing
long-withheld
long-wooled
long-worded
longcase clock
longed-for
longhair music
longi-
longicorn beetle
longing eye
longing for the past
longitude by account

longitude in arc
longitude in time
longitudinal axis
longitudinal coefficient
longitudinal framing
longitudinal magnification
longitudinal section
longitudinal stability
longitudinal wave
longleaf pine
longleaf yellow pine
longschat pine
longshore drift
longways dance
loo mask
look a fright
look a gift horse
 in the mouth
look a mess
look a sight
look about for
look about one
look after
look after your fences
look after your own interests
look aghast
look agog
look ahead
look alive
look all over
look all over hell
look another way
look around
look around for
look as if you had seen a ghost
look aside
look askance
look askance at
look askant
look asquint
look at
look at in the light of
look at it
look away
look back
look back on
look back upon things past
look bad

look beautiful
look before you leap
look beyond
look big
look black
look black as thunder
look black upon
look bleak
look blue
look closely at
look coldly upon
look cool upon
look daggers
look daggers at
look dark
look down
look down on
look down over
look down upon
look down your nose
look down your nose at
look everywhere
look fit to kill
look foolish
look for
look for a needle in a haystack
look for time
look for trouble
look forth
look forward to
look full in the face
look good
look green about the gills
look guilty
look here
look
 high and low
look in
look in on
look in the face
look in your eyes
look into
look into every hole and corner
look into the future
look kindly upon
look like
look like a million
look like hell

look like the devil
look lively
look on
look on the bright side
look on the dark side
look on with the evil eye
look out
look out for
look out for number one
look out upon
look over
look right through
look round
look serious
look sharp
look silly
look slippy
look something terrible
look straight in the eye
look straight in the eyes
look sullen
look sweet upon
look the other way
look threatening
look through
look to
look to be
look to your laurels
look toward
look up
look up and down
look up to
look upon
look upon as
look upstairs and downstairs
look with scorn upon
look with your own eyes
look you
look you in the eye
look you in the face
look you up
look-alike
look-alikes
look-down
look-in
look-over
look-see
look-through

look-up
looked-for
looker-on
lookers-on
looking ahead
looking back
looking
 fit to kill
looking for
looking forward to
looking glass
looking out the window
looking up
looking-glass
looking-glass bush
lookout man
loom joiner
loom large
loom of the land
loom oiler
loom tenter
loom turner
loom weaver
loom-state
looming in the distance
looming in the future
loony bin
loop aerial
loop antenna
loop back
loop in
loop knot
loop line
loop of Henle
loop stitch
loop the loop
loop winding
loop window
loop-hole
loop-the-loop
loophole frame
looping mill
looping the loop
loose bowels
loose change
loose construction
loose cover
loose end

loose ends
loose for sea
loose formation
loose memory
loose morals
loose order
loose purse strings
loose sentence
loose smut
loose thread
loose tongue
loose translation
loose woman
loose-barbed
loose-bodied
loose-coupled
loose-curled
loose-driving
loose-enrobed
loose-fibered
loose-fitting
loose-fleshed
loose-floating
loose-flowered
loose-flowing
loose-footed
loose-footed sail
loose-girdled
loose-gowned
loose-handed
loose-hanging
loose-hipped
loose-hung
loose-joint
hinge
loose-jointed
loose-kneed
loose-leaf
loose-leaf notebook
loose-limbed
loose-lipped
loose-lived
loose-living
loose-locked
loose-lying
loose-mannered
loose-moraled
loose-necked

loose-packed
loose-panicled
loose-principled
loose-robed
loose-skinned
loose-spiked
loose-thinking
loose-tongued
loose-topped
loose-wadded
loose-wived
loose-woven
loose-writ
loosen the purse strings
loosen up
looseness of the bowels
lop-ear
lop-eared
lop-sided
lopho-
loppered milk
lord and master
lord bird
lord chancellor
lord it over
lord lieutenant
lord mayor
lord of creation
lord of misrule
lord of the bedchamber
lord of the manor
lord paramount
lord spiritual
lord temporal
lord trier
lord's day
lord's prayer
lord's supper
lord's table
lord-in-waiting
lord-lieutenancy
lord-lieutenant
lords and ladies
lords of creation
lords temporal and spiritual
lords-and-ladies
lords-in-waiting
lorraine cross

lose altitude
lose blood
lose caste
lose color
lose countenance
lose courage
lose credit
lose
currency
lose distinctness
lose face
lose flesh
lose ground
lose heart
lose heat
lose hope
lose momentum
lose no time
lose novelty
lose one
lose one's cookies
lose out
lose patience
lose power
lose resolution
lose self-control
lose sharpness
lose sight of
lose speed
lose strength
lose the chance
lose the day
lose the opportunity
lose the will to live
lose time
lose track of
lose weight
lose your good name
lose your grip
lose your head
lose your hearing
lose your heart
lose your heart to
lose your life
lose your nerve
lose your reason
lose your senses
lose your shirt

lose your sight
lose your temper
lose your tongue
lose your vision
lose your way
lose your wits
lose yourself in
lose-out
losh hide
losh leather
losing game
losing hazard
losing streak
losing your touch
loss leader
loss of contact with reality
loss of ground
loss of hearing
loss of honor
loss of innocence
loss of life
loss of memory
loss of mind
loss of name
loss of reason
loss of repute
loss of speech
loss of tone
loss
of touch with reality
loss of voice
loss of your illusions
loss ratio
lost cause
lost in
lost in amazement
lost in thought
lost in wonder
lost lamb
lost language
lost motion
lost river
lost sheep
lost soul
lost souls
lost to
lost to all sense of honor
lost to shame

lost to sight
lost to view
lost tribes
lost-wax process
lot on
lot out
lot, a
lot, the
lote bush
lots of laughs
lotus grass
lotus land
lotus position
lotus-eater
lotus-eating
loud and clear
loud color
loud noise
loud pedal
loud sound
loud-acclaiming
loud-applauding
loud-bellowing
loud-blustering
loud-calling
loud-clamoring
loud-cursing
loud-hailer
loud-laughing
loud-mouth
loud-mouthed
loud-mouths
loud-ringing
loud-roared
loud-roaring
loud-screaming
loud-singing
loud-sounding
loud-speaker
loud-speaking
loud-spoken
loud-squeaking
loud-thundering
loud-ticking
loud-voiced
loudspeaker van
loudy-da
lough diver

louis d'or
louis quatorze
louis quinze
louis seize
louis treize
lounge around
lounge bar
lounge car
lounge chair
lounge
 lizard
lounge suit
lounging jacket
lounging pajamas
lounging robe
loup cervier
loup-cervier
loup-garou
louping ill
loups-garous
louse herb
louse up
louse-up
loused up
lousy knave
lousy rich
lousy with
louver board
louver boards
louver window
love God
love affair
love apple
love arrows
love charm
love chest
love child
love deities
love ditty
love feast
love game
love god
love goddess
love grass
love interest
love knot
love letter
love match

love nest
love of God
love of country
love of mankind
love potion
love seat
love set
love song
love story
love the sound of your own voice
love to
love to distraction
love vine
love-anguished
love-apple
love-begot
love-begotten
love-bird
love-bitten
love-born
love-breathing
love-crossed
love-darting
love-delighted
love-devouring
love-drury
love-entangle
love-entangled
love-enthralled
love-feast
love-illumined
love-in-a-mist
love-in-idleness
love-inspired
love-inspiring
love-knot
love-lacking
love-laden
love-learned
love-lies-bleeding
love-lilt
love-lorn
love-mad
love-madness
love-maker
love-making
love-mourning
love-performing

love-sick
love-smitten
love-spent
love-starved
love-stricken
love-touched
love-whispering
love-worthiness
love-worthy
love-wounded
loved
one
lovely as the day
lovely build
lovely time
lovely to behold
lover of beauty
lover of learning
lover of wisdom
lover's knot
lover's leap
lover-boy
lovers' lane
lovey-dovey
loving care
loving couple
loving cup
loving kindness
loving-kindness
low IQ
low area
low beam
low blood pressure
low brass
low bunt
low camp
low charge
low church
low class
low comedian
low comedy
low cunning
low down
low estimation
low explosive
low fellow
low frequency
low fulham

low german
low grade
low green tent
low ground
low grounds
low growth rate
low house
low hurdles
low in the pecking order
low latin
low man on the totem pole
low mass
low milling
low opinion
low order of importance
low order of probability
low pitch
low price
low price tag
low prices
low priority
low profile
low quality
low
 relief
low rumbling
low sodium diet
low spear grass
low spirits
low sunday
low tariff
low taste
low temperature
low tide
low visibility
low voice
low water
low wine
low wines
low-altitude bombing
low-arched
low-backed
low-bellowing
low-bended
low-blast
low-blooded
low-bodied
low-boiling

low-born
low-boughed
low-bowed
low-breasted
low-bred
low-brow
low-browed
low-built
low-calorie diet
low-camp
low-capacitance probe
low-carbohydrate diet
low-caste
low-ceiled
low-ceilinged
low-charge
low-churchman
low-class
low-conceited
low-conditioned
low-consumption
low-cost
low-country
low-crested
low-crowned
low-current
low-cut
low-deep
low-down
low-down dirty shame
low-downer
low-downness
low-ebbed
low-energy fission
low-filleted
low-flighted
low-fortuned
low-frequency
low-frequency current
low-frequency speaker
low-frequency wave
low-gauge
low-geared
low-grade
low-heeled
low-hung
low-intensity
low-key

low-keyed
low-lead gas
low-level
low-level language
low-leveled
low-lipped
low-lived
low-living
low-low
low-lying
low-masted
low-melting
low-minded
low-mindedly
low-mindedness
low-murmuring
low-muttered
low-necked
low-paneled
low-pass
filter
low-pitched
low-power
low-pressure
low-pressure area
low-pressure cylinder
low-pressure salesmanship
low-priced
low-principled
low-priority
low-profile
low-purposed
low-quality
low-quartered
low-rate
low-rented
low-resistance
low-rimmed
low-rise
low-roofed
low-salt diet
low-set
low-sized
low-sounding
low-spirited
low-spiritedly
low-spiritedness
low-spoken

low-statured
low-temperature
low-tension
low-test
low-thoughted
low-toned
low-tongued
low-tread
low-uttered
low-voiced
low-voltage
low-voltage protection
low-voltage release
low-waisted
low-water
low-water mark
low-wattage
low-wheeled
low-wing monoplane
low-withered
low-witted
low-yield nuclear weapons
lowbush blueberry
lowdown, the
lower apsis
lower atmosphere
lower berth
lower bo
lower boom
lower bound
lower case
lower chamber
lower class
lower classes
lower criticism
lower deck
lower frequencies
lower
 fungus
lower hold
lower house
lower limit
lower mast
lower middle class
lower mizzen-topsail yard
lower mordent
lower oneself
lower orders

lower ranks
lower regions
lower sail
lower school
lower semi-continuous function
lower semicontinuous function
lower side
lower status
lower strata
lower studding sail
lower the boom
lower the spirits
lower world
lower your colors
lower your flag
lower your guard
lower your note
lower your tone
lower yourself
lower-boom topping lift
lower-case
lower-case alphabet
lower-cased
lower-casing
lower-income housing
lowering yourself
lowest common denominator
lowest common multiple
lowest layer
lowest level
lowest point
lowest stratum
lowest terms
lowland fir
lowland plover
lowland white fir
lowness of spirit
lowside window
loxa bark
loyal friendship
loyal opposition
loyalty oath
lozenge perforation
lozenge-shaped
lpW
lt-yr
lubber fend
lubber fiend

lubber grasshopper
lubber line
lubber's hole
lubber's knot
lubber's line
lubber's mark
lubber's
point
lubber-hole
lube oil
lubricating agent
lubricating oil
lucid interval
lucid stillness
lucifer match
luck of the draw
luck penny
lucken gowan
lucky bean
lucky break
lucky dip
lucky dog
lucky person
lucky piece
lucky shot
lucky strike
lucky-bag
lucrative interest
lucus a non lucendo
ludicro-
lufbery circle
luff on luff
luff tackle
luff up
luff upon luff
lug foresail
lug hook
lug in
lug in by the heels
lug nut
lug pad
lug screw
lug sill
lug topsail
lug wrench
lug-rigged
lug-worm
luggage shop

luggage tan
luggage train
luggage van
lugger topsail
lukewarm piety
lukewarm support
lull before the storm
lull to sleep
lullaby vt
lumb-
lumbar puncture
lumbar region
lumbar rheumatism
lumber jacket
lumber kiln
lumber room
lumber-pie
lumbering pace
lumberman's saw
lumbo-
lumbo-abdominal
lumbo-aortic
lumbo-iliac
lumbo-inguinal
lumbo-ovarian
lumen meter
lumen-hour
lumin-
luminosity curve
luminous efficacy
luminous efficiency
luminous emittance
luminous energy
luminous exitance
luminous flux
luminous
 flux density
luminous intensity
luminous paint
luminous power
luminous range
lump coal
lump it
lump of sugar
lump sucker
lump sum
lump together
lump-fish

lumpen proletariat
lumpy jaw
luna cornea
luna moth
lunar base
lunar caustic
lunar city
lunar colony
lunar corona
lunar cycle
lunar day
lunar distance
lunar eclipse
lunar excursion module
lunar halo
lunar insertion
lunar landscape
lunar mare
lunar module
lunar month
lunar orbit
lunar rainbow
lunar rill
lunar rille
lunar tide
lunar waste
lunar year
lunar-diurnal
lunatic asylum
lunatic fringe
lunch break
lunch counter
lunch hour
lunch time
lunch wagon
luncheon bar
luncheon meat
luncheon voucher
lung book
lung cancer
lung fever
lung fish
lung fluke
lung plague
lung sickness
lunge at
lungworm disease
lunisolar precession

lunitidal interval
lupus erythematosus
lupus vulgaris
lurid imagination
lurking hole
lurking place
lush up
lust after
lust for
lust for knowledge
lust for learning
lust-born
lust-burned
lust-burning
lust-engendered
lust-stained
lust-tempting
luster
 pottery
luster wool
lustful leer
lusts of the flesh
lusus naturae
lute maker
lute player
lute stern
lute tablature
lute-
lute-backed
lute-fashion
lute-playing
lute-string
lute-voiced
luteinizing hormone
luteo-
lutine bell
luting paste
luxuriate in
luxuriate on
luxury liner
luxury price
luxury tax
luxury-loving
luxury-proof
lyam-hound
lych gate
lych-gate
lychee nut

lycoperdon nut
lycopodium powder
lye boil
lygaeid bug
lygus bug
lying ahull
lying down
lying hid
lying in ambush
lying in wait
lying low
lying press
lying pretension
lying to
lying wall
lying-in
lying-in hospital
lying-ins
lyings-in
lyke-wake
lyme grass
lyme-grass
lyme-hound
lymph cell
lymph corpuscle
lymph gland
lymph heart
lymph node
lymph nodule
lymph-
lymph-vascular
lymphatic gland
lymphatic leukemia
lymphatic system
lympho-
lympho-adenoma
lymphogenous leukemia
lymphogranuloma inguinale
lymphogranuloma venereum
lymphoid cell
lymphoid leukemia
lynch law
lynx cat
lynx flower
lynx-eyed
lyo-
lyra

viol
lyrate-lobed
lyre back
lyre bat
lyre pheasant
lyre snake
lyre tree
lyre turtle
lyre-form sofa
lyre-guitar
lyre-leaved
lyre-shaped
lyre-tailed
lyre-tailed nightjar
lyric bass
lyric cantata
lyric drama
lyric poet
lyric poetry
lyric soprano
lyric stage
lyric tenor
lyric theater
lyric-writing
lyrical abstraction
lyrical abstractionist
lyrico-dramatic
lyrico-epic
lys-
lysergic acid
lysergic acid diethylamide
lyso-
m b
m d
m-1
m-RNA
m-day
m-hum
m-ple point
mA
mAN
mC
mCi
mF
mGal
mH
mL
mM

mR
mRNA
mV
mW
ma chere
ma-jong
mabi bark
macaco worm
macadamia nut
macaranga gum
macaroni and cheese
macaroni cheese
macaroni salad
macaroni wheat
macaronic verse
macaw fat
macaw palm
mace butter
mace oil
mace-bearer
mach number
machina versatilis
machinations of the devil
machine binder
machine bolt
machine composition
machine computation
machine cutter
machine dresser
machine drill
machine feeder
machine gun
machine gunner
machine knife
machine knitter
machine language
machine lapper
machine nailer
machine
pistol
machine politician
machine politics
machine readable
machine rifle
machine ruler
machine screw
machine shop
machine stamper

machine steel
machine stitch
machine stitcher
machine stitching
machine tool
machine word
machine-breaking
machine-broken
machine-cut
machine-drilled
machine-driven
machine-finished
machine-forged
machine-gun
machine-gun fire
machine-gunned
machine-gunning
machine-hour
machine-knitted
machine-made
machine-mixed
machine-sewed
machine-stitch
machine-stitched
machine-switching office
machine-tooled
machine-woven
machine-wrought
machinery steel
machinist's hammer
machinist's mate
mackay bean
mackerel bait
mackerel bird
mackerel breeze
mackerel gull
mackerel shark
mackerel sky
mackinaw coat
macnab cypress
macr-
macrame cord
macrame knot
macro-
macro-axis
macrobiotic diet
macrocytic anemia
macula lutea

mad about
mad apple
mad as a March hare
mad as a hatter
mad as a hornet
mad as a wet hen
mad dog
mad for
mad itch
mad money
mad on
mad round
mad staggers
mad
 with lust
mad-apple
mad-brained
mad-bred
mad-doctor
mad-dog skullcap
mad-headed
madder bleach
madder bloom
madder blue
madder brown
madder carmine
madder crimson
madder extract
madder lake
madder orange
madder pink
madder purple
madder red
madder rose
madder scarlet
madder violet
madder yellow
made dish
made eye
made flesh
made for
made mast
made of
made of iron
made of money
made out of
made out of whole cloth
made public

made rug
made sure
made to grovel
made to order
made up
made up of
made-beaver
made-over
made-to-measure
made-to-order
made-up
madia oil
madonna lily
madre-perl
madrepore glass
madrepore marble
madreporic body
madreporic plate
madreporic tubercle
mae west
maestro di cappella
mafura tallow
mag tape
magazine camera
magazine clothing
magazine publishing
magazine section
magazine writer
magellanic cloud
magen david
maggot in one's brain
maggot in the brain
maggot snipe
maggot therapy
maggot-pie
magic act
magic belt
magic bullets
magic carpet
magic circle
magic eye
magic
formula
magic lantern
magic lily
magic number
magic realism
magic realist

magic ring
magic show
magic spectacles
magic spell
magic square
magic wand
magic words
magico-religious
magico-sympathetic
maginot line
magistral line
magistrates' court
magma basalt
magmatic stoping
magna charta
magna cum laude
magne-
magnesia magma
magnesium carbonate
magnesium chloride
magnesium citrate
magnesium dioxide
magnesium flare
magnesium hydroxide
magnesium light
magnesium oxide
magnesium peroxide
magnesium sulfate
magnesium trisilicate
magnet forger
magnet keeper
magnet school
magnet-
magnetic amplifier
magnetic attraction
magnetic axis
magnetic battery
magnetic bearing
magnetic bottle
magnetic bubble
magnetic cartridge
magnetic character reader
magnetic chart
magnetic circuit
magnetic coefficient
magnetic compass
magnetic concentration
magnetic conductivity

magnetic constant
magnetic core
magnetic course
magnetic creeping
magnetic curves
magnetic declination
magnetic deviation
magnetic dip
magnetic
dipole moment
magnetic disk
magnetic domain
magnetic drum
magnetic drum recorder
magnetic electricity
magnetic elements
magnetic equator
magnetic field
magnetic field of currents
magnetic figures
magnetic flux
magnetic flux density
magnetic force
magnetic friction
magnetic heading
magnetic hysteresis
magnetic inclination
magnetic induction
magnetic ink
magnetic intensity
magnetic lag
magnetic lens
magnetic memory
magnetic meridian
magnetic mine
magnetic moment
magnetic needle
magnetic north
magnetic permeability
magnetic pickup
magnetic pole
magnetic potential
magnetic pulley
magnetic quantum number
magnetic recorder
magnetic recording
magnetic relay
magnetic reluctance

magnetic remanence
magnetic repulsion
magnetic resistance
magnetic retardation
magnetic retentiveness
magnetic rotation
magnetic scalar potential
magnetic storm
magnetic tape
magnetic tape recorder
magnetic tape unit
magnetic tube of force
magnetic variation
magnetic viscosity
magnetic wire
magnetic wire recorder
magnetico-
magnetite
 arc
magnetite arc lamp
magnetite-basalt
magnetite-olivinite
magnetite-spinellite
magnetizing current
magnetizing force
magneto assembler
magneto-
magneto-electric
magneto-electricity
magneto-optical effect
magnetocaloric effect
magnetoelectric generator
magnetoelectric machine
magnetomotive force
magnetostriction microphone
magnificent rifle bird
magnifying glass
magnifying power
magnolia warbler
magnum bonum
magnum opus
magnus hitch
magpie diver
magpie finch
magpie goose
mah jong
mah-jongg
mahala mat

mahaleb cherry
mahali disease
maharao raja
mahogany birch
mahogany brown
mahogany family
mahogany-brown
mahua butter
maid marian
maid of all work
maid of honor
maid of honour
maid-in-waiting
maiden cane
maiden lady
maiden name
maiden over
maiden pink
maiden speech
maiden state
maiden voyage
maiden's blush
maiden's-tears
maiden's-wreath
maiden's-wreaths
maidenhair fern
maidenhair spleenwort
maidenhair tree
maidenhair-tree
maidenhair-vine
maids-hair
maids-in-waiting
mail
 boat
mail car
mail carrier
mail catcher
mail coach
mail drop
mail flag
mail order
mail orderly
mail packet
mail phaeton
mail pouch
mail steamer
mail train
mail truck

mail van
mail-cheeked
mail-coach
mail-order buying
mail-order goods
mail-order house
mail-order selling
mailed fist
mailed fist, the
mailed-cheeked
mailing list
mailing machine
mailing tube
main body
main brace
main chance
main clause
main course
main current
main deck
main diagonal
main dish
main drag
main feature
main features
main force
main gaff-topsail
main gauche
main idea
main interest
main lift
main line
main office
main plane
main plant
main point
main road
main rocket
main royal
main sea
main sequence
main sequence star
main skysail
main staysail
main stem
main store
main street
main strength

main thing
main yard
main-brace
main-brace bumpkin
main-course
main-de-fer
main-deck
main-frame computer
main-guard
main-royal brace
main-royal lift
main-royal mast
main-royal stay
main-royal staysail
main-royal studding sail
main-royal
yard
main-royal-studding-sail boom
main-sheet
main-skysail brace
main-skysail lift
main-skysail mast
main-skysail stay
main-skysail yard
main-top
main-topgallant
main-topgallant brace
main-topgallant lift
main-topgallant mast
main-topgallant sail
main-topgallant stay
main-topgallant studding sail
main-topgallant yard
main-topgallantmast
main-topmast
main-topmast stay
main-topmast staysail
main-topmast studding sail
main-topmast-studding-sail boom
main-topsail
main-topsail lift
main-topsail schooner
main-topsail yard
main-trysail gaff
main-trysail peak halyard
main-trysail rig
main-trysail vang
main-yard

main-yardman
mainstream jazz
maintain a household
maintain clearance
maintain connection
maintain continuity
maintain distance
maintain position
maintain the heading
maintain the highest standards
maintain with your last breath
maintain your perspective
maintained school
maintaining power
maintenance and cure
maintenance bond
maintenance man
maintenance of membership
maintenance
 of your good name
mais oui
maison de sante
maison-dieu
maitre d'
maitre d'hotel
maitre de ballet
maitre dhotel
maize mildew
maize oil
maize smut
maize yellow
maize-eater
majo bitters
majolica dipper
majolica painter
major agglutinins
major axis
major basilica
major chord
major element
major form class
major general
major in
major interval
major key
major league
major medical insurance
major mode

major operation
major operations
major order
major orders
major part
major party
major penalty
major piece
major planet
major poet
major premise
major premiss
major scale
major second
major seminary
major seventh chord
major suit
major surgery
major tenace
major term
major third
major triad
major-domo
major-domos
major-domoship
major-general
major-generalcy
major-generalship
major-league
major-leaguer
majority carrier
majority leader
majority rule
majuscule script
make a North River jibe
make a U-turn
make a bargain
make a bed
make a beeline
make a beginning
make a bequest
make a bet
make
 a bid
make a bid for
make a blind bargain
make a blooper
make a blunder

make a board
make a boast of
make a bold push
make a boner
make a boo-boo
make a break for
make a break for it
make a breakthrough
make a brolly-hop
make a burst of speed
make a buy
make a call
make a cash payment
make a cat's-paw of
make a cautious move
make a chattel of
make a circuit
make a clamor
make a clean breast
make a clean breast of
make a clean sweep
make a close study of
make a comeback
make a commotion
make a comparison
make a compromise
make a critical revision
make a cross-reference
make a dash
make a dash at
make a dash for
make a date
make a dead set against
make a dead set at
make a dead-stick landing
make a deal
make a deal for
make a decision
make a demand
make a dent in
make a determined resistance
make a detour
make a dicker
make a distinction
make a doormat of oneself
make a doormat of yourself
make a face
make a fair copy

make a false step
make a faux pas
make a federal case
make a federal
case of
make a figure
make a fine distinction
make a flight
make a fool of
make a fool of yourself
make a fortune
make a fresh start
make a funny
make a fuss
make a fuss about
make a fuss over
make a generalization
make a getaway
make a go of it
make a good board
make a good end
make a good thing of
make a grab for
make a half board
make a hash of
make a hit
make a hit with
make a hog of yourself
make a hole in
make a household word of
make a journey
make a killing
make a landfall
make a laughingstock of
make a leg
make a light
make a lip
make a liquid sound
make a living
make a long face
make a long story short
make a low bow
make a lucky strike
make a man of
make a mark
make a match
make a memorandum
make a mess of

make a miscue
make a misstep
make a mistake
make a mockery of
make a monkey of
make a monkey of yourself
make a monkey out of
make a motion
make a moue
make a mouth
make a move
make a mow
make a new beginning
make a new man of
make a nice distinction
make a noise
make a noise
 in the world
make a nose dive
make a note
make a parachute jump
make a party to
make a pass
make a pass at
make a passage
make a patsy of
make a pawn of
make a peace offering
make a personal appearance
make a pig of yourself
make a pilgrimage
make a pinch
make a pitch for
make a play for
make a plaything of
make a plea
make a point of
make a practice of
make a precipitate departure
make a prediction
make a present of
make a pretense
make a pretense of
make a pretext of
make a production of
make a prognosis
make a projection
make a promise

make a proof
make a prophecy
make a puppet of
make a purchase
make a quick exit
make a racket
make a radical change
make a raid
make a rebuttal
make a recension
make a reconnaissance
make a regulation
make a report
make a request
make a requisition
make a resolute stand
make a resolution
make a reverence
make a round trip
make a row
make a run
make a run for
make a rush at
make a sacrifice
make a sale
make a scene
make a scoop
make a selection
make
a set at
make a short sale
make a show
make a show of
make a sign
make a signal
make a slow start
make a sound
make a sounding
make a space
make a special effort
make a spectacle of yourself
make a speech
make a spinnaker run
make a splash
make a splurge
make a sport of
make a spurt
make a stab at

make a stand
make a stand against
make a statement
make a stir about
make a strategic withdrawal
make a strong bid for
make a study of
make a subtle distinction
make a success
make a sucker of
make a survey
make a syllabus
make a tentative move
make a thrust at
make a tilt at
make a to-do
make a to-do over
make a touch
make a train
make a trial of
make a trip
make a try
make a virtue of necessity
make a visit
make a whole
make a will
make a wrong step
make a wry face
make a wry face at
make a wry mouth
make accounts square
make acknowledgment
make acknowledgments of
make acquaintance with
make acquainted
make acute
make advances
make after
make agree
make all clear for
make all square
make
allocations
make allowance
make allowance for
make allowances for
make amends
make an adaptation

make an adjustment
make an ado
make an ado about
make an allusion to
make an announcement
make an appearance
make an approximation
make an arrangement
make an arrest
make an ass of
make an ass of yourself
make an assignment
make an attempt
make an auspicious beginning
make an edition
make an effort
make an end of
make an entrance
make an entry
make an estimation
make an example of
make an exit
make an expedition
make an experiment
make an idol of
make an impact upon
make an impression
make an improvement
make an incursion
make an inroad
make an intrusion
make an investment
make an irruption into
make an obeisance
make an offer
make an opening
make an outcry
make an overture
make an uproar
make and break
make angry
make answer
make anxious
make apology for
make application
make arrangements
make arrangements for
make as if

make as though
make assignments
make assurance double sure
make at
make
 attentive
make available
make available to all
make away
make away with
make bad weather
make believe
make better
make bite the dust
make black
make blind
make blood flow freely
make blue
make bold
make bold to
make bold to ask
make bold with
make bones about
make bones of
make book
make both ends meet
make bricks without straw
make businesslike
make capital of
make capital out of
make ceramics
make certain
make choice of
make clear
make cold
make comfortable
make common cause
make common cause with
make compensation
make complex
make concave
make concessions
make conditional
make confession
make conform
make connection
make contact with
make contingent

make conversation
make court to
make delivery
make dependent
make dispositions for
make dissimilar
make distinctions
make do
make do with
make doubt
make drunk
make ducks and drakes of
make due provision for
make dutiable
make economies
make elastic
make electric
make ends meet
make every effort
make expiation
make explosive noise
make
eyes at
make fair promise
make fair weather
make false pretenses
make fast
make for
make for health
make foul water
make four
make free
make free of
make free with
make friends with
make fun
make fun of
make game of
make go
make goo-goo eyes at
make good
make good time
make good use of
make good weather
make good your escape
make good your promise
make good your word
make grandiloquent

make graphics
make grieve
make grow
make happy
make haste
make haste slowly
make hay
make hay of
make hay while the sun shines
make head
make head against
make headway
make heavy weather
make heavy weather of it
make her number
make holiday
make hopeless
make hot
make hot under the collar
make human
make ill-humored
make immortal verse
make imperative
make impossible
make incumbent
make innovations
make inquiry
make inquisition
make it
make it a condition
make it clear
make it felt
make it hot for
make it quick
make it snappy
make it so
make it tough for
make it up
make it up to
make it with
make it
 your business
make its appearance
make justice prevail
make knots
make known
make land
make larger

make late
make laws
make leeway
make legal
make legal and binding
make legendary
make lie down and roll over
make lie down and turn over
make light
make light of
make lighter
make like
make likely
make liquor
make little of
make love
make mad
make magnetic
make mandatory
make matters up
make mention of
make merry
make merry with
make mincemeat of
make money
make money by
make more acute
make more likely
make more than one
make more than you
make mountains out of molehills
make much ado about
make much ado about nothing
make much of
make music
make nervous
make no bones about
make no bones about it
make no doubt
make no mistake
make no provision
make no scruple of
make no sign
make nothing of
make obeisance
make obligatory
make of
make off

make off with
make one
make one easy
make one tremble
make one's blood run cold
make one's flesh creep
make one's hair stand on end
make one's teeth chatter
make
 oneself heard
make out
make out a case
make out a report
make out like
make out with
make over
make overtures
make parallel
make parts
make pay through the nose
make peace
make perfect
make place
make plain
make plates
make pleasant
make pliant
make plumb
make port
make possible
make precise
make preparations
make prints
make probable
make profit
make progress
make progress against
make propitiation
make proud
make provision for
make public
make purple
make putty of
make quits
make rapid strides
make ready
make red
make redundant

make reference to
make reparation
make reprisal
make requisition
make requital
make reservations
make restitution
make retribution
make right
make right prevail
make room
make round
make sacrifice to
make sad
make sad work of
make safe
make sail
make sea room
make secure
make semitransparent
make sense
make sensitive
make shift
make short work of
make sit up and beg
make small
make smell like roses
make so bold as to
make soft
make someone see stars
make
 sore
make space
make special
make staccato sounds
make sternway
make strides
make suit to
make supplication
make sure
make sure against
make sure of
make talk
make terms
make the air blue
make the best of
make the best of a bad bargain
make the best of it

make the best of your time
make the best of your way
make the butt of your humor
make the chips fly
make the dust fly
make the eagle scream
make the eyes water
make the flesh crawl
make the flesh creep
make the fur fly
make the grade
make the mind a blank
make the most of
make the most of it
make the most of your time
make the mouth water
make the round of
make the rules
make the scene
make the sign of the cross
make the sign of the cross over
make the sign of the cross upon
make the sparks fly
make the supreme sacrifice
make the welkin ring
make the worst of
make things hum
make threads
make time
make time stand still
make tired
make too much of
make tough
make toward
make toxic
make tracks
make tributary
make trouble
make uncertain
make
 unfeeling
make uniform
make unintelligible
make unique
make up
make up accounts
make up for
make up for lost time

make up leeway
make up to
make up your mind
make use of
make vertical
make viscid
make void
make war
make war on
make water
make waves
make way
make way for
make way into
make welcome
make whoopee
make with
make worse
make you a
make you a compliment
make you fed-up
make you feel at home
make you feel welcome
make you jump out of his skin
make you puke
make you retch
make you say 'uncle'
make you see
make you see double
make you shit your pants
make you shudder
make you sick
make you sick in the stomach
make you sick to the stomach
make you sing small
make you sit up and take notice
make you stare
make you tiddly
make you tired
make you tremble
make you vomit
make young
make your adieus
make your appearance
make your bed
make your bed and lie on it
make your blood boil
make your blood run

make your blood run cold
make your bow
make your business
make your case
make
your cause your own
make your choice
make your compliments to
make your debut
make your escape
make your exit
make your field
make your flesh creep
make your fortune
make your hair stand on end
make your head reel
make your head revolve
make your head spin
make your head swim
make your head whirl
make your heart bleed
make your home
make your keep
make your mark
make your mouth water
make your move
make your nerves tingle
make your oath
make your own
make your own way
make your peace
make your pile
make your point
make your rounds
make your salutations
make your skin crawl
make your teeth chatter
make your voice heard
make your way
make your way to
make yourself acquainted with
make yourself at home
make yourself comfortable
make yourself conspicuous
make yourself easy about
make yourself easy on that score
make yourself felt
make yourself heard

make yourself master of
make yourself part of
make yourself scarce
make yourself understood
make-
make-ado
make-belief
make-believe
make-do
make-faith
make-falcon
make-fire
make-fray
make-game
make-hawk
make-king
make-law
make-mirth
make-or-break
make-out
artist
make-peace
make-ready
make-shame
make-sport
make-talk
make-up
make-way
make-weight
make-work
maker's mark
maker-off
maker-up
makes of
makes you shiver
makeup artist
makeup man
making a clean breast
making a leg
making a part of
making again
making amends
making an end
making blind
making certain
making distinctions
making do
making foolish

making good
making iron
making it with
making light
making no bones about it
making once more
making over
making ready
making right
making scenes
making soft
making up
making way
making yourself scarce
making-up
making-up day
making-up price
mako shark
mal a propos
mal de mer
mal de pinto
mal du pays
mal-
mal-entendu
mal-observation
mala fide
mala fides
malac-
malacca cane
malachite green
malaco-
malade imaginaire
maladie du pays
maladjusted personality
malar bone
malarial fever
malayo-
male alto
male animal
male bamboo
male being
male
cat
male chauvinism
male chauvinist
male chauvinist pig
male fern
male gamete

male line
male organs
male person
male rhyme
male servant
male sex
male turkey
male-
male-sterile
maleic acid
maleic hydrazide
malevolent influence
malgre soi
malic acid
malice aforethought
malice prepense
malicious defamation
malicious gossip
malicious mischief
malicious parody
malignant catarrh
malignant catarrhal fever
malignant granuloma
malignant growth
malignant hypertension
malignant lymphoma
malignant pustule
malignant tumor
malleable cast iron
malleable iron
mallee bird
mallee fowl
mallee root
malleh bug
mallow family
mallow pink
mallow rose
mallow rust
mallow tree
malm rock
malonic acid
malonic ester
malonyl group
malonyl radical
maloo climber
malpighian layer
malpighian tube
malpractice insurance

malt extract
malt house
malt liquor
malt sugar
malt vinegar
malt whiskey
malt whisky
malt-dust
malt-horse
malt-house
malt-worm
malta fever
malted milk
maltese cat
maltese cross
malum in se
mama's boy
mamma's
boy
mammary gland
mammato-cumulus
mammee apple
mammee colorado
mammee sapota
mammoth tree
mammy coot
mammy wagon
mamori katana
man Friday
man about town
man after your own heart
man alive
man and boy
man and wife
man and woman
man ape
man engine
man fish
man friday
man from Mars
man fungus
man higher up
man hunt
man hunter
man in the moon
man in the street
man jack
man lock

man midwife
man mountain
man of God
man of action
man of all work
man of commerce
man of courage
man of deeds
man of experience
man of few words
man of genius
man of good will
man of his word
man of honor
man of influence
man of intellect
man of iron
man of learning
man of letters
man of mark
man of means
man of men
man of mettle
man of note
man of old
man of parts
man of property
man of science
man of straw
man of substance
man of taste
man of the cloth
man of the house
man of the people
man of the world
man of wealth
man of wisdom
man on the flying trapeze
man on the make
man overboard
man power
man the
garrison
man tiger
man with hair on his chest
man without a country
man's best friend
man's estate

man-abhorring
man-about-town
man-at-arms
man-back
man-bearing
man-begot
man-bodied
man-born
man-brute
man-carrying
man-catching
man-centered
man-changed
man-child
man-compelling
man-created
man-day
man-days
man-degrading
man-destroying
man-devised
man-devouring
man-eater
man-eating
man-eating shark
man-enchanting
man-enslaved
man-fashion
man-fearing
man-for-man defense
man-forked
man-god
man-grown
man-handle
man-hater
man-hating
man-headed
man-high
man-hole
man-hour
man-hunter
man-keen
man-killer
man-killing
man-made
man-maiming
man-making
man-midwife

man-midwifery
man-milliner
man-mimicking
man-minded
man-minute
man-o'-war
man-o'-war bird
man-of-the-earths
man-of-war
man-of-war bird
man-of-war fish
man-of-war's man
man-orchis
man-pleasing
man-record chart
man-ridden
man-servant
man-shaped
man-size
man-sized
man-sized job
man-sized meal
man-stalking
man-subduing
man-supporting
man-tailored
man-taught
man-to-man
man-to-man
defense
man-trap
man-woman
man-worshiping
man-worthiness
man-worthy
man-year
manage somehow
manage the price of
manage to
manage with
manage yourself
manageable price
managed currency
managed price
managed prices
management accounting
management consultant
management consulting

management engineering
management information system
management share
management theory
management trust
managing director
managing editor
mancona bark
mandarin duck
mandarin orange
mandated territory
mandatory injunction
mandatory primary
mandatory referendum
mandelic acid
mandibulo-
mandibulo-auricularis
mando-bass
mando-cello
mandrel lathe
mandrel press
maned wolf
manettia vine
maneuver tactics
maneuvering room
maneuvering space
mangabeira rubber
mangan-
manganese bronze
manganese brown
manganese dioxide
manganese epidote
manganese heptoxide
manganese oxide
manganese sesquioxide
manganese spar
manganese steel
manganese sulfate
manganese tetroxide
manganese velvet brown
manganese
violet
manganic acid
manganous sulfate
mange mite
mange-mange
mangel-wurzel
manger board

manger son ble en herbe
mangle operator
mangle rack
mangle wheel
mango anthracnose
mango bird
mango fish
mango ginger
mango melon
mango-squash
mangold fly
mangold-wurzel
mangrove catechu
mangrove cuckoo
mangrove family
mangrove mullet
mangrove skipper
mangrove snapper
mangum terrace
manhood suffrage
mania a potu
maniacal excitement
manic condition
manic state
manic-depressive
manic-depressive psychosis
manicoba rubber
maniere criblee
manifest content
manifest destiny
manifest itself
manifest yourself
manifold paper
manifold pressure gauge
manila grass
manila hemp
manila paper
manipulate the market
manipulated market
manipulated variable
manipulative surgery
manlike types
manly art of self-defense
manly vigor
mann tree
mann-
manna ash
manna from heaven

manna grass
manna gum
manna in the wilderness
manna insect
manna lichen
manna sugar
manna-croup
manned rocket
manned station
manner of articulation
manner
 of being composed
manner of speaking
manner of working
manners of cooking
mannish bob
mannish female
mannish wavy shingle
mannitol hexanitrate
manometer pressure
manor farm
manor house
manor manege
manor-house
manrope knot
mansard roof
mansion house
mansion-house
mansions in the sky
manstopping bullet
manta ray
mantel shelf
mantel-tree
mantis crab
mantis shrimp
mantle cavity
mantle of snow
mantle rock
mantle yourself with
mantle-rock
mantled in darkness
mantoux test
manual alphabet
manual art
manual arts school
manual control
manual labor
manual of instruction

manual training
manubial column
manufactured gas
manufacturer's agent
manufacturing center
manufacturing lathe
manufacturing plant
manufacturing quarter
manufacturing town
manure pile
manx cat
many a time
many a time and oft
many and various
many irons in the fire
many thanks
many times
many times over
many-
many-acred
many-angled
many-armed
many-banded
many-beaming
many-belled
many-bleating
many-blossomed
many-blossoming
many-branched
many-breasted
many-celled
many-chambered
many-cobwebbed
many-colored
many-coltered
many-cornered
many-eared
many-eyed
many-faced
many-facedness
many-faceted
many-flowered
many-folded
many-formed
many-fountained
many-gifted
many-handed
many-headed

many-headed
multitude
many-headedness
many-horned
many-hued
many-jointed
many-knotted
many-languaged
many-lay
many-leaved
many-legged
many-lived
many-lobed
many-meaning
many-millioned
many-minded
many-mingled
many-mingling
many-mouthed
many-named
many-nationed
many-nerved
many-one
many-parted
many-peopled
many-petaled
many-pigeonholed
many-pillared
many-pointed
many-ranked
many-rayed
many-ribbed
many-rooted
many-rowed
many-seated
many-seatedness
many-seeded
many-sided
many-sidedness
many-sounding
many-spangled
many-spotted
many-steepled
many-stemmed
many-storied
many-stringed
many-syllabled
many-tailed

many-tinted
many-toned
many-tongued
many-towered
many-tribed
many-tubed
many-twinkling
many-valued
many-valued logic
many-valved
many-veined
many-voiced
many-wandering
many-weathered
many-winding
many-windowed
many-wintered
many-yeared
map
 lichen
map maker
map making
map out
map projection
map reader
map reading
map turtle
maple ash
maple borer
maple eye
maple family
maple scale
maple sirup
maple sugar
maple syrup
maple syrup urine disease
maple worm
maple-faced
maple-leaved
mar-
mar-hawk
marabou stork
maraging steel
marang nut
maraschino cherries
maraschino cherry
marathon race
marble cake

marble cork
marble flower
marble thrush
marble-arched
marble-breasted
marble-calm
marble-checkered
marble-colored
marble-constant
marble-covered
marble-faced
marble-grinding
marble-hard
marble-imaged
marble-looking
marble-minded
marble-mindedness
marble-pale
marble-paved
marble-piled
marble-pillared
marble-polishing
marble-quarrying
marble-ribbed
marble-sculptured
marble-topped
marble-white
marbled paper
marc de Burgogne
marcel wave
march against
march away
march in double-quick time
march in quick time
march of events
march
 of time
march off
march on
march out
march out of step
march past
march stone
march tempo
march under the banner of
march up to the cannon's mouth
march upon
march with

march-land
march-man
march-past
marche aux puces
marching orders
marchioness-ship
marconi rig
mardi gras
mare clausum
mare liberum
mare nostrum
mare's nest
mare's tail
mare's-nest
mare's-tail
mare-rode
marechal niel
mares of Diomedes
margaric acid
margate fish
margin draft
margin line
margin of lift
margin of power
margin purchaser
margin up
marginal affair
marginal land
marginal man
marginal matter
marginal note
marginal sea
marginal utility
margined securities
maria theresa dollar
mariage de convenance
marigold finch
marigold window
marigold yellow
marijuana cigarette
marijuana smoker
marine animal
marine animals
marine barometer
marine belt
marine biology
marine blue
marine chronometer

marine corps
marine engine
marine engineer
marine engineering
marine glue
marine green
marine insurance
marine ivy
marine league
marine
 painter
marine painting
marine railway
marine shell
marine soap
marine store
marine superintendent
marine travel
marine-finish
mariner's chart
mariner's compass
mariposa lily
marital affinity
marital faithfulness
marital fidelity
marital relations
maritime belt
maritime law
maritime reconnaissance plane
marjoram oil
mark boundaries
mark degree
mark down
mark lodge
mark of Cain
mark of office
mark of signature
mark off
mark out
mark out a course
mark out for
mark paid
mark the interface
mark the periphery
mark the time
mark time
mark tooth
mark up

mark with a red letter
mark-on
mark-up
marked down
marked resemblance
marked with the crow's foot
marker beacon
marker buoy
marker-down
marker-off
marker-out
markers-off
market analysis
market analyst
market bleach
market boat
market crab
market cross
market expansion
market garden
market gardener
market gardening
market hunter
market index
market keeper
market letter
market mammy
market order
market overt
market penny
market place
market
 pot
market price
market research
market town
market value
market, the
market-ripe
marketable securities
marketing research
marking caliper
marking cotton
marking gage
marking gauge
marking hammer
marking hatchet
marking ink

marking iron
marking knife
marking nut
marking stitch
marking the occasion
marl grass
marl-pit
marlin swordfish
marline-spike
marlinespike fish
marlinespike hitch
marlinespike seamanship
marling hitch
marmalade box
marmalade plum
marmalade tree
marmoreal repose
marmot squirrel
marnean epoch
maroon red
marquise rose
marquoise scale
marram grass
marriage act
marriage bed
marriage brokage
marriage broker
marriage ceremony
marriage chest
marriage connection
marriage contract
marriage counselor
marriage deities
marriage encounter
marriage flight
marriage god
marriage goddess
marriage guidance
marriage license
marriage of convenience
marriage portion
marriage proposal
marriage relationship
marriage sacrament
marriage settlement
marriage song
marriage vow
marriage-bed

married
couple
married love
married man
married name
married print
married state
married status
married woman
marron glace
marrons glac
marrow bean
marrow cabbage
marrow pea
marrow squash
marry into
marry off
marsh andromeda
marsh bent
marsh blackbird
marsh bluebill
marsh buck
marsh cress
marsh crocodile
marsh deer
marsh elder
marsh fern
marsh fever
marsh five-finger
marsh foxtail
marsh gas
marsh grass
marsh harrier
marsh hawk
marsh hen
marsh mallow
marsh marigold
marsh parsley
marsh pea
marsh peep
marsh pennywort
marsh pine
marsh pink
marsh plover
marsh purslane
marsh quail
marsh rabbit
marsh robin

marsh rosemary
marsh samphire
marsh shield fern
marsh speedwell
marsh spike grass
marsh spot
marsh stitchwort
marsh tea
marsh tern
marsh tit
marsh titmouse
marsh treader
marsh trefoil
marsh turnip
marsh vetchling
marsh violet
marsh warbler
marsh watercress
marsh wren
marsh-mallow
marshal your ideas
marshal your thoughts
marshal's baton
marshalling yard
marsupial mole
marsupial mouse
martello
 tower
martial arts
martial law
martial music
martial spirit
martin snipe
martingale backrope
martingale boom
marumi kumquat
marvel-of-Peru
mary jane
mary magdalene
mascarene grass
mascot blue
masculine caesura
masculine ending
masculine rhyme
masculo-
mash machine
mash note
mash tun

mash up
mash weld
mashie iron
mashie niblick
mask microphone
mask of death
mask stop
masked ball
masking piece
masking tape
mason bee
mason jar
mason moth
mason spider
mason wasp
mason's line
mason's lung
mason-dixon line
masquerade as
masquerade ball
masquerade party
mass action
mass attack
mass card
mass defect
mass destruction
mass energy
mass in
mass leave
mass man
mass market
mass media
mass meeting
mass movement
mass murder
mass noun
mass number
mass observation
mass observer
mass of the presanctified
mass production
mass ratio
mass reflex
mass spectrograph
mass spectrography
mass spectrometer
mass spectrometry
mass spectroscope

mass spectroscopy
mass spectrum
mass suicide
mass unit
mass-book
mass-energy
mass-energy
 equation
mass-fiber
mass-house
mass-luminosity law
mass-minded
mass-mindedness
mass-monger
mass-penny
mass-priest
mass-produce
mass-produced
mass-word
masses of
massor mass
massy-proof
mast ball
mast band
mast brown
mast cell
mast clamp
mast cloth
mast cover
mast funnel
mast hasp
mast hoop
mast house
mast lining
mast partner
mast ring
mast track
mast tree
mast-
mast-fed
mast-head
master alloy
master bedroom
master builder
master carpenter
master chief petty officer
master chord
master clock

master compass
master control desk
master controller
master craftsman
master cylinder
master film
master gauge
master gunner
master hand
master key
master leaf
master map
master mariner
master mason
master matrix
master mechanic
master of
master of ceremonies
master of foxhounds
master of style
master of the house
master of the revels
master of the rolls
master of the situation
master plan
master race
master rod
master screw
master sergeant
master shifter
master spirit
master spirit
of the age
master spring
master stroke
master switch
master tap
master touch
master wheel
master workman
master your feelings
master yourself
master's degree
master's degree candidate
master's gown
master's oral
master-at-arms
master-builder

master-hand
master-key
master-mason
master-singer
master-slave manipulator
master-stroke
master-vein
master-work
masters-at-arms
mastery of skills
masthead angle
masthead compass
mastic tree
mastiff bat
masting house
masto-
mastodon locomotive
mastoid cell
mastoid process
mat bean
mat burn
mat cane
mat finish
mat of hair
mat rush
mat-covered
mat-forming
mat-ridden
mat-roofed
mata-mata
matc-maker
match coins
match cord
match data
match findings
match frame
match game
match hook
match in the powder barrel
match joint
match lining
match pipe
match plane
match plate
match play
match point
match race
match rifling

match rope
match stamp
match tub
match up with
match wheel
match yourself against
match-board
match-lined
matchbox bean
matched order
matching
 machine
matching pair
matching plane
matching set
matchless discordant
mate gourd
mateo-
mater dolorosa
mater lectionis
mater of fact
materia medica
material assets
material basis
material body
material cause
material costs
material culture
material fallacy
material grounds
material logic
material means
material part
material point
material resources
material thing
material things
material wealth
material world
materials handling
maternal ancestor
maternal love
maternity benefit
maternity hospital
maternity insurance
maternity ward
mathematical elements
mathematical expectation

mathematical induction
mathematical linguistics
mathematical logic
mathematical notation
mathematical physicist
mathematical physics
mathematical point
mathematical precision
mathematical probability
mathematically exact
mathematically probable
mathematico-
mathematico-logical
mathematico-physical
matilija poppy
matin song
matinee idol
matinee race
matinee racing
mating call
mating cry
mator mate
matr-
matre
d'htel
matre d'htel butter
matri-
matricaria camphor
matrimonial agency
matrimonial agent
matrimonial bureau
matrimonial union
matrimony vine
matrix algebra
matrix mechanics
matrix paper
matrix sentence
matron of honor
matron of honour
matron-like
matt weave
matte shot
matted hair
matter in deed
matter in hand
matter informalism
matter informalist
matter little

matter of chance
matter of concern
matter of course
matter of fact
matter of ignorance
matter of importance
matter of indifference
matter of interest
matter of law
matter of life and death
matter of life or death
matter of necessity
matter of no consequence
matter of no importance
matter of record
matter painting
matter waves
matter-of
matter-of-course
matter-of-fact
matter-of-factly
matter-of-factness
matters in hand
matters of importance
mattress type
matura diamond
mature age
mature belief
mature judgment
mature man
mature thought
mature woman
matutinal epilepsy
matzo ball soup
matzo balls
matzo meal
matzoth baker
maundy thursday
mauvais
 quart d'heure
mauvais sujet
mauvaise honte
mauve blush
mauve decade
maxillo-
maximal ideal
maximum dissemination
maximum likelihood

maximum modulus principle
maximum speed
maximum thermometer
maximum-security prison
may I
may day
may duke
may it please you
may queen
may tree
may-apple
may-bug
may-bush
may-butter
may-day
may-dew
may-flowering tulip
may-fly
may-game
may-lady
may-lord
may-woon
mayfair tan
mayor-elect
mazal tov
maze-gane
mazel tov
mazer tree
mcm1io n9p8y9r Iilglhut
me-too
me-tooism
me-ward
mea culpa
meadow anemone
meadow barley
meadow beauty
meadow bell
meadow bird
meadow brook
meadow brown
meadow cabbage
meadow campion
meadow chicken
meadow chickweed
meadow clover
meadow crake
meadow cress
meadow crocus

meadow crowfoot
meadow cup
meadow death camass
meadow fern
meadow fescue
meadow foxtail
meadow gowan
meadow grass
meadow grasshopper
meadow green
meadow hen
meadow land
meadow lark
meadow lily
meadow moor
meadow mouse
meadow mushroom
meadow mussel
meadow nematode
meadow
nuts
meadow nymph
meadow orchis
meadow ore
meadow parsnip
meadow pea
meadow peat
meadow pine
meadow pink
meadow pipit
meadow queen
meadow reed grass
meadow rice grass
meadow rue
meadow saffron
meadow sage
meadow salsify
meadow saxifrage
meadow scabish
meadow snipe
meadow soft grass
meadow sorrel
meadow spear grass
meadow titling
meadow vetchling
meadow vole
meadow-beauty family
meadow-brown

meadow-sweet
meadows and pastures
meager diet
meaking iron
meal beetle
meal moth
meal offering
meal pennant
meal plum
meal snout moth
meal ticket
meal worm
mealie meal
mealy bellwort
mealy bug
mealy-back
mealy-mouthed
mealy-mouthedness
mean anomaly
mean business
mean calorie
mean deviation
mean deviation from the mean
mean distance
mean free path
mean latitude
mean life
mean line
mean mind
mean much
mean noon
mean nothing
mean planet
mean sea level
mean semitone
mean solar day
mean solar time
mean square
mean square deviation
mean sun
mean time
mean to
mean to imply
mean to say
mean to suggest
mean
 value
mean value theorem

mean well
mean what you say
mean while
mean wretch
mean-acting
mean-conditioned
mean-dressed
mean-looking
mean-minded
mean-souled
mean-spirited
mean-spiritedly
mean-spiritedness
mean-square error
mean-time clock
mean-tone tuning
mean-witted
meander belt
meander line
meandering stream
means of access
means of carrying
means of conveyance
means of dealing
means of production
means of transporting
means test
means to an end
meantone system
measles vaccine
measure against
measure depth
measure for measure
measure line
measure of my days
measure off
measure out
measure signature
measure swords
measure swords with
measure time
measure up
measure up to
measure your length
measure zero
measurement cargo
measurement of variables
measurement ton

measuring cup
measuring device
measuring glass
measuring machine
measuring rod
measuring stick
measuring wheel
measuring worm
meat ax
meat block
meat breakfast
meat by-product
meat chopper
meat cleaner
meat eater
meat
fly
meat grinder
meat loaf
meat market
meat offering
meat packer
meat pie
meat preserver
meat saw
meat slicer
meat stew
meat tea
meat thermometer
meat-eater
meat-eating
meat-fed
meat-hungry
meat-packing
meato-
mechan-
mechanic's lien
mechanical advantage
mechanical aid
mechanical aptitude
mechanical arts
mechanical binding
mechanical bird
mechanical device
mechanical drawing
mechanical engineer
mechanical engineering
mechanical equivalent of heat

mechanical heart
mechanical impedance
mechanical instrument
mechanical man
mechanical means
mechanical metallurgy
mechanical piano
mechanical refrigeration
mechanical suspension
mechanical telephone
mechanical tissue
mechanical twin
mechanical vector
mechanical wave
mechanically precise
mechanico-
mechanized warfare
medaddy-bush
medal bronze
medal chief
medal for merit
medal of freedom
medal of honor
medal play
medal winner
meddle with
meden agan
medi-
media campaign
medial condyle
medial strip
median strip
mediastino-pericardial
mediastino-pericarditis
mediastinum
testis
mediated generalization
medical Greek
medical aid
medical and surgical instruments
medical attendant
medical attention
medical care
medical center
medical certificate
medical corps
medical diagnosis
medical diathermy

medical dressing
medical ethics
medical examination
medical examiner
medical history
medical instrument
medical jurisprudence
medical jury
medical man
medical practice
medical practitioner
medical prognosis
medical school
medical treatment
medicinal herbs
medicinal leech
medicinal oil
medicine animal
medicine bag
medicine ball
medicine case
medicine chest
medicine dance
medicine dropper
medicine glass
medicine lodge
medicine man
medicine monger
medicine shop
medicine show
medicine tree
medicine wolf
medico-
medico-legal medicine
medieval latin
medieval literature
medieval mode
medio-
medio-passive
meditate over
meditate upon
mediterranean flour moth
mediterranean fruit fly
medium artillery
medium bomber
medium frequency
medium of exchange
medium

of transportation
medium quarto
medium shot
medium wave
medium-dated
medium-rare
medium-sized
medley cloth
medley of colors
medley race
medley relay
medulla oblongata
medulla oblongatas
medullae oblongatae
medullary ray
medullary sheath
medusa bud
medusa's head
meed of praise
meek soul
meek-browed
meek-eyed
meek-eyed Morn
meek-minded
meek-spirited
meerschaum enameler
meet a bet
meet adversity
meet an obligation
meet and right
meet around the conference table
meet boldly
meet eyeball to eyeball
meet face to face
meet halfway
meet hand-to-hand
meet head-on
meet her
meet one's end
meet requirements
meet squarely
meet the expense of
meet the eye
meet the gaze
meet up with
meet with
meet with a loss
meet with approval

meet with attention
meet with foul play
meet with success
meet you at every turn
meet your Maker
meet your Waterloo
meet your committments
meet your death
meet your fate
meet your obligations
meet your wishes
meeting house
meeting of minds
meeting place
meeting rail
meeting-house
meeting-place
meetone's
end
meetyour end
mega-
megal-
megalithic tomb
megalo-
megaloblastic anaemia
megavolt-ampere
megawatt-hour
mein Herr
meiwa kumquat
melamine resin
melan-
melancholia attonita
melancholia hypochrondriaca
melancholia religiosa
melano-
melanocyte-stimulating hormone
melba toast
melegueta pepper
melic grass
melic poetry
melilite-basalt
mell-doll
mell-supper
mellow wisdom
mellow-breathing
mellow-colored
mellow-deep
mellow-eyed

mellow-flavored
mellow-lighted
mellow-looking
mellow-mouthed
mellow-ripe
mellow-tasted
mellow-tempered
mellow-toned
melodic interval
melodic line
melodic minor
melodic minor scale
melody part
melon aphid
melon apple
melon beetle
melon cactus
melon caterpillar
melon fly
melon foot
melon loco
melon louse
melon moth
melon pear
melon seed
melon shell
melon shrub
melon thistle
melon tree
melon worm
melon-bulb
melon-faced
melon-formed
melon-laden
melon-leaved
melon-shaped
melon-yellow
melt away
melt down
melt in tears
melt in the air
melt into
melt
into one
melt like snow
melt the heart
melting mood
melting point

melting pot
melton cloth
mem-sahib
member bank
member in good standing
member of the bar
member of the human race
member of the intelligentsia
members in Christ
members of the bar
membrana propria
membrana serosa
membrana tympana
membrane bone
membraneous labyrinth
membranous labyrinth
memento mori
memo book
memorandum book
memorandum head
memoria in aeterna
memoria technica
memorial arch
memorial column
memorial day
memorial park
memorial record
memorial rose
memorial statue
memorial stone
memorial tablet
memory bank
memory book
memory circuit
memory gap
memory like a sieve
memory obstruction
memory root
memory span
memory trace
memory training
memory tubes
memory verse
memory-trace
men's chorus
men's clothing
men's lounge
men's magazine

men's room
men's wear
men's-wear shop
men-
men-at-arms
men-children
men-folk
men-of-the-earth
men-of-war
menace to health
menage a trois
menage man
mend sail
mend the furl
mend your
 fences
mend your manners
mend your ways
mendel's law
mendicant friar
mendicant order
mendoza beaver
menhaden boat
menhaden oil
mening-
meningo-
meningo-osteophlebitis
meno mosso
meno-
menopausal arthritis
mens rea
mens sana in corpore sano
menstrual discharge
menstrual epact
menstrual epilepsy
menstrual equation
menstrual flow
menstrual flux
mensural music
mensural notation
mental acquisitiveness
mental act
mental age
mental alertness
mental alienation
mental association
mental attitude
mental balance

mental blankness
mental blindness
mental block
mental body
mental capacity
mental case
mental chemistry
mental climate
mental composure
mental confusion
mental cruelty
mental cultivation
mental culture
mental defectiveness
mental deficiency
mental derangement
mental disease
mental disorder
mental dissociation
mental distress
mental disturbance
mental effort
mental equilibrium
mental exercise
mental faculty
mental fatigue
mental genius
mental giant
mental grasp
mental handicap
mental healer
mental
healing
mental health
mental home
mental hospital
mental hygiene
mental illness
mental image
mental impression
mental instability
mental institution
mental labor
mental linking
mental object
mental outlook
mental philosophy
mental picture

mental poise
mental presentation
mental process
mental prominence
mental ratio
mental representation
mental reservation
mental retardation
mental set
mental shock
mental sickness
mental strain
mental subnormality
mental symptom
mental telepathist
mental telepathy
mental test
mental topography
mental void
mental weakness
mentally blind
mentally defective
mentally defective personality
mentally deficient
mentally handicapped
mentally ill
mentally retarded
mentally sick
mentally sound
menteur a triple etage
menthane group
mention confidentially
mention in passing
mention privately
mention to
mentioned in dispatches
mento-
menue viande
meperidine hydrochloride
mer-
mercantile agency
mercantile business
mercantile economy
mercantile law
mercantile
 marine
mercantile paper
mercantile system

mercapto group
mercapto radical
mercapto-
mercator projection
merchant adventurer
merchant bank
merchant banker
merchant flag
merchant fleet
merchant guild
merchant marine
merchant navy
merchant prince
merchant ship
merchant venturer
merchant-adventurer
merchant-tailor
merchant-venturer
merci beaucoup
mercur-
mercurial barometer
mercurial mind
mercurial ointment
mercurial telescope
mercuric chloride
mercuric oxide
mercuric subsulfate
mercuric sulfide
mercuric sulphide
mercurous chloride
mercury arc
mercury barometer
mercury bath
mercury bichloride
mercury boiler
mercury cell
mercury chloride
mercury cyanide
mercury dichloride
mercury fulminate
mercury iodide
mercury lamp
mercury mass
mercury oxide
mercury perchloride
mercury poisoning
mercury subchloride
mercury sulfide

mercury sulphide
mercury switch
mercury thiocyanate
mercury weed
mercury-arc lamp
mercury-arc rectifier
mercury-discharge lamp
mercury-vapor detector
mercury-vapor lamp
mercury-vapor
tube
mercury-vapor turbine
mercury-vapour lamp
mercy flight
mercy killer
mercy killing
mercy seat
mercy stroke
mercy-seat
mere caricature
mere chance
mere child
mere child's play
mere counterfeit
mere existence
mere externals
mere facade
mere farce
mere few
mere hint
mere noise
mere nothing
mere notion
mere rhetoric
mere scratch
mere shadow
mere show
mere skin and bones
mere subsistence
mere talk
mere theory
mere things
mere tropism
mere wreck
merely exist
merely glimpsed
merely nominal
merely surface

merge in
merge into
meridian angle
meridian circle
meridian of life
meridian section
merit badge
merit rate
merit system
merit-monger
mermaid weed
mermaid's purse
mero cabrilla
mero-
merocrine gland
meromorphic function
merry as a cricket
merry as a grig
merry chase
merry dancers
merry man
merry men
merry-andrew
merry-andrewism
merry-andrewize
merry-eyed
merry-faced
merry-go-round
merry-hearted
merry-make
merry-making
merry-meeting
merry-minded
merry-singing
merry-smiling
merry-totter
mes-
mescal
 bean
mescal button
mescal buttons
mescal maguey
mesh bag
mesh connection
mesh knot
meshing-spur gear
mesityl oxide
mesmeric sleep

mesne lord
meso-
mesoxalyl-urea
mesquite grass
mesquite gum
mess about
mess about with
mess around
mess around with
mess beef
mess call
mess gear
mess hall
mess in
mess jacket
mess kit
mess pork
mess sergeant
mess steward
mess up
mess with
mess-john
mess-up
message carrier
message stick
message-bearer
messed up
messed-up
messenger RNA
messenger bird
messenger cable
messenger of God
messenger wire
messiah religion
messing around
meta-
meta-toluidine
metabolic disease
metabolic diseases
metabolic heat
metabolic pathway
metabolic psychosis
metacentric stability
metacresol purple
metagalactic space
metal age
metal breaker
metal carbonyl

metal casting
metal cloth
metal coloring
metal cut
metal detector
metal foil
metal fouling
metal lath
metal lather
metal leaf
metal paste-up
metal sculpture
metal spraying
metal wood
metal-bearing
metal-bending
metal-boring
metal-bound
metal-broaching
metal-bushed
metal-clad
metal-clasped
metal-cleaning
metal-coated
metal-covered
metal-cutting
metal-decorated
metal-drilling
metal-drying
metal-edged
metal-embossed
metal-forged
metal-framed
metal-free
phthalocyanine
metal-grinding
metal-jacketed
metal-lined
metal-lithography
metal-melting
metal-perforating
metal-piercing
metal-shaping
metal-sheathed
metal-slitting
metal-slotting
metal-studded
metal-testing

metal-tipped
metal-trimming
metallic bond
metallic conduction
metallic luster
metallic soap
metallic thermometer
metallic wood-boring beetle
metallo-
metallo-organic
metallurgical chemistry
metallurgical engineer
metallurgical engineering
metallurgical microscope
metamict substance
metamorphic cycle
metamorphic rock
metanil yellow
metaphorical meaning
metaphorical sense
metaphosphoric acid
metaphysical idealism
metaphysical poetry
metaphysico-
metastable state
metastatic inflammation
metastatic tumor
mete out
mete out to
meteor crater
meteor dust
meteor
 dust impacts
meteor shower
meteor swarm
meteor trail
meteor train
meteoric particles
meteoric shower
meteoric success
meteorological instrument
meteorological reconnaissance
meteorological tower
meter angle
meter fixer
meter maid
meter rate
meter relay

meter-ampere
meter-candle
meter-candle-second
meter-kilogram
meter-kilogram-second
meter-millimeter
meter-reading
metered mail
metes and bounds
meth-
methacrylate resin
methacrylic acid
methamphetamine hydrochloride
methane series
methanol alcohol
methodical signs
methoxy DDT
methoxy group
methoxy radical
methyl acetate
methyl alcohol
methyl aldehyde
methyl benzene
methyl blue
methyl bromide
methyl cellulose
methyl chloride
methyl chlorocarbonate
methyl chloroformate
methyl cyanide
methyl ester
methyl ether
methyl ethyl ketone
methyl green
methyl group
methyl isobutyl ketone
methyl methacrylate
methyl methane
methyl oleate
methyl orange
methyl phenol
methyl phenyl ether
methyl propyl ketone
methyl radical
methyl red
methyl rubber
methyl

salicylate
methyl styryl ketone
methyl sulfate
methyl violet
methyl yellow
methylacetic acid
methylated spirit
methylated spirits
methylene azure
methylene blue
methylene chloride
methylene dichloride
methylene group
methylene iodide
methylene radical
methylidyne group
methylidyne radical
methylisobutenyl ketone
methylphenylcarbinyl acetate
methylrosaniline chloride
methylthionine chloride
methyltri-nitrob
meticulous attention
meting out
metopon hydrochloride
metr-
metre-candle
metre-kilogram-second
metric carat
metric centner
metric grain
metric hundredweight
metric space
metric system
metric ton
metric topology
metrical accent
metrical foot
metrical form
metrical group
metrical pattern
metrical psalm
metrical unit
metro-
metronome mark
metronomic mark
metropolitan area
metropolitan county

metropolitan district
meum et tuum
mew gull
mew up
mewling infant
mexican hairless
mexican spanish
mezankorrie moth
mezereon family
mezza voce
mezzamine floor
mezzanine floor
mezzanine story
mezzo
 forte
mezzo piano
mezzo staccato
mezzo-mezzo
mezzo-relievo
mezzo-relievos
mezzo-rilievi
mezzo-rilievo
mezzo-soprano
mezzo-soprano clef
mi-
mia mia
mica condenser
mica diorite
mica schist
mice pea
mice pink
michaelmas daisy
miching malicho
mickey finn
mickey mouse
mickle-mouthed
micn1n o9p8y9r iilglhutm
micr-
micro biology
micro-
micro-aerophile
micro-aerophilic
micro-audiphone
micro-form
micro-instrumentation
micro-movie
micro-needle
micro-stress

microcosmic salt
microcytic anemia
microfilm plotter
microfilm reader
microfilm viewer
micrometer caliper
micrometer calliper
micrometer drum
micrometer gauge
micrometer head
micrometer screw
micrometrically precise
microscopic distinction
microwave diathermy
microwave diathermy machine
microwave height finder
microwave linear accelerator
microwave link
microwave mixer
microwave oven
microwave radar
microwave relay station
microwave spectroscope
microwave spectroscopy
microwave spectrum
mid air
mid gear
mid leg
mid mashie
mid off
mid
 position
mid spoon
mid wicket off
mid wicket on
mid-
mid-Victorian
mid-act
mid-age
mid-aged
mid-air
mid-arctic
mid-back
mid-block
mid-body
mid-breast
mid-career
mid-carpal

mid-central
mid-century
mid-channel
mid-chest
mid-continent
mid-course
mid-court
mid-crowd
mid-current
mid-diastolic
mid-dish
mid-distance
mid-earth
mid-eighteenth
mid-feather
mid-field
mid-flight
mid-forty
mid-front
mid-gray
mid-gut
mid-heaven
mid-hour
mid-ice
mid-incisor
mid-kidney
mid-lake
mid-length
mid-lent
mid-life
mid-line
mid-link
mid-lobe
mid-mixed
mid-mouth
mid-movement
mid-nineteenth
mid-ocean
mid-oestral
mid-off
mid-on
mid-orbital
mid-part
mid-period
mid-periphery
mid-pillar
mid-point
mid-position

mid-refrain
mid-region
mid-river
mid-road
mid-sea
mid-season
mid-side
mid-sky
mid-slope
mid-sole
mid-span
mid-stride
mid-styled
mid-sun
mid-swing
mid-tarsal
mid-term
mid-thigh
mid-thoracic
mid-tide
mid-time
mid-totality
mid-tow
mid-town
mid-travel
mid-value
mid-ventral
mid-volley
mid-walk
mid-wall
mid-wall column
mid-water
mid-week
mid-wicket
mid-workings
mid-world
mid-zone
midair
 collision
midas fly
midday flower
midday sun
midden mavis
middle C
middle Paleolithic
middle age
middle ages
middle body

middle buster
middle c
middle class
middle common room
middle course
middle deck
middle distance
middle ear
middle earth
middle eight
middle english
middle finger
middle french
middle game
middle greek
middle ground
middle high german
middle irish
middle lamella
middle latitude
middle life
middle low german
middle mast
middle name
middle of the road
middle oil
middle order
middle orders
middle passage
middle path
middle plane
middle point
middle position
middle sailing
middle school
middle scots
middle state
middle staysail
middle stone
middle stump
middle term
middle voice
middle watch
middle way
middle welsh
middle white
middle-aged
middle-agedly

middle-agedness
middle-burst
middle-class
middle-class type
middle-classdom
middle-classism
middle-classness
middle-colored
middle-cut file
middle-distance
middle-earth
middle-growthed
middle-horned
middle-of-the-road
middle-of-the-roader
middle-rate
middle-road
middle-shot
 wheel
middle-sized
middle-sizedness
middle-statured
middle-temperature error
middle-tone
middle-witted
middle-wooled
middling meat
middling well
middy blouse
midget golf
midget racer
midnight blue
midnight line
midnight sun
midrange speaker
midship oar
midshipman's hitch
midst of
midsummer daisy
midsummer day
midsummer madness
midsummer-men
midwall column
midwall shaft
midwife frog
midwife toad
midwing monoplane
might and main

might be
might of arms
might-be
might-have-been
mighty effort
mighty in battle
mighty like
mighty-brained
mighty-handed
mighty-minded
mighty-mouthed
mighty-spirited
mignonette family
mignonette green
mignonette lace
mignonette-vine
migrant laborer
migrant shrike
migrant worker
migration of ions
migration velocity
migratory bird
migratory laborer
migratory locust
migratory worker
mikado brown
mikado locomotive
mikado orange
mikado yellow
mike
fright
mil-foot
mila a landi
milch cow
milch glass
milch-cow
mild alkali
mild as milk
mild as milk and water
mild as mother's milk
mild blushing goddess
mild mercurous chloride
mild mosaic
mild process
mild radical
mild silver protein
mild steel
mild-aired

mild-aspected
mild-blowing
mild-brewed
mild-cured
mild-eyed
mild-faced
mild-flavored
mild-looking
mild-mannered
mild-mooned
mild-savored
mild-scented
mild-seeming
mild-spirited
mild-spoken
mild-tempered
mild-tongued
mild-worded
mildew-proof
mildly radical
mile-ohm
mile-pound
mile-ton
mileage book
mileage ticket
miles gloriosus
miles per hour
miliary fever
miliary tuberculosis
military academy
military aircraft
military attache
military band
military camp
military campaign
military chaplain
military cloak
military court
military dictatorship
military engineer
military engineering
military establishment
military flight
military government
military governor
military honours
military insignia
military intelligence

military judge
military
law
military man
military march
military mast
military medal
military medicine
military music
military obligation
military officer
military operation
military operations
military orchid
military pace
military pilot
military police
military police corps
military policeman
military reserves
military rocket
military school
military science
military service
military spirit
military step
military subdivision
military tactics
military top
military training
military transport
military unit
military-intelligence man
military-minded
militate against
milk a he-goat into a sieve
milk a scene
milk and honey
milk and water
milk bar
milk bench
milk brother
milk can
milk cart
milk checker
milk chocolate
milk cow
milk fever

milk float
milk glass
milk leg
milk of almonds
milk of bismuth
milk of human kindness
milk of magnesia
milk pail
milk powder
milk products
milk pudding
milk punch
milk purslane
milk route
milk run
milk shake
milk sherry
milk sickness
milk snake
milk stout
milk sugar
milk tester
milk
 the ram
milk thistle
milk toast
milk tooth
milk train
milk vetch
milk willow-herb
milk-and-water
milk-and-wateriness
milk-and-waterish
milk-and-waterism
milk-and-watery
milk-bearing
milk-blended
milk-borne
milk-breeding
milk-condensing
milk-cooling
milk-curdling
milk-drying
milk-faced
milk-fed
milk-giving
milk-hued
milk-livered

milk-punch
milk-tested
milk-testing
milk-toast
milk-tooth
milk-warm
milk-washed
milk-white
milk-yielding
milking machine
milking stool
milkweed butterfly
milkweed family
milkweed tortoise beetle
milkwort family
milky disease
milky way
milky way galaxy
mill agent
mill around
mill beetle
mill bill
mill cake
mill chisel
mill cinder
mill construction
mill end
mill engineer
mill engineering
mill fever
mill hole
mill outlet
mill run
mill saw
mill store
mill town
mill wheel
mill work
mill-dam
mill-headed
mill-ink
mill-lead
mill-leat
mill-pond
mill-post
mill-race
mill-rind
mill-round

mill-run
mill-sixpence
mill-type motor
mill-wheel
mille marin
milled soap
miller's
 thumb
miller's-thumb
millet disease
millet grass
millet seed
millet-seed rash
milli-
milligram-hour
milline rate
milling cutter
milling machine
millionth comparator
millstone around your neck
millstone bridge
millwright chisel
milo disease
milo maize
milo root rot
milori blue
milori green
milpa system
mime artist
mimeograph copy
mimic thrush
miminy-piminy
mimosa bark
mimosa family
mimosa-leaved
min min
mince it
mince pie
mince the truth
mince words
mince-pie
minced meat
minced pie
minced-pie
mincing horse
mincing steps
mind blindness
mind body

mind cure
mind deafness
mind like a blotter
mind like a sieve
mind of your own
mind out
mind overthrown
mind reader
mind reading
mind the store
mind unhinged
mind what you are about
mind what you are doing
mind your P's and Q's
mind your business
mind your manners
mind your own business
mind's core
mind's eye
mind-altering drug
mind-blind
mind-blindness
mind-blowing
mind-blowing drug
mind-body
mind-body problem
mind-boggler
mind-boggling
mind-changer
mind-changing
mind-curist
mind-expanding
mind-expanding
drug
mind-expansion
mind-healer
mind-healing
mind-infected
mind-matter theory
mind-perplexing
mind-ravishing
mind-reader
mind-set
mind-sick
mind-stricken
mind-stuff theory
mind-torturing
mind-wrecking

mind-your-own-business
minded to
mindful of
mindful of others
mindless of
mine detector
mine examiner
mine host
mine layer
mine of information
mine of wealth
mine pig
mine ship
mine sweeper
mine thrower
mine work
mine-run
miner's anemia
miner's asthma
miner's consumption
miner's dial
miner's inch
miner's lamp
miner's lettuce
miner's lung
miner's phthisis
mineral acid
mineral black
mineral blue
mineral brown
mineral charcoal
mineral coal
mineral deposit
mineral dressing
mineral jelly
mineral kingdom
mineral oil
mineral pigment
mineral pitch
mineral processing
mineral resources
mineral salt
mineral science
mineral seal oil
mineral sperm oil
mineral spirits
mineral spring
mineral tallow

mineral tar
mineral water
mineral waters
mineral
 wax
mineral wool
mineral world
mineral-bearing material
mineralogical chemistry
ming tree
mingle with
mingle-mangle
mingle-mangleness
mingle-mangler
mini-
mini-specs
miniature camera
miniature golf
miniature painting
miniature photography
miniature pinscher
miniature poodle
miniature schnauzer
minie ball
minimal art
minimal pair
minimax theorem
minimum access programming
minimum flying speed
minimum free form
minimum lending rate
minimum thermometer
minimum wage
minimum-security prison
minimum-wage law
mining claim
mining engineer
mining engineering
mining geology
minion of the law
minister of music
minister of state
minister of the Gospel
minister plenipotentiary
minister resident
minister to
minister without portfolio
minister-general

ministering angel
ministering spirits
ministers resident
ministers without portfolios
mink frog
mink-ranching
minny bass
mino bird
minole-mangle
minor axis
minor basilica
minor canon
minor chord
minor coin
minor criticism
minor detail
minor details
minor
element
minor in
minor interval
minor key
minor league
minor matter
minor mode
minor operation
minor operations
minor order
minor orders
minor party
minor penalty
minor piece
minor planet
minor poet
minor premise
minor premiss
minor role
minor scale
minor second
minor seminary
minor seventh chord
minor suit
minor surgery
minor tenace
minor term
minor triad
minor wrong
minor-league

minor-leaguer
minority carrier
minority group
minority interests
minority leader
minority opinion
minority position
minority prejudice
minority voice
minstrel show
minstrel song
mint bush
mint camphor
mint condition
mint family
mint geranium
mint julep
mint leaves
mint of money
mint sauce
mint stamp
minus acceleration
minus sight
minus sign
minus some buttons
minuscule script
minute attention
minute bell
minute book
minute drops
minute glass
minute gun
minute hand
minute man
minute mark
minute of arc
minute quantity
minute steak
minute thing
minute things
minuteness of detail
mio-
mirabile dictu
miracle
drug
miracle drugs
miracle man
miracle play

miracle player
miracle wheat
miracle-breeding
miracle-proof
miracle-worker
miracle-working
mire down
mire dromble
mire duck
miriti palm
mirror carp
mirror image
mirror image, the
mirror of the mind
mirror symmetry
mirror writer
mirror writing
mirror-faced
mirror-writing
mirth-inspiring
mirth-loving
mirth-making
mirth-marring
mirth-moving
mirth-provoking
mis-
mis-aver
mis-censure
mis-center
mis-citation
mis-cite
mis-con
mis-copy
mis-cue
mis-eat
mis-enter
mis-entry
mis-event
mis-hallowed
mis-hear
mis-hearer
mis-heed
mis-hit
mis-hold
mis-humility
mis-lie
mis-mark
mis-meet

mis-pen
mis-rely
mis-say
mis-season
mis-seat
mis-see
mis-seek
mis-seem
mis-send
mis-sense
mis-serve
mis-set
mis-shape
mis-shapen
mis-sheathed
mis-ship
mis-shod
mis-sing
mis-solution
mis-sort
mis-sound
mis-space
mis-speak
mis-spell
mis-spend
mis-start
mis-state
mis-steer
mis-step
mis-stitch
mis-stop
mis-strike
mis-stroke
mis-style
mis-succeeding
mis-sue
mis-suit
mis-sway
mis-swear
mis-sworn
mis-tilled
mis-tune
mis-union
mis-word
misbehave
yourself
miscarriage of justice
miscellaneous drugs

misch metal
mischief-loving
mischief-maker
mischief-making
mischief-working
mischio marble
misconduct yourself
misdemean yourself
mise en sc
mise-en-scene
mise-enscene
miserable lot
misery in the head
misfortune- difficulty
misfortune-proof
mish-mash
miso soup
miso-
misoshiru soup
misplaced modifier
misprision of felony
misprision of treason
misread the case
misread the situation
miss a cue
miss an opportunity
miss by a mile
miss fire
miss nothing
miss on the low side
miss out
miss stays
miss the boat
miss the bus
miss the chance
miss the mark
miss the market
miss the truth
miss your aim
miss your footing
miss your mooring
miss-fire
missa cantata
missal letter
missal stand
missel bird
missel thrush
missel tree

missel-bird
missel-thrush
missile engineer
missile engineering
missile guidance
missile man
missile program
missile project
missile research
missile science
missile
technology
missile testing
missile warfare
missing link
mission accomplished
mission furniture
mission grass
missionaries apostolic
missionary alphabet
missionary apostolic
missionary position
missionary rector
missionary salesman
missionary weed
misspeak yourself
mist blue
mist concentrate sprayer
mist gray
mist-blotted
mist-blurred
mist-clad
mist-covered
mist-enshrouded
mist-exhaling
mist-impelling
mist-laden
mist-shrouded
mist-wet
mist-wreathen
mistle thrush
mistletoe bird
mistletoe cactus
mistress-piece
mistress-ship
misty rain
misty-eyed
misty-moisty

misunderstand one another
misuse of words
mitch board
mitch-board
miter box
miter box saw
miter cap
miter clamp
miter gear
miter jib
miter joint
miter saw
miter square
miter-clamped
miter-jointed
mitered jib
mitered sail
mithridate mustard
mitigating circumstances
mitis casting
mitis metal
mitral incompetence
mitral insufficiency
mitral stenosis
mitral valve
mitre block
mitre box
mitre joint
mitre square
mitre-jointed
mitre-wort
mitten
money
mix Up
mix it up
mix it up with
mix up
mix with
mix yourself up with
mix-hellene
mix-up
mixed acid
mixed bag
mixed blessing
mixed bud
mixed cadence
mixed chorus
mixed crystal

mixed decimal
mixed doubles
mixed drink
mixed drinks
mixed economy
mixed farming
mixed foursome
mixed grill
mixed language
mixed larceny
mixed marriage
mixed metaphor
mixed nerve
mixed number
mixed race
mixed times
mixed up
mixed-blood
mixed-up
mixer tube
mixing faucet
mixing ratio
mixing room
mixing valve
mixo-
mixolydian mode
mixture curve
mixture stop
mixy-maxy
mizen-mast
mizzen royal
mizzen sail
mizzen skysail
mizzen stay
mizzen staysail
mizzen-royal brace
mizzen-royal lift
mizzen-royal mast
mizzen-royal stay
mizzen-royal staysail
mizzen-royal yard
mizzen-skysail brace
mizzen-skysail lift
mizzen-skysail mast
mizzen-skysail stay
mizzen-skysail yard
mizzen-topgallant brace
mizzen-topgallant lift

mizzen-topgallant mast
mizzen-topgallant sail
mizzen-topgallant stay
mizzen-topgallant staysail
mizzen-topgallant
yard
mizzen-topmast
mizzen-topmast stay
mizzen-topmast staysail
mizzen-topsail lift
mizzen-topsail yard
mks units
mmHg
mnemonic device
mob law
mob rule
mob tactics
mob, the
mob-cap
mob-minded
mobile antenna
mobile call
mobile camera
mobile command post
mobile home
mobile library
mobile militia
mobile radio
mobile tactics
mobile trailer unit
mobile transmitter
mobile unit
mobile vulgus
mobile warfare
moccasin flower
moccasin plant
moccasin telegraph
mocha stone
mochi wood
mock chicken
mock court
mock danger
mock epic
mock mold
mock moon
mock orange
mock pendulum
mock pennyroyal

mock sun
mock turtle
mock turtle soup
mock up
mock-beggar
mock-bird
mock-heroic
mock-heroic poetry
mock-heroical
mock-heroically
mock-up
mockernut hickory
mockery of justice
mockery-proof
mocking-bird
mocking-stock
mod cons
mod suit
modacrylic fiber
modal auxiliary
modal logic
mode Logic
mode beige
mode of expression
mode of operation
mode of procedure
mode of succession
mode of worship
model after
model child
model
 maker
model school
modeling clay
modeling tool
moderate breeze
moderate gale
moderate position
moderate price
moderator lamp
modern ballet
modern dance
modern dancer
modern generation
modern greats
modern hebrew
modern jazz
modern language

modern logic
modern man
modern-bred
modern-built
modern-looking
modern-made
modern-practiced
modern-sounding
moderne cut
modernist verse
modest price
modest violet
modi operandi
modi vivendi
modock wool
modular arithmetic
modular assembly
modular production
modulation monitor
modulus of elasticity
modulus of rigidity
modulus of volume elasticity
modus operandi
modus ponens
modus tollens
modus vivendi
moeso-goth
mogul base
mogul locomotive
mohair rug
mohawk weed
mohs' scale
moire pattern
moist gangrene
moisten your whistle
moisture equivalent
moisture meter
moisture-absorbent
moisture-resisting
moko-moko
mol wt
molar conductance
molar conductivity
molar tooth
molar volume
molar weight
molasses grass
mold fungus

mold loft
mold of perfection
moldboard
 plow
molded base line
molded breadth
molded depth
molded displacement
molded draft
molded form
molded line
molded plastic
molded salad
molding board
molding book
molding compounds
molding edge
molding plane
moldy nose
mole catcher
mole crab
mole cricket
mole drain
mole drainage
mole drainer
mole fraction
mole gray
mole plow
mole rat
mole trap
mole-blind
mole-blindedly
mole-catching
mole-eyed
mole-head
mole-hill
mole-sighted
molecular beam
molecular biology
molecular distillation
molecular film
molecular formula
molecular heat
molecular mass
molecular physics
molecular ray
molecular sieve
molecular volume

molecular weight
moll hern
molluscum contagiosum
molluscum epitheliate
mollweide protection
molly maguire
molly washdish
molly-coddle
molotov cocktail
molybdenum steel
molybdenum trioxide
molybdic anhydride
molybdic oxide
moment of force
moment of inertia
moment of momentum
moment of stability
moment of truth
moment-area method
momentary success
momentary triumph
momentary-contact
switch
momentum pump
momentum valve
mon cher
mon semblable
mon-
mon-khmer
monad deme
monaural system
monel metal
monesia bark
monetary arithmetic
monetary unit
money belt
money box
money broker
money changer
money changing
money chest
money clip
money cowry
money dealer
money dealing
money down
money getter
money going out

money illusion
money in hand
money market
money matter
money matters
money of account
money of necessity
money order
money player
money saver
money spider
money teller
money to burn
money wages
money's worth
money's-worth
money-bag
money-bloated
money-bound
money-box
money-breeding
money-changer
money-earning
money-getting
money-grasping
money-grub
money-grubbing
money-hungry
money-lender
money-loving
money-mad
money-maker
money-making
money-raising
money-saving
money-spelled
money-spinner
money-wort
moneyed capital
moneyed corporation
moneyed man
mong corn
mongolian idiot
mongoloid idiocy
mongoloid idiot
mongoose plant
monilia disease
monistic idealism

monitor bug
monitor
chuck
monitor room
monitor screen
monitoring booth
monitory letter
monk bat
monk parrot
monk saki
monk's cloth
monk's pepper tree
monk's robe
monk's-hood
monk-fish
monkey apple
monkey around
monkey bag
monkey block
monkey bread
monkey bread tree
monkey bridge
monkey business
monkey dog
monkey fist
monkey flower
monkey forecastle
monkey foresail
monkey jacket
monkey link
monkey nut
monkey paw
monkey pinscher
monkey pole
monkey poop
monkey puzzle
monkey rail
monkey suit
monkey tail
monkey tricks
monkey with
monkey wrench
monkey's fist
monkey-ball
monkey-face
monkey-faced
monkey-faced owl
monkey-god

monkey-pot
monkey-rigged
monkey-tail valve
monkey-tailed
monkeying around
mono carpellary
mono carpic
mono carpous
mono cephalous
mono ceros
mono chord
mono clinal
mono clinic
mono clinous
mono cyclic
mono-
mono-ideic
mono-ideism
mono-ideistic
mono-iodo
mono-iodohydrin
mono-iodomethane
mono-ion
monoamine oxidase
monobasic sodium phosphate
monochloro-
monochloroacetic acid
monochromatic
film
monochromatic illuminator
monoclinic system
monocytic leukemia
monoenergetic neutron
monophonic system
monopolistic competition
monopolize the conversation
monopolize the thoughts
monopolize your attention
monopoly value
monorange speaker
monosodium glutamate
monostable circuit
monoxy-
monroe doctrine
mons pubis
mons veneris
monsoon low
monster-bearing

monster-breeding
monster-eating
monster-guarded
monster-taming
monster-teeming
monstrous lie
mont-de-piete
mont-de-pit
montan wax
montani semper liberi
monte bank
monte-jus
montes veneris
month after month
month in month out
month of Sundays
month's mind
monthly epact
monthly investment plan
monthly meeting
monthly payments
monument plant
monumental mason
monumental record
monumental sculpture
mooch around
mooch off
mood music
mood phrase
mood swing
moon around
moon base
moon blindness
moon daisy
moon dog
moon goddess
moon goddesses
moon jelly
moon jellyfish
moon knife
moon letter
moon orbit
moon pillar
moon rat
moon ray
moon ship
moon

station
moon-blanched
moon-blasted
moon-blasting
moon-blind
moon-born
moon-bright
moon-browed
moon-calf
moon-charmed
moon-crowned
moon-culminating
moon-dial
moon-eye
moon-eyed
moon-faced
moon-fern
moon-fish
moon-flower
moon-gathered
moon-gazing
moon-glittering
moon-god
moon-gray
moon-led
moon-loved
moon-mad
moon-made
moon-man
moon-raised
moon-shaped
moon-stricken
moon-struck
moon-taught
moon-tipped
moon-touched
moon-trodden
moon-white
moon-whitened
mooneye cisco
moonlight blue
moonlight flit
moonlight requisition
moonlight school
moonseed family
moor besom
moor blackbird
moor buzzard

moor cock
moor grass
moor hen
moor myrtle
moor-bred
moor-cock
moor-fowl
moor-hen
moor-pout
mooring buoy
mooring chock
mooring harness
mooring line
mooring mast
mooring pendant
mooring pennant
mooring rack
mooring screw
mooring shackle
mooring swivel
mooring telegraph
mooring tower
moose call
moose elm
moose fly
moose-ear
moose-misse
moot case
moot court
moot hall
moot point
moot-hill
moot-house
moot-stow
mootchie
wood
mop and mow
mop bucket
mop pail
mop up
mop up the floor with
mop-up
mope-eyed
mopped up
mopper-up
moppers-up
mopping up
mopping-up

mopstick rail
mora hair
morainal drift
moral badness
moral censor
moral certainty
moral climate
moral code
moral courage
moral delinquency
moral excellence
moral faculty
moral fiber
moral flaw
moral goodness
moral hazard
moral insanity
moral lesson
moral obligation
moral of the story
moral philosophy
moral pollutedness
moral pollution
moral precept
moral principles
moral rectitude
moral rightness
moral sense
moral strength
moral support
moral theology
moral turpitude
moral victory
moral virtue
moral weakness
morality play
moralize upon
morally corrupt
morally polluted
morass ore
moray eel
morbid anatomy
morbid anxiety
morbid curiosity
morbid drive
morbid excitability
morbid growth
morbid psychology

morbid sensibility
morbidity rate
morbidly curious
morbidly sensitive
morbus Gallicus
mordant dye
mordant rouge
more and more
more dead than
alive
more desirable
more dict
more distant
more frightened than hurt
more heat than light
more in sorrow than in anger
more or less
more sol
more suo
more than a match for
more than doubtful
more than enough
more than ever
more than expected
more than half
more than meets the ear
more than meets the eye
more than one
more than you bargained for
more than you can afford
more than you can tell
more truth than poetry
morgan le fay
morganatic marriage
moriche palm
morn star
morning after
morning campion
morning coat
morning devotions
morning dress
morning glory
morning glory seeds
morning loan
morning prayer
morning prayers
morning services
morning sickness

morning star
morning time
morning twilight
morning watch
morning-breathing
morning-bright
morning-colored
morning-gift
morning-glory
morning-glory family
morning-glory sphinx
morning-tide
morning-watch
morning-winged
mornings after
morocco leather
mororation in composition
morph-
morphemic analysis
morphine meconate
morpho-
morphologic
construction
morphological analogy
morphological botany
morphological individual
morphophonemic analysis
morris chair
morris dance
morris tube
morris-dance
morris-pike
morro castle
morrow-mass
morrow-tide
morse code
mort d'ancestor
mort note
mortal blow
mortal fear
mortal flesh
mortal horror
mortal mind
mortal remains
mortal sin
mortal wound
mortality committee
mortality rate

mortality table
mortally ill
mortar and pestle
mortar barrage
mortar bed
mortar board
mortar boat
mortar fire
mortar ketch
mortar-board
mortgage bond
mortgage broker
mortgage company
mortgage deed
mortgage holder
mortgage points
mortgage shark
mortgage-holder
mortgaged to the hilt
mortgagee clause
mortification of the flesh
mortification root
mortify the flesh
mortify your flesh
mortify yourself
mortise and tenon joint
mortise block
mortise chisel
mortise gauge
mortise gear
mortise joint
mortise lock
mortise-and-tenon joint
mortuary roll
mortuum vadium
mosaic binding
mosaic bold
mosaic disease
mosaic dwarf
mosaic
 gold
mosaic work
mosaic-drawn
mosaic-floored
mosaic-paved
moschatel family
mosey along
mosey off

mosque swallow
mosquito bar
mosquito bee
mosquito boat
mosquito fleet
mosquito hawk
mosquito net
mosquito netting
mosquito-bitten
mosquito-bred
mosquito-free
moss agate
moss animal
moss campion
moss fern
moss green
moss pink
moss rose
moss stitch
moss-back
moss-backed
moss-begrown
moss-bordered
moss-bound
moss-brown
moss-clad
moss-covered
moss-crowned
moss-gray
moss-green
moss-grown
moss-hag
moss-inwoven
moss-lined
moss-trooper
moss-woven
mossy-backed
most admired disorder
most assuredly
most certainly
most distant
most frequently
most important
most likely
most often
most recent
most reverend
most significant digit

most unkindest cut of all
most, the
most-favored-nation clause
mot d'ordre
mot juste
mote nut
mote spoon
mote-hill
moth and rust
moth ball
moth bean
moth blight
moth mullein
moth-balled
moth-eat
moth-eaten
mother carey's chicken
mother cask
mother cell
mother complex
mother country
mother
earth
mother figure
mother fixation
mother goose
mother hubbard
mother language
mother liquor
mother lode
mother love
mother naked
mother of coal
mother of dews
mother of pearl
mother of the Muses
mother of thyme
mother of vinegar
mother ship
mother spleenwort
mother superior
mother superiors
mother surrogate
mother symbol
mother tongue
mother wit
mother yaw
mother's boy

mother's darling
mother's day
mother's milk
mother's son
mother-church
mother-in-law
mother-in-law plant
mother-naked
mother-of-pearl
mother-of-pearl cloud
mother-of-pearl glass
mother-of-thousands
mother-of-thyme
mother-of-thymes
mother-sick
mother-spot
mothers superior
mothers-in-law
motion backwards
motion block
motion downward
motion forwards
motion from
motion in general
motion photomicrograph
motion picture
motion pictures
motion short of
motion sickness
motion study
motion to
motion to and fro
motion towards
motion upwards
motion work
motion-picture
motion-picture actor
motion-picture camera
motion-picture
fan
motion-picture film
motion-picture photography
motion-picture projector
motion-picture show
motion-picture theater
motionless torrents
motivating force
motivation research

motivational research
motive column
motive force
motive power
motive-monger
motive-mongering
motley color
motley fool
motley-minded
motmot blue
motmot green
moto-
motor abreaction
motor ambulance
motor aphasia
motor assembler
motor builder
motor bus
motor car
motor caravan
motor coach
motor corps
motor court
motor drive
motor generator
motor hotel
motor impulse
motor inn
motor launch
motor lodge
motor lorry
motor neuron
motor oil
motor paralysis
motor park
motor pool
motor scooter
motor ship
motor torpedo boat
motor truck
motor unit
motor van
motor vehicle
motor vessel
motor-camper
motor-camping
motor-driven
motor-generator

motor-generator servo
motor-man
motor-minded
motor-mindedness
motor-ship
motor-speed control system
motorcycle race
motorcycle saddle
motorized vehicle
motorized warfare
mots justes
mottle-leaf
mottle-leaf
mosaic
mottled enamel
mottled-top disease
motto kiss
motu proprio
motuca fly
moubata bug
moudy-warp
mould-board
moulding board
moulding-board
mouldy fig
moulin a paroles
mound bird
mound builder
mound maker
mound making
mound-builder
mound-building
mount Pegasus
mount an attack
mount an offensive
mount guard
mount the barricades
mount the ladder of success
mount the throne
mount up to
mount your high horse
mountain accentor
mountain adder
mountain artillery
mountain ash
mountain avens
mountain beaver
mountain bluebird

mountain bluet
mountain bracken
mountain bunch grass
mountain camellia
mountain cat
mountain chain
mountain climber
mountain cranberry
mountain creeper
mountain currant
mountain damso
mountain devil
mountain dew
mountain ebony
mountain fern
mountain fetterbush
mountain fever
mountain flax
mountain fleece
mountain foxtail
mountain fringe
mountain goat
mountain gorilla
mountain gun
mountain heath
mountain hollow
mountain holly fern
mountain laurel
mountain
lilac
mountain lion
mountain mahogany
mountain maker
mountain making
mountain man
mountain maple
mountain nymph
mountain oyster
mountain parsley
mountain range
mountain redtop
mountain rice
mountain rose
mountain rosebay
mountain sage
mountain sandwort
mountain sheep
mountain sickness

mountain spleenwort
mountain starwort
mountain tent
mountain time
mountain timothy
mountain viscacha
mountain wave
mountain whitefish
mountain wind
mountain wine
mountain-built
mountain-dwelling
mountain-girdled
mountain-green
mountain-high
mountain-loving
mountain-sick
mountain-walled
mounted infantryman
mounted police
mounted policeman
mounting medium
mounting-block
mourners' bench
mourning band
mourning cloak
mourning cloak butterfly
mourning dove
mourning garment
mourning iris
mourning ring
mourning warbler
mouse barley
mouse bloodwort
mouse deer
mouse grass
mouse gray
mouse opossum
mouse out
mouse pox
mouse-brown
mouse-color
mouse-colored
mouse-colour
mouse-deer
mouse-dun
mouse-ear
mouse-ear chickweed

mouse-ear
cress
mouse-ear hawkweed
mouse-eared
mouse-eaten
mouse-gray
mouse-hole
mouse-hunt
mouse-killing
mouse-pea
mouse-still
mousetail grass
mousetrap switch
mousing hook
mousquetaire gloves
mousseline de laine
mousseline de soie
mousseline sauce
moustache cup
mouth bow
mouth breathing
mouth footed
mouth glue
mouth harp
mouth hole
mouth honor
mouth organ
mouth piece
mouth-filling
mouth-made
mouth-organ
mouth-to-mouth
mouth-to-mouth method
mouth-to-mouth resuscitation
mouth-watering
movable feast
movable type
movable-do system
move along
move apart
move around
move aside
move away
move back
move behind
move for
move forward
move heaven and earth

move in
move in a circle
move in a groove
move in a rut
move into
move off
move on
move out
move over
move quickly
move to action
move to the side
move with the times
move you to
move your fanny
move your tail
moveable feast
movement of air
movie actor
movie camera
movie film
movie house
movie star
movie theater
movie-goer
movie-minded
movies,
the
moving apart
moving average
moving cause
moving cluster
moving picture
moving road
moving spirit
moving staircase
moving stairway
moving target indicator
moving toward
moving van
moving-coil galvanometer
moving-coil meter
moving-coil microphone
moving-coil speaker
moving-conductor microphone
moving-iron meter
moving-picture show
moving-picture theater

mow down
mow-burnt
mowing grass
mowing machine
mowrah butter
mowrah fat
mowrah oil
mowrah-seed oil
moyen-age
mrs grundy
mu meson
mu-meson
muc-
much acclaimed
much ado about nothing
much as
much at one
much cry and little wool
much esteemed
much obliged
much of a muchness
much the same
much to be desired
much to be regretted
much-admired
much-advertised
much-branched
much-coiled
much-containing
much-devouring
much-discussed
much-enduring
much-engrossed
much-honored
much-hunger
much-lauded
much-loved
much-loving
much-mooted
much-pondering
much-praised
much-revered
much-sought
much-suffering
much-valued
much-worshiped
mucic acid
mucilage

canal
mucilage cell
mucilage duct
muck about
muck around
muck bar
muck in
muck rolls
muck soil
muck up
muck-rake
muck-up
mucked up
mucking around
muckle hammer
muco-
mucoitin-sulphuric
mucoitinsulfuric acid
mucoso-
mucous colitis
mucous membrane
mucus body
mud bath
mud berth
mud dauber
mud drum
mud flat
mud heap
mud henmud house
mud house
mud lump
mud map
mud pie
mud pilot
mud pot
mud puddle
mud puppy
mud turtle
mud-bespattered
mud-built
mud-color
mud-colored
mud-exhausted
mud-fish
mud-lost
mud-roofed
mud-shot
mud-slinging

mud-splashed
mud-walled
muddle along
muddle away
muddle through
muddle-headed
muddle-minded
muddy-complexioned
muddy-mettled
mudslinging campaign
muermo family
muff coupling
muff your cue
muffin cap
muffin man
muffin pan
muffin turner
muffle color
muffle furnace
muffle kiln
muffle up
muffle-jaw
muffle-shaped
muffled drum
muffled drums
muffled tone
mug shot
mug up
mug-house
mug-up
mug-wet
muga moth
muga silk
muggy weather
mugho pine
muhammadan calendar
mui-tsai
muir
ill
muir poot
mulatto jack
mulatto-wood
mulberry bird
mulberry family
mulberry wine
mulberry-faced
mulct law
mule armadillo

mule chair
mule chest
mule deer
mule skinner
mule spinning
mule train
mule-fat
mule-foot
mule-headed
mule-jenny
muley axle
muley cow
muley head
muley saw
mulga grass
mulier puisne
mulier younger
mull muslin
mull over
mullein dock
mullein foxglove
mullein pink
mullet hawk
mulligan stew
multi-
multi-colour
multi-jet
multi-ply
multi-prop
multi-scene control board
multiaxial joint
multiband antenna
multichannel analyser
multiflora rose
multigrid tube
multilateral symmetry
multilateral trade
multilinear form
multipath transmission
multiphase current
multiple algebra
multiple alleles
multiple allelism
multiple allelomorph
multiple circuit
multiple connection
multiple drill
multiple factor

multiple factors
multiple fission
multiple fruit
multiple image
multiple integr
multiple integral
multiple messages
multiple myeloma
multiple neuritis
multiple party system
multiple
personality
multiple projector
multiple sclerosis
multiple series
multiple shop
multiple star
multiple store
multiple telegraph
multiple thread
multiple voting
multiple warhead
multiple-beam interferometer
multiple-choice
multiple-clutch
multiple-die
multiple-disk
multiple-disk clutch
multiple-dome
multiple-drill
multiple-feed closed loop
multiple-line
multiple-missile warhead
multiple-pass
multiple-series
multiple-speed
multiple-threaded
multiple-toothed
multiple-tuned
multiple-unit car
multiple-valued
multiplex circuit
multiplex receiver
multiplex telegraphy
multiplex transmission
multiplex tube
multiplication sign
multiplication table

multiplicative axiom
multiplicative group
multiplicative identity
multiplicative inverse
multiplier channels
multiplier phototube
multiply and replenish the earth
multiply by four
multiply by three
multiply by two
multiplying-glass
multipurpose plane
multipurpose tube
multistage flight
multistage rocket
multistep hydroplane
multivalent vaccine
multum
 in parvo
mum's the word
mumble-the-peg
mumblety-peg
mumbly-peg
mumbo jumbo
mumbo jumbos
mumbo-jumbo
mummy apple
mummy brown
mummy case
mummy chamber
mummy wheat
mummy-brown
mummy-cloth
mumping day
mumps meningitis
mundane astrology
mundane house
mung bean
municipal bond
municipal building
municipal corporation
municipal engineer
municipal securities
munition armor
munitions of war
munitions plant
mural coronet
mural crown

mural painting
murder en masse
murder the King's English
murder the Queen's English
murder wholesale
murder will out
murderous frenzy
murderous insanity
murexide reaction
murexide test
muriatic acid
murillo bark
murine opossum
murmur diphthong
murphy bed
murphy button
murrhine glass
mus b
muscae volitantes
muscle beach
muscle cell
muscle column
muscle fiber
muscle fibre
muscle in
muscle maker
muscle making
muscle man
muscle plasma
muscle power
muscle sense
muscle tissue
muscle-bound
muscle-bound between the ears
muscle-building
muscle-celled
muscle-kneading
muscle-tired
muscovy
 duck
muscul-
muscular disease
muscular dystrophy
musculo-
musculocutaneous nerve
muse on
muse on other things
muse over

muse upon
musette bag
museum beetle
museum piece
mush rot
mush through
mush up
mush-kinu
mushroom anchor
mushroom cloud
mushroom sauce
mushroom system
mushroom-colored
mushroom-grown
mushroom-shaped
music Muses
music arrangement
music box
music buff
music centre
music critic
music director
music division
music drama
music fan
music festival
music form
music hall
music in space
music lover
music lyre
music maker
music notation
music of the spheres
music paper
music passage
music patron
music patrons
music performance
music piece
music program
music roll
music room
music school
music score
music speech
music stand
music style

music theme
music theory
music wire
music-copying
music-drawing
music-flowing
music-footed
music-like
music-loving
music-mad
music-making
music-panting
music-stirring
music-tongued
musica falsa
musica ficta
musica mensurata
musical
 accent
musical box
musical chairs
musical comedy
musical copy
musical ear
musical flair
musical glasses
musical instrument
musical notation
musical note
musical ornament
musical part
musical passage
musical performance
musical phrase
musical piece
musical program
musical quality
musical revue
musical saw
musical scale
musical score
musical sense
musical sentence
musical sound
musical stage
musical suite
musical talent
musical theater

musical thought
musically inclined
musico-
musicogenic epilepsy
musing on the past
musique concr
musk ambrette
musk bag
musk deer
musk duck
musk hog
musk mallow
musk melon
musk orchid
musk ox
musk parrot
musk plant
musk rose
musk turtle
musk-cat
musk-cod
musk-deer
musk-duck
musk-ox
musk-rat
musk-root
musk-tree
musk-wood
muskeg moss
musket arrow
muskrat weed
muskus grass
muslin clipper
muslin delaine
musquash root
muss up
mussaenda coffee
mussed up
mussel bill
mussel crab
mussel-shell
must item
mustache cup
mustache monkey
mustang grape
mustard and cress
mustard

beetle
mustard family
mustard gas
mustard greens
mustard oil
mustard plaster
mustard sauce
mustard seed
mustard-seed coal
muster courage
muster in
muster on
muster out
muster roll
muster up
muster your resources
muster-out
mustering out
mut dash
mutamur in illis
mutated form
mutation fox
mutation mink
mutation pressure
mutation stop
mutatis mutandis
mutato nomine
mute swan
mute witness
muted ecstasy
muth-labben
muto-
mutton bird
mutton cane
mutton chop
mutton chops
mutton grass
mutton snapper
mutton spanker
mutton tallow
mutton-chop
mutton-fish
mutton-head
mutton-legger
muttonchop whiskers
mutual admiration
mutual affinity
mutual agreement

mutual aid
mutual approach
mutual assistance
mutual attraction
mutual company
mutual concession
mutual fund
mutual impedance
mutual inductance
mutual induction
mutual insurance
mutual regard
mutual replacement
mutual repulsion
mutual savings bank
mutual support
mutual supportiveness
mutual transfer
mutual understanding
mutual-defense treaty
mutually
 approaching
muu-muu
muzzle ring
muzzle velocity
muzzle yourself
muzzle-loader
muzzle-loading
muzzy speech
my Angel-infancy
my Father's house
my boys
my burning youth
my craft and sullen art
my goodness
my green age
my humble self
my love
my nearest and dearest enemy
my stars
my word
my-
myall wood
myasthenia gravis
myc-
myceto-
myco-
mycobacterium paratuberculosis

mydas fly
myel-
myelin sheath
myelo-
myelogenous leukemia
myeloid leukemia
myna bird
mynad-minded
myo-
myocardial infarction
myocardial insufficiency
myoclonous epilepsy
myogen fibrin
myosin fibrin
myosotis blue
myovascular insufficiency
myrcia oil
myria-
myriad-leaf
myriad-leaves
myriad-minded
myricyl alcohol
myrio-
myristic acid
myrmec-
myrmeco-
myrobalan family
myrrh-tree
myrtle berry
myrtle bird
myrtle grass
myrtle green
myrtle-berry
myrtle-leaved
mystery clock
mystery grass
mystery of mysteries
mystery play
mystery religion
mystery story
mystery tour
mystical experience
mystical intuition
mystical theology
mystico-
mystico-allegoric
mystico-religious
mythical

lore
mythical monster
mythical monsters
mythico-
mythico-historical
mythico-philosophical
mythico-romantic
mytho-
myxo-
n number
n'est-ce pas
n-
n-dimensional
n-ple
n-ply
n-tuple
n-tuple linear algebra
n-tuply
n-type
nCi
nF
nW
na zdorov'e
na-dene
nacreous cloud
nag at
nag-tailed
nagaed wood
nagami kumquat
nail bed
nail bit
nail bone
nail brush
nail caster
nail down
nail enamel
nail file
nail filer
nail filing
nail fold
nail hole
nail maker
nail making
nail molder
nail polish
nail puller
nail set
nail up

nail varnish
nail violin
nail water
nail your colors to the mast
nail-bearing
nail-biting
nail-clipping
nail-cutting
nail-head
nail-headed
nail-paring
nail-pierced
nail-shaped
nail-sick
nail-studded
nail-tailed
nailed down
nailer joist
nailhead rust
nailhead spar
nailhead spot
naive realism
nake-footed
naked as a jaybird
naked as a needle
naked as a worm
naked as my nail
naked as the day one was born
naked as the day you were born
naked eye
naked
 fact
naked floor
naked force
naked ladies
naked oat
naked singularity
naked smut
naked steel
naked to
naked-armed
naked-bladed
naked-eared
naked-eye
naked-eyed
naked-flowered
naked-fruited
naked-seeded

naked-stalked
naked-tailed
nalidixic acid
namas kar
namby-pambical
namby-pambics
namby-pambies
namby-pambiness
namby-pamby
namby-pambyish
namby-pambyism
namby-pambyness
name and address
name day
name for office
name names
name of the game
name over
name part
name plate
name tape
name to conjure with
name-caller
name-calling
name-child
name-day
name-drop
name-dropped
name-dropper
name-dropping
names of
namma hole
nand pearl
nankeen bird
nankeen lily
nanny goat
nanny plum
nanny-goat
nano-
nap hand
napa leather
naphth-
naphtha distiller
naphtha launch
naphthene-base oil
naphthol black
naphthol blue black
naphthol yellow

naphthyl group
naphthyl methyl ketone
naphthyl radical
naphthylamine black
napier's bones
napkin pattern
napkin ring
narcissus fly
narco-
narcotic injection
narcotic
 shot
narcotic stupor
narcotic trance
narcotico-acrid
narcotico-irritant
narcotics addict
narcotics agent
narcotics pusher
narcotics smuggling
narcotics traffic
nark it
narkul grass
narra amarilla
narra blanca
narra encarnada
narrative poem
narrative poetry
narrow boat
narrow brush
narrow down
narrow escape
narrow gauge
narrow house
narrow margin
narrow means
narrow place
narrow seas
narrow squeak
narrow sympathies
narrow the gap
narrow views
narrow-backed
narrow-billed
narrow-bladed
narrow-brained
narrow-breasted
narrow-celled

narrow-chested
narrow-crested
narrow-ended
narrow-eyed
narrow-faced
narrow-fisted
narrow-gage
narrow-gauge
narrow-gauged
narrow-guage
narrow-guaged
narrow-headed
narrow-hearted
narrow-hipped
narrow-jointed
narrow-laced
narrow-leaved
narrow-leaved oat grass
narrow-meshed
narrow-minded
narrow-mindedly
narrow-mindedness
narrow-mouthed
narrow-mouthed toad
narrow-necked
narrow-nosed
narrow-petaled
narrow-rimmed
narrow-seeded
narrow-shouldered
narrow-shouldred
narrow-skulled
narrow-souled
narrow-spirited
narrow-spiritedness
narrow-streeted
narrow-throated
narrow-toed
narrow-visioned
narrow-waisted
narrowing
 gap
nary one
nas-
nasal accent
nasal bone
nasal cavity
nasal concha

nasal discharge
nasal gleet
nasal index
nasal tone
nasal twang
nascent condition
nascent state
nash-gab
naso-
nasolacrimal duct
nastic movement
nasturtium family
nasturtium red
nasturtium yellow
nasty blow
nasty crack
nasty look
natal day
natch-bone
nation hood
nation-state
national accounting
national anthem
national assembly
national assistance
national bank
national bank note
national blue
national cemetery
national chairman
national church
national code
national convention
national debt
national economy
national emergency
national flag
national forest
national guard
national holiday
national honor
national income
national insurance
national language
national leader
national leadership
national literature
national militia

national monument
national newspaper
national park
national
product
national school
national service
national socialism
national style
native Australian
native bear
native cleverness
native companion
native dextran
native environment
native land
native language
native metals
native millet
native mineral
native oak
native peach
native soil
native speaker
native speech
native tendency
native timothy
native to
native to the heath
native to the place
native to the soil
native tongue
native wit
native-born
native-born citizenship
native-bornness
natura non facit saltum
natural affection
natural aids
natural astrology
natural child
natural childbirth
natural classification
natural color
natural death
natural development
natural dye
natural dyestuff

natural endowment
natural fiber
natural gas
natural gender
natural geometry
natural gift
natural growth
natural harbor
natural hierarchy
natural history
natural idiot
natural immunity
natural impulse
natural instinct
natural language
natural law
natural levee
natural logarithm
natural magic
natural man
natural
mineral
natural minor
natural number
natural person
natural philosopher
natural philosophy
natural politeness
natural radioactivity
natural realism
natural realist
natural religion
natural resources
natural right
natural rights
natural rubber
natural science
natural scientist
natural selection
natural state
natural tendency
natural theology
natural to
natural varnish
natural virtue
natural virtues
natural wit
natural world

natural-born
natural-born fool
naturalis possessio
naturalistic description
naturalistic fallacy
naturalistic humanism
naturalized citizen
naturalized citizenship
nature book
nature cure
nature deity
nature in the raw
nature myth
nature philosopher
nature philosophy
nature printing
nature spirit
nature strip
nature study
nature trail
nature worship
nature worshiper
nature's nobleman
nature-print
nature-printing
naughty child
naughty pack
naughty word
nautch dance
nautch girl
nautical chain
nautical day
nautical mile
naval academy
naval air station
naval aircraft
naval
architecture
naval auxiliary
naval bomber
naval brass
naval cadet
naval college
naval combat
naval crown
naval engineer
naval fighter
naval forces

naval intelligence
naval interceptor
naval medicine
naval militia
naval mine
naval officer
naval operations
naval pilot
naval pipe
naval reserve
naval school
naval stores
naval vessel
naval vessels
naval warfare
naval-intelligence man
navel ill
navel orange
navel pipe
navel point
navel-shaped
navigable airspace
navigable river
navigable semicircle
navigate in space
navigating bridge
navigating bridge deck
navigating officer
navigation act
navigation and ranging
navigation light
navigation lights
navigation of empty space
navigation radius
navigation weir
navigational satellite
navigator's bubble
navigator-bombardier trainer
navy agent
navy bean
navy bill
navy blue
navy board
navy cross
navy cut
navy green
navy league
navy leaguer

navy man
navy plug
navy unit
navy yard
nay rather
nay-say
naya paisa
naye paise
ne exeat
ne plus ultra
ne'er
 a
ne'er a one
ne'er-do-well
ne'er-dos
ne-
neanderthal man
neap tide
near and far
near as the bark on a tree
near at hand
near beer
near by
near death
near duplicate
near east
near enough to
near future
near go
near hand
near likeness
near miss
near point
near relation
near rhyme
near side
near squeak
near the ground
near the limen of hearing
near the mark
near the surface
near the threshold of hearing
near the wind
near thing
near to
near upon
near your end
near your heart

near-
near-acquainted
near-adjoining
near-at-hand
near-blindness
near-bordering
near-by
near-colored
near-coming
near-dwelling
near-fighting
near-following
near-growing
near-guessed
near-hand
near-legged
near-miss
near-point
near-related
near-resembling
near-sight
near-sighted
near-silk
near-smiling
near-stored
near-threatening
near-touching
near-ushering
near-white
nearly die laughing
nearly duplicate
nearly duplicated
nearly replicate
nearly replicated
nearly reproduce
nearly reproduced
nearly the same
neat
 as a button
neat as a pin
neat as wax
neat house
neat line
neat price
neat profit
neat soap
neat weight
neat's foot

neat's leather
neat's tongue
neat's-foot oil
neat-ankled
neat-dressed
neat-faced
neat-fingered
neat-folded
neat-footed
neat-handed
neat-handedly
neat-handedness
neat-house
neat-limbed
neat-looking
neb-neb
nebula of Lyra
nebula of Orion
nebular hypothesis
nebulous stars
necessary condition
necessary stool
necessity money
necessity's sharp pinch
neck and crop
neck and heels
neck and neck
neck canal cell
neck cell
neck cord
neck deep
neck handkerchief
neck journal
neck molding
neck of the woods
neck or nothing
neck rot
neck strap
neck sweetbread
neck verse
neck yoke
neck-and-neck race
neck-band
neck-beef
neck-bone
neck-break
neck-breaking
neck-cracking

neck-deep
neck-fast
neck-high
neck-hole
neck-piece
neck-rein
neck-stretching
neck-tie
neck-verse
necklace orchid
necklace poplar
necklace tree
necktie party
necktie sociable
necr-
necro-
necrotic enteritis
necrotic inflammation
necrotic
 tissue
nectar bird
nectar of the gods
nectar-bearing
nectar-breathing
nectar-dropping
nectar-loving
nectar-secreting
nectar-seeking
nectar-spouting
nectar-streaming
nectar-tongued
need clarification
need doing
need explanation
need for
need must
need no explanation
need no prodding
need to
need translation
need-be
need-not
needle bath
needle beam
needle bearing
needle blight
needle bug
needle bush

needle cast
needle chervil
needle dam
needle diatom
needle file
needle fir
needle furze
needle girder
needle gorse
needle grass
needle grinder
needle grinding
needle gun
needle holder
needle ironstone
needle juniper
needle lace
needle loom
needle maker
needle ore
needle palm
needle point
needle pointer
needle scar
needle spar
needle spike rush
needle telegraph
needle time
needle tooth
needle trade
needle valve
needle weir
needle whin
needle-and-ball indicator
needle-and-thread
needle-bar
needle-billed
needle-fish
needle-form
needle-gun
needle-leaved
needle-made
needle-nosed
needle-point
needle-point
lace
needle-pointed
needle-scarred

needle-shaped
needle-sharp
needle-witted
needlenose pliers
needs must
needs-be
needy, the
neel-bhunder
neer-do-well
negation-proof
negative acceleration
negative answer
negative attitude
negative catalyst
negative electricity
negative feedback
negative flag
negative geotropism
negative glow
negative hallucination
negative income tax
negative ion
negative lens
negative misprision
negative polarity
negative pole
negative reinforcement
negative resistance
negative sign
negative tax
negative taxis
negative transfer
negative transference
negative tropism
negative valence
negative-pole
negative-raising
neglect the opportunity
neglected-looking
negotiable bond
negotiable instrument
negotiable instruments
negotiable note
negotiable paper
negotiable securities
negotiate a loan
negotiate a peace
negro corn

negro-head
negrohead beech
neiges d'antan
neighborhood house
neighborhood newspaper
neither fish
neither fish nor fowl
neither here nor there
neither
 hide nor hair
neither hot nor cold
neither more nor less
neither nobility nor clergy
neither one thing nor the other
nem con
nemat-
nemato-
nematode worm
nemean lion
nemine contradicente
nemine dissentiente
nemo me impune lacessit
neo-
neo-Catholic
neo-Celtic
neo-Christianity
neo-Darwinian
neo-Darwinism
neo-Darwinist
neo-Gothic
neo-Greek
neo-Hippocratic medicine
neo-Plasticism
neo-Platonician
neo-Roman
neo-Sanskrit
neo-Sanskritic
neo-Scholastic
neo-Scholasticism
neo-Sogdian
neo-Sumerian
neo-Syriac
neo-Thomism
neo-classic
neo-classicist
neo-darwinian
neo-darwinism
neo-grammarian

neo-impressionism
neo-lamarckism
neo-orthodoxy
neo-scholastic
neo-scholasticism
neocolonialist threat
neoconcrete art
neofigural postsurrealism
neofigural postsurrealist
neolithic man
neon lamp
neon light
neon tetra
neon tube
neoorthodox theology
neoprene rubber
neoza pine
nephelite-basanite
nephelite-diorite
nephelite-porphyry
nephelite-syenite
nephelite-tephrite
nephelo-
nephr-
nephro-
nephro-ureterectomy
neptunium
series
nero antico
neroli camphor
neroli oil
nerv-
nerve and sinew
nerve block
nerve canal
nerve cavity
nerve cell
nerve center
nerve centre
nerve cord
nerve eminence
nerve ending
nerve fiber
nerve fibre
nerve gas
nerve impulse
nerve net
nerve ring

nerve sheath
nerve stretching
nerve trunk
nerve yourself
nerve-ache
nerve-celled
nerve-cutting
nerve-deaf
nerve-deafness
nerve-destroying
nerve-irritating
nerve-jangling
nerve-racked
nerve-racking
nerve-rending
nerve-ridden
nerve-shaken
nerve-shaking
nerve-shattering
nerve-stretching
nerve-tingling
nerve-trying
nerve-winged
nerve-wracking
nerves of steel
nerves on edge
nervo-
nervous as a cat
nervous breakdown
nervous disorder
nervous exhaustion
nervous nellie
nervous prostration
nervous stomach
nervous strain
nervous system
nervous tension
nervous wreck
nest box
nest egg
nest fungus
nest of drawers
nest-building
nest-egg
nestle-cock
net area
net assets
net blotch

net domestic product
net earnings
net fixer
net income
net
 interest
net line
net national product
net necrosis
net pay
net plankton
net price
net profit
net receipts
net register ton
net register tonnage
net silk
net tare
net ton
net tonnage
net tracery
net valuation
net value
net wages
net weaver
net weight
net worth
net-fashion
net-tender
net-veined
net-winged
nether cheeks
nether regions
nether side
nether vert
nether world
nether world diety
nethermost layer
nethermost level
nethermost stratum
neti neti
netted melon
netted-veined
nettie-wife
netting knot
nettle butterfly
nettle cell
nettle cloth

nettle creeper
nettle family
nettle geranium
nettle hemp
nettle potato
nettle rash
nettle tree
nettle-cloth
nettle-leaved
nettle-rough
nettle-stung
nettle-tree
nettling cell
network affiliations
network pulser
network show
network stations
neufchatel cheese
neur-
neural arch
neural axis
neural canal
neural cavity
neural crest fold
neural gland
neural groove
neural lamina
neural plate
neural process
neural shield
neural spine
neural tube
neuraminic
 acid
neuro-
neurocirculatory asthenia
neurogenic shock
neurological disease
neuromotor apparatus
neuron doctrine
neurotic disorder
neurotic personality
neurotic-depressive reaction
neuter passive
neuter verb
neutral acriflavine
neutral atom
neutral axis

neutral color
neutral corner
neutral ground
neutral monist
neutral point
neutral position
neutral red
neutral spirits
neutral territory
neutral tint
neutral zone
neutral-tinted
neutralist nation
neutro-
neutron bomb
neutron factory
neutron number
neutron reaction
neutron star
never a one
never be forgotten
never cease
never die
never end
never fear
never feel better
never finish
never forget
never free from
never hear the last of
never idle
never in all your born days
never in my life
never in the world
never let go
never let on
never mind
never nod
never on earth
never on time
never otherwise
never pass
never say die
never sleep
never so
never stoop
never to be erased from the mind
never to be forgotten

never to return
never touch
never-ceasing
never-ceasingly
never-certain
never-changing
never-conquered
never-constant
never-daunted
never-dead
never-dietree
never-dying
never-ended
never-ending
never-endingly
never-endingness
never-fading
never-failing
never-lasting
never-needed
never-never
never-never
country
never-never land
never-quenching
never-ready
never-resting
never-resting thing called Time
never-satisfied
never-say-die
never-setting
never-shaken
never-silent
never-sleeping
never-smiling
never-stable
never-strike
never-swerving
never-tamed
never-tiring
never-to-be-equaled
never-trodden
never-twinkling
never-vacant
never-varied
never-varying
never-waning
never-wearied

never-winking
never-withering
new arrival
new beginning
new birth
new blue
new boy
new broom
new brutalism
new catholic edition
new church
new covenant
new critic
new criticism
new deal
new departure
new englander
new english bible
new ethical movement
new generation
new greek
new halfpenny
new hampshire
new hebrew
new high
new humanism
new issue
new
latin
new lease on life
new life
new light
new look
new man
new math
new mathematics
new maths
new meaning
new mintage
new moon
new moon bob
new morality
new pence
new penny
new penny Brit
new phase
new philharmonic pitch
new planets

new realism
new sense
new slant
new style
new term
new testament
new theology
new thought
new to
new town
new twist
new wave
new wine
new wine in old bottles
new wool
new word
new world
new wrinkle
new year
new year's day
new yorker
new zealander
new-admitted
new-apparel
new-array
new-awaked
new-begotten
new-bladed
new-bloomed
new-blown
new-born
new-built
new-coined
new-come
new-create
new-cut
new-day
new-fallen
new-fashion
new-fashioned
new-fire method
new-fledged
new-found
new-front
new-furbish
new-furnish
new-grown
new-laid

new-light
new-looking
new-made
new-mint
new-minted
new-mintedness
new-model
new-modeler
new-mown
new-name
new-people
new-rich
new-rigged
new-risen
new-set
new-shaped
new-sprung
new-spun
new-written
new-wrought
new-year
newborn
 babe
newcastle disease
newel post
newel stair
newel-post
newest of the new
newfangled contraption
newfangled device
newfangled expression
newly come
newly-rich
newness to
news agency
news agent
news analyst
news bell
news case
news channel
news commentator
news conference
news dealer
news editor
news flash
news item
news kiosk
news media

news medium
news peg
news release
news report
news room
news service
news stall
news stirring
news story
news ticker
news vendor
news writer
news-greedy
news-letter
news-making
news-man
news-seeking
news-sheet
news-writer
newspaper of record
newspaper post
newspaper syndicate
newton-meter
next best
next best thing
next door
next door to
next friend
next in line
next life
next of kin
next to
next to nothing
next ways
next world
next-beside
next-door
next-door neighbor
nexus of cause and effect
nez perce
ngai camphor
ni-hard iron
ni-resist iron
nibbing plank
nibble at
nibble away
nibby-jibby
nice Nelly

nice body
nice distinction
nice ear
nice going
nice
 guy
nice nellie
nice piece of work
nice predicament
nice-Nellie
nice-Nellyism
nice-nelly
nice-nellyism
nicene creed
niceness of distinction
niche in the hall of fame
nicht wahr
nick of time
nick-eared
nick-nack
nickel acetate
nickel bloom
nickel bronze
nickel calciner
nickel carbonyl
nickel glance
nickel gray
nickel green
nickel gymnite
nickel monoxide
nickel ocher
nickel oxide
nickel plate
nickel protoxid
nickel sesquioxide
nickel silver
nickel steel
nickel tetracarbonyl
nickel-cadmium battery
nickel-iron accumulator
nickel-plate
nickel-plated
nickelic oxide
nickelous oxide
nicker nut
nicker tree
nicker-tree
nicotine addict

nicotine addiction
nicotine sulphate
nicotinic acid
nicotinic acid amide
nictitating membrane
nid-nod
niddle-noddle
niddy-noddy
nieve penitente
nievie-nievie-nick-nack
niff-naff
niff-naffy
niffy-naffy
niger oil
niger seed
nigger bug
nigger chaser
nigger chub
nigger daisy
nigger heaven
nigger pine
nigger toe
niggerhead cactus
nigh about
nigh by
nigh hand
nigh on
nigh
onto
nigh side
nigh-destroyed
nigh-drowned
nigh-ebbed
nigh-hand
nigh-naked
nigh-past
nigh-spent
night adder
night and day
night ape
night bird
night blindness
night blue
night bolt
night cart
night chair
night clothes
night cloud

night club
night court
night crawler
night crow
night dancer
night dew
night dial
night editor
night effect
night emerald
night fighter
night fire
night flower
night green
night heron
night jasmine
night jessamine
night kaka
night key
night lamp
night latch
night letter
night life
night light
night line
night lizard
night monkey
night office
night operations
night owl
night palsy
night parrot
night partridge
night pennant
night piece
night prayer
night rail
night raven
night rider
night robe
night rocket
night school
night sergeant
night shift
night singer
night snake
night soil
night song

night sparrow
night spell
night spot
night steed
night stick
night sweat
night table
night terror
night vision
night warbler
night watch
night watcher
night watches
night
 watching
night watchman
night willow herb
night-bird
night-black
night-blind
night-blindness
night-blooming
night-blooming cereus
night-blowing
night-born
night-bringing
night-cap
night-cellar
night-cheering
night-clad
night-cloaked
night-clothes
night-club
night-clubbed
night-clubbing
night-contending
night-cradled
night-crow
night-dark
night-decking
night-dispersing
night-dress
night-enshrouded
night-eyed
night-fallen
night-faring
night-feeding
night-filled

night-flowering
night-fly
night-flying
night-folded
night-foundered
night-gaping
night-glass
night-gown
night-grown
night-hag
night-haired
night-haunted
night-hawk
night-heron
night-hid
night-light
night-long
night-mantled
night-night
night-overtaken
night-owl
night-piece
night-prowling
night-rail
night-raven
night-riding
night-robbing
night-robe
night-robed
night-rolling
night-scented
night-season
night-shift
night-shining
night-shirt
night-singing
night-spell
night-straying
night-struck
night-swaying
night-swift
night-swollen
night-tide
night-time
night-traveling
night-tripping
night-veiled
night-walker

night-wandering
night-warbling
night-watch
night-watching
night-watchman
night-work
nightclub
habitue
nightshade family
nighty-night
nigrosine spirit-soluble
nigrosine water-soluble
nigrospora cob rot
nihil ad rem
nihil album
nihil debet
nihil dicit
nihil ex nihilo
nihil habet
nihil obstat
nihilistic delusion
niku-bori
nil admirari
nil desperandum
nil nisi bonum
nil sine numine
nile green
nilly-willy
nilpotent algebra
nim tree
nimble mind
nimble will
nimble wit
nimble-eyed
nimble-feathered
nimble-fingered
nimble-footed
nimble-headed
nimble-heeled
nimble-jointed
nimble-mouthed
nimble-moving
nimble-pinioned
nimble-shifting
nimble-spirited
nimble-stepping
nimble-tongued
nimble-toothed

nimble-winged
nimble-witted
nimble-wittedness
nimbus cloud
niminy-pimininess
niminy-piminy
niminy-piminyism
nimmy-pimmy
nimonic alloy
nine days' wonder
nine o'clock
nine points of the law
nine-banded
nine-banded armadillo
nine-circled
nine-cornered
nine-day
nine-eyed
nine-eyed
eel
nine-eyes
nine-foot
nine-hole
nine-holes
nine-hour
nine-inch
nine-jointed
nine-killer
nine-knot
nine-lived
nine-mile
nine-part
nine-part measure
nine-part time
nine-ply
nine-point
nine-point circle
nine-pound
nine-pounder
nine-power
nine-share
nine-shilling
nine-spined
nine-spined stickleback
nine-spot
nine-spotted
nine-syllabled
nine-tailed

nine-tenths
nine-voiced
nine-word
nine-year
ninepenny morris
ninepin block
nineteenth hole
nineteenth man
ninety-acre
ninety-day
ninety-day wonder
ninety-eight
ninety-eighth
ninety-fifth
ninety-first
ninety-five
ninety-four
ninety-fourth
ninety-hour
ninety-mile
ninety-nine
ninety-ninth
ninety-one
ninety-second
ninety-seven
ninety-seventh
ninety-six
ninety-sixth
ninety-third
ninety-three
ninety-ton
ninety-two
ninety-word
ninny-hammer
ninth chord
ninth cranial nerve
ninth-born
ninth-built
ninth-class
ninth-formed
ninth-hand
ninth-known
ninth-mentioned
ninth-rate
ninth-told
niobic acid
nip and tuck
nip

at the heels of
nip in the bud
nip in the head
nip off
nip through
nip up
nip-up
nipa alcohol
nipa sugar
nipped at
nipped waist
nipper crab
nipperty-tipperty
nipping wind
nipple cactus
nippy wind
nirvana principle
nisi prius
nisi prius court
nisi-prius
nissen hut
nissuee trout
nit grass
nit-grass
nit-picking
niter cake
niter-blue
nitr-
nitramino group
nitramino radical
nitric acid
nitric bacteria
nitric bacterium
nitric ether
nitric oxide
nitride process
nitriding steel
nitrile base
nitrile rubber
nitro compound
nitro group
nitro powder
nitro radical
nitro-
nitro-cellulose
nitro-cotton
nitro-hydro-carbon
nitrogen balance

nitrogen chloride
nitrogen cycle
nitrogen dioxide
nitrogen equilibrium
nitrogen family
nitrogen fixation
nitrogen fixer
nitrogen iodide
nitrogen monoxide
nitrogen mustard
nitrogen narcosis
nitrogen oxide
nitrogen pentoxide
nitrogen peroxide
nitrogen tetroxide
nitrogen trioxide
nitrogen-fixing
nitrogen-free
nitrohydrochloric acid
nitros-
nitroso group
nitroso radical
nitroso-
nitrosyl
chloride
nitrosylsulfuric acid
nitrous acid
nitrous bacteria
nitrous bacterium
nitrous ether
nitrous oxide
nitroxanthic acid
nitta tree
nitty-gritty
nitty-gritty, the
njave butter
njave oil
no alternative
no ball
no beauty
no better than she should be
no better than you should be
no buts about it
no catch
no chance
no charge
no chicken
no choice

no claim
no conjuror
no contest
no credit to
no depth
no dice
no difference
no doubt
no dumbbell
no ear
no end
no end of
no end of a fellow
no end to
no exit
no expectation
no fear
no few
no fine print
no fine print at the bottom
no flies on
no go
no great matter
no great shakes
no holds barred
no hope
no ifs
no ifs, ands, or buts
no joke
no joker
no joker in the deck
no kicker
no laughing matter
no less
no less than
no longer among us
no longer present
no longer with us
no love lost
no ma'am
no man
no man's land
no matter
no matter how
no matter what
no matter when
no matter which
no matter who

no mean
no mo
no modest violet
no
more
no more and no less
no more beyond
no nearer
no nerves
no one
no onenobody
no other
no picnic
no place higher
no prize
no room for error
no room to swing a cat
no say
no scholar
no sir
no sirree
no skin off your back
no skin off your elbow
no skin off your nose
no slouch
no small print
no soap
no sooner said than done
no stranger to
no strings
no strings attached
no such a thing
no such thing
no sweat
no time
no time at all
no time to be lost
no title
no two ways about it
no use
no water
no way
no way out
no whit
no-account
no-ball
no-being
no-bottom sounding

no-claim bonus
no-claims bonus
no-count
no-deposit
no-deposit-no-return
no-eye pea
no-fault
no-fault insurance
no-go
no-go area
no-go gauge
no-good
no-hit
no-hitter
no-hoper
no-load fund
no-man's-land
no-no
no-nonsense
no-one
no-par
no-par stock
no-par-value
no-place
no-rent land
no-show
no-side
no-surrender
no-system
no-thoroughfare
no-tillage
no-trump
no-trumper
noan's ark
nobel prize
nobiliary particle
noble ambition
noble
art
noble art of self-defense
noble birth
noble experiment
noble fir
noble gas
noble metal
noble metals
noble opal
noble rank

noble rank or birth
noble savage
noble-born
noble-couraged
noble-featured
noble-fronted
noble-looking
noble-minded
noble-mindedly
noble-mindedness
noble-natured
noble-spirited
noble-tempered
noble-visaged
noblesse d'epee
noblesse de robe
noblesse oblige
nobody home
nobody knows
nobody on earth
nobody one knows
nobody present
nobody special
nobody the wiser
nobody under the sun
nobody's fool
nobody's patsy
nobody's sucker
nocking point
noct-
nocti-
nocturnal arc
nocturnal epilepsy
nod assent
nod of assent
nod off
nod to
nod to its fall
nod to your fall
nodal point
nodding acceptance
nodding acquaintance
nodding cap
nodding lilac
nodding to its fall
nodding trillium
noddy tern
node house

node longitude
node of Ranvier
nodi-
nodical month
nodule disease
noise about
noise abroad
noise and shouting
noise factor
noise field intensity
noise figure
noise interference
noise
 limiter
noise pollution
noise suppressor
noise-canceling microphone
noiseless foot of Time
noisette brown
nol pros
nol-pros
nol-prossed
nol-prossing
nolens volens
noli me tangere
noli-me-tangere
noll-kholl
nolle prosequi
nolo contendere
nom de guerre
nom de plume
nom de theatre
nombril point
nomen nudum
nominal charge
nominal damages
nominal head
nominal partner
nominal price
nominal rate
nominal value
nominal wages
nominating convention
nomination borough
nomination in the race
nominative absolute
nominative of address
nomo-

noms de guerre
non avenu
non compos
non compos mentis
non est
non est inventus
non licet
non liquet
non nobis
non obst
non obstante
non placet
non plus
non plus ultra
non possumus
non pros
non prosequitur
non rep
non repetatur
non seq
non sequitur
non troppo
non ultra
non-
non-African
non-Alexandrian
non-American
non-Anglican
non-Arab
non-Arabic
non-Aryan
non-Asian
non-Asiatic
non-Attic
non-Bantu
non-Baptist
non-Biblical
non-Biblically
non-Bolshevik
non-Bolshevism
non-Bolshevist
non-Bolshevistic
non-Brahmanic
non-Brahmanical
non-Brahminic
non-Brahminical
non-British
non-Buddhist

non-Buddhistic
non-Calvinist
non-Calvinistic
non-Calvinistical
non-Catholic
non-Caucasian
non-Caucasic
non-Caucasoid
non-Celtic
non-Chaucerian
non-Chinese
non-Christian
non-Congregational
non-Congressional
non-Cymric
non-Czech
non-Czechoslovakian
non-Danish
non-Darwinian
non-Druid
non-Egyptian
non-English
non-Episcopalian
non-Euclidean
non-Euclidean
geometry
non-European
non-Flemish
non-French
non-Gaelic
non-German
non-Germanic
non-Gothic
non-Gothically
non-Greek
non-Gypsies
non-Gypsy
non-Hamitic
non-Hebraic
non-Hebraically
non-Hebrew
non-Hellenic
non-Hibernian
non-Hindu
non-Homeric
non-Indian
non-Ionic
non-Irish

non-Islamic
non-Islamitic
non-Israelite
non-Israelitic
non-Israelitish
non-Italian
non-Italic
non-Japanese
non-Jew
non-Jewish
non-Kaffir
non-Latin
non-Lutheran
non-Magyar
non-Malay
non-Malayan
non-Malthusian
non-Mediterranean
non-Mendelian
non-Methodist
non-Methodistic
non-Mohammedan
non-Mongol
non-Mongolian
non-Mormon
non-Moslem
non-Moslems
non-Muhammadan
non-Muhammedan
non-Muslem
non-Muslems
non-Muslim
non-Muslims
non-Negritic
non-Negro
non-Negroes
non-Newtonian
non-Nicene
non-Nordic
non-Norman
non-Norse
non-Oscan
non-Parisian
non-Peruvian
non-Polish
non-Portuguese
non-Presbyterian
non-Protestant

non-Prussian
non-Quaker
non-Quakerish
non-Roman
non-Russian
non-Sabbatic
non-Sabbatical
non-Sabbatically
non-Sanskritic
non-Saxon
non-Scandinavian
non-Semite
non-Semitic
non-Shakespearean
non-Shakespearian
non-Slavic
non-Spanish
non-Spartan
non-Stoic
non-Swedish
non-Swiss
non-Syrian
non-Tartar
non-Teuton
non-Teutonic
non-Trinitarian
non-Turk
non-Turkic
non-Turkish
non-Tuscan
non-U
non-Ukrainian
non-Umbrian
non-Unitarian
non-Uralian
non-Vedic
non-Venetian
non-Virginian
non-Welsh
non-White
non-Zionist
non-ability
non-access
non-appearance
non-arcking
non-assumpsit
non-attendance
non-claim

non-co-operate
non-co-operation
non-co-operationist
non-co-operative
non-co-operator
non-co-ordination
non-coll
non-collegiate
non-com
non-combatant
non-commissioned
non-committal
non-communicant
non-compounder
non-con
non-condensing
non-conductor
non-contagion
non-content
non-contradiction
non-effective
non-efficient
non-ego
non-elect
non-electric
non-ens
non-essential
non-euclidean
non-existence
non-existent
non-feasance
non-gremial
non-importation
non-intercourse
non-interference
non-intervention
non-intrusion
non-iron
non-joinder
non-jurant
non-juring
non-juror
non-jury
non-literate
non-member
non-metal
non-moral
non-natty

non-natural
non-necessity
non-noble
non-obedience
non-payment
non-performance
non-placet
non-proficiency
non-profit-making
non-pros
non-prosequitur
non-prossed
non-prossing
non-recoiling
non-reduction
non-regent
non-regulation
non-residence
non-resident
non-residential
non-resistance
non-resistant
non-society
non-striker
non-subscriber
non-substantial
non-tenure
non-term
non-union
non-user
non-vascular
nona-
nonaction
calligraphist
nonaction calligraphy
nonaggression pact
nonalcoholic beverage
nonaligned nation
nonanoic acid
nonapparent easement
nonapparent servitude
nonassessable mutual
nonassessable stock
noncallable bond
noncallable securities
noncanonical writings
nonce word
nonce, the

nonchord tone
nonco-operation
nonco-operationist
nonco-operator
noncommissioned officer
noncommutative algebra
noncondensing engine
noncontingent existence
noncontingent free will
noncritical mass
nondestructive testing
nondirectional antenna
nondirectional microphone
nondirective therapy
nondischarge of debts
nondrying oil
none else
none of your business
none other
none to spare
none too soon
none-so-pretties
none-so-pretty
nonfat dry milk
nonfat milk
nonfiction prose
nonfiction writer
nonfilterable virus
nonforfeiture benefit
nonforfeiture law
nonforfeiture value
nonfunctional addition
nongraded school
nonharmonic tone
nonionic detergent
nonlinear calibrations
nonlinear system
nonliving matter
nonmalignant tumor
nonmaterial
culture
nonmedical therapist
nonmedical therapy
nonmember bank
nonnative citizen
nonnegotiable bond
nonnegotiable demand
nonnuclear weapons

nonny-nonny
nonordained persons
nonorganic matter
nonpartisan ballot
nonpartisan election
nonpartisan primary
nonprescription drug
nonprone to disease
nonproneness to disease
nonprovided school
nonre-eligibility
nonre-eligible
nonrestrictive clause
nonreversible reaction
nonsanctioned behavior
nonscheduled airline
nonself-governing
nonsense talk
nonsense verse
nonsex-linked
nonsinusoidal circuit
nonskid tire
nonspecific immunity
nonspecific therapy
nonspore-forming
nonstandard language
nonstandard speech
nonsusceptibility to disease
nonsusceptible to disease
nontransferable vote
nontuple time
nonunion shop
nonvalue bill
nonverbal communication
nonvintage wine
nonviolent change
nonviolent protest
nonviolent resistance
nonvolatile oil
nonvoting stock
nonyl alcohol
noodle-head
noogoora bur
nook shaft
nook-shotten
noon-light
noonday light
noonday

night
noontide light
nor flesh
nor good red herring
nor nee
nor yet
nor'-west
nor'-wester
nor-
nor-noreast
norfolk howard
norfolk jacket
norm of perfection
normal atom
normal axis
normal barrage
normal curve
normal distribution
normal divisor
normal equivalent deviate
normal landing
normal load
normal loop
normal magnification
normal matrix
normal orthogonal
normal pentane
normal pitch
normal saline solution
normal school
normal series
normal spin
normal tax
normal unemployment
normalized text
norman architecture
norman-french
normative system
normed conjugate
normed space
north about
north briton
north by east
north by west
north celestial pole
north country
north germanic
north mark

north pole
north sea
north shore
north side
north star
north wind
north-countriness
north-countryman
north-east
north-easter
north-easterly
north-eastern
north-eastward
north-end
north-following
north-light
north-north-east
north-north-west
north-northeast
north-northeastward
north-northeastwardly
north-northeastwards
north-northwest
north-northwestward
north-northwestwardly
north-northwestwards
north-polar
north-preceding
north-seeking
north-sider
north-west
north-wester
north-westerly
north-western
north-westward
northeast
by east
northeast by north
northeast storm
northern canoe
northern cross
northern crown
northern harvestfish
northern hemisphere
northern kingfish
northern lights
northern mammoth
northern pike

northern porgy
northern red currant
northern redtop
northern sennet
northern studfish
northwest by north
northwest by west
norwegian elkhound
nos-
nosce te ipsum
nose ape
nose around
nose around for
nose bag
nose bit
nose cone
nose count
nose dive
nose down
nose drops
nose ender
nose flute
nose glasses
nose guard
nose hitch
nose into
nose iron
nose key
nose leaf
nose out
nose over
nose peg
nose pipe
nose radiator
nose rag
nose ring
nose stiffener
nose to nose
nose to nose with
nose turret
nose up
nose wheel
nose-bag
nose-band
nose-belled
nose-bleed
nose-dive
nose-dived

nose-diving
nose-dove
nose-grown
nose-heavy
nose-high
nose-leafed
nose-led
nose-nippers
nose-piece
nose-piercing
nose-pipe
nose-pulled
nose-ring
nose-shy
nose-smart
nose-thirl
nose-thumbing
nose-tickling
nose-up
nose-wise
nosee-um
nosegay
 tree
nosewheel undercarriage
nosey Parker
nosh-up
noso-
nostalgia for the past
nosy Parker
nosy parker
not a Chinaman's chance
not a bad idea
not a bit
not a bit alike
not a bit of difference
not a bit of it
not a blessed one
not a blessed soul
not a breath of air
not a chance
not a dream
not a few
not a hint
not a jot
not a jot or tittle
not a leaf stirring
not a lick
not a lick or smell

not a little
not a mite
not a one
not a particle
not a patch on
not a pin to choose
not a prayer
not a scrap
not a shadow of a suspicion
not a single one
not a single person
not a smidgen
not a smitch
not a snowball's chance in hell
not a soul
not a speck
not a stitch
not a stitch to your back
not a stitch to your name
not a suspicion
not a trace
not a whit
not
abide
not absolutely
not accept
not accept compromise
not accept defeat
not accomplish
not accord with
not add up
not admit
not affordable
not agree
not all there
not allow
not allow yourself to believe
not allowed
not amiss
not amount to a damn
not amount to a hill of beans
not amount to anything
not an illusion
not an iota
not another peep out of you
not another word
not answer
not anticipate

not anticipated
not any
not appreciate
not approach
not approve
not as young as you used to be
not at all
not at any price
not at issue
not attend
not back down
not bad
not bargain for
not bat an eye
not bat an eyelash
not be a bit surprised
not be able
not be able to abide
not be able to account for
not be able to bear
not be able to dispense with
not be able to do without
not be able to down
not be able to endure
not be able to say much for
not be able to sit down
not be able to stand still
not be able to swallow
not be able toabide
not be affected by
not be all there
not be at home to
not be
behindhand
not be born yesterday
not be caught flatfooted
not be content with
not be entitled to
not be found
not be good for
not be in existence
not be in it
not be in pigtails
not be in your right mind
not be likely
not be met with
not be on speakers
not be on speaking terms

not be on time
not be ready
not be right in the head
not be surprised
not be taken in by
not be too visible
not be up to
not be versed
not be with it
not bear
not bear inspection
not bear with
not beat about the bush
not believe
not believe your ears
not believe your eyes
not believe your senses
not believed
not blink an eye
not boggle at anything
not born yesterday
not breathe
not breathe a word
not bright
not brook
not budge
not budge an inch
not butt in
not buy
not by a damn sight
not by a darn sight
not by a long chalk
not by a long shot
not by a long sight
not by any means
not care
not care a damn
not care a straw about
not care for
not care if you do
not care much for
not care to
not catching
not change
not
charmed
not choke on
not come

not come amiss
not come near
not come off
not come to grips with
not come to the point
not come up to
not come up to expectation
not come up to par
not come up to scratch
not come up to the mark
not coming
not comparable
not comparable to
not compare
not compare with
not comply
not comprehensively
not concern
not condone
not conform
not connect with
not consent
not consider
not considerate
not considered
not convey anything
not cost anything
not count
not count the cost
not countenance
not counting
not crack a smile
not cricket
not cry over spilled milk
not cut it
not cut out for
not cut the mustard
not dare to show your face
not deep
not deep enough to float a match
not deny
not deserving belief
not destroy
not do
not do by halves
not do justice to
not done
not dry behind the ears

not easy
not eat
not either
not endanger
not endure
not enough
not enough to count
not enough to matter
not enter your head
not enter your mind
not equal to
not ever
not exhaustively
not
exist
not expect
not expend
not expose yourself
not face up to
not fail
not fair
not fall for
not far
not far from
not far off
not fast
not feel like
not feel like anything
not figure
not fill the bill
not find it in your heart to
not find your way to first base
not firm
not fit for man or beast
not fit for mixed company
not fit to be seen
not fit to drink
not fit to eat
not flag
not flinch from
not following
not for attribution
not for love or money
not for publication
not for release
not for the life of me
not for the record
not for the world

not foresee
not forget
not found
not gag on
not get all choked up over
not get along
not get involved
not get involved in
not get off base
not get out of line
not get to first base
not give
not give a damn
not give a damn about
not give a dime a dozen for
not give a hoot
not give a hoot for
not give a shit
not give a shit for
not give a thought to
not give away
not give it a second thought
not give it another thought
not give two hoots
for
not give up
not give up the ship
not go along with
not go for
not go off the deep end
not go on all fours with
not go out on a limb
not go too far
not good enough
not guesswork
not guilty
not hack it
not half
not half a chance
not half bad
not half of
not hard
not hard to look at
not hardly
not harken
not have
not have a Chinaman's chance
not have a chance

not have a dry thread
not have a leg to stand on
not have a moment to spare
not have a penny
not have a prayer
not have a sou
not have a word to say
not have all your buttons
not have all your marbles
not have any part of
not have anything to do with
not have idea one
not have it
not have it in one
not have the first idea
not have the foggiest
not have the heart
not have the heart to
not have the knack
not have the least idea
not have the remotest idea
not have the stomach for
not have the stomach to
not have time
not having all one's marbles
not having any
not hear a word
not hear of
not heed
not held against one
not held against
you
not here
not hesitate
not hesitate to
not hold a candle to
not hold back
not hold it against one
not hold it against you
not hold together
not hold up
not hold up in the wash
not hold water
not hold with
not hold your breath
not if I can help it
not if I know it
not if you can help it

not implicate
not imply
not in donkey's years
not in error
not in it
not in keeping with
not in residence
not in the habit of
not in the least
not in the mood
not in the picture
not in the same street with
not in your right mind
not included
not infrequently
not interfere
not involve
not involve yourself
not keep
not keep faith with
not kid yourself
not know
not know any better
not know any of the answers
not know beans
not know chalk from cheese
not know from A to B
not know from Adam
not know how
not know someone from Adam
not know the first thing about
not know the half of it
not know the score
not know the time of day
not know the way home
not know up from down
not know what it is all about
not
know what o'clock it is
not know what to make of
not know what you are about
not know what's what
not know when to stop
not know when you are beaten
not know where you stand
not know which way is up
not know which way to turn
not know your interest

not know your own mind
not known
not kosher
not leave a leg to stand on
not let a word escape one
not let a word escape you
not let go
not let it get you down
not let it go further
not let out a peep
not lift a finger
not lift a hand
not like
not likely
not listen
not live to eat
not live up to expectation
not long ago
not look back
not look backward
not look for
not look like
not lose a moment
not lose sight of
not lying down
not make an issue of
not make any difference
not make head or tail of
not make heads or tails of
not make it
not make out
not make sense
not make static
not make the course
not make the grade
not make waves
not many
not matter
not matter to
not mean a thing
not measure up
not measure up to expectation
not measuring
up
not meddle
not meddle with
not meriting belief
not mince words

not mind
not mind if you do
not mind your business
not miss a trick
not move a foot
not moving
not much
not much for looks
not much of a bargain
not much to boast of
not much tolook at
not nearly
not new
not notice
not observe
not occur
not of the earth
not of this world
not often
not on speaking terms
not on the job
not on your life
not one
not open your mouth
not opinion
not oppose
not outstanding
not overlook a bet
not pass
not pass muster
not pay
not penetrate
not perfect
not permit
not permitted
not play fair
not possible
not present
not pretend to say
not proceed with
not proved
not proven
not pull fair
not pull your punches
not pursue with
not put a foot wrong
not put it past
not put up with

not qualify
not quite
not quite right
not rare
not reach
not reach to
not real
not realize your expectations
not really
not receive
not refuse
not register
not relate to
not relax
not relax your concern
not remember
not resemble
not
resist
not respect
not respectable
not rest
not right
not right in the head
not rightly know
not ring any bells
not ring true
not rock the boat
not say 'boo'
not say a word
not see
not see an inch beyond your nose
not see beyond your nose
not see the wood for the trees
not seldom
not show up
not shrink from
not shut your eyes
not signify
not singular
not slacken
not sleep a wink
not so
not so bad
not so dumb
not so many
not so much
not so you could tell it

not spare the horses
not speak well of
not square
not square with
not stand a chance
not stand for
not stand on ceremony
not stand up
not standard
not stick your neck out
not stir
not stir a step
not stomach
not stop to think
not stretch
not strike your colors
not subject to call
not submit
not suffer
not suffice
not surprised
not swallow
not sweat it
not take
not take 'no' for an answer
not take care of
not take it as a joke
not take kindly to
not take lying down
not take upon yourself to say
not tamper
not tell
not tell apart
not
tell one from the other
not that sort
not that you know
not that you would know it
not the half of
not the same
not the same thing at all
not the thing
not the type
not there
not think
not think much of
not think of
not to be believed

not to be borne
not to be changed
not to be compared
not to be compared with
not to be deflected
not to be depended on
not to be depended upon
not to be despised
not to be distinguished
not to be endured
not to be expected
not to be had
not to be had at any price
not to be had for love or money
not to be handled without gloves
not to be improved
not to be minuted
not to be mistaken
not to be moved
not to be overlooked
not to be quoted
not to be recommended
not to be relied on
not to be relied upon
not to be shaken
not to be sneezed at
not to be thought of
not to be trifled with
not to be trusted
not to get a thing out of
not to lift a hand
not to mention
not to mince the matter
not to mince words
not to the purpose
not to your taste
not tolerate
not
too bad
not touch
not touch with a ten-foot pole
not trouble your head about
not trouble your head with
not trouble yourself with
not true
not true to
not turn a hair
not turn the other cheek

not turning over
not understand
not unlike
not up to
not up to expectation
not up to sample
not up to scratch
not up to snuff
not up to specification
not up to standard
not up to your hopes
not use
not use up
not used
not utter a word
not vital
not wait for an invitation
not wait to be asked
not want any part of
not war
not wash
not waste
not weaken
not well-founded
not what it is cracked up to be
not what you used to be
not willing to hear of
not with it
not within the memory of man
not words but action
not work
not worth a continental
not worth a damn
not worth a rap
not worth a thought
not worth a whoop
not worth having
not worth mentioning
not worth saving
not worth speaking of
not worth the candle
not worth the pains
not worth the powder and shot
not worthwhile
not write off
not yield an inch
not

your cup of tea
not your sort
not yourself
not-
not-being
not-delivery
not-ephemeral
not-good
not-living
not-out
not-self
not-soul
not-under-command lights
nota bene
notaries public
notarized statement
notary public
notch block
notch-lobed
notched-leaved
note broker
note discounting
note down
note of alarm
note of explanation
note of hand
note paper
note row
note shaver
note shaving
note value
note well
note-blind
note-blindness
note-book
note-holder
note-paper
note-perfect
notes inegales
notes of a scale
nothing at all
nothing doing
nothing else
nothing else but
nothing if not critical
nothing in excess
nothing in particular
nothing like

nothing loath
nothing more
nothing of the kind
nothing of the sort
nothing off
nothing on earth
nothing special
nothing to boast of
nothing to brag about
nothing to do with
nothing to do with the case
nothing to hide
nothing to it
nothing to say about
nothing to signify
nothing to speak of
nothing to the left
nothing to the right
nothing to think
twice about
nothing to write home about
nothing under the sun
nothing whatever
nothing worth speaking of
notice board
notions counter
noto-
nought beside
noughts and crosses
noughts-and-crosses
noun clause
noun determiner
noun equivalent
noun phrase
nourish in your bosom
nouveau riche
nouveau roman
nouveau roturier
nouveau-riche
nouvelle cuisine
nouvelle vague
nouvelles vagues
novel idea
novel maker
novel of character
novel of ideas
novel of incident
novel of manners

novel of sensibility
novel of the soil
novel reader
novel writer
novel-crazed
novel-making
novel-purchasing
novel-reading
novel-sick
novel-writing
novelty shop
novelty siding
novice point
novus homo
novus ordo seclorum
now and again
now and forever
now and then
now as previously
now or never
now that
now you're talking
now-a-day
now-a-days
now-accumulated
now-being
now-big
now-borne
now-dead
now-existing
now-fallen
now-full
now-known
now-lost
now-neglected
now-waning
nowhere near
nowhere to be found
nowhere to turn
nowhere-dense
noxious
 stench
ns-a-vis
nt wt
nth degree
nth power
nu-value
nub yarn

nubbin disease
nubecula major
nubecula minor
nuci-
nucle-
nuclear artillery
nuclear atom
nuclear bomb
nuclear chemistry
nuclear cross section
nuclear electron
nuclear energy
nuclear engineer
nuclear envelope
nuclear explosive
nuclear family
nuclear fission
nuclear force
nuclear fuel
nuclear furnace
nuclear fusion
nuclear isomer
nuclear isomerism
nuclear magnetic resonance
nuclear magneton
nuclear particle
nuclear physicist
nuclear physics
nuclear power
nuclear power plant
nuclear radiation
nuclear rays
nuclear reaction
nuclear reactor
nuclear resonance
nuclear submarine
nuclear warhead
nuclear weapons
nuclear-powered ship
nuclear-powered submarine
nucleic acid
nuclein base
nucleo-
nucleon number
nucleus counter
nude painting
nudi-
nudum pactum

nugi-
nuisance ground
nuisance tax
nuisance value
null and void
null hypothesis
null method
null sequence
null-manifold
nulla bona
nulla-nulla
nulli secundus
nullius filius
nullius
juris
numb-fish
number admit
number among
number field
number five iron
number four iron
number four wood
number line
number lottery
number nine iron
number off
number one
number one iron
number one wood
number opera
number plate
number present
number seven iron
number six iron
number system
number theory
number three wood
number two
number two iron
number two wood
number work
numbered with the dead
numbers game
numbers pool
numbers racket
numbers runner
numdah rug
numeric data

numerical analysis
numerical aperture
numerical control
numerical forecasting
numerical weather prediction
numerous as the sands
numerous as the stars
nummulitic limestone
nun buoy
nun moth
nun's cloth
nun's fiddle
nun's veiling
nun-bird
nun-buoy
nunc dimittis
nuncupative will
nunny bag
nuptial apartment
nuptial bond
nuptial knot
nuptial mass
nuptial plumage
nuptial song
nuptial tie
nurse an idea
nurse balloon
nurse cell
nurse child
nurse crop
nurse frog
nurse mother
nurse resentment
nurse shark
nurse
tree
nurse your revenge
nurse's aide
nurse-child
nurse-father
nurse-mother
nurse-tree
nursery cannon
nursery rhyme
nursery school
nursery school child
nursery slopes
nursery stakes

nursery stock
nursery tale
nurses' station
nursing bottle
nursing father
nursing foot
nursing home
nursing mother
nursing sister
nurture a belief
nurture a feeling
nurture an idea
nurture the hope
nut bone
nut bread
nut brown
nut buoy
nut coal
nut crab
nut dash
nut grass
nut margarine
nut oil
nut palm
nut pine
nut quad
nut rush
nut sedge
nut to crack
nut weevil
nut-brown
nut-crack
nut-cracker
nut-cracking
nut-gall
nut-gathering
nut-grass
nut-hook
nut-oil
nut-shaped
nut-shelling
nut-sweet
nut-tapper
nut-toasting
nut-tree
nut-weevil
nutgall oak
nutmeg apple

nutmeg bird
nutmeg butter
nutmeg family
nutmeg flower
nutmeg geranium
nutmeg grater
nutmeg hickory
nutmeg liver
nutmeg melon
nutmeg oil
nutmeg pigeon
nutrient ratio
nutritional disease
nutritive ratio
nutritive value
nuts about
nuts and bolts
nuts on
nuts
 over
nutty as a fruitcake
nutty-brown
nutty-flavored
nutty-looking
nux vomica
nycti-
nycto-
nylon carpeting
nylon string
nymph pink
o gauge
o k
o-
o-o
o-o-a-a
o-os
oak apple
oak bark
oak beauty
oak blight
oak brown
oak button
oak canker
oak chestnut
oak family
oak fern
oak fly
oak fungus

oak gall
oak green
oak leaf
oak leaf cluster
oak leather
oak moss
oak nut
oak of Dodona
oak pruner
oak tag
oak thistle
oak toad
oak tree
oak veneer
oak wart
oak wilt
oak-apple
oak-beamed
oak-boarded
oak-clad
oak-cleaving thunderbolts
oak-covered
oak-crested
oak-crowned
oak-leaf brown
oak-leaf cluster
oak-leaved
oak-paneled
oak-tanned
oak-timbered
oak-tree
oak-tree money
oak-wainscoted
oar feather
oar-footed
oast house
oast-house
oast-houses
oat bread
oat cleaner
oat field
oat flour
oat grass
oat grinder
oat huller
oat kiln
oat mill
oat sheller

oat thistle
oat thresher
oat-bearing
oat-cake
oat-crushing
oat-fed
oat-growing
oat-producing
oat-shaped
oaten reed
oath breaker
oath breaking
oath helper
oath
 of allegiance
oath of office
oath of secrecy
oath purgatory
oath suppletory
oath-bound
oath-breaking
oath-despising
oath-detesting
oath-making
oatlike bent grass
oatlike grass
oatmeal cookie
oatseed bird
ob-
obeah doctor
obesity diet
obey the rules
obey your impulse
obispo pine
obiter dicta
obiter dictum
object ball
object case
object glass
object in mind
object language
object lens
object lesson
object libido
object matter
object of art
object of compassion
object of note

object of pity
object of your affections
object program
object space
object speculum
object staff
object teaching
object to
object-glass
object-matter
objectionable person
objective behavior
objective case
objective complement
objective correlative
objective existence
objective genitive
objective idealism
objective point
objective predicate
objective prism
objective relativism
objective relativist
objective spirit
objective truth
objectively true
objectivn objectless preposition
objet d'art
objet d-art
objet trouv
objets
d'art
oblate spheroid
oblation cloth
obligate yourself
obliged to
oblique angle
oblique case
oblique circular cone
oblique circular cylinder
oblique coordinates
oblique figure
oblique line
oblique motion
oblique narration
oblique sailing
oblique section
oblique speech

oblique-angled
oblique-fire
obliquity of the ecliptic
obliterative inflammation
oblong-acuminate
oblong-cordate
oblong-cylindric
oblong-elliptic
oblong-elliptical
oblong-falcate
oblong-hastate
oblong-lanceolate
oblong-leaved
oblong-linear
oblong-ovate
oblong-ovoid
oblong-spatulate
oblong-triangular
oblong-wedgeshaped
obnoxious person
oboe d'amore
oboe da caccia
obscene language
obscene literature
obscure darkness
obscurum per obscurius
obsequent stream
observable behavior
observation balloon
observation car
observation flight
observation kite
observation mine
observation plane
observation platform
observation point
observation post
observation squadron
observation tower
observation train
observatory on the moon
observatory
outlook
observe etiquette
observe protocol
observe the
observe the Golden Rule
observe the formalities

observe the proprieties
observe with a fine-toothed comb
obsess the mind
obsessed by
obsessional neurosis
obsessive compulsion
obsessive-compulsive neurosis
obsessive-compulsive reaction
obsidional coin
obsolete securities
obstacle course
obstacle race
obstacle racer
obstinate person
obstinate pride
obstruction light
obstruction to vision
obtain a divorce
obtain a return
obtain by fair means or foul
obtain under false pretenses
obtaining by deception
obtrude on
obtrude upon
obturator artery
obturator canal
obturator fascia
obturator membrane
obturator nerve
obturator vein
obtuse angle
obtuse bisectrix
obtuse triangle
obtuse-angled
obtuse-angled triangle
obtuse-angular
obtusi-
obvious clue
occasional cause
occasional chair
occasional licence
occasional poet
occasional table
occasional verse
occasioned by
occipital bone
occipital lobe
occipito-

occluded front
occult balance
occult
 meaning
occult phenomena
occult, the
occulting light
occulting screen
occupation bridge
occupation force
occupation franchise
occupation layer
occupation neurosis
occupation stamp
occupational disease
occupational hazard
occupational neurosis
occupational psychology
occupational school
occupational therapy
occupy a certain position
occupy a post
occupy the attention
occupy the chair
occupy the mind
occupy the mind with
occupy the thoughts
occupy the thoughts with
occupy time
occupy your time
occupy yourself
occupy yourself with
occur often
occur periodically
occur to
occur to your mind
ocean basin
ocean bed
ocean bottom
ocean breeze
ocean bug
ocean depths
ocean floor
ocean front
ocean green
ocean greyhound
ocean lane
ocean liner

ocean main
ocean marine insurance
ocean nymph
ocean of emptiness
ocean perch
ocean pout
ocean racer
ocean sea
ocean spray
ocean sunfish
ocean trade
ocean tramp
ocean travel
ocean trip
ocean zone
ocean-born
ocean-borne
ocean-carrying
ocean-compassed
ocean-flooded
ocean-girdled
ocean-going
ocean-going
tug
ocean-guarded
ocean-rocked
ocean-severed
ocean-skirted
ocean-smelling
ocean-spanning
ocean-sundered
ocean-wide
oceanic island
oceanographic research ship
ocellated turkey
ocelli-
ocher brown
ocher orange
ocher red
ocher-brown
ocher-colored
ocher-red
ocher-yellow
ochr-el-guerche
ochro-
oct-
octa-
octadecanoic acid

octagon scale
octahedron group
octal base
octal notation
octal system
octane number
octane rating
octanedioic acid
octave coupler
octave flute
octave scale
octave species
octet theory
octo-
octyl alcohol
octyl phenol
ocuba wax
ocul-
ocular inspection
ocular spectroscope
ocular spectrum
ocular spot
oculo-
oculomotor nerve
odd and even
odd fellow
odd fish
odd job
odd lot
odd man
odd man out
odd moments
odd number
odd or even
odd permutation
odd person
odd thing
odd-bell system
odd-come-short
odd-come-shortly
odd-even check
odd-fangled
odd-humored
odd-jobber
odd-jobman
odd-looking
odd-lot
odd-lot dealer

odd-mannered
odd-me-dod
odd-numbered
odd-pinnate
odd-shaped
odd-sounding
odd-thinking
odd-toed
odds
 and ends
odds and sods
odds or evens
odds-on
odds-on chance
odium theologicum
odont-
odonto-
odontoid process
odor of sanctity
odour of sanctity
odylic force
oedipus complex
oeil-de-boeuf
oeils-de-boeuf
oenanthic ester
oenanthic ether
oeno-
oesophago-
oestrous cycle
of Nassau
of Preston
of a certain age
of a certainty
of a kind
of a low order of importance
of a mind to
of a piece
of a place
of a size
of a sort
of a sudden
of a truth
of age
of all descriptions
of all kinds
of all manner of colors
of all misery
of all shapes

of all sorts
of all the colors of the rainbow
of all things
of all types
of all work
of another sort
of any description
of any kind
of any sort
of bad faith
of behavior
of choice
of cleanly habits
of common ancestry
of common descent
of common occurrence
of common source
of common stock
of concern
of concernment
of consequence
of consummate art
of counsel
of course
of design
of different orders
of
doubt
of easy virtue
of evil portent
of fatal omen
of feeling
of few words
of fiction
of full age
of general application
of general utility
of gentle blood
of good breed
of good cheer
of good comfort
of good credit
of good hope
of good omen
of good physique
of gourmet qualityof great cost
of great price
of happy portent

of heart
of help
of ill omen
of importance
of interest
of itself
of kin
of language
of late
of like mind
of little brain
of little consequence
of little importance
of long duration
of long standing
of loose morals
of many words
of mark
of marriageable age
of moment
of necessity
of no account
of no avail
of no concern
of no consequence
of no earthly use
of no effect
of no force
of no great importance
of no importance
of no matter
of no purpose
of no significance
of no use
of note
of old
of one accord
of one mind
of one piece
of opposite polarity
of other times
of powerful physique
of preference
of promise
of quality
of rank
of record
of ripe age

of sentiment
of service
of
 set purpose
of significance
of small importance
of small number
of sorts
of soul
of sound mind
of that ilk
of that kind
of that sort
of the best
of the best sort
of the blood
of the clock
of the cloth
of the dead
of the deepest
of the deepest dye
of the earth
of the essence
of the faith
of the first magnitude
of the first rank
of the first water
of the folk
of the highest type
of the old school
of the same hue
of the same kidney
of the same mind
of the same stripe
of the true faith
of the war party
of two minds
of unsound mind
of use
of value
of vital importance
of weight
of yesterday
of yore
of your own
of your own accord
of your own choice
of your own free will

of your own volition
of-
of-door
of-fact
of-the-moment
off Broadway
off and on
off base
off chance
off colour
off cut
off day
off duty
off guard
off in the clouds
off in the upper story
off in your reckoning
off key
off limits
off line
off market
off note
off of
off on
off pat
off plumb
off season
off side
off soundings
off
stage
off stump
off the air
off the beam
off the beaten track
off the course
off the cuff
off the field
off the ground
off the heading
off the hinges
off the hip
off the hook
off the old block
off the rails
off the record
off the reel
off the shelf

off the subject
off the top of the head
off the top of your head
off the track
off the trolley
off the vertical
off the wall
off the wind
off white
off with
off with you
off work
off year
off you go
off your beat
off your chump
off your feed
off your guard
off your hands
off your head
off your nut
off your rocker
off your trolley
off-
off-Broadway
off-balance
off-base
off-bear
off-bearer
off-bitten
off-board
off-break
off-cast
off-center
off-centered
off-centre
off-chance
off-color
off-colored
off-corn
off-cutting
off-drive
off-fall
off-falling
off-flavor
off-flow
off-glide
off-go

off-guard
off-hand
off-handed
off-hit
off-hitting
off-hour
off-key
off-licence
off-license
off-limits
off-line
off-load
off-loading
off-look
off-lying
off-mike
off-off-Broadway
off-peak
off-pitch
off-put
off-putting
off-reckoning
off-season
off-setting
off-shaving
off-shed
off-sider
off-sloping
off-sorts
off-stage
off-standing
off-street
off-taking
off-the-cuff
off-the-face
off-the-peg
off-the-record
off-the-wall
off-thrown
off-time
off-tone
off-turning
off-wheel
off-wheeler
off-white
off-year
off-year

election
offend against the law
offend the ear
offend the eye
offend the nostrils
offense to the nostrils
offensive lineman
offensive load
offensive odor
offensive strategy
offensive to ears polite
offensive to gentle ears
offensive warfare
offer a good prospect
offer a prayer
offer a resolution
offer as a plea
offer at a bargain
offer bait to
offer excuse for
offer for sale
offer in defense
offer in exchange
offer itself
offer of marriage
offer of parley
offer price
offer resistance
offer sacrifice
offer thanks
offer the expectation
offer to buy
offer to the public
offer up
offer up an oblation
offer your compliments
offer your congratulations
offer
your felicitations
offer yourself
offered price
offering no delight
offering price
offertory hymn
offertory sentence
offertory veil
offhand position
offhand shot

offical residence
office bearer
office block
office boy
office building
office copy
office fixture
office force
office found
office furniture
office girl
office hours
office hunter
office lawyer
office lock
office manager
office practice
office premium
office seeker
office temporary
office worker
office-bearer
office-block ballot
office-boy
office-seeking
officer of arms
officer of the court
officer of the day
officer of the deck
officer of the guard
officer of the watch
officer plant
officer tree
officers' country
official count
official document
official jargon
official journal
official language
official oath
official scorer
official secrecy
official spokesman
officious will
offscourings of society
offscum of society
offset line
offset lithography

offset lithography press
offset sheet
offset staff
offset-litho
offshore dock
offshore
 rights
offspring of Heav'n firstborn
offtrack betting
oft-named
oft-repeated
oft-time
oft-times
often enough
often offensive
ogee arch
ogee doorway
ogle at
oh boy
oh yes
ohm-ammeter
ohm-ampere system
ohm-mile
ohmic resistance
oil and vinegar
oil asphalt
oil bath
oil beetle
oil box
oil burner
oil bushing
oil cake
oil camp
oil can
oil cellar
oil circuit breaker
oil color
oil column
oil cup
oil derrick
oil distiller
oil drill
oil drum
oil engine
oil extractor
oil feeder
oil field
oil fuel

oil furnace
oil gas
oil gauge
oil gilding
oil gland
oil green
oil groove
oil gun
oil heat
oil heater
oil heating
oil lamp
oil land
oil meal
oil mill
oil milling
oil mold
oil nut
oil of almonds
oil of ben
oil of cade
oil of catechumens
oil of mirbane
oil of myrbane
oil of palms
oil of the sick
oil of turpentine
oil of vitriol
oil of wintergreen
oil omphacine
oil paint
oil painter
oil painting
oil paints
oil palm
oil pan
oil plant
oil press
oil pulp
oil refiner
oil refinery
oil rig
oil ring
oil
rock
oil sand
oil shale
oil shark

oil sheet
oil silk
oil slick
oil spot
oil stove
oil switch
oil tanker
oil tanning
oil tar
oil the tongue
oil tree
oil tube
oil varnish
oil well
oil whetstone
oil yellow
oil-bag
oil-base paint
oil-bearing
oil-break switch
oil-bright
oil-burning
oil-carrying
oil-colorist
oil-colour
oil-containing
oil-cooled
oil-dispensing
oil-distributing
oil-driven
oil-electric
oil-fed
oil-filled
oil-finding
oil-finished
oil-fired
oil-forming
oil-fueled
oil-gas tar
oil-gilding
oil-harden
oil-hardened steel
oil-hardening
oil-heat
oil-heated
oil-insulated
oil-laden
oil-lit

oil-mill
oil-nut
oil-plant
oil-producing
oil-pumping
oil-refining
oil-regulating
oil-saving
oil-seal
oil-secreting
oil-seed
oil-smelling
oil-soaked
oil-temper
oil-tempered
oil-testing
oil-thickening
oil-tongued
oil-tree
oil-yielding
oilcloth knife
oiled silk
oilspot glaze
oily calm
oily-brown
oily-looking
oily-smooth
oily-tongued
oino-
oiticica oil
oka cheese
okey-doke
okle-dokle
old Adam
old age
old
 age pension
old amethyst
old as Adam
old as Methuselah
old as history
old as the hills
old as time
old bach
old bachelor
old bag
old battle-ax
old believer

old bird
old blue
old boy
old boy network
old bulgarian
old campaigner
old catholic
old cedar
old chap
old chat
old christmas
old church slavonic
old clothes
old clothes man
old clothing
old codger
old country
old country, the
old covenant
old crock
old crony
old dame
old days
old dodo
old dog
old duffer
old english
old english sheepdog
old enough to know better
old face
old fart
old fellow
old field
old fogey
old fogy
old folks' home
old french
old fud
old fustic
old geezer
old gent
old gentleman
old girl
old glory
old goat
old gold
old granny
old guard

old hand
old hat
old hen
old high german
old ionic
old ivory
old joke
old lady
old liner
old maid
old man
old man's beard
old master
old moon
old nick
old nobility
old norse
old order
old paper
old party
old person
old poop
old pro
old prussian
old red
old river
old rose
old salt
old
saw
old saxon
old school
old school tie
old sea dog
old sledge
old soldier
old soldiers' home
old song
old squaw
old stager
old story
old style
old talk
old testament
old times
old trot
old turkey
old welsh

old wheeze
old wife
old witch grass
old wives' tale
old woman
old world
old-age
old-age and survivors insurance
old-age assistance
old-age insurance
old-age pension
old-age pensioner
old-aged
old-bachelorish
old-bachelorship
old-boyish
old-clothesman
old-country
old-established
old-faced
old-fangled
old-farrand
old-farrandlike
old-fashioned
old-fashionedly
old-fashionedness
old-field birch
old-field dove
old-field lark
old-field pine
old-fogeydom
old-fogeyish
old-fogy
old-fogydom
old-fogyish
old-fogyishness
old-fogyism
old-gathered
old-gentlemanly
old-gold
old-growing
old-ivory
old-ladyhood
old-line
old-line company
old-liner
old-looking
old-maid

old-maidenish
old-maidish
old-maidishness
old-maidism
old-man cactus
old-man fern
old-man's-beard
old-new
old-rose
old-school
old-sighted
old-sightedness
old-squaw
old-standing
old-style
old-time
old-time
 country music
old-time religion
old-timer
old-timey
old-timey music
old-timiness
old-timy
old-wifely
old-wifish
old-womanish
old-womanishness
old-womanism
old-womanly
old-world
old-worldish
old-worldism
old-worldliness
old-worldly
old-young
olde-worlde
olden times
oldest profession
ole-
oleander fern
oleander scale
oleaster family
olefiant gas
olefin series
oleic acid
oleo gear
oleo leg

oleo oil
oleo strut
oleo-
oleoyl group
oleoyl radical
oleyl alcohol
olfactory area
olfactory bulb
olfactory cell
olfactory nerve
olfactory nerves
olfactory organ
olfactory pit
olfactory sense
olfactory tract
olig-
oligo-
olinda bug
olivaceo-
olive acanthus
olive bark
olive berry
olive branch
olive brown
olive crown
olive drab
olive drabs
olive dun
olive family
olive fly
olive gnat
olive gray
olive green
olive gum
olive knot
olive mangrove
olive nut
olive oil
olive ore
olive plant
olive plum
olive quill
olive scab
olive scale
olive shell
olive
tubercle
olive yellow

olive-backed
olive-backed thrush
olive-bordered
olive-branch
olive-brown
olive-cheeked
olive-clad
olive-colored
olive-complexioned
olive-drab
olive-drab shirt
olive-green
olive-greenish
olive-growing
olive-kernel oil
olive-oil castile soap
olive-pale
olive-shaded
olive-shadowed
olive-sided
olive-sided flycatcher
olive-skinned
olive-tree agaric
olive-wood
olivine-andesite
olivine-basalt
olla podrida
olla-podrida
olympian games
olympic games
om mani padme hum
omander wood
ombres chinoises
ombro-
ome next
omega minus
omega particle
omni mane
omni-
omni-ignorant
omnia vincit amor
omnibus bill
omnibus box
omnibus clause
omnibus driver
omnibus train
omnibus volume
omnibus-driving

omnibus-fashion
omnibus-riding
omnidirectional antenna
omnidirectional microphone
omnidirectional range
omnipotent ruler
omnium gatherum
omnium-gatherum
omnium-gatherums
omo-hyoid
omphalo-
on Easy Street
on Queer Street
on a beam
on a beat
on a bed of roses
on a bowline
on a broad reach
on
a cloud
on a declining scale
on a first-name basis
on a footing
on a good footing
on a large scale
on a leash
on a lee shore
on a level
on a line
on a minuscule scale
on a par
on a reach
on a rock
on a slant
on a small scale
on a stretch
on a string
on a sudden
on a sudden impulse
on a treadmill
on account
on account of
on account of this
on account of what
on account of which
on all accounts
on all counts
on all fours

on all fours with
on all hands
on all sides
on all tongues
on amicable terms
on an easy bowline
on an even keel
on an infinitesimal scale
on and off
on and on
on approval
on bad terms
on bail
on balance
on base
on bedrock
on behalf of
on bended knee
on board
on board ship
on budget terms
on call
on center
on chosen
on cloud nine
on condition
on condition that
on consignment
on credit
on deck
on demand
on deposit
on dit
on divers occasions
on draft
on dry land
on duty
on eagle's wings
on earth
on easy terms
on edge
on end
on equal terms
on even ground
on even terms
on
every hand
on every side

on everyone's lips
on everyone's tongue
on faith
on familiar terms
on file
on fire
on foot
on footback
on friendly terms
on furlough
on good terms
on guard
on hand
on hands and knees
on her beam-ends
on her own bottom
on high
on hire
on holiday
on horseback
on ice
on impulse
on instinct
on intimate terms
on its beam-ends
on its side
on key
on land
on leash
on leave
on line
on live
on loan
on no account
on no condition
on no occasion
on occasion
on offer
on one
on one occasion
on one side
on one's beam-ends
on one's hands and knees
on one's last legs
on one's uppers
on order
on pain of
on paper

on parole
on passage
on penalty of
on pension
on pins and needles
on principle
on probation
on purpose
on reconsideration
on record
on relief
on route to
on sabbatical leave
on schedule
on second thought
on security
on shank's mare
on shank's pony
on shipboard
on ships
on short commons
on short notice
on side
on sight
on slippery ground
on solid ground
on soundings
on speaking
terms
on stilts
on stream
on sufferance
on sure ground
on tap
on tenterhooks
on terms
on terms of equality
on terra firma
on that account
on that ground
on that occasion
on the
on the Book
on the agenda
on the air
on the alert
on the anvil
on the anxious bench

on the anxious seat
on the assumption that
on the attack
on the average
on the back of
on the ball
on the bare possibility
on the barricades
on the bash
on the beach
on the beam
on the beam's ends
on the beam-ends
on the beat
on the beaten track
on the bench
on the berth
on the bias
on the blink
on the block
on the boards
on the books
on the borderline
on the bounce
on the brain
on the brink
on the brink of
on the bum
on the button
on the calendar
on the cards
on the carpet
on the chance
on the cheap
on the coattails of
on the confines of
on the contrary
on the course
on the crest
on the crest of the wave
on the critical list
on the cuff
on the decline
on the defensive
on the descendant
on the docket
on the dole
on the dot

on
the double
on the double-quick
on the downgrade
on the downward track
on the earth
on the edge
on the edge of
on the edge of tears
on the eve of
on the evidence
on the face of
on the face of it
on the face of the earth
on the face of the globe
on the fence
on the fire
on the flank of
on the floor
on the fly
on the fritz
on the gad
on the go
on the good side of
on the ground
on the heading
on the heel and toe
on the high road
on the high road to
on the high seas
on the high side
on the hip
on the hoof
on the hook
on the hop
on the horizon
on the horns of a dilemma
on the house
on the in with
on the increase
on the instant
on the jar
on the job
on the jump
on the knees of the gods
on the knocker
on the lam
on the lap of the gods

on the left
on the level
on the lift
on the lines of
on the lookout
on the lookout for
on the loose
on the low side
on the make
on the march
on the mark
on the market
on the mend
on the minute
on the model of
on the money
on the move
on the nail
on the nod
on
the nose
on the off chance
on the offensive
on the order of
on the other hand
on the outs
on the outs with
on the outside
on the pad
on the parish
on the part of
on the peak
on the pinnacle
on the point
on the point of
on the present occasion
on the qt
on the quiet
on the rack
on the ragged edge
on the razor's edge
on the rebound
on the receiving end
on the return
on the right
on the right scent
on the right side of
on the right track

on the rise
on the road
on the road to
on the rocks
on the run
on the safe side
on the same footing
on the same level
on the same old round
on the same plane
on the scent of
on the score of
on the shady side
on the shady side of
on the shelf
on the shelves
on the shoulders of
on the sick list
on the side
on the skids
on the skirts of
on the sly
on the spot
on the spur of the moment
on the square
on the stage
on the stick
on the stocks
on the straight
on the streets
on the strength of
on the subject of
on the summit
on the supposition that
on the surface
on
the table
on the take
on the tapis
on the throne
on the tip of your tongue
on the top
on the town
on the track of
on the trail of
on the tramp
on the turn
on the up-and-up

on the upbeat
on the upgrade
on the upswing
on the verge
on the verge of
on the wagon
on the wane
on the watch
on the watch for
on the water cart
on the water wagon
on the way
on the way to
on the whole
on the wind
on the wing
on the wrong
on the wrong tack
on thin ice
on this account
on this side of the grave
on tick
on time
on tippytoe
on tiptoe
on to
on top
on top of
on top of the heap
on top of the roost
on top of the world
on tour
on trial
on trust
on vacation
on velvet
on view
on visiting terms
on welfare
on what account
on what occasion
on wheels
on which
on which occasion
on your
on your back
on your beam-ends
on your belly

on your bended knees
on your coattails
on your deathbed
on your feet
on your guard
on your hands
on your head
on your high horse
on your hind legs
on your hunkers
on your knees
on your
last legs
on your legs
on your mark
on your marrowbones
on your mettle
on your mind
on your nose
on your own
on your own account
on your own ground
on your own hook
on your own initiative
on your own responsibility
on your own say-so
on your own time
on your shitlist
on your toes
on your travels
on your uppers
on your way
on your word
on your word of honor
on-
on-again-off-again
on-board
on-coming
on-ding
on-dit
on-drive
on-glaze
on-glide
on-go
on-going
on-hit
on-limits
on-line

on-off switch
on-stage
on-stream
on-the-job training
once again
once and again
once and for all
once and for always
once and no more
once for all
once in a blue moon
once in a coon's age
once in a thousand years
once in a while
once more
once or twice
once over lightly
once pinnate
once removed
once upon a time
once-accented
once-born
once-over
once-run
onco-
ondes Martenot
one C
one accord
one after the other
one all over
one and all
one and indivisible
one and only
one and the same
one another
one at a time
one
 bone and one flesh
one by one
one can assume
one cheer more
one day
one dem'd horrid grind
one fifth
one fine day
one fine morning
one flesh
one for all

one for the book
one for the road
one fourth
one half
one hoss shay
one hundred thousand
one in a million
one in a thousand
one in a way
one in ten thousand
one leg
one man
one mind
one o'clock
one of the people
one of these days
one of us
one old cat
one or two
one small difficulty
one thing leads to another
one thing nor the other
one thing to another
one time
one touch of nature
one up
one up on
one voice
one vote
one's adieus
one's all
one's ancestors
one's best
one's best effort
one's best endeavor
one's betters
one's blind side
one's crowd
one's damndest
one's darndest
one's days are numbered
one's disposal
one's doom is sealed
one's due
one's fathers
one's heels
one's hour is come
one's level best

one's mouth
one's move
one's native ground
one's native heath
one's native place
one's number is up
one's own choice
one's own discretion
one's
own initiative
one's own man
one's own sweet time
one's own will
one's race is run
one's say
one's set
one's turn
one's two cents' worth
one's utmost
one's worth
one-a-cat
one-act
one-acter
one-and-a-half
one-armed
one-armed bandit
one-base hit
one-berry
one-blade
one-bladed
one-buttoned
one-by-one
one-celled
one-chambered
one-class
one-classer
one-colored
one-crop
one-cusped
one-day
one-decker
one-dimensional
one-dimensional wave
one-dollar
one-eared
one-egg
one-eighty
one-eyed

one-eyedness
one-finned
one-flowered
one-foot
one-footed
one-fourth
one-grained
one-hand
one-handed
one-handedness
one-hearted
one-hoofed
one-horned
one-horse
one-horse town
one-humped
one-hundred-fifty
one-hundred-percenter
one-hundred-percentism
one-ideaed
one-inch
one-jointed
one-layered
one-leaf
one-leaved
one-legged
one-leggedness
one-letter
one-line
one-line octave
one-lung
one-lunged
one-lunger
one-man
one-man rule
one-many
one-minute
one-nerved
one-night
one-night stand
one-nighter
one-oclock
one-off
one-one
one-party
rule
one-party system
one-petaled

one-piece
one-piece suit
one-piecer
one-pipe
one-pipe furnace
one-point
one-point perspective
one-pope
one-pound
one-pounder
one-price
one-quarter
one-rail
one-reeler
one-ribbed
one-roomed
one-seater
one-seeded
one-sepaled
one-septate
one-shot
one-sided
one-sidedly
one-sidedness
one-spot
one-star general
one-step
one-step rocket
one-storied
one-story
one-striper
one-term
one-third
one-time
one-to-one
one-toed
one-track
one-track mind
one-two
one-two punch
one-up
one-upmanship
one-valued
one-way
one-way communication
one-way ticket
one-way trip
one-windowed

one-winged
one-word
one-year
oneiro-
ones self
onga-onga
onglette file
onion couch
onion dome
onion flute
onion fly
onion foot
onion louse
onion maggot
onion mildew
onion red
onion roll
onion salt
onion sauce
onion set
onion smudge
onion smut
onion structure
onion twitch
onion-eyed
onionskin pink
oniro-
onium compound
onization potential
only a few
only a step
only choice
only
 have eyes for
only human
only if
only just
only not
only now and then
only occasionally
only once
only think
only too
only when necessary
only when the spirit moves
only yesterday
only-begotten
onomato-

onomatopoeic word
onshore breeze
ont-
onto-
ontological argument
ontological proof
ontrary to expectation
onus probandi
onward and upward
onward course
onyx marble
oo-
oo-la-la
ooblastema filament
oop cit
ooze leather
ooze out
op art
op artist
op cit
op-
opal blue
opal glass
opal gray
opal matrix
opal-tinted
opaline green
opaque color
opaque context
opaque projector
open Pandora's box
open a can of worms
open a show
open a show cold
open account
open aerial
open air
open an account with
open an offensive
open and aboveboard
open arms
open as day
open book
open chain
open circuit
open city
open classroom school
open cluster

open communion
open conflict
open country
open couplet
open court
open cut
open day
open discussion
open door
open enemy
open enrollment
open field
open fire
open
 for discussion
open forum
open game
open hand
open hand knot
open heart
open her up
open hostilities
open house
open housing
open into
open juncture
open letter
open mandate
open market
open market operations
open mind
open one's mouth
open order
open policy
open position
open primary
open quarrel
open question
open road, the
open rupture
open secret
open sentence
open sequence
open sesame
open shop
open sight
open space
open sphere

open stock
open string
open syllable
open system
open the
open the door to
open the draft
open the eyes
open the eyes to
open the floodgates
open the light
open the lock
open the mind
open the possibility of
open the purse
open the sluices
open the throttle
open the way
open the way for
open throttle
open time
open to
open to all
open to criticism
open to doubt
open to error
open to question
open to reproach
open to solution
open to suspicion
open to the public
open to view
open trailer
open union
open up
open up on
open up the possibility of
open verdict
open
 waggon
open war
open warfare
open wound
open your big fat mouth
open your big mouth
open your eyes
open your eyes to
open your lips

open your mind to
open your mouth
open-air
open-air theater
open-airish
open-airishness
open-airism
open-airness
open-and-shut
open-and-shut case
open-armed
open-armedly
open-back
open-back press
open-backed
open-bill
open-bladed
open-breasted
open-caisson
open-chested
open-circuit
open-coil
open-countenanced
open-crib
open-cribbed
open-door
open-door policy
open-doored
open-eared
open-end
open-end bond
open-end fund
open-end investment company
open-end wrench
open-ended
open-endedness
open-eyed
open-eyedly
open-face
open-face sandwich
open-faced
open-field
open-fire
open-flowered
open-frame girder
open-front
open-fronted
open-frontedness

open-gaited
open-grained
open-handed
open-handedly
open-headed
open-heart surgery
open-hearted
open-heartedly
open-heartedness
open-hearth
open-hearth furnace
open-hearth process
open-hearthed
open-housed
open-housedness
open-housing
open-joint
open-jointed
open-kettle
open-kneed
open-letter
open-letter
proof
open-lined
open-market
open-minded
open-mindedly
open-mindedness
open-mouthed
open-mouthedly
open-mouthedness
open-newel
open-newel stair
open-pan
open-patterned
open-phase
open-phase relay
open-pit
open-pitted
open-plan
open-pollinated
open-reel
open-roofed
open-rounded
open-sand
open-sequence system
open-shelf
open-shelter-deck vessel

open-shelved
open-shop
open-sided
open-sidedly
open-sidedness
open-sleeved
open-spaced
open-spacedly
open-spacedness
open-spoken
open-spokenly
open-spokenness
open-tank
open-tide
open-timber
open-timber roof
open-timbered
open-timbre
open-top
open-topped
open-view
open-visaged
open-weave
open-web
open-webbed
open-webbedness
open-well
open-windowed
open-windowedness
open-work
open-worked
opencast mining
opening bit
opening die
opening gun
opening move
opening price
opening time
opening up
openness to sensation
openness to sight
openside planer
opera ballet
opera
bouffe
opera box
opera buffa
opera buffas

opera cape
opera cloak
opera comique
opera dancer
opera festival
opera flannel
opera glass
opera glasses
opera hat
opera hood
opera house
opera omnia
opera pink
opera score
opera season
opera seria
opera serias
opera singer
opera-going
opera-mad
operant conditioning
operas buffa
operas seria
operate at a loss
operate on
operatic overture
operatic singing
operating budget
operating company
operating cost
operating costs
operating expense
operating expenses
operating room
operating speed
operating table
operating theatre
operational gain
operational purpose
operational research
operations research
operations room
operative dentist
operative dentistry
operative surgeon
operative surgery
operator gene
operculi-

opere buffe
opere citato
opere serie
ophio-
ophthalm-
ophthalmia neonatorum
ophthalmo-
ophthalmo-reaction
opiate addiction
opinion poll
opinion sampling
opinion survey
opinion-sampler
opistho-
opium den
opium drinker
opium eater
opium poisoning
opium
 poppy
opium smoker
opium taker
opium-drinking
opium-drowsed
opium-eating
opium-shattered
opium-smoking
opium-taking
opossum mouse
opossum shrimp
opossum tree
opossum wood
opponent colors theory
opportunity cost
oppose change
opposed to
opposed to change
opposed-piston engine
opposing party
opposite as black and white
opposite as day and night
opposite as fire and water
opposite as light and darkness
opposite as the poles
opposite camp
opposite number
opposite poles
opposite prompt

opposite prompt side
opposite sex
opposite side
opposite tide
opposite to
opposite-leaved
oppositi-
opposition party
opposition to change
opposition voice
oppression of spirit
opra bouffe
opra comique
opsonic immunity
opsonic index
opsonic therapy
opsonocytophagic test
opt for
opt out
opt out of society
optic axis
optic chiasm
optic disc
optic disk
optic nerve
optic neuritis
optic thalamus
optical activity
optical air mass
optical altimeter
optical bench
optical character reader
optical crown
optical
density
optical double star
optical flint
optical glass
optical illusion
optical instrument
optical instruments
optical isomer
optical isomerism
optical maser
optical microscope
optical path
optical physics
optical pyrometer

optical rotation
optical scanning
optical telescope
optical tooling
optically active
optically inactive
optico-
optimum capacity
optimum programming
optional bond
optional dividend
optional primary
optional referendum
opto-
opus araneum
opus consutum
opus incertum
opus isodomum
opus pectineum
opus pseudoisodomum
opus reticulatum
or Harry
or buts
or circuit
or else
or ever
or not
or steal
or the instrument evidencing
or-
ora pro nobis
oracle of Dodona
oral cavity
oral communication
oral contraceptive
oral evidence
oral examination
oral groove
oral history
oral interpretation
oral method
oral poetry
oral society
oral surgery
oral-genital stimulation
orang-outang
orang-utan
orange III

orange aphid
orange aurora
orange basketworm
orange berry
orange blossom
orange
chipper
orange chrome yellow
orange chromide
orange coneflower
orange daisy
orange flower water
orange grower
orange gum
orange hawkweed
orange juice
orange lead
orange leaf rust
orange lily
orange madder
orange maggot
orange marmalade
orange melon
orange milkweed
orange milkwort
orange mineral
orange ocher
orange orchard
orange peel
orange peel reflector
orange peeler
orange pekoe
orange quince
orange quit
orange rust
orange scab
orange scale
orange spoon
orange stick
orange sulfur
orange sulphur
orange sunflower
orange swallowwort
orange tip
orange vermilion
orange water
orange wife
orange wine

orange-blossom
orange-colored
orange-crowned
orange-eared
orange-eye butterfly bush
orange-fleshed
orange-flower
orange-flowered
orange-headed
orange-hued
orange-leaf
orange-leaf beetle
orange-peel bucket
orange-red
orange-rufous
orange-shaped
orange-sized
orange-striped
orange-tailed
orange-tawny
orange-throated
orange-tip
orange-tipped
orange-tree
orange-winged
orange-yellow
orate fratres
oratio
 obliqua
oratio recta
oratorio society
orb of day
orb of night
orb weaver
orbiculato-
orbit sweeper
orbit the earth
orbit the moon
orbital angular momentum
orbital electron
orbital index
orbital quantum number
orbital velocity
orbiting geophysical observatory
orbiting observatory
orbiting solar observatory
orbito-
orchard bush

orchard fruit
orchard grass
orchard heater
orchard heating
orchard house
orchard oriole
orchard valve
orchella weed
orchestra bells
orchestra circle
orchestra leader
orchestra pit
orchestral bells
orchestral horn
orchestral musician
orchestral score
orchid family
orchid fly
orchid peat
orchid pink
orchid rose
orchid tree
orchido-
orchilla weed
ordeal bark
ordeal bean
ordeal by battle
ordeal by fire
ordeal by lots
ordeal by water
ordeal root
ordeal tree
order about
order arms
order around
order bill of lading
order blank
order in council
order of battle
order of being
order of business
order of magnitude
order of nature
order of succession
order of the day
order
of worship
order paper

order port
order up
order-book
ordered around
ordered field
ordered pair
orderly bin
orderly book
orderly officer
orderly room
orderly sergeant
ordinal number
ordinary Joe
ordinary algebra
ordinary differential equation
ordinary jubilee
ordinary life insurance
ordinary man
ordinary people
ordinary point
ordinary ray
ordinary run
ordinary run of things
ordinary seaman
ordinary share
ordinary shares
ordinary stock
ordinary wave
ordinary, the
ordinary-language philosophy
ordinato-punctate
ordnance corps
ordnance datum
ordnance engineer
ordnance engineering
ordnance map
ordnance officer
ordnance rocket
ordnance sergeant
ore bed
ore body
ore bridge
ore car
ore charger
ore chute
ore digger
ore dressing
ore handler

ore hearth
ore mill
ore miner
ore process
ore rotundo
ore shoot
ore smelter
ore weigher
ore-bearing
ore-buying
ore-crushing
ore-extracting
ore-forming
ore-handling
ore-hoisting
ore-milling
ore-mining
ore-roasting
ore-smelting
ore-washing
ore-weed
oregon
grape
orey-eyed
organ beater
organ blower
organ builder
organ building
organ cactus
organ coral
organ desk
organ erector
organ fish
organ gallery
organ grinder
organ gun
organ harmonium
organ loft
organ maker
organ manual
organ of Corti
organ of taste
organ of thought
organ of vision
organ pipe
organ player
organ point
organ screen

organ stop
organ swell
organ transplant
organ transplantation
organ whistle
organ-
organ-blowing
organ-grinder
organ-piano
organ-pipe
organ-pipe cactus
organ-pipe coral
organic being
organic chemical
organic chemist
organic chemistry
organic chlorine
organic disease
organic electricity
organic fertilizer
organic matter
organic mechanism
organic mechanist
organic nature
organic phosphate insecticide
organic psychosis
organic remains
organic structure
organic unity
organization insignia
organization man
organized crime
organized ferment
organized labor
organized matter
organized militia
organized reserves
organo-
orgone box
orgone energy
orgone theory
orgone-energy
accumulator
ori-ellipse
oriel window
orient blue
orient pink
orient red

orient the chart
orient the map
orient yellow
orient yourself
oriental beetle
oriental cockroach
oriental poppy
oriental roach
oriental rug
orientate yourself
orientation course
orifice meter
origanum oil
original condition
original jurisdiction
original sin
original title
originate from
originate in
orl fly
orlop deck
ormolu varnish
ornamental composition
ornamental garden
ornamental glass
ornamental grass
ornamental motif
ornamental style
ornamental theme
ornaments rubric
ornith-
ornitho-
oro-
orographic cloud
orographic precipitation
orphan chamber
orphans' court
orphreyed miter
orpiment orange
orpiment red
orpiment yellow
orpine family
orra man
orris oil
orth-
ortho-
ortho-cousin
ortho-orsellinic

ortho-toluidine
ortho-xylene
orthoboric acid
orthochromatic film
orthoclase-basalt
orthoclase-gabbro
orthodox Christian
orthodox judaism
orthoformic acid
orthogonal matrix
orthogonal projection
orthogonal trajectory
orthographic
 projection
orthomorphic projection
orthopedic surgery
orthophosphoric acid
orthophosphorous acid
orthoptic exercises
ortolan bunting
orycto-
os magnum
osage orange
oscheo-
oscillating current
oscillating engine
oscillating universe theory
oscillation circuit
oscillation constant
oscillation engine
oscillation number
oscillation transformer
oscillation-cylinder engine
oscillator relay actuator
oscillator relay control
oscillatory behavior
oscillatory discharge
oscillograph data
oscillograph recorder
oscilloscope tube
oscine bird
osco-umbrian
osculating circle
osculating plane
osier cornel
osier willow
osier-bordered
osier-fringed

osier-like
osier-woven
osmi-iridium
osmio-
osmium lamp
osmium oxide
osmium tetroxide
osmo-
osmotic pressure
osmotic shock
osmund brake
osmund furnace
osmund iron
oso-berry
osseo-
osseous rheumatism
osso bucco
osso buco
oste-
osteitis deformans
ostensible motive
ostensible partner
ostentatious complexity
ostentatious devotion
ostentatious profundity
osteo-
osteopathic
 hospital
ostraco-
ostrei-
ostrich fern
ostrich-egg
ostrich-feather
ostrich-feather grass
ostrich-plume
oswego tea
ot-
otaheite apple
other continuums
other face
other fish to fry
other from
other half
other self
other side
other side of the coin
other side of the picture
other some

other than
other things being equal
other world
other-directed
other-directedness
other-direction
other-group
other-self
otic vesicle
otitis externa
otitis interna
otitis media
otium cum dignitate
oto-
ottava alta
ottava bassa
ottava rima
otter board
otter brown
otter canoe
otter gear
otter hound
otter raft
otter sheep
otter shell
otter shrew
otter trawl
ouabe oil
oufs a la coque
oufs brouilles
oufs poches
oufs sur le plat
ought to
ouija board
ounce apothecaries'
ounce avoirdupois
ounce metal
ounce troy
our account of ourselves
our father
our times
ourang-outang
ourano-
ouster le main
ouster-le-main
out ahead
out and away
out at elbows

out at heels
out at the elbows
out at the heels
out
board
out cold
out for
out for bear
out from under
out front
out guide
out in front
out in left field
out in the cold
out in the open
out in your reckoning
out loud
out of
out of a clear blue sky
out of a clear sky
out of a job
out of accord
out of action
out of all bounds
out of all proportion
out of all reason
out of bounds
out of breath
out of character
out of commission
out of conceit with
out of condition
out of contact
out of control
out of countenance
out of court
out of danger
out of date
out of debt
out of doors
out of earreach
out of earshot
out of employ
out of fashion
out of favor
out of focus
out of form
out of funds

out of gear
out of hand
out of harm's reach
out of harm's way
out of harness
out of hearing
out of humor
out of it
out of its element
out of joint
out of keeping
out of kelter
out of kilter
out of line
out of line with
out of luck
out of measure
out of order
out of phase
out of pitch
out of place
out of play
out of plumb
out of pocket
out of practice
out of
print
out of proportion
out of question
out of range
out of reach
out of repair
out of season
out of shape
out of sight
out of sight out of mind
out of sorts
out of soundings
out of spirits
out of square
out of step
out of stock
out of style
out of sympathy
out of temper
out of the battle
out of the blue
out of the common

out of the habit of
out of the meshes
out of the mind
out of the ordinary
out of the pale
out of the perpendicular
out of the picture
out of the question
out of the running
out of the sphere of
out of the toils
out of the way
out of the woods
out of the world
out of this
out of this world
out of time
out of tone
out of touch
out of training
out of trim
out of true
out of tune
out of tune and harsh
out of turn
out of use
out of whack
out of whole cloth
out of wind
out of work
out of working order
out of your bearings
out of your control
out of your depth
out of your element
out of your hands
out of your head
out of your league
out of your mind
out of your mind with fear
out
of your misery
out of your power
out of your reckoning
out of your senses
out of your skull
out of your teens
out of your wits

out on a limb
out on a rail
out on strike
out sister
out the window
out to
out tray
out with
out with it
out-
out-Herod
out-and-out
out-and-out lie
out-and-outer
out-argue
out-ask
out-babble
out-boarder
out-bound
out-bowed
out-brag
out-building
out-burn
out-by
out-cargo
out-clearer
out-clearing
out-college
out-country
out-craft
out-door
out-field
out-fielder
out-group
out-guard
out-herod
out-herod Herod
out-kneed
out-migrant
out-migrate
out-migration
out-of
out-of-bounds
out-of-center
out-of-course
out-of-date
out-of-dateness
out-of-door

out-of-doors
out-of-fashion
out-of-focus
out-of-hand
out-of-humor
out-of-joint
out-of-line
out-of-office
out-of-order
out-of-place
out-of-plumb
out-of-pocket
out-of-print
out-of-reach
out-of-school
out-of-season
out-of-stater
out-of-stock
out-of-the-common
out-of-the-way
out-of-the-world
out-of-town
out-of-towner
out-of-townish
out-of-tune
out-of-tunish
out-of-turn
out-of-vogue
out-office
out-parish
out-patient
out-pension
out-pointed
out-quarter
out-relief
out-room
out-sentry
out-settlement
out-soul
out-station
out-street
out-take
out-throw
out-thrust
out-top
out-travel
out-voter
out-wall

out-worker
outa
sight
outboard cruiser
outboard motor
outboard motorboat
outboard profile
outburst of anger
outburst of laughter
outcast of society
outcrop mine
outdoor theater
outer atmosphere
outer automorphism
outer bar
outer barrister
outer ear
outer face
outer garments
outer jib
outer layer
outer planet
outer product
outer side
outer skin
outer space
outer station
outer-directed
outermost reaches of space
outfit car
outing flannel
outlaw strike
outlet box
outlet plate
outline stitch
outlook over
outlying picket
outpatient clinic
outpost of advancing day
outpost province
output conductance
output current
output data
output indicator
output lag
output measurement
output oscillation
output pulse

output quantity
output
 resistance
output signal
output transformer
output tube
output voltage
outrigger canoe
outrigger torpedo
outs with
outside broadcast
outside broker
outside caliper
outside chance
outside clinch
outside finish
outside form
outside home
outside hope
outside in
outside jaunting car
outside lap
outside lead
outside left
outside loop
outside market
outside of
outside pickup
outside right
outside roll
outside securities
outside the gates
outside the pale
outside work
outsmart yourself
outstanding accounts
outstanding debt
outstanding feature
outstanding securities
outstretched hand
outstrip the wind
outward appearance
outward show
outward-bound
outward-bounder
outward-facing
outward-flow turbine
ov-

oval chuck
oval compass
oval file
oval kumquat
oval window
oval-arched
oval-berried
oval-bodied
oval-bored
oval-faced
oval-figured
oval-headed
oval-lanceolate
oval-leaved
oval-shaped
oval-truncate
oval-visaged
ovals of Cassini
ovario-
ovate-acuminate
ovate-cordate
ovate-cuneate
ovate-cylindraceous
ovate-cylindrical
ovate-deltoid
ovate-ellipsoidal
ovate-elliptic
ovate-lanceolate
ovate-leaved
ovate-oblong
ovate-orbicular
ovate-rotundate
ovate-serrate
ovate-serrated
ovate-subulate
ovate-triangular
ovato-
oven
builder
oven furnace
oven thermometer
oven tit
oven wood
oven-bake
oven-baked
oven-bird
oven-dried
oven-dry

oven-ready
oven-shaped
over a barrel
over again
over against
over and above
over and over
over and over again
over head and ears
over head and ears in
over head and ears in love
over my dead body
over the board
over the counter
over the hill
over the hills and far away
over the hump
over the side
over the top
over the water
over there
over your head
over-
over-abound
over-age
over-all
over-and-over stitch
over-anxious
over-arm
over-bold
over-capitalize
over-caution
over-cautious
over-confident
over-correct
over-counter
over-credulous
over-curious
over-dear
over-deck
over-delicate
over-develop
over-discharge
over-eager
over-earnest
over-estimate
over-excite
over-exert

over-expose
over-feed
over-gear
over-greedy
over-hard
over-hasty
over-indulge
over-inform
over-issue
over-king
over-labour
over-liberal
over-lip
over-long
over-measure
over-modest
over-nice
over-people
over-persuade
over-please
over-populate
over-print
over-produce
over-proof
over-proportion
over-read
over-reckon
over-refine
over-rent
over-riding
over-round
over-rule
over-scrupulous
over-sell
over-shoe
over-size
over-soul
over-subscribe
over-supply
over-the-counter
over-the-counter
drug
over-the-counter market
over-the-counter securities
over-train
over-trouble
over-trust
over-under

over-value
over-weight
over-wet
over-wise
over-zeal
overall length
overbearing pride
overcast stitch
overcome your resistance
overcome yourself
overcorrection of error
overcurrent relay
overdo it
overdose of
overdraft kiln
overdraw your account
overdrawn account
overextend yourself
overflow bug
overflow pipe
overflow with
overflow with energy
overflow with gratitude
overflowing eyes
overhand knot
overhead
camshaft
overhead door
overhead lighting
overhead price
overhead railway
overhead-valve engine
overheated economy
overland stage
overlap fault
overlap radar
overlay glass
overload breaker
overload circuit
overload circuit breaker
overload relay
overload starter
overload switch
overlook distinctions
overlook no possibility
overlook nothing
overlooking no possibility
overly permissive

overmonopo-lizing
overnight bag
overnight sensation
overnight telegram
overopenness to conviction
overopenness to persuasion
overplay your hand
overreach yourself
overreact to
overseas bar
overseas cap
overseas operations
overseas telegram
overshoot the field
overshoot the mark
overshot wheel
overstay the market
overstep the bounds
overstep your bounds
overstep your prerogatives
overstep your rights
overstuffed chair
overt act
overthrow your mind
overthrow your reason
overthrust fault
overtime pay
overture and beginners
overweening pride
overwhelming defeat
ovi-
ovo-
ovo-testis
ovo-viviparous
owala oil
owala
tree
owe a grudge
owe it to
owe it to yourself
owe you no thanks
owing to
owl butterfly
owl car
owl fly
owl midge
owl monkey
owl moth

owl parrot
owl swallow
owl's light
owl's-crown
owl-eyed
owl-faced
owl-glass
owl-haunted
owl-headed
owl-light
owl-sighted
owl-wide
owl-winged
owlet moth
owlet nightjar
own accord
own account
own authority
own choice
own correspondent
own discretion
own free will
own hands
own hook
own initiative
own power
own responsibility
own say-so
own sweet way
own up
own volition
own way
own yourself in the wrong
own-form
own-root
own-rooted
owning up
ox antelope
ox ball
ox balm
ox bile
ox bot
ox daisy
ox dance
ox feather
ox fence
ox heart
ox louse

ox rail
ox ray
ox sole
ox team
ox warble
ox-
ox-bird
ox-bow
ox-eye
ox-eyed
ox-eyed arch
ox-foot
ox-harrow
ox-head
ox-headed
ox-horn
ox-stall
ox-tail
ox-tongue
ox-tongue partisan
oxa-
oxal-
oxalic acid
oxalo-
oxbow chest
oxbow front
oxbow lake
oxeye bean
oxeye camomile
oxeye daisy
oxeye molding
oxford cloth
oxford down
oxford
movement
oxi-
oxidation number
oxidation potential
oxidation state
oxidation-reduction
oxide blue
oxide brown
oxide purple
oxide red
oxide yellow
oxidizing agent
oxidizing flame
oxime group

oxo process
oxo reaction
oxo-
oxonium compound
oxtail soup
oxter plate
oxy acid
oxy-
oxy-acetylene
oxy-calcium
oxy-salt
oxyacetylene blowpipe
oxyacetylene cutting
oxyacetylene torch
oxyacetylene welder
oxyacetylene welding
oxycalcium light
oxychlor-
oxydiacetic acid
oxygen acid
oxygen effect
oxygen lance
oxygen mask
oxygen ratio
oxygen recorder
oxygen tank
oxygen tent
oxygen therapy
oxygen-acetylene
oxygen-acetylene cutting
oxygen-acetylene welding
oxygen-hydrogen welding
oxyhydrogen blowpipe
oxyhydrogen light
oxyhydrogen microscope
oxyquinoline sulphate
oyer and terminer
oyster agaric
oyster bank
oyster bar
oyster bay
oyster bed
oyster canoe
oyster catcher
oyster crab
oyster cracker
oyster culture
oyster dredge

oyster drill
oyster farmer
oyster fork
oyster fungus
oyster grass
oyster gray
oyster
 knife
oyster mine
oyster mushroom
oyster park
oyster pink
oyster plant
oyster plover
oyster rake
oyster rock
oyster scale
oyster schooner
oyster scow
oyster shell
oyster sloop
oyster stew
oyster tongs
oyster tree
oyster white
oyster-catcher
oyster-culturist
oyster-shaped
oyster-shell bark louse
oyster-shell scale
oysters in the half shell
oysters on the half shell
oystershell scale
oz ap
oz av
oz t
ozaena-
ozon-
ozone layer
ozone paper
ozonic ether
p & p
p's and q's
p-n junction
p-type
p/e ratio
pF
pH

pH meter
pW
pa system
paca-rana
pace egg
pace off
pachy-
pacific time
pack a punch
pack animal
pack away
pack bearer
pack carrier
pack drill
pack driver
pack duck
pack hoister
pack horse
pack ice
pack in
pack mule
pack needle
pack of cigarettes
pack of dogs
pack of lies
pack of nonsense
pack of troubles
pack off
pack on
pack on sail
pack puller
pack rat
pack road
pack rolling
pack sack
pack sheet
pack tent
pack the deal
pack train
pack twine
pack up
pack wall
pack-bearing
pack-horse
pack-laden
pack-needle
pack-saddle
package

advertising
package bargaining
package conveyer
package deal
package price
package store
package tour
packaged goods
packaged house
packaged tour
packed caucus
packed cell volume
packed deal
packed jury
packed like herrings
packed like sardines
packed out
packed-up
packet boat
packet day
packet folio
packet ship
packet-boat
packing box
packing case
packing fraction
packing house
packing nut
packing plant
packing ring
pad crimp
pad eye
pad foot
pad groom
pad hook
pad horse
pad saddle
pad saw
pad stone
padded cell
paddle beam
paddle board
paddle boat
paddle box
paddle hole
paddle plate
paddle shaft
paddle staff

paddle steamer
paddle tennis
paddle tumbler
paddle wheel
paddle wing
paddle your own canoe
paddle-shaped
paddle-wheel
paddock pipe
paddy blast
paddy field
paddy lucern
paddy wagon
paddy-bird
paddywhack almanac
padge owl
padlock injunction
padlock law
padouk wood
padparadschah sapphire
paean of cheers
paed-
paedo-
pagan deity
pagan divinity
pagan
 priest
pagano-Christian
pagano-Christianism
page boy
page chair
page cord
page gauge
page numbering
page proof
page rest
page through
page-boy
pagoda sleeve
pagoda stone
pagoda tree
pagoda-tree
pai-hua
pai-loo
pai-loos
paid holiday
paid in full
paid vacation

paid-
paid-in
paille finne
pain in the ass
pain in the neck
pain killer
pain pill
pain spot
pain-afflicted
pain-assuaging
pain-bearing
pain-bought
pain-chastened
pain-dispelling
pain-distorted
pain-drawn
pain-fearing
pain-free
pain-giving
pain-inflicting
pain-killer
pain-killing
pain-producing
pain-racked
pain-stricken
pain-worn
pain-wrought
pain-wrung
pains and punishments
painstakingly match
paint a picture
paint binder
paint bridge
paint brusher
paint cleaner
paint drier
paint finish
paint frame
paint grinder
paint horse
paint hose
paint in bright colors
paint in glowing colors
paint in its true colors
paint keg
paint locker
paint mixer
paint pony

paint pot
paint pretty pictures of
paint primer
paint process
paint remover
paint
 roller
paint room
paint strake
paint the lily
paint the town red
paint thinner
paint work
paint yourself into a corner
paint-beplastered
paint-filler
paint-filling
paint-mixing
paint-removing
paint-splashed
paint-spotted
paint-spraying
paint-stained
paint-washing
paint-worn
painted beauty
painted bunting
painted cup
painted grass
painted greenling
painted lady
painted pony
painted snipe
painted tongue
painted trillium
painted turtle
painted woman
painter etcher
painter etching
painter graver
painter graving
painter stainer
painter's colic
painter's cream
painter-stainer
painting with the gift of speech
pair annihilation
pair case

pair of bellows
pair of binoculars
pair of compasses
pair of glasses
pair of pincers
pair of scales
pair of scissors
pair of spectacles
pair of suspenders
pair of tongs
pair of trousers
pair of tweezers
pair of twins
pair of virginals
pair of winks
pair off
pair production
pair royal
pair-horse
pair-oar
pair-oared
pair-royal
paired with
paisley print
pajama
party
pak-choi
pak-choi cabbage
pak-chois
pakpak-lauin
pal around with
pal up
pal up with
pal with
palace car
palace court
palace guard
palace revolution
palaeo-
palais de danse
palais glide
palas kino
palate bone
palatial residence
palatine tonsil
palato-
pale as a corpse
pale as a forpined ghost

pale as a ghost
pale as death
pale as his shirt
pale bark
pale blue chip
pale brandy
pale broomrape
pale catechu
pale color
pale corydalis
pale elder
pale horse
pale laurel
pale rider
pale-
pale-blooded
pale-blue
pale-bright
pale-cheeked
pale-colored
pale-complexioned
pale-dried
pale-eared
pale-eyed
pale-face
pale-faced
pale-gray
pale-green
pale-hued
pale-leaved
pale-livered
pale-looking
pale-red
pale-reddish
pale-refined
pale-souled
pale-spirited
pale-spotted
pale-striped
pale-tinted
pale-visaged
pale-yellow
paleo-
paleolithic man
paleontological geology
pales weevil
palette knife
paling board

palisade cell
palisade crown
palisade parenchyma
palisade worm
palkee gharry
pall-like
pall-mall
palladium
red
palladium sponge
pallet board
pallet box
pallet eye
pallet knife
pallet leather
pallet stone
pallet tail
pallial sinus
palliative operation
palliative treatment
pallid-faced
pallid-fuliginous
pallid-gray
pallid-looking
pallid-ochraceous
pallid-tomentose
pallio-
pallisado crown
pally walsy
palm beetle
palm branch
palm butter
palm cabbage
palm capital
palm cat
palm chat
palm civet
palm cockatoo
palm crab
palm dove
palm family
palm fern
palm for
palm grass
palm grease
palm greaser
palm greasing
palm green

palm grub
palm honey
palm house
palm kale
palm kernel
palm leaf
palm lily
palm marten
palm nut
palm off
palm off on
palm oil
palm on
palm peach
palm play
palm reader
palm squirrel
palm starch
palm stay
palm sugar
palm sunday
palm swift
palm upon
palm vaulting
palm warbler
palm wax
palm weevil
palm willow
palm wine
palm worm
palm-bearing
palm-crowned
palm-fringed
palm-kernel oil
palm-leaf fan
palm-leaf hat
palm-leaved grass
palm-oil
palm-oil chop
palm-reading
palm-shaded
palm-shaped
palm-thatched
palm-tree
palm-veined
palma
christi
palma samandoca

palmarosa oil
palmati-
palmella stage
palmer fly
palmer tree
palmer trout
palmer worm
palmer-worm
palmetto barrens
palmetto flag
palmetto green
palmetto scrub
palmi-
palmitic acid
palmy days
palmyra wood
palo blanco
palolo worm
palpebral fissure
palpitation of the heart
palsy-quaking
palsy-shaken
palsy-shaking
palsy-sick
palsy-stricken
palsy-struck
palsy-walsy
paltry affair
paludal fever
paludi-
paly-bendy
pam head
pampas cat
pampas deer
pampas formation
pampas fox
pampas grass
pampas-grass
pamper yourself
pampered darling
pan amalgamation
pan american day
pan boiler
pan bolt
pan broiler
pan conveyer
pan fish
pan for gold

pan grave
pan gravy
pan head
pan ice
pan out
pan shot
pan supari
pan-
pan-Latin
pan-Saxon
pan-american
pan-americanism
pan-anglican
pan-broil
pan-broiled
pan-broiling
pan-fired
pan-fried
pan-fry
pan-frying
pan-headed
pan-leaf
pan-loaf
pan-pipe
pan-sexualism
pan-shaped
pancake bell
pancake engine
pancake
 ice
pancake landing
pancake plant
panchen lama
panchromatic film
pancreas ptyalin
pancreat-
pancreatic digestion
pancreatic duct
pancreatic fibrosis
pancreatic juice
pancuronium bromide
panda car
pandemic disease
pander to
pandora shell
panel beater
panel bed
panel board

panel body
panel den
panel discussion
panel heating
panel house
panel length
panel lighting
panel patch
panel photograph
panel pin
panel plane
panel point
panel saw
panel show
panel strip
panel switching
panel system
panel thief
panel truck
panel van
panel wall
panel wheel
pangs of conscience
panic bar
panic bent
panic bolt
panic fear
panic grass
panic party
panic terror
panic-driven
panic-pale
panic-prone
panic-proof
panic-stricken
panic-strike
panic-struck
panic-stunned
panne velvet
pannier pack
pannikin boss
panoramic radar
panoramic shot
panoramic sight
panoramic telescope
pansy orchid
pansy purple
pansy violet

pansy-colored
pansy-growing
pansy-purple
pansy-violet
pansy-yellow
pant after
pant for
pant
 suit
pant-
panta-
pantechnicon van
panther cat
panther cowrie
panther lily
panther piss
pantie girdle
pantile lath
pantile roof
panting stringer
panto-
pantograph snaffle
pantograph trolley
pantomime dame
pantothenic acid
pants suit
panty girdle
panty hose
panty-hose
panzer division
panzer warfare
papa rock
papal brief
papal cross
papal infallibility
papanicolaou test
papaw family
paper baler
paper birch
paper blockade
paper book
paper boy
paper bush
paper carrier
paper chase
paper chaser
paper chromatography
paper clip

paper cloth
paper coal
paper colorer
paper credit
paper cutter
paper doll
paper dolls
paper flower
paper foot
paper grass
paper hanger
paper hanging
paper holder
paper hornet
paper house
paper hunt
paper jogger
paper joint
paper knife
paper lapper
paper machine
paper mill
paper money
paper mulberry
paper muslin
paper nautilus
paper nautlius
paper office
paper on the wall
paper over
paper plant
paper profit
paper profits
paper pulp
paper pulper
paper rack
paper rate
paper
sculpture
paper seller
paper shale
paper sorter
paper stainer
paper standard
paper surplus
paper tape
paper tiger
paper title

paper towel
paper toweling
paper tree
paper varnisher
paper war
paper wasp
paper work
paper works
paper-backed
paper-baling
paper-bound
paper-capped
paper-chasing
paper-clothed
paper-coated
paper-coating
paper-collared
paper-covered
paper-cutter
paper-cutting
paper-drilling
paper-embossing
paper-faced
paper-filled
paper-folding
paper-footed
paper-hangings
paper-lined
paper-mended
paper-palisaded
paper-paneled
paper-patched
paper-saving
paper-selling
paper-shell
paper-shelled
paper-shuttered
paper-slitting
paper-sparing
paper-stainer
paper-stamping
paper-testing
paper-thick
paper-thin
paper-using
paper-varnishing
paper-waxing
paper-white

paper-whiteness
paper-windowed
paperbark maple
papery-skinned
papier coll
papier colle
papier mache
papier-mache
papier-mch
papoose board
papoose-root
paprika sauce
papular rash
papulo-
papyro-
papyrus capital
papyrus column
par
 avance
par avion
par bond
par collection
par cour
par excellence
par exemple
par parenthese
par value
par-
par-three
para red
para rubber
para-
para-agglutinin
para-aminobenzoic acid
para-aminophenol
para-analgesia
para-anesthesia
para-appendicitis
para-cymene
para-nitrophenol
para-phenetidine
para-rescue
para-ski
para-toluidine
parabolic aerial
parabolic antenna
parabolic reflector
parabolic-reflector microphone

parachute approach
parachute badge
parachute brake
parachute drogue
parachute flare
parachute jump
parachute jumper
parachute light
parachute light ball
parachute rigger
parachute spinnaker
parachute troops
paracoto bark
parade armor
parade bed
parade ground
parade rest
parade your wares
paradental pyorrhea
paradigm case
paradise apple
paradise bird
paradise duck
paradise finch
paradise fish
paradise flower
paradise flycatcher
paradise gallery
paradise grackle
paradise green
paradise grosbeak
paradise nut
paradise plant
paradise seed
paradise stock
paradise tree
paradox gun
paradoxical
sleep
paraffin distillate
paraffin hydrocarbon
paraffin oil
paraffin paper
paraffin scale
paraffin series
paraffin wax
paraffin xylol
paraffin-base

paraffin-base oil
paraglyph printing
paragonite schist
parainfluenza virus
paralinguistic communication
parallel axiom
parallel bar
parallel bars
parallel column
parallel cousin
parallel cousin marriage
parallel dash
parallel fifths
parallel file
parallel forces
parallel intervals
parallel line
parallel middle body
parallel motion
parallel octaves
parallel of altitude
parallel of latitude
parallel operation
parallel postulate
parallel projection
parallel rule
parallel ruler
parallel rulers
parallel rules
parallel sailing
parallel series
parallel top
parallel trench
parallel turn
parallel vector
parallel-flow turbine
parallel-line scanning
parallel-veined
parallelogram law
parallelogram of forces
parallelogram rule
paralysis agitams
paralysis agitans
paralysis of authority
paralytic dementia
paralytic rabies
paralytic stroke
parametric

amplifier
paramine brown
paramount estate
paranitraniline red
paranoiac psychosis
paranoid delusion
paranoid personality
paranoid psychosis
paranoid schizophrenia
paraphase amplifier
parasite drag
parasite resistance
parasitic drag
parasitic plant
parasitic suppressor
parasitic vowel
parasol ant
parasol fern
parasol mushroom
parasol pine
parasol skirt
parasol wing
parasol-shaped
parasympathetic nervous system
parathyroid extract
parathyroid gland
parathyroid hormone
parathyroid tetany
paratoid gland
paratroop tactics
paratrooper boots
paratyphoid bacillus
paratyphoid fever
parce que
parcel carrier
parcel checker
parcel delivery
parcel gilding
parcel of land
parcel out
parcel paper
parcel post
parcel-blind
parcel-carrying
parcel-deaf
parcel-divine
parcel-drunk
parcel-gilder

parcel-gilding
parcel-gilt
parcel-guilty
parcel-learned
parcel-mad
parcel-packing
parcel-plate
parcel-popish
parcel-post stamp
parcel-stupid
parcel-terrestrial
parcel-tying
parchment bark
parchment lace
parchment
 paper
parchment worm
parchment-colored
parchment-covered
parchment-faced
parchment-maker
parchment-skinned
parchment-spread
pardon bowl
pardon chair
pardon me
pardon screen
pardonable pride
pare down expenses
pareira brava
parent company
parent complex
parent compound
parent element
parent fixation
parent language
parent metal
parent-in-law
parental generation
parental home
parental love
parental school
parenthetical remark
parfait amour
parheliacal ring
parhelic circle
parhelic ring
pari passu

pari-
pari-mutuel
pari-mutuel machine
pariah dog
pariah kite
parian ware
parietal bone
parietal cell
parietal eye
parietal lobe
parieto-
parieto-occipital
parimutuel machine
paring chisel
paring down
paring gouge
paring knife
paris green
parish church
parish clerk
parish council
parish house
parish meeting
parish priest
parish records
parish register
parish rolls
parish school
parish top
parish-pump
parish-rigged
parity bit
parity check
park flower
park forest
park green
park in space
park
 of artillery
park savanna
parkin baker
parking brake
parking disc
parking light
parking lot
parking meter
parking orbit
parking ramp

parking ticket
parkinson's disease
parl proc
parlatoria scale
parliament cake
parliament heel
parliament hinge
parliament house
parliament man
parliamentary agent
parliamentary government
parliamentary law
parliamentary private secretary
parliamentary secretary
parliamentary train
parlor Bolshevik
parlor boarder
parlor car
parlor grand
parlor house
parlor pink
parlour car
parlour game
parlous straits
parochial church council
parochial council
parochial school
parol arrest
parol contract
parole femne
parole law
paroquet auklet
paroquet bur
parotid duct
parotid gland
paroxysmal tachycardia
parquet circle
parquet floor
parrel truck
parrot bullfinch
parrot cry
parrot disease
parrot fever
parrot fish
parrot green
parrot mouth
parrot's-bill
parrot's-feather

parrot-beak
parrot-beaked
parrot-billed
parrot-coal
parrot-fashion
parrot-fish
parrot-gray
parrot-learned
parrot-mouthed
parrot-nosed
parrot-red
parrot-toed
pars
 intermedia
parsley bed
parsley crown
parsley fern
parsley pie
parsley piert
parsley wreath
parsley-flavored
parsley-leaved
parsnip wine
parson bird
parson's nose
parson-bird
part and parcel
part by part
part company
part exchange
part from
part gate
part music
part of speech
part of writing
part owner
part singing
part song
part time
part with
part work
part-created
part-done
part-earned
part-finished
part-heard
part-off
part-opened

part-owner
part-score
part-song
part-time
part-time worker
part-timer
part-writing
partake in
partake of
partake of the Lord's Supper
parted and fretty
parted from
parted per tierce
parterre box
parterre boxes
parti pris
parti-
parti-color
parti-colored
parti-coloured
parti-decorated
parti-mortgage
parti-named
parti-striped
partial amnesia
partial blindness
partial darkness
partial denture
partial derivative
partial differential
partial differential equation
partial eclipse
partial fraction
partial fractions
partial
 hold deck
partial ordering
partial pressure
partial product
partial score
partial sum
partial to
partial tone
partial vacuum
partially ordered
partially ordered set
particeps criminis
participant observation

participant observer
participate in
participating bond
participating insurance
participating mortgage
participating preferred
participating preferred stock
participatory democracy
particle accelerator
particle counter
particle of difference
particle physics
particle separation
particle velocity
particular affirmative
particular average
particular choice
particular estate
particular lien
particular negative
particular quantifier
particular solution
particulate inheritance
parties litigant
partin of wood
parting bead
parting chisel
parting cup
parting gate
parting of the ways
parting shard
parting shot
parting strip
parting tool
parting words
partisan election
partisan politics
partisan spirit
partition bulkhead
partition law
partition line
partner in crime
partner plate
partnered
with
partners with
partners' desk
partridge cane

partridge dove
partridge pea
partridge pigeon
partridge-berry
partridge-wood
parts list
parts of
parts of ships
party boss
party chairman
party chieftain
party circle
party doctrine
party dress
party emblem
party faithful
party girl
party hack
party in power
party leader
party line
party liner
party machine
party man
party member
party per fess
party per tierce
party philosophy
party platform
party politics
party pooper
party principle
party spirit
party to a suit
party wall
party wheelhorse
party whip
party wire
party-colored
party-column ballot
party-giving
party-making
party-man
party-political
party-spirited
party-wall
party-walled
party-zealous

parula blue
parula warbler
parvi-
pas d'action
pas de basque
pas de chat
pas de cheval
pas de deux
pas de trois
pas du tout
pas seul
pasch egg
pasch-egg
paschal candle
paschal controversy
paschal flower
paschal lamb
paschal letter
paso doble
pasque-flower
pass all bounds
pass along
pass
 an opinion
pass and repass
pass around
pass as
pass away
pass band
pass belief
pass boat
pass box
pass by
pass by in silence
pass check
pass comprehension
pass counterfeit money
pass course
pass current
pass degree
pass door
pass for
pass from mouth to mouth
pass holder
pass in review
pass in the dark
pass in the mind
pass in the thoughts

pass in your checks
pass in your chips
pass into
pass into your hands
pass judgment
pass key
pass law
pass master
pass muster
pass off
pass off on
pass on
pass out
pass out cold
pass out of sight
pass out of the picture
pass over
pass over Jordan
pass over lightly
pass point
pass sentence
pass sentence on
pass the Rubicon
pass the buck
pass the eyes over
pass the fingers over
pass the hat
pass the queer
pass the time
pass the time of day
pass through
pass through your head
pass through your mind
pass time
pass to the order of the day
pass under review
pass under the name of
pass understanding
pass up
pass upon
pass water
pass with flying colors
pass
you by
pass your lips
pass your time in
pass your word
pass-

pass-book
pass-by
pass-bye
pass-guard
pass-key
pass-man
pass-out
passage at arms
passage bed
passage bird
passage board
passage boat
passage d'arms
passage grave
passage hawk
passage money
passage of arms
passage of time
passage penny
passage work
passage-boat
passage-free
passage-making
passage-work
passaree boom
passe-partout
passe-partouts
passe-temps
passed away
passed ball
passed by
passed master
passed on
passed out
passed over
passed up
passed-master
passenger agent
passenger capacity
passenger car
passenger density
passenger falcon
passenger list
passenger locomotive
passenger manager
passenger mile
passenger mileage
passenger pigeon

passenger plane
passenger steamer
passenger train
passenger-mile
passenger-pigeon
passer-by
passerine bird
passers-by
passing around
passing away
passing belief
passing bell
passing by
passing fancy
passing note
passing over
passing shot
passing spring
passing strake
passing strange
passing
the buck
passing through
passing up
passing word
passing-note
passion cross
passion flower
passion fruit
passion nail
passion play
passion sunday
passion week
passion-blazing
passion-breathing
passion-colored
passion-distracted
passion-driven
passion-feeding
passion-filled
passion-flower
passion-fraught
passion-frenzied
passion-guided
passion-kindled
passion-kindling
passion-led
passion-proud

passion-ridden
passion-shaken
passion-smitten
passion-stirred
passion-stung
passion-swayed
passion-thrilled
passion-thrilling
passion-torn
passion-tossed
passion-wasted
passion-winged
passion-worn
passive algolagnia
passive immunity
passive noun
passive obedience
passive reason
passive resistance
passive resister
passive self-annihilation
passive voice
passive-aggressive reaction
passive-dependence reaction
passive-minded
passy-measures
past and gone
past bearing
past comprehension
past danger
past dispute
past due
past expectation
past experience
past history
past hope
past master
past
 mistress
past one's head
past participle
past perfect
past perfect tense
past praying for
past progressive tense
past recall
past recollection
past tense

past time
past times
past use
past your prime
past-due
past-master
paste grain
paste mold
paste on
paste wash
paste water
paste-egg
paste-up
pastel blue
pastel color
pastel gray
pastel orange
pastel painting
pastel-tinted
pasteur treatment
pasteurized milk
pastor-elect
pastoral care
pastoral counseling
pastoral drama
pastoral elegy
pastoral epistle
pastoral letter
pastoral poet
pastoral poetry
pastoral prayer
pastoral staff
pastoral theology
pastrami sandwich
pastry bag
pastry chef
pastry cook
pastry cream
pastry custard
pastry flour
pastry shell
pastry tube
pasture bird
pasture grass
pasture land
pasture on
pasture rose
pasture thistle

pasty-faced
pasty-footed
pat hand
pat on the back
pat on the cheek
pat on the head
pat pend
pat yourself on the back
pat-a-cake
pat-pat
patch board
patch bolt
patch box
patch pocket
patch test
patch things
up
patch together
patch up
patch up a friendship
patch up a quarrel
patch-box
patching plaster
patchouli oil
patchwork quilt
pate d'amande
pate de foie gras
patellar reflex
patent anchor
patent block
patent flour
patent hammer
patent leather
patent light
patent log
patent medicine
patent note
patent office
patent right
patent slip
patent space
patent still
patent-cut jib
pater patratus
paternal ancestor
paternal domicile
paternal love
paternal roof

paternity suit
paternoster line
path of least resistance
path-
pathetic fallacy
patho-
pathologic anatomy
pathological chemistry
pathological condition
pathological drinker
pathological drunkenness
pathological indecisiveness
pathological intoxication
pathological liar
pathological lying
pathological type
patience dock
patience of Job
patience-dock
patient as Job
patient man
patient of
patina green
patio process
patr-
patres conscripti
patri-
patria potestas
patriarchal basilica
patriarchal cross
patriarchate of Alexandria
patriarchate
of Antioch
patriarchate of Constantinople
patriarchate of Jerusalem
patriots' day
patristic philosophy
patristic theology
patrol boat
patrol bomber
patrol car
patrol plane
patrol torpedo boat
patrol wagon
patron of drama
patron saint
patronal festival
patronizing attitude

patten maker
patter song
pattern after
pattern bargaining
pattern bombing
pattern box
pattern card
pattern designer
pattern maker
pattern of perfection
pattern reader
pattern wheel
pattern-bomb
pattes de mouche
patty shell
patty-cake
patty-shell
pauci-
paucis verbis
paul bunyan
paulo-post-future
paunch mat
pauper costs
pauper-born
pauper-bred
pauper-breeding
pauper-fed
pauper-feeding
pauper-making
pause for station identification
pauvre diable
pave the way
pave the way to
paved road
pavement ant
pavement artist
pavement epithelium
pavement light
paver of the way
pavilion hospital
pavilion roof
paving brick
paving material
paving roller
paving stone
paving tile
pavor nocturnus
paw print

paw-paw
paw-pawness
pawed-over
pawl
 bitt
pawl head
pawl post
pawl rim
pawn ticket
pax in bello
pax tecum
pax vobiscum
pay COD
pay a compliment
pay a visit
pay addresses to
pay after deductions
pay after taxes
pay and allowances
pay as you go
pay at sight
pay attention
pay attention to
pay attentions to
pay back
pay back in full measure
pay bed
pay by installments
pay cash
pay cash down
pay cash on delivery
pay cash on the barrelhead
pay clerk
pay close attention
pay conscience money
pay court to
pay damages
pay dearly
pay dirt
pay divine honors to
pay down
pay envelope
pay exorbitantly
pay for
pay heed
pay heed to
pay homage to
pay honor to

pay in
pay in advance
pay in full
pay in kind
pay load
pay mind to
pay more than it's worth
pay no attention
pay no attention to
pay no mind
pay no regard to
pay off
pay off old scores
pay off the head
pay old debts
pay on
pay one in his own coin
pay out
pay over
pay phone
pay raise
pay regard to
pay reparation
pay reparations
pay respect to
pay roll
pay scot and lot
pay someone
back in his own coin
pay spot cash
pay station
pay strict attention
pay suit to
pay the bill
pay the bills
pay the costs
pay the debt of nature
pay the debt to nature
pay the forfeit
pay the penalty
pay the piper
pay the shot
pay through the nose
pay to the tune of
pay too much
pay tribute
pay tribute to
pay up

pay you in your own coin
pay you in your own currency
pay your
pay your addresses to
pay your court to
pay your dues
pay your respects to
pay your share
pay your way
pay-
pay-TV
pay-all
pay-as-you-go
pay-day
pay-off
pay-rent
pay-roller
paying back
paying guest
paying off
paying out
paying the bills
paying up
paymaster general
paymaster-generalship
payment bill
payment in kind
payno regard to
payroll deduction insurance
payroll padding
pe-tsai cabbage
pea bean
pea beetle
pea blight
pea coal
pea comb
pea crab
pea flower
pea green
pea grit
pea huller
pea in the shoe
pea jacket
pea measle
pea mildew
pea moth
pea ore
pea rifle

pea sheller
pea shrub
pea soup
pea souper
pea tree
pea vetchling
pea
 vine
pea weevil
pea-brained
pea-chick
pea-coat
pea-combed
pea-flower
pea-flowered
pea-jacket
pea-picking
pea-shoot
pea-sized
pea-soup
pea-soup fog
pea-souper
pea-soupy
pea-tree
peabody bird
peace and quiet
peace be to this house
peace be to you
peace be with you
peace be within thy walls
peace conference
peace dove
peace establishment
peace feelers
peace giver
peace guild
peace lover
peace of God
peace of heart
peace of mind
peace of soul
peace of spirit
peace offensive
peace offer
peace offering
peace officer
peace pipe
peace warrant

peace-abiding
peace-blessed
peace-breathing
peace-bringing
peace-enamored
peace-giving
peace-inspiring
peace-keeping force
peace-loving
peace-lulled
peace-offering
peace-preaching
peace-procuring
peace-restoring
peace-trained
peaceful change
peaceful coexistence
peaceful death
peaceful end
peaceful protest
peaceful sleep
peach aphid
peach bacteriosis
peach bark beetle
peach bell
peach blight
peach blister
peach bloom
peach blossom
peach borer
peach
canker
peach color
peach fuzz
peach melba
peach moth
peach red
peach rosette
peach twig borer
peach wine
peach-blossom
peach-blow
peach-colored
peach-kernel oil
peach-leaved
peachblossom pink
peachblow glass
peachtree borer

peachy-keen
peacock blue
peacock butterfly
peacock fan
peacock green
peacock heron
peacock iris
peacock moth
peacock ore
peacock pheasant
peacock poppy
peacock worm
peacock's feather
peacock's tail
peacock-blue
peacock-feathered
peacock-fish
peacock-flower
peacock-herl
peacock-hued
peacock-spotted
peacock-voiced
peak crest
peak factor
peak load
peak out
peaked cap
peaking circuit
peaky-faced
peal of applause
peal of laughter
peal of thunder
peal ringing
peanut bar
peanut brittle
peanut butter
peanut butter and jelly sandwich
peanut flour
peanut gallery
peanut oil
peanut politician
peanut politics
peanut tube
peanut worm
pear blight
pear blight beetle
pear borer
pear brandy

pear gauge
pear haw
pear midge
pear scale
pear shell
pear slug
pear squash
pear thorn
pear
thrips
pear-leaved
pear-shaped
pearl ash
pearl barley
pearl blue
pearl bluish
pearl blush
pearl coating
pearl cotton
pearl danio
pearl diabase
pearl disease
pearl diver
pearl diving
pearl edge
pearl essence
pearl eye
pearl filler
pearl fisher
pearl fishing
pearl grain
pearl gray
pearl grey
pearl harbor
pearl hardening
pearl hen
pearl millet
pearl molding
pearl mussel
pearl oyster
pearl shell
pearl sheller
pearl shelling
pearl sinter
pearl spar
pearl spurry
pearl tapioca
pearl white

pearl-ash
pearl-barley
pearl-bearing
pearl-besprinkled
pearl-bordered
pearl-bush
pearl-coated
pearl-colored
pearl-crowned
pearl-encrusted
pearl-eyed
pearl-fishery
pearl-gemmed
pearl-gray
pearl-handled
pearl-headed
pearl-hued
pearl-like
pearl-lined
pearl-lipped
pearl-oyster
pearl-pale
pearl-pure
pearl-round
pearl-set
pearl-shell
pearl-studded
pearl-teethed
pearl-toothed
pearl-white
pearl-wreathed
pearl-yielding
pearly everlasting
pearly king
pearly nautilus
pearly-white
pearten up
peas in a pod
peasant blue
peasant
cunning
peasant holder
peasant proprietor
peasant proprietorship
peasant revolt
peasant sleeve
peasant-born
pease brose

pease cod
pease pudding
peasecod breastplate
peat bank
peat bog
peat coal
peat digger
peat fiber
peat gas
peat hag
peat machine
peat moor
peat moss
peat reek
peat soil
peat spade
peat-roofed
peat-smoked
peau de soie
pebble cast
pebble dash
pebble gravel
pebble grinder
pebble heater
pebble leather
pebble mill
pebble powder
pebble vetch
pebble-covered
pebble-dashed
pebble-paved
pebble-paven
pebble-shaped
pebble-stone
pebble-strewn
pecan brown
peccant humor
peche melba
peck at
peck horn
peck of troubles
peck order
peckerwood mill
pecking order
pecky cypress
pectic acid
pectin sugar
pectini-

pectoral arch
pectoral cross
pectoral fin
pectoral girdle
pectoral muscle
pectoral sandpiper
peculiar expression
peculiar institution
peculiar people
peculiar thing
peculiar trait
pecuniary advantage
pecuniary aid
pecuniary resources
ped-
pedal board
pedal brake
pedal cords
pedal
 coupler
pedal curve
pedal extremity
pedal ganglion
pedal key
pedal keyboard
pedal note
pedal organ
pedal piano
pedal point
pedal polygon
pedal pushers
pedal surface
pedal wheel
pedal-pushers
pedately cleft
pedately veined
pedati-
peddler's cart
pede cloth
pede window
pedestal box
pedestal mount
pedestal pile
pedestal rock
pedestal table
pedestrian crossing
pedi-
pedigree clause

pedo-
pedunculate oak
pee your pants laughing
pee-pee
peek in
peek-bo
peel end
peel off
peel tower
peeled eye
peelie-wally
peeling disease
peen hammer
peen-to
peening rammer
peep frog
peep hawk
peep into the future
peep nap
peep of day
peep out
peep plate
peep show
peep sight
peep-bo
peep-hole
peep-show
peeping tom
peer at
peer group
peer into
peer of the realm
peer out
peers of the realm
peevish person
peg along
peg at
peg away
peg down
peg drum
peg float
peg leg
peg on
peg out
peg pants
peg the market
peg to hang on
peg tooth

peg top
peg-a-lantern
peg-tooth harrow
peg-top
pegged market
pegging awl
peking
 man
pelagic zone
pelargonic acid
pelargonium oil
pelican crossing
pelican fish
pelican flower
pelican hook
pell mell
pell-mell
pellagra-preventive factor
pellet bow
pellet molding
pellitory bark
pelo-
pelorus card
pelt rot
pelt wool
pelti-
pelting rain
pelvi-
pelvic arch
pelvic fin
pelvic girdle
pembroke table
pen and ink
pen cancellation
pen driver
pen driving
pen feather
pen friend
pen in
pen keeping
pen machine
pen maker
pen mating
pen name
pen nib
pen pal
pen palsy
pen picture

pen point
pen portrait
pen portraiture
pen pot
pen pusher
pen pushing
pen sketch
pen up
pen yan
pen-
pen-and-ink
pen-bearing
pen-cancel
pen-clerk
pen-driver
pen-feather
pen-feathered
pen-fish
pen-pusher
pen-shaped
pen-tailed
pen-written
penal code
penal colony
penal institution
penal interest
penal law
penal retribution
penal servitude
penal settlement
penalty area
penalty bench
penalty box
penalty clause
penalty double
penalty envelope
penalty goal
penalty kick
penalty killer
penalty rates
penalty stroke
penang
lawyer
penang nut
penang-lawyer
pencil beam
pencil blue
pencil box

pencil case
pencil cedar
pencil compass
pencil diamond
pencil drawing
pencil driver
pencil driving
pencil flower
pencil gate
pencil gating
pencil holder
pencil maker
pencil pusher
pencil pushing
pencil rod
pencil sharpener
pencil sharpening
pencil stone
pencil-beam antenna
pencil-case
pencil-formed
pencil-mark
pencil-shaped
pendant bow
pendant cloud
pendant post
pendant switch
pendant tackle
pendant-shaped
pendant-winding
pendent post
pendente lite
pendulum bob
pendulum clock
pendulum level
pendulum motion
pendulum press
pendulum pump
pendulum watch
pendulum wheel
pene-
penetrate into the mind
penetrated with
penetrating eye
penetrating look
penguin duck
penguin grass
peninsula pine

penis envy
penitent form
penitential Psalm
penitential act
penitential exercise
penitentiary book
pennant fish
pennant hoist
pennant-winged
pennati-
penner-up
penni-
penniless man
pennsylvania dutch
penny ante
penny arcade
penny bank
penny
 black
penny bridal
penny cake
penny dreadful
penny gaff
penny grass
penny hat
penny horrible
penny loaf
penny pies
penny pincher
penny post
penny rent
penny stock
penny stocks
penny tree
penny wedding
penny wheep
penny whistle
penny wisdom
penny-a-line
penny-a-liner
penny-cress
penny-dreadful
penny-farthing
penny-gaff
penny-grass
penny-pinch
penny-pincher
penny-pinching

penny-plain
penny-stone
penny-whistle
penny-wise
penny-wise and pound-foolish
pension off
pensionable age
pensioned off
pensioning off
pent road
pent roof
pent-roof
pent-up
pent-up in the memory
penta-
penta-acetate
pentaerythritol tetranitrate
pentagon dodecahedron
pentagonal dodecahedron
pentane lamp
pentanoic acid
pentatonic scale
penteconta-
penthouse roof
pentobarbitone sodium
pentose nucleic acid
pentose sugar
pentyl acetate
pentyl alcohol
pentyl group
peony dahlia
peony-flowered
people at large
people in general
people of fashion
people's democracy
people's front
people's republic
people's war
people-blinding
people-born
people-devouring
people-king
people-loving
people-pestered
people-pleasing
pep

pill
pep rally
pep talk
pep up
pepped up
pepper bush
pepper caster
pepper game
pepper mill
pepper oil
pepper plant
pepper pod
pepper pot
pepper red
pepper sauce
pepper spot
pepper tree
pepper turnip
pepper vine
pepper wheat
pepper-and-salt
pepper-and-salt rope
pepper-box
pepper-castor
pepper-pot
pepper-tree
peppercorn rent
peppered moth
peppermint camphor
peppermint geranium
peppermint gum
peppermint oil
peppermint stringbark
peppermint tree
peptic digestion
peptic ulcer
peptide bond
per an
per annum
per ascensum
per bend
per capita
per caput
per cent
per centum
per chevron
per compound
per contra

per descensum
per diem
per head
per mensem
per mil
per mill
per pais
per pale
per pro
per procuration
per procurationem
per saltire
per saltum
per se
per second per second
per simpliciter
per stirpes
per-
perboric acid
perceived noise decibel
percentage composition
percentage error
percentage tare
perception
 deafness
perceptual defence
perch pole
perching bird
perchlor-
perchloric acid
perchromic acid
percolate in
percolate into
percussion bullet
percussion cap
percussion drilling
percussion figure
percussion fire
percussion fuse
percussion hammer
percussion instrument
percussion lock
percussion section
percussion stop
percussion table
percussion-proof
percussive welding
peregrine falcon

pereira bark
peremptory challenge
peremptory plea
peremptory refusal
perennial pea
perennial phlox
perennial ryegrass
perennial treatment
perennial-rooted
perfect binding
perfect body
perfect cadence
perfect competition
perfect contrition
perfect flower
perfect fool
perfect game
perfect gas
perfect gentleman
perfect lady
perfect likeness
perfect number
perfect participle
perfect pitch
perfect radiator
perfect ream
perfect rhyme
perfect square
perfect tense
perfect type
perfect usufruct
perfect year
perfecting press
perfecting touch
perfective aspect
perfectly sure
perfector press
perfide Albion
perforated
 tape
perforated tracery
perforation gauge
perform a
perform a part
perform a part in
perform a rite
perform a role
perform action

perform aerobatics
perform as
perform divine service
perform music
perform on
perform rites
perform service
perform the act of love
perform the duties of
perform the functions of
perform the marriage act
perform the office of
perform your duty
performance test
performing area
performing arts
pergelisol table
peri-
peri-insular
periarteritis nodosa
pericline twinning
peridental membrane
peridot of Ceylon
perigean tide
perigean tides
peril point
peril-laden
perilla oil
perineo-
period of duty
period of existence
period of revolution
period of rotation
period piece
period style
periodic acid
periodic function
periodic law
periodic motion
periodic sentence
periodic system
periodic table
periodic wave
periodical cicada
periodical index
periodicity factor
periodontal membrane
periodontal tissue

periost-
periosteo-edema
peripatetic exercise
peripatetic journey
peripheral
 device
peripheral field
peripheral nervous system
peripheral neuritis
peripheral speed
peripheral vision
periscopic lens
perish the thought
perish with cold
perishing with hunger
periton-
periwig chair
periwinkle blue
perjure yourself
perjury-proof
perk up
perle cotton
permafrost table
permanent magnet
permanent magnet speaker
permanent magnetism
permanent press
permanent tooth
permanent wave
permanent way
permanent white
permanent yellow
permanent-press fabric
permanganic acid
permeate by nature
permission to enter
permissions editor
permit all
permit anything
permit bond
permonosulfuric acid
permutation lock
pernicious anaemia
pernicious anemia
pernicious weed
pernyi silkworm
peroxide blond
peroxide-blond

peroxy group
peroxy radical
peroxy-
peroxymonosulfuric acid
peroxysulfuric acid
peroxysulphuric acid
perpend stone
perpend wall
perpendicular distance
perpendicular hand
perpetual adoration
perpetual bond
perpetual calendar
perpetual motion
perplexed question
persecution
 complex
persian cat
persian lamb
persist in
persistence of vision
persistent cruelty
persistent lactation
person in charge
person of consequence
person of fashion
person of importance
person of note
person of renown
person to be reckoned with
person-to-person
person-to-person call
persona grata
persona non grata
personae gratae
personae non gratae
personal adviser
personal aims
personal ambition
personal appearance
personal choice
personal column
personal conflict
personal correspondence
personal desires
personal effects
personal eq his essays
personal equation

personal file
personal idealism
personal identity
personal initiative
personal judgment
personal letter
personal liberty
personal matter
personal name
personal pronoun
personal property
personal property tax
personal remark
personal responsibility
personal shopper
personal sonar
personal staff
personal style
personal usage
personality bob
personality conflict
personality disintegration
personality disorder
personality disorganization
personality
inventory
personality tendency
personality test
personality type
personnel director
personnel manager
persons of the drama
perspiration odor
persuade yourself
persuasion-proof
persulfuric acid
persulphuric acid
pertain to
pertaining to
pertinent to
peruvian bark
pervading attitude
pervading attitudes
perverse fool
perverse personality
perverse-notioned
perverted image
pest pear

pest-house
pest-ridden
pestilence-proof
pestle and mortar
pestle-shaped
pet cock
pet expression
pet food
pet lamb
pet name
pet peeve
pet subject
pet-cock
peta-
petal pink
pete blower
pete man
peter boat
peter gunner
peter out
peter pan
peter's pence
peter-boat
peter-penny
petit bleu
petit bourgeois
petit dejeuner
petit feu
petit four
petit juror
petit jury
petit larceny
petit mal
petit point
petit serjeanty
petit souper
petit treason
petit-bourgeois
petit-juror
petit-juryman
petit-maftre
petit-maitre
petit-maltre
petit-mattre
petit-negre
petit-noir
petite bourgeoisie
petite marmite

petite noblesse
petite
perception
petites perceptions
petitio principii
petition nomination
petition-proof
petits bourgeois
petits fours
petr-
petrarchan sonnet
petri dish
petrified forest
petrified wood
petro-
petro-occipital
petrol engine
petrol station
petroleum asphalt
petroleum benzine
petroleum coke
petroleum engine
petroleum engineer
petroleum engineering
petroleum ether
petroleum grease
petroleum jelly
petroleum naphtha
petroleum spirit
petticoat breeches
petticoat government
petticoat insulator
petticoat narcissus
petticoat pipe
petty bourgeois
petty bourgeoisie
petty canon
petty captain
petty cash
petty cashbook
petty criticism
petty gambler
petty grafter
petty juror
petty jury
petty king
petty larceny
petty mind

petty officer
petty officer first class
petty officer second class
petty officer third class
petty politician
petty politics
petty sessions
petty theft
petty thief
petty treason
petty tyrant
petty-bag
petty-minded
petty-mindedly
petty-mindedness
petulant person
petunia violet
peu
de chose
pew chair
pew hinge
pew opener
pew rent
pew rental
pew renter
pewter mill
phaeton butterfly
phago-
phagocytic immunity
phako-
phallic stage
phallic symbol
phallic worship
phallic worshiper
phanero-
phantom acceleration
phantom circuit
phantom larva
phantom limb
phantom minnow
phantom of the mind
phantom orchid
phantom picture
phantom red
phantom tumor
phantom wire
phantom-fair
phantom-white

pharaoh ant
pharmaceutical chemist
pharmaco-
pharmaco-oryctology
pharyng-
pharyngeal cavity
pharyngeal tonsil
pharyngo-
pharyngo-oesophageal
pharyngo-oral
phase adjustment
phase advancer
phase angle
phase contrast microscope
phase control
phase converter
phase difference
phase discriminator
phase in
phase inverter
phase microscope
phase modulation
phase out
phase rule
phase space
phase splitter
phase splitting
phase transformer
phase velocity
phase-contrast
phase-discriminating amplifier
phase-rotation relay
phase-shift microphone
phase-wound
phase-wound rotor motor
phases of the moon
phatic
communion
pheasant cuckoo
pheasant duck
pheasant under glass
pheasant's eye
pheasant's-eye
pheasant's-eyes
pheasant-eyed
pheasant-plumed
pheasant-shell
pheasant-tailed

phello-
phen-
phenacyl chloride
phenarsazine chloride
phenethyl alcohol
pheno-
phenobarbital sodium
phenol alcohol
phenol aldehyde
phenol coefficient
phenol red
phenol-phthalein
phenolic resin
phenolic urea
phenomenological psychology
phenomenological theology
phenyl acetate
phenyl alcohol
phenyl cyanide
phenyl ether
phenyl ethyl ether
phenyl group
phenyl iodide
phenyl isocyanate
phenyl mercaptan
phenyl methyl ketone
phenyl salicylate
phenyl valerate
phenylaminoproprionic acid
phenylene blue
phenylene group
phenylethyl alcohol
phenylethylbarbituric acid
phenylformic acid
phenylic acid
phenylmethylcarbinyl acetate
phenylpropyl acetate
phenylpyruvic oligophrenia
phi-meson
phi-phenomena
phi-phenomenon
phil-
philenor butterfly
philharmonic pitch
philo-
philosopher king
philosopher's stone
philosopher's wool

philosophers'
stone
philosophic composure
philosophic doctrine
philosophic system
philosophic theory
philosophical anthropology
philosophical exisistentialism
philosophical existentialism
philosophical existentialist
philosophical idealism
philosophical induction
philosophical inquiry
philosophical investigation
philosophical optimism
philosophical optimist
philosophical pitch
philosophical proposition
philosophical speculation
philosophical theology
philosophical unitarianism
philosophico-
philosophy learned from examples
philosophy of being
philosophy of organism
philosophy of signs
philosophy of the Academy
philosophy of the Garden
philosophy of the Lyceum
philosophy of the Porch
philosophy of the Stoa
phleb-
phlebo-
phloem fiber
phloem necrosis
phloem parenchyma
phloem ray
phloro-
phobic reaction
phoebe bird
phoenix fowl
phon-
phone book
phone call
phone number
phone-in
phonemic alphabet
phonetic alphabet

phonetic character
phonetic law
phonetic spelling
phonetic symbol
phono-
phonograph record
phony
 disease
phony dividend
phony money
phony peach
phony war
phoo-phoo
phos-
phosph-
phosphate rock
phosphine oxide
phospho-
phosphonium iodide
phosphor bronze
phosphor copper
phosphoric acid
phosphoric anhydride
phosphoro-
phosphorous acid
phosphorous anhy-dride
phosphorus chloride
phosphorus disease
phosphorus necrosis
phosphorus oxide
phosphorus oxychloride
phosphorus pentachloride
phosphorus pentoxide
phosphorus sesquisulfide
phosphorus sulphide
phosphorus trichloride
phosphoryl chloride
phosphoryl group
phosphoryl radical
phossy jaw
phot-
phote finish
photo base
photo finish
photo layout
photo relief
photo spread
photo-

photo-electric
photo-engraving
photo-finish
photo-galvanography
photo-mount
photo-offset
photo-reconnaissance
photo-reconnaissance plane
photo-retouch
photo-set
photo-setting
photochemical process
photoconductor cell
photoelectric cathode
photoelectric cell
photoelectric cell meter
photoelectric cells
photoelectric colorimeter
photoelectric counter
photoelectric
current
photoelectric detector
photoelectric device
photoelectric effect
photoelectric emission
photoelectric image converter
photoelectric inspection machine
photoelectric intrusion detector
photoelectric meter
photoelectric multiplier tube
photoelectric photometer
photoelectric pickup
photoelectric pinhole detector
photoelectric recorder
photoelectric sorter
photoelectric threshold
photoelectric timer
photoelectric tube
photoelectric tubes and cells
photoflash bulb
photoflash lamp
photoflash photography
photoflash synchronizer
photoflood lamp
photogelatin process
photograph album
photographer's model
photographic equipment

photographic magnitude
photographic memory
photographic paper
photographic realism
photographic reproduction
photographic telescope
photomicrographic camera
photomultiplier tube
photosensitive device
photosensitive devices
photosensitive glass
photostatic copy
phototypesetting machine
photovoltaic cell
photovoltaic effect
phrasal idiom
phrasal verb
phrase book
phrase
 mark
phrase marker
phrase structure
phrase-structure grammar
phrase-structure rule
phren-
phreno-
phthalic acid
phthalic anhydride
phthalocyanine blue
phthalocyanine green
phyco-
phyl-
phyll-
phyllo-
phylo-
physi-
physic nut
physic-nut
physical anthropology
physical body
physical charm
physical checkup
physical chemistry
physical condition
physical culture
physical culturist
physical dependence
physical diagnosis

physical double star
physical education
physical examination
physical fitness
physical force
physical geography
physical geology
physical jerks
physical love
physical map
physical medicine
physical metallurgy
physical meteorology
physical optics
physical pendulum
physical pleasure
physical presence
physical science
physical sensibility
physical suffering
physical therapist
physical therapy
physical unfeeling
physical world
physician in ordinary
physico-
physico-theology
physio-
physiographic geology
physiologic epilepsy
physiological atmosphere
physiological botany
physiological
chemistry
physiological individual
physiological phonetics
physiological psychology
physiological saline
physiological salt soluti
physiological salt solution
physiologically addictive
physo-
phyt-
phytic acid
phyto-
phytogenic infection
pi a form
pi meson

pi-jaw
pi-meson
pia mater
pia-arachnitis
pia-arachnoid
pia-matral
piacular offering
piano accordion
piano action
piano deal
piano duet
piano keys
piano lamp
piano nobile
piano organ
piano player
piano player roll
piano quartet
piano quintet
piano roll
piano score
piano stool
piano subito
piano trio
piano wire
piano-organ
piano-player roll
piano-violin
pica em
picaresque novel
picayune critic
piccolopasso red
pick a bone with
pick a hole
pick a quarrel
pick and choose
pick apart
pick at
pick clean
pick clock
pick dressing
pick eye
pick glass
pick hammer
pick holes
pick nits
pick off
pick on

pick out
pick over
pick rake
pick the bones of
pick the brains of
pick the lock
pick to pieces
pick tongs
pick up
pick up an acquaintance
with
pick up information
pick up speed
pick up the check
pick up the mooring
pick up the tab
pick your brains
pick your pockets
pick your steps
pick your way
pick-
pick-a-back
pick-bearing
pick-me-up
pick-nosed
pick-off
pick-up
pick-up arm
pick-up sticks
pick-up-sticks
pickaback plane
pickax team
picke-devant
picked dogfish
picked on
picked up
picked-hatch
picker-up
pickerel frog
pickerel-weed
picket fence
picket fort
picket guard
picket line
picket patrol plane
picket pin
picket ship
picket tail

picking and choosing
picking out
picking up
picking up the check
picking up the tab
pickle grass
pickle green
pickle moth
pickle-cured
pickle-herring
pickup arm
pickup camera
pickup current
pickup service
pickup tube
pickup unit man
picnic basket
picnic ham
picnic races
picnic shoulder
pico-
picot edge
picot stitch
picr-
picramic acid
picric acid
picro-
pictographic character
pictographic symbol
picture book
picture bride
picture card
picture cards
picture carrier
picture channel
picture control
picture
 detector
picture frame
picture gallery
picture hat
picture hook
picture house
picture in your mind
picture layout
picture marriage
picture mirror
picture mold

picture molding
picture monitor
picture noise
picture of health
picture ore
picture palace
picture plane
picture play
picture playwright
picture post card
picture postcard
picture rail
picture sash
picture shifts
picture show
picture spread
picture to yourself
picture tube
picture tubes
picture window
picture wire
picture writing
picture, the
picture-borrowing
picture-broidered
picture-buying
picture-dealing
picture-hanging
picture-hung
picture-painting
picture-pasted
picture-seeking
picture-taking
picture-writing
pictures, the
piddling few
piddling number
pidgin English
pie baker
pie board
pie chart
pie dish
pie eater
pie filler
pie filling
pie in the sky
pie knife
pie maker

pie making
pie meat
pie piece
pie plate
pie rack
pie tin
pie vendor
pie wagon
pie wool
pie-baking
pie-eater
pie-eyed
pie-faced
pie-gow
pie-stuffed
piebald
skin
piece accent
piece bien faite
piece brace
piece broker
piece by piece
piece de resistance
piece goods
piece justificative
piece mold
piece of advice
piece of ass
piece of cake
piece of eight
piece of evidence
piece of exchange
piece of gold
piece of good luck
piece of gossip
piece of guesswork
piece of land
piece of meat
piece of money
piece of news
piece of sharp practice
piece of silver
piece of virtu
piece of work
piece of writing
piece of your mind
piece out
piece price

piece price system
piece rate
piece together
piece wage
piece-dye
piece-dyed
piecing together
piecrust table
pied blackbird
pied goose
pied noir
pied wagtail
pied-
pied-a-terre
pied-billed
pied-billed grebe
pied-coated
pied-colored
pied-de-biche
pied-faced
pied-piping
pied-winged
piedmont glacier
pieds de cochon
pien check
pier arch
pier buttress
pier dam
pier glass
pier table
pier-head
pierce the ears
pierce the heart
pierce to the depths
pierced dollar
piercing eye
piercing look
piercing pain
piercing
wind
pierian spring
pierre-perdu
pierrot show
piezo oscillator
piezo resonator
piezo-
piezoelectric crystal
piezoelectric effect

piezoelectric microphone
piff-paff
pig Latin
pig bed
pig boiling
pig breaker
pig cart
pig dealer
pig deer
pig hutch
pig in a poke
pig in clover
pig iron
pig lead
pig man
pig metal
pig tub
pig typhoid
pig wife
pig yoke
pig's ear
pig's wash
pig-back
pig-backed
pig-bed
pig-bellied
pig-breeding
pig-bribed
pig-chested
pig-dealing
pig-driving
pig-eating
pig-eyed
pig-faced
pig-farming
pig-fat
pig-footed
pig-haired
pig-haunted
pig-headed
pig-iron
pig-jaw
pig-jawed
pig-jump
pig-jumper
pig-keeping
pig-metal
pig-nut

pig-proof
pig-tailed
pig-tight
pigeon English
pigeon blood
pigeon breast
pigeon clock
pigeon flyer
pigeon grape
pigeon grass
pigeon hawk
pigeon hole
pigeon house
pigeon loft
pigeon pea
pigeon post
pigeon pox
pigeon timer
pigeon's milk
pigeon's-neck
pigeon-berry
pigeon-breast
pigeon-breasted
pigeon-breastedness
pigeon-hawk
pigeon-hearted
pigeon-hole
pigeon-house
pigeon-livered
pigeon-pea
pigeon-plum
pigeon-tailed
pigeon-toe
pigeon-toed
pigeon-wood
piggy
 bank
piggy-wiggy
piggyback car
piggyback control
piggyback rocket
pigment cell
pignus judiciale
pignus legale
pigs in blankets
pigs' feet
pigs' knuckles
pigsty bulwark

pigtail hook
pikaba hemp
pike hammer
pike perch
pike pole
pike sauce
pike squirrel
pike whale
pike-eyed
pike-gray
pike-snouted
piked dogfish
pil-
pilaster mass
pilaster strip
pile Pelion on Ossa
pile bent
pile bridge
pile builder
pile building
pile cap
pile drawer
pile drive
pile driver
pile dweller
pile dwelling
pile fender
pile hammer
pile house
pile in
pile it on
pile on
pile out
pile shoe
pile up
pile weave
pile weaving
pile wire
pile-built
pile-driven
pile-driver
pile-driving
pile-woven
pileated woodpecker
pilferage hazard
pilgrim bottle
pilgrim brown
pilgrim ring

pilgrim scallop
pilgrim's bottle
pilgrim's staff
pilgrimage psalm
pili nut
piling strip
pill bug
pill pipe
pill slab
pill tile
pill wood louse
pill, the
pill-boasting
pill-box
pill-dispensing
pill-gilding
pill-rolling
pill-shaped
pill-taking
pillar
 block
pillar bolt
pillar box
pillar crane
pillar cult
pillar dollar
pillar file
pillar lip
pillar mount
pillar of society
pillar of the church
pillar plate
pillar post
pillar saint
pillar stone
pillar-and-breast
pillar-box
pillar-shaped
pillow block
pillow fight
pillow lace
pillow lava
pillow sham
pillow slip
pillow sword
pillow word
pillow-case
pillow-shaped

pilo-
pilose bent grass
pilot balloon
pilot bird
pilot biscuit
pilot boat
pilot bread
pilot burner
pilot cell
pilot chart
pilot chute
pilot cloth
pilot driver
pilot engine
pilot film
pilot fish
pilot flag
pilot flame
pilot house
pilot jack
pilot jacket
pilot ladder
pilot lamp
pilot light
pilot method
pilot model
pilot motor
pilot nut
pilot officer
pilot pin
pilot plan
pilot plane
pilot plant
pilot plow
pilot program
pilot raise
pilot signal
pilot skiff
pilot station
pilot trainee
pilot training
pilot tunnel
pilot valve
pilot waters
pilot
whale
pilot wheel
pilot-bird

pilot-boat
pilot-fish
pilotless aircraft
pilsner glass
piltdown man
pima cotton
pimento cheese
pimento grass
pimiento cheese
pimpernel root
pimple copper
pimple metal
pin a medal on
pin basket
pin bit
pin block
pin borer
pin boy
pin bridge
pin buttock
pin cherry
pin clover
pin curl
pin down
pin fallow
pin gear
pin grass
pin horse
pin in
pin knot
pin mark
pin mill
pin money
pin oak
pin on
pin pallet
pin pallet escapement
pin point
pin pool
pin prod
pin rack
pin rail
pin rod
pin seal
pin setter
pin something on someone
pin stripe
pin the tail on the donkey

pin tooth
pin tuck
pin tumbler
pin up
pin valve
pin vise
pin wheel
pin wire
pin wrench
pin your ears back
pin your faith to
pin your hope upon
pin yourself upon
pin-brained
pin-buttocked
pin-curl
pin-eyed
pin-feather
pin-fire
pin-head
pin-hole
pin-lever escapement
pin-money
pin-pallet escapement
pin-prick
pin-spotted
pin-striped
pin-tailed
pin-tailed sand grouse
pin-toed
pin-up
pin-wheel
pin-wing
pina cloth
pinacate
bug
pinacone-pinacolin
pinafore dress
pinball machine
pinbone steak
pinc-pinc
pince-nez
pincer movement
pincer-shaped
pincers movement
pincers-shaped
pinch bar
pinch effect

pinch hit
pinch hitter
pinch of snuff
pinch out
pinch pennies
pinch phenomenon
pinch point
pinch runner
pinch running
pinch-
pinch-faced
pinch-hit
pinch-hit for
pinch-hitting
pinch-run
pinch-spotted
pinched with hunger
pinched-in
pinchgut money
pincushion distortion
pincushion-flower
pindo palm
pindova palm
pine away
pine bark
pine bark aphid
pine barren
pine barrens
pine borer
pine bullfinch
pine cone
pine end
pine finch
pine for
pine grass
pine grosbeak
pine marten
pine mouse
pine needle
pine nut
pine oil
pine resins
pine sawfly
pine sawyer
pine siskin
pine snake
pine tag
pine tar

pine tree
pine warbler
pine wool
pine worm
pine-apple
pine-barren
pine-bearing
pine-bordered
pine-built
pine-capped
pine-clad
pine-cone fish
pine-covered
pine-crested
pine-crowned
pine-dotted
pine-encircled
pine-fringed
pine-leaf
scale
pine-needle oil
pine-sequestered
pine-shaded
pine-shipping
pine-tar oil
pine-tip moth
pine-tree
pine-tree flag
pine-wood
pineal apparatus
pineal body
pineal eye
pineal gland
pineapple cactus
pineapple disease
pineapple fiber
pineapple fungus
pineapple juice
pineapple oil
pineapple weed
piney dammar
piney tallow
piney woods
pinfall Wrestling
ping pong
ping-pong
pinhole camera
pinhole decay

pinhole pupil
pinion focusing microscope
pink bollworm
pink calla lily
pink champagne
pink coat
pink colors and pigments
pink corydalis
pink disease
pink elephant
pink elephants
pink eye
pink gin
pink grass
pink in
pink lady
pink locust
pink of perfection
pink poplar
pink rhododendron
pink salmon
pink salt
pink slip
pink spiders
pink spray
pink squirrel
pink stern
pink tea
pink vine
pink wine
pink-blossomed
pink-bound
pink-breasted
pink-checked
pink-cheeked
pink-coated
pink-colored
pink-eared
pink-eye
pink-eyed
pink-faced
pink-fleshed
pink-flowered
pink-foot
pink-footed
pink-hi
pink-leaved
pink-lipped

pink-ribbed
pink-shaded
pink-shelled
pink-skinned
pink-sterned
pink-striped
pink-tinted
pink-veined
pink-violet
pink-white
pinking
 iron
pinking shears
pinkster flower
pinnate-leaved
pinnate-ribbed
pinnate-veined
pinnati-
pinnatifid-lobed
pinned down
pinni-
pinning down
pinochle rummy
pinon grass
pinon pine
pinpoint bombing
pinpoint precision
pins and needles
pint pot
pint-pot
pint-size
pint-sized
pintado petrel
pintle boss
pintle chain
pintle hook
pinto bean
pintsch gas
pinup girl
pinwheel roll
pinxster flower
pinxter flower
pioneer day
pioneer tunnel
pious fiction
pious fraud
pip card
pip emma

pip, the
pip-pip
pip-squeak
pipe amygdules
pipe batten
pipe beetle
pipe berth
pipe binder
pipe bomb
pipe box
pipe clay
pipe cleaner
pipe coupling
pipe cutter
pipe die
pipe down
pipe dream
pipe dreamer
pipe dreaming
pipe fitter
pipe fitting
pipe founder
pipe isinglass
pipe line
pipe major
pipe maker
pipe metal
pipe of peace
pipe off
pipe organ
pipe rack
pipe roll
pipe stop
pipe thimble
pipe
thread
pipe threader
pipe tongs
pipe tool
pipe up
pipe up a song
pipe vine
pipe welder
pipe wrench
pipe your eye
pipe-bending
pipe-boring
pipe-caulking

pipe-clay
pipe-clayey
pipe-clayish
pipe-cleaning
pipe-cutting
pipe-drawn
pipe-dream
pipe-dreaming
pipe-drilling
pipe-fish
pipe-joint cement
pipe-layer
pipe-line
pipe-necked
pipe-playing
pipe-puffed
pipe-roll
pipe-shaped
pipe-smoker
pipe-stone
pipe-tapping
pipe-thawing
pipe-threading
piperonyl alcohol
piperonyl aldehyde
piperonyl butoxide
pipes of Pan
piping cord
piping hot
piping time of peace
piping times
pippin file
pippin-faced
pippin-hearted
piptostegia root
pique your interest
pique yourself
pirate bird
pirate perch
pirate stream
pis aller
pisang wax
pisci-
pish-pash
pismo clam
piss about
piss and vinegar
piss artist

piss away
piss off
piss pot
piss you off
pissed off
pissed-off
pissy-eyed
pistachia galls
pistachio green
pistachio nut
pistacia gall
pistol carbine
pistol fire
pistol grip
pistol plant
pistol shot
pistol-handle
 knife
pistol-shaped
pistol-whip
pistol-whipping
piston displacement
piston drill
piston engine
piston motion
piston pin
piston plane
piston power
piston pump
piston ring
piston rod
piston spring
piston valve
piston-valve engine
pit against
pit against one another
pit bank
pit boss
pit brink
pit coal
pit craneman
pit dwelling
pit grave
pit hand
pit head
pit house
pit man
pit of Acheron

pit of your stomach
pit prop
pit sample
pit saw
pit sawing
pit sawyer
pit tomb
pit viper
pit-a-pat
pit-black
pit-blackness
pit-coal
pit-eyed
pit-head frame
pit-headed
pit-hole
pit-marked
pit-pat
pit-patter
pit-rotted
pit-specked
pit-working
pita fiber
pita fibre
pita flax
pita floja
pitch accent
pitch and plunge
pitch and toss
pitch apple
pitch black
pitch board
pitch box
pitch camp
pitch chain
pitch chisel
pitch circle
pitch coal
pitch cone
pitch cylinder
pitch discharger
pitch factor
pitch in
pitch indicator
pitch into
pitch kettle
pitch line
pitch on

pitch opal
pitch pine
pitch pipe
pitch point
pitch pot
pitch
 ratio
pitch shot
pitch speed
pitch surface
pitch upon
pitch your tent
pitch-and-putt
pitch-and-run
pitch-and-run shot
pitch-and-toss
pitch-black
pitch-blackened
pitch-blackness
pitch-blende
pitch-brand
pitch-brown
pitch-colored
pitch-dark
pitch-darkness
pitch-diameter
pitch-faced
pitch-farthing
pitch-lined
pitch-marked
pitch-ore
pitch-pine
pitch-pipe
pitch-stained
pitched battle
pitched roof
pitcher house
pitcher mold
pitcher molding
pitcher plant
pitcher-plant
pitcher-shaped
pitchfork grass
pitching indicator
pitching niblick
pitching piece
pitching tool
pitchy darkness

pith ball
pith hat
pith helmet
pith knot
pithy saying
pitot tube
pitot-static tube
pits, the
pitter-patter
pituitary body
pituitary extract
pituitary gland
pity-bound
pity-moved
pity-worthy
pivitol point
pivot about
pivot bearing
pivot blow
pivot bridge
pivot joint
pivot man
pivot on
pivot pier
pivot span
pivot stand
pivot tooth
pix-jury
pixy ring
pixy stool
pixy-led
pizza pie
place a value on
place after
place
against
place an order
place at your disposal
place before
place bill
place brick
place card
place confidence in
place emphasis on
place hitter
place holder
place hunter
place in

place in difficulty
place in office
place in the foreground
place in the sun
place in your way
place isomerism
place itself
place kick
place kicker
place mat
place name
place of arms
place of articulation
place of assignation
place of confinement
place of habitation or resort
place of torment
place of trade
place of vice
place of worship
place open
place out at interest
place parallel to
place reliance in
place reliance on
place seeker
place setting
place side by side
place the blame for
place the blame on
place the responsibility for
place to live
place to your account
place to your credit
place trust in
place under arrest
place under oath
place upon
place upon record
place where you hang your hat
place your feet carefully
place yourself
place-begging
place-brick
place-grabbing
place-holder
place-holding
place-hunter

place-hunting
place-kick
place-kicker
place-loving
place-money
place-name
place-names
place-naming
place-proud
place-seeking
placebo
 effect
placement examination
placement kick
placement test
placer claim
placer deposit
placer gravel
placer miner
placer mining
placery boom
placid-featured
placid-mannered
placing-out
placita coronae
placket hole
placo-
plagal cadence
plagal mode
plagio-
plagioclase-basalt
plagioclase-granite
plagioclase-porphyrite
plagioclase-porphyry
plagioclase-rhyolite
plague grasshopper
plague mark
plague one
plague spot
plague-beleagured
plague-free
plague-haunted
plague-infected
plague-infested
plague-ridden
plague-smitten
plague-spot
plague-spotted

plague-stricken
plain English
plain Jane
plain aerial
plain as a pikestaff
plain as day
plain as the nose on your face
plain bearing
plain chant
plain chocolate
plain clothes
plain dealer
plain dealing
plain folks
plain knit
plain lap
plain living
plain people
plain rail
plain sail
plain sailing
plain sense
plain
 sewing
plain song
plain speaking
plain speech
plain style
plain stylist
plain suit
plain text
plain to be seen
plain tripe
plain wanderer
plain weave
plain words
plain-bodied
plain-bred
plain-clothed
plain-clothes man
plain-darn
plain-dressing
plain-edged
plain-faced
plain-featured
plain-garbed
plain-headed
plain-hearted

plain-laid
plain-looking
plain-mannered
plain-pranked
plain-soled
plain-speaking
plain-spoken
plain-spokenly
plain-spokenness
plain-work
plainclothes man
plan ahead
plan expenditures
plan of action
plan on
plan out
plan position indicator
plan-
planar process
planching nail
plane angle
plane chart
plane curve
plane figure
plane geometry
plane handlers
plane iron
plane of incidence
plane polarization
plane sailing
plane surveying
plane table
plane tree
plane trigonometry
plane-faced
plane-parallel
plane-polarized
plane-shear
plane-sheer
plane-table
plane-tabler
plane-tree
planer center
planer head
planer knife
planer saw
planer tree
planet differential

planet gear
planet
 wheel
planet-stricken
planet-struck
planetary colony
planetary electrons
planetary house
planetary mansion
planetary nebula
planetary precession
planetary shell
planetesimal hypothesis
plani-
planing hull
planing machine
planing mill
plank buttress
plank down
plank plating
plank road
plank scraper
plank-shear
plank-sheer
planked steak
plankton net
planktonic algae
planned economy
planned parenthood
planning blight
planning board
planning function
planning hull
plano-
plano-concave
plano-convex
planographic printing
planomilling machine
plant a mine
plant anatomy
plant and animal life
plant beard
plant breeder
plant bug
plant cane
plant cell
plant cutter
plant disease

plant factor
plant families
plant feeder
plant fibrin
plant food
plant formation
plant gapeseed
plant geographer
plant geography
plant hair
plant hemp
plant hormone
plant house
plant insulin
plant kingdom
plant life
plant louse
plant part
plant pathology
plant physiology
plant root
plant seed
plant stem
plant thermal
efficiency
plant worship
plant worshiper
plant yourself
plant-animal
plant-cutter
plant-eater
plant-eating
plantain lily
plantain squirrel
plantain tree
plantain-eater
plantain-leaved
plantar ligament
plantar nerves
plantar reflex
plantar veins
plantation acre
plantation rubber
planter's punch
planting stick
plantlike flagellate
plash wheel
plasm-

plasma body
plasma cell
plasma cell leukemia
plasma engine
plasma jet
plasma membrane
plasma substitute
plasma thromboplastic component
plasma torch
plasma transfusion
plasma-jet propulsion
plasmo-
plaster baker
plaster bond
plaster burner
plaster cast
plaster casting
plaster chopper
plaster down
plaster jacket
plaster of Paris
plaster of paris
plaster spreader
plastering trowel
plastic art
plastic bandage
plastic binding
plastic bomb
plastic explosive
plastic flow
plastic glass
plastic operation
plastic paint
plastic person
plastic plate
plastic plywood
plastic surgeon
plastic surgery
plastic tape
plastic wrap
plat du jour
plat-eye
plat-footed
plate
 armor
plate armour
plate battery
plate beam

plate bender
plate bone
plate calender
plate circuit
plate clutch
plate column
plate conductance
plate coupling
plate culture
plate current
plate cutter
plate cylinder
plate driller
plate engraving
plate fulcrum scale
plate gear
plate girder
plate glass
plate glazing
plate heater
plate horse
plate jig
plate keel
plate machine
plate maker
plate mark
plate modulation
plate money
plate oven
plate pail
plate paper
plate piece
plate press
plate printer
plate proof
plate race
plate rail
plate resistance
plate shop
plate tectonics
plate tower
plate tracery
plate-bending
plate-carrier
plate-collecting
plate-cutting
plate-dog
plate-drilling

plate-glass
plate-glazed
plate-incased
plate-layer
plate-mark
plate-mounting
plate-punching
plate-roll
plate-rolling
plate-scarfing
plate-shaped
plate-shearing
plate-tossing
plated stem
platen press
plates of meat
platform balance
platform car
platform deck
platform elevator
platform frame
platform harvester
platform
 orator
platform oratory
platform rocker
platform scale
platform speaker
platform speaking
platform spring
platform ticket
platform wagon
platin-
platina yellow
platinic chloride
platino-
platinocyanic acid
platinoso-
platinum ammine
platinum black
platinum blond
platinum blonde
platinum lamp
platinum metal
platinum paper
platinum process
platinum sponge
platinum thermometer

platinum-blond
platitudinous ponderosity
platonic love
platoon fire
platoon school
platoon sergeant
platoon system
plats du jour
platted stem
platter-faced
platy-
play God
play Russian roulette
play a bunco game
play a deep game
play a desperate game
play a double game
play a double role
play a joke on
play a lone hand
play a part
play a part in
play a practical joke
play a practical joke upon
play a role
play a role in
play a scene
play a trick on
play a waiting game
play acting
play actor
play actorism
play actress
play against
play agent
play along
play around
play around with
play at
play at cross-purposes
play
at dice
play at fast and loose with
play at hide and seek
play back
play backer
play ball
play bopeep

play by ear
play by the rules
play cat and mouse with
play construction
play debt
play dirty pool
play doctor
play down
play drum
play ducks and drakes with
play dumb
play d
play fair
play fast and loose
play fast and loose with
play favorites
play first fiddle
play fixer
play footsie with
play for
play for a sucker
play for time
play games
play group
play havoc with
play hell
play hell with
play hide and seek
play hob
play hob with
play hooky
play into the hands of
play it by ear
play it just right
play it like a master
play jazz
play merry hell with
play mischief with
play music
play of color
play of colors
play of fancy
play of light
play of wit
play off
play on
play on the feelings
play on words

play one false
play opposite
play out
play peekaboo
play pipe
play politics
play possum
play pranks
play right
play safe
play script
play second fiddle
play someone false
play
 the badger game
play the buffoon
play the deuce
play the deuce with
play the devil
play the devil with
play the drums
play the field
play the fool
play the game
play the hell with
play the hypocrite
play the lead
play the market
play the merry hell with
play the mischief with
play the part of
play the ponies
play the pontiff
play the same broken record
play the same old record
play the same old song
play the same old tune
play the spy
play the violin
play therapy
play to the galleries
play to the gallery
play tricks
play truant
play up
play up to
play upon
play violin

play with
play with fire
play with marked cards
play with yourself
play you off against another
play your cards
play your cards well
play your part
play your proper role
play-act
play-bill
play-book
play-by-play
play-day
play-down
play-judging
play-loving
play-off
play-pretty
play-producing
play-reading
playback machine
played out
player piano
playful as a kitten
playground ball
playing God
playing area
playing around
playing
 by ear
playing card
playing cards
playing engagement
playing field
playing lightly over
playing possum
playing suit
playing trick
playing with fire
playing with yourself
plaza de toros
plea bargaining
plead for
plead guilty
plead ignorance
plead with
plead your case

plead your cause
pleasant company
pleasant journey
pleasant reception
pleasant stimulation
pleasant time
pleasant-eyed
pleasant-faced
pleasant-featured
pleasant-looking
pleasant-mannered
pleasant-minded
pleasant-natured
pleasant-sounding
pleasant-spirited
pleasant-spoken
pleasant-tasted
pleasant-tasting
pleasant-tongued
pleasant-voiced
pleasant-witted
please reply
please the crowd
please the nostrils
please yourself
pleased as Punch
pleased with
pleased with a rattle
pleased with yourself
pleasing style
pleasing to the eye
pleasure dome
pleasure dome of Kubla Khan
pleasure garden
pleasure giver
pleasure ground
pleasure lover
pleasure principle
pleasure seeker
pleasure taker
pleasure trip
pleasure-bent
pleasure-bound
pleasure-giving
pleasure-greedy
pleasure-loving
pleasure-pain
pleasure-seeker

pleasure-seeking
pleasure-shunning
pleasure-tempted
pleasure-tired
pleasure-wasted
pleasure-weary
pleasures
 of the mind
pledge keeper
pledge of secrecy
pledge taker
pledge the health of
pledge your honor
pledge your word
pledge-bound
pledge-free
plein air
plein jeu
plein-air
plein-air school
plein-airist
pleio-
plenary council
plenary indulgence
plenary inspiration
plenipotentiary power
pleno jure
plenty as blackberries
plenty good enough
plenty of notice
plenty to do
plenum system
pleo-
pleroma violet
plesio-
pleur-
pleurisy root
pleuro-
pleuro-peritoneum
pleuro-pneumonia
pleuropneumonia-like organism
pliant-bodied
pliant-necked
plica polonica
plicato-
plight your faith
plight your honor
plight your troth

plighted bride
plighted faith
plighted love
plighted troth
plimsoll mark
plinth block
plinth course
plio-
plisse crepe
plod along
plop down
plot a course
plot line
plot lines
plot of ground
plot of land
plot
 out
plot survey
plottage increment
plottage value
plotting board
plotting paper
plough back
plough-boy
plough-head
plough-land
plough-monday
plough-staff
plough-tail
ploughman's spikenard
plover egg
plover page
plover quail
plover-billed
plover-page
plow alms
plow anchor
plow back
plow back into
plow drill
plow hand
plow horse
plow iron
plow out
plow paddle
plow press
plow sole

plow steel
plow team
plow the deep
plow tree
plow truck
plow under
plow up
plow-bred
plow-cloven
plow-shaped
plow-torn
plowshare bone
pluck a crow with
pluck by the beard
pluck out
pluck the beard
pluck up
pluck up by the roots
pluck up heart
pluck up your spirits
pluck with someone
pluck-buffet
plug along
plug and feathers
plug at
plug away
plug bib
plug cap
plug casing
plug cock
plug drill
plug frame
plug hat
plug in
plug rod
plug switch
plug the same theme
plug tobacco
plug up
plug-hatted
plug-ugly
plugged up
plum bladder
plum blotch
plum brandy
plum broth
plum curculio
plum duff

plum fir
plum gouger
plum
 granite
plum grape
plum pocket
plum pudding
plum purple
plum scab
plum thrips
plum tree
plum violet
plum weevil
plum wine
plum yew
plum-blue
plum-brown
plum-cake
plum-colored
plum-duff
plum-green
plum-pie
plum-porridge
plum-purple
plum-shaped
plum-sized
plum-tinted
plum-tree
plumb bob
plumb bond
plumb joint
plumb level
plumb line
plumb rule
plumb the depths
plumb-
plumb-bob
plumb-line
plumb-rule
plumbago blue
plumbago gray
plumbago slate
plumber block
plumber's snake
plumber-block
plumbo-
plumbous oxide
plume feather

plume grass
plume moss
plume moth
plume nutmeg
plume of smoke
plume polypody
plume poppy
plume stick
plume yourself on
plume-crowned
plume-decked
plume-dressed
plume-embroidered
plume-fronted
plume-gay
plume-like
plume-plucked
plume-plucking
plume-soft
plume-stripped
plumed tussock grass
plummer block
plummer-block
plummet line
plump as a dumpling
plump as a partridge
plump down
plump fact
plump for
plump in the middle
plump upon
plumy coconut
plunge bath
plunge battery
plunge
headlong
plunge in
plunge in water
plunge into
plunge into debt
plunge into difficulties
plunge into dissipation
plunge rod
plunge the world into war
plunge you into despair
plunge you into sorrow
plunged in debt
plunged in grief

plunger bucket
plunger elevator
plunger magnet
plunger piston
plunger pump
plunging fire
plunging neckline
plunk down
plunk down the money
plunk for
plural number
plural system
plural vote
plural voting
pluralistic idealism
pluri-
plus c'est la meme chose
plus ca change
plus fours
plus head
plus lens
plus ou moins
plus sight
plus sign
plus thread
plus-foured
plus-fours
plush copper
plush stitch
plutonic rock
plutonium bomb
plutonium reactor
ply metal
ply rolling
ply the oar
ply upon
ply yarn
ply your trade
plymouth brethren
plymouth cloak
plymouth rock
plywood saw
pn-
pneo-
pneum-
pneumat-
pneumatic clock
pneumatic hammer

pneumatic servo
pneumatic tire
pneumatic trough
pneumatic tyre
pneumatic-tired
pneumatico-
pneumatico-hydraulic
pneumato-
pneumato-hydato-genetic
pneumo-
pneumococcal
pneumonia
pneumogastric nerve
pneumonic fever
pneumonic plague
pneumono-
po-faced
poached eggs
poacher tub
poalike fescue grass
pock lymph
pock nook
pock scab
pock-arred
pock-frecken
pock-fretten
pock-marked
pock-pit
pocket battleship
pocket billiards
pocket bird
pocket bladder
pocket book
pocket boom
pocket borough
pocket burner
pocket chisel
pocket chronometer
pocket edition
pocket fiddle
pocket flap
pocket flask
pocket gopher
pocket lighter
pocket money
pocket mouse
pocket notebook
pocket picking

pocket piece
pocket plum
pocket print
pocket radio
pocket rat
pocket sheriff
pocket the affront
pocket trumpet
pocket veto
pocket watch
pocket-book
pocket-eyed
pocket-handkerchief
pocket-knife
pocket-money
pocket-size
pocket-sized
poco a poco
poco-curante
pod auger
pod borer
pod corn
pod fern
pod gimlet
pod rot
pod shrimp
pod-shaped
poddy-dodger
podo-
podophyllin resin
poe-bird
poecilo-
poet laureate
poet's narcissus
poet-artist
poet-dramatist
poet-farmer
poet-historian
poet-humorist
poet-in-residence
poet-king
poet-laureateship
poet-musician
poet-novelist
poet-painter
poet-patriot
poet-pilgrim
poet-playwright

poet-plowman
poet-preacher
poet-priest
poet-princess
poet-saint
poet-satirist
poet-seer
poet-thinker
poet-warrior
poetic
division
poetic genius
poetic image
poetic imagery
poetic imagination
poetic inspiration
poetic justice
poetic kineticist
poetic kinetics
poetic language
poetic licence
poetic license
poetic prose
poetic realism
poetic realist
poetic source
poetic tachism
poetic tachist
poetic works
poetico-
poetico-antiquarian
poetico-architectural
poetico-grotesque
poetico-mystical
poetico-mythological
poetico-philosophic
poetry Muses
poetry image
poetry-proof
poets laureate
pogo stick
pogo-stick
poikilo-
point a moral
point alphabet
point at
point at issue
point bar

point blanket
point boat
point champain
point charge
point chisel
point co-ordinate
point count
point d'Angleterre
point d'appui
point d'esprit
point de Hongrie
point
de gaze
point defect
point draftsman
point duchesse
point duty
point fuse
point group
point handle
point hole
point in question
point indirectly to
point lace
point of a pin
point of articulation
point of convergence
point of departure
point of difference
point of etiquette
point of flight
point of honor
point of honour
point of inflection
point of interest
point of land
point of no return
point of order
point of repose
point of sailing
point of the chin
point of time
point of vantage
point of view
point off
point out
point out to
point paper

point rail
point salient
point set
point source
point space
point switch
point system
point tense
point the finger at
point the finger of scorn
point the way
point to
point to be solved
point transformation
point up
point-bearing pile
point-blank
point-blank refusal
point-by-point comparison
point-contact transistor
point-device
point-duty
point-event
point-junction transistor
point-lace
point-laced
point-on
point-particle
point-ring sight
point-set
point-set
topology
point-to-point
point-to-point navigation
point-to-point race
pointed arch
pointed fox
pointed projection
pointing bone
pointing chisel
pointing doors
pointing mark
pointing out
pointing to
pointing tool
pointing trowel
points d'appui
points of the compass

poised against one another
poison bean
poison bush
poison dogwood
poison elder
poison gas
poison haw
poison hemlock
poison injector
poison ivy
poison mask
poison oak
poison parsley
poison pen
poison rye grass
poison sumac
poison sumach
poison tobacco
poison-laden
poison-pen
poison-pen letter
poison-pen writer
poison-sprinkled
poison-tainted
poison-tipped
poison-toothed
poisonous plant
poisonous plants
poitrine d'agneau
poitrine de veau
poke along
poke around
poke at
poke bonnet
poke brim
poke check
poke full of holes
poke fun at
poke in
poke into
poke out
poke the fire
poke your nose in
poke your nose into something
poke-bonnet
poke-bonneted
poke-brimmed
poke-cheeked

poke-easy
poke-pudding
poker dice
poker face
poker
 machine
poker work
poker-faced
poker-work
poky bonnet
polacca rig
polacca-rigged
poland china
polar axis
polar bear
polar body
polar circle
polar coordinate
polar coordinates
polar data
polar distance
polar easterlies
polar equation
polar fox
polar front
polar lights
polar opposites
polar opposition
polar ray
polar seal
polar sequence
polar star
polar valence
polari-
polarity cap
polarity of opinion
polarized-relay armature
polarizing angle
polarizing filter
polarizing microscope
pole bean
pole chain
pole changer
pole compass
pole effect
pole flounder
pole hammer
pole horse

pole jump
pole jumper
pole lathe
pole mast
pole of cold
pole piece
pole pitch
pole plate
pole screen
pole star
pole strap
pole topgallant mast
pole trawl
pole vault
pole vaulter
pole vaulting
pole-armed
pole-axe
pole-dried
pole-jump
pole-masted
pole-shaped
pole-stack
pole-trap
pole-vault
pole-vaulter
poles apart
poles asunder
polewood stage
poli-sci
police action
police alarm
police badge
police band
police baton
police
 blotter
police boat
police captain
police car
police chief
police club
police commissioner
police constable
police court
police detective
police dog
police force

police headquarters
police inquiry
police inspector
police interrogation
police investigation
police judge
police jury
police justice
police lantern
police lieutenant
police magistrate
police matron
police office
police officer
police power
police reporter
police sergeant
police state
police station
police up
police van
police wagon
police whistle
police-up
policeman bird
policeman's helmet
policemanice station
policy loan
policy maker
policy racket
policy science
policy shop
policy year
policy-holder
polio vaccine
polish off
polish the apple
polish the platter
polish up
polished rice
polissoir wheel
polite act
polite behavior
polite commendation
polite deportment
polite literature
polite society
political activism

political activist
political affairs
political animal
political arithmetic
political ballot
political
behavior
political belief
political campaign
political canard
political candidate
political caucus
political commissar
political conservatism
political convention
political corruption
political dabbler
political doubletalk
political economist
political economy
political election
political faith
political front
political geography
political government
political hack
political henchman
political hopeful
political influence
political intrigue
political intriguer
political jargon
political leader
political leadership
political liberty
political machine
political map
political movement
political nomination
political organization
political party
political patronage
political philosophy
political platform
political police
political policy
political principle
political principles

political prisoner
political program
political question
political realist
political referendum
political science
political scientist
political theory
political worker
political-minded
politician-proof
politico-
politico-arithmetical
politico-commercial
politico-diplomatic
politico-ecclesiastical
politico-economical
politico-ethical
politico-geographical
politico-judicial
politico-military
politico-moral
politico-orthodox
politico-peripatetic
politico-religious
politico-sacerdotal
politico-scientific
politico-social
politico-theological
politics
with bloodshed
polka dot
polka mazurka
polka-dot
polka-dotted
poll booth
poll degree
poll end
poll evil
poll parrot
poll pick
poll tax
poll watcher
poll-deed
poll-parrot
poll-parroty
pollen analysis
pollen basket

pollen brush
pollen catarrh
pollen chamber
pollen count
pollen mass
pollen plate
pollen sac
pollen tube
pollen-covered
pollen-dusted
pollen-sprinkled
pollice verso
pollin-
polling booth
polling place
polling station
polly mountain
polly-fox
polly-parrot
polo ball
polo cart
polo coat
polo ground
polo neck
polo pony
polo shirt
polt-foot
poly-
poly-mountain
polyarthritis rheumatism
polychrest salt
polyconic projection
polyethylene glycol
polyglot dictionary
polygonal
number
polyhedral angle
polyhedron formula
polymeric amide
polymorpho-
polymorphonuclear leucocyte
polymorphous perversity
polymorphous-perverse
polyneuritic psychosis
polynomial ring
polyphase induction motor
polyphonic music
polyphonic prose

polyphosphoric acid
polypod brake
polypody family
polysulfide rubber
polysyllabic profundity
polytechnic school
polyunsaturated fat
polyurethane rubber
polyvalent vaccine
polyvinyl acetal
polyvinyl acetate
polyvinyl alcohol
polyvinyl butyral
polyvinyl chloride
polyvinyl resin
polyvinyl-formaldehyde
polyvinylidene chloride
polyvinylidene resin
pom girl
pom-pom
pom-pom girl
pom-pom-pullaway
pomace fly
pome-citron
pome-like
pomegranate purple
pomfret-cake
pomme blanche
pomme de terre
pomme-lion
pommel bag
pommes blanches
pomp and circumstance
pompadour green
pompano shell
pompous person
pompous prolixity
pompous word
ponceau red
pond apple
pond crow
pond cypress
pond duck
pond lily
pond pine
pond scum
pond smelt
pond-apple

pond-scum
parasite
pond-skater
ponder over
ponderosa pine
pondosa pine
pondus medicinale
pone bread
pons Varolii
pons asinorum
pont l'eveque
pont-levis
pontes Varolii
pontiff purple
pontoon bridge
pontoon dock
pontoon hull
pontoon lifeboat
pony engine
pony express
pony grass
pony shaft
pony trekking
pony truck
pony truss
pony up
poodle dog
pooh bah
pooh pooh
pooh-bah
pooh-pooh
pooh-pooh theory
pooh-pooher
pool bottle
pool hall
pool hole
pool seller
pool table
pool your interests
pool your interests with
pooling of resources
poon up
poonga-oil
poop cabin
poop deck
poop out
poop royal
poop staff

pooped out
poor White
poor as Job
poor as Job's turkey
poor as a church mouse
poor behavior
poor bet
poor box
poor boy
poor boy sweater
poor clare
poor creature
poor cuckoldy knave
poor custody
poor debtor
poor devil
poor diction
poor excuse
poor farm
poor fist
poor gas
poor guardianship
poor health
poor husbandry
poor imitation
poor in spirit
poor john
poor judgment
poor law
poor lookout
poor man
poor man's
gout
poor oat
poor opinion
poor outlook
poor person
poor possibility
poor prognosis
poor prospect
poor relation
poor relief
poor reputation
poor stewardship
poor taste
poor timing
poor tool
poor unfortunate

poor white
poor white trash
poor, the
poor-blooded
poor-box
poor-charactered
poor-clad
poor-debtor law
poor-do
poor-feeding
poor-folksy
poor-law
poor-minded
poor-rate
poor-sighted
poor-spirited
poor-spiritedly
poor-spiritedness
poor-will
poorly argued
poorly off
pop art
pop artist
pop ash
pop at
pop concert
pop culture
pop fly
pop foul
pop hero
pop in
pop into your head
pop literature
pop music
pop off
pop out
pop safety valve
pop the question
pop up
pop upon
pop valve
pop wine
pop your cherry
pop-
pop-corn
pop-gun
pop-off
pop-shop

pop-up
popcorn balls
popcorn flower
pope joan
pope's eye
pope's head
pope's nose
pope-holy
popeye catalufa
popinjay green
poplar birch
poplar borer
poplar box
poplar hawk
poplar worm
poplar-covered
poplar-crowned
poplar-flanked
poplar-leaved
poplar-lined
poplar-planted
popliteal
space
popper cake
poppet head
poppet leg
poppet valve
poppet-head
popping crease
popping-crease
poppy anemone
poppy ash
poppy bee
poppy mallow
poppy oil
poppy seed
poppy-bordered
poppy-colored
poppy-crimson
poppy-crowned
poppy-flowered
poppy-haunted
poppy-head
poppy-pink
poppy-red
poppy-seed
poppy-sprinkled
poppyseed oil

pops concert
poptical art
poptical artist
popular air
popular belief
popular concert
popular etymology
popular front
popular hero
popular idol
popular literature
popular music
popular prices
popular psychology
popular regard
popular singer
popular song
popular sovereignty
popular taste
popular tune
popular vote
popular-priced
population explosion
population parameter
population pressure
population pyramid
porbeagle shark
porcelain clay
porcelain enamel
porcelain glass
porcelain green
porcelain maker
porcelain making
porcelain shell
porcelain tower
porch chair
porch climber
porch hammock
porch lamp
porch railing
porch rocker
porch screen
porch
seat
porch settee
porch swing
porcupine anteater
porcupine balls

porcupine beater
porcupine boiler
porcupine crab
porcupine disease
porcupine fish
porcupine grass
porcupine man
porcupine rat
pore fungus
pore over
pork and beans
pork barrel
pork butcher
pork chop
pork eater
pork packer
pork pie
pork pig
pork store
pork tapeworm
pork-barrel legislation
pork-barrel politician
pork-barrel politics
pork-barreling
porkpie hat
porno film
pornographic art
pornographic film
pornographic literature
pornographic novel
porphyr-
porphyry chamber
porphyry copper
porphyry shell
porpoise oil
porpoise whale
port anchor
port authority
port bar
port captain
port charge
port differential
port duty
port engine
port engine ahead
port engineer
port in a storm
port of call

port of embarkation
port of entry
port risk insurance
port royalist
port superintendent
port tack
port-caustic
port-crayon
port-hole
port-mouthed
port-royal
port-sale
port-vent
port-wine
port-wine mark
port-wine stain
port-winy
portable
TV set
portable drill
portable engine
portable field unit
portable radio
portable saw
portable television set
portal frame
portal vein
portal-to-portal
portal-to-portal pay
portative organ
portcullis money
porte cochere
porte-
porte-cochere
porte-monnaie
porte-monnaies
porteous roll
porter aux nues
porter chair
porter's lodge
porter-house
porterhouse steak
porthole die
portia tree
portion off
portion or point of time
portion out
portioned out

portland cement
portmanteau word
portrait bust
portrait camera
portrait flask
portrait lens
portrait painter
portrait painting
portrait sculpture
portrait statue
portraying in the mind
portuguese man-of-war
portulan chart
pose a question
pose against
pose as
pose for effect
pose over against
posigrade rocket
posing against
posing over against
position artillery
position buoy
position co-ordinate
position code converter
position coder
position data transmitter
position effect
position finder
position indicator
position isomer
position isomerism
position
light
position line
position paper
position target
position tracker
position warfare
positional error
positional notation
positioning mechanism
positive column
positive declaration
positive definiteness
positive direction of pitch
positive direction of roll
positive direction of yaw

positive electricity
positive electron
positive fact
positive feedback
positive geotropism
positive ion
positive law
positive lens
positive lift axis
positive misprision
positive organ
positive philosophy
positive polarity
positive pole
positive ray
positive reinforcement
positive statement
positive transference
positive valence
positive-ion accelerator
positively right
poss stick
poss tub
posse comitatus
possess authority
possess incriminating evidence
possess nine lives
possess one of the facts
possess sexually
possess your soul in patience
possess yourself
possess yourself of
possessed of
possessed with a demon
possessed with a devil
possessive adjective
possessive case
possessive pronoun
posset pot
possibility
upon a possibility
possible choice
possum haw
possum oak
post auger
post bill
post bills
post binder

post boat
post brake
post captain
post car
post card
post cedar
post chaise
post chariot
post coach
post croaker
post day
post exchange
post hoc
post hoc ergo propter hoc
post horn
post horse
post hospital
post house
post insulator
post locust
post meridiem
post mortem
post note
post oak
post obitum
post octavo
post office
post office box
post partum
post quarto
post race
post road
post school
post term
post time
post town
post trader
post up
post-
post-Adamic
post-Advent
post-Alexandrine
post-Aristotelian
post-Augustan
post-Augustinian
post-Aztec
post-Babylonian
post-Biblical

post-Caesarean
post-Cambrian
post-Carboniferous
post-Carolingian
post-Cartesian
post-Cesarean
post-Chaucerian
post-Christian
post-Christmas
post-Columbian
post-Confucian
post-Constantinian
post-Copernican
post-Crusade
post-Darwinian
post-Davidic
post-Devonian
post-Diocletian
post-Easter
post-Elizabethan
post-Eocene
post-Galilean
post-Gothic
post-Hittite
post-Homeric
post-Ibsen
post-Impressionist
post-Johnsonian
post-Jurassic
post-Justinian
post-Jutland
post-Kansan
post-Kantian
post-Leibnitzian
post-Leibnizian
post-Lent
post-Linnean
post-Marxian
post-Mendelian
post-Mesozoic
post-Miocene
post-Mishnaic
post-Mishnic
post-Mishnical
post-Mosaic
post-Mycenean
post-Napoleonic
post-Newtonian

post-Nicene
Fathers
post-Oligocene
post-Ordovician
post-Paleozoic
post-Pauline
post-Pentecostal
post-Permian
post-Petrine
post-Phidian
post-Platonic
post-Pleistocene
post-Pliocene
post-Pythagorean
post-Reformation
post-Renaissance
post-Restoration
post-Revolutionary
post-Roman
post-Romantic
post-Shakespearean
post-Shakespearian
post-Silurian
post-Socratic
post-Talmudic
post-Talmudical
post-Tertiary
post-Transcendental
post-Triassic
post-Tridentine
post-Vedic
post-Victorian
post-Volstead
post-audit
post-bag
post-bellum
post-boat
post-boy
post-captain
post-chaise
post-classical
post-communion
post-cyclic
post-date
post-diluvial
post-diluvian
post-factum
post-fine

post-free
post-glacial
post-graduate
post-haste
post-horn
post-horse
post-house
post-impressionism
post-impressionistic
post-juvenal
post-kantian
post-mortem
post-mortem
clot
post-mortem examination
post-oak grape
post-obit
post-obit bond
post-obituary
post-office address
post-office box
post-office car
post-office order
post-officer
post-ordinar
post-partum
post-pliocene
post-remogeniture
post-road
post-signer
post-tension
post-tertiary
post-town
postage currency
postage due stamp
postage envelope
postage label
postage meter
postage stamp
postage-due stamp
postal card
postal clerk
postal currency
postal delivery zone
postal meter
postal note
postal order
postal service

postal system
postal union
postal zone
postcard bander
poste restante
poster bed
poster color
poster paint
poster painting
posterio-occlusion
postern door
postern gate
postero-
postgraduate education
postgraduate school
posthole auger
posthole spade
posthumous
fame
posthypnotic suggestion
posting house
postlapsarian nature
postlapsarian state
postmaster general
postmaster-generalship
postmasters general
postmistress-ship
postmortem diagnosis
postmortem examination
postnasal drip
postoperative shock
postpainterly abstraction
postpainterly abstractionist
posture maker
posture making
posture-maker
pot ale
pot arch
pot barley
pot bottom
pot cheese
pot companion
pot culture
pot derby
pot earth
pot fisher
pot fisherman
pot furnace

pot garden
pot hat
pot kiln
pot lace
pot layering
pot lead
pot liquor
pot maker
pot marigold
pot marjoram
pot metal
pot plant
pot roast
pot shot
pot spinning
pot still
pot valve
pot wheel
pot-au-feu
pot-bellied
pot-belly
pot-boiler
pot-bound
pot-boy
pot-clay
pot-color
pot-earth
pot-gun
pot-gutted
pot-herb
pot-hole
pot-hook
pot-house
pot-hunter
pot-lead
pot-lid
pot-liquor
pot-luck
pot-metal
pot-pie
pot-pourri
pot-rustler
pot-shaped
pot-shot
pot-sick
pot-valiance
pot-valiancy
pot-valiant

pot-valiantly
pot-valiantry
pot-valliance
pot-valor
pot-valorous
pot-wabbler
pot-walloper
pot-walloping
pot-wobbler
potage
 a la julienne
potage a la tete de veau
potage a la tortue
potage au tomate
potage aux herbes
potage volaille a la reine
potash alum
potash feldspar
potash granite
potash hunger
potash niter
potash soap
potassio-
potassium acetate
potassium acid carbonate
potassium acid oxala
potassium acid oxalate
potassium acid sulphate
potassium acid tartrate
potassium alum
potassium amide
potassium antimonate
potassium antimonyl
potassium antimonyl tartrate
potassium argon dating
potassium biartrate
potassium bicarbonate
potassium bichromate
potassium binoxalate
potassium bisulfate
potassium bisulphate
potassium bitartrate
potassium bromide
potassium carbonate
potassium chlorate
potassium chloride
potassium chromate
potassium chrome alum

potassium chromic sulfate
potassium cobaltinitrite
potassium cyanide
potassium dichromate
potassium ethyl xanthogenate
potassium ferricyanide
potassium ferrocyanide
potassium fluoride
potassium
hydrate
potassium hydrogen tartrate
potassium hydroxide
potassium hypoantimonate
potassium hypochlorite
potassium iodide
potassium manganate
potassium myronate
potassium nitrate
potassium oxalate
potassium permanganate
potassium persulphate
potassium rhodanide
potassium sodium tartrate
potassium sulfate
potassium sulphate
potassium tetroxalate
potassium thiocyanate
potassium xanthate
potassium-argon dating
potato aphid
potato apple
potato ball
potato bean
potato beetle
potato blight
potato bug
potato cake
potato canker
potato cellar
potato chip
potato chips
potato crisp
potato fern
potato flour
potato fork
potato fungus
potato hook
potato masher

potato mosaic
potato moth
potato mottle
potato murrain
potato onion
potato peeler
potato race
potato salad
potato scab
potato set
potato soup
potato tree
potato vine
potato wart
potato weevil
potato whisky
potato worm
potato-sick
potbellied stove
potcher engine
potcher man
potent cross
potent-counterpotent
potential cautery
potential
difference
potential divider
potential energy
potential gradient
potentiometric titration
pothooks and hangers
pott octavo
pott quarto
pott's disease
potter away
potter bee
potter wasp
potter's clay
potter's earth
potter's field
potter's wheel
pottern ore
pottery tissue
pottery tree
potting shed
pottle pot
pottle-bellied
pottle-bodied

pottle-crowned
pottle-deep
potty-chair
pou de ciel
pou sto
pouch bone
pouch-shaped
pouched mole
pouched rat
poulard wheat
poulette sauce
poult-de-soie
poulter's measure
poultry breeder
poultry breeding
poultry buyer
poultry buyerpoultry car
poultry car
poultry culture
poultry dealer
poultry dresser
poultry dressing
poultry fancier
poultry fancying
poultry farm
poultry farmer
poultry farming
poultry feed
poultry grower
poultry house
poultry husbandry
poultry judging
poultry keeper
poultry keeping
poultry raiser
poultry raising
poultry rearing
poultry shop
poultry show
poultry stall
poultry tick
poultry wire
poultry yard
pounce bag
pounce box
pounce
on
pounce paper

pounce tree
pounce upon
pouncet box
pouncet-box
pouncing paper
pound Scots
pound apothecaries'
pound avoirdupois
pound away
pound boat
pound brush
pound cake
pound degree
pound in
pound lock
pound mile
pound net
pound of flesh
pound out
pound sovereign
pound sterling
pound the ear
pound troy
pound-cake
pound-folly
pound-foolish
pound-foolishness
pound-foot
pound-force
pound-trap
pound-weight
pounds in after trim
pounds of thrust
pour a broadside into
pour balm into
pour balm on
pour balm upon
pour down
pour down the drain
pour down the rathole
pour forth
pour in
pour it on
pour money into
pour oil on
pour oil on the blaze
pour oil on the fire
pour oil on troubled waters

pour oil upon
pour on
pour on the coal
pour out
pour out blood like water
pour out the vials of your wrath
pour out vials of wrath
pour over
pour plate
pour point
pour test
pour water into a sieve
pour water on
pour with rain
pourer-off
pourer-out
pouring basin
pouring basket
pouring box
pouring rain
pousse-caf
pousse-cafe
poverty
 birch
poverty grass
poverty plant
poverty subculture
poverty-proof
poverty-stricken
pow wow
powder and shot
powder barrel
powder beef
powder blue
powder box
powder boy
powder burn
powder charge
powder chest
powder compact
powder down
powder flag
powder flask
powder grain
powder gray
powder horn
powder house
powder keg

powder magazine
powder maker
powder metallurgy
powder mill
powder monkey
powder paper
powder pimperlimpimp
powder post
powder puff
powder room
powder ship
powder snow
powder train
powder-black
powder-blue
powder-charged
powder-down
powder-flask
powder-gray
powder-horn
powder-laden
powder-marked
powder-monkey
powder-post beetle
powder-posted
powder-puff
powder-scorched
powder-tinged
powdered milk
powdered soap
powdered sugar
powdery mildew
power amplifier
power base
power behind the throne
power brake
power brakes
power broker
power cab
power cable
power chain
power cruiser
power cut
power dive
power drill
power duster
power elite
power engineer

power
engineering
power factor
power for good
power gas
power grab
power jack
power line
power load
power loading
power loom
power meter
power microscope
power mower
power of appointment
power of attorney
power of expression
power of mind
power of mind over matter
power of money
power of reason
power of sight
power of suggestion
power of the keys
power of thought
power off
power pack
power plant
power play
power plug
power point
power politics
power press
power pump
power punch
power rail
power reactor
power relay
power sander
power saw
power sawyer
power series
power servo
power set
power shaft
power shears
power shovel
power source

power spin
power sprayer
power station
power steering
power stroke
power structure
power struggle
power supply
power take-off
power to act
power tool
power train
power transformer
power tube
power vacuum
power vessel
power weaver
power wheel
power-assisted steering
power-breeder reactor
power-directional relay
power-dive
power-dived
power-diving
power-dove
power-driven
power-elated
power-hunger
power-hungry
power-loom
power-operate
power-operated
power-packed
power-plant
engineer
power-plant engineering
power-political
power-riveting
power-saw
power-sawed
power-sawing
power-sawn
power-seeking
power-supply engineer
powered flight
powerful like
powers of darkness
powers that be

powers that be, the
pox-marked
practical ability
practical art
practical consequence
practical joke
practical joker
practical knowledge
practical mechanics
practical mind
practical nurse
practical person
practical piece
practical politics
practical prop
practical reason
practical scientist
practical skill
practical test
practical theology
practical utility
practical wisdom
practical-minded
practical-mindedness
practice a profession
practice at the bar
practice curve
practice domesticity
practice fraud upon
practice landing
practice law
practice medicine
practice nonviolence
practice of medicine
practice on your credulity
practice philosophy
practice self-control
practice
 self-denial
practice sorcery
practice spiritualism
practice teacher
practice teaching
practice the golden rule
practice upon
practice-teach
practiced hand
prae-

praedium dominans
praedium serviens
praemunientes clause
praemunientes writ
praetorian guard
pragmatic logic
pragmatic sanction
pragmatic theory
pragmatic theory of truth
prairie acacia
prairie artichoke
prairie aster
prairie breaker
prairie button snakeroot
prairie chicken
prairie clover
prairie coneflower
prairie crab apple
prairie dock
prairie dog
prairie falcon
prairie fire
prairie fowl
prairie fox
prairie goose
prairie grouse
prairie hen
prairie itch
prairie june grass
prairie larkspur
prairie lily
prairie mallow
prairie marmot
prairie owl
prairie oyster
prairie phlox
prairie pine
prairie pointer
prairie poppy
prairie rattlesnake
prairie rocket
prairie rose
prairie sage
prairie schooner
prairie smoke
prairie soil
prairie squirrel
prairie turnip

prairie violet
prairie wakerobin
prairie warbler
prairie wolf
praise Father
praise
God
praise and glorify God
praise meeting
praise the Lord
praise to excess
praise to the skies
praise ye Himall His hosts
praise ye the Lord
praise-begging
praise-deserving
praise-fed
praise-giving
praise-spoiled
praise-winning
pram bow
prank up
praso-
pray God that
pray do
pray for quarter
pray over
prayer bead
prayer beads
prayer book
prayer carpet
prayer flag
prayer machine
prayer mat
prayer meeting
prayer mill
prayer of thanks
prayer paper
prayer rug
prayer scarf
prayer service
prayer shawl
prayer tower
prayer wheel
prayer-answering
prayer-book
prayer-clenched
prayer-granting

prayer-hearing
prayer-lisping
prayer-loving
prayer-repeating
prayerful hope
praying cylinder
praying mantis
pre-
pre-Achaean
pre-Alfredian
pre-American
pre-Ammonite
pre-Ammonitish
pre-Armistice
pre-Arthurian
pre-Aryan
pre-Assyrian
pre-Augustan
pre-Augustine
pre-Babylonian
pre-Baconian
pre-British
pre-Buddhist
pre-Byzantine
pre-Cambrian
pre-Cambridge
pre-Canaanite
pre-Canaanitic
pre-Carboniferous
pre-Carolingian
pre-Catholic
pre-Celtic
pre-Centennial
pre-Chaucerian
pre-Chellean
pre-Chinese
pre-Christian
pre-Christianic
pre-Christmas
pre-Columbian
pre-Columbian
art
pre-Congregationalist
pre-Congress
pre-Conquest
pre-Copernican
pre-Copernicanism
pre-Crusade

pre-Dantean
pre-Darwinian
pre-Darwinianism
pre-Dickensian
pre-Dorian
pre-Doric
pre-Dravidian
pre-Dravidic
pre-Dutch
pre-Easter
pre-Elizabethan
pre-Empire
pre-English
pre-French
pre-Georgian
pre-German
pre-Germanic
pre-Gothic
pre-Greek
pre-Han
pre-Hebrew
pre-Hellenic
pre-Hieronymian
pre-Hinduized
pre-Hispanic
pre-Homeric
pre-Inca
pre-Incan
pre-Incarial
pre-Indian
pre-Irish
pre-Islam
pre-Islamic
pre-Islamite
pre-Islamitic
pre-Israelite
pre-Israelitish
pre-Jewish
pre-Johannine
pre-Johnsonian
pre-Justinian
pre-Kantian
pre-Koranic
pre-Latin
pre-Laurentian
pre-Linnaean
pre-Linnean
pre-Luciferian

pre-Lutheran
pre-Malay
pre-Malayan
pre-Malaysian
pre-Marxian
pre-Mendelian
pre-Messianic
pre-Methodist
pre-Mohammedian
pre-Mongolian
pre-Mosaic
pre-Moslem
pre-Muslim
pre-Mycenaean
pre-Napoleonic
pre-Newtonian
pre-Noachian
pre-Norman
pre-Norse
pre-Osmanli
pre-Palaeozoic
pre-Paleozoic
pre-Patrician
pre-Pauline
pre-Permian
pre-Persian
pre-Petrine
pre-Pharaonic
pre-Phidian
pre-Polish
pre-Pueblo
pre-Puebloan
pre-Raphael
pre-Raphaelism
pre-Raphaelite
pre-Raphaelitic
pre-Raphaelitish
pre-Raphaelitism
pre-Reconstruction
pre-Reformation
pre-Renaissance
pre-Restoration
pre-Revolution
pre-Roman
pre-Sargonic
pre-Saxon
pre-Semitic
pre-Shakepeare

pre-Shakespeare
pre-Shakespearean
pre-Shakespearian
pre-Silurian
pre-Socratic
pre-Solomonic
pre-Solonian
pre-Spanish
pre-Sumerian
pre-Syriac
pre-Syrian
pre-Tertiary
pre-Thanksgiving
pre-Tridentine
pre-Tudor
pre-Victorian
pre-Virgilian
pre-Volstead
pre-adamite
pre-amp
pre-audit
pre-axial
pre-chellean
pre-christian
pre-conquestal
pre-contract
pre-distortion
pre-earthly
pre-earthquake
pre-eclampsia
pre-eclamptic
pre-economic
pre-economical
pre-edit
pre-edition
pre-editor
pre-editorial
pre-editorially
pre-educate
pre-education
pre-educational
pre-educationally
pre-effect
pre-effective
pre-effectively
pre-effectual
pre-efficiency
pre-efficient

pre-efficiently
pre-effort
pre-elect
pre-election
pre-elective
pre-electric
pre-electrical
pre-electrically
pre-elemental
pre-elementary
pre-eligibility
pre-eligible
pre-eliminate
pre-elimination
pre-eliminator
pre-emancipation
pre-embarrass
pre-embarrassment
pre-embodiment
pre-embody
pre-emergency
pre-eminence
pre-eminency
pre-eminent
pre-eminently
pre-eminentness
pre-emotion
pre-emotional
pre-emperor
pre-employ
pre-employee
pre-employer
pre-employment
pre-empt
pre-emptible
pre-emption
pre-emption
right
pre-emptioner
pre-emptive
pre-emptively
pre-emptor
pre-emptory
pre-enable
pre-enact
pre-enaction
pre-enclose
pre-enclosure

pre-encounter
pre-encourage
pre-encouragement
pre-endeavor
pre-endorse
pre-endorsement
pre-endorser
pre-energetic
pre-energy
pre-enforce
pre-enforcement
pre-engage
pre-engagement
pre-engineering
pre-enjoy
pre-enjoyable
pre-enjoyment
pre-enlarge
pre-enlargement
pre-enlighten
pre-enlightener
pre-enlightening
pre-enlightenment
pre-enlist
pre-enlistment
pre-enroll
pre-enrollment
pre-entail
pre-entailment
pre-enter
pre-entertain
pre-entertainer
pre-entertainment
pre-enthusiasm
pre-enthusiastic
pre-entitle
pre-entrance
pre-entry
pre-enumerate
pre-enumeration
pre-envelop
pre-envelopment
pre-environmental
pre-epic
pre-epidemic
pre-epochal
pre-equalization
pre-equip

pre-equipment
pre-equity
pre-erect
pre-erection
pre-erupt
pre-eruption
pre-eruptive
pre-escape
pre-escort
pre-esophageal
pre-essay
pre-essential
pre-establish
pre-established
pre-establisher
pre-establishment
pre-esteem
pre-estimate
pre-estimation
pre-estival
pre-eter
pre-eternal
pre-evade
pre-evaporate
pre-evaporation
pre-evaporator
pre-evasion
pre-evidence
pre-evident
pre-evidently
pre-evite
pre-evolutional
pre-evolutionary
pre-evolutionist
pre-exact
pre-exaction
pre-examination
pre-examine
pre-examiner
pre-excel
pre-excellence
pre-excellency
pre-excellent
pre-except
pre-exception
pre-exceptional
pre-exceptionally
pre-exchange

pre-excitation
pre-excite
pre-excitement
pre-exclude
pre-exclusion
pre-exclusive
pre-exclusively
pre-excursion
pre-excuse
pre-execute
pre-execution
pre-executor
pre-exempt
pre-exemption
pre-exhaust
pre-exhaustion
pre-exhibit
pre-exhibition
pre-exhibitor
pre-exile
pre-exilian
pre-exilic
pre-exist
pre-existence
pre-existent
pre-existentiary
pre-existentism
pre-expand
pre-expansion
pre-expect
pre-expectant
pre-expectation
pre-expedition
pre-expeditionary
pre-expend
pre-expenditure
pre-expense
pre-experience
pre-experiment
pre-experimental
pre-expiration
pre-explain
pre-explanation
pre-explanatory
pre-explode
pre-explosion
pre-expose
pre-exposition

pre-exposure
pre-expound
pre-expounder
pre-express
pre-expression
pre-expressive
pre-extend
pre-extensive
pre-extensively
pre-extent
pre-extinction
pre-extinguish
pre-extinguishment
pre-extract
pre-extraction
pre-fabulous
pre-free-trade
pre-glacial
pre-ignition
pre-judicial
pre-judiciary
pre-man
pre-operculum
pre-option
pre-orbital
pre-ordain
pre-ordinate
pre-preference
pre-raphael
pre-raphaelite
pre-raphaelitism
pre-shrunk
pre-socratic
pre-sternum
pre-teens
preach
 to the winds
preacher bird
preaching brother
preaching friar
preaching-house
prealternate molt
prebasic molt
prebendal stall
precedent condition
precession of the equinoxes
precinct captain
precinct house

precinct leader
precious coral
precious heart
precious little
precious metal
precious metals
precious moonstone
precious opal
precious rascal
precious stone
precipitable water
precipitate yourself
precipitation hardening
precision balance
precision barometer
precision block
precision bomber
precision bombing
precision caliper
precision camera
precision casting
precision clock
precision focusing
precision gauge
precision gauge block
precision grinding
precision instrument
precision lathe
precision lens
precision meter
precision punch
precision scale
precision screw
precision tool
precision
weight
precision-production control
preclinical medicine
precombustion engine
precordial anxiety
precordial pain
precordial region
predaceous diving beetle
predation pressure
predicate adjective
predicate calculus
predicate nominative
predicate noun

predicate objective
predicated on
predictable error
predictable response
predictable within limits
predisposed to
predominance of Aquarius
pree the mouth of
preen gland
preen yourself
prefabricated house
prefect apostolic
prefects apostolic
prefecture apostolic
prefectures apostolic
prefer a claim
prefer a petition
prefer charges
prefer to
prefer your own company
preference for the best
preference primary
preference share
preference shares
preference stock
preferential shop
preferential system
preferential treatment
preferential voting
prefernce bond
prefernce freight
preferred lie
preferred position
preferred stock
prefree-trade
prefrontal leucotomy
prefrontal lobotomy
pregenital fixation
pregnant imagination
pregnant moment
pregnant
 of good
pregnant with meaning
prehensile tail
prehistoric animal
prehistoric animals
prehistoric anthropology
prehistoric archaeology

prehistoric man
prehistoric races
prejudice against
prejudice the issue
prejudice-proof
prelapsarian state
prelate nullius
preliminary act
preliminary approach
preliminary convention
preliminary examination
preliminary measure
preliminary sign
preliminary signal
preliminary step
preliminary study
premarital relations
premarital sex
premature acceptation
premature baby
premature beat
premature contraction
premature judgment
premier danseur
premier performance
premiere danseuse
premiers danseurs
premium bond
premium bonds
premium gas
premium note
premium system
premonitory chill
premonitory plague
premonitory shiver
premonitory sign
premonitory symptom
prenatal Informal
prendre la balle au bond
prep school
prep schooler
preparatory act
preparatory instruction
preparatory measure
preparatory school
preparatory step
preparatory study
prepare against

prepare
food
prepare for
prepare for burial
prepare for the evil day
prepare the ground
prepare the way
prepare to
prepare yourself
prepared and ready
prepared for
prepared for either course
prepared piano
prepared speech
prepared text
prepay station
prepositional phrase
prerogative court
prerogative instance
prerogative office
prerogative writ
presby-
preschool child
prescribe for
prescribed form
prescription drug
prescriptive grammar
preseasonal treatment
presence chamber
presence of God
presence of mind
presence room
presence-chamber
presenile dementia
present a bold front
present a petition
present a position paper
present a true bill
present arms
present difficulties
present itself
present itself to the mind
present itself to the thoughts
present no difficulties
present participle
present perfect
present tense
present the appearance of

present to
present to the eye
present to the eyes
present to the mind
present value
present your case
present yourself
present yourself to view
present-age
present-day
present-minded
present-time
presentation
copy
presentation of the case
presentation time
presentative realism
presenting arms
preservative medium
preserve a balance
preserve a middle course
preserve an even course
preserve from oblivion
preserve your dignity
preserve your honor
preset board
preset control board
preside at the board
preside over
president general
president pro tempore
president-elect
presidential election
presidential government
presidential palace
presidential papers
presidential preference primary
presidential primary
presidential timber
presiding judge
presiding officer
press agency
press agent
press association
press bed
press boava
press box
press boy

press brake
press bundler
press bureau
press cake
press camera
press card
press charges
press clipper
press clipping
press cloth
press conference
press copy
press corrector
press correspondent
press cupboard
press down
press drill
press fastener
press feeder
press fit
press fitter
press forward
press gallery
press
gang
press hard upon
press heavy on
press her
press in
press into service
press iron
press money
press notice
press objections
press of business
press of canvas
press of sail
press on
press onward
press operator
press out
press proof
press release
press roll
press section
press stud
press tender
press the attack

press time
press to the bosom
press to the ground
press upon
press your hand
press your suit
press, the
press-agent
press-agentry
press-bed
press-forge
press-gang
press-made
press-mark
press-money
press-noticed
press-point
press-ridden
press-room
press-up
press-warrant
press-work
press-yard
pressed beef
pressed brick
pressed down
pressed for time
pressed glass
pressed hardboard
presser bar
presser foot
presser shoe
presser wheel
pressing boards
pressing iron
pressing out
pressure altimeter
pressure altitude
pressure atrophy
pressure blower
pressure boiler
pressure bottle
pressure box
pressure cabin
pressure center
pressure coil
pressure control
pressure cooker

pressure
drag
pressure element
pressure evaporator
pressure fan
pressure filter
pressure gauge
pressure governor
pressure gradient
pressure group
pressure head
pressure hull
pressure ice
pressure indicator
pressure microphone
pressure mine
pressure neuropathy
pressure nozzle
pressure point
pressure producer
pressure pump
pressure recorder
pressure register
pressure regulator
pressure ridge
pressure saucepan
pressure sense
pressure siphon
pressure spot
pressure spring
pressure stage
pressure suit
pressure syllable
pressure tank
pressure transducer
pressure transmitter
pressure tube
pressure valve
pressure warrant
pressure welding
pressure wire
pressure-cook
pressure-fixing
pressure-group politics
pressure-reciprocating
pressure-reducing
pressure-regulating
pressure-relief ring

pressure-relieving
pressure-testing
pressure-vacuum valve
pressureless space
pressurized suit
pressyou hard
prest money
prest-money
prestation money
prester john
prestige dialect
presto change
presto chango
prestressed
 concrete
presume on
presume upon
presumption of fact
presumption of innocence
presumptive evidence
presumptive heir
presumptive right
pretend not to see
pretend to
pretend to be
preter-
preterit-present
preterite-present
preterito-present
preterito-presential
pretium puellae
pretty as a picture
pretty damned quick
pretty good
pretty kettle of fish
pretty lies
pretty much
pretty much the same
pretty near
pretty pass
pretty penny
pretty pickle
pretty piece of business
pretty predicament
pretty up
pretty well
pretty wit
pretty-behaved

pretty-by-night
pretty-face
pretty-faced
pretty-footed
pretty-humored
pretty-looking
pretty-mannered
pretty-pretty
pretty-spoken
pretty-toned
pretty-witted
prevail on
prevail over
prevail upon
prevail with
prevailing belief
prevailing sentiment
prevailing taste
prevailing westerlies
prevailing wind
prevenient grace
preventer backstay
preventer plate
preventer stay
prevention-proof
preventive custody
preventive dentist
preventive dentistry
preventive detention
preventive
law
preventive measure
preventive medicine
preventive treatment
preventive war
previous question
previous time
previous to
prey on
prey on the mind
prey to blind fear
prey to malaise
prey upon
pribble-prabble
price ceiling
price control
price controls
price current

price cut
price determination
price discrimination
price fall
price fixing
price freeze
price index
price level
price list
price of money
price out of the market
price range
price reduction
price ring
price support
price supports
price tag
price war
price-cut
price-cutter
price-cutting
price-deciding
price-enhancing
price-fixing
price-lowering
price-raising
price-reducing
price-ruling
price-stabilizing
prices current
prick ear
prick mark
prick post
prick punch
prick shaft
prick shooting
prick song
prick the bubble
prick up
prick up the ears
prick up your ears
prick wheel
prick your balloon
prick-ear
prick-eared
prick-madam
prick-post
prick-seam

prick-song
prick-timber
pricking of conscience
pricking of heart
pricking
 wheel
pricking-up
prickle cell
prickle grass
prickle-back
prickle-cone pine
prickley heat
prickly ash
prickly glasswort
prickly grass
prickly heat
prickly lettuce
prickly pear
prickly phlox
prickly poppy
prickly shield fern
prickly thrift
prickly-finned
prickly-fruited
prickly-lobed
prickly-margined
prickly-seeded
prickly-toothed
pride and joy
pride of China
pride of India
pride of bearing
pride of place
pride of the morning
pride yourself
pride-blind
pride-blinded
pride-bloated
pride-fed
pride-inflamed
pride-inspiring
pride-of-India
pride-ridden
pride-sick
pride-swollen
prie-dieu
priest hole
priest vicar

priest-astronomer
priest-baiting
priest-catching
priest-doctor
priest-dynast
priest-educated
priest-guarded
priest-harboring
priest-hating
priest-hermit
priest-hole
priest-king
priest-knight
priest-led
priest-monk
priest-noble
priest-philosopher
priest-poet
priest-prince
priest-prompted
priest-ridden
priest-riddenness
priest-ruler
priest-statesman
priest-surgeon
priest-wrought
prim
up
prim-behaving
prim-lipped
prim-looking
prim-mannered
prim-mouthed
prim-notioned
prim-seeming
prima ballerina
prima donna
prima facie
prima facie case
prima facie evidence
prima inter pares
prima materia
prima vista
prima-facie evidence
primal chaos
primal ignorance
primal stupidity
primal therapy

primary accent
primary anemia
primary atypical pneumonia
primary battery
primary burial
primary cell
primary coil
primary color
primary colour
primary contact
primary derivative
primary digestion
primary education
primary election
primary electron
primary evidence
primary form
primary group
primary highway
primary infection
primary intention
primary oocyte
primary optical area
primary phloem
primary pigment
primary processes
primary quality
primary road
primary scholar
primary school
primary schooler
primary sex character
primary sex characteristic
primary spermatocyte
primary stress
primary syphilis
primary trainer
primary type
primary wave
prime coat
prime cost
prime field
prime focus
prime
hours
prime ideal
prime interest rate
prime interval

prime investment
prime issue
prime meridian
prime minister
prime ministry
prime mover
prime number
prime number theorem
prime of life
prime of the morning
prime of the year
prime rate
prime song
prime the pump
prime time
prime tone
prime vertical
prime-ministerial
prime-ministership
prime-ministry
primed for
primeval forest
priming boiler
priming charge
primitive Indo-European
primitive arch
primitive art
primitive church
primitive faith
primitive polynomial
primitive self
primitive settler
primo tenore
primp up
primrose green
primrose path
primrose peerless
primrose tree
primrose willow
primrose yellow
primrose-colored
primrose-decked
primrose-dotted
primrose-haunted
primrose-leaved
primrose-scented
primrose-spangled
primrose-starred

primrose-sweet
primrose-tinted
primrose-yellow
primuline color
primuline yellow
primum mobile
primus inter pares
primus stove
prince albert
prince charming
prince consort
prince elector
prince of
wales
prince regent
prince royal
prince's feather
prince's pipe
prince's-feather
prince's-pine
prince-abbot
prince-angel
prince-bishop
prince-duke
prince-elector
prince-general
prince-killing
prince-poet
prince-president
prince-priest
prince-primate
prince-protected
prince-proud
prince-ridden
prince-teacher
prince-trodden
prince-wood
princes of India
princess pine
princess post
princess regent
princess royal
princess tree
princess-ship
principal argument
principal axis
principal boy
principal character

principal clause
principal diagonal
principal focus
principal idea
principal ideal
principal keeper
principal parts
principal plane
principal point
principal quantum number
principal rafter
principal series
principal sum
principal value
principle of complementarity
principle of corres
principle of correspondence
principle of desire
principle of equivalence
principle of faith
principle of government
principle of indeterminacy
principle of least action
principle of relativity
principle of
superposition
principle of virtual work
prink out
prink up
print cloth
print cutter
print media
print medium
print out
print shop
print trimmer
print-out
print-out paper
printed antenna
printed circuit
printed matter
printed paper
printer's copy
printer's devil
printer's error
printer's imprint
printer's ink
printer's mark

printer's reader
printer's ream
printing calculator
printing equipment
printing frame
printing ink
printing machine
printing office
printing paper
printing plate
printing press
printing surface
printing telegraph
printing-house
printing-in
printing-out
printing-out paper
printing-press
prior consultation
prior right of purchase
prior to
prism binocular
prism binoculars
prism diopter
prism glass
prism level
prism spectrometer
prism spectroscope
prism telescope
prismatic coefficient
prismatic compass
prismatic layer
prismatic telescope
prison base
prison bird
prison breach
prison camp
prison fever
prison guard
prison house
prison pallor
prison psychosis
prison term
prison
ward
prison-bound
prison-bred
prison-bursting

prison-caused
prison-escaping
prison-free
prison-house
prison-made
prison-making
prison-taught
prisoner of war
prisoner's base
prisoner-of-war camp
prisoner-of-war stockade
prisoners' bars
prisse papyrus
pristine ignorance
prittle-prattle
private aims
private attorney
private aviation
private bill
private branch exchange
private business exchange
private checker
private company
private conference
private desires
private detective
private enterprise
private eye
private first class
private flying
private hospital
private hotel
private income
private information
private instructor
private international law
private investigator
private judgment
private knowledge
private law
private line
private matter
private means
private member
private ownership
private parts
private patient
private pilot

private plane
private practice
private press
private road
private room
private school
private secretary
private sector
private teaching
private treaty
private-duty
nurse
private-enterprise
private-enterprise economy
private-line car
privation-proof
privet adelia
privet andromeda
privet hawk
privet honeysuckle
privilege from
privileged communication
privileged question
privy chamber
privy council
privy councilor
privy counsellor
privy parts
privy purse
privy seal
privy to
privy-councilship
prix fixe
prix fixes
prize court
prize crew
prize fight
prize fighter
prize fighting
prize flag
prize money
prize open
prize out
prize ring
prize sap
prize winner
prize-fight
prize-fighter

prize-giving
prize-playing
prize-ring
prize-taking
prize-winning
pro and con
pro bono publico
pro forma
pro forma balance sheet
pro memoria
pro patria
pro patria mori
pro rata
pro tanto
pro tem
pro tempore
pro-
pro-Abyssinian
pro-Alabaman
pro-Alaskan
pro-Algerian
pro-Alsatian
pro-American
pro-Americanism
pro-Anglican
pro-Arab
pro-Arabian
pro-Arabic
pro-Argentina
pro-Arian
pro-Aristotelian
pro-Armenian
pro-Asian
pro-Asiatic
pro-Athenian
pro-Australian
pro-Austrian
pro-Baconian
pro-Baptist
pro-Belgian
pro-Bessarabian
pro-Biblical
pro-Bohemian
pro-Bolivian
pro-Bolshevik
pro-Bolshevism
pro-Bolshevist
pro-Brazilian

pro-British
pro-Buddhist
pro-Bulgarian
pro-Burman
pro-Cambodia
pro-Cameroun
pro-Canadian
pro-Catholic
pro-Catholicism
pro-Ceylon
pro-Chilean
pro-Chinese
pro-Colombian
pro-Confederate
pro-Congolese
pro-Congressional
pro-Cuban
pro-Cyprus
pro-Czech
pro-Czechoslovakian
pro-Danish
pro-Darwin
pro-Darwinian
pro-Darwinism
pro-Denmark
pro-Dominican
pro-East
pro-Eastern
pro-Ecuador
pro-Egyptian
pro-Elizabethan
pro-Emersonian
pro-English
pro-Eskimo
pro-Ethiopian
pro-European
pro-Finnish
pro-Florentine
pro-France
pro-French
pro-Freud
pro-Freudian
pro-Gaelic
pro-Gentile
pro-German
pro-Ghana
pro-Gothic
pro-Grecian

pro-Greek
pro-Guatemalan
pro-Haitian
pro-Hawaiian
pro-Hellenic
pro-Hindu
pro-Hitler
pro-Honduran
pro-Hungarian
pro-Icelandic
pro-Indian
pro-Indonesian
pro-Iranian
pro-Iraq
pro-Iraqi
pro-Irish
pro-Israel
pro-Israeli
pro-Italian
pro-Jacobean
pro-Japanese
pro-Jeffersonian
pro-Jewish
pro-Jordan
pro-Korean
pro-Koweit
pro-Kuwait
pro-Laotian
pro-Latin
pro-Lebanese
pro-Liberian
pro-Lybian
pro-Madagascan
pro-Malayan
pro-Malaysian
pro-Methodist
pro-Mexican
pro-Monaco
pro-Moroccan
pro-Moslem
pro-Muslem
pro-Muslim
pro-Negro
pro-Nigerian
pro-Nordic
pro-North
pro-Northern
pro-Norwegian

pro-Oriental
pro-Panama
pro-Panamanian
pro-Paraguay
pro-Paraguayan
pro-Peruvian
pro-Philippine
pro-Polish
pro-Portuguese
pro-Presbyterian
pro-Protestant
pro-Prussian
pro-Quaker
pro-Renaissance
pro-Rumanian
pro-Russian
pro-Scandinavian
pro-Scriptural
pro-Scripture
pro-Somalia
pro-South
pro-Southern
pro-Soviet
pro-Spain
pro-Spanish
pro-Sudanese
pro-Sweden
pro-Swedish
pro-Swiss
pro-Switzerland
pro-Syrian
pro-Tunisian
pro-Turkey
pro-Turkish
pro-Unitarian
pro-United
States
pro-Uruguayan
pro-Venezuelan
pro-Vietnamese
pro-West
pro-Western
pro-Westerner
pro-Whig
pro-Yugoslav
pro-Yugoslavian
pro-Zionism
pro-Zionist

pro-am
pro-art
pro-budgeting
pro-bus
pro-cathedral
pro-city
pro-co-operation
pro-form
pro-government
pro-immigrationist
pro-infinitive
pro-man
pro-modern
pro-observance
pro-oceanic
pro-ode
pro-oestrous
pro-oestrum
pro-oestrus
pro-oestrys
pro-opera
pro-operation
pro-opic
pro-opium
pro-orthodox
pro-orthodoxical
pro-orthodoxy
pro-ostracal
pro-ostracum
pro-otic
pro-pre-existentiary
pro-proctor
pro-rata
pro-rate
pro-rector
pro-rex
pro-skin
pro-state
pro-strike
pro-vice-chancellor
proAfrican
proactive
 inhibition
probability curve
probability density function
probability distribution
probability function
probability theory

probable cause
probable error
probate bond
probate court
probate duty
probate judge
probation officer
probatum est
probe scissors
probe-pointed
probirth-control
problem drinker
problem drinking
problem novel
problem play
problems in living
problon is a probability
proboscis monkey
procaine amide
procaryotic cell
proceed from
proceed out in the open
proceed to
proceed with
proces verbal
proces-verbal
proces-verbaux
process
butter
process cheese
process control
process costing
process lag
process loop
process milling
process of time
process photos
process plate
process printer
process printing
process server
process shot
process variable
process-control system
process-server
processed cheese
processing solution
processing tax

procession flower
processional march
processionary moth
prochain ami
prochein ami
prochein amy
proclaim at Charing Cross
proclaim at the crossroads
proclaim at the market cross
proclaim from
procrustean bed
procto-
procuration fee
procurator fiscal
procurator-fiscal
procurator-general
procure materials
procurement editor
prodigal returned
prodigal son
produce an instance
produce conviction
produce race
producer gas
producer goods
producing again
producing once more
producing over
product engineer
production control
production curve
production editor
production goods
production line
production manager
production number
productive capacity
productive imagination
profane language
profane
 oath
profane swearing
profane, the
profanity-proof
profanum vulgus
profession of belief
profession of faith
professional athlete

professional consultant
professional education
professional ethics
professional killer
professional mourner
professional musician
professional name
professional politician
professional soldiers
professional standing
professional status
professor emeritus
professor ordinarius
proffer aid
proffer yourself
proficiency badge
proficient in
profile board
profile cutter
profile drag
profile line
profile machine
profile map
profile microscope
profile paper
profile plan
profiling machine
profit and loss
profit and loss account
profit by
profit sharing
profit system
profit taking
profit-and-loss
profit-building
profit-making
profit-producing
profit-seeking
profit-sharing
profit-taking
profit-yielding
profound idiocy
profound knowledge
profound secret
profound sense
profound sleep
profound thought
prognostic chart

program clock
program director
program discriminator
program
feed
program music
program of action
program of music
program of operation
program picture
programme music
programmed instruction
programmed learning
programming language
progress chart
progress clerk
progress of time
progressive conservative
progressive jazz
progressive proof
progressive school
progressive sorites
progressive tax
progressive taxation
progressive tense
progressive trials
prohibition-proof
prohibitory injunction
project over
projected window
projectile anchor
projectile lathe
projectile rocket
projecting microscope
projection booth
projection fiber
projection machine
projection print
projection printing
projection room
projection tube
projective geometry
projective property
projective test
projector lamp
projector tube
prolate spheroid
proletarian novel

proliferative arthritis
prolong the agony
prolonge knot
prolonged narcosis
promenade concert
promenade deck
promenade tile
promethea moth
prominent belly
promise in marriage
promise of harm
promise-bound
promise-breach
promise-breaking
promise-crammed
promise-fed
promise-fulfilling
promise-keeping
promise-led
promise-making
promise-performing
promised
 land
promissory note
promoter of the faith
promotional material
prompt dower
prompt note
prompt side
prompt the mind
prompter's box
prone before
prone float
prone pressure method
prone to
prong box
prong budding
prong chuck
prong die
prong hoe
prong key
prong-horned
pronghorn antelope
pronounce judgment
pronounce on
pronounce sentence
prony brake
proof against

proof armor
proof before letter
proof charge
proof coin
proof correction
proof leaf
proof paper
proof plane
proof planer
proof press
proof sheet
proof spirit
proof stress
proof-correct
proof-proof
proof-spirit
prop joint
prop man
prop root
prop up
prop word
prop-
prop-wash
propaganda novel
propaganda-proof
propanoic acid
propeller horsepower
propeller plane
propeller post
propeller race
propeller shaft
propeller thrust
propeller torque
propeller wash
propeller-drive gas turbine
propeller-jet
engine
propelling charge
propelling nozzle
propelling pencil
propenyl alcohol
propenyl group
propenyl radical
proper adjective
proper claim
proper fraction
proper function
proper motion

proper name
proper noun
proper occasion
proper piloting
proper subalgebra
proper subset
proper task
proper thing
proper time
proper to
proper value
propertied person
property damage insurance
property insurance
property line
property man
property master
property owner
property right
property rights
property roll
property tax
property transfer
property-increment tax
property-owning
prophet flower
prophet of doom
prophet-bard
prophet-flower
prophet-king
prophet-painter
prophet-poet
prophet-preacher
prophet-statesman
prophetic revelation
prophetico-historical
prophylactic psychiatry
prophylactic psychology
propio-
propionic acid
propitiatory gift
propjet engine
proportional band
proportional control
proportional counter
proportional ionization chamber
proportional limit
proportional parts

proportional representation
proportional
tax
proportioning lever
proposal bond
propose a question
propose to
proposed explanation
propositional calculus
propositional function
propound a question
proprietary colony
proprietary drug
proprietary hospital
proprietary medicine
proprietary name
proprietary rights
proprio motu
props from under one
props from under you
propter hoc
propulsion charge
propulsive duct
propulsive efficiency
propyl alcohol
propyl aldehyde
propylene glycol
propylphenyl acetate
pros and cons
pros-
proscenium arch
proscenium box
proscenium boxes
proscenium stage
prose fiction
prose poem
prose poet
prose poetry
prose rhythm
prose run mad
prose style
prose writer
prosecute a suit against
prosecute at law
prosecute to a conclusion
prosecuting attorney
prosecution-proof
prosodic form

prosodic pattern
prospect glass
prospective glass
prospective-glass
prosperity-proof
prosperous issue
prostate gland
prostatic fluid
prosthetic dentistry
prosthetic group
prostrate before
prostrate yourself
prostrate
 yourself before
prot-
prote-
protean actor
protected anchorage
protected cruiser
protection forest
protection racket
protective clothing
protective coloration
protective covering
protective custody
protective deck
protective mimicry
protective slope
protective stock
protective system
protective tariff
protective umbrella
protector paravane
protein crystal
protein deficiency
protein factor
protein fever
protein fibers
protein milk
protein plastic
protein shock
protein therapy
protein-free
proteolytic enzyme
protero-
protest against
protest demonstration
protest flag

protest too much
protested bill
proteus animalcule
prothetic vowel
prothonotary apostolic
prothonotary warbler
proto-
protocol sentence
protocol statement
proton gun
proton number
proton reaction
proton-synchrotron
protoxide of nitrogen
protozoan disease
protracted meeting
protruding belly
proud as Lucifer
proud as a peacock
proud bearing
proud flesh
proud-blind
proud-blooded
proud-crested
proud-exulting
proud-glancing
proud-hearted
proud-looking
proud-minded
proud-mindedness
proud-paced
proud-pillared
proud-prancing
proud-quivered
proud-spirited
proud-stomached
provable
fact
provascular tissue
prove false
prove out
prove the contrary
prove to be
prove true
prove up
prove your point
proved fact
proverbial saying

provice-chancellor
provide a hedge
provide a rationale
provide against
provide against a rainy day
provide capital for
provide for
provide for a rainy day
provide money for
provide the wherewithal
provide with a roof
provided always
provided for
provided school
provided that
provident care
provident club
provident society
provincial court
provincial legislature
provincial parliament
provincial police
provincial tax
proving ground
proving out
provision account
provision of capital
provision tree
provisional government
provisionally accept
provisionally admit
provolone cheese
provost court
provost guard
provost marshal
provost-marshal
prow on
prowl after
prowl car
proximal convoluted tubule
proximate
 analysis
proximate cause
proxime accessit
proximity fuse
proximity fuze
proximity meter
proxy marriage

proxy statement
proxy voting
prudent administration
prudential administration
prune purple
prune tree
prunes and prisms
pruning hook
pruning saw
pruning shears
prurient interest
prussian blue
prussic acid
pry around
pry into
pry into the future
pry loose from
pry open
pry out
pry pole
psalm book
psalm singer
psalm tone
psalm tune
psammo-
pseud-
pseudo abolitionist
pseudo abstainer
pseudo academy
pseudo acceptance
pseudo accident
pseudo acid
pseudo acquaintance
pseudo actor
pseudo actress
pseudo aesthete
pseudo aestheticism
pseudo affection
pseudo agent
pseudo alliance
pseudo ally
pseudo alumna
pseudo alumnus
pseudo amateur
pseudo analogy
pseudo ancestor
pseudo angel
pseudo animal

pseudo animalism
pseudo announcement
pseudo apology
pseudo applicant
pseudo application
pseudo appointment
pseudo appreciation
pseudo aristocrat
pseudo arrest
pseudo art
pseudo artist
pseudo asceticism
pseudo
assertion
pseudo association
pseudo astonishment
pseudo aunt
pseudo author
pseudo authoress
pseudo authorization
pseudo bacillus
pseudo banker
pseudo bankruptcy
pseudo baptism
pseudo bard
pseudo base
pseudo benefactor
pseudo benefactress
pseudo benevolence
pseudo bible
pseudo biographer
pseudo biography
pseudo biology
pseudo bird
pseudo bishop
pseudo boa
pseudo bookcase
pseudo boy
pseudo bride
pseudo broker
pseudo brokerage
pseudo brother
pseudo cancellation
pseudo candidacy
pseudo candidate
pseudo candor
pseudo captive
pseudo capture

pseudo catholic
pseudo catholicism
pseudo census
pseudo champion
pseudo championship
pseudo charity
pseudo chemist
pseudo chemistry
pseudo citizen
pseudo citizenship
pseudo clergy
pseudo clergyman
pseudo clerk
pseudo client
pseudo club
pseudo college
pseudo competitor
pseudo conclusion
pseudo cone
pseudo confession
pseudo confessional
pseudo confirmation
pseudo conflict
pseudo connection
pseudo consent
pseudo conservator
pseudo conversion
pseudo
cook
pseudo cordiality
pseudo corporation
pseudo count
pseudo courtesy
pseudo courtier
pseudo cousin
pseudo creditor
pseudo crisis
pseudo critic
pseudo criticism
pseudo crystal
pseudo cult
pseudo cultivation
pseudo culture
pseudo date
pseudo death
pseudo declaration
pseudo deficit
pseudo delegate

pseudo delegation
pseudo democracy
pseudo deputation
pseudo deputy
pseudo devotee
pseudo devotion
pseudo dike
pseudo diplomacy
pseudo diplomat
pseudo distance
pseudo distribution
pseudo distributor
pseudo divination
pseudo divine
pseudo divinity
pseudo doctor
pseudo donation
pseudo donor
pseudo drama
pseudo dramatist
pseudo duke
pseudo earl
pseudo economics
pseudo economy
pseudo editor
pseudo editorial
pseudo education
pseudo educator
pseudo election
pseudo electorate
pseudo emotion
pseudo endeavor
pseudo enthusiasm
pseudo enthusiast
pseudo episcopacy
pseudo equality
pseudo ethics
pseudo etymologist
pseudo etymology
pseudo evangelist
pseudo example
pseudo exemplar
pseudo experiment
pseudo
expert
pseudo exposure
pseudo fabric
pseudo failure

pseudo faith
pseudo fame
pseudo farmer
pseudo farming
pseudo father
pseudo femininity
pseudo feminism
pseudo feminist
pseudo fertilization
pseudo finality
pseudo flatterer
pseudo flattery
pseudo form
pseudo fruit
pseudo generosity
pseudo geniality
pseudo genius
pseudo gentility
pseudo gentleman
pseudo geyser
pseudo ghost
pseudo healer
pseudo heart
pseudo heathen
pseudo hero
pseudo humanism
pseudo humanist
pseudo humanitarian
pseudo husband
pseudo identity
pseudo impartiality
pseudo independence
pseudo information
pseudo insanity
pseudo inspiration
pseudo internationalism
pseudo internationalist
pseudo invalid
pseudo invalidism
pseudo island
pseudo isle
pseudo jaundice
pseudo judge
pseudo judgment
pseudo justice
pseudo knight
pseudo label
pseudo learning

pseudo legality
pseudo legend
pseudo legislation
pseudo legislator
pseudo liberalism
pseudo liberality
pseudo liquidation
pseudo literature
pseudo loan
pseudo lord
pseudo mahogany
pseudo
marble
pseudo marquis
pseudo marriage
pseudo martyr
pseudo martyrdom
pseudo masculinism
pseudo masculinity
pseudo masterpiece
pseudo medievalism
pseudo meditation
pseudo member
pseudo membership
pseudo memory
pseudo messenger
pseudo militarism
pseudo minister
pseudo ministry
pseudo miracle
pseudo modesty
pseudo monastery
pseudo monk
pseudo moralist
pseudo morality
pseudo myth
pseudo narcotism
pseudo nationalism
pseudo nobility
pseudo noble
pseudo nymph
pseudo occidentalism
pseudo occupation
pseudo official
pseudo officialism
pseudo orientalism
pseudo owner
pseudo pagan

pseudo parallel
pseudo parasite
pseudo parent
pseudo parson
pseudo participation
pseudo partner
pseudo partnership
pseudo pastor
pseudo pastorate
pseudo patriot
pseudo patriotism
pseudo patron
pseudo patronage
pseudo payment
pseudo peasant
pseudo peasantry
pseudo philanthropist
pseudo philanthropy
pseudo philologist
pseudo philology
pseudo philosopher
pseudo philosophy
pseudo physician
pseudo piety
pseudo pigmentation
pseudo
poet
pseudo poetess
pseudo poetry
pseudo politician
pseudo politics
pseudo popularity
pseudo possession
pseudo possessor
pseudo poverty
pseudo precedent
pseudo prescription
pseudo presentiment
pseudo priest
pseudo priesthood
pseudo prince
pseudo principality
pseudo profession
pseudo professor
pseudo prohibition
pseudo prohibitionist
pseudo prophecy
pseudo prophet

pseudo prophetess
pseudo prosperity
pseudo psychologist
pseudo psychology
pseudo purity
pseudo ray
pseudo realism
pseudo recognition
pseudo recollection
pseudo reconciliation
pseudo reform
pseudo reformation
pseudo reformatory
pseudo reformer
pseudo registration
pseudo relation
pseudo relationship
pseudo relative
pseudo religion
pseudo republic
pseudo residence
pseudo resident
pseudo resignation
pseudo reversal
pseudo rheumatism
pseudo romanticism
pseudo royal
pseudo royalty
pseudo sacrilege
pseudo saint
pseudo saintliness
pseudo sanctity
pseudo sanctuary
pseudo satire
pseudo satirist
pseudo scholar
pseudo scholarship
pseudo
science
pseudo scientist
pseudo sensation
pseudo sense
pseudo sensibility
pseudo servility
pseudo servitor
pseudo servitude
pseudo signature
pseudo siphon

pseudo slavery
pseudo socialism
pseudo socialist
pseudo specialist
pseudo specialty
pseudo specter
pseudo spirit
pseudo spirituality
pseudo statement
pseudo stem
pseudo student
pseudo subtlety
pseudo suicide
pseudo symptom
pseudo temperance
pseudo theft
pseudo tribe
pseudo tribulation
pseudo tribute
pseudo university
pseudo virgin
pseudo witness
pseudo worship
pseudo zeal
pseudo-
pseudo-African
pseudo-American
pseudo-Argentinean
pseudo-Argentinian
pseudo-Aristotelian
pseudo-Aryan
pseudo-Assyrian
pseudo-Australian
pseudo-Austrian
pseudo-Babylonian
pseudo-Baptist
pseudo-Belgian
pseudo-Bohemian
pseudo-Bolivian
pseudo-Brahman
pseudo-Brazilian
pseudo-Buddhist
pseudo-Bulgarian
pseudo-Canadian
pseudo-Carthaginian
pseudo-Catholic
pseudo-Chilean
pseudo-Chinese

pseudo-Christian
pseudo-Ciceronian
pseudo-Dantesque
pseudo-Democratic
pseudo-Dutch
pseudo-East
Indian
pseudo-Egyptian
pseudo-Elizabethan
pseudo-English
pseudo-Episcopalian
pseudo-European
pseudo-French
pseudo-Georgian
pseudo-German
pseudo-Germanic
pseudo-Gothic
pseudo-Grecian
pseudo-Greek
pseudo-Hindu
pseudo-Homeric
pseudo-Hungarian
pseudo-Incan
pseudo-Indian
pseudo-Iranian
pseudo-Irish
pseudo-Italian
pseudo-Japanese
pseudo-Mayan
pseudo-Messianic
pseudo-Methodist
pseudo-Mexican
pseudo-Miltonic
pseudo-Mohammedan
pseudo-Mohammedanism
pseudo-Mongolian
pseudo-Moslem
pseudo-Muslem
pseudo-Muslim
pseudo-Norwegian
pseudo-Panamanian
pseudo-Persian
pseudo-Polish
pseudo-Presbyterian
pseudo-Republican
pseudo-Roman
pseudo-Russian
pseudo-Semitic

pseudo-Serbian
pseudo-Shakespearean
pseudo-Shakespearian
pseudo-Socratic
pseudo-Spanish
pseudo-Swedish
pseudo-Turkish
pseudo-Vergilian
pseudo-Victorian
pseudo-Virgilian
pseudo-carp
pseudo-catholic
pseudo-christ
pseudo-code
pseudo-hieroglyphic
pseudo-intransitive
pseudo-ionone
pseudo-isometric
pseudo-occidental
pseudo-orthorhombic
pseudo-osteomalacia
pseudo-papal
pseudo-uniseptate
pseudo-urate
pseudo-urea
pseudo-uric
pseudoaortic
insufficiency
pseudologia phantastica
pseudometric space
pseudonymous literature
psi particle
psilo-
psych out
psych-
psychasthenic reaction
psyche knot
psyched up
psychedelic drug
psychedelic show
psychiatric evaluation
psychiatric ward
psychic apparatus
psychic bid
psychic blindness
psychic determinism
psychic energizer
psychic energy

psychic epilepsy
psychic income
psychic monism
psychic phenomena
psychic research
psychical phenomena
psychical research
psychically blind
psycho-
psycho-asthenics
psycho-physic
psycho-physical
psycho-therapeutic
psychoactive drug
psychoactive drugs
psychoanalytic method
psychoanalytic theory
psychoanalytic therapy
psychogenic disease
psychological block
psychological complex
psychological conditioning
psychological counseling
psychological defenses
psychological dependence
psychological dictionary
psychological evaluation
psychological fixation
psychological
hedonism
psychological logic
psychological medicine
psychological moment
psychological novel
psychological primary
psychological profile
psychological screening
psychological stress
psychological support
psychological surrogate
psychological symbol
psychological test
psychological time
psychological warfare
psychologically addictive
psychology of depths
psychomotor disturbance
psychomotor epilepsy

psychoneurotic disorder
psychopathia martialis
psychopathia sexualis
psychopathic case
psychopathic condition
psychopathic hospital
psychopathic personality
psychopathic ward
psychophysical parallelism
psychosexual disorder
psychosocial medicine
psychosomatic disease
psychosomatic medicine
psychosomatic symptom
psychotic personality
psychro-
psychrometric chart
psyllium seed
pterid-
pterido-
ptero-
pteroic acid
pteroylglutamic acid
pteroylmonoglutamic acid
pterygo-
pterygoid bone
pterygoid process
ptilo-
ptolemaic system
ptomaine poisoning
pub crawler
pub-crawl
pubertal gland
puberty gland
pubic
 hair
public acclaim
public accountant
public act
public address
public administration
public assistance
public bar
public baths
public belief
public bill
public charge
public company

public consciousness
public convenience
public corporation
public crib
public debt
public defender
public dishonor
public domain
public enemy
public enterprise
public entertainer
public eye
public figure
public gallery
public health
public health doctor
public health medicine
public health nurse
public health physician
public hospital
public house
public image
public international law
public knowledge
public law
public lending right
public librarian
public library
public man
public motive
public notice
public nuisance
public official
public opinion
public orator
public ownership
public park
public policy
public press
public print
public prosecutor
public records
public relations
public relations man
public relations officer
public report
public sale
public school

public servant
public service
public
speaker
public speaking
public speech
public spirit
public square
public statute
public telephone
public television
public till
public tit
public tranquillity
public treasury
public trough
public utilities
public utility
public walk
public welfare
public works
public worship
public-address system
public-liability insurance
public-minded
public-mindedness
public-official bond
public-opinion poll
public-school
public-service corporation
public-spirited
public-spiritedly
public-spiritedness
public-utility
public-voiced
publicity agent
publicity law
publicity man
publicity manager
publicity story
publicity-proof
publish a manifesto
publish the banns
publisher's catalog
publisher's list
publishing house
publishing industry
pubo-

puce oxide
puck-carrier
pucker up
pudding bag
pudding boom
pudding club
pudding face
pudding grass
pudding sleeve
pudding spar
pudding stone
pudding time
pudding-faced
pudding-pie
pudding-pipe tree
pudding-shaped
puddle ball
puddle bar
puddle duck
puddle rolls
puddle
 wall
puddling furnace
pudendal ulcer
puerperal fever
puerperal psychosis
puff adder
puff and blow
puff box
puff like a grampus
puff of air
puff of smoke
puff of wind
puff paste
puff pastry
puff pipe
puff shark
puff sleeve
puff up
puff-adder
puff-ball
puff-bird
puff-fish
puff-leg
puff-paste
puff-puff
puffed rice
puffed up

puffed wheat
puffer pipe
puffing up
pug dog
pug head
pug knife
pug mill
pug moth
pug nose
pug piling
pug-faced
pug-nosed
pug-pile
puisne judge
puisne justice
puke-stocking
pukka sahib
puling infant
pull a blooper
pull a bluff
pull a boner
pull a boo-boo
pull a face
pull a fast one
pull a fast one on
pull a gun on
pull a lone oar
pull a long face
pull a proof
pull about
pull about your ears
pull an oar
pull apart
pull around
pull at the heartstrings
pull at the leash
pull away
pull back
pull box
pull broach
pull by the sleeve
pull clear
pull date
pull different ways
pull down
pull fo
pull for
pull in

pull in pieces
pull in your horns
pull lamp holder
pull off
pull
on
pull out
pull out all the stops
pull out of it
pull over
pull pin
pull punches
pull rank
pull ropes
pull round
pull station
pull strap
pull strings
pull switch
pull the forelock
pull the strings
pull the wires
pull the wool over your eyes
pull through
pull to pieces
pull together
pull towards
pull up
pull up by the roots
pull up short
pull up stakes
pull wires
pull you up short
pull your leg
pull your own weight
pull your rank
pull your teeth
pull your weight
pull your wits together
pull yourself together
pull-
pull-back
pull-down
pull-drive
pull-in
pull-in torque
pull-off
pull-on

pull-on sweater
pull-out
pull-out torque
pull-over
pull-through
pull-through torque
pull-up
pull-up chair
pullboat logging
puller-in
puller-out
pullet disease
pulley block
pulley chain
pulley frame
pulley lathe
pulley oiler
pulley stile
pulley tackle
pulley tap
pulley-shaped
pulling boat
pulling down
pulling out
pulling power
pulling together
pulling-out
pullorum disease
pullulate with
pully-haul
pully-hauly
pulmo-
pulmonary
 artery
pulmonary emphysema
pulmonary insufficiency
pulmonary phthisis
pulmonary stenosis
pulmonary tuberculosis
pulmonary valve
pulmonary vein
pulmoni-
pulmono-
pulp canal
pulp canal therapy
pulp canal treatment
pulp cavity
pulp chamber

pulp engine
pulp lead
pulp machine
pulp magazine
pulp nodule
pulp plaster
pulpilyl galaxy
pulpit cloth
pulpit cross
pulpit rock
pulsating direct current
pulsating star
pulsating universe
pulsating universe theory
pulsation pump
pulsation theory
pulse analyzer
pulse deficit
pulse family
pulse generator
pulse glass
pulse height analyser
pulse ionization chamber
pulse jet
pulse jet helicopter
pulse modulation
pulse pressure
pulse radar
pulse rate
pulse transformer
pulse wave
pulse-jet
pulse-jet engine
pulse-jet propulsion
pulse-modulated radar
pulse-time modulation
pulsejet engine
pulsion diverticulum
pulsus alternans
pulvering day
pulverizer harrow
pumice soap
pumice stone
pumice-stone
pump bilge
pump bob
pump box
pump brake

pump cylinder
pump
 doctor
pump drill
pump for information
pump full of lead
pump gun
pump handle
pump house
pump out
pump priming
pump rod
pump room
pump sole
pump spear
pump staff
pump up
pump well
pump-action
pump-back method
pump-handle
pump-handler
pump-priming
pump-room
pump-well
pumping engine
pumping plan
pumping-back method
pumpkin ash
pumpkin head
pumpkin pine
pumpkin seed
pumpkin tree
pumpkin-colored
pumpkin-headed
pumpkin-seed
pumpkin-seed oil
puna grass
punch barrel
punch bowl
punch card
punch cards
punch cattle
punch cutter
punch full of holes
punch holder
punch house
punch in

punch ladle
punch lifter
punch line
punch mark
punch mat
punch out
punch pliers
punch press
punch spoon
punch the clock
punch-and-judy show
punch-ball
punch-bowl
punch-card data
punch-drunk
punch-hole
punch-marked
punch-up
punched card
punched cards
punched tape
punching bag
punching machine
punching press
punctuation mark
punctuation marks
puncture vine
puncture voltage
puncture your balloon
pungent meadow grass
pungle
up
punish yourself
punishment of Tantalus
punishment that fits the crime
punishment-proof
punitive damages
punitive sanction
punk kid
punk oak
punk rock
punk tree
punkah wallah
punner bar
punt formation
punt gun
punt shooter
punt shooting

punto reverso
pup tent
pupa shell
pupa-shaped
pupil hour
pupil load
pupil teacher
pupil teachery
pupil-teacherdom
pupil-teachership
puppet government
puppet play
puppet player
puppet regime
puppet show
puppet valve
puppet-play
puppet-show
puppet-valve
puppy drum
puppy fat
puppy love
puppy-dog
pur sang
pur-
purchase book
purchase journal
purchase ledger
purchase money
purchase money bond
purchase record
purchase shears
purchase tax
purchase-money
purchasing agent
purchasing power
purchasing public
pure and simple
pure chemistry
pure color
pure culture
pure cussedness
pure democracy
pure form
pure imaginary
pure imaginary number
pure in heart
pure line

pure mathematics
pure mechanics
pure science
pure white
pure-blooded
pure-bosomed
pure-dye
pure-eyed
pure-food
law
pure-heartedness
pure-minded
purebred horse
pureness of heart
purgatory hammer
purge away
purge yourself
purging nut
purification flower
purified cotton
purine base
purity rubric
purl stitch
purlieu-man
purlin plate
puro-
purple and fine linen
purple beard grass
purple bent
purple boneset
purple cestrum
purple chokeberry
purple color
purple daisy
purple finch
purple fish
purple fishery
purple foxglove
purple gallinule
purple heart
purple heron
purple lake
purple loosestrife
purple martin
purple medic
purple melick grass
purple mombin
purple mullein

purple oat
purple of Cassius
purple pall
purple passage
purple passages
purple patch
purple patches
purple rock cress
purple sage
purple sandpiper
purple shore crab
purple trillium
purple willow herb
purple wood grass
purple wood sorrel
purple wreath
purple-awned
purple-awned oat grass
purple-backed
purple-beaming
purple-berried
purple-black
purple-blue
purple-brown
purple-clad
purple-coated
purple-colored
purple-crimson
purple-dawning
purple-dyeing
purple-eyed
purple-faced
purple-flowered
purple-fringed
purple-fringed
orchid
purple-glowing
purple-green
purple-headed
purple-hued
purple-leaved
purple-nosed
purple-red
purple-robed
purple-rose
purple-skirted
purple-spiked
purple-spotted

purple-staining
purple-stemmed
purple-streaked
purple-streaming
purple-tailed
purple-tipped
purple-top
purple-topped
purple-veined
purple-vested
purple-yellow
purpose clause
purpose of
purpose to yourself
purpose-built
purpura hemorrhagica
purpureo-
purre maw
purse atomizer
purse bearer
purse boat
purse crab
purse cutter
purse cutting
purse isinglass
purse line
purse maker
purse net
purse pride
purse race
purse ring
purse rope
purse seine
purse seiner
purse silk
purse snatcher
purse snatching
purse spider
purse string
purse strings
purse weight
purse-bearer
purse-eyed
purse-lined
purse-lipped
purse-mad
purse-pinched
purse-pride

purse-proud
purse-shaped
purse-snatching
purse-string
purse-string suture
purse-swollen
purslane
speedwell
purslane tree
pursuant to
pursue a policy of
pursue a strategy
pursue an inquiry
pursue the arts of peace
pursue your education
pursuit airplane
pursuit pendulum
pursuit plane
pursuit squadron
pus basin
pus cell
pus pan
push about
push along
push around
push aside
push back
push bicycle
push bolt
push broach
push broom
push button
push car
push cycle
push down
push drill
push fit
push forward
push from your thoughts
push hoe
push in
push moraine
push off
push on
push onward
push out
push out of place
push shot

push the panic button
push the pen
push the pencil
push through
push to one side
push to the wall
push up daisies
push upon
push your luck
push your way
push-
push-bike
push-button
push-button control
push-button plant
push-button telephone
push-button warfare
push-down
push-off
push-out chuck
push-pin
push-pull
push-pull microphone
push-start
push-up
pusher airplane
pusher grade
pusher plane
pusher propeller
pushing down
pushing under
pushing up daisies
puss clover
puss
 in the corner
puss moth
puss-cat
puss-moth
pussle-gutted
pussy clover
pussy wants a corner
pussy willow
pussy's toe
pussy's toes
pussy-foot
pustula maligna
put a bold face on
put a bold face upon

put a bridle on your tongue
put a bug in your ear
put a construction on
put a crimp in
put a curse on
put a duty on
put a false appearance upon
put a false construction on
put a false construction upon
put a figure on
put a flea in your ear
put a gloss upon
put a good face upon
put a half nelson on
put a hex on
put a juju on
put a mark on
put a penalty on
put a period to
put a question to
put a spoke in your wheel
put a spoke in your wheels
put a stop to
put a tuck in your tail
put about
put across
put all your eggs in one basket
put all your strength into
put an embargo on
put an end to
put an end to yourself
put and call
put apart
put aside
put asunder
put at a disadvantage
put at ease
put at your disposal
put away
put away for
put away thought
put back
put beef into it
put before
put
behind one
put between
put beyond the pale

put by
put down
put down to
put faith in
put for
put forth
put forth buds
put forth leaves
put forth your strength
put forward
put heads together
put hep
put hip
put in
put in a call
put in a false light
put in a good word for
put in a hole
put in a new light
put in a nutshell
put in a spot
put in a trance
put in a word
put in a word for
put in an appearance
put in an order
put in an order for
put in black and white
put in bodily fear
put in commission
put in condition
put in danger
put in fear
put in for
put in force
put in good humor
put in hock
put in irons
put in jeopardy
put in mind
put in mothballs
put in motion
put in operation
put in opposition
put in order
put in pawn
put in phase
put in place

put in plain English
put in plain words
put in practice
put in proper fore-and-aft trim
put in remembrance
put in repair
put in requisition
put in shape
put in suit
put in the bag
put in the foreground
put in the minutes
put in the place of
put
in the right
put in time
put in trim
put in tune
put in words
put in words of one syllable
put in working order
put in writing
put in your bad books
put in your black books
put in your head
put in your oar
put in your two cents
put in your two cents worth
put into
put into a flutter
put into a gas
put into effect
put into execution
put into port
put into practice
put into requisition
put into shape
put into the hands of
put into the picture
put into your head
put it
put it all behind one
put it all behind you
put it away
put it in few words
put it out of your thoughts
put it to
put it up to

put life into
put money in
put new life into
put next to
put obeah on
put off
put off mortality
put off the track
put on
put on a bold face
put on a burst of speed
put on a business basis
put on a business footing
put on a drive for
put on a false front
put on a false scent
put on a front
put on a harbor furl
put on a high
put on a pedestal
put on a show
put on airs
put on an act
put on an allowance
put
on an even keel
put on blinders
put on edge
put on ice
put on immortality
put on long pants
put on long trousers
put on more sail
put on more speed
put on mourning
put on paper
put on parole
put on report
put on sail
put on side
put on steam
put on tape
put on the Index
put on the acid
put on the agenda
put on the air
put on the alert
put on the back burner

put on the block
put on the brakes
put on the dog
put on the drag
put on the feed bag
put on the gloves with
put on the grill
put on the map
put on the market
put on the new man
put on the rack
put on the record
put on the retired list
put on the right track
put on the ritz
put on the scales
put on the shelf
put on the soft pedal
put on the spot
put on the stage
put on the stand
put on the style
put on thetrack
put on to
put on to something hot
put on trial
put on weight
put on your considering cap
put on your feet
put on your guard
put on your thinking cap
put one on
put one on guard
put one's heart in one's mouth
put option
put
out
put out a feeler
put out at interest
put out bag and baggage
put out buds
put out leaves
put out of action
put out of breath
put out of business
put out of commission
put out of countenance
put out of court

put out of existence
put out of face
put out of gear
put out of joint
put out of mind
put out of order
put out of place
put out of reach
put out of sight
put out of the way
put out of your head
put out of your mind
put out of your misery
put out of your thoughts
put out the welcome mat
put out to grass
put out to pasture
put out to sea
put over
put over against
put paid to
put pep into it
put pressure on
put price
put queries
put right
put six feet under
put somebody in his or her place
put someone on
put something across
put something aside
put something in the pot
put something over
put stock in
put straight
put teeth in
put the bee on
put the best color on
put the best face upon
put the bite on
put the blame on
put the cart before the horse
put the damper on
put the evil
eye on
put the fear of God into
put the finger on
put the finisher on

put the finishing strokes on
put the finishing touches on
put the helm hard over
put the helm to leeward
put the helm up
put the jinx on
put the kibosh on
put the lid on
put the lid on it
put the pressure on
put the right foot forward
put the rudder amidships
put the rudder hard left
put the rudder hard over
put the rudder hard right
put the screw on
put the screw to
put the screws on
put the screws to
put the settler on
put the shot
put the skids to
put the skids under
put the touch on
put the worst face upon
put through
put through a deal
put through channels
put through the grind
put through the mill
put through the third degree
put to
put to advantage
put to bed
put to choice
put to death
put to flight
put to inconvenience
put to it
put to music
put to one side
put to press
put to rights
put to rout
put to school
put to sea
put to shame
put to silence

put to sleep
put to the blush
put to the proof
put to the question
put
to the rack
put to the sword
put to the test
put to torture
put to trial
put to trouble
put to use
put to vote
put to your last shifts
put to your oath
put to your shifts
put to your wit's end
put together
put trust in
put two and two together
put under
put under a spell
put under an injunction
put under an interdict
put under an interdiction
put under an obligation
put under arrest
put under lock and key
put under oath
put under restraint
put under surveillance
put under the ban
put under the yoke
put up
put up a bluff
put up a bold front
put up a false front
put up a fight
put up a front
put up a howl
put up a job
put up a squawk
put up a struggle
put up an argument
put up as collateral
put up at
put up for auction
put up for sale

put up no barriers
put up the money
put up the shutters
put up the spout
put up to
put up with
put up with it
put up your hair
put upon
put upon oath
put upon record
put upon your mettle
put violently
put way upon
put with
put words in your mouth
put
you in mind of
put you in the picture
put you in your place
put you on cloud nine
put you on top of the world
put you out
put you out of your misery
put you through your paces
put your Irish up
put your John Hancock on
put your arms around
put your back into
put your back into it
put your back to
put your back to the wall
put your back up
put your best foot forward
put your bristles up
put your cards on the table
put your cross on
put your dander up
put your eyes out
put your finger on
put your foot down
put your foot down on
put your foot in it
put your foot in your mouth
put your fur up
put your good name in jeopardy
put your hair up
put your hand to

put your hand to the plow
put your hands in your pockets
put your hands on
put your head in a lion's mouth
put your heart into
put your life on the line
put your mark on
put your mind at rest on
put your mind to
put your money on the line
put your monkey up
put your nose out of joint
put your pride in your pocket
put your shoulder to
the wheel
put your teeth on edge
put your trust in
put your trust in God
put your two cents in
put your veto upon
put your weight in the scale
put your whole soul in
put yourself between disputants
put yourself down
put yourself down for
put yourself forward
put yourself in a spot
put yourself in another's shoes
put yourself in the hands of
put yourself out
put yourself out of court
put yourself out of the way
put yourself outside of
put yourself upon the
put zip into it
put-and-take
put-down
put-off
put-on
put-out
put-put
put-putter
put-up
put-up job
put-up market
put-upon
putative marriage
putrid matter

putt-putt
putter-forth
putter-in
putter-off
putter-on
putter-out
putter-through
putter-up
putting away
putting cleek
putting down
putting green
putting in
putting in order
putting on
putting on airs
putting out
putting out the eyes
putting stone
putting the best color on
putting together
putting two and two together
putting yourself between
putting-off
putting-stone
putty coat
putty
 eye
putty gloss
putty in your hands
putty knife
putty powder
putty-colored
putty-faced
putty-jointed
putty-looking
putty-powdered
putty-stopped
puzzle box
puzzle canon
puzzle lock
puzzle out
puzzle over
puzzle-brain
puzzle-cap
puzzle-headed
puzzle-monkey
puzzle-wit

puzzling problem
py-
pycno-
pye-dog
pygmy glider
pygmy weasel
pygmy-minded
pygo-
pyloro-
pyo-
pyogenic infection
pyorrhea alveolaris
pyorrhoea alveolaris
pyr-
pyramid flower
pyramid plant
pyramid selling
pyramid shell
pyramid-shaped
pyramidal number
pyramidal peak
pyramidal roof
pyramidal tent
pyrethrin I
pyrethrin II
pyrethrum yellow
pyreto-
pyrimidine base
pyrite type
pyrite yellow
pyrito-
pyritohedral group
pyro-
pyro-acid
pyrogallic acid
pyrogallol monoacetate
pyroligneous acid
pyroligneous alcohol
pyroligneous spirit
pyrometer cone
pyrometric bead
pyrometric cone
pyromucic aldehyde
pyrophosphoric acid
pyroracemic acid
pyrosulfuric acid
pyrosulphuric acid
pyrotechnic sponge

pyroxene group
pyroxylin plastic
pyrrhic victory
pyrrole
 red
pyrruvic acid
pyruvic acid
pyruvic aldehyde
pyx chest
pyx cloth
pyx veil
pyx-jury
q fever
q v
q-boat
qua-bird
quack doctor
quack grass
quack remedy
quack-quack
quad crown
quad demy
quad large
quad line
quad royal
quad small
quadrant compass
quadrant electrometer
quadrant plate
quadraphonic sound system
quadrate cross
quadratic equation
quadratic form
quadratic formula
quadratic residue
quadrato-
quadrature component
quadrature of the circle
quadrennial circus
quadri-
quadri-invariant
quadric surface
quadrilateral spinnaker
quadrille ruling
quadrimum merum
quadru-
quadruple counterpoint
quadruple fugue

quadruple time
quadruple-expansion
quadruplex telegraphy
quaff the bitter cup
quai d' orsay
quail brush
quail call
quail dove
quail hawk
quail pipe
quail snipe
quail-brush
quaint-costumed
quaint-eyed
quaint-felt
quaint-looking
quaint-notioned
quaint-shaped
quaint-spoken
quaint-stomached
quaint-witty
quaint-worded
quake grass
quake in your boots
quake in your shoes
quake like
an aspen leaf
quake ooze
quaker gun
quaker meeting
quaker moth
quaker-colored
quaker-ladies
quaking aspen
quaking grass
quaking-grass
qualified negative
qualified veto
qualifying examination
qualitative analysis
quality binding
quality control
quality curve
quality factor
quality loop
quality stock
quality-control inspector
qualm of conscience

qualm-sick
quam libet
quandong nut
quantitative analysis
quantitative inheritance
quantitative meter
quantity control
quantity mark
quantity production
quantity surveying
quantity surveyor
quantity theorist
quantity theory
quantity theory of money
quantum chromodynamics
quantum electronics
quantum field theory
quantum liquid
quantum mechanics
quantum number
quantum optics
quantum statistics
quantum sufficit
quantum theory
quantum-mechanical
quarantine anchorage
quarantine flag
quarantine period
quare impedit
quarrel over
quarry bed
quarry face
quarry light
quarry miner
quarry out
quarry tile
quarry-faced
quarry-rid
quarrystone bond
quart major
quart
minor
quart pot
quart-pot
quartal harmony
quarter ail
quarter at
quarter badge

quarter bar
quarter belt
quarter bend
quarter berth
quarter bill
quarter binding
quarter blanket
quarter block
quarter board
quarter boards
quarter boot
quarter box
quarter butt
quarter cask
quarter crack
quarter day
quarter deck
quarter dollar
quarter eagle
quarter evil
quarter face
quarter fast
quarter gallery
quarter galley
quarter grain
quarter hollow
quarter horse
quarter hour
quarter ill
quarter iron
quarter ladder
quarter lift
quarter light
quarter line
quarter miler
quarter nelson
quarter note
quarter of a century
quarter of a hundred
quarter pillar
quarter pitch
quarter plate
quarter point
quarter points
quarter rail
quarter rest
quarter round
quarter rudder

quarter screw
quarter section
quarter semitone
quarter sessions
quarter step
quarter stock
quarter tie
quarter tone
quarter watch
quarter-bound
quarter-breed
quarter-cast
quarter-cleft
quarter-cut
quarter-day
quarter-deck
quarter-decker
quarter-dollar
quarter-faced
quarter-final
quarter-finalist
quarter-foot
quarter-gallery
quarter-hollow
quarter-hoop
quarter-horse
race
quarter-hour
quarter-inch
quarter-left
quarter-mile
quarter-miler
quarter-minute
quarter-month
quarter-moon
quarter-phase
quarter-pierced
quarter-pint
quarter-pound
quarter-right
quarter-run
quarter-second
quarter-sessions
quarter-sheet
quarter-size
quarter-turn stair
quarter-vine
quarter-wave

quarter-witted
quarter-yard
quarter-year
quarter-yearly
quarterback sneak
quarterly meeting
quarterly payments
quartermaster corps
quartermaster sergeant
quartern loaf
quartet table
quarto-centenary
quartz battery
quartz crystal
quartz flint
quartz glass
quartz lamp
quartz mill
quartz mining
quartz plate
quartz porphyry
quartz rock
quartz sand
quartz schist
quartz vein
quartz wedge
quartz-basalt
quartz-crystal clock
quartz-diorite
quartz-free
quartz-iodine lamp
quartz-light therapy
quartz-monzonite
quartz-syenite
quash the charge
quash the indictment
quashing of the
charge
quashing of the indictment
quasi accident
quasi acquaintance
quasi actor
quasi adjective
quasi adjustment
quasi admiration
quasi adoption
quasi advantage
quasi adverb

quasi advice
quasi advocate
quasi affection
quasi agreement
quasi alarm
quasi alliance
quasi alumnus
quasi amateur
quasi amendment
quasi amusement
quasi angel
quasi animal
quasi answer
quasi apology
quasi appeal
quasi application
quasi appointment
quasi appreciation
quasi approval
quasi architect
quasi argument
quasi aristocracy
quasi aristocrat
quasi army
quasi arrangement
quasi art
quasi artist
quasi aspiration
quasi asset
quasi assignment
quasi assistance
quasi assurance
quasi asylum
quasi athlete
quasi attachment
quasi attack
quasi attainment
quasi attempt
quasi attendant
quasi attention
quasi attorney
quasi auditor
quasi author
quasi authority
quasi baby
quasi ballot
quasi bank
quasi banker

quasi bankruptcy
quasi banquet
quasi baptism
quasi bargain
quasi basis
quasi battle
quasi beginner
quasi belief
quasi beneficiary
quasi
benevolence
quasi biography
quasi bird
quasi blessing
quasi blockade
quasi blunder
quasi body
quasi broker
quasi brother
quasi calamity
quasi caller
quasi cancellation
quasi candidate
quasi candor
quasi captain
quasi cause
quasi celebration
quasi certificate
quasi champion
quasi charity
quasi cheer
quasi chemistry
quasi circulation
quasi citizen
quasi civilization
quasi clairvoyance
quasi client
quasi climax
quasi club
quasi co-operation
quasi collapse
quasi collateral
quasi collection
quasi collector
quasi college
quasi colloquial
quasi combat
quasi comedy

quasi comfort
quasi command
quasi compact
quasi competition
quasi competitor
quasi compliance
quasi compliment
quasi comprehension
quasi compromise
quasi concern
quasi concession
quasi conclusion
quasi conference
quasi confession
quasi confinement
quasi confirmation
quasi conflict
quasi conformance
quasi congratulation
quasi congress
quasi conjunction
quasi connection
quasi conquest
quasi conscience
quasi consent
quasi
consequence
quasi consideration
quasi consignment
quasi consolation
quasi consolidation
quasi constitution
quasi construction
quasi consulatation
quasi consumption
quasi contempt
quasi contest
quasi continent
quasi continuation
quasi contract
quasi contrast
quasi contribution
quasi control
quasi convenience
quasi convention
quasi conversation
quasi conveyance
quasi conviction

quasi cook
quasi copula
quasi corporateness
quasi corporation
quasi correction
quasi council
quasi coupon
quasi court
quasi courtesy
quasi cousin
quasi craft
quasi creation
quasi credit
quasi creditor
quasi crime
quasi crisis
quasi criticism
quasi cultivation
quasi culture
quasi currency
quasi customer
quasi damage
quasi debt
quasi decision
quasi declaration
quasi decoration
quasi dedication
quasi default
quasi defeat
quasi defiance
quasi deficit
quasi definition
quasi dejection
quasi delegate
quasi delict
quasi demand
quasi democrat
quasi deposit
quasi depreciation
quasi depression
quasi deputy
quasi despair
quasi
destination
quasi destruction
quasi detention
quasi development
quasi devil

quasi devotion
quasi diamond
quasi difference
quasi dinner
quasi diplomacy
quasi disadvantage
quasi disappeance
quasi disaster
quasi discipline
quasi discovery
quasi discrimination
quasi disgrace
quasi disgust
quasi dismissal
quasi distress
quasi distribution
quasi diversion
quasi division
quasi dominion
quasi donation
quasi doubt
quasi drama
quasi earnings
quasi easement
quasi economy
quasi education
quasi election
quasi emperor
quasi emphasis
quasi employment
quasi endorsement
quasi enemy
quasi enforcement
quasi engagement
quasi enrollment
quasi entertainment
quasi enthusiasm
quasi envy
quasi error
quasi escape
quasi estimation
quasi evidence
quasi exchange
quasi exclusion
quasi excuse
quasi executive
quasi exertion
quasi exile

quasi expectation
quasi expenditure
quasi expense
quasi experience
quasi expert
quasi explanation
quasi export
quasi exposure
quasi expression
quasi fact
quasi factor
quasi factory
quasi
faculty
quasi failure
quasi faith
quasi farewell
quasi farmer
quasi fascination
quasi favor
quasi fee
quasi fiction
quasi flight
quasi force
quasi friend
quasi fulfillment
quasi gem
quasi genius
quasi gentleman
quasi gift
quasi glory
quasi graduate
quasi grief
quasi growth
quasi guarantee
quasi guest
quasi guilt
quasi handicap
quasi hardship
quasi harm
quasi health
quasi heir
quasi help
quasi hero
quasi hesitation
quasi historian
quasi history
quasi holiday

quasi honor
quasi horror
quasi identification
quasi ignorance
quasi illness
quasi import
quasi improvement
quasi incentive
quasi inclination
quasi increase
quasi indifference
quasi inducement
quasi indulgence
quasi inference
quasi information
quasi inheritance
quasi initiation
quasi injury
quasi injustice
quasi innocence
quasi inquiry
quasi insight
quasi inspection
quasi inspiration
quasi installation
quasi institution
quasi instruction
quasi insult
quasi integrity
quasi intention
quasi interest
quasi interference
quasi interview
quasi
introduction
quasi invasion
quasi investigation
quasi invitation
quasi invoice
quasi judge
quasi judgment
quasi justice
quasi justification
quasi kindred
quasi king
quasi knowledge
quasi labor
quasi lady

quasi lament
quasi league
quasi legacy
quasi legality
quasi legislation
quasi liability
quasi liberty
quasi limit
quasi literature
quasi loan
quasi lord
quasi loss
quasi luxury
quasi magic
quasi maintenance
quasi majority
quasi management
quasi manager
quasi market
quasi masterpiece
quasi maximum
quasi melancholy
quasi member
quasi memory
quasi mercy
quasi merit
quasi message
quasi method
quasi millionaire
quasi minimum
quasi minister
quasi miracle
quasi misery
quasi mishap
quasi missionary
quasi monopoly
quasi mystery
quasi navy
quasi need
quasi neglect
quasi negligence
quasi neighbor
quasi neutrality
quasi news
quasi nobleman
quasi nomination
quasi notice
quasi novel

quasi obedience
quasi objection
quasi objective
quasi obligation
quasi observance
quasi observation
quasi
obstacle
quasi occupation
quasi offense
quasi offer
quasi official
quasi omission
quasi opponent
quasi opposition
quasi optimist
quasi orator
quasi outrage
quasi owner
quasi ownership
quasi painter
quasi panic
quasi paradise
quasi pardon
quasi participation
quasi partisan
quasi partner
quasi patron
quasi payment
quasi penalty
quasi perfection
quasi person
quasi perusal
quasi philosopher
quasi pity
quasi plea
quasi pleasure
quasi pledge
quasi plenty
quasi poem
quasi policy
quasi politician
quasi possession
quasi poverty
quasi power
quasi praise
quasi preference
quasi prejudice

quasi preparation
quasi prepositional
quasi pressure
quasi prestige
quasi prevention
quasi principal
quasi principle
quasi prisoner
quasi privilege
quasi problem
quasi product
quasi profit
quasi progress
quasi prohibition
quasi promise
quasi prophecy
quasi proposal
quasi prosecution
quasi prosperity
quasi protection
quasi provocation
quasi punishment
quasi pupil
quasi purchase
quasi purity
quasi pursuit
quasi qualification
quasi
quarantine
quasi quarrel
quasi quotation
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quasi realization
quasi reason
quasi rebellion
quasi receipt
quasi recognition
quasi recollection
quasi reconciliation
quasi record
quasi recreation
quasi reduction
quasi reference
quasi refinement
quasi reform
quasi refusal
quasi registration
quasi rejection

quasi relief
quasi religion
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quasi replacement
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quasi report
quasi representative
quasi request
quasi requirement
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quasi residence
quasi resident
quasi resistance
quasi response
quasi restoration
quasi result
quasi retirement
quasi revolution
quasi reward
quasi rival
quasi romance
quasi safety
quasi sagacity
quasi saint
quasi sale
quasi salvation
quasi sanction
quasi sarcasm
quasi satisfaction
quasi savings
quasi scarcity
quasi scholar
quasi science
quasi search
quasi sentence
quasi sentiment
quasi seriousness
quasi service
quasi settlement
quasi
severalty
quasi shortage

quasi signature
quasi sincerity
quasi skill
quasi slander
quasi socialist
quasi soldier
quasi solution
quasi sonnet
quasi sovereign
quasi space
quasi specialist
quasi sphere
quasi spirit
quasi sport
quasi standard
quasi starvation
quasi statesman
quasi strike
quasi student
quasi subject
quasi submission
quasi success
quasi suggestion
quasi supervision
quasi support
quasi suppression
quasi sympathy
quasi system
quasi teacher
quasi temperance
quasi testimony
quasi thanks
quasi threat
quasi toleration
quasi tradition
quasi tragedy
quasi translation
quasi trial
quasi triumph
quasi trustee
quasi truth
quasi tyranny
quasi union
quasi unity
quasi university
quasi usufruct
quasi utility
quasi vacation

quasi valuation
quasi value
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quasi victory
quasi vigilance
quasi violation
quasi violence
quasi virtue
quasi vocation
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quasi wager
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quasi warrant
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quasi wealth
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quasi wisdom
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quasi
wonder
quasi worship
quasi zeal
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quasi-marble
quasi-material
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quasi-mechanically
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quasi-medically
quasi-medieval
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quasi-mentally
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quasi-mysteriously
quasi-mythical
quasi-mythically
quasi-nameless
quasi-national
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quasi-nationally
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quasi-probable
quasi-probably
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quasi-rebelliously
quasi-recent
quasi-recently
quasi-recognized
quasi-reconciled
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quasi-remarkably

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quasi-retired
quasi-revolutionized
quasi-rewarding
quasi-ridiculous
quasi-ridiculously
quasi-righteous
quasi-righteously
quasi-romantic
quasi-romantically
quasi-royal
quasi-royally
quasi-rural
quasi-rurally
quasi-sad
quasi-sadly
quasi-safe
quasi-safely
quasi-sagacious
quasi-sagaciously
quasi-saintly
quasi-sanctioned
quasi-sanguine
quasi-sanguinely
quasi-sarcastic
quasi-sarcastically
quasi-satirical
quasi-satirically

quasi-satisfied
quasi-savage
quasi-savagely
quasi-scholarly
quasi-scholastic
quasi-scholastically
quasi-scientific
quasi-scientifically
quasi-secret
quasi-secretive
quasi-secretively
quasi-secretly
quasi-secure
quasi-securely
quasi-sentimental
quasi-sentimentally
quasi-serious
quasi-seriously
quasi-settled
quasi-similar
quasi-similarly
quasi-sincere
quasi-sincerely
quasi-single
quasi-singly
quasi-skillful
quasi-skillfully
quasi-slanderous
quasi-slanderously
quasi-sober
quasi-soberly
quasi-socialistic
quasi-socialistically
quasi-sovereign
quasi-spatial
quasi-spatially
quasi-spherical
quasi-spherically
quasi-spirited
quasi-spiritedly
quasi-spiritual
quasi-spiritually
quasi-standardized
quasi-stationary
quasi-stellar
object
quasi-stellar radio source
quasi-strenuous

quasi-strenuously
quasi-studious
quasi-studiously
quasi-stylish
quasi-stylishly
quasi-subjective
quasi-subjectively
quasi-submissive
quasi-submissively
quasi-successful
quasi-successfully
quasi-sufficient
quasi-sufficiently
quasi-superficial
quasi-superficially
quasi-superior
quasi-supervised
quasi-supported
quasi-suppressed
quasi-sympathetic
quasi-sympathetically
quasi-systematic
quasi-systematically
quasi-systematized
quasi-tangent
quasi-tangible
quasi-tangibly
quasi-technical
quasi-technically
quasi-temporal
quasi-temporally
quasi-territorial
quasi-territorially
quasi-testamentary
quasi-theatrical
quasi-theatrically
quasi-thorough
quasi-thoroughly
quasi-tolerant
quasi-tolerantly
quasi-total
quasi-totally
quasi-traditional
quasi-traditionally
quasi-tragic
quasi-tragically
quasi-tribal
quasi-tribally

quasi-truthful
quasi-truthfully
quasi-typical
quasi-typically
quasi-tyrannical
quasi-tyrannically
quasi-ultimate
quasi-unanimous
quasi-unanimously
quasi-unconscious
quasi-unconsciously
quasi-unified
quasi-universal
quasi-universally
quasi-uplift
quasi-utilized
quasi-valid
quasi-validly
quasi-valued
quasi-venerable
quasi-venerably
quasi-victorious
quasi-victoriously
quasi-violated
quasi-violent
quasi-violently
quasi-virtuous
quasi-virtuously
quasi-vital
quasi-vitally
quasi-vocational
quasi-vocationally
quasi-warfare
quasi-warranted
quasi-wealthy
quasi-whispered
quasi-wicked
quasi-wickedly
quasi-willing
quasi-willingly
quasi-wrong
quasi-young
quasi-zealous
quasi-zealously
quater-centenary
quaternary
ammonium compound
quaternary ammonium salt

quaternian algebra
quaternion algebra
quaternion unit
quatre point
quatre premiers
quay punt
que sera sera
quean-cat
queen anne
queen anne's lace
queen bee
queen blue
queen bolt
queen butterfly
queen cactus
queen cage
queen cat
queen cattleya
queen
cell
queen closer
queen conch
queen consort
queen dowager
queen excluder
queen fern
queen fritter
queen gold
queen mother
queen note
queen of heaven
queen of night
queen of puddings
queen of the meadow
queen of the prairie
queen olive
queen palm
queen post
queen regent
queen regnant
queen rod
queen shell
queen snake
queen staysail
queen stitch
queen substance
queen truss
queen's English

queen's birthday
queen's counsel
queen's evidence
queen's highway
queen's scout
queen's shilling
queen's ware
queen's wreath
queen-mother
queen-of-the-meadow
queen-of-the-prairie
queen-post
queen-post truss
queen-size bed
queens-ware
queer cuffin
queer duck
queer fish
queer in the head
queer potato
queer specimen
queer street
queer the works
queer-bashing
queer-eyed
queer-faced
queer-headed
queer-legged
queer-looking
queer-made
queer-notioned
queer-shaped
queer-spirited
queer-tempered
queerqueer cuffin
queez-madam
quelque chose
quench hook
quenching bath
quenouille training
quercitron lake
quercitron oak
querulous
person
query mark
quest after
question at issue
question before the house

question in your mind
question mark
question master
question of fact
question of law
question stop
question time
question-and-answer session
question-begging
question-mark
quetzal bird
queue up
queuing theory
qui s'excuse s'accuse
qui tam
qui transtulit sustinet
qui vive
qui-hi
qui-hy
quia-quia
quick as a wink
quick as lightning
quick as thought
quick assets
quick bread
quick ear
quick exit
quick fire
quick freezing
quick grass
quick hunch
quick inspection
quick kick
quick look
quick march
quick on the draw
quick on the trigger
quick on the uptake
quick one
quick parts
quick pull
quick sight
quick sighted
quick step
quick stick
quick temper
quick thinking
quick time

quick to take offense
quick trick
quick water
quick wit
quick-acting
quick-break switch
quick-burning
quick-change
quick-change artist
quick-coming
quick-compounded
quick-conceiving
quick-decaying
quick-designing
quick-devouring
quick-drawn
quick-eared
quick-fading
quick-falling
quick-fire
quick-firer
quick-firing
quick-flowing
quick-freeze
quick-freezer
quick-freezing
quick-froze
quick-frozen
quick-glancing
quick-gone
quick-growing
quick-guiding
quick-gushing
quick-handed
quick-laboring
quick-lunch
quick-lunch
counter
quick-minded
quick-moving
quick-nosed
quick-paced
quick-piercing
quick-questioning
quick-raised
quick-returning
quick-rolling
quick-running

quick-saver
quick-scented
quick-scenting
quick-selling
quick-setting
quick-shifting
quick-shutting
quick-sighted
quick-sightedness
quick-speaking
quick-spirited
quick-spouting
quick-stepping
quick-talking
quick-tempered
quick-thinking
quick-thoughted
quick-thriving
quick-voiced
quick-winged
quick-witted
quick-wittedly
quick-wittedness
quick-wrought
quicken tree
quicken your pace
quickening grass
quickie strike
quickness to take offense
quickset hedge
quicksilver weed
quickstep march
quicumque vult
quid pro quo
quid pro quos
quids pro quo
quiet as a mouse
quiet as a street
at night
quiet day
quiet death
quiet down
quiet ecstasy
quiet end
quiet good manners
quiet hour
quiet life
quiet mind

quiet please
quiet pleasure
quiet spell
quiet taste
quiet-colored
quiet-dispositioned
quiet-eyed
quiet-going
quiet-living
quiet-looking
quiet-mannered
quiet-minded
quiet-moving
quiet-patterned
quiet-seeming
quiet-spoken
quiet-tempered
quietistic painting
quill bark
quill bit
quill drive
quill driver
quill driving
quill fern
quill fly
quill gear
quill nib
quill pen
quill pig
quill worts
quill-less
quill-like
quill-tailed
quillai bark
quillback carpsucker
quilting bee
quilting cotton
quin-
quince curculio
quince wine
quince yellow
quince-seed gum
quince-seed mucilage
quinhydrone electrode
quinic acid
quinine bush
quinine cherry
quinine flower

quinine herb
quinine plant
quinine tree
quinine water
quinnat salmon
quino-
quinoline dye
quinoline yellow
quinone diazide
quinone diimine
quinone oxime
quinova bitter
quinque-
quinque-angle
quinque-angled
quinque-angular
quinque-annulate
quinque-articulate
quinsy
 woodruff
quint major
quint minor
quint-
quinti-
quintuple counterpoint
quintuple point
quintuple time
quintuple-nerved
quintuple-ribbed
quip at
quips and cranks
quirk bead
quirk molding
quit cold
quit of
quit the field
quit this world
quit yourself
quit-rent
quitch grass
quitclaim deed
quite a
quite a few
quite a little
quite a thing
quite another thing
quite rather
quite so

quite some
quite the contrary
quite the lady
quitter bone
quiver along the spine
quiver leg
quiver like a rabbit
quiver of terror
quiver tree
quixotic ideal
quiz kid
quiz show
quizzing glass
quizzing-glass
quo warranto
quoad hoc
quobosque-weed
quod erat demonstrandum
quod erat faciendum
quod vide
quoddy boat
quoin post
quota immigrant
quota system
quotation board
quotation book
quotation mark
quotation marks
quotation noun
quote a price
quote chapter and verse
quote mark
quote out of context
quote yourself
quoted price
quotient group
quotient ring
quotient space
quotient verdict
r
 color
r-RNA
r-colour
r-less
rKET
rabbet draft
rabbet joint
rabbet plane

rabbet plank
rabbet-shaped
rabbinic hebrew
rabbit bandicoot
rabbit berry
rabbit breeder
rabbit brush
rabbit cat
rabbit ears
rabbit fev
rabbit fever
rabbit fish
rabbit flower
rabbit foot
rabbit louse
rabbit moth
rabbit punch
rabbit squirrel
rabbit stick
rabbit tick
rabbit tobacco
rabbit warren
rabbit's foot
rabbit's-foot
rabbit's-foot clover
rabbit-backed
rabbit-chasing
rabbit-ear
rabbit-ear faucet
rabbit-eared
rabbit-faced
rabbit-foot
rabbit-foot clover
rabbit-foot grass
rabbit-meat
rabbit-mouthed
rabbit-proof fence
rabbit-shouldered
rabbit-tail grass
rabbitskin glue
rabble rout
rabble-charming
rabble-chosen
rabble-courting
rabble-curbing
rabble-rouse
rabble-roused
rabble-rouser

rabble-rousing
raccon dog
raccoon dog
raccoon fox
raccoon grape
raccoon oyster
raccoon perch
race against time
race board
race boat
race car
race card
race cloth
race cup
race extermination
race glass
race ground
race hatred
race horse
race
horses
race knife
race meeting
race memory
race of man
race off
race plate
race prejudice
race problem
race psychology
race relations
race riot
race rotation
race runner
race snobbery
race stand
race suicide
race through the mind
race tool
race track
race week
race with
race with time
race your motor
race-begotten
race-course
race-horse
race-maintaining

race-murder
race-riding
race-running
race-track
race-wide
race-winning
racehorse grass
racemic acid
racemo-
racemose gland
rachi-
racial discrimination
racial immunity
racial memory
racial segregation
racial unconscious
racing car
racing crab
racing flag
racing form
racing gig
racing glass
racing iron
racing plate
racing saddle
racing shell
racing skate
racing skiff
racing stream
racing yacht
rack back
rack bar
rack block
rack car
rack clock
rack comb
rack locomotive
rack pillar
rack pin
rack punch
rack rail
rack railway
rack rent
rack saw
rack the rents
rack up
rack up the rents
rack wheel

rack your brains
rack-and-pinion
rack-and-pinion
railroad
rack-and-pinion railway
rack-rent
rack-renter
rack-stick
racket court
racket press
racket wheel
racket-tail
rackets, the
racomo-oxalic
radar antenna
radar application
radar astronomer
radar astronomy
radar beacon
radar beacon buoy
radar bombsight
radar controls
radar countermeasure
radar defenses
radar dome
radar engineer
radar fence
radar highway patrol
radar interference
radar marked beacon
radar nacelle
radar navigation
radar nose
radar operation
radar parts
radar picket plane
radar pulse
radar reflector
radar scanner
radar screen
radar signal
radar speed meter
radar station
radar technician
radar telescope
radar tracking station
radar trap
radar-telephone relay

radial engine
radial motion
radial saw
radial symmetry
radial tire
radial triangulation
radial tyre
radial velocity
radial-flow turbine
radial-ply
radiant efficiency
radiant emittance
radiant energy
radiant exitance
radiant flux
radiant heat
radiant heater
radiant heating
radiant intensity
radiant point
radiant
splendor
radiant-heat brooder
radiate cheer
radiate heat
radiate-veined
radiation atom
radiation belt
radiation counter
radiation counters and chambers
radiation fog
radiation pattern
radiation physicist
radiation physics
radiation potential
radiation pressure
radiation pyrometer
radiation sickness
radiation therapy
radiato-
radiato-undulate
radiator cap
radiator casing
radiator compound
radiator core
radiator foot
radiator gauge
radiator grille

radiator maker
radiator making
radiator tank
radiator valve
radical axis
radical change
radical chic
radical empiricism
radical empiricist
radical expression
radical operation
radical reform
radical right
radical rightism
radical sign
radical therapy
radici-
radio aerial
radio altimeter
radio amateur
radio antenna
radio astronomer
radio astronomy
radio audience
radio beacon
radio beam
radio bearing
radio broadcast
radio broadcasting
radio car
radio channel
radio circuit
radio communication
radio compass
radio compass station
radio control
radio
 detection and ranging
radio direction finder
radio drama
radio electrician
radio electronics
radio engineer
radio engineering
radio fare
radio field intensity
radio frequency
radio horizon

radio interference
radio interferometer
radio knife
radio link
radio links
radio listener
radio marker
radio mast
radio mirror
radio navigation
radio observatory
radio operator
radio play
radio program
radio proximity fuze
radio range
radio range beacon
radio range station
radio receiver
radio reception
radio relay station
radio room
radio set
radio shack
radio show
radio signal
radio source
radio spectator
radio spectrum
radio star
radio station
radio technician
radio telescope
radio transmission
radio transmitter
radio tube
radio tubes
radio units
radio valve
radio wave
radio window
radio-
radio-active
radio-controlled lifeboat
radio-frequency
radio-frequency amplification
radio-frequency amplifier
radio-frequency circuit

radio-frequency echoes
radio-frequency heater
radio-frequency pulse
radio-frequency
signal
radio-frequency stage
radio-frequency tube
radio-iodine
radio-navigational trainer
radio-phonograph
radio-phonograph combination
radio-record player
radio-ulna
radio-ulnar
radioactive decay
radioactive dust
radioactive element
radioactive elements
radioactive emanation
radioactive fallout
radioactive isotope
radioactive particle
radioactive radiation
radioactive series
radioactive substance
radioactive unit
radioactive units
radioactive waste
radiocarbon dating
radiological physics
radiosonde balloon
radiotelephone transmitter
radiotherapeutic substance
radiotherapeutic treatment
radish tree
radium B
radium bath
radium dial
radium emanation
radium lead
radium miner
radium paint
radium therapy
radium vermilion
radium-proof
radius bar
radius gauge
radius of action

radius of convergence
radius of curvature
radius of gyration
radius rod
radius trowel
radius vector
radius vectors
radix graminis
radix point
radon seed
raffia palm
raffle off
raffle wheel
raft body
raft dog
raft
 duck
raft ice
raft of money
raft port
rafted ice
rafter dam
rafter table
rag baby
rag bag
rag beater
rag bleacher
rag board
rag bolt
rag bush
rag carpet
rag chopper
rag dealer
rag doll
rag engine
rag fair
rag felt
rag gourd
rag lining
rag money
rag mop
rag offering
rag out
rag paper
rag peddler
rag pulp
rag rug
rag shop

rag stock
rag trade
rag tree
rag up
rag well
rag wheel
rag wool
rag work
rag-and-bone man
rag-and-chain pump
rag-bag
rag-bailing
rag-beating
rag-boiling
rag-bolt
rag-burn
rag-chew
rag-cutting
rag-fair
rag-made
rag-tag
rag-threshing
rag-time
rag-wheel
rage-crazed
rage-filled
rage-infuriate
rage-subduing
rage-swelling
rage-transported
ragged edge
ragged robin
ragged school
ragged staff
raggle block
raggle-taggle
raging fire
raging passion
raglan sleeve
ragman roll
ragman rolls
ragsorter's disease
ragtag and bobtail
ragtime band
ragtime music
ragweed family
rah-rah
raid the market

rail at
rail bead
rail car
rail chair
rail clip
rail dumper
rail ender
rail fence
rail filler
rail
 fork
rail guard
rail in
rail line
rail lock
rail maker
rail making
rail plate
rail setter
rail straightener
rail tongs
rail track
rail train
rail-bearing
rail-bending
rail-bonding
rail-borne
rail-cutting
rail-laying
rail-ocean
rail-ridden
rail-sawing
rail-splitter
rail-splitting
railroad center
railroad chair
railroad engineer
railroad engineering
railroad euchre
railroad flat
railroad furniture
railroad jack
railroad lantern
railroad line
railroad man
railroad pen
railroad radio
railroad scale

railroad sickness
railroad station
railroad telegraphy
railroad through
railroad train
railroad truck
railroad tunnel
railroad worm
railway car
railway express
railway guard
railway line
railway mail car
railway maker
railway making
railway man
railway spine
railway stitch
railway-borne
rain area
rain barrel
rain belt
rain bullfrogs
rain cats and dogs
rain chamber
rain check
rain cloud
rain course
rain dance
rain doctor
rain dogs and polecats
rain down
rain forest
rain gauge
rain glass
rain
god
rain gods
rain insurance
rain leader
rain lily
rain maker
rain making
rain or shine
rain out
rain pie
rain pipe
rain pitchforks

rain print
rain rot
rain shadow
rain shower
rain spot
rain suit
rain tadpoles
rain tree
rain water
rain wind rose
rain-awakened
rain-bearing
rain-beat
rain-beaten
rain-bird
rain-bitten
rain-bleared
rain-blue
rain-bright
rain-damped
rain-drenched
rain-driven
rain-dropping
rain-fowl
rain-fraught
rain-god
rain-gutted
rain-scented
rain-soaked
rain-sodden
rain-soft
rain-streaked
rain-swept
rain-threatening
rain-washed
rain-water
rain-water fish
rainbow bird
rainbow cactus
rainbow chaser
rainbow chasing
rainbow cordial
rainbow darter
rainbow fish
rainbow herring
rainbow moss
rainbow parrotfish
rainbow perch

rainbow runner
rainbow seaperch
rainbow snake
rainbow trout
rainbow-arched
rainbow-clad
rainbow-colored
rainbow-edged
rainbow-girded
rainbow-hued
rainbow-large
rainbow-painted
rainbow-sided
rainbow-skirted
rainbow-tinted
rainbow-winged
rainette green
rainwater
pipe
rainy day
rainy season
rainy weather
raise Cain
raise Ned
raise a clamor
raise a cry
raise a din
raise a hand against
raise a howl
raise a hue and cry
raise a hue and cry against
raise a hullabaloo
raise a laugh
raise a question
raise a ruckus
raise a rumpus
raise a siege
raise a smile
raise a storm
raise aloft
raise an alarm
raise animals
raise apprehensions
raise expectation
raise expectations
raise from the dead
raise ghosts
raise hell

raise hob
raise hob with
raise hope
raise merry hell
raise money
raise objections
raise sand
raise the curtain
raise the deuce
raise the devil
raise the dickens
raise the drawbridge
raise the elbow
raise the hue and cry
raise the hunt
raise the roof
raise the spirits
raise the temperature
raise to a fever heat
raise to a fever pitch
raise to more than one
raise up
raise up the voice
raise your choler
raise your dander
raise your eyebrows
raise your gorge
raise your hackles
raise your hand against
raise your hopes
raise your pay
raise your
voice
raise your voice against
raised beach
raised doughnut
raised girt
raised in a barn
raised quarter-deck
raisin black
raisin bread
raisin grape
raisin purple
raisin tree
raisin wine
raisin-colored
raising bee
raising hammer

raising of temperature
raising plate
raising-piece
raison d'etat
raison d'etre
raison d'tre
raj-kumari
rake in
rake out
rake over the coals
rake up
rake up the past
rake vein
rake-hell
rake-off
rake-teeth
raked bow
raker tooth
raking bond
raking cornice
raking course
raking fire
raking over the coals
raking shore
raking-down
raking-over
ralli-car
rally around
rally round
rallying cry
rallying device
rallying point
rallying theme
ram bow
ram cat
ram down
ram down your throat
ram effect
ram in
ram leather
ram pressure
ram rocket
ram schooner
ram's horn
ram's-head lady's-slipper
ram's-horn
ram-air turbine
ram-cat

ram-headed
ram-jam
ram-jet engine
ram-jet propulsion
ram-line
ram-rod
ramage hawk
ramble on
ramble-scramble
ramjet engine
rammed earth
ramp along
ramp valley
rampant
 arch
rampant will
ramper eel
ramrod-stiff
ran-tan
ranch company
ranch country
ranch economics
ranch hand
ranch house
ranch life
ranch owner
ranch rider
ranch wagon
rand machine
randall grass
random access
random access memory
random bond
random data
random line
random motion
random point
random sample
random sampling
random shot
random-jointed
range angle
range finder
range finding
range grass
range horse
range itself
range light

range line
range mark
range marker
range masonry
range of accommodation
range of meaning
range of view
range of vision
range out
range over
range paralysis
range pole
range rake
range rider
range stove
range table
range the coast
range the world
range through
range with
range wool
range yourself on the side of
range yourself with
range-bred
range-marker generator
range-sweep amplifier
range-sweep generator
ranging pole
rank and file
rank beneath
rank first
rank high
rank low
rank out
rank under
rank-and-filer
rank-brained
rank-feeding
rank-growing
rank-grown
rank-minded
rank-out
rank-scented
rank-scenting
rank-smelling
rank-springing
rank-swelling
rank-tasting

rank-winged
ranking
 bar
ranking jumper
rankle in the breast
ransack your brains
ransom bill
ransom bond
rant and rave
rantum-scantum
ranz-des-vaches
rap full
rap on the knuckles
rap out an oath
rap session
rap sheet
rap shot
rap-full
rape butterfly
rape oil
rape wine
rapeseed oil
rapid eye movement
rapid fire
rapid glance
rapid recurrence
rapid slope
rapid succession
rapid transit
rapid-changing
rapid-fire
rapid-fire mount
rapid-firer
rapid-firing
rapid-flowing
rapid-flying
rapid-footed
rapid-mannered
rapid-passing
rapid-running
rapid-speaking
rapid-transit
rapier-like
rapier-proof
rapper-dandies
rapt attention
rapt away
rapt full

rapt in wonder
rapture-bound
rapture-breathing
rapture-bursting
rapture-giving
rapture-moving
rapture-ravished
rapture-rising
rapture-smitten
rapture-speaking
rapture-touched
rapture-trembling
rapture-wrought
rara avis
rare bird
rare book
rare earth
rare
 gas
rare good humor
rare metals
rare-bred
rare-earth element
rare-earth elements
rare-earth metal
rare-earth metals
rare-featured
rare-felt
rare-gifted
rare-painted
rare-qualitied
rare-ripe
rare-seen
rare-shaped
raree show
raree-show
rarin' to go
raring to
rascally knave
rash conviction
rash impulse
rash-brain
rash-brained
rash-conceived
rash-embraced
rash-headed
rash-hearted
rash-levied

rash-minded
rash-pledged
rash-running
rash-spoken
rash-thoughted
rasher of bacon
rasing iron
rasing knife
rasp grass
rasp house
rasp palm
rasp pod
raspberry apple
raspberry beetle
raspberry bug
raspberry curl
raspberry mosaic
raspberry red
raspberry root borer
raspberry root rot
raspberry sawfly
raspberry wine
raspberry yellows
raspberry-jam
rasphead rockfish
rat cheese
rat claw foot
rat flea
rat goose
rat hare
rat kangaroo
rat mite
rat mole
rat pineapple
rat poison
rat race
rat rhyme
rat snake
rat stop
rat tail
rat terrier
rat unit
rat's nest
rat's-tail
rat-a-tat
rat-bite fever
rat-catcher
rat-colored

rat-deserted
rat-eyed
rat-faced
rat-gnawn
rat-infested
rat-inhabited
rat-kangaroo
rat-kangaroos
rat-killing
rat-lin
rat-ridden
rat-riddled
rat-skin
rat-stripper
rat-tail
rat-tail
 cactus
rat-tail file
rat-tail spoon
rat-tailed
rat-tailed maggot
rat-tat
rat-tat-tat
rat-tattle
rat-tight
rat-trap
ratable value
ratafia biscuit
ratatat-tat
ratbite disease
ratbite fever
ratchet brace
ratchet chain
ratchet clock
ratchet coupling
ratchet crank
ratchet drill
ratchet jack
ratchet stop
ratchet thread
ratchet tooth
ratchet wheel
ratchet-toothed
rate action
rate base
rate cap
rate determination
rate highly

rate low
rate maker
rate making
rate of exchange
rate of interest
rate-aided
rate-cutting
rate-fixing
rate-of-climb indicator
rate-raising
rate-setting
rated load
rathe-ripe
rather than
rating badge
rating flume
rating nut
ratio arm
ratio cognoscendi
ratio test
ration out
rational animal
rational calorie
rational faculty
rational form
rational function
rational ground
rational horizon
rational
 mechanics
rational number
rational psychology
rational theology
rational treatment
rational-emotive therapy
ratline down
ratline stuff
rato unit
rattail cactus
rattail comb
rattail fescue
rattail file
rattan vine
rattle around
rattle barrel
rattle grass
rattle on
rattle the windows

rattle-bush
rattle-head
rattle-pate
rattle-top
rattlesnake bean
rattlesnake fern
rattlesnake flag
rattlesnake grass
rattlesnake leaf
rattlesnake master
rattlesnake plantain
rattlesnake root
rattlesnake weed
rattlesnake-bite
rattlety-bang
rattling pace
rattrap pedal
raucous happiness
raus mit dir
ravage with fire and sword
ravaged with age
ravages of time
rave about
rave against
rave hook
rave-up
ravel bread
ravel out
raven black
raven cockatoo
raven gray
raven standard
raven-black
raven-colored
raven-feathered
raven-haired
raven-plumed
raven-toned
raven-torn
raven-tressed
ravigote sauce
ravine deer
raving beauty
raving lunatic
raving mad
ravished away
ravison oil
raw comedy

raw data
raw deal
raw fibers
raw
glaze
raw material
raw milk
raw nerve
raw nerves
raw recruit
raw score
raw sienna
raw silk
raw umber
raw vegetables
raw weather
raw wind
raw, the
raw-bone
raw-boned
raw-colored
raw-devouring
raw-edged
raw-faced
raw-handed
raw-head
raw-headed
raw-looking
raw-mouthed
raw-nosed
raw-pack method
raw-ribbed
raw-striped
raw-wool
ray filter
ray floret
ray flower
ray fungus
ray grass
ray gun
ray of hope
ray of light
ray of sunshine
ray pod
ray therapy
ray-fringed
ray-gilt
ray-girt

ray-grass
ray-illumined
ray-lit
ray-strewn
rayless goldenrod
rayon casheen
rayon stockings
raze to the dust
raze to the ground
razee plane
razon bomb
razor blade
razor clam
razor fish
razor grass
razor saw
razor shell
razor stone
razor strap
razor temper
razor-back
razor-backed
razor-bill
razor-billed
razor-billed auk
razor-bladed
razor-bowed
razor-cut
razor-edge
razor-edged
razor-fish
razor-grinder
razor-keen
razor-leaved
razor-shaped
razor-sharp
razor-sharpening
razor-shell
razor-tongued
razor-weaponed
razor-witted
razzle-dazzle
re-
re-act
re-ally
re-book
re-buff
re-cede

re-claim
re-co-operate
re-co-operation
re-cognition
re-cognitional
re-coil
re-coilre-collect
re-collect
re-collection
re-commend
re-cord
re-count
re-cover
re-create
re-created
re-creating
re-creation
re-creative
re-creator
re-derive
re-desert
re-do
re-dress
re-earn
re-ebullient
re-echo
re-edificate
re-edification
re-edifier
re-edify
re-edit
re-educate
re-education
re-educative
re-effeminate
re-egg
re-ejaculate
re-eject
re-ejection
re-ejectment
re-elaborate
re-elaboration
re-elect
re-election
re-elevate
re-elevation
re-eligibility
re-eligible

re-eliminate
re-elimination
re-emanate
re-embark
re-embarkation
re-embarrass
re-embarrassment
re-embattle
re-embed
re-embellish
re-embodiment
re-embody
re-embosom
re-embrace
re-embracement
re-embroil
re-emerge
re-emergence
re-emergent
re-emersion
re-emigrant
re-emigrate
re-emigration
re-emission
re-emit
re-emphasis
re-emphasize
re-employ
re-employment
re-empower
re-empty
re-emulsify
re-enable
re-enact
re-enaction
re-enactment
re-enamel
re-enamor
re-enamour
re-enchain
re-enclose
re-enclosure
re-encounter
re-encourage
re-encouragement
re-endear
re-endearment
re-ender

re-endorse
re-endorsement
re-endow
re-endowment
re-energize
re-enfeoff
re-enfeoffment
re-enforce
re-enforcement
re-enforcer
re-enfranchise
re-enfranchisement
re-engage
re-engagement
re-engender
re-engenderer
re-engine
re-engraft
re-engrave
re-engraving
re-engross
re-enhearten
re-enjoin
re-enjoy
re-enjoyment
re-enkindle
re-enlarge
re-enlargement
re-enlighten
re-enlightenment
re-enlist
re-enlister
re-enlistment
re-enliven
re-ennoble
re-enroll
re-enrollment
re-enshrine
re-enslave
re-enslavement
re-ensphere
re-enter
re-entering
re-entering
angle
re-entertain
re-entertainment
re-enthral

re-enthrone
re-enthronement
re-enthronize
re-entice
re-entitle
re-entoil
re-entomb
re-entrain
re-entrance
re-entrancy
re-entrant
re-entrant angle
re-entrenchment
re-entry
re-entry card
re-enumerate
re-enumeration
re-enunciate
re-enunciation
re-epitomize
re-equilibrate
re-equilibration
re-equip
re-equipment
re-erect
re-erection
re-escape
re-escort
re-espousal
re-espouse
re-essay
re-establish
re-establisher
re-establishment
re-esteem
re-estimate
re-estimation
re-etch
re-etcher
re-evacuate
re-evacuation
re-evade
re-evaluate
re-evaluation
re-evaporate
re-evaporation
re-evasion
re-evoke

re-evolution
re-exalt
re-examinable
re-examination
re-examine
re-examiner
re-excavate
re-excavation
re-excel
re-exchange
re-excitation
re-excite
re-exclude
re-exclusion
re-execute
re-execution
re-exempt
re-exemption
re-exercise
re-exert
re-exertion
re-exhale
re-exhaust
re-exhibit
re-exhibition
re-exhilarate
re-exhilaration
re-exist
re-existence
re-existent
re-expand
re-expansion
re-expect
re-expectation
re-expedite
re-expedition
re-expel
re-experience
re-experiment
re-explain
re-explanation
re-export
re-exportation
re-exporter
re-expose
re-exposure
re-expound
re-express

re-expression
re-expulsion
re-extend
re-extension
re-extent
re-extract
re-extraction
re-form
re-formation
re-formative
re-former
re-fund
re-genesis
re-ice
re-ink
re-laid
re-lay
re-laying
re-lease
re-leased
re-leasing
re-mark
re-pose
re-posed
re-posing
re-present
re-presentation
re-presentment
re-press
re-proof
re-prove
re-proved
re-proven
re-proving
re-reaction
re-rebel
re-receive
re-reception
re-recital
re-recite
re-reckon
re-recognition
re-recognize
re-recollect
re-recollection
re-recommend
re-recommendation
re-reconcile

re-reconciliation
re-record
re-recover
re-rectification
re-rectify
re-reduce
re-reduction
re-refer
re-refine
re-reflect
re-reflection
re-reform
re-reformation
re-refusal
re-refuse
re-regenerate
re-regeneration
re-rehearsal
re-rehearse
re-reiterate
re-reiteration
re-reject
re-rejection
re-rejoinder
re-relate
re-relation
re-release
re-relish
re-rely
re-remember
re-remind
re-remit
re-removal
re-remove
re-rendition
re-repair
re-repeat
re-repent
re-replevin
re-reply
re-report
re-represent
re-representation
re-reproach
re-request
re-require
re-requirement
re-rescue

re-resent
re-resentment
re-reservation
re-reserve
re-reside
re-residence
re-resign
re-resignation
re-resolution
re-resolve
re-respond
re-response
re-restitution
re-restoration
re-restore
re-restrain
re-restraint
re-restrict
re-restriction
re-retire
re-retirement
re-return
re-reveal
re-revealation
re-revenge
re-reversal
re-reverse
re-revise
re-revision
re-search
re-serve
re-sign
re-soluble
re-solution
re-sort
re-sorter
re-sound
re-store
re-strain
re-trace
re-traced
re-tracing
re-tread
re-treader
re-treat
re-treatment
re-trench
re-try

re-turn
re-up
re-use
reach
 a better land
reach a better life
reach a better place
reach a better world
reach a compromise
reach a new low
reach a parting of the ways
reach boat
reach boiling point
reach its season
reach land
reach manhood
reach maturity
reach of mind
reach orgasm
reach out
reach perfection
reach rod
reach safety
reach the age of consent
reach the breaking point
reach the depths
reach the ear
reach the ear of
reach
 the snapping point
reach to
reach twenty-one
reach voting age
reach womanhood
reach your destination
reach your ears
reach your goal
reach your majority
reach your nostrils
reach-me-down
reach-me-downs
reacher-in
reaching foresail
reaching high
reaching jib
reaching post
react chemically
reactance coil

reactance drop
reaction border
reaction engine
reaction formation
reaction locus
reaction machine
reaction motor
reaction propulsion
reaction rim
reaction ring
reaction time
reaction turbine
reaction wheel
reaction-proof
reactive current
reactive inflammation
reactive neurosis
reactive psychosis
reactor engine
reactor pile
read a lecture
read a lecture to
read a lesson
read a lesson to
read a sermon
read between the lines
read copy
read easily
read for
read in
read in view of
read into
read law
read out
read out of
read palms
read tea leaves
read the future
read the meter
read the riot act
read up
read up on
read with
read your hand
read your lines
read yourself in
read-write head
reader-off

readiness
of feeling
readiness of speech
reading book
reading chair
reading desk
reading distance
reading glass
reading glasses
reading hook
reading in
reading lamp
reading man
reading matter
reading notice
reading pew
reading room
reading, writing, and arithmetic
reading-in machine
ready about
ready and willing
ready at hand
ready box
ready for
ready for anything
ready for bed
ready money
ready pen
ready reckoner
ready reply
ready retort
ready roofing
ready room
ready to
ready to believe
ready to burst
ready to burst forth
ready to cry
ready to drop
ready up
ready wit
ready yourself
ready yourself to
ready-armed
ready-beaten
ready-bent
ready-braced
ready-built

ready-coined
ready-cooked
ready-cut
ready-dressed
ready-for-wear
ready-formed
ready-furnished
ready-grown
ready-handed
ready-made
ready-mades
ready-mix
ready-mixed
ready-mounted
ready-penned
ready-prepared
ready-reference
ready-sanded
ready-sensitized
ready-shapen
ready-starched
ready-to-wear
ready-tongued
ready-typed
ready-winged
ready-witted
ready-wittedly
ready-wittedness
ready-worded
ready-written
reagent
 bottle
real McCoy, the
real axis
real estate
real estate agent
real estate broker
real income
real issue
real lady
real man
real meaning
real number
real part
real presence
real property
real scholar
real school

real tennis
real thing, the
real variable
real wages
real woman
real-estate trust
real-hearted
real-minded
real-sighted
real-time
realgar orange
realgar yellow
realistic comedy
realistic description
realistic representation
reality therapy
realize on
realize profit
really into
really something
really-truly
realm of light
realm-bounding
realm-conquering
realm-destroying
realm-governing
realm-peopling
realm-subduing
realm-sucking
realm-unpeopling
ream ass
ream out
reaming-out
reap and carry
reap gapeseed
reap profit
reap the benefit of
reap the fruits of
reap the whirlwind
reap where you have sown
reaper binder
reaper binder Obsolete
reaper file
reaper thresher
reaping hook
reaping machine
rear

admiral
rear aloft
rear arch
rear area
rear echelon
rear end
rear guard
rear its head
rear light
rear projection
rear sight
rear up
rear vault
rear-
rear-admiral
rear-arch
rear-cut
rear-directed
rear-driven
rear-driving
rear-end
rear-guard
rear-horse
rear-steering
rear-vassal
rear-vault
rear-view mirror
rear-vision mirror
rearguard action
rearing bit
rearview mirror
reason about
reason behind
reason for
reason for being
reason ill
reason in a circle
reason out
reason speciously
reason that
reason the point
reason to believe
reason why
reason with
reasonable charge
reasonable ground
reasonable hope
reasonable presumption

reasonable price
reasoning faculty
reasoning power
rebate plane
rebel clover
rebel yell
rebound clip
rebound leaf
rebus sic stantibus
rec room
recalescence point
recall dose
recall knowledge of
recall of ambassadors
recall to life
recall to mind
recapitulation theory
recapture clause
receipt book
receipt in full
receipt in full of all demands
receive Christ
receive
 a false impression
receive absolution
receive an impression
receive credit
receive instruction
receive pleasure from
receive the Sacrament
receive with open arms
received meaning
receiver of stolen goods
receiver part
receiver parts
receiver-general
receiving antenna
receiving blanket
receiving line
receiving note
receiving order
receiving pallet
receiving set
receiving ship
receiving station
receiving tube
recent past
receptaculum seminis

reception hall
reception room
receptive mood
recess appointment
recess bed
recess committee
recess of the memory
recesses of the heart
recession from one another
recessional hymn
recessional march
recessive character
recharge your batteries
rechargeable-battery radio
reciprocal exchange
reciprocal insurance
reciprocal leveling
reciprocal ohm
reciprocal or mutual relation
reciprocal pronoun
reciprocal trade
reciprocal transfusion
reciprocating engine
reciprocity failure
reciprocity law
recitation room
recitativi accompagnati
recitativi secchi
recitativo
 accompagnato
recitativo secco
recitativo stromentato
recite the rosary
reciting note
reciting the rosary
reck- less
reckless expenditure
reckless person
reckless spending
reckon among
reckon in
reckon on
reckon up
reckon up to
reckon with
reckon without your host
reclaimed rubber
reclamation district

recline on
reclining chair
reclining lounge chair
recognition mark
recoil atom
recoil cylinder
recoil electron
recoil escapement
recoil wave
recoilless rifle
recommend itself
recommended price
reconcile yourself to
reconnaissance car
reconnaissance mission
reconnaissance plane
reconnaissance rocket
reconnaissance ship
reconstructive operation
reconstructive surgery
record book
record changer
record clerk
record holder
record hop
record keeping
record player
record ribbon
record time
record vote
record-bearing
record-beating
record-breaking
record-changer
record-making
record-player
record-seeking
record-setting
recorded delivery
recording altimeter
recording analyzer
recording anemometer
recording
angel
recording barometer
recording hygrometer
recording instrument
recording instruments

recording meter
recording potentiometer
recording pyrometer
recording secretary
records-pulse generator
recover health
recover knowledge of
recover one'sequilibrium
recover your balance
recover your equilibrium
recover your sanity
recovery coke
recovery oven
recovery peg
recovery room
recreation ground
recreation room
recreational therapy
recruit your strength
recruiting ground
rect-
rectangular coordinate
rectangular coordinates
rectangular data
rectangular hyperbola
rectangular number
recti-
rectifier circuit
rectifier instrument
rectifier tube
rectilinear number
recto-
recto-urethral
recto-uterine
rectovesical fascia
rectus abdominus
rectus femoris
recumbent anticline
recuperative furnace
recur to
recur to the mind
recurrence formula
recurrent fever
recurring action
recurring decimal
recursion formula
recurvo-
red admiral

red alder
red alert
red alga
red algae
red ant
red as a
 beet
red as a hot coal
red as a live coal
red as a lobster
red as a turkey-cock
red as blood
red as fire
red bag
red bark
red bay
red biddy
red birch
red blindness
red blood
red blood cell
red blood corpuscle
red book
red brass
red breast
red brush
red bryony
red bug
red cabbage
red calla lily
red cap
red carpet
red cedar
red cent
red chalk
red chokeberry
red clay
red clover
red cluster pepper
red coat
red colors and pigments
red coral
red corpuscle
red count
red cross
red currant
red dead nettle
red deer

red devil
red dogwood
red drum
red duster
red dwarf
red earth
red elm
red ensign
red false mallow
red feed
red fescue
red fir
red fire
red fish
red flag
red flash
red flour beetle
red fox
red giant
red giant star
red grouse
red gum
red hand
red hands
red hat
red heat
red herring
red hind
red horse
red horse chestnut
red in the face
red indian
red jasmine
red jungle fowl
red kauri
red kowhai
red label
red larkspur
red lattice
red lead
red leaf
red letter
red light
red line
red liquor
red
maids
red man

red maple
red mass
red meat
red mercuric oxide
red mercuric sulfide
red mombin
red mulberry
red mullet
red oak
red ocher
red ochre
red orpiment
red osier
red packet
red pepper
red periwinkle
red pine
red pink
red poll
red prussiate of potash
red puccoon
red race
red rag
red rag to a bull
red rat snake
red ribbon
red robin
red roncador
red rose
red rot
red rover
red rust
red sable
red sage
red salmon
red sand
red setter
red shank
red shanks
red shift
red sindhi
red siskin
red snapper
red snow
red spider
red squill
red squirrel
red stuff

red tai
red tape
red tide
red tipped moss
red trillium
red turtlehead
red valerian
red water
red whortleberry
red wine
red worm
red zinc ore
red, white, and blue
red-alder
red-armed
red-backed
red-backed sandpiper
red-backed shrike
red-bait
red-baiting
red-banded
red-bar
red-barked
red-beaded
red-beaked
red-beamed
red-bearded
red-bellied
red-bellied turtle
red-belted
red-berried
red-billed
red-black
red-blind
red-blooded
red-bloodedness
red-bodied
red-boled
red-bonnet
red-bound
red-branched
red-branching
red-breasted
red-brick
red-brick
university
red-brown
red-burning

red-buttoned
red-carpet
red-cheeked
red-chested
red-ciled
red-ciling
red-cilled
red-cilling
red-clad
red-clay
red-cloaked
red-clocked
red-coat
red-coated
red-cockaded
red-collared
red-colored
red-combed
red-complexioned
red-crested
red-crowned
red-curtained
red-dabbled
red-dog
red-dogged
red-dogger
red-dogging
red-dyed
red-eared
red-edged
red-eye
red-eyed
red-eyed vireo
red-faced
red-facedly
red-facedness
red-feathered
red-figure
red-figured
red-finned
red-flag
red-flag law
red-flagger
red-flaggery
red-flanked
red-flecked
red-fleshed
red-flowered

red-flowering
red-footed
red-fronted
red-fruited
red-gemmed
red-gilled
red-girdled
red-gleaming
red-gold
red-gowned
red-gownedred-green blind
red-green blind
red-green blindness
red-haired
red-hand
red-handed
red-handedly
red-handedness
red-hard
red-harden
red-hardness
red-hat
red-hatted
red-head
red-headed
red-headed
 woodpecker
red-heeled
red-herring prospectus
red-hipped
red-hissing
red-hooded
red-horned
red-hot
red-hot poker
red-hued
red-humped
red-ink
red-jerseyed
red-kneed
red-knobbed
red-lead
red-lead ore
red-lead putty
red-leader
red-leaf
red-leather
red-leaved

red-legged
red-legged partridge
red-legs
red-letter
red-letter day
red-lettered
red-lidded
red-light
red-light district
red-lined
red-lipped
red-listed
red-lit
red-litten
red-looking
red-making
red-minded
red-mouthed
red-naped
red-neck
red-necked
red-nosed
red-orange
red-out
red-painted
red-pencil
red-plowed
red-plumed
red-polled
red-purple
red-ribbed
red-rimmed
red-ripening
red-roan
red-roofed
red-rooted
red-rose
red-rumped
red-rusted
red-scaled
red-scarlet
red-shafted
red-shank
red-shirted
red-short
red-shortness
red-shouldered
red-shouldered hawk

red-sided
red-silk
red-skinned
red-snooded
red-specked
red-speckled
red-spotted
red-spotted purple
red-stalked
red-streak
red-streaked
red-streaming
red-swelling
red-tailed
red-tailed
 hawk
red-tape
red-taped
red-tapedom
red-tapeism
red-taper
red-tapery
red-tapey
red-tapish
red-tapism
red-tapist
red-tempered
red-thighed
red-throat
red-throated
red-tiled
red-tinted
red-tipped
red-tongued
red-top
red-topped
red-topped buffalo grass
red-trousered
red-tufted
red-twigged
red-up
red-upholstered
red-veined
red-vented
red-vested
red-violet
red-walled
red-wat

red-water
red-wattled
red-waved
red-white
red-winged
red-winged blackbird
red-wooded
red-written
red-yellow
redback spider
redbelly dace
redbrick university
redd-up
reddish brown
reddish brown colors
reddish-amber
reddish-bay
reddish-bellied
reddish-black
reddish-blue
reddish-brown
reddish-colored
reddish-gray
reddish-green
reddish-haired
reddish-headed
reddish-looking
reddish-orange
reddish-purple
reddish-white
reddish-yellow
redear sunfish
redeem your pledge
redeem your pledges
redeemable bond
redeemed soul
redemption center
redemption fund
redevelopment area
redevelopment company
redhead-grass
redheart hickory
redhorse
 sucker
redirect examination
rediscount rate
redmouth buffalo fish
redouble your efforts

redound to
redound to the honor of
redound to your honor
redox potential
redpoll linnet
redpoll warbler
redrawing press
redrawing punch
redress a wrong
redress an injustice
reduce sail
reduce the temperature
reduce to
reduce to ashes
reduce to dust
reduce to elements
reduce to essentials
reduce to order
reduce to powder
reduce to rubble
reduce to silence
reduce to unity
reduce to writing
reduce weight
reduced circumstances
reduced hemoglobin
reduced in health
reduced level
reduced mass
reduced paid-up insurance
reduced price
reduced rates
reduced sail
reduced sight
reduced to a skeleton
reduced to dire straits
reduced to jelly
reduced to powder
reduced vowel
reducer sleeve
reducible algebra
reducing agent
reducing diet
reducing furnace
reducing glass
reducing press
reducing valve
reducing wheels

reductase test
reductio ad absurdum
reduction division
reduction formula
reduction of armaments
reduction
 of expenses
reduction of government spending
reduction of spending
reduction of temperature
reduction potential
reduction to ashes
reduction to dust
reduction to elements
reduction to parts
reduction to powder
reduction works
reduction-improbation
redundant check
redundant verb
redwing blackbird
reed basket
reed bent
reed bunting
reed canary grass
reed fescue
reed grass
reed green
reed instrument
reed mace
reed mark
reed meadow grass
reed organ
reed pipe
reed plane
reed stop
reed thrush
reed warbler
reed wren
reed yellow
reed-back
reed-blade
reed-bordered
reed-clad
reed-compacted
reed-crowned
reed-grown
reed-mace

reed-rond
reed-roofed
reed-rustling
reed-shaped
reed-thatched
reed-warbler
reef band
reef cringle
reef down
reef earing
reef goose
reef hook
reef jig
reef jigger
reef knot
reef pendant
reef point
reef tackle
reef your sails
reef-knoll
reef-knot
reefed sail
reefing bowsprit
reefing jacket
reek of piety
reel and bead
reel back
reel borer
reel foot
reel in
reel man
reel off
reel
 oven
reel-fed
reel-fitted
reel-footed
reel-to-reel
reeled silk
reeling hammer
reeming beetle
reeming iron
reentering angle
reentering polygon
reeving-line bend
refectory table
refer to
reference book

reference editor
reference electrode
reference frame
reference gauge
reference group
reference librarian
reference library
reference mark
reference marks
reference peg
reference quantity
reference system
reference to
reference-voltage generator
referendum dollar
referred pain
referred to
referring to
refine a distinction
refine upon
refined discrimination
refined palate
refined sense of hearing
refined taste
refining engine
refining equipment
refining heat
refining place
reflect discredit upon
reflect honor on
reflect over
reflect upon
reflected light
reflected light meter
reflected plan
reflected signal
reflecting telescope
reflection density
reflection factor
reflection plane
reflector mirror
reflex act
reflex action
reflex angle
reflex arc
reflex camera
reflex epilepsy
reflex klystron

reflex
zenith tube
reflexive pronoun
reflux condenser
reflux value
reform Jew
reform judaism
reform politician
reform politics
reform school
reform yourself
reformation-proof
reformed spelling
refracting telescope
refraction circle
refractive index
refractory brick
refractory clay
refractory ware
refrain from
refresh the inner man
refresh the memory
refresh the memory of
refresher course
refrigerating engine
refrigerating engineer
refrigerating engineering
refrigerating machine
refrigerating plant
refrigeration anesthesia
refrigeration ship
refrigerator car
refrigerator truck
refund annuity
refunding bond
refusal to be amazed
refusal to be awed
refusal to be impressed
refusal to believe
refuse comment
refuse consent
refuse credence to
refuse credit to
refuse destructor
refuse heap
refuse lac
refuse point-blank
refuse stays

refuse summarily
refuse to accept
refuse to acknowledge
refuse to admit
refuse to associate with
refuse to be impressed
refuse to believe
refuse to consider
refuse
 to cooperate
refuse to credit
refuse to pay
refuse to receive
refuse to recognize
refuse to shed blood
refuse work
refusing work
regal purple
regard before
regard studiously
regard with indulgence
regardless of
regardless of consequences
regardless of cost
regenerated cellulose
regenerative cooling
regenerative furnace
regenerative receiver
regenerative wave-meter
regent bird
regent house
regie-book
regimental tie
regional accent
regional dialect
regional enteritis
regional governor
regional novel
regional school
regions of
register a complaint
register breadth
register length
register of deaths
register of wills
register office
register point
register regulator

register thermometer
register ton
register tonnage
register with
registered Democrat
registered Republican
registered bond
registered breadth
registered certificate
registered depth
registered length
registered lobbyist
registered mail
registered nurse
registered post
registered representative
registered securities
registered
trademark
registered voter
registering rocket
registrar-general
registration area
registration county
registration number
registry office
regius professor
regression coefficient
regression neurosis
regression therapy
regressive sorites
regressive tax
regressive taxation
regular army
regular as clockwork
regular bevel
regular buyer
regular canoness
regular customer
regular dividend
regular gas
regular lay
regular ode
regular old fogy
regular payments
regular play
regular solid
regular tertiaries

regular wave motion
regular year
regular-bred
regular-built
regular-featured
regular-growing
regular-lay rope
regular-shaped
regular-sized
regulate by
regulating box
regulating button
regulation-proof
regulative first principle
regulator gene
regulator pin
rehearse a play
rehearse in extenso
reheat the ashes
reheating furnace
rei persecutoria
rei-ntrant
reign of Saturn
reign of St
reign of terror
reigning beauty
reim-kennar
rein in
rein orchis
reindeer flower
reindeer lichen
reindeer moss
reindeer
 pest
reinforced bow
reinforced concrete
reins of government
reinsurance fund
reisner work
reject authority
reject back
rejection slip
rejoice in
rejoice in a seller's market
rejoice in the name of
rejoice the heart
rejoice with
relapsing fever

relate at large
relate in extenso
relate to
relate to emotionally
related by blood
related word
relating to
relation word
relative aperture
relative atomic mass
relative bearing
relative by marriage
relative clause
relative complement
relative density
relative dispersion
relative electron affinity
relative frequency
relative heading
relative humidit
relative humidity
relative incidence
relative magnitude
relative major
relative majority
relative maximum
relative minimum
relative minor
relative molecular mass
relative permeability
relative permittivity
relative pitch
relative pronoun
relative to
relative topology
relative wind
relative-in-law
relatively prime numbers
relatives-in-law
relativistic quantum mechanics
relativity doublet
relativity
shift
relax conditions
relax the condition
relax your grip
relax your hold
relaxation of tension

relay broadcast
relay fast
relay governor
relay hunger strike
relay links
relay race
relay receiver
relay register
relay station
relay stations
relay transmitters
relayer rail
release copy
release date
release therapy
released time
relegate to a place
relevant fact
relevant instance
reliability coefficient
reliance in
reliance on
relic area
relic of the past
relic-covered
relic-vending
relief etching
relief frame
relief map
relief method
relief motion
relief pallet
relief payments
relief pitcher
relief printing
relief ship
relief tube
relief valve
relief well
relief-carving
relieve the mind of
relieve you of
relieve your mind
relieve yourself
relieving arch
relieving tackle
religio-
religio-educational

religio-magical
religio-military
religio-philosophical
religio-political
religio-scientific
religions and sects
religious belief
religious believer
religious ceremony
religious discourse
religious
education
religious faith
religious founder
religious house
religious humbug
religious hypocrite
religious leader
religious order
religious prophets
religious rites
religious school
religious truth
religious war
religious-minded
religious-mindedness
religiously exact
relinquish your life
relocation camp
reluctance amplifier
rely on
rely on fortune
rely upon
remain anonymous
remain at a distance
remain at peace
remain firm
remain in the shade
remain in your memory
remain incommunicado
remain motionless
remain neutral
remain on your hands
remain seated
remain stable
remain unmoved
remain valid
remainder theorem

remand home
remand school
remanent magnetism
remark upon
remarkably like
remarque proof
remedial measure
remedial of
remedy an injustice
remedy-proof
remembrance day
remind one of
remind you of
remission of sin
remit the penalty of
remittance man
remittent fever
remontoir escapement
remorse of conscience
remote age
remote cause
remote control
remote distance
remote future
remote
handling
remote past
remote pickup
remote possibility
remote region
remote resemblance
remote time
remote-control
remote-controlled
remote-pickup unit
remotely like
remotely related
remotest corner of the world
remoulade sauce
remount cavalry
removal cutting
removal to Abraham's bosom
removal to heaven
remove all doubt
remove all restrictions
remove friction
remove from life
remove from office

removed from the record
removing the veil
remuneratory sanction
renal calculus
renal hematuria
renal pelvis
renal splanchnic nerve
rend asunder
rend from
rend the air
rend the eardrums
rend the ears
rend the firmament
rend the heart
rend the skies
render a service
render assistance
render blind
render credit
render honor to
render insensible
render lip service
render powerless
render recognition
render service to
render thanks
render up
rendering coat
rendering works
renew your strength
reni-
rennet bag
rennet casein
rennet ferment
renounce the throne
rent charge
rent charger
rent control
rent
 gouger
rent insurance
rent money
rent out
rent party
rent resolute
rent seck
rent service
rent-charge

rent-collecting
rent-free
rent-paying
rent-producing
rent-raising
rent-reducing
rent-roll
rent-seck
rent-service
rental car
rental color income
rental library
rents seck
renunciation of the world
rep show
repair run
repair ship
repair shop
repair to
reparative surgery
repay in kind
repeat again
repeat by heart
repeat by rote
repeat like a broken record
repeat like a parrot
repeat order
repeat performance
repeat verbatim
repeat word for word
repeat yourself
repeated figure
repeated sounds
repeating decimal
repeating firearm
repeating theodolite
repeating watch
repent in sackcloth and ashes
repertory company
repertory drama
repertory show
repertory theater
repetition for effect
repetition for emphasis
replacement cost
replacement therapy
replacement transfusion
replacement vein

replica grating
reply by return mail
reply card
reply coupon
reply to
report card
report for duty
report
 out
report stage
reported speech
reporting pay
repose confidence in
repose in
repose on
repose on your laurels
repose upon
represent yourself to be
representative art
representative democracy
representative fraction
representative government
representative of the press
representative realism
representative town meeting
representative-elect
representing in the mind
repress a smile
repress your desires
repro proof
reproach yourself
reproduce after your kind
reproduce in kind
reproducing element
reproduction cost
reproduction proof
reproductive cell
reproductive imagination
reproductive organs
reproving look
reptilian age
republic of letters
request note
request stop
request the presence of
requiem mass
requiem shark
requiescant in pace

requiescat in pace
require an answer
required visit
requisition form
rere-
rere-brace
rere-dorter
rere-supper
res adjudicata
res gestae
res ipsa loquitur
res judicata
res publica
resale price maintenance
rescue device
rescue grass
rescue helicopter
rescue
 mission
rescue plane
research and development
research center
research engineer
research engineering
research establishment
research facility
research installation
research laboratory
research library
research material
research monograph
research paper
research plane
research professor
research rocket
research satellite
research station
research study
research worker
reserve account
reserve bank
reserve buoyancy
reserve city
reserve currency
reserve forces
reserve fund
reserve militia
reserve officer

reserve price
reserve ratio
reserve ration
reserve supply
reserve yourself
reserved list
reserved occupation
reserved power
reset action
reside in
resident commissioner
resident maid
resident physician
residential district
residual clay
residual magnetism
residual power
residual stress
residuary devisee
residuary legatee
resign from
resign your being
resign your life
resign yourself
resign yourself to
resignation bond
resigned-looking
resin alcohol
resin bee
resin canal
resin cerate
resin
distiller
resin gnat
resin jack
resin oil
resin opal
resin plant
resin plastic
resin soap
resin spirit
resino-
resist believing
resist entreaty
resist persuasion
resist printing
resistance box
resistance butt welding

resistance capacitance
resistance coil
resistance coupling
resistance derivative
resistance drop
resistance fighter
resistance fighting
resistance frame
resistance furnace
resistance pyrometer
resistance thermometer
resistance to belief
resistance to change
resistance welding
resisting medium
resisting moment
resistive conductor
resistive coupling
resistiveness to belief
resojet engine
resojet propulsion
resolutory condition
resolve into
resolve itself into
resolve to
resolved upon
resolving power
resonace box
resonace potential
resonance cavity
resonance curve
resonance duct jet engine
resonance energy
resonance form
resonance frequency
resonance frequency control
resonance hybrid
resonance indicator
resonance jet engine
resonance neutron
resonance pipe
resonance radiation
resonance
spectrum
resonance wave coil
resonance-coil antenna
resonant cavity
resonant chamber

resonant frequency
resonant-jet engine
resorcin acetate
resorcin brown
resorcin dark brown
resorcinol monoacetate
resorption border
resort to
resort to arms
resound in the ears
resound the praises of
resounding triumph
respect your duty
respectable citizen
respeian composer
respiration calorimeter
respirato-
respiratory center
respiratory disease
respiratory leaf
respiratory nerve
respiratory pigment
respiratory plate
respiratory quotient
respiratory system
respiratory tree
respiratory trumpet
resplendent trogon
resplendently beautiful
respond to
respond to stimuli
responding note
responsary report
response generalization
response time
response to stimuli
responsible for
responsible person
responsory report
rest and be thankful
rest assured
rest cure
rest day
rest easy
rest energy
rest from your labors
rest hard upon
rest home

rest house
rest in
rest in confidence
rest in peace
rest in the
 arms of Morpheus
rest mass
rest on
rest on the shoulders of
rest on your laurels
rest on your oars
rest room
rest satisfied
rest stop
rest treatment
rest up
rest upon
rest upon your oars
rest with
rest your case
rest-balk
rest-cure
rest-cured
rest-giving
rest-harrow
rest-home
rest-ordained
rest-refreshed
rest-seeking
rest-taking
restaurant car
restful sleep
resting easy
resting in peace
resting of the case
resting place
resting point
restless cavy
restore harmony
restore self-respect
restore to health
restoring spring
restrain yourself
restraining hand
restraining order
restraint of trade
restrict to
restrict yourself

restricted class
restricted information
restricted practice
restricted propellant
restricted theory of relativity
restriction of intake
restrictive clause
restrictive covenants
restrictive practice
result clause
result from
result on
resultant force
resultant tone
resulting from
resurrecet-tasting liquid
resurrection body
resurrection bolly
resurrection fern
resurrection
 gate
resurrection man
resurrection pie
resurrection plant
resurrection woman
retail dealer
retail gossip
retail merchant
retail seller
retail store
retain in the thoughts
retain the memory of
retained earnings
retained income
retained object
retained objective complement
retaining fee
retaining wall
retardation method
retentive memory
retentive mind
retia mirabilia
reticular system
reticulate python
reticulated tracery
reticulated vessel
reticulato-
reticulo-

reticuloendothelial system
reticulum cell
reticulum cell sarcoma
retin-
retinal rod
retinitis pigmentosa
retino-
retire from office
retire from sight
retire from the world
retire into the shade
retire into your shell
retired list
retired professor
retirement benefits
retirement from office
retirement income insurance
retiring disposition
retold story
retonation wave
retort an accusation
retort drawer
retort stand
retrace your steps
retractable landing gear
retreaded tire
retreat into your mind
retreat into your shell
retreat into
your thoughts
retreat to immaturity
retreating market
retributive justice
retro rocket
retro-
retro-float light
retro-ocular
retro-omental
retro-operative
retro-oral
retro-rocket
retro-umbilical
retro-uterine
retroactive inhibition
retroanterograde amnesia
retrograde amnesia
rets currach
return a true bill

return a verdict
return a verdict of not guilty
return address
return answer
return ball
return bead
return beam
return bend
return blow for blow
return card
return crease
return day
return evil for evil
return for answer
return game
return like for like
return match
return of evil for evil
return piece
return receipt
return shock
return signal
return thanks
return the compliment
return the like
return ticket
return to
return to dust
return to life
return to mind
return to reality
return to the earth
return to the fold
return to the soil
return to the starting point
return trap
return wall
return-cocked
return-day
return-flue boiler
return-tubular boiler
returning board
returning officer
rev
counter
reveal a secret
reveal yourself
revealed religion

revealed truth
revel in
revel master
revel-rout
revenge in kind
revenge tragedy
revenue account
revenue bond
revenue cutter
revenue expenditure
revenue stamp
revenue tariff
reverbatory furnace
reverberation chamber
reverberation time
reverberatory furnace
reverberatory kiln
reverend sir
reverential regard
reversal film
reversal plate
reversal process
reverse bar
reverse bevel
reverse bid
reverse discard
reverse discrimination
reverse of fortune
reverse plate
reverse shot
reverse split
reverse transcriptase
reverse transfer resistance
reverse turn
reverse your field
reverse yourself
reverse-angle shot
reverse-charge
reverse-phase relay
reversed collar
reversed feedback
reversible reaction
reversible-disk plow
reversing light
reversing prism
reversing switch
reversing thermometer
reversion duty

reversion pendulum
reversion spectroscope
reversionary annuity
revert to
review copy
review in retrospect
review of things past
revise
 your thoughts
revised edition
revised standard version
revised version
revival meeting
revolt at
revolting with
revolting with endured
revolution control
revolutionary calendar
revolutionary junta
revolutionary war
revolutions per minute
revolve in the mind
revolve on
revolve upon
revolving bookcase
revolving bookstand
revolving credit
revolving door
revolving fund
revolving lever
revolving on
revolving stage
revolving-jaw box chuck
revolving-jaw chuck
rewa-rewa
reward claim
reworked wool
rewrite man
rewrite rule
rex begonia
rez-de-chaussee
rh factor
rh-negative
rh-positive
rhabdo-
rhaeto-romanic
rheims version
rhein-berry

rheo-
rhesus baby
rhesus factor
rhesus monkey
rhetorical accent
rhetorical question
rhetorical stress
rheumatic disease
rheumatic fever
rheumatic heart disease
rheumatism of the heart
rheumatism root
rheumatism weed
rheumatism-root
rheumato-
rheumatoid arthritis
rhin-
rhine wine
rhino-
rhinoceros auklet
rhinoceros beetle
rhinoceros bird
rhinoceros bush
rhinoceros
 hide
rhinoceros hornbill
rhinoceros viper
rhinoceros-shaped
rhinolalia aperta
rhinolalia clausa
rhiz-
rhizo-
rhizoctonia disease
rhizosphere effect
rho particle
rhod-
rhode island bent
rhode island red
rhode island white
rhodes grass
rhodes scholar
rhodesian man
rhodium oil
rhodium wood
rhodo-
rhodonite pink
rhomb spar
rhomb-

rhomb-leaved
rhombic aerial
rhombic antenna
rhombo-
rhomboid-ovate
rhubarb wine
rhumb line
rhumbline sailing
rhus dermatitis
rhus glabra
rhyme or reason
rhyme royal
rhyme scheme
rhyme word
rhyme-beginning
rhyme-composing
rhyme-fettered
rhyme-forming
rhyme-free
rhyme-inspiring
rhyme-tagged
rhyming dictionary
rhyming slang
rhyolite-porphyry
rhythm band
rhythm method
rhythm section
rhythm stick
rhythm-and-blues
rhythmic pattern
rhythmic phrase
rhythmic play
rhythmical accent
rhythmical accentuation
rhythmical stress
rib cage
rib cut
rib grass
rib lath
rib meristem
rib rifling
rib roast
rib steak
rib stitch
rib tickler
rib-bearing
rib-breaking
rib-faced

rib-grass
rib-grated
rib-mauled
rib-nosed
rib-pointed
rib-poking
rib-roast
rib-sticking
rib-striped
rib-supported
rib-welted
riband-shaped
riband-wreathed
ribband
carvel
ribband lines
ribbed and smoked sheet
ribbed toad
ribble-rabble
ribbon brake
ribbon building
ribbon bush
ribbon candy
ribbon conveyer
ribbon copy
ribbon development
ribbon fern
ribbon grass
ribbon gum
ribbon isinglass
ribbon jasper
ribbon lightning
ribbon maker
ribbon microphone
ribbon movement
ribbon of light
ribbon park
ribbon rock
ribbon saw
ribbon snake
ribbon strip
ribbon tree
ribbon winder
ribbon wire
ribbon worm
ribbon-bedizened
ribbon-bordering
ribbon-bound

ribbon-fish
ribbon-grass
ribbon-marked
ribbon-shaped
ribonucleic acid
ribose nucleic acid
ribosomal RNA
rice body
rice boiler
rice bowl
rice bran
rice bug
rice christian
rice cleaner
rice coal
rice cousin
rice cut-grass
rice drier
rice dust
rice eater
rice field
rice flour
rice flower
rice glue
rice grader
rice grass
rice grinder
rice grower
rice hen
rice huller
rice
milk
rice mill
rice miller
rice mouse
rice paddy
rice paper
rice planter
rice polish
rice polisher
rice polishings
rice powder
rice rat
rice shell
rice tenrec
rice water
rice weevil
rice wine

rice-bird
rice-cleaning
rice-clipping
rice-eating
rice-field eel
rice-grading
rice-grain decoration
rice-grinding
rice-growing
rice-hulling
rice-paper
rice-paper tree
rice-planting
rice-polishing
rice-pounding
rice-root grass
rice-seed body
rice-water
rich as Croesus
rich harvest
rich hat
rich imagination
rich lode
rich man
rich man's panic
rich ore
rich rhyme
rich soil
rich source
rich uncle
rich vein
rich, the
rich-appareled
rich-attired
rich-bedight
rich-bound
rich-built
rich-burning
rich-clad
rich-colored
rich-conceited
rich-distilled
rich-embroidered
rich-figured
rich-flavored
rich-fleeced
rich-fleshed
rich-glittering

rich-haired
rich-jeweled
rich-laden
rich-looking
rich-minded
rich-ored
rich-robed
rich-set
rich-soiled
rich-tasting
rich-toned
rich-voiced
rich-weed
rich-wrought
richard roe
richel
bird
richly deserve
richly deserved
richness of meaning
ricinoleic acid
ricinus oil
rick carrier
rick-barton
rick-burton
rick-yard
rickettsial disease
ricochet fire
rictal bristle
rid of
rid yourself of
riddle ballad
riddle cake
riddle canon
riddle of the Sphinx
ride a broomstick
ride a hobby
ride a hobbyhorse
ride a storm
ride and tie
ride at anchor
ride bareback
ride down
ride easy
ride for a fall
ride full tilt against
ride gain
ride hard

ride hawse full
ride herd on
ride high
ride it out
ride on a rail
ride out
ride out a storm
ride out the storm
ride over
ride roughshod over
ride shank's mare
ride shank's pony
ride shotgun for
ride the beam
ride the high horse
ride the hobnail express
ride the sea
ride the shoe-leather
ride the skies
ride to a fall
ride to death
ride to hounds
ride to leeward
ride up
rider embolus
rider keelson
ridge beam
ridge buster
ridge fillet
ridge harrow
ridge oak
ridge plow
ridge rib
ridge rope
ridge runner
ridge stone
ridge strut
ridge tile
ridge-bone
ridge-seeded
ridge-tile
ridging
 grass
ridging plow
ridicule-proof
ridiculously like
riding academy
riding at anchor

riding boot
riding boots
riding breeches
riding crop
riding habit
riding hood
riding horse
riding lamp
riding light
riding master
riding on cloud nine
riding pants
riding rhyme
riding saddle
riding sail
riding school
riding-coat
riding-habit
riding-hood
rie grass
riemannian geometry
rien du tout
rien ne va plus
riff through
riff-raff
riffle bar
riffle block
riffle file
riffle through
rifle assembler
rifle ball
rifle bar
rifle bird
rifle bomb
rifle corps
rifle fire
rifle frock
rifle green
rifle grenade
rifle gun
rifle pit
rifle range
rifle salute
rifle shot
rifle tie
rifle-bird
rifle-range
rifle-shot

rifled slug
rift board
rift saw
rift valley
rift-sawed
rift-sawing
rift-sawn
rifty-tufty
rig down
rig for diving
rig out
rig shenanigan
rig the market
rig tree
rig up
rig-out
rig-up
rig-veda
rigged jury
rigged market
rigged oar
rigged out
rigger's knife
rigging angle of incidence
rigging
 loft
rigging plan
rigging screw
right about
right about face
right along
right along there with
right amount
right and left
right and proper
right angle
right as rain
right ascension
right away
right belief
right bower
right boys
right center
right circular cone
right circular cylinder
right conduct
right cylinder
right doctrine

right face
right field
right fielder
right five degrees rudder
right full rudder
right half rudder
right hand
right handsomely
right in the head
right itself
right line
right mind
right mood
right now
right of angary
right of asylum
right of center
right of common
right of eminent domain
right of emption
right of entry
right of preemption
right of put and call
right of search
right of sole emption
right of use
right of way
right off
right off the bat
right off the reel
right on
right on end
right people
right reverend
right rudder
right section
right side
right side of the tracks
right side of, the
right smart
right smart spell
right sort
right stage
right
 standard rudder
right taste
right ten degrees rudder
right thing, the

right thinking
right to vote
right triangle
right whale
right wing
right with
right you are
right-about
right-about-face
right-aiming
right-angle
right-angled
right-angled triangle
right-angledness
right-angular
right-angularity
right-away
right-bank
right-believed
right-believing
right-born
right-bout
right-brained
right-bred
right-center
right-central
right-down
right-drawn
right-eared
right-eyed
right-eyedness
right-footed
right-footer
right-forward
right-framed
right-hand
right-hand man
right-hand side
right-hand tool
right-handed
right-handedly
right-handedness
right-hander
right-handwise
right-ho
right-laid
right-lay
right-left handed

right-lined
right-made
right-meaning
right-minded
right-mindedly
right-mindedness
right-of-way
right-of-way signal
right-oh
right-onward
right-principled
right-running
right-shaped
right-shapen
right-side
right-sided
right-sidedly
right-sidedness
right-thinking
right-to-work
law
right-turn
right-up
right-walking
right-wheel
right-wing
right-winger
right-wingish
right-wingism
rightabout-face
righteous indignation
righteous, the
righteye flounder
rightful authority
rightful succession
righting lever
righting moment
rights issue
rights of man
rights of women
rights-of-way
rigid airship
rigid control
rigid discipline
rigid frame
rigid motion
rigid supports
rigid-body

rigid-frame
rigid-nerved
rigid-seeming
rigor mortis
riled up
rilievi schiacciati
rilievo schiacciato
rilievo stiacciato
rill stope
rill-like
rim ash
rim blight
rim clutch
rim lighting
rim lock
rim man
rim of the horizon
rim pulley
rim ram ruf
rim saw
rim shaft
rim wheel
rim-bearing
rim-bending
rim-bound
rim-cut
rim-deep
rim-fire
rimble-ramble
rime frost
rime ice
rime riche
rime suffisante
rime-covered
rime-damp
rime-frost
rime-frosted
rime-laden
rimes riches
rimes suffisantes
riming stool
rince pichon
rind disease
rind fungus
rind gall
rind grafting
ring a bell
ring armature

ring armor
ring around
the moon
ring around the sun
ring back
ring bander
ring binder
ring bore
ring bottle
ring canal
ring cell
ring changes
ring chuck
ring circuit
ring clew
ring compound
ring crib
ring dial
ring dollar
ring doorbells
ring down the curtain
ring down the curtain on
ring dropper
ring dropping
ring false
ring fence
ring finger
ring formation
ring formula
ring frame
ring gage
ring gauge
ring gear
ring in
ring in the ear
ring in the ears
ring machine
ring main
ring man
ring micrometer
ring nebula
ring necrosis
ring of the nibelung
ring off
ring oiler
ring on the air
ring out
ring ouzel

ring peals
ring pin
ring road
ring rope
ring rot
ring screw
ring seizing
ring shake
ring shout
ring snake
ring spinner
ring spinning
ring spot
ring stone
ring taw
ring the bell
ring the changes
ring the tocsin
ring traveler
ring true
ring up
ring up the curtain
ring winding
ring with the praises of
ring your praises
ring-a-lievio
ring-a-rosy
ring-adorned
ring-around
ring-banded
ring-bark
ring-billed
ring-billed
duck
ring-billed gull
ring-bone
ring-bored
ring-bound
ring-chain isomerism
ring-chain tautomerism
ring-dove
ring-dyke
ring-eyed
ring-fence
ring-finger
ring-formed
ring-handled
ring-in

ring-legged
ring-man
ring-neck
ring-necked
ring-necked duck
ring-necked pheasant
ring-off
ring-oil
ring-porous
ring-ridden
ring-shaped
ring-shout
ring-small
ring-spinning frame
ring-straked
ring-streaked
ring-tailed
ring-tailed cat
ring-up
ringed about
ringed plain
ringed plover
ringed snake
ringing spindrift
ringing tone
ringside seat
ringtail topsail
ringworm bush
rink polo
rinka fadda
rinse out
riot act
riot away
riot gun
riot in
riot of color
riot of colors
riot police
riot squad
riotous living
rip apart
rip cord
rip current
rip from
rip hook
rip into
rip off
rip open

rip out
rip out an oath
rip panel
rip tide
rip to pieces
rip up
rip van winkle
rip-off
rip-rap
rip-roaring
rip-roaring drunk
rip-roarious
rip-saw
riparian right
ripe age
ripe for instruction
ripe idea
ripe old age
ripe rot
ripe stump
ripe
 wisdom
ripe-aged
ripe-bending
ripe-cheeked
ripe-colored
ripe-eared
ripe-faced
ripe-grown
ripe-looking
ripe-picked
ripe-red
ripe-tongued
ripe-witted
ripen into
riper years
ripper act
ripping bar
ripping chisel
ripping iron
ripping out
ripping panel
ripping punch
ripping size
ripple cloth
ripple current
ripple effect
ripple grass

ripple mark
ripple of applause
ripple of laughter
ripple plantain
ripple voltage
ripple weld
ripple-grass
rippling kame
ris de veau
rise above
rise again
rise against
rise and fall
rise and shine
rise from
rise from the grave
rise in the mind
rise in the world
rise of bottom
rise of floor
rise of the tide
rise on in the world
rise on the hind legs
rise to
rise to a point of order
rise to mind
rise to the fly
rise to the occasion
rise up
rise up in arms
risen from the ranks
rising action
rising diphthong
rising floor
rising generation
rising ground
rising hinge
rising line
rising market
rising of the curtain
rising prices
rising rhythm
rising terminal
rising
trot
rising vote
risk assuming
risk capital

risk premium
risk stating
risk your life
risus sardonicus
rite de passage
rite of confession
rite of intensification
rite of passage
ritual contamination
ritual impurity
ritual killing
ritual murder
ritual observance
ritual suicide
ritual uncleanness
ritualistic article
ritualistic book
ritualistic manual
ritually clean
ritually contaminated
ritually immerse
ritually impure
ritually pure
ritually unclean
ritz it
rivage green
river ash
river bank
river basin
river bass
river bed
river birch
river boulder
river bulrush
river carpsucker
river craft
river deer
river dolphin
river driver
river front
river grass
river gunboat
river horse
river jack
river lamprey
river locust
river maple
river mussel

river novel
river oak
river of Hades
river of death
river of oblivion
river pilot
river rat
river road
river shrew
river sunflower
river wattle
river-blanched
river-borne
river-bottom
river-caught
river-drift
river-fish
river-formed
river-given
river-god
river-goddess
river-horse
river-sundered
river-water
river-watered
river-worn
riverbank
grape
rivet buster
rivet carrier
rivet catcher
rivet forge
rivet heater
rivet hole
rivet in the memory
rivet knob
rivet pitch
rivet set
rivet snap
rivet steel
rivet the eyes upon
rivet the mind on
rivet the thoughts on
rivet weld
rivet wheat
rivet your attention
riveting hammer
riveting knob

riveting stake
riving knife
riving machine
rix-dollar
rk-up
roach back
roach paste
roach powder
roach-back
roach-backed
roach-bellied
roach-bent
road agent
road binder
road book
road builder
road building
road cart
road compound
road contractor
road donkey
road drag
road fettler
road gang
road grader
road guard
road harrow
road hog
road horse
road layer
road maker
road making
road map
road mender
road metal
road monkey
road oil
road pen
road plow
road race
road racer
road racing
road rash
road repairer
road roller
road runner
road scraper
road show

road sign
road tar
road test
road train
road wagon
road wheel
road
works
road-bike
road-faring
road-fund licence
road-grading
road-hoggish
road-hoggism
road-maker
road-oiling
road-ready
road-test
road-testing
road-train
road-weary
road-wise
roan-tree
roar like a bull
roar of laughter
roar up
roar with laughter
roaring drunk
roaring fire
roaring forties
roaring mad
roaring success
roaring trade
roast beef
roast meat
roast sintering
roast-beef plant
roasting ear
roasting hot
roasting jack
rob Peter to pay Paul
rob roy
rob the cradle
rob you of ease
rob you of rest
rob you of sleep
rob you of your illusions
robbed of

robbed of illusion
robber bee
robber crab
robber fly
robber frog
robbers' roost
robbery insurance
robe de chambre
robe of royalty
robe of state
robe-de-chambre
robes-de-chambre
robin accentor
robin chat
robin dipper
robin goodfellow
robin hood
robin redbreast
robin runaway
robin sandpiper
robin snipe
robin's-egg blue
robing room
robinson crusoe
robot bomb
robot control
robot factory
robot pilot
robot plane
robot satellite
robot specialist
robot
submarine
robot system
robot-control
robust health
roche alum
roche lime
roche moutonn
roche moutonnee
rochelle powders
rochelle salt
roching cask
rock 'n' roll
rock alyssum
rock and roll
rock and rye
rock barnacle

rock basin
rock bass
rock beauty
rock blenny
rock bottom
rock brake
rock breaker
rock burst
rock cake
rock candy
rock climber
rock cod
rock cornish
rock crab
rock cress
rock crusher
rock crystal
rock cycle
rock dove
rock drill
rock driller
rock eel
rock elm
rock face
rock fern
rock festival
rock flint
rock flour
rock flower
rock garden
rock gardener
rock gardening
rock glacier
rock goat
rock goldenrod
rock grouse
rock gunnel
rock gypsum
rock hind
rock hole
rock hopper
rock hopping
rock hound
rock hyrax
rock jasmine
rock lever
rock lily
rock lobster

rock maple
rock melon
rock milk
rock moss
rock music
rock oak
rock oil
rock oyster
rock painting
rock phospate
rock pigeon
rock pile
rock plant
rock pressure
rock rabbit
rock salmon
rock salt
rock samphire
rock saw
rock
saxifrage
rock seal
rock shelter
rock singer
rock snake
rock sparrow
rock spleenwort
rock spray
rock squirrel
rock the boat
rock the sky
rock thrush
rock to sleep
rock tripe
rock trout
rock violet
rock vole
rock wallaby
rock whiting
rock wool
rock wren
rock'n roll
rock-'n'-roll
rock-and-roll
rock-and-roll group
rock-and-roll singer
rock-based
rock-basin

rock-battering
rock-bed
rock-begirdled
rock-bestudded
rock-bethreatened
rock-boring
rock-bottom
rock-bottom prices
rock-bound
rock-breaking
rock-built
rock-cistus
rock-clad
rock-cleft
rock-climb
rock-climber
rock-climbing
rock-concealed
rock-covered
rock-crested
rock-crushing
rock-cut
rock-drilling
rock-dusted
rock-dwelling
rock-eel
rock-embosomed
rock-encircled
rock-encumbered
rock-enthroned
rock-faced
rock-fallen
rock-fast
rock-fill
rock-fill dam
rock-firm
rock-firmed
rock-fish
rock-forming
rock-free
rock-frequenting
rock-girded
rock-girt
rock-hard
rock-hewn
rock-inhabiting
rock-loving
rock-melting

rock-piercing
rock-pigeon
rock-piled
rock-plant
rock-pulverizing
rock-razing
rock-reared
rock-ribbed
rock-roofed
rock-rooted
rock-rose
rock-rushing
rock-salt
rock-scarped
rock-shaft
rock-sheltered
rock-steady
rock-strewn
rock-studded
rock-throned
rock-thwarted
rock-torn
rock-weed
rock-wombed
rock-work
rock-worked
rockbound
coast
rocker arm
rocker bent
rocker cam
rocker panel
rocket airplane
rocket and missile names
rocket apparatus
rocket assist
rocket boat
rocket bomb
rocket car
rocket engine
rocket engineer
rocket engineering
rocket exhaust
rocket fire
rocket firing
rocket fuel
rocket glider
rocket gun

rocket harpoon
rocket laboratory
rocket larkspur
rocket launcher
rocket launching
rocket man
rocket motor
rocket pilot
rocket plane
rocket power
rocket program
rocket project
rocket propulsion
rocket research
rocket salad
rocket science
rocket scientist
rocket ship
rocket sled
rocket society
rocket technician
rocket technology
rocket testing
rocket to the moon
rocket torpedo
rocket-borne
rocket-firing plane
rocket-propelled
rocketing
up
rocking bed
rocking chair
rocking horse
rocking rhythm
rocking stone
rocking valve
rocks ahead
rockweed bird
rocky mountain sheep
rocky mountain spotted fever
rod adaptation
rod and reel
rod bayonet
rod bolt
rod breaker
rod epithelium
rod fiber
rod granule

rod mill
rod of empire
rod of office
rod peeler
rod rigging
rod vision
rod-bending
rod-boring
rod-caught
rod-cone theory
rod-drawing
rod-healing
rod-pointing
rod-polishing
rod-shaped
rodded joint
rode goose
rodent operative
rodent ulcer
roe deer
roe-deer
roebuck berry
roentgen equivalent man
roentgen ray
roentgen ray therapy
roentgen-ray cancer
roentgeno-
rogation day
roger de coverley
rogue elephant
rogue's badge
rogue's march
rogue's yarn
rogues' gallery
rohr flute
roister-doister
roister-doisterly
role-player
role-playing
roll about
roll and fillet molding
roll around
roll back
roll call
roll cloud
roll film
roll flat
roll in

roll in the dust
roll in the lap of luxury
roll in wealth
roll into one
roll lathe
roll logs
roll
 of coins
roll of honour
roll of the dead
roll of the wheel
roll on
roll on the ground
roll on the tongue
roll out
roll over
roll over and play dead
roll scale
roll the stone of Sisyphus
roll top
roll train
roll under the tongue
roll up
roll up into a ball
roll up your sleeves
roll welding
roll with the punches
roll-about
roll-away bed
roll-call
roll-collar
roll-cumulus
roll-leaf
roll-on/roll-off
roll-out
roll-over
roll-top
roll-top desk
roll-turning lathe
rolled flat
rolled glass
rolled gold
rolled into one
rolled oats
rolled roast
rolled-steel joist
roller bandage
roller bar

roller bearing
roller blind
roller bowl
roller chain
roller chock
roller coaster
roller dam
roller derby
roller fairlead
roller gate
roller gear
roller gin
roller grinder
roller jewel
roller mill
roller nest
roller press
roller shade
roller skate
roller skater
roller skates
roller skating
roller stock
roller towel
roller-backer
roller-blind shutter
roller-carrying
roller-grinding
roller-made
roller-milled
roller-milling
roller-reefing
gear
roller-skate
roller-skated
roller-skating
roller-top
rolling barrage
rolling bunt
rolling chock
rolling country
rolling crest dam
rolling fire
rolling friction
rolling hitch
rolling hitches
rolling in money
rolling in wealth

rolling kitchen
rolling machine
rolling mill
rolling on
rolling pin
rolling press
rolling rope
rolling stock
rolling stone
rolling-contact bearing
rolling-element bearing
rolling-key clutch
rolling-mill
rolling-pin
rolling-press
rolltop desk
roly-poliness
roly-poly
roly-poly grass
romaine lettuce
roman a clef
roman architecture
roman calendar
roman candle
roman catholic
roman collar
roman numeral
roman-fleuve
romance stanza
romance-empurpled
romance-hallowed
romance-inspiring
romance-making
romance-writing
romano-
romantic bond
romantic comedy
romantic melancholy
romantic tie
romantic tragedy
romantico-heroic
romantico-robustious
rome-penny
rome-scot
romp home
romp through
rond de jambe
rondeau redouble

rondo form
ronds de jambe
rood
 altar
rood arch
rood beam
rood cloth
rood goose
rood ladder
rood loft
rood screen
rood spire
rood stair
rood stairs
rood steeple
rood tower
rood-day
roof beam
roof board
roof bracket
roof cover
roof covering
roof dome
roof door
roof fixer
roof garden
roof gardener
roof guard
roof high
roof in
roof iris
roof line
roof nucleus
roof over
roof over your head
roof plate
roof prism
roof rack
roof rat
roof ridge
roof thatch
roof tile
roof truss
roof-blockaded
roof-building
roof-climbing
roof-deck
roof-draining

roof-dwelling
roof-gardening
roof-haunting
roof-reaching
roof-shaped
roof-tree
roofed-in
roofed-over
roofing nail
roofing paper
roofing tile
rook-coated
rooketty-coo
room and board
room clerk
room decoration
room decorator
room divider
room service
room temperature
room to spare
room to swing a cat
room trader
room-and-pillar
room-mate
room-ridden
room-temperature
rooming house
roost cock
roosting place
root and branch
root beer
root beer float
root borer
root canal
root canal therapy
root
canal treatment
root cap
root cell
root cellar
root chord
root climber
root crop
root cutting
root determinative
root disease
root division

root field
root for
root gall
root graft
root grafting
root hair
root in
root knot
root mean square
root nodule
root of all evil
root on
root out
root parasite
root position
root pressure
root rot
root sheath
root test
root tip
root up
root vole
root weevil
root-bound
root-bruising
root-built
root-devouring
root-digging
root-eating
root-feeding
root-hardy
root-inwoven
root-mean-square
root-neck
root-parasitic
root-parasitism
root-prune
root-pruned
root-stock
root-torn
rooted belief
rooting out
rope belting
rope brake
rope bridge
rope brown
rope dancer
rope enough to hang yourself

rope greaser
rope house
rope in
rope ladder
rope machine
rope maker
rope molding
rope of sand
rope off
rope race
rope railway
rope shoes
rope socket
rope spinner
rope stitch
rope twine
rope yarn
rope's end
rope-band
rope-bound
rope-closing
rope-dancer
rope-driven
rope-driving
rope-end
rope-fastened
rope-girt
rope-laying
rope-muscled
rope-pulling
rope-reeved
rope-shod
rope-sight
rope-spinning
rope-stock
rope-stropped
rope-work
rope-yarn
rope-yarn
knot
roped off
roping horse
roping palm
ropy lava
rory-cum-tory
rory-tory
ros solis
rosa solis

rosa solises
rosary pea
rosary plant
rosary ring
rosary shell
rose acacia
rose aphid
rose apple
rose beetle
rose beige
rose bengale
rose blush
rose box
rose campion
rose carnation
rose chafer
rose champagne
rose chestnut
rose cold
rose comb
rose cross
rose cut
rose cutter
rose d'Anvers
rose daphne
rose diamond
rose drill
rose engine
rose fever
rose fever n
rose geranium
rose gray
rose lily
rose madder
rose mallow
rose metal
rose mildew
rose milkweed
rose moss
rose noble
rose of China
rose of Heaven
rose of Jericho
rose of Sharon
rose of jericho
rose of sharon
rose oil
rose opal

rose pink
rose point
rose purple
rose quartz
rose rial
rose slug
rose stitch
rose tickseed
rose water
rose weevil
rose willow
rose window
rose
 wine
rose worm
rose-a-ruby
rose-apple
rose-back
rose-bay
rose-bellied
rose-blue
rose-breasted
rose-breasted grosbeak
rose-bright
rose-bush
rose-campion
rose-carved
rose-chafer
rose-cheeked
rose-clad
rose-color
rose-colored
rose-colored glasses
rose-colored spectacles
rose-colorist
rose-colour
rose-coloured
rose-combed
rose-covered
rose-crowned
rose-cut
rose-diamond
rose-diffusing
rose-drop
rose-eared
rose-engine
rose-ensanguined
rose-faced

rose-fingered
rose-flowered
rose-fresh
rose-gathering
rose-geranium oil
rose-growing
rose-headed
rose-hedged
rose-hued
rose-leaf
rose-leaved
rose-lipped
rose-lit
rose-loving
rose-nail
rose-petty
rose-pink
rose-podded
rose-red
rose-ringed
rose-root
rose-scented
rose-shell reamer
rose-slug
rose-sweet
rose-tinged
rose-tinted
rose-tree
rose-warm
rose-water
rose-window
rose-wreathed
rosemary oil
roseo-
rosetta stone
rosetta wood
rosetta-wood
rosette plate
rosewood oil
rosh hashanah
rosin grease
rosin jack
rosin oil
rosin plant
rosin rose
rosin soap
rosin

spirit
rosso antico
rostral column
rosy era
rosy expectation
rosy finch
rosy outlook
rosy pastor
rosy-armed
rosy-blushing
rosy-bosomed
rosy-cheeked
rosy-colored
rosy-crimson
rosy-dancing
rosy-eared
rosy-faced
rosy-finger'd morn
rosy-fingered
rosy-hued
rosy-lipped
rosy-purple
rosy-red
rosy-tinted
rosy-tipped
rosy-toed
rosy-warm
rot grass
rot-gut
rot-steep
rotary cultivator
rotary current
rotary drill
rotary engine
rotary gap
rotary hoe
rotary photogravure
rotary plough
rotary plow
rotary press
rotary pump
rotary shutter
rotary storm
rotary tiller
rotary wing
rotary-beam antenna
rotary-cut
rotary-piston engine

rotary-wing aircraft
rotating prism
rotating spit
rotation axis
rotation band
rotation of axes
rotation pool
rotation-inversion axis
rotational motion
rote learning
rote memory
rote song
rother nail
roto section
rotogravure press
rotor cloud
rotor motor
rotor plane
rotor ship
rott goose
rotten at
rotten at the core
rotten borough
rotten break
rotten egg
rotten humor
rotten
ice
rotten luck
rotten row
rotten smell
rotten stop
rotten to the core
rotten-dry
rotten-egg
rotten-hearted
rotten-heartedly
rotten-heartedness
rotten-minded
rotten-planked
rotten-red
rotten-rich
rotten-ripe
rotten-stone
rotten-throated
rotten-timbered
rotundi-
rotundo-

rotundo-ovate
rouge et noir
rouge plant
rough air
rough bent
rough bluegrass
rough breathing
rough cast
rough copy
rough corners
rough diamond
rough draft
rough edges
rough fish
rough go
rough guess
rough in
rough it
rough leaf
rough loader
rough log
rough measure
rough out
rough outline
rough passage
rough puff pastry
rough sea
rough sketch
rough spot
rough stuff
rough surface
rough trade
rough turner
rough up
rough usage
rough water
rough weather
rough wine
rough woodbine
rough-and-readiness
rough-and-ready
rough-and-tumble
rough-backed
rough-barked
rough-bearded
rough-bedded
rough-billed
rough-blustering

rough-board
rough-bordered
rough-cast
rough-cheeked
rough-clad
rough-clanking
rough-coat
rough-coated
rough-cut
rough-draw
rough-dried
rough-dry
rough-drying
rough-edge
rough-edged
rough-enter
rough-face
rough-faced
rough-feathered
rough-finned
rough-foliaged
rough-footed
rough-form
rough-fruited
rough-furrowed
rough-grained
rough-grind
rough-grinder
rough-grown
rough-hackle
rough-hackled
rough-haired
rough-handed
rough-handedness
rough-headed
rough-hew
rough-hew
them how we will
rough-hewed
rough-hewing
rough-hewn
rough-hob
rough-hobbed
rough-hull
rough-jacketed
rough-keeled
rough-leaved
rough-legged

rough-legged buzzard
rough-legged hawk
rough-level
rough-lipped
rough-living
rough-looking
rough-mannered
rough-necked
rough-paved
rough-plain
rough-plane
rough-plastered
rough-plow
rough-plumed
rough-podded
rough-point
rough-ream
rough-reddened
rough-rider
rough-ridged
rough-roll
rough-sawn
rough-scaled
rough-seeded
rough-shape
rough-sketch
rough-skinned
rough-spirited
rough-spoken
rough-square
rough-stalked
rough-stemmed
rough-stone
rough-stringed
rough-surfaced
rough-swelling
rough-tailed
rough-tanned
rough-tasted
rough-textured
rough-thicketed
rough-toned
rough-tongued
rough-toothed
rough-tree
rough-tree
rail
rough-turn

rough-turned
rough-voiced
rough-walled
rough-weather
rough-winged
rough-winged swallow
rough-write
rougher-down
rougher-out
rougher-up
roughing mill
roughing roll
roughing stone
roughing-in
roughly speaking
roulette table
roulette wheel
round a bend
round a corner
round a point
round about
round and round
round angle
round arch
round as a ball
round clam
round dance
round dancing
round down
round hand
round heart
round herring
round in
round kumquat
round lot
round number
round of applause
round of beef
round of drinks
round of pleasure
round of pleasures
round of visits
round off
round on
round out
round pace
round robin
round scale

round seizing
round shot
round steak
round sum
round table
round the bend
round the clock
round to
round top
round tower
round trade
round transaction
round trip
round turn
round turn and half hitch
round turn in the hawse
round up
round
 whitefish
round window
round-about-face
round-arch
round-arched
round-arm
round-arm blow
round-armed
round-backed
round-barreled
round-bellied
round-beset
round-billed
round-blazing
round-bodied
round-boned
round-bottomed
round-bowed
round-bowled
round-built
round-cell sarcoma
round-celled
round-cornered
round-crested
round-dancer
round-eared
round-edge
round-edged
round-end
round-eyed

round-faced
round-fenced
round-footed
round-fruited
round-furrowed
round-hand
round-handed
round-headed
round-heart
round-hoofed
round-horned
round-house
round-leafed
round-leaved
round-leaved dogwood
round-limbed
round-lipped
round-lobed
round-made
round-mouthed
round-nosed
round-podded
round-pointed
round-ribbed
round-rolling
round-rooted
round-seeded
round-shapen
round-shouldered
round-shouldred
round-sided
round-skirted
round-spun
round-stalked
round-table
round-table conference
round-tailed
round-the-clock
round-toed
round-topped
round-trip
round-trip ticket
round-tripper
round-trussed
round-turning
round-up
round-visaged
round-winged

round-wombed
round-worm
roundabout
 chair
roundabout system
roundabout way
rounded out
roundheaded apple tree borer
roundhouse curve
rounding adz
rounding off
rounding out
rounding-out
roundish-deltoid
roundish-faced
roundish-featured
roundish-leaved
roundish-obovate
roundish-oval
roundish-ovate
roundish-shaped
roundnose chisel
rouse out
rout cake
rout chair
rout out
rout seat
route army
route march
route marker
route nationale
route order
route step
route survey
router patch
router plane
routing plane
rove beetle
rove iron
rove punch
rove-beetle
rove-over
rover ball
roving commission
roving iron
row away
row crop
row culture

row dry
row galley
row house
row of buttons
row of pins
row over
row vector
row-barge
row-boat
row-de-dow
row-dow-dow
row-off
row-port
rowan tree
rowan-tree
rowdy-dowdy
rowed of all
rowing boat
rowing crew
rowing machine
rowing port
rowlock arch
royal Canadian
royal antler
royal assent
royal authority
royal blue
royal coachman
royal
 colony
royal crown
royal duke
royal fern
royal fizz
royal flush
royal grant
royal icing
royal insignia
royal jelly
royal lily
royal marriage
royal mast
royal oak
royal palm
royal pendulum
royal personage
royal pink
royal poinciana

royal prerogative
royal purple
royal quarto
royal red
royal road
royal seat
royal stag
royal standard
royal tennis
royal warrant
royal water lily
royal-born
royal-chartered
royal-hearted
royal-rich
royal-souled
royal-spirited
royal-towered
royston crow
ruat caelum
rub against
rub against the grain
rub along
rub away
rub down
rub elbows with
rub in
rub iron
rub it in
rub noses
rub off
rub off corners
rub on
rub out
rub salt in the wound
rub the lamp
rub the picture off a nickel
rub the print off a dollar bill
rub the right way
rub the ring
rub the wrong way
rub up
rub your eyes
rub your hands
rub-a-dub
rub-dub
rubaiyat stanza
rubarth's disease

rubber ball
rubber band
rubber bandage
rubber cement
rubber check
rubber cheque
rubber cloth
rubber dinghy
rubber
gloves
rubber goods
rubber hydrocarbon
rubber knife
rubber latex
rubber mallet
rubber oil
rubber plant
rubber plate
rubber shoes
rubber snake
rubber spreader
rubber stamp
rubber tissue
rubber tree
rubber varnisher
rubber vine
rubber-base paint
rubber-block print
rubber-coated
rubber-collecting
rubber-cored
rubber-covered
rubber-cutting
rubber-down
rubber-faced
rubber-growing
rubber-headed
rubber-lined
rubber-mixing
rubber-off
rubber-producing
rubber-proofed
rubber-reclaiming
rubber-set
rubber-slitting
rubber-soled
rubber-spreading
rubber-stamp

rubber-testing
rubber-tired
rubber-varnishing
rubber-yielding
rubberneck tour
rubbing alcohol
rubbing away
rubbing block
rubbing off
rubbing out
rubbing stone
rubbing varnish
rubbing-stone
rubbish bin
rubbish heap
rubbish unloader
rubble car
rubble masonry
rubble-work
rube faction
rube town
rubella vaccine
rubicon bezique
rubicon piquet
rubidium-strontium dating
ruby blende
ruby copper
ruby fly
ruby glass
ruby grass
ruby pin
ruby port
ruby
red
ruby roller
ruby silver
ruby spaniel
ruby spinel
ruby sulphur
ruby wood
ruby zinc
ruby-berried
ruby-budded
ruby-circled
ruby-colored
ruby-crested
ruby-crowned
ruby-crowned kinglet

ruby-eyed
ruby-faced
ruby-headed
ruby-hued
ruby-lipped
ruby-lustered
ruby-necked
ruby-red
ruby-set
ruby-studded
ruby-throated
ruby-throated hummingbird
ruby-tinctured
ruby-tinted
ruby-toned
ruby-visaged
ruck up
rudder amidships
rudder angle
rudder band
rudder bar
rudder brake
rudder chain
rudder coat
rudder crosshead
rudder fish
rudder horn
rudder pedals
rudder pendant
rudder snug
rudder tackle
rudder torque
rudder-fish
ruddy duck
ruddy-bright
ruddy-brown
ruddy-cheeked
ruddy-colored
ruddy-complexioned
ruddy-faced
ruddy-gold
ruddy-haired
ruddy-headed
ruddy-leaved
ruddy-purple
ruddy-spotted
rude awakening
rude health

rude justice
rude reproach
rude-carved
rude-ensculptured
rude-fanged
rude-fashioned
rude-featured
rude-growing
rude-hewn
rude-looking
rude-made
rude-mannered
rude-spoken
rude-spokenrude-spun
rude-spun
rude-thoughted
rude-tongued
rude-washed
rudge
 wash
rue anemone
rue bargain
rue fern
rue oil
rue spleenwort
rue the day
ruff-coat
ruff-necked
ruff-tree
ruffed grouse
ruffian-like
ruffle your feathers
ruffle-
ruffle-headed
ruffled feelings
ruffy-tuffy
rufi-
rufo-
rufous-backed
rufous-banded
rufous-bellied
rufous-billed
rufous-breasted
rufous-brown
rufous-buff
rufous-chinned
rufous-colored
rufous-crowned

rufous-edged
rufous-haired
rufous-headed
rufous-hooded
rufous-naped
rufous-necked
rufous-rumped
rufous-spotted
rufous-tailed
rufous-tinged
rufous-toed
rufous-vented
rufous-winged
rufous-yellow
rufter hood
rufter-hood
rufty-tufty
rug designer
rug gown
rug maker
rug-cutter
rug-cutting
rug-gowned
rugby league
rugby union
rugged health
rugged individualism
rugged individualist
rugosa rose
rugose-leaved
rugose-punctate
ruhmkorff coil
ruin agate
ruin marble
ruin-breathing
ruin-crowned
ruin-heaped
ruin-hurled
ruin-loving
rule against
rule by terror
rule joint
rule nisi
rule of action
rule
 of conduct
rule of deduction
rule of eleven

rule of might
rule of nature
rule of the road
rule of the sword
rule of three
rule of thumb
rule off
rule out
rule over
rule the roost
rule with a rod of iron
rule with an iron fist
rule with an iron hand
rule-joint
rulebook slowdown
ruled out
ruled surface
ruled-out
ruler of th' inverted year
ruler-straight
rules committee
rules of conduct
rules of language
rules of war
ruling circle
ruling circles
ruling class
ruling classes
ruling elder
ruling engine
ruling machine
ruling out
ruling passion
ruly English
rum barge
rum blossom
rum cherry
rum essence
rum hound
rum mill
rum one
rum punch
rum ram ruf
rum shrub
rum sucker
rum truffle
rum-bred
rum-crazed

rum-drinking
rum-dum
rum-fired
rum-flavored
rum-hole
rum-mill
rum-nosed
rum-producing
rum-selling
rum-smelling
rumble seat
rumble-bumble
rumble-tumble
ruminate over
rummage out
rummage sale
rumored about
rump bone
rump roast
rump steak
rump-fed
rumpled feathers
rumpus room
run a chance
run a
comparison
run a deficit
run a good chance
run a race
run a sample
run a specimen
run a temperature
run a tight ship
run a tilt
run a tilt at
run about
run abreast
run across
run afoul of
run after
run against
run aground
run along
run amok
run amuck
run an experiment
run around
run around with

run at
run at flank speed
run away
run away from
run away with
run back
run before
run before the wind
run before you can walk
run broadside on
run by
run circles around
run counter to
run down
run down the latitude
run down the wind
run dry
run end on
run for
run for it
run for office
run for your life
run for your money
run foul of
run from
run head and head
run head on
run in
run in couples
run in opposition to
run in pursuit of
run in the blood
run in the family
run in the head
run in with
run interference for
run into
run into a brick wall
run into a corner
run into danger
run into debt
run into money
run into port
run into the ground
run its course
run like a scared rabbit
run like mad
run

low
run mad
run mad after
run neck and neck
run of luck
run of the cards
run of the mill
run of things
run off
run off at the mouth
run off with
run on
run on in a groove
run on like a mill race
run on the rocks
run out
run out a rope
run out a warp
run out of
run out of patience
run out of steam
run out of time
run out of town
run out on
run over
run parallel
run parallel to
run prow on
run ragged
run rings around
run riot
run scared
run short
run short of
run smack into
run smoothly
run the chance
run the eye over
run the eye through
run the fingers over
run the gauntlet
run the hazard
run the risk
run the show
run through
run to
run to earth
run to seed

run to waste
run together
run true to form
run true to type
run under bare poles
run up
run up a bill
run up a score
run up against
run up an account
run upon
run upon a bank
run wide open
run wild
run with
run with the pack
run with the wind
run with the wind quartering
run you hard
run your eye over
run your head against
run-about
run-around
run-down
run-down
neighborhood
run-in
run-of-mill
run-of-mine
run-of-paper
run-of-the-mill
run-of-the-mine
run-on
run-on sentence
run-out
run-over
run-through
run-up
runaround, the
runaway ship
runaway shop
runaway victory
runcible spoon
rune-bearing
rune-inscribed
rune-staff
rune-stave
rune-stone

rung of the ladder
runic alphabet
runic character
runic symbol
runic verse
runner and tackle
runner bean
runner foot
runner peanut
runner stick
runner tackle
runner-up
runners-up
running English
running account
running away
running board
running bond
running bowline
running bowsprit
running broad jump
running commentary
running dive
running dog
running down
running engagement
running fight
running fire
running fit
running for office
running free
running gaff
running gate
running gear
running hand
running head
running high jump
running in
running in the blood
running in the race
running in the strain
running jump
running knot
running light
running livestock
running mad
running martingale
running

mate
running myrtle
running noose
running out of time
running over
running pine
running rhythm
running rigging
running sore
running start
running stitch
running story
running text
running title
running track
running water
running wild
running-birch
running-down clause
running-out fire
running-out of the sands
runo-
runoff election
runoff primary
runway light
runway lights
rupert's drop
rupture yourself
ruptured duck
rural dean
rural deanery
rural delivery
rural district
rural economics
rural economy
rural free delivery
rural idiocy
rural market
rural route
rural science
rus in urbe
rush about
rush ahead
rush along
rush around
rush at
rush basket
rush bearing

rush broom
rush candle
rush daffodil
rush garlic
rush grass
rush hour
rush in
rush into
rush light
rush lily
rush marsh grass
rush of emotion
rush off
rush order
rush ring
rush through
rush to the assistance of
rush up on one
rush up on you
rush wheat
rush-bearer
rush-bearing
rush-bordered
rush-bottomed
rush-candle
rush-floored
rush-fringed
rush-girt
rush-grown
rush-hour
rush-leaved
rush-like
rush-margined
rush-ring
rush-seated
rush-stemmed
rush-strewn
rush-wove
rush-woven
russel
 cord
russell's viper
russet coat
russet-backed
russet-bearded
russet-brown
russet-coated
russet-colored

russet-golden
russet-green
russet-pated
russet-robed
russet-roofed
russia leather
russian blue
russian olive
russian thistle
russian wolfhound
russo-
rust brown
rust bucket
rust cement
rust coat
rust fungus
rust joint
rust mite
rust of antiquity
rust together
rust-cankered
rust-colored
rust-complexioned
rust-eaten
rust-preventing
rust-proofed
rust-red
rust-removing
rust-resisting
rust-stained
rust-worn
rust-yellow
rustic region
rustic style
rustic work
rustle up
rusts smuts
rusty black
rusty blackbird
rusty dab
rusty gum
rusty-branched
rusty-brown
rusty-coated
rusty-collared
rusty-colored
rusty-crowned
rusty-dusty

rusty-fusty
rusty-leaved
rusty-looking
rusty-red
rusty-rested
rusty-spotted
rusty-throated
ruthenium oxide
ruthenium
 red
rutherford atom
rye bread
rye grass
rye rust
rye smut
rye whiskey
rye whisky
rye-bread
rye-brome
rye-grass
s ap
s os
s t
s'il vous pla
s'il vous plait
sa sa
sab-cat
sabai grass
sabbath school
sabbath-day
sabbatical leave
sabbatical year
saber bean
saber fish
saber knot
saber rattling
saber shin
saber-legged
saber-rattling
saber-shaped
saber-toothed
saber-toothed cat
saber-toothed tiger
sabicu wood
sable antelope
sable iron
sable night
sable-bordered

sable-cinctured
sable-cloaked
sable-colored
sable-hooded
sable-lettered
sable-robed
sable-spotted
sable-stoled
sable-suited
sable-vested
sable-vested Night
sable-visaged
sabre-toothed tiger
sac de nuit
sac fungus
sac-a-lait
sac-wrist
sacchar-
saccharic acid
saccharifying enzyme
saccharin insoluble
saccharin sodium
saccharine sorghum
saccharo-
saccharolactic acid
sacer vates
sachet powder
sack baler
sack baling
sack beater
sack borer
sack carrier
sack checker
sack cleaner
sack cloud
sack coal
sack coat
sack collector
sack cutter
sack
 doubler
sack dress
sack duty
sack elevator
sack emptier
sack examiner
sack hand
sack hoist

sack holder
sack lifter
sack machinist
sack maker
sack mender
sack moth
sack out
sack packer
sack printer
sack race
sack racer
sack racing
sack repairer
sack running
sack searcher
sack sewer
sack shaker
sack shoot
sack sorter
sack store
sack suit
sack superintendent
sack tackle
sack the
sack time
sack tree
sack up
sack weight
sack-bearer
sack-coated
sack-formed
sack-sailed
sack-shaped
sack-winged
sackcloth and ashes
sacking needle
sacr-
sacra peregrina
sacrament chapel
sacrament cloth
sacrament house
sacrament of matrimony
sacramental anointment
sacramental offering
sacramental wine
sacred Nine
sacred anchor
sacred article

sacred baboon
sacred bamboo
sacred calling
sacred canon
sacred cow
sacred ibis
sacred lotus
sacred mushroom
sacred music
sacred orders
sacred quality
sacred relics
sacred thread
sacred unction
sacred writings
sacred, the
sacred-bean family
sacrifice bunt
sacrifice fly
sacrifice
 hit
sacrifice yourself for
sacrificial anode
sacring bell
sacring-bell
sacro-
sacro-uterine
sad cake
sad case
sad disappointment
sad of heart
sad person
sad sack
sad sack of shit
sad times
sad tree
sad work
sad-a-vised
sad-colored
sad-eyed
sad-faced
sad-iron
sad-looking
sad-natured
sad-paced
sad-seeming
sad-tuned
sad-voiced

saddle band
saddle bar
saddle blanket
saddle block
saddle boiler
saddle bracket
saddle carpenter
saddle case
saddle chimes
saddle clip
saddle crutch
saddle currier
saddle cutter
saddle feathers
saddle fitter
saddle flange
saddle flap
saddle fungus
saddle gall
saddle girth
saddle glacier
saddle grafting
saddle gun
saddle hackle
saddle hand
saddle hip
saddle horn
saddle horse
saddle house
saddle hub
saddle iron
saddle joint
saddle key
saddle lap
saddle lashing
saddle leather
saddle maker
saddle making
saddle mat
saddle nail
saddle of mutton
saddle on
saddle ox
saddle oxford
saddle oyster
saddle pad
saddle pile
saddle piling

saddle pin
saddle pistol
saddle plant
saddle
plate
saddle pocket
saddle point
saddle pommel
saddle press
saddle rack
saddle reef
saddle rock
saddle roof
saddle room
saddle rug
saddle seam
saddle seamer
saddle seat
saddle shell
saddle shoe
saddle skirt
saddle soap
saddle sore
saddle spot
saddle spring
saddle staple
saddle stirrup
saddle stitch
saddle stitcher
saddle stitching
saddle stone
saddle strap
saddle tank
saddle trunk
saddle upon
saddle wire stitch
saddle wiring
saddle with
saddle withers
saddle worker
saddle-backed
saddle-bag
saddle-billed
saddle-bow
saddle-check chair
saddle-cloth
saddle-fast
saddle-galled

saddle-girt
saddle-graft
saddle-nosed
saddle-shaped
saddle-sore
saddle-spotted
saddle-stitch
saddle-tree
saddle-wired
saddleback roof
saddleback stitch
sadist torturer
sadistic cruelty
saeva indignatio
safari ant
safari jacket
safari park
safari suit
safe and sound
safe builder
safe district
safe edge
safe finisher
safe fitter
safe hands
safe haven
safe lifter
safe lock
safe maker
safe painter
safe period
safe
 stuffer
safe-bestowed
safe-blower
safe-borne
safe-breaker
safe-conduct
safe-cracker
safe-deposit
safe-deposit box
safe-deposit vault
safe-edge file
safe-hidden
safe-hold
safe-keeping
safe-marching
safe-moored

safe-sequestered
safe-time
safeguarding duty
safety arch
safety belt
safety bicycle
safety bolt
safety buoy
safety cage
safety car
safety catch
safety chain
safety clause
safety control
safety curtain
safety disk
safety dog
safety edge
safety equipment
safety explosive
safety factor
safety film
safety first
safety funnel tube
safety fuse
safety fuze
safety glass
safety hanger
safety hoist
safety hook
safety island
safety isle
safety lamp
safety lift
safety link
safety lintel
safety lock
safety loop
safety man
safety match
safety nut
safety paper
safety pin
safety pinion
safety plug
safety rail
safety razor
safety roller

safety setscrew
safety shoes
safety spring
safety squeeze
safety squeeze play
safety stop
safety switch
safety switchboard
safety tire
safety tube
safety valve
safety
 wire
safety zone
safety-deposit
safety-deposit box
safety-deposit vault
safety-fund system
safety-pin
safety-valve
safflower carmine
safflower oil
safflower red
saffron cake
saffron cordial
saffron crocus
saffron gatherer
saffron kiln
saffron oil
saffron plum
saffron robe
saffron thistle
saffron veil
saffron yellow
saffron-colored
saffron-hued
saffron-yellow
safrano pink
sag rod
sag to leeward
saga novel
sage Derby
sage ale
sage apple
sage brush green
sage cheese
sage chippy
sage cock

sage green
sage grouse
sage hare
sage hen
sage mullein
sage oil
sage rabbit
sage sparrow
sage tea
sage thrasher
sage tree
sage willow
sage wine
sage wormwood
sage-colored
sage-covered
sage-leaf
sage-leaf mullein
sage-leaved
sagging in folds
sagging market
sagittal suture
sago fern
sago flour
sago grass
sago palm
sago plant
sago spleen
sago tree
sahuca bean
sail against the wind
sail arm
sail away
sail away from
sail before the wind
sail burton
sail by the wind
sail canvas
sail carrier
sail close to
the wind
sail close-hauled
sail closer to the wind
sail coast-wise
sail down the wind
sail drill
sail duck
sail fine

sail fluke
sail for
sail free
sail full and by
sail furler
sail gang
sail grommet
sail ho
sail hook
sail hoop
sail in the teeth of the wind
sail in the wind's eye
sail into
sail into the wind's eye
sail keeper
sail lizard
sail loft
sail model
sail near the wind
sail needle
sail netting
sail off the wind
sail on the wind
sail packet
sail part
sail plan
sail pulley
sail room
sail rope
sail round
sail sewer
sail sewing
sail the ocean blue
sail the sea
sail thimble
sail thread
sail to the windward of
sail to windward
sail too close to the wind
sail too near the wind
sail trimmer
sail twine
sail under false colors
sail with the wind
sail with the wind aft
sail with the wind quartering
sail yard
sail-bearing

sail-borne
sail-broad
sail-carrying
sail-dotted
sail-filling
sail-over
sail-propelled
sail-stretched
sail-winged
sailfin sculpin
sailing aid
sailing auxiliary
sailing barge
sailing
 boat
sailing canoe
sailing car
sailing cruiser
sailing day
sailing dinghy
sailing instructions
sailing launch
sailing master
sailing match
sailing orders
sailing packet
sailing ship
sailing sucker
sailing trawler
sailing trim
sailing vessel
sailing vessels
sailing yacht
sailmaker's needle
sailmaker's palm
sailor blue
sailor boy
sailor cap
sailor fish
sailor gang
sailor hat
sailor helmsman
sailor laborer
sailor lad
sailor phrase
sailor plant
sailor suit
sailor tie

sailor's breastplate
sailor's choice
sailor's knot
sailor's-choice
sailor-fashion
sailor-fisherman
sailor-looking
sailor-mind
sailor-poet
sailor-soul
sailor-train
sailors' snug harbor
saint agnes's eve
saint andrews's cross
saint anthony's cross
saint anthony's fire
saint bernard
saint elmo's fire
saint louis encephalitis
saint maker
saint making
saint martin's summer
saint valentine's day
saint's day
saint's legend
saint-errant
saint-errantry
saint-john's-wort
saker falcon
sal alembroth
sal ammoniac
sal armoniac
sal
 soda
sal tartari
sal tree
sal volatile
sal-ammoniac
sal-prunella
salaam aleikum
salad bowl
salad burnet
salad course
salad days
salad dish
salad dressing
salad fork
salad herb

salad nicoise
salad oil
salad plate
salad rocket
salad server
salad spoon
salad tree
salai tree
salamander stove
salaried worker
salary deduction
salary savings insurance
sale and leaseback
sale at auction
sale block
sale by auction
sale note
sale price
sale to the highest bidder
sale-over
saleratus weed
sales account
sales agency
sales agent
sales book
sales campaign
sales check
sales engineer
sales floor
sales force
sales journal
sales ledger
sales manager
sales note
sales personnel
sales pitch
sales promotion
sales register
sales resistance
sales talk
sales tax
salfern stoneseed
sali-
salic law
salicyl alcohol glucoside
salicylic acid
salicylic aldehyde
salient angle

salient fact
salient point
salino-
salisbury steak
salivary digestion
salivary gland
salivary glands
salivary secretion
salk vaccine
salle a manger
salle
d'armes
salle d'attente
salle de danse
sallee-man
sallow-cheeked
sallow-colored
sallow-complexioned
sallow-faced
sallow-looking
sallow-visaged
sally forth
sally lunn
sally picker
sally port
salmon brick
salmon cloud
salmon color
salmon disease
salmon family
salmon fisher
salmon fisherman
salmon fishery
salmon fishing
salmon fly
salmon hatchery
salmon herring
salmon ladder
salmon loaf
salmon oil
salmon peal
salmon pink
salmon river
salmon rod
salmon smelt
salmon spear
salmon spearing
salmon steak

salmon tail
salmon trout
salmon wheel
salmon-breeding
salmon-colored
salmon-haunted
salmon-pink
salmon-rearing
salmon-red
salmon-tinted
salmon-trout
salon de beaute
salon music
saloon bar
saloon car
saloon carriage
saloon deck
saloon keeper
saloon pistol
salping-
salpingo-
salpingo-oophorectomy
salpingo-oophoritis
salpingo-ovariotomy
salpingo-ovaritis
salpingo-ureterostomy
salt a mine
salt acid
salt and pepper beard
salt and pepper hair
salt away
salt barrel
salt bed
salt beef
salt block
salt
bottom
salt box
salt brig
salt cake
salt cedar
salt chrome
salt coffer
salt conveyer
salt crusher
salt crystal
salt dome
salt down

salt drawer
salt dryer
salt duty
salt eel
salt elevator
salt evaporator
salt filler
salt filter
salt fireman
salt firm
salt fish
salt flat
salt furnace
salt garden
salt gauge
salt glaze
salt glazing
salt grainer
salt grape
salt grass
salt grinder
salt hay
salt heaver
salt holder
salt horse
salt in the wound
salt junk
salt kettle
salt lake
salt lick
salt loader
salt lump
salt maker
salt marsh
salt master
salt millman
salt mine
salt miner
salt of phosphorus
salt of sorrel
salt of the earth
salt out
salt pack
salt pan
salt pansmith
salt pit
salt plug
salt pocket

salt pond
salt pork
salt prairie
salt press
salt rammer
salt reed grass
salt refiner
salt rheum
salt room
salt screen
salt sea
salt seller
salt shaker
salt shop
salt shovel
salt soda
salt something away
salt spoon
salt spring
salt stain
salt stick
salt tax
salt tree
salt trimmer
salt trough
salt
 vase
salt washer
salt water
salt well
salt yard
salt-and-pepper
salt-box
salt-box house
salt-cat
salt-cellar
salt-cured
salt-edged
salt-free diet
salt-glazed
salt-glazed ware
salt-green
salt-hard
salt-incrusted
salt-laden
salt-loving
salt-marsh aster
salt-marsh caterpillar

salt-marsh fleabane
salt-marsh gerardia
salt-marsh goldenrod
salt-marsh grass
salt-marsh hen
salt-marsh mosquito
salt-marsh moth
salt-marsh terrapin
salt-meadow grass
salt-pan
salt-rheum weed
salt-rising
salt-rising bread
salt-spilling
salt-watery
salt-white
salted peanuts
salting bath
salting box
salting house
salting kit
salting pan
salting press
salting room
salting trough
salting tub
saltpeter paper
saltpeter rot
saltwater sailor
saltwater taffy
saltwort family
salus populi suprema lex esto
salutatory address
salute with
saluto dor
saluto doro
salvage corps
salvage man
salvation army
salve bug
salve mull
salver-shaped
salvia blue
salvinia family
salvo point
sam browne
sam browne belt
sam-sodden

samadera bark
same
 but different
same here
same mind
same old story
same, the
same-colored
same-featured
same-minded
same-seeming
same-sized
same-sounding
sample ballot
sample book
sample bottle
sample box
sample boy
sample cabinet
sample card
sample carrier
sample case
sample catcher
sample cutter
sample drawer
sample driller
sample envelope
sample holder
sample maker
sample making
sample ore
sample passer
sample phial
sample picker
sample point
sample porter
sample roll
sample room
sample space
sample tester
sample trunk
sample vial
sampling inspection
sampling shovel
samson post
samson's post
san benito
san jacinto day

san jose scale
san-gaku
sancho panza
sancho pedro
sancte bell
sanctimonious fraud
sanction mark
sanctioned behavior
sanctioned conduct
sanctuary knocker
sanctuary ring
sanctum sanctorum
sanctus bell
sanctus turret
sand anchor
sand badger
sand bar
sand bath
sand bear
sand bellows
sand belt
sand binder
sand bird
sand blackberry
sand blaster
sand blindness
sand block
sand blower
sand bluestem
sand
boil
sand brier
sand buffer
sand bug
sand bunker
sand burner
sand calciner
sand car
sand caster
sand casting
sand castle
sand cherry
sand chute
sand clam
sand clock
sand cloth
sand clover
sand cock

sand collar
sand column
sand cone
sand conveyer
sand corn
sand crab
sand crack
sand crater
sand cricket
sand cusk
sand dab
sand darter
sand digger
sand disease
sand diver
sand dollar
sand dredge
sand dropseed
sand drown
sand dune
sand eel
sand finish
sand flag
sand flask
sand flat
sand flea
sand flotation
sand flounder
sand fluke
sand fly
sand fox
sand gall
sand grape
sand grass
sand grouse
sand hill
sand hog
sand hoist
sand hole
sand hopper
sand hornet
sand in the eyes
sand jack
sand jet
sand lance
sand lark
sand launce
sand leek

sand lily
sand line
sand lizard
sand lob
sand lotter
sand martin
sand mason
sand mist
sand mixer
sand mold
sand molding
sand mole
sand monitor
sand mouse
sand mullet
sand myrtle
sand nettle
sand oat
sand pail
sand painter
sand painting
sand partridge
sand
pear
sand phlox
sand pig
sand pigeon
sand pike
sand pile
sand pillar
sand pine
sand pipe
sand pit
sand plain
sand plover
sand plum
sand prey
sand pride
sand pump
sand rat
sand reed
sand reef
sand reel
sand rocket
sand roll
sand roller
sand runner
sand saucer

sand scoop
sand screw
sand sedge
sand shark
sand shell
sand shoe
sand skink
sand skipper
sand smelt
sand snake
sand snipe
sand spout
sand spurry
sand squeteague
sand star
sand stargazer
sand strake
sand sucker
sand swallow
sand table
sand tester
sand tiger
sand trap
sand trout
sand tube
sand verbena
sand vetch
sand vine
sand violet
sand viper
sand walk
sand wasp
sand whiting
sand widgeon
sand yacht
sand-bag
sand-bar willow
sand-belt machine
sand-blight
sand-blind
sand-blindness
sand-blown
sand-bottomed
sand-box
sand-built
sand-buried
sand-burned
sand-cast

sand-cloth
sand-colored
sand-etched
sand-faced
sand-finished
sand-float finish
sand-floated
sand-fly bush
sand-fly fever
sand-glass
sand-groper
sand-hemmed
sand-hill
sand-hill
bloom
sand-hill crane
sand-hill rose
sand-hill rosemary
sand-hiller
sand-lime
sand-lime brick
sand-lot
sand-paper
sand-red
sand-strewn
sand-struck
sand-warped
sandal brick
sandal tree
sandalwood family
sandalwood oil
sandalwood tan
sandarac tree
sandbeach grape
sandbox tree
sanders blue
sandhill crane
sanding machine
sandpaper fig
sandpaper starwort
sandpaper tree
sands of the sea
sands of time
sandwich batten
sandwich beam
sandwich board
sandwich boy
sandwich cake

sandwich coin
sandwich compound
sandwich course
sandwich girder
sandwich man
sandwich shop
sandwich tern
sandy blight
sandy loam
sandy-bearded
sandy-bottomed
sandy-colored
sandy-flaxen
sandy-haired
sandy-pated
sandy-red
sandy-rufous
sane-minded
sang de bouf
sang-de-boeuf
sang-dragon
sang-froid
sanga-sanga
sanguinary ant
sanguine expectation
sanguine humor
sanguine-complexioned
sanitary belt
sanitary cordon
sanitary engineer
sanitary engineering
sanitary napkin
sanitary towel
sanitation-proof
sans appel
sans ceremonie
sans doute
sans
 facon
sans pareil
sans peur et sans reproche
sans reproche
sans serif
sans souci
sans-culotte
sans-culotterie
sans-culottic
sans-culottid

sans-culottide
sans-culottides
sans-culottish
sans-culottism
sans-culottist
sans-culottize
sans-serif
sant tree
santa claus
santa gertrudis
santal oil
santalwood oil
sanwa millet
sap cavity
sap chafer
sap fagot
sap flow
sap green
sap gum
sap pine
sap roller
sap rot
sap shield
sap stain
sap the foundations
sap the foundations of
sap the strength of
sap tree
sap tube
sap-green
sap-wood
sapele mahogany
saphenous vein
sapling cup
sapodilla family
sapodilla plum
saponification number
saponification value
sapota gum
sapper and miner
sapphire blue
sapphire-blue
sapphire-colored
sapphire-hued
sapphire-visaged
sappy spot
sapr-
sapro-

sapta-matri
sapucaia nut
sapucaia-nut family
sapwood rot
saratoga trunk
sarc-
sarco-
sarcoptic mange
sardine box
sardine can
sardine factory
sardine fishery
sardine oil
sardine shears
sardine tongs
sardonic grin
sargasso
 weed
sargassum crab
sargassum fish
sargassum pipefish
sargassum shell
sarsen stone
saru-gaku
sarus crane
sash bar
sash chain
sash cord
sash curtain
sash fast
sash fillister
sash holder
sash house
sash line
sash lock
sash maker
sash making
sash plane
sash pocket
sash ribbon
sash saw
sash ventilation
sash weight
sash window
sash-window
sashay along
sashay off
sassa gum

sassafras laurel
sassafras medulla
sassafras nut
sassafras oil
sassafras pith
sassafras tea
sassy bark
satan monkey
satanic cunning
satchel charge
satellite DNA
satellite relay
satellite sphinx
satellite status
satem language
satin bird
satin bowerbird
satin cloth
satin glass
satin grass
satin moth
satin sheeting
satin spar
satin sparrow
satin stitch
satin stone
satin sultan
satin walnut
satin weave
satin white
satin-backed
satin-faced
satin-finished
satin-flower
satin-leaved
satin-lidded
satin-lined
satin-shining
satin-smooth
satin-striped
satin-worked
satiric humor
satiric wit
satirical novel
satirical poetry
satisfaction
piece
satisfactory amount

satisfy requirements
satisfy your obligations
satisfy yourself
satisfy yourself on that point
saturated fat
saturated liquid
saturated vapor
saturating oil
saturation bombing
saturation current
saturation curve
saturation factor
saturation level
saturation point
saturation pressure
saturation raid
saturnalia of blood
satyr butterfly
satyr orchid
satyr play
sauba ant
sauce boat
sauce espagnole
sauce-alone
sauce-boat
sauce-crayon
saucer dome
saucer eye
saucer eyes
saucer lake
saucer-eyed
saucer-shaped
sauna bath
saunce bell
saunders blue
sauro-
sausage balloon
sausage bassoon
sausage curl
sausage dog
sausage filler
sausage maker
sausage making
sausage meat
sausage poisoning
sausage roll
sausage tree
sausage turning

sausage-fingered
sausage-shaped
saussurite gabbro
saut de basque
sauter aux yeux
sauts de basque
sauva ant
sauve qui peut
sauve-qui-peut
sauvignon blanc
savage-featured
savage-fierce
savage-hearted
savage-looking
savage-spoken
savage-wild
savanilla
 rhatany
savanna blackbird
savanna flower
savanna forest
savanna sparrow
savanna wattle
savanna woodland
savate expert
save and except
save as you earn
save face
save for a rainy day
save the necessity
save to fall back on
save to fall back upon
save up
save your bacon
save your breath
save your face
save your neck
save your skin
save yourself
save-all
saved by the bell
saved soul
savin oil
savin-leaved
saving clause
saving grace
saving your reverence
savings account

savings and loan association
savings bank
savings bank life insurance
savings bond
savings insurance
savings stamp
savoir faire
savoir vivre
savoir-faire
savoir-vivre
savor of
savor of wit
savoring of
savory-leaved
savory-leaved aster
savoy cabbage
saw arbor
saw bearing
saw bench
saw bill
saw bit
saw blade
saw brier
saw cabbage palm
saw carriage
saw clamp
saw cut
saw driver
saw fern
saw file
saw file temper
saw filer
saw filing
saw gate
saw gin
saw grass
saw grinder
saw guard
saw guide
saw handle
saw jointer
saw kerf
saw
knife
saw log
saw logs
saw machine
saw machinery

saw maker
saw palmetto
saw palmetto berry
saw pit
saw set
saw setting
saw shark
saw sharpener
saw steel
saw straightener
saw swage
saw table
saw teeth
saw the air
saw tooth
saw tree
saw vise
saw wedge
saw wood
saw wrack
saw wrest
saw-billed
saw-edged
saw-fly
saw-handled
saw-leaved
saw-pierce
saw-pit
saw-shaped
saw-tooth wave
saw-toothed
saw-whet
saw-whet owl
saw-wort
sawara cypress
sawarra nut
sawbuck table
sawdust trail
sawed-off
sawed-off shotgun
sawing block
sawing stop
sawn-off
sawtooth roof
sawyer beetle
sax-horn
saxe blue
saxicava sand

saxifrage family
saxifrage pink
say 'amen' to
say 'ditto' to
say 'no'
say 'yes' to
say a good word for
say a word to the wise
say again
say amen to
say aside
say aye
say by the way
say cast
say farewell
say good-bye
say goodbye to
say grace
say hello
say in defense
say in reply
say nay
say neither yes nor no
say no
say no to
say nothing
say one's say
say out
say over
say over again
say over and over
say
something nice about
say that all is for the best
say the word
say to yourself
say uncle
say what comes uppermost
say what you think
say yes
say your lesson
say your prayers
say your say
say-nothing
say-so
scab mite
scab over
scabbard fish

scabby mouth
scabby-head
scaff net
scaff-raff
scaffold nail
scala cordonata
scala media
scalar field
scalar product
scalar triple product
scald crow
scald' head
scald-fish
scalding hot
scale armor
scale beam
scale book
scale bug
scale buying
scale carp
scale caterpillar
scale charge
scale cordonate
scale degree
scale dove
scale down
scale drawing
scale duck
scale effect
scale fern
scale figure
scale fly
scale insect
scale leaf
scale louse
scale maker
scale making
scale micrometer
scale modulus
scale moss
scale off
scale passage
scale pipette
scale plan
scale plate
scale quail
scale reading
scale rule

scale selling
scale singing
scale stair
scale stone
scale the heights
scale the walls
scale wax
scale worm
scale-bearing
scale-board
scale-bright
scale-down
scale-tailed
scale-up
scaled
 partridge
scaled quail
scaled-down
scalene triangle
scalenus anterior
scalenus medius
scalenus posterior
scales of justice
scaling circuit
scaling down
scaling ladder
scaling-ladder
scallop budding
scallop-shell
scallop-shell moth
scalloped-edged
scalp dance
scalp lock
scalping boots
scalping iron
scalping-knife
scaly anteater
scaly mistletoe
scaly spleenwort
scaly tetter
scaly-bark
scaly-barked
scaly-finned
scaly-leg mite
scaly-stemmed
scaly-winged
scamper off
scan conversion

scan converter
scandal sheet
scandal-bearer
scandal-bearing
scandal-mongering
scandalous rumor
scandalum magnatum
scanning beam
scanning disk
scanning electron microscope
scanning line
scanning pattern
scanning speech
scansorial barbet
scant of
scant sufficiency
scantling number
scantling-draft vessel
scap net
scape grace
scape wheel
scape-bearing
scapho-
scapolite group
scapolite-gabbro
scapular medal
scapular-shaped
scapulo-
scar end
scar tissue
scar-bearer
scar-bearing
scar-clad
scar-faced
scar-seamed
scarab
 beetle
scarb-tree
scarce as hen's teeth
scarce-closed
scarce-cold
scarce-covered
scarce-discerned
scarce-found
scarce-heard
scarce-met
scarce-moving
scarce-parted

scarce-seen
scarce-told
scarce-warned
scarcely any
scarcely anything
scarcely ever
scarcely heard
scarcely like
scarcely to be anticipated
scarcely to be expected
scarcer than hen's teeth
scarcity price
scare away
scare bullfinch
scare goose
scare hell out of
scare off
scare one spitless
scare one stiff
scare shitless
scare stiff
scare the life out of
scare the pants off of
scare the shit out of
scare to death
scare up
scare-bear
scare-beggar
scare-bird
scare-devil
scare-fire
scare-fish
scare-fly
scare-hawk
scare-hog
scare-mouse
scare-peddler
scare-robin
scare-sheep
scare-sinner
scare-sleep
scare-thief
scare-vermin
scared rabbit
scared shitless
scared stiff
scared to death
scaredy-cat

scarf cloud
scarf joint
scarf maker
scarf making
scarf weld
scarf-skin
scarfed joint
scaring off
scarlet bugler
scarlet
 clematis
scarlet eggplant
scarlet fever
scarlet hat
scarlet larkspur
scarlet letter
scarlet lightning
scarlet lobelia
scarlet lychnis
scarlet madder
scarlet monkey flower
scarlet ocher
scarlet pimpernel
scarlet plume
scarlet runner
scarlet runners
scarlet sage
scarlet tanager
scarlet woman
scarlet-ariled
scarlet-barred
scarlet-berried
scarlet-blossomed
scarlet-breasted
scarlet-circled
scarlet-clad
scarlet-coated
scarlet-colored
scarlet-crested
scarlet-day
scarlet-faced
scarlet-flowered
scarlet-fruited
scarlet-gowned
scarlet-haired
scarlet-lined
scarlet-lipped
scarlet-red

scarlet-robed
scarlet-tipped
scarlet-vermillion
scarp wall
scarph joint
scat singing
scat-
scato-
scatological literature
scatter diagram
scatter pin
scatter pins
scatter rug
scatter seed
scatter shot
scatter to the winds
scatter-brain
scatter-brained
scatter-gun
scaup duck
scaup-duck
scavenger beetle
scavenger hunt
scavenger's daughter
scenario writer
scene cloth
scene dock
scene master
scene of action
scene
pack
scene painter
scene painting
scene plot
scene-stealer
scenery wagon
scenic artist
scenic railway
scenic view
scent article
scent bag
scent ball
scent bottle
scent box
scent from afar
scent gland
scent out
scent scale

scented fern
scented grass
scented oak fern
scented tea
scented verbena
scentless camomile
schappe silk
schedule of operation
schedule rate
scheduled airline
scheduled castes
scheduled territories
scheme arch
scheme of arrangement
scheme out
schenk beer
schick test
schiller spar
schist oil
schistosome dermatitis
schiz-
schizo-
schizoid personality
schizothymic personality
schlieren effect
schlieren method
schlieren photography
schlock house
schlock rock
schlock shop
schmidt system
schola cantorum
scholae cantorum
scholarly edition
scholastic institution
scholastic theology
school account
school age
school agent
school airship
school aptitude
school argument
school author
school badge
school bass
school bell
school bench
school board

school brush
school building
school
bus
school case
school chalk
school chapel
school chart
school child
school chum
school clamp
school clerk
school clock
school commissioner
school committee
school companion
school crayon
school day
school desk
school dictionary
school district
school divine
school divinity
school doctor
school door
school drilling
school edition
school emblem
school equipment
school ethics
school exercise
school fee
school for the handicapped
school friendship
school furniture
school garden
school globe
school grade
school grammar
school hour
school inspector
school kid
school lad
school land
school language
school library
school life
school locker

school logic
school manager
school manner
school map
school matter
school medicine
school model
school moralist
school morality
school name
school nurse
school of architecture
school of art
school of arts and crafts
school of communications
school of continuing education
school of design
school of drama
school of dramatic arts
school of education
school
of fine arts
school of graphic arts
school of philosophy
school of the performing arts
school of thought
school officer
school omnibus
school opinion
school organ
school pad
school paper
school pedantry
school pence
school philosopher
school philosophy
school phrase
school playground
school porter
school prank
school principal
school prize
school publication
school publisher
school question
school quiddity
school railing
school ranking

school rating
school register
school ring
school roof
school rule
school savings bank
school scale
school schnapper
school scissors
school seat
school seating
school section
school shark
school ship
school sign
school signal
school slate
school snapper
school strap
school subtlety
school superintendent
school supervisor
school survey
school syllogism
school table
school tablet
school tax
school team
school term
school testing
school theology
school tie
school trick
school vacation
school ventilator
school vise
school wage
school wagon
school warden
school
wardrobe
school welfare officer
school without walls
school year
school-age
school-bred
school-house
school-leaving

school-made
school-magisterial
school-taught
school-trained
schools and movements
schools of
schooner bark
schooner ketch
schooner rig
schooner-rigged
schorl-granite
schorl-rock
schreiner finish
sci-fi
sciara army worm
sciatic artery
sciatic foramen
sciatic neuritis
science dictionary
science fiction
science in the flesh
science of being
science of discursive thought
science of human behavior
science of language
science of man
science of mind
science of the mind
science of war
science-fiction novel
scientia est potentia
scientia scientiarum
scientific education
scientific exactness
scientific humanism
scientific management
scientific method
scientific name
scientific socialism
scientifically exact
scimitar foot
scimitar-shaped
scintillation counter
scintillation spectrometer
scire facias
scissor blade
scissor case
scissor chain

scissor kick
scissor maker
scissor making
scissor
 screw
scissor sharpener
scissor tooth
scissor-fashion
scissor-grinder
scissor-legs
scissor-tailed
scissor-winged
scissors blade
scissors case
scissors chain
scissors chair
scissors fault
scissors hardener
scissors kick
scissors maker
scissors making
scissors pipe
scissors sharpener
scissors truss
scissors worker
scissors-fashion
scissors-grinder
scissors-shaped
scissors-smith
scler-
sclero-
sclero-oophoritis
sclero-optic
sclerosing inflammation
sclerotium disease
scoff at
scoinson arch
scold's bridle
scolding bridle
scolding stool
scolding winds
sconcheon arch
scone cap
scoop bonnet
scoop driver
scoop neck
scoop neckline
scoop net

scoop out
scoop seat
scoop shovel
scoop the market
scoop wheel
scoop, the
scoop-net
scope of mind
scope of vision
scopol-
scops owl
scorched earth
scorched earth policy
scorched-earth tactics
scorching hot
score a breakthrough
score a bull's eye
score a success
score card
score off
score playing
score sheet
score up
scorn to accept
scorn to receive
scornful
 laugh
scornful smile
scorpion broom
scorpion bug
scorpion fish
scorpion fly
scorpion grass
scorpion iris
scorpion lobster
scorpion mouse
scorpion oil
scorpion plant
scorpion senna
scorpion shell
scorpion spider
scorpion thorn
scot and lot
scot-free
scotch broth
scotch cap
scotch roman
scotch terrier

scotch verdict
scotch whisky
scotch woodcock
scotch your wheel
scotch-hopper
scotch-irish
scotch-tape
scotch-taped
scotch-taping
scotland yard
scoto-
scottish gaelic
scottish rite
scottish terrier
scour out
scour the country
scourge top
scouring ball
scouring barrel
scouring cinder
scouring out
scouring pad
scouring rush
scouring stock
scout around
scout at
scout badge
scout boat
scout camp
scout car
scout commissioner
scout cruiser
scout executive
scout law
scout motto
scout oath
scout out
scout patrol
scout plane
scout salute
scout ship
scout sign
scout staff
scout training
scout vessel
scouting plane
scove kiln
scr-

scrabble up
scrabble your way up
scrag end
scrag whale
scram hand
scram-handed
scramble
 for
scramble up
scrambled eggs
scrap basket
scrap box
scrap heap
scrap iron
scrap log
scrap paper
scrap pudding
scrap rubber
scrap the plan
scrap value
scrap-book
scrap-heap
scrape acquaintance with
scrape along
scrape and save
scrape in
scrape into
scrape off
scrape out
scrape through
scrape together
scrape togetheror up
scrape up
scrape-finished
scrape-gut
scrape-shoe
scrape-trencher
scraper conveyer
scraper mat
scraper plane
scraper ring
scrappy con
scratch awl
scratch brusher
scratch carving
scratch coat
scratch comma
scratch cradle

scratch division
scratch each other's back
scratch feed
scratch figure
scratch gauge
scratch grass
scratch hit
scratch line
scratch out
scratch pad
scratch paper
scratch player
scratch sheet
scratch test
scratch the surface
scratch togetheror up
scratch wig
scratch-brush
scratch-coated
scratch-pad
scratch-penny
scratching post
scratching shed
scrawny horse
scream defiance
scream therapy
screaming color
screaming meemies, the
screaming-meemies
screech
 hawk
screech martin
screech owl
screech-owl
screen boy
screen door
screen facade
screen gate
screen grid
screen maker
screen making
screen memory
screen out
screen pass
screen plate
screen process
screen test
screen, the

screen-faced
screen-grid tube
screen-grid voltage
screen-plate process
screen-test
screen-wall counter
screen-wiper
screening constant
screening effect
screw alley
screw anchor
screw arbor
screw around
screw auger
screw axis
screw back
screw bean
screw bell
screw blower
screw bolt
screw box
screw bunter
screw cap
screw chain
screw collar
screw conveyer
screw conveyor
screw coupling
screw driver
screw eye
screw fern
screw gear
screw gearing
screw hook
screw jack
screw joint
screw key
screw machine
screw machinery
screw maker
screw making
screw mill
screw mooring
screw mouth
screw nail
screw nut
screw palm
screw peg

screw pile
screw piling
screw pine
screw plate
screw plug
screw pod
screw post
screw press
screw propeller
screw pump
screw punch
screw
 rivet
screw shell
screw shot
screw smile
screw spanner
screw spike
screw stair
screw stake
screw stay
screw steamer
screw stock
screw stone
screw stud
screw surface
screw tap
screw thread
screw tool
screw tree
screw up
screw up the eyes
screw up the works
screw up your courage
screw up your face
screw up your nerve
screw wedge
screw wheel
screw wrench
screw-back
screw-bound
screw-capped
screw-chasing
screw-clamped
screw-cutting
screw-cutting lathe
screw-down
screw-driven

screw-eyed
screw-geared
screw-lifted
screw-piled
screw-pin
screw-pine
screw-pine family
screw-pitch
screw-pitch gauge
screw-pod mesquite
screw-propelled
screw-shaped
screw-slotting
screw-stoppered
screw-thread fit
screw-thread tolerance
screw-threaded
screw-topped
screw-torn
screw-turned
screw-turning
screw-up
screwed up
screwed-up
screwing around
screwing machine
scribble-scrabble
scribbling block
scribbling lark
scribe saw
scribes and Pharisees
scribing block
scribing compass
scribing gouge
scribing iron
scrieve board
scrimmage
line
scrimp rail
scrimping bar
scrip certificate
scrip dividend
scrip issue
scrip-scrap
script girl
script lichen
script reader
script-writer

scritch-owl
scritch-scratch
scritch-scratching
scrive board
scrofula plant
scrolar line
scroll casing
scroll chuck
scroll creeper
scroll foot
scroll front
scroll gear
scroll lathe
scroll pediment
scroll saw
scroll step
scroll wheel
scroll-cut
scroll-like
scroll-shaped
scrooch down
scrootch down
scrouch down
scrounge around
scrub birch
scrub bird
scrub brush
scrub bush
scrub chestnut oak
scrub fowl
scrub hickory
scrub juniper
scrub myrtle
scrub nurse
scrub oak
scrub outscrub pine
scrub pine
scrub plane
scrub robin
scrub round
scrub sandalwood
scrub shrub
scrub turkey
scrub typhus
scrub up
scrub vine
scrub wren
scrub-bird

scrub-up
scrubbing board
scrubbing brush
scrubbing out
scrubbing up
scrubbing-brush
scrum half
scrutinize comparatively
scrutiny-proof
scuba diver
scuba diving
scuff plate
scuffle hoe
scullery maid
sculling oar
sculpting
 tool
sculptor's wax
sculptured glass
sculptured piece
scum of society
scum of the earth
scupper pipe
scupper shoot
scurvy grass
scurvy trick
scut work
scutch cane
scutch grass
scutching tow
scutellum rot
scuttle butt
scyphi-
scypho-
scythe maker
scythe making
scythe of Death
scythe of Time
scythe-armed
scythe-bearing
scythe-leaved
scythe-shaped
se defendendo
se tenant
se-
se-baptism
se-baptist
sea acorn

sea adder
sea air
sea anchor
sea anemone
sea anemones
sea ape
sea apple
sea apron
sea arrow grass
sea ash
sea aster
sea bag
sea bank
sea basket
sea bass
sea bat
sea bean
sea bear
sea beef
sea beet
sea bells
sea belt
sea bent
sea bindweed
sea bird
sea biscuit
sea bladder
sea blite
sea bloom
sea blossom
sea blubber
sea blue
sea boat
sea boots
sea bottle
sea boy
sea brant
sea breach
sea bread
sea bream
sea breeze
sea brief
sea buckthorn
sea bugloss
sea burdock
sea bush
sea butterfly
sea cabbage

sea cabin
sea calf
sea campion
sea captain
sea card
sea carp
sea cat
sea catfish
sea catgut
sea
cauliflower
sea celandine
sea change
sea chest
sea chickweed
sea chub
sea clam
sea cliff
sea cloth
sea club rush
sea clutter
sea coal
sea cob
sea cock
sea coco
sea coconut
sea colander
sea cole
sea colewort
sea combat
sea compass
sea connection
sea coot
sea corn
sea cow
sea cradle
sea crawfish
sea crayfish
sea creature
sea cress
sea crow
sea cucumber
sea cudweed
sea cushion
sea daffodil
sea dahlia
sea daisy
sea date

sea day
sea devil
sea dock
sea dog
sea dotterel
sea dove
sea dragon
sea drake
sea duck
sea dust
sea duty
sea eagle
sea ear
sea eel
sea egg
sea elephant
sea endive
sea fan
sea feather
sea fee
sea fennel
sea fern
sea fig
sea fight
sea fir
sea fire
sea fish
sea fisher
sea fisherman
sea fishery
sea fishing
sea flea
sea foalfoot
sea foam
sea fog
sea food
sea fox
sea fret
sea front
sea frontage
sea froth
sea furbelow
sea gasket
sea gate
sea gauge
sea gillyflower
sea girdle
sea god

sea gods
sea goose
sea gooseberry
sea goosefoot
sea gown
sea grape
sea grass
sea grass wrack
sea
green
sea gromwell
sea gudgeon
sea gull
sea gypsy
sea hanger
sea hare
sea hawk
sea hay
sea heath
sea hedgehog
sea hen
sea herdsman
sea herring
sea hog
sea holly
sea hollyhock
sea holm
sea horse
sea hulver
sea ice
sea island
sea island cotton
sea kale
sea kemps
sea kidney
sea king
sea kittie
sea lace
sea ladder
sea lamprey
sea lane
sea language
sea lark
sea laurel
sea lavender
sea law
sea lawyer
sea league

sea leather
sea legs
sea lemon
sea lentil
sea leopard
sea letter
sea lettuce
sea level
sea light
sea lily
sea line
sea lion
sea lizard
sea loach
sea louse
sea lovage
sea luce
sea lungs
sea lungwort
sea lyme grass
sea magpie
sea mail
sea mallow
sea mantis
sea margin
sea marigold
sea mat
sea matweed
sea meadow
sea membrane
sea mew
sea mile
sea milkwort
sea mink
sea mist
sea monk
sea monster
sea moss
sea moth
sea mouse
sea mud
sea mugwort
sea mulberry
sea mule
sea mullet
sea necklace
sea nettle
sea nymph

sea oak
sea oat
sea of flames
sea of grass
sea of troubles
sea officer
sea onion
sea
ooze
sea orach
sea orange
sea ore
sea otter
sea owl
sea oxeye
sea palm
sea panther
sea park
sea parrot
sea parsley
sea parsnip
sea partridge
sea pass
sea pay
sea pea
sea peach
sea pear
sea peat
sea pen
sea perch
sea perils
sea pheasant
sea pie
sea piet
sea pig
sea pigeon
sea pike
sea pimpernel
sea pincushion
sea pine
sea pink
sea plain
sea plantain
sea plume
sea poacher
sea poker
sea poppy
sea porcupine

sea post
sea post office
sea potato
sea power
sea preacher
sea pumpkin
sea purse
sea purslane
sea puss
sea quail
sea radish
sea ragweed
sea ragwort
sea ranger
sea rat
sea raven
sea reach
sea reed
sea rim
sea risk
sea risks
sea road
sea robber
sea robin
sea rocket
sea rod
sea room
sea rosemary
sea rover
sea ruffle
sea salmon
sea salt
sea sand
sea sand grass
sea sand reed
sea sandpiper
sea sands
sea sandwort
sea scallop
sea scorpion
sea scout
sea scouting
sea sedge
sea serpent
sea service
sea shell
sea shrub
sea silk

sea sled
sea slope
sea slug
sea smoke
sea snail
sea snake
sea snipe
sea
soldier
sea soldiers
sea spear grass
sea spider
sea spirit
sea spleenwort
sea squill
sea squirt
sea stack
sea staff
sea staghorn
sea star
sea starwort
sea steps
sea stickleback
sea stores
sea sulphurweed
sea surgeon
sea swallow
sea swine
sea tangle
sea term
sea thief
sea thong
sea thrift
sea time
sea titling
sea toad
sea tortoise
sea town
sea train
sea travel
sea tree
sea trip
sea trout
sea trumpet
sea turn
sea turnip
sea turtle
sea twine

sea unicorn
sea urchin
sea valve
sea vampire
sea wall
sea walnut
sea wand
sea warfare
sea water
sea wax
sea wheat
sea whip
sea whipcord
sea whiplash
sea whistle
sea widgeon
sea willow
sea withwind
sea wolf
sea woodcock
sea worm
sea wormwood
sea wrack
sea-bank
sea-bathed
sea-bean
sea-beast
sea-beat
sea-beaten
sea-bird
sea-boat
sea-born
sea-borne
sea-bounded
sea-bounding
sea-bred
sea-breeze
sea-broke
sea-built
sea-calf
sea-captain
sea-card
sea-circled
sea-cliff
sea-coal
sea-coast
sea-cock
sea-compelling

sea-convulsing
sea-cow
sea-cut
sea-deep
sea-deserted
sea-devil
sea-divided
sea-dog
sea-dragon
sea-driven
sea-eagle
sea-ear
sea-elephant
sea-encircled
sea-faring
sea-fern
sea-fight
sea-fighter
sea-fish
sea-flower
sea-foam
sea-food
sea-form
sea-fowl
sea-framing
sea-front
sea-gait
sea-gate
sea-girt
sea-god
sea-goddess
sea-going
sea-grape
sea-grass
sea-gray
sea-green
sea-gull
sea-heath
sea-heath
family
sea-hedgehog
sea-hen
sea-holly
sea-holm
sea-horse
sea-island
sea-island cotton
sea-kale

sea-kale beet
sea-kindliness
sea-kindly
sea-king
sea-lane
sea-lawyer
sea-legs
sea-level
sea-level pressure
sea-line
sea-lion
sea-lost
sea-louse
sea-loving
sea-maid
sea-maiden
sea-mark
sea-monk
sea-monster
sea-mouse
sea-nymph
sea-otter
sea-otter's-cabbage
sea-packed
sea-parrot
sea-pie
sea-piece
sea-pike
sea-pink
sea-plane
sea-poacher
sea-potent
sea-purse
sea-quake
sea-racing
sea-raven
sea-robin
sea-room
sea-rounded
sea-rover
sea-roving
sea-run
sea-running
sea-sailing
sea-salt
sea-sand
sea-saw
sea-scape

sea-scented
sea-scourged
sea-serpent
sea-service
sea-shell
sea-shore
sea-shouldering
sea-sick
sea-side
sea-slug
sea-snail
sea-snake
sea-snipe
sea-spider
sea-star
sea-surrounded
sea-swallow
sea-swallowed
sea-torn
sea-tossed
sea-tost
sea-traveling
sea-trout
sea-urchin
sea-wall
sea-walled
sea-wandering
sea-ware
sea-washed
sea-water
sea-water
green
sea-way
sea-weary
sea-wide
sea-wildered
sea-wolf
sea-wrack
sea-wrecked
seabeach morning-glory
seabeach sandwort
seacoast angelica
seacoast laburnum
seafaring man
seakale beet
seal brown
seal character
seal coat

seal cutter
seal cutting
seal cylinder
seal fisher
seal fisherman
seal fishery
seal fishing
seal hole
seal lock
seal maker
seal making
seal of approval
seal of confession
seal of secrecy
seal off
seal oil
seal point
seal press
seal ring
seal the doom of
seal up
seal your infamy
seal your lips
seal-brown
seal-point
sealed book
sealed move
sealed off
sealed orders
sealed-beam
sealing hole
sealing nut
sealing off
sealing tape
sealing wax
sealing-wax
sealyham terrier
seam blasting
seam face
seam
 lace
seam presser
seam roller
seam set
seam stitch
seam strip
seam weld
seam welding

seam-rent
seam-ripped
seam-ript
seaman apprentice
seaman branch
seaman gunner
seaman recruit
seaming dies
seaming lace
seamless stockings
seamy-sided
seaplane carrier
sear pin
search coil
search ephemeris
search for
search high heaven
search into
search lamp
search me
search mission
search out
search party
search plane
search radar
search room
search thoroughly
search through
search warrant
search your motives
search your soul
search-and-destroy mission
search-and-destroy operation
searching investigation
searchlight lantern
seared conscience
seashell pink
seashore heliotrope
seashore pea
seaside alder
seaside arrowgrass
seaside aster
seaside balsam
seaside bean
seaside bent
seaside brome grass
seaside crowfoot
seaside daisy

seaside finch
seaside gerardia
seaside goldenrod
seaside grape
seaside heliotrope
seaside knotweed
seaside laurel
seaside millet
seaside morning-glory
seaside oat
seaside oxeye
seaside
 painted-cup
seaside pea
seaside pimpernel
seaside pine
seaside plantain
seaside plum
seaside poppy
seaside radish
seaside sandwort
seaside sparrow
seaside spurge
season check
season crack
season of the year
season ticket
seasonal unemployment
seasoned hand
seasoned professional
seasoned salt
seasoned stock
seasoned understanding
seasoned veteran
seat angle
seat arm
seat back
seat bath
seat belt
seat board
seat bone
seat clip
seat cover
seat coverer
seat cushion
seat designer
seat maker
seat making

seat of affections
seat of authority
seat of government
seat of justice
seat of life
seat of power
seat of state
seat of thought
seat of war
seat owner
seat worm
seat yourself
seat-mile
seaweed fern
seaweed glue
seaweed green
seaweed isinglass
seaweed marquetry
sebaceous cyst
sebaceous gland
sebaceous glands
sebacic acid
sebi-
seborrheic dermatitis
secale cornutum
seclude yourself
seclusive personality
secobarbital sodium
second axiom of countability
second ballot
second banana
second
base
second baseman
second best
second birth
second blessing
second carbon
second category
second chamber
second childhood
second class
second coming
second cousin
second crop
second derivative
second detector
second draft

second edition
second empire
second estate
second fiddle
second floor
second growth
second hand
second helping
second in command
second intention
second job
second law of motion
second law of thermodynamics
second lieutenant
second line of defense
second look
second man
second mate
second mortgage
second mortgage bond
second nature
second officer
second paper
second papers
second person
second philosophy
second position
second prize
second rank
second reader
second reading
second self
second sex
second sight
second stomach
second story
second string
second stringer
second team
second thought
second thoughts
second to none
second wind
second youth
second-best
second-class
second-class mail
second-cut

second-cut file
second-degree
second-degree burn
second-drawer
second-feet
second-first
second-floor
second-foot
second-growth
second-guess
second-guesser
second-hand
second-handedness
second-in-command
second-line
 battleship
second-line destroyer
second-order reaction
second-rate
second-rateness
second-rater
second-sighted
second-sightedness
second-story
second-story man
second-story thief
second-story work
second-story worker
second-touch
secondary accent
secondary articulation
secondary battery
secondary burial
secondary cell
secondary color
secondary colour
secondary con
secondary condition
secondary contact
secondary diagonal
secondary digestion
secondary disease
secondary eardrum
secondary education
secondary electron
secondary emission
secondary evidence
secondary group

secondary infection
secondary intention
secondary issue
secondary modern school
secondary oocyte
secondary ordinary
secondary phloem
secondary planet
secondary plot
secondary processes
secondary propyl alcohol
secondary quality
secondary radiation
secondary road
secondary school
secondary
schooler
secondary sense
secondary sex character
secondary sex characteristic
secondary sexual characteristic
secondary shock
secondary spermatocyte
secondary stress
secondary syphilis
secondary wave
secondary xylem
secondary-emission tube
secondhand clothes
secondhand shop
secondhand store
seconds pendulum
secret agent
secret ballot
secret block
secret caucus
secret exit
secret grip
secret heart
secret ink
secret language
secret nailing
secret name
secret order
secret partner
secret passage
secret place
secret places

secret police
secret recesses of the heart
secret service
secret society
secret staircase
secret thoughts
secret writing
secret-false
secret-service
secretarial school
secretaries-general
secretary bird
secretary bookcase
secretary of legation
secretary of state
secretary-general
secretary-treasurer
secreto-inhibitory
section bar
section boss
section crew
section cutter
section eight
section gang
section hand
section line
section man
section mark
section mill
section
modulus
section paper
section plane
sector disk
sector gear
sector wheel
secular canoness
secular humanism
secular humanist
secular tertiaries
secular vicar
secure place in history
secure the engines
secure the main induction
secure your object
secured bond
secured loan
securi-

securities issue
security agreement
security analyst
security blanket
security clearance
security council
security force
security guard
security risk
sed-festival
sedan chair
sedan clock
sedan cruiser
sedan delivery truck
sedan landaulet
sedan limousine
sedative salt
sedge bird
sedge cane
sedge family
sedge fly
sedge grass
sedge hen
sedge root
sedge warbler
sedge wren
sediment bulb
sediment yeast
sedimentary clay
sedimentary rock
sedimentation coefficient
sedimentation test
sedition-proof
seduction-proof
see about
see action
see active duty
see after
see ahead
see as it really is
see at a glance
see badly
see beforehand
see both sides
see both sides of the question
see but one side of the question
see

combat
see daylight
see double
see eye to eye
see fit
see how the cat jumps
see how the cookie crumbles
see how the land lies
see how the wind blows
see if one can do
see in a special light
see in its true colors
see in one's mind
see in perspective
see in retrospect
see in the crystal ball
see into
see it out
see it through
see justice done
see life
see nothing
see nuances of difference
see of
see off
see only the good points of
see out
see over
see poorly
see red
see shades of difference
see that
see the cloven hoof
see the difference
see the future
see the inside of
see the light
see the light of day
see the lions
see the sights
see the special circumstances
see through
see through a glass
see through rose-colored glasses
see through the press
see to
see to it
see to the bottom of

see visions and dream dreams
see what can be done
see what you can do
see which way the cat jumps
see which way the land lies
see which way the wind blows
see with half an eye
see with your own eyes
see you
see
you alone
see you later
see you redressed
see you righted
see you through
see your way
see your way clear
see-bright
see-er
see-ho
see-through
seed ball
seed beetle
seed capsule
seed coat
seed coral
seed corn
seed cotton
seed crown
seed down
seed feed cup
seed fern
seed fish
seed hair
seed leaf
seed mesquite
seed money
seed oil cake
seed oyster
seed pearl
seed plant
seed planter
seed plants
seed plat
seed plate
seed plot
seed plow
seed pod

seed potato
seed screener
seed snipe
seed stitch
seed stock
seed tick
seed treatment
seed tree
seed vessel
seed weevil
seed-cake
seed-corn
seed-corn maggot
seed-eating bird
seed-lac
seed-lip
seed-pearl
seed-snipe
seed-time
seeding plow
seedtime of life
seeing as how
seeing distinctions
seeing double
seeing eye
seeing glass
seeing that
seek for
seek gapeseed
seek in law
seek justice
seek legal redress
seek out
seek peace
seek refuge
seek the company of
seek to
seek-sorrow
seem like
seem likely
seem to be
seem true
seenie bean
seep in
seer-fish
segment
 gear
segment rack

segmental arch
segmental phoneme
segmental saw
segmentation cavity
segmentation nucleus
segmentation sphere
sego lily
sei whale
seidlitz powders
seif dune
seine gang
seir-fish
seis-ing
seismic wave
seismo-
seize on
seize one of the facts
seize power
seize quartiers
seize the crown
seize the day
seize the mantle
seize the meaning
seize the mind
seize the present hour
seize the throne
seize upon
seize your mind
seized of
seized with
seizing stuff
seizing truck
seizure of power
sejant-erect
sejeant-erect
sel- dom
seldom ever
seldom if ever
seldom met with
seldom seen
select committee
selected passage
selected short subject
selected works
selection forest
selection principle
selection rule
selection system

selection value
selective assembly
selective attention
selective calculator
selective service
selective transmission
selective-head
selective-head lathe
selector switch
selen-
selenic acid
selenio-
selenious acid
selenium cell
seleno-
selenographic chart
self blue
self
 correlation
self destruction
self discharge
self examination
self incrimination
self psychologist
self psychology
self-
self-abandon
self-abandoned
self-abandoning
self-abandoningly
self-abandonment
self-abased
self-abasement
self-abasing
self-abdication
self-abhorrence
self-abhorring
self-ability
self-abnegating
self-abnegation
self-abnegatory
self-abominating
self-abomination
self-absorbed
self-absorption
self-abuse
self-abuser
self-accorded

self-accusation
self-accusative
self-accusatory
self-accused
self-accuser
self-accusing
self-acknowledged
self-acquaintance
self-acquainter
self-acquired
self-acquisition
self-acquitted
self-acted
self-acting
self-action
self-active
self-activity
self-actor
self-actualization
self-actualizing
self-actuating
self-adapting
self-adaptive
self-addiction
self-addressed
self-adhesion
self-adhesive
self-adjoint
self-adjustable
self-adjusting
self-adjustment
self-administer
self-administered
self-administering
self-admiration
self-admired
self-admirer
self-admiring
self-admission
self-adorer
self-adorned
self-adorning
self-adornment
self-adulation
self-advanced
self-advancement
self-advancer
self-advancing

self-advantage
self-advantageous
self-advertise
self-advertisement
self-advertiser
self-advertising
self-affair
self-affected
self-affecting
self-affectionate
self-affirmation
self-afflicting
self-affliction
self-afflictive
self-affrighted
self-agency
self-aggrandized
self-aggrandizement
self-aggrandizing
self-aid
self-aim
self-alighing
self-aligning
self-alignment
self-alinement
self-alining
self-amendment
self-amplifier
self-amputation
self-amusement
self-analysis
self-analytical
self-analyzed
self-anatomy
self-angry
self-annealing
self-annihilated
self-annihilation
self-annulling
self-answering
self-antithesis
self-apparent
self-applauding
self-applause
self-applausive
self-application
self-applied
self-applying

self-appointed
self-appointment
self-appreciating
self-appreciation
self-approbation
self-approval
self-approved
self-approver
self-approving
self-arched
self-arching
self-arising
self-asserting
self-assertingly
self-assertion
self-assertive
self-assertively
self-assertiveness
self-assertory
self-assigned
self-assumed
self-assuming
self-assumption
self-assurance
self-assured
self-assuredness
self-attachment
self-attracting
self-attraction
self-attractive
self-attribution
self-auscultation
self-authority
self-authorized
self-authorizing
self-aware
self-awareness
self-bailing
self-balanced
self-banished
self-banishment
self-baptizer
self-basting
self-beautiful
self-beauty
self-bedizenment
self-befooled
self-begetter

self-begotten
self-beguiled
self-being
self-belief
self-benefit
self-benefiting
self-besot
self-betrayal
self-betrayed
self-betraying
self-betrothed
self-bias
self-binder
self-binding
self-black
self-blame
self-blamed
self-blessed
self-blind
self-blinded
self-blinding
self-blood
self-boarding
self-boasted
self-boasting
self-boiled
self-bored
self-born
self-buried
self-burning
self-called
self-canceled
self-cancelled
self-canting
self-capacity
self-captivity
self-care
self-castigating
self-castigation
self-catalysis
self-catalyst
self-catering
self-causation
self-caused
self-center
self-centered
self-centered

self-contained
self-centeredly
self-centeredness
self-centering
self-centerment
self-centralization
self-centration
self-centred
self-centredly
self-centredness
self-chain
self-changed
self-changing
self-charging
self-charity
self-chastise
self-chastised
self-chastisement
self-chastising
self-cheatery
self-checking
self-chosen
self-christened
self-clamp
self-cleaning
self-clearance
self-closed
self-closing
self-cocker
self-cocking
self-cognition
self-cognizably
self-cognizance
self-coherence
self-coiling
self-collected
self-collectedness
self-collection
self-color
self-colored
self-colour
self-coloured
self-combating
self-combustion
self-command
self-commande
self-commendation
self-comment

self-commissioned
self-commitment
self-committal
self-committing
self-commune
self-communed
self-communication
self-communicative
self-communing
self-communion
self-comparison
self-compassion
self-compatible
self-compensation
self-competition
self-complacence
self-complacency
self-complacent
self-complacential
self-complacently
self-complaisance
self-completion
self-composed
self-composedly
self-composedness
self-comprehending
self-comprised
self-conceit
self-conceited
self-conceitedly
self-conceitedness
self-conceived
self-concentered
self-concentrated
self-concentration
self-concept
self-concern
self-concerned
self-concerning
self-concernment
self-condemnable
self-condemnant
self-condemnation
self-condemnatory
self-condemned
self-condemnedly
self-condemning
self-condemningly

self-conditioned
self-conditioning
self-conduct
self-confessed
self-confession
self-confidence
self-confident
self-confidently
self-confiding
self-confinement
self-confining
self-conflict
self-conflicting
self-conformance
self-confounding
self-confuted
self-congratulating
self-congratulation
self-congratulatory
self-conjugate
self-conjugately
self-conjugation
self-conquest
self-conscious
self-consciously
self-consciousness
self-consecration
self-consequence
self-consequent
self-conservation
self-conservative
self-conserving
self-consideration
self-considerative
self-considering
self-consistency
self-consistent
self-consistently
self-consoling
self-consolingly
self-constituted
self-constituting
self-consultation
self-consumed
self-consuming
self-consumption
self-contained
self-contained

ornament
self-containedly
self-containedness
self-containing
self-containment
self-contaminating
self-contamination
self-contemner
self-contemplation
self-contempt
self-content
self-contented
self-contentedly
self-contentedness
self-contentment
self-contracting
self-contraction
self-contradicter
self-contradicting
self-contradiction
self-contradictory
self-control
self-controlled
self-controller
self-controlling
self-convened
self-converse
self-convicted
self-convicting
self-conviction
self-cooking
self-cooled
self-correcting
self-correction
self-corrective
self-correspondent
self-corresponding
self-corrupted
self-counsel
self-coupler
self-covered
self-cozening
self-created
self-creating
self-creation
self-creative
self-credit
self-credulity

self-cremation
self-critical
self-critically
self-criticism
self-cruel
self-cruelty
self-cultivation
self-culture
self-culturist
self-cure
self-cutting
self-damnation
self-danger
self-deaf
self-debasement
self-debasing
self-debate
self-deceit
self-deceitful
self-deceitfulness
self-deceived
self-deceiver
self-deceiving
self-deception
self-deceptious
self-deceptive
self-declared
self-declaredly
self-dedicated
self-dedication
self-defeated
self-defeating
self-defence
self-defencive
self-defended
self-defense
self-defensive
self-defensory
self-defining
self-definition
self-deflated
self-deflation
self-degradation
self-deifying
self-dejection
self-delation
self-delight
self-delighting

self-deliverer
self-delivery
self-deluded
self-deluder
self-deluding
self-delusion
self-demagnetizing
self-denial
self-denied
self-deniedly
self-denier
self-denying
self-denyingly
self-dependence
self-dependency
self-dependent
self-dependently
self-depending
self-depraved
self-deprecating
self-deprecatingly
self-deprecation
self-depreciating
self-depreciation
self-depreciative
self-deprivation
self-deprived
self-depriving
self-derived
self-desertion
self-deserving
self-design
self-designer
self-desirable
self-desire
self-despair
self-destadv
self-destroyed
self-destroyer
self-destroying
self-destruction
self-destructive
self-destructive
urge
self-destructively
self-detaching
self-determination
self-determined

self-determining
self-determinism
self-detraction
self-developing
self-development
self-devised
self-devoted
self-devotedly
self-devotedness
self-devotement
self-devoting
self-devotion
self-devotional
self-devouring
self-dialog
self-dialogue
self-differentiating
self-differentiation
self-diffidence
self-diffident
self-diffusion
self-diffusive
self-diffusively
self-diffusiveness
self-digestion
self-dilated
self-dilation
self-diminishment
self-direct
self-directed
self-directing
self-direction
self-directive
self-director
self-diremption
self-disapprobation
self-disapproval
self-discernment
self-discharging
self-discipline
self-disciplined
self-disclosed
self-disclosing
self-disclosure
self-discoloration
self-discontented
self-discovered
self-discovery

self-discrepant
self-discrepantly
self-discrimination
self-disdain
self-disengaging
self-disgrace
self-disgraced
self-disgracing
self-disgust
self-dislike
self-disliked
self-disparagement
self-disparaging
self-dispatch
self-display
self-displeased
self-displicency
self-disposal
self-dispraise
self-disquieting
self-dissatisfaction
self-dissatisfied
self-dissecting
self-dissection
self-disservice
self-disserving
self-dissociation
self-dissolution
self-dissolved
self-distinguishing
self-distributing
self-distrust
self-distrustful
self-distrusting
self-disunity
self-divided
self-division
self-doctrine
self-dominance
self-domination
self-dominion
self-donation
self-doomed
self-dosage
self-doubt
self-doubting
self-dramatization
self-dramatizing

self-drawing
self-drinking
self-drive
self-driven
self-dropping
self-drown
self-dual
self-dualistic
self-dubbed
self-dumping
self-duplicating
self-duplication
self-ease
self-easing
self-eating
self-educated
self-education
self-effacement
self-effacing
self-effacingly
self-effacingness
self-effacive
self-effort
self-elaborated
self-elaboration
self-elation
self-elect
self-elected
self-election
self-elective
self-emitted
self-emolument
self-employed
self-employed
person
self-employer
self-employment
self-emptiness
self-emptying
self-enamored
self-enamoured
self-enclosed
self-endeared
self-endearing
self-endearment
self-energizing
self-energizing brake
self-energy

self-enforcing
self-engrossed
self-engrossment
self-enjoyment
self-enriching
self-enrichment
self-entertaining
self-entertainment
self-entity
self-erected
self-escape
self-essence
self-essentiated
self-esteem
self-esteeming
self-esteemingly
self-estimate
self-estimation
self-estrangement
self-eternity
self-evacuation
self-evaluation
self-evidence
self-evidencing
self-evidencingly
self-evident
self-evident
fact
self-evident truth
self-evidential
self-evidentism
self-evidently
self-evidentness
self-evolution
self-evolved
self-evolving
self-exaggerated
self-exaggeration
self-exaltation
self-exaltative
self-exalted
self-exalting
self-examinant
self-examination
self-examiner
self-examining
self-example
self-excellency

self-excitation
self-excite
self-excited
self-exciter
self-exciting
self-exclusion
self-exculpation
self-excuse
self-excused
self-excusing
self-executing
self-exertion
self-exhibited
self-exhibition
self-exile
self-exiled
self-exist
self-existence
self-existent
self-existing
self-expanded
self-expanding
self-expansion
self-expatriation
self-experience
self-experienced
self-explained
self-explaining
self-explanation
self-explanatory
self-explication
self-exploited
self-exploiting
self-exposed
self-exposing
self-exposure
self-expression
self-expressive
self-expressiveness
self-extermination
self-extolled
self-exultation
self-exulting
self-faced
self-fame
self-farming
self-fearing
self-fed

self-feed
self-feeder
self-feeding
self-feeling
self-felicitation
self-felony
self-fermentation
self-fertile
self-fertility
self-fertilization
self-fertilize
self-fertilized
self-fertilizer
self-figure
self-figured
self-filler
self-filling
self-fitting
self-flagellating
self-flagellation
self-flattered
self-flatterer
self-flattering
self-flattery
self-flowing
self-fluxing
self-focused
self-focusing
self-focussed
self-focussing
self-folding
self-fondest
self-fondness
self-forbidden
self-forgetful
self-forgetfully
self-forgetfulness
self-forgetting
self-forgettingly
self-formation
self-formed
self-forsaken
self-fountain
self-friction
self-frighted
self-fruitful
self-fruition
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duty
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self-infatuation
self-infection

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loan
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self-locating
self-locking
self-lost
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self-maceration
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self-manifestation
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self-martyrdom
self-mastered
self-mastering
self-mastery
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self-motion
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self-multiplying
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self-mutilation
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self-objectification
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self-oblivious
self-observation
self-observed
self-obsessed
self-obsession
self-occupation
self-occupied
self-offence
self-offense
self-offered
self-offering
self-oiling
self-opened
self-opener
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self-opiniativeness
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self-opinionatedly

self-opinionatedness
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self-oppressor
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self-ostentation
self-outlaw
self-outlawed
self-ownership
self-oxidation
self-paid
self-painter
self-pampered
self-pampering
self-panegyric
self-parasitism
self-parricide
self-partiality
self-paying
self-peace
self-penetrability
self-penetration
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self-perceptive
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self-perfectibility
self-perfecting
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self-perplexed
self-persuasion

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self-piquer
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self-poisedness
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triangle
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self-polluter
self-pollution
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self-prizing
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self-procurement
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self-reference
self-refinement
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self-vivacious
self-vivisector
self-vulcanizing

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self-watchfulness
self-weariness
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self-whipper
self-whipping
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self-will
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self-willedness
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self-wine
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self-worn
self-worship
self-worshiper
self-worshiping
self-worshipper
self-worshipping
self-worth
self-worthiness
self-wounded
self-wounding
self-writing
self-written
self-wrong
self-wrongly
self-wrought
selfish
 person
selfliquidating loan
sell a pig in a poke
sell at a loss
sell at a sacrifice
sell at auction
sell by auction
sell down the river
sell for

sell foreign
sell gold bricks
sell in futures
sell off
sell on consignment
sell on credit
sell one on
sell out
sell over
sell over the counter
sell retail
sell short
sell stocks
sell to the highest bidder
sell under the counter
sell up
sell wholesale
sell you a bill of goods
sell your life dearly
sell yourself
sell-off
sellenger's round
seller four
seller's market
sellers' market
selling account
selling agent
selling point
selling price
selling race
selling-plater
seltzer water
semantic cluster
semantic field
semantic history
semantic tone
semantic unit
semaphore flag
semaphore
plant
semaphore telegraph
semasiological unit
semei-
semen cinae
semen contra
semester hour
semi-
semi-Augustinianism

semi-abstract
semi-abstraction
semi-annual
semi-arian
semi-aridity
semi-armor-piercing
semi-chorus
semi-circle
semi-cubical
semi-demi-
semi-detached
semi-diesel
semi-diurnal
semi-double
semi-form
semi-idiocy
semi-idiotic
semi-idleness
semi-ignorance
semi-illiteracy
semi-illiterate
semi-illiterately
semi-illiterateness
semi-illuminated
semi-imbricated
semi-immersed
semi-impressionistic
semi-incandescent
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semi-independent
semi-independently
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semi-indirectly
semi-indirectness
semi-inductive
semi-indurate
semi-indurated
semi-industrial
semi-industrialized
semi-industrially
semi-inertness
semi-infidel
semi-infinite
semi-inhibited
semi-inhibition
semi-insoluble
semi-instinctive
semi-instinctively

semi-instinctiveness
semi-insular
semi-intellectual
semi-intellectualized
semi-intellectually
semi-intelligent
semi-intelligently
semi-intercostal
semi-internal
semi-internalized
semi-internally
semi-interosseous
semi-intoxication
semi-intrados
semi-invalid
semi-inverse
semi-ironic
semi-ironical
semi-ironically
semi-isolated
semi-learning
semi-lune
semi-mat
semi-matte
semi-metal
semi-nocturnal
semi-opal
semi-ped
semi-pelagian
semi-private
room
semi-saxon
semi-unabridged dictionary
semi-uncial
semiRussian
semiair-cooled
semiautomatic control
semiautomatic rifle
semibreve rest
semicircular canal
semicircular canals
semiclassical music
semico-operative
semicolon butterfly
semiconductor circuit
semiconductor device
semiconductor physics
semidrying oil

semilatus rectum
semilunar valve
semimajor axis
semiminor axis
seminal duct
seminal fluid
seminal imagination
seminal principle
semiotic unit
semipalmated plover
semipalmated sandpiper
semiprecious stone
semirigid airship
semisimple algebra
semiwater gas
semor sem
semper eadem
semper et ubique
semper fidelis
semper idem
semper paratus
semper-
sen robber
senate house
senate-house
senator-elect
senatorial
courtesy
senatorial district
senatus consult
senatus consultum
send a letter to
send a note
send a statement
send a wire
send about your business
send abroad
send after
send away
send back
send down
send flying
send for
send forth
send headlong
send in
send in your papers
send mad

send off
send on a fool's errand
send on a mission
send out
send out of your mind
send out rays
send packing
send round
send scuttling
send sprawling
send to Coventry
send to Davy Jones's locker
send to glory
send to hell
send to jail
send to kingdom come
send to school
send to sleep
send to the bottom
send to the gas chamber
send to the right-about
send to the showers
send to your last account
send up
send up a prayer
send up a trial balloon
send up the river
send word
send you spinning
send your compliments
send your condolences
send your regards
send-off
send-out
sending abroad
sending back
sending set
sending station
sending to Coventry
seneca oil
seneca snakeroot
senega root
senega snakeroot
seneka
root
seneka snakeroot
sengreen saxifrage
senile debility

senile dementia
senile psychosis
senile weakness
senility necrosis
senior checker
senior chief petty officer
senior citizen
senior citizenship
senior common room
senior high
senior high school
senior master sergeant
senior officer
senior securities
seniority rule
senna family
senna tree
sensation level
sensation-proof
sensational play
sense datum
sense faculty
sense finder
sense form
sense group
sense impression
sense of duty
sense of hearing
sense of humor
sense of humour
sense of indebtedness
sense of language
sense of mystery
sense of obligation
sense of relief
sense of rhythm
sense of right and wrong
sense of sight
sense of smell
sense of taste
sense of the meeting
sense of touch
sense of wonder
sense organ
sense perception
sense pleasure
sense stress
sense survival

sense-bereaving
sense-bound
sense-confounding
sense-confusing
sense-data
sense-datum
sense-distracted
sense-ravishing
sensible note
sensible of
sensible
 price
sensible to
sensiblesensible horizon
sensitive area
sensitive ear
sensitive fern
sensitive heart
sensitive plant
sensitive to
sensitivity to
sensitivity training
sensitizing antibody
sensitol green
sensitometric curve
sensori-
sensory aid
sensory area
sensory awareness training
sensory cell
sensory deprivation
sensory epilepsy
sensory experience
sensory neuron
sensory organ
sensory paralysis
sensory pattern
sensual pleasure
sensum theory
sensuous desire
sensuous pleasure
sensus communis
sentence accent
sentence adverb
sentence balance
sentence building
sentence connector
sentence fragment

sentence making
sentence method
sentence modifier
sentence monger
sentence of death
sentence pattern
sentence stress
sentence structure
sentence substitute
sentence tone
sentential calculus
sentential connective
sentential function
sententious expression
sententious saying
sentiment-proof
sentimental comedy
sentimental novel
sentimental value
sentinel crab
sentry board
sentry box
sentry go
sentry-box
sentry-fashion
sentry-go
separate
 forcibly
separate from the service
separate identity
separate involuntarily
separate maintenance
separate out
separate person
separate returns
separate school
separate the men from the boys
separate yourself
separated brother
separating funnel
separating power
separation allowance
separation center
separation energy
separation from the service
separation layer
separation negative
separation of attention

separation of powers
separation theorem
separatory funnel
sepia paper
sepia-colored
sepia-eyed
sepia-tinted
seppa dai
sept chord
septal cartilage
septal neck
septem-
septi-
septic poisoning
septic sore throat
septic tank
septicemic plag
septicemic plague
septifragal dehiscence
septo-
septuple time
sequence flasher
sequence flashers
sequence of ideas
sequence of phonemes
sequence of tenses
sequence of thought
sequence switch
sequential access
sequential system
sequentially compact set
sequester yourself
sequoia pitch moth
serbo-
serbo-croatian
sergeant
 armorer
sergeant at arms
sergeant at law
sergeant bugler
sergeant clerk
sergeant cook
sergeant drummer
sergeant first class
sergeant fish
sergeant footman
sergeant instructor
sergeant major

sergeant painter
sergeant porter
sergeant saddler
sergeant schoolmaster
sergeant tailor
sergeant trumpet
sergeant trumpeter
sergeant-at-arms
sergeant-at-law
sergeant-major
sergeant-majorship
sergeants major
serial bond
serial correlation
serial epilepsy
serial number
serial operation
serial order
serial polygamy
serial right
serial technique
sericin gum
sericite gneiss
sericite schist
series dynamo
series motor
series multiple
series parallel
series resonance
series spectra
series turn
series winding
series-wound
serin finch
serio-
serio-comic
serious drinker
serious drinking
serious literature
serious music
serious operation
serious-minded
serious-mindedly
serious-mindedness
serjeant at arms
serjeant at law
serjeant-at-law
sermon bell

sermon on the mount
sero-
seroplastic inflammation
serous
 fluid
serous gland
serous inflammation
serous membrane
serpent cucumber
serpent cult
serpent eagle
serpent eater
serpent fern
serpent fish
serpent gourd
serpent grass
serpent melon
serpent moss
serpent radish
serpent star
serpent stone
serpent-god
serpent-goddess
serpent-shaped
serpent-stone
serpentine front
serpentine green
serpentine marble
serpentine stretcher
serran imperial
serrana hispana
serrate-ciliate
serrate-dentate
serrato-
serre-papier
serri-
serum albumin
serum anaphylaxis
serum death
serum disease
serum gamma globulin
serum globulin
serum hepatitis
serum jaundice
serum prothrombin accelerator
serum shock
serum sickness
serum therapy

serum transfusion
servant girl
servant of God
servant of the servants of God
serve Mammon
serve an apprenticeship
serve as
serve in the capacity of
serve in the office of
serve in your stead
serve notice
serve one out
serve out
serve the office of
serve the purpose
serve time
serve with the colors
serve you right
serve your need
serve-out
service
 ace
service aircraft
service area
service battery
service book
service box
service brake
service break
service buzzer
service call
service cap
service ceiling
service charge
service clasp
service club
service company
service court
service door
service elevator
service engineer
service entrance
service flag
service flat
service hat
service industry
service line
service magazine

service mark
service medal
service module
service of music
service of song
service pension
service pipe
service plate
service road
service side
service side line
service squadron
service stair
service station
service stripe
service switch
service tree
service troop
service uniform
service wall
servient tenement
servile work
serving cart
serving girl
serving hatch
serving knife
serving mallet
serving man
serving pantry
serving stuff
serving table
servo amplifier
servo brake
servo control
servo engineer
servo engineering
servo instrumentation
servo laboratory
servo regulator
servo system
servo tab
servo valve
servo-
servo-control
servo-controlled
servo-motor
servo-pilot
sesame

grass
sesame oil
sesame seeds
sesamoid bones
sesqui-
sesquipedalian word
sessile oak
sessile-eyed
sessile-flowered
sessile-fruited
sessile-leaved
sessional indemnity
set a course
set a limit
set a new mark
set a price on
set a question
set a stopping place
set a task
set a trap for
set a value on
set about
set above
set abroach
set afloat
set against
set against one another
set agoing
set an anchor watch
set an arbitrary price on
set an end point
set an examination
set an example
set apart
set aside
set astir
set at
set at defiance
set at each other's throat
set at ease
set at hazard
set at intervals
set at large
set at liberty
set at naught
set at odds
set at rest
set at variance

set at your throat
set attention to
set back
set bar
set before
set before yourself
set book
set by
set by the ears
set chisel
set conditions
set designer
set down
set down as
set down for
set down for hearing
set down to
set eyes on
set fast
set
 fire to
set foot in
set foot on
set foot on dry land
set for
set form
set forth
set forward
set free
set function
set gauge
set going
set gun
set hammer
set her down
set hook
set hurdles
set in
set in contrast
set in motion
set in opposition
set in order
set in print
set in the tablets of memory
set in towards
set in your ways
set iron
set limits

set little by
set mind
set naught by
set no store by
set nut
set of conditions
set of postulates
set of rooms
set of teeth
set of the current
set of three
set of two
set off
set off against
set off for
set off to advantage
set off to good advantage
set on
set on edge
set on fire
set on foot
set on its base
set on its beam ends
set on its feet
set on its legs
set on your feet
set on your legs
set one back
set one's face against
set out
set out for
set over against
set over against one another
set phrase
set piece
set pin
set point
set pot
set purpose
set right
set sail
set shot
set side by side
set someone on his feet
set speech
set square
set

store by
set straight
set task
set temper
set term
set terms
set the Thames on fire
set the brain to work
set the date
set the echoes ringing
set the fashion
set the law at defiance
set the law at naught
set the limit
set the mind to
set the mood
set the pace
set the price tag too high
set the river on fire
set the stage
set the style
set the table on a roar
set the teeth on edge
set the time
set the tone
set the wits to work
set the world on fire
set theory
set to
set to music
set to one side
set to rights
set to sleep
set to the account of
set to work
set toward
set tub
set type
set up
set up for
set up housekeeping
set up in business
set up shop
set upon
set upon on all sides
set width
set with thorns
set your back against the wall

set your cap at
set your cap for
set your compass for
set your course for
set your dignity aside
set your dignity to one side
set your face against
set your foot down
set your foot down on
set your hand and seal
set your hand to
set your heart against
set
 your heart at rest
set your heart on
set your heart upon
set your house in order
set your jaw
set your mind at ease
set your mind at rest
set your mind upon
set your seal
set your shoulder to the wheel
set your sights on
set your teeth
set your teeth on edge
set your thoughts on
set your wits to work
set yourself against
set-
set-aside
set-back
set-down
set-fair
set-hands
set-in
set-in sleeve
set-off
set-out
set-stitched
set-to
set-up
set-up board
set-upness
seti-
setoff sheet
sett beater
settee bed

settee rig
setter-forth
setter-in
setter-on
setter-out
setter-to
setter-up
setting apart
setting aside
setting at liberty
setting block
setting board
setting circle
setting coat
setting day
setting dog
setting free
setting gauge
setting hen
setting in motion
setting lotion
setting node
setting point
setting pole
setting punch
setting rule
setting stake
setting stick
setting sun
setting-free
setting-out
setting-to
setting-up
setting-up exercise
setting-up exercises
settle a score
settle
 accounts
settle accounts with
settle at
settle bed
settle differences
settle down
settle for
settle in
settle into
settle it
settle on

settle preliminaries
settle the land
settle the matter
settle the score
settle to rest
settle to sleep
settle upon
settle with
settle your differences
settle your hash
settle your mind
settle- abide
settle-bench
settle-brain
settle-down
settled belief
settled in habit
settled judgment
settled principle
settled production
settled purpose
settled soap
settled upon
settlement day
settlement house
settlement lease
settlement option
settlement sheet
settlement worker
settling clerk
settling day
settling price
seven deadly sins
seven o'clock
seven principles of man
seven sacraments
seven seas
seven sisters
seven sleepers
seven stars
seven year
seven-banded
seven-branched
seven-caped
seven-card stud
seven-channeled
seven-chorded
seven-cornered

seven-day
seven-eleven
seven-eyed
seven-eyes
seven-figure
seven-foot
seven-footer
seven-formed
seven-gated
seven-gilled
seven-hand
seven-headed
seven-hilled
seven-hilly
seven-holes
seven-horned
seven-inch
seven-league
seven-league
boots
seven-leaved
seven-line
seven-masted
seven-mouthed
seven-nerved
seven-ounce
seven-part
seven-part time
seven-piled
seven-ply
seven-point
seven-point circle
seven-poled
seven-pronged
seven-quired
seven-sealed
seven-shilling
seven-shooter
seven-sided
seven-sisters
seven-spot
seven-spotted
seven-syllabled
seven-thirties
seven-thirty
seven-thorned
seven-tined
seven-toned

seven-twined
seven-twisted
seven-up
seven-year
seven-year itch
seventeen-hundreds
seventeen-year
seventeen-year locust
seventh chord
seventh day
seventh heaven
seventh nerve
seventh-day
seventy-day
seventy-dollar
seventy-eight
seventy-eighth
seventy-fifth
seventy-first
seventy-five
seventy-foot
seventy-footer
seventy-four
seventy-fourth
seventy-horse
seventy-mile
seventy-nine
seventy-ninth
seventy-odd
seventy-one
seventy-second
seventy-seven
seventy-seventh
seventy-six
seventy-sixth
seventy-third
seventy-three
seventy-ton
seventy-two
seventy-year
several
times
several-celled
several-flowered
several-fold
several-lobed
several-nerved
several-ribbed

severance pay
severance tax
severe check
sew up
sewage disposal
sewage disposalsewage farm
sewed up
sewee bean
sewer brick
sewer builder
sewer gas
sewer pipe
sewer rat
sewing awl
sewing basket
sewing bench
sewing bird
sewing board
sewing cabinet
sewing circle
sewing class
sewing cotton
sewing machine
sewing needle
sewing press
sewing room
sewing school
sewing silk
sewing society
sewing table
sewing teacher
sewing thread
sewing tray
sewing twine
sewing wire
sewing woman
sewing work
sewing-machine needle
sex act
sex appeal
sex behavior
sex cell
sex characteristic
sex chromosome
sex crime
sex criminal
sex deviant
sex deviate

sex discrimination
sex drive
sex fiend
sex goddess
sex hormone
sex hygiene
sex kitten
sex linkage
sex object
sex organ
sex organs
sex pervert
sex queen
sex ratio
sex-
sex-intergrade
sex-limited
sex-linkage
sex-linked
sex-starved
sexagesimal
scale
sexagesimal system
sexagesimo-quarto
sexed-up
sexi-
sextant altitude
sexto-decimo
sexton beetle
sextuple press
sextuple time
sexual abnormality
sexual abstinence
sexual advance
sexual approach
sexual assault
sexual attraction
sexual attractiveness
sexual climax
sexual commerce
sexual congress
sexual customs
sexual desire
sexual deviance
sexual deviant
sexual deviate
sexual deviation
sexual excitement

sexual freedom
sexual generation
sexual infantilism
sexual innocence
sexual instinct
sexual intercourse
sexual inversion
sexual invitation
sexual longing
sexual love
sexual magnetism
sexual morality
sexual mores
sexual normality
sexual overture
sexual passion
sexual pathology
sexual perversion
sexual pervert
sexual pleasure
sexual possession
sexual power
sexual practices
sexual precocity
sexual preference
sexual psychopath
sexual psychopathy
sexual relations
sexual reproduction
sexual revolution
sexual selection
sexual union
sexual urge
sexually abstinent
sexually excited
sexually
innocent
sexy body
sh-sh
shab-rag
shabby-genteel
shabby-gentility
shack bait
shack up
shackle bar
shackle bolt
shackle insulator
shackle joint

shad fly
shad frog
shad scale
shad spirit
shad tree
shad-bellied
shad-belly
shad-blow
shade deck
shade into
shade of difference
shade off
shade pine
shade plant
shade tree
shade-bearing
shade-enduring
shade-giving
shade-grown
shade-loving
shade-seeking
shades and shadows
shades below
shades of death
shading amplifier
shading coil
shadow band
shadow bird
shadow box
shadow cabinet
shadow compass
shadow cone
shadow dance
shadow fight
shadow figure
shadow forth
shadow line
shadow mask
shadow nucleus
shadow of death
shadow of doubt
shadow pantomime
shadow pin
shadow play
shadow show
shadow skirt
shadow stitch
shadow stop

shadow test
shadow-box
shadow-mask kinescope
shadowed forth
shadows numberless
shady dealings
shady reputation
shaft alley
shaft efficiency
shaft eye
shaft feather
shaft furnace
shaft governor
shaft grave
shaft grave
tomb
shaft head
shaft horse
shaft horsepower
shaft house
shaft key
shaft sinker
shaft tackle
shaft tug
shaft tunnel
shaft-rubber
shaft-straightener
shaftfoot man
shafting lathe
shag ass
shag rug
shag-haired
shag-rag
shagbark hickory
shaggy cap
shaggy dog story
shaggy-barked
shaggy-bearded
shaggy-bodied
shaggy-coated
shaggy-dog story
shaggy-fleeced
shaggy-footed
shaggy-haired
shaggy-leaved
shaggy-mane
shaggy-mane mushroom
shaggy-maned

shake a leg
shake all over
shake bolt
shake culture
shake down
shake hands
shake hands and kiss babies
shake hands on
shake hands with
shake hands with yourself
shake in your boots
shake in your shoes
shake it up
shake like an aspen leaf
shake like jelly
shake off
shake off the yoke
shake on it
shake the dust from your feet
shake the head
shake the windows
shake up
shake with laughter
shake your faith
shake your fist at
shake your hand
shake your head
shake your head at
shake-bag
shake-cabin
shake-down
shake-hands
shake-out
shake-rag
shake-up
shakebag club
shakebag
match
shakedown artist
shakedown cruise
shaken up
shaking of hands
shaking palsy
shaking prairie
shaking pudding
shaking table
shaky health
shalach manosh

shale green
shale naphtha
shale oil
shale spirit
shallot sauce
shallow structure
shallow water
shallow-bottomed
shallow-brained
shallow-draft
shallow-footed
shallow-forded
shallow-headed
shallow-hulled
shallow-minded
shallow-mindedness
shallow-pated
shallow-read
shallow-rooted
shallow-rooting
shallow-sea
shallow-searching
shallow-sighted
shallow-soiled
shallow-thoughted
shallow-toothed
shallow-waisted
shallow-water
shallow-witted
shallow-wittedness
shalom aleichem
shalom alekhem
shalosh seudos
shalosh seudoth
sham object
sham subject
shama millet
shamalo grass
shame brier
shame child
shame vine
shame-burnt
shame-crushed
shame-eaten
shame-shrunk
shame-stricken
shame-swollen
shameless falsehood

shammy leather
shamrock green
shamrock pea
shamrock-pea
shangri-la
shank bone
shank cutter
shank grass
shank mill
shank of the afternoon
shank
 of the evening
shank painter
shank's mare
shank's pony
shank-painter
shanks' mare
shanks' pony
shanks's pony
shanty boat
shanty boy
shanty-boater
shape a course
shape note
shape out a course
shape shifting
shape target
shape the hair
shape up
shape your course for
shape-knife
shape-shifting
shape-up
shaped charge
shaped note
shaping dies
shaping imagination
shaping planer
shard beetle
shard-born
shard-borne
share and share alike
share around
share beam
share certificate
share crop
share head
share in

share ledger
share out
share premium
share register
share tenant
share with
share your bed and board
share your grief
share your sorrow
share-out
shared pair
sharing of grief
sharing of sorrow
sharing out
shark barrow
shark bell
shark moth
shark net
shark oil
shark patrol
shark pilot
shark ray
shark siren
shark sucker
shark-liver
shark-liver oil
sharkskin pahoehoe
sharp air
sharp as a needle
sharp as a razor
sharp as a tack
sharp as a two-edged sword
sharp as broken glass
sharp cash
sharp
 cedar
sharp dock
sharp ear
sharp edge
sharp eye
sharp freezing
sharp frost
sharp iron
sharp look
sharp mixture
sharp pain
sharp practice
sharp sand

sharp sight
sharp wind
sharp words
sharp-angled
sharp-ankled
sharp-back
sharp-back shark
sharp-backed
sharp-beaked
sharp-bellied
sharp-billed
sharp-biting
sharp-bottomed
sharp-breasted
sharp-clawed
sharp-cornered
sharp-cut
sharp-cutting
sharp-eared
sharp-edged
sharp-elbowed
sharp-eye
sharp-eyed
sharp-eyes
sharp-faced
sharp-fanged
sharp-featured
sharp-flavored
sharp-freeze
sharp-freezer
sharp-freezing
sharp-froze
sharp-frozen
sharp-fruited
sharp-gritted
sharp-ground
sharp-headed
sharp-heeled
sharp-horned
sharp-keeled
sharp-leaved
sharp-looking
sharp-minded
sharp-nebbed
sharp-nosed
sharp-nosed shark
sharp-nosedly
sharp-nosedness

sharp-odored
sharp-petaled
sharp-piercing
sharp-piled
sharp-pointed
sharp-quilled
sharp-ridged
sharp-set
sharp-setness
sharp-shinned
sharp-shinned hawk
sharp-sighted
sharp-sightedly
sharp-sightedness
sharp-smelling
sharp-smitten
sharp-snouted
sharp-staked
sharp-staring
sharp-tailed
sharp-tailed
grouse
sharp-tailed sparrow
sharp-tasted
sharp-tasting
sharp-tempered
sharp-toed
sharp-tongued
sharp-toothed
sharp-toothed unkindness
sharp-topped
sharp-visaged
sharp-whetted
sharp-winged
sharp-witted
sharp-wittedly
sharp-wittedness
sharpen a distinction
sharpen the wits
sharpen your tools
sharper than a serpent's tooth
sharptail mola
shatter your hopes
shattered mind
shattered nerves
shave away
shave grass
shave hook

shave off
shave rush
shaving basin
shaving board
shaving box
shaving brush
shaving case
shaving cream
shaving cup
shaving dies
shaving glass
shaving horse
shaving mill
shaving mirror
shaving mug
shaving paper
shaving paste
shaving powder
shaving set
shaving soap
shaving stand
shaving stick
shaving strop
shaving towel
shaving water
shawl collar
shawl goat
shawl loom
shawl material
shawl pattern
shawl strap
shawl waistcoat
she all
she pitch pine
she teak
she-actor
she-adventurer
she-ape
she-apostle
she-ass
she-baker
she-balsam
she-bear
she-beech
she-captain
she-chattel
she-costermonger
she-cousin

she-demon
she-devil
she-dragon
she-fish
she-foal
she-fool
she-fox
she-friend
she-goat
she-god
she-gypsy
she-ironbark
she-kind
she-king
she-lion
she-malady
she-monster
she-negro
she-oak
she-page
she-panther
she-peace
she-pig
she-pine
she-poet
she-poetry
she-preacher
she-priest
she-relative
she-saint
she-salmon
she-school
she-scoundrel
she-society
she-sparrow
she-sun
she-thief
she-tongue
she-villain
she-whale
she-witch
she-wolf
she-woman
shea
 butter
shea tree
shea-nut
shea-nut oil

sheaf arrow
sheaf catalogue
shear angle
shear boom
shear hulk
shear legs
shear modulus
shear pin
shear plane
shear skid
shear steel
shear strain
shear stress
shear structure
shear transformation
shear zone
shear-grass
shear-legs
shearing deformation
shearing dies
shearing force
shearing machine
shearing plane
shearing punch
shearing stress
shearing tool
sheath gown
sheath knife
sheath moth
sheath pieffield
sheath
 pile
sheath-fish
sheath-winged
sheathe the sword
sheathing board
sheathing copper
sheathing felt
sheathing lead
sheathing lumber
sheathing nail
sheathing paper
sheave hole
shed a luster on
shed blood
shed burn
shed dormer
shed fresh light upon

shed hand
shed ink
shed light upon
shed luster on
shed new light upon
shed of
shed roof
shed tears
shed-builder ant
sheeling hill
sheep bar
sheep barn
sheep bell
sheep bot
sheep botfly
sheep boy
sheep breeder
sheep breeding
sheep bur
sheep clipper
sheep clipping
sheep dip
sheep dipper
sheep dipping
sheep dog
sheep fair
sheep farm
sheep farmer
sheep farming
sheep fescue
sheep fescue grass
sheep flake
sheep fly
sheep gadfly
sheep hound
sheep husbandry
sheep ked
sheep killer
sheep killing
sheep land
sheep laurel
sheep louse
sheep measles
sheep oat grass
sheep owner
sheep owning
sheep parsley
sheep pelt

sheep pest
sheep plant
sheep poison
sheep pox
sheep rack
sheep raiser
sheep raising
sheep ranch
sheep range
sheep reeve
sheep rot
sheep
run
sheep scab
sheep scabious
sheep shears
sheep silver
sheep sorrel
sheep station
sheep tansy
sheep tick
sheep wash
sheep washer
sheep's eye
sheep's eyes
sheep's fescue
sheep's head
sheep's sorrel
sheep's-bit
sheep-biter
sheep-dip
sheep-grazing
sheep-hued
sheep-kneed
sheep-lice
sheep-root
sheep-shearer
sheep-shearing
sheep-sick
sheep-spirited
sheep-tick
sheep-white
sheep-witted
sheepdog trial
sheepshead minnow
sheepshead porgy
sheepswool sponge
sheer batten

sheer boom
sheer chemistry
sheer draft
sheer drawing
sheer hook
sheer leg
sheer legs
sheer line
sheer off
sheer plan
sheer pole
sheer ratline
sheer stockings
sheer strake
sheer thursday
sheer-built
sheer-hulk
sheer-off
sheet anchor
sheet bend
sheet bundler
sheet cable
sheet chain
sheet down
sheet erosion
sheet film
sheet glass
sheet home
sheet iron
sheet lightning
sheet metal
sheet mill
sheet mold
sheet music
sheet of fire
sheet of rain
sheet pavement
sheet pile
sheet piling
sheet steel
sheet tin
sheet watermark
sheet writer
sheet-anchor
sheet-block
sheet-fed
sheet-fed

press
sheeting pile
sheld-duck
shelf bracket
shelf catalogue
shelf fungus
shelf ice
shelf ladder
shelf life
shelf list
shelf mark
shelf plate
shelf rest
shelf warmer
shelf-room
shell auger
shell back
shell bark
shell bean
shell bit
shell boiler
shell button
shell carver
shell cast
shell chuck
shell construction
shell couching
shell crest
shell cut
shell dove
shell down
shell drill
shell edging
shell expansion
shell eye
shell feed
shell fire
shell game
shell gland
shell gray
shell heap
shell hole
shell hooks
shell ibis
shell ice
shell jacket
shell limestone
shell marble

shell money
shell mound
shell out
shell parakeet
shell pear
shell pink
shell plating
shell pump
shell quail
shell reamer
shell reducer
shell road
shell room
shell ruching
shell sac
shell shock
shell snail
shell socket
shell steak
shell stitch
shell strake
shell transformer
shell turtle
shell-carving
shell-fish
shell-leaf
shell-less
shell-like
shell-shaped
shell-shock
shell-shocked
shell-worker
shelly
pahoehoe
shelter belt
shelter cabin
shelter deck
shelter half
shelter pit
shelter tent
shelter trench
shelter under
shelter-deck vessel
sheltering trust
shelterwood method
shelving beach
shenk beer
shepherd dog

shepherd god
shepherd king
shepherd spider
shepherd's check
shepherd's dial
shepherd's dog
shepherd's needle
shepherd's pie
shepherd's pipe
shepherd's plaid
shepherd's purse
shepherd's staff
shepherd's weatherglass
shepherd's-purse
shepherd's-scabious
shepherds-staff
sherbet powder
shere khan
sheriff court
sheriff depute
sheriff substitute
sheriff-pink
sherry brown
sherry cobbler
shetland pony
shetland sheepdog
shetland wool
shibuichi-doshi
shick-shack
shield arm
shield back
shield bearer
shield bud
shield budding
shield bug
shield cell
shield fern
shield fungus
shield grid
shield roots
shield wall
shield-back
shield-bearer
shield-bearing
shield-breaking
shield-fern
shield-headed
shield-leaved

shield-maiden
shield-scale fungus
shield-shaped
shield-tailed snake
shiffle-shuffle
shift
 about
shift ballast
shift bid
shift boss
shift for yourself
shift into
shift joint
shift key
shift lock
shift marriage
shift of structure
shift of tense
shift off
shift place
shift the blame
shift the control
shift the responsibility
shift the rudder
shift the scene
shift with
shift your ground
shifter fork
shifting course
shifting cultivation
shifting path
shifting pedal
shifting sands
shifting scene
shifting spanner
shifting trust
shifting use
shifty-eyed
shih-tzu
shilling mark
shilling shocker
shilly-shallied
shilly-shallies
shilly-shally
shilly-shallyer
shilly-shallying
shilly-shallyingly
shim plow

shim-sham
shimmer with heat
shin guard
shin oak
shin up
shin-bone
shin-tangle
shindig dancer
shine a light
shine at
shine brightly
shine forth
shine in
shine out
shine through
shine up to
shine upon
shiner perch
shiner sea perch
shiner-up
shingle band
shingle bolt
shingle lap
shingle oak
shingle roof
shingle tree
shingle weaver
shingle-back
shining example
shining
 flycatcher
shining from shook foil
shining light
shining oat grass
shining willow
shiny-backed
ship ahoy
ship auger
ship biscuit
ship boat
ship borer
ship breaker
ship broker
ship canal
ship carpenter
ship carpentry
ship chandler
ship chandlery

ship control
ship decanter
ship fever
ship head
ship joiner
ship ladder
ship letter
ship money
ship news
ship oars
ship of state
ship of the desert
ship of the line
ship of war
ship out
ship part
ship pendulum
ship pound
ship railway
ship rat
ship rigger
ship room
ship route
ship splice
ship stuff
ship time
ship tire
ship writ
ship's biscuit
ship's boat
ship's boy
ship's carpenter
ship's company
ship's cooper
ship's husband
ship's log
ship's officer
ship's papers
ship's ropes
ship's service
ship's tailor
ship's watch
ship's writer
ship-chandler
ship-holder
ship-load
ship-minded
ship-mindedly

ship-mindedness
ship-money
ship-of-war
ship-rigged
ship-shape
ship-shaped
ship-to-shore
ship-to-shore radio
shipboard interceptor
shipboard plane
shiplapped
 lumber
shipper fork
shipping articles
shipping center
shipping clerk
shipping commissioner
shipping fever
shipping mark
shipping master
shipping note
shipping office
shipping order
shipping pneumonia
shipping room
shipping ton
shipping-dry
shipplane carrier
shipshape and Bristol fashion
shire borough
shire day
shire ground
shire horse
shire knight
shire moot
shire reeve
shire town
shire-moot
shirley poppy
shirred eggs
shirt board
shirt dresser
shirt frame
shirt frill
shirt front
shirt ironer
shirt sleeve
shirt-dress

shirt-sleeve
shirt-sleeve diplomacy
shirt-sleeved
shirt-tail
shirtwaist dress
shirtwaist suit
shish kebab
shit in your pants
shit-headed
shittah tree
shittim wood
shive wheel
shiver my timbers
shiver spar
shoal duck
shoal water
shock absorber
shock action
shock battalion
shock bump
shock cord
shock corps
shock dog
shock force
shock pad
shock reaction
shock soldier
shock tactics
shock therapy
shock treatment
shock troops
shock tube
shock wave
shock-bucker
shock-dog
shock-head
shocking
pink
shoe blacking
shoe block
shoe board
shoe boil
shoe bolt
shoe box
shoe buckle
shoe button
shoe cleaner
shoe dauber

shoe dealer
shoe department
shoe drill
shoe dye
shoe fastener
shoe findings
shoe last
shoe laster
shoe leather
shoe lifter
shoe machinery
shoe mender
shoe merchant
shoe nail
shoe peg
shoe piece
shoe polish
shoe polisher
shoe repaired
shoe shiner
shoe silver
shoe stone
shoe store
shoe tie
shoe tree
shoe trimmer
shoe-button spider
shoe-cleaning
shoe-horn
shoe-leather
shoe-make
shoe-spoon
shoeblack plant
shoeing-horn
shoeless horse
shoestring catch
shoestring fern
shoestring fungus
shoestring lily
shoestring margin
shoestring potato
shoestring weed
shoggy-shoo
shoo-fly pie
shoo-in
shoofly finger
shoofly pie
shook swarming

shook up
shook-up
shoot ahead
shoot ahead of
shoot apex
shoot at
shoot back
shoot ballast
shoot craps
shoot down
shoot down in flames
shoot for
shoot full of holes
shoot into space
shoot it out with
shoot off at an angle
shoot off your face
shoot
 off your mouth
shoot out
shoot out rays
shoot questions at
shoot straight
shoot straight with
shoot the breeze
shoot the bull
shoot the chutes
shoot the shit
shoot the sun
shoot the works
shoot through
shoot to death
shoot up
shoot your bolt
shoot your cookies
shoot-'em-up
shoot-off
shoot-out
shoot-root ratio
shoot-the-chutes
shooting board
shooting box
shooting brake
shooting coat
shooting fish
shooting gallery
shooting glove
shooting iron

shooting jacket
shooting lodge
shooting match
shooting pain
shooting range
shooting script
shooting star
shooting stick
shooting up
shooting war
shop around
shop assistant
shop at
shop bill
shop chairman
shop clerk
shop committee
shop complex
shop deputy
shop drawing
shop fitter
shop floor
shop lumber
shop paper
shop right
shop rivet
shop steward
shop-board
shop-made
shop-soiled
shop-window
shopping cart
shopping center
shopping centre
shopping complex
shopping goods
shopping mall
shopping plaza
shopping precinct
shopping spree
shore bird
shore
boat
shore boulder
shore cod
shore cover
shore crab
shore dinner

shore fast
shore grape
shore grass
shore lark
shore leave
shore line
shore onion
shore party
shore patrol
shore pay
shore pine
shore pipit
shore snipe
shore spurge
shore terrace
shore up
shore whiting
shore-going
shored up
shorn of
short account
short allowance
short and
short and sweet
short answer
short ballot
short bill
short bob
short circuit
short column
short commons
short covering
short cross
short cut
short demy
short distance
short division
short duration
short end
short extension
short field
short fuse pepperiness
short game
short haul
short hundredweight
short interest
short iron
short jenny

short leet
short leg
short line
short list
short loin
short measure
short memory
short memory span
short odds
short of
short of breath
short of cash
short of funds
short of luck
short of money
short of wind
short on looks
short order
short out
short pants
short particular meter
short period
short piece
short plate
short position
short
 range aid to navigation
short rations
short rib
short ribs
short sale
short score
short seller
short session
short short story
short shorts
short shrift
short side
short sight
short snorter
short spell
short splice
short step
short stock
short story
short subject
short suit
short supply

short sweetening
short temper
short time
short title
short ton
short up
short version
short vowel
short wave
short way
short weight
short wool
short-arm
short-arm balance
short-arm blow
short-armed
short-awned
short-barred
short-barreled
short-beaked
short-bearded
short-billed
short-bitten
short-bladed
short-bobbed
short-bodied
short-branched
short-bread
short-breasted
short-breathed
short-breathing
short-cake
short-celled
short-change
short-changed
short-changer
short-changing
short-chinned
short-circuit
short-circuiter
short-clawed
short-cloaked
short-commons
short-coupled
short-crested
short-cropped
short-crowned
short-cut

short-cycle
short-cycled
short-dated
short-day
short-distance
short-docked
short-drawn
short-eared
short-eared
owl
short-extend
short-eyed
short-faced
short-fed
short-fingered
short-finned
short-footed
short-fruited
short-grained
short-growing
short-hair
short-hair plume grass
short-haired
short-handed
short-handled
short-haul
short-headed
short-headedness
short-heeled
short-hop airline
short-horned
short-horned grasshopper
short-jointed
short-keeled
short-laid
short-landed
short-lasting
short-leaf
short-leaved
short-legged
short-limbed
short-lined
short-list
short-lived
short-livedness
short-living
short-long
short-lunged

short-made
short-manned
short-measured
short-mouthed
short-nailed
short-napped
short-necked
short-nighted
short-nosed
short-order
short-order cook
short-period comet
short-period variable
short-pitch
short-pitch winding
short-podded
short-pointed
short-quartered
short-range
short-run
short-running
short-set
short-shafted
short-shanked
short-shelled
short-shipped
short-short
short-shouldered
short-shucks
short-sighted
short-sightedness
short-skirted
short-sleeved
short-sleeved
shirt
short-sloped
short-snouted
short-span
short-spined
short-spined sea scorpion
short-spired
short-spoken
short-spurred
short-staffed
short-stalked
short-staple
short-staple isinglass
short-statured

short-stemmed
short-stepped
short-stop
short-stop bath
short-story
short-story writer
short-story writing
short-styled
short-suiter
short-sword
short-tailed
short-tailed shrew
short-tempered
short-term
short-term bond
short-term loan
short-term memory
short-term note
short-termed
short-time
short-time rating
short-toed
short-tongued
short-toothed
short-trunked
short-trussed
short-twisted
short-waisted
short-wall machine
short-weight
short-weighter
short-winded
short-windedly
short-windedness
short-winged
short-witted
short-wool
short-wooled
short-wristed
shorten sail
shortened version
shortest way
shortfin corvina
shorthand typist
shortleaf pine
shortleaf yellow pine
shortness of breath
shortstop bath

shortwave antenna
shortwave band
shortwave
broadcasting
shortwave diathermy
shortwave diathermy machine
shortwave radio
shortwave receiver
shortwave signal
shortwave station
shortwave transmitter
shot borer
shot bort
shot cartridge
shot corn
shot crossbow
shot drill
shot effect
shot garland
shot glass
shot hoist
shot hole
shot holing
shot hooks
shot in the arm
shot in the dark
shot in the locker
shot lighter
shot line
shot locker
shot metal
shot noise
shot plant
shot put
shot rope
shot samples
shot silk
shot through
shot to pieces
shot tongs
shot tower
shot-blasting
shot-clog
shot-free
shot-gun
shot-hole borer
shot-log
shot-peen

shot-put
shot-putter
shot-putting
shot-silk
shot-stified
shotgun marriage
shotgun microphone
shotgun pattern
shotgun wedding
shotten down
should want
should-be
shoulder a gun
shoulder angle
shoulder arm
shoulder arms
shoulder bag
shoulder bar
shoulder belt
shoulder blade
shoulder block
shoulder board
shoulder bone
shoulder brace
shoulder clod
shoulder flash
shoulder girdle
shoulder gun
shoulder knot
shoulder
loop
shoulder mark
shoulder note
shoulder pad
shoulder patch
shoulder point
shoulder screw
shoulder sleeve insignia
shoulder slip
shoulder strap
shoulder to shoulder
shoulder tuft
shoulder weapon
shoulder-blade
shoulder-bone
shoulder-clap
shoulder-clapper
shoulder-high

shoulder-hitter
shoulder-knot
shoulder-piece
shoulder-shotten
shoulder-strap
shouldered arch
shout at the top of your voice
shout defiance
shout down
shout from the housetops
shout hallelujah
shout hosanna
shout of laughter
shout out
shout song
shouting distance
shove aside
shove away
shove in your oar
shove off
shove the queer
shove-groat
shove-ha'penny
shove-halfpenny
shove-hapenny
shoved joint
shovel cultivator
shovel hat
shovel plow
shovel-beaked
shovel-bladed
shovel-board
shovel-footed
shovel-handed
shovel-hatted
shovel-headed
shovel-mouthed
shovel-nose
shovel-nosed
shovel-nosed duck
shovel-nosed ray
shovel-nosed shark
shovel-nosed sturgeon
shovel-shaped
shovelhead catfish
shovelhead shark
shovelnose sturgeon
shoving

match
show a bold front
show a clean pair of heels
show a deficit
show a direction
show a lack of respect for
show a leg
show a light pair of heels
show a proper spirit
show a set
show a tendency
show a trend
show aptitude for
show bill
show biz
show box
show business
show card
show consideration
show copy
show dahlia
show disrespect for
show distaste for
show dog
show end
show expertise
show fight
show forth
show fragility
show geranium
show girl
show glass
show how
show improvement
show in the best colors
show its colors
show its face
show kindness to
show marks of age
show mercy
show no amazement
show no appetite
show no mercy
show of hands
show of joy
show off
show one's cards
show one's face

show palce
show pipe
show pity
show preference
show resentment
show respect
show respect for
show ring
show sensitivity
show signs of
show signs of life
show someone the door
show stone
show stopper
show sufficient grounds for
show tact
show talent for
show the door
show the gate
show
 the heels
show the way
show the white feather
show the white flag
show through
show trial
show up
show up late
show what you have
show window
show you your place
show your age
show your authority
show your cards
show your colors
show your face
show your hand
show your heels to
show your mind
show your teeth
show your true colors
show yourself
show-bread
show-me
show-off
show-offish
show-offy
show-through

show-worthy
shower bath
shower bouquet
shower curtain
shower down
shower down upon
shower head
shower room
shower stall
shower-bath
showing for all to see
showing forth
showing up
showing-off
shown up
showy crab apple
showy gaillardia
showy mentzelia
showy milkweed
showy orchis
showy portulaca
showy primrose
showy sunflower
showy-flowered
showy-leaved
shred of comfort
shred-pie
shrew mole
shrewd-brained
shrewd-headed
shrewd-looking
shrewd-pated
shrewd-tongued
shrewd-witted
shriek owl
shriek-owl
shrift-father
shrike thrush
shrike tit
shrill sound
shrill-edged
shrill-gorged
shrill-toned
shrill-tongued
shrill-voiced
shrimp
catcher
shrimp pink

shrimp red
shrink back
shrink fit
shrink from
shrink link
shrink rule
shrink-wrap
shrinkage fit
shrinkage rule
shrinkage stope
shrinking fit
shrinking head
shrinking violet
shrive yourself
shrivel up
shriveled up
shroud knot
shroud line
shroud lines
shroud plate
shroud-laid
shrouded in darkness
shrouded in mystery
shrouded spirit
shrove monday
shrove sunday
shrove tuesday
shrove-tide
shroving time
shrub cinquefoil
shrub mallow
shrub oak
shrub steppe
shrub willow
shrub yellowroot
shrubby cinquefoil
shrug away
shrug it off
shrug off
shrug the shoulders
shrug your shoulders at
shuck off
shuck spray
shuck-bottom
shudder at
shudder of the flesh
shuffle along
shuffle off

shuffle off this mortal coil
shuffle on
shuffle out of
shuffle scale
shuffle the cards
shuffle-board
shun companionship
shun-pike
shunt circuit
shunt dynamo
shunt excitation
shunt field
shunt lamp
shunt lead
shunt motor
shunt valve
shunt winding
shunt-wound
shunting
engine
shunting off
shut down
shut down on
shut fast
shut in
shut it down
shut mind
shut my mouth
shut of
shut of day
shut off
shut out
shut the door
shut the door in your face
shut the door to
shut the door upon
shut the eyes of your mind
shut the eyes to
shut tight
shut up
shut up shop
shut your bazoo
shut your doors
shut your ears
shut your eyes
shut your eyes to
shut your face
shut your mouth

shut your trap
shut yourself up
shut-away
shut-eye
shut-in
shut-in personality
shut-mouthed
shut-off
shut-out
shut-out bid
shut-up
shutter box
shutter dam
shutter speed
shutter weir
shutting post
shutting stile
shutting up
shutting-in
shuttle armature
shuttle bombing
shuttle bone
shuttle box
shuttle diplomacy
shuttle flights
shuttle loading
shuttle race
shuttle raid
shuttle rocket
shuttle service
shuttle shell
shuttle train
shuttle trip
shuttle winding
shuttle-core
shuttle-core magneto
shuttle-witted
shuttle-wound
shuttlecock-flower
shutur sowar
shy at
shy away
shy of
shy of belief
shy off
shy
 on
shy person

si quaeris peninsulam amo
si quis
siamese cat
siamese connection
siamese joint
siamese twin
sibber sauce
sibby bean
siberian brown
siberian husky
sic at
sic on
sic passim
sic semper tyrannis
sic transit gloria mundi
sicca rupee
sick abed
sick and tired of
sick as a dog
sick at heart
sick at the stomach
sick bay
sick berth
sick call
sick fancy
sick flag
sick headache
sick humor
sick in the head
sick joke
sick leave
sick list
sick market
sick mind
sick nurse
sick of
sick on each other
sick pay
sick person
sick to the stomach
sick to your stomach
sick unto death
sick up
sick-abed
sick-bed
sick-brained
sick-fallen
sick-feathered

sick-in
sick-list
sick-nurse
sick-nursish
sick-out
sick-pale
sick-thoughted
sicken at
sicken for
sicken of
sicken with
sickle bar
sickle bender
sickle cell
sickle cell anaemia
sickle cell anemia
sickle cell disease
sickle feather
sickle ham
sickle herb
sickle hock
sickle medick
sickle of Death
sickle senna
sickle thorn
sickle-billed
sickle-billed curlew
sickle-billed
 thrasher
sickle-cell
sickle-cell anemia
sickle-cell disease
sickle-grass
sickle-hammed
sickle-hocked
sickle-leaved
sickle-like
sickle-shaped
sickle-tailed
sickly hue
sickly-born
sickly-colored
sickly-looking
sickly-seeming
sickly-sweet
sickly-sweetness
sickness benefit
sickness insurance

sicut patribus sit Deus nobis
side action
side aisle
side arm
side arms
side ax
side band
side bar
side beam
side bench
side bet
side box
side boy
side brake
side by side
side cap
side car
side card
side chain
side chair
side chapel
side check
side chisel
side circuit
side cut
side cutting
side delivery
side dish
side door
side drum
side effect
side face
side frequency
side hatchet
side horse
side interest
side issue
side jointer
side keelson
side ladder
side lamp
side light
side line
side meat
side mirror
side oats
side of bacon
side of controversy

side partner
side path
side prime
side reaction
side remark
side road
side room
side scene
side sewing
side step
side stitch
side street
side
suit
side table
side thread stitch
side whisker
side whiskers
side wire stitch
side with
side-bar
side-bar keel
side-bar rule
side-beam engine
side-bended
side-bone
side-box
side-by-side
side-by-sideness
side-cast
side-chain theory
side-cut
side-door
side-dress
side-dressed
side-dressing
side-end
side-end line
side-flowing
side-glance
side-graft
side-handed
side-hanging
side-kick
side-lever
side-lever engine
side-light
side-line

side-liner
side-look
side-looker
side-lying
side-necked
side-on
side-post
side-saddle
side-seen
side-show
side-skip
side-slip
side-splitting
side-step
side-stepped
side-stepper
side-stepping
side-stick
side-stitched
side-table
side-taking
side-track
side-valve engine
side-view
side-walk
side-wall
side-wheel
side-wheeler
side-whiskered
side-whiskers
side-wind
side-winded
side-winder
sidearm heater
sidelight castle
sidelight tower
sidelong look
sider-
siderating plague
sidereal clock
sidereal day
sidereal hour
sidereal hour angle
sidereal minute
sidereal month
sidereal
second
sidereal time

sidereal universe
sidereal year
siderin yellow
sidero-
sidesaddle flower
sideslip landing
sidewalk artist
sidewalk bike
sidewalk door
sidewalk elevator
sidewalk salesman
sidewalk superintendent
sideward motion
siding tool
siding track
sidle up to
siege artillery
siege cannon
siege carriage
siege engine
siege gun
siege howitzer
siege mortar
siege perilous
siege piece
siege train
siege wagon
siege warfare
siegfried line
sierra brownbark pine
sierra juniper
sierra plum
sierra redbark pine
sieva bean
sieve cell
sieve disk
sieve maker
sieve making
sieve out
sieve pit
sieve plate
sieve pore
sieve tissue
sieve tube
sieve vessel
sift out
sifting out
sigh for

sigh of relief
sigh-born
sighed-for
sight bill
sight draft
sight edge
sight for sore eyes
sight gag
sight land
sight line
sight on
sight point
sight reader
sight reading
sight rhyme
sight rule
sight screen
sight seeing trip
sight setter
sight unseen
sight vane
sight-feed
sight-hole
sight-read
sight-reader
sight-reading
sight-saver
type
sight-see
sight-seeing
sight-seer
sight-shot
sight-unseen transaction
sighting angle
sighting hood
sighting shot
sightless eyes
sigma finite set
sigma particle
sigma-ring
sigmoid flexure
sign a petition
sign and seal
sign away
sign factor
sign for
sign in
sign language

sign manual
sign of aggregation
sign of the cross
sign of the three balls
sign of the times
sign of the zodiac
sign off
sign on
sign on the dotted line
sign out
sign over
sign painter
sign painting
sign up
sign up for
sign your death warrant
sign your note
sign-board
sign-manual
sign-off
sign-post
signal alarm
signal beacon
signal bell
signal board
signal box
signal corps
signal display
signal fades
signal fire
signal flag
signal flare
signal generator
signal gong
signal gun
signal halyard
signal lamp
signal lantern
signal light
signal lights
signal mast
signal modulation
signal multiplier
signal noise ratio
signal of distress
signal oil
signal post
signal red

signal relay
signal rocket
signal
separator
signal service
signal shot
signal siren
signal squirter
signal tower
signal whistle
signal wire
signal-noise ratio
signal-to-noise ratio
signature loan
signature mark
signature tune
signed and sealed
signet ring
signet-ring
significance level
significant fact
significant figures
significant form
significate form
signify nothing
signifying nothing
signing on
signs manual
signs of the zodiac
silage cutter
silence cloth
silence of the grave
silence of the tomb
silent area
silent as a post
silent as a stone
silent as the grave
silent as the shadows
silent as the tomb
silent barter
silent butler
silent cataracts
silent chain
silent consent
silent discharge
silent film
silent majority
silent partner

silent poetry
silent prayer
silent service
silent trade
silent treatment
silic-
silica brick
silica gel
silica glass
silica ware
silicate cotton
silicate paint
silicated soap
siliceo-
silici-
silicic acid
silicified wood
silicium bronze
silico-
silicon bronze
silicon carbide
silicon
controlled rectifier
silicon copper
silicon dioxide
silicon fluoride
silicon hydride
silicon nitrimide
silicon spiegel
silicon star
silicon steel
silicon tetrachloride
silicon tetraethyl
silicon tetrafluoride
silicone resin
silicone rubber
silk cotton
silk coverer
silk discharger
silk floss
silk fowl
silk gelatin
silk gland
silk glue
silk gown
silk grass
silk green
silk gum

silk hat
silk louse
silk mercer
silk mill
silk moth
silk muslin
silk oak
silk paper
silk plant
silk serge
silk snapper
silk spider
silk spinner
silk stocking
silk stockings
silk stretcher
silk tartan
silk tester
silk thrower
silk throwster
silk tree
silk vine
silk weaver
silk wire
silk-bark
silk-bark oak
silk-cotton
silk-cotton family
silk-cotton tree
silk-family
silk-gownsman
silk-hatted
silk-robed
silk-screen
silk-screen artist
silk-screen printing
silk-screen process
silk-skirted
silk-soft
silk-stocking
silk-stocking district
silk-stocking politics
silk-stocking ward
silk-stockinged
silk-tail
silk-tassel tree
silk-winder
silken

repose
silken-coated
silken-fastened
silken-leafed
silken-sailed
silken-sandaled
silken-shining
silken-soft
silken-threaded
silken-winged
silking machine
silkscreen process
silkworm gut
silkworm jaundice
silkworm moth
silkworm rot
silkworm seed
silky anteater
silky camellia
silky cornel
silky grass
silky oak
silky swallowwort
silky terrier
silky-barked
silky-black
silky-haired
silky-leaved
silky-looking
silky-smooth
silky-soft
silky-textured
silky-voiced
sill cock
sill course
sill floor
sill-like
silly Billy
silly about
silly ass
silly grin
silly over
silly season
silly smilesilly-billy
silly-faced
silly-facedly
silly-shally
silo filler

silt grass
silt up
siluro-
silver age
silver bass
silver beard grass
silver bell
silver birch
silver bromide
silver cat
silver certificate
silver chloride
silver citrate
silver cord
silver cyanide
silver dollar
silver fir
silver fish
silver fizz
silver fluoride
silver foil
silver fox
silver frost
silver fulminate
silver gilt
silver grain
silver
grass
silver gray
silver green
silver hair
silver hake
silver iodate
silver iodide
silver jenny
silver jubilee
silver king
silver kings
silver lace
silver lactate
silver lead
silver leaf
silver lining
silver maple
silver medal
silver mill
silver mine
silver miner

silver mining
silver morning-glory
silver nitrate
silver ore
silver oxide
silver paper
silver perch
silver plate
silver plater
silver plating
silver point
silver polish
silver powder
silver protein
silver queen
silver sage
silver salmon
silver salt
silver screen
silver smelter
silver spoon
silver standard
silver star medal
silver storm
silver thaw
silver threads among the gold
silver tin
silver tongue
silver vine
silver vitellin
silver wattle
silver wedding
silver wedding anniversary
silver white
silver-backed
silver-bar
silver-bar fish
silver-barked
silver-barred
silver-bearded
silver-bearing
silver-bell
silver-bell tree
silver-black
silver-bordered
silver-bright
silver-buskined
silver-chased

silver-chiming
silver-clasped
silver-clear
silver-coated
silver-colored
silver-coloured
silver-copper
silver-corded
silver-cupped
silver-eddied
silver-embroidered
silver-eye
silver-eyed
silver-eyes
silver-feathered
silver-fleeced
silver-flowing
silver-footed
silver-fork
silver-fronted
silver-glittering
silver-golden
silver-grained
silver-gray
silver-grey
silver-hafted
silver-haired
silver-handled
silver-headed
silver-lace
vine
silver-laced
silver-lead
silver-leafed
silver-leaved
silver-leaved linden
silver-leaved nightshade
silver-lined
silver-mail
silver-melting
silver-mounted
silver-penciled
silver-plate
silver-plated
silver-plating
silver-print drawing
silver-producing
silver-rag

silver-rimmed
silver-shafted
silver-shedding
silver-shining
silver-smitten
silver-sounded
silver-sounding
silver-spangled
silver-spoon
silver-spoonism
silver-spotted
silver-streaming
silver-striped
silver-studded
silver-sweet
silver-swelling
silver-thread
silver-thread blight
silver-thrilling
silver-tipped
silver-toned
silver-tongue
silver-tongued
silver-tongued
 orator
silver-true
silver-tuned
silver-using
silver-voiced
silver-washed
silver-winged
silver-wiry
silver-work
silverberry family
silverleaf boree
silverleaf linden
silverleaf maple
silverleaf poplar
silverleaf redwood
silvertop palmetto
silverwing gray
silvery hair
silvery moon
silvi-
simblin cake
simchas torah
simian shelf
similar sound

similar sounding
similarity transformation
simile mark
similia similibus curantur
simmer down
simnel cake
simon legree
simon pure
simon-pure
simple Fink truss
simple algebra
simple algebraic extension
simple arc
simple as ABC
simple assault
simple chancre
simple circularity
simple closed curve
simple contract
simple diet
simple enumeration
simple equation
simple extension
simple fact
simple fraction
simple fracture
simple fruit
simple harmonic motion
simple honors
simple idea
simple inflammation
simple interest
simple interval
simple larceny
simple machine
simple majority
simple measure
simple microscope
simple motion
simple
 pole
simple protein
simple radical
simple reflex
simple sentence
simple soul
simple syrup
simple tense

simple time
simple transcendental extension
simple twist of the wrist
simple variable
simple vow
simple-armed
simple-faced
simple-headed
simple-hearted
simple-leaved
simple-life
simple-lifer
simple-mannered
simple-minded
simple-mindedly
simple-mindedness
simple-rooted
simple-seeming
simple-speaking
simple-stemmed
simple-toned
simple-tuned
simple-witted
simple-wittedness
simplex method
simplex telegraphy
simply and solely
simply connected
simply ordered
simply ordered set
simply-connected
simulated rank
simultaneous equations
sin against the Holy Ghost
sin eater
sin eating
sin money
sin of Adam
sin of commission
sin of omission
sin of pride
sin offering
sin rent
sin-absolved
sin-absolving
sin-afflicting
sin-black
sin-born

sin-bred
sin-burdened
sin-burthened
sin-chastising
sin-clouded
sin-concealing
sin-condemned
sin-consuming
sin-crushed
sin-drowned
sin-guilty
sin-indulging
sin-laden
sin-loving
sin-mortifying
sin-offering
sin-proud
sin-revenging
sin-sick
sin-sickness
sin-soiling
sin-sowed
sin-thralled
sin-washing
sin-wounded
sinay
bean
since God knows when
since Hector was a pup
since days of yore
since long ago
since the world was made
since the world was young
since the year one
since time began
sincere friendship
sindbad the sailor
sine bar
sine curve
sine die
sine galvanometer
sine law
sine mechanism
sine prole
sine qua non
sine wave
sine-qua-nonical
sine-qua-noniness

sine-wave
sinew-backed
sinew-grown
sinew-shrunk
sinful act
sing a different tune
sing a familiar tune
sing deathless songs
sing in chorus
sing in the shrouds
sing out
sing praises
sing small
sing the blues
sing the praise of
sing the praises of
sing the same old song
sing the same old tune
sing your own praises
sing your praises
sing-in
sing-sing
sing-song
singhara nut
singing bird
singing book
singing bread
singing club
singing lesson
singing master
singing part
singing psalm
singing school
singing
society
singing teacher
singing voice
single Spanish burton
single bed
single blessedness
single block
single bond
single combat
single condition
single crochet
single cut
single doubler
single entry

single file
single girl
single knot
single man
single messages
single microscope
single mordent
single out
single person
single purchase
single quotation marks
single quotes
single reed
single rhyme
single sap
single sculls
single shell
single sideband
single sideband transmission
single space
single standard
single state
single step rocket
single stitch
single system
single tackle
single tape
single tax
single taxer
single ticket
single transfer
single transferrable vote
single voice
single vote
single voting
single whip
single wicket
single wing
single wingback formation
single woman
single-acting
single-acting engine
single-action
single-action engine
single-bank
single-banked
single-barrel
single-barreled

single-barrelled
single-beat
single-bitted
single-blind
single-blossomed
single-bodied
single-branch
single-breasted
single-breasted
jacket
single-breasted suit
single-button carbon microphone
single-caped
single-cell
single-celled
single-chamber
single-colored
single-combed
single-crested
single-crop
single-cross
single-current telegraphy
single-cut
single-cutting
single-cylinder
single-deck
single-decker
single-disk
single-dotted
single-driver
single-edged
single-end
single-ended
single-entry
single-entry accounting
single-entry bookkeeping
single-eyed
single-file
single-filed
single-finned
single-fire
single-flowered
single-foot
single-footer
single-framed
single-fringed
single-gear
single-grown

single-handed
single-handedly
single-handedness
single-hander
single-headed
single-hearted
single-heartedly
single-heartedness
single-hoofed
single-hooked
single-horned
single-horsed
single-hung
single-jet
single-layer
single-layered
single-leaded
single-leaf
single-leaf ash
single-leaved
single-lens reflex
single-letter
single-lever
single-light
single-line
single-living
single-loader
single-masted
single-measure
single-member
single-member
constituency
single-member district
single-minded
single-mindedly
single-mindedness
single-motored
single-mouthed
single-name
single-name paper
single-nerved
single-pass
single-pen
single-phase
single-phase alternating current
single-phase motor
single-phaser
single-piece

single-pitched
single-plated
single-ply
single-pointed
single-pole
single-prop
single-punch
single-rail
single-reed
single-reed instrument
single-reefed
single-rivet
single-riveted
single-row
single-screw
single-seated
single-seater
single-seed
single-seed cucumber
single-seeded
single-shear
single-sheaved
single-shooting
single-shot
single-soled
single-space
single-speech
single-stage
single-stage rocket
single-step
single-stepped
single-stick
single-stitch
single-strand
single-strength
single-stroke
single-surfaced
single-swing
single-swing joint
single-tap
single-tax
single-thoughted
single-threaded
single-throw
single-throw switch
single-tongue
single-tonguing
single-track

single-tree
single-trip
single-trunked
single-twist
single-twisted
single-valued
single-walled
single-wheel
single-wheeled
single-whip
single-whip
 tackle
single-wicket
single-wire
single-wired
singled out
singled-out
singleness of heart
singleness of purpose
singles court
singular point
singular proposition
sinister influence
sinister-handed
sinistro-
sink away
sink back
sink boat
sink box
sink down
sink in
sink in the mind
sink into despair
sink into oblivion
sink into the mind
sink like lead
sink money in
sink of corruption
sink of iniquity
sink or swim
sink or swim with
sink your soul
sink-hole
sink-stone
sinker bar
sinker boat
sinker drill
sinker wood

sinkhole drainage
sinking bowl
sinking fund
sinking head
sinking heart
sinking speed
sinking stomach
sinking-fund
sinking-fund bond
sinking-fund payment
sinn fein
sino-
sino-tibetan
sinoatrial node
sinuate-leaved
sinuato-
sinumbra lamp
sinuoso-
sinus arrhythmia
sinus band
sinus node
sinusoidal
circuit
sinusoidal projection
siphon alga
siphon barometer
siphon bottle
siphon condenser
siphon cup
siphon gauge
siphon off
siphon recorder
siphon slide
siphon spillway
siphono-
sir-reverence
sirdar bearer
sire-found
siren song
sirloin steak
sirup sorghum
sisal hemp
siskin parrot
sissy-pants
sister block
sister cell
sister fold
sister hook

sister keelson
sister rib
sister ship
sister-german
sister-in-law
sister-wife
sisters under the skin
sit around
sit at
sit at the feet of
sit back
sit bolt upright
sit by
sit down
sit down at the bargaining table
sit down on
sit down together
sit down with
sit in
sit in for
sit in judgment
sit in on
sit it out
sit on
sit on a barrel of gunpowder
sit on the dais
sit on the fence
sit on the sidelines
sit on the tail of
sit on the throne
sit on your ass
sit on your butt
sit on your duff
sit on your hands
sit out
sit over
sit pretty
sit shibah
sit tight
sit under
sit up
sit up and take notice
sit up for
sit upon
sit upon thorns
sit well with one
sit well

with you
sit-down
sit-down strike
sit-downer
sit-fast
sit-in
sit-up
sit-upon
sitdown striker
site development
site land
sitio-
sitka spruce
sito-
sitter-by
sitter-in
sitter-out
sitting day
sitting duck
sitting height
sitting place
sitting room
sitting shot
sitting tenant
sitting trot
situation comedy
situation ethics
situational neurosis
situational psychosis
situs inversus
sitz bath
siva snake
siva-siva
siwash sweater
six and two threes
six feet above contradiction
six feet under
six o'clock
six point
six ways from Sunday
six-acre
six-angled
six-arched
six-banded
six-bar
six-barred
six-barreled
six-bottle

six-by-six
six-canted
six-cent
six-chambered
six-colored
six-cornered
six-coupled
six-course
six-cut
six-cylinder
six-cylindered
six-day
six-dollar
six-eared
six-edged
six-eight
six-eight time
six-ell
six-eyed
six-faced
six-figure income
six-figured
six-fingered
six-flowered
six-foiled
six-foot
six-footed
six-footer
six-gallon
six-gated
six-gilled
six-gilled shark
six-grain
six-gram
six-gun
six-headed
six-hoofed
six-horse
six-hour
six-inch
six-jointed
six-leaved
six-legged
six-letter
six-lettered
six-lined
six-lobed
six-masted

six-master
six-mile
six-minute
six-mouth
six-o-six
six-oared
six-oclock
six-ounce
six-pack
six-part
time
six-petaled
six-phase
six-plumed
six-ply
six-pointed
six-pointed star
six-pot
six-pound
six-pounder
six-ranked
six-rayed
six-ribbed
six-room
six-roomed
six-rowed
six-second
six-shafted
six-shared
six-shilling
six-shooter
six-sided
six-spined
six-spot
six-spotted
six-storied
six-story
six-stringed
six-striped
six-syllable
six-three-three
six-time
six-ton
six-week
six-weeks grass
six-wheel
six-wheeled
six-wheeler

six-winged
six-yard
six-yard area
six-yard line
six-year
six-year-old
sixpenny bit
sixteen-foot
sixteen-foot stop
sixteen-pounder
sixteenth note
sixteenth rest
sixth chord
sixth column
sixth form
sixth nerve
sixth sense
sixth-floor
sixth-form
sixth-grade
sixth-rate
sixty per cent
sixty-eight
sixty-eighth
sixty-fifth
sixty-first
sixty-five
sixty-four
sixty-four-dollar
question
sixty-fourmo
sixty-fourmos
sixty-fourth
sixty-fourth note
sixty-fourth rest
sixty-nine
sixty-ninth
sixty-one
sixty-second
sixty-seven
sixty-seventh
sixty-six
sixty-sixth
sixty-third
sixty-three
sixty-two
size bone
size roll

size stick
size up
size up your measure
sizer die
sizer tap
sizing tool
sizing up
sizzling heat
sizzling hot
skate on thin ice
skate over
skate sailing
skating rink
skean dhu
skee-ball
skeel duck
skeel goose
skeeling goose
skeen arch
skeet shooting
skeleto-
skeleton at the feast
skeleton clock
skeleton company
skeleton construction
skeleton dance
skeleton drill
skeleton girder
skeleton in the closet
skeleton in the cupboard
skeleton key
skeleton leaf
skeleton movement
skeleton pattern
skeleton proof
skeleton regiment
skeleton shrimp
skeleton suit
skelic index
skelpie-limmer
skene arch
skene dhu
sketch book
sketch map
sketch out
sketch plan
sketch plate
sketch-book

skew arch
skew chisel
skew distribution
skew field
skew
 polygon
skew putt
skew table
skew-back
skew-gee
skew-jawed
skew-symmetric
skewed judgment
skewer-up
ski boot
ski boots
ski bum
ski jacket
ski jump
ski landing gear
ski lift
ski pants
ski pole
ski run
ski stick
ski suit
ski sweater
ski tow
ski troops
ski wax
ski-jumping
ski-plane
skia-
skid box
skid chain
skid engine
skid fin
skid landing gear
skid platform
skid road
skid row
skid to a stop
skid-row bum
skidding hooks
skidding sled
skidding trail
skiffle band
skill facet

skill with language
skill with words
skill-less
skill-lessness
skilled hand
skilled in
skilled laborer
skilled workman
skillet chopper
skim coat
skim colter
skim gate
skim milk
skim off
skim over
skim the surface
skim through
skim-coulter
skim-milk
skimble-scamble
skimble-skamble
skimmed milk
skimmer cake
skimmer gate
skimmer scoop
skimming back
skimming dish
skimming gate
skimming-dish
skimmington ride
skimper-scamper
skin alive
skin and bones
skin beetle
skin boat
skin book
skin cancer
skin coat
skin color
skin coloring
skin
 disease
skin dive
skin diver
skin diving
skin effect
skin eruption
skin flick

skin food
skin friction
skin friction drag
skin game
skin graft
skin grafting
skin layer
skin man
skin mark
skin nose
skin out
skin planing
skin resistance
skin spot
skin test
skin tone
skin wool
skin-breaking
skin-built
skin-clad
skin-clipping
skin-deep
skin-devouring
skin-dive
skin-dived
skin-diver
skin-diving
skin-dove
skin-peeled
skin-piercing
skin-plastering
skin-pop
skin-popping
skin-shifter
skin-spread
skin-testing
skin-tight
skinned alive
skinning alive
skinning knife
skinning loam
skinny as a lath
skinny as a rail
skinny dip
skinny dipper
skinny-dip
skinny-dipped
skinny-dipper

skinny-dipping
skinny-dipt
skinny-necked
skip bail
skip bomb
skip bridge
skip car
skip distance
skip elevator
skip for joy
skip hoist
skip it
skip numbering
skip off
skip out
skip over
skip rope
skip straight
skip through
skip tracer
skip zone
skip-bomb
skip-bombing
skip-kennel
skipjack pike
skipjack tuna
skipping rope
skipping-rope
skirmish
 drill
skirmish line
skirt cassock
skirt chaser
skirt dance
skirt dancer
skirt marker
skirt of tasses
skirt the shore
skirt-dancer
skirting board
skirting table
skirting-board
skittle alley
skittle ball
skittle out
skittle pool
skittle pot
skittle-shaped

skivvy shirt
skookum-house
skrim shander
skua gull
skulk away
skull and crossbones
skull cracker
skull practice
skull session
skull-built
skull-cap
skull-covered
skull-crowned
skull-dividing
skull-hunting
skull-less
skull-like
skull-lined
skullcap speedwell
skunk bear
skunk bird
skunk blackbird
skunk cabbage
skunk currant
skunk grape
skunk mushroom
skunk plant
skunk porpoise
skunk spruce
skunk turtle
skunk-drunk
skunk-headed
skunkhead coot
sky advertising
sky an oar
sky atlas
sky blue
sky compass
sky cover
sky dive
sky diver
sky diving
sky drain
sky farmer
sky gazer
sky gray
sky hooker
sky iron

sky line
sky map
sky marker
sky parlor
sky pilot
sky pipit
sky screen
sky shade
sky sign
sky train
sky truck
sky wave
sky-aspiring
sky-blasted
sky-blue
sky-blue
pink
sky-born
sky-bred
sky-capped
sky-cast
sky-clad
sky-clear
sky-cleaving
sky-climbing
sky-color
sky-colored
sky-dive
sky-diving
sky-dome
sky-dyed
sky-elephant
sky-engendered
sky-facer
sky-falling
sky-gazer
sky-god
sky-high
sky-kissing
sky-line
sky-line logging
sky-measuring
sky-planted
sky-reaching
sky-rending
sky-resembling
sky-rocket
sky-ruling

sky-sail
sky-scaling
sky-scraper
sky-sign
sky-throned
sky-tinctured
sky-touching
sky-worn
skye terrier
skyhook balloon
skysail mast
skysail pole
skysail yard
skysail-yarder
slab bridge
slab dashing
slab house
slab line
slab mill
slab pahoehoe
slab plastering
slab reef
slab tie
slab top
slab-sided
slab-sidedly
slab-sidedness
slabbing cutter
slabbing machine
slabbing mill
slack back
slack barrel
slack coal
slack cooperage
slack filling
slack jaw
slack off
slack purse strings
slack suit
slack up
slack water
slack-bake
slack-baked
slack-filled
slack-jawed
slack-laid
slack-off
slack-rope

slack-rope artist
slack-salted
slack-spined
slack-twisted
slack-up
slack-water
slag
 cement
slag concrete
slag down
slag furnace
slag heap
slag hearth
slag sand
slag wool
slag-hearth
slag-lead
slag-tap furnace
slagging furnace
slagging hole
slake trough
slake your thirst
slaked lime
slam bidding
slam into
slam the door in your face
slam-bang
slamming stile
slang dictionary
slang-whang
slang-whanger
slanging match
slant across
slant culture
slant dam
slant front
slant height
slant of wind
slant rhyme
slant-eye
slant-eyed
slant-top
slanting hand
slap a tax on
slap around
slap at
slap dashing
slap down

slap in the face
slap in the middle
slap of the glove
slap on
slap on paint
slap on the wrist
slap plastering
slap the face
slap the lid on
slap up
slap you in the face
slap your face
slap-bang
slap-bang shop
slap-dab
slap-dash
slap-sided
slap-slap
slap-up
slapstick comedian
slapstick comedy
slapstick humor
slapstick quality
slash across
slash bar
slash mark
slash pine
slash pocket
slash the throat
slash-grain
slash-saw
slash-sawed
slash-sawing
slash-sawn
slat
 bonnet
slat sign
slat-back
slate ax
slate bed
slate black
slate blue
slate cement
slate clay
slate galiot
slate gray
slate green
slate olive

slate pencil
slate picker
slate purple
slate roof
slate spar
slate splitter
slate writer
slate writing
slate-beveling
slate-brown
slate-color
slate-colored
slate-colour
slate-cutting
slate-formed
slate-pencil
slate-spired
slate-strewn
slate-trimming
slate-violet
slaughter pen
slaughter tree
slaughter-breathing
slaughter-dealing
slaughter-house
slaughter-threatening
slave ant
slave broker
slave clock
slave cylinder
slave dealer
slave dealing
slave driver
slave fork
slave hunt
slave hunter
slave hunting
slave labor
slave labor camp
slave maker
slave market
slave ship
slave song
slave state
slave trade
slave trader
slave trading
slave-carrying

slave-collecting
slave-cultured
slave-deserted
slave-drive
slave-driver
slave-enlarging
slave-got
slave-grown
slave-labor
slave-making
slave-making ant
slave-merchant
slave-owning
slave-peopled
slave-trade
slaver
over
slavo-
slay en masse
sleave silk
sleave-silk
sled cultivator
sled dog
sled harvester
sled knife
sled lister cultivator
sled marker
sled part
sled-log
sledge chair
sledge dog
sledge hammer
sledge-hammer
sleek stone
sleek-browed
sleek-faced
sleek-haired
sleek-headed
sleek-leaf
sleek-looking
sleek-skinned
sleeker-up
sleep around
sleep at your post
sleep drink
sleep in
sleep it off
sleep like a log

sleep like a top
sleep like the dead
sleep movement
sleep movements
sleep of the just
sleep off
sleep on
sleep on a volcano
sleep out
sleep soundly
sleep talker
sleep talking
sleep together
sleep treatment
sleep upon
sleep with
sleep with one eye open
sleep with the Lord
sleep with your ancestors
sleep with your fathers
sleep-at-noon
sleep-bedeafened
sleep-bringer
sleep-bringing
sleep-causing
sleep-compelling
sleep-created
sleep-desiring
sleep-dewed
sleep-dispelling
sleep-disturbing
sleep-drowned
sleep-drunk
sleep-enthralled
sleep-fatted
sleep-fearing
sleep-filled
sleep-heavy
sleep-in
sleep-inducer
sleep-inducing
sleep-inviting
sleep-loving
sleep-procuring
sleep-producer
sleep-producing
sleep-provoker
sleep-provoking

sleep-resisting
sleep-soothing
sleep-stuff
sleep-swollen
sleep-tempting
sleep-walker
sleeper
 goby
sleeper shark
sleeping around
sleeping bag
sleeping beauty
sleeping car
sleeping carriage
sleeping chair
sleeping disease
sleeping draught
sleeping fire
sleeping partner
sleeping pill
sleeping place
sleeping policeman
sleeping porch
sleeping rent
sleeping room
sleeping sickness
sleeping suit
sleeping table
sleeping together
sleeping with
sleepless eye
sleepy Dick
sleepy disease
sleepy sickness
sleepy-acting
sleepy-eyed
sleepy-eyes
sleepy-headed
sleepy-headedness
sleepy-looking
sleepy-souled
sleepy-sounding
sleepy-voiced
sleet wheel
sleeve axle
sleeve board
sleeve brick
sleeve button

sleeve dog
sleeve link
sleeve links
sleeve nut
sleeve target
sleeve valve
sleeve waistcoat
sleeve-defended
sleeve-hidden
sleigh
 bed
sleigh bell
sleigh bells
sleigh cutter
sleight of hand
sleight-of-hand
sleight-of-hand artist
sleight-of-hand performer
sleight-of-hand trick
slender as a thread
slender blind snake
slender blue flag
slender loris
slender means
slender-ankled
slender-armed
slender-beaked
slender-billed
slender-bladed
slender-bodied
slender-branched
slender-fingered
slender-finned
slender-flanked
slender-flowered
slender-footed
slender-hipped
slender-jawed
slender-jointed
slender-leaved
slender-legged
slender-limbed
slender-looking
slender-muzzled
slender-nosed
slender-podded
slender-shafted
slender-shouldered

slender-spiked
slender-stalked
slender-stemmed
slender-striped
slender-tailed
slender-toed
slender-trunked
slender-waisted
slender-witted
slenderness ratio
sleuth-hound
slew rope
slew-eyed
slibber-sauce
slice bar
slice galley
slice of life
slice the melon
slice the pie
slice up
slick as a whistle
slick chick
slick citizen
slick down
slick magazine
slick on
slick stone
slick up
slick-ear
slick-faced
slick-haired
slick-looking
slick-spoken
slick-talking
slick-tongued
slicked
up
slicker hat
slide back
slide bar
slide block
slide box
slide bridge
slide caliper
slide down
slide fastener
slide film
slide into

slide knot
slide lathe
slide off
slide out of
slide over
slide pole
slide projector
slide rail
slide rest
slide rod
slide rule
slide shaft
slide stacker
slide tongs
slide tool
slide trombone
slide valve
slide viewer
slide-
slide-action
slide-easy
slide-groat
slide-rest
slide-rest lathe
slide-rock
slide-rule
slide-rule warfare
slide-valve
slide-valve engine
slide-wire
slide-wire bridge
slider crank
slider-crank chain
sliding board
sliding fit
sliding friction
sliding keel
sliding scale
sliding seat
sliding vector
sliding way
sliding-gear
sliding-scale
sliding-scale premium
slight knowledge
slight over
slight stretching
slight wrong

slight-billed
slight-bottomed
slight-built
slight-esteemed
slight-informed
slight-limbed
slight-looking
slight-made
slight-natured
slight-seeming
slight-shaded
slight-timbered
slim
 chance
slim down
slim pickings
slim-ankled
slim-built
slim-jim
slim-leaved
slim-limbed
slim-shanked
slim-spired
slim-trunked
slim-waisted
slime eel
slime flux
slime fungus
slime mold
slime mould
slime pit
slime table
slime thickening
slime-begotten
slime-browned
slime-coated
slime-filled
slime-secreting
slime-washed
slimy-backed
sling at
sling cart
sling chair
sling dog
sling hash
sling off
sling psychrometer
sling pump

sling rope
sling stay
sling strap
sling the lead
sling thermometer
sling trot
sling unloader
sling-
slinger ring
slink butcher
slink in
slink lamb
slink off
slip 'twixt cup and lip
slip a cog
slip away
slip back
slip by
slip carriage
slip cheese
slip cloth
slip clutch
slip coach
slip coupling
slip cover
slip curd
slip dock
slip down
slip friction
slip friction clutch
slip gauge
slip glaze
slip grab
slip hook
slip in
slip indicator
slip into
slip jaw
slip joint
slip key
slip kiln
slip knot
slip line
slip mortise
slip noose
slip of the
pen
slip of the tongue

slip off
slip on
slip one over on
slip out
slip out of
slip over
slip panel
slip proof
slip rail
slip regulator
slip ring
slip road
slip rope
slip seat
slip shackle
slip share
slip sheet
slip sill
slip skid
slip something over on
slip spring
slip stem
slip stitch
slip stopper
slip stream
slip switch
slip tap
slip the
slip the cable
slip the collar
slip the memory
slip through
slip through your fingers
slip through your hands
slip tongue
slip up
slip ware
slip washer
slip wool
slip you a Mickey
slip you a Mickey Finn
slip your cable
slip your mind
slip-
slip-along
slip-knot
slip-on
slip-rail

slip-ring
slip-sheet
slip-shelled
slip-shoe
slip-skin
slip-slop
slip-stitch
slip-string
slip-tongue wheel
slip-top
slip-up
slip-way
slipcoat cheese
slipe wool
slipped disc
slipped disk
slipped tendon
slipped wing
slipper animalcule
slipper animalcules
slipper bath
slipper block
slipper boat
slipper brake
slipper chair
slipper drag
slipper foot
slipper limpet
slipper orchid
slipper
 piston
slipper plant
slipper satin
slipper shell
slipper sock
slipper-foxed
slipper-root
slipper-shaped
slippered ease
slippery as an eel
slippery dip
slippery elm
slippery-bellied
slippery-breeched
slippery-looking
slippery-shod
slippery-sleek
slippery-tongued

slipping away
slipping back
slipshod construction
slit band
slit deal
slit lamp
slit pocket
slit skirt
slit tapestry
slit trench
slit-drum
slit-eared
slit-eyed
slit-footed
slit-nosed
slit-shaped
slither off
slitting file
slitting machine
slitting saw
slitting shears
sliver box
slob ice
slob land
slobber over
slobber-chops
slocking stone
sloe gin
sloe plum
sloe thorn
sloe-black
sloe-blue
sloe-colored
sloe-eyed
slog away
slog on
sloop of war
sloop rig
sloop yacht
sloop-rigged
slop around
slop basin
slop book
slop bowl
slop chest
slop chute
slop cloth
slop dealer

slop frock
slop hand
slop jar
slop man
slop merchant
slop molding
slop on paint
slop out
slop over
slop padding
slop pail
slop room
slop sink
slop-built
slop-molded
slop-over
slop-seller
slop-shop
slop-work
slope
 arms
slope culture
slope form
slope up
slope-
slope-browed
slope-eared
slope-edged
slope-faced
slope-lettered
slope-roofed
slope-sided
slope-toothed
slope-walled
sloping downward
sloping upward
sloppy Joe
sloppy joe
slosh wheel
slot and filler
slot burner
slot conveyer
slot driller
slot file
slot machine
slot man
slot mortise
slot rail

slot washer
slot winding
slot-boring
slot-drill
slot-drilling
slot-drilling machine
slot-headed
slot-spike
sloth animalcule
sloth bear
sloth monkey
sloth tree
slotting auger
slotting drill
slotting end mill
slotting file
slotting machine
slouch around
slouch hat
slough bass
slough grass
slough ice
slough of despond
slough off
slough over
slovenly performance
slow ahead
slow and careful steps
slow as death
slow as molasses
slow as slow
slow astern
slow burn
slow coach
slow down
slow goer
slow handclap
slow loris
slow march
slow market
slow match
slow motion
slow neutron
slow off the mark
slow person
slow pile
slow

starter
slow time
slow to
slow to act
slow to commit yourself
slow to make your move
slow up
slow-back
slow-belly
slow-blooded
slow-breathed
slow-breathing
slow-breeding
slow-burning
slow-circling
slow-coach
slow-combustion
slow-conceited
slow-consuming age
slow-contact
slow-crawling
slow-creeping
slow-developed
slow-drawing
slow-drawn
slow-driving
slow-ebbing
slow-endeavoring
slow-extinguished
slow-eyed
slow-fingered
slow-foot
slow-footed
slow-gaited
slow-going
slow-growing
slow-legged
slow-march
slow-mettled
slow-motion
slow-moving
slow-paced
slow-poky
slow-run
slow-running
slow-sailing
slow-speaking
slow-speeched

slow-spirited
slow-spoken
slow-stepped
slow-sudden
slow-sure
slow-thinking
slow-time
slow-tongued
slow-tuned
slow-up
slow-winged
slow-witted
slow-wittedness
slow-worm
slowed down
slower than the seven-year itch
slowing down
slowness to act
slubber de gullion
slubber over
slubbing billy
slubbing machine
sludge acid
slue rope
slue-footed
slug caterpillar
slug horn
slug
 snail
slug worm
slug-a-bed
slug-abed
slug-horn
slug-worm
slugging average
slugging machine
slugging match
slugging percentage
sluice box
sluice gate
sluice out
sluice valve
slum clearance
slum-dwellers
slumber party
slumber-bound
slumber-bringing
slumber-closing

slumber-loving
slumber-seeking
slumber-wrapt
slump cone
slump down
slump test
slung shot
slur over
slurp up
slush casting
slush fund
slush lamp
slush-cast
slushing oil
slut's wool
sly dog
sly grog
sly look
sly suggestion
sly-boots
sly-eyed
sly-goose
sly-grog
sly-looking
sly-tongued
sma-boukit
smack boat
smack in the middle
smack into
smack of
smack the lips
smack your lips
smack-dab
smack-dab in the middle
smacking of
small ale
small amount
small arm
small arms
small beer
small boat
small bond
small bower
small boy
small burgh
small business
small businessman
small calorie

small cane
small cap
small capital
small chance
small change
small chop
small circle
small claims court
small clothes
small coal
small cranberry
small debt
small
end
small fry
small game
small goods
small ham
small honeysuckle
small hope
small hours
small intestine
small letter
small matter
small number
small octave
small pastern bone
small pica
small place
small potato
small potatoes
small price tag
small print
small royal
small screen
small share
small signal hybrid open circuit
small signal open circuit
small signal short circuit
small slam
small space
small stores
small stuff
small talk
small time
small tradesmen
small voice
small woodbine

small years
small-acred
small-ankled
small-arm
small-armed
small-arms
small-beer
small-billed
small-boat
small-bodied
small-boned
small-bore
small-boyhood
small-boyish
small-brained
small-caliber
small-celled
small-claims court
small-clawed
small-clothes
small-college
small-colleger
small-cornered
small-craft warning
small-crowned
small-debts court
small-diameter
small-drink
small-eared
small-eyed
small-faced
small-feed
small-finned
small-flowered
small-footed
small-framed
small-fruited
small-fry
small-grain
small-grained
small-habited
small-handed
small-headed
small-hipped
small-horned
small-jointed
small-leaved
small-letter

small-lettered
small-limbed
small-looking
small-lunged
small-minded
small-mindedly
small-mindedness
small-nailed
small-natured
small-paneled
small-paper
small-part
small-pattern
small-petaled
small-pored
small-preferred
small-reasoned
small-scale
small-scaled
small-shelled
small-size
small-sized
small-souled
small-spaced
small-spotted
small-sword
small-tailed
small-talk
small-threaded
small-timbered
small-time
small-timer
small-tired
small-toned
small-tooth
small-toothed
small-topped
small-town
small-towner
small-trunked
small-type
small-visaged
small-visioned
small-ware
small-wheeled
small-windowed
smallmouth

bass
smallpox plant
smallpox-proof
smalt green
smalt-blue
smart aleck
smart as a whip
smart ass
smart crack
smart money
smart operator
smart pace
smart saying
smart set
smart-aleck
smart-aleckiness
smart-alecky
smart-ass
smart-built
smart-cocked
smart-dressing
smart-looking
smart-money
smart-spoken
smart-stinging
smart-talking
smart-tongued
smart-witted
smarten
up
smarty-pants
smash all opposition
smash hit
smash in
smash into
smash piecer
smash the atom
smash up
smash-and-grab
smash-up
smashboard signal
smasher hammer
smasher hat
smashing defeat
smashing machine
smattering of ignorance
smattering of knowledge
smear campaign

smear culture
smear dab
smear dock
smear on
smear test
smear ware
smear word
smear-dab
smear-sheet
smegma bacillus
smell a rat
smell around
smell bad
smell good
smell in the wind
smell of
smell of decay
smell of the lamp
smell out
smell sweet
smell to heaven
smell to high heaven
smell up
smell-feast
smell-less
smell-lessness
smell-smock
smeller-out
smelling bottle
smelling salts
smelling-stick
smelt-
smick-smack
smick-smock
smiddy-leaves
smilax family
smile at
smile brightly
smile of recognition
smile upon
smile-covering
smile-frowning
smile-tuned
smile-wreathed
smileage book
smiled-out
smiles of fortune
smiling

reception
smiling sleep
smiling wakerobin
smite hip and thigh
smithing coal
smithy coal
smiting line
smitten with
smitten with death
smock frock
smock marriage
smock mill
smock windmill
smock-faced
smock-frock
smock-frocked
smoke agent
smoke arch
smoke ball
smoke blue
smoke bomb
smoke cat
smoke chamber
smoke curtain
smoke dome
smoke explosion
smoke gray
smoke grenade
smoke helmet
smoke hole
smoke jumper
smoke kiln
smoke like a chimney
smoke like a furnace
smoke out
smoke passage
smoke pipe
smoke plant
smoke pot
smoke proof
smoke quartz
smoke rocket
smoke room
smoke sail
smoke screen
smoke shelf
smoke shop
smoke stop

smoke talk
smoke the pipe of peace
smoke tree
smoke washer
smoke-ball
smoke-begotten
smoke-black
smoke-bleared
smoke-blinded
smoke-blue
smoke-bound
smoke-brown
smoke-burning
smoke-colored
smoke-condensing
smoke-consuming
smoke-consumptive
smoke-cure
smoke-curing
smoke-dried
smoke-dry
smoke-drying
smoke-dyed
smoke-eater
smoke-eating
smoke-enrolled
smoke-exhaling
smoke-filled
smoke-filled
room
smoke-gray
smoke-grimed
smoke-hole
smoke-jack
smoke-laden
smoke-oh
smoke-paint
smoke-pennoned
smoke-preventing
smoke-preventive
smoke-selling
smoke-smothered
smoke-sodden
smoke-stack
smoke-stained
smoke-torn
smoke-vomiting
smoke-wreathed

smoke-yellow
smoked glass
smoked glasses
smoked herring
smoked rubber
smokeless powder
smokeless powder rocket
smokeless zone
smoking bean
smoking car
smoking compartment
smoking concert
smoking duck
smoking habit
smoking hot
smoking jacket
smoking lamp
smoking opium
smoking room
smoking stand
smoking tobacco
smoking-concert
smoking-room
smoky quartz
smoky topaz
smoky-bearded
smoky-blue
smoky-colored
smoky-flavored
smoky-looking
smoky-smelling
smoky-tinted
smoky-waving
smoldering fire
smoot hole
smooth as a baby's ass
smooth as a billiard ball
smooth as glass
smooth bore
smooth breathing
smooth citizen
smooth coat
smooth down
smooth flounder
smooth hound
smooth it over
smooth muscle
smooth out

smooth over
smooth plane
smooth road
smooth
 sailing
smooth snake
smooth sumac
smooth surface
smooth talker
smooth temper
smooth the path
smooth the road
smooth the ruffled brow of care
smooth the way
smooth the way for
smooth wine
smooth winterberry
smooth your feathers
smooth your ruffled
smooth-ankled
smooth-barked
smooth-bedded
smooth-bellied
smooth-billed
smooth-bodied
smooth-browed
smooth-cast
smooth-cheeked
smooth-chinned
smooth-clouded
smooth-coated
smooth-coil
smooth-combed
smooth-core
smooth-crested
smooth-cut
smooth-dittied
smooth-edged
smooth-face
smooth-faced
smooth-famed
smooth-fibered
smooth-finned
smooth-flowing
smooth-foreheaded
smooth-fronted
smooth-fruited
smooth-gliding

smooth-going
smooth-grained
smooth-haired
smooth-handed
smooth-headed
smooth-hewn
smooth-leaved
smooth-legged
smooth-limbed
smooth-looking
smooth-necked
smooth-nosed
smooth-paced
smooth-plastered
smooth-podded
smooth-polished
smooth-riding
smooth-rimmed
smooth-rinded
smooth-rubbed
smooth-running
smooth-sculptured
smooth-shaven
smooth-sided
smooth-skinned
smooth-sliding
smooth-soothing
smooth-sounding
smooth-speaking
smooth-spoken
smooth-stalked
smooth-stemmed
smooth-surfaced
smooth-tailed
smooth-taper
smooth-taper
drift
smooth-tempered
smooth-textured
smooth-tined
smooth-tired
smooth-tongued
smooth-voiced
smooth-walled
smooth-winding
smooth-winged
smooth-working
smooth-woven

smooth-writing
smooth-wrought
smoothback flounder
smoothbore gun
smoothbore weapon
smoothed out
smoother-over
smoothhound shark
smoothing box
smoothing iron
smoothing mill
smoothing of the way
smoothing plane
smother crop
smother fire
smother fly
smother-kiln
smothered mate
smudge fire
smudge pot
smug-faced
smug-looking
smug-skinned
smuggle in
smuggled goods
smut ball
smut fungus
smut gall
smut grass
smut mill
smut-free
smutty-faced
smutty-nosed
smutty-yellow
snack bar
snack stool
snack table
snaffle bit
snaffle-bridled
snaffle-mouthed
snaffle-reined
snag boat
snag tooth
snag tree
snaggle-toothed
snail bore
snail borer
snail cloud

snail clover
snail
countersink
snail fever
snail horn
snail medic
snail plant
snail shell
snail trefoil
snail wheel
snail's pace
snail-horned
snail-like
snail-likeness
snail-paced
snail-seed
snail-shell
snail-slow
snake bearer
snake bite
snake blenny
snake boat
snake buzzard
snake cactus
snake cane
snake charmer
snake crane
snake cucumber
snake dance
snake doctor
snake eel
snake eggplant
snake eyes
snake feeder
snake fence
snake fern
snake fly
snake foot
snake gentian
snake gourd
snake guide
snake hole
snake idol
snake in the grass
snake juice
snake killer
snake leaf
snake lily

snake line
snake mackerel
snake medicine
snake melon
snake moss
snake nut
snake oil
snake palm
snake pit
snake star
snake violet
snake wire
snake worship
snake worshiper
snake's head
snake's-head
snake-bitten
snake-bodied
snake-devouring
snake-drawn
snake-eater
snake-eating
snake-encircled
snake-engirdled
snake-eyed
snake-goddess
snake-grass
snake-haired
snake-headed
snake-hipped
snake-killing
snake-like
snake-milk
snake-necked
snake-plantain
snake-set
snake-shaped
snake-skin
snake-tressed
snake-wanded
snake-weed
snake-wigged
snake-winged
snake-wood
snakebite
 remedy
snakehead mullet
snakemouth pogonia

snakes and ladders
snakes in the boots
snaky-eyed
snaky-haired
snaky-handed
snaky-headed
snaky-paced
snaky-sparkling
snaky-tailed
snaky-wreathed
snap at
snap back
snap bean
snap beetle
snap brim
snap bug
snap cap
snap catch
snap clutch
snap decision
snap fastener
snap flask
snap gauge
snap header
snap hook
snap judgment
snap link
snap lock
snap machine
snap molder
snap molding
snap out
snap out of it
snap point
snap ring
snap roll
snap shooter
snap shooting
snap shot
snap switch
snap table
snap the thread
snap the whip
snap to it
snap tool
snap turtle
snap up
snap vote

snap willow
snap your fingers
snap your fingers at
snap your head off
snap your nose off
snap-
snap-apple
snap-brim
snap-brim hat
snap-brimmed
snap-finger
snap-hook
snap-on
snap-rivet
snap-roll
snap-shot
snap-top
snap-top table
snaphead rivet
snapper
up
snapper-back
snapper-up
snapping beetle
snapping point
snapping tool
snapping turtle
snappy comeback
snappy pace
snare drum
snare strainer
snarl defiance
snarl up
snarl-up
snarled up
snarling iron
snatch at
snatch block
snatch from
snatch from the jaws of death
snatch hitch
snatch team
snatch-
snaw-broo
sneak attack
sneak boat
sneak box
sneak current

sneak in
sneak off
sneak out
sneak out of
sneak preview
sneak shooting
sneak thief
sneak thievery
sneak through
sneak-
sneak-cup
sneak-up
sneaking suspicion
sneaky pete
sneck band
sneck drawer
sneck harling
sneck hook
sneck posset
sneck-drawer
sneer at
sneeshing box
sneeshing mill
sneeshing mull
sneeze at
sneeze gas
sneeze weed
sneezewort tansy
sneezewort yarrow
sneezing gas
snick and snee
snick drawer
snick-a-snee
snick-and-snee
snick-and-snee knife
snick-snarl
snicker at
sniff at
sniff out
sniffle valve
sniffles, the
snifter valve
snifting valve
snigger at
snip-snap
snip-snap-snorum
snip-snappy
snipe at

snipe eel
snipe fly
snipe hawk
snipe
 hunt
snipe-bill
snipe-nosed
sniper-scope
snipnose mullet
snipper-snapper
snitch on
sno-cat
snob appeal
snooker pool
snore hole
snore piece
snorkel diver
snorkel diving
snorkel pen
snort at
snot-rag
snotnose kid
snotty-nosed
snout beetle
snout butterfly
snout machine
snout mite
snout moth
snow apple
snow banner
snow bear
snow bed
snow blanket
snow blast
snow blindness
snow board
snow boot
snow bunting
snow buttercup
snow chains
snow chukor
snow cock
snow cover
snow crust
snow cup
snow devil
snow dust
snow eater

snow eyes
snow fence
snow field
snow finch
snow flea
snow flurry
snow fly
snow gem
snow glare
snow glory
snow gnat
snow goggles
snow goose
snow grains
snow grass
snow ground
snow grouse
snow guard
snow gum
snow hut
snow ice
snow in
snow insect
snow job
snow knife
snow leopard
snow light
snow lily
snow limit
snow line
snow mold
snow mosquito
snow mouse
snow one under
snow owl
snow panther
snow partridge
snow pea
snow peak
snow pear
snow pellets
snow pheasant
snow pigeon
snow
plant
snow plume
snow poppy
snow pudding

snow quail
snow rack
snow roller
snow rose
snow rosette
snow scale
snow sheen
snow sleep
snow slope
snow slush
snow smoke
snow snake
snow squall
snow stake
snow stream
snow tire
snow track
snow train
snow tree
snow trillium
snow tyre
snow under
snow vine
snow vole
snow water
snow white
snow wreath
snow-barricaded
snow-bearded
snow-beaten
snow-beater
snow-besprinkled
snow-blanketed
snow-blind
snow-blinded
snow-blown
snow-bright
snow-brilliant
snow-broth
snow-capped
snow-casting
snow-choked
snow-clad
snow-clearing
snow-climbing
snow-cold
snow-colored
snow-covered

snow-crested
snow-crowned
snow-crystal
snow-deep
snow-drifted
snow-driven
snow-dropping
snow-drowned
snow-encircled
snow-fair
snow-feathered
snow-fed
snow-haired
snow-hung
snow-in-summer
snow-laden
snow-limbed
snow-line
snow-lined
snow-loaded
snow-man
snow-mantled
snow-melting
snow-molded
snow-nodding
snow-on-the-mountain
snow-plough
snow-pure
snow-resembled
snow-rigged
snow-robed
snow-rubbing
snow-scarred
snow-slip
snow-soft
snow-sprinkled
snow-still
snow-swathe
snow-sweeping
snow-thrower
snow-tipped
snow-topped
snow-white
snow-whitened
snow-whiteness
snow-winged
snow-wrought
snowball

bush
snowball tree
snowclad peak
snowdrop anemone
snowdrop tree
snowdrop windflower
snowed-in
snowflower tree
snows of yesteryear
snowshoe hare
snowshoe rabbit
snowy egret
snowy owl
snowy-banded
snowy-bosomed
snowy-capped
snowy-countenanced
snowy-fleeced
snowy-flowered
snowy-headed
snowy-vested
snowy-winged
snub line
snub post
snub-
snub-nosed
snubbing post
snuff bottle
snuff brown
snuff brush
snuff color
snuff dipper
snuff dipping
snuff in
snuff it
snuff maker
snuff mill
snuff mull
snuff out
snuff paper
snuff shop
snuff stick
snuff swab
snuff up
snuff-box
snuff-clad
snuff-colored
snuff-headed

snuff-stained
snuff-taking
snuff-using
snuffbox bean
snuffbox fern
snuffing out
snug as a bug in a rug
snug down
snug harbor
snug together
snug up
snuggle up to
so as
so as to
so be it
so big
so
 bold
so cold you could spit ice cubes
so far
so far as
so far as you can
so far so good
so forget yourself
so help me
so is it
so it is
so long
so long as
so long as it's red
so many
so mote it be
so much
so much as
so much for that
so shall it be
so so
so that
so to say
so to speak
so very much
so what
so what else is new
so-and-so
so-and-sos
so-called
so-caused
so-conditioned

so-considered
so-designated
so-fa syllables
so-formed
so-forth
so-ho
so-instructed
so-like
so-named
so-regarded
so-seeming
so-so
so-soish
so-styled
so-termed
so-titled
so-wise
soak Austral
soak hole
soak in
soak up
soaking furnace
soaking pit
soaking rain
soaking through
soaking wet
soaking-up
soap apple
soap ashes
soap box
soap box derby
soap brick
soap bubble
soap bulb
soap copper
soap dish
soap earth
soap flakes
soap fruit
soap gentian
soap nut
soap opera
soap orange
soap pad
soap plant
soap pod
soap powder
soap stone

soap test
soap the ways
soap tree
soap-boiler
soap-bubble
soap-fast
soap-maker
soapbark tree
soapberry
family
soapberry tree
soapbox derby
soapbox orator
soapwort gentian
soar falcon
soar hawk
soaring costs
soaring heights
soaring plane
soaring prices
sob sister
sob story
sob stuff
sobe it
sober as a judge
sober down
sober fact
sober off
sober reality
sober senses
sober up
sober-blooded
sober-clad
sober-disposed
sober-eyed
sober-headed
sober-headedness
sober-minded
sober-mindedly
sober-mindedness
sober-sad
sober-spirited
sober-suited
sober-tinted
soccer ball
soccer field
sociable coach
sociable person

social Darwinism
social Darwinist
social accounting
social activity
social affair
social anthropologist
social anthropology
social assistance
social barrier
social bee
social call
social circle
social class
social climber
social climbing
social code
social compact
social conduct
social conscience
social consciousness
social contract
social control
social convention
social critic
social dancer
social dancing
social democracy
social democrat
social differentiation
social director
social
discrimination
social disease
social disorganization
social distance
social drinker
social drinking
social environment
social ethics
social evolution
social full-dress uniform
social gathering
social gospel
social grace
social graces
social grouping
social heritage
social incompatibility

social insurance
social interaction
social intercourse
social isolation
social lion
social lubricant
social maladjustment
social organization
social outcast
social parasite
social pathology
social pressure
social procedures
social process
social psychiatry
social psychology
social realism
social realist
social register
social relations
social round
social science
social scientist
social season
social secretary
social security
social service
social services
social set
social settlement
social studies
social usage
social wasp
social welfare
social whirl
social work
social worker
social-climbing
social-minded
social-mindedly
social-mindedness
social-service
socialist economy
socialistic economy
socialized
 medicine
socially incompatible
socially prominent

society evil
society goods
society queen
society screw
society verse
socio-
socio-economic
socio-official
sociological adjustive reactions
sociological novel
socius criminis
sock away
sock in
sock lamb
sock lining
sock suspender
sock suspenders
socket basket
socket chisel
socket eye
socket pole
socket punch
socket screw
socket spanner
socket washer
socket wrench
sockeye salmon
sod cloth
sod culture
sod grass
sod house
sod mulch
sod off
sod oil
sod plow
sod webworm
sod-bound
sod-build
sod-cutting
sod-forming
sod-roofed
soda alum
soda ash
soda ball
soda biscuit
soda bread
soda cracker
soda crystals

soda feldspar
soda fountain
soda jerk
soda lake
soda lime
soda lye
soda mesolite
soda mica
soda niter
soda nitre
soda plant
soda pop
soda pulp
soda saleratus
soda siphon
soda soap
soda waste
soda water
soda-granite
soda-lime
soda-lime feldspar
soda-potash
soda-potash feldspar
sodalite-syenite
sodden-faced
sodden-headed
sodden-minded
sodden-witted
sodio-
sodium
 acetate
sodium acid car
sodium acid carbonate
sodium alum
sodium aluminate
sodium amide
sodium ammonium phosphate
sodium arsenate
sodium arsenite
sodium arsphenamine
sodium barbital
sodium benzoate
sodium biborate
sodium bicarbonate
sodium bichromate
sodium bisulphate
sodium bisulphite
sodium borate

sodium bromide
sodium carbonate
sodium carbonite
sodium chlorate
sodium chloride
sodium citrate
sodium cyanide
sodium cyclamate
sodium cyclohexylsulfamate
sodium dicarbonate
sodium dichromate
sodium dioxide
sodium dithionate
sodium dithionite
sodium ethoxide
sodium ethylate
sodium fluoride
sodium fluoroacetate
sodium glutamate
sodium hydrate
sodium hydrosulfite
sodium hydrosulphide
sodium hydrosulphite
sodium hydroxide
sodium hypochlorite
sodium hyposulfi
sodium hyposulfite
sodium hyposulphite
sodium iodide
sodium lamp
sodium light
sodium meta-arsenite
sodium methoxide
sodium methylate
sodium monoxide
sodium nitrate
sodium nitrite
sodium nitroprusside
sodium oxide
sodium
pentothal
sodium perborate
sodium peroxide
sodium phosphate
sodium polysulfide
sodium propionate
sodium pump
sodium pyroborate

sodium salicylate
sodium silicate
sodium stearate
sodium suing agent
sodium sulfate
sodium sulfide
sodium sulfite
sodium sulphate
sodium sulphide
sodium sulphite
sodium sulphydrate
sodium tetrabor
sodium tetraborate
sodium thiocyanate
sodium thiopental
sodium thiosulfate
sodium thiosulphate
sodium tungstate
sodium-vapor
sodium-vapor lamp
sodium-vapour lamp
sofa bed
sofa bedstead
sofa corner
sofa cover
sofa cushion
sofa maker
sofa pillow
sofa seat
sofa table
sofa-bed
sofa-ridden
soffit brick
soft armor
soft as a kiss
soft as a sigh
soft as clay
soft as dough
soft as putty
soft as silk
soft binding
soft chancre
soft clam
soft coal
soft color
soft currency
soft diet
soft drink

soft focus
soft furnishings
soft goods
soft ground
soft hail
soft hat
soft ice cream
soft in the head
soft landing
soft market
soft nose stem
soft on
soft palate
soft paste
soft patch
soft
pedal
soft phototube
soft phrases
soft place in your heart
soft ray
soft roe
soft roll
soft rot
soft scale
soft sell
soft shoulder
soft sign
soft sleep
soft soap
soft solder
soft spot
soft spot in your heart
soft tick
soft tongue
soft touch
soft tube
soft voice
soft water
soft wheat
soft wood
soft words
soft-armed
soft-backed
soft-bedded
soft-bellied
soft-bill
soft-billed

soft-blowing
soft-board
soft-bodied
soft-boil
soft-boiled
soft-bone
soft-bosomed
soft-bound book
soft-breathed
soft-bright
soft-brushing
soft-centred
soft-circling
soft-coal
soft-coated
soft-colored
soft-conched
soft-conscienced
soft-core pornography
soft-cored
soft-couched
soft-cover
soft-dressed
soft-ebbing
soft-embodied
soft-extended
soft-eyed
soft-feathered
soft-feeling
soft-fingered
soft-finished
soft-finned
soft-flecked
soft-fleshed
soft-flowing
soft-focus
soft-foliaged
soft-footed
soft-footedly
soft-glazed
soft-going
soft-ground
soft-ground etching
soft-haired
soft-handed
soft-head
soft-headed
soft-headedness

soft-hearted
soft-heartedly
soft-heartedness
soft-hued
soft-laid
soft-leaved
soft-lucent
soft-mannered
soft-mettled
soft-minded
soft-murmuring
soft-natured
soft-nosed
soft-paced
soft-pale
soft-palmed
soft-paste
soft-paste
porcelain
soft-pated
soft-pedal
soft-pedaled
soft-pedaling
soft-pedalled
soft-pedalling
soft-rayed
soft-roasted
soft-rock geology
soft-sawder
soft-sawderer
soft-sealed
soft-shell
soft-shell clam
soft-shell crab
soft-shelled
soft-shelled turtle
soft-shining
soft-shoe
soft-shoe dancing
soft-shouldered
soft-sighing
soft-silken
soft-skinned
soft-sleeping
soft-sliding
soft-slow
soft-smiling
soft-soap

soft-soaper
soft-soaping
soft-solder
soft-soothing
soft-sounding
soft-speaking
soft-spirited
soft-spleened
soft-spoken
soft-spread
soft-spun
soft-steel
soft-swelling
soft-tailed
soft-tanned
soft-tempered
soft-throbbing
soft-timbered
soft-tinted
soft-toned
soft-tongued
soft-treading
soft-voiced
soft-wafted
soft-warbling
soft-water
soft-whispering
soft-winged
soft-witted
soft-wooded
soft-yielding
softblowing
 wind
soften the blow
soften up
softening of the brain
softening point
softening-up
softer sex
softwood tree
soi-disant
soil bank
soil binder
soil cap
soil cement
soil chemistry
soil conditioner
soil conservation

soil mechanics
soil miller
soil mulch
soil pipe
soil profile
soil rot
soil science
soil scientist
soil sickness
soil stack
soil stain
soil survey
soil-bank
soil-bound
soil-freesoilage
soiling crop
soixante-neuf
soixante-quinze
soja bean
soja-bean oil
soke reeve
sol-fa
sol-fa exercise
sol-fa syllables
sol-faed
sol-faer
sol-faing
sol-faist
sol-lunar
sola topee
solan goose
solar X-ray counter
solar X-ray detector
solar apex
solar battery
solar cell
solar chariot
solar constant
solar corona
solar day
solar eclipse
solar ecliptic
solar engine
solar flare
solar furnace
solar gamma ray counter
solar halo
solar heat

solar heater
solar heating
solar house
solar machine
solar mirror
solar month
solar myth
solar particle
solar physicist
solar physics
solar
plexus
solar power
solar prominence
solar rays
solar spectrum
solar still
solar system
solar telegraph
solar therapy
solar tide
solar time
solar ultraviolet detector
solar wind
solar year
solari-
sold on
solder nipple
soldering bolt
soldering copper
soldering gun
soldering iron
soldering nipple
soldering paste
soldering torch
soldering union
soldering wig
soldier ant
soldier beetle
soldier bug
soldier course
soldier crab
soldier fly
soldier of fortune
soldier on
soldier orchid
soldier orchis
soldier palmer

soldier sprag
soldier suit
soldier turtle
soldier's heart
soldier's medal
soldier-crab
soldier-fashion
soldier-mad
soldierly quality
soldierly virtues
soldiers' home
sole blocker
sole corporation
sole cutter
sole sewer
sole sorter
sole stamper
sole tile
sole trader
sole tree
sole-beating
sole-begotten
sole-beloved
sole-bound
sole-channeling
sole-commissioned
sole-cutting
sole-deep
sole-finishing
sole-happy
sole-justifying
sole-leather
sole-leather kelp
sole-living
sole-lying
sole-ruling
sole-saving
sole-seated
sole-shaped
sole-stitching
sole-sufficient
sole-thoughted
sole-walking
solemn
 affirmation
solemn declaration
solemn form
solemn mass

solemn mockery
solemn oath
solemn observance
solemn secret
solemn silence
solemn vow
solemn word
solemn-breathing
solemn-browed
solemn-cadenced
solemn-eyed
solemn-garbed
solemn-looking
solemn-mannered
solemn-measured
solemn-proud
solemn-seeming
solemn-shaded
solemn-sounding
solemn-thoughted
solemn-toned
solemn-visaged
solemnly mark
soleno-
solenoid brake
solent goose
solera sherry
solferino red
soli-deo
solicit advice
solicit attention
solicit votes
solicitor general
solicitors general
solid angle
solid as a rock
solid body
solid bottom
solid comfort
solid fuel
solid geometry
solid ground
solid injection
solid of revolution
solid propellant
solid rock
solid solution
solid-billed

solid-bronze
solid-browed
solid-color
solid-colored
solid-drawn
solid-fronted
solid-fuel rocket
solid-full
solid-gold
solid-headed
solid-hoofed
solid-horned
solid-injection
solid-ink
solid-ivory
solid-looking
solid-ported
solid-seeming
solid-set
solid-silver
solid-state
solid-state
device
solid-state physics
solid-tired
solidus curve
solitary bee
solitary confinement
solitary person
solitary sandpiper
solitary vireo
solitary wasp
solo dancer
solo dancing
solo flight
solo grand
solo organ
solo part
solo stop
solo whist
solomon's seal
solomon-gundy
solstitial colure
solubility product
soluble RNA
soluble glass
solution plane
solution pressure

solution set
solution tension
solution-proof
solvate theory
solvay process
solvent naphtha
soma plant
somat-
somatic cell
somatic death
somatization reaction
somato-
somber-clad
somber-colored
somber-looking
somber-minded
somber-seeming
somber-toned
some fine day
some fine morning
some five or six
some hope
some of these days
some one
some such way
some sweet day
some time ago
some time back
some time since
some way
somehow or another
somehow or other
someplace or other
something awful
something
between
something between the lines
something comfortable
something else
something else again
something extra
something fierce
something for good measure
something for something
something in hand
something in reserve
something in return
something like

something missing
something of value
something or other
something out of your system
something special
something terrible
something to be desired
something to brag about
something to chew on
something to fall back on
something to get your teeth into
something to shout about
something to spare
something to write home about
sometime or other
sometimes and sometimes not
somewhere about
somewhere else
somewhere near
somn-
somnambul-
somnambulistic hypnosis
somni-
son and heir
son et lumiere
son of Adam
son of God
son of a bitch
son of a gun
son of the sable night
son of the soil
son-in-law
son-in-lawship
sonata allegro
sonata form
sonata-allegro
sonder yacht
song and dance
song and dance man
song box
song cycle
song form
song hit
song leader
song
 maker
song making
song of the Sirens

song sparrow
song thrush
song writer
song writing
song-and-dance
song-and-dance act
song-bird
song-book
song-fraught
song-play
song-school
song-singing
song-smith
song-timed
song-tuned
song-worthy
sonic barrier
sonic boom
sonic depth finder
sonic depth sounder
sonic mine
sonic speed
sonic wall
sonnet sequence
sonny boy
sonority syllable
sons of Belial
sons of Martha
sons of guns
sons of men
sons of the devil
sons-in-law
soogee-moogee
soola clover
soon enough
soon-believing
soon-choked
soon-clad
soon-consoled
soon-contented
soon-descending
soon-done
soon-drying
soon-ended
soon-fading
soon-known
soon-mended
soon-monied

soon-parted
soon-quenched
soon-repeated
soon-repenting
soon-rotting
soon-said
soon-sated
soon-speeding
soon-tired
soon-wearied
sooner or later
sooner than
soot black
soot bodies
soot brown
soot dew
soot-bespeckled
soot-black
soot-bleared
soot-colored
soot-dark
soot-fall
soot-grimed
soot-smutched
soot-sowing
soothing syrup
soothing
words
sooty black
sooty blotch
sooty mold
sooty mould
sooty tern
sooty-faced
sooty-mouthed
sooty-planed
sop to Cerberus
sop up
sophistic syllogism
sophistical reasoning
sopping wet
soprano clef
soprano part
sops-in-wine
sora rail
sorb apple
sorb tree
sorb-apple

sorbic acid
sorbo rubber
sore beset
sore disappointment
sore head
sore mouth
sore point
sore pressed
sore shin
sore spot
sore throat
sore-backed
sore-beset
sore-dreaded
sore-eyed
sore-footed
sore-head
sore-pressed
sore-pressedsore-taxed
sore-taxed
sore-toed
sore-tried
sore-vexed
sore-wearied
sore-won
sore-worn
soredi-
sorely disappointed
sorely pressed
sorghum brown
sorghum midge
sorghum smut
sorority girl
sorority house
sorority woman
sorrel dock
sorrel family
sorrel salt
sorrel tree
sorrel vine
sorrow for
sorrow over
sorrow with
sorrow-beaten
sorrow-blinded
sorrow-bound
sorrow-breathing
sorrow-breeding

sorrow-bringing
sorrow-burdened
sorrow-ceasing
sorrow-closed
sorrow-clouded
sorrow-daunted
sorrow-furrowed
sorrow-healing
sorrow-laden
sorrow-melted
sorrow-parted
sorrow-ripening
sorrow-seasoned
sorrow-seeing
sorrow-sharing
sorrow-shot
sorrow-shrunken
sorrow-sick
sorrow-sighing
sorrow-sobbing
sorrow-streaming
sorrow-stricken
sorrow-struck
sorrow-tired
sorrow-torn
sorrow-wasted
sorrow-worn
sorrow-wounded
sorrow-wreathen
sorrowful
tree
sorry for yourself
sorry lot
sorry plight
sorry-flowered
sorry-looking
sort of
sort out
sort with
sorter-out
sortes Biblicae
sortes Homericae
sortes Praenestinae
sortes Vergilianae
sorting boom
sorting jack
sorting out
sorting tracks

sorting yard
sostenuto pedal
sostinente pianoforte
sot on
sot-weed
sothic cycle
sotto voce
sou markee
sou marqu
sou'-west
sou-sou
sou-southerly
souari nut
souari-nut
souari-nut family
soubise sauce
soufriere bird
sought-after
soul bell
soul blindness
soul body
soul cake
soul curer
soul deafness
soul food
soul house
soul in glory
soul kiss
soul mate
soul mates
soul of kindness
soul of the dead
soul scat
soul scot
soul shot
soul silver
soul sleep
soul
 sleeper
soul-adorning
soul-amazing
soul-benumbed
soul-blind
soul-blinded
soul-blindness
soul-boiling
soul-born
soul-burdened

soul-charming
soul-choking
soul-cloying
soul-conceived
soul-confirming
soul-confounding
soul-converting
soul-corrupting
soul-damning
soul-deep
soul-delighting
soul-destroying
soul-devouring
soul-diseased
soul-dissolving
soul-driver
soul-enchanting
soul-ennobling
soul-enthralling
soul-fatting
soul-fearing
soul-felt
soul-forsaken
soul-fostered
soul-frighting
soul-galled
soul-gnawing
soul-harrowing
soul-humbling
soul-illumined
soul-imitating
soul-infused
soul-killing
soul-kiss
soul-loving
soul-mass
soul-moving
soul-murdering
soul-numbing
soul-pained
soul-piercing
soul-pleasing
soul-racking
soul-raising
soul-ravishing
soul-rending
soul-reviving
soul-sapping

soul-satisfying
soul-saving
soul-scot
soul-searching
soul-shaking
soul-shot
soul-sick
soul-sickening
soul-sickness
soul-sinking
soul-slaying
soul-stirring
soul-subduing
soul-sunk
soul-sure
soul-sweet
soul-tainting
soul-thralling
soul-tiring
soul-tormenting
soul-vexed
soul-wise
soul-wounded
soul-wounding
souls
 in hell
sound a fanfare
sound a knell
sound a retreat
sound a sour note
sound a tattoo
sound an alarm
sound and fury
sound area
sound as a dollar
sound asleep
sound barrier
sound block
sound boarding
sound bone
sound booth
sound bow
sound box
sound cage
sound camera
sound carrier
sound change
sound channel

sound chest
sound compensation
sound control
sound critical judgment
sound director
sound economy
sound effect
sound effects
sound evidence
sound field
sound figures
sound film
sound frequency
sound gate
sound harshly
sound head
sound hole
sound in the ear
sound in tune
sound in wind and limb
sound intensity
sound intensity level
sound judgment
sound knot
sound law
sound lens
sound like
sound limiter
sound line
sound man
sound mind
sound mixer
sound money
sound monitor
sound motion picture
sound of mind and body
sound of trumpets
sound off
sound out
sound pendulum
sound perimeter
sound
picture
sound post
sound pressure
sound projector
sound proof
sound propagation

sound ranging
sound reasoning
sound recorder
sound recording
sound reproduction system
sound screen
sound sense
sound shadow
sound shift
sound shifting
sound shrill
sound similar
sound sleep
sound slidefilm
sound spectrogram
sound spectrograph
sound stage
sound taps
sound the alarm
sound the death knell of
sound the horn
sound the keynote
sound the note of preparation
sound the praises of
sound the tocsin
sound the trumpet
sound together
sound track
sound truck
sound true
sound understanding
sound units
sound wave
sound wormy
sound-absorbing
sound-absorbing material
sound-board
sound-conducting
sound-effects man
sound-exulting
sound-group
sound-hole
sound-judging
sound-level data
sound-making
sound-minded
sound-mindedness
sound-on-film

sound-post
sound-powered telephone
sound-producing
sound-ranging altimeter
sound-sensed
sound-set
sound-sleeping
sound-stated
sound-stilling
sound-sweet
sound-thinking
sound-winded
sound-witted
sounding
balloon
sounding block
sounding board
sounding bottle
sounding harsh
sounding lead
sounding line
sounding machine
sounding out
sounding post
sounding rocket
sounding rod
sounding stop
sounding tube
sounding-board
sounding-lead
sounding-line
soundness of doctrine
soundness of judgment
soundness of mind
soundproofing insulation
soup bowl
soup cup
soup house
soup kitchen
soup maigre
soup plate
soup shop
soup stock
soup up
soup's on
soup-and-fish
soup-fin shark
soup-strainer

souple silk
sour as vinegar
sour ball
sour balls
sour cherry
sour cream
sour gourd
sour grapes
sour gum
sour mash
sour milk
sour note
sour orange
sour pickle
sour salt
sour thing
sour-blooded
sour-breathed
sour-complexioned
sour-dough
sour-eyed
sour-faced
sour-featured
sour-headed
sour-looked
sour-looking
sour-natured
sour-sap
sour-sap disease
sour-smelling
sour-sop
sour-sweet
sour-tasted
sour-tasting
sour-tempered
sour-tongued
sour-visaged
source book
source material
source of aesthetic
delight
source of aesthetic pleasure
source of light
source of supply
source program
sourdough bread
soured cream
sous-

sous-lieutenant
sous-prefect
south about
south african
south by east
south by west
south country
south pole
south sea
south wind
south-
south-blowing
south-borne
south-east
south-easterly
south-eastern
south-eastward
south-facing
south-following
south-preceding
south-seaman
south-seeking
south-side
south-south-east
south-south-west
south-southeast
south-southeasterly
south-southeastward
south-southerly
south-southwest
south-southwesterly
south-southwestward
south-southwestwardly
south-west
south-wester
south-westerly
south-western
south-westward
south-westwardly
southeast by east
southeast by south
southerly burster
southerly buster
southern cane
southern crab apple
southern cross
southern crown
southern cypress

southern dewberry
southern english
southern hemisphere
southern lights
southern magnolia
southern right whale
southern studfish
southern toad
southwest by south
southwest
by west
soutien-gorge
souvenir book
souvenir day
souvenir hunter
souvenir sheet
souvenir spoon
sovereign contempt
sovereign nation
sovereign nationhood
sovereign pontiff
sovereign princess
sovereign queen
sovereign remedy
sovereign state
sovereign statehood
sow block
sow broadcast
sow bug
sow chaos
sow disorder
sow dissension
sow fennel
sow gapeseed
sow grass
sow the sand
sow the seed
sow the seeds of
sow thistle
sow your wild oats
sow-back
sow-bread
sow-bug
sow-gelder
sow-metal
sow-pig
sow-thistle
sow-tit

sower type
sowing with salt
soy flour
soy frame
soy pea
soy sauce
soya bean
soya sauce
soya-bean oil
soybean fibers
soybean oil
soyez le bienvenu
sp gr
sp ht
spa-water
space age
space airport
space bar
space between
space bullets
space capsule
space centrode
space charge
space crew
space curvature
space curve
space dock
space docking
space doctor
space engineering
space error
space exploration
space factor
space fiction
space flight
space formula
space frame
space group
space
hazard
space heater
space heating
space helmet
space island
space isomerism
space key
space laboratory
space lat

space lattice
space line
space linkage
space man
space mark
space medicine
space mirror
space motion
space navigation
space observatory
space opera
space out
space perception
space platform
space probe
space probes
space quadrature
space rate
space ratio
space research
space rocket
space rule
space satellite
space science
space shuttle
space stage
space station
space suit
space technology
space telegraphy
space telephony
space terminal
space travel
space traveler
space variation
space velocity
space walk
space washer
space writer
space-bar
space-charge effect
space-cramped
space-embosomed
space-filling
space-lattice
space-occupying
space-penetrating
space-pervading

space-piercing
space-polar
space-saving
space-spread
space-thick
space-time
space-time continuum
space-traveling
space-world
spaced out
spaced-antenna direction finder
spaced-loop direction finder
spaced-out
spaceport
 station
spacing Telegraphy
spacious mind
spacious of mind
spackling compound
spade bayonet
spade beard
spade cassino
spade convention
spade face
spade foot
spade graft
spade grass
spade guinea
spade handle
spade iron
spade lug
spade maker
spade money
spade press
spade rudder
spade-beard
spade-bearded
spade-cut
spade-deep
spade-dug
spade-footed
spade-fronted
spade-shaped
spade-trenched
spadefoot toad
spadici-
spading fork
spading harrow

spae-man
spaghetti Western
spaghetti and meat balls
spaghetti western
spall off
spalling hammer
span blocks
span dog
span iron
span loading
span of apprehension
span of attention
span of meaning
span roof
span shackle
span-
span-counter
span-farthing
span-hapenny
span-long
span-new
span-roof
spandrel frame
spandrel step
spandrel wall
spang-new
spangle-baby
spangled glass
spanish american
spanish bayonet
spanish broom
spanish fly
spanish heel
spanish influenza
spanish mackerel
spanish moss
spanish needles
spanish omelet
spanish paprika
spanish
rice
spank along
spanker boom
spanker gaff
spanker peak halyard
spanker sheet
spanker vang
spanking new

spanking pace
spanking wind
spanking-new
spanner wrench
spanner-tight
spar bridge
spar buoy
spar ceiling
spar deck
spar down
spar torpedo
spar tree
spar varnish
spar-deck vessel
spar-decked
spar-decker
spare a thought for
spare diet
spare no effort
spare no expense
spare no pains
spare nothing
spare room
spare the price
spare the rod
spare time
spare tire
spare tyre
spare-bodied
spare-built
spare-fed
spare-handed
spare-handedly
spare-looking
spare-rib
spare-set
spare-time
spare-time activity
sparge pipe
sparing of words
sparingness of words
spark advance
spark arrester
spark chamber
spark coil
spark condenser
spark discharge
spark frequency

spark gap
spark generator
spark instant
spark knock
spark lead
spark lever
spark micrometer
spark of life
spark off
spark plug
spark potential
spark spectrum
spark transmission
spark transmitter
spark-over
spark-plug
spark-plug wrench
sparked-back
sparking
 lamp
sparking plug
sparking points
sparking voltage
sparkle metal
sparkle-blazing
sparkle-drifting
sparkle-eyed
sparkling Burgundy
sparkling synchysis
sparkling water
sparkling wine
sparling fowl
sparring mate
sparring partner
sparrow dust
sparrow hawk
sparrow owl
sparrow pecking
sparrow-bill
sparrow-billed
sparrow-blasting
sparrow-colored
sparrow-footed
sparrow-hawk
sparrow-tail
sparrow-tailed
sparrow-witted
sparse-flowered

spart grass
spasm band
spasm of terror
spastic colon
spastic paralysis
spatch-cock
spate of words
spatial extension
spatling poppy
spatter cone
spatter dash
spatter pipe
spatting stick
spatulate-leaved
spawn brick
spawn fungus
speak about
speak at length
speak before you think
speak by the book
speak by the card
speak drunkenly
speak faintly
speak fair
speak falsely
speak for
speak for Buncombe
speak for itself
speak highly of
speak ill of
speak ill of behind your back
speak imperfectly
speak in high terms of
speak in privacy
speak in riddles
speak in tongues
speak
incoherently
speak inopportunely
speak one's mind
speak one's piece
speak out
speak plainly
speak poorly
speak slightingly of
speak soothing words
speak the truth
speak thickly

speak through your nose
speak to
speak to the winds
speak too late
speak too soon
speak true
speak up
speak up for
speak volumes
speak warmly of
speak well for
speak well of
speak with
speak with forked tongue
speak words of wisdom
speak your mind
speak your piece
speak-easy
speaker hole
speaker key
speaker system
speaker unit
speaker's platform
speaker's stand
speaking arc
speaking clock
speaking generally
speaking in tongues
speaking of
speaking part
speaking pipe
speaking rod
speaking stop
speaking terms
speaking trumpet
speaking tube
speaking type
speaking up for
speaking-to
speaking-trumpet
speaking-tube
spear bed
spear crowfoot
spear foot
spear grass
spear gun
spear hand
spear hook

spear javelin
spear kin
spear lily
spear plate
spear play
spear point
spear pyrites
spear rest
spear rod
spear side
spear
 thistle
spear thrower
spear widgeon
spear-bearing
spear-bill
spear-billed
spear-bound
spear-brandishing
spear-breaking
spear-carrier
spear-fallen
spear-famed
spear-grass
spear-head
spear-head spoon
spear-headed
spear-high
spear-nosed
spear-pierced
spear-pointed
spear-shaking
spear-shaped
spear-skilled
spear-splintering
spear-swept
spear-thrower
spear-throwing
spear-wielding
spearmint oil
special act
special affinity
special agent
special area
special article
special assessment
special case
special circumstance

special committee
special consideration
special constable
special contract
special correspondent
special court-martial
special delivery
special demurrer
special dividend
special drawing rights
special edition
special effect
special effects
special electronic
special favor
special full-dress uniform
special handling
special hospital
special interest
special interests
special jury
special knowledge
special library
special licence
special map
special order
special orders
special
partner
special partnership
special permission
special pleader
special pleading
special police
special privilege
special providence
special relativity
special rule
special school
special session
special sessions
special situation stock
special sort
special staff
special term
special theory of relativity
special treatment
special troops

special-delivery
special-interest group
special-interest lobby
special-interest pressure
special-process
special-purpose tubes
specialite de la maison
specialize in
specialized dictionary
specialized kinds
specialized knowledge
specialized stones
specialty contract
specialty shop
specialty stock
specie payment
specie point
species pectorales
specific activity
specific character
specific charge
specific conductance
specific duty
specific epithet
specific gravity
specific heat
specific heat capacity
specific humidity
specific immunity
specific impulse
specific inductive capacity
specific inflammation
specific performance
specific reluctance
specific remedy
specific
resistance
specific therapy
specific treatment
specific viscosity
specific volume
specific-gravity
specific-gravity balance
specific-gravity bottle
specific-gravity bulbs
specifica requirements
specifically provide
specimen bottle

specimen plant
specio-
specious appearance
specious argument
specious present
specious reasoning
speck block
speckle loon
speckle perch
speckle trout
speckle-backed
speckle-bellied
speckle-billed
speckle-breasted
speckle-coated
speckle-faced
speckle-marked
speckle-skinned
speckle-starred
speckled Sussex
speckled trout
spectacle case
spectacle clew
spectacle coot
spectacle frame
spectacle furnace
spectacle iron
spectacle stone
spectacled cobra
spectator sport
specter bat
specter candle
specter crab
specter lemur
specter shrimp
specter-fighting
specter-haunted
specter-looking
specter-mongering
specter-pallid
specter-staring
specter-thin
specter-wan
spectra yellow
spectral classification
spectral color
spectral ghost
spectral line

spectral luminous
efficiency
spectral series
spectral type
spectro-
spectroscopic analysis
spectroscopic binary
spectroscopic camera
spectrum analysis
spectrum color
spectrum locus
spectrum-luminosity diagram
speculate in stocks
speculative geometry
speculative philosophy
speculative securities
speculative stock
speculum metal
speech abnormality
speech accent
speech act
speech area
speech center
speech choir
speech circuit
speech clinic
speech community
speech correction
speech curve
speech day
speech defect
speech form
speech from the throne
speech house
speech impediment
speech island
speech map
speech melody
speech organ
speech pathology
speech reading
speech rhythm
speech room
speech situation
speech sound
speech sounds
speech tune
speech-bereaving

speech-bereft
speech-bound
speech-famed
speech-flooded
speech-maker
speech-reading
speech-reporting
speech-shunning
speech-writing
speed along
speed away
speed boss
speed box
speed comparisons
speed cone
speed cones
speed control
speed controller
speed
cop
speed counter
speed demon
speed flag
speed frame
speed freak
speed gauge
speed gear
speed indicator
speed lamp
speed lathe
speed light
speed limit
speed maniac
speed merchant
speed meter
speed of sound
speed on
speed on its way
speed over the bottom
speed over the ground
speed pulley
speed record
speed recorder
speed reducer
speed regulator
speed rigger
speed road
speed sheet

speed sight
speed skate
speed sprayer
speed test
speed the parting guest
speed tool
speed trap
speed truck
speed up
speed-length ratio
speed-up
speeding-place
speedway race
spek-boom
spell backward
spell down
spell of nerves
spell of rain
spell of work
spell off
spell out
spell-banned
spell-bind
spell-bound
spell-casting
spell-caught
spell-free
spell-invoking
spell-like
spell-raised
spell-riveted
spell-set
spell-sprung
spell-stopped
spell-struck
spell-weaving
spelling bee
spelling book
spelling match
spelling pronunciation
spelling reform
spelling reformer
spelter calciner
spelter chills
spelter solder
spencer
 mast
spend a penny

spend as if money grew on trees
spend like a drunken sailor
spend money like water
spend more than you have
spend the time
spend time
spend what you havn't got
spend your time in
spend yourself
spend yourself for
spend-all
spend-good
spending money
spending-money
spendthrift of your tongue
spendthrift trust
spenserian sonnet
spenserian stanza
spent-gnat
spent-gnat fly
sperm aster
sperm candle
sperm cell
sperm center
sperm nucleus
sperm oil
sperm receptor
sperm sac
sperm whale
sperm whaler
sperm whaling
sperm-
sperm-whale porpoise
spermat-
spermathecal gland
spermatic cord
spermatic fluid
spermatic plexus
spermatic veins
spermato-
spermatophore sac
spermi-
spermicidal jelly
spermo-
spew out
spewing sickness
spey cast
sphae-ropsidaceous

sphaero-
sphagnum bog
sphagnum frog
sphagnum moss
spheno-
spheno-occipital
sphenoid bone
sphere circle
sphere crystals
sphere fungus
sphere gap
sphere geometry
sphere of influence
sphere of work
sphere tracks
sphere-born
sphere-descended
sphere-filled
sphere-found
sphere-headed
sphere-shaped
sphere-tuned
spheres
 of influence
spherical aberration
spherical angle
spherical coordinate
spherical coordinates
spherical excess
spherical geometry
spherical polygon
spherical sailing
spherical triangle
spherical trigonometry
spherico-
sphero-
spheroidal galaxy
spherometer caliper
sphinx baboon
sphinx caterpillar
sphinx moth
sphinxes without secrets
sphygmo-
spice ball
spice birch
spice box
spice cake
spice currant

spice grinder
spice mill
spice nut
spice of wit
spice plate
spice shop
spice store
spice trade
spice tree
spice-bearing
spice-box
spice-breathing
spice-burnt
spice-cake
spice-fraught
spice-laden
spice-warmed
spice-wood
spicebush silk moth
spicebush swallowtail
spici-
spick and span
spick and span new
spick-and-span
spick-and-spandy
spick-and-spanness
spick-span-new
spiculi-
spicy fleabane
spider ant
spider band
spider beetle
spider bug
spider cart
spider catcher
spider cell
spider crab
spider diver
spider eater
spider
 fern
spider fly
spider grass
spider hoop
spider hunter
spider leg
spider lily
spider line

spider mite
spider monkey
spider nevus
spider orchid
spider orchis
spider phaeton
spider plant
spider shell
spider stitch
spider wagon
spider wasp
spider web
spider wheel
spider's web
spider-catcher
spider-crab
spider-fingered
spider-hunting wasp
spider-leg
spider-leg table
spider-legged
spider-leggy
spider-like
spider-limbed
spider-line
spider-shanked
spider-spun
spider-web
spider-webby
spiderwort family
spiegel charger
spiegel iron
spiff up
spiffed up
spigot joint
spike bit
spike bowsprit
spike buck
spike disease
spike grass
spike heath
spike heel
spike knot
spike lavender
spike nail
spike oil
spike rush
spike shell

spike team
spike tub
spike your guns
spike-billed
spike-horned
spike-kill
spike-lavender oil
spike-leaved
spike-nail
spike-pitch
spike-pitcher
spike-rush
spike-tailed
spike-tooth
spike-tooth harrow
spiked alder
spikenard tree
spiketail coat
spiketail family
spiking piece
spile driver
spiling
 batten
spill blood
spill box
spill ink
spill it
spill light
spill out
spill over
spill stream
spill the beans
spill your guts
spill-
spill-over
spillet fishing
spilling line
spilt milk
spin a long yarn
spin bowler
spin casting
spin fisherman
spin fishing
spin house
spin in
spin like a teetotum
spin like a top
spin off

spin out
spin quantum number
spin rocks
spin stabilization
spin the bottle
spin the plate
spin the platter
spin wave
spin-dried
spin-drier
spin-dry
spin-dryer
spin-drying
spin-house
spin-off
spin-stabilized rocket
spin-text
spina bifida
spinach beet
spinach blight
spinach dock
spinach flea beetle
spinach green
spinach yellows
spinach-colored
spinach-rhubarb
spinal accessory nerve
spinal anaesthesia
spinal anesthesia
spinal canal
spinal column
spinal cord
spinal meningitis
spinal tap
spindle bander
spindle fiber
spindle fibers
spindle file
spindle kin
spindle oil
spindle pointer
spindle sander
spindle shell
spindle side
spindle sprout
spindle step
spindle stone
spindle

stretcher
spindle stromb
spindle temper
spindle tree
spindle tuber
spindle whorl
spindle-cell
spindle-cell sarcoma
spindle-celled
spindle-formed
spindle-legged
spindle-pointed
spindle-rooted
spindle-shanked
spindle-shaped
spindle-shinned
spindle-side
spindle-tree
spindling sprout
spine cell
spine-ache
spine-bashing
spine-breaking
spine-broken
spine-chiller
spine-chilling
spine-clad
spine-covered
spine-finned
spine-headed
spine-pointed
spine-protected
spine-rayed
spine-tail
spine-tailed
spine-tailed swift
spine-tipped
spinel group
spinel pink
spinel ruby
spinel-red
spinet desk
spini-
spinnaker boom
spinnaker pole
spinnaker staysail
spinner of yarns
spinner play

spinning axis
spinning box
spinning electrons
spinning frame
spinning gland
spinning head
spinning house
spinning jenny
spinning lathe
spinning machine
spinning mammilla
spinning mite
spinning mule
spinning out
spinning pot
spinning top
spinning tube
spinning wheel
spinning-house
spinning-jenny
spinning-out
spinning-wheel
spino-
spino-olivary
spino-olivary
tract
spinocerebellar tract
spinous process
spinous-branched
spinous-finned
spinous-foliaged
spinous-leaved
spinous-pointed
spinous-serrate
spinous-tailed
spinous-tipped
spinous-toothed
spinuli-
spiny anteater
spiny bur
spiny cocklebur
spiny dogfish
spiny lizard
spiny lobster
spiny ray
spiny-backed
spiny-coated
spiny-crested

spiny-finned
spiny-footed
spiny-fruited
spiny-haired
spiny-leaved
spiny-legged
spiny-margined
spiny-pointed
spiny-rayed
spiny-ribbed
spiny-skinned
spiny-tailed
spiny-tipped
spiny-toothed
spiral balance
spiral bevel gear
spiral binding
spiral casing
spiral galaxy
spiral gear
spiral loop
spiral nebula
spiral notebook
spiral of Archimedes
spiral shell end mill
spiral spring
spiral staircase
spiral stairs
spiral upward
spiral-bound
spiral-coated
spiral-geared
spiral-grooved
spiral-horned
spiral-nebula
spiral-nebula hypothesis
spiral-pointed
spiral-spring
spiral-vane
spiraling prices
spiraling up
spire light
spire-bearer
spire-shaped
spire-steeple
spiric
 body
spirit away

spirit blue
spirit butterfly
spirit compass
spirit control
spirit duck
spirit duplicator
spirit gum
spirit lamp
spirit level
spirit leveling
spirit manifestation
spirit of hartshorn
spirit of nitrous ether
spirit of the age
spirit of the sea
spirit of the time
spirit of turpentine
spirit rapper
spirit rapping
spirit up
spirit varnish
spirit vinegar
spirit world
spirit writing
spirit-awing
spirit-boiling
spirit-born
spirit-bowed
spirit-bribing
spirit-broken
spirit-cheering
spirit-chilling
spirit-crushed
spirit-crushing
spirit-drinking
spirit-fallen
spirit-freezing
spirit-froze
spirit-guided
spirit-haunted
spirit-healing
spirit-inspiring
spirit-lifting
spirit-marring
spirit-numb
spirit-piercing
spirit-possessed
spirit-prompted

spirit-pure
spirit-quelling
spirit-rapper
spirit-rapping
spirit-refreshing
spirit-rousing
spirit-sinking
spirit-small
spirit-soothing
spirit-speaking
spirit-stirring
spirit-stricken
spirit-thrilling
spirit-torn
spirit-troubling
spirit-walking
spirit-wearing
spirit-wise
spirits
of ammonia
spirits of camphor
spirits of hartshorn
spirits of salt
spirits of the air
spirits of turpentine
spirits of wine
spiritual being
spiritual blindness
spiritual body
spiritual bouquet
spiritual cleansing
spiritual climate
spiritual death
spiritual director
spiritual father
spiritual healer
spiritual healing
spiritual humbug
spiritual incest
spiritual leader
spiritual love
spiritual presence
spiritual purification
spiritual void
spiritual wife
spiritual-minded
spiritual-mindedly
spiritual-mindedness

spiritually blind
spiritually cleansed
spiritually purified
spirituous tincture
spiritus asper
spiritus camphorae
spiritus frumenti
spiritus lenis
spiritus mundi
spirketing plate
spiro compound
spiro-
spit and image
spit and polish
spit bug
spit curl
spit image
spit in the ocean
spit it out
spit on your hands
spit up
spit upon
spit-and-polish
spit-ball
spite fence
spite of
spite wall
spite work
spitfire jib
spitting cobra
spitting
 distance
spitting image
spitting snake
spittle bug
spittle fly
spittle insect
spitz dog
spitz flute
splanchno-
splash back
splash dam
splash feed
splash guard
splash lubrication
splash of rain
splash out
splash system

splash zone
splash-
splash-down
splash-lubricate
splash-tight
splat-back
splatter-faced
splay-edged
splay-footed
splay-kneed
splay-legged
splay-mouthed
splay-toed
spleen amaranth
spleen stone
spleen-born
spleen-devoured
spleen-pained
spleen-piercing
spleen-shaped
spleen-sick
spleen-struck
spleen-swollen
spleenwort bush
splen-
splendid isolation
splenic fever
spleno-
splice bar
splice box
splice graftage
splice grafting
splice the main brace
splicing chamber
splicing hammer
spline broach
spline clutch
spline joint
spline milling machine
spline shaft
spline weight
splint armor
splint bar
splint basket
splint bone
splint coal
splint peeler
splint seat

splint-bottom
splint-bottomed
splinter bar
splinter bulkhead
splinter deck
splinter group
splinter party
splinter-bar
splinter-proof
splish-splash
split
'S'
split T formation
split balance
split decision
split flap
split hairs
split in two
split infinitive
split nut
split open
split pea
split personality
split rail
split run
split schedule
split screen
split second
split shift
split shot
split shovel
split spindle
split sprit
split stroke
split the atom
split the difference
split the ear
split the eardrums
split the ears
split the lungs
split the throat
split ticket
split tin
split turning
split up
split upon a rock
split wheel
split wing

split with laughter
split your head
split your sides
split-
split-bottom
split-eared
split-edge
split-face
split-level
split-lift
split-mouth
split-nosed
split-oak
split-off
split-phase
split-phase motor
split-screen technique
split-second watch
split-timber
split-tongued
split-up
splitmouth sucker
splitting chisel
splitting factor
splitting field
splitting gun
splitting headache
splitting in two
splitting plate
splitting the atom
splitworm moth
spodo-
spoil bank
spoil for
spoil
ground
spoil paper
spoil-
spoil-mold
spoil-paper
spoiled brat
spoiled child
spoiled darling
spoiled rotten
spoiling for
spoils of office
spoils system
spoke auger

spoke in your wheel
spoke stitch
spoke-dog
spoken language
spoken word, the
spolia opima
spon-image
spondylitis deformans
sponge bag
sponge bath
sponge cake
sponge cloth
sponge cucumber
sponge diver
sponge down
sponge drop
sponge finger
sponge fisher
sponge fisherman
sponge gourd
sponge grafting
sponge hook
sponge iron
sponge mop
sponge off
sponge on
sponge out
sponge pudding
sponge rubber
sponge tree
sponge up
sponge-bearing
sponge-cake
sponge-colored
sponge-diving
sponge-fishing
sponge-footed
sponge-leaved
sponge-painted
sponge-shaped
spongi-
sponging house
sponging-house
spongio-
spongo-
spongy-flowered
spongy-footed
spongy-looking

spongy-rooted
spongy-wet
spongy-wooded
spontaneous combustion
spontaneous generation
spontaneous recovery
spontaneous response
spool bed
spool turner
spool turning
spool winder
spool-shaped
spooling
 bracket
spoon bait
spoon bit
spoon bow
spoon brake
spoon bread
spoon chisel
spoon end
spoon food
spoon gouge
spoon hook
spoon iron
spoon lever
spoon meat
spoon nail
spoon net
spoon oar
spoon out
spoon tool
spoon victual
spoon victuals
spoon-back
spoon-beaked
spoon-billed
spoon-bowed
spoon-fashion
spoon-fashioned
spoon-fed
spoon-feed
spoon-feeding
spoon-formed
spoon-meat
spoon-shaped
spoonbill cat
spoonwood ivy

spoony over
spor-
sporadic E layer
sporadic cholera
spore ball
spore case
spore cell
spore fruit
spore mother cell
spore print
spore sac
sporo-
sport car
sport clothes
sport coat
sport fish
sport jacket
sport plane
sport shirt
sport your oak
sport-affording
sport-giving
sport-hindering
sport-loving
sport-making
sport-starved
sporting blood
sporting book
sporting chance
sporting dog
sporting editor
sporting girl
sporting goods
sporting goods store
sporting house
sporting lady
sporting man
sporting page
sporting section
sporting-wise
sports car
sports clothes
sports day
sports
editor
sports jacket
sports page
sports parachutist

sports plane
sports section
sports shirt
sports suit
spot announcement
spot ball
spot blotch
spot board
spot card
spot cards
spot cash
spot check
spot cotton
spot dyeing
spot grain
spot height
spot illustration
spot lamp
spot lens
spot lighting
spot line
spot map
spot news
spot of lunch
spot of sleep
spot pass
spot pawn
spot pickup
spot plate
spot price
spot rot
spot sale
spot stroke
spot test
spot weld
spot welder
spot welding
spot white
spot zone
spot-barred
spot-billed
spot-check
spot-drill
spot-eared
spot-face
spot-grind
spot-leaved
spot-lipped

spot-mill
spot-on
spot-soiled
spot-weld
spot-winged
spotted adder
spotted calla lily
spotted cavy
spotted cowbane
spotted crake
spotted crane's-bill
spotted dick
spotted fever
spotted flycatcher
spotted hemlock
spotted hyena
spotted joe-pye weed
spotted sandpiper
spotted spurge
spotted sunfish
spotted wilt
spotted wintergreen
spotted-beaked
spotted-bellied
spotted-billed
spotted-breasted
spotted-eared
spotted-fever
tick
spotted-finned
spotted-leaved
spotted-necked
spotted-tailed
spotted-winged
spotter plane
spotting machine
spotting motion
spotting scope
spotty market
spouse-breach
spout adz
spout cup
spout fish
spout hole
spout off
spout out
spout shell
spout-hole

spouting horn
spraddle-legged
sprag road
sprain fracture
sprangle-top
sprat barley
sprat borer
sprat day
sprat loon
sprat-barley
spray can
spray carburetor
spray drain
spray gun
spray nozzle
spray outfit
spray strip
spray-casting
spray-decked
spray-shaped
spray-topped
spray-washed
spray-wet
spread a large clew
spread a shade over
spread a shadow over
spread a small clew
spread about
spread city
spread eagle
spread formation
spread light
spread like wildfire
spread on
spread on a color
spread on the record
spread out
spread over
spread reflection
spread sail
spread sheet
spread sideways
spread sidewise
spread the toils
spread with
spread yourself
spread-eagle
spread-eagled

spread-eagleism
spread-eagleist
spread-eagling
spread-out
spread-over
spread-set
spreader
 beam
spreader car
spreading abroad
spreading board
spreading dogbane
spreading factor
spreading like a cancer
spreading like wildfire
spreading machine
spreading out
spreading too thin
sprig bolt
sprig budding
sprig-bit
sprig-tailed
sprightly wit
spring a leak
spring a mine under
spring a surprise
spring apart
spring azure
spring back
spring balance
spring barley
spring base
spring beam
spring beauty
spring bed
spring beetle
spring bell
spring binder
spring block
spring bolt
spring bows
spring brass
spring caliper
spring calipers
spring cankerworm
spring catarrh
spring catch
spring chair

spring chicken
spring clip
spring collet
spring corn
spring cotter
spring cowslip
spring cress
spring detent
spring die
spring dividers
spring draft gear
spring faucet
spring fever
spring flood
spring fly
spring frog
spring from
spring governor
spring grain aphis
spring grass
spring green
spring gun
spring hammer
spring harrow
spring heath
spring
heel
spring herring
spring hoe
spring hook
spring iris
spring key
spring lamb
spring latch
spring leaf
spring ligament
spring lily
spring line
spring lock
spring mattress
spring molding
spring mushroom
spring needle
spring nut
spring oats
spring onion
spring open
spring orange

spring orchid
spring pad
spring padlock
spring peeper
spring perch
spring pin
spring plate
spring pole
spring rail
spring rains
spring ring
spring rye
spring safety valve
spring sage
spring saxifrage
spring scale
spring scorpion grass
spring seat
spring snow
spring snowflake
spring starflower
spring stay
spring steel
spring stripper
spring switch
spring temper
spring the eye
spring tide
spring to your feet
spring tool
spring tooth
spring training
spring up
spring upon
spring valve
spring vetch
spring vetchling
spring vise
spring wagon
spring washer
spring water
spring weir
spring wheat
spring wheel
spring-
spring-beam
spring-blooming
spring-blossoming

spring-board
spring-born
spring-budding
spring-clean
spring-cleaner
spring-cleaning
spring-driven
spring-flood
spring-flowering
spring-framed
spring-gathered
spring-grown
spring-habited
spring-head
spring-headed
spring-heeled
spring-jointed
spring-loaded
spring-lock
spring-made
spring-peering
spring-planted
spring-plow
spring-rail
frog
spring-raised
spring-seated
spring-set
spring-snecked
spring-sowed
spring-sown
spring-spawning
spring-stricken
spring-tail
spring-taught
spring-tempered
spring-tide
spring-tight
spring-tooth harrow
spring-touched
spring-trip
spring-trip hoe
spring-well
spring-wood
springer spaniel
springing cow
springing line
springing point

springing wall
springtide of life
springtime of life
sprinkler head
sprinkler system
sprinkling can
sprinkling system
sprint car
sprint medley
sprint race
sprite crab
spritsail topmast
spritsail yard
sproat hook
sprocket wheel
sprout cell
sprout forest
sprout from
sprout up
sprout wings
sprouted oats
spruce bark beetle
spruce beer
spruce budworm
spruce fir
spruce grouse
spruce pine
spruce sawfly
spruce
up
spruce yellow
spruced up
sprung molding
sprung rhythm
spud casing
spud in
spud-bashing
spudding bar
spule-bane
spun glass
spun hay
spun out
spun rayon
spun silk
spun sugar
spun yarn
spun-out
spunk up

spur bit
spur blight
spur bunting
spur chuck
spur dike
spur forger
spur fowl
spur gall
spur gear
spur gear wheel
spur gearing
spur grass
spur mortise gear
spur on
spur pepper
spur pinion
spur pruning
spur royal
spur ryal
spur shell
spur shore
spur stone
spur timber
spur track
spur tree
spur valerian
spur whang
spur wheel
spur-bearing
spur-clad
spur-driven
spur-finned
spur-gall
spur-galled
spur-geared
spur-gilled
spur-heeled
spur-jingling
spur-leather
spur-of-the-moment
spur-of-the-moment response
spur-off-the-moment
spur-rowel
spur-royal
spur-shaped
spur-tailed
spur-toed
spur-wing

spur-winged
spurge daphne
spurge family
spurge flax
spurge ipecac
spurge laurel
spurge moth
spurge nettle
spurge olive
spurge thyme
spurge-wort
spurious wing
spurling line
spurling pipe
spurry sandwort
spurt
 of rain
sputter and stop
sputum cup
spy glass
spy on
spy out
spy plane
spy ship
spy upon
spy-
spy-catcher
spy-glass
squab broiler
squab pie
squab-pie
squabble over
squad car
squad leader
squad room
squadron leader
squads-left
squads-right
squall cloud
squall line
squam duck
squam-
squamo-
squamo-occipital
squamoso-
squamous epithelium
squander in dribs and drabs
squanter-squash

square accounts
square accounts with
square and rabbet
square away
square bit
square body
square bracket
square cap
square centimeter
square contingency
square dance
square dancing
square deal
square dealing
square file
square foot
square frame
square inch
square it
square joint
square kilometer
square knot
square leg
square mark
square matrix
square meal
square measure
square meter
square mile
square millimeter
square number
square odds
square of opposition
square off
square one
square peg in a round hole
square piano
square rig
square root
square root planimeter
square sail
square serif
square set
square
shake
square shooter
square shooting
square splice

square the circle
square the yards
square things
square tin
square up
square wave
square with
square with the evidence
square with the facts
square yourself with
square-John
square-barred
square-based
square-bashing
square-bladed
square-bodied
square-bottomed
square-browed
square-built
square-butted
square-cheeked
square-chinned
square-countered
square-cut
square-dancer
square-dealing
square-draw
square-drill
square-eared
square-edged
square-elbowed
square-faced
square-figured
square-fronted
square-headed
square-hewn
square-jawed
square-jointed
square-leg
square-lipped
square-looking
square-made
square-marked
square-meshed
square-mouthed
square-necked
square-nosed
square-rigged

square-rigger
square-root flowmeter
square-rumped
square-set
square-set stoping
square-shafted
square-shaped
square-shooting
square-shouldered
square-skirted
square-stalked
square-stem
square-stemmed
square-sterned
square-tailed
square-thread
square-threaded
square-tipped
square-toed
square-toedness
square-toes
square-topped
square-towered
square-wave
 generator
squared circle
squared off
squared paper
squared ring
squared splice
squaring lathe
squaring the circle
squarroso-
squarroso-dentate
squarroso-laciniate
squarroso-pinnatipartite
squarroso-pinnatisect
squash beetle
squash bite
squash borer
squash bug
squash court
squash flea beetle
squash ladybird
squash rackets
squash racquets
squash tennis
squash vine borer

squash-
squash-vine borer
squashed flat
squat board
squat on
squat tag
squat-bodied
squat-built
squat-hatted
squatter sovereignty
squatter's right
squaw carpet
squaw corn
squaw duck
squaw huckleberry
squaw man
squaw mint
squaw vine
squaw waterweed
squaw winter
squaw-drops
squawk box
squawk duck
squeak by
squeak through
squeal on
squeegee roller
squeeze bottle
squeeze box
squeeze in
squeeze joint
squeeze out
squeeze out a living
squeeze play
squeeze shut
squeeze your hand
squeeze-box
squeeze-up
squeezed joint
squeezed shut
squeezing
out
squelch circuit
squelette clock
squid hound
squid-jigger
squid-jigging
squill blue

squill-like
squinancy berry
squinch arch
squinch-eyed
squint brick
squint eyes
squint the eye
squint-eye
squint-eyed
squint-eyedness
squinting construction
squire snapper
squirm out of
squirm with embarrassment
squirm with self-consciousness
squirrel away
squirrel cage
squirrel cage rotor motor
squirrel corn
squirrel cup
squirrel food
squirrel frog
squirrel grass
squirrel hake
squirrel hawk
squirrel monkey
squirrel mouse
squirrel phalanger
squirrel plague
squirrel rifle
squirrel shrew
squirrel something away
squirrel tail
squirrel tail grass
squirrel's-ear
squirrel's-foot fern
squirrel-cage motor
squirrel-colored
squirrel-eyed
squirrel-headed
squirrel-limbed
squirrel-minded
squirrel-tail
squirrel-tail grass
squirrel-trimmed
squirrels-foot fern
squirreltail grass
squirt can

squirt gun
squirt-fire
squirting cucumber
squish-squash
squitch grass
stab at
stab culture
stab in the back
stab kick
stab
 pass
stab to death
stab wages
stab wound
stabat mater
stabbing pain
stabilization fund
stable color
stable door
stable equation
stable equilibrium
stable fly
stable oscillation
stable police
stable state
stable-born
stable-stand
staccato mark
staccato sound
stack against
stack of bones
stack process
stack room
stack the cards
stack the deck
stack up
stack up with
stack-garth
stacked deck
stacking band
stacking belt
stacking swivel
stadia hair
stadia rod
stadia wire
staff angle
staff bead
staff captain

staff car
staff college
staff commander
staff corps
staff degree
staff department
staff notation
staff nurse
staff of Aesculapius
staff of life
staff of office
staff officer
staff ride
staff rush
staff section
staff sergeant
staff sling
staff surgeon
staff system
staff tree
staff vine
staff walk
staff work
staff-herd
staff-tree family
staffordshire terrier
stag beetle
stag bush
stag dance
stag film
stag gang
stag moss
stag party
stag sumac
stag the market
stag tick
stag's-horn coral
stag-beetle
stag-evil
stag-eyed
stag-hafted
stag-handled
stag-headed
stag-headedness
stag-horn
stag-horned
stag-necked
stag-sure

stage
boat
stage box
stage brace
stage business
stage carriage
stage cloth
stage coachman
stage direction
stage directions
stage director
stage door
stage effect
stage fright
stage left
stage lighting
stage management
stage manager
stage managership
stage micrometer
stage name
stage peg
stage performance
stage performer
stage play
stage player
stage playing
stage pocket
stage presence
stage presentation
stage property
stage right
stage scenery
stage screw
stage set
stage setter
stage setting
stage show
stage technician
stage wagon
stage wait
stage whisper
stage world
stage, the
stage-blanks
stage-bleed
stage-coach
stage-frighten

stage-manage
stage-managed
stage-manager
stage-managing
stage-set
stage-struck
stagger along
stagger belief
stagger grass
stagger head
stagger on
stagger spokes
stagger wire
stagger wires
staggered head
staggering belief
staggering blow
staggering
 bob
staggering drunk
staghorn coral
staghorn fern
staghorn moss
staghorn sumac
staging area
staging nail
stagnant market
stagnant water
stagnant-blooded
stagnant-minded
stagnant-souled
stagnation mastitis
staight-bred
stain paper
stained glass
stained glass window
stainless steel
stainless-steel ware
stair horse
stair rail
stair rod
stair tower
stair turret
stair well
stair wire
stair-foot
stair-head
stair-step

stair-stepper
staircase curve
staircase shell
stake boat
stake body
stake down
stake driver
stake horse
stake net
stake out
stake race
stake truck
stake your claim
stake-boat
stakes race
staking your claim
stalactite vault
stalactite work
stalagmite marble
stale repetition
stale-drunk
stale-grown
stale-mouthed
stale-worn
stalk borer
stalk disease
stalk smut
stalk-eyed
stalking-horse
stall angl
stall angle
stall angle of attack
stall around
stall for time
stall landing
stall net
stall off
stall plate
stall reader
stall-fed
stall-feed
stall-feeding
stall-like
stall-master
stalling
 angle
stalling angle of attack
stalling speed

stallion plague
stamin-
stamp and go
stamp battery
stamp book
stamp booklet
stamp copper
stamp dealer
stamp duty
stamp hammer
stamp in the memory
stamp licker
stamp mill
stamp note
stamp of approval
stamp on
stamp out
stamp pad
stamp rock
stamp tax
stamp upon
stamp your foot
stamp-licking
stamped on the memory
stamped securities
stamping ground
stamping mill
stance fatigue
stanch friendship
stanchion gun
stand a chance
stand a good chance
stand aghast
stand agog
stand alone
stand aloof
stand aloof from
stand and be counted against
stand apart
stand around
stand aside
stand at attention
stand at bay
stand at ease
stand at parade rest
stand at the head
stand away
stand back

stand back of
stand bail for
stand behind
stand by
stand by the main sheet
stand by the side of
stand by to weigh anchor
stand clear of
stand condemned
stand down
stand drinks
stand easy
stand erect
stand fair to
stand fast
stand fire
stand firm
stand first
stand
for
stand for office
stand forth
stand from
stand guard
stand guard over
stand hawk
stand high
stand house
stand in
stand in a white sheet
stand in awe of
stand in dread of
stand in for
stand in for the land
stand in front
stand in good stead
stand in need of
stand in the place of
stand in the stead of
stand in the way
stand in the way of
stand in with
stand in your own light
stand like a post
stand method
stand mute
stand neuter
stand no nonsense

stand of arms
stand of timber
stand off
stand off and on
stand oil
stand on
stand on a course
stand on a straight course
stand on a volcano
stand on ancient ways
stand on ceremony
stand on end
stand on tiptoe
stand on tiptoes
stand on your own
stand on your own feet
stand on your own legs
stand on your own two feet
stand on your rights
stand one in hand
stand opposed
stand opposite
stand or fall with
stand out
stand out from the shore
stand over
stand over against
stand pat
stand ready
stand responsible for
stand rest
stand revealed
stand sentinel
stand
 shoulder to shoulder
stand shoulder to shoulder with
stand sponsor for
stand still
stand the costs
stand the gaff
stand the hazard of the die
stand the test
stand to
stand to attention
stand to gain
stand to lose
stand to reason
stand to your engagement

stand together
stand treat
stand under
stand up
stand up against
stand up and be counted
stand up for
stand up for Jesus
stand up straight
stand up to
stand up with
stand upon
stand upon a course
stand upon your rights
stand upright
stand vis-a-vis
stand with arms akimbo
stand you in good stead
stand you in stead
stand your ground
stand your trick
stand your watch
stand-by
stand-bys
stand-down
stand-easy
stand-in
stand-off
stand-off half
stand-offish
stand-offishly
stand-offishness
stand-on vessel
stand-patter
stand-pipe
stand-to
stand-up
stand-up comedian
stand-up comedy
stand-up comedy act
stand-up comic
stand-up fight
standard article
standard atmosphere
standard band
standard behavior
standard broadcasting
standard candle

standard
cell
standard coke
standard compass
standard cost
standard deviation
standard dialect
standard dollar
standard error
standard gauge
standard language
standard lining
standard microphone
standard money
standard of comfort
standard of life
standard of living
standard of perfection
standard of value
standard operating procedure
standard page
standard phrase
standard pitch
standard position
standard refraction
standard stock
standard time
standard transmission
standard usage
standard work
standard-bearer
standard-bearership
standard-bred
standard-gage
standard-gaged
standard-gauge
standard-gauged
standard-sized
standard-wing
standardized test
stander-by
standing against
standing apart
standing army
standing at attention
standing barrage
standing broad jump
standing committee

standing custom
standing for office
standing gaff
standing high jump
standing jump
standing lug
standing martingale
standing matter
standing on end
standing on its base
standing on its feet
standing on its
legs
standing order
standing orders
standing ovation
standing place
standing rigging
standing room
standing room only
standing salt
standing stone
standing to
standing treat
standing up
standing upright
standing vise
standing water
standing wave
standing way
standing-place
standing-wave indicator
standoff coat
standoff half
stanford-binet test
stank hen
stann-
stannel hawk
stannic acid
stannic oxide
stannic sulfide
stannic sulphide
stanno-
stannoso-
staphylo-
staple fiber
staple fur
staple item

staple punch
staple right
staple-fashion
staple-headed
staple-shaped
stapling machine
star acacia
star anise
star anise oil
star aniseed
star antimony
star apple
star belt
star bomb
star buzzard
star capsicum
star catalog
star catalogue
star chart
star check
star chickweed
star cloud
star cluster
star colors
star connection
star coral
star count
star cucumber
star cut
star density
star disk
star drift
star drill
star dust
star facet
star feed
star fern
star finch
star finder
star fort
star gauge
star
 gear
star ghost
star gooseberry
star grass
star hummingbird
star hyacinth

star image
star in the firmament
star ipomoea
star jasmine
star jelly
star lily
star lot
star map
star metal
star motion
star network
star of David
star of bethlehem
star of david
star pagoda
star pepper
star phlox
star pine
star place
star plate
star plum
star point
star polygon
star position
star quartz
star ratio
star reed
star route
star ruby
star sapphire
star saxifrage
star scout
star shake
star shell
star shifter
star shower
star skunk
star slough
star spectroscope
star spray
star stream
star streaming
star system
star thistle
star time
star trail
star tulip
star turn

star violet
star wheel
star winding
star worship
star worshiper
star-apple
star-aspiring
star-bearing
star-bedecked
star-bedizened
star-bespotted
star-bestudded
star-blasting
star-born
star-bright
star-broidered
star-chamber
star-climbing
star-connected
star-crossed
star-crossed life
star-decked
star-directed
star-distant
star-dogged
star-dust
star-embroidered
star-eyed
star-fashion
star-fed
star-flower
star-flowered
star-gaze
star-gazer
star-gazing
star-grass
star-inwrought
star-leaved
star-led
star-like
star-mouthed
star-nosed
star-nosed
mole
star-of-Bethlehem
star-of-Jerusalem
star-of-bethlehem
star-paved

star-peopled
star-pointed
star-proof
star-ribbed
star-scattered
star-shaped
star-shot
star-skilled
star-spangled
star-spangled banner
star-staring
star-stone
star-studded
star-surveying
star-sweet
star-taught
star-thistle
star-throated
star-watching
star-wearing
star-wise
star-ypointing
starboard anchor
starboard engine
starboard engine ahead
starboard tack
starch blue
starch cellulose
starch corn
starch gum
starch hyacinth
starch layer
starch paste
starch room
starch sheath
starch sirup
starch star
starch syrup
starch tree
starch-digesting
starch-producing
starch-reduced
starch-sized
stare at
stare decisis
stare down
stare hard
stare openmouthed

stare out
stare out of countenance
stare you in the face
stare-about
starfish
 flower
stark blind
stark dead
stark naught
stark upright
stark-awake
stark-becalmed
stark-blind
stark-calm
stark-dead
stark-drunk
stark-dumb
stark-false
stark-mad
stark-naked
stark-naught
stark-new
stark-raving
stark-raving mad
stark-spoiled
stark-staring
stark-staring mad
stark-stiff
stark-wild
stark-wood
starling stone
starnose mole
starring role
starry campion
starry grasswort
starry heaven
starry heavens
starry host
starry orbs
starry-bright
starry-eyed
starry-eyed over
starry-flowered
starry-golden
starry-headed
starry-nebulous
stars and bars
stars and stripes

stars-of-Bethlehem
stars-of-Jerusalem
start all over
start aside
start back
start going
start in
start music
start off
start on
start out
start the ball rolling
start up
start-naked
start-off
start-stop switch
start-up
starter-off
starting block
starting box
starting friction
starting gate
starting grid
starting handle
starting line
starting note
starting place
starting point
starting post
starting price
starting
 punch
starting stalls
starting step
starting torque
starting-hole
startle the echoes
startling resemblance
starvation diet
starvation treatment
starvation wages
starved-looking
stash away
stat mi
state a grievance
state aid
state assembly
state attorney

state bank
state bond
state capitalism
state chairman
state chamber
state church
state college
state convention
state coordinate system
state flower
state forest
state guard
state highway
state hospital
state legislature
state medicine
state mutual
state note
state of affairs
state of being
state of being one
state of expectancy
state of grace
state of mind
state of nature
state of nerves
state of suspense
state of the exchequer
state of the market
state of things
state of war
state ownership
state paper
state police
state prayers
state prison
state religion
state rights
state school
state senator
state services
state socialism
state socialist
state tax
state trial
state trooper
state university
state your case

state's attorney
state's
 evidence
state-aided
state-caused
state-changing
state-educated
state-enforced
state-fed
state-house
state-making
state-mending
state-monger
state-of-the-art
state-owned
state-paid
state-pensioned
state-provided
state-provisioned
state-prying
state-ridden
state-room
state-ruling
state-socialist
state-taxed
state-wide
state-wielding
stated cause
stated clerk
stated value
stateless person
stately home
stately-beauteous
stately-grave
stately-paced
stately-sailing
stately-storied
stately-written
statement covering the evidence
statement covering the facts
statement of belief
statement of claim
statement of defense
statement of facts
statement of principles
statement under oath
states general
states' righter

states' rights
states-people
static ceiling
static electricity
static field
static firing
static friction
static line
static propeller thrust
static stability
static tube
static water
station agent
station break
station day
station error
station hospital
station house
station hut
station
identification
station interference
station jack
station keeping
station mark
station point
station pointer
station pole
station selector
station wagon
station-house
station-to-station
station-to-station call
stationary dive
stationary engine
stationary engineer
stationary engineering
stationary front
stationary orbit
stationary point
stationary state
stationary wave
stationery store
stations for diving
stations of the Cross
stations of the cross
statistical communication
statistical independence

statistical mechanics
statistical prediction
statistical probability
statistical survey
statistically probable
stato-
statu quo ante
statuary bronze
statuary marble
statue maker
statue making
statue of liberty
statue-blind
statue-bordered
statue-turning
statuelike repose
statues personal
status emphaticus
status in quo
status quo
status quo ante
status seeker
status symbol
status-seeking
statute book
statute fair
statute labor
statute law
statute merchant
statute mile
statute of limitations
statute
 roll
statute staple
statute-barred
statute-book
statutes mixed
statutory crime
statutory declaration
statutory law
statutory lien
statutory next of kin
statutory offense
statutory rape
statutory referendum
staunch belief
staunch friend
staunch friendship

stauro-
stave basket
stave in
stave oak
stave off
stave pipe
stave rhyme
stay alert
stay alive
stay aloof
stay at
stay at home
stay awake
stay away
stay away in droves
stay bar
stay boom
stay briefed
stay busk
stay chain
stay detached from
stay employed
stay for
stay foresail
stay girder
stay hole
stay in hiding
stay in line
stay in shape
stay in soundings
stay in the background
stay in the shade
stay inshore
stay it out
stay late
stay law
stay near
stay of execution
stay on
stay on the beam
stay on the treadmill
stay on your heels
stay on your tail
stay out
stay over
stay pin
stay plow
stay put

stay stitching
stay tackle
stay tap
stay the distance
stay tube
stay up
stay up for
stay up into the small hours
stay up late
stay with
it
stay young
stay your hand
stay-a-while
stay-at-home
stay-bearer
stay-bolt
stay-in
stay-in strike
stay-log
stay-ship
stay-tape
staying over
staying power
staysail schooner
steadfast faith
steady market
steady nerves
steady pin
steady rest
steady so
steady state
steady state theory
steady temper
steady-eyed
steady-footed
steady-going
steady-handed
steady-handedness
steady-headed
steady-hearted
steady-looking
steady-minded
steady-nerved
steady-state theory
steady-state universe
steady-stream
steadysteady as you go

steak and kidney pie
steak hammer
steak knife
steak raid
steak set
steak tartar
steak tartare
steal a march
steal a march on
steal a march upon
steal along
steal away
steal in
steal on the ear
steal the show
steal up on
steal your stuff
steal your thunder
steam at flank speed
steam bath
steam beer
steam blow
steam blower
steam boiler
steam boiler insurance
steam box
steam cabinet
steam carriage
steam case
steam chest
steam cleaner
steam cleaning
steam coal
steam cock
steam
coil
steam color
steam condenser
steam cure
steam cylinder
steam digger
steam distillation
steam dome
steam dredger
steam drop
steam drop hammer
steam engine
steam engineer

steam engineering
steam excavator
steam feed
steam filature
steam fire engine
steam fit
steam fitter
steam fitting
steam fog
steam frigate
steam gas
steam gauge
steam gun
steam hammer
steam harvester
steam heat
steam heater
steam heating
steam in line
steam in line of bearing
steam injector
steam iron
steam jacket
steam jammer
steam joint
steam knife
steam lance
steam lap
steam launch
steam lead
steam line
steam locomotive
steam loop
steam mason
steam metal
steam molder
steam navvy
steam nigger
steam nozzle
steam organ
steam owner
steam packing
steam piano
steam pipe
steam piping
steam plow
steam point
steam port

steam power
steam press
steam printing
steam propulsion
steam pump
steam radiator
steam radio
steam ram
steam road
steam roller
steam room
steam schooner
steam shovel
steam sizes
steam sloop
steam stamp
steam
still
steam table
steam tackle
steam thresher
steam trap
steam tug
steam turbine
steam twill
steam up
steam valve
steam vessel
steam whistle
steam yacht
steam-boiler
steam-chest
steam-clean
steam-cleaned
steam-cooked
steam-cut
steam-distill
steam-dredge
steam-dried
steam-driven
steam-eating
steam-engine
steam-filled
steam-going
steam-heat
steam-heated
steam-lance
steam-lanced

steam-lancing
steam-laundered
steam-pocket
steam-processed
steam-propelled
steam-ridden
steam-roll
steam-roller
steam-shovel
steam-treated
steam-turbine
steam-turbine locomotive
steam-type
steam-wrought
steamboat Gothic
steamboat coal
steamboat gothic
steamboat ratchet
steamed pudding
steamed up
steamed up about
steamer anchorage
steamer basket
steamer captain
steamer chair
steamer clam
steamer contract
steamer crew
steamer cruise
steamer dock
steamer duck
steamer freight
steamer funnel
steamer hull
steamer landing
steamer lane
steamer line
steamer passenger
steamer port
steamer road
steamer route
steamer rug
steamer
 sailing
steamer service
steamer siren
steamer smoke
steamer smokestack

steamer subsidy
steamer ticket
steamer track
steamer traffic
steamer travel
steamer trunk
steamer voyage
steamer wharf
steamer whistle
steamer-borne
steaming up
steamroller methods
steamroller through
steamship coal
steamship company
steamship freight
steamship lane
steamship line
steamship mail
steamship office
steamship route
steamship service
steamship ticket
steamship traffic
steamship travel
steamship voyage
stearic acid
stearo-
stearoyl group
stearoyl radical
steat-
steato-
steel band
steel bar
steel baron
steel blue
steel bronze
steel company
steel concrete
steel construction
steel drawer
steel dresser
steel electrotype
steel emery
steel engraver
steel engraving
steel factory
steel fiber

steel glass
steel gray
steel grey
steel guitar
steel hand
steel lumber
steel magnate
steel man
steel manufacturer
steel manufacturing
steel master
steel measurer
steel merchant
steel mill
steel mirror
steel orchestra
steel
 pen
steel plate
steel presser
steel share
steel spring
steel square
steel string
steel town
steel trap
steel wire gauge
steel wool
steel yourself
steel-black
steel-blue
steel-bound
steel-bow
steel-bright
steel-cage
steel-cage construction
steel-capped
steel-cased
steel-clad
steel-clenched
steel-cold
steel-colored
steel-covered
steel-cut
steel-die printing
steel-digesting
steel-edged
steel-faced

steel-framed
steel-grained
steel-graven
steel-gray
steel-green
steel-hard
steel-hardened
steel-head
steel-headed
steel-hilted
steel-lined
steel-nerved
steel-pen
steel-plated
steel-pointed
steel-rimmed
steel-riveted
steel-shafted
steel-sharp
steel-shod
steel-strong
steel-studded
steel-tempered
steel-tipped
steel-tired
steel-topped
steel-trap
steeled against
steelhead trout
steep price
steep slope
steep-ascending
steep-backed
steep-bending
steep-descending
steep-down
steep-faced
steep-gabled
steep-hanging
steep-pitched
steep-pointed
steep-rising
steep-roofed
steep-scarped
steep-sided
steep-streeted
steep-to
steep-up

steep-walled
steep-yawning
steeped
 in iniquity
steeped in vice
steeple bellflower
steeple cup
steeple engine
steeple hat
steeple headdress
steeple hunt
steeple hunter
steeple hunting
steeple jack
steeple race
steeple racer
steeple racing
steeple skull
steeple-crown
steeple-crowned
steeple-head
steeple-high
steeple-house
steeple-jacking
steeple-loving
steeple-roofed
steeple-shadowed
steeple-shaped
steeple-studded
steeple-topped
steer a middle course
steer a straight course
steer an even course
steer away from
steer clear of
steer for
steer oar
steer toward
steerage passenger
steering arm
steering axle
steering box
steering bridge
steering column
steering committee
steering crutch
steering engine
steering fan

steering fork
steering gear
steering handle
steering head
steering joint
steering knuckle
steering lever
steering light
steering line
steering lock
steering oar
steering pillar
steering wheel
stego-
stellar cosmogony
stellar magnitude
stellar photometry
stellate-crystal
stellate-crystal
fungus
stellate-pubescent
stem anchor
stem blight
stem borer
stem break
stem canker
stem cell
stem climber
stem cutting
stem duchy
stem eelworm
stem end
stem father
stem from
stem ginger
stem girdler
stem leaf
stem length
stem mother
stem rot
stem rust
stem sapper
stem sawfly
stem sickness
stem smut
stem stitch
stem the current
stem the flood

stem the tide
stem turn
stem work
stem-bearing
stem-bud
stem-clasping
stem-end rot
stem-sick
stem-wind
stem-winder
stem-winding
stem-winding watch
sten-
stench bomb
stench of decay
stench trap
stencil cutter
stencil cutting
stencil machine
stencil painting
stencil paper
stencil pen
stencil printing
steneo saurys
steno-
stenographing machine
stent net
stent roll
step along
step aside
step backward
step bearing
step box
step by step
step chair
step cut
step dance
step dancer
step dancing
step down
step fault
step flight
step forward
step function
step gauge
step grate
step in
step into a fortune

step into the limelight
step
 into the place of
step into the shoes of
step joint
step lively
step of time
step off
step on
step on it
step on its tail
step on the gas
step on your corns
step on your toes
step out
step out of
step over
step rail
step rate
step rocket
step socket
step stool
step tap
step terrace
step to the fore
step to the front
step turn
step up
step up the ladder
step ward
step wheel
step-
step-and-repeat
step-back
step-back relay
step-by-step
step-by-step switching
step-cline
step-cone
step-cone pulley
step-cut
step-down
step-down transformer
step-in
step-ins
step-ladder
step-log
step-off

step-on
step-parent
step-up
step-up transformer
steppe cat
steppe disease
steppe murrain
steppe rue
stepped line
stepped-up
stepping in
stepping line
stepping pace
stepping stone
stepping-off
stepping-off place
stepping-out
stepping-stone
stepping-stones
steps and measures
stercoral ulcer
sterculia gum
stere-
stereo camera
stereo formula
stereo microphone
stereo-
stereophonic sound system
stereophonic system
stereoscopic
 microscope
stereospecific catalyst
stereospecific polymer
stereotyped behavior
stereotyped saying
sterling area
sterling bloc
sterling silver
stern anchor
stern board
stern boat
stern chase
stern chaser
stern fast
stern frame
stern gallery
stern gun
stern hatch

stern hatchway
stern hook
stern knee
stern ladder
stern line
stern race
stern rail
stern sea
stern sheets
stern staysail
stern timber
stern tube
stern walk
stern wave
stern wheel
stern window
stern-bearer
stern-board
stern-born
stern-browed
stern-chase
stern-chaser
stern-eyed
stern-faced
stern-fast
stern-featured
stern-gated
stern-issuing
stern-lipped
stern-looking
stern-minded
stern-mouthed
stern-post
stern-set
stern-sheet
stern-sounding
stern-spoken
stern-visaged
stern-wheel
stern-wheeler
sterno-
sterro metal
sterro-metal
stetho-
stevedore knot
stevedore's knot
stew in your own juice
stew over

steward's department
stewing chicken
sthula sharira
stib-
stibio-
stick around
stick aroundor about
stick at
stick at
 nothing
stick bean
stick bug
stick by
stick caterpillar
stick chair
stick close
stick closer than a brother
stick control
stick down
stick fast
stick figure
stick for
stick in
stick in the mud
stick in your craw
stick in your crop
stick in your gizzard
stick in your throat
stick insect
stick it
stick it out
stick lac
stick licorice
stick like a barnacle
stick like a leech
stick like a limpet
stick like a wet shirt
stick like glue
stick like the shadow of
stick like wax
stick of wood
stick out
stick out a mile
stick out like a sore thumb
stick out over
stick pin
stick rider
stick salve

stick shift
stick to
stick to it
stick to like a barnacle
stick to the
stick to the facts
stick to your colors
stick to your guns
stick to your knitting
stick to your last
stick together
stick up
stick up for
stick with
stick with it
stick your head in the sand
stick your long nose into
stick your neck out
stick your nose in
stick-at-it
stick-at-it-ive
stick-at-itive
stick-at-itiveness
stick-at-nothing
stick-back
stick-button
stick-candy
stick-dice
stick-ear
stick-in-the-mud
stick-jaw
stick-lac
stick-leg
stick-legged
stick-out
stick-ride
stick-to-it-iveness
stick-to-itive
stick-to-itively
stick-to-itiveness
stick-up
sticker-in
sticker-on
sticker-up
sticking
out
sticking piece
sticking place

sticking plaster
sticking point
sticking power
sticking salve
sticking tommy
stickle for
sticks and stones
sticks, the
sticktight flea
stickup job
stickup man
sticky dog
sticky end
sticky fingers
sticky mess
sticky tape
sticky weather
sticky wicket
sticky willie
sticky-eyed
sticky-fingered
stiff as a poker
stiff as buckram
stiff aster
stiff bit
stiff breeze
stiff climb
stiff collar
stiff gentian
stiff market
stiff neck
stiff price
stiff temper
stiff wind
stiff-arm
stiff-armed
stiff-backed
stiff-bearded
stiff-bent
stiff-billed
stiff-bodied
stiff-bolting
stiff-boned
stiff-bosomed
stiff-branched
stiff-built
stiff-clay
stiff-collared

stiff-docked
stiff-dressed
stiff-eared
stiff-grown
stiff-haired
stiff-horned
stiff-ironed
stiff-jointed
stiff-jointedness
stiff-kneed
stiff-lamb
 disease
stiff-land
stiff-leathered
stiff-leaved
stiff-legged
stiff-limbed
stiff-lipped
stiff-minded
stiff-mud
stiff-neck
stiff-necked
stiff-necked pride
stiff-neckedly
stiff-neckedness
stiff-plate
stiff-pointed
stiff-rimmed
stiff-rumped
stiff-rusting
stiff-shanked
stiff-skirted
stiff-starched
stiff-stretched
stiff-swathed
stiff-tailed
stiff-uddered
stiff-veined
stiff-winged
stiff-witted
stiffen your backbone
stiffening bar
stiffening order
stiffening truss
stiffleg derrick
stifle bone
stifle joint
stifle shoe

stifle-out
stigma disk
stigmal vein
stigmatic grating spectrograph
stil-de-grain yellow
stilbene dye
stilbine color
stiletto fly
stiletto heel
stiletto-proof
stiletto-shaped
still alarm
still and all
still as a mouse
still as a statue
still as death
still box
still camera
still head
still hunt
still life
still lifes
still liquor
still more
still photograph
still return
still room
still small voice
still small
 voice within
still trailer
still watcher
still water
still wine
still-admired
still-birth
still-born
still-burn
still-closed
still-continued
still-continuing
still-diminishing
still-existing
still-fish
still-fisher
still-fishing
still-florid
still-flowing

still-fresh
still-gazing
still-hunt
still-hunter
still-hunting
still-improving
still-increasing
still-life
still-life painter
still-life painting
still-living
still-new
still-pagan
still-pining
still-recurring
still-refuted
still-renewed
still-repaired
still-rocking
still-room
still-sick
still-slaughtered
still-stand
still-unmarried
still-vexed
still-watching
still-young
stilling box
stilling well
stilt bug
stilt palm
stilt petrel
stilt plover
stilt sandpiper
stilt wheel
stilt-legged
stimulus coefficient
stimulus error
stimulus generalization
stimulus threshold
stimulus word
stimulus-response
stimulus-response psychology
sting bladder
sting moth
sting nettle
sting of conscience
sting ray

sting to the quick
sting winkle
stinging capsule
stinging
 cell
stinging defeat
stinging hair
stinging nettle
stingless bee
stink ball
stink bell
stink bomb
stink brand
stink bug
stink cat
stink fly
stink gland
stink grass
stink in the nostrils
stink out
stink trap
stink up
stink-horn
stink-pot
stinking badger
stinking cedar
stinking clover
stinking drunk
stinking iris
stinking mayweed
stinking roger
stinking smut
stinky pinkie
stipple board
stipple engraving
stipple paper
stipple streak
stipulate for
stir about
stir bird
stir feelings
stir of air
stir one's blood
stir the blood
stir the embers
stir the feelings
stir the fire
stir up

stir up a hornet's nest
stir up trouble
stir your bile
stir your stumps
stir-fry
stir-up
stirred up
stirring up
stirring-up
stirrup bar
stirrup bone
stirrup cover
stirrup cup
stirrup dram
stirrup glass
stirrup iron
stirrup jar
stirrup leather
stirrup oil
stirrup pump
stirrup strap
stirrup-vase
stitch in the side
stitch of work
stitch rivet
stitch watermark
stitch wheel
stitching horse
stochastic independence
stochastic
matrix
stock account
stock assessment
stock beer
stock beet
stock block
stock board
stock book
stock buckle
stock car
stock card
stock cattle
stock cerificate
stock certificate
stock change
stock clerk
stock company
stock dealer

stock dealing
stock dividend
stock dove
stock duck
stock eagle
stock exchange
stock family
stock farm
stock farmer
stock farming
stock feeder
stock fire
stock footage
stock gillyflower
stock gold
stock guard
stock hawk
stock horse
stock in trade
stock insurance company
stock issue
stock ledger
stock list
stock lock
stock manipulation
stock margin
stock market
stock market quotations
stock note
stock of words
stock option
stock owl
stock pass
stock pigeon
stock pile
stock power
stock price
stock price index
stock prices
stock pump
stock purse
stock rail
stock raiser
stock raising
stock rate
stock receipt
stock record
stock room

stock saddle
stock saying
stock shot
stock soap
stock solution
stock speculation
stock speculator
stock split
stock
 station
stock still
stock tackle
stock the mind
stock ticker
stock type
stock up
stock vaccine
stock whaap
stock whip
stock-blind
stock-broker
stock-car
stock-car race
stock-dove
stock-dumb
stock-exchange broker
stock-fish
stock-gillyflower
stock-in-trade
stock-job
stock-jobber
stock-jobbing
stock-route
stock-still
stock-taking
stock-work
stockbroker belt
stockholder of record
stocking board
stocking cap
stocking cutter
stocking cutter tool
stocking filler
stocking frame
stocking hose
stocking knitter
stocking knitting
stocking loom

stocking machine
stocking maker
stocking making
stocking mask
stocking needle
stocking sole
stocking spinner
stocking stitch
stocking stuffer
stocking the mind
stocking trimmer
stocking weaver
stocking-foot
stocking-frame
stockless anchor
stocks and bonds
stocks machine
stoech-
stoke the fire
stoke up
stoke-hole
stole fee
stole mesh
stole-shaped
stolen goods
stolen property
stom-
stomach ache
stomach bucket
stomach condition
stomach cough
stomach piece
stomach
poison
stomach pump
stomach staggers
stomach sweetbread
stomach tooth
stomach tube
stomach ulcer
stomach upset
stomach worm
stomach-ache
stomach-achy
stomach-filling
stomach-formed
stomach-hating
stomach-healing

stomach-qualmed
stomach-shaped
stomach-sick
stomach-soothing
stomach-tight
stomach-turning
stomach-twitched
stomach-weary
stomach-whetted
stomach-worn
stomat-
stomato-
stomodaeal food
stone age
stone ax
stone axe
stone bag
stone basil
stone bass
stone blue
stone boiling
stone bolt
stone borer
stone brake
stone bramble
stone breaker
stone breaking
stone brick
stone bruise
stone butter
stone canal
stone carver
stone cat
stone cell
stone china
stone circle
stone clover
stone coal
stone collar
stone color
stone contractor
stone coral
stone crab
stone crayfish
stone cricket
stone crusher
stone curlew
stone devil

stone dresser
stone dressing
stone falcon
stone fence
stone fern
stone fly
stone fox
stone fruit
stone grape
stone gray
stone green
stone grig
stone hammer
stone harmonicon
stone
 hawk
stone in your path
stone jug
stone leek
stone lichen
stone lifter
stone lily
stone lime
stone lugger
stone marten
stone mill
stone mint
stone money
stone oak
stone ocher
stone oil
stone orpine
stone owl
stone parsley
stone perch
stone picker
stone pine
stone pit
stone pitch
stone plover
stone proof
stone rag
stone roller
stone rue
stone run
stone runner
stone saw
stone sclerenchyma

stone sculpture
stone shifter
stone snipe
stone sucker
stone thrush
stone to death
stone toter
stone wall
stone wine
stone wire
stone writing
stone yellow
stone's throw
stone-arched
stone-asleep
stone-axe
stone-bladed
stone-blind
stone-blindness
stone-bow
stone-broke
stone-brown
stone-bruised
stone-buff
stone-built
stone-cleaving
stone-coated
stone-cold
stone-colored
stone-covered
stone-cutter
stone-cutting
stone-darting
stone-dead
stone-deaf
stone-deafness
stone-dumb
stone-dust
stone-eared
stone-eating
stone-edged
stone-eyed
stone-faced
stone-floored
stone-fruit
stone-ground
stone-hand
stone-hard

stone-headed
stone-horse
stone-lily
stone-lined
stone-living
stone-milled
stone-moving
stone-parsley
stone-paved
stone-pillared
stone-pine
stone-ribbed
stone-rolling
stone-roofed
stone-silent
stone-smickle
stone-still
stone-throwing
stone-using
stone-vaulted
stone-wall
stone-walled
stone-walling
stoned-horse
stoner-out
stoney
 gate
stony coral
stony heart
stony pit
stony-blind
stony-broke
stony-eyed
stony-faced
stony-hearted
stony-heartedly
stony-heartedness
stony-jointed
stony-pitiless
stony-toed
stony-winged
stooge around
stool ball
stool end
stool land
stool pigeon
stool-ball
stoop-gallant

stoop-shouldered
stooping from your high place
stop at nothing
stop bath
stop bead
stop blowing
stop breathing
stop by
stop chorus
stop clause
stop clock
stop cold
stop consonant
stop dead
stop dead in your tracks
stop down
stop drill
stop finger
stop for breath
stop gauge
stop in
stop in your tracks
stop inor stop by
stop it
stop key
stop knob
stop light
stop list
stop log
stop looking
stop motion
stop
needle
stop net
stop number
stop nut
stop odor
stop off
stop on
stop on a dime
stop order
stop out
stop over
stop payment
stop pin
stop plank
stop plate
stop press

stop rod
stop screw
stop seine
stop short
stop shot
stop spine
stop street
stop stroke
stop tester
stop the breath
stop the clock
stop the mouth of
stop thief
stop thrust
stop time
stop to consider
stop up
stop valve
stop volley
stop watch
stop wheel
stop work
stop your ears
stop your mouth
stop-and-go light
stop-cylinder press
stop-gap
stop-go
stop-loss
stop-loss order
stop-off
stop-open
stop-watch
stope drill
stopen bottle
stopped diapason
stopped flute
stopped up
stopper bolt
stopper hole
stopper knot
stopper's knot
stopping condenser
stopping knife
stopping out of time
stopping place
stopping train
storage battery

storage bellows
storage capacity
storage cell
storage device
storage disease
storage egg
storage heater
storage life
storage place
storage rot
storage space
storage spot
storage system
storage unit
storage
 wall
storax benzoin
storax family
store away
store card
store cheese
store clerk
store clothes
store detective
store dresser
store in the mind
store manager
store of knowledge
store order
store pay
store pig
store sign
store teeth
store the mind
store types
store up
store-bought
store-bought clothes
store-bought wear
store-boughten
store-room
store-ship
storefront school
storehouse of the mind
storehouse of words
stores ledger
storey house
storing the mind

stork's bill
stork's-bill
stork, the
stork-billed
stork-fashion
storm along
storm and stress
storm axis
storm bell
storm belt
storm boat
storm boot
storm breeder
storm cave
storm cellar
storm center
storm centre
storm cloud
storm clouds
storm coat
storm collar
storm cone
storm current
storm door
storm drain
storm drum
storm finch
storm flag
storm glass
storm gray
storm in
storm in a teacup
storm in a teapot
storm jib
storm kite
storm lane
storm lantern
storm mizzen
storm pennant
storm petrel
storm porch
storm rubber
storm sail
storm
sash
storm serge
storm sewer
storm signal

storm stay
storm surge
storm thrush
storm track
storm tracking
storm trooper
storm troops
storm trysail
storm warning
storm wind
storm window
storm-armed
storm-beat
storm-beaten
storm-boding
storm-breathing
storm-cock
storm-drenched
storm-encompassed
storm-felled
storm-god
storm-laden
storm-lit
storm-portending
storm-presaging
storm-rent
storm-stayed
storm-swept
storm-tight
storm-tossed
storm-trooper
storm-washed
storm-wise
storm-worn
storm-wracked
storming party
stormy petrel
stormy weather
stormy winds
story element
story hour
story line
story post
story rod
story writer
story-teller
story-writing
story-wrought

stout fellow
stout heart
stout-armed
stout-billed
stout-bodied
stout-girthed
stout-hearted
stout-heartedly
stout-heartedness
stout-legged
stout-limbed
stout-looking
stout-minded
stout-ribbed
stout-sided
stout-soled
stout-stalked
stout-stomached
stout-winged
stout-worded
stove black
stove bolt
stove coal
stove distillate
stove enamel
stove
 glass
stove heating
stove in
stove length
stove lifter
stove oil
stove plant
stove poker
stove polish
stove-dried
stove-heated
stove-pipe
stove-warmed
stoved salt
stovepipe hat
stow away
stow down
stow it
stow net
stow-blade
stow-boating
straddle carrier

straddle mill
straddle pipe
straddle the fence
straddle truck
straddle-face
straddle-fashion
straddle-legged
straggle tooth
straggle-brained
stragling money
straight accent
straight across
straight ahead
straight and narrow
straight and narrow, the
straight angle
straight arch
straight arm lift
straight as a ruler
straight as an arrow
straight as an edge
straight away
straight bat
straight bill of lading
straight chain
straight chair
straight coil
straight course
straight deck
straight drama
straight face
straight fight
straight flush
straight forth
straight forward
straight from the shoulder
straight grain
straight hair shingle
straight jacket
straight joint
straight life insurance
straight line
straight man
straight matter
straight
off
straight part
straight poker

straight razor
straight sailing
straight shooter
straight stall
straight stretch
straight thinking
straight ticket
straight time
straight to the mark
straight up
straight up and down
straight up-and-downness
straight whiskey
straight-arm
straight-backed
straight-barred
straight-barreled
straight-billed
straight-bitted
straight-bodied
straight-body
straight-cut
straight-drawn
straight-edge
straight-edged
straight-faced
straight-falling
straight-fibered
straight-flung
straight-flute
straight-fluted
straight-from-the-shoulder
straight-front
straight-going
straight-grained
straight-growing
straight-grown
straight-haired
straight-hairedness
straight-hemmed
straight-horned
straight-jointed
straight-laced
straight-lacedly
straight-leaved
straight-legged
straight-limbed
straight-line

straight-line-frequency
straight-lined
straight-made
straight-minded
straight-necked
straight-nosed
straight-out
straight-pull
straight-ribbed
straight-shaped
straight-shooting
straight-side
straight-sided
straight-sliding
straight-spoken
straight-stemmed
straight-stocked
straight-tail
dog
straight-tailed
straight-thinking
straight-trunked
straight-tusked
straight-up
straight-up-and-down
straight-veined
straight-winged
straighten out
straighten up
straighten yourself out
straightway drill
strain at
strain band
strain diagram
strain ellipsoid
strain every nerve
strain every nerve and sinew
strain for
strain gauge
strain hardening
strain insulator
strain normal
strain sheet
strain the meaning
strain the muscles
strain the sense
strain the throat
strain the truth

strain the voice
strain theory
strain your attention
strain your credulity
strain your ears
strain your eyes
strain your invention
strained relations
strainer arch
strainer core
strainer gate
strainer vine
straining arch
straining beam
straining frame
straining piece
straining sill
strainslip cleavage
strait jacket
strait waistcoat
strait-besieged
strait-bodied
strait-braced
strait-breasted
strait-breeched
strait-chested
strait-clothed
strait-coated
strait-embraced
strait-jacket
strait-knotted
strait-lace
strait-laced
strait-lacedly
strait-lacedness
strait-lacer
strait-lacing
strait-necked
strait-sleeved
strait-tied
strait-toothed
strait-waistcoat
strait-waisted
straitened
circumstances
straits dollar
strand fishery
strand flat

strand former
strand line
strand plover
strand rat
strand snipe
strand wolf
strange duck
strange particle
strange thing
strange to
strange to say
strange woman
strange-achieved
strange-clad
strange-colored
strange-composed
strange-disposed
strange-fashioned
strange-favored
strange-garbed
strange-looking
strange-met
strange-plumaged
strange-sounding
strange-tongued
strange-voiced
strange-wayed
stranger's gallery
strangers' gallery
strangle hold
strangled blade
strangler tree
strangulated hernia
strap bolt
strap brake
strap drill
strap fern
strap game
strap hammer
strap hinge
strap iron
strap joint
strap key
strap oil
strap oyster
strap rail
strap railroad
strap

railway
strap watch
strap work
strap-hinge
strap-laid
strap-leaved
strap-oil
strap-shaped
strapping motion
strapping plate
strategic air force
strategic bombing
strategic line
strategic materials
strategic plan
strategic point
strati-
stratificational grammar
stratified charge engine
stratified discharge
stratigraphic geology
strato-
strato-cirrus
strato-cumulus
stratocumulus castellanus
stratocumulus castellatus
stratocumulus floccus
stratocumulus lenticularis
stratosphere balloon
stratus cloud
stratus cumuliformis
stratus fractus
stratus maculosus
stratus nebulosus
straw bail
straw ballot
straw basher
straw bass
straw bid
straw bidder
straw bond
straw boss
straw cat
straw color
straw death
straw drain
straw fiddle
straw hat

straw in the wind
straw man
straw needle
straw oil
straw plait
straw ride
straw sedge
straw splitter
straw stem
straw to show the wind
straw vote
straw wedding
straw wine
straw yellow
straw-barreled
straw-boss
straw-breadth
straw-built
straw-capped
straw-colored
straw-crowned
straw-cutting
straw-dried
straw-emboweled
straw-hatted
straw-laid
straw-necked
straw-plaiter
straw-plaiting
straw-roofed
straw-shoe
straw-splitting
straw-stuffed
straw-thatched
strawberry
 bass
strawberry blite
strawberry blond
strawberry blonde
strawberry borer
strawberry bush
strawberry cactus
strawberry clover
strawberry comb
strawberry crab
strawberry crown borer
strawberry crown moth
strawberry dish

strawberry fern
strawberry finch
strawberry fleabeetle
strawberry fly
strawberry geranium
strawberry guava
strawberry leaf
strawberry leaf blight
strawberry leaf roller
strawberry leaf spot
strawberry mark
strawberry moth
strawberry nettle
strawberry pear
strawberry perch
strawberry pink
strawberry raspberry
strawberry roan
strawberry root aphid
strawberry root borer
strawberry root weevil
strawberry rootworm
strawberry rust
strawberry sawfly
strawberry saxifrage
strawberry shrub
strawberry spinach
strawberry sunburn
strawberry tassel
strawberry tomato
strawberry tongue
strawberry
tree
strawberry vine
strawberry weevil
strawberry-blond
strawberry-raspberry
strawberry-shrub family
strawhat circuit
strawhat theater
stray capacitance
stray current
stray energy
stray line
stray-line
streak culture
streak lightning
streak of lightning

streak of luck
streak plate
streaked-back
stream action
stream anchor
stream and dogs
stream bed
stream cable
stream capture
stream conservation
stream driver
stream forth
stream function
stream gold
stream ice
stream jam
stream of air
stream of consciousness
stream of fashion
stream of light
stream of time
stream piracy
stream the log
stream tin
stream wheel
stream-bordering
stream-drive
stream-embroidered
stream-illumed
stream-line
stream-of-consciousness
stream-of-consciousness novel
streamer aurora
streamer fly
streaming light
streaming potential
streamline flow
streams of rain
streams of sweat
street Arab
street academy
street arab
street band
street broker
street certificate
street cleaner
street coach
street cry

street
door
street dress
street elbow
street fight
street floor
street game
street girl
street market
street name
street of fallen women
street orderly
street organ
street people
street piano
street plate
street price
street railway
street singer
street sweeper
street urchin
street virus
street-bred
street-cleaning
street-door
street-pacing
street-raking
street-sold
street-sprinkling
street-sweeping
street-walker
streetcar line
strength change
strength deck
strength of mind
strength of purpose
strength of will
strength-bringing
strength-conferring
strength-decaying
strength-giving
strength-increasing
strength-inspiring
strength-restoring
strength-sustaining
strength-testing
strengthening lead
strenthening card

strep throat
strepto-
streptococcus tonsilitis
stress accent
stress and strain
stress arsis
stress diagram
stress group
stress of life
stress pattern
stress reaction
stress sheet
stress-strain
stress-strain curve
stress-verse
stressed skin
stretch away to
stretch fabric
stretch forth
 a helping hand
stretch forth your hand
stretch mill
stretch modulus
stretch of the imagination
stretch of time
stretch out
stretch pants
stretch stockings
stretch the legs
stretch the meaning
stretch the sense
stretch the truth
stretch to
stretch your legs
stretch your luck
stretch yourself
stretch-out
stretched out
stretched tight
stretched-out
stretcher bar
stretcher bond
stretcher-bearer
stretching course
stretching everywhere
stretching of the truth
stretching out
stretching piece

stretching your luck
stretching-out
striato-
stricken dumb
stricken in years
stricken with amnesia
stricken with years
strickle bar
strict attention
strict construction
strict constructionism
strict constructionist
strict discipline
strict interpretation
strict law
strict minded
strict neutrality
strict settlement
strictly between us
strictly cash
strictly decreasing function
strictly increasing function
strictly speaking
stride-legged
strident-voiced
striding compass
striding level
strife-breeding
strife-healing
strife-stirring
strike
 a balance
strike a bargain
strike a blow
strike a light
strike a pose
strike a responsive chord
strike a rich vein
strike against
strike all of a heap
strike an attitude
strike at
strike at the root of
strike back
strike benefit
strike bill
strike blind
strike block

strike board
strike camp
strike dead
strike down
strike dumb
strike enforcer
strike fault
strike figure
strike fire
strike hands
strike hard
strike home
strike in
strike in with
strike insurance
strike it lucky
strike it rich
strike joint
strike knife
strike me dead
strike measure
strike mute
strike note
strike off
strike off the roll
strike off the rolls
strike oil
strike out
strike out at
strike out for
strike out for yourself
strike pan
strike pay
strike plane
strike plate
strike radar scanner
strike root
strike root in
strike shift
strike slip
strike tent
strike terror into
strike the death knell of
strike the eye
strike the first blow
strike the flag
strike the mind
strike through

strike
up
strike up a friendship
strike up a tune
strike up the band
strike upon
strike valley
strike while the iron is hot
strike with awe
strike with wonder
strike you
strike you as
strike you right
strike your colors
strike your fancy
strike your flag
strike zone
strike-a-light
strike-anywhere match
strike-out
striker boat
striker of poses
striker plate
striker-out
striker-up
striking alteration
striking angle
striking bag
striking base
striking board
striking circle
striking distance
striking hammer
striking out
striking pin
striking plate
striking reed
striking resemblance
striking solution
striking stile
striking success
striking train
striking-out machine
strikingly like
string along
string along with
string alphabet
string band

string bass
string bead
string bean
string block
string choir
string correspondent
string course
string development
string diapason
string figure
string galvanometer
string instrument
string insulator
string lead
string leaf
string line
string musician
string
 orchestra
string organ
string out
string pea
string plate
string player
string pottery
string proof
string pump
string quartet
string section
string stop
string telephone
string tie
string together
string tone
string trio
string up
string-binding
string-colored
string-soled
string-tailed
string-toned
stringed instrument
stringer bar
stringer lode
stringer plate
stringer strake
stringing course
stringing out

stringy kelp
stringy sap
stringy-bark
stringybark pine
strinking-out
strip artist
strip away
strip bare
strip cartoon
strip clean
strip club
strip count
strip cropping
strip down
strip farm
strip farming
strip for action
strip lighting
strip line
strip map
strip method
strip mill
strip mine
strip mining
strip of office
strip of rank
strip off
strip out
strip pit
strip planting
strip poker
strip printing
strip survey
strip tease
strip template
strip to the buff
strip you of your illusions
strip-crop
strip-cropping
strip-teaser
stripe blight
stripe canker
stripe rust
stripe smut
striped
 bass
striped grass
striped hyena

striped maple
striped marlin
striped snake
striped spermophile
striped squirrel
striped-leaved
stripped atom
stripped bare
stripped down
stripped of
stripped of illusion
stripped to the buff
stripper-harvester
stripping bare
stripping down
stripping liquor
stripping of rank
strive about
strive against
strive for
strive to
strive with
strobe light
strobe lighting
stroboscopic light
stroboscopic photography
stroke culture
stroke hole
stroke oar
stroke oarsman
stroke of death
stroke of lightning
stroke of luck
stroke of policy
stroke of the hour
stroke of the pen
stroke of wit
stroke of work
stroke play
stroke stitch
stroker-in
strolling gait
strolling minstrel
strolling player
strong accumulation point
strong argument
strong arm
strong as a horse

strong as a lion
strong as an ox
strong as brandy
strong as flesh and blood
strong as strong
strong belief
strong bid
strong breeze
strong derived set
strong drink
strong flair
strong gale
strong hand
strong
in
strong interaction
strong language
strong man
strong market
strong meat
strong nerves
strong point
strong pull
strong relief
strong right hand
strong room
strong suit
strong water
strong waters
strong wind
strong-ankled
strong-arm
strong-arm man
strong-arm tactics
strong-armed
strong-armer
strong-backed
strong-bodied
strong-boned
strong-box
strong-breathed
strong-decked
strong-elbowed
strong-featured
strong-fibered
strong-fisted
strong-flavored
strong-handed

strong-headed
strong-jawed
strong-jointed
strong-limbed
strong-looking
strong-lunged
strong-man
strong-minded
strong-mindedly
strong-mindedness
strong-nerved
strong-pointed
strong-quartered
strong-ribbed
strong-scented
strong-seated
strong-set
strong-sided
strong-smelling
strong-stapled
strong-stomached
strong-tasted
strong-tasting
strong-tempered
strong-tested
strong-trunked
strong-voiced
strong-weak
strong-willed
strong-winged
strong-wristed
strongbox security
strontia digger
strontia process
strontian white
strontian yellow
strontium
90
strontium hydroxide
strontium monoxide
strontium nitrate
strontium oxide
strontium process
strontium salicylate
strontium unit
strontium white
strontium yellow
struck all of a heap

struck jury
struck measure
struck up
struck with
struck with surprise
structural botany
structural drag
structural engineer
structural engineering
structural fatigue
structural formula
structural gene
structural geology
structural grammar
structural iron
structural linguistics
structural meaning
structural mill
structural outline
structural polysaccharide
structural psychology
structural shop
structural steel
structural-steel
structure contours
struggle against
struggle for
struggle for existence
struggle up
struggle with
strung out
strung up
strut beam
strut your stuff
strutting piece
stub axle
stub feather
stub file
stub hoe
stub iron
stub mortise
stub nail
stub pen
stub short
stub shot
stub switch
stub tenon
stub tooth

stub track
stub twist
stub your toe
stub your toe upon
stub-bearded
stub-end
stub-end
 feeder
stub-pointed
stub-thatched
stub-toed
stub-wing stabilizer
stubble crop
stubble field
stubble goose
stubble mulch
stubble plow
stubble pulverizer
stubble quail
stubble rake
stubble shaver
stubble spurge
stubble-fed
stubble-loving
stubble-mulch farming
stubborn as a mule
stubborn fact
stubborn-chaste
stubborn-hard
stubborn-minded
stubborn-shafted
stubborn-stout
stubby-fingered
stucco pointer
stucco-adorned
stucco-fronted
stucco-molded
stucco-walled
stuck fast
stuck on
stuck on yourself
stuck-up
stuck-upness
stuck-upper
stuck-uppish
stuck-uppishness
stuck-uppy
stud block

stud bolt
stud book
stud box
stud chain
stud driver
stud fee
stud link
stud mating
stud poker
stud print
stud rivet
stud scab
stud screw
stud wall
stud wheel
stud-horse
stud-mare
stud-pink
stud-sail
studded tire
studding bolt
studding sail
studding-sail
studding-sail halyard bend
student adviser
student assistant
student council
student glider
student government
student hour
student lamp
student nurse
student
 pastor
student teacher
student teaching
student union
student volunteer
studhorse poker
studio apartment
studio couch
studio plant
study for
study group
study hall
study in still life
study to
study to be

study up
study up on
study with
study your part
study-bearing
study-bred
study-given
study-loving
study-racked
study-worn
stuff and nonsense
stuff chest
stuff engine
stuff gown
stuff hat
stuff in
stuff the mind
stuff the mind with
stuff up
stuff with knowledge
stuff yourself
stuff-chest
stuff-gownsman
stuff-over
stuffed cabbage
stuffed derma
stuffed eggs
stuffed grape leaves
stuffed peppers
stuffed shirt
stuffed to the gills
stuffed tomatoes
stuffed up
stuffed-over
stuffing and stripping
stuffing box
stuffing nut
stuffing-box recess
stuffy weather
stultify yourself
stumble on
stumble upon
stumbling block
stumbling stone
stumbling-block
stump bed
stump burning
stump da

stump excursion
stump extractor
stump foot
stump it
stump joint
stump jumper
stump mast
stump mortise
stump orator
stump
 puller
stump ranch
stump rot
stump speaker
stump speaking
stump speech
stump spud
stump sucker
stump tail
stump tenon
stump the country
stump topmast
stump tracery
stump tree
stump up
stump wood
stump work
stump-fingered
stump-footed
stump-jump
stump-jump plow
stump-jumping plow
stump-legged
stump-nosed
stump-rooted
stump-tail
stump-tailed
stump-tailed lizard
stumping tour
stunner hitch
stunt flier
stunt flying
stunt girl
stunt man
stunt woman
stupefied with boredom
stupefyingly boring
stupid ass

stupid grin
stupid thing
stupid work
stupid-acting
stupid-headed
stupid-honest
stupid-looking
stupid-sure
stuporous melancholia
stuporous with boredom
sturdy as an ox
sturdy-chested
sturdy-legged
sturdy-limbed
sturm und drang
styl-
style branch
style galant
style of writing
style pen
style sheet
style the hair
style-conscious
style-consciousness
styles of
stylistic analysis
stylo-
stylograph pen
stylographic pen
styloid process
styour throw
styptic pencil
styralyl acetate
styrene resin
suan
 pan
suarrow nut
suave-looking
suave-mannered
suave-spoken
sub arid
sub for
sub judice
sub post office
sub rosa
sub specie aeternitatis
sub verbo
sub voce

sub-
sub-Andean
sub-Atlantic
sub-Carpathian
sub-Christian
sub-Himalayan
sub-Pontine
sub-Pyrenean
sub-agent
sub-arch
sub-assembly
sub-base
sub-constable
sub-district
sub-edit
sub-editor
sub-head
sub-human
sub-jugate
sub-lease
sub-let
sub-level
sub-lieutenant
sub-machine-gun
sub-man
sub-officer
sub-prefect
sub-rosa
sub-title
sub-treasurer
sub-treasury
sub-war
sub-zero
subacute rheumatism
subaerial deposit
subaltern genus
subarctic current
subassembly plant
subatomic particle
subatomic particles
subclavian artery
subclavian groove
subclavian vein
subclinical infection
subcloud car
subconscious drive
subconscious knowledge
subconscious mind

subconscious perception
subconscious self
subconscious urge
suberic acid
subero-
subhymenial layer
subject case
subject catalog
subject catalogue
subject for thought
subject index
subject matter
subject
 of thought
subject substantive
subject term
subject to
subject to a duty
subject to a fee
subject to a tax
subject to call
subject to close scrutiny
subject to death
subject yourself
subject-matter
subject-object
subject-objectivity
subject-raising
subjective certainty
subjective complement
subjective idealism
subjective idealist
subjective inspection
subjective speculation
subjective spirit
subjectivo-
subjectivo-objective
subjunct adjective
subjunct word
sublimation pressure
sublimation vein
sublime tobacco
subliminal advertising
subliminal perception
subliminal self
sublimity summit
submachine gun
submarine badge

submarine chaser
submarine killer
submarine mine
submarine patrol boat
submarine sandwich
submarine sentry
submarine telegraphy
submarine tender
submarine torpedo
submarine warfare
submaxillary gland
submerged coast
submerged in
submerged mind
submerged-tube boiler
subminiature camera
submit to
submit to indignity
submit with a good grace
suboctave coupler
subordinate
clause
subordinate conjunction
subordinate ordinary
subordinate role
subordinate to
subordinate yourself
subordinating conjunction
subornation of perjury
subpoena ad testificandum
subpoena duces tecum
subscribe to
subscriber trunk dialling
subscription book
subscription concert
subscription edition
subscription library
subscription list
subscription television
subsequent to
subsidiary coin
subsidiary company
subsidiary sense
subsidy citizen
subsidy man
subsist in
subsistence agriculture
subsistence allowance

subsistence department
subsistence farming
subsistence level
subsistence money
subsistence stores
subsistent form
subsoil plough
subsoil plow
subsonic flight
subsonic jet
subsonic speed
subspace topology
substance of life
substandard language
substandard speech
substandard usage
substantial meal
substantiality theory
substantially true
substantive basis
substantive law
substantive point
substantive rank
substantive right
substitute for
substitution cipher
substitution deposit
substitution
 group
substitution tables
substitution therapy
substitution vein
subsurface tillage
subtarget machine
subtense bar
subter-
subterranean river
subtle body
subtle color
subtle distinction
subtle influence
subtle odor
subtle wit
subtle-brained
subtle-cadenced
subtle-fingered
subtle-headed
subtle-looking

subtle-meshed
subtle-minded
subtle-nosed
subtle-paced
subtle-scented
subtle-shadowed
subtle-souled
subtle-thoughted
subtle-tongued
subtle-witted
subtraction logarithm
subtraction mark
subtraction sign
subtractive color
subtractive primary
subtractive process
subtropical anticyclone
subtropical high
suburban market
subvalent electrons
subzero weather
succade gourd
succeed in
succeed to
succeed to the throne
succeed with
succes d'estime
succes de scandale
success fou
success story
successful advocate
successful defender
successful person
succession duty
succession of ideas
succession of thought
succession of time
succession state
succin-
succinic acid
succino-
succory blue
succumb
to
such and such
such as
such being the case
such stuff as dreams are made on

such stuff asdreams are made on
such-and-such
such-like
suck dry
suck fly
suck in
suck into
suck off
suck out
suck the blood from
suck the blood of
suck up
suck up to
suck your blood
suck your breath
suck your wind
suck-
suck-bottle
suck-egg
suck-in
sucked dry
sucked into
sucker bait
sucker foot
sucker for
sucker list
sucker rod
sucket fork
sucking louse
sucking pig
sucking-fish
sucking-pig
sucking-pump
suckling pig
sucro-
suction anemometer
suction chamber
suction cleaner
suction cup
suction dredge
suction flask
suction hose
suction machine
suction pipe
suction primer
suction producer
suction pump
suction root

suction stop
suction stroke
suction sweeper
suction valve
sudan grass
sudden and quick in quarrel
sudden attack
sudden change
sudden death
sudden development
sudden impulse
sudden infant death syndrome
sudden or radical change
sudden pull
sudden thought
sudden turn
sudden-beaming
sudden-starting
sudden-whelming
sue
 at law
sue for
sue for divorce
sue out
sue to
suede cloth
suede gloves
suet pudding
suet refiner
suffer a misfortune
suffer an eclipse
suffer anguish
suffer for
suffer hanging
suffer hearing impairment
suffer hearing loss
suffer loss
suffer pain
suffer pangs of jealousy
suffer the consequences
suffer the penalty
sufferance wharf
suffering angst
suffering dread
suffering from amnesia
suffering nausea
suffice to yourself
sufficient condition

sufficient for
sufficient to
sufficient unto
suffused with light
sugar almond
sugar ant
sugar apple
sugar ash
sugar bag
sugar baker
sugar bakery
sugar basin
sugar bean
sugar beet
sugar bird
sugar bowl
sugar brake
sugar bush
sugar cake
sugar camp
sugar candy
sugar cane
sugar cookie
sugar corn
sugar daddy
sugar diabetes
sugar engineering
sugar fish
sugar glider
sugar grape
sugar grass
sugar grove
sugar gum
sugar jack
sugar jack process
sugar loaf
sugar maker
sugar making
sugar maple
sugar mill
sugar mite
sugar mule
sugar nippers
sugar
of lead
sugar of milk
sugar off
sugar orchard

sugar over
sugar palm
sugar pea
sugar pear
sugar pine
sugar planter
sugar planting
sugar pumpkin
sugar puncture
sugar refiner
sugar refinery
sugar refining
sugar shell
sugar sifter
sugar sorghum
sugar spoon
sugar squirrel
sugar tongs
sugar tree
sugar vinegar
sugar wrack
sugar-baker
sugar-beet webworm
sugar-bird
sugar-boiling
sugar-bush
sugar-candy
sugar-cane
sugar-cane beetle
sugar-cane borer
sugar-cane gummosis
sugar-cane mosaic
sugar-cane root disease
sugar-cane smut
sugar-chopped
sugar-chopper
sugar-coat
sugar-coated
sugar-coating
sugar-colored
sugar-cured
sugar-destroying
sugar-growing
sugar-laden
sugar-lipped
sugar-loaded
sugar-loaf
sugar-loafed

sugar-loving
sugar-making
sugar-maple
sugar-maple borer
sugar-mouthed
sugar-plum
sugar-producing
sugar-sop
sugar-sweet
sugar-teat
sugar-tit
sugar-topped
sugar-water
sugar-yielding
sugared almond
sugarhouse molasses
sugaring off
suggest itself
suggest the earmarks of
suggestio falsi
suggestion
therapy
suggestive of
sui generis
sui juris
suicidal despair
suicide clause
suicide club
suicide pact
suicide pilot
suicide plane
suicide squeeze
suicide squeeze play
suit and service
suit at law
suit case
suit court
suit down to the ground
suit in law
suit of armor
suit of clothes
suit service
suit the action to the word
suit the occasion
suit the season
suit the time
suit yourself
suit-dress

suitable for
suitable occasion
suitable time
suite of dances
suite of rooms
sujee-mujee
suji-muji
sulcato-
sulf-
sulfa drug
sulfa drugs
sulfanilic acid
sulfanilyl radical
sulfate paper
sulfate process
sulfate pulp
sulfide dye
sulfinyl group
sulfinyl radical
sulfite paper
sulfite process
sulfite pulp
sulfo group
sulfo radical
sulfon-
sulfonic acid
sulfonyl chloride
sulfur black
sulfur butterfly
sulfur dioxide
sulfur dye
sulfur trioxide
sulfur-bottom
sulfur-bottom whale
sulfur-colored
sulfur-flower
sulfur-yellow
sulfurated potash
sulfureted hydrogen
sulfuric acid
sulfuric anhydride
sulfuric ether
sulfurous
 acid
sulfurted potash
sulfuryl chloride
sulfuryl group
sulfuryl radical

sulky lister
sulky plow
sulky-shaped
sulla clover
sullage head
sullen looks
sullen rabies
sullen-browed
sullen-eyed
sullen-looking
sullen-natured
sullen-seeming
sullen-sour
sullen-visaged
sullen-wise
sulph-
sulpha drug
sulphanilic acid
sulphate green
sulphate paper
sulphate process
sulphate pulp
sulphate ultramarine
sulphato-
sulphide color
sulphide dye
sulphide toning
sulphindigotic acid
sulphine color
sulphine yellow
sulphite brown
sulphite pulp
sulpho salt
sulpho-
sulpho-acid
sulpho-salt
sulphocarbon oil
sulphon cyanine
sulphon cyanine black
sulphonic acid
sulphonium compound
sulphur acid
sulphur alcohol
sulphur bacteria
sulphur black
sulphur butterfly
sulphur candle
sulphur chloride

sulphur color
sulphur dioxide
sulphur dye
sulphur ether
sulphur family
sulphur granule
sulphur lime
sulphur match
sulphur monochloride
sulphur oil
sulphur olive oil
sulphur ore
sulphur paste
sulphur plant
sulphur rain
sulphur
rose
sulphur shower
sulphur subchloride
sulphur toning
sulphur trioxide
sulphur vivum
sulphur water
sulphur whale
sulphur yellow
sulphur-bearing
sulphur-bellied
sulphur-bottom
sulphur-bottom whale
sulphur-breasted
sulphur-colored
sulphur-containing
sulphur-crested
sulphur-flower
sulphur-hued
sulphur-impregnated
sulphur-scented
sulphur-smoking
sulphur-tinted
sulphur-tipped
sulphureo-
sulphureo-aerial
sulphuretted hydrogen
sulphuric acid
sulphurous acid
sultan flower
sultan red
sultana bird

sultana roll
sultry weather
sum and substance
sum of money
sum of things
sum to
sum total
sum und substance
sum up
sum up your case
sum-total
sum-up
sumac family
sumac wax
summa cum laude
summary court-martial
summary judgment
summary justice
summary negative
summary offence
summary proceeding
summation curve
summation method
summation tone
summer aster
summer barley
summer camp
summer cholera
summer complaint
summer coot
summer crookneck
summer cypress
summer day
summer dew grass
summer diarrhea
summer
disease
summer duck
summer egg
summer ermine
summer fallow
summer finch
summer flounder
summer forest
summer grape
summer hail
summer haw
summer heat

summer heliotrope
summer herring
summer house
summer hyacinth
summer kitchen
summer lightning
summer lilac
summer oil
summer parlor
summer pudding
summer queening
summer rape
summer rash
summer redbird
summer resort
summer sausage
summer savory
summer school
summer sheldrake
summer snipe
summer snowflake
summer soldier
summer solstice
summer sore
summer spore
summer squash
summer stock
summer stone
summer suit
summer sweet
summer tanager
summer teal
summer theater
summer time
summer tree
summer truffle
summer wagtail
summer warbler
summer wheat
summer yellowbird
summer yellowlegs
summer's day
summer-bird
summer-blanched
summer-breathing
summer-brewed
summer-bright
summer-cloud

summer-dried
summer-fallow
summer-fed
summer-felled
summer-flowering
summer-grazed
summer-house
summer-leaping
summer-like
summer-lived
summer-loving
summer-made
summer-ripening
summer-seeming
summer-shrunk
summer-staying
summer-stir
summer-stricken
summer-sweet
summer-swelling
summer-threshed
summer-tide
summer-tilled
summer-time
summer-up
summer-weight
summing
register
summing up
summing-up
summit canal
summit conference
summit level
summit yard
summit-level canal
summon forth
summon spirits
summon up
summon up courage
summons case
summons of death
summons-proof
summum bonum
summum genus
summum jus
sump cut
sump fuse
sump pit

sump pump
sump shot
sump winze
sumping cut
sumping shot
sumpter horse
sumpter mule
sumptuary law
sumptuary laws
sumptuary ordinances
sums total
sun animalcule
sun arc
sun bark
sun bath
sun bather
sun bear
sun bittern
sun blind
sun blindness
sun burner
sun clock
sun compass
sun crack
sun cult
sun cure
sun dance
sun date
sun deck
sun disc
sun disk
sun dog
sun fern
sun fever
sun flag
sun fruit
sun gall
sun gear
sun gem
sun god
sun gods
sun grass
sun grebe
sun hat
sun helmet
sun hemp
sun in glory
sun in splendor

sun lamp
sun
letter
sun letters
sun lounge
sun moss
sun pan
sun parlor
sun perch
sun picture
sun pillar
sun plane
sun plant
sun porch
sun power
sun print
sun printing
sun rose
sun shower
sun side
sun snake
sun spark
sun spider
sun spot
sun spurge
sun star
sun suit
sun tan
sun temperature
sun time
sun trap
sun tree
sun trout
sun valve
sun view
sun visor
sun watch
sun wheel
sun worship
sun worshiper
sun worshiping
sun yourself
sun-affronting
sun-arrayed
sun-awakened
sun-baked
sun-bathe
sun-bathed

sun-beat
sun-beaten
sun-begotten
sun-blackened
sun-blanched
sun-blind
sun-blistered
sun-blown
sun-born
sun-bred
sun-bright
sun-bringing
sun-broad
sun-bronzed
sun-brown
sun-browned
sun-clear
sun-confronting
sun-courting
sun-cracked
sun-crowned
sun-cure
sun-cured
sun-dazzling
sun-delighting
sun-descended
sun-dial
sun-drawn
sun-dried
sun-dry
sun-eclipsing
sun-excluding
sun-expelling
sun-exposed
sun-eyed
sun-faced
sun-feathered
sun-filled
sun-fish
sun-flagged
sun-flaring
sun-flooded
sun-fringed
sun-gazed
sun-gazing
sun-gilt
sun-god
sun-graced

sun-graze
sun-grazer
sun-grebe
sun-grown
sun-heated
sun-illumined
sun-kissed
sun-loved
sun-loving
sun-made
sun-marked
sun-melted
sun-nursed
sun-outshining
sun-pain
sun-painted
sun-paled
sun-praising
sun-printed
sun-projected
sun-ray
sun-red
sun-resembling
sun-scorched
sun-scorching
sun-shading
sun-shot
sun-shunning
sun-sodden
sun-specs
sun-spot
sun-staining
sun-steeped
sun-struck
sun-swart
sun-swept
sun-tanned
sun-tight
sun-up
sun-warm
sun-warmed
sun-withered
sunburst
plaiting
sunburst pleats
sunday punch
sunday school
sunday-go-to-meeting

sunday-school
sunder tree
sundew family
sundra tree
sundry shop
sundry-colored
sundry-patterned
sundry-shaped
sunflower chest
sunflower oil
sunflower oil cake
sunflower tree
sunflower yellow
sung mass
sunk fence
sunk garden
sunk in iniquity
sunk in oblivion
sunk key
sunk relief
sunken garden
sunken part
sunken place
sunlight burner
sunn hemp
sunny side
sunny weather
sunny-clear
sunny-colored
sunny-faced
sunny-haired
sunny-looking
sunny-natured
sunny-red
sunny-side
up
sunny-spirited
sunny-sweet
sunny-warm
sunray pleats
sunrise service
sunrise wall
sunrise watch
sunset brown
sunset clam
sunset glow
sunset gun
sunset of your days

sunset shell
sunset wall
sunset-blue
sunset-flushed
sunset-lighted
sunset-purpled
sunset-red
sunset-ripened
sunshine roof
sunshine-showery
sunshiny weather
sunspot cycle
sunspot numbers
sunspot period
sunspot zone
sunt tree
suo jure
suo loco
sup off
sup up
super cool
super royal
super royal octavo
super royal quarto
super-
super-acid
super-cooling
super-decompound
super-duper
super-pumper
super-royal
super-smooth
super-tanker
supercharged engine
supercilious superior
supercompression engine
superdense theory
superficial extension
superficial soundness
superficially sound
supergiant star
superheated air
superheterodyne circuit
superheterodyne receiver
superhigh frequency
superintendent engineer
superintendent general
superior conjunction

superior court
superior courts of
Westminster
superior general
superior goods
superior planet
superior-general
superiority complex
superiors general
superiors-general
supernatural being
supernatural virtue
supernatural virtues
supernatural, the
supero-
supero-occipital
superposition principle
supersonic aerodynamics
supersonic combat plane
supersonic flight
supersonic flow detection
supersonic jet
supersonic research plane
supersonic rocket
supersonic speed
supersonic transport
supersonic wings
superstition-proof
superstructure deck
supervisory control
supper club
supple-jack
supple-kneed
supple-limbed
supple-minded
supple-mouth
supple-sinewed
supple-sliding
supple-visaged
supple-working
supple-wristed
supplemental plumage
supplementary angle
supplementary angles
supplementary benefit
supplementary reserves
supplementary story
supply base

supply bond
supply clergy
supply depot
supply minister
supply of short-term funds
supply on hand
supply preacher
supply price
supply services
supply ship
supply support
supplying electricity
support
for
support life
support line
support mission
support politically
support proper
support trench
support yourself
supporting actor
supporting cast
supporting character
supporting distance
supporting evidence
supporting instrumentalist
supporting player
supporting role
supporting treatment
supportive relationship
supportive therapy
supposing that
suppressed desire
suppressio veri
suppressor grid
suppurative arthritis
suppurative inflammation
supra-
supra-abdominal
supra-acromial
supra-aerial
supra-anal
supra-angular
supra-arytenoid
supra-auditory
supra-auricular
supra-axillary

supra-esophagal
supra-esophageal
supra-ethmoid
supra-intestinal
supracardinal vein
supralinear punctuation
supranational government
suprapartisan leadership
suprarational automatism
suprarational automatist
suprarenal gland
suprasegmental phoneme
suprasternal notch
supratrochlear nerve
supreme being
supreme commander
supreme court
supreme principle
supreme principle of pure reason
supreme sacrifice
supreme
 sauce
supreme soul
sur le tapis
sur-
sur-royal
suranal plate
surbased arch
surdo-mute
sure as can be
sure as death
sure as death and taxes
sure as fate
sure as hell
sure as shooting
sure as the devil
sure bet
sure card
sure crop
sure enough
sure loser
sure of yourself
sure sign
sure success
sure thing
sure winner
sure-aimed
sure-enough

sure-fire
sure-footed
sure-footedly
sure-footedness
sure-founded
sure-grounded
sure-nosed
sure-presaging
sure-refuged
sure-seeing
sure-set
sure-settled
sure-slow
sure-steeled
surest thing you know
surety bond
surf bum
surf caster
surf casting
surf clam
surf coot
surf duck
surf fish
surf line
surf plant
surf scoter
surf shiner
surf smelt
surf snipe
surf whiting
surf-battered
surf-beaten
surf-bound
surf-riding
surf-showered
surf-sunk
surf-swept
surf-tormented
surf-vexed
surf-washed
surf-wasted
surf-white
surf-worn
surface analyzer
surface anatomy
surface appearance
surface board
surface boundary layer

surface carburetor
surface card
surface color
surface
condenser
surface cooler
surface density
surface energy
surface extension
surface fire
surface friction
surface friction drag
surface gauge
surface gravity
surface integral
surface layer
surface mail
surface measure
surface microscope
surface noise
surface of light and shade
surface of revolution
surface paper
surface plate
surface printing
surface quality
surface radar
surface railway
surface resistance
surface resistivity
surface rib
surface show
surface strain
surface structure
surface switch
surface tension
surface texture
surface wave
surface yeast
surface-active
surface-active agent
surface-bent
surface-bound electron
surface-coated
surface-damaged
surface-deposited
surface-dressed
surface-dry

surface-dwelling
surface-feeding
surface-hold
surface-printing
surface-scratched
surface-scratching
surface-to-air
surface-to-surface
surface-to-underwater
surfacing machine
surfeit water
surfeit-gorged
surfeit-slain
surfeit-swelled
surfeit-swollen
surfeit-taking
surge back
surge chamber
surge
 gap
surge of emotion
surge of sound
surge tank
surgeon apothecary
surgeon bird
surgeon commander
surgeon dentist
surgeon general
surgeon major
surgeon's knot
surgeon's saw
surgeons general
surgical anatomy
surgical boot
surgical dentistry
surgical diathermy
surgical hospital
surgical instrument
surgical intervention
surgical knife
surgical measure
surgical needle
surgical nurse
surgical operation
surgical shock
surgical spirit
surgical technique
surgical treatment

surmounted arch
surplice fee
surplus state
surplus value
surplus- age
surprise attack
surprise ending
surprise package
surprise party
surrealist tachism
surrealist tachist
surrender charge
surrender one's colors
surrender value
surrender your life
surround verge
sursum corda
surveillance radar
survey course
surveying sextant
surveyor general
surveyor's arrow
surveyor's chain
surveyor's compass
surveyor's dial
surveyor's level
surveyor's measure
survival of the fittest
survival rate
survival value
survive or perish
survivorship
 annuity
sus per coll
susceptible to
susceptive to
suspend judgment
suspend operations
suspended animation
suspended cadence
suspended sentence
suspender belt
suspense account
suspense drama
suspense ledger
suspense story
suspension bridge
suspension colloid

suspension insulator
suspension of civil rights
suspension of disbelief
suspension of hostilities
suspension periods
suspension point
suspension points
suspensive veto
suspensory ligament
suspensory veto
suspicion-proof
sussex spaniel
sustain a part
sustain someone's side
sustained action
sustained activity
sustained note
sustaining pedal
sustaining program
sustentation fund
suture needle
suum cuique
suwarrow nut
svarabhakti vowel
swab stick
swaddling bands
swaddling clothes
swaddling-band
swaddling-clothes
swaddling-clouts
swag belly
swag-bellied
swage block
swage bolt
swage-set
swagger coat
swagger stick
swagger-
swago bass
swallow an insult
swallow anything
swallow dive
swallow fish
swallow flycatcher
swallow hawk
swallow
 hole
swallow hook

swallow it
swallow plover
swallow roller
swallow shrike
swallow stone
swallow the bitter pill
swallow the pill
swallow thorn
swallow up
swallow warbler
swallow whole
swallow your dust
swallow your pride
swallow your words
swallow-fork
swallow-hole
swallow-tail
swallow-tailed
swallow-tailed coat
swallow-tailed kite
swallow-wing
swami house
swamp andromeda
swamp angel
swamp apple
swamp ash
swamp azalea
swamp bay
swamp beggar-tick
swamp birch
swamp black gum
swamp blackberry
swamp blackbird
swamp blueberry
swamp boat
swamp brake
swamp broom
swamp buggy
swamp buttercup
swamp buttonwood
swamp cabbage
swamp cedar
swamp chess
swamp chestnut oak
swamp cottonwood
swamp crake
swamp cypress
swamp deer

swamp dewberry
swamp dock
swamp dogwood
swamp elm
swamp evergreen
swamp fern
swamp fever
swamp globeflower
swamp gooseberry
swamp grape
swamp gum
swamp hare
swamp harrier
swamp hawk
swamp hellebore
swamp hen
swamp hickory
swamp holly
swamp honeysuckle
swamp hook
swamp hornbeam
swamp
itch
swamp laurel
swamp lily
swamp locust
swamp loosestrife
swamp lover
swamp magnolia
swamp mahogany
swamp mallow
swamp maple
swamp milkweed
swamp moss
swamp oak
swamp ore
swamp owl
swamp partridge
swamp pheasant
swamp pine
swamp pink
swamp poplar
swamp post oak
swamp potato
swamp privet
swamp quail
swamp rabbit
swamp red bay

swamp robin
swamp rose
swamp rose mallow
swamp sassafras
swamp saxifrage
swamp silkweed
swamp sparrow
swamp spleenwort
swamp spruce
swamp squawweed
swamp sumac
swamp sunflower
swamp tea
swamp thistle
swamp tickseed
swamp tupelo
swamp turnip
swamp warbler
swamp white cedar
swamp white oak
swamp willow
swamp willow herb
swamp wire grass
swamp-dwelling
swamp-growing
swamp-loving
swamp-oak
swamping resistance
swan animalcule
swan boat
swan dive
swan goose
swan knight
swan maiden
swan mussel
swan neck
swan neck pediment
swan orchid
swan pan
swan potato
swan shift
swan shot
swan song
swan's down
swan's neck
swan's neck pediment
swan's-down
swan-bosomed

swan-clad
swan-drawn
swan-eating
swan-fashion
swan-hopper
swan-hopping
swan-like
swan-mark
swan-neck
swan-pan
swan-plumed
swan-poor
swan-proud
swan-sweet
swan-tuned
swan-upper
swan-upping
swan-white
swan-winged
swanking
 stick
swanskin calico
swap hook
swap horses
swap places with
sward-cut
sward-cutter
swarm cell
swarm over
swarm spore
swarm up
swarm with
swart star
swartkranz ape-man
swash bulkhead
swash channel
swash letter
swash plate
swathing band
swathing clothes
sway bar
sway boat
sway brace
sway bracing
sway pole
sway-
sway-back
sway-backed

swear and affirm
swear at
swear by
swear by bell
swear falsely
swear in
swear like a sailor
swear like a trooper
swear off
swear on the Bible
swear out
swear the truth
swear to
swear to God
swear to a belief
swear to goodness
swear-word
swearer-in
swearing off
sweat and slave
sweat and stew
sweat bath
sweat bee
sweat blood
sweat gland
sweat it
sweat it out
sweat leather
sweat like a horse
sweat like a trooper
sweat lodge
sweat of your brow
sweat off
sweat
out
sweat over
sweat pad
sweat pants
sweat room
sweat shirt
sweat shop
sweat socks
sweat stock
sweat suit
sweat-house
sweater girl
sweater shop
sweating iron

sweating sickness
sweating stock
sweating system
sweating-sickness
swede turnip
swedish massage
swedish movements
swedish turnip
swee-swee
swee-sweet
sweep along
sweep aside all obstacles
sweep away
sweep check
sweep generator
sweep hand
sweep head
sweep mill
sweep net
sweep of time
sweep off your feet
sweep out
sweep plate
sweep point
sweep rake
sweep seine
sweep seining
sweep smelter
sweep the strings
sweep ticket
sweep under the rug
sweep up
sweep you off your feet
sweep-chimney
sweep-oar
sweep-second
sweeping change
sweeping net
sweeping process
sweeping score
sweeping statement
sweet William
sweet almond
sweet almond oil
sweet alyssum
sweet and pungent
sweet and sour
sweet as a nut

sweet as a rose
sweet as honey
sweet as sugar
sweet basil
sweet bay
sweet birch oil
sweet calamus
sweet cassava
sweet cherry
sweet chestnut
sweet
chocolate
sweet cicely
sweet cider
sweet clover
sweet coltsfoot
sweet corn
sweet crab apple
sweet false camomile
sweet father of soft rest
sweet fern
sweet flag
sweet gale
sweet grass
sweet gum
sweet marjoram
sweet marten
sweet mock orange
sweet nature
sweet nothings
sweet oil
sweet oleander
sweet on
sweet orange
sweet patootie
sweet pea
sweet pepper
sweet pepper bush
sweet pepperbush
sweet pitahaya
sweet potato
sweet reason
sweet reasonableness
sweet reed
sweet reed grass
sweet revenge
sweet savor
sweet scabious

sweet shop
sweet singer
sweet sixteen
sweet sleep
sweet smell
sweet sorghum
sweet spire
sweet spirit of nitre
sweet stand
sweet stuff
sweet sucker
sweet sultan
sweet talk
sweet talker
sweet temper
sweet tongue
sweet tooth
sweet upon
sweet vernal grass
sweet viburnum
sweet water
sweet william
sweet william catchfly
sweet wine
sweet woodruff
sweet words
sweet wormwood
sweet-almond
sweet-almond oil
sweet-and-sour
sweet-and-sour sauce
sweet-beamed
sweet-bitter
sweet-bleeding
sweet-blooded
sweet-breath
sweet-breathed
sweet-breathing
sweet-brier
sweet-bright
sweet-charming
sweet-chaste
sweet-complaining
sweet-conditioned
sweet-corn
wilt
sweet-curd
sweet-dispositioned

sweet-eyed
sweet-faced
sweet-featured
sweet-field
sweet-flavored
sweet-flowered
sweet-flowering
sweet-flowing
sweet-gale
sweet-leafed
sweet-lipped
sweet-looking
sweet-minded
sweet-murmuring
sweet-natured
sweet-numbered
sweet-orange oil
sweet-pea streak
sweet-pickle
sweet-piercing
sweet-potato beetle
sweet-potato borer
sweet-potato scurf
sweet-potato sphinx
sweet-potato weevil
sweet-potato worm
sweet-recording
sweet-roasted
sweet-sacred
sweet-sad
sweet-savored
sweet-scented
sweet-seasoned
sweet-set
sweet-shaped
sweet-singing
sweet-smelled
sweet-smelling
sweet-smiling
sweet-sop
sweet-souled
sweet-sounded
sweet-sounding
sweet-sour
sweet-spoken
sweet-spun
sweet-suggesting
sweet-sweet

sweet-talk
sweet-talking
sweet-tasted
sweet-tasting
sweet-tempered
sweet-temperedly
sweet-temperedness
sweet-throat
sweet-throated
sweet-toned
sweet-tongued
sweet-toothed
sweet-touched
sweet-tulk
sweet-tuned
sweet-voiced
sweet-warbling
sweet-whispered
sweet-william
sweet-wort
sweeten
the kitty
sweetheart agreement
sweetheart contract
sweetheart neckline
sweetie pie
sweetleaf family
sweetness and light
sweetness of life
sweetness und light
sweets candy
sweetwood bark
swell box
swell dash
swell front
swell head
swell it
swell mob
swell organ
swell out
swell pedal
swell piece
swell shark
swell the ranks of
swell with emotion
swell-
swell-butted
swell-front

swell-headed
swell-headedness
swell-mobsman
swelled head
swelled-gelatin
swelled-gelatin process
swelled-headed
swelled-headedness
swelling utterance
sweltering heat
swept deck
swept up
swept-back
swept-forward
swift as an arrow
swift boat
swift fox
swift moth
swift rate
swift shrike
swift-advancing
swift-brought
swift-burning
swift-changing
swift-concerted
swift-declining
swift-effected
swift-fated
swift-finned
swift-flowing
swift-flying
swift-foot
swift-footed
swift-frightful
swift-glancing
swift-gliding
swift-handed
swift-heeled
swift-hoofed
swift-judging
swift-lamented
swift-marching
swift-paced
swift-posting
swift-recurring
swift-revenging
swift-running
swift-rushing

swift-seeing
swift-sliding
swift-slow
swift-spoken
swift-starting
swift-stealing
swift-streamed
swift-swimming
swift-tongued
swift-winged
swiftering
line
swill down
swill up
swill-bowl
swill-tub
swim against the current
swim bladder
swim bow
swim fin
swim fins
swim in
swim mask
swim suit
swim upstream
swim with the current
swim with the stream
swim with the tide
swim-bladder
swimmer's itch
swimming bath
swimming bell
swimming bladder
swimming costume
swimming crab
swimming eyes
swimming funnel
swimming hole
swimming of the head
swimming plate
swimming pool
swimming suit
swimming tank
swimming trunks
swimming upstream
swindle sheet
swine back
swine cress

swine dysentery
swine erysipelas
swine fever
swine flu
swine grass
swine itch
swine plague
swine pox
swine thistle
swine
 vesicular disease
swine's feather
swine-backed
swine-bread
swine-chopped
swine-cote
swine-eating
swine-faced
swine-headed
swine-mouthed
swine-pipe
swine-pox
swine-snouted
swine-stead
swine-stone
swine-sty
swing arm
swing at
swing back
swing band
swing bar
swing beam
swing boat
swing bolster
swing bolt
swing bridge
swing cart
swing chair
swing district
swing door
swing drawbridge
swing from one thing to another
swing gate
swing hammer crusher
swing in with
swing jack
swing joint
swing knife

swing leg
swing music
swing musician
swing on
swing open
swing plate
swing plow
swing round
swing round the circle
swing saw
swing shift
swing shifter
swing team
swing the deal
swing the stern
swing tool
swing toward
swing train
swing vote
swing wheel
swing-
swing-jointed
swing-swang
swing-tree
swing-wing
swinging bar
swinging basin
swinging boom
swinging both ways
swinging buoy
swinging compass
swinging door
swinging post
swinging ring
swinging toward
swinging voter
swingle staff
swingle tow
swingle-
swingling
tow
swinish gluttony
swinish multitude
swipe at
swirl bob
swirl the senses
swish tail
swish-

swish-swash
swiss muslin
swiss roll
swiss steak
switch box
switch cane
switch cast
switch engine
switch grass
switch hitter
switch hook
switch knife
switch line
switch off
switch off the light
switch on
switch on the light
switch over
switch plant
switch plate
switch plug
switch rail
switch sorrel
switch stand
switch tail
switch tender
switch tenter
switch tower
switch yard
switch-hit
switch-hitter
switch-hitting
switch-horn
switch-over
switchblade knife
switchboard operator
switching circuit
switching eye
swivel block
swivel bridge
swivel chain
swivel chair
swivel eyes
swivel fabric
swivel gun
swivel hook
swivel jaw
swivel musket

swivel pin
swivel pipe
swivel plow
swivel shuttle
swivel silk
swivel spindle
swivel table
swivel union
swivel vise
swivel weaving
swivel-eyed
swivel-hooked
swivel-lock
swizzle stick
swollen belly
swollen diction
swollen head
swollen phrase
swollen
 with pride
swollen-cheeked
swollen-eyed
swollen-faced
swollen-glowing
swollen-headed
swollen-jawed
swollen-tongued
swooning-ripe
swoop down
swoop down on
swoop down upon
sword arm
sword bayonet
sword bean
sword belt
sword blade
sword breaker
sword cane
sword cut
sword cutler
sword cutlery
sword dance
sword dancer
sword dollar
sword fern
sword flag
sword flax
sword grass

sword guard
sword hand
sword hanger
sword hilt
sword in hand
sword kin
sword knot
sword law
sword lily
sword maker
sword mat
sword of Damocles
sword sedge
sword service
sword side
sword swallower
sword swallowing
sword tash
sword thrust
sword tip
sword-armed
sword-bearer
sword-bearership
sword-billed
sword-girded
sword-girt
sword-grass
sword-leaved
sword-play
sword-shaped
sword-tailed
swordfish sucker
sworn and affirmed
sworn enemy
sworn evidence
sworn off
sworn statement
sworn testimony
sworn to
swot up
swung dash
sycamore anthracnose
sycamore fig
sycamore maple
sycee silver
syenite-porphyry
syenitic gneiss
syllabic

accent
syllabic character
syllabic meter
syllabic nucleus
syllabic peak
syllabic symbol
syllable name
syllogistic reasoning
sylvan deity
sylvic acid
sym-
symbol-using animal
symbolic books
symbolic code
symbolic language
symbolic logic
symbolic meaning
symbolic system
symbolical books
symbolist movement
symbolist verse
symbols of
symmetric difference
symmetric function
symmetric group
symmetric matrix
symmetric polynomial
symmetry axis of rotation
symmetry class
symmetry element
symmetry plane
sympathetic chord
sympathetic contact
sympathetic ink
sympathetic introspection
sympathetic ma
sympathetic magic
sympathetic nervous system
sympathetic ophthalmia
sympathetic response
sympathetic strike
sympathetic string
sympathetic vibration
sympathize with
sympathy strike
symphonic conductor
symphonic form
symphonic music

symphonic ode
symphonic poem
symphonie concertante
symphony band
symphony concert
symphony orchestra
symphyo-
symphysio-
symptom complex
symptomatic anthrax
symptomatic treatment
syn-
synaposematic
mimicry
sync-generator
synchro receiver
synchro transmitter
synchro unit
synchro-
synchro-cyclotron
synchronic linguistics
synchronized shifting
synchronizing generator
synchronizing pulse
synchronizing separator
synchronizing signal
synchronous converter
synchronous machine
synchronous motor
synchronous orbit
synchrotron radiation
syncopated music
syncro-mesh
syndesmo-
synectics group
synneusis texture
synodic month
synonym dictionary
syntactic analysis
syntactic construction
syntactic meaning
syntactic structure
syntax language
syntectic magma
synthesis gas
synthetic cloth
synthetic detergent
synthetic division

synthetic dye
synthetic fabric
synthetic geometry
synthetic lacquer
synthetic philosophy
synthetic plasma
synthetic resin
synthetic rubber
synthetic textile
syntonic personality
syphil-
syphilitic arthritis
syphilitic meningoencephalitis
syphilitic paresis
syphilo-
syringo-
syro-
syrphid fly
syrphus fly
syrup of ipecac
system component
system components
system
 engineer
system engineering
system function
system of belief
system of beliefs
system of government
system of ideas
system of knowledge
system of oral communication
system of theories
system of values
system of weight
system stabilization
systematic amnesia
systematic botany
systematic theology
systematically terrorize
systemic insecticide
systems analysis
systems analyst
systems design
systems engineering
systems planning
systole and diastole
systolic hypertension

t aint
t b
t distribution
t formation
t square
t will
t'ai chi chu'an
t'ao t'ieh
t-bar lift
t-bone
t-man
t-shirt
tRNA
ta ta
ta-ta
ta-zaung
tab key
tab of
taban puteh
tabby cat
tabby moth
tabby weave
tabby-cat heart
tabby-cat striation
tabernacle mirror
tabernacle work
tabes dorsales
tabes dorsalis
table base
table board
table book
table chair
table clothing
table cover
table cut
table d'hote
table decoration
table decorator
table dhote
table diamond
table engine
table glass
table knife
table lamp
table licence
table
 line
table linen

table money
table mountain
table napkin
table of contents
table of organization
table of prothesis
table of the Lord
table oil
table radio
table rapping
table round
table ruby
table salt
table saw
table service
table setting
table settle
table spar
table stake
table stone
table talk
table talker
table tennis
table the motion
table tilting
table tipping
table tomb
table tripod
table turning
table wine
table work
table-board
table-book
table-cloth
table-cut
table-cutter
table-cutting
table-faced
table-formed
table-hop
table-hopped
table-hopper
table-hopping
table-land
table-mountain pine
table-rapping
table-shaped
table-spoon

table-stone
table-tail
table-talk
table-topped
table-turning
tableau curtain
tableau vivant
tableaux vivants
tabled joint
tablet chair
tablet letter
tablet tea
tablet triturate
tablets of the memory
taboo language
taboo word
tabor pipe
tabs of
tabs on
tabucki grass
tabula rasa
tabular iceberg
tacca arrowroot
tacheo-
tachina fly
tacho-
tachy case
tachy-
tacit
 consent
tack bend
tack board
tack bumpkin
tack comb
tack down wind
tack duty
tack hammer
tack line
tack on
tack pin
tack rivet
tack room
tack together
tack up
tack weld
tack welder
tack welding
tacketing gut

tacking needle
tackle block
tackle board
tackle fall
tackle house
tackle post
tackles back formation
tacky party
tacnodeRare
tactical air force
tactical bombing
tactical evolutions
tactical maneuvers
tactical nuclear weapons
tactical plan
tactical police
tactical unit
tacticalsupport bomber
tactile amnesia
tactile cell
tactile corpuscle
tactile hair
tactile organ
tactile process
tactile sense
tadpole fish
tadpole-shaped
tae-kwan-do
taedium vitae
taenii-
taenio-
taffeta weave
taffrail log
taffy pull
tag addresser
tag after
tag alder
tag along
tag and rag
tag boat
tag dance
tag day
tag end
tag line
tag on
tag up
tag, rag, and bobtail
tag-addressing

tag-affixing
tag-dating
tag-marking
tag-rag
tag-stringing
tagged atom
tagged element
tagmemic analysis
tagrag and bobtail
tai-ping
tail
 barley
tail bay
tail beam
tail block
tail boom
tail coat
tail cone
tail covert
tail end
tail fan
tail fin
tail fly
tail force
tail gate
tail grab
tail grape
tail group
tail gunner
tail hook
tail house
tail in a gate
tail joist
tail lamp
tail lock
tail off
tail pipe
tail pit
tail plane
tail print
tail rhyme
tail rod
tail rope
tail rotor
tail set
tail shaft
tail skid
tail slide

tail spin
tail spindle
tail stinger
tail tackle
tail unit
tail water
tail wheel
tail wind
tail-board
tail-chasing
tail-cropped
tail-decorated
tail-docked
tail-end
tail-glide
tail-heavy
tail-high landing
tail-joined
tail-low landing
tail-piece
tail-pipe burner
tail-race
tail-rhymed
tail-rope
tail-switching
tail-tied
tail-wagging
tailed frog
tailed sonnet
tailed toad
tailings auger
taille-douce
tailless airplane
tailless jet
tailor warbler
tailor's chalk
tailor's-tack
tailor-bird
tailor-built
tailor-cut
tailor-legged
tailor-made
tailor-mades
tailor-make
tailor-making
tailor-suited
tailored suit
taint-free

taint-worm
taintor
gate
tais toi
take French leave
take a Sunday drive
take a back seat
take a bow
take a break
take a call
take a careful look
take a chance
take a close look
take a course
take a crack at
take a crap
take a cursory view of
take a dare
take a decision
take a dim view of
take a dislike to
take a dive
take a drop
take a drop too much
take a fall
take a fancy to
take a favorable turn
take a flier
take a flight
take a fling at
take a flop
take a fresh lease on life
take a further look
take a gamble on
take a glance at
take a hand
take a hand in
take a header
take a heading
take a holiday
take a journey
take a joyride
take a leaf out of
take a leaf out of your book
take a leap in the dark
take a leave of absence
take a liberty
take a likeness

take a liking to
take a lively interest
take a long
take a look at
take a nap
take a new lease on life
take a part
take a peek
take a peep
take a percentage
take a photograph
take a picture
take a poke at
take a pop at
take a potshot
take
 a powder
take a pratfall
take a premium
take a prompt
take a random sample
take a rap
take a reading
take a recess
take a reef
take a resolution
take a rest
take a rubbing
take a runout powder
take a second look
take a set
take a shine to
take a shit
take a short cut
take a shot at
take a shy at
take a sight
take a spill
take a squint at
take a stand
take a straw vote
take a stretch
take a swing at
take a swipe at
take a trip
take a tumble
take a turn
take a turn for the better

take a voyage
take a walk
take a whack attake a whiff of
take a wrong turn
take a wrong turning
take aback
take account of
take action
take advantage of
take advice
take after
take aim
take aim at
take alarm
take all of
take amiss
take an active part in
take an approach to
take an assumed name
take an attitude
take an aversion to
take an interest
take an interest in
take an overdose
take and do
take another look
take apart
take arms
take as a matter of course
take as a model
take as a precondition
take as a reason
take
as an excuse
take as an occasion
take as demonstrated
take as gospel truth
take as proved
take aside
take at face value
take at your word
take away
take away from
take away your breath
take back
take bearings
take before the judge
take birth

take by assault
take by storm
take by surprise
take by the beard
take by the button
take by the hand
take by the lapel
take by the throat
take captive
take care
take care of
take care of number one
take center stage
take chances
take charge
take charge of
take charge of your destiny
take cognizance of
take cold
take comfort
take command
take counsel
take counsel of your pillow
take counsel with
take courage
take cover
take cover under
take credit
take dead aim at
take delight in
take doing
take down
take down a peg
take down a peg or two
take down in shorthand
take effect
take exception
take exception to
take fire
take five
take flight
take for
take for a ride
take for a sucker
take for better or for worse
take for gospel
take for granted
take

for your own
take for yourself
take form
take forty winks
take fright
take from
take good care
take great satisfaction
take heart
take heart of grace
take heed
take heed at your peril
take heed of
take hold
take hold of
take hold of one
take hold of you
take holy orders
take horse
take ill
take in
take in a reef
take in bad part
take in exchange
take in good part
take in hand
take in sail
take in the sights
take in tow
take in vain
take in your stride
take into account
take into camp
take into consideration
take into custody
take into employment
take into your head
take into your service
take issue
take issue with
take it
take it all
take it as given
take it easy
take it in your stride
take it into your head
take it like a man
take it lying down

take it on the chin
take it on the lam
take it or leave it
take it out of
take it out of your hide
take it out of your skin
take it out on
take it that
take its place
take its rise
take its rise from
take kindly to
take leave
take leave
of
take leave of your senses
take legal proceedings against
take lessons
take liberties
take liberties with
take life
take life easy
take line
take lying down
take measures
take medicine
take merit to yourself
take narrow views
take no account of
take no denial
take no interest in
take no note of
take no notice of
take no part in
take no stock in
take no thought of
take no thought of the morrow
take no thought of tomorrow
take note
take note of
take notice
take notice of
take nourishment
take oath
take off
take off a high
take off after
take off for

take off on
take off weight
take off your hands
take off your hat to
take off your shoes
take offense
take office
take on
take on credit
take on faith
take on over
take on trust
take on weight
take on yourself
take one over
take one step at a time
take one's breath away
take one's life
take order
take orders
take origin
take out
take out after
take out from under wraps
take out insurance
take out membership
take out of mothballs
take out on
take
over
take over for
take pains
take part in
take part with
take pen in hand
take pity on
take pity upon
take place
take pleasure in
take position
take possession
take possession of
take potluck
take precautions
take precedence
take pride in
take prisoner
take rank

take refuge
take refuge in
take residence at
take rest
take revenge
take rise
take root
take shame
take shape
take shelter
take ship
take short
take sick
take sides
take sides with
take silk
take snuff
take some doing
take something in your stride
take soundings
take steps
take steps and measures
take stock
take stock in
take stock of
take ten
take the Lord's name in vain
take the air
take the air line
take the attitude
take the average
take the back track
take the bait
take the ball on the rebound
take the bit in
take the bit in the teeth
take the bit in your teeth
take the bite out
take the blame
take the breath away
take the bull by the horns
take the cake
take the chair
take the chance
take the chances of
take the chill
off
take the consequences

take the count
take the cross
take the cure
take the dimensions of
take the edge off
take the edge off of
take the fancy of
take the field
take the first step
take the floor
take the good the gods provide
take the ground
take the ground from under
take the heart out of
take the helm
take the initiative
take the last count
take the law in your own hands
take the law into your own hands
take the law of
take the law on
take the lead
take the liberty
take the lid off
take the life of
take the load off your mind
take the mantle of
take the marriage vows
take the mean
take the measure
take the measure of
take the mind off of
take the offensive
take the opportunity
take the part of
take the place of
take the pledge
take the plunge
take the rap
take the rap for
take the reciprocal course
take the reins into your hand
take the reins of government
take the responsibility
take the risk
take the road
take the shape of
take the shine out of

take the starch out of
take
 the sting out
take the sting out of
take the stump
take the the bull by the horns
take the throne
take the tuck out of
take the veil
take the vows
take the wind out of
take the wind out of your sails
take the words out of your mouth
take the wraps off
take things as they come
take thought of
take time
take time by the forelock
take time out
take to
take to account
take to arms
take to be
take to court
take to drink
take to drinking
take to flight
take to heart
take to mean
take to one's heels
take to pieces
take to task
take to the air
take to the airways
take to the bosom
take to the cleaners
take to the hustings
take to the road
take to the stump
take to wife
take to your arms
take to your heels
take to yourself a wife
take trouble
take turns
take umbrage
take unawares
take under active consideration

take under advisement
take under consideration
take under your wing
take up
take up a side
take up again
take up an inquiry
take up and pay off
take up arms
take up membership
take up residence
take
up the cause of
take up the cudgels
take up the cudgels against
take up the cudgels for
take up the gauntlet
take up the hatchet
take up the sword
take up time
take up with
take up your abode
take up your option
take up your quarters
take up your thoughts
take up your time
take upon your shoulders
take upon yourself
take vows
take what comes
take wing
take with a grain of salt
take wrong
take you at your word
take you back
take you up on
take your bearings
take your breath away
take your business to
take your case to the public
take your chance
take your choice
take your constitutional
take your cue from
take your death
take your departure
take your dust
take your ease

take your fancy
take your foot off the gas
take your hat off to
take your head off
take your last breath
take your last sleep
take your leave
take your leisure
take your life away
take your life in your hand
take your life in your hands
take your lumps
take your measure
take your medicine
take your oath
take
 your oath upon
take your opinions ready-made
take your own course
take your own life
take your own sweet time
take your picture
take your place
take your pleasure
take your position
take your punishment
take your sabbatical
take your stand
take your stand against
take your stand upon
take your time
take your trade to
take your turn
take your way
take your word
take your word for
take yourself away
take yourself off
take-
take-all
take-charge
take-charge guy
take-down
take-home
take-home examination
take-home pay
take-in
take-off

take-off booster
take-off rocket
take-off speed
take-off strip
take-out
take-over
take-up
take-up box
taken aback
taken as granted
taken away
taken by surprise
taken for granted
taken ill
taken off
taken on
taken unawares
taken up
taken up with
taken with
takeoff power
takeoff ramp
takeoff rocket
takeoff run
takeout double
taker-down
taker-in
taker-off
taking a part
taking a role
taking all in all
taking all things together
taking apart
taking away
taking by storm
taking
down
taking everything into account
taking exception
taking from under wraps
taking in
taking into account
taking into account that
taking into custody
taking it for all in all
taking leave
taking of life
taking off

taking office
taking on
taking one thing with another
taking or drawing out
taking over
taking place
taking possession
taking the wraps off
taking ways
taking-in
tal-laisim
talba gum
talc bag
talc blank
talc brick
talc crayon
talc cube
talc facing
talc pencil
talc pulverizer
talc schist
talc-grinding
talca gum
talco gum
talcum powder
tale-teller
tale-telling
taleh gum
talent money
talent scout
talent show
talented person
talha gum
talk about
talk against time
talk at
talk away
talk back
talk beans
talk between ships
talk big
talk dirty
talk double Dutch
talk down
talk down to
talk film
talk highfalutin
talk idly

talk in
talk in superlatives
talk incoherently
talk into
talk nineteen to the dozen
talk nonsense
talk of
talk of the town
talk off the top of your head
talk
on
talk out
talk out of
talk out of turn
talk over
talk over the back fence
talk round
talk show
talk the hind leg off a mule
talk through your hat
talk to
talk to death
talk to hear your head rattle
talk to in private
talk to yourself
talk together
talk too much
talk turkey
talk up
talk with
talk with one
talk with you in private
talk you around
talk you deaf and dumb
talk you into a fever
talk you to death
talk your ear off
talk your head
talk your head off
talk yourself hoarse
talk yourself out of breath
talk-back
talkative person
talked about
talked-about
talked-of
talkee-talkee
talking book

talking chief
talking down
talking machine
talking out of
talking picture
talking point
talking through your nose
talking to hear yourself talk
talking-down system
talking-to
talking-tos
talky-talk
talky-talky
tall as a maypole
tall coreopsis
tall drink
tall fescue
tall meadow oat
tall meadow rue
tall oat grass
tall oil
tall order
tall person
tall poppy
tall ship
tall story
tall sunflower
tall
tale
tall talk
tall-bodied
tall-built
tall-case clock
tall-chimneyed
tall-columned
tall-corn
tall-elmed
tall-growing
tall-looking
tall-masted
tall-master
tall-necked
tall-pillared
tall-sceptered
tall-sitting
tall-spired
tall-stalked
tall-stemmed

tall-trunked
tall-tussocked
tall-wheeled
tallith katan
tallow bayberry
tallow candle
tallow catch
tallow chandler
tallow chandlery
tallow chandling
tallow cooler
tallow crackling
tallow cup
tallow cutter
tallow dip
tallow drop
tallow gourd
tallow loaf
tallow mange
tallow melter
tallow nut
tallow oil
tallow pot
tallow press
tallow refiner
tallow renderer
tallow sampler
tallow shrub
tallow tree
tallow wood
tallow-chandlering
tallow-colored
tallow-cut
tallow-face
tallow-faced
tallow-hued
tallow-lighted
tallow-pale
tallow-top
tallow-topped
tallow-white
tally board
tally card
tally clerk
tally iron
tally of
tally plan
tally room

tally sheet
tally shop
tally stick
tally trade
tally up
tally walk
tally with
tally-ho
tallyho back
tallyho coach
tallyho
 over
talmi gold
talon-tipped
tam o' shanter
tam o'shanter
tam-o'-shanter
tam-o'shanter
tam-o-shanter
tam-o-shantered
tam-tam
tamale pie
tamarack pine
tamarind fish
tamarind plum
tamarisk family
tamarisk salt
tamarisk salt tree
tamarix family
tambookie grass
tambour clock
tambour lace
tambour stitch
tambour stitcher
tambour work
tame-grief
tame-grown
tame-lived
tame-looking
tame-minded
tame-natured
tame-spirited
tame-witted
tammie norie
tammy cloth
tamp in
tamper with
tampered with

tamping bar
tamping iron
tamping pick
tamping stick
tan bay
tan oak
tan your hide
tan-burning
tan-colored
tan-faced
tan-mouthed
tan-sailed
tan-skinned
tan-strewn
tan-tan
tan-tinted
tan-trodden
tanbark beetle
tanbark oak
tanbark tree
tandem bicycle
tandem cart
tandem plane
tandem rotors
tandem seat
tandem-compound
tandem-punch
tandem-rotor helicopter
tang chisel
tang end
tangent distance
tangent galvanometer
tangent plane
tangent-cut
tangent-saw
tangent-sawed
tangent-sawing
tangent-sawn
tangential motion
tangerine-colored
tangible
 assets
tangle picker
tangle up with
tangle with
tangle-haired
tangle-headed
tangle-legs

tangle-tail
tangle-tailed
tangled in
tangled skein
tank car
tank circuit
tank corps
tank corpsman
tank crewman
tank destroyer
tank dome
tank drama
tank driver
tank engine
tank farm
tank farming
tank fighter
tank furnace
tank iron
tank liquor
tank locomotive
tank meter
tank nipple
tank rivet
tank runner
tank ship
tank station
tank suit
tank table
tank top
tank town
tank trailer
tank truck
tank up
tank wagon
tank waste
tank-town
tankard bearer
tankard-bearing
tanker ship
tannery fungus
tannic acid
tannin color
tanning extract
tanno-
tannyl acetate
tansy mustard
tansy oil

tansy ragwort
tant mieux
tant pis
tant soit peu
tantalic acid
tantalum lamp
tao-tieh
tap bell
tap bolt
tap bond
tap borer
tap chuck
tap cinder
tap cutter
tap dance
tap dancer
tap dancing
tap dressing
tap drill
tap extractor
tap funnel
tap gauge
tap grinder
tap holder
tap hose
tap line
tap out the rhythm
tap
 rate
tap reamer
tap rivet
tap screw
tap shoe
tap tool
tap water
tap wrench
tap-dance
tap-danced
tap-dancer
tap-dancing
tap-hole
tap-house
tap-lash
tap-off
tap-pickle
tap-room
tap-root
tap-tap

tap-tap-tap
tapa cloth
tape cartridge
tape cassette
tape deck
tape fern
tape grass
tape machine
tape measure
tape memory
tape needle
tape player
tape price
tape reader
tape reading
tape recorder
tape recording
tape sizer
tape sizing
tape thermometer
tape-bound
tape-grass family
tape-printing
tape-record
tape-slashing
tape-tied
tape-tying
taped program
taped show
taper drill
taper file
taper gauge
taper jack
taper mandrel
taper off
taper pin
taper pipe thread
taper reamer
taper reducer sleeve
taper tap
taper to a point
taper tool
taper-bored
taper-fashion
taper-fashion arrow
taper-grown
taper-headed
taper-lighted

taper-limbed
taper-molded
taper-pointed
tapered-in
tapestry Brussels
tapestry beetle
tapestry carpet
tapestry glass
tapestry maker
tapestry making
tapestry moth
tapestry needle
tapestry painting
tapestry
 stitch
tapestry weaver
tapestry weaving
tapestry work
tapestry-covered
tapestry-worked
tapestry-woven
tapeworm plant
taping arrow
taping pin
tapioca plant
tapioca pudding
tapioca snow
tapioca-plant
tapir mouth
tapis vert
tapped joint
tapper tap
tapper-out
tappet motion
tappet rod
tappet wrench
tapping chuck
tapping clay
tapping drill
tapping hole
tapping key
tapping screw
tappit hen
tappit-hen
tapsal-teerie
tapsie-teerie
tar acid
tar and feather

tar baby
tar base
tar boy
tar bucket
tar camphor
tar cancer
tar concrete
tar distillate
tar distiller
tar drum
tar kettle
tar macadam
tar number
tar oil
tar on
tar paper
tar pavior
tar pool
tar putty
tar sand
tar soap
tar spot
tar sprayer
tar still
tar water
tar well
tar-and-feathering
tar-barrel
tar-bedaubed
tar-bind
tar-black
tar-boiling
tar-brand
tar-brush
tar-burning
tar-clotted
tar-coal
tar-dipped
tar-heating
tar-laid
tar-paint
tar-paved
tar-removing
tar-roofed
tar-scented
tar-sealed
tar-soaked
tar-spray

tar-water
tara fern
tarage
table
tarantula hawk
tardive dyskinesia
tardy epilepsy
tardy-gaited
tardy-moving
tardy-rising
tare an ages
tare anouns
tare anounty
tare grass
tare room
tare vetch
target arrow
target bass
target boat
target date
target day
target frame
target image
target lamp
target language
target man
target meeting
target missile
target planet
target practice
target range
target rifle
target rod
target shaft
target spot
target values
target-shy
target-tower
target-tug
tariff duty
tariff law
tariff maker
tariff making
tariff reform
tariff reformer
tariff treaty
tariff wall
tariff-born

tariff-bound
tariff-fed
tariff-protected
tariff-raised
tariff-raising
tariff-reform
tariff-regulating
tariff-ridden
tariff-tinkering
tariff-wise
tarn-brown
tarpaulin muster
tarpaulin-covered
tarpaulin-lined
tarragon oil
tarragon vinegar
tarred with the same brush
tarry for
tarry-breeks
tarry-fingered
tarry-jacket
tarrying irons
tarso-
tarso-metatarsal
tarso-metatarsus
tarso-orbital
tart up
tartan velvet
tartan-purry
tartar
 emetic
tartar sauce
tartar steak
tartar yeast
tartare sauce
tartare steak
tartaric acid
tartro-
task force
task group
task the mind with
task time
task wage
task with
task-work
tasmanian devil
tasmanian wolf
tassel bush

tassel flower
tassel grass
tassel hand
tassel hyacinth
tassel mold
tassel plant
tassel pondweed
tassel stitch
tassel tree
tassel weaver
tassel-hung
taste beaker
taste blood
taste bud
taste bulb
taste cell
taste cup
taste goblet
taste good
taste hair
taste in the mouth
taste like
taste like ashes in the mouth
taste of
taste paper
taste-maker
tat tvam asi
tat-tat
tat-tat-tat
tatou peba
tattie bogle
tattie lifting
tattle on
tattletale gray
tattoo mark
tatty-peelin
tau cross
tau staff
tau-meson
tau-saghyz
tau-topped
taunt ship
taunt with
taunt-masted
taunt-rigged
taupe brown
taupe-rose
tauro-

taurocholic acid
taut as a bowstring
taut-
tauto-
tavern car
tavern table
tavern token
tavern-gotten
tavern-hunting
tavern-tainted
taw line
tawdry lace
tawed leather
tawny
 owl
tawny port
tawny-brown
tawny-coated
tawny-colored
tawny-faced
tawny-gold
tawny-gray
tawny-green
tawny-haired
tawny-moor
tawny-olive
tawny-skinned
tawny-tanned
tawny-visaged
tawny-whiskered
tawny-yellow
tax anticipation note
tax assessor
tax avoidance
tax base
tax benefit
tax bond
tax book
tax cart
tax certificate
tax collecting
tax collector
tax collectors
tax credit
tax deduction
tax deed
tax dodger
tax dodging

tax evader
tax evasion
tax exemption
tax farmer
tax haven
tax layer
tax levy
tax lien
tax list
tax money
tax rate
tax receiver
tax return
tax roll
tax sale
tax shelter
tax stamp
tax stamp n
tax structure
tax taker
tax the memory
tax title
tax with
tax withholding
tax write-off
tax your energies
tax yourself
tax-
tax-born
tax-bought
tax-burdened
tax-cart
tax-deductible
tax-dodging
tax-exempt
tax-exempt bond
tax-exempt status
tax-free
tax-free bond
tax-gatherer
tax-laden
tax-levying
tax-ridden
tax-supported
taxable goods
taxable income
taxable land
taxable property

taxi dancer
taxi
driver
taxi horn
taxi radar
taxi strip
taxi truck
taxi-bordered
taxi-cab
taximeter cab
tch tch
tcheck out
te deum
te igitur
te-hee
te-heed
te-heing
tea bag
tea ball
tea bell
tea biscuit
tea blender
tea blight
tea borer
tea bread
tea break
tea broom
tea caddy
tea cake
tea can
tea canister
tea cart
tea ceremony
tea checker
tea chest
tea clipper
tea cloth
tea cooper
tea cosy
tea cozy
tea dance
tea drinker
tea drunkard
tea egg
tea family
tea fight
tea fighting
tea garden

tea gardener
tea girl
tea gown
tea green
tea hound
tea hour
tea house
tea infuser
tea kettle broth
tea kitchen
tea lead
tea leaf
tea maid
tea maker
tea meeting
tea mite
tea mixer
tea mosquito
tea oil
tea oil tree
tea olive
tea packer
tea party
tea percolator
tea plant
tea planter
tea planting
tea plate
tea rose
tea sampler
tea scrub
tea service
tea set
tea shop
tea sifter
tea strainer
tea table
tea tasting
tea towel
tea tray
tea tree
tea trolley
tea urn
tea wagon
tea weigher
tea-blending
tea-chest
tea-clipper

tea-colored
tea-covered
tea-cup
tea-garden
tea-gardened
tea-growing
tea-inspired
tea-leaf
tea-leaved
tea-leaves
tea-loving
tea-maker
tea-mixing
tea-of-heaven
tea-packing
tea-party
tea-plant
tea-planter
tea-pot
tea-producing
tea-rose
tea-rose
 pink
tea-scented
tea-seed oil
tea-sodden
tea-spoon
tea-swilling
tea-table
tea-table talk
tea-tabular
tea-taster
tea-things
tea-tray
tea-tree
teach a lesson
teach an old dog new tricks
teach fishes to swim
teach in
teach the elements
teach the rudiments
teach-in
teach-ins
teacher bird
teacher clerk
teacher edition
teacher of rhetoric
teacher training

teacher's aide
teacher's pet
teachers college
teachers' college
teaching aid
teaching assistant
teaching elder
teaching fellow
teaching fellowship
teaching hospital
teaching institution
teaching intern
teaching machine
teaching staff
teagle post
teak-brown
teak-built
teak-complexioned
teak-lined
teak-producing
teal blue
teal duck
teal flock
team boat
team play
team spirit
team teaching
team up
team up with
team
 with
team-mate
tear along
tear apart
tear around
tear ass
tear away
tear bag
tear bomb
tear bottle
tear down
tear duct
tear from
tear gas
tear gland
tear grass
tear grenade
tear into

tear limb from limb
tear loose
tear off
tear off the mask
tear open
tear out
tear sheet
tear shell
tear streak
tear strip
tear tape
tear to pieces
tear to rags
tear to shreds
tear to tatters
tear up
tear up the earth
tear up the road
tear up the track
tear up your mortgage
tear your hair
tear your hair out
tear yourself away
tear-
tear-acknowledged
tear-affected
tear-angry
tear-arresting
tear-attested
tear-baptized
tear-bedabbled
tear-bedewed
tear-besprinkled
tear-blinded
tear-bottle
tear-bright
tear-commixed
tear-compelling
tear-composed
tear-creating
tear-damped
tear-derived
tear-dewed
tear-dimmed
tear-distained
tear-distilling
tear-dropped
tear-drowned

tear-eased
tear-embarrassed
tear-expressed
tear-falling
tear-filled
tear-forced
tear-fraught
tear-freshened
tear-gas
tear-gas bomb
tear-gas grenade
tear-gas
gun
tear-gassed
tear-gassing
tear-glistening
tear-imaged
tear-jerker
tear-jerking
tear-kissed
tear-lamenting
tear-lined
tear-marked
tear-melted
tear-mirrored
tear-misty
tear-mocking
tear-moist
tear-mourned
tear-off
tear-out
tear-owned
tear-pale
tear-pardoning
tear-paying
tear-persuaded
tear-phrased
tear-pictured
tear-pitying
tear-plagued
tear-pouring
tear-practiced
tear-procured
tear-protested
tear-provoking
tear-purchased
tear-quick
tear-raining

tear-reconciled
tear-regretted
tear-resented
tear-revealed
tear-reviving
tear-salt
tear-scorning
tear-sealed
tear-shaped
tear-shedding
tear-shot
tear-stained
tear-stubbed
tear-swollen
tear-thirsty
tear-washed
tear-wet
tear-wiping
tear-worn
tear-wrung
tearful eyes
tearing down
tearing out
tearing passion
tearing up root and branch
tease out
tease tenon
tease up
teasel clipper
teasel cutter
teasel family
teasel frame
teasel gourd
teasel grower
teasel merchant
teasel packer
teasel sorter
teaser artist
teaser curtain
teat cup
teaze tenon
technical
adviser
technical brilliance
technical college
technical education
technical expert
technical flaw

technical jargon
technical knockout
technical know-how
technical knowledge
technical mastery
technical oil
technical school
technical sergeant
technical skill
technical term
technical training institute
technical writer
technical writing
technically superb
technico-
techno-
technological institute
technological revolution
technological school
technological unemployment
technological warfare
tecno-
tectorial membrane
teddy bear
teddy boy
teddy girl
teddy-bear
tedious work
tedium-proof
tee bar
tee beam
tee burial
tee iron
tee joint
tee off
tee plate
tee rail
tee shirt
tee slot
tee square
tee-bulb
tee-hee
tee-hole
tee-name
tee-shirt
teed off
teeing ground
teel oil

teem over
teem with
teeming imagination
teeming loins
teeming rain
teeming womb
teen age
teen-age
teen-aged
teen-ager
teenie-weenie
teensie-weensie
teensy-weensy
teentsy-weentsy
teeny-weeny
teeter-totter
teeter-tottering
teetering-board
teetery-bender
teeth
 ridge
teeth-chattering
teeth-edging
teeth-gnashing
teeth-grinding
teething ring
teething troubles
teil tree
teind boll
tel-
tele-
tele-action
tele-iconograph
telechron clock
telegraph agency
telegraph bar
telegraph block
telegraph blue
telegraph board
telegraph box
telegraph bracket
telegraph bug
telegraph buoy
telegraph cable
telegraph clerk
telegraph clock
telegraph coil
telegraph connector

telegraph editor
telegraph form
telegraph hook
telegraph inspector
telegraph instrument
telegraph insulator
telegraph jack
telegraph key
telegraph laborer
telegraph line
telegraph lineman
telegraph mechanic
telegraph messenger
telegraph operator
telegraph plant
telegraph pole
telegraph protector
telegraph recorder
telegraph recorders
telegraph relay
telegraph repeater
telegraph rope
telegraph sounder
telegraph superintendent
telegraph switchboard
telegraph tape
telegraph transmitter
telegraph tubing
telegraph wire
telegraph wireman
teleo-
teleological argument
teleological
proof
telepathic dream
telepathic hallucination
telepathic transmission
telephone amplifier
telephone area
telephone arm
telephone attendant
telephone bell
telephone book
telephone booth
telephone box
telephone cabinet
telephone cable
telephone call

telephone case
telephone cell
telephone closet
telephone coil
telephone condenser
telephone connector
telephone cord
telephone counter
telephone desk
telephone directory
telephone engineer
telephone engineering
telephone exchange
telephone extension
telephone faultsman
telephone fitter
telephone fuse
telephone generator
telephone holder
telephone instrument
telephone insulation
telephone insulator
telephone jack
telephone kiosk
telephone knob
telephone laborer
telephone line
telephone lineman
telephone magneto
telephone man
telephone market
telephone mechanic
telephone mechanics
telephone mouthpiece
telephone number
telephone office
telephone operator
telephone pad
telephone plug
telephone pole
telephone protector
telephone receiver
telephone
relay
telephone selector
telephone set
telephone stand
telephone supervisor

telephone support
telephone switch
telephone switchboard
telephone table
telephone tax
telephone terminal
telephone tester
telephone transmitter
telephone wire
telephone wireman
telephonic engineer
telephoto lens
teleprinter exchange
telescope antenna
telescope bag
telescope box
telescope chimney
telescope door
telescope eye
telescope finder
telescope fish
telescope fly
telescope jack
telescope joint
telescope lens
telescope screw
telescope shell
telescope sight
telescope stack
telescope table
telescope tube
telescope word
telescopic camera
telescopic sight
telestial kingdom
television audience
television broadcast
television camera
television channel
television drama
television engineer
television mast
television play
television radar air navigation
television receiver
television receiver parts
television reception
television relay

television set
television show
television station
television studio
television
technician
television transmission
television transmitter
television transmitter parts
television tube
television-viewer
tell a good story
tell a lie
tell a story
tell a thing or two
tell all
tell apart
tell confidentially
tell for your ears only
tell fortunes
tell how
tell idle tales
tell in advance
tell in glowing terms
tell it like it is
tell it not in Gath
tell it to the judge
tell its own story
tell its own tale
tell more than you want to know
tell off
tell on
tell once and for all
tell one thing from another
tell secrets
tell tales
tell tales out of school
tell the future
tell the meaning of
tell the news
tell the truth
tell true
tell where to get off
tell you a secret
tell you to your face
tell your beads
tell your fortune
tell yourself

tell-tale
tell-truth
teller of tales
teller's check
teller-out
telling of beads
telltale compass
telltale sign
tellur-
telluric acid
tellurium glance
telo-
telome theory
telpher carrier
telpher line
telpher railway
telpher ropeway
temper
 color
temper pin
temper screw
temper tantrum
temper-spoiling
temper-trying
temper-wearing
tempera painting
temperance drink
temperance hotel
temperance movement
temperantia salver
temperantia tray
temperate zone
temperature coefficient
temperature control
temperature curve
temperature gradient
temperature relay
temperature sensation
temperature sense
temperature sensor
temperature signal
temperature spot
temperature wind rose
temperature-humidity index
tempered glass
tempered safety glass
tempered semitone
tempest in a teacup

tempest in a teapot
tempest-bearing
tempest-beaten
tempest-blown
tempest-born
tempest-clear
tempest-driven
tempest-flung
tempest-gripped
tempest-harrowed
tempest-loving
tempest-proof
tempest-rent
tempest-rocked
tempest-scattered
tempest-scoffing
tempest-shattered
tempest-sundered
tempest-swept
tempest-threatened
tempest-torn
tempest-tossed
tempest-tost
tempest-troubled
tempest-walking
tempest-winged
tempest-worn
tempestuous rage
tempestuous wind
template excavator
template
jig
temple axis
temple flower
temple mound
temple name
temple of the Holy Ghost
temple prostitute
temple title
temple tree
temple-bar
temple-crowned
temple-guarded
temple-haunting
temple-robbing
temple-sacred
temple-treated
tempo mark

tempo primo
tempo rubato
tempo turn
temporal bone
temporal hour
temporal lobe
temporal summation
temporary arrangement
temporary duty
temporary employee
temporary expedient
temporary life annuity
temporary lodger
temporary measure
temporo-
temps lie
tempt Providence
tempt fortune
tempt the appetite
temptation-proof
tempus edax rerum
tempus fugit
ten best-dressed
ten cents
ten commandments
ten million
ten o'clock
ten strike
ten thousand
ten to one
ten-
ten-a-penny
ten-acre
ten-acred
ten-armed
ten-barreled
ten-bore
ten-cell
ten-cent
ten-cent store
ten-coupled
ten-course
ten-cylindered
ten-day
ten-day fern
ten-dollar
ten-dollar bill
ten-dollar gold piece

ten-eighty
ten-fingered
ten-footed
ten-forties
ten-gallon hat
ten-gauge
ten-grain
ten-guinea
ten-headed
ten-horned
ten-horsepower
ten-hour
ten-inch
ten-jointed
ten-keyed
ten-knotter
ten-league
ten-mile
ten-minute
ten-month
ten-oared
ten-parted
ten-peaked
ten-percenter
ten-pins
ten-ply
ten-point
ten-pound
ten-pounder
ten-rayed
ten-ribbed
ten-roomed
ten-second
ten-share
 unit stock
ten-shilling
ten-spined
ten-spot
ten-strike
ten-striker
ten-stringed
ten-syllable
ten-syllabled
ten-talented
ten-thousandaire
ten-to-one shot
ten-ton
ten-tongued

ten-toothed
ten-twenty-thirty
ten-weeks stock
ten-wheeled
ten-wheeled locomotive
ten-year
tenacious of life
tenaille line
tenant at sufferance
tenant at will
tenant farmer
tenant for life
tenant for years
tenant from year to year
tenant in capite
tenant in chief
tenant right
tenant righter
tenant-in-chief
tenant-right
tend animals
tend on
tend to
tend to a point
tend to go
tend to show
tend toward
tend towards
tendency chord
tendency play
tendency theory
tendency tone
tendency writing
tender age
tender annual
tender conscience
tender feeling
tender
 heart
tender loving care
tender mercies
tender passion
tender perennial
tender rocket
tender spot
tender susceptibilities
tender thanks
tender your compliments

tender your congratulations
tender your felicitations
tender your resignation
tender-bearded
tender-bladed
tender-bodied
tender-boweled
tender-colored
tender-conscienced
tender-dying
tender-eared
tender-eyed
tender-faced
tender-footed
tender-footedness
tender-foreheaded
tender-handed
tender-hearted
tender-heartedly
tender-hefted
tender-hoofed
tender-hued
tender-looking
tender-minded
tender-mouthed
tender-natured
tender-nosed
tender-personed
tender-rooted
tender-shelled
tender-sided
tender-skinned
tender-souled
tender-taken
tender-tempered
tender-witted
tenderloin steak
tending to
tendinous arch
tendon reflex
tendon sense
tendril climber
tendril-climbing
tene-bricose
tenement building
tenement district
tenement house
tenement of clay

tennessee walking horse
tennis ball
tennis bum
tennis court
tennis elbow
tennis marker
tennis
 play
tennis player
tennis playing
tennis racket
tennis shoe
tennis shoes
tennis-ball
tennis-court
tennis-play
teno-
tenon auger
tenon saw
tenon tooth
tenonto-
tenor behind
tenor clef
tenor covering
tenor drum
tenor horn
tenor octave
tenor tuba
tenor viol
tenor violin
tenpenny nail
tenpin bowling
tense auxiliary
tense logic
tense phrase
tense readiness
tense-drawn
tense-eyed
tense-fibered
tensile strength
tension carriage
tension element
tension fatigue
tension line
tension pulley
tension rod
tension roller
tension zone

tent bed
tent caterpillar
tent dress
tent fly
tent meeting
tent pegger
tent pegging
tent pin
tent pole
tent show
tent stake
tent stitch
tent stripe
tent tree
tent worm
tent-clad
tent-dotted
tent-dwelling
tent-fashion
tent-fly
tent-peg
tent-shaped
tent-sheltered
tent-stitch
tentaculi-
tentative approach
tentative contact
tentative examination
tentative explanation
tentative method
tentative poke
tentatively suggest
tented field
tenter-hook
tenterhook willey
tenth
 muse
tenth's place
tenth-rate
tenui-
tenure by free alms
tenure in chivalry
tenure in free alms
tenure in office
tenure of office
teo-nong
tepary bean
ter-

ter-equivalent
ter-sacred
ter-sanctus
tera-
terai hat
terat-
terbium metal
terbium oxide
tercel gentle
tercel-gentle
terebic acid
terebinic acid
terebinth tree
terephthalic acid
tereti-
tergo-
term attendant
term day
term fee
term hour
term insurance
term loan
term of imprisonment
term paper
term policy
term rate
term settlement
term-time
terminable annuity
terminal case
terminal date
terminal figure
terminal leave
terminal market
terminal moraine
terminal point
terminal speed
terminal velocity
terminate the account
terminating decimal
terminating plan
terminus a quo
terminus ad quem
termite-proof
terms of trade
tern schooner
tern-plate
ternary form

ternate-pinnate
terne metal
terne plate
terpane group
terpene alcohol
terpene hydrate
terpin hydrate
terra a terra
terra alba
terra cariosa
terra catechu
terra cotta
terra damnata
terra
 firma
terra foliata
terra incognita
terra japonica
terra miraculosa
terra muriatica
terra orellana
terra pinguis
terra ponderosa
terra porcellanea
terra pozzuoli
terra putura
terra rosa
terra rossa
terra salitrosa
terra sienna
terra sigillata
terra umbra
terra verde
terra-cotta
terra-cotta lumber
terrace maker
terrace-banked
terrace-fashion
terrace-mantling
terrace-steepled
terraced house
terrae filii
terrae filius
terrain clearance indicator
terrain cure
terrain map
terramara culture
terrapin paws

terrapin scale
terrasse green
terre verte
terre-a-terreishly
terre-tenant
terre-verte
terrestrial globe
terrestrial guidance
terrestrial kingdom
terrestrial planet
terrestrial telescope
terrible thing
territorial court
territorial defense army
territorial division
territorial militia
territorial reserves
territorial system
territorial waters
territory wool
terror tactics
terror-bearing
terror-breathing
terror-breeding
terror-bringing
terror-crazed
terror-driven
terror-fleet
terror-fraught
terror-giving
terror-haunted
terror-inspiring
terror-lessening
terror-mingled
terror-preaching
terror-ridden
terror-riven
terror-shaken
terror-smitten
terror-stirring
terror-stricken
terror-striking
terror-struck
terror-threatened
terror-troubled
terror-wakened
terror-warned
terror-weakened

terroristic
tactics
terry cloth
tersy-versy
tertia tone
tertiary college
tertiary color
tertiary stress
tertiary syphilis
tertium quid
teru-tero
terza rima
tesla coil
tessara-
test act
test animal
test ban
test bar
test blank
test bow
test boy
test case
test clerk
test cutter
test driver
test flight
test frame
test furnace
test game
test glass
test height
test hop
test house
test indicator
test instrument vehicle
test kitchen
test lead
test man
test marker
test match
test meal
test nail
test oath
test object
test one another
test out
test paper
test pattern

test pilot
test pit
test rocket
test room
test run
test solution
test tube
test tubing
test type
test-ban
test-bed
test-tube
test-tube baby
test-tubeful
testaceo-
testament
 dative
tester bed
testify against
testimonial banquet
testimonial dinner
testimony meeting
testing area
testing device
testing engineer
testing engineering
testing equipment
testing ground
testing sample
testing terminal
tetano-
tetanus bacillus
tetanus toxin
tetanus toxoid
tetarto-
tetbrothalein sodium
tete a tete
tete de veau
tete-a-tete
tete-beche
tether-devil
tetiothalein sodium
tetra-
tetra-icosane
tetrad difference
tetradecyl alcohol
tetraethyl lead
tetraethyl pyrophosphate

tetraethylthiuram disulfide
tetragonal system
tetragonal trisoctahedron
tetrahedral kite
tetrahedrite type
tetrahydrol cannabinol
tetrahydroxyadipic acid
tetrakis-hexahedron
tetralogy of Fallot
tetramethyl base
tetrode transistor
tetter berry
tetter-berry
teuto-
tew iron
texas deck
texas fever
texas independence day
texas leaguer
texas ranger
texas tower
text blindness
text edition
text hand
text letter
text pen
text title
text writer
text-book
text-hand
text-letter
text-writer
textbook
editor
textile designer
textile engineer
textile engineering
textile fabric
textile soap
textual critic
textual criticism
textus receptus
th-
thalamo-
thalamo-olivary
thalass-
thale-cress
thall-

thallium oxysulfide
thallium sulfate
thalloid shoot
thallous sulfate
thalofide cell
thanato-
thank God
thank offering
thank you
thank you kindly
thank your stars
thank-offering
thank-you
thank-you-ma'am
thank-you-maam
thanks be to God
thanks to
thanksgiving day
that bald sexton Time
that be
that being so
that being the case
that buttons it up
that dreamless sleep
that fell sergeant
that flattering unction
that goes without saying
that good night
that grim ferryman
that inward eye
that is
that is evident
that is so
that is to be
that is to say
that leaps to the eye
that old bald cheater
that old common arbitrator
that one
that or nothing
that or the other
that orbed continent
that orbed maiden
that time
that unwritten law
that wants discourse of reason
that way
that will be

that's final
that's
 for sure
that's it
that's just it
that's just the thing
that's right
that's that
that's the end of the matter
that's the idea
that's the thing
that's the ticket
that's the very thing
that's the way the ball bounces
that's your lookout
that's your pigeon
that's your tough luck
that-a-way
that-away
thatch cloak
thatch grass
thatch palm
thatch peg
thatch pin
thatch rake
thatch rod
thatch tree
thatch-browed
thatch-headed
thatch-roofed
thatched roof
thaumato-
thaw out
thaw-drop
the Abbey
the Absolute
the Absolute Being
the Absolute Idea
the Academy
the Acropolis
the Adjutant General
the Admiralty
the Adversary
the Advocate
the Air Pump
the All-father
the All-holy
the All-knowing

the All-merciful
the All-powerful
the All-wise
the Almighty
the Altar
the Americas
the Anointed
the Antarctic
the Apocalypse
the Arch-fiend
the Archer
the Archipelago
the Arctic
the Argentine
the Arrow
the Ascension
the Assumption
the Author of Evil
the Axis
the Bab
the Balance
the Balkans
the Baptist
the Big Board
the
Bird of Paradise
the Blessed One
the Blessed Virgin
the Bluegrass
the Book
the Book of Books
the Bowery
the Bread of Life
the Bride of the Lamb
the Bull
the Canaanite
the Cape
the Carolinas
the Cascades
the Catacombs
the Caucasus
the Centaur
the Chained Lady
the Chameleon
the Charioteer
the Christ
the Christ Child
the Church

the City
the Clock
the Coalsack
the Coast
the Colonies
the Colophonian
the Comforter
the Common Enemy
the Commonwealth
the Commonwealth of Nations
the Commune
the Compasses
the Confederacy
the Confederation
the Confessor
the Conquest
the Consoler
the Continent
the Crab
the Crane
the Creation
the Creator
the Cross
the Crow
the Crown
the Cup
the Cyprian
the DT's
the Dakotas
the Dales
the Decalogue
the Deity
the Deluge
the Demon
the Demon Rum
the Depression
the Destinies
the Destroyer
the Deuce
the Devil
the Devil Incarnate
the Devil's pitchfork
the Dickens
the Digest
the Dirae
the Directory
the Divine
the Divine Liturgy

the Divinity
the Dog Star
the Dolphin
the
Dominion
the Door
the Dorado Fish
the Dove
the Doxology
the Dragon
the Eagle
the East
the Eddas
the Eight
the Elevation
the Enemy
the Enlightenment
the Erinyes
the Essence of the Universe
the Establishment
the Eternal
the Eternal Being
the Eucharist
the Eumenides
the Everlasting
the Everlasting Father
the Evil One
the Evil Spirit
the Exchange
the Exile
the Exodus
the Fall
the Father
the Father of Evil
the Father of Lies
the Fathers
the Fens
the Fiend
the First Cause
the Fishes
the Fleet
the Flood
the Fly
the Flying Fish
the Foal
the Forerunner
the Forum
the Foul Fiend

the Four Freedoms
the Four Hundred
the Fund
the Furies
the Furnace
the Galilean
the Garter
the Giant Hunter
the Giraffe
the Gironde
the Goat
the Good Book
the Good Shepherd
the Gospel
the Gracchi
the Graces
the Grange
the Great Bear
the Great Depression
the Great Divide
the Great Dog
the Great Spirit
the Guardian of Mankind
the Hare
the Hebrides
the Herdsman
the Hill
the Holocaust
the Holy Father
the Holy Ghost
the Holy
Sacrament
the Holy See
the Holy Spirit
the Honorable
the Horn
the Horned Goat
the Hours
the Hub
the Hunting Dogs
the Hypostatic Union
the I
the Incarnation
the Indian
the Indies
the Infant Jesus
the Infinite
the Infinite Being

the Infinite Spirit
the Inquisition
the Intercessor
the Jewish Law
the Judge
the Judgment
the Keel
the King of Light
the King's English
the King's evil
the Kirk
the Kremlin
the Lady in the Chair
the Lady of the Lake
the Lamb
the Larger Dog
the Last Day
the Law
the Left
the Legion
the Lesser Bear
the Lesser Dog
the Lesser Lion
the Life
the Light of the World
the Lion
the Litany
the Little Dog
the Little Fox
the Liturgy
the Lizard
the Loop
the Lord Buddha
the Lord of Wisdom
the Lord's Prayer
the Lowlands
the Lynx
the Lyre
the Mafia
the Maker
the Man
the Man of Sorrows
the Mast
the Master
the McCoy
the Mediator
the Method
the Microscope

the Monarch
the Mosaic Law
the Most Excellent
the Most Honorable
the Most Noble
the Most Reverend
the Most Worshipful
the Most Worthy
the
Mountain
the Muses
the Nativity
the Nazarene
the Net
the Nine
the Noble
the North Star
the Northern Crown
the Northwest
the Now Generation
the Octant
the Old Adam
the Old Enemy
the Old Gentleman
the Old Man
the Old Serpent
the Olympics
the Omnipotent
the Omniscient
the Only-Begotten
the Orient
the Painter
the Pale Horse
the Paphian
the Peacock
the Peninsula
the Pentagon
the Phoenix
the Plain
the Pole Star
the Porch
the Potteries
the Preparation
the Preserver
the Prince of Darkness
the Prince of the Devils
the Prince of this world
the Promised Land

the Prophet
the Prophets
the Psalmist
the Psalms
the Psalter
the Psaltery
the Queen's English
the Ram
the Rand
the Reaper
the Red Planet
the Reef
the Regenerator
the Reproaches
the Restoration
the Rev Dr Dryasdust
the Reverend
the Right Honorable
the Right Reverend
the Risen
the River Po
the Roman Emperor
the Rule
the Rump
the Sacrament
the Sails
the Salon
the Scales
the Scandinavian Peninsula
the Scorpion
the Scriptures
the Sculptor
the
Sculptor's Tool
the Sea Serpent
the Self-determined
the Serpent
the Serpent Bearer
the Seventy
the Sextant
the Shepherd
the Shield
the Ship Argo
the Shires
the Slump
the Snowies
the Snowy
the Son

the Sorrowful Mother
the South Seas
the Southern Crown
the Southern Fish
the Southern Triangle
the Spirit
the Spirit of God
the Spirit of Truth
the Stagirite
the Star-Spangled Banner
the States
the Stern
the Street
the Sudeten
the Sun of Righteousness
the Supreme Being
the Supreme Soul
the Swan
the Taal
the Table
the Teacher
the Telescope
the Tempter
the Thousand and One Nights
the Toucan
the Triangle
the True Vine
the Truth
the Twelve
the Twins
the Ukraine
the Unicorn
the Union
the Universal Ego
the Universal Self
the Unmoved Mover
the VIP's
the Vatican
the Vedas
the Very Reverend
the Vine
the Virgin
the Virgin Mary
the Virgin Mother
the Wandering Jew
the Water Bearer
the Water Carrier
the Water Snake

the Way
the Whale
the Wicked One
the Wigwam
the Winged Horse
the Wise Lord
the Wise One
the
Wolf
the Wooden Horse
the Word
the Word Made Flesh
the Word of God
the Wreath
the Writings
the Yukon
the abroad
the absolute truth
the abstract
the absurd
the abyss
the administration
the affirmative
the affluent life
the air
the almighty dollar
the alphabet
the altogether
the always wind-obeying deep
the amount
the ancient and honourable
the angel of the bottomless pit
the anouilh
the ape of wisdom
the arch of heaven
the archenemy
the arms of Morpheus
the art of conversation
the art of hoping
the art of the possible
the article
the arts
the assured
the atmosphere of Soul
the attainable
the author of authors
the authorities
the avarice of power

the ax
the back of beyond
the backs
the bad
the battle of life
the be-all and the end-all
the beast
the beast with many heads
the beasts of the field
the beaten path
the beaten track
the beautiful
the beezie-weezies
the believing
the bends
the best
the best ever
the best people
the best words in the best order
the best you can
the best you
know how
the beyond
the big battalions
the big idea
the big lie
the big picture
the big smoke
the big stick
the big time
the big top
the bird
the biter bit
the black art
the blahs
the blaze of noon
the blessed
the blind
the blind leading the blind
the block
the blood of life
the bludgeon
the blue
the blue planet
the blue serene
the blues
the boards
the book

the boondocks
the boot
the boot in the face
the border
the bosom of our rest
the bottle
the bottom line
the bottomless pit
the bounce
the bounding main
the boyhood of the year
the brandy of the damned
the brass
the brave
the breaks
the brine
the briny
the briny deep
the brush
the bubble reputation
the buff
the bum's rush
the bunch
the burning tapers of the sky
the bush
the business of barbarians
the business world
the campus
the case
the cat's meow
the cat's pajamas
the chair
the chances are
the chase
the children of God
the children of light
the choir invisible
the chosen
the chuck
the church
the church universal
the cinema
the circumcision
the
citizenry
the clash of creeds
the classes
the classics

the clear hyaline
the clinches
the clocksetter
the cloth
the cloven hoof
the club
the coast is clear
the cold shoulder
the comic
the common
the common herd
the commonplace
the community
the compleat
the compleat angler
the complete
the concrete
the condition being such
the confessional
the confessionary
the conn
the conscious
the contrary
the conventions
the cool of the evening
the cops
the corpus
the corridors of power
the couch
the count
the country
the courage of your convictions
the course of events
the courts
the cradle
the creed
the creeps
the cricket no relief
the crippled
the crowd
the crown
the crown of life
the cud
the cunning of the serpent
the cup
the cup that cheers
the curse
the curse of Eve

the daily round
the damned
the dance
the danger is past
the dangerous age
the dansant
the dark
the dark sanctuary of incapacity
the data
the dawn of day
the dawn's early light
the day after tomorrow
the days of our years
the
days that are no more
the dead
the dead Summer's soul
the deaf
the deal is off
the deceased
the deep
the deep blue sea
the deep sea
the deeps
the defensive
the defunct
the departed
the depths
the desk
the details
the deuce you say
the devil and all
the devil and the deep blue sea
the devil to pay
the devil you say
the devourer of things
the die is cast
the dim past
the direct opposite
the disadvantaged
the dismal science
the dismals
the dispossessed
the distance
the distressed
the dizzy rounds
the doldrums
the dolefuls

the domain of the impossible
the domain of the possible
the dome of Thought
the dominion of absurdity
the dope
the down-and-out
the downward path
the downward slope
the dragon
the dream of those that wake
the dress of thoughts
the drill
the duration
the earth
the elect
the elements
the empyrean
the enclosed
the end of the line
the end of the rainbow
the ends of the earth
the enemy of creativeness
the ensemble
the entirety
the eternal feminine
the eternal fitness
of things
the evil
the evil one
the evil shadow of aspiration
the exact truth
the executive
the expiring day
the exterior
the eye
the fact of the matter
the facts
the facts of the case
the facts of the matter
the fair thing
the faith
the faithful
the family way
the fancy
the far side of
the fat is in the fire
the fat of the land
the feasible

the feast of vultures
the felon winds
the female of the human species
the few
the field
the fights
the first of painters
the first philosophy
the first theology
the flesh
the fleshly
the flip side
the flowing bowl
the following
the footlights
the fore
the forgotten man
the fount whence honour springs
the four corners of the earth
the four elements
the fourth estate
the fowl of the air
the front
the full count
the funny side
the fur fly
the future
the fuzz
the gallows
the gantlet
the gapes
the gas chamber
the gate
the gate of life
the gen
the general drift
the general public
the general tendency
the genuine article
the glad
the glad hand
the glad season
of life
the glassy sea
the glorious lamp of Heav'n
the go-ahead
the go-by
the goat god

the god of my idolatry
the gods
the golden touch
the golden years
the good
the good folk
the good hereafter
the good life
the good people
the good side of
the goods
the governess of floods
the government
the grades
the grand style
the grape
the grave
the gray-hooded Ev'n
the great
the great beyond
the great hereafter
the great majority
the great out-of-doors
the great unknown
the great unnumbered
the great unwashed
the great white throne
the great world of light
the greater gods
the greater number
the greatest
the greatest innovator
the greatest number
the green light
the grill
the ground of being
the groves of Academe
the guillotine
the halls of learning
the halt
the handicapped
the handsome thing
the happy land
the hard truth
the hard way
the hard-of-hearing
the harmonious voice of creation
the have-nots

the haves
the hawk
the hay
the health of the soul
the hearing of deaf actions
the heebie-jeebies
the
height of your ambition
the helm
the help
the herd
the hereafter
the hills
the hoi polloi
the hole
the holy
the holy of holies
the honest truth
the honest-to-God truth
the honey-heavy dew of slumber
the horde
the horrors
the hot seat
the how
the humanities
the hump
the hunted
the hurdles
the idea
the illimitable
the image of life
the immortals
the impossible
the in thing
the incalculable
the individual
the ineffable
the inenarrable
the inexpressible
the infirm
the information
the ingroup
the inner circle
the ins
the intelligent
the intense inane
the interests
the intrinsic truth

the invisible
the iron entering the soul
the irrevocable Past
the jackboot
the jaundice of the soul
the jerks
the jig is up
the jimjams
the journey's end
the jumps
the kibosh on
the king of terrors
the knife
the know
the knowing
the koine
the lam
the lambent easy light
the lame
the last extremity
the last refuge of a scoundrel
the last straw
the last thing civilized by man
the last thing you expect
the
last word
the latest
the latest thing
the latest wrinkle
the latter end
the law
the law of the jungle
the lay of the land
the lead
the legitimate
the lesser gods
the letter
the life of Riley
the light fantastic
the lightning's gleaming rod
the like
the like of
the likes of
the limit
the limit of your patience
the line
the little O
the little men

the little people
the livelong day
the living
the living and breathing
the logic of the heart
the long and short of
the long and the short of
the long green
the lord's Supper
the lost
the lot
the loved one
the low'ring element
the lowdown
the lower cut
the loyal opposition
the luscious liquor
the mailed fist
the main course
the major deities
the majority
the majors
the man in the White House
the man in the street
the many
the market
the marketplace
the mass of the people
the masses
the matter is ended
the measure of all things
the measure of the year
the melting pot
the microscope of the judgment
the middle of nowhere
the middle years
the mighty
the
military
the millennium
the million
the mind's immodesty
the ministry
the minor deities
the minority
the minors
the mirror image
the mirror of all courtesy

the mirror of the soul
the mob
the moon
the moon personified
the more it changes
the more it's the same thing
the mores
the morn
the morrow
the mosaic of the Air
the most
the mother of devotion
the mother of prejudice
the movies
the multitude
the mundane
the music of the soul
the music of the spheres
the mystic wine of Night
the mystical jewels of God
the naked ape
the naked truth
the native hue of resolution
the nature of the beast
the nature of things
the necessary
the neck up
the needful
the needle
the needy
the negative
the new look
the new music
the nitty-gritty
the nod
the nonce
the noose
the normal
the normal order of things
the not ourselves
the now
the nth degree
the nude
the numbers
the numbers game
the numinous
the nursery
the nuts

the observed of all observers
the occult
the odds are
the offending Adam
the old
Adam
the old college spirit
the old college try
the old country
the old heave-ho
the old man
the old man of the sea
the old one-two
the old woman
the olden time
the only animal that blushes
the only son of Mary
the only universal tongue
the open
the open air
the open road
the opening eyelids of the morn
the opposite extreme
the opposition
the ordinary
the orthodox
the other
the other America
the other day
the other extreme
the other half
the other side
the other side of
the other side of the coin
the other side of the picture
the other side of the tracks
the other way around
the out-of-doors
the painter of the soul
the palace of the Soul
the pale child
the pale populace of Heaven
the palpable obscure
the particular
the particulars
the past
the past again
the people

the people in the front office
the people upstairs
the perfection of nature
the petrifaction of feelings
the physic of the field
the pick
the picture
the pictures
the pill
the pip
the pit
the pits
the plain style
the plain truth
the
planet
the plate
the plaything of fortune
the pledge
the plumeless genus of bipeds
the plural
the point
the polar opposite
the poor
the poor man's Parnassus
the populace
the population
the possible
the power elite
the power structure
the powerless
the powers that be
the present
the present age
the present day
the present hour
the present juncture
the present moment
the present occasion
the present time
the press
the prime work of God
the principality
the printing press of all ages
the profane
the profession
the proof of the pudding
the proper thing

the proper thing to do
the proprieties
the prosecution
the proud
the provinces
the prudent
the public
the pulpit
the purple
the quick
the quick and the dead
the quiet-voiced elders
the rabble
the rack
the rackets
the radiant sun
the rage
the rat race
the raw
the ready
the real McCoy
the real Simon Pure
the real thing
the realized ideal
the realm of possibility
the realm of the impossible
the record
the red sweet wine of youth
the reign
of Spirit
the religious
the remembrance of things past
the reprobate
the rest is silence
the reverend mother
the reverse image
the rhythmic
the rich
the right Reverend
the right of the strong
the right side of
the right thing
the right thing to do
the right things
the right to live as we wish
the righteous
the ring
the road

the road to ruin
the rope
the rough
the round
the rounds
the ruddy cup
the rule and pattern of speech
the rulers
the ruling spirit of all things
the run of
the runaround
the runs
the sack
the sacred
the salt of the earth
the same
the same damn thing
the same difference
the same old thing
the same way
the saved
the say
the say-so
the scenes
the scoop
the score
the screaming meemies
the screen
the sea-mouth of mortality
the season
the season's look
the second soul of the unhappy
the secular
the seed of Chaos
the seemly
the seen
the self
the sensible
the sere
the serpent
the seven seas
the shades
the shadow of a shade
the shady side
the shakes
the shape of things
the

shining ones
the ship
the shoe is on the other foot
the sick
the sightless
the silver livery of advised age
the silver screen
the simple truth
the sincerest form of flattery
the sinews of affairs
the sinews of war
the size of it
the skids
the sleep of the dead
the sleeping partner of life
the slip
the slums
the small hours
the sniffles
the snuffles
the sober truth
the social evil
the soft down of manhood
the soft underbelly of Europe
the soil
the son of Mary
the soul of the world
the soul of wit
the special
the specific
the specifics
the speech of angels
the spit and image of
the spoken word
the sport of fortune
the sport of kings
the squirrel cage
the stage
the stake
the state of affairs
the status quo
the stern truth
the sticks
the still
the stork
the storm blown over
the storm has blown over
the story

the straight and narrow
the straight of it
the straight truth
the strange
the string
the strong
the strong arm
the stuff
the subject is closed
the sublime
the sublime style
the suit
of night
the summer of your youth
the summit
the supernatural
the supersensible
the supreme fiction
the suspicion of a suspicion
the sweat of your brow
the sweet by-and-by
the sweeter banquet of the mind
the sword
the syndicate
the tag-rag people
the temporal
the theater
the thing
the third dimension
the third estate
the thirtieth of February
the throne
the thunder
the time
the time being
the time of the singing of birds
the times
the tongue of vanity
the tooth of time
the top
the top of your bent
the tops
the touch
the toy of fortune
the trade of kings
the tragic
the transgression of the law
the treadmill

the treasury of everlasting joy
the tribute due unto nature
the tropics
the trots
the true
the true church
the truth
the truth of the matter
the tullies
the turf
the two
the unalloyed truth
the unconscious
the undead
the underground
the underprivileged
the undersigned
the understanding
the underworld
the unemployable
the unemployed
the unfamiliar
the unforeseen
the unholy
the unique
the
universal sovereign
the unknowable
the unknown
the unlooked-for
the unqualified truth
the unrighteous
the unrolled scroll of prophecy
the unseeing
the unseen
the unspeakable
the unutterable
the unvarnished truth
the unwritten law
the urban poor
the usual
the vanquished
the various turns of chance
the vasty deep
the veil
the veriest
the very May-morn of his youth
the very Reverend

the very acme and pitch
the very best
the very model
the very pineapple of politeness
the very pink of courtesy
the very thing
the very witching time of night
the very words
the visible
the void
the void above
the vote
the vulgar herd
the wakey nights
the wandering Moon
the warder of the brain
the wat'ry star
the wavy waste
the way it is
the way it looks
the way it shapes up
the way of
the way of it
the way of the world
the way of things
the way the ball bounces
the way the cards fall
the way the cookie crumbles
the way the wind blows
the way things are
the way things fall
the way things go
the way you are
the
way you feel
the way you think
the ways of the world
the wealthy
the weary round
the weather
the weed
the well to do
the whatfor
the wheel
the wheels of justice
the wherefore
the wherewith
the wherewithal

the while
the white radiance of eternity
the whitening shower
the whites
the whole
the whole bit
the whole night
the whole range
the whole spectrum
the whole story
the whole truth
the whole way to
the why
the why and wherefore
the whyfor
the wicked
the wild
the wind personified
the winds
the wine of life
the wine-dark sea
the wings of the wind
the wink
the wink of an eye
the wire
the wise
the womb of time
the wooded mountains
the word 'go'
the works
the world
the world above
the world of commerce
the world of trade
the world of waters wild
the world over
the worldly
the worse for
the worse for liquor
the worse for wear
the worst
the worst of all evils
the worst way
the wretched of the earth
the written word
the wrong side of forty
the wrong way
the years that are past

the yellow
 leaf
the-
theater lighting
theater man
theater of cruelty
theater of operations
theater of the absurd
theater of war
theater part
theater world
theater, the
theater-craft
theater-in-the-round
theatre of cruelty
theatre of the absurd
theatre stall
theatre-in-the-round
theatrical agent
theatrical makeup
theatrical performance
theatrical season
theatro-
theco-
theezan tea
theft insurance
theft-boot
thegn-born
thegn-right
thematic apperception test
thematic development
thematic map
theme and variations
theme park
theme song
then and there
then as previously
then-a-days
then-clause
thence-from
theo-
theobroma oil
theological hermeneutics
theological school
theological seminary
theological student
theological virtue
theological virtues

theologico-
theologo-
theology of crisis
theophylline ethylenediamine
theorem of the mean
theoretic atom
theoretic atoms
theoretical arithmetic
theoretical basis
theoretical chemistry
theoretical construct
theoretical economics
theoretical justification
theoretical
linguistics
theoretical mechanics
theoretical physics
theoretical specific impulse
theoretical structure
theory of beauty
theory of being
theory of equations
theory of evolution
theory of games
theory of history
theory of knowledge
theory of probability
theory of relativity
theory-blind
theory-blinded
theory-building
theory-making
theory-spinning
therapeutic abortion
therapeutic index
there and then
there is no help for it
there is no helping it
there is no question
there is not a shadow of doubt
there is nothing more to be said
there is reason to believe
there's no place like home
there's no two ways about it
therefore because of this
therefore on account of this
therio-
therm-

thermal ammeter
thermal barrier
thermal conductivity
thermal cracking
thermal detector
thermal detectors
thermal diffusion
thermal efficiency
thermal engine
thermal equator
thermal equilibrium
thermal neutron
thermal radiation
thermal reactor
thermal shock
thermal spring
thermal timing relay
thermal unit
thermic
fever
thermionic cathode
thermionic current
thermionic emission
thermionic grid emission
thermionic instrument
thermionic tube
thermionic tube circuit
thermionic valve
thermite process
thermo development
thermo-
thermo-inhibitory
thermo-unstable
thermocouple instrument
thermocouple meter
thermocouple pyrometer
thermodynamic equilibrium
thermodynamic potential
thermodynamic temperature
thermodynamics pot
thermoelectric couple
thermoelectric current
thermoelectric effect
thermoelectric thermometer
thermoelectromotive force
thermometer pointer
thermometric titration
thermonuclear arsenal

thermonuclear attack
thermonuclear bomb
thermonuclear explosion
thermonuclear fusion
thermonuclear power
thermonuclear reaction
thermonuclear warhead
thermonuclear weapons
thermos bottle
thermos flask
thermosetting plastic
thero-
thesaurus dictionary
these days
thesis dramatist
thesis novel
thesis novelist
thesis play
thesis playwright
theta function
thi-
thiacetic acid
thiazine dye
thick and thin
thick
as flies
thick as hail
thick as thieves
thick darkness
thick hide
thick of hearing
thick of things
thick register
thick shade
thick shake
thick shell
thick skin
thick soup
thick space
thick squall
thick with
thick-ankled
thick-barked
thick-barred
thick-beating
thick-bedded
thick-billed
thick-blooded

thick-blown
thick-bodied
thick-bossed
thick-bottomed
thick-brained
thick-breathed
thick-cheeked
thick-clouded
thick-coated
thick-coming
thick-coming fancies
thick-cut
thick-decked
thick-descending
thick-drawn
thick-eared
thick-fingered
thick-flaming
thick-flanked
thick-flashing
thick-fleeced
thick-fleshed
thick-flowing
thick-foliaged
thick-footed
thick-girthed
thick-growing
thick-grown
thick-haired
thick-head
thick-headed
thick-headedness
thick-hided
thick-hidedness
thick-jawed
thick-jeweled
thick-knee
thick-kneed
thick-knobbed
thick-laid
thick-leaved
thick-legged
thick-lined
thick-lipped
thick-looking
thick-maned
thick-necked
thick-packed

thick-pated
thick-peopled
thick-piled
thick-pleached
thick-plied
thick-ribbed
thick-rinded
thick-rooted
thick-rusting
thick-set
thick-shadowed
thick-shafted
thick-shelled
thick-sided
thick-sighted
thick-skinned
thick-skulled
thick-soled
thick-sown
thick-spaced
thick-spread
thick-spreading
thick-sprung
thick-stalked
thick-starred
thick-stemmed
thick-streaming
thick-swarming
thick-tailed
thick-tailed
ray
thick-thronged
thick-toed
thick-tongued
thick-toothed
thick-topped
thick-voiced
thick-walled
thick-warbled
thick-winded
thick-witted
thick-wittedly
thick-wittedness
thick-wooded
thick-woven
thick-wristed
thick-wrought
thickness gauge

thickness of speech
thickness piece
thief ant
thief glass
thief tube
thief-resisting
thief-taker
thieves' cross
thigh boot
thigh boots
thigh puff
thigmo-
thill horse
thill-horse
thimble lily
thimble skein
thimble-crowned
thimble-eye
thimble-eyed
thimble-pie
thimble-shaped
thimble-sized
thin air
thin as a lath
thin as a rail
thin away
thin down
thin end of the wedge
thin ice
thin margin
thin off
thin
out
thin person
thin register
thin skin
thin soup
thin space
thin wine
thin-ankled
thin-armed
thin-barked
thin-bedded
thin-bellied
thin-belly
thin-bladed
thin-blooded
thin-blown

thin-bodied
thin-bottomed
thin-brained
thin-cheeked
thin-clad
thin-coated
thin-cut
thin-descending
thin-eared
thin-faced
thin-featured
thin-film
thin-flanked
thin-fleshed
thin-flowing
thin-frozen
thin-fruited
thin-grown
thin-haired
thin-headed
thin-hipped
thin-laid
thin-leaved
thin-legged
thin-lined
thin-lipped
thin-lippedly
thin-lippedness
thin-necked
thin-officered
thin-peopled
thin-pervading
thin-rinded
thin-set
thin-shelled
thin-shot
thin-skinned
thin-skinnedness
thin-soled
thin-sown
thin-spread
thin-spun
thin-stalked
thin-stemmed
thin-veiled
thin-voiced
thin-walled
thin-worn

thin-woven
thin-wristed
thin-wrought
thing added
thing copied
thing desired
thing done
thing given as a pledge
thing imagined
thing of beauty
thing of interest
thing of naught
thing, the
thing-in-itself
thing-it-self
thing-word
things
 going against one
things going against you
things to be done
things to do
things-in-themselves
think about
think affirmatively
think aloud
think back
think best
think better of
think better of it
think dependable
think downbeat
think factory
think fit
think good
think hard
think highly of
think ill of
think improbable
think it over
think likely
think little of
think much of
think negatively
think no more of
think no more of it
think nothing of
think of
think one is it

think only of others
think out
think out loud
think over
think piece
think positively
think probable
think proper
think reliable
think tank
think that way about
think the best of
think the world of
think the worst of
think through
think too much of
think twice
think twice about
think unlikely
think up
think well of
think well of yourself
think worlds of
think your head off
think your shit doesn't stink
think-so
think-tank
thinking aloud
thinking cap
thinking machine
thinking of it later
thinking out
thinking over
thinking
power
thinking shop
thinking through
thinned-out
thinning agent
thio acid
thio ether
thio salt
thio-
thio-ether
thioacetic acid
thioallyl ether
thioantimonic acid
thioarsenic acid

thioarsenious acid
thiocyan group
thiocyanic acid
thiocyano group
thiocyano radical
thioethyl alcohol
thioindigo red B
thioindigo red b
thiol-
thion-
thionic acid
thiopental sodium
thiopentone sodium
thiophosphoric acid
thiosulfuric acid
thiosulphuric acid
third astute
third base
third baseman
third best
third class
third degree
third dimension
third ear
third estate
third estate, the
third eyelid
third force
third hand
third house
third law of motion
third law of thermodynamics
third man
third market
third mate
third mortgage
third officer
third order
third part
third party
third party procedure
third person
third position
third rail
third rank
third reading
third sex
third stomach

third stream
third string
third stringer
third ventricle
third world
third-class
third-class mail
third-degree
third-degree burn
third-degreed
third-degreing
third-estate
third-force
third-hand
third-order
third-rail
third-rate
third-rateness
third-rater
third-string
third-world
thirst
 after
thirst country
thirst for
thirst for knowledge
thirst quencher
thirst-abating
thirst-allaying
thirst-creating
thirst-inducing
thirst-maddened
thirst-quenching
thirst-raising
thirst-scorched
thirst-tormented
thirsty for knowledge
thirsty soul
thirteen-day
thirteen-inch
thirteen-lined
thirteen-lined gopher
thirteen-pence halfpenny
thirteen-ringed
thirteen-square
thirteen-stone
thirteen-story
thirteenth chord

thirty-acre
thirty-day
thirty-eight
thirty-eighth
thirty-fifth
thirty-first
thirty-five
thirty-foot
thirty-four
thirty-fourth
thirty-gunner
thirty-hour
thirty-inch
thirty-knot
thirty-mile
thirty-nine
thirty-ninth
thirty-one
thirty-pound
thirty-second
thirty-second note
thirty-second rest
thirty-seven
thirty-seventh
thirty-six
thirty-sixth
thirty-third
thirty-thirty
thirty-three
thirty-ton
thirty-two
thirty-twomo
thirty-twomos
thirty-word
thirty-yard
thirty-year
this
AM
this PM
this aft
this afternoon
this and no other
this and that
this bank and shoal of time
this being so
this big
this day
this day and age

this goodly frame
this hour
this instant
this man's army
this minute
this moment
this morning
this night
this one
this pendent world
this point
this quintessence of dust
this scepter'd isle
this seat of Mars
this second
this single
this size
this stage
this very minute
this way
this world
this-a-way
this-way-ward
this-worldian
this-worldliness
this-worldly
this-worldness
thistle ball
thistle beard
thistle butterfly
thistle cock
thistle crown
thistle dollar
thistle family
thistle finch
thistle funnel
thistle noble
thistle poppy
thistle saffron
thistle sage
thistle tube
thistle-down
thistle-finch
thiuram disulphide
thompson submachine gun
thomsen's disease
thong leather
thong seal

thoraci-
thoracic duct
thoracic surgery
thoraco-
thoracolumbar nervous system
thorium dioxide
thorium emanation
thorium nitrate
thorium
oxide
thorium series
thorn apple
thorn broom
thorn crown
thorn devil
thorn forest
thorn hedge
thorn in the flesh
thorn in the side
thorn in your flesh
thorn letter
thorn locust
thorn oyster
thorn palm
thorn plum
thorn poppy
thorn tree
thorn-apple
thorn-bearing
thorn-bound
thorn-bush
thorn-covered
thorn-crowned
thorn-encompassed
thorn-headed
thorn-hedge
thorn-hedged
thorn-marked
thorn-pricked
thorn-resisting
thorn-set
thorn-strewn
thorn-tree
thorn-wounded
thorn-wreathed
thornback ray
thornbill warbler
thorny problem

thorny-backed
thorny-edged
thorny-handed
thorny-pointed
thorny-pricking
thorny-thin
thorny-twining
thoro-
thorough bass
thorough brace
thorough light
thorough stone
thorough-
thorough-bind
thorough-bore
thorough-cleanse
thorough-dress
thorough-dry
thorough-felt
thorough-fought
thorough-humble
thorough-light
thorough-lighted
thorough-line
thorough-made
thorough-paced
thorough-pin
thorough-ripe
thorough-shot
thorough-stain
thorough-stitch
thou breath of Autumn's
being
thou deep and dark blue ocean
thou scarlet sin
thou unrelenting past
thou weed
thou-shalt-not
though the heavens may fall
thought control
thought disorder
thought disturbance
thought reader
thought reading
thought transference
thought writing
thought-abhorring
thought-bewildered

thought-burdened
thought-challenging
thought-concealing
thought-conjuring
thought-depressed
thought-exceeding
thought-executing
thought-fed
thought-fixed
thought-free
thought-giving
thought-hating
thought-haunted
thought-heavy
thought-heeding
thought-hounded
thought-humbled
thought-imaged
thought-inspiring
thought-instructed
thought-involving
thought-jaded
thought-kindled
thought-laden
thought-lighted
thought-mad
thought-mastered
thought-meriting
thought-moving
thought-numb
thought-out
thought-outraging
thought-pained
thought-peopled
thought-poisoned
thought-pressed
thought-provoking
thought-read
thought-reading
thought-reviving
thought-ridden
thought-saving
thought-set
thought-shaming
thought-sounding
thought-stirring
thought-straining
thought-swift

thought-tight
thought-tinted
thought-tracing
thought-unsounded
thought-winged
thought-working
thought-worn
thought-worthy
thousand
 dollars
thousand island dressing
thousand million
thousand-acre
thousand-dollar
thousand-dollar bill
thousand-eyed
thousand-footed
thousand-guinea
thousand-handed
thousand-headed
thousand-headed kale
thousand-hued
thousand-jacket
thousand-leaf
thousand-legged
thousand-legger
thousand-legs
thousand-mile
thousand-pound
thousand-round
thousand-sided
thousand-souled
thousand-voiced
thousand-year
thousandth's place
thraco-phrygian
thrall-less
thrall-like
thrall-likethrallborn
thrash about
thrash out
thrash over
thrash soundly
thrasher shark
thrasher whale
thrashing-floor
thrashing-machine
thrashing-mill

thread angle
thread bar
thread blight
thread board
thread cabinet
thread cell
thread count
thread counter
thread cutter
thread drawer
thread drawing
thread dresser
thread eel
thread escutcheon
thread fungus
thread gauge
thread
generator
thread herring
thread insert
thread lace
thread lubricator
thread maker
thread mark
thread miller
thread moss
thread paper
thread protector
thread roller
thread spinner
thread splicer
thread spooler
thread tangle
thread winder
thread your way
thread-cutting
thread-leaved
thread-legged
thread-legged bug
thread-lettered
thread-line fishing
thread-marked
thread-measuring
thread-mercerizing
thread-milling
thread-needle
thread-paper
thread-shaped

thread-the-needle
thread-waisted
thread-winding
thread-worn
threaded glass
threader-up
threading lathe
threading machine
threading tool
threadneedle street
threat to health
threatening course
three R's
three Rs
three balls
three birds
three estates
three hours
three hundred
three o' cat
three o'clock
three of a kind
three old cat
three parts
three percent
three r's
three sheets in
three sheets to the wind
three times
three-D
three-a-cat
three-accent
three-acre
three-act
three-aged
three-aisled
three-alarm fire
three-and-a-halfpenny
three-angled
three-arched
three-arm
three-arm
protractor
three-armed
three-awned
three-bagger
three-ball
three-ballmatch

three-banded
three-bar
three-base hit
three-basehit
three-bearded
three-bid
three-blade
three-bladed
three-bodied
three-bolted
three-bottle
three-bottom
three-bottom plow
three-bout
three-branch
three-branched
three-bushel
three-by-four
three-capsuled
three-card
three-card lant
three-card loo
three-card monte
three-card trick
three-celled
three-centered arch
three-charge
three-charge rate
three-chinned
three-circle
three-circuit
three-circuit switch
three-class
three-class system
three-clause
three-cleft
three-coat
three-cocked
three-color
three-color photography
three-color printing
three-color process
three-color theory
three-colored
three-colour
three-component
three-coned
three-corded

three-corner
three-cornered
three-cornered hat
three-cornered needle
three-corneredness
three-course
three-crank
three-crowned
three-cup
three-cylinder
three-day
three-day fever
three-day
measles
three-dayed
three-deck
three-deck vessel
three-decked
three-decker
three-deep
three-dimensional
three-dimensional chess
three-dimensional display
three-dimensional photography
three-dimensional war
three-dimensional wave
three-dimensionalness
three-dip
three-dropped
three-eared
three-echo
three-edged
three-effect
three-electrode
three-em space
three-eyed
three-faced
three-farthing
three-farthings
three-fathom
three-fibered
three-field
three-figure
three-fingered
three-floored
three-flowered
three-fold
three-foot

three-footed
three-forked
three-formed
three-four time
three-fourths
three-fruited
three-gaited
three-grained
three-groined
three-groove
three-grooved
three-guinea
three-halfpence
three-halfpenny
three-halfpennyworth
three-hand
three-handed
three-headed
three-high
three-hinged
three-hooped
three-horned
three-horse
three-hour
three-in-hand
three-in-one
three-inch
three-index
three-iron
three-island ship
three-jointed
three-layered
three-leaf
three-leafed
three-leaved
three-legged
three-legged
race
three-letter
three-lettered
three-life
three-light
three-line
three-lined
three-lipped
three-lobed
three-man
three-mast

three-masted
three-master
three-mile
three-mile limit
three-minute
three-minute glass
three-month
three-monthly
three-mouthed
three-move
three-mover
three-name
three-necked
three-nerved
three-ounce
three-out
three-ovuled
three-pair
three-part
three-part harmony
three-part time
three-parted
three-pass
three-peaked
three-petaled
three-phase
three-phase alternating current
three-phase alternator
three-phase motor
three-phase resistance welder
three-phased
three-phaser
three-piece
three-piece suit
three-pile
three-piled
three-piler
three-pint
three-plait
three-ply
three-point
three-point landing
three-point perspective
three-point problem
three-point switch
three-point turn
three-pointed
three-pointing

three-position
three-poster
three-pound
three-pound piece
three-pounder
three-power receiver
three-pronged
three-quality
three-quart
three-quarter
three-quarter
back
three-quarter bed
three-quarter binding
three-quarter nelson
three-quarter time
three-quarter tone
three-quarter turn stair
three-quarter vamp
three-quarter-bred
three-quarters nelson
three-rail
three-ranked
three-reel
three-ribbed
three-ridge
three-ring
three-ring circus
three-ringed
three-ringed circus
three-roll
three-room
three-roomed
three-row
three-rowed
three-sail
three-salt
three-scene
three-second
three-seeded
three-shanked
three-shaped
three-shilling
three-sided
three-sidedness
three-sixty
three-soled
three-space

three-span
three-speed
three-spined
three-spored
three-spot
three-spread
three-square
three-square file
three-stage rocket
three-star
three-star general
three-step
three-step rocket
three-sticker
three-storied
three-story
three-strand
three-stranded
three-stringed
three-striped
three-striper
three-styled
three-suited
three-syllable
three-syllable law
three-syllabled
three-tailed
three-thorned
three-thorned acacia
three-thread
three-throw
three-tie
three-tie
joint
three-tier
three-tiered
three-time
three-tined
three-toed
three-toed woodpecker
three-toes
three-ton
three-tongued
three-toothed
three-toothed cinquefoil
three-torque
three-tripod
three-up

three-valued
three-valved
three-volume
three-way
three-way receiver
three-way spread
three-way switch
three-wayed
three-week
three-weekly
three-wheeled
three-wheeler
three-winged
three-wire
three-wire cable
three-wire generator
three-wire system
three-wive
three-woods
three-wormed
three-year
three-year-old
three-years
threefold block
threefold purchase
threefold tackle
threepenny bit
threepenny piece
threescore and ten
threescore years and ten
thresh out
thresh over
thresher shark
thresher whale
threshing floor
threshing machine
threshold exposure
threshold frequency
threshold of sensation
thrice and four times blessed
thrice happy
thrice-accented
thrice-blessed
thrice-boiled
thrice-crowned
thrice-famed
thrice-great
thrice-happy

thrice-honorable
thrice-noble
thrice-sold
thrice-told
thrice-venerable
thrice-worthy
thrift
 shop
thrift society
thrift stamp
thrifty person
thrill killer
thrill of fear
thrill seeker
thrill to
thrill-crazed
thrill-exciting
thrill-less
thrill-pursuing
thrill-sated
thrill-seeking
thriller-diller
thrilling all over
thriving condition
throat brail
throat cavity
throat halyards
throat microphone
throat mike
throat plate
throat seizing
throat sheet
throat sweetbread
throat track
throat-clearing
throat-clutching
throat-cracking
throat-full
throat-latch
throat-slitting
throat-swollen
throbbing pain
throes of death
throgmorton street
thromb-
thrombo-
throne of God
throne room

throne-born
throne-capable
throne-shattering
throne-worthy
throned on highest bliss
throng in
throng with
throstle cock
throstle-cock
throttle down
throttle lever
throttle valve
throttling bar
throttling governor
through and through
through bass
through bolt
through bond
through bridge
through check
through cut
through fire and water
through message
through rate
through
 retort
through road
through shake
through stane
through stone
through street
through switch
through the agency of
through the good offices of
through the instrumentality of
through the medium of
through the mill
through the night
through thick and thin
through way
through with
through with a fine-tooth comb
through-
through-and-through
through-blow
through-carve
through-cast
through-composed

through-drainage
through-drive
through-formed
through-galled
through-ither
through-joint
through-key
through-lance
through-mortise
through-nail
through-other
through-passage
through-pierce
through-rod
through-shoot
through-splint
through-stone
through-swim
through-thrill
through-toll
through-tube
through-tube boiler
throughout the ages
throughout the course of
throughout the world
throw a curve
throw a curve ball
throw a fight
throw a fit
throw a game
throw a lot of weight
throw a party
throw a pass
throw a pot
throw a scare into
throw a sop to
throw a stone at
throw a wet blanket on
throw
 a whammy
throw a wrench in the machinery
throw about
throw at
throw away
throw away the opportunity
throw away the prepared text
throw away the scabbard
throw away the speech

throw back
throw blind fear into
throw cold water on
throw doubt upon
throw down
throw down the gage
throw down the gauntlet
throw down the glove
throw down your arms
throw downstairs
throw dust in your eyes
throw forth
throw good money after bad
throw in
throw in prison
throw in the face of
throw in the sponge
throw in the towel
throw in together
throw in with
throw in your teeth
throw into a snit
throw into a stew
throw into a swivet
throw into a tizzy
throw into confusion
throw into disorder
throw into jail
throw into the shade
throw lathe
throw light on
throw light upon
throw line
throw money around
throw mud at
throw of dice
throw of the dice
throw off
throw off all disguise
throw off balance
throw off the scent
throw off your guard
throw on
throw on one's beam end
throw on paper
throw on the junk heap
throw

on the market
throw on your beam ends
throw open
throw open to
throw out
throw out a feeler
throw out a hint
throw out a smoke screen
throw out of gear
throw out of joint
throw out of order
throw out on your ear
throw out the window
throw out your chest
throw over
throw overboard
throw rug
throw stick
throw stones at
throw the book at
throw the bull
throw the first stone
throw the spotlight on
throw to the dogs
throw together
throw under the jailhouse
throw up
throw up the cards
throw up your hands
throw your arms around
throw your back at
throw your hat in the ring
throw your money away
throw your weight around
throw your weight into the scale
throw yourself at the feet of
throw yourself at the head of
throw yourself into
throw yourself into the arms of
throw yourself on
throw yourself on your knees
throw-
throw-back
throw-crook
throw-forward
throw-in
throw-off
throw-on

throw-over
throw-stick
throwing away
throwing downstairs
throwing engine
throwing iron
throwing knife
throwing net
throwing
open
throwing out
throwing overboard
throwing power
throwing stick
throwing your hat in the ring
throwing-in
throwing-stick
thrown away
thrown for a loss
thrown into the shade
thrown over
thrown silk
thrown together
thrum-eyed
thrush blackbird
thrush brown
thrush fungus
thrush lichen
thrush nightingale
thrush tit
thrush-breast heart
thrust and parry
thrust aside
thrust at
thrust augmentation
thrust augmenter
thrust back
thrust bearing
thrust coefficient
thrust deduction
thrust down
thrust fault
thrust hoe
thrust in
thrust in the face of
thrust out
thrust over
thrust plane

thrust shaft
thrust to one side
thrust upon
thrust yourself forward
thrust yourself upon
thrusting under
thuja oil
thulium oxide
thumb a ride
thumb ball
thumb bottle
thumb box
thumb cleat
thumb down
thumb flint
thumb glass
thumb hole
thumb holing
thumb index
thumb knot
thumb lancet
thumb lock
thumb loose
thumb notch
thumb nut
thumb one's nose at
thumb over
thumb pad
thumb pin
thumb piston
thumb plane
thumb pot
thumb
ring
thumb rule
thumb through
thumb turn
thumb your nose
thumb your nose at
thumb your way
thumb-and-finger
thumb-fingered
thumb-index
thumb-kissing
thumb-made
thumb-mark
thumb-marked
thumb-nail

thumb-ring
thumb-rope
thumb-screw
thumb-shaped
thumb-stall
thumb-sucker
thumb-sucking
thumb-worn
thumbing a ride
thumbnail sketch
thumbs down
thumbs up
thumbs-down
thumbs-up
thump in
thump the tub for
thump-cushion
thumped-in landing
thunder against
thunder along
thunder and lightning
thunder at the top of your voice
thunder ax
thunder forth
thunder god
thunder gods
thunder mug
thunder of applause
thunder planet
thunder plant
thunder pumper
thunder rod
thunder snake
thunder spirit
thunder tube
thunder-armed
thunder-baffled
thunder-bearer
thunder-blast
thunder-breathing
thunder-charged
thunder-clap
thunder-cloud
thunder-darting
thunder-delighting
thunder-dirt
thunder-fearless
thunder-footed

thunder-forging
thunder-fraught
thunder-free
thunder-girt
thunder-god
thunder-guiding
thunder-gust
thunder-hid
thunder-laden
thunder-maned
thunder-rejoicing
thunder-riven
thunder-ruling
thunder-scarred
thunder-scathed
thunder-shod
thunder-slain
thunder-smitten
thunder-splintered
thunder-split
thunder-splitten
thunder-stone
thunder-storm
thunder-teeming
thunder-throwing
thunder-thwarted
thunder-tipped
thunder-tongued
thunder-voiced
thunder-wielding
thunderstorm
cirrus
thus and so
thus and thus
thus far
thus far and no farther
thwacking frame
thwacking horse
thwacking knife
thwacking stool
thwaite shad
thwart motion
thwart-marks
thwart-ship
thwartwise motion
thy name is woman
thy nature's weakness
thyine wood

thym-
thyme camphor
thyme dodder
thyme oil
thyme-capped
thyme-fed
thyme-flavored
thyme-grown
thyme-leaved
thyme-scented
thymic acid
thymo-
thymol blue
thymonucleic acid
thymus death
thymus gland
thymus histone
thyr-
thyrd-
thyro-
thyroid gland
thyroid-stimulating hormone
ti palm
ti tree
tib-cat
tibetan terrier
tibeto-burman
tibio-
tic douloureux
tic-polonga
tic-tac-toe
tick bird
tick
 clover
tick doleru
tick farcy
tick fever
tick off
tick over
tick paralysis
tick trefoil
tick-a-tick
tick-bird
tick-borne typhus
tick-tack
tick-tack-toe
tick-tack-too
tick-tick

ticked off
ticker market
ticker tape
ticker-tape parade
ticket agency
ticket agent
ticket booth
ticket chopper
ticket clerk
ticket collector
ticket day
ticket gate
ticket holder
ticket maker
ticket night
ticket of admission
ticket of leave
ticket office
ticket porter
ticket printer
ticket punch
ticket rack
ticket scalper
ticket taker
ticket varnisher
ticket window
ticket writer
ticket-canceling
ticket-counting
ticket-dating
ticket-making
ticket-of-leave
ticket-of-leave man
ticket-of-leaver
ticket-porter
ticket-printing
ticket-registering
ticket-selling
ticket-vending
tickets of leave
tickety-boo
ticking work
tickle grass
tickle in the palm
tickle pink
tickle the fancy
tickle the palate
tickle the palm

tickle to death
tickle your fancy
tickle-footed
tickle-headed
tickle-heeled
tickle-toby
tickle-tongued
tickled
 pink
tickled to death
tickled with a straw
tickler coil
tickler file
ticklish business
ticklish issue
ticklish spot
tickly-benders
tickseed sunflower
ticktack man
tidal amplitude
tidal basin
tidal bench mark
tidal bore
tidal current
tidal current chart
tidal datum
tidal flat
tidal flats
tidal flood
tidal flow
tidal light
tidal pond
tidal pool
tidal range
tidal stream
tidal wave
tide boat
tide chart
tide crack
tide day
tide gage
tide gate
tide gauge
tide hole
tide lock
tide mill
tide of time
tide over

tide pole
tide pool
tide predictor
tide race
tide register
tide rip
tide staff
tide table
tide wave
tide way
tide wheel
tide work
tide-beaten
tide-beset
tide-bound
tide-caught
tide-covered
tide-driven
tide-flooded
tide-forsaken
tide-free
tide-gauge
tide-generating
tide-locked
tide-mark
tide-marked
tide-mill
tide-predicting
tide-producing
tide-ribbed
tide-rip
tide-rode
tide-swept
tide-taking
tide-tossed
tide-trapped
tide-waiter
tide-washed
tide-water
tide-worn
tideland spruce
tidewater
cypress
tidewater glacier
tidy step
tidy sum
tidy up
tidy-kept

tidy-looking
tidy-minded
tidy-up
tie band
tie bar
tie beam
tie bolt
tie breaker
tie clasp
tie clip
tie conductor
tie cord
tie down
tie dyeing
tie feeder
tie hand and foot
tie in
tie in a reef
tie in with
tie knot
tie line
tie mill
tie off
tie one on
tie periwig
tie plate
tie point
tie post
tie rod
tie rope
tie silk
tie stay
tie strap
tie tack
tie the hands of
tie the knot
tie the nuptial knot
tie the wedding knot
tie up
tie up with
tie up with red tape
tie up your money in
tie wall
tie your hands
tie-
tie-and-dye
tie-down
tie-dyeing

tie-in
tie-in sale
tie-off rail
tie-on
tie-out
tie-plater
tie-tie
tie-up
tie-wig
tied down
tied house
tied image
tied letters
tied score
tied to your apron strings
tied up
tied up in
tier building
tier ranger
tier shot
tier table
tierce de Picardie
tierce major
tierce minor
tierce point
tierce rhyme
tiers etat
tiers-argent
ties of affection
ties of blood
tiger beetle
tiger bittern
tiger cat
tiger
chop
tiger cocoa
tiger cowrie
tiger finch
tiger fish
tiger frog
tiger grass
tiger heart
tiger lily
tiger milk
tiger mosquito
tiger moth
tiger python
tiger salamander

tiger shark
tiger shell
tiger snake
tiger swallowtail
tiger wolf
tiger's milk
tiger's-eye
tiger-cat
tiger-footed
tiger-lily heart
tiger-looking
tiger-marked
tiger-minded
tiger-mouth
tiger-passioned
tiger-spotted
tiger-striped
tight cooper
tight discipline
tight fit
tight grip
tight hand
tight joint
tight money
tight purse strings
tight rein
tight rope
tight ship
tight spot
tight squeeze
tight-ankled
tight-belted
tight-bodied
tight-booted
tight-bound
tight-clap
tight-clenched
tight-closed
tight-draped
tight-drawn
tight-fisted
tight-fitting
tight-gartered
tight-hosed
tight-knit
tight-laced
tight-limbed
tight-lipped

tight-looking
tight-made
tight-mouthed
tight-necked
tight-packed
tight-pressed
tight-reining
tight-rooted
tight-set
tight-shut
tight-skinned
tight-skirted
tight-sleeved
tight-stretched
tight-tie
tight-valved
tight-waisted
tight-wound
tight-woven
tight-wristed
tighten
 the purse strings
tighten your belt
tightening pulley
tightrope walker
tiglic acid
til oil
til seed
til tree
tile drain
tile hook
tile kiln
tile maker
tile ore
tile painter
tile pin
tile pipe
tile red
tile roof
tile setter's hammer
tile-clad
tile-covered
tile-fish
tile-pin
tile-red
tile-roofed
till alarm
till basket

till death
till death do us part
till doomsday
till hell freezes over
till money
till now
till shrimps learn to whistle
till the cows come home
till the end of time
till the soil
till then
till time runs out
till time stops
till you are blue in the face
till you're blue in the face
tiller bow
tiller chains
tiller lines
tiller of the soil
tiller rope
tilleul green
tilly-fally
tilly-vally
tilt angle
tilt at
tilt at windmills
tilt boat
tilt bonnet
tilt hammer
tilt mill
tilt roof
tilt steel
tilt with
tilt-boat
tilt-hammer
tilt-top table
tilt-up
tilt-yard
tilting chest
tilting conveyor
tilting fillet
tilting ground
tilting
 hammer
tilting helmet
tilting level
tilting yard
tim-whiskey

timbale case
timbale iron
timber bamboo
timber bar
timber beetle
timber borer
timber contractor
timber cruiser
timber cutter
timber estimating
timber estimator
timber faller
timber forest
timber frame
timber grapple
timber grouse
timber hitch
timber jumper
timber knot
timber leader
timber limit
timber line
timber loader
timber mare
timber marker
timber measurer
timber mill
timber preserver
timber rattlesnake
timber right
timber rot
timber scribe
timber shifter
timber toe
timber topper
timber topping
timber tower
timber tree
timber unloader
timber wheels
timber wolf
timber worm
timber yard
timber-boring
timber-built
timber-carrying
timber-ceilinged
timber-covered

timber-cutting
timber-devouring
timber-eating
timber-floating
timber-framed
timber-headed
timber-hitch
timber-laden
timber-line
timber-lined
timber-producing
timber-propped
timber-skeletoned
timber-strewn
timber-toed
timber-tree
timber-wood
timber-work
timber-yard
timbrel
arch
timbrel vault
time about
time after time
time ahead
time allotment
time allowance
time and a half
time and again
time and motion
time and motion study
time and time again
time at bat
time at your command
time at your disposal
time azimuth
time ball
time bargain
time belt
time bill
time bomb
time book
time capsule
time card
time chart
time charter
time charter party
time clerk

time clock
time constant
time constants
time control
time copy
time delay
time deposit
time derivative
time detector
time discount
time draft
time drawing on
time enough
time error
time exposure
time fire
time flies
time fuse
time globe
time gun
time hanging on your hands
time hit
time immemorial
time in
time interval
time just ahead
time killer
time lag
time lamp
time lead
time limit
time loan
time lock
time machine
time marches on
time measurement
time money
time note
time of day
time of life
time of year
time of your life
time off
time on your hands
time out
time out of mind
time out of time
time pattern

time
policy
time quadrature
time rating
time recorder
time runs out
time scale
time schedule
time selling
time sense
time series
time service
time sharing
time sheet
time shrapnel
time sight
time signal
time signature
time space
time spirit
time stamp
time star
time study
time switch
time thrust
time ticket
time to burn
time to catch your breath
time to come
time to kill
time to spare
time train
time trial
time triangle
time value
time was
time waster
time without end
time zone
time's caravan
time's forelock
time-authorized
time-ball
time-bargain
time-barred
time-battered
time-beguiling
time-bent

time-bettering
time-bewasted
time-binding
time-blackened
time-blanched
time-born
time-bound
time-breaking
time-canceled
time-changed
time-cleft
time-consuming
time-delay relay
time-deluding
time-discolored
time-eaten
time-economizing
time-enduring
time-expired
time-exposure
time-fused
time-gnawn
time-halting
time-hastening
time-honored
time-honored practice
time-honoured
time-interval meter
time-keeper
time-killing
time-lag
time-lapse
time-lapse
photography
time-lasting
time-limit
time-marked
time-measuring
time-mellowed
time-motion study
time-noting
time-out
time-pressed
time-rent
time-rusty
time-saver
time-saving
time-scarred

time-served
time-server
time-serving
time-sharing
time-shrouded
time-space
time-spirit
time-table
time-taught
time-temperature
time-temperature curve
time-tested
time-tried
time-wasted
time-wasting
time-wearied
time-white
time-withered
time-worn
timeo Danaos et dona ferentes
times of old
times of yore
times past
times without number
times, the
timing chain
timing gears
timing pulse
timing screw
timing unit
timing valve
timothy grass
tin ash
tin bronze
tin calciner
tin can
tin chloride
tin cow
tin cry
tin crystal
tin cup
tin dichloride
tin dioxide
tin disease
tin ear
tin fish
tin foil
tin frame

tin glaze
tin god
tin hare
tin hat
tin kettle
tin liquor
tin lizzie
tin loaf
tin monoxide
tin opener
tin ore
tin oxide
tin pail
tin pan alley
tin pest
tin
plague
tin plate
tin plater
tin pot
tin pulp
tin putty
tin pyrite
tin pyrites
tin salt
tin shop
tin smelter
tin snips
tin soldier
tin spirit
tin spirits
tin spot
tin stream
tin streamer
tin streaming
tin tack
tin tetrachloride
tin wash
tin washing
tin wedding
tin whistle
tin-bearing
tin-bottomed
tin-bound
tin-bounder
tin-capped
tin-colored
tin-covered

tin-eared
tin-edged
tin-filled
tin-foil
tin-foil paper
tin-foiler
tin-glass
tin-glazed
tin-handled
tin-kettle
tin-kettler
tin-lined
tin-mailed
tin-opener
tin-pan
tin-pan alley
tin-plate
tin-plate worker
tin-plated
tin-plating
tin-pot
tin-pottery
tin-pottiness
tin-potty
tin-roofed
tin-stone
tin-tabled
tin-tack
tin-type
tin-whistle
tin-white
tina process
tincture of iodine
tincture of opium
tincture press
tinder fungus
tinder-cloaked
tinder-dry
tinea barbae
ting ware
ting-a-ling
tingle with excitement
tinhorn gambler
tink-a-tink
tinker mackerel
tinker up
tinker's dam
tinker's damn

tinker's damn, a
tinker's weed
tinkle-tankle
tinkle-tankling
tinned
 dog
tinned goods
tinning stack
tinsel-bright
tinsel-clad
tinsel-covered
tinsel-embroidered
tinsel-paned
tinsel-slippered
tint block
tint for tant
tint meter
tint photometer
tint tool
tiny bit
tip and run
tip cap
tip car
tip cheese
tip crane
tip in
tip off
tip over
tip plant
tip roast
tip roll
tip sled
tip slide
tip speed
tip table
tip the hat to
tip the scale
tip the scales
tip truck
tip van
tip wagon
tip worm
tip your hand
tip-
tip-and-run
tip-cat
tip-crowning
tip-curled

tip-eared
tip-finger
tip-in
tip-off
tip-on
tip-tap
tip-tilted
tip-top
tip-top table
tip-up
tip-up table
tippa-malku
tipper truck
tipper-off
tippet grebe
tippet-scuffle
tipping center
tippling house
tippling-house
tipsy cake
tipsy key
tipsy-cake
tipsy-topsy
tire becker
tire bender
tire borer
tire buffer
tire carrier
tire case
tire cement
tire chain
tire changer
tire chipper
tire clamp
tire compressor
tire cooler
tire core
tire cover
tire curler
tire dresser
tire examiner
tire fastener
tire filler
tire finisher
tire
fitter
tire gauge
tire heater

tire holder
tire iron
tire lacing
tire lock
tire mold
tire molder
tire out
tire preservative
tire press
tire pressman
tire prier
tire protector
tire pump
tire rack
tire remover
tire repairman
tire retreader
tire roller
tire setter
tire shaper
tire shoe
tire shrinker
tire stamper
tire tape
tire to death
tire tool
tire tread
tire tube
tire turner
tire upsetter
tire valve
tire vulcanizer
tire-bending
tire-changing
tire-filling
tire-heating
tire-inflating
tire-mile
tire-woman
tired and weary-laden
tired cliche
tired market
tired of
tired of living
tired out
tired to death
tired-armed
tired-eyed

tired-faced
tired-headed
tired-looking
tired-winged
tiresome work
tiring house
tiring irons
tiring maid
tiring room
tiring woman
tiring-house
tiring-irons
tiring-room
tirlie-wirlie
tirling pin
tirly-toy
tirra-lirra
tishah-b'ab
tissue culture
tissue fibrinogen
tissue fluid
tissue paper
tissue-building
tissue-changing
tissue-destroying
tissue-forming
tissue-paper
tissue-producing
tissue-secreting
tisty-tosty
tit
 babbler
tit drill
tit for tat
tit in the wringer
tit screw
tit-bit
tit-tat-toe
tit-up
tita root
titading or caption
titan crane
titan-
titanic acid
titanic anhydride
titanic iron ore
titanic oxide
titanium dioxide

titanium oxide
titanium white
titano-
titer test
tithe barn
tithe collector
tithe gatherer
tithe man
tithe pig
tithe proctor
tithe-collecting
tithe-free
tithe-paying
tithing-man
title bearer
title border
title catalog
title catalogue
title deed
title deeds and papers
title essay
title hero
title insurance
title letter
title lining
title of honor
title page
title role
title space
title type
title-bearing
title-deed
title-holding
title-hunting
title-mad
title-page
title-seeking
title-winning
titter-totter
tittle-tattle
tittle-tattled
tittle-tattler
tittle-tattling
titular bishop
tityre-tu
tiz-woz
to a T
to a certain extent

to a certainty
to a degree
to a draw
to a fare-thee-well
to a fare-ye-well
to a fare-you-well
to a fault
to a
finish
to a frazzle
to a great degree
to a great extent
to a hair
to a large extent
to a man
to a nicety
to a small degree
to a small extent
to a standoff
to a tee
to a tie
to a tittle
to a turn
to advantage
to all appearances
to all intents and purposes
to all seeming
to an extent
to an inch
to and fro
to any end
to atone for
to be brief
to be counted on
to be counted on your fingers
to be depended upon
to be desired
to be exact
to be expected
to be fair
to be had
to be on the road
to be precise
to be preferred
to be reckoned on
to be relied upon
to be seen
to be specific

to be sure
to be trusted
to beat the Dutch
to beat the band
to beat the deuce
to beat the devil
to bits
to blame
to boot
to cite an instance
to come
to come to the point
to completion
to crown all
to cut the matter short
to date
to death
to do
to everywhere
to excess
to explain
to extremes
to fit the pocketbook
to gain some private ends
to gild refined gold
to go
to good account
to good effect
to good purpose
to good
use
to grin like a Cheshire cat
to guess
to hand
to have and to hold
to have sex
to hawse
to heel
to hell and back
to his executors and assigns
to his heirs
to his heirs and assigns
to illustrate
to infinity
to judge by appearances
to kalon
to keep
to landward

to lease
to leeward
to let
to little purpose
to make a dent
to make a guess
to make a long story short
to name an instance
to no extent
to no purpose
to nourish a viper in your bosom
to one side
to order
to paint the lily
to perfection
to pieces
to post on a diagonal
to profit
to prove the point
to relieve yourself
to retain
to rights
to say nothing of
to sell
to shards
to shreds
to smithereens
to some degree
to some extent
to some purpose
to spare
to speak of
to speak truthfully
to splinters
to state the fact
to state the truth
to such an extent
to tatters
to tell the truth
to that place
to the account of
to the amount of
to the backbone
to the bad
to the best of your ability
to the best of your belief
to the best of your knowledge
to

the bitter end
to the brim
to the contrary
to the core of
to the crack of doom
to the credit of
to the death
to the edge of doom
to the end
to the end of time
to the end that
to the extreme
to the eye
to the fore
to the four corners of the earth
to the four winds
to the front
to the full
to the good
to the heart of
to the heirs of his body
to the highest degree
to the hilt
to the king's taste
to the last gasp
to the last trumpet
to the left
to the letter
to the life
to the limit
to the manner born
to the marrow
to the memory of
to the minute
to the nth degree
to the nth power
to the past
to the point
to the point of exhaustion
to the purpose
to the queen's taste
to the rear
to the right
to the same degree
to the second
to the side
to the skies
to the sky

to the teeth
to the top of your bent
to the tune of
to the utmost
to the wind
to the windward
to the wise
to the zenith
to this day
to this place
to throw a perfume on the violet
to what extent
to what place
to which place
to
 windward
to wit
to year and day
to your account
to your amazement
to your astonishment
to your cost
to your credit
to your delight
to your disgust
to your displeasure
to your face
to your fancy
to your fingertips
to your great glee
to your great surprise
to your health
to your heart's content
to your knowledge
to your liking
to your mind
to your satisfaction
to your shame
to your shame be it spoken
to your surprise
to your taste
to your utmost
to your way of thinking
to-
to-and-fro
to-and-fros
to-and-ko
to-arrive

to-be
to-break
to-burst
to-day
to-do
to-dos
to-draw
to-drive
to-fall
to-morn
to-morrow
to-name
to-night
to-rend
to-rights
to-side
to-tear
to-year
toad bug
toad grass
toad lily
toad orchis
toad rush
toad snatcher
toad spit
toad spittle
toad spot
toad stabber
toad sticker
toad's-mouth
toad-bellied
toad-blind
toad-eat
toad-eater
toad-fish
toad-flax
toad-frog
toad-green
toad-hating
toad-housing
toad-in-the-hole
toad-legged
toad-shaped
toad-spotted
toad-swollen
toadstool disease
toady

to
toast color
toast list
toast rack
toast water
toast-brown
toasted cheese sandwich
toasting fork
toasting iron
tobacco addiction
tobacco bagger
tobacco barn
tobacco beetle
tobacco belt
tobacco box
tobacco brown
tobacco bug
tobacco camphor
tobacco carton
tobacco case
tobacco chewing
tobacco cloth
tobacco cultivator
tobacco cutter
tobacco dryer
tobacco dust
tobacco fertilizer
tobacco flea beetle
tobacco granulator
tobacco grater
tobacco hawk moth
tobacco heart
tobacco hornworm
tobacco juice
tobacco lath
tobacco leaf miner
tobacco liquor
tobacco liquorer
tobacco machine
tobacco machinery
tobacco mildew
tobacco molder
tobacco mosaic
tobacco mosaic virus
tobacco panner
tobacco pipe
tobacco pouch
tobacco press

tobacco rack
tobacco retainer
tobacco road
tobacco roller
tobacco shaver
tobacco shed
tobacco shop
tobacco smoker
tobacco smoking
tobacco sprayer
tobacco spreader
tobacco stick
tobacco stopper
tobacco store
tobacco stripper
tobacco thrips
tobacco tongs
tobacco twister
tobacco user
tobacco
water
tobacco wilt
tobacco worm
tobacco-abusing
tobacco-box
tobacco-box skate
tobacco-breathed
tobacco-growing
tobacco-pipe
tobacco-pipe clay
tobacco-plant
tobacco-sick
tobacco-smoking
tobacco-stained
tobacco-stemming
tobin's tube
tobira family
toboggan cap
toboggan slide
tobosa grass
toby jug
toc-toc
toccata form
tocharian a
tocharian b
tocher band
tocher good
toco-

tod stove
toddle along
toddy bird
toddy blossom
toddy cat
toddy ladle
toddy palm
toddy stick
toddy table
toddy tree
toe and heel
toe biter
toe box
toe calk
toe cap
toe clip
toe crack
toe dance
toe dancer
toe distance
toe dog
toe hardy
toe hold
toe kisser
toe kissing
toe pilling
toe rail
toe ring
toe the line
toe the mark
toe upon
toe wall
toe weight
toe-dance
toe-danced
toe-dancing
toe-drop
toe-in
toe-mark
toe-punch
toffee dipper
toffee-apple
toffee-nosed
tog out
tog up
toga virilis
together on
together with

toggle bolt
toggle chain
toggle harpoon
toggle hook
toggle iron
toggle joint
toggle motion
toggle press
toggle
rail
toggle riveter
toggle switch
toggle-joint press
toggle-jointed
togt-rider
togt-riding
tohu-bohu
toil and moil
toil and trouble
toil-assuaging
toil-beaten
toil-bent
toil-exhausted
toil-hardened
toil-marred
toil-oppressed
toil-stained
toil-stricken
toil-tried
toil-weary
toil-won
toil-worn
toile de Jouy
toile de jouy
toilet article
toilet atomizer
toilet bottle
toilet bowl
toilet brush
toilet cabinet
toilet case
toilet cloth
toilet cup
toilet glass
toilet goods
toilet hardware
toilet mirror
toilet paper

toilet powder
toilet room
toilet seat
toilet service
toilet set
toilet soap
toilet sponge
toilet table
toilet tissue
toilet training
toilet water
toiling class
toison d'or
tok-tokkie
token book
token coin
token gesture
token money
token of esteem
token of remembrance
token payment
token punishment
token ring
token sheet
token silver
token strike
token vote
token-money
tol de rol
tol-
tol-de-rol
tol-lol
tol-lol-de-rol
tol-lol-ish
tolerance limits
toll agent
toll bait
toll bar
toll
board
toll bridge
toll call
toll clerk
toll collector
toll corn
toll dish
toll farmer
toll highway

toll inspector
toll line
toll road
toll thorough
toll traverse
toll turn
toll-book
toll-dish
toll-free
toll-gatherer
toll-house
tollhouse cooky
tolling dog
tolling of the knell
tolosa wood
tolu balsam
tolu resin
tolu tree
tolu-
toluene trichloride
toluene trifluoride
toluic acid
toluidine blue
toluidine red
toluric acid
toluyl radical
tolyl group
tolyl radical
tom and jerry
tom collins
tom hurry
tom pudding
tom tailor
tom thumb
tom tiddler's ground
tom turkey
tom-ax
tom-cod
tom-fool
tom-noddy
tom-tit
tom-toe
tom-tom
tom-trot
tomato aspic
tomato black rot
tomato blight
tomato bouillon

tomato can
tomato curly top
tomato eggplant
tomato fern
tomato fruitworm
tomato gall
tomato hamper
tomato hawk moth
tomato hornworm
tomato juice
tomato ketchup
tomato leaf blight
tomato leaf mold
tomato mosaic
tomato packer
tomato paste
tomato pulp
tomato puree
tomato red
tomato sauce
tomato scalder
tomato soup
tomato
sphinx
tomato streak
tomato stripe
tomato transplanter
tomato trellis
tomato wilt
tomato worm
tomato yellows
tomato-colored
tomato-growing
tomato-leaf
tomato-washing
tomb bat
tomb house
tomb maker
tomb tower
tomb-bat
tomb-black
tomb-breaker
tomb-dwelling
tomb-making
tomb-paved
tomb-robbing
tomb-strewn
tomblike silence

tombstone marking
tomcat around
tomkin post
tommy bar
tommy book
tommy day
tommy gun
tommy hole
tommy master
tommy noddy
tommy shop
tommy system
tommy-axe
tommy-gun
ton-foot
ton-force
ton-kilometer
ton-mile
ton-mileage
ton-up
tonal gap
tonal island
tone accent
tone arm
tone cluster
tone color
tone colour
tone control
tone deafness
tone down
tone gap
tone grammar
tone island
tone language
tone long
tone measurer
tone of voice
tone of your voice
tone painting
tone pattern
tone picture
tone poem
tone poet
tone poetry
tone quality
tone row
tone syllable
tone tester

tone up
tone wheel
tone with
tone-deaf
tone-full
tone-producing
tone-setter
tone-up
toned down
tong borer
tongue
 and groove
tongue bar
tongue bird
tongue bit
tongue blade
tongue bone
tongue compressor
tongue cover
tongue depressor
tongue fern
tongue fish
tongue graft
tongue grafting
tongue grass
tongue hero
tongue in cheek
tongue joint
tongue pipe
tongue shell
tongue sole
tongue swallowing
tongue tree
tongue truck
tongue twister
tongue work
tongue worm
tongue-and-groove joint
tongue-back
tongue-baited
tongue-bang
tongue-bitten
tongue-blade
tongue-bound
tongue-dumb
tongue-flowered
tongue-free
tongue-front

tongue-garbled
tongue-gilt
tongue-graft
tongue-haltered
tongue-hammer
tongue-jangling
tongue-kill
tongue-lash
tongue-lashing
tongue-leaved
tongue-lolling
tongue-murdering
tongue-pad
tongue-point
tongue-puissant
tongue-shaped
tongue-tack
tongue-taming
tongue-taw
tongue-tie
tongue-tied
tongue-tier
tongue-valiant
tongue-wagging
tongue-walk
tongue-wanton
tonguing plane
tonguing-and-grooving plane
tonic accent
tonic chord
tonic epilepsy
tonic key
tonic major
tonic minor
tonic motion
tonic
section
tonic sol-fa
tonic sol-faist
tonic spasm
tonic treatment
tonic triad
tonic water
tonka bean
tonka bean camphor
tonka-bean camphor
tonka-bean wood
tonnage coefficient

tonnage deck
tonnage displacement
tonnage duty
tonnage length
tonnage opening
tonnage pool
tonnage train
tonnage well
tonneau cover
tonneau lamp
tonneau windshield
tono-
tonsill-
tonsured cleric
too bad
too big
too big for your britches
too big for your shoes
too clever by half
too deep for
too early
too far
too few
too frugal
too funny for words
too killing for words
too late
too little
too many cooks
too many irons in the fire
too much
too much at once
too much for
too much of a good thing
too much with us
too precious for words
too soon
too soon off the mark
too-aged
too-anxious
too-big
too-bigness
too-bold
too-celebrated
too-confident
too-coy
too-dainty
too-devoted

too-early
too-earnest
too-familiar
too-fervent
too-forced
too-good
too-hectic
too-large
too-late
too-lateness
too-laudatory
too-long
too-much
too-muchness
too-near
too-old
too-patient
too-piercing
too-proud
too-ripe
too-short
too-soon
too-soonness
too-timely
too-too
too-trusting
too-willing
too-wise
too-young
toodle-oo
tool
 angle
tool apron
tool bag
tool belt
tool boy
tool cabinet
tool car
tool carriage
tool carrier
tool cart
tool case
tool chest
tool coupling
tool demagnetizer
tool engineer
tool engineering
tool examiner

tool fasher
tool fettler
tool filer
tool finder
tool fitter
tool forge
tool forger
tool gauge
tool glazer
tool grinder
tool grinding
tool handle
tool heater
tool house
tool kit
tool lubricant
tool miller
tool oil
tool plane
tool post
tool press
tool rack
tool reclaimer
tool regrinding
tool repairer
tool rest
tool roll
tool set
tool sharpener
tool shed
tool shop
tool socket
tool spindle
tool stamper
tool stand
tool steel
tool storekeeper
tool subject
tool table
tool temper
tool tray
tool treating
tool truck
tool turner
tool wagon
tool whetter
tool-and-die maker
tool-cleaning

tool-cutting
tool-dresser
tool-dressing
tool-maker
tool-sharpening
tool-using
tooling
up
toolroom lathe
tools and machinery
toot plant
toot your own horn
tooth and nail
tooth ax
tooth caliper
tooth chisel
tooth cleaner
tooth cough
tooth cress
tooth decay
tooth doctor
tooth edge
tooth fever
tooth filling
tooth for tooth
tooth forceps
tooth fungus
tooth gauge
tooth key
tooth mark
tooth ornament
tooth paste
tooth plane
tooth plugger
tooth powder
tooth puller
tooth pulp
tooth rail
tooth rash
tooth relic
tooth sac
tooth shell
tooth violet
tooth wheel
tooth wound
tooth-billed
tooth-bred
tooth-brush

tooth-chattering
tooth-drawer
tooth-extracting
tooth-leaved
tooth-marked
tooth-pulling
tooth-rounding
tooth-set
tooth-setting
tooth-shaped
tooth-shell
tooth-tempting
tooth-winged
toothache grass
toothache tree
toothbrush tree
toothed whale
toothed-billed
toothful grin
toothing plane
toothy-peg
tootle bug
tootsy-wootsies
tootsy-wootsy
top banana
top beam
top billing
top block
top boot
top boots
top brass
top burton
top cinder
top cleaner
top
 cow
top deck
top dog
top drawer
top dresser
top dressing
top executive
top flight
top floor
top gallery
top grafting
top hamper
top hat

top horse
top lift
top light
top line
top liner
top milk
top notch
top of house
top of the world
top off
top out
top part
top people
top price
top priority
top round
top secret
top sergeant
top shape
top side
top slice
top slicing
top speed
top spin
top spot
top the
top timber
top up
top yeast
top-
top-armor
top-boot
top-cap
top-castle
top-coated
top-cross
top-cutter
top-dog
top-drain
top-drawer
top-dress
top-dressing
top-flight
top-full
top-graft
top-hamper
top-hampered
top-hand

top-hat
top-hatted
top-heavily
top-heaviness
top-heavy
top-heavy market
top-hole
top-level
top-lit
top-notch
top-over-tail
top-piece
top-rank
top-ranking
top-road bridge
top-sawyer
top-secret
top-set
top-sew
top-shaped
top-shell
top-stone
top-timber
top-work
topaz quartz
topaz rock
topaz-colored
topaz-green
topaz-tailed
topaz-throated
topaz-tinted
topaz-yellow
toper's-plant
topgallant
 mast
topgallant sail
topgallant yard
tophus stone
topic of the day
topic sentence
topical anesthetic
topical outline
topknot pigeon
topo-
topographic chart
topographico-mythical
topological equivalence
topological group

topological invariant
topological space
topological transformation
topping lift
topping off
topping-off
topping-out course
topple down
topple over
tops, the
topsail schooner
topsail-tye
topsy-turn
topsy-turnness
topsy-turvical
topsy-turvies
topsy-turvification
topsy-turvifier
topsy-turvify
topsy-turvily
topsy-turviness
topsy-turvy
topsy-turvydom
topsy-turvyhood
topsy-turvyism
topsy-turvyist
topsy-turvyize
torch cactus
torch course
torch dance
torch flower
torch holder
torch light
torch lily
torch pine
torch race
torch singer
torch singing
torch song
torch staff
torch thistle
torch tree
torch-bearer
torch-fish
torch-light
torch-tree family
torch-wood
torchon board

torchon lace
torchon paper
torchwood family
toreador pants
toric lens
toringo crab apple
torment
 of Tantalus
tormentor wing
torn-down
tornado belt
tornado cellar
tornado cloud
tornado insurance
tornado lamp
tornado lantern
tornado-breeding
tornado-haunted
tornado-swept
toro bravo
tororo-konbu
tororo-kubu
torpedo battery
torpedo boat
torpedo body
torpedo bomber
torpedo boom
torpedo catcher
torpedo director
torpedo fish
torpedo mine
torpedo net
torpedo ram
torpedo rocket
torpedo room
torpedo sand
torpedo school
torpedo spar
torpedo station
torpedo stern
torpedo strike aircraft
torpedo tube
torpedo-boat
torpedo-boat catcher
torpedo-boat destroyer
torpedo-shaped
torque arm
torque converter

torque tube
torque wrench
torrent bow
torrent duck
torrent of rain
torrent-bitten
torrent-borne
torrent-braving
torrent-flooded
torrent-mad
torrent-swept
torrid heat
torrid zone
torsion angle
torsion axis
torsion balance
torsion bar
torsion basin
torsion curve
torsion galvanometer
torsion group
torsion head
torsion meter
torsion pendulum
torsion scale
torsion screw
torsion spasm
torsion spring
torsion-free
group
torsional stress
torso murder
tort-feasor
tortoise beetle
tortoise flower
tortoise plant
tortoise shell
tortoise that supports the earth
tortoise's pace
tortoise-core
tortoise-footed
tortoise-headed
tortoise-paced
tortoise-rimmed
tortoise-roofed
tortoise-shaped
tortoise-shell
tortoise-shell butterfly

tortoise-shell cat
tortoise-shell turtle
tortoiseshell turtle
torture the law to your own ends
torus palatinus
tory democracy
tory-rory
tosh nailing
tosh-up
toss and tumble
toss and turn
toss around
toss at
toss down
toss off
toss out
toss overboard
toss the head
toss together
toss up
toss your cookies
toss your drink
toss your hat in the ring
toss-up
tossed salad
tossing and turning
tossing-in
tot system
tot to
tot up
tot up to
total abstinence
total agreement
total approach
total attention
total bases
total blindness
total change
total commitment
total compensation
total darkness
total defeat
total depravity
total differential
total eclipse
total effect
total environment
total

heat
total immersion
total impression
total impulse
total internal reflection
total loss
total loss only policy
total memory
total quantum number
total recall
total reflection
total self-assurance
total serialism
total situation
total skepticism
total theater
total up
total up to
total utility
total victory
total war
totalitarian government
totalitarian regime
totalitarian threat
totality of associations
totality of being
totality of references
totality of relations
totally absorbed
totally committed
totally ordered set
totally self-assured
tote bag
tote board
tote box
tote road
tote sack
tote shop
tote to
tote up
tote up to
totem animal
totem badge
totem kin
totem pole
toti-
totidem verbis
toties quoties

toto caelo
toto-
totter along
totter on the brink
totter to your fall
tottery in years
totty-headed
touch a chord
touch a nerve
touch a nerve ending
touch a raw nerve
touch a soft spot
touch a sore spot
touch a sympathetic chord
touch a tender spot
touch and go
touch body
touch
bottom
touch cerate
touch down
touch elbows with
touch football
touch judge
touch lightly
touch mark
touch method
touch needle
touch of conscience
touch off
touch on
touch on the raw
touch paper
touch reader
touch shoulders with
touch spot
touch system
touch the cap
touch the hat
touch the wind
touch to the quick
touch typewriter
touch typewriting
touch up
touch upon
touch upon in passing
touch upon lightly
touch where it hurts

touch writer
touch writing
touch your heart
touch-
touch-and-go
touch-box
touch-hole
touch-in goal
touch-in-goal
touch-in-goal line
touch-line
touch-me-not
touch-me-not-ish
touch-paper
touch-piece
touch-powder
touch-tackle
touch-type
touch-up
touched in the head
touched in the wind
touching down
tough as leather
tough break
tough cake
tough grind
tough guy
tough it out
tough job
tough lineup to buck
tough luck
tough nut to crack
tough out
tough pitch
tough pitch copper
tough policy
tough proposition
tough shit
tough tenacity of purpose
tough titty
tough-backed
tough-fibered
tough-fisted
tough-handed
tough-lived
tough-looking
tough-metaled
tough-minded

tough-mindedly
tough-mindedness
tough-muscled
tough-shelled
tough-sinewed
tough-skinned
tough-thonged
toujours
perdrix
tour billion
tour conductor
tour de force
tour director
tour en l'air
tour guide
tour jete
tour of duty
toura grass
touring car
touring coupe
tourist car
tourist card
tourist center
tourist class
tourist court
tourist home
tourist trap
tourist-crammed
tourist-haunted
tourist-infested
tourist-laden
tourist-ridden
tourist-trodden
tourmaline pink
tourmaline tongs
tours en l'air
tous-les-mois
tousled hair
tout a fait
tout a l'heure
tout au contraire
tout court
tout de suite
tout ensemble
tout le monde
tow boy
tow car
tow carder

tow carrier
tow cloth
tow hook
tow iron
tow mixer
tow post
tow sack
tow team
tow truck
tow wheel
tow-colored
tow-coloured
tow-feeder
tow-haired
tow-headed
tow-line
tow-made
tow-net
tow-netter
tow-netting
tow-path
tow-pung
tow-rope
tow-row
tow-spinning
towel
 gourd
towel horse
towel rack
towel rail
tower above
tower away
tower bastion
tower bolt
tower cap
tower chime
tower clock
tower cress
tower hill
tower house
tower light
tower mustard
tower of Pisa
tower of silence
tower of strength
tower over
tower owl
tower pound

tower projector
tower shell
tower stamp
tower telescope
tower wagon
tower window
tower-bearing
tower-capped
tower-crested
tower-crowned
tower-dwelling
tower-encircled
tower-flanked
tower-high
tower-mill
tower-razing
tower-shaped
tower-studded
tower-supported
tower-tearing
towering alps
towering heights
towering passion
towering rage
towing basin
towing bridle
towing lights
towing net
towing path
towing post
towing spar
town adjutant
town ball
town book
town boomer
town bridge
town bushel
town car
town church
town clerk
town clerkship
town council
town councilor
town cress
town crier
town dweller
town economy
town end

town foot
town forest
town gas
town guard
town hall
town head
town house
town jail
town life
town lot
town manager
town
meeting
town mouse
town mutual
town officer
town park
town people
town place
town plan
town planner
town planning
town reeve
town row
town sickness
town soviet
town talk
town tallow
town top
town traveler
town wall
town way
town woman
town yard
town-absorbing
town-and-country suit
town-born
town-bound
town-bred
town-clerk
town-cress
town-dotted
town-dwelling
town-end
town-flanked
town-frequenting
town-girdled
town-goer

town-going
town-house
town-imprisoned
town-keeping
town-killed
town-living
town-looking
town-loving
town-made
town-major
town-meeting
town-pent
town-planning
town-sick
town-talk
town-tied
town-trained
town-weary
townhall clock
township line
township road
towrope horsepower
tox-
toxic goiter
toxic inflammation
toxic psychosis
toxic shock syndrome
toxic-
toxico-
toxin-anatoxin
toxin-antitoxin
toxin-antitoxin immunity
toxin-antitoxin immunization
toxo-
toxophore group
toy dog
toy manchester
toy poodle
toy shop
toy soldier
toy spaniel
toy terrier
toy with
toy-loving
toy-shop
toy-sized
tr-ties
tra-la

tra-la-la
trace
 buckle
trace chain
trace connector
trace down
trace element
trace fastener
trace holder
trace hook
trace horse
trace of an idea
trace out
trace over
trace spring
trace the derivation of
trace the origin of
trace to
trace-bearer
trace-galled
trace-high
tracer atom
tracer bullet
tracer element
tracer investigation
trache-
trachelo-
trachelo-occipital
tracheo-
trachio branchia
trachy-
tracing braid
tracing cloth
tracing paper
tracing thread
tracing wheel
track and field
track boat
track bolt
track brake
track chisel
track cleaner
track clip
track down
track drill
track edge
track gauge
track guard

track harness
track indicator
track inspector
track instrument
track jack
track level
track leveler
track lifter
track liner
track map
track mark
track meet
track of
track oven
track punch
track race
track record
track road
track rod
track roller
track scale
track shim
track shoe
track shot
track spike
track sports
track sprocket
track suit
track
 switch
track tank
track tool
track wrench
track-
track-and-field
track-clearing
track-laying
track-mile
track-walking
tracked vehicle
tracker action
tracker bar
tracker-action organ
tracking down
tracking shot
tracking station
trackless trolley
tract index

tract of time
traction engine
traction fiber
traction sprayer
traction wheel
traction-engine
tractive effort
tractive power
tractor airplane
tractor airscrew
tractor plane
tractor propeller
tractor trailer
tractor truck
tractor-trailer
trade acceptance
trade agreement
trade allowance
trade association
trade at
trade balance
trade board
trade book
trade center
trade club
trade coin
trade commissioner
trade council
trade cumulus
trade cycle
trade discount
trade dollar
trade ducat
trade edition
trade editor
trade eruption
trade fair
trade fixture
trade gap
trade goods
trade guild
trade hall
trade in
trade journal
trade language
trade magazine
trade name
trade off

trade officer
trade on
trade on margin
trade paper
trade plate
trade practice
trade
 price
trade rat
trade reference
trade rights
trade road
trade route
trade sale
trade school
trade secret
trade sight unseen
trade test
trade tomahawk
trade union
trade unionism
trade unionist
trade up
trade warranty
trade wind
trade winds
trade with
trade work
trade-bound
trade-destroying
trade-facilitating
trade-fallen
trade-gild
trade-in
trade-laden
trade-last
trade-made
trade-mark
trade-mark infringement
trade-mark name
trade-marker
trade-off
trade-seeking
trade-union
trade-unionism
trade-unionist
trade-wind
trade-wind rig

trademark name
trades board
trades council
trades hall
trades-union
trades-unionism
trades-unionist
trading account
trading estate
trading market
trading post
trading stamp
tradition-bound
tradition-fed
tradition-following
tradition-making
tradition-nourished
tradition-ridden
traditional grammar
traditional logic
traditor battery
traffic beacon
traffic circle
traffic constable
traffic control
traffic control signal
traffic cop
traffic court
traffic density
traffic
director
traffic engineering
traffic in
traffic in women
traffic island
traffic jam
traffic law
traffic light
traffic manager
traffic of the stage
traffic officer
traffic pattern
traffic policeman
traffic post
traffic regulator
traffic sheet
traffic shifter
traffic signal

traffic squad
traffic tower
traffic warden
traffic with
traffic-bearing
traffic-choked
traffic-congested
traffic-furrowed
traffic-laden
traffic-mile
traffic-regulating
traffic-thronged
tragedy-proof
tragi-
tragi-comedy
tragi-comic
tragic drama
tragic flaw
tragic irony
tragic muse
tragic-comedy
trail after
trail along
trail angle
trail arms
trail away
trail bar
trail behind
trail bike
trail blazer
trail blazing
trail board
trail boss
trail breaker
trail bridge
trail car
trail cart
trail ferry
trail handspike
trail herd
trail net
trail of
trail plank
trail plate
trail rope
trail sight
trail spade
trail spur

trail-eye
trail-marked
trail-weary
trail-wise
trailer camp
trailer car
trailer court
trailer park
trailer
truck
trailing arbutus
trailing edge
trailing evergreen
trailing fuchsia
trailing myrtle
trailing phlox
trailing vortex drag
trailing-point
trailing-point switch
train butcher
train caller
train conductor
train crew
train dispatcher
train flagman
train foreman
train guard
train hand
train indicator
train inspector
train jumper
train legs
train line
train mileage
train of thought
train off
train oil
train pipe
train recorder
train reporter
train robber
train room
train rope
train schedule
train service
train shed
train sheet
train sickness

train signal
train spotter
train staff
train starter
train stop
train tackle
train ticket
train trip
train upon
train wrecker
train-dispatching
train-giddy
train-lighting
train-mile
trained nurse
trainer-bomber
trainer-fighter
training aid
training bank
training college
training day
training group
training level
training missile
training mission
training pants
training rocket
training school
training ship
training table
training tackle
training
wall
trait of character
trait-complex
trajectory missile
tram crane
tram greaser
tram guard
tram load
tram plate
tram rail
tram rod
tram shed
tram-borne
tram-car
tram-line
tram-road

tram-traveling
trammel net
trammel wheel
trammel-net
tramp pick
tramp ship
tramp steamer
trample down
trample in the dust
trample on
trample out
trample under foot
trample underfoot
trample upon
trampling down
trance speaking
trance state
trance writing
tranche de bouf
tranche de lard
tranche de vie
tranquil-acting
tranquil-ization
tranquil-looking
tranquil-minded
trans-
trans-Adriatic
trans-African
trans-Algerian
trans-Alleghenian
trans-American
trans-Andean
trans-Andine
trans-Antarctic
trans-Apennine
trans-Arabian
trans-Asiatic
trans-Australian
trans-Austrian
trans-Balkan
trans-Baltic
trans-Canadian
trans-Carpathian
trans-Caspian
trans-Congo
trans-Cordilleran
trans-Danubian
trans-Egyptian

trans-Euphrates
trans-Germanic
trans-Grampian
trans-Himalayan
trans-Hispanic
trans-Iberian
trans-Indian
trans-Indus
trans-Iranian
trans-Iraq
trans-Jovian
trans-Liberian
trans-Libyan
trans-Manchurian
trans-Martian
trans-Mediterranean
trans-Mississippi
trans-Mississippian
trans-Mongolian
trans-Neptunian
trans-Niger
trans-Panamanian
trans-Paraguayian
trans-Persian
trans-Pyrenean
trans-Rhenish
trans-Sahara
trans-Saharan
trans-Saturnian
trans-Severn
trans-Siberian
trans-Stygian
trans-Tiber
trans-Tiberian
trans-Ural
trans-Uralian
trans-Volga
trans-border
trans-continental
trans-etherian
trans-frontier
trans-oceanic
trans-pacific
trans-shape
trans-shift
trans-sonic
trans-subjective
transact

business
transact business with
transactional analysis
transcendent essence
transcendent idea
transcendent universal
transcendent wonder
transcendental aesthetic
transcendental analytic
transcendental dialectic
transcendental idealism
transcendental logic
transcendental meditation
transcendental number
transcendental object
transcendental philosophy
transcription turntable
transfer RNA
transfer agent
transfer book
transfer
box
transfer caliper
transfer case
transfer company
transfer conductance
transfer day
transfer fee
transfer ink
transfer list
transfer of property
transfer of right
transfer of training
transfer paper
transfer payment
transfer picture
transfer printing
transfer property
transfer resistance
transfer right
transfer stamp
transfer table
transferable vote
transference neurosis
transference number
transferred meaning
transferred sense
transferring machine

transfinite cardinal
transfinite number
transfinite ordinal
transformation myth
transformation range
transformation rule
transformation scene
transformation temperature
transformational grammar
transformational linguistics
transformational rule
transformer oil
transfuse the sense of
transfusion cell
transfusion tissue
transient boarder
transient cause
transient guest
transient lodging
transient state
transistor circuit
transistor hearing aid
transistor physics
transistor radio
transit camp
transit certificate
transit circle
transit compass
transit
department
transit duty
transit floater
transit instrument
transit pass
transit prism
transit privileges
transit rot
transit station
transit theodolite
transit time
transition curve
transition element
transition fit
transition form
transition mission
transition point
transition probability
transition sound

transition strip
transition temperature
transition tint
transitive verb
transitive vnsit number
transitory action
translate into
translate into action
translating roller
translation of axes
translucent things
transmigration of souls
transmission bands
transmission belting
transmission cable
transmission case
transmission chain
transmission clutch
transmission density
transmission dynamometer
transmission efficiency
transmission electron microscope
transmission factor
transmission gear
transmission grating
transmission level
transmission line
transmission lock
transmission loss
transmission of light
transmission pulley
transmission pump
transmission rope
transmission shaft
transmission
sheaf
transmission stop system
transmission theory
transmission tower
transmission unit
transmission wheel
transmit warrant
transmit-receive unit
transmit-receiver
transmitter part
transmitter parts
transmitter receiver
transmitter signal

transmitter truck
transmitting antenna
transmitting set
transmitting station
transoceanic rocket
transom adjuster
transom bar
transom butt
transom catch
transom center
transom chain
transom eye
transom frame
transom knee
transom lift
transom light
transom operator
transom plate
transom stern
transom window
transom-sterned
transonic barrier
transparent color
transparent item
transparent substance
transparent things
transpartisan leadership
transpersonal therapy
transphysical science
transpiration current
transport caf
transport number
transport rider
transport riding
transport ship
transport vessel
transportation corps
transportation engineer
transportation insurance
transportation map
transporter bridge
transposed conjug
transposed conjugate
transposed
matrix
transposing instrument
transposition cipher
transposition method

transsonic speed
transverse colon
transverse flute
transverse magnification
transverse presentation
transverse process
transverse section
transverse vibrations
transverse wave
trap bat
trap bat and ball
trap brilliant
trap bushing
trap car
trap clamp
trap cleaner
trap cover
trap crop
trap cut
trap door
trap driver
trap drummer
trap fisher
trap hatch
trap lever
trap line
trap match
trap nest
trap net
trap on the ropes
trap play
trap screw
trap shot
trap stair
trap tree
trap tuff
trap vent
trap weir
trap window
trap-ball
trap-cut
trap-door
trap-door spider
trap-nester
trapeze artist
trapeze dress
trapezoid ligament
trapezoidal rule

trash bag
trash barrel
trash can
trash farming
trash gatherer
trash ice
trash pile
trash shield
trash turner
traumatic epilepsy
traumatic fever
traumatic inflammation
traumatic memory
traumatic neurosis
traumatic shock
traumatic trace
traumato-
travail and bring forth
travel
 agency
travel agent
travel book
travel bureau
travel by air
travel by airline
travel by water
travel in a groove
travel in a rut
travel in space
travel literature
travel over
travel ration
travel shot
travel sickness
travel the open road
travel through
travel time
travel with
travel-bent
travel-broken
travel-changed
travel-disordered
travel-enjoying
travel-famous
travel-formed
travel-gifted
travel-infected
travel-jaded

travel-loving
travel-mad
travel-met
travel-opposing
travel-parted
travel-planning
travel-sated
travel-sick
travel-soiled
travel-spent
travel-stained
travel-tainted
travel-tattered
travel-tired
travel-toiled
travel-weary
travel-worn
traveler crane
traveler iron
traveler's check
traveler's-joy
traveler's-tree
traveling agent
traveling bag
traveling block
traveling carriage
traveling case
traveling clock
traveling crab
traveling derrick
traveling elevator
traveling examiner
traveling fellowship
traveling grate
traveling hoist
traveling inspector
traveling man
traveling salesman
traveling
 tinker
traveling trunk
traveling woman
traveling-head shaper
traveling-wave tube
traveller's cheque
traveller's joy
travelling salesman
travelling wave

traverse a yard
traverse board
traverse circle
traverse drill
traverse feed
traverse flute
traverse jury
traverse rail
traverse rod
traverse sailing
traverse shaper
traverse survey
traverse table
traverse track
traverse wind
traverse-table
traversing bridge
traversing circle
traversing crane
traversing gear
traversing jack
traversing mandrel
travois road
trawl board
trawl line
trawl net
trawl-net
tray agriculture
tray boy
tray cloth
tray conveyer
tray elevator
tray emptier
tray filler
tray frame
tray handle
tray maker
tray table
tray-shaped
tray-top table
treacle mold
treacle molding
treacle mustard
treacle sleep
treacle water
treacle wormseed
tread close upon
tread down

tread on
tread on air
tread on eggs
tread on the heels of
tread on your heels
tread on your toes
tread the boards
tread under foot
tread underfoot
tread
upon
tread upon eggs
tread water
tread-softly
tread-wheel
treading down
treading mill
treading water
treads and risers
treason felony
treason-breeding
treason-canting
treason-hatching
treason-haunted
treason-sowing
treasure box
treasure chamber
treasure chest
treasure city
treasure house
treasure hunt
treasure hunter
treasure hunting
treasure quest
treasure room
treasure seeker
treasure ship
treasure trove
treasure up
treasure up in the heart
treasure up in the memory
treasure-baited
treasure-bearing
treasure-filled
treasure-house
treasure-houses
treasure-laden
treasure-seeking

treasure-trove
treasurer general
treasury agent
treasury bench
treasury bill
treasury bond
treasury certificate
treasury check
treasury letter
treasury note
treasury of information
treasury of merits
treasury of the Church
treasury of words
treasury stock
treasury warrant
treat as routine
treat for sore eyes
treat gently
treat lightly
treat like dirt under your feet
treat of
treat to
treat unequally
treat well
treat
with
treat with contempt
treat with disrespect
treat with indignity
treat with reserve
treatment room
treaty maker
treaty making
treaty of peace
treaty port
treaty reinsurance
treaty-bound
treaty-breaking
treaty-favoring
treaty-sealed
treaty-secured
treble best
treble block
treble bob
treble chance
treble clef
treble gear

treble purchase
treble staff
treble viol
treble-dated
treble-geared
treble-sinewed
tree agate
tree aloe
tree azalea
tree bear
tree belt
tree boa
tree bracket
tree cactus
tree calf
tree cat
tree celandine
tree class
tree clover
tree cobra
tree compass
tree cony
tree cotton
tree crab
tree creeper
tree cricket
tree crow
tree cult
tree cypress
tree dassie
tree dove
tree duck
tree farm
tree farmer
tree farming
tree feller
tree fender
tree fern
tree frog
tree fruit
tree fuchsia
tree germander
tree goldenrod
tree goose
tree guard
tree heath
tree holder
tree hoopoe

tree hopper
tree house
tree houseleek
tree huckleberry
tree hyrax
tree insulator
tree ipomoea
tree kangaroo
tree
lark
tree lawn
tree lily
tree line
tree looker
tree lotus
tree lucern
tree lungwort
tree lupine
tree mallow
tree marking
tree marten
tree martin
tree medic
tree mildew
tree milk
tree molasses
tree moss
tree mouse
tree myrtle
tree nymph
tree of Jesse
tree of heaven
tree of knowledge
tree of life
tree of sadness
tree onion
tree orchis
tree partridge
tree peony
tree pie
tree pigeon
tree pipit
tree planter
tree planting
tree poke
tree poppy
tree porcupine
tree primrose

tree protector
tree pruner
tree root rot
tree rune
tree runner
tree scribe
tree shrew
tree snake
tree sorrel
tree sparrow
tree spirit
tree squirrel
tree steppe
tree stool
tree sugar
tree surgeon
tree surgery
tree swallow
tree swift
tree tag
tree tiger
tree toad
tree tobacco
tree tomato
tree trimmer
tree trunk
tree veld
tree violet
tree viper
tree wax
tree wool
tree wormwood
tree worship
tree worshiper
tree yucca
tree-banding
tree-bordered
tree-boring
tree-clad
tree-climbing
tree-covered
tree-creeper
tree-crowned
tree-dotted
tree-dwelling
tree-embowered
tree-feeding
tree-fern

tree-form
 frame
tree-fringed
tree-garnished
tree-girt
tree-god
tree-goddess
tree-goose
tree-great
tree-haunting
tree-hewing
tree-inhabiting
tree-lined
tree-living
tree-locked
tree-loving
tree-marked
tree-moss
tree-planted
tree-pruning
tree-ripe
tree-run
tree-runner
tree-sawing
tree-shaded
tree-shaped
tree-skirted
tree-sparrow
tree-spraying
tree-surgeon
tree-toad
tree-top
trefled cross
trefoil arch
trefoil knot
trefoil-shaped
trek ox
trek wagon
trellis-bordered
trellis-covered
trellis-framed
trellis-shaded
trellis-sheltered
trellis-work
trellis-woven
tremble in the balance
tremble in your boots
tremble in your shoes

tremble like an aspen leaf
tremble on the verge
tremble to its fall
tremble to your fall
trembleuse cup
trembling in the balance
trembling poplar
trembling prairie
tremor disk
tremor of excitement
trench albuminuria
trench artillery
trench back
trench bomb
trench cart
trench cavalier
trench coat
trench digger
trench
 disease
trench fever
trench foot
trench gun
trench knife
trench mortar
trench mouth
trench nephritis
trench plow
trench sickness
trench silo
trench warfare
trench-plough
trencher attendant
trencher cap
trencher companion
trencher critic
trencher friend
trencher knight
trencher philosopher
trencher plate
trencher poetry
trencher rascal
trencher slave
trencher time
trencher-cap
trencher-fed
trencher-man
trenching plane

trenching spade
trend downward
trend of the times
trend upwards
trend-setter
trente et quarante
trente-et-quarante
tres bien
tres bon
tres vif
tres-tine
trespass board
trespass offering
tress-braiding
tress-encircled
tress-lifting
tress-plaiting
tress-shorn
tress-topped
trestle and table
trestle bed
trestle bent
trestle board
trestle bridge
trestle legs
trestle post
trestle table
trestle-tree
trey-ace
trez-tine
tri-
tri-city
tri-ester
tri-iodide
tri-mide
tri-pack
tri-personal
tri-ply
tri-tunnel
tria juncta in uno
triakis-
trial and error
trial at the bar
trial balance
trial
balloon
trial brief
trial by battle

trial by jury
trial case
trial court
trial docket
trial engagement
trial examiner
trial frame
trial glasses
trial heat
trial horse
trial impression
trial judge advocate
trial jury
trial lawyer
trial lenses
trial marriage
trial order
trial package
trial piece
trial print
trial proof
trial run
trial sample
trial square
trial trip
trial-and-error
trials and tribulations
triammonium phosphate
triangle inequality
triangle of forces
triangle spider
triangle winding
triangle-leaved
triangle-shaped
triangular bandage
triangular matrix
triangular-shaped
triangulation stations
triangulato-ovate
triarylmethane dye
triatic stay
triaxial cable
triaxial speaker
tribasic sodium phosphate
tribo-
tribrom-
tribromoethyl alcohol
tribute money

tribute pitch
tric-trac
trice up
triceps surae
trich-
trichlor-
trichloroacetic acid
trichloroacetic acid aldeh
trichloroacetic acid aldehyde
trichloromethyl chloroformate
trichlorophenoxyacetic acid
trichlorphenoxyacetic acid
tricho-
trick
 knee
trick of behavior
trick of eyesight
trick off
trick or treat
trick out
trick rider
trick score
trick up
trick valve
trick wheel
trick work
trick-o-the-loop
trick-or-treat
trick-or-treater
tricked out
trickle away
trickle charge
trickle charger
trickle-down theory
tricks of the trade
tricky spot
tricolor camera
tricot stitch
tricuspid insufficiency
tricuspid stenosis
tricuspid valve
tricyanic acid
tridarn cupboard
trident bat
trident-shaped
tridymite-trachyte
tried and true
tried-and-trueness

triethyl orthoformate
trifacial neuralgia
trifid foot
trifle away
trifle away time
trifle with
trifle with the truth
trifles light as air
trifling amount
trifling matter
trifoliate orange
trig loop
trig up
trigeminal nerve
trigeminal neuralgia
trigesimo-secundo
trigger a mine
trigger circuit
trigger finger
trigger guard
trigger hair
trigger man
trigger mechanism
trigger plant
trigger pulse
trigger tube
trigger-happy
trigger-men
triggering pulse
triggering signals
trigonal trisoctahedron
trigono-
trigonometric
equation
trigonometric function
trihydric alcohol
trilateral symmetry
trilby hat
trillium family
trim angle
trim by the head
trim by the stern
trim controls
trim rail
trim sail
trim ship
trim size
trim tab

trim tabs
trim to
trim up
trim your sails to the breeze
trim-ankled
trim-bearded
trim-bodiced
trim-bodied
trim-cut
trim-dressed
trim-hedged
trim-kept
trim-looking
trim-suited
trim-swept
trim-up
trim-waisted
trimetric projection
trimmer arch
trimmer beam
trimmer condenser
trimmer joist
trimmer signal
trimming capacitor
trimming hatch
trimming hole
trimming joist
trimming machine
trimming press
trimming punch
trimming store
trimming tab
trimming tank
trine immersion
trinitro-
trinity column
trinity field
trinity lily
trinity violet
trinkum-trankum
trinomial name
trio sonata
triode-heptode
trip catch
trip charter party
trip dial
trip die
trip dog

trip engine
trip gear
trip hammer
trip hook
trip line
trip money
trip over your own feet
trip over your tongue
trip
 piece
trip pin
trip rate
trip shaft
trip slip
trip system
trip the light fantastic
trip to Mars
trip to the moon
trip train
trip up
trip-free
trip-hammer
trip-madam
trip-toe
tripartite and fretty
tripe de roche
tripe dresser
tripe seller
tripe-de-roche
tripe-eating
tripe-selling
triphenylmethane color
triphenylmethane dye
triphosphoric acid
triple bond
triple counterpoint
triple crown
triple dresser
triple fugue
triple integral
triple jump
triple measure
triple play
triple plume
triple point
triple rhyme
triple rhythm
triple scalar product

triple superphosphate
triple tangent
triple tangent plane
triple threat
triple time
triple vaccine
triple-acting
triple-action
triple-aisled
triple-apsidal
triple-arched
triple-awned
triple-barbed
triple-barred
triple-bearded
triple-bodied
triple-bolted
triple-branched
triple-check
triple-chorded
triple-colored
triple-crested
triple-crowned
triple-cylinder
triple-deck
triple-decked
triple-decker
triple-dyed
triple-edged
triple-entry
triple-expansion
triple-expansion
engine
triple-formed
triple-gemmed
triple-hatted
triple-headed
triple-header
triple-hearth
triple-ingrain
triple-line
triple-lived
triple-lock
triple-nerved
triple-piled
triple-pole
triple-rayed
triple-ribbed

triple-rivet
triple-roofed
triple-space
triple-stranded
triple-tailed
triple-terraced
triple-thread
triple-throated
triple-throw
triple-tiered
triple-tongue
triple-tongued
triple-tonguing
triple-toothed
triple-towered
triple-turned
triple-turreted
triple-veined
triple-wick
triplet lily
triplicate-pinnate
triplicate-ternate
triplo-
tripod camera
tripod of the Pythia
tripod puller
tripod table
tripped out
tripped up
tripping coil
tripping line
tripping link
tripping relay
tripping transformer
trippingly on the tongue
trismus cynicus
trisodium phosphate
tristimulus computer
tristimulus values
trit-trot
trite expression
trite joke
trite saying
trito-
triumph over
triumphal arch
trivalent carbon
trivet table

trivial affair
trivial name
trobar clus
trocar-shaped
trochlear
 nerve
trocho-
trodden flat
troilus butterfly
trois point
trojan horse
trojan war
troll plate
troll-drum
troll-madam
trolley attendant
trolley block
trolley bracket
trolley bus
trolley car
trolley carrier
trolley catcher
trolley clip
trolley coach
trolley cord
trolley fork
trolley frog
trolley gong
trolley guard
trolley harp
trolley hoist
trolley insulator
trolley lace
trolley line
trolley locomotive
trolley maker
trolley pole
trolley rail
trolley retrieiver
trolley road
trolley shoe
trolley spring
trolley track
trolley tracking
trolley wagon
trolley wheel
trolley wire
tromba marina

trombe marine
trombone coil
trompe l'oeil
tron weight
trone weight
troop carrier
troop duck
troop leader
troop school
troop train
troop transport
troop-lined
troop-thronged
troops of the line
troostite-martensite
troosto-martensite
trop-
tropaeolin D
trope of comparison
tropeolin D
troph-
trophic level
tropho-
trophy cress
trophy money
trophy room
trophy tax
tropic bird
tropic of
tropic of Cancer
tropic
 of cancer
tropical aquarium
tropical bubo
tropical cycl
tropical cyclone
tropical fish
tropical heat
tropical medicine
tropical storm
tropical suit
tropical year
tropo-
trot along
trot out
troth ring
troth-contracted
troth-keeping

troth-plight
troth-telling
trotter cases
trotting race
trou madame
trou-de-coup
trou-de-loup
troubadour fiddle
troubadour poem
trouble maker
trouble man
trouble shooter
trouble shooting
trouble spot
trouble you for
trouble your head about
trouble yourself
trouble-bringing
trouble-free
trouble-giving
trouble-haunted
trouble-house
trouble-mirth
trouble-saving
trouble-shooter
trouble-tossed
trouble-worn
troubled mind
troubled thought
troubled waters
trough battery
trough conveyor
trough gutter
trough iron
trough keel
trough line
trough roof
trough room
trough shape
trough-shaped
trouser press
trouser presser
trouser suit
trouser-press
trout bass
trout brook
trout fishing
trout fly

trout lily
trout perch
trout shad
trout stream
trout-colored
trout-famous
trout-haunted
trout-perch
trowel
 bayonet
trowel-shaped
troy ounce
troy pound
troy weight
truant officer
truant school
truce flag
truce-hating
truce-seeking
truck box
truck car
truck crop
truck driver
truck farm
truck farmer
truck farming
truck garden
truck gardener
truck gardening
truck horse
truck house
truck jobber
truck shot
truck system
truck tractor
truck trailer
trucking house
trucking shot
truckle bed
truckle to
truckle-bed
truckman's knot
trudgen crawl
trudgen stroke
true Christian
true air speed
true anomaly
true as gospel

true bearing
true being
true believer
true bill
true blue
true bug
true course
true faith
true fly
true fresco
true grit
true heading
true horizon
true inwardness
true jade
true laurel
true level
true lover's knot
true meaning
true north
true rib
true skin
true time
true to form
true to life
true to nature
true to reality
true to the facts
true to the letter
true to the spirit
true to type
true to your colors
true up
true vocal cord
true vocal cords
true-aimed
true-based
true-begotten
true-believing
true-blooded
true-blue
true-born
true-breasted
true-bred
true-dealing
true-derived
true-devoted
true-disposing

true-divining
true-eyed
true-false
true-false
test
true-felt
true-grained
true-hearted
true-heartedness
true-heroic
true-life
true-love
true-love knot
true-lover's knot
true-made
true-mannered
true-meaning
true-meant
true-noble
true-paced
true-ringing
true-run
true-seeming
true-souled
true-speaking
true-spelling
true-spirited
true-spoken
true-stamped
true-strung
true-sublime
true-sweet
true-thought
true-to-lifeness
true-toned
true-tongued
truelove knot
trump and solemn heraldry
trump card
trump of doom
trump signal
trump up
trump up a charge
trump-poor
trumped-up
trumped-up charge
trumped-up story
trumpet animalcule

trumpet arch
trumpet ash
trumpet blare
trumpet blast
trumpet call
trumpet conch
trumpet creeper
trumpet daffodil
trumpet fish
trumpet flower
trumpet fly
trumpet forth
trumpet honey suckle
trumpet honeysuckle
trumpet hypha
trumpet
 lily
trumpet major
trumpet marine
trumpet milkweed
trumpet narcissus
trumpet of doom
trumpet plant
trumpet reed
trumpet seaweed
trumpet shell
trumpet sound
trumpet tree
trumpet turning
trumpet vine
trumpet-blowing
trumpet-creeper family
trumpet-hung
trumpet-leaf
trumpet-leaves
trumpet-loud
trumpet-shaped
trumpet-toned
trumpet-tongued
trumpet-tree
trumpet-voiced
trumpeter fish
trumpeter muscle
trumpeter perch
trumpeter swan
trumpeter whiting
truncated pyramid
trundle bed

trundle-bed
trundle-tail
trunk breeches
trunk buoy
trunk cabin
trunk call
trunk curl
trunk deck
trunk dial
trunk engine
trunk hatch
trunk hatchway
trunk hose
trunk line
trunk piston
trunk road
trunk room
trunk scald
trunk steamer
trunk turtle
trunk whale
trunk-breeches
trunk-decked vessel
trunk-fish
trunk-hose
trunk-maker
trunnion band
trunnion carriage
trunnion chain
trunnion cradle
trunnion hoop
trunnion jig
trunnion plate
truss beam
truss bow
truss bridge
truss hoop
truss rod
truss up
truss-bound
truss-galled
truss-hoop
trussed
 beam
trussed joist
trussing bed
trussing machine
trust account

trust agreement
trust beneficiary
trust buster
trust busting
trust certificate
trust company
trust corporation
trust deed
trust fund
trust implicitly
trust in
trust in God
trust indenture
trust institution
trust maker
trust mortgage
trust officer
trust receipt
trust territory
trust to
trust to chance
trust to luck
trust unto
trust upon
trust your word
trust-bolstering
trust-breaking
trust-controlled
trust-controlling
trust-ingly
trust-regulating
trust-ridden
trust-winning
trusted friend
trustee account
trustee bank
trustee in bankruptcy
trustee mortgage bond
trustee process
trustee savings bank
trustee security
trustee stock
trusting soul
trusty friend
trusty sword
truth claim
truth drug
truth in action

truth lover
truth or consequences
truth seeker
truth serum
truth set
truth speaker
truth table
truth to life
truth to nature
truth to the letter
truth-armed
truth-bearing
truth-cloaking
truth-cowed
truth-declaring
truth-denying
truth-desiring
truth-destroying
truth-dictated
truth-filled
truth-function
truth-functional
truth-functionally
truth-guarding
truth-instructed
truth-led
truth-loving
truth-mocking
truth-passing
truth-perplexing
truth-revealing
truth-seeking
truth-shod
truth-speaking
truth-telling
truth-tried
truth-value
truth-writ
try
 a case
try again
try and
try and make me
try and try
try and try again
try anything once
try cock
try conclusions

try conclusions with
try for
try for a miracle
try for point
try gun
try hard
try hole
try in all its phases
try it
try it for size
try it on
try on
try on for size
try one
try one another
try out
try out for
try plane
try square
try the chance
try the patience
try to
try to be in two places at once
try to bribe
try to catch the wind in a net
try to fetch water in a sieve
try to find
try to gather grapes from thorns
try to get blood from a turnip
try to get figs from thistles
try to make bricks from straw
try to make cheese of chalk
try to
 reach
try to recall
try to weave a rope of sand
try up
try you out
try your best
try your damndest
try your darndest
try your fortune
try your hand
try your luck
try your strength
try your utmost
try-
try-on

try-pot
tryer-out
trying for
trying plane
trypaflavine neut
trypan blue
trypan red
trysail gaff
trysail mast
trysting day
trysting place
tsetchem leshalom
tsetse fly
tsetse fly disease
tsutsugamushi disease
tsutsugamushi mite
tu quoque
tu-chung
tu-chung bark
tu-whit
tu-whit tu-whoo
tu-whoo
tuan muda
tub boat
tub butter
tub chair
tub desk
tub drubber
tub front
tub maker
tub of lard
tub preacher
tub preaching
tub thumper
tub thumping
tub wheel
tub-brained
tub-coopering
tub-fast
tub-keeping
tub-preach
tub-preacher
tub-shaped
tub-size
tub-sized
tub-t
tub-thump
tub-thumper

tubal pregnancy
tube brazer
tube casts
tube coral
tube counter
tube culture
tube door
tube drawer
tube foot
tube generator
tube mill
tube of electric force
tube of force
tube plate
tube railway
tube saw
tube set
tube
sheet
tube shutter
tube spinner
tube transmitter
tube weaver
tube well
tube worm
tube wrench
tube-bearing
tube-curing
tube-drawing
tube-drilling
tube-eye
tube-eyed
tube-eyes
tube-fed
tube-filling
tube-nosed
tube-rolling
tube-scraping
tube-shaped
tube-straightening
tube-weaving
tubeless tire
tubeless tyre
tuber aster
tuber fern
tuber indexing
tuber moth
tuber root

tubercle bacillus
tubercul-
tuberculin test
tuberculo-
tuberculosis cutis
tuberculosis luposa
tuberculosis of the intestines
tuberculosis of the larynx
tuberculous arthritis
tuberculous meningitis
tuberculous rheumatism
tuberous root
tuberous-rooted
tubi-
tubo-
tubo-uterine
tubular bells
tubular floret
tubular girder
tubular goods
tubular skate
tubular-flowered
tubular-pneumatic organ
tubuli-
tuck away
tuck box
tuck in
tuck in a reef
tuck net
tuck plate
tuck pointer
tuck pointing
tuck seine
tuck shop
tuck your tail
tuck-in
tuck-net
tuck-out
tuck-point
tuck-pointed
tuck-pointer
tuck-shop
tuckaway table
tucked up
tucker bag
tucker
out
tucker-bag

tucker-box
tucker-in
tuckered out
tucky lily
tuco tuco
tuco-tuco
tuco-tucos
tucu tucu
tudor arch
tuft tree
tuft-hunter
tufted duck
tufted hair grass
tufted titmouse
tufted-eared
tufted-necked
tug at the heart
tug at the heartstrings
tug chain
tug iron
tug of war
tug the heartstrings
tug-of-war
tug-of-warring
tula metal
tule chicken
tule goose
tule hen
tule mint
tule perch
tule potato
tule root
tule wren
tulema arrow-root
tulip bed
tulip blight
tulip ear
tulip fancier
tulip fire
tulip grower
tulip mold
tulip oak
tulip orchid
tulip poplar
tulip poppy
tulip root
tulip shell
tulip tree

tulip-eared
tulip-fancying
tulip-grass
tulip-growing
tulip-shaped
tulip-tree
tulip-wood
tum out
tum-ti-tum
tum-tum
tumble car
tumble cart
tumble drier
tumble for
tumble grass
tumble home
tumble mustard
tumble on
tumble through the mind
tumble to
tumble-
tumble-down
tumbledown shack
tumbler bearing
tumbler cart
tumbler cup
tumbler drier
tumbler gear
tumbler gearing
tumbler pigeon
tumbler switch
tumbler-shaped
tumbling
 barrel
tumbling bay
tumbling box
tumbling rod
tumbling shaft
tumbling verse
tumbling-
tumbu fly
tump-line
tumulus scab
tun of flesh
tun pail
tun shell
tun-bellied
tun-dish

tuna cheese
tuna clipper
tuna fish
tuna fish salad
tuna oil
tuna salad sandwich
tune down
tune in
tune off
tune out
tune up
tune your lyre
tune-skilled
tune-up
tuned antenna
tuneful Nine
tuner-inner
tung oil
tung tree
tung-oil
tung-oil tree
tungst-
tungsten lamp
tungsten ocher
tungsten steel
tungsten trioxide
tungstic acid
tunic flower
tunica palmata
tuning bar
tuning capacitor
tuning coil
tuning condenser
tuning cone
tuning fork
tuning hammer
tuning hole
tuning horn
tuning key
tuning lever
tuning peg
tuning pin
tuning pipe
tuning slide
tuning wrench
tunking fit
tunna smjors
tunnel anemia

tunnel diode
tunnel disease
tunnel effect
tunnel head
tunnel kiln
tunnel miner
tunnel net
tunnel of love
tunnel of time
tunnel pit
tunnel right
tunnel shaft
tunnel sickness
tunnel stern
tunnel vault
tunnel
vision
tunnel weaver
tunnel worm
tunnel-boring
tunnel-shaped
tunny oil
tuno gum
tup lamb
tup-headed
tupelo gum
tupi-guarani
tupi-guaranian
tuppenny-hapenny
turban buttercup
turban lily
turban sheep
turban squash
turban stone
turban toque
turban-crested
turban-crowned
turban-shaped
turbary hog
turbidity current
turbine centrifugal pump
turbine interrupter
turbine nozzle
turbine steamer
turbine ventilator
turbine-driven
turbine-engined
turbine-propelled

turbo-
turbo-electric
turbo-prop
turbo-propeller engine
turbo-propeller plane
turbo-ram-jet engine
turbo-ramjet engine
turbojet engine
turbojet propulsion
turboprop engine
turboprop-jet
turboprop-jet engine
turboram-jet
turboramjet engine
turbulent flow
turco-
turf accountant
turf ant
turf cake
turf hog
turf moss
turf out
turf webworm
turf-boring
turf-bound
turf-built
turf-clad
turf-covered
turf-cutting
turf-digging
turf-forming
turf-grown
turf-laid
turf-roofed
turf-spread
turf-walled
turfing daisy
turgor pressure
turk's cap
turk's head
turkey
 beard
turkey berry
turkey bird
turkey blossom
turkey bur
turkey buzzard
turkey call

turkey carpet
turkey claw
turkey cock
turkey corn
turkey fig
turkey foot
turkey gnat
turkey gobbler
turkey grape
turkey grass
turkey hen
turkey louse
turkey mullein
turkey oak
turkey pea
turkey pod
turkey red
turkey shoot
turkey stone
turkey trot
turkey vulture
turkey-cock
turkey-feather
turkey-feather fucus
turkey-foot
turkey-hen
turkey-trot
turkey-trotted
turkey-trotting
turkey-worked
turkish bath
turkish coffee
turkish delight
turkish tobacco
turkish towel
turmeric paper
turmeric root
turmeric tree
turn a blind eye
turn a blind eye to
turn a cold shoulder to
turn a cold shoulder upon
turn a corner
turn a deaf ear
turn a deaf ear to
turn a hair
turn a hand
turn a penny

turn a pirouette
turn a pot
turn a somersault
turn a willing ear
turn about
turn acid
turn against
turn an honest penny
turn and turn about
turn around
turn around your little finger
turn aside
turn aside from
turn aside provocation
turn
 ass over elbows
turn attention to
turn away
turn away from
turn awry
turn back
turn back the clock
turn bench
turn blue in the face
turn bolt
turn bottom side up
turn bridge
turn button
turn cloak
turn color
turn down
turn file
turn for
turn from
turn gray
turn green
turn head over heels
turn in
turn in an alarm
turn in your badge
turn in your uniform
turn indicator
turn informer
turn inside out
turn into
turn into money
turn into the opposite
turn inward

turn it off
turn king's evidence
turn loose
turn meter
turn of events
turn of expression
turn of mind
turn of phrase
turn of the cards
turn of the screw
turn of the table
turn of the tide
turn of the wheel
turn of thought
turn of work
turn off
turn off the juice
turn off the light
turn on
turn on a dime
turn on her heel
turn on the juice
turn on the light
turn on the offensive
turn on the tap
turn on to
turn on your heel
turn one's back on
turn one's back upon
turn out
turn out bag and baggage
turn out doors
turn out of doors
turn
out of house and home
turn out that way
turn out to be
turn out well
turn over
turn over a new leaf
turn over in the mind
turn over the leaves
turn over your knees
turn pale
turn queen's
turn queen's evidence
turn red
turn round

turn sign
turn sour
turn state's evidence
turn stitch
turn swords into plowshares
turn tail
turn the back upon
turn the balance
turn the corner
turn the edge of
turn the eyes
turn the mind to
turn the other cheek
turn the point of
turn the scale
turn the scales
turn the shoulder
turn the stomach
turn the tables
turn the tables on
turn the tables upon
turn the thoughts to
turn the tide
turn the trick
turn thumbs down on
turn to
turn to a lake
turn to a sea
turn to account
turn to good account
turn to naught
turn to nothing
turn to profit
turn to stone
turn to the right-about
turn to the side
turn to use
turn to your advantage
turn topsy-turvy
turn traitor
turn turtle
turn under
turn up
turn up missing
turn up one's face
turn up trumps
turn up your nose at
turn

up your toes
turn upon
turn upon your heel
turn upside down
turn west
turn white
turn yellow
turn you away
turn you on
turn your attention from
turn your back on
turn your back upon
turn your coat
turn your face to the wall
turn your hand to
turn your head
turn your stomach
turn your tail upon
turn your tracks to
turn-
turn-and-bank indicato
turn-and-bank indicator
turn-and-slip indicator
turn-buckle
turn-crowned
turn-down
turn-furrow
turn-hall
turn-in
turn-key
turn-key job
turn-out
turn-over
turn-penny
turn-round
turn-server
turn-serving
turn-sick
turn-sickness
turn-table
turn-to
turn-tree
turn-under
turn-up
turned around
turned comma
turned on
turned period

turned-back
turned-down
turned-in
turned-off
turned-on
turned-out
turned-over
turned-up
turner hall
turner harp
turner hood
turner-off
turning arbor
turning around
turning away
turning back
turning backwards
turning basin
turning chisel
turning circle
turning down
turning engine
turning front to back
turning gouge
turning head
over heels
turning inside out
turning into
turning inward
turning movement
turning on
turning out
turning over
turning over in the mind
turning pendant
turning piece
turning plow
turning point
turning rest
turning saw
turning side to side
turning spur
turning square
turning traitor
turning upside down
turning upside-down
turning value
turnip aphid

turnip bean
turnip cabbage
turnip flea
turnip flea beetle
turnip fly
turnip foot
turnip grass
turnip jack
turnip leaf miner
turnip louse
turnip maggot
turnip nigger
turnip parsnip
turnip radish
turnip sawfly
turnip shell
turnip tops
turnip-bearing
turnip-eating
turnip-fed
turnip-growing
turnip-headed
turnip-leaved
turnip-pate
turnip-pointed
turnip-rooted
turnip-rooted celery
turnip-shaped
turnip-sick
turnip-stemmed
turnip-tailed
turnip-yielding
turnover door
turnover hinge
turnover tax
turnpike bond
turnpike geranium
turnpike man
turnpike road
turntable ladder
turnup bed
turnup card
turpentine beetle
turpentine camphor
turpentine gum
turpentine
moth
turpentine oil

turpentine orchard
turpentine pine
turpentine plant
turpentine shrub
turpentine substitute
turpentine sunflower
turpentine tree
turpeth mineral
turquoise blue
turquoise green
turquoise-blue
turquoise-colored
turquoise-encrusted
turquoise-hued
turquoise-studded
turquoise-tinted
turret angle-rack tool
turret captain
turret clock
turret crew
turret cutter
turret deck
turret drier
turret drill
turret gun
turret lathe
turret ship
turret slide tool
turret spider
turret steamer
turret taper tool
turret-deck vessel
turret-decked vessel
turret-shaped
turret-topped
turret-turning
turtle cowrie
turtle crawl
turtle deck
turtle grass
turtle green
turtle heart
turtle peg
turtle pegger
turtle pegging
turtle plate
turtle shell
turtle soup

turtle stone
turtle-back
turtle-back shooting
turtle-billing
turtle-dove
turtle-footed
turtle-haunted
turtle-mouthed
turtle-neck
turtle-winged
turtleback scale
turtleneck sweater
tusk shell
tusk tenon
tussah silk
tussock grass
tussock moth
tussock
 sedge
tussock-grass
tut money
tut-mouthed
tut-tut
tut-tutted
tut-tutting
tutelar genius
tutelar god
tutelar spirit
tutelary genius
tutelary god
tutelary spirit
tutor-sick
tutorial system
tutti passage
tutti-frutti
tuxedo coat
tuxedo jacket
tuyere arch
tuyere box
tuyere notch
tw-
twae-three
twain cloud
twaite shad
twanging nerves
twattle-basket
tweak the devil's nose
tweak the nose

tweed-clad
tweed-covered
tweed-suited
tweedle-
tween-brain
tween-deck
tween-watch
tweet-tweet
tweeter-woofer
tweezer-case
twelfhynde man
twelfth day
twelfth man
twelfth night
twelfth-cake
twelfth-day
twelfth-night
twelfth-second
twelve dozen
twelve men in a box
twelve o'clock
twelve-acre
twelve-armed
twelve-banded
twelve-bore
twelve-button
twelve-candle
twelve-carat
twelve-cut
twelve-day
twelve-dram
twelve-feet
twelve-foot
twelve-footed
twelve-fruited
twelve-gated
twelve-gauge
twelve-gemmed
twelve-handed
twelve-hole
twelve-horsepower
twelve-hour
twelve-inch
twelve-labor
twelve-legged
twelve-line
twelve-mile
twelve-mile

limit
twelve-minute
twelve-monthly
twelve-note row
twelve-o'clock
twelve-oared
twelve-ounce
twelve-part
twelve-pint
twelve-point
twelve-point sphere
twelve-pound
twelve-pounder
twelve-rayed
twelve-seated
twelve-shilling
twelve-sided
twelve-spoke
twelve-spotted
twelve-starred
twelve-stone
twelve-stranded
twelve-thread
twelve-tone
twelve-tone row
twelve-tone technique
twelve-towered
twelve-verse
twelve-wired
twelve-word
twelve-year
twelve-year-old
twelvehynde man
twentieth man
twentieth-century
twenty questions
twenty-acre
twenty-carat
twenty-centimeter
twenty-cubit
twenty-day
twenty-dollar
twenty-dollar bill
twenty-dollar gold piece
twenty-eight
twenty-eighth
twenty-fifth
twenty-first

twenty-five
twenty-five cents
twenty-five percent
twenty-foot
twenty-four
twenty-four carat
twenty-four-hour
twenty-fourmo
twenty-fourmos
twenty-fourth
twenty-gauge
twenty-grain
twenty-gun
twenty-hour
twenty-inch
twenty-knot
twenty-line
twenty-man
twenty-mark
twenty-mesh
twenty-meter
twenty-mile
twenty-minute
twenty-nigger
twenty-nine
twenty-ninth
twenty-one
twenty-one
point cassino
twenty-ounce
twenty-payment
twenty-penny
twenty-plume
twenty-pound
twenty-round
twenty-second
twenty-seven
twenty-seventh
twenty-shilling
twenty-six
twenty-sixth
twenty-third
twenty-thread
twenty-three
twenty-ton
twenty-twenty
twenty-two
twenty-wood

twenty-word
twenty-yard
twenty-year
twi-
twi-banked
twi-circle
twi-colored
twi-form
twi-formed
twi-minded
twi-night
twi-nighter
twice as much
twice over
twice-abandoned
twice-abolished
twice-absent
twice-accented
twice-accepted
twice-accomplished
twice-accorded
twice-accused
twice-achieved
twice-acknowledged
twice-acquired
twice-acted
twice-adapted
twice-adjourned
twice-adjusted
twice-admitted
twice-adopted
twice-affirmed
twice-agreed
twice-alarmed
twice-alleged
twice-allied
twice-altered
twice-amended
twice-angered
twice-announced
twice-answered
twice-anticipated
twice-appealed
twice-appointed
twice-appropriated
twice-approved
twice-arbitrated
twice-arranged

twice-assaulted
twice-asserted
twice-assessed
twice-assigned
twice-associated
twice-assured
twice-attained
twice-attempted
twice-attested
twice-audited
twice-authorized
twice-avoided
twice-baked
twice-balanced
twice-bankrupt
twice-baptized
twice-barred
twice-bearing
twice-beaten
twice-begged
twice-begun
twice-beheld
twice-beloved
twice-bent
twice-bereaved
twice-bereft
twice-bested
twice-bestowed
twice-betrayed
twice-bid
twice-bit
twice-blamed
twice-blessed
twice-blooming
twice-blowing
twice-boiled
twice-born
twice-borrowed
twice-bought
twice-branded
twice-broken
twice-brought
twice-buried
twice-called
twice-canceled
twice-canvassed
twice-captured
twice-carried

twice-caught
twice-censured
twice-challenged
twice-changed
twice-charged
twice-cheated
twice-chosen
twice-cited
twice-claimed
twice-collected
twice-commenced
twice-commended
twice-committed
twice-competing
twice-completed
twice-compromised
twice-concealed
twice-conceded
twice-condemned
twice-conferred
twice-confessed
twice-confirmed
twice-conquered
twice-consenting
twice-considered
twice-consulted
twice-contested
twice-continued
twice-converted
twice-convicted
twice-copyrighted
twice-corrected
twice-counted
twice-cowed
twice-created
twice-crowned
twice-cured
twice-damaged
twice-dared
twice-darned
twice-dead
twice-dealt
twice-debated
twice-deceived
twice-declined
twice-decorated
twice-decreed
twice-deducted

twice-defaulting
twice-defeated
twice-deferred
twice-defied
twice-delayed
twice-delivered
twice-demanded
twice-denied
twice-depleted
twice-deserted
twice-deserved
twice-destroyed
twice-detained
twice-diminished
twice-dipped
twice-directed
twice-disabled
twice-disappointed
twice-discarded
twice-discharged
twice-discontinued
twice-discounted
twice-discovered
twice-disgraced
twice-dismissed
twice-dispatched
twice-divided
twice-divorced
twice-doubled
twice-doubted
twice-drafted
twice-drugged
twice-dyed
twice-earned
twice-effected
twice-elected
twice-enacted
twice-encountered
twice-endorsed
twice-engaged
twice-enlarged
twice-ennobled
twice-essayed
twice-evaded
twice-examined
twice-excelled
twice-excused
twice-exempted

twice-exiled
twice-exposed
twice-expressed
twice-extended
twice-fallen
twice-false
twice-favored
twice-felt
twice-filmed
twice-fined
twice-folded
twice-fooled
twice-forgiven
twice-forgotten
twice-forsaken
twice-fought
twice-foul
twice-fulfilled
twice-gained
twice-garbed
twice-given
twice-granted
twice-grieved
twice-guilty
twice-handicapped
twice-hazarded
twice-healed
twice-heard
twice-helped
twice-hidden
twice-hinted
twice-hit
twice-honored
twice-humbled
twice-hurt
twice-identified
twice-ignored
twice-imposed
twice-improved
twice-incensed
twice-increased
twice-indulged
twice-infected
twice-injured
twice-insulted
twice-insured
twice-invented
twice-invited

twice-issued
twice-jailed
twice-judged
twice-kidnaped
twice-knighted
twice-laid
twice-lamented
twice-leagued
twice-learned
twice-left
twice-lengthened
twice-levied
twice-liable
twice-listed
twice-loaned
twice-lost
twice-mad
twice-maintained
twice-marketed
twice-married
twice-mastered
twice-mated
twice-measured
twice-menaced
twice-mended
twice-mentioned
twice-merited
twice-met
twice-missed
twice-mistaken
twice-modified
twice-mortal
twice-mourned
twice-named
twice-necessitated
twice-needed
twice-negligent
twice-negotiated
twice-nominated
twice-noted
twice-notified
twice-numbered
twice-objected
twice-obligated
twice-occasioned
twice-occupied
twice-offended
twice-offered

twice-offset
twice-omitted
twice-opened
twice-opposed
twice-ordered
twice-originated
twice-orphaned
twice-overdue
twice-overtaken
twice-overthrown
twice-owned
twice-paid
twice-painted
twice-pardoned
twice-parted
twice-partitioned
twice-patched
twice-pensioned
twice-permitted
twice-persuaded
twice-perused
twice-petitioned
twice-pinnate
twice-placed
twice-planned
twice-pleased
twice-pledged
twice-poisoned
twice-pondered
twice-posed
twice-postponed
twice-praised
twice-predicted
twice-preferred
twice-prepaid
twice-prepared
twice-prescribed
twice-presented
twice-preserved
twice-pretended
twice-prevailing
twice-prevented
twice-printed
twice-procured
twice-professed
twice-prohibited
twice-promised
twice-promoted

twice-proposed
twice-prosecuted
twice-protected
twice-proven
twice-provided
twice-provoked
twice-published
twice-punished
twice-pursued
twice-qualified
twice-questioned
twice-quoted
twice-raided
twice-re-elected
twice-read
twice-realized
twice-rebuilt
twice-recognized
twice-reconciled
twice-reconsidered
twice-recovered
twice-redeemed
twice-refined
twice-reformed
twice-refused
twice-regained
twice-regretted
twice-rehearsed
twice-reimbursed
twice-reinstated
twice-rejected
twice-released
twice-relieved
twice-remedied
twice-remembered
twice-remitted
twice-removed
twice-rendered
twice-rented
twice-repaired
twice-repeated
twice-replaced
twice-reported
twice-reprinted
twice-requested
twice-required
twice-reread
twice-resented

twice-resisted
twice-restored
twice-restrained
twice-resumed
twice-revenged
twice-reversed
twice-revised
twice-revived
twice-revolted
twice-rewritten
twice-rich
twice-right
twice-risen
twice-roasted
twice-robbed
twice-roused
twice-ruined
twice-sacked
twice-sacrificed
twice-said
twice-salvaged
twice-sampled
twice-sanctioned
twice-saved
twice-scared
twice-scattered
twice-scolded
twice-scorned
twice-sealed
twice-searched
twice-secreted
twice-secured
twice-seen
twice-seized
twice-selected
twice-sensed
twice-sent
twice-sentenced
twice-separated
twice-served
twice-set
twice-settled
twice-severed
twice-shamed
twice-shared
twice-shelled
twice-shelved
twice-shielded

twice-shot
twice-shown
twice-sick
twice-silenced
twice-sketched
twice-soiled
twice-sold
twice-soled
twice-solicited
twice-solved
twice-sought
twice-sounded
twice-spared
twice-specified
twice-spent
twice-sprung
twice-stabbed
twice-staged
twice-stated
twice-stolen
twice-stopped
twice-straightened
twice-stress
twice-stretched
twice-stricken
twice-struck
twice-subdued
twice-subjected
twice-subscribed
twice-substituted
twice-sued
twice-suffered
twice-sufficient
twice-suggested
twice-summoned
twice-suppressed
twice-surprised
twice-surrendered
twice-suspected
twice-suspended
twice-sustained
twice-sworn
twice-tabled
twice-taken
twice-tamed
twice-taped
twice-tardy
twice-taught

twice-tempted
twice-tendered
twice-terminated
twice-tested
twice-thanked
twice-thought
twice-threatened
twice-thrown
twice-tied
twice-told
twice-told
tale
twice-torn
twice-touched
twice-trained
twice-transferred
twice-translated
twice-transported
twice-treated
twice-tricked
twice-tried
twice-trusted
twice-turned
twice-undertaken
twice-undone
twice-united
twice-unpaid
twice-upset
twice-used
twice-uttered
twice-vacant
twice-vamped
twice-varnished
twice-ventured
twice-verified
twice-vetoed
twice-victimized
twice-violated
twice-visited
twice-voted
twice-waged
twice-waived
twice-wanted
twice-warned
twice-wasted
twice-weaned
twice-welcomed
twice-whipped

twice-widowed
twice-wished
twice-withdrawn
twice-witnessed
twice-won
twice-worn
twice-wounded
twice-yielded
twiddle
 your thumbs
twiddle-twaddle
twiddling line
twig beetle
twig blight
twig borer
twig caterpillar
twig drop
twig gall
twig girdler
twig insect
twig pruner
twig rush
twig-formed
twig-green
twig-lined
twig-strewn
twig-suspended
twig-wrought
twilight arch
twilight blue
twilight home
twilight of the gods
twilight of your days
twilight parallel
twilight sleep
twilight state
twilight vision
twilight war
twilight zone
twilight-enfolded
twilight-hidden
twilight-hushed
twilight-loving
twilight-seeming
twilight-tinctured
twill weave
twill-woven
twin band mill

twin bed
twin bill
twin boat
twin equatorial
twin mill
twin screws
twin ship
twin sister
twin sisterhood
twin spinnaker rig
twin stock
twin tail wheel
twin tap
twin telescope
twin town
twin triode
twin valve
twin-balled
twin-bearing
twin-begot
twin-blossomed
twin-born
twin-brother
twin-cylinder
twin-engine
twin-engined
twin-engines
twin-existent
twin-float
twin-forked
twin-gun
twin-headed
twin-hued
twin-jet
twin-leaf
twin-leaved
twin-leaves
twin-lens
twin-lens
camera
twin-lens reflex
twin-lens reflex camera
twin-light
twin-motor
twin-motored
twin-named
twin-peaked
twin-power

twin-prop
twin-roller
twin-screw
twin-set
twin-sister
twin-six
twin-spiked
twin-spired
twin-spot
twin-striped
twin-tailboom jet
twin-towered
twin-towned
twin-tractor
twin-wheeled
twin-wire
twine around
twine binder
twine braider
twine cutter
twine holder
twine polisher
twine reeler
twine spinner
twine-binding
twine-bound
twine-colored
twine-spinning
twine-toned
twine-twisting
twinge of conscience
twingle-twangle
twinkle of an eye
twinkling of an eye
twinning axis
twinning law
twinning machine
twist and turn
twist around your little finger
twist belting
twist bit
twist drill
twist grip
twist stitch
twist the knife
twist the law to your own ends
twist the lion's tail
twist the meaning

twist the meaning of
twist the words
twist your arm
twisted eglantine
twisted stomach worm
twisted-horn
twisted-stalk
twisting course
twisting machine
twisting
 pair
twisting path
twisting the lion's tail
twisty-wisty
twit-twat
twitch grass
twitch of conscience
twitch road
twite finch
twitter-twatter
twittle-twattle
twizzle-twig
two bits
two cents
two dozen
two estates
two fifths
two hundred
two leg
two o'clock
two of a kind
two old
two old cat
two or three
two pair
two shakes
two shakes of a lamb's tail
two times
two weeks
two whoops and a holler
two-a-cat
two-alarm fire
two-along
two-and-a-half stripes
two-and-one-half striper
two-angle
two-arched
two-armed

two-aspect
two-barred
two-barreled
two-base
two-base hit
two-beat
two-bedded
two-bid
two-bill
two-bit
two-bit politician
two-blade
two-bladed
two-block
two-blocks
two-bodied
two-bodies
two-bodies problem
two-bond
two-bottle
two-bottom plow
two-branched
two-bristled
two-bushel
two-by-four
two-capsuled
two-celled
two-cent
two-centered
two-chamber
two-chambered
two-charge
two-charge rate
two-circle
two-circuit
two-circuit switch
two-cleft
two-coat
two-color
two-color press
two-color
printing
two-colored
two-compartment vessel
two-component
two-course system
two-cycle
two-cylinder

two-day
two-deck
two-deck vessel
two-decker
two-dimensional
two-dimensional wave
two-dimensionality
two-dimensionally
two-dimensioned
two-dollar
two-dollar bill
two-dollar broker
two-dollar word
two-eared
two-edged
two-em
two-em dash
two-ended
two-eye
two-eyed
two-eyes
two-face
two-faced
two-facedly
two-facedness
two-factor
two-family
two-family house
two-feeder
two-field system
two-figure
two-fingered
two-fisted
two-fisted man
two-floor
two-flowered
two-fluid
two-fold
two-foot
two-foot octave
two-footed
two-for-a-cent
two-for-a-penny
two-forked
two-formed
two-four
two-four time
two-gallon

two-grained
two-groove
two-grooved
two-guinea
two-gun
two-hand
two-handed
two-handed saw
two-handedly
two-handedness
two-handled
two-headed
two-high
two-hinged
two-horned
two-horse
two-horsepower
two-hour
two-humped
two-inch
two-leaf
two-leaved
two-legged
two-level
two-life
two-light
two-line
two-line octave
two-lined
two-lipped
two-lobed
two-lunged
two-man
two-man
tent
two-mast
two-masted
two-master
two-membered
two-mile
two-minded
two-minute
two-minute gun
two-monthly
two-name
two-name paper
two-named
two-necked

two-needle
two-nerved
two-oar
two-oared
two-ounce
two-pair
two-part
two-part harmony
two-part time
two-parted
two-party
two-party system
two-pass
two-peaked
two-petaled
two-phase
two-phaser
two-piece
two-piece bow
two-piece suit
two-pile
two-piled
two-pin escapement
two-pipe
two-place
two-platoon
two-platoon system
two-plowed
two-ply
two-point
two-point landing
two-pointic
two-pole
two-position
two-pot screamer
two-pound
two-principle
two-pronged
two-quart
two-rail
two-ranked
two-rate
two-rayed
two-revolution
two-roomed
two-row
two-rowed
two-seated

two-seater
two-seeded
two-shafted
two-shanked
two-shaped
two-sheave
two-shilling
two-shillingly
two-shillingness
two-shot
two-sided
two-sidedness
two-soused
two-speed
two-spined
two-spored
two-spot
two-spotted
two-stage rocket
two-stall
two-stalled
two-star
two-star
general
two-step
two-step rocket
two-stepped
two-stepping
two-sticker
two-storied
two-story
two-stream
two-stringed
two-striped
two-striper
two-stroke
two-stroke cycle engine
two-stroke-cycle
two-suit
two-suiter
two-syllable
two-tailed test
two-teeth
two-thirder
two-thirds
two-three
two-throw
two-time

two-time loser
two-timed
two-timer
two-timing
two-tined
two-toed
two-toed anteater
two-tone
two-toned
two-tongued
two-toothed
two-topped
two-topsail schooner
two-track
two-tusked
two-twisted
two-unit
two-up
two-valved
two-volume
two-way
two-way communication
two-way radio
two-wheel
two-wheeled
two-wheeler
two-wicked
two-winged
two-winged fly
two-woods
two-word
two-year
two-year college
two-year-old
twofold tackle
twopenny grass
twopenny-halfpenny
twyhynde man
tye block
tying up
tylo-
tymp stick
tympan frame
tympan sheet
tympanic bone
tympanic cavity
tympanic membrane
tympano-

type A
type AB
type B
type O
type bar
type block
type body
type cabinet
type
case
type caster
type characteristic
type class
type cutter
type cutting
type face
type founder
type founding
type foundry
type gauge
type genus
type lice
type locality
type matter
type measure
type metal
type mold
type object
type page
type part
type plate
type rack
type shank
type size
type sizes
type slug
type species
type specimen
type station
type stem
type style
type styles
type theory
type wash
type wheel
type-blackened
type-cast
type-caster

type-casting
type-cutting
type-distributing
type-dressing
type-high
types of
types of containers
types of languages
types of marks
types of photography
typesetting machine
typesetting machines
typewriter brush
typewriter cabinet
typewriter case
typewriter cover
typewriter desk
typewriter eraser
typewriter holder
typewriter key
typewriter mat
typewriter oil
typewriter pad
typewriter paper
typewriter ribbon
typewriter roller
typewriter stand
typewriter table
typewriter type
typewriting telegraph
typh fever
typhlo-
typhlo-ureterostomy
typho-
typhoid
 bacillus
typhoid carrier
typhoid fever
typhoid spine
typhus fever
typical case
typical example
typical man
typing machine
typing paper
typist's error
typo-
typographical error

tyrannize over
tyranny of the majority
tyrant bird
tyrant flycatcher
tyrant sparing none
tyrant wren
tyrant-bought
tyrant-hating
tyrant-quelling
tyrant-ridden
tyrant-scourging
tyrian purple
tyrolean hat
tyrolite green
tyrosine hydroxylase
tzetze fly
u hlan
u-boat
u-mm
u-o umlaut
ua mau ke ea o ka aina i ka pono
uberrima fides
ubi supra
ubussu palm
ucinate epilepsy
ugli fruit
ugly as hell
ugly as sin
ugly as the wrath of God
ugly customer
ugly duckling
ugly person
ugly thing
ugly wind
ugly-clouded
ugly-conditioned
ugly-eyed
ugly-faced
ugly-headed
ugly-looking
ugly-omened
ugly-tempered
ugly-visaged
uh-huh
ujamaa village
uji fly
ukiyo-e
ulcer diet

ulcerative colitis
ule tree
ulla grass
ullage rocket
ulnar nerve
ulnocondylar foramen
ulterior motive
ultima Thule
ultima ratio
ultima ratio regum
ultima thule
ultimate
 aim
ultimate analysis
ultimate cause
ultimate concern
ultimate constituent
ultimate load
ultimate purpose
ultimate strength
ultimate stress
ultimate truth
ultra vires
ultra-
ultra-Protestantism
ultra-abolitionism
ultra-abstract
ultra-academic
ultra-affected
ultra-aggressive
ultra-ambitious
ultra-angelic
ultra-apologetic
ultra-arbitrary
ultra-argumentative
ultra-atomic
ultra-auspicious
ultra-slow
ultra-ultra
ultrahigh frequency
ultrahigh-frequency
ultrahigh-frequency station
ultramannish bob
ultrashortwave diathermy
ultrasonic detector
ultrasonic diathermy
ultrasonic flow detection
ultrasonic flow detector

ultrasonic inspector
ultrasonic spectacles
ultrasonic speed
ultrasonic therapy
ultraviolet heat
ultraviolet lamp
ultraviolet light
ultraviolet microscope
ultraviolet ray
ultraviolet therapy
um suff
um-
um-hum
um-yum
umber bird
umber-black
umber-brown
umber-colored
umber-rufous
umbilical cord
umbilical hernia
umble pie
umbra tree
umbrella ant
umbrella bird
umbrella bush
umbrella catalpa
umbrella
 fern
umbrella fir
umbrella grass
umbrella leaf
umbrella maker
umbrella making
umbrella man
umbrella palm
umbrella pine
umbrella plant
umbrella pulley
umbrella sedge
umbrella shell
umbrella stand
umbrella step
umbrella tent
umbrella tree
umbrella-shaped
umbrella-topped
umbro-

umbu-rana
umpire assay
un w
un-
un-American
un-Americanism
un-Australian
un-Austrian
un-Brahminical
un-Christianise
un-Christianised
un-Christianising
un-Christianize
un-Christianized
un-Christianizing
un-Christianlike
un-Christianly
un-Christliness
un-Christly
un-Christmaslike
un-English
un-Eucharistic
un-Eucharistical
un-Eucharistically
un-European
un-French
un-German
un-Jesuitic
un-Jesuitical
un-Jesuitically
un-Latinised
un-Latinized
un-Negro
un-Scripturality
un-Victorian
un-american
un-co-operating
un-co-operative
un-co-ordinate
un-co-ordinated
un-come-at-able
un-come-at-ableness
un-come-at-ably
un-english
un-first-class
un-free-trade
un-frenchify
un-get-at-able

un-get-at-ableness
un-hunh
un-numbed
un-panic-stricken
un-preempted
un-reembodied
un-thought-of
una
 corda
una corda pedal
una voce
unable to
unable to believe your eyes
unable to believe your senses
unable to forget
unable to make ends meet
unable to meet your obligations
unable to pay your creditors
unable to say 'boo' to a goose
unable to say 'no'
unable to show your face
unabridged dictionary
unacceptable person
unaccommodated man
unaccounted-for
unaccustomed to
unacquaintance with evil
unacquainted with
unacquainted with evil
unadorned meaning
unadorned style
unaided eye
unalienable rights
unaligned nation
unalloyed happiness
unanalyzed mass
unanimously elected
unarmored scale
unasked-for
unassisted eye
unattended to
unauthorized absence
unavailable energy
unavoidable casualty
unaware of
unbalanced mind
unbiased observer
unblessed with

unblinking eye
unbloody sacrifice
unblush mg
unbosom yourself
unbroken chord
unbroken sleep
unbuckle your belt
unburden your conscience
unburden your heart
unburden your mind
unburdening
 yourself
unbuttoned ease
uncalled for
uncalled-for
uncared-for
uncertainty principle
uncertainty relation
unchaste man
unchaste person
unchaste woman
unchecked will
unciform process
uncinate process
uncle sam
unclean spirit
unco guid
uncollected accounts
uncome-at-able
uncommitted amplifier
uncommitted person
uncommitted voter
uncommonly like
uncommunicative person
uncomplimentary remark
unconditional convergence
unconditioned free will
unconditioned reflex
unconditioned response
unconfirmed report
unconscionable price
unconscious drive
unconscious knowledge
unconscious memory
unconscious mind
unconscious of
unconscious urge
uncontrolled growth

uncontrolled spin
unconversant with
uncover yourself
uncreated being
uncritical acceptance
uncross-examined
und so weiter
unda maris
undec-
undecided issue
undecided voter
undeclared war
undecylenic acid
undeniable fact
under a charm
under a cloud
under a spell
under a strain
under active consideration
under advisement
under an eclipse
under
an error
under any other name
under arms
under arrest
under attack
under bare poles
under bevel
under canvas
under close arrest
under coercion
under compulsion
under consideration
under construction
under control
under cover
under cover of
under damping
under detention
under discipline
under dominant
under easy sail
under examination
under false colors
under fire
under forced draft
under full steam

under hand and seal
under handicap
under heaven
under house arrest
under investigation
under lock and key
under mediant
under nine
under no circumstances
under oath
under obligation
under one's breath
under one's wing
under pain of
under par
under part
under penalty of
under power
under press of
under press of canvas
under press of sail
under press of sail and steam
under press of steam
under pressure
under privilege
under probation
under protest
under restraint
under revision
under sail
under secretary
under security
under security restrictions
under siege
under steam
under surveillance
under
suspicion
under the aegis of
under the auspices of
under the ban
under the ban of secrecy
under the breath
under the circumstances
under the cloak of
under the counter
under the eyes of
under the garb of

under the hammer
under the harrow
under the heel
under the heel of
under the impression
under the influence
under the knife
under the lash
under the lee
under the nose of
under the pretext of
under the protection of
under the rose
under the seal of secrecy
under the shadow of your wing
under the shield of
under the stars
under the sun
under the surface
under the table
under the weather
under the wind
under the wing of
under the wire
under tow
under way
under weigh
under wraps
under your belt
under your breath
under your care
under your command
under your control
under your eyes
under your hand
under your hat
under your jurisdiction
under your nose
under your orders
under your own power
under your thumb
under your very nose
under your wing
under-
under-action
under-body
under-breath
under-carriage

under-chap
under-covert
under-deck
under-dip
under-earth
under-estimate
under-frame
under-garment
under-glaze
under-jaw
under-king
under-mentioned
under-petticoat
under-round
under-runner
under-secretary
under-sized
under-skirt
under-steward
under-surface
under-the-counter
under-the-table
under-time
under-treasurer
undercover
 activity
undercover man
undercurrent relay
underdeck tonnage
underdeveloped nation
underfrequency relay
undergo a change
undergo an eclipse
undergo deprivation
undergo privation
undergo schooling
undergo treatment
underground activity
underground cable
underground fighter
underground film
underground literature
underground movie
underground railroad
underground railway
underground river
underground route
underground trolley

underground warfare
underhand bundler
underhand dealing
underhand stope
underheat brooder
underhung rudder
underload starter
underload switch
underlying level
underlying meaning
underlying reason
underlying structure
undermine
your faith
undermine your reason
underpitch vault
underpower relay
underprivileged, the
undershot wheel
understand by
understand one another
understudy for
undertake operations
undertaker's establishment
undervaluing of self
underwater archaeologist
underwater archaeology
underwater craft
undesirable discharge
undesirable person
undigested securities
undistributed costs
undistributed middle
undivided attention
undivided profits
undreamed-of
undress uniform
undue excitability
undue liberty
undulant fever
undulatory theory
unduly neglected
undying fame
undying friendship
unearned income
unearned increment
uneducated speech
unemployed, the

unemployment benefit
unemployment compensation
unemployment insurance
unequal to
unequal treatment
unequal-lengthed
unequal-limbed
unequal-lobed
unequal-sided
unequal-tempered
unequal-valved
uneven-aged
uneven-carriaged
uneven-handed
uneven-numbered
uneven-priced
uneven-roofed
unexcused absence
unexempt from
unexpended balance
unexplored ground
unexplored
territory
unfair competition
unfair discrimination
unfair list
unfair practice
unfairly neglected
unfallen state
unfamiliar with
unfathomed deeps
unfavorable balance of payments
unfavorable wind
unfeel mg
unfinished worsted
unfit for human consumption
unfit to live in
unfold a tale
unforeseen attack
unforgivable sin
unfortunate time
unfortunate woman
unfrozen hydrometeor
unfulfilled pledge
unfunded debt
unfurl a banner
unfurl a flag
unfurl an ensign

unfurl sail
unfurnished uninhabited
unget-at-able
ungka puti
ungrateful wretch
ungreenable black
unh-unh
unhappy about
unhappy lot
unhappy-eyed
unhappy-faced
unhappy-happy
unhappy-looking
unhappy-seeming
unhappy-witted
unharmonious relationship
unheard-of
unholy dread
unholy joy
unholy mess
unhoped for
unhoped-for
uni-
uni-univalent
unicameral legislature
unicellular animal
unicorn antelope
unicorn beetle
unicorn bird
unicorn fish
unicorn hawk moth
unicorn moth
unicorn plant
unicorn ram
unicorn root
unicorn shell
unicorn whale
unicorn-plant
family
unidentified flying object
unidirectional current
unidirectional microphone
unidirectional signal
unified atomic mass unit
unified field theory
unified theory
uniflow engine
uniform convergence

uniform velocity
uniform with
uniform-proof
uniformly continuous function
unilateral trade
unimportant person
uninhabited region
uninitiated in
uninterrupted course
uninterrupted sequence
unintoxicated state
uninvited guest
unio-
union black
union blue
union bow
union card
union catalog
union catalogue
union color
union contract
union cord
union district
union down
union dye
union elbow
union flag
union grass
union house
union jack
union jet burner
union joint
union label
union language
union list
union local
union member
union nut
union officer
union orange
union organizer
union pipes
union school
union shop
union station
union suit
union tannage
union tee

union territory
union-made
unipolar transistor
unique factorization domain
unique factorization theorem
uniqueness theorem
unisex
 clothing
unison interval
unissued capital stock
unit banking
unit carrier
unit cell
unit character
unit cost
unit element
unit factor
unit fraction
unit insignia
unit investm
unit investment trust
unit line
unit lock
unit magnetic pole
unit matrix
unit of account
unit of being
unit of energy
unit of flux
unit of force
unit of light
unit of meaning
unit of measurement
unit of weight
unit operation
unit organ
unit plane
unit point
unit price
unit pricing
unit prism
unit process
unit pyramid
unit quantity
unit rule
unit stress
unit switch
unit tare

unit trust
unit vector
unit watermark
unit's place
unit-set
unitary government
unitary matrix
unite efforts
unite in
unite in holy wedlock
unite in marriage
unite in sexual intercourse
unite with
united action
united front
united nations day
united states
unitive life
units of force
units of mass
units of weight
unity of interest
unity stress
univalent chromosome
univalent vaccine
universal accord
universal affirmative
universal agreement
universal
 algebra
universal antenna
universal church
universal class
universal concept
universal conception
universal coupling
universal donor
universal ego
universal essence
universal gas constant
universal geometry
universal head
universal joint
universal language
universal law
universal life force
universal military training
universal motor

universal negative
universal plane
universal plate
universal quantifier
universal remedy
universal ruin
universal self
universal solvent
universal stage
universal suffrage
universal symbol
universal time
universal truth
universalistic hedonism
universally admitted
universally recognized
universe of discourse
universe vine
university college
university extension
university settlement
university-bred
university-conferred
university-going
university-sponsored
university-taught
university-trained
unjust legal disability
unjust representation
unknown depths
unknown quantity
unknown soldier
unknown, the
unlapsed state
unlawful assembly
unlawful entry
unlearned
 capacity
unleash destruction
unleash the hurricane
unleavened bread
unless that
unlicked cub
unlisted securities
unlonged-for
unlooked for
unlooked-for
unlucky day

unlucky hour
unlucky person
unmade-up
unmanned satellite
unmarried person
unmeasured in your praise
unmediated perception
unmindful of
unmistakable sign
unmoth-eaten
unmoved mover
unnarrow-minded
unnarrow-mindedly
unnarrow-mindedness
unnecessary repetition
unnumbered bank account
uno saltu
unobstructed vision
unofficial wife
unorganized data
unorganized ferment
unorganized matter
unpaid accounts
unpaid-for
unpaid-letter
unpaid-letter stamp
unpardonable sin
unparliamentary language
unpath'd waters
unplanned t
unpleasant taste
unpolished rice
unpossessed of
unpracticed in
unprepared for
unprovoked assault
unquestioning belief
unreal hope
unreasonable behaviour
unreasoning impulse
unrefined flour
unrefined mineral
unregistered bank account
unregistered securities
unrelenting attention
unrepeatable expressions
unrestricted

propellant
unrhymed poetry
unripe acceptation
unsanctioned behavior
unsaturated fat
unsavory reputation
unsecured bond
unsecured loan
unself-assertive
unself-centered
unself-centred
unself-changing
unself-confident
unself-conscious
unself-consciously
unself-consciousness
unself-denying
unself-determined
unself-evident
unself-indulgent
unself-knowing
unself-opinionated
unself-possessed
unself-reflecting
unself-righteous
unself-righteously
unself-righteousness
unself-sacrificial
unself-sacrificially
unself-sacrificing
unself-sufficiency
unself-sufficient
unself-sufficiently
unself-supported
unself-valuing
unself-willed
unself-willedness
unsent-for
unshakable nerves
unshaken confidence
unsheathe your weapon
unsighed-for
unskilled in
unskilled labor
unskilled laborer
unskillful person
unslaked lime
unsorted mass

unsound mind
unsoundness of mind
unsparing of self
unspoken accusation
unspoken consent
unstable as water
unsteady market
unstopper your ears
unsuccessful person
unsuitable time
unsupported
by evidence
unsure of yourself
unswerving attention
unsymmetrical loading
untalked-of
unthinking response
unthought-of
unthought-on
unthought-out
untie the knot
untie the purse strings
untie your hands
until now
until the conclusion of
until then
until this time
until tomorrow
until we meet again
untimely end
unto the ends of the earth
unto yourself
untongue-tied
untouched by evil
untreated mineral
unup-braided
unused to
unutterable sin
unverified report
unverified supposition
unversed in
unwanted person
unwarranted demand
unwed condition
unwed state
unwedded to an opinion
unwelcome guest
unwell-intentioned

unwholesome joy
unwilling to accept
unwilling to forgive and forget
unwinking eye
unwise step
unwished-for
unwitting disclosure
unworm-eaten
unworthy of belief
unworthy of consideration
unworthy of one
unworthy of regard
unworthy person
unwritten constitution
unwritten law
up a stump
up a tree
up against
up against it
up ahead
up and about
up and around
up and at 'em
up and
 coming
up and die
up and do
up and doing
up and down
up and go
up attic
up for
up for discussion
up for grabs
up for hearing
up for investigation
up for sale
up helm
up in arms
up in the air
up in the world
up left
up north
up oars
up on
up on end
up quark
up right

up steps
up the creek
up the river
up the spout
up the wind
up till
up to
up to date
up to expectation
up to grade
up to now
up to par
up to scratch
up to snuff
up to standard
up to the ears
up to the elbows
up to the eyes
up to the hilt
up to the mark
up to the minute
up to the notch
up to the present
up to the time of
up to this time
up to your ears
up to your ears in
up to your ears in debt
up to your elbows
up to your elbows in
up to your neck in
up town
up your alley
up your pay
up your sleeve
up your street
up-
up-a-daisy
up-anchor
up-and
up-and-coming
up-and-comingness
up-and-doing
up-and-down
up-and-down dial
up-and-down indicator
up-and-downish
up-and-downishness

up-and-downness
up-and-downy
up-and-over
up-and-under
up-and-up
up-bow
up-bow
 sign
up-chuck
up-country
up-end
up-grade
up-market
up-over
up-page
up-patient
up-put
up-putting
up-see-daisy
up-sky
up-stream
up-stroke
up-to-date
up-to-dately
up-to-dateness
up-to-datish
up-to-datishness
up-to-the-minute
up-trending
up-wind
upas tree
upfeed system
uphill going
uphill work
upholsterer bee
upholsterer's needle
upland cotton
upland hickory
upland plover
uplift brassiere
upmost height
upon condition that
upon even terms
upon oath
upon pain of
upon presentation
upon shares
upon sight

upon something
upon the heels of
upon the hip
upon the point of
upon the whole
upon this bank and shoal of time
upon trust
upon which
upon your hands
upon your honor
upper air
upper arm
upper atmosphere
upper berth
upper bo
upper bound
upper bracket
upper case
upper chamber
upper circles
upper class
upper classes
upper classman
upper crust
upper cut
upper deck
upper extremity
upper frequencies
upper hand
upper house
upper leather
upper limit
upper middle class
upper
 mordent
upper partial tone
upper regions
upper school
upper semicontinuous function
upper side
upper spanker
upper story
upper ten
upper ten thousand
upper works
upper-case
upper-cased
upper-casing

upper-circle
upper-class
upper-cruster
upper-form
upper-grade
upper-school
uppermost height
uppers and lowers
upright drill
upright piano
upright shave
upright-growing
upright-grown
upright-hearted
upright-heartedness
upright-minded
upright-standing
upright-walking
ups and downs
ups and downs of life
upset one's applecart
upset price
upset stomach
upset the
upset the boat
upset your applecart
upsetting lever
upsetting moment
upsetting thermometer
upside down
upside downward
upside-down
upside-down cake
upside-down flag
upside-downism
upside-downness
upside-downwards
upsilon particle
upstairs and downstairs
upstairs maid
upswept hairdo
upsy-daisy
upsy-freesy
upsy-turvy
upward looking
upward mobility
upward mordent
upward motion

upward strabismus
upward system
upward-borne
upward-bound
upward-gazing
upward-looking
upward-pointed
upward-rushing
upward-shooting
upward-stirring
upward-striving
upward-turning
upwards
of
ur washed
ur-
ural-altaic
uralite-gabbro
uralo-
uran-
uranite group
uranium 235
uranium 238
uranium dioxide
uranium glass
uranium lead
uranium nitrate
uranium oxide
uranium ray
uranium reactor
uranium red
uranium series
uranium trioxide
uranium yellow
uranium-radium series
urano-
uranoso-
uranosouranic oxide
uratic arthritis
urban blight
urban blues
urban center
urban complex
urban district
urban economy
urban guerrillaurban market
urban planner
urban redevelopment

urban renewal
urban sociology
urban sprawl
urbi et orbi
urchin fish
urdor urd
ure-ox
urea ferment
urea formaldehyde
urea frost
urea-formaldehyde
urea-formaldehyde resin
uredo-fruit
ureido group
ureido radical
ureo-
uretero-
uretero-ureterostomy
uretero-uterine
urethr-
urethral arthritis
urethral fever
urethro-
ureylene group
ureylene radical
urge along
urge as a motive
urge on
urge on the mind
urge reasons
for
urge upon
urgent need
uric acid
uric-acid
urim and thummim
urin-
urinal fever
urinalysis kit
urinary bladder
urinary calculus
urine analysis
uriniferous tubule
urino-
urinogenital disease
urinogenital ridge
urinogenital sinus
urn burial

urn field
urn moss
urn schemata
urn-buried
urn-cornered
urn-enclosing
urn-shaped
urn-topped
uro-
urogenital disease
urogenital system
urological surgery
uropygial gland
urradhus law
ursa major
ursa minor
ursine dasyure
ursine howler
urucu-rana
urucuri iba
usar grass
usara root
use a light hand
use a light rein
use advisedly
use an experimental sample
use as a doormat
use as a meal ticket
use badly
use district
use faulty grammar
use for your own ends
use force
use force upon
use hindsight
use ill
use inadmissible grammar
use inappropriate grammar
use informal speech
use informal style
use inheritance
use language
use loosely
use materials
use money
use of words
use one's head
use radar

use reason
use tax
use terror tactics
use terroristic tactics
use
 the gray matter
use the mails
use the mind
use the occasion
use the old bean
use time
use to advantage
use to the full
use tobacco
use unadvisedly
use up
use violence
use your endeavor
use your fine Italian hand
use your good offices
use your head
use your influence
use your option
use your palate
use your wits
use-money
used to
used to keep two parts separated
used up
used with the
used-car lot
used-up
useful consciousness
useful lift
useful load
usher in
usher into the world
usher-in
using up
using-ground
usque ad aras
usual, the
usurp the crown
usurp the mantle
usurp the throne
usus loquendi
ut infra
ut supra

uterine brother
uterine kin
uterine sister
utero-
uti possidetis
utile dulci
utility man
utility plane
utility player
utility pole
utility room
utility sash
utmost extent
utmost height
uto-aztecan
utopian socialism
utopian socialist
utter a caveat
utter a judgment
utter a mot
utter bar
utter barrister
utter darkness
utter defeat
utter rout
utter threats against
utterance
 string
utterly attentive
utterly detest
uva grass
uva-ursi
uvi yam
uviol glass
uviol lamp
uzara root
v aux
v sign
v-day
v-eight
v-engine
v-particle
vCechy
vCeskd
vCeskoslovensko
va' via
va-et-vien
va-t'-en

vacancy clause
vacant possession
vacant post
vacant-brained
vacant-eyed
vacant-headed
vacant-looking
vacant-minded
vacant-mindedness
vacant-seeming
vacation barrister
vacation church school
vacation school
vaccinal fever
vaccine lymph
vaccine point
vaccine rash
vaccine therapy
vaccino-syphilis
vachette clasp
vacuum boiler
vacuum bottle
vacuum brake
vacuum breaker
vacuum bulb
vacuum can
vacuum cleaner
vacuum cleaning
vacuum coffee maker
vacuum concrete
vacuum condenser
vacuum crystallizer
vacuum desiccator
vacuum distillation
vacuum drier
vacuum engine
vacuum evaporating
vacuum fan
vacuum filter
vacuum flask
vacuum gauge
vacuum hammer
vacuum induction furnace
vacuum jar
vacuum kettle
vacuum line
vacuum machine
vacuum oven

vacuum pack
vacuum pan
vacuum phototube
vacuum pump
vacuum separator
vacuum
 shunt
vacuum still
vacuum strainer
vacuum sweeper
vacuum tank
vacuum tar
vacuum tester
vacuum trap
vacuum tube
vacuum tube components
vacuum tube rectifier
vacuum valve
vacuum ventilation
vacuum vessel
vacuum-clean
vacuum-packed
vacuum-tube circuit
vacuum-tube electrometer
vacuum-tube hearing aid
vacuum-tube voltmeter
vade in pace
vade mecum
vade mecums
vade-mecum
vadium mortuum
vadium vivum
vae victis
vag-
vagabond green
vagino-
vagrant impulse
vague appearance
vague feeling
vague idea
vague memory
vague notion
vague supposition
vague-eyed
vague-ideaed
vague-looking
vague-menacing
vague-minded

vague-phrased
vague-shining
vague-worded
vain attempt
vain expectation
vain person
vain pretensions
vain show
vair en point
vale of tears
vale of years
valedictory address
valence electron
valence electrons
valence formula
valence isomerism
valence number
valence shell
valency electron
valent atoms and radicals
valentine day
valeric acid
valero-
valet de chambre
valet de pied
valet-de-chambre
valet-de-place
valiant
knight
valid contract
vallary crown
vallate papilla
vallecular canal
valley board
valley breeze
valley flat
valley lily
valley mahogany
valley oak
valley of the shadow of death
valley partridge
valley quail
valley rafter
valley roof
valley tile
valley train
valley white oak
valley wind

valonia oak
valuable consideration
valuation account
valuation survey
value added
value added tax
value date
value judgment
value received
value stress
value system
value theory
value-added tax
valued at
valued policy
valued-policy law
valval view
valve body
valve box
valve cage
valve cap
valve casing
valve casting
valve chamber
valve chest
valve control
valve coupling
valve cup
valve diagram
valve ellipse
valve file
valve filter
valve fitting
valve gear
valve generator
valve grinder
valve handle
valve housing
valve indicator
valve key
valve line
valve motion
valve plate
valve ring
valve rod
valve seat
valve spring
valve stem

valve tool
valve travel
valve trombone
valve
 trumpet
valve view
valve washer
valve wrench
valve-grinding
valve-in-head engine
valve-shaped
valvular incompetence
valvular insufficiency
vamp up
vampire bat
van Eyck
van Gogh
van Ruisdael
van attendant
van boy
van builder
van de graaff generator
van der Rohe
van der Waals equation
van der Waals forces
van der Waals' forces
van der Weyden
van driver
van load
van loader
van owner
van't Hoff
van-courier
van-foss
van-john
van-winged hawk
vanadic acid
vanadium bronze
vanadium family
vanadium oxide
vanadium steel
vanadous oxide
vandyke brown
vanilla bean
vanilla chica
vanilla extract
vanilla grass
vanilla leaf

vanilla plant
vanilla pudding
vanille ice
vanillyl alcohol
vanish from sight
vanish into thin air
vanish like a dream
vanishing cream
vanishing fraction
vanishing line
vanishing point
vanishing trace
vanity bag
vanity box
vanity case
vanity fair
vanity lamp
vanity plate
vanity press
vanity unit
vanity-proof
vant-
vantage game
vantage ground
vantage point
vantage post
vantage-ground
vapor
bath
vapor bathing
vapor burner
vapor cabinet
vapor cloud
vapor condenser
vapor density
vapor engine
vapor heating
vapor inhaler
vapor jacket
vapor lamp
vapor lock
vapor plane
vapor pressure
vapor regulator
vapor stove
vapor tension
vapor trail
vapor treatment

vapor tube
vapor valve
vapor volume
vapor-belted
vapor-braided
vapor-burdened
vapor-clouded
vapor-filled
vapor-headed
vapor-producing
vapor-sandaled
vaporer moth
vapour density
vapour lock
vapour pressure
vapour trail
vapour-bath
vare widgeon
vari-
vari-coloured
varia lectio
variable annuity
variable capacitor
variable condenser
variable cost
variable density system
variable error
variable field
variable star
variable time fuze
variable-mu tube
variable-reluctance microphone
variable-speed gear
variable-speed motor
variable-time fuse
variae lectiones
variance analysis
variant reading
variation chart
variation compass
variation factor
variation of parameters
variation range
varico-
varicose aneurysm
varicose vein
varicose

veins
varied robin
varied thrush
variegated pattern
variegated-leaved
variety hybrid
variety meat
variety shop
variety show
variety store
varifocal lens
vario-
variola porcina
various-blossomed
various-colored
various-formed
various-leaved
variscite green
varix lymphaticus
varnish brush
varnish cleaner
varnish dryer
varnish filler
varnish gum
varnish maker
varnish remover
varnish renovator
varnish resins
varnish sumac
varnish thinner
varnish tree
varnish-drying
varnish-making
varnish-treated
varnish-treating
varnishing day
varsity socks
varsity student
varve-count
varying duty
varying hare
varying-speed motor
vas deferens
vas-
vasa deferentia
vasa murrhina
vasa parrot
vascular bundle

vascular cylinder
vascular hemophilia
vascular plant
vascular ray
vascular tissue
vase clock
vase painter
vase painting
vase rug
vase-shaped
vase-vine
vaso-
vaso-motor
vassal state
vast knowledge
vast-dimensioned
vast-rolling
vast-skirted
vastus intermedius
vastus lateralis
vastus medialis
vat builder
vat
 color
vat dye
vat keeper
vat liquor
vat setter
vat waste
vat-dyed
vat-net
vates sacer
vau consecutive
vau conversive
vaudeville circuit
vaudeville show
vaudeville theater
vault light
vault mount
vault of heaven
vault rib
vault up
vaulting ambition
vaulting capital
vaulting cell
vaulting course
vaulting horse
vaulting pillar

vaulting shaft
vaulting shoe
vaulting tile
vaunt-
vaunt-courier
vaya con Dios
veal Parmigiana
veal bird
veal calf
veal chop
veal cutlet
veal scallopini
vector addition
vector algebra
vector analysis
vector area
vector field
vector for
vector line
vector point function
vector potential
vector product
vector quantity
vector space
vector sum
vedette boat
vedette post
vee tail
veer around
veer off
veer short
veering wind
vegetable albumin
vegetable alkali
vegetable anatomy
vegetable bezoar
vegetable black
vegetable brimstone
vegetable butter
vegetable calomel
vegetable cheese
vegetable dye
vegetable earth
vegetable egg
vegetable ethiops
vegetable existence
vegetable fibrin
vegetable

flannel
vegetable garden
vegetable gelatin
vegetable glue
vegetable gold
vegetable hair
vegetable ivory
vegetable jelly
vegetable kingdom
vegetable lamb
vegetable life
vegetable market
vegetable marrow
vegetable mold
vegetable naphtha
vegetable oil
vegetable oils
vegetable orange
vegetable oyster
vegetable parchment
vegetable pathology
vegetable physiology
vegetable plate
vegetable red
vegetable remedies
vegetable resins
vegetable satyr
vegetable sheep
vegetable silk
vegetable soup
vegetable spermaceti
vegetable sponge
vegetable stock
vegetable store
vegetable tallow
vegetable tanning
vegetable wax
vegetable wool
vegetable-eating
vegetable-feeding
vegetable-growing
vegetable-tallow tree
vegetal pole
vegetation daemon
vegetation daimon
vegetation demon
vegetation spirit
vegetation-proof

vegeto-
vehement action
vehicle tank
vehicular tunnel
veil of secrecy
veil-hid
veil-wearing
veiled accusation
veiled in darkness
veiled threat
veiled voice
vein claim
vein dike
vein islet
vein
 quartz
vein-bearing
vein-healing
vein-mining
vein-streaked
veining tool
velar-pharyngeal
veld cornet
veld sickness
veld sore
veld-
veld-kost
velic point
velleda moth
vellum binder
vellum binding
vellum cloth
vellum form
vellum paper
vellum-bound
vellum-covered
vellum-leaved
vellum-papered
vellum-written
velocity co-ordinate
velocity function
velocity head
velocity microphone
velocity modulation
velocity of circulation
velocity of money
velocity peak
velocity potential

velocity ratio
velocity screen
velocity stage
velt-marshal
velvet ant
velvet ash
velvet bean
velvet bent
velvet bur
velvet cap
velvet carpet
velvet cork
velvet darkness
velvet dock
velvet duck
velvet finish
velvet fish
velvet flower
velvet glove
velvet grass
velvet green
velvet groundsel
velvet head
velvet leaf
velvet leather jacket
velvet moss
velvet osier
velvet paper
velvet plant
velvet rug
velvet runner
velvet scoter
velvet sponge
velvet stout
velvet tree
velvet violet
velvet-banded
velvet-bearded
velvet-black
velvet-caped
velvet-clad
velvet-leaved
velvet-pile
velvet-suited
ven-
vena
 cava
vena contracta

venae contractae
vending machine
veneer grafting
veneer moth
venerable sir
venerable-looking
venereal appetite
venereal desire
venereal disease
venetian blind
venetian blind reflector
venetian glass
venetian red
venga lo que venga
vengeance-crying
vengeance-prompting
vengeance-sated
vengeance-scathed
vengeance-seeking
vengeance-taking
veni-
venial sin
venire de novo
venire facias
venire facias de novo
venom maker
venom-breathing
venom-breeding
venom-cold
venom-fanged
venom-hating
venom-mouthed
venom-spotted
venom-sputtering
venom-venting
venomous-hearted
venomous-looking
venomous-minded
venous blood
venous transfusion
vent drill
vent feather
vent punch
vent stack
vent tank
vent wire
vent your anger
vent your choler

vent your rancor
vent your spleen
vent-hole
vent-peg
ventilate inboard
ventilating apparatus
ventilating blower
ventilating brick
ventilating column
ventilating engineer
ventilating fan
ventilating
 grate
ventilating jack
ventilating millstone
ventilating shaft
ventilating skylight
ventilating system
ventilation engineer
ventr-
ventral airdome
ventral fin
ventral radome
ventri-
ventricular fibrillation
ventro-
venture a guess
venture capital
venture on
venture to
venture to say
venture upon
venturi tube
venus's-flytrap
veratr-
veratric acid
verb complex
verb phrase
verb sap
verbal adjective
verbal agreement
verbal amnesia
verbal auxiliary
verbal contest
verbal diarrhea
verbal engagement
verbal fallacy
verbal intercourse

verbal noun
verbal response
verbal thrust
verbal translation
verbatim et litteratim
verbena family
verbena oil
verbena violet
verbum sap
verbum sapienti
verbum sat
verd antique
verd gay
verd russe
verd-antique
verdant green
verde antico
verde antique
verdict of acquittal
verdict of guilty
verdict of not guilty
verdigris green
verditer blue
verditer green
verge escapement
verge on
verge paper
verge upon
verge watch
verge-board
verging on
verging upon
vermeil-cheeked
vermeil-dyed
vermeil-rimmed
vermeil-tinctured
vermeil-tinted
vermeil-veined
vermi-
vermiform
appendix
vermiform process
vermilion rockfish
vermilion-colored
vermilion-dyed
vermilion-red
vermilion-spotted
vermilion-tawny

vermilion-veined
vermin-covered
vermin-destroying
vermin-eaten
vermin-footed
vermin-haunted
vermin-infested
vermin-ridden
vermin-spoiled
vermin-tenanted
vermouth cassis
vernacular language
vernacular speech
vernal equinox
vernal grass
vernal point
vernal-bearded
vernal-blooming
vernal-flowering
vernal-seeming
vernal-tinctured
verner's law
vernier caliper
vernier dial
vernier engine
vernier micrometer
vernier rocket
vernier scale
vernier telescope
vernis Martin
vernix caseosa
vernonia purple
verruci-
vers de societe
vers de socit
vers libre
vers librist
vers libriste
vers-librist
versatile digit computer
verse anthem
verse service
verse-colored
verse-commemorated
verse-prose
verse-writing
versed cosine
versed in

versed sine
version book
vert russe
vertebral
 arthritis
vertebral column
vertebro-
vertical amplifier
vertical angle
vertical angles
vertical circle
vertical combination
vertical combinatioticalness
vertical deflector
vertical distance
vertical engine
vertical envelopment
vertical file
vertical fin
vertical fire
vertical grouping
vertical height
vertical integration
vertical interference
vertical lift bridge
vertical mobility
vertical overlap
vertical radiator antenna
vertical rays
vertical saw
vertical stabilizer
vertical synchronizer
vertical synchronizing pulse
vertical union
vertical-grained
vertical-lift mower
vervain family
vervain hummingbird
vervain mallow
vervain sage
vervain thoroughwort
very beginning
very best
very good
very high frequency
very image
very important person
very light

very like
very likely
very low frequency
very many
very model
very much
very much alive
very picture
very pistol
very reverend
very same
very seldom
very thing
very top
very truth
very well
very-high-frequency
vesica piscis
vesicatory gas
vesico-
vesico-umbilical
vesico-urachal
vesico-ureteral
vesico-urethral
vesico-uterine
vesicular
 exanthema
vesicular stomatitis
vesper bird
vesper mouse
vesper sparrow
vest in
vest with
vest-pocket
vest-pocket camera
vestal virgin
vested authority
vested estate
vested interest
vested interests
vested right
vestibule car
vestibule latch
vestibule of Day
vestibule school
vestibule train
vestibulo-urethral
vestigial transmission

vesting order
vestry board
vestry room
vesuvian jade
vesuvianite jade
vetch-leaved
veteran car
veterans day
veterans hospital
veterans' preference
veterinary corps
veterinary medicine
veterinary science
veterinary surgeon
veterinary surgery
vetiver green
vetivert oil
veto message
veto power
vexation of spirit
vexed question
vi apple
vi et armis
via media
via-medialism
vials of hate
vials of wrath
viande de boucherie
vibration and stress analyzer
vibration massage
vibration meter
vibration number
vibration point
vibration treatment
vibration-proof
vibratory current
vibratory
massage
vibrionic abortion
vibro-
vicar apostolic
vicar capitular
vicar choral
vicar forane
vicar general
vicar of christ
vicar-choralship
vicar-general

vicar-generalship
vicarage tithe
vicariate apostolic
vicariates apostolic
vicarious authority
vicars capitular
vicars choral
vicars forane
vicars-general
vice admiral
vice chancellor
vice presidency
vice president
vice squad
vice versa
vice-
vice-abbot
vice-admiral
vice-admirality
vice-admiralship
vice-admiralty
vice-admiralty court
vice-agent
vice-apostle
vice-apostolical
vice-architect
vice-begotten
vice-bishop
vice-bitten
vice-burgomaster
vice-butler
vice-caliph
vice-cancellarian
vice-chair
vice-chairman
vice-chairmen
vice-chamberlain
vice-chancellor
vice-chancellorship
vice-collector
vice-commodore
vice-constable
vice-consul
vice-consular
vice-consulate
vice-consulship
vice-corrupted
vice-county

vice-created
vice-dean
vice-deity
vice-detesting
vice-dictator
vice-director
vice-emperor
vice-freed
vice-general
vice-government
vice-governor
vice-governorship
vice-guilty
vice-haunted
vice-headmaster
vice-imperial
vice-king
vice-kingdom
vice-laden
vice-legate
vice-legateship
vice-librarian
vice-lieutenant
vice-loathing
vice-marred
vice-marshal
vice-master
vice-ministerial
vice-nature
vice-palatine
vice-papacy
vice-patron
vice-patronage
vice-polluted
vice-pope
vice-porter
vice-postulator
vice-prefect
vice-premier
vice-pres
vice-presidency
vice-president
vice-presidential
vice-presidentship
vice-priest
vice-principal
vice-principalship
vice-prior

vice-prone
vice-protector
vice-provost
vice-provostship
vice-punishing
vice-queen
vice-rebuking
vice-rector
vice-rectorship
vice-regal
vice-regalize
vice-regency
vice-regent
vice-reign
vice-residency
vice-resident
vice-secretary
vice-sheriff
vice-sick
vice-squandered
vice-stadtholder
vice-steward
vice-sultan
vice-taming
vice-tenace
vice-throne
vice-treasurer
vice-treasurership
vice-trustee
vice-upbraiding
vice-verger
vice-viceroy
vice-warden
vice-wardenry
vice-wardenship
vice-worn
viceregal
 assent
vichy water
vicious circle
vicious reasoning
vicissitudes of fortune
vicontiel rent
vicontiel writ
victoria cross
victoria plum
victory garden
victory girl

victory medal
victual rent
victualing bill
victualing house
victualing note
victualing office
victualing ship
victualing station
victualing yard
vida finch
vide ante
vide infra
vide post
vide supra
vide ut supra
video amplifier
video channel
video detector
video frequency
video game
video monitor
video signal
video static
video tape
video tape recorder
video transmitter
video truck
video-gazer
videotape recorder
vie against
vie for
vie with
vienna sausage
view angle
view as
view camera
view finder
view halloa
view halloo
view in a new light
view in all its phases
view mark
view together
view with a jaundiced eye
view with a scornful eye
view with disfavor
view with favor
view with indulgence

view with the mind's eye
view-halloo
view-point
viewing audience
vigesimo-quarto
vigesimo-quartos
vigil light
vigilance
committee
vigilance man
vigogne yarn
vile language
vile-born
vile-bred
vile-concluded
vile-fashioned
vile-looking
vile-natured
vile-proportioned
vile-smelling
vile-spirited
vile-spoken
vile-tasting
villa-dotted
villa-dwelling
villa-haunted
village cart
village college
village community
village economy
village green
village of the dead
village reserve
village soviet
village-born
village-dwelling
village-lit
villain d
villainous-looking
villainy-proof
villanous saltpetre
villein socage
vin du pays
vin mousseux
vin ordinaire
vin rose
vin rouge
vin-

vin-jaune
vinaigrette sauce
vincent's angina
vincent's infection
vincit omnia veritas
vinculum matrimonii
vindicate a claim to
vindicate a right to
vindicate a title to
vine bamboo
vine bark louse
vine beetle
vine black
vine borer
vine bower
vine cactus
vine chafer
vine forester
vine fretter
vine hawk moth
vine hopper
vine leaf
vine leaf folder
vine leek
vine louse
vine maple
vine mesquite
vine mildew
vine misquite
vine moth
vine peach
vine
pest
vine sawfly
vine scale
vine slug
vine snake
vine sorrel
vine sphinx
vine tie
vine turner
vine webworm
vine weevil
vine wilt
vine-bearing
vine-bordered
vine-clad
vine-covered

vine-crowned
vine-decked
vine-dresser
vine-encircled
vine-fed
vine-garlanded
vine-growing
vine-hung
vine-laced
vine-leafed
vine-leaved
vine-mantled
vine-planted
vine-producing
vine-robed
vine-shadowed
vine-sheltered
vine-wreathed
vinegar aspect
vinegar eel
vinegar essence
vinegar fly
vinegar lamp
vinegar maker
vinegar making
vinegar mother
vinegar plant
vinegar rot
vinegar tree
vinegar worm
vinegar-faced
vinegar-flavored
vinegar-generating
vinegar-hearted
vinegar-tart
vineyard plow
vingt-et-un
vinho verde
vini-
vino de pasto
vino-
vins ordinaires
vintage car
vintage wine
vintage year
vinyl acetate
vinyl alcohol
vinyl chloride

vinyl ether
vinyl group
vinyl plastic
vinyl polymer
vinyl radical
vinyl resin
vinylidene chloride
vinylidene group
vinylidene radical
vinylidene resin
viol block
viol d'amore
viol
d'orchestre
viol da braccio
viol da gamba
viol da spalla
viol di bordone
viol di fagotto
viol family
viola alta
viola bastarda
viola clef
viola d'amore
viola d'amores
viola da braccio
viola da braccios
viola da gamba
viola da gambas
viola da spalla
viola damore
viola di bordone
viola di fagotto
viola pomposa
violate grammar
violate the law
violation of law
viole damour
violent blow
violent change
violent death
violent exercise
violent flow
violent person
violet carmine
violet cress
violet family
violet iris

violet prairie clover
violet ray
violet root
violet root rot
violet sage
violet shell
violet shift
violet tip
violet water
violet wood
violet wood sorrel
violet-black
violet-blind
violet-blindness
violet-bloom
violet-blue
violet-brown
violet-colored
violet-coloured
violet-crimson
violet-crowned
violet-dyed
violet-ear
violet-eared
violet-embroidered
violet-flowered
violet-garlanded
violet-gray
violet-green
violet-green swallow
violet-headed
violet-horned
violet-hued
violet-inwoven
violet-purple
violet-rayed
violet-red
violet-ringed
violet-scented
violet-shrouded
violet-stoled
violet-striped
violet-sweet
violet-tailed
violet-throated
violin
 bow
violin case

violin clef
violin diapason
violin piano
violin string
violin-shaped
violino piccolo
violoncello piccolo
viper broth
viper gourd
viper grass
viper lozenge
viper wine
viper's bugloss
viper's grass
viper-bit
viper-curled
viper-haunted
viper-headed
viper-mouthed
viper-nourished
vir et uxor
viral dysentery
virgin birth
virgin bower
virgin dip
virgin forest
virgin honey
virgin knot
virgin land
virgin mary
virgin moth
virgin parchment
virgin rosin
virgin scammony
virgin soil
virgin spawn
virgin state
virgin territory
virgin tree
virgin wax
virgin widow
virgin wool
virgin's bower
virgin's milk
virgin's-bower
virgin-born
virgin-eyed
virgin-minded

virgin-vested
virginia cowslip
virginia creeper
virginia fence
virginia reel
virginibus puerisque
virgo intacta
viridine green
viridine yellow
virola tallow
virtual focus
virtual
 image
virtual storage
virtue-armed
virtue-binding
virtue-loving
virtue-tempting
virtue-wise
virtute et armis
virus disease
virus pneumonia
virus warfare
vis comica
vis inertiae
vis major
vis mortua
vis vitae
vis vitalis
vis viva
vis-a-ns
vis-a-vis
vis-a-visness
viscera itch
visceral leishmaniasis
visceral rheumatism
viscero-
vise cap
vise chuck
vise coupling
visibility curve
visibility meter
visibility unlimited
visibility zero
visible balance
visible horizon
visible radiation
visible spectrum

visible speech
visible-speech data
vision-directed
vision-filled
vision-haunted
vision-seeing
vision-struck
visit at
visit upon
visit with
visitations of providence
visiting book
visiting card
visiting day
visiting fireman
visiting list
visiting nurse
visiting patrol
visiting professor
visiting teacher
visiting ticket
visitor-general
vista of time
visual acuity
visual aid
visual aids
visual arts
visual binary
visual display unit
visual examination
visual field
visual flight
visual flight rules
visual
flying
visual humor
visual image
visual joke
visual magnitude
visual memory
visual organ
visual purple
visual range
visual sense
visual tracking station
visual violet
visual yellow
visual-aural radio range

visual-aural range
vita contemplativa
vita glass
vital body
vital capacity
vital center
vital concern
vital energy
vital flame
vital fluid
vital force
vital function
vital impulse
vital interest
vital principle
vital soul
vital spark
vital spirit
vital staining
vital statistics
vitam impendere vero
vitamin A
vitamin A1
vitamin A2
vitamin B
vitamin B complex
vitamin B1
vitamin B12
vitamin B2
vitamin B6
vitamin Bc
vitamin C
vitamin D
vitamin D2
vitamin D3
vitamin E
vitamin G
vitamin H
vitamin K
vitamin K1
vitamin K2
vitamin K3
vitamin M
vitamin P
vitamin a
vitamin b
vitamin b12
vitamin b2

vitamin b6
vitamin c
vitamin chart
vitamin complex
vitamin d
vitamin deficiency
vitamin e
vitamin g
vitamin h
vitamin k
vitamin p
vitamin shot
vitamin-deficiency diet
vitamin-free
vitelline membrane
vitello-
vitello-intestinal
viti-
vitreous
 body
vitreous china
vitreous copper
vitreous electricity
vitreous enamel
vitreous fusion
vitreous humor
vitreous humour
vitreous selenium
vitreous silica
vitreous silver
vitreous sponge
vitreous table
vitrified fort
vitriol chamber
vitriol stone
vitriolated tartar
vitriolized bone
vitro-
vitro-clarain
vitro-di-trina
vitular apoplexy
viva voce
viva voce examination
viva-voce
vivaciousness vivacity
vivacity of imagination
vive l'amour
vive la bagatelle

vive valeque
viverrine cat
viverrine otter
vivi-
vivid description
vivid image
vivid imagination
vizard maker
vizard making
vizard mask
vizard-faced
vizard-hid
vizard-mask
vizard-wearing
voa vanga
vocabulary entry
vocabulary test
vocal band
vocal bands
vocal chink
vocal cord
vocal cords
vocal fold
vocal folds
vocal fremitus
vocal lip
vocal minority
vocal music
vocal organ
vocal process
vocal processes
vocal resonance
vocal sac
vocal score
vocalic alliteration
vocational advisor
vocational
council
vocational counselor
vocational director
vocational education
vocational guidance
vocational school
vocational therapy
vocational training
voce di petto
voce di testa
voce velata

vodka martini
vogue la galere
vogue word
voice box
voice coil
voice glide
voice glottis
voice key
voice leading
voice of conscience
voice of the tempter
voice part
voice placing
voice qualifier
voice quality
voice stop
voice tube
voice vote
voice-leading
voice-over
voiced breath
voiced sound
voiceless glide
voiceless sound
void end
void of
void of truth
void space
voided cross
voided lozenge
voir dire
voir en couleur de rose
voix celeste
voix cleste
vol-au-vent
volant piece
volar accessory ligament
volar carpal ligament
volatile alkali
volatile liniment
volatile oil
volatile salt
volcanic ash
volcanic bomb
volcanic cloud
volcanic cone
volcanic dust
volcanic glass

volcanic lake
volcanic pipe
volcanic plug
volcanic rock
volcanic tuff
volcanic water
volcanic wind
volcano fish
volitional tremor
volley fire
volt
box
volt-ammeter
volt-ampere
volt-ampere-hour meter
volt-coulomb
volt-ohm meter
volt-ohm-milliammeter
volt-second
volta's pile
volta-
voltage amplification
voltage changer
voltage coil
voltage divider
voltage gradient
voltage indicator
voltage pulse
voltage ratio
voltage regulator
voltage relay
voltage saturation
voltage stabilizer
voltage transformer
voltage-reference tube
voltage-regulator tube
voltaic battery
voltaic cell
voltaic circuit
voltaic couple
voltaic current
voltaic electricity
voltaic pile
voltameter law
volte-face
voltmeter-milliammeter
voluble-tongued
volume color

volume control
volume density
volume displacement
volume engineer
volume indicator
volume integral
volume measure
volume measures
volume production
volume resistance
volume table
volume velocity
volume-produce
volume-produced
volumetric analysis
volumetric flask
volumetric solution
volumetric strain
voluntary affidavit
voluntary association
voluntary bankruptcy
voluntary conveyance
voluntary escape
voluntary
 hospital
voluntary improvement
voluntary inaction
voluntary jurisdiction
voluntary manslaughter
voluntary muscle
voluntary muscles
voluntary oath
voluntary poverty
voluntary resignation
voluntary school
voluntary waste
volunteer army
volunteer fireman
volunteer militia
volunteer navy
volunteer soldier
volunteers of america
volute centrifugal pump
volute compass
volute pump
volute spring
volutin granule
vomerine cartilage

vomic nut
vomit forth
vomit nut
vomit out
vomiting center
vomiting gas
vomito negro
von Braun
von Neumann
von Sternberg
vortex atom
vortex filament
vortex fringe
vortex line
vortex plate
vortex ring
vortex sheet
vortex theory
vortex tube
vortex wheel
vortical motion
votary candle
vote affirmatively
vote against
vote aye
vote checking
vote counter
vote down
vote for
vote in
vote in the negative
vote nay
vote negatively
vote-bringing
vote-buying
vote-casting
vote-catching
voter-preference survey
voting age
voting bond
voting booth
voting machine
voting paper
voting
right
voting stock
voting trust
voting-right certificate

votive candle
votive mass
votive medal
votive offering
votive office
vouch for
vouched for
voucher check
voucher register
voucher system
vouchers payable
voussoir-shaped
vow-bound
vow-breaking
vow-keeping
vow-pledged
vowel flame
vowel gradation
vowel harmony
vowel mutation
vowel point
vowel quantity
vowel rhyme
vowel system
vows of poverty
vox angelica
vox barbara
vox caelestis
vox et praeterea nihil
vox humana
vox pop
vox populi
vox populi vox Dei
voyage policy
vrai reseau
vt fuze
vulcanite grinding wheel
vulcanite pavement
vulcanized fiber
vulcanized rubber
vulgar era
vulgar establishment
vulgar fellow
vulgar fraction
vulgar language
vulgar latin
vulgar person
vulgar purgation

vulgar substitution
vulgar taste
vulgar tongue
vulnerable place
vulnerable point
vulnerable to
vulnerant omnes ultima necat
vulpine opossum
vulture hock
vulture raven
vulture-beaked
vulture-gnawn
vulture-hocked
vulture-rent
vulture-torn
vulture-tortured
vulture-winged
vulturine
 eagle
vulturine guinea fowl
vulturine sea eagle
vulvo-
w will
wabble saw
waberan-leaf
wabert-leaf
wad hook
wad up
wade an
wade in
wade into
wade knee-deep in blood
wade through
wading bird
wading pool
wadmel wadmol
wafer ash
wafer bread
wafer cake
wafer capsule
wafer cutter
wafer iron
wafer paper
wafer sheet
wafer stamp
wafer tong
wafer-sealed
wafer-thin

wafer-torn
waffle cloth
waffle ingot
waffle iron
waft on the ear
wag the tongue
wag-on-the-wall
wag-tongue
wage board
wage capital
wage contract
wage control
wage earner
wage earning
wage fixing
wage freeze
wage fund
wage labor
wage level
wage paying
wage peace
wage rate
wage reduction
wage rollback
wage scale
wage slave
wage slavery
wage system
wage war
wage-fund theory
wage-plug
wager policy
wagering contract
wages after deductions
wages after taxes
wages fund
wages plus fringe benefits
wages-man
waggish trick
waggon-headed
wagh down
waging board
wagon bed
wagon boiler
wagon boss
wagon box
wagon breast
wagon ceiling

wagon
filler
wagon greaser
wagon gun
wagon hammer
wagon jobber
wagon lock
wagon master
wagon road
wagon roof
wagon seat
wagon shed
wagon shoe
wagon soldier
wagon table
wagon tent
wagon tongue
wagon top
wagon track
wagon trail
wagon train
wagon tree
wagon truck
wagon vault
wagon wheel
wagon yard
wagon-headed
wagon-lit
wagon-roofed
wagon-shaped
wagon-spring clock
wagon-vaulted
wagtail flycatcher
waifs and strays
waika chewstick
wail of woe
wailing wall
wainscot chair
wainscot oak
wainscot-faced
wainscot-joined
wainscot-paneled
waist anchor
waist belt
waist board
waist boat
waist boater
waist gun blister

waist strap
waist tree
waist-deep
waist-high
waist-pressing
waist-slip
wait a minute
wait a second
wait and see
wait and see policy
wait fee
wait for
wait for something to turn up
wait impatiently
wait it out
wait on
wait on hand and foot
wait out the market
wait service
wait table
wait to see how the cat jumps
wait to see how the wind blows
wait up
wait up for
wait upon
wait with
bated breath
wait-a-bit
wait-awhile
waiter on Providence
waiter-on
waiting concealed
waiting for
waiting game
waiting it out
waiting list
waiting maid
waiting man
waiting period
waiting room
waiting woman
waiver of premium
wake current
wake dirge
wake up
wake-robin
wake-up
wakeless sleep

waking dream
waking time
waldorf salad
wale knot
wale shore
walk a middle path
walk all over
walk away
walk away with
walk clerk
walk hand in hand with
walk humbly with your God
walk in darkness
walk in the shoes of
walk in your sleep
walk into
walk of life
walk off
walk off with
walk off with the game
walk on air
walk on eggshells
walk on hot coals
walk out
walk out on
walk over
walk over the course
walk the earth
walk the plank
walk the straight path
walk the tracks
walk the waters
walk up
walk-around
walk-down
walk-in
walk-in apartment
walk-in closet
walk-on
walk-over
walk-through
walk-up
walker-on
walkie-lookie
walkie-talkie
walking bass
walking beam
walking boat

walking crane
walking dead man
walking
 delegate
walking encyclopedia
walking engine
walking excursion
walking fern
walking fish
walking gentleman
walking lady
walking leaf
walking line
walking mort
walking papers
walking part
walking phallus
walking pipe
walking plow
walking scow
walking skeleton
walking staff
walking stick
walking straw
walking sword
walking toad
walking tour
walking twig
walking tyrant
walking wheel
walking-out
walking-stick
walking-stick palm
walking-sticked
walky-talkies
walky-talky
wall anchor
wall arcade
wall barley
wall bars
wall bearing
wall bed
wall bee
wall box
wall bracket
wall bugloss
wall cabbage
wall cabinet

wall card
wall clamp
wall crane
wall creeper
wall cress
wall engine
wall fern
wall frame
wall fruit
wall garden
wall gecko
wall germander
wall gillyflower
wall grass
wall green
wall grenade
wall hanging
wall hawkweed
wall hold
wall hook
wall in
wall iron
wall knot
wall link
wall lizard
wall molding
wall mustard
wall of secrecy
wall off
wall painting
wall pass
wall pellitory
wall penny
grass
wall pennywort
wall pepper
wall pie
wall plate
wall plug
wall pocket
wall rock
wall rocket
wall rue
wall rue spleenwort
wall saltpeter
wall socket
wall speedwell
wall spleenwort

wall street
wall telephone
wall tent
wall tower
wall up
wall wasp
wall-bound
wall-cheeked
wall-climbing
wall-defended
wall-drilling
wall-encircled
wall-eyed
wall-fed
wall-fight
wall-girt
wall-hanging
wall-inhabiting
wall-knot
wall-less
wall-like
wall-loving
wall-piece
wall-piercing
wall-plat
wall-scaling
wall-shaking
wall-sided
wall-to-wall
wall-to-wall carpet
wallaby acacia
wallaby bush
wallaby grass
wallaby-proof
walled plain
walled-in
walled-up
walleye pollack
walleye pollock
walleyed pike
wallflower brown
walling crib
walling wax
walling-in
wallow in
wallow in ignorance
wallow in the mire
wallow in wealth

wallowing in wealth
walnut blight
walnut borer
walnut brown
walnut case-bearer
walnut caterpillar
walnut curculio
walnut family
walnut juice
walnut moth
walnut oil
walnut scale
walnut shell
walnut spanworm
walnut
 sphinx
walnut tree
walnut weevil
walnut worm
walnut-brown
walnut-finished
walnut-framed
walnut-inlaid
walnut-paneled
walnut-shell
walnut-stained
walnut-trimmed
walpurgis night
walrus bird
walrus moustache
walrus mustache
waltz Matilda
waltz measure
waltz off with
waltz song
waltz time
waltzing Matilda
waltzing mouse
wamble-cropped
wamper-jawed
wampum belt
wampum snake
wan-
wan-cheeked
wan-colored
wan-worn
wand bearer
wand of office

wand shoot
wand shooting
wand shot
wand-bearing
wand-shaped
wand-waving
wander from
wander from the subject
wander termite
wander-year
wandering Jew
wandering albatross
wandering ant
wandering cell
wandering course
wandering dervish
wandering dune
wandering electron
wandering jenny
wandering jew
wandering minstrel
wandering path
wandering scholar
wandering soul
wandering star
wandering tattler
wane cloud
wangle into
wangle out of
waning crescent moon
waning moon
wankel engine
want ad
want doing
want in
want in the worst way
want list
want to
want
 to know
want with all your heart
want-wit
wantage rod
wanted-right-hand
wanting to fly in the air
wanton cruelty
wanton ringlets wav'd
wanton-cruel

wanton-eyed
wanton-mad
wanton-sick
wanton-tongued
wanton-winged
wapper-eyed
wapper-jawed
war baby
war bag
war bird
war bond
war bonnet
war book
war boom
war boomerang
war bow
war bride
war cabinet
war cart
war cheat
war chest
war cloud
war clouds
war club
war college
war correspondent
war crime
war crimes
war criminal
war cross
war cry
war dance
war debt
war dog
war drum
war eagle
war economy
war flame
war footing
war galley
war game
war gas
war god
war goddess
war gods
war guilt
war hammer
war hat

war hawk
war head
war horse
war hound
war lord
war machine
war medal
war memorial
war neurosis
war of attrition
war of independence
war of movement
war of national liberation
war of nerves
war of position
war of the elements
war of words
war office
war paint
war party
war plans
war power
war proof
war rebel
war risk
war risk insurance
war rocket
war
scare
war school
war scythe
war service chevron
war song
war spirit
war stamp
war surplus
war to end war
war traitor
war vessel
war whoop
war zone
war-appareled
war-blasted
war-breathing
war-breeding
war-broken
war-denouncing
war-dight

war-disabled
war-dreading
war-fain
war-famed
war-god
war-goddess
war-hawk
war-horse
war-savings certificate
war-savings stamp
war-tax stamp
war-time
war-weary
war-whoop
war-wolf
warble fly
warbler green
warbling vireo
ward heeler
ward hill
ward of the state
ward off
ward politics
ward-walk
warden court
warden pie
wardian case
warding file
wardmote court
wardmote quest
wardour-street
wardrobe bed
wardrobe case
wardrobe dealer
wardrobe trunk
ware cleaner
ware goose
ware grinder
ware sorter
warehouse bond
warehouse boy
warehouse clerk
warehouse foreman
warehouse receipt
warehouse sorter
warehouse truck
warlike spirit
warm as toast

warm assent
warm body
warm color
warm friend
warm friendship
warm front
warm heart
warm imagination
warm man
warm over
warm
 sector
warm spot
warm spring
warm temper
warm the bency
warm the blood
warm the cockles of the heart
warm the spirits
warm up
warm weather
warm welcome
warm work
warm-backed
warm-blooded
warm-breathed
warm-clad
warm-colored
warm-complexioned
warm-contested
warm-glowing
warm-headed
warm-hearted
warm-kept
warm-lying
warm-reeking
warm-sheltered
warm-tempered
warm-tinted
warm-up
warm-working
warm-wrapped
warmed over
warmed up
warmed-over
warmed-over cabbage
warmed-up
warming house

warming pad
warming pan
warming-pan
warming-up
warminster broom
warmth of color
warmth of feeling
warmth of heart
warn against
warning coloration
warning lever
warning piece
warning sign
warning signal
warp and weft
warp and woof
warp beam
warp frame
warp knit
warp knitting
warp lace
warp land
warp net
warp roll
warp sizer
warp stitch
warp tier
warp-knit
warp-knitted
warp-net frame
warp-proof
warped conception
warped judgment
warping bank
warping bridge
warping chock
warping hook
warping-frame
warple way
warrant
 of arrest
warrant of attorney
warrant officer
warrant trying
warrants off
warrants on
warranty deed
warrior ant

warrior bush
warsaw grouper
wart cress
wart disease
wart grass
wart hog
wart snake
wart spurge
warted gourd
warted grass
warted spurge
wartime footing
warts and all
warty egg
warty-faced honey eater
wary-eyed
wary-footed
wary-looking
wash and wear
wash ball
wash barrel
wash bear
wash boiler
wash boring
wash coat
wash down
wash drawing
wash gilding
wash goods
wash leather
wash mill
wash miller
wash oil
wash out
wash pitcher
wash sale
wash sales
wash strake
wash up
wash water
wash your dirty linen in public
wash your hands of
wash your sins away
wash-and-wear
wash-and-wear fabric
wash-bear
wash-colored
wash-hand

wash-house
wash-in
wash-leather
wash-mouth
wash-out
wash-pot
wash-up
washable paint
washboard road
washed metal
washed out
washed sale
washed up
washed-out
washed-up
washing bear
washing bottle
washing crystal
washing engine
washing equipment
washing machine
washing
maid
washing out
washing pot
washing powder
washing soda
washing tub
washing up
washing-up
washington pie
washington's birthday
washout process
washrag gourd
wasp ant
wasp bee
wasp beetle
wasp fly
wasp nest
wasp spider
wasp waist
wasp's nest
wasp-barbed
wasp-minded
wasp-stung
wasp-waisted
wasp-waistedness
wassail bowl

wassail cup
wassermann reaction
wassermann test
waste away
waste baling
waste bank
waste bin
waste book
waste box
waste boy
waste breaker
waste bundler
waste heat
waste leaf
waste lot
waste matter
waste mold
waste no words
waste nut
waste of breath
waste of labor
waste of time
waste pallet
waste pipe
waste product
waste the opportunity
waste the precious hours
waste time
waste time in regret
waste waste
waste well
waste your breath
waste-cleaning
waste-dwelling
waste-heat boiler
waste-heat drier
waste-paper
waste-thrift
waste-wax process
wasted away
wasted loins
wastepaper basket
wastes of outer space
wasting asset
wasting away
wasting disease
wasting palsy
watch adjuster

watch
and wait
watch and ward
watch bell
watch bracelet
watch cap
watch chain
watch cleaner
watch coat
watch crystal
watch fire
watch fob
watch for
watch for your moment
watch glass
watch guard
watch it
watch meeting
watch movement
watch night
watch officer
watch out
watch out for
watch over
watch pocket
watch repairer
watch screw thread
watch spring
watch tackle
watch television
watch your step
watch your weight
watch-glass
watch-making
watch-night service
watchet-colored
watchful eye
watchful waiting
watching and waiting
watching brief
watching for
watching rate
watchman beetle
watchman's clock
watchman's rattle
water adder
water agrimony
water aloe

water arum
water avens
water awlwort
water back
water bag
water ballet
water bath
water bear
water bearer
water bed
water beetle
water bench
water bewitched
water bird
water biscuit
water blister
water bloom
water blue
water boat
water boatman
water bog rush
water bomb
water bottle
water bouget
water boy
water brash
water breather
water
budget
water buffalo
water bug
water butt
water caltrop
water cannon
water carrier
water channel
water chestnut
water chinquapin
water clock
water closet
water color
water conservation
water cooler
water crake
water cress
water crowfoot
water cure
water cycle

water diviner
water dog
water down
water dropwort
water farmer
water fern
water fever
water flag
water flea
water flow
water fountain
water foxtail
water frame
water frontage
water furrow
water gap
water gas
water gate
water gauge
water gilder
water gilding
water glass
water god
water gods
water grass
water gum
water gun
water hair grass
water hammer
water hawthorn
water heater
water hemlock
water hen
water hole
water holly
water horehound
water hyacinth
water ice
water jacket
water jump
water kelpie
water leaf
water lemon
water lettuce
water level
water light
water lily
water lily tulip

water line
water locust
water loss
water main
water marigold
water meadow
water meadow grass
water meter
water milfoil
water mill
water mink
water
 mint
water moccasin
water mold
water motor
water nymph
water oak
water oat
water oats
water of ayr
water of crystallization
water of hydration
water of life
water off a duck's back
water oleander
water opossum
water ouzel
water oven
water ox
water paint
water parting
water pepper
water pimpernel
water pipe
water pipit
water pistol
water plantain
water platter
water plug
water poa
water pocket
water polo
water poppy
water power
water pox
water pump
water pumper

water purslane
water rail
water rat
water reed
water rice
water right
water sapphire
water scorpion
water set
water shield
water shrew
water skater
water ski
water sky
water slide
water smoke
water snail
water snake
water snowflake
water softener
water soldier
water sound
water spaniel
water spider
water spirit
water spot
water sprite
water sprout
water starwort
water strider
water supply
water system
water table
water tare grass
water target
water telescope
water thrush
water ton
water tortoise
water torture
water tower
water
trap
water travel
water treatment
water vapor
water vapour
water vole

water wagon
water wagtail
water wave
water wheel
water willow
water wings
water witch
water witcher
water witching
water works
water-bag
water-bailage
water-bailiff
water-base paint
water-bath
water-bearer
water-bearing
water-beaten
water-bed
water-bind
water-borne
water-bound
water-brain
water-break
water-breathing
water-broken
water-buck
water-butt
water-can
water-carriage
water-carrier
water-cart
water-caster
water-clock
water-closet
water-color
water-colored
water-colorist
water-colour
water-commanding
water-consolidated
water-cool
water-cooled
water-cress
water-cressy
water-cure
water-dog
water-drinker

water-drinking
water-drop
water-dwelling
water-engine
water-fast
water-fennel oil
water-finished
water-flood
water-flowing
water-free
water-front
water-fronter
water-furrow
water-gall
water-galled
water-gas
water-gas tar
water-gate
water-gild
water-girt
water-glass
water-glass painting
water-gray
water-growing
water-gruel
water-gruellish
water-hammer
water-hen
water-hole
water-horse
water-ice
water-inch
water-jacket
water-jacketing
water-jelly
water-jet
water-laid
water-lane
water-level
water-lily
water-lily
family
water-lily tree
water-line
water-line model
water-lined
water-living
water-logged

water-loving
water-mark
water-meadow
water-measure
water-melon
water-milfoil family
water-mill
water-mint
water-nut family
water-nymph
water-packed
water-pipe
water-plantain family
water-pot
water-power engineering
water-pumping
water-purpie
water-quenched
water-rat
water-repellant
water-repellent
water-resistant
water-ret
water-rolled
water-rot
water-seal
water-sealed
water-season
water-shield family
water-shot
water-sick
water-ski
water-skied
water-skiing
water-slaked lime
water-smoke
water-soak
water-soaked
water-soluble
water-souchy
water-spout
water-spring
water-standing
water-starwort family
water-stream
water-struck
water-supply
water-supply engineer

water-supply engineering
water-sweet
water-table
water-tube
 boiler
water-vascular
water-vascular system
water-wagtail
water-washed
water-wave
water-waved
water-waving
water-way
water-weed
water-wheel
water-white
water-witch
waterborne infection
watered fabric
watered silk
watered steel
watered stock
watered-down
waterglass painting
watering can
watering hole
watering place
watering pot
watering-place
watering-pot
watering-pot shell
waterless cooker
waterproofing salt
waters of Lethe
waters of bitterness
waters of oblivion
watertight integrity
watertube boiler
watery grave
watery-colored
watery-eyed
watery-headed
watt current
watt-hour
watt-hour meter
watt-second
wattle and dab
wattle and daub

wattle bark
wattle crow
wattled bee eater
wattled crow
wattled honey eater
wattled lapwing
wattled stare
wattless current
wave a flag
wave a wand
wave antenna
wave band
wave changer
wave cyclone
wave down
wave drag
wave equation
wave form
wave front
wave function
wave guide
wave mechanics
wave molding
wave motion
wave number
wave phenomenon
wave
 scroll
wave surface
wave system
wave telegraphy
wave telephony
wave the arms
wave the bloody shirt
wave the hand
wave the white flag
wave theory
wave top
wave train
wave trap
wave wheel
wave winding
wave-cut
wave-cut platform
wave-encircled
wave-form
wave-form theory
wave-green

wave-haired
wave-hollowed
wave-lashed
wave-laved
wave-like
wave-line
wave-making
wave-moist
wavering flame
wavering light
waving of the bloody shirt
wavy-coated
wavy-edged
wavy-grained
wavy-haired
wavy-leaved
wavy-toothed
waw consecutive
waw conversive
waw-waw
wax and wane
wax bean
wax bleacher
wax brown
wax candle
wax cloth
wax cluster
wax end
wax figure
wax flower
wax gland
wax gourd
wax insect
wax jack
wax light
wax modeler
wax modeling
wax moth
wax myrtle
wax palm
wax paper
wax pink
wax privet
wax tablet
wax tree
wax worm
wax-bearing
wax-billed

wax-chandler
wax-coated
wax-colored
wax-composed
wax-covered
wax-ended
wax-erected
wax-extracting
wax-featured
wax-finished
wax-forming
wax-headed
wax-jointed
wax-lighted
wax-polished
wax-producing
wax-red
wax-rubbed
wax-secreting
wax-shot
wax-stitched
wax-tipped
wax-topped
wax-white
wax-yellow
waxed
paper
waxed tablet
waxing crescent moon
waxing moon
way back
way baggage
way beam
way bennet
way bent
way car
way chain
way enough
way freight
way in
way of dealing
way of escape
way of holding yourself
way of life
way of looking at things
way of putting
way of saying
way of seeing

way of speaking
way of the cross
way of thinking
way of understanding
way of walking
way off
way out
way passenger
way point
way shaft
way station
way thistle
way ticket
way train
way wire
way-beguiling
way-bill
way-clearing
way-down
way-god
way-haunting
way-off
way-out
way-up
way-weary
way-wise
way-wiser
way-worn
wayfaring tree
wayfaring-tree
waygoing crop
wayleave rent
ways and means
ways of the fathers
wayside cross
we happy few
we'll see you
we-all
we-group
we-ship
we-uns
weak accumulation poi
weak as a baby
weak as a chicken
weak as a child
weak as a drink of water
weak

as a kitten
weak as a mouse
weak as a rained-on bee
weak as milk and water
weak as water
weak derived set
weak ego
weak ending
weak in the upper story
weak interaction
weak knees
weak link
weak market
weak personality
weak point
weak side
weak sister
weak soul
weak stress
weak tool
weak will
weak-ankled
weak-armed
weak-backed
weak-bodied
weak-built
weak-chested
weak-chined
weak-chinned
weak-eyed
weak-fibered
weak-headed
weak-headedly
weak-headedness
weak-hinged
weak-jawed
weak-kneed
weak-kneedly
weak-kneedness
weak-legged
weak-limbed
weak-lunged
weak-minded
weak-mindedly
weak-mindedness
weak-nerved
weak-pated
weak-spirited

weak-spiritedly
weak-spiritedness
weak-stemmed
weak-stomached
weak-toned
weak-voiced
weak-willed
weak-winged
weakengrow weak
weaker sex
weaker vessel
weakness comparisons
weakness of the flesh
wealth tax
wealth-encumbered
wealth-fraught
wealth-getting
wealth-yielding
wealthy man
wean from
wean your thoughts from
wean yourself from
weaning brash
weapons of mass destruction
wear
 a hairshirt
wear a mask
wear an earnest frown
wear and tear
wear away
wear back
wear blinkers
wear down
wear horns
wear iron
wear land
wear limit gauge
wear mourning
wear off
wear on
wear out
wear out your welcome
wear ragged
wear sackcloth
wear sackcloth and ashes
wear ship
wear short
wear the cloth

wear the crown
wear the horn
wear the look of
wear the pants
wear the uniform
wear thin
wear upon
wear upon one
wear well
wear you down
wear your heart on your sleeve
wear your heart upon your sleeve
wear-out
wearer of the cap and bells
weariness of life
wearing a hairshirt
wearing a sackcloth
wearing a sackcloth and ashes
wearing apparel
wearing arms
wearing away
wearing course
wearing down
wearisome sameness
wearisome trip
weary for
weary of life
weary to death
weary unto death
weary waste
weary-foot
weary-footed
weary-laden
weary-looking
weary-winged
weary-worn
weasel cat
weasel coot
weasel lemur
weasel out
weasel spider
weasel word
weasel words
weasel-faced
weasel-worded
weather
anchor
weather back

weather balloon
weather bow
weather box
weather breeder
weather bureau
weather cast
weather caster
weather chart
weather cloth
weather deck
weather eye
weather forecast
weather forecaster
weather front
weather gall
weather gauge
weather helm
weather house
weather instrument
weather joint
weather map
weather out
weather prophet
weather rail
weather reconnaissance
weather reconnaissance plane
weather report
weather roll
weather satellite
weather science
weather scientist
weather sheet
weather ship
weather side
weather signal
weather slating
weather stain
weather station
weather strip
weather stripping
weather tack
weather the storm
weather tide
weather vane
weather wheel
weather wisdom
weather-battered
weather-beaten

weather-bitt
weather-bitten
weather-bound
weather-breeding
weather-driven
weather-eaten
weather-eye
weather-fagged
weather-fast
weather-fend
weather-free
weather-glass
weather-going tide
weather-guard
weather-hardened
weather-headed
weather-reporting
network
weather-scarred
weather-slated
weather-stayed
weather-strip
weather-stripped
weather-stripping
weather-tanned
weather-wasted
weather-wise
weatherboard house
weathered joint
weathered oak
weave bead
weave peace between
weave your way
weaver finch
weaver shell
weaver's hitch
weaver's knot
weazen-faced
web foot
web frame
web glazing
web lead
web maker
web member
web of intrigue
web perfecting press
web press
web printing

web saw
web spinner
web stiffener
web wheel
web-beam
web-fed
web-fed press
web-fingered
web-foot
web-footed
web-footedness
web-glazed
web-perfecting
web-toed
web-winged
web-worked
webbing moth
weber turn
wedded bliss
wedded pair
wedded state
wedded status
wedded to
wedded to poverty
wedded wife
wedding anniversary
wedding attendant
wedding breakfast
wedding cake
wedding canopy
wedding chest
wedding clothes
wedding day
wedding dinner
wedding flower
wedding gown
wedding guest
wedding journey
wedding knot
wedding march
wedding party
wedding ring
wedding sheet
wedding
song
wedding veil
wedge bone
wedge character

wedge gauge
wedge gearing
wedge heel
wedge in
wedge-bearing
wedge-billed
wedge-form
wedge-formed
wedge-shaped
wedge-tailed
wedge-tailed dove
wedge-tailed eagle
wedge-tailed gull
wedge-tailed shearwater
wedged-tailed
wedging crib
wee bit
wee doch-an-dorrach
wee folk
wee tot
wee-wee
weed killer
weed out
weed tree
weed-choked
weed-cutting
weed-entwined
weed-fringed
weed-grown
weed-hidden
weed-hook
weed-hung
weed-killer
weed-killing
weed-ridden
weed-spoiled
weeded out
weeder clips
weeder hoe
weedy-bearded
weedy-haired
weedy-looking
week work
week-end
week-long
week-old
week-work
weekend bag

weekly newspaper
weekly payments
weeny-bopper
weep for
weep hole
weep over
weep with
weep with them that weep
weeping and gnashing of teeth
weeping ash
weeping beech
weeping cross
weeping eczema
weeping golden bell
weeping honey locust
weeping lantana
weeping myall
weeping pea tree
weeping willow
weeping-ripe
weese-allan
weet-weet
weft fork
weft knitting
weft
 sorter
weft-knit
weft-knitted
weigh against
weigh anchor
weigh beam
weigh down
weigh heavy
weigh heavy on
weigh heavy upon
weigh in
weigh in the balance
weigh lightly
weigh on
weigh one thing against another
weigh out
weigh scales
weigh upon
weigh with
weigh you down
weigh your words
weigh-bridge
weigh-in

weigh-out
weigh-scale
weighbar shaft
weighed down
weighed upon
weighing down
weighing instrument
weighing instruments
weighing machine
weighing-in
weighing-out
weight cloth
weight control
weight density
weight down
weight down with
weight down with ornament
weight lifter
weight lifting
weight playing
weight voltameter
weight watcher
weight-bearing
weight-carrying
weight-lifting
weight-measuring
weight-raising
weight-resisting
weight-watch
weight-watching
weighted down
weighting down
weir basin
weir box
weird sisters
weird-fixed
weird-looking
weird-set
weiss beer
welch plug
welcome as the roses in May
welcome mat
welcome release
welcome wagon
weld metal
welder's mask
welding blowpipe
welding

engineer
welding powder
welding rod
welding torch
welfare aid
welfare capitalism
welfare cases
welfare client
welfare clients
welfare families
welfare payments
welfare program
welfare rolls
welfare state
welfare stater
welfare statism
welfare statist
welfare work
welfare worker
welkin eye
welkin-high
well I never
well I never!
well afford
well and good
well boat
well borer
well casing
well cress
well decker
well done
well driller
well drilling
well enough
well fern
well house
well in
well in hand
well log
well met
well off
well out
well out of
well over
well provided for
well rig
well room
well shrimp

well sinker
well smack
well staircase
well sweep
well to do in the world
well to live
well to pass
well tomb
well trap
well turned-out
well up on
well vessel
well water
well worship
well worth the money
well-able
well-abolished
well-abounding
well-absorbed
well-abused
well-accented
well-accentuated
well-accepted
well-accommodated
well-accompanied
well-accomplished
well-accorded
well-according
well-accoutered
well-accredited
well-accumulated
well-accustomed
well-achieved
well-acknowledged
well-acquainted
well-acquired
well-acted
well-adapted
well-addicted
well-addressed
well-adjusted
well-administered
well-admitted
well-adopted
well-adorned
well-advanced
well-adventured
well-advertised

well-advertized
well-advised
well-advocated
well-affected
well-affectedness
well-affectioned
well-affirmed
well-afforded
well-aged
well-agreed
well-agreeing
well-aimed
well-aired
well-alleged
well-allied
well-allotted
well-allowed
well-alphabetized
well-altered
well-amended
well-amused
well-analysed
well-analyzed
well-ancestored
well-anchored
well-anear
well-ankled
well-annealed
well-annotated
well-announced
well-anointed
well-answered
well-anticipated
well-appareled
well-apparelled
well-appearing
well-applauded
well-applied
well-appointed
well-appointedly
well-appointedness
well-appreciated
well-approached
well-appropriated
well-approved
well-arbitrated
well-arched
well-argued

well-armed
well-armored
well-armoured
well-aroused
well-arranged
well-arrayed
well-articulated
well-ascertained
well-assembled
well-asserted
well-assessed
well-assigned
well-assimilated
well-assisted
well-associated
well-assorted
well-assumed
well-assured
well-attached
well-attained
well-attempered
well-attempted
well-attended
well-attending
well-attested
well-attired
well-attributed
well-audited
well-authenticated
well-authorized
well-averaged
well-avoided
well-awakened
well-awarded
well-aware
well-baby
clinic
well-backed
well-baked
well-balanced
well-balanced mind
well-baled
well-bandaged
well-bang
well-banked
well-barbered
well-bargained
well-base rim

well-based
well-bathed
well-batted
well-bearing
well-beaten
well-becoming
well-bedded
well-befitting
well-begotten
well-begun
well-behated
well-behaved
well-being
well-beknown
well-believed
well-believing
well-beloved
well-beneficed
well-bent
well-beseemingly
well-bespoken
well-bested
well-bestowed
well-blacked
well-blended
well-blent
well-blessed
well-blooded
well-blown
well-bodied
well-boding
well-boiled
well-bonded
well-boned
well-booted
well-bored
well-boring
well-born
well-borne
well-bottled
well-bottomed
well-bought
well-bound
well-bowled
well-boxed
well-braced
well-braided
well-branched

well-branded
well-brawned
well-breasted
well-breathed
well-bred
well-bredness
well-brewed
well-bricked
well-bridged
well-broken
well-brooked
well-brought-up
well-browed
well-browned
well-brushed
well-built
well-buried
well-burned
well-burnished
well-burnt
well-bushed
well-busied
well-buttoned
well-caked
well-calculated
well-calculating
well-calked
well-called
well-calved
well-camouflaged
well-caned
well-canned
well-canvassed
well-cared-for
well-carpeted
well-carved
well-cased
well-cast
well-caught
well-cautioned
well-celebrated
well-cemented
well-censured
well-centered
well-centred
well-certified
well-chained
well-changed

well-chaperoned
well-characterized
well-charged
well-charted
well-chauffeured
well-checked
well-cheered
well-cherished
well-chested
well-chewed
well-chilled
well-choosing
well-chopped
well-chosen
well-chosen
moment
well-churned
well-circularized
well-circulated
well-circumstanced
well-civilized
well-clad
well-classed
well-classified
well-cleansed
well-cleared
well-climaxed
well-cloaked
well-cloistered
well-closed
well-closing
well-clothed
well-coached
well-coated
well-coined
well-collected
well-colonized
well-colored
well-coloured
well-combed
well-combined
well-commanded
well-commenced
well-commended
well-committed
well-communicated
well-compacted
well-compared

well-compassed
well-compensated
well-compiled
well-completed
well-complexioned
well-composed
well-comprehended
well-concealed
well-conceded
well-conceived
well-concentrated
well-concerted
well-concluded
well-concocted
well-concorded
well-condensed
well-conditioned
well-conducted
well-conferred
well-confessed
well-confided
well-confirmed
well-connected
well-conned
well-consenting
well-conserved
well-considered
well-consoled
well-consorted
well-constituted
well-constricted
well-constructed
well-construed
well-contained
well-content
well-contented
well-contested
well-continued
well-contracted
well-contrasted
well-contrived
well-controlled
well-conveyed
well-convinced
well-cooked
well-cooled
well-coordinated
well-copied

well-corked
well-corrected
well-corseted
well-costumed
well-couched
well-counseled
well-counselled
well-counted
well-counterfeited
well-coupled
well-courted
well-covered
well-cowed
well-crammed
well-crated
well-credited
well-cress
well-crested
well-criticized
well-crocheted
well-cropped
well-crossed
well-crushed
well-cultivated
well-cultured
well-curbed
well-cured
well-curled
well-curried
well-curved
well-cushioned
well-cut
well-cutting
well-damped
well-danced
well-darkened
well-darned
well-dealing
well-dealt
well-debated
well-deceived
well-decided
well-deck
well-decked
well-declaimed
well-decorated
well-decreed
well-deeded

well-deemed
well-defended
well-deferred
well-defined
well-delayed
well-deliberated
well-delineated
well-delivered
well-demeaned
well-demonstrated
well-denied
well-depicted
well-derived
well-descended
well-described
well-deserved
well-deserved
punishment
well-deservedly
well-deserver
well-deserving
well-deservingness
well-designated
well-designed
well-designing
well-desired
well-destroyed
well-developed
well-devised
well-diagnosed
well-diffused
well-digested
well-directed
well-disbursed
well-disciplined
well-discounted
well-discussed
well-disguised
well-dish
well-dispersed
well-displayed
well-disposed
well-disposedly
well-disposedness
well-dispositioned
well-disputed
well-dissected
well-dissembled

well-dissipated
well-distanced
well-distinguished
well-distributed
well-diversified
well-divided
well-divined
well-documented
well-doer
well-doing
well-domesticated
well-dominated
well-done
well-dosed
well-drafted
well-drain
well-drained
well-dramatized
well-drawn
well-dressed
well-dried
well-drilled
well-driven
well-drugged
well-dunged
well-dusted
well-dying
well-eared
well-earned
well-earthed
well-eased
well-economized
well-edited
well-educated
well-effected
well-elaborated
well-elevated
well-eliminated
well-embodied
well-emphasized
well-employed
well-enacted
well-enchanting
well-encountered
well-encouraged
well-ended
well-endorsed
well-endowed

well-enforced
well-engineered
well-engraved
well-enlightened
well-entered
well-entertained
well-entitled
well-enumerated
well-enveloped
well-equipped
well-erected
well-escorted
well-essayed
well-established
well-esteemed
well-estimated
well-evidence
well-evidenced
well-examined
well-executed
well-exemplified
well-exercised
well-exerted
well-exhibited
well-expended
well-experienced
well-explained
well-explicated
well-exploded
well-exposed
well-expressed
well-fabricated
well-faced
well-faded
well-famed
well-fancied
well-farmed
well-fashioned
well-fastened
well-fatted
well-favored
well-favoredly
well-favoredness
well-favoured
well-favouredness
well-feasted
well-feathered
well-featured

well-fed
well-feed
well-feigned
well-felt
well-fenced
well-fended
well-fermented
well-fielded
well-filed
well-filled
well-filmed
well-filtered
well-financed
well-fined
well-finished
well-fitted
well-fitting
well-fixed
well-flanked
well-flattered
well-flavored
well-flavoured
well-fledged
well-fleeced
well-fleshed
well-flooded
well-floored
well-floured
well-flowered
well-flowering
well-focused
well-focussed
well-folded
well-followed
well-fooled
well-foreseen
well-forested
well-forewarned
well-forewarning
well-forged
well-forgotten
well-formed
well-formulated
well-fortified
well-fought
well-found
well-founded
well-foundedly

well-foundedness
well-framed
well-fraught
well-freckled
well-freighted
well-frequented
well-fried
well-friended
well-frightened
well-fruited
well-fueled
well-fuelled
well-functioning
well-furnished
well-furnishedness
well-furred
well-gained
well-gaited
well-gardened
well-garmented
well-garnished
well-gathered
well-geared
well-generaled
well-gifted
well-girt
well-glossed
well-gloved
well-glued
well-going
well-gotten
well-governed
well-gowned
well-graced
well-graded
well-grained
well-grassed
well-gratified
well-graveled
well-gravelled
well-graven
well-greased
well-greaved
well-greeted
well-groomed
well-groomedness
well-grounded
well-grounded

hope
well-grouped
well-grown
well-guaranteed
well-guarded
well-guessed
well-guided
well-guiding
well-guyed
well-hained
well-haired
well-hallowed
well-hammered
well-handicapped
well-handled
well-hardened
well-harnessed
well-hatched
well-havened
well-hazarded
well-head
well-headed
well-healed
well-heard
well-hearted
well-heated
well-hedged
well-heeled
well-helped
well-hemmed
well-hewn
well-hidden
well-hinged
well-hit
well-hoarded
well-hole
well-holed
well-hoofed
well-hooped
well-horned
well-horsed
well-housed
well-hued
well-humbled
well-humbugged
well-humored
well-humoured
well-hung

well-husbanded
well-iced
well-identified
well-ignored
well-illustrated
well-imagined
well-imitated
well-immersed
well-implied
well-imposed
well-impressed
well-improved
well-improvised
well-inaugurated
well-inclined
well-included
well-incurred
well-indexed
well-indicated
well-inferred
well-informed
well-inhabited
well-initiated
well-inscribed
well-inspected
well-installed
well-instanced
well-instituted
well-instructed
well-insulated
well-insured
well-integrated
well-intended
well-intentioned
well-interested
well-interpreted
well-interviewed
well-introduced
well-invented
well-invested
well-investigated
well-ironed
well-irrigated
well-itemized
well-joined
well-jointed
well-judged
well-judging

well-judgingly
well-justified
well-kempt
well-kenned
well-kent
well-kept
well-kindled
well-knit
well-knitted
well-knotted
well-knowing
well-knowledged
well-known
well-known
fact
well-labeled
well-labored
well-laboring
well-laboured
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well-laden
well-laid
well-languaged
well-larded
well-launched
well-laundered
well-leaded
well-learned
well-leased
well-leaved
well-led
well-left
well-lent
well-less
well-lettered
well-leveled
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well-levied
well-lighted
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well-liked
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well-limited
well-limned
well-lined
well-lined

purse
well-linked
well-lit
well-liveried
well-living
well-loaded
well-located
well-locked
well-lodged
well-lofted
well-looked
well-looking
well-lost
well-loved
well-lunged
well-made
well-made play
well-maintained
well-managed
well-manned
well-mannered
well-manufactured
well-manured
well-mapped
well-marked
well-marketed
well-married
well-marshalled
well-masked
well-mastered
well-matched
well-mated
well-matured
well-meaner
well-meaning
well-meaningly
well-meaningness
well-meant
well-measured
well-membered
well-mended
well-merited
well-met
well-metalled
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well-mettled
well-milked
well-mingled

well-minted
well-mixed
well-modeled
well-modified
well-modulated
well-moduled
well-moneyed
well-moralized
well-motivated
well-motived
well-moulded
well-mounted
well-mouthed
well-named
well-narrated
well-natured
well-naturedness
well-navigated
well-near
well-necked
well-needed
well-negotiated
well-neighbored
well-nicknamed
well-nigh
well-nosed
well-noted
well-nourished
well-nursed
well-nurtured
well-oared
well-obeyed
well-observed
well-occupied
well-off
well-officered
well-oiled
well-omened
well-omitted
well-operated
well-opinioned
well-ordered
well-ordered
set
well-ordering theorem
well-organised
well-organized
well-oriented

well-ornamented
well-ossified
well-outlined
well-overseen
well-packed
well-paid
well-painted
well-paired
well-paneled
well-paragraphed
well-parceled
well-parked
well-past
well-patched
well-patrolled
well-patronised
well-patronized
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well-penned
well-pensioned
well-peopled
well-perceived
well-perfected
well-performed
well-persuaded
well-philosophized
well-photographed
well-picked
well-pictured
well-piloted
well-pitched
well-placed
well-planned
well-planted
well-played
well-plead
well-pleased
well-pleasedly
well-pleasedness
well-pleasing
well-pleasingness
well-plenished
well-plotted
well-plowed
well-plucked
well-plumaged
well-plumed

well-pointed
well-policed
well-policied
well-polished
well-polled
well-pondered
well-posed
well-positioned
well-possessed
well-posted
well-postponed
well-practiced
well-predicted
well-prepared
well-preserved
well-pressed
well-pretended
well-priced
well-primed
well-principled
well-printed
well-prized
well-professed
well-prolonged
well-pronounced
well-prophesied
well-proportioned
well-prosecuted
well-protected
well-proved
well-proven
well-provendered
well-provided
well-published
well-punished
well-pursed
well-pushed
well-put
well-puzzled
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well-qualitied
well-quartered
well-quizzed
well-raised
well-ranged
well-rated
well-read
well-read

in
well-readied
well-reared
well-reasoned
well-received
well-recited
well-reckoned
well-recognised
well-recognized
well-recommended
well-recorded
well-recovered
well-refereed
well-referred
well-refined
well-reflected
well-reformed
well-refreshed
well-refreshing
well-regarded
well-regulated
well-regulated mind
well-rehearsed
well-relished
well-relishing
well-remarked
well-remembered
well-rendered
well-rented
well-repaid
well-repaired
well-replaced
well-replenished
well-reported
well-represented
well-reprinted
well-reputed
well-requited
well-resolved
well-resounding
well-respected
well-rested
well-restored
well-revenged
well-reviewed
well-revised
well-rewarded
well-rhymed

well-ribbed
well-ridden
well-rigged
well-ringed
well-ripened
well-risen
well-risked
well-roasted
well-rode
well-rolled
well-roofed
well-rooted
well-roped
well-rotted
well-rounded
well-rounded
periods
well-routed
well-rowed
well-rubbed
well-ruled
well-ruling
well-run
well-running
well-sacrificed
well-saffroned
well-sailing
well-salted
well-sanctioned
well-sanded
well-satisfied
well-saved
well-savoring
well-saying
well-scared
well-scattered
well-scented
well-scheduled
well-schemed
well-schooled
well-scolded
well-scorched
well-scored
well-screened
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well-searched
well-seasoned

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well-secured
well-seeded
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well-seeming
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well-separated
well-served
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well-set-up
well-settled
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well-shading
well-shafted
well-shaken
well-shaped
well-shapen
well-sharpened
well-shaved
well-shaven
well-sheltered
well-shod
well-shot
well-showered
well-shown
well-sifted
well-sighted
well-simulated
well-sinewed
well-sinking
well-situated
well-sized
well-sketched
well-skilled
well-skinned
well-smelling
well-smoked
well-soaked
well-sold
well-soled
well-solved
well-sorted
well-sounding

well-spaced
well-speaking
well-sped
well-spent
well-spiced
well-splitting
well-spoken
well-sprayed
well-spread
well-spring
well-spun
well-spurred
well-squared
well-stabilized
well-stacked
well-staffed
well-staged
well-stained
well-stamped
well-starred
well-stated
well-stationed
well-steered
well-stirred
well-stitched
well-stocked
well-stopped
well-stored
well-straightened
well-strained
well-strapped
well-stressed
well-stretched
well-striven
well-stroked
well-strung
well-studied
well-stuffed
well-styled
well-subscribed
well-succeeding
well-sufficing
well-sugared
well-suggested
well-suited
well-summarised
well-summarized
well-sunburned

well-sung
well-superintended
well-supervised
well-supplemented
well-supplied
well-supported
well-suppressed
well-sustained
well-swelled
well-swollen
well-systematised
well-systematized
well-tailored
well-taken
well-tamed
well-tanned
well-tasted
well-taught
well-taxed
well-tempered
well-tenanted
well-tended
well-terraced
well-tested
well-thewed
well-thought
well-thought-of
well-thought-out
well-thrashed
well-thriven
well-thrown
well-thumbed
well-tied
well-tilled
well-timbered
well-timed
well-timed
opportunity
well-tinted
well-to-do
well-toasted
well-told
well-toned
well-tongued
well-toothed
well-tossed
well-traced
well-traded

well-trained
well-translated
well-trapped
well-traveled
well-travelled
well-treated
well-tricked
well-tried
well-trimmed
well-trod
well-trodden
well-trunked
well-trussed
well-trusted
well-tuned
well-turned
well-turned
periods
well-turned-out
well-tutored
well-twisted
well-typed
well-umpired
well-understood
well-uniformed
well-united
well-upholstered
well-urged
well-used
well-utilized
well-valeted
well-varied
well-varnished
well-veiled
well-ventilated
well-ventured
well-verified
well-versed
well-visualised
well-visualized
well-voiced
well-vouched
well-walled
well-wared
well-warmed
well-warned
well-warranted
well-washed

well-watched
well-watered
well-weaponed
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well-weaved
well-weaving
well-wedded
well-weighed
well-weighing
well-whipped
well-wigged
well-willed
well-willer
well-willing
well-winded
well-windowed
well-winged
well-winnowed
well-wired
well-wish
well-wisher
well-wishing
well-witnessed
well-witted
well-won
well-wooded
well-wooing
well-wooled
well-worded
well-worked
well-worked-out
well-worn
well-worn groove
well-woven
well-wreathed
well-written
well-wrought
well-yoked
wellington boot
welsh corgi
welsh harp
welsh hook
welsh rabbit
welsh rarebit
welsh
springer spaniel
welsh terrier
welt seam

welter in your own blood
welter weight
wen-li
wend your way
were it not
were it not that
were-
were-animal
were-animals
were-ass
west Greenland current
west by north
west by south
west coast fir
west coast hemlock
west country
west end
west germanic
west highland
west india
west indian
west indies
west saxon
west wind
west wind drift
west-by
west-central
west-ender
west-endism
west-endy
west-faced
west-facing
west-going
west-india man
west-north-west
west-northwest
west-northwesterly
west-northwestward
west-south-west
west-southwest
west-southwesterly
west-southwestward
west-southwestwardly
west-turning
west-winded
west-windy
western diamondb
western diamondback rattlesnake

western frame
western hemisphere
western hemlock
western juniper
western mountain ash
western omelet
western paper birch
western red cedar
western roll
western sandwich
western swing
western tanager
western wool
western yellow pine
westphalian ham
westward-looking
wet
behind the ears
wet blanket
wet bulb
wet cell
wet chinook
wet cleaner
wet compass
wet contact
wet cooper
wet dock
wet down
wet dream
wet fly
wet look
wet moon
wet nurse
wet pack
wet pleurisy
wet puddling
wet rot
wet season
wet snow
wet squib
wet strength
wet suit
wet to the skin
wet wash
wet weather
wet weathers
wet with sweat
wet your whistle

wet-air
wet-air pump
wet-and-dry-bulb thermometer
wet-blanket
wet-blanketing
wet-bulb
wet-bulb thermometer
wet-cell
wet-cheeked
wet-clean
wet-eyed
wet-footed
wet-lipped
wet-my-lip
wet-nurse
wet-nursed
wet-nursing
wet-pipe
wet-pipe system
wet-plate
wet-plate process
wet-process machine
wet-salt
wet-season
wet-shod
wet-worked
wether wool
wetlands conservation
wetness fraction
wetter-off
wetting agent
wetting down
wetting-out agent
wh-movement
whack down
whack off
whack up
whale barnacle
whale catcher
whale feed
whale fin
whale fisher
whale fisherman
whale fishery
whale fishing
whale food
whale iron
whale line

whale louse
whale of a difference
whale
 oil
whale shark
whale-backed
whale-built
whale-gig
whale-headed
whale-hunting
whale-mouthed
whale-tailed
whalebone tree
whalebone whale
whaling fleet
whaling gun
whaling master
whaling port
whaling rocket
whare-kura
whare-puni
whare-wananga
wharf boat
wharf dues
wharf duty
wharf end
wharf fee
wharf fish
wharf hand
wharf laborer
wharf lumper
wharf monkey
wharf owner
wharf rat
wharf spike
wharf worker
what a life
what are the odds
what bodes
what boots it
what can be done
what can be seen
what can never be
what cannot be
what cannot happen
what do I care
what do you know
what do you know about that

what does it matter
what else is new
what for
what goes up must come down
what happens
what have you
what if
what in the world
what is coming to one
what is coming to you
what is comprised
what is condign
what is contained
what is destined
what is done
what is doomed
what is due
what is fated
what is in the books
what is included
what is merited
what is owing
what is possible
what is proper
what
is revealed
what is right
what is to be
what is to come
what it is about
what it takes
what looms
what makes it tick
what makes you tick
what matter
what may be
what might be
what must not be
what of it
what on earth
what ought not be
what ought to be
what ought to be done
what should be
what should not be
what the hell
what time
what will be will be

what you are about
what you are doing
what you are responsible for
what you are worth
what you can call your own
what you can do
what you have coming
what you have earned
what you have to your name
what you may fairly call
what you may fitly call
what you may properly call
what you may well call
what you merit
what you will
what's happening
what's in
what's in it for one
what's it to you
what's its name
what's the diff
what's the difference
what's the odds
what's what
what's-her-name
what's-his-face
what's-his-name
what's-its-name
what-d'ye-call-'em
what-d'ye-call-it
what-d'you-call-it
what-do-you-call-it
what-eer
what-for
what-is-it
what-like
what-you-call-it
what-you-may
 call-it
what-you-may--call-it
what-you-may-call-'em
whatever comes
whatever may happen
whatever the cost
whats-her-name
whats-his-name
whats-it
whats-its-name

wheaf take-all
wheaf-head
wheat aphid
wheat aphis
wheat beetle
wheat belt
wheat berry
wheat bread
wheat bug
wheat bulb fly
wheat bulb worm
wheat cake
wheat chafer
wheat cutworm
wheat duck
wheat eel
wheat eelworm
wheat farmer
wheat field
wheat fly
wheat from the chaff
wheat gallfly
wheat germ
wheat grass
wheat jointworm
wheat louse
wheat maggot
wheat meal
wheat midge
wheat mildew
wheat mite
wheat mosaic
wheat moth
wheat pest
wheat pit
wheat plant louse
wheat rosette
wheat rust
wheat sawfly
wheat scab
wheat seed
wheat sheaf
wheat smut
wheat stem
wheat stem rust
wheat thief
wheat thrips
wheat weevil

wheat weigher
wheat-blossoming
wheat-colored
wheat-fed
wheat-growing
wheat-head army worm
wheat-hid
wheat-producing
wheat-raising
wheat-rich
wheat-stem maggot
wheat-stem sawfly
wheat-straw
wheatear
cockle
wheatsel bird
wheatstone bridge
wheel about
wheel and axle
wheel and deal
wheel animal
wheel animalcule
wheel around
wheel back
wheel barometer
wheel base
wheel bearer
wheel bug
wheel case
wheel chain
wheel chair
wheel colter
wheel control
wheel cowlings
wheel cross
wheel cultivator
wheel excavator
wheel fitter
wheel governor
wheel hoe
wheel horse
wheel lathe
wheel load
wheel load weigher
wheel lock
wheel maker
wheel man
wheel map

wheel money
wheel of chance
wheel of fortune
wheel ore
wheel organ
wheel parts
wheel pen
wheel pit
wheel plate
wheel plow
wheel rod
wheel rope
wheel scraper
wheel static
wheel stitch
wheel tracery
wheel trap
wheel tree
wheel trolley
wheel welder
wheel window
wheel-backed
wheel-barrower
wheel-broad
wheel-cut
wheel-cutting
wheel-footed
wheel-going
wheel-made
wheel-marked
wheel-mounted
wheel-resembling
wheel-shaped
wheel-smashed
wheel-spun
wheel-supported
wheel-track
wheel-turned
wheel-turning
wheel-worn
wheelbarrow race
wheeler and dealer
wheeler-dealer
wheeling
 and dealing
wheels within wheels
whelk tingle
whelk-shaped

when all is said and done
when as
when day is done
when hell freezes over
when in Rome do as the Romans do
when issued
when it is handy
when the chips are down
when the mood strikes
when the spirit moves
when you get around to it
when you have a minute to spare
when you have the time
when your ship comes in
when-issued
whenever you like
whenever you wish
where it's at
where the earth meets the sky
where the shoe pinches
where the sun beats
where the sun rises
where you are
where you live
where you reside
where you sit
where you stand
wherefore, the
wherever it may be
wherever you look
wherever you turn
whet slate
whet the appetite
whet the knife
whet the sword
whet your interest
whether or no
whether you will or not
whetstone slate
whetstone-shaped
whettle-bone
whew duck
whey bird
whey butter
whey cure
whey whig
whey-bearded
whey-blooded

whey-brained
whey-colored
whey-face
whey-faced
whi-Zbang
which is Not we
which
 is in us and all around us
which see
which way the wind blows
whidah bird
whidah finch
whiff of grapeshot
whiffle ball
while airborne
while away
while away the time
while life endures
while on the subject
while you draw breath
whim berry
whim gin
whim-proof
whim-wham
whim-whams
whin sparrow
whin-wrack
whing-ding
whip along
whip and spur
whip antenna
whip away
whip bird
whip crane
whip crop
whip gin
whip graft
whip graftage
whip grass
whip hand
whip handle
whip hoist
whip horse
whip in
whip into shape
whip line
whip maker
whip off

whip on
whip purchase
whip ray
whip rod
whip roll
whip row
whip scorpion
whip snake
whip stall
whip thread
whip top
whip up
whip yarn
whip yourself
whip-
whip-bearing
whip-corrected
whip-cracker
whip-cracking
whip-ended
whip-grafting
whip-hand
whip-jack
whip-lash
whip-marked
whip-poor-will
whip-round
whip-saw
whip-shaped
whip-stick
whip-stitch
whip-tailed
whip-tom-kelly
whip-tongue
whip-up
whip-wielding
whipbelly vengeance
whipcord willow
whiplash injury
whipped
 cream
whipped up
whipper-in
whipper-snapper
whippers-in
whippet tank
whipping boy
whipping cream

whipping girl
whipping post
whipping top
whipping up
whipping-boy
whipping-snapping
whipping-up
whipsy-derry
whiptail shark
whirl drill
whirl gate
whirl like a dervish
whirl the mind
whirl-
whirl-blast
whirl-shaped
whirligig beetle
whirligig mullet
whirligig of time
whirling dervish
whirling table
whirlpool bath
whirlpool nebula
whirlwinds of tempestuous fire
whirly-
whisk broom
whisk tail
whisk-tailed
whisker boom
whisker jumper
whisker pole
whiskey jack
whiskey smash
whiskey sour
whisky cherry
whisky drinker
whisky jack
whisky john
whisky liver
whisky mac
whisky poker
whisky sour
whisky-drinking
whisky-frisky
whisky-jack
whisky-sodden
whisper glide
whisper glottis

whisper in the ear
whisper sweet nothings
whisper-soft
whispered about
whispering campaign
whispering dome
whispering gallery
whispering office
whispering pectoriloquy
whispering voice
whist drive
whistle at
whistle duck
whistle
 for
whistle punk
whistle stop
whistle-blower
whistle-pig
whistle-stop
whistle-stop campaign
whistle-stopper
whistle-stopping
whistlebelly vengeance
whistling buoy
whistling duck
whistling jar
whistling swan
whit sunday
white Leghorn
white Mariposa
white Orpington
white Plymouth Rock
white Wyandotte
white acid
white admiral
white alert
white alkali
white ant
white area
white arsenic
white as a lily
white as a sheet
white as snow
white ash
white ash herb
white bass
white bay

white bear
white beet
white belt
white birch
white blood cell
white blood corpuscle
white book
white boy
white bread
white bronze
white bryony
white cake
white campion
white cast iron
white cedar
white chip
white clover
white coal
white comparisons
white cooper
white corpuscle
white crab
white crappie
white cross
white currant
white daisy
white damp
white dew
white dutch clover
white dwarf
white dwarf star
white eardrop
white elephant
white elephant sale
white ensign
white feather
white flag
white flax
white flint
white
fox
white friar
white frost
white gas
white gasoline
white globe lily
white gold
white goldenrod

white goods
white gourd
white grape
white grease
white gum
white hairs
white hake
white heat
white hole
white hope
white horde
white horehound
white horse
white horses
white house
white hunter
white iron
white iron pyrites
white lead
white lead ore
white leather
white leg
white lie
white light
white lightning
white lime
white line
white liquor
white list
white liver
white livered
white lotus
white lupine
white magic
white mahogany
white man
white man's burden
white marlin
white matter
white meat
white melilot
white metal
white moss
white mulberry
white mule
white mustard
white noise
white oak

white oil
white paper
white paternoster
white pepper
white perch
white pine
white plague
white poplar
white potato
white pottery
white power
white primary
white pudding
white race
white rainbow
white rat
white room
white rose
white rose mallow
white rot
white russian
white rust
white sage
white
 sale
white salmon
white sandalwood
white sapote
white sapphire
white sauce
white sea bass
white shark
white sidewall tire
white slave
white slaver
white slavery
white snakeroot
white sour
white space
white spirit
white spiritual
white spruce
white squall
white staff
white stork
white stuff
white sturgeon
white supremacist

white supremacy
white swamp azalea
white tassel flower
white tie
white tie and tails
white titi
white turnip
white upland aster
white vitriol
white walnut
white water
white water lily
white wax
white way
white whale
white wine
white with age
white wolf
white wood aster
white-acre
white-alder
white-alder family
white-ankled
white-ant
white-anted
white-armed
white-ash
white-backed
white-barked
white-barred
white-beaked
white-bearded
white-bellied
white-berried
white-billed
white-blood
white-blooded
white-blue
white-bodied
white-bone
white-boned
white-bordered
white-bosomed
white-breasted
white-brick
white-browed
white-brown
white-burning

white-capped
white-cell
white-cell
 blood
white-cheeked
white-chinned
white-churned
white-clad
white-clothed
white-coated
white-collar
white-collar intellectual
white-collar thief
white-collar worker
white-colored
white-cotton
white-cotton tree
white-crested
white-cross
white-cross diatom
white-crossed
white-crowned
white-crowned sparrow
white-domed
white-dotted
white-dough
white-ear
white-eared
white-eye
white-eyed
white-eyed vireo
white-eyelid
white-eyelid monkey
white-eyes
white-faced
white-faced hornet
white-favored
white-feathered
white-featherism
white-felled
white-flanneled
white-flecked
white-fleshed
white-flower
white-flowered
white-flowing
white-foot
white-footed

white-footed mouse
white-frilled
white-fringed
white-frocked
white-fronted
white-fronted goose
white-fruited
white-girdled
white-glittering
white-gloved
white-gray
white-green
white-ground
white-haired
white-hairy
white-handed
white-hard
white-hatted
white-headed
white-heart
white-heart hickory
white-hoofed
white-hooved
white-horned
white-horsed
white-hot
white-jacketed
white-laced
white-leaf
white-leaved
white-legged
white-lie
white-lined
white-linen
white-lipped
white-list
white-listed
white-livered
white-liveredly
white-liveredness
white-loaf
white-looking
white-maned
white-mantled
white-marked
white-mooned
white-mottled
white-mouthed

white-mustard
white-mustard
oil
white-necked
white-nosed
white-painted
white-paneled
white-petaled
white-pickle
white-pickle mosaic
white-pine
white-pine blister rust
white-pine rust
white-pine weevil
white-piped
white-plumed
white-rag
white-railed
white-rayed
white-red
white-ribbed
white-ribboned
white-ribboner
white-rinded
white-robed
white-roofed
white-ruffed
white-rumped
white-russet
white-salted
white-satin
white-set
white-sewing
white-shafted
white-sheeted
white-shouldered
white-sided
white-skin
white-skinned
white-slaver
white-slaving
white-sleeved
white-spored
white-spotted
white-stemmed
white-stoled
white-strawed
white-tail

white-tailed
white-tailed deer
white-tailed kit
white-tailed kite
white-tailed
 sea eagle
white-thighed
white-throated
white-throated sparrow
white-tinned
white-tipped
white-tomentose
white-tongued
white-tooth
white-toothed
white-topped
white-tufted
white-tusked
white-uniformed
white-veiled
white-veined
white-vented
white-waistcoated
white-walled
white-wanded
white-water
white-waving
white-way
white-whiskered
white-wig
white-wigged
white-winged
white-winged coot
white-winged dove
white-winged scoter
white-woolly
white-wristed
white-zoned
whitebark pine
whited sepulcher
whited sepulchre
whitening stone
whitetail deer
whitetailed deer
whitewall tire
whitewash job
whitewood bark
whiting bottle

whiting box
whiting brush
whiting can
whiting dabber
whiting filler
whiting furnace
whiting kit
whiting loader
whiting maker
whiting mill
whiting packer
whiting paste
whiting pollack
whiting pout
whiting powder
whiting sponge
whiting time
whiting tin
whitish-blue
whitish-brown
whitish-cream
whitish-flowered
whitish-green
whitish-lavender
whitish-red
whitish-tailed
whitish-yellow
whitley
council
whitlow grass
whitlowwort family
whitten tree
whitty-tree
whity-brown
whity-gray
whity-green
whity-yellow
whiz about
whiz kid
whiz off
whiz-bang
whizz-bang
whizzing stick
who cares
who feel great truths
who knows
who would have thought it
who's who

who-does-what
who-whoop
whole amount
whole attention
whole ball of wax
whole bit
whole blood
whole brother
whole bunch
whole caboodle
whole deal
whole gale
whole hog
whole kit and caboodle
whole kit and kaboodle
whole life insurance
whole megillah
whole mess
whole milk
whole note
whole number
whole offering
whole people
whole picture
whole rest
whole schmear
whole shebang
whole shooting match
whole show
whole shtick
whole slew
whole step
whole story, the
whole time
whole tone
whole wheat
whole wheat bread
whole wheat flour
whole wide world
whole works
whole-and-half
whole-and-half compass
whole-backed
whole-bodied
whole-bound
whole-cloth
whole-colored
whole-eared

whole-eyed
whole-feathered
whole-footed
whole-headed
whole-hearted
whole-hog
whole-hogger
whole-hoofed
whole-leaved
whole-length
whole-minded
whole-mouthed
whole-or-none
whole-sail
whole-seas
whole-skinned
whole-souled
whole-souledly
whole-souledness
whole-spirited
whole-step
whole-timer
whole-tone
scale
whole-wheat
whole-witted
wholesale dealer
wholesale house
wholesale murder
wholesale price
whomp up
whoop and a holler
whoop it up
whoop it up about
whoop-de-do
whoop-de-doo
whoop-de-dos
whoop-up
whoopee cup
whooper swan
whooping cough
whooping crane
whooping-cough
whore's bird
whorl foot
why yes
why-not
whydah bird

wi-wi
wibble-wabble
wibble-wobble
wicked imitation
wicked, the
wicked-acting
wicked-eyed
wicked-looking
wicked-minded
wicked-speaking
wicked-tongued
wicker basket
wicker-woven
wicket dam
wicket door
wicket gate
wicket maiden
widbin pear tree
wide apart
wide as a church door
wide awake
wide away
wide berth
wide gauge
wide knowledge
wide margin
wide of the mark
wide open
wide place in the road
wide ration
wide reading
wide
world
wide-a-wake
wide-abounding
wide-accepted
wide-angle
wide-angle lens
wide-arched
wide-armed
wide-awake
wide-awake hat
wide-awakeness
wide-banked
wide-bottomed
wide-branched
wide-branching
wide-breasted

wide-brimmed
wide-cast
wide-chapped
wide-circling
wide-climbing
wide-consuming
wide-crested
wide-distant
wide-doored
wide-eared
wide-echoing
wide-elbowed
wide-expanded
wide-expanding
wide-extended
wide-extending
wide-eyed
wide-faced
wide-flung
wide-framed
wide-gaping
wide-gated
wide-girdled
wide-handed
wide-hipped
wide-honored
wide-imperial
wide-jointed
wide-kneed
wide-lamented
wide-leafed
wide-leaved
wide-lipped
wide-met
wide-minded
wide-mindedness
wide-mouthed
wide-necked
wide-nosed
wide-open
wide-open spaces
wide-open speed
wide-opened
wide-openly
wide-openness
wide-palmed
wide-patched
wide-permitted

wide-petaled
wide-pledged
wide-ranging
wide-reaching
wide-realmed
wide-resounding
wide-ribbed
wide-rimmed
wide-rolling
wide-roving
wide-row
wide-said
wide-sanctioned
wide-screen
wide-seen
wide-set
wide-shaped
wide-shown
wide-skirted
wide-sleeved
wide-sold
wide-soled
wide-sought
wide-spaced
wide-spanned
wide-spread
wide-spreaded
wide-spreading
wide-straddling
wide-streeted
wide-stretched
wide-stretching
wide-throated
wide-toed
wide-toothed
wide-tracked
wide-veined
wide-wasting
wide-watered
wide-wayed
wide-where
wide-winding
wide-winged
wide-yawning
widely
 apart
widely known
widely read

widen the distance
widest dissemination
widgeon coot
widgeon grass
widow bird
widow duck
widow finch
widow fish
widow flower
widow lady
widow monkey
widow right
widow woman
widow's benefit
widow's cruse
widow's dower
widow's mite
widow's peak
widow's walk
widow's weeds
widow's-cross
widow-bench
widow-bird
widow-maker
widow-wail
widow-wail family
wie geht's
wield authority
wield the baton
wield the scepter
wield the sword
wiener roast
wiener schnitzel
wienie roast
wife in all but name
wife in name only
wife of your bosom
wife swapping
wife-awed
wife-beating
wife-bound
wife-hunting
wife-ridden
wife-to-be
wife-worn
wig
 block
wig sumac

wig tree
wig-wag
wiggen tree
wiggle nail
wiggle out of
wiggle the finger at
wiggle-tail
wiggle-tail cultivator
wiggle-waggle
wiggle-woggle
wiggly-waggly
wigwag flag
wigwag signal
wilcolored flowers
wild West
wild about
wild allspice
wild and woolly
wild animal
wild animals
wild ass
wild basil
wild bean
wild beast
wild beasts
wild bergamot
wild bleeding-heart
wild boar
wild brier
wild calla
wild carrot
wild cat
wild celery
wild cherry
wild chervil
wild clove
wild corn
wild date
wild deer
wild dog
wild duck
wild fig
wild flax
wild flower
wild for
wild fowl
wild geranium
wild ginger

wild goat
wild goose
wild goose chase
wild growth
wild guess
wild hollyhock
wild honeysuckle
wild horse
wild hyacinth
wild hyacn
wild hydrangea
wild imagination
wild indigo
wild ipecac
wild land
wild lettuce
wild lily-of-the-valley
wild madder
wild man
wild marjoram
wild mulberry
wild mustard
wild oat
wild oats
wild oleander
wild oleaster
wild olive
wild orange
wild
ox
wild pansy
wild parsley
wild parsnip
wild passion flower
wild pennyroyal
wild pink
wild pitch
wild potato
wild pumpkin
wild radish
wild rice
wild rose
wild rosemary
wild rubber
wild rye
wild sage
wild sarsaparilla
wild senna

wild service tree
wild sheep
wild shot
wild silk
wild spikenard
wild sunflower
wild sweet pea
wild sweet potato
wild sweet william
wild thyme
wild to
wild track
wild type
wild vanilla
wild west
wild wormwood
wild-acting
wild-aimed
wild-and-woolly
wild-ass
wild-billowing
wild-blooded
wild-booming
wild-born
wild-brained
wild-bred
wild-chosen
wild-eyed
wild-fire
wild-flying
wild-fought
wild-fowl
wild-fowler
wild-fowling
wild-goose
wild-goose chase
wild-goose plum
wild-grown
wild-haired
wild-headed
wild-headedness
wild-looking
wild-made
wild-notioned
wild-oat
wild-oat kicker
wild-phrased
wild-spirited

wild-staring
wild-warbling
wild-warring
wild-williams
wild-winged
wild-witted
wild-woven
wildcat bank
wildcat strike
wildcat well
wilderness area
wilderness
 preserve
wildest dream
wildest dreams
wildlife conservation
wildlife preserve
wile away
will and bequeath
will and pleasure
will and will not
will contest
will for power
will of Heaven
will of iron
will of your own
will power
will to
will to believe
will to power
will turn
will wonders never cease
will you
will-call
will-commanding
will-fraught
will-less
will-lessly
will-lessness
will-o'-the-wisp
will-o-the-wisp
will-strong
will-willet
will-with-the-wisp
will-worship
will-worshiper
willful disobedience
willful misconception

william tell
willie gow
willie hawkie
willie wagtail
willie wicket
willie-waucht
willie-waught
willing ear
willing heart
willing humor
willing mind
willing or unwilling
willingness to believe
willo'-the-wispish
willo'-the-wispy
willow acacia
willow amsonia
willow apple
willow beauty
willow beetle
willow borer
willow buffer
willow cactus
willow cat
willow catfish
willow chafer
willow charcoal
willow cottonwood
willow family
willow fly
willow gall
willow goldfinch
willow
green
willow grouse
willow herb
willow lark
willow leaf
willow leaf beetle
willow louse
willow moth
willow myrtle
willow oak
willow pattern
willow peeler
willow poplar
willow ptarmigan
willow sawfly

willow shoot
willow slug
willow slug caterpillar
willow sparrow
willow thorn
willow thrush
willow tit
willow tree
willow wand
willow warbler
willow wren
willow-bordered
willow-colored
willow-cone
willow-cone gall
willow-fringed
willow-grown
willow-herb
willow-leaved
willow-leaved jasmine
willow-shaded
willow-skirted
willow-tree money
willow-tufted
willow-veiled
willow-wielder
willow-wood
willow-wort
willy wagtail
willy-mufty
willy-nilly
willy-waa
willy-wagtail
willy-waw
willy-wicket
willy-willies
willy-willy
wilt disease
wilting coefficient
wilting percentage
wilting point
wily device
win away
win back
win by a fluke
win by a neck
win easily
win freedom

win friends
win friends and influence people
win going away
win hands down
win in a canter
win in a walk
win in a waltz
win out
win over
win
 the affections of
win the battle
win the bays
win the day
win the laurels
win the love of
win the palm
win the prize
win the regard of
win the start
win through
win your heart
win your spurs
wince pit
wince pot
winch driver
wincing machine
wind and weather permitting
wind around your little finger
wind arrow
wind band
wind beam
wind belt
wind blast
wind box
wind brace
wind burn
wind catcher
wind chest
wind cloud
wind colic
wind component table
wind cone
wind contusion
wind cripple
wind cutter
wind direction
wind down

wind drift
wind dropsy
wind eddy
wind egg
wind engine
wind erosion
wind flapper
wind force
wind furnace
wind gap
wind gauge
wind god
wind gods
wind guard
wind gun
wind gust
wind harp
wind hawk
wind herb
wind house
wind in
wind in and out
wind indicator
wind instrument
wind load
wind machine
wind mantle
wind marker
wind motor
wind music
wind musician
wind part
wind plant
wind poppy
wind porch
wind power
wind propulsion
wind pump
wind resistance
wind ripple
wind rose
wind
sail
wind scale
wind scoop
wind scorpion
wind shaft
wind shake

wind sheet
wind shelf
wind side
wind signal
wind slash
wind sleeve
wind sock
wind sound
wind sprint
wind stack
wind stacker
wind star
wind stop
wind sucking
wind supply
wind tee
wind the horn
wind throw
wind thrush
wind tie
wind trunk
wind tunnel
wind up
wind valley
wind vane
wind wheel
wind zone
wind-bag
wind-balanced
wind-balancing
wind-beaten
wind-bell
wind-bells
wind-blazing
wind-blown
wind-borne
wind-bound
wind-broken
wind-built
wind-changing
wind-chapped
wind-clipped
wind-cutter
wind-delayed
wind-dispersed
wind-dried
wind-driven
wind-egg

wind-equator
wind-exposed
wind-fanned
wind-fast
wind-fertilization
wind-fertilized
wind-flower
wind-flowing
wind-footed
wind-force
wind-gall
wind-god
wind-grass
wind-guage
wind-gun
wind-hungry
wind-instrument
wind-instrumental
wind-instrumentalist
wind-laid
wind-lashed
wind-making
wind-nodding
wind-obeying
wind-outspeeding
wind-parted
wind-pollinated
wind-pollination
wind-propelled
wind-puff
wind-puffed
wind-raising
wind-rent
wind-rode
wind-scattered
wind-screen
wind-shake
wind-shaken
wind-shift
wind-shift
line
wind-speed indicator
wind-struck
wind-stuffed
wind-sucking
wind-swept
wind-swift
wind-swung

wind-taut
wind-toned
wind-up
wind-wandering
wind-waved
wind-waving
wind-whipped
wind-wing
wind-winged
wind-worn
windblown bob
winder rod
winder-on
windfall money
windfall profit
windflower gentian
winding engine
winding frame
winding number
winding pendant
winding sheet
winding staircase
winding stick
winding strip
winding tackle
winding-sheet
windlass bitt
windmill grass
windmill orchid
windmill palm
windmill pink
windmill plane
windmill plant
windmill tower
windmill-like
window back
window bar
window bay
window board
window bole
window box
window card
window case
window catch
window cleaner
window curtain
window decoration
window decorator

window display
window dresser
window dressing
window envelope
window fixture
window fly
window frame
window furniture
window
gardening
window glass
window head
window lead
window martin
window mirror
window oyster
window rocket
window sash
window screen
window seat
window shade
window shell
window show
window shutter
window sill
window sole
window space
window stile
window stool
window stop
window swallow
window tax
window trim
window trimmer
window trimming
window work
window-breaking
window-broken
window-cleaning
window-dress
window-dresser
window-dressing
window-efficiency
window-efficiency ratio
window-opening
window-rattling
window-shop
window-shopper

window-shopping
window-smashing
window-ventilating
windowless monad
windpipe-slitting art
windscreen wiper
windshield wing
windshield wiper
windsor chair
windsor knot
windsor tie
windstorm insurance
windward ebb
windward flood
windward side
windward tide
windy-aisled
windy-blowing
windy-clear
windy-footed
windy-headed
windy-looking
windy-mouthed
windy-voiced
windy-worded
wine acid
wine and dine
wine apple
wine bag
wine bar
wine biscuit
wine black
wine bush
wine
butt
wine card
wine cask
wine cellar
wine cooler
wine cooper
wine ferment
wine flask
wine fly
wine fountain
wine gallon
wine garden
wine grape
wine lees

wine maker
wine making
wine measure
wine merchant
wine palm
wine party
wine plant
wine press
wine presser
wine purple
wine red
wine seller
wine shop
wine steward
wine stone
wine table
wine taster
wine tester
wine thrush
wine tun
wine vault
wine vinegar
wine whey
wine yeast
wine yellow
wine-bright
wine-cask borer
wine-colored
wine-cooler
wine-crowned
wine-cup
wine-dark
wine-drabbed
wine-drinking
wine-driven
wine-drunken
wine-hardy
wine-heated
wine-house
wine-inspired
wine-laden
wine-merry
wine-press
wine-producing
wine-red
wine-selling
wine-shaken
wine-soaked

wine-stained
wine-stuffed
wine-swilling
wine-tinged
wine-wise
wine-yielding
wing and wing
wing axis
wing back formation
wing band
wing bar
wing bay
wing bearing
wing bit
wing bolt
wing bone
wing bow
wing car
wing case
wing cell
wing chair
wing clipper
wing clipping
wing collar
wing
commander
wing compass
wing cover
wing covert
wing coverts
wing dam
wing deck
wing divider
wing dividers
wing drag
wing elm
wing feather
wing flap
wing flat
wing formation
wing game
wing gap
wing gudgeon
wing it
wing jam
wing load
wing loading
wing net

wing nut
wing out ballast
wing over
wing pad
wing passage
wing petal
wing plow
wing power
wing quill
wing radiator
wing rail
wing resistance
wing rib
wing root air intake
wing roots
wing sac
wing screw
wing sheath
wing shell
wing shooting
wing shot
wing skid
wing snail
wing stopper
wing tie
wing tip
wing top
wing tract
wing transom
wing truss
wing valve
wing wale
wing wall
wing your way
wing-borne
wing-broken
wing-case
wing-clipped
wing-ding
wing-footed
wing-hoofed
wing-leafed
wing-leaved
wing-limed
wing-loose
wing-maimed
wing-margined
wing-shaped

wing-slot
wing-swift
wing-tip
wing-tip flare
wing-tip float
wing-tipped
wing-wearily
wing-weariness
wing-weary
wing-wide
wingback formation
winged chair
winged elm
winged rocket
winged
 spindle tree
winged-footed
winged-heeled
winged-leaved
wink at
wink of sleep
winker braces
winking cartilage
winking muscle
winkle out
winkle-pickers
winner's circle
winning gallery
winning hazard
winning opening
winning post
winning streak
winning ways
winnow cloth
winnow out
winnow sheet
winnow the chaff from the wheat
winnow-corb
winnowed out
winnowing basket
winnowing fan
winnowing machine
winter aconite
winter annual
winter apple
winter barley
winter beer
winter blight

winter bonnet
winter brake
winter bud
winter bunting
winter cherry
winter clover
winter count
winter cress
winter crookneck
winter crop
winter daffodil
winter day
winter duck
winter egg
winter fallow
winter fat
winter fever
winter flounder
winter flower
winter garden
winter geranium
winter gillyflower
winter golf
winter grape
winter green
winter gull
winter hail
winter hawk
winter heath
winter hedge
winter heliotrope
winter hellebore
winter house
winter huckleberry
winter itch
winter jasmine
winter leaf
winter lettuce
winter
melon
winter mew
winter midge
winter moth
winter oats
winter of your days
winter oil
winter pear
winter pink

winter plum
winter purslane
winter quarters
winter radish
winter rocket
winter rose
winter rye
winter savory
winter shad
winter sheldrake
winter skate
winter sleep
winter snipe
winter sol
winter solstice
winter spice
winter spore
winter sports
winter squash
winter strawberry
winter sucker
winter sunscald
winter sweet
winter teal
winter tire
winter vetch
winter wagtail
winter wheat
winter wind
winter wolfsbane
winter wren
winter yellowlegs
winter's bark
winter-beaten
winter-blasted
winter-blooming
winter-boding
winter-bound
winter-chilled
winter-clad
winter-damaged
winter-fattened
winter-fed
winter-felled
winter-flowering
winter-gladdening
winter-gray
winter-ground

winter-grown
winter-habited
winter-hardened
winter-hardy
winter-house
winter-kill
winter-long
winter-love
winter-loving
winter-made
winter-old
winter-proof
winter-proud
winter-pruned
winter-quarter
winter-reared
winter-rig
winter-ripening
winter-seeming
winter-shaken
winter-sown
winter-standing
winter-starved
winter-swollen
winter-thin
winter-verging
winter-visaged
winter-wasted
winter-withered
winter-worn
wintergreen
 barberry
wintergreen family
wintergreen oil
wintry weather
wintry wind
wipe away the tears
wipe away your tears
wipe break
wipe breaker
wipe joint
wipe off
wipe off old scores
wipe off the map
wipe out
wipe the floor with
wipe the slate clean
wipe the smile off your face

wipe up
wipe up the floor with
wipe-off
wiped away
wiped out
wiper shaft
wiper wheel
wiping contact
wiping out
wiping rod
wiping up
wire agency
wire basket
wire bender
wire bent
wire birch
wire bridge
wire brush
wire cartridge
wire chief
wire chisel
wire cloth
wire coat
wire communication
wire coverer
wire cutter
wire cutting
wire drawer
wire drawing
wire edge
wire entanglement
wire former
wire galvanizer
wire gauge
wire gauze
wire glass
wire grama
wire grass
wire grating
wire grub
wire gun
wire house
wire lath
wire
line
wire ling
wire loop binding
wire mark

wire micrometer
wire money
wire nail
wire netting
wire nut
wire pack
wire plant
wire press
wire radio
wire recorder
wire recording
wire reducer
wire road
wire rod
wire roller
wire room
wire rope
wire ropeway
wire rush
wire saw
wire sculpture
wire service
wire sewer
wire side
wire silver
wire spooler
wire stem
wire stitch
wire stitcher
wire stitching
wire straightener
wire strander
wire tapper
wire tapping
wire tester
wire tightener
wire tinner
wire vine
wire walker
wire wave communication
wire weaver
wire welder
wire wheel
wire winder
wire wool
wire-bending
wire-blocking
wire-borne

wire-bound
wire-brushing
wire-caged
wire-cloth
wire-coiling
wire-crimping
wire-cut
wire-draw
wire-drawer
wire-drawn
wire-edged
wire-feed
wire-feeding
wire-flattening
wire-galvanizing
wire-gauge
wire-grass
wire-guarded
wire-haired
wire-haired pointing griffon
wire-haired terrier
wire-hung
wire-insulating
wire-measuring
wire-mended
wire-netted
wire-pointing
wire-pull
wire-puller
wire-pulling
wire-record
wire-rolling
wire-safed
wire-sewed
wire-sewn
wire-shafted
wire-spun
wire-stitched
wire-straightening
wire-stranding
wire-stretching
wire-stringed
wire-strung
wire-tailed
wire-testing
wire-tightening
wire-tinning
wire-toothed

wire-wheeled
wire-winding
wire-worker
wire-wound
wire-wound
resistor
wire-wove
wire-woven
wired glass
wired radio
wired television
wired wireless
wirehaired pointing griffon
wirehaired terrier
wireless apparatus
wireless beacon
wireless circuit
wireless communication
wireless compass
wireless operator
wireless set
wireless telegraph
wireless telegrapher
wireless telegraphist
wireless telegraphy
wireless telephone
wireless telephony
wirewound resistor
wiring die
wiring machine
wiring press
wiring punch
wiry-brown
wiry-coated
wiry-haired
wiry-leaved
wiry-looking
wiry-stemmed
wiry-voiced
wisdom literature
wisdom tooth
wisdom-bred
wisdom-given
wisdom-giving
wisdom-led
wisdom-loving
wisdom-seasoned
wisdom-seeking

wisdom-teaching
wisdom-working
wise
 as Solomon
wise as a serpent
wise as an owl
wise beyond your years
wise crack
wise expression
wise fool
wise guy
wise in the ways of the world
wise in your generation
wise in your own conceit
wise man
wise man of Chelm
wise man of Gotham
wise old man
wise passiveness
wise saying
wise to
wise up
wise up to
wise-ass
wise-bold
wise-framed
wise-hardy
wise-headed
wise-heart
wise-judging
wise-lipped
wise-reflecting
wise-said
wise-spoken
wise-valiant
wise-worded
wiser head
wish for
wish fulfillment
wish fulfilment
wish on
wish to
wish to goodness
wish upon
wish very much
wish well
wish you joy
wish you luck

wish-bringer
wish-fulfilling
wish-fulfillment
wish-fulfillment fantasy
wish-giver
wish-maiden
wish-wash
wish-washy
wishbone bush
wishbone gaff
wishbone rig
wished-for
wishful belief
wishful thinker
wishful thinking
wishing bone
wishing cap
wishing stone
wishing well
wishy-washily
wishy-washiness
wishy-washy
wisp of smoke
wisteria blue
wisteria violet
wistful eye
wistful-eyed
wit
 tooth
wit's end
wit-abused
wit-assailing
wit-beaten
wit-cherishing
wit-crack
wit-cracker
wit-drawn
wit-foundered
wit-fraught
wit-gracing
wit-infusing
wit-loving
wit-masked
wit-offended
wit-oppressing
wit-pointed
wit-salted
wit-snapper

wit-starved
wit-stung
wit-worn
witch alder
witch baiter
witch baiting
witch ball
witch bird
witch broom
witch burner
witch burning
witch butter
witch cake
witch chick
witch doctor
witch doctoring
witch doctory
witch doctress
witch fire
witch flounder
witch for water
witch gowan
witch grass
witch hazel
witch hobble
witch hopple
witch hunt
witch hunter
witch knot
witch light
witch lock
witch mania
witch mark
witch master
witch meal
witch moth
witch of Agnesi
witch of Endor
witch sabbath
witch stick
witch stitch
witch tree
witch's mark
witch-charmed
witch-doctor
witch-elm
witch-finder
witch-finding

witch-hazel family
witch-held
witch-hunt
witch-hunter
witch-hunting
witch-ridden
witch-stricken
witch-struck
witch-woman
witches' Sabbath
witches'
chorus
witches' coven
witches' meeting
witches' sabbath
witches'-besom
witches'-broom
witchetty grub
witching hour
witching hour of the night
witching stick
with a bad grace
with a bellyful
with a bump for
with a catch to it
with a cheerful heart
with a clear conscience
with a collar on
with a difference
with a firm hand
with a flair
with a free hand
with a good grace
with a grain of salt
with a guilty conscience
with a handful of thumbs
with a head on
with a heavy hand
with a heavy heart
with a high hand
with a joker to it
with a kick
with a kicker to it
with a liking for
with a long face
with a loud voice
with a memory like a sieve
with a mind like a sieve

with a new to
with a nose for
with a poker face
with a reservation
with a right to
with a rush
with a skinful
with a sneer
with a snootful
with a sparing hand
with a stiff neck
with a straight face
with a string to it
with a strong hand
with a tight hand
with a touch of genius
with a vengeance
with a view to
with a weather eye open
with
 a whole skin
with a whoop and a hurrah
with a will
with a yellow streak
with abandon
with advantage
with affection
with agonizing slowness
with alacrity
with all due respect for
with all due respect to
with all haste
with all my heart
with all respect
with all speed
with all your heart
with all your love
with all your might
with an ear for
with an ear for music
with an exception
with an eye for
with an eye to
with an ill grace
with an interval
with an iron hand
with an unsparing hand
with arms akimbo

with attention
with authority
with bad grace
with bad intent
with bated breath
with bats in the belfry
with beat of drum
with beating heart
with bedroom eyes
with bells on
with both eyes closed
with both feet on the ground
with both hands
with breathless expectation
with brimming eyes
with care
with caution
with chattering teeth
with child
with clarity
with clean hands
with confidence
with constancy
with consummate skill
with contempt
with crossed bayonets
with crow's feet
with crystal
clarity
with curling lip
with deliberation
with difficulty
with dignity
with dispatch
with distinction
with downcast eyes
with dragging feet
with dry eyes
with due deference
with due respect
with ears pricked up
with ears strained
with ease
with effort
with elan
with emphasis
with enough of
with enthusiasm

with everything against one
with everything against you
with everything that is in one
with everything that is in you
with exactitude
with eyes strained
with eyes suffused
with faith
with faltering steps
with fear and trembling
with feeling
with finesse
with flourish of trumpet
with flying colors
with folded hands
with foresight
with forethought
with full intent
with gaping mouth
with genius
with giant strides
with glistening eyes
with good cheer
with good faith
with good grace
with good right
with good will
with great care
with great haste
with great nicety
with gusto
with half a mind to
with halting steps
with haste
with head erect
with head held high
with heart beating high
with
heart going pitapat
with heart going pitter-patter
with heart in mouth
with honor
with impunity
with indifference
with intent
with intent to deceive
with interest
with intervals

with it
with joined hands
with leaping heart
with life and spirit
with love
with low resistance
with malice aforethought
with malice prepense
with many a flirt and flutter
with many others
with might and main
with much ado
with muscles tense
with news value
with no heart
with no nonsense
with no stomach
with no time to spare
with nose in air
with nose turned up
with nothing inside
with nothing on
with one accord
with one another
with one consent
with one foot in the grave
with one voice
with one wild yell
with open arms
with open eyes
with open hands
with over-measure
with overflowing eyes
with pep
with permission
with pleasure
with precision
with premeditation
with pride
with purpose
with qualifications
with rapid strides
with rapt attention
with reason
with reference to
with regard to
with relation to
with

relish
with reservations
with resignation
with respect to
with right good will
with safety
with sails spread
with satisfaction
with set jaw
with skill
with some allowance
with speed
with steerageway
with sullen mouth
with swimming eyes
with taste
with tearful eyes
with tears in eyes
with tears in your eyes
with telling effect
with that
with the Lord
with the addition of
with the assistance of
with the beat
with the best
with the exception of
with the exception that
with the help of
with the intent that
with the lark
with the saints
with the speed of light
with the stipulation
with the strong arm
with the sun
with the understanding
with the view of
with the wind
with the wind abaft the beam
with the wind aft
with this
with this proviso
with time to spare
with tongue in cheek
with total dedication
with truth
with undivided attention

with us
with utter indifference
with verve
with vim
with voice
with voice and vote
with vote
with watery eyes
with way on
with wind abeam
with young
with your
 back to the wall
with your eyes open
with your eyes peeled
with your family
with your fill of
with your head in the clouds
with your own petard
with your permission
with your tail between your legs
with your tongue in your cheek
with zest
with zip
with-
with-drawn
with-it
withdraw from
withdraw from the field
withdraw the charge
withdraw your support
withdrawal of attention
withdrawal sickness
withdrawal symptom
withdrawal symptoms
withdrawing room
withe rod
wither away
wither-wrung
withered loins
withhold assent
withholding tax
within a stone's throw
within a styour throw
within a whoop and a holler
within an ace of
within an inch
within an inch of

within bounds
within call
within compass
within earreach
within earshot
within hail
within hearing
within means
within range
within range of
within reach
within reason
within reasonable limitations
within sight
within the bounds of possibility
within the bounds of reason
within the domain of possibility
within the frame of reference
within
 the framework
within the law
within the limits of reason
within the range of possibility
within the realm of possibility
within the reference system
within the scope of the law
within the universe of discourse
within these four walls
within two whoops and a holler
within your grasp
within-bound
within-door
within-named
without a break
without a change of menu
without a change of pace
without a change of scenery
without a clue
without a dissenting voice
without a minute to spare
without a name
without a nerve in your body
without a shadow of turning
without a sou
without a stitch
without a stitch on
without a stitch to one's name
without a stitch to your back

without a stitch to your name
without a tremor
without a will of your own
without any qualms
without any scruples
without any weight
without appeal
without basis
without being
without benefit of clergy
without body
without book
without bottom
without bound
without break
without care
without cease
without ceasing
without ceremony
without
charge
without choice
without coercion
without compulsion
without compunction
without connection
without content
without contradiction
without date
without delay
without demur
without design
without difference
without difficulty
without distinction
without distraction
without door
without doors
without doubt
without end
without equal
without equivocation
without exception
without fail
without faith
without fear of contradiction
without fear or favor
without foundation

without further delay
without grounds
without hesitation
without hope
without intermission
without intimidation
without issue
without letup
without life
without limit
without looking back
without measure
without mercy
without nerves
without notice
without number
without omission
without parallel
without prejudice
without premeditation
without pressure
without price
without reason
without reference
without regard
without regard to
without regard to persons
without regret
without reluctance
without remorse
without reproach
without
reserve
without respect to
without respect to persons
without restraint
without rhyme or reason
without shame
without sound basis
without stint
without stopping
without striking a blow
without strings
without success
without suspicion
without term
without the least delay
without the least doubt

without turning a hair
without unspotted
without vital functions
without warning
without wasting words
without willing
withy-bound
withy-woody
witloof chicory
witness box
witness corner
witness mark
witness stand
witness-box
witney nap
witty reply
witty retort
witty-brained
witty-conceited
witty-feigned
witty-pated
witty-pretty
witty-worded
wizard-woven
wizen-faced
wizen-hearted
woad vat
woad-leaved
woad-painted
wobble board
wobble pump
wobble saw
wobbling disk
woe is me
woe-begetting
woe-begone
woe-beseen
woe-bested
woe-betrothed
woe-boding
woe-dejected
woe-delighted
woe-denouncing
woe-destined
woe-embroidered
woe-enwrapped
woe-exhausted
woe-foreboding

woe-fraught
woe-grim
woe-humbled
woe-illumed
woe-infirmed
woe-laden
woe-maddened
woe-revolving
woe-scorning
woe-sprung
woe-stricken
woe-struck
woe-surcharged
woe-threatened
woe-tied
woe-wearied
woe-weary
woe-wedded
woe-whelmed
woe-wrinkled
woeful-wan
wold
mouse
wolf at the door
wolf call
wolf cub
wolf dog
wolf down
wolf eel
wolf fish
wolf fruit
wolf grape
wolf herring
wolf in sheep's clothing
wolf in the stomach
wolf madness
wolf moth
wolf note
wolf pack
wolf snake
wolf spider
wolf tooth
wolf tree
wolf willow
wolf's-bane
wolf's-head
wolf-begotten
wolf-boy

wolf-child
wolf-children
wolf-colored
wolf-dog
wolf-eel
wolf-eyed
wolf-gray
wolf-haunted
wolf-headed
wolf-hound
wolf-hunting
wolf-man
wolf-moved
wolf-scaring
wolf-shaped
wolf-slaying
wolf-suckled
wolffian body
wolfram lamp
wolfram ocher
wolfram steel
woman chaser
woman child
woman movement
woman of easy virtue
woman of her word
woman of honor
woman of the house
woman of the street
woman of the streets
woman of the town
woman of the world
woman suffrage
woman's
editor
woman's intuition
woman's rights
woman-bearing
woman-born
woman-bred
woman-built
woman-child
woman-churching
woman-conquered
woman-daunted
woman-degrading
woman-despising
woman-easy

woman-faced
woman-fair
woman-fashion
woman-flogging
woman-governed
woman-grown
woman-hater
woman-hating
woman-headed
woman-loving
woman-mad
woman-made
woman-man
woman-murdering
woman-proud
woman-ridden
woman-servant
woman-shy
woman-suffrage
woman-suffragist
woman-tended
woman-vested
woman-wary
womb-enclosed
womb-lodged
womb-to-tomb security
women's clothing
women's hairdos
women's lib
women's libber
women's liberation
women's liberation activist
women's liberation adherent
women's liberation advocate
women's liberation movement
women's liberationist
women's magazine
women's rightist
women's rights
women's room
women's suffrage
womens' chorus
won ton
won ton soup
wonder about
wonder drug
wonder drugs
wonder whether

wonder-beaming
wonder-bearing
wonder-charmed
wonder-dumb
wonder-exciting
wonder-fed
wonder-hiding
wonder-loving
wonder-mocking
wonder-promising
wonder-raising
wonder-seeking
wonder-sharing
wonder-smit
wonder-smitten
wonder-stirring
wonder-stricken
wonder-striking
wonder-struck
wonder-teeming
wonder-waiting
wonder-work
wonder-worker
wonder-working
wonder-wounded
wonder-writing
wonderful
thing
wonders of the world
wondrous strange
wonga-wonga
wont-believer
wont-learn
wont-wait
wont-work
wood acid
wood alcohol
wood almond
wood anemone
wood ant
wood apple
wood aster
wood avens
wood awl
wood baboon
wood barker
wood bass
wood bedstraw

wood bender
wood betony
wood bison
wood block
wood boiler
wood borer
wood broom
wood brown
wood buffalo
wood bundle
wood calamint
wood calker
wood carpet
wood carver
wood carving
wood cell
wood cement
wood checker
wood chess
wood chopper
wood clamp
wood cleaner
wood cleaver
wood cloth
wood coal
wood coker
wood collier
wood copper
wood corn
wood cudweed
wood culver
wood daffodil
wood distiller
wood dove
wood draftsman
wood drake
wood drawing
wood
dresser
wood driller
wood duck
wood duster
wood dyer
wood enameler
wood engraver
wood engraving
wood evil
wood facer

wood fagoter
wood feller
wood fern
wood fiber
wood file
wood filler
wood finisher
wood flour
wood flower
wood fretter
wood fringe
wood frog
wood gas
wood gatherer
wood germander
wood grass
wood groundsel
wood grouse
wood grower
wood grubber
wood gum
wood hair grass
wood hen
wood hewer
wood honey
wood hoopoe
wood hyacinth
wood ibis
wood instrument
wood ipecac
wood keeper
wood kingfisher
wood laborer
wood lark
wood laurel
wood leopard
wood leopard moth
wood lily
wood loader
wood lock
wood lot
wood louse
wood machine
wood machinist
wood meadow grass
wood meal
wood measurer
wood milling machine

wood mite
wood model
wood molder
wood mouse
wood naphtha
wood nettle
wood nightshade
wood nut
wood nymph
wood offering
wood oil
wood oil tree
wood opal
wood owl
wood packing
wood painting
wood paper
wood parenchyma
wood partridge
wood pavior
wood pea
wood peat
wood pegger
wood pennyroyal
wood
pewee
wood pie
wood pigeon
wood pimpernel
wood pitch
wood planer
wood plant
wood polisher
wood port
wood pulp
wood pussy
wood quail
wood quartet
wood quintet
wood rabbit
wood range
wood rat
wood ray
wood reed
wood reed grass
wood render
wood robin
wood rose

wood rosin
wood rot
wood rush
wood sage
wood sandpiper
wood saw
wood sawyer
wood scale
wood screw
wood sheldrake
wood shock
wood shrike
wood slave
wood snail
wood snipe
wood sorrel
wood spack
wood spear grass
wood spirit
wood splitter
wood spurge
wood stain
wood stainer
wood stamp
wood star
wood stork
wood stove
wood strawberry
wood sugar
wood swallow
wood tapper
wood tar
wood tenoner
wood terrapin
wood thrush
wood tick
wood tin
wood titmouse
wood tortoise
wood trimmer
wood turner
wood turning
wood turpentine
wood vetch
wood vetchling
wood vine
wood vinegar
wood violet

wood warbler
wood wasp
wood widgeon
wood willower
wood wind
wood wool
wood wren
wood-and-water joey
wood-apple gum
wood-block
wood-block printing
wood-boring
wood-born
wood-bred
wood-built
wood-carver
wood-cased
wood-crowned
wood-cutter
wood-dried
wood-dwelling
wood-eating
wood-embosomed
wood-embossing
wood-encumbered
wood-faced
wood-fibered
wood-fringed
wood-girt
wood-hen
wood-hewing
wood-hooped
wood-kern
wood-keyed
wood-lined
wood-louse
wood-mat
wood-nep
wood-note
wood-nymph
wood-oil-tree
family
wood-paneled
wood-paved
wood-pigeon
wood-planing
wood-queest
wood-quest

wood-ray parenchyma
wood-rip
wood-roofed
wood-sear
wood-sheathed
wood-skirted
wood-sorrel family
wood-sour
wood-spirit
wood-stock
wood-swallow
wood-tar pitch
wood-turning
wood-turning lathe
wood-walled
wood-wind instrument
wood-wind quartet
wood-wind quintet
woodbine green
woodbine-clad
woodbine-covered
woodbine-wrought
woodchat shrike
woodchuck day
woodcock owl
woodcock pilot
woodcock shell
woodcock snipe
woodcock soil
wooden Indian
wooden basket
wooden horse
wooden indian
wooden kimono
wooden nickel
wooden overcoat
wooden shoe
wooden shoes
wooden spoon
wooden spoonist
wooden
tongue
wooden wedge
wooden-barred
wooden-bottom
wooden-faced
wooden-featured
wooden-headed

wooden-headedness
wooden-hooped
wooden-hulled
wooden-legged
wooden-lined
wooden-pinned
wooden-posted
wooden-seated
wooden-shoed
wooden-sided
wooden-soled
wooden-tined
wooden-walled
wooden-wheeled
woodgate rust
woodland brown
woodland caribou
woodland goldenrod
woodland primrose
woodland star
woodland sunflower
woods and fields
woods colt
woods cranberry
woods phlox
woods run
woodwind choir
woodwind instrument
woodwind quartet
woodwind section
woodworking chisel
woodworking lathe
woody nightshade
woody-stemmed
wooer-bab
wool breaker
wool burler
wool card
wool carder
wool carding
wool classer
wool classing
wool clip
wool comb
wool comber
wool combing
wool crepe
wool driver

wool extract
wool extractor
wool fast dye
wool fat
wool feeder
wool fell
wool fiber
wool former
wool grade
wool grader
wool grading
wool grass
wool grease
wool green
wool hall
wool hardener
wool mill
wool moth
wool needle
wool
oil
wool oiler
wool packer
wool powder
wool sampler
wool scour
wool spinner
wool spinning
wool sponge
wool staple
wool stapler
wool stripper
wool table
wool thistle
wool tree
wool waste
wool wax
wool-backed
wool-bearing
wool-bundling
wool-burring
wool-cleaning
wool-clipper
wool-coming
wool-drying
wool-dyed
wool-eating
wool-flock

wool-fringed
wool-gather
wool-gathering
wool-growing
wool-hetchel
wool-laden
wool-lined
wool-oerburdened
wool-pack
wool-packing
wool-pated
wool-picking
wool-producing
wool-rearing
wool-sorter's disease
wool-staple
wool-stapling
wool-white
wool-witted
wool-woofed
wool-work
woolen draper
woolen drapery
woolen mill
woolen-clad
woolen-frocked
woolen-stockinged
woollen-draper
woolly aphid
woolly bear
woolly beard grass
woolly foot
woolly mammoth
woolly manzanita
woolly worm
woolly-butted
woolly-coated
woolly-haired
woolly-haried
woolly-head
woolly-headed
woolly-headedness
woolly-leaved
woolly-looking
woolly-minded
woolly-mindedness
woolly-pated
woolly-podded

woolly-tailed
woolly-white
woolly-witted
woolsorter's
 disease
woolsorters' disease
wooly-headed
wootz steel
worcester china
worcester porcelain
worcestershire sauce
word accent
word arrangement
word association
word association test
word blindness
word boundary
word by word
word class
word contest
word deafness
word for word
word form
word game
word history
word hoard
word in the ear
word letter
word list
word lore
word method
word music
word musician
word of advice
word of command
word of explanation
word of honor
word of mouth
word order
word painter
word painting
word picture
word processing
word processor
word salad
word sign
word square
word stress

word study
word symbol
word time
word to the wise
word value
word-beat
word-blind
word-book
word-bound
word-breaking
word-catcher
word-catching
word-charged
word-clad
word-coiner
word-compelling
word-conjuring
word-deaf
word-dearthing
word-driven
word-for-word
word-for-word translation
word-formation
word-group
word-hoard
word-jobber
word-juggling
word-keeping
word-lore
word-of
word-of-mouth
word-of-mouth
evidence
word-of-mouth success
word-paint
word-painting
word-perfect
word-pity
word-seller
word-selling
word-slinger
word-slinging
word-splitting
word-stock
word-wounded
words in their best order
words of wisdom
work a change

work a cure
work against
work against time
work as
work as a team
work at
work away
work back
work basket
work both sides of the street
work camp
work clothes
work cure
work curve
work day and night
work double hours
work double tides
work evil
work farm
work for
work for wages
work force
work function
work hard
work horse
work in
work into
work late
work lead
work like a Trojan
work like a cart horse
work like a coal heaver
work like a dog
work like a galley slave
work like a horse
work like a horse to
work like a machine
work like a slave
work load
work of Penelope
work of a master
work of a past master
work of an artist
work of art
work of fiction
work of reference
work off
work on

work out
work out
a deal
work out beforehand
work over
work overtime
work release
work roller
work school
work sheet
work shift
work shoe
work shoes
work site
work socks
work song
work space
work spreading
work stock
work stone
work stoppage
work ticket
work to windward
work to your advantage
work to your will
work together
work toward
work train
work under pressure
work up
work up into a lather
work up into a passion
work up to
work upon
work week
work well
work wonders
work your fingers to the bone
work your head off
work your head to the bone
work your shift
work your way
work your way up
work yourself into a lather
work yourself into a stew
work yourself into a sweat
work yourself up
work-and-tumble

work-and-turn
work-and-twist
work-and-whirl
work-day
work-harden
work-hardened
work-hour
work-master
work-producing
work-seeking
work-shy
work-shyness
work-stained
work-stopper
work-study
work-study-play plan
work-study-play school
work-up
work-wan
work-weary
work-worn
worked out
worked up
worked up into
 a lather
worked-up
worker cell
worker comb
worker major
worker minor
worker of evil
worker of ill
worker-correspondent
worker-guard
worker-priest
workhouse sheeting
workhouse test
working asset
working beam
working capital
working card
working class
working day
working dog
working drawing
working face
working fit
working fluid

working force
working gauge
working girl
working hypothesis
working into a lather
working jib
working line
working load
working on
working order
working out a deal
working papers
working party
working pattern
working people
working person
working pit
working plan
working point
working principle
working proposition
working rail
working rod
working rule
working space
working stiff
working strength
working stress
working substance
working toward
working tube
working up
working week
working-capital fund
working-class
working-day
working-man
working-out
workings of the mind
workmen's compensation
workmen's compensation insurance
works committee
works council
works
 manager
works, the
world ash
world at large

world belt
world beyond the grave
world champion
world communion sunday
world concept
world day of prayer
world economy
world federalism
world federalist
world government
world ground
world island
world language
world line
world myth
world of fashion
world of finance
world of good
world of the dead
world point
world politics
world pound
world power
world premiere
world principle
world process
world series
world soul
world speech
world spirit
world state
world to come
world travel
world tree
world view
world war
world without end
world's oldest profession
world-abhorring
world-abiding
world-abstracted
world-accepted
world-acknowledged
world-adored
world-adorning
world-advancing
world-advertised
world-affecting

world-agitating
world-alarming
world-altering
world-amazing
world-amusing
world-animating
world-anticipated
world-applauded
world-appreciated
world-apprehended
world-approved
world-argued
world-arousing
world-arresting
world-assuring
world-astonishing
world-authorized
world-awed
world-barred
world-beater
world-beating
world-beheld
world-beloved
world-beset
world-borne
world-bound
world-braving
world-broken
world-bruised
world-building
world-burdened
world-busied
world-canvassed
world-captivating
world-celebrated
world-censored
world-censured
world-challenging
world-changing
world-charming
world-cheering
world-choking
world-chosen
world-circling
world-circulated
world-civilizing
world-classifying
world-cleansing

world-comforting
world-commanding
world-commended
world-compassing
world-compelling
world-condemned
world-confounding
world-connecting
world-conquering
world-conscious
world-consciousness
world-constituted
world-consuming
world-contemning
world-contracting
world-contrasting
world-controlling
world-converting
world-copied
world-corrupted
world-corrupting
world-covering
world-creating
world-credited
world-crippling
world-crowding
world-crushed
world-deaf
world-debated
world-deceiving
world-deep
world-defying
world-delighting
world-delivering
world-demanded
world-denying
world-depleting
world-depressing
world-describing
world-deserting
world-desired
world-desolation
world-despising
world-destroying
world-detached
world-detesting
world-devouring
world-diminishing

world-directing
world-disappointing
world-discovering
world-discussed
world-disgracing
world-dissolving
world-distributed
world-disturbing
world-divided
world-dividing
world-dominating
world-dreaded
world-dwelling
world-echoed
world-educating
world-embracing
world-eminent
world-encircling
world-ending
world-enlarging
world-enlightening
world-entangled
world-enveloping
world-envied
world-esteemed
world-excelling
world-exciting
world-famed
world-familiar
world-famous
world-favored
world-fearing
world-felt
world-forgetting
world-forgotten
world-forming
world-forsaken
world-forsaking
world-fretted
world-girdling
world-gladdening
world-governing
world-grasping
world-great
world-grieving
world-hailed
world-hardened
world-hating

world-heating
world-helping
world-honored
world-horrifying
world-humiliating
world-imagining
world-improving
world-infected
world-informing
world-involving
world-jaded
world-jeweled
world-joining
world-kindling
world-knowing
world-known
world-lamented
world-lasting
world-leading
world-leveling
world-lighting
world-line
world-linking
world-long
world-loving
world-mad
world-made
world-marked
world-mastering
world-melting
world-menacing
world-missed
world-mocking
world-mourned
world-moving
world-naming
world-needed
world-neglected
world-nigh
world-noised
world-noted
world-obligating
world-observed
world-occupying
world-offending
world-old
world-opposing
world-oppressing

world-ordering
world-organizing
world-outraging
world-overcoming
world-overthrowing
world-owned
world-paralyzing
world-pardoned
world-patriotic
world-peopling
world-perfecting
world-pestering
world-picked
world-pitied
world-plaguing
world-pleasing
world-poisoned
world-pondered
world-populating
world-portioning
world-possessing
world-power
world-practiced
world-preserving
world-prevalent
world-prized
world-producing
world-prohibited
world-protected
world-raising
world-rare
world-read
world-recognized
world-record
holder
world-redeeming
world-reflected
world-regulating
world-rejected
world-rejoicing
world-relieving
world-remembered
world-renewing
world-renowned
world-resented
world-respected
world-restoring
world-revealing

world-reviving
world-revolving
world-ridden
world-round
world-rousing
world-roving
world-ruling
world-sacred
world-sacrificing
world-sanctioned
world-sated
world-saving
world-scarce
world-scattered
world-schooled
world-scorning
world-seasoned
world-self
world-serving
world-settling
world-shaking
world-sharing
world-shocking
world-sick
world-simplifying
world-sized
world-slandered
world-sobered
world-soiled
world-spoiled
world-spread
world-stained
world-startling
world-staying
world-stirring
world-strange
world-studded
world-subduing
world-sufficing
world-supplying
world-supporting
world-surrounding
world-surveying
world-sustaining
world-swallowing
world-taking
world-taming
world-taught

world-tempted
world-tested
world-thrilling
world-tired
world-tolerated
world-tossing
world-traveler
world-troubling
world-turning
world-uniting
world-used
world-valid
world-valued
world-venerated
world-view
world-waited
world-wandering
world-wanted
world-wasting
world-watched
world-wearied
world-wearily
world-weariness
world-weary
world-welcome
world-wept
world-wide
world-widely
world-wideness
world-winning
world-wise
world-without-end
world-witnessed
world-worn
world-wrecking
worldly
minded
worldly wisdom
worldly-minded
worldly-mindedly
worldly-mindedness
worldly-wise
worlds apart
worlds of
worlds-high
worm abscess
worm along
worm aneurysm

worm bark
worm brood
worm burrow
worm capsule
worm cast
worm conveyer
worm disease
worm drive
worm fence
worm fever
worm gear
worm gearing
worm grass
worm gut
worm in
worm in the apple
worm in the rose
worm lizard
worm medicine
worm moss
worm oil
worm out
worm out
of
worm powder
worm punch
worm shell
worm snake
worm tea
worm thread
worm tincture
worm tube
worm wheel
worm wire
worm your way
worm yourself in
worm yourself into
worm's eye view
worm-breeding
worm-cankered
worm-consumed
worm-destroying
worm-driven
worm-eat
worm-eaten
worm-eatenness
worm-eater
worm-eating

worm-gear elevator
worm-geared
worm-gnawed
worm-gnawn
worm-killing
worm-nest
worm-pierced
worm-resembling
worm-reserved
worm-riddled
worm-ripe
worm-shaped
worm-spun
worm-tongued
worm-wheel
worm-wheel hob thread
worm-worn
worm-wrought
wormseed mustard
wormseed oil
wormwood oil
wormwood sage
worn away
worn clothes
worn down
worn out
worn ragged
worn thin
worn to a frazzle
worn to a shadow
worn to rags
worn to the bone
worn to the bones
worn to the stump
worn to threads
worn-down
worn-out
worn-outness
worried sick
worried stiff
worried to a frazzle
worries and cares
worry along
worry beads
worry shoe
worry your head about
worry yourself
worry yourself sick

worry-carl
worse and worse
worse
off
worse-affected
worse-applied
worse-bodied
worse-born
worse-bred
worse-calculated
worse-conditioned
worse-disposed
worse-dispositioned
worse-executed
worse-faring
worse-governed
worse-handled
worse-informed
worse-lighted
worse-mannered
worse-mated
worse-named
worse-natured
worse-opinionated
worse-ordered
worse-paid
worse-performed
worse-printed
worse-rated
worse-ruled
worse-satisfied
worse-served
worse-spent
worse-succeeding
worse-taught
worse-tempered
worse-thoughted
worse-timed
worse-treated
worse-typed
worse-utilized
worse-wanted
worse-wrought
worship great store by
worship idols
worship mammon
worship the golden calf
worship the ground you walk on

worship-paying
worst-affected
worst-bred
worst-cast
worst-damaged
worst-deserving
worst-disposed
worst-fashioned
worst-formed
worst-governed
worst-informed
worst-managed
worst-manned
worst-paid
worst-printed
worst-ruled
worst-served
worst-taught
worst-timed
worst-treated
worst-used
worst-wanted
worsted-stocking knave
worth a great
deal
worth a king's ransom
worth a pretty penny
worth having
worth its weight in gold
worth the money
worth your salt
worth your while
worth-while
worth-whileness
worthless as tits on a boar
worthless fellow
worthy of
worthy of faith
wot not of
wot of
wou-wou
would as leave
would as lief
would as lief as not
would be glad of
would fain do
would fain have
would rather not

would-be
would-be gentleman
would-have-been
wound chevron
wound cork
wound fever
wound fungus
wound gall
wound parasite
wound rocket
wound shock
wound string
wound to the quick
wound up
wound-dressing
wound-fevered
wound-free
wound-inflicting
wound-marked
wound-plowed
wound-producing
wound-scarred
wound-secreted
wound-up
wound-worn
wounded pride
wounds immedicable
wove paper
woven-wire
wow-wow
wowie zowie
wr-
wrack and ruin
wrack grass
wrack the nerves
wrack up
wracked with age
wrangle over
wrap about
wrap around
wrap up
wrap yourself in
wrap-
wrap-around
wrap-rascal
wrap-round
wrap-up
wrapped in

wrapped in clouds
wrapped
 in mystery
wrapped in thought
wrapped in wonder
wrapped up
wrapped up in
wrapped up in yourself
wrapping paper
wrapping-gown
wrath-allaying
wrath-bewildered
wrath-consumed
wrath-faced
wrath-kindled
wrath-kindling
wrath-provoking
wrath-swollen
wrath-wreaking
wrathful-eyed
wreak havoc
wreak havoc on
wreak your vengeance
wreath goldenrod
wreath shell
wreath-crowned
wreath-drifted
wreath-festooned
wreath-wrought
wreathe around
wreathed column
wreck buoy
wreck gun
wreck master
wreck of your former self
wreck-bestrewn
wreck-causing
wreck-devoted
wreck-free
wreck-raising
wreck-strewn
wreck-threatening
wrecking bar
wrecking car
wrecking crane
wrecking frog
wrecking pump
wren babbler

wren tit
wren warbler
wren-thrush
wren-tit
wrench fit
wrench forger
wrench from
wrench hammer
wrench head
wrest block
wrest from
wrest out
wrest pin
wrest plank
wresting out
wrestle with
wrestling hold
wrestling match
wrestling meet
wrestling ring
wrestling school
wretched lot
wretched of the earth
wretched-fated
wretched-looking
wretched-witched
wriggle
 out of
wriggle yourself into
wring from
wring out
wring the heart
wring your hands
wringer washer
wringing fit
wringing machine
wringing wet
wringing-wet
wrinkle-coated
wrinkle-faced
wrinkle-fronted
wrinkle-furrowed
wrinkle-making
wrinkle-scaled
wrinkled like a prune
wrinkled-browed
wrinkled-cheeked
wrinkled-leaved

wrinkled-old
wrinkled-shelled
wrinkled-visaged
wrist clonus
wrist drop
wrist joint
wrist pin
wrist plate
wrist shot
wrist watch
wrist-drop
writ of assistance
writ of certiorari
writ of election
writ of error
writ of execution
writ of extent
writ of habeas corpus
writ of privilege
writ of prohibition
writ of protection
writ of right
writ of summons
write a letter
write between the lines
write destination
write down
write home about
write in
write in prose
write into your will
write off
write out
write poetry
write prose
write to
write up
write up a report
write upon
write your own ticket
write yourself a man
write-down
write-in
write-in
campaign
write-in vote
write-off
write-up

writer to the signet
writer's block
writer's cramp
writer's itch
writer's palsy
writer's spasm
writer-in-residence
writing board
writing brush
writing cabinet
writing case
writing desk
writing exercise
writing expert
writing fluid
writing frame
writing ink
writing lesson
writing machine
writing machines
writing master
writing material
writing materials
writing on the wall
writing pad
writing paper
writing reed
writing room
writing set
writing stamps
writing style
writing system
writing systems
writing table
writing tablet
writing telegraph
writing-table
writining paper
written character
written communication
written constitution
written down
written examination
written hand
written language
written law
written matter
written music

wrong conduct
wrong construction
wrong font
wrong foot
wrong fount
wrong impression
wrong linking
wrong move
wrong name
wrong number
wrong side
wrong side of your face
wrong side out
wrong step
wrong time
wrong
use
wrong-directed
wrong-doer
wrong-ended
wrong-endedness
wrong-feigned
wrong-foot
wrong-gotten
wrong-grounded
wrong-headed
wrong-headedly
wrong-headedness
wrong-jawed
wrong-minded
wrong-mindedly
wrong-mindedness
wrong-ordered
wrong-principled
wrong-screwed
wrong-thinking
wrong-timed
wrong-voting
wrong-way
wrong-way around
wroth money
wroth penny
wroth silver
wrought iron
wrought iron casting
wrought out
wrought up
wrought up by

wrought-iron
wrought-up
wry face
wry mouth
wry-armed
wry-billed
wry-blown
wry-eyed
wry-faced
wry-formed
wry-guided
wry-legged
wry-looked
wry-mouthed
wry-necked
wry-neckedness
wry-nosed
wry-set
wry-tailed
wry-toothed
wu-su
wu-wei
wung-out
wych elm
wych-elm
wych-hazel
wye level
x chromosome
x height
x in
x number
x out
x ray
x rays
x-axis
x-disease
x-ed
x-height
x-high
x-ing
x-line
x-out
x-radiation
x-ray
x-ray astronomy
x-ray crystallography
x-ray photograph
x-ray photography

x-ray star
x-ray therapy
x-ray tube
x-shaped
x-stretcher
x-unit
xanth-
xanthd-
xanthene
 dye
xanthic acid
xantho-
xanthoproteic acid
xaverian brother
xen-
xenic acid
xeno-
xenon hexafluoride
xenon tetrafluoride
xer-
xero-
xeroderma pigmentosum
xi-particle
xiphi-
xiphoid process
xyl-
xylem parenchyma
xylem ray
xylene blue
xylic acid
xylite oil
xylo-
xyloglyphic artist
xylonic acid
y chromosome
y tile
y-
y-axes
y-axis
y-bake
y-blend
y-blennies
y-blenny
y-blent
y-cast
y-clept
y-end
y-painted

y-pointing
y-rapt
y-scalded
y-ssed
y-warn
ya-ta-ta
yaba bark
yacca gum
yacht berth
yacht builder
yacht chair
yacht club
yacht decorator
yacht designer
yacht engineer
yacht ensign
yacht gear
yacht propeller
yacht race
yacht racing
yacht rigging
yacht rope
yacht squadron
yacht-built
yachtman's anchor
yackety-yack
yackety-yak
yackety-yakked
yackety-yakking
yak-yak
yakety-yak
yakety-yakked
yakety-yakking
yakity-yak
yakkety-yak
yam bean
yam family
yam potato
yam stick
yam tree
yam-root
yammer yawp
yang-kin
yankee-doodle
yap at
yapp binding
yard boy
yard cleaner

yard donkey
yard engineer
yard
foreman
yard goods
yard grass
yard inspector
yard laborer
yard locomotive
yard lumber
yard of ale
yard porter
yard regulator
yard rope
yard rush
yard scavenger
yard signalman
yard slings
yard sweeper
yard tackle
yard trader
yard up
yard-arm
yard-broad
yard-deep
yard-long
yard-long bean
yard-measure
yard-of-ale
yard-square
yard-thick
yard-wand
yard-wide
yardarm to yardarm
yarding engine
yarn baller
yarn bleacher
yarn boiler
yarn buncher
yarn bundler
yarn carrier
yarn conditioner
yarn croft
yarn dresser
yarn dryer
yarn dyer
yarn finisher
yarn inspector

yarn packer
yarn printer
yarn reel
yarn reeler
yarn remover
yarn sizer
yarn sorter
yarn spinner
yarn spinning
yarn spreader
yarn stretcher
yarn stripper
yarn tester
yarn twister
yarn warper
yarn washer
yarn waste
yarn weigher
yarn winder
yarn-boiling
yarn-cleaning
yarn-dye
yarn-dyed
yarn-measuring
yarn-mercerizing
yarn-spinning
yarn-testing
yate tree
yaw off
yaw shrub
yaw-haw
yaw-sighted
yaw-ways
yaw-yaw
yawl boat
yawl-rigged
yawning abyss
yawning
 chasm
yawning depths
yay big
ye do
ye-makimono
yea sayer
yea vote
yea-and-nay
yea-and-nayish
yea-nay

yea-sayer
yea-saying
yeah-yeah
year after year
year count
year hour
year in
year in and year out
year in year out
year letter
year of grace
year out
year's mind
year-around
year-book
year-born
year-counted
year-daimon
year-demon
year-end
year-long
year-marked
year-old
year-round
yearly meeting
yearn for
yearning for the past
years ago
years of discretion
years old
years on end
yeas and nays
yeast bee
yeast cake
yeast cell
yeast fungus
yeast nucleic acid
yeast plant
yeast powder
yeast spot
yeast-bitten
yeddo hawthorn
yell at
yell bloody murder
yell out
yell to high heaven
yell yourself hoarse
yellow Chartreuse

yellow alert
yellow bell
yellow belly
yellow bile
yellow birch
yellow blindness
yellow book
yellow brass
yellow bush
yellow cake
yellow calla lily
yellow camomile
yellow carmine
yellow cedar
yellow complexion
yellow copper ore
yellow cypress
yellow daisy
yellow dog
yellow
enzyme
yellow fever
yellow flag
yellow foxglove
yellow gentian
yellow goatfish
yellow gold
yellow granadilla
yellow grass
yellow grease
yellow honeysuckle
yellow jack
yellow jacket
yellow jasmine
yellow jaundice
yellow jessamine
yellow journal
yellow journalism
yellow journalist
yellow lady's-slipper
yellow lead ore
yellow light
yellow line
yellow locust
yellow loosestrife
yellow madder
yellow man
yellow mandarin

yellow medick
yellow melilot
yellow mercuric oxide
yellow metal
yellow mombin
yellow ocher
yellow pages
yellow perch
yellow peril
yellow perilla
yellow pikeperch
yellow pine
yellow pitcher pla
yellow pitcher plant
yellow poplar
yellow prussiate of potash
yellow puccoon
yellow race
yellow rust
yellow skin
yellow spot
yellow star
yellow stonecrop
yellow streak
yellow stuff
yellow trillium
yellow tuft
yellow warbler
yellow water lily
yellow-aproned
yellow-armed
yellow-backed
yellow-banded
yellow-bark
yellow-bark oak
yellow-barked
yellow-barred
yellow-beaked
yellow-bearded
yellow-bellied
yellow-bellied
sapsucker
yellow-bellied woodpecker
yellow-belly
yellow-billed
yellow-billed cuckoo
yellow-billed magpie
yellow-black

yellow-blossomed
yellow-blotched
yellow-bodied
yellow-breasted
yellow-breasted chat
yellow-browed
yellow-brown
yellow-capped
yellow-centered
yellow-checked
yellow-cheeked
yellow-chinned
yellow-collared
yellow-colored
yellow-complexioned
yellow-covered
yellow-crested
yellow-cross
yellow-cross liquid
yellow-crowned
yellow-crowned night heron
yellow-daisy
yellow-dog
yellow-dog contract
yellow-dotted
yellow-dun
yellow-dye
yellow-dye tree
yellow-dyed
yellow-eared
yellow-earth
yellow-eye
yellow-eyed
yellow-eyed grass
yellow-eyed-grass family
yellow-faced
yellow-feathered
yellow-fever
yellow-fever fly
yellow-fever mosquito
yellow-fin
yellow-fingered
yellow-finned
yellow-flagged
yellow-fleeced
yellow-fleshed
yellow-flowered
yellow-flowering

yellow-footed
yellow-fringed
yellow-fronted
yellow-fruited
yellow-funneled
yellow-girted
yellow-gloved
yellow-green
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yellow-haired
yellow-hammer
yellow-handed
yellow-headed
yellow-headed blackbird
yellow-hilted
yellow-horned
yellow-hosed
yellow-jerkined
yellow-labeled
yellow-leaved
yellow-legged
yellow-legger
yellow-legginged
yellow-lettered
yellow-lit
yellow-locked
yellow-lustered
yellow-maned
yellow-marked
yellow-necked
yellow-nosed
yellow-olive
yellow-orange
yellow-painted
yellow-papered
yellow-pinioned
yellow-pyed
yellow-rayed
yellow-red
yellow-ringed
yellow-ringleted
yellow-ripe
yellow-robed
yellow-rooted
yellow-rumped
yellow-sallow
yellow-seal

yellow-sealed
yellow-shafted
yellow-shafted flicker
yellow-shanked
yellow-shouldered
yellow-skinned
yellow-skirted
yellow-speckled
yellow-splotched
yellow-spotted
yellow-sprinkled
yellow-stained
yellow-starched
yellow-striped
yellow-tailed
yellow-throated
yellow-throated vireo
yellow-tinged
yellow-tinging
yellow-tinted
yellow-tipped
yellow-toed
yellow-tressed
yellow-tufted
yellow-vented
yellow-washed
yellow-white
yellow-winged
yellowfin
tuna
yellowish-amber
yellowish-brown
yellowish-colored
yellowish-gold
yellowish-gray
yellowish-green
yellowish-green-yellow
yellowish-haired
yellowish-orange
yellowish-pink
yellowish-red
yellowish-red-yellow
yellowish-rose
yellowish-skinned
yellowish-tan
yellowish-white
yelly-hoo
yelly-hooing

yelp at
yen for
yeoman of the guard
yeoman service
yeoman's service
yeomen of the guard
yerba buena
yerba mansa
yerba mate
yerba reuma
yerba sagrada
yerba santa
yerba-mate
yerk out
yes indeed
yes indeedy
yes ma'am
yes man
yes sir
yes sirree
yes-and-no answer
yes-man
yes-no
yes-noer
yes-noism
yeshiva bocher
yester-
yester-year
yesterday and today and forever
yet again
yew berry
yew family
yew green
yew pine
yew tree
yew-besprinkled
yew-crested
yew-hedged
yew-leaved
yew-roofed
yew-shaded
yew-treed
yi tsing ware
yield a profit
yield again to
yield an aroma
yield an odor
yield assent

yield hope
yield point
yield strength
yield stress
yield the floor
yield the ghost
yield the palm
yield the spirit
yield
to
yield to despair
yield to maturity
yield value
yield your breath
yielding a return
yielding prop
yill-caup
ylang-ylang
yo-heave-ho
yo-ho
yo-ho-ho
yo-kyoku
yo-yo
yoga trance
yohimbe bark
yoke bone
yoke devil
yoke elm
yoke front
yoke method
yoke riveter
yoke with
yoke-footed
yoke-toed
yolk bag
yolk boil
yolk cord
yolk duct
yolk gland
yolk nucleus
yolk plate
yolk plug
yolk sac
yolk stalk
yolk yellow
yom kippur
yom tob
yom tobs

yom tov
yom tovs
yomin tovim
yoo-hoo
york rite
yorkshire pudding
yorkshire terrier
you and me
you are mistaken
you are right
you are wrong
you bet
you bet your boots
you bet your life
you better believe it
you can bank on it
you can bet on it
you can bet your bottom dollar
you can just bet
you can make book on it
you can say that again
you can't go wrong
you don't say
you have another guess coming
you name it
you said a mouthful
you said it
you should live so long
you speak truly
you too
you're all wet
you're darn tootin'
you're not kidding
you're telling me
you're
way off
you've got it
you've got me
you've got something there
you-all
you-be-damned
you-be-damnedness
you-know-what
you-know-who
you-uns
young animal
young bird
young blood

young buck
young cat
young chicken
young cow
young creature
young deer
young devil
young dog
young duck
young frog
young fry
young fustic
young generation
young goat
young goose
young hopeful
young horse
young hyson
young insect
young lady
young man
young one
young people
young person
young pig
young sheep
young thing
young turk
young whippersnapper
young woman
young-bladed
young-chinned
young-conscienced
young-counseled
young-eyed
young-headed
young-ladydom
young-ladyfied
young-ladyhood
young-ladyish
young-ladyism
young-ladylike
young-ladyship
young-looking
young-manhood
young-manlike
young-manliness
young-manly

young-mannish
young-mannishness
young-manship
young-old
young-winged
young-womanhood
young-womanish
young-womanishness
young-womanlike
young-womanly
young-womanship
young-yeared
younger generation
youngest-born
your
 adieus
your all
your ancestors
your applecart
your best
your best effort
your best endeavor
your betters
your blind side
your blood
your crowd
your cup of tea
your days are numbered
your doom is sealed
your due
your fathers
your grain
your head off
your hour
your hour is come
your last hour
your level best
your native ground
your native heath
your native place
your number is up
your own choice
your own discretion
your own initiative
your own level
your own man
your own will
your race is run

your ribs
your say
your set
your turn
your utmost
your worth
yours truly
youth club
youth group
youth hood
youth hostel
youth hosteler
youth market
youth offender
youth-bold
youth-consuming
youthful offender
youthful spirits
ytterbium metal
ytterbium oxide
yttrium metal
yttrium oxide
yttro-
yuan dollar
yucca borer
yucca cactus
yucca fertilizer
yucca moth
yucca palm
yucca pollenizer
yuk-yuk
yukon time
yule block
yule clog
yule log
yum-yum
z iron
z term
z-axes
z-axis
zB
zZt
za-zen
zacate
 limon
zanona palm
zante fustic
zapota gum

zeal-blind
zeal-consuming
zeal-inflamed
zeal-inspiring
zeal-pretending
zeal-quenching
zeal-scoffing
zeal-transported
zeal-worthy
zebra antelope
zebra bird
zebra caterpillar
zebra crossing
zebra finch
zebra fish
zebra grass
zebra opossum
zebra parakeet
zebra plant
zebra poison
zebra shark
zebra spider
zebra swallowtail
zebra wolf
zebra-back
zebra-plant
zebra-tailed
zebra-tailed lizard
zebrawood family
zebu cattle
zee bar
zeeman effect
zenaida dove
zend-avesta
zenith blue
zenith collimator
zenith distance
zenith point
zenith sector
zenith star
zenith telescope
zenith tube
zenith-pole
zenith-pole arc
zenith-star arc
zenithal projection
zephr worsted
zephyr cloth

zephyr flower
zephyr lily
zephyr shawl
zephyr shirting
zephyr worsted
zephyr yarn
zephyr-fanned
zephyr-haunted
zephyr-kissed
zero ablaut grade
zero algebra
zero beat
zero day
zero element
zero fleck
zero grade
zero gravity
zero grazing
zero group
zero hour
zero in
zero in on
zero magnet
zero
 mark
zero matrix
zero method
zero oil
zero point
zero post
zero potential
zero set
zero stage
zero stem
zero thrust pitch
zero tone
zero torque pitch
zero vector
zero weather
zero-dimensional
zero-divisor
zero-lift
zero-lift angle
zero-point energy
zero-rated
zero-thrust pitch
zero-zero
zeroth law of thermodynamics

zeta function
zetetic philosophy
zig and zag
zigzag course
zigzag fence
zigzag path
zigzag rule
zigzag-fashion
zigzag-lined
zigzag-shaped
zila parishad
zimocca sponge
zinc alkyl
zinc amide
zinc blende
zinc bloom
zinc bromide
zinc carbonate
zinc chloride
zinc chromate
zinc chrome
zinc crust
zinc dust
zinc engraving
zinc etching
zinc ethide
zinc ethyl
zinc fixer
zinc flowers
zinc gray
zinc green
zinc methide
zinc methyl
zinc ointment
zinc orange
zinc oxide
zinc phosphide
zinc sender
zinc spar
zinc spinel
zinc standard cell
zinc stearate
zinc sulfate
zinc sulfide
zinc sulphate
zinc sulphide
zinc vitriol
zinc white

zinc yellow
zinc-coated
zinc-etched
zinc-lined
zinc-roofed
zinc-sampler
zinco-
zinco-polar
zip
code
zip fastener
zip gun
zip through
zip up
zircon lamp
zircon light
zircon-syenite
zirconium dioxide
zirconium oxide
zo-
zodiacal constellation
zodiacal light
zona pellucida
zonae pellucidae
zonal soil
zone axis
zone catalogue
zone fire
zone line
zone melting
zone of communications
zone of fire
zone of interior
zone of no signal
zone phenomenon
zone plate
zone refining
zone system
zone tariff
zone time
zone-confounding
zone-marked
zone-tailed
zoning act
zoning commission
zoning law
zoning laws
zoning ordinance

zonked out
zono-
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zoo-ecologist
zoo-ecology
zoogenic infection
zoological garden
zoom binoculars
zoom in
zoom lens
zoom shot
zoot suit
zoot-suiter
zwitter ion
zyg-
zygo-
zygomatic arch
zygomatic bone
zygomatic process
zym-
zymo-

Found in path(s):
* /words-3.0-39.el9.src.rpm-cosi-expand-archive-H29vsAr3/mwords.tar.Z-cosi-expand-archive-hP67tLJH/mwords/256772co.mpo
No license file was found, but licenses were detected in source scan.

&c
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abdominohysterotomy
abdominoposterior
abdominoscope
abdominoscopy

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abducens
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abducentes
abduces
abducing
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Ashton
Ashton-under-Lyne
Ashtoreth
Ashur
Ashurbanipal
Asia
Asia Minor
Asian
Asian flu
Asiatic
Asiatic beetle
Asiatic cholera
Asiatic flu
Asir
Ask
Askja
Asmara
Asmodeus
Asoka
Aspasia
Asperges
Aspinwall
Asquith
Assam
Assamese
Asshur
Assiniboine
Assisi
Assiut
Associated

Press
Assuan
Assur
Assurbanipal
Assyr.
Assyria
Assyrian
Assyriology
Astaire
Astarte
Asti
Astolat
Aston
Astor
Astoria
Astrakhan
Asturias
Astyanax
Asur
Aswan
Asyut
At
Atabrine
Atacama Desert
Atahualpa
Atalanta
Atbara
Ate
Aten
Athabaska
Athamas
Athanasian
Athanasian Creed
Athanasius
Athapaskan
Atharva-Veda
Athelstan
Athena
Athenian
Athens
Athos
Atkinson
Atlanta
Atlantean
Atlantic
Atlantic Charter
Atlantic City
Atlantic Intracoastal Waterway

Atlantic Ocean
Atlantic Provinces
Atlantis
Atlas
Atlas Mountains
Atli
Atomic Energy Commission
Aton
Atreus
Atropos
Att. Gen.
Attic
Attic salt
Attica
Atticism
Attila
Attis
Attlee
Attorney General
Attu
Au
Aube
Aubervilliers
Aubrey
Auckland
Aude
Auden
Audubon
Audubon Society
Audubon's warbler
Auer
Aug.
Augean
Augean stables
Auger effect
Augsburg
August
Augusta
Augustan
Augustine
Augustinian
Augustus
Aulic Council
Aunt Sally
Aurangzeb
Aurelian
Aurelius
Aureomycin

Auriga
Aurignacian
Auriol
Aurora
Aus.
Auschwitz
Ausgleich
Aussie
Aust.
Austen
Auster
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Austin
Austral.
Australasia
Australia
Australian
Australian
Alps
Australian Capital Territory
Australian ballot
Australian crawl
Australian terrier
Australoid
Australopithecus
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Austrasia
Austria
Austria-Hungary
Austro-
Austroasiatic
Austronesia
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Auth. Ver.
Authorized Version
Autoharp
Autolycus
Auvergne
Aux Cayes
Av
Avalokitesvara
Avalon
Avar
Ave
Ave Maria
Ave.
Avebury
Avellaneda

Aventine
Avernus
Averroes
Averroism
Avertin
Aves
Avesta
Avestan
Aveyron
Avicenna
Avignon
Avlona
Avogadro
Avogadro's law
Avon
Axminster carpet
Axum
Ayacucho
Ayer
Ayesha
Aylesbury
Aymara
Ayr
Ayrshire
Ayub Khan
Ayurveda
Azazel
Azerbaijan
Azerbaijani
Azikiwe
Azilian
Azores
Azov
Azrael
Aztec
B
B battery
B complex
B horizon
B'nai B'rith
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B.A.A.
B.Arch.
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B.C.L.

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B.Litt.
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B.Mus.
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B.Phil.
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B.Sc.
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Baalbek
Bab el Mandeb
Babar
Babbage
Babbitt
Babbitt metal
Babbittry
Babel
Baber
Babeuf
Babi

Babism
Babur
Babylon
Babylonia
Babylonian
Babylonian captivity
Bacardi
Bacchae
Bacchic
Bacchus
Bach
Bach trumpet
Bachelor of Arts
Bachelor of Science
Bacolod
Bacon
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Bactria
Bactrian camel
Bad Godesberg
Bad Lands
Badajoz
Badalona
Baden
Baden-Powell
Badoglio
Baeda
Baedeker
Baeyer
Baez
Baffin Bay
Baffin Island
Bagdad
Bagehot
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Baguio
Bahaism
Bahamas
Bahasa Indonesia
Bahia
Bahrain
Baikal
Bailey bridge
Bailly
Baily's beads
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Baird
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Bakelite
Baker
Bakst
Baku
Bakunin
Bala
Balaam
Balakirev
Balaklava
Balanchine
Balaton
Balbo
Balboa
Balder
Baldwin
Baldwin I
Balearic Islands
Balenciaga
Balfour
Balfour Declaration
Bali
Balikpapan
Balinese
Baliol
Balkan
Balkan Mountains
Balkan Peninsula
Balkan States
Balkanize
Balkh
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Ballance
Ballarat
Balliol
Balmoral
Balmung
Balt.
Balthazar
Baltic
Baltic
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Baltic States
Baltimore
Baltimore heater
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Balto-Slavic
Baluchi

Baluchistan
Balzac
Bamako
Bambara
Bamberg
Banbury
Banbury cake
Band-Aid
Banda
Banda Sea
Bandaranaike
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Banff
Bangalore
Bangka
Bangkok
Bangor
Bangui
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Banjermasin
Bank of England
Banka
Banks
Bannister
Bannockburn
Bantam
Banting
Bantu
Bantustan
Banville
Baptist
Barabbas
Barbados
Barbarossa
Barbary
Barbary Coast
Barbary ape
Barber
Barbera
Barbirolli
Barbizon School
Barbuda
Barbusse
Barca
Barcelona
Barclay de Tolly
Bareilly
Barents Sea

Bari
Baring
Barmecidal
Barmecide
Barnabas
Barnard
Barnardo
Barnaul
Barnsley
Barocchio
Baroda
Baroja
Barozzi
Barquisimeto
Barranquilla
Barrault
Barrie
Barros
Barrow
Barry
Barrymore
Barsac
Bart.
Barth
Bartholomew
Bartlett
Bartolommeo
Barton
Baruch
Bas-Rhin
Basel
Basenji
Bashan
Bashkir
Basie
Basil
Basildon
Basilian
Basilicata
Baskerville
Basket Maker
Basle
Basque
Basque Provinces
Basra
Bass Strait
Basse-Terre
Basses-Alpes

Basseterre
Bastia
Bastille Day
Bastogne
Basuto
Basutoland
Bataan
Batan
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Batangas
Batavia
Bates
Bath
Bath chair
Bath stone
Bathsheba
Bathurst
Batista
Baton Rouge
Battle of Britain
Baucis
Baudelaire
Baudouin I
Bauer
Bauhaus
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Bautzen
Bavaria
Bavarian cream
Bax
Bayard
Bayern
Bayeux tapestry
Bayle
Bayonne
Bayreuth
Baziotes
Be
Beach-la-Mar
Beaconsfield
Beadle
Beaker folk
Beardsley
Beat Generation
Beatty
Beaufort
Beaufort Sea
Beaufort scale

Beauharnais
Beaujolais
Beaumarchais
Beaumont
Beaune
Beauvais
Beauvoir
Beaverboard
Beaverbrook
Bebel
Bechuana
Bechuanaland
Becket
Beckett
Beckford
Beckmann
Becquerel
Bede
Bedford
Bedford cord
Bedfordshire
Bedivere
Bedlington terrier
Bedloe's Island
Bedouin
Beecham
Beecher
Beelzebub
Beerbohm
Beersheba
Beethoven
Beghard
Beguin
Beguine
Behan
Behistun
Behring
Beiderbecke
Beira
Beirut
Bel
Bel Paese
Belfast
Belfort
Belg.
Belgae
Belgian
Belgian Congo

Belgian hare
Belgium
Belgrade
Belgravia
Belial
Belisarius
Belize
Bell
Bellay
Belle Isle
Belleau Wood
Belleek
Bellerophon
Bellini
Bellinzona
Belloc
Bellona
Bellow
Bellows
Belo
Horizonte
Belorussia
Belostok
Belovo
Belsen
Belshazzar
Beltane
Bemba
Ben Bella
Ben Day process
Ben Lomond
Ben Nevis
Ben-Gurion
Ben-Zvi
Benadryl
Benares
Bendigo
Benedicite
Benedict
Benedict XV
Benedictine
Benedictus
Benelux
Benevento
Beng.
Bengal
Bengal light
Bengali

Benghazi
Beni
Beni Hasan
Benin City
Benjamin
Bennett
Bennington
Benoni
Bentham
Benthamism
Bentinck
Bentley
Benton
Benue
Benue-Congo
Benzedrine
Beograd
Beowulf
Berar
Berber
Berbera
Berchtesgaden
Bercy
Berdichev
Berenice's Hair
Berenson
Berezina
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Berg
Bergama
Bergamo
Bergen
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Bering Sea
Bering Strait
Beriosova
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Berkeley
Berkshire
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Berlioz

Bermejo
Bermuda
Bermuda grass
Bermuda onion
Bermuda rig
Bermuda shorts
Bern
Bernadette
Bernadotte
Bernard
Bernard of Clairvaux
Bernardine
Bernese Alps
Bernese mountain dog
Bernhardt
Bernina
Bernina Pass
Bernini
Bernoulli
Bernstein
Berry
Bertillon system
Berwick
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Besant
Bessarabia
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Bessemer converter
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Betelgeuse
Bethany
Bethe
Bethel
Bethesda
Bethlehem
Bethsaida
Betjeman
Betti
Beulah
Beuthen
Bevan
Beveridge
Beverly Hills
Bevin

Bewick
Beyrouth
Bhagavad-Gita
Bharat
Bhili
Bhopal
Bhutan
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Biafra
Biak
Bialystok
Biarritz
Bias
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Bible
Bible Belt
Bible paper
Bible school
Biblical
Biblical Latin
Biblicist
Biddle
Biedermeier
Biel
Bielefeld
Bienne
Bierce
Bifrost
Big Ben
Big Bertha
Big Board
Big Dipper
Big Five
Bihar
Bihari
Biisk
Bikaner
Bikini
Bikol
Bilbao
Bildungsroman
Bill of Rights
Billiton
Billy the Kid
Bim
Binet-Simon scale
Bingen

Binh Dinh
Bini
Bircher
Bird
Birkenhead
Birmingham
Bisayas
Biscay
Bisitun
Bisk
Biskra
Bismarck
Bismarck Archipelago
Bismarck herring
Bissau
Bisutun
Bithynia
Bitolj
Bitter Lakes
Biysk
Bizerte
Bizet
Bk
Black
Black Country
Black Death
Black Forest
Black Friar
Black Hand
Black Hills
Black Maria
Black Mass
Black Monk
Black Mountains
Black Muslim
Black
Panther
Black Power
Black Prince
Black Rod
Black Russian
Black Sea
Black Volta
Black Watch
Black and Tan
Blackbeard
Blackburn
Blackburnian warbler

Blackett
Blackfoot
Blackpool
Blackstone
Blackwall hitch
Blackwood
Blagoveshchensk
Blake
Blanc
Blaue Reiter
Blavatsky
Blenheim
Blenheim spaniel
Blessed Sacrament
Blessed Virgin
Blida
Bligh
Blindheim
Bliss
Bloch
Bloemfontein
Blois
Blok
Bloody Mary
Bloomfield
Bloomington
Bloomsbury
Blue Mountains
Blue Nile
Bluebeard
Blum
Bn.
Boabdil
Boadicea
Boanerges
Board of Trade unit
Boaz
Bobo-Dioulasso
Boccherini
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Boche
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Bodhisattva
Bodleian
Bodoni
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Boehmenism
Boehmenist

Boehmite
Boeotia
Boeotian
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Boethius
Bofors gun
Bogart
Bogor
Bohemia
Bohemian
Bohemian Brethren
Bohemian Forest
Bohemianism
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Bohr
Bohr atom
Bohr theory
Boiardo
Bois de Boulogne
Bois-le-Duc
Boise
Boito
Bokhara
Bol.
Bolan Pass
Boleyn
Bolingbroke
Bolivar
Bolivia
Bologna
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Bolshevik
Bolshevism
Bolshevist
Bolton
Boltzmann
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Bolzano
Bomarc
Bombay
Bombay
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Bona
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Bonaparte
Bonaventura

Bonaventure
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Boniface
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Bora Bora
Bordeaux
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Boreas
Borgerhout
Borges
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Borgia
Borglum
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Borneo
Bornholm
Bornholm disease
Bornu
Borodin
Borodino
Borrow
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Bosnia and Herzegovina
Bosporus
Bossuet
Boston
Boston Tea Party
Boston bag
Boston cream pie
Boston ivy
Boston rocker

Boston terrier
Boswell
Bosworth Field
Botany Bay
Botany wool
Botha
Bothnia
Bothwell
Botswana
Botticelli
Bottrop
Botvinnik
Boucher
Boucicault
Boudicca
Bougainville
Boulanger
Boulder Dam
Boulogne
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Bourbon
Bourbonism
Bourgeois
Bourges
Bourgogne
Bourguiba
Bournemouth
Bourse
Bouvier des Flandres
Bowery
Bowie
Boxer
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Boyd
Boyle
Boyle's law
Boyne
Boz
Bozcaada
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Br.
Brabant
Bracknell
Bradford
Bradley
Braga
Bragg

Bragg's
law
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Brahman
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Brahmaputra
Brahmi
Brahmin
Brahms
Brahui
Braille
Brakpan
Bramante
Brancusi
Brandenburg
Brandt
Brantford
Braque
Brasil
Bratislava
Braun
Braunschweig
Braz.
Brazil
Brazil nut
Brazzaville
Breda
Breed's Hill
Bregenz
Bremen
Bremerhaven
Bren gun
Brenner Pass
Brentwood
Brescia
Breslau
Brest
Bretagne
Breton
Bretton Woods Conference
Breuer
Breughel
Brewster
Brewster chair

Brezhnev
Brian Boru
Briand
Briard
Briareus
Bride
Bridge
Bridge of Sighs
Bridgeport
Bridges
Bridget
Bridgetown
Bridgman
Brie
Brig.
Briggs
Bright
Bright's disease
Brighton
Brigid
Brigit
Brillat-Savarin
Brindisi
Brinell number
Brisbane
Bristol
Bristol Channel
Bristol board
Bristol fashion
Brit
Brit.
Britain
Britannia
Britannia metal
Britannic
Briticism
British
British Antarctic Territory
British Columbia
British Commonwealth of Nations
British East Africa
British Empire
British Guiana
British Honduras
British India
British Isles
British Legion
British Museum

British North
America
British Somaliland
British Virgin Islands
British West Africa
British West Indies
British gum
British thermal unit
Britisher
Britishism
Briton
Brittany
Brittany spaniel
Britten
Brix scale
Brno
Broad
Broad Church
Broads
Broadway
Brobdingnagian
Broca
Brocken
Broglie
Broken Hill
Bromberg
Bromley
Bronx
Bronx cheer
Bronze Age
Brook Farm
Brooke
Brooklyn
Brooklynese
Brooks Range
Brother Jonathan
Brown
Brown Shirt
Brown Swiss
Browne
Brownian movement
Browning
Browning automatic rifle
Broz
Brubeck
Bruce
Bruch
Bruckner

Brueghel
Bruges
Brumaire
Brummell
Brundisium
Brunei
Brunel
Brunelleschi
Brunhild
Bruno
Brunswick
Brusa
Brussels
Brussels carpet
Brussels griffon
Brussels lace
Brussels sprout
Brutus
Bruxelles
Bryansk
Brynhild
Brython
Brythonic
Bs/L
Bt.
Buber
Bucaramanga
Bucephalus
Buchan
Buchanan
Bucharest
Buchenwald
Buchmanism
Buchner
Buck
Buckingham
Buckingham Palace
Buckinghamshire
Bucovina
Budapest
Buddh Gaya
Buddha
Buddhism
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Budge
Budget
Budweis
Buena Vista

Buenaventura
Buenos
Aires
Buffalo
Buffalo Bill
Buffet
Buffon
Bug
Buitenzorg
Bujumbura
Bukavu
Bukhara
Bukharin
Bukovina
Bul
Bulawayo
Bulg.
Bulganin
Bulgar
Bulgaria
Bulgarian
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Bull
Bull Run
Bullpup
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Buna
Bunche
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Bundelkhand
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Bunin
Bunker Hill
Bunsen
Bunsen burner
Bunyan
Buonaparte
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Bur.
Burbage
Burberry
Burgas
Burgenland
Burgess
Burghley
Burgoyne
Burgundy

Burke
Burleigh
Burley
Burlington
Burma
Burma Road
Burmese
Burmese cat
Burne-Jones
Burnet
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Burney
Burnley
Burns
Burroughs
Bursa
Burschenschaft
Burton
Burundi
Burushaski
Bury St. Edmunds
Buryat
Bushido
Bushire
Bushman
Busoni
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Bute
Butler
Buxtehude
Bydgoszcz
Byelorussian
Byelostok
Byng
Byrd
Byron
Bytom
Byz.
Byzantine
Byzantine Church
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C
C battery
C clef
C horizon
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C.A.
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COBOL
CORE
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Cabanatuan
Cabernet
Cabinda
Cabot
Cabral
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Cadmus
Caelian
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Calabar bean
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Calcutta
Calder
Caldwell
Caledonia
Caledonian
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Calgary
Cali
Caliban
Calicut
Calif.
California
California poppy

Caligula
Callaghan
Callao
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Callimachus
Calliope
Callisto
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Calvary cross
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Camb.
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Cambrian
Cambridge
Cambridgeshire
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Camelot
Camembert
Camenae
Cameroon
Cameroun
Camorra
Campagna
Campania
Campbell
Campbell-Bannerman
Campbellite
Campeche
Campina Grande
Campinas
Campion
Campo Formio
Campo Grande
Campobello
Campos

Camus
Can.
Cana
Canaan
Canaanite
Canad.
Canada
Canada
 balsam
Canada goose
Canada thistle
Canadian
Canadian French
Canadian River
Canadian bacon
Canadian football
Canadian whiskey
Canadianism
Canal Zone
Canaletto
Canara
Canarese
Canary Islands
Canaveral
Canberra
Cancer
Candia
Candiot
Candlemas
Canea
Canes Venatici
Canicula
Canis Major
Canis Minor
Cannae
Cannes
Canning
Canopic jar
Canopus
Canossa
Canova
Canso
Cant.
Cantabrigian
Cantal
Canterbury
Canterbury bell
Canticle of Canticles

Canton
Canton River
Canton crepe
Canton flannel
Cantonese
Canuck
Canute
Cap-Haitien
Capablanca
Cape Cod
Cape Colony
Cape Dutch
Cape Horn
Cape Town
Cape buffalo
Capella
Capernaum
Capet
Capetian
Capitol
Capitoline
Caporetto
Cappadocia
Capri
Capri pants
Capricorn
Capt.
Capua
Capuchin
Caracalla
Caracas
Caravaggio
Carboloy
Carbonari
Carboniferous
Carborundum
Carcassonne
Carchemish
Card.
Cardiff
Cardigan
Cardigan Bay
Cardiganshire
Carducci
Carew
Carey
Caria
Carib

Caribbean
Caribbean Sea
Cariboo Mountains
Carina
Carinthia
Carlisle
Carlist
Carlos
Carlota
Carlovingian
Carlow
Carlsbad
Carlton
Carlyle
Carmarthen
Carmarthenshire
Carmel
Carmelite
Carnap
Carnarvon
Carnatic
Carnegie
Carniola
Carnot
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Caro's acid
Carol II
Carolina
Caroline
Caroline Islands
Carolingian
Carolinian
Carpathian Mountains
Carpatho-Ukraine
Carpentaria
Carpenter
Carrara
Carrel
Carroll
Carson
Carson City
Carstensz
Cartagena
Carte
Carter
Carteret
Cartesian

Cartesian coordinates
Carthage
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Cartier
Cartier-Bresson
Cartwright
Caruso
Carver
Cary
Casablanca
Casals
Casanova
Casaubon
Cascade Range
Casement
Cashmere
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Caspar
Casparian strip
Caspian
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Cassandra
Cassatt
Cassegrainian telescope
Cassel
Cassel yellow
Cassino
Cassiodorus
Cassiopeia
Cassirer
Cassius Longinus
Castalia
Castelo Branco
Castiglione
Castile
Castilian
Castilla la Vieja
Castle walk
Castlereagh
Castor
Castor and Pollux
Castro
Castrop-Rauxel
Catalan
Catalina Island
Catalonia
Catania
Catanzaro

Catawba
Cath.
Cathar
Cathay
Catherine
Catherine I
Catherine II
Catherine of Aragon
Catherine
of Siena
Catherine wheel
Catholic
Catholic Church
Catholic Epistles
Catholicism
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Catiline
Cato
Catskill Mountains
Cattegat
Catullus
Cauca
Caucasia
Caucasian
Caucasoid
Caucasus
Cauchy
Caudine Forks
Cauvery
Cav.
Cavafy
Cavalier poets
Cavan
Cavell
Cavendish
Cavite
Cavour
Cawnpore
Caxton
Cayenne
Cayes
Cayman Islands
Cayuga
Cb
Cd
Cdr.
Ce
Cecil

Cecilia
Cecropia moth
Cecrops
Cedar Rapids
Celaeno
Celanese
Celebes
Celestial City
Celestial Empire
Cellini
Celluloid
Celsius
Celsius scale
Celt
Celt.
Celtic
Celtic cross
Cenis
Cenozoic
Centaurus
Central African Empire
Central African Federation
Central America
Central Intelligence Agency
Central Powers
Central Treaty Organization
Central time
Centralia
Cephalonia
Cepheid variable
Cepheus
Ceram
Cerberus
Cerenkov
Cerenkov radiation
Ceres
Cerro Gordo
Cerro de Pasco
Cervantes
Cervin
Cesarean
Cesena
Cetinje
Ceto
Cetus
Ceuta
Ceylon
Ceylon moss

Ceyx
Cf
Ch.B.
Ch.E.
Chablis
Chaco
Chad
Chadwick
Chaeronea
Chagall
Chagas' disease
Chagres
Chain
Chalcidice
Chalcis
Chaldea
Chaldean
Chaliapin
Cham
Chamaeleon
Chamberlain
Chambertin
Chamonix
Chamorro
Champagne
Champlain
Champollion
Chancellor
of the Exchequer
Chancellorsville
Chandigarh
Chandler
Chandragupta
Chanel
Changchun
Changsha
Changteh
Channel Islands
Chantilly
Chantilly lace
Chanukah
Chao Phraya
Chaoan
Chaplin
Chapman
Charcot
Chardin
Charente

Charente-Maritime
Chari
Chari-Nile
Charing Cross
Charlemagne
Charleroi
Charles
Charles I
Charles II
Charles IV
Charles IX
Charles Martel
Charles V
Charles VI
Charles VII
Charles X
Charles the Great
Charles' law
Charles's Wain
Charleston
Charlotte
Charlotte Amalie
Charlottenburg
Charlottetown
Charlton
Charon
Charpentier
Charterhouse
Chartism
Chartres
Charybdis
Chatham
Chatham Islands
Chattanooga
Chatterton
Chaucer
Chaucerian
Chaumont
Chavannes
Cheboksary
Cheddar
Chefoo
Cheiron
Cheju
Cheka
Chekhov
Chekiang
Chellean

Chelsea
Cheltenham
Chelyabinsk
Chelyuskin
Chemnitz
Chemulpo
Chenab
Chengteh
Chengtu
Cheops
Cher
Cherbourg
Cheremis
Cheremkhovo
Cherenkov
Cherokee
Cherokee
rose
Cherubini
Chesapeake Bay
Chesapeake Bay retriever
Cheshire
Cheshvan
Chester
Chester White
Chesterfield
Chesterfieldian
Chesterton
Chetnik
Chevalier
Cheviot
Cheviot Hills
Cheyenne
Chian
Chiang Kai-shek
Chianti
Chiapas
Chiba
Chibcha
Chibchan
Chicago
Chichihaerh
Chickamauga
Chickasaw
Chiclayo
Chief of Staff
Chifley
Chihli

Chihuahua
Chile
Chile saltpeter
Chilkoot Pass
Chillon
Chilon
Chilpancingo
Chiltern Hundreds
Chilung
Chimborazo
Chimkent
Chin.
China
China Sea
China aster
China rose
China silk
China tree
Chinaman
Chinatown
Chindwin
Chinese
Chinese Chippendale
Chinese Empire
Chinese Revolution
Chinese Turkestan
Chinese Wall
Chinese cabbage
Chinese calendar
Chinese checkers
Chinese ink
Chinese lantern
Chinese puzzle
Chinese red
Chinese wax
Chinese white
Chinese windlass
Chinese wood oil
Chinghai
Chink
Chinkiang
Chino-
Chinook
Chinook Jargon
Chinook salmon
Chinookan
Chios
Chippewa

Chirico
Chiron
Chishima
Chita
Chittagong
Chkalov
Chlodwig
Chloe
Chloromycetin
Choctaw
Choiseul
Cholon
Cholula
Chopin
Chosen
Chou
Chou
En-lai
Chr.
Christ
Christ Jesus
Christ's-thorn
Christadelphian
Christchurch
Christendom
Christhood
Christian
Christian Era
Christian Science
Christian Scientist
Christian X
Christian name
Christiania
Christianism
Christianity
Christianize
Christianly
Christiansand
Christie
Christina
Christlike
Christly
Christmas
Christmas Eve
Christmas Island
Christmas cactus
Christmas card
Christmas disease

Christmas pudding
Christmas rose
Christmas stocking
Christmas tree
Christmastide
Christo-
Christogram
Christology
Christophany
Christophe
Christopher
Christy
Chron.
Chronicles
Chrysostom
Chu Teh
Chubb
Chudskoye Ozero
Chukchi
Chukchi Sea
Chumash
Chungking
Chur
Church of Christ
Church of England
Church of Rome
Churchill
Chuvash
Ci
Cibber
Cicero
Ciceronian
Cid
Cienfuegos
Ciliata
Cilicia
Cilician Gates
Cimabue
Cimbri
Cimmerian
Cimon
Cincinnati
Cincinnatus
Cinderella
Cinemascope
Cinerama
Cinque Ports
Cipango

Circassia
Circassian
Circe
Circinus
Circus
 Maximus
Cirenaica
Cisalpine Gaul
Ciscaucasia
Cistercian
City of God
Ciudad Trujillo
Ciudad Victoria
Cl
Clackmannan
Clactonian
Clare
Clarenceux
Clarendon
Clark
Claudel
Claudius II
Clausewitz
Clausius
Clavius
Clay
Cleanthes
Cleisthenes
Clemenceau
Clemens
Clement I
Clement V
Clement VII
Clement of Alexandria
Cleobulus
Cleon
Cleopatra
Cleopatra's Needle
Clermont-Ferrand
Cleveland
Clichy
Clifford
Clio
Clisthenes
Clive
Clotho
Clouet
Clough

Clovis I
Cluj
Cluny
Cluny lace
Clyde
Clydebank
Clydesdale
Clytemnestra
Cm
Cmdr.
Cnidus
Cnossus
Cnut
Co
Co.
Coahuila
Coatbridge
Coates
Cobbett
Cobden
Cobham
Coblenz
Coburg
Cochabamba
Cochin
Cochise
Cockaigne
Cockayne
Cockcroft
Cocos Islands
Cocteau
Cocytus
Cod
Codex Juris Canonici
Cody
Coeur de Lion
Cognac
Cohen
Coimbatore
Coimbra
Cointreau
Coke
Col.
Colbert
Colchester
Colchis
Coldstream Guards
Coleridge

Colet
Colette
Coligny
Colima
College of Cardinals
Collins
Colmar
Colo.
Cologne
Cologne brown
Colombes
Colombia
Colombo
Colonel Blimp
Colorado
Colorado
Desert
Colorado Springs
Colorado beetle
Colorado potato beetle
Colossae
Colosseum
Colossian
Colossians
Colt
Colum
Columba
Columbia
Columbian
Columbine
Columbus
Columbus Day
Com.
Com. Ver.
Coma Berenices
Comanche
Comanchean
Comdr.
Comdt.
Comenius
Comines
Cominform
Comintern
Commerce
Commines
Commodus
Common Era
Common Market

Commonwealth Day
Commonwealth of Nations
Communard
Communion
Communist China
Communist International
Communist Manifesto
Communist Party
Comnenus
Como
Comorin
Comoro Islands
Comptometer
Compton
Compton effect
Comr.
Comstock Lode
Comte
Comus
Con.
Conakry
Conchobar
Concord
Concord grape
Condillac
Condorcet
Conestoga wagon
Coney Island
Confiteor
Confucian
Confucianism
Confucius
Cong.
Congo
Congo Free State
Congo red
Congregationalism
Congregationalist
Congress
Congress of Vienna
Congressional Medal of Honor
Congressional Record
Congressional district
Congreve
Conn.
Connacht
Connaught
Connecticut

Conrad
Cons.
Conservatism
Conservative Jew
Conservative Judaism
Conservative
Party
Constable
Constance
Constant
Constantia
Constantine
Constantine I
Constantine II
Constantinople
Continental Congress
Conway
Cooch Behar
Cook
Cook Inlet
Cook Islands
Cook Strait
Cook's tour
Coolidge
Cooper
Cooper's hawk
Coorg
Copenhagen
Copenhagen blue
Copernicus
Copland
Copley
Copt
Coptic
Coptic Church
Cor.
Cora
Coral Sea
Corby
Corcovado
Corcyra
Cordelier
Cordilleras
Cordova
Cordovan
Corelli
Corfam
Corfu

Corinth
Corinthian
Corinthians
Coriolanus
Cork
Corneille
Cornish
Cornish pasty
Cornwall
Cornwallis
Coromandel Coast
Corona Australis
Corona Borealis
Corot
Corpus Christi
Corpus Juris Canonici
Corpus Juris Civilis
Correggio
Corregidor
Corriedale
Corrientes
Corse
Corsica
Cortes
Corunna
Corvus
Corybant
Corydon
Cos
Cosa Nostra
Cosenza
Cosgrave
Cosmotron
Cossack
Costa Brava
Costa Rica
Costermansville
Cotonou
Cotopaxi
Cotswold
Cotswolds
Cottbus
Cottian Alps
Coulomb
Coulomb's law
Council of Trent
Couperin
Courbet

Courbevoie
Courland
Court of Appeal
Court of Common Pleas
Court of Exchequer
Court
of Session
Courtrai
Cousin
Cousteau
Covent Garden
Coventry
Coverdale
Coverley
Coward
Cowes
Cowley
Cowper
Cox
Coxsackie virus
Cr
Crab Nebula
Crabbe
Cracow
Craig
Craigie
Craiova
Cranach
Crane
Cranmer
Cranwell
Crashaw
Crassus
Crater
Credo
Cree
Creek
Cremona
Creole
Creon
Cressy
Cretaceous
Cretan
Crete
Creuse
Crichton
Crick
Crimea

Crimean War
Cripple Creek
Cripps
Criseyde
Crispi
Crispin
Cro-Magnon
Cro-Magnon man
Croat
Croatia
Croatian
Croce
Crockett
Crocodile River
Croesus
Croix de Guerre
Crompton
Cromwell
Cronus
Crookes
Crookes tube
Crosby
Cross
Croton bug
Crow
Croydon
Cruikshank
Crutched Friar
Crux
Cs
Ctesiphon
Cu
Cub
Cuba
Cuba libre
Cuban heel
Cuenca
Cufic
Culbertson
Culebra Cut
Culver's root
Cumae
Cumaean sibyl
Cuman
Cumberland
Cummings
Cunaxa
Cuneo

Cupid
Cupid's bow
Curia Regis
Curie
Curie point
Curie's law
Curie-Weiss law
Curitiba
Curry
Curtin
Curzon
Cusco
Cush
Cushing
Cushing's disease
Cushitic
Custer
Cutch
Cuthbert
Cuxhaven
Cuyp
Cuzco
Cwmbran
Cybele
Cyclades
Cyclopean
Cyclops
Cydnus
Cygnus
Cymric
Cymry
Cynewulf
Cynic
Cynicism
Cynthia
Cyprian
Cypriot
Cyprus
Cyrano
de Bergerac
Cyrenaic
Cyrenaica
Cyrene
Cyril
Cyrillic
Cyrus
Cythera
Cytherea

Cyzicus
Czech
Czech.
Czechoslovak
Czechoslovakia
Czernowitz
Czerny
D
D and C
D region
D'Annunzio
D'Entrecasteaux Islands
D'Oyly Carte
D-day
D.
D.A.
D.B.E.
D.C.
D.C.L.
D.C.M.
D.D.
D.D.S.
D.Eng.
D.F.
D.F.C.
D.J.
D.O.
D.O.A.
D.O.M.
D.P.
D.P.H.
D.P.W.
D.S.
D.S.C.
D.S.M.
D.S.O.
D.Sc.
D.V.
D.V.M.
D/A
D/F
D/L
D/O
D/W
DC
DD
DDT
DEW line

DM
DMSO
DMZ
DNA
DOVAP
DX
Dacca
Dachau
Dacia
Dacron
Dada
Daedalus
Dagan
Dagda
Dagenham
Dagon
Daguerre
Dagwood sandwich
Dahna
Dahomey
Dairen
Dak.
Dakar
Dakin's solution
Dakota
Daladier
Dalai Lama
Dale
Dalhousie
Dali
Dallapiccola
Dallas
Dalmatia
Dalmatian
Dalton
Dalton's law
Dam
Daman
Damaraland
Damascene
Damascus
Damascus steel
Damien
Damietta
Damocles
Damon and Pythias
Dampier
Dan

Dan.
Danaides
Danaus
Dandie Dinmont
Dane
Danegeld
Danelaw
Daniel
Daniell cell
Danish
Danish West Indies
Danish blue
Danish
pastry
Dano-Norwegian
Dante
Danton
Danu
Danube
Danzig
Daphne
Daphnis
Daphnis and Chloe
Dapsang
Dar es Salaam
Darby and Joan
Dardan
Dardanelles
Dardanus
Darfur
Darien
Darius I
Darius III
Darjeeling
Dark Ages
Darlan
Darling
Darling Range
Darling River
Darlington
Darmstadt
Darnley
Dartmoor
Dartmouth
Darvon
Darwin
Darwinian
Darwinism

Dasht-i-Kavir
Dasht-i-Lut
Daubigny
Daudet
Daugava
Daugavpils
Daumier
Dauphin
Davao
David
David I
Davies
Davis
Davis Strait
Davy
Davy Jones
Davy lamp
Dawes
Dawson
Dawson Creek
Day of Atonement
Day of Judgment
Dayak
Dayan
Dayton
Daytona Beach
De Forest
De La Warr
De Mille
De Quincey
De Soto
De Stijl
De Vries
Dead Sea
Dead Sea Scrolls
Deakin
Dearborn
Death
Death Valley
Deauville
Deborah
Debrecen
Debs
Debussy
Dec.
Decalogue
Decapolis
Deccan

December
Decembrist
Decker
Declaration of Independence
Dee
Deep South
Defoe
Degas
Dehra Dun
Deianira
Deimos
Deirdre
Dekker
Del.
Delacroix
Delagoa Bay
Delaunay
Delaware
Deledda
Delft
Delgado
Delhi
Delian
Delibes
Delilah
Delius
Delmarva
Peninsula
Delorme
Delos
Delphi
Delphic
Delphic oracle
Delphinus
Delta
Dem.
Demavend
Demerol
Demeter
Democrat
Democratic Party
Democratic-Republican Party
Democritus
Demogorgon
Demosthenes
Dempsey
Den.
Denbighshire

Deneb
Denmark
Denmark Strait
Denton
Denver
Denys
Deo gratias
Deo volente
Department of Agriculture
Department of Commerce
Department of Defense
Department of Justice
Department of Labor
Derain
Derbent
Derby
Derbyshire
Derry
Derwent
Des Moines
Descartes
Desmoulins
Dessalines
Dessau
Detroit
Deucalion
Deus
Deut.
Deuteronomy
Deutschland
Devanagari
Deventer
Devereux
Devi
Devil's Island
Devon
Devonian
Devonshire cream
Dewar
Dewey
Dexamyl
Dexedrine
Dexter
Dezhnev
Dhahran
Dhammapada
Dhaulagiri
Di

Diaghilev
Diana
Dias
Diaspora
Diaz
Dick
Dick test
Dickens
Dickinson
Dictaphone
Dictograph
Didache
Diderot
Dido
Diefenbaker
Diels-Alder reaction
Dieppe
Dies Irae
Diesel
Dietrich
Dijon
Dike
Dilantin
Dimitrovo
Din.
Dinah
Dinaric Alps
Dinesen
Dinka
Diocletian
Diodorus Siculus
Diogenes
Diomede
Islands
Diomedes
Dione
Dionysia
Dionysiac
Dionysian
Dionysius
Dionysius Exiguus
Dionysius of Halicarnassus
Dionysus
Diophantus
Dior
Dioscuri
Dirac
Directoire

Dirichlet
Dis
Disciples of Christ
Dismal Swamp
Disney
Disraeli
Distinguished Conduct Medal
Distinguished Flying Cross
Distinguished Service Cross
Distinguished Service Medal
Distinguished Service Order
District of Columbia
Distrito Federal
Diu
Dives
Divine Mind
Dixie
Dixieland
Djakarta
Djambi
Djerba
Djokjakarta
Dneprodzerzhinsk
Dnepropetrovsk
Dnieper
Dniester
Dobell's solution
Doberman pinscher
Dobruja
Doctor of Philosophy
Dodecanese
Dodge City
Dodgem
Dodgson
Dodona
Doe
Doenitz
Dog Star
Dogberry
Dogger Bank
Doha
Dollfuss
Dolly Varden
Dolomites
Dom
Dom.
Domesday Book
Domett

Dominic
Dominica
Dominican
Dominican Republic
Dominion Day
Dominus
Domitian
Don
Don Juan
Don Quixote
Donar
Donatello
Donatist
Donatus
Donau
Doncaster
Donegal
Donets
Donetsk
Dongola
Donna
Donne
Doolittle
Doomsday Book
Doorn
Doppler effect
Doppler
radar
Dorado
Dorcas
Dorcas society
Dorchester
Dordogne
Dordrecht
Dorian
Dorian mode
Doric
Doris
Dorking
Dorpat
Dorset
Dorset Horn
Dort
Dortmund
Dos Passos
Dou
Douai
Douala

Douay Bible
Doubs
Doughty
Douglas
Douglas fir
Douglas-Home
Doukhobor
Douro
Dove
Dover
Dover's powder
Dow
Dow-Jones average
Dowland
Down
Down's syndrome
Downing Street
Dowson
Doyle
Dr
Dr.
Draco
Draconian
Dracula
Drake
Drake Passage
Drakensberg
Dramamine
Drambuie
Draper
Drava
Dravidian
Drayton
Dreibund
Dreiser
Drenthe
Dresden
Dresden china
Dreyfus
Drin
Drinkwater
Drogheda
Druid
Drury Lane
Druse
Dry Ice
Dry Tortugas
Dryden

Du Barry
Du Gard
Du Guesclin
Du Maurier
Du.
DuPont
Dual Alliance
Dual Monarchy
Duala
Dubai
Dublin
Dubonnet
Dubrovnik
Dubuffet
Duccio di Buoninsegna
Duchamp
Dudley
Duero
Dufy
Duhamel
Duisburg
Dukas
Dulles
Duluth
Dumas
Dumbarton
Dumbarton Oaks
Dumfries
Dumuzi
Dumyat
Dun Laoghaire
Duna
Dunaj
Dunant
Dunbar
Dunbarton
Duncan
Duncan I
Duncan Phyfe
Dundalk
Dundee
Dunedin
Dunfermline
Dungeness crab
Dunker
Dunkirk
Dunlop
Dunois

Duns
Scotus
Dunsany
Dunsinane
Dunstable
Dunstan
Dupleix
Duplessis-Mornay
Dur.
Duralumin
Durango
Durazzo
Durban
Durga
Durham
Durkheim
Duroc
Durrell
Dutch
Dutch Belted
Dutch East Indies
Dutch Guiana
Dutch New Guinea
Dutch West Indies
Dutch auction
Dutch cap
Dutch cheese
Dutch courage
Dutch door
Dutch elm disease
Dutch gold
Dutch metal
Dutch oven
Dutch rush
Dutch treat
Dutch uncle
Dutchman
Dutchman's-breeches
Dutchman's-pipe
Duvalier
Dvina
Dvina Bay
Dvinsk
Dy
Dyak
Dyaus
Dylan
Dynel

Dzerzhinsk
Dzungaria
E
E layer
E region
E-boat
E.
E.E.
E.E. & M.P.
E.I.
E.R.
E.T.A.
E.T.D.
E.V.
EAM
ECG
EDP
EEC
EEG
EFTA
EHF
EKG
EP
EPA
ERS
ESE
ESP
EVA
Ea
Eakins
Ealing
Earhart
Earl Marshal
Early Bird
Early Christian
Early English
Early Renaissance
East
East Anglia
East Bengal
East Berlin
East Cape
East China Sea
East End
East Flanders
East Germanic
East Germany
East India Company

East Indies
East Kilbride
East London
East Lothian
East Pakistan
East Prussia
East Riding
East Sussex
Eastbourne
Easter
Easter
Island
Easter Monday
Easter Sunday
Easter egg
Easter lily
Easter sepulcher
Eastern Church
Eastern Ghats
Eastern Hemisphere
Eastern Orthodox Church
Eastern Roman Empire
Eastern rite
Eastern time
Easterner
Eastertide
Eastman
Ebert
Eblis
Eboracum
Ebro
Ecbatana
Eccles
Ecclesiastes
Ecclesiasticus
Ecclus.
Echo
Eck
Eckhart
Ecua.
Ecuador
Edam
Edda
Eddington
Eddy
Eddystone Rocks
Ede
Eden

Edessa
Edgar
Edgeworth
Edinburgh
Edirne
Edison
Edison effect
Edmonton
Edmund I
Edmund II
Edo
Edom
Edomite
Edward
Edward I
Edward II
Edward III
Edward IV
Edward V
Edward VI
Edward VII
Edward VIII
Edward the Confessor
Edwardian
Edwards
Edwin
Efik
Eg.
Egbert
Eger
Egeria
Egmont
Egypt
Egyptian
Egyptology
Ehrenburg
Ehrlich
Eichmann
Eiffel
Eiffel Tower
Eijkman
Eindhoven
Einstein
Einstein shift
Einstein theory
Eire
Eisenach
Eisenhower

Eisenhower jacket
Eisenstein
Eisk
Ekaterinburg
Ekaterinodar
Ekaterinoslav
El Alamein
El Capitan
El Cid Campeador
El Dorado
El Ferrol
El Greco
El Mansura
El Misti
El Obeid
El
Paso
El Salvador
Elagabalus
Elaine
Elam
Elamite
Elamitic
Elba
Elbe
Elbert
Elbrus
Elburz Mountains
Eldorado
Elea
Eleanor of Aquitaine
Eleatic
Electra
Electra complex
Eleusinian mysteries
Eleusis
Elgar
Elgin marbles
Elgon
Eli
Elia
Elias
Elijah
Eliot
Elis
Elisabeth
Elisabethville
Elisavetgrad

Elisavetpol
Elisha
Eliz.
Elizabeth
Elizabeth I
Elizabeth II
Elizabethan
Ellesmere Island
Ellice Islands
Ellington
Ellis
Elohim
Elohist
Elsinore
Elul
Ely
Elyot
Elysian
Elysium
Elzevir
Emancipation Proclamation
Emden
Emerald Isle
Emerson
Emilia-Romagna
Eminence
Emmanuel
Emmen
Emmy
Emp.
Empedocles
Empire Day
Empire State
Empirin
Empson
Enceladus
Enderby Land
Endymion
Enesco
Enfield
Enfield rifle
Eng.
Engadine
Engels
England
English
English Channel
English bond

English horn
English ivy
English muffin
English red
English saddle
English setter
English sonnet
English sparrow
English springer spaniel
English toy spaniel
English walnut
Englishism
Englishman
Englishman's tie
Englishry
Enid
Eniwetok
Enki
Enlil
Ennis
Ennius
Enoch
Enos
Ens.
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Legnica
Lehmann
Lehmbruck
Leibniz
Leicester
Leicestershire
Leiden
Leigh
Leinster
Leipzig
Leith
Leix
Lely
Lemberg
Lemnos
Lena
Lenin
Leninakan
Leningrad
Leninism
Leninist
Lent
Lenten
Leo
Leo I
Leo III
Leo Minor
Leo X
Leo XIII
Leon
Leonardo da Vinci
Leoncavallo
Leonid
Leonidas
Leopardi
Leopold
I
Leopold II
Leopold III
Lepanto
Lepidus
Lepontine Alps
Lepus
Lermontov
Lerwick

Les Cayes
Lesbian
Lesbos
Lesotho
Lesseps
Lesser Antilles
Lesser Sunda Islands
Lessing
Lethbridge
Lethe
Leto
Lett
Lettish
Leucas
Leucippus
Leuctra
Leukas
Lev.
Levalloisian
Levant
Levantine
Leven
Leverhulme
Leverrier
Levi
Levis
Levit.
Levite
Levitical
Leviticus
Levkas
Lewes
Lewis
Lewis acid
Lewis base
Lewis gun
Lewis with Harris
Lexington
Leyden
Leyden jar
Leyte
Lhasa
Lhasa apso
Li
Li Po
Liao
Liaoning
Liaotung

Liaoyang
Liard
Lias
Lib.
Libau
Libava
Libby
Liberal Party
Liberec
Liberia
Liberty Island
Liberty bond
Libia
Libra
Library of Congress
Libreville
Librium
Libya
Libyan
Libyan Desert
Lichfield
Lidice
Lie
Liebfraumilch
Liebig
Liebknecht
Liechtenstein
Liederkranz
Liegnitz
Liestal
Lietuva
Lieut.
Life Guards
Liguria
Ligurian
Lilienthal
Lilith
Liliuokalani
Lille
Lilliputian
Lilongwe
Lima
Limassol
Limbourg
Limburg
Limburger
Limerick
Limoges

Limousin
Limpopo
Lin Piao
Linacre
Linares
Lincoln
Lincoln
green
Lincoln's Inn
Lincolnshire
Lind
Lindbergh
Lindesnes
Lindsey
Linear A
Linear B
Link trainer
Linlithgow
Linnaeus
Linnean
Linotype
Linz
Lions
Lipari Islands
Lipchitz
Lipetsk
Lippe
Lippi
Lippizaner
Lippmann
Lir
Lisbon
Lissajous figure
Lister
Listerism
Liszt
Lith.
Lithuanian
Little America
Little Bear
Little Bighorn
Little Corporal
Little Diomede
Little Dipper
Little Dog
Little John
Little Rock
Little Russia

Little Russian
Liverpool
Liverpudlian
Livingston
Livingstone
Livonia
Livorno
Livy
Ljubljana
Llano Estacado
Llew Llaw Gyffes
Llewellyn
Lloyd
Lloyd George
Lloyd's
Loanda
Lobachevsky
Lobito
Locarno
Lochaber ax
Locke
Lockyer
Locris
Lodge
Lodi
Loeb
Loewe
Loewi
Logan
Logos
Lohengrin
Loir-et-Cher
Loire
Loire-Atlantique
Loiret
Loki
Lolland
Lollard
Lomax
Lombard
Lombard Street
Lombardy
Lombardy poplar
Lombok
Lombroso
Lomond
London
London broil

London pride
Londonderry
Londrina
Long
Long Beach
Long Island
Long Parliament
Longfellow
Longford
Longhorn
Longinus
Longobard
Longs
Peak
Lons-le-Saunier
Lope de Vega
Lorca
Lord
Lord Chancellor
Lord Chief Justice
Lord Lieutenant
Lord Mayor
Lord President of the Council
Lord Privy Seal
Lord Protector
Lord Provost
Lord of Misrule
Lord of hosts
Lord's Supper
Lord's table
Lordship
Lorelei
Loren
Lorentz
Lorenz
Lorenzetti
Lorient
Lorraine
Lorraine cross
Los Angeles
Lost Generation
Lot
Lot-et-Garonne
Lothair I
Lothair II
Lothario
Lothians
Lotze

Louis
Louis I
Louis II
Louis IV
Louis IX
Louis Napoleon
Louis Philippe
Louis Quatorze
Louis Quinze
Louis Seize
Louis Treize
Louis V
Louis XI
Louis XII
Louis XIII
Louis XIV
Louis XVI
Louis XVII
Louis XVIII
Louisburg
Louisiana
Louisiana Purchase
Louisville
Lourdes
Lourenco Marques
Louth
Louvain
Louvre
Lovelace
Lovell
Low
Low Archipelago
Low Church
Low Countries
Low German
Low Latin
Low Mass
Low Sunday
Lowell
Lower Austria
Lower California
Lower Canada
Lower Egypt
Lower Lakes
Lower Palatinate
Lower Saxony
Lowestoft
Lowry

Loyola
Lt.
Lt. Col.
Lt. Comdr.
Lt. Gen.
Lt. Gov.
Ltd.
Lu
Lualaba
Luanda
Luang
Prabang
Lubbock
Lublin
Lubumbashi
Lucan
Lucania
Lucas van Leyden
Lucca
Lucerne
Lucian
Lucifer
Lucilius
Lucina
Lucite
Lucknow
Lucretia
Lucretius
Lucullus
Lucy
Luddite
Ludendorff
Ludhiana
Ludlow
Ludwigshafen
Luftwaffe
Lug
Luganda
Lugansk
Luger
Lugo
Luik
Luke
Lulea
Lully
Luluabourg
Luminal
Lumumba

Luna
Lundy's Lane
Lungki
Lunik
Lupercalia
Lupus
Lusaka
Lusatia
Lusatian
Lusitania
Luth.
Luther
Lutheran
Luthuli
Lutine bell
Lutyens
Luwian
Lux.
Luxembourg
Luxemburg
Luxor
Luzern
Luzon
Lvov
Lw
Lyallpur
Lyautey
Lycaon
Lycaonia
Lycia
Lycian
Lycurgus
Lydgate
Lydia
Lydian
Lydian mode
Lyell
Lyly
Lynch
Lynn
Lynx
Lyon
Lyon King of Arms
Lyonnais
Lyonnesse
Lyons
Lyra
Lysander

Lysenko
Lysenkoism
Lysias
Lysimachus
Lysippus
Lysol
Lytton
Lyublin
M
M roof
M'-
M-16
M.
M.A.
M.Arch.
M.B.
M.B.A.
M.B.E.
M.C.
M.D.
M.E.
M.Ed.
M.I.A.
M.M.
M.O.
M.P.
M.P.S.
M.S.
M.Sc.
MA
MATS
MC
MD
ME
MF
MHD
MM.
MRA
MS
MS.
MSG
MT
MV
MVD
Mab
Mabuse
Mac
MacArthur

MacDonald
Macao
Macassar
Macassar oil
Macaulay
Macbeth
Macc.
Maccabean
Maccabees
Macdonald
Mace
Maced.
Macedonia
Macedonian
Maceio
Mach
Mach
number
Machiavelli
Machiavellian
Machmeter
Machu Picchu
Mackenzie
Mackinaw coat
Mackintosh
Macleod
Macmillan
Macon
Macpherson
Macready
Madag.
Madagascar
Madeira
Madhya Pradesh
Madison
Madison Avenue
Madonna
Madras
Madre de Dios
Madrid
Madura
Maeander
Maebashi
Maecenas
Maelstrom
Maestricht
Mafeking
Mafia

Magallanes
Magdalena
Magdalena Bay
Magdalenian
Magdeburg
Magellan
Magellanic cloud
Magen David
Maggiore
Maginot line
Magna Carta
Magna Charta
Magna Graecia
Magna Mater
Magnificat
Magnitogorsk
Magog
Magritte
Magus
Magyar
Mahalla el Kubra
Maharashtra
Mahayana
Mahdi
Mahican
Mahound
Mahratta
Maia
Maid Marian
Maidstone
Maiduguri
Mailer
Maillol
Maimonides
Main
Maine
Maine-et-Loire
Mainland
Maintenon
Mainz
Maitland
Maj. Gen.
Majesty
Major Prophets
Majunga
Makalu
Makarios III
Makassar

Makeyevka
Makhachkala
Makkah
Malacca
Malacca cane
Malachi
Malagasy
Malagasy Republic
Malang
Malathion
Malatya
Malawi
Malay
Malay Archipelago
Malay
Peninsula
Malay States
Malaya
Malayalam
Malayan
Malayo-Indonesian
Malayo-Polynesian
Malaysia
Malcolm
Maldives
Maldon
Male
Malebranche
Malherbe
Mali
Malines
Malinowski
Mallarme
Mallorca
Malmo
Malpighi
Malpighian corpuscle
Malpighian layer
Malraux
Malta
Maltese
Maltese cat
Maltese cross
Maltese dog
Malvern
Mameluke
Man
Man.

Manado
Managua
Manama
Manassas
Manasseh
Manaus
Manche
Manchester
Manchester terrier
Manchu
Manchukuo
Mancunian
Mandaean
Mandalay
Mande
Mandeville
Mandingo
Manes
Manet
Manganin
Manhattan
Mani
Manichaeism
Manifest Destiny
Manila
Manila Bay
Manila hemp
Manila paper
Manila rope
Manipur
Manisa
Manizales
Mann
Mannerheim
Mannheim School
Manning
Manolete
Mansfield
Mantegna
Mantinea
Mantua
Manutius
Manx
Manx cat
Manxman
Manzoni
Mao Tse-tung
Maoism

Maori
Map
Mar del Plata
Mar.
Maracaibo
Maracanda
Maratha
Marathi
Marathon
Marc
Marceau
Marcellus
March
March.
Marche
Marcheshvan
Marciano
Marcionism
Marco Polo
Marconi
Marconi rig
Mardi Gras
Marduk
Marengo
Margaret
Margaret
of Valois
Margarita
Margate
Margaux
Margherita
Maria Theresa
Marian
Mariana Islands
Marianne
Marie Antoinette
Marie Byrd Land
Marie Galante
Mariehamn
Marienbad
Marin
Marinduque
Marine Corps
Mariner
Marinetti
Mariology
Marist
Maritain

Maritime Alps
Maritime Provinces
Maritsa
Mariupol
Marius
Marivaux
Mark
Mark Antony
Markov chain
Markova
Marlborough
Marlin
Marlowe
Marmara
Marmolada
Marne
Maroc
Maronite
Maros
Marquand
Marquesan
Marquesas Islands
Marquette
Marquis
Marrakech
Marrano
Mars
Mars brown
Mars violet
Marsala
Marseillaise
Marshall
Marshall Islands
Marshall Plan
Marshallese
Marsilius of Padua
Marston Moor
Martaban
Martel
Martello tower
Martha
Martial
Martian
Martin
Martin du Gard
Martineau
Martinmas
Marvin

Marx
Marxian
Marxism
Marxism-Leninism
Marxist
Mary
Mary I
Mary Jane
Mary Magdalene
Maryland
Masaccio
Masan
Masaryk
Masbate
Mascagni
Masefield
Maseru
Mashhad
Masinissa
Mason
Masonite
Masorete
Masoretic
Masqat
Mass
Mass book
Massachusetts
Massachusetts Bay
Massachusetts ballot
Massasoit
Massenet
Massey
Massif
Central
Massorete
Master
Master of Arts
Master of Science
Master of the Rolls
Masuria
Mata Hari
Matabele
Matadi
Matamoros
Mathura
Matilda
Matisse
Mato Grosso

Matsu
Matsuyama
Matt.
Matterhorn
Matthew
Matthias
Matto Grosso
Mau Mau
Maugham
Maui
Maulmain
Mauna Kea
Mauna Loa
Maundy Thursday
Maupassant
Mauretania
Mauriac
Maurice
Maurist
Mauritania
Mauritius
Maurois
Maury
Maurya
Mauser
Mawson
Maxim
Maxim gun
Maximalist
Maximilian
Maximilian I
Maxwell
May
May Day
May apple
May queen
May wine
Maya
Mayakovski
Mayan
Mayday
Mayence
Mayenne
Mayer
Mayfair
Mayo
Mayon
Mayotte

Maypole
Maytime
Mazarin
Mazda
Mazdaism
Mc-
McCarthy
McCarthyism
McCormack
McCormick
McCoy
McCullers
McKinley
Md
Md.
Me
Me.
MeV
Mead
Meade
Meath
Mechlin
Mechlin lace
Mecklenburg
Medal of Honor
Medan
Medawar
Mede
Medea
Media
Medicaid
Medicare
Medici
Medieval Latin
Medina
Medit.
Mediterranean
Mediterranean Sea
Mediterranean fever
Medusa
Megaera
Meganthropus
Megara
Megiddo
Mehemet Ali
Meilhac
Meir
Meissen

Meistersinger
Meitner
Mekka
Mekong
Melanesian
Melba
Melba
sauce
Melba toast
Melbourne
Melchior
Melchizedek
Meleager
Melitopol
Melos
Melpomene
Melville Island
Melville Peninsula
Member of Parliament
Memling
Memnon
Memorial Day
Memphian
Memphis
Menado
Menai Strait
Menam
Menander
Mencius
Mendel
Mendel's laws
Mendelian
Mendelism
Mendelssohn
Menderes
Mendoza
Menelik II
Menes
Mennonite
Menorca
Mensa
Menton
Mentor
Menzies
Mephistopheles
Merca
Mercator
Mercator projection

Mercator sailing
Mercia
Mercurochrome
Mercury
Meredith
Merlin
Merodach
Merovingian
Mersenne number
Mersey
Merthiolate
Merthyr Tydfil
Merton
Mesa Verde
Meshach
Meshed
Mesolithic
Mesopotamia
Mesozoic
Messalina
Messapian
Messeigneurs
Messene
Messenia
Messiaen
Messiah
Messidor
Messina
Meta
Metchnikoff
Methedrine
Methodism
Methodist
Methodius
Methuselah
Metternich
Metz
Meuse
Mexicali
Mexican
Mexican War
Mexican hairless
Mexican hat dance
Mexico
Mexico City
Meyerbeer
Meyerhof
Mg

Miami
Mic.
Micah
Micawber
Mich.
Michael
Michaelmas
Michaelmas
daisy
Michelangelo
Michelson
Michelson-Morley experiment
Michigan
Mick
Mickey
Micmac
Micronesia
Micronesian
Microscopium
Mid.
Midas
Middelburg
Middle Ages
Middle America
Middle Atlantic States
Middle East
Middle English
Middle Greek
Middle High German
Middle Kingdom
Middle Low German
Middle Persian
Middle States
Middle Temple
Middle West
Middleton
Mideast
Midgard
Midgard serpent
Midi
Midian
Midland
Midlands
Midlothian
Midsummer Day
Midway
Midwest
Milanese

Milesian
Miletus
Milford Haven
Milhaud
Milky Way
Mill
Millais
Miller
Millet
Millikan
Miltiades
Milton
Milwaukee
Mimamsa
Mimas
Mimir
Min
Minas Basin
Minas Gerais
Mindanao
Mindoro
Mindszenty
Minerva
Ming
Mingrelian
Minho
Minimalist
Minn.
Minna
Minneapolis
Minnesota
Minoan
Minor Prophets
Minorca
Minorite
Minos
Minotaur
Minsk
Minuteman
Miocene
Miquelon
Mirabeau
Miraflores
Miranda
Miseno
Miserere
Mishnah
Miskolc

Miss
Miss.
Missionary Ridge
Mississippian
Missouri meerschaum
Mistassini
Mister
Misti
Mithgarthr
Mithraism
Mithras
Mithridates
VI
Mitra
Mixtec
Mizar
Mlle
Mme
Mn
Mnemosyne
Mo
Mo.
Mobile
Mocambique
Modena
Modern English
Modern Greek
Modern Hebrew
Modigliani
Modred
Mogador
Mogen David
Mogilev
Moham.
Mohammed
Mohammed Ali
Mohammed II
Mohammedan
Mohammedanism
Mohave
Mohave Desert
Mohawk
Mohenjo-Daro
Mohican
Mohock
Mohs scale
Moirai
Mojave

Mokpo
Moldau
Moldavia
Molech
Molina
Mollweide projection
Molly Maguire
Moloch
Molokai
Molotov
Moltke
Moluccas
Mombasa
Momus
Mon
Mon-Khmer
Mon.
Mona Lisa
Mona Passage
Monaco
Monaghan
Monck
Moncton
Monday
Mondrian
Monegasque
Monel metal
Monet
Mongol
Mongolia
Mongolian
Mongolian People's Republic
Mongolic
Mongoloid
Monmouth
Monmouthshire
Monnet
Monoceros
Monongahela
Monophysite
Monopoly
Monotype
Monroe
Monroe Doctrine
Mons
Monseigneur
Monsignor
Mont Blanc

Mont Cervin
Mont-Saint-Michel
Mont.
Montagnard
Montagu
Montague
Montana
Montcalm
Monte Carlo
Monte Cassino
Monte Corno
Montefiascone
Montego Bay
Montenegro
Monterrey
Montespan
Montessori method
Monteux
Monteverdi
Montevideo
Montfort
Montgolfier
Montgomery
Montherlant
Montmartre
Montparnasse
Montpelier
Montpellier
Montreal
Montserrat
Moody
Moor
Moore
Moorish
Moorish
idol
Moose Jaw
Moradabad
Moral Rearmament
Morava
Moravia
Moravian
Moray
Moray Firth
Morbihan
Mordecai
Mordred
Mordvin

More
Morea
Moreau
Morelos
Moresque
Morgan
Morgan le Fay
Morisco
Morley
Mormon
Mornay
Moro
Morocco
Morpheus
Morris
Morris chair
Morrison
Mors
Morse
Mortimer
Mosaic
Moseley
Moselle
Moses
Moskva
Moslem
Moslemism
Mosul
Mother Carey's chicken
Mother Goose
Mother Hubbard
Mother of God
Mothering Sunday
Motherwell
Motherwell and Wishaw
Moulmein
Mount Desert Island
Mountain time
Mountbatten
Mountie
Moussorgsky
Mousterian
Mozambique
Mozarab
Mozart
Mr.
Mrs.
Ms.

Msgr.
Mt.
Mt. Rev.
Muhammad
Muhammadan
Muir
Muir Glacier
Mukden
Mulciber
Mulhouse
Mull
Mumford
Munch
Munda
Munich
Munich Pact
Munro
Munsell scale
Munster
Muntz metal
Murat
Murcia
Murdoch
Murillo
Murman Coast
Murmansk
Murphy
Murphy bed
Murray
Murrumbidgee
Mus.B.
Musca
Muscat
Muscat
and Oman
Muscovite
Muscovy duck
Muse
Musil
Muskogean
Muskogee
Muslim
Musset
Mussolini
Mussorgsky
Mussulman
Mustafa Kemal
Mutazilite

Muttra
Mv
Mweru
Mycenae
Mycenaean
Mycostatin
Mylitta
Myrmidon
Myron
Mysia
Mytilene
N
N.
N.A.
N.B.
N.C.
N.C.O.
N.F.
N.G.
N.I.
N.J.
N.S.
N.S.W.
N.T.
N.U.T.
N.W.T.
N.Y.
N.Y.C.
N.Z.
NACA
NAD
NASA
NATO
NB
NE
NF
NGC
NKVD
NL
NMR
NNE
NNW
NS
NSF
NW
Na
Na-Dene
Nabataean

Nablus
Nabokov
Nabonidus
Naga
Nagaland
Nagano
Nagari
Nagorno-Karabakh Autonomous Region
Nagoya
Nagpur
Nagy
Nah.
Nahuatl
Nahuatlan
Nahum
Nairn
Nairobi
Nalchik
Nama
Namangan
Namaqualand
Namhoi
Nammu
Namtar
Nanak
Nanchang
Nancy
Nanga Parbat
Nanna
Nanning
Nansen
Nansen bottle
Nantucket
Naoise
Naomi
Napier's bones
Napierian logarithm
Naples
Naples yellow
Napoleon
Napoleon I
Napoleon II
Napoleonic
Napoleonic Code
Napoleonic Wars
Nara
Naraka
Narbada

Narbonne
Narcissus
Narragansett Bay
Narva
Narvik
Naseby
Nashua
Nashville
Nasser
Natal
Nathan
Nathanael
National Covenant
National Guard
National Liberation
Front
National Security Council
National Socialism
Nationalist China
Native States
Nativity
Naucratis
Nauru
Navaho
Navarino
Navarre
Navy Cross
Naxos
Nayarit
Nazarene
Nazareth
Nazarite
Naze
Nazi
Nb
Nd
Ne
Ne Win
Neanderthal
Neanderthal man
Neapolitan
Neapolitan ice cream
Near East
Nebiim
Nebo
Nebr.
Nebraska
Nebuchadnezzar

Neckar
Necker
Nefertiti
Negress
Negrillo
Negrito
Negro
Negro spiritual
Negrophobe
Neh.
Nehemiah
Nehru
Neisse
Nejd
Nelson
Neman
Nembutal
Nemean lion
Nemesis
Neo-Darwinism
Neo-Gothic
Neo-Lamarckism
Neo-Latin
Neo-Pythagoreanism
Neocene
Neogaea
Neogene
Neolithic
Neoplatonism
Neoptolemus
Neotropical
Nepali
Nepos
Neptune
Neptunian
Nereid
Nereus
Nernst
Nero
Neruda
Nerva
Nerval
Nesselrode
Nessus
Nestor
Nestorian
Nestorius
Neth.

Netherlands
Netherlands Guiana
Neusatz
Neustria
Nev.
Neva
Nevada
Nevers
Nevis
Nevski
New Bedford
New Britain
New Brunswick
New Castile
New Church
New Deal
New England
New Forest
New France
New Georgia
New Granada
New Guinea
New Hampshire
New Harmony
New
Hebrides
New Ireland
New Jersey
New Jerusalem
New Jerusalem Church
New Kingdom
New Latin
New Learning
New Left
New Mexico
New Netherland
New Objectivity
New Orleans
New Plymouth
New Siberian Islands
New South Wales
New Spain
New Testament
New Thought
New World
New World monkey
New Year
New Year's Day

New Year's Eve
New York
New York Bay
New Zealand
Newark
Newburg
Newcastle
Newcastle disease
Newcomen
Newfoundland
Newman
Newmarket
Newport
Newton
Newtonian telescope
Ni
Niagara
Niagara Falls
Nibelung
Nibelungenlied
Nicaea
Nicaragua
Nice
Nicene Council
Nicene Creed
Nicholas
Nicholas I
Nicholas II
Nicholson
Nichrome
Nicias
Nicklaus
Nicobar Islands
Nicobarese
Nicodemus
Nicol prism
Nicolai
Nicolson
Nicosia
Nidaros
Niedersachsen
Nielsen
Niersteiner
Nietzsche
Niflheim
Niger
Niger-Congo
Nigeria

Nightingale
Nihon
Niigata
Nijinsky
Nike
Nikko
Nile
Nile blue
Nile green
Nilgiri Hills
Nilotic
Nilsson
Nimitz
Nimrod
Nimwegen
Nina
Nineveh
Ningal
Ningpo
Ningsia
Ninurta
Niobe
Nip
Nipissing
Nippon
Nippur
Nisan
Nissen
hut
Niue
Nivernais
Nizhni Novgorod
Nizhni Tagil
Njord
Nkrumah
No
Noachian
Noah
Noah's Dove
Nobel
Nobel Prize
Nobel prize
Noel
Nofretete
Noguchi
Noh
Nolde
Nona

Nootka
Nor.
Nordau
Nordic
Nordkyn Cape
Nordrhein-Westfalen
Norfolk
Norfolk Island
Norfolk jacket
Norge
Norma
Norman Conquest
Norman French
Normandy
Norse
Norseman
North
North America
North Atlantic Treaty Organization
North Borneo
North Brabant
North Carolina
North Channel
North Country
North Dakota
North Germanic
North Holland
North Island
North Korea
North Pole
North Rhine-Westphalia
North Riding
North Star
North Vietnam
Northampton
Northamptonshire
Northcliffe
Northeast
Northern Cross
Northern Ireland
Northern Rhodesia
Northern Territories
Northerner
Northman
Northumberland
Northumbria
Northumbrian
Northwest

Northwest Passage
Northwest Territories
Northwest Territory
Norw.
Norway
Norway maple
Norwegian
Norwegian Sea
Norwegian elkhound
Norwich
Nostradamus
Notogaea
Notre Dame
Nottingham
Nottinghamshire
Notus
Nov.
Nova
Lisboa
Nova Scotia
Novara
Novaya Zemlya
November
Novgorod
Novocaine
Novokuznetsk
Novosibirsk
Np
Nubia
Nubian
Nubian Desert
Nuevo Laredo
Numa Pompilius
Numbers
Numidia
Numidian crane
Nunc Dimittis
Nupercaine
Nuremberg
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Nuristan
Nurmi
Nusku
Nut
Nyasaland
Nyaya
Nyeman
Nynorsk

Nyx
O
O'Casey
O'Connor
O'Higgins
O'Neill
O.
O. Henry
O.B.
O.C.
O.D.
O.E.D.
O.F.M.
O.G.
O.P.
O.S.
O.S.A.
O.S.B.
O.S.D.
O.S.F.
O.T.C.
OAO
OAS
OCAM
OCD
OD
OE
OECD
OEO
OF
OFris
OHG
OP
OPEC
Oahu
Oakland
Oates
Oaxaca
Ob
Obad.
Obadiah
Oberammergau
Oberhausen
Oberland
Oberon
Oc.
Occam
Occident

Occidental
Occidentalize
Ocean of Storms
Oceania
Oceanid
Oceanus
Ockeghem
Ockham
Ockham's razor
Oct.
Octans
Octavia
Octavian
October
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Oddfellow
Odelsting
Odense
Oder
Odin
Odoacer
Odysseus
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Oe
Oedipus
Oedipus complex
Oenone
Offenbach
Ogbomosho
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Ogpu
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Oil Rivers
Oireachtas
Oisin
Oistrakh
Ojibwa
Okeechobee
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Okhotsk
Okie
Okinawa
Okla.
Oklahoma
Olaf I
Olaf II
Olaf V

Olcott
Old
Bailey
Old Bulgarian
Old Castile
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Old Delhi
Old English
Old English sheepdog
Old French
Old Frisian
Old Guard
Old Harry
Old High German
Old Icelandic
Old Kingdom
Old Latin
Old Low German
Old Nick
Old Norse
Old North French
Old Northwest
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Old Pretender
Old Prussian
Old Saxon
Old South
Old Test.
Old Testament
Old World
Old World monkey
Oldcastle
Oldenburg
Oldham
Olduvai Gorge
Oligocene
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Oliver
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Olivier
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Om
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Omar Khayyam
Omdurman
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Onassis
Onega
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Ont.
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Ophir
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Oporto
Oppenheimer
Ops
Oran
Orange Free State
Orangeism
Orangeman
Oratorian
Orcus
Ordovician
Ordzhonikidze
Orebro
Oreg.
Oregon
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Orenburg
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Orestes
Oresund
Orff
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Orientalize
Oriente
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Orion

Orissa
Oriya
Orizaba
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Orleanist
Orleans
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 y Gasset
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Orth.
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Os
Osage
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Oscan
Oscar
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Osco-Umbrian
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Ossa
Osset
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Ossetic
Ossian
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Ostend
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Ostrogoth
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Ostyak
Otranto
Otterburn
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Ouachita
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P.
P.A.
P.B.
P.C.
P.D.
P.E.
P.E.I.
P.G.
P.I.
P.M.
P.M.G.
P.O.
P.O.D.
P.P.
P.R.
P.S.
P.T.

P.T.O.
P.W.D.
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PA
PA system
PABA
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PPI
PR
PVC
Pa
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Pacific Ocean
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Paddy
Paderewski
Padishah
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Padua
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Pahlavi
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Paley
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Palladian
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Palladium
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Palm Beach
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Palo Alto
Pamlico Sound
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Piranesi
Pisa

Pisano
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Ponta Delgada
Pontefract
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Pontianak
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Pontifical Mass
Pontine Marshes
Pontius Pilate
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Porsena
Port Arthur
Port Blair
Port Elizabeth
Port Harcourt
Port Jackson
Port Moresby
Port
Orford cedar
Port Phillip Bay
Port Royal
Port Said
Port Sudan
Port-Salut
Port-au-Prince
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Porte
Porter
Portland
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Portsmouth
Portugal
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Portuguese East Africa
Portuguese Guinea
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Portuguese Timor
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Portuguese man-of-war
Poseidon
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Potsdam
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Poussin
Powys
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Pre-Raphaelite
Precambrian
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Presb.
Presbyterian
Presley
Prester John
Preston
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Preussen
Priam
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Pride
Prince Albert
Prince Edward Island
Prince Rupert

Prince of Darkness
Prince of Peace
Prince of Wales
Princeton
Principe
Prinz
Prior
Priscian
Privatdocent
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Procne
Procopius
Procrustean
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Procyon
Prog.
Progressive Party
Prokofiev
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Promethean
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Pronuba
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Q.C.
Q.E.D.
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Qatar
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Quaker
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Quaternary
Quathlamba
Quatre Bras
Que.
Quebec

Quechua
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Queensland
Queensland nut
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Quelpart
Quemoy
Quesnay
Quetzalcoatl
Quezon City
Quiberon
Quilmes
Quimper
Quinn
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Quintana Roo
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Quirinal
Quirinus
Quirites
Quito
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Qumran
Quonset hut
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R and R
R.
R.A.
R.A.A.F.
R.A.M.
R.C.
R.C.A.F.
R.C.M.P.
R.C.P.
R.C.S.
R.E.
R.I.
R.I.B.A.
R.I.P.

R.M.A.
R.M.S.
R.N.
R.Q.
R.R.
R.S.V.P.
RA
RAF
RAM
RATO
RF
RM
RNA
ROK
RSFSR
Ra
Rabat
Rabaul
Rabbath Ammon
Rabelais
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Rabia
Race
Rachmaninoff
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Raeburn
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Rajab
Rajasthan
Rajasthani
Rajkot
Rajput
Raleigh
Ram
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Ramachandra
Ramadan
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Ramat Gan
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Rameau
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Rangoon
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Rapa Nui
Rapallo
Raphael
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Red Indian
Red Poll
Redeemer
Redmond
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Ref. Ch.

Reform Bill
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Regin
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Remscheid
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Renaissance
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Richthofen
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Rip Van Winkle
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Robespierre
Robin Goodfellow
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Rockefeller
Rockhampton

Rockies
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Rocky Mountain goat
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Roentgen
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Roger
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Rolf
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Rom. Cath.
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Roquefort
Rorschach test
Rosa
Roscius
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Rosetta stone
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Rosh Hashanah
Rosicrucian
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Ross Ice Shelf
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Rossetti
Rossini
Rossiya
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Rotherham
Rothermere
Rothko
Rothschild
Rotorua
Rotterdam
Rottweiler

Rouault
Roubaix
Rouen
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Roulers
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Rousseau
Roussillon
Rover
Rowe
Rowlandson
Roxburgh
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S. Dak.
S. of Sol.
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San Blas
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San Francisco Bay
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San Jose scale
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Turgot
Turin
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Turk.
Turkestan
Turkey
Turkey red
Turki
Turkic
Turkish
Turkish Empire
Turkish bath
Turkish coffee
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Turkish rug
Turkish tobacco
Turkish towel
Turkmen
Turkoman
Turku
Turner
Turpin
Tuscan
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UAM
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Unit.
Unitarian
Unitarianism
United Arab Republic

United Arab States
United Kingdom
United Nations
United Press International
United Provinces
United States
United States Navy
United States of America
Univ.
Universal Postal Union
Universalism
Unknown Soldier
Unterwalden
Upanishad
Upolu
Upper Austria
Upper
Egypt
Upper Silesia
Upper Tunguska
Upper Volta
Uppsala
Ur
Ural-Altaic
Uralian
Uralic
Urania
Uranian
Uranus
Urban II
Urdar
Urdu
Urey
Urfa
Urga
Uriah
Uriel
Urim and Thummim
Urmia
Urquhart
Ursa Major
Ursa Minor
Ursula
Ursuline
Uru.
Uruguay
Urumchi
Ushant

Ushas
Usk
Uspallata Pass
Ust-Kamenogorsk
Utah
Utgard-Loki
Uther
Utica
Uto-Aztecan
Utopia
Utrecht
Utrillo
Uttar Pradesh
Utu
Uxmal
Uzbek
V
V neck
V-1
V-2
V-Day
V-E Day
V-J Day
V-mail
V-shaped
V-type engine
V.
V. Rev.
V.A.
V.C.
V.I.
V.P.
V.R.
V.W.
VAR
VAT
VC
VD
VHF
VIP
VISTA
VLF
VTOL
Va.
Vaal
Vaasa
Vaduz
Vaishnava

Vaisya
Valais
Valdai Hills
Valdemar I
Valence
Valencia
Valenciennes
Valentine
Valentinian I
Valentino
Valera
Valkyrie
Valladolid
Valletta
Valley Forge
Vallombrosa
Valois
Valona
Valparaiso
Van
Van Allen belt
Van Buren
Van Diemen's Land
Van Dyck
Van Gogh
Vance
Vancouver
Vandal
Vanderbilt
Vandyke
Vandyke beard
Vandyke brown
Vandyke collar
Vane
Vanir
Vanity Fair
Vanua Levu
Var
Varanasi
Vardar
Vardhamana
Varese
Vargas
Varityper
Varro
Varuna
Vasco

da Gama
Vaseline
Vashti
Vat.
Vatican
Vatican City
Vauban
Vaucluse
Vaud
Vaudois
Vaughan
Vaughan Williams
Veda
Vedanta
Vedda
Vedic
Vega
Veii
Vela
Ven.
Venetia
Venetian
Venetian blind
Venetian glass
Venetian red
Venetic
Venezia Giulia
Venezia Tridentina
Venezuela
Venice
Venite
Venlo
Venn diagram
Ventris
Venturi tube
Venus
Venus's flower basket
Venus's looking-glass
Venus's-flytrap
Venus's-hair
Venusberg
Venusian
Veracruz
Vercelli
Vercingetorix
Verde
Verdun
Vereeniging

Verein
Vergil
Vermeer
Vermont
Verner's law
Vernoleninsk
Verona
Veronese
Verrazano
Verrocchio
Vertumnus
Verulamium
Verwoerd
Vespasian
Vesper
Vespucci
Vesta
Vesuvius
Veterans Administration
Veterans Day
Viborg
Vic.
Vicar of Christ
Vichy
Vicksburg
Vicky
Vico
Victor Emmanuel III
Victoria
Victoria Cross
Victoria Island
Victoria Land
Victorian
Vidar
Vienna
Vienna sausage
Vienne
Vientiane
Vietcong
Vietnam
Vietnam War
Vietnamese
Vignola
Viipuri
Viking
Villa
Villanovan
Villeneuve

Villon
Viminal
Vincennes
Vincent de
Paul
Vincent's angina
Vindhya Pradesh
Vineland
Vinnitsa
Virchow
Virgil
Virgin Mary
Virginia
Virginia Beach
Virginia creeper
Virginia deer
Virginia reel
Virginia stock
Virgo
Visakhapatnam
Visayan
Visayan Islands
Visby
Visconti
Vishinsky
Vishnu
Visigoth
Vistula
Vitebsk
Vitoria
Vitruvius Pollio
Vivian
Viyella
Vladikavkaz
Vladimir
Vladivostok
Vlaminck
Vlissingen
Vltava
Vogul
Volans
Volga
Volgograd
Volkslied
Volsci
Volscian
Volsung
Volsunga Saga

Volta
Voltaire
Volturno
Vorlage
Voronezh
Voroshilov
Voroshilovgrad
Voroshilovsk
Vortumnus
Vosges
Vostok
Votyak
Vouvray
Vries
Vt.
Vuelta Abajo
Vuillard
Vul.
Vulcan
Vulg.
Vulgate
Vulpecula
Vyatka
Vyborg
W
W.
W.A.
W.C.
W.C.T.U.
W.D.
W.I.
W.O.
WAAC
WAAF
WHO
WNW
WRAC
WRAF
Waadt
Waal
Wabash
Wace
Wad Medani
Wadai
Wade
Wadi Halfa
Wafd
Wagga Wagga

Wagner
Wagram
Wahhabi
Waikiki
Wakashan
Wakayama
Wake Island
Wakefield
Waksman
Wal.
Walachia
Waldemar I
Waldenburg
Waldenses
Waldheim
Waldorf salad
Waler
Wales
Walfish Bay
Walhalla
Walkyrie
Wall Street
Wallace
Wallachia
Wallasey
Wallenstein
Waller
Wallis
Walloon
Wallsend
Walpurgis
Night
Walsingham
Walter
Walvis Bay
Wandering Jew
Wanderjahr
Wanhsien
Wanne-Eickel
War Between the States
War of 1812
War of Secession
War of the Austrian Succession
War of the Spanish Succession
Warbeck
Ward
Warhol
Warren

Warrington
Wars of the Roses
Warsaw Pact
Warta
Wartburg
Warwick
Warwickshire
Wash
Wash.
Washington
Washington palm
Waterford
Waterloo
Watling Island
Watson
Watt
Watteau
Watts
Watusi
Waugh
Waves
Wayland
Wayne
Waziristan
Wb
Weald
Webb
Weber
Weddell Sea
Wedekind
Wedgwood
Wedgwood blue
Wednesday
Wehrmacht
Weichsel
Weimar Republic
Weimaraner
Weismannism
Weisshorn
Weizmann
Welch
Welles
Wellesley
Wellesz
Wellington boots
Wells
Welsh
Welsh corgi

Welsh dresser
Welsh rabbit
Welsh rarebit
Welsh springer spaniel
Welsh terrier
Weltanschauung
Weltpolitik
Weltschmerz
Wembley
Wenceslaus
Wend
Wendish
Wensleydale
Wentworth
Wesley
Wesleyan
Wesleyanism
Wessex
West
West Berlin
West Bromwich
West End
West Flanders
West Germanic
West
Germany
West Hartlepool
West Irian
West Pakistan
West Point
West Prussia
West Sussex
West Virginia
Western
Western Australia
Western Church
Western Hemisphere
Western Ocean
Western Roman Empire
Western Samoa
Westfalen
Westminster
Westminster Abbey
Westmorland
Westphalia
Wetterhorn
Wexford
Weymouth

Wheatstone bridge
Whig
Whiggism
Whistler
Whit
Whitaker
White House
White Mountains
White Nile
White Russia
White Russian
White Sea
White Volta
Whitechapel
Whitehall
Whitehead
Whitehorse
Whitney
Whitsun
Whitsunday
Whitsuntide
Whittington
Whittle
Whyalla
Wichita
Wick
Wickliffe
Wicklow
Wieland
Wien
Wiesbaden
Wigan
Wight
Wilberforce
Wild Hunt
Wild West
Wild West show
Wilde
Wilderness
Wilhelm I
Wilhelm II
Wilhelmstrasse
Wilkes
Wilkes Land
Wilkins
Willemstad
William I
William II

William the Conqueror
Williams
Williamsburg
Williamson
Wilmington
Wilson cloud chamber
Wilson's snipe
Wilton
Wiltshire
Wimshurst machine
Winchester
Wind River Range
Windermere
Windhoek
Windsor
Windsor chair
Windsor
knot
Windsor tie
Windward Islands
Windward Passage
Winnebago
Winnipegosis
Wirephoto
Wis.
Wisconsin
Wisd.
Wisla
Wismar
Wittenberg
Wittgenstein
Witwatersrand
Wobbly
Woden
Wolf
Wolfe
Wolff
Wolfram von Eschenbach
Wollongong
Wolof
Wolsey
Wolverhampton
Wood
Woodbridge
Woods
Woolf
Woolley
Woolworth

Worcester
Worcestershire
Wordsworth
World Bank
World Court
World Health Organization
World Series
World War I
World War II
Worms
Worship
Worth
Wotan
Wotton
Wrens
Wright
Wuhan
Wuhsien
Wuhu
Wulfila
Wundt
Wyandotte
Wyatt
Wycliffite
Wye
Wyeth
Wyo.
Wyoming
X
X chromosome
XL
XP
Xanthippe
Xanthus
Xavier
Xe
Xenocrates
Xenophanes
Xenophon
Xeres
Xerox
Xerxes I
Xhosa
Ximenes
Xmas
Xn.
Xnty.
Xt.

Xuthus
Y
Y chromosome
Y.
Y.M.C.A.
Y.M.H.A.
Y.T.
Y.W.C.A.
Y.W.H.A.
YHVH
Yahata
Yahrzeit
Yahweh
Yahwistic
Yajur-Veda
Yakut
Yakutsk
Yalta
Yalu
Yama
Yamashita
Yang
Yangtze
Yanina
Yank
Yankee
Yankee Doodle
Yankeeism
Yap
Yarkand
Yarmouth
Yaroslavl
Yawata
Yb
Yeisk
Yellow River
Yellowknife
Yellowstone
Yellowstone Falls
Yellowstone
National Park
Yemen
Yenisei
Yentai
Yerevan
Yezd
Ygerne
Yggdrasil

Yiddish
Yin and Yang
Yingkow
Ymir
Yoga
Yokohama
Yom Kippur
Yonkers
Yonne
Yorkist
Yorkshire
Yorkshire pudding
Yorkshire terrier
Yorktown
Yoruba
Yosemite Falls
Young
Young Pretender
Young Turk
Young's modulus
Youngstown
Ypres
Ypsilanti
Yser
Yseult
Yt
Yugo.
Yugoslav
Yugoslavia
Yukaghir
Yukon
Yukon time
Yurev
Z
Zabrze
Zacatecas
Zacynthus
Zagazig
Zagreb
Zagreus
Zagros Mountains
Zama
Zambia
Zamboanga
Zamora
Zante
Zapata
Zaporozhye

Zarathustra
Zebedee
Zebulun
Zech.
Zechariah
Zeebrugge
Zeeland
Zeeman effect
Zeist
Zeitgeist
Zen
Zend-Avesta
Zeno of Citium
Zeno of Elea
Zenobia
Zeph.
Zephaniah
Zephyrus
Zeppelin
Zermatt
Zetland
Zeus
Zeuxis
Zhdanov
Zhukov
Ziegfeld
Zilpah
Zimbabwe
Zinfandel
Zinovievsk
Zion
Zionism
Zipangu
Ziska
Zlatoust
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Zoan
Zollverein
Zomba
Zorn
Zoroaster
Zoroastrian
Zoroastrianism
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Zuyder Zee
Zweig
Zwickau
Zwinglian
Zwolle
Zworykin
Zyrian
a
a cappella
a capriccio
a fortiori
a
la carte
a la mode
a posteriori
a priori
a tempo
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a.c.
a.f.
a.m.
a.p.
a.r.
a.w.
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aalii
aardvark
aardwolf
ab initio
ab origine
ab ovo
ab urbe condita
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abacus
abaft
abalone
abamp
abampere
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abandoned
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abeyance
abeyant
abfarad
abhenry
abhor
abhorrence
abhorrent
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ability
abiogenesis
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abiosis
abiotic
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abirritate
abject
abjuration
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able seaman
able-bodied
able-bodied seaman
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abnegate
abnormal
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abnormality
abnormity
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abomasum
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aborticide
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abortive
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about-face
about-ship
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abrasive
abraxas
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abroach
abroad
abrogate
abrupt
abruption
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abscission
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abseil
absence
absence of mind
absence without leave
absent
absent without leave
absent-minded

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absentee ballot
absentee landlord
absentee vote
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absolute alcohol
absolute altitude
absolute ceiling
absolute humidity
absolute idealism
absolute magnitude
absolute majority
absolute monarchy
absolute music
absolute pitch
absolute temperature
absolute value
absolute zero
absolutely
absolution
absolutism
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absorptance
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absorption spectrum
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abstention
abstergent

abstinence
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abstract expressionism
abstract noun
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abstractionism
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abstriction
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absurdity
abulia
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abuzz
abvolt
abwatt
aby
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abysmal
abyss
abyssal
acacia
academe
academia
academic
academic freedom
academic year
academician
academicism
academy
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acanthocephalan

acanthoid
acanthopterygian
acanthous
acanthus
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acaricide
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accommodation bill
accommodation ladder
accommodation train
accommodative
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accordingly
accordion
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account book
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account receivable
accountable
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accountant
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acerose
acervate
acescent
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acetic acid
acetic anhydride
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acetometer
acetone
acetone body
acetophenetidin
acetous
acetum
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acetylate
acetylcholine
acetylene
acetylide
acetylsalicylic acid
acey-deucy
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achievement
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achievement quotient
achievement test
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achlorhydria
achondrite
achondroplasia
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achromaticity
achromatin
achromatism
achromatize
achromatous
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aciculum
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acid drop
acid dye
acid rock
acid soil
acid test
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acid-forming
acid-head
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acidophil
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acidosis
acidulant
acidulate
acidulent
acidulous
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acinaciform
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acinus
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acknowledge
acknowledgment
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acne
acnode
acolyte
aconite
acorn
acorn barnacle
acorn squash
acorn worm
acosmism
acotyledon
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acoustic mine
acoustic nerve
acoustic phonetics
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acoustics
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acquaintance
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acquiesce
acquiescence
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acquittal
acquittance
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acre-inch
acreage
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acridine
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acrobatics
acrocarpous
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acrodrome
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acrolein
acrolith
acromegaly
acromion
acronym
acropetal
acrophobia
acropolis
acrospire
across
across-the-board
acrostic
acroter
acroterion
acrylic
acrylic acid

acrylic resin
acrylonitrile
acrylyl
act
act curtain
act of God
act of faith
act of war
act on
act out
act up
actable
actg.
actin
actinal
acting
acting area
actinia
actinic
actinic ray
actinide series
actiniform
actinism
actinium
actinium series
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actinochemistry
actinoid
actinolite
actinology
actinometer
actinomorphic
actinomycete
actinomycin
actinomycosis
actinon
actinopod
actinotherapy
actinouranium
actinozoan
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action
 painting
actionable
activate
activated sludge
activator
active

active duty
active immunity
active list
active service
activism
activist
activity
actomyosin
actor
actress
actual
actuality
actualize
actually
actuary
actuate
acuate
acuity
aculeate
aculeus
acumen
acuminate
acupuncture
acutance
acute
acute accent
acute alcoholism
acyclic
acyl
ad
ad hoc
ad hominem
ad infinitum
ad interim
ad lib
ad libitum
ad litem
ad nauseam
ad rem
ad val.
ad valorem
ad-
ad-lib
adactylous
adage
adagietto
adagio
adamant

adamantine
adamsite
adapt
adaptable
adaptation
adapter
adaptive
adaxial
add
add up
add.
addax
addend
addendum
adder
adder's-mouth
adder's-tongue
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addiction
addictive
adding machine
additament
addition
additional
additive
additory
addle
addlebrained
addlepated
address
addressee
addressing machine
adduce
adduct
adduction
adductor
ademption
adenectomy
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adenitis
adeno-
adenocarcinoma
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adenoidal
adenoidectomy
adenoma
adenosine

adenosine
triphosphate
adenovirus
adept
adequacy
adequate
adermin
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adherence
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adhesion
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adhesive tape
adhibit
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adiaphorism
adiaphorous
adiathermancy
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adipocere
adipose
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adjective
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adjoint
adjourn
adjournment
adjt.
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adjudicate
adjudication
adjunct
adjunction
adjure
adjust
adjustment
adjutant
adjutant bird
adjutant general

adjuvant
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admass
admeasure
admeasurement
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administer
administrate
administration
administrative
administrator
admirable
admiral
admiralty
admiralty metal
admiration
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admission
admissive
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admonition
admonitory
adnate
ado
adobe
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adoptive
adorable
adoration
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adorn
adornment
adown
adrenal
adrenal
gland
adrenaline
adrenocorticotropic

adrenocorticotropic hormone
adrift
adroit
adscititious
adscription
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adsorbate
adsorbent
adsuki bean
adularia
adulate
adulation
adult
adulterant
adulterate
adulteration
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adulteress
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adulterous
adultery
adulthood
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adumbrate
adust
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advance
advance guard
advanced
advancement
advantage
advantageous
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advent
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adventuresome
adventuress
adventurism
adventurous
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adversaria
adversary
adversative
adverse

adverse possession
adversity
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advertent
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advertisement
advertising
advice
advisable
advise
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advisedly
advisee
advisement
adviser
advisory
advocaat
advocacy
advocate
advocation
advocatus diaboli
advowson
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adytum
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ae.
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aecium
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aedile
aegis
aegrotat
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aeolian harp
aeolipile
aeolotropic
aeon
aeonian
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aerate
aerator
aeri-
aerial
aerial bomb

aerial ladder
aerial
mine
aerial perspective
aerial photograph
aerial torpedo
aerialist
aerie
aerification
aeriform
aerify
aero
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aeroballistics
aerobatics
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air-sea rescue
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all-American

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anchor light
anchor man
anchor ring

anchor watch
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angiosperm
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angle iron

angle of attack
angle of bank
angle of deviation
angle of dip
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annulment
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annunciate
annunciation
annunciator
annus mirabilis

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ball bearing
ball boy
ball cock
ball game
ball lightning
ball mill
ball of fire
ball valve
ball-and-socket joint

ball-peen hammer
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ballad stanza
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balladry
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ballata
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ballflower
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ballistic galvanometer
ballistic missile
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balloon sail
balloon tire
balloon vine
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ballottement
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bank account
bank balance
bank bill
bank check
bank clerk
bank discount
bank examiner
bank holiday
bank indicator
bank loan
bank manager
bank note
bank on
bank rate
bank statement
bank swallow
bankable
bankbook
banker
banker's check
banket
banking
bankroll
bankrupt
bankruptcy
banksia
banlieue
banner

banner cloud
banneret
bannerol
bannock
banns
banquet
banquette
bans
banshee
bant
bantam
bantamweight
banter
banting
bantling
banyan
banzai
banzai
 attack
baobab
baptism
baptism of fire
baptismal regeneration
baptistery
baptistry
baptize
bar
bar graph
bar line
bar magnet
bar mitzvah
bar sinister
bar.
barathea
barb
barbarian
barbaric
barbarism
barbarity
barbarize
barbarous
barbate
barbecue
barbecue sauce
barbed
barbed wire
barbel
barbell

barbellate
barber
barber chair
barber's itch
barberry
barbershop
barbet
barbette
barbican
barbicel
barbital
barbitone
barbiturate
barbituric acid
barbiturism
barbule
barbwire
barcarole
barchan
bard
barde
bare
bare-handed
bareback
barefaced
barefoot
barehanded
bareheaded
barely
baresark
barfly
bargain
bargain for
bargain-basement
barge
barge couple
barge course
bargeboard
bargello
bargeman
barghest
baric
barilla
barit.
barite
baritone
barium
barium hydroxide

barium oxide
barium sulfate
bark
bark beetle
barkeeper
barkentine
barker
barking deer
barley
barley sugar
barley water
barleycorn
barm
barmaid
barman
barmy
barn
barn dance
barn owl
barn swallow
barnacle
barnacle
 goose
barney
barnstorm
barnyard
baro-
barogram
barograph
barometer
barometric pressure
barometrograph
barometry
baron
baron of beef
baronage
baroness
baronet
baronetage
baronetcy
barong
baronial
barony
baroque
baroque organ
baroscope
barouche
barque

barquentine
barrack
barracks
barracks bag
barracoon
barracuda
barrage
barrage balloon
barramunda
barranca
barrator
barratry
barre
barred
barrel
barrel chair
barrel organ
barrel roll
barrel vault
barrel-chested
barrelhouse
barren
barrens
barret
barrette
barretter
barricade
barrier
barrier reef
barring
barrio
barrister
barroom
barrow
bartender
barter
bartizan
barton
barye
baryon
baryta
barytes
baryton
barytone
bas bleu
bas mitzvah
bas-relief
basal

basal metabolic rate
basal metabolism
basalt
basaltware
basanite
bascinet
bascule
base
base hospital
base level
base metal
base on balls
base pay
base period
base rate
baseball
baseball glove
baseboard
baseborn
baseburner
baseless
baseline
baseman
basement
bases
bash
bashaw
bashful
bashibazouk
basic
basic
anhydride
basic slag
basically
basicity
basidiomycete
basidiospore
basidium
basifixed
basil
basilar
basilic vein
basilica
basilisk
basin
basinet
basion
basipetal

basis
bask
basket
basket chair
basket fern
basket hilt
basket weave
basket-handle arch
basketball
basketry
basketwork
basking shark
basophil
bass
bass clef
bass drum
bass guitar
bass horn
bass viol
bassarisk
basset
basset horn
bassinet
bassist
basso
basso cantante
basso continuo
basso profundo
basso-rilievo
bassoon
basswood
bast
bastard
bastard measles
bastard title
bastard wing
bastardize
bastardy
baste
bastille
bastinado
basting
bastion
bat
batch
bate
bateau
batfish

batfowl
bath
bath salts
bath towel
bathe
bathetic
bathhouse
bathing beauty
bathing suit
batho-
batholith
bathometer
bathos
bathrobe
bathroom
bathtub
bathtub gin
bathy-
bathyal
bathymetry
bathypelagic
bathyscaphe
bathysphere
batik
batiste
batman
baton
batrachian
bats
batsman
batt
battalion
battement
batten
batter
battering ram
battery
battik
batting
battle
battle
cruiser
battle cry
battle fatigue
battle group
battle lantern
battle line
battle royal

battle-ax
battled
battledore
battlefield
battlement
battleplane
battleship
battologize
battology
battue
batty
batwing
bauble
baud
baudekin
baulk
bauxite
bavardage
bawbee
bawcock
bawd
bawdry
bawdy
bawdyhouse
bawl
bawl out
bay
bay leaf
bay lynx
bay oil
bay rum
bay tree
bay window
bayadere
bayard
bayberry
bayonet
bayou
baywood
bazaar
bazooka
bbl.
bd.
bd. ft.
bdellium
bdl.
be
be-

be-all and end-all
beach
beach ball
beach buggy
beach flea
beach grass
beach plum
beach umbrella
beach wagon
beachcomber
beachhead
beacon
bead
bead-ruby
beaded
beading
beadle
beadledom
beadroll
beadsman
beady
beagle
beak
beaker
beam
beam antenna
beam compass
beam wind
beam-ends
beam-power tube
beaming
beamy
bean
bean caper
bean sprout
bean tree
beanery
beanfeast
beanie
beano
beanpole
beanstalk
bear
bear down
bear garden
bear hug
bear off
bear on

bear out
bear up
bear with
bear's-ear
bear's-foot
bearable
bearberry
bearcat
beard
bearded
bearded
darnel
bearded lizard
bearded tit
bearded vulture
beardless
bearer
bearing
bearing plate
bearing rein
bearish
bearskin
bearwood
beast
beast of burden
beastings
beastly
beat
beat down
beat up
beat-up
beaten
beater
beatific
beatification
beatify
beating
beatitude
beatnik
beau
beau geste
beau ideal
beau monde
beaut
beauteous
beautician
beautiful
beautifully

beautify
beauty
beauty parlor
beauty queen
beauty salon
beauty sleep
beauty spot
beaux
beaver
beaverette
bebeerine
bebeeru
bebop
becalm
becalmed
became
because
beccafico
bechance
becharm
beck
becket
becket bend
beckon
becloud
become
becoming
bed
bed and board
bed chair
bed jacket
bed linen
bed of roses
bedabble
bedaub
bedazzle
bedbug
bedchamber
bedclothes
bedcover
bedder
bedding
bedeck
bedel
bedesman
bedevil
bedew
bedfast

bedfellow
bedight
bedim
bedizen
bedlam
bedlamite
bedmate
bedpan
bedplate
bedpost
bedrabble
bedraggle
bedraggled
bedrail
bedridden
bedrock
bedroll
bedroom
bedside
bedsore
bedspread
bedspring
bedstead
bedstraw
bedtime
bedtime
story
bedwarmer
bee
bee beetle
bee fly
bee glue
bee killer
bee moth
bee plant
bee tree
bee-eater
beebread
beech
beech fern
beechnut
beef
beef cattle
beef extract
beef tea
beef-witted
beefburger
beefcake

beefeater
beefsteak
beefwood
beefy
beehive
beekeeper
beekeeping
beeline
been
beep
beer
beer and skittles
beer garden
beer pump
beery
beestings
beeswax
beeswing
beet
beet sugar
beetle
beetle-browed
beetroot
beeves
beezer
befall
befit
befitting
befog
befool
before
beforehand
beforetime
befoul
befriend
befuddle
beg
beg off
began
begat
beget
beggar
beggar's-lice
beggarly
beggarweed
beggary
begin
beginner

beginning
begird
begone
begonia
begorra
begot
begotten
begrime
begrudge
beguile
beguine
begum
begun
behalf
behave
behavior
behavior pattern
behavioral science
behaviorism
behead
beheld
behemoth
behest
behind
behindhand
behold
beholden
behoof
behoove
beige
being
bejewel
bel
bel canto
bel-esprit
belabor
belated
belaud
belay
belaying pin
belch
beldam
beleaguer
belemnite
belfry
belga
belie
belief

believe
belike
belittle
bell
bell
 buoy
bell glass
bell heather
bell jar
bell metal
bell pepper
bell tent
bell-bottoms
bell-ringer
belladonna
belladonna lily
bellarmine
bellbird
bellboy
belle
belles lettres
belles-lettres
belletrist
bellflower
bellhop
bellicose
bellied
belligerence
belligerency
belligerent
bellman
bellow
bellows
bellows fish
bells of Ireland
bellwether
bellwort
belly
belly dance
belly flop
belly landing
belly laugh
bellyache
bellyband
bellybutton
bellyful
belomancy
belong

belonging
belongings
beloved
below
belt
belted
belting
beluga
belvedere
bema
bemean
bemire
bemoan
bemock
bemuse
bemused
ben
ben trovato
bename
bench
bench mark
bench warrant
bencher
bend
bend sinister
bender
bendwise
bendy
beneath
benedicite
benedict
benediction
benefaction
benefactor
benefactress
benefic
benefice
beneficence
beneficent
beneficial
beneficiary
benefit
benefit of clergy
benempt
benevolence
benevolent
bengaline
benighted

benign
benignant
benignity
benison
benjamin
benne
bennet
benny
bent
bent
 grass
benthos
bentonite
bentwood
benumb
benzaldehyde
benzene
benzene hexachloride
benzene ring
benzidine
benzine
benzo-
benzoate
benzoate of soda
benzocaine
benzofuran
benzoic
benzoic acid
benzoin
benzol
benzophenone
benzoyl
benzoyl peroxide
benzyl
bequeath
bequest
berate
berberidaceous
berberine
berceuse
bereave
bereft
beret
berg
berg wind
bergamot
bergschrund
beriberi

berkelium
berley
berlin
berm
berretta
berry
bersagliere
berseem
berserk
berserker
berth
bertha
beryl
beryllium
beseech
beseem
beset
besetting
beshrew
beside
besides
besiege
beslobber
besmear
besmirch
besom
besot
besotted
besought
bespangle
bespatter
bespeak
bespectacled
bespoke
bespread
besprent
besprinkle
best
best bower
best girl
best man
best seller
bestead
bestial
bestiality
bestialize
bestiary
bestir

bestow
bestraddle
bestrew
bestride
bet
bet.
beta
beta decay
beta iron
beta particle
beta ray
beta test
betaine
betake
betatron
betel
betel nut
betel palm
beth
bethel
bethink
bethought
betide
betimes
betoken
betony
betook
betray
betroth
betrothal
betrothed
betta
better
better
half
betterment
betting shop
bettor
betulaceous
between
betweentimes
betweenwhiles
betwixt
bevatron
bevel
bevel gear
bevel square
beverage

bevy
bewail
beware
bewhiskered
bewilder
bewilderment
bewitch
bewray
bey
beyond
bezant
bezel
bezique
bezoar
bezonian
bhakti
bhang
bharal
bi-
bialy
biannual
biannulate
bias
biased
biathlon
biauriculate
biaxial
bib
bib and tucker
bibb
bibber
bibcock
bibelot
bibl.
biblio-
biblioclast
bibliofilm
bibliog.
bibliogony
bibliographer
bibliography
bibliolatry
bibliology
bibliomancy
bibliomania
bibliopegy
bibliophage
bibliophile

bibliopole
bibliotaph
bibliotheca
bibliotherapy
bibulous
bicameral
bicapsular
bicarb
bicarbonate
bicarbonate of soda
bice
bicentenary
bicentennial
bicephalous
biceps
bichloride
bichloride of mercury
bichromate
bicipital
bicker
bickering
bicollateral
bicolor
biconcave
biconvex
bicorn
bicuspid
bicycle
bicycle pump
bicycle race
bicyclic
bid
bid
price
bid up
bidarka
biddable
bidden
bidding
bidding prayer
biddy
bide
bidentate
bidet
bield
biennial
bier
biestings

bifacial
bifarious
biff
biffin
bifid
bifilar
biflagellate
bifocal
bifocals
bifoliate
bifoliolate
biforate
biforked
biform
bifurcate
big
big band
big business
big cheese
big end
big game
big gun
big idea
big name
big noise
big shot
big stick
big talk
big time
big top
big tree
big wheel
big-bang theory
big-name
bigamist
bigamous
bigamy
bigener
bigeye
biggin
bighead
bighorn
bight
bigmouth
bignonia
bignoniaceous
bigot
bigoted

bigotry
bigwig
bijection
bijou
bijouterie
bijugate
bike
bikini
bilabial
bilabiate
bilander
bilateral
bilateral symmetry
bilberry
bilbo
bile
bilection
bilestone
bilge
bilge keel
bilharziasis
biliary
biliary calculus
bilinear
bilingual
bilious
bilk
bill
bill of attainder
bill of exchange
bill of fare
bill of health
bill of indictment
bill of lading
bill of particulars
bill of sale
billabong
billboard
billbug
billet
billet-doux
billfish
billfold
billhead
billhook
billiard
billiard

ball
billiard parlor
billiard table
billiards
billing
billingsgate
billion
billionaire
billon
billow
billowy
billposter
billy
billy club
billy goat
billycock
bilobate
bilocular
biltong
bimah
bimanous
bimbo
bimestrial
bimetallic
bimetallism
bimolecular
bimonthly
bin
bin-
binal
binary
binary code
binary digit
binary fission
binary form
binary star
binary system
binate
binaural
bind
bind over
binder
bindery
binding
binding energy
bindle
bindweed
bine

binge
binghi
bingle
bingo
binnacle
binocular
binoculars
binomial
binomial distribution
binomial nomenclature
binomial theorem
binominal
binturong
binucleate
bio-
bioastronautics
biocatalyst
biocellate
biochemical oxygen demand
biochemistry
bioclimatology
biodegradable
biodynamics
bioecology
bioenergetics
biofeedback
biog.
biogen
biogenesis
biogeochemistry
biogeography
biographer
biographical
biography
biol.
biological
biological clock
biological warfare
biologist
biology
bioluminescence
biolysis
biomass
biome
biomedicine
biometrics
biometry
bionics

bionomics
biophysics
bioplasm
biopsy
bioscope
bioscopy
biosphere
biostatics
biosynthesis
biota
biotechnology
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biotin
biotite
biotope
biotype
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biparietal
biparous
bipartisan
bipartite
biparty
biped
bipetalous
biphenyl
bipinnate
biplane
bipod
bipolar
bipropellant
biquadrate
biquadratic
biquarterly
biracial
biradial
biramous
birch
birch
 beer
bird
bird call
bird cherry
bird dog
bird of paradise
bird of passage
bird of prey
bird pepper
bird shot

bird's-eye
bird's-foot
bird's-foot trefoil
bird's-nest fungus
bird-dog
bird-watcher
birdbath
birdcage
birdhouse
birdie
birdlike
birdlime
birdman
birdseed
birefringence
bireme
biretta
birl
birr
birth
birth certificate
birth control
birth rate
birthday
birthday suit
birthmark
birthplace
birthright
birthroot
birthstone
birthwort
bis
biscuit
bise
bisect
bisector
bisectrix
biserrate
bisexual
bishop
bishop's-cap
bishopric
bisk
bismuth
bismuthic
bismuthinite
bismuthous
bison

bisque
bissextile
bister
bistort
bistoury
bistre
bistro
bisulcate
bisulfate
bit
bit
part
bitartrate
bitch
bitchy
bite
biting
biting midge
bitstock
bitt
bitten
bitter
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bitter end
bitter orange
bitter principle
bitterling
bittern
bitternut
bitterroot
bitters
bittersweet
bitterweed
bitty
bitumen
bituminize
bituminous
bituminous coal
bivalent
bivalve
bivouac
biweekly
biyearly
biz
bizarre
bk.
bkcy.
bkg.

bks.
bl.
blab
blabber
blabbermouth
black
black and white
black art
black bass
black bear
black belt
black bile
black bindweed
black body
black book
black bottom
black box
black bread
black buck
black diamond
black eye
black flag
black fly
black fox
black frost
black gang
black grouse
black guillemot
black hole
black horehound
black knot
black lead
black letter
black light
black magic
black mark
black market
black marketeer
black measles
black mustard
black nightshade
black opal
black pepper
black powder
black power
black pudding
black quarter
black rat

black rot
black rust
black sea bass
black sheep
black spot
black
spruce
black tea
black tie
black velvet
black vomit
black walnut
black whale
black widow
black-and-blue
black-and-white
black-backed gull
black-eyed Susan
black-eyed pea
black-market
black-marketeer
blackamoor
blackball
blackberry
blackbird
blackboard
blackcap
blackcock
blackdamp
blacken
blackface
blackfellow
blackfish
blackguard
blackguardly
blackhead
blackheart
blacking
blackjack
blackleg
blacklist
blackmail
blackness
blackout
blackpoll
blacksmith
blacksnake
blackstrap molasses

blacktail
blackthorn
blacktop
blackwater fever
bladder
bladder campion
bladder ketmia
bladder worm
bladdernose
bladdernut
bladderwort
blade
blaeberry
blague
blah
blain
blamable
blame
blamed
blameful
blameless
blameworthy
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blanch
blancmange
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blandish
blandishment
blandishments
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blank cartridge
blank check
blank endorsement
blank verse
blank wall
blankbook
blanket
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blanketing
blankety-blank
blankly
blare
blarney
blaspheme
blasphemous
blasphemy
blast
blast furnace

blast lamp
blast
off
blast-off
blasted
blastema
blasting
blasto-
blastocoel
blastocyst
blastoderm
blastogenesis
blastomere
blastopore
blastosphere
blastula
blat
blatant
blate
blather
blatherskite
blaubok
blaze
blazer
blazing star
blazon
blazonry
bldg.
bleach
bleacher
bleachers
bleaching powder
bleak
blear
blear-eyed
bleary
bleary-eyed
bleat
bleb
bleed
bleeder
bleeder's disease
bleeding
bleeding heart
blemish
blench
blend
blende

blended whiskey
blender
blennioid
blenny
blent
blepharitis
blesbok
bless
blessed
blessing
blest
blether
blew
blight
blighter
blimey
blimp
blind
blind alley
blind date
blind gut
blind pig
blind snake
blind spot
blind staggers
blind tiger
blindage
blinders
blindfish
blindfold
blinding
blindly
blindman's buff
blindstory
blindworm
blink
blinker
blinkers
blinking
blintz
blintze
blip
bliss
blissful
blister
blister beetle
blister copper
blister rust

blistery
blithe
blither
blithering
blithesome
blitz
blitzkrieg
blizzard
blk.
bloat
bloated
bloater
blob
bloc
block
block and tackle
block
 diagram
block lava
block letter
block out
block plane
block print
block tin
blockade
blockage
blockbuster
blockbusting
blocked
blockhead
blockhouse
blocking
blockish
blocky
bloke
blond
blood
blood and thunder
blood bank
blood bath
blood brother
blood cell
blood count
blood donor
blood feud
blood fluke
blood group
blood grouping

blood heat
blood money
blood orange
blood plasma
blood platelet
blood poisoning
blood pressure
blood pudding
blood relation
blood sausage
blood serum
blood sport
blood test
blood transfusion
blood type
blood vessel
blood-and-thunder
blood-red
bloodcurdling
blooded
bloodfin
bloodhound
bloodless
bloodletting
bloodline
bloodmobile
bloodroot
bloodshed
bloodshot
bloodstain
bloodstained
bloodstock
bloodstone
bloodstream
bloodsucker
bloodthirsty
bloody
bloody flux
bloody shirt
bloody-minded
bloom
bloomer
bloomers
bloomery
blooming
bloomy
blooper
blossom

blot
blotch
blotchy
blotter
blotting paper
blotto
blouse
blouson
blow
blow off
blow out
blow over
blow up
blow-by-blow
blower
blowfish
blowfly
blowgun
blowhard
blowhole
blowing
blown
blowout
blowpipe
blowsy
blowtorch
blowtube
blowup
blowy
blowzed
blowzy
blub
blubber
blubberhead
blubbery
blucher
bludge
bludgeon
blue
blue
baby
blue blood
blue book
blue cheese
blue chip
blue crab
blue devils
blue fox

blue grouse
blue gum
blue jay
blue jeans
blue laws
blue mold
blue note
blue ointment
blue peter
blue point
blue racer
blue ribbon
blue shark
blue spruce
blue vitriol
blue whale
blue-collar
blue-eyed Mary
blue-eyed grass
blue-green
blue-green algae
blue-pencil
blue-ribbon jury
blue-sky law
bluebell
blueberry
bluebill
bluebird
bluebonnet
bluebottle
bluecoat
bluefish
bluegill
bluegrass
blueing
bluejacket
blueness
bluenose
bluepoint
blueprint
blues
bluestocking
bluestone
bluet
bluetongue
blueweed
bluey
bluff

bluing
bluish
blunder
blunderbuss
blunge
blunger
blunt
blur
blurb
blurt
blush
bluster
bo tree
bo's'n
boa
boa constrictor
boar
board
board foot
board measure
board of education
board of trade
board
 rule
board school
boarder
boarding
boarding school
boardinghouse
boardwalk
boarfish
boarhound
boarish
boart
boast
boaster
boastful
boat
boat deck
boat hook
boat neck
boat race
boat train
boatbill
boatel
boater
boathouse
boating

boatload
boatman
boatsman
boatswain
boatswain's chair
boatyard
bob
bob skate
bobbery
bobbin
bobbin lace
bobbinet
bobble
bobby
bobby pin
bobbysocks
bobbysoxer
bobcat
bobolink
bobsled
bobsledding
bobsleigh
bobstay
bobwhite
bocage
boccie
bock beer
bod
bode
bodega
bodgie
bodice
bodiless
bodily
boding
bodkin
body
body blow
body cavity
body corporate
body language
body politic
body snatcher
body stocking
bodycheck
bodyguard
bodywork
boffin

bog
bog asphodel
bog down
bog oak
bogbean
bogey
bogeyman
boggart
boggle
bogie
bogle
bogtrotter
bogus
bogy
bohunk
boil
boil down
boiled
boiled dinner
boiled shirt
boiled sweet
boiler
boiler room
boilermaker
boiling
boiling point
boisterous
bola
bold
bold-faced
boldface
bole
bolection
bolero
boletus
bolide
bolivar
boliviano
boll
boll
weevil
bollard
bollix
bollworm
bolo
bologna
bolometer
boloney

bolster
bolt
bolter
boltonia
boltrope
bolus
bomb
bomb bay
bomb ketch
bomb rack
bomb shelter
bombacaceous
bombard
bombardier
bombardon
bombast
bombastic
bombazine
bombe
bomber
bombproof
bombshell
bombsight
bombycid
bon mot
bon ton
bon vivant
bon voyage
bona fide
bona fides
bonanza
bonbon
bond
bond paper
bondage
bonded
bonded warehouse
bondholder
bondmaid
bondman
bondsman
bondstone
bondswoman
bondwoman
bone
bone ash
bone china
bone meal

bone of contention
bone oil
bone-dry
boneblack
bonefish
bonehead
boner
boneset
bonesetter
boneyard
bonfire
bongo
bonhomie
bonito
bonkers
bonne
bonne bouche
bonne foi
bonnet
bonnet monkey
bonnet rouge
bonny
bonnyclabber
bonsai
bonspiel
bontebok
bonus
bony
bony labyrinth
bonze
bonzer
boo
boo-boo
boob
booby
booby hatch
booby prize
booby trap
boodle
boogeyman
boogie
boogie-woogie
boohoo
book
book club
book end
book jacket
book learning

book of account
book review
book scorpion
book value
bookbinder
bookbindery
bookbinding
bookcase
bookcraft
bookie
booking
booking
 office
bookish
bookkeeper
bookkeeping
booklet
booklover
bookmaker
bookman
bookmark
bookmobile
bookplate
bookrack
bookrest
bookseller
bookshelf
bookstack
bookstall
bookstand
bookstore
bookworm
boom
boom shot
boom town
boomer
boomerang
boomkin
boon
boondocks
boondoggle
boong
boor
boorish
boost
booster
booster shot
boot

boot tree
bootblack
booted
bootee
bootery
booth
bootie
bootjack
bootlace
bootleg
bootless
bootlick
boots
boots and saddles
bootstrap
booty
booze
boozer
boozy
bop
bor.
bora
boracic
boracite
borage
boraginaceous
borak
borate
borax
borborygmus
bordello
border
border line
bordereau
borderer
borderland
borderline
bordure
bore
boreal
borecole
boredom
borehole
borer
boresome
boric
boric acid
boride

boring
born
borne
borneol
bornite
boron
boron carbide
borosilicate
borough
borough-English
borrow
borrowing
borsch
borscht
borscht circuit
borstal
bort
borzoi
boscage
boschbok
boschvark
bosh
bosk
bosket
bosky
bosom
bosomed
bosomy
boson
bosquet
boss
bossa
 nova
bossism
bossy
bosun
bot
bot.
botanical
botanical garden
botanist
botanize
botanomancy
botany
botch
botchy
botel
botfly

both
bother
botheration
bothersome
bothy
botryoidal
bots
bott
bottle
bottle glass
bottle green
bottle party
bottle tree
bottle up
bottleneck
bottom
bottom drawer
bottomless
bottommost
bottomry
bottoms up!
botulin
botulinus
botulism
boudoir
bouffant
bouffe
bough
boughpot
bought
boughten
bougie
bouillabaisse
bouilli
bouillon
boulder
boulder clay
boule
boulevard
boulevardier
bouleversement
bounce
bounce back
bouncer
bouncing
bouncing Bet
bouncy
bound

bound form
boundary
boundary condition
boundary layer
boundary line
boundary rider
bounded
bounden
bounder
boundless
bounds
bounteous
bountiful
bounty
bouquet
bouquet garni
bourbon
bourdon
bourg
bourgeois
bourgeoisie
bourgeon
bourn
bourse
bouse
boustrophedon
bout
boutique
boutonniere
bovid
bovine
bow
bow compass
bow out
bow saw
bow tie
bow window
bowdlerize
bowel
bowel movement
bower
bowerbird
bowery
bowfin
bowhead
bowie
knife
bowing

bowknot
bowl
bowl over
bowlder
bowleg
bowler
bowline
bowling
bowling alley
bowling crease
bowling green
bowls
bowman
bowse
bowshot
bowsprit
bowstring
bowstring hemp
bowyer
box
box calf
box camera
box canyon
box coat
box elder
box girder
box kite
box office
box pleat
box seat
box spring
box turtle
box wrench
boxberry
boxboard
boxcar
boxer
boxfish
boxhaul
boxing
boxing glove
boxing ring
boxthorn
boxwood
boy
boy scout
boyar
boycott

boyfriend
boyhood
boyish
boyla
boysenberry
bozo
bp.
br'er
br.
bra
brabble
brace
brace and bit
bracelet
bracer
braces
brach
brachial
brachiate
brachio-
brachiopod
brachium
brachy-
brachycephalic
brachylogy
brachypterous
brachyuran
bracing
bracken
bracket
bracketing
brackish
bract
bracteate
bracteole
brad
bradawl
brady-
bradycardia
bradytelic
brae
brag
braggadocio
braggart
braid
braided
braiding
brail

brain
brain coral
brain drain
brain fever
brain stem
brain wave
brainchild
brainless
brainpan
brainsick
brainstorm
brainstorming
brainwash
brainwashing
brainwork
brainy
braise
brake
brake
band
brake drum
brake horsepower
brake lining
brake parachute
brake shoe
brakeman
brakesman
bramble
brambling
brambly
bran
branch
branch line
branch out
branched chain
branchia
branching
branchiopod
brand
brand-new
brandish
brandling
brandy
branks
branle
branny
brant
brash

brashy
brasier
brasilein
brasilin
brass
brass band
brass hat
brass knuckles
brass tacks
brassard
brassbound
brasserie
brassica
brassie
brassiere
brassware
brassy
brat
brattice
brattishing
bratwurst
braunite
bravado
brave
bravery
bravissimo
bravo
bravura
braw
brawl
brawn
brawny
braxy
bray
brayer
braze
brazen
brazen-faced
brazier
brazil
brazilein
brazilin
breach
breach of promise
breach of trust
bread
bread and butter
bread knife

bread mold
bread-and-butter pickle
breadbasket
breadboard
breadfruit
breadnut
breadroot
breadstuff
breadth
breadthways
breadwinner
break
break and entry
break down
break in
break into
break of day
break out
break through
break
up
breakable
breakage
breakaway
breakbone fever
breakdown
breaker
breakfast
breakfast food
breakfront
breaking
breaking and entering
breakneck
breakout
breakthrough
breakup
breakwater
bream
breast
breast drill
breast-beating
breast-feed
breastbone
breastpin
breastplate
breaststroke
breastsummer
breastwork

breath
breathe
breathed
breather
breathing
breathing space
breathless
breathtaking
breathy
breccia
brecciate
bred
brede
bree
breech
breech delivery
breechblock
breechcloth
breeches
breeches buoy
breeching
breechloader
breed
breeder
breeder reactor
breeding
breeks
breeze
breeze block
breezeway
breezy
bregma
brei
bremsstrahlung
brent
brethren
breve
brevet
breviary
brevier
brevity
brew
brewage
brewer's yeast
brewery
brewhouse
brewing
brewis

brewmaster
briar
briarroot
briarwood
bribe
bribery
bric-a-brac
brick
brick cheese
brick red
brickbat
brickkiln
bricklayer
bricklaying
brickle
brickwork
bricky
brickyard
bricole
bridal
bridal wreath
bride
bride price
bridegroom
bridesmaid
bridewell
bridge
bridge
deck
bridge lamp
bridgeboard
bridgehead
bridgework
bridging
bridle
bridle path
bridlewise
bridoon
brief
briefcase
briefing
briefless
briefs
brier
brierroot
brierwood
brig
brigade

brigadier
brigadier general
brigand
brigandage
brigandine
brigantine
bright
brighten
brightness
brightwork
brill
brilliance
brilliancy
brilliant
brilliantine
brim
brimful
brimmer
brimstone
brindle
brindled
brine
bring
bring about
bring down
bring forward
bring in
bring off
bring on
bring out
bring over
bring round
bring to
bring up
bringing-up
brink
brinkmanship
briny
brio
brioche
briolette
briony
briquet
briquette
brisance
brise-soleil
brisk
brisket

brisling
bristle
bristletail
bristling
brit
britches
britska
brittle
britzka
broach
broad
broad arrow
broad bean
broad gauge
broad jump
broad jumper
broad seal
broad-faced
broad-leaved
broad-minded
broad-spectrum
broadax
broadbill
broadbrim
broadcast
broadcaster
broadcasting
broadcloth
broaden
broadleaf
broadloom
broadside
broadsword
broadtail
brocade
brocatel
broccoli
broch
brochette
brochure
brock
brocket
brogan
brogue
broider
broil
broiler
broke

broken
broken
heart
broken wind
broken-down
brokenhearted
broker
brokerage
brolly
bromal
bromate
brome grass
bromeosin
bromic
bromic acid
bromide
bromide paper
bromidic
brominate
bromine
bromism
bromo-
bromoform
bronchi
bronchia
bronchial
bronchial pneumonia
bronchial tube
bronchiectasis
bronchiole
bronchitis
broncho-
bronchopneumonia
bronchoscope
bronchus
bronco
broncobuster
bronze
brooch
brood
brooder
broody
brook
brook trout
brookite
brooklet
brooklime
brookweed

broom
broomcorn
broomrape
broomstick
bros.
brose
broth
brothel
brother
brother-in-law
brotherhood
brotherly
brougham
brought
brouhaha
brow
browband
browbeat
brown
brown algae
brown bear
brown belt
brown bread
brown coal
brown rat
brown rice
brown rot
brown sauce
brown study
brown sugar
brown thrasher
brown trout
brown-nose
brown-tail moth
browned-off
brownie
browning
brownout
brownstone
browse
brucellosis
brucine
brucite
bruin
bruise
bruiser
bruit
brumal

brumby
brume
brunch
brunch
 coat
brunet
brunette
brunt
brush
brush aside
brush discharge
brush off
brush turkey
brush up
brush-off
brushwood
brushwork
brusque
brusquerie
brut
brutal
brutality
brutalize
brute
brutify
brutish
bryology
bryony
bryophyte
bryozoan
btl.
btry.
bu.
bub
bubal
bubaline
bubble
bubble and squeak
bubble bath
bubble chamber
bubble dance
bubble gum
bubbler
bubbly
bubo
bubonic plague
bubonocele
buccal

buccaneer
buccinator
bucentaur
buck
buck and wing
buck fever
buck up
buckaroo
buckboard
buckeen
bucket
bucket seat
bucket shop
buckeye
buckhound
buckish
buckjump
buckjumper
buckle
buckle down
buckler
buckling
bucko
buckra
buckram
bucksaw
buckshee
buckshot
buckskin
buckskins
buckthorn
bucktooth
buckwheat
buckwheat cake
bucolic
bud
bud scale
buddhi
buddle
buddleia
buddy
budge
budgerigar
budget
budgie
bueno
buff
buffalo

buffalo bug
buffalo carpet beetle
buffalo fish
buffalo gnat
buffalo grass
buffalo robe
buffer
buffer state
buffet
buffet car
buffing
 wheel
bufflehead
buffo
buffoon
bug
bugaboo
bugbane
bugbear
bugeye
bugger
buggery
buggy
bughouse
bugle
bugleweed
bugloss
bugs
buhl
buhr
buhrstone
build
build up
builder
builder's knot
building
building line
built
built-in
built-up
bul.
bulb
bulbar
bulbiferous
bulbil
bulbous
bulbul
bulge

bulimia
bulk
bulk modulus
bulkhead
bulky
bull
bull fiddle
bull mastiff
bull nose
bull session
bull snake
bull terrier
bull tongue
bull's-eye
bull-necked
bull-roarer
bull.
bulla
bullace
bullate
bullbat
bulldog
bulldoze
bulldozer
bullet
bulletin
bulletin board
bulletproof
bullfight
bullfighter
bullfinch
bullfrog
bullhead
bullheaded
bullhorn
bullion
bullish
bullnose
bullock
bullpen
bullring
bullshit
bullwhip
bully
bully beef
bullyboy
bullyrag
bulrush

bulwark
bum
bum's rush
bumbailiff
bumble
bumblebee
bumbledom
bumbling
bumboat
bumf
bumkin
bummalo
bummer
bump
bump into
bump off
bumper
bumpkin
bumptious
bumpy
bun
bunch
bunch grass
bunch light
bunchy
bunco
buncombe
bund
bundle
bundle of isoglosses
bundle
up
bung
bungalow
bunghole
bungle
bunion
bunk
bunk bed
bunker
bunkhouse
bunkmate
bunko
bunkum
bunny
bunny hug
bunt
bunting

buntline
bunya-bunya
bunyip
buoy
buoyage
buoyancy
buoyant
buprestid
bur
bur marigold
bur oak
bur reed
buran
burble
burbot
burden
burden of proof
burdened
burdensome
burdock
bureau
bureaucracy
bureaucrat
bureaucratic
bureaucratize
burette
burg
burgage
burgee
burgeon
burger
burgess
burgh
burgher
burglar
burglar alarm
burglarious
burglarize
burglary
burgle
burgomaster
burgonet
burgoo
burgrave
burial
burial ground
burial mound
burier

burin
burka
burke
burl
burlap
burlesque
burletta
burley
burly
burn
burn in
burn off
burn out
burned
burned out
burned-out
burner
burnet
burning
burning bush
burning glass
burnish
burnisher
burnoose
burnout
burnsides
burnt
burnt almond
burnt offering
burnt sienna
burnt umber
burp
burp gun
burr
burro
burrow
burrstone
burry
bursa
bursar
bursarial
bursary
burse
burseraceous
bursiform
bursitis
burst
burstone

burthen
burton
burweed
bury
burying
 beetle
burying ground
bus
bus.
busboy
busby
bush
bush house
bush jacket
bush pilot
bush telegraph
bush wren
bushbuck
bushcraft
bushed
bushel
bushelman
bushhammer
bushing
bushman
bushmaster
bushranger
bushtit
bushwa
bushwhack
bushwhacker
bushy
busily
business
business English
business agent
business college
business cycle
business end
business suit
businesslike
businessman
businesswoman
busk
buskin
buskined
busload
busman

busman's holiday
buss
bust
bust-up
bustard
bustee
buster
bustle
busty
busy
busybody
busyness
busywork
but
butacaine
butadiene
butane
butanol
butanone
butch
butcher
butcher knife
butcher paper
butcher shop
butcher's saw
butcher's-broom
butcherbird
butchery
butene
butler
butlery
butt
butt hinge
butt joint
butt plate
butt shaft
butt weld
butte
butter
butter bean
butter muslin
butter up
butter-and-eggs
butterball
butterbur
buttercup
butterfat
butterfingers

butterfish
butterflies
butterfly
butterfly bush
butterfly valve
butterfly weed
buttermilk
butternut
butternut squash
butterscotch
butterwort
buttery
buttock
buttocks
button
button
 quail
button tree
button up
buttonball
buttonhole
buttonhole stitch
buttonhook
buttons
buttonwood
buttress
butyl
butyl alcohol
butylene
butyraceous
butyraldehyde
butyrate
butyric acid
butyrin
buxom
buy
buy in
buy into
buy off
buy out
buy up
buyer
buyers' market
buying power
buzz
buzz bomb
buzz off
buzz saw

buzzard
buzzer
bwana
bx.
by
by and by
by and large
by-
by-and-by
by-bidder
by-blow
by-election
by-line
by-play
by-product
by-your-leave
bye
bye-bye
byelaw
bygone
bylaw
bypass
bypath
byre
byrnie
byroad
byssinosis
byssus
bystander
bystreet
byte
byway
byword
c
c'est la vie
c.
c.d.
c.g.
c.h.
c.m.
c.p.
c.w.o.
c/f
c/o
ca'canny
ca.
cab
cabal

cabala
cabalism
cabalist
cabalistic
caballero
cabana
cabaret
cabasset
cabbage
cabbage palm
cabbage palmetto
cabbagehead
cabbageworm
cabbala
cabby
cabdriver
caber
cabezon
cabin
cabin boy
cabin class
cabin cruiser
cabinet
cabinet pudding
cabinetmaker
cabinetwork
cable
cable car
cable railway
cable
release
cable ship
cable stitch
cablegram
cablet
cableway
cabman
cabob
cabochon
caboodle
caboose
cabotage
cabretta
cabrilla
cabriole
cabriolet
cabstand
cacao

cacao butter
cacciatore
cachalot
cache
cachepot
cachet
cachexia
cachinnate
cachou
cachucha
cacique
cackle
caco-
cacodemon
cacodyl
cacoepy
cacogenics
cacography
cacology
cacomistle
cacophonous
cacophony
cactus
cacuminal
cad
cadastre
cadaver
cadaverine
cadaverous
caddie
caddie cart
caddis
caddis fly
caddish
caddy
cade
cadelle
cadence
cadency
cadency mark
cadent
cadenza
cadet
cadge
cadi
cadmium
cadmium orange
cadmium yellow

cadre
caduceus
caducity
caducous
caecilian
caecum
caenogenesis
caeoma
caesalpiniaceous
caesium
caespitose
caesura
cafard
cafeteria
caffeine
caftan
cage
cageling
cagey
cahier
cahoot
caiman
cain
caird
cairn
cairngorm
caisson
caisson disease
caitiff
cajeput
cajole
cajolery
cajuput
cake
cakes and ale
cakewalk
cal.
calabash
calaboose
caladium
calamanco
calamander
calamine
calamint
calamite
calamitous
calamity
calamondin

calamus
calash
calathus
calaverite
calc-
calc-tufa
calcaneus
calcar
calcareous
calcariferous
calceiform
calceolaria
calces
calci-
calcic
calcicole
calciferol
calciferous
calcific
calcification
calcifuge
calcify
calcimine
calcine
calcite
calcium
calcium
arsenate
calcium carbide
calcium carbonate
calcium chloride
calcium cyanamide
calcium cyclamate
calcium hydroxide
calcium light
calcium oxide
calcium phosphate
calculable
calculate
calculated
calculated risk
calculating
calculating machine
calculation
calculator
calculous
calculus
calculus of variations

caldarium
caldera
caldron
calefacient
calefaction
calefactory
calendar
calendar clock
calendar day
calendar month
calendar watch
calendar year
calender
calends
calendula
calenture
calf
calf love
calf's-foot jelly
calfskin
caliber
calibrate
calibre
calices
caliche
calicle
calico
calico bush
calico cat
calif
califate
californium
caliginous
calipash
calipee
caliper
caliph
caliphate
calisaya
calisthenics
calix
calk
call
call box
call
down
call forth
call girl

call in
call letters
call loan
call money
call number
call off
call out
call rate
call slip
call up
call-board
call-up
calla
callable
callant
callboy
caller
calli-
calligraphy
calling
calling card
calliope
calliopsis
callipash
calliper
callipygian
callisthenics
callosity
callous
callow
callus
calm
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calomel
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calorie
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calorific
calorimeter
calotte
caloyer
calpac
calque
caltrop
calumet
calumniate
calumniation
calumnious

calumny
calutron
calvaria
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calves
calvities
calx
calyces
calycine
calycle
calypso
calyptra
calyptrogen
calyx
cam
camail
camaraderie
camarilla
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camber
cambist
cambium
cambogia
camboose
cambrel
cambric
came
camel
camel's hair
camelback
cameleer
camellia
camelopard
cameo
cameo glass
cameo ware
camera
camera lucida
camera obscura
camera tube
cameral
cameraman
camerlengo
camino real
camion
camisado
camise
camisole

camlet
camomile
camouflage
camp
camp bed
camp chair
camp follower
camp meeting
camp stove
campaign
campaign
 fund
campaign hat
campanile
campanology
campanula
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campanulate
camper
campestral
campfire
campground
camphene
camphor
camphor ball
camphor ice
camphor tree
camphorate
camphorated oil
campion
campo
campo santo
camporee
campstool
campus
campy
camshaft
can
can buoy
can opener
can't
can.
canaigre
canaille
canakin
canal
canal boat
canal ray

canaliculus
canalize
canard
canary
canary grass
canary seed
canary yellow
canasta
canaster
canc.
cancan
cancel
cancellate
cancellation
cancer
cancer stick
cancroid
candela
candelabra
candelabrum
candent
candescent
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candid camera
candidacy
candidate
candied
candle
candleberry
candlefish
candlelight
candlemaker
candlenut
candlepin
candlepower
candlestand
candlestick
candlewick
candlewood
candor
candy
candy store
candy-striped
candytuft
cane
cane sugar
canebrake
canella

canescent
canfield
cangue
canicular
canikin
canine
caning
canister
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canker sore
cankered
cankerous
cankerworm
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cannel coal
cannelloni
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cannery
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cannibalism
cannibalize
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canning
cannon
cannon
bone
cannon cracker
cannon fodder
cannon shot
cannonade
cannonball
cannoneer
cannonry
cannot
cannula
cannular
canny
canoe
canoewood
canon
canon law
canoness
canonical
canonical hour
canonicals

canonicate
canonicity
canonist
canonize
canonry
canoodle
canopy
canorous
canso
canst
cant
cant hook
cantabile
cantaloupe
cantankerous
cantata
cantatrice
canteen
canter
cantharides
canthus
canticle
cantilena
cantilever
cantilever bridge
cantillate
cantina
canting arms
cantle
canto
canton
cantonment
cantor
cantoris
cantrip
cantus
cantus firmus
canty
canula
canvas
canvasback
canvass
canyon
canzona
canzone
canzonet
caoutchouc
cap

cap and bells
cap and gown
cap cloud
cap of estate
cap of maintenance
cap rock
cap screw
cap-a-pie
cap.
capability
capable
capacious
capacitance
capacitate
capacitive reactance
capacitor
capacity
caparison
cape
cape gooseberry
capelin
caper
capercaillie
capeskin
capful
capias
capillaceous
capillarity
capillary
capillary
 tube
capita
capital
capital account
capital expenditure
capital gain
capital gains tax
capital goods
capital levy
capital punishment
capital ship
capital stock
capital surplus
capitalism
capitalist
capitalistic
capitalization
capitalize

capitally
capitate
capitation
capitol
capitular
capitulary
capitulate
capitulation
capitulum
caplin
capo
capon
caponize
caporal
capote
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capper
capping
cappuccino
capreolate
capriccio
capriccioso
caprice
capricious
caprification
caprifig
caprifoliaceous
caprine
capriole
caproic acid
caps.
capsaicin
capsicum
capsize
capstan
capstan bar
capstan lathe
capstone
capsular
capsulate
capsule
capsulize
captain
captain of industry
captain's chair
captainship
caption
captious

captivate
captive
captive balloon
captivity
captor
capture
capuche
capuchin
caput
capybara
car
car coat
car park
carabao
carabin
carabineer
carabiniere
caracal
caracara
caracole
caracul
carafe
caramel
caramelize
carangid
carapace
carat
caravan
caravansary
caravel
caraway
carbamate
carbamic
 acid
carbamidine
carbarn
carbazole
carbide
carbine
carbineer
carbo-
carbohydrate
carbolated
carbolic acid
carbolize
carbon
carbon 14
carbon black

carbon copy
carbon cycle
carbon dating
carbon dioxide
carbon disulfide
carbon microphone
carbon monoxide
carbon paper
carbon process
carbon steel
carbon tetrachloride
carbon tissue
carbon-14 dating
carbonaceous
carbonado
carbonate
carbonation
carbonic
carbonic acid
carbonic-acid gas
carboniferous
carbonization
carbonize
carbonous
carbonyl
carbonyl chloride
carboxyl group
carboxylase
carboxylate
carboxylic acid
carboy
carbuncle
carburet
carburetor
carburize
carbylamine
carcajou
carcanet
carcass
carcinogen
carcinoma
carcinomatosis
card
card catalog
card index
card punch
card table
card vote

card-carrying
cardamom
cardboard
cardholder
cardiac
cardialgia
cardigan
cardinal
cardinal flower
cardinal number
cardinal points
cardinal virtues
cardinalate
carding
cardio-
cardiogram
cardiograph
cardioid
cardiology
cardiomegaly
cardiovascular
carditis
cardoon
cards
cardsharp
carduaceous
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careen
career
careerism
careerist
carefree
careful
careless
caress
caressive
caret
caretaker
careworn
carfare
cargo
carhop
caribou
caricature
caries
carillon
carillonneur
carina

carinate
carioca
cariole
carious
caritas
cark
carl
carline
carling
carload
carmagnole
carman
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carmine
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carnassial
carnation
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carnelian
carnet
carnify
carnival
carnivore
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carnotite
carny
carob
caroche
carol
carolus
carom
carotene
carotenoid
carotid
carousal
carouse
carousel
carp
carpal
carpe diem
carpel
carpenter
carpenter ant
carpenter bee

carpenter moth
carpentry
carpet
carpet beetle
carpet bombing
carpet knight
carpet shark
carpet slipper
carpet sweeper
carpet tack
carpetbag
carpetbagger
carpeting
carpi
carping
carpo-
carpogonium
carpology
carpometacarpus
carpophagous
carpophore
carport
carpospore
carpus
carrack
carrageen
carrefour
carrel
carriage
carriage dog
carriage
horse
carriage house
carriage trade
carrick bend
carrick bitt
carrier
carrier pigeon
carriole
carrion
carrion crow
carrion flower
carron oil
carronade
carrot
carroty
carrousel
carry

carry away
carry back
carry off
carry on
carry out
carry over
carry through
carryall
carrying charge
carrying-on
carse
carsick
cart
cart horse
cartage
carte
carte blanche
carte de visite
carte du jour
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cartelize
cartilage
cartilage bone
cartilaginous
cartload
cartogram
cartography
cartomancy
carton
cartoon
cartouche
cartridge
cartridge belt
cartridge brass
cartridge clip
cartridge paper
cartridge pen
cartulary
cartwheel
caruncle
carve
carve up
carvel
carvel-built
carven
carving
carving knife
caryatid

caryo-
caryophyllaceous
caryopsis
casa
casaba
cascabel
cascade
cascara
cascara sagrada
cascarilla
case
case history
case knife
case law
case shot
casease
caseate
caseation
casebook
casebound
casefy
casein
caseinogen
casemaker
casemate
casement
caseose
caseous
casern
casework
caseworm
cash
cash
crop
cash discount
cash in
cash on delivery
cash register
cash-and-carry
cashbook
cashbox
cashew
cashier
cashier's check
cashmere
casing
casino
cask

casket
casque
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cassareep
cassation
cassava
casserole
cassette
cassia
cassimere
cassino
cassis
cassiterite
cassock
cassoulet
cassowary
cast
cast about
cast down
cast iron
cast steel
cast-iron
cast-off
castanets
castaway
caste
caste mark
castellan
castellany
castellated
castellatus
caster
castigate
casting
casting vote
castle
castle in the air
castled
castoff
castor
castor bean
castor oil
castor-oil plant
castrate
castration complex
castrato
casual
casualty

casualty insurance
casuist
casuistry
casus belli
cat
cat brier
cat burglar
cat nap
cat rig
cat whisker
cat's cradle
cat's-ear
cat's-eye
cat's-foot
cat's-paw
cat's-tail
cat-and-dog
cat-eyed
cat-o'-mountain
cat-o'-nine-tails
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cata-
catabasis
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catabolite
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catachresis
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catadromous
catafalque
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catalectic
catalepsy
catalo
catalog
catalogue
catalpa
catalysis
catalyst
catalyze
catamaran
catamenia
catamite
catamnesis
catamount

cataphoresis
cataphyll
cataplasia
cataplasm
cataplexy
catapult
cataract
catarrh
catarrhine
catastrophe
catastrophism
catatonia
catbird
catboat
catcall
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basin
catch crop
catch on
catch out
catch phrase
catch up
catch-as-catch-can
catchall
catcher
catchfly
catching
catchment
catchpenny
catchpole
catchup
catchweight
catchword
catchy
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catechin
catechism
catechist
catechize
catechol
catechu
catechumen
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categorical imperative
categorize
category

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cateran
catercorner
caterer
catering
caterpillar
caterpillar hunter
caterwaul
catfall
catfish
catgut
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catharsis
cathartic
cathead
cathedral
cathepsin
catheter
catheterize
cathexis
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cathode ray
cathode-ray tube
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cathodoluminescence
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catholicize
catholicon
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cation
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catling
catmint
catnap
catnip
catoptrics
catsup
cattail

cattalo
cattery
cattish
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cattle
 egret
cattle plague
cattleman
cattleya
catty
catty-cornered
catwalk
caucus
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caudal fin
caudate
caudex
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caudle
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cauldron
caulescent
caulicle
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cauliflower ear
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caulis
caulk
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causalgia
causality
causation
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cause
causerie
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causeway
causey
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cauterant
cauterize
cautery
caution
caution money

cautionary
cautious
cavalcade
cavalier
cavalierly
cavalla
cavalry
cavalry twill
cavalryman
cavatina
cave
cave art
cave dweller
cave in
cave-in
caveat
caveat emptor
caveator
cavefish
caveman
cavendish
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cavernous
cavesson
cavetto
caviar
cavicorn
cavie
cavil
cavitation
cavity
cavity resonator
cavo-relievo
cavo-rilievo
cavort
cavy
caw
cay
cayenne
cayenne pepper
cayman
cayuse
cc.
cd
cd.
cease
cease-fire
ceaseless

cecity
cecum
cedar
cedar of Lebanon
cedar waxwing
cede
cedilla
ceiba
ceil
ceilidh
ceiling
ceiling
light
ceilometer
celadon
celandine
celebrant
celebrate
celebrated
celebration
celebrity
celeriac
celerity
celery
celery salt
celesta
celestial
celestial equator
celestial globe
celestial guidance
celestial horizon
celestial latitude
celestial longitude
celestial mechanics
celestial navigation
celestial pole
celestial sphere
celestite
celiac
celibacy
celibate
celiotomy
cell
cell division
cell membrane
cell wall
cella
cellar

cellarage
cellarer
cellaret
cellist
cello
cellobiose
celloidin
cellophane
cellular
cellule
cellulitis
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cellulose acetate
cellulose nitrate
cellulosic
cellulous
celom
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celtuce
cembalo
cement
cementation
cementite
cementum
cemetery
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cenacle
cenesthesia
cenobite
cenogenesis
cenotaph
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censer
censor
censorious
censorship
censurable
censure
census
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cent.
cental
centare
centaur
centaury
centavo
centenarian
centenary

centennial
center
center of buoyancy
center of curvature
center of effort
center of flotation
center of gravity
center of mass
center
of percussion
center of pressure
center of symmetry
center punch
centerboard
centering
centerpiece
centesimal
centesimo
centi-
centiare
centigrade
centigram
centiliter
centillion
centime
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centipoise
centistere
centner
cento
centra
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central angle
central bank
central heating
central nervous system
central sulcus
centralism
centrality
centralization
centralize
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centrepiece
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centric
centrifugal

centrifugal force
centrifugate
centrifuge
centring
centriole
centripetal
centripetal force
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centroclinal
centroid
centromere
centrosome
centrosphere
centrosymmetric
centrum
centum
centuple
centuplicate
centurial
centurion
century
century plant
ceorl
cephalad
cephalalgia
cephalic
cephalic index
cephalization
cephalo-
cephalochordate
cephalometer
cephalopod
cephalothorax
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ceramal
ceramic
ceramics
ceramist
cerargyrite
cerate
cerated
ceratodus
ceratoid
cercaria
cercus
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palsy
cerebrate
cerebration
cerebritis
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cerebroside
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cerebrospinal meningitis
cerebrovascular
cerebrum
cerecloth
cerement
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ceremonious
ceremony
ceresin
cereus
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ceric
cerise
cerium
cermet
cernuous
cero
cerography
ceroplastic
ceroplastics
cerotic acid
cerotype
cerous
cert.
certain
certainly
certainty
certes
certifiable
certificate
certificate of deposit
certificate of incorporation
certificate of origin
certificate of stock
certification
certified

certified check
certified mail
certified milk
certified public accountant
certify
certiorari
certitude
cerulean
cerumen
ceruse
cerussite
cervelat
cervical
cervicitis
cervine
cervix
cesium
cespitose
cess
cessation
cession
cessionary
cesspool
cesta
cestode
cestoid
cestus
cesura
cetacean
cetane
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ceteris paribus
cetology
cf.
cg.
ch.
cha-cha
chabazite
chacma
chaconne
chad
chaeta
chaetognath
chaetopod
chafe
chafer
chaff
chaffer

chaffinch
chafing dish
chagrin
chain
chain gang
chain
letter
chain lightning
chain locker
chain mail
chain reaction
chain reactor
chain rule
chain saw
chain shot
chain stitch
chain store
chain-smoke
chainman
chainplate
chair
chair car
chairborne
chairman
chairmanship
chairwoman
chaise
chaise longue
chalaza
chalcanthite
chalcedony
chalco-
chalcocite
chalcography
chalcopyrite
chaldron
chalet
chalice
chalk
chalk out
chalk talk
chalk up
chalkboard
chalkstone
chalky
challah
challenge
challenging

challis
chalone
chalutz
chalybeate
chalybite
cham
chamade
chamber
chamber concert
chamber music
chamber of commerce
chamber orchestra
chamber pot
chambered nautilus
chamberlain
chambermaid
chambers
chambray
chameleon
chamfer
chamfer bit
chamfron
chammy
chamois
chamomile
champ
champac
champaca oil
champagne
champaign
champerty
champignon
champion
championship
chance
chance-medley
chancel
chancellery
chancellor
chancellorship
chancery
chancre
chancroid
chancy
chandelier
chandelle
chandler
chandlery

change
change of life
change of venue
change ringing
change-up
changeable
changeful
changeless
changeling
changeover
changing
 bag
channel
channel iron
channelize
chanson
chanson de geste
chant
chanter
chanterelle
chanteuse
chantey
chanticleer
chantress
chantry
chanty
chaos
chaotic
chap
chap.
chaparajos
chaparral
chaparral pea
chapatti
chapbook
chape
chapeau
chapeau bras
chapel
chapel of ease
chaperon
chaperone
chapfallen
chapiter
chaplain
chaplet
chapman
chappie

chaps
chapter
chaqueta
char
charabanc
character
character actor
character sketch
character witness
characteristic
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characterization
characterize
charactery
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charades
charcoal
charcuterie
chard
chare
charge
charge account
charge nurse
charge of quarters
chargeable
charged
charger
charily
chariness
chariot
charioteer
charisma
charismatic
charitable
charity
charivari
charkha
charlady
charlatan
charlatanism
charlatanry
charley horse
charlock
charlotte
charlotte russe
charm
charmed circle
charmer

charmeuse
charming
charnel
charnel house
charpoy
charqui
charr
chart
chart
house
chart room
charter
charter colony
charter member
chartered accountant
chartist
chartography
chartreuse
chartulary
charwoman
chary
chase
chaser
chasing
chasm
chassepot
chasseur
chassis
chaste
chaste tree
chasten
chastise
chastity
chastity belt
chasuble
chat
chateau
chatelain
chatelaine
chatoyant
chattel
chattel mortgage
chatter
chatter mark
chatterbox
chatterer
chatty
chaudfroid

chauffer
chauffeur
chaulmoogra
chaunt
chausses
chaussure
chauvinism
chaw
chayote
chazan
cheap
cheap-jack
cheapen
cheapskate
cheat
cheater
check
check in
check list
check out
check valve
checkbook
checked
checker
checkerberry
checkerbloom
checkerboard
checkered
checkers
checkerwork
checking account
checklist
checkmate
checkoff
checkpoint
checkrein
checkroom
checkrow
checks and balances
checkup
checky
cheddite
cheder
cheek
cheek pouch
cheekbone
cheekpiece
cheeky

cheep
cheer
cheerful
cheerio
cheerleader
cheerless
cheerly
cheery
cheese
cheeseburger
cheesecake
cheesecloth
cheeseparing
cheesewood
cheesy
cheetah
chef
chef
 de cuisine
cheiro-
chela
chelate
chelicera
cheliform
cheloid
chelonian
chem-
chem.
chemical
chemical engineering
chemical potential
chemical warfare
chemiluminescence
chemin de fer
chemise
chemisette
chemism
chemisorb
chemisorption
chemist
chemistry
chemmy
chemo-
chemoprophylaxis
chemoreceptor
chemosmosis
chemosphere
chemosynthesis

chemotaxis
chemotherapy
chemotropism
chemurgy
chenille
chenopod
cheongsam
cheque
chequer
chequerboard
chequered
cherimoya
cherish
cheroot
cherry
cherry bomb
cherry laurel
cherry picker
chersonese
chert
cherub
chervil
chervonets
chess
chessboard
chessman
chest
chest of drawers
chest of viols
chest voice
chest-on-chest
chesterfield
chestnut
chesty
chetah
cheval glass
cheval-de-frise
chevalier
chevet
cheviot
chevrette
chevron
chevrotain
chevy
chew
chew out
chew over
chew up

chewing gum
chewink
chewy
chez
chg.
chi
chi-square test
chiack
chiao
chiaroscuro
chiasma
chiasmus
chiastic
chiastolite
chibouk
chic
chicalote
chicane
chicanery
chiccory
chichi
chick
chickabiddy
chickadee
chickaree
chicken
chicken
 breast
chicken coop
chicken feed
chicken hawk
chicken out
chicken pox
chicken wire
chicken-hearted
chicken-livered
chickenhearted
chickpea
chickweed
chicle
chico
chicory
chide
chief
chief justice
chief mate
chief of state
chief petty officer

chief warrant officer
chiefly
chieftain
chiffchaff
chiffon
chiffonier
chifforobe
chigetai
chigger
chignon
chigoe
chilblain
child
child psychology
child's play
childbearing
childbed
childbed fever
childbirth
childe
childhood
childish
childlike
children
chile
chili
chili con carne
chili pepper
chili sauce
chiliad
chiliarch
chiliasm
chill
chiller
chilli
chilly
chilopod
chimaera
chimb
chime
chime in
chimera
chimere
chimerical
chimney
chimney corner
chimney swallow
chimney sweep

chimney swift
chimp
chimpanzee
chin
chin-chin
china
china bark
china clay
chinaberry
chinaware
chincapin
chinch
chinch bug
chinchilla
chinchy
chine
chinfest
chink
chinkapin
chino
chinoiserie
chinook
chinquapin
chintz
chintzy
chip
chip
in
chip log
chip shot
chipboard
chipmunk
chipped beef
chipper
chipping sparrow
chippy
chirk
chirm
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chirography
chiromancy
chiropodist
chiropody
chiropractic
chiropractor
chiropteran
chirp
chirpy

chirr
chirrup
chirrupy
chirurgeon
chisel
chiseler
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chitarrone
chitchat
chitin
chiton
chitter
chitterlings
chivalric
chivalrous
chivalry
chivaree
chive
chivy
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chlamydospore
chlamys
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chloral
chloral hydrate
chloramine
chloramphenicol
chlorate
chlordane
chlorella
chlorenchyma
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chloric acid
chloride
chloride of lime
chlorinate
chlorine
chlorine dioxide
chlorite
chloro-
chloroacetic acid
chlorobenzene
chloroform
chlorohydrin
chlorophyll
chloropicrin
chloroplast

chloroprene
chlorosis
chlorothiazide
chlorous
chlorous acid
chlorpromazine
chlortetracycline
chm.
choanocyte
chock
chock-a-block
chock-full
chocolate
choice
choir
choir loft
choir school
choirboy
choirmaster
choke
choke coil
choke up
choke-full
chokeberry
chokebore
chokecherry
chokedamp
choker
choking
chole-
cholecalciferol
cholecyst
cholecystectomy
cholecystitis
cholecystotomy
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morbus
choleric
cholesterol
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cholic acid
choline
cholinesterase
cholla
chomp

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chondroma
chondrule
choo-choo
chook
choose
choosey
choosy
chop
chop chop
chop suey
chopfallen
chophouse
chopine
choplogic
chopper
chopping
choppy
chops
chopstick
choragus
choral
chorale
chorale prelude
chord
chordate
chordophone
chore
chore boy
chorea
choreodrama
choreograph
choreographer
choreography
choriamb
choric
choriocarcinoma
chorion
chorister
chorizo
chorography
choroid
choroiditis
chortle
chorus

chorus boy
chorus girl
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chosen
chosen people
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chow chow
chow mein
chow-chow
chowder
chrestomathy
chrism
chrismatory
chrisom
christcross
christcross-row
christen
christening
chroma
chromate
chromatic
chromatic aberration
chromatic scale
chromaticity
chromaticity diagram
chromaticness
chromatics
chromatid
chromatin
chromatism
chromato-
chromatogram
chromatograph
chromatography
chromatology
chromatolysis
chromatophore
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chrome
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chrome green
chrome red
chrome steel
chrome yellow
chromic
chromic acid

chrominance
chromite
chromium
chromium steel
chromo
chromo-
chromogen
chromogenic
chromolithograph
chromolithography
chromomere
chromonema
chromophore
chromoplast
chromoprotein
chromosome
chromosome number
chromosphere
chromous
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chronaxie
chronic
chronic alcoholism
chronicle
chronicle play
chrono-
chronogram
chronograph
chronological
chronologist
chronology
chronometer
chronometry
chronon
chronopher
chronoscope
chrysalid
chrysalis
chrysanthemum
chrysarobin
chryselephantine
chryso-
chrysoberyl
chrysolite
chrysoprase
chrysotile
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chthonian
chub
chubby
chuck
chuck out
chuck wagon
chuck-full
chuck-will's-widow
chuckhole
chuckle
chucklehead
chuckwalla
chuddar
chufa
chuff
chuffy
chug
chukar
chukka boot
chukker
chum
chummy
chump
chunk
chunky
chuppah
church
church book
church calendar
church
 invisible
church militant
church mode
church text
church visible
churchgoer
churchless
churchlike
churchly
churchman
churchwarden
churchwoman
churchy
churchyard
churinga
churl
churlish
churn

churning
churr
churrigueresque
chute
chutney
chutzpah
chyack
chyle
chyme
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ci-devant
ciao
ciborium
cicada
cicala
cicatrix
cicatrize
cicely
cicero
cicerone
cichlid
cicisbeo
cider
cig
cigar
cigar store
cigarette
cigarette holder
cigarette lighter
cigarette paper
cigarillo
cilia
ciliary
ciliary body
ciliate
cilice
ciliolate
cilium
cimbalom
cimex
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cinchona
cinchonidine
cinchonine
cinchonism
cinchonize
cincture
cinder

cinder block
cinder track
cine-
cineaste
cinema
cinematograph
cinematography
cineraria
cinerarium
cinerary
cinerator
cinereous
cingulum
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cinnamic acid
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cinnamon stone
cinquain
cinque
cinquecento
cinquefoil
cipher
cipolin
cir.
circa
circadian
circinate
circle
circlet
circuit
circuit binding
circuit breaker
circuit judge
circuit rider
circuitous
circuitry
circuity
circular
circular
function
circular measure
circular mil
circular polarization
circular saw
circular triangle
circularize
circulate

circulating capital
circulating decimal
circulating library
circulating medium
circulation
circum-
circumambient
circumambulate
circumbendibus
circumcise
circumcision
circumference
circumferential
circumflex
circumfluent
circumfluous
circumfuse
circumgyration
circumjacent
circumlocution
circumlunar
circumnavigate
circumnutate
circumpolar
circumrotate
circumscissile
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circumscription
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circumspect
circumspection
circumstance
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circumstantial evidence
circumstantiality
circumstantiate
circumvallate
circumvent
circumvolution
circus
cire perdue
cirque
cirrate
cirrhosis
cirro-
cirrocumulus
cirrose
cirrostratus

cirrus
cirsoid
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cisalpine
cisco
cislunar
cismontane
cispadane
cissoid
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cistaceous
cistern
cisterna
cit.
citadel
citation
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cither
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citizen
citizenry
citizenship
citole
citral
citrange
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citreous
citric
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citriculture
citrin
citrine
citron
citron wood
citronella
citronellal
citrus
citrus fruit
cittern
city
city council
city desk
city editor
city father
city hall

city man
city manager
city planning
city slicker
city-state
cityscape
civ.
civet
civic
civics
civies
civil
civil day
civil death
civil disobedience
civil engineer
civil engineering
civil law
civil liberty
civil list
civil marriage
civil rights
civil servant
civil service
civil war
civilian
civility
civilization
civilize
civilized
civilly
civism
civvies
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clabber
clachan
clack
clad
cladding
cladoceran
cladophyll
claim
claimant
claiming race
clair-obscure
clairaudience
clairvoyance
clairvoyant

clam
clam up
clamant
clamatorial
clambake
clamber
clammy
clamor
clamorous
clamp
clamper
clamshell
clamworm
clan
clandestine
clang
clangor
clank
clannish
clansman
clap
clap on
clapboard
clapper
clapperclaw
claptrap
claque
claqueur
clarabella
clarence
claret
claret cup
clarify
clarinet
clarino
clarion
clarity
clarkia
claro
clarsach
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clash
clasp
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knife
clasping
class
class consciousness

class struggle
class.
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classical conditioning
classical economics
classicism
classicist
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classification
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classify
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classroom
classy
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claudication
clause
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claw hammer
claw hatchet
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claybank
claymore
claypan

claytonia
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clean hands
clean out
clean up
clean-cut
clean-limbed
clean-shaven
cleaner
cleaning
cleaning woman
cleanly
cleanse
cleanser
cleansing tissue
cleanup
clear
clear away
clear off
clear out
clear up
clear-air turbulence
clear-cut
clear-eyed
clear-sighted
clearance
clearcole
clearheaded
clearing
clearing house
clearly
clearness
clearstory
clearway
clearwing
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cleavers
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palate
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cleptomania
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clericalism
clericals
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clerkly
cleromancy
cleruchy
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clever
clevis
clew
clew line
click
click beetle
clicker
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clientage
clientele
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cliff brake
cliff swallow
cliff-hanger
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climbing fern
climbing irons
clime
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cline
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clingfish
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clingstone
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clinical psychology
clinical thermometer
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clinometer
clinquant
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clip joint
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clip-fed
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cloaca
cloak
cloak-and-dagger
cloakroom
clobber
cloche
clock
clock golf
clock watcher
clockmaker
clockwise
clockwork
clod
cloddish

clodhopper
clodhopping
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clomp
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clonic
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close call
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close harmony
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close juncture
close out
close quarters
close shave
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close-grained
close-hauled
close-knit
close-lipped
close-stool
close-up
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closed chain
closed circuit
closed corporation
closed primary
closed shop
closed-circuit television
closed-end investment company
closefisted
closemouthed
closer
closet
closet drama
closing
clostridium
closure

clot
cloth
clothbound
clothe
clothes
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clothes pole
clothes tree
clothesbasket
clotheshorse
clothesline
clothespin
clothespress
clothier
clothing
clotted cream
cloture
cloud
cloud chamber
cloud cover
cloud rack
cloud-capped
cloudberry
cloudburst
clouded
cloudland
cloudless
cloudlet
cloudscape
cloudy
clough
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clove pink
cloven
cloven hoof
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clown
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clownery
cloy
cloying
club
club chair
club foot
club moss

club sandwich
club
steak
club topsail
clubbable
clubby
clubfoot
clubhaul
clubhouse
clubman
clubwoman
cluck
clue
clueless
clumber spaniel
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clumsy
clung
clunk
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clupeoid
cluster
clustered
clutch
clutter
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co-opt
co-star
co-worker
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coach box
coach dog
coach horse
coach house
coach screw
coach-and-four
coacher
coachman

coachwhip
coachwork
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coadjutress
coadjutrix
coadunate
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coagulase
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coagulum
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coal car
coal gas
coal heaver
coal hole
coal mine
coal oil
coal scuttle
coal tar
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coaming
coaptation
coarctate
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coarsen
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coast guard
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coastal plain
coaster
coastguardsman
coastland
coastline
coastward
coastwise
coat
coat hanger

coat of arms
coat of mail
coated
coatee
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coating
coattail
coauthor
coax
coaxial
coaxial cable
cob
cob money
cobalt
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cobalt
blue
cobalt bomb
cobalt green
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cobaltite
cobaltous
cobber
cobble
cobbler
cobblestone
cobelligerent
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cobnut
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cobra de capello
coburg
cobweb
cobwebby
coca
cocaine
cocainism
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coccus
coccyx
cochineal
cochlea
cochleate

cock
cock of the walk
cock-a-doodle-doo
cock-a-hoop
cock-a-leekie
cock-and-bull story
cock-of-the-rock
cockade
cockalorum
cockatiel
cockatoo
cockatrice
cockboat
cockchafer
cockcrow
cocked hat
cocker
cocker spaniel
cockerel
cockeye
cockeyed
cockfight
cockhorse
cockiness
cockle
cockleboat
cocklebur
cockleshell
cockloft
cockney
cockneyfy
cockneyism
cockpit
cockroach
cockscomb
cockshy
cockspur
cocksure
cockswain
cocktail
cocktail hour
cocktail lounge
cocktail party
cocktail table
cockup
cocky
coco
cocoa

cocoa bean
cocoa butter
coconut
coconut butter
coconut oil
coconut palm
cocoon
cocotte
cod
cod-liver oil
coda
coddle
code
codeclination
codeine
codex
codfish
codger
codices
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codification
codify
codling
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codpiece
coeducation
coefficient
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coelenteron
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coelostat
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coenurus
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coessential
coetaneous

coeternal
coeternity
coeval
coexecutor
coexist
coextend
coextensive
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coffee break
coffee cup
coffee maker
coffee mill
coffee nut
coffee shop
coffee table
coffee tree
coffee-colored
coffeehouse
coffeepot
coffer
cofferdam
coffin
coffin bone
coffin nail
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cog railway
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cognizance
cognizant
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cogwheel
cohabit

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coherent
cohesion
cohesive
cohobate
cohort
cohosh
cohune
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coiffeur
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coil spring
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coin box
coin silver
coinage
coincide
coincidence
coincident
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coinsurance
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coke
coke oven
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cola nut
colander
colatitude
colcannon
colchicine
colchicum
colcothar
cold

cold chisel
cold comfort
cold cream
cold cuts
cold duck
cold feet
cold frame
cold front
cold light
cold pack
cold rubber
cold shoulder
cold snap
cold sore
cold steel
cold storage
cold sweat
cold turkey
cold war
cold water
cold wave
cold-blooded
cold-hearted
cold-shoulder
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colemanite
coleopteran
coleoptile
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coleslaw
coleus
colewort
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colicweed
coliseum
colitis
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collaborate
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collaborationist
collaborative
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collagen
collapse
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collar cell

collarbone
collard
collat.
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collateral trust bond
collation
collative
collator
colleague
collect
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collected
collection
collective
collective agreement
collective bargaining
collective farm
collective noun
collective ownership
collective security
collective unconscious
collectivism
collectivity
collectivize
collector
colleen
college
collegian
collegiate
collegiate
church
collegiate institute
collegium
collenchyma
collet
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collier
colliery
colligate
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collimator
collinear
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collinsia
collision
collision course

collision insurance
collision mat
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collocation
collocutor
collodion
collogue
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colloquialism
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collyrium
collywobbles
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colobus
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cologne
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colonialism
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colonist
colonize
colonnade
colony
colophon
colophony
coloquintida
color
color bar
color blindness
color filter
color line
color scheme
color sergeant
color-blind
colorable

colorado
colorant
coloration
coloratura
colorcast
colored
colorfast
colorful
colorific
colorimeter
coloring
coloring book
colorist
colorless
colossal
colosseum
colossus
colostomy
colostrum
colotomy
colour
colourable
colpitis
colporteur
colpotomy
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colter
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coltsfoot
colubrid
colubrine
colugo
columbarium
columbary
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columbium
columbous
columella
columelliform
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column
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columnar
columniation
columnist
colure

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colza
colza oil
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com.
coma
comate
comatose
comatulid
comb
comb jelly
comb.
combat
combat fatigue
combat team
combat zone
combatant
combative
combe
comber
combination
combination lock
combination tone
combinative
combinatorial analysis
combinatorial topology
combine
combined
combined operations
combings
combining form
combo
combust
combustible
combustion
combustion chamber
combustor
comdg.
come
come about
come across
come along
come at
come away
come between
come by
come forward
come in

come into
come of
come off
come out
come over
come round
come through
come to
come up
come upon
come-hither
come-on
comeback
comedian
comedic
comedienne
comedietta
comedo
comedown
comedy
comedy of manners
comely
comer
comestible
comet
comeuppance
comfit
comfort
comfort station
comfortable
comforter
comfrey
comfy
comic
comic book
comic opera
comic
relief
comic strip
comical
coming
comitative
comitia
comity
comm.
comma
comma bacillus
comma fault

comma splice
command
command car
command guidance
command module
command paper
command performance
command post
commandant
commandeer
commander
commander in chief
commanding
commanding officer
commandment
commando
comme il faut
commeasure
commedia dell'arte
commemorate
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commemorative
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commencement
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commendam
commendation
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commensurable
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commentary
commentate
commentative
commentator
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commercial art
commercial bank
commercial college
commercial credit
commercial fertilizer
commercial law
commercial paper
commercial pilot
commercial traveler
commercialism

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commination
commingle
comminute
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commissar
commissariat
commissary
commission
commission plan
commissionaire
commissioned officer
commissioner
commissure
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commitment
committal
committee
committeeman
committeewoman
commix
commixture
commode
commodious
commodity
commodity
exchange
commodore
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common carrier
common chord
common cold
common council
common denominator
common divisor
common fraction
common ground
common knowledge
common law
common logarithm
common man
common measure
common multiple
common noun
common people

common pleas
common prayer
common property
common room
common school
common scold
common sense
common stock
common time
common touch
common year
common-law marriage
commonable
commonage
commonality
commonalty
commoner
commonly
commonplace
commonplace book
commons
commonsense realism
commonweal
commonwealth
commorancy
commorant
commotion
commove
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communalism
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commune
communicable
communicant
communicate
communication
communications satellite
communications zone
communicative
communion
communion cloth
communion of saints
communism
communist
communistic
communitarian
community
community chest

community college
community singing
communize
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commutate
commutation
commutation
 ticket
commutative
commutative law
commutator
commute
commuter
commutual
comose
comp
comp.
compact
compaction
compagnie
compander
companion
companion ladder
companionable
companionate
companionate marriage
companionship
companionway
company
company officer
company union
compar.
comparable
comparative
comparative government
comparative linguistics
comparative literature
comparative method
comparator
compare
comparison
compartment
compartmentalize
compass
compass card
compass course
compass plant
compass rose

compass saw
compassion
compassionate
compatible
compatriot
compeer
compel
compellation
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contractual
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control chart

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control experiment
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control room
control stick
control surface
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cooker

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coonhound
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copy editor
copy paper
copy-edit
copybook
copyboy
copycat
copyhold
copyholder
copyist

copyread
copyreader
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copywriter
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coquelicot
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corn earworm
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corn marigold
corn meal
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corn picker
corn pone

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corn silk
corn smut
corn snow
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cost ledger
cost of living
cost sheet
cost-of-living index

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cotton mill

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council of state
council of war
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counsellor
counselor

counselor-at-law
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counterattack
counterattraction
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countercheck
counterclaim
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counterfoil
counterforce
counterglow
counterinsurgency
counterintelligence
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counterman
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counterpoison
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counterproductive

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counterproposal
counterpunch
counterreply
counterrevolution
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counterspy
counterstamp
counterstatement
counterstroke
countersubject
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countertype
countervail
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counterword
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country cousin
country dance
country gentleman
country house
country music
country rock
country seat
country store
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country-bred
country-dance
country-wide
countryfied
countryman
countryside
countrywoman
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county commissioner

county court
county palatine
county seat
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coup d'oeil
coup de main
coup de plume
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coupler
couplet
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courante
coureur de bois
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courlan
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coursing
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court card
court dress
court hand
court of appeals
court of chancery
court of first instance
court of honor
court of inquiry
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 of record
court of wards
court plaster
court tennis
court-martial
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courtesy
courtesy title
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courtier
courtly
courtly love
courtroom

courtship
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cousin
cousin-german
couteau
couthie
couture
couturier
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covariance
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cover charge
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cover girl
cover point
cover story
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covering letter
coverlet
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covert coat
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cracker-barrel
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craftwork
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crammer

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creativity
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creature
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credendum
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credit line
credit man
credit rating
credit slip
credit standing
credit union
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creditor
credits
credo
credulity
credulous
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crenulation

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crepe de Chine
crepe hair
crepe paper
crepe rubber
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crept
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crepuscular light
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crystal pickup
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customhouse
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day letter
day lily
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day nursery
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day school
day shift
day-care center
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daybreak
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death rattle
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demand loan
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direct action
direct current

direct distance dialing
direct evidence
direct lighting
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direct object
direct primary
direct tax
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dirndl
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dirt-cheap
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divining rod
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divisionism
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do for
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do over
do up
do with
do without
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do-goodism
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do-nothing
do-nothingism
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dockyard
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dog fennel
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dog paddle
dog rose
dog sled
dog tag
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dog's-tongue
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dog-eat-dog
dog-tired
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double back
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double bass
double bassoon
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double boiler
double bond
double chin
double cross
double dagger
double decomposition
double eagle

double entendre
double entry
double exposure
double fault
double feature
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double glazing
double harness
double hitch
double indemnity
double jeopardy
double negative
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double refraction
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double salt
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double-check
double-cross
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double-ripper
double-space
double-stop
double-talk
double-team
double-time
double-tongue

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dovecote
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dovetail plane
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dowable
dowager
dowdy
dowel
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dower house

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down payment
down under
down-and-out
down-at-heel
down-bow
down-to-earth
downbeat
downcast
downcome
downcomer
downdraft
downfall
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downhaul
downhearted
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downpipe
downpour
downrange
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downstage
downstairs
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downthrow
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downtrend
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draft animal
draft board
draft chair
draft dodger
draft horse
draftee
draftsman
drafty
drag
drag
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drag in
drag link
drag race
drag sail
drag up
dragging
draggle
draggletailed
draghound
dragline
dragnet
dragoman
dragon

dragon tree
dragon's blood
dragonet
dragonfly
dragonhead
dragonnade
dragonroot
dragoon
dragrope
dragster
drain
drainage
drainage basin
draining board
drainpipe
drake
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drama
dramatic
dramatic irony
dramatics
dramatis personae
dramatist
dramatization
dramatize
dramaturge
dramaturgy
dramshop
drank
drape
draper
drapery
drastic
drat
dratted
draught
draughtboard
draughts
draughtsman
draughty
draw
draw in
draw off
draw on
draw out
draw poker
draw up
drawback

drawbar
drawbridge
drawee
drawer
drawers
drawing
drawing account
drawing board
drawing card
drawing pin
drawing room
drawknife
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drawn butter
drawn work
drawplate
drawshave
drawstring
drawtube
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drayman
dread
dreadful
dreadfully
dreadnought
dream
dream analysis
dream up
dream vision
dreamer
dreamland
dreamworld
dreamy
drear
dreary
dredge
dredge up
dredger
dredging
machine
dree
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drench
dress
dress circle

dress coat
dress down
dress parade
dress rehearsal
dress shield
dress shirt
dress suit
dress uniform
dress up
dressage
dresser
dressing
dressing gown
dressing room
dressing sack
dressing station
dressing table
dressing-down
dressmaker
dressy
drew
dribble
driblet
dribs and drabs
dried
dried-up
drier
driest
drift
drift anchor
drift angle
drift ice
drift net
drift netter
drift tube
driftage
drifter
driftwood
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drill press
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drillmaster
drillstock
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drink
drinkable
drinker
drinking

drinking fountain
drinking song
drinking water
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drip-dry
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dripping pan
drippy
dripstone
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driver ant
driver's seat
driveway
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driving wheel
drizzle
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droit du seigneur
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drollery
dromedary
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drop black
drop cloth
drop curtain
drop forge
drop hammer
drop kick
drop leaf
drop letter
drop off
drop scene
drop shipment
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drug addict
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druggist
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drum corps
drum major
drum majorette
drum out
drumbeat
drumfire
drumfish
drumhead
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drumlin
drummer
drumstick

drunk
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drunken
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dry battery
dry cell
dry cleaner
dry cleaning
dry distillation
dry dock
dry farming
dry fly
dry goods
dry kiln
dry law
dry martini
dry measure
dry mop
dry nurse
dry offset
dry plate
dry rot
dry run
dry up
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dry-bulb thermometer
dry-clean
dry-nurse
dry-salt
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drying oil
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duck soup
duckbill
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duckpin
ducks
ducks and drakes
ducktail
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durable goods
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dust bowl
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dust devil
dust jacket
dust mop
dust shot
dust storm
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dustman
dustpan
dustproof
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dusty
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dwarf chestnut
dwarf cornel
dwarf mallow
dwarf star

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dwarfism
dwell
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dwelling
dwelling house
dwelling place
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dyed-in-the-wool
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dyeline
dyer's-weed
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dynamic geology
dynamic psychology
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dysfunction
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ear trumpet
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earpiece
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earth mother
earth pillar
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earthlight
earthling
earthly
earthman
earthnut
earthquake

earthshaker
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earthshine
earthstar
earthward
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earwitness
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east by south
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east-southeast
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eating house
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eau de Javelle

eau de vie
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ecclesiastical law
ecclesiastical mode
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echo sounder
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echolocation

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economic geography
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ectomorph
ectoparasite

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egg roll
egg timer
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egg white
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eggcup
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egghead
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eggplant
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electric chair
electric charge

electric current
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electric field
electric furnace
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electric needle
electric organ
electric potential
electric ray
electric shock
electric storm
electric thermometer
electric torch
electric wave
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electromagnetic spectrum
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electromagnetic wave
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electromotive
electromotive force
electromotor
electromyography
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electron affinity
electron camera
electron gun
electron lens
electron microscope
electron multiplier
electron optics
electron telescope
electron tube
electron-ray tube
electronarcosis
electronegative
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electronic brain
electronic data processing
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electronic organ
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electrophoresis
electrophorus

electrophotography
electrophysiology
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electroscope
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electrostatic unit
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electrostriction
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electrotechnology
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electrothermics
electrotonus
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elephant seal

elephant shrew
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en famille
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en passant
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en prise
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en rapport
en route
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encrust
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end organ
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end product
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end-blown
end-of-day glass
end-stopped
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endamoeba
endanger
endarch
endbrain
endear
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endgame
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face-lift
face-lifting

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face-saving
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facilitation
facility
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fairy ring
fairy tale
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fall over
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false front
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family court
family doctor

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fanny
fanon
fantail
fantasia
fantasist

fantasize
fantasm
fantast
fantastic
fantastically
fantasy
fantoccini
fantom
faqir
far
far-famed
far-fetched
far-flung
far-gone
far-off
far-reaching
farad
faradic
faradism
faradize
faradmeter
farandole
faraway
farce
farceur
farceuse
farci
farcical
farcy
fard
fardel
fare
fare-thee-well
farewell
farfetched
farina
farinaceous
farinose
farl
farm
farm
belt
farm hand
farm out
farmer
farmer cheese
farmer-general
farmhand

farmhouse
farming
farmland
farmstead
farmyard
farnesol
faro
farouche
farrago
farrier
farriery
farrow
farseeing
farsighted
fart
farther
farthermost
farthest
farthing
farthingale
fasces
fascia
fasciate
fasciation
fascicle
fascicule
fasciculus
fascinate
fascinating
fascination
fascinator
fascine
fascism
fascist
fash
fashion
fashion plate
fashionable
fast
fast day
fast neutron
fastback
fasten
fastening
fastidious
fastigiate
fastigium
fastness

fat
fat cat
fat-soluble
fat-witted
fatal
fatalism
fatality
fatally
fatback
fate
fated
fateful
fath.
fathead
father
father confessor
father figure
father image
father-in-law
fatherhood
fatherland
fatherless
fatherly
fathom
fathomless
fatidic
fatigue
fatigued
fatling
fatness
fatso
fatten
fattish
fatty
fatty acid
fatty degeneration
fatty oil
fatuitous
fatuity
fatuous
faubourg
faucal
fauces
faucet
faugh
fault
fault plane
faultfinder

faultfinding
faultless
faulty
faun
fauna
faute de
 mieux
fauteuil
faux pas
faveolate
favonian
favor
favorable
favored
favorite
favorite son
favoritism
favour
favourable
favourite
favouritism
favus
fawn
fawn lily
fay
fayalite
faze
feal
fealty
fear
fearful
fearfully
fearless
fearnought
fearsome
feasible
feast
feast day
feat
feather
feather bed
feather duster
feather grass
feather palm
feather star
feather-veined
featherbedding
featherbrain

feathercut
feathered
featheredge
featherhead
feathering
feathers
featherstitch
featherweight
feathery
featly
feature
feature-length
featured
featureless
feaze
febri-
febricity
febrifacient
febrific
febrifugal
febrifuge
febrile
fec.
fecal
feces
fecit
feck
feckless
fecula
feculent
fecund
fecundate
fecundity
fed
fed up
federal
federal district
federalese
federalism
federalist
federalize
federate
federation
federative
fedora
fee
fee simple
fee tail

feeble
feeble-minded
feebleminded
feed
feedback
feeder
feeder line
feeding
feel
feeler
feeler gauge
feeling
feet
feeze
feign
feigned
feint
feints
feisty
felafel
feldspar
felicific
felicitate
felicitation
felicitous
felicity
felid
feline
fell
fellah
fellatio
feller
fellmonger
felloe
fellow
fellow
creature
fellow feeling
fellow traveler
fellowman
fellowship
felly
felo-de-se
felon
felonious
felonry
felony
felsite

felspar
felt
felting
felucca
fem.
female
female impersonator
female suffrage
feme
feme covert
feme sole
feminacy
femineity
feminine
feminine caesura
feminine ending
feminine rhyme
femininity
feminism
feminize
femme
femme de chambre
femme fatale
femoral
femur
fen
fence
fence-sitter
fencer
fencible
fencing
fend
fender
fenestella
fenestra
fenestrated
fenestration
fenland
fennec
fennel
fennelflower
fenny
fenugreek
feoff
feoffee
fer-de-lance
feral
ferbam

fere
feretory
feria
ferial
ferine
ferity
fermata
ferment
fermentation
fermentative
fermi
fermion
fermium
fern
fern seed
fernery
ferocious
ferocity
ferrate
ferreous
ferret
ferret badger
ferri-
ferriage
ferric
ferric oxide
ferricyanic acid
ferricyanide
ferriferous
ferrite
ferritin
ferro-
ferrocene
ferrochromium
ferroconcrete
ferrocyanic
acid
ferrocyanide
ferroelectric
ferromagnesian
ferromagnetic
ferromagnetism
ferromanganese
ferrosilicon
ferrotype
ferrous
ferruginous
ferrule

ferry
ferryboat
ferryman
fertile
fertility
fertility cult
fertility symbol
fertilization
fertilize
fertilizer
ferula
ferule
fervency
fervent
fervid
fervor
fescue
fess
fess point
festal
fester
festinate
festination
festival
festive
festivity
festoon
festoon cloud
festoonery
fetal
fetation
fetch
fetch up
fetching
fete
fete day
fetial
fetich
feticide
fetid
fetiparous
fetish
fetishism
fetishist
fetlock
fetor
fetter
fetter bone

fetterlock
fettle
fettling
fetus
feu
feuar
feud
feudal
feudal system
feudalism
feudality
feudalize
feudatory
feudist
feuilleton
fever
fever blister
fever heat
fever pitch
fever therapy
fever tree
feverfew
feverish
feverous
feverroot
feverwort
few
fewer
fewness
fey
fez
ff.
fiacre
fiance
fiasco
fiat
fiat money
fib
fiber
fiber glass
fiberboard
fibered
fiberglass
fibre
fibriform
fibril
fibrilla
fibrillation

fibrilliform
fibrin
fibrinogen
fibrinolysin
fibrinolysis
fibrinous
fibro-
fibroblast
fibroid
fibroin
fibroma
fibrosis
fibrous
fibrovascular
fibster
fibula
fiche
fichu
fickle
fico
fictile
fiction
fictional
fictionalize
fictionist
fictitious
fictive
fid
fiddle
fiddle
pattern
fiddle-de-dee
fiddle-faddle
fiddlehead
fiddler
fiddler crab
fiddlestick
fiddlewood
fiddling
fideicommissary
fideicommissum
fideism
fidelity
fidge
fidget
fidgety
fiducial
fiduciary

fidus Achates
fie
fief
field
field army
field artillery
field battery
field captain
field corn
field day
field emission
field event
field glass
field glasses
field goal
field guide
field gun
field hockey
field hospital
field magnet
field marshal
field mouse
field of force
field of view
field of vision
field officer
field spaniel
field trial
field trip
field winding
field work
fielder
fieldfare
fieldpiece
fieldsman
fieldstone
fieldwork
fiend
fiendish
fierce
fieri facias
fiery
fiery cross
fiesta
fife
fife rail
fifteen
fifteenth

fifth
fifth
column
fifth wheel
fiftieth
fifty
fifty-fifty
fig
fig leaf
fig marigold
fig.
fight
fighter
fighter-bomber
fighting chance
fighting cock
fighting fish
fighting top
figment
figural
figurant
figurate
figurate number
figuration
figurative
figure
figure of eight
figure of speech
figure on
figure out
figure skating
figure-ground
figured
figured bass
figurehead
figurine
figwort
filagree
filament
filamentary
filamentous
filar
filaria
filariasis
filature
filbert
filch
file

filefish
filet
filet lace
filet mignon
filial
filiate
filiation
filibeg
filibuster
filicide
filiform
filigree
filigreed
filing
filing clerk
filings
fill
fill in
fill out
fill up
fill-in
fillagree
fille de chambre
fille de joie
filled gold
filler
fillet
filling
filling station
fillip
fillister
filly
film
film library
film pack
film star
filmdom
filmy
filoplume
filose
fils
filter
filter bed
filter paper
filter tip
filterable
filth
filthy

filthy lucre
filtrate
filtration
filum
fimble
fimbria
fimbriate
fimbriation
fin
fin
 keel
fin.
finable
finagle
final
final cause
finale
finalism
finalist
finality
finalize
finally
finance
finance bill
finance company
financial
financier
finback
finch
find
finder
finding
fine
fine art
fine print
fine structure
fine-cut
fine-draw
fine-drawn
fine-grain
fine-grained
fine-tooth comb
fineable
finely
fineness
fineness ratio
finer
finery

fines herbes
finespun
finesse
finfoot
finger
finger bowl
finger painting
finger post
finger wave
fingerboard
fingerbreadth
fingered
fingering
fingerling
fingernail
fingerprint
fingerstall
fingertip
finial
finical
finicking
finicky
fining
finis
finish
finished
finishing school
finite
finite verb
finitude
fink
finnan haddie
finnan haddock
finned
finny
fino
finochio
fiord
fiorin
fioritura
fipple
fipple flute
fir
fire
fire alarm
fire ant
fire apparatus
fire balloon

fire beetle
fire blight
fire brigade
fire clay
fire company
fire control
fire department
fire drill
fire engine
fire escape
fire extinguisher
fire fighter
fire hydrant
fire
insurance
fire irons
fire marshal
fire opal
fire power
fire red
fire resistance
fire sale
fire screen
fire ship
fire station
fire tower
fire trench
fire wall
fire-cure
fire-eater
fire-new
fire-resistant
firearm
fireback
fireball
firebird
fireboard
fireboat
firebox
firebrand
firebrat
firebreak
firebrick
firebug
firecracker
firecrest
firedamp
firedog

firedrake
firefly
fireguard
firehouse
fireless cooker
firelock
fireman
fireplace
fireplug
firepower
fireproof
fireproofing
firer
fireside
firestone
firetrap
firewarden
firewater
fireweed
firewood
firework
fireworks
fireworm
firing
firing line
firing order
firing pin
firing squad
firkin
firm
firmament
firmer chisel
firn
firry
first
first aid
first base
first cause
first class
first cousin
first edition
first estate
first floor
first fruits
first lady
first lieutenant
first mate
first mortgage

first name
first offender
first officer
first person
first post
first principle
first quarter
first reading
first refusal
first sergeant
first string
first
water
first-born
first-class
first-day cover
first-degree burn
first-foot
first-nighter
first-rate
firsthand
firstling
firstly
firth
fisc
fiscal
fiscal year
fish
fish and chips
fish cake
fish fry
fish hawk
fish joint
fish ladder
fish louse
fish meal
fish out
fishbolt
fishbowl
fisher
fisherman
fisherman's bend
fishery
fisheye lens
fishgig
fishhook
fishing
fishing rod

fishing smack
fishing tackle
fishmonger
fishnet
fishplate
fishskin disease
fishtail
fishwife
fishworm
fishy
fissi-
fissile
fission
fission bomb
fissionable
fissiparous
fissirostral
fissure
fissure of Rolando
fissure of Sylvius
fist
fistic
fisticuffs
fistula
fistulous
fit
fit in
fit out
fit up
fitch
fitful
fitly
fitment
fitted
fitter
fitting
five
five hundred
five senses
five-and-ten
five-finger
five-spot
five-star
fivefold
fivepenny
fiver
fives
fix

fix up
fixate
fixation
fixative
fixed
fixed assets
fixed capital
fixed charge
fixed idea
fixed oil
fixed price
fixed satellite
fixed star
fixed-do system
fixer
fixing
fixity
fixture
fizgig
fizz
fizzle
fizzy
fjeld
fjord
fl.
fl.
dr.
fl. oz.
flabbergast
flabby
flabellate
flabellum
flaccid
flack
flacon
flag
flag day
flag of convenience
flag of truce
flag officer
flag rank
flag-waving
flagella
flagellant
flagellate
flagelliform
flagellum
flageolet

flagging
flaggy
flagitious
flagman
flagon
flagpole
flagrant
flagrante delicto
flagship
flagstaff
flagstone
flail
flair
flak
flak jacket
flake
flake out
flake white
flaky
flam
flambeau
flamboyant
flame
flame cell
flame-out
flamen
flamenco
flameproof
flamethrower
flaming
flamingo
flammable
flan
flanch
flange
flank
flanker
flannel
flannel cake
flannelette
flap
flapdoodle
flapjack
flapper
flare
flare-up
flaring
flash

flash burn
flash card
flash flood
flash gun
flash lamp
flash photography
flash point
flashback
flashboard
flashbulb
flashcube
flasher
flashgun
flashing
flashing point
flashlight
flashover
flashy
flask
flasket
flat
flat arch
flat knot
flat race
flat roof
flat silver
flat spin
flat tire
flat wash
flat-bed press
flatboat
flatcar
flatfish
flatfoot
flatfooted
flathead
flatiron
flatling
flats
flatten
flatter
flattery
flattie
flatting
flattish
flattop
flatulent
flatus

flatware
flatways
flatwise
flatworm
flaunch
flaunt
flaunty
flautist
flavescent
flavin
flavine
flavone
flavoprotein
flavopurpurin
flavor
flavorful
flavoring
flavorous
flavorsome
flavory
flavour
flavourful
flavouring
flaw
flawed
flawy
flax
flaxen
flaxseed
flay
fld.
flea
flea
beetle
flea market
flea-bitten
fleabag
fleabane
fleabite
fleam
fleawort
fleck
flection
fled
fledge
fledgling
fledgy
flee

fleece
fleecy
fleer
fleet
fleet admiral
fleeting
flense
flesh
flesh and blood
flesh color
flesh fly
flesh wound
flesher
fleshings
fleshly
fleshpots
fleshy
fletch
fletcher
fleur-de-lis
fleurette
fleuron
flew
flews
flex
flexed
flexible
flexile
flexion
flexor
flexuosity
flexuous
flexure
fley
flibbertigibbet
flick
flicker
flickertail
flied
flier
flight
flight arrow
flight deck
flight engineer
flight feather
flight formation
flight path
flight plan

flight
recorder
flight simulator
flight strip
flight surgeon
flightless
flighty
flimflam
flimsy
flinch
flinders
fling
flinger
flint
flint glass
flintlock
flinty
flip
flip side
flip-flop
flippant
flipper
flirt
flirtation
flirtatious
flit
flitch
flite
flitter
flittermouse
flitting
flivver
float
float glass
float-feed
floatable
floatage
floatation
floater
floating
floating dock
floating heart
floating island
floating policy
floating rib
floating stock
floatplane
floats

floatstone
floaty
floc
floccose
flocculant
flocculate
floccule
flocculent
flocculus
floccus
flock
flocky
floe
flog
flogging
flong
flood
flood control
flood insurance
flood lamp
flood plain
flood tide
flooded
floodgate
floodlight
floor
floor broker
floor lamp
floor leader
floor manager
floor plan
floor show
floor trader
floorage
floorboard
floorer
flooring
flooring saw
floorman
floorwalker
floozy
flop
flop-eared
flophouse
floppy
flor.
flora
floral

floral envelope
floreated
florescence
floret
floriated
floribunda
floriculture
florid
florilegium
florin
florist
floristic
floruit
flory
flos
ferri
floss
flossy
flotage
flotation
flotilla
flotsam
flotsam and jetsam
flounce
flouncing
flounder
flour
flour mill
flourish
flourishing
floury
flout
flow
flow chart
flow sheet
flowage
flower
flower girl
flower head
flower power
flower-de-luce
flowerage
flowered
flowerer
floweret
flowering
flowering maple
flowering moss

flowering plant
flowerless
flowerlike
flowerpot
flowery
flowing
flown
flu
flub
fluctuant
fluctuate
fluctuation
flue
flue pipe
flue stop
flue-cure
fluency
fluent
fluff
fluffy
flugelhorn
fluid
fluid dram
fluid drive
fluid mechanics
fluid ounce
fluid pressure
fluidextract
fluidics
fluidize
fluke
fluky
flume
flummery
flummox
flump
flung
flunk
flunkey
flunky
fluor
fluor-
fluorene
fluoresce
fluorescein
fluorescence
fluorescent
fluorescent lamp

fluoric
fluoridate
fluoridation
fluoride
fluorinate
fluorine
fluorite
fluoro-
fluorocarbon
fluorometer
fluoroscope
fluoroscopy
fluorosis
fluorspar
flurried
flurry
flush
fluster
flute
fluted
fluter
fluting
flutist
flutter
flutter
kick
flutterboard
fluttery
fluvial
fluviatile
fluviomarine
flux
flux density
fluxion
fluxmeter
fly
fly agaric
fly ash
fly casting
fly gallery
fly rod
fly sheet
fly-by-night
fly-fish
flyaway
flyback
flyblow
flyblown

flyboat
flycatcher
flyer
flying
flying boat
flying bomb
flying boxcar
flying bridge
flying buttress
flying circus
flying column
flying doctor
flying dragon
flying field
flying fish
flying fox
flying frog
flying gurnard
flying jib
flying jib boom
flying lemur
flying lizard
flying machine
flying mare
flying phalanger
flying saucer
flying squad
flying squirrel
flying start
flying wing
flyleaf
flyman
flyover
flypaper
flyspeck
flyte
flytrap
flyweight
flywheel
fm.
fo'c's'le
fo'c'sle
fo.
foal
foam
foam rubber
foamflower
foamy

fob
fob off
focal
focal infection
focal length
focal plane
focal point
focal ratio
focalize
focus
fodder
foe
foehn
foeman
foetation
foeticide
foetid
foetor
foetus
fog
fog bank
fog bell
fog drip
fog light
fog
signal
fogbound
fogbow
fogdog
fogged
foggy
foghorn
fogy
foible
foie gras
foil
foiled
foilsman
foin
foison
foist
fol.
folacin
fold
fold up
foldaway
foldboat
folded dipole

folder
folderol
folding door
folding money
folia
foliaceous
foliage
foliar
foliate
foliated
foliation
folic acid
folie
folio
foliolate
foliole
foliose
folium
folk
folk dance
folk etymology
folk medicine
folk music
folk singer
folk singing
folk song
folk tale
folk-rock
folklore
folkmoot
folksy
folkway
folkways
foll.
follicle
follicle-stimulating hormone
folliculin
follow
follow out
follow through
follow up
follow-through
follow-up
follower
following
folly
foment
fomentation

fond
fondant
fondle
fondly
fondness
fondue
fons et origo
font
fontanel
food
food chain
food poisoning
foodstuff
foofaraw
fool
fool's cap
fool's errand
fool's gold
fool's paradise
fool's-parsley
foolery
foolhardy
foolish
foolproof
foolscap
foot
foot brake
foot fault
foot rot
foot rule
foot soldier
foot warmer
foot-and-mouth disease
foot-candle
foot-lambert
foot-pound
foot-pound-second
foot-poundal
foot-ton
footage
football
footboard
footboy
footbridge
footcloth
footed
footer
footfall

footgear
foothill
foothold
footie
footing
footle
footless
footlight
footlights
footling
footlocker
footloose
footman
footmark
footnote
footpace
footpad
footpath
footplate
footprint
footrace
footrest
footrope
footsie
footslog
footsore
footstalk
footstall
footstep
footstone
footstool
footwall
footway
footwear
footwork
footworn
footy
foozle
fop
foppery
foppish
for
for-
for.
forage
forage
cap
foramen

foramen magnum
foraminifer
forasmuch as
foray
forayer
forb
forbade
forbear
forbearance
forbid
forbiddance
forbidden
forbidden fruit
forbidding
forbore
forborne
forby
force
force majeure
force pump
force-feed
forced
forced landing
forced march
forceful
forcemeat
forceps
forcer
forcible
forcing house
ford
fordo
fordone
fore
fore edge
fore plane
fore-
fore-and-aft
fore-and-aft sail
fore-and-after
fore-topgallant
fore-topgallant mast
fore-topmast
fore-topsail
forearm
forebear
forebode
foreboding

forebrain
forecast
forecastle
foreclose
foreclosure
foreconscious
forecourse
forecourt
foredate
foredeck
foredo
foredoom
forefather
forefend
forefinger
forefoot
forefront
foregather
foreglimpse
forego
foregoing
foregone
foregone
conclusion
foreground
foregut
forehand
forehanded
forehead
foreign
foreign affairs
foreign aid
foreign bill
foreign correspondent
foreign exchange
foreign minister
foreign mission
foreign office
foreign service
foreign-born
foreigner
foreignism
forejudge
foreknow
foreknowledge
forelady
foreland
foreleg

forelimb
forelock
foreman
foremast
foremost
forename
forenamed
forenoon
forensic
forensic chemistry
forensic medicine
forensic psychiatry
forensics
foreordain
foreordination
forepart
forepaw
forepeak
foreplay
forepleasure
forequarter
forereach
forerun
forerunner
foresaid
foresail
foresee
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forest ranger
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reserve
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forestall
forestation
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forester

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foretime
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foretooth
foretop
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forewoman
foreword
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foreyard
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forge
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forgiveness
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forjudge
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fork out
forked
forked lightning
forklift
forlorn
forlorn hope
form

form class
form drag
form genus
form letter
formal
formal cause
formal logic
formaldehyde
formalin
formalism
formality
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formally
formant
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former
formerly
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formication
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formulate
formulism
formwork
formyl
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fornication
fornix
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forsooth
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forsterite
forswear
forsworn
forsythia

fort
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fortalice
forte
forte-piano
forth
forthcoming
forthright
forthwith
fortieth
fortification
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fortissimo
fortitude
fortnight
fortnightly
fortress
fortuitism
fortuitous
fortuity
fortunate
fortune
fortune cookie
fortune hunter
fortune-teller
fortuneteller
fortunetelling
forty
forty winks
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forty-four
forty-niner
fortyish
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forward delivery
forward pass
forward quotation
forward-looking
forwarder
forwarding
forwardness
forwards
forwent
forwhy

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fossorial
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foster brother
foster child
foster home
foster sister
fosterage
fosterling
fou
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fought
foul
foul play
foul shot
foul up
foul-mouthed
foul-up
foulard
foulmouthed
foulness
foumart
found
foundation
foundation garment
foundation stone
founder
founders' shares
foundling
foundry
foundry proof
fount
fountain
fountain pen
fountainhead
four
four flush
four-cycle
four-dimensional
four-eyed fish

four-flush
four-handed
four-in-hand
four-leaf
clover
four-legged
four-letter word
four-o'clock
four-poster
four-way
four-wheeler
fourchette
fourflusher
fourfold
fourgon
fourpence
fourpenny
fourscore
foursome
foursquare
fourteen
fourteenth
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fourth dimension
fourth estate
fourth-class
fourthly
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fovea centralis
foveola
fowl
fowling
fowling piece
fox
fox grape
fox hunting
fox squirrel
fox terrier
fox trot
fox-trot
foxed
foxglove
foxhole
foxhound
foxing
foxtail
foxy
foyer

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fractostratus
fracture
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fragrant
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frame line
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frame-up
framework
framing
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frankforter

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frankness
frankpledge
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frater
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insurance
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frazil
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freak of nature
freak out
freakish
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freckle-faced
freckly
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free agent
free alongside ship
free association
free balloon
free city
free coinage
free companion
free company
free energy
free enterprise
free fall
free form
free gold
free hand

free house
free list
free liver
free love
free on board
free port
free radical
free rider
free silver
free socage
free speech
free thought
free throw
free trade
free verse
free will
free zone
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freedom rider
freedwoman
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freestone

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freezing point
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freight car
freight ton
freight train
freightage
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frenulum
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frequency distribution
frequency modulation
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frequentation
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fresh gale
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freshet
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freshwater
fresnel
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fretted
fretwork
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friary
fribble
fricandeau
fricassee
frication
fricative
friction
friction clutch
friction match
friction tape
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friedcake
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friendship
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frieze
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frightfully
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fringe benefit
fringe tree
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fringing reef

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frog spit
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frogman
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frolic
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front bench
front door
front line
front man
front matter
front room
front runner
front-page

frontage
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frontal lobe
frontality
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frontiersman
frontispiece
frontlet
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frontwards
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frost line
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frostbite
frostbitten
frosted
frosting
frostwork
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froward
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fructificative
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fructose
fructuous
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frugal

frugivorous
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fruit cup
fruit fly
fruit knife
fruit salad
fruit sugar
fruit tree
fruitage
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fruitcake
fruiter
fruiterer
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fruition
fruitless
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fuchsin
fucoid
fucus
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fudge
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fuel cell
fuel injection
fuel oil
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fugacity
fugal
fugato
fugitive
fugleman
fugue
fulcrum
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fulgurant
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fulguration
fulgurite
fulgurous
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full blood
full dress
full house
full moon
full nelson
full professor
full sail
full score
full stop
full swing
full tilt
full time
full-blooded
full-blown
full-bodied
full-faced
full-fledged
full-grown
full-length
full-mouthed
full-rigged
full-scale
full-time
fullback
fuller
fuller's earth
fuller's teasel

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fulminant
fulminate
fulminating powder
fulmination
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fulsome
fulvous
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fumatorium
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fume
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fumigant
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fumigator
fumitory
fumy
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fundamental unit
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funiculus
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funnel cloud
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funny paper
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fur seal
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furlough
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furnace
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fusspot
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future life
future perfect
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futurism
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futurity
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gaberlunzie
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gable window
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gadget

gadgeteer
gadgetry
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gadroon
gadwall
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gaggle
gagman
gahnite
gaiety
gaillardia
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gainer
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gainsay
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gaiter
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gala
galactagogue
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galactic circle
galactic coordinates
galactic equator
galactic latitude
galactic longitude
galactic plane
galactic poles
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gallbladder
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galloglass

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gallows bird
gallows humor
gallows tree
gallstone
galluses
galoot
galop
galore
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galoshes
galumph
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galvanoscope
galvanotropism
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gambier
gambit
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gambol
gambrel
gambrel roof
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game bird
game fish
game fowl

game point
game room
game theory
game warden
gamecock
gamekeeper
gamelan
gamely
gameness
gamesmanship
gamesome
gamester
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gamma iron
gamma radiation
gamma ray
gammadion
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gammon
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gander
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gang
gang plow

gang saw
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gangling
ganglion
gangplank
gangrel
gangrene
gangster
gangue
gangway
gangway ladder
ganister
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ganoid
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garble
garboard
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garden party
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gardener
gardenia
gardening

garderobe
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gargantuan
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garlicky
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garner
garnet
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garnish
garnishee
garnishment
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garrison cap
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garrotte
garrulity
garrulous
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garter belt
garter snake
garter stitch
garth
garvey
gas
gas attack
gas black
gas burner
gas chamber
gas coal
gas
constant
gas engine
gas fitter
gas fixture
gas furnace
gas gangrene

gas jet
gas log
gas main
gas mantle
gas mask
gas meter
gas oil
gas plant
gas range
gas station
gas thermometer
gas tube
gas turbine
gas well
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gasconade
gaselier
gaseous
gash
gasholder
gasiform
gasify
gasket
gaskin
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gastrocnemius
gastroenteritis

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gastrostomy
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gastrula
gastrulation
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gate-leg table
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gatepost
gateway
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gauffer
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gauntry
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gazpacho
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gearshift
gearwheel
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geisha
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gelatinoid
gelatinous
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gelignite
gelsemium

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geminate
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gemmation
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gemmulation
gemmule
gemology
gemot
gemsbok
gemstone
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genappe
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gendarmerie
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gene flow
gene pool
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genealogical tree
genealogy
genera
generable
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general court-martial
general delivery
general election
general headquarters
general hospital
general linguistics
general of the army
general officer
general paralysis
general partner
general post office
general practitioner
general semantics
general sessions
general staff
general store
general strike
general theory of relativity

generalissimo
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generalization
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generatrix
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generosity
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genethlialogy
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genie
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genipap
genista
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genitourinary
genius
genius loci
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genocide
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genotype
genre

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genteelism
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gentian violet
gentianaceous
gentianella
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gentilesse
gentilism
gentility
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gentle breeze
gentlefolk
gentleman
gentleman's gentleman
gentleman-at-arms
gentleman-farmer
gentlemanly
gentlemen's agreement
gentleness
gentlewoman
gentry
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genuflect
genuflection
genuine
genus
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geodesy
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geodynamics
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geognosy
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geographical
geographical mile

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geometer
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geometric ratio
geometric series
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geometrid
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geopolitics
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geosyncline
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geranium
geratology

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germ plasm
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gerontology
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gestation
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gesticulation
gesticulative
gesticulatory
gesture
gesundheit
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get about
get across
get ahead

get along
get around
get at
get away
get back
get by
get down
get in
get into
get off
get on
get
 over
get round
get through
get up
get-together
get-up-and-go
getaway
getter
getup
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gewgaw
gey
geyser
geyserite
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ghastly
ghat
ghazi
ghee
gherkin
ghetto
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ghost moth
ghost town
ghost word
ghostly
ghostwrite
ghoul
ghyll
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giant powder
giant star
giant tortoise

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giantism
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gid
giddy
gie
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gift of tongues
gift tax
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gigahertz
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gigantic
gigantism
giggle
gigolo
gigot
gigue
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gilder
gilding
gilgai
gill
gill fungus
gill net
gill slit
gillie
gills
gillyflower
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gilt-edged

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gimbals
gimcrack
gimcrackery
gimel
gimlet
gimlet eye
gimmal
gimmick
gimp
gin
gin and tonic
gin rickey
gin rummy
gin sling
ginger
ginger ale
ginger beer
ginger group
ginger snap
ginger wine
gingerbread
gingerbread tree
gingerly
gingersnap
gingery
gingham
gingili
gingivitis
ginglymus
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ginkgo
ginseng
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gipon
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girandole
girasol
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girder
girdle
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 lizard
girdler
girl
girl Friday
girlfriend
girlhood

girlie
girlish
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girosol
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girth
gisarme
gismo
gist
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gittern
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give in
give off
give out
give over
give up
give-and-take
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gizzard
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glabrous
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glacial epoch
glacial period
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glad hand
glad rags
gladden
glade
gladiate
gladiator
gladiatorial

gladiolus
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glaikit
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glairy
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glamorize
glamorous
glamour
glance
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glanders
glandular
glandular fever
glandule
glandulous
glans
glare
glaring
glary
glass
glass cutter
glass harmonica
glass jaw
glass snake
glass wool
glassblowing
glasses
glassful
glasshouse
glassine
glassman
glassware
glasswork
glassworker
glassworks
glasswort
glassy
glaucescent
glaucoma
glauconite
glaucous
glaucous gull
glaze
glazed
glazer
glazier
glazing

gleam
glean
gleaning
gleanings
glebe
glede
glee
glee
 club
gleeful
gleeman
gleesome
gleet
glen
glengarry
glenoid
gley
glia
gliadin
glib
glide
glide bomb
glide-bomb
glider
gliding joint
glim
glimmer
glimmering
glimpse
glint
glioma
glissade
glissando
glisten
glister
glitter
glitter ice
glittery
gloam
gloaming
gloat
glob
global
globate
globe
globe-trotter
globefish
globeflower

globetrotter
globigerina
globin
globoid
globose
globular
globule
globuliferous
globulin
glochidiate
glochidium
glockenspiel
glomerate
glomeration
glomerule
glomerulonephritis
glomerulus
gloom
glooming
gloomy
glop
glorification
glorify
gloriole
glorious
glory
glory hole
glory-of-the-snow
gloss
gloss.
glossa
glossal
glossary
glossator
glossectomy
glossematics
glosseme
glossitis
glosso-
glossographer
glossography
glossolalia
glossology
glossopharyngeal nerve
glossotomy
glossy
glottal
glottal stop

glottalized
glottic
glottis
glottochronology
glottology
glove
glove compartment
glover
glow
glow discharge
glow lamp
glower
glowing
glowworm
gloxinia
gloze
glt.
glucinum
gluconeogenesis
glucoprotein
glucose
glucoside
glucosuria
glue
gluey
glum
glume
glut
glutamate
glutamic
 acid
glutamine
glutathione
gluteal
glutelin
gluten
gluten bread
glutenous
gluteus
gluteus maximus
glutinous
glutton
gluttonize
gluttonous
gluttony
glyceric
glyceric acid
glyceride

glycerin
glycerinate
glycerite
glycerol
glyceryl
glyceryl trinitrate
glycine
glyco-
glycogen
glycogenesis
glycol
glycolic acid
glycolysis
glyconeogenesis
glycoprotein
glycoside
glycosuria
glyoxaline
glyph
glyphography
glyptic
glyptics
glyptodont
glyptograph
glyptography
gnarl
gnarled
gnarly
gnash
gnat
gnatcatcher
gnathic
gnathion
gnathonic
gnaw
gnawing
gneiss
gnome
gnomic
gnomon
gnosis
gnostic
gnotobiotics
gnu
go
go about
go against
go ahead

go along
go around
go at
go away
go back
go by
go down
go for
go forth
go in
go into
go off
go on
go out
go over
go slow
go through
go to
go together
go under
go up
go with
go-ahead
go-between
go-by
go-cart
go-devil
go-getter
go-go dancer
goa
goad
goal
goal
line
goal post
goalie
goalkeeper
goaltender
goat
goat antelope
goat's-rue
goatee
goatfish
goatherd
goatish
goatsbeard
goatskin
goatsucker

gob
gobang
gobbet
gobble
gobbledegook
gobbledygook
gobbler
gobioid
goblet
goblin
gobo
goby
god
godchild
goddamn
goddamned
goddaughter
goddess
godfather
godforsaken
godhead
godhood
godless
godlike
godly
godmother
godown
godparent
godroon
godsend
godship
godson
godwit
goer
goethite
goffer
goggle
goggle-eyed
goggler
goggles
goglet
going
going-over
goings-on
goiter
gold
gold basis
gold beetle

gold certificate
gold digger
gold dust
gold fever
gold foil
gold leaf
gold mine
gold mining
gold note
gold plate
gold point
gold reserve
gold rush
gold standard
gold-exchange standard
gold-filled
gold-of-pleasure
gold-plate
goldarn
goldarned
goldbeater's skin
goldbrick
goldcrest
golden
golden age
golden aster
golden calf
golden chain
golden eagle
golden goose
golden mean
golden oriole
golden pheasant
golden plover
golden retriever
golden rule
golden
section
golden syrup
golden wattle
goldeneye
goldenrod
goldenseal
goldeye
goldfinch
goldfish
goldilocks
goldsmith

goldsmith beetle
goldstone
goldthread
golem
golf
golf bag
golf ball
golf club
golf course
golfer
goliard
golly
gombroon
gomphosis
gomuti
gon-
gonad
gonadotropin
gondola
gondola car
gondolier
gone
gone away
goneness
goner
gonfalon
gonfalonier
gonfanon
gong
gong buoy
gonidium
goniometer
gonion
gonna
gono-
gonococcus
gonocyte
gonophore
gonorrhea
goo
goober
good
good Joe
good Samaritan
good afternoon
good behavior
good cheer
good day

good egg
good evening
good faith
good fellow
good humor
good looks
good morning
good nature
good night
good offices
good sort
good turn
good use
good-bye
good-fellowship
good-for-nothing
good-humored
good-looking
good-natured
good-oh
good-sized
good-tempered
goodbye
goodish
goodly
goodman
goodness
goods
goods and chattels
goodwife
goodwill
goody
goody-goody
gooey
goof
goofball
goofy
googly
googol
googolplex
gook
goon
gooney bird
goop
goosander
goose
goose

barnacle
goose flesh
goose grass
goose grease
goose pimples
goose step
goose-step
gooseberry
goosefish
gooseflesh
goosefoot
goosegog
gooseherd
gooseneck
goosy
gopak
gopher
gopher snake
gopher wood
gopherwood
goral
gorblimey
gorcock
gore
gorge
gorged
gorgeous
gorgerin
gorget
gorgoneion
gorilla
goring
gormand
gormandize
gormless
gorse
gory
gosh
goshawk
gosling
gospel
gospel truth
gospodin
gosport
gossamer
gossip
gossipmonger
gossipry

gossipy
gossoon
got
gotten
gouache
gouge
goulash
gourami
gourd
gourde
gourmand
gourmandise
gourmet
gout
goutweed
gouty
govern
governance
governess
government
government issue
governor
governor general
governorship
gowan
gowk
gown
gownsman
goy
gr.
gr. wt.
grab
grab bag
grab rope
grabble
graben
grace
grace cup
grace note
grace period
graceful
graceless
gracile
gracioso
gracious
grackle
grad
gradate

gradatim
gradation
grade
grade crossing
grade school
gradely
grader
gradient
gradin
gradual
gradualism
graduate
graduate nurse
graduate school
graduated
graduation
gradus
graffito
graft
graft
 hybrid
grafting
graham
graham cracker
graham flour
grain
grain alcohol
grain elevator
grained
grainfield
grains of paradise
grainy
grallatorial
gram
gram atom
gram calorie
gram equivalent
gram molecule
gram.
grama grass
gramarye
gramercy
gramicidin
gramineous
graminivorous
grammalogue
grammar
grammar school

grammarian
grammatical
grammatical gender
grammatical meaning
gramme
gramps
grampus
granadilla
granary
grand
grand duchess
grand duchy
grand duke
grand jury
grand larceny
grand mal
grand opera
grand piano
grand slam
grand tour
grand vizier
grand-
grandam
grandaunt
grandchild
granddad
granddaddy
granddaughter
grande dame
grandee
grandeur
grandfather
grandfather clause
grandfather clock
grandfatherly
grandiloquence
grandiloquent
grandiose
grandioso
grandma
grandmamma
grandmother
grandmotherly
grandnephew
grandniece
grandpa
grandpapa
grandparent

grandsire
grandson
grandstand
granduncle
grange
granger
grangerize
grani-
granite
graniteware
granitite
granivorous
granny
granny
knot
grano-
granophyre
grant
grant-in-aid
grantee
grantor
granular
granulate
granulated sugar
granulation
granulation tissue
granule
granulite
granulocyte
granuloma
granulose
grape
grape fern
grape hyacinth
grape sugar
grapefruit
grapery
grapeshot
grapevine
graph
graph paper
grapheme
graphemics
graphic
graphic arts
graphics
graphite
graphitize

graphology
graphomotor
grapnel
grappa
grapple
grapple plant
grappling
grappling iron
graptolite
grasp
grasping
grass
grass cloth
grass court
grass hockey
grass roots
grass snake
grass tree
grass widow
grass-green
grass-of-Parnassus
grasshopper
grassland
grassplot
grassquit
grassy
grate
grateful
grater
graticule
gratification
gratify
gratifying
gratin
grating
gratis
gratitude
gratuitous
gratuity
gratulant
gratulate
gratulation
graupel
gravamen
grave
graveclothes
gravedigger
gravel

gravel-blind
gravelly
graven
graven image
graver
gravestone
graveyard
gravid
gravimeter
gravimetric
gravimetric analysis
graving dock
gravitate
gravitation
gravitational
constant
gravitational field
gravitative
graviton
gravity
gravity cell
gravity dam
gravity fault
gravity knife
gravity wind
gravure
gravy
gravy boat
gravy train
gray
gray eminence
gray fox
gray market
gray matter
gray wolf
gray-headed
grayback
graybeard
grayish
grayling
graze
grazier
grazing
grease
grease cup
grease gun
grease monkey
greaseball

greasepaint
greaser
greasewood
greasy
greasy spoon
great
great ape
great auk
great calorie
great circle
great council
great crested grebe
great gross
great pox
great primer
great seal
great tit
great white heron
great year
great-aunt
great-circle sailing
great-grandaunt
great-granduncle
great-nephew
great-niece
great-uncle
greatcoat
greaten
greatest
greatest common divisor
greathearted
greatly
greave
greaves
grebe
gree
greed
greedy
greegree
green
green algae
green bean
green belt
green corn
green dragon
green fingers
green gland
green glass

green heron
green light
green manure
green mold
green monkey
green onion
green pepper
green
plover
green soap
green tea
green thumb
green turtle
green vitriol
green woodpecker
green-eyed
greenback
greenbelt
greenbottle fly
greenbrier
greenery
greenfinch
greengage
greengrocer
greengrocery
greenhead
greenheart
greenhorn
greenhouse
greenhouse effect
greening
greenish
greenlet
greenling
greenness
greenockite
greenroom
greensand
greenshank
greensickness
greenstick fracture
greenstone
greensward
greenwood
greet
greeting
gregale
gregarine

gregarious
greige
greisen
gremial
gremlin
grenade
grenadier
grenadine
gressorial
grew
grey
greyback
greybeard
greyhen
greyhound
greylag
greywacke
gribble
grid
grid bias
grid variation
griddle
griddlecake
gride
gridiron
grief
grief-stricken
grievance
grieve
grievous
griffe
griffin
griffon
grig
grigri
grill
grillage
grille
grilled
grillroom
grillwork
grilse
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grimace
grimalkin
grime
grimy
grin

grind
grindelia
grinder
grindery
grinding wheel
grindstone
gringo
grip
gripe
grippe
gripper
gripping
gripsack
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grisaille
griseofulvin
griseous
grisette
griskin
grisly
grison
grist
gristle
gristly
gristmill
grit
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grits
gritty
grivation
grivet
grizzle
grizzled
grizzly
grizzly
 bear
gro.
groan
groat
groats
grocer
groceries
grocery
groceryman
grog
groggery
groggy
grogram

grogshop
groin
grommet
gromwell
groom
groomsman
groove
grooved
grooving plane
groovy
grope
groping
gros de Londres
gros point
grosbeak
groschen
grosgrain
gross
gross national product
gross profit
gross ton
gross weight
grossularite
grosz
grot
grotesque
grotesquery
grotto
grouch
grouchy
ground
ground bait
ground bass
ground beetle
ground cherry
ground cloth
ground cover
ground crew
ground floor
ground glass
ground hog
ground ice
ground ivy
ground log
ground loop
ground pine
ground plan
ground plate

ground plum
ground rent
ground rule
ground squirrel
ground state
ground stroke
ground swell
ground water
ground wave
ground zero
ground-controlled approach
groundage
grounder
groundhog
groundless
groundling
groundmass
groundnut
groundsel
groundsheet
groundsill
groundspeed
groundwork
group
group
insurance
group marriage
group practice
group therapy
grouper
groupie
grouping
grouse
grout
grouty
grove
grovel
grow
grow into
grow out of
grow up
grower
growing
growing pains
growl
growler
grown
grown-up

grownup
growth
growth hormone
growth ring
growth stock
groyne
grozing iron
grub
grub hoe
grubby
grubstake
grudge
grudging
gruel
grueling
gruelling
gruesome
gruff
grugru
grum
grumble
grume
grummet
grumous
grumpy
grunion
grunt
grunter
gryphon
gt.
gtd.
guacharo
guacin
guaco
guaiacol
guaiacum
guan
guanabana
guanaco
guanase
guanidine
guanine
guano
guar.
guarani
guarantee
guaranteed annual wage
guaranteed bond

guaranteed stock
guarantor
guaranty
guard
guard cell
guard hair
guard ring
guard ship
guardant
guarded
guardhouse
guardian
guardian angel
guardianship
guardrail
guardroom
guardsman
guava
guayule
gubernatorial
guberniya
guck
guddle
gudgeon
gudgeon pin
guelder-rose
guenon
guerdon
guereza
guerrilla
guess
guess-rope
guess-warp
guesstimate
guesswork
guest
guest
rope
guesthouse
guff
guffaw
guggle
guib
guidance
guide
guide dog
guide rope
guideboard

guidebook
guided missile
guided missile cruiser
guided wave
guideline
guidepost
guidon
guild
guild socialism
guilder
guildhall
guildsman
guile
guileful
guileless
guillemot
guilloche
guillotine
guilt
guiltless
guilty
guimpe
guinea
guinea fowl
guinea grains
guinea grass
guinea hen
guinea pig
guipure
guise
guitar
guitarfish
guitarist
gula
gulch
gulden
gules
gulf
gulfweed
gull
gullet
gullible
gully
gulosity
gulp
gum
gum ammoniac
gum arabic

gum benzoin
gum dammar
gum elastic
gum elemi
gum plant
gum resin
gum up
gumbo
gumboil
gumbotil
gumdrop
gumma
gummite
gummosis
gummous
gummy
gumption
gumshoe
gumwood
gun
gun carriage
gun deck
gun dog
gun for
gun metal
gun moll
gun room
gun tackle
gun-shy
gunboat
guncotton
gunfight
gunfire
gunflint
gung ho
gunk
gunlock
gunmaker
gunman
gunnel
gunner
gunnery
gunning
gunny
gunnysack
gunpaper
gunplay
gunpoint

gunpowder
gunrunning
gunsel
gunshot
gunslinger
gunsmith
gunstock
gunter
gunwale
gunyah
guppy
gurdwara
gurge
gurgitation
gurgle
gurglet
gurnard
guru
gush
gusher
gushy
gusset
gust
gustation
gustative
gustatory
gusto
gusty
gut
gutbucket
gutsy
gutta
gutta-percha
guttate
gutter
guttering
guttersnipe
guttle
guttural
gutturalize
gutty
guv
guy
guyot
guzzle
gybe
gym
gym

shoe
gymkhana
gymnasiarch
gymnasiast
gymnasium
gymnast
gymnastic
gymnastics
gymno-
gymnosophist
gymnosperm
gyn-
gynaeceum
gynaeco-
gynaecocracy
gynaecology
gynaecomastia
gynandromorph
gynandrous
gynandry
gynarchy
gynecic
gynecium
gyneco-
gynecocracy
gynecoid
gynecologist
gynecology
gyniatrics
gyno-
gynoecium
gynophore
gyp
gyp joint
gypsophila
gypsum
gypsy moth
gyral
gyrate
gyration
gyratory
gyre
gyrfalcon
gyro
gyro horizon
gyro-
gyrocompass
gyromagnetic

gyromagnetic ratio
gyron
gyronny
gyroplane
gyroscope
gyrose
gyrostabilizer
gyrostat
gyrostatic
gyrostatic compass
gyrostatics
gyrus
gyve
h
h'm
h.
h.a.
h.s.
ha
ha'penny
ha-ha
haaf
haar
habanera
habeas corpus
haberdasher
haberdashery
habergeon
habile
habiliment
habilitate
habit
habit-forming
habitable
habitancy
habitant
habitat
habitation
habited
habitual
habituate
habitude
habitue
hachure
hacienda
hack
hack

hammer
hackamore
hackberry
hackbut
hackery
hacking
hacking jacket
hackle
hackle fly
hackman
hackney
hackney coach
hackneyed
hacksaw
had
haddock
hade
hadj
hadji
hadn't
hadron
hadst
hae
haecceity
haem-
haema-
haemachrome
haemagglutinate
haemal
haematic
haematin
haematinic
haematite
haemato-
haematoblast
haematocele
haematocryal
haematogenesis
haematogenous
haematoid
haematoma
haematopoiesis
haematosis
haematothermal
haematoxylin
haematoxylon
haematozoon
haemic

haemin
haemo-
haemocyte
haemoglobin
haemoid
haemolysin
haemolysis
haemophilia
haemophiliac
haemophilic
haemorrhage
haemostasis
haemostat
haemostatic
haeres
hafiz
hafnium
haft
hag
hag-ridden
hagberry
hagbut
hagfish
haggadist
haggard
haggis
haggle
hagiarchy
hagio-
hagiocracy
hagiographer
hagiography
hagiolatry
hagiology
hagioscope
hagride
hah
haik
haiku
hail
hail-fellow-well-met
hailstone
hailstorm
hair
hair
follicle
hair hygrometer
hair seal

hair shirt
hair space
hair stroke
hair trigger
hair's-breadth
hair-raising
hairball
hairbreadth
hairbrush
haircloth
haircut
hairdo
hairdresser
hairless
hairline
hairpiece
hairpin
hairsplitter
hairsplitting
hairspring
hairstreak
hairstyle
hairtail
hairworm
hairy
hajj
hajji
hake
hakim
hal-
halation
halberd
halcyon
hale
haler
half
half blood
half boot
half brother
half cadence
half crown
half deck
half dollar
half eagle
half frame
half gainer
half hitch
half hose

half note
half sister
half step
half time
half volley
half-and-half
half-assed
half-baked
half-blood
half-blooded
half-bound
half-breed
half-caste
half-cock
half-cocked
half-hardy
half-hour
half-length
half-life
half-light
half-mast
half-moon
half-pint
half-price
half-seas over
half-slip
half-sole
half-timbered
half-track
half-truth
half-wit
half-witted
halfback
halfbeak
halfhearted
halfpenny
halftone
halfway
halfway house
halibut
halibut-liver oil
halide
halidom
halite
halitosis
hall
hallah
hallelujah

halliard
hallmark
hallo
halloo
hallow
hallowed
hallucinate
hallucination
hallucinatory
hallucinogen
hallucinosis
hallux
hallway
halm
halo
halo-
halogen
halogenate
haloid
halophyte
halothane
halt
halter
halting
halutz
halvah
halve
halves
halyard
ham
hamadryad
hamal
hamamelidaceous
hamartia
hamate
hamburger
hame
hamlet
hammer
hammer
 and sickle
hammer and tongs
hammer beam
hammer out
hammered
hammerhead
hammering
hammerless

hammerlock
hammertoe
hammock
hammy
hamper
hamster
hamstring
hamulus
hamza
hanaper
hance
hand
hand down
hand drill
hand glass
hand grenade
hand in
hand on
hand organ
hand over
hand truck
hand's-breadth
hand-knit
hand-me-down
hand-off
hand-to-hand
hand-to-mouth
handbag
handball
handbarrow
handbill
handbook
handbreadth
handcar
handcart
handclap
handclasp
handcraft
handcrafted
handcuff
handed
handedness
handfast
handfasting
handful
handgrip
handgun
handhold

handicap
handicapped
handicapper
handicraft
handicraftsman
handily
handiness
handiwork
handkerchief
handle
handlebar
handlebar
 moustache
handler
handling
handmade
handmaid
handmaiden
handout
handpick
handrail
hands
handsaw
handsel
handset
handshake
handshaker
handsome
handsomely
handspike
handspring
handstand
handwork
handwoven
handwriting
handy
handyman
hang
hang about
hang back
hang in
hang on
hang out
hang together
hang up
hang-up
hangar
hangbird

hangdog
hanger
hanger-on
hanging
hanging buttress
hanging post
hanging valley
hanging wall
hangman
hangnail
hangout
hangover
hank
hanker
hankering
hanky
hanky-panky
hansel
hansom
hanuman
hap
hapax legomenon
haphazard
haphazardly
hapless
haplite
haplo-
haplography
haploid
haplology
haplosis
haply
happen
happening
happenstance
happily
happiness
happy
happy hunting ground
happy-go-lucky
hapten
hara-kiri
harangue
harass
harassed
harbinger
harbor
harbor seal

harborage
harbour
harbourage
hard
hard and fast
hard candy
hard cash
hard cider
hard coal
hard copy
hard core
hard court
hard goods
hard hat
hard labor
hard
landing
hard lines
hard palate
hard paste
hard rock
hard rubber
hard sauce
hard sell
hard wheat
hard-and-fast
hard-bitten
hard-boiled
hard-core
hard-favored
hard-featured
hard-nosed
hard-pressed
hard-set
hard-shell
hard-shell clam
hard-shell crab
hard-spun
hardback
hardball
hardboard
harden
hardened
hardener
hardening
hardening of the arteries
hardhack
hardheaded

hardhearted
hardihood
hardily
hardiness
hardly
hardness
hardpan
hards
hardship
hardtack
hardtop
hardware
hardwood
hardworking
hardy
hare
hare and hounds
harebell
harebrained
harelip
harem
haricot
hark
hark back
harken
harl
harlequin
harlequin bug
harlequin duck
harlequin opal
harlequinade
harlot
harlotry
harm
harmattan
harmful
harmless
harmonic
harmonic analysis
harmonic mean
harmonic minor scale
harmonic motion
harmonic progression
harmonic series
harmonic tone
harmonica
harmonicon
harmonics

harmonious
harmonist
harmonium
harmonize
harmony
harmotome
harness
harness cask
harness hitch
harness race
harnessed antelope
harp
harper
harping
harpist
harpoon
harpoon
 gun
harpsichord
harpy
harpy eagle
harquebus
harquebusier
harridan
harrier
harrow
harrumph
harry
harsh
harslet
hart
hart's-tongue
hartal
hartebeest
hartshorn
harum-scarum
haruspex
haruspicy
harvest
harvest home
harvest mite
harvest moon
harvest mouse
harvester
harvestman
has
has-been
hash

hash house
hashish
haslet
hasn't
hasp
hassle
hassock
hast
hastate
haste
hasten
hasty
hasty pudding
hat
hat trick
hatband
hatbox
hatch
hatchel
hatchery
hatchet
hatchet face
hatchet job
hatchet man
hatching
hatchment
hatchway
hate
hateful
hath
hatpin
hatred
hatter
haubergeon
hauberk
haugh
haughty
haul
haul off
haul up
haulage
hauler
haulm
haunch
haunch bone
haunt
haunted
haunting

hausfrau
haustellum
haustorium
haut monde
hautbois
hautboy
haute couture
haute cuisine
hauteur
have
have at
have on
have-not
havelock
haven
haven't
haver
haversack
haversine
havildar
havoc
haw
hawfinch
hawk
hawk moth
hawk owl
hawk's-beard
hawk's-eye
hawk-eyed
hawkbill
hawker
hawking
hawksbill
 turtle
hawkshaw
hawkweed
hawse
hawse bag
hawsehole
hawsepiece
hawsepipe
hawser
hawser bend
hawser-laid
hawthorn
hay
hay fever
haycock

hayfield
hayfork
hayloft
haymaker
haymow
hayrack
hayrick
hayseed
haystack
hayward
haywire
hazan
hazard
hazardous
haze
hazel
hazelnut
hazing
hazy
hd.
hdqrs.
he
he-man
head
head arrangement
head for
head gate
head lamp
head louse
head money
head off
head register
head resistance
head sea
head start
head tone
head voice
head-on
headache
headachy
headband
headboard
headcheese
headcloth
headdress
headed
header
headfirst

headforemost
headgear
heading
headland
headless
headlight
headline
headliner
headlock
headlong
headman
headmaster
headmistress
headmost
headphone
headpiece
headpin
headquarters
headrace
headrail
headreach
headrest
headroom
heads
heads or tails
headsail
headset
headship
headsman
headspring
headstall
headstand
headstock
headstone
headstream
headstrong
headwaiter
headward
headwards
headwater
headwaters
headway
headwind
headword
headwork
heady
heal
heal-all

healing
health
health
 insurance
health physics
healthful
healthy
heap
hear
hear out
hearing
hearing aid
hearken
hearsay
hearsay evidence
hearse
heart
heart attack
heart block
heart cherry
heart failure
heart murmur
heart-lung machine
heart-stricken
heart-to-heart
heart-warming
heart-whole
heartache
heartbeat
heartbreak
heartbreaker
heartbreaking
heartbroken
heartburn
heartburning
hearten
heartfelt
hearth
hearthside
hearthstone
heartily
heartland
heartless
heartrending
hearts
heartsease
heartsick
heartsome

heartstrings
heartthrob
heartwood
heartworm
hearty
heat
heat barrier
heat capacity
heat content
heat engine
heat exchanger
heat exhaustion
heat lightning
heat prostration
heat pump
heat rash
heat shield
heat wave
heated
heater
heath
heath cock
heath grass
heath hen
heathberry
heathen
heathendom
heathenish
heathenism
heathenize
heathenry
heather
heating element
heating pad
heatstroke
heaume
heave
heave down
heave to
heave-ho
heaven
heaven-sent
heavenly
heavenward
heaver
heaves
heavier-than-air
heavily

heaviness
heaving-line
bend
heavy
heavy artillery
heavy bomber
heavy cream
heavy cruiser
heavy earth
heavy hydrogen
heavy spar
heavy water
heavy-armed
heavy-duty
heavy-footed
heavy-handed
heavy-hearted
heavy-laden
heavyhearted
heavyset
heavyweight
hebdomad
hebdomadal
hebdomadary
hebephrenia
hebetate
hebetic
hebetude
hecatomb
heck
heckelphone
heckle
hectare
hectic
hecto-
hectocotylus
hectogram
hectograph
hectoliter
hectometer
hector
heddle
heder
hedge
hedge garlic
hedge hyssop
hedge sparrow
hedgehog

hedgehop
hedger
hedgerow
hedonic
hedonic calculus
hedonics
hedonism
heebie-jeebies
heed
heedful
heedless
heehaw
heel
heel bone
heel-and-toe
heeled
heeler
heeling
heelpiece
heelpost
heeltap
heft
hefty
hegemony
hegira
hegumen
heifer
heigh-ho
height
height of land
height-to-paper
heighten
heinous
heir
heir apparent
heir at law
heir presumptive
heirdom
heiress
heirloom
heirship
heist
held
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helianthus
helical
helical gear
helices

helicline
helico-
helicograph
helicoid
helicon
helicopter
helio-
heliocentric
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parallax
heliograph
heliogravure
heliolatry
heliometer
heliostat
heliotaxis
heliotherapy
heliotrope
heliotropin
heliotropism
heliotype
heliozoan
heliport
helium
helix
hell
hell-bent
hell-raiser
hellbender
hellbent
hellbox
hellcat
helldiver
hellebore
heller
hellfire
hellgrammite
hellhole
hellhound
hellion
hellish
hellkite
hello
helluva
helm
helmet
helminth
helminthiasis

helminthic
helminthology
helmsman
helot
helotism
helotry
help
helper
helpful
helping
helping hand
helpless
helpmate
helpmeet
helter-skelter
helve
hem
hem-
hema-
hemangioma
hematite
hemato-
hematology
hematuria
hemelytron
hemeralopia
hemi-
hemialgia
hemianopsia
hemicellulose
hemichordate
hemicrania
hemicycle
hemidemisemiquaver
hemielytron
hemihedral
hemihydrate
hemimorphic
hemimorphite
hemiplegia
hemipode
hemipterous
hemisphere
hemispheroid
hemistich
hemiterpene
hemitrope
hemline

hemlock
hemmer
hemo-
hemocyte
hemoglobin
hemolysis
hemophilia
hemorrhage
hemorrhoid
hemorrhoidectomy
hemostat
hemotherapy
hemp
hemp
 agrimony
hemp nettle
hemp tree
hemstitch
hen
hen party
hen-and-chickens
henbane
henbit
hence
henceforth
henceforward
henchman
hendeca-
hendecagon
hendecahedron
hendecasyllable
hendiadys
henequen
henhouse
henna
hennery
henotheism
henpeck
henry
hent
hep
heparin
hepatic
hepatica
hepatitis
hepato-
hepcat
hepta-

heptachord
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heptahedron
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heptameter
heptane
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heptarchy
heptastich
heptavalent
heptode
her
her.
herald
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heraldry
herb
herb Paris
herb Robert
herb bennet
herbaceous
herbage
herbal
herbalist
herbarium
herbicide
herbivore
herbivorous
herby
herculean
herd
herd instinct
herder
herdic
herdsman
here
hereabout
hereabouts
hereafter
hereat
hereby
heredes
hereditable
hereditament
hereditary
heredity

herein
hereinafter
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hereinto
hereof
hereon
heres
heresiarch
heresy
heretic
heretical
hereto
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hereunder
hereunto
hereupon
herewith
heriot
heritable
heritage
heritor
herl
herm
hermaphrodite
hermaphrodite
brig
hermaphroditism
hermeneutic
hermeneutics
hermetic
hermit
hermit crab
hermit thrush
hermitage
hern
hernia
herniorrhaphy
herniotomy
hero
hero sandwich
hero worship
hero-worship
heroic
heroic age
heroic couplet
heroic tenor
heroic verse
heroics

heroin
heroine
heroism
heron
heronry
herp.
herpes
herpes simplex
herpes zoster
herpetology
herring
herring gull
herringbone
herringbone bond
herringbone gear
hers
herself
hertz
hesitancy
hesitant
hesitate
hesitation
hesperidin
hesperidium
hessian
hessite
hest
het up
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hetaerism
hetero-
heterocercal
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heterochromosome
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heterogenesis
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heteroplasty
heteropolar
heteropterous
heterosexual
heterosexuality
heterosis
heterosporous
heterotaxis
heterothallic
heterotopia
heterotrophic
heterotypic
heterozygote
heterozygous
heth
hetman
heulandite
heuristic
hew
hex
hexa-
hexachlorophene
hexachord
hexacosanoic
 acid
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hexaemeron
hexagon
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hexagram
hexahedron
hexahydrate

hexamerous
hexameter
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hexane
hexangular
hexanoic acid
hexapartite
hexapla
hexapod
hexapody
hexarchy
hexastich
hexastyle
hexavalent
hexone
hexosan
hexose
hexyl
hexylresorcinol
hey
heyday
hf.
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hi
hi-fi
hiatus
hibachi
hibernaculum
hibernal
hibernate
hibiscus
hic
hic jacet
hiccup
hick
hickey
hickory
hid
hidalgo
hidden
hiddenite
hide
hide-and-seek
hideaway
hidebound
hideous

hideout
hiding
hidrosis
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hieracosphinx
hierarch
hierarchize
hierarchy
hieratic
hiero-
hierocracy
hierodule
hieroglyphic
hierogram
hierolatry
hierology
hierophant
hifalutin
higgle
higgledy-piggledy
higgler
high
high and mighty
high blood pressure
high
camp
high comedy
high command
high commissioner
high day
high explosive
high fashion
high fidelity
high frequency
high hat
high jinks
high jump
high jumper
high noon
high place
high point
high priest
high relief
high school
high schooler
high sea
high seas

high sign
high society
high spirits
high spot
high table
high tea
high tide
high time
high treason
high water
high wire
high-angle fire
high-class
high-colored
high-flown
high-grade
high-handed
high-hat
high-key
high-keyed
high-minded
high-muck-a-muck
high-octane
high-pitched
high-powered
high-pressure
high-priced
high-sounding
high-speed
high-speed steel
high-spirited
high-stepper
high-strung
high-tension
high-test
high-toned
high-up
high-water mark
high-wrought
highball
highbinder
highborn
highboy
highbred
highbrow
highchair
higher arithmetic
higher criticism

higher education
higher mathematics
higher-up
highfalutin
highflier
highjack
highland
highlight
highline
highly
highness
highroad
hight
hightail
highway
highway robbery
highwayman
hijack
hijacker
hike
hilarious
hilarity
hill
hill
myna
hill station
hillbilly
hillbilly music
hillock
hillside
hilltop
hilly
hilt
hilum
him
himation
himself
hin
hind
hindbrain
hinder
hindermost
hindgut
hindmost
hindquarter
hindrance
hindsight
hindward

hinge
hinging post
hinny
hint
hinterland
hip
hip bath
hip joint
hip roof
hip-huggers
hipbone
hipparch
hipped
hippie
hippo
hippocampus
hippocras
hippodrome
hippogriff
hippopotamus
hippy
hipster
hiragana
hircine
hire
hired hand
hireling
hirsute
hirsutism
hirudin
hirundine
his
hispid
hispidulous
hiss
hissing
hist
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histidine
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histochemistry
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histogenesis
histogram
histoid

histology
histolysis
histone
histopathology
histoplasmosis
historian
historiated
historic
historical
historical geology
historical linguistics
historical materialism
historical method
historical novel
historical present
historical school
historicism
historicity
historied
historiographer
historiography
history
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histrionics
histrionism
hit
hit
off
hit-and-miss
hit-and-run
hit-or-miss
hitch
hitchhike
hitching post
hither
hithermost
hitherto
hitherward
hive
hives
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hoactzin
hoagy
hoar
hoard
hoarding

hoarfrost
hoarhound
hoarse
hoarsen
hoary
hoatzin
hoax
hob
hobble
hobble skirt
hobbledehoy
hobby
hobbyhorse
hobgoblin
hobnail
hobnailed
hobnob
hobo
hock
hockey
hocus
hocus-pocus
hod
hod carrier
hodden
hodgepodge
hodman
hodometer
hoe
hoecake
hoedown
hog
hog cholera
hog peanut
hogan
hogback
hogfish
hoggish
hognose snake
hognut
hogshead
hogtie
hogwash
hogweed
hoi polloi
hoick
hoicks
hoiden

hoist
hoity-toity
hokey-pokey
hokku
hokum
hold
hold back
hold down
hold forth
hold in
hold off
hold on
hold out
hold over
hold together
hold with
holdall
holdback
holden
holder
holdfast
holding
holding company
holding pattern
holdover
holdup
hole
hole in one
hole up
hole-and-corner
holeproof
holiday
holier-than-thou
holily
holiness
holism
hollandaise sauce
holler
hollo
hollow
hollow-eyed
holly
holly
 fern
hollyhock
holm
holm oak
holmic

holmium
holo-
holoblastic
holocaust
holocrine
holoenzyme
holograph
holography
holohedral
holomorphic
holophrastic
holophytic
holothurian
holotype
holozoic
holp
holpen
hols
holster
holt
holus-bolus
holy
holy day
holy of holies
holy orders
holy place
holy rood
holy synod
holy war
holy water
holystone
holytide
homage
homager
hombre
homburg
home
home economics
home guard
home plate
home range
home rule
home run
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home-grown
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homebred
homecoming

homegrown
homeland
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homeostasis
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homeroom
homesick
homespun
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homesteader
homestretch
homeward
homework
homey
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homicide
homiletic
homiletics
homily
homing
homing pigeon
hominid
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hominy grits
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homoeo-
homoeroticism
homogamy
homogeneity
homogeneous

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homogeny
homogony
homograft
homograph
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homologize
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chromosomes
homolographic
homologue
homology
homolosine projection
homomorphism
homonym
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homophone
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homophonous
homophony
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homosexual
homosexuality
homosporous
homotaxis
homothallic
homothermal
homozygote
homozygous
homunculus
homy
hon
hone
honest
honestly
honesty
honewort
honey
honey buzzard
honey guide
honey locust

honey mesquite
honey plant
honey-sweet
honeybee
honeybunch
honeycomb
honeydew
honeydew melon
honeyed
honeymoon
honeysucker
honeysuckle
honeysuckle ornament
hong
honied
honk
honky
honky-tonk
honor
honor point
honor roll
honorable
honorarium
honorary
honorific
honoris causa
honour
honourable
hoo
hooch
hood
hooded
hooded crow
hooded seal
hoodlum
hoodman-blind
hoodoo
hoodwink
hooey
hoof
hoof-and-mouth disease
hoofbeat
hoofbound
hoofed
hoofer
hook
hook and eye
hook-nosed

hookah
hooked
hooked rug
hooker
hooknose
hookup
hookworm
hooky
hooligan
hoop
hoop
 pine
hoop skirt
hoop snake
hooper
hoopla
hoopoe
hooray
hoosegow
hoot
hoot owl
hootchy-kootchy
hootenanny
hooves
hop
hop clover
hop-o'-my-thumb
hope
hope chest
hopeful
hopefully
hopeless
hophead
hoplite
hopper
hopping
hopple
hopscotch
hoptoad
hor.
hora
horal
horary
horde
hordein
horehound
horizon
horizontal

horizontal bar
horizontal stabilizer
horizontal union
horme
hormonal
hormone
horn
horn in
horn of plenty
horn silver
horn-mad
hornbeam
hornbill
hornblende
hornbook
horned
horned lizard
horned owl
horned poppy
horned pout
horned screamer
horned toad
horned viper
hornet
hornet's nest
hornpipe
hornstone
hornswoggle
horntail
hornwort
horny
horol.
horologe
horologist
horologium
horology
horoscope
horoscopy
horotelic
horrendous
horrible
horribly
horrid
horrific
horrified
horrify
horripilate
horripilation

horror
horror-struck
hors concours
hors d'oeuvre
hors de combat
horse
horse around
horse bean
horse brass
horse chestnut
horse gentian
horse latitudes
horse
 mackerel
horse marine
horse nettle
horse opera
horse pistol
horse sense
horse trader
horse-faced
horseback
horsecar
horseflesh
horsefly
horsehair
horsehide
horselaugh
horseleech
horseman
horsemanship
horsemint
horseplay
horsepower
horsepower-hour
horseradish
horseshit
horseshoe
horseshoe arch
horseshoe crab
horseshoe magnet
horseshoes
horsetail
horseweed
horsewhip
horsewoman
horsey
horst

horsy
hort.
hortative
hortatory
horticulture
hortus siccus
hosanna
hose
hosier
hosiery
hosp.
hospice
hospitable
hospital
hospital bed
hospital corner
hospital ship
hospitality
hospitalization
hospitalization insurance
hospitalize
hospitium
hospodar
host
hostage
hostel
hostel school
hostelry
hostess
hostile
hostility
hostler
hot
hot air
hot buttered rum
hot cake
hot cockles
hot cross bun
hot dog
hot lick
hot line
hot metal
hot money
hot pants
hot pepper
hot plate
hot potato
hot rod

hot seat
hot spot
hot spring
hot stuff
hot war
hot water
hot-air balloon
hot-blooded
hot-cathode tube
hot-press
hot-tempered
hot-water
bag
hot-water bottle
hotbed
hotbox
hotchpot
hotchpotch
hotel
hotfoot
hothead
hotheaded
hothouse
hotshot
hotspur
hough
hound
hound's-tongue
hounding
houppelande
hour
hour angle
hour circle
hour hand
hourglass
houri
hourly
house
house agent
house arrest
house detective
house finch
house flag
house martin
house mouse
house of God
house of assignation
house of cards

house of correction
house of detention
house of ill repute
house of prayer
house of prostitution
house of worship
house organ
house party
house physician
house sparrow
house trailer
house-raising
houseboat
housebound
houseboy
housebreak
housebreaker
housebreaking
housebroken
housecarl
houseclean
housecoat
housefather
housefly
household
household gods
household troops
householder
housekeeper
housekeeping
housel
houseleek
houseless
houselights
houseline
housemaid
housemaid's knee
houseman
housemaster
housemother
houseroom
housetop
housewares
housewarming
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housework

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hovercraft
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how-do-you-do
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hubble-bubble
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hug-me-tight
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hugely
hugger-mugger
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hula skirt
hula-hula
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hullo
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human being
human interest
human nature
human rights
humane
humane society
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humbug
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hunky-dory
hunt
hunt down
hunt up
hunter
hunter's moon
hunting
hunting ground
hunting horn
hunting knife
huntress
huntsman
huntsman's-cup
huppah
hurdle

hurds
hurdy-gurdy
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hurly-burly
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hurricane
hurricane deck
hurricane lamp
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hush money
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hyaloid
hyaloid membrane
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hydraulic mining
hydraulic press
hydraulic ram
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hydrobromic acid
hydrocarbon
hydrocele
hydrocellulose
hydrocephalus
hydrochloric acid

hydrochloride
hydrocortisone
hydrocyanic acid
hydrodynamic
hydrodynamics
hydroelectric
hydrofluoric acid
hydrofoil
hydrogen
hydrogen bomb
hydrogen bromide
hydrogen chloride
hydrogen cyanide
hydrogen fluoride
hydrogen iodide
hydrogen ion
hydrogen peroxide
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hydrokinetic
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hypercatalectic
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hypercorrection
hypercritical
hypercriticism
hyperdulia
hyperemia
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hyperextension
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hyperfocal distance
hyperform
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hyperkeratosis
hyperkinesia
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hyperostosis
hyperparathyroidism
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hyperplasia
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hypochlorous acid
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in absentia
in aeternum
in articulo mortis
in camera
in esse
in extenso
in extremis

in flagrante delicto
in limine
in loco
in loco parentis
in medias res
in mem.
in memoriam
in perpetuum
in personam
in petto
in posse
in propria persona
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in statu quo
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industrial park
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inertial system
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jack staff
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jump seat
jump shot
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jump turn
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jumping jack
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jury list
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jus gentium
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kala-azar
kale
kaleidoscope
kaleidoscopic
kalends
kaleyard
kaleyard
school
kali
kalian
kalif
kalmia
kalong
kalpa
kalpak
kalsomine
kamacite
kamala
kame
kami
kamikaze
kampong
kamseen
kana
kangaroo
kangaroo court
kangaroo rat

kanji
kantar
kanzu
kaoliang
kaolin
kaolinite
kaon
kaph
kapok
kappa
kaput
karakul
karat
karate
karma
karmadharaya
kaross
karst
karyo-
karyogamy
karyokinesis
karyolymph
karyolysis
karyoplasm
karyosome
karyotin
karyotype
kasha
kasher
kashmir
kat
kata-
katabasis
katabatic
katabolism
katakana
katharsis
katydid
katzenjammer
kauri
kauri resin
kava
kayak
kayo
kazachok
kazoo
kb
kc

kcal
kea
kebab
keck
ked
keddah
kedge
kedgeree
keef
keek
keel
keel over
keelboat
keelhaul
keelson
keen
keening
keep
keep at
keep away
keep back
keep down
keep from
keep in
keep off
keep on
keep out
keep under
keep up
keeper
keeping
keepsake
keeshond
kef
keffiyeh
keg
kegler
keister
keitloa
kelly
keloid
kelp
kelpie
kelson
kelt
kelter
ken
kenaf

kendo
kennel
kenning
keno
kenogenesis
kenosis
kenspeckle
kentledge
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kept
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keramics
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keratinize
keratitis
kerato-
keratogenous
keratoid
keratoplasty
keratose
keratosis
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 market
kerbing
kerbstone
kerchief
kerf
kermes
kermis
kern
kernel
kernite
kero
kerosene
kerplunk
kersey
kerseymere
kestrel
ketch
ketchup
ketene
keto form
keto-
keto-enol tautomerism
ketone
ketone body

ketone group
ketonuria
ketose
ketosis
kettle
kettle hole
kettle of fish
kettledrum
kettledrummer
kevel
kex
key
key fruit
key money
key punch
key signature
key up
key word
keyboard
keyhole
keyhole saw
keynote
keynote address
keystone
keystroke
keyway
kg
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khaddar
khaki
khalif
khamsin
khan
khanate
kharif
khat
kheda
khedive
kiang
kibble
kibbutz
kibbutznik
kibe
kibitka
kibitz
kibitzer
kiblah
kibosh

kick
kick off
kick pleat
kick turn
kickback
kicker
kickoff
kickshaw
kicksorter
kickstand
kid
kid gloves
kidding
kiddy
kidnap
kidney
kidney bean
kidney
 stone
kidney vetch
kidskin
kief
kier
kieselguhr
kieserite
kif
kike
kilderkin
kill
kill-joy
killdeer
killer
killer whale
killer-diller
killick
killifish
killing
killing frost
killjoy
kiln
kilo
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kilocalorie
kilocycle
kilogram
kilogram-meter
kilohertz
kiloliter

kilometer
kiloton
kilovolt
kilovolt-ampere
kilowatt
kilowatt-hour
kilt
kilter
kimberlite
kimono
kin
kinaesthesia
kinase
kind
kindergarten
kindergartner
kindhearted
kindle
kindless
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kindling
kindly
kindness
kindred
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kinematic viscosity
kinematics
kinematograph
kinescope
kinesics
kinesiology
kinesthesia
kinetic
kinetic art
kinetic energy
kinetics
kinfolk
king
king cobra
king crab
king post
king salmon
king snake
king's evidence
king's evil
king's highway
king's ransom
king's shilling

king-of-arms
king-size
kingbird
kingbolt
kingcraft
kingcup
kingdom
kingdom come
kingfish
kingfisher
kinghood
kinglet
kingly
kingmaker
kingpin
kingship
kingwood
kinin
kink
kinkajou
kinky
kinnikinnick
kino
kinsfolk
kinship
kinsman
kinswoman
kiosk
kip
kipper
kirk
kirkman
kirmess
kirtle
kish
kishke
kismet
kiss
kiss
 of death
kiss of peace
kissable
kisser
kissing bug
kissing gate
kist
kit
kit bag

kit fox
kitchen
kitchen cabinet
kitchen garden
kitchen midden
kitchen police
kitchen sink
kitchener
kitchenette
kitchenmaid
kitchenware
kite
kith
kith and kin
kithara
kitsch
kitten
kittenish
kittiwake
kittle
kitty
kiva
kiwi
kl.
klaxon
klepht
kleptomania
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klipspringer
klong
kloof
klutz
klystron
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knacker
knackwurst
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knapsack
knapweed
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knave
knavery
knavish
knawel
knead

knee
knee breeches
knee jerk
knee-deep
knee-high
kneecap
kneehole
kneel
kneepad
kneepan
knell
knelt
knew
knickerbockers
knickers
knickknack
knife
knife edge
knife pleat
knife switch
knife-edged
knight
knight bachelor
knight banneret
knight of the road
knight-errant
knight-errantry
knighthead
knighthood
knightly
knish
knit
knitted
knitting
knitting needle
knitwear
knives
knob
knobby
knobkerrie
knock
knock about
knock back
knock
down
knock off
knock up
knock-knee

knockabout
knocker
knockout
knockout drops
knockwurst
knoll
knop
knot
knotgrass
knothole
knotted
knotting
knotty
knotweed
knout
know
know-all
know-how
know-it-all
know-nothing
knowable
knowing
knowledge
knowledgeable
known
known quantity
knuckle
knuckle down
knuckle joint
knuckle under
knuckle-duster
knucklebone
knucklehead
knur
knurl
knurled
knurly
koa
koala
koan
kob
kobold
koel
kohl
kohlrabi
koine
kokanee
kola

kola nut
kolinsky
kolkhoz
kolo
komatik
koniology
koodoo
kook
kookaburra
kooky
kop
kopeck
koph
kopje
kor
koruna
kos
kosher
koto
koumis
kowtow
kr.
kraal
kraft
krait
kraken
kreplach
kreutzer
kriegspiel
krill
krimmer
kris
krona
krone
kroon
kruller
krummhorn
krypton
kt.
kuchen
kudos
kudu
kukri
kulak
kumiss
kummerbund
kumquat
kunzite

kurbash
kurrajong
kurtosis
kurus
kuvasz
kvass
kwashiorkor
kyanite
kyanize
kyat
kyle
kylix
kymograph
kyphosis
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la
la-di-da
laager
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labarum
labdanum
labefaction
label
labellum
labia
labia
majora
labia minora
labial
labialize
labialized
labiate
labile
labio-
labiodental
labionasal
labiovelar
labium
lablab
labor
labor camp
labor of love
labor union

labor-saving
laboratory
labored
laborer
laborious
labour
labour exchange
laboured
labourer
labradorite
labret
labroid
labrum
laburnum
labyrinth
labyrinth fish
labyrinthine
labyrinthodont
lac
lac insect
laccolith
lace
lacerate
lacerated
laceration
lacewing
lacework
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lachrymal
lachrymator
lachrymatory
lachrymose
lacing
laciniate
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lackadaisical
lackaday
lacker
lackey
lacking
lackluster
laconic
laconism
lacquer
lacrimal
lacrimal duct
lacrimal gland
lacrimator

lacrimatory
lacrosse
lactalbumin
lactam
lactary
lactase
lactate
lactation
lacteal
lacteous
lactescent
lactic
lactic acid
lactiferous
lacto-
lactobacillus
lactoflavin
lactogenic hormone
lactometer
lactone
lactoprotein
lactoscope
lactose
lacuna
lacunar
lacustrine
lacy
lad
ladanum
ladder
ladder back
ladder tournament
ladder truck
laddie
lade
laden
ladies' man
lading
ladino
ladle
lady
lady
 bountiful
lady fern
lady's maid
lady's man
lady's-slipper
lady's-smock

lady's-thumb
lady's-tresses
lady-in-waiting
lady-killer
ladybird
ladybug
ladyfinger
ladylike
ladylove
ladyship
laevo-
laevogyrate
laevorotation
laevorotatory
lag
lag screw
lagan
lagena
lager
laggard
lagging
lagniappe
lagomorph
lagoon
lah-di-dah
laic
laicize
laid
laid paper
lain
lair
laird
laissez faire
laissez-faire
laity
lake
lake dweller
lake dwelling
lake herring
lake trout
laker
lakh
laky
lalapalooza
lallation
lallygag
lam
lam.

lama
lamasery
lamb
lamb's wool
lamb's-quarters
lambaste
lambda
lambdacism
lambdoid
lambency
lambent
lambert
lambkin
lamblike
lambrequin
lambskin
lame
lame duck
lamebrain
lamed
lamella
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lamellate
lamelli-
lamellibranch
lamellicorn
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lamellirostral
lament
lamentable
lamentation
lamented
lamia
lamina
laminar
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laminate
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laminitis
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lamp shell
lampas
lampblack
lamper eel
lampion

lamplighter
lampoon
lamppost
lamprey
lamprophyre
lampyrid
lanai
lanate
lance
lance
 corporal
lance rest
lance sergeant
lancelet
lanceolate
lancer
lancers
lancet
lancet arch
lancet window
lanceted
lancewood
lanciform
lancinate
land
land agent
land bank
land crab
land grant
land measure
land mine
land of Nod
land of milk and honey
land office
land rail
land reform
land tax
land-grabber
land-office business
land-poor
landau
landaulet
landed
landfall
landgrave
landgraviate
landgravine
landholder

landing
landing craft
landing field
landing gear
landing net
landing stage
landing strip
landlady
landlocked
landloper
landlord
landlordism
landlubber
landman
landmark
landmass
landowner
lands
landscape
landscape architecture
landscape gardening
landscapist
landside
landsknecht
landslide
landsman
landwaiter
landward
lane
lang
lang.
langlauf
langouste
langrage
langsyne
language
langue
langue d'oc
languet
languid
languish
languishing
languishment
languor
languorous
langur
laniard
laniary

laniferous
lank
lanky
lanner
lanneret
lanolin
lanose
lansquenet
lantana
lantern
lantern
fish
lantern fly
lantern jaw
lantern slide
lanthanide
lanthanum
lanthorn
lanugo
lanyard
lap
lap dissolve
lap dog
lap joint
lap robe
lap up
laparotomy
lapboard
lapel
lapful
lapidary
lapidate
lapidify
lapillus
lapin
lapis lazuli
lappet
lapse
lapse rate
lapstrake
lapsus
lapsus calami
lapsus linguae
lapwing
lar
larboard
larcener
larcenous

larceny
larch
lard
lard oil
lardaceous
larder
larder beetle
lardon
lardy
lares and penates
large
large calorie
large intestine
large-hearted
large-minded
large-scale
largely
largemouth bass
largess
larghetto
largish
largo
lariat
larine
lark
larkspur
larrigan
larrikin
larrup
larum
larva
larval
larvicide
laryngeal
laryngitis
laryngo-
laryngology
laryngoscope
laryngotomy
larynx
lasagne
lascar
lascivious
lase
laser
lash
lashing
lass

lassie
lassitude
lasso
last
last name
last out
last post
last quarter
last rites
last straw
last word
last-ditch
last-minute
lasting
lastly
lat
lat.
latch
latchet
latchkey
latchstring
late
latecomer
lated
lateen
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 sail
lately
latency
latency period
latent
latent content
latent heat
latent period
later
lateral
lateral pass
laterality
laterite
lateritious
latest
latex
lath
lathe
lather
lathery
lathi
lathing

lathy
latices
laticiferous
latifundium
latish
latissimus dorsi
latitude
latitudinarian
latria
latrine
latten
latter
latter-day
latterly
lattermost
lattice
lattice girder
latticed
latticework
latus rectum
laud
laudable
laudanum
laudation
laudatory
lauds
laugh
laugh away
laugh off
laughable
laughing
laughing gas
laughing hyena
laughing jackass
laughingstock
laughter
launce
launch
launch pad
launcher
launching pad
launder
launderette
laundress
laundry
laundryman
laundrywoman
lauraceous

laureate
laurel
lauric acid
laurustinus
lauryl alcohol
lava
lava-lava
lavabo
lavage
lavaliere
lavation
lavatory
lave
lavender
laver
laverock
lavish
lavolta
law
law agent
law court
law merchant
law of averages
law of nations
law of parsimony
law of thermodynamics
law-abiding
lawbreaker
lawful
lawgiver
lawless
lawmaker
lawman
lawn
lawn
 mower
lawn party
lawn sleeves
lawn tennis
lawrencium
lawsuit
lawyer
lax
laxation
laxative
laxity
lay
lay analyst

lay aside
lay away
lay brother
lay down
lay figure
lay in
lay into
lay off
lay on
lay out
lay over
lay reader
lay sister
lay to
lay up
lay-by
layer
layer cake
layette
laying on of hands
layman
layoff
layout
laywoman
lazar
lazaretto
laze
lazuli
lazulite
lazurite
lazy
lazy Susan
lazy daisy stitch
lazy tongs
lazybones
lb.
lb. ap.
lb. av.
lb. t.
lea
lea.
leach
lead
lead acetate
lead arsenate
lead colic
lead glass
lead line

lead monoxide
lead off
lead on
lead pencil
lead poisoning
lead screw
lead tetraethyl
lead time
lead-in
lead-pipe cinch
leaden
leader
leadership
leading
leading article
leading edge
leading lady
leading light
leading man
leading question
leading strings
leadsman
leadwort
leaf
leaf bud
leaf fat
leaf insect
leaf miner
leaf mold
leaf monkey
leaf spot
leaf spring
leafage
leaflet
leafstalk
leafy
league
leaguer
leak
leakage
leaky
leal
lean
lean-to
leaning
leant
leap
leap

year
leaper
leapfrog
leapt
learn
learned
learning
learnt
lease
leaseback
leasehold
leaseholder
leash
least
least common denominator
least common multiple
least squares
leastways
leastwise
leather
leatherback
leatherjacket
leatherleaf
leathern
leatherneck
leatherwood
leatherworker
leathery
leave
leave behind
leave of absence
leave off
leave out
leave-taking
leaved
leaven
leavening
leaves
leaving
leavings
lebkuchen
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lecherous
lechery
lecithin
lecithinase
lect.
lectern

lection
lectionary
lector
lecture
lecturer
lectureship
lecythus
led
lederhosen
ledge
ledger
ledger board
ledger line
lee
lee shore
lee tide
leeboard
leech
leek
leek-green
leer
leery
lees
leet
leeward
leeway
left
left wing
left-hand
left-handed
left-hander
left-luggage office
leftist
leftover
leftward
leftwards
lefty
leg
leg bye
leg-of-mutton
leg-of-mutton sail
leg-pull
leg.
legacy
legal
legal aid
legal cap
legal chemistry

legal holiday
legal medicine
legal
separation
legal tender
legalese
legalism
legality
legalize
legate
legatee
legation
legato
legator
legend
legendary
leger line
legerdemain
leges
legged
legging
leggy
leghorn
legibility
legible
legion
legionary
legionary ant
legionnaire
legislate
legislation
legislative
legislative assembly
legislator
legislatorial
legislature
legist
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legitimacy
legitimate
legitimatize
legitimist
legitimize
legman
legroom
legume
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legwork
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leister
leisure
leisured
leisurely
leitmotif
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lemma
lemming
lemniscate
lemniscus
lemon
lemon balm
lemon drop
lemon geranium
lemon grass
lemon squash
lemon verbena
lemonade
lempira
lemur
lemures
lemuroid
lend
lend-lease
lending library
length
lengthen
lengthways
lengthwise
lengthy
leniency
lenient
lenis
lenitive
lenity
leno
lens
lent
lentamente
lentic
lenticel

lenticular
lenticularis
lentiginous
lentigo
lentil
lentissimo
lento
leonine
leopard
leopard frog
leopard lily
leopard moth
leopard's-bane
leotard
leper
lepido-
lepidolite
lepidopteran
lepidopterous
lepidosiren
lepidote
leporid
leporide
leporine
leprechaun
leprosarium
leprose
leprosy
leprous
lepto-
lepton
leptophyllous
leptorrhine
leptosome
leptospirosis
lesbian
lesbianism
lese
majesty
lesion
less
lessee
lessen
lesser
lesser panda
lesson
lessor
lest

let
let down
let in
let into
let off
let on
let out
let up
let's
letch
letdown
lethal
lethargic
lethargy
letter
letter box
letter carrier
letter drop
letter of advice
letter of credit
letter of introduction
letter of marque
letter-perfect
lettered
letterhead
lettering
letterpress
letters
letters patent
letters testamentary
lettuce
letup
leu
leucine
leucite
leuco base
leuco-
leucocratic
leucocyte
leucocytosis
leucoderma
leucoma
leucomaine
leucopenia
leucoplast
leucopoiesis
leucotomy
leukemia

leuko-
leukocyte
leukoderma
leukorrhea
lev
levant
levanter
levator
levee
level
level crossing
level line
level-headed
level-off
levelheaded
leveller
lever
leverage
leveret
leviable
leviathan
levigate
levin
levirate
levitate
levitation
levity
levo-
levorotation
levorotatory
levulose
levy
levy
 en masse
lewd
lewis
lewisite
lex
lex loci
lex non scripta
lex scripta
lex talionis
lex.
lexeme
lexical
lexical meaning
lexicog.
lexicographer

lexicography
lexicologist
lexicology
lexicon
lexicostatistics
lexigraphy
lexis
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liability insurance
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liaison
liana
liar
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libeccio
libel
libelant
libelee
libeler
libelous
liber
liberal
liberal arts
liberal education
liberalism
liberality
liberalize
liberate
libertarian
liberticide
libertinage
libertine
libertinism
liberty
liberty cap
libidinous
libido
libra
librarian
librarianship

library
library binding
library edition
library paste
library science
librate
libration
libratory
librettist
libretto
libriform
lice
licence
license
license plate
licensee
licentiate
licentious
lich gate
lichee
lichen
lichenin
lichenology
lichi
licit
lick
lickerish
lickety-split
licking
lickspittle
licorice
lictor
lid
lidless
lido
lie
lie
detector
lie down
lie in
lie to
lie up
lie-abed
lied
lief
liege
liegeman
lien

lientery
lierne
lieu
lieutenancy
lieutenant
lieutenant colonel
lieutenant commander
lieutenant general
lieutenant governor
lieutenant junior grade
life
life belt
life buoy
life cycle
life expectancy
life history
life instinct
life jacket
life mask
life net
life preserver
life raft
life science
life span
life table
life vest
life-and-death
life-giving
life-or-death
life-size
lifeblood
lifeboat
lifeguard
lifeless
lifelike
lifeline
lifelong
lifer
lifesaver
lifesaving
lifetime
lifework
lift
lift pump
lift-off
lifting body
ligament
ligamentous

ligan
ligate
ligation
ligature
liger
light
light air
light bomber
light breeze
light bulb
light cream
light cruiser
light heavyweight
light horse
light into
light meter
light music
light opera
light out
light quantum
light show
light up
light verse
light-fingered
light-footed
light-headed
light-hearted
light-year
lighten
lightening
lighter
lighterage
lighterman
lightface
lighthearted
lighthouse
lighting
lightish
lightless
lightly
lightness
lightning
lightning
arrester
lightning bug
lightning conductor
lightning rod
lightproof

lights
lights out
lightship
lightsome
lightweight
lignaloes
ligneous
ligni-
ligniform
lignify
lignin
lignite
lignocellulose
lignum vitae
ligroin
ligula
ligulate
ligule
ligure
likable
like
like-minded
likelihood
likely
liken
likeness
likewise
liking
likker
lilac
liliaceous
lilt
lily
lily iron
lily of the valley
lily pad
lily-livered
lily-trotter
lily-white
lima bean
limacine
limb
limbate
limber
limber hole
limber up
limbic
limbo

limbus
lime
lime burner
limeade
limekiln
limelight
limen
limerick
limes
limestone
limewater
limey
limicoline
limicolous
liminal
limit
limit point
limit switch
limitary
limitation
limitative
limited
limited company
limited edition
limited liability
limited monarchy
limited payment insurance
limiter
limiting
limitless
limn
limner
limnetic
limnology
limonene
limonite
limousine
limp
limpet
limpid
limpkin
limulus
limy
lin.
linage
linalool
linchpin
linctus

lindane
linden
lindy
line
line
drawing
line drive
line engraving
line gauge
line of battle
line of credit
line of fire
line of force
line of position
line of scrimmage
line of sight
line of vision
line squall
line storm
line-of-battle ship
line-up
lineage
lineal
lineament
linear
linear accelerator
linear algebra
linear measure
linear perspective
linear programming
linearity
lineate
lineation
linebacker
linebreeding
lineman
linen
linen closet
linen paper
lineolate
liner
lines
linesman
lineup
ling
ling.
lingam
lingcod

linger
lingerie
lingo
lingonberry
lingua
lingua franca
lingual
linguiform
linguini
linguist
linguistic
linguistic atlas
linguistic form
linguistic geography
linguistician
linguistics
lingulate
liniment
linin
lining
link
link motion
linkage
linkboy
linked
linking verb
linkman
links
linkwork
linn
linnet
linocut
linoleic acid
linoleum
linsang
linseed
linseed oil
linsey-woolsey
linstock
lint
lintel
linter
lintwhite
lion
lion's
share
lioness
lionfish

lionhearted
lionize
lip
lip reading
lip service
lip-
lip-read
lipase
lipid
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lipocaic
lipography
lipoid
lipolysis
lipoma
lipophilic
lipoprotein
lipstick
liq.
liquate
liquefacient
liquefied petroleum gas
liquefy
liquesce
liquescent
liqueur
liquid
liquid air
liquid crystal
liquid fire
liquid glass
liquid measure
liquid oxygen
liquid petrolatum
liquidambar
liquidate
liquidation
liquidator
liquidity
liquidity preference
liquidize
liquor
liquor up
liquorice
liquorish
lira
liriodendron
liripipe

lis pendens
lisle
lisp
lissome
lissotrichous
list
list price
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listel
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listen in
listening post
lister
listing
listless
listlessness
lists
lit
lit up
lit.
litany
litchi
litchi nut
liter
literacy
literae humaniores
literal
literal-minded
literalism
literality
literally
literary
literary agent
literate
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literator
literature
lith.
litharge
lithe
lithesome
lithia
lithia water
lithiasis
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lithium
litho

litho-
litho.
lithograph
lithographer
lithography
lithoid
lithol.
lithology
lithomarge
lithometeor
lithophyte
lithopone
lithosphere
lithotomy
lithotrity
litigable
litigant
litigate
litigation
litigious
litmus
litmus
 paper
litotes
litre
litter
litterbug
little
little finger
little hours
little man
little office
little owl
little people
little slam
little theater
littlest
littoral
liturgical
liturgics
liturgist
liturgy
lituus
litz wire
livable
live
live load
live oak

live steam
live together
live wire
livelihood
livelong
lively
liven
liver
liver extract
liver fluke
liver sausage
liveried
liverish
liverwort
liverwurst
livery
livery stable
liveryman
lives
livestock
livid
living
living death
living picture
living room
living wage
livraison
livre
lixiviate
lixivium
lizard
ll.
llama
llano
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ln
lo
loach
load
load displacement
load factor
load line
loaded
loader
loading
loading coil
loads
loadstar

loadstone
loaf
loafer
loaiasis
loam
loan
loan office
loan shark
loan translation
loan word
loaning
loath
loathe
loathing
loathly
loathsome
loaves
lob
lobar
lobar
 pneumonia
lobate
lobation
lobby
lobbyism
lobbyist
lobe
lobectomy
lobelia
lobeline
loblolly
loblolly boy
lobo
lobotomy
lobscouse
lobster
lobster Newburg
lobster pot
lobster thermidor
lobster trick
lobule
lobworm
loc. cit.
local
local color
local government
local option
local oscillator

local time
locale
localism
locality
localize
locally
locate
location
locative
loch
lochia
loci
lock
lock out
lock step
lock stitch
lock up
lockage
locker
locker plant
locket
lockjaw
lockout
locksmith
lockup
loco
loco citato
loco disease
locoism
locomobile
locomotion
locomotive
locomotor
locomotor ataxia
locoweed
locular
locule
loculus
locum tenens
locus
locus classicus
locus sigilli
locus standi
locust
locution
lode
loden
lodestar

lodestone
lodge
lodged
lodger
lodging
lodging house
lodgings
lodgment
lodicule
loess
loft
lofty
log
log canoe
log chip
log line
logan
logan stone
loganberry
loganiaceous
logarithm
logarithmic
logbook
loge
loggan stone
logger
loggerhead
loggia
logging
logia
logic
logical
logical
 positivism
logician
logicize
logion
logistic
logistician
logistics
logjam
logo
logo-
logogram
logographic
logography
logogriph
logomachy

logorrhea
logos
logotype
logroll
logrolling
logway
logwood
logy
loin
loincloth
loiter
loll
lollapalooza
lollipop
lollop
lolly
lollygag
loment
lone
lone hand
lone wolf
lonely
loner
lonesome
long
long account
long arm
long cross
long distance
long dozen
long face
long haul
long horse
long house
long hundredweight
long johns
long jump
long measure
long moss
long pig
long primer
long shot
long suit
long tom
long ton
long vacation
long wave
long-distance

long-drawn
long-drawn-out
long-eared owl
long-faced
long-headed
long-horned beetle
long-legged
long-limbed
long-lived
long-playing
long-range
long-sighted
long-standing
long-sufferance
long-suffering
long-term
long-term bond
long-winded
longan
longanimity
longboat
longbow
longcloth
longe
longeron
longevity
longevous
longhair
longhand
longicorn
longing
longish
longitude
longitudinal
longitudinal
wave
longleaf pine
longs
longship
longshore
longshoreman
longsome
longspur
longueur
longways
longwise
loo
looby

look
look after
look back
look forward to
look on
look over
look through
look up
look-in
look-see
look-through
looker
looker-on
looking glass
lookout
loom
looming
loon
looney
loony
loony bin
loop
loop knot
looper
loophole
loopy
loose
loose end
loose smut
loose-jointed
loose-leaf
loose-limbed
loose-tongued
loosen
loosestrife
loosing
loot
lop
lop-eared
lope
lophobranch
lophophore
loppy
lopsided
loq.
loquacious
loquacity
loquat

loquitur
loran
lord
lord-in-waiting
lording
lordling
lordly
lordosis
lords-and-ladies
lordship
lore
lorgnette
lorgnon
lorica
loricate
lorikeet
lorimer
loris
lorn
lorry
lory
lose
lose out
losel
loser
losing
loss
loss leader
loss ratio
lost
lost cause
lost tribes
lost-wax process
lot
lota
loth
lotic
lotion
lots
lottery
lotto
lotus
lotus-eater
loud
loud pedal
loud-hailer
louden
loudish

loudmouth
loudmouthed
loudspeaker
lough
louis
louis
d'or
lounge
lounge lizard
lounge suit
lounging
loup
loup-garou
loupe
louping ill
lour
louse
lousewort
lousy
lout
loutish
louvar
louver
louvre
lovable
lovage
love
love affair
love apple
love child
love feast
love game
love knot
love letter
love match
love nest
love potion
love seat
love set
love-in-a-mist
love-in-idleness
love-lies-bleeding
lovebird
lovegrass
loveless
lovelock
lovelorn
lovely

lovemaking
lover
loverly
lovesick
lovesome
loving
loving cup
low
low brass
low camp
low comedy
low explosive
low frequency
low pitch
low profile
low relief
low tide
low water
low-down
low-grade
low-key
low-minded
low-necked
low-pitched
low-pressure
low-spirited
low-tension
low-water mark
lowborn
lowboy
lowbred
lowbrow
lower
lower case
lower chamber
lower class
lower criticism
lower deck
lower house
lower world
lower-case
lowerclassman
lowering
lowermost
lowest common denominator
lowest common multiple
lowland
lowlife

lowly
lox
loxodrome
loxodromic
loxodromics
loyal
loyalist
loyalty
lozenge
lozengy
luau
lubber
lubber
 line
lubber's hole
lubberly
lubra
lubric
lubricant
lubricate
lubricator
lubricious
lubricity
lubricous
lucarne
luce
lucent
lucerne
lucid
lucifer
luciferase
luciferin
luciferous
luck
luckily
luckless
lucky
lucrative
lucre
lucubrate
lucubration
luculent
ludicrous
lues
luetic
luff
luff tackle
luffa

lug
lug wrench
luge
luggage
lugger
lugsail
lugubrious
lugworm
lukewarm
lull
lullaby
lulu
lumbago
lumbar
lumber
lumber room
lumbering
lumberjack
lumberman
lumberyard
lumbricalis
lumbricoid
lumen
lumen-hour
luminance
luminary
luminesce
luminescence
luminescent
luminiferous
luminosity
luminous
luminous energy
luminous flux
luminous intensity
lumisterol
lummox
lump
lumpen
lumper
lumpfish
lumpish
lumpy
lumpy jaw
luna moth
lunacy
lunar
lunar caustic

lunar eclipse
lunar module
lunar month
lunar year
lunarian
lunate
lunatic
lunatic asylum
lunatic fringe
lunation
lunch
luncheon
luncheon meat
luncheonette
lunchroom
lune
lunette
lung
lungan
lunge
lungfish
lungi
lungworm
lungwort
lunisolar
lunitidal
lunitidal
interval
lunkhead
lunula
lunular
lunulate
lupine
lupulin
lupus
lupus erythematosus
lupus vulgaris
lur
lurch
lurcher
lurdan
lure
lurid
lurk
luscious
lush
lushy
lust

luster
lusterware
lustful
lustihood
lustral
lustrate
lustre
lustreware
lustring
lustrous
lustrum
lusty
lusus naturae
lutanist
lute
luteal
luteinizing hormone
lutenist
luteolin
luteous
lutestring
lutetium
luthern
luting
lutist
lux
luxate
luxe
luxuriance
luxuriant
luxuriate
luxurious
luxury
lv.
lx
lycanthrope
lycanthropy
lyceum
lych gate
lychnis
lycopodium
lyddite
lye
lying
lying-in
lyme grass
lymph
lymph cell

lymph gland
lymphadenitis
lymphangial
lymphangitis
lymphatic
lympho-
lymphoblast
lymphocyte
lymphocytosis
lymphoid
lymphoma
lymphosarcoma
lyncean
lynch
lynch law
lynching
lynx
lynx-eyed
lyonnaise
lyophilic
lyophilize
lyophobic
lyrate
lyre
lyrebird
lyric
lyricism
lyricist
lyrism
lyrist
lys-
lyse
lysergic acid
lysergic acid diethylamide
lysimeter
lysin
lysine
lysis
lyso-
lysozyme
lyssa
lythraceous
lytic
lytta
m
m.
m.m.f.
m.o.

m.p.
m.s.l.
ma
ma'am
mac
macabre
macaco
macadam
macadamia
macaque
macaroni
macaronic
macaroon
macaw
maccaboy
mace
macedoine
macerate
mach.
machete
machicolate
machicolation
machinate
machination
machine
machine
 bolt
machine gun
machine language
machine pistol
machine screw
machine shop
machine tool
machine-gun
machinery
machinist
machismo
machree
machzor
macintosh
mackerel
mackerel sky
mackinaw
mackintosh
mackle
macle
macro-
macrobiotic

macrobiotics
macroclimate
macrocosm
macrocytic anemia
macrogamete
macrography
macromolecule
macron
macronucleus
macrophage
macrophysics
macropterous
macroscopic
macrospore
macruran
macula
maculate
maculation
macule
mad
mad staggers
madam
madame
madcap
madden
maddening
madder
madder lake
madding
made
made-up
mademoiselle
madhouse
madly
madman
madness
madras
madrepore
madrigal
madrigalist
maduro
madwort
maelstrom
maenad
maestoso
maestro
maestro di cappella
maffick

mag
mag.
magazine
magdalen
mage
magenta
maggot
maggoty
magi
magic
magic
carpet
magic lantern
magical
magically
magician
magisterial
magistery
magistracy
magistral
magistrate
magma
magna cum laude
magnanimity
magnanimous
magnate
magnesia
magnesite
magnesium
magnesium oxide
magnet
magnetic
magnetic axis
magnetic bearing
magnetic circuit
magnetic compass
magnetic course
magnetic declination
magnetic dip
magnetic equator
magnetic field
magnetic flux
magnetic flux density
magnetic force
magnetic induction
magnetic meridian
magnetic mine
magnetic moment

magnetic needle
magnetic north
magnetic pickup
magnetic pole
magnetic potential
magnetic quantum number
magnetic storm
magnetic tape
magnetic variation
magnetics
magnetism
magnetite
magnetize
magneto
magneto-
magnetochemistry
magnetoelectricity
magnetograph
magnetohydrodynamics
magnetometer
magnetomotive
magnetomotive force
magneton
magnetostriction
magnetron
magnific
magnification
magnificence
magnificent
magnifico
magnify
magnifying glass
magniloquent
magnitude
magnolia
magnoliaceous
magnum
magnum
 opus
magnus hitch
magpie
magus
maharaja
maharajah
maharanee
maharani
mahatma
mahlstick

mahogany
mahout
maid
maid of honor
maid-in-waiting
maidan
maiden
maiden name
maiden over
maiden voyage
maidenhair
maidenhead
maidenhood
maidenly
maidservant
maieutic
maigre
maihem
mail
mail car
mail order
mailable
mailbag
mailbox
mailed
mailer
mailing list
maillot
mailman
maim
main
main body
main course
main deck
main line
main yard
main-topmast
mainland
mainly
mainmast
mainsail
mainsheet
mainspring
mainstay
mainstream
maintain
maintenance
maintop

maiolica
maisonette
maitre d'hotel
maize
majestic
majesty
majolica
major
major axis
major general
major league
major mode
major orders
major planet
major premise
major scale
major triad
major-domo
majordomo
majorette
majority
majuscule
make
make believe
make for
make off
make out
make over
make-believe
make-peace
makefast
maker
makeshift
makeup
makeweight
making
makings
mako
mal de mer
mal du pays
mal-
mala fide
mala fides
malachite
malaco-
malacology
malacostracan
maladapted

maladjusted
maladjustment
maladminister
maladroit
malady
malaguena
malaise
malamute
malapert
malapropism
malapropos
malar
malaria
malarkey
malcontent
male
maleate
maledict
malediction
malefaction
malefactor
malefic
maleficence
maleficent
maleic
 acid
malemute
malevolent
malfeasance
malformation
malfunction
malic acid
malice
malice aforethought
malicious
malign
malignancy
malignant
malignity
malines
malinger
malison
mall
mallard
malleable
malleable iron
mallee
mallemuck

malleolus
mallet
malleus
mallow
malm
malmsey
malnourished
malnutrition
malocclusion
malodorous
malonic acid
malonylurea
malpighiaceous
malposition
malpractice
malt
malt extract
malt liquor
maltase
malted milk
maltha
maltose
maltreat
malvaceous
malvasia
malversation
malvoisie
mam
mama
mama's boy
mamba
mambo
mamelon
mamey
mamma
mammal
mammalian
mammalogy
mammary
mammary gland
mammet
mammiferous
mammilla
mammillary
mammillate
mammon
mammoth
mammy

man
man Friday
man about town
man in the street
man
of God
man of straw
man-at-arms
man-eater
man-eating
man-hour
man-made
man-of-war
man-sized
man-to-man
mana
manacle
manage
manageable
managed currency
management
manager
managerial
managing
managing editor
manakin
manana
manas
manatee
manchineel
manciple
mandamus
mandarin
mandate
mandatory
mandible
mandibular
mandola
mandolin
mandorla
mandragora
mandrake
mandrel
mandrill
manducate
mane
manes
maneuver

manful
manganate
manganese
manganese bronze
manganese steel
manganite
manganous
mange
manger
mangle
mango
mangonel
mangosteen
mangrove
manhandle
manhole
manhood
manhood suffrage
manhunt
mania
maniac
maniacal
manic
manic-depressive
manicotti
manicure
manicurist
manifest
manifestation
manifestative
manifesto
manifold
manikin
manilla
manille
maniple
manipular
manipulate
manipulator
mankind
manlike
manly
manna
manned
mannequin
manner
mannered
mannerism

mannerless
mannerly
manners
mannikin
mannish
mannose
manoeuvre
manometer
manor
manor house
manpower
manque
manrope
mansard
manse
manservant
mansion
manslaughter
manslayer
manstopper
mansuetude
manta
manteau
mantel
mantelet
mantelletta
mantellone
mantelpiece
manteltree
mantic
mantilla
mantis
mantis
shrimp
mantissa
mantle
mantle rock
mantling
mantra
mantua
manual
manual training
manubrium
manuf.
manufactory
manufacture
manufacturer
manumission

manumit
manure
manuscript
many
many-sided
manyplies
manzanilla
map
map out
map projection
maple
maple sugar
maple syrup
mapping
maquette
maquis
mar
mar.
mara
marabou
marabout
maraca
marasca
maraschino
maraschino cherry
marasmus
marathon
maraud
marauding
maravedi
marble
marble cake
marbleize
marbles
marbling
marc
marcasite
marcel
marcescent
march
march-past
marcher
marchesa
marchese
marching orders
marchioness
marchland
marchpane

marconigraph
mare
mare liberum
mare nostrum
mare's-nest
mare's-tail
maremma
marg.
margaric acid
margarine
margarite
margay
marge
margent
margin
marginal
marginalia
marginate
margrave
margravine
marguerite
mariage de convenance
marigold
marigraph
marijuana
marimba
marina
marinade
marinara
marinate
marine
marine
 engineer
marine insurance
mariner
mariner's compass
marionette
marish
marital
maritime
marjoram
mark
markdown
marked
marker
market
market garden
market gardening

market order
market price
market research
market town
market value
marketable
marketing
marketplace
markhor
marking
markka
marksman
markswoman
markup
marl
marlin
marline
marlinespike
marlite
marmalade
marmalade tree
marmite
marmoreal
marmoset
marmot
marocain
maroon
marplot
marque
marquee
marquess
marquetry
marquis
marquisate
marquise
marquisette
marram grass
marriage
marriage of convenience
marriage portion
marriageable
married
marron
marrow
marrow squash
marrowbone
marrowfat
marry

marry off
marseilles
marsh
marsh elder
marsh fever
marsh gas
marsh harrier
marsh hawk
marsh hen
marsh mallow
marsh marigold
marshal
marshland
marshmallow
marshy
marsipobranch
marsupial
marsupium
mart
martellato
marten
martensite
martial
martial law
martin
martinet
martingale
martingale boom
martini
martlet
martyr
martyrdom
martyrize
martyrology
martyry
marvel
marvel-of-Peru
marvellous
marvelous
marzipan
masc.
mascara
mascle
mascon
mascot
masculine
masculine

caesura
masculine rhyme
maser
mash
mashie
masjid
mask
maskanonge
masked
masked ball
masker
masking tape
masochism
mason
mason bee
masonic
masonry
masque
masquer
masquerade
mass
mass media
mass meeting
mass noun
mass number
mass spectrograph
mass spectrometer
mass spectroscope
mass-produce
massacre
massage
massasauga
masseter
masseur
masseuse
massicot
massif
massive
massotherapy
massy
mast
mast-
mastaba
mastectomy
master
master hand
master key
master of ceremonies

master of foxhounds
master sergeant
master stroke
master's degree
master-at-arms
masterful
masterly
mastermind
masterpiece
mastership
mastersinger
masterstroke
masterwork
mastery
masthead
mastic
masticate
masticatory
mastiff
mastigophoran
mastitis
masto-
mastodon
mastoid
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mastoiditis
masturbate
masturbation
masurium
mat
matador
match
matchboard
matchbook
matchbox
matchless
matchlock
matchmaker
matchmark
matchwood
mate
matelot
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mater
dolorosa
materfamilias
materia medica
material

materialism
materialist
materiality
materialize
materially
materials
materiel
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maternity
matey
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mathematics
matin
matinee
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matrass
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matriarch
matriarchate
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matronly
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matter of course

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may
may tree
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mayapple
maybe
mayest
mayflower
mayfly

mayhap
mayhem
mayn't
mayonnaise
mayor
mayoralty
maypole
mayst
mayweed
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mazuma
mazurka
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mazzard
mb
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culpa
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meadow grass
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meadow mouse
meadow mushroom
meadow rue
meadow saffron
meadowlark
meadowsweet
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meagre
meal
mealie
mealtime
mealworm
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mealymouthed
mean
mean distance
mean free path
mean solar day
mean solar time
mean sun
mean time
meander
meandrous

meanie
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meanly
means
means test
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meantime
meanwhile
meany
measles
measly
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measure off
measure out
measure up
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measureless
measurement
measurement ton
measures
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measuring worm
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meatball
meathead
meatiness
meatman
meatus
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mechanic
mechanic's lien
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mechanical drawing
mechanical engineer
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mechanism
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mechanotherapy
med.

medal
medal play
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meddlesome
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medical examiner
medical jurisprudence
medicament
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meditation
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medium bomber
medium frequency
medium of exchange

medium shot
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megadeath
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megaspore
megasporophyll
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megathere
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meiosis
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melamine resin

melancholia
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melanochroi
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melilot
melinite
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melioration
meliorism
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 minor scale
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meltage
melting point

melting pot
melton
meltwater
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member
membership
membrane
membrane bone
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membranous
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memento mori
memo
memoir
memoirs
memorabilia
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memorandum
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memorial park
memorialist
memorialize
memoried
memorize
memory
memory bank
memory span
memory trace
men
men's room
menace
menadione
menagerie
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mendacity
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mendicity
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menhir
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mercantile paper
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mercaptopurine
mercenary
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merchant marine
merchant navy
merchant ship
merchantable
merchantman
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merciless
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mercuric oxide
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mercury-vapor lamp
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mercy seat
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merganser
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merger
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meridian circle
meridional
meringue
merino
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merit
merit system
merited

meritocracy
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merits
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merry-andrew
merry-go-round
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mesne lord
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mesoblast
mesocarp

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mesothorium
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mesquite
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mess jacket
mess kit
message
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messieurs
messily
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messroom
messuage
messy
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mestizo
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metatherian
metathesis
metathesize

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methenamine
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methionine
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methodize
methodology
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methoxychlor
methyl
methyl alcohol
methyl bromide
methyl chloride
methyl ethyl ketone
methyl isobutyl ketone
methyl orange
methylal
methylamine
methylated spirits
methylene
methylene blue

methylnaphthalene
metic
meticulous
metonym
metonymy
metope
metopic
metralgia
metre
metric
metric hundredweight
metric
 system
metric ton
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metrics
metrify
metrist
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metro
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metrology
metronome
metronymic
metropolis
metropolitan
metrorrhagia
mettle
mettlesome
mew
mewl
mews
mezcaline
mezereon
mezereum
mezuzah
mezza voce
mezzanine
mezzo
mezzo-relievo
mezzo-rilievo
mezzo-soprano
mezzotint
mf
mfd.
mg
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miasma
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microampere
microanalysis
microbalance
microbarograph
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microbicide
microbiology
microchemistry
microcircuit
microclimate
microclimatology
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micrococcus
microcopy
microcosm
microcosmic salt
microcrystalline
microcurie
microcyte
microdont
microdot
microeconomics
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microelement
microfarad
microfiche
microfilm
microgamete
microgram
micrography
microgroove
microhenry
microlith
micrometeorite
micrometeorology
micrometer
micrometer caliper
micrometer screw
micrometry
micromho

micromillimeter
microminiaturization
micron
micronucleus
micronutrient
microorganism
micropaleontology
microparasite
micropathology
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microphotograph
microphysics
microphyte
microprint
micropyle
microreader
microscope
microscopic
microscopy
microsecond
microseism
microsome
microsporangium
microspore
microsporophyll
microstructure
microsurgery
microtome
microtone
microvolt
microwatt
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micturition
mid
mid-
mid-Victorian
mid.
midbrain
midcourse
midday
midden
middle
middle C
middle age
middle class
middle ear

middle finger
middle game
middle ground
middle passage
middle school
middle term
middle watch
middle-aged
middle-class
middle-of-the-road
middle-of-the-roader
middlebreaker
middlebrow
middlebuster
middleman
middlemost
middleweight
middling
middlings
middy
middy blouse
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midget
midgut
midi
midinette
midiron
midland
midmost
midnight
midnight blue
midnight sun
midpoint
midrash
midrib
midriff
midsection
midship
midshipman
midshipmite
midships
midst
midstream
midsummer
midterm
midtown
midway
midweek

midwife
midwife toad
midwifery
midwinter
midyear
mien
miff
miffy
mig
might
mightily
mighty
mignon
mignonette
migraine
migrant
migrate
migration
migratory
mihrab
mikado
mike
mikvah
mil
mil.
milady
milch
milch
 cow
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milden
mildew
mile
mileage
milepost
miler
miles gloriosus
milestone
miliaria
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milieu
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militant
militarism
militarist
militarize

military
military academy
military government
military law
military march
military pace
military police
military school
military science
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militia
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milk of magnesia
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milk run
milk shake
milk sickness
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milk thistle
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milk-livered
milk-white
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milkfish
milking stool
milkmaid
milkman
milksop
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milkwort
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mill wheel
millboard
milldam
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millenarian

millenarianism
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millennium
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millepore
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millerite
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milliard
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millihenry
milliliter
millimeter
millimicron
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millinery
milling
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 machine
million
millionaire
millipede
millisecond
millpond
millrace
millrun
millstone
millstream
millwork
millwright
milo
milord
milquetoast
milreis
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milter
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mimicry
mimosa
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min
min.
mina
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minaret
minatory
mince
mincemeat
mincing
mind
mind deafness
mind's eye
mind-expanding
minded
mindful
mindless
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mine detector
minefield
minelayer
miner
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mineral charcoal
mineral kingdom
mineral oil
mineral pitch
mineral spring
mineral tar
mineral water
mineral wax
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mineralize
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mineralogy
mineraloid
minestrone
minesweeper
mingle
mingy
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mini-
miniature
miniature camera
miniature photography

miniaturist
miniaturize
minicam
minify
minim
minima
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minimize
minimum
minimum wage
minimus
mining
mining geology
minion
miniskirt
minister
minister plenipotentiary
minister resident
ministerial
ministrant
ministration
ministry
minium
miniver
minivet
mink
minnesinger
minnow
minor
minor
axis
minor key
minor mode
minor orders
minor planet
minor premise
minor scale
minor term
minor triad
minority
minority group
minority leader
minster
minstrel
minstrel show
minstrelsy
mint
mint julep

mint sauce
mintage
minuend
minuet
minus
minus sign
minuscule
minute
minute gun
minute hand
minute steak
minutely
minutes
minutia
minutiae
minx
minyan
miosis
mir
mirabile dictu
miracidium
miracle
miracle play
miraculous
mirador
mirage
mire
mirepoix
mirk
mirror
mirror image
mirth
mirthful
mirthless
miry
mirza
mis-
misadventure
misadvise
misalliance
misanthrope
misanthropy
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misapprehend
misapprehension
misappropriate
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misbegotten

misbehave
misbehavior
misbelief
misbeliever
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miscalculate
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miscarriage
miscarry
miscegenation
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miscellany
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mischance
mischief
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misconception
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misconstruction
misconstrue
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misesteem

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mishmash
misinform
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misjoinder
misjudge
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mismanage
mismatch
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misnomer
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misogamy
misogynist
misogyny
misology
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misprize
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misquotation
misquote
misread

misreckon
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misrepresent
misrule
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missel thrush
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misshapen
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missilery
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missioner
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misspend
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mistime
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mistook
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mistreat
mistress
mistrial
mistrust
mistrustful
misty

misunderstand
misunderstanding
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misvalue
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miter box
miterwort
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mithridatism
miticide
mitigate
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mitral stenosis
mitral valve
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mitrewort
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mittimus
mitzvah
mix
mix-up
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mixed bag
mixed blessing
mixed bud
mixed farming
mixed grill
mixed marriage
mixed number
mixed-up
mixer
mixologist
mixolydian mode
mixture
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mizzle
mk.
mkt.

ml
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mm
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mo
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moa
moan
moat
mob
mobcap
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mobile home
mobile unit
mobility
mobilize
mobocracy
mobster
moccasin
moccasin flower
mocha
mock
mock moon
mock orange
mock sun
mock turtle soup
mock-heroic
mock-up
mockery
mockingbird
mod
mod.
modal
modal auxiliary
modality
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model
modeling
moderate
moderate breeze
moderate gale
moderation
moderato
moderator
modern

modern dance
modern jazz
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modernity
modernize
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modulus
modulus
of elasticity
modulus of rigidity
modus operandi
modus vivendi
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mog
mogul
mohair
mohur
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moiety
moil
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moisture
moke
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mol. wt.
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molar
molarity

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moldy
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mole cricket
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molecular beam
molecular biology
molecular distillation
molecular film
molecular formula
molecular volume
molecular weight
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moleskin
moleskins
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mollusc
molluscoid
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molt
molten
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moneymaker
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mongoloid

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monkey flower
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monkey nut
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monkey suit
monkey wrench
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monochromatism
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monocotyledon

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monsignor
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monster
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monstrosity
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montgolfier
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monthly
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mooch
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moody
moolah
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moonbeam
mooncalf
mooned
mooneye
moonfish
moonlight
moonlighting
moonlit
moonraker
moonrise
moonscape
moonseed
moonset
moonshine
moonshiner
moonshot
moonstone
moonstruck
moonwort
moony
moor
moorfowl
mooring
mooring
 mast
moorings
moorland
moorwort
moose
moot
moot court
mop
mop up
mop-up
mopboard
mope
mopes
mopey
moppet
moquette
mora

moraceous
moraine
moral
moral hazard
moral philosophy
moral theology
moral turpitude
morale
moralist
morality
morality play
moralize
morass
moratorium
moray
morbid
morbidezza
morbidity
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morbilli
morceau
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mordancy
mordant
mordent
more
moreen
morel
morello
moreover
mores
morganatic
morganite
morgen
morgue
moribund
morion
morn
morning
morning coat
morning dress
morning glory
morning loan
morning sickness
morning star
morning watch
morning-glory
mornings

morocco
moron
morose
morph
morpheme
morphia
morphine
morphinism
morpho-
morphogenesis
morphology
morphophoneme
morphophonemics
morphosis
morris
morris dance
morrow
morse
morsel
mort
mortal
mortal sin
mortality
mortality table
mortar
mortarboard
mortgage
mortgage bond
mortgagee
mortgagor
mortician
mortification
mortify
mortise
mortise
 lock
mortmain
mortuary
morula
mosaic
mosaic gold
mosasaur
moschatel
mosey
mosque
mosquito
mosquito boat
mosquito fleet

mosquito hawk
mosquito net
moss
moss pink
moss rose
moss-grown
mossback
mossbunker
mosstrooper
mossy
most
mostly
mot
mot juste
mote
motel
motet
moth
moth-eaten
mothball
mother
mother country
mother of vinegar
mother superior
mother tongue
mother wit
mother-in-law
mother-of-pearl
motherhood
mothering
motherland
motherless
motherly
motherwort
mothy
motif
motile
motion
motion picture
motion sickness
motion study
motionless
motivate
motivation
motive
motive power
motivity
motley

motmot
motoneuron
motor
motor coach
motor court
motor scooter
motor truck
motor vehicle
motor vessel
motorbike
motorboat
motorboating
motorbus
motorcade
motorcar
motorcycle
motoring
motorist
motorize
motorman
motorway
motte
mottle
mottled
motto
motu proprio
moue
mouflon
moujik
mould
moulder
moulding
mouldy
moulin
moult
mound
mount
mountain
mountain ash
mountain cat
mountain chain
mountain
goat
mountain laurel
mountain lion
mountain range
mountain sheep
mountain sickness

mountaineer
mountaineering
mountainous
mountainside
mountaintop
mountebank
mounting
mourn
mourner
mourners' bench
mournful
mourning
mourning band
mourning cloak
mourning dove
mouse
mouse deer
mouse-ear
mousebird
mouser
mousetail
mousetrap
mousey
moussaka
mousse
mousseline
mousseline de laine
mousseline de soie
moustache
mousy
mouth
mouth organ
mouth-watering
mouthful
mouthpart
mouthpiece
mouthwash
mouthy
mouton
movable
movable-do system
move
move in
move out
movement
mover
movie
movie camera

movie house
moving
moving picture
moving staircase
mow
mow down
mown
moxa
moxie
mozzarella
mozzetta
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mu meson
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muchness
mucilage
mucilaginous
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mucker
muckrake
muckraker
muckworm
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mucoid
mucoprotein
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mucosa
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mucous membrane
mucoviscidosis
mucro
mucronate
mucus
mud
mud dauber
mud flat
mud hen
mud puppy
mud turtle
mudcat
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muddle through
muddlehead
muddleheaded
muddler

muddy
mudfish
mudguard
mudlark
mudpack
mudra
mudskipper
mudslinger
mudslinging
mudstone
muenster
muezzin
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muggins
muggy
mugwump
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mulatto
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muleteer
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mullion
mullite
mullock

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murrhine
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muscatel
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muscle sense
muscle-bound
muscovado
muscular
muscular dystrophy
musculature
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museology
musette
musette bag
museum
museum piece
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mushroom
mushroom anchor
mushroom cloud
mushy
music
music box
music drama
music hall
music of the spheres
music paper
music roll
music stand
musical
musical box
musical chairs
musical comedy
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musician
musicianship
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mutton chop
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mutual
mutual fund
mutual inductance
mutual induction
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mutual savings bank
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muzhik
muzz
muzzle
muzzle-loader
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mycobacterium
mycol.
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mycosis
mydriasis
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myel-
myelencephalon
myelin sheath
myelitis
myeloid
myiasis
mylohyoid
mylonite
myna
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myocardial infarction
myocardiograph
myocarditis
myocardium

myogenic
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myopia
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myosotis
myotome
myotonia
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myrobalan
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nail down
nail file
nail polish
nail set
nail-biting
nailbrush
nailhead
nainsook
naissant
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naivete
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naker
namby-pamby
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name day
name-calling
name-dropper
name-dropping
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namely
nameplate
namesake
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nanny
nanny goat
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nanoid
nanosecond
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naphthyl
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napkin
napoleon
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national income
national park
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native-born
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natterjack
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natural child
natural childbirth
natural death

natural gas
natural gender
natural history
natural language
natural law
natural number
natural philosophy
natural realism
natural resources
natural right
natural rubber
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natural selection
natural theology
natural virtues
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nature study
nature worship
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navigator
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navy blue
navy plug
navy yard
nawab
nay
naya paisa
ne plus ultra
ne'er
ne'er-do-well
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neap tide
near
near beer
near miss
near rhyme
near thing
nearby
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nebulose
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necessity
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neckband

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neckwear
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negative feedback
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negotiation
negus
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neither
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nelly
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nemato-
nematode
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nemine dissentiente
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neoplasty
neoprene

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nephrectomy
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nephron
nephrosis
nephrotomy
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neptunium
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neritic
neroli oil
nerval
nerve
nerve gas
nerve impulse
nerve-racking
nerveless
nerves
nervine
nervous
nervous breakdown
nervous prostration
nervous system
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nest
nest egg
nestle

nestling
net
net national product
net profit
net ton
nether
nether world
nethermost
netsuke
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netting knot
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neurilemma
neuritis
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neuroblast
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neuroglia
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neuroma
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neurosurgery
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neurotomy
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neuter
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neutral spirits
neutralism
neutrality
neutralization
neutralize
neutretto
neutrino
neutron
neutron star
neutrophil
never
never-never
nevermore
nevertheless
nevus
new
new broom
new criticism
new look
new moon
new wave
new-fashioned
new-mint
new-model
new-mown
newborn
newcomer
newel
newel post
newfangled
newfashioned
newish
newly
newlywed
newness
news
news agency
news conference
news service
newsboy
newscast
newsdealer
newsletter
newsmagazine
newsman
newsmonger
newspaper
newspaperman

newspaperwoman
newsprint
newsreel
newsstand
newsworthy
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next
next friend
next of kin
nexus
niacin
nib
nibble
niblick
niccolite
nice
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nick
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plate
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nicotinism
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nidus
niece
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nifty

niggard
niggardly
nigger
niggerhead
niggle
niggling
nigh
night
night blindness
night clothes
night crawler
night heron
night latch
night letter
night light
night owl
night raven
night robe
night school
night shift
night soil
night watch
night watchman
nightcap
nightclub
nightdress
nightfall
nightgown
nighthawk
nightie
nightingale
nightjar
nightlong
nightly
nightmare
nightrider
nightshade
nightshirt
nightspot
nightstick
nighttime
nightwalker
nightwear
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nigrify
nigritude
nigrosine
nihil

nihil obstat
nihilism
nihility
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nil desperandum
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nimbus
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nine days' wonder
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ninth
chord
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niobium
niobous
nip
nip and tuck
nipa
niphablepsia
nipper
nippers
nipping
nipple
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nirvana
nisi
nisi prius
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nit
nit-picking
niter

nitid
nitramine
nitrate
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nitric acid
nitric bacteria
nitric oxide
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nitrification
nitrile
nitrite
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nitrobacteria
nitrobenzene
nitrochloroform
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nitrogen dioxide
nitrogen fixation
nitrogen mustard
nitrogen tetroxide
nitrogenize
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nitrohydrochloric acid
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nitroparaffin
nitrosamine
nitroso
nitrosyl
nitrous
nitrous acid
nitrous bacteria
nitrous oxide
nitty
nitty-gritty
nitwit
nival
niveous
nix
no
no-account
no-good
no-man's-land
no-par
no-show
nob

nobby
nobelium
nobility
noble
noble savage
noble-minded
nobleman
noblesse
noblesse oblige
noblewoman
nobody
nock
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noctiluca
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noctule
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nocturne
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noiseless
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noisome
noisy
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nolens volens
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nom de guerre
nom de plume
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nomen
nomenclator
nomenclature
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nominal wages
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non pros.
non prosequitur
non seq.
non sequitur
non troppo
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non-Euclidean geometry
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non-pros
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nonaggression
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nonaligned
nonalignment
nonanoic acid

nonappearance
nonary
nonattendance
nonbeliever
nonbelligerent
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nonce word
nonchalance
nonchalant
noncombatant
noncommissioned officer
noncommittal
noncompliance
nonconcurrence
noncondensing engine
nonconductor
nonconformance
nonconformist
nonconformity
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nonintervention
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nonresistance
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nonstriated
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nonunion shop
nonunionism
nonviolence
noodle
noodlehead
nook
noon
noonday
noontide
noontime

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norm
normal
normal curve
normal distribution
normal pitch
normal school
normalcy
normalize
normally
normative
north
north by east
north-northeast
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northbound
northeast
northeast
by east
northeast by north
northeaster
northeasterly
northeastward
northeastwards
norther
northerly
northern
northern lights
northernmost
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northwest by north
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northwester
northwesterly
northwestward
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nose

nose cone
nose dive
nose out
nose ring
nose-dive
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nuclear family
nuclear fission
nuclear fuel
nuclear fusion
nuclear isomer
nuclear magnetic resonance
nuclear physics
nuclear power
nuclear reaction
nuclear reactor
nuclear warhead
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nudicaul
nudism
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nuggar
nugget
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nuisance tax
nuke
null
null and void
nullification
nullifidian
nullify
nullipore
nullity
nullius filius
numb
numbat
number
number one
number theory
numberless
numbers pool
numbfish
numbing
numbles
numbskull
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numeral
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numeration
numerator
numerical
numerology
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numinous
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numismatist
numismatology
nummary
nummular
nummulite
numskull
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nuncupative
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off-off-Broadway
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office block
office boy
office hours
office seeker
office-block ballot
officeholder
officer

officer of the day
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officialdom
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oil slick
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oilcan
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oilcup
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old boy
old chap
old country
old fogy
old girl
old gold
old hand
old hat
old lady
old maid
old man
old master
old rose
old school
old school tie
old soldier
old squaw
old stager
old style
old wives' tale
old woman
old-fashioned
old-line
old-time
old-timer
old-world
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omnibus
omnidirectional
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omnipotence
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one-horse
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one-piece
one-sided
one-step
one-time
one-to-one
one-upmanship
one-way

oneiric
oneirocritic
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onerous
oneself
onetime
ongoing
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onion dome
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onlooker
only
only-begotten
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onomatology
onomatopoeia
onrush
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onshore
onslaught
onstage
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ontogeny
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open-and-shut
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open-faced
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open-mouthed
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openhanded
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openwork

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optical glass
optical illusion
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optical maser
optical rotation
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oxygen tent
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oxyhydrogen
oxymoron
oxysalt
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oyster crab
oyster plant
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paleobiology
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paleopsychology
paleozoology
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palfrey
palikar
palimpsest
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pallbearer
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panache
panada
panatella
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panchromatic
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panlogism
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paper mulberry
paper tiger
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paperboy
paperhanger

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part song
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partial pressure
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parturition
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party line
party man
party politics
party wall
party whip
party-column ballot
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parvenu
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pas de deux
pas seul
paschal candle
paschal flower
paschal lamb
paschal letter
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pasqueflower
pasquil
pasquinade
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pass out
pass over
pass up
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passionless
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passive resistance
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passport
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patent right
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pay up
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payday

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pea jacket
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peace offensive
peace offering
peace officer
peace pipe
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per diem
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perfect rhyme
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phenacite
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phenetidine
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phenylketonuria
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phosgenite
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photoelectric effect
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photokinesis

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photoreconnaissance
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phototransistor
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phototype
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phycomycete
phyla
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phyletic
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phylloid
phyllome
phylloquinone
phyllotaxis
phylloxera
phylogeny
phylum
phys.
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physical chemistry
physical education
physical examination
physical geography
physical jerks
physical medicine
physical optics
physical science
physical therapy
physicalism
physicality
physician
physicist

physicochemical
physics
physiognomy
physiography
physiological
physiological psychology
physiologist
physiology
physiotherapy
physique
physoclistous
physostomous
phyto-
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phytogenesis
phytogeography
phytography
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phytology
phytopathology
phytophagous
phytoplankton
phytosociology
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piaffe
pianette
pianism
pianissimo
pianist
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piano accordion
piano player
piano roll
pianoforte
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piazza
pibgorn
pibroch
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picador
picaresque
picaroon
picayune

piccalilli
piccaninny
piccolo
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pick at
pick off
pick on
pick out
pick-me-up
pickaback
pickaninny
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pickaxe
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picker
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pickerelweed
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pickup
picky
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picofarad
picoline
picot
picrate
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picture book
picture hat
picture show

picture tube
picture window
picture writing
picturesque
picturize
picul
piddle
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piddock
pidgin
pidgin English
pie
pie-eyed
piebald
piece
piece goods
piece of eight
piece out
piece-dyed
piecemeal
piecework
piecrust
piecrust table
pied
pieplant
pier
pier
glass
pier table
pierce
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pietism
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piezochemistry
piezoelectricity
piffle
pig
pig bed
pig iron
pig lead
pigeon
pigeon breast
pigeon hawk
pigeon-hearted
pigeon-toed
pigeonhole
pigeonwing

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piggery
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piglet
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pigsty
pigtail
pigweed
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pikeperch
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pikestaff
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pilaster
pilau
pilch
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pileous
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pileup
pileus
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pilgrim
pilgrimage
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piliform

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pill
pill bug
pillage
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pillar box
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pillory
pillow
pillow block
pillow lace
pillow sham
pillowcase
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pilot biscuit
pilot boat
pilot burner
pilot film
pilot fish
pilot flag
pilot lamp
pilot light
pilotage
pilothouse
piloting
pilotless aircraft
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pily
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pimiento
pimp
pimpernel
pimple
pimply
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pin curl
pin down
pin
money
pin rail
pin wrench
pinafore
pinball

pinball machine
pince-nez
pincer
pincers
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pinch bar
pinch effect
pinch hitter
pinch-hit
pinchbeck
pinchcock
pinchpenny
pincushion
pindling
pine
pine cone
pine marten
pine needle
pine snake
pine tar
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pineal eye
pineapple
pinery
pinetum
pinfeather
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pinfold
ping
pinguid
pinhead
pinhole
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pinion
pinite
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pink lady
pink slip
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pinkie
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pinko
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pinna
pinnace
pinnacle

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pinnule
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pins and needles
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pint-size
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pintail
pintle
pinto
pinto bean
pinup
pinwheel
pinwork
pinworm
pinxit
piny
pion
pioneer
pious
pip
pip-squeak
pipage
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pipe clay
pipe cleaner
pipe dream
pipe of peace
pipe organ
pipe up
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piperonal
pipestone

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piragua
piranha
pirate
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pirogue
piroshki
pirouette
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pistoleer
piston
piston ring
piston rod

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pit viper
pita
pitanga
pitapat
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pitch accent
pitch circle
pitch in
pitch into
pitch pine
pitch pipe
pitch ratio
pitch-black
pitch-dark
pitchblende
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pitcher
pitcher plant
pitchfork
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pitchman
pitchstone
pitchy
piteous
pitfall
pith
pith helmet
pithead
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pitiless
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pittance
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pivoting

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place kick
place setting
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placeman
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placentation
placer
placet
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placket
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plain sailing

plain text
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plain-spoken
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plane polarization
plane sailing
plane table
plane tree
plane trigonometry
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planetesimal
planetoid
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plank-sheer
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planned parenthood
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plano-concave
plano-convex
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planospore
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plant kingdom
plant louse
plant pathology
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plantain lily
plantain-eater
plantar
plantation
planter
planula
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plasmolysis
plasmosome
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of Paris
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plastic surgery
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plate glass
plateau
plated
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platelet
platen
plater
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platform rocker
platform ticket
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platinocyanide
platinotype
platinous
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platinum black
platinum-blond
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platter
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platy-
platyhelminth
platypus
platysma
plaudit
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plausive
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play down
play on
play on words
play out
play up
play with
play-off
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playacting
playback
playbill

playbook
playboy
player
player piano
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playgoer
playground
playhouse
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playing field
playlet
playmate
playpen
playreader
playroom
playsuit
plaything
playtime
playwright
playwriting
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plexor
plexus
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plight
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plinth
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plonk
plop
plosion
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plot

plotter
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ploughman
ploughshare
plover
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plowman
plowshare
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pluck up
pluckless
plucky
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plug-ugly
plugboard
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plumule
plumy
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plunge
plunge bath

plunger
plunging fire
plunk
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plus
plus fours
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plutonium
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pluviometer
pluvious
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plywood
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pneumoconiosis
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pneumoencephalogram
pneumogastric
pneumograph
pneumonectomy
pneumonia
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pneumonoultramicroscopicsilicovolcanoconiosis

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poacher
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pochard
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pocket battleship
pocket billiards
pocket borough
pocket gopher
pocket money
pocket mouse
pocket veto
pocketbook
pocketful
pocketknife
pockmark
pocky
poco
poco a poco
pocosin
pod
podagra
poddy
podesta
podgy
podiatry
podite
podium
podophyllin
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poesy
poet
poet laureate
poet.
poetaster
poetess
poetic justice
poetic license
poeticize
poetics
poetize
poetry
pogey
pogge

pogonia
pogrom
pogy
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poignant
poikilothermic
poilu
poinciana
poinsettia
point
point
d'appui
point duty
point group
point lace
point of articulation
point of departure
point of honor
point of order
point of view
point out
point source
point system
point up
point-blank
point-device
point-set topology
point-to-point
pointed
pointed arch
pointer
pointillism
pointing
pointless
pointsman
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poised
poison
poison dogwood
poison gas
poison hemlock
poison ivy
poison oak
poison sumac
poison-pen letter
poisoning
poisonous
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pokeberry
pokelogan
poker
poker dice
pokeweed
pokey
poky
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polacca
polacre
polar
polar axis
polar bear
polar coordinates
polar distance
polar equation
polar front
polar lights
polarimeter
polariscope
polarity
polarization
polarize
polarizing microscope
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pole vault
poleax
poleaxe
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polestar
poleyn
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police action
police car
police court
police dog
police officer
police state
police station
policeman
policewoman

policlinic
policy
policy loan
policyholder
polio
poliomyelitis
polis
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politesse
politic
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political economy
political science
politician
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politick
politicking
politico
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politics
polity
polka
polka dot
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poll tax
pollack
pollard
polled
pollen
pollen basket
pollen count
pollinate
pollination
polling booth
polling place
pollinize
pollinosis
polliwog
pollock
pollster
pollute
polluted

pollywog
polo
polo pony
polo shirt
polonaise
polonium
poltergeist
poltroon
poltroonery
poly-
polyadelphous
polyamide
polyandrist
polyandrous
polyandry
polyanthus
polybasite
polychaete
polychasium
polychromatic
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polycotyledon
polycythemia
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polydipsia
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polyethylene
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polygenesis
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polygraph
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polymath
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polymeric
polymerism

polymerization
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polymerous
polymorphism
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polypus
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polysemy
polysepalous
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polytonality
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polyvinyl resin

polyvinylidene chloride
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polyzoarium
polyzoic
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pomegranate
pomelo
pomfret
pomiculture
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pomology
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pompadour
pompano
pompon
pomposity
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ponceau
poncho
pond
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pond scum
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ponderous
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poniard
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pons Varolii
pons asinorum
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pontiff
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pontificals
pontificate
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pontonier
pontoon

pontoon bridge
pony
pony express
ponytail
pooch
pood
poodle
pooh
pooh-pooh
pooka
pool
pool
 hall
pool table
poolroom
poon
poop
poop deck
poor
poor boy
poor law
poorhouse
poorly
pop
pop art
pop off
pop-up
popcorn
pope
pope's nose
popedom
popery
popeyed
popgun
popinjay
popish
poplar
poplin
popliteal
popover
poppied
popping crease
popple
poppy
poppy seed
poppycock
poppyhead
pops

populace
popular
popular etymology
popular front
popular music
popular song
popular sovereignty
popularity
popularize
popularly
populate
population
population explosion
populous
porbeagle
porcelain
porcelain clay
porch
porcine
porcupine
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porgy
poriferous
porism
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pork barrel
pork pie
porker
porkpie
porky
pornocracy
pornography
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porphyrin
porphyritic
porphyroid
porphyry
porpoise
porridge
porringer
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port of call
port of entry
portable
portage
portal

portal vein
portal-to-portal
portal-to-portal pay
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porte cochere
porte-cochere
porte-monnaie
portend
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porterage
porterhouse
portfire
portfolio
porthole
portico
portiere
portion
portly
portmanteau
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 word
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portraiture
portray
portulaca
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poser
poseur
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position line
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positive feedback
positively
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posology
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possessory
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possum
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post chaise
post exchange
post hoc
post horn
post house
post meridiem
post office
post road
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post-bellum
post-free
post-horse
post-obit
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postage stamp
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postal order
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postbox
postboy
postcard
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postdiluvian
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poste restante
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posterior
posterity
postern
postexilian
postfix
postglacial

postgraduate
posthaste
posthumous
posthypnotic suggestion
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posticous
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postimpressionism
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postliminy
postlude
postman
postmark
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postmeridian
postmillennialism
postmistress
postmortem
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postorbital
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postpone
postpositive
postprandial
postremogeniture
postrider
postscript
postulant
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pot cheese
pot liquor
pot marigold
pot roast
pot shot
pot-au-feu
pot-valiant
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potash alum
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potassium chlorate
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potassium ferricyanide
potassium ferrocyanide
potassium hydroxide
potassium nitrate
potassium permanganate
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potato bug
potato chip
potato crisp
potato race
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potbelly
potboiler
potboy
poteen
potence
potency
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potentate
potential
potential difference
potential divider
potential energy
potentiality
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potentilla
potentiometer
potful
pothead
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pother
potherb
pothole
pothook
pothouse
pothunter
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potion

potluck
potman
potoroo
potpie
potpourri
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potshot
pottage
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poulard
poult
poulterer
poultice
poultry
poultryman
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pound cake
pound net
pound-foolish
poundage
poundal
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pourboire
pourparler
pourpoint
poussette
pout
pouter
poverty
poverty-stricken
pow
powder

powder blue
powder burn
powder charge
powder flask
powder horn
powder keg
powder metallurgy
powder mill
powder monkey
powder puff
powder room
powder snow
powdered milk
powdery
power
power amplifier
power brake
power dive
power drill
power line
power loading
power of appointment
power of attorney
power pack
power plant
power politics
power saw
power series
power station
power steering
power structure
power supply
power-dive
powerboat
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powerful
powerhouse
powerless
powwow
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ppd.
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practicable
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practical joke
practical nurse

practically
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practice teacher
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practise
practitioner
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prairie oyster
prairie schooner
prairie wolf
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pralltriller
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prana
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prandial
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praxis
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prayer
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prayer book
prayer meeting
prayer rug
prayer shawl
prayer wheel
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praying mantis
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pre-Socratic
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preachment
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preciosity

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predecessor
predella
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predigestion
predikant
predilection
predispose
predisposition
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predominant
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preemption
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preform

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prelatism
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premium
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premonitory
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prenomen
prenotion
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preoccupy
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preparator
preparatory
preparatory school
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preparedness
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preponderate
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prepossession
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prerecord
prerequisite
prerogative
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presage
presbyopia
presbyter
presbyterate

presbyterial
presbyterian
presbytery
preschool
prescience
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prescript
prescriptible
prescription
prescriptive
preselector
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presence
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presence of mind
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present arms
present participle
present perfect
present-day
presentable
presentation
presentational
presentationism
presentative
presentiment
presently
presentment
preservative
preserve
preset
preshrunk
preside
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presignify
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press agent
press association
press conference
press gallery
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press release
press stud
pressed glass
presser
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pressman
pressmark
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pressure altimeter
pressure altitude
pressure cabin
pressure cooker
pressure gauge
pressure group
pressure head
pressure point
pressure suit
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prestidigitation
prestige
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presumptive heir
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prevocalic
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price tag
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pricket

pricking
prickle
prickly
prickly heat
prickly pear
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priest-ridden
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prima donna
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primal
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primary accent
primary cell
primary color
primary election
primary school
primary stress
primary syphilis
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primateship
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primavera
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prime minister
prime mover
prime number
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prince consort
prince regent
prince's-feather
princedom
princeling
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princess
princess royal
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principal axis
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prison psychosis
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pristine
prithee
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private bill
private company
private enterprise
private eye
private first class
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private practice
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privateer
privation
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privilege
privileged
privileged communication
privily
privity
privy
privy chamber

privy council
privy purse
privy seal
prix fixe
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prize court
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pro forma
pro patria
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probability curve
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procrastinate
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profess
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prohibitive
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proliferous
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prolix
prolocutor
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prolongate
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prom
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promenade
promenade concert
promenade deck
promethium
prominence
prominent

promiscuity
promiscuous
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promissory
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promontory
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proof sheet
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prop root
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proper fraction
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proper noun
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prophylaxis
propinquity
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propitious
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coloration
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protector
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prototherian
prototrophic
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protrusile
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public assistance
public charge
public debt
public defender
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public enemy
public house
public law
public opinion
public prosecutor

public relations
public school
public servant
public service
public utility
public works
public-address
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pudding stone
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puerility
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puffball
puffer
puffery
puffin

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pull up
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punching bag
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push-up
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pushcart
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pussyfoot
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pylorus
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pyrotechnics
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quagmire
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qualifier
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quality control
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quantic
quantifier

quantify
quantitative
quantitative analysis
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quantity surveyor
quantize
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quantum mechanics
quantum number
quantum statistics
quantum theory
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quarantine flag
quark
quarrel
quarrelsome
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quarry tile
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quarter crack
quarter day
quarter grain
quarter horse
quarter nelson
quarter note
quarter round
quarter section
quarter sessions
quarter tone
quarter-hour
quarter-phase
quarterage
quarterback
quarterdeck
quartered
quartering
quarterly
quartermaster
quartern
quarters
quartersaw
quarterstaff
quartet

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quartile
quarto
quartz
quartz glass
quartz lamp
quartziferous
quartzite
quasar
quash
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quasi-judicial
quasi-stellar radio source
quass
quassia
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quaternion
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quatrain
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quatrefoil
quattrocento
quaver
quay
quean
queasy
queen
queen bee
queen dowager
queen mother
queen olive
queen post
queen regent
queen regnant
queen's English
queen's evidence
queen's shilling
queenhood
queenly
queer
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quelque chose
quench
quenchless

quenelle
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querist
quern
querulous
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ques.
quest
question
question mark
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questionary
questioning
questionless
questionnaire
questor
quetzal
queue
qui vive
quibble
quibbling
quiche
quick
quick assets
quick bread
quick fire
quick grass
quick march
quick time
quick trick
quick-change artist
quick-freeze
quick-tempered
quick-witted
quicken
quickie
quicklime
quickly
quicksand
quicksilver
quickstep
quid
quid pro quo
quiddity
quidnunc
quiescent
quiet
quieten

quietism
quietly
quietude
quietus
quiff
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quince
quincentenary
quincuncial
quincunx
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quinidine
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quinnat salmon
quinol
quinone
quinonoid
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quinquefid
quinquennial
quinquennium
quinquepartite
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quinquevalent
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quisling
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quitclaim
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quitrent
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quittance
quittor
quiver
quixotic
quixotism
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quizmaster
quizzical
quod
quod erat demonstrandum
quod vide
quodlibet
quoin
quoit
quoits
quondam
quorum
quot.
quota
quotable
quotation
quotation mark
quote
quoth
quotha
quotidian
quotient
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rabato
rabbet
rabbet plane

rabbi
rabbin
rabbinate
rabbinical
rabbinism
rabbit
rabbit ears
rabbit fever
rabbit punch
rabbitfish
rabbitry
rabble
rabble-rouser
rabble-rousing
rabblement
rabid
rabies
raccoon
raccoon dog
race
race horse
race riot
racecourse
racehorse
raceme
racemic
racemose
racer
raceway
rachis
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racial
racialism
racing
racism
rack
rack
railway
rack up
rack-rent
racket
racketeer
rackety
racon
raconteur
racoon
racquet
racy

rad
rad.
radar
radar beacon
radarman
radarscope
raddle
raddled
radial
radial engine
radian
radiance
radiancy
radiant
radiant energy
radiant flux
radiant heat
radiant heating
radiate
radiation
radiation sickness
radiative
radiator
radical
radical axis
radical sign
radicalism
radically
radicand
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radices
radicle
radiculitis
radii
radio
radio astronomy
radio beacon
radio beam
radio compass
radio control
radio direction finder
radio frequency
radio knife
radio range beacon
radio source
radio spectrum
radio star
radio station

radio telescope
radio tube
radio wave
radio-
radioactivate
radioactive
radioactive decay
radioactive series
radioactivity
radiobiology
radiobroadcast
radiocarbon
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radiochemical
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radiocommunication
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radioscopy
radiosensitive
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radiotelegram
radiotelegraph
radiotelegraphy
radiotelephone
radiotelephony
radiotherapy
radiothermy
radiothorium
radiotransparent

radish
radium
radium
 emanation
radium therapy
radius
radius of curvature
radix
radome
radon
raff
raffia
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raft
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rain water
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rare book
rare earth
rare gas
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rattlesnake plantain
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reaction formation
reaction turbine
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readjust
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ready money
ready reckoner
ready-made
ready-mix
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real presence
real property
real wages
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rear end
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red algae
red ant
red blood cell
red brass
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red cent
red clay
red clover
red coral
red corpuscle
red currant
red deer
red duster
red fir
red fire
red flag

red fox
red giant
red grouse
red gum
red hat
red heat
red herring
red lead
red light
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red meat
red mullet
red osier
red pepper
red rag
red rose
red shift
red snapper
red squirrel
red tape
red wine
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red-faced
red-handed
red-headed
red-hot
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red-light district
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redbird
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reed bunting
reed grass

reed instrument
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reed stop
reed warbler
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road hog
road metal
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robber fly
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robe-de-chambre
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rock bass
rock bottom
rock brake
rock candy
rock crystal
rock dove
rock garden
rock lobster
rock oil
rock pigeon
rock plant
rock salt
rock wool
rock-and-roll
rock-bottom
rock-bound
rock-ribbed
rockabilly
rockaway
rockbound
rocker
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arm
rockery
rocket
rocket bomb
rocket engine
rocket gun
rocket launcher

rocketeer
rocketry
rockfish
rocking chair
rocking horse
rocking stone
rockling
rockoon
rockrose
rockweed
rocky
rococo
rod
rode
rodent
rodenticide
rodeo
rodomontade
roe
roe deer
roebuck
roentgen ray
roentgenogram
roentgenograph
roentgenology
roentgenoscope
roentgenotherapy
rogation
rogatory
roger
rogue
rogue's march
roguery
rogues' gallery
roguish
roil
roily
roister
role
roll
roll call
roll film
roll in
roll on
roll up
rollaway
rollback
rolled gold

rolled oats
rolled roast
roller
roller bearing
roller coaster
roller skate
roller towel
roller-skate
rollick
rollicking
rolling
rolling hitch
rolling mill
rolling pin
rolling stone
rollmop
rollway
roly-poly
rom.
romaine
roman
roman-fleuve
romance
romantic
romanticism
romanticist
romanticize
romp
rompers
rompish
rondeau
rondel
rondelet
rondelle
rondo
rondure
roo
rood
rood loft
rood screen
rood spire
roof
roof garden
roof-deck
roofer
roofing
rooftop
rooftree

rook
rookery
rookie
rooky
room
room
 service
roomer
roomette
roomful
rooming house
roommate
roomy
roorback
roose
roost
rooster
root
root beer
root canal
root cellar
root hair
root out
root position
root up
rooted
rootless
rootlet
rootstock
ropable
rope
rope yarn
rope's end
ropedancer
ropeway
roping
ropy
roque
roquelaure
rorqual
rosaceous
rosaniline
rosarium
rosary
rose
rose acacia
rose apple
rose beetle

rose campion
rose engine
rose geranium
rose mallow
rose moss
rose of Jericho
rose of Sharon
rose quartz
rose water
rose window
rose-water
roseate
rosebay
rosebud
rosefish
rosemary
roseola
rosette
rosewood
rosily
rosin
rosin oil
rosinweed
rostellum
roster
rostrum
rosy
rosy finch
rot
rota
rotary
rotary engine
rotary plow
rotary press
rotary pump
rotate
rotation
rotative
rotator
rotatory
rote
rotenone
rotgut
rotifer
rotl
rotogravure
rotor
rotten

rottenstone
rotter
rotund
rotunda
roturier
rouble
roue
rouge
rouge et noir
rough
rough diamond
rough stuff
rough
up
rough-and-ready
rough-and-tumble
rough-dry
rough-hew
rough-spoken
roughage
roughcast
roughen
roughhew
roughhouse
roughish
roughneck
roughrider
roughshod
roulade
rouleau
roulette
rounce
round
round and round
round clam
round dance
round hand
round lot
round out
round robin
round table
round top
round trip
round-faced
round-shouldered
round-the-clock
roundabout
rounded

roundel
roundelay
rounder
rounders
roundhouse
rounding
roundish
roundlet
roundly
roundsman
roundup
roundworm
roup
rouse
rousing
roustabout
rout
route
router
routine
routinize
roux
rove
rove beetle
rove-over
rover
roving
row
rowan
rowboat
rowdy
rowdyish
rowdyism
rowel
rowing boat
rowing machine
rowlock
royal
royal blue
royal duke
royal fern
royal flush
royal jelly
royal palm
royal poinciana
royal purple
royal road
royal standard

royal tennis
royalist
royalty
rpt.
rt.
rub
rub down
rub in
rub off
rub out
rub up
rub-a-dub
rubato
rubber
rubber band
rubber cement
rubber plant
rubber stamp
rubber tree
rubberize
rubberneck
rubbery
rubbing
rubbish
rubble
rubdown
rube
rubefaction
rubella
rubellite
rubeola
rubescent
rubiaceous
rubicund
rubidium
rubiginous
rubious
ruble
rubric
rubricate
rubrician
rubstone
ruby
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ruby spinel
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rudderhead
rudderpost
ruddle
ruddock
ruddy
ruddy duck
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rudiment
rudimentary
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rueful
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ruff
ruffed grouse
ruffian
ruffianism
ruffle
ruffled
rufous
rug
rugged
rugger
rugging
rugose
ruin
ruination
ruinous
rule
rule of three
rule of thumb
rule out
ruler
ruling
ruling elder
rum
rumal
rumba
rumble
rumble seat
rumen

ruminant
ruminate
rummage
rummage sale
rummer
rummy
rumor
rumormonger
rump
rumple
rumpus
rumpus room
rumrunner
run
run across
run after
run along
run around
run away
run down
run in
run into
run off
run on
run out
run over
run through
run to
run up
run-down
run-in
run-of-the-mill
run-of-the-mine
run-through
runabout
runagate
runaway
runcible spoon
rundle
rundlet
rundown
rune
runesmith
rung
runic
runlet
runnel
runner

runner
 and tackle
runner bean
runner-up
running
running board
running broad jump
running head
running knot
running light
running mate
running rigging
running start
running stitch
running title
runny
runoff
runt
runty
runway
rupee
rupiah
rupture
rural
rural dean
rural district
rural free delivery
ruralize
ruse
rush
rush hour
rushing
rushy
rusk
russet
rust
rust-colored
rustic
rusticate
rustication
rustle
rustler
rustproof
rusty
rut
rutabaga
rutaceous
ruth

ruthenic
ruthenious
ruthenium
rutherfordium
ruthful
ruthless
rutilant
rutile
ruttish
rutty
rye
rye bread
rye whiskey
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s.a.
s.d.
s.g.
s.l.
s.o.
s.p.
sabadilla
sabayon
sabbatical
sabbatical year
saber
saber-toothed tiger
sabin
sable
sable antelope
sabotage
saboteur
sabra
sabre
sabulous
sac
sacaton
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saccharate
saccharic acid
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saccharify
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saccharoid
saccharometer

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saccule
sacculus
sacellum
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sacerdotalism
sachem
sachet
sack
sack
 coat
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sack suit
sackbut
sackcloth
sacker
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sacral
sacrament
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sacramental wine
sacramentalism
sacramentalist
sacrarium
sacred
sacred cow
sacrifice
sacrificial
sacrilege
sacrilegious
sacring
sacring bell
sacristan
sacristy
sacroiliac
sacrosanct
sacrum
sad
sad sack
sad-faced
sadden
saddle
saddle blanket
saddle horse
saddle roof
saddle seat

saddle soap
saddle-backed
saddleback
saddlebag
saddlebow
saddlecloth
saddler
saddlery
saddletree
sadiron
sadism
sadness
sadomasochism
safari
safe
safe period
safe-conduct
safeguard
safekeeping
safelight
safety
safety belt
safety bicycle
safety factor
safety fuse
safety glass
safety lamp
safety match
safety pin
safety razor
safety valve
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saffron
safranine
sag
saga
sagacious
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sagamore
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sage grouse
sage hen
sagebrush
sagittal
sagittate
sago
sago palm
saguaro

sahib
said
saiga
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sailboat
sailcloth
sailer
sailfish
sailing
sailing boat
sailing ship
sailmaker
sailor
sailor suit
sailor's-choice
sailplane
sain
sainfoin
saint
saint's
 day
sainted
sainthood
saintly
saith
sake
saker
saki
sal ammoniac
sal soda
sal volatile
salaam
salable
salacious
salad
salad bowl
salad days
salad dressing
salade
salamander
salami
salaried
salary
sale
saleable
salep
saleratus
sales

sales promotion
sales resistance
sales talk
sales tax
salesclerk
salesgirl
salesman
salesmanship
salespeople
salesperson
salesroom
saleswoman
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salicylate
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salimeter
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salinometer
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salivate
salivation
sallet
sallow
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salmagundi
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salpingitis
salpingotomy
salpinx
salsify
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salt cake
salt dome
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salt lick
salt marsh
salt pork
salt water
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saltant
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saltation
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salvage
salvation
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samarskite

samba
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samekh
sameness
samiel
samisen
samite
samovar
sampan
samphire
sample
sampler
sampling
samsara
samurai
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sanatorium
sanatory
sanbenito
sanctified
sanctify
sanctimonious
sanctimony
sanction
sanctitude
sanctity
sanctuary
sanctum
sanctum
sanctorum
sand
sand castle
sand crack
sand dab
sand dollar
sand flea
sand hopper
sand lance
sand lizard
sand martin
sand painting
sand trap
sand-blind
sandal
sandalwood
sandarac

sandbag
sandbank
sandblast
sandbox
sandbox tree
sander
sanderling
sandfly
sandglass
sandhi
sandhog
sandman
sandpaper
sandpiper
sandpit
sandstone
sandstorm
sandwich
sandwich board
sandwich man
sandy
sandy blight
sane
sang
sang-froid
sangria
sanguinaria
sanguinary
sanguine
sanguineous
sanguinolent
sanies
sanious
sanitarian
sanitarium
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sanitary
belt
sanitary cordon
sanitary engineering
sanitary towel
sanitation
sanitize
sanity
sanjak
sank
sannyasi
sans

sans pareil
sans serif
sans souci
sans-culotte
santalaceous
santonica
santonin
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sap green
sapajou
sapanwood
sapele
saphead
sapheaded
saphena
sapid
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sapindaceous
sapless
sapling
sapodilla
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saponify
saponin
sapor
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saporous
sapota
sapotaceous
sappanwood
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sapphire
sapphirine
sapphism
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sapro-
saprogenic
saprolite
saprophagous
saprophyte
sapsago
sapsucker
sapwood
saraband
saran
sarangi
sarcasm

sarcastic
sarcenet
sarco-
sarcocarp
sarcoid
sarcoma
sarcomatosis
sarcophagus
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sardius
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sari
sarmentose
sarmentum
sarong
saros
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sarraceniaceous
sarrusophone
sarsaparilla
sarsen
sarsenet
sartor
sartorial
sartorius
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sash cord
sash weight
sashay
sasin
saskatoon
sass
sassaby
sassafras
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sastruga
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satang
satanic
satchel
sate
sateen

satellite
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satiety
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satin stitch
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satinwood
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satrap
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saturation point
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saturnine
satyr
satyr play
satyriasis
sauce
saucepan
saucer
saucy
sauerbraten
sauerkraut
sauger
sauna
saunter
saurel
saurian
saurischian
sauropod

saury
sausage
saut de basque
sauterne
sauve qui peut
savage
savagery
savagism
savanna
savant
savarin
savate
save
save-all
saveloy
saving
savings account
savings and loan association
savings bank
savior
saviour
savoir-faire
savoir-vivre
savor
savory
savour
savoury
savoy
saw
saw palmetto
saw-toothed
sawbuck
sawdust
sawfish
sawfly
sawhorse
sawmill
sawn
sawyer
sax
saxhorn
saxophone
saxtuba
say
saying
sayyid
sb.
sc.

scab
scabbard
scabble
scabby
scabies
scabious
scabrous
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scaffold
scaffolding
scag
scagliola
scalable
scalade
scalage
scalar
scalar product
scalariform
scalawag
scald
scale
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 insect
scale moss
scaleboard
scalene
scalenus
scaler
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scallop
scalp
scalpel
scalping
scaly
scaly anteater
scammony
scamp
scamper
scampi
scan
scandal
scandalize
scandalmonger
scandent
scandic
scandium
scanner
scansion

scansorial
scant
scanties
scantling
scanty
scape
scapegoat
scapegrace
scaphoid
scapolite
scapula
scapular
scar
scarab
scarabaeid
scarabaeoid
scarabaeus
scarce
scarcely
scarcity
scare
scarecrow
scaremonger
scarf
scarfskin
scarification
scarificator
scarify
scarlatina
scarlet
scarlet fever
scarlet hat
scarlet letter
scarlet pimpernel
scarlet runner
scarlet tanager
scarlet woman
scarp
scarper
scary
scat
scat singing
scathe
scathing
scatology
scatter
scatter pin
scatter rug

scatterbrain
scattering
scaup duck
scauper
scavenge
scavenger
scenario
scenarist
scend
scene
scene dock
scenery
scenic
scenography
scent
scepter
sceptic
sceptre
sch.
schappe
schedule
scheelite
schema
schematic
schematism
schematize
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scheming
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scherzo
schiller
schilling
schipperke
schism
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schistosome
schistosomiasis
schizo
schizogenesis
schizogony
schizoid
schizomycete
schizont
schizophrenia
schizophyceous
schizopod
schizothymia

schlemiel
schlep
schlieren
schlieren
photography
schlimazel
schlock
schmaltz
schmaltzy
schmo
schmooze
schmuck
schnapps
schnauzer
schnitzel
schnook
schnorkle
schnorrer
schnozzle
schola cantorum
scholar
scholarship
scholastic
scholasticate
scholasticism
scholiast
scholium
school
school age
school board
school year
schoolbag
schoolbook
schoolboy
schoolfellow
schoolgirl
schoolhouse
schooling
schoolma'am
schoolman
schoolmarm
schoolmaster
schoolmate
schoolmistress
schoolroom
schoolteacher
schooner
schorl

schottische
schuss
schwa
sci-fi
sci.
sciamachy
sciatic
sciatica
science
science fiction
sciential
scientific
scientism
scientist
scientistic
scilicet
scilla
scimitar
scincoid
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scintillant
scintillate
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scintillation counter
scintillator
scintillometer
sciolism
sciomachy
sciomancy
scion
scirrhous
scirrhus
scissel
scissile
scission
scissor
scissors
scissors
kick
scissors truss
scissure
sciurine
sciuroid
sclaff
sclera
sclerenchyma
sclerite
scleritis

scleroderma
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scleroma
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scleroprotein
sclerosed
sclerosis
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sclerotomy
sclerous
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scofflaw
scold
scolecite
scolex
scoliosis
scolopendrid
sconce
scone
scoop
scoop neck
scoot
scooter
scop
scope
scopolamine
scopoline
scopophilia
scopula
scorbutic
scorch
scorcher
score
scoreboard
scorecard
scorekeeper
scoria
scorify
scorn
scornful
scorpaenid
scorpaenoid
scorper
scorpion
scot
scot and lot
scot-free

scotch
scoter
scotia
scotopia
scoundrel
scoundrelly
scour
scourge
scouring
scourings
scout
scout car
scouting
scoutmaster
scow
scowl
scr.
scrabble
scrag
scraggly
scraggy
scram
scramble
scrambled eggs
scrambler
scrannel
scrap
scrap iron
scrapbook
scrape
scraper
scraperboard
scrapple
scrappy
scratch
scratch hit
scratch pad
scratch sheet
scratch test
scratchboard
scratches
scratchy
scrawl
scrawly
scrawny
screak
scream
screamer

scree
screech
screech
 owl
screeching
screed
screen
screen grid
screen memory
screen test
screening
screenplay
screw
screw anchor
screw eye
screw pine
screw propeller
screw up
screwball
screwdriver
screwed
screwworm
screwy
scribble
scribbler
scribe
scriber
scrim
scrimmage
scrimp
scrimpy
scrimshaw
scrip
scrip dividend
script
scriptorium
scriptural
scripture
scriptwriter
scrivener
scrobiculate
scrod
scrofula
scrofulous
scroll
scroll saw
scroop
scrophulariaceous

scrotum
scrouge
scrounge
scrub
scrub typhus
scrubber
scrubby
scrubland
scruff
scruffy
scrummage
scrumptious
scrunch
scruple
scrupulous
scrutable
scrutator
scrutineer
scrutinize
scrutiny
scuba
scud
scudo
scuff
scuffle
scull
scullery
scullion
sculp.
sculpin
sculpsit
sculpt
sculptor
sculptress
sculpture
sculpturesque
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scumble
scummy
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scupper
scuppernong
scurf
scurrile
scurrility
scurrilous
scurry
scurvy

scurvy grass
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scutate
scutch
scutch grass
scutcheon
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scutellation
scutiform
scutter
scuttle
scuttlebutt
scutum
scyphate
scyphozoan
scyphus
scythe
sd.
sea
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 anchor
sea anemone
sea bag
sea bass
sea bird
sea biscuit
sea bream
sea breeze
sea captain
sea chest
sea coal
sea cow
sea devil
sea dog
sea duck
sea eagle
sea elephant
sea fan
sea foam
sea green
sea gull
sea heath
sea holly
sea horse
sea king
sea ladder

sea lavender
sea lawyer
sea legs
sea lettuce
sea level
sea lily
sea lion
sea mew
sea mile
sea milkwort
sea moss
sea onion
sea otter
sea perch
sea pink
sea power
sea purse
sea raven
sea robin
sea room
sea rover
sea serpent
sea shell
sea slug
sea snake
sea squill
sea squirt
sea swallow
sea tangle
sea trout
sea turtle
sea urchin
sea wrack
sea-island cotton
sea-maid
seaboard
seaborne
seacoast
seacock
seadog
seafarer
seafaring
seafood
seagirt
seagoing
seal
seal brown
seal ring

sealed
sealed book
sealed orders
sealer
sealing wax
sealskin
seam
seaman
seamanlike
seamanship
seamark
seamount
seamstress
seamy
seaplane
seaport
seaquake
sear
search
search party
search
 warrant
searching
searchlight
seascape
seashore
seasick
seasickness
seaside
season
seasonable
seasonal
seasoning
seat
seat belt
seating
seaward
seawards
seaware
seaway
seaweed
seaworthy
sebaceous
sebaceous gland
sebacic acid
sebi-
sebiferous
sebum

sec
sec.
secant
secateurs
secco
secede
secern
secession
secessionist
sech
seclude
secluded
seclusion
seclusive
second
second childhood
second class
second cousin
second estate
second fiddle
second floor
second growth
second hand
second lieutenant
second mate
second mortgage
second nature
second person
second reading
second sight
second string
second thought
second wind
second-best
second-class
second-degree burn
second-guess
second-rate
secondary
secondary cell
secondary color
secondary emission
secondary school
secondary sex characteristic
secondary stress
secondary syphilis
secondhand
secondly

secrecy
secret
secret agent
secret partner
secret police
secret service
secret society
secretarial
secretariat
secretary
secretary bird
secretary
 of state
secretary-general
secrete
secretin
secretion
secretive
secretory
sect
sect.
sectarian
sectarianism
sectarianize
sectary
section
section mark
sectional
sectionalism
sectionalize
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sectorial
secular
secularism
secularity
secund
secundine
secundines
secure
security
security risk
sedan
sedan chair
sedan cruiser
sedate
sedation
sedative
sedentary

sedge
sediment
sedimentary
sedimentation
sedimentology
sedition
seditious
seduce
seducer
seduction
seductive
seductress
sedulity
sedulous
sedum
see
see into
see out
see through
see-through
seed
seed capsule
seed coat
seed corn
seed leaf
seed plant
seed vessel
seedbed
seedcase
seeder
seedling
seedtime
seedy
seeing
seek
seek out
seeker
seel
seem
seeming
seemly
seen
seep
seepage
seer
seeress
seersucker
seesaw

seethe
segment
segmental
segmentation
segmentation cavity
segno
segregate
segregation
segregationist
seguidilla
sei whale
seicento
seigneur
seigneury
seignior
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selachian
selaginella
selah
seldom
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selectee
selection
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service
selectivity
selectman
selector
selenate
selenious
selenious acid

selenite
selenium
selenodont
selenography
self
self-
self-abasement
self-abnegation
self-absorbed
self-absorption
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self-aggrandizement
self-analysis
self-annihilation
self-appointed
self-assertion
self-assurance
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self-centered
self-command
self-conceit
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self-consistent
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self-content
self-contradiction
self-control
self-deceit
self-deception
self-defense
self-delusion
self-denial
self-deprecating
self-determination
self-devotion
self-discipline
self-drive
self-driven
self-educated
self-effacement
self-effacing
self-employed

self-esteem
self-evident
self-examination
self-excited
self-executing
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self-expression
self-fertilization
self-forgetful
self-fulfillment
self-governed
self-government
self-gratification
self-help
self-hypnosis
self-identity
self-immolating
self-immolation
self-important
self-improvement
self-induced
self-inductance
self-induction
self-indulgent
self-insurance
self-interest
self-justifying
self-knowledge
self-liquidating
self-loading
self-love
self-made
self-mastery
self-mortification
self-moving
self-operating
self-opinionated
self-pity
self-pollination
self-possessed
self-possession
self-preservation
self-pronouncing
self-propelled
self-propulsion
self-realization
self-regard

self-regulated
self-regulating
self-reliance
self-reliant
self-renunciation
self-reproach
self-respect
self-restraint
self-revealing
self-righteous
self-rising
self-sacrifice
self-satisfaction
self-satisfied
self-sealing
self-seeker
self-seeking
self-service
self-sown
self-starter
self-styled
self-sufficient
self-suggestion
self-support
self-supporting
self-sustaining
self-taught
self-will
self-winding
selfheal
selfhood
selfish
selfless
selfness
selfsame
sell
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off
sell out
seller
sellers' market
selling race
selling-plater
selsyn
selvage
selves
sem.
semanteme

semantic
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sematic
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semblance
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semiannual
semiaquatic
semiautomatic
semibreve
semicentennial
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semicircular canal
semicolon
semiconductor
semiconscious
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semifluid
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semiliterate
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semimonthly
seminal
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seminarian
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semination
semiology
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semipermeable
semiporcelain
semipostal
semipro
semiprofessional
semiquaver
semirigid

semiskilled
semitone
semitrailer
semitropical
semivitreous
semivowel
semiweekly
semiyearly
semolina
semper fidelis
semper paratus
sempiternal
sempstress
sen
senarmontite
senary
senate
senator
senatorial
senatus consultum
send
send down
send-off
sendal
sender
senega
senescent
seneschal
senhor
senhorita
senile
senility
senior
senior
citizen
senior high school
seniority
senna
sennet
sennight
sennit
sensate
sensation
sensational
sensationalism
sense
sense datum
sense organ

sense perception
senseless
sensibility
sensible
sensible horizon
sensillum
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sensitive plant
sensitivity
sensitize
sensitometer
sensor
sensorimotor
sensorium
sensory
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sensualism
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sensuality
sensuous
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sentry
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sepal
sepaloid
separable
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separates
separation
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separator
separatrix
sepia
sepoy
seppuku

sepsis
sept
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septal
septarium
septate
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septennial
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septic tank
septicemia
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septicidal
septilateral
septillion
septimal
septime
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septuor
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sepulchre
sepulture
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sequential
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sequestrate
sequestration
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ser
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seraglio

serai
seraph
seraphic
serdab
sere
serena
serenade
serenata
serendipity
serene
serenity
serf
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sergeant
sergeant
 at arms
sergeant first class
sergeant major
serial
serial number
serialize
seriate
seriatim
sericeous
sericin
seriema
series
series-wound
serif
serigraph
serin
serine
seringa
seriocomic
serious
serjeant
sermon
sermonize
sero-
serology
serosa
serotherapy
serotine
serotonin
serous
serous fluid
serous membrane
serow

serpent
serpentiform
serpentine
serpigo
serranid
serrate
serrated
serration
serried
serriform
serrulate
serrulation
serum
serum albumin
serum globulin
serum hepatitis
serval
servant
serve
server
service
service book
service ceiling
service medal
service station
service stripe
serviceable
serviceberry
serviceman
servient tenement
serviette
servile
servility
serving
servitor
servitude
servo
servo system
servomechanical
servomechanism
servomotor
sesame
sesqui-
sesquialtera
sesquicarbonate
sesquicentennial
sesquioxide
sesquipedalian

sesquiplane
sessile
session
sessions
sesterce
sestertium
sestet
sestina
set
set
about
set against
set aside
set back
set down
set forth
set in
set off
set on
set out
set piece
set point
set square
set theory
set to
set up
set width
seta
setaceous
setback
setiform
setose
setscrew
sett
settee
setter
setting
setting-up exercises
settle
settle down
settle for
settle in
settle with
settlement
settler
settling
settlings
setula

setup
seven
seven deadly sins
seven seas
seven-up
seven-year itch
sevenfold
seventeen
seventeen-year locust
seventeenth
seventh
seventh chord
seventh heaven
seventieth
seventy
sever
severable
several
severally
severalty
severance
severance pay
severe
severity
sew
sew up
sewage
sewan
sewellel
sewer
sewerage
sewing
sewing machine
sewn
sex
sex act
sex appeal
sex chromosome
sex hormone
sex-
sex-limited
sexagenarian
sexagenary
sexagesimal
sexcentenary
sexdecillion
sexed
sexennial

sexism
sexist
sexivalent
sexless
sexology
sexpartite
sexpot
sext
sextain
sextan
sextant
sextet
sextillion
sextodecimo
sexton
sextuple
sextuple
 time
sextuplet
sextuplicate
sexual
sexual intercourse
sexual reproduction
sexual selection
sexuality
sexy
sf
sferics
sfumato
sgd.
sgraffito
shabby
shabby-genteel
shack
shackle
shad
shadberry
shadbush
shadchan
shaddock
shade
shade tree
shading
shadoof
shadow
shadow play
shadowgraph
shadowy

shaduf
shady
shaft
shafting
shag
shagbark
shaggy
shaggy-dog story
shagreen
shah
shake
shake down
shake off
shake up
shake-up
shakedown
shaker
shaking
shaking palsy
shako
shaky
shale
shale oil
shall
shalloon
shallop
shallot
shallow
shalom aleichem
shalt
sham
shaman
shamanism
shamble
shambles
shame
shamefaced
shameful
shameless
shammer
shammy
shampoo
shamrock
shamus
shan't
shandrydan
shandy
shanghai

shank
shanny
shantung
shanty
shape
shape up
shaped
shapeless
shapely
shard
share
sharecrop
sharecropper
shareholder
shark
sharkskin
sharp
sharp-eared
sharp-edged
sharp-eyed
sharp-freeze
sharp-nosed
sharp-set
sharp-sighted
sharp-witted
sharpen
sharper
sharpie
sharpshooter
shashlik
shastra
shatter
shatterproof
shave
shaveling
shaven
shaver
shaving
shaving
 soap
shaw
shawl
shawl collar
shawm
shay
she
she'd
she'll

she's
she-devil
sheaf
shear
sheared
shears
shearwater
sheatfish
sheath
sheath knife
sheathbill
sheathe
sheathing
sheave
sheaves
shebang
shebeen
shed
shed roof
sheen
sheeny
sheep
sheep ked
sheep sorrel
sheep tick
sheep's eyes
sheep's fescue
sheep-dip
sheepcote
sheepdog
sheepfold
sheepherder
sheepish
sheepshank
sheepshead
sheepshearing
sheepskin
sheepwalk
sheer
sheer strake
sheerlegs
sheers
sheet
sheet anchor
sheet bend
sheet glass
sheet lightning
sheet metal

sheet music
sheet-fed
sheeting
sheik
sheikdom
sheikh
shekel
shelduck
shelf
shelf ice
shelf life
shell
shell bean
shell game
shell jacket
shell out
shell shock
shellac
shellacking
shellback
shellbark
shelled
shellfire
shellfish
shellproof
shelter
shelter deck
shelter
 tent
shelty
shelve
shelves
shelving
shend
shepherd
shepherd dog
shepherd's pie
shepherd's-purse
sherbet
sherd
sherif
sheriff
sherry
sheugh
shew
shibboleth
shied
shield

shield bug
shield fern
shier
shiest
shift
shift key
shiftless
shifty
shigella
shikari
shiksa
shill
shillelagh
shilling
shilling mark
shilly-shally
shimmer
shimmery
shimmy
shin
shinbone
shindig
shine
shiner
shingle
shingles
shingly
shinleaf
shinny
shiny
ship
ship biscuit
ship chandler
ship money
ship of the line
ship of war
ship's boat
ship's boy
ship's husband
ship's papers
ship-rigged
shipboard
shipentine
shipload
shipman
shipmaster
shipmate
shipment

shipowner
shippen
shipper
shipping
shipping ton
shipshape
shipway
shipworm
shipwreck
shipwright
shipyard
shire
shire horse
shirk
shirker
shirr
shirring
shirt
shirting
shirtmaker
shirtwaist
shirty
shish kebab
shit
shithead
shittim wood
shitty
shiv
shivaree
shive
shiver
shivery
shoal
shoat
shock
shock absorber
shock therapy
shock troops
shock wave
shocker
shockheaded
shocking
shockproof
shod
shoddy
shoe
shoe

leather
shoebill
shoeblack
shoelace
shoemaker
shoer
shoeshine
shoestring
shofar
shogun
shogunate
shone
shoo
shoo-in
shook
shool
shoon
shoot
shoot down
shoot out
shoot up
shooter
shooting box
shooting brake
shooting gallery
shooting iron
shooting script
shooting star
shooting stick
shooting war
shop
shop assistant
shop steward
shophar
shopkeeper
shoplifter
shopper
shopping
shopping center
shopwindow
shopworn
shoran
shore
shore bird
shore leave
shore patrol
shoreless
shoreline

shoreward
shoring
shorn
short
short account
short circuit
short covering
short division
short hundredweight
short interest
short list
short shrift
short story
short subject
short ton
short-change
short-circuit
short-cut
short-lived
short-sighted
short-tempered
short-term
short-winded
shortage
shortbread
shortcake
shortcoming
shortcut
shorten
shortening
shortfall
shorthand
shorthanded
shorthorn
shortie
shortly
shorts
shortsighted
shortstop
shortwave
shot
shot glass
shot hole
shot
put
shot tower
shot-putter
shote

shotgun
shotgun wedding
shotten
should
shoulder
shoulder bag
shoulder blade
shoulder pad
shoulder patch
shoulder strap
shoulder weapon
shouldn't
shouldst
shout
shout down
shove
shove off
shovel
shovel hat
shovelboard
shoveler
shovelhead
shovelnose
show
show bill
show business
show girl
show of hands
show off
show up
show-off
show-through
showboat
showbread
showcase
showdown
shower
showery
showily
showiness
showing
showman
showmanship
shown
showpiece
showplace
showroom
showy

shpt.
shr.
shrapnel
shred
shredding
shrew
shrew mole
shrewd
shrewish
shrewmouse
shriek
shrieval
shrievalty
shrieve
shrift
shrike
shrill
shrimp
shrine
shrink
shrinkage
shrive
shrivel
shroff
shroud
shroud knot
shroud-laid
shrove
shrub
shrubbery
shrubby
shrug
shrug off
shrunk
shrunken
shtg.
shuck
shudder
shuddering
shuffle
shuffleboard
shul
shun
shunt
shunt-wound
shush
shut
shut up

shut-in
shutdown
shutout
shutter
shuttering
shuttle
shuttlecock
shwa
shy
shyster
si
sialagogue
sialoid
siamang
sib
sibilant
sibilate
sibling
sibship
sibyl
sic
sic
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siccative
sick
sick headache
sick leave
sick list
sicken
sickener
sickening
sickle
sickle feather
sicklebill
sickly
sickness
sickroom
siddur
side
side arms
side chain
side dish
side drum
side effect
side horse
side meat
side step
side street

side table
side whiskers
side-dress
sideband
sideboard
sideburns
sidecar
sidekick
sidelight
sideline
sideling
sidelong
sideman
sidereal
sidereal day
sidereal hour
sidereal month
sidereal time
sidereal year
siderite
sidero-
siderolite
siderosis
siderostat
sidesaddle
sideshow
sideslip
sidesman
sidestep
sidestroke
sideswipe
sidetrack
sidewalk
sideward
sideway
sideways
sidewheel
sidewinder
siding
sidle
siege
siemens
sienna
sierra
siesta
sieve
sieve tube
sift

siftings
sig.
sigh
sight
sight bill
sight draft
sight-read
sight-seeing
sighted
sightless
sightly
sigil
siglos
sigma
sigmatism
sigmoid
sigmoid flexure
sign
sign away
sign in
sign language
sign manual
sign of the cross
sign on
sign
up
signal
signal box
signal corps
signal-to-noise ratio
signalize
signally
signalman
signalment
signatory
signature
signature tune
signboard
signet
signet ring
significance
significancy
significant
signification
significative
significs
signify
signor

signora
signore
signorina
signorino
signory
signpost
sika
sike
silage
silence
silencer
silent
silent discharge
silent majority
silent partner
silesia
silhouette
silica
silica gel
silica glass
silicate
siliceous
silici-
silicic
silicic acid
silicify
silicious
silicium
silicle
silicon
silicon carbide
silicone
silicosis
siliculose
siliqua
silique
silk
silk hat
silk oak
silk-screen printing
silk-stocking
silkaline
silken
silkweed
silkworm
silky
sill
sillabub

sillimanite
silly
silly season
silo
siloxane
silt
siltstone
silurid
silva
silvan
silver
silver age
silver bell
silver birch
silver bromide
silver certificate
silver chloride
silver fizz
silver foil
silver fox
silver frost
silver iodide
silver leaf
silver lining
silver maple
silver nitrate
silver
 plate
silver screen
silver standard
silver thaw
silver-eye
silver-plate
silver-tongued
silverfish
silvern
silverpoint
silverside
silversmith
silverware
silverweed
silvery
silviculture
sima
simar
simarouba
simaroubaceous
simba

simian
similar
similarity
simile
similitude
simitar
simmer
simnel cake
simon-pure
simoniac
simonize
simony
simoom
simp
simpatico
simper
simple
simple chancre
simple harmonic motion
simple interest
simple machine
simple microscope
simple sentence
simple time
simple-hearted
simple-minded
simpleton
simplex
simplicidentate
simplicity
simplify
simplism
simplistic
simply
simulacrum
simulant
simulate
simulated
simulation
simulator
simulcast
simultaneous
simultaneous equations
sin
sinapism
since
sincere
sincerity

sinciput
sine
sine curve
sine die
sine prole
sine qua non
sine wave
sinecure
sinew
sinewy
sinfonia
sinfonietta
sinful
sing
sing out
sing.
singe
singer
singing bird
single
single bond
single combat
single entry
single file
single quotes
single rhyme
single
 tax
single-action
single-breasted
single-cross
single-foot
single-handed
single-handedly
single-hearted
single-lens reflex
single-minded
single-phase
singleness
singles
singlestick
singlet
singleton
singletree
singly
singsong
singular
singularity

singularize
singultus
sinh
sinister
sinistrad
sinistral
sinistrality
sinistrocular
sinistrodextral
sinistrorse
sinistrous
sink
sink in
sinkage
sinker
sinkhole
sinking
sinking fund
sinless
sinner
sinter
sinuate
sinuation
sinuosity
sinuous
sinus
sinusitis
sinusoid
sinusoidal
sinusoidal projection
sip
siphon
siphon bottle
siphonophore
siphonostele
sipper
sippet
sir
sir-reverence
sirdar
sire
siren
sirenic
siriasis
sirloin
sirocco
sirrah
sirree

sirup
sis
sisal
siskin
sissified
sissy
sister
sister-in-law
sisterhood
sisterly
sit
sit back
sit down
sit on
sit up
sit-down
sit-down strike
sit-in
sitar
site
sitology
sitter
sitting
sitting duck
sitting room
situate
situated
situation
situation comedy
situla
situs
sitz bath
sitzmark
six
six-eight time
six-footer
six-gun
six-pack
sixfold
sixpence
sixpenny
sixteen
sixteenmo
sixteenth
sixteenth
note
sixth
sixth chord

sixth sense
sixtieth
sixty
sixty-four
sixty-fourmo
sixty-fourth note
sixty-nine
sizable
sizar
size
size up
sizeable
sized
sizing
sizzle
sizzler
sjambok
skald
skat
skate
skateboard
skater
skatole
skean
skean dhu
skedaddle
skeet
skeg
skein
skeleton
skeleton key
skellum
skelp
skep
skepful
skeptic
skeptical
skepticism
skerrick
skerry
sketch
sketchbook
sketchy
skew
skewback
skewbald
skewer
skewness

ski
ski jump
ski lift
ski pants
ski tow
ski troops
skiagraph
skiascope
skid
skid fin
skid row
skidproof
skidway
skied
skiff
skiffle
skiing
skijoring
skilful
skill
skill-less
skilled
skillet
skillful
skilling
skim
skim milk
skimmer
skimmia
skimp
skimpy
skin
skin diving
skin effect
skin flick
skin friction
skin graft
skin-deep
skin-dive
skinflint
skinhead
skink
skinned
skinny
skinny-dip
skintight
skip
skip distance

skip tracer
skip-bomb
skipjack
skiplane
skipper
skippet
skirl
skirling
skirmish
skirr
skirret
skirt
skirting
skit
skite
skitter
skittish
skittle
skive
skiver
skivvy
skulduggery
skulk
skull
skull
 and crossbones
skullcap
skunk
skunk cabbage
sky
sky blue
sky pilot
sky wave
sky-high
skycap
skydive
skyjack
skylark
skylight
skyline
skyrocket
skysail
skyscape
skyscraper
skysweeper
skyward
skyway
skywriting

slab
slabber
slack
slack suit
slack water
slack-jawed
slacken
slacker
slacks
slag
slain
slake
slaked lime
slalom
slam
slam-bang
slander
slang
slangy
slant
slant rhyme
slantwise
slap
slap-bang
slap-up
slapdash
slaphappy
slapjack
slapstick
slash
slash pocket
slashing
slat
slate
slater
slather
slating
slattern
slatternly
slaty
slaughter
slaughterhouse
slave
slave ant
slave driver
slave ship
slave-making ant
slaveholder

slaver
slavery
slavey
slavish
slavocracy
slaw
slay
sld.
sleave
sleazy
sled
sledge
sledgehammer
sleek
sleekit
sleep
sleep around
sleep with
sleeper
sleeping
sleeping bag
sleeping beauty
sleeping car
sleeping draught
sleeping partner
sleeping pill
sleeping
 sickness
sleepless
sleepwalk
sleepy
sleepyhead
sleet
sleety
sleeve
sleigh
sleight
sleight of hand
slender
slenderize
sleuth
sleuthhound
slew
slice
slice bar
slicer
slick
slickenside

slicker
slide
slide fastener
slide rule
slide trombone
slide valve
slide-action
slider
sliding
sliding scale
slier
sliest
slight
slighting
slightly
slily
slim
slime
slime mold
slimsy
slimy
sling
sling psychrometer
slinger ring
slingshot
slink
slinky
slip
slip ring
slip stitch
slip up
slip-on
slipcase
slipcover
slipknot
slipnoose
slipover
slippage
slipper
slipperwort
slippery
slippery elm
slippy
slipsheet
slipshod
slipslop
slipstream
slipway

slit
slit trench
slither
sliver
slivovitz
slob
slob ice
slobber
slobbery
sloe
sloe gin
slog
slogan
sloganeer
sloop
sloop of war
slop
slope
sloppy
slopwork
slosh
sloshy
slot
slot machine
sloth
sloth bear
slothful
slotter
slouch
slouch hat
slough
sloven
slovenly
slow
slow march
slow match
slow motion
slow time
slow-moving
slow-witted
slowdown
slowpoke
slowworm
slub
sludge
sludgy
slue
sluff

slug
slugabed
sluggard
sluggish
sluice
slum
slumber
slumber
party
slumberland
slumberous
slumgullion
slumlord
slump
slung
slung shot
slunk
slur
slurp
slurry
slush
slush fund
slushy
slut
sly
slype
smack
smack-dab
smacker
smacking
small
small arms
small beer
small calorie
small capital
small change
small circle
small fry
small hours
small intestine
small pica
small potatoes
small slam
small stores
small stuff
small talk
small-minded
small-scale

small-time
smallage
smallclothes
smallish
smallmouth bass
smallpox
smallsword
smalt
smaltite
smalto
smaragd
smaragdine
smaragdite
smarm
smarmy
smart
smart aleck
smart money
smart set
smarten
smash
smash-and-grab
smash-up
smashed
smasher
smashing
smatter
smattering
smaze
smear
smear word
smearcase
smectic
smegma
smell
smelling bottle
smelling salts
smelly
smelt
smelter
smew
smidgen
smilacaceous
smilax
smile
smirch
smirk
smite

smith
smithereens
smithery
smithsonite
smithy
smitten
smock
smock frock
smock mill
smocking
smog
smoke
smoke
 bomb
smoke out
smoke screen
smoke tree
smoke-dry
smokechaser
smokejumper
smokeless
smokeless powder
smokeproof
smoker
smokestack
smoking
smoking car
smoking jacket
smoking room
smoko
smoky
smoky quartz
smolder
smolt
smoodge
smooth
smooth breathing
smooth muscle
smooth over
smooth plane
smooth-shaven
smooth-spoken
smooth-tongued
smoothbore
smoothen
smoothie
smoothing iron
smorgasbord

smote
smother
smothered mate
smoulder
smriti
smudge
smug
smuggle
smut
smutch
smutchy
smutty
snack
snack bar
snaffle
snafu
snag
snaggletooth
snaggy
snail
snail's pace
snail-paced
snailfish
snake
snake charmer
snake dance
snakebird
snakebite
snakemouth
snakeroot
snaky
snap
snap bean
snap ring
snap roll
snap up
snapback
snapdragon
snapper
snapping turtle
snappish
snappy
snapshot
snare
snare drum
snarl
snatch
snatch block

snatchy
snath
snazzy
sneak
sneak preview
sneak thief
sneakbox
sneaker
sneakers
sneaking
sneaky
sneck
sneer
sneeze
sneeze at
snick
snicker
snide
sniff
sniff at
sniff out
sniffle
sniffy
snifter
snigger
sniggle
snip
snipe
sniper
sniperscope
snippet
snippy
snips
snitch
snivel
snob
snobbery
snobbish
snood
snook
snooker
snoop
snooperscope
snoopy
snooty
snooze
snore
snorkel

snort
snorter
snot
snotty
snout
snout
 beetle
snow
snow blindness
snow bunting
snow fence
snow goose
snow ice
snow job
snow leopard
snow line
snow plant
snow-blind
snow-clad
snow-in-summer
snow-on-the-mountain
snow-white
snowball
snowberry
snowbird
snowblink
snowbound
snowcap
snowdrift
snowdrop
snowfall
snowfield
snowflake
snowman
snowmobile
snowplow
snowshed
snowshoe
snowslide
snowstorm
snowy
snowy egret
snowy owl
snub
snub-nosed
snuck
snuff
snuffbox

snuffer
snuffle
snuffy
snug
snuggery
snuggle
so
so long
so-and-so
so-called
so-so
soak
soakage
soap
soap bubble
soap powder
soapbark
soapberry
soapbox
soapstone
soapsuds
soapwort
soapy
soar
soaring
soave
sob
sob sister
sob story
sober
sober-minded
sobersided
sobriety
sobriquet
socage
soccer
sociability
sociable
social
social anthropology
social class
social climber
social
 contract
social democracy
social disease
social insurance
social organization

social psychology
social science
social security
social service
social welfare
social work
social worker
social-minded
socialism
socialist
socialistic
socialite
sociality
socialization
socialize
socialized medicine
societal
society
society verse
socio-
socioeconomic
sociol.
sociolinguistics
sociology
sociometry
sociopath
sock
socket
socket wrench
socle
socman
sod
soda
soda ash
soda biscuit
soda cracker
soda fountain
soda pop
soda water
sodalite
sodality
sodamide
sodden
sodium
sodium bicarbonate
sodium bromide
sodium carbonate
sodium chloride

sodium cyanide
sodium cyclamate
sodium dichromate
sodium fluoride
sodium fluoroacetate
sodium glutamate
sodium hydroxide
sodium lamp
sodium nitrate
sodium perborate
sodium peroxide
sodium phosphate
sodium propionate
sodium silicate
sodium sulfate
sodium thiosulfate
sodium-vapor lamp
sodomite
sodomy
soever
sofa
sofa bed
sofar
soffit
soft
soft chancre
soft clam
soft
 coal
soft drink
soft focus
soft goods
soft landing
soft palate
soft paste
soft pedal
soft rot
soft sell
soft shoulder
soft soap
soft spot
soft touch
soft wheat
soft-boiled
soft-cover
soft-finned
soft-pedal
soft-shell clam

soft-shell crab
soft-shelled turtle
soft-shoe
soft-spoken
softa
softball
soften
soften up
softener
softhearted
software
softwood
softy
soggy
soi-disant
soil
soil bank
soil conservation
soil pipe
soilage
soilure
soiree
sojourn
soke
sol
sol-fa
sol.
sola
solace
solan
solanaceous
solander
solano
solanum
solar
solar apex
solar battery
solar constant
solar day
solar eclipse
solar flare
solar month
solar plexus
solar system
solar wind
solar year
solarism
solarium

solarize
solatium
sold
solder
soldering iron
soldier
soldier of fortune
soldierly
soldiery
soldo
sole
solecism
solely
solemn
solemnity
solemnize
solenoid
solfatara
solfeggio
solferino
solicit
solicitor
solicitor general
solicitous
solicitude
solid
solid angle
solid fuel
solid geometry
solid-state
solid-state
physics
solidago
solidarity
solidary
solidify
solidus
solifidian
solifluction
soliloquize
soliloquy
solipsism
solitaire
solitary
solitary confinement
solitude
solleret
solmization

solo
solo whist
soloist
solstice
solubility
solubilize
soluble
soluble glass
solus
solute
solution
solvable
solve
solvency
solvent
solvolysis
soma
somatic
somatic cell
somatist
somato-
somatology
somatoplasm
somatotype
somber
sombrero
sombrous
some
somebody
someday
somehow
someone
someplace
somersault
somerset
something
sometime
sometimes
someway
somewhat
somewhere
somewise
somite
sommelier
somnambulate
somnambulation
somnambulism
somnifacient

somniferous
somniloquy
somnolent
son
son of a bitch
son-in-law
sonant
sonar
sonata
sonata form
sonatina
sonde
sone
song
song and dance
song cycle
song form
song sparrow
song thrush
songbird
songful
songster
songstress
songwriter
sonic
sonic barrier
sonic boom
sonic depth finder
sonic mine
sonics
soniferous
sonnet
sonnet sequence
sonneteer
sonny
sonobuoy
sonometer
sonorant
sonority
sonorous
soon
sooner
soot
sooth
soothe
soothfast
soothsay
soothsayer

sooty
sop
sophism
sophist
sophister
sophistic
sophisticate
sophisticated
sophistication
sophistry
sophomore
sophrosyne
sopor
soporific
sopping
soppy
soprano
soprano
clef
sora
sorb
sorbitol
sorbose
sorcerer
sorcery
sordid
sordino
sore
sore throat
soredium
sorehead
sorely
sorghum
sorgo
sori
soricine
sorites
sorn
sororate
sororicide
sorority
sorosis
sorption
sorrel
sorrel tree
sorrow
sorry
sort

sort out
sortie
sortilege
sortition
sorus
sostenuto
sostenuto pedal
sot
soteriology
sotted
sottish
sotto voce
sou
sou'wester
souari nut
soubise
soubrette
soubriquet
souffle
sough
sought
sought-after
soul
soul mate
soul-searching
soulful
soulless
sound
sound barrier
sound effect
sound film
sound hole
sound man
sound out
sound ranging
sound shift
sound truck
sound wave
soundboard
sounder
sounding
sounding board
sounding lead
sounding line
sounding machine
soundless
soundproof
soup

soup kitchen
soup plate
soup-and-fish
soupspoon
soupy
sour
sour
 cherry
sour cream
sour gourd
sour grapes
sour gum
sour mash
source
source book
sourdine
sourdough
sourpuss
soursop
sourwood
sousaphone
souse
soutache
soutane
souter
souterrain
south
south by east
south by west
south-southeast
south-southwest
southbound
southeast
southeast by east
southeast by south
southeaster
southeasterly
southeastward
southeastwardly
southeastwards
souther
southerly
southern
southern lights
southernly
southernmost
southing
southland

southpaw
southward
southwards
southwest
southwest by south
southwest by west
southwester
southwesterly
southwestward
southwestwardly
southwestwards
souvenir
sovereign
sovereignty
soviet
sovran
sow
sow bug
sow thistle
sowens
sox
soy
soy sauce
soya bean
soybean
soybean oil
sp.
sp. ht.
spa
space
space capsule
space flight
space heater
space lattice
space medicine
space probe
space station
space suit
space writer
space-time
spaceband
spacecraft
spaced out
spaceless
spaceman
spaceport
spaceship
spacesuit

spacial
spacing
spacious
spade
spadefish
spadework
spadiceous
spadix
spae
spaetzle
spaghetti
spagyric
spahi
spake
spall
spallation
span
span
 loading
span-new
spancel
spandex
spandrel
spang
spangle
spaniel
spank
spanker
spanking
spanner
spar
spar buoy
spar deck
spare
sparerib
sparge
sparid
sparing
spark
spark chamber
spark coil
spark gap
spark plug
spark transmitter
sparker
sparking plug
sparkle
sparkler

sparkling wine
sparks
sparling
sparoid
sparrow
sparrow hawk
sparrowgrass
sparry
sparse
sparteine
spasm
spasmodic
spastic
spat
spate
spathe
spathic
spathose
spatial
spatiotemporal
spatter
spatterdash
spatula
spavin
spavined
spawn
spay
speak
speak for
speak out
speak to
speak up
speakeasy
speaker
speaking
speaking trumpet
speaking tube
spear
spear grass
spear gun
spear side
spearhead
spearman
spearmint
spearwort
spec
spec.
special

special case
special committee
special court-martial
special delivery
special handling
special jury
special partner
special pleading
special privilege
special theory of relativity
specialism
specialist
specialistic
speciality
specialize
specialty
speciation
specie
species
specific
specific
gravity
specific impulse
specific resistance
specific volume
specification
specify
specimen
speciosity
specious
speck
speckle
speckled trout
specs
spectacle
spectacled
spectacles
spectacular
spectator
spectatress
specter
spectra
spectral
spectre
spectrochemistry
spectrogram
spectrograph
spectroheliograph

spectrohelioscope
spectrometer
spectrophotometer
spectroradiometer
spectroscope
spectroscopy
spectrum
spectrum analysis
specular
speculate
speculation
speculative
speculator
speculum
speculum metal
sped
speech
speech community
speech island
speech organ
speechless
speechmaker
speechmaking
speed
speed demon
speed limit
speed up
speedball
speedboat
speedometer
speedway
speedwell
speedy
speiss
spelaean
speleology
spell
spell out
spellbind
spellbinder
spellbound
spelldown
speller
spelling
spelling bee
spelling book
spelling pronunciation
spelling reform

spelt
spelter
spelunker
spence
spencer
spend
spendable
spender
spending
 money
spendthrift
spent
speos
sperm
sperm oil
sperm whale
spermaceti
spermary
spermatic
spermatic cord
spermatic fluid
spermatid
spermatium
spermato-
spermatocyte
spermatogonium
spermatophore
spermatophyte
spermatozoid
spermatozoon
spermic
spermicide
spermine
spermiogenesis
spermogonium
spermophile
spermophyte
spermous
sperrylite
spessartite
spew
sphacelus
sphagnum
sphalerite
sphene
sphenic
spheno-
sphenogram

sphenoid
sphere
sphere of influence
spherical
spherical aberration
spherical angle
spherical coordinates
spherical geometry
spherical polygon
spherical trigonometry
sphericity
spherics
spheroid
spheroidal
spheroidicity
spherule
spherulite
sphery
sphincter
sphingosine
sphinx
sphinx moth
sphygmic
sphygmo-
sphygmograph
sphygmoid
sphygmomanometer
spic
spica
spicate
spiccato
spice
spiceberry
spicebush
spick-and-span
spiculate
spicule
spiculum
spicy
spider
spider crab
spider monkey
spider phaeton
spiderwort
spidery
spiegeleisen
spiel
spieler

spier
spiffing
spiffy
spigot
spike
spike
 heel
spike lavender
spikelet
spikenard
spiky
spile
spill
spill over
spillage
spillway
spilt
spin
spin out
spin-dry
spin-off
spinach
spinal
spinal canal
spinal column
spinal cord
spindle
spindle tree
spindlelegs
spindling
spindly
spindrift
spine
spinel
spinel ruby
spineless
spinescent
spinet
spiniferous
spinifex
spinnaker
spinner
spinneret
spinney
spinning
spinning jenny
spinning wheel
spinode

spinose
spinous
spinster
spinthariscope
spinule
spiny
spiny anteater
spiny lobster
spiracle
spiraea
spiral
spiral galaxy
spiral staircase
spirant
spire
spirelet
spireme
spirillum
spirit
spirit level
spirit rapping
spirit writing
spirited
spiritism
spiritless
spiritoso
spirits of turpentine
spirits of wine
spiritual
spiritualism
spiritualist
spirituality
spiritualize
spiritualty
spirituel
spirituous
spiritus asper
spirketing
spiro-
spirochaetosis
spirochete
spirograph
spirogyra
spiroid
spirometer
spirt
spirula
spiry

spit
spit and polish
spit curl
spital
spitball
spite
spiteful
spitfire
spitter
spittle
spittle
 insect
spittoon
spitz
spiv
splanchnic
splanchnology
splash
splashboard
splashdown
splasher
splashy
splat
splatter
splay
splayfoot
spleen
spleenful
spleenwort
spleeny
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splendid
splendiferous
splendor
splenectomy
splenetic
splenic
splenitis
splenius
splenomegaly
splice
spline
splint
splinter
splinter group
split
split decision
split personality

split second
split shift
split ticket
split up
split-level
splitting
splore
splotch
splurge
splutter
spodumene
spoil
spoilage
spoiler
spoilfive
spoils
spoils system
spoilsman
spoilsport
spoilt
spoke
spoken
spokeshave
spokesman
spokeswoman
spoliate
spoliation
spondaic
spondee
spondylitis
sponge
sponge bag
sponge bath
sponge cake
sponge cloth
sponger
spongin
sponging house
spongioblast
spongy
sponson
sponsor
spontaneity
spontaneous
spontaneous combustion
spontaneous generation
spontoon
spoof

spoofery
spook
spooky
spool
spoon
spoon-feed
spoonbill
spoondrift
spoonerism
spoonful
spoony
spoor
sporadic
sporangium
spore
sporocarp
sporocyst
sporocyte
sporogenesis
sporogonium
sporogony
sporophore
sporophyll
sporophyte
sporozoite
sporran
sport
sport
shirt
sporting
sporting chance
sporting house
sportive
sports
sports car
sports jacket
sportscast
sportsman
sportsmanship
sportswear
sportswoman
sporty
sporulate
sporule
spot
spot announcement
spot check
spot-weld

spotless
spotlight
spotted
spotted crake
spotted fever
spotter
spotty
spousal
spouse
spout
spp.
spraddle
sprag
sprain
sprang
sprat
sprawl
spray
spray gun
spread
spread eagle
spread-eagle
spreader
spree
sprig
sprightly
spring
spring balance
spring chicken
spring fever
spring line
spring tide
spring-clean
springboard
springbok
springe
springer
springer spaniel
springhalt
springhead
springhouse
springing
springlet
springtail
springtime
springwood
springy
sprinkle

sprinkler
sprinkler system
sprinkling
sprinkling can
sprint
sprit
sprite
spritsail
sprocket
sprout
spruce
spruce beer
spruce up
sprue
spruik
sprung
sprung rhythm
spry
spud
spue
spume
spumescent
spun
spun
 glass
spun rayon
spun yarn
spunk
spunky
spur
spur gear
spur wheel
spurge
spurious
spurn
spurrier
spurry
spurt
spurtle
sputnik
sputter
sputum
spy
spy out
spyglass
sq.
sqq.
squab

squabble
squad
squad car
squadron
squalene
squalid
squall
squall line
squally
squalor
squama
squamation
squamosal
squamous
squamulose
squander
square
square away
square bracket
square dance
square deal
square foot
square inch
square kilometer
square knot
square leg
square matrix
square measure
square meter
square mile
square number
square off
square piano
square root
square sail
square shooter
square-rigged
square-rigger
squarely
squarrose
squash
squash bug
squash racquets
squashy
squat
squatness
squatter
squatter sovereignty

squaw
squawk
squeak
squeaky
squeal
squeamish
squeegee
squeeze
squelch
squeteague
squib
squid
squiffy
squiggle
squilgee
squill
squinch
squint
squint-eyed
squinty
squire
squirearchy
squireen
squirm
squirmy
squirrel
squirrel cage
squirrel-tail grass
squirt
squirt
 gun
squirting cucumber
squish
squishy
sri
sruti
ss.
st.
stab
stabile
stability
stabilize
stabilizer
stable
stable fly
stableboy
stableman
stablish

stacc.
staccato
stack
stacked
stacte
stadholder
stadia
stadiometer
stadium
stadtholder
staff
staff college
staff of life
staff officer
staff sergeant
staffer
staffman
stag
stag beetle
stage
stage business
stage direction
stage director
stage door
stage fright
stage left
stage manager
stage right
stage screw
stage whisper
stage-manage
stage-struck
stagecoach
stagecraft
stagehand
stagey
staggard
stagger
staggers
staghound
staging
staging area
stagnant
stagnate
stagy
staid
stain
stained glass

stainless
stainless steel
stair
stair rod
staircase
stairhead
stairs
stairway
stairwell
stake
stake race
stakeout
stalactite
stalag
stalagmite
stale
stalemate
stalk
stalking-horse
stalky
stall
stall-feed
stalling angle
stallion
stalwart
stamen
stamin
stamina
staminody
stammel
stammer
stamp
stamp mill
stamp out
stampede
stamping ground
stance
stanch
stanchion
stand
stand
by
stand down
stand for
stand oil
stand on
stand out
stand over

stand pat
stand up
stand-in
stand-up
standard
standard cost
standard deviation
standard gauge
standard of living
standard time
standard-bearer
standardize
standby
standee
standfast
standing
standing army
standing broad jump
standing committee
standing lug
standing order
standing rigging
standing wave
standoff
standoffish
standpipe
standpoint
standstill
stane
stang
stanhope
stank
stannary
stannic
stannite
stannum
stanza
stapes
staphylo-
staphylococcus
staphyloplasty
staphylorrhaphy
staple
stapler
star
star anise
star cloud
star drill

star grass
star sapphire
star shell
star-crossed
star-nosed mole
star-of-Bethlehem
star-shaped
star-spangled
star-studded
starboard
starch
starchy
stardom
stare
starfish
starflower
stark
stark-naked
starlet
starlight
starlike
starling
starred
starry
starry-eyed
start
start in
start off
start out
start up
starter
starting block
starting gate
startle
startling
starvation
starve
starveling
starwort
stash
stasis
stat.
statampere
statant
state
state
 bank
state capitalism

state medicine
state of war
state prison
state socialism
state trooper
state's evidence
statecraft
stated
statehood
stateless
stately
statement
stater
stateroom
states' rights
statesman
statesmanship
statfarad
static
static electricity
static tube
statics
station
station agent
station break
station house
station wagon
stationary
stationary engine
stationary wave
stationer
stationery
stationmaster
statism
statist
statistical
statistical mechanics
statistician
statistics
stative
statocyst
statolatry
statolith
stator
statuary
statue
statued
statuesque

statuette
stature
status
status quo
status symbol
statutable
statute
statute book
statute law
statute mile
statute of limitations
statutory
statutory rape
statvolt
staunch
staurolite
stave
stave off
staves
stay
stay-at-home
staying power
stays
staysail
std.
stead
steadfast
steading
steady
steady state
steak
steakhouse
steal
stealage
stealer
stealing
stealth
stealthy
steam
steam
bath
steam engine
steam fitter
steam heat
steam heater
steam organ
steam point
steam room

steam shovel
steam turbine
steam up
steam whistle
steam-heated
steamboat
steamer
steamer chair
steamer rug
steamroller
steamship
steamtight
steamy
steapsin
stearic
stearic acid
stearin
stearoptene
steatite
steato-
steatopygia
stedfast
steed
steel
steel band
steel blue
steel engraving
steel guitar
steel mill
steel wool
steelhead
steelmaker
steels
steelwork
steelworker
steelworks
steelyard
steenbok
steep
steepen
steeple
steeplebush
steeplechase
steeplejack
steer
steerage
steerageway
steering committee

steering gear
steering wheel
steersman
steeve
stegodon
stegosaur
stein
steinbok
stela
stele
stellar
stellarator
stellate
stelliform
stellular
stem
stem turn
stemma
stemson
stemware
stench
stench bomb
stencil
steno-
stenograph
stenographer
stenography
stenopetalous
stenophagous
stenophyllous
stenosis
stenotype
stenotypy
stentor
stentorian
step
step down
step in
step
 rocket
step up
step-
step-up
stepbrother
stepchild
stepdame
stepdaughter
stepfather

stephanotis
stepladder
stepmother
stepparent
steppe
stepper
stepsister
stepson
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stercoricolous
sterculiaceous
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stereometry
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steric
sterigma
sterilant
sterile
sterilization
sterilize
sterling
sterling silver
stern
stern sheets

stern-wheeler
sternforemost
sternmost
sternpost
sternson
sternum
sternutation
sternutatory
sternway
steroid
sterol
stertor
stertorous
stet
stethoscope
stevedore
stevedore's knot
stew
steward
stewardess
stewed
stewpan
stg.
stge.
sthenic
stibine
stibnite
stich
stichometry
stichomythia
stick
stick at
stick insect
stick out
stick to
stick together
stick-in-the-mud
sticker
sticking
 plaster
stickle
stickleback
stickler
stickpin
stickseed
sticktight
stickup
stickweed

sticky
sticky wicket
stickybeak
stiff
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stiffen
stifle
stifling
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stigmatism
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stilbestrol
stilbite
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stiletto
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still hunt
still life
still water
still-hunt
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stillbirth
stillborn
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stillness
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stilted
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stimulate
stimulative
stimulus
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stinging nettle
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stink bomb
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stinkhorn
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stinking smut

stinko
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stipend
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stipulate
stipulation
stipule
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stir up
stirk
stirpiculture
stirps
stirring
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stirrup pump
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stithy
stiver
stoa
stoat
stob
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stock car
stock certificate
stock clerk
stock company
stock dividend
stock dove
stock exchange
stock farm
stock horse
stock in trade
stock market
stock option
stock
raising
stock saddle

stock-still
stockade
stockbreeder
stockbroker
stockholder
stockinet
stocking
stocking cap
stockish
stockist
stockjobber
stockman
stockpile
stockroom
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stocktaking
stocky
stockyard
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stoicism
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stole
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stolon
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stomachache
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stomatal
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stomato-
stomatology
stomodaeum

stone
stone curlew
stone fruit
stone parsley
stone proof
stone's throw
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stone-dead
stone-deaf
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stonecrop
stonecutter
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stonefish
stonefly
stonemason
stonewall
stoneware
stonework
stonewort
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stony coral
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stony-hearted
stood
stooge
stook
stool
stool pigeon
stoop
stop
stop bath
stop order
stop payment
stop work
stop-off
stopcock
stope
stopgap
stoplight
stopover
stoppage
stopped
stopped diapason
stopper
stopping
stopple

stopwatch
storage
storage battery
storax
store
store-bought
storehouse
storekeeper
storeroom
stores
storey
storied
storiette
stork
storm
storm
center
storm cloud
storm cone
storm door
storm petrel
storm troops
storm warning
storm window
stormproof
stormy
stormy petrel
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story line
storybook
storyteller
storytelling
stoss
stotinka
stound
stoup
stour
stoush
stout
stouthearted
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stovepipe
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stover
stow
stowage
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str.

strabismus
straddle
strafe
straggle
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straight and narrow
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straight chain
straight chair
straight face
straight joint
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straight-out
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straighten
straighten out
straighten up
straightforward
straightjacket
straightway
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strain hardening
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strainer
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straitjacket
straitlaced
strake
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strand
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strangeness
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strangulation
strangury
strap
straphanger

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strapper
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straticulate
stratification
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stratosphere
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strawflower
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stream of consciousness
streamer
streaming
streamlet

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streetlight
streetwalker
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strengthen
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stretchy
stretto
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strew
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strickle
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striction
strictly
stricture
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stridor
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stridulous
strife
strigil

strigose
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strike
off
strike out
strike pay
strike up
strike zone
strikebound
strikebreaker
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string band
string bass
string bean
string line
string orchestra
string quartet
string tie
stringboard
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stringed instrument
stringency
stringendo
stringent
stringer
stringhalt
stringpiece
stringy
strip
strip cropping
strip lighting
strip mining
strip poker
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stripper
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stripteaser
stripy
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stroganoff
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stroke play
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stroller
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strong breeze
strong drink
strong gale
strong interaction
strong man
strong point
strong waters
strong-arm
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strong-willed
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stronghold
strongroom
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strontianite
strontium
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strophanthus
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strove
strow
stroy
struck
struck measure
structural
structural formula
structural geology
structural linguistics
structural
psychology
structural steel
structuralism

structure
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struggle
struggle for existence
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struma
strumpet
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strung out
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strychnine
strychninism
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stub tenon
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stubborn
stubby
stucco
stuccowork
stuck
stuck-up
stud
stud poker
studbook
studding
studdingsail
student
student teacher
studhorse
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studio
studio couch
studious
study
stuff
stuff gown
stuffed
stuffed shirt
stuffing
stuffing box
stuffy
stull
stultify

stumble
stumbling block
stumer
stump
stumpage
stumper
stumpy
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stung
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stunner
stunning
stunsail
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stupefaction
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stupor
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sturgeon
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styrene
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suasion
suave
suavity
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sub rosa
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subaxillary
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subclavius
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subcontinent
subcontract
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subdebutante

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subjectivism
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subjoinder
subjugate
subjunction
subjunctive
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sublet
sublieutenant
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sublimity
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submariner
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subrogate
subrogation

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substitute
substitution
substitutive
substrate
substratosphere
substratum

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subversion
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succentor
success

successful
succession
successive
successor
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suede
suet

suet pudding
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sufferance
suffering
suffice
sufficiency
sufficient
suffix
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suffocate
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suffrage
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suffragist
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suffumigate
suffuse
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sugar cane
sugar daddy
sugar loaf
sugar maple
sugar pine
sugar spoon
sugar-coat
sugared
sugarplum
sugary
suggest
suggestibility
suggestible
suggestion
suggestive
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sui juris
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suicide
suint
suit
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suitcase
suite

suited
suiting
suitor
sukiyaki
sukkah
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sulcus
sulf-
sulfa
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sulfamerazine
sulfanilamide
sulfapyrazine
sulfapyridine
sulfate
sulfate paper
sulfate pulp
sulfathiazole
sulfatize
sulfide
sulfite
sulfonate
sulfonation
sulfonmethane
sulfur
sulfur dioxide
sulfuric
sulfuric acid
sulfurous
sulk
sulky
sullage
sullen
sully
sulph-
sulphanilamide
sulphate
sulphathiazole
sulphide
sulphonamide
sulphonate
sulphone
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sulphurous

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sultana
sultanate
sultry
sum
sum and substance
sum total
sum up
sumac
sumach
summa
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 cum laude
summand
summarize
summary
summary court-martial
summation
summer
summer school
summer solstice
summer squash
summerhouse
summerly
summersault
summertime
summertree
summerwood
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summitry
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summons
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sumo
sump
sumpter
sumption
sumptuary
sumptuary law
sumptuous
sun
sun bath
sun dance
sun deck
sun lamp
sun-dried
sun-god

sunbaked
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sunbeam
sunbonnet
sunbow
sunbreak
sunburn
sunburst
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sundew
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sunflower
sung
sunglass
sunglasses
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sunk fence
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sunken garden
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sunlit
sunn
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sunny-side up
sunproof
sunrise
sunrise watch
sunroom
sunset
sunshade
sunshine
sunspot
sunstone
sunstroke
suntan
sunup
sunward

sunwise
suo loco
sup
super
super-
superable
superabound
superabundant
superadd
superaltar
superannuate
superannuated
superannuation
superb
superbomb
supercargo
supercharge
supercharger
supercilious
superclass
supercolumnar
superconductivity
supercool
superdominant
superdreadnought
superego
superelevation
supereminent
supererogate
supererogation
supererogatory
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superfecundation
superfetation
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superfluity
superfluous
superfuse
supergalaxy
superheat
superheterodyne
superhigh
frequency
superhighway
superhuman

superimpose
superimposed
superincumbent
superinduce
superintend
superintendency
superintendent
superior
superior court
superior planet
superiority
superiority complex
superjacent
superl.
superlative
superload
superman
supermarket
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supernal
supernatant
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supernova
supernumerary
superorder
superordinate
superorganic
superpatriot
superphosphate
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superpose
superposition
superpower
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supersaturated
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supersedure
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supersensual
supersession
supersonic
supersonics

superstar
superstition
superstitious
superstratum
superstructure
superstructure
deck
supertanker
supertax
supertonic
supervene
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supervision
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supper club
supplant
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supposition

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supranatural
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suprarenal
suprarenal gland
suprasegmental
supremacist
supremacy
supreme
supreme commander
sur-
surah
sural
surbase
surbased
surcease
surcharge
surcingle
surculose
surd
sure
sure thing
sure-footed
surefire
surely
surety
surf
surface
surface mail
surface noise
surface plate
surface structure

surface
 tension
surface-to-air
surface-to-surface
surfactant
surfbird
surfboard
surfboarding
surfboat
surfeit
surfing
surfperch
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surgeon
surgeon general
surgeon's knot
surgeonfish
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surgical needle
surgy
suricate
surly
surmise
surmount
surmullet
surname
surpass
surpassing
surplice
surplus
surplusage
surprint
surprisal
surprise
surprise party
surprising
surra
surrealism
surrebuttal
surrebutter
surrejoinder
surrender
surreptitious
surrey
surrogate
surround

surrounding
surroundings
sursum corda
surtax
surtout
surv.
surveillance
survey
surveying
surveyor
surveyor's chain
surveyor's compass
surveyor's level
surveyor's measure
survival
survive
survivor
susceptibility
susceptible
susceptive
sushi
suslik
suspect
suspend
suspended animation
suspender
suspender belt
suspense
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suspension
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suspensor
suspensory
suspicion
suspicious
suspiration
suspire
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sustentation
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susurrate
susurration

susurrous
susurrus
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sutra
suttee
suture
suzerain
suzerainty
svelte
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swabber
swacked
swaddle
swaddling
 clothes
swag
swage
swage block
swagger
swagger stick
swaggering
swagman
swagsman
swain
swale
swallow
swallow dive
swallow-tailed
swallow-tailed coat
swallowtail
swam
swami
swamp
swamp buggy
swamp cypress
swamp fever
swamper
swampland
swampy
swan
swan dive
swan maiden
swan song
swan's-down
swanherd
swank
swanky
swansdown

swanskin
swap
swaraj
sward
swarm
swarm spore
swart
swarth
swarthy
swash
swash letter
swashbuckler
swashbuckling
swastika
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sway
sway-back
swear
swear in
swear off
swearword
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sweat gland
sweat out
sweat pants
sweat shirt
sweat suit
sweatband
sweatbox
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sweater girl
sweatshop
sweaty
swede
sweeny
sweep
sweepback
sweeper
sweeping
sweepings
sweeps
sweepstake

sweepstakes
sweet
sweet alyssum
sweet cherry
sweet cicely
sweet cider
sweet corn
sweet gale
sweet gum
sweet
 marjoram
sweet oil
sweet pea
sweet potato
sweet shop
sweet tooth
sweet william
sweet woodruff
sweet-and-sour
sweet-scented
sweet-talk
sweet-tempered
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sweetbrier
sweeten
sweetener
sweetening
sweetheart
sweetie
sweeting
sweetmeat
sweetness and light
sweetsop
swell
swelled head
swellfish
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swelter
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sweptback
sweptwing
swerve
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swift
swifter
swiftlet

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swimming hole
swimming pool
swimmingly
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swindle sheet
swine
swineherd
swing
swing bridge
swing door
swing shift
swinge
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swinger
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swingletree
swinish
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swipe
swipple
swirl
swirly
swish
switch
switch off
switch on
switchback
switchblade
switchboard
switcheroo
switchman
swivel
swivel chair
swivel plow
swivet
swizzle
swizzle stick
swob
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swoon
swoop
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sword
sword bayonet
sword belt
sword cane
sword dance
sword grass
sword knot
sword lily
swordbill
swordcraft
swordfish
swordplay
swordsman
swordtail
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sycamore
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sycophant
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syllabub
syllabus
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sylvan
sylvanite
sylviculture

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sympathetic magic
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sympathize
sympathizer
sympathy
sympathy strike
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symphonize
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symphysis
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symposiarch
symposium
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synaesthesia
synagogue
synapse
synapsis
sync

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synchroflash
synchromesh
synchronic
synchronism
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synchronous
synchronous converter
synchronous motor
synchroscope
synchrotron
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syncopated
syncopation
syncope
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syndactyl
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syndrome
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synecology
synectics
syneresis
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synergism
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synovitis
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syntactics
syntax
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synthesize
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synthetic detergent
synthetic rubber
syntonic
sypher
syphilis
syphilology
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syringa
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syringomyelia
syrinx
syrup
syrupy
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system
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systematics
systematism
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systems analysis
systems design
systole
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table d'hote
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table talk
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table wine
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tableland
tablespoon
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tableware
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tail plane
tail rotor
tail skid
tail wheel
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tailband
tailgate
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taille
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tailpiece
tailpipe
tailrace
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tailspin
tailstock
tailwind
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taintless
taipan
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take aback
take after
take apart
take back
take down
take for
take in
take off
take on
take out
take over
take to
take up
take-home pay
taken
takeoff
takeover
taker

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talapoin
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talion
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talisman
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talk into
talkathon
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talkfest
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tallowy
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tally sheet
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taluk
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tank up
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tant pis
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 dance
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tape measure
tape recorder
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tape-record
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taphole
taphouse
tapioca

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taproom
taproot
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tapster
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tarantella
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task force
taskmaster
taskwork
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taverner
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tax return
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tax-exempt
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taxation
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taxidermy
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taxonomy
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tea gown
tea party
tea rose
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tea towel
tea tree
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teach-in

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teaching aid
teaching elder
teaching fellow
teacup
teahouse
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team spirit
teammate
teamster
teamwork
teapot
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tear gas
tear into
tear off
tear-jerker
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tearoom
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teatime
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technical knockout
technical sergeant
technicality
technician
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technocracy
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teddy bear
tedious
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telefilm
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telegenic
telegony
telegram

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telegraphone
telegraphy
telekinesis
telemark
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telemetry
telemotor
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telephone booth
telephone directory
telephone pole
telephone receiver
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telephonist
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telephotography
teleplay
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telestich
telethermometer
telethon
teletypewriter
teleutospore
teleview
televise
television
televisor
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temerity
temp.
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temperature gradient
temperature-humidity index
tempered
tempest
tempestuous
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template
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temporal
temporal bone
temporal lobe

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temporize
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tempus fugit
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ten-gallon hat
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tenfold
tenia
teniacide
teniafuge
tenne
tennis
tennis ball
tennis elbow

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tenor clef
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tenpenny
tenpin
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tergum
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term insurance
term paper
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terminal velocity
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termination
terminator
terminology
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terminus a quo
terminus ad quem
termitarium
termite
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ternary form

ternate
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terra cotta
terra firma
terra incognita
terra sigillata
terra-cotta
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terraqueous
terrarium
terrazzo
terre-verte
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terrestrial globe
terrestrial telescope
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terrier
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terrorize
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theodolite
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theosophy
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therapeutics
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therapsid
therapy

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thermal conductivity
thermal efficiency
thermal spring
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thermionic emission
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thermonuclear reaction
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thermostatics
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thiazole

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thimbleweed
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think
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think over
think up
thinkable
thinker
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thionic
thiosinamine
thiouracil
thiourea

third
third class
third degree
third dimension
third estate
third eyelid
third man
third mate
third party
third person
third rail
third reading
third-degree
third-degree burn
third-rate
thirlage
thirst
thirsty
thirteen
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thirtieth
thirty
thirty-eight
thirty-one
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thirty-second rest
thirty-three
thirty-two
thirty-twomo
this
thistle
thistledown
thistly
thither
thitherto
tho
thole
tholos
thong
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duct
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thoracotomy
thorax
thoria
thorianite

thorite
thorium
thorium series
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thoron
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thorough bass
thoroughbred
thoroughfare
thoroughgoing
thoroughpaced
thoroughwort
thorp
those
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though
thought
thought transference
thought-out
thoughtful
thoughtless
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thousandth
thrall
thralldom
thrash
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thrasher
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thrawn
thread
thread mark
threadbare
threadfin
thready
threap
threat
threaten
three
three R's
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three-cornered
three-decker

three-dimensional
three-four time
three-gaited
three-legged race
three-master
three-mile limit
three-part time
three-phase
three-piece
three-ply
three-point landing
three-quarter
three-quarter nelson
three-quarter time
three-ring circus
three-square
three-wheeler
threefold
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threnode
threnody
threonine
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thresh out
thresher
threshing machine
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threw
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thrifty
thrill
thriller
thrilling
thrippence
thrips
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throat
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 microphone
throaty
throb
throe

throes
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thrombocyte
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thrombokinase
thrombophlebitis
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thromboplastin
thrombosis
thrombus
throne
throne room
throng
throstle
throttle
through
through street
through-composed
throughout
throughput
throughway
throve
throw
throw about
throw off
throw out
throw over
throw together
throw up
throwaway
throwback
thrower
throwing stick
thrown
thrum
thrush
thrust
thrust bearing
thrust fault
thruster
thruway
thud
thug
thuggee
thuja
thulium
thumb

thumb index
thumbnail
thumbprint
thumbs-down
thumbscrew
thumbstall
thumbtack
thump
thumping
thunder
thunderbolt
thunderclap
thundercloud
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thundershower
thundersquall
thunderstone
thunderstorm
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thurifer
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thwart
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thymelaeaceous
thymic
thymol
thymus
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thyroid gland
thyroiditis
thyrotoxicosis
thyroxine
thyrse
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thyself
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tibia
tibiotarsus
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tical
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tick fever
tick off
tick trefoil
tick-tack-toe
ticker
ticker tape
ticket
ticking
tickle
tickler
tickler coil
ticklish
ticktack
ticktock
tidal
tidal basin
tidal wave
tidbit
tiddly
tiddlywinks
tide
tide gate
tide over
tide table
tideland
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tidings
tidy
tie
tie beam
tie line
tie rod
tie-in
tie-up
tieback
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tiemannite
tier

tierce
tierce de Picardie
tiercel
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tiffin
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tiger cat
tiger lily
tiger moth
tiger shark
tiger snake
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tight-lipped
tighten
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tightrope
tightrope walker
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tightwad
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tigon
tigress
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tilbury
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tiling
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tiltyard
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timber hitch
timber line
timber wolf

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timbrel
time
time and a half
time and motion study
time
 ball
time bill
time bomb
time clock
time constant
time deposit
time discount
time draft
time exposure
time immemorial
time loan
time lock
time money
time of day
time sharing
time sheet
time signal
time signature
time study
time zone
time-consuming
time-honored
time-lag
time-lapse photography
time-out
timecard
timekeeper
timeless
timely
timeous
timepiece
timepleaser
timer
timeserver
timetable
timework
timeworn

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tin can
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tin hat
tin lizzie
tin soldier
tinamou
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tinworks
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titillate
titivate

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to and fro
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to-do
to-name
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toggle joint
toggle switch
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tone control
tone deafness
tone down
tone language
tone poem
tone up

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tonga
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tongue twister
tongue-and-groove joint
tongue-lash
tongue-lashing
tongue-tied
tonguing
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tonic sol-fa
tonic spasm
tonicity
tonight
tonnage
tonne
tonneau
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tonsillotomy
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tonsure
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tooth shell
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tootsy
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 banana
top boot
top dog
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top hat
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top out
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top-hole
top-level
top-notch
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topee
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topsoil
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torch song
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torchier
torchon lace
torchwood
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tormentil
tormentor
torn
tornado
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torose
torpedo

torpedo boat
torpedo tube
torpedo-boat destroyer
torpedoman
torpid
torpor
torque
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torque wrench
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torture
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off
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total recall
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totalizer
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touch football
touch off
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touchwood
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toughie
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touraco
tourbillion
tourer
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tourist
touristy
tourmaline
tournament

tournedos
tourney
tourniquet
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tousle
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tout le monde
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tow truck
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towardly
towards
towboat
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towelling
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towhead
towhee
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towline
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town crier
town hall
town house
town
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townscape
townsfolk
township
townsman
townspeople
townswoman
towpath
towrope
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toxemia
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toxicology
toxicosis
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toxophilite
toxoplasmosis
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trachytic
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track shoe
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trackman
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tractable
tractate
tractile
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traction engine

tractor
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trade book
trade discount
trade name
trade on
trade route
trade school
trade secret
trade union
trade unionist
trade wind
trade-in
trade-last
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tradescantia
tradesfolk
tradesman
tradespeople
tradeswoman
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traditionalism
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traffic court
traffic light
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tragedy
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flaw
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tragus
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trailblazer
trailer

trailer camp
trailer truck
trailing arbutus
trailing edge
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trainband
trainbearer
trained nurse
trainee
trainer
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training school
trainload
trainman
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traitor
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transduction
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transference
transferor
transfiguration
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transformer
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transfusion
transgress
transgression
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transhumance
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transit instrument
transit theodolite

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transmittal
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treasure hunt
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treatise
treatment
treaty
treaty port
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tree creeper
tree farm
tree fern

tree frog
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tree kangaroo
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tree of knowledge of good and evil
tree of life
tree shrew
tree sparrow
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surgery
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tree toad
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trencher
trencherman

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trompe l'oeil
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trooper
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true level
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trumpet

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trumpet vine
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trumpetweed
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truncation
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trunnion
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trust fund
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trustbuster
trustee
trusteeship
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truth-value
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tryout

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tsarevna
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tubby
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tube foot
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tuberculin
tuberculin test
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tubulure
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tucket
tufa

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tufthunter
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tuition
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tumble-down
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tumbler gear
tumbleweed
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tumefaction
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tumulus
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tuner
tunesmith

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tunnel vault
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turbinal
turbinate
turbine
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turbo-propeller engine
turbofan
turbojet
turbojet engine
turboprop
turbosupercharger
turbot
turbulence
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turbulent flow
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turdine
tureen
turf
turfman

turfy
turgent
turgescent
turgid
turgite
turgor
turkey
turkey
 buzzard
turkey trot
turkey vulture
turmeric
turmeric paper
turmoil
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turn against
turn away
turn in
turn indicator
turn on
turn out
turn to
turn up
turn-and-bank indicator
turnabout
turnaround
turnbuckle
turncoat
turned comma
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turner
turnery
turning
turning point
turnip
turnkey
turnout
turnover
turnpike
turnsole
turnspit
turnstile
turnstone
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turpentine
turpeth
turpitude
turquoise

turret
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turret lathe
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turtleneck
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tusker
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twelve-tone
twelve-tone row

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twiddle
twig
twiggy
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twilight
 zone
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twin bed
twin bill
twin-lens reflex
twin-screw
twinberry
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twinge
twink
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twinned
twirl
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upper atmosphere

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vasodilator
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vertical mobility
vertical stabilizer
vertical union
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veterinarian
veterinary
veterinary medicine
vetiver
veto
vex
vexation
vexatious
vexed

vexillum
vi et armis
via
via media
viable
viaduct
vial
viand
viaticum
viator
vibes
vibraculum
vibraharp
vibrant
vibraphone
vibrate
vibratile
vibration
vibrations
vibrato
vibrator
vibratory
vibrio
vibrissa
viburnum
vicar
vicar forane
vicar general
vicarage
vicarial
vicariate
vicarious
vice
vice admiral
vice squad
vice versa
vice-chairman
vice-chancellor
vice-president
vice-regent
vicegerent
vicenary
vicennial
viceregal
vicereine
viceroy
vichy

water
vichyssoise
vicinage
vicinal
vicinity
vicious
vicious circle
vicissitude
victim
victimize
victor
victoria
victorious
victory
victory garden
victual
victualage
victualer
victualler
victuals
vide
videlicet
video
videogenic
vidette
vidicon
vie
view
viewable
viewer
viewfinder
viewing
viewless
viewpoint
viewy
vigesimal
vigil
vigil light
vigilance
vigilance committee
vigilant
vigilante
vigilantism
vignette
vigor
vigorous
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vilify
vilipend
villa
village
villager
villain
villainage
villainous
villainy
villanelle
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villenage
villiform
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villosity
villous
villus
vim
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vimineous
vin ordinaire
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vina
vinaceous
vinaigrette
vinasse
vincible
vinculum
vindicable
vindicate
vindication
vindictive
vine
vinegar
vinegar eel
vinegar fly
vinegarette
vinegarish
vinegarroon
vinegary
vinery
vineyard
vingt-et-un
vinic
viniculture

viniferous
vinificator
vino
vinosity
vinous
vintage
vintage wine
vintager
vintner
vinyl
vinyl acetate
vinylidene
viol
viola
viola
d'amore
viola da braccio
viola da gamba
violable
violaceous
violate
violation
violative
violence
violent
violet
violet ray
violin
violinist
violist
violoncellist
violoncello
violone
viosterol
viper
viper's bugloss
viperine
viperish
viperous
virago
viral
virelay
vireo
virescence
virescent
virga
virgate
virgin

virgin birth
virgin's-bower
virginal
virginity
virginium
virgulate
virgule
viridescent
viridian
viridity
virile
virilism
virility
virology
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virtual
virtually
virtue
virtues
virtuosic
virtuosity
virtuoso
virtuous
virulence
virulent
virus
virus disease
vis major
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viscacha
viscera
visceral
viscid
viscoid
viscometer
viscose
viscosity
viscount
viscountcy
viscountess
viscounty
viscous
viscus
vise
visibility
visible
visible horizon

visible radiation
visible speech
vision
visional
visionary
visit
visitant
visitation
visiting card
visiting fireman
visiting nurse
visiting professor
visitor
visor
vista
visual
visual acuity
visual purple
visualize
visually
vita
vitaceous
vital
vital
force
vital principle
vitalism
vitality
vitalize
vitals
vitamin
vitamin A
vitamin A2
vitamin B
vitamin B complex
vitamin B2
vitamin Bc
vitamin C
vitamin D
vitamin E
vitamin G
vitamin H
vitamin K
vitamin M
vitamin P
vitascope
vitellin
vitelline

vitellus
vitiate
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viticulture
vitiligo
vitrain
vitreous
vitreous silica
vitrescence
vitrescent
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vitrification
vitriform
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vitrine
vitriol
vitriolic
vitriolize
vitta
vittle
vituline
vituperate
vituperation
viva
viva voce
vivace
vivacious
vivacity
vivarium
vive
vivid
vivify
viviparous
vivisect
vivisection
vivisectionist
vixen
viz.
vizard
vizcacha
vizier
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vizor
vo.
voc.
vocable
vocabulary

vocal
vocal cords
vocal folds
vocal score
vocalic
vocalise
vocalism
vocalist
vocalize
vocation
vocational
vocational education
vocative
vociferance
vociferant
vociferate
vociferation
vociferous
vocoid
vodka
vogue
voguish
voice
voice box
voice coil
voice part
voice vote
voiced
voiceful
voiceless
void
voidable
voidance
voile
voir
 dire
voiture
vol-au-vent
volant
volar
volatile
volatile oil
volatile salt
volatilize
volcanic
volcanic glass
volcanism
volcano

volcanology
vole
volitant
volition
volitive
volley
volleyball
volost
volplane
vols.
volt
volt-coulomb
voltage
voltage divider
voltaic
voltaic battery
voltaic electricity
voltaic pile
voltaism
voltameter
voltammeter
volte-face
voltmeter
voluble
volume
volumed
volumeter
volumetric
volumetric analysis
voluminous
voluntarism
voluntary
voluntaryism
volunteer
voluptuary
voluptuous
volute
volution
volva
volvox
volvulus
vomer
vomit
vomitory
vomiturition
von Braun
voodoo
voodooism

voracious
voracity
vortex
vortical
vorticella
votary
vote
voter
voting machine
votive
vouch
voucher
vouchsafe
vouge
voussoir
vow
vowel
vowelize
vox angelica
vox humana
vox populi
voyage
voyageur
voyeur
voyeurism
vraisemblance
vs.
vulcanism
vulcanite
vulcanize
vulcanology
vulg.
vulgar
vulgar fraction
vulgarian
vulgarism
vulgarity
vulgarize
vulgate
vulgus
vulnerable
vulnerary
vulpine
vulture
vulturine
vulva
vulvitis
vv.

vying
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w.
w.b.
w.c.
w.f.
w.l.
w/o
wabble
wack
wacke
wacky
wad
wadding
waddle
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wader
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wading
 bird
wadmal
wafer
waffle
waft
waftage
wafture
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wage earner
wage scale
wage slave
wager
wageworker
waggery
waggish
waggle
waggon
wagon
wagon soldier
wagon train
wagon vault
wagon-lit
wagonage
wagoner
wagonette
wagtail
wahoo
waif

wail
wailful
wain
wainscot
wainscoting
wainwright
waist
waistband
waistcloth
waistcoat
waisted
waistline
wait
wait on
wait up
wait-a-bit
waiter
waiting game
waiting list
waiting room
waitress
waive
waiver
wake
wake-robin
wake-up
wakeful
wakeless
waken
wakerife
waldgrave
wale
walk
walk-in
walk-on
walk-through
walk-up
walkabout
walker
walkie-talkie
walking
walking delegate
walking fern
walking papers
walking stick
walkout
walkover
walkway

wall
wall fern
wall knot
wall pellitory
wall plate
wall rock
wall rocket
wall rue
wallaby
wallah
wallaroo
wallboard
walled plain
wallet
walleye
walleyed
wallflower
wallop
walloper
walloping
wallow
wallpaper
wally
walnut
walrus
waltz
waltz
time
wamble
wame
wampum
wampumpeag
wan
wand
wander
wandering
wanderlust
wanderoo
wane
wangle
wanigan
waning moon
want
want ad
wantage
wanting
wanton
wapentake

wapiti
war
war baby
war bonnet
war bride
war correspondent
war crime
war cry
war dance
war footing
war game
war of nerves
war paint
war vessel
war whoop
war-horse
warble
warble fly
warbler
ward
ward heeler
ward off
warden
warder
wardmote
wardrobe
wardrobe trunk
wardroom
wardship
ware
warehouse
warehouseman
wareroom
wares
warfare
warfarin
warhead
warily
wariness
warison
warlike
warlock
warlord
warm
warm front
warm over
warm-blooded
warm-hearted

warm-up
warmed-over
warmhearted
warming pan
warmonger
warmongering
warmth
warn
warning
warp
warpath
warplane
warrant
warrant officer
warrantable
warrantee
warrantor
warranty
warren
warrener
warrigal
warrior
warship
warsle
wart
wart hog
warthog
wartime
warty
wary
was
wash
wash down
wash drawing
wash up
washable
washbasin
washboard
washbowl
washcloth
washday
washed
up
washed-out
washed-up
washer
washerman
washerwoman

washery
washhouse
washin
washing
washing machine
washing powder
washing soda
washout
washrag
washroom
washstand
washtub
washwoman
washy
wasn't
wasp
wasp waist
waspish
wassail
wast
wastage
waste
waste pipe
wastebasket
wasteful
wasteland
wastepaper
wastepaper basket
wasting
wastrel
wat
watch
watch and ward
watch cap
watch chain
watch fire
watch night
watchband
watchcase
watchdog
watcher
watchful
watchmaker
watchman
watchtower
watchword
water
water back

water beetle
water bird
water blister
water boatman
water boy
water buffalo
water bug
water chestnut
water chinquapin
water clock
water closet
water cooler
water crake
water cure
water dog
water down
water flea
water gap
water gas
water gate
water gauge
water glass
water gum
water gun
water hammer
water hemlock
water hen
water hole
water hyacinth
water ice
water jacket
water jump
water lemon
water level
water lily
water line
water main
water meadow
water
meter
water milfoil
water mill
water moccasin
water nymph
water ouzel
water ox
water parting
water pepper

water pimpernel
water pipe
water plantain
water plug
water pocket
water polo
water power
water purslane
water rail
water rat
water right
water scorpion
water shield
water snake
water softener
water spaniel
water sprite
water strider
water supply
water system
water table
water tower
water vapor
water wave
water wheel
water wings
water witch
water witching
water-cool
water-repellent
water-resistant
water-sick
water-soak
waterage
waterborne
waterbuck
watercolor
watercourse
watercraft
watercress
watered-down
waterfall
waterfowl
waterfront
wateriness
watering
watering can
watering place

watering pot
waterish
waterless
waterline
waterlog
waterlogged
waterman
watermark
watermelon
waterproof
waterscape
watershed
waterside
waterspout
watertight
waterway
waterworks
watery
watt
watt-hour
wattage
wattle
wattle and daub
wattmeter
wave
wave equation
wave front
wave function
wave mechanics
wave
number
wave theory
wave train
wavelength
wavelet
wavellite
wavemeter
waver
wavy
waw
wax
wax bean
wax flower
wax insect
wax myrtle
wax paper
waxbill
waxed paper

waxen
waxing moon
waxplant
waxwing
waxwork
waxy
way
way train
waybill
wayfarer
wayfaring
wayfaring tree
waylay
wayless
ways
ways and means
wayside
wayward
wayworn
wayzgoose
wd.
we
we're
we've
weak
weak sister
weak-kneed
weak-minded
weak-willed
weaken
weaker sex
weakfish
weakling
weakly
weakness
weal
weald
wealth
wealthy
wean
weaner
weanling
weapon
weaponeer
weaponless
weaponry
wear
wear and tear

wear down
wear off
wear out
wearable
weariful
weariless
wearing
wearing apparel
wearisome
wearproof
weary
weasand
weasel
weasel out
weasel words
weather
weather deck
weather eye
weather map
weather report
weather station
weather strip
weather vane
weather-beaten
weather-bound
weather-wise
weatherboard
weatherboarding
weathercock
weathered
weatherglass
weathering
weatherly
weatherman
weatherproof
weathertight
weatherworn
weave
weaver
weaver's
 hitch
weaverbird
web
web press
web spinner
web-footed
webbed
webbing

webby
weber
webfoot
webworm
wed
wedded
wedding
wedding ring
wedge
wedge heel
wedged
wedlock
wee
weed
weed out
weeds
weedy
week
weekday
weekend
weekender
weekly
ween
weeny
weep
weeper
weeping
weeping willow
weepy
weever
weevil
weevily
weft
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weigh
weigh down
weigh-in
weighbridge
weight
weighted
weighting
weightless
weightlessness
weighty
weir
weird
weird sisters
weirdie

weirdo
weka
welch
welcome
weld
welfare
welfare state
welfare work
welfarism
welkin
well
well smack
well sweep
well-advised
well-appointed
well-balanced
well-being
well-beloved
well-bred
well-chosen
well-defined
well-disposed
well-done
well-dressed
well-established
well-favored
well-fed
well-fixed
well-found
well-founded
well-groomed
well-grounded
well-heeled
well-informed
well-intentioned
well-knit
well-known
well-made play
well-mannered
well-meaning
well-nigh
well-off
well-oiled
well-ordered
well-preserved
well-read
well-rounded
well-spoken

well-stacked
well-thought-of
well-timed
well-to-do
well-turned
well-wisher
well-worn
wellborn
wellhead
wellspring
welsh
welt
welter
welterweight
wen
wench
wend
went
wentletrap
wept
were
weren't
werewolf
wergild
wernerite
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wert
west
west
 by north
west by south
west-northwest
west-southwest
westbound
wester
westering
westerly
western
western hemlock
westernism
westernize
westernmost
westing
westward
westwardly
wet
wet blanket
wet cell

wet fly
wet nurse
wet pack
wet suit
wet-nurse
wether
wetting agent
whack
whacking
whacky
whale
whaleback
whaleboat
whalebone
whalebone whale
whaler
whaling
wham
whangee
whap
wharf
wharf rat
wharfage
wharfinger
wharve
what
whate'er
whatever
whatnot
whatsoe'er
whatsoever
wheal
wheat
wheat germ
wheat rust
wheatear
wheaten
wheatworm
wheedle
wheel
wheel and axle
wheel animalcule
wheel bug
wheel horse
wheel lock
wheel of fortune
wheel window
wheelbarrow

wheelbase
wheelchair
wheeled
wheeler
wheelhorse
wheelhouse
wheeling
wheelman
wheels
wheelsman
wheelwork
wheelwright
wheen
wheeze
wheezy
whelk
whelm
whelp
when
whenas
whence
whencesoever
whene'er
whenever
whensoever
where
where'er
whereabouts
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whereat
whereby
wherefore
wherefrom
wherein
whereinto
whereof
whereon
wheresoever
whereto
whereunto
whereupon
wherever
wherewith
wherewithal
wherry
whet
whether
whetstone

whew
whey
whf.
which
whichever
whichsoever
whicker
whidah
whiff
whiffet
whiffle
whiffler
whiffletree
while
while
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whiles
whilom
whilst
whim
whim-wham
whimper
whimsey
whimsical
whimsicality
whimsy
whin
whinchat
whine
whinny
whinstone
whiny
whip
whip graft
whip hand
whip in
whip scorpion
whip up
whipcord
whiplash
whipper-in
whippersnapper
whippet
whipping
whipping boy
whipping cream
whipping post
whippletree

whippoorwill
whipsaw
whipstall
whipstitch
whipstock
whirl
whirlabout
whirligig
whirligig beetle
whirlpool
whirlpool bath
whirlwind
whirly
whirlybird
whish
whisk
whisk broom
whisker
whiskey
whiskey sour
whisky
whisper
whispering
whispering campaign
whispering gallery
whist
whistle
whistler
whistling
whistling
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whit
white
white admiral
white alkali
white ant
white bear
white birch
white blood cell
white book
white bryony
white cedar
white clover
white dwarf
white elephant
white ensign
white feather
white flag

white fox
white frost
white gold
white goods
white gum
white heat
white lead
white lead ore
white leather
white leg
white lie
white matter
white meat
white metal
white mustard
white noise
white oak
white paper
white pepper
white pine
white plague
white poplar
white potato
white rainbow
white rat
white rose
white sale
white sapphire
white sauce
white slave
white slavery
white spruce
white squall
white supremacy
white tie
white turnip
white vitriol
white walnut
white water
white whale
white wine
white-collar
white-eye
white-faced
white-footed mouse
white-headed
white-hot
white-livered

white-tailed deer
whitebait
whitebeam
whitecap
whited sepulcher
whitefish
whitefly
whiten
whiteness
whitening
whitesmith
whitethorn
whitethroat
whitewall
whitewash
whitewing
whitewood
whither
whithersoever
whitherward
whiting
whitish
whitleather
whitlow
whittle
whittling
whity
whiz
whiz-bang
who
who's
whoa
whodunit
whoever
whole
whole
 blood
whole gale
whole hog
whole milk
whole note
whole number
whole rest
whole step
whole wheat
whole-tone scale
whole-wheat
wholehearted

wholesale
wholesome
wholism
wholly
whom
whomever
whomp
whomsoever
whoop
whoopee
whooper
whooper swan
whooping cough
whoops
whoosh
whop
whopper
whopping
whore
whoredom
whorehouse
whoremaster
whoreson
whorish
whorl
whorled
whortleberry
whose
whoso
whosoever
whsle.
why
whydah
wick
wicked
wickedness
wicker
wickerwork
wicket
wicketkeeper
wickiup
wicopy
widdershins
wide
wide-angle
wide-angle lens
wide-awake
wide-eyed

wide-open
wide-ranging
wide-screen
widely
widen
widespread
widgeon
widget
widow
widow bird
widow's cruse
widow's mite
widow's peak
widow's walk
widower
width
widthwise
wield
wieldy
wiener
wife
wifehood
wifeless
wifely
wig
wigeon
wigging
wiggle
wiggler
wiggly
wight
wigwag
wigwam
wikiup
wild
wild
 boar
wild brier
wild celery
wild lettuce
wild man
wild mustard
wild oat
wild oats
wild olive
wild pansy
wild parsley
wild parsnip

wild rice
wild rose
wild rubber
wild rye
wild-eyed
wild-goose chase
wildcat
wildcat strike
wildebeest
wilder
wilderness
wildfire
wildfowl
wilding
wildlife
wildwood
wile
wilful
wiliness
will
will power
will-o'-the-wisp
willable
willed
willet
willful
willies
willing
williwaw
willow
willow pattern
willowy
willpower
willy-nilly
willy-willy
wilt
wily
wimble
wimple
win
win out
wince
winch
wind
wind cone
wind gauge
wind harp
wind indicator

wind instrument
wind rose
wind scale
wind shake
wind tee
wind tunnel
wind up
wind vane
wind-broken
wind-pollinated
wind-sucking
windage
windbag
windblown
windbound
windbreak
windburn
windcheater
winded
winder
windfall
windflower
windgall
windhover
winding
winding sheet
winding staircase
windjammer
windlass
windmill
window
window box
window dresser
window dressing
window sill
window-shop
windowlight
windowpane
windowsill
windpipe
windproof
windrow
windsail
windshield
windstorm
windswept
windtight
windup

windward
windy
wine
wine
 cellar
wine cooler
wine gallon
winebibber
wineglass
winegrower
winepress
winery
wineshop
wineskin
wing
wing and wing
wing collar
wing commander
wing loading
wing nut
wing shot
wing skid
wing tip
wing-footed
wingback
wingding
winged
winger
wingless
winglet
wingover
wingspan
wingspread
wink
wink at
winker
winkle
winner
winning
winning gallery
winnow
wino
winsome
winter
winter aconite
winter cherry
winter jasmine
winter wheat

winterfeed
wintergreen
wintergreen oil
winterize
winterkill
wintertide
wintertime
wintery
wintry
winy
winze
wipe
wiper
wire
wire cloth
wire entanglement
wire gauze
wire glass
wire grass
wire house
wire recorder
wire service
wire wheel
wire-haired
wire-wove
wiredraw
wireless
wireless telegraphy
wireless telephone
wireless telephony
wireman
wirer
wiretap
wirework
wireworm
wiring
wirra
wiry
wisdom
wisdom tooth
wise
wise guy
wiseacre
wisecrack
wisent
wish
wishbone
wishful

wishful
thinking
wishy-washy
wisp
wispy
wist
wisteria
wistful
wit
witch
witch doctor
witch hazel
witch-hunt
witchcraft
witchery
witches' Sabbath
witches'-broom
witching
witching hour
witchy
wite
witenagemot
with
withal
withdraw
withdrawal
withdrawing room
withdrawn
withdrew
withe
wither
witherite
withers
withershins
withhold
withholding tax
within
withindoors
without
withoutdoors
withstand
withy
witless
witling
witness
witness box
witness stand
wits

witted
witticism
witting
wittol
witty
wive
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Found in path(s):
* /words-3.0-39.el9.src.rpm-cosi-expand-archive-H29vsAr3/mwords.tar.Z-cosi-expand-archive-hP67tLJH/mwords/74550com.mon

# 1.663 slang 2.3.2-11.el9

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package migration

import "fmt"

// Notice is a migration warning
type Notice struct {
 Plugin     string
 Option     string
 Severity   string // 'deprecated', 'removed', or 'unsupported'
 ReplacedBy string
 Additional string
 Version    string
}

func (n *Notice) ToString() string {
 s := ""
 if n.Option == "" {
  s += fmt.Sprintf(`Plugin "%v" `, n.Plugin)
 } else {
  s += fmt.Sprintf(`Option "%v" in plugin "%v" `, n.Option, n.Plugin)
 }
 if n.Severity == SevUnsupported {
  s += "is unsupported by this migration tool in " + n.Version + "."
 } else if n.Severity == SevNewDefault {
  s += "is added as a default in " + n.Version + "."
 } else {
  s += "is " + n.Severity + " in " + n.Version + "."
 }
 if n.ReplacedBy != "" {
  s += fmt.Sprintf(` It is replaced by "%v".`, n.ReplacedBy)
 }
 if n.Additional != "" {
  s += " " + n.Additional
 }
 return s
}

const (
 // The following statuses are used to indicate the state of support/deprecation in a given release.
 SevDeprecated  = "deprecated"
```

```
  // deprecated, but still completely functional
 SevIgnored     = "ignored"     // if included in the corefile, it will be ignored by CoreDNS
 SevRemoved     = "removed"     // completely removed from CoreDNS, and would cause CoreDNS to exit if present
in the Corefile
 SevNewDefault  = "newdefault"  // added to the default corefile.  CoreDNS may not function properly if it is not
present in the corefile.
 SevUnsupported = "unsupported" // the plugin/option is not supported by the migration tool

 // The following statuses are used for selecting/filtering notifications
 SevAll = "all" // show all statuses
)
```

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==========
The common/types/pb/equal.go modification of proto.Equal logic
==========
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package spec

// License information for the exposed API.
//
// For more information: http://goo.gl/8us55a#licenseObject
type License struct {
 Name string `json:"name,omitempty"`
 URL  string `json:"url,omitempty"`
}
```

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Protocol Buffers for Go with Gadgets

Go support for Protocol Buffers - Google's data interchange format

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procfs provides functions to retrieve system, kernel and process
metrics from the pseudo-filesystem proc.

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```

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* DNS resolver (dirmngr/dns.c)

dns.c - Recursive, Reentrant DNS Resolver.
---
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Subsequently modified by:

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1987 James A. Woods ames!jaw
1993 Christopher Seiwald seiwald@vix.com
2000, 2002 Christopher Seiwald <seiwald@perforce.com>
2010 Steve Bennett <steveb@workware.net.au>
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# 1.677 go-autorest-autorest-adal 0.9.22

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* /stateless4j-2-5-0-sources-jar/com/github/oxo42/stateless4j/delegates/FuncBoolean.java
* /stateless4j-2-5-0-sources-jar/com/github/oxo42/stateless4j/OutVar.java

# 1.680 apimachinery 0.33.5

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However, linking a "work that uses the Library" with the Library
creates an executable that is a derivative of the Library (because it
contains portions of the Library), rather than a "work that uses the
library". The executable is therefore covered by this
License.
Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library. The
threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small inline
functions (ten lines or less in length), then the use of the object
file is unrestricted, regardless of whether it is legally a derivative
work. (Executables containing this object code plus portions of the
Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may
distribute the object code for the work under the terms of Section 6.
Any executables
containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or
link a "work that uses the Library" with the Library to produce a
work containing portions of the Library, and distribute that work
under terms of your choice, provided that the terms permit

modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

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b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception,

the materials to be distributed need not include anything that is
normally distributed (in either source or binary form) with the
major
components (compiler, kernel, and so on) of the operating system on
which the executable runs, unless that component itself accompanies
the executable.

It may happen that this requirement contradicts the license
restrictions of other proprietary libraries that do not normally
accompany the operating system. Such a contradiction means you cannot
use both them and the Library together in an executable that you
distribute.

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facilities not covered by this License, and distribute such a combined
library, provided that the separate distribution of the work based on
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based on the Library, uncombined with any other library
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# 1.695 coreutils 9.4-3ubuntu6

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*/

/*
* copyright.h
*  A 3270 Terminal Emulator
*  Copyright display
*/

const char *show_copyright(void);
```

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# 1.703 redux 4.2.1

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# 1.705 bash 5.2.21-2ubuntu4

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# 1.706 ret 0.1.15

## 1.706.1 Available under license :

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# 1.707 systemd 255.4-1ubuntu8.6

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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If such an object file uses only numerical parameters, data structure
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* https://github.com/jakartaee/common-annotations-api

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# 1.711 flatten 1.0.1

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import: ../../../../fossene/db/schema/thing.yml
fields:
  site: string
  author: root

# 1.714 cffi 1.14.5

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# 1.715 @octokit/request 8.4.1

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# 1.718 maxminddb-golang 1.13.0

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# 1.721 grpc-go 1.72.2

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# 1.722 datachannel 1.5.10

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# 1.723 fuse 2.9.9-17.el9

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The precise terms and conditions for copying, distribution and modification follow.

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The "source code" for a work means the preferred form of the work for making modifications to it. "Object code" means any non-source form of a work.

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written offer, valid for at least three years
and valid for as
long as you offer spare parts or customer support for that product
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product that is covered by this License, on a durable physical
medium customarily used for software interchange, for a price no
more than your reasonable cost of physically performing this
conveying of source, or (2) access to copy the
Corresponding Source from a network server at no charge.

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with subsection 6b.

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Corresponding Source in
the same way through the same place at no
further charge. You need not require recipients to copy the
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```
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```
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```

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Version 3, 29 June 2007

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with the Linked
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# 1.729 hikaricp 7.0.2

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# 1.730 go-errors-errors 1.4.2

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# 1.731 jwalterweatherman 1.1.0

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# 1.732 open-ldap 2.6.8-4.el9

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# 1.734 libp2p-go-libp2p-routing-helpers 0.7.5

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# 1.735 events-to-array 1.1.2

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# 1.739 convert-source-map 1.9.0

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# 1.740 turn 4.0.0

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package allocation

import (
 "net"
 "time"

 "github.com/pion/logging"
)

const permissionTimeout = time.Duration(5) * time.Minute

// Permission represents a TURN permission. TURN permissions mimic the address-restricted
// filtering mechanism of NATs that comply with [RFC4787].
// See: https://tools.ietf.org/html/rfc5766#section-2.3
type Permission struct {
 Addr          net.Addr
 allocation    *Allocation
 lifetimeTimer *time.Timer
 log           logging.LeveledLogger
}
```

```
// NewPermission create a new Permission
func NewPermission(addr net.Addr, log logging.LeveledLogger) *Permission {
 return &Permission{
  Addr: addr,
  log:  log,
 }
}

func (p *Permission) start(lifetime time.Duration) {
 p.lifetimeTimer = time.AfterFunc(lifetime, func() {
  p.allocation.RemovePermission(p.Addr)
 })
}

func (p *Permission) refresh(lifetime time.Duration) {
 if !p.lifetimeTimer.Reset(lifetime) {
  p.log.Errorf("Failed
 to reset permission timer for %v %v", p.Addr, p.allocation.fiveTuple)
 }
}
```

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package client

import (
 "net"
 "sync"
 "sync/atomic"

 "github.com/pion/turn/v4/internal/ipnet"
)

type permState int32

const (
 permStateIdle permState = iota
 permStatePermitted
)

type permission struct {
 addr  net.Addr
 st    permState    // Thread-safe (atomic op)
 mutex sync.RWMutex // Thread-safe
}

func (p *permission) setState(state permState) {
 atomic.StoreInt32((*int32)(&p.st), int32(state))
}

func (p *permission) state() permState {
 return permState(atomic.LoadInt32((*int32)(&p.st)))
}
```

```
// Thread-safe permission map
type permissionMap struct {
 permMap map[string]*permission
 mutex   sync.RWMutex
}

func (m *permissionMap) insert(addr net.Addr, p *permission) bool {
 m.mutex.Lock()
 defer m.mutex.Unlock()
 p.addr = addr
 m.permMap[ipnet.FingerprintAddr(addr)] = p
 return true
}

func (m *permissionMap) find(addr net.Addr) (*permission, bool) {
 m.mutex.RLock()
 defer
 m.mutex.RUnlock()
 p, ok := m.permMap[ipnet.FingerprintAddr(addr)]
 return p, ok
}

func (m *permissionMap) delete(addr net.Addr) {
 m.mutex.Lock()
 defer m.mutex.Unlock()
 delete(m.permMap, ipnet.FingerprintAddr(addr))
}

func (m *permissionMap) addrs() []net.Addr {
 m.mutex.RLock()
 defer m.mutex.RUnlock()

 addrs := []net.Addr{}
 for _, p := range m.permMap {
  addrs = append(addrs, p.addr)
 }
 return addrs
}

func newPermissionMap() *permissionMap {
 return &permissionMap{
  permMap: map[string]*permission{},
 }
}
```

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# 1.742 json-c 0.14-11.el9

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# 1.748 go-jose 4.0.5

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# 1.749 uglify-js 3.19.3

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#ifndef _BASENAME_LGPL_H

```
#define _BASENAME_LGPL_H

#include <stddef.h>

#ifndef DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif


/*
 Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
          FILENAME      RESULT
          "foo.c"       "foo.c"
          "foo/bar.c"   "bar.c"
          "/foo/bar.c"  "bar.c"
          "foo/bar/"    "bar/"
          "foo/bar//"   "bar//"
          "/"           ""
          "//"          ""
          ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(), defined in <string.h>, does
      not consider trailing slashes to be part of the component:

 FILENAME      RESULT
          "foo/bar/"    ""
          "foo/bar//"   ""
    * The 'basename' command eliminates trailing slashes and for a root
      produces a non-empty result:
          FILENAME      RESULT
          "foo/bar/"    "bar"
          "foo/bar//"   "bar"
          "/"           "/"
          "//"          "/"
*/
```

```
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;


#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
```

# 1.770 nghttp2 1.43.0-6.el9

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# 1.771 nopt 5.0.0

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pycparser -- A C parser in Python

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# 1.778 simpleline 1.8.3

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Version 3, 29 June 2007

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# 1.782 semver 4.0.0

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# 1.783 spire-api-sdk 1.11.1

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. The `grn' preprocessor, written by Barry Roitblat <barry@rentonww.com> and David Slattengren <slatteng@Xinet.COM>. These files have been part of the original Berkeley ditroff distribution, without AT&T code, and are in the public domain.

The original package can be found at http://ftp.cs.wisc.edu/pub/misc/grn.tar.Z .

src/preproc/grn/gprint.h
src/preproc/grn/hdb.cpp
src/preproc/grn/hgraph.cpp
src/preproc/grn/hpoint.cpp
src/preproc/grn/main.cpp

. The `gxditview' output device. It is based on X11's `xditview' program and thus has the X license.

src/devices/xditview/DESC.in
src/devices/xditview/Dvi.c
src/devices/xditview/Dvi.h
src/devices/xditview/DviP.h
src/devices/xditview/FontMap
src/devices/xditview/GXditview.ad
src/devices/xditview/Menu.h
src/devices/xditview/ad2c
src/devices/xditview/device.c
src/devices/xditview/device.h
src/devices/xditview/draw.c
src/devices/xditview/font.c
src/devices/xditview/gray1.bm
src/devices/xditview/gray2.bm
src/devices/xditview/gray3.bm
src/devices/xditview/gray4.bm
src/devices/xditview/gray5.bm
src/devices/xditview/gray6.bm
src/devices/xditview/gray7.bm
src/devices/xditview/gray8.bm
src/devices/xditview/gxditview.man
src/devices/xditview/lex.c
src/devices/xditview/page.c
src/devices/xditview/parse.c
src/devices/xditview/xdit.bm
src/devices/xditview/xdit_mask.bm
src/devices/xditview/xditview.c

src/include/DviChar.h
src/include/XFontName.h

src/libs/libxutil/DviChar.c
src/libs/libxutil/XFontName.c

Macro Packages
---

. The -mdoc macro set, using the BSD license.

tmac/doc.tmac
tmac/doc-old.tmac
tmac/doc-common
tmac/doc-ditroff
tmac/doc-nroff
tmac/doc-syms
tmac/groff_mdoc.man

. The -me macro set, using the BSD license.

tmac/e.tmac
tmac/groff_me.man
doc/meintro.me
doc/meintro_fr.me
doc/meref.me

Hyphenation Patterns
---

. The file `tmac/hyphen.us' is identical to the file `hyphen.tex', part of the TeX system written by Donald E. Knuth; the master file can be found at

ftp://labrea.stanford.edu/pub/tex/dist/lib/hyphen.tex .

It has been renamed for consistency, i.e., to make patterns available under the filenames `hyphen.<language>', e.g. `hyphen.de' or `hyphen.uk'.

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. The file `tmac/hyphen.fr' contains the
same patterns as the file
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. The file `tmac/hyphen.sv' is identical to the file `svhyph.tex', which can be found at

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. The files `tmac/hyphen.det' and `tmac/hyphen.den' contain the same patterns as the files `dehypht-x-2017-03-31.pat' and `dehyphn-x-2017-03-31.pat' (for TeX), respectively, which can be found at

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. The file `tmac/hyphen.cs' contains the same patterns as the file `czhyphen.tex' (for TeX), which can be found in the archive

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# 1.810 queue 1.1.0

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# 1.811 go-openapi-jsonpointer 0.21.0

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# 1.815 pq 1.10.9

## 1.815.1 Available under license :

```
//go:build go1.10
// +build go1.10

package pq

import (
 "context"
 "database/sql/driver"
)

// NoticeHandler returns the notice handler on the given connection, if any. A
// runtime panic occurs if c is not a pq connection. This is rarely used
// directly, use ConnectorNoticeHandler and ConnectorWithNoticeHandler instead.
func NoticeHandler(c driver.Conn) func(*Error) {
 return c.(*conn).noticeHandler
}

// SetNoticeHandler sets the given notice handler on the given connection. A
// runtime panic occurs if c is not a pq connection. A nil handler may be used
// to unset it. This is rarely used directly, use ConnectorNoticeHandler and
// ConnectorWithNoticeHandler instead.
//
// Note: Notice handlers are executed synchronously by pq meaning commands
// won't continue to be processed until the handler returns.
func SetNoticeHandler(c driver.Conn, handler func(*Error)) {
 c.(*conn).noticeHandler = handler
}

// NoticeHandlerConnector wraps a regular connector and sets a notice handler
//
 on it.
type NoticeHandlerConnector struct {
 driver.Connector
 noticeHandler func(*Error)
}

// Connect calls the underlying connector's connect method and then sets the
// notice handler.
func (n *NoticeHandlerConnector) Connect(ctx context.Context) (driver.Conn, error) {
 c, err := n.Connector.Connect(ctx)
 if err == nil {
```

```
  SetNoticeHandler(c, n.noticeHandler)
 }
 return c, err
}

// ConnectorNoticeHandler returns the currently set notice handler, if any. If
// the given connector is not a result of ConnectorWithNoticeHandler, nil is
// returned.
func ConnectorNoticeHandler(c driver.Connector) func(*Error) {
 if c, ok := c.(*NoticeHandlerConnector); ok {
  return c.noticeHandler
 }
 return nil
}

// ConnectorWithNoticeHandler creates or sets the given handler for the given
// connector. If the given connector is a result of calling this function
// previously, it is simply set on the given connector and returned. Otherwise,
// this returns a new connector wrapping the given one and
 setting the notice
// handler. A nil notice handler may be used to unset it.
//
// The returned connector is intended to be used with database/sql.OpenDB.
//
// Note: Notice handlers are executed synchronously by pq meaning commands
// won't continue to be processed until the handler returns.
func ConnectorWithNoticeHandler(c driver.Connector, handler func(*Error)) *NoticeHandlerConnector {
 if c, ok := c.(*NoticeHandlerConnector); ok {
  c.noticeHandler = handler
  return c
 }
 return &NoticeHandlerConnector{Connector: c, noticeHandler: handler}
}
```

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# 1.816 x-net 0.41.0

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# 1.817 @jridgewell/sourcemap-codec 1.5.5

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# 1.818 python-distro 1.5.0-7.el9

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# 1.819 yajl 2.1.0-25.el9

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# 1.820 proto-otlp 1.5.0

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```
---
name: Handle External Contributor PRs

on:
 # run in the context of the base branch, so that it still works in PR from forks
 pull_request_target:
   types: [opened, reopened]

permissions: {}

jobs:
 external-contributor-prs:
   name: Handle Fork PRs
   runs-on: ubuntu-latest
   permissions:
     pull-requests: write
   if: github.event.pull_request.head.repo.full_name != github.repository
   steps:
```

```
    - name: Checkout repository
      uses: actions/checkout@11bd71901bbe5b1630ceea73d27597364c9af683 # v4.2.2
      with:
        ref: main
        fetch-depth: 0
        persist-credentials: false
    - name: Install dda
      uses: ./.github/actions/install-dda
      with:
        features: legacy-tasks
    - name: Set label on external contributor PRs
      run: |
        dda inv -- -e github.handle-community-pr --repo="$GH_REPO" --pr-id="$NUMBER" --labels="$LABELS"
      env:
        GH_TOKEN: ${{ secrets.GITHUB_TOKEN }}
        GITHUB_TOKEN:
 ${{ secrets.GITHUB_TOKEN }}
        SLACK_DATADOG_AGENT_BOT_TOKEN: ${{ secrets.SLACK_DATADOG_AGENT_BOT_TOKEN }}
        GH_REPO: ${{ github.repository }}
        NUMBER: ${{ github.event.number }}
        # labels is a comma-separated list of tags
        LABELS: community
Component,Origin,License
devenv,github.com/StefanScherer/packer-windows,MIT
devenv,github.com/luciusbono/Packer-Windows10,MIT
```

# 1.827 javax-annotation-api 1.3.2

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# 1.829 fsnotify 1.8.0

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# 1.834 openshift-client-go 0.0.0-20250402181141-b3bad3b645f2

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# 1.835 escalade 3.2.0

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```
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```

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# 1.839 fs-minipass 2.1.0

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# 1.855 sample-controller 0.33.4

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d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form

under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work

under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception,

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

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When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object

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b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

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For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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# 1.865 braces 3.0.3

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# 1.867 bronze1man-gostrongswanvici 0.0.0-20231128135937-211cef3b0b20

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# 1.869 go-buffer-pool 0.1.0

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### Applies to buffer.go and buffer_test.go ###

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# 1.870 sprintf-js 1.0.3

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# 1.871 @babel/helper-plugin-utils 7.22.5

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

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in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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This option is useful when you wish to copy part of the code of

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4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

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When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

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distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

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The precise terms and conditions for copying, distribution and modification follow.

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1. Source Code.

The "source code" for a work means the preferred form of the work for making modifications to it. "Object code" means any non-source form of a work.

A "Standard Interface" means an interface that either is an official standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.

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d) If the work has interactive user interfaces, each must display Appropriate Legal Notices; however, if the Program has interactive interfaces that do not display Appropriate Legal Notices, your work need not make them do so.

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b) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years and valid for as long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a copy of the Corresponding Source for all the software in the product that is covered by this License, on a durable physical medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the Corresponding Source from a network server at no charge.

c) Convey individual copies of the object code with a copy of the

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A separable portion of the object code, whose source code is excluded from the Corresponding Source as a System Library, need not be included in conveying the object code work.

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Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

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You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

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must itself be a software library.

b) You must cause the files modified to carry prominent notices
stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no
charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a
table of data to be supplied by an application program that uses
the facility, other than as an argument passed when the facility
is invoked, then you must make a good faith effort to ensure that,
in the event an application does not supply such function or
table, the facility still operates, and performs whatever part of
its purpose remains meaningful.

(For example, a function in a library to compute square roots has
a purpose that is entirely well-defined independent of the
application. Therefore, Subsection 2d requires that any
application-supplied function or table used by
this function must
be optional: if the application does not supply it, the square
root function must still compute square roots.)

These requirements apply to the modified work as a whole. If
identifiable sections of that work are not derived from the Library,
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themselves, then this License, and its terms, do not apply to those
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on the Library, the distribution of the whole must be on the terms of
this License, whose permissions for other licensees extend to the
entire whole, and thus to each and every part regardless of who wrote
it.

Thus, it is not the intent of this section to claim rights or contest
your rights to work written entirely by you; rather, the intent is to
exercise the right to control the distribution of derivative or
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addition, mere aggregation of another work not based on the Library
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License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

c) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

d) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

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# 1.894 ibus 1.5.25-6.el9

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Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits

its criteria of freedom. The Lesser General
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We call this license the "Lesser" General Public License because it
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For example, on rare occasions, there may be a special need to
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library does the same job as widely used non-free libraries. In this
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a) The modified work must itself be a software library.

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stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2,

instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed
under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this
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When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline

functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables
containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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a) Accompany the work with the complete corresponding machine-readable
source code for the Library including whatever
changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user
installs one, as long as the modified version is
interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

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# 1.895 tenacity 8.2.2

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# 1.901 call-bind-apply-helpers 1.0.2

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# 1.904 python-setuptools 68.2.2

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In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member
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| | | | | |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
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# 1.908 yargs-parser 21.1.1

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#+STARTUP: showall

* DNS resolver (dirmngr/dns.c)

dns.c - Recursive, Reentrant DNS Resolver.
---
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* Regular
expression support

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Subsequently modified by:

1986 John Gilmore hoptoad!gnu
1987 James A. Woods ames!jaw
1993 Christopher Seiwald seiwald@vix.com
2000, 2002 Christopher Seiwald <seiwald@perforce.com>
2010 Steve Bennett <steveb@workware.net.au>
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fontconfig/fc-case/CaseFolding.txt

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---

fontconfig/src/fcatomic.h

/*
* Mutex operations.  Originally copied from HarfBuzz.

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*/

---
fontconfig/src/fcfoundry.h

/*
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*/

---

fontconfig/src/fcmd5.h

```
/*
* This code implements the MD5 message-digest algorithm.
* The algorithm is due to Ron Rivest.  This code was
* written by Colin Plumb in 1993, no copyright is claimed.
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*
* Equivalent code is available from RSA Data Security, Inc.
* This code has been tested against that, and is equivalent,
* except that you don't need to include two pages of legalese
* with every copy.
*
* To compute the message digest of a chunk of bytes, declare an
* MD5Context structure, pass it to MD5Init, call MD5Update
 as
* needed on buffers full of bytes, and then call MD5Final, which
* will fill a supplied 16-byte array with the digest.
*/
```

---

fontconfig/src/fcmutex.h

```
/*
* Atomic int and pointer operations.  Originally copied from HarfBuzz.
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*/



-------------------------------------------------------------------------------
fontconfig/src/ftglue.[ch]

/* ftglue.c: Glue code for compiling the OpenType code from
*          FreeType 1 using only the public API of FreeType 2
*
* By David Turner, The FreeType Project (www.freetype.org)
*
* This code is explicitely put in the public domain
*
* ==========================================================================
*
* the OpenType
 parser codes was originally written as an extension to
* FreeType 1.x. As such, its source code was embedded within the library,
* and used many internal FreeType functions to deal with memory and
* stream i/o.
*
* When it was 'salvaged' for Pango and Qt, the code was "ported" to FreeType 2,
* which basically means that some macro tricks were performed in order to
* directly access FT2 _internal_ functions.
*
* these functions were never part of FT2 public API, and _did_ change between
* various releases. This created chaos for many users: when they upgraded the
* FreeType library on their system, they couldn't run Gnome anymore since
* Pango refused to link.
*
* Very fortunately, it's possible to completely avoid this problem because
* the FT_StreamRec and FT_MemoryRec structure types, which describe how
```

```
* memory and stream implementations interface with the rest of the font
* library, have always been part of the public API, and never changed.
*
* What we do
 thus is re-implement, within the OpenType parser, the few
* functions that depend on them. This only adds one or two kilobytes of
* code, and ensures that the parser can work with _any_ version
* of FreeType installed on your system. How sweet... !
*
* Note that we assume that Pango doesn't use any other internal functions
* from FreeType. It used to in old versions, but this should no longer
* be the case. (crossing my fingers).
*
*  - David Turner
*  - The FreeType Project  (www.freetype.org)
*
* PS: This "glue" code is explicitely put in the public domain
*/
```

# 1.931 parse-json 5.2.0

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# 1.932 libeconf 0.4.1-4.el9

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# 1.933 path-key 3.1.1

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# 1.934 libmnl 1.0.4-16.el9_4

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# 1.936 dario.cat-mergo 1.0.1

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# 1.937 json-c 0.14-11.el9

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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name: Handle External Contributor PRs

on:
 # run in the context of the base branch, so that it still works in PR from forks
 pull_request_target:
   types: [opened, reopened]

permissions: {}

jobs:
 external-contributor-prs:
   name: Handle Fork PRs
   runs-on: ubuntu-latest
   permissions:
     pull-requests: write
   if: github.event.pull_request.head.repo.full_name != github.repository
   steps:
     - name: Checkout repository
       uses: actions/checkout@11bd71901bbe5b1630ceea73d27597364c9af683 # v4.2.2
       with:
         ref: main
         fetch-depth: 0
```

```
      persist-credentials: false
    - name: Install dda
      uses: ./.github/actions/install-dda
      with:
        features: legacy-tasks
    - name: Set label on external contributor PRs
      run: |
        dda inv -- -e github.handle-community-pr --repo="$GH_REPO" --pr-id="$NUMBER" --labels="$LABELS"
      env:
        GH_TOKEN: ${{ secrets.GITHUB_TOKEN }}
        GITHUB_TOKEN:
 ${{ secrets.GITHUB_TOKEN }}
        SLACK_DATADOG_AGENT_BOT_TOKEN: ${{ secrets.SLACK_DATADOG_AGENT_BOT_TOKEN }}
        GH_REPO: ${{ github.repository }}
        NUMBER: ${{ github.event.number }}
        # labels is a comma-separated list of tags
        LABELS: community
Component,Origin,License
devenv,github.com/StefanScherer/packer-windows,MIT
devenv,github.com/luciusbono/Packer-Windows10,MIT
```

# 1.957 go-intervals 0.0.2

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# here. Please keep the list sorted by first names.

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  * Fixed minor IBM xlC compiler build issues
  * Added atomicops for AIX (POWER)
# This file contains a list of people who've made non-trivial
# contribution to the Google C++ Testing Framework project.  People
# who commit code to the project are encouraged to add their names
# here.  Please keep the list sorted by first names.

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distribution (with or without modification), making available to the
public, and in some countries other activities as well.

To ``convey'' a work means any kind of propagation that enables other
parties to make or receive copies. Mere
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through a computer network, with no transfer of a copy, is not
conveying.

An interactive user interface displays ``Appropriate Legal Notices'' to
the extent that it includes a convenient and prominently visible
feature that (1) displays an appropriate copyright notice, and (2)
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work under this License, and how to view a copy of this License. If
the interface presents a list of user commands or options, such as a
menu, a prominent item in the list meets this criterion.

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A ``Standard Interface'' means an interface that either is an official standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.

The ``System Libraries'' of an executable work include anything, other than the work as a whole, that (a) is included in the normal form of packaging a Major Component, but which is not part of that Major Component, and (b) serves only to enable use of the work with that Major Component, or to implement a Standard Interface for which an implementation is available to the public in source code form. A ``Major Component'', in this context, means a major essential component (kernel, window system, and so on) of the specific operating system (if any) on which the executable work runs, or a compiler used to produce the work, or an object code interpreter used to run it.

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used for software interchange.

@item
Convey the object code in, or embodied in, a physical product
(including a physical distribution medium), accompanied by a written
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for software interchange, for a price no more than your reasonable
cost of physically performing this conveying of source, or (2) access
to copy the Corresponding Source from a network server at no charge.

@item
Convey individual copies of the object code with a copy of the written
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allowed only occasionally and noncommercially, and only if you
received the object code with such an offer, in accord with subsection
6b.

@item
Convey the object code by offering access from a designated place
(gratis or for a charge), and offer equivalent access to the
Corresponding Source in the same way through
 the same place at no
further charge.  You need not require recipients to copy the
Corresponding Source along with the object code.  If the place to copy
the object code is a network server, the Corresponding Source may be
on a different server (operated by you or a third party) that supports
equivalent copying facilities, provided you maintain clear directions
next to the object code saying where to find the Corresponding Source.
Regardless of what server hosts the Corresponding Source, you remain

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satisfy these requirements.

@item
Convey the object code using peer-to-peer transmission, provided you
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@end enumerate

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from the Corresponding Source as a System Library, need not be
included in conveying the
 object code work.

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Version 3, 29 June 2007

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deemed a mode
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of the Library that is interface-compatible
with the Linked
Version.

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# 1.968 kustomize-kyaml 0.19.0

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# 1.969 @jridgewell/gen-mapping 0.3.13

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# 1.970 python-simpleline 1.8.3-1.el9

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# 1.975 merge-descriptors 1.0.3

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## OpenSSL Notes

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# 1.985 datadog-go-libddwaf 4.3.0

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# 1.987 espree 9.6.1

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# 1.1006 pion-sctp 1.8.37

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---
name: Handle External Contributor PRs

```
on:
 # run in the context of the base branch, so that it still works in PR from forks
 pull_request_target:
   types: [opened, reopened]

permissions: {}

jobs:
 external-contributor-prs:
   name: Handle Fork PRs
   runs-on: ubuntu-latest
   permissions:
     pull-requests: write
   if: github.event.pull_request.head.repo.full_name != github.repository
   steps:
     - name: Checkout repository
       uses: actions/checkout@11bd71901bbe5b1630ceea73d27597364c9af683 # v4.2.2
       with:
         ref: main
         fetch-depth: 0
         persist-credentials: false
     - name: Install dda
       uses: ./.github/actions/install-dda
       with:
         features: legacy-tasks
     - name: Set label on external contributor PRs
       run: |
         dda inv -- -e github.handle-community-pr --repo="$GH_REPO" --pr-id="$NUMBER" --labels="$LABELS"
       env:
         GH_TOKEN: ${{ secrets.GITHUB_TOKEN }}
         GITHUB_TOKEN:
 ${{ secrets.GITHUB_TOKEN }}
         SLACK_DATADOG_AGENT_BOT_TOKEN: ${{ secrets.SLACK_DATADOG_AGENT_BOT_TOKEN }}
         GH_REPO: ${{ github.repository }}
         NUMBER: ${{ github.event.number }}
         # labels is a comma-separated list of tags
         LABELS: community
Component,Origin,License
devenv,github.com/StefanScherer/packer-windows,MIT
devenv,github.com/luciusbono/Packer-Windows10,MIT
```

# 1.1008 tidwall-btree 1.8.1

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# 1.1009 transport 3.0.7

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RECORD
Carriage_Control carriage_return
Format stream_lf

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# 1.1012 angus-activation 2.0.3

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under certain conditions; type `show c' for details.

The hypothetical commands
`show w' and `show c' should show the appropriate
parts of the General Public License. Of course, the commands you use may
be called something other than `show w' and `show c'; they could even be
mouse-clicks or menu items--whatever suits your program.

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`Gnomovision' (which makes passes at compilers) written by James Hacker.

<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice

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# 1.1016 cracklib 2.9.6-27.el9

## 1.1016.1 Available under license :

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Version 2.1, February 1999

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^L
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the free library to free
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in order to run.
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If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

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However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a
"work that uses the
library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline

functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute
the object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.
^L
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b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2)

will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

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mail.

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school, if any, to sign a "copyright disclaimer" for the library, if
necessary. Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the
library `Frob' (a library for tweaking knobs) written by James
Random Hacker.

<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

That's all there is to it!
---
EFFECTIVE OCT 2008, LICENSE IS BEING CHANGED TO LGPL-2.1 (though not reflected
in released code until Nov 2009 - slow release cycle...)
---

Discussion thread from mailing list archive, with approval from everyone actively
involved or holding original licensing rights included.

[Cracklib-devel] cracklib license
From: Mike Frysinger <vapier@ge...> - 2007-10-02 01:16

Attachments: Message as HTML
looks like 2.8.11 is out and marked as "GPL-2" ... releasing libraries unde=
r=20
GPL-2 is not desirable at all ... this is why the LGPL-2.1 exists
=2Dmike

Re: [Cracklib-devel] cracklib license
From: Neulinger, Nathan <nneul@um...> - 2007-10-02 01:18
I understand that, and you're welcome to bring it up with Alec directly
and see if he wants to relicense his code as LGPL... but at this point,
it was enough to just get it consistent and documented as to what it was
released under. This wasn't actually a license change, just a

clarification of the licensing that was already in place.=20

-- Nathan
=20
---
Nathan Neulinger EMail: nneul@um...
University of Missouri - Rolla Phone: (573) 341-6679
UMR Information Technology Fax: (573) 341-4216

> -----Original Message-----
> From: cracklib-devel-bounces@li...
> [mailto:cracklib-devel-bounces@li...] On Behalf Of
> Mike Frysinger
> Sent: Monday, October 01, 2007 8:15 PM
> To: cracklib-devel@li...
> Subject: [Cracklib-devel] cracklib license
>=20
> looks like 2.8.11 is out and marked as "GPL-2" ... releasing
> libraries under
> GPL-2 is not desirable at all ... this is why the LGPL-2.1 exists
> -mike

Re: [Cracklib-devel] cracklib license
From: Mike Frysinger <vapier@ge...> - 2007-10-02 01:33

Attachments: Message as HTML
On Monday 01 October 2007, Neulinger, Nathan
wrote:
> I understand that, and you're welcome to bring it up with Alec directly
> and see if he wants to relicense his code as LGPL... but at this point,
> it was enough to just get it consistent and documented as to what it was
> released under. This wasn't actually a license change, just a
> clarification of the licensing that was already in place.

the original license (before moving to sourceforge -- aka, 2.7) was not=20
GPL-2 ... it was a modified artistic license ... i didnt notice the license=
=20
change until it was mentioned in the latest notes.

unlike the old license, GPL-2 prevents people from using cracklib unless th=
eir=20
applications are also GPL-2 which imo is just wrong. it isnt the place of =
a=20
library to dictact to application writes what license they should be using.=
=20
thus LGPL-2.1 enters to fill this void.
=2Dmike

Re: [Cracklib-devel]
cracklib license
From: Neulinger, Nathan <nneul@um...> - 2007-10-02 01:46
Seems like the ideal thing here would be for you and the other distro
maintainers to get together with Alec in a conversation and come to a
decision as to what licensing scheme y'all want. I haven't really done
much other than cleaning up the packaging and patches and a small bit of
additional code, so whatever licensing y'all come up with is fine by me.

-- Nathan
=20
---
Nathan Neulinger EMail: nneul@um...
University of Missouri - Rolla Phone: (573) 341-6679
UMR Information Technology Fax: (573) 341-4216

> -----Original Message-----
> From: cracklib-devel-bounces@li...
> [mailto:cracklib-devel-bounces@li...] On Behalf Of
> Mike Frysinger
> Sent: Monday, October 01, 2007 8:33 PM
> To: Neulinger, Nathan
> Cc: cracklib-devel@li...; Alec Muffett
> Subject: Re: [Cracklib-devel] cracklib license
>=20
> On Monday 01 October 2007, Neulinger, Nathan wrote:
> > I understand that, and you're welcome to bring it up with Alec
> directly
> > and see if he wants to relicense his code as LGPL... but at this
> point,
> > it was enough to just get it consistent and documented as to what
> it was
> > released under. This wasn't actually a license change, just a
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> not
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> license
> change until it was mentioned in the latest notes.
>=20
> unlike the old license, GPL-2 prevents people from using cracklib
> unless their
> applications are also GPL-2 which imo is just wrong. it isnt the
> place of a
> library

to dictact to application writes what license they should
> be using.
> thus LGPL-2.1 enters to fill this void.
> -mike

Re: [Cracklib-devel] cracklib license
From: Alec Muffett <alecm@cr...> - 2007-10-02 08:57
> Seems like the ideal thing here would be for you and the other distro
> maintainers to get together with Alec in a conversation and come to a
> decision as to what licensing scheme y'all want. I haven't really done
> much other than cleaning up the packaging and patches and a small
> bit of
> additional code, so whatever licensing y'all come up with is fine
> by me.

I am sympathetic. Guys, what do you reckon?

What I am hearing so far is that LGPL makes sense, since it can be
linked with any code, not just GPL...

-a

Re: [Cracklib-devel] cracklib license
From: Devin Reade <gdr@gn...> - 2007-10-02 15:04
I would like to see it under LGPL as well. I
think it is in everyone's
best interests to have as secure systems as possible, and I think tainting
it via GPL will just make it less likely that the library gets used, and
will not usually cause companies/developers to GPL the dependent code
(where it is not already GPL).

I like GPL, I use it when I can, but I don't think that it's the correct
license in this situation.

Devin
--
If it's sinful, it's more fun.

Re: [Cracklib-devel] cracklib license
From: Nalin Dahyabhai <nalin@re...> - 2008-01-28 16:32
On Tue, Oct 02, 2007 at 09:57:31AM +0100, Alec Muffett wrote:
> > Seems like the ideal thing here would be for you and the other distro
> > maintainers to get together with Alec in a conversation and come to a
> > decision as to what licensing scheme y'all want. I haven't really done
> > much other than cleaning up the packaging and patches and a small

> > bit of
> > additional
code, so whatever licensing y'all come up with is fine
> > by me.
>
> I am sympathetic. Guys, what do you reckon?
>
> What I am hearing so far is that LGPL makes sense, since it can be
> linked with any code, not just GPL...

My apologies for not chiming in in anything resembling a reasonable
timeframe.

I'd also suggest the LGPL, for the reason you noted above. Alternately,
GPLv2 with the option of using the library under a later version of the
GPL would permit applications which were released under version 3 of the
GPL to use the library, too, which would be sufficient for the packages
which are included in Fedora. FWIW, I'd personally lean toward LGPL.

In any case, I thank you both for working on sorting this out.

Cheers,

Nalin

Re: [Cracklib-devel] cracklib license
From: Mike Frysinger <vapier@ge...> - 2008-10-05 21:27

Attachments: Message as HTML

On Monday 28 January 2008, Nalin Dahyabhai wrote:
> On Tue, Oct 02, 2007 at 09:57:31AM +0100, Alec Muffett wrote:
> > > Seems like the ideal thing here would be for you and the other distro
> > > maintainers to get together with Alec in a conversation and come to a
> > > decision as to what licensing scheme y'all want. I haven't really done
> > > much other than cleaning up the packaging and patches and a small
> > > bit of
> > > additional code, so whatever licensing y'all come up with is fine
> > > by me.
> >
> > I am sympathetic. Guys, what do you reckon?
> >
> > What I am hearing so far is that LGPL makes sense, since it can be
> > linked with any code, not just GPL...
>
> My apologies for not chiming in in anything resembling a reasonable
> timeframe.

>
> I'd also suggest the LGPL, for the reason you noted above. Alternately,
> GPLv2 with the option of using
the library under a later version of the
> GPL would permit applications which were released under version 3 of the
> GPL to use the library, too, which would be sufficient for the packages
> which are included in Fedora. FWIW, I'd personally lean toward LGPL.
>
> In any case, I thank you both for working on sorting this out.

looks like everyone is OK with LGPL-2.1 (GNU Lesser license), so can we make
the change now ?
-mike

Re: [Cracklib-devel] cracklib license
From: Alec Muffett <alecm@cr...> - 2008-10-05 23:18
>> In any case, I thank you both for working on sorting this out.
>
> looks like everyone is OK with LGPL-2.1 (GNU Lesser license), so can we make
> the change now ?

yes. go for it. thanks++

-a

Re: [Cracklib-devel] cracklib license
From: Mike Frysinger <vapier@ge...> - 2008-10-25 22:34

Attachments: Message as HTML
On Sunday 05 October
2008, Alec Muffett wrote:
> >> In any case, I thank you both for working on sorting this out.
> >
> > looks like everyone is OK with LGPL-2.1 (GNU Lesser license), so can we
> > make the change now ?
>
> yes. go for it. thanks++

Nathan Neulinger is the only one who can actually make said change ...
-mike

---
BELOW IS ORIGINAL LICENSING DISCUSSION RE CHANGING TO GPL from Artistic.
---

CrackLib was originally licensed with a variant of the Artistic license. In the interests of wider acceptance and more modern licensing, it was switched with the original author's blessing to GPL v2.

This approval was carried out in email discussions in 2005, and has been reconfirmed as of 2007-10-01 with the following email from Alec Muffett.

The below email references nneul@umr.edu address, as that is the address that was used at the time. For any future emails regarding this, please use nneul@neulinger.org.

---

From
 alecm@crypticide.com Mon Oct  1 12:26:03 2007
Received: from umr-exproto2.cc.umr.edu ([131.151.0.192]) by UMR-CMAIL1.umr.edu with Microsoft SMTPSVC(6.0.3790.3959);
  Mon, 1 Oct 2007 12:26:03 -0500
Received: from scansrv2.srv.mst.edu ([131.151.1.114]) by umr-exproto2.cc.umr.edu with Microsoft SMTPSVC(6.0.3790.3959);
  Mon, 1 Oct 2007 12:26:02 -0500
Received: (qmail 8022 invoked from network); 1 Oct 2007 16:59:55 -0000
Received: from smtp1.srv.mst.edu (131.151.1.43)
 by scanin-ipvs.cc.umr.edu with SMTP; 1 Oct 2007 16:59:55 -0000
Received: from spunkymail-mx8.g.dreamhost.com (mx1.spunky.mail.dreamhost.com [208.97.132.47])
 by smtp1.srv.mst.edu (8.13.1/8.13.1) with ESMTP id l91Gxtpr020623
 for <nneul@umr.edu>; Mon, 1 Oct 2007 11:59:55 -0500
Received: from rutherford.zen.co.uk (rutherford.zen.co.uk [212.23.3.142])
 by spunkymail-mx8.g.dreamhost.com (Postfix) with ESMTP id 2C7734D311
 for <nneul@neulinger.org>; Mon,  1 Oct 2007 09:59:50 -0700 (PDT)
Received: from
 [82.68.43.14] (helo=[192.168.1.3])
 by rutherford.zen.co.uk with esmtp (Exim 4.50)
 id 1IcOcX-0004Qt-6L
 for nneul@neulinger.org; Mon, 01 Oct 2007 16:59:49 +0000
Mime-Version: 1.0 (Apple Message framework v752.2)
In-Reply-To: <1b1b3fd80710010908k11dac0afp1f2dd471059ff9a4@mail.gmail.com>
References: <1190922867.3457.147.camel@localhost.localdomain>
<EC90713277D2BE41B7110CCD74E235CEF44F38@UMR-CMAIL1.umr.edu>
<1b1b3fd80710010908k11dac0afp1f2dd471059ff9a4@mail.gmail.com>
Content-Type: text/plain; charset=US-ASCII; delsp=yes; format=flowed
Message-Id: <117A1264-F6DC-4E25-B0DD-56FBFEBE6E9F@crypticide.com>
Content-Transfer-Encoding: 7bit
From: Alec Muffett <alecm@crypticide.com>
Subject: Re: cracklib license

Date: Mon, 1 Oct 2007 17:59:46 +0100
To: Nathan Neulinger <nneul@neulinger.org>
X-Mailer: Apple Mail (2.752.2)
X-Originating-Rutherford-IP: [82.68.43.14]
Return-Path: alecm@crypticide.com
X-OriginalArrivalTime: 01 Oct 2007 17:26:03.0008 (UTC) FILETIME=[2420C000:01C80450]
Status: RO
Content-Length:
585
Lines: 21

>
> ---------- Forwarded message ----------
> From: Neulinger, Nathan <nneul@umr.edu>
> Date: Sep 27, 2007 2:58 PM
> Subject: RE: cracklib license
> To: alecm@crypto.dircon.co.uk
>
> Any chance you could write me a self-contained email stating clearly
> that the license is being changed to GPL, so I could include that
> email
> in the repository and clean up the repository/tarballs? I have all the
> original discussion, but something succinct and self contained
> would be
> ideal.

The license for my code in the Cracklib distribution is henceforth GPL.

Happy now? :-)

-a

# 1.1017 @babel/highlight 7.22.13

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# 1.1024 edwards25519 1.1.0

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Julian Seward, jseward@bzip.org
bzip2/libbzip2 version 1.0.6 of 6 September 2010

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```
#ifndef __VTV_H__
#define __VTV_H__

/* We could have used an enumeration here but it just makes it more
  difficult for the compiler to generate a call to this.  These are
  used as arguments to the function __VLTChangePermission, declared
  below.  */
#define __VLTP_READ_ONLY  0
#define __VLTP_READ_WRITE 1

#ifdef __cplusplus
extern "C" void __VLTChangePermission (int);
#else
extern void __VLTChangePermission (int);
#endif

#ifdef BIG_PAGE_SIZE
/* TODO - Replace '4096' below with correct big page size.  */
#define VTV_PAGE_SIZE 4096
#else
#if defined(__sun__) && defined(__svr4__) && defined(__sparc__)
#define VTV_PAGE_SIZE 8192
#else
#define VTV_PAGE_SIZE 4096
#endif
#endif



#endif /* __VTV_H__ */
```

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Version 3.1, 31 March 2009

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/* Definitions for BSD assembler syntax for Intel 386
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/* Use the Sequent Symmetry assembler syntax.  */

/* Define the syntax of pseudo-ops, labels and comments.  */

/* Prefix for internally generated assembler
 labels.  If we aren't using
  underscores, we are using prefix `.'s to identify labels that should
  be ignored, as in `i386/gas.h' --karl@cs.umb.edu  */

#define LPREFIX "L"

/* Assembler pseudos to introduce constants of various size.  */

#define ASM_BYTE "\t.byte\t"
#define ASM_SHORT "\t.word\t"
#define ASM_LONG "\t.long\t"
#define ASM_QUAD "\t.quad\t"  /* Should not be used for 32bit compilation.  */

/* This was suggested, but it shouldn't be right for DBX output. -- RMS
  #define ASM_OUTPUT_SOURCE_FILENAME(FILE, NAME) */


/* Define the syntax of labels and symbol definitions/declarations.  */

/* This is how to output an assembler line
  that says to advance the location counter by SIZE bytes.  */

#define ASM_OUTPUT_SKIP(FILE,SIZE)  \
 fprintf (FILE, "\t.space " HOST_WIDE_INT_PRINT_UNSIGNED"\n", (SIZE))

/* Define the syntax of labels and symbol definitions/declarations.  */

/* This says how to output an assembler line
  to define a global common symbol.  */

#define
```

```
 ASM_OUTPUT_COMMON(FILE, NAME, SIZE, ROUNDED)  \
( fputs (".comm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u\n", (int)(ROUNDED)))

/* This says how to output an assembler line
  to define a local common symbol.  */

#define ASM_OUTPUT_LOCAL(FILE, NAME, SIZE, ROUNDED)  \
( fputs (".lcomm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u\n", (int)(ROUNDED)))

#ifdef HAVE_GAS_LCOMM_WITH_ALIGNMENT
#define ASM_OUTPUT_ALIGNED_LOCAL(FILE, NAME, SIZE, ALIGNMENT)  \
( fputs (".lcomm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u,%u\n", (int)(SIZE), (int)(ALIGNMENT) / BITS_PER_UNIT))
#endif

/* This is how to output an assembler line
  that says to advance the location counter
  to a multiple of 2**LOG bytes.  */

#define ASM_OUTPUT_ALIGN(FILE,LOG) \
 if ((LOG)!=0) fprintf ((FILE), "\t.align %d\n", (LOG))

/* This is how to store into the string BUF
  the symbol_ref name of an internal numbered label
 where
  PREFIX is the class of label and NUM is the number within the class.
  This is suitable for output with `assemble_name'.  */

#define ASM_GENERATE_INTERNAL_LABEL(BUF,PREFIX,NUMBER) \
   sprintf ((BUF), "*%s%ld", (PREFIX), (long)(NUMBER))

/* The prefix to add to user-visible assembler symbols.  */

#define USER_LABEL_PREFIX "_"

/* Sequent has some changes in the format of DBX symbols.  */
#define DBX_NO_XREFS 1

/* Don't split DBX symbols into continuations.  */
#define DBX_CONTIN_LENGTH 0
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```

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# 1.1029 libdrm 2.4.123-2.el9

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```
/* amdgpu_drm.h -- Public header for the amdgpu driver -*- linux-c -*-
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*    Gareth Hughes <gareth@valinux.com>
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/xf86drmHash.h
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```
prebuilt_etc {
  name: "amdgpu.ids",
  proprietary: true,
  sub_dir: "hwdata",
  src: "amdgpu.ids",
}
```

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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/xf86drmMode.h
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/exynos/exynos_fimg2d_event.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/radeon/radeon_bo_gem.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/radeon/radeon_bo.h
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/* exynos_drm.h
*
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* Authors:
* Inki Dae <inki.dae@samsung.com>
* Joonyoung Shim <jy0922.shim@samsung.com>
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*/
/*
* Arm Framebuffer Compression (AFBC) modifiers
*
* AFBC is a proprietary lossless image compression protocol and format.
* It provides fine-grained random access and minimizes the amount of data
* transferred between IP blocks.
*
* AFBC has several features which may be supported and/or used, which are
* represented using bits in the modifier. Not all combinations are valid,
* and different devices or use-cases may support different combinations.
*
* Further information on the use of AFBC modifiers can be found in
* Documentation/gpu/afbc.rst
*/
/*
* Arm Fixed-Rate Compression (AFRC) modifiers
*
* AFRC is a proprietary fixed rate image compression protocol and format,
* designed to provide guaranteed bandwidth and memory footprint
* reductions
 in graphics and media use-cases.
*
* AFRC buffers consist of one or more planes, with the same components
```

```
* and meaning as an uncompressed buffer using the same pixel format.
*
* Within each plane, the pixel/luma/chroma values are grouped into
* "coding unit" blocks which are individually compressed to a
* fixed size (in bytes). All coding units within a given plane of a buffer
* store the same number of values, and have the same compressed size.
*
* The coding unit size is configurable, allowing different rates of compression.
*
* The start of each AFRC buffer plane must be aligned to an alignment granule which
* depends on the coding unit size.
*
* Coding Unit Size   Plane Alignment
* ----------------   ---------------
* 16 bytes           1024 bytes
* 24 bytes           512  bytes
* 32 bytes           2048 bytes
*
* Coding units are grouped into paging tiles. AFRC buffer dimensions must be aligned
* to a multiple of the paging tile dimensions.
* The dimensions
 of each paging tile depend on whether the buffer is optimised for
* scanline (SCAN layout) or rotated (ROT layout) access.
*
* Layout   Paging Tile Width   Paging Tile Height
* ------   -----------------   ------------------
* SCAN     16 coding units     4 coding units
* ROT      8  coding units     8 coding units
*
* The dimensions of each coding unit depend on the number of components
* in the compressed plane and whether the buffer is optimised for
* scanline (SCAN layout) or rotated (ROT layout) access.
*
* Number of Components in Plane   Layout      Coding Unit Width   Coding Unit Height
* ------------------------------   ---------   -----------------   ------------------
* 1                                SCAN        16 samples          4 samples
* Example: 16x4 luma samples in a 'Y' plane
*         16x4 chroma 'V' values, in the 'V' plane of a fully-planar YUV buffer
* ------------------------------   ---------   -----------------   ------------------
* 1
                                   ROT         8 samples           8 samples
* Example: 8x8 luma samples in a 'Y' plane
*         8x8 chroma 'V' values, in the 'V' plane of a fully-planar YUV buffer
* ------------------------------   ---------   -----------------   ------------------
* 2                                DONT CARE   8 samples           4 samples
* Example: 8x4 chroma pairs in the 'UV' plane of a semi-planar YUV buffer
* ------------------------------   ---------   -----------------   ------------------
* 3                                DONT CARE   4 samples           4 samples
```

```
* Example: 4x4 pixels in an RGB buffer without alpha
* ----------------------------   ---------   -----------------   ------------------
* 4                              DONT CARE   4 samples           4 samples
* Example: 4x4 pixels in an RGB buffer with alpha
*/
/*
* Amlogic Video Framebuffer Compression modifiers
*
* Amlogic uses a proprietary lossless image compression protocol and format
 * for their hardware video codec accelerators, either video decoders or
* video input encoders.
*
* It considerably reduces memory bandwidth while writing and reading
* frames in memory.
*
* The underlying storage is considered to be 3 components, 8bit or 10-bit
* per component YCbCr 420, single plane :
* - DRM_FORMAT_YUV420_8BIT
* - DRM_FORMAT_YUV420_10BIT
*
* The first 8 bits of the mode defines the layout, then the following 8 bits
* defines the options changing the layout.
*
* Not all combinations are valid, and different SoCs may support different
* combinations of layout and options.
*/
/*
* 64K_S is the same for GFX9/GFX10/GFX10_RBPLUS and hence has GFX9 as canonical
* version.
*/
```

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```
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/* drmsl.c -- Skip list test
* Created: Mon May 10 09:28:13 1999 by faith@precisioninsight.com
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*
* Authors: Rickard E. (Rik) Faith <faith@valinux.com>
*

```
* DESCRIPTION
*
* This file contains a straightforward skip list implementation.n
*
* FUTURE ENHANCEMENTS
*
* REFERENCES
*
* [Pugh90] William Pugh.  Skip Lists: A Probabilistic Alternative to
* Balanced Trees. CACM 33(6), June 1990, pp. 668-676.
*
*/
```

Found in path(s):
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/drmsl.c
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```
/*
* DRM based mode setting test program
* Copyright 2008 Tungsten Graphics
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*   Jesse Barnes <jesse.barnes@intel.com>
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/modetest/buffers.h
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/modetest/modetest.c
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```
/* xf86drmRandom.c -- "Minimal Standard" PRNG Implementation
* Created: Mon Apr 19 08:28:13 1999 by faith@precisioninsight.com
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*
* Authors: Rickard E. (Rik) Faith <faith@valinux.com>
*
* DESCRIPTION
*
* This file contains a simple, straightforward implementation of the Park
* & Miller "Minimal Standard" PRNG [PM88, PMS93], which is a Lehmer
* multiplicative linear congruential generator (MLCG) with a period of
* 2^31-1.
*
* This implementation is intended to provide a reliable, portable PRNG
* that is suitable for testing a hash table implementation and for
* implementing skip lists.
*
* FUTURE ENHANCEMENTS
*
* If initial seeds are not selected randomly, two instances of the PRNG
* can be correlated.
  [Knuth81, pp. 32-33] describes a shuffling technique
* that can eliminate this problem.
*
* If PRNGs are used for simulation, the period of the current
* implementation may be too short.  [LE88] discusses methods of combining
* MLCGs to produce much longer periods, and suggests some alternative
* values for A and M.  [LE90 and Sch92] also provide information on
* long-period PRNGs.
*
* REFERENCES
*
* [Knuth81] Donald E. Knuth. The Art of Computer Programming.  Volume 2:
* Seminumerical Algorithms.  Reading, Massachusetts: Addison-Wesley, 1981.
*
* [LE88] Pierre L'Ecuyer. "Efficient and Portable Combined Random Number
```

* Generators".  CACM 31(6), June 1988, pp. 742-774.
*
* [LE90] Pierre L'Ecuyer. "Random Numbers for Simulation". CACM 33(10,
* October 1990, pp. 85-97.
*
* [PM88] Stephen K. Park and Keith W. Miller. "Random Number Generators:
* Good Ones are Hard to Find". CACM 31(10), October 1988, pp. 1192-1201.
*
* [Sch92] Bruce Schneier. "Pseudo-Ransom Sequence
 Generator for 32-Bit
* CPUs".  Dr. Dobb's Journal 17(2), February 1992, pp. 34, 37-38, 40.
*
* [PMS93] Stephen K. Park, Keith W. Miller, and Paul K. Stockmeyer.  In
* "Technical Correspondence: Remarks on Choosing and Implementing Random
* Number Generators". CACM 36(7), July 1993, pp. 105-110.
*
*/

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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/xf86drmRandom.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/exynos/exynos_fimg2d.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/exynos/fimg2d_reg.h
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/exynos/exynos_fimg2d_test.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/amdgpu/vcn_tests.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/amdgpu/uvd_enc_tests.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/amdgpu/syncobj_tests.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/amdgpu/deadlock_tests.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/etnaviv/etnaviv_cmd_stream.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/etnaviv/etnaviv_pipe.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/etnaviv/etnaviv_drmif.h
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/etnaviv/etnaviv_2d_test.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/freedreno/freedreno_priv.h
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/freedreno/freedreno_ringbuffer.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/freedreno/freedreno_bo.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/freedreno/freedreno_device.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/amdgpu/amdgpu_cs.c

* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/amdgpu/amdgpu_vamgr.c
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Contributing to libdrm
==========

Submitting Patches
---

Patches should be sent to dri-devel@lists.freedesktop.org, using git
send-email. For patches only touching driver specific code one of the driver
mailing lists (like amd-gfx@lists.freedesktop.org) is also appropriate. See git
documentation for help:

http://git-scm.com/documentation

Since dri-devel is a very busy mailing list please use --subject-prefix="PATCH
libdrm" to make it easier to find libdrm patches. This is best done by running

  git config --local format.subjectprefix "PATCH libdrm"

The first line of a commit message should contain a prefix indicating what part
is affected by the patch followed by one sentence that describes the change. For
examples:

  amdgpu: Use uint32_t i in amdgpu_find_bo_by_cpu_mapping

The body of the commit message should describe what the patch changes and why,
and also note any particular
 side effects. For a recommended reading on
writing commit messages, see:

http://who-t.blogspot.de/2009/12/on-commit-messages.html

Your patches should also include a Signed-off-by line with your name and email
address. If you're not the patch's original author, you should also gather
S-o-b's by them (and/or whomever gave the patch to you.) The significance of
this is that it certifies that you created the patch, that it was created under
an appropriate open source license, or provided to you under those terms.  This
lets us indicate a chain of responsibility for the copyright status of the code.
For more details:

https://developercertificate.org/

We won't reject patches that lack S-o-b, but it is strongly recommended.

Review and Merging
---

Patches should have at least one positive review (Reviewed-by: tag) or
indication of approval (Acked-by: tag) before merging. For any code shared
between drivers this is mandatory.

Please note that kernel/userspace API header files
have special rules, see
include/drm/README.

Coding style in the project loosely follows the CodingStyle of the linux kernel:

https://www.kernel.org/doc/html/latest/process/coding-style.html?highlight=coding%20style

Commit Rights
---

Commit rights will be granted to anyone who requests them and fulfills the
below criteria:

- Submitted a few (5-10 as a rule of thumb) non-trivial (not just simple
 spelling fixes and whitespace adjustment) patches that have been merged
 already. Since libdrm is just a glue library between the kernel and userspace
 drivers, merged patches to those components also count towards the commit
 criteria.

- Are actively participating on discussions about their work (on the mailing
 list or IRC). This should not be interpreted as a requirement to review other
 peoples patches but just make sure that patch submission isn't one-way
 communication. Cross-review is still highly encouraged.

- Will be regularly contributing further patches. This
 includes regular
 contributors to other parts of the open source graphics stack who only
 do the oddball rare patch within libdrm itself.

- Agrees to use their commit rights in accordance with the documented merge
 criteria, tools, and processes.

To apply for commit rights ("Developer" role in gitlab) send a mail to
dri-devel@lists.freedesktop.org and please ping the maintainers if your request
is stuck.

Committers are encouraged to request their commit rights get removed when they
no longer contribute to the project. Commit rights will be reinstated when they
come back to the project.

Maintainers and committers should encourage contributors to request commit
rights, as especially junior contributors tend to underestimate their skills.

Code of Conduct
---

Please be aware the fd.o Code of Conduct also applies to libdrm:

https://www.freedesktop.org/wiki/CodeOfConduct/

See the gitlab project owners for contact details of the libdrm maintainers.

Abuse of commit
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patches that violate the documented merge criteria, will also be handled through
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Happy hacking!

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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/amdgpu/amdgpu_vm.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/freedreno/msm/msm_ringbuffer.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/freedreno/msm/msm_pipe.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/freedreno/kgsl/kgsl_bo.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/freedreno/kgsl/kgsl_ringbuffer.c
*
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/freedreno/kgsl/kgsl_priv.h
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/freedreno/msm/msm_bo.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/freedreno/msm/msm_priv.h
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/freedreno/kgsl/kgsl_pipe.c
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*
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tegra/private.h
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/exynos/meson.build
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/radeon/meson.build

* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tegra/meson.build
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/proptest/meson.build
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/amdgpu/meson.build
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/exynos/meson.build
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/util/format.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/util/pattern.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/util/common.h
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*
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/omap/omap_drm.h
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/omap/omap_drmif.h
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```
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/include/drm/qxl_drm.h
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```
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*
* Authors: Rickard E. (Rik) Faith <faith@valinux.com>
*
* DESCRIPTION
*
* This file contains a straightforward skip list implementation.n
*
* FUTURE ENHANCEMENTS
*
* REFERENCES
*
* [Pugh90] William Pugh.  Skip Lists: A Probabilistic Alternative to
* Balanced Trees. CACM 33(6), June 1990, pp. 668-676.
*
*/
```

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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/exynos/exynos_drm.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/radeon/bof.c
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The release criteria for libdrm is essentially "if you need a release, make one". There is no designated release engineer or maintainer. Anybody is free to make a release if there's a certain feature or bug fix they need in a released version of libdrm.

When new ioctl definitions are merged into drm-next, we will add support to libdrm, at which point we typically create a new release. However, this is up to whoever is driving the feature in question.

Follow these steps to release a new version of libdrm:

1) Bump the version number in meson.build. We seem to have settled for 2.4.x as the versioning scheme for libdrm, so just bump the micro version.

2) Run `ninja -C builddir/ dist` to generate the tarballs. Make sure that the version number of the tarball name in builddir/meson-dist/ matches the number you bumped to. Move that tarball to the libdrm repo root for the release script to pick up.

3) Push the updated main branch with the bumped version number:

git push origin main

assuming the remote for the upstream libdrm repo is called origin.

4) Use the release.sh script from the xorg/util/modular repo to upload the tarballs to the freedesktop.org download area and create an announce email template. The script takes one argument: the path to the libdrm checkout. So, if a checkout of modular is at the same level than the libdrm repo:

./modular/release.sh libdrm

This copies the two tarballs to freedesktop.org and creates libdrm-2.4.16.announce which has a detailed summary of the changes, links to the tarballs, MD5 and SHA1 sums and pre-filled out email headers. Fill out the blank between the email headers and the list of changes with a brief message of what changed or

what prompted this release.  Send out the email and you're done!

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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/RELEASING
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/etnaviv/write_bmp.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/Android.bp
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/util/Android.bp
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/radeon/radeon_surface.h
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/vc4/vc4_qpu_defines.h
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/etnaviv/etnaviv_bo_cache_test.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/amdgpu/amdgpu_test.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/amdgpu/basic_tests.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/amdgpu/amdgpu_test.h
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/amdgpu/bo_tests.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/util_math.h

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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/radeon/radeon_ttm.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/radeon/rbo.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/intel/intel_bufmgr.h
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/amdgpu/amdgpu_stress.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/etnaviv/etnaviv_bo.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/amdgpu/vce_ib.h
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/amdgpu/vce_tests.c
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/* xf86drmHash.c -- Small hash table support for integer -> integer mapping
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*
* Authors: Rickard E. (Rik) Faith <faith@valinux.com>
*
* DESCRIPTION

```
*
* This file contains a straightforward implementation of a fixed-sized
* hash table using self-organizing linked lists [Knuth73, pp. 398-399] for
* collision resolution.  There are two potentially interesting things
* about this implementation:
*
* 1) The table is power-of-two sized.  Prime sized tables are more
* traditional, but do not have a significant advantage over power-of-two
* sized table, especially when double hashing is not used for collision
* resolution.
*
* 2) The hash computation
 uses a table of random integers [Hanson97,
* pp. 39-41].
*
* FUTURE ENHANCEMENTS
*
* With a table size of 512, the current implementation is sufficient for a
* few hundred keys.  Since this is well above the expected size of the
* tables for which this implementation was designed, the implementation of
* dynamic hash tables was postponed until the need arises.  A common (and
* naive) approach to dynamic hash table implementation simply creates a
* new hash table when necessary, rehashes all the data into the new table,
* and destroys the old table.  The approach in [Larson88] is superior in
* two ways: 1) only a portion of the table is expanded when needed,
* distributing the expansion cost over several insertions, and 2) portions
* of the table can be locked, enabling a scalable thread-safe
* implementation.
*
* REFERENCES
*
* [Hanson97] David R. Hanson.  C Interfaces and Implementations:
* Techniques for Creating Reusable Software.  Reading, Massachusetts:
 * Addison-Wesley, 1997.
*
* [Knuth73] Donald E. Knuth. The Art of Computer Programming.  Volume 3:
* Sorting and Searching.  Reading, Massachusetts: Addison-Wesley, 1973.
*
* [Larson88] Per-Ake Larson. "Dynamic Hash Tables".  CACM 31(4), April
* 1988, pp. 446-457.
*
*/
```

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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/hash.c

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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/amdgpu/handle_table.h

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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/tegra/vic-flip.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/tegra/vic41.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/tegra/vic30.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/etnaviv/etnaviv_gpu.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/intel/test_decode.c
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- state.xml  (  18940 bytes, from 2016-09-06 14:14:12)
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- state_2d.xml  (  51552 bytes, from 2016-09-06 14:44:16)
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/etnaviv/state.xml.h
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-Yl8zbB98/libdrm-2.4.123.tar.xz-cosi-expand-archive-ucbhKiv3/libdrm-2.4.123/tests/amdgpu/security_tests.c

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# 1.1033 cobra 1.8.1

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# 1.1037 pygobject 3.40.1

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Ty Coon, President of Vice

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# 1.1043 gomega 1.37.0

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# 1.1044 morgan 1.10.1

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# 1.1045 levn 0.4.1

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name: 'levn'
version: '0.4.1'

author: 'George Zahariev <z@georgezahariev.com>'
description: 'Light ECMAScript (JavaScript) Value Notation - human written, concise, typed, flexible'
homepage: 'https://github.com/gkz/levn'
keywords:
'levn'
'light'
'ecmascript'
'value'
'notation'

'json'
'typed'
'human'
'concise'
'typed'
'flexible'
files:
'lib'
'README.md'
'LICENSE'
main: './lib/'

bugs: 'https://github.com/gkz/levn/issues'
license: 'MIT'
engines:
node: '>= 0.8.0'
repository:
type: 'git'
url: 'git://github.com/gkz/levn.git'
scripts:
test: 'make test'

dependencies:
'prelude-ls': '^1.2.1'
'type-check': '~0.4.0'

dev-dependencies:
livescript: '^1.6.0'
mocha: '^7.1.1'
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# 1.1046 genproto-googleapis-rpc 0.0.0-20250407143221-ac9807e6c755

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Protocol Buffers for Go with Gadgets

Go support for Protocol Buffers - Google's data interchange format

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```
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```

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```
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<signature of Ty Coon>, 1 April 1989
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# 1.1073 @babel/helpers 7.22.15

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* JavaScript MD5 Test
* https://github.com/blueimp/JavaScript-MD5
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*/
```

Found in path(s):
* /blueimp-md5-2-3-0-2-tgz/package/test/test.js
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No license file was found, but licenses were detected in source scan.

```
/**
  * Inspects an object.
  *
  * @see taken from node.js `util` module (copyright Joyent, MIT license)
  * @api private
  */
/**
  * Asserts deep equality
  *
  * @see taken from node.js `assert` module (copyright Joyent, MIT license)
  * @api private
  */
```

Found in path(s):
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```
MD5
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# 1.1075 cpuid 2.2.10

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# 1.1078 flatpak 1.12.9-4.el9_6

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# 1.1081 wayland 1.21.0-1.el9

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# 1.1082 wide-align 1.1.5

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  as part of the Insight Segmentation and Registration
 Toolkit (ITK).

* US National Labs (Los Alamos, Livermore, Sandia) ASC Parallel
  Visualization Initiative.

* National Alliance for Medical Image Computing (NAMIC) is funded by the
  National Institutes of Health through the NIH Roadmap for Medical Research,
  Grant U54 EB005149.

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# 1.1115 gpgme 1.15.1-6.el9

## 1.1115.1 Available under license :

(21:protected-private-key(3:elg(1:p129:|B36I(s7}+ZJ/pvE;"tg7N ca"Gxvnyu&bB#h'7=89&oG
R<hO)(1:g1:)(1:y128:Ji]WU_UP}AQ\YMhAl|2e{_tcMNDg]{QnWsK 4pY{$bDCs)(9:protected25:openpgp-s2k3-
sha1-aes-cbc((4:sha18:JcE7:6452224)16: i[Q*vK)192:FJA!O!ZAF
biJ&Tsb!t
&9@R\~V+x>?sedDz-W(yqf?u^e?s1saV8<T0:tC5%ZMh?$|,y_e[1D)(12:protected-at15:20130812T105135)))
(21:protected-private-key(3:elg(1:p129:W#}}l;;m>
;4YV$Qg
LoLy~*Tru*+ID8"-9,:17^g*({ #7)(1:g1:)(1:y128:2o62,Tj/
rRi3sSS iCAYNYbVtAHKi7(UPp)?Od{'R^f)(9:protected25:openpgp-s2k3-sha1-aes-
cbc((4:sha18:fw`E7:5242880)16:aqR)192:5f1a-`{^EV699WoB\,:Rs1*W6Lu iZ
:=ZqURM47;pA3#DL
so8O)Th^P@lP0&.DR;"rkN7)(12:protected-at15:20101008T070216)))
#+TITLE: GPGME Python Bindings HOWTO Examples
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltxtra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

* Examples
 :PROPERTIES:
 :CUSTOM_ID: gpgme-python3-examples
 :END:

 The contents of this directory are the examples included in the /GNU
 Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO/ file.  Each
 script is explicitly for Python 3 and specifically for Python 3.4 or
 later.

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cython
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;;; Conventions:
;;;
;;; gpg-error is used for error handling.
;;;
;;; Standard I/O streams are used for input and output.

(defpackage #:gpgme
 (:use #:common-lisp #:cffi #:gpg-error)
  (:import-from #:trivial-garbage
             #:finalize)
 (:export #:check-version
   #:*version*
   #:context
   #:protocol
   #:armorp
   #:textmodep
   #:+include-certs-default+
   #:include-certs
   #:keylist-mode
   #:signers
   #:sig-notations
   #:with-context
   #:key-data
   #:get-key
   #:op-encrypt
   #:op-decrypt
   #:op-sign
   #:op-verify
   #:op-import
   #:op-export))
2011-12-02  Werner Koch  <wk@g10code.com>

 NB: ChangeLog files are no longer manually maintained.  Starting
 on December 1st, 2011 we put change information only in the GIT
 commit log, and generate a top-level ChangeLog file from logs at
```

"make dist".  See doc/HACKING for details.

2011-05-12  Marcus Brinkmann  <marcus@g10code.com>

* gpgme.texi (I/O Callback Example): Fix example code.

* gpgme.texi (Generating Keys): Fix OpenPGP parameters and reference
GPG and GPGSM manual.

2010-01-05  Werner Koch  <wk@g10code.com>

* gpgme.texi (Changing Passphrases): New.

2009-07-21  Werner Koch  <wk@g10code.com>

* uiserver.texi (UI Server Encrypt): Add --expect-sign option to
PREP_ENCRYPT.

2009-06-16  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Result Management): New section.

2009-06-16  Werner Koch  <wk@g10code.com>

* gpgme.texi (Exporting Keys): Document gpgme_op_export_keys.
(Importing Keys): Document gpgme_op_import_keys.
(Data Buffer Meta-Data): Document URL encodings.

2009-05-28
Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Library Version Check): Document selftest error.
(Creating Contexts): Likewise.

2009-05-18  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document
GPGME_ENCRYPT_NO_ENCRYPT_TO.

2009-05-05  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Engine Information): Replace path by file_name.

2008-11-28  Werner Koch  <wk@g10code.com>

* gpgme.texi (Listing Keys): Change description of the return
value to match the code.  Spotted by Colin Leroy.

2008-10-15  Werner Koch  <wk@g10code.com>

* uiserver.texi (Miscellaneous UI Server Commands): Add option
--protocol to the SENDER command.

2008-07-17  Werner Koch  <wk@g10code.com>

* module-overview.sk: New.

2008-07-04  Werner Koch  <wk@g10code.com>

* gpgme.texi (Algorithms): Add a hint on symmetric only encryption.

2008-06-27  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Cancellation): Document gpgme_cancel_async.

2008-06-25
Werner Koch  <wk@g10code.com>

* gpgme.texi (Listing Keys): Updated example to the current API.
Noted by Nico Schottelius.

2008-06-05  Werner Koch  <wk@g10code.com>

* uiserver.texi (Miscellaneous UI Server Commands): Describe
START_CONFDIALOG.

2008-06-04  Werner Koch  <wk@g10code.com>

* gpgme.texi: Use @copying command. Change license to
GPLv3. Include protocol specis from GpgOL and GPGEx.  Minor
cleanups.

2008-03-11  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (File Based Data Buffers): Document the need for
blocking operations.
(Callback Based Data Buffers): Likewise.

2008-03-05  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Library Version Check): Rename snippet function to
init_gpgme.
(I/O Callback Example): Call it here.

2008-01-28  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi: Document that data encoding affects some output data
objects now.

2007-09-27  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Protocols and Engines):
Document GPGME_PROTOCOL_UNKNOWN.

2007-09-11  Werner Koch  <wk@g10code.com>

* gpgme.texi (I/O Callback Example): Typo fix.

2007-08-07  Werner Koch  <wk@g10code.com>

* gpgme.texi (Verify): Describe chain_model.

2007-07-12  Werner Koch  <wk@g10code.com>

* gpgme.texi (Library Version Check): Add remark that the socket
layer will get initialized.

2007-06-05  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Advanced Key Editing): New section.

2007-05-21  Werner Koch  <wk@g10code.com>

* Makefile.am (online): New target.

2007-05-18  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Error Strings): Fix documentation of
gpgme_strerror_r.

2006-11-01  Moritz Schulte  <moritz@g10code.com>

* gpgme.texi (Data Buffer I/O Operations): Fixed entry for
gpgme_data_seek: OFFSET is not a pointer; some s/whence/offset/.

2006-09-25  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Destroying Data Buffers): Clarify that
gpgme_data_release_and_get_mem destroys DH unconditionally.

2005-03-24
Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Library Version Check): Make example code compatible

to W32 systems.

2006-06-21  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Fix inverted condition in
description.

2005-12-20  Werner Koch  <wk@g10code.com>

* gpgme.texi (Verify): Document pka_trust.

2005-12-06  Werner Koch  <wk@g10code.com>

* gpgme.texi (Key Management): Updated to match the fixes for
subkey fingerprints and theg secret flag.

2005-10-06  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Destroying Data Buffers): Document gpgme_free.

2005-10-02  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Key Management): Add the new member notations of
gpgme_sig_key_t.
(Key Listing Mode): Document GPGME_KEYLIST_MODE_SIG_NOTATIONS.

2005-10-01  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi: Enclose all return parameters of deftypefuns in
curly brackets.

* gpgme.texi (Signature Notation Data): New
section.
(Verify): Added more about the notation data structure.

2005-09-30  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Data Buffer I/O Operations, Data Buffer Meta-Data):
New subsections.

* gpgme.texi: Replace plaintext_filename with file_name.

* gpgme.texi (Key Management): Document is_qualified.

2005-07-27  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Decrypt): Add plaintext_filename to
gpgme_decrypt_result_t.

(Verify): Likewise for gpgme_verify_result_t.

2005-06-03 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Add information about new fields in
gpgme_signature_t.

* gpgme.texi (Decrypt): Add gpgme_recipient_t.

2005-05-28 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Listing Mode): Fix return type of
gpgme_set_keylist_mode.
Reported by "Sergio" <ml_sergico@virgilio.it>.

2005-04-28 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Included Certificates): Document
GPGME_INCLUDE_CERTS_DEFAULT.

2005-01-12 Marcus
Brinkmann <marcus@g10code.de>

* gpgme.texi (Engine Configuration): New section.
(Crypto Engine): New subsection.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

* lesser.texi (Library Copying): Change from @appendixsec to
@appendix.
* gpgme.texi (Features): Change reference to GPL to one to LGPL.

* Makefile.am: Change license to LGPL.
(gpgme_TEXINFOS): Replace gpl.texi with lesser.texi.

* gpgme.texi: Change license to LGPL (also for documentation of
GPGME's license).
* lesser.texi: New file.
* gpl.texi: File removed.

* gpgme.texi (Creating Contexts): Fix cut&paste error. Reported
by Noel Torres <envite@rolamasao.org>.

2004-09-30 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (gpgme_TEXINFOS): Remove fdl.texi.
* gpgme.texi: Do not include fdl.texi. Change license to GPL.
* fdl.texi: File removed.

2004-09-29  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Key Management): Change type of keylist_mode in
gpgme_key_t to gpgme_keylist_mode_t.

2004-09-28
Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Fix last change.

2004-09-27  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Document
GPG_ERR_NOT_IMPLEMENTED.

* gpgme.texi: Update copyright year for tex version.

2004-07-29  Moritz Schulte  <moritz@g10code.com>

* gpgme.texi (Verify): Fix gpgme_get_key example (ancient
force_update argument was still there).

2004-06-08  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Listing Keys): Elaborate on the length restrictions
on search patterns.

* gpgme.texi (Decrypt and Verify): Document the NO_DATA error
code.
(Verify): Document the relationship between gpgme_op_verify_result
and the decrypt and verify operations.

2004-05-21  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.text (Verify): Document GPG_ERR_CERT_REVOKED status.

* gpgme.texi (Decrypt): Add note about new field wrong_key_usage
of gpgme_decrypt_result_t.

* gpgme.texi (Key Management): Add
note about new field
keylist_mode of gpgme_key_t.

2004-04-29  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Verify): Correct type of member wrong_key_usage.

2004-03-29  Moritz Schulte  <moritz@duesseldorf.ccc.de>

* gpgme.texi (Verify): Fix type of gpgme_op_verify_result.
* gpgme.texi (Key Listing Mode): Typo fix.

2004-03-23  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Library Version Check): Fix the instruction when to
set the locale.

2004-03-03  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (I/O Callback Example Qt): New section by Marc Mutz.

2004-02-24  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (cancellation): New section.

2004-02-17  Werner Koch  <wk@gnupg.org>

* gpgme.texi (Key Listing Mode): Doc KEYLIST_MODE_VALIDATE.

2004-02-06  Moritz Schulte  <mo@g10code.com>

* gpgme.texi: A couple of small fixes regarding the Largfile
Support section.

2004-02-01  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Largefile Support): New
section.

2004-01-13  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Key Management): Fix exportable field.

2003-12-25  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Key Management): Rename member class in
gpgme_key_sig_t to sig_class.
(Creating a Signature): Likewise for gpgme_signature_t.

2003-12-23  Moritz Schulte  <mo@g10code.com>

* gpgme.texi (Listing Keys): Minor clarification for
gpgme_get_key.

2003-10-06  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Signal Handling): New section.

2003-09-14  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Multi Threading): Correct documentation on memory
synchronization requirement.

* gpgme.texi (Locale): New section.
(Multi Threading): Set locale in example.

2003-09-13  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Error Strings): Add gpgme_strerror_r.

2003-09-13  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Multi Threading): Update documentation.

2003-09-03  Marcus Brinkmann  <marcus@g10code.de>

*
gpgme.texi (Header): We don't use the assuan namespace anymore.
Document new thread options.

2003-08-14  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Creating a Signature): Change type of member class
to unsigned int.

2003-08-04  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Verify): Get error code from SIG->status in the code
for gpgme_get_sig_status.

2003-07-31  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Key Management): Add can_authenticate flag.

* gpgme.texi (Listing Keys): Document GPG_ERR_AMBIGUOUS_NAME for
gpgme_get_key.

2003-07-29  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (EXTRA_DIST): Remove variable.

* gpgme.texi (Encrypting a Plaintext): Bad passphrase is only
possible with symmetric encryption, change the wording to reflect

that.

* gpgme.texi (Creating a Signature): Document
GPG_ERR_UNUSABLE_SECKEY.

* gpgme.texi (Encrypting a Plaintext): Mention encrypt and sign
operations in result function.
(Creating
a Signature): Likewise.

2003-07-23  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Key Listing Mode): Remove word duplication.
(Listing Keys): Remove mentioning of force argument.
(Verify): Don't mention r_stat.  Fix some typos.
(Decrypt and Verify): Correct info how to get the result.  Don't
mention r_stat.
(Manipulating Data Buffers): Fix documentation of return value.
(Listing Keys): Update examples.
(Decrypt): Result might also be available when operation failed.
(Verify): Result might also be available when operation failed.
All spotted by Stphane Corthsy.

2003-07-22  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Error Sources): Fix cut and paste error.

2003-07-09  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Key Management): Clarify difference between can_sign
and can_certify.
(Information About Keys): Likewise for GPGME_ATTR_CAN_SIGN and
GPGME_ATTR_CAN_CERTIFY.

2003-07-08  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Progress
Meter Callback): Change return type of
gpgme_progress_cb_t to void.

2003-06-22  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi: Add 2003 to copyright notice.

* gpgme.texi (Header): Fix name space documentation on
libgpg-error.

2003-06-22  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Multi Threading): Remove reference to
gpgme_recipients_t.

2003-06-06  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Crypto Operations): Rename gpgme_invalid_user_id_t
to gpgme_invalid_key_t.

2003-06-06  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi: Change error codes to GPG_ERR_* variants.
(Error Handling): Rewritten.

2003-05-29  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Exporting Keys): Change and document prototypes.
Add new gpgme_op_export_ext and gpgme_op_export_ext_start
variants.
(Selecting Recipients): Section removed.
(Encrypting a Plaintext): Change prototypes and document the
changes.

2003-05-28  Marcus Brinkmann  <marcus@g10code.de>

*
gpgme.texi (Exporting Keys): Change argument type from
gpgme_recipient_t to gpgme_user_id_t.
(Encrypting a Plaintext): Likewise.
(Selecting Recipients): Rewritten.

2003-05-27  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Protocol Selection): Do not use @acronym in @node
because that breaks texi2dvi.

* gpgme.texi (Passphrase Callback): Document new prototype.

2003-05-18  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Header): Remove Gpgme as namespace prefix.  Add
_GPGME to namespace prefix.
* gpgme.texi (Multi Threading): Add note about link order.

2003-05-04  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Listing Keys): Document what happens if key is not
found.

* gpgme.texi (Importing Keys): Fix cut and paste error.

2003-04-30  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Remove reference to
gpgme_get_op_info.
(Detailed Results): Subsection removed.

* gpgme.texi (Key Listing Mode): Add GPGME_KEYLIST_MODE_SIGS.
(Manipulating
Keys): Add obsoleteness note.
(Key Signatures): Likewise.
(Information About Keys): Likewise.
(Key Management): Add new data types GpgmeSubkey, GpgmeKeySig,
GpgmeUserID, and all the information about GpgmeKey.

2003-04-29  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Listing Keys): Remove force_update argument from
gpgme_get_key.

* gpgme.texi (Trust Item Management): Add data members of
GpgmeTrustItem type.
(Information About Trust Items): Add note about obsoleteness.
(Manipulating Trust Items): Add gpgme_trust_item_ref and
gpgme_trust_item_unref.

2003-04-28  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Verify): Rewritten to take into account new and
deprecated functions and data types.

* gpgme.texi (Decrypt): Descript gpgme_op_decrypt_result and
GpgmeDecryptResult.

2003-04-27  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Add info about
GpgmeEncryptResult and gpgme_op_encrypt_result.

* gpgme.texi
(Creating a Signature): Add info about
GpgmeNewSignature, GpgmeSignResult and gpgme_op_sign_result.
(Crypto Operations): Add GpgmeInvalidUserID.
(Algorithms): New chapter.

* gpgme.texi (Deleting Keys): Document

GPGME_Ambiguous_Specification.
(Error Values): Remove GPGME_Invalid_Type and GPGME_Invalid_Mode.
Add GPGME_Unknown_Reason, GPGME_Not_Found,
GPGME_Ambiguous_Specification, GPGME_Wrong_Key_Usage,
GPGME_Key_Revoked, GPGME_Key_Expired, GPGME_No_CRL_Known,
GPGME_CRL_Too_Old, GPGME_Policy_Mismatch, GPGME_No_Secret_Key,
GPGME_Key_Not_Trusted, GPGME_Issuer_Missing, GPGME_Chain_Too_Long,
GPGME_Unsupported_Algorithm, GPGME_Sig_Expired,
GPGME_Bad_Signature, GPGME_No_Public_Key.

2003-04-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Importing Keys): Change GPGME_IMPORT_PRIVATE to
GPGME_IMPORT_SECRET.

* gpgme.texi (Importing Keys): Remove note about gpgme_get_op_info.
(Detailed Results): Remove note about import.

* gpgme.texi (Importing Keys): Add documentation
for
GpgmeImportStatus, GpgmeImportResult and gpgme_op_import_result.

* gpgme.texi (Generating Keys): Fix documentation of public and
secret arguments.

2003-04-24 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Generating Keys): Document changed gpgme_op_genkey
and new gpgme_op_genkey_result function. Document
GpgmeGenKeyResult data type.

* gpgme.texi (Error Values): Rename GPGME_No_Passphrase to
GPGME_Bad_Passphrase.
* gpgme.texi (Decrypt): Likewise.
(Decrypt and Verify): Likewise.
(Creating a Signature): Likewise.
(Encrypting a Plaintext): Likewise.

* gpgme.texi (Error Values): Rename GPGME_No_Recipients to
GPGME_No_UserID and GPGME_Invalid_Recipient to
GPGME_Invalid_UserID.
(Encrypting a Plaintext): Likewise.

* gpgme.texi (Error Values): Remove GPGME_Busy and GPGME_No_Request.
(Listing Keys): Likewise.
(Listing Trust Items): Likewise.

2003-02-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Cancelling an Operation): Removed.
(Passphrase
Callback): Document new type for GpgmePassphraseCb.

2003-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Engine Information): Rename member part to
file_name.

* gpgme.texi (Protocols and Engines): Document
gpgme_get_protocol_name.

* gpgme.texi (Engine Information): Rewritten.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (I/O Callback Interface): Document new even
GPGME_EVENT_START.
(Waiting For Completion): Document new possible return values.
(I/O Callback Interface): Document return type of GpgmeIOCb.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Hooking Up Into Idle Time): Section removed.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Drop R_STAT argument in gpgme_op_verify.
* gpgme.texi (Decrypt and Verify): Likewise for
gpgme_op_decrypt_verify.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Information About Keys): Document that
GPGME_ATTR_IS_SECRET is not representable
as a string anymore.

2002-12-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Signatures): New section.
(Listing Keys): Add gpgme_get_key.

2002-12-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Memory Based Data Buffers): New subsection.
(File Based Data Buffers): Likewise.
(Callback Based Data Buffers): Likewise.

(Manipulating Data Buffers): Update interfaces. Add
gpgme_data_seek.
* gpgme.texi (Engine Version Check): Remove gpgme_check_engine.

2002-11-21 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Document the new interface.

2002-11-19 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Generating Keys): Document new argument to
gpgme_op_genkey.

2002-11-05 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Fix prototype of gpgme_get_sig_key.
Reported by Miguel Coca <e970095@zipi.fi.upm.es>.

2002-08-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Selecting Signers): Fix reference count.

2002-08-21
Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Header): Document name space.

2002-08-20 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Importing Keys): Document gpgme_op_import_ext.

* gpgme.texi (Importing Keys): Undocument EOF.

2002-08-14 Werner Koch <wk@gnupg.org>

* gpgme.texi (Information About Keys): Changed GPGME_ATTR_TYPE.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Deleting Keys): Say that secret keys might not be
deleted.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Information About Keys): Document (badly) the new
key attributes.

* gpgme.texi (Manipulating Data Buffers): Mention that backend

tries to detect encoding automatically.

2002-07-03 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Run Control): Update this section.
(Waiting For Completion): Likewise for this subsection.
(Cancelling an Operation): Likewise for this subsection.
(Using External Event Loops): New subsection with several
subsubsections.

2002-06-28
Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Remove item about the need to
synchronize anything against gpgme_wait (except gpgme_wait
itself).

2002-06-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Information About Keys): Fix documentation for IDX.
(Information About Trust Items): Likewise.

2002-06-26 Werner Koch <wk@gnupg.org>

* gpgme.texi (Importing Keys): Document the return value -1 of
gpgme_op_import.

2002-06-20 Werner Koch <wk@gnupg.org>

* gpgme.texi (Verify): Explain the new whatidx variable.

2002-06-10 Werner Koch <wk@gnupg.org>

* gpgme.texi (Verify): Document attribute GPGME_ATTR_ERRTOK.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Document new autodetection.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (DISTCLEANFILES): New variable.

2002-05-26 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Some typographical corrections
throughout.

2002-05-09  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Using Automake): New section.

2002-05-09  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Multi Threading): Escape { and }.

2002-05-09  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Overview): Replace note about thread-safeness.
(Multi Threading): New section.

2002-05-03  Werner Koch  <wk@gnupg.org>

* gpgme.texi (Manipulating Data Buffers): Changed some data types
to void*.
(Protocol Selection): Added gpgme_get_protocol.
(Verify): Updated to include the new attribute functions and
status codes.

2002-04-27  Werner Koch  <wk@gnupg.org>

* gpgme.texi (Manipulating Data Buffers): New type GpgmeDataEncoding.

2002-04-23  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Document that either return
argument can be NULL.
(Progress Meter Callback): Likewise.

2002-04-22  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Fix small
typo.  Document the
new function gpgme_get_passphrase_cb.
(Progress Meter Callback): Document the new function
gpgme_get_progress_cb.

2002-04-16  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Creating a Signature): Fix function name.  Reported
by Wichert Ackerman <wichert@debian.org>.

2002-03-29  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (direntry): End index entry with a full stop.
Patch submitted by Jose Carlos Garcia Sogo <jsogo@debian.org>.

2002-03-17  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Detailed Results): Fix syntax error in last change.

2002-03-08  Werner Koch  <wk@gnupg.org>

* gpgme.texi (Detailed Results): Import does also return info.

2002-03-06  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document symmetric
encryption.

2002-03-06  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Error Strings): Add example.
* gpgme.texi (Listing Keys): Likewise.

2002-03-03  Marcus Brinkmann  <marcus@g10code.de>

*
gpgme.texi (Information About Keys): Document GPGME_ATTR_EXPIRE.

2002-03-03  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Verify): Document verification of normal and
cleartext signatures.

2002-02-27  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Listing Keys): Document gpgme_op_keylist_ext_start.

2002-02-27  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document
GPGME_Invalid_Recipients.
(Error Values): Likewise.

2002-02-26  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document
gpgme_op_encrypt_sign and gpgme_op_encrypt_sign_start.

2002-02-25  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Creating a Signature): Add a note about
certificates to include.

(Included Certificates): New section.

2002-02-09  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Detailed Results): Remove literal tags.
(Generating Keys): Update documentation.

* gpgme.texi (Generating Keys):
Fix syntax error.

2002-02-06  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Waiting For Completion): Adjust doc to changes in
the code.

2002-02-06  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Key Listing Mode): Update documentation.

2002-01-31  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Generating Keys): Document error at creation
failure.

2002-01-30  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Deleting Keys): Document new error values.

2002-01-30  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Importing Keys): Add reference to gpgme_get_op_info.

2002-01-30  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi: Some spell checking.

2002-01-30  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi: Add all the gpgme_op_*_start functions.
Fill the concept index with many, many entries.

2002-01-29  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Run Control): New section.
(Verify): Document gpgme_get_notation.
(More Information):
New section describing gpgme_get_op_info.

2002-01-22  Marcus Brinkmann  <marcus@g10code.de>

 * gpgme.texi (Passphrase callback): Change GpgmePassphraseCb's
 R_HD type from void* to void**.

2002-01-22  Marcus Brinkmann  <marcus@g10code.de>

 * gpgme.texi (Creating data buffers): Change
 gpgme_data_new_from_filepart's LENGTH type from off_t to size_t.

2002-01-22  Marcus Brinkmann  <marcus@g10code.de>

 * gpgme.texi (Generating keys): New subsection.
 (Exporting keys): Likewise.
 (Importing keys): Likewise.
 (Deleting keys): Likewise.

2002-01-16  Marcus Brinkmann  <marcus@g10code.de>

 * gpgme.texi: g10Code -> g10 Code

 * gpgme.texi (Top): Complete detailmenu.

 * gpgme.texi: Convert embarrassing cruft to the real thing.

2002-01-16  Marcus Brinkmann  <marcus@g10code.de>

 * ChangeLog: New file.
 * gpgme.texi: Likewise.
 * gpl.texi: Likewise.
 * fdl.texi: Likewise.
 * Makefile.am (info_TEXINFOS): New variable.
 (gpgme_TEXINFOS): Likewise.

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(private-key
(oid.1.2.840.113549.1.1.1
 (n

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(e #010001#)
(d
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(u
#304559a9ead56d2309d203811a641bb1a09626bc8eb36fffa23c968ec5bd891eebbafc73ae666e01ba7c8990bae06cc2bbe10b75e69fcacb353a6473079d8e9b#)
)
)
This is gpgme.info, produced by makeinfo version 6.5 from gpgme.texi.

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INFO-DIR-SECTION GNU Libraries
START-INFO-DIR-ENTRY
* GPGME: (gpgme). Adding support for cryptography to your program.
END-INFO-DIR-ENTRY

This file documents the GPGME library.

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The
GnuPG Made Easy Reference Manual, for Version
1.14.1-beta35.

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File: gpgme.info, Node: Top, Next: Introduction, Up: (dir)

Main Menu
*********

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The
GnuPG Made Easy Reference Manual, for Version 1.14.1-beta35 of the
GPGME library.

* Menu:

* Introduction:: How to use this manual.
* Preparation:: What you should
do before using the library.
* Protocols and Engines:: Supported crypto protocols.
* Algorithms:: Supported algorithms.
* Error Handling:: Error numbers and their meanings.
* Exchanging Data:: Passing data to and from GPGME.
* Contexts:: Handling GPGME contexts.

Appendices

* UI Server Protocol:: The GnuPG UI Server Protocol.
* Debugging:: How to solve problems.
* Deprecated Functions:: Documentation of deprecated functions.

* Library Copying:: The GNU Lesser General Public License says
how you can copy and share GnuPG Made Easy.
* Copying:: The GNU General Public License says how you
can copy and share this manual.

Indices

* Concept Index:: Index of concepts and programs.
* Function and Data Index:: Index of functions, variables and data types.

The Detailed Node Listing

Introduction

* Getting Started:: Purpose of the manual, and how to use it.
* Features:: Reasons to install and use GPGME.
* Overview:: Basic architecture of the GPGME library.

Preparation

* Header:: What header file you need to include.
* Building the Source:: Compiler options to be used.
* Largefile Support (LFS):: How to use GPGME with LFS.
* Using Automake:: Compiler options to be used the easy way.
* Using Libtool:: Avoiding compiler options entirely.
* Library Version Check:: Getting and verifying the library version.
* Signal Handling:: How GPGME affects signal handling.
* Multi-Threading:: How GPGME can be used in an MT environment.

Protocols and Engines

* Engine Version Check:: Verifying the engine version.
* Engine Information:: Obtaining more information about the engines.
* Engine Configuration:: Changing the engine configuration.
* OpenPGP:: Support for the OpenPGP protocol.
* Cryptographic Message Syntax:: Support for the CMS.

Algorithms

* Public Key Algorithms:: A list of all public key algorithms.
* Hash Algorithms:: A list of all hash algorithms.

Error Handling

* Error Values:: The error value and what it means.
* Error Codes:: A list of important error codes.
* Error Sources:: A list of important error sources.
* Error Strings:: How to get a descriptive string from a value.

Exchanging Data

* Creating Data Buffers:: Creating new data buffers.
* Destroying Data Buffers:: Releasing data buffers.
* Manipulating Data Buffers:: Operations on data buffers.

Creating Data Buffers

* Memory Based Data Buffers:: Creating memory based data buffers.
* File Based Data Buffers:: Creating file based data buffers.
* Callback Based Data Buffers:: Creating callback based data buffers.

Manipulating Data Buffers

* Data Buffer I/O Operations:: I/O operations on data buffers.
* Data Buffer Meta-Data:: Meta-data manipulation of data buffers.
* Data Buffer Convenience:: Convenience function for data buffers.

Contexts

* Creating Contexts:: Creating new GPGME contexts.
* Destroying Contexts:: Releasing GPGME contexts.
* Result Management:: Managing the result of crypto operations.
* Context Attributes:: Setting properties of a context.
* Key Management:: Managing keys with GPGME.
* Crypto Operations:: Using a context for cryptography.
* Miscellaneous:: Miscellaneous operations.
* Run Control:: Controlling how operations are run.

Context Attributes

* Protocol Selection:: Selecting the protocol used by a context.
* Crypto Engine:: Configuring the crypto engine.
* Setting the Sender:: How to tell the engine the sender.
* ASCII Armor:: Requesting ASCII armored output.
* Text Mode:: Choosing canonical text mode.
* Offline Mode:: Choosing offline mode.
* Included Certificates:: Including a number of certificates.
* Key Listing Mode:: Selecting key listing mode.
* Passphrase Callback:: Getting the passphrase from the user.
* Progress Meter Callback:: Being informed about the progress.
* Status Message Callback:: Status messages received from gpg.
* Locale:: Setting the locale of a context.

Key Management

* Key objects:: Description of the key structures.
* Listing Keys:: Browsing the list of available keys.
* Information About Keys:: Requesting detailed information about keys.
* Manipulating Keys:: Operations on keys.
* Generating Keys:: Creating new key pairs.
* Signing Keys:: Adding key signatures to public keys.
* Exporting Keys:: Retrieving key data from the key ring.

* Importing Keys:: Adding keys to the key ring.
* Deleting Keys:: Removing keys from the key ring.
* Changing Passphrases:: Change the passphrase of a key.
* Changing TOFU Data:: Changing data pertaining to TOFU.
* Advanced Key Editing:: Advanced key edit operation.

Crypto Operations

* Decrypt:: Decrypting a ciphertext.
* Verify:: Verifying a signature.
* Decrypt and Verify:: Decrypting a signed ciphertext.
* Sign:: Creating a signature.
* Encrypt:: Encrypting a plaintext.

Sign

* Selecting Signers:: How to choose the keys to sign with.
* Creating a Signature:: How to create a signature.
* Signature Notation Data::
How to add notation data to a signature.

Encrypt

* Encrypting a Plaintext:: How to encrypt a plaintext.

Miscellaneous

* Running other Programs:: Running other Programs.
* Using the Assuan protocol:: Using the Assuan protocol.
* Checking for updates:: How to check for software updates.

Run Control

* Waiting For Completion:: Waiting until an operation is completed.
* Using External Event Loops:: Advanced control over what happens when.
* Cancellation:: How to end pending operations prematurely.

Using External Event Loops

* I/O Callback Interface:: How I/O callbacks are registered.
* Registering I/O Callbacks:: How to use I/O callbacks for a context.
* I/O Callback Example:: An example how to use I/O callbacks.
* I/O Callback Example GTK+:: How to integrate GPGME in GTK+.
* I/O Callback Example GDK:: How to integrate GPGME in GDK.
* I/O Callback Example Qt:: How to integrate GPGME in Qt.

File:
gpgme.info, Node: Introduction, Next: Preparation, Prev: Top, Up: Top

# 1 Introduction
**********

GnuPG Made Easy (GPGME) is a C language library that allows to add support for cryptography to a program. It is designed to make access to public key crypto engines like GnuPG or GpgSM easier for applications. GPGME provides a high-level crypto API for encryption, decryption, signing, signature verification and key management.

GPGME uses GnuPG and GpgSM as its backends to support OpenPGP and the Cryptographic Message Syntax (CMS).

* Menu:

* Getting Started:: Purpose of the manual, and how to use it.
* Features:: Reasons to install and use GPGME.
* Overview:: Basic architecture of the GPGME library.

File: gpgme.info, Node: Getting Started, Next: Features, Up: Introduction

## 1.1 Getting Started
==========

This manual documents the GPGME library programming interface. All functions and data types provided
by the library are explained.

The reader is assumed to possess basic knowledge about cryptography in general, and public key cryptography in particular. The underlying cryptographic engines that are used by the library are not explained, but where necessary, special features or requirements by an engine are mentioned as far as they are relevant to GPGME or its users.

This manual can be used in several ways. If read from the beginning to the end, it gives a good introduction into the library and how it can be used in an application. Forward references are included where necessary. Later on, the manual can be used as a reference manual to get just the information needed about any particular interface of the library. Experienced programmers might want to start looking at the examples at the end of the manual, and then only read up those parts of the interface which are unclear.

The documentation for the language bindings is currently not included in this manual. Those

languages bindings follow the general programming
model of GPGME but may provide some extra high level abstraction on top
of the GPGME style API. For now please see the README files in the
lang/ directory of the source distribution.

File: gpgme.info, Node: Features, Next: Overview, Prev: Getting Started, Up: Introduction

## 1.2 Features

GPGME has a couple of advantages over other libraries doing a similar
job, and over implementing support for GnuPG or other crypto engines
into your application directly.

its free software
: Anybody can use, modify, and redistribute it under the terms of the
GNU Lesser General Public License (*note Library Copying::).

its flexible
: GPGME provides transparent support for several cryptographic
protocols by different engines. Currently, GPGME supports the
OpenPGP protocol using GnuPG as the backend, and the Cryptographic
Message Syntax using GpgSM as the backend.

its easy
: GPGME hides the differences
between the protocols and engines from
the programmer behind an easy-to-use interface. This way the
programmer can focus on the other parts of the program, and still
integrate strong cryptography in his application. Once support for
GPGME has been added to a program, it is easy to add support for
other crypto protocols once GPGME backends provide them.

its language friendly
: GPGME comes with languages bindings for several common programming
languages: Common Lisp, C++, Python 2, and Python 3.

File: gpgme.info, Node: Overview, Prev: Features, Up: Introduction

## 1.3 Overview

GPGME provides a data abstraction that is used to pass data to the
crypto engine, and receive returned data from it. Data can be read from
memory or from files, but it can also be provided by a callback
function.

The actual cryptographic operations are always set within a context. A context provides configuration parameters that define the behaviour of all operations performed within it. Only one operation per context is allowed at any time, but when one operation is finished, you can run the next operation in the same context. There can be more than one context, and all can run different operations at the same time.

Furthermore, GPGME has rich key management facilities including listing keys, querying their attributes, generating, importing, exporting and deleting keys, and acquiring information about the trust path.

With some precautions, GPGME can be used in a multi-threaded environment, although it is not completely thread safe and thus needs the support of the application.

File: gpgme.info, Node: Preparation, Next: Protocols and Engines, Prev: Introduction, Up: Top

## 2 Preparation

To use GPGME, you have to perform some changes to your sources and the build system. The necessary changes are small and explained in the following sections. At the end of this chapter, it is described how the library is initialized, and how the requirements of the library are verified.

* Menu:


* Header:: What header file you need to include.
* Building the Source:: Compiler options to be used.
* Largefile Support (LFS):: How to use GPGME with LFS.
* Using Automake:: Compiler options to be used the easy way.
* Using Libtool:: Avoiding compiler options entirely.
* Library Version Check:: Getting and verifying the library version.
* Signal Handling:: How GPGME affects signal handling.
* Multi-Threading:: How GPGME can be used in an MT environment.


File: gpgme.info, Node: Header, Next: Building the Source, Up: Preparation

### 2.1 Header

All interfaces (data types and functions) of the library are defined in the header file gpgme.h. You must include this in all programs using the library, either directly or through some other header file, like this:

```
#include <gpgme.h>
```

The name space of GPGME is gpgme_* for function names and data types and GPGME_* for other symbols. Symbols internal to GPGME take the form _gpgme_* and _GPGME_*.

Because GPGME makes use of the GPG Error library, using GPGME will also use the GPG_ERR_* name space directly, and the gpg_err*, gpg_str*, and gpgrt_* name space indirectly.

File: gpgme.info, Node: Building the Source, Next: Largefile Support (LFS), Prev: Header, Up: Preparation

## 2.2 Building the Source

If you want to compile a source file including the gpgme.h header file, you must make sure that the compiler can find it in the directory hierarchy. This is accomplished by adding the path to the directory in which the header file is located to the compilers include file search path (via the -I option).

However, the path to the include file is determined at the time the source is configured. To solve this problem, gpgme ships with a small helper program gpgme-config that knows about the path to the include file and other configuration options. The options that need to be added to the compiler invocation at compile time are output by the --cflags option to gpgme-config. The following example shows how it can be used at the command line:

```
gcc -c foo.c `gpgme-config --cflags`
```

Adding the output of gpgme-config --cflags to the compiler command line will ensure that the compiler can find the GPGME header file.

A similar problem occurs when linking the program with the library. Again, the compiler has to find the library files. For this to work, the path to the library files has to be added to the library search path (via the -L option). For this, the option --libs to gpgme-config can be used. For convenience, this option also outputs all other options that are required to link the program with GPGME (in particular,

the -lgpgme option). The example shows how to link foo.o with the GPGME library to a program foo.

```
gcc -o foo foo.o `gpgme-config --libs`
```

Of course you can also combine both examples to a single command by specifying both options to gpgme-config:

```
gcc -o foo foo.c `gpgme-config --cflags --libs`
```

If you need to detect the installed language bindings you can use list them using:

```
gpgme-config --print-lang
```

or test for the availability using

```
gpgme-config --have-lang=python && echo 'Bindings for Pythons available'
```

File: gpgme.info, Node: Largefile Support (LFS), Next: Using Automake, Prev: Building the Source, Up: Preparation

## 2.3 Largefile Support (LFS)

GPGME is compiled with largefile support by default, if it is available on the system. This means that GPGME supports files larger than two gigabyte in size, if the underlying operating system can. On some systems, largefile support is already the default. On such systems, nothing special is required. However, some systems provide only support for files up to two gigabyte in size by default. Support for larger file sizes has to be specifically enabled.

To make a difficult situation even more complex, such systems provide two different types of largefile support. You can either get all relevant functions replaced with alternatives that are largefile capable, or you can get new functions and data types for largefile support added. Those new functions have the same name as their smallfile counterparts, but with a suffix of 64.

An example: The data type off_t is 32 bit wide on GNU/Linux PC systems. To address offsets in large files, you can either enable largefile support add-on. Then a new data type off64_t is provided, which is 64 bit wide. Or you can replace the existing off_t data type with its 64 bit wide counterpart. All occurrences of off_t are then

automagically replaced.

As if matters were not complex enough, there are also two different types of file descriptors in such systems. This is important because if file descriptors are exchanged between programs that use a different maximum file size, certain errors must be produced on some file descriptors to prevent subtle overflow bugs from occurring.

As you can see, supporting two different maximum file sizes at the same time is not at all an easy task. However, the maximum file size does matter for GPGME, because some data types it uses in its interfaces are affected by that. For example, the off_t data type is used in the gpgme_data_seek function, to match its POSIX counterpart. This affects the call-frame of the function, and thus the ABI of the library. Furthermore, file descriptors can be exchanged between GPGME and the application.

For you as the user of the library, this means that your program must be compiled in the same file size mode as the library. Luckily, there is absolutely no valid reason for new programs to not enable largefile support by default and just use that. The compatibility modes (small file sizes or dual mode) can be considered an historic artefact, only useful to allow for a transitional period.

On POSIX platforms GPGME is compiled using largefile support by default. This means that your application must do the same, at least as far as it is relevant for using the gpgme.h header file. All types in this header files refer to their largefile counterparts, if they are different from any default types on the system.

On 32 and 64 bit Windows platforms off_t is declared as 32 bit signed integer. There is no specific support for LFS in the C library. The recommendation from Microsoft is to use the native interface (CreateFile et al.) for large files. Released binary versions of GPGME (libgpgme-11.dll) have always been build with a 32 bit off_t. To avoid an ABI break we stick to this convention for 32 bit Windows by using long there. GPGME versions for 64 bit Windows have never been released and thus we are able to use int64_t instead of off_t there. For easier migration the typedef gpgme_off_t has been defined. The reason we cannot use off_t directly is that some toolchains (e.g. mingw64) introduce a POSIX compatible hack for off_t. Some widely used toolkits make use of this hack and in turn GPGME would need to use it also. However, this would introduce an ABI break and existing software making use of libgpgme might suffer from a severe break. Thus with version 1.4.2 we redefined all functions using off_t to use

gpgme_off_t which is defined as explained above. This way we keep the ABI well defined and independent of any toolchain hacks. The bottom line is that LFS support in GPGME is only available on 64 bit versions of Windows.

On POSIX platforms you can enable largefile support, if it is different from the default on the system the application is compiled on, by using the Autoconf macro AC_SYS_LARGEFILE. If you do this, then you dont need to worry about anything else: It will just work. In this case you might also want to use AC_FUNC_FSEEKO to take advantage of some new interfaces, and AC_TYPE_OFF_T (just in case).

If you do not use Autoconf, you can define the preprocessor symbol _FILE_OFFSET_BITS to 64 _before_ including any header files, for example by specifying the option -D_FILE_OFFSET_BITS=64 on the compiler command line. You will also want to define the preprocessor symbol LARGEFILE_SOURCE to 1 in this case, to take advantage of some new interfaces.

If you do not want to do either of the above, you probably know enough about the issue to invent your own solution. Just keep in mind that the GPGME header file expects that largefile support is enabled, if it is available. In particular, we do not support dual mode (_LARGEFILE64_SOURCE).

File: gpgme.info, Node: Using Automake, Next: Using Libtool, Prev: Largefile Support (LFS), Up: Preparation

## 2.4 Using Automake

It is much easier if you use GNU Automake instead of writing your own Makefiles. If you do that you do not have to worry about finding and invoking the gpgme-config script at all. GPGME provides an extension to Automake that does all the work for you.

-- Macro: AM_PATH_GPGME ([MINIMUM-VERSION], [ACTION-IF-FOUND], [ACTION-IF-NOT-FOUND])

-- Macro: AM_PATH_GPGME_PTH ([MINIMUM-VERSION], [ACTION-IF-FOUND], [ACTION-IF-NOT-FOUND])

-- Macro: AM_PATH_GPGME_PTHREAD ([MINIMUM-VERSION], [ACTION-IF-FOUND], [ACTION-IF-NOT-FOUND])

Check whether GPGME (at least version MINIMUM-VERSION, if given) exists on the host system. If it is found, execute ACTION-IF-FOUND, otherwise do ACTION-IF-NOT-FOUND, if given.

Additionally, the function defines GPGME_CFLAGS to the flags needed for compilation of the program to find the gpgme.h header file, and GPGME_LIBS to the linker flags needed to link the program to the GPGME library. If the used helper script does not match the target type you are building for a warning is printed and the string libgcrypt is appended to the variable gpg_config_script_warn.

AM_PATH_GPGME_PTH checks for the version of GPGME that can be used with GNU Pth, and defines GPGME_PTH_CFLAGS and GPGME_PTH_LIBS.

AM_PATH_GPGME_PTHREAD checks for the version of GPGME that can be used with the native pthread implementation, and defines GPGME_PTHREAD_CFLAGS and GPGME_PTHREAD_LIBS. Since version 1.8.0 this is no longer required to GPGME_PTHREAD as GPGME itself is thread safe.

This macro searches for gpgme-config along the PATH. If you are cross-compiling, it is useful to set the environment variable SYSROOT to the top directory of your target. The macro will then first look for the helper program in the bin directory below that top directory. An absolute directory name must be used for SYSROOT. Finally, if the configure command line option --with-gpgme-prefix is used, only its value is used for the top directory below which the helper script is expected.

You can use the defined Autoconf variables like this in your Makefile.am:

```
AM_CPPFLAGS = $(GPGME_CFLAGS)
LDADD = $(GPGME_LIBS)
```

File: gpgme.info, Node: Using Libtool, Next: Library Version Check, Prev: Using Automake, Up: Preparation

## 2.5 Using Libtool

The easiest way is to just use GNU Libtool. If you use libtool, and link to libgpgme.la, libgpgme-pth.la or libgpgme-pthread.la respectively, everything will be done automatically by Libtool.

File: gpgme.info, Node: Library Version Check, Next: Signal Handling, Prev: Using Libtool, Up: Preparation

## 2.6 Library Version Check

-- Function: const char * gpgme_check_version
(const char *REQUIRED_VERSION)

The function gpgme_check_version has four purposes. It can be used to retrieve the version number of the library. In addition it can verify that the version number is higher than a certain required version number. In either case, the function initializes some sub-systems, and for this reason alone it must be invoked early in your program, before you make use of the other functions in GPGME. The last purpose is to run selftests.

As a side effect for W32 based systems, the socket layer will get initialized.

If REQUIRED_VERSION is NULL, the function returns a pointer to a statically allocated string containing the version number of the library.

If REQUIRED_VERSION is not NULL, it should point to a string containing a version number, and the function checks that the version of the library is at least as high as the version number provided. In this case, the function returns a pointer to a statically allocated string containing the version number of the library. If REQUIRED_VERSION is not a valid version number, or if the version requirement is not met, the function returns NULL.

If you use a version of a library that is backwards compatible with older releases, but contains additional interfaces which your program uses, this function provides a run-time check if the necessary features are provided by the installed version of the library.

If a selftest fails, the function may still succeed. Selftest errors are returned later when invoking gpgme_new or gpgme-data_new, so that a detailed error code can be returned (historically, gpgme_check_version does not return a detailed error code).

-- Function: int gpgme_set_global_flag (const char *NAME,
const char *VALUE)

SINCE: 1.4.0

On some systems it is not easy to set environment variables and

thus hard to use GPGMEs internal trace facility for debugging.
This function has been introduced as an alternative way to enable
debugging and for a couple of other rarely used tweaks. It is
important to assure that only one thread accesses GPGME functions
between a call to this function and after the return from the call
to
gpgme_check_version.

All currently supported features require that this function is
called as early as possible even before gpgme_check_version.
The features are identified by the following values for NAME:

debug
To enable debugging use the string debug for NAME and VALUE
identical to the value used with the environment variable
GPGME_DEBUG.

disable-gpgconf
Using this feature with any VALUE disables the detection of
the gpgconf program and thus forces GPGME to fallback into the
simple OpenPGP only mode. It may be used to force the use of
GnuPG-1 on systems which have both GPG versions installed.
Note that in general the use of gpgme_set_engine_info is a
better way to select a specific engine version.

gpgconf-name
gpg-name
Set the name of the gpgconf respective gpg binary. The
defaults are GNU/GnuPG/gpgconf and GNU/GnuPG/gpg. Under

Unix the leading directory part is ignored. Under Windows the
leading directory part is used as the default installation
directory; the .exe suffix is added by GPGME. Use forward
slashed even under Windows.

require-gnupg
Set the minimum version of the required GnuPG engine. If that
version is not met, GPGME fails early instead of trying to use
the existent version. The given version must be a string with
major, minor, and micro number. Example: "2.1.0".

w32-inst-dir
On Windows GPGME needs to know its installation directory to
find its spawn helper. This is in general no problem because
a DLL has this information. Some applications however link
statically to GPGME and thus GPGME can only figure out the
installation directory of this application which may be wrong
in certain cases. By supplying an installation directory as

value to this flag, GPGME will assume that that directory is the installation directory. This flag has no effect on non-Windows platforms.

This function returns 0 on success. In contrast to other functions the non-zero return value on failure does not convey any error code. For setting debug the only possible error cause is an out of memory condition; which would exhibit itself later anyway. Thus the return value may be ignored.

After initializing GPGME, you should set the locale information to the locale required for your output terminal. This locale information is needed for example for the curses and Gtk pinentry. Here is an example of a complete initialization:

```
#include <locale.h>
#include <gpgme.h>

void
init_gpgme (void)
{
  /* Initialize the locale environment.  */
  setlocale (LC_ALL, "");
  gpgme_check_version (NULL);
  gpgme_set_locale (NULL, LC_CTYPE, setlocale (LC_CTYPE, NULL));
 #ifdef LC_MESSAGES
  gpgme_set_locale (NULL, LC_MESSAGES, setlocale (LC_MESSAGES, NULL));
#endif
}
```

Note that you are highly recommended to initialize the locale settings like this. GPGME can not do this for you because it would not be thread safe. The conditional on LC_MESSAGES is only necessary for portability to W32 systems.

File: gpgme.info, Node: Signal Handling, Next: Multi-Threading, Prev: Library Version Check, Up: Preparation

## 2.7 Signal Handling

The GPGME library communicates with child processes (the crypto engines). If a child process dies unexpectedly, for example due to a bug, or system problem, a SIGPIPE signal will be delivered to the application. The default action is to abort the program. To protect against this, gpgme_check_version sets the SIGPIPE signal action to SIG_IGN, which means that the signal will be ignored.

GPGME will only do that if the signal action for SIGPIPE is SIG_DEF at the time gpgme_check_version is called. If it is something different, GPGME will take no action.

This means that if your application does not install any signal handler for SIGPIPE, you dont need to take any precautions. If you do install a signal handler for SIGPIPE, you must be prepared to handle any SIGPIPE events that occur due to GPGME writing to a defunct pipe. Furthermore, if your application is multi-threaded, and you install a signal action for SIGPIPE, you must make sure you do this either before gpgme_check_version is called or afterwards.

File: gpgme.info, Node: Multi-Threading, Prev: Signal Handling, Up: Preparation

## 2.8 Multi-Threading

The GPGME library is mostly thread-safe, and can be used in a multi-threaded environment but there are some requirements for multi-threaded use:

The function gpgme_check_version must be called before any other function in the library, because it initializes the thread support subsystem in GPGME. To achieve this in multi-threaded programs, you must synchronize the memory with respect to other threads that also want to use GPGME. For this, it is sufficient to call gpgme_check_version before creating the other threads using GPGME(1).

Any gpgme_data_t and gpgme_ctx_t object must only be accessed by one thread at a time. If multiple threads want to deal with the same object, the caller has to make sure that operations on that object are fully synchronized.

Only one thread at any time is allowed to call gpgme_wait. If multiple threads call this function, the caller must make sure that all invocations are fully synchronized. It is safe to start asynchronous operations while a thread is running in gpgme_wait.

The function gpgme_strerror is not thread safe. You have to use gpgme_strerror_r instead.

---------- Footnotes ----------

(1) At least this is true for POSIX threads, as pthread_create is a function that synchronizes memory with respects to other threads. There are many functions which have this property, a complete list can be found in POSIX, IEEE Std 1003.1-2003, Base Definitions, Issue 6, in the definition of the term Memory Synchronization. For other thread packages other, more relaxed or more strict rules may apply.

File: gpgme.info, Node: Protocols and Engines, Next: Algorithms, Prev: Preparation, Up: Top

# 3 Protocols and Engines

GPGME supports several cryptographic protocols, however, it does not implement them. Rather it uses backends (also called engines) which implement the protocol. GPGME uses inter-process communication to pass data back and forth between the application and the backend, but the details of the communication protocol and invocation of the backend is completely hidden by the interface. All complexity is handled by GPGME. Where an exchange of information between the application and the backend is necessary, GPGME provides the necessary callback function hooks and further interfaces.

-- Data type: enum gpgme_protocol_t

The gpgme_protocol_t type specifies the set of possible protocol values that are supported by GPGME. The following protocols are supported:

GPGME_PROTOCOL_OpenPGP
GPGME_PROTOCOL_OPENPGP
This specifies the OpenPGP protocol.

GPGME_PROTOCOL_CMS
This specifies the Cryptographic Message Syntax.

GPGME_PROTOCOL_GPGCONF
Under development. Please ask on <gnupg-devel@gnupg.org> for help.

GPGME_PROTOCOL_ASSUAN
SINCE: 1.2.0

This specifies the raw Assuan protocol.

GPGME_PROTOCOL_G13
SINCE: 1.3.0

Under development. Please ask on <gnupg-devel@gnupg.org> for help.

GPGME_PROTOCOL_UISERVER
Under development. Please ask on <gnupg-devel@gnupg.org> for help.

GPGME_PROTOCOL_SPAWN
SINCE: 1.5.0

Special protocol for use with gpgme_op_spawn.

GPGME_PROTOCOL_UNKNOWN
Reserved for future extension. You may use this to indicate that the used protocol is not known to the application. Currently, GPGME does not accept this value in any operation, though, except for gpgme_get_protocol_name.

-- Function: const char * gpgme_get_protocol_name (gpgme_protocol_t PROTOCOL)
The function gpgme_get_protocol_name returns a statically allocated string describing the protocol PROTOCOL, or NULL if the protocol number is not valid.

* Menu:

* Engine Version Check:: Verifying the engine version.
* Engine Information:: Obtaining more information about the engines.
* Engine Configuration:: Changing the engine configuration.
* OpenPGP:: Support for the OpenPGP protocol.
* Cryptographic Message Syntax:: Support for the CMS.
* Assuan:: Support for the raw Assuan protocol.

File: gpgme.info,
Node: Engine Version Check, Next: Engine Information, Up: Protocols and Engines

3.1 Engine Version Check
==========

-- Function: const char * gpgme_get_dirinfo (cons char *WHAT)
SINCE: 1.5.0

The function gpgme_get_dirinfo returns a statically allocated string with the value associated to WHAT. The returned values are the defaults and wont change even after gpgme_set_engine_info

has been used to configure a different engine. NULL is returned if no value is available. Commonly supported values for WHAT are:

homedir
: Return the default home directory.

sysconfdir
: Return the name of the system configuration directory

bindir
: Return the name of the directory with GnuPG program files.

libdir
: Return the name of the directory with GnuPG related library files.

libexecdir
: Return the name of the directory with GnuPG helper program files.

datadir
: Return the name of the directory with GnuPG shared data.

localedir
: Return the name of the directory with GnuPG locale data.

agent-socket
: Return the name of the socket to connect to the gpg-agent.

agent-ssh-socket
: Return the name of the socket to connect to the ssh-agent component of gpg-agent.

dirmngr-socket
: Return the name of the socket to connect to the dirmngr.

uiserver-socket
: Return the name of the socket to connect to the user interface server.

gpgconf-name
: Return the file name of the engine configuration tool.

gpg-name
: Return the file name of the OpenPGP engine.

gpgsm-name

Return the file name of the CMS engine.

g13-name
Return the name of the file container encryption engine.

gpg-wks-client-name
Return the name of the Web Key Service tool.

-- Function: gpgme_error_t gpgme_engine_check_version
(gpgme_protocol_t PROTOCOL)
The function gpgme_engine_check_version verifies that the engine implementing the protocol PROTOCOL is installed in the expected path and meets the version requirement of GPGME.

This function returns the error code GPG_ERR_NO_ERROR if the engine is available and GPG_ERR_INV_ENGINE if it is not.

File: gpgme.info, Node: Engine Information, Next: Engine Configuration, Prev: Engine Version Check, Up: Protocols and Engines

3.2 Engine Information
==========

-- Data type: gpgme_engine_info_t
The gpgme_engine_info_t type specifies a pointer to a structure describing a crypto engine. The structure contains the following elements:

gpgme_engine_info_t next
This is a pointer to the next engine info structure in the linked list, or NULL if this is the last element.

gpgme_protocol_t protocol
This is the protocol for which the crypto engine is used. You
can convert this to a string with gpgme_get_protocol_name for printing.

const char *file_name
This is a string holding the file name of the executable of the crypto engine. Currently, it is never NULL, but using NULL is reserved for future use, so always check before you use it.

const char *home_dir
This is a string holding the directory name of the crypto engines configuration directory. If it is NULL, then the

default directory is used. See gpgme_get_dirinfo on how to get the default directory.

const char *version
This is a string containing the version number of the crypto engine. It might be NULL if the version number can not be determined, for example because the executable doesnt exist or is invalid.

const char *req_version
This is a string containing the minimum required version number
of the crypto engine for GPGME to work correctly. This is the version number that gpgme_engine_check_version verifies against. Currently, it is never NULL, but using NULL is reserved for future use, so always check before you use it.

-- Function: gpgme_error_t gpgme_get_engine_info (gpgme_engine_info_t *INFO)
The function gpgme_get_engine_info returns a linked list of engine info structures in INFO. Each info structure describes the defaults of one configured backend.

The memory for the info structures is allocated the first time this function is invoked, and must not be freed by the caller.

This function returns the error code GPG_ERR_NO_ERROR if successful, and a system error if the memory could not be allocated.

Here is an example how you can provide more diagnostics if you receive an error message which indicates that the crypto engine is invalid.

```
gpgme_ctx_t ctx;
gpgme_error_t
err;

[...]

if (gpgme_err_code (err) == GPG_ERR_INV_ENGINE)
  {
    gpgme_engine_info_t info;
    err = gpgme_get_engine_info (&info);
    if (!err)
      {
        while (info && info->protocol != gpgme_get_protocol (ctx))
```

```
        info = info->next;
      if (!info)
        fprintf (stderr, "GPGME compiled without support for protocol %s",
                 gpgme_get_protocol_name (info->protocol));
      else if (info->file_name && !info->version)
        fprintf (stderr, "Engine %s not installed properly",
                 info->file_name);
      else if (info->file_name && info->version && info->req_version)
        fprintf (stderr, "Engine %s version %s installed, "
                 "but at least version %s required", info->file_name,
                 info->version, info->req_version);
      else
        fprintf (stderr, "Unknown problem with engine
for protocol %s",
                 gpgme_get_protocol_name (info->protocol));
    }
  }
```

File: gpgme.info, Node: Engine Configuration, Next: OpenPGP, Prev: Engine Information, Up: Protocols and Engines

## 3.3 Engine Configuration

You can change the configuration of a backend engine, and thus change the executable program and configuration directory to be used. You can make these changes the default or set them for some contexts individually.

-- Function: gpgme_error_t gpgme_set_engine_info
(gpgme_protocol_t PROTO, const char *FILE_NAME,
const char *HOME_DIR)

SINCE: 1.1.0

The function gpgme_set_engine_info changes the default configuration of the crypto engine implementing the protocol PROTO.

FILE_NAME is the file name of the executable program implementing this protocol, and HOME_DIR is the directory name of the configuration directory for this crypto engine. If HOME_DIR is

NULL, the engines default will be used.

The new defaults are not applied to already created GPGME contexts.

This function returns the error code GPG_ERR_NO_ERROR if successful, or an error code on failure.

The functions gpgme_ctx_get_engine_info and gpgme_ctx_set_engine_info can be used to change the engine configuration per context. *Note Crypto Engine::.

File: gpgme.info, Node: OpenPGP, Next: Cryptographic Message Syntax, Prev: Engine Configuration, Up: Protocols and Engines

## 3.4 OpenPGP

OpenPGP is implemented by GnuPG, the GNU Privacy Guard. This is the first protocol that was supported by GPGME.

The OpenPGP protocol is specified by GPGME_PROTOCOL_OpenPGP.

File: gpgme.info, Node: Cryptographic Message Syntax, Next: Assuan, Prev: OpenPGP, Up: Protocols and Engines

## 3.5 Cryptographic Message Syntax

CMS is implemented by GpgSM, the S/MIME implementation for GnuPG.

The CMS protocol is specified by GPGME_PROTOCOL_CMS.

File: gpgme.info, Node: Assuan, Prev: Cryptographic Message Syntax, Up: Protocols and Engines

## 3.6 Assuan

Assuan is the RPC library used by the various GnuPG components. The Assuan protocol allows one to talk to arbitrary Assuan servers using GPGME. *Note Using the Assuan protocol::.

The ASSUAN protocol is specified by GPGME_PROTOCOL_ASSUAN.

File: gpgme.info, Node: Algorithms, Next: Error Handling, Prev: Protocols and Engines, Up: Top

# 4 Algorithms

The crypto backends support a variety of algorithms used in public key

cryptography.(1) The following sections list the identifiers used to denote such an algorithm.

* Menu:

* Public Key Algorithms:: A list of all public key algorithms.
* Hash Algorithms:: A list of all hash algorithms.

---------- Footnotes ----------

(1) Some engines also provide symmetric only encryption; see the description of the encryption function on how to use this.

File:
gpgme.info, Node: Public Key Algorithms, Next: Hash Algorithms, Up: Algorithms

## 4.1 Public Key Algorithms

Public key algorithms are used for encryption, decryption, signing and verification of signatures.

-- Data type: enum gpgme_pubkey_algo_t
The gpgme_pubkey_algo_t type specifies the set of all public key algorithms that are supported by GPGME. Possible values are:

GPGME_PK_RSA
This value indicates the RSA (Rivest, Shamir, Adleman) algorithm.

GPGME_PK_RSA_E
Deprecated. This value indicates the RSA (Rivest, Shamir, Adleman) algorithm for encryption and decryption only.

GPGME_PK_RSA_S
Deprecated. This value indicates the RSA (Rivest, Shamir, Adleman) algorithm for signing and verification only.

GPGME_PK_DSA
This value indicates DSA, the Digital Signature Algorithm.

GPGME_PK_ELG
This value indicates ElGamal.

GPGME_PK_ELG_E

This value also indicates ElGamal and is used specifically in GnuPG.

GPGME_PK_ECC
SINCE: 1.5.0

This value is a generic indicator for ellipic curve algorithms.

GPGME_PK_ECDSA
SINCE: 1.3.0

This value indicates ECDSA, the Elliptic Curve Digital Signature Algorithm as defined by FIPS 186-2 and RFC-6637.

GPGME_PK_ECDH
SINCE: 1.3.0

This value indicates ECDH, the Eliptic Curve Diffie-Hellmann encryption algorithm as defined by RFC-6637.

GPGME_PK_EDDSA
SINCE: 1.7.0

This value indicates the EdDSA algorithm.

-- Function: const char * gpgme_pubkey_algo_name (gpgme_pubkey_algo_t ALGO)

The function gpgme_pubkey_algo_name returns a pointer to a statically allocated string containing a description of the public key algorithm ALGO. This string can be used to output the name of the public key algorithm to the user.

If ALGO is not a valid public key algorithm, NULL is returned.

-- Function: char * gpgme_pubkey_algo_string (gpgme_subkey_t KEY)

SINCE: 1.7.0

The function gpgme_pubkey_algo_string is a convenience function to build and return an algorithm string in the same way GnuPG does (e.g. rsa2048 or ed25519). The caller must free the result using gpgme_free. On error (e.g. invalid argument or memory exhausted), the function returns NULL and sets ERRNO.

File: gpgme.info, Node: Hash Algorithms, Prev: Public Key Algorithms, Up: Algorithms

## 4.2 Hash Algorithms

==========

Hash (message digest) algorithms are used to compress a long message to make it suitable for public key cryptography.

-- Data type: enum gpgme_hash_algo_t
The gpgme_hash_algo_t type specifies the set of all hash algorithms that are supported by GPGME. Possible values are:

GPGME_MD_MD5
GPGME_MD_SHA1
GPGME_MD_RMD160
GPGME_MD_MD2
GPGME_MD_TIGER
GPGME_MD_HAVAL
GPGME_MD_SHA256
GPGME_MD_SHA384
GPGME_MD_SHA512
GPGME_MD_SHA224
SINCE: 1.5.0

GPGME_MD_MD4
GPGME_MD_CRC32
GPGME_MD_CRC32_RFC1510
GPGME_MD_CRC24_RFC2440

-- Function: const char * gpgme_hash_algo_name (gpgme_hash_algo_t ALGO)
The function gpgme_hash_algo_name returns a pointer to a statically allocated string containing a description of the hash algorithm ALGO. This string can be used to output the name of the hash algorithm to the user.

If ALGO is not a valid hash algorithm, NULL is returned.

File: gpgme.info, Node: Error Handling, Next: Exchanging Data, Prev: Algorithms, Up: Top

5 Error Handling
**********

Many functions in GPGME can return an error if they fail. For this reason, the application should always catch the error condition and take appropriate measures, for example by releasing the resources and passing the error up to the caller, or by displaying a descriptive message to the user and cancelling the operation.

Some error values do not indicate a system error or an error in the

operation, but the result of an operation that failed properly. For example, if you try to decrypt a tempered message, the decryption will fail. Another error value actually means that the end of a data buffer or list has been reached. The following descriptions explain for many error codes what they mean usually. Some error values have specific meanings if returned by a certain functions. Such cases are described in the documentation of those functions.

GPGME uses the libgpg-error library. This allows to share the error codes with other components of the GnuPG system, and thus pass error values transparently from the crypto engine, or some helper application of the crypto engine, to the user. This way no information is lost. As a consequence, GPGME does not use its own identifiers for error codes, but uses those provided by libgpg-error. They usually start
with GPG_ERR_.

However, GPGME does provide aliases for the functions defined in libgpg-error, which might be preferred for name space consistency.

* Menu:

* Error Values:: The error value and what it means.
* Error Sources:: A list of important error sources.
* Error Codes:: A list of important error codes.
* Error Strings:: How to get a descriptive string from a value.

File: gpgme.info, Node: Error Values, Next: Error Sources, Up: Error Handling

## 5.1 Error Values

-- Data type: gpgme_err_code_t
The gpgme_err_code_t type is an alias for the libgpg-error type gpg_err_code_t. The error code indicates the type of an error, or the reason why an operation failed.

A list of important error codes can be found in the next section.

-- Data type: gpgme_err_source_t
The gpgme_err_source_t type is an alias for the libgpg-error type gpg_err_source_t. The error source
has not a precisely
defined meaning. Sometimes it is the place where the error happened, sometimes it is the place where an error was encoded into an error value. Usually the error source will give an indication to where to look for the problem. This is not always true, but it

is attempted to achieve this goal.

A list of important error sources can be found in the next section.

-- Data type: gpgme_error_t
The gpgme_error_t type is an alias for the libgpg-error type gpg_error_t. An error value like this has always two components, an error code and an error source. Both together form the error value.

Thus, the error value can not be directly compared against an error code, but the accessor functions described below must be used. However, it is guaranteed that only 0 is used to indicate success (GPG_ERR_NO_ERROR), and that in this case all other parts of the error value are set to 0, too.

Note
that in GPGME, the error source is used purely for diagnostical purposes. Only the error code should be checked to test for a certain outcome of a function. The manual only documents the error code part of an error value. The error source is left unspecified and might be anything.

-- Function: static inline gpgme_err_code_t gpgme_err_code (gpgme_error_t ERR)
The static inline function gpgme_err_code returns the gpgme_err_code_t component of the error value ERR. This function must be used to extract the error code from an error value in order to compare it with the GPG_ERR_* error code macros.

-- Function: static inline gpgme_err_source_t gpgme_err_source (gpgme_error_t ERR)
The static inline function gpgme_err_source returns the gpgme_err_source_t component of the error value ERR. This function must be used to extract the error source from an error value in order to compare it with the GPG_ERR_SOURCE_*
error
source macros.

-- Function: static inline gpgme_error_t gpgme_err_make (gpgme_err_source_t SOURCE, gpgme_err_code_t CODE)
The static inline function gpgme_err_make returns the error value consisting of the error source SOURCE and the error code CODE.

This function can be used in callback functions to construct an error value to return it to the library.

-- Function: static inline gpgme_error_t gpgme_error

(gpgme_err_code_t CODE)
The static inline function gpgme_error returns the error value consisting of the default error source and the error code CODE.

For GPGME applications, the default error source is GPG_ERR_SOURCE_USER_1. You can define GPGME_ERR_SOURCE_DEFAULT before including gpgme.h to change this default.

This function can be used in callback functions to construct an error value to return it to the library.

The libgpg-error library provides error codes for all system error numbers
it knows about. If ERR is an unknown error number, the error code GPG_ERR_UNKNOWN_ERRNO is used. The following functions can be used to construct error values from system errnor numbers.

-- Function: gpgme_error_t gpgme_err_make_from_errno
(gpgme_err_source_t SOURCE, int ERR)
The function gpgme_err_make_from_errno is like gpgme_err_make, but it takes a system error like errno instead of a gpgme_err_code_t error code.

-- Function: gpgme_error_t gpgme_error_from_errno (int ERR)
The function gpgme_error_from_errno is like gpgme_error, but it takes a system error like errno instead of a gpgme_err_code_t error code.

Sometimes you might want to map system error numbers to error codes directly, or map an error code representing a system error back to the system error number. The following functions can be used to do that.

-- Function: gpgme_err_code_t gpgme_err_code_from_errno (int ERR)
The function gpgme_err_code_from_errno returns
the error code for
the system error ERR. If ERR is not a known system error, the function returns GPG_ERR_UNKNOWN_ERRNO.

-- Function: int gpgme_err_code_to_errno (gpgme_err_code_t ERR)
The function gpgme_err_code_to_errno returns the system error for the error code ERR. If ERR is not an error code representing a system error, or if this system error is not defined on this system, the function returns 0.

File: gpgme.info, Node: Error Sources, Next: Error Codes, Prev: Error Values, Up: Error Handling

5.2 Error Sources

==========

The library libgpg-error defines an error source for every component of the GnuPG system. The error source part of an error value is not well defined. As such it is mainly useful to improve the diagnostic error message for the user.

If the error code part of an error value is 0, the whole error value will be 0. In this case the error source part is of course GPG_ERR_SOURCE_UNKNOWN.

The list of error sources that might occur in applications using GPGME is:

GPG_ERR_SOURCE_UNKNOWN
The error source is not known. The value of this error source is 0.

GPG_ERR_SOURCE_GPGME
The error source is GPGME itself. This is the default for errors that occur in the GPGME library.

GPG_ERR_SOURCE_GPG
The error source is GnuPG, which is the crypto engine used for the OpenPGP protocol.

GPG_ERR_SOURCE_GPGSM
The error source is GPGSM, which is the crypto engine used for the CMS protocol.

GPG_ERR_SOURCE_GCRYPT
The error source is libgcrypt, which is used by crypto engines to perform cryptographic operations.

GPG_ERR_SOURCE_GPGAGENT
The error source is gpg-agent, which is used by crypto engines to perform operations with the secret key.

GPG_ERR_SOURCE_PINENTRY
The error source is pinentry, which is used by gpg-agent to query the passphrase to unlock a secret key.

GPG_ERR_SOURCE_SCD
The error source is the SmartCard Daemon, which is used by gpg-agent to delegate operations with the secret key to a SmartCard.

GPG_ERR_SOURCE_KEYBOX
The error source is libkbx, a library used by the crypto engines to manage local keyrings.

GPG_ERR_SOURCE_USER_1
GPG_ERR_SOURCE_USER_2
GPG_ERR_SOURCE_USER_3
GPG_ERR_SOURCE_USER_4
These error sources are not used by any GnuPG component and can be used by other software. For example, applications using GPGME can use them to mark error values coming from callback handlers. Thus GPG_ERR_SOURCE_USER_1 is the default for errors created with gpgme_error and gpgme_error_from_errno, unless you define GPGME_ERR_SOURCE_DEFAULT before including gpgme.h.

File: gpgme.info, Node: Error Codes, Next: Error Strings, Prev: Error Sources, Up: Error Handling

## 5.3 Error Codes

The library libgpg-error defines many error values. Most of them are not used by GPGME directly, but might be returned by GPGME because it received them
from the crypto engine. The below list only includes such error codes that have a specific meaning in GPGME, or which are so common that you should know about them.

GPG_ERR_EOF
This value indicates the end of a list, buffer or file.

GPG_ERR_NO_ERROR
This value indicates success. The value of this error code is 0. Also, it is guaranteed that an error value made from the error code 0 will be 0 itself (as a whole). This means that the error source information is lost for this error code, however, as this error code indicates that no error occurred, this is generally not a problem.

GPG_ERR_GENERAL
This value means that something went wrong, but either there is not enough information about the problem to return a more useful error value, or there is no separate error value for this type of problem.

GPG_ERR_ENOMEM
This value means that an out-of-memory condition occurred.

GPG_ERR_E...
System errors are mapped to GPG_ERR_FOO
where FOO is the symbol for
the system error.

GPG_ERR_INV_VALUE
This value means that some user provided data was out of range.
This can also refer to objects. For example, if an empty
gpgme_data_t object was expected, but one containing data was
provided, this error value is returned.

GPG_ERR_UNUSABLE_PUBKEY
This value means that some recipients for a message were invalid.

GPG_ERR_UNUSABLE_SECKEY
This value means that some signers were invalid.

GPG_ERR_NO_DATA
This value means that a gpgme_data_t object which was expected to
have content was found empty.

GPG_ERR_CONFLICT
This value means that a conflict of some sort occurred.

GPG_ERR_NOT_IMPLEMENTED
This value indicates that the specific function (or operation) is
not implemented. This error should never happen. It can only
occur if you use certain values or configuration options which do
not work, but for which we think that they should work at some
later time.

GPG_ERR_DECRYPT_FAILED
This value indicates that a decryption operation was unsuccessful.

GPG_ERR_BAD_PASSPHRASE
This value means that the user did not provide a correct passphrase
when requested.

GPG_ERR_CANCELED
This value means that the operation was canceled.

GPG_ERR_INV_ENGINE
This value means that the engine that implements the desired
protocol is currently not available. This can either be because
the sources were configured to exclude support for this engine, or
because the engine is not installed properly.

GPG_ERR_AMBIGUOUS_NAME
This value indicates that a user ID or other specifier did not specify a unique key.

GPG_ERR_WRONG_KEY_USAGE
This value indicates that a key is not used appropriately.

GPG_ERR_CERT_REVOKED
This value indicates that a key signature was revoced.

GPG_ERR_CERT_EXPIRED
This value indicates that a key signature expired.

GPG_ERR_NO_CRL_KNOWN
This value indicates
that no certificate revocation list is known
for the certificate.

GPG_ERR_NO_POLICY_MATCH
This value indicates that a policy issue occurred.

GPG_ERR_NO_SECKEY
This value indicates that no secret key for the user ID is available.

GPG_ERR_MISSING_CERT
This value indicates that a key could not be imported because the issuer certificate is missing.

GPG_ERR_BAD_CERT_CHAIN
This value indicates that a key could not be imported because its certificate chain is not good, for example it could be too long.

GPG_ERR_UNSUPPORTED_ALGORITHM
This value means a verification failed because the cryptographic algorithm is not supported by the crypto backend.

GPG_ERR_BAD_SIGNATURE
This value means a verification failed because the signature is bad.

GPG_ERR_NO_PUBKEY
This value means a verification failed because the public key is not available.

GPG_ERR_USER_1
GPG_ERR_USER_2
...

GPG_ERR_USER_16
These error codes are not used
by any GnuPG component and can be
freely used by other software. Applications using GPGME might use
them to mark specific errors returned by callback handlers if no
suitable error codes (including the system errors) for these errors
exist already.

File: gpgme.info, Node: Error Strings, Prev: Error Codes, Up: Error Handling

5.4 Error Strings
==========

-- Function: const char * gpgme_strerror (gpgme_error_t ERR)
The function gpgme_strerror returns a pointer to a statically
allocated string containing a description of the error code
contained in the error value ERR. This string can be used to
output a diagnostic message to the user.

This function is not thread safe. Use gpgme_strerror_r in
multi-threaded programs.

-- Function: int gpgme_strerror_r (gpgme_error_t ERR, char *BUF,
size_t BUFLEN)
The function gpgme_strerror_r returns the error string for ERR in
the user-supplied buffer BUF of size BUFLEN.
This function is, in
contrast to gpgme_strerror, thread-safe if a thread-safe
strerror_r function is provided by the system. If the function
succeeds, 0 is returned and BUF contains the string describing the
error. If the buffer was not large enough, ERANGE is returned and
BUF contains as much of the beginning of the error string as fits
into the buffer.

-- Function: const char * gpgme_strsource (gpgme_error_t ERR)
The function gpgme_strerror returns a pointer to a statically
allocated string containing a description of the error source
contained in the error value ERR. This string can be used to
output a diagnostic message to the user.

The following example illustrates the use of gpgme_strerror:

```
gpgme_ctx_t ctx;
gpgme_error_t err = gpgme_new (&ctx);
if (err)
  {
    fprintf (stderr, "%s: creating GpgME context failed: %s: %s\n",
```

```
            argv[0], gpgme_strsource (err), gpgme_strerror (err));
      exit (1);
    }
```

File: gpgme.info, Node: Exchanging Data, Next: Contexts, Prev: Error Handling, Up: Top

# 6 Exchanging Data

A lot of data has to be exchanged between the user and the crypto engine, like plaintext messages, ciphertext, signatures and information about the keys. The technical details about exchanging the data information are completely abstracted by GPGME. The user provides and receives the data via gpgme_data_t objects, regardless of the communication protocol between GPGME and the crypto engine in use.

-- Data type: gpgme_data_t
The gpgme_data_t type is a handle for a container for generic data, which is used by GPGME to exchange data with the user.

gpgme_data_t objects do not provide notifications on events. It is assumed that read and write operations are blocking until data is available. If this is undesirable, the application must ensure that all GPGME data operations always have data available, for example by using memory buffers or files rather than pipes or sockets. This might be relevant, for example, if the external event loop mechanism is used.

-- Data type: gpgme_off_t
SINCE: 1.4.1

On POSIX platforms the gpgme_off_t type is an alias for off_t; it may be used interchangeable. On Windows platforms gpgme_off_t is defined as a long (i.e. 32 bit) for 32 bit Windows and as a 64 bit signed integer for 64 bit Windows.

-- Data type: gpgme_ssize_t
The gpgme_ssize_t type is an alias for ssize_t. It has only been introduced to overcome portability problems pertaining to the declaration of ssize_t by different toolchains.

* Menu:

* Creating Data Buffers:: Creating new data buffers.
* Destroying Data Buffers:: Releasing data buffers.
* Manipulating Data Buffers:: Operations on data buffers.

File: gpgme.info,  Node: Creating Data Buffers,  Next: Destroying Data Buffers,  Up: Exchanging Data

## 6.1 Creating Data Buffers

Data
 objects can be based on memory, files, or callback functions
provided by the user.  Not all operations are supported by all objects.

* Menu:

* Memory Based Data Buffers::  Creating memory based data buffers.
* File Based Data Buffers::  Creating file based data buffers.
* Callback Based Data Buffers::  Creating callback based data buffers.

File: gpgme.info,  Node: Memory Based Data Buffers,  Next: File Based Data Buffers,  Up: Creating Data Buffers

### 6.1.1 Memory Based Data Buffers

Memory based data objects store all data in allocated memory.  This is
convenient, but only practical for an amount of data that is a fraction
of the available physical memory.  The data has to be copied from its
source and to its destination, which can often be avoided by using one
of the other data object

-- Function: gpgme_error_t gpgme_data_new (gpgme_data_t *DH)
The function gpgme_data_new creates a new gpgme_data_t object

and returns a handle for it in DH.  The data object is memory based
and initially empty.

The function returns the error code GPG_ERR_NO_ERROR if the data
object was successfully created, GPG_ERR_INV_VALUE if DH is not a
valid pointer, and GPG_ERR_ENOMEM if not enough memory is
available.

-- Function: gpgme_error_t gpgme_data_new_from_mem (gpgme_data_t *DH,
const char *BUFFER, size_t SIZE, int COPY)
The function gpgme_data_new_from_mem creates a new gpgme_data_t
object and fills it with SIZE bytes starting from BUFFER.

If COPY is not zero, a private copy of the data is made.  If COPY
is zero, the data is taken from the specified buffer as needed, and
the user has to ensure that the buffer remains valid for the whole
life span of the data object.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, GPG_ERR_INV_VALUE if DH or BUFFER is not a valid pointer, and GPG_ERR_ENOMEM if not enough memory is available.

-- Function: gpgme_error_t gpgme_data_new_from_file (gpgme_data_t *DH, const char *FILENAME, int COPY)

The function gpgme_data_new_from_file creates a new gpgme_data_t object and fills it with the content of the file FILENAME.

If COPY is not zero, the whole file is read in at initialization time and the file is not used anymore after that. This is the only mode supported currently. Later, a value of zero for COPY might cause all reads to be delayed until the data is needed, but this is not yet implemented.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, GPG_ERR_INV_VALUE if DH or FILENAME is not a valid pointer, GPG_ERR_NOT_IMPLEMENTED if CODE is zero, and GPG_ERR_ENOMEM if not enough memory is available.

-- Function: gpgme_error_t gpgme_data_new_from_filepart (gpgme_data_t *DH, const char *FILENAME, FILE *FP, off_t OFFSET, size_t LENGTH)

The function gpgme_data_new_from_filepart creates a new gpgme_data_t object and fills it with a part of the file specified by FILENAME or FP.

Exactly one of FILENAME and FP must be non-zero, the other must be zero. The argument that is not zero specifies the file from which LENGTH bytes are read into the data object, starting from OFFSET.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, GPG_ERR_INV_VALUE if DH and exactly one of FILENAME and FP is not a valid pointer, and GPG_ERR_ENOMEM if not enough memory is available.

File: gpgme.info, Node: File Based Data Buffers, Next: Callback Based Data Buffers, Prev: Memory Based Data Buffers, Up: Creating Data Buffers

### 6.1.2 File Based Data Buffers

File based data objects operate directly on file descriptors or streams.
Only a small amount of data is stored
in core at any time, so the size
of the data objects is not limited by GPGME.

-- Function: gpgme_error_t gpgme_data_new_from_fd (gpgme_data_t *DH, int FD)

The function gpgme_data_new_from_fd creates a new gpgme_data_t object and uses the file descriptor FD to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the file descriptor than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the file descriptor is set to blocking mode. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, and GPG_ERR_ENOMEM if not enough memory is available.

-- Function: gpgme_error_t gpgme_data_new_from_stream (gpgme_data_t *DH, FILE *STREAM)

The function gpgme_data_new_from_stream creates a new gpgme_data_t object and uses the I/O stream STREAM to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the stream than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the stream is in blocking mode. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, and GPG_ERR_ENOMEM if not enough memory is available.

-- Function: gpgme_error_t gpgme_data_new_from_estream (gpgme_data_t *DH, gpgrt_stream_t STREAM)

The function gpgme_data_new_from_estream creates

a new
gpgme_data_t object and uses the gpgrt stream STREAM to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the stream than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the stream is in blocking mode. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, and GPG_ERR_ENOMEM if not enough memory is available.

File: gpgme.info, Node: Callback Based Data Buffers, Prev: File Based Data Buffers, Up: Creating Data Buffers

### 6.1.3 Callback Based Data Buffers

If neither memory nor file based data objects are a good fit for your application, you can
implement the functions a data object provides
yourself and create a data object from these callback functions.

-- Data type: ssize_t (*gpgme_data_read_cb_t) (void *HANDLE,
void *BUFFER, size_t SIZE)
The gpgme_data_read_cb_t type is the type of functions which GPGME calls if it wants to read data from a user-implemented data object. The function should read up to SIZE bytes from the current read position into the space starting at BUFFER. The HANDLE is provided by the user at data object creation time.

Note that GPGME assumes that the read blocks until data is available. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function should return the number of bytes read, 0 on EOF, and -1 on error. If an error occurs, ERRNO should be set to describe the type of the error.

-- Data type: ssize_t (*gpgme_data_write_cb_t) (void *HANDLE,
const void *BUFFER, size_t SIZE)

The gpgme_data_write_cb_t type is the type of functions which GPGME calls if it wants to write data to a user-implemented data object. The function should write up to SIZE bytes to the current write position from the space starting at BUFFER. The HANDLE is provided by the user at data object creation time.

Note that GPGME assumes that the write blocks until data is available. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function should return the number of bytes written, and -1 on error. If an error occurs, ERRNO should be set to describe the type of the error.

-- Data type: off_t (*gpgme_data_seek_cb_t) (void *HANDLE, off_t OFFSET, int WHENCE)

The gpgme_data_seek_cb_t type is the type of functions which GPGME calls if it wants to change the current read/write position in a user-implemented data object, just like the lseek function.

The function should return the new read/write position, and -1 on error. If an error occurs, ERRNO should be set to describe the type of the error.

-- Data type: void (*gpgme_data_release_cb_t) (void *HANDLE)

The gpgme_data_release_cb_t type is the type of functions which GPGME calls if it wants to destroy a user-implemented data object. The HANDLE is provided by the user at data object creation time.

-- Data type: struct gpgme_data_cbs

This structure is used to store the data callback interface functions described above. It has the following members:

gpgme_data_read_cb_t read

This is the function called by GPGME to read data from the data object. It is only required for input data object.

gpgme_data_write_cb_t write

This is the function called by GPGME to write data to the data object. It is only required for output data object.

gpgme_data_seek_cb_t seek

This is the function called by GPGME to change the current read/write pointer in the data object (if available). It is optional.

gpgme_data_release_cb_t release
This is the function called by GPGME to release a data object.
It is optional.

-- Function: gpgme_error_t gpgme_data_new_from_cbs (gpgme_data_t *DH, gpgme_data_cbs_t CBS, void *HANDLE)
The function gpgme_data_new_from_cbs creates a new gpgme_data_t object and uses the user-provided callback functions to operate on the data object.

The handle HANDLE is passed as first argument to the callback functions. This can be used to identify this data object.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, and GPG_ERR_ENOMEM if not enough memory is available.

File: gpgme.info, Node: Destroying Data Buffers, Next: Manipulating Data Buffers, Prev: Creating Data Buffers, Up: Exchanging Data

## 6.2 Destroying Data Buffers

-- Function: void gpgme_data_release (gpgme_data_t DH)
The function gpgme_data_release destroys the data object with the handle DH. It releases all associated resources that were not provided by the user in the first place.

-- Function: char * gpgme_data_release_and_get_mem (gpgme_data_t DH, size_t *LENGTH)
The function gpgme_data_release_and_get_mem is like gpgme_data_release, except that it returns the data buffer and its length that was provided by the object.

The user has to release the buffer with gpgme_free. In case the user provided the data buffer in non-copy mode, a copy will be made for this purpose.

In case an error returns, or there is no suitable data buffer that can be returned to the user, the function will return NULL. In any case, the data object DH is destroyed.

-- Function: void gpgme_free (void *BUFFER)
SINCE: 1.1.1

The function gpgme_free releases

the memory returned by
gpgme_data_release_and_get_mem and gpgme_pubkey_algo_string.
It should be used instead of the system libraries free function
in case different allocators are used by a program. This is often
the case if gpgme is used under Windows as a DLL.

File: gpgme.info, Node: Manipulating Data Buffers, Prev: Destroying Data Buffers, Up: Exchanging Data

## 6.3 Manipulating Data Buffers

Data buffers contain data and meta-data. The following operations can
be used to manipulate both.

* Menu:

* Data Buffer I/O Operations:: I/O operations on data buffers.
* Data Buffer Meta-Data:: Meta-data manipulation of data buffers.
* Data Buffer Convenience:: Convenience function for data buffers.

File: gpgme.info, Node: Data Buffer I/O Operations, Next: Data Buffer Meta-Data, Up: Manipulating Data Buffers

### 6.3.1 Data Buffer I/O Operations

-- Function: ssize_t gpgme_data_read
(gpgme_data_t DH, void *BUFFER,
size_t LENGTH)
The function gpgme_data_read reads up to LENGTH bytes from the
data object with the handle DH into the space starting at BUFFER.

If no error occurs, the actual amount read is returned. If the end
of the data object is reached, the function returns 0.

In all other cases, the function returns -1 and sets ERRNO.

-- Function: ssize_t gpgme_data_write (gpgme_data_t DH,
const void *BUFFER, size_t SIZE)
The function gpgme_data_write writes up to SIZE bytes starting
from BUFFER into the data object with the handle DH at the current
write position.

The function returns the number of bytes actually written, or -1 if
an error occurs. If an error occurs, ERRNO is set.

-- Function: off_t gpgme_data_seek (gpgme_data_t DH, off_t OFFSET, int WHENCE)

The function gpgme_data_seek changes the current read/write position.

The WHENCE argument specifies how the OFFSET should be interpreted.

It must be one of the following symbolic constants:

SEEK_SET
: Specifies that OFFSET is a count of characters from the beginning of the data object.

SEEK_CUR
: Specifies that OFFSET is a count of characters from the current file position. This count may be positive or negative.

SEEK_END
: Specifies that OFFSET is a count of characters from the end of the data object. A negative count specifies a position within the current extent of the data object; a positive count specifies a position past the current end. If you set the position past the current end, and actually write data, you will extend the data object with zeros up to that position.

If successful, the function returns the resulting file position, measured in bytes from the beginning of the data object. You can use this feature together with SEEK_CUR to read the current read/write position.

If the function fails, -1 is returned and ERRNO is set.

File: gpgme.info, Node: Data Buffer Meta-Data, Next: Data Buffer Convenience, Prev: Data Buffer I/O Operations, Up: Manipulating Data Buffers

### 6.3.2 Data Buffer Meta-Data

-- Function: char * gpgme_data_get_file_name (gpgme_data_t DH)

SINCE: 1.1.0

The function gpgme_data_get_file_name returns a pointer to a string containing the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting

or verifying the output data.

If no error occurs, the string containing the file name is returned. Otherwise, NULL will be returned.

-- Function: gpgme_error_t gpgme_data_set_file_name (gpgme_data_t DH, const char *FILE_NAME)

SINCE: 1.1.0

The function gpgme_data_set_file_name sets the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting or verifying the output data.

The function returns the error code GPG_ERR_INV_VALUE if DH is not a valid pointer and GPG_ERR_ENOMEM if not enough memory is available.

-- Data type: enum gpgme_data_encoding_t

The gpgme_data_encoding_t type specifies the encoding of a gpgme_data_t object. For input data objects, the encoding is useful to give the backend a hint on the type of data. For output data objects, the encoding can specify the output data format on certain operations. Please note that not all backends support all encodings on all operations. The following data types are available:

GPGME_DATA_ENCODING_NONE

This specifies that the encoding is not known. This is the default for a new data object. The backend will try its best to detect the encoding automatically.

GPGME_DATA_ENCODING_BINARY

This specifies that the data is encoding in binary form; i.e. there is no special encoding.

GPGME_DATA_ENCODING_BASE64

This specifies that the data is encoded using the Base-64 encoding scheme as used by MIME and other protocols.

GPGME_DATA_ENCODING_ARMOR

This specifies that the data is encoded in an armored form as used by OpenPGP and PEM.

GPGME_DATA_ENCODING_MIME

SINCE: 1.7.0

This specifies that the data is encoded as a MIME part.

GPGME_DATA_ENCODING_URL
SINCE: 1.2.0

The data is a list of linefeed delimited URLs. This is only useful with gpgme_op_import.

GPGME_DATA_ENCODING_URL0
SINCE: 1.2.0

The data is a list of binary zero delimited URLs. This is only useful with gpgme_op_import.

GPGME_DATA_ENCODING_URLESC

SINCE: 1.2.0

The data is a list of linefeed delimited URLs with all control and space characters percent escaped. This mode is is not yet implemented.

-- Function: gpgme_data_encoding_t gpgme_data_get_encoding (gpgme_data_t DH)
The function gpgme_data_get_encoding returns the encoding of the data object with the handle DH. If DH is not a valid pointer (e.g. NULL) GPGME_DATA_ENCODING_NONE is returned.

-- Function: gpgme_error_t gpgme_data_set_encoding (gpgme_data_t DH, gpgme_data_encoding_t ENC)
The function gpgme_data_set_encoding changes the encoding of the data object with the handle DH to ENC.

-- Function: gpgme_error_t gpgme_data_set_flag (gpgme_data_t DH, const char *NAME, const char *VALUE)

SINCE: 1.7.0

Some minor properties of the data object can be controlled with flags set by this function. The properties are identified by the following values for NAME:

size-hint
The value is a decimal number with the length gpgme shall assume for this data object. This is useful if the data is provided by callbacks or via file descriptors but the applications knows the total size of the data. If this is set

the OpenPGP engine may use this to decide on buffer allocation strategies and to provide a total value for its progress information.

This function returns 0 on success.

File: gpgme.info, Node: Data Buffer Convenience, Prev: Data Buffer Meta-Data, Up: Manipulating Data Buffers

6.3.3 Data Buffer Convenience Functions
---

-- Data type: enum gpgme_data_type_t
SINCE: 1.4.3

The gpgme_data_type_t type is used to return the detected type of the content of a data buffer.

GPGME_DATA_TYPE_INVALID
This is returned by gpgme_data_identify if it was not possible to identify the data. Reasons for this might be a non-seekable stream or a memory problem. The value is 0.
GPGME_DATA_TYPE_UNKNOWN
The type of the data is not known.
GPGME_DATA_TYPE_PGP_SIGNED
The data is an OpenPGP signed message. This may be a binary signature, a detached one or a cleartext signature.
GPGME_DATA_TYPE_PGP_ENCRYPTED
SINCE: 1.7.0

The data is an OpenPGP encrypted message.
GPGME_DATA_TYPE_PGP_SIGNATURE
SINCE: 1.7.0

The data is an OpenPGP detached signature.
GPGME_DATA_TYPE_PGP_OTHER
This is a generic OpenPGP message. In most cases this will be encrypted data.
GPGME_DATA_TYPE_PGP_KEY
This is an OpenPGP key (private or public).
GPGME_DATA_TYPE_CMS_SIGNED
This is a CMS signed message.
GPGME_DATA_TYPE_CMS_ENCRYPTED
This is a CMS encrypted (enveloped data) message.
GPGME_DATA_TYPE_CMS_OTHER
This is used for other CMS message types.
GPGME_DATA_TYPE_X509_CERT

The data is a X.509 certificate
GPGME_DATA_TYPE_PKCS12
The data is a PKCS#12 message. This
is commonly used to exchange
private keys for X.509.

-- Function: gpgme_data_type_t gpgme_data_identify (gpgme_data_t DH)
SINCE: 1.4.3

The function gpgme_data_identify returns the type of the data
with the handle DH. If it is not possible to perform the
identification, the function returns zero
(GPGME_DATA_TYPE_INVALID). Note that depending on how the data
object has been created the identification may not be possible or
the data object may change its internal state (file pointer moved).
For file or memory based data object, the state should not change.

File: gpgme.info, Node: Contexts, Next: UI Server Protocol, Prev: Exchanging Data, Up: Top

# 7 Contexts

All cryptographic operations in GPGME are performed within a context, which contains the internal state of the operation as well as configuration parameters. By using several contexts you can run several cryptographic operations in parallel, with different configuration.

-- Data type: gpgme_ctx_t
The gpgme_ctx_t type is a handle for a GPGME context, which is
used to hold the configuration, status and result of cryptographic
operations.

* Menu:

* Creating Contexts:: Creating new GPGME contexts.
* Destroying Contexts:: Releasing GPGME contexts.
* Result Management:: Managing the result of crypto operations.
* Context Attributes:: Setting properties of a context.
* Key Management:: Managing keys with GPGME.
* Crypto Operations:: Using a context for cryptography.
* Miscellaneous:: Miscellaneous operations
* Run Control:: Controlling how operations are run.

File: gpgme.info, Node: Creating Contexts, Next: Destroying Contexts, Up: Contexts

## 7.1 Creating Contexts

==========

-- Function: gpgme_error_t gpgme_new (gpgme_ctx_t *CTX)
The function gpgme_new creates a new gpgme_ctx_t object and returns a handle
for it in CTX.

The function returns the error code GPG_ERR_NO_ERROR if the context was successfully created, GPG_ERR_INV_VALUE if CTX is not a valid pointer, and GPG_ERR_ENOMEM if not enough memory is available. Also, it returns GPG_ERR_NOT_OPERATIONAL if gpgme_check_version was not called to initialize GPGME, and GPG_ERR_SELFTEST_FAILED if a selftest failed. Currently, the only selftest is for Windows MingW32 targets to see if -mms-bitfields was used (as required).

File: gpgme.info, Node: Destroying Contexts, Next: Result Management, Prev: Creating Contexts, Up: Contexts

## 7.2 Destroying Contexts

==========

-- Function: void gpgme_release (gpgme_ctx_t CTX)
The function gpgme_release destroys the context with the handle CTX and releases all associated resources.

File: gpgme.info, Node: Result Management, Next: Context Attributes, Prev: Destroying Contexts, Up: Contexts

## 7.3 Result Management

==========

The detailed result of an operation is returned in operation-specific structures such as gpgme_decrypt_result_t. The corresponding retrieval functions such as gpgme_op_decrypt_result provide static access to the results after an operation completes. Those structures shall be considered read-only and an application must not allocate such a structure on its own. The following interfaces make it possible to detach a result structure from its associated context and give it a lifetime beyond that of the current operation or context.

-- Function: void gpgme_result_ref (void *RESULT)
SINCE: 1.2.0

The function gpgme_result_ref acquires an additional reference for the result RESULT, which may be of any type gpgme_*_result_t. As long as the user holds a reference, the result structure is

guaranteed to be valid and unmodified.

-- Function: void gpgme_result_unref (void *RESULT)
SINCE: 1.2.0

The function gpgme_result_unref releases a reference for
the
result RESULT. If this was the last reference, the result
structure will be destroyed and all resources associated to it will
be released.

Note that a context may hold its own references to result structures,
typically until the context is destroyed or the next operation is
started. In fact, these references are accessed through the
gpgme_op_*_result functions.

File: gpgme.info, Node: Context Attributes, Next: Key Management, Prev: Result Management, Up: Contexts

## 7.4 Context Attributes

* Menu:


* Protocol Selection:: Selecting the protocol used by a context.
* Crypto Engine:: Configuring the crypto engine.
* Setting the Sender:: How to tell the engine the sender.
* ASCII Armor:: Requesting ASCII armored output.
* Text Mode:: Choosing canonical text mode.
* Offline Mode:: Choosing offline mode.
* Pinentry Mode:: Choosing
the pinentry mode.
* Included Certificates:: Including a number of certificates.
* Key Listing Mode:: Selecting key listing mode.
* Passphrase Callback:: Getting the passphrase from the user.
* Progress Meter Callback:: Being informed about the progress.
* Status Message Callback:: Status messages received from gpg.
* Context Flags:: Additional flags for a context.
* Locale:: Setting the locale of a context.
* Additional Logs:: Additional logs of a context.


File: gpgme.info, Node: Protocol Selection, Next: Crypto Engine, Up: Context Attributes

### 7.4.1 Protocol Selection

-- Function: gpgme_error_t gpgme_set_protocol (gpgme_ctx_t CTX,

gpgme_protocol_t PROTO)
The function gpgme_set_protocol sets the protocol used within the context CTX to PROTO. All crypto operations will be performed by the crypto engine configured for that protocol. *Note Protocols and Engines::.

Setting the protocol with gpgme_set_protocol does intentionally not check if the crypto engine for that protocol is available and installed correctly. *Note Engine Version Check::.

The function returns the error code GPG_ERR_NO_ERROR if the protocol could be set successfully, and GPG_ERR_INV_VALUE if PROTOCOL is not a valid protocol.

-- Function: gpgme_protocol_t gpgme_get_protocol (gpgme_ctx_t CTX)
The function gpgme_get_protocol retrieves the protocol currently use with the context CTX.

File: gpgme.info, Node: Crypto Engine, Next: Setting the Sender, Prev: Protocol Selection, Up: Context Attributes

7.4.2 Crypto Engine
---

The following functions can be used to set and retrieve the configuration of the crypto engines of a specific context. The default can also be retrieved without any particular context. *Note Engine Information::. The default can also be changed globally. *Note Engine Configuration::.

-- Function: gpgme_engine_info_t gpgme_ctx_get_engine_info
(gpgme_ctx_t CTX)
SINCE: 1.1.0

The function gpgme_ctx_get_engine_info returns a linked list of engine info structures. Each info structure describes the configuration of one configured backend, as used by the context CTX.

The result is valid until the next invocation of gpgme_ctx_set_engine_info for this particular context.

This function can not fail.

-- Function: gpgme_error_t gpgme_ctx_set_engine_info (gpgme_ctx_t CTX,

gpgme_protocol_t PROTO, const char *FILE_NAME,
const char *HOME_DIR)

SINCE: 1.1.0

The function gpgme_ctx_set_engine_info changes the configuration of the crypto engine implementing the protocol PROTO for the context CTX.

FILE_NAME is the file name of the executable program implementing this protocol, and HOME_DIR is the directory name of the configuration directory for this crypto engine. If HOME_DIR is NULL, the engines default will be used.

Currently this function must be used before starting the first crypto operation. It is unspecified if and when the changes will take effect if the function is called after starting the first operation on the context CTX.

This function returns the error code GPG_ERR_NO_ERROR if successful, or an error code on failure.

File: gpgme.info, Node: Setting the Sender, Next: ASCII Armor, Prev: Crypto Engine, Up: Context Attributes

7.4.3 How to tell the engine the sender.
---

Some engines can make use of the senders address, for example to figure out the best user id in certain trust models. For verification and signing of mails, it is thus suggested to let the engine know the sender ("From:") address. GPGME provides two functions to accomplish that. Note that the esoteric use of multiple "From:" addresses is not supported.

-- Function: gpgme_error_t
gpgme_set_sender (gpgme_ctx_t CTX,
int ADDRESS)

SINCE: 1.8.0

The function gpgme_set_sender specifies the sender address for use in sign and verify operations. ADDRESS is expected to be the addr-spec part of an address but my also be a complete mailbox address, in which case this function extracts the addr-spec from it. Using NULL for ADDRESS clears the sender address.

The function returns 0 on success or an error code on failure. The

most likely failure is that no valid addr-spec was found in
ADDRESS.

-- Function: const char * gpgme_get_sender (gpgme_ctx_t CTX)

SINCE: 1.8.0

The function gpgme_get_sender returns the current sender address
from the context, or NULL if none was set. The returned value is
valid as long as the CTX is valid and gpgme_set_sender has not
been called again.

File: gpgme.info, Node: ASCII Armor, Next: Text Mode, Prev: Setting the Sender, Up: Context Attributes

7.4.4
ASCII Armor
---

-- Function: void gpgme_set_armor (gpgme_ctx_t CTX, int YES)
The function gpgme_set_armor specifies if the output should be
ASCII armored. By default, output is not ASCII armored.

ASCII armored output is disabled if YES is zero, and enabled
otherwise.

-- Function: int gpgme_get_armor (gpgme_ctx_t CTX)
The function gpgme_get_armor returns 1 if the output is ASCII
armored, and 0 if it is not, or if CTX is not a valid pointer.

File: gpgme.info, Node: Text Mode, Next: Offline Mode, Prev: ASCII Armor, Up: Context Attributes

7.4.5 Text Mode
---

-- Function: void gpgme_set_textmode (gpgme_ctx_t CTX, int YES)
The function gpgme_set_textmode specifies if canonical text mode
should be used. By default, text mode is not used.

Text mode is for example used for the RFC2015 signatures; note that
the updated RFC 3156 mandates that the mail user agent does some
preparations so that
text mode is not needed anymore.

This option is only relevant to the OpenPGP crypto engine, and
ignored by all other engines.

Canonical text mode is disabled if YES is zero, and enabled otherwise.

-- Function: int gpgme_get_textmode (gpgme_ctx_t CTX)
The function gpgme_get_textmode returns 1 if canonical text mode is enabled, and 0 if it is not, or if CTX is not a valid pointer.

File: gpgme.info, Node: Offline Mode, Next: Pinentry Mode, Prev: Text Mode, Up: Context Attributes

### 7.4.6 Offline Mode

-- Function: void gpgme_set_offline (gpgme_ctx_t CTX, int YES)
SINCE: 1.6.0

The function gpgme_set_offline specifies if offline mode should be used. Offline mode is disabled if YES is zero, and enabled otherwise. By default, offline mode is disabled.

The details of the offline mode depend on the used protocol and its backend engine. It may eventually be extended to be more stricter and for example
completely disable the use of Dirmngr for any engine.

For the CMS protocol the offline mode specifies whether Dirmngr shall be used to do additional validation that might require connecting external services (e.g. CRL / OCSP checks). Here the offline mode only affects the keylist mode GPGME_KEYLIST_MODE_VALIDATE.

For the OpenPGP protocol offline mode entirely disables the use of the Dirmngr and will thus guarantee that no network connections are done as part of an operation on this context. It has only an effect with GnuPG versions 2.1.23 or later.

For all other protocols the offline mode is currently ignored.

-- Function: int gpgme_get_offline (gpgme_ctx_t CTX)
SINCE: 1.6.0

The function gpgme_get_offline returns 1 if offline mode is enabled, and 0 if it is not, or if CTX is not a valid pointer.

File: gpgme.info, Node: Pinentry Mode, Next: Included Certificates, Prev: Offline Mode, Up: Context Attributes

7.4.7
Pinentry Mode
---

-- Function: gpgme_error_t gpgme_set_pinentry_mode (gpgme_ctx_t CTX, gpgme_pinentry_mode_t MODE)

SINCE: 1.4.0

The function gpgme_set_pinentry_mode specifies the pinentry mode to be used.

For GnuPG >= 2.1 this option is required to be set to GPGME_PINENTRY_MODE_LOOPBACK to enable the passphrase callback mechanism in GPGME through gpgme_set_passphrase_cb.

-- Function: gpgme_pinentry_mode_t gpgme_get_pinentry_mode (gpgme_ctx_t CTX)

SINCE: 1.4.0

The function gpgme_get_pinenty_mode returns the mode set for the context.

-- Data type: enum gpgme_pinentry_mode_t

SINCE: 1.4.0

The gpgme_minentry_mode_t type specifies the set of possible pinentry modes that are supported by GPGME if GnuPG >= 2.1 is used. The following modes are supported:

GPGME_PINENTRY_MODE_DEFAULT

SINCE: 1.4.0

Use the default of the agent, which is ask.

GPGME_PINENTRY_MODE_ASK

SINCE: 1.4.0

Force the use of the Pinentry.

GPGME_PINENTRY_MODE_CANCEL

SINCE: 1.4.0

Emulate use of Pinentrys cancel button.

GPGME_PINENTRY_MODE_ERROR

SINCE: 1.4.0

Return a Pinentry error No Pinentry.

GPGME_PINENTRY_MODE_LOOPBACK
SINCE: 1.4.0

Redirect Pinentry queries to the caller. This enables the use of gpgme_set_passphrase_cb because pinentry queries are redirected to gpgme.

Note: For 2.1.0 - 2.1.12 this mode requires allow-loopback-pinentry to be enabled in the gpg-agent.conf or an agent started with that option.

File: gpgme.info, Node: Included Certificates, Next: Key Listing Mode, Prev: Pinentry Mode, Up: Context Attributes

7.4.8 Included Certificates
---

-- Function: void gpgme_set_include_certs (gpgme_ctx_t CTX, int NR_OF_CERTS)

The function gpgme_set_include_certs specifies how many certificates should be included in an S/MIME signed message. By default, only the senders certificate is included. The possible values of NR_OF_CERTS are:

GPGME_INCLUDE_CERTS_DEFAULT
SINCE: 1.0.3

Fall back to the default of the crypto backend. This is the default for GPGME.

-2
Include all certificates except the root certificate.

-1
Include all certificates.

0
Include no certificates.

1
Include the senders certificate only.

n
Include the first n certificates of the certificates path, starting from the senders certificate. The number n must be positive.

Values of NR_OF_CERTS smaller than -2 are undefined.

This option is only relevant to the CMS crypto engine, and ignored by all other engines.

-- Function: int gpgme_get_include_certs (gpgme_ctx_t CTX)
The function gpgme_get_include_certs returns the number of certificates to include into an S/MIME signed message.

File: gpgme.info, Node: Key Listing Mode, Next: Passphrase Callback, Prev: Included Certificates, Up: Context Attributes

7.4.9 Key Listing Mode
---

-- Function: gpgme_error_t gpgme_set_keylist_mode (gpgme_ctx_t CTX, gpgme_keylist_mode_t MODE)
The function gpgme_set_keylist_mode changes the default behaviour of the key listing functions. The value in MODE is a bitwise-or combination of one or multiple of the following bit values:

GPGME_KEYLIST_MODE_LOCAL
The GPGME_KEYLIST_MODE_LOCAL symbol specifies that the local keyring should be searched for keys in the keylisting operation. This is the default.

Using only this option results in a --list-keys.

GPGME_KEYLIST_MODE_EXTERN
The GPGME_KEYLIST_MODE_EXTERN symbol specifies that an external source should be searched for keys in the keylisting operation. The type of external source is dependent on the crypto engine used and whether it is combined with GPGME_KEYLIST_MODE_LOCAL. For example, it can be a remote keyserver or LDAP certificate server.

Using only this option results in a --search-keys for GPGME_PROTOCOL_OpenPGP and something similar to --list-external-keys for GPGME_PROTOCOL_CMS.

GPGME_KEYLIST_MODE_LOCATE
This is a shortcut for the combination of GPGME_KEYLIST_MODE_LOCAL and GPGME_KEYLIST_MODE_EXTERN, which results in a --locate-keys for GPGME_PROTOCOL_OpenPGP.

GPGME_KEYLIST_MODE_SIGS
The GPGME_KEYLIST_MODE_SIGS symbol specifies that the key

signatures should be included in the listed keys.

GPGME_KEYLIST_MODE_SIG_NOTATIONS
SINCE: 1.1.1

The GPGME_KEYLIST_MODE_SIG_NOTATIONS symbol specifies that
the signature notations on key signatures
should be included
in the listed keys. This only works if
GPGME_KEYLIST_MODE_SIGS is also enabled.

GPGME_KEYLIST_MODE_WITH_TOFU
SINCE: 1.7.0

The GPGME_KEYLIST_MODE_WITH_TOFU symbol specifies that
information pertaining to the TOFU trust model should be
included in the listed keys.

GPGME_KEYLIST_MODE_WITH_KEYGRIP
SINCE: 1.14.0

The GPGME_KEYLIST_MODE_WITH_KEYRIP symbol specifies that the
keygrip is always included in the listing. The default
depends on the version of the backend and the used protocol.

GPGME_KEYLIST_MODE_WITH_SECRET
SINCE: 1.5.1

The GPGME_KEYLIST_MODE_WITH_SECRET returns information about
the presence of a corresponding secret key in a public key
listing. A public key listing with this mode is slower than a
standard listing but can be used instead of a second run to
list the secret keys.
This is only supported for GnuPG
versions >= 2.1. Note that using this option also makes sure
that the keygrip is available in the output.

GPGME_KEYLIST_MODE_EPHEMERAL
SINCE: 1.2.0

The GPGME_KEYLIST_MODE_EPHEMERAL symbol specifies that keys
flagged as ephemeral are included in the listing.

GPGME_KEYLIST_MODE_VALIDATE
SINCE: 0.4.5

The GPGME_KEYLIST_MODE_VALIDATE symbol specifies that the
backend should do key or certificate validation and not just

get the validity information from an internal cache. This might be an expensive operation and is in general not useful. Currently only implemented for the S/MIME backend and ignored for other backends.

At least one of GPGME_KEYLIST_MODE_LOCAL and GPGME_KEYLIST_MODE_EXTERN must be specified. For future binary compatibility, you should get the current mode with gpgme_get_keylist_mode and modify it by setting or clearing the appropriate bits, and then using that calculated value in the gpgme_set_keylisting_mode operation. This will leave all other bits in the mode value intact (in particular those that are not used in the current version of the library).

The function returns the error code GPG_ERR_NO_ERROR if the mode could be set correctly, and GPG_ERR_INV_VALUE if CTX is not a valid pointer or MODE is not a valid mode.

-- Function: gpgme_keylist_mode_t gpgme_get_keylist_mode (gpgme_ctx_t CTX)

The function gpgme_get_keylist_mode returns the current key listing mode of the context CTX. This value can then be modified and used in a subsequent gpgme_set_keylist_mode operation to only affect the desired bits (and leave all others intact).

The function returns 0 if CTX is not a valid pointer, and the current mode otherwise. Note that 0 is not a valid mode value.

File: gpgme.info, Node: Passphrase Callback, Next: Progress Meter Callback, Prev: Key Listing Mode, Up: Context Attributes

7.4.10 Passphrase Callback
---

-- Data type: gpgme_error_t (*gpgme_passphrase_cb_t)(void *HOOK, const char *UID_HINT, const char *PASSPHRASE_INFO, int PREV_WAS_BAD, int FD)

The gpgme_passphrase_cb_t type is the type of functions usable as passphrase callback function.

The argument UID_HINT might contain a string that gives an indication for which user ID the passphrase is required. If this is not available, or not applicable (in the case of symmetric encryption, for example), UID_HINT will be NULL.

The argument PASSPHRASE_INFO, if not NULL, will give further

information about the context in which the passphrase is required.
This information is engine and operation specific.

If this is the repeated attempt to get the passphrase, because
previous attempts failed, then PREV_WAS_BAD is 1,
otherwise it will
be 0.

The user must write the passphrase, followed by a newline
character, to the file descriptor FD. The function
gpgme_io_writen should be used for the write operation. Note
that if the user returns 0 to indicate success, the user must at
least write a newline character before returning from the callback.

If an error occurs, return the corresponding gpgme_error_t value.
You can use the error code GPG_ERR_CANCELED to abort the
operation. Otherwise, return 0.

Note: The passphrase_cb only works with GnuPG 1.x and 2.1.x and not
with the 2.0.x series. See gpgme_set_pinentry_mode for more
details on 2.1.x usage.

-- Function: void gpgme_set_passphrase_cb (gpgme_ctx_t CTX,
gpgme_passphrase_cb_t PASSFUNC, void *HOOK_VALUE)
The function gpgme_set_passphrase_cb sets the function that is
used when a passphrase needs to be provided by the user to
PASSFUNC. The function PASSFUNC needs to
implemented by the user,
and whenever it is called, it is called with its first argument
being HOOK_VALUE. By default, no passphrase callback function is
set.

Not all crypto engines require this callback to retrieve the
passphrase. It is better if the engine retrieves the passphrase
from a trusted agent (a daemon process), rather than having each
user to implement their own passphrase query. Some engines do not
even support an external passphrase callback at all, in this case
the error code GPG_ERR_NOT_SUPPORTED is returned.

For GnuPG >= 2.1 the pinentry mode has to be set to
GPGME_PINENTRY_MODE_LOOPBACK to enable the passphrase callback.
See gpgme_set_pinentry_mode.

The user can disable the use of a passphrase callback function by
calling gpgme_set_passphrase_cb with PASSFUNC being NULL.

-- Function: void gpgme_get_passphrase_cb (gpgme_ctx_t CTX,
gpgme_passphrase_cb_t *PASSFUNC, void **HOOK_VALUE)

The function gpgme_get_passphrase_cb returns the function that is used when a passphrase needs to be provided by the user in *PASSFUNC, and the first argument for this function in *HOOK_VALUE. If no passphrase callback is set, or CTX is not a valid pointer, NULL is returned in both variables.

PASSFUNC or HOOK_VALUE can be NULL. In this case, the corresponding value will not be returned.

File: gpgme.info, Node: Progress Meter Callback, Next: Status Message Callback, Prev: Passphrase Callback, Up: Context Attributes

7.4.11 Progress Meter Callback
---

-- Data type: void (*gpgme_progress_cb_t)(void *HOOK, const char *WHAT, int TYPE, int CURRENT, int TOTAL)

The gpgme_progress_cb_t type is the type of functions usable as progress callback function.

The arguments are specific to the crypto engine. More information about the progress information returned from the GnuPG engine can be found in the GnuPG source code in the file doc/DETAILS in the section PROGRESS.

-- Function: void gpgme_set_progress_cb (gpgme_ctx_t CTX, gpgme_progress_cb_t PROGFUNC, void *HOOK_VALUE)

The function gpgme_set_progress_cb sets the function that is used when progress information about a cryptographic operation is available. The function PROGFUNC needs to implemented by the user, and whenever it is called, it is called with its first argument being HOOK_VALUE. By default, no progress callback function is set.

Setting a callback function allows an interactive program to display progress information about a long operation to the user.

The user can disable the use of a progress callback function by calling gpgme_set_progress_cb with PROGFUNC being NULL.

-- Function: void gpgme_get_progress_cb (gpgme_ctx_t CTX, gpgme_progress_cb_t *PROGFUNC, void **HOOK_VALUE)

The function gpgme_get_progress_cb returns the function that is used to inform the user about the progress made in *PROGFUNC, and the first argument for this function in *HOOK_VALUE. If no

progress callback is set, or CTX is not a valid pointer, NULL is returned in both variables.

PROGFUNC or HOOK_VALUE can be NULL. In this case, the corresponding value will not be returned.

File: gpgme.info, Node: Status Message Callback, Next: Context Flags, Prev: Progress Meter Callback, Up: Context Attributes

7.4.12 Status Message Callback
---

-- Data type: gpgme_error_t (*gpgme_status_cb_t)(void *HOOK, const char *KEYWORD, const char *ARGS)

The gpgme_status_cb_t type is the type of function usable as a status message callback function.

The argument KEYWORD is the name of the status message while the ARGS argument contains any arguments for the status message.

If an error occurs, return the corresponding gpgme_error_t value. Otherwise,
return 0.

-- Function: void gpgme_set_status_cb (gpgme_ctx_t CTX, gpgme_status_cb_t STATUSFUNC, void *HOOK_VALUE)

SINCE: 1.6.0

The function gpgme_set_status_cb sets the function that is used when a status message is received from gpg to STATUSFUNC. The function STATUSFUNC needs to be implemented by the user, and whenever it is called, it is called with its first argument being HOOK_VALUE. By default, no status message callback function is set.

The user can disable the use of a status message callback function by calling gpgme_set_status_cb with STATUSFUNC being NULL.

-- Function: void gpgme_get_status_cb (gpgme_ctx_t CTX, gpgme_status_cb_t *STATUSFUNC, void **HOOK_VALUE)

SINCE: 1.6.0

The function gpgme_get_status_cb returns the function that is used to process status messages from gpg in *STATUSFUNC, and the first argument for this function in *HOOK_VALUE. If no status message callback

is set, or CTX is not a valid pointer, NULL is
returned in both variables.

File: gpgme.info, Node: Context Flags, Next: Locale, Prev: Status Message Callback, Up: Context Attributes

7.4.13 Context Flags
---

-- Function: gpgme_error_t gpgme_set_ctx_flag (gpgme_ctx_t CTX,
const char *NAME, const char *VALUE)

SINCE: 1.7.0

Some minor properties of the context can be controlled with flags
set by this function. The properties are identified by the
following values for NAME:

"redraw"
This flag is normally not changed by the caller because GPGME
sets and clears it automatically: The flag is cleared before
an operation and set if an operation noticed that the engine
has launched a Pinentry. A Curses based application may use
this information to redraw the screen; for example:

```
err = gpgme_op_keylist_start (ctx, "foo@example.org", 0);
while
(!err)
  {
    err = gpgme_op_keylist_next (ctx, &key);
    if (err)
      break;
    show_key (key);
    gpgme_key_release (key);
  }
if ((s = gpgme_get_ctx_flag (ctx, "redraw")) && *s)
  redraw_screen ();
gpgme_release (ctx);
```

"full-status"
Using a VALUE of "1" the status callback set by
gpgme_set_status_cb returns all status lines with the
exception of PROGRESS lines. With the default of "0" the
status callback is only called in certain situations.

"raw-description"
Setting the VALUE to "1" returns human readable strings in a
raw format. For example the non breaking space characters

("~") will not be removed from the description field of the gpgme_tofu_info_t object.

"export-session-key"

Using a VALUE of "1" specifies that the context should try to export the symmetric session key when decrypting data. By default, or when using an empty string or "0" for VALUE, session keys are not exported.

"override-session-key"

The string given in VALUE is passed to the GnuPG engine to override the session key for decryption. The format of that session key is specific to GnuPG and can be retrieved during a decrypt operation when the context flag "export-session-key" is enabled. Please be aware that using this feature with GnuPG < 2.1.16 will leak the session key on many platforms via ps(1).

"auto-key-retrieve"

Setting the VALUE to "1" asks the backend to automatically retrieve a key for signature verification if possible. Note that this option makes a "web bug" like behavior possible. Keyserver or Web Key Directory operators can see which keys you request, so by sending you a message signed by a brand new key (which you naturally will not have on your local keyring), the operator can tell both your IP address and the time when you verified the signature.

"auto-key-import"

Setting the VALUE to "1" forces the GPG backend to automatically import a missing key for signature verification from the signature.

"include-key-block"

Setting the VALUE to "1" forces the GPG backend to embed the signing key as well as an encryption subkey into the the signature.

"request-origin"

The string given in VALUE is passed to the GnuPG engines to request restrictions based on the origin of the request. Valid values are documented in the GnuPG manual and the gpg man page under the option --request-origin. Requires at least GnuPG 2.2.6 to have an effect.

"no-symkey-cache"

For OpenPGP disable the passphrase cache used for symmetrical en- and decryption. This cache is based on the message specific salt value. Requires at least GnuPG 2.2.7 to have an effect.

"ignore-mdc-error"
This flag passes the option --ignore-mdc-error to gpg. This can be used to force decryption of a message which failed due to a missing integrity check. This flag must be used with great caution and only if it is a known non-corrupted old message and the decryption result of the former try had the decryption result flag legacy_cipher_nomdc set. For failsafe reasons this flag is reset after each operation.

"auto-key-locate"
The string given in VALUE is passed to gpg. This can be used to change the behavior of a GPGME_KEYLIST_MODE_LOCATE keylisting. Valid values are documented in the GnuPG manual and the gpg
man page under the option --auto-key-locate.
Requires at least GnuPG 2.1.18.

Note: Keys retrieved through auto-key-locate are automatically imported in the keyring.

trust-model
SINCE: 1.11.2

Change the trust-model for all GnuPG engine operations. An empty string sets the trust-model back to the users default. If the trust-model is not supported by GnuPG the behavior is undefined and will likely cause all operations to fail. Example: "tofu+pgp".

This options should be used carefully with a strict version requirement. In some versions of GnuPG setting the trust-model changes the default trust-model for future operations. A change in the trust-model also can have unintended side effects, like rebuilding the trust-db.

"extended-edit"
This flag passes the option --expert to gpg key edit. This can be used to get additional
callbacks in gpgme_op_edit.

This function returns 0 on success.

-- Function: const char * gpgme_get_ctx_flag (gpgme_ctx_t CTX,

const char *NAME)

SINCE: 1.8.0

The value of flags settable by gpgme_set_ctx_flag can be retrieved by this function. If NAME is unknown the function returns NULL. For boolean flags an empty string is returned for False and the string "1" is returned for True; either atoi(3) or a test for an empty string can be used to get the boolean value.

File: gpgme.info, Node: Locale, Next: Additional Logs, Prev: Context Flags, Up: Context Attributes

### 7.4.14 Locale

A locale setting can be associated with a context. This locale is passed to the crypto engine, and used for applications like the PIN entry, which is displayed to the user when entering a passphrase is required.

The default locale is used to initialize the locale setting of all contexts created afterwards.

-- Function: gpgme_error_t
gpgme_set_locale (gpgme_ctx_t CTX,
int CATEGORY, const char *VALUE)

SINCE: 0.4.3

The function gpgme_set_locale sets the locale of the context CTX, or the default locale if CTX is a null pointer.

The locale settings that should be changed are specified by CATEGORY. Supported categories are LC_CTYPE, LC_MESSAGES, and LC_ALL, which is a wildcard you can use if you want to change all the categories at once.

The value to be used for the locale setting is VALUE, which will be copied to GPGMEs internal data structures. VALUE can be a null pointer, which disables setting the locale, and will make PIN entry and other applications use their default setting, which is usually not what you want.

Note that the settings are only used if the application runs on a text terminal, and that the settings should fit the configuration of the output terminal. Normally, it is sufficient to initialize the default

value at startup.

The function returns an error if not enough memory is available.

File: gpgme.info, Node: Additional Logs, Prev: Locale, Up: Context Attributes

7.4.15 Additional Logs
---

Additional logs can be associated with a context. These logs are engine specific and can be be obtained with gpgme_op_getauditlog.

-- Function: gpgme_error_t gpgme_op_getauditlog (gpgme_ctx_t CTX, gpgme_data_t OUTPUT, unsigned int FLAGS)
SINCE: 1.1.1

The function gpgme_op_getauditlog is used to obtain additional logs as specified by FLAGS into the OUTPUT data. If

The function returns the error code GPG_ERR_NO_ERROR if a log could be queried from the engine, and GPG_ERR_NOT_IMPLEMENTED if the log specified in FLAGS is not available for this engine. If no log is available GPG_ERR_NO_DATA is returned.

The value in FLAGS is a bitwise-or combination of one or multiple of the following bit values:

GPGME_AUDITLOG_DIAG
SINCE: 1.11.2

Obtain diagnostic output which would be written to stderr in interactive use of the engine. This can be used to provide additional diagnostic information in case of errors in other operations.

Note: If log-file has been set in the configuration the log will be empty and GPG_ERR_NO_DATA will be returned.

Implemented for: GPGME_PROTOCOL_OpenPGP

GPGME_AUDITLOG_DEFAULT
SINCE: 1.11.2

This flag has the value 0 for compatibility reasons. Obtains additional information from the engine by issuing the GETAUDITLOG command. For GPGME_PROTOCOL_CMS this provides additional information about the X509 certificate chain.

Implemented for: GPGME_PROTOCOL_CMS

GPGME_AUDITLOG_HTML
SINCE: 1.1.1

Same as GPGME_AUDITLOG_DEFAULT but in HTML.

Implemented for: GPGME_PROTOCOL_CMS

-- Function: gpgme_error_t
gpgme_op_getauditlog_start (gpgme_ctx_t CTX,
gpgme_data_t OUTPUT, unsigned int FLAGS)
SINCE: 1.1.1

This is the asynchronous variant of gpgme_op_getauditlog.

File: gpgme.info, Node: Key Management, Next: Crypto Operations, Prev: Context Attributes, Up: Contexts

## 7.5 Key Management

Some of the cryptographic operations require that recipients or signers are specified. This is always done by specifying the respective keys that should be used for the operation. The following section describes how such keys can be selected and manipulated.

* Menu:


* Key objects:: Description of the key structures.
* Listing Keys:: Browsing the list of available keys.
* Information About Keys:: Requesting detailed information about keys.
* Manipulating Keys:: Operations on keys.
* Generating Keys:: Creating new key pairs.
* Signing Keys:: Adding key signatures to public keys.
* Exporting Keys:: Retrieving key data from the key ring.
* Importing Keys:: Adding keys to the key ring.
* Deleting Keys:: Removing keys from the key ring.
* Changing Passphrases:: Change the passphrase of a key.
* Changing TOFU Data:: Changing data pertaining to TOFU.
* Advanced Key Editing:: Advanced key edit operation.


File: gpgme.info, Node: Key objects, Next: Listing Keys, Up: Key Management

### 7.5.1 Key objects

---

The keys are represented in GPGME by structures which may only be read by the application but never be allocated or changed. They are valid as long as the key object itself is valid.

-- Data type: gpgme_key_t

The gpgme_key_t type is a pointer to a key object. It has the following members:

gpgme_keylist_mode_t keylist_mode
SINCE: 0.9.0

The keylist mode that was active when the key was retrieved.

unsigned int revoked : 1
This is true if the key is revoked.

unsigned int expired : 1
This is true if the key is expired.

unsigned int disabled : 1
This is true if the key is disabled.

unsigned int invalid : 1
This is true if the key is invalid. This might have several reasons, for a example for the S/MIME backend, it will be set during key listings if the key could not be validated due to missing certificates or unmatched policies.

unsigned int can_encrypt : 1
This is true if the key (ie one of its subkeys) can be used for encryption.

unsigned int can_sign : 1
This is true if the key (ie one of its subkeys) can be used to create data signatures.

unsigned int can_certify : 1
This is true if the key (ie one of its subkeys) can be used to create key certificates.

unsigned int can_authenticate : 1
SINCE: 0.4.5

This is true

if the key (ie one of its subkeys) can be used
for authentication.

unsigned int is_qualified : 1
SINCE: 1.1.0

This is true if the key can be used for qualified signatures according to local government regulations.

unsigned int secret : 1
This is true if the key is a secret key. Note, that this will always be true even if the corresponding subkey flag may be false (offline/stub keys). This is only set if a listing of secret keys has been requested or if GPGME_KEYLIST_MODE_WITH_SECRET is active.

unsigned int origin : 5
SINCE: 1.8.0

Reserved for the origin of this key.

gpgme_protocol_t protocol
This is the protocol supported by this key.

char *issuer_serial
If protocol is GPGME_PROTOCOL_CMS, then this is the issuer serial.

char *issuer_name
If protocol is GPGME_PROTOCOL_CMS, then this is the issuer name.

char *chain_id
If protocol is GPGME_PROTOCOL_CMS, then this is the chain ID, which can be used to built the certificate chain.

gpgme_validity_t owner_trust
If protocol is GPGME_PROTOCOL_OpenPGP, then this is the owner trust.

gpgme_subkey_t subkeys
This is a linked list with the subkeys of the key. The first subkey in the list is the primary key and usually available.

gpgme_user_id_t uids
This is a linked list with the user IDs of the key. The first user ID in the list is the main (or primary) user ID.

char *fpr
SINCE: 1.7.0

This field gives the fingerprint of the primary key. Note that this is a copy of the fingerprint of the first subkey. For an incomplete key (for example from a verification result) a subkey may be missing but this field may be set nevertheless.

unsigned long last_update

SINCE: 1.8.0

Reserved for the time of the last update of this key.

-- Data type: gpgme_subkey_t
SINCE: 1.5.0

The gpgme_subkey_t type is a pointer to a subkey structure. Subkeys are one component of a gpgme_key_t object. In fact, subkeys are those parts that contains the real information about the individual cryptographic keys that belong to the same key object. One gpgme_key_t can contain several subkeys. The first subkey in the linked list is also called the primary key.

The subkey structure has the following members:

gpgme_subkey_t next
This is a pointer to the next subkey structure in the linked list, or NULL if this is the last element.

unsigned int revoked : 1
This is true if the subkey is revoked.

unsigned int expired : 1
This is true if the subkey is expired.

unsigned int disabled : 1
This is true if the subkey is disabled.

unsigned int
invalid : 1
This is true if the subkey is invalid.

unsigned int can_encrypt : 1
This is true if the subkey can be used for encryption.

unsigned int can_sign : 1

This is true if the subkey can be used to create data signatures.

unsigned int can_certify : 1
This is true if the subkey can be used to create key certificates.

unsigned int can_authenticate : 1
SINCE: 0.4.5

This is true if the subkey can be used for authentication.

unsigned int is_qualified : 1
SINCE: 1.1.0

This is true if the subkey can be used for qualified signatures according to local government regulations.

unsigned int is_de_vs : 1
SINCE: 1.8.0

This is true if the subkey complies with the rules for classified information in Germany at the restricted level (VS-NfD). This are currently RSA keys of at least 2048 bits or ECDH/ECDSA
keys using a Brainpool curve.

unsigned int secret : 1
This is true if the subkey is a secret key. Note that it will be false if the key is actually a stub key; i.e. a secret key operation is currently not possible (offline-key). This is only set if a listing of secret keys has been requested or if GPGME_KEYLIST_MODE_WITH_SECRET is active.

gpgme_pubkey_algo_t pubkey_algo
This is the public key algorithm supported by this subkey.

unsigned int length
This is the length of the subkey (in bits).

char *keyid
This is the key ID of the subkey in hexadecimal digits.

char *fpr
This is the fingerprint of the subkey in hexadecimal digits, if available.

char *keygrip

SINCE: 1.7.0

The keygrip of the subkey in hex digit form or NULL if not available.

long int timestamp
This is the creation timestamp of the subkey. This is -1 if the timestamp is invalid, and 0 if it is not available.

long int expires
This is the expiration timestamp of the subkey, or 0 if the subkey does not expire.

unsigned int is_cardkey : 1
SINCE: 1.2.0

True if the secret key is stored on a smart card.

char *card_number
SINCE: 1.2.0

The serial number of a smart card holding this key or NULL.

char *curve
For ECC algorithms the name of the curve.

-- Data type: gpgme_user_id_t

A user ID is a component of a gpgme_key_t object. One key can have many user IDs. The first one in the list is the main (or primary) user ID.

The user ID structure has the following members.

gpgme_user_id_t next
This is a pointer to the next user ID structure in the linked list, or NULL if this is the last element.

unsigned int revoked : 1
This is true if the user ID is revoked.

unsigned int invalid : 1
This is true if the user ID is invalid.

gpgme_validity_t validity
This specifies the validity of the user ID.

char *uid
This is the user ID string.

char *name
This is the name component of uid, if available.

char *comment
This is the comment component of uid, if available.

char *email
This is the email component of uid, if available.

char *address;
The mail address (addr-spec from RFC-5322) of the user ID string. This is general the same as the email part of this structure but might be slightly different. If no mail address is available NULL is stored.

gpgme_tofu_info_t tofu
SINCE: 1.7.0

If not NULL information from the TOFU database pertaining to this user id.

gpgme_key_sig_t signatures
This is a linked list with the signatures on this user ID.

unsigned int origin :
5
SINCE: 1.8.0

Reserved for the origin of this user ID.

unsigned long last_update
SINCE: 1.8.0

Reserved for the time of the last update of this user ID.

char *uidhash;
A string used by gpg to identify a user ID. This string can be used at certain prompts of gpgme_op_edit to select a user ID. Users must be prepared to see a NULL value here. The format of the value is not specified and may depend on the GPGME or GnuPG version.

-- Data type: gpgme_tofu_info_t

SINCE: 1.7.0

The gpgme_tofu_info_t type is a pointer to a tofu info structure. Tofu info structures are one component of a gpgme_user_id_t object, and provide information from the TOFU database pertaining to the user ID.

The tofu info structure has the following members:

gpgme_key_sig_t next
This is a pointer to the next tofu info structure in the linked list, or NULL if this is the last element.

unsigned int validity : 3
This is the TOFU validity. It can have the following values:

0
The value 0 indicates a conflict.

1
The value 1 indicates a key without history.

2
The value 2 indicates a key with too little history.

3
The value 3 indicates a key with enough history for basic trust.

4
The value 4 indicates a key with a lot of history.

unsigned int policy : 4
This is the TOFU policy, see gpgme_tofu_policy_t.

unsigned short signcount
This is the number of signatures seen for this binding (or USHRT_MAX if there are more than that).

unsigned short encrcount
This is the number of encryptions done with this binding (or USHRT_MAX if there are more than that).

unsigned long signfirst
Number of seconds since Epoch when the first signature was seen with this binding.

unsigned long signlast
Number of seconds since Epoch when the last signature was seen with this binding.

unsigned long encrfirst
Number of seconds since Epoch when the first encryption was done with this binding.

unsigned long encrlast
Number of seconds since Epoch when the last encryption was done with this binding.

char *description
A human-readable string summarizing the TOFU data (or NULL).

-- Data type: gpgme_key_sig_t

The gpgme_key_sig_t type is a pointer to a key signature structure. Key signatures are one component of a gpgme_key_t object, and validate user IDs on the key in the OpenPGP protocol.

The signatures on a key are only available if the key was retrieved via a listing operation with the GPGME_KEYLIST_MODE_SIGS mode enabled, because it can be expensive to retrieve all signatures of

a key.

The signature notations on a key signature are only available if the key was retrieved via a listing operation with the GPGME_KEYLIST_MODE_SIG_NOTATIONS mode enabled, because it can be expensive to retrieve all signature notations.

The key signature structure has the following members:

gpgme_key_sig_t next
This is a pointer to the next key signature structure in the linked list, or NULL if this is the last element.

unsigned int revoked : 1
This is true if the key signature is a revocation signature.

unsigned int expired : 1
This is true if the key signature is expired.

unsigned int invalid : 1
This is true if the key signature is invalid.

unsigned int exportable : 1
This is true if the key signature is exportable.

gpgme_pubkey_algo_t pubkey_algo
This is the public key algorithm used to create the signature.

char *keyid
This is the
key ID of the key (in hexadecimal digits) used to
create the signature.

long int timestamp
This is the creation timestamp of the key signature. This is
-1 if the timestamp is invalid, and 0 if it is not available.

long int expires
This is the expiration timestamp of the key signature, or 0 if
the key signature does not expire.

gpgme_error_t status
This is the status of the signature and has the same meaning
as the member of the same name in a gpgme_signature_t
object.

unsigned int sig_class
This specifies the signature class of the key signature. The
meaning is specific to the crypto engine.

char *uid
This is the main user ID of the key used to create the
signature.

char *name
This is the name component of uid, if available.

char *comment
This is the comment component of uid, if available.

char *email
This is the email component of uid, if available.

gpgme_sig_notation_t notations
This is a linked list with the notation data and policy URLs.

File: gpgme.info, Node: Listing Keys, Next: Information About Keys, Prev: Key objects, Up: Key Management

7.5.2 Listing Keys

---

-- Function: gpgme_error_t gpgme_op_keylist_start (gpgme_ctx_t CTX,
const char *PATTERN, int SECRET_ONLY)

The function gpgme_op_keylist_start initiates a key listing operation inside the context CTX. It sets everything up so that subsequent invocations of gpgme_op_keylist_next return the keys in the list.

If PATTERN is NULL, all available keys are returned. Otherwise, PATTERN contains an engine specific expression that is used to limit the list to all keys matching the pattern. Note that the total length of the pattern is restricted to an engine-specific maximum (a couple of hundred characters are usually accepted). The pattern should be used to restrict the search to a certain common name or user, not to list many specific keys at once by listing their fingerprints or key IDs.

If SECRET_ONLY is not 0, the list is restricted to secret keys only.

The context will be busy until either all keys are received (and gpgme_op_keylist_next returns GPG_ERR_EOF), or gpgme_op_keylist_end is called to finish the operation.

The function returns the error code GPG_ERR_INV_VALUE if CTX is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_keylist_ext_start (gpgme_ctx_t CTX,
const char *PATTERN[], int SECRET_ONLY, int RESERVED)

The function gpgme_op_keylist_ext_start initiates an extended key listing operation inside the context CTX. It sets everything up so that subsequent invocations of gpgme_op_keylist_next return the

keys in the list.

If PATTERN or *PATTERN is NULL, all available keys are returned. Otherwise, PATTERN is a NULL terminated array of strings that are used to limit the list to all keys matching at least one of the patterns verbatim. Note that the total length of all patterns is restricted to an engine-specific maximum (the exact limit also depends on the number of patterns and amount of quoting required, but a couple of hundred characters are usually accepted). Patterns should be used to restrict the search to a certain common name or

user, not to list many specific keys at once by listing their fingerprints or key IDs.

If SECRET_ONLY is not 0, the list is restricted to secret keys only.

The value of RESERVED must be 0.

The context will be busy until either all keys are received (and gpgme_op_keylist_next returns GPG_ERR_EOF), or gpgme_op_keylist_end is called to finish the operation.

The function returns the error code GPG_ERR_INV_VALUE if CTX is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_keylist_from_data_start (gpgme_ctx_t CTX, gpgme_data_t DATA, int RESERVED)

SINCE: 1.8.0

The function gpgme_op_keylist_from_data_start initiates a key listing operation inside the context CTX. In contrast to the other key listing operation the keys are read from the supplied DATA and not from the local key database. The keys are also not imported into the local key database. The function sets everything up so that subsequent invocations of gpgme_op_keylist_next return the keys from DATA.

The value of RESERVED must be 0.

This function requires at least GnuPG version 2.1.14 and currently works only with OpenPGP keys.

The context will be busy until either all keys are received (and gpgme_op_keylist_next returns GPG_ERR_EOF), or gpgme_op_keylist_end is called to finish the operation. While the context is busy DATA may not be released.

The function returns the error code GPG_ERR_INV_VALUE if CTX is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_keylist_next (gpgme_ctx_t CTX, gpgme_key_t *R_KEY)

The function gpgme_op_keylist_next returns the next key in the list created by a previous gpgme_op_keylist_start operation in the context CTX. The key will have one reference for the user. *Note Manipulating Keys::.

This is the only way to get at gpgme_key_t objects in GPGME.

If the last key in the list has already been returned, gpgme_op_keylist_next returns GPG_ERR_EOF.

The function returns the error code GPG_ERR_INV_VALUE if CTX or R_KEY is not a valid pointer, and GPG_ERR_ENOMEM if there is not enough memory
for the operation.

-- Function: gpgme_error_t gpgme_op_keylist_end (gpgme_ctx_t CTX)

The function gpgme_op_keylist_end ends a pending key list operation in the context CTX.

After the operation completed successfully, the result of the key listing operation can be retrieved with gpgme_op_keylist_result.

The function returns the error code GPG_ERR_INV_VALUE if CTX is not a valid pointer, and GPG_ERR_ENOMEM if at some time during the operation there was not enough memory available.

The following example illustrates how all keys containing a certain string (g10code) can be listed with their key ID and the name and email address of the main user ID:

```
gpgme_ctx_t ctx;
gpgme_key_t key;
gpgme_error_t err = gpgme_new (&ctx);

if (!err)
  {
    err = gpgme_op_keylist_start (ctx, "g10code", 0);
    while (!err)
      {
        err = gpgme_op_keylist_next (ctx, &key);
        if (err)

break;
        printf ("%s:", key->subkeys->keyid);
        if (key->uids && key->uids->name)
          printf (" %s", key->uids->name);
        if (key->uids && key->uids->email)
```

```
            printf (" <%s>", key->uids->email);
          putchar ('\n');
          gpgme_key_release (key);
        }
      gpgme_release (ctx);
    }
  if (gpg_err_code (err) != GPG_ERR_EOF)
    {
      fprintf (stderr, "can not list keys: %s\n", gpgme_strerror (err));
      exit (1);
    }
```

-- Data type: gpgme_keylist_result_t
This is a pointer to a structure used to store the result of a gpgme_op_keylist_* operation. After successfully ending a key listing operation, you can retrieve the pointer to the result with gpgme_op_keylist_result. The structure contains the following member:

unsigned int truncated : 1
This is true if the crypto backend had to truncate the result, and less than the desired keys
could be listed.

-- Function: gpgme_keylist_result_t gpgme_op_keylist_result (gpgme_ctx_t CTX)
The function gpgme_op_keylist_result returns a gpgme_keylist_result_t pointer to a structure holding the result of a gpgme_op_keylist_* operation. The pointer is only valid if the last operation on the context was a key listing operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

In a simple program, for which a blocking operation is acceptable, the following function can be used to retrieve a single key.

-- Function: gpgme_error_t gpgme_get_key (gpgme_ctx_t CTX, const char *FPR, gpgme_key_t *R_KEY, int SECRET)
The function gpgme_get_key gets the key with the fingerprint (or key ID) FPR from the crypto backend and return it in R_KEY. If SECRET is true, get the secret key. The currently active keylist mode is used to retrieve
the key. The key will have one reference
for the user.

If the key is not found in the keyring, gpgme_get_key returns the error code GPG_ERR_EOF and *R_KEY will be set to NULL.

The function returns the error code GPG_ERR_INV_VALUE if CTX or R_KEY is not a valid pointer or FPR is not a fingerprint or key ID, GPG_ERR_AMBIGUOUS_NAME if the key ID was not a unique specifier for a key, and GPG_ERR_ENOMEM if at some time during the operation there was not enough memory available.

File: gpgme.info, Node: Information About Keys, Next: Manipulating Keys, Prev: Listing Keys, Up: Key Management

7.5.3 Information About Keys
---

Please see the beginning of this section for more information about gpgme_key_t objects.

-- Data type: gpgme_validity_t
The gpgme_validity_t type is used to specify the validity of a user ID in a key. The following validities are defined:

GPGME_VALIDITY_UNKNOWN
The user ID is of unknown validity. The string representation of this validity is ?.

GPGME_VALIDITY_UNDEFINED
The validity of the user ID is undefined. The string representation of this validity is q.

GPGME_VALIDITY_NEVER
The user ID is never valid. The string representation of this validity is n.

GPGME_VALIDITY_MARGINAL
The user ID is marginally valid. The string representation of this validity is m.

GPGME_VALIDITY_FULL
The user ID is fully valid. The string representation of this validity is f.

GPGME_VALIDITY_ULTIMATE
The user ID is ultimately valid. The string representation of this validity is u.

File: gpgme.info, Node: Manipulating Keys, Next: Generating Keys, Prev: Information About Keys, Up: Key Management

7.5.4 Manipulating Keys
---

-- Function: void gpgme_key_ref (gpgme_key_t KEY)
The function gpgme_key_ref
acquires an additional reference for
the key KEY.

-- Function: void gpgme_key_unref (gpgme_key_t KEY)
The function gpgme_key_unref releases a reference for the key
KEY. If this was the last reference, the key will be destroyed and
all resources associated to it will be released.

-- Function: gpgme_error_t gpgme_op_setexpire (gpgme_ctx_t CTX,
gpgme_key_t KEY, unsigned long EXPIRES, const char *SUBFPRS,
unsigned int RESERVED);

SINCE: 1.14.1

The function gpgme_op_setexpire sets the expiration time of the
key KEY or of the specified subkeys. This function requires at
least version 2.1.22 of GnuPG.

KEY specifies the key to operate on.

EXPIRES specifies the expiration time in seconds from now. To be
similar to other usages where expiration times are provided in
unsigned long this is similar to the key creation date and so it is
in seconds from NOW.

The common case is to use 0 to not set an
expiration time. Note
that this parameter takes an unsigned long value and not a time_t
to avoid problems on systems which use a signed 32 bit time_t.
Note further that the OpenPGP protocol uses 32 bit values for
timestamps and thus can only encode dates up to the year 2106.

SUBFPRS selects the subkey(s) for which the expiration time should
be set. If SUBFPRS is set to NULL, then the expiration time of
the primary key is set. If SUBFPRS is an asterisk (*), then the
expiration times of all non-revoked and not yet expired subkeys are
set. To select more than one subkey put all subkey fingerprints
into one string separated by linefeeds characters (\n).

RESERVED is reserved for later use and must be 0.

-- Function: gpgme_error_t gpgme_op_setexpire_start (gpgme_ctx_t CTX,

gpgme_key_t KEY, unsigned long EXPIRES, const char *SUBFPRS,
unsigned int FLAGS);

SINCE: 1.14.1

The function gpgme_op_setexpire_start
initiates a
gpgme_op_setexpire operation; see there for details. It must be
completed by calling gpgme_wait on the context. *Note Waiting
For Completion::.

-- Function: gpgme_error_t gpgme_op_revuid_start (gpgme_ctx_t CTX,
gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);

SINCE: 1.14.1

The function gpgme_op_setexpire_start initiates a
gpgme_op_setexpire operation; see there for details. It must be
completed by calling gpgme_wait on the context. *Note Waiting
For Completion::.

File: gpgme.info, Node: Generating Keys, Next: Signing Keys, Prev: Manipulating Keys, Up: Key Management

7.5.5 Generating Keys
---

GPGME provides a set of functions to create public key pairs. Most of
these functions require the use of GnuPG 2.1 and later; for older GnuPG
versions the gpgme_op_genkey function can be used. Existing code
which wants to update to the new functions or new code which shall
supports older
GnuPG versions may try the new functions first and
provide a fallback to the old function if the error code
GPG_ERR_NOT_SUPPORTED is received.

-- Function: gpgme_error_t gpgme_op_createkey (gpgme_ctx_t CTX,
const char *USERID, const char *ALGO, unsigned long RESERVED,
unsigned long EXPIRES, gpgme_key_t EXTRAKEY,
unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_createkey generates a new key for the
procotol active in the context CTX. As of now this function does
only work for OpenPGP and requires at least version 2.1.13 of
GnuPG.

USERID is commonly the mail address associated with the key. GPGME does not require a specific syntax but if more than a mail address is given, RFC-822 style format is suggested. The value is expected to be in UTF-8 encoding (i.e. no IDN encoding for mail addresses). This is a required parameter.

ALGO specifies the algorithm for the new key (actually a keypair of public and private key). For a list of supported algorithms, see the GnuPG manual. If ALGO is NULL or the string "default", the key is generated using the default algorithm of the engine. If the string "future-default" is used the engine may use an algorithm which is planned to be the default in a future release of the engine; however existing implementation of the protocol may not be able to already handle such future algorithms. For the OpenPGP protocol, the specification of a default algorithm, without requesting a non-default usage via FLAGS, triggers the creation of a primary key plus a secondary key (subkey).

RESERVED must be set to zero.

EXPIRES specifies the expiration time in seconds. If you supply 0, a reasonable expiration time is chosen. Use the flag GPGME_CREATE_NOEXPIRE to create keys that do not expire. Note that this parameter takes an unsigned long value and not a time_t to avoid problems on systems which use a signed 32 bit time_t. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

EXTRAKEY is currently not used and must be set to NULL. A future version of GPGME may use this parameter to create X.509 keys.

FLAGS can be set to the bit-wise OR of the following flags:

GPGME_CREATE_SIGN
GPGME_CREATE_ENCR
GPGME_CREATE_CERT
GPGME_CREATE_AUTH
SINCE: 1.7.0

Do not create the key with the default capabilities (key usage) of the requested algorithm but use those explicitly given by these flags: signing, encryption, certification, or authentication. The allowed combinations depend on the algorithm.

If any of these flags are set and a default algorithm has been

selected only one key is created in the case of the OpenPGP protocol.

GPGME_CREATE_NOPASSWD
SINCE: 1.7.0

Request generation of the key without password protection.

GPGME_CREATE_SELFSIGNED
SINCE: 1.7.0

For an X.509 key do not create a CSR but a self-signed certificate. This has not yet been implemented.

GPGME_CREATE_NOSTORE
SINCE: 1.7.0

Do not store the created key in the local key database. This has not yet been implemented.

GPGME_CREATE_WANTPUB
GPGME_CREATE_WANTSEC
SINCE: 1.7.0

Return the public or secret key as part of the result structure. This has not yet been implemented.

GPGME_CREATE_FORCE
SINCE: 1.7.0

The engine does not allow the creation of a key with a user ID already existing in the local key database. This flag can be used to override this check.

GPGME_CREATE_NOEXPIRE
SINCE: 1.9.0

Request generation of keys that do not expire.

After the operation completed successfully, information about the created key can be retrieved with gpgme_op_genkey_result.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

-- Function: gpgme_error_t gpgme_op_createkey_start (gpgme_ctx_t CTX,

const char *USERID, const char *ALGO, unsigned long RESERVED,
unsigned long EXPIRES, gpgme_key_t EXTRAKEY,
unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_createkey_start initiates a
gpgme_op_createkey operation; see there for details. It must be
completed by calling gpgme_wait on the context. *Note Waiting
For Completion::.

-- Function: gpgme_error_t gpgme_op_createsubkey (gpgme_ctx_t CTX,
gpgme_key_t KEY, const char *ALGO, unsigned long RESERVED,
unsigned long EXPIRES, unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_createsubkey creates and adds
a new subkey
to the primary OpenPGP key given by KEY. The only allowed protocol
in CTX is GPGME_PROTOCOL_OPENPGP. Subkeys (aka secondary keys)
are a concept in the OpenPGP protocol to bind several keys to a
primary key. As of now this function requires at least version
2.1.13 of GnuPG.

KEY specifies the key to operate on.

ALGO specifies the algorithm for the new subkey. For a list of
supported algorithms, see the GnuPG manual. If ALGO is NULL or
the string "default", the subkey is generated using the default
algorithm for an encryption subkey of the engine. If the string
"future-default" is used the engine may use an encryption algorithm
which is planned to be the default in a future release of the
engine; however existing implementation of the protocol may not be
able to already handle such future algorithms.

RESERVED must be set to zero.

EXPIRES specifies the expiration time in seconds. If you
supply 0,
a reasonable expiration time is chosen. Use the flag
GPGME_CREATE_NOEXPIRE to create keys that do not expire. Note
that this parameter takes an unsigned long value and not a time_t
to avoid problems on systems which use a signed 32 bit time_t.
Note further that the OpenPGP protocol uses 32 bit values for
timestamps and thus can only encode dates up to the year 2106.

FLAGS takes the same values as described above for

gpgme_op_createkey.

After the operation completed successfully, information about the created key can be retrieved with gpgme_op_genkey_result.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

-- Function: gpgme_error_t gpgme_op_createsubkey_start
(gpgme_ctx_t CTX, gpgme_key_t KEY, const char *ALGO,
unsigned long RESERVED, unsigned long EXPIRES,
unsigned int FLAGS);

SINCE:
1.7.0

The function gpgme_op_createsubkey_start initiates a gpgme_op_createsubkey operation; see there for details. It must be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

-- Function: gpgme_error_t gpgme_op_adduid (gpgme_ctx_t CTX,
gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_adduid adds a new user ID to the OpenPGP key given by KEY. Adding additional user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context CTX must be set to OpenPGP. As of now this function requires at least version 2.1.13 of GnuPG.

KEY specifies the key to operate on.

USERID is the user ID to add to the key. A user ID is commonly the mail address to be associated with the key. GPGME does not require a specific syntax but if more than a mail address is given, RFC-822 style format is suggested.
The value is expected to be in UTF-8
encoding (i.e. no IDN encoding for mail addresses). This is a required parameter.

FLAGS are currently not used and must be set to zero.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

-- Function: gpgme_error_t gpgme_op_adduid_start (gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_adduid_start initiates a gpgme_op_adduid operation; see there for details. It must be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

-- Function: gpgme_error_t gpgme_op_revuid (gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_revuid revokes a user ID from the OpenPGP key given by KEY. Revoking user IDs after key creation is a feature
of the OpenPGP protocol and thus the protocol for the context CTX must be set to OpenPGP. As of now this function requires at least version 2.1.13 of GnuPG.

KEY specifies the key to operate on.

USERID is the user ID to be revoked from the key. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the uid field from the user ID object (gpgme_user_id_t) is to be used. This is a required parameter.

FLAGS are currently not used and must be set to zero.

Note that the engine wont allow to revoke the last valid user ID. To change a user ID is better to first add the new user ID, then revoke the old one, and finally publish the key.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

-- Function: gpgme_error_t gpgme_op_revuid_start (gpgme_ctx_t CTX, gpgme_key_t KEY, const
char *USERID, unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_revuid_start initiates a gpgme_op_revuid operation; see there for details. It must be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

-- Function: gpgme_error_t gpgme_op_set_ui_flag (gpgme_ctx_t CTX,
gpgme_key_t KEY, const char *USERID, cons char * NAME,
cons char * VALUE);

SINCE: 1.8.0

The function gpgme_op_set_uid_flag is used to set flags on a user ID from the OpenPGP key given by KEY. Setting flags on user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context CTX must be set to OpenPGP.

KEY specifies the key to operate on. This parameters is required.

USERID is the user ID of the key to be manipulated. This user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the uid field from the user ID object

(gpgme_user_id_t) is to be used. This is a required parameter.

NAME names the flag which is to be changed. The only currently supported flag is:

primary
This sets the primary key flag on the given user ID. All other primary key flag on other user IDs are removed. VALUE must be given as NULL. For technical reasons this functions bumps the creation timestamp of all affected self-signatures up by one second. At least GnuPG version 2.1.20 is required.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

-- Function: gpgme_error_t gpgme_op_set_uid_flag_start
(gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID,
cons char * NAME, cons char * VALUE);

SINCE: 1.8.0

The function gpgme_op_set_uid_flag_start initiates a gpgme_op_set_uid_flag operation; see there for details. It must

be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

-- Function: gpgme_error_t gpgme_op_genkey (gpgme_ctx_t CTX,
const char *PARMS, gpgme_data_t PUBLIC, gpgme_data_t SECRET)

The function gpgme_op_genkey generates a new key pair in the context CTX. The meaning of PUBLIC and SECRET depends on the crypto backend.

GPG does not support PUBLIC and SECRET, they should be NULL. GnuPG will generate a key pair and add it to the standard key ring. The fingerprint of the generated key is available with gpgme_op_genkey_result.

GpgSM requires PUBLIC to be a writable data object. GpgSM will generate a secret key (which will be stored by gpg-agent, and return a certificate request in PUBLIC, which then needs to be signed by the certification authority and imported before it can be used. GpgSM does not make the fingerprint available.

The argument PARMS specifies parameters for the key in an string that looks something like XML. The details about the format of PARMS are specific to the crypto engine used by CTX. The first line of the parameters must be <GnupgKeyParams format="internal">
and the last line must be </GnupgKeyParams>. Every line in between the first and last lines is treated as a Header: Value pair. In particular, no XML escaping is necessary if you need to include the characters <, >, or &.

Here is an example for GnuPG as the crypto engine (all parameters of OpenPGP key generation are documented in the GPG manual):

```
<GnupgKeyParms format="internal">
Key-Type: default
Subkey-Type: default
Name-Real: Joe Tester
Name-Comment: with stupid passphrase
Name-Email: joe@foo.bar
Expire-Date: 0
Passphrase: abc
</GnupgKeyParms>
```

Here is an example for GpgSM as the crypto engine (all parameters of OpenPGP key generation are documented in the GPGSM manual):

```
<GnupgKeyParms format="internal">
Key-Type: RSA
Key-Length: 1024
Name-DN: C=de,O=g10 code,OU=Testlab,CN=Joe 2 Tester
Name-Email: joe@foo.bar
```

</GnupgKeyParms>

Strings should be given in UTF-8 encoding. The only format supported for now is internal. The content of the GnupgKeyParms container is passed verbatim to the crypto backend. Control statements are not allowed.

After the operation completed successfully, the result can be retrieved with gpgme_op_genkey_result.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, GPG_ERR_INV_VALUE if PARMS is not a well-formed string (e.g. does not have the expected tag-like headers and footers), GPG_ERR_NOT_SUPPORTED if PUBLIC or SECRET is not valid, and GPG_ERR_GENERAL if no key was created by the backend.

-- Function: gpgme_error_t
gpgme_op_genkey_start (gpgme_ctx_t CTX,
const char *PARMS, gpgme_data_t PUBLIC, gpgme_data_t SECRET)

The function gpgme_op_genkey_start initiates a gpgme_op_genkey operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, GPG_ERR_INV_VALUE if PARMS is not a valid XML string, and GPG_ERR_NOT_SUPPORTED if PUBLIC or SECRET is not NULL.

-- Data type: gpgme_genkey_result_t

This is a pointer to a structure used to store the result of a gpgme_op_genkey operation. After successfully generating a key, you can retrieve the pointer to the result with gpgme_op_genkey_result. The structure contains the following members:

unsigned int primary : 1
This flag is set to 1 if a primary key was created and to 0 if not.

unsigned int sub : 1
This
flag is set to 1 if a subkey was created and to 0 if not.

unsigned int uid : 1
This flag is set to 1 if a user ID was created and to 0 if

not.

char *fpr
This is the fingerprint of the key that was created. If both a primary and a subkey were generated, the fingerprint of the primary key will be returned. If the crypto engine does not provide the fingerprint, fpr will be a null pointer.

gpgme_data_t pubkey
SINCE: 1.7.0

This will eventually be used to return the public key. It is currently not used.

gpgme_data_t seckey
SINCE: 1.7.0

This will eventually be used to return the secret key. It is currently not used.

-- Function: gpgme_genkey_result_t gpgme_op_genkey_result (gpgme_ctx_t CTX)

The function gpgme_op_genkey_result returns a gpgme_genkey_result_t pointer to a structure holding the result of a gpgme_op_genkey operation. The pointer is only valid if the last operation on the context was a gpgme_op_genkey or gpgme_op_genkey_start operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

File: gpgme.info, Node: Signing Keys, Next: Exporting Keys, Prev: Generating Keys, Up: Key Management

### 7.5.6 Signing Keys

Key signatures are a unique concept of the OpenPGP protocol. They can be used to certify the validity of a key and are used to create the Web-of-Trust (WoT). Instead of using the gpgme_op_interact function along with a finite state machine, GPGME provides a convenient function to create key signatures when using modern GnuPG versions.

-- Function: gpgme_error_t gpgme_op_keysign (gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID, unsigned long EXPIRES, unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_keysign adds
a new key signature to the
public key KEY. This function requires at least version 2.1.12 of
GnuPG.

CTX is the usual context which describes the protocol to use (which
must be OpenPGP) and has also the list of signer keys to be used
for the signature. The common case is to use the default key for
signing other keys. If another key or more than one key shall be
used for a key signature, gpgme_signers_add can be used. *Note
Selecting Signers::.

KEY specifies the key to operate on.

USERID selects the user ID or user IDs to be signed. If USERID is
set to NULL all valid user IDs are signed. The user ID must be
given verbatim because the engine does an exact and case sensitive
match. Thus the uid field from the user ID object
(gpgme_user_id_t) is to be used. To select more than one user ID
put them all into one string separated by linefeeds characters
(\n) and set the flag GPGME_KEYSIGN_LFSEP.

EXPIRES
specifies the expiration time of the new signature in
seconds. The common case is to use 0 to not set an expiration
date. However, if the configuration of the engine defines a
default expiration for key signatures, that is still used unless
the flag GPGME_KEYSIGN_NOEXPIRE is used. Note that this
parameter takes an unsigned long value and not a time_t to avoid
problems on systems which use a signed 32 bit time_t. Note
further that the OpenPGP protocol uses 32 bit values for timestamps
and thus can only encode dates up to the year 2106.

FLAGS can be set to the bit-wise OR of the following flags:

GPGME_KEYSIGN_LOCAL
SINCE: 1.7.0

Instead of creating an exportable key signature, create a key
signature which is is marked as non-exportable.

GPGME_KEYSIGN_LFSEP
SINCE: 1.7.0

Although linefeeds are uncommon in user IDs this flag is
required to explicitly declare that

USERID may contain several
linefeed separated user IDs.

GPGME_KEYSIGN_NOEXPIRE
Force the creation of a key signature without an expiration date. This overrides EXPIRE and any local configuration of the engine.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

-- Function: gpgme_error_t gpgme_op_keysign_start (gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID, unsigned long EXPIRES, unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_keysign_start initiates a gpgme_op_keysign operation; see there for details. It must be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

-- Function: gpgme_error_t gpgme_op_revsig (gpgme_ctx_t CTX, gpgme_key_t KEY, gpgme_key_t SIGNING_KEY, const char *USERID, unsigned int FLAGS);

SINCE: 1.14.1

The function gpgme_op_revsig revokes key signatures of the public key KEY made with the key SIGNING_KEY. This function requires at least version 2.2.24 of GnuPG.

KEY specifies the key to operate on.

SIGNING_KEY specifies the key whose signatures shall be revoked.

USERID selects the user ID or user IDs whose signatures shall be revoked. If USERID is set to NULL the signatures on all user IDs are revoked. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the uid field from the user ID object (gpgme_user_id_t) is to be used. To select more than one user ID put them all into one string separated by linefeeds characters (\n) and set the flag GPGME_REVSIG_LFSEP.

FLAGS can be set to the bit-wise OR of the following flags:

GPGME_REVSIG_LFSEP

SINCE: 1.14.1

Although linefeeds are uncommon in user IDs this flag is required to explicitly declare that USERID may contain several linefeed separated user IDs.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

-- Function: gpgme_error_t gpgme_op_revsig_start (gpgme_ctx_t CTX, gpgme_key_t KEY, gpgme_key_t SIGNING_KEY, const char *USERID, unsigned int FLAGS);

SINCE: 1.14.1

The function gpgme_op_revsig_start initiates a gpgme_op_revsig operation; see there for details. It must be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

File: gpgme.info, Node: Exporting Keys, Next: Importing Keys, Prev: Signing Keys, Up: Key Management

7.5.7 Exporting Keys
---

Exporting keys means the same as running gpg with the command --export. However, a mode flag can be used to change the way the export works. The available mode flags are described below, they may be or-ed together.

GPGME_EXPORT_MODE_EXTERN

If this bit is set, the output is send directly to the default keyserver. This is currently only allowed for OpenPGP keys. It is good practise to not send more than a few dozens key to a keyserver at one time. Using this flag requires that the KEYDATA argument of the export function is set to NULL.

GPGME_EXPORT_MODE_MINIMAL

SINCE: 1.3.1

If this bit is set, the smallest possible key is exported. For OpenPGP keys it removes all signatures except for the latest self-signatures. For X.509 keys it has no effect.

GPGME_EXPORT_MODE_SSH

SINCE: 1.4.0

If this bit is set, the latest authentication key of the requested OpenPGP key is exported in the OpenSSH public key format. This accepts just a single key; to force the export of a specific subkey a fingerprint pattern with an appended exclamation mark may be used.

GPGME_EXPORT_MODE_SECRET
SINCE: 1.6.0

Instead of exporting the public key, the secret key is exported. This may not be combined with GPGME_EXPORT_MODE_EXTERN. For X.509 the export format is PKCS#8.

GPGME_EXPORT_MODE_RAW
SINCE: 1.6.0

If this flag is used with GPGME_EXPORT_MODE_SECRET for an X.509 key the export format will be changed to PKCS#1. This flag may not be used with OpenPGP.

GPGME_EXPORT_MODE_PKCS12
SINCE: 1.6.0

If this flag is used with GPGME_EXPORT_MODE_SECRET for an X.509 key the export format will be changed to PKCS#12 which also includes the certificate. This flag may not be used with OpenPGP.

GPGME_EXPORT_MODE_NOUID
SINCE: 1.12.0 - experimental Do not export user ids. Works only with certain gpg version.

-- Function: gpgme_error_t gpgme_op_export (gpgme_ctx_t CTX, const char *PATTERN, gpgme_export_mode_t MODE, gpgme_data_t KEYDATA)

The function gpgme_op_export extracts public keys and returns them in the data buffer KEYDATA. The output format of the key data returned is determined by the ASCII armor attribute set for the context CTX, or, if that is not set, by the encoding specified for KEYDATA.

If PATTERN is NULL, all available keys are returned. Otherwise, PATTERN contains an engine specific expression that is used to limit the list to all keys matching the pattern.

MODE is usually 0; other values are described above.

The function returns the error code GPG_ERR_NO_ERROR if the operation completed successfully, GPG_ERR_INV_VALUE if KEYDATA is not a valid empty data buffer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_export_start (gpgme_ctx_t CTX, const char *PATTERN, gpgme_export_mode_t MODE, gpgme_data_t KEYDATA)

The function gpgme_op_export_start initiates a gpgme_op_export operation. It can be completed by calling gpgme_wait on the context.

*Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, and GPG_ERR_INV_VALUE if KEYDATA is not a valid empty data buffer.

-- Function: gpgme_error_t gpgme_op_export_ext (gpgme_ctx_t CTX, const char *PATTERN[], gpgme_export_mode_t MODE, gpgme_data_t KEYDATA)

The function gpgme_op_export extracts public keys and returns them in the data buffer KEYDATA. The output format of the key data returned is determined by the ASCII armor attribute set for the context CTX, or, if that is not set, by the encoding specified for KEYDATA.

If PATTERN or *PATTERN is NULL, all available keys are returned. Otherwise, PATTERN is a NULL terminated array of strings that are used to limit the list to all keys matching at least one of the patterns verbatim.

MODE is usually 0; other values are described above.

The function returns the error code GPG_ERR_NO_ERROR if the operation completed successfully, GPG_ERR_INV_VALUE if KEYDATA is not a valid empty data buffer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_export_ext_start (gpgme_ctx_t CTX, const char *PATTERN[], gpgme_export_mode_t MODE, gpgme_data_t KEYDATA)

The function gpgme_op_export_ext_start initiates a gpgme_op_export_ext operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the

operation could be started successfully, and GPG_ERR_INV_VALUE if KEYDATA is not a valid empty data buffer.

-- Function: gpgme_error_t gpgme_op_export_keys (gpgme_ctx_t CTX, gpgme_key_t keys[], gpgme_export_mode_t MODE, gpgme_data_t KEYDATA)

SINCE: 1.2.0

The function gpgme_op_export_keys extracts public keys and returns them in the data buffer KEYDATA. The output format of the key data returned is determined by the ASCII armor attribute set for the context CTX, or, if that is not set, by the encoding specified for KEYDATA.

The keys to export are taken form the NULL terminated array KEYS. Only keys of the currently selected protocol of CTX which do have a fingerprint set are considered for export. Other keys specified by the KEYS are ignored. In particular OpenPGP keys retrieved via an external key listing are not included.

MODE is usually 0; other values are described above.

The function returns the error code GPG_ERR_NO_ERROR if the operation completed successfully, GPG_ERR_INV_VALUE if KEYDATA is not a valid empty data buffer, GPG_ERR_NO_DATA if no useful keys are in KEYS and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_export_keys_start (gpgme_ctx_t CTX, gpgme_key_t KEYS[], gpgme_export_mode_t MODE, gpgme_data_t KEYDATA)

SINCE: 1.2.0

The function gpgme_op_export_keys_start initiates a gpgme_op_export_ext operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, and GPG_ERR_INV_VALUE if KEYDATA is not a valid empty data buffer, GPG_ERR_NO_DATA if no useful keys are in KEYS and passes through any errors that are reported by the crypto engine support routines.

File: gpgme.info, Node: Importing Keys, Next: Deleting Keys, Prev: Exporting Keys, Up: Key Management

7.5.8 Importing Keys
---

Importing keys means the same as running gpg with the command
--import.

-- Function: gpgme_error_t gpgme_op_import (gpgme_ctx_t CTX,
gpgme_data_t KEYDATA)
The function gpgme_op_import
adds the keys in the data buffer
KEYDATA to the key ring of the crypto engine used by CTX. The
format of KEYDATA can be ASCII armored, for example, but the
details are specific to the crypto engine.

After the operation completed successfully, the result can be
retrieved with gpgme_op_import_result.

The function returns the error code GPG_ERR_NO_ERROR if the
import was completed successfully, GPG_ERR_INV_VALUE if KEYDATA
if CTX or KEYDATA is not a valid pointer, and GPG_ERR_NO_DATA if
KEYDATA is an empty data buffer.

-- Function: gpgme_error_t gpgme_op_import_start (gpgme_ctx_t CTX,
gpgme_data_t KEYDATA)
The function gpgme_op_import_start initiates a gpgme_op_import
operation. It can be completed by calling gpgme_wait on the
context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the
import could be started successfully, GPG_ERR_INV_VALUE if CTX or
KEYDATA
is not a valid pointer, and GPG_ERR_NO_DATA if KEYDATA is
an empty data buffer.

-- Function: gpgme_error_t gpgme_op_import_keys (gpgme_ctx_t CTX,
gpgme_key_t *KEYS)
SINCE: 1.2.0

The function gpgme_op_import_keys adds the keys described by the
NULL terminated array KEYS to the key ring of the crypto engine
used by CTX. It is used to actually import and make keys permanent
which have been retrieved from an external source (i.e. using
GPGME_KEYLIST_MODE_EXTERN) earlier. The external keylisting must
have been made with the same context configuration (in particular
the same home directory). (1) Note that for OpenPGP this may
require another access to the keyserver over the network.

Only keys of the currently selected protocol of CTX are considered

for import. Other keys specified by the KEYS are ignored. As of now all considered keys must have been retrieved using the same method, i.e. the used key
listing mode must be identical.

After the operation completed successfully, the result can be retrieved with gpgme_op_import_result.

To move keys from one home directory to another, export and import the keydata using gpgme_op_export and gpgme_op_import.

The function returns the error code GPG_ERR_NO_ERROR if the import was completed successfully, GPG_ERR_INV_VALUE if CTX is not a valid pointer, GPG_ERR_CONFLICT if the key listing mode does not match, and GPG_ERR_NO_DATA if no keys are considered for export.

-- Function: gpgme_error_t gpgme_op_import_keys_start (gpgme_ctx_t CTX, gpgme_key_t *KEYS)
SINCE: 1.2.0

The function gpgme_op_import_keys_start initiates a gpgme_op_import_keys operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the import was completed successfully, GPG_ERR_INV_VALUE
if KEYDATA
if CTX or KEYDATA is not a valid pointer, GPG_ERR_CONFLICT if the key listing mode does not match, and GPG_ERR_NO_DATA if no keys are considered for export.

-- Data type: gpgme_import_status_t
This is a pointer to a structure used to store a part of the result of a gpgme_op_import operation. For each considered key one status is added that contains information about the result of the import. The structure contains the following members:

gpgme_import_status_t next
This is a pointer to the next status structure in the linked list, or NULL if this is the last element.

char *fpr
This is the fingerprint of the key that was considered.

gpgme_error_t result
If the import was not successful, this is the error value that caused the import to fail. Otherwise the error code is

GPG_ERR_NO_ERROR.

unsigned int status
This is a bit-wise OR of the following
flags that give more
information about what part of the key was imported. If the
key was already known, this might be 0.

GPGME_IMPORT_NEW
The key was new.

GPGME_IMPORT_UID
The key contained new user IDs.

GPGME_IMPORT_SIG
The key contained new signatures.

GPGME_IMPORT_SUBKEY
The key contained new sub keys.

GPGME_IMPORT_SECRET
The key contained a secret key.

-- Data type: gpgme_import_result_t
This is a pointer to a structure used to store the result of a
gpgme_op_import operation. After a successful import operation,
you can retrieve the pointer to the result with
gpgme_op_import_result. The structure contains the following
members:

int considered
The total number of considered keys.

int no_user_id
The number of keys without user ID.

int imported
The total number
of imported keys.

int imported_rsa
The number of imported RSA keys.

int unchanged
The number of unchanged keys.

int new_user_ids
The number of new user IDs.

int new_sub_keys
The number of new sub keys.

int new_signatures
The number of new signatures.

int new_revocations
The number of new revocations.

int secret_read
The total number of secret keys read.

int secret_imported
The number of imported secret keys.

int secret_unchanged
The number of unchanged secret keys.

int not_imported
The number of keys not imported.

gpgme_import_status_t imports
A list of gpgme_import_status_t objects which contain more information about the keys for which an import was attempted.

int skipped_v3_keys
For security reasons modern versions of GnuPG do not anymore support v3 keys (created with PGP
2.x) and ignores them on
import. This counter provides the number of such skipped v3 keys.

-- Function: gpgme_import_result_t gpgme_op_import_result (gpgme_ctx_t CTX)
The function gpgme_op_import_result returns a gpgme_import_result_t pointer to a structure holding the result of a gpgme_op_import operation. The pointer is only valid if the last operation on the context was a gpgme_op_import or gpgme_op_import_start operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

---------- Footnotes ----------

(1) Thus it is a replacement for the usual workaround of exporting and then importing a key to make an X.509 key permanent.

File: gpgme.info, Node: Deleting Keys, Next: Changing Passphrases, Prev: Importing Keys, Up: Key Management

7.5.9 Deleting Keys
---

-- Function: gpgme_error_t gpgme_op_delete_ext
(gpgme_ctx_t CTX,
const gpgme_key_t KEY, unsigned int FLAGS)
SINCE: 1.9.1

The function gpgme_op_delete_ext deletes the key KEY from the key ring of the crypto engine used by CTX.

FLAGS can be set to the bit-wise OR of the following flags:

GPGME_DELETE_ALLOW_SECRET
SINCE: 1.9.1

If not set, only public keys are deleted. If set, secret keys are deleted as well, if that is supported.

GPGME_DELETE_FORCE
SINCE: 1.9.1

If set, the user is not asked to confirm the deletion.

The function returns the error code GPG_ERR_NO_ERROR if the key was deleted successfully, GPG_ERR_INV_VALUE if CTX or KEY is not a valid pointer, GPG_ERR_NO_PUBKEY if KEY could not be found in the keyring, GPG_ERR_AMBIGUOUS_NAME if the key was not specified unambiguously, and GPG_ERR_CONFLICT if the secret key for KEY is available, but ALLOW_SECRET is zero.

-- Function: gpgme_error_t gpgme_op_delete_ext_start
(gpgme_ctx_t CTX,
const gpgme_key_t KEY, unsigned int FLAGS)
SINCE: 1.9.1

The function gpgme_op_delete_ext_start initiates a gpgme_op_delete operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation was started successfully, and GPG_ERR_INV_VALUE if CTX or KEY is not a valid pointer.

The following functions allow only to use one particular flag.

-- Function: gpgme_error_t gpgme_op_delete (gpgme_ctx_t CTX,
const gpgme_key_t KEY, int ALLOW_SECRET)
Similar to gpgme_op_delete_ext, but only the flag
GPGME_DELETE_ALLOW_SECRET can be provided.

-- Function: gpgme_error_t gpgme_op_delete_start (gpgme_ctx_t CTX,
const gpgme_key_t KEY, int ALLOW_SECRET)
Similar to gpgme_op_delete_ext_start, but only the flag
GPGME_DELETE_ALLOW_SECRET can be provided.

File: gpgme.info, Node:
Changing Passphrases, Next: Changing TOFU Data, Prev: Deleting Keys, Up: Key Management

7.5.10 Changing Passphrases
---

-- Function: gpgme_error_t gpgme_op_passwd (gpgme_ctx_t CTX,
const gpgme_key_t KEY, unsigned int FLAGS)

SINCE: 1.3.0

The function gpgme_op_passwd changes the passphrase of the
private key associated with KEY. The only allowed value for FLAGS
is 0. The backend engine will usually popup a window to ask for
the old and the new passphrase. Thus this function is not useful
in a server application (where passphrases are not required
anyway).

Note that old gpg engines (before version 2.0.15) do not support
this command and will silently ignore it.

-- Function: gpgme_error_t gpgme_op_passwd_start (gpgme_ctx_t CTX,
const gpgme_key_t KEY, unsigned int FLAGS)

SINCE: 1.3.0

The function gpgme_op_passwd_start initiates a gpgme_op_passwd
operation. It can be completed
by calling gpgme_wait on the
context. *Note Waiting For Completion::.

The function returns 0 if the operation was started successfully,
and an error code if one of the arguments is not valid or the
oepration could not be started.

File: gpgme.info, Node: Changing TOFU Data, Next: Advanced Key Editing, Prev: Changing Passphrases, Up: Key Management

7.5.11 Changing TOFU Data
---

The OpenPGP engine features a Trust-On-First-Use (TOFU) key validation model. For resolving conflicts it is necessary to declare the policy for a key. See the GnuPG manual for details on the TOFU implementation.

-- Data type: enum gpgme_tofu_policy_t
SINCE: 1.7.0

The gpgme_tofu_policy_t type specifies the set of possible policy values that are supported by GPGME:

GPGME_TOFU_POLICY_AUTO
Set the policy to auto.
GPGME_TOFU_POLICY_GOOD
Set the policy to good.
GPGME_TOFU_POLICY_BAD
Set the policy to
bad.
GPGME_TOFU_POLICY_ASK
Set the policy to ask.
GPGME_TOFU_POLICY_UNKNOWN
Set the policy to unknown.

To change the policy for a key the following functions can be used:

-- Function: gpgme_error_t gpgme_op_tofu_policy (gpgme_ctx_t CTX, const gpgme_key_t KEY, gpgme_tofu_policy_t POLICY)

SINCE: 1.7.0

The function gpgme_op_tofu_policy changes the TOFU policy of KEY. The valid values for POLICY are listed above. As of now this function does only work for OpenPGP and requires at least version 2.1.10 of GnuPG.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

-- Function: gpgme_error_t gpgme_op_tofu_policy_start (gpgme_ctx_t CTX, const gpgme_key_t KEY, gpgme_tofu_policy_t POLICY)

SINCE: 1.7.0

The function gpgme_op_tofu_policy_start initiates a gpgme_op_tofu_policy operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns 0 if the operation was started successfully, and an error code if one of the arguments is not valid or the oepration could not be started.

File: gpgme.info, Node: Advanced Key Editing, Prev: Changing TOFU Data, Up: Key Management

7.5.12 Advanced Key Editing
---

-- Data type: gpgme_error_t (*gpgme_interact_cb_t) (void *HANDLE, const char *STATUS, const char *ARGS, int FD)

SINCE: 1.7.0

The gpgme_interact_cb_t type is the type of functions which GPGME calls if it a key interact operation is on-going. The status keyword STATUS and the argument line ARGS are passed through by GPGME from the crypto engine. An empty string represents EOF. The file descriptor FD is -1 for normal status messages. If STATUS indicates a command rather than a status message, the response to the command should be written to FD. The HANDLE is provided by the user at start of operation.

The function should return GPG_ERR_FALSE if it did not handle the status code, 0 for success, or any other error value.

-- Function: gpgme_error_t gpgme_op_interact (gpgme_ctx_t CTX, gpgme_key_t KEY, unsigned int FLAGS, gpgme_interact_cb_t FNC, void *HANDLE, gpgme_data_t OUT)

SINCE: 1.7.0

The function gpgme_op_interact processes the key KEY interactively, using the interact callback function FNC with the handle HANDLE. The callback is invoked for every status and command request from the crypto engine. The output of the crypto engine is written to the data object OUT.

Note that the protocol between the callback function and the crypto

engine is specific to the crypto engine and no further support in implementing this protocol correctly is provided by GPGME.

FLAGS modifies the behaviour of the function; the only defined bit value is:

GPGME_INTERACT_CARD
SINCE: 1.7.0

This is used for smartcard based keys and uses gpgs --card-edit command.

The function returns 0 if the edit operation completes successfully, GPG_ERR_INV_VALUE if CTX or KEY is not a valid pointer, and any error returned by the crypto engine or the edit callback handler.

-- Function: gpgme_error_t gpgme_op_interact_start (gpgme_ctx_t CTX, gpgme_key_t KEY, unsigned int FLAGS, gpgme_interact_cb_t FNC, void *HANDLE, gpgme_data_t OUT)

SINCE: 1.7.0

The function gpgme_op_interact_start initiates a gpgme_op_interact operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns 0 if the operation was started successfully, and GPG_ERR_INV_VALUE if CTX or KEY is not a valid pointer.

File: gpgme.info, Node: Crypto Operations, Next: Miscellaneous, Prev: Key Management, Up: Contexts

## 7.6 Crypto Operations

Sometimes, the result of a crypto operation returns a list of invalid keys encountered in processing the request. The following structure is used to hold information about such a key.

-- Data type: gpgme_invalid_key_t
This is a pointer to a structure used to store a part of the result of a crypto operation which takes user IDs as one input parameter. The structure contains the following members:

gpgme_invalid_key_t next

This is a pointer to the next invalid key structure in the linked list, or NULL if this is the last element.

char *fpr
The fingerprint or key ID of the invalid key encountered.

gpgme_error_t reason
An error code describing the reason why the key was found invalid.

* Menu:

* Decrypt:: Decrypting a ciphertext.
* Verify:: Verifying a signature.
* Decrypt and Verify:: Decrypting a signed ciphertext.
* Sign:: Creating a signature.
* Encrypt:: Encrypting a plaintext.

File: gpgme.info, Node: Decrypt, Next: Verify, Up: Crypto Operations

7.6.1 Decrypt
---

-- Function: gpgme_error_t gpgme_op_decrypt (gpgme_ctx_t CTX, gpgme_data_t CIPHER, gpgme_data_t PLAIN)
The function gpgme_op_decrypt decrypts the ciphertext in the data object CIPHER and stores it into the data object PLAIN.

The function returns the error code GPG_ERR_NO_ERROR if the ciphertext could be decrypted successfully, GPG_ERR_INV_VALUE if CTX, CIPHER or PLAIN is not a valid pointer, GPG_ERR_NO_DATA if CIPHER does not contain any data to decrypt, GPG_ERR_DECRYPT_FAILED if CIPHER is not a valid cipher text, GPG_ERR_BAD_PASSPHRASE if the passphrase for the secret key could not be retrieved, and passes through some errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_decrypt_start (gpgme_ctx_t CTX, gpgme_data_t CIPHER, gpgme_data_t PLAIN)
The function gpgme_op_decrypt_start initiates a gpgme_op_decrypt operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, and GPG_ERR_INV_VALUE if CIPHER or PLAIN is not a valid pointer.

-- Function: gpgme_error_t gpgme_op_decrypt_ext ( gpgme_ctx_t CTX, gpgme_decrypt_flags_t FLAGS, gpgme_data_t CIPHER, gpgme_data_t PLAIN)

SINCE: 1.8.0

The function gpgme_op_decrypt_ext is the same as gpgme_op_decrypt but has an additional argument FLAGS. If FLAGS is 0 both function behave identically.

The value in FLAGS is a bitwise-or combination of one or multiple of the following bit values:

GPGME_DECRYPT_VERIFY
SINCE: 1.8.0

The GPGME_DECRYPT_VERIFY symbol specifies that this function shall exactly act as gpgme_op_decrypt_verify.

GPGME_DECRYPT_UNWRAP
SINCE: 1.8.0

The GPGME_DECRYPT_UNWRAP symbol specifies that the output shall be an OpenPGP message with only the encryption layer removed. This requires GnuPG 2.1.12 and works only for OpenPGP. This is the counterpart to GPGME_ENCRYPT_WRAP.

The function returns the error codes as described for gpgme_op_decrypt.

-- Function: gpgme_error_t gpgme_op_decrypt_ext_start ( gpgme_ctx_t CTX, gpgme_decrypt_flags_t FLAGS, gpgme_data_t CIPHER, gpgme_data_t PLAIN)

SINCE: 1.8.0

The function gpgme_op_decrypt_ext_start initiates a gpgme_op_decrypt_ext operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully,
and GPG_ERR_INV_VALUE if
CIPHER or PLAIN is not a valid pointer.

-- Data type: gpgme_recipient_t

SINCE: 1.1.0

This is a pointer to a structure used to store information about the recipient of an encrypted text which is decrypted in a gpgme_op_decrypt operation. This information (except for the status field) is even available before the operation finished successfully, for example in a passphrase callback. The structure contains the following members:

gpgme_recipient_t next
This is a pointer to the next recipient structure in the linked list, or NULL if this is the last element.

gpgme_pubkey_algo_t
The public key algorithm used in the encryption.

char *keyid
This is the key ID of the key (in hexadecimal digits) used as recipient.

gpgme_error_t status
This is an error number with the error code GPG_ERR_NO_SECKEY if the secret key for this recipient
is not available, and 0
otherwise.

-- Data type: gpgme_decrypt_result_t
This is a pointer to a structure used to store the result of a gpgme_op_decrypt operation. After successfully decrypting data, you can retrieve the pointer to the result with gpgme_op_decrypt_result. As with all result structures, it this structure shall be considered read-only and an application must not allocate such a strucure on its own. The structure contains the following members:

char *unsupported_algorithm
If an unsupported algorithm was encountered, this string describes the algorithm that is not supported.

unsigned int wrong_key_usage : 1
SINCE: 0.9.0 This is true if the key was not used according to its policy.

unsigned int legacy_cipher_nomdc : 1
SINCE: 1.11.2 The message was made by a legacy algorithm without any integrity protection. This might be an old but

legitimate message.

unsigned int is_mime : 1;
SINCE: 1.11.0 The message claims that the content is a MIME object.

unsigned int is_de_vs : 1;
SINCE: 1.10.0 The message was encrypted in a VS-NfD compliant way. This is a specification in Germany for a restricted communication level.

gpgme_recipient_t recipients
SINCE: 1.1.0

This is a linked list of recipients to which this message was encrypted.

char *file_name
This is the filename of the original plaintext message file if it is known, otherwise this is a null pointer.

char *session_key
SINCE: 1.8.0

A textual representation (nul-terminated string) of the session key used in symmetric encryption of the message, if the context has been set to export session keys (see gpgme_set_ctx_flag, "export-session-key"), and a session key was available for the
most recent decryption operation.
Otherwise, this is a null pointer.

You must not try to access this member of the struct unless gpgme_set_ctx_flag (ctx, "export-session-key") returns success or gpgme_get_ctx_flag (ctx, "export-session-key") returns true (non-empty string).

char *symkey_algo
SINCE: 1.11.0

A string with the symmetric encryption algorithm and mode using the format "<algo>.<mode>". Note that the deprecated non-MDC encryption mode of OpenPGP is given as "PGPCFB".

-- Function: gpgme_decrypt_result_t gpgme_op_decrypt_result (gpgme_ctx_t CTX)
The function gpgme_op_decrypt_result returns a gpgme_decrypt_result_t pointer to a structure holding the result

of a gpgme_op_decrypt operation. The pointer is only valid if
the last operation on the context was a gpgme_op_decrypt or
gpgme_op_decrypt_start operation. If the operation failed this

might be a NULL pointer. The returned pointer is only valid
until the next operation is started on the context.

File: gpgme.info, Node: Verify, Next: Decrypt and Verify, Prev: Decrypt, Up: Crypto Operations

7.6.2 Verify
---

-- Function: gpgme_error_t gpgme_op_verify (gpgme_ctx_t CTX,
gpgme_data_t SIG, gpgme_data_t SIGNED_TEXT,
gpgme_data_t PLAIN)
The function gpgme_op_verify verifies that the signature in the
data object SIG is a valid signature. If SIG is a detached
signature, then the signed text should be provided in SIGNED_TEXT
and PLAIN should be a null pointer. Otherwise, if SIG is a normal
(or cleartext) signature, SIGNED_TEXT should be a null pointer and
PLAIN should be a writable data object that will contain the
plaintext after successful verification.

The results of the individual signature verifications can be
retrieved with gpgme_op_verify_result.

The function returns the error
code GPG_ERR_NO_ERROR if the
operation could be completed successfully, GPG_ERR_INV_VALUE if
CTX, SIG or PLAIN is not a valid pointer, GPG_ERR_NO_DATA if SIG
does not contain any data to verify, and passes through any errors
that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_verify_start (gpgme_ctx_t CTX,
gpgme_data_t SIG, gpgme_data_t SIGNED_TEXT,
gpgme_data_t PLAIN)
The function gpgme_op_verify_start initiates a gpgme_op_verify
operation. It can be completed by calling gpgme_wait on the
context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the
operation could be started successfully, GPG_ERR_INV_VALUE if
CTX, SIG or PLAIN is not a valid pointer, and GPG_ERR_NO_DATA if
SIG or PLAIN does not contain any data to verify.

-- Data type: gpgme_sig_notation_t
This is a pointer to a structure used to store a part of the result

of a gpgme_op_verify operation. The structure contains the following members:

gpgme_sig_notation_t next
This is a pointer to the next new signature notation structure in the linked list, or NULL if this is the last element.

char *name
The name of the notation field. If this is NULL, then the member value will contain a policy URL.

int name_len
The length of the name field. For strings the length is counted without the trailing binary zero.

char *value
The value of the notation field. If name is NULL, then this is a policy URL.

int value_len
The length of the value field. For strings the length is counted without the trailing binary zero.

gpgme_sig_notation_flags_t flags
The accumulated flags field. This field contains the flags associated with the notation data in an accumulated form which can be used
as an argument to the function
gpgme_sig_notation_add. The value flags is a bitwise-or combination of one or multiple of the following bit values:

GPGME_SIG_NOTATION_HUMAN_READABLE
SINCE: 1.1.0

The GPGME_SIG_NOTATION_HUMAN_READABLE symbol specifies that the notation data is in human readable form

GPGME_SIG_NOTATION_CRITICAL
SINCE: 1.1.0

The GPGME_SIG_NOTATION_CRITICAL symbol specifies that the notation data is critical.

unsigned int human_readable : 1
This is true if the GPGME_SIG_NOTATION_HUMAN_READABLE flag is set and false otherwise. This flag is only valid for notation data, not for policy URLs.

unsigned int critical : 1

This is true if the GPGME_SIG_NOTATION_CRITICAL flag is set and false otherwise. This flag is valid for notation data and policy URLs.

-- Data type: gpgme_signature_t

This is a pointer to a structure used to store a part of the result of a gpgme_op_verify operation. The structure contains the following members:

gpgme_signature_t next

This is a pointer to the next new signature structure in the linked list, or NULL if this is the last element.

gpgme_sigsum_t summary

This is a bit vector giving a summary of the signature status. It provides an easy interface to a defined semantic of the signature status. Checking just one bit is sufficient to see whether a signature is valid without any restrictions. This means that you can check for GPGME_SIGSUM_VALID like this:

```
if ((sig.summary & GPGME_SIGSUM_VALID))
{
  ..do stuff if valid..
}
else
{
  ..do stuff if not fully valid..
}
```

The defined bits are:

GPGME_SIGSUM_VALID

The signature is fully valid.

GPGME_SIGSUM_GREEN

The signature is good but one might want to display some extra information. Check the other bits.

GPGME_SIGSUM_RED

The signature is bad. It might be useful to check other bits and display more information, i.e. a revoked certificate might not render a signature invalid when the message was received prior to the cause for the revocation.

GPGME_SIGSUM_KEY_REVOKED

The key or at least one certificate has been revoked.

GPGME_SIGSUM_KEY_EXPIRED
The key or one of the certificates has expired. It is probably a good idea to display the date of the expiration.

GPGME_SIGSUM_SIG_EXPIRED
The signature has expired.

GPGME_SIGSUM_KEY_MISSING
Cant verify due to a missing key or certificate.

GPGME_SIGSUM_CRL_MISSING
The CRL (or an equivalent mechanism) is not available.

GPGME_SIGSUM_CRL_TOO_OLD
Available CRL is too old.

GPGME_SIGSUM_BAD_POLICY
A policy requirement was not met.

GPGME_SIGSUM_SYS_ERROR
A system error occurred.

GPGME_SIGSUM_TOFU_CONFLICT
A TOFU conflict was detected.

char *fpr
This is the fingerprint or key ID of the signature.

gpgme_error_t status
This is the status of the signature. In particular, the following status codes are of interest:

GPG_ERR_NO_ERROR
This status indicates that the signature could be verified or that there is no signature. For the combined result this status means that all signatures could be verified.

Note: This does not mean that a valid signature could be found. Check the summary field for that.

For example a gpgme_op_decrypt_verify returns a verification result with GPG_ERR_NO_ERROR for encrypted but unsigned data.

GPG_ERR_SIG_EXPIRED
This status indicates that the signature is valid but expired. For the combined result this status means that all signatures are valid and expired.

GPG_ERR_KEY_EXPIRED
This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.

GPG_ERR_CERT_REVOKED
This status indicates that the signature is valid but the key used to verify the signature has been revoked. For the combined result this status means that all signatures

are valid and all keys are revoked.

GPG_ERR_BAD_SIGNATURE
This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

GPG_ERR_NO_PUBKEY
This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

GPG_ERR_GENERAL
This status indicates that there was some other error which prevented the signature verification.

gpgme_sig_notation_t notations
This is a linked list with the notation data and policy URLs.

unsigned long timestamp
The creation timestamp of this signature.

unsigned long exp_timestamp
The expiration timestamp of this signature, or 0 if the signature
does not expire.

unsigned int wrong_key_usage : 1
This is true if the key was not used according to its policy.

unsigned int pka_trust : 2

This is set to the trust information gained by means of the PKA system. Values are:

0

No PKA information available or verification not possible.

1

PKA verification failed.

2

PKA verification succeeded.

3

Reserved for future use.

Depending on the configuration of the engine, this metric may also be reflected by the validity of the signature.

unsigned int chain_model : 1

SINCE: 1.1.6

This is true if the validity of the signature has been checked using the chain model. In the chain model the time the signature has been created must be within the validity period of the certificate and the time the certificate itself has been created must be within the validity period of the issuing certificate. In contrast the default validation model checks the validity of signature as well at the entire certificate chain at the current time.

gpgme_validity_t validity

The validity of the signature.

gpgme_error_t validity_reason

If a signature is not valid, this provides a reason why.

gpgme_pubkey_algo_t

The public key algorithm used to create this signature.

gpgme_hash_algo_t

The hash algorithm used to create this signature.

char *pka_address

The mailbox from the PKA information or NULL.

gpgme_key_t key

SINCE: 1.7.0

An object describing the key used to create the signature. This key object may be incomplete in that it only conveys information availabale directly with a signature. It may also be NULL if such information is not readily available.

-- Data type: gpgme_verify_result_t
This is a pointer to a structure used to store the result of a gpgme_op_verify operation. After verifying a signature, you can retrieve the pointer to the result with gpgme_op_verify_result. If the operation failed this might be a NULL pointer. The structure contains the following member:

gpgme_signature_t signatures
A linked list with information about all signatures for which a verification was attempted.

char *file_name
This is the filename of the original plaintext message file if it is known, otherwise this is a null pointer. Warning: The filename is not covered by the signature.

unsigned int is_mime : 1;
SINCE: 1.11.0

The message claims that the content is a MIME object. Warning: This flag is not covered by the signature.

-- Function: gpgme_verify_result_t gpgme_op_verify_result
(gpgme_ctx_t CTX)

The function gpgme_op_verify_result returns a gpgme_verify_result_t pointer to a structure holding the result of a gpgme_op_verify operation. The pointer is only valid if the last operation on the context was a gpgme_op_verify, gpgme_op_verify_start, gpgme_op_decrypt_verify or gpgme_op_decrypt_verify_start operation, and if this operation finished successfully (for gpgme_op_decrypt_verify and gpgme_op_decrypt_verify_start, the error code GPG_ERR_NO_DATA counts as successful in this context). The returned pointer is only valid until the next operation is started on the context.

File: gpgme.info, Node: Decrypt and Verify, Next: Sign, Prev: Verify, Up: Crypto Operations

7.6.3 Decrypt and Verify
---

-- Function: gpgme_error_t gpgme_op_decrypt_verify (gpgme_ctx_t CTX,
gpgme_data_t CIPHER, gpgme_data_t PLAIN)
The function gpgme_op_decrypt_verify decrypts the ciphertext in the data object CIPHER and

stores it into the data object PLAIN.
If CIPHER contains signatures, they will be verified.

After the operation completed, gpgme_op_decrypt_result and gpgme_op_verify_result can be used to retrieve more information about the signatures.

If the error code GPG_ERR_NO_DATA is returned, CIPHER does not contain any data to decrypt. However, it might still be signed. The information about detected signatures is available with gpgme_op_verify_result in this case.

The function returns the error code GPG_ERR_NO_ERROR if the ciphertext could be decrypted successfully, GPG_ERR_INV_VALUE if CTX, CIPHER or PLAIN is not a valid pointer, GPG_ERR_NO_DATA if CIPHER does not contain any data to decrypt, GPG_ERR_DECRYPT_FAILED if CIPHER is not a valid cipher text, GPG_ERR_BAD_PASSPHRASE if the passphrase for the secret key could not be retrieved, and passes through any errors that are reported by the crypto engine support
routines.

-- Function: gpgme_error_t gpgme_op_decrypt_verify_start
(gpgme_ctx_t CTX, gpgme_data_t CIPHER, gpgme_data_t PLAIN)
The function gpgme_op_decrypt_verify_start initiates a gpgme_op_decrypt_verify operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, GPG_ERR_INV_VALUE if CTX, CIPHER, PLAIN or R_STAT is not a valid pointer, and GPG_ERR_NO_DATA if CIPHER does not contain any data to decrypt.

When processing mails it is sometimes useful to extract the actual mail address (the addr-spec) from a string. GPGME provides this helper function which uses the same semantics as the internal functions in GPGME and GnuPG:

-- Function: char * gpgme_addrspec_from_uid (const char *UID)

SINCE: 1.7.1

Return the mail address (called addr-spec in RFC-5322) from the string
UID which is assumed to be a user id (called address in RFC-5322). All plain ASCII characters (i.e. those with bit 7 cleared) in the result are converted to lowercase. Caller must

free the result using gpgme_free. Returns NULL if no valid address was found (in which case ERRNO is set to EINVAL) or for other errors.

File: gpgme.info, Node: Sign, Next: Encrypt, Prev: Decrypt and Verify, Up: Crypto Operations

### 7.6.4 Sign

A signature can contain signatures by one or more keys. The set of keys used to create a signatures is contained in a context, and is applied to all following signing operations in this context (until the set is changed).

* Menu:

* Selecting Signers:: How to choose the keys to sign with.
* Creating a Signature:: How to create a signature.
* Signature Notation Data:: How to add notation data to a signature.

File: gpgme.info, Node: Selecting Signers, Next: Creating a Signature, Up: Sign

#### 7.6.4.1 Selecting Signers

The key or the keys used to create a signature are stored in the context. The following functions can be used to manipulate this list. If no signer has been set into the context a default key is used for signing.

-- Function: void gpgme_signers_clear (gpgme_ctx_t CTX)
The function gpgme_signers_clear releases a reference for each key on the signers list and removes the list of signers from the context CTX.

Every context starts with an empty list.

-- Function: gpgme_error_t gpgme_signers_add (gpgme_ctx_t CTX, const gpgme_key_t KEY)
The function gpgme_signers_add adds the key KEY to the list of signers in the context CTX.

Calling this function acquires an additional reference for the key.

-- Function: unsigned int gpgme_signers_count (const gpgme_ctx_t CTX)

SINCE: 1.4.3

The function gpgme_signers_count returns the number of signer keys in the context CTX.

-- Function:
gpgme_key_t gpgme_signers_enum (const gpgme_ctx_t CTX,
int SEQ)

The function gpgme_signers_enum returns the SEQth key in the list of signers in the context CTX. An additional reference is acquired for the user.

If SEQ is out of range, NULL is returned.

File: gpgme.info, Node: Creating a Signature, Next: Signature Notation Data, Prev: Selecting Signers, Up: Sign

7.6.4.2 Creating a Signature
.....

-- Data type: enum gpgme_sig_mode_t

The gpgme_sig_mode_t type is used to specify the desired type of a signature. The following modes are available:

GPGME_SIG_MODE_NORMAL
A normal signature is made, the output includes the plaintext and the signature.

GPGME_SIG_MODE_DETACH
A detached signature is made.

GPGME_SIG_MODE_CLEAR
A clear text signature is made. The ASCII armor and text mode settings of the context are ignored.

-- Function: gpgme_error_t gpgme_op_sign
(gpgme_ctx_t CTX,
gpgme_data_t PLAIN, gpgme_data_t SIG, gpgme_sig_mode_t MODE)

The function gpgme_op_sign creates a signature for the text in the data object PLAIN and returns it in the data object SIG. The type of the signature created is determined by the ASCII armor (or, if that is not set, by the encoding specified for SIG), the text mode attributes set for the context CTX and the requested signature mode MODE.

After the operation completed successfully, the result can be retrieved with gpgme_op_sign_result.

If an S/MIME signed message is created using the CMS crypto engine, the number of certificates to include in the message can be specified with gpgme_set_include_certs. *Note Included Certificates::.

The function returns the error code GPG_ERR_NO_ERROR if the signature could be created successfully, GPG_ERR_INV_VALUE if CTX, PLAIN or SIG is not a valid pointer, GPG_ERR_NO_DATA if the signature could not be created, GPG_ERR_BAD_PASSPHRASE if the passphrase for the secret key could not be retrieved, GPG_ERR_UNUSABLE_SECKEY if there are invalid signers, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_sign_start (gpgme_ctx_t CTX, gpgme_data_t PLAIN, gpgme_data_t SIG, gpgme_sig_mode_t MODE)

The function gpgme_op_sign_start initiates a gpgme_op_sign operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, and GPG_ERR_INV_VALUE if CTX, PLAIN or SIG is not a valid pointer.

-- Data type: gpgme_new_signature_t

This is a pointer to a structure used to store a part of the result of a gpgme_op_sign operation. The structure contains the following members:

gpgme_new_signature_t next

This is a pointer to the next new signature structure in the linked list, or NULL if this is the last element.

gpgme_sig_mode_t type

The type of this signature.

gpgme_pubkey_algo_t pubkey_algo

The public key algorithm used to create this signature.

gpgme_hash_algo_t hash_algo

The hash algorithm used to create this signature.

unsigned int sig_class

The signature class of this signature.

long int timestamp

The creation timestamp of this signature.

char *fpr
The fingerprint of the key which was used to create this signature.

-- Data type: gpgme_sign_result_t
This is a pointer to a structure used to store the result of a gpgme_op_sign operation. After successfully generating a signature, you can retrieve the pointer to the result with gpgme_op_sign_result. The structure contains the following members:

gpgme_invalid_key_t
invalid_signers
A linked list with information about all invalid keys for which a signature could not be created.

gpgme_new_signature_t signatures
A linked list with information about all signatures created.

-- Function: gpgme_sign_result_t gpgme_op_sign_result (gpgme_ctx_t CTX)
The function gpgme_op_sign_result returns a gpgme_sign_result_t pointer to a structure holding the result of a gpgme_op_sign operation. The pointer is only valid if the last operation on the context was a gpgme_op_sign, gpgme_op_sign_start, gpgme_op_encrypt_sign or gpgme_op_encrypt_sign_start operation. If that operation failed, the function might return a NULL pointer. The returned pointer is only valid until the next operation is started on the context.

File: gpgme.info, Node: Signature Notation Data, Prev: Creating a Signature, Up: Sign

7.6.4.3 Signature Notation Data
.....

Using the following
functions, you can attach arbitrary notation data to
a signature. This information is then available to the user when the
signature is verified.

-- Function: void gpgme_sig_notation_clear (gpgme_ctx_t CTX)
SINCE: 1.1.0

The function gpgme_sig_notation_clear removes the notation data from the context CTX. Subsequent signing operations from this context will not include any notation data.

Every context starts with an empty notation data list.

-- Function: gpgme_error_t gpgme_sig_notation_add (gpgme_ctx_t CTX,
const char *NAME, const char *VALUE,
gpgme_sig_notation_flags_t FLAGS)
SINCE: 1.1.0

The function gpgme_sig_notation_add adds the notation data with the name NAME and the value VALUE to the context CTX.

Subsequent signing operations will include this notation data, as well as any other notation data that was added since the creation of the context or the last gpgme_sig_notation_clear operation.

The arguments NAME and VALUE must be NUL-terminated strings in human-readable form. The flag GPGME_SIG_NOTATION_HUMAN_READABLE is implied (non-human-readable notation data is currently not supported). The strings must be in UTF-8 encoding.

If NAME is NULL, then VALUE should be a policy URL.

The function gpgme_sig_notation_add returns the error code GPG_ERR_NO_ERROR if the notation data could be added successfully, GPG_ERR_INV_VALUE if CTX is not a valid pointer, or if NAME, VALUE and FLAGS are an invalid combination. The function also passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_sig_notation_t gpgme_sig_notation_get
(const gpgme_ctx_t CTX)
SINCE: 1.1.0

The function gpgme_sig_notation_get returns the linked list of notation data structures that are contained in the context CTX.

If CTX is not a valid pointer, or there is no notation data added for this context, NULL is returned.

File: gpgme.info, Node: Encrypt, Prev: Sign, Up: Crypto Operations

7.6.5 Encrypt
---

One plaintext can be encrypted for several recipients at the same time. The list of recipients is created independently of any context, and then

passed to the encryption operation.

* Menu:

* Encrypting a Plaintext:: How to encrypt a plaintext.

File: gpgme.info, Node: Encrypting a Plaintext, Up: Encrypt

7.6.5.1 Encrypting a Plaintext
.....

-- Function: gpgme_error_t gpgme_op_encrypt (gpgme_ctx_t CTX,
gpgme_key_t RECP[], gpgme_encrypt_flags_t FLAGS,
gpgme_data_t PLAIN, gpgme_data_t CIPHER)
The function gpgme_op_encrypt encrypts the plaintext in the data
object PLAIN for the recipients RECP and stores the ciphertext in
the data object CIPHER. The type of the ciphertext created is
determined by the ASCII armor (or, if that is not set, by the
encoding specified
for CIPHER) and the text mode attributes set for
the context CTX.

RECP must be a NULL-terminated array of keys. The user must keep
references for all keys during the whole duration of the call (but
see gpgme_op_encrypt_start for the requirements with the
asynchronous variant).

The value in FLAGS is a bitwise-or combination of one or multiple
of the following bit values:

GPGME_ENCRYPT_ALWAYS_TRUST
The GPGME_ENCRYPT_ALWAYS_TRUST symbol specifies that all the
recipients in RECP should be trusted, even if the keys do not
have a high enough validity in the keyring. This flag should
be used with care; in general it is not a good idea to use any
untrusted keys.

GPGME_ENCRYPT_NO_ENCRYPT_TO
SINCE: 1.2.0

The GPGME_ENCRYPT_NO_ENCRYPT_TO symbol specifies that no
default or hidden default recipients as configured in the
crypto backend should be included. This
can be useful for
managing different user profiles.

GPGME_ENCRYPT_NO_COMPRESS

SINCE: 1.5.0

The GPGME_ENCRYPT_NO_COMPRESS symbol specifies that the plaintext shall not be compressed before it is encrypted. This is in some cases useful if the length of the encrypted message may reveal information about the plaintext.

GPGME_ENCRYPT_PREPARE
GPGME_ENCRYPT_EXPECT_SIGN

The GPGME_ENCRYPT_PREPARE symbol is used with the UI Server protocol to prepare an encryption (i.e. sending the PREP_ENCRYPT command). With the GPGME_ENCRYPT_EXPECT_SIGN symbol the UI Server is advised to also expect a sign command.

GPGME_ENCRYPT_SYMMETRIC

SINCE: 1.7.0

The GPGME_ENCRYPT_SYMMETRIC symbol specifies that the output should be additionally encrypted symmetrically even if recipients are provided. This feature is only supported for the OpenPGP
crypto engine.

GPGME_ENCRYPT_THROW_KEYIDS

SINCE: 1.8.0

The GPGME_ENCRYPT_THROW_KEYIDS symbols requests that the identifiers for the decrption keys are not included in the ciphertext. On the receiving side, the use of this flag may slow down the decryption process because all available secret keys must be tried. This flag is only honored for OpenPGP encryption.

GPGME_ENCRYPT_WRAP

SINCE: 1.8.0

The GPGME_ENCRYPT_WRAP symbol specifies that the input is an OpenPGP message and not a plain data. This is the counterpart to GPGME_DECRYPT_UNWRAP.

GPGME_ENCRYPT_WANT_ADDRESS

SINCE: 1.11.0

The GPGME_ENCRYPT_WANT_ADDRESS symbol requests that all supplied keys or key specifications include a syntactically valid mail address. If this is not the case the operation is not even tried and the error code GPG_ERR_INV_USER_ID

is
returned. Only the address part of the key specification is conveyed to the backend. As of now the key must be specified using the RECPSTRING argument of the extended encrypt functions. This feature is currently only supported for the OpenPGP crypto engine.

If GPG_ERR_UNUSABLE_PUBKEY is returned, some recipients in RECP are invalid, but not all. In this case the plaintext might be encrypted for all valid recipients and returned in CIPHER (if this happens depends on the crypto engine). More information about the invalid recipients is available with gpgme_op_encrypt_result.

If RECP is NULL, symmetric rather than public key encryption is performed. Symmetrically encrypted cipher text can be deciphered with gpgme_op_decrypt. Note that in this case the crypto backend needs to retrieve a passphrase from the user. Symmetric encryption is currently only supported for the OpenPGP
crypto backend.

The function returns the error code GPG_ERR_NO_ERROR if the ciphertext could be created successfully, GPG_ERR_INV_VALUE if CTX, RECP, PLAIN or CIPHER is not a valid pointer, GPG_ERR_UNUSABLE_PUBKEY if RECP contains some invalid recipients, GPG_ERR_BAD_PASSPHRASE if the passphrase for the symmetric key could not be retrieved, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_encrypt_start (gpgme_ctx_t CTX,
gpgme_key_t RECP[], gpgme_encrypt_flags_t FLAGS,
gpgme_data_t PLAIN, gpgme_data_t CIPHER)
The function gpgme_op_encrypt_start initiates a gpgme_op_encrypt operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

References to the keys only need to be held for the duration of this call. The user can release its references to the keys after this function returns, even
if the operation is not yet finished.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, GPG_ERR_INV_VALUE if CTX, RSET, PLAIN or CIPHER is not a valid pointer, and GPG_ERR_UNUSABLE_PUBKEY if RSET does not contain any valid recipients.

-- Function: gpgme_error_t gpgme_op_encrypt_ext (gpgme_ctx_t CTX,
gpgme_key_t RECP[], const char *RECPSTRING,

gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN,
gpgme_data_t CIPHER)

SINCE: 1.11.0

This is an extended version of gpgme_op_encrypt with RECPSTRING as additional parameter. If RECP is NULL and RECPSTRING is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to RECP the keys are given directly as strings and there is no need to first create key objects. Leading and trailing white space is remove from each line in RECPSTRING. The keys are then passed verbatim to the backend engine.

For the OpenPGP backend several special keywords are supported to modify the operation. These keywords are given instead of a key specification. The currently supported keywords are:

--hidden
--no-hidden
These keywords toggle between normal and hidden recipients for all following key specifications. When a hidden recipient is requested the gpg option -R (or -F in file mode) is used instead of -r (-f in file mode).

--file
--no-file
These keywords toggle between regular and file mode for all following key specification. In file mode the option -f or -F is passed to gpg. At least GnuPG version 2.1.14 is required to handle these options. The GPGME_ENCRYPT_WANT_ADDRESS flag is ignored in file mode.

--
This keyword disables all keyword detection up to the end of the string. All keywords are treated as verbatim arguments.

To create a RECPSTRING it is often useful to employ a strconcat style function. For example this function creates a string to encrypt to two keys:

```
char *
xbuild_recpstring (const char *key1, const char *key2)
{
  char *result = gpgrt_strconcat ("--\n", key1, "\n", key2, NULL);
  if (!result)
```

```
    { perror ("strconcat failed"); exit (2); }
  return result;
}
```

Note the use of the double dash here; unless you want to specify a keyword, it is a good idea to avoid any possible trouble with key specifications starting with a double dash. The used strconcat function is available in Libgpg-error 1.28 and later; Libgpg-error (aka Gpgrt) is a dependency of GPGME. The number of arguments to gpgrt_strconcat is limited to 47 but that should always be sufficient. In case a larger and non-fixed number of keys are to be
supplied the following code can be used:

```
char *
xbuild_long_recpstring (void)
{
  gpgrt_stream_t memfp;
  const char *s;
  void *result;

  memfp = gpgrt_fopenmem (0, "w+b");
  if (!memfp)
    { perror ("fopenmem failed"); exit (2); }
  gpgrt_fputs ("--", memfp);
  while ((s = get_next_keyspec ()))
    {
      gpgrt_fputc ('\n', memfp);
      gpgrt_fputs (s, memfp);
    }
  gpgrt_fputc (0, memfp);
  if (gpgrt_ferror (memfp))
    { perror ("writing to memstream failed"); exit (2); }
  if (gpgrt_fclose_snatch (memfp, &result, NULL))
    { perror ("fclose_snatch failed"); exit (2); }
  return result;
}
```

In this example get_next_keyspec is expected to return the next key to be added to the string. Please take care: Encrypting to a large number of recipients
is often questionable due to security reasons and also for the technicality that all keys are currently passed on the command line to gpg which has as a platform specific length limitation.

-- Function: gpgme_error_t gpgme_op_encrypt_ext_start (gpgme_ctx_t CTX,
gpgme_key_t RECP[], const char *RECPSTRING,

gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN,
gpgme_data_t CIPHER)

SINCE: 1.11.0

This is an extended version of gpgme_op_encrypt_start with RECPSTRING as additional parameter. If RECP is NULL and RECPSTRING is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to RECP the keys are given directly as strings and there is no need to first create key objects. The keys are passed verbatim to the backend engine.

-- Data type: gpgme_encrypt_result_t
This is a pointer to a structure used to store the result of a gpgme_op_encrypt
operation. After successfully encrypting data, you can retrieve the pointer to the result with gpgme_op_encrypt_result. The structure contains the following members:

gpgme_invalid_key_t invalid_recipients
A linked list with information about all invalid keys for which the data could not be encrypted.

-- Function: gpgme_encrypt_result_t gpgme_op_encrypt_result
(gpgme_ctx_t CTX)
The function gpgme_op_encrypt_result returns a gpgme_encrypt_result_t pointer to a structure holding the result of a gpgme_op_encrypt operation. The pointer is only valid if the last operation on the context was a gpgme_op_encrypt, gpgme_op_encrypt_start, gpgme_op_sign or gpgme_op_sign_start operation. If this operation failed, this might be a NULL pointer. The returned pointer is only valid until the next operation is started on the context.

-- Function: gpgme_error_t gpgme_op_encrypt_sign (gpgme_ctx_t CTX,
gpgme_key_t RECP[], gpgme_encrypt_flags_t FLAGS,
gpgme_data_t PLAIN, gpgme_data_t CIPHER)
The function gpgme_op_encrypt_sign does a combined encrypt and sign operation. It is used like gpgme_op_encrypt, but the ciphertext also contains signatures for the signers listed in CTX.

The combined encrypt and sign operation is currently only available for the OpenPGP crypto engine.

-- Function: gpgme_error_t gpgme_op_encrypt_sign_start
(gpgme_ctx_t CTX, gpgme_key_t RECP[],

gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN,
gpgme_data_t CIPHER)

The function gpgme_op_encrypt_sign_start initiates a gpgme_op_encrypt_sign operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, and GPG_ERR_INV_VALUE if CTX, RSET, PLAIN or CIPHER is not a valid pointer.

-- Function: gpgme_error_t gpgme_op_encrypt_sign_ext (gpgme_ctx_t CTX,
gpgme_key_t RECP[], const char *RECPSTRING,
gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN,
gpgme_data_t CIPHER)

SINCE: 1.11.0

This is an extended version of gpgme_op_encrypt_sign with RECPSTRING as additional parameter. If RECP is NULL and RECPSTRING is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to RECP the keys are given directly as strings and there is no need to first create the key objects. The keys are passed verbatim to the backend engine.

-- Function: gpgme_error_t gpgme_op_encrypt_sign_ext_start
(gpgme_ctx_t CTX, gpgme_key_t RECP[], const char *RECPSTRING,
gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN,
gpgme_data_t CIPHER)

SINCE: 1.11.0

This is an extended version of gpgme_op_encrypt_sign_start with RECPSTRING
as additional parameter. If RECP is NULL and RECPSTRING is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to RECP the keys are given directly as strings and there is no need to first create the key objects. The keys are passed verbatim to the backend engine.

File: gpgme.info, Node: Miscellaneous, Next: Run Control, Prev: Crypto Operations, Up: Contexts

## 7.7 Miscellaneous operations

Here are some support functions which are sometimes useful.

* Menu:

* Running other Programs:: Running other Programs
* Using the Assuan protocol:: Using the Assuan protocol
* Checking for updates:: How to check for software updates

File: gpgme.info, Node: Running other Programs, Next: Using the Assuan protocol, Up: Miscellaneous

### 7.7.1 Running other Programs

GPGME features an internal subsystem to run the actual backend engines. Along with data abstraction object this subsystem can be used to run arbitrary simple programs which even need not be related to cryptographic features. It may for example be used to run tools which are part of the GnuPG system but are not directly accessible with the GPGME API.

-- Function: gpgme_error_t gpgme_op_spawn (gpgme_ctx_t CTX, const char *FILE, const char *ARGV[], gpgme_data_t DATAIN, gpgme_data_t DATAOUT, gpgme_data_t DATAERR, unsigned int FLAGS)

SINCE: 1.5.0

The function gpgme_op_spawn runs the program FILE with the arguments taken from the NULL terminated array ARGV. If no arguments are required ARGV may be given as NULL. In the latter case or if argv[0] is the empty string, GPGME uses the basename of FILE for argv[0]. The file descriptors stdin, stdout, and stderr are connected to the data objects DATAIN, DATAOUT, and DATAERR. If NULL is passed for one of these data objects the corresponding file descriptor is connected to /dev/null.

The value in FLAGS is a bitwise-or combination of one or multiple of the following bit values:

GPGME_SPAWN_DETACHED
SINCE: 1.5.0

Under Windows this flag inhibits the allocation of a new console for the program. This is useful for a GUI application which needs to call a command line helper tool.

GPGME_SPAWN_ALLOW_SET_FG
SINCE: 1.5.0

Under Windows this flag allows the called program to put itself into the foreground.

-- Function: gpgme_error_t gpgme_op_spawn_start (gpgme_ctx_t CTX, const char *FILE, const char *ARGV[], gpgme_data_t DATAIN, gpgme_data_t DATAOUT, gpgme_data_t DATAERR, unsigned int FLAGS)

SINCE: 1.5.0

This is the asynchronous variant of gpgme_op_spawn.

File: gpgme.info, Node: Using the Assuan protocol, Next: Checking for updates, Prev: Running other Programs, Up: Miscellaneous

7.7.2
Using the Assuan protocol
---

The Assuan protocol can be used to talk to arbitrary Assuan servers. By default it is connected to the GnuPG agent, but it may be connected to arbitrary servers by using gpgme_ctx_set_engine_info, passing the location of the servers socket as FILE_NAME argument, and an empty string as HOME_DIR argument.

The Assuan protocol functions use three kinds of callbacks to transfer data:

-- Data type: gpgme_error_t (*gpgme_assuan_data_cb_t) (void *OPAQUE, const void *DATA, size_t DATALEN)

SINCE: 1.2.0

This callback receives any data sent by the server. OPAQUE is the pointer passed to gpgme_op_assuan_transact_start, DATA of length DATALEN refers to the data sent.

-- Data type: gpgme_error_t (*gpgme_assuan_inquire_cb_t) (void *OPAQUE, const char *NAME, const char *ARGS, gpgme_data_t *R_DATA)

SINCE: 1.2.0

This callback is used to provide additional data to the Assuan

server. OPAQUE is the pointer passed to
gpgme_op_assuan_transact_start, NAME and ARGS specify what kind
of data the server requested, and R_DATA is used to return the
actual data.

Note: Returning data is currently not implemented in GPGME.

-- Data type: gpgme_error_t (*gpgme_assuan_status_cb_t) (void *OPAQUE,
const char *STATUS, const char *ARGS)

SINCE: 1.2.0

This callback receives any status lines sent by the server. OPAQUE
is the pointer passed to gpgme_op_assuan_transact_start, STATUS
and ARGS denote the status update sent.

-- Function: gpgme_error_t gpgme_op_assuan_transact_start
(gpgme_ctx_t CTX, const char *COMMAND,
gpgme_assuan_data_cb_t DATA_CB, void * DATA_CB_VALUE,
gpgme_assuan_inquire_cb_t INQUIRE_CB, void * INQUIRE_CB_VALUE,
gpgme_assuan_status_cb_t STATUS_CB, void * STATUS_CB_VALUE)

SINCE: 1.2.0

Send the Assuan COMMAND and return results via the callbacks. Any
callback may be NULL. The result of the operation may be
retrieved using gpgme_wait_ext.

Asynchronous variant.

-- Function: gpgme_error_t gpgme_op_assuan_transact_ext
(gpgme_ctx_t CTX, const char *COMMAND,
gpgme_assuan_data_cb_t DATA_CB, void * DATA_CB_VALUE,
gpgme_assuan_inquire_cb_t INQUIRE_CB, void * INQUIRE_CB_VALUE,
gpgme_assuan_status_cb_t STATUS_CB, void * STATUS_CB_VALUE,
gpgme_error_t *OP_ERR)

Send the Assuan COMMAND and return results via the callbacks. The
result of the operation is returned in OP_ERR.

Synchronous variant.

File: gpgme.info, Node: Checking for updates, Prev: Using the Assuan protocol, Up: Miscellaneous

7.7.3 How to check for software updates
---

The GnuPG Project operates a server to query the current versions of software packages related to GnuPG. GPGME can be used to access this online database and check whether a new version of a software package is available.

-- Data type: gpgme_query_swdb_result_t
SINCE: 1.8.0

This is a pointer to a structure used to store the result of a gpgme_op_query_swdb operation. After success full call to that function, you can retrieve the pointer to the result with gpgme_op_query_swdb_result. The structure contains the following member:

name
This is the name of the package.

iversion
The currently installed version or an empty string. This value is either a copy of the argument given to gpgme_op_query_swdb or the version of the installed software as figured out by GPGME or GnuPG.

created
This gives the date the file with the list of version numbers has originally be created by the GnuPG project.

retrieved
This gives the date the file was downloaded.

warning
If this flag is set either an error has occurred or some of the information in this structure are not properly set. For example if the version number of the installed software could not be figured out, the update flag may not reflect a required update status.

update
If this flag is set an update of the software is available.

urgent
If this flag is set an available update is important.

noinfo
If this flag is set, no valid information could be retrieved.

unknown
If this flag is set the given name is not known.

toold
If this flag is set the available information is not fresh enough.

error
If this flag is set some other error has occurred.

version
The version string of the latest released version.

reldate
The release date of the latest released version.

-- Function: gpgme_error_t gpgme_op_query_swdb (gpgme_ctx_t CTX, const char *NAME, const char *IVERSION, gpgme_data_t RESERVED)

SINCE: 1.8.0

Query the software version database for software package NAME and check against the installed version given by IVERSION. If IVERSION is given as NULL a check is only done if GPGME can figure out the version by itself (for example when using "gpgme" or "gnupg"). If NULL is used for NAME the current gpgme version is checked. RESERVED must be set to 0.

-- Function: gpgme_query_swdb_result_t gpgme_op_query_swdb_result (gpgme_ctx_t CTX)

SINCE: 1.8.0

The function gpgme_op_query_swdb_result returns a gpgme_query_swdb_result_t pointer to a structure holding the result of a gpgme_op_query_swdb operation. The pointer is only valid if the last operation on the context was a successful call to gpgme_op_query_swdb. If that call failed, the result might be a NULL pointer. The returned pointer is only valid until the next operation is started on the context CTX.

Here is an example on
how to check whether GnuPG is current:

```
#include <gpgme.h>

int
main (void)
```

```
{
  gpg_error_t err;
  gpgme_ctx_t ctx;
  gpgme_query_swdb_result_t result;

  gpgme_check_version (NULL);
  err = gpgme_new (&ctx);
  if (err)
    fprintf (stderr, "error creating context: %s\n", gpg_strerror (err));
  else
    {
      gpgme_set_protocol (ctx, GPGME_PROTOCOL_GPGCONF);

      err = gpgme_op_query_swdb (ctx, "gnupg", NULL, 0);
      if (err)
        fprintf (stderr, "error querying swdb: %s\n", gpg_strerror (err));
      else
        {
          result = gpgme_op_query_swdb_result (ctx);
          if (!result)
            fprintf (stderr, "error querying swdb\n");
          if (!result->warning && !result->update)
            printf ("GnuPG version %s is current\n",
                    result->iversion);
          else if (!result->warning && result->update)

      printf ("GnuPG version %s can be updated to %s\n",
                    result->iversion, result->version);
          else
            fprintf (stderr, "error finding the update status\n");
        }
      gpgme_release (ctx);
    }
  return 0;
}
```

File: gpgme.info,  Node: Run Control,  Prev: Miscellaneous,  Up: Contexts

## 7.8 Run Control

GPGME supports running operations synchronously and asynchronously.  You can use asynchronous operation to set up a context up to initiating the desired operation, but delay performing it to a later point.

Furthermore, you can use an external event loop to control exactly when GPGME runs.  This ensures that GPGME only runs when necessary and

also prevents it from blocking for a long time.

* Menu:

* Waiting For Completion:: Waiting until an operation is completed.
* Using External Event Loops:: Advanced control over what happens when.
* Cancellation:: How to
end pending operations prematurely.

File: gpgme.info, Node: Waiting For Completion, Next: Using External Event Loops, Up: Run Control

7.8.1 Waiting For Completion
---

-- Function: gpgme_ctx_t gpgme_wait (gpgme_ctx_t CTX,
gpgme_error_t *STATUS, int HANG)

The function gpgme_wait continues the pending operation within the context CTX. In particular, it ensures the data exchange between GPGME and the crypto backend and watches over the run time status of the backend process.

If HANG is true, the function does not return until the operation is completed or cancelled. Otherwise the function will not block for a long time.

The error status of the finished operation is returned in STATUS if gpgme_wait does not return NULL.

The CTX argument can be NULL. In that case, gpgme_wait waits for any context to complete its operation.

gpgme_wait can be used only in conjunction with any context that has a pending operation initiated with one of the gpgme_op_*_start functions except gpgme_op_keylist_start and gpgme_op_trustlist_start (for which you should use the corresponding gpgme_op_*_next functions). If CTX is NULL, all of such contexts are waited upon and possibly returned. Synchronous operations running in parallel, as well as key and trust item list operations, do not affect gpgme_wait.

In a multi-threaded environment, only one thread should ever call gpgme_wait at any time, regardless of whether CTX is specified or not. This means that all calls to this function should be fully synchronized by locking primitives. It is safe to start asynchronous operations while a thread is running in gpgme_wait.

The function returns the CTX of the context which has finished the operation. If HANG is false, and the timeout expires, NULL is returned and *status will be set to 0. If an error occurs, NULL
is returned and the error is returned in *status.

File: gpgme.info, Node: Using External Event Loops, Next: Cancellation, Prev: Waiting For Completion, Up: Run Control

7.8.2 Using External Event Loops
---

GPGME hides the complexity of the communication between the library and the crypto engine. The price of this convenience is that the calling thread can block arbitrary long waiting for the data returned by the crypto engine. In single-threaded programs, in particular if they are interactive, this is an unwanted side-effect. OTOH, if gpgme_wait is used without the HANG option being enabled, it might be called unnecessarily often, wasting CPU time that could be used otherwise.

The I/O callback interface described in this section lets the user take control over what happens when. GPGME will provide the user with the file descriptors that should be monitored, and the callback functions that should be invoked when a file descriptor is ready for reading
or writing. It is then the users responsibility to decide when to check the file descriptors and when to invoke the callback functions. Usually this is done in an event loop, that also checks for events in other parts of the program. If the callback functions are only called when the file descriptors are ready, GPGME will never block. This gives the user more control over the program flow, and allows to perform other tasks when GPGME would block otherwise.

By using this advanced mechanism, GPGME can be integrated smoothly into GUI toolkits like GTK+ even for single-threaded programs.

* Menu:

* I/O Callback Interface:: How I/O callbacks are registered.
* Registering I/O Callbacks:: How to use I/O callbacks for a context.
* I/O Callback Example:: An example how to use I/O callbacks.
* I/O Callback Example GTK+:: How to use GPGME with GTK+.
* I/O Callback Example GDK:: How to use GPGME with GDK.
* I/O Callback Example Qt:: How to use
GPGME with Qt.

7.8.2.1 I/O Callback Interface
.....

-- Data type: gpgme_error_t (*gpgme_io_cb_t) (void *DATA, int FD)
The gpgme_io_cb_t type is the type of functions which GPGME wants to register as I/O callback handlers using the gpgme_register_io_cb_t functions provided by the user.

DATA and FD are provided by GPGME when the I/O callback handler is registered, and should be passed through to the handler when it is invoked by the user because it noticed activity on the file descriptor FD.

The callback handler always returns 0, but you should consider the return value to be reserved for later use.

-- Data type: gpgme_error_t (*gpgme_register_io_cb_t) (void *DATA, int FD, int DIR, gpgme_io_cb_t FNC, void *FNC_DATA, void **TAG)
The gpgme_register_io_cb_t type is the type of functions which can be called by GPGME to register an I/O callback function FNC for the file descriptor FD with the user. FNC_DATA should be passed as the first argument to FNC when the handler is invoked (the second argument should be FD). If DIR is 0, FNC should be called by the user when FD is ready for writing. If DIR is 1, FNC should be called when FD is ready for reading.

DATA was provided by the user when registering the gpgme_register_io_cb_t function with GPGME and will always be passed as the first argument when registering a callback function. For example, the user can use this to determine the event loop to which the file descriptor should be added.

GPGME will call this function when a crypto operation is initiated in a context for which the user has registered I/O callback handler functions with gpgme_set_io_cbs. It can also call this function when it is in an I/O callback handler for a file descriptor associated to this context.

The user should return a unique handle in TAG identifying this I/O callback registration, which will be passed to the gpgme_register_io_cb_t function without interpretation when the file descriptor should not be monitored anymore.

-- Data type: void (*gpgme_remove_io_cb_t) (void *TAG)
The gpgme_remove_io_cb_t type is the type of functions which can be called by GPGME to remove an I/O callback handler that was registered before. TAG is the handle that was returned by the gpgme_register_io_cb_t for this I/O callback.

GPGME can call this function when a crypto operation is in an I/O callback. It will also call this function when the context is destroyed while an operation is pending.

-- Data type: enum gpgme_event_io_t
The gpgme_event_io_t type specifies the type of an event that is reported to the user by GPGME as a consequence of an I/O operation. The following events
are defined:

GPGME_EVENT_START
The operation is fully initialized now, and you can start to run the registered I/O callback handlers now. Note that registered I/O callback handlers must not be run before this event is signalled. TYPE_DATA is NULL and reserved for later use.

GPGME_EVENT_DONE
The operation is finished, the last I/O callback for this operation was removed. The accompanying TYPE_DATA points to a struct gpgme_io_event_done_data variable that contains the status of the operation that finished. This event is signalled after the last I/O callback has been removed.

GPGME_EVENT_NEXT_KEY
In a gpgme_op_keylist_start operation, the next key was received from the crypto engine. The accompanying TYPE_DATA is a gpgme_key_t variable that contains the key with one reference for the user.

-- Data type: void (*gpgme_event_io_cb_t)
(void *DATA,
gpgme_event_io_t TYPE, void *TYPE_DATA)
The gpgme_event_io_cb_t type is the type of functions which can be called by GPGME to signal an event for an operation running in a context which has I/O callback functions registered by the user.

DATA was provided by the user when registering the gpgme_event_io_cb_t function with GPGME and will always be passed as the first argument when registering a callback function. For example, the user can use this to determine the context in which this event has occurred.

TYPE will specify the type of event that has occurred. TYPE_DATA specifies the event further, as described in the above list of possible gpgme_event_io_t types.

GPGME can call this function in an I/O callback handler.

File: gpgme.info, Node: Registering I/O Callbacks, Next: I/O Callback Example, Prev: I/O Callback Interface, Up: Using External Event Loops

7.8.2.2 Registering I/O Callbacks
.....

-- Data type: struct gpgme_io_cbs
This structure is used to store the I/O callback interface functions described in the previous section. It has the following members:

gpgme_register_io_cb_t add
This is the function called by GPGME to register an I/O callback handler. It must be specified.

void *add_priv
This is passed as the first argument to the add function when it is called by GPGME. For example, it can be used to determine the event loop to which the file descriptor should be added.

gpgme_remove_io_cb_t remove
This is the function called by GPGME to remove an I/O callback handler. It must be specified.

gpgme_event_io_cb_t event
This is the function called by GPGME to signal an event for an operation. It must be specified, because at least the start event must be processed.

void *event_priv
This is passed as the first argument to the event function when it is called by GPGME. For example, it can be used to determine the context in which the event has occurred.

-- Function: void gpgme_set_io_cbs (gpgme_ctx_t CTX, struct gpgme_io_cbs *IO_CBS)
The function gpgme_set_io_cbs enables the I/O callback interface for the context CTX. The I/O callback functions are specified by IO_CBS.

If IO_CBS->add is NULL, the I/O callback interface is disabled
for the context, and normal operation is restored.

-- Function: void gpgme_get_io_cbs (gpgme_ctx_t CTX,
struct gpgme_io_cbs *IO_CBS)
The function gpgme_get_io_cbs returns the I/O callback functions
set with gpgme_set_io_cbs in IO_CBS.

File: gpgme.info, Node: I/O Callback Example, Next: I/O Callback Example GTK+, Prev: Registering I/O Callbacks, Up: Using External Event Loops

7.8.2.3 I/O Callback Example
.....

To
actually use an external event loop, you have to implement the I/O
callback functions that are used by GPGME to register and unregister
file descriptors. Furthermore, you have to actually monitor these file
descriptors for activity and call the appropriate I/O callbacks.

The following example illustrates how to do that. The example uses
locking to show in which way the callbacks and the event loop can run
concurrently. For the event loop, we use a fixed array. For a
real-world implementation, you should use a dynamically sized structure
because the number of file descriptors needed for a crypto operation in
GPGME is not predictable.

```
#include <assert.h>
#include <errno.h>
#include <stdlib.h>
#include <pthread.h>
#include <sys/types.h>
#include <gpgme.h>

/* The following structure holds the result of a crypto operation. */
struct op_result
{
  int done;
  gpgme_error_t err;
};

/* The following structure holds the
 data associated with one I/O
callback. */
struct one_fd
{
```

```
  int fd;
  int dir;
  gpgme_io_cb_t fnc;
  void *fnc_data;
  void *loop;
};

struct event_loop
{
  pthread_mutex_t lock;
#define MAX_FDS 32
  /* Unused slots are marked with FD being -1.  */
  struct one_fd fds[MAX_FDS];
};
```

The following functions implement the I/O callback interface.

```
gpgme_error_t
add_io_cb (void *data, int fd, int dir, gpgme_io_cb_t fnc, void *fnc_data,
    void **r_tag)
{
  struct event_loop *loop = data;
  struct one_fd *fds = loop->fds;
  int i;

  pthread_mutex_lock (&loop->lock);
  for (i = 0; i < MAX_FDS; i++)
    {
      if (fds[i].fd == -1)
 {
   fds[i].fd = fd;
   fds[i].dir = dir;
   fds[i].fnc = fnc;
   fds[i].fnc_data = fnc_data;
   fds[i].loop = loop;
   break;
 }
    }
  pthread_mutex_unlock (&loop->lock);
   if (i == MAX_FDS)
    return gpg_error (GPG_ERR_GENERAL);
  *r_tag = &fds[i];
  return 0;
}

void
remove_io_cb (void *tag)
{
```

```
  struct one_fd *fd = tag;
  struct event_loop *loop = fd->loop;

  pthread_mutex_lock (&loop->lock);
  fd->fd = -1;
  pthread_mutex_unlock (&loop->lock);
}

void
event_io_cb (void *data, gpgme_event_io_t type, void *type_data)
{
  struct op_result *result = data;

  /* We don't support list operations here.  */
  if (type == GPGME_EVENT_DONE)
    {
      result->done = 1;
      result->err = *type_data;
    }
}
```

The final missing piece is the event loop, which will be presented next. We only support waiting for the success of a single operation.

```
int
do_select (struct event_loop *loop)
{
  fd_set rfds;
  fd_set wfds;
  int i, n;
  int any = 0;
  struct timeval tv;
  struct one_fd *fdlist
= loop->fds;

  pthread_mutex_lock (&loop->lock);
  FD_ZERO (&rfds);
  FD_ZERO (&wfds);
  for (i = 0; i < MAX_FDS; i++)
    if (fdlist[i].fd != -1)
      FD_SET (fdlist[i].fd, fdlist[i].dir ? &rfds : &wfds);
  pthread_mutex_unlock (&loop->lock);

  tv.tv_sec = 0;
  tv.tv_usec = 1000;

  do
    {
```

```
      n = select (FD_SETSIZE, &rfds, &wfds, NULL, &tv);
    }
  while (n < 0 && errno == EINTR);

  if (n < 0)
    return n; /* Error or timeout.  */

  pthread_mutex_lock (&loop->lock);
  for (i = 0; i < MAX_FDS && n; i++)
    {
      if (fdlist[i].fd != -1)
 {
   if (FD_ISSET (fdlist[i].fd, fdlist[i].dir ? &rfds : &wfds))
     {
       assert (n);
       n--;
       any = 1;
             /* The I/O callback handler can register/remove callbacks,
                so we have to unlock the file descriptor list.  */
             pthread_mutex_unlock (&loop->lock);
        (*fdlist[i].fnc) (fdlist[i].fnc_data, fdlist[i].fd);
             pthread_mutex_lock (&loop->lock);
     }
 }
    }
  pthread_mutex_unlock (&loop->lock);
  return any;
}

void
wait_for_op (struct event_loop *loop, struct op_result *result)
{
  int ret;

  do
    {
      ret = do_select (loop);
    }
  while (ret >= 0 && !result->done);
}
```

The main function shows how to put it all together.

```
int
main (int argc, char *argv[])
{
  struct event_loop loop;
  struct op_result result;
```

```
    gpgme_ctx_t ctx;
    gpgme_error_t err;
    gpgme_data_t sig, text;
    int i;
    pthread_mutexattr_t attr;
    struct gpgme_io_cbs io_cbs =
    {
      add_io_cb,
      &loop,
      remove_io_cb,
      event_io_cb,
      &result
    };

    init_gpgme ();

    /* Initialize the loop structure.  */

    /* The mutex must be
recursive, since remove_io_cb (which acquires a
       lock) can be called while holding a lock acquired in do_select.  */
    pthread_mutexattr_init (&attr);
    pthread_mutexattr_settype (&attr, PTHREAD_MUTEX_RECURSIVE);
    pthread_mutex_init (&loop.lock, &attr);
    pthread_mutexattr_destroy (&attr);

    for (i = 0; i < MAX_FDS; i++)
      loop.fds[i].fd = -1;

    /* Initialize the result structure.  */
    result.done = 0;

    err = gpgme_data_new_from_file (&sig, "signature", 1);
    if (!err)
      err = gpgme_data_new_from_file (&text, "text", 1);
    if (!err)
      err = gpgme_new (&ctx);
    if (!err)
      {
        gpgme_set_io_cbs (ctx, &io_cbs);
        err = gpgme_op_verify_start (ctx, sig, text, NULL);
      }
    if (err)
      {
        fprintf (stderr, "gpgme error: %s: %s\n",
                 gpgme_strsource (err), gpgme_strerror (err));
        exit (1);
      }
```

```
    wait_for_op (&loop,
&result);
    if (!result.done)
      {
        fprintf (stderr, "select error\n");
        exit (1);
      }
    if (!result.err)
      {
        fprintf (stderr, "verification failed: %s: %s\n",
                 gpgme_strsource (result.err), gpgme_strerror (result.err));
        exit (1);
      }
    /* Evaluate verify result.  */
    ...
    return 0;
  }
```

File: gpgme.info, Node: I/O Callback Example GTK+, Next: I/O Callback Example GDK, Prev: I/O Callback Example, Up: Using External Event Loops

7.8.2.4 I/O Callback Example GTK+
.....

The I/O callback interface can be used to integrate GPGME with the GTK+ event loop. The following code snippets shows how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any GTK+ specific
setup.

```
  #include <gtk/gtk.h>

  struct my_gpgme_io_cb
  {
    gpgme_io_cb_t fnc;
    void *fnc_data;
    guint input_handler_id
  };

  void
  my_gpgme_io_cb (gpointer data, gint source, GdkInputCondition condition)
  {
    struct my_gpgme_io_cb *iocb = data;
    (*(iocb->fnc)) (iocb->data, source);
```

```
}

void
my_gpgme_remove_io_cb (void *data)
{
  struct my_gpgme_io_cb *iocb = data;
  gtk_input_remove (data->input_handler_id);
}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
                               void *fnc_data, void **tag)
{
  struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
  iocb->fnc = fnc;
  iocb->data = fnc_data;
  iocb->input_handler_id = gtk_input_add_full (fd, dir
                                               ? GDK_INPUT_READ
                                               : GDK_INPUT_WRITE,
                                              my_gpgme_io_callback,
                                              0, iocb, NULL);
  *tag = iocb;
  return 0;
}
```

File: gpgme.info, Node: I/O Callback Example GDK, Next: I/O Callback Example Qt, Prev: I/O Callback Example GTK+, Up: Using External Event Loops

7.8.2.5 I/O Callback Example GDK
.....

The I/O callback interface can also be used to integrate GPGME with the GDK event loop. The following code snippets shows how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any GDK specific setup.

It is very similar to the GTK+ example in the previous section.

```
#include <gdk/gdk.h>

struct my_gpgme_io_cb
{
  gpgme_io_cb_t fnc;
  void *fnc_data;
  gint tag;
```

```
};

void
my_gpgme_io_cb (gpointer data, gint source, GdkInputCondition condition)
{
  struct my_gpgme_io_cb *iocb = data;
  (*(iocb->fnc)) (iocb->data, source);
}

void
my_gpgme_remove_io_cb (void *data)
{
  struct my_gpgme_io_cb *iocb = data;
  gdk_input_remove (data->tag);
}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
                               void *fnc_data, void **tag)
{
  struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
  iocb->fnc = fnc;
  iocb->data = fnc_data;
  iocb->tag = gtk_input_add_full (fd, dir ? GDK_INPUT_READ : GDK_INPUT_WRITE,
                                  my_gpgme_io_callback, iocb, NULL);
  *tag = iocb;
  return 0;
}
```

File: gpgme.info, Node: I/O Callback Example Qt, Prev: I/O Callback Example GDK, Up: Using External Event Loops

7.8.2.6 I/O Callback Example Qt
.....

The
I/O callback interface can also be used to integrate GPGME with the Qt event loop. The following code snippets show how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any Qt specific setup.

```
#include <qsocketnotifier.h>
#include <qapplication.h>
```

```
  struct IOCB {
    IOCB( GpgmeIOCb f, void * d, QSocketNotifier * n )
      : func( f ), data( d ), notifier( n ) {}
    GpgmeIOCb func;
    void * data;
    QSocketNotifier * notifier;
  }

  class MyApp : public QApplication {

    // ...

    static void registerGpgmeIOCallback( void * data, int fd, int dir,
                                         GpgmeIOCb func, void * func_data,
                                         void ** tag ) {
      QSocketNotifier * n =
        new QSocketNotifier(
fd, dir ? QSocketNotifier::Read
                                       : QSocketNotifier::Write );
      connect( n, SIGNAL(activated(int)),
               qApp, SLOT(slotGpgmeIOCallback(int)) );
      qApp->mIOCBs.push_back( IOCB( func, func_data, n ) );
      *tag = (void*)n;
    }

    static void removeGpgmeIOCallback( void * tag ) {
      if ( !tag ) return;
      QSocketNotifier * n = static_cast<QSocketNotifier*>( tag );
      for ( QValueList<IOCB>::iterator it = qApp->mIOCBs.begin() ;
            it != qApp->mIOCBs.end() ; ++it )
        if ( it->notifier == n ) {
          delete it->notifier;
          qApp->mIOCBs.erase( it );
          return;
        }
    }

  public slots:
    void slotGpgmeIOCallback( int fd ) {
      for ( QValueList<IOCB>::const_iterator it = mIOCBs.begin() ;
            it != mIOCBs.end() ; ++it )
        if ( it->notifier && it->notifier->socket() == fd )
          (*(it->func))
( it->func_data, fd );
    }

    // ...
```

```
private:
  QValueList<IOCB> mIOCBs;
  // ...
};
```

File: gpgme.info, Node: Cancellation, Prev: Using External Event Loops, Up: Run Control

### 7.8.3 Cancellation

Sometimes you do not want to wait for an operation to finish. GPGME provides two different functions to achieve that. The function gpgme_cancel takes effect immediately. When it returns, the operation is effectively canceled. However, it has some limitations and can not be used with synchronous operations. In contrast, the function gpgme_cancel_async can be used with any context and from any thread, but it is not guaranteed to take effect immediately. Instead, cancellation occurs at the next possible time (typically the next time I/O occurs in the target context).

-- Function: gpgme_ctx_t gpgme_cancel (gpgme_ctx_t CTX)
SINCE: 0.4.5

The function gpgme_cancel attempts to cancel a pending operation in the context
CTX. This only works if you use the global event loop or your own event loop.

If you use the global event loop, you must not call gpgme_wait during cancellation. After successful cancellation, you can call gpgme_wait (optionally waiting on CTX), and the context CTX will appear as if it had finished with the error code GPG_ERR_CANCEL.

If you use an external event loop, you must ensure that no I/O callbacks are invoked for this context (for example by halting the event loop). On successful cancellation, all registered I/O callbacks for this context will be unregistered, and a GPGME_EVENT_DONE event with the error code GPG_ERR_CANCEL will be signalled.

The function returns an error code if the cancellation failed (in this case the state of CTX is not modified).

-- Function: gpgme_ctx_t gpgme_cancel_async (gpgme_ctx_t CTX)
SINCE: 1.1.7

The function gpgme_cancel_async attempts to cancel a pending

operation
in the context CTX. This can be called by any thread at
any time after starting an operation on the context, but will not
take effect immediately. The actual cancellation happens at the
next time GPGME processes I/O in that context.

The function returns an error code if the cancellation failed (in
this case the state of CTX is not modified).

File: gpgme.info, Node: UI Server Protocol, Next: Debugging, Prev: Contexts, Up: Top

# Appendix A The GnuPG UI Server Protocol

This section specifies the protocol used between clients and a User Interface Server (UI server). This protocol helps to build a system where all cryptographic operations are done by a server and the server is responsible for all dialogs. Although GPGME has no direct support for this protocol it is believed that servers will utilize the GPGME library; thus having the specification included in this manual is an appropriate choice. This protocol should be referenced as The GnuPG UI Server Protocol.

A server needs to implement these commands:(1)

* Menu:

* UI Server Encrypt:: Encrypt a message.
* UI Server Sign:: Sign a message.
* UI Server Decrypt:: Decrypt a message.
* UI Server Verify:: Verify a message.
* UI Server Set Input Files:: Specifying the input files to operate on.
* UI Server Sign/Encrypt Files:: Encrypting and signing files.
* UI Server Verify/Decrypt Files:: Decrypting and verifying files.
* UI Server Import/Export Keys:: Managing certificates.
* UI Server Checksum Files:: Create and verify checksums for files.
* Miscellaneous UI Server Commands:: Commands not related to a specific operation.

---------- Footnotes ----------

(1) In all examples we assume that the connection has already been established; see the Assuan manual for details.

File: gpgme.info, Node: UI Server Encrypt, Next: UI Server Sign, Up:

## A.1 UI Server: Encrypt a Message

Before encryption can be done the recipients must be set using the command:

-- Command: RECIPIENT STRING

Set the recipient for the encryption. STRING is an RFC-2822 recipient name ("mailbox" as per section 3.4). This command may or may not check the recipient for validity right away; if it does not all recipients are expected to be checked at the time of the ENCRYPT command. All RECIPIENT commands are cumulative until a successful ENCRYPT command or until a RESET command. Linefeeds are obviously not allowed in STRING and should be folded into spaces (which are equivalent).

To tell the server the source and destination of the data, the next two commands are to be used:

-- Command: INPUT FD=N

Set the file descriptor for the message to be encrypted to N. The message send to the server is binary encoded.

GpgOL is a Windows only program, thus N is not a libc file descriptor but a regular system handle. Given that the Assuan connection works over a socket, it is not possible to use regular inheritance to make the file descriptor available to the server. Thus DuplicateHandle needs to be used to duplicate a handle to the server process. This is the reason that the server needs to implement the GETINFO pid command. Sending this command a second time replaces the file descriptor set by the last one.

-- Command: OUTPUT FD=N [--binary]

Set the file descriptor to be used for the output (i.e. the encrypted message) to N. If the option --binary is given the output shall be in binary format; if not given, the output for OpenPGP needs to be ASCII armored and for CMS Base-64 encoded. For details on the file descriptor, see the INPUT command.

The setting of the recipients, the data source and destination may happen in any order, even intermixed. If this has been done the actual encryption operation is called using:

-- Command: ENCRYPT --protocol=NAME

This command reads the plaintext from the file descriptor set by the INPUT command, encrypts it and writes the ciphertext to the file descriptor set by the OUTPUT command. The server may (and should) overlap reading and writing. The recipients used for the encryption are all the recipients set so far. If any recipient is not usable the server should take appropriate measures to notify the user about the problem and may cancel the operation by returning an error code. The used file descriptors are void after this command; the recipient list is only cleared if the server returns success.

Because GpgOL uses a streaming mode of operation the server is not allowed to auto select the protocol and must obey to the mandatory PROTOCOL parameter:

OpenPGP
Use the OpenPGP protocol (RFC-2440).
CMS
Use the CMS
(PKCS#7) protocol (RFC-3852).

To support automagically selection of the protocol depending on the selected keys, the server MAY implement the command:

-- Command: PREP_ENCRYPT [--protocol=NAME] [--expect-sign]

This commands considers all recipients set so far and decides whether it is able to take input and start the actual encryption. This is kind of a dry-run ENCRYPT without requiring or using the input and output file descriptors. The server shall cache the result of any user selection to avoid asking this again when the actual ENCRYPT command is send. The --protocol option is optional; if it is not given, the server should allow the user to select the protocol to be used based on the recipients given or by any other means.

If --expect-sign is given the server should expect that the message will also be signed and use this hint to present a unified recipient and signer selection dialog if possible and desired.
A
selected signer should then be cached for the expected SIGN command (which is expected in the same session but possible on another connection).

If this command is given again before a successful ENCRYPT command, the second one takes effect.

Before sending the OK response the server shall tell the client the protocol to be used (either the one given by the argument or the one selected by the user) by means of a status line:

-- Status line: PROTOCOL NAME
Advise the client to use the protocol NAME for the ENCRYPT command. The valid protocol names are listed under the description of the ENCRYPT command. The server shall emit exactly one PROTOCOL status line.

Here is an example of a complete encryption sequence; client lines are indicated by a C:, server responses by C::

```
C: RESET
S: OK
C: RECIPIENT foo@example.net
S: OK
C: RECIPIENT bar@example.com
S: OK
C: PREP_ENCRYPT
 S: S PROTOCOL OpenPGP
S: OK
C: INPUT FD=17
S: OK
C: OUTPUT FD=18
S: OK
C: ENCRYPT
S: OK
```

File: gpgme.info, Node: UI Server Sign, Next: UI Server Decrypt, Prev: UI Server Encrypt, Up: UI Server Protocol

## A.2 UI Server: Sign a Message

The server needs to implement opaque signing as well as detached signing. Due to the nature of OpenPGP messages it is always required to send the entire message to the server; sending just the hash is not possible. The following two commands are required to set the input and output file descriptors:

-- Command: INPUT FD=N
Set the file descriptor for the message to be signed to N. The message send to the server is binary encoded. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: OUTPUT FD=N [--binary]
Set the file descriptor to be used for the output. The output
is
either the complete signed message or in case of a detached
signature just that detached signature. If the option --binary
is given the output shall be in binary format; if not given, the
output for OpenPGP needs to be ASCII armored and for CMS Base-64
encoded. For details on the file descriptor, see the INPUT
command.

To allow the server the selection of a non-default signing key the
client may optionally use the SENDER command, see *note command
SENDER::.

The signing operation is then initiated by:

-- Command: SIGN --protocol=NAME [--detached]
Sign the data set with the INPUT command and write it to the sink
set by OUTPUT. NAME is the signing protocol used for the message.
For a description of the allowed protocols see the ENCRYPT
command. With option --detached given, a detached signature is
created; this is actually the usual way the command is used.

The client expects the server to send at least this status information
before
the final OK response:

-- Status line: MICALG STRING
The STRING represents the hash algorithm used to create the
signature. It is used with RFC-1847 style signature messages and
defined by PGP/MIME (RFC-3156) and S/MIME (RFC-3851). The GPGME
library has a supporting function gpgme_hash_algo_name to return
the algorithm name as a string. This string needs to be lowercased
and for OpenPGP prefixed with "pgp-".
-----BEGIN PGP PRIVATE KEY BLOCK-----

lQOYBFrsKEkBCADKw4Wt8J6M/88qD8PO6lSMCxH1cpwH8iK0uPaFFYsJkkXo7kWf
PTAtrV+REqF/o80dvYcdLvRsV21pvncZz/HXLu1yQ18mC3XObrKokbdgrTTKA5XE
BZkNsqyaMMJauT18H4hYkSg62/tTdO1cu/zWv/LFf7Xyn6+uA74ovXCJlO1s0N2c
PShtr98QRzPMf2owgVk37JnDNp4gGVDGHxSZOuUwxgYAZYnA8SFc+c+3ZrQfY870
+O4j3Mz4p7yD13AwP4buQLBsb/icxekeQCqpRJhLH9f7MdEcGXa1x36RcEkHdu+M
yJ392eMgD+dKNfRCtyTPhjZTxvbNELIBYICfABEBAAEAB/wLJ0gyMjs2fFfT83wM
5Lzz2yQIwV4t3bblBAujdHTqeN5Zmsm/oakFyjSokULK96Kv0R4ej9eoIgMFvxFk
HRkrggxTrbsNJ7I6QcKYHTPeIIj318ykNL6fj0WJUcdPIENukXl5jbqNyk3/4D2y
TTDySyq6jHTgvMH4K4KJUSpglvSJPntTk9RhuFGHAF+sNR9atygDYctAaERMRtSg
LCoSt/AoX5GRMlQjXT9oqQjwSQoZyF4s8HMC8wdTFIE/E0L4IVdHVp8sz2UszNtT
W/evmCA+KVruKjRH/Fhrq4hHkEamW28+j4L6uAyagONP7BONs+S5Oo2zTT9+tV2R

ILTZBADdgLuAgF6C5Lu9jCF6DfFgaT/uafMyQNkEGNlxOHMWHTgLHe475V2eG9gA
amd4yXKyEFKU1PWnvlGuicQSGdzVcwmq61msvXgYD0FK3LP3yWzKnE4X1tzrC9Vp
/uHJxKjewCuyt1f5in919v+T8TbUxBYKC0zX/qWtX+10cTx77QQA6leqhToJ95Yc
u4UBrKMEO+y2v8Svb3LG7yI5oY8tkw0EkJ/kpZ8xTAfZYCe6fXdvVE3PHg2lrxyc
Wv/EU3QY/qA3G82mbXYeJ2jNZaTNYo4MylMrt4Mx25x4ke7JlsE8SVrQ+4CrHkqp
OjSIa7fppLrQ78uW980AtN8NNQGrlTsD/A9aoA60Igxy1Q3K2uSyDCyjLknv57ym
ZSBD3/t7m0l6Q6gbdfhNGosT+Hd4y3actqEqzXZHW2VG4dKZ/wRNkxtSm9adU9vs
EHyzxjb6mKIH32zAG5TaFT20hC+NK6lsyHr9UE2ZrS6ma2sLxGW2O40hqNsdD+5m
NrqeBc2I/js1PMK0EHRlc3RAZXhhbXBsZS5vcmeJAVQEEwEIAD4WIQTUFzW5Ejb9
uIIEjFojAWNe7/DLBQUCWuwoSQIbAwUJA8JnAAULCQgHAgYVCgkICwIEFgIDAQIe
AQIXgAAKCRAjAWNe7/DLBf9kB/wOQ/S60HGwFq07W9N01HWULyhHKoMmcHL6rfZ6
4oDqLxolPSasz7WAMW1jN4qtWJ0mFzwO83V6kaBe+wF6Kqir6udFSBW9rPcFg6/V
ZXPltT0a6uacIHq6DyQ5iMW4YQWbVy9OR2rNGkYo1JCBR0XdRJYCSX3yB4TWv/eX
nZ37/WjmiTOIZh35rjs+NuU/S5JPDfAp2/k70DevQeBsv+UjVXjWpNTZmPbvDnd9
95uSmC6UY4hzyP84ORYMYn9n1QAR0goxDN6UunOf9Rlp1oMzdxMool/d1MlCxg2h
3jheuhv7lgUF4KpvHOuEPXQ7UO417E0TYcDZ1J8Nsv87SZeEnQOYBFrsKEkBCADj
oEBhG/QPqZHg8VyoD1xYRAWGxyDJkX/GrSs6yE+x2hk5FoQCajxKa/d4AVxOnJpd
whAfeXeSNaql5Ejgzax+Tdj9BV6vtGVJVv0pO7bgAiZxkA6RHxtNqhpPnPQoXvUz
kzpRgpuL+Nj4yIg7z1ITH6KQH4u5SI9vd+j/8i9Taz67pdZwuJjac8qBuJHjzAo1
bjYctFYUSG5pbmMQyNLySzgiNkFa4DajODlt3RuqVGP316Fk+Sy2+60tC/HlX8jg
MyMONfOGBQx6jk8tvAphS/LAqrrNepnagIyLUGKU+L8cB2g1PGGp2biBFWqZbudZ
oyRBet/0yH/zirBdQJw1ABEBAAEAB/4lN3gXOI4OuoOcsvHak4pebx61Mt0YP9cT
qZASIBqxok5x8E28pFh/tYfkYdqRCtdNYZOnxcEoUWh5j6nfwZkEnJ9P/T8GPNk7
pMKnKXmExi05b5uGHD8nU1rSbf/YkvAF0vpbxd4/RDxbbtQhbUwGzusSI+pBLM0w
5TreEB+vRGBc2gOvXXOtKLNEa7M9rH2EwbAkP3jOGGwgk6adxbQdBcRxq4merqhL
YrVz73bCj8TDc0fsNJyIaZZJ++ejfBFYavsF1pvx9z7FNFi8rSXoiB3SBtaWGfhr
bwNaMZrDc7TRIq/fgGaL6g//bzcWrr1YaHXZ10Bgx6UymDOlYkCpBADm0Hv46sPw
07SO8+IACcaQliOto1pndOPwTimCeo58/7rf8I2a5uuJloGrnPwAX65bKDnUALp6
X3lnXRNMhnB3Uewx4i00LQmjsxhJfQiGLpMv0j58tn64s7GqQzGVV1JKcQm992RV
jFOydyjZ+K4LGWEOITG/bZrMEVNGCM+OnQQA/Haz8xN0NFSlq7tyfFc0pkx/TiCX
xGfBqbO0wU2b5GMnZbY/06HENpidIzpa231VQaw5/nPTvfhlLKW1iGAkc148cX1q
lL9w2ksXuaHR3LXud2VcfVTIdxU/7h7u1dD/85+c0+7jlGObD9cXKxlM6OjpIJz1
l5/1h3C5S0TuxHkEAL/3BGihkhNfv1Xx0rWu0/732usX/nE/A9C26hGu41FUf3fp
0ilonKpKZUEwWt5hWSEFCSrznNVekiO0rxvuu3RVegvzThPNU4Pf4JZtJpRVhvUQ
d9ulxJw7V9rs75uNBatTNC0kXuGoXhehw4Bn93xa67gYGd3LfrH+oT0GCDpTSHCJ
ATwEGAEIACYWIQTUFzW5Ejb9uIIEjFojAWNe7/DLBQUCWuwoSQIbDAUJA8JnAAAK
CRAjAWNe7/DLBf0pCACPp5hBuUWngu2Hqvg+tNiujfsiYzId3MffFxEk3CbXeHcJ
5F32NDJ9PYCnra4L8wSv+NZt9gIa8lFwoFSFQCjzH7KE86XcV3MhfdJTNb/+9CR7
Jq3e/4Iy0N5ip7PNYMCyakcAsxvsNCJKrSaDuYe/OAoTXRBtgRWE2uyT315em02L
kr+2Cc/Qk6H+vlNOHGRgnpI/OZZjnUuUfBUvMGHr1phW+y7aeymC9PnUGdViRdJe
23nntMSDA+0/I7ESO9JsWvJbyBmuiZpu9JjScOjYH9xpQLqRNyw4WHpZriN69F0t
9Mmd7bM1+UyPgbPEr0iWMeyctYsuOLeUyQKMscDT
=hkUm
-----END
 PGP PRIVATE KEY BLOCK-----

```
from __future__ import absolute_import

import cython
```

```
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

if cython.compiled is True:
   cc = "Powered by Cython compiled C code."
else:
   cc = "Powered by Python."

print("""
   Number of secret keys:  {0}
   Number of public keys:  {1}

 {2}
""".format(secnum, pubnum, cc))
```

This is gpgme.info, produced by makeinfo version 6.5 from gpgme.texi.

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INFO-DIR-SECTION GNU Libraries
START-INFO-DIR-ENTRY
* GPGME: (gpgme).  Adding support for cryptography to your program.
END-INFO-DIR-ENTRY

This file documents the GPGME library.

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The GnuPG Made Easy Reference Manual, for Version 1.14.1-beta35.

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gpgme.info-2: 301751

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End Tag Table

Local Variables:
coding: utf-8
End:
000
 *H
010 UDE1!0U
Deutsches Forschungsnetz10UDFN-PCA1.0,U%DFN Top Level Certification Authority1!0 *H
 certify@pca.dfn.de0
001102164724Z
011230180000Z010 UDE1!0U
Deutsches Forschungsnetz10UDFN-PCA1+0)U"DFN Server Certification Authority1!0 *H
 certify@pca.dfn.de0"0
 *H
0
W`r;wXu)QYHm1t]4?|-.B(iw6G01N>[mQSwC'muw~E'l-M
+<[A|F)F%
ZiRaW=OC,,meKW@J-*<,L}:Bnm-kv
EYBmu tt[-%,R+n0j0U00U0U{upz*D\
v0Ux0v09753http://www.pca.dfn.de/dfnpca/certify/ssl/dfnpca.crx09753http://www.pca.dfn.de/dfnpca/certify/ssl/dfn
pca.crl0 `HB0) `HBhttps://mystic.pca.dfn.de/0A `HB42http://www.pca.dfn.de/dfnpca/policy/wwwpolicy.html0 `HB
This certificate was issued by the DFN-PCA, the Top
Level Certification Authority of the German Research
Network (Deutsches Forschungsnetz, DFN).
The key owner's identity was authenticated in
accordance with the DFN World Wide Web Policy, v1.00! `HBcgi/check-rev.cgi?0
 *H
\C)2
+ZYG| UCA|PzYFnTj@SA)/<HU+4t?@g?pb5w'Z;dqLi9\(d=
,}h?c(MeM44=Qe/_^^JyYN/61&jPFXifP&#;/KZ
1 xOK?ps
```
\input texinfo                  @c -*- mode: texinfo; coding: utf-8; -*-
@documentencoding UTF-8
@setfilename gpgme.info
@include defs.inc
@settitle The `GnuPG Made Easy' Reference Manual

@dircategory GNU Libraries
@direntry
* @acronym{GPGME}: (gpgme).          Adding support for cryptography to your program.
@end direntry

@c Unify some of the indices.
@syncodeindex tp fn
@syncodeindex pg fn

@copying
```

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@end copying

@c Macros used by the description of the UI server protocol
@macro clnt{string}
@sc{c:} \string\
@end macro
@macro srvr{string}
@sc{s:} \string\
@end macro

@c API version.
@macro since{string}
@sc{Since:} \string\
@end macro

@c
@c T I T L E P A G E
@c
@ifinfo
This file documents the @acronym{GPGME} library.

This is Edition @value{EDITION}, last updated @value{UPDATED}, of
@cite{The `GnuPG Made Easy' Reference Manual}, for Version
@value{VERSION}.

@c NOTE: Don't forget to update the year for the TeX version, too.
@insertcopying

@end ifinfo

@c We do not want that bastard short titlepage.
@c @iftex

```
@c @shorttitlepage The `GnuPG Made Easy' Reference Manual
@c @end iftex
@titlepage
@center @titlefont{The `GnuPG Made Easy'}
@sp 1
@center @titlefont{Reference Manual}
@sp 6
@center Edition @value{EDITION}
@sp 1
@center last updated @value{UPDATED}
@sp 1
@center for version @value{VERSION}
@page
@vskip 0pt plus 1filll
Published
 by The GnuPG Project@* c/o g10 Code GmbH@* Httenstr. 61@* 40699 Erkrath, Germany

@insertcopying
@end titlepage
@page

@summarycontents
@contents

@ifnottex
@node Top
@top Main Menu
This is Edition @value{EDITION}, last updated @value{UPDATED}, of
@cite{The `GnuPG Made Easy' Reference Manual}, for Version
@value{VERSION} of the @acronym{GPGME} library.
@end ifnottex

@menu
* Introduction::                How to use this manual.
* Preparation::                 What you should do before using the library.
* Protocols and Engines::       Supported crypto protocols.
* Algorithms::                  Supported algorithms.
* Error Handling::              Error numbers and their meanings.
* Exchanging Data::             Passing data to and from @acronym{GPGME}.
* Contexts::                    Handling @acronym{GPGME} contexts.

Appendices

* UI Server Protocol::          The GnuPG UI Server Protocol.
* Debugging::                   How to solve problems.
* Deprecated
 Functions::        Documentation of deprecated functions.
```

* Library Copying:: The GNU Lesser General Public License says how you can copy and share `GnuPG Made Easy'.
* Copying:: The GNU General Public License says how you can copy and share this manual.

Indices

* Concept Index:: Index of concepts and programs.
* Function and Data Index:: Index of functions, variables and data types.

@detailmenu
--- The Detailed Node Listing ---

Introduction

* Getting Started:: Purpose of the manual, and how to use it.
* Features:: Reasons to install and use @acronym{GPGME}.
* Overview:: Basic architecture of the @acronym{GPGME} library.

Preparation

* Header:: What header file you need to include.
* Building the Source:: Compiler options to be used.
* Largefile Support (LFS):: How to use @acronym{GPGME} with LFS.
* Using Automake:: Compiler options to be used the easy way.
* Using Libtool:: Avoiding compiler options entirely.
* Library Version Check:: Getting and verifying the library version.
* Signal Handling:: How @acronym{GPGME} affects signal handling.
* Multi-Threading:: How @acronym{GPGME} can be used in an MT environment.

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* Engine Version Check:: Verifying the engine version.
* Engine Information:: Obtaining more information about the engines.
* Engine Configuration:: Changing the engine configuration.
* OpenPGP:: Support for the OpenPGP protocol.
* Cryptographic Message Syntax:: Support for the CMS.

Algorithms

* Public Key Algorithms:: A list of all public key algorithms.
* Hash Algorithms:: A list of all hash algorithms.

Error Handling

* Error Values:: The error

value and what it means.
* Error Codes:: A list of important error codes.
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* Destroying Data Buffers:: Releasing data buffers.
* Manipulating Data Buffers:: Operations on data buffers.

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* Creating Contexts:: Creating new @acronym{GPGME} contexts.
*
Destroying Contexts:: Releasing @acronym{GPGME} contexts.
* Result Management:: Managing the result of crypto operations.
* Context Attributes:: Setting properties of a context.
* Key Management:: Managing keys with @acronym{GPGME}.
* Crypto Operations:: Using a context for cryptography.
* Miscellaneous:: Miscellaneous operations.
* Run Control:: Controlling how operations are run.

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* Crypto Engine:: Configuring the crypto engine.
* Setting the Sender:: How to tell the engine the sender.
* ASCII Armor:: Requesting @acronym{ASCII} armored output.
* Text Mode:: Choosing canonical text mode.
* Offline Mode:: Choosing offline mode.
* Included Certificates:: Including a number of certificates.
* Key Listing Mode::
Selecting key listing mode.
* Passphrase Callback:: Getting the passphrase from the user.
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* Changing Passphrases:: Change the passphrase of
a key.
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Sign

* Selecting Signers:: How to choose the keys to sign with.
* Creating a Signature:: How to create a signature.
* Signature Notation Data:: How to add notation data to a signature.

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* Encrypting a Plaintext:: How to encrypt a plaintext.

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* Running other Programs:: Running other Programs.
* Using the Assuan protocol:: Using the Assuan protocol.
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Run Control

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until an operation is completed.
* Using External Event Loops:: Advanced control over what happens when.

* Cancellation:: How to end pending operations prematurely.

Using External Event Loops

* I/O Callback Interface:: How I/O callbacks are registered.
* Registering I/O Callbacks:: How to use I/O callbacks for a context.
* I/O Callback Example:: An example how to use I/O callbacks.
* I/O Callback Example GTK+:: How to integrate @acronym{GPGME} in GTK+.
* I/O Callback Example GDK:: How to integrate @acronym{GPGME} in GDK.
* I/O Callback Example Qt:: How to integrate @acronym{GPGME} in Qt.

@end detailmenu
@end menu

@node Introduction
@chapter Introduction

`GnuPG Made Easy' (@acronym{GPGME}) is a C language library that allows to add support for cryptography to a program. It is designed to make access to public key crypto engines like GnuPG or GpgSM easier for applications. @acronym{GPGME} provides a high-level crypto API for
encryption, decryption, signing, signature verification and key management.

@acronym{GPGME} uses GnuPG and GpgSM as its backends to support OpenPGP and the Cryptographic Message Syntax (CMS).

@menu
* Getting Started:: Purpose of the manual, and how to use it.
* Features:: Reasons to install and use @acronym{GPGME}.
* Overview:: Basic architecture of the @acronym{GPGME} library.
@end menu

@node Getting Started
@section Getting Started

This manual documents the @acronym{GPGME} library programming interface. All functions and data types provided by the library are explained.

The reader is assumed to possess basic knowledge about cryptography in general, and public key cryptography in particular. The underlying cryptographic engines that are used by the library are not explained, but where necessary, special features or requirements by an engine are mentioned as far as they are relevant to @acronym{GPGME} or its users.

This manual
can be used in several ways. If read from the beginning
to the end, it gives a good introduction into the library and how it
can be used in an application. Forward references are included where
necessary. Later on, the manual can be used as a reference manual to
get just the information needed about any particular interface of the
library. Experienced programmers might want to start looking at the
examples at the end of the manual, and then only read up those parts
of the interface which are unclear.

The documentation for the language bindings is currently not included
in this manual. Those languages bindings follow the general
programming model of @acronym{GPGME} but may provide some extra high
level abstraction on top of the @acronym{GPGME} style API. For now
please see the README files in the @file{lang/} directory of the
source distribution.

@node Features
@section Features

@acronym{GPGME} has a couple of advantages over other libraries doing
a similar job, and over
implementing support for GnuPG or other crypto
engines into your application directly.

@table @asis
@item it's free software
Anybody can use, modify, and redistribute it under the terms of the GNU
Lesser General Public License (@pxref{Library Copying}).

@item it's flexible
@acronym{GPGME} provides transparent support for several cryptographic
protocols by different engines. Currently, @acronym{GPGME} supports
the OpenPGP protocol using GnuPG as the backend, and the Cryptographic
Message Syntax using GpgSM as the backend.

@item it's easy
@acronym{GPGME} hides the differences between the protocols and
engines from the programmer behind an easy-to-use interface. This way
the programmer can focus on the other parts of the program, and still
integrate strong cryptography in his application. Once support for
@acronym{GPGME} has been added to a program, it is easy to add support
for other crypto protocols once @acronym{GPGME} backends provide them.

@item it's language friendly
@acronym{GPGME}

comes with languages bindings for several common
programming languages: Common Lisp, C++, Python 2, and Python 3.
@end table

@node Overview
@section Overview

@acronym{GPGME} provides a data abstraction that is used to pass data
to the crypto engine, and receive returned data from it. Data can be
read from memory or from files, but it can also be provided by a
callback function.

The actual cryptographic operations are always set within a context.
A context provides configuration parameters that define the behaviour
of all operations performed within it. Only one operation per context
is allowed at any time, but when one operation is finished, you can
run the next operation in the same context. There can be more than
one context, and all can run different operations at the same time.

Furthermore, @acronym{GPGME} has rich key management facilities
including listing keys, querying their attributes, generating,
importing, exporting and deleting keys, and acquiring information
about
the trust path.

With some precautions, @acronym{GPGME} can be used in a multi-threaded
environment, although it is not completely thread safe and thus needs
the support of the application.

@node Preparation
@chapter Preparation

To use @acronym{GPGME}, you have to perform some changes to your
sources and the build system. The necessary changes are small and
explained in the following sections. At the end of this chapter, it
is described how the library is initialized, and how the requirements
of the library are verified.

@menu
* Header:: What header file you need to include.
* Building the Source:: Compiler options to be used.
* Largefile Support (LFS):: How to use @acronym{GPGME} with LFS.
* Using Automake:: Compiler options to be used the easy way.
* Using Libtool:: Avoiding compiler options entirely.
* Library Version Check:: Getting and verifying the library version.
* Signal Handling::

How @acronym{GPGME} affects signal handling.
* Multi-Threading:: How @acronym{GPGME} can be used in an MT environment.
@end menu

@node Header
@section Header
@cindex header file
@cindex include file

All interfaces (data types and functions) of the library are defined
in the header file `gpgme.h'. You must include this in all programs
using the library, either directly or through some other header file,
like this:

@example
#include <gpgme.h>
@end example

The name space of @acronym{GPGME} is @code{gpgme_*} for function names
and data types and @code{GPGME_*} for other symbols. Symbols internal
to @acronym{GPGME} take the form @code{_gpgme_*} and @code{_GPGME_*}.

Because @acronym{GPGME} makes use of the GPG Error library, using
@acronym{GPGME} will also use the @code{GPG_ERR_*} name space
directly, and the @code{gpg_err*}, @code{gpg_str*}, and @code{gpgrt_*}
name space indirectly.

@node Building the Source
@section Building the Source
@cindex compiler options
@cindex
compiler flags

If you want to compile a source file including the `gpgme.h' header
file, you must make sure that the compiler can find it in the
directory hierarchy. This is accomplished by adding the path to the
directory in which the header file is located to the compilers include
file search path (via the @option{-I} option).

However, the path to the include file is determined at the time the
source is configured. To solve this problem, gpgme ships with a small
helper program @command{gpgme-config} that knows about the path to the
include file and other configuration options. The options that need
to be added to the compiler invocation at compile time are output by
the @option{--cflags} option to @command{gpgme-config}. The following
example shows how it can be used at the command line:

@example
gcc -c foo.c `gpgme-config --cflags`
@end example

Adding the output of @samp{gpgme-config --cflags} to the compiler
command line will ensure that the compiler can find the
@acronym{GPGME}
header file.

A similar problem occurs when linking the program with the library.
Again, the compiler has to find the library files. For this to work,
the path to the library files has to be added to the library search
path (via the @option{-L} option). For this, the option
@option{--libs} to @command{gpgme-config} can be used. For
convenience, this option also outputs all other options that are
required to link the program with @acronym{GPGME} (in particular, the
@samp{-lgpgme} option). The example shows how to link @file{foo.o}
with the @acronym{GPGME} library to a program @command{foo}.

@example
gcc -o foo foo.o `gpgme-config --libs`
@end example

Of course you can also combine both examples to a single command by
specifying both options to @command{gpgme-config}:

@example
gcc -o foo foo.c `gpgme-config --cflags --libs`
@end example

If you need to detect the installed language bindings you can use list
them using:

@example
gpgme-config --print-lang
@end example

or
test for the availability using

@example
gpgme-config --have-lang=python && echo 'Bindings for Pythons available'
@end example

@node Largefile Support (LFS)
@section Largefile Support (LFS)

@cindex largefile support
@cindex LFS

@acronym{GPGME} is compiled with largefile support by default, if it is available on the system. This means that GPGME supports files larger than two gigabyte in size, if the underlying operating system can. On some systems, largefile support is already the default. On such systems, nothing special is required. However, some systems provide only support for files up to two gigabyte in size by default. Support for larger file sizes has to be specifically enabled.

To make a difficult situation even more complex, such systems provide two different types of largefile support. You can either get all relevant functions replaced with alternatives that are largefile capable, or you can get new functions and data types for largefile support added. Those new functions have the same name as their smallfile counterparts, but with a suffix of 64.

An example: The data type @code{off_t} is 32 bit wide on GNU/Linux PC systems. To address offsets in large files, you can either enable largefile support add-on. Then a new data type @code{off64_t} is provided, which is 64 bit wide. Or you can replace the existing @code{off_t} data type with its 64 bit wide counterpart. All occurrences of @code{off_t} are then automagically replaced.

As if matters were not complex enough, there are also two different types of file descriptors in such systems. This is important because if file descriptors are exchanged between programs that use a different maximum file size, certain errors must be produced on some file descriptors to prevent subtle overflow bugs from occurring.

As you can see, supporting two different maximum file sizes at the same time is not at all an easy task. However, the maximum file size does matter for @acronym{GPGME}, because some data types it uses in its interfaces are affected by that. For example, the @code{off_t} data type is used in the @code{gpgme_data_seek} function, to match its @acronym{POSIX} counterpart. This affects the call-frame of the function, and thus the ABI of the library. Furthermore, file descriptors can be exchanged between GPGME and the application.

For you as the user of the library, this means that your program must be compiled in the same file size mode as the library. Luckily, there is absolutely no valid reason for new programs to not enable largefile support by default and just use that. The compatibility modes (small file sizes or dual mode) can be considered an historic artefact, only useful to allow for a transitional period.

On POSIX platforms @acronym{GPGME} is compiled using largefile support by default. This means that your application must do the same, at least as far as it is relevant for using the @file{gpgme.h} header file. All types in this header files refer to their largefile counterparts, if they are different from any default types on the system.

On 32 and 64 bit Windows platforms @code{off_t} is declared as 32 bit signed integer. There is no specific support for LFS in the C library. The recommendation from Microsoft is to use the native interface (@code{CreateFile} et al.) for large files. Released binary versions of @acronym{GPGME} (libgpgme-11.dll) have always been build with a 32 bit @code{off_t}. To avoid an ABI break we stick to this convention for 32 bit Windows by using @code{long} there. @acronym{GPGME} versions for 64 bit Windows have never been released and thus we are able to use @code{int64_t} instead of @code{off_t} there. For easier migration the typedef @code{gpgme_off_t} has been defined. The reason we cannot use @code{off_t} directly is that some toolchains (e.g. mingw64) introduce a POSIX compatible hack for @code{off_t}. Some widely used toolkits make use of this hack and in turn @acronym{GPGME} would need to use it also. However, this would introduce an ABI break and existing software making use of libgpgme might suffer from a severe break. Thus with version 1.4.2 we redefined all functions using @code{off_t} to use @code{gpgme_off_t} which is defined as explained above. This way we keep the ABI well defined and independent of any toolchain hacks. The bottom line is that LFS support in @acronym{GPGME} is only available on 64 bit versions of Windows.

On POSIX platforms you can enable largefile support, if it is different from the default on the system the application is compiled on, by using the Autoconf macro @code{AC_SYS_LARGEFILE}. If you do this, then you don't need to worry about anything else: It will just work. In this case you might also want to use @code{AC_FUNC_FSEEKO} to take advantage of some new interfaces, and @code{AC_TYPE_OFF_T} (just in case).

If you do not use Autoconf, you can define the preprocessor symbol @code{_FILE_OFFSET_BITS} to 64 @emph{before} including any header files, for example by specifying the option @code{-D_FILE_OFFSET_BITS=64} on the compiler command line. You will also want to define the preprocessor symbol @code{LARGEFILE_SOURCE} to 1 in this case, to take advantage of some new interfaces.

If you do not want to do either of the above, you probably know enough about the issue to invent your own solution. Just keep in mind that the @acronym{GPGME} header file expects that largefile support is enabled, if it is available. In particular, we do not support dual mode (@code{_LARGEFILE64_SOURCE}).

@node Using Automake
@section Using Automake
@cindex automake
@cindex autoconf

It is much easier if you use GNU Automake instead of writing your own Makefiles. If you do that you do not have to worry about finding and invoking the @command{gpgme-config} script at all. @acronym{GPGME} provides an extension to Automake that does all the work for you.

@c A simple macro for optional variables.
@macro ovar{varname}
@r{[}@var{\varname\}@r{]}
@end
macro
@defmac AM_PATH_GPGME (@ovar{minimum-version}, @ovar{action-if-found}, @ovar{action-if-not-found})
@defmacx AM_PATH_GPGME_PTH (@ovar{minimum-version}, @ovar{action-if-found}, @ovar{action-if-not-found})
@defmacx AM_PATH_GPGME_PTHREAD (@ovar{minimum-version}, @ovar{action-if-found}, @ovar{action-if-not-found})
Check whether @acronym{GPGME} (at least version @var{minimum-version}, if given) exists on the host system. If it is found, execute @var{action-if-found}, otherwise do @var{action-if-not-found}, if given.

Additionally, the function defines @code{GPGME_CFLAGS} to the flags needed for compilation of the program to find the @file{gpgme.h} header file, and @code{GPGME_LIBS} to the linker flags needed to link the program to the @acronym{GPGME} library. If the used helper script does not match the target type you are building for a warning is printed and the string @code{libgcrypt} is appended to the variable @code{gpg_config_script_warn}.

@code{AM_PATH_GPGME_PTH}
checks for the version of @acronym{GPGME} that can be used with GNU Pth, and defines @code{GPGME_PTH_CFLAGS} and @code{GPGME_PTH_LIBS}.

@code{AM_PATH_GPGME_PTHREAD} checks for the version of @acronym{GPGME} that can be used with the native pthread implementation, and defines @code{GPGME_PTHREAD_CFLAGS} and @code{GPGME_PTHREAD_LIBS}. Since

version 1.8.0 this is no longer required to GPGME_PTHREAD as
@acronym{GPGME} itself is thread safe.

This macro searches for @command{gpgme-config} along the PATH. If
you are cross-compiling, it is useful to set the environment variable
@code{SYSROOT} to the top directory of your target. The macro will
then first look for the helper program in the @file{bin} directory
below that top directory. An absolute directory name must be used for
@code{SYSROOT}. Finally, if the configure command line option
@code{--with-gpgme-prefix} is used, only its value is used for the top
directory below which the helper script is expected.

@end defmac

You can
use the defined Autoconf variables like this in your
@file{Makefile.am}:

@example
AM_CPPFLAGS = $(GPGME_CFLAGS)
LDADD = $(GPGME_LIBS)
@end example

@node Using Libtool
@section Using Libtool
@cindex libtool

The easiest way is to just use GNU Libtool. If you use libtool, and
link to @code{libgpgme.la}, @code{libgpgme-pth.la} or
@code{libgpgme-pthread.la} respectively, everything will be done
automatically by Libtool.

@node Library Version Check
@section Library Version Check
@cindex version check, of the library

@deftypefun {const char *} gpgme_check_version (@w{const char *@var{required_version}})
The function @code{gpgme_check_version} has four purposes. It can be
used to retrieve the version number of the library. In addition it
can verify that the version number is higher than a certain required
version number. In either case, the function initializes some
sub-systems, and for this reason alone it must be invoked early in
your program, before you make use of the other functions
in
@acronym{GPGME}. The last purpose is to run selftests.

As a side effect for W32 based systems, the socket layer will get
initialized.

If @var{required_version} is @code{NULL}, the function returns a
pointer to a statically allocated string containing the version number
of the library.

If @var{required_version} is not @code{NULL}, it should point to a
string containing a version number, and the function checks that the
version of the library is at least as high as the version number
provided. In this case, the function returns a pointer to a
statically allocated string containing the version number of the
library. If @var{REQUIRED_VERSION} is not a valid version number, or
if the version requirement is not met, the function returns
@code{NULL}.

If you use a version of a library that is backwards compatible with
older releases, but contains additional interfaces which your program
uses, this function provides a run-time check if the necessary
features are provided by the
installed version of the library.

If a selftest fails, the function may still succeed. Selftest errors
are returned later when invoking @code{gpgme_new} or
@code{gpgme-data_new}, so that a detailed error code can be returned
(historically, @code{gpgme_check_version} does not return a detailed
error code).
@end deftypefun

@deftypefun {int} gpgme_set_global_flag @
(@w{const char *@var{name}}, @
@w{const char *@var{value}})

@since{1.4.0}

On some systems it is not easy to set environment variables and thus
hard to use @acronym{GPGME}'s internal trace facility for debugging.
This function has been introduced as an alternative way to enable
debugging and for a couple of other rarely used tweaks. It is
important to assure that only one thread accesses @acronym{GPGME}
functions between a call to this function and after the return from
the call to @code{gpgme_check_version}.

All currently supported features require that this function is called
as early as possible

--- even before @code{gpgme_check_version}. The
features are identified by the following values for @var{name}:

@table @code
@item debug
To enable debugging use the string ``debug'' for @var{name} and
@var{value} identical to the value used with the environment variable
@code{GPGME_DEBUG}.

@item disable-gpgconf
Using this feature with any @var{value} disables the detection of the
gpgconf program and thus forces GPGME to fallback into the simple
OpenPGP only mode. It may be used to force the use of GnuPG-1 on
systems which have both GPG versions installed. Note that in general
the use of @code{gpgme_set_engine_info} is a better way to select a
specific engine version.

@item gpgconf-name
@itemx gpg-name
Set the name of the gpgconf respective gpg binary. The defaults are
@code{GNU/GnuPG/gpgconf} and @code{GNU/GnuPG/gpg}. Under Unix the
leading directory part is ignored. Under Windows the leading
directory part is used as the default installation directory; the
@code{.exe} suffix
is added by GPGME. Use forward slashed even under
Windows.

@item require-gnupg
Set the minimum version of the required GnuPG engine. If that version
is not met, GPGME fails early instead of trying to use the existent
version. The given version must be a string with major, minor, and
micro number. Example: "2.1.0".

@item w32-inst-dir
On Windows GPGME needs to know its installation directory to find its
spawn helper. This is in general no problem because a DLL has this
information. Some applications however link statically to GPGME and
thus GPGME can only figure out the installation directory of this
application which may be wrong in certain cases. By supplying an
installation directory as value to this flag, GPGME will assume that
that directory is the installation directory. This flag has no effect
on non-Windows platforms.

@end table

This function returns @code{0} on success. In contrast to other
functions the non-zero return value on failure does not convey any
error

code.  For setting ``debug'' the only possible error cause is an
out of memory condition; which would exhibit itself later anyway.
Thus the return value may be ignored.
@end deftypefun

After initializing @acronym{GPGME}, you should set the locale
information to the locale required for your output terminal.  This
locale information is needed for example for the curses and Gtk
pinentry.  Here is an example of a complete initialization:

```
@example
#include <locale.h>
#include <gpgme.h>

void
init_gpgme (void)
@{
 /* Initialize the locale environment.  */
 setlocale (LC_ALL, "");
 gpgme_check_version (NULL);
 gpgme_set_locale (NULL, LC_CTYPE, setlocale (LC_CTYPE, NULL));
#ifdef LC_MESSAGES
 gpgme_set_locale (NULL, LC_MESSAGES, setlocale (LC_MESSAGES, NULL));
#endif
@}
@end example
```

Note that you are highly recommended to initialize the locale settings
like this.  @acronym{GPGME} can not do this for you because it would
not be thread safe.  The conditional on LC_MESSAGES is only necessary
for
 portability to W32 systems.

@node Signal Handling
@section Signal Handling
@cindex signals
@cindex signal handling

The @acronym{GPGME} library communicates with child processes (the
crypto engines).  If a child process dies unexpectedly, for example
due to a bug, or system problem, a @code{SIGPIPE} signal will be
delivered to the application.  The default action is to abort the
program.  To protect against this, @code{gpgme_check_version} sets the
@code{SIGPIPE} signal action to @code{SIG_IGN}, which means that the
signal will be ignored.

@acronym{GPGME} will only do that if the signal action for
@code{SIGPIPE} is @code{SIG_DEF} at the time
@code{gpgme_check_version} is called. If it is something different,
@code{GPGME} will take no action.

This means that if your application does not install any signal
handler for @code{SIGPIPE}, you don't need to take any precautions.
If you do install a signal handler for @code{SIGPIPE}, you must be
prepared to handle any @code{SIGPIPE}
events that occur due to
@acronym{GPGME} writing to a defunct pipe. Furthermore, if your
application is multi-threaded, and you install a signal action for
@code{SIGPIPE}, you must make sure you do this either before
@code{gpgme_check_version} is called or afterwards.

@node Multi-Threading
@section Multi-Threading
@cindex thread-safeness
@cindex multi-threading

The @acronym{GPGME} library is mostly thread-safe, and can be used
in a multi-threaded environment but there are some requirements
for multi-threaded use:

@itemize @bullet
@item
The function @code{gpgme_check_version} must be called before any
other function in the library, because it initializes the thread
support subsystem in @acronym{GPGME}. To achieve this in
multi-threaded programs, you must synchronize the memory with respect
to other threads that also want to use @acronym{GPGME}. For this, it
is sufficient to call @code{gpgme_check_version} before creating the
other threads using @acronym{GPGME}@footnote{At least
this is true for
POSIX threads, as @code{pthread_create} is a function that
synchronizes memory with respects to other threads. There are many
functions which have this property, a complete list can be found in
POSIX, IEEE Std 1003.1-2003, Base Definitions, Issue 6, in the
definition of the term ``Memory Synchronization''. For other thread
packages other, more relaxed or more strict rules may apply.}.

@item
Any @code{gpgme_data_t} and @code{gpgme_ctx_t} object must only be
accessed by one thread at a time. If multiple threads want to deal
with the same object, the caller has to make sure that operations on
that object are fully synchronized.

@item
Only one thread at any time is allowed to call @code{gpgme_wait}. If
multiple threads call this function, the caller must make sure that
all invocations are fully synchronized. It is safe to start
asynchronous operations while a thread is running in gpgme_wait.

@item
The function @code{gpgme_strerror} is not thread safe. You have
to
use @code{gpgme_strerror_r} instead.
@end itemize

@node Protocols and Engines
@chapter Protocols and Engines
@cindex protocol
@cindex engine
@cindex crypto engine
@cindex backend
@cindex crypto backend

@acronym{GPGME} supports several cryptographic protocols, however, it
does not implement them. Rather it uses backends (also called
engines) which implement the protocol. @acronym{GPGME} uses
inter-process communication to pass data back and forth between the
application and the backend, but the details of the communication
protocol and invocation of the backend is completely hidden by the
interface. All complexity is handled by @acronym{GPGME}. Where an
exchange of information between the application and the backend is
necessary, @acronym{GPGME} provides the necessary callback function
hooks and further interfaces.

@deftp {Data type} {enum gpgme_protocol_t}
@tindex gpgme_protocol_t
The @code{gpgme_protocol_t} type specifies the set of possible protocol
values that are supported
by @acronym{GPGME}. The following protocols
are supported:

@table @code
@item GPGME_PROTOCOL_OpenPGP
@itemx GPGME_PROTOCOL_OPENPGP
This specifies the OpenPGP protocol.

@item GPGME_PROTOCOL_CMS
This specifies the Cryptographic Message Syntax.

@item GPGME_PROTOCOL_GPGCONF

Under development.  Please ask on @email{gnupg-devel@@gnupg.org} for help.

@item GPGME_PROTOCOL_ASSUAN
@since{1.2.0}

This specifies the raw Assuan protocol.

@item GPGME_PROTOCOL_G13
@since{1.3.0}

Under development.  Please ask on @email{gnupg-devel@@gnupg.org} for help.

@item GPGME_PROTOCOL_UISERVER
Under development.  Please ask on @email{gnupg-devel@@gnupg.org} for help.

@item GPGME_PROTOCOL_SPAWN
@since{1.5.0}

Special protocol for use with @code{gpgme_op_spawn}.

@item GPGME_PROTOCOL_UNKNOWN
Reserved for future extension.  You may use this to indicate that the
used protocol is not known to the application.  Currently,
@acronym{GPGME} does not accept this value in any operation, though,
except for @code{gpgme_get_protocol_name}.
@end
 table
@end deftp

@deftypefun {const char *} gpgme_get_protocol_name (@w{gpgme_protocol_t @var{protocol}})
The function @code{gpgme_get_protocol_name} returns a statically
allocated string describing the protocol @var{protocol}, or
@code{NULL} if the protocol number is not valid.
@end deftypefun

@menu
* Engine Version Check::  Verifying the engine version.
* Engine Information::  Obtaining more information about the engines.
* Engine Configuration::  Changing the engine configuration.
* OpenPGP::  Support for the OpenPGP protocol.
* Cryptographic Message Syntax::  Support for the CMS.
* Assuan::  Support for the raw Assuan protocol.
@end menu

@node Engine Version Check
@section Engine Version Check

@cindex version check, of the engines

@deftypefun @w{const char *} gpgme_get_dirinfo (@w{cons char *@var{what}})
@since{1.5.0}

The function @code{gpgme_get_dirinfo} returns a statically
allocated
string with the value associated to @var{what}. The returned values
are the defaults and won't change even after
@code{gpgme_set_engine_info} has been used to configure a different
engine. @code{NULL} is returned if no value is available. Commonly
supported values for @var{what} are:

@table @code
@item homedir
Return the default home directory.

@item sysconfdir
Return the name of the system configuration directory

@item bindir
Return the name of the directory with GnuPG program files.

@item libdir
Return the name of the directory with GnuPG related library files.

@item libexecdir
Return the name of the directory with GnuPG helper program files.

@item datadir
Return the name of the directory with GnuPG shared data.

@item localedir
Return the name of the directory with GnuPG locale data.

@item agent-socket
Return the name of the socket to connect to the gpg-agent.

@item agent-ssh-socket
Return the name of the socket to connect to the ssh-agent component of
gpg-agent.

@item
dirmngr-socket
Return the name of the socket to connect to the dirmngr.

@item uiserver-socket
Return the name of the socket to connect to the user interface server.

@item gpgconf-name
Return the file name of the engine configuration tool.

@item gpg-name
Return the file name of the OpenPGP engine.

@item gpgsm-name
Return the file name of the CMS engine.

@item g13-name
Return the name of the file container encryption engine.

@item gpg-wks-client-name
Return the name of the Web Key Service tool.

@end table

@end deftypefun

@deftypefun gpgme_error_t gpgme_engine_check_version (@w{gpgme_protocol_t @var{protocol}})
The function @code{gpgme_engine_check_version} verifies that the
engine implementing the protocol @var{PROTOCOL} is installed in the
expected path and meets the version requirement of @acronym{GPGME}.

This function returns the error code @code{GPG_ERR_NO_ERROR} if the
engine is available and @code{GPG_ERR_INV_ENGINE} if it is not.
@end deftypefun

@node Engine
Information
@section Engine Information
@cindex engine, information about

@deftp {Data type} {gpgme_engine_info_t}
@tindex gpgme_protocol_t
The @code{gpgme_engine_info_t} type specifies a pointer to a structure
describing a crypto engine. The structure contains the following
elements:

@table @code
@item gpgme_engine_info_t next
This is a pointer to the next engine info structure in the linked
list, or @code{NULL} if this is the last element.

@item gpgme_protocol_t protocol

This is the protocol for which the crypto engine is used.  You can
convert this to a string with @code{gpgme_get_protocol_name} for
printing.

@item const char *file_name
This is a string holding the file name of the executable of the crypto
engine.  Currently, it is never @code{NULL}, but using @code{NULL} is
reserved for future use, so always check before you use it.

@item const char *home_dir
This is a string holding the directory name of the crypto engine's
configuration directory.  If it is @code{NULL}, then
 the default
directory is used.  See @code{gpgme_get_dirinfo} on how to get the
default directory.

@item const char *version
This is a string containing the version number of the crypto engine.
It might be @code{NULL} if the version number can not be determined,
for example because the executable doesn't exist or is invalid.

@item const char *req_version
This is a string containing the minimum required version number of the
crypto engine for @acronym{GPGME} to work correctly.  This is the
version number that @code{gpgme_engine_check_version} verifies
against.  Currently, it is never @code{NULL}, but using @code{NULL} is
reserved for future use, so always check before you use it.
@end table
@end deftp

@deftypefun gpgme_error_t gpgme_get_engine_info (@w{gpgme_engine_info_t *@var{info}})
The function @code{gpgme_get_engine_info} returns a linked list of
engine info structures in @var{info}.  Each info structure describes
the defaults of one configured backend.

The memory for the info
 structures is allocated the first time this
function is invoked, and must not be freed by the caller.

This function returns the error code @code{GPG_ERR_NO_ERROR} if
successful, and a system error if the memory could not be allocated.
@end deftypefun

Here is an example how you can provide more diagnostics if you receive
an error message which indicates that the crypto engine is invalid.

@example
gpgme_ctx_t ctx;

```
gpgme_error_t err;

[...]

if (gpgme_err_code (err) == GPG_ERR_INV_ENGINE)
 @{
   gpgme_engine_info_t info;
   err = gpgme_get_engine_info (&info);
   if (!err)
     @{
       while (info && info->protocol != gpgme_get_protocol (ctx))
         info = info->next;
       if (!info)
         fprintf (stderr, "GPGME compiled without support for protocol %s",
                  gpgme_get_protocol_name (info->protocol));
       else if (info->file_name && !info->version)
         fprintf (stderr, "Engine %s not installed properly",
                  info->file_name);
        else if (info->file_name && info->version && info->req_version)
         fprintf (stderr, "Engine %s version %s installed, "
                  "but at least version %s required", info->file_name,
                  info->version, info->req_version);
       else
         fprintf (stderr, "Unknown problem with engine for protocol %s",
                  gpgme_get_protocol_name (info->protocol));
     @}
 @}
@end example


@node Engine Configuration
@section Engine Configuration
@cindex engine, configuration of
@cindex configuration of crypto backend

You can change the configuration of a backend engine, and thus change
the executable program and configuration directory to be used.  You
can make these changes the default or set them for some contexts
individually.

@deftypefun gpgme_error_t gpgme_set_engine_info (@w{gpgme_protocol_t @var{proto}}, @w{const char
*@var{file_name}}, @w{const char *@var{home_dir}})
@since{1.1.0}

The function @code{gpgme_set_engine_info} changes
 the default
configuration of the crypto engine implementing the protocol
@var{proto}.
```

@var{file_name} is the file name of the executable program
implementing this protocol, and @var{home_dir} is the directory name
of the configuration directory for this crypto engine.  If
@var{home_dir} is @code{NULL}, the engine's default will be used.

The new defaults are not applied to already created GPGME contexts.

This function returns the error code @code{GPG_ERR_NO_ERROR} if
successful, or an error code on failure.
@end deftypefun

The functions @code{gpgme_ctx_get_engine_info} and
@code{gpgme_ctx_set_engine_info} can be used to change the engine
configuration per context.  @xref{Crypto Engine}.

@node OpenPGP
@section OpenPGP
@cindex OpenPGP
@cindex GnuPG
@cindex protocol, GnuPG
@cindex engine, GnuPG

OpenPGP is implemented by GnuPG, the @acronym{GNU} Privacy Guard.
This is the first protocol that was supported by @acronym{GPGME}.

The OpenPGP protocol is specified by @code{GPGME_PROTOCOL_OpenPGP}.

@node
 Cryptographic Message Syntax
@section Cryptographic Message Syntax
@cindex CMS
@cindex cryptographic message syntax
@cindex GpgSM
@cindex protocol, CMS
@cindex engine, GpgSM
@cindex S/MIME
@cindex protocol, S/MIME

@acronym{CMS} is implemented by GpgSM, the S/MIME implementation for
GnuPG.

The @acronym{CMS} protocol is specified by @code{GPGME_PROTOCOL_CMS}.

@node Assuan

@section Assuan
@cindex ASSUAN
@cindex protocol, ASSUAN
@cindex engine, ASSUAN

Assuan is the RPC library used by the various @acronym{GnuPG}
components.  The Assuan protocol allows one to talk to arbitrary
Assuan servers using @acronym{GPGME}.  @xref{Using the Assuan
protocol}.

The ASSUAN protocol is specified by @code{GPGME_PROTOCOL_ASSUAN}.

@node Algorithms
@chapter Algorithms
@cindex algorithms

The crypto backends support a variety of algorithms used in public key
cryptography.@footnote{Some engines also provide symmetric only
encryption; see the description of the encryption function on
 how to use
this.}  The following sections list the identifiers used to denote such
an algorithm.

@menu
* Public Key Algorithms::  A list of all public key algorithms.
* Hash Algorithms::  A list of all hash algorithms.
@end menu

@node Public Key Algorithms
@section Public Key Algorithms
@cindex algorithms, public key
@cindex public key algorithms

Public key algorithms are used for encryption, decryption, signing and
verification of signatures.

@deftp {Data type} {enum gpgme_pubkey_algo_t}
@tindex gpgme_pubkey_algo_t
The @code{gpgme_pubkey_algo_t} type specifies the set of all public key
algorithms that are supported by @acronym{GPGME}.  Possible values
are:

@table @code
@item GPGME_PK_RSA
This value indicates the RSA (Rivest, Shamir, Adleman) algorithm.

@item GPGME_PK_RSA_E
Deprecated.  This value indicates the RSA (Rivest, Shamir, Adleman)
algorithm for encryption and decryption only.

@item GPGME_PK_RSA_S
Deprecated.  This value indicates the RSA (Rivest, Shamir,
 Adleman)
algorithm for signing and verification only.

@item GPGME_PK_DSA
This value indicates DSA, the Digital Signature Algorithm.

@item GPGME_PK_ELG
This value indicates ElGamal.

@item GPGME_PK_ELG_E
This value also indicates ElGamal and is used specifically in GnuPG.

@item GPGME_PK_ECC
@since{1.5.0}

This value is a generic indicator for ellipic curve algorithms.

@item GPGME_PK_ECDSA
@since{1.3.0}

This value indicates ECDSA, the Elliptic Curve Digital Signature
Algorithm as defined by FIPS 186-2 and RFC-6637.

@item GPGME_PK_ECDH
@since{1.3.0}

This value indicates ECDH, the Eliptic Curve Diffie-Hellmann
encryption algorithm as defined by RFC-6637.

@item GPGME_PK_EDDSA
@since{1.7.0}

This value indicates the EdDSA algorithm.

@end table
@end deftp

@deftypefun {const char *} gpgme_pubkey_algo_name (@w{gpgme_pubkey_algo_t @var{algo}})
The function @code{gpgme_pubkey_algo_name} returns a pointer to a
statically allocated string containing a description of the public key
algorithm

@var{algo}.  This string can be used to output the name of
the public key algorithm to the user.

If @var{algo} is not a valid public key algorithm, @code{NULL} is
returned.
@end deftypefun

@deftypefun {char *} gpgme_pubkey_algo_string (@w{gpgme_subkey_t @var{key}})
@since{1.7.0}

The function @code{gpgme_pubkey_algo_string} is a convenience function
to build and return an algorithm string in the same way GnuPG does
(e.g. ``rsa2048'' or ``ed25519'').  The caller must free the result
using @code{gpgme_free}.  On error (e.g. invalid argument or memory
exhausted), the function returns NULL and sets @code{ERRNO}.
@end deftypefun

@node Hash Algorithms
@section Hash Algorithms
@cindex algorithms, hash
@cindex algorithms, message digest
@cindex hash algorithms
@cindex message digest algorithms

Hash (message digest) algorithms are used to compress a long message
to make it suitable for public key cryptography.

@deftp {Data type} {enum gpgme_hash_algo_t}
@tindex gpgme_hash_algo_t
The
@code{gpgme_hash_algo_t} type specifies the set of all hash algorithms
that are supported by @acronym{GPGME}.  Possible values are:

@table @code
@item GPGME_MD_MD5
@item GPGME_MD_SHA1
@item GPGME_MD_RMD160
@item GPGME_MD_MD2
@item GPGME_MD_TIGER
@item GPGME_MD_HAVAL
@item GPGME_MD_SHA256
@item GPGME_MD_SHA384
@item GPGME_MD_SHA512
@item GPGME_MD_SHA224
@since{1.5.0}

@item GPGME_MD_MD4

@item GPGME_MD_CRC32
@item GPGME_MD_CRC32_RFC1510
@item GPGME_MD_CRC24_RFC2440
@end table
@end deftp

@deftypefun {const char *} gpgme_hash_algo_name (@w{gpgme_hash_algo_t @var{algo}})
The function @code{gpgme_hash_algo_name} returns a pointer to a
statically allocated string containing a description of the hash
algorithm @var{algo}.  This string can be used to output the name of
the hash algorithm to the user.

If @var{algo} is not a valid hash algorithm, @code{NULL} is returned.
@end deftypefun

@node Error Handling
@chapter Error Handling
@cindex error handling

Many functions in @acronym{GPGME}
 can return an error if they fail.
For this reason, the application should always catch the error
condition and take appropriate measures, for example by releasing the
resources and passing the error up to the caller, or by displaying a
descriptive message to the user and cancelling the operation.

Some error values do not indicate a system error or an error in the
operation, but the result of an operation that failed properly.  For
example, if you try to decrypt a tempered message, the decryption will
fail.  Another error value actually means that the end of a data
buffer or list has been reached.  The following descriptions explain
for many error codes what they mean usually.  Some error values have
specific meanings if returned by a certain functions.  Such cases are
described in the documentation of those functions.

@acronym{GPGME} uses the @code{libgpg-error} library.  This allows to
share the error codes with other components of the GnuPG system, and
thus pass error values transparently
 from the crypto engine, or some
helper application of the crypto engine, to the user.  This way no
information is lost.  As a consequence, @acronym{GPGME} does not use
its own identifiers for error codes, but uses those provided by
@code{libgpg-error}.  They usually start with @code{GPG_ERR_}.

However, @acronym{GPGME} does provide aliases for the functions
defined in libgpg-error, which might be preferred for name space
consistency.

```
@menu
* Error Values::            The error value and what it means.
* Error Sources::            A list of important error sources.
* Error Codes::             A list of important error codes.
* Error Strings::           How to get a descriptive string from a value.
@end menu


@node Error Values
@section Error Values
@cindex error values
@cindex error codes
@cindex error sources

@deftp {Data type} {gpgme_err_code_t}
The @code{gpgme_err_code_t} type is an alias for the @code{libgpg-error}
type @code{gpg_err_code_t}.  The
 error code indicates the type of an
error, or the reason why an operation failed.

A list of important error codes can be found in the next section.
@end deftp

@deftp {Data type} {gpgme_err_source_t}
The @code{gpgme_err_source_t} type is an alias for the
@code{libgpg-error} type @code{gpg_err_source_t}.  The error source
has not a precisely defined meaning.  Sometimes it is the place where
the error happened, sometimes it is the place where an error was
encoded into an error value.  Usually the error source will give an
indication to where to look for the problem.  This is not always true,
but it is attempted to achieve this goal.

A list of important error sources can be found in the next section.
@end deftp

@deftp {Data type} {gpgme_error_t}
The @code{gpgme_error_t} type is an alias for the @code{libgpg-error}
type @code{gpg_error_t}.  An error value like this has always two
components, an error code and an error source.  Both together form the
error value.

Thus, the error value
 can not be directly compared against an error
code, but the accessor functions described below must be used.
However, it is guaranteed that only 0 is used to indicate success
(@code{GPG_ERR_NO_ERROR}), and that in this case all other parts of
the error value are set to 0, too.
```

Note that in @acronym{GPGME}, the error source is used purely for
diagnostical purposes.  Only the error code should be checked to test
for a certain outcome of a function.  The manual only documents the
error code part of an error value.  The error source is left
unspecified and might be anything.
@end deftp

@deftypefun {static inline gpgme_err_code_t} gpgme_err_code (@w{gpgme_error_t @var{err}})
The static inline function @code{gpgme_err_code} returns the
@code{gpgme_err_code_t} component of the error value @var{err}.  This
function must be used to extract the error code from an error value in
order to compare it with the @code{GPG_ERR_*} error code macros.
@end deftypefun

@deftypefun {static inline gpgme_err_source_t}
 gpgme_err_source (@w{gpgme_error_t @var{err}})
The static inline function @code{gpgme_err_source} returns the
@code{gpgme_err_source_t} component of the error value @var{err}.  This
function must be used to extract the error source from an error value in
order to compare it with the @code{GPG_ERR_SOURCE_*} error source macros.
@end deftypefun

@deftypefun {static inline gpgme_error_t} gpgme_err_make (@w{gpgme_err_source_t @var{source}},
@w{gpgme_err_code_t @var{code}})
The static inline function @code{gpgme_err_make} returns the error
value consisting of the error source @var{source} and the error code
@var{code}.

This function can be used in callback functions to construct an error
value to return it to the library.
@end deftypefun

@deftypefun {static inline gpgme_error_t} gpgme_error (@w{gpgme_err_code_t @var{code}})
The static inline function @code{gpgme_error} returns the error value
consisting of the default error source and the error code @var{code}.

For @acronym{GPGME}
 applications, the default error source is
@code{GPG_ERR_SOURCE_USER_1}.  You can define
@code{GPGME_ERR_SOURCE_DEFAULT} before including @file{gpgme.h} to
change this default.

This function can be used in callback functions to construct an error
value to return it to the library.
@end deftypefun

The @code{libgpg-error} library provides error codes for all system

error numbers it knows about.  If @var{err} is an unknown error
number, the error code @code{GPG_ERR_UNKNOWN_ERRNO} is used.  The
following functions can be used to construct error values from system
errnor numbers.

@deftypefun {gpgme_error_t} gpgme_err_make_from_errno (@w{gpgme_err_source_t @var{source}}, @w{int @var{err}})
The function @code{gpgme_err_make_from_errno} is like
@code{gpgme_err_make}, but it takes a system error like @code{errno}
instead of a @code{gpgme_err_code_t} error code.
@end deftypefun

@deftypefun {gpgme_error_t} gpgme_error_from_errno (@w{int @var{err}})
The function @code{gpgme_error_from_errno}
 is like @code{gpgme_error},
but it takes a system error like @code{errno} instead of a
@code{gpgme_err_code_t} error code.
@end deftypefun

Sometimes you might want to map system error numbers to error codes
directly, or map an error code representing a system error back to the
system error number.  The following functions can be used to do that.

@deftypefun {gpgme_err_code_t} gpgme_err_code_from_errno (@w{int @var{err}})
The function @code{gpgme_err_code_from_errno} returns the error code
for the system error @var{err}.  If @var{err} is not a known system
error, the function returns @code{GPG_ERR_UNKNOWN_ERRNO}.
@end deftypefun

@deftypefun {int} gpgme_err_code_to_errno (@w{gpgme_err_code_t @var{err}})
The function @code{gpgme_err_code_to_errno} returns the system error
for the error code @var{err}.  If @var{err} is not an error code
representing a system error, or if this system error is not defined on
this system, the function returns @code{0}.
@end deftypefun

@node Error Sources
@section
 Error Sources
@cindex error codes, list of

The library @code{libgpg-error} defines an error source for every
component of the GnuPG system.  The error source part of an error
value is not well defined.  As such it is mainly useful to improve the
diagnostic error message for the user.

If the error code part of an error value is @code{0}, the whole error

value will be @code{0}.  In this case the error source part is of course @code{GPG_ERR_SOURCE_UNKNOWN}.

The list of error sources that might occur in applications using @acronym{GPGME} is:

@table @code
@item GPG_ERR_SOURCE_UNKNOWN
The error source is not known.  The value of this error source is @code{0}.

@item GPG_ERR_SOURCE_GPGME
The error source is @acronym{GPGME} itself.  This is the default for errors that occur in the @acronym{GPGME} library.

@item GPG_ERR_SOURCE_GPG
The error source is GnuPG, which is the crypto engine used for the OpenPGP protocol.

@item GPG_ERR_SOURCE_GPGSM
The error source is GPGSM, which is
 the crypto engine used for the
CMS protocol.

@item GPG_ERR_SOURCE_GCRYPT
The error source is @code{libgcrypt}, which is used by crypto engines to perform cryptographic operations.

@item GPG_ERR_SOURCE_GPGAGENT
The error source is @command{gpg-agent}, which is used by crypto engines to perform operations with the secret key.

@item GPG_ERR_SOURCE_PINENTRY
The error source is @command{pinentry}, which is used by @command{gpg-agent} to query the passphrase to unlock a secret key.

@item GPG_ERR_SOURCE_SCD
The error source is the SmartCard Daemon, which is used by @command{gpg-agent} to delegate operations with the secret key to a SmartCard.

@item GPG_ERR_SOURCE_KEYBOX
The error source is @code{libkbx}, a library used by the crypto engines to manage local keyrings.

@item GPG_ERR_SOURCE_USER_1
@item GPG_ERR_SOURCE_USER_2
@item GPG_ERR_SOURCE_USER_3

@item GPG_ERR_SOURCE_USER_4
These error sources are not used by any GnuPG component and can be
used by other software.  For example, applications
 using
@acronym{GPGME} can use them to mark error values coming from callback
handlers.  Thus @code{GPG_ERR_SOURCE_USER_1} is the default for errors
created with @code{gpgme_error} and @code{gpgme_error_from_errno},
unless you define @code{GPGME_ERR_SOURCE_DEFAULT} before including
@file{gpgme.h}.
@end table

@node Error Codes
@section Error Codes
@cindex error codes, list of

The library @code{libgpg-error} defines many error values.  Most of
them are not used by @code{GPGME} directly, but might be returned by
@acronym{GPGME} because it received them from the crypto engine.  The
below list only includes such error codes that have a specific meaning
in @code{GPGME}, or which are so common that you should know about
them.

@table @code
@item GPG_ERR_EOF
This value indicates the end of a list, buffer or file.

@item GPG_ERR_NO_ERROR
This value indicates success.  The value of this error code is
@code{0}.  Also, it is guaranteed that an error value made from the
error code @code{0}
 will be @code{0} itself (as a whole).  This means
that the error source information is lost for this error code,
however, as this error code indicates that no error occurred, this is
generally not a problem.

@item GPG_ERR_GENERAL
This value means that something went wrong, but either there is not
enough information about the problem to return a more useful error
value, or there is no separate error value for this type of problem.

@item GPG_ERR_ENOMEM
This value means that an out-of-memory condition occurred.

@item GPG_ERR_E...
System errors are mapped to GPG_ERR_FOO where FOO is the symbol for
the system error.

@item GPG_ERR_INV_VALUE
This value means that some user provided data was out of range. This can also refer to objects. For example, if an empty @code{gpgme_data_t} object was expected, but one containing data was provided, this error value is returned.

@item GPG_ERR_UNUSABLE_PUBKEY
This value means that some recipients for a message were invalid.

@item GPG_ERR_UNUSABLE_SECKEY
This value means that some signers were invalid.

@item GPG_ERR_NO_DATA
This value means that a @code{gpgme_data_t} object which was expected to have content was found empty.

@item GPG_ERR_CONFLICT
This value means that a conflict of some sort occurred.

@item GPG_ERR_NOT_IMPLEMENTED
This value indicates that the specific function (or operation) is not implemented. This error should never happen. It can only occur if you use certain values or configuration options which do not work, but for which we think that they should work at some later time.

@item GPG_ERR_DECRYPT_FAILED
This value indicates that a decryption operation was unsuccessful.

@item GPG_ERR_BAD_PASSPHRASE
This value means that the user did not provide a correct passphrase when requested.

@item GPG_ERR_CANCELED
This value means that the operation was canceled.

@item GPG_ERR_INV_ENGINE
This value means that the engine that implements the desired protocol is currently not available. This can either be because the sources were configured to exclude support for this engine, or because the engine is not installed properly.

@item GPG_ERR_AMBIGUOUS_NAME
This value indicates that a user ID or other specifier did not specify a unique key.

@item GPG_ERR_WRONG_KEY_USAGE

This value indicates that a key is not used appropriately.

@item GPG_ERR_CERT_REVOKED
This value indicates that a key signature was revoced.

@item GPG_ERR_CERT_EXPIRED
This value indicates that a key signature expired.

@item GPG_ERR_NO_CRL_KNOWN
This value indicates that no certificate revocation list is known for
the certificate.

@item GPG_ERR_NO_POLICY_MATCH
This value indicates that a policy issue occurred.

@item GPG_ERR_NO_SECKEY
This value indicates that no secret key for the user ID is available.

@item GPG_ERR_MISSING_CERT
This value indicates that a key could not be imported because the
issuer certificate is missing.

@item GPG_ERR_BAD_CERT_CHAIN
This value indicates that a key could not be imported because its
certificate
chain is not good, for example it could be too long.

@item GPG_ERR_UNSUPPORTED_ALGORITHM
This value means a verification failed because the cryptographic
algorithm is not supported by the crypto backend.

@item GPG_ERR_BAD_SIGNATURE
This value means a verification failed because the signature is bad.

@item GPG_ERR_NO_PUBKEY
This value means a verification failed because the public key is not
available.

@item GPG_ERR_USER_1
@item GPG_ERR_USER_2
@item ...
@item GPG_ERR_USER_16
These error codes are not used by any GnuPG component and can be
freely used by other software. Applications using @acronym{GPGME}
might use them to mark specific errors returned by callback handlers
if no suitable error codes (including the system errors) for
these errors exist already.
@end table

@node Error Strings
@section Error Strings
@cindex error values, printing of
@cindex error codes, printing of
@cindex error sources, printing of
@cindex error strings

@deftypefun {const char *} gpgme_strerror
 (@w{gpgme_error_t @var{err}})
The function @code{gpgme_strerror} returns a pointer to a statically
allocated string containing a description of the error code contained
in the error value @var{err}.  This string can be used to output a
diagnostic message to the user.

This function is not thread safe.  Use @code{gpgme_strerror_r} in
multi-threaded programs.
@end deftypefun

@deftypefun {int} gpgme_strerror_r (@w{gpgme_error_t @var{err}}, @w{char *@var{buf}}, @w{size_t @var{buflen}})
The function @code{gpgme_strerror_r} returns the error string for
@var{err} in the user-supplied buffer @var{buf} of size @var{buflen}.
This function is, in contrast to @code{gpgme_strerror}, thread-safe if
a thread-safe @code{strerror_r} function is provided by the system.
If the function succeeds, 0 is returned and @var{buf} contains the
string describing the error.  If the buffer was not large enough,
ERANGE is returned and @var{buf} contains as much of the beginning of
the error string as fits into
 the buffer.
@end deftypefun

@deftypefun {const char *} gpgme_strsource (@w{gpgme_error_t @var{err}})
The function @code{gpgme_strerror} returns a pointer to a statically
allocated string containing a description of the error source
contained in the error value @var{err}.  This string can be used to
output a diagnostic message to the user.
@end deftypefun

The following example illustrates the use of @code{gpgme_strerror}:

@example
gpgme_ctx_t ctx;
gpgme_error_t err = gpgme_new (&ctx);
if (err)

```
 @{
   fprintf (stderr, "%s: creating GpgME context failed: %s: %s\n",
            argv[0], gpgme_strsource (err), gpgme_strerror (err));
   exit (1);
 @}
@end example
```

@node Exchanging Data
@chapter Exchanging Data
@cindex data, exchanging

A lot of data has to be exchanged between the user and the crypto engine, like plaintext messages, ciphertext, signatures and information about the keys. The technical details about exchanging the data information are completely abstracted by @acronym{GPGME}. The user provides and receives the data via @code{gpgme_data_t} objects, regardless of the communication protocol between @acronym{GPGME} and the crypto engine in use.

@deftp {Data type} {gpgme_data_t}
The @code{gpgme_data_t} type is a handle for a container for generic data, which is used by @acronym{GPGME} to exchange data with the user.
@end deftp

@code{gpgme_data_t} objects do not provide notifications on events. It is assumed that read and write operations are blocking until data is available. If this is undesirable, the application must ensure that all GPGME data operations always have data available, for example by using memory buffers or files rather than pipes or sockets. This might be relevant, for example, if the external event loop mechanism is used.

@deftp {Data type} {gpgme_off_t}
@since{1.4.1}

On POSIX platforms the @code{gpgme_off_t} type is an alias for @code{off_t}; it may be used interchangeable. On Windows platforms @code{gpgme_off_t} is defined as a long (i.e. 32 bit) for 32 bit Windows and as a 64 bit signed integer for 64 bit Windows.
@end deftp

@deftp {Data type} {gpgme_ssize_t}
The @code{gpgme_ssize_t} type is an alias for @code{ssize_t}. It has only been introduced to overcome portability problems pertaining to the declaration of @code{ssize_t} by different toolchains.

@end deftp

@menu
* Creating Data Buffers:: Creating new data buffers.
* Destroying Data Buffers:: Releasing data buffers.
* Manipulating Data Buffers:: Operations on data buffers.
@end menu

@node Creating Data Buffers
@section Creating Data Buffers
@cindex data buffer, creation

Data objects can be based on memory, files, or callback functions provided by the user. Not all operations are supported by all objects.

@menu
* Memory Based Data Buffers:: Creating memory based data buffers.
* File Based Data Buffers:: Creating file based data buffers.
* Callback Based Data Buffers:: Creating callback based data buffers.
@end menu

@node
Memory Based Data Buffers
@subsection Memory Based Data Buffers

Memory based data objects store all data in allocated memory. This is convenient, but only practical for an amount of data that is a fraction of the available physical memory. The data has to be copied from its source and to its destination, which can often be avoided by using one of the other data object

@deftypefun gpgme_error_t gpgme_data_new (@w{gpgme_data_t *@var{dh}})
The function @code{gpgme_data_new} creates a new @code{gpgme_data_t} object and returns a handle for it in @var{dh}. The data object is memory based and initially empty.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the data object was successfully created, @code{GPG_ERR_INV_VALUE} if @var{dh} is not a valid pointer, and @code{GPG_ERR_ENOMEM} if not enough memory is available.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_new_from_mem (@w{gpgme_data_t *@var{dh}}, @w{const char

*@var{buffer}}, @w{size_t @var{size}},
 @w{int @var{copy}})
The function @code{gpgme_data_new_from_mem} creates a new
@code{gpgme_data_t} object and fills it with @var{size} bytes starting
from @var{buffer}.

If @var{copy} is not zero, a private copy of the data is made.  If
@var{copy} is zero, the data is taken from the specified buffer as
needed, and the user has to ensure that the buffer remains valid for
the whole life span of the data object.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, @code{GPG_ERR_INV_VALUE} if
@var{dh} or @var{buffer} is not a valid pointer, and
@code{GPG_ERR_ENOMEM} if not enough memory is available.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_new_from_file (@w{gpgme_data_t *@var{dh}}, @w{const char
*@var{filename}}, @w{int @var{copy}})
The function @code{gpgme_data_new_from_file} creates a new
@code{gpgme_data_t} object and fills it with the content of the file
@var{filename}.

If @var{copy} is not zero, the whole file is
 read in at initialization
time and the file is not used anymore after that.  This is the only
mode supported currently.  Later, a value of zero for @var{copy} might
cause all reads to be delayed until the data is needed, but this is
not yet implemented.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, @code{GPG_ERR_INV_VALUE} if
@var{dh} or @var{filename} is not a valid pointer,
@code{GPG_ERR_NOT_IMPLEMENTED} if @var{code} is zero, and
@code{GPG_ERR_ENOMEM} if not enough memory is available.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_new_from_filepart (@w{gpgme_data_t *@var{dh}}, @w{const char
*@var{filename}}, @w{FILE *@var{fp}}, @w{off_t @var{offset}}, @w{size_t @var{length}})
The function @code{gpgme_data_new_from_filepart} creates a new
@code{gpgme_data_t} object and fills it with a part of the file specified
by @var{filename} or @var{fp}.

Exactly one of @var{filename} and @var{fp} must be non-zero, the other
must
 be zero.  The argument that is not zero specifies the file from
which @var{length} bytes are read into the data object, starting from
@var{offset}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, @code{GPG_ERR_INV_VALUE} if
@var{dh} and exactly one of @var{filename} and @var{fp} is not a valid
pointer, and @code{GPG_ERR_ENOMEM} if not enough memory is available.
@end deftypefun

@node File Based Data Buffers
@subsection File Based Data Buffers

File based data objects operate directly on file descriptors or
streams.  Only a small amount of data is stored in core at any time,
so the size of the data objects is not limited by @acronym{GPGME}.

@deftypefun gpgme_error_t gpgme_data_new_from_fd (@w{gpgme_data_t *@var{dh}}, @w{int @var{fd}})
The function @code{gpgme_data_new_from_fd} creates a new
@code{gpgme_data_t} object and uses the file descriptor @var{fd} to read
from (if used as an input data object) and write to (if used as
an
output data object).

When using the data object as an input buffer, the function might read
a bit more from the file descriptor than is actually needed by the
crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the file descriptor is set to blocking
mode.  Errors during I/O operations, except for EINTR, are usually
fatal for crypto operations.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, and @code{GPG_ERR_ENOMEM} if not
enough memory is available.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_new_from_stream (@w{gpgme_data_t *@var{dh}}, @w{FILE
*@var{stream}})
The function @code{gpgme_data_new_from_stream} creates a new
@code{gpgme_data_t} object and uses the I/O stream @var{stream} to read
from (if used as an input data object) and write to (if used as an
output data object).

When using the data object as an input buffer, the function might read
a bit more from the
stream than is actually needed by the crypto
engine in the desired operation because of internal buffering.

Note that GPGME assumes that the stream is in blocking mode.  Errors

during I/O operations, except for EINTR, are usually fatal for crypto
operations.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, and @code{GPG_ERR_ENOMEM} if not
enough memory is available.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_new_from_estream (@w{gpgme_data_t *@var{dh}},
@w{gpgrt_stream_t @var{stream}})
The function @code{gpgme_data_new_from_estream} creates a new
@code{gpgme_data_t} object and uses the gpgrt stream @var{stream} to read
from (if used as an input data object) and write to (if used as an
output data object).

When using the data object as an input buffer, the function might read
a bit more from the stream than is actually needed by the crypto
engine in the desired operation because of internal buffering.

Note that GPGME
 assumes that the stream is in blocking mode.  Errors
during I/O operations, except for EINTR, are usually fatal for crypto
operations.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, and @code{GPG_ERR_ENOMEM} if not
enough memory is available.
@end deftypefun

@node Callback Based Data Buffers
@subsection Callback Based Data Buffers

If neither memory nor file based data objects are a good fit for your
application, you can implement the functions a data object provides
yourself and create a data object from these callback functions.

@deftp {Data type} {ssize_t (*gpgme_data_read_cb_t) (@w{void *@var{handle}}, @w{void @var{*buffer}},
@w{size_t @var{size}})}
@tindex gpgme_data_read_cb_t
The @code{gpgme_data_read_cb_t} type is the type of functions which
@acronym{GPGME} calls if it wants to read data from a user-implemented
data object.  The function should read up to @var{size} bytes from the
current read position into the space
 starting at @var{buffer}.  The
@var{handle} is provided by the user at data object creation time.

Note that GPGME assumes that the read blocks until data is available.

Errors during I/O operations, except for EINTR, are usually fatal for
crypto operations.

The function should return the number of bytes read, 0 on EOF, and -1
on error.  If an error occurs, @var{errno} should be set to describe
the type of the error.
@end deftp

@deftp {Data type} {ssize_t (*gpgme_data_write_cb_t) (@w{void *@var{handle}}, @w{const void
@var{*buffer}}, @w{size_t @var{size}})}
@tindex gpgme_data_write_cb_t
The @code{gpgme_data_write_cb_t} type is the type of functions which
@acronym{GPGME} calls if it wants to write data to a user-implemented
data object.  The function should write up to @var{size} bytes to the
current write position from the space starting at @var{buffer}.  The
@var{handle} is provided by the user at data object creation time.

Note that GPGME assumes that the write blocks until data
 is available.
Errors during I/O operations, except for EINTR, are usually fatal for
crypto operations.

The function should return the number of bytes written, and -1 on
error.  If an error occurs, @var{errno} should be set to describe the
type of the error.
@end deftp

@deftp {Data type} {off_t (*gpgme_data_seek_cb_t) (@w{void *@var{handle}}, @w{off_t @var{offset}},
@w{int @var{whence}})}
@tindex gpgme_data_seek_cb_t
The @code{gpgme_data_seek_cb_t} type is the type of functions which
@acronym{GPGME} calls if it wants to change the current read/write
position in a user-implemented data object, just like the @code{lseek}
function.

The function should return the new read/write position, and -1 on
error.  If an error occurs, @var{errno} should be set to describe the
type of the error.
@end deftp

@deftp {Data type} {void (*gpgme_data_release_cb_t) (@w{void *@var{handle}})}
@tindex gpgme_data_release_cb_t
The @code{gpgme_data_release_cb_t} type is the type of functions which
@acronym{GPGME}
 calls if it wants to destroy a user-implemented data
object.  The @var{handle} is provided by the user at data object
creation time.
@end deftp

@deftp {Data type} {struct gpgme_data_cbs}
This structure is used to store the data callback interface functions
described above.  It has the following members:

@table @code
@item gpgme_data_read_cb_t read
This is the function called by @acronym{GPGME} to read data from the
data object.  It is only required for input data object.

@item gpgme_data_write_cb_t write
This is the function called by @acronym{GPGME} to write data to the
data object.  It is only required for output data object.

@item gpgme_data_seek_cb_t seek
This is the function called by @acronym{GPGME} to change the current
read/write pointer in the data object (if available).  It is optional.

@item gpgme_data_release_cb_t release
This is the function called by @acronym{GPGME} to release a data
object.  It is optional.
@end table
@end deftp

@deftypefun gpgme_error_t gpgme_data_new_from_cbs
 (@w{gpgme_data_t *@var{dh}}, @w{gpgme_data_cbs_t @var{cbs}}, @w{void *@var{handle}})
The function @code{gpgme_data_new_from_cbs} creates a new
@code{gpgme_data_t} object and uses the user-provided callback functions
to operate on the data object.

The handle @var{handle} is passed as first argument to the callback
functions.  This can be used to identify this data object.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, and @code{GPG_ERR_ENOMEM} if not
enough memory is available.
@end deftypefun

@node Destroying Data Buffers
@section Destroying Data Buffers
@cindex data buffer, destruction

@deftypefun void gpgme_data_release (@w{gpgme_data_t @var{dh}})
The function @code{gpgme_data_release} destroys the data object with
the handle @var{dh}.  It releases all associated resources that were
not provided by the user in the first place.
@end deftypefun

@deftypefun {char *} gpgme_data_release_and_get_mem (@w{gpgme_data_t
 @var{dh}}, @w{size_t *@var{length}})
The function @code{gpgme_data_release_and_get_mem} is like
@code{gpgme_data_release}, except that it returns the data buffer and
its length that was provided by the object.

The user has to release the buffer with @code{gpgme_free}.  In case
the user provided the data buffer in non-copy mode, a copy will be
made for this purpose.

In case an error returns, or there is no suitable data buffer that can
be returned to the user, the function will return @code{NULL}.  In any
case, the data object @var{dh} is destroyed.
@end deftypefun

@deftypefun void gpgme_free (@w{void *@var{buffer}})
@since{1.1.1}

The function @code{gpgme_free} releases the memory returned by
@code{gpgme_data_release_and_get_mem} and
@code{gpgme_pubkey_algo_string}.  It should be used instead of the
system libraries @code{free} function in case different allocators are
used by a program.  This is often the case if gpgme is used under
Windows as a DLL.
@end deftypefun

@node
 Manipulating Data Buffers
@section Manipulating Data Buffers
@cindex data buffer, manipulation

Data buffers contain data and meta-data.  The following operations can
be used to manipulate both.

@menu
* Data Buffer I/O Operations::  I/O operations on data buffers.
* Data Buffer Meta-Data::  Meta-data manipulation of data buffers.
* Data Buffer Convenience::  Convenience function for data buffers.
@end menu

@node Data Buffer I/O Operations
@subsection Data Buffer I/O Operations
@cindex data buffer, I/O operations

@cindex data buffer, read
@cindex data buffer, write
@cindex data buffer, seek

@deftypefun ssize_t gpgme_data_read (@w{gpgme_data_t @var{dh}}, @w{void *@var{buffer}}, @w{size_t @var{length}})
The function @code{gpgme_data_read} reads up to @var{length} bytes
from the data object with the handle @var{dh} into the space starting
at @var{buffer}.

If no error occurs, the actual amount read is returned. If the end of
the data object is reached, the function returns
0.

In all other cases, the function returns -1 and sets @var{errno}.
@end deftypefun

@deftypefun ssize_t gpgme_data_write (@w{gpgme_data_t @var{dh}}, @w{const void *@var{buffer}}, @w{size_t @var{size}})
The function @code{gpgme_data_write} writes up to @var{size} bytes
starting from @var{buffer} into the data object with the handle
@var{dh} at the current write position.

The function returns the number of bytes actually written, or -1 if an
error occurs. If an error occurs, @var{errno} is set.
@end deftypefun

@deftypefun off_t gpgme_data_seek (@w{gpgme_data_t @var{dh}}, @w{off_t @var{offset}}, @w{int @var{whence}})
The function @code{gpgme_data_seek} changes the current read/write
position.

The @var{whence} argument specifies how the @var{offset} should be
interpreted. It must be one of the following symbolic constants:

@table @code
@item SEEK_SET
Specifies that @var{offset} is a count of characters from the
beginning of the data object.

@item SEEK_CUR
Specifies that @var{offset}
is a count of characters from the current
file position. This count may be positive or negative.

@item SEEK_END
Specifies that @var{offset} is a count of characters from the end of
the data object. A negative count specifies a position within the

current extent of the data object; a positive count specifies a
position past the current end.  If you set the position past the
current end, and actually write data, you will extend the data object
with zeros up to that position.
@end table

If successful, the function returns the resulting file position,
measured in bytes from the beginning of the data object.  You can use
this feature together with @code{SEEK_CUR} to read the current
read/write position.

If the function fails, -1 is returned and @var{errno} is set.
@end deftypefun

@node Data Buffer Meta-Data
@subsection Data Buffer Meta-Data
@cindex data buffer, meta-data
@cindex data buffer, file name
@cindex data buffer, encoding

@deftypefun {char *} gpgme_data_get_file_name
 (@w{gpgme_data_t @var{dh}})
@since{1.1.0}

The function @code{gpgme_data_get_file_name} returns a pointer to a
string containing the file name associated with the data object.  The
file name will be stored in the output when encrypting or signing the
data and will be returned to the user when decrypting or verifying the
output data.

If no error occurs, the string containing the file name is returned.
Otherwise, @code{NULL} will be returned.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_set_file_name (@w{gpgme_data_t @var{dh}}, @w{const char
*@var{file_name}})
@since{1.1.0}

The function @code{gpgme_data_set_file_name} sets the file name
associated with the data object.  The file name will be stored in the
output when encrypting or signing the data and will be returned to the
user when decrypting or verifying the output data.

The function returns the error code @code{GPG_ERR_INV_VALUE} if
@var{dh} is not a valid pointer and @code{GPG_ERR_ENOMEM} if not
enough memory is available.

@end
deftypefun

@deftp {Data type} {enum gpgme_data_encoding_t}
@tindex gpgme_data_encoding_t
The @code{gpgme_data_encoding_t} type specifies the encoding of a @code{gpgme_data_t} object. For input data objects, the encoding is useful to give the backend a hint on the type of data. For output data objects, the encoding can specify the output data format on certain operations. Please note that not all backends support all encodings on all operations. The following data types are available:

@table @code
@item GPGME_DATA_ENCODING_NONE
This specifies that the encoding is not known. This is the default for a new data object. The backend will try its best to detect the encoding automatically.

@item GPGME_DATA_ENCODING_BINARY
This specifies that the data is encoding in binary form; i.e. there is no special encoding.

@item GPGME_DATA_ENCODING_BASE64
This specifies that the data is encoded using the Base-64 encoding scheme as used by @acronym{MIME} and other protocols.

@item
GPGME_DATA_ENCODING_ARMOR
This specifies that the data is encoded in an armored form as used by OpenPGP and PEM.

@item GPGME_DATA_ENCODING_MIME
@since{1.7.0}

This specifies that the data is encoded as a MIME part.

@item GPGME_DATA_ENCODING_URL
@since{1.2.0}

The data is a list of linefeed delimited URLs. This is only useful with @code{gpgme_op_import}.

@item GPGME_DATA_ENCODING_URL0
@since{1.2.0}

The data is a list of binary zero delimited URLs. This is only useful with @code{gpgme_op_import}.

@item GPGME_DATA_ENCODING_URLESC
@since{1.2.0}

The data is a list of linefeed delimited URLs with all control and space
characters percent escaped.  This mode is is not yet implemented.

@end table
@end deftp

@deftypefun gpgme_data_encoding_t gpgme_data_get_encoding (@w{gpgme_data_t @var{dh}})
The function @code{gpgme_data_get_encoding} returns the encoding of
the data object with the handle @var{dh}.  If @var{dh} is not a valid
pointer (e.g. @code{NULL}) @code{GPGME_DATA_ENCODING_NONE}
 is
returned.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_set_encoding (@w{gpgme_data_t @var{dh}, gpgme_data_encoding_t
@var{enc}})
The function @code{gpgme_data_set_encoding} changes the encoding of
the data object with the handle @var{dh} to @var{enc}.
@end deftypefun

@deftypefun {gpgme_error_t} gpgme_data_set_flag  @
    (@w{gpgme_data_t @var{dh}}, @
    @w{const char *@var{name}}, @
    @w{const char *@var{value}})

@since{1.7.0}

Some minor properties of the data object can be controlled with flags
set by this function.  The properties are identified by the following
values for @var{name}:

@table @code
@item size-hint
The value is a decimal number with the length gpgme shall assume for
this data object.  This is useful if the data is provided by callbacks
or via file descriptors but the applications knows the total size of
the data.  If this is set the OpenPGP engine may use this to decide on
buffer allocation strategies and to provide a total
 value for its
progress information.

@end table

This function returns @code{0} on success.

@end deftypefun

@node Data Buffer Convenience
@subsection Data Buffer Convenience Functions
@cindex data buffer, convenience
@cindex type of data
@cindex identify

@deftp {Data type} {enum gpgme_data_type_t}
@tindex gpgme_data_type_t
@since{1.4.3}

The @code{gpgme_data_type_t} type is used to return the detected type
of the content of a data buffer.
@end deftp

@table @code
@item GPGME_DATA_TYPE_INVALID
This is returned by @code{gpgme_data_identify} if it was not possible
to identify the data.  Reasons for this might be a non-seekable stream
or a memory problem.  The value is 0.
@item GPGME_DATA_TYPE_UNKNOWN
The type of the data is not known.
@item GPGME_DATA_TYPE_PGP_SIGNED
The data is an OpenPGP signed message.  This may be a binary
signature, a detached one or a cleartext signature.
@item GPGME_DATA_TYPE_PGP_ENCRYPTED
@since{1.7.0}

The data is an OpenPGP encrypted message.
@item GPGME_DATA_TYPE_PGP_SIGNATURE
@since{1.7.0}

The
 data is an OpenPGP detached signature.
@item GPGME_DATA_TYPE_PGP_OTHER
This is a generic OpenPGP message.  In most cases this will be
encrypted data.
@item GPGME_DATA_TYPE_PGP_KEY
This is an OpenPGP key (private or public).
@item GPGME_DATA_TYPE_CMS_SIGNED
This is a CMS signed message.
@item GPGME_DATA_TYPE_CMS_ENCRYPTED
This is a CMS encrypted (enveloped data) message.
@item GPGME_DATA_TYPE_CMS_OTHER
This is used for other CMS message types.
@item GPGME_DATA_TYPE_X509_CERT

The data is a X.509 certificate
@item GPGME_DATA_TYPE_PKCS12
The data is a PKCS#12 message.  This is commonly used to exchange
private keys for X.509.
@end table

@deftypefun gpgme_data_type_t gpgme_data_identify (@w{gpgme_data_t @var{dh}})
@since{1.4.3}

The function @code{gpgme_data_identify} returns the type of the data
with the handle @var{dh}.  If it is not possible to perform the
identification, the function returns zero
(@code{GPGME_DATA_TYPE_INVALID}).  Note that depending
 on how the data
object has been created the identification may not be possible or the
data object may change its internal state (file pointer moved).  For
file or memory based data object, the state should not change.
@end deftypefun

@c
@c  Chapter Contexts
@c
@node Contexts
@chapter Contexts
@cindex context

All cryptographic operations in @acronym{GPGME} are performed within a
context, which contains the internal state of the operation as well as
configuration parameters.  By using several contexts you can run
several cryptographic operations in parallel, with different
configuration.

@deftp {Data type} {gpgme_ctx_t}
The @code{gpgme_ctx_t} type is a handle for a @acronym{GPGME} context,
which is used to hold the configuration, status and result of
cryptographic operations.
@end deftp

@menu
* Creating Contexts::  Creating new @acronym{GPGME} contexts.
* Destroying Contexts::  Releasing @acronym{GPGME} contexts.
* Result Management::  Managing the
 result of crypto operations.
* Context Attributes::  Setting properties of a context.
* Key Management::  Managing keys with @acronym{GPGME}.
* Crypto Operations::  Using a context for cryptography.
* Miscellaneous::  Miscellaneous operations

```
* Run Control::                Controlling how operations are run.
@end menu


@node Creating Contexts
@section Creating Contexts
@cindex context, creation

@deftypefun gpgme_error_t gpgme_new (@w{gpgme_ctx_t *@var{ctx}})
The function @code{gpgme_new} creates a new @code{gpgme_ctx_t} object
and returns a handle for it in @var{ctx}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
context was successfully created, @code{GPG_ERR_INV_VALUE} if
@var{ctx} is not a valid pointer, and @code{GPG_ERR_ENOMEM} if not
enough memory is available.  Also, it returns
@code{GPG_ERR_NOT_OPERATIONAL} if @code{gpgme_check_version} was not
called to initialize GPGME, and @code{GPG_ERR_SELFTEST_FAILED}
 if a
selftest failed.  Currently, the only selftest is for Windows MingW32
targets to see if @code{-mms-bitfields} was used (as required).
@end deftypefun


@node Destroying Contexts
@section Destroying Contexts
@cindex context, destruction

@deftypefun void gpgme_release (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_release} destroys the context with the handle
@var{ctx} and releases all associated resources.
@end deftypefun


@node Result Management
@section Result Management
@cindex context, result of operation

The detailed result of an operation is returned in operation-specific
structures such as @code{gpgme_decrypt_result_t}.  The corresponding
retrieval functions such as @code{gpgme_op_decrypt_result} provide
static access to the results after an operation completes.  Those
structures shall be considered read-only and an application must not
allocate such a structure on its own.  The following interfaces make
it possible to detach a result structure from its associated
 context
and give it a lifetime beyond that of the current operation or
context.
```

```
@deftypefun void gpgme_result_ref (@w{void *@var{result}})
@since{1.2.0}

The function @code{gpgme_result_ref} acquires an additional reference
for the result @var{result}, which may be of any type
@code{gpgme_*_result_t}.  As long as the user holds a reference, the
result structure is guaranteed to be valid and unmodified.
@end deftypefun

@deftypefun void gpgme_result_unref (@w{void *@var{result}})
@since{1.2.0}

The function @code{gpgme_result_unref} releases a reference for the
result @var{result}.  If this was the last reference, the result
structure will be destroyed and all resources associated to it will be
released.
@end deftypefun

Note that a context may hold its own references to result structures,
typically until the context is destroyed or the next operation is
started.  In fact, these references are accessed through the
@code{gpgme_op_*_result} functions.


@node Context Attributes
@section
 Context Attributes
@cindex context, attributes

@menu
* Protocol Selection::          Selecting the protocol used by a context.
* Crypto Engine::               Configuring the crypto engine.
* Setting the Sender::          How to tell the engine the sender.
* ASCII Armor::                 Requesting @acronym{ASCII} armored output.
* Text Mode::                   Choosing canonical text mode.
* Offline Mode::                Choosing offline mode.
* Pinentry Mode::               Choosing the pinentry mode.
* Included Certificates::       Including a number of certificates.
* Key Listing Mode::            Selecting key listing mode.
* Passphrase Callback::         Getting the passphrase from the user.
* Progress Meter Callback::     Being informed about the progress.
* Status Message Callback::     Status messages received from gpg.
* Context Flags::               Additional flags for a context.
* Locale::                      Setting the locale of a context.
*
 Additional Logs::              Additional logs of a context.
@end menu
```

@node Protocol Selection
@subsection Protocol Selection
@cindex context, selecting protocol
@cindex protocol, selecting

@deftypefun gpgme_error_t gpgme_set_protocol (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_protocol_t @var{proto}})
The function @code{gpgme_set_protocol} sets the protocol used within
the context @var{ctx} to @var{proto}.  All crypto operations will be
performed by the crypto engine configured for that protocol.
@xref{Protocols and Engines}.

Setting the protocol with @code{gpgme_set_protocol} does intentionally
not check if the crypto engine for that protocol is available and
installed correctly.  @xref{Engine Version Check}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
protocol could be set successfully, and @code{GPG_ERR_INV_VALUE} if
@var{protocol} is not a valid protocol.
@end deftypefun

@deftypefun gpgme_protocol_t gpgme_get_protocol (@w{gpgme_ctx_t @var{ctx}})
The
 function @code{gpgme_get_protocol} retrieves the protocol currently
use with the context @var{ctx}.
@end deftypefun

@node Crypto Engine
@subsection Crypto Engine
@cindex context, configuring engine
@cindex engine, configuration per context

The following functions can be used to set and retrieve the
configuration of the crypto engines of a specific context.  The
default can also be retrieved without any particular context.
@xref{Engine Information}.  The default can also be changed globally.
@xref{Engine Configuration}.

@deftypefun gpgme_engine_info_t gpgme_ctx_get_engine_info (@w{gpgme_ctx_t @var{ctx}})
@since{1.1.0}

The function @code{gpgme_ctx_get_engine_info} returns a linked list of
engine info structures.  Each info structure describes the
configuration of one configured backend, as used by the context
@var{ctx}.

The result is valid until the next invocation of
@code{gpgme_ctx_set_engine_info} for this particular context.

This function can not fail.
@end deftypefun

@deftypefun
 gpgme_error_t gpgme_ctx_set_engine_info (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_protocol_t
@var{proto}}, @w{const char *@var{file_name}}, @w{const char *@var{home_dir}})
@since{1.1.0}

The function @code{gpgme_ctx_set_engine_info} changes the
configuration of the crypto engine implementing the protocol
@var{proto} for the context @var{ctx}.

@var{file_name} is the file name of the executable program
implementing this protocol, and @var{home_dir} is the directory name
of the configuration directory for this crypto engine.  If
@var{home_dir} is @code{NULL}, the engine's default will be used.

Currently this function must be used before starting the first crypto
operation.  It is unspecified if and when the changes will take effect
if the function is called after starting the first operation on the
context @var{ctx}.

This function returns the error code @code{GPG_ERR_NO_ERROR} if
successful, or an error code on failure.
@end deftypefun


@node Setting the Sender
@subsection How to tell
 the engine the sender.
@cindex context, sender
@cindex sender
@cindex From:

Some engines can make use of the senders address, for example to
figure out the best user id in certain trust models.  For verification
and signing of mails, it is thus suggested to let the engine know the
sender ("From:") address.  @acronym{GPGME} provides two functions to
accomplish that.  Note that the esoteric use of multiple "From:"
addresses is not supported.

@deftypefun gpgme_error_t gpgme_set_sender @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{int @var{address}})

@since{1.8.0}

The function @code{gpgme_set_sender} specifies the sender address for use in sign and verify operations.  @var{address} is expected to be the ``addr-spec'' part of an address but my also be a complete mailbox address, in which case this function extracts the ``addr-spec'' from it.  Using @code{NULL} for @var{address} clears the sender address.

The function returns 0 on success or an error code on failure.  The most likely
 failure is that no valid ``addr-spec'' was found in @var{address}.

@end deftypefun

@deftypefun @w{const char *} gpgme_get_sender @
    (@w{gpgme_ctx_t @var{ctx}})

@since{1.8.0}

The function @code{gpgme_get_sender} returns the current sender address from the context, or NULL if none was set.  The returned value is valid as long as the @var{ctx} is valid and @code{gpgme_set_sender} has not been called again.

@end deftypefun

@c FIXME: Unfortunately, using @acronym here breaks texi2dvi.
@node ASCII Armor
@subsection @acronym{ASCII} Armor
@cindex context, armor mode
@cindex @acronym{ASCII} armor
@cindex armor mode

@deftypefun void gpgme_set_armor (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{yes}})
The function @code{gpgme_set_armor} specifies if the output should be @acronym{ASCII} armored.  By default, output is not @acronym{ASCII} armored.

@acronym{ASCII} armored output is disabled if @var{yes} is zero, and enabled otherwise.
@end deftypefun

@deftypefun int gpgme_get_armor (@w{gpgme_ctx_t

@var{ctx}})
The function @code{gpgme_get_armor} returns 1 if the output is
@acronym{ASCII} armored, and @code{0} if it is not, or if @var{ctx} is
not a valid pointer.
@end deftypefun

@node Text Mode
@subsection Text Mode
@cindex context, text mode
@cindex text mode
@cindex canonical text mode

@deftypefun void gpgme_set_textmode (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{yes}})
The function @code{gpgme_set_textmode} specifies if canonical text mode
should be used.  By default, text mode is not used.

Text mode is for example used for the RFC2015 signatures; note that
the updated RFC 3156 mandates that the mail user agent does some
preparations so that text mode is not needed anymore.

This option is only relevant to the OpenPGP crypto engine, and ignored
by all other engines.

Canonical text mode is disabled if @var{yes} is zero, and enabled
otherwise.
@end deftypefun

@deftypefun int gpgme_get_textmode (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_get_textmode} returns
1 if canonical text
mode is enabled, and @code{0} if it is not, or if @var{ctx} is not a
valid pointer.
@end deftypefun

@node Offline Mode
@subsection Offline Mode
@cindex context, offline mode
@cindex offline mode

@deftypefun void gpgme_set_offline (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{yes}})
@since{1.6.0}

The function @code{gpgme_set_offline} specifies if offline mode should
be used.  Offline mode is disabled if @var{yes} is zero, and enabled
otherwise.  By default, offline mode is disabled.

The details of the offline mode depend on the used protocol and its
backend engine.  It may eventually be extended to be more stricter and
for example completely disable the use of Dirmngr for any engine.

For the CMS protocol the offline mode specifies whether Dirmngr shall
be used to do additional validation that might require connecting
external services (e.g. CRL / OCSP checks).  Here the offline mode
only affects the keylist mode @code{GPGME_KEYLIST_MODE_VALIDATE}.

For the OpenPGP
 protocol offline mode entirely disables the use of the
Dirmngr and will thus guarantee that no network connections are done
as part of an operation on this context.  It has only an effect with
GnuPG versions 2.1.23 or later.

For all other protocols the offline mode is currently ignored.

@end deftypefun

@deftypefun int gpgme_get_offline (@w{gpgme_ctx_t @var{ctx}})
@since{1.6.0}

The function @code{gpgme_get_offline} returns 1 if offline
mode is enabled, and @code{0} if it is not, or if @var{ctx} is not a
valid pointer.
@end deftypefun

@node Pinentry Mode
@subsection Pinentry Mode
@cindex context, pinentry mode
@cindex pinentry mode

@deftypefun gpgme_error_t gpgme_set_pinentry_mode (@w{gpgme_ctx_t @var{ctx}},
@w{gpgme_pinentry_mode_t @var{mode}})

@since{1.4.0}

The function @code{gpgme_set_pinentry_mode} specifies the pinentry mode
to be used.

For GnuPG >= 2.1 this option is required to be set to
@code{GPGME_PINENTRY_MODE_LOOPBACK} to enable the passphrase callback
mechanism in GPGME
 through @code{gpgme_set_passphrase_cb}.
@end deftypefun

@deftypefun gpgme_pinentry_mode_t gpgme_get_pinentry_mode (@w{gpgme_ctx_t @var{ctx}})

@since{1.4.0}

The function @code{gpgme_get_pinenty_mode} returns the
mode set for the context.
@end deftypefun

@deftp {Data type} {enum gpgme_pinentry_mode_t}
@tindex gpgme_pinentry_mode_t
@since{1.4.0}

The @code{gpgme_minentry_mode_t} type specifies the set of possible pinentry
modes that are supported by @acronym{GPGME} if GnuPG >= 2.1 is used.
The following modes are supported:

@table @code
@item GPGME_PINENTRY_MODE_DEFAULT
@since{1.4.0}

Use the default of the agent, which is ask.

@item GPGME_PINENTRY_MODE_ASK
@since{1.4.0}

Force the use of the Pinentry.

@item GPGME_PINENTRY_MODE_CANCEL
@since{1.4.0}

Emulate use of Pinentry's cancel button.

@item GPGME_PINENTRY_MODE_ERROR
@since{1.4.0}

Return a Pinentry error @code{No Pinentry}.

@item GPGME_PINENTRY_MODE_LOOPBACK
@since{1.4.0}

Redirect Pinentry queries to the caller.
This enables
 the use of @code{gpgme_set_passphrase_cb} because pinentry
queries are redirected to gpgme.

Note: For 2.1.0 - 2.1.12 this mode requires @code{allow-loopback-pinentry}
to be enabled in the @file{gpg-agent.conf} or an agent started with that option.

@end table
@end deftp

@node Included Certificates
@subsection Included Certificates
@cindex certificates, included

@deftypefun void gpgme_set_include_certs (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{nr_of_certs}})
The function @code{gpgme_set_include_certs} specifies how many
certificates should be included in an S/MIME signed message.  By
default, only the sender's certificate is included.  The possible
values of @var{nr_of_certs} are:

@table @code
@item GPGME_INCLUDE_CERTS_DEFAULT
@since{1.0.3}

Fall back to the default of the crypto backend.  This is the default
for GPGME.
@item -2
Include all certificates except the root certificate.
@item -1
Include all certificates.
@item 0
Include no certificates.
@item 1
Include the sender's
 certificate only.
@item n
Include the first n certificates of the certificates path, starting
from the sender's certificate.  The number @code{n} must be positive.
@end table

Values of @var{nr_of_certs} smaller than -2 are undefined.

This option is only relevant to the CMS crypto engine, and ignored by
all other engines.
@end deftypefun

@deftypefun int gpgme_get_include_certs (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_get_include_certs} returns the number of
certificates to include into an S/MIME signed message.
@end deftypefun

@node Key Listing Mode
@subsection Key Listing Mode
@cindex key listing mode
@cindex key listing, mode of

@deftypefun gpgme_error_t gpgme_set_keylist_mode (@w{gpgme_ctx_t @var{ctx}},
@w{gpgme_keylist_mode_t @var{mode}})
The function @code{gpgme_set_keylist_mode} changes the default
behaviour of the key listing functions. The value in @var{mode} is a
bitwise-or combination of one or multiple of the following bit values:

@table @code
@item GPGME_KEYLIST_MODE_LOCAL
The
@code{GPGME_KEYLIST_MODE_LOCAL} symbol specifies that the local
keyring should be searched for keys in the keylisting operation. This
is the default.

Using only this option results in a @code{--list-keys}.

@item GPGME_KEYLIST_MODE_EXTERN
The @code{GPGME_KEYLIST_MODE_EXTERN} symbol specifies that an external
source should be searched for keys in the keylisting operation. The
type of external source is dependent on the crypto engine used and
whether it is combined with @code{GPGME_KEYLIST_MODE_LOCAL}. For
example, it can be a remote keyserver or LDAP certificate server.

Using only this option results in a @code{--search-keys} for
@code{GPGME_PROTOCOL_OpenPGP} and something similar to
@code{--list-external-keys} for @code{GPGME_PROTOCOL_CMS}.

@item GPGME_KEYLIST_MODE_LOCATE
This is a shortcut for the combination of
@code{GPGME_KEYLIST_MODE_LOCAL} and @code{GPGME_KEYLIST_MODE_EXTERN}, which
results in a @code{--locate-keys} for @code{GPGME_PROTOCOL_OpenPGP}.

@item
GPGME_KEYLIST_MODE_SIGS
The @code{GPGME_KEYLIST_MODE_SIGS} symbol specifies that the key
signatures should be included in the listed keys.

@item GPGME_KEYLIST_MODE_SIG_NOTATIONS
@since{1.1.1}

The @code{GPGME_KEYLIST_MODE_SIG_NOTATIONS} symbol specifies that the
signature notations on key signatures should be included in the listed
keys. This only works if @code{GPGME_KEYLIST_MODE_SIGS} is also
enabled.

@item GPGME_KEYLIST_MODE_WITH_TOFU
@since{1.7.0}

The @code{GPGME_KEYLIST_MODE_WITH_TOFU} symbol specifies that
information pertaining to the TOFU trust model should be included in
the listed keys.

@item GPGME_KEYLIST_MODE_WITH_KEYGRIP
@since{1.14.0}

The @code{GPGME_KEYLIST_MODE_WITH_KEYRIP} symbol specifies that the
keygrip is always included in the listing.  The default depends on the
version of the backend and the used protocol.

@item GPGME_KEYLIST_MODE_WITH_SECRET
@since{1.5.1}

The @code{GPGME_KEYLIST_MODE_WITH_SECRET} returns information about
the presence of a corresponding
secret key in a public key listing.  A
public key listing with this mode is slower than a standard listing
but can be used instead of a second run to list the secret keys.  This
is only supported for GnuPG versions >= 2.1.  Note that using this
option also makes sure that the keygrip is available in the output.

@item GPGME_KEYLIST_MODE_EPHEMERAL
@since{1.2.0}

The @code{GPGME_KEYLIST_MODE_EPHEMERAL} symbol specifies that keys
flagged as ephemeral are included in the listing.

@item GPGME_KEYLIST_MODE_VALIDATE
@since{0.4.5}

The @code{GPGME_KEYLIST_MODE_VALIDATE} symbol specifies that the
backend should do key or certificate validation and not just get the
validity information from an internal cache.  This might be an
expensive operation and is in general not useful.  Currently only
implemented for the S/MIME backend and ignored for other backends.

@end table

At least one of @code{GPGME_KEYLIST_MODE_LOCAL} and
@code{GPGME_KEYLIST_MODE_EXTERN} must be specified.  For future binary
compatibility,
you should get the current mode with
@code{gpgme_get_keylist_mode} and modify it by setting or clearing the
appropriate bits, and then using that calculated value in the
@code{gpgme_set_keylisting_mode} operation.  This will leave all other
bits in the mode value intact (in particular those that are not used
in the current version of the library).

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
mode could be set correctly, and @code{GPG_ERR_INV_VALUE} if @var{ctx}
is not a valid pointer or @var{mode} is not a valid mode.
@end deftypefun

@deftypefun gpgme_keylist_mode_t gpgme_get_keylist_mode (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_get_keylist_mode} returns the current key
listing mode of the context @var{ctx}. This value can then be
modified and used in a subsequent @code{gpgme_set_keylist_mode}
operation to only affect the desired bits (and leave all others
intact).

The function returns 0 if @var{ctx} is not a valid pointer, and
the
current mode otherwise. Note that 0 is not a valid mode value.
@end deftypefun

@node Passphrase Callback
@subsection Passphrase Callback
@cindex callback, passphrase
@cindex passphrase callback

@deftp {Data type} {gpgme_error_t (*gpgme_passphrase_cb_t)(void *@var{hook}, const char *@var{uid_hint},
const char *@var{passphrase_info}, @w{int @var{prev_was_bad}}, @w{int @var{fd}})}
@tindex gpgme_passphrase_cb_t
The @code{gpgme_passphrase_cb_t} type is the type of functions usable as
passphrase callback function.

The argument @var{uid_hint} might contain a string that gives an
indication for which user ID the passphrase is required. If this is
not available, or not applicable (in the case of symmetric encryption,
for example), @var{uid_hint} will be @code{NULL}.

The argument @var{passphrase_info}, if not @code{NULL}, will give
further information about the context in which the passphrase is
required. This information is engine and operation specific.

If this is the repeated attempt
to get the passphrase, because
previous attempts failed, then @var{prev_was_bad} is 1, otherwise it
will be 0.

The user must write the passphrase, followed by a newline character,
to the file descriptor @var{fd}. The function @code{gpgme_io_writen}
should be used for the write operation. Note that if the user returns

0 to indicate success, the user must at least write a newline
character before returning from the callback.

If an error occurs, return the corresponding @code{gpgme_error_t}
value.  You can use the error code @code{GPG_ERR_CANCELED} to abort
the operation.  Otherwise, return @code{0}.

Note: The passphrase_cb only works with GnuPG 1.x and 2.1.x and not
with the 2.0.x series. See @code{gpgme_set_pinentry_mode} for more
details on 2.1.x usage.
@end deftp

@deftypefun void gpgme_set_passphrase_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_passphrase_cb_t
@var{passfunc}}, @w{void *@var{hook_value}})
The function @code{gpgme_set_passphrase_cb} sets the function that is
used
 when a passphrase needs to be provided by the user to
@var{passfunc}.  The function @var{passfunc} needs to implemented by
the user, and whenever it is called, it is called with its first
argument being @var{hook_value}.  By default, no passphrase callback
function is set.

Not all crypto engines require this callback to retrieve the
passphrase.  It is better if the engine retrieves the passphrase from
a trusted agent (a daemon process), rather than having each user to
implement their own passphrase query.  Some engines do not even
support an external passphrase callback at all, in this case the error
code @code{GPG_ERR_NOT_SUPPORTED} is returned.

For GnuPG >= 2.1 the pinentry mode has to be set to
@code{GPGME_PINENTRY_MODE_LOOPBACK} to enable the passphrase callback.
See @code{gpgme_set_pinentry_mode}.

The user can disable the use of a passphrase callback function by
calling @code{gpgme_set_passphrase_cb} with @var{passfunc} being
@code{NULL}.
@end deftypefun

@deftypefun void gpgme_get_passphrase_cb
 (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_passphrase_cb_t *@var{passfunc}}, @w{void
**@var{hook_value}})
The function @code{gpgme_get_passphrase_cb} returns the function that
is used when a passphrase needs to be provided by the user in
@var{*passfunc}, and the first argument for this function in
@var{*hook_value}.  If no passphrase callback is set, or @var{ctx} is
not a valid pointer, @code{NULL} is returned in both variables.

@var{passfunc} or @var{hook_value} can be @code{NULL}.  In this case,

the corresponding value will not be returned.
@end deftypefun

@node Progress Meter Callback
@subsection Progress Meter Callback
@cindex callback, progress meter
@cindex progress meter callback

@deftp {Data type} {void (*gpgme_progress_cb_t)(void *@var{hook}, const char *@var{what}, int @var{type}, int @var{current}, int @var{total})}
@tindex gpgme_progress_cb_t
The @code{gpgme_progress_cb_t} type is the type of functions usable as
progress callback function.

The arguments are
 specific to the crypto engine.  More information
about the progress information returned from the GnuPG engine can be
found in the GnuPG source code in the file @file{doc/DETAILS} in the
section PROGRESS.
@end deftp

@deftypefun void gpgme_set_progress_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_progress_cb_t @var{progfunc}}, @w{void *@var{hook_value}})
The function @code{gpgme_set_progress_cb} sets the function that is
used when progress information about a cryptographic operation is
available.  The function @var{progfunc} needs to implemented by the
user, and whenever it is called, it is called with its first argument
being @var{hook_value}.  By default, no progress callback function
is set.

Setting a callback function allows an interactive program to display
progress information about a long operation to the user.

The user can disable the use of a progress callback function by
calling @code{gpgme_set_progress_cb} with @var{progfunc} being
@code{NULL}.
@end deftypefun

@deftypefun void
 gpgme_get_progress_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_progress_cb_t *@var{progfunc}}, @w{void **@var{hook_value}})
The function @code{gpgme_get_progress_cb} returns the function that is
used to inform the user about the progress made in @var{*progfunc},
and the first argument for this function in @var{*hook_value}.  If no
progress callback is set, or @var{ctx} is not a valid pointer,
@code{NULL} is returned in both variables.

@var{progfunc} or @var{hook_value} can be @code{NULL}.  In this case,
the corresponding value will not be returned.
@end deftypefun

@node Status Message Callback
@subsection Status Message Callback
@cindex callback, status message
@cindex status message callback

@deftp {Data type} {gpgme_error_t (*gpgme_status_cb_t)(void *@var{hook}, const char *@var{keyword}, const char *@var{args})}
@tindex gpgme_status_cb_t
The @code{gpgme_status_cb_t} type is the type of function usable as
a status message callback function.

The argument @var{keyword} is the name
 of the status message while the
@var{args} argument contains any arguments for the status message.

If an error occurs, return the corresponding @code{gpgme_error_t}
value. Otherwise, return @code{0}.
@end deftp

@deftypefun void gpgme_set_status_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_status_cb_t @var{statusfunc}}, @w{void *@var{hook_value}})
@since{1.6.0}

The function @code{gpgme_set_status_cb} sets the function that is used when a
status message is received from gpg to @var{statusfunc}. The function
@var{statusfunc} needs to be implemented by the user, and whenever it is
called, it is called with its first argument being @var{hook_value}.  By
default, no status message callback function is set.

The user can disable the use of a status message callback function by calling
@code{gpgme_set_status_cb} with @var{statusfunc} being @code{NULL}.
@end deftypefun

@deftypefun void gpgme_get_status_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_status_cb_t *@var{statusfunc}}, @w{void **@var{hook_value}})
@since{1.6.0}

The
 function @code{gpgme_get_status_cb} returns the function that is used to
process status messages from gpg in @var{*statusfunc}, and the first argument
for this function in @var{*hook_value}.  If no status message callback is set,
or @var{ctx} is not a valid pointer, @code{NULL} is returned in both
variables.

```
@end deftypefun

@node Context Flags
@subsection Context Flags
@cindex flags, of a context

@deftypefun {gpgme_error_t} gpgme_set_ctx_flag  @
        (@w{gpgme_ctx_t @var{ctx}}, @
        @w{const char *@var{name}}, @
        @w{const char *@var{value}})

@since{1.7.0}

Some minor properties of the context can be controlled with flags set
by this function.  The properties are identified by the following
values for @var{name}:

@table @code
@item "redraw"
This flag is normally not changed by the caller because GPGME sets and
clears it automatically: The flag is cleared before an operation and
set if an operation noticed that the engine has launched
 a Pinentry.
A Curses based application may use this information to redraw the
screen; for example:

@example
  err = gpgme_op_keylist_start (ctx, "foo@@example.org", 0);
  while (!err)
    @{
      err = gpgme_op_keylist_next (ctx, &key);
      if (err)
        break;
      show_key (key);
      gpgme_key_release (key);
    @}
  if ((s = gpgme_get_ctx_flag (ctx, "redraw")) && *s)
    redraw_screen ();
  gpgme_release (ctx);
@end example


@item "full-status"
Using a @var{value} of "1" the status callback set by
gpgme_set_status_cb returns all status lines with the exception of
PROGRESS lines.  With the default of "0" the status callback is only
called in certain situations.
```

@item "raw-description"
Setting the @var{value} to "1" returns human readable strings in a raw format. For example the non breaking space characters ("~") will not be removed from the @code{description} field of the @code{gpgme_tofu_info_t} object.

@item "export-session-key"
Using a @var{value}
of "1" specifies that the context should try to
export the symmetric session key when decrypting data. By default, or when using an empty string or "0" for @var{value}, session keys are not exported.

@item "override-session-key"
The string given in @var{value} is passed to the GnuPG engine to override the session key for decryption. The format of that session key is specific to GnuPG and can be retrieved during a decrypt operation when the context flag "export-session-key" is enabled. Please be aware that using this feature with GnuPG < 2.1.16 will leak the session key on many platforms via ps(1).

@item "auto-key-retrieve"
Setting the @var{value} to "1" asks the backend to automatically retrieve a key for signature verification if possible. Note that this option makes a "web bug" like behavior possible. Keyserver or Web Key Directory operators can see which keys you request, so by sending you a message signed by a brand new key (which you naturally will not have on your
local keyring), the operator can tell both your IP address and the time when you verified the signature.

@item "auto-key-import"
Setting the @var{value} to "1" forces the GPG backend to automatically import a missing key for signature verification from the signature.

@item "include-key-block"
Setting the @var{value} to "1" forces the GPG backend to embed the signing key as well as an encryption subkey into the the signature.

@item "request-origin"
The string given in @var{value} is passed to the GnuPG engines to request restrictions based on the origin of the request. Valid values are documented in the GnuPG manual and the gpg man page under the option @option{--request-origin}. Requires at least GnuPG 2.2.6 to have an effect.

@item "no-symkey-cache"
For OpenPGP disable the passphrase cache used for symmetrical en- and

decryption.  This cache is based on the message specific salt value.
Requires at least GnuPG 2.2.7 to have an effect.

@item "ignore-mdc-error"
This flag passes
 the option @option{--ignore-mdc-error} to gpg.  This
can be used to force decryption of a message which failed due to a
missing integrity check.  This flag must be used with great caution
and only if it is a known non-corrupted old message and the decryption
result of the former try had the decryption result flag
@code{legacy_cipher_nomdc} set.  For failsafe reasons this flag is
reset after each operation.

@item "auto-key-locate"
The string given in @var{value} is passed to gpg.  This can be used
to change the behavior of a @code{GPGME_KEYLIST_MODE_LOCATE} keylisting.
Valid values are documented in the GnuPG manual and the gpg man page under
the option @option{--auto-key-locate}.
Requires at least GnuPG 2.1.18.

Note: Keys retrieved through @code{auto-key-locate} are automatically
imported in the keyring.

@item trust-model
@since{1.11.2}

Change the trust-model for all GnuPG engine operations.  An empty
string sets the trust-model back to the users default.  If the
trust-model is not
 supported by GnuPG the behavior is undefined
and will likely cause all operations to fail.  Example: "tofu+pgp".

This options should be used carefully with a strict version
requirement.  In some versions of GnuPG setting the
trust-model changes the default trust-model for future operations.
A change in the trust-model also can have unintended side effects, like
rebuilding the trust-db.

@item "extended-edit"
This flag passes the option @option{--expert} to gpg key edit.  This
can be used to get additional callbacks in @code{gpgme_op_edit}.

@end table

This function returns @code{0} on success.
@end deftypefun

@deftypefun {const char *} gpgme_get_ctx_flag @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{const char *@var{name}})

@since{1.8.0}

The value of flags settable by @code{gpgme_set_ctx_flag} can be
retrieved by this function. If @var{name} is unknown the function
returns @code{NULL}. For boolean flags an empty string is returned
for False and the string "1" is
returned for True; either atoi(3) or a
test for an empty string can be used to get the boolean value.

@end deftypefun

@node Locale
@subsection Locale
@cindex locale, default
@cindex locale, of a context

A locale setting can be associated with a context. This locale is
passed to the crypto engine, and used for applications like the PIN
entry, which is displayed to the user when entering a passphrase is
required.

The default locale is used to initialize the locale setting of all
contexts created afterwards.

@deftypefun gpgme_error_t gpgme_set_locale (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{category}},
@w{const char *@var{value}})
@since{0.4.3}

The function @code{gpgme_set_locale} sets the locale of the context
@var{ctx}, or the default locale if @var{ctx} is a null pointer.

The locale settings that should be changed are specified by
@var{category}. Supported categories are @code{LC_CTYPE},
@code{LC_MESSAGES}, and @code{LC_ALL}, which is a wildcard you can use
if you want to change
all the categories at once.

The value to be used for the locale setting is @var{value}, which will
be copied to @acronym{GPGME}'s internal data structures. @var{value}
can be a null pointer, which disables setting the locale, and will
make PIN entry and other applications use their default setting, which
is usually not what you want.

Note that the settings are only used if the application runs on a text
terminal, and that the settings should fit the configuration of the
output terminal.  Normally, it is sufficient to initialize the default
value at startup.

The function returns an error if not enough memory is available.
@end deftypefun

@node Additional Logs
@subsection Additional Logs
@cindex auditlog, of the engine
@cindex auditlog

Additional logs can be associated with a context.  These logs are
engine specific and can be be obtained with @code{gpgme_op_getauditlog}.

@deftypefun gpgme_error_t gpgme_op_getauditlog @
	(@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{output}},
 @
	@w{unsigned int @var{flags}})
@since{1.1.1}

The function @code{gpgme_op_getauditlog} is used to obtain additional
logs as specified by @var{flags} into the @var{output} data.  If

The function returns the error code @code{GPG_ERR_NO_ERROR} if a
log could be queried from the engine, and @code{GPG_ERR_NOT_IMPLEMENTED}
if the log specified in @var{flags} is not available for this engine.
If no log is available @code{GPG_ERR_NO_DATA} is returned.

The value in @var{flags} is a bitwise-or combination of one or
multiple of the following bit values:

@table @code
@item GPGME_AUDITLOG_DIAG
@since{1.11.2}

Obtain diagnostic output which would be written to @code{stderr} in
interactive use of the engine.  This can be used to provide additional
diagnostic information in case of errors in other operations.

Note: If log-file has been set in the configuration the log will
be empty and @code{GPG_ERR_NO_DATA} will be returned.

Implemented for: @code{GPGME_PROTOCOL_OpenPGP}

@item

GPGME_AUDITLOG_DEFAULT
@since{1.11.2}

This flag has the value 0 for compatibility reasons. Obtains additional information from the engine by issuing the @code{GETAUDITLOG} command. For @code{GPGME_PROTOCOL_CMS} this provides additional information about the X509 certificate chain.

Implemented for: @code{GPGME_PROTOCOL_CMS}

@item GPGME_AUDITLOG_HTML
@since{1.1.1}

Same as @code{GPGME_AUDITLOG_DEFAULT} but in HTML.

Implemented for: @code{GPGME_PROTOCOL_CMS}
@end table
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_getauditlog_start @
(@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{output}}, @
@w{unsigned int @var{flags}})
@since{1.1.1}

This is the asynchronous variant of @code{gpgme_op_getauditlog}.
@end deftypefun

@node Key Management
@section Key Management
@cindex key management

Some of the cryptographic operations require that recipients or signers are specified. This is always done by specifying the respective keys that should be used for the operation. The following section describes how such keys can be selected and manipulated.

@menu
* Key objects:: Description of the key structures.
* Listing Keys:: Browsing the list of available keys.
* Information About Keys:: Requesting detailed information about keys.
* Manipulating Keys:: Operations on keys.
* Generating Keys:: Creating new key pairs.
* Signing Keys:: Adding key signatures to public keys.
* Exporting Keys:: Retrieving key data from the key ring.
* Importing Keys:: Adding keys to the key ring.
* Deleting Keys:: Removing keys from the key ring.

* Changing Passphrases:: Change the passphrase of a key.
* Changing TOFU Data:: Changing data pertaining to TOFU.
* Advanced Key Editing:: Advanced key edit operation.
@end menu

@node Key objects
@subsection Key objects

The keys are represented in GPGME by
structures which may only be read
by the application but never be allocated or changed. They are valid
as long as the key object itself is valid.

@deftp {Data type} gpgme_key_t

The @code{gpgme_key_t} type is a pointer to a key object. It has the
following members:

@table @code
@item gpgme_keylist_mode_t keylist_mode
@since{0.9.0}

The keylist mode that was active when the key was retrieved.

@item unsigned int revoked : 1
This is true if the key is revoked.

@item unsigned int expired : 1
This is true if the key is expired.

@item unsigned int disabled : 1
This is true if the key is disabled.

@item unsigned int invalid : 1
This is true if the key is invalid. This might have several reasons,
for a example for the S/MIME backend, it will be set during key
listings if the key could not be validated due to missing
certificates or unmatched policies.

@item unsigned int can_encrypt : 1
This is true if the key (ie one of its subkeys) can be used for
encryption.

@item unsigned int can_sign
: 1
This is true if the key (ie one of its subkeys) can be used to create
data signatures.

@item unsigned int can_certify : 1
This is true if the key (ie one of its subkeys) can be used to create
key certificates.

@item unsigned int can_authenticate : 1
@since{0.4.5}

This is true if the key (ie one of its subkeys) can be used for
authentication.

@item unsigned int is_qualified : 1
@since{1.1.0}

This is true if the key can be used for qualified signatures according
to local government regulations.

@item unsigned int secret : 1
This is true if the key is a secret key.  Note, that this will always
be true even if the corresponding subkey flag may be false
(offline/stub keys).  This is only set if a listing of secret keys has
been requested or if @code{GPGME_KEYLIST_MODE_WITH_SECRET} is active.

@item unsigned int origin : 5
@since{1.8.0}

Reserved for the origin of this key.

@item gpgme_protocol_t protocol
This is the protocol supported by this key.

@item char *issuer_serial
If
 @code{protocol} is @code{GPGME_PROTOCOL_CMS}, then this is the
issuer serial.

@item char *issuer_name
If @code{protocol} is @code{GPGME_PROTOCOL_CMS}, then this is the
issuer name.

@item char *chain_id
If @code{protocol} is @code{GPGME_PROTOCOL_CMS}, then this is the
chain ID, which can be used to built the certificate chain.

@item gpgme_validity_t owner_trust
If @code{protocol} is @code{GPGME_PROTOCOL_OpenPGP}, then this is the
owner trust.

@item gpgme_subkey_t subkeys

This is a linked list with the subkeys of the key.  The first subkey
in the list is the primary key and usually available.

@item gpgme_user_id_t uids
This is a linked list with the user IDs of the key.  The first user ID
in the list is the main (or primary) user ID.

@item char *fpr
@since{1.7.0}

This field gives the fingerprint of the primary key.  Note that
this is a copy of the fingerprint of the first subkey.  For an
incomplete key (for example from a verification result) a subkey may
be missing but this field
 may be set nevertheless.

@item unsigned long last_update
@since{1.8.0}

Reserved for the time of the last update of this key.

@end table
@end deftp

@deftp {Data type} gpgme_subkey_t
@since{1.5.0}

The @code{gpgme_subkey_t} type is a pointer to a subkey structure.
Subkeys are one component of a @code{gpgme_key_t} object.  In fact,
subkeys are those parts that contains the real information about the
individual cryptographic keys that belong to the same key object.  One
@code{gpgme_key_t} can contain several subkeys.  The first subkey in
the linked list is also called the primary key.

The subkey structure has the following members:

@table @code
@item gpgme_subkey_t next
This is a pointer to the next subkey structure in the linked list, or
@code{NULL} if this is the last element.

@item unsigned int revoked : 1
This is true if the subkey is revoked.

@item unsigned int expired : 1
This is true if the subkey is expired.

@item unsigned int disabled : 1
This is true if the subkey
is disabled.

@item unsigned int invalid : 1
This is true if the subkey is invalid.

@item unsigned int can_encrypt : 1
This is true if the subkey can be used for encryption.

@item unsigned int can_sign : 1
This is true if the subkey can be used to create data signatures.

@item unsigned int can_certify : 1
This is true if the subkey can be used to create key certificates.

@item unsigned int can_authenticate : 1
@since{0.4.5}

This is true if the subkey can be used for authentication.

@item unsigned int is_qualified : 1
@since{1.1.0}

This is true if the subkey can be used for qualified signatures
according to local government regulations.

@item unsigned int is_de_vs : 1
@since{1.8.0}

This is true if the subkey complies with the rules for classified
information in Germany at the restricted level (VS-NfD). This are
currently RSA keys of at least 2048 bits or ECDH/ECDSA keys using a
Brainpool curve.

@item unsigned int secret : 1
This is true if the subkey is a secret key. Note that
it will be
false if the key is actually a stub key; i.e. a secret key operation
is currently not possible (offline-key). This is only set if a
listing of secret keys has been requested or if
@code{GPGME_KEYLIST_MODE_WITH_SECRET} is active.

@item gpgme_pubkey_algo_t pubkey_algo
This is the public key algorithm supported by this subkey.

@item unsigned int length
This is the length of the subkey (in bits).

@item char *keyid
This is the key ID of the subkey in hexadecimal digits.

@item char *fpr
This is the fingerprint of the subkey in hexadecimal digits, if
available.

@item char *keygrip
@since{1.7.0}

The keygrip of the subkey in hex digit form or @code{NULL} if not
available.

@item long int timestamp
This is the creation timestamp of the subkey.  This is -1 if the
timestamp is invalid, and 0 if it is not available.

@item long int expires
This is the expiration timestamp of the subkey, or 0 if the subkey
does not expire.

@item unsigned int is_cardkey : 1
@since{1.2.0}

True if
 the secret key is stored on a smart card.

@item char *card_number
@since{1.2.0}

The serial number of a smart card holding this key or @code{NULL}.

@item char *curve
For ECC algorithms the name of the curve.

@end table
@end deftp

@deftp {Data type} gpgme_user_id_t

A user ID is a component of a @code{gpgme_key_t} object.  One key can
have many user IDs.  The first one in the list is the main (or
primary) user ID.

The user ID structure has the following members.

@table @code

@item gpgme_user_id_t next
This is a pointer to the next user ID structure in the linked list, or
@code{NULL} if this is the last element.

@item unsigned int revoked : 1
This is true if the user ID is revoked.

@item unsigned int invalid : 1
This is true if the user ID is invalid.

@item gpgme_validity_t validity
This specifies the validity of the user ID.

@item char *uid
This is the user ID string.

@item char *name
This is the name component of @code{uid}, if available.

@item char *comment
This is the comment
component of @code{uid}, if available.

@item char *email
This is the email component of @code{uid}, if available.

@item char *address;
The mail address (addr-spec from RFC-5322) of the user ID string.
This is general the same as the @code{email} part of this structure
but might be slightly different. If no mail address is available
@code{NULL} is stored.

@item gpgme_tofu_info_t tofu
@since{1.7.0}

If not @code{NULL} information from the TOFU database pertaining to
this user id.

@item gpgme_key_sig_t signatures
This is a linked list with the signatures on this user ID.

@item unsigned int origin : 5
@since{1.8.0}

Reserved for the origin of this user ID.

@item unsigned long last_update
@since{1.8.0}

Reserved for the time of the last update of this user ID.

@item char *uidhash;
A string used by gpg to identify a user ID.  This string can be used
at certain prompts of @code{gpgme_op_edit} to select a user ID.  Users
must be prepared to see a @code{NULL} value here.  The format
 of the
value is not specified and may depend on the GPGME or GnuPG version.

@end table
@end deftp

@deftp {Data type} gpgme_tofu_info_t

@since{1.7.0}

The @code{gpgme_tofu_info_t} type is a pointer to a tofu info
structure.  Tofu info structures are one component of a
@code{gpgme_user_id_t} object, and provide information from the TOFU
database pertaining to the user ID.

The tofu info structure has the following members:

@table @code
@item gpgme_key_sig_t next
This is a pointer to the next tofu info structure in the linked
list, or @code{NULL} if this is the last element.

@item unsigned int validity : 3
This is the TOFU validity.  It can have the following values:

@table @code
@item 0
The value @code{0} indicates a conflict.

@item 1
The value @code{1} indicates a key without history.

@item 2
The value @code{2} indicates a key with too little history.

@item 3
The value @code{3} indicates a key with enough history for basic trust.

@item 4
The value @code{4} indicates a key

with a lot of history.

@end table

@item unsigned int policy : 4
This is the TOFU policy, see @code{gpgme_tofu_policy_t}.

@item unsigned short signcount
This is the number of signatures seen for this binding (or
@code{USHRT_MAX} if there are more than that).

@item unsigned short encrcount
This is the number of encryptions done with this binding (or
@code{USHRT_MAX} if there are more than that).

@item unsigned long signfirst
Number of seconds since Epoch when the first signature was seen with
this binding.

@item unsigned long signlast
Number of seconds since Epoch when the last signature was seen with
this binding.

@item unsigned long encrfirst
Number of seconds since Epoch when the first encryption was done with
this binding.

@item unsigned long encrlast
Number of seconds since Epoch when the last encryption was done with
this binding.

@item char *description
A human-readable string summarizing the TOFU data (or NULL).

@end table
@end deftp

@deftp {Data type} gpgme_key_sig_t

The
@code{gpgme_key_sig_t} type is a pointer to a key signature structure.
Key signatures are one component of a @code{gpgme_key_t} object, and
validate user IDs on the key in the OpenPGP protocol.

The signatures on a key are only available if the key was retrieved
via a listing operation with the @code{GPGME_KEYLIST_MODE_SIGS} mode
enabled, because it can be expensive to retrieve all signatures of a

key.

The signature notations on a key signature are only available if the
key was retrieved via a listing operation with the
@code{GPGME_KEYLIST_MODE_SIG_NOTATIONS} mode enabled, because it can
be expensive to retrieve all signature notations.

The key signature structure has the following members:

@table @code
@item gpgme_key_sig_t next
This is a pointer to the next key signature structure in the linked
list, or @code{NULL} if this is the last element.

@item unsigned int revoked : 1
This is true if the key signature is a revocation signature.

@item unsigned int expired : 1
This is
 true if the key signature is expired.

@item unsigned int invalid : 1
This is true if the key signature is invalid.

@item unsigned int exportable : 1
This is true if the key signature is exportable.

@item gpgme_pubkey_algo_t pubkey_algo
This is the public key algorithm used to create the signature.

@item char *keyid
This is the key ID of the key (in hexadecimal digits) used to create
the signature.

@item long int timestamp
This is the creation timestamp of the key signature.  This is -1 if
the timestamp is invalid, and 0 if it is not available.

@item long int expires
This is the expiration timestamp of the key signature, or 0 if the key
signature does not expire.

@item gpgme_error_t status
This is the status of the signature and has the same meaning as the
member of the same name in a @code{gpgme_signature_t} object.

@item unsigned int sig_class
This specifies the signature class of the key signature.  The meaning

is specific to the crypto engine.

@item char *uid
This is the main
 user ID of the key used to create the signature.

@item char *name
This is the name component of @code{uid}, if available.

@item char *comment
This is the comment component of @code{uid}, if available.

@item char *email
This is the email component of @code{uid}, if available.

@item gpgme_sig_notation_t notations
This is a linked list with the notation data and policy URLs.
@end table
@end deftp

@node Listing Keys
@subsection Listing Keys
@cindex listing keys
@cindex key listing
@cindex key listing, start
@cindex key ring, list
@cindex key ring, search

@deftypefun gpgme_error_t gpgme_op_keylist_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{pattern}}, @w{int @var{secret_only}})

The function @code{gpgme_op_keylist_start} initiates a key listing
operation inside the context @var{ctx}.  It sets everything up so that
subsequent invocations of @code{gpgme_op_keylist_next} return the keys
in the list.

If @var{pattern} is @code{NULL}, all available keys are returned.
Otherwise,
 @var{pattern} contains an engine specific expression that
is used to limit the list to all keys matching the pattern.  Note that
the total length of the pattern is restricted to an engine-specific
maximum (a couple of hundred characters are usually accepted).  The
pattern should be used to restrict the search to a certain common name
or user, not to list many specific keys at once by listing their
fingerprints or key IDs.

If @var{secret_only} is not @code{0}, the list is restricted to secret
keys only.

The context will be busy until either all keys are received (and
@code{gpgme_op_keylist_next} returns @code{GPG_ERR_EOF}), or
@code{gpgme_op_keylist_end} is called to finish the operation.

The function returns the error code @code{GPG_ERR_INV_VALUE} if
@var{ctx} is not a valid pointer, and passes through any errors that
are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_keylist_ext_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char
 *@var{pattern}[]}, @w{int @var{secret_only}}, @w{int @var{reserved}})

The function @code{gpgme_op_keylist_ext_start} initiates an extended
key listing operation inside the context @var{ctx}.  It sets
everything up so that subsequent invocations of
@code{gpgme_op_keylist_next} return the keys in the list.

If @var{pattern} or @var{*pattern} is @code{NULL}, all available keys
are returned.  Otherwise, @var{pattern} is a @code{NULL} terminated
array of strings that are used to limit the list to all keys matching
at least one of the patterns verbatim.  Note that the total length of
all patterns is restricted to an engine-specific maximum (the exact
limit also depends on the number of patterns and amount of quoting
required, but a couple of hundred characters are usually accepted).
Patterns should be used to restrict the search to a certain common
name or user, not to list many specific keys at once by listing their
fingerprints or key IDs.

If @var{secret_only} is not @code{0}, the list
 is restricted to secret
keys only.

The value of @var{reserved} must be @code{0}.

The context will be busy until either all keys are received (and
@code{gpgme_op_keylist_next} returns @code{GPG_ERR_EOF}), or
@code{gpgme_op_keylist_end} is called to finish the operation.

The function returns the error code @code{GPG_ERR_INV_VALUE} if
@var{ctx} is not a valid pointer, and passes through any errors that
are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_keylist_from_data_start @
        (@w{gpgme_ctx_t @var{ctx}}, @

@w{gpgme_data_t @var{data}}, @
@w{int @var{reserved}})

@since{1.8.0}

The function @code{gpgme_op_keylist_from_data_start} initiates a key
listing operation inside the context @var{ctx}.  In contrast to the
other key listing operation the keys are read from the supplied
@var{data} and not from the local key database.  The keys are also not
imported into the local key database.  The function
 sets everything up
so that subsequent invocations of @code{gpgme_op_keylist_next} return
the keys from @var{data}.

The value of @var{reserved} must be @code{0}.

This function requires at least GnuPG version 2.1.14 and currently
works only with OpenPGP keys.

The context will be busy until either all keys are received (and
@code{gpgme_op_keylist_next} returns @code{GPG_ERR_EOF}), or
@code{gpgme_op_keylist_end} is called to finish the operation.
While the context is busy @var{data} may not be released.

The function returns the error code @code{GPG_ERR_INV_VALUE} if
@var{ctx} is not a valid pointer, and passes through any errors that
are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_keylist_next (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
*@var{r_key}})

The function @code{gpgme_op_keylist_next} returns the next key in the
list created by a previous @code{gpgme_op_keylist_start} operation in
the context @var{ctx}.  The key will have
 one reference for the user.
@xref{Manipulating Keys}.

This is the only way to get at @code{gpgme_key_t} objects in
@acronym{GPGME}.

If the last key in the list has already been returned,
@code{gpgme_op_keylist_next} returns @code{GPG_ERR_EOF}.

The function returns the error code @code{GPG_ERR_INV_VALUE} if
@var{ctx} or @var{r_key} is not a valid pointer, and
@code{GPG_ERR_ENOMEM} if there is not enough memory for the operation.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_keylist_end (@w{gpgme_ctx_t @var{ctx}})

The function @code{gpgme_op_keylist_end} ends a pending key list
operation in the context @var{ctx}.

After the operation completed successfully, the result of the key
listing operation can be retrieved with
@code{gpgme_op_keylist_result}.

The function returns the error code @code{GPG_ERR_INV_VALUE} if
@var{ctx} is not a valid pointer, and @code{GPG_ERR_ENOMEM} if at some
time during the operation there was not enough memory available.
@end deftypefun

The following
example illustrates how all keys containing a certain
string (@code{g10code}) can be listed with their key ID and the name
and email address of the main user ID:

```
@example
gpgme_ctx_t ctx;
gpgme_key_t key;
gpgme_error_t err = gpgme_new (&ctx);

if (!err)
 @{
   err = gpgme_op_keylist_start (ctx, "g10code", 0);
   while (!err)
     @{
       err = gpgme_op_keylist_next (ctx, &key);
       if (err)
         break;
       printf ("%s:", key->subkeys->keyid);
       if (key->uids && key->uids->name)
         printf (" %s", key->uids->name);
       if (key->uids && key->uids->email)
         printf (" <%s>", key->uids->email);
       putchar ('\n');
       gpgme_key_release (key);
     @}
   gpgme_release (ctx);
 @}
if (gpg_err_code (err) != GPG_ERR_EOF)
 @{
   fprintf (stderr, "can not list keys: %s\n", gpgme_strerror (err));
   exit (1);
 @}
```

@end example

@deftp {Data type} {gpgme_keylist_result_t}
This is a pointer to a structure used to store the result of a
@code{gpgme_op_keylist_*}
operation. After successfully ending a key
listing operation, you can retrieve the pointer to the result with
@code{gpgme_op_keylist_result}. The structure contains the following
member:

@table @code
@item unsigned int truncated : 1
This is true if the crypto backend had to truncate the result, and
less than the desired keys could be listed.
@end table
@end deftp

@deftypefun gpgme_keylist_result_t gpgme_op_keylist_result (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_op_keylist_result} returns a
@code{gpgme_keylist_result_t} pointer to a structure holding the
result of a @code{gpgme_op_keylist_*} operation. The pointer is only
valid if the last operation on the context was a key listing
operation, and if this operation finished successfully. The returned
pointer is only valid until the next operation is started on the
context.
@end deftypefun

In a simple program, for which a blocking operation is acceptable, the
following function can be used to retrieve
a single key.

@deftypefun gpgme_error_t gpgme_get_key (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{fpr}},
@w{gpgme_key_t *@var{r_key}}, @w{int @var{secret}})
The function @code{gpgme_get_key} gets the key with the fingerprint
(or key ID) @var{fpr} from the crypto backend and return it in
@var{r_key}. If @var{secret} is true, get the secret key. The
currently active keylist mode is used to retrieve the key. The key
will have one reference for the user.

If the key is not found in the keyring, @code{gpgme_get_key} returns
the error code @code{GPG_ERR_EOF} and *@var{r_key} will be set to
@code{NULL}.

The function returns the error code @code{GPG_ERR_INV_VALUE} if
@var{ctx} or @var{r_key} is not a valid pointer or @var{fpr} is not a
fingerprint or key ID, @code{GPG_ERR_AMBIGUOUS_NAME} if the key ID was
not a unique specifier for a key, and @code{GPG_ERR_ENOMEM} if at some
time during the operation there was not enough memory available.

@end deftypefun

@node Information About Keys
@subsection
Information About Keys
@cindex key, information about
@cindex key, attributes
@cindex attributes, of a key

Please see the beginning of this section for more information about
@code{gpgme_key_t} objects.

@deftp {Data type} gpgme_validity_t
The @code{gpgme_validity_t} type is used to specify the validity of a user ID
in a key. The following validities are defined:

@table @code
@item GPGME_VALIDITY_UNKNOWN
The user ID is of unknown validity. The string representation of this
validity is ``?''.

@item GPGME_VALIDITY_UNDEFINED
The validity of the user ID is undefined. The string representation of this
validity is ``q''.

@item GPGME_VALIDITY_NEVER
The user ID is never valid. The string representation of this
validity is ``n''.

@item GPGME_VALIDITY_MARGINAL
The user ID is marginally valid. The string representation of this
validity is ``m''.

@item GPGME_VALIDITY_FULL
The user ID is fully valid. The string representation of this
validity is ``f''.

@item GPGME_VALIDITY_ULTIMATE
The
user ID is ultimately valid. The string representation of this
validity is ``u''.
@end table
@end deftp

```
@node Manipulating Keys
@subsection Manipulating Keys
@cindex key, manipulation

@deftypefun void gpgme_key_ref (@w{gpgme_key_t @var{key}})
The function @code{gpgme_key_ref} acquires an additional reference for
the key @var{key}.
@end deftypefun

@deftypefun void gpgme_key_unref (@w{gpgme_key_t @var{key}})
The function @code{gpgme_key_unref} releases a reference for the key
@var{key}.  If this was the last reference, the key will be destroyed
and all resources associated to it will be released.
@end deftypefun

@c
@c  gpgme_op_setexpire
@c
@deftypefun gpgme_error_t gpgme_op_setexpire @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{unsigned long @var{expires}}, @
     @w{const char *@var{subfprs}}, @
     @w{unsigned int @var{reserved}});

@since{1.14.1}

The function @code{gpgme_op_setexpire} sets the expiration time of
the
 key @var{key} or of the specified subkeys.
This function requires at least version 2.1.22 of GnuPG.

@var{key} specifies the key to operate on.

@var{expires} specifies the expiration time in seconds from now.
To be similar to other usages where expiration times are provided
in unsigned long this is similar to the key creation date
and so it is in seconds from NOW.

The common case is to use 0 to not set an expiration time.
Note that this parameter takes an unsigned long value and not
a @code{time_t} to avoid problems on systems which use a signed
32 bit @code{time_t}.  Note further that the OpenPGP protocol
uses 32 bit values for timestamps and thus can
only encode dates up to the year 2106.

@var{subfprs} selects the subkey(s) for which the expiration time
should be set.  If @var{subfprs} is set to @code{NULL}, then the
```

expiration time of the primary key is set.  If @var{subfprs} is
an asterisk (@code{*}), then the expiration times of all non-revoked
and not yet expired subkeys are set.
  To select more than one subkey
put all subkey fingerprints into one string separated by linefeeds
characters (@code{\n}).

@var{reserved} is reserved for later use and must be @code{0}.

@end deftypefun

@deftypefun gpgme_error_t gpgme_op_setexpire_start @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{unsigned long @var{expires}}, @
     @w{const char *@var{subfprs}}, @
     @w{unsigned int @var{flags}});

@since{1.14.1}

The function @code{gpgme_op_setexpire_start} initiates a
@code{gpgme_op_setexpire} operation; see there for details.  It must
be completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun

@deftypefun gpgme_error_t gpgme_op_revuid_start @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}}, @
     @w{unsigned int @var{flags}});

@since{1.14.1}

The function @code{gpgme_op_setexpire_start} initiates a
@code{gpgme_op_setexpire}
 operation; see there for details.  It must
be completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun

@node Generating Keys
@subsection Generating Keys

@cindex key, creation
@cindex key ring, add

GPGME provides a set of functions to create public key pairs. Most of these functions require the use of GnuPG 2.1 and later; for older GnuPG versions the @code{gpgme_op_genkey} function can be used. Existing code which wants to update to the new functions or new code which shall supports older GnuPG versions may try the new functions first and provide a fallback to the old function if the error code @code{GPG_ERR_NOT_SUPPORTED} is received.

```
@c
@c  gpgme_op_createkey
@c
@deftypefun gpgme_error_t gpgme_op_createkey @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{const char *@var{userid}}, @
     @w{const char *@var{algo}}, @
     @w{unsigned long @var{reserved}}, @
     @w{unsigned long @var{expires}}, @
     @w{gpgme_key_t @var{extrakey}},
 @
     @w{unsigned int @var{flags}});
```

@since{1.7.0}

The function @code{gpgme_op_createkey} generates a new key for the procotol active in the context @var{ctx}. As of now this function does only work for OpenPGP and requires at least version 2.1.13 of GnuPG.

@var{userid} is commonly the mail address associated with the key. GPGME does not require a specific syntax but if more than a mail address is given, RFC-822 style format is suggested. The value is expected to be in UTF-8 encoding (i.e. no IDN encoding for mail addresses). This is a required parameter.

@var{algo} specifies the algorithm for the new key (actually a keypair of public and private key). For a list of supported algorithms, see the GnuPG manual. If @var{algo} is @code{NULL} or the string "default", the key is generated using the default algorithm of the engine. If the string "future-default" is used the engine may use an algorithm which is planned to be the default in a future release of the engine;
however existing implementation of the protocol may not be able to already handle such future algorithms. For the OpenPGP protocol, the specification of a default algorithm, without requesting a non-default usage via @var{flags}, triggers the creation of a

primary key plus a secondary key (subkey).

@var{reserved} must be set to zero.

@var{expires} specifies the expiration time in seconds. If you supply
0, a reasonable expiration time is chosen. Use the flag
@code{GPGME_CREATE_NOEXPIRE} to create keys that do not expire. Note
that this parameter takes an unsigned long value and not a
@code{time_t} to avoid problems on systems which use a signed 32 bit
@code{time_t}. Note further that the OpenPGP protocol uses 32 bit
values for timestamps and thus can only encode dates up to the year
2106.

@var{extrakey} is currently not used and must be set to @code{NULL}.
A future version of GPGME may use this parameter to create X.509 keys.

@var{flags} can be set to the bit-wise OR of the following
flags:

@table @code
@item GPGME_CREATE_SIGN
@itemx GPGME_CREATE_ENCR
@itemx GPGME_CREATE_CERT
@itemx GPGME_CREATE_AUTH
@since{1.7.0}

Do not create the key with the default capabilities (key usage) of the
requested algorithm but use those explicitly given by these flags:
``signing'', ``encryption'', ``certification'', or ``authentication''.
The allowed combinations depend on the algorithm.

If any of these flags are set and a default algorithm has been
selected only one key is created in the case of the OpenPGP
protocol.

@item GPGME_CREATE_NOPASSWD
@since{1.7.0}

Request generation of the key without password protection.

@item GPGME_CREATE_SELFSIGNED
@since{1.7.0}

For an X.509 key do not create a CSR but a self-signed certificate.
This has not yet been implemented.

@item GPGME_CREATE_NOSTORE
@since{1.7.0}

Do not store the created key in the local key database.
This has not yet been implemented.

@item GPGME_CREATE_WANTPUB
@itemx GPGME_CREATE_WANTSEC
@since{1.7.0}

Return
 the public or secret key as part of the result structure.
This has not yet been implemented.

@item GPGME_CREATE_FORCE
@since{1.7.0}

The engine does not allow the creation of a key with a user ID
already existing in the local key database.  This flag can be used to
override this check.

@item GPGME_CREATE_NOEXPIRE
@since{1.9.0}

Request generation of keys that do not expire.

@end table

After the operation completed successfully, information about the
created key can be retrieved with @code{gpgme_op_genkey_result}.

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if
the engine does not support the command, or a bunch of other error
codes.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_createkey_start @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{const char *@var{userid}}, @
     @w{const char *@var{algo}}, @
     @w{unsigned long @var{reserved}}, @
     @w{unsigned long @var{expires}}, @
     @w{gpgme_key_t @var{extrakey}}, @
     @w{unsigned int
 @var{flags}});
```

@since{1.7.0}

The function @code{gpgme_op_createkey_start} initiates a
@code{gpgme_op_createkey} operation; see there for details.  It must
be completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun

@c
@c  gpgme_op_createsubkey
@c
@deftypefun gpgme_error_t gpgme_op_createsubkey @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{algo}}, @
     @w{unsigned long @var{reserved}}, @
     @w{unsigned long @var{expires}}, @
     @w{unsigned int @var{flags}});

@since{1.7.0}

The function @code{gpgme_op_createsubkey} creates and adds a new
subkey to the primary OpenPGP key given by @var{KEY}.  The only
allowed protocol in @var{ctx} is @code{GPGME_PROTOCOL_OPENPGP}.
Subkeys (aka secondary keys) are a concept in the OpenPGP protocol to
bind several keys to a primary key.  As of now this function requires
at least version 2.1.13 of GnuPG.

@var{key} specifies the key to operate
 on.

@var{algo} specifies the algorithm for the new subkey.  For a list of
supported algorithms, see the GnuPG manual.  If @var{algo} is
@code{NULL} or the string "default", the subkey is generated using the
default algorithm for an encryption subkey of the engine.  If the
string "future-default" is used the engine may use an encryption
algorithm which is planned to be the default in a future release of
the engine; however existing implementation of the protocol may not be
able to already handle such future algorithms.

@var{reserved} must be set to zero.

@var{expires} specifies the expiration time in seconds.  If you supply
0, a reasonable expiration time is chosen.  Use the flag
@code{GPGME_CREATE_NOEXPIRE} to create keys that do not expire.  Note
that this parameter takes an unsigned long value and not a
@code{time_t} to avoid problems on systems which use a signed 32 bit
@code{time_t}.  Note further that the OpenPGP protocol uses 32 bit
values for timestamps and thus can only encode

dates up to the year
2106.

@var{flags} takes the same values as described above for
@code{gpgme_op_createkey}.

After the operation completed successfully, information about the
created key can be retrieved with @code{gpgme_op_genkey_result}.

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if
the engine does not support the command, or a bunch of other error
codes.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_createsubkey_start @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{algo}}, @
     @w{unsigned long @var{reserved}}, @
     @w{unsigned long @var{expires}}, @
     @w{unsigned int @var{flags}});
```

@since{1.7.0}

The function @code{gpgme_op_createsubkey_start} initiates a
@code{gpgme_op_createsubkey} operation; see there for details. It must
be completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun

```
@c
@c  gpgme_op_adduid
@c
@deftypefun gpgme_error_t
 gpgme_op_adduid @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}}, @
     @w{unsigned int @var{flags}});
```

@since{1.7.0}

The function @code{gpgme_op_adduid} adds a new user ID to the OpenPGP
key given by @var{KEY}. Adding additional user IDs after key creation

is a feature of the OpenPGP protocol and thus the protocol for the context @var{ctx} must be set to OpenPGP.  As of now this function requires at least version 2.1.13 of GnuPG.

@var{key} specifies the key to operate on.

@var{userid} is the user ID to add to the key.  A user ID is commonly the mail address to be associated with the key.  GPGME does not require a specific syntax but if more than a mail address is given, RFC-822 style format is suggested.  The value is expected to be in UTF-8 encoding (i.e. no IDN encoding for mail addresses).  This is a required parameter.

@var{flags} are currently not used and must be set to zero.

The function returns zero
 on success, @code{GPG_ERR_NOT_SUPPORTED} if
the engine does not support the command, or a bunch of other error codes.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_adduid_start @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}}, @
     @w{unsigned int @var{flags}});
```

@since{1.7.0}

The function @code{gpgme_op_adduid_start} initiates a @code{gpgme_op_adduid} operation; see there for details.  It must be completed by calling @code{gpgme_wait} on the context. @xref{Waiting For Completion}.

@end deftypefun

```
@c
@c  gpgme_op_revuid
@c
@deftypefun gpgme_error_t gpgme_op_revuid @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}}, @
     @w{unsigned int @var{flags}});
```

@since{1.7.0}

The function @code{gpgme_op_revuid} revokes a user ID from the OpenPGP
key given by @var{KEY}.  Revoking user IDs after key creation is a
feature of the OpenPGP protocol and thus the protocol
 for the context
@var{ctx} must be set to OpenPGP.  As of now this function requires at
least version 2.1.13 of GnuPG.

@var{key} specifies the key to operate on.

@var{userid} is the user ID to be revoked from the key.  The user ID
must be given verbatim because the engine does an exact and case
sensitive match.  Thus the @code{uid} field from the user ID object
(@code{gpgme_user_id_t}) is to be used.  This is a required parameter.

@var{flags} are currently not used and must be set to zero.

Note that the engine won't allow to revoke the last valid user ID.  To
change a user ID is better to first add the new user ID, then revoke
the old one, and finally publish the key.

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if
the engine does not support the command, or a bunch of other error
codes.

@end deftypefun

@deftypefun gpgme_error_t gpgme_op_revuid_start @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}},
 @
     @w{unsigned int @var{flags}});

@since{1.7.0}

The function @code{gpgme_op_revuid_start} initiates a
@code{gpgme_op_revuid} operation; see there for details.  It must
be completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun

@c
@c  gpgme_op_set_uid_flag
@c
@deftypefun gpgme_error_t gpgme_op_set_ui_flag @

```
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}}, @
     @w{cons char * @var{name}}, @
     @w{cons char * @var{value}});

@since{1.8.0}

The function @code{gpgme_op_set_uid_flag} is used to set flags on a
user ID from the OpenPGP key given by @var{KEY}.  Setting flags on
user IDs after key creation is a feature of the OpenPGP protocol and
thus the protocol for the context @var{ctx} must be set to OpenPGP.

@var{key} specifies the key to operate on.  This parameters is required.

@var{userid} is the user ID of the key to be manipulated.  This user ID
must
 be given verbatim because the engine does an exact and case
sensitive match.  Thus the @code{uid} field from the user ID object
(@code{gpgme_user_id_t}) is to be used.  This is a required parameter.

@var{name} names the flag which is to be changed.  The only currently
supported flag is:

@table @code
@item primary
This sets the primary key flag on the given user ID.  All other
primary key flag on other user IDs are removed.  @var{value} must be
given as NULL.  For technical reasons this functions bumps the
creation timestamp of all affected self-signatures up by one second.
At least GnuPG version 2.1.20 is required.

@end table

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if
the engine does not support the command, or a bunch of other error
codes.

@end deftypefun

@deftypefun gpgme_error_t gpgme_op_set_uid_flag_start @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}}, @
     @w{cons char * @var{name}},
 @
     @w{cons char * @var{value}});
```

@since{1.8.0}

The function @code{gpgme_op_set_uid_flag_start} initiates a @code{gpgme_op_set_uid_flag} operation; see there for details. It must be completed by calling @code{gpgme_wait} on the context. @xref{Waiting For Completion}.

@end deftypefun

@c
@c gpgme_op_genkey
@c
@deftypefun gpgme_error_t gpgme_op_genkey @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{const char *@var{parms}}, @
@w{gpgme_data_t @var{public}}, @
@w{gpgme_data_t @var{secret}})

The function @code{gpgme_op_genkey} generates a new key pair in the context @var{ctx}. The meaning of @var{public} and @var{secret} depends on the crypto backend.

GPG does not support @var{public} and @var{secret}, they should be @code{NULL}. GnuPG will generate a key pair and add it to the standard key ring. The fingerprint of the generated key is available with @code{gpgme_op_genkey_result}.

GpgSM requires @var{public} to be a writable data object. GpgSM will generate
a secret key (which will be stored by @command{gpg-agent}, and return a certificate request in @var{public}, which then needs to be signed by the certification authority and imported before it can be used. GpgSM does not make the fingerprint available.

The argument @var{parms} specifies parameters for the key in an string that looks something like XML. The details about the format of @var{parms} are specific to the crypto engine used by @var{ctx}. The first line of the parameters must be @code{<GnupgKeyParams format="internal">} and the last line must be @code{</GnupgKeyParams>}. Every line in between the first and last lines is treated as a Header: Value pair. In particular, no XML escaping is necessary if you need to include the characters @code{<}, @code{>}, or @code{&}.

Here is an example for GnuPG as the crypto engine (all parameters of OpenPGP key generation are documented in the GPG manual):

@example

<GnupgKeyParms format="internal">
Key-Type: default
Subkey-Type: default
Name-Real:
 Joe Tester
Name-Comment: with stupid passphrase
Name-Email: joe@@foo.bar
Expire-Date: 0
Passphrase: abc
</GnupgKeyParms>
@end example

Here is an example for GpgSM as the crypto engine (all parameters of
OpenPGP key generation are documented in the GPGSM manual):

@example
<GnupgKeyParms format="internal">
Key-Type: RSA
Key-Length: 1024
Name-DN: C=de,O=g10 code,OU=Testlab,CN=Joe 2 Tester
Name-Email: joe@@foo.bar
</GnupgKeyParms>
@end example

Strings should be given in UTF-8 encoding.  The only format supported
for now is ``internal''.  The content of the @code{GnupgKeyParms}
container is passed verbatim to the crypto backend.  Control
statements are not allowed.

After the operation completed successfully, the result can be
retrieved with @code{gpgme_op_genkey_result}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, @code{GPG_ERR_INV_VALUE} if
@var{parms} is not a well-formed string (e.g. does not have the
expected
 tag-like headers and footers), @code{GPG_ERR_NOT_SUPPORTED}
if @var{public} or @var{secret} is not valid, and
@code{GPG_ERR_GENERAL} if no key was created by the backend.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_genkey_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char
*@var{parms}}, @w{gpgme_data_t @var{public}}, @w{gpgme_data_t @var{secret}})

The function @code{gpgme_op_genkey_start} initiates a
@code{gpgme_op_genkey} operation.  It can be completed by calling
@code{gpgme_wait} on the context.  @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, @code{GPG_ERR_INV_VALUE} if
@var{parms} is not a valid XML string, and
@code{GPG_ERR_NOT_SUPPORTED} if @var{public} or @var{secret} is not
@code{NULL}.
@end deftypefun

@c
@c  gpgme_op_genkey_result
@c
@deftp {Data type} {gpgme_genkey_result_t}

This is a pointer to a structure used to store the result of a
@code{gpgme_op_genkey} operation.
 After successfully generating a
key, you can retrieve the pointer to the result with
@code{gpgme_op_genkey_result}.  The structure contains the following
members:

@table @code
@item unsigned int primary : 1
This flag is set to 1 if a primary key was created and to 0
if not.

@item unsigned int sub : 1
This flag is set to 1 if a subkey was created and to 0 if not.

@item unsigned int uid : 1
This flag is set to 1 if a user ID was created and to 0 if not.

@item char *fpr
This is the fingerprint of the key that was created.  If both a
primary and a subkey were generated, the fingerprint of the primary
key will be returned.  If the crypto engine does not provide the
fingerprint, @code{fpr} will be a null pointer.

@item gpgme_data_t pubkey
@since{1.7.0}

This will eventually be used to return the public key.  It is
currently not used.

@item gpgme_data_t seckey
@since{1.7.0}

This will eventually be used to return the secret key.  It is
currently not used.

```
@end table
@end deftp

@deftypefun
 gpgme_genkey_result_t gpgme_op_genkey_result (@w{gpgme_ctx_t @var{ctx}})

The function @code{gpgme_op_genkey_result} returns a
@code{gpgme_genkey_result_t} pointer to a structure holding the result of
a @code{gpgme_op_genkey} operation.  The pointer is only valid if the
last operation on the context was a @code{gpgme_op_genkey} or
@code{gpgme_op_genkey_start} operation, and if this operation finished
successfully.  The returned pointer is only valid until the next
operation is started on the context.

@end deftypefun


@c
@c  SIGNING KEYS
@c
@node Signing Keys
@subsection Signing Keys
@cindex key, signing

Key signatures are a unique concept of the OpenPGP protocol.  They can
be used to certify the validity of a key and are used to create the
Web-of-Trust (WoT).  Instead of using the @code{gpgme_op_interact}
function along with a finite state machine, GPGME provides a
convenient function to create key signatures when using modern GnuPG
versions.


@c
@c  gpgme_op_keysign
@c
@deftypefun
 gpgme_error_t gpgme_op_keysign @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}}, @
     @w{unsigned long @var{expires}}, @
     @w{unsigned int @var{flags}});

@since{1.7.0}

The function @code{gpgme_op_keysign} adds a new key signature to the
public key @var{KEY}.   This function requires at least version 2.1.12 of
```

GnuPG.

@var{CTX} is the usual context which describes the protocol to use
(which must be OpenPGP) and has also the list of signer keys to be
used for the signature.  The common case is to use the default key for
signing other keys.  If another key or more than one key shall be used
for a key signature, @code{gpgme_signers_add} can be used.
@xref{Selecting Signers}.

@var{key} specifies the key to operate on.

@var{userid} selects the user ID or user IDs to be signed.  If
@var{userid} is set to @code{NULL} all valid user IDs are signed.  The
user ID must be given verbatim because the engine does an exact
 and
case sensitive match.  Thus the @code{uid} field from the user ID
object (@code{gpgme_user_id_t}) is to be used.  To select more than
one user ID put them all into one string separated by linefeeds
characters (@code{\n}) and set the flag @code{GPGME_KEYSIGN_LFSEP}.

@var{expires} specifies the expiration time of the new signature in
seconds.  The common case is to use 0 to not set an expiration date.
However, if the configuration of the engine defines a default
expiration for key signatures, that is still used unless the flag
@code{GPGME_KEYSIGN_NOEXPIRE} is used.  Note that this parameter takes
an unsigned long value and not a @code{time_t} to avoid problems on
systems which use a signed 32 bit @code{time_t}.  Note further that
the OpenPGP protocol uses 32 bit values for timestamps and thus can
only encode dates up to the year 2106.

@var{flags} can be set to the bit-wise OR of the following flags:

@table @code
@item GPGME_KEYSIGN_LOCAL
@since{1.7.0}

Instead of creating an exportable
 key signature, create a key
signature which is is marked as non-exportable.

@item GPGME_KEYSIGN_LFSEP
@since{1.7.0}

Although linefeeds are uncommon in user IDs this flag is required to
explicitly declare that @var{userid} may contain several linefeed
separated user IDs.

@item GPGME_KEYSIGN_NOEXPIRE

Force the creation of a key signature without an expiration date.  This
overrides @var{expire} and any local configuration of the engine.

@end table

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if
the engine does not support the command, or a bunch of other error
codes.

@end deftypefun

@deftypefun gpgme_error_t gpgme_op_keysign_start @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}}, @
     @w{unsigned long @var{expires}}, @
     @w{unsigned int @var{flags}});

@since{1.7.0}

The function @code{gpgme_op_keysign_start} initiates a
@code{gpgme_op_keysign} operation; see there for details.  It must
be
 completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun

@c
@c  gpgme_op_revsig
@c
@deftypefun gpgme_error_t gpgme_op_revsig @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{gpgme_key_t @var{signing_key}}, @
     @w{const char *@var{userid}}, @
     @w{unsigned int @var{flags}});

@since{1.14.1}

The function @code{gpgme_op_revsig} revokes key signatures of the
public key @var{key} made with the key @var{signing_key}.  This
function requires at least version 2.2.24 of GnuPG.

@var{key} specifies the key to operate on.

@var{signing_key} specifies the key whose signatures shall be revoked.

@var{userid} selects the user ID or user IDs whose signatures shall
be revoked.  If @var{userid} is set to @code{NULL} the signatures
on all user IDs are revoked.  The user ID must be given verbatim
because the engine does an exact and case sensitive match.  Thus the
@code{uid} field from the user ID object
 (@code{gpgme_user_id_t}) is to
be used.  To select more than one user ID put them all into one string
separated by linefeeds characters (@code{\n}) and set the flag
@code{GPGME_REVSIG_LFSEP}.

@var{flags} can be set to the bit-wise OR of the following flags:

@table @code
@item GPGME_REVSIG_LFSEP
@since{1.14.1}

Although linefeeds are uncommon in user IDs this flag is required to
explicitly declare that @var{userid} may contain several linefeed
separated user IDs.

@end table

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if
the engine does not support the command, or a bunch of other error
codes.

@end deftypefun

@deftypefun gpgme_error_t gpgme_op_revsig_start @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{gpgme_key_t @var{signing_key}}, @
     @w{const char *@var{userid}}, @
     @w{unsigned int @var{flags}});

@since{1.14.1}

The function @code{gpgme_op_revsig_start} initiates a
@code{gpgme_op_revsig} operation; see there
 for details.  It must
be completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun

@c
@c  EXPORTING KEYS
@c
@node Exporting Keys
@subsection Exporting Keys
@cindex key, export
@cindex key ring, export from

Exporting keys means the same as running @command{gpg} with the command
@option{--export}.  However, a mode flag can be used to change the way
the export works.  The available mode flags are described below, they
may be or-ed together.

@table @code

@item GPGME_EXPORT_MODE_EXTERN
If this bit is set, the output is send directly to the default
keyserver. This is currently only allowed for OpenPGP keys.  It is good
practise to not send more than a few dozens key to a keyserver at one
time.  Using this flag requires that the @var{keydata} argument of the
export function is set to @code{NULL}.

@item GPGME_EXPORT_MODE_MINIMAL
@since{1.3.1}

If this bit is set, the smallest possible key is exported.  For OpenPGP
keys it removes all signatures
 except for the latest self-signatures.
For X.509 keys it has no effect.

@item GPGME_EXPORT_MODE_SSH
@since{1.4.0}

If this bit is set, the latest authentication key of the requested
OpenPGP key is exported in the OpenSSH public key format.  This
accepts just a single key; to force the export of a specific subkey
a fingerprint pattern with an appended exclamation mark may be used.

@item GPGME_EXPORT_MODE_SECRET
@since{1.6.0}

Instead of exporting the public key, the secret key is exported.  This
may not be combined with @code{GPGME_EXPORT_MODE_EXTERN}.  For X.509
the export format is PKCS#8.

@item GPGME_EXPORT_MODE_RAW

@since{1.6.0}

If this flag is used with @code{GPGME_EXPORT_MODE_SECRET} for an X.509
key the export format will be changed to PKCS#1. This flag may not be
used with OpenPGP.

@item GPGME_EXPORT_MODE_PKCS12
@since{1.6.0}

If this flag is used with @code{GPGME_EXPORT_MODE_SECRET} for an X.509
key the export format will be changed to PKCS#12 which also includes
the
certificate. This flag may not be used with OpenPGP.

@item GPGME_EXPORT_MODE_NOUID
@since{1.12.0 - experimental}
Do not export user ids. Works only with certain gpg version.

@end table

@deftypefun gpgme_error_t gpgme_op_export (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{pattern}},
@w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
The function @code{gpgme_op_export} extracts public keys and returns
them in the data buffer @var{keydata}. The output format of the key
data returned is determined by the @acronym{ASCII} armor attribute set
for the context @var{ctx}, or, if that is not set, by the encoding
specified for @var{keydata}.

If @var{pattern} is @code{NULL}, all available keys are returned.
Otherwise, @var{pattern} contains an engine specific expression that
is used to limit the list to all keys matching the pattern.

@var{mode} is usually 0; other values are described above.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation
completed successfully, @code{GPG_ERR_INV_VALUE} if
@var{keydata} is not a valid empty data buffer, and passes through any
errors that are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_export_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char
*@var{pattern}}, @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
The function @code{gpgme_op_export_start} initiates a
@code{gpgme_op_export} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, and @code{GPG_ERR_INV_VALUE}
if @var{keydata} is not a valid empty data buffer.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_export_ext (@w{gpgme_ctx_t @var{ctx}}, @w{const char
*@var{pattern}[]}, @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
The function @code{gpgme_op_export} extracts public
keys and returns
them in the data buffer @var{keydata}. The output format of the key
data returned is determined by the @acronym{ASCII} armor attribute set
for the context @var{ctx}, or, if that is not set, by the encoding
specified for @var{keydata}.

If @var{pattern} or @var{*pattern} is @code{NULL}, all available keys
are returned. Otherwise, @var{pattern} is a @code{NULL} terminated
array of strings that are used to limit the list to all keys matching
at least one of the patterns verbatim.

@var{mode} is usually 0; other values are described above.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation completed successfully, @code{GPG_ERR_INV_VALUE} if
@var{keydata} is not a valid empty data buffer, and passes through any
errors that are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_export_ext_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char
*@var{pattern}[]}, @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t
@var{keydata}})
The function @code{gpgme_op_export_ext_start} initiates a
@code{gpgme_op_export_ext} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, and @code{GPG_ERR_INV_VALUE}
if @var{keydata} is not a valid empty data buffer.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_export_keys (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t keys[]},
@w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
@since{1.2.0}

The function @code{gpgme_op_export_keys} extracts public keys and returns
them in the data buffer @var{keydata}. The output format of the key
data returned is determined by the @acronym{ASCII} armor attribute set

for the context @var{ctx}, or, if that is not set, by the encoding
specified for @var{keydata}.

The keys to export are taken form the @code{NULL} terminated array
@var{keys}.  Only
 keys of the currently selected protocol of
@var{ctx} which do have a fingerprint set are considered for export.
Other keys specified by the @var{keys} are ignored.  In particular
OpenPGP keys retrieved via an external key listing are not included.

@var{mode} is usually 0; other values are described above.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation completed successfully, @code{GPG_ERR_INV_VALUE} if
@var{keydata} is not a valid empty data buffer, @code{GPG_ERR_NO_DATA}
if no useful keys are in @var{keys} and passes through any errors that
are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_export_keys_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
@var{keys}[]}, @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
@since{1.2.0}

The function @code{gpgme_op_export_keys_start} initiates a
@code{gpgme_op_export_ext} operation.  It can be completed by calling
@code{gpgme_wait} on the
 context.  @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, and @code{GPG_ERR_INV_VALUE}
if @var{keydata} is not a valid empty data buffer, @code{GPG_ERR_NO_DATA}
if no useful keys are in @var{keys} and passes through any errors that
are reported by the crypto engine support routines.
@end deftypefun

@node Importing Keys
@subsection Importing Keys
@cindex key, import
@cindex key ring, import to

Importing keys means the same as running @command{gpg} with the command
@option{--import}.

@deftypefun gpgme_error_t gpgme_op_import (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t
@var{keydata}})
The function @code{gpgme_op_import} adds the keys in the data buffer

@var{keydata} to the key ring of the crypto engine used by @var{ctx}.
The format of @var{keydata} can be @acronym{ASCII} armored, for example,
but the details are specific to the crypto engine.

After the operation completed successfully, the result
can be
retrieved with @code{gpgme_op_import_result}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
import was completed successfully, @code{GPG_ERR_INV_VALUE} if
@var{keydata} if @var{ctx} or @var{keydata} is not a valid pointer,
and @code{GPG_ERR_NO_DATA} if @var{keydata} is an empty data buffer.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_import_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{keydata}})
The function @code{gpgme_op_import_start} initiates a
@code{gpgme_op_import} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
import could be started successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx} or @var{keydata} is not a valid pointer, and
@code{GPG_ERR_NO_DATA} if @var{keydata} is an empty data buffer.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_import_keys (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t *@var{keys}})
@since{1.2.0}

The
function @code{gpgme_op_import_keys} adds the keys described by
the @code{NULL} terminated array @var{keys} to the key ring of the
crypto engine used by @var{ctx}. It is used to actually import and
make keys permanent which have been retrieved from an external source
(i.e. using @code{GPGME_KEYLIST_MODE_EXTERN}) earlier. The external
keylisting must have been made with the same context configuration (in
particular the same home directory). @footnote{Thus it is a
replacement for the usual workaround of exporting and then importing a
key to make an X.509 key permanent.} Note that for OpenPGP this may
require another access to the keyserver over the network.

Only keys of the currently selected protocol of @var{ctx} are
considered for import. Other keys specified by the @var{keys} are
ignored. As of now all considered keys must have been retrieved using
the same method, i.e. the used key listing mode must be identical.

After the operation completed successfully,

the result can be
retrieved with @code{gpgme_op_import_result}.

To move keys from one home directory to another, export and import the
keydata using @code{gpgme_op_export} and @code{gpgme_op_import}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
import was completed successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx} is not a valid pointer, @code{GPG_ERR_CONFLICT} if the key
listing mode does not match, and @code{GPG_ERR_NO_DATA} if no keys are
considered for export.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_import_keys_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
*@var{keys}})
@since{1.2.0}

The function @code{gpgme_op_import_keys_start} initiates a
@code{gpgme_op_import_keys} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
import was completed successfully, @code{GPG_ERR_INV_VALUE} if
@var{keydata} if @var{ctx}
or @var{keydata} is not a valid pointer,
@code{GPG_ERR_CONFLICT} if the key listing mode does not match, and
@code{GPG_ERR_NO_DATA} if no keys are considered for export.
@end deftypefun

@deftp {Data type} {gpgme_import_status_t}
This is a pointer to a structure used to store a part of the result of
a @code{gpgme_op_import} operation. For each considered key one
status is added that contains information about the result of the
import. The structure contains the following members:

@table @code
@item gpgme_import_status_t next
This is a pointer to the next status structure in the linked list, or
@code{NULL} if this is the last element.

@item char *fpr
This is the fingerprint of the key that was considered.

@item gpgme_error_t result
If the import was not successful, this is the error value that caused
the import to fail. Otherwise the error code is
@code{GPG_ERR_NO_ERROR}.

@item unsigned int status
This is a bit-wise OR of the following flags that give more
information about what
part of the key was imported. If the key was
already known, this might be 0.

@table @code
@item GPGME_IMPORT_NEW
The key was new.

@item GPGME_IMPORT_UID
The key contained new user IDs.

@item GPGME_IMPORT_SIG
The key contained new signatures.

@item GPGME_IMPORT_SUBKEY
The key contained new sub keys.

@item GPGME_IMPORT_SECRET
The key contained a secret key.
@end table
@end table
@end deftp

@deftp {Data type} {gpgme_import_result_t}
This is a pointer to a structure used to store the result of a
@code{gpgme_op_import} operation. After a successful import
operation, you can retrieve the pointer to the result with
@code{gpgme_op_import_result}. The structure contains the following
members:

@table @code
@item int considered
The total number of considered keys.

@item int no_user_id
The number of keys without user ID.

@item int imported
The total number of imported keys.

@item int imported_rsa
The number of imported RSA keys.

@item int unchanged
The number of unchanged keys.

@item
int new_user_ids
The number of new user IDs.

@item int new_sub_keys
The number of new sub keys.

@item int new_signatures
The number of new signatures.

@item int new_revocations
The number of new revocations.

@item int secret_read
The total number of secret keys read.

@item int secret_imported
The number of imported secret keys.

@item int secret_unchanged
The number of unchanged secret keys.

@item int not_imported
The number of keys not imported.

@item gpgme_import_status_t imports
A list of gpgme_import_status_t objects which contain more information
about the keys for which an import was attempted.

@item int skipped_v3_keys
For security reasons modern versions of GnuPG do not anymore support
v3 keys (created with PGP 2.x) and ignores them on import. This
counter provides the number of such skipped v3 keys.

@end table
@end deftp

@deftypefun gpgme_import_result_t gpgme_op_import_result (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_op_import_result} returns a
@code{gpgme_import_result_t}
pointer to a structure holding the result
of a @code{gpgme_op_import} operation. The pointer is only valid if
the last operation on the context was a @code{gpgme_op_import} or
@code{gpgme_op_import_start} operation, and if this operation finished
successfully. The returned pointer is only valid until the next
operation is started on the context.
@end deftypefun

@node Deleting Keys
@subsection Deleting Keys
@cindex key, delete
@cindex key ring, delete from

@deftypefun gpgme_error_t gpgme_op_delete_ext (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t @var{key}}, @w{unsigned int @var{flags}})
@since{1.9.1}

The function @code{gpgme_op_delete_ext} deletes the key @var{key} from
the key ring of the crypto engine used by @var{ctx}.

@var{flags} can be set to the bit-wise OR of the following flags:

@table @code
@item GPGME_DELETE_ALLOW_SECRET
@since{1.9.1}

If not set, only public keys are deleted. If set, secret keys are
deleted as well, if that is supported.

@item
 GPGME_DELETE_FORCE
@since{1.9.1}

If set, the user is not asked to confirm the deletion.
@end table

The function returns the error code @code{GPG_ERR_NO_ERROR} if the key
was deleted successfully, @code{GPG_ERR_INV_VALUE} if @var{ctx} or
@var{key} is not a valid pointer, @code{GPG_ERR_NO_PUBKEY} if
@var{key} could not be found in the keyring,
@code{GPG_ERR_AMBIGUOUS_NAME} if the key was not specified
unambiguously, and @code{GPG_ERR_CONFLICT} if the secret key for
@var{key} is available, but @var{allow_secret} is zero.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_delete_ext_start (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t @var{key}}, @w{unsigned int @var{flags}})
@since{1.9.1}

The function @code{gpgme_op_delete_ext_start} initiates a
@code{gpgme_op_delete} operation.  It can be completed by calling
@code{gpgme_wait} on the context.  @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation was started successfully,

and @code{GPG_ERR_INV_VALUE} if
@var{ctx} or @var{key} is not a valid pointer.
@end deftypefun

The following functions allow only to use one particular flag.

@deftypefun gpgme_error_t gpgme_op_delete (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t @var{key}}, @w{int @var{allow_secret}})
Similar to @code{gpgme_op_delete_ext}, but only the flag
@code{GPGME_DELETE_ALLOW_SECRET} can be provided.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_delete_start (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t @var{key}}, @w{int @var{allow_secret}})
Similar to @code{gpgme_op_delete_ext_start}, but only the flag
@code{GPGME_DELETE_ALLOW_SECRET} can be provided.
@end deftypefun

@node Changing Passphrases
@subsection Changing Passphrases
@cindex passphrase, change

@deftypefun gpgme_error_t gpgme_op_passwd @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{const gpgme_key_t @var{key}}, @
@w{unsigned int @var{flags}})

@since{1.3.0}

The function @code{gpgme_op_passwd}
changes the passphrase of the
private key associated with @var{key}. The only allowed value for
@var{flags} is @code{0}. The backend engine will usually popup a window
to ask for the old and the new passphrase. Thus this function is not
useful in a server application (where passphrases are not required
anyway).

Note that old @code{gpg} engines (before version 2.0.15) do not support
this command and will silently ignore it.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_passwd_start @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{const gpgme_key_t @var{key}}, @
@w{unsigned int @var{flags}})

@since{1.3.0}

The function @code{gpgme_op_passwd_start} initiates a
@code{gpgme_op_passwd} operation.  It can be completed by calling
@code{gpgme_wait} on the context.  @xref{Waiting For Completion}.

The function returns @code{0} if the operation was started successfully,
and an error code if one of the arguments is not valid or the
 oepration
could not be started.
@end deftypefun

@c
@c  CHANGING TOFU DATA
@c
@node Changing TOFU Data
@subsection Changing TOFU Data
@cindex validity, TOFU

The OpenPGP engine features a Trust-On-First-Use (TOFU) key validation
model.  For resolving conflicts it is necessary to declare the policy
for a key.  See the GnuPG manual for details on the TOFU
implementation.

@deftp {Data type} {enum gpgme_tofu_policy_t}
@since{1.7.0}

@tindex gpgme_tofu_policy_t
The @code{gpgme_tofu_policy_t} type specifies the set of possible
policy values that are supported by @acronym{GPGME}:

@table @code
@item GPGME_TOFU_POLICY_AUTO
Set the policy to ``auto''.
@item GPGME_TOFU_POLICY_GOOD
Set the policy to ``good''.
@item GPGME_TOFU_POLICY_BAD
Set the policy to ``bad''.
@item GPGME_TOFU_POLICY_ASK
Set the policy to ``ask''.
@item GPGME_TOFU_POLICY_UNKNOWN
Set the policy to ``unknown''.
@end table

@end deftp

To change the policy for a key the following functions can be used:

```
@deftypefun gpgme_error_t
 gpgme_op_tofu_policy @
          (@w{gpgme_ctx_t @var{ctx}},       @
           @w{const gpgme_key_t @var{key}}, @
           @w{gpgme_tofu_policy_t @var{policy}})

@since{1.7.0}

The function @code{gpgme_op_tofu_policy} changes the TOFU policy of
@var{key}.  The valid values for @var{policy} are listed above.  As of
now this function does only work for OpenPGP and requires at least
version 2.1.10 of GnuPG.

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if
the engine does not support the command, or a bunch of other error
codes.

@end deftypefun

@deftypefun gpgme_error_t gpgme_op_tofu_policy_start @
          (@w{gpgme_ctx_t @var{ctx}},       @
           @w{const gpgme_key_t @var{key}}, @
           @w{gpgme_tofu_policy_t @var{policy}})

@since{1.7.0}

The function @code{gpgme_op_tofu_policy_start} initiates a
@code{gpgme_op_tofu_policy} operation.    It can be completed by calling
@code{gpgme_wait} on the context.  @xref{Waiting For Completion}.

The
 function returns @code{0} if the operation was started successfully,
and an error code if one of the arguments is not valid or the oepration
could not be started.

@end deftypefun


@node Advanced Key Editing
@subsection Advanced Key Editing
@cindex key, edit

@deftp {Data type} {gpgme_error_t (*gpgme_interact_cb_t) @
  (@w{void *@var{handle}}, @
   @w{const char *@var{status}}, @
   @w{const char *@var{args}}, @
   @w{int @var{fd}})}
```

@since{1.7.0}

@tindex gpgme_interact_cb_t
The @code{gpgme_interact_cb_t} type is the type of functions which
@acronym{GPGME} calls if it a key interact operation is on-going. The
status keyword @var{status} and the argument line @var{args} are
passed through by @acronym{GPGME} from the crypto engine. An empty
string represents EOF. The file descriptor @var{fd} is -1 for normal
status messages. If @var{status} indicates a command rather than a
status message, the response to the command should be written to
@var{fd}. The @var{handle} is
provided by the user at start of
operation.

The function should return @code{GPG_ERR_FALSE} if it did not handle
the status code, @code{0} for success, or any other error value.
@end deftp

@deftypefun gpgme_error_t gpgme_op_interact (@w{gpgme_ctx_t @var{ctx}}, @
@w{gpgme_key_t @var{key}}, @
@w{unsigned int @var{flags}}, @
@w{gpgme_interact_cb_t @var{fnc}}, @
@w{void *@var{handle}}, @
@w{gpgme_data_t @var{out}})

@since{1.7.0}

The function @code{gpgme_op_interact} processes the key @var{KEY}
interactively, using the interact callback function @var{FNC} with the
handle @var{HANDLE}. The callback is invoked for every status and
command request from the crypto engine. The output of the crypto
engine is written to the data object @var{out}.

Note that the protocol between the callback function and the crypto
engine is specific to the crypto engine and no further support in
implementing this protocol correctly is provided by @acronym{GPGME}.

@var{flags} modifies the behaviour
of the function; the only defined
bit value is:

@table @code
@item GPGME_INTERACT_CARD
@since{1.7.0}

This is used for smartcard based keys and uses gpgs
@code{--card-edit} command.

@end table

The function returns @code{0} if the edit operation completes
successfully, @code{GPG_ERR_INV_VALUE} if @var{ctx} or @var{key} is
not a valid pointer, and any error returned by the crypto engine or
the edit callback handler.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_interact_start (@w{gpgme_ctx_t @var{ctx}}, @
  @w{gpgme_key_t @var{key}}, @
  @w{unsigned int @var{flags}}, @
  @w{gpgme_interact_cb_t @var{fnc}}, @
  @w{void *@var{handle}}, @
  @w{gpgme_data_t @var{out}})

@since{1.7.0}

The function @code{gpgme_op_interact_start} initiates a
@code{gpgme_op_interact} operation.  It can be completed by calling
@code{gpgme_wait} on the context.  @xref{Waiting For Completion}.

The function returns @code{0} if the operation was started
successfully, and @code{GPG_ERR_INV_VALUE}
 if @var{ctx} or @var{key}
is not a valid pointer.
@end deftypefun

@node Crypto Operations
@section Crypto Operations
@cindex cryptographic operation

Sometimes, the result of a crypto operation returns a list of invalid
keys encountered in processing the request.  The following structure
is used to hold information about such a key.

@deftp {Data type} {gpgme_invalid_key_t}
This is a pointer to a structure used to store a part of the result of
a crypto operation which takes user IDs as one input parameter.  The
structure contains the following members:

@table @code
@item gpgme_invalid_key_t next
This is a pointer to the next invalid key structure in the linked
list, or @code{NULL} if this is the last element.

@item char *fpr

The fingerprint or key ID of the invalid key encountered.

@item gpgme_error_t reason
An error code describing the reason why the key was found invalid.
@end table
@end deftp

@menu
* Decrypt:: Decrypting a ciphertext.
* Verify:: Verifying a signature.
* Decrypt and Verify:: Decrypting a signed ciphertext.
* Sign:: Creating a signature.
* Encrypt:: Encrypting a plaintext.
@end menu

@node Decrypt
@subsection Decrypt
@cindex decryption
@cindex cryptographic operation, decryption

@deftypefun gpgme_error_t gpgme_op_decrypt (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{cipher}}, @w{gpgme_data_t @var{plain}})
The function @code{gpgme_op_decrypt} decrypts the ciphertext in the data object @var{cipher} and stores it into the data object @var{plain}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the ciphertext could be decrypted successfully, @code{GPG_ERR_INV_VALUE} if @var{ctx}, @var{cipher} or @var{plain} is not a valid pointer, @code{GPG_ERR_NO_DATA} if @var{cipher} does not contain any data to decrypt, @code{GPG_ERR_DECRYPT_FAILED} if @var{cipher} is not a valid cipher text, @code{GPG_ERR_BAD_PASSPHRASE} if the passphrase for the secret key could not be retrieved, and passes through some errors that are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_decrypt_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{cipher}}, @w{gpgme_data_t @var{plain}})
The function @code{gpgme_op_decrypt_start} initiates a @code{gpgme_op_decrypt} operation. It can be completed by calling @code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the operation could be started successfully, and @code{GPG_ERR_INV_VALUE}

if @var{cipher} or @var{plain} is not a valid pointer.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_decrypt_ext ( @
    @w{gpgme_ctx_t @var{ctx}}, @
    @w{gpgme_decrypt_flags_t @var{flags}}, @
    @w{gpgme_data_t @var{cipher}}, @
    @w{gpgme_data_t @var{plain}})

@since{1.8.0}

The function @code{gpgme_op_decrypt_ext} is the same as
@code{gpgme_op_decrypt}
but has an additional argument
@var{flags}. If @var{flags} is 0 both function behave identically.

The value in @var{flags} is a bitwise-or combination of one or
multiple of the following bit values:

@table @code
@item GPGME_DECRYPT_VERIFY
@since{1.8.0}

The @code{GPGME_DECRYPT_VERIFY} symbol specifies that this function
shall exactly act as @code{gpgme_op_decrypt_verify}.

@item GPGME_DECRYPT_UNWRAP
@since{1.8.0}

The @code{GPGME_DECRYPT_UNWRAP} symbol specifies that the output shall
be an OpenPGP message with only the encryption layer removed. This
requires GnuPG 2.1.12 and works only for OpenPGP. This is the
counterpart to @code{GPGME_ENCRYPT_WRAP}.

@end table

The function returns the error codes as described for
@code{gpgme_op_decrypt}.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_decrypt_ext_start ( @
    @w{gpgme_ctx_t @var{ctx}}, @
    @w{gpgme_decrypt_flags_t @var{flags}}, @
    @w{gpgme_data_t @var{cipher}}, @

@w{gpgme_data_t @var{plain}})

@since{1.8.0}

The function @code{gpgme_op_decrypt_ext_start} initiates a
@code{gpgme_op_decrypt_ext} operation.  It can be completed by calling
@code{gpgme_wait} on the context.  @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, and @code{GPG_ERR_INV_VALUE}
if @var{cipher} or @var{plain} is not a valid pointer.
@end deftypefun

@deftp {Data type} {gpgme_recipient_t}
@since{1.1.0}

This is a pointer to a structure used to store information about the
recipient of an encrypted text which is decrypted in a
@code{gpgme_op_decrypt} operation.  This information (except for the
status field) is even available before the operation finished
successfully, for example in a passphrase callback.  The structure
contains the following members:

@table @code
@item gpgme_recipient_t next
This is a pointer to the next recipient structure in the linked list,
or @code{NULL} if this is
 the last element.

@item gpgme_pubkey_algo_t
The public key algorithm used in the encryption.

@item char *keyid
This is the key ID of the key (in hexadecimal digits) used as
recipient.

@item gpgme_error_t status
This is an error number with the error code GPG_ERR_NO_SECKEY if the
secret key for this recipient is not available, and 0 otherwise.
@end table
@end deftp

@deftp {Data type} {gpgme_decrypt_result_t}
This is a pointer to a structure used to store the result of a
@code{gpgme_op_decrypt} operation.  After successfully decrypting
data, you can retrieve the pointer to the result with
@code{gpgme_op_decrypt_result}.  As with all result structures, it
this structure shall be considered read-only and an application must
not allocate such a strucure on its own.  The structure contains the

following members:

@table @code
@item char *unsupported_algorithm
If an unsupported algorithm was encountered, this string describes the
algorithm that is not supported.

@item unsigned int wrong_key_usage
 : 1
@since{0.9.0}
This is true if the key was not used according to its policy.

@item unsigned int legacy_cipher_nomdc : 1
@since{1.11.2}
The message was made by a legacy algorithm without any integrity
protection.  This might be an old but legitimate message.

@item unsigned int is_mime : 1;
@since{1.11.0}
The message claims that the content is a MIME object.

@item unsigned int is_de_vs : 1;
@since{1.10.0}
The message was encrypted in a VS-NfD compliant way.  This is a
specification in Germany for a restricted communication level.

@item gpgme_recipient_t recipients
@since{1.1.0}

This is a linked list of recipients to which this message was encrypted.

@item char *file_name
This is the filename of the original plaintext message file if it is
known, otherwise this is a null pointer.

@item char *session_key
@since{1.8.0}

A textual representation (nul-terminated string) of the session key
used in symmetric encryption of the message, if the context has been
set to export session
 keys (see @code{gpgme_set_ctx_flag,
"export-session-key"}), and a session key was available for the most
recent decryption operation.  Otherwise, this is a null pointer.

You must not try to access this member of the struct unless
@code{gpgme_set_ctx_flag (ctx, "export-session-key")} returns success
or @code{gpgme_get_ctx_flag (ctx, "export-session-key")} returns true

(non-empty string).

@item char *symkey_algo
@since{1.11.0}

A string with the symmetric encryption algorithm and mode using the
format "<algo>.<mode>". Note that the deprecated non-MDC encryption mode of
OpenPGP is given as "PGPCFB".

@end table
@end deftp

@deftypefun gpgme_decrypt_result_t gpgme_op_decrypt_result (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_op_decrypt_result} returns a
@code{gpgme_decrypt_result_t} pointer to a structure holding the
result of a @code{gpgme_op_decrypt} operation. The pointer is only
valid if the last operation on the context was a
@code{gpgme_op_decrypt} or @code{gpgme_op_decrypt_start}
operation.
If the operation failed this might be a @code{NULL} pointer. The
returned pointer is only valid until the next operation is started on
the context.
@end deftypefun

@node Verify
@subsection Verify
@cindex verification
@cindex signature, verification
@cindex cryptographic operation, verification
@cindex cryptographic operation, signature check
@cindex signature notation data
@cindex notation data

@deftypefun gpgme_error_t gpgme_op_verify (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{sig}},
@w{gpgme_data_t @var{signed_text}}, @w{gpgme_data_t @var{plain}})
The function @code{gpgme_op_verify} verifies that the signature in the
data object @var{sig} is a valid signature. If @var{sig} is a
detached signature, then the signed text should be provided in
@var{signed_text} and @var{plain} should be a null pointer.
Otherwise, if @var{sig} is a normal (or cleartext) signature,
@var{signed_text} should be a null pointer and @var{plain} should be a
writable data object
that will contain the plaintext after successful
verification.

The results of the individual signature verifications can be retrieved
with @code{gpgme_op_verify_result}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be completed successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx}, @var{sig} or @var{plain} is not a valid pointer,
@code{GPG_ERR_NO_DATA} if @var{sig} does not contain any data to
verify, and passes through any errors that are reported by the crypto
engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_verify_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{sig}}, @w{gpgme_data_t @var{signed_text}}, @w{gpgme_data_t @var{plain}})
The function @code{gpgme_op_verify_start} initiates a
@code{gpgme_op_verify} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started
successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx}, @var{sig} or @var{plain} is not a valid pointer, and
@code{GPG_ERR_NO_DATA} if @var{sig} or @var{plain} does not contain
any data to verify.
@end deftypefun

@deftp {Data type} {gpgme_sig_notation_t}
This is a pointer to a structure used to store a part of the result of
a @code{gpgme_op_verify} operation. The structure contains the
following members:

@table @code
@item gpgme_sig_notation_t next
This is a pointer to the next new signature notation structure in the
linked list, or @code{NULL} if this is the last element.

@item char *name
The name of the notation field. If this is @code{NULL}, then the
member @code{value} will contain a policy URL.

@item int name_len
The length of the @code{name} field. For strings the length is
counted without the trailing binary zero.

@item char *value
The value of the notation field. If @code{name} is @code{NULL}, then
this is a policy URL.

@item int value_len
The length of the @code{value}

field.  For strings the length is
counted without the trailing binary zero.

@item gpgme_sig_notation_flags_t flags
The accumulated flags field.  This field contains the flags associated
with the notation data in an accumulated form which can be used as an
argument to the function @code{gpgme_sig_notation_add}.  The value
@code{flags} is a bitwise-or combination of one or multiple of the
following bit values:

@table @code
@item GPGME_SIG_NOTATION_HUMAN_READABLE
@since{1.1.0}

The @code{GPGME_SIG_NOTATION_HUMAN_READABLE} symbol specifies that the
notation data is in human readable form

@item GPGME_SIG_NOTATION_CRITICAL
@since{1.1.0}

The @code{GPGME_SIG_NOTATION_CRITICAL} symbol specifies that the
notation data is critical.

@end table

@item unsigned int human_readable : 1
This is true if the @code{GPGME_SIG_NOTATION_HUMAN_READABLE} flag is
set and false otherwise.  This flag is only valid for notation data,
not for policy URLs.

@item unsigned int critical : 1
This is true if the
@code{GPGME_SIG_NOTATION_CRITICAL} flag is set and
false otherwise.  This flag is valid for notation data and policy URLs.

@end table
@end deftp

@deftp {Data type} {gpgme_signature_t}
This is a pointer to a structure used to store a part of the result of
a @code{gpgme_op_verify} operation.  The structure contains the
following members:

@table @code
@item gpgme_signature_t next
This is a pointer to the next new signature structure in the linked
list, or @code{NULL} if this is the last element.

@item gpgme_sigsum_t summary
This is a bit vector giving a summary of the signature status. It provides an easy interface to a defined semantic of the signature status. Checking just one bit is sufficient to see whether a signature is valid without any restrictions. This means that you can check for GPGME_SIGSUM_VALID like this:

@example
if ((sig.summary & GPGME_SIGSUM_VALID))
@{
..do stuff if valid..
@}
else
@{
..do stuff if not fully valid..
@}
@end example

The defined bits are:
@table @code
@item GPGME_SIGSUM_VALID
The signature is fully valid.

@item GPGME_SIGSUM_GREEN
The signature is good but one might want to display some extra information. Check the other bits.

@item GPGME_SIGSUM_RED
The signature is bad. It might be useful to check other bits and display more information, i.e. a revoked certificate might not render a signature invalid when the message was received prior to the cause for the revocation.

@item GPGME_SIGSUM_KEY_REVOKED
The key or at least one certificate has been revoked.

@item GPGME_SIGSUM_KEY_EXPIRED
The key or one of the certificates has expired. It is probably a good idea to display the date of the expiration.

@item GPGME_SIGSUM_SIG_EXPIRED
The signature has expired.

@item GPGME_SIGSUM_KEY_MISSING
Can't verify due to a missing key or certificate.

@item GPGME_SIGSUM_CRL_MISSING
The CRL (or an equivalent mechanism) is not available.

@item GPGME_SIGSUM_CRL_TOO_OLD
Available CRL is too
old.

@item GPGME_SIGSUM_BAD_POLICY
A policy requirement was not met.

@item GPGME_SIGSUM_SYS_ERROR
A system error occurred.

@item GPGME_SIGSUM_TOFU_CONFLICT
A TOFU conflict was detected.
@end table

@item char *fpr
This is the fingerprint or key ID of the signature.

@item gpgme_error_t status
This is the status of the signature. In particular, the following
status codes are of interest:

@table @code
@item GPG_ERR_NO_ERROR
This status indicates that the signature could be verified or that
there is no signature. For the combined result this status
means that all signatures could be verified.

Note: This does not mean that a valid signature could be found. Check
the @code{summary} field for that.

For example a @code{gpgme_op_decrypt_verify} returns a verification
result with GPG_ERR_NO_ERROR for encrypted but unsigned data.

@item GPG_ERR_SIG_EXPIRED
This status indicates that the signature is valid but expired. For
the combined result this
status means that all signatures are valid
and expired.

@item GPG_ERR_KEY_EXPIRED
This status indicates that the signature is valid but the key used to
verify the signature has expired. For the combined result this status
means that all signatures are valid and all keys are expired.

@item GPG_ERR_CERT_REVOKED
This status indicates that the signature is valid but the key used
to verify the signature has been revoked. For the combined result

this status means that all signatures are valid and all keys are
revoked.

@item GPG_ERR_BAD_SIGNATURE
This status indicates that the signature is invalid.  For the combined
result this status means that all signatures are invalid.

@item GPG_ERR_NO_PUBKEY
This status indicates that the signature could not be verified due to
a missing key.  For the combined result this status means that all
signatures could not be checked due to missing keys.

@item GPG_ERR_GENERAL
This status indicates that there was some other
error which prevented
the signature verification.
@end table

@item gpgme_sig_notation_t notations
This is a linked list with the notation data and policy URLs.

@item unsigned long timestamp
The creation timestamp of this signature.

@item unsigned long exp_timestamp
The expiration timestamp of this signature, or 0 if the signature does
not expire.

@item unsigned int wrong_key_usage : 1
This is true if the key was not used according to its policy.

@item unsigned int pka_trust : 2
This is set to the trust information gained by means of the PKA system.
Values are:
@table @code
@item 0
No PKA information available or verification not possible.
@item 1
PKA verification failed.
@item 2
PKA verification succeeded.
@item 3
Reserved for future use.
@end table
Depending on the configuration of the engine, this metric may also be
reflected by the validity of the signature.

@item unsigned int chain_model : 1

@since{1.1.6}

This is true if the
 validity of the signature has been checked using the
chain model.  In the chain model the time the signature has been created
must be within the validity period of the certificate and the time the
certificate itself has been created must be within the validity period
of the issuing certificate.  In contrast the default validation model
checks the validity of signature as well at the entire certificate chain
at the current time.

@item gpgme_validity_t validity
The validity of the signature.

@item gpgme_error_t validity_reason
If a signature is not valid, this provides a reason why.

@item gpgme_pubkey_algo_t
The public key algorithm used to create this signature.

@item gpgme_hash_algo_t
The hash algorithm used to create this signature.

@item char *pka_address
The mailbox from the PKA information or @code{NULL}.

@item gpgme_key_t key
@since{1.7.0}

An object describing the key used to create the signature.  This key
object may be incomplete in that it only conveys information
availabale
 directly with a signature.  It may also be @code{NULL} if
such information is not readily available.

@end table
@end deftp

@deftp {Data type} {gpgme_verify_result_t}
This is a pointer to a structure used to store the result of a
@code{gpgme_op_verify} operation.  After verifying a signature, you
can retrieve the pointer to the result with
@code{gpgme_op_verify_result}.  If the operation failed this might be
a @code{NULL} pointer.  The structure contains the following member:

@table @code
@item gpgme_signature_t signatures

A linked list with information about all signatures for which a
verification was attempted.

@item char *file_name
This is the filename of the original plaintext message file if it is
known, otherwise this is a null pointer.  Warning: The filename is
not covered by the signature.

@item unsigned int is_mime : 1;
@since{1.11.0}

The message claims that the content is a MIME object.  Warning: This
flag is not covered by the signature.

@end table
@end deftp

@deftypefun
 gpgme_verify_result_t gpgme_op_verify_result (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_op_verify_result} returns a
@code{gpgme_verify_result_t} pointer to a structure holding the result
of a @code{gpgme_op_verify} operation.  The pointer is only valid if
the last operation on the context was a @code{gpgme_op_verify},
@code{gpgme_op_verify_start}, @code{gpgme_op_decrypt_verify} or
@code{gpgme_op_decrypt_verify_start} operation, and if this operation
finished successfully (for @code{gpgme_op_decrypt_verify} and
@code{gpgme_op_decrypt_verify_start}, the error code
@code{GPG_ERR_NO_DATA} counts as successful in this context).  The
returned pointer is only valid until the next operation is started on
the context.
@end deftypefun

@node Decrypt and Verify
@subsection Decrypt and Verify
@cindex decryption and verification
@cindex verification and decryption
@cindex signature check
@cindex cryptographic operation, decryption and verification

@deftypefun gpgme_error_t gpgme_op_decrypt_verify
 (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{cipher}}, @w{gpgme_data_t @var{plain}})
The function @code{gpgme_op_decrypt_verify} decrypts the ciphertext in
the data object @var{cipher} and stores it into the data object
@var{plain}.  If @var{cipher} contains signatures, they will be
verified.

After the operation completed, @code{gpgme_op_decrypt_result} and

@code{gpgme_op_verify_result} can be used to retrieve more information
about the signatures.

If the error code @code{GPG_ERR_NO_DATA} is returned, @var{cipher}
does not contain any data to decrypt. However, it might still be
signed. The information about detected signatures is available with
@code{gpgme_op_verify_result} in this case.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
ciphertext could be decrypted successfully, @code{GPG_ERR_INV_VALUE}
if @var{ctx}, @var{cipher} or @var{plain} is not a valid pointer,
@code{GPG_ERR_NO_DATA} if @var{cipher} does not contain any data to
decrypt,
@code{GPG_ERR_DECRYPT_FAILED} if @var{cipher} is not a valid
cipher text, @code{GPG_ERR_BAD_PASSPHRASE} if the passphrase for the
secret key could not be retrieved, and passes through any errors that
are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_decrypt_verify_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t
@var{cipher}}, @w{gpgme_data_t @var{plain}})
The function @code{gpgme_op_decrypt_verify_start} initiates a
@code{gpgme_op_decrypt_verify} operation. It can be completed by
calling @code{gpgme_wait} on the context. @xref{Waiting For
Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx}, @var{cipher}, @var{plain} or @var{r_stat} is not a valid
pointer, and @code{GPG_ERR_NO_DATA} if @var{cipher} does not contain
any data to decrypt.
@end deftypefun

When processing mails it is sometimes useful to extract the actual
mail
address (the ``addr-spec'') from a string. GPGME provides this
helper function which uses the same semantics as the internal
functions in GPGME and GnuPG:

@deftypefun @w{char *} gpgme_addrspec_from_uid (@w{const char *@var{uid}})

@since{1.7.1}

Return the mail address (called ``addr-spec'' in RFC-5322) from the
string @var{uid} which is assumed to be a user id (called ``address''
in RFC-5322). All plain ASCII characters (i.e. those with bit 7
cleared) in the result are converted to lowercase. Caller must free
the result using @code{gpgme_free}. Returns @code{NULL} if no valid

address was found (in which case @code{ERRNO} is set to @code{EINVAL})
or for other errors.

@end deftypefun

@node Sign
@subsection Sign
@cindex signature, creation
@cindex sign
@cindex cryptographic operation, signing

A signature can contain signatures by one or more keys. The set of
keys used to create a signatures is contained in a context, and is
applied to all following signing operations in
this context (until the
set is changed).

@menu
* Selecting Signers:: How to choose the keys to sign with.
* Creating a Signature:: How to create a signature.
* Signature Notation Data:: How to add notation data to a signature.
@end menu

@node Selecting Signers
@subsubsection Selecting Signers
@cindex signature, selecting signers
@cindex signers, selecting

The key or the keys used to create a signature are stored in the
context. The following functions can be used to manipulate this list.
If no signer has been set into the context a default key is used for
signing.

@deftypefun void gpgme_signers_clear (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_signers_clear} releases a reference for each
key on the signers list and removes the list of signers from the
context @var{ctx}.

Every context starts with an empty list.
@end deftypefun

@deftypefun gpgme_error_t gpgme_signers_add (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t
@var{key}})
The function
@code{gpgme_signers_add} adds the key @var{key} to the
list of signers in the context @var{ctx}.

Calling this function acquires an additional reference for the key.
@end deftypefun

@deftypefun @w{unsigned int} gpgme_signers_count (@w{const gpgme_ctx_t @var{ctx}})
@since{1.4.3}

The function @code{gpgme_signers_count} returns the number of signer keys in
the context @var{ctx}.
@end deftypefun

@deftypefun gpgme_key_t gpgme_signers_enum (@w{const gpgme_ctx_t @var{ctx}}, @w{int @var{seq}})
The function @code{gpgme_signers_enum} returns the @var{seq}th key in
the list of signers in the context @var{ctx}.  An additional reference
is acquired for the user.

If @var{seq} is out of range, @code{NULL} is returned.
@end deftypefun

@node Creating a Signature
@subsubsection Creating a Signature

@deftp {Data type} {enum gpgme_sig_mode_t}
@tindex gpgme_sig_mode_t
The @code{gpgme_sig_mode_t} type is used to specify the desired type of a
signature.  The following modes are available:

@table @code
@item
 GPGME_SIG_MODE_NORMAL
A normal signature is made, the output includes the plaintext and the
signature.

@item GPGME_SIG_MODE_DETACH
A detached signature is made.

@item GPGME_SIG_MODE_CLEAR
A clear text signature is made.  The @acronym{ASCII} armor and text
mode settings of the context are ignored.
@end table
@end deftp

@deftypefun gpgme_error_t gpgme_op_sign (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{plain}},
@w{gpgme_data_t @var{sig}}, @w{gpgme_sig_mode_t @var{mode}})
The function @code{gpgme_op_sign} creates a signature for the text in
the data object @var{plain} and returns it in the data object
@var{sig}.  The type of the signature created is determined by the

@acronym{ASCII} armor (or, if that is not set, by the encoding
specified for @var{sig}), the text mode attributes set for the context
@var{ctx} and the requested signature mode @var{mode}.

After the operation completed successfully, the result can be
retrieved with @code{gpgme_op_sign_result}.

If an S/MIME
signed message is created using the CMS crypto engine,
the number of certificates to include in the message can be specified
with @code{gpgme_set_include_certs}. @xref{Included Certificates}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
signature could be created successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx}, @var{plain} or @var{sig} is not a valid pointer,
@code{GPG_ERR_NO_DATA} if the signature could not be created,
@code{GPG_ERR_BAD_PASSPHRASE} if the passphrase for the secret key
could not be retrieved, @code{GPG_ERR_UNUSABLE_SECKEY} if there are
invalid signers, and passes through any errors that are reported by the
crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_sign_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t
@var{plain}}, @w{gpgme_data_t @var{sig}}, @w{gpgme_sig_mode_t @var{mode}})
The function @code{gpgme_op_sign_start} initiates a
@code{gpgme_op_sign} operation. It can be completed by calling
@code{gpgme_wait}
on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the operation could be
started successfully, and @code{GPG_ERR_INV_VALUE} if @var{ctx},
@var{plain} or @var{sig} is not a valid pointer.
@end deftypefun

@deftp {Data type} {gpgme_new_signature_t}
This is a pointer to a structure used to store a part of the result of
a @code{gpgme_op_sign} operation. The structure contains the
following members:

@table @code
@item gpgme_new_signature_t next
This is a pointer to the next new signature structure in the linked
list, or @code{NULL} if this is the last element.

@item gpgme_sig_mode_t type
The type of this signature.

@item gpgme_pubkey_algo_t pubkey_algo

The public key algorithm used to create this signature.

@item gpgme_hash_algo_t hash_algo
The hash algorithm used to create this signature.

@item unsigned int sig_class
The signature class of this signature.

@item long int timestamp
The creation timestamp of this signature.

@item
 char *fpr
The fingerprint of the key which was used to create this signature.
@end table
@end deftp

@deftp {Data type} {gpgme_sign_result_t}
This is a pointer to a structure used to store the result of a
@code{gpgme_op_sign} operation.  After successfully generating a
signature, you can retrieve the pointer to the result with
@code{gpgme_op_sign_result}.  The structure contains the following
members:

@table @code
@item gpgme_invalid_key_t invalid_signers
A linked list with information about all invalid keys for which a
signature could not be created.

@item gpgme_new_signature_t signatures
A linked list with information about all signatures created.
@end table
@end deftp

@deftypefun gpgme_sign_result_t gpgme_op_sign_result (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_op_sign_result} returns a
@code{gpgme_sign_result_t} pointer to a structure holding the result
of a @code{gpgme_op_sign} operation.  The pointer is only valid if the
last operation on the context was
 a @code{gpgme_op_sign},
@code{gpgme_op_sign_start}, @code{gpgme_op_encrypt_sign} or
@code{gpgme_op_encrypt_sign_start} operation.  If that operation
failed, the function might return a @code{NULL} pointer. The returned
pointer is only valid until the next operation is started on the
context.
@end deftypefun

@node Signature Notation Data
@subsubsection Signature Notation Data
@cindex notation data
@cindex signature notation data
@cindex policy URL

Using the following functions, you can attach arbitrary notation data
to a signature.  This information is then available to the user when
the signature is verified.

@deftypefun void gpgme_sig_notation_clear (@w{gpgme_ctx_t @var{ctx}})
@since{1.1.0}

The function @code{gpgme_sig_notation_clear} removes the notation data
from the context @var{ctx}.  Subsequent signing operations from this
context will not include any notation data.

Every context starts with an empty notation data list.
@end deftypefun

@deftypefun gpgme_error_t gpgme_sig_notation_add
 (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{name}}, @w{const char *@var{value}},
@w{gpgme_sig_notation_flags_t @var{flags}})
@since{1.1.0}

The function @code{gpgme_sig_notation_add} adds the notation data with
the name @var{name} and the value @var{value} to the context
@var{ctx}.

Subsequent signing operations will include this notation data, as well
as any other notation data that was added since the creation of the
context or the last @code{gpgme_sig_notation_clear} operation.

The arguments @var{name} and @var{value} must be @code{NUL}-terminated
strings in human-readable form.  The flag
@code{GPGME_SIG_NOTATION_HUMAN_READABLE} is implied
(non-human-readable notation data is currently not supported).  The
strings must be in UTF-8 encoding.

If @var{name} is @code{NULL}, then @var{value} should be a policy URL.

The function @code{gpgme_sig_notation_add} returns the error code
@code{GPG_ERR_NO_ERROR} if the notation data could be added
successfully, @code{GPG_ERR_INV_VALUE}
 if @var{ctx} is not a valid
pointer, or if @var{name}, @var{value} and @var{flags} are an invalid
combination.  The function also passes through any errors that are
reported by the crypto engine support routines.

@end deftypefun

@deftypefun gpgme_sig_notation_t gpgme_sig_notation_get (@w{const gpgme_ctx_t @var{ctx}})
@since{1.1.0}

The function @code{gpgme_sig_notation_get} returns the linked list of
notation data structures that are contained in the context @var{ctx}.

If @var{ctx} is not a valid pointer, or there is no notation data
added for this context, @code{NULL} is returned.
@end deftypefun

@node Encrypt
@subsection Encrypt
@cindex encryption
@cindex cryptographic operation, encryption

One plaintext can be encrypted for several recipients at the same
time. The list of recipients is created independently of any context,
and then passed to the encryption operation.

@menu
* Encrypting a Plaintext:: How to encrypt a plaintext.
@end menu

@node Encrypting a
Plaintext
@subsubsection Encrypting a Plaintext

@deftypefun gpgme_error_t gpgme_op_encrypt (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
@var{recp}[]}, @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t
@var{cipher}})
The function @code{gpgme_op_encrypt} encrypts the plaintext in the
data object @var{plain} for the recipients @var{recp} and stores the
ciphertext in the data object @var{cipher}. The type of the
ciphertext created is determined by the @acronym{ASCII} armor (or, if
that is not set, by the encoding specified for @var{cipher}) and the
text mode attributes set for the context @var{ctx}.

@var{recp} must be a @code{NULL}-terminated array of keys. The user
must keep references for all keys during the whole duration of the
call (but see @code{gpgme_op_encrypt_start} for the requirements with
the asynchronous variant).

The value in @var{flags} is a bitwise-or combination of one or
multiple of the following bit values:

@table @code
@item GPGME_ENCRYPT_ALWAYS_TRUST
The
@code{GPGME_ENCRYPT_ALWAYS_TRUST} symbol specifies that all the
recipients in @var{recp} should be trusted, even if the keys do not
have a high enough validity in the keyring. This flag should be used
with care; in general it is not a good idea to use any untrusted keys.

@item GPGME_ENCRYPT_NO_ENCRYPT_TO
@since{1.2.0}

The @code{GPGME_ENCRYPT_NO_ENCRYPT_TO} symbol specifies that no
default or hidden default recipients as configured in the crypto
backend should be included. This can be useful for managing different
user profiles.

@item GPGME_ENCRYPT_NO_COMPRESS
@since{1.5.0}

The @code{GPGME_ENCRYPT_NO_COMPRESS} symbol specifies that the
plaintext shall not be compressed before it is encrypted. This is
in some cases useful if the length of the encrypted message
may reveal information about the plaintext.

@item GPGME_ENCRYPT_PREPARE
@itemx GPGME_ENCRYPT_EXPECT_SIGN
The @code{GPGME_ENCRYPT_PREPARE} symbol is used with the UI Server
protocol to prepare an encryption
(i.e. sending the
@code{PREP_ENCRYPT} command). With the
@code{GPGME_ENCRYPT_EXPECT_SIGN} symbol the UI Server is advised to
also expect a sign command.

@item GPGME_ENCRYPT_SYMMETRIC
@since{1.7.0}

The @code{GPGME_ENCRYPT_SYMMETRIC} symbol specifies that the
output should be additionally encrypted symmetrically even
if recipients are provided. This feature is only supported
for the OpenPGP crypto engine.

@item GPGME_ENCRYPT_THROW_KEYIDS
@since{1.8.0}

The @code{GPGME_ENCRYPT_THROW_KEYIDS} symbols requests that the
identifiers for the decrption keys are not included in the ciphertext.
On the receiving side, the use of this flag may slow down the

decryption process because all available secret keys must be tried.
This flag is only honored for OpenPGP encryption.

@item GPGME_ENCRYPT_WRAP
@since{1.8.0}

The @code{GPGME_ENCRYPT_WRAP} symbol specifies that the input is an
OpenPGP message and not a plain data. This is the counterpart to
@code{GPGME_DECRYPT_UNWRAP}.

@item GPGME_ENCRYPT_WANT_ADDRESS
@since{1.11.0}

The
@code{GPGME_ENCRYPT_WANT_ADDRESS} symbol requests that all
supplied keys or key specifications include a syntactically valid mail
address. If this is not the case the operation is not even tried and
the error code @code{GPG_ERR_INV_USER_ID} is returned. Only the
address part of the key specification is conveyed to the backend. As
of now the key must be specified using the @var{recpstring} argument
of the extended encrypt functions. This feature is currently only
supported for the OpenPGP crypto engine.

@end table

If @code{GPG_ERR_UNUSABLE_PUBKEY} is returned, some recipients in
@var{recp} are invalid, but not all. In this case the plaintext might
be encrypted for all valid recipients and returned in @var{cipher} (if
this happens depends on the crypto engine). More information about
the invalid recipients is available with
@code{gpgme_op_encrypt_result}.

If @var{recp} is @code{NULL}, symmetric rather than public key
encryption is performed.
Symmetrically encrypted cipher text can be
deciphered with @code{gpgme_op_decrypt}. Note that in this case the
crypto backend needs to retrieve a passphrase from the user.
Symmetric encryption is currently only supported for the OpenPGP
crypto backend.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
ciphertext could be created successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx}, @var{recp}, @var{plain} or @var{cipher} is not a valid
pointer, @code{GPG_ERR_UNUSABLE_PUBKEY} if @var{recp} contains some
invalid recipients, @code{GPG_ERR_BAD_PASSPHRASE} if the passphrase
for the symmetric key could not be retrieved, and passes through any
errors that are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_encrypt_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{recp}[]}, @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
The function @code{gpgme_op_encrypt_start} initiates
a
@code{gpgme_op_encrypt} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

References to the keys only need to be held for the duration of this
call. The user can release its references to the keys after this
function returns, even if the operation is not yet finished.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx}, @var{rset}, @var{plain} or @var{cipher} is not a valid
pointer, and @code{GPG_ERR_UNUSABLE_PUBKEY} if @var{rset} does not
contain any valid recipients.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_encrypt_ext @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{gpgme_key_t @var{recp}[]}, @
@w{const char *@var{recpstring}}, @
@w{gpgme_encrypt_flags_t @var{flags}}, @
@w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})

@since{1.11.0}

This is an extended
version of @code{gpgme_op_encrypt} with
@var{recpstring} as additional parameter. If @var{recp} is NULL and
@var{recpstring} is not NULL, the latter is expected to be a linefeed
delimited string with the set of key specifications. In contrast to
@var{recp} the keys are given directly as strings and there is no need
to first create key objects. Leading and trailing white space is
remove from each line in @var{recpstring}. The keys are then passed
verbatim to the backend engine.

For the OpenPGP backend several special keywords are supported to
modify the operation. These keywords are given instead of a key
specification. The currently supported keywords are:

@table @code
@item --hidden
@itemx --no-hidden
These keywords toggle between normal and hidden recipients for all
following key specifications. When a hidden recipient is requested

the gpg option @option{-R} (or @option{-F} in file mode) is used
instead of @option{-r} (@option{-f} in file mode).

@item --file
@itemx
 --no-file
These keywords toggle between regular and file mode for all following
key specification.  In file mode the option @option{-f} or @option{-F}
is passed to gpg.  At least GnuPG version 2.1.14 is required to handle
these options.  The @code{GPGME_ENCRYPT_WANT_ADDRESS} flag is ignored
in file mode.

@item --
This keyword disables all keyword detection up to the end of the
string.  All keywords are treated as verbatim arguments.

@end table

To create a @var{recpstring} it is often useful to employ a strconcat
style function.  For example this function creates a string to encrypt
to two keys:

@example
char *
xbuild_recpstring (const char *key1, const char *key2)
@{
 char *result = gpgrt_strconcat ("--\n", key1, "\n", key2, NULL);
 if (!result)
   @{ perror ("strconcat failed"); exit (2); @}
 return result;
@}
@end example

Note the use of the double dash here; unless you want to specify a
keyword, it is a good idea to avoid any possible trouble with key
specifications starting
 with a double dash.  The used strconcat
function is available in Libgpg-error 1.28 and later; Libgpg-error
(aka Gpgrt) is a dependency of GPGME.  The number of arguments to
@code{gpgrt_strconcat} is limited to 47 but that should always be
sufficient.  In case a larger and non-fixed number of keys are to be
supplied the following code can be used:

@example
char *
xbuild_long_recpstring (void)
@{
 gpgrt_stream_t memfp;

```
 const char *s;
 void *result;

 memfp = gpgrt_fopenmem (0, "w+b");
 if (!memfp)
   @{ perror ("fopenmem failed"); exit (2); @}
 gpgrt_fputs ("--", memfp);
 while ((s = get_next_keyspec ()))
   @{
     gpgrt_fputc ('\n', memfp);
     gpgrt_fputs (s, memfp);
   @}
 gpgrt_fputc (0, memfp);
 if (gpgrt_ferror (memfp))
   @{ perror ("writing to memstream failed"); exit (2); @}
 if (gpgrt_fclose_snatch (memfp, &result, NULL))
   @{ perror ("fclose_snatch failed"); exit (2); @}
 return result;
@}
@end example
```

In this example @code{get_next_keyspec} is expected
 to return the next
key to be added to the string.  Please take care: Encrypting to a
large number of recipients is often questionable due to security
reasons and also for the technicality that all keys are currently
passed on the command line to @command{gpg} which has as a platform
specific length limitation.
@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_encrypt_ext_start @
          (@w{gpgme_ctx_t @var{ctx}}, @
           @w{gpgme_key_t @var{recp}[]}, @
           @w{const char *@var{recpstring}}, @
           @w{gpgme_encrypt_flags_t @var{flags}}, @
           @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
```

@since{1.11.0}

This is an extended version of @code{gpgme_op_encrypt_start} with
@var{recpstring} as additional parameter.  If @var{recp} is NULL and
@var{recpstring} is not NULL, the latter is expected to be a linefeed
delimited string with the set of key specifications.  In contrast to
@var{recp} the keys are given directly as strings and there
 is no need
to first create key objects.  The keys are passed verbatim to the
backend engine.

@end deftypefun

@deftp {Data type} {gpgme_encrypt_result_t}
This is a pointer to a structure used to store the result of a
@code{gpgme_op_encrypt} operation. After successfully encrypting
data, you can retrieve the pointer to the result with
@code{gpgme_op_encrypt_result}. The structure contains the following
members:

@table @code
@item gpgme_invalid_key_t invalid_recipients
A linked list with information about all invalid keys for which
the data could not be encrypted.
@end table
@end deftp

@deftypefun gpgme_encrypt_result_t gpgme_op_encrypt_result (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_op_encrypt_result} returns a
@code{gpgme_encrypt_result_t} pointer to a structure holding the
result of a @code{gpgme_op_encrypt} operation. The pointer is only
valid if the last operation on the context was a
@code{gpgme_op_encrypt}, @code{gpgme_op_encrypt_start},
@code{gpgme_op_sign} or
@code{gpgme_op_sign_start} operation. If this
operation failed, this might be a @code{NULL} pointer. The returned
pointer is only valid until the next operation is started on the
context.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_encrypt_sign (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{recp}[]}, @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
The function @code{gpgme_op_encrypt_sign} does a combined encrypt and
sign operation. It is used like @code{gpgme_op_encrypt}, but the
ciphertext also contains signatures for the signers listed in
@var{ctx}.

The combined encrypt and sign operation is currently only available
for the OpenPGP crypto engine.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_encrypt_sign_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{recp}[]}, @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
The function @code{gpgme_op_encrypt_sign_start}

initiates a
@code{gpgme_op_encrypt_sign} operation. It can be completed by
calling @code{gpgme_wait} on the context. @xref{Waiting For
Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, and @code{GPG_ERR_INV_VALUE}
if @var{ctx}, @var{rset}, @var{plain} or @var{cipher} is not a valid
pointer.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_encrypt_sign_ext @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{gpgme_key_t @var{recp}[]}, @
@w{const char *@var{recpstring}}, @
@w{gpgme_encrypt_flags_t @var{flags}}, @
@w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})

@since{1.11.0}

This is an extended version of @code{gpgme_op_encrypt_sign} with
@var{recpstring} as additional parameter. If @var{recp} is NULL and
@var{recpstring} is not NULL, the latter is expected to be a linefeed
delimited string with the set of key specifications. In contrast to
@var{recp}
the keys are given directly as strings and there is no need
to first create the key objects. The keys are passed verbatim to the
backend engine.

@end deftypefun

@deftypefun gpgme_error_t gpgme_op_encrypt_sign_ext_start @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{gpgme_key_t @var{recp}[]}, @
@w{const char *@var{recpstring}}, @
@w{gpgme_encrypt_flags_t @var{flags}}, @
@w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})

@since{1.11.0}

This is an extended version of @code{gpgme_op_encrypt_sign_start} with
@var{recpstring} as additional parameter. If @var{recp} is NULL and
@var{recpstring} is not NULL, the latter is expected to be a linefeed
delimited string with the set of key specifications. In contrast to
@var{recp} the keys are given directly as strings and there is no need
to first create the key objects. The keys are passed verbatim to the
backend engine.

@end deftypefun

@node Miscellaneous
@section Miscellaneous
operations

Here are some support functions which are sometimes useful.

@menu
* Running other Programs:: Running other Programs
* Using the Assuan protocol:: Using the Assuan protocol
* Checking for updates:: How to check for software updates
@end menu

@node Running other Programs
@subsection Running other Programs

GPGME features an internal subsystem to run the actual backend engines. Along with data abstraction object this subsystem can be used to run arbitrary simple programs which even need not be related to cryptographic features. It may for example be used to run tools which are part of the GnuPG system but are not directly accessible with the GPGME API.

@deftypefun gpgme_error_t gpgme_op_spawn @
(@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{file}}, @
@w{const char *@var{argv}[]}, @w{gpgme_data_t @var{datain}}, @
@w{gpgme_data_t @var{dataout}}, @w{gpgme_data_t @var{dataerr}}, @
@w{unsigned int @var{flags}})

@since{1.5.0}

The
function @code{gpgme_op_spawn} runs the program @var{file} with the arguments taken from the NULL terminated array @var{argv}. If no arguments are required @var{argv} may be given as @code{NULL}. In the latter case or if @code{argv[0]} is the empty string, GPGME uses the basename of @var{file} for @code{argv[0]}. The file descriptors @code{stdin}, @code{stdout}, and @code{stderr} are connected to the data objects @var{datain}, @var{dataout}, and @var{dataerr}. If NULL is passed for one of these data objects the corresponding file descriptor is connected to @file{/dev/null}.

The value in @var{flags} is a bitwise-or combination of one or multiple of the following bit values:

```
@table @code
@item GPGME_SPAWN_DETACHED
@since{1.5.0}

Under Windows this flag inhibits the allocation of a new console for
the program.  This is useful for a GUI application which needs to call
a command line helper tool.

@item GPGME_SPAWN_ALLOW_SET_FG
@since{1.5.0}

Under Windows
 this flag allows the called program to put itself into
the foreground.
@end table
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_spawn_start @
        (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{file}}, @
         @w{const char *@var{argv}[]}, @w{gpgme_data_t @var{datain}}, @
         @w{gpgme_data_t @var{dataout}}, @w{gpgme_data_t @var{dataerr}}, @
         @w{unsigned int @var{flags}})

@since{1.5.0}

This is the asynchronous variant of @code{gpgme_op_spawn}.
@end deftypefun


@node Using the Assuan protocol
@subsection Using the Assuan protocol

The Assuan protocol can be used to talk to arbitrary Assuan servers.
By default it is connected to the GnuPG agent, but it may be connected
to arbitrary servers by using @code{gpgme_ctx_set_engine_info},
passing the location of the servers socket as @var{file_name}
argument, and an empty string as @var{home_dir} argument.

The Assuan protocol functions use three kinds of callbacks to transfer
data:

@deftp {Data type}
 {gpgme_error_t (*gpgme_assuan_data_cb_t) @
    (@w{void *@var{opaque}}, @w{const void *@var{data}}, @
     @w{size_t @var{datalen}})}

@since{1.2.0}
```

This callback receives any data sent by the server.  @var{opaque} is
the pointer passed to @code{gpgme_op_assuan_transact_start},
@var{data} of length @var{datalen} refers to the data sent.
@end deftp

@deftp {Data type} {gpgme_error_t (*gpgme_assuan_inquire_cb_t) @
(@w{void *@var{opaque}}, @w{const char *@var{name}}, @
@w{const char *@var{args}}, @w{gpgme_data_t *@var{r_data}})}

@since{1.2.0}

This callback is used to provide additional data to the Assuan server.
@var{opaque} is the pointer passed to
@code{gpgme_op_assuan_transact_start}, @var{name} and @var{args}
specify what kind of data the server requested, and @var{r_data} is
used to return the actual data.

Note: Returning data is currently not implemented in @acronym{GPGME}.
@end deftp

@deftp {Data type} {gpgme_error_t (*gpgme_assuan_status_cb_t) @

(@w{void *@var{opaque}}, @w{const char *@var{status}}, @
@w{const char *@var{args}})}

@since{1.2.0}

This callback receives any status lines sent by the server.
@var{opaque} is the pointer passed to
@code{gpgme_op_assuan_transact_start}, @var{status} and @var{args}
denote the status update sent.
@end deftp

@deftypefun gpgme_error_t gpgme_op_assuan_transact_start @
(@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{command}}, @
@w{gpgme_assuan_data_cb_t @var{data_cb}}, @
@w{void * @var{data_cb_value}}, @
@w{gpgme_assuan_inquire_cb_t @var{inquire_cb}}, @
@w{void * @var{inquire_cb_value}}, @
@w{gpgme_assuan_status_cb_t @var{status_cb}}, @
@w{void * @var{status_cb_value}})

@since{1.2.0}

Send the Assuan @var{command} and return results via the callbacks.
Any callback may be @code{NULL}.  The result of the operation may be
retrieved using @code{gpgme_wait_ext}.

Asynchronous variant.
@end deftypefun

@deftypefun
 gpgme_error_t gpgme_op_assuan_transact_ext @
        (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{command}}, @
         @w{gpgme_assuan_data_cb_t @var{data_cb}}, @
         @w{void * @var{data_cb_value}}, @
         @w{gpgme_assuan_inquire_cb_t @var{inquire_cb}}, @
         @w{void * @var{inquire_cb_value}}, @
         @w{gpgme_assuan_status_cb_t @var{status_cb}}, @
         @w{void * @var{status_cb_value}}, @
         @w{gpgme_error_t *@var{op_err}})

Send the Assuan @var{command} and return results via the callbacks.
The result of the operation is returned in @var{op_err}.

Synchronous variant.
@end deftypefun

@node Checking for updates
@subsection How to check for software updates

The GnuPG Project operates a server to query the current versions of
software packages related to GnuPG.  GPGME can be used to
access this online database and check whether a new version of a
software package is available.

@deftp {Data type} {gpgme_query_swdb_result_t}
@since{1.8.0}

This
 is a pointer to a structure used to store the result of a
@code{gpgme_op_query_swdb} operation.  After success full call to that
function, you can retrieve the pointer to the result with
@code{gpgme_op_query_swdb_result}.  The structure contains the
following member:

@table @code
@item name
This is the name of the package.

@item iversion
The currently installed version or an empty string.  This value is
either a copy of the argument given to @code{gpgme_op_query_swdb} or
the version of the installed software as figured out by GPGME or GnuPG.

@item created
This gives the date the file with the list of version numbers has
originally be created by the GnuPG project.

@item retrieved
This gives the date the file was downloaded.

@item warning
If this flag is set either an error has occurred or some of the
information in this structure are not properly set.  For example if
the version number of the installed software could not be figured out,
the
 @code{update} flag may not reflect a required update status.

@item update
If this flag is set an update of the software is available.

@item urgent
If this flag is set an available update is important.

@item noinfo
If this flag is set, no valid information could be retrieved.

@item unknown
If this flag is set the given @code{name} is not known.

@item toold
If this flag is set the available information is not fresh enough.

@item error
If this flag is set some other error has occurred.

@item version
The version string of the latest released version.

@item reldate
The release date of the latest released version.

@end table
@end deftp

@deftypefun gpgme_error_t gpgme_op_query_swdb @
(@w{gpgme_ctx_t @var{ctx}},  @
 @w{const char *@var{name}},  @
 @w{const char *@var{iversion}},  @
 @w{gpgme_data_t @var{reserved}})

```
@since{1.8.0}

Query the software version database for software package @var{name}
and check against the installed
 version given by @var{iversion}.  If
@var{iversion} is given as @code{NULL} a check is only done if GPGME
can figure out the version by itself (for example when using
"gpgme" or "gnupg").  If @code{NULL} is used for @var{name} the
current gpgme version is checked.  @var{reserved} must be set to 0.

@end deftypefun

@deftypefun gpgme_query_swdb_result_t gpgme_op_query_swdb_result @
        (@w{gpgme_ctx_t @var{ctx}})

@since{1.8.0}

The function @code{gpgme_op_query_swdb_result} returns a
@code{gpgme_query_swdb_result_t} pointer to a structure holding the
result of a @code{gpgme_op_query_swdb} operation.  The pointer is only
valid if the last operation on the context was a successful call to
@code{gpgme_op_query_swdb}.  If that call failed, the result might
be a @code{NULL} pointer.  The returned pointer is only valid until
the next operation is started on the context @var{ctx}.
@end deftypefun

@noindent
Here is an example on how to check whether GnuPG is current:

@example
#include
 <gpgme.h>

int
main (void)
@{
 gpg_error_t err;
 gpgme_ctx_t ctx;
 gpgme_query_swdb_result_t result;

 gpgme_check_version (NULL);
 err = gpgme_new (&ctx);
 if (err)
   fprintf (stderr, "error creating context: %s\n", gpg_strerror (err));
 else
   @{
     gpgme_set_protocol (ctx, GPGME_PROTOCOL_GPGCONF);
```

```
    err = gpgme_op_query_swdb (ctx, "gnupg", NULL, 0);
    if (err)
      fprintf (stderr, "error querying swdb: %s\n", gpg_strerror (err));
    else
      @{
        result = gpgme_op_query_swdb_result (ctx);
        if (!result)
          fprintf (stderr, "error querying swdb\n");
        if (!result->warning && !result->update)
          printf ("GnuPG version %s is current\n",
                  result->iversion);
        else if (!result->warning && result->update)
          printf ("GnuPG version %s can be updated to %s\n",
                  result->iversion, result->version);
        else
          fprintf (stderr, "error finding the
 update status\n");
      @}
    gpgme_release (ctx);
  @}
 return 0;
@}
@end example
```

```
@node Run Control
@section Run Control
@cindex run control
@cindex cryptographic operation, running

@acronym{GPGME} supports running operations synchronously and
asynchronously.  You can use asynchronous operation to set up a
context up to initiating the desired operation, but delay performing
it to a later point.

Furthermore, you can use an external event loop to control exactly
when @acronym{GPGME} runs.  This ensures that @acronym{GPGME} only
runs when necessary and also prevents it from blocking for a long
time.

@menu
* Waiting For Completion::       Waiting until an operation is completed.
* Using External Event Loops::    Advanced control over what happens when.
* Cancellation::                  How to end pending operations prematurely.
@end menu


@node Waiting For Completion
```

@subsection Waiting For Completion
@cindex cryptographic operation, wait for
@cindex wait for completion

@deftypefun
 gpgme_ctx_t gpgme_wait (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_error_t *@var{status}}, @w{int @var{hang}})
The function @code{gpgme_wait} continues the pending operation within the context @var{ctx}.  In particular, it ensures the data exchange between @acronym{GPGME} and the crypto backend and watches over the run time status of the backend process.

If @var{hang} is true, the function does not return until the operation is completed or cancelled.  Otherwise the function will not block for a long time.

The error status of the finished operation is returned in @var{status} if @code{gpgme_wait} does not return @code{NULL}.

The @var{ctx} argument can be @code{NULL}.  In that case, @code{gpgme_wait} waits for any context to complete its operation.

@code{gpgme_wait} can be used only in conjunction with any context that has a pending operation initiated with one of the @code{gpgme_op_*_start} functions except @code{gpgme_op_keylist_start} and @code{gpgme_op_trustlist_start} (for
 which you should use the
corresponding @code{gpgme_op_*_next} functions).  If @var{ctx} is @code{NULL}, all of such contexts are waited upon and possibly returned.  Synchronous operations running in parallel, as well as key and trust item list operations, do not affect @code{gpgme_wait}.

In a multi-threaded environment, only one thread should ever call @code{gpgme_wait} at any time, regardless of whether @var{ctx} is specified or not.  This means that all calls to this function should be fully synchronized by locking primitives.  It is safe to start asynchronous operations while a thread is running in @code{gpgme_wait}.

The function returns the @var{ctx} of the context which has finished the operation.  If @var{hang} is false, and the timeout expires, @code{NULL} is returned and @code{*status} will be set to 0.  If an error occurs, @code{NULL} is returned and the error is returned in @code{*status}.
@end deftypefun

@node Using External Event Loops
@subsection Using External Event

Loops
@cindex event loop, external

@acronym{GPGME} hides the complexity of the communication between the library and the crypto engine. The price of this convenience is that the calling thread can block arbitrary long waiting for the data returned by the crypto engine. In single-threaded programs, in particular if they are interactive, this is an unwanted side-effect. OTOH, if @code{gpgme_wait} is used without the @var{hang} option being enabled, it might be called unnecessarily often, wasting CPU time that could be used otherwise.

The I/O callback interface described in this section lets the user take control over what happens when. @acronym{GPGME} will provide the user with the file descriptors that should be monitored, and the callback functions that should be invoked when a file descriptor is ready for reading or writing. It is then the user's responsibility to decide when to check the file descriptors and when to invoke the callback functions. Usually this is done in an event loop, that also checks for events in other parts of the program. If the callback functions are only called when the file descriptors are ready, @acronym{GPGME} will never block. This gives the user more control over the program flow, and allows to perform other tasks when @acronym{GPGME} would block otherwise.

By using this advanced mechanism, @acronym{GPGME} can be integrated smoothly into GUI toolkits like GTK+ even for single-threaded programs.

@menu
* I/O Callback Interface:: How I/O callbacks are registered.
* Registering I/O Callbacks:: How to use I/O callbacks for a context.
* I/O Callback Example:: An example how to use I/O callbacks.
* I/O Callback Example GTK+:: How to use @acronym{GPGME} with GTK+.
* I/O Callback Example GDK:: How to use @acronym{GPGME} with GDK.
* I/O Callback Example Qt:: How to use @acronym{GPGME} with Qt.
@end menu

@node I/O Callback Interface
@subsubsection I/O Callback Interface

@deftp {Data type} {gpgme_error_t (*gpgme_io_cb_t) (@w{void *@var{data}}, @w{int @var{fd}})}
@tindex gpgme_io_cb_t
The @code{gpgme_io_cb_t} type is the type of functions which @acronym{GPGME} wants to register as I/O callback handlers using the

@code{gpgme_register_io_cb_t} functions provided by the user.

@var{data} and @var{fd} are provided by @acronym{GPGME} when the I/O
callback handler is registered, and should be passed through to the
handler when it is invoked by the user because it noticed activity on
the file descriptor @var{fd}.

The callback handler always returns @code{0}, but you should consider
the return value to be reserved for later use.
@end deftp

@deftp {Data type} {gpgme_error_t (*gpgme_register_io_cb_t) (@w{void *@var{data}}, @w{int @var{fd}},
@w{int @var{dir}}, @w{gpgme_io_cb_t @var{fnc}}, @w{void *@var{fnc_data}}, @w{void **@var{tag}})}
@tindex gpgme_register_io_cb_t
The @code{gpgme_register_io_cb_t} type is the type of functions which can
be called by @acronym{GPGME} to register an I/O callback
function
@var{fnc} for the file descriptor @var{fd} with the user.
@var{fnc_data} should be passed as the first argument to @var{fnc}
when the handler is invoked (the second argument should be @var{fd}).
If @var{dir} is 0, @var{fnc} should be called by the user when
@var{fd} is ready for writing. If @var{dir} is 1, @var{fnc} should be
called when @var{fd} is ready for reading.

@var{data} was provided by the user when registering the
@code{gpgme_register_io_cb_t} function with @acronym{GPGME} and will always
be passed as the first argument when registering a callback function.
For example, the user can use this to determine the event loop to
which the file descriptor should be added.

@acronym{GPGME} will call this function when a crypto operation is
initiated in a context for which the user has registered I/O callback
handler functions with @code{gpgme_set_io_cbs}. It can also call this
function when it is in an I/O callback handler for a file descriptor
associated to this context.

The
user should return a unique handle in @var{tag} identifying this
I/O callback registration, which will be passed to the
@code{gpgme_register_io_cb_t} function without interpretation when the file
descriptor should not be monitored anymore.
@end deftp

@deftp {Data type} {void (*gpgme_remove_io_cb_t) (@w{void *@var{tag}})}
The @code{gpgme_remove_io_cb_t} type is the type of functions which can be
called by @acronym{GPGME} to remove an I/O callback handler that was
registered before. @var{tag} is the handle that was returned by the
@code{gpgme_register_io_cb_t} for this I/O callback.

@acronym{GPGME} can call this function when a crypto operation is in
an I/O callback.  It will also call this function when the context is
destroyed while an operation is pending.
@end deftp

@deftp {Data type} {enum gpgme_event_io_t}
@tindex gpgme_event_io_t
The @code{gpgme_event_io_t} type specifies the type of an event that is
reported to the user by @acronym{GPGME} as a consequence of an I/O
operation.
  The following events are defined:

@table @code
@item GPGME_EVENT_START
The operation is fully initialized now, and you can start to run the
registered I/O callback handlers now.  Note that registered I/O
callback handlers must not be run before this event is signalled.
@var{type_data} is @code{NULL} and reserved for later use.

@item GPGME_EVENT_DONE
The operation is finished, the last I/O callback for this operation
was removed.  The accompanying @var{type_data} points to a
@code{struct gpgme_io_event_done_data} variable that contains the
status of the operation that finished.  This event is signalled after
the last I/O callback has been removed.

@item GPGME_EVENT_NEXT_KEY
In a @code{gpgme_op_keylist_start} operation, the next key was
received from the crypto engine.  The accompanying @var{type_data} is
a @code{gpgme_key_t} variable that contains the key with one reference
for the user.

@end table
@end deftp

@deftp {Data type} {void (*gpgme_event_io_cb_t) (@w{void *@var{data}},
 @w{gpgme_event_io_t @var{type}}, @w{void *@var{type_data}})}
The @code{gpgme_event_io_cb_t} type is the type of functions which can be
called by @acronym{GPGME} to signal an event for an operation running
in a context which has I/O callback functions registered by the user.

@var{data} was provided by the user when registering the
@code{gpgme_event_io_cb_t} function with @acronym{GPGME} and will always be
passed as the first argument when registering a callback function.
For example, the user can use this to determine the context in which
this event has occurred.

@var{type} will specify the type of event that has occurred.
@var{type_data} specifies the event further, as described in the above
list of possible @code{gpgme_event_io_t} types.

@acronym{GPGME} can call this function in an I/O callback handler.
@end deftp

@node Registering I/O Callbacks
@subsubsection Registering I/O Callbacks

@deftp {Data type} {struct gpgme_io_cbs}
@tindex gpgme_event_io_t
This structure
 is used to store the I/O callback interface functions
described in the previous section.  It has the following members:

@table @code
@item gpgme_register_io_cb_t add
This is the function called by @acronym{GPGME} to register an I/O
callback handler.  It must be specified.

@item void *add_priv
This is passed as the first argument to the @code{add} function when
it is called by @acronym{GPGME}.  For example, it can be used to
determine the event loop to which the file descriptor should be added.

@item gpgme_remove_io_cb_t remove
This is the function called by @acronym{GPGME} to remove an I/O
callback handler.  It must be specified.

@item gpgme_event_io_cb_t event
This is the function called by @acronym{GPGME} to signal an event for
an operation.  It must be specified, because at least the start event
must be processed.

@item void *event_priv
This is passed as the first argument to the @code{event} function when
it is called by @acronym{GPGME}.  For example, it can be used to
determine
 the context in which the event has occurred.
@end table
@end deftp

@deftypefun void gpgme_set_io_cbs (@w{gpgme_ctx_t @var{ctx}}, @w{struct gpgme_io_cbs *@var{io_cbs}})
The function @code{gpgme_set_io_cbs} enables the I/O callback
interface for the context @var{ctx}.  The I/O callback functions are
specified by @var{io_cbs}.

```
If @var{io_cbs}->@code{add} is @code{NULL}, the I/O callback interface
is disabled for the context, and normal operation is restored.
@end deftypefun

@deftypefun void gpgme_get_io_cbs (@w{gpgme_ctx_t @var{ctx}}, @w{struct gpgme_io_cbs *@var{io_cbs}})
The function @code{gpgme_get_io_cbs} returns the I/O callback
functions set with @code{gpgme_set_io_cbs} in @var{io_cbs}.
@end deftypefun


@node I/O Callback Example
@subsubsection I/O Callback Example

To actually use an external event loop, you have to implement the I/O
callback functions that are used by @acronym{GPGME} to register and
unregister file descriptors.  Furthermore, you have to actually
monitor these
 file descriptors for activity and call the appropriate
I/O callbacks.

The following example illustrates how to do that.  The example uses
locking to show in which way the callbacks and the event loop can
run concurrently.  For the event loop, we use a fixed array.  For a
real-world implementation, you should use a dynamically sized
structure because the number of file descriptors needed for a crypto
operation in @acronym{GPGME} is not predictable.

@example
#include <assert.h>
#include <errno.h>
#include <stdlib.h>
#include <pthread.h>
#include <sys/types.h>
#include <gpgme.h>

/* The following structure holds the result of a crypto operation.  */
struct op_result
@{
 int done;
 gpgme_error_t err;
@};

/* The following structure holds the data associated with one I/O
callback.  */
struct one_fd
@{
 int fd;
```

```
 int dir;
 gpgme_io_cb_t fnc;
 void *fnc_data;
 void *loop;
@};

struct event_loop
@{
 pthread_mutex_t lock;
#define MAX_FDS 32
 /* Unused slots are marked with FD being
 -1.  */
 struct one_fd fds[MAX_FDS];
@};
@end example
```

The following functions implement the I/O callback interface.

```
@example
gpgme_error_t
add_io_cb (void *data, int fd, int dir, gpgme_io_cb_t fnc, void *fnc_data,
    void **r_tag)
@{
 struct event_loop *loop = data;
 struct one_fd *fds = loop->fds;
 int i;

 pthread_mutex_lock (&loop->lock);
 for (i = 0; i < MAX_FDS; i++)
   @{
     if (fds[i].fd == -1)
 @{
   fds[i].fd = fd;
   fds[i].dir = dir;
   fds[i].fnc = fnc;
   fds[i].fnc_data = fnc_data;
   fds[i].loop = loop;
   break;
 @}
   @}
 pthread_mutex_unlock (&loop->lock);
 if (i == MAX_FDS)
   return gpg_error (GPG_ERR_GENERAL);
 *r_tag = &fds[i];
 return 0;
@}

void
```

```
remove_io_cb (void *tag)
@{
 struct one_fd *fd = tag;
 struct event_loop *loop = fd->loop;

 pthread_mutex_lock (&loop->lock);
 fd->fd = -1;
 pthread_mutex_unlock (&loop->lock);
@}

void
event_io_cb (void *data, gpgme_event_io_t type, void *type_data)
@{
 struct op_result *result = data;

 /* We
 don't support list operations here.  */
 if (type == GPGME_EVENT_DONE)
   @{
     result->done = 1;
     result->err = *type_data;
   @}
@}
@end example
```

The final missing piece is the event loop, which will be presented next.  We only support waiting for the success of a single operation.

```
@example
int
do_select (struct event_loop *loop)
@{
 fd_set rfds;
 fd_set wfds;
 int i, n;
 int any = 0;
 struct timeval tv;
 struct one_fd *fdlist = loop->fds;

 pthread_mutex_lock (&loop->lock);
 FD_ZERO (&rfds);
 FD_ZERO (&wfds);
 for (i = 0; i < MAX_FDS; i++)
   if (fdlist[i].fd != -1)
     FD_SET (fdlist[i].fd, fdlist[i].dir ? &rfds : &wfds);
 pthread_mutex_unlock (&loop->lock);

 tv.tv_sec = 0;
```

```
 tv.tv_usec = 1000;

 do
   @{
     n = select (FD_SETSIZE, &rfds, &wfds, NULL, &tv);
   @}
 while (n < 0 && errno == EINTR);

 if (n < 0)
   return n; /* Error or timeout.  */

 pthread_mutex_lock (&loop->lock);
 for (i = 0; i < MAX_FDS && n; i++)
   @{
     if (fdlist[i].fd
 != -1)
 @{
   if (FD_ISSET (fdlist[i].fd, fdlist[i].dir ? &rfds : &wfds))
     @{
       assert (n);
       n--;
       any = 1;
            /* The I/O callback handler can register/remove callbacks,
               so we have to unlock the file descriptor list.  */
            pthread_mutex_unlock (&loop->lock);
       (*fdlist[i].fnc) (fdlist[i].fnc_data, fdlist[i].fd);
            pthread_mutex_lock (&loop->lock);
     @}
 @}
   @}
 pthread_mutex_unlock (&loop->lock);
 return any;
@}

void
wait_for_op (struct event_loop *loop, struct op_result *result)
@{
 int ret;

 do
   @{
     ret = do_select (loop);
   @}
 while (ret >= 0 && !result->done);
@}
@end example
```

The main function shows how to put it all together.

```
@example
int
main (int argc, char *argv[])
@{
 struct event_loop loop;
 struct op_result result;
 gpgme_ctx_t ctx;
 gpgme_error_t err;
 gpgme_data_t sig, text;
 int i;
 pthread_mutexattr_t attr;
 struct gpgme_io_cbs io_cbs =
 @{
   add_io_cb,
    &loop,
   remove_io_cb,
   event_io_cb,
   &result
 @};

 init_gpgme ();

 /* Initialize the loop structure.  */

 /* The mutex must be recursive, since remove_io_cb (which acquires a
    lock) can be called while holding a lock acquired in do_select.  */
 pthread_mutexattr_init (&attr);
 pthread_mutexattr_settype (&attr, PTHREAD_MUTEX_RECURSIVE);
 pthread_mutex_init (&loop.lock, &attr);
 pthread_mutexattr_destroy (&attr);

 for (i = 0; i < MAX_FDS; i++)
   loop.fds[i].fd = -1;

 /* Initialize the result structure.  */
 result.done = 0;

 err = gpgme_data_new_from_file (&sig, "signature", 1);
 if (!err)
   err = gpgme_data_new_from_file (&text, "text", 1);
 if (!err)
   err = gpgme_new (&ctx);
 if (!err)
   @{
      gpgme_set_io_cbs (ctx, &io_cbs);
      err = gpgme_op_verify_start (ctx, sig, text, NULL);
   @}
```

```
 if (err)
   @{
     fprintf (stderr, "gpgme error: %s: %s\n",
              gpgme_strsource (err), gpgme_strerror (err));
     exit (1);

   @}

 wait_for_op (&loop, &result);
 if (!result.done)
   @{
     fprintf (stderr, "select error\n");
     exit (1);
   @}
 if (!result.err)
   @{
     fprintf (stderr, "verification failed: %s: %s\n",
              gpgme_strsource (result.err), gpgme_strerror (result.err));
     exit (1);
   @}
 /* Evaluate verify result.  */
 @dots{}
 return 0;
@}
@end example
```

```
@node I/O Callback Example GTK+
@subsubsection I/O Callback Example GTK+
@cindex GTK+, using @acronym{GPGME} with

The I/O callback interface can be used to integrate @acronym{GPGME}
with the GTK+ event loop.  The following code snippets shows how this
can be done using the appropriate register and remove I/O callback
functions.  In this example, the private data of the register I/O
callback function is unused.  The event notifications is missing
because it does not require any GTK+ specific setup.

@example
#include <gtk/gtk.h>

struct my_gpgme_io_cb
@{
 gpgme_io_cb_t fnc;
 void *fnc_data;
 guint input_handler_id
@};
```

```
void
my_gpgme_io_cb
 (gpointer data, gint source, GdkInputCondition condition)
@{
 struct my_gpgme_io_cb *iocb = data;
 (*(iocb->fnc)) (iocb->data, source);
@}

void
my_gpgme_remove_io_cb (void *data)
@{
 struct my_gpgme_io_cb *iocb = data;
 gtk_input_remove (data->input_handler_id);
@}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
                               void *fnc_data, void **tag)
@{
 struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
 iocb->fnc = fnc;
 iocb->data = fnc_data;
 iocb->input_handler_id = gtk_input_add_full (fd, dir
                                              ? GDK_INPUT_READ
                                              : GDK_INPUT_WRITE,
                                            my_gpgme_io_callback,
                                            0, iocb, NULL);
 *tag = iocb;
 return 0;
@}
@end example


@node I/O Callback Example GDK
@subsubsection I/O Callback Example
 GDK
@cindex GDK, using @acronym{GPGME} with

The I/O callback interface can also be used to integrate
@acronym{GPGME} with the GDK event loop.  The following code snippets
shows how this can be done using the appropriate register and remove
I/O callback functions.  In this example, the private data of the
register I/O callback function is unused.  The event notifications is
missing because it does not require any GDK specific setup.

It is very similar to the GTK+ example in the previous section.

@example
```

```
#include <gdk/gdk.h>

struct my_gpgme_io_cb
@{
 gpgme_io_cb_t fnc;
 void *fnc_data;
 gint tag;
@};

void
my_gpgme_io_cb (gpointer data, gint source, GdkInputCondition condition)
@{
 struct my_gpgme_io_cb *iocb = data;
 (*(iocb->fnc)) (iocb->data, source);
@}

void
my_gpgme_remove_io_cb (void *data)
@{
 struct my_gpgme_io_cb *iocb = data;
 gdk_input_remove (data->tag);
@}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,

                void *fnc_data, void **tag)
@{
 struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
 iocb->fnc = fnc;
 iocb->data = fnc_data;
 iocb->tag = gtk_input_add_full (fd, dir ? GDK_INPUT_READ : GDK_INPUT_WRITE,
                                 my_gpgme_io_callback, iocb, NULL);
 *tag = iocb;
 return 0;
@}
@end example


@node I/O Callback Example Qt
@subsubsection I/O Callback Example Qt
@cindex Qt, using @acronym{GPGME} with

The I/O callback interface can also be used to integrate
@acronym{GPGME} with the Qt event loop.  The following code snippets
show how this can be done using the appropriate register and remove
I/O callback functions.  In this example, the private data of the
register I/O callback function is unused.  The event notifications is
```

missing because it does not require any Qt specific setup.

```
@example
#include <qsocketnotifier.h>
#include <qapplication.h>

struct IOCB @{
 IOCB( GpgmeIOCb f, void * d, QSocketNotifier * n )
   : func(
 f ), data( d ), notifier( n ) @{@}
 GpgmeIOCb func;
 void * data;
 QSocketNotifier * notifier;
@}

class MyApp : public QApplication @{

 // ...

 static void registerGpgmeIOCallback( void * data, int fd, int dir,
                                      GpgmeIOCb func, void * func_data,
                                      void ** tag ) @{
   QSocketNotifier * n =
     new QSocketNotifier( fd, dir ? QSocketNotifier::Read
                                  : QSocketNotifier::Write );
   connect( n, SIGNAL(activated(int)),
            qApp, SLOT(slotGpgmeIOCallback(int)) );
   qApp->mIOCBs.push_back( IOCB( func, func_data, n ) );
   *tag = (void*)n;
 @}

 static void removeGpgmeIOCallback( void * tag ) @{
   if ( !tag ) return;
   QSocketNotifier * n = static_cast<QSocketNotifier*>( tag );
   for ( QValueList<IOCB>::iterator it = qApp->mIOCBs.begin() ;
         it != qApp->mIOCBs.end() ; ++it )
     if ( it->notifier == n ) @{
       delete it->notifier;
       qApp->mIOCBs.erase(
 it );
       return;
     @}
 @}

public slots:
 void slotGpgmeIOCallback( int fd ) @{
   for ( QValueList<IOCB>::const_iterator it = mIOCBs.begin() ;
         it != mIOCBs.end() ; ++it )
```

```
    if ( it->notifier && it->notifier->socket() == fd )
      (*(it->func)) ( it->func_data, fd );
 @}

 // ...

private:
 QValueList<IOCB> mIOCBs;
 // ...
@};
@end example
```

@node Cancellation
@subsection Cancellation
@cindex cryptographic operation, aborting
@cindex cryptographic operation, cancelling
@cindex aborting operations
@cindex cancelling operations

Sometimes you do not want to wait for an operation to finish. @acronym{GPGME} provides two different functions to achieve that. The function @code{gpgme_cancel} takes effect immediately. When it returns, the operation is effectively canceled. However, it has some limitations and can not be used with synchronous operations. In contrast, the function @code{gpgme_cancel_async} can be used with any context and from
 any thread, but it is not guaranteed to take effect
immediately. Instead, cancellation occurs at the next possible time (typically the next time I/O occurs in the target context).

@deftypefun gpgme_ctx_t gpgme_cancel (@w{gpgme_ctx_t @var{ctx}})
@since{0.4.5}

The function @code{gpgme_cancel} attempts to cancel a pending operation in the context @var{ctx}. This only works if you use the global event loop or your own event loop.

If you use the global event loop, you must not call @code{gpgme_wait} during cancellation. After successful
cancellation, you can call @code{gpgme_wait} (optionally waiting on @var{ctx}), and the context @var{ctx} will appear as if it had finished with the error code @code{GPG_ERR_CANCEL}.

If you use an external event loop, you must ensure that no I/O callbacks are invoked for this context (for example by halting the event loop). On successful cancellation, all registered I/O callbacks for this context will be unregistered, and a @code{GPGME_EVENT_DONE}

event
 with the error code @code{GPG_ERR_CANCEL} will be signalled.

The function returns an error code if the cancellation failed (in this
case the state of @var{ctx} is not modified).
@end deftypefun


@deftypefun gpgme_ctx_t gpgme_cancel_async (@w{gpgme_ctx_t @var{ctx}})
@since{1.1.7}

The function @code{gpgme_cancel_async} attempts to cancel a pending
operation in the context @var{ctx}.  This can be called by any thread
at any time after starting an operation on the context, but will not
take effect immediately.  The actual cancellation happens at the next
time GPGME processes I/O in that context.

The function returns an error code if the cancellation failed (in this
case the state of @var{ctx} is not modified).
@end deftypefun

@c ************************************************************
@c *******************  Appendices  *************************
@c ************************************************************

@include uiserver.texi

@node Debugging
@appendix How to solve problems
@cindex
 debug
@cindex GPGME_DEBUG

Everyone knows that software often does not do what it should do and thus
there is a need to track down problems.  This is in particular true
for applications using a complex library like @acronym{GPGME} and of
course also for the library itself.  Here we give a few hints on how
to solve such problems.

First of all you should make sure that the keys you want to use are
installed in the GnuPG engine and are usable.  Thus the first test is
to run the desired operation using @command{gpg} or @command{gpgsm} on
the command line.  If you can't figure out why things don't work, you
may use @acronym{GPGME}'s built in trace feature.  This feature is
either enabled using the environment variable @code{GPGME_DEBUG} or,
if this is not possible, by calling the function
@code{gpgme_set_global_flag}.  The value is the trace level and
an optional file name.  If no file name is given the trace output is

printed to @code{stderr}.

@noindent
For example
@smallexample
GPGME_DEBUG=9:/home/user/mygpgme.log
@end
smallexample
@noindent
(Note that under Windows you use a semicolon in place of the colon to
separate the fields.)

A trace level of 9 is pretty verbose and thus you may want to start
off with a lower level. The exact definition of the trace levels and
the output format may change with any release; you need to check the
source code for details. In any case the trace log should be helpful
to understand what is going going on. Warning: The trace log may
reveal sensitive details like passphrases or other data you use in
your application. If you are asked to send a log file, make sure that
you run your tests only with play data.

@node Deprecated Functions
@appendix Deprecated Functions
@cindex deprecated

For backward compatibility @acronym{GPGME} has a number of functions,
data types and constants which are deprecated and should not be used
anymore. We document here those which are really old to help
understanding old code and to allow migration
to their modern
counterparts.

@strong{Warning:} These interfaces will be removed in a future version
of @acronym{GPGME}.

@deftypefun void gpgme_key_release (@w{gpgme_key_t @var{key}})
The function @code{gpgme_key_release} is equivalent to
@code{gpgme_key_unref}.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_import_ext (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t
@var{keydata}}, @w{int *@var{nr}})
@since{0.3.9}

The function @code{gpgme_op_import_ext} is equivalent to:

@example

```
 gpgme_error_t err = gpgme_op_import (ctx, keydata);
 if (!err)
   @{
     gpgme_import_result_t result = gpgme_op_import_result (ctx);
     *nr = result->considered;
   @}
@end example
@end deftypefun
```

```
@deftp {Data type} {gpgme_error_t (*gpgme_edit_cb_t) @
  (@w{void *@var{handle}}, @
   @w{gpgme_status_code_t @var{status}}, @
   @w{const char *@var{args}}, @
   @w{int @var{fd}})}
@tindex gpgme_edit_cb_t
The @code{gpgme_edit_cb_t} type is the type of functions which
@acronym{GPGME} calls
 if it a key edit operation is on-going.  The
status code @var{status} and the argument line @var{args} are passed
through by @acronym{GPGME} from the crypto engine.  The file
descriptor @var{fd} is -1 for normal status messages.  If @var{status}
indicates a command rather than a status message, the response to the
command should be written to @var{fd}.  The @var{handle} is provided
by the user at start of operation.

The function should return @code{GPG_ERR_FALSE} if it did not handle
the status code, @code{0} for success, or any other error value.
@end deftp

@deftypefun gpgme_error_t gpgme_op_edit (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{key}},
@w{gpgme_edit_cb_t @var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})
@since{0.3.9}

Note: This function is deprecated, please use
@code{gpgme_op_interact} instead.

The function @code{gpgme_op_edit} processes the key @var{KEY}
interactively, using the edit callback function @var{FNC} with the
handle @var{HANDLE}.  The callback
 is invoked for every status and
command request from the crypto engine.  The output of the crypto
engine is written to the data object @var{out}.

Note that the protocol between the callback function and the crypto
engine is specific to the crypto engine and no further support in
implementing this protocol correctly is provided by @acronym{GPGME}.
```

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
edit operation completes successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx} or @var{key} is not a valid pointer, and any error returned
by the crypto engine or the edit callback handler.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_edit_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
@var{key}}, @w{gpgme_edit_cb_t @var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})

@since{0.3.9}

Note: This function is deprecated, please use
@code{gpgme_op_interact_start} instead.

The function @code{gpgme_op_edit_start} initiates a
@code{gpgme_op_edit} operation.
It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation was started successfully, and @code{GPG_ERR_INV_VALUE} if
@var{ctx} or @var{key} is not a valid pointer.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_card_edit (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
@var{key}}, @w{gpgme_edit_cb_t @var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})
Note: This function is deprecated, please use @code{gpgme_op_interact}
with the flag @code{GPGME_INTERACT_CARD} instead.

The function @code{gpgme_op_card_edit} is analogous to
@code{gpgme_op_edit}, but should be used to process the smart card corresponding to the key @var{key}.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_card_edit_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
@var{key}}, @w{gpgme_edit_cb_t @var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})
Note: This function is deprecated,
please use @code{gpgme_op_interact_start}
with the flag @code{GPGME_INTERACT_CARD} instead.

The function @code{gpgme_op_card_edit_start} initiates a
@code{gpgme_op_card_edit} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation was started successfully, and @code{GPG_ERR_INV_VALUE} if
@var{ctx} or @var{key} is not a valid pointer.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_new_with_read_cb (@w{gpgme_data_t *@var{dh}}, @w{int (*@var{readfunc})} (@w{void *@var{hook}}, @w{char *@var{buffer}}, @w{size_t @var{count}}, @w{size_t *@var{nread}}), @w{void *@var{hook_value}})
The function @code{gpgme_data_new_with_read_cb} creates a new
@code{gpgme_data_t} object and uses the callback function @var{readfunc}
to retrieve the data on demand. As the callback function can supply
the data in any way it wants, this is the most flexible data type
@acronym{GPGME}
provides. However, it can not be used to write data.

The callback function receives @var{hook_value} as its first argument
whenever it is invoked. It should return up to @var{count} bytes in
@var{buffer}, and return the number of bytes actually read in
@var{nread}. It may return @code{0} in @var{nread} if no data is
currently available. To indicate @code{EOF} the function should
return with an error code of @code{-1} and set @var{nread} to
@code{0}. The callback function may support to reset its internal
read pointer if it is invoked with @var{buffer} and @var{nread} being
@code{NULL} and @var{count} being @code{0}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, @code{GPG_ERR_INV_VALUE} if
@var{dh} or @var{readfunc} is not a valid pointer, and
@code{GPG_ERR_ENOMEM} if not enough memory is available.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_rewind (@w{gpgme_data_t @var{dh}})
The function @code{gpgme_data_rewind}
is equivalent to:

@example
return (gpgme_data_seek (dh, 0, SEEK_SET) == -1)
? gpgme_error_from_errno (errno) : 0;
@end example
@end deftypefun

@deftp {Data type} gpgme_attr_t
The @code{gpgme_attr_t} type is used to specify a key or trust item
attribute. The following attributes are defined:

@table @code
@item GPGME_ATTR_KEYID
This is the key ID of a sub key. It is representable as a string.

@item GPGME_ATTR_FPR
This is the fingerprint of a sub key.  It is representable as a
string.

@item GPGME_ATTR_ALGO
This is the crypto algorithm for which the sub key can be used.  It
is representable as a string and as a number.  The numbers correspond
to the @code{enum gcry_pk_algos} values in the gcrypt library.

@item GPGME_ATTR_LEN
This is the key length of a sub key.  It is representable as a
number.

@item GPGME_ATTR_CREATED
This is the timestamp at creation time of a sub key.  It is
representable as a number.

@item GPGME_ATTR_EXPIRE
This is the expiration time of
 a sub key.  It is representable as a
number.

@item GPGME_ATTR_USERID
This is a user ID.  There can be more than one user IDs in a
@var{gpgme_key_t} object.  The first one (with index 0) is the primary
user ID.  The user ID is representable as a number.

@item GPGME_ATTR_NAME
This is the name belonging to a user ID.  It is representable as a string.

@item GPGME_ATTR_EMAIL
This is the email address belonging to a user ID.  It is representable
as a string.

@item GPGME_ATTR_COMMENT
This is the comment belonging to a user ID.  It is representable as a
string.

@item GPGME_ATTR_VALIDITY
This is the validity belonging to a user ID.  It is representable as a
string and as a number.  See below for a list of available validities.

@item GPGME_ATTR_UID_REVOKED
This specifies if a user ID is revoked.  It is representable as a
number, and is @code{1} if the user ID is revoked, and @code{0}
otherwise.

@item GPGME_ATTR_UID_INVALID

This specifies if a user ID is invalid.  It is representable as a
number,
 and is @code{1} if the user ID is invalid, and @code{0}
otherwise.

@item GPGME_ATTR_TYPE
This returns information about the type of key.  For the string function
this will eother be "PGP" or "X.509".  The integer function returns 0
for PGP and 1 for X.509.

@item GPGME_ATTR_IS_SECRET
This specifies if the key is a secret key.  It is representable as a
number, and is @code{1} if the key is revoked, and @code{0} otherwise.

@item GPGME_ATTR_KEY_REVOKED
This specifies if a sub key is revoked.  It is representable as a
number, and is @code{1} if the key is revoked, and @code{0} otherwise.

@item GPGME_ATTR_KEY_INVALID
This specifies if a sub key is invalid.  It is representable as a
number, and is @code{1} if the key is invalid, and @code{0} otherwise.

@item GPGME_ATTR_KEY_EXPIRED
This specifies if a sub key is expired.  It is representable as a
number, and is @code{1} if the key is expired, and @code{0} otherwise.

@item GPGME_ATTR_KEY_DISABLED
This specifies if a sub key is disabled.
  It is representable as a
number, and is @code{1} if the key is disabled, and @code{0} otherwise.

@item GPGME_ATTR_KEY_CAPS
This is a description of the capabilities of a sub key.  It is
representable as a string.  The string contains the letter ``e'' if
the key can be used for encryption, ``s'' if the key can be used for
signatures, and ``c'' if the key can be used for certifications.

@item GPGME_ATTR_CAN_ENCRYPT
This specifies if a sub key can be used for encryption.  It is
representable as a number, and is @code{1} if the sub key can be used
for encryption, and @code{0} otherwise.

@item GPGME_ATTR_CAN_SIGN
This specifies if a sub key can be used to create data signatures.  It
is representable as a number, and is @code{1} if the sub key can be
used for signatures, and @code{0} otherwise.

@item GPGME_ATTR_CAN_CERTIFY

This specifies if a sub key can be used to create key certificates.
It is representable as a number, and is @code{1} if the sub key can be
used for certifications,
 and @code{0} otherwise.

@item GPGME_ATTR_SERIAL
The X.509 issuer serial attribute of the key.  It is representable as
a string.

@item GPGME_ATTR_ISSUE
The X.509 issuer name attribute of the key.  It is representable as a
string.

@item GPGME_ATTR_CHAINID
The X.509 chain ID can be used to build the certification chain.  It
is representable as a string.
@end table
@end deftp

@deftypefun {const char *} gpgme_key_get_string_attr (@w{gpgme_key_t @var{key}}, @w{gpgme_attr_t
@var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
The function @code{gpgme_key_get_string_attr} returns the value of the
string-representable attribute @var{what} of key @var{key}.  If the
attribute is an attribute of a sub key or an user ID, @var{idx}
specifies the sub key or user ID of which the attribute value is
returned.  The argument @var{reserved} is reserved for later use and
should be @code{NULL}.

The string returned is only valid as long as the key is valid.

The function returns @code{0}
 if an attribute can't be returned as a
string, @var{key} is not a valid pointer, @var{idx} out of range,
or @var{reserved} not @code{NULL}.
@end deftypefun

@deftypefun {unsigned long} gpgme_key_get_ulong_attr (@w{gpgme_key_t @var{key}}, @w{gpgme_attr_t
@var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
The function @code{gpgme_key_get_ulong_attr} returns the value of the
number-representable attribute @var{what} of key @var{key}.  If the
attribute is an attribute of a sub key or an user ID, @var{idx}
specifies the sub key or user ID of which the attribute value is
returned.  The argument @var{reserved} is reserved for later use and
should be @code{NULL}.

The function returns @code{0} if the attribute can't be returned as a
number, @var{key} is not a valid pointer, @var{idx} out of range, or
@var{reserved} not @code{NULL}.

@end deftypefun

@c
@c Key Signatures
@c
The signatures on a key are only available if the key was retrieved
via a listing operation with the @code{GPGME_KEYLIST_MODE_SIGS}
mode
enabled, because it is expensive to retrieve all signatures of a key.

So, before using the below interfaces to retrieve the signatures on a
key, you have to make sure that the key was listed with signatures
enabled. One convenient, but blocking, way to do this is to use the
function @code{gpgme_get_key}.

@deftp {Data type} gpgme_attr_t
The @code{gpgme_attr_t} type is used to specify a key signature
attribute. The following attributes are defined:

@table @code
@item GPGME_ATTR_KEYID
This is the key ID of the key which was used for the signature. It is
representable as a string.

@item GPGME_ATTR_ALGO
This is the crypto algorithm used to create the signature. It is
representable as a string and as a number. The numbers correspond to
the @code{enum gcry_pk_algos} values in the gcrypt library.

@item GPGME_ATTR_CREATED
This is the timestamp at creation time of the signature. It is
representable as a number.

@item GPGME_ATTR_EXPIRE
This is the expiration
time of the signature. It is representable as
a number.

@item GPGME_ATTR_USERID
This is the user ID associated with the signing key. The user ID is
representable as a number.

@item GPGME_ATTR_NAME
This is the name belonging to a user ID. It is representable as a string.

@item GPGME_ATTR_EMAIL
This is the email address belonging to a user ID. It is representable

as a string.

@item GPGME_ATTR_COMMENT
This is the comment belonging to a user ID.  It is representable as a
string.

@item GPGME_ATTR_KEY_REVOKED
This specifies if a key signature is a revocation signature.  It is
representable as a number, and is @code{1} if the key is revoked, and
@code{0} otherwise.

@c @item GPGME_ATTR_KEY_EXPIRED
@c This specifies if a key signature is expired.  It is representable as
@c a number, and is @code{1} if the key is revoked, and @code{0}
@c otherwise.
@c
@item GPGME_ATTR_SIG_CLASS
This specifies the signature class of a key signature.  It is
representable as a number.  The meaning is specific
 to the crypto
engine.

@item GPGME_ATTR_SIG_CLASS
This specifies the signature class of a key signature.  It is
representable as a number.  The meaning is specific to the crypto
engine.

@item GPGME_ATTR_SIG_STATUS
This is the same value as returned by @code{gpgme_get_sig_status}.
@end table
@end deftp

@deftypefun {const char *} gpgme_key_sig_get_string_attr (@w{gpgme_key_t @var{key}}, @w{int
@var{uid_idx}}, @w{gpgme_attr_t @var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
The function @code{gpgme_key_sig_get_string_attr} returns the value of
the string-representable attribute @var{what} of the signature
@var{idx} on the user ID @var{uid_idx} in the key @var{key}.  The
argument @var{reserved} is reserved for later use and should be
@code{NULL}.

The string returned is only valid as long as the key is valid.

The function returns @code{0} if an attribute can't be returned as a
string, @var{key} is not a valid pointer, @var{uid_idx} or @var{idx}
out of range, or @var{reserved}
 not @code{NULL}.
@end deftypefun

@deftypefun {unsigned long} gpgme_key_sig_get_ulong_attr (@w{gpgme_key_t @var{key}}, @w{int @var{uid_idx}}, @w{gpgme_attr_t @var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
The function @code{gpgme_key_sig_get_ulong_attr} returns the value of the number-representable attribute @var{what} of the signature @var{idx} on the user ID @var{uid_idx} in the key @var{key}. The argument @var{reserved} is reserved for later use and should be @code{NULL}.

The function returns @code{0} if an attribute can't be returned as a string, @var{key} is not a valid pointer, @var{uid_idx} or @var{idx} out of range, or @var{reserved} not @code{NULL}.
@end deftypefun

@deftp {Data type} {enum gpgme_sig_stat_t}
@tindex gpgme_sig_stat_t
The @code{gpgme_sig_stat_t} type holds the result of a signature check, or the combined result of all signatures. The following results are possible:

@table @code
@item GPGME_SIG_STAT_NONE
This status should not occur
in normal operation.

@item GPGME_SIG_STAT_GOOD
This status indicates that the signature is valid. For the combined result this status means that all signatures are valid.

@item GPGME_SIG_STAT_GOOD_EXP
This status indicates that the signature is valid but expired. For the combined result this status means that all signatures are valid and expired.

@item GPGME_SIG_STAT_GOOD_EXPKEY
This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.

@item GPGME_SIG_STAT_BAD
This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

@item GPGME_SIG_STAT_NOKEY
This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

```
@item GPGME_SIG_STAT_NOSIG
This
 status indicates that the signature data provided was not a real
signature.

@item GPGME_SIG_STAT_ERROR
This status indicates that there was some other error which prevented
the signature verification.

@item GPGME_SIG_STAT_DIFF
For the combined result this status means that at least two signatures
have a different status.  You can get each key's status with
@code{gpgme_get_sig_status}.
@end table
@end deftp

@deftypefun {const char *} gpgme_get_sig_status (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}},
@w{gpgme_sig_stat_t *@var{r_stat}}, @w{time_t *@var{r_created}})
The function @code{gpgme_get_sig_status} is equivalent to:

@example
 gpgme_verify_result_t result;
 gpgme_signature_t sig;

 result = gpgme_op_verify_result (ctx);
 sig = result->signatures;

 while (sig && idx)
   @{
     sig = sig->next;
     idx--;
   @}
 if (!sig || idx)
   return NULL;

 if (r_stat)
   @{
     switch (gpg_err_code (sig->status))
 @{
 case GPG_ERR_NO_ERROR:
   *r_stat = GPGME_SIG_STAT_GOOD;

  break;

 case GPG_ERR_BAD_SIGNATURE:
   *r_stat = GPGME_SIG_STAT_BAD;
   break;
```

```
 case GPG_ERR_NO_PUBKEY:
   *r_stat = GPGME_SIG_STAT_NOKEY;
   break;

 case GPG_ERR_NO_DATA:
   *r_stat = GPGME_SIG_STAT_NOSIG;
   break;

 case GPG_ERR_SIG_EXPIRED:
   *r_stat = GPGME_SIG_STAT_GOOD_EXP;
   break;

 case GPG_ERR_KEY_EXPIRED:
   *r_stat = GPGME_SIG_STAT_GOOD_EXPKEY;
   break;

 default:
   *r_stat = GPGME_SIG_STAT_ERROR;
   break;
 @}
   @}
 if (r_created)
   *r_created = sig->timestamp;
 return sig->fpr;
@end example
@end deftypefun

@deftypefun {const char *} gpgme_get_sig_string_attr (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}},
@w{gpgme_attr_t @var{what}}, @w{int @var{whatidx}})
The function @code{gpgme_get_sig_string_attr} is equivalent to:

@example
 gpgme_verify_result_t result;
 gpgme_signature_t sig;

 result = gpgme_op_verify_result (ctx);
 sig = result->signatures;

 while (sig && idx)
   @{
     sig = sig->next;
     idx--;
   @}
 if (!sig || idx)
   return
 NULL;

 switch (what)
```

```
  @{
  case GPGME_ATTR_FPR:
    return sig->fpr;

  case GPGME_ATTR_ERRTOK:
    if (whatidx == 1)
      return sig->wrong_key_usage ? "Wrong_Key_Usage" : "";
    else
 return "";
  default:
    break;
  @}

 return NULL;
@end example
@end deftypefun

@deftypefun {const char *} gpgme_get_sig_ulong_attr (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}},
@w{gpgme_attr_t @var{what}}, @w{int @var{whatidx}})
The function @code{gpgme_get_sig_ulong_attr} is equivalent to:

@example
 gpgme_verify_result_t result;
 gpgme_signature_t sig;

 result = gpgme_op_verify_result (ctx);
 sig = result->signatures;

 while (sig && idx)
  @{
    sig = sig->next;
    idx--;
  @}
 if (!sig || idx)
  return 0;

 switch (what)
  @{
  case GPGME_ATTR_CREATED:
    return sig->timestamp;

  case GPGME_ATTR_EXPIRE:
    return sig->exp_timestamp;

  case GPGME_ATTR_VALIDITY:
    return (unsigned long) sig->validity;

  case GPGME_ATTR_SIG_STATUS:
```

```
    switch (sig->status)
 @{
 case GPG_ERR_NO_ERROR:
   return GPGME_SIG_STAT_GOOD;

 case GPG_ERR_BAD_SIGNATURE:
   return GPGME_SIG_STAT_BAD;

 case GPG_ERR_NO_PUBKEY:
   return GPGME_SIG_STAT_NOKEY;

 case GPG_ERR_NO_DATA:
   return GPGME_SIG_STAT_NOSIG;

 case GPG_ERR_SIG_EXPIRED:
   return GPGME_SIG_STAT_GOOD_EXP;

 case GPG_ERR_KEY_EXPIRED:
   return GPGME_SIG_STAT_GOOD_EXPKEY;

 default:
   return GPGME_SIG_STAT_ERROR;
 @}

   case GPGME_ATTR_SIG_SUMMARY:
     return sig->summary;

   default:
     break;
   @}
 return 0;
@end example
@end deftypefun

@deftypefun {const char *} gpgme_get_sig_key (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}},
@w{gpgme_key_t *@var{r_key}})
The function @code{gpgme_get_sig_key} is equivalent to:

@example
 gpgme_verify_result_t result;
 gpgme_signature_t sig;

 result = gpgme_op_verify_result (ctx);
 sig = result->signatures;

 while (sig && idx)
   @{
     sig = sig->next;
```

```
    idx--;
  @}
 if (!sig || idx)
   return gpg_error
 (GPG_ERR_EOF);

 return gpgme_get_key (ctx, sig->fpr, r_key, 0);
@end example
@end deftypefun
```

```
@include lesser.texi

@include gpl.texi

@node Concept Index
@unnumbered Concept Index

@printindex cp

@node Function and Data Index
@unnumbered Function and Data Index

@printindex fn


@bye
```


```
(21:protected-private-key(3:elg(1:p193:5*n^f"Q'R0_6<ymec \=c7S8u[5
ZF'xf5yi9F@T=KhZdU0(k5nZEI/ R]njVITPU$W<xs-Yx)(1:g1:)(1:y192:O9GNR{?]Y_W[FD*zuRmk%'R\'>>e9pe
eU)uS%VJ!5F)yH*O
]l'7{@wJmQP^jurx'V2H2j[G{q_"8()(9:protected25:openpgp-s2k3-sha1-aes-cbc((4:sha18:o"%7:5242880)16:Hs*}u
)256:Gzk3%\Kb2=oOO@,}eBBI3F|OQP3eD%n,;~L-6UH^=64i);l
e+sG"(mlH_2sn_BBO7hRcZUt(p6,{5|37C3m8EY9=gQ )(12:protected-at15:20101008T070148)))
```


```
-----BEGIN PGP PUBLIC KEY BLOCK-----

mQENBFsMHecBCACqdJgqa+CeNYwPCK+MpOwAV6uFVjDyO2LmOs6+XfDWRBU/Zjtz
8zdYNKSbLjkWN4ujV5aiyA7MtEofszzYLEoKUt1wiDScHMpW8qmEFDvl9g26MeAV
rTno9D5KodHvEIs8wnrqBs8ix0WLbh6J1Dtt8HQgIbN+v3gaRQrgBFe6z2ZYpHHx
ZfOu3iFKlm2WE/NekRkvvFIo3ApGvRhGIYw6JMmugBlo7s5xosJK0I9dkPGlEEtt
aF1RkcMj8sWG9vHAXcjlGgFfXSN9YLppydXpkuZGm4+gjLB2a3rbQCZVFnxCyG4O
ybjkP8Jw6Udm89bK2ucYFfjdrmYn/nJqRxeNABEBAAG0I1Rlc3QgTm9Qcml2S2V5
IDxub2JvZHlAZXhhbXBsZS5vcmc+iQFOBBMBCAA4FiEE4Fmh4IZtMa4TEXCITZou
EzBBU9EFAlsMHecCGwMFCwkIBwIGFQoJCAsCBBYCAwECHgECF4AACgkQTZouEzBB
U9F+qwf/SHj4uRnTWgyJ71FBxQDYCBq3jbi6e7hMkRPbJyJdnPIMAb2p0PJjBgjW
0pp4+kDPZans3UDHbma1u/SFI4/y6isJiK94Bk5xp5YliLGnUceTjgDFe6lBhfQ1
```

zVWZC/NF3tPgbziIxXQTNt34nS+9dbV/QFDLW0POcN7C0jR/hgkBjMEH2PezWhSj
mL/yLfLfUYAoxVpXjfC5aPJKqw0tR7m5ibznjCphE+FUMRg8EOmJcg6soeJ5QspU
k2dPN3+Y0zCTNRgAHEI+yIQbM6pio6v2c+UCtT1QhW4xSI38/kcEG8QiM55r1TUy
FcWAY5n5t1nNZtMxxse3LqEon3rKiLkBDQRbDB3nAQgAqfAjSjcngERtM+ZYOwN0
QF2v2FuEuMe8mhju7Met7SN2zGv1LnjhTNshEa9IABEfjZirE2Tqx4xCWDwDedK4
u1ToFvcnuAMnq2O47Sh+eTypsf6WPFtPBWf6ctKY31hFXjgoyDBULBvl43XU/D9C
Mt7nsKDPYHVrrnge/qWPYVcb+cO0sSwNImMcwQSdTQ3VBq7MeNS9ZeBcXi+XCjhN
kjNum2AQqpkHHDQV7871yQ8RIILvZSSfkLb0/SNDU+bGaw2G3lcyKdIfZi2EWWZT
oCbH38I/+LV7nAEe4zFpHwW8X0Dkx2aLgxe6UszDH9L3eGhTLpJhOSiaanG+zZKm
+QARAQABiQE2BBgBCAAgFiEE4Fmh4IZtMa4TEXCITZouEzBBU9EFAlsMHecCGwwA
CgkQTZouEzBBU9H5TQgAolWvIsez/WW8N2tmZEnX0LOFNB+1S4L4X983njwNdoVI
w19pbj+8RIHF/H9kcPGi7jK96gvlykQn3uez/95D2AiRFW5KYdOouFisKgHpv8Ay
BrhclHv11yK+X/0iTD0scYaG7np5162xLkaxSO9hsz2fGv20RKaXCWkI69fWw0BR
XlI5pZh2YFei2ZhH/tIMIW65h3w0gtgaZBBdpZTOOW4zvghyN+0MSObqkI1BvUJu
caDFI4d6ZTmp5SY+pZyktZ4bg/vMH5VFxdIKgbLx9uVeTvOupvbAW0TNulYGUBQE
nm+S0zr3W18t64e4sS3oHse8zCqo1iiImpba6F1Oaw==
=y6DD
-----END
 PGP PUBLIC KEY BLOCK-----

```
;;;; gpgme.lisp

;;; Copyright (C) 2006 g10 Code GmbH
;;;
;;; This file is part of GPGME-CL.
;;;
;;; GPGME-CL is free software; you can redistribute it and/or modify it
;;; under the terms of the GNU General Public License as published by
;;; the Free Software Foundation; either version 2 of the License, or
;;; (at your option) any later version.
;;;
;;; GPGME-CL is distributed in the hope that it will be useful, but
;;; WITHOUT ANY WARRANTY; without even the implied warranty of
;;; MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the GNU
;;; Lesser General Public License for more details.
;;;
;;; You should have received a copy of the GNU General Public License
;;; along with GPGME; if not, write to the Free Software Foundation,
;;; Inc., 59 Temple Place - Suite 330, Boston, MA 02111-1307, USA.

;;; TODO

;;; Set up the library.

(in-package :gpgme)

(deftype byte-array ()
 '(simple-array (unsigned-byte 8) (*)))
```

```
(deftype character-array ()
 '(simple-array character (*)))

;;;
 Debugging.

(defvar *debug* nil "If debugging output should be given or not.")

;;; Load the foreign library.

(define-foreign-library libgpgme
 (:unix "libgpgme.so")
 (t (:default "libgpgme")))

(use-foreign-library libgpgme)

;;; System dependencies.

; Access to ERRNO.
(defcfun ("strerror" c-strerror) :string
 (err :int))

(defun get-errno ()
 *errno*)

(defun set-errno (errno)
 (setf *errno* errno))

(define-condition system-error (error)
 ((errno :initarg :errno :reader system-error-errno))
 (:report (lambda (c stream)
     (format stream "System error: ~A: ~A"
      (system-error-errno c)
      (c-strerror (system-error-errno c)))))
 (:documentation "Signalled when an errno is encountered."))

; Needed to write passphrases.
(defcfun ("write" c-write) ssize-t
 (fd :int)
 (buffer :string) ; Actually :pointer, but we only need string.
 (size size-t))

(defun system-write (fd buffer size)
 (let ((res (c-write fd buffer size)))
   (when (< res 0) (error 'system-error
 :errno (get-errno)))
   res))
```

```
;;;
;;; C Interface Definitions
;;;

;;; Data Type Interface

;;; Some new data types used for easier translation.

;;; The number of include certs.  Translates to NIL for default.
(defctype cert-int-t
   (:wrapper :int
    :from-c translate-cert-int-t-from-foreign
    :to-c translate-cert-int-t-to-foreign))

;;; A string that may be NIL to indicate a null pointer.
(defctype string-or-nil-t
   (:wrapper :string
    :to-c translate-string-or-nil-t-to-foreign))

;;; Some opaque data types used by GPGME.

(defctype gpgme-ctx-t
   (:wrapper :pointer
    :to-c translate-gpgme-ctx-t-to-foreign)
 "The GPGME context type.")

(defctype gpgme-data-t
   (:wrapper :pointer
    :to-c translate-gpgme-data-t-to-foreign)
 "The GPGME data object type.")

;;; Wrappers for the libgpg-error library.

(defctype gpgme-error-t
   (:wrapper gpg-error::gpg-error-t
    :from-c translate-gpgme-error-t-from-foreign
    :to-c translate-gpgme-error-t-to-foreign)
 "The
 GPGME error type.")

(defctype gpgme-error-no-signal-t
   (:wrapper gpg-error::gpg-error-t
    :from-c translate-gpgme-error-no-signal-t-from-foreign)
 "The GPGME error type (this version does not signal conditions in translation.")

(defctype gpgme-err-code-t gpg-error::gpg-err-code-t
 "The GPGME error code type.")
```

```
(defctype gpgme-err-source-t gpg-error::gpg-err-source-t
 "The GPGME error source type.")

(defun gpgme-err-make (source code)
 "Construct an error value from an error code and source."
 (gpg-err-make source code))

(defun gpgme-error (code)
 "Construct an error value from an error code."
 (gpgme-err-make :gpg-err-source-gpgme code))

(defun gpgme-err-code (err)
 "Retrieve an error code from the error value ERR."
 (gpg-err-code err))

(defun gpgme-err-source (err)
 "Retrieve an error source from the error value ERR."
 (gpg-err-source err))

(defun gpgme-strerror (err)
 "Return a string containing a description of the error code."
 (gpg-strerror err))

(defun
 gpgme-strsource (err)
 "Return a string containing a description of the error source."
 (gpg-strsource err))

(defun gpgme-err-code-from-errno (err)
 "Retrieve the error code for the system error.  If the system error
  is not mapped, :gpg-err-unknown-errno is returned."
 (gpg-err-code-from-errno err))

(defun gpgme-err-code-to-errno (code)
 "Retrieve the system error for the error code.  If this is not a
  system error, 0 is returned."
 (gpg-err-code-to-errno code))

(defun gpgme-err-make-from-errno (source err)
 (gpg-err-make-from-errno source err))

(defun gpgme-error-from-errno (err)
 (gpg-error-from-errno err))

;;;

(defcenum gpgme-data-encoding-t
 "The possible encoding mode of gpgme-data-t objects."
```

```
 (:none 0)
 (:binary 1)
 (:base64 2)
 (:armor 3)
 (:url 4)
 (:urlesc 5)
 (:url0 6)
 (:mime 7))

;;;

(defcenum gpgme-pubkey-algo-t
 "Public key algorithms from libgcrypt."
 (:rsa 1)
 (:rsa-e 2)
 (:rsa-s 3)
 (:elg-e 16)
 (:dsa 17)
 (:ecc 18)
 (:elg 20)
  (:ecdsa 301)
 (:ecdh 302)
 (:eddsa 303))

(defcenum gpgme-hash-algo-t
 "Hash algorithms from libgcrypt."
 (:none 0)
 (:md5 1)
 (:sha1 2)
 (:rmd160 3)
 (:md2 5)
 (:tiger 6)
 (:haval 7)
 (:sha256 8)
 (:sha384 9)
 (:sha512 10)
 (:sha224 11)
 (:md4 301)
 (:crc32 302)
 (:crc32-rfc1510 303)
 (:crc24-rfc2440 304))

;;;

(defcenum gpgme-sig-mode-t
 "The available signature modes."
 (:none 0)
 (:detach 1)
```

```
 (:clear 2))

;;;

(defcenum gpgme-validity-t
 "The available validities for a trust item or key."
 (:unknown 0)
 (:undefined 1)
 (:never 2)
 (:marginal 3)
 (:full 4)
 (:ultimate 5))

;;;

(defcenum gpgme-protocol-t
 "The available protocols."
 (:openpgp 0)
 (:cms 1)
 (:gpgconf 2)
 (:assuan 3)
 (:g13 4)
 (:uiserver 5)
 (:spawn 6)
 (:default 254)
 (:unknown 255))

;;;

(defbitfield (gpgme-keylist-mode-t :unsigned-int)
 "The available keylist mode flags."
 (:local 1)
 (:extern 2)
 (:sigs 4)
 (:sig-notations)
 (:with-secret 16)
 (:with-tofu 32)
 (:ephemeral
 128)
 (:validate 256))

;;;

(defbitfield (gpgme-sig-notation-flags-t :unsigned-int)
 "The available signature notation flags."
 (:human-readable 1)
 (:critical 2))
```

```
(defctype gpgme-sig-notation-t
   (:wrapper :pointer
    :from-c translate-gpgme-sig-notation-t-from-foreign)
 "Signature notation pointer type.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-sig-notation-bitfield :unsigned-int)
 (:human-readable 1)
 (:critical 2))

(defcstruct gpgme-sig-notation
 "Signature notations."
 (next gpgme-sig-notation-t)
 (name :pointer)
 (value :pointer)
 (name-len :int)
 (value-len :int)
 (flags gpgme-sig-notation-flags-t)
 (bitfield gpgme-sig-notation-bitfield))

;;;

(defcenum gpgme-status-code-t
 "The possible status codes for the edit operation."
 (:eof 0)
 (:enter 1)
 (:leave 2)
 (:abort 3)
 (:goodsig 4)
 (:badsig 5)
 (:errsig 6)
 (:badarmor 7)
 (:rsa-or-idea 8)
 (:keyexpired 9)
 (:keyrevoked 10)
 (:trust-undefined 11)
 (:trust-never
 12)
 (:trust-marginal 13)
 (:trust-fully 14)
 (:trust-ultimate 15)
 (:shm-info 16)
 (:shm-get 17)
 (:shm-get-bool 18)
 (:shm-get-hidden 19)
 (:need-passphrase 20)
 (:validsig 21)
 (:sig-id 22)
```

(:enc-to 23)
(:nodata 24)
(:bad-passphrase 25)
(:no-pubkey 26)
(:no-seckey 27)
(:need-passphrase-sym 28)
(:decryption-failed 29)
(:decryption-okay 30)
(:missing-passphrase 31)
(:good-passphrase 32)
(:goodmdc 33)
(:badmdc 34)
(:errmdc 35)
(:imported 36)
(:import-ok 37)
(:import-problem 38)
(:import-res 39)
(:file-start 40)
(:file-done 41)
(:file-error 42)
(:begin-decryption 43)
(:end-decryption 44)
(:begin-encryption 45)
(:end-encryption 46)
(:delete-problem 47)
(:get-bool 48)
(:get-line 49)
(:get-hidden 50)
(:got-it 51)
(:progress 52)
(:sig-created 53)
(:session-key 54)
(:notation-name 55)
(:notation-data 56)
(:policy-url 57)
(:begin-stream 58)
(:end-stream 59)
(:key-created 60)
(:userid-hint 61)
(:unexpected
62)
(:inv-recp 63)
(:no-recp 64)
(:already-signed 65)
(:sigexpired 66)
(:expsig 67)
(:expkeysig 68)
(:truncated 69)

```
 (:error 70)
 (:newsig 71)
 (:revkeysig 72)
 (:sig-subpacket 73)
 (:need-passphrase-pin 74)
 (:sc-op-failure 75)
 (:sc-op-success 76)
 (:cardctrl 77)
 (:backup-key-created 78)
 (:pka-trust-bad 79)
 (:pka-trust-good 80)
 (:plaintext 81)
 (:inv-sgnr 82)
 (:no-sgnr 83)
 (:success 84)
 (:decryption-info 85)
 (:plaintext-length 86)
 (:mountpoint 87)
 (:pinentry-launched 88)
 (:attribute 89)
 (:begin-signing 90)
 (:key-not-created 91)
 (:inquire-maxlen 92)
 (:failure 93)
 (:key-considered 94)
 (:tofu-user 95)
 (:tofu-stats 96)
 (:tofu-stats-long 97)
 (:notation-flags 98)
 (:decryption-compliance-mode 99)
 (:verification-compliance-mode 100))

;;;

(defctype gpgme-engine-info-t
   (:wrapper :pointer
    :from-c translate-gpgme-engine-info-t-to-foreign)
 "The engine information structure pointer type.")

(defcstruct gpgme-engine-info
  "Engine information."
 (next gpgme-engine-info-t)
 (protocol gpgme-protocol-t)
 (file-name :string)
 (version :string)
 (req-version :string)
 (home-dir :string))
```

```
;;;

(defctype gpgme-subkey-t
   (:wrapper :pointer
    :from-c translate-gpgme-subkey-t-from-foreign)
 "A subkey from a key.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-subkey-bitfield :unsigned-int)
 "The subkey bitfield."
 (:revoked 1)
 (:expired 2)
 (:disabled 4)
 (:invalid 8)
 (:can-encrypt 16)
 (:can-sign 32)
 (:can-certify 64)
 (:secret 128)
 (:can-authenticate 256)
 (:is-qualified 512)
 (:is-cardkey 1024)
 (:is-de-vs 2048))

(defcstruct gpgme-subkey
 "Subkey from a key."
 (next gpgme-subkey-t)
 (bitfield gpgme-subkey-bitfield)
 (pubkey-algo gpgme-pubkey-algo-t)
 (length :unsigned-int)
 (keyid :string)
 (-keyid :char :count 17)
 (fpr :string)
 (timestamp :long)
 (expires :long))


(defctype gpgme-key-sig-t
   (:wrapper :pointer
    :from-c translate-gpgme-key-sig-t-from-foreign)
  "A signature on a user ID.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-key-sig-bitfield :unsigned-int)
 "The key signature bitfield."
 (:revoked 1)
 (:expired 2)
 (:invalid 4)
 (:exportable 16))
```

```
(defcstruct gpgme-key-sig
 "A signature on a user ID."
 (next gpgme-key-sig-t)
 (bitfield gpgme-key-sig-bitfield)
 (pubkey-algo gpgme-pubkey-algo-t)
 (keyid :string)
 (-keyid :char :count 17)
 (timestamp :long)
 (expires :long)
 (status gpgme-error-no-signal-t)
 (-class :unsigned-int)
 (uid :string)
 (name :string)
 (email :string)
 (comment :string)
 (sig-class :unsigned-int))


(defctype gpgme-user-id-t
   (:wrapper :pointer
    :from-c translate-gpgme-user-id-t-from-foreign)
 "A user ID from a key.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-user-id-bitfield :unsigned-int)
 "The user ID bitfield."
 (:revoked 1)
 (:invalid 2))

(defcstruct gpgme-user-id
 "A user ID from a key."
 (next
 gpgme-user-id-t)
 (bitfield gpgme-user-id-bitfield)
 (validity gpgme-validity-t)
 (uid :string)
 (name :string)
 (email :string)
 (comment :string)
 (signatures gpgme-key-sig-t)
 (-last-keysig gpgme-key-sig-t))


(defctype gpgme-key-t
   (:wrapper :pointer
    :from-c translate-gpgme-key-t-from-foreign
    :to-c translate-gpgme-key-t-to-foreign)
```

```
 "A key from the keyring.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-key-bitfield :unsigned-int)
 "The key bitfield."
 (:revoked 1)
 (:expired 2)
 (:disabled 4)
 (:invalid 8)
 (:can-encrypt 16)
 (:can-sign 32)
 (:can-certify 64)
 (:secret 128)
 (:can-authenticate 256)
 (:is-qualified 512))

(defcstruct gpgme-key
 "A signature on a user ID."
 (-refs :unsigned-int)
 (bitfield gpgme-key-bitfield)
 (protocol gpgme-protocol-t)
 (issuer-serial :string)
 (issuer-name :string)
 (chain-id :string)
 (owner-trust gpgme-validity-t)
 (subkeys gpgme-subkey-t)
 (uids gpgme-user-id-t)
 (-last-subkey gpgme-subkey-t)
  (-last-uid gpgme-user-id-t)
 (keylist-mode gpgme-keylist-mode-t))

;;;

;;; There is no support in CFFI to define callback C types and have
;;; automatic type checking with the callback definition.

(defctype gpgme-passphrase-cb-t :pointer)

(defctype gpgme-progress-cb-t :pointer)

(defctype gpgme-edit-cb-t :pointer)


;;;
;;; Function Interface
;;;

;;; Context management functions.
```

```
(defcfun ("gpgme_new" c-gpgme-new) gpgme-error-t
 (ctx :pointer))

(defcfun ("gpgme_release" c-gpgme-release) :void
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_protocol" c-gpgme-set-protocol) gpgme-error-t
 (ctx gpgme-ctx-t)
 (proto gpgme-protocol-t))

(defcfun ("gpgme_get_protocol" c-gpgme-get-protocol) gpgme-protocol-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_get_protocol_name" c-gpgme-get-protocol-name) :string
 (proto gpgme-protocol-t))

(defcfun ("gpgme_set_armor" c-gpgme-set-armor) :void
 (ctx gpgme-ctx-t)
 (yes :boolean))

(defcfun ("gpgme_get_armor" c-gpgme-get-armor) :boolean
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_textmode" c-gpgme-set-textmode) :void
 (ctx gpgme-ctx-t)
 (yes :boolean))

(defcfun ("gpgme_get_textmode" c-gpgme-get-textmode) :boolean
 (ctx gpgme-ctx-t))

(defconstant +include-certs-default+ -256)

(defcfun ("gpgme_set_include_certs" c-gpgme-set-include-certs) :void
 (ctx gpgme-ctx-t)
 (nr-of-certs cert-int-t))

(defcfun ("gpgme_get_include_certs" c-gpgme-get-include-certs) cert-int-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_keylist_mode" c-gpgme-set-keylist-mode) gpgme-error-t
 (ctx gpgme-ctx-t)
 (mode gpgme-keylist-mode-t))

(defcfun ("gpgme_get_keylist_mode" c-gpgme-get-keylist-mode)
   gpgme-keylist-mode-t
 (ctx gpgme-ctx-t))
```

```
(defcfun ("gpgme_set_passphrase_cb" c-gpgme-set-passphrase-cb) :void
 (ctx gpgme-ctx-t)
 (cb gpgme-passphrase-cb-t)
 (hook-value :pointer))

(defcfun ("gpgme_get_passphrase_cb" c-gpgme-get-passphrase-cb) :void
 (ctx gpgme-ctx-t)
 (cb-p :pointer)
 (hook-value-p :pointer))

(defcfun ("gpgme_set_progress_cb"
 c-gpgme-set-progress-cb) :void
 (ctx gpgme-ctx-t)
 (cb gpgme-progress-cb-t)
 (hook-value :pointer))

(defcfun ("gpgme_get_progress_cb" c-gpgme-get-progress-cb) :void
 (ctx gpgme-ctx-t)
 (cb-p :pointer)
 (hook-value-p :pointer))

(defcfun ("gpgme_set_locale" c-gpgme-set-locale) gpgme-error-t
 (ctx gpgme-ctx-t)
 (category :int)
 (value string-or-nil-t))

(defcfun ("gpgme_ctx_get_engine_info" c-gpgme-ctx-get-engine-info)
   gpgme-engine-info-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_ctx_set_engine_info" c-gpgme-ctx-set-engine-info)
   gpgme-error-t
 (ctx gpgme-ctx-t)
 (proto gpgme-protocol-t)
 (file-name string-or-nil-t)
 (home-dir string-or-nil-t))

;;;

(defcfun ("gpgme_pubkey_algo_name" c-gpgme-pubkey-algo-name) :string
 (algo gpgme-pubkey-algo-t))

(defcfun ("gpgme_hash_algo_name" c-gpgme-hash-algo-name) :string
 (algo gpgme-hash-algo-t))

;;;

(defcfun ("gpgme_signers_clear" c-gpgme-signers-clear) :void
```

```
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_signers_add" c-gpgme-signers-add)
 gpgme-error-t
 (ctx gpgme-ctx-t)
 (key gpgme-key-t))

(defcfun ("gpgme_signers_enum" c-gpgme-signers-enum) gpgme-key-t
 (ctx gpgme-ctx-t)
 (seq :int))

;;;

(defcfun ("gpgme_sig_notation_clear" c-gpgme-sig-notation-clear) :void
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_sig_notation_add" c-gpgme-sig-notation-add) gpgme-error-t
 (ctx gpgme-ctx-t)
 (name :string)
 (value string-or-nil-t)
 (flags gpgme-sig-notation-flags-t))

(defcfun ("gpgme_sig_notation_get" c-gpgme-sig-notation-get)
   gpgme-sig-notation-t
 (ctx gpgme-ctx-t))

;;; Run Control.

;;; There is no support in CFFI to define callback C types and have
;;; automatic type checking with the callback definition.

(defctype gpgme-io-cb-t :pointer)

(defctype gpgme-register-io-cb-t :pointer)

(defctype gpgme-remove-io-cb-t :pointer)

(defcenum gpgme-event-io-t
 "The possible events on I/O event callbacks."
 (:start 0)
 (:done 1)
 (:next-key 2)
 (:next-trustitem 3))

(defctype gpgme-event-io-cb-t :pointer)

(defcstruct
```

```
 gpgme-io-cbs
 "I/O callbacks."
 (add gpgme-register-io-cb-t)
 (add-priv :pointer)
 (remove gpgme-remove-io-cb-t)
 (event gpgme-event-io-cb-t)
 (event-priv :pointer))

(defctype gpgme-io-cbs-t :pointer)

(defcfun ("gpgme_set_io_cbs" c-gpgme-set-io-cbs) :void
 (ctx gpgme-ctx-t)
 (io-cbs gpgme-io-cbs-t))

(defcfun ("gpgme_get_io_cbs" c-gpgme-get-io-cbs) :void
 (ctx gpgme-ctx-t)
 (io-cbs gpgme-io-cbs-t))

(defcfun ("gpgme_wait" c-gpgme-wait) gpgme-ctx-t
 (ctx gpgme-ctx-t)
 (status-p :pointer)
 (hang :int))

;;; Functions to handle data objects.

;;; There is no support in CFFI to define callback C types and have
;;; automatic type checking with the callback definition.

(defctype gpgme-data-read-cb-t :pointer)
(defctype gpgme-data-write-cb-t :pointer)
(defctype gpgme-data-seek-cb-t :pointer)
(defctype gpgme-data-release-cb-t :pointer)

(defcstruct gpgme-data-cbs
 "Data callbacks."
 (read gpgme-data-read-cb-t)
 (write gpgme-data-write-cb-t)
 (seek gpgme-data-seek-cb-t)
  (release gpgme-data-release-cb-t))

(defctype gpgme-data-cbs-t :pointer
 "Data callbacks pointer.")

(defcfun ("gpgme_data_read" c-gpgme-data-read) ssize-t
 (dh gpgme-data-t)
 (buffer :pointer)
 (size size-t))
```

```
(defcfun ("gpgme_data_write" c-gpgme-data-write) ssize-t
 (dh gpgme-data-t)
 (buffer :pointer)
 (size size-t))

(defcfun ("gpgme_data_seek" c-gpgme-data-seek) off-t
 (dh gpgme-data-t)
 (offset off-t)
 (whence :int))

(defcfun ("gpgme_data_new" c-gpgme-data-new) gpgme-error-t
 (dh-p :pointer))

(defcfun ("gpgme_data_release" c-gpgme-data-release) :void
 (dh gpgme-data-t))

(defcfun ("gpgme_data_new_from_mem" c-gpgme-data-new-from-mem) gpgme-error-t
 (dh-p :pointer)
 (buffer :pointer)
 (size size-t)
 (copy :int))

(defcfun ("gpgme_data_release_and_get_mem" c-gpgme-data-release-and-get-mem)
   :pointer
 (dh gpgme-data-t)
 (len-p :pointer))

(defcfun ("gpgme_data_new_from_cbs" c-gpgme-data-new-from-cbs) gpgme-error-t
 (dh-p :pointer)
 (cbs gpgme-data-cbs-t)
  (handle :pointer))

(defcfun ("gpgme_data_new_from_fd" c-gpgme-data-new-from-fd) gpgme-error-t
 (dh-p :pointer)
 (fd :int))

(defcfun ("gpgme_data_new_from_stream" c-gpgme-data-new-from-stream)
   gpgme-error-t
 (dh-p :pointer)
 (stream :pointer))

(defcfun ("gpgme_data_get_encoding" c-gpgme-data-get-encoding)
   gpgme-data-encoding-t
 (dh gpgme-data-t))

(defcfun ("gpgme_data_set_encoding" c-gpgme-data-set-encoding)
   gpgme-error-t
 (dh gpgme-data-t)
```

```
 (enc gpgme-data-encoding-t))

(defcfun ("gpgme_data_get_file_name" c-gpgme-data-get-file-name) :string
 (dh gpgme-data-t))

(defcfun ("gpgme_data_set_file_name" c-gpgme-data-set-file-name) gpgme-error-t
 (dh gpgme-data-t)
 (file-name string-or-nil-t))

(defcfun ("gpgme_data_new_from_file" c-gpgme-data-new-from-file) gpgme-error-t
 (dh-p :pointer)
 (fname :string)
 (copy :int))

(defcfun ("gpgme_data_new_from_filepart" c-gpgme-data-new-from-filepart)
   gpgme-error-t
 (dh-p :pointer)
 (fname :string)
 (fp
 :pointer)
 (offset off-t)
 (length size-t))

;;; Key and trust functions.

(defcfun ("gpgme_get_key" c-gpgme-get-key) gpgme-error-t
 (ctx gpgme-ctx-t)
 (fpr :string)
 (key-p :pointer)
 (secret :boolean))

(defcfun ("gpgme_key_ref" c-gpgme-key-ref) :void
 (key gpgme-key-t))

(defcfun ("gpgme_key_unref" c-gpgme-key-unref) :void
 (key gpgme-key-t))

;;; Crypto operations.

(defcfun ("gpgme_cancel" c-gpgme-cancel) gpgme-error-t
 (ctx gpgme-ctx-t))

;;;

(defctype gpgme-invalid-key-t
   (:wrapper :pointer
    :from-c translate-gpgme-invalid-key-t-from-foreign)
 "An invalid key structure.")
```

```
(defcstruct gpgme-invalid-key
 "An invalid key structure."
 (next gpgme-invalid-key-t)
 (fpr :string)
 (reason gpgme-error-no-signal-t))

;;; Encryption.

(defcstruct gpgme-op-encrypt-result
 "Encryption result structure."
 (invalid-recipients gpgme-invalid-key-t))

(defctype gpgme-op-encrypt-result-t
   (:wrapper :pointer
    :from-c translate-gpgme-op-encrypt-result-t-from-foreign)
  "An encryption result structure.")

(defcfun ("gpgme_op_encrypt_result" c-gpgme-op-encrypt-result)
   gpgme-op-encrypt-result-t
 (ctx gpgme-ctx-t))

(defbitfield gpgme-encrypt-flags-t
 (:always-trust 1)
 (:no-encrypt-to 2)
 (:prepare 4)
 (:expect-sign 8)
 (:no-compress 16)
 (:symmetric 32)
 (:throw-keyids 64)
 (:wrap 128)
 (:want-address 256))

(defcfun ("gpgme_op_encrypt_start" c-gpgme-op-encrypt-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (recp :pointer) ; Key array.
 (flags gpgme-encrypt-flags-t)
 (plain gpgme-data-t)
 (cipher gpgme-data-t))

(defcfun ("gpgme_op_encrypt" c-gpgme-op-encrypt) gpgme-error-t
 (ctx gpgme-ctx-t)
 (recp :pointer) ; Key array.
 (flags gpgme-encrypt-flags-t)
 (plain gpgme-data-t)
 (cipher gpgme-data-t))

(defcfun ("gpgme_op_encrypt_sign_start" c-gpgme-op-encrypt-sign-start)
```

```
   gpgme-error-t
 (ctx gpgme-ctx-t)
 (recp :pointer) ; Key array.
 (flags gpgme-encrypt-flags-t)
 (plain gpgme-data-t)
 (cipher gpgme-data-t))

(defcfun ("gpgme_op_encrypt_sign"
 c-gpgme-op-encrypt-sign) gpgme-error-t
 (ctx gpgme-ctx-t)
 (recp :pointer) ; Key array.
 (flags gpgme-encrypt-flags-t)
 (plain gpgme-data-t)
 (cipher gpgme-data-t))

;;; Decryption.

(defctype gpgme-recipient-t
   (:wrapper :pointer
    :from-c translate-gpgme-recipient-t-from-foreign)
 "A recipient structure.")

(defcstruct gpgme-recipient
 "Recipient structure."
 (next gpgme-recipient-t)
 (keyid :string)
 (-keyid :char :count 17)
 (pubkey-algo gpgme-pubkey-algo-t)
 (status gpgme-error-no-signal-t))

(defbitfield gpgme-op-decrypt-result-bitfield
 "Decryption result structure bitfield."
 (:wrong-key-usage 1)
 (:is-de-vs 2)
 (:is-mine 4))

(defcstruct gpgme-op-decrypt-result
 "Decryption result structure."
 (unsupported-algorithm :string)
 (bitfield gpgme-op-decrypt-result-bitfield)
 (recipients gpgme-recipient-t)
 (file-name :string))

(defctype gpgme-op-decrypt-result-t
   (:wrapper :pointer
    :from-c translate-gpgme-op-decrypt-result-t-from-foreign)
  "A decryption result structure.")
```

```
(defcfun ("gpgme_op_decrypt_result" c-gpgme-op-decrypt-result)
   gpgme-op-decrypt-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_decrypt_start" c-gpgme-op-decrypt-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (cipher gpgme-data-t)
 (plain gpgme-data-t))

(defcfun ("gpgme_op_decrypt" c-gpgme-op-decrypt) gpgme-error-t
 (ctx gpgme-ctx-t)
 (cipher gpgme-data-t)
 (plain gpgme-data-t))

(defcfun ("gpgme_op_decrypt_verify_start" c-gpgme-op-decrypt-verify-start)
   gpgme-error-t
 (ctx gpgme-ctx-t)
 (cipher gpgme-data-t)
 (plain gpgme-data-t))

(defcfun ("gpgme_op_decrypt_verify" c-gpgme-op-decrypt-verify) gpgme-error-t
 (ctx gpgme-ctx-t)
 (cipher gpgme-data-t)
 (plain gpgme-data-t))

;;; Signing.

(defctype gpgme-new-signature-t
   (:wrapper :pointer
    :from-c translate-gpgme-new-signature-t-from-foreign)
 "A new signature structure.")

(defcstruct gpgme-new-signature
 "New signature structure."
 (next gpgme-new-signature-t)
  (type gpgme-sig-mode-t)
 (pubkey-algo gpgme-pubkey-algo-t)
 (hash-algo gpgme-hash-algo-t)
 (-obsolete-class :unsigned-long)
 (timestamp :long)
 (fpr :string)
 (-obsolete-class-2 :unsigned-int)
 (sig-class :unsigned-int))

(defcstruct gpgme-op-sign-result
 "Signing result structure."
 (invalid-signers gpgme-invalid-key-t)
 (signatures gpgme-new-signature-t))
```

```
(defctype gpgme-op-sign-result-t
   (:wrapper :pointer
    :from-c translate-gpgme-op-sign-result-t-from-foreign)
 "A signing result structure.")

(defcfun ("gpgme_op_sign_result" c-gpgme-op-sign-result)
   gpgme-op-sign-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_sign_start" c-gpgme-op-sign-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (plain gpgme-data-t)
 (sig gpgme-data-t)
 (mode gpgme-sig-mode-t))

(defcfun ("gpgme_op_sign" c-gpgme-op-sign) gpgme-error-t
 (ctx gpgme-ctx-t)
 (plain gpgme-data-t)
 (sig gpgme-data-t)
 (mode gpgme-sig-mode-t))

;;; Verify.

(defbitfield (gpgme-sigsum-t :unsigned-int)
 "Flags
 used for the summary field in a gpgme-signature-t."
 (:valid #x0001)
 (:green #x0002)
 (:red #x0004)
 (:key-revoked #x0010)
 (:key-expired #x0020)
 (:sig-expired #x0040)
 (:key-missing #x0080)
 (:crl-missing #x0100)
 (:crl-too-old #x0200)
 (:bad-policy #x0400)
 (:sys-error #x0800)
 (:tofu-conflict #x1000))

(defctype gpgme-signature-t
   (:wrapper :pointer
    :from-c translate-gpgme-signature-t-from-foreign)
 "A signature structure.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-signature-bitfield :unsigned-int)
 "The signature bitfield."
```

```
 (:wrong-key-usage 1)
 (:pka-trust 2)
 (:chain-model 4)
 (:is-de-vs 8))

(defcstruct gpgme-signature
 "Signature structure."
 (next gpgme-signature-t)
 (summary gpgme-sigsum-t)
 (fpr :string)
 (status gpgme-error-no-signal-t)
 (notations gpgme-sig-notation-t)
 (timestamp :unsigned-long)
 (exp-timestamp :unsigned-long)
 (bitfield gpgme-signature-bitfield)
 (validity gpgme-validity-t)
 (validity-reason
 gpgme-error-no-signal-t)
 (pubkey-algo gpgme-pubkey-algo-t)
 (hash-algo gpgme-hash-algo-t))

(defcstruct gpgme-op-verify-result
 "Verify result structure."
 (signatures gpgme-signature-t)
 (file-name :string))

(defctype gpgme-op-verify-result-t
   (:wrapper :pointer
    :from-c translate-gpgme-op-verify-result-t-from-foreign)
 "A verify result structure.")

(defcfun ("gpgme_op_verify_result" c-gpgme-op-verify-result)
   gpgme-op-verify-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_verify_start" c-gpgme-op-verify-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (sig gpgme-data-t)
 (signed-text gpgme-data-t)
 (plaintext gpgme-data-t))

(defcfun ("gpgme_op_verify" c-gpgme-op-verify) gpgme-error-t
 (ctx gpgme-ctx-t)
 (sig gpgme-data-t)
 (signed-text gpgme-data-t)
 (plaintext gpgme-data-t))

;;; Import.
```

```
(defbitfield (gpgme-import-flags-t :unsigned-int)
 "Flags used for the import status field."
 (:new #x0001)
 (:uid #x0002)
 (:sig #x0004)
 (:subkey #x0008)
 (:secret
 #x0010))

(defctype gpgme-import-status-t
   (:wrapper :pointer
    :from-c translate-gpgme-import-status-t-from-foreign)
 "An import status structure.")

(defcstruct gpgme-import-status
 "New import status structure."
 (next gpgme-import-status-t)
 (fpr :string)
 (result gpgme-error-no-signal-t)
 (status :unsigned-int))

(defcstruct gpgme-op-import-result
 "Import result structure."
 (considered :int)
 (no-user-id :int)
 (imported :int)
 (imported-rsa :int)
 (unchanged :int)
 (new-user-ids :int)
 (new-sub-keys :int)
 (new-signatures :int)
 (new-revocations :int)
 (secret-read :int)
 (secret-imported :int)
 (secret-unchanged :int)
 (skipped-new-keys :int)
 (not-imported :int)
 (imports gpgme-import-status-t))

(defctype gpgme-op-import-result-t
   (:wrapper :pointer
    :from-c translate-gpgme-op-import-result-t-from-foreign)
 "An import status result structure.")

(defcfun ("gpgme_op_import_result" c-gpgme-op-import-result)
   gpgme-op-import-result-t
```

```
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_import_start" c-gpgme-op-import-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (keydata gpgme-data-t))

(defcfun ("gpgme_op_import" c-gpgme-op-import) gpgme-error-t
 (ctx gpgme-ctx-t)
 (keydata gpgme-data-t))

;;; Export.

(defcfun ("gpgme_op_export_start" c-gpgme-op-export-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (pattern :string)
 (reserved :unsigned-int)
 (keydata gpgme-data-t))

(defcfun ("gpgme_op_export" c-gpgme-op-export) gpgme-error-t
 (ctx gpgme-ctx-t)
 (pattern :string)
 (reserved :unsigned-int)
 (keydata gpgme-data-t))

;;; FIXME: Extended export interfaces require array handling.

;;; Key generation.

(defbitfield (gpgme-genkey-flags-t :unsigned-int)
 "Flags used for the key generation result bitfield."
 (:primary #x0001)
 (:sub #x0002)
 (:uid #x0004))

(defcstruct gpgme-op-genkey-result
 "Key generation result structure."
 (bitfield gpgme-genkey-flags-t)
 (fpr :string))

(defctype gpgme-op-genkey-result-t :pointer
 "A
 key generation result structure.")

(defcfun ("gpgme_op_genkey_result" c-gpgme-op-genkey-result)
   gpgme-op-genkey-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_genkey_start" c-gpgme-op-genkey-start) gpgme-error-t
```

```
 (ctx gpgme-ctx-t)
 (parms :string)
 (pubkey gpgme-data-t)
 (seckey gpgme-data-t))

(defcfun ("gpgme_op_genkey" c-gpgme-op-genkey) gpgme-error-t
 (ctx gpgme-ctx-t)
 (parms :string)
 (pubkey gpgme-data-t)
 (seckey gpgme-data-t))

;;; Key deletion.

(defcfun ("gpgme_op_delete_start" c-gpgme-op-delete-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (key gpgme-key-t)
 (allow-secret :int))

(defcfun ("gpgme_op_delete" c-gpgme-op-delete) gpgme-error-t
 (ctx gpgme-ctx-t)
 (key gpgme-key-t)
 (allow-secret :int))

;;; FIXME: Add edit interfaces.

;;; Keylist interface.

(defbitfield (gpgme-keylist-flags-t :unsigned-int)
 "Flags used for the key listing result bitfield."
 (:truncated #x0001))

(defcstruct gpgme-op-keylist-result
 "Key listing result structure."
 (bitfield
 gpgme-keylist-flags-t))

(defctype gpgme-op-keylist-result-t :pointer
 "A key listing result structure.")

(defcfun ("gpgme_op_keylist_result" c-gpgme-op-keylist-result)
   gpgme-op-keylist-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_keylist_start" c-gpgme-op-keylist-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (pattern :string)
 (secret_only :boolean))
```

```
;;; FIXME: Extended keylisting requires array handling.

(defcfun ("gpgme_op_keylist_next" c-gpgme-op-keylist-next) gpgme-error-t
 (ctx gpgme-ctx-t)
 (r-key :pointer))

(defcfun ("gpgme_op_keylist_end" c-gpgme-op-keylist-end) gpgme-error-t
 (ctx gpgme-ctx-t))

;;; Various functions.

(defcfun ("gpgme_check_version" c-gpgme-check-version) :string
 (req-version string-or-nil-t))

(defcfun ("gpgme_get_engine_info" c-gpgme-get-engine-info) gpgme-error-t
 (engine-info-p :pointer))

(defcfun ("gpgme_set_engine_info" c-gpgme-set-engine-info) gpgme-error-t
 (proto gpgme-protocol-t)
 (file-name string-or-nil-t)
 (home-dir
 string-or-nil-t))

(defcfun ("gpgme_engine_check_version" c-gpgme-engine-check-verson)
   gpgme-error-t
 (proto gpgme-protocol-t))

;;;
;;;  L I S P   I N T E R F A C E
;;;

;;;
;;; Lisp type translators.
;;;

;;; Both directions.

;;; cert-int-t is a helper type that takes care of representing the
;;; default number of certs as NIL.

(defun translate-cert-int-t-from-foreign (value)
 (cond
   ((eql value +include-certs-default+) nil)
   (t value)))

(defun translate-cert-int-t-to-foreign (value)
 (cond
   (value value)
```

```
   (t +include-certs-default+)))

;;; string-or-nil-t translates a null pointer to NIL and vice versa.
;;; Translation from foreign null pointer already works as expected.

(defun translate-string-or-nil-t-to-foreign (value)
 (cond
   (value value)
   (t (null-pointer))))

;;; Output only.

;;; These type translators only convert from foreign type, because we
;;; never use these types in the other direction.

;;; Convert gpgme-engine-info-t linked lists into a
 list of property
;;; lists.  Note that this converter will automatically be invoked
;;; recursively.
;;;
;;; FIXME: Should we use a hash table (or struct, or clos) instead of
;;; property list, as recommended by the Lisp FAQ?

(defun translate-gpgme-engine-info-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next protocol file-name version req-version home-dir)
     value (:struct gpgme-engine-info))
  (append (list protocol (list
        :file-name file-name
        :version version
        :req-version req-version
        :home-dir home-dir))
   next)))))

(defun translate-gpgme-invalid-key-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next fpr reason)
     value (:struct gpgme-invalid-key))
  (append (list (list :fpr fpr
        :reason reason))
   next)))))

(defun translate-gpgme-op-encrypt-result-t-from-foreign (value)
 (cond
```

```
  ((null-pointer-p value) nil)
  (t (with-foreign-slots

  ((invalid-recipients)
    value (:struct gpgme-op-encrypt-result))
 (list :encrypt
       (list :invalid-recipients invalid-recipients))))))

(defun translate-gpgme-recipient-t-from-foreign (value)
 (cond
  ((null-pointer-p value) nil)
  (t (with-foreign-slots
   ((next keyid pubkey-algo status)
    value (:struct gpgme-recipient))
 (append (list (list :keyid keyid
       :pubkey-algo pubkey-algo
       :status status))
  next)))))

(defun translate-gpgme-op-decrypt-result-t-from-foreign (value)
 (cond
  ((null-pointer-p value) nil)
  (t (with-foreign-slots
   ((unsupported-algorithm bitfield recipients file-name)
    value (:struct gpgme-op-decrypt-result))
 (list :decrypt (list :unsupported-algorithm unsupported-algorithm
        :bitfield bitfield
        :recipients recipients
        :file-name file-name))))))

(defun translate-gpgme-new-signature-t-from-foreign (value)
 (cond
  ((null-pointer-p value) nil)
  (t (with-foreign-slots
   ((next
 type pubkey-algo hash-algo timestamp fpr sig-class)
    value (:struct gpgme-new-signature))
 (append (list (list :type type
       :pubkey-algo pubkey-algo
       :hash-algo hash-algo
       :timestamp timestamp
       :fpr fpr
       :sig-class sig-class))
  next)))))

(defun translate-gpgme-op-sign-result-t-from-foreign (value)
 (cond
  ((null-pointer-p value) nil)
```

```
   (t (with-foreign-slots
    ((invalid-signers signatures)
     value (:struct gpgme-op-sign-result))
  (list :sign (list :invalid-signers invalid-signers
      :signatures signatures))))))

(defun translate-gpgme-signature-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next summary fpr status notations timestamp
    exp-timestamp bitfield validity validity-reason
    pubkey-algo hash-algo)
     value (:struct gpgme-signature))
  (append (list (list :summary summary
        :fpr fpr
        :status status
        :notations notations
        :timestamp timestamp

     :exp-timestamp exp-timestamp
        :bitfield bitfield
        :validity validity
        :validity-reason validity-reason
        :pubkey-algo pubkey-algo))
   next)))))

(defun translate-gpgme-op-verify-result-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((signatures file-name)
     value (:struct gpgme-op-verify-result))
  (list :verify (list :signatures signatures
        :file-name file-name))))))

(defun translate-gpgme-import-status-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next fpr result status)
     value (:struct gpgme-import-status))
  (append (list (list :fpr fpr
        :result result
        :status status))
   next)))))

(defun translate-gpgme-op-import-result-t-from-foreign (value)
```

```
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((considered no-user-id imported imported-rsa unchanged
   new-user-ids new-sub-keys new-signatures
   new-revocations
 secret-read secret-imported
   secret-unchanged skipped-new-keys not-imported
   imports)
     value (:struct gpgme-op-import-result))
  (list :verify (list :considered considered
        :no-user-id no-user-id
        :imported imported
        :imported-rsa imported-rsa
        :unchanged unchanged
        :new-user-ids new-user-ids
        :new-sub-keys new-sub-keys
        :new-signatures new-signatures
        :new-revocations new-revocations
        :secret-read secret-read
        :secret-imported secret-imported
        :secret-unchanged secret-unchanged
        :skipped-new-keys skipped-new-keys
        :not-imported not-imported
        :imports imports))))))

;;; Error handling.

;;; Use gpgme-error-no-signal-t to suppress automatic error handling
;;; at translation time.
;;;
;;; FIXME: Part of this probably should be in gpg-error!

(define-condition gpgme-error (error)
 ((value :initarg :gpgme-error :reader gpgme-error-value))
 (:report (lambda (c stream)

     (format stream "GPGME returned error: ~A (~A)"
       (gpgme-strerror (gpgme-error-value c))
       (gpgme-strsource (gpgme-error-value c)))))
 (:documentation "Signalled when a GPGME function returns an error."))

(defun translate-gpgme-error-t-from-foreign (value)
 "Raise a GPGME-ERROR if VALUE is non-zero."
 (when (not (eql (gpgme-err-code value) :gpg-err-no-error))
   (error 'gpgme-error :gpgme-error value))
 (gpg-err-canonicalize value))
```

```
(defun translate-gpgme-error-t-to-foreign (value)
 "Canonicalize the error value."
 (if (eql (gpgme-err-code value) :gpg-err-no-error)
     0
     (gpg-err-as-value value)))

(defun translate-gpgme-error-no-signal-t-from-foreign (value)
 "Canonicalize the error value."
 (gpg-err-canonicalize value))


;;; *INTERNAL* Lispy Function Interface that is still close to the C
;;; interface.

;;; Passphrase callback management.

;;; Maybe: Instead, use subclassing, and provide a customizable
;;; default implementation for ease-of-use.

(defvar
 *passphrase-handles* (make-hash-table)
 "Hash table with GPGME context address as key and the corresponding
  passphrase callback object as value.")

(defcallback passphrase-cb gpgme-error-t ((handle :pointer)
       (uid-hint :string)
       (passphrase-info :string)
       (prev-was-bad :boolean)
       (fd :int))
 (handler-case
     (let* ((passphrase-cb
       (gethash (pointer-address handle) *passphrase-handles*))
      (passphrase
       (cond
  ((functionp passphrase-cb)
   (concatenate 'string
         (funcall passphrase-cb uid-hint passphrase-info
           prev-was-bad)
         '(#\Newline)))
  (t (concatenate 'string passphrase-cb '(#\Newline)))))
      (passphrase-len (length passphrase))
      ;; FIXME: Could be more robust.
      (res (system-write fd passphrase passphrase-len)))
 (cond
   ((< res passphrase-len) ; FIXME: Blech.  A weak attempt to be robust.
    (gpgme-error :gpg-err-inval))
   (t (gpgme-error :gpg-err-no-error))))
   (gpgme-error (err)
```

```
 (gpgme-error-value err))
   (system-error (err) (gpgme-error-from-errno (system-error-errno err)))
   ;; FIXME: The original error gets lost here.
   (condition (err) (progn
         (when *debug*
    (format t "DEBUG: passphrase-cb: Unexpressable: ~A~%"
     err))
         (gpgme-error :gpg-err-general)))))

;;; CTX is a C-pointer to the context.
(defun gpgme-set-passphrase-cb (ctx cb)
 "Set the passphrase callback for CTX."
 (let ((handle (pointer-address ctx)))
   (cond
     (cb (setf (gethash handle *passphrase-handles*) cb)
   (c-gpgme-set-passphrase-cb ctx (callback passphrase-cb) ctx))
     (t (c-gpgme-set-passphrase-cb ctx (null-pointer) (null-pointer))
  (remhash handle *passphrase-handles*)))))

;;; Progress callback management.

;;; Maybe: Instead, use subclassing, and provide a customizable
;;; default implementation for ease-of-use.

(defvar *progress-handles* (make-hash-table)
 "Hash table with GPGME context address as key and the corresponding
  progress callback
 object as value.")

(defcallback progress-cb :void ((handle :pointer)
    (what :string)
    (type :int)
    (current :int)
    (total :int))
 (handler-case
     (let* ((progress-cb
       (gethash (pointer-address handle) *progress-handles*)))
 (funcall progress-cb what type current total))
   ;; FIXME: The original error gets lost here.
   (condition (err) (when *debug*
         (format t "DEBUG: progress-cb: Unexpressable: ~A~%"
          err)))))

;;; CTX is a C-pointer to the context.
(defun gpgme-set-progress-cb (ctx cb)
 "Set the progress callback for CTX."
 (let ((handle (pointer-address ctx)))
   (cond
```

```
    (cb (setf (gethash handle *progress-handles*) cb)
  (c-gpgme-set-progress-cb ctx (callback progress-cb) ctx))
    (t (c-gpgme-set-progress-cb ctx (null-pointer) (null-pointer))
  (remhash handle *progress-handles*)))))

;;; Context management.

(defun gpgme-new (&key (protocol :openpgp) armor textmode include-certs
    keylist-mode passphrase progress file-name
 home-dir)
 "Allocate a new GPGME context."
 (with-foreign-object (ctx-p 'gpgme-ctx-t)
   (c-gpgme-new ctx-p)
   (let ((ctx (mem-ref ctx-p 'gpgme-ctx-t)))
     ;;; Set locale?
     (gpgme-set-protocol ctx protocol)
     (gpgme-set-armor ctx armor)
     (gpgme-set-textmode ctx textmode)
     (when include-certs (gpgme-set-include-certs ctx include-certs))
     (when keylist-mode (gpgme-set-keylist-mode ctx keylist-mode))
     (gpgme-set-passphrase-cb ctx passphrase)
     (gpgme-set-progress-cb ctx progress)
     (gpgme-set-engine-info ctx protocol
        :file-name file-name :home-dir home-dir)
     (when *debug* (format t "DEBUG: gpgme-new: ~A~%" ctx))
     ctx)))

(defun gpgme-release (ctx)
 "Release a GPGME context."
 (when *debug* (format t "DEBUG: gpgme-release: ~A~%" ctx))
 (c-gpgme-release ctx))

(defun gpgme-set-protocol (ctx proto)
 "Set the protocol to be used by CTX to PROTO."
 (c-gpgme-set-protocol ctx proto))

(defun gpgme-get-protocol (ctx)
 "Get
 the protocol used with CTX."
 (c-gpgme-get-protocol ctx))

;;; FIXME: How to do pretty printing?
;;;
;;; gpgme-get-protocol-name

(defun gpgme-set-armor (ctx armor)
 "If ARMOR is true, enable armor mode in CTX, disable it otherwise."
(c-gpgme-set-armor ctx armor))
```

```
(defun gpgme-armor-p (ctx)
 "Return true if armor mode is set for CTX."
 (c-gpgme-get-armor ctx))

(defun gpgme-set-textmode (ctx textmode)
 "If TEXTMODE is true, enable text mode mode in CTX, disable it otherwise."
(c-gpgme-set-textmode ctx textmode))

(defun gpgme-textmode-p (ctx)
 "Return true if text mode mode is set for CTX."
 (c-gpgme-get-textmode ctx))

(defun gpgme-set-include-certs (ctx &optional certs)
 "Include up to CERTS certificates in an S/MIME message."
 (c-gpgme-set-include-certs ctx certs))

(defun gpgme-get-include-certs (ctx)
 "Return the number of certs to include in an S/MIME message,
  or NIL if the default is used."
 (c-gpgme-get-include-certs ctx))

(defun gpgme-get-keylist-mode (ctx)
  "Get the keylist mode in CTX."
 (c-gpgme-get-keylist-mode ctx))

(defun gpgme-set-keylist-mode (ctx mode)
 "Set the keylist mode in CTX."
 (c-gpgme-set-keylist-mode ctx mode))


;;; FIXME: How to handle locale?  cffi-grovel?

(defun gpgme-get-engine-info (&optional ctx)
 "Retrieve the engine info for CTX, or the default if CTX is omitted."
 (cond
   (ctx (c-gpgme-ctx-get-engine-info ctx))
   (t (with-foreign-object (info-p 'gpgme-engine-info-t)
  (c-gpgme-get-engine-info info-p)
  (mem-ref info-p 'gpgme-engine-info-t)))))

(defun gpgme-set-engine-info (ctx proto &key file-name home-dir)
 "Set the engine info for CTX, or the default if CTX is NIL."
 (cond
   (ctx (c-gpgme-ctx-set-engine-info ctx proto file-name home-dir))
   (t (c-gpgme-set-engine-info proto file-name home-dir))))

;;; FIXME: How to do pretty printing?
```

```
;;;
;;; gpgme_pubkey_algo_name, gpgme_hash_algo_name

(defun gpgme-set-signers (ctx keys)
 "Set the signers for the context CTX."
 (c-gpgme-signers-clear ctx)
  (dolist (key keys) (c-gpgme-signers-add ctx key)))

;;;

(defun gpgme-set-sig-notation (ctx notations)
 "Set the sig notation for the context CTX."
 (c-gpgme-sig-notation-clear ctx)
 (dolist (notation notations)
   (c-gpgme-sig-notation-add
    ctx (first notation) (second notation) (third notation))))

(defun gpgme-get-sig-notation (ctx)
 "Get the signature notation data for the context CTX."
 (c-gpgme-sig-notation-get ctx))

;;; FIXME: Add I/O callback interface, for integration with clg.

;;; FIXME: Add gpgme_wait?

;;; Streams
;;; -------
;;;
;;; GPGME uses standard streams.  You can define your own streams, or
;;; use the existing file or string streams.
;;;
;;; A stream-spec is either a stream, or a list with a stream as its
;;; first argument followed by keyword parameters: encoding,
;;; file-name.
;;;
;;; FIXME: Eventually, we should provide a class that can be mixed
;;; into stream classes and which provides accessors for encoding and
;;; file-names.  This interface
 should be provided in addition to the
;;; above sleazy interface, because the sleazy interface is easier to
;;; use (less typing), and is quite sufficient in a number of cases.
;;;
;;; For best results, streams with element type (unsigned-byte 8)
;;; should be used.  Character streams may work if armor mode is used.

;;; Do we need to provide access to GPGME data objects through streams
;;; as well?  It seems to me that specific optimizations, like
;;; directly writing to file descriptors, is better done by extending
```

```
;;; the sleazy syntax (stream-spec) instead of customized streams.
;;; Customized streams do buffering, and this may mess up things.  Mmh.

(defvar *data-handles* (make-hash-table)
 "Hash table with GPGME data user callback handle address as key
  and the corresponding stream as value.")

;;; The release callback removes the stream from the *data-handles*
;;; hash and releases the CBS structure that is used as the key in
;;; that hash.  It is implicitly invoked (through
 GPGME) by
;;; gpgme-data-release.
(defcallback data-release-cb :void ((handle :pointer))
 (unwind-protect (remhash (pointer-address handle) *data-handles*)
   (when (not (null-pointer-p handle)) (foreign-free handle))))

(defcallback data-read-cb ssize-t ((handle :pointer) (buffer :pointer)
                                   (size size-t))
 (when *debug* (format t "DEBUG: gpgme-data-read-cb: want ~A~%" size))
 (let ((stream (gethash (pointer-address handle) *data-handles*)))
   (cond
     (stream
      (let* ((stream-type (stream-element-type stream))
             (seq (make-array size :element-type stream-type))
             (read (read-sequence seq stream)))
        (cond
          ((equal stream-type '(unsigned-byte 8))
           (dotimes (i read)
             (setf (mem-aref buffer :unsigned-char i)
                   (aref (the byte-array seq) i))))
          ((eql stream-type 'character)
           (dotimes (i read)
             (setf (mem-aref buffer :unsigned-char
 i)
                   (char-code (aref (the character-array seq) i)))))
          (t
           (dotimes (i read)
             (setf (mem-aref buffer :unsigned-char i)
                   (coerce (aref seq i) '(unsigned-byte 8))))))
        (when *debug* (format t "DEBUG: gpgme-data-read-cb: read ~A~%" read))
        read))
     (t
      (set-errno +ebadf+)
      -1))))

(defcallback data-write-cb ssize-t ((handle :pointer) (buffer :pointer)
                                    (size size-t))
 (when *debug* (format t "DEBUG: gpgme-data-write-cb: want ~A~%" size))
```

```
(let ((stream (gethash (pointer-address handle) *data-handles*)))
  (cond
    (stream
     (let* ((stream-type (stream-element-type stream))
            (seq (make-array size :element-type stream-type)))
       (cond
         ((equal stream-type '(unsigned-byte 8))
          (dotimes (i size)
            (setf (aref (the byte-array seq) i)
                  (mem-aref buffer :unsigned-char i))))
         ((eql stream-type 'character)
          (dotimes (i size)
            (setf (aref (the character-array seq) i)
                  (code-char (mem-aref buffer :unsigned-char i)))))
         (t
          (dotimes (i size)
            (setf (aref seq i)
                  (coerce (mem-aref buffer :unsigned-char i) stream-type)))))
       (write-sequence seq stream)
       size))
    (t
     (set-errno +ebadf+)
     -1))))

;;; This little helper macro allows us to swallow the cbs structure by
;;; simply setting it to a null pointer, but still protect against
;;; conditions.
(defmacro with-cbs-swallowed ((cbs) &body body)
 `(let ((,cbs (foreign-alloc '(:struct gpgme-data-cbs))))
   (unwind-protect (progn ,@body)
     (when (not (null-pointer-p ,cbs)) (foreign-free ,cbs)))))

(defun gpgme-data-new (stream &key encoding file-name)
 "Allocate a new GPGME data object for STREAM."
 (with-foreign-object (dh-p 'gpgme-data-t)
   ;;; We allocate one CBS structure
 for each stream we wrap in a
   ;;; data object.  Although we could also share all these
   ;;; structures, as they contain the very same callbacks, we need a
   ;;; unique C pointer as handle anyway to look up the stream in the
   ;;; callback.  This is a convenient one to use.
   (with-cbs-swallowed (cbs)
     (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'read)
           (callback data-read-cb))
     (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'write)
           (callback data-write-cb))
     (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'seek)
           (null-pointer))
```

```
    (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'release)
          (callback data-release-cb))
    (c-gpgme-data-new-from-cbs dh-p cbs cbs)
    (let ((dh (mem-ref dh-p 'gpgme-data-t)))
 (when encoding (gpgme-data-set-encoding dh encoding))
 (when file-name (gpgme-data-set-file-name dh file-name))
 ;;; Install the stream into the hash table and
 swallow the cbs
       ;;; structure while protecting against any errors.
 (unwind-protect
      (progn
        (setf (gethash (pointer-address cbs) *data-handles*) stream)
        (setf cbs (null-pointer)))
   (when (not (null-pointer-p cbs)) (c-gpgme-data-release dh)))
 (when *debug* (format t "DEBUG: gpgme-data-new: ~A~%" dh))
 dh))))

;;; This function releases a GPGME data object.  It implicitly
;;; invokes the data-release-cb function to clean up associated junk.
(defun gpgme-data-release (dh)
 "Release a GPGME data object."
 (when *debug* (format t "DEBUG: gpgme-data-release: ~A~%" dh))
 (c-gpgme-data-release dh))

(defclass data ()
 (c-data)  ; The C data object pointer
 (:documentation "The GPGME data type."))

(defmethod initialize-instance :after ((data data) &key streamspec
                                       &allow-other-keys)
 (let ((c-data (if (listp streamspec)
                   (apply #'gpgme-data-new streamspec)
                   (gpgme-data-new streamspec)))
       (cleanup t))
   (unwind-protect
       (progn
         (setf (slot-value data 'c-data) c-data)
         (finalize data (lambda () (gpgme-data-release c-data)))
         (setf cleanup nil))
    (if cleanup (gpgme-data-release c-data)))))

(defun translate-gpgme-data-t-to-foreign (value)
 ;; Allow a pointer to be passed directly for the finalizer to work.
 (cond
   ((null value) (null-pointer))
   ((pointerp value) value)
   (t (slot-value value 'c-data))))
```

```
(defmacro with-gpgme-data ((dh streamspec) &body body)
 `(let ((,dh (make-instance 'data :streamspec ,streamspec)))
    ,@body))

(defun gpgme-data-get-encoding (dh)
 "Get the encoding associated with the data object DH."
 (c-gpgme-data-get-encoding dh))

(defun gpgme-data-set-encoding (dh encoding)
 "Set the encoding associated with the data object DH to ENCODING."
 (c-gpgme-data-set-encoding dh encoding))

(defun gpgme-data-get-file-name (dh)
 "Get the file name associated with the data object
 DH."
 (c-gpgme-data-get-file-name dh))

(defun gpgme-data-set-file-name (dh file-name)
 "Set the file name associated with the data object DH to FILE-NAME."
 (c-gpgme-data-set-file-name dh file-name))

;;; FIXME: Add key accessor interfaces.

(defun gpgme-get-key (ctx fpr &optional secret)
 "Get the key with the fingerprint FPR from the context CTX."
 (with-foreign-object (key-p 'gpgme-key-t)
   (c-gpgme-get-key ctx fpr key-p secret)
   (mem-ref key-p 'gpgme-key-t)))

(defun gpgme-key-ref (key)
 "Acquire an additional reference to the key KEY."
 (when *debug* (format t "DEBUG: gpgme-key-ref: ~A~%" key))
 (c-gpgme-key-ref key))

(defun gpgme-key-unref (key)
 "Release a reference to the key KEY."
 (when *debug* (format t "DEBUG: gpgme-key-unref: ~A~%" key))
 (c-gpgme-key-unref key))

;;; FIXME: We REALLY need pretty printing for keys and all the other
;;; big structs.

;;; Various interfaces.

(defun gpgme-check-version (&optional req-version)
 (c-gpgme-check-version req-version))

;;;
```

```
;;;
 The *EXPORTED* CLOS interface.
;;;

;;; The context type.

;;; We wrap the C context pointer into a class object to be able to
;;; stick a finalizer on it.

(defclass context ()
 (c-ctx  ; The C context object pointer.
  signers ; The list of signers.
  sig-notation) ; The list of signers.
 (:documentation "The GPGME context type."))

(defmethod initialize-instance :after ((ctx context) &rest rest
          &key &allow-other-keys)
 (let ((c-ctx (apply #'gpgme-new rest))
 (cleanup t))
   (unwind-protect
  (progn (setf (slot-value ctx 'c-ctx) c-ctx)
  (finalize ctx (lambda () (gpgme-release c-ctx)))
  (setf cleanup nil))
     (if cleanup (gpgme-release c-ctx)))))

(defun translate-gpgme-ctx-t-to-foreign (value)
 ;; Allow a pointer to be passed directly for the finalizer to work.
 (if (pointerp value) value (slot-value value 'c-ctx)))

(defmacro context (&rest rest)
 "Create a new GPGME context."
 `(make-instance 'context ,@rest))

;;; The context type: Accessor
 functions.

;;; The context type: Accessor functions: Protocol.

(defgeneric protocol (ctx)
 (:documentation "Get the protocol of CONTEXT."))

(defmethod protocol ((ctx context))
 (gpgme-get-protocol ctx))

(defgeneric (setf protocol) (protocol ctx)
 (:documentation "Set the protocol of CONTEXT to PROTOCOL."))

;;; FIXME: Adjust translator to reject invalid protocols.  Currently,
```

```
;;; specifying an invalid protocol throws a "NIL is not 32 signed int"
;;; error.  This is suboptimal.
(defmethod (setf protocol) (protocol (ctx context))
 (gpgme-set-protocol ctx protocol))

;;; The context type: Accessor functions: Armor.
;;; FIXME: Is it good style to make foop setf-able?  Or should it be
;;; foo/foop for set/get?

(defgeneric armorp (ctx)
 (:documentation "Get the armor flag of CONTEXT."))

(defmethod armorp ((ctx context))
 (gpgme-armor-p ctx))

(defgeneric (setf armorp) (armor ctx)
 (:documentation "Set the armor flag of CONTEXT to ARMOR."))

(defmethod (setf armorp) (armor (ctx
 context))
 (gpgme-set-armor ctx armor))

;;; The context type: Accessor functions: Textmode.
;;; FIXME: Is it good style to make foop setf-able?  Or should it be
;;; foo/foop for set/get?

(defgeneric textmodep (ctx)
 (:documentation "Get the text mode flag of CONTEXT."))

(defmethod textmodep ((ctx context))
 (gpgme-textmode-p ctx))

(defgeneric (setf textmodep) (textmode ctx)
 (:documentation "Set the text mode flag of CONTEXT to TEXTMODE."))

(defmethod (setf textmodep) (textmode (ctx context))
 (gpgme-set-textmode ctx textmode))

;;; The context type: Accessor functions: Include Certs.

(defgeneric include-certs (ctx)
 (:documentation "Get the number of included certificates in an
                  S/MIME message, or NIL if the default is used."))

(defmethod include-certs ((ctx context))
 (gpgme-get-include-certs ctx))

(defgeneric (setf include-certs) (certs ctx)
```

```
 (:documentation "Return the number of certificates to include in an
                 S/MIME message, or
 NIL if the default is used."))

(defmethod (setf include-certs) (certs (ctx context))
 (gpgme-set-include-certs ctx certs))

;;; The context type: Accessor functions: Engine info.

(defgeneric engine-info (ctx)
 (:documentation "Retrieve the engine info for CTX."))

(defmethod engine-info ((ctx context))
 (gpgme-get-engine-info ctx))

(defgeneric (setf engine-info) (info ctx)
 (:documentation "Set the engine info for CTX."))

(defmethod (setf engine-info) (info (ctx context))
 (dolist (proto '(:openpgp :cms))
   (let ((pinfo (getf info proto)))
     (when pinfo
 (gpgme-set-engine-info ctx proto :file-name (getf pinfo :file-name)
         :home-dir (getf pinfo :home-dir))))))

;;; The context type: Accessor functions: Keylist mode.

(defgeneric keylist-mode (ctx)
 (:documentation "Get the keylist mode of CTX."))

(defmethod keylist-mode ((ctx context))
 (gpgme-get-keylist-mode ctx))

(defgeneric (setf keylist-mode) (mode ctx)
 (:documentation "Set the keylist mode of CTX to MODE."))

(defmethod
 (setf keylist-mode) (mode (ctx context))
 (gpgme-set-keylist-mode ctx mode))

;;; The context type: Accessor functions: Signers.

(defgeneric signers (ctx)
 (:documentation "Get the signers of CTX."))

(defmethod signers ((ctx context))
 (slot-value ctx 'signers))
```

```
(defgeneric (setf signers) (signers ctx)
 (:documentation "Set the signers of CTX to SIGNERS."))

(defmethod (setf keylist-mode) (signers (ctx context))
 (gpgme-set-signers ctx signers)
 (setf (slot-value ctx 'signers) signers))

;;; The context type: Accessor functions: Sig notations.

(defgeneric sig-notations (ctx)
 (:documentation "Get the signature notations of CTX."))

(defmethod sig-notations ((ctx context))
 (slot-value ctx 'signers))

(defgeneric (setf sig-notations) (notations ctx)
 (:documentation "Set the signatire notations of CTX to NOTATIONS."))

(defmethod (setf sig-notations) (notations (ctx context))
 (gpgme-set-signers ctx notations)
 (setf (slot-value ctx 'notations) notations))

;;;
 The context type: Support macros.

(defmacro with-context ((ctx &rest rest) &body body)
 `(let ((,ctx (make-instance 'context ,@rest)))
   ,@body))

;;; The key type.

(defclass key ()
 (c-key)  ; The C key object pointer.
 (:documentation "The GPGME key type."))

;;; In the initializer, we swallow the c-key argument.
(defmethod initialize-instance :after ((key key) &key c-key
          &allow-other-keys)
 (setf (slot-value key 'c-key) c-key)
 (finalize key (lambda () (gpgme-key-unref c-key))))

(defun translate-gpgme-key-t-from-foreign (value)
 (when *debug* (format t "DEBUG: import key: ~A~%" value))
 (make-instance 'key :c-key value))

(defun translate-gpgme-key-t-to-foreign (value)
 ;; Allow a pointer to be passed directly for the finalizer to work.
 (if (pointerp value) value (slot-value value 'c-key)))
```

```
(defmethod print-object ((key key) stream)
 (print-unreadable-object (key stream :type t :identity t)
   (format stream "~s" (fpr key))))

;;; The key type:
 Accessor functions.

;;; FIXME: The bitfield and flags contain redundant information at
;;; this point.  FIXME: Deal nicer with zero-length name (policy url)
;;; and zero length value (omit?) and human-readable (convert to string).
;;; FIXME: Turn binary data into sequence or vector or what it should be.
;;; FIXME: Turn the whole thing into a hash?
(defun translate-gpgme-sig-notation-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next name value name-len value-len flags bitfield)
     value (:struct gpgme-sig-notation))
  (append (list (list
   :name name
   :value value
   :name-len name-len
   :value-len value-len
   :flags flags
   :bitfield bitfield))
   next)))))

;;; FIXME: Deal nicer with timestamps.  bitfield field name?
(defun translate-gpgme-subkey-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next bitfield pubkey-algo length keyid fpr timestamp expires)
     value (:struct gpgme-subkey))

 (append (list (list
   :bitfield bitfield
   :pubkey-algo pubkey-algo
   :length length
   :keyid keyid
   :fpr fpr
   :timestamp timestamp
   :expires expires))
   next)))))

(defun translate-gpgme-key-sig-t-from-foreign (value)
 (cond
```

```
  ((null-pointer-p value) nil)
  (t (with-foreign-slots
   ((next bitfield pubkey-algo keyid timestamp expires status
   uid name email comment sig-class)
    value (:struct gpgme-key-sig))
  (append (list (list
   :bitfield bitfield
   :pubkey-algo pubkey-algo
   :keyid keyid
   :timestamp timestamp
   :expires expires
   :status status
   :uid uid
   :name name
   :email email
   :comment comment
   :sig-class sig-class))
   next)))))

(defun translate-gpgme-user-id-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next bitfield validity uid name email comment signatures)
     value (:struct gpgme-user-id))
  (append (list (list
   :bitfield bitfield
   :validity validity
   :uid uid
   :name
 name
   :email email
   :comment comment
   :signatures signatures))
   next)))))

(defun key-data (key)
 (with-slots (c-key) key
   (with-foreign-slots
 ((bitfield protocol issuer-serial issuer-name chain-id
     owner-trust subkeys uids keylist-mode)
  c-key (:struct gpgme-key))
     (list
      :bitfield bitfield
      :protocol protocol
      :issuer-serial issuer-serial
      :issuer-name issuer-name
      :chain-id chain-id
```

```
      :owner-trust owner-trust
      :subkeys subkeys
      :uids uids
      :keylist-mode keylist-mode))
   ))


(defgeneric fpr (key)
 (:documentation "Get the primary fingerprint of the key."))

(defmethod fpr ((key key))
 (getf (car (getf (key-data key) :subkeys)) :fpr))


;;; The context type: Crypto-Operations.

(defgeneric get-key (ctx fpr &optional secret)
 (:documentation "Get the (secret) key FPR from CTX."))

(defmethod get-key ((ctx context) fpr &optional secret)
 (gpgme-get-key ctx fpr secret))

;;; Encrypt.

(defgeneric
 op-encrypt (ctx recp plain cipher &key always-trust sign)
 (:documentation "Encrypt."))

(defmethod op-encrypt ((ctx context) recp plain cipher
        &key always-trust sign)
 (with-foreign-object (c-recp :pointer (+ 1 (length recp)))
   (dotimes (i (length recp))
     (setf (mem-aref c-recp 'gpgme-key-t i) (elt recp i)))
   (setf (mem-aref c-recp :pointer (length recp)) (null-pointer))
   (with-gpgme-data (in plain)
     (with-gpgme-data (out cipher)
 (let ((flags))
   (if always-trust (push :always-trust flags))
   (cond
     (sign
      (c-gpgme-op-encrypt-sign ctx c-recp flags in out)
      (append (c-gpgme-op-encrypt-result ctx)
       (c-gpgme-op-sign-result ctx)))
     (t
      (c-gpgme-op-encrypt ctx c-recp flags in out)
      (c-gpgme-op-encrypt-result ctx))))))))

;;; Decrypt.
```

```
(defgeneric op-decrypt (ctx cipher plain &key verify)
 (:documentation "Decrypt."))

(defmethod op-decrypt ((ctx context) cipher plain &key verify)
 (with-gpgme-data (in cipher)
   (with-gpgme-data
 (out plain)
     (cond
 (verify
  (c-gpgme-op-decrypt-verify ctx in out)
  (append (c-gpgme-op-decrypt-result ctx)
   (c-gpgme-op-verify-result ctx)))
 (t
  (c-gpgme-op-decrypt ctx in out)
  (c-gpgme-op-decrypt-result ctx))))))

;;; Signing.

(defgeneric op-sign (ctx plain sig &optional mode)
 (:documentation "Sign."))

(defmethod op-sign ((ctx context) plain sig &optional (mode :none))
 (with-gpgme-data (in plain)
   (with-gpgme-data (out sig)
     (c-gpgme-op-sign ctx in out mode)
     (c-gpgme-op-sign-result ctx))))

;;; Verify.

(defgeneric op-verify (ctx sig text &key detached)
 (:documentation "Verify."))

(defmethod op-verify ((ctx context) sig text &key detached)
 (with-gpgme-data (in sig)
   (with-gpgme-data (on text)
     (c-gpgme-op-verify ctx in (if detached on nil)
    (if detached nil on))
     (c-gpgme-op-verify-result ctx))))

;;; Import.

(defgeneric op-import (ctx keydata)
 (:documentation "Import."))

(defmethod op-import ((ctx context) keydata)
  (with-gpgme-data (in keydata)
   (c-gpgme-op-import ctx in)
```

```
  (c-gpgme-op-import-result ctx)))

;;; Export.

(defgeneric op-export (ctx pattern keydata)
 (:documentation "Export public key data matching PATTERN to the
                  stream KEYDATA."))

(defmethod op-export ((ctx context) pattern keydata)
 (with-gpgme-data (dh keydata)
  (c-gpgme-op-export ctx pattern 0 dh)))

;;; Key generation.



;;;
;;; Initialization
;;;

(defun check-version (&optional req-version)
 "Check that the GPGME version requirement is satisfied."
 (gpgme-check-version req-version))

(defparameter *version* (check-version)
 "The version number of GPGME used.")
# -*- mode: org -*-
#+TITLE: A Short History of the GPGME bindings for Python
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltxtra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}

* Overview
 :PROPERTIES:
 :CUSTOM_ID: overview
 :END:

| Version:       | 0.0.1                                |
| GPGME Version:  | 1.13.0                              |
| Author:        | Ben McGinnes <ben@gnupg.org>            |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language:      | Australian English, British English      |
| xml:lang:      | en-AU, en-GB, en                         |

The GPGME Python bindings passed through many hands and numerous
phases before, after a fifteen year journey, coming full circle to
```

return to the source.  This is a short explanation of that journey.

** In the beginning
:PROPERTIES:
:CUSTOM_ID: in-the-begining
:END:

In 2002 John Goerzen released PyME; Python bindings for the GPGME module which utilised the current release of Python of the time and SWIG.[fn:1]  Shortly after creating it and ensuring it worked he stopped supporting it, though he left his work available on his Gopher site.

** Keeping the flame alive
:PROPERTIES:
:CUSTOM_ID: keeping-the-flame-alive
:END:

A couple of years later the project was picked up by Igor Belyi and actively developed and maintained by him from 2004 to 2008.  Igor's whereabouts at the time of this document's creation are unknown, but the current authors do hope he is well.  We're assuming (or hoping) that life did what life does and made continuing untenable.

** Passing the torch
:PROPERTIES:
:CUSTOM_ID: passing-the-torch
:END:

In 2014 Martin Albrecht wanted to patch a bug in the PyME code and discovered the absence of Igor.  Following a discussion on the PyME mailing list he
became the new maintainer for PyME, releasing
version 0.9.0 in May of that year.  He remains the maintainer of the original PyME release in Python 2.6 and 2.7 (available via PyPI).

** Coming full circle
:PROPERTIES:
:CUSTOM_ID: ouroboros
:END:

In 2015 Ben McGinnes approached Martin about a Python 3 version, while investigating how complex a task this would be the task ended up being completed.  A subsequent discussion with Werner Koch led

to the decision to fold the Python 3 port back into the original
GPGME release in the languages subdirectory for non-C bindings
under the module name of =pyme3=.

In 2016 this PyME module was integrated back into the GPGME project
by Justus Winter. During the course of this work Justus adjusted
the port to restore limited support for Python 2, but not as many
minor point releases as the original PyME package supports. During
the course of this integration the package was renamed to more
accurately
reflect its status as a component of GPGME. The =pyme3=
module was renamed to =gpg= and adopted by the upstream GnuPG team.

In 2017 Justus departed G10code and the GnuPG team. Following this
Ben returned to maintain of gpgme Python bindings and continue
building them from that point.

* Relics of the past
:PROPERTIES:
:CUSTOM_ID: relics-past
:END:

There are a few things, in addition to code specific factors, such as
SWIG itself, which are worth noting here.

** The Annoyances of Git
:PROPERTIES:
:CUSTOM_ID: the-annoyances-of-git
:END:

As anyone who has ever worked with git knows, submodules are
horrible way to deal with pretty much anything. In the interests
of avoiding migraines, that was skipped with addition of the PyME
code to GPGME.

Instead the files were added to a subdirectory of the =lang/=
directory, along with a copy of the entire git log up to that point
as a separate file within the =lang/python/docs/= directory.[fn:2]
As the log for PyME is nearly 100KB and the log for GPGME is
approximately 1MB, this would cause considerable bloat, as well as
some confusion, should the two be merged.

Hence the unfortunate, but necessary, step to simply move the
files. A regular repository version has been maintained should it
be possible to implement this better in the future.

** The Perils of PyPI
:PROPERTIES:
:CUSTOM_ID: the-perils-of-pypi
:END:

The early port of the Python 2 =pyme= module as =pyme3= was never added to PyPI while the focus remained on development and testing during 2015 and early 2016. Later in 2016, however, when Justus completed his major integration work and subsequently renamed the module from =pyme3= to =gpg=, some prior releases were also provided through PyPI.

Since these bindings require a matching release of the GPGME libraries in order to function, it was determined that there was little benefit in also providing a copy through PyPI since anyone obtaining the GPGME source code would obtain the Python bindings source code at the same time. Whereas there was the potential to sew confusion amongst Python users installing the module from PyPI, only to discover that without the relevant C files, header files or SWIG compiled binaries, the Python module did them little good.

There are only two files on PyPI which might turn up in a search for this module or a sample of its content:

1. gpg (1.8.0) - Python bindings for GPGME GnuPG cryptography library
2. pyme (0.9.0) - Python support for GPGME GnuPG cryptography library

*** GPG 180 - Python bindings for GPGME GnuPG cryptography library
:PROPERTIES:
:CUSTOM_ID: pypi-gpgme-180
:END:

This is the most recent version to reach PyPI and is the version of the official Pyhon bindings which shipped with GPGME 1.8.0. If you have GPGME 1.8.0 installed and /only/ 1.8.0 installed, then it is probably safe to use this copy from PyPI.

As there have been a lot of changes since the release of GPGME 1.8.0, the GnuPG Project recommends not using this version of the module and instead installing the current version of GPGME along with the Python bindings included with that package.

*** PyME 090 - Python support for GPGME GnuPG cryptography library
:PROPERTIES:
:CUSTOM_ID: pypi-gpgme-90

:END:

This is the last release of the PyME bindings maintained by Martin Albrecht and is only compatible with Python 2, it will not work with Python 3. This is the version of the software from which the port from Python 2 to Python 3 code was made in 2015.

Users of the more recent Python bindings will recognise numerous points of similarity, but also significant differences. It is likely that the more recent official bindings will feel "more pythonic."

For those using Python 2, there is essentially no harm in using this module, but it may lack
a number of more recent features
added to GPGME.

* Footnotes

[fn:1] In all likelihood this would have been Python 2.2 or possibly Python 2.3.

[fn:2] The entire PyME git log and other preceding VCS logs are located in the =gpgme/lang/python/docs/old-commits.log= file.
# HACKING -*- org -*-
#+TITLE: Hacking notes for GPGME
#+STARTUP: showall

* How to contribute
** No more ChangeLog files

Do not modify any of the ChangeLog files in GPGME. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist" time. As such, there are strict requirements on the form of the commit log messages. The old ChangeLog files have all be renamed to ChangeLog-2011

** Commit log requirements

Your commit log should always start with a one-line summary, the second line should be blank, and the remaining lines are usually ChangeLog-style entries for all affected files. However, it's fine -- even recommended -- to write a few lines of prose describing the change, when the summary and ChangeLog entries don't give enough of the big picture. Omit the leading TABs that you're used to seeing

in a "real" ChangeLog
file, but keep the maximum line length at 72
or smaller, so that the generated ChangeLog lines, each with its
leading TAB, will not exceed 80 columns.  If you want to add text
which shall not be copied to the ChangeLog, separate it by a line
consisting of two dashes at the begin of a line.

Note that ./autogen.sh installs a git hook to do some basic syntax
checking on the commit log message.

Typo fixes and documentation updates don't need a ChangeLog entry;
thus you would use a commit message like

#+begin_example
Fix typo in a comment

--
#+end_example

The marker line here is important; without it the first line would
appear in the ChangeLog.

If you exceptionally need to have longer lines in a commit log you may
do this after this scissor line:
#+begin_example
# ------------------------ >8 ------------------------
#+end_example
(hash, blank, 24 dashes, blank, scissor, blank, 24 dashes).
Note that such a comment will be removed if the
git commit option
=--cleanup-scissor= is used.

** License policy

GPGME is currently licensed under the LGPLv2.1+ with tools and the
manual being under the GPLv3+.  We may eventually update to a newer
version of the licenses or a combination of them.  It is thus
important, that all contributed code allows for an update of the
license; for example we can't accept code under the LGPLv2(only).

If you want to contribute code or documentation to GPGME you are
asked to assert that the contribution is in accordance to the "GPGME
Developer's Certificate of Origin" as found in the file "DCO".
Except for a slight wording change, this DCO is identical to the one
used by the Linux kernel.  Please take these simple steps:

- Decide which mail address you want to use.  Please have your real
  name in the address and not a pseudonym.  Anonymous contributions

can only be done if you find a proxy who certifies for you.

- If your employer or school might claim ownership
of code written
by you; you need to talk to them to make sure that you have the
right to contribute under the DCO.

- Send an OpenPGP signed mail to the gnupg-devel@gnupg.org public
mailing list from your mail address. Include a copy of the DCO as
found in the official master branch. Insert your name and email
address into the DCO in the same way you want to use it later.
Example:

Signed-off-by: Joe R. Hacker <joe@example.org>

If you need it, you may perform simple transformations on the mail
address: Replacing "@" by " at " or "." by " dot ".)

- That's it. From now on you only need to add a "Signed-off-by:"
line with your name and mail address to the GIT commit message.
It is recommended to send the patches using a PGP/MIME signed
mail.

** Coding standards

Please follow the GNU coding standards. If you are in doubt consult
the existing code as an example. Do no re-indent code without a
need. If you really need to
do it, use a separate commit for such a
change.

- C99 syntax should not be used; stick to C90.
- Please do not use C++ =//= style comments.
- Try to fit lines into 80 columns.
- Ignore signed/unsigned pointer mismatches
- No arithmetic on void pointers; cast to char* first.

** Commit log keywords

- GnuPG-bug-id :: Values are comma or space delimited bug numbers
from bug.gnupg.org pertaining to this commit.
- Debian-bug-id :: Same as above but from the Debian bug tracker.
- CVE-id :: CVE id number pertaining to this commit.
- Regression-due-to :: Commit id of the regression fixed by this commit.
- Fixes-commit :: Commit id this commit fixes.
- Reported-by :: Value is a name or mail address of a bug reporte.
- Suggested-by :: Value is a name or mail address of someone how
suggested this change.

- Co-authored-by :: Name or mail address of a co-author
- Some-comments-by :: Name or mail address of the author of

  additional comments (commit log or code).
- Proofread-by :: Sometimes used by translation commits.
- Signed-off-by :: Name or mail address of the developer

* Debug hints

- Use gpgme-tool for manual tests.
- The envvar GPGME_DEBUG enables debugging; see debug.[ch] for
  details.

Configuration files may go here. Note that config.h.in is
auto-generated so that this file is not in git.

2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting
on December 1st, 2011 we put change information only in the GIT
commit log, and generate a top-level ChangeLog file from logs at
"make dist". See doc/HACKING for details.

2011-04-06 Werner Koch <wk@g10code.com>

* gpg-error.m4: Update from current libgpg-error repo.

2010-05-07 Werner Koch <wk@g10code.com>

* libassuan.m4: Update from libassuan svn.

2009-11-10 Marcus Brinkmann <marcus@g10code.de>

* libassuan.m4: Fix LIBASSUAN_VERSION.

2006-06-08 Marcus Brinkmann <marcus@g10code.de>

* pth.m4: Add --all to pth-config invocation.

2006-02-22 Marcus Brinkmann <marcus@g10code.de>

* pth.m4: Fix code generation (required for Max OS X).
Submitted by Emanuele Giaquinta <exg@gentoo.org>.

2005-11-17 Marcus Brinkmann <marcus@g10code.de>

* glib-2.0.m4: New file.

2004-12-28 Werner Koch <wk@g10code.com>

* pth.m4: Changed quoting for use with automake 1.9.

2004-09-14
Marcus Brinkmann <marcus@g10code.de>

* pth.m4: Disable _ac_pth_line, and don't fail if Pth is not
found.

* glibc21.m4: New file.
* gpg-error.m4: New file.
* pth.m4: New file.

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(d) I understand and agree that this project and the contribution
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all personal information I submit with it, including my
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consistent with this project or the free software license(s)
involved.

Signed-off-by: [Your name and mail address]
1.15.1
2011-12-02  Werner Koch  <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained.  Starting
on December 1st, 2011 we put change information only in the GIT
commit log, and generate a top-level ChangeLog file from logs at
"make dist".  See doc/HACKING for details.

2008-11-08  Moritz  <moritz@gnu.org>

* gpgme.lisp (size-t): Wrong call to defctype: function accepts
optional, not keyword argument.
(ssize-t): Likewise.
(off-t): Likewise.
(gpgme-data-t, gpgme-ctx-t): Likewise.
(gpgme-error-t): Likewise.
(gpgme-error-no-signal-t): Likewise.
(gpgme-err-code-t): Likewise.
(gpgme-err-source-t): Likewise.
(gpgme-sig-notation-t, gpgme-engine-info-t): Likewise.
(gpgme-subkey-t): Likewise.
(gpgme-key-sig-t): Likewise.
(gpgme-user-id-t): Likewise.
(gpgme-key-t): Likewise.
(gpgme-data-cbs-t): Likewise.
(gpgme-invalid-key-t): Likewise.
(gpgme-op-encrypt-result-t): Likewise.
(gpgme-recipient-t): Likewise.
(gpgme-op-decrypt-result-t): Likewise.
(gpgme-new-signature-t):
Likewise.
(gpgme-op-sign-result-t): Likewise.
(gpgme-signature-t): Likewise.
(gpgme-op-verify-result-t): Likewise.
(gpgme-import-status-t): Likewise.
(gpgme-op-import-result-t): Likewise.
(gpgme-op-genkey-result-t): Likewise.
(gpgme-op-keylist-result-t): Likewise.

2006-07-06  Marcus Brinkmann  <marcus@g10code.de>

* Initial release.

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000
 *H
010 UDE1!0U
Deutsches Forschungsnetz10UDFN-PCA1.0,U%DFN Top Level Certification Authority1!0 *H
 certify@pca.dfn.de0
981029180310Z
011231180310Z010 UDE1!0U
Deutsches Forschungsnetz10UDFN-PCA1.0,U%DFN Top Level Certification Authority1!0 *H
 certify@pca.dfn.de0"0
 *H
0
nskvS2r#iA4H|*/
:Sd;v
tD}L+~IWWD|eP&qH)
!1\p%,1.tIsmnQ,g-W)@\(t<kvm5j(d)9M_KGQJ0:qTE 00 `HB0) `HBhttps://mystic.pca.dfn.de/0A
`HB42http://www.pca.dfn.de/dfnpca/policy/wwwpolicy.html08 `HB
+)The DFN Top Level Certification Authority0! `HBcgi/check-rev.cgi?0 `HB
dfnpca.crl0U00U0
 *H
`^[:8\e7*%QC?:/JVgwPUB
OgGqjGVxl50%<`Pb18 z;t~r0U<A%3#l'8b"<iX"V!k"*Q8&hAPI"3 00KUb&Qq'46_{D[JZ!i<=T
/OF
# -*- mode: org -*-
#+TITLE: What Was New in the GPGME Python Bindings and Documentation
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltxtra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}


* What Was New
 :PROPERTIES:
 :CUSTOM_ID: new-stuff
 :END:

| Version:  | 0.0.1  |

| GPGME Version: | 1.13.0 |
| Author: | Ben McGinnes <ben@gnupg.org> |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language: | Australian English, British English |
| xml:lang: | en-AU, en-GB, en |

The following are all the past /What's New/ sections for the Python
Bindings HOWTO and other documentation.

** What Was New in GPGME 1120
:PROPERTIES:

:CUSTOM_ID: gpgme-1-12-0
:END:

The most obviously new point for those reading this guide is this
section on other new things, but thats hardly important. Not given
all the other things which spurred the need for adding this section
and its subsections.

*** New in GPGME 1120
:PROPERTIES:
:CUSTOM_ID: new-stuff-1-12-0
:END:

There have been quite a number of additions to GPGME and the Python
bindings to it since the last release of GPGME with versions 1.11.0
and 1.11.1 in April, 2018.

The bullet points of new additiions are:

- an expanded section on [[file:gpgme-python-howto#installation][installing]] and [[file:gpgme-python-howto#snafu][troubleshooting]] the Python
bindings.
- The release of Python 3.7.0; which appears to be working just fine
with our bindings, in spite of intermittent reports of problems for
many other Python projects with that new release.
- Python 3.7 has been moved to the head of the specified python
versions list in the build process.
- In
order to fix some other issues, there are certain underlying
functions which are more exposed through the [[file:gpgme-python-howto#howto-get-context][gpg.Context()]], but
ongoing documentation ought to clarify that or otherwise provide the
best means of using the bindings. Some additions to =gpg.core= and
the =Context()=, however, were intended (see below).
- Continuing work in identifying and confirming the cause of

oft-reported [[file:gpgme-python-howto#snafu-runtime-not-funtime][problems installing the Python bindings on Windows]].
- GSOC: Google's Surreptitiously Ordered Conscription ... erm ... oh,
right; Google's Summer of Code. Though there were two hopeful
candidates this year; only one ended up involved with the GnuPG
Project directly, the other concentrated on an unrelated third party
project with closer ties to one of the GNU/Linux distributions than
to the GnuPG Project. Thus the Python bindings benefited from GSOC
participant Jacob Adams, who added
the key_import function; building
on prior work by Tobias Mueller.
- Several new methods functions were added to the gpg.Context(),
including: [[file:gpgme-python-howto#howto-import-key][key_import]], [[file:gpgme-python-howto#howto-export-key][key_export]], [[file:gpgme-python-howto#howto-export-public-key][key_export_minimal]] and
[[file:gpgme-python-howto#howto-export-secret-key][key_export_secret]].
- Importing and exporting examples include versions integrated with
Marcel Fest's recently released [[https://github.com/Selfnet/hkp4py][HKP for Python]] module. Some
[[file:gpgme-python-howto#hkp4py][additional notes on this module]] are included at the end of the HOWTO.
- Instructions for dealing with semi-walled garden implementations
like ProtonMail are also included. This is intended to make things
a little easier when communicating with users of ProtonMail's
services and should not be construed as an endorsement of said
service. The GnuPG Project neither favours,
nor disfavours
ProtonMail and the majority of this deals with interacting with the
ProtonMail keyserver.
- Semi-formalised the location where [[file:gpgme-python-howto#draft-editions][draft versions]] of this HOWTO may
periodically be accessible. This is both for the reference of
others and testing the publishing of the document itself. Renamed
this file at around the same time.
- The Texinfo documentation build configuration has been replicated
from the parent project in order to make to maintain consistency
with that project (and actually ship with each release).
- a reStructuredText (=.rst=) version is also generated for Python
developers more used to and comfortable with that format as it is
the standard Python documentation format and Python developers may
wish to use it with Sphinx. Please note that there has been no
testing of the reStructuredText version with Sphinx at all. The
reST file was generated by the simple expedient of using [[https://pandoc.org/][Pandoc]].
-
Added a new section for [[file:gpgme-python-howto#advanced-use][advanced or experimental use]].
- Began the advanced use cases with [[file:gpgme-python-howto#cython][a section]] on using the module with
[[https://cython.org/][Cython]].
- Added a number of new scripts to the =example/howto/= directory;
some of which may be in advance of their planned sections of the
HOWTO (and some are just there because it seemed like a good idea at
the time).

- Cleaned up a lot of things under the hood.
This is gpgme.info, produced by makeinfo version 6.5 from gpgme.texi.

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Public License for more details.
INFO-DIR-SECTION GNU Libraries
START-INFO-DIR-ENTRY
* GPGME: (gpgme).  Adding support for cryptography to your program.
END-INFO-DIR-ENTRY

This file documents the GPGME library.

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The
GnuPG Made Easy Reference Manual, for Version
1.14.1-beta35.

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Public License for more details.

File: gpgme.info,  Node: UI Server Decrypt,  Next: UI Server Verify,  Prev: UI Server Sign,  Up: UI Server Protocol

## A.3 UI Server: Decrypt a Message

Decryption may include the verification of OpenPGP messages.  This is
due to the often used combined signing/encryption modus of OpenPGP. The
client may pass an option

to the server to inhibit the signature
verification. The following two commands are required to set the input
and output file descriptors:

-- Command: INPUT FD=N
Set the file descriptor for the message to be decrypted to N. The
message send to the server is either binary encoded or in the
case of OpenPGP ASCII armored. For details on the file
descriptor, see the description of INPUT in the ENCRYPT
section.

-- Command: OUTPUT FD=N
Set the file descriptor to be used for the output. The output is
binary encoded. For details on the file descriptor, see the
description of INPUT in the ENCRYPT section.

The decryption is started with the command:

-- Command: DECRYPT --protocol=NAME [--no-verify]
[--export-session-key]
NAME is the encryption protocol used for the message. For a
description of the allowed protocols see the ENCRYPT command.
This argument is mandatory. If the option --no-verify is given,
the server
should not try to verify a signature, in case the input
data is an OpenPGP combined message. If the option
--export-session-key is given and the underlying engine knows how
to export the session key, it will appear on a status line

File: gpgme.info, Node: UI Server Verify, Next: UI Server Set Input Files, Prev: UI Server Decrypt, Up: UI Server Protocol

A.4 UI Server: Verify a Message
==========

The server needs to support the verification of opaque signatures as
well as detached signatures. The kind of input sources controls what
kind message is to be verified.

-- Command: MESSAGE FD=N
This command is used with detached signatures to set the file
descriptor for the signed data to N. The data is binary encoded
(used verbatim). For details on the file descriptor, see the
description of INPUT in the ENCRYPT section.

-- Command: INPUT FD=N
Set the file descriptor for the opaque message or the signature

part
of a detached signature to N. The message send to the server
is either binary encoded or in the case of OpenPGP ASCII
armored. For details on the file descriptor, see the description
of INPUT in the ENCRYPT section.

-- Command: OUTPUT FD=N
Set the file descriptor to be used for the output. The output is
binary encoded and only used for opaque signatures. For details on
the file descriptor, see the description of INPUT in the
ENCRYPT section.

The verification is then started using:

-- Command: VERIFY --protocol=NAME [--silent]
NAME is the signing protocol used for the message. For a
description of the allowed protocols see the ENCRYPT command.
This argument is mandatory. Depending on the combination of
MESSAGE INPUT and OUTPUT commands, the server needs to select
the appropriate verification mode:

MESSAGE and INPUT
This indicates a detached signature. Output data is not
applicable.

INPUT
This indicates an opaque signature. As no output command has
been given, the server is only required to check the
signature.
INPUT and OUTPUT
This indicates an opaque signature. The server shall write
the signed data to the file descriptor set by the output
command. This data shall even be written if the signatures
cant be verified.

With --silent the server shall not display any dialog; this is for
example used by the client to get the content of opaque signed messages.
The client expects the server to send at least this status information
before the final OK response:

-- Status line: SIGSTATUS FLAG DISPLAYSTRING
Returns the status for the signature and a short string explaining
the status. Valid values for FLAG are:

none
The message has a signature but it could not not be verified
due to a missing key.
green

The signature is fully valid.

yellow
The signature is valid but additional information was shown
regarding the validity of the key.

red
The signature is not valid.

DISPLAYSTRING is a percent-and-plus-encoded string with a short
human readable description of the status. For example

S SIGSTATUS green Good+signature+from+Keith+Moon+<keith@example.net>

Note that this string needs to fit into an Assuan line and should
be short enough to be displayed as short one-liner on the clients
window. As usual the encoding of this string is UTF-8 and it
should be send in its translated form.

The server shall send one status line for every signature found on
the message.

File: gpgme.info, Node: UI Server Set Input Files, Next: UI Server Sign/Encrypt Files, Prev: UI Server Verify, Up: UI Server Protocol

A.5 UI Server: Specifying the input files to operate on.
==========

All file related UI
server commands operate on a number of input files
or directories, specified by one or more FILE commands:

-- Command: FILE [--clear] NAME
Add the file or directory NAME to the list of pathnames to be
processed by the server. The parameter NAME must be an absolute
path name (including the drive letter) and is percent espaced (in
particular, the characters %, = and white space characters are
always escaped). If the option --clear is given, the list of
files is cleared before adding NAME.

Historical note: The original spec did not define --clear but the
keyword --continued after the file name to indicate that more
files are to be expected. However, this has never been used and
thus removed from the specs.

File: gpgme.info, Node: UI Server Sign/Encrypt Files, Next: UI Server Verify/Decrypt Files, Prev: UI Server Set Input Files, Up: UI Server Protocol

A.6 UI Server: Encrypting and signing files.
==========

First,
the input files need to be specified by one or more FILE
commands. Afterwards, the actual operation is requested:

-- Command: ENCRYPT_FILES --nohup
-- Command: SIGN_FILES --nohup
-- Command: ENCRYPT_SIGN_FILES --nohup
Request that the files specified by FILE are encrypted and/or
signed. The command selects the default action. The UI server may
allow the user to change this default afterwards interactively, and
even abort the operation or complete it only on some of the
selected files and directories.

What it means to encrypt or sign a file or directory is specific to
the preferences of the user, the functionality the UI server
provides, and the selected protocol. Typically, for each input
file a new file is created under the original filename plus a
protocol specific extension (like .gpg or .sig), which contain
the encrypted/signed file or a detached signature. For
directories, the server may offer
multiple options to the user (for
example ignore or process recursively).

The ENCRYPT_SIGN_FILES command requests a combined sign and
encrypt operation. It may not be available for all protocols (for
example, it is available for OpenPGP but not for CMS).

The option --nohup is mandatory. It is currently unspecified
what should happen if --nohup is not present. Because --nohup
is present, the server always returns OK promptly, and completes
the operation asynchronously.

File: gpgme.info, Node: UI Server Verify/Decrypt Files, Next: UI Server Import/Export Keys, Prev: UI Server Sign/Encrypt Files, Up: UI Server Protocol

A.7 UI Server: Decrypting and verifying files.
==========

First, the input files need to be specified by one or more FILE
commands. Afterwards, the actual operation is requested:

-- Command: DECRYPT_FILES --nohup
-- Command: VERIFY_FILES --nohup

-- Command: DECRYPT_VERIFY_FILES
--nohup
Request that the files specified by FILE are decrypted and/or verified. The command selects the default action. The UI server may allow the user to change this default afterwards interactively, and even abort the operation or complete it only on some of the selected files and directories.

What it means to decrypt or verify a file or directory is specific to the preferences of the user, the functionality the UI server provides, and the selected protocol. Typically, for decryption, a new file is created for each input file under the original filename minus a protocol specific extension (like .gpg) which contains the original plaintext. For verification a status is displayed for each signed input file, indicating if it is signed, and if yes, if the signature is valid. For files that are signed and encrypted, the VERIFY command transiently decrypts the file to verify the enclosed signature. For directories,
the server may offer multiple
options to the user (for example ignore or process recursively).

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

File: gpgme.info, Node: UI Server Import/Export Keys, Next: UI Server Checksum Files, Prev: UI Server Verify/Decrypt Files, Up: UI Server Protocol

A.8 UI Server: Managing certificates.
==========

First, the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

-- Command: IMPORT_FILES --nohup
Request that the certificates contained in the files specified by FILE are imported into the local certificate databases.

For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The
option --nohup is mandatory. It is currently unspecified
what should happen if --nohup is not present. Because --nohup
is present, the server always returns OK promptly, and completes
the operation asynchronously.

FIXME: It may be nice to support an EXPORT command as well, which is enabled by the context menu of the background of a directory.

File: gpgme.info, Node: UI Server Checksum Files, Next: Miscellaneous UI Server Commands, Prev: UI Server Import/Export Keys, Up: UI Server Protocol

A.9 UI Server: Create and verify checksums for files.
==========

First, the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

-- Command: CHECKSUM_CREATE_FILES --nohup
Request that checksums are created for the files specified by FILE. The choice of checksum algorithm and the destination storage and format for the created checksums depend on the

preferences of the user and the functionality provided by the UI server. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

-- Command: CHECKSUM_VERIFY_FILES --nohup
Request that checksums are created for the files specified by FILE and verified against previously created and stored checksums. The choice of checksum algorithm and the source storage and format for previously created checksums depend on the preferences of the user and the functionality provided by the UI server. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

If the source storage of previously created checksums is available
to the user through the Windows shell, this command may also accept such checksum files as FILE arguments. In this case, the UI server should instead verify the checksum of the referenced files as if they were given as INPUT files.

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

File: gpgme.info, Node: Miscellaneous UI Server Commands, Prev: UI Server Checksum Files, Up: UI Server Protocol

## A.10 Miscellaneous UI Server Commands

The server needs to implement the following commands which are not related to a specific command:

-- Command: GETINFO WHAT
This is a multi purpose command, commonly used to return a variety of information. The required subcommands as described by the WHAT parameter are:

pid
Return the process id of the server in decimal notation using an Assuan data line.

To allow the server to pop up the windows in the correct relation to the client, the client is advised to tell the server by sending the option:

-- Command option: window-id NUMBER
The NUMBER represents the native window ID of the clients current window. On Windows systems this is a windows handle (HWND) and on X11 systems it is the X Window ID. The number needs to be given as a hexadecimal value so that it is easier to convey pointer values (e.g. HWND).

A client may want to fire up the certificate manager of the server. To do this it uses the Assuan command:

-- Command: START_KEYMANAGER
The server shall pop up the main window of the key manager (aka certificate manager). The client expects that the key manager is brought into the foregound and that this command immediately returns (does not wait until the key manager has been fully brought up).

A client may want to fire up the configuration dialog of the server. To do this it uses the Assuan command:

-- Command: START_CONFDIALOG
The server shall pop up its configuration dialog. The client expects that this dialog is brought into the foregound and that this command immediately returns (i.e. it does not wait until the

dialog has been fully brought up).

When doing an operation on a mail, it is useful to let the server know the address of the sender:

-- Command: SENDER [--info] [--protocol=NAME] EMAIL
EMAIL is the plain ASCII encoded address ("addr-spec" as per RFC-2822) enclosed in angle brackets. The address set with this command is valid until a successful completion of the operation or until a RESET command. A second command overrides the effect of the first one; if EMAIL is not given and --info is not used, the server shall use the default signing key.

If option --info is not given, the server shall also suggest a protocol to use for signing. The client may use this suggested protocol on its own discretion. The same status line as with PREP_ENCRYPT is used for this.

The option --protocol may be used to give the server a hint on which signing protocol should be preferred.

To allow the UI-server to visually identify a running operation or to associate operations the server MAY support the command:

-- Command: SESSION NUMBER [STRING]
The NUMBER is an arbitrary value, a server may use to associate simultaneous running sessions. It is a 32 bit unsigned integer with 0 as a special value indicating that no session association shall be done.

If STRING is given, the server may use this as the title of a window or, in the case of an email operation, to extract the senders address. The string may contain spaces; thus no plus-escaping is used.

This command may be used at any time and overrides the effect of the last command. A RESET undoes the effect of this command.

File: gpgme.info, Node: Debugging, Next: Deprecated Functions, Prev: UI Server Protocol, Up: Top

# Appendix B How to solve problems

Everyone knows that software often does not do what it should do and thus there is a need to track down problems. This is in particular true

for applications using a complex library like GPGME and of course also for the library itself. Here we give a few hints on how to solve such problems.

First of all you should make sure that the keys you want to use are installed in the GnuPG engine and are usable. Thus the first test is to run the desired operation using gpg or gpgsm on the command line. If you cant figure out why things dont work, you may use GPGMEs built in trace feature. This feature is either enabled using the environment variable GPGME_DEBUG or, if this is not possible, by calling the function gpgme_set_global_flag. The value is the trace level and an optional file name. If no file name is given the trace output is printed to stderr.

For example

```
GPGME_DEBUG=9:/home/user/mygpgme.log
```

(Note that under Windows you use a semicolon in place of the colon to separate the fields.)

A trace level of 9 is pretty verbose and thus you may want to start off with a lower level. The exact definition of the trace levels and the output format may change with any release; you need to check the source code for details. In any case the trace log should be helpful to understand what is going going on. Warning: The trace log may reveal sensitive details like passphrases or other data you use in your application. If you are asked to send a log file, make sure that you run your tests only with play data.

File: gpgme.info, Node: Deprecated Functions, Next: Library Copying, Prev: Debugging, Up: Top

## Appendix C Deprecated Functions

For backward compatibility GPGME has a number of functions, data types and constants which are deprecated and should not be used anymore. We document here those which are really old to help understanding old code and to allow migration to their modern counterparts.

*Warning:* These interfaces will be removed in a future version of GPGME.

-- Function: void gpgme_key_release (gpgme_key_t KEY)
The function gpgme_key_release is equivalent to gpgme_key_unref.

-- Function: gpgme_error_t gpgme_op_import_ext (gpgme_ctx_t CTX,
gpgme_data_t KEYDATA, int *NR)
SINCE: 0.3.9

The function gpgme_op_import_ext is equivalent to:

```
gpgme_error_t err = gpgme_op_import (ctx, keydata);
if (!err)
  {
    gpgme_import_result_t result = gpgme_op_import_result (ctx);
    *nr = result->considered;
  }
```

-- Data type: gpgme_error_t (*gpgme_edit_cb_t) (void *HANDLE,
gpgme_status_code_t STATUS, const char *ARGS, int FD)
The gpgme_edit_cb_t
type is the type of functions which GPGME
calls if it a key edit operation is on-going. The status code
STATUS and the argument line ARGS are passed through by GPGME from
the crypto engine. The file descriptor FD is -1 for normal status
messages. If STATUS indicates a command rather than a status
message, the response to the command should be written to FD. The
HANDLE is provided by the user at start of operation.

The function should return GPG_ERR_FALSE if it did not handle the
status code, 0 for success, or any other error value.

-- Function: gpgme_error_t gpgme_op_edit (gpgme_ctx_t CTX,
gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE,
gpgme_data_t OUT)
SINCE: 0.3.9

Note: This function is deprecated, please use gpgme_op_interact
instead.

The function gpgme_op_edit processes the key KEY interactively,
using the edit callback function FNC with the handle HANDLE. The
callback is
invoked for every status and command request from the
crypto engine. The output of the crypto engine is written to the
data object OUT.

Note that the protocol between the callback function and the crypto
engine is specific to the crypto engine and no further support in
implementing this protocol correctly is provided by GPGME.

The function returns the error code GPG_ERR_NO_ERROR if the edit
operation completes successfully, GPG_ERR_INV_VALUE if CTX or KEY

is not a valid pointer, and any error returned by the crypto engine
or the edit callback handler.

-- Function: gpgme_error_t gpgme_op_edit_start (gpgme_ctx_t CTX,
gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE,
gpgme_data_t OUT)

SINCE: 0.3.9

Note: This function is deprecated, please use
gpgme_op_interact_start instead.

The function gpgme_op_edit_start initiates a gpgme_op_edit
operation. It can be completed by calling gpgme_wait on
the
context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the
operation was started successfully, and GPG_ERR_INV_VALUE if CTX
or KEY is not a valid pointer.

-- Function: gpgme_error_t gpgme_op_card_edit (gpgme_ctx_t CTX,
gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE,
gpgme_data_t OUT)
Note: This function is deprecated, please use gpgme_op_interact
with the flag GPGME_INTERACT_CARD instead.

The function gpgme_op_card_edit is analogous to gpgme_op_edit,
but should be used to process the smart card corresponding to the
key KEY.

-- Function: gpgme_error_t gpgme_op_card_edit_start (gpgme_ctx_t CTX,
gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE,
gpgme_data_t OUT)
Note: This function is deprecated, please use
gpgme_op_interact_start with the flag GPGME_INTERACT_CARD
instead.

The function gpgme_op_card_edit_start initiates a

gpgme_op_card_edit operation. It can be completed by calling
gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the
operation was started successfully, and GPG_ERR_INV_VALUE if CTX
or KEY is not a valid pointer.

-- Function: gpgme_error_t gpgme_data_new_with_read_cb

(gpgme_data_t *DH, int (*READFUNC) (void *HOOK, char *BUFFER, size_t COUNT, size_t *NREAD), void *HOOK_VALUE)

The function gpgme_data_new_with_read_cb creates a new gpgme_data_t object and uses the callback function READFUNC to retrieve the data on demand. As the callback function can supply the data in any way it wants, this is the most flexible data type GPGME provides. However, it can not be used to write data.

The callback function receives HOOK_VALUE as its first argument whenever it is invoked. It should return up to COUNT bytes in BUFFER, and return the number of bytes actually read in NREAD. It may return 0 in NREAD if no data is currently available. To indicate EOF the function should return with an error code of -1 and set NREAD to 0. The callback function may support to reset its internal read pointer if it is invoked with BUFFER and NREAD being NULL and COUNT being 0.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, GPG_ERR_INV_VALUE if DH or READFUNC is not a valid pointer, and GPG_ERR_ENOMEM if not enough memory is available.

-- Function: gpgme_error_t gpgme_data_rewind (gpgme_data_t DH)

The function gpgme_data_rewind is equivalent to:

```
return (gpgme_data_seek (dh, 0, SEEK_SET) == -1)
  ? gpgme_error_from_errno (errno) : 0;
```

-- Data type: gpgme_attr_t

The gpgme_attr_t type is used to specify a key or trust item attribute. The following attributes are defined:

GPGME_ATTR_KEYID

This is the key ID of a sub key. It is representable as a string.

GPGME_ATTR_FPR

This is the fingerprint of a sub key. It is representable as a string.

GPGME_ATTR_ALGO

This is the crypto algorithm for which the sub key can be used. It is representable as a string and as a number. The numbers correspond to the enum gcry_pk_algos values in the gcrypt library.

GPGME_ATTR_LEN
This is the key length of a sub key. It is representable as a number.

GPGME_ATTR_CREATED
This is the timestamp at creation time of a sub key. It is representable as a number.

GPGME_ATTR_EXPIRE
This is the expiration time of a sub key. It is representable as a number.

GPGME_ATTR_USERID
This is a user ID. There can be more than one user IDs in a GPGME_KEY_T object. The first one (with index 0) is the primary user ID. The user ID
is representable as a number.

GPGME_ATTR_NAME
This is the name belonging to a user ID. It is representable as a string.

GPGME_ATTR_EMAIL
This is the email address belonging to a user ID. It is representable as a string.

GPGME_ATTR_COMMENT
This is the comment belonging to a user ID. It is representable as a string.

GPGME_ATTR_VALIDITY
This is the validity belonging to a user ID. It is representable as a string and as a number. See below for a list of available validities.

GPGME_ATTR_UID_REVOKED
This specifies if a user ID is revoked. It is representable as a number, and is 1 if the user ID is revoked, and 0 otherwise.

GPGME_ATTR_UID_INVALID
This specifies if a user ID is invalid. It is representable as a number, and is 1 if the user ID is invalid, and 0 otherwise.

GPGME_ATTR_TYPE
This

returns information about the type of key. For the
string function this will eother be "PGP" or "X.509". The
integer function returns 0 for PGP and 1 for X.509.

GPGME_ATTR_IS_SECRET
This specifies if the key is a secret key. It is
representable as a number, and is 1 if the key is revoked,
and 0 otherwise.

GPGME_ATTR_KEY_REVOKED
This specifies if a sub key is revoked. It is representable
as a number, and is 1 if the key is revoked, and 0
otherwise.

GPGME_ATTR_KEY_INVALID
This specifies if a sub key is invalid. It is representable
as a number, and is 1 if the key is invalid, and 0
otherwise.

GPGME_ATTR_KEY_EXPIRED
This specifies if a sub key is expired. It is representable
as a number, and is 1 if the key is expired, and 0
otherwise.

GPGME_ATTR_KEY_DISABLED
This specifies if a sub key is disabled. It is
representable
as a number, and is 1 if the key is disabled, and 0
otherwise.

GPGME_ATTR_KEY_CAPS
This is a description of the capabilities of a sub key. It is
representable as a string. The string contains the letter e
if the key can be used for encryption, s if the key can be
used for signatures, and c if the key can be used for
certifications.

GPGME_ATTR_CAN_ENCRYPT
This specifies if a sub key can be used for encryption. It is
representable as a number, and is 1 if the sub key can be
used for encryption, and 0 otherwise.

GPGME_ATTR_CAN_SIGN
This specifies if a sub key can be used to create data
signatures. It is representable as a number, and is 1 if
the sub key can be used for signatures, and 0 otherwise.

GPGME_ATTR_CAN_CERTIFY

This specifies if a sub key can be used to create key
certificates. It is representable
as a number, and is 1 if
the sub key can be used for certifications, and 0 otherwise.

GPGME_ATTR_SERIAL
The X.509 issuer serial attribute of the key. It is
representable as a string.

GPGME_ATTR_ISSUE
The X.509 issuer name attribute of the key. It is
representable as a string.

GPGME_ATTR_CHAINID
The X.509 chain ID can be used to build the certification
chain. It is representable as a string.

-- Function: const char * gpgme_key_get_string_attr (gpgme_key_t KEY,
gpgme_attr_t WHAT, const void *RESERVED, int IDX)
The function gpgme_key_get_string_attr returns the value of the
string-representable attribute WHAT of key KEY. If the attribute
is an attribute of a sub key or an user ID, IDX specifies the sub
key or user ID of which the attribute value is returned. The
argument RESERVED is reserved for later use and should be NULL.

The string returned is
only valid as long as the key is valid.

The function returns 0 if an attribute cant be returned as a
string, KEY is not a valid pointer, IDX out of range, or RESERVED
not NULL.

-- Function: unsigned long gpgme_key_get_ulong_attr (gpgme_key_t KEY,
gpgme_attr_t WHAT, const void *RESERVED, int IDX)
The function gpgme_key_get_ulong_attr returns the value of the
number-representable attribute WHAT of key KEY. If the attribute
is an attribute of a sub key or an user ID, IDX specifies the sub
key or user ID of which the attribute value is returned. The
argument RESERVED is reserved for later use and should be NULL.

The function returns 0 if the attribute cant be returned as a
number, KEY is not a valid pointer, IDX out of range, or RESERVED
not NULL.

The signatures on a key are only available if the key was retrieved
via a listing operation with the GPGME_KEYLIST_MODE_SIGS mode enabled,
because it is expensive to retrieve

all signatures of a key.

So, before using the below interfaces to retrieve the signatures on a key, you have to make sure that the key was listed with signatures enabled. One convenient, but blocking, way to do this is to use the function gpgme_get_key.

-- Data type: gpgme_attr_t

The gpgme_attr_t type is used to specify a key signature attribute. The following attributes are defined:

GPGME_ATTR_KEYID

This is the key ID of the key which was used for the signature. It is representable as a string.

GPGME_ATTR_ALGO

This is the crypto algorithm used to create the signature. It is representable as a string and as a number. The numbers correspond to the enum gcry_pk_algos values in the gcrypt library.

GPGME_ATTR_CREATED

This is the timestamp at creation time of the signature. It is representable as a number.

GPGME_ATTR_EXPIRE

This is the expiration time of the signature. It is representable as a number.

GPGME_ATTR_USERID

This is the user ID associated with the signing key. The user ID is representable as a number.

GPGME_ATTR_NAME

This is the name belonging to a user ID. It is representable as a string.

GPGME_ATTR_EMAIL

This is the email address belonging to a user ID. It is representable as a string.

GPGME_ATTR_COMMENT

This is the comment belonging to a user ID. It is representable as a string.

GPGME_ATTR_KEY_REVOKED

This specifies if a key signature is a revocation signature.

It is representable as a number, and is 1 if the key is revoked, and 0 otherwise.

GPGME_ATTR_SIG_CLASS
This specifies the signature class of a key signature. It is representable as a number. The meaning is specific to the crypto engine.

GPGME_ATTR_SIG_CLASS
This specifies the signature class of a key signature. It is representable as a number. The meaning is specific to the crypto engine.

GPGME_ATTR_SIG_STATUS
This is the same value as returned by gpgme_get_sig_status.

-- Function: const char * gpgme_key_sig_get_string_attr (gpgme_key_t KEY, int UID_IDX, gpgme_attr_t WHAT, const void *RESERVED, int IDX)

The function gpgme_key_sig_get_string_attr returns the value of the string-representable attribute WHAT of the signature IDX on the user ID UID_IDX in the key KEY. The argument RESERVED is reserved for later use and should be NULL.

The string returned is only valid as long as the key is valid.

The function returns 0 if an attribute cant be returned as a string, KEY is not a valid pointer, UID_IDX or IDX out of range, or RESERVED not NULL.

-- Function: unsigned long gpgme_key_sig_get_ulong_attr (gpgme_key_t KEY, int UID_IDX, gpgme_attr_t WHAT, const void *RESERVED, int IDX)

The function gpgme_key_sig_get_ulong_attr returns the value of the number-representable attribute WHAT of the signature IDX on the user ID UID_IDX in the key KEY. The argument RESERVED is reserved for later use and should be NULL.

The function returns 0 if an attribute cant be returned as a string, KEY is not a valid pointer, UID_IDX or IDX out of range, or RESERVED not NULL.

-- Data type: enum gpgme_sig_stat_t

The gpgme_sig_stat_t type holds the result of a signature check, or the combined result of all signatures. The following results are possible:

GPGME_SIG_STAT_NONE
This status should not occur in normal operation.

GPGME_SIG_STAT_GOOD
This status indicates that the signature is valid. For the combined result this status means that all signatures are valid.

GPGME_SIG_STAT_GOOD_EXP
This status indicates that
the signature is valid but expired.
For the combined result this status means that all signatures are valid and expired.

GPGME_SIG_STAT_GOOD_EXPKEY
This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.

GPGME_SIG_STAT_BAD
This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

GPGME_SIG_STAT_NOKEY
This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

GPGME_SIG_STAT_NOSIG
This status indicates that the signature data provided was not a real signature.

GPGME_SIG_STAT_ERROR
This status indicates that there was some other error which prevented the signature verification.

GPGME_SIG_STAT_DIFF
For the combined result this status means that at least two signatures have a different status. You can get each keys status with gpgme_get_sig_status.

-- Function: const char * gpgme_get_sig_status (gpgme_ctx_t CTX, int IDX, gpgme_sig_stat_t *R_STAT, time_t *R_CREATED)
The function gpgme_get_sig_status is equivalent to:

```
 gpgme_verify_result_t result;
 gpgme_signature_t sig;

 result = gpgme_op_verify_result (ctx);
 sig = result->signatures;

 while (sig && idx)
   {
     sig = sig->next;
     idx--;
   }
 if (!sig || idx)
   return NULL;

 if (r_stat)
   {
     switch (gpg_err_code (sig->status))
{
case GPG_ERR_NO_ERROR:
   *r_stat = GPGME_SIG_STAT_GOOD;
  break;

case GPG_ERR_BAD_SIGNATURE:
  *r_stat = GPGME_SIG_STAT_BAD;
  break;

case GPG_ERR_NO_PUBKEY:
  *r_stat = GPGME_SIG_STAT_NOKEY;
  break;

case GPG_ERR_NO_DATA:
  *r_stat = GPGME_SIG_STAT_NOSIG;
  break;

case GPG_ERR_SIG_EXPIRED:
  *r_stat = GPGME_SIG_STAT_GOOD_EXP;
  break;

case GPG_ERR_KEY_EXPIRED:
  *r_stat = GPGME_SIG_STAT_GOOD_EXPKEY;
  break;

default:
  *r_stat = GPGME_SIG_STAT_ERROR;
  break;
}
   }
```

```
if (r_created)
  *r_created = sig->timestamp;
return sig->fpr;
```

-- Function: const char * gpgme_get_sig_string_attr (gpgme_ctx_t CTX, int IDX, gpgme_attr_t WHAT, int WHATIDX)

The function gpgme_get_sig_string_attr is equivalent to:

```
gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
  {
    sig = sig->next;
    idx--;
  }
if (!sig || idx)
  return NULL;

switch (what)
  {
  case GPGME_ATTR_FPR:
    return sig->fpr;

  case GPGME_ATTR_ERRTOK:
    if (whatidx == 1)
      return sig->wrong_key_usage ? "Wrong_Key_Usage" : "";
    else
  return "";
  default:
    break;
  }

return NULL;
```

-- Function: const char * gpgme_get_sig_ulong_attr (gpgme_ctx_t CTX, int IDX, gpgme_attr_t WHAT, int WHATIDX)

The function gpgme_get_sig_ulong_attr is equivalent to:

```
gpgme_verify_result_t result;
gpgme_signature_t sig;
```

```
result = gpgme_op_verify_result (ctx);
        sig = result->signatures;

        while (sig && idx)
          {
            sig = sig->next;
            idx--;
          }
        if (!sig || idx)
          return 0;

        switch (what)
          {
          case GPGME_ATTR_CREATED:
            return sig->timestamp;

          case GPGME_ATTR_EXPIRE:
            return sig->exp_timestamp;

          case GPGME_ATTR_VALIDITY:
            return (unsigned long) sig->validity;

          case GPGME_ATTR_SIG_STATUS:
            switch (sig->status)
        {
        case GPG_ERR_NO_ERROR:
          return GPGME_SIG_STAT_GOOD;

        case GPG_ERR_BAD_SIGNATURE:
          return GPGME_SIG_STAT_BAD;

        case GPG_ERR_NO_PUBKEY:
          return GPGME_SIG_STAT_NOKEY;

        case GPG_ERR_NO_DATA:
          return GPGME_SIG_STAT_NOSIG;

        case GPG_ERR_SIG_EXPIRED:

      return GPGME_SIG_STAT_GOOD_EXP;

        case GPG_ERR_KEY_EXPIRED:
          return GPGME_SIG_STAT_GOOD_EXPKEY;

        default:
          return GPGME_SIG_STAT_ERROR;
        }
```

```
      case GPGME_ATTR_SIG_SUMMARY:
        return sig->summary;

      default:
        break;
      }
    return 0;
```

-- Function: const char * gpgme_get_sig_key (gpgme_ctx_t CTX, int IDX, gpgme_key_t *R_KEY)

The function gpgme_get_sig_key is equivalent to:

```
    gpgme_verify_result_t result;
    gpgme_signature_t sig;

    result = gpgme_op_verify_result (ctx);
    sig = result->signatures;

    while (sig && idx)
      {
        sig = sig->next;
        idx--;
      }
    if (!sig || idx)
      return gpg_error (GPG_ERR_EOF);

    return gpgme_get_key (ctx, sig->fpr, r_key, 0);
```

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Version 2.1, February 1999

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[This is the first released version of the Lesser GPL. It also counts as the successor of the GNU Library Public License, version 2, hence the version number 2.1.]

Preamble

========

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In this case,
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* gpgme_invalid_key_t: Crypto Operations. (line 10)
* gpgme_io_cb_t: I/O Callback Interface. (line 7)
* gpgme_keylist_result_t: Listing Keys. (line 155)
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* gpgme_key_release: Deprecated Functions.
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* gpgme_key_sig_get_string_attr: Deprecated Functions.
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* gpgme_key_t: Key objects. (line 10)
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* gpgme_op_adduid_start: Generating Keys. (line 215)
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* gpgme_op_createkey: Generating Keys. (line 14)
* gpgme_op_createkey_start: Generating Keys. (line 119)
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* gpgme_op_createsubkey_start: Generating Keys. (line 176)
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* gpgme_tofu_policy_t: Changing TOFU Data. (line 13)
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(line 10)
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(line 27)
* START_CONFDIALOG: Miscellaneous UI Server Commands.
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* VERIFY_FILES: UI Server Verify/Decrypt Files.
(line 10)
* void (*gpgme_data_release_cb_t) (void *HANDLE): Callback Based Data Buffers.
(line 54)
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(line 6)
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(line 48)
* window-id: Miscellaneous UI Server Commands.
(line 21)
Wenn Sie dies lesen knnen, ist es wohl nicht
geheim genug.
hkp4py
requests
Additional license notices for GPGME. -*- org -*-

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For files:
- cJSON.c, cJSON.h

#+begin_quote
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#+end_quote
# -*- mode: org -*-
#+TITLE: Maintenance Mode
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltxtra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

* Maintenance Mode from 2019
:PROPERTIES:
:CUSTOM_ID: maintenance-mode
:END:

| Version: | 0.0.1 |
| GPGME Version: | 1.13.0 |
| Author: | Ben McGinnes <ben@gnupg.org> |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language: | Australian English, British English |
| xml:lang: | en-AU, en-GB, en |

From the beginning of 2019 the Python bindings to GPGME will enter maintenance mode, meaning that new features will not be added and only bug fixes and security fixes will be made.
This also means that
documentation beyond that existing at the end of 2018 will not be developed further except to correct errors.

Though use of these bindings appears to have been quite well received, there has been no indication of what demand there is, if any for either financial backing of the current Python bindings development or support contracts with g10code GmbH citing the necessity of including the bindings.

** Maintainer from 2019 onward
:PROPERTIES:
:CUSTOM_ID: maintenance-mode-bm
:END:

How does this affect the position of GnuPG Python Bindings Maintainer?

Well, I will remain as maintainer of the bindings; but without funding for that position, the amount of time I will be able to dedicate solely to this task will be limited and reduced to volunteered time. As with all volunteered time and effort in free software projects, this will be subject to numerous external imperatives.

** Using the Python Bindings from 2019 and beyond
:PROPERTIES:
:CUSTOM_ID:
maintenance-mode-blade-runner
:END:

For most, if not all, Python developers using these bindings; they will continue to just work the same as they always have. Expansions of GPGME itself are usually handled by SWIG with the existing code and thus bindings are generated properly when the bindings are installed alongside GPGME and when the latter is built from source.

In the rare circumstances where that is not enough to address some new addition to GPGME, then that is a bug and thus subject to the maintenance mode provisions (i.e. it will be fixed following a bug report being raised and your humble author will need to remember where the timesheet template was filed, depending on how many years off such an event is).

All the GPGME functionality will continue to be accessible via the

lower level, dynamically generated methods which match the GPGME C
documentation. While the more intuitively Pythonic higher level layer
already covers the vast majority of functionality people require
with
key generation, signatures, certifications (key signing), encryption,
decryption, verification, validation, trust levels and so on.

Any wanted features lacking in the Python bindings are usually lacking
because they are missing from GPGME itself (e.g. revoking keys via the
API) and in such cases they are usually deliberately excluded. More
discussion of these issues can be found in the archives of the
[[https://lists.gnupg.org/mailman/listinfo/gnupg-devel][gnupg-devel mailing list]].

Any features existing in the dynamically generated layer for which
people want a specific, higher level function included to make it more
Pythonic (e.g. to avoid needing to learn or memorise cryptographic
mode values or GnuPG status code numbers), would be a feature request
and /not/ a bug.

It is still worthwhile requesting it, but the addition of such a
feature would not be guaranteed and provided on a purely volunteer
basis. Expediting such a request would require funding that request.

Those
with a commercial interest in expediting such a feature request
already know how to [[https://gnupg.org/cgi-bin/procdonate.cgi?mode=preset][expedite it]] (use the message field to state what
feature is being requested).

** Documentation formats
:PROPERTIES:
:CUSTOM_ID: docs
:END:

The documentation has been written in Org mode for GNU Emacs, with
both Texinfo and reStructuredText formats generated from that. The
Texinfo files are intended for use with the rest of the GnuPG
documentation; while the reStructuredText files are intended for use
with Docutils and Sphinx, as with other Python projects.

*** Cautionary Notes regarding Sphinx and EPUB
:PROPERTIES:
:CUSTOM_ID: sphinx-made-epubs-suck
:END:

Though Python's Docutils in conjunction with Sphinx is capable of

generating some very useful HTML sites, as proven by [[https://readthedocs.org/][Read the Docs]] and the [[https://docs.python.org/][Python documentation]], there are a number of output formats it does not
handle well. At the top of the list of things it manages to break so atrociously as to be embarassing is the [[http://idpf.org/epub][EPUB 3]] format.

The automatically generated EPUB of the CPython documentation always contains hundreds of validation errors and even the modest amount of documentation here [[https://files.au.adversary.org.s3.amazonaws.com/crypto/gpgme-python/rst/epub/GPGMEPythonBindings.epub][produced a file]] with approximately thirty validation errors. As the volume of documentation content increases, so does the induced errors. Whereas Texinfo doesn't produce EPUB output at all, nor does Org-mode.

Should there ever be genuine demand for this format, lodge a [[https://dev.gnupg.org/maniphest/task/edit/form/4/][feature request]] case marked for [[https://dev.gnupg.org/p/BenM/][my]] attention. The means of generating such files flawlessly is already available, but is not yet part of the GnuPG build system. Nor is it integrated with a means of converting Org
mode input files to the relevant base format automatically, as can already be done when converting Org to reStructuredText or Org to Texinfo. As a certain amount of work would be required to get it done, there would need to be clear demand for that work to be done.
Just GNU it!
2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2011-10-25 Marcus Brinkmann <marcus@g10code.com>

* m4/pth.m4: Removed.
* configure.ac: Remove check for pth and automake conditional HAVE_PTH.

2011-06-16 Marcus Brinkmann <marcus@g10code.com>

Release 1.3.1

* configure.ac: Set LT version to C19/A8/R0.

2011-05-06 Marcus Brinkmann <marcus@g10code.com>

* Makefile.am (SUBDIRS): Remove complus.

* configure.ac (AC_CONFIG_FILES): Remove complus/Makefile.
(BUILD_COMPLUS): Remove AM_CONDITIONAL.
* complus/: Remove very old and stale component.

* acinclude.m4 (GNUPG_FIX_HDR_VERSION): Remove.

2011-04-14 Werner Koch <wk@g10code.com>

* configure.ac: Require automake 1.11.

2011-04-06 Werner Koch <wk@g10code.com>

* autogen.sh (--build-w32):
Support option --build-w64.
* configure.ac (HAVE_W64_SYSTEM): Define.
(INSERT__TYPEDEFS_FOR_GPGME_H): New.
(GPGME_CONFIG_HOST): New.

2011-02-02 Marcus Brinkmann <mb@g10code.com>

* configure.ac (NEED_LIBASSUAN_VERSION): Bump to 2.0.2 for system hooks.

2010-12-30 Werner Koch <wk@g10code.com>

* configure.ac: Support a git revision.

2010-11-03 Werner Koch <wk@g10code.com>

* configure.ac (AC_CHECK_HEADERS): Check for sys/types.h and
sys.stat.h.

2010-11-02 Werner Koch <wk@g10code.com>

* configure.ac (AC_CHECK_HEADERS): Check for sys.time.h.

2010-08-19 Werner Koch <wk@g10code.com>

* configure.ac (AH_BOTTOM): Define GPG_ERR_ENABLE_ERRNO_MACROS.

2010-05-12 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Check for setlocale.

2010-05-07 Werner Koch <wk@g10code.com>

* configure.ac: Change checks to always require libassuan.

2010-05-07 Marcus Brinkmann <marcus@g10code.de>

* autogen.sh: Update the thing.

* configure.ac: Check for locale.h.

2010-05-06
Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Detect Windows CE.
(HAVE_W32CE_SYSTEM): New symbol and automake conditional.
* ltmain.sh, m4/libtool.m4: Patch so that it works for Windows CE.

* configure.ac: Require libgpg-error 1.8.

2010-03-15 Werner Koch <wk@g10code.com>

* configure.ac (emacs_local_vars_begin)
(emacs_local_vars_read_only, emacs_local_vars_end): New.

2010-01-22 Werner Koch <wk@g10code.com>

* autogen.sh (--build-w32): Add --with-libassuan-prefix.

2010-01-11 Marcus Brinkmann <marcus@g10code.de>

Release 1.3.0.

2009-12-22 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Do not use echo -n. Test for __thread.

2009-12-17 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Make largefile check more robust.

2009-12-10 Werner Koch <wk@g10code.com>

* configure.ac: Check for getgid and getegid.

2009-12-08 Marcus Brinkmann <marcus@g10code.de>

Update to libtool 2.2.6a.
* configure.ac: Invoke AC_CONFIG_MACRO_DIR.
(AC_LIBTOOL_WIN32_DLL,
AC_LIBTOOL_RC): Replace by ...
(LT_PREREQ, LT_INIT, LT_LANG): ... these.
* config.guess, config.sub, install-sh, ltmain.sh, m4/libtool.m4:
Updated to libtool 2.2.6a.

* m4/ltoptions.m4, m4/ltsugar.m4, m4/ltversion.m4,
m4/lt~obsolete.m4: New files from libtool 2.2.6a.

2009-11-10  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Activate UIServer if FD passing is enabled and
Assuan is available.

2009-10-30  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Check for argp.h and error_t.

2009-10-26  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (NEED_GPG_VERSION_DEFAULT): Bump to 1.4.0 as 1.3.0
was development versions only.

2009-10-22  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Add support for G13.

2009-10-20  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (AC_CONFIG_FILES): Remove assuan/Makefile.

2009-10-20  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Replace internal libassuan by external libassuan.
* m4/libassuan.m4:
New file.
* Makefile.am (assuan): Remove variable.
(SUBDIRS): Remove ${assuan}.
* assuan/: Removed.

2009-06-22  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Add AC_TYPE_UINTPTR_T.

* assuan/assuan.h [_ASSUAN_IN_GPGME_BUILD_ASSUAN]: Declare
_gpgme_io_connect.

2009-06-18  Marcus Brinkmann  <marcus@g10code.de>

Released GPGME 1.2.0.

* configure.ac (my_version): Set to 1.2.0.
(LIBGPGME_LT_CURRENT, LIBGPGME_LT_AGE): Bump.
(LIBGPGME_LT_REVISION): Reset.

2009-05-05  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Add infrastructure for compile time check of
_FILE_OFFSET_BITS.

2009-04-19  Moritz  <moritz@gnu.org>

* Makefile.am (DISTCHECK_CONFIGURE_FLAGS): Specify --with-gpg.

2009-03-06  Marcus Brinkmann  <marcus@g10code.de>

* assuan/: Update to libassuan SVN 2009-03-06.

2009-01-26  Werner Koch  <wk@g10code.com>

* configure.ac (AC_CONFIG_FILES): Add tests/opassuan/Makefile.

2008-12-08  Marcus Brinkmann  <marcus@g10code.de>

Release GPGME
1.1.8.

* configure.ac: Bump API revision.

2008-11-03  Marcus Brinkmann  <marcus@g10code.com>

* configure.ac: Replace gpgme paths with src.
* gpgme: Move to ...
* src: ... this new directory.

2008-10-20  Werner Koch  <wk@g10code.com>

* configure.ac (AC_CONFIG_FILES): Add gpgme.h.
(GNUPG_FIX_HDR_VERSION): Remove.

2008-10-17  Marcus Brinkmann  <marcus@g10code.com>

Release GPGME 1.1.7.

* configure.ac (LIBGPGME_LT_REVISION): Bump for release.

2008-09-19  Moritz  <moritz@gnu.org>

* configure.ac: Remove bogus "esac".

2008-09-16  Marcus Brinkmann  <marcus@g10code.com>

* configure.ac (_XOPEN_SOURCE) [apple-darwin]: Define it.

2008-07-04  Werner Koch  <wk@g10code.com>

* config.guess, config.sub: Update to 2007-11-19.  Also update
missing et al scripts.

2008-04-01  Werner Koch  <wk@g10code.com>

* configure.ac (AC_INIT): Fix quoting.

2008-01-30  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Bump required version of automake up to 1.10.
* autogen.sh: Fix
aclocal check.

2008-01-04  Marcus Brinkmann  <marcus@g10code.de>

Release GPGME 1.1.6.

* configure.ac: Support gpgconf.

2007-09-27  Marcus Brinkmann  <marcus@g10code.de>

* assuan-pipe-connect.c (pipe_connect_gpgme): Do not close process
handle here.  Use this function also on Unix systems.

* assuan-pipe-connect.c (pipe_connect_gpgme): Fix last change.

* assuan-pipe-connect.c (pipe_connect_gpgme): New function, use it
if _ASSUAN_IN_GPGME_BUILD_ASSUAN.

2007-09-17  Werner Koch  <wk@g10code.com>

* configure.ac: Use the svn version magic.

2007-09-07  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Check for C++, Qt and support --enable-w32-qt.
* m4/pkg.m4: New file.

2007-08-21  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (--enable-w32-glib): Use --enableval, not
--withval.

2007-07-16  Marcus Brinkmann  <marcus@g10code.de>

* assuan/assuan-socket.c (_assuan_close): Always use close().
* assuan/assuan.h (_gpgme_io_close): New prototype.
(close): New
macro, define as _gpgme_io_close.

2007-07-13  Marcus Brinkmann  <marcus@g10code.de>

* assuan/assuan-io.c (_assuan_simple_read, _assuan_simple_write):
Always use read/write (which means _gpgme_io_read and
_gpgme_io_write).

2007-07-09  Marcus Brinkmann  <marcus@g10code.de>

Released 1.1.5.

* configure.ac (LIBGPGME_LT_REVISION): Bump for release.

2007-07-08  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (GPGSM_DEFAULT) [*-mingw32*]: Initialize it.
(HAVE_ASSUAN_H): Set to 1 if we have it.
(funopen): Use AC_REPLACE_FUNCS.
(USE_DESCRIPTOR_PASSING): Define to 1 if we have it.  Do not
define it at all if we don't.
(NETLIBS) [have_w32_system]: Add -lws2_32.
(DIRSEP_C, DIRSEP_S, EXPSEP_C, EXPSEP_S, PATHSEP_S)
[HAVE_DOSISH_SYSTEM]: Remove definitions.

* assuan/assuan.h (_assuan_funopen): Define to _gpgme_funopen.
* assuan/funopen.c: Move to ../gpgme/funopen.c.
* assuan/Makefile.am (libassuan_la_SOURCES): Remove funopen.c.

2007-07-04  Marcus Brinkmann  <marcus@g10code.de>

*
assuan/Makefile.am (INCLUDES): Include $(top_srcdir)/gpgme.
* assuan/assuan.h: Include <ath.h> instead of trying to duplicate
the definitions.

* assuan/: Update files to 2007-07-04 version of assuan.

* autogen.sh: Use = not == in test.

2007-03-05  Werner Koch  <wk@g10code.com>

Released 1.1.4.

* configure.ac (LIBGPGME_LT_REVISION): Bump for release.

* autogen.sh: New option --force.

2007-01-29  Marcus Brinkmann  <marcus@g10code.de>

Released 1.1.3.

* configure.ac (LIBGPGME_LT_REVISION): Bump for release.

2007-01-26  Werner Koch  <wk@g10code.com>

* configure.ac: Changed gpg and gpgsm version checks to work with
arbitrary names of the gpg binary. New option --disable-gpg-test
and --disable-gpgsm-test.

2007-01-09  Werner Koch  <wk@g10code.com>

* configure.ac (NEED_GPG_VERSION, NEED_GPGSM_VERSION): Must define
after it may have been changed by an option.

2007-01-08  Werner Koch  <wk@g10code.com>

* configure.ac: Require gpg-error 1.4 due to the use of
gpg_error_from_syserror.
(HAVE_ASSUAN_H):
New.

2007-01-05  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Add options --with-gpg-version and
--with-gpgsm-version to allow overriding the minimum version
requirements.

2006-12-17  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Fix two typos in last change.

2006-12-03  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Use descriptor passing only if --enable-fd-passing
is provided.

* configure.ac: Add check for use of descriptor passing.

2006-11-29  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (NEED_GPG_VERSION): Bump to 1.3.0.

2006-09-19  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Turn stpcpy into a replacement function.
Check for unistd.h and add setenv as replacement function.

2006-07-29  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Check for network libraries and set NETLIBS.

2006-07-06  Marcus Brinkmann  <marcus@g10code.de>

* lang, lang/cl: New subdirectories.
*
lang/Makefile.am, lang/README: New files.
* configure.ac (AC_CONFIG_FILES): Add lang/Makefile,
lang/cl/Makefile and lang/cl/gpgme.asd.
* Makefile.am (SUBDIRS): Add lang.

2006-03-02  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (LIBGPGME_LT_REVISION): Bump for release.

2006-02-22  Marcus Brinkmann  <marcus@g10code.de>

Released 1.1.1.

* configure.ac (LIBGPGME_LT_CURRENT, LIBGPGME_LT_AGE): Bump for
release.
(LIBGPGME_LT_REVISION): Reset to 0 for release.

2006-01-05  Werner Koch  <wk@g10code.com>

* configure.ac: Test for inline feature.
(AH_BOTTOM): New to define the pure attribute.

2006-01-03  Werner Koch  <wk@g10code.com>

* configure.ac: Append SVN revision to the version.

2005-11-18  Werner Koch  <wk@g10code.com>

* configure.ac (BUILD_REVISION): New.

2005-11-17  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Add support for --enable-w32-glib (disabled by
default).  Invoke AM_PATH_GLIB_2_0.

2005-11-16  Werner Koch  <wk@g10code.com>

* configure.ac
(CFLAGS) [W32]: Make sure that -mms-bitfields are used.

2005-11-15  Werner Koch  <wk@g10code.com>

* configure.ac: Create BUILD_FILEVERSION from SVN Revision.

* autogen.sh [W32]: Build shared and static versions of the library.

2005-10-20  Marcus Brinkmann  <marcus@g10code.de>

* w32-dll/ChangeLog, w32-dll/build-dll, w32-dll/gpgme.def: Remove
files.

* configure.ac: Instead checking for windres and dlltool, invoke
AC_LIBTOOL_WIN32_DLL and AC_LIBTOOL_RC.
* src/Makefile.am [HAVE_W32_SYSTEM]: Use libtool, which simplifies
the rules.

2005-10-01  Marcus Brinkmann  <marcus@g10code.de>

Released 1.1.0.

* configure.ac (LIBGPGME_LT_CURRENT, LIBGPGME_LT_AGE): Bump for
release.
(LIBGPGME_LT_REVISION): Reset to 0 for release.

2005-09-12  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (HAVE_PTH): Don't add $PTH_CFLAGS to $CFLAGS here.

2005-08-26  Werner Koch  <wk@g10code.com>

* configure.ac (SEPCONSTANTS): New to define DIRSEP_C et al.

2005-08-19  Werner Koch  <wk@g10code.com>

*
configure.ac [W32]: Create values for versioninfo.rc and list
substuture versioninfo.rc.
* configure.ac: Define ENABLE_GPGSM.

2005-08-08  Werner Koch  <wk@g10code.com>

* configure.ac (stpcpy): Changed from replace to test.

2005-03-24  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (AH_BOTTOM): Removed.

2005-03-09  Werner Koch  <wk@g10code.com>

* acinclude.m4 (GNUPG_CHECK_VA_COPY): Assume no when cross-compiling.

* Makefile.am (EXTRA_DIST): Include autogen.sh

* autogen.sh: Added the usual code to build for W32 (--build-w32).

* configure.ac: Fixed the mingw32 host string, removed OS/2 stuff.
(HAVE_DRIVE_LETTERS): Removed.
(HAVE_W32_SYSTEM): Added.
(AC_GNU_SOURCE): New to replace the identical AH_VERBATIM.
(AH_BOTTOM): Added.

2004-12-28  Werner Koch  <wk@g10code.com>

Released 1.0.2.

* Makefile.am (AUTOMAKE_OPTIONS): Build bzip 2 version.
(ACLOCAL_AMFLAGS): Add -I m4.
* configure.ac: Require automake 1.9.3 and autoconf 2.59.
* acinclude.m4:
Changed quoting for automake 1.9.
* README: Use SHA1 instead of MD5.

2004-12-11  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Replace ttyname_r if it doesn't exist (and warn in
that case).

2004-12-07  Marcus Brinkmann  <marcus@g10code.de>

* README: Refer to COPYING.LESSER and "each file" instead of
COPYING.
* COPYING.LESSER: New file.
* gpgme.spec.in (%doc): Add COPYING.LESSER.
* acinclude.m4, configure.ac, Makefile.am: Change license to LGPL
2.1 or later.
* TODO: Add copyright notice.
* README.CVS: Likewise.

* configure.ac (GPGSM_VERSION): Fix filter to get it.

2004-10-22  Marcus Brinkmann  <marcus@g10code.de>

Released 1.0.1.

* configure.ac (LIBGPGME_LT_REVISION): Bump up to 2.
(AC_INIT): Set version to 1.0.1.

* configure.ac: Set HAVE_GPGSM to true only if $GPGSM is not "no".

2004-09-30  Marcus Brinkmann  <marcus@g10code.de>

Released 1.0.0.

* configure.ac (LIBGPGME_LT_REVISION): Bump up to 1.
(AC_INIT): Set version to 1.0.0.

* Makefile.am
(EXTRA_DIST): Remove README-alpha.
* README-alpha: Remove file.

2004-09-17  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Disable AC_CONFIG_MACRO_DIR for now.

2004-09-14  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Improve diagnostics with version check.

* configure.ac: Print diagnostics about found thread libraries at
the end.  Check for the versions of GPG and GPGSM and print the
found versions at the end.
(HAVE_GPGSM): Do not require GPGSM to exist and be readable.
(AC_CONFIG_MACRO_DIR): Invoke with argument m4.

* acinclude.m4: Add copyright notice.
(jm_GLIBC21, AM_PATH_GPG_ERROR, _AC_PTH_ERROR, _AC_PTH_VERBOSE,
AC_CHECK_PTH): Removed.

2004-06-23  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Check for <sys/uio.h>.

2004-06-08  Marcus Brinkmann  <marcus@g10code.de>

Released 0.9.0.

* configure.ac (AC_INIT): Set version number to 0.9.0.
(LIBGPGME_LT_CURRENT, LIBGPGME_LT_AGE): Bump up by one.

(LIBGPGME_LT_REVISION): Reset to zero.

2004-05-21
Marcus Brinkmann <marcus@g10code.de>

* configure.ac (GPGME_CONFIG_API_VERSION): New variable,
substitute it.

2004-04-29 Marcus Brinkmann <marcus@g10code.de>

Released 0.4.7.

* configure.ac (LIBGPGME_LT_REVISION): Bump it up.

2004-04-02 Thomas Schwinge <schwinge@nic-nac-project.de>

* autogen.sh: Added ACLOCAL_FLAGS.

2004-04-06 Werner Koch <wk@gnupg.org>

Released 0.4.6.

* config.guess, config.sub, ltmain.sh: Updated to those from
libtools 1.5.4.

2004-03-07 Marcus Brinkmann <marcus@g10code.de>

Released 0.4.5.

* configure.ac (NEED_GPGSM_VERSION): Bump up to 1.9.6.

* Makefile.am (EXTRA_DIST): Remove autogen.sh and README.CVS.

2004-02-18 Werner Koch <wk@gnupg.org>

* configure.ac: Make the check for funopen fail with just a
warning.

2004-02-11 Werner Koch <wk@gnupg.org>

* autogen.sh (check_version): Removed bashism and simplified.

2004-02-10 Werner Koch <wk@gnupg.org>

* configure.ac: Fixed funopen test change.

2004-02-06 Moritz Schulte

<mo@g10code.com>

* configure.ac: Fix funopen replacement mechanism.

2004-01-31 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Add invocation of AC_SYS_LARGEFILE, AC_TYPE_OFF_T
and AC_FUNC_FSEEKO.

2004-01-12 Werner Koch <wk@gnupg.org>

Released 0.4.4.

* configure.ac: Bumbed LT_Revision; now at C12/A1/R1.
(NEED_GPGSM_VERSION): Set to 1.9.3.
(min_automake_version): Added.
* README.CVS: New.
* Makefile.am (EXTRA_DIST): Added README.CVS.
* autogen.sh: Updated.

2003-11-19 Werner Koch <wk@gnupg.org>

* acinclude.m4: Add AM_PATH_GPG_ERROR.
* configure.ac: Check for timegm. Made warning messages more
prominent.

2003-10-06 Marcus Brinkmann <marcus@g10code.de>

Released 0.4.3.

* configure.ac (LIBGPGME_LT_CURRENT, LIBGPGME_LT_AGE): Bump up by 1.
(LIBGPGME_LT_REVISION): Set to 0.

2003-09-13 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Require libgpg-error 0.5.

* acinclude.m4: Remove libtool cruft, add jm_GLIBC21.
* configure.ac: Add check for
getenv_r, and call jm_GLIBC21.
Define HAVE_THREAD_SAFE_GETENV if appropriate.

2003-09-03 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Remove GPGME_CONFIG_LIBS and GPGME_CONFIG_CFLAGS.

2003-09-02 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Move invocation of AC_CANONICAL_HOST up to
suppress warning by autoconf.

2003-08-30  Robert Schiele <rschiele@uni-mannheim.de>

* gpgme.spec.in: %{_infodir}/dir is not packaged,
remove to prevent checking failure.

2003-08-18  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: If building Assuan, check for funopen and
fopencookie, and make isascii, putc_unlocked and memrchr
replacement functions.
(AM_PATH_GPG_ERROR): Require 0.3.

2003-07-31  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (AC_INIT): Bump version to 0.4.3.

2003-07-30  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (LIBGPGME_LT_REVISION): Bump up to 1.

Released 0.4.2.

2003-07-08  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac:
Complain if libgpg-error is not found.

2003-06-22  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (AC_INIT): Bump version to 0.4.2.

2003-06-06  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (LIBGPGME_LT_CURRENT): Bump up to 11.

* configure.ac: Use AM_PATH_GPG_ERROR.

* configure.ac: Check for libgpg-error.  Define
GPG_ERR_SOURCE_DEFAULT.

2003-05-26  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (NEED_GPG_VERSION): Bump up to 1.2.2.

2003-05-18  Marcus Brinkmann  <marcus@g10code.de>

In all files, replace the Gpgme* type names with the new gpgme_*
type names.

2003-02-01  Marcus Brinkmann  <marcus@g10code.de>

* assuan/: Update files to 2002-11-10 version of assuan.

2003-01-29  Marcus Brinkmann  <marcus@g10code.de>

* bonobo/gpgme.c, bonobo/main.c, bonobo/main.h, bonobo/Makefile,
bonobo/Makefile.am, bonobo/Makefile.in: Dead files removed.
* configure.ac: Remove automake conditional BUILD_BONOBO
(AC_CONFIG_FILES): Remove bonobo/Makefile.
*
Makefile.am (bonobo): Remove variable.
(SUBDIRS): Remove ${bonobo}.

* configure.ac: Remove all uses of GNUPG_CHECK_TYPEDEF, for byte,
ushort, ulong, u16 and u32.
* acinclude.m4 (GNUPG_CHECK_TYPEDEF): Remove macro.

2002-12-24  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: New conditional HAVE_LD_VERSION_SCRIPT.
Call AC_CANONICAL_HOST, use host instead target.

2002-12-23  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Bump up to 0.4.1.

Released 0.4.0.

2002-12-23  Marcus Brinkmann  <marcus@g10code.de>

* autogen.sh (automake_vers): Require 1.7 (really 1.7.1) for the
conditional source distribution bug fix.

2002-12-08  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (LIBGPGME_LT_CURRENT): Increase by one.
(LIBGPGME_LT_AGE, LIBGPGME_LT_REVISION): Set to 0.

2002-11-28  Marcus Brinkmann  <marcus@g10code.de>

* NEWS: Add note about moving "gpgmeplug" to the "cryptplug"
package.
* README: Remove instructions related to "gpgmeplug".

* configure.ac:
Remove enable option "gpgmeplug" and automake
conditional BUILD_GPGMEPLUG, as well as the status info about it.
(GPGMEPLUG): Remove variable.
* Makefile.am (gpgmeplug): Remove variable.
(SUBDIRS): Remove ${gpgmeplug}.
* cryptplug.h, gpgme-openpgp.c, gpgmeplug.dox, gpgme-smime.c,
Makefile.am, gpgmeplug.c, ChangeLog: Files removed.

2002-11-22 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Disable GPGSM for all dosish systems.

2002-10-12 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Add automake conditional HAVE_GPGSM.

2002-10-08 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (AC_INIT): Bump version up to 0.4.0.
(NEED_GPG_VERSION): Bump up to 1.2.0.
(NEED_GPGSM_VERSION): Bump up to 0.9.0.
* README: Update version numbers.
* NEWS: Start entry for 0.4.0.

2002-09-20 Werner Koch <wk@gnupg.org>

Released 0.3.11.

* configure.ac: Bump up LIBGPGME_LT_REVISION.

* configure.ac (AC_CHECK_HEADERS): Check for sys/select.h.

2002-09-04 Marcus Brinkmann
<marcus@g10code.de>

* autogen.sh (autoconf_vers): Bump up to 2.53 to get the @&t@
quadrigraph. Always cutting the edge!

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Create and substitute LTLIBOBJS.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

Released 0.3.10.

* NEWS: Update for 0.3.9 release.

* configure.ac: Bump up LIBGPGME_LT_REVISION.

2002-08-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.spec.in: Changed user name in Wojciech Polak's email
address from ghostface to polak per request by himself.

2002-08-28 Werner Koch <wk@gnupg.org>

* acinclude.m4 (GNUPG_CHECK_VA_COPY): New.
* configure.ac: Use it.

2002-08-23 Werner Koch <wk@gnupg.org>

* configure.ac (GPGME_CONFIG_CFLAGS): Renamed from GPGME_CFLAGS
and removed the libpath because it is set by the config script.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Bump version number to 0.3.10.

* NEWS: Add template for development version.

2002-08-21
Marcus Brinkmann <marcus@g10code.de>

Released 0.3.9.

* NEWS: Update for 0.3.9 release.
* Makefile.am (EXTRA_DIST): Add gpgme.spec.in.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

* jnlib/argparse.c, jnlib/argparse.h, jnlib/ChangeLog,
jnlib/dotlock.c, jnlib/dotlock.h, jnlib/libjnlib-config.h,
jnlib/logging.c, jnlib/logging.h,jnlib/Makefile.am,
jnlib/mischelp.h, jnlib/README, jnlib/stringhelp.c,
jnlib/stringhelp.h, jnlib/strlist.c, jnlib/strlist.h,
jnlib/types.h, jnlib/xmalloc.c, jnlib/xmalloc.h: Remove files.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (SUBDIRS): Remove jnlib.
* configure.ac: Don't check for unsigned short or unsigned long.
Don't check for memicmp, strlwr, strtoul, memmove, stricmp.
Make stpcpy a replaced function.
Don't define HAVE_JNLIB_LOGGING.
Don't generate jnlib/Makefile.

2002-07-02  Werner Koch  <wk@gnupg.org>

* configure.ac: Bumbed version number to 0.3.9; add a comment on
when to change it.

* gpgme.spec.in:
New. Contributed by Wojciech Polak.
* Makefile.am (dist-hook): New.

* AUTHORS: Added Wojciech and bug reporting addresses.

2002-06-25  Werner Koch  <wk@gnupg.org>

Released 0.3.8.

* configure.ac: Bumbed LT version to 9/3/0.
(NEED_GPGSM_VERSION): Need 0.3.8 due to fixed export command.

2002-06-04  Marcus Brinkmann  <marcus@g10code.de>

Released 0.3.7.

* configure.ac (AC_INIT): Set version to 0.3.7.
(LIBGPGME_LT_REVISION): Add one.

* README: Document version requirement correctly.

2002-06-02  Marcus Brinkmann  <marcus@g10code.de>

* acinclude.m4: Fix Pth check so that it doesn't error out if pth
is not found.

2002-06-02  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Add checks for Pth and pthreads.
* acinclude.m4: Add slightly hacked check for pth (seems to be an
autoconf version problem).

2002-05-21  Werner Koch  <wk@gnupg.org>

* configure.ac (NEED_GPGSM_VERSION): We need gpgsm 0.3.7.

2002-05-03  Werner Koch  <wk@gnupg.org>

Released 0.3.6.

2002-04-05

Marcus Brinkmann <marcus@g10code.de>

* acconfig.h: File removed.
* configure.ac (NEED_GPG_VERSION): Add description.
(NEED_GPGSM_VERSION): Likewise.
(HAVE_DOSISH_SYSTEM): Likewise.
(HAVE_DRIVE_LETTERS): Likewise.
(GPG_PATH): Likewise.
(GPGSM_PATH): Likewise.
* acinclude.m4 (GNUPG_CHECK_TYPEDEF): Likewise.

2002-04-01 Werner Koch <wk@gnupg.org>

Released 0.3.5.

2002-03-17 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Add automake conditional HAVE_DOSISH_SYSTEM.

2002-03-04 Werner Koch <wk@gnupg.org>

* configure.ac: Bumbed version to 0.3.4-cvs to continue development.

Released 0.3.4.

* configure.ac: Bumbed LT version numbers to (7,1,0), requires
gpgsm 0.3.1.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (AC_INIT): Change version number to snapshot CVS
version.

2002-02-13 Werner Koch <wk@gnupg.org>

* configure.ac (vasprintf,fopencookie): Add checks.

2002-02-12 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (AC_INIT):
Bump version to 0.3.3.
* jnlib/Makefile.am: Rever to older version that includes xmalloc
but not dotlock and some other files. Reported by Stphane
Corthsy.

2002-02-10 Marcus Brinkmann <marcus@g10code.de>

* Released 0.3.2.

* configure.ac (AC_INIT): Bump version to 0.3.2.
* jnlib/libjnlibconfig.h: Revert to older version that doesn't
expect libgcrypt.  Reported by Jose Carlos Garcia Sogo
<jsogo@debian.org>.

2002-02-09  Marcus Brinkmann  <marcus@g10code.de>

* Released 0.3.1.

* configure.ac (LIBGPGME_LT_CURRENT): Bump it up to 6!
(NEED_GPGSM_VERSION): Bump it up to 0.3.0!
(AC_INIT): Bump version to 0.3.1

2002-01-22  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (HAVE_JNLIB_LOGGING): Define always for assuan.

2001-12-19  Werner Koch  <wk@gnupg.org>

* configure.ac (VERSION,PACKAGE): Defined and subst.  Used for
AM_INIT_AUTOMAKE and moved all version number more to the top.

2001-12-18  Marcus Brinkmann  <marcus@g10code.de>

* autogen.sh (libtool_vers):
Bump to 1.4.

* configure.ac (LIBGPGME_LT_CURRENT): Increment.
(LIBGPGME_LT_AGE): Reset.
Improve comment.
Fix wrong comment character.

2001-12-18  Werner Koch  <wk@gnupg.org>

* acinclude.m4 (GNUPG_FIX_HDR_VERSION): Fixed for new automake.

2001-12-14  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (GPG): Substitute this variable.
(GPGSM): Likewise.

2001-11-22  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (AC_CONFIG_FILES): Add tests/gpg/Makefile and
tests/gpgsm/Makefile.

2001-11-21  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (gpgmeplug): New variable, set to gpgmeplug if
[BUILD_GPGMEPLUG].
* configure.ac (AC_CONFIG_FILES): Add gpgmeplug/Makefile.
Support --enable-gpgmeplug.

2001-11-21 Marcus Brinkmann <marcus@g10code.de>

* autogen.sh: Tighten version dependencies.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (SUBDIRS): Support building the assuan library
(currently if GPGSM_PATH is set)..
* configure.ac: Support building
the assuan library.
* assuan: New directory, populated with the Assuan library
(copied from the newpg repository).

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (NEED_GPGSM_VERSION): New variable. Treat it
similarly to NEED_GPG_VERSION.
* acconfig.h: Likewise.

2001-11-18 Marcus Brinkmann <marcus@g10code.de>

* configure.in: Renamed to ...
* configure.ac: ... this. Update to autoconf 2.52. Lots of small
changes in the transition. Support --with-gpg=PATH and
--with-gpgsm=PATH options. Check if test suites can be run.
* acconfig.h: Add GPGSM_PATH.
* Makefile.am: New variable `tests', set to `tests' if
RUN_GPG_TESTS.
(SUBDIRS): Replace string `tests' with variable `tests'.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

* autogen.sh: Invoke automake with `-a' (add missing files).
Do not invoke configure.

2001-09-17 Werner Koch <wk@gnupg.org>

Released 0.2.3.

* configure.in (NEED_GPG_VERSION): Set to 1.0.6. Incremented LT
current

and age.

* Makefile.am (SUBDIRS): Add doc

2001-06-12  Werner Koch  <wk@gnupg.org>

Released 0.2.2.

2001-04-05  Werner Koch  <wk@gnupg.org>

* configure.in (NEED_GPG_VERSION): Set to 1.0.4g

2001-04-02  Werner Koch  <wk@gnupg.org>

Released 0.2.1.

Changed the copyright notices all over the place.

2001-02-28  Werner Koch  <wk@gnupg.org>

Released 0.2.0.

2001-01-18  Werner Koch  <wk@gnupg.org>

* autogen.sh: Added option --build-w32.

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2011-12-02  Werner Koch  <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained.  Starting
on December 1st, 2011 we put change information only in the GIT
commit log, and generate a top-level ChangeLog file from logs at
"make dist".  See doc/HACKING for details.

2011-05-11  Marcus Brinkmann  <marcus@g10code.com>

* gpgsm/Makefile.am (DISTCLEANFILES): Move to ...
(CLEANFILES): ... here.

(clean-local): New rule.
* gpg/Makefile.am (DISTCLEANFILES): Move to ...
(CLEANFILES): ... here.

2011-05-05  Marcus Brinkmann  <marcus@g10code.com>

* gpg/Makefile.am: Unset GPG_AGENT_INFO when setting up local
configuration.
(clean-local): Shut down local gpg-agent.

2011-05-04  Marcus Brinkmann  <marcus@g10code.com>

* gpg/t-import.c (check_result): Complete secret key pair counting
and disable status check, as GPG 2.1 currently emits two IMPORT_OK
lines and we only look at the first.

2011-04-27  Marcus Brinkmann  <marcus@g10code.com>

* gpg/Makefile.am (DISTCLEANFILES):
Add S.gpg-agent.
(mkdemodirs, ./Alpha/Secret.gpg): Remove targets.
(GNUPGHOME): Export as absolute build directory (for gpg-agent).
(./pubring.gpg): Remove --homedir option, import secdemo.asc.
(clean-local): Rewrite.
* gpg/secdemo.asc: New file.
* gpg/pubkey-1.asc, gpg/seckey-1.asc: Change passphrase to
"abc" (now needed as GnuPG 2.1 asks for secret key passphrase on
import).
* gpg/t-keylist.c (keys): Update key info for Joe Random Hacker.
(main): Disable check for can_encrypt, as this is now in a
different subkey.
* gpg/t-encrypt-sign.c (check_result): Allow RMD160 hash
algorithm.
* gpg/t-import.c (check_result): One secret key pair now counts as
two secret keys, allow that.

2009-11-03  Werner Koch  <wk@g10code.com>

* run-support.h (fail_if_err): Include program name.

* run-sign.c (main): Add option --uiserver.

2009-10-26  Marcus Brinkmann  <marcus@g10code.de>

* opassuan/t-command.c: Update to new interface.

2009-10-15  Werner Koch  <wk@g10code.com>

* run-verify.c:
New.

2009-08-06  Werner Koch  <wk@g10code.com>

* run-sign.c: New.

2009-07-07  Werner Koch  <wk@g10code.com>

* run-keylist.c (main):  Add options --cms and --openpgp.

* gpg/pgp-keylist.c: Rename to ...
* run-keylist.c: ... this.
* gpg/pgp-import.c: Rename to ...
* run-import.c: ... this.
* gpg/pgp-export.c: Rename to ...
* run-export.c: ... this.
* run-support.h: New. Copied from gpg/t-support.h.
* gpg/Makefile.am (noinst_PROGRAMS): Remove them.
* Makefile.am (noinst_PROGRAMS): Add them.
(noinst_HEADERS): New.

2009-06-22  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-support.h (passphrase_cb): Implement write() according to
the book to silence compiler warning.
* gpgsm/t-support.h (passphrase_cb): Likewise.

2009-06-16  Werner Koch  <wk@g10code.com>

* gpg/pgp-import.c: New.
* gpg/t-support.h (print_import_result, nonnull): Factored out
from other tools.

* gpg/pgp-export.c, gpg/pgp-keylist.c: New.

2009-06-09  Werner Koch  <wk@g10code.com>

* gpg/Makefile.am
(./pubring.gpg): Ignore errors in case of
already imported keys.  Add --no-permission-warning and remove
obsolete --allow-secret-key-import.
* gpg/mkdemodirs.in (GPG): Add --no-permission-warning.

* gpg/t-edit.c (edit_fnc): Use gpgme_io_write.

2009-04-19  Moritz  <moritz@gnu.org>

* gpg/Makefile.am (EXTRA_DIST): Replaced mkdemodirs with mkdemodirs.in.
(mkdemodirs): New target.
(clean-local): Added command for removing mkdemodirs script.
(./Alpha/Secret.gpg): Added dependency on mkdemodirs.

* gpg/mkdemodirs: Renamed to ...
* gpg/mkdemodirs.in: ... here.
* gpg/mkdemodirs.in (GPG): Derive value from @GPG@ instead of
hard-coding "gpg".

2009-02-24 Werner Koch <wk@g10code.com>

* opassuan/t-command.c: Adjust for changed new op_assuan interface.

2009-02-03 Werner Koch <wk@g10code.com>

* gpg/t-keylist.c (main): Check that new fields is_cardkey and
card_number are not set.

2009-01-26 Werner Koch <wk@g10code.com>

* opassuan/: New.
* opassuan/Makefile.am:
New.
* opassuan/t-command.c: New.

2008-12-03 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (INCLUDES): Fix path to include file.
* gpg/Makefile.am (INCLUDES), gpgsm/Makefile.am (INCLUDES): Likewise.

2008-11-18 Werner Koch <wk@g10code.com>

* gpgsm/cms-decrypt.c: New.

2008-11-03 Marcus Brinkmann <marcus@g10code.com>

* gpgsm/Makefile.am (INCLUDES, LDADD): Replace gpgme path with src.
* gpg/Makefile.am (INCLUDES, LDADD, t_thread1_LDADD): Likewise.
* Makefile.am (LDADD): Likewise.

2008-10-30 Werner Koch <wk@g10code.com>

* gpgsm/cms-keylist.c: New.

2008-06-19 Werner Koch <wk@g10code.com>

* gpg/t-gpgconf.c (dump_arg): Add new types. Print strings in

quotes.

2008-01-28  Marcus Brinkmann  <marcus@g10code.de>

* gpg/Makefile.am (DISTCLEANFILES): Add pubring.kbx~.

2008-01-10  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-gpgconf.c (main): Allow for dirmngr not to be available.

* gpg/Makefile.am (./gpg-agent.conf): Correct pinentry path.

* gpg/pinentry:
New file.
* gpg/Makefile.am (DISTCLEANFILES, all-local): Add gpg-agent.conf
(./gpg-agent.conf): New target.
(EXTRA_DIST): Add pinentry.

* gpg/t-gpgconf.c (main): Exit early if compiled without gpgconf.

2008-01-04  Marcus Brinkmann  <marcus@g10code.de>

* gpg/Makefile.am (CLEANFILES): Add pubring.kbx and dirmngr.conf.

* Makefile.am (TESTS_ENVIRONMENT): Use absolute path for
GNUPGHOME.
* gpg/Makefile.am (TESTS_ENVIRONMENT): Use absolute path for
GNUPGHOME.
* gpgsm/Makefile.am (TESTS_ENVIRONMENT): Use absolute path for
GNUPGHOME.
* gpg/Makefile.am (TESTS): Add t-gpgconf.
t-gpgconf.c: New file.

2007-11-23  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/t-verify.c (show_auditlog): Check for GPG_ERR_ASS_UNKNOWN_CMD.

2007-11-23  Werner Koch  <wk@g10code.com>

* gpgsm/t-verify.c (check_result): Don't exit on error but set a flag.
(main): Cosnult flag for return value.
(show_auditlog): New.
(main): Use it.

2007-09-27  Marcus Brinkmann  <marcus@g10code.de>

* t-engine-info.c

(check_engine_info): Fix debug output.
* gpg/Makefile.am (tests_unix): New variable.
(TESTS): Use it.
* gpg/t-support.h (passphrase_cb) [HAVE_W32_SYSTEM]: Use WriteFile instead of write.
* gpg/t-wait.c [HAVE_W32_SYSTEM]: Define sleep as _sleep.

2007-09-14 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-verify.c (main): Release TEXT and SIG.

2007-07-12 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/Makefile.am (key_id): Change := into =.

2007-07-12 Werner Koch <wk@g10code.com>

* gpgsm/t-support.h (init_gpgme) [W32]: Do not init the locales as
the constants are not available.

2007-02-26 Werner Koch <wk@g10code.com>

* gpg/t-verify.c (double_plaintext_sig): New.
(main): Check it.

2006-12-02 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-keylist.c (main): Skip unknown keys. Newer versions of
GPGSM import more keys than older ones.

2005-12-06 Werner Koch <wk@g10code.com>

* gpg/t-keylist.c (main): Changed for that secondary keys now have
a fingerprint.
*
gpg/t-keylist-sig.c (main): Ditto.
* gpgsm/t-keylist.c (main): Ditto. The test used to be wrong.

2005-10-18 Werner Koch <wk@g10code.com>

* gpg/pubdemo.asc, gpg/secdemo.asc: Add 2 expired subkeys to
Whisky.
* gpg/t-keylist.c: Reordered list to match new demo keyring. Add
arg for number of subkeys and for extra checking function.
(main): Enhanced a few error outputs. Changed subkey
counting. Call extra checking function.
(check_whisky): New.

2005-10-07 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-keylist.c (main): Allow for an email address as a second
uid.

* gpg/t-sig-notation.c: Change critical notation to something
GnuPG understands.

2005-10-01  Marcus Brinkmann  <marcus@g10code.de>

* gpg/Makefile.am (EXTRA_DIST): Remove gpg.conf.
(DISTCLEANFILES): Add gpg.conf.
(all-local): Add gpg.conf.
(./gpg.conf): New target.
* gpg/gpg.conf: Remove file.

* gpg/Makefile.am (EXTRA_DIST): Add gpg.conf.

* gpg/Makefile.am (TESTS): Add t-sig-notation.
* gpg/t-sig-notation.c
(check_result): New file.
* gpg/t-verify.c (check_result): Also check the length of the
notation data.
* gpg/gpg.conf: New file.

2005-09-30  Marcus Brinkmann  <marcus@g10code.de>

* gpg/Makefile.am (TESTS): Add t-filename.
* gpg/t-filename.c: New file.

2005-09-23  Werner Koch  <wk@g10code.com>

* gpg/t-support.h (init_gpgme) [W32]: Don't use LC_MESSAGES.

* gpg/t-encrypt-large.c: New test.
* gpg/Makefile.am (TESTS): Add t-encrypt-large.

2005-06-03  Marcus Brinkmann  <marcus@g10code.de>

* gpg/Makefile.am (TESTS): Add t-wait.
* gpg/t-wait.c (main): New test.

2004-12-07  Marcus Brinkmann  <marcus@g10code.de>

* gpg/mkdemodirs: Add copyright notice.

* gpgsm/Makefile.am, gpgsm/t-support.h, gpgsm/t-decrypt.c,
gpgsm/t-encrypt.c, gpgsm/t-export.c, gpgsm/t-genkey.c,
gpgsm/t-import.c, gpgsm/t-keylist.c, gpgsm/t-sign.c,

gpgsm/t-verify.c, gpg/Makefile.am, gpg/t-decrypt.c,
gpg/t-decrypt-verify.c, gpg/t-edit.c, gpg/t-encrypt.c,
gpg/t-encrypt-sign.c, gpg/t-encrypt-sym.c,
gpg/t-eventloop.c,
gpg/t-export.c, gpg/t-genkey.c, gpg/t-import.c, gpg/t-keylist.c,
gpg/t-keylist-sig.c, gpg/t-sign.c, gpg/t-signers.c,
gpg/t-support.h, gpg/t-thread1.c, gpg/t-trustlist.c,
gpg/t-verify.c, Makefile.am, t-data.c, t-engine-info.c,
t-version.c: Change license to LGPL.

2004-08-17 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-keylist.c (struct): Add new fields VALIDITY and
KEY_LENGTH.
(main): Use them.
* gpgsm/t-import.c (check_result): New argument total_stat.
(main): Pass this argument. Reduce number of total considered
keys to 1 for the second test.

2004-04-05 Werner Koch <wk@gnupg.org>

* gpgsm/Makefile.am: Changed the faked system time to 20011213T12000.

2004-03-07 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-keylist.c: Add chain IDs.

2004-03-03 Werner Koch <wk@gnupg.org>

* gpgsm/t-export.c (main): Also check exporting 2 certificates.

2004-02-17 Werner Koch <wk@gnupg.org>

* gpgsm/t-import.c (check_result): gpgsm does now
return info in
the result->imports; adjust for that.

* gpgsm/Makefile.am (TESTS_ENVIRONMENT): Reset the GPG_AGENT_INFO.

Include config.h at the top of each C source. This is required
due to LFS support.

* gpg/t-keylist-sig.c (main): s/class/sig_class/.
* gpg/t-signers.c (check_result): Ditto.
* gpg/t-sign.c (check_result): Ditto.
* gpg/t-encrypt-sign.c (check_result): Ditto.
* gpgsm/t-sign.c (check_result): Ditto.

2004-01-12  Werner Koch  <wk@gnupg.org>

* gpg/t-keylist-sig.c (main): Temporary disabled one test due top
gpg 1.3.4 problems.
* gpg/t-import.c (check_result): Likewise.

2003-11-19  Werner Koch  <wk@gnupg.org>

* gpg/t-support.h (DIM): Added.

* gpg/t-verify.c (check_result): Rewrote test for notations
because the order of notaions is not guaranteed.

* gpgsm/t-support.h (fail_if_err): Also print the numeric values.

2003-10-06  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-eventloop.c: Include <sys/types.h> for old systems.

* gpgsm/Makefile.am
(DISTCLEANFILES): Add random_seed.

* gpg/t-thread1.c (thread_one): Do not call initialize_gpgme.
Likewise.

2003-09-14  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-thread1.c (main): Call init_gpgme here.
(initialize_gpgme): Function removed.

* gpg/t-thread1.c: New file.
* gpg/Makefile.am (TESTS): Add t-thread1.c.
(t_thread1_LDADD): New variable.
(LDADD): Remove GPG Error lib.
* gpgsm/Makefile.am (LDADD): Likewise.

* gpg/t-import.c (main): Likewise.
* gpg/t-keylist-sig.c (main): Likewise.
* gpg/t-keylist.c (main): Likewise.
* gpg/t-sign.c (main): Likewise.
* gpg/t-signers.c (main): Likewise.
* gpg/t-trustlist.c (main): Likewise.
* gpgsm/t-support.h: Include <stdlib.h> and <locale.h>.
(init_gpgme): New function.
* gpg/t-support.h: Likewise.
* gpgsm/t-verify.c (main): Call init_gpgme.
* gpgsm/t-decrypt.c (main): Likewise.
* gpgsm/t-encrypt.c (main): Likewise.

* gpgsm/t-export.c (main): Likewise.
* gpgsm/t-genkey.c (main): Likewise.
* gpgsm/t-import.c (main):
Likewise.
* gpgsm/t-keylist.c (main): Likewise.
* gpgsm/t-sign.c (main): Likewise.
* gpg/t-verify.c (main): Call init_gpgme.
* gpg/t-decrypt-verify.c (main): Likewise.
* gpg/t-decrypt.c (main): Likewise.
* gpg/t-edit.c (main): Likewise.
* gpg/t-encrypt-sign.c (main): Likewise.
* gpg/t-encrypt-sym.c (main): Likewise.
* gpg/t-encrypt.c (main): Likewise.
* gpg/t-eventloop.c (main): Likewise.
* gpg/t-export.c (main): Likewise.
* gpg/t-genkey.c (main): Likewise.

2003-08-14 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-sign.c (check_result): Change output format for signature
class to unsigned int.
* gpg/t-signers.c (check_result): Likewise.
* gpg/t-encrypt-sign.c (check_result): Likewise.
* gpgsm/t-sign.c (check_result): Likewise.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-verify.c (check_result): Change type of SUMMARY to
unsigned int.
* gpg/t-decrypt-verify.c (check_verify_result): Likewise.
* gpg/t-keylist-sig.c (keys): Change type of member CLASS
to
unsigned int.
* t-data.c (read_cb): Change type of AMOUNT to unsigned int.
* t-version.c (version): Remove unused variable.

2003-07-22 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (AM_CPPFLAGS): New variable.
(LDADD): Add @GPG_ERROR_LIBS@.
* gpg/Makefile.am (AM_CPPFLAGS): New variable.
(LDADD): Add @GPG_ERROR_LIBS@.
* gpgsm/Makefile.am (AM_CPPFLAGS): New variable.
(LDADD): Add @GPG_ERROR_LIBS@.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

Everywhere: Use libgpg-error error codes.

* gpg/Makefile.am (noinst_HEADERS): New variable.
* gpg/t-support.h: New file.
* gpgsm/Makefile.am (noinst_HEADERS): New variable.
* gpgsm/t-support.h: New file.

2003-05-29 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-encrypt-sym.c (main): Adapt to new syntax.
* gpg/t-encrypt.c (main): Likewise.
* gpg/t-eventloop.c (main): Likewise.
* gpg/t-encrypt-sign.c (main): Likewise.
* gpgsm/t-export.c (main): Likewise.
* gpgsm/t-encrypt.c (main): Likewise.

2003-05-28 Marcus
Brinkmann <marcus@g10code.de>

* gpg/t-eventloop.c (main): Rewrite recipient management.
* gpg/t-encrypt-sign.c (main): Likewise.
* gpg/t-encrypt.c (main): Likewise.
* gpg/t-export.c (main): Likewise.
* gpgsm/t-encrypt.c (main): Likewise.
* gpgsm/t-export.c (main): Likewise.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

* gpg/Makefile.am (TESTS): Order t-keylist and t-keylist-sig after
t-import.
* gpg/t-edit.c (edit_fnc): Fix primary UID for keylisting tests.
* gpg/t-keylist.c: Change order of user IDs.
* gpg/t-keylist-sig.c: Likewise.
* gpg/t-import.c: Add support for gpg in CVS.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

* t-data.c: Remove TEST_OUT_CB.
(main): Likewise.
* gpg/t-trustlist.c (main): Access ITEM directly.

* (t-decrypt-verify.c, t-decrypt.c, t-edit.c, t-encrypt-sign.c,
t-encrypt-sym.c, t-sign.c, t-signers.c): Include <unistd.h>.
(passphrase_cb): Rewritten.
* t-edit.c (edit_fnc): Rewritten.

2003-05-04 Marcus Brinkmann <marcus@g10code.de>

*

gpg/t-keylist-sig.c (main): Remove timestamp check.

* gpgsm/t-keylist.c: Add check for timestamp.

* gpg/Makefile.am (TESTS): Add t-keylist-sig.
* gpg/t-keylist-sig.c: New file.

2003-04-30 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-eventloop.c (main): Do not call print_op_info.
(print_op_info): Function removed.

* gpg/t-keylist.c: Rewritten.
* gpgsm/t-keylist.c (main): Rewritten.
* gpg/t-edit.c (main): Do not use gpgme_key_get_as_xml. Use
gpgme_key_unref instead gpgme_key_release.
* gpg/t-signers.c (main): Use gpgme_key_unref instead
gpgme_key_release.

2003-04-29 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-trustlist.c: Rewritten.

* gpg/t-verify.c (main): Rewritten.
* gpg/t-decrypt-verify.c: Rewritten.
* gpgsm/t-verify.c (main): Rewritten.

2003-04-28 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-decrypt.c (main): Rewritten.

* gpg/t-decrypt.c: Rewritten.

* gpg/t-signers.c: Rewritten.

2003-04-27 Marcus Brinkmann <marcus@g10code.de>

*
gpg/t-encrypt-sign.c (check_result): Rewritten.

* gpg/t-sign.c: Rewritten.
* gpgsm/t-sign.c: Rewritten.
* gpg/t-encrypt.c: Check for invalid recipients.
* gpgsm/t-encrypt.c: Likewise.

* gpg/t-import.c (check_result): Really use FPR.
* gpgsm/t-import.c (check_result): Rewritten.

2003-04-25  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-import.c: Rewritten.

* gpgsm/t-genkey.c: Rewritten.
* gpgsm/Makefile.am (noinst_PROGRAMS): Add t-genkey.
* gpg/t-genkey.c: Include <stdlib.h>.
(main): Check result->fpr before checking its length.

2003-04-24  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-genkey.c: Rewritten to match new semantics.

2003-02-06  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-decrypt.c (passphrase_cb): Fix to new prototype.
* gpg/t-decrypt-verify.c (passphrase_cb): Likewise.
* gpg/t-edit.c (passphrase_cb): Likewise.
* gpg/t-encrypt-sign.c (passphrase_cb): Likewise.
* gpg/t-encrypt-sym.c (passphrase_cb): Likewise.
* gpg/t-sign.c (passphrase_cb): Likewise.
*
gpg/t-signers.c (passphrase_cb): Likewise.

2003-01-30  Marcus Brinkmann  <marcus@g10code.de>

* t-engine-info.c: Use file_name instead path throughout.

* Makefile.am (TESTS): Add t-engine-info.
* t-engine-info.c: New file.
* gpg/t-encrypt.c (main): Don't print engine info.
* gpg/t-eventloop.c (main): Likewise.
* gpg/t-encrypt-sign.c (main): Likewise.
* gpgsm/t-encrypt.c (main): Likewise.

2002-12-24  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/t-verify.c (main): Adjust caller of gpgme_op_verify.
* gpg/t-verify.c (main): Likewise.
* gpg/t-decrypt-verify.c (main): Likewise for
gpgme_op_decrypt_verify.

2002-12-23  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/Makefile.am (./gpgsm.conf): Add a faked system time to
avoid certification's expiry.
* gpgsm/t-encrypt.c (main): Use the short certification name.

2002-11-19  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-genkey.c (main): Add missing argument to gpgme_op_genkey
invocation.

2002-10-09  Marcus Brinkmann
<marcus@g10code.de>

* gpg/t-decrypt.c (print_data): Update to new gpgme_data_read
interface, and use gpgme_engine_check_version instead
gpgme_check_version.
* gpg/t-decrypt-verify.c (print_data): Likewise.
* gpg/t-edit.c (main): Likewise.
* gpg/t-encrypt.c (print_data): Likewise.
* gpg/t-encrypt-sign.c (print_data): Likewise.
* gpg/t-encrypt-sym.c (print_data): Likewise.
* gpg/t-eventloop.c (print_data): Likewise.
* gpg/t-export.c (print_data): Likewise.
* gpg/t-sign.c (print_data): Likewise.
* gpg/t-signers.c (print_data): Likewise.
* gpgsm/t-decrypt.c (print_data): Likewise.
* gpgsm/t-encrypt.c (print_data): Likewise.
* gpgsm/t-export.c (print_data): Likewise.
* gpgsm/t-sign.c (print_data): Likewise.
* gpg/t-verify.c (main): Likewise for gpgme_op_verify.
* gpgsm/t-verify.c (main): Likewise for gpgme_op_verify.
* t-data.c (read_once_test): Likewise.
(write_test): Update for new behaviour of data objects.
(main): Remove type test.

2002-09-30  Werner Koch  <wk@gnupg.org>

*
gpgsm/t-keylist.c (doit): Add arg SECRET.
(main): Add option --secret.

2002-09-28  Marcus Brinkmann  <marcus@g10code.de>

* t-version.c: Include <string.h>.  Reported by Stphane Corthsy.

2002-09-02  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-keylist.c (main): Test PATTERN for NULL before printing.
Reported by Dr. Stefan Dalibor <Dr.Stefan.Dalibor@bfa.de>.

2002-08-01  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-edit.c: Also add a test for the expire command (testing

the passphrase callback).

2002-07-28  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-edit.c: New file.
* gpg/Makefile (TESTS): Add t-edit.

2002-07-25  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-encrypt-sym.c (main): Change type of I to size_t and
rename to LEN.
* gpg/t-verify.c (main): Likewise.  Submitted by Stphane
Corthsy.

2002-07-03  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-eventloop.c: New file.
* gpg/Makefile (TESTS): Add t-eventloop.

2002-06-26  Werner Koch  <wk@gnupg.org>

*
gpgsm/t-import.c (print_op_info): New.
(main): Print operation info.

2002-06-25  Werner Koch  <wk@gnupg.org>

* gpgsm/Makefile.am (DISTCLEANFILES): new.

2002-06-25  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/Makefile.am (TESTS): Add t-export.
gpgsm/t-export.c: New file.

2002-06-20  Werner Koch  <wk@gnupg.org>

* gpgsm/t-sign.c (main): Also test a normal signature.

* gpg/Makefile (TESTS_ENVIRONMENT): Set GPG_AGENT_INFO empty.
* gpg/t-signers.c, gpg/t-sign.c, gpg/t-encrypt-sym.c
* gpg/t-encrypt-sign.c, gpg/t-decrypt.c
* gpg/t-decrypt-verify.c (main): Changed the GPG_AGENT_INFO check to
match the one in ../../gpgme/rungpg.c.

2002-06-12  Werner Koch  <wk@gnupg.org>

* gpgsm/t-keylist.c (doit): Print operation info if available.

2002-06-10  Werner Koch  <wk@gnupg.org>

* gpgsm/t-verify.c (print_sig_stat): Print the error token.

2002-06-04  Werner Koch  <wk@gnupg.org>

* gpgsm/t-encrypt.c (main): Add a simple option parser and allow
to specify an encryption
key.

2002-05-26  Marcus Brinkmann  <marcus@g10code.de>

* gpg/Makefile.am (all-local): Remove dependency on ./secring.gpg.
(./secring.gpg): Remove target, and move all rules for this target
to ...
(./pubring.gpg): ... here.  This was necessary because GnuPG 1.0.7
does create an empty secring.gpg file when importing public keys.

2002-05-08  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/t-verify.c (validity_string): New.
(print_sig_stat): Print expire time and validity.
(status_string): Add new exipred stati.

2002-05-03  Werner Koch  <wk@gnupg.org>

* gpg/t-verify.c (validity_string): New.
(print_sig_stat): Print expire time and validity.
(status_string): Add new exipred stati.

2002-04-05  Marcus Brinkmann  <marcus@g10code,de>

* gpgsm/Makefile.am (./trustlist.txt): Put more into this file to
prevent use of gpg-agent.
(./gpg-agent.conf): Remove target.
(all-local): Remove ./gpg-agent.conf.

2002-04-05  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/t-keylist.c
(main): Use gpgme_engine_check_version instead
gpgme_check_engine.
* gpgsm/t-encrypt.c (main): Likewise.

2002-03-06  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-encrypt-sym.c: New file.
* gpg/Makefile.am (TESTS): Add t-encrypt-sym.

2002-03-05  Marcus Brinkmann  <marcus@g10code.de>

* gpg/Makefile.am (CLEANFILES): Remove random_seed, which is now
in DISTCLEANFILES.

2002-03-04  Werner Koch  <wk@gnupg.org>

* gpg/Makefile.am (DISTCLEANFILES): Added.

2002-03-03  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-verify.c (main): Add a few more sanity checks, and a check
for normal signatures.

2002-02-26  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-encrypt-sign.c: New file.
* gpg/Makefile.am (TESTS): Add t-encrypt-sign.

2002-02-13  Werner Koch  <wk@gnupg.org>

* gpgsm/Makefile.am (private-keys-v1.d): Don't
fail when the directory already exists.

2002-02-12  Marcus Brinkmann  <marcus@g10code.de>

* gpg/Makefile.am (CLEANFILES): New target.
(distclean-local): Rename to
...
(clean-local): ... this.

2002-02-09  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/Makefile.am (./private-keys-v1.d/$(key_id).key): Fix rule.

2002-02-09  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/t-genkey.c: New file (not added to Makefile.am because of
gpg-agent bug).

2002-02-08  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/Makefile.am (key_id): Update value.
(all-local): Add .key to keyid filename.
(./private-keys-v1.d/$(key_id)): Renamed to ...
(./private-keys-v1.d/$(key_id).key): ... this.
(all-local): Add ./gpgsm.conf, ./trustlist.txt.

(./gpgsm.conf, ./trustlist.txt): New target.
* gpgsm/567064FE6D14A17B2D811ABB407728BC558AA455: Renamed to ...
* gpgsm/32100C27173EF6E9C4E9A25D3D69F86D37A4F939: ... this.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-import.c (print_op_info): New function.
(main): Use it.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-signers.c (passphrase_cb): Change type of r_hd to void**.
* gpg/t-sign.c (passphrase_cb):
Likewise.
* gpg/t-decrypt-verify.c (passphrase_cb): Likewise.
* gpg/t-decrypt.c (passphrase_cb): Likewise.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-decrypt-verify.c: Don't include `mcheck.h'. Reported by
Stphane Corthsy.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

* gpg/Makefile.am (EXTRA_DIST): Add missing line continuation.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/Makefile.am (EXTRA_DIST): Add $(key_id).

2001-12-16 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/Makefile: Rename `pubcerts.kbx' to `pubring.kbx'.

2001-12-15 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-keylist.c (check_two_contexts): Set protocols.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-sign.c: New file.
* gpgsm/Makefile.am (TESTS): Add t-sign.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-decrypt.c: New file.
* gpgsm/567064FE6D14A17B2D811ABB407728BC558AA455: Likewise.
* gpgsm/Makefile.am (TESTS): Add

t-decrypt.
(key_id): New variable.
(all-local): New target ./private-keys-v1.d/$(key_id) added.
(./private-keys-v1.d/$(key_id)): New target.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-verify.c: New file.
* gpgsm/Makefile.am (TESTS): Add t-verify.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

* gpg/Makefile.am (GPG): Set to @GPG_PATH@.
(./pubring.gpg): Use $(GPG) instead gpg.
(./secring.gpg): Likewise.

* gpgsm/t-import.c (main): Remove third test case.
* gpgsm/Makefile.am (GPGSM): Set to @GPGSM@.
(all-local): New target.
(./pubcerts.kbx): Likewise.
* gpgsm/t-encrypt.c: New file.
* gpgsm/Makefile.am (TESTS): Add t-encrypt.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-keylist.c: New file.
* gpgsm/Makefile.am (TESTS): Add t-keylist.

2001-12-13 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/cert_dfn_pca01.der: New file.
* gpgsm/cert_dfn_pca15.der: Likewise.
* gpgsm/cert_g10code_test1.der: Likewise.
* gpgsm/t-import.c: Likewise.
*
gpgsm/Makefile.am (EXTRADIST): Add new files.
(TESTS): Add t-import.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

* gpg/: New directory.
* Makefile.am, t-verify.c, t-encrypt.c, t-signers.c, t-trustlist.c,
t-sign.c, t-keylist.c, t-import.c, t-genkey.c, t-export.c,
t-decrypt-verify.c, t-decrypt.c, t-version.c, t-data.c, mkdemodirs.
cipher-1.asc, cipher-2.asc, geheim.txt, pubdemo.asc, pubkey-1.asc,
secdemo.asc, seckey-1.asc): Move to sub directory gpg/.

* gpg/Makefile.am (INCLUDES): Include gpgme/, not include/ and

intl/.
(LDD): Correct relative path to gpgme library.
(TESTS): Remove t-version and t-data.
* gpg/t-verify.c, gpg/t-encrypt.c, gpg/t-signers.c, gpg/t-trustlist.c,
gpg/t-sign.c, gpg/t-keylist.c, gpg/t-import.c, gpg/t-genkey.c,
gpg/t-export.c, gpg/t-decrypt-verify.c, gpg/t-decrypt.c,
t-version.c, t-data.c): Include gpgme.h, not "../gpgme/gpgme.h".

* Makefile.am: New file.
* gpgsm/: New directory.
* gpgsm/Makefile.am: New file.

2001-11-16 Marcus
Brinkmann <marcus@g10code.de>

* Makefile.am (TESTS): Add t-decrypt-verify.
* t-decrypt-verify.c: New file.
* cipher-2.asc: Likewise.

2001-11-02 Marcus Brinkmann <marcus@g10code.de>

* t-data.c: Include stddef.h.
(read_once_test): Change type of READ to size_t.
(read_test): Likewise.
(write_test): Likewise.

2001-10-29 Marcus Brinkmann <marcus@g10code.de>

* t-signers.c: New file.
* Makefile.am (TESTS): Add t-signers.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (TEST_ENVIRONMENT): Revert last change.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (TEST_ENVIRONMENT): Set environment to $(srcdir),
not current directory.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

* t-data.c (write_test): New function.
(main): Invoke write_test for all rounds except TEST_OUT_CB.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (INCLUDES): Remove spurious duplicate to silence

automake.

2001-10-16 Marcus Brinkmann <marcus@g10code.de>

*
t-version.c: New file.
* t-data.c: Likewise.
* t-data-1.txt: Likewise.
* t-data-2.txt: Likewise.
* Makefile.am (TESTS): Add t-version, t-data.

2001-09-17 Werner Koch <wk@gnupg.org>

* t-keylist.c (check_two_contexts): New.

2001-09-03 Werner Koch <wk@gnupg.org>

* t-encrypt.c (print_op_info): New and use it after each operation.

2001-08-28 Werner Koch <wk@gnupg.org>

* t-sign.c (print_op_info): New and use it after each operation.

2001-03-15 Werner Koch <wk@gnupg.org>

* t-keylist.c (doit): List subkeys too, show caps.

2001-02-13 Werner Koch <wk@gnupg.org>

* t-verify.c (print_sig_stat): Repaled ulong by unsigned long
because we don't use the config stuff here.

2001-02-12 Werner Koch <wk@gnupg.org>

* tests/t-verify.c (print_sig_stat): Print info about the keys.

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(11:private-key(3:dsa(1:p129:eC_L&$2,6tx.gh1VirlqI9
,^g3.$DveUvX1'oIj)(1:q21: #UFK2z(tuVG)(1:g128:zu^Rab;qeQQA B?/6/aspfE/
gx!Mr0YY*oMrJc2xWG:.r6)(1:y128:Uf]j^@oEn4j#QrRq" RcEa E/}4C[3A
5+~~.#!+
)W&5d)ij)(1:x21:` )))
# libgpgme.vers - List of symbols to export.
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#-----------------------------------------------------
# Please remember to add new functions also to gpgme.def
#-----------------------------------------------------

```
GPGME_1.1 {
 global:
   gpgme_set_engine_info;

    gpgme_ctx_get_engine_info;
   gpgme_ctx_set_engine_info;

   gpgme_data_set_file_name;
   gpgme_data_get_file_name;
   gpgme_data_identify;

   gpgme_sig_notation_clear;
   gpgme_sig_notation_add;
   gpgme_sig_notation_get;

   gpgme_free;

   gpgme_op_getauditlog_start;
   gpgme_op_getauditlog;

   gpgme_conf_release;
```

gpgme_conf_arg_new;
gpgme_conf_arg_release;
gpgme_conf_opt_change;
gpgme_op_conf_load;
gpgme_op_conf_save;
gpgme_op_conf_dir;

gpgme_cancel_async;

gpgme_op_assuan_result;
gpgme_op_assuan_transact;
gpgme_op_assuan_transact_start;

gpgme_check_version_internal;

gpgme_io_read;
gpgme_io_write;

gpgme_result_ref;
gpgme_result_unref;

gpgme_op_import_keys;
gpgme_op_import_keys_start;
gpgme_op_export_keys;
gpgme_op_export_keys_start;

gpgme_op_assuan_transact_ext;

gpgme_wait_ext;

gpgme_op_vfs_mount_result;
gpgme_op_vfs_mount;
gpgme_op_vfs_create;

gpgme_key_from_uid;
gpgme_set_sub_protocol;
gpgme_get_sub_protocol;

gpgme_op_passwd_start;
gpgme_op_passwd;

gpgme_set_global_flag;

gpgme_io_writen;

gpgme_set_pinentry_mode;
gpgme_get_pinentry_mode;

```
    gpgme_get_dirinfo;

    gpgme_op_spawn_start;
    gpgme_op_spawn;

    gpgme_set_offline;
    gpgme_get_offline;

    gpgme_set_status_cb;
    gpgme_get_status_cb;

    gpgme_pubkey_algo_string;
    gpgme_set_ctx_flag;
    gpgme_get_ctx_flag;
    gpgme_data_set_flag;

    gpgme_op_createkey_start;
    gpgme_op_createkey;
    gpgme_op_createsubkey_start;
    gpgme_op_createsubkey;
    gpgme_op_adduid_start;
    gpgme_op_adduid;
    gpgme_op_revuid_start;
    gpgme_op_revuid;
    gpgme_op_keysign_start;
    gpgme_op_keysign;
    gpgme_op_tofu_policy_start;
    gpgme_op_tofu_policy;
    gpgme_op_interact_start;
    gpgme_op_interact;

    gpgme_addrspec_from_uid;

    gpgme_set_sender;
    gpgme_get_sender;

    gpgme_op_query_swdb;
    gpgme_op_query_swdb_result;

     gpgme_op_set_uid_flag_start;
    gpgme_op_set_uid_flag;

    gpgme_op_decrypt_ext;
    gpgme_op_decrypt_ext_start;

    gpgme_data_new_from_estream;

  };
```

```
GPGME_1.0 {
 global:
   gpgme_check_version;
   gpgme_get_engine_info;
   gpgme_engine_check_version;

   gpgme_err_code_from_errno;
   gpgme_err_code_to_errno;
   gpgme_err_make_from_errno;
   gpgme_error_from_errno;
   gpgme_strerror;
   gpgme_strerror_r;
   gpgme_strsource;

   gpgme_data_get_encoding;
   gpgme_data_new;
   gpgme_data_new_from_cbs;
   gpgme_data_new_from_fd;
   gpgme_data_new_from_file;
   gpgme_data_new_from_filepart;
   gpgme_data_new_from_mem;
   gpgme_data_new_from_stream;
   gpgme_data_read;
   gpgme_data_release;
   gpgme_data_release_and_get_mem;
   gpgme_data_seek;
   gpgme_data_set_encoding;
   gpgme_data_write;

   gpgme_get_protocol_name;
   gpgme_hash_algo_name;
   gpgme_pubkey_algo_name;

   gpgme_new;
   gpgme_get_armor;
   gpgme_get_include_certs;
   gpgme_get_io_cbs;
    gpgme_get_keylist_mode;
   gpgme_get_passphrase_cb;
   gpgme_get_progress_cb;
   gpgme_get_protocol;
   gpgme_get_textmode;
   gpgme_release;
   gpgme_set_armor;
   gpgme_set_include_certs;
   gpgme_set_io_cbs;
```

gpgme_set_keylist_mode;
gpgme_set_locale;
gpgme_set_passphrase_cb;
gpgme_set_progress_cb;
gpgme_set_protocol;
gpgme_set_textmode;
gpgme_signers_add;
gpgme_signers_clear;
gpgme_signers_count;
gpgme_signers_enum;

gpgme_key_ref;
gpgme_key_unref;
gpgme_key_release;

gpgme_trust_item_ref;
gpgme_trust_item_unref;

gpgme_cancel;
gpgme_op_card_edit;
gpgme_op_card_edit_start;
gpgme_op_decrypt;
gpgme_op_decrypt_result;
gpgme_op_decrypt_start;
gpgme_op_decrypt_verify;
gpgme_op_decrypt_verify_start;
gpgme_op_delete;
gpgme_op_delete_start;
gpgme_op_delete_ext;
gpgme_op_delete_ext_start;
gpgme_op_edit;
gpgme_op_edit_start;
gpgme_op_encrypt;
gpgme_op_encrypt_start;
gpgme_op_encrypt_ext;
gpgme_op_encrypt_ext_start;
gpgme_op_encrypt_sign;
gpgme_op_encrypt_sign_ext;
gpgme_op_encrypt_sign_start;
gpgme_op_encrypt_sign_ext_start;
gpgme_op_encrypt_result;

gpgme_op_export;
gpgme_op_export_ext;
gpgme_op_export_ext_start;
gpgme_op_export_start;
gpgme_op_genkey;
gpgme_op_genkey_result;

```
  gpgme_op_genkey_start;
  gpgme_get_key;
  gpgme_op_import;
  gpgme_op_import_result;
  gpgme_op_import_start;
  gpgme_op_keylist_end;
  gpgme_op_keylist_ext_start;
  gpgme_op_keylist_from_data_start;
  gpgme_op_keylist_next;
  gpgme_op_keylist_result;
  gpgme_op_keylist_start;
  gpgme_op_sign;
  gpgme_op_sign_result;
  gpgme_op_sign_start;
  gpgme_op_trustlist_end;
  gpgme_op_trustlist_next;
  gpgme_op_trustlist_start;
  gpgme_op_verify;
  gpgme_op_verify_result;
  gpgme_op_verify_start;
  gpgme_wait;

  gpgme_data_new_with_read_cb;
  gpgme_data_rewind;
  gpgme_get_sig_status;
   gpgme_get_sig_string_attr;
  gpgme_get_sig_ulong_attr;
  gpgme_get_sig_key;
  gpgme_key_get_string_attr;
  gpgme_key_get_ulong_attr;
  gpgme_key_sig_get_string_attr;
  gpgme_key_sig_get_ulong_attr;
  gpgme_op_import_ext;
  gpgme_trust_item_get_int_attr;
  gpgme_trust_item_get_string_attr;
  gpgme_trust_item_release;

  gpgme_err_code_from_syserror;
  gpgme_err_set_errno;

  gpgme_op_setexpire;
  gpgme_op_setexpire_start;

  gpgme_op_revsig;
  gpgme_op_revsig_start;

local:
  *;
```

```
};
# -*- mode: org -*-
#+TITLE: What's New in the GPGME Python Bindings and Documentation
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltxtra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}


* What's New
 :PROPERTIES:
 :CUSTOM_ID: new-stuff
 :END:

| Version:        | 0.0.1                                |
| GPGME Version:  | 1.13.0                               |
| Author:         | Ben McGinnes <ben@gnupg.org>         |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language:       | Australian English, British English  |
| xml:lang:       | en-AU, en-GB, en                     |

Last time the most obviously new thing was adding the /What's New/
section to the HOWTO.  Now it's moving it out of the HOWTO.


** New in GPGME 1130
  :PROPERTIES:
   :CUSTOM_ID: new-stuff-1-13-0
  :END:

Additions since GPGME 1.12.0 include:

- Moving the /What's New/ section out of the basic [[file:gpgme-python-howto.org][HOWTO]] document and
 into its own file so as to more readily include other documents
 beyond that HOWTO.
- Moving the preceding, archival, segments into [[file:what-was-new.org][another file]].
- Added =gpg.version.versionintlist= to make it easier for Python
 developers to check for a specific version number, even with beta
 versions (it will drop the "-betaN" part).
- Added expanded detail on issues pertaining to installing for Windows
 users.
- Bindings enter [[file:maintenance-mode][maintenance mode]] from January, 2019.
- Added documentation on maintenance mode and what changes can be made
```

to the code when in that status. Essentially that boils down to bug fixes only and no feature requests.

- The import-keys-hkp.py example script, which uses the =hkp4py= module to search the SKS servers for a key, has been tightened up to search for both hexadecimal key IDs and user ID strings with reduced chance of unnecessary repitition. There may still be some repetition if a key includes a user ID matching the hexadecimal value of a key ID.

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Version 2.1, February 1999

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<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

That's all there is to it!
1603972630
##Sketch 1 2
document()
layout('A4',1)
fp((0,0,0))
ft(1)
Fn('Helvetica-Bold')
Fs(18)
dstyle('Text')
fp((0,1,0.498))
ft(1)
lp((0,0,0))
lw(0.283465)
lc(1)
lj(0)
ld(())
la1()
la2()
dstyle('Application Box')
layer('Layer 1',1,1,0,0,(0,0,0))
lw(1)
r(0,0,0,0,688.145,44.1554)
lw(1)
r(0,0,0,0,682.363,85.0359)
lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(605.383,329.758,0)
bs(605.383,230.546,0)
lw(1)
r(0,0,0,0,807.414,53.6148)
lp((0.392,0.584,0.929))

```
lw(4.25)
b()
bs(480.134,240.945,0)
bs(480.358,325.277,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(474.803,432.284,0)
bs(475.334,360.243,0)
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(354.331,432.284,0)
bs(352.806,361.417,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(212.598,432.284,0)
bs(212.598,361.417,0)
fp((0.999,1,0.4))
lw(0.283465)
r(70.5968,0,0,-56.6929,191.608,488.976,0.0603744,0.151107)
lw(1)
r(0,0,0,0,88.5492,390.805)
lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(226.772,524.409,0)
bs(226.772,488.976,0)
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(403.937,528.718,0)
bs(403.937,488.976,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1,
 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(240.945,432.284,0)
bs(240.574,394.994,0)
bs(595.276,396.85,0)
```

```
bs(595.276,361.417,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(333.071,432.284,0)
bs(333.07,425.196,0)
bs(333.07,382.677,0)
bs(240.945,382.677,0)
bs(240.945,361.417,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.347,318.897,354.331,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica-Bold')
Fs(10)
txt('GPG',(1,0,0,0.905764,344.004,335.686))
G_()
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.3464,446.763,354.33,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('GpgConf',(0.552654,0,0,0.500564,481.802,340.184),1,1)
G_()
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.347,191.338,354.331,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('GpgSM',(0.552654,0,0,0.500574,226.376,340.185),1,1)
G_()
lp((0.392,0.584,0.929))
lw(4.25)
```

```
b()
bs(347.244,325.984,0)
bs(347.244,325.984,0)
bs(347.244,255.118,0)
bs(304.724,255.118,0)
bs(304.724,226.771,0)
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(233.858,325.984,0)
bs(233.858,255.118,0)
bs(276.378,255.118,0)
bs(276.378,226.771,0)
fp((0,0,0))
le()
lw(1)
Fn('Palatino-Roman')
txt('2008-07-17',(0.608301,0,0,0.608301,708.661,65.8308))
lw(1)
r(0,0,0,0,750.427,153.265)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1,
 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(219.685,325.984,0)
bs(219.685,198.425,0)
bs(219.685,162.992,0)
G()
fp((1,1,1))
lw(0.283465)
r(113.386,0,0,-42.5196,35.4333,162.992,0.0670228,0.151107)
fp((0,0,0))
lw(0.283465)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('LDAP
 Server',(0.552654,0,0,0.552654,92.1261,148.819),1,1)
fp((0,0,0))
lw(0.283465)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
```

```
Fs(18)
txt('(CRLs, Certificates)',(0.552654,0,0,0.552654,92.1261,134.646),1,1)
G_()
G()
fp((1,1,1))
lw(0.283465)
r(113.386,0,0,-42.5196,35.4331,99.2125,0.0670228,0.151107)
fp((0,0,0))
lw(0.283465)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('HTTP Server',(0.552654,0,0,0.552654,92.1259,85.0394),1,1)
fp((0,0,0))
lw(0.283465)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('(CRLs)',(0.552654,0,0,0.552654,92.1259,70.8662),1,1)
G_()
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.866,0,0,-31.2962,191.338,158.855,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('DirMngr',(0.552654,0,0,0.552654,224.02,142.978),1,1)
G_()
lw(2)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(219.15,126.18,0)
bs(219.685,77.9528,0)
bs(155.906,77.9528,0)
lp((0.392,0.584,0.929))
lw(3)
b()
bs(233.858,127.559,0)
bs(233.858,99.2125,0)
```

```
bs(276.378,99.2125,0)
bs(276.378,85.0393,0)
lp((0.392,0.584,0.929))
lw(3)
b()
bs(248.031,127.559,0)
bs(248.031,113.386,0)
bs(375.59,113.386,0)
bs(375.59,85.0393,0)
G()
fp((1,0.647,0.31))
lw(0.283465)
r(99.2124,0,0,-28.3464,333.07,85.0393,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Certificate
 Cache',(0.552654,0,0,0.552654,382.606,69.8548),1,1)
fp((1,0.647,0.31))
lw(0.283465)
r(70.5589,0,0,-28.3464,248.031,85.0393,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('CRL Cache',(0.552654,0,0,0.552654,284.147,70.6936),1,1)
G_()
lw(1)
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(503.149,240.945,0)
bs(503.149,283.464,0)
bs(588.189,283.465,0)
bs(588.189,325.984,0)
lw(1)
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(503.149,283.464,0)
bs(503.149,283.464,0)
bs(361.417,283.464,0)
bs(361.417,325.984,0)
```

```
lw(1)
la2(([(-4.0,
 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(361.417,283.464,0)
bs(205.512,283.465,0)
bs(205.512,325.984,0)
lw(1)
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(574.015,85.0393,0)
bs(574.015,141.732,0)
bs(262.204,141.732,0)
lw(1)
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(602.361,85.0393,0)
bs(602.361,170.079,0)
bs(439.37,170.079,0)
bs(439.37,311.811,0)
bs(460.629,311.811,0)
bs(460.629,325.984,0)
lw(1)
ld((5, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(389.763,240.945,0)
bs(389.763,269.291,0)
bs(290.551,269.291,0)
bs(290.551,340.157,0)
bs(262.204,340.157,0)
lw(1)
ld((5, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(389.763,269.291,0)
bs(559.843,269.291,0)
bs(559.843,333.071,0)
bs(574.016,333.071,0)
lw(1)
ld((5, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(488.976,85.0393,0)
bs(488.976,127.559,0)
bs(389.763,127.559,0)
bs(389.763,212.598,0)
lw(2)
```

```
ld((1,
 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(205.512,127.559,0)
bs(205.512,113.386,0)
bs(170.079,113.386,0)
bs(170.079,141.732,0)
bs(155.906,141.732,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(622.961,356.76,0)
bs(622.961,518.503,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.3459,573.199,354.33,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('GpgAgent',(0.552654,0,0,0.500554,608.238,340.185),1,1)
G_()
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(721.712,467.717,0)
bs(721.712,297.838,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.3464,686.278,297.637,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('SCdaemon',(0.552654,0,0,0.500564,721.316,283.492),1,1)
G_()
fp((1,0.647,0.31))
lw(0.283465)
lj(1)
```

```
r(86.162,0,0,-117.493,679.192,566.929,0.181818,0.333333)
G()
fp((0,0,0))
le()
lw(1)
Fn('Helvetica-Bold')
Fs(18)
txt('Smartcard',(0.552654,0,0,0.552654,698.127,491.036))
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-31.2962,686.279,557.593,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('Card
 Reader',(0.552654,0,0,0.552654,721.318,541.975),1,1)
G_()
G()
fp((0.999,1,0.4))
lw(0.283465)
r(73.6353,0,0,-41.2944,587.066,565.703,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('PIN Entry',(0.57675,0,0,0.729211,623.632,545.097),1,1)
G_()
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(643.758,340.157,0)
bs(643.758,340.157,0)
bs(707.539,340.158,0)
bs(707.539,304.724,0)
lw(1)
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(574.016,283.465,0)
bs(587.066,283.464,0)
bs(686.278,283.464,0)
G()
```

```
lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(98.9053,325.985,0)
bs(98.9053,240.945,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.3464,63.7795,354.331,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('WatchGnuPG',(0.552654,0,0,0.552654,98.8185,338.713),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(70.5589,0,0,-28.1194,63.7795,240.718,0.0670228,0.168178)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('Log
 Socket',(0.552654,0,0,0.552654,98.8175,225.1),1,1)
G_()
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(85.0392,0,0,-28.3464,446.457,240.945,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Config Files',(0.552654,0,0,0.552654,485.621,226.772),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
```

```
r(85.0392,0,0,-28.3464,545.669,85.0394,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Config Files',(0.552654,0,0,0.552654,584.834,70.8662),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(84.6546,0,0,-27.3609,347.245,239.959,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Help
 Files',(0.552654,0,0,0.552654,388.252,224.705),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(84.6546,0,0,-27.3609,446.457,85.0394,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Help Files',(0.552654,0,0,0.552654,487.464,69.7854),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(85.0392,0,0,-28.3464,248.032,240.945,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
```

```
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Keybox Files',(0.552654,0,0,0.552654,289.59,226.322),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(70.866,0,0,-28.3464,574.016,240.945,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Private Keys',(0.552654,0,0,0.552654,609.449,226.772),1,1)
G_()
G()
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(24)
txt('Scute',(0.552654,0,0,0.599958,224.978,465.775),1,1)
fp((0,0,0))
le()
lw(1)
Fn('Times-Roman')
Fs(10)
txt('(pkcs#11)',(1,0,0,1.08559,206.081,445.011))
G_()
G()
fp((0.999,1,0.4))
lw(0.283465)
r(198.827,0,0,-56.6929,304.322,488.976,0.0603744,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
```

```
Fs(36)
txt('GPGME
 Library',(0.552654,0,0,0.552654,404.952,457.853),1,1)
G_()
G()
lw(1)
style('Application Box')
r(197.598,0,0,-42.5187,304.724,566.928,0.0152672,0.0677968)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
txt('GPGME aware Application',(0.98062,0,0,0.937018,334.892,540.985))
G_()
G()
lw(1)
style('Application Box')
r(127.829,0,0,-41.7496,162.992,566.159,0.0152672,0.0677968)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
txt('Legacy Application',(174.688,540.01))
G_()
G()
G()
lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(749.296,162.296,0)
bs(705.89,162.296,0)
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0,
 -3.0), (-4.0, 3.0)], 1))
b()
bs(705.89,100.083,0)
bs(744.472,100.083,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(705.89,131.189,0)
bs(744.472,131.189,0)
fp((0,0,0))
le()
lw(1)
```

```
Fn('Helvetica')
Fs(14)
style('Text')
txt('execute/access',(0.31891,0,0,0.280771,726.951,87.3768),1,1)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('closely linked',(0.31891,0,0,0.280771,724.715,149.589),1,1)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('Assuan protocol',(0.31891,0,0,0.280771,728.535,118.483),1,1)
G_()
lw(1)
r(56.6929,0,0,-92.126,701.575,170.079)
G_()
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(248.031,325.984,0)
bs(248.031,297.638,0)
bs(538.583,297.638,0)
bs(538.583,340.157,0)
bs(566.929,340.157,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(375.591,325.984,0)
bs(375.591,304.724,0)
bs(531.496,304.724,0)
bs(531.496,347.244,0)
bs(566.929,347.244,0)
guidelayer('Guide
 Lines',1,0,0,1,(0,0,1))
grid((0,0,7.08661,7.08661),1,(0,0,1),'Grid')
00~0
 *H
0k10 UDE10U
```

Dsseldorf10U

g10 Code GmbH10UAegypten Project10Utest cert 10
011203093638Z
021203093638Z0k10 UDE10U
Dsseldorf10U

g10 Code GmbH10UAegypten Project10Utest cert 100
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Dsseldorf10U

g10 Code GmbH10UAegypten Project10Utest cert 10U00
 *H
l8gD Z
wYL,M'j
pk2pf|L ;Rl}#h$~O!9;3e\A'v&P^$'Oc.-TS~A>:fQY<
# -*- mode: org -*-
#+TITLE: GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltxtra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}


* Introduction
 :PROPERTIES:
 :CUSTOM_ID: intro
 :END:

| Version: | 0.1.5 |
| GPGME Version: | 1.13.0 |
| Author: | Ben McGinnes <ben@gnupg.org> |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language: | Australian English, British English |
| Language codes: | en-AU, en-GB, en |

This document provides basic instruction in how to use the GPGME
Python bindings to programmatically leverage the GPGME library.


** Python 2 versus Python
 3
  :PROPERTIES:

:CUSTOM_ID: py2-vs-py3
:END:

Though the GPGME Python bindings themselves provide support for both Python 2 and 3, the focus is unequivocally on Python 3 and specifically from Python 3.4 and above. As a consequence all the examples and instructions in this guide use Python 3 code.

Much of it will work with Python 2, but much of it also deals with Python 3 byte literals, particularly when reading and writing data. Developers concentrating on Python 2.7, and possibly even 2.6, will need to make the appropriate modifications to support the older string and unicode types as opposed to bytes.

There are multiple reasons for concentrating on Python 3; some of which relate to the immediate integration of these bindings, some of which relate to longer term plans for both GPGME and the python bindings and some of which relate to the impending EOL period for Python 2.7. Essentially, though, there is little value in tying the bindings to a version of the language which is a dead end and the advantages offered by Python 3 over Python 2 make handling the data types with which GPGME deals considerably easier.

** Examples
:PROPERTIES:
:CUSTOM_ID: howto-python3-examples
:END:

All of the examples found in this document can be found as Python 3 scripts in the =lang/python/examples/howto= directory.

** Unofficial Drafts
:PROPERTIES:
:CUSTOM_ID: unofficial-drafts
:END:

In addition to shipping with each release of GPGME, there is a section on locations to read or download [[#draft-editions][draft editions]] of this document from at the end of it. These are unofficial versions produced in between major releases.

** What's New
:PROPERTIES:
:CUSTOM_ID: new-stuff

:END:

Full details of what is new are now available in the [[file:what-is-new.org][What's New]] file
and archives of the preceding /What's New/ sections are available in
the [[file:what-was-new][What Was New]] file.

*** New in GPGME 1130
:PROPERTIES:
:CUSTOM_ID:
new-stuff-1-13-0
:END:

See the [[file:what-is-new#new-stuff-1-13-0][What's New]] document for what is new in version 1.13.0.

*** New in GPGME 1120
:PROPERTIES:
:CUSTOM_ID: new-stuff-1-12-0
:END:

See the [[file:what-was-new#new-stuff-1-12-0][What Was New]] document for what was new in version 1.12.0.

* GPGME Concepts
:PROPERTIES:
:CUSTOM_ID: gpgme-concepts
:END:

** A C API
:PROPERTIES:
:CUSTOM_ID: gpgme-c-api
:END:

Unlike many modern APIs with which programmers will be more familiar
with these days, the GPGME API is a C API. The API is intended for
use by C coders who would be able to access its features by including
the =gpgme.h= header file with their own C source code and then access
its functions just as they would any other C headers.

This is a very effective method of gaining complete access to the API
and in the most efficient manner possible. It does, however, have the
drawback that it cannot be directly used by other languages without
some
means of providing an interface to those languages. This is
where the need for bindings in various languages stems.

** Python bindings
:PROPERTIES:
:CUSTOM_ID: gpgme-python-bindings
:END:

The Python bindings for GPGME provide a higher level means of accessing the complete feature set of GPGME itself. It also provides a more pythonic means of calling these API functions.

The bindings are generated dynamically with SWIG and the copy of =gpgme.h= generated when GPGME is compiled.

This means that a version of the Python bindings is fundamentally tied to the exact same version of GPGME used to generate that copy of =gpgme.h=.

** Difference between the Python bindings and other GnuPG Python packages
:PROPERTIES:
:CUSTOM_ID: gpgme-python-bindings-diffs
:END:

There have been numerous attempts to add GnuPG support to Python over the years. Some of the most well known are listed here, along with what differentiates them.

*** The python-gnupg package maintained by Vinay Sajip
:PROPERTIES:
:CUSTOM_ID: diffs-python-gnupg
:END:

This is arguably the most popular means of integrating GPG with Python. The package utilises the =subprocess= module to implement wrappers for the =gpg= and =gpg2= executables normally invoked on the command line (=gpg.exe= and =gpg2.exe= on Windows).

The popularity of this package stemmed from its ease of use and capability in providing the most commonly required features.

Unfortunately it has been beset by a number of security issues in the past; most of which stemmed from using unsafe methods of accessing the command line via the =subprocess= calls. While some effort has been made over the last two to three years (as of 2018) to mitigate this, particularly by no longer providing shell access through those subprocess calls, the wrapper is still somewhat limited in the scope

of its GnuPG features coverage.

The python-gnupg package is available under the MIT license.

*** The gnupg package created
 and maintained by Isis Lovecruft
   :PROPERTIES:
   :CUSTOM_ID: diffs-isis-gnupg
   :END:

In 2015 Isis Lovecruft from the Tor Project forked and then
re-implemented the python-gnupg package as just gnupg.  This new
package also relied on subprocess to call the =gpg= or =gpg2=
binaries, but did so somewhat more securely.

The naming and version numbering selected for this package, however,
resulted in conflicts with the original python-gnupg and since its
functions were called in a different manner to python-gnupg, the
release of this package also resulted in a great deal of consternation
when people installed what they thought was an upgrade that
subsequently broke the code relying on it.

The gnupg package is available under the GNU General Public License
version 3.0 (or any later version).

*** The PyME package maintained by Martin Albrecht
   :PROPERTIES:
   :CUSTOM_ID: diffs-pyme
   :END:

This package is the origin of these bindings, though they are somewhat
different now.
  For details of when and how the PyME package was
folded back into GPGME itself see the [[file:short-history.org][Short History]] document.[fn:1]

The PyME package was first released in 2002 and was also the first
attempt to implement a low level binding to GPGME.  In doing so it
provided access to considerably more functionality than either the
=python-gnupg= or =gnupg= packages.

The PyME package is only available for Python 2.6 and 2.7.

Porting the PyME package to Python 3.4 in 2015 is what resulted in it
being folded into the GPGME project and the current bindings are the
end result of that effort.

The PyME package is available under the same dual licensing as GPGME
itself: the GNU General Public License version 2.0 (or any later
version) and the GNU Lesser General Public License version 2.1 (or any
later version).

* GPGME Python bindings installation
 :PROPERTIES:
 :CUSTOM_ID: gpgme-python-install
 :END:

** No PyPI
  :PROPERTIES:
  :CUSTOM_ID: do-not-use-pypi
  :END:

Most
 third-party Python packages and modules are available and
distributed through the Python Package Installer, known as PyPI.

Due to the nature of what these bindings are and how they work, it is
infeasible to install the GPGME Python bindings in the same way.

This is because the bindings use SWIG to dynamically generate C
bindings against =gpgme.h= and =gpgme.h= is generated from
=gpgme.h.in= at compile time when GPGME is built from source.  Thus to
include a package in PyPI which actually built correctly would require
either statically built libraries for every architecture bundled with
it or a full implementation of C for each architecture.

See the additional notes regarding [[#snafu-cffi][CFFI and SWIG]] at the end of this
section for further details.

** Requirements
  :PROPERTIES:
  :CUSTOM_ID: gpgme-python-requirements
  :END:

The GPGME Python bindings only have three requirements:

1. A suitable version of Python 2 or Python 3.  With Python 2 that
  means CPython
 2.7 and with Python 3 that means CPython 3.4 or
  higher.
2. [[https://www.swig.org][SWIG]].
3. GPGME itself.  Which also means that all of GPGME's dependencies

must be installed too.

*** Recommended Additions
:PROPERTIES:
:CUSTOM_ID: gpgme-python-recommendations
:END:

Though none of the following are absolute requirements, they are all recommended for use with the Python bindings. In some cases these recommendations refer to which version(s) of CPython to use the bindings with, while others refer to third party modules which provide a significant advantage in some way.

1. If possible, use Python 3 instead of 2.
2. Favour a more recent version of Python since even 3.4 is due to reach EOL soon. In production systems and services, Python 3.6 should be robust enough to be relied on.
3. If possible add the following Python modules which are not part of the standard library: [[http://docs.python-requests.org/en/latest/index.html][Requests]], [[https://cython.org/][Cython]], [[https://pendulum.eustace.io/][Pendulum]] and [[https://github.com/Selfnet/hkp4py][hkp4py]].

Chances are quite high that at least the first one and maybe two of those will already be installed.

Note that, as with Cython, some of advanced use case scenarios will bring with them additional requirements. Most of these will be fairly well known and commonly installed ones, however, which are in many cases likely to have already been installed on many systems or be familiar to Python programmers.

** Installation
:PROPERTIES:
:CUSTOM_ID: installation
:END:

Installing the Python bindings is effectively achieved by compiling and installing GPGME itself.

Once SWIG is installed with Python and all the dependencies for GPGME are installed you only need to confirm that the version(s) of Python you want the bindings installed for are in your =$PATH=.

By default GPGME will attempt to install the bindings for the most recent or highest version number of Python 2 and Python

3 it detects
in =$PATH=.  It specifically checks for the =python= and =python3=
executables first and then checks for specific version numbers.

For Python 2 it checks for these executables in this order: =python=,
=python2= and =python2.7=.

For Python 3 it checks for these executables in this order: =python3=,
=python3.7=, =python3.6=, =python3.5= and =python3.4=.[fn:2]

On systems where =python= is actually =python3= and not =python2= it
may be possible that =python2= may be overlooked, but there have been
no reports of that actually occurring as yet.

In the three months or so since the release of Python 3.7.0 there has
been extensive testing and work with these bindings with no issues
specifically relating to the new version of Python or any of the new
features of either the language or the bindings.  This has also been
the case with Python 3.7.1rc1.  With that in mind and given the
release of Python 3.7.1 is scheduled for around the same time as GPGME
1.12.0, the order of preferred
Python versions has been changed to
move Python 3.7 ahead of Python 3.6.

*** Installing GPGME
:PROPERTIES:
:CUSTOM_ID: install-gpgme
:END:

See the GPGME =README= file for details of how to install GPGME from
source.

** Known Issues
:PROPERTIES:
:CUSTOM_ID: snafu
:END:

There are a few known issues with the current build process and the
Python bindings.  For the most part these are easily addressed should
they be encountered.

*** Breaking Builds
:PROPERTIES:
:CUSTOM_ID: snafu-a-swig-of-this-builds-character
:END:

Occasionally when installing GPGME with the Python bindings included
it may be observed that the =make= portion of that process induces a
large very number of warnings and, eventually errors which end that
part of the build process.  Yet following that with =make check= and
=make install= appears to work seamlessly.

The cause of this is related to the way SWIG needs to be called to
dynamically generate the C bindings for GPGME in
 the first place.  So
the entire process will always produce =lang/python/python2-gpg/= and
=lang/python/python3-gpg/= directories.  These should contain the
build output generated during compilation, including the complete
bindings and module installed into =site-packages=.

Occasionally the errors in the early part or some other conflict
(e.g. not installing as */root/* or */su/*) may result in nothing
being installed to the relevant =site-packages= directory and the
build directory missing a lot of expected files.  Even when this
occurs, the solution is actually quite simple and will always work.

That solution is simply to run the following commands as either the
*root* user or prepended with =sudo -H=[fn:3] in the =lang/python/=
directory:

#+BEGIN_SRC shell
 /path/to/pythonX.Y setup.py build
 /path/to/pythonX.Y setup.py build
 /path/to/pythonX.Y setup.py install
#+END_SRC

Yes, the build command does need to be run twice.  Yes, you still need
to run the potentially failing or
 incomplete steps during the
=configure=, =make= and =make install= steps with installing GPGME.
This is because those steps generate a lot of essential files needed,
both by and in order to create, the bindings (including both the
=setup.py= and =gpgme.h= files).

**** IMPORTANT Note
   :PROPERTIES:
   :CUSTOM_ID: snafu-swig-build-note
   :END:

If specifying a selected number of languages to create bindings for,
try to leave Python last.  Currently the majority of the other
language bindings are also preceding Python of either version when

listed alphabetically (not counting the Qt bindings).

If Python is set to precede one of the other languages then it is possible that the errors described here may interrupt the build process before generating bindings for those other languages. In these cases it may be preferable to configure all preferred language bindings separately with alternative =configure= steps for GPGME using the =--enable-languages=$LANGUAGE= option.

Alternatively =make= (or =gmake=, depending on your platform) may be run with the the =-k= option, which tells make to keep going even if errors are encountered. In that case the failure of one language's set of bindings to build should not hamper another language's bindings to build.

*** Reinstalling Responsibly
:PROPERTIES:
:CUSTOM_ID: snafu-lessons-for-the-lazy
:END:

Regardless of whether you're installing for one version of Python or several, there will come a point where reinstallation is required. With most Python module installations, the installed files go into the relevant site-packages directory and are then forgotten about. Then the module is upgraded, the new files are copied over the old and that's the end of the matter.

While the same is true of these bindings, there have been intermittent issues observed on some platforms which have benefited significantly from removing all the previous installations of the bindings before installing the updated versions.

Removing the previous version(s) is simply a matter of changing to the relevant =site-packages= directory for the version of Python in question and removing the =gpg/= directory and any accompanying egg-info files for that module.

In most cases this will require root or administration privileges on the system, but the same is true of installing the module in the first place.

*** Multiple installations
:PROPERTIES:
:CUSTOM_ID: snafu-the-full-monty

:END:

For a variety of reasons it may be either necessary or just preferable
to install the bindings to alternative installed Python versions which
meet the requirements of these bindings.

On POSIX systems this will generally be most simply achieved by
running the manual installation commands (build, build, install) as
described in the previous section for each Python installation the
bindings need to be installed to.

As per the SWIG documentation: the compilers, libraries and runtime
used to build GPGME and the Python Bindings *must*
match those used to
compile Python itself, including the version number(s) (at least going
by major version numbers and probably minor numbers too).

On most POSIX systems, including OS X, this will very likely be the
case in most, if not all, cases.

Note that from GPGME [[https://dev.gnupg.org/rMff6ff616aea6f59b7f2ce1176492850ecdf3851e][1.12.1]] the
default installation installs to each
version of Python it can find first. That is that it will currently
install for the first copies of Python versions 2.7, 3.4, 3.5, and so on
up until the current dev branch that it finds. Usually this will be in the
same prefix as GPGME itself, but is dictated by the =$PATH= when the
installation is performed. The above instructions can still be
performed on other python installations which the installer does not
find, including alternative prefixes.

*** Won't Work With Windows
:PROPERTIES:
:CUSTOM_ID: snafu-runtime-not-funtime
:END:

There are semi-regular reports of Windows users
having considerable
difficulty in installing and using the Python bindings at all. Very
often, possibly even always, these reports come from Cygwin users
and/or MinGW users and/or Msys2 users. Though not all of them have
been confirmed, it appears that these reports have also come from
people who installed Python using the Windows installer files from the
[[https://python.org][Python website]] (i.e. mostly MSI installers, sometimes self-extracting
=.exe= files).

The Windows versions of Python are not built using Cygwin, MinGW or

Msys2; they're built using Microsoft Visual Studio. Furthermore the version used is /considerably/ more advanced than the version which MinGW obtained a small number of files from many years ago in order to be able to compile anything at all. Not only that, but there are changes to the version of Visual Studio between some micro releases, though that is is particularly the case with Python 2.7, since it has been kept around far longer than it should have been.

There are two theoretical solutions to this issue:

1. Compile and install the GnuPG stack, including GPGME and the Python bindings using the same version of Microsoft Visual Studio used by the Python Foundation to compile the version of Python installed.

   If there are multiple versions of Python then this will need to be done with each different version of Visual Studio used for those versions of Python.

2. Compile and install Python using the same tools used by choice, such as MinGW or Msys2.

Do *not* use the official Windows installer for Python unless following the first method.

In this type of situation it may even be for the best to accept that there are less limitations on permissive software than free software and simply opt to use a recent version of the Community Edition of Microsoft Visual Studio to compile and build all of it, no matter what.

Investigations into the extent or the limitations of this issue are ongoing.

The following table lists the version of Microsoft Visual Studio which needs to be used when compiling GPGME and the Python bindings with each version of the CPython binary released [[https://www.python.org/downloads/windows/][for Windows]]:

| CPython | Microsoft product name | runtime filename |
|---|---|---|
| 2.7.6 | Visual Studio 2008 | MSVCR90.DLL |
| 3.4.0 | Visual Studio 2010 | MSVCR100.DLL |
| 3.5.0 | Visual Studio 2015 | *see below* |
| 3.6.0 | Visual Studio 2015 | *see below* |
| 3.7.0 | Visual Studio 2017* | *see below* |

It is important to note that MingW and Msys2 ship with the Visual C

runtime from Microsoft Visual Studio 2005 and are thus *incompatible*
with all the versions of CPython which can be used with the GPGME
Python bindings.

It is also important to note that from CPython 3.5 onwards, the Python
Foundation has adopted the reworking of the Visual C runtime which was
performed for Visual Studio 2015 and aimed at resolving many of these
kinds
of issues. Much greater detail on these issues and the correct
file(s) to link to are available from Matthew Brett's invaluable page,
[[https://matthew-brett.github.io/pydagogue/python_msvc.html][Using Microsoft Visual C with Python]]. It is also
worth reading the
Microsoft Developer Network blog post on [[http://blogs.msdn.com/b/vcblog/archive/2015/03/03/introducing-the-
universal-crt.aspx][the universal CRT]] and Steve
Dower's blog posts on Python extensions ([[http://stevedower.id.au/blog/building-for-python-3-5][part 1]] and
[[http://stevedower.id.au/blog/building-for-python-3-5-part-two][part 2]]).

The second of those two posts by Steve Dower contains the details of
specific configuration options required for compiling anything to be
used with official CPython releases. In addition to those
configuration and compiler settings to use, the versions of Visual
Studio prior to Visual Studio 2015 did not support 64-bit systems by
default. So compiling a 64-bit version of these
bindings for a 64-bit
version of CPython 2.7 or 3.4 requires additional work.

In addition to the blog posts, the [[https://wiki.python.org/moin/WindowsCompilers][Windows compilers]] wiki
page on the
CPython wiki is another essential reference on the relevant versions
of Visual Studio to use and the degree of compatibility with CPython
releases.

Eventually someone will ask why there isn't an installable binary for
Windows, which the GPGME of the licenses do not preclude as long as
the source code is available in conjunction with such a release.

The sheer number of versions of Visual Studio in conjunction with
differing configuration options depending on the target Windows
version and whether the architecture is 64-bit or 32-bit makes it
difficult to provide a correct binary installer for Windows users. At
the bare minimum doing so would require the GnuPG project compile ten
different versions of the bindings with each release; both 32-bit and
64-bit versions for CPython 2.7 and 3.4,
with 64-bit versions for both
x86-64 (i.e. Intel and AMD) and ARM architectures for CPython 3.5,
3.6, 3.7 and later releases. That's the bare *minimum*, it'd probably
be higher.

Additionally, with only a binary installation used in conjunction with
the CPython installer from =python.org= the advanced options available
which utilise [[#cython][Cython]] will not be able to be used at all. Cython
depends on being able to compile the C code it generates and that too
would need to utilise a matching runtime to both the installed version
of CPython and these bindings in order to work with the bindings.

Considering all of that, what do we recommend?

1. Use a recent version of CPython; at least 3.5, but ideally 3.6 or
   later.

2. Use Visual Studio 2015 or the standalone build tools for Visual
   Studio 2017 (or later).

3. Compile both CPython and GPGME with these bindings using the tools
   selected in step 2.

4. Ignore MingW, Msys2 and the official CPython binary installers.

5. Be thankful the answer to this question wasn't simply to say
   something like, install Linux or install FreeBSD (or even
   Apple's OS X).

*** CFFI is the Best and GPGME should use it instead of SWIG
:PROPERTIES:
:CUSTOM_ID: snafu-cffi
:END:

There are many reasons for favouring [[https://cffi.readthedocs.io/en/latest/overview.html][CFFI]] and proponents of it are
quite happy to repeat these things as if all it would take to switch
from SWIG to CFFI is repeating that list as if it were a new concept.

The fact is that there are things which Python's CFFI implementation
cannot handle in the GPGME C code. Beyond that there are features of
SWIG which are simply not available with CFFI at all. SWIG generates
the bindings to Python using the =gpgme.h= file, but that file is not
a single version shipped with each release, it too is generated when
GPGME is compiled.

CFFI is currently unable to adapt to such a potentially mutable
codebase. If there were some means of
applying SWIG's dynamic code
generation to produce the Python/CFFI API modes of accessing the GPGME
libraries (or the source source code directly), but such a thing does
not exist yet either and it currently appears that work is needed in

at least one of CFFI's dependencies before any of this can be addressed.

So if you're a massive fan of CFFI; that's great, but if you want this project to switch to CFFI then rather than just insisting that it should, I'd suggest you volunteer to bring CFFI up to the level this project needs.

If you're actually seriously considering doing so, then I'd suggest taking the =gpgme-tool.c= file in the GPGME =src/= directory and getting that to work with any of the CFFI API methods (not the ABI methods, they'll work with pretty much anything). When you start running into trouble with "ifdefs" then you'll know what sort of things are lacking. That doesn't even take into account the amount of work saved via SWIG's code generation techniques either.

***

Virtualised Environments

:PROPERTIES:

:CUSTOM_ID: snafu-venv

:END:

It is fairly common practice amongst Python developers to, as much as possible, use packages like virtualenv to keep various things that are to be installed from interfering with each other. Given how much of the GPGME bindings is often at odds with the usual pythonic way of doing things, it stands to reason that this would be called into question too.

As it happens the answer as to whether or not the bindings can be used with virtualenv, the answer is both yes and no.

In general we recommend installing to the relevant path and matching prefix of GPGME itself. Which means that when GPGME, and ideally the rest of the GnuPG stack, is installed to a prefix like =/usr/local= or =/opt/local= then the bindings would need to be installed to the main Python installation and not a virtualised abstraction. Attempts to separate the two in the past have been known to cause weird and intermittent errors ranging from
minor annoyances to complete failures
in the build process.

As a consequence we only recommend building with and installing to the main Python installations within the same prefix as GPGME is installed to or which are found by GPGME's configuration stage immediately prior to running the make commands. Which is exactly what the compiling and installing process of GPGME does by default.

Once that is done, however, it appears that a copy of the compiled module may be installed into a virtualenv of the same major and minor version matching the build. Alternatively it is possible to utilise a =sites.pth= file in the =site-packages/= directory of a virtualenv installation, which links back to the system installations corresponding directory in order to import anything installed system wide. This may or may not be appropriate on a case by case basis.

Though extensive testing of either of these options is not yet complete, preliminary testing of them indicates that both are viable as long as the main installation is complete. Which means that certain other options normally restricted to virtual environments are also available, including integration with pythonic test suites (e.g. [[https://docs.pytest.org/en/latest/index.html][pytest]]) and other large projects.

That said, it is worth reiterating the warning regarding non-standard installations. If one were to attempt to install the bindings only to a virtual environment without somehow also including the full GnuPG stack (or enough of it as to include GPGME) then it is highly likely that errors would be encountered at some point and more than a little likely that the build process itself would break.

If a degree of separation from the main operating system is still required in spite of these warnings, then consider other forms of virtualisation. Either a virtual machine (e.g. [[https://www.virtualbox.org/][VirtualBox]]), a hardware emulation layer (e.g. [[https://www.qemu.org/][QEMU]]) or an application container (e.g. [[https://www.docker.com/why-docker][Docker]]).

Finally it should be noted that the limited tests conducted thus far have been using the =virtualenv= command in a new directory to create the virtual python environment. As opposed to the standard =python3 -m venv= and it is possible that this will make a difference depending on the system and version of Python in use. Another option is to run the command =python3 -m virtualenv /path/to/install/virtual/thingy= instead.

*** Post installation
:PROPERTIES:
:CUSTOM_ID: snafu-docs
:END:

Following installation it is recommended to move the =post_installer.py= script from the =lang/python/examples/howto/= directory to the =lang/python/= directory and run it. This will fix

or restore files needed by Sphinx which may be removed during a
distribution build for release.  It will also generate reST files from
Org mode files with Pandoc and generate Texinfo files from Org mode
files with GNU Emacs and Org mode (in batch
 mode).  Additionally it
will fix the UTF-8 declaration line in the Texinfo files (Emacs
expects "UTF-8" to be "utf-8").

* Fundamentals
 :PROPERTIES:
 :CUSTOM_ID: howto-fund-a-mental
 :END:

Before we can get to the fun stuff, there are a few matters regarding
GPGME's design which hold true whether you're dealing with the C code
directly or these Python bindings.

** No REST
  :PROPERTIES:
  :CUSTOM_ID: no-rest-for-the-wicked
  :END:

The first part of which is or will be fairly blatantly obvious upon
viewing the first example, but it's worth reiterating anyway.  That
being that this API is /*not*/ a REST API.  Nor indeed could it ever
be one.

Most, if not all, Python programmers (and not just Python programmers)
know how easy it is to work with a RESTful API.  In fact they've
become so popular that many other APIs attempt to emulate REST-like
behaviour as much as they are able.  Right down to the use of JSON
formatted output to facilitate the use of their API without having
 to
retrain developers.

This API does not do that.  It would not be able to do that and also
provide access to the entire C API on which it's built.  It does,
however, provide a very pythonic interface on top of the direct
bindings and it's this pythonic layer that this HOWTO deals with.

** Context
  :PROPERTIES:
  :CUSTOM_ID: howto-get-context
  :END:

One of the reasons which prevents this API from being RESTful is that most operations require more than one instruction to the API to perform the task.  Sure, there are certain functions which can be performed simultaneously, particularly if the result known or strongly anticipated (e.g. selecting and encrypting to a key known to be in the public keybox).

There are many more, however, which cannot be manipulated so readily: they must be performed in a specific sequence and the result of one operation has a direct bearing on the outcome of subsequent operations.  Not merely by generating an error either.

When dealing with this type of persistent state on the web, full of both the RESTful and REST-like, it's most commonly referred to as a session.  In GPGME, however, it is called a context and every operation type has one.

```
* Working with keys
 :PROPERTIES:
 :CUSTOM_ID: howto-keys
 :END:
```

```
** Key selection
  :PROPERTIES:
  :CUSTOM_ID: howto-keys-selection
  :END:
```

Selecting keys to encrypt to or to sign with will be a common occurrence when working with GPGMe and the means available for doing so are quite simple.

They do depend on utilising a Context; however once the data is recorded in another variable, that Context does not need to be the same one which subsequent operations are performed.

The easiest way to select a specific key is by searching for that key's key ID or fingerprint, preferably the full fingerprint without any spaces in it.  A long key ID will probably be okay, but is not advised and short key IDs are already a problem with some being generated to match specific patterns.  It does not matter whether the pattern is upper or lower case.

So this is the best method:

```
#+BEGIN_SRC python -i
import gpg

k = gpg.Context().keylist(pattern="258E88DCBD3CD44D8E7AB43F6ECB6AF0DEADBEEF")
keys = list(k)
#+END_SRC
```

This is passable and very likely to be common:

```
#+BEGIN_SRC python -i
import gpg

k = gpg.Context().keylist(pattern="0x6ECB6AF0DEADBEEF")
keys = list(k)
#+END_SRC
```

And this is a really bad idea:

```
#+BEGIN_SRC python -i
import gpg

k = gpg.Context().keylist(pattern="0xDEADBEEF")
keys = list(k)
#+END_SRC
```

Alternatively it may be that the intention is to create a list of keys
which all match a particular search string.  For instance all the
addresses at a particular domain, like this:

```
#+BEGIN_SRC python -i
import gpg

ncsc = gpg.Context().keylist(pattern="ncsc.mil")
nsa = list(ncsc)
#+END_SRC
```

*** Counting keys
   :PROPERTIES:
   :CUSTOM_ID: howto-keys-counting
   :END:

Counting the number of keys in your public keybox (=pubring.kbx=), the
format which has superseded
 the old keyring format (=pubring.gpg= and
=secring.gpg=), or the number of secret keys is a very simple task.

```
#+BEGIN_SRC python -i
```

```
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

print("""
 Number of secret keys:  {0}
 Number of public keys:  {1}
""".format(secnum, pubnum))
#+END_SRC
```

NOTE: The [[#cython][Cython]] introduction in the [[#advanced-use][Advanced and Experimental]] section uses this same key counting code with Cython to demonstrate some areas where Cython can improve performance even with the bindings.  Users with large public keyrings or keyboxes, for instance, should consider these options if they are comfortable with using Cython.

** Get key
  :PROPERTIES:
  :CUSTOM_ID: howto-get-key
  :END:

An alternative method of getting a single key via its fingerprint is available directly within a Context
 with =Context().get_key=.  This is the preferred method of selecting a key in order to modify it, sign or certify it and for obtaining relevant data about a single key as a part of other functions; when verifying a signature made by that key, for instance.

By default this method will select public keys, but it can select secret keys as well.

This first example demonstrates selecting the current key of Werner Koch, which is due to expire at the end of 2018:

```
#+BEGIN_SRC python -i
import gpg
```

```
fingerprint = "80615870F5BAD690333686D0F2AD85AC1E42B367"
key = gpg.Context().get_key(fingerprint)
#+END_SRC
```

Whereas this example demonstrates selecting the author's current key with the =secret= key word argument set to =True=:

```
#+BEGIN_SRC python -i
import gpg

fingerprint = "DB4724E6FA4286C92B4E55C4321E4E2373590E5D"
key = gpg.Context().get_key(fingerprint, secret=True)
#+END_SRC
```

It is, of course, quite possible to select expired, disabled and revoked keys with this function, but only to effectively
 display
information about those keys.

It is also possible to use both unicode or string literals and byte literals with the fingerprint when getting a key in this way.

** Importing keys
  :PROPERTIES:
  :CUSTOM_ID: howto-import-key
  :END:

Importing keys is possible with the =key_import()= method and takes one argument which is a bytes literal object containing either the binary or ASCII armoured key data for one or more keys.

The following example retrieves one or more keys from the SKS keyservers via the web using the requests module.  Since requests returns the content as a bytes literal object, we can then use that directly to import the resulting data into our keybox.

```
#+BEGIN_SRC python -i
import gpg
import os.path
import requests

c = gpg.Context()
url = "https://sks-keyservers.net/pks/lookup"
pattern = input("Enter the pattern to search for key or user IDs: ")
payload = {"op": "get", "search": pattern}

r = requests.get(url, verify=True, params=payload)
```

```
result
 = c.key_import(r.content)

if result is not None and hasattr(result, "considered") is False:
   print(result)
elif result is not None and hasattr(result, "considered") is True:
   num_keys = len(result.imports)
   new_revs = result.new_revocations
   new_sigs = result.new_signatures
   new_subs = result.new_sub_keys
   new_uids = result.new_user_ids
   new_scrt = result.secret_imported
   nochange = result.unchanged
   print("""
 The total number of keys considered for import was:  {0}

    Number of keys revoked:  {1}
  Number of new signatures:  {2}
     Number of new subkeys:  {3}
    Number of new user IDs:  {4}
 Number of new secret keys:  {5}
  Number of unchanged keys:  {6}

 The key IDs for all considered keys were:
""".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scrt,
          nochange))
   for i in range(num_keys):
       print("{0}\n".format(result.imports[i].fpr))
else:
   pass
#+END_SRC
```

NOTE: When searching for a key ID of any length
 or a fingerprint
(without spaces), the SKS servers require the the leading =0x=
indicative of hexadecimal be included.  Also note that the old short
key IDs (e.g. =0xDEADBEEF=) should no longer be used due to the
relative ease by which such key IDs can be reproduced, as demonstrated
by the Evil32 Project in 2014 (which was subsequently exploited in
2016).

Testing for whether a string in any given search is or may be a
hexadecimal value which may be missing the leading =0x= is a simple
matter of using a try/except statement which attempts to convert the
string as hex to an integer and then back to hex; then using that to
search with.  Raising a ValueError simply results in treating the
string as a string.  This is the method and logic utilised in the
=import-keys-hkp.py= script (see below).

*** Working with ProtonMail
:PROPERTIES:
:CUSTOM_ID: import-protonmail
:END:

Here is a variation on the example above which checks the constrained ProtonMail keyserver for ProtonMail
public keys.

```
#+BEGIN_SRC python -i
import gpg
import requests
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it.
""")

c = gpg.Context(armor=True)
url = "https://api.protonmail.ch/pks/lookup"
ksearch = []

if len(sys.argv) >= 2:
   keyterm = sys.argv[1]
else:
   keyterm = input("Enter the key ID, UID or search string: ")

if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
   ksearch.append(keyterm[1:])
   ksearch.append(keyterm[1:])
   ksearch.append(keyterm[1:])
elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
   ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
   ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
   ksearch.append("{0}@pm.me".format(keyterm[1:]))
elif keyterm.count("@") == 0:
   ksearch.append("{0}@protonmail.com".format(keyterm))
   ksearch.append("{0}@protonmail.ch".format(keyterm))
   ksearch.append("{0}@pm.me".format(keyterm))
elif keyterm.count("@") ==
 2 and keyterm.startswith("@") is False:
   uidlist = keyterm.split("@")
   for uid in uidlist:
       ksearch.append("{0}@protonmail.com".format(uid))
       ksearch.append("{0}@protonmail.ch".format(uid))
```

```
        ksearch.append("{0}@pm.me".format(uid))
elif keyterm.count("@") > 2:
    uidlist = keyterm.split("@")
    for uid in uidlist:
        ksearch.append("{0}@protonmail.com".format(uid))
        ksearch.append("{0}@protonmail.ch".format(uid))
        ksearch.append("{0}@pm.me".format(uid))
else:
    ksearch.append(keyterm)

for k in ksearch:
    payload = {"op": "get", "search": k}
    try:
        r = requests.get(url, verify=True, params=payload)
        if r.ok is True:
            result = c.key_import(r.content)
        elif r.ok is False:
            result = r.content
    except Exception as e:
        result = None

    if result is not None and hasattr(result, "considered") is False:
        print("{0} for {1}".format(result.decode(), k))
    elif result is not None
 and hasattr(result, "considered") is True:
        num_keys = len(result.imports)
        new_revs = result.new_revocations
        new_sigs = result.new_signatures
        new_subs = result.new_sub_keys
        new_uids = result.new_user_ids
        new_scrt = result.secret_imported
        nochange = result.unchanged
        print("""
The total number of keys considered for import was:  {0}

With UIDs wholely or partially matching the following string:

        {1}

  Number of keys revoked:  {2}
Number of new signatures:  {3}
   Number of new subkeys:  {4}
  Number of new user IDs:  {5}
Number of new secret keys:  {6}
Number of unchanged keys:  {7}

The key IDs for all considered keys were:
""".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scrt,
```

```
        nochange))
    for i in range(num_keys):
        print(result.imports[i].fpr)
    print("")
  elif result is None:
    print(e)
#+END_SRC
```

Both the above example, [[../examples/howto/pmkey-import.py][pmkey-import.py]],
 and a version which prompts
for an alternative GnuPG home directory, [[../examples/howto/pmkey-import-alt.py][pmkey-import-alt.py]], are
available with the other examples and are executable scripts.

Note that while the ProtonMail servers are based on the SKS servers,
their server is related more to their API and is not feature complete
by comparison to the servers in the SKS pool.  One notable difference
being that the ProtonMail server does not permit non ProtonMail users
to update their own keys, which could be a vector for attacking
ProtonMail users who may not receive a key's revocation if it had been
compromised.

*** Importing with HKP for Python
  :PROPERTIES:
  :CUSTOM_ID: import-hkp4py
  :END:

Performing the same tasks with the [[https://github.com/Selfnet/hkp4py][hkp4py module]] (available via PyPI)
is not too much different, but does provide a number of options of
benefit to end users.  Not least of which being the ability to perform
some
 checks on a key before importing it or not.  For instance it may
be the policy of a site or project to only import keys which have not
been revoked.  The hkp4py module permits such checks prior to the
importing of the keys found.

```
#+BEGIN_SRC python -i
import gpg
import hkp4py
import sys

c = gpg.Context()
server = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")
results = []
keys = []

if len(sys.argv) > 2:
  pattern = " ".join(sys.argv[1:])
```

```
elif len(sys.argv) == 2:
  pattern = sys.argv[1]
else:
  pattern = input("Enter the pattern to search for keys or user IDs: ")


if pattern is not None:
  try:
    key = server.search(hex(int(pattern, 16)))
    keyed = True
  except ValueError as ve:
    key = server.search(pattern)
    keyed = False

  if key is not None:
    keys.append(key[0])
    if keyed is True:
      try:
        fob = server.search(pattern)
      except:
        fob = None
      if fob is not
 None:
        keys.append(fob[0])
    else:
      pass
  else:
    pass

  for logrus in pattern.split():
    try:
      key = server.search(hex(int(logrus, 16)))
      hexed = True
    except ValueError as ve:
      key = server.search(logrus)
      hexed = False

    if key is not None:
      keys.append(key[0])
      if hexed is True:
        try:
          fob = server.search(logrus)
        except:
          fob = None
        if fob is not None:
          keys.append(fob[0])
      else:
        pass
```

```
        else:
            pass


if len(keys) > 0:
    for key in keys:
        import_result = c.key_import(key.key_blob)
        results.append(import_result)

for result in results:
    if result is not None and hasattr(result, "considered") is False:
        print(result)
    elif result is not None and hasattr(result, "considered") is True:
         num_keys = len(result.imports)
        new_revs = result.new_revocations
        new_sigs = result.new_signatures
        new_subs = result.new_sub_keys
        new_uids = result.new_user_ids
        new_scrt = result.secret_imported
        nochange = result.unchanged
        print("""
The total number of keys considered for import was:  {0}

  Number of keys revoked:  {1}
Number of new signatures:  {2}
   Number of new subkeys:  {3}
  Number of new user IDs:  {4}
Number of new secret keys:  {5}
Number of unchanged keys:  {6}

The key IDs for all considered keys were:
""".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scrt,
            nochange))
        for i in range(num_keys):
            print(result.imports[i].fpr)
        print("")
    else:
        pass
#+END_SRC
```

Since the hkp4py module handles multiple keys just as effectively as
one (=keys= is a list of responses per matching key), the example
above is able to do a little bit more with the returned
 data before
anything is actually imported.

*** Importing from ProtonMail with HKP for Python

:PROPERTIES:
:CUSTOM_ID: import-protonmail-hkp4py
:END:

Though this can provide certain benefits even when working with ProtonMail, the scope is somewhat constrained there due to the limitations of the ProtonMail keyserver.

For instance, searching the SKS keyserver pool for the term "gnupg" produces hundreds of results from any time the word appears in any part of a user ID. Performing the same search on the ProtonMail keyserver returns zero results, even though there are at least two test accounts which include it as part of the username.

The cause of this discrepancy is the deliberate configuration of that server by ProtonMail to require an exact match of the full email address of the ProtonMail user whose key is being requested. Presumably this is intended to reduce breaches of privacy of their users as an email address must already be known before a key for that address
can be obtained.

**** Import from ProtonMail via HKP for Python Example no. 1
:PROPERTIES:
:CUSTOM_ID: import-hkp4py-pm1
:END:

The following script is available with the rest of the examples under the somewhat less than original name, =pmkey-import-hkp.py=.

```
#+BEGIN_SRC python -i
import gpg
import hkp4py
import os.path
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it.

Usage:  pmkey-import-hkp.py [search strings]
""")

c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
```

```
allkeys = []
results = []
paradox = []
homeless = None

if len(sys.argv) > 2:
  keyterms = sys.argv[1:]
elif len(sys.argv) == 2:
  keyterm = sys.argv[1]
  keyterms.append(keyterm)
else:
  key_term = input("Enter the key ID, UID or search string: ")
  keyterms = key_term.split()

for keyterm in keyterms:
  if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
    ksearch.append(keyterm[1:])
     ksearch.append(keyterm[1:])
    ksearch.append(keyterm[1:])
  elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
    ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
    ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
    ksearch.append("{0}@pm.me".format(keyterm[1:]))
  elif keyterm.count("@") == 0:
    ksearch.append("{0}@protonmail.com".format(keyterm))
    ksearch.append("{0}@protonmail.ch".format(keyterm))
    ksearch.append("{0}@pm.me".format(keyterm))
  elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
    uidlist = keyterm.split("@")
    for uid in uidlist:
      ksearch.append("{0}@protonmail.com".format(uid))
      ksearch.append("{0}@protonmail.ch".format(uid))
      ksearch.append("{0}@pm.me".format(uid))
  elif keyterm.count("@") > 2:
    uidlist = keyterm.split("@")
    for uid in uidlist:
      ksearch.append("{0}@protonmail.com".format(uid))
       ksearch.append("{0}@protonmail.ch".format(uid))
      ksearch.append("{0}@pm.me".format(uid))
  else:
    ksearch.append(keyterm)

for k in ksearch:
  print("Checking for key for: {0}".format(k))
  try:
    keys = server.search(k)
    if isinstance(keys, list) is True:
      for key in keys:
```

```
            allkeys.append(key)
            try:
                import_result = c.key_import(key.key_blob)
            except Exception as e:
                import_result = c.key_import(key.key)
        else:
            paradox.append(keys)
            import_result = None
    except Exception as e:
        import_result = None
    results.append(import_result)

for result in results:
    if result is not None and hasattr(result, "considered") is False:
        print("{0} for {1}".format(result.decode(), k))
    elif result is not None and hasattr(result, "considered") is True:
        num_keys = len(result.imports)
         new_revs = result.new_revocations
        new_sigs = result.new_signatures
        new_subs = result.new_sub_keys
        new_uids = result.new_user_ids
        new_scrt = result.secret_imported
        nochange = result.unchanged
        print("""
The total number of keys considered for import was:  {0}

With UIDs wholely or partially matching the following string:

        {1}

  Number of keys revoked:  {2}
Number of new signatures:  {3}
   Number of new subkeys:  {4}
  Number of new user IDs:  {5}
Number of new secret keys:  {6}
Number of unchanged keys:  {7}

The key IDs for all considered keys were:
""".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scrt,
            nochange))
        for i in range(num_keys):
            print(result.imports[i].fpr)
        print("")
    elif result is None:
        pass
#+END_SRC
```

**** Import from ProtonMail via HKP for Python Example no. 2
:PROPERTIES:
:CUSTOM_ID: import-hkp4py-pm2
:END:

Like
its counterpart above, this script can also be found with the
rest of the examples, by the name pmkey-import-hkp-alt.py.

With this script a modicum of effort has been made to treat anything
passed as a =homedir= which either does not exist or which is not a
directory, as also being a pssible user ID to check for. It's not
guaranteed to pick up on all such cases, but it should cover most of
them.

```
#+BEGIN_SRC python -i
import gpg
import hkp4py
import os.path
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it.  Optionally enables specifying a different GnuPG home directory.

Usage:  pmkey-import-hkp.py [homedir] [search string]
  or:  pmkey-import-hkp.py [search string]
""")

c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None

if len(sys.argv) > 3:
   homedir = sys.argv[1]
   keyterms = sys.argv[2:]
elif len(sys.argv)
 == 3:
   homedir = sys.argv[1]
   keyterm = sys.argv[2]
   keyterms.append(keyterm)
elif len(sys.argv) == 2:
   homedir = ""
```

```
    keyterm = sys.argv[1]
    keyterms.append(keyterm)
else:
    keyterm = input("Enter the key ID, UID or search string: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")
    keyterms.append(keyterm)

if len(homedir) == 0:
    homedir = None
    homeless = False

if homedir is not None:
    if homedir.startswith("~"):
        if os.path.exists(os.path.expanduser(homedir)) is True:
            if os.path.isdir(os.path.expanduser(homedir)) is True:
                c.home_dir = os.path.realpath(os.path.expanduser(homedir))
            else:
                homeless = True
        else:
            homeless = True
    elif os.path.exists(os.path.realpath(homedir)) is True:
        if os.path.isdir(os.path.realpath(homedir)) is True:
            c.home_dir = os.path.realpath(homedir)
        else:
            homeless = True
     else:
        homeless = True

# First check to see if the homedir really is a homedir and if not, treat it as
# a search string.
if homeless is True:
    keyterms.append(homedir)
    c.home_dir = None
else:
    pass

for keyterm in keyterms:
    if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
        ksearch.append(keyterm[1:])
        ksearch.append(keyterm[1:])
        ksearch.append(keyterm[1:])
    elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
        ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
        ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
        ksearch.append("{0}@pm.me".format(keyterm[1:]))
    elif keyterm.count("@") == 0:
        ksearch.append("{0}@protonmail.com".format(keyterm))
        ksearch.append("{0}@protonmail.ch".format(keyterm))
```

```
        ksearch.append("{0}@pm.me".format(keyterm))
    elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
        uidlist = keyterm.split("@")

    for uid in uidlist:
            ksearch.append("{0}@protonmail.com".format(uid))
            ksearch.append("{0}@protonmail.ch".format(uid))
            ksearch.append("{0}@pm.me".format(uid))
    elif keyterm.count("@") > 2:
        uidlist = keyterm.split("@")
        for uid in uidlist:
            ksearch.append("{0}@protonmail.com".format(uid))
            ksearch.append("{0}@protonmail.ch".format(uid))
            ksearch.append("{0}@pm.me".format(uid))
    else:
        ksearch.append(keyterm)

for k in ksearch:
    print("Checking for key for: {0}".format(k))
    try:
        keys = server.search(k)
        if isinstance(keys, list) is True:
            for key in keys:
                allkeys.append(key)
                try:
                    import_result = c.key_import(key.key_blob)
                except Exception as e:
                    import_result = c.key_import(key.key)
        else:
            paradox.append(keys)
            import_result = None
    except Exception
 as e:
        import_result = None
    results.append(import_result)

for result in results:
    if result is not None and hasattr(result, "considered") is False:
        print("{0} for {1}".format(result.decode(), k))
    elif result is not None and hasattr(result, "considered") is True:
        num_keys = len(result.imports)
        new_revs = result.new_revocations
        new_sigs = result.new_signatures
        new_subs = result.new_sub_keys
        new_uids = result.new_user_ids
        new_scrt = result.secret_imported
        nochange = result.unchanged
        print("""
```

```
The total number of keys considered for import was:  {0}

With UIDs wholely or partially matching the following string:

      {1}

  Number of keys revoked:  {2}
Number of new signatures:  {3}
   Number of new subkeys:  {4}
  Number of new user IDs:  {5}
Number of new secret keys:  {6}
Number of unchanged keys:  {7}

The key IDs for all considered keys were:
""".format(num_keys, k, new_revs, new_sigs,
 new_subs, new_uids, new_scrt,
         nochange))
      for i in range(num_keys):
          print(result.imports[i].fpr)
      print("")
   elif result is None:
      pass
#+END_SRC
```

** Exporting keys
:PROPERTIES:
:CUSTOM_ID: howto-export-key
:END:

Exporting keys remains a reasonably simple task, but has been separated into three different functions for the OpenPGP cryptographic engine.  Two of those functions are for exporting public keys and the third is for exporting secret keys.

*** Exporting public keys
:PROPERTIES:
:CUSTOM_ID: howto-export-public-key
:END:

There are two methods of exporting public keys, both of which are very similar to the other.  The default method, =key_export()=, will export a public key or keys matching a specified pattern as normal.  The alternative, the =key_export_minimal()= method, will do the same thing except producing a minimised output with extra signatures and third party signatures or certifications removed.

```
#+BEGIN_SRC
 python -i
import gpg
import os.path
import sys

print("""
This script exports one or more public keys.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = sys.argv[3]
elif len(sys.argv) == 3:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
   keyfile = sys.argv[1]
   logrus = input("Enter the UID matching the key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")
else:
   keyfile = input("Enter the path and filename to save the secret key to: ")
   logrus = input("Enter the UID matching the key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
   if os.path.exists(os.path.expanduser(homedir)) is True:
       c.home_dir = os.path.expanduser(homedir)
   else:
       pass
elif
 os.path.exists(homedir) is True:
   c.home_dir = homedir
else:
   pass

try:
   result = c.key_export(pattern=logrus)
except:
   result = c.key_export(pattern=None)

if result is not None:
   with open(keyfile, "wb") as f:
       f.write(result)
```

```
else:
   pass
#+END_SRC
```

It should be noted that the result will only return =None= when a search pattern has been entered, but has not matched any keys.  When the search pattern itself is set to =None= this triggers the exporting of the entire public keybox.

```
#+BEGIN_SRC python -i
import gpg
import os.path
import sys

print("""
This script exports one or more public keys in minimised form.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = sys.argv[3]
elif len(sys.argv) == 3:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
   keyfile = sys.argv[1]
   logrus
 = input("Enter the UID matching the key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")
else:
   keyfile = input("Enter the path and filename to save the secret key to: ")
   logrus = input("Enter the UID matching the key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
   if os.path.exists(os.path.expanduser(homedir)) is True:
      c.home_dir = os.path.expanduser(homedir)
   else:
      pass
elif os.path.exists(homedir) is True:
   c.home_dir = homedir
else:
   pass
```

```
try:
   result = c.key_export_minimal(pattern=logrus)
except:
   result = c.key_export_minimal(pattern=None)

if result is not None:
   with open(keyfile, "wb") as f:
       f.write(result)
else:
   pass
#+END_SRC
```

*** Exporting secret keys
   :PROPERTIES:
   :CUSTOM_ID: howto-export-secret-key
   :END:

Exporting secret keys is, functionally, very similar to exporting public
 keys; save for the invocation of =pinentry= via =gpg-agent= in order to securely enter the key's passphrase and authorise the export.

The following example exports the secret key to a file which is then set with the same permissions as the output files created by the command line secret key export options.

```
#+BEGIN_SRC python -i
import gpg
import os
import os.path
import sys

print("""
This script exports one or more secret keys.

The gpg-agent and pinentry are invoked to authorise the export.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = sys.argv[3]
elif len(sys.argv) == 3:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
```

```
   homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
   keyfile = sys.argv[1]
   logrus = input("Enter the UID matching the secret key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")
else:
    keyfile = input("Enter the path and filename to save the secret key to: ")
   logrus = input("Enter the UID matching the secret key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
   homedir = None
elif homedir.startswith("~"):
   userdir = os.path.expanduser(homedir)
   if os.path.exists(userdir) is True:
       homedir = os.path.realpath(userdir)
   else:
       homedir = None
else:
   homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
   homedir = None
else:
   if os.path.isdir(homedir) is False:
       homedir = None
   else:
       pass

if homedir is not None:
   c.home_dir = homedir
else:
   pass

try:
   result = c.key_export_secret(pattern=logrus)
except:
   result = c.key_export_secret(pattern=None)

if result is not None:
   with open(keyfile, "wb") as f:
       f.write(result)
   os.chmod(keyfile, 0o600)
else:
   pass
#+END_SRC
```

Alternatively the approach

of the following script can be used. This
longer example saves the exported secret key(s) in files in the GnuPG
home directory, in addition to setting the file permissions as only
readable and writable by the user. It also exports the secret key(s)
twice in order to output both GPG binary (=.gpg=) and ASCII armoured
(=.asc=) files.

```
#+BEGIN_SRC python -i
import gpg
import os
import os.path
import subprocess
import sys

print("""
This script exports one or more secret keys as both ASCII armored and binary
file formats, saved in files within the user's GPG home directory.

The gpg-agent and pinentry are invoked to authorise the export.
""")

if sys.platform == "win32":
  gpgconfcmd = "gpgconf.exe --list-dirs homedir"
else:
  gpgconfcmd = "gpgconf --list-dirs homedir"

a = gpg.Context(armor=True)
b = gpg.Context()
c = gpg.Context()

if len(sys.argv) >= 4:
  keyfile = sys.argv[1]
  logrus = sys.argv[2]
  homedir = sys.argv[3]
elif len(sys.argv) == 3:
  keyfile = sys.argv[1]
   logrus = sys.argv[2]
  homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
  keyfile = sys.argv[1]
  logrus = input("Enter the UID matching the secret key(s) to export: ")
  homedir = input("Enter the GPG configuration directory path (optional): ")
else:
  keyfile = input("Enter the filename to save the secret key to: ")
  logrus = input("Enter the UID matching the secret key(s) to export: ")
  homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
```

```
    homedir = None
elif homedir.startswith("~"):
    userdir = os.path.expanduser(homedir)
    if os.path.exists(userdir) is True:
        homedir = os.path.realpath(userdir)
    else:
        homedir = None
else:
    homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
    homedir = None
else:
    if os.path.isdir(homedir) is False:
        homedir = None
    else:
        pass

if homedir is not None:
    c.home_dir
 = homedir
else:
    pass

if c.home_dir is not None:
    if c.home_dir.endswith("/"):
        gpgfile = "{0}{1}.gpg".format(c.home_dir, keyfile)
        ascfile = "{0}{1}.asc".format(c.home_dir, keyfile)
    else:
        gpgfile = "{0}/{1}.gpg".format(c.home_dir, keyfile)
        ascfile = "{0}/{1}.asc".format(c.home_dir, keyfile)
else:
    if os.path.exists(os.environ["GNUPGHOME"]) is True:
        hd = os.environ["GNUPGHOME"]
    else:
        try:
            hd = subprocess.getoutput(gpgconfcmd)
        except:
            process = subprocess.Popen(gpgconfcmd.split(),
                                       stdout=subprocess.PIPE)
            procom = process.communicate()
            if sys.version_info[0] == 2:
                hd = procom[0].strip()
            else:
                hd = procom[0].decode().strip()
    gpgfile = "{0}/{1}.gpg".format(hd, keyfile)
    ascfile = "{0}/{1}.asc".format(hd, keyfile)
```

```
try:
   a_result = a.key_export_secret(pattern=logrus)
   b_result
 = b.key_export_secret(pattern=logrus)
except:
   a_result = a.key_export_secret(pattern=None)
   b_result = b.key_export_secret(pattern=None)

if a_result is not None:
   with open(ascfile, "wb") as f:
       f.write(a_result)
   os.chmod(ascfile, 0o600)
else:
   pass

if b_result is not None:
   with open(gpgfile, "wb") as f:
       f.write(b_result)
   os.chmod(gpgfile, 0o600)
else:
   pass
#+END_SRC
```

*** Sending public keys to the SKS Keyservers

```
   :PROPERTIES:
   :CUSTOM_ID: howto-send-public-key
   :END:
```

As with the previous section on importing keys, the =hkp4py= module adds another option with exporting keys in order to send them to the public keyservers.

The following example demonstrates how this may be done.

```
#+BEGIN_SRC python -i
import gpg
import hkp4py
import os.path
import sys

print("""
This script sends one or more public keys to the SKS keyservers and is
essentially a slight variation on the export-key.py script.
""")

c = gpg.Context(armor=True)
server
```

```
 = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")

if len(sys.argv) > 2:
   logrus = " ".join(sys.argv[1:])
elif len(sys.argv) == 2:
   logrus = sys.argv[1]
else:
   logrus = input("Enter the UID matching the key(s) to send: ")

if len(logrus) > 0:
   try:
      export_result = c.key_export(pattern=logrus)
   except Exception as e:
      print(e)
      export_result = None
else:
   export_result = c.key_export(pattern=None)

if export_result is not None:
   try:
      try:
         send_result = server.add(export_result)
      except:
         send_result = server.add(export_result.decode())
      if send_result is not None:
         print(send_result)
      else:
         pass
   except Exception as e:
      print(e)
else:
   pass
#+END_SRC
```

An expanded version of this script with additional functions for specifying an alternative homedir location is in the examples directory as =send-key-to-keyserver.py=.

The =hkp4py= module appears to handle both string and byte literal text data equally well, but the GPGME bindings deal primarily with byte literal data only and so this script sends in that format first, then tries the string literal form.

* Basic Functions
 :PROPERTIES:
 :CUSTOM_ID: howto-the-basics

:END:

The most frequently called features of any cryptographic library will be the most fundamental tasks for encryption software. In this section we will look at how to programmatically encrypt data, decrypt it, sign it and verify signatures.

** Encryption
:PROPERTIES:
:CUSTOM_ID: howto-basic-encryption
:END:

Encrypting is very straight forward. In the first example below the message, =text=, is encrypted to a single recipient's key. In the second example the message will be encrypted to multiple recipients.

*** Encrypting to one key
:PROPERTIES:
:CUSTOM_ID: howto-basic-encryption-single
:END:

Once the the Context is set the main issues with encrypting data is essentially reduced
to key selection and the keyword arguments
specified in the =gpg.Context().encrypt()= method.

Those keyword arguments are: =recipients=, a list of keys encrypted to (covered in greater detail in the following section); =sign=, whether or not to sign the plaintext data, see subsequent sections on signing and verifying signatures below (defaults to =True=); =sink=, to write results or partial results to a secure sink instead of returning it (defaults to =None=); =passphrase=, only used when utilising symmetric encryption (defaults to =None=); =always_trust=, used to override the trust model settings for recipient keys (defaults to =False=); =add_encrypt_to=, utilises any preconfigured =encrypt-to= or =default-key= settings in the user's =gpg.conf= file (defaults to =False=); =prepare=, prepare for encryption (defaults to =False=); =expect_sign=, prepare for signing (defaults to =False=); =compress=, compresses the plaintext prior to encryption (defaults to =True=).

#+BEGIN_SRC python -i
import
gpg

a_key = "0x12345678DEADBEEF"
text = b"""Some text to test with.

Since the text in this case must be bytes, it is most likely that
the input form will be a separate file which is opened with "rb"
as this is the simplest method of obtaining the correct data format.
"""

```
c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext, result, sign_result = c.encrypt(text, recipients=rkey, sign=False)

with open("secret_plans.txt.asc", "wb") as afile:
  afile.write(ciphertext)
```
#+END_SRC

Though this is even more likely to be used like this; with the
plaintext input read from a file, the recipient keys used for
encryption regardless of key trust status and the encrypted output
also encrypted to any preconfigured keys set in the =gpg.conf= file:

#+BEGIN_SRC python -i

```
import gpg

a_key = "0x12345678DEADBEEF"

with open("secret_plans.txt", "rb") as afile:
  text = afile.read()

c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext,
 result, sign_result = c.encrypt(text, recipients=rkey, sign=True,
                                 always_trust=True,
                                 add_encrypt_to=True)

with open("secret_plans.txt.asc", "wb") as afile:
  afile.write(ciphertext)
```
#+END_SRC

If the =recipients= parameter is empty then the plaintext is encrypted
symmetrically.  If no =passphrase= is supplied as a parameter or via a
callback registered with the =Context()= then an out-of-band prompt
for the passphrase via pinentry will be invoked.

*** Encrypting to multiple keys
  :PROPERTIES:
  :CUSTOM_ID: howto-basic-encryption-multiple
  :END:

Encrypting to multiple keys essentially just expands upon the key
selection process and the recipients from the previous examples.

The following example encrypts a message (=text=) to everyone with an
email address on the =gnupg.org= domain,[fn:4] but does /not/ encrypt
to a default key or other key which is configured to
 normally encrypt
to.

```
#+BEGIN_SRC python -i
import gpg

text = b"""Oh look, another test message.

The same rules apply as with the previous example and more likely
than not, the message will actually be drawn from reading the
contents of a file or, maybe, from entering data at an input()
prompt.

Since the text in this case must be bytes, it is most likely that
the input form will be a separate file which is opened with "rb"
as this is the simplest method of obtaining the correct data
format.
"""

c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org", secret=False))
logrus = []

for i in range(len(rpattern)):
   if rpattern[i].can_encrypt == 1:
       logrus.append(rpattern[i])

ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
                                   sign=False, always_trust=True)

with open("secret_plans.txt.asc", "wb") as afile:
   afile.write(ciphertext)
#+END_SRC
```

All it would take to change the above example to sign
 the message
and also encrypt the message to any configured default keys would
be to change the =c.encrypt= line to this:

```
#+BEGIN_SRC python -i
ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
```

```
                                always_trust=True,
                                add_encrypt_to=True)
#+END_SRC
```

The only keyword arguments requiring modification are those for which the default values are changing. The default value of =sign= is =True=, the default of =always_trust= is =False=, the default of =add_encrypt_to= is =False=.

If =always_trust= is not set to =True= and any of the recipient keys are not trusted (e.g. not signed or locally signed) then the encryption will raise an error. It is possible to mitigate this somewhat with something more like this:

```
#+BEGIN_SRC python -i
import gpg

with open("secret_plans.txt.asc", "rb") as afile:
  text = afile.read()

c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org",
 secret=False))
logrus = []

for i in range(len(rpattern)):
  if rpattern[i].can_encrypt == 1:
    logrus.append(rpattern[i])

  try:
    ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
                                        add_encrypt_to=True)
  except gpg.errors.InvalidRecipients as e:
    for i in range(len(e.recipients)):
      for n in range(len(logrus)):
        if logrus[n].fpr == e.recipients[i].fpr:
          logrus.remove(logrus[n])
        else:
          pass
    try:
      ciphertext, result, sign_result = c.encrypt(text,
                                          recipients=logrus,
                                          add_encrypt_to=True)
      with open("secret_plans.txt.asc", "wb") as afile:
        afile.write(ciphertext)
    except:
      pass
#+END_SRC
```

This will attempt to encrypt to all the keys searched
 for, then remove
invalid recipients if it fails and try again.

** Decryption
  :PROPERTIES:
  :CUSTOM_ID: howto-basic-decryption
  :END:

Decrypting something encrypted to a key in one's secret keyring is
fairly straight forward.

In this example code, however, preconfiguring either =gpg.Context()=
or =gpg.core.Context()= as =c= is unnecessary because there is no need
to modify the Context prior to conducting the decryption and since the
Context is only used once, setting it to =c= simply adds lines for no
gain.

```
#+BEGIN_SRC python -i
import gpg

ciphertext = input("Enter path and filename of encrypted file: ")
newfile = input("Enter path and filename of file to save decrypted data to: ")

with open(ciphertext, "rb") as cfile:
   try:
       plaintext, result, verify_result = gpg.Context().decrypt(cfile)
   except gpg.errors.GPGMEError as e:
       plaintext = None
       print(e)

if plaintext is not None:
   with open(newfile, "wb") as nfile:
     nfile.write(plaintext)

   else:
       pass
#+END_SRC
```

The data available in =plaintext= in this example is the decrypted
content as a byte object, the recipient key IDs and algorithms in
=result= and the results of verifying any signatures of the data in
=verify_result=.

If =gpg.Context().decrypt(cfile, verify=False)= is called instead,
then =verify_result= will be returned as =None= and the rest remains

as described here.

** Signing text and files
:PROPERTIES:
:CUSTOM_ID: howto-basic-signing
:END:

The following sections demonstrate how to specify keys to sign with.

*** Signing key selection
:PROPERTIES:
:CUSTOM_ID: howto-basic-signing-signers
:END:

By default GPGME and the Python bindings will use the default key configured for the user invoking the GPGME API. If there is no default key specified and there is more than one secret key available it may be necessary to specify the key or keys with which to sign messages and files.

```
#+BEGIN_SRC python -i
import gpg

logrus = input("Enter
 the email address or string to match signing keys to: ")
hancock = gpg.Context().keylist(pattern=logrus, secret=True)
sig_src = list(hancock)
#+END_SRC
```

The signing examples in the following sections include the explicitly designated =signers= parameter in two of the five examples; once where the resulting signature would be ASCII armoured and once where it would not be armoured.

While it would be possible to enter a key ID or fingerprint here to match a specific key, it is not possible to enter two fingerprints and match two keys since the patten expects a string, bytes or None and not a list. A string with two fingerprints won't match any single key.

*** Normal or default signing messages or files
:PROPERTIES:
:CUSTOM_ID: howto-basic-signing-normal
:END:

The normal or default signing process is essentially the same as is most often invoked when also encrypting a message or file. So when the encryption component is not utilised, the result is to produce an encoded
and signed output which may or may not be ASCII armoured and which may or may not also be compressed.

By default compression will be used unless GnuPG detects that the plaintext is already compressed. ASCII armouring will be determined according to the value of =gpg.Context().armor=.

The compression algorithm is selected in much the same way as the symmetric encryption algorithm or the hash digest algorithm is when multiple keys are involved; from the preferences saved into the key itself or by comparison with the preferences with all other keys involved.

```
#+BEGIN_SRC python -i
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context(armor=True, signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.asc", "w") as afile:
   afile.write(signed_data.decode())
#+END_SRC
```

Though everything in this example is accurate, it is more likely that reading the input data from another
file and writing the result to a
new file will be performed more like the way it is done in the next example. Even if the output format is ASCII armoured.

```
#+BEGIN_SRC python -i
import gpg

with open("/path/to/statement.txt", "rb") as tfile:
   text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.sig", "wb") as afile:
```

```
   afile.write(signed_data)
#+END_SRC
```

*** Detached signing messages and files
   :PROPERTIES:
   :CUSTOM_ID: howto-basic-signing-detached
   :END:

Detached signatures will often be needed in programmatic uses of GPGME, either for signing files (e.g. tarballs of code releases) or as a component of message signing (e.g. PGP/MIME encoded email).

```
#+BEGIN_SRC python -i
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context(armor=True)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.asc",
 "w") as afile:
   afile.write(signed_data.decode())
#+END_SRC
```

As with normal signatures, detached signatures are best handled as byte literals, even when the output is ASCII armoured.

```
#+BEGIN_SRC python -i
import gpg

with open("/path/to/statement.txt", "rb") as tfile:
   text = tfile.read()

c = gpg.Context(signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.sig", "wb") as afile:
   afile.write(signed_data)
#+END_SRC
```

*** Clearsigning messages or text
   :PROPERTIES:

```
  :CUSTOM_ID: howto-basic-signing-clear
  :END:
```

Though PGP/in-line messages are no longer encouraged in favour of PGP/MIME, there is still sometimes value in utilising in-line signatures.  This is where clear-signed messages or text is of value.

```
#+BEGIN_SRC python -i
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)

with
 open("/path/to/statement.txt.asc", "w") as afile:
   afile.write(signed_data.decode())
#+END_SRC
```

In spite of the appearance of a clear-signed message, the data handled by GPGME in signing it must still be byte literals.

```
#+BEGIN_SRC python -i
import gpg

with open("/path/to/statement.txt", "rb") as tfile:
   text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)

with open("/path/to/statement.txt.asc", "wb") as afile:
   afile.write(signed_data)
#+END_SRC
```

```
** Signature verification
  :PROPERTIES:
  :CUSTOM_ID: howto-basic-verification
  :END:
```

Essentially there are two principal methods of verification of a signature.  The first of these is for use with the normal or default signing method and for clear-signed messages.  The second is for use

with files and data with detached signatures.

The following example is intended for use with the default signing method where the file was not ASCII armoured:

```
#+BEGIN_SRC python
 -i
import gpg
import time

filename = "statement.txt"
gpg_file = "statement.txt.gpg"

c = gpg.Context()

try:
   data, result = c.verify(open(gpg_file))
   verified = True
except gpg.errors.BadSignatures as e:
   verified = False
   print(e)

if verified is True:
   for i in range(len(result.signatures)):
       sign = result.signatures[i]
       print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
          time.ctime(sign.timestamp)))
else:
   pass
#+END_SRC
```

Whereas this next example, which is almost identical would work with normal ASCII armoured files and with clear-signed files:

```
#+BEGIN_SRC python -i
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
```

```
   data, result = c.verify(open(asc_file))
   verified = True
except gpg.errors.BadSignatures as e:
   verified = False
   print(e)

if verified is True:
   for i in range(len(result.signatures)):
       sign = result.signatures[i]
      print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
         time.ctime(sign.timestamp)))
else:
   pass
#+END_SRC
```

In both of the previous examples it is also possible to compare the original data that was signed against the signed data in =data= to see if it matches with something like this:

```
#+BEGIN_SRC python -i
with open(filename, "rb") as afile:
   text = afile.read()

if text == data:
   print("Good signature.")
else:
   pass
#+END_SRC
```

The following two examples, however, deal with detached signatures. With his method of verification the data that was signed does not get returned since it is already being explicitly referenced in the first argument of =c.verify=.  So =data= is =None= and only the information in =result= is available.

```
#+BEGIN_SRC python -i
import gpg
import time

filename = "statement.txt"
sig_file = "statement.txt.sig"

c = gpg.Context()
```

```
try:
   data,
 result = c.verify(open(filename), open(sig_file))
   verified = True
except gpg.errors.BadSignatures as e:
   verified = False
   print(e)

if verified is True:
   for i in range(len(result.signatures)):
       sign = result.signatures[i]
       print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
          time.ctime(sign.timestamp)))
else:
   pass
#+END_SRC

#+BEGIN_SRC python -i
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
   data, result = c.verify(open(filename), open(asc_file))
   verified = True
except gpg.errors.BadSignatures as e:
   verified = False
   print(e)

if verified is True:
   for i in range(len(result.signatures)):
       sign = result.signatures[i]
       print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
          time.ctime(sign.timestamp)))
else:
   pass
```

#+END_SRC

*
 Creating keys and subkeys
 :PROPERTIES:
 :CUSTOM_ID: key-generation
 :END:

The one thing, aside from GnuPG itself, that GPGME depends on, of course, is the keys themselves.  So it is necessary to be able to generate them and modify them by adding subkeys, revoking or disabling them, sometimes deleting them and doing the same for user IDs.

In the following examples a key will be created for the world's greatest secret agent, Danger Mouse.  Since Danger Mouse is a secret agent he needs to be able to protect information to =SECRET= level clearance, so his keys will be 3072-bit keys.

The pre-configured =gpg.conf= file which sets cipher, digest and other preferences contains the following configuration parameters:

#+BEGIN_SRC conf
 expert
 allow-freeform-uid
 allow-secret-key-import
 trust-model tofu+pgp
 tofu-default-policy unknown
 enable-large-rsa
 enable-dsa2
 cert-digest-algo SHA512
 default-preference-list TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128
 AES BLOWFISH IDEA CAST5 3DES SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1 ZLIB BZIP2 ZIP
Uncompressed
 personal-cipher-preferences TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128 AES
BLOWFISH IDEA CAST5 3DES
 personal-digest-preferences SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1
 personal-compress-preferences ZLIB BZIP2 ZIP Uncompressed
#+END_SRC

** Primary key
  :PROPERTIES:
  :CUSTOM_ID: keygen-primary
  :END:

Generating a primary key uses the =create_key= method in a Context.
It contains multiple arguments and keyword arguments, including:

=userid=, =algorithm=, =expires_in=, =expires=, =sign=, =encrypt=, =certify=, =authenticate=, =passphrase= and =force=. The defaults for all of those except =userid=, =algorithm=, =expires_in=, =expires= and =passphrase= is =False=. The defaults for =algorithm= and =passphrase= is =None=. The default for =expires_in= is =0=. The default for =expires= is =True=. There is no default for =userid=.

If =passphrase= is left as =None=
then the key will not be generated
with a passphrase, if =passphrase= is set to a string then that will be the passphrase and if =passphrase= is set to =True= then gpg-agent will launch pinentry to prompt for a passphrase. For the sake of convenience, these examples will keep =passphrase= set to =None=.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()

c.home_dir = "~/.gnupg-dm"
userid = "Danger Mouse <dm@secret.example.net>"

dmkey = c.create_key(userid, algorithm="rsa3072", expires_in=31536000,
                     sign=True, certify=True)
#+END_SRC
```

One thing to note here is the use of setting the =c.home_dir= parameter. This enables generating the key or keys in a different location. In this case to keep the new key data created for this example in a separate location rather than adding it to existing and active key store data. As with the default directory, =~/.gnupg=, any temporary or separate directory needs the permissions set to only permit access by the directory
owner. On posix systems this means
setting the directory permissions to 700.

The =temp-homedir-config.py= script in the HOWTO examples directory will create an alternative homedir with these configuration options already set and the correct directory and file permissions.

The successful generation of the key can be confirmed via the returned =GenkeyResult= object, which includes the following data:

```
#+BEGIN_SRC python -i
print("""
Fingerprint: {0}
Primary Key: {1}
 Public Key: {2}
```

```
 Secret Key:  {3}
Sub Key:  {4}
User IDs:  {5}
""".format(dmkey.fpr, dmkey.primary, dmkey.pubkey, dmkey.seckey, dmkey.sub,
        dmkey.uid))
#+END_SRC
```

Alternatively the information can be confirmed using the command line program:

```
#+BEGIN_SRC shell
 bash-4.4$ gpg --homedir ~/.gnupg-dm -K
 ~/.gnupg-dm/pubring.kbx
 ----------------------
 sec   rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
 177B7C25DB99745EE2EE13ED026D2F19E99E63AA
 uid           [ultimate] Danger Mouse <dm@secret.example.net>

  bash-4.4$
#+END_SRC
```

As with generating keys manually, to preconfigure expanded preferences for the cipher, digest and compression algorithms, the =gpg.conf= file must contain those details in the home directory in which the new key is being generated.  I used a cut down version of my own =gpg.conf= file in order to be able to generate this:

```
#+BEGIN_SRC shell
 bash-4.4$ gpg --homedir ~/.gnupg-dm --edit-key 177B7C25DB99745EE2EE13ED026D2F19E99E63AA showpref
quit
 Secret key is available.

 sec  rsa3072/026D2F19E99E63AA
     created: 2018-03-15  expires: 2019-03-15  usage: SC
     trust: ultimate      validity: ultimate
 [ultimate] (1). Danger Mouse <dm@secret.example.net>

 [ultimate] (1). Danger Mouse <dm@secret.example.net>
     Cipher: TWOFISH, CAMELLIA256, AES256, CAMELLIA192, AES192, CAMELLIA128, AES, BLOWFISH,
IDEA, CAST5, 3DES
     Digest: SHA512, SHA384, SHA256, SHA224, RIPEMD160, SHA1
     Compression: ZLIB, BZIP2, ZIP, Uncompressed
     Features: MDC, Keyserver
 no-modify

 bash-4.4$
#+END_SRC
```

** Subkeys
  :PROPERTIES:
  :CUSTOM_ID: keygen-subkeys
  :END:

Adding subkeys to a primary key is fairly similar to creating the primary key with the =create_subkey= method. Most of the arguments are the same, but not quite all. Instead of the =userid= argument there is now a =key= argument for selecting which primary key to add the subkey to.

In the following example an encryption subkey will be added to the primary key. Since Danger Mouse is a security conscious secret agent, this subkey will only be valid for about six months, half the length of the primary key.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

key = c.get_key(dmkey.fpr, secret=True)
dmsub = c.create_subkey(key, algorithm="rsa3072", expires_in=15768000,
                        encrypt=True)
#+END_SRC
```

As with the primary key, the results here can be checked with:

```
#+BEGIN_SRC python -i
print("""
Fingerprint:  {0}
Primary Key:  {1}
  Public Key:  {2}
 Secret Key:  {3}
Sub Key:  {4}
User IDs:  {5}
""".format(dmsub.fpr, dmsub.primary, dmsub.pubkey, dmsub.seckey, dmsub.sub,
          dmsub.uid))
#+END_SRC
```

As well as on the command line with:

```
#+BEGIN_SRC shell
 bash-4.4$ gpg --homedir ~/.gnupg-dm -K
 ~/.gnupg-dm/pubring.kbx
 ----------------------
```

```
 sec   rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
 177B7C25DB99745EE2EE13ED026D2F19E99E63AA
 uid           [ultimate] Danger Mouse <dm@secret.example.net>
 ssb   rsa3072 2018-03-15 [E] [expires: 2018-09-13]

 bash-4.4$
#+END_SRC
```

```
** User IDs
  :PROPERTIES:
  :CUSTOM_ID: keygen-uids
  :END:
```

```
*** Adding User IDs
   :PROPERTIES:
   :CUSTOM_ID: keygen-uids-add
   :END:
```

By comparison to creating primary keys and subkeys, adding a new user ID to an existing key is much simpler.  The method used to do this is =key_add_uid= and the only arguments it takes are for the =key= and the new =uid=.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

dmfpr
 = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid = "Danger Mouse <danger.mouse@secret.example.net>"

c.key_add_uid(key, uid)
#+END_SRC
```

Unsurprisingly the result of this is:

```
#+BEGIN_SRC shell
 bash-4.4$ gpg --homedir ~/.gnupg-dm -K
 ~/.gnupg-dm/pubring.kbx
 ----------------------
 sec   rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
 177B7C25DB99745EE2EE13ED026D2F19E99E63AA
 uid           [ultimate] Danger Mouse <danger.mouse@secret.example.net>
```

```
 uid           [ultimate] Danger Mouse <dm@secret.example.net>
 ssb   rsa3072 2018-03-15 [E] [expires: 2018-09-13]

 bash-4.4$
#+END_SRC
```

*** Revoking User IDs
:PROPERTIES:
:CUSTOM_ID: keygen-uids-revoke
:END:

Revoking a user ID is a fairly similar process, except that it uses the =key_revoke_uid= method.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid
 = "Danger Mouse <danger.mouse@secret.example.net>"

c.key_revoke_uid(key, uid)
#+END_SRC
```

** Key certification
:PROPERTIES:
:CUSTOM_ID: key-sign
:END:

Since key certification is more frequently referred to as key signing, the method used to perform this function is =key_sign=.

The =key_sign= method takes four arguments: =key=, =uids=, =expires_in= and =local=. The default value of =uids= is =None= and which results in all user IDs being selected. The default value of both =expires_in= and =local= is =False=; which results in the signature never expiring and being able to be exported.

The =key= is the key being signed rather than the key doing the signing. To change the key doing the signing refer to the signing key selection above for signing messages and files.

If the =uids= value is not =None= then it must either be a string to match a single user ID or a list of strings to match multiple user IDs. In this case the matching of those strings must be precise and it
is case sensitive.

To sign Danger Mouse's key for just the initial user ID with a signature which will last a little over a month, do this:

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
uid = "Danger Mouse <dm@secret.example.net>"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
c.key_sign(key, uids=uid, expires_in=2764800)
#+END_SRC
```

```
*** Verifying key certifications
   :PROPERTIES:
   :CUSTOM_ID: key-sign-verify
   :END:

#+BEGIN_SRC python -i
import gpg
import time

c = gpg.Context()
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
keys = list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
   for sig in user.signatures:
      print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
            sig.uid)
#+END_SRC
```

Which for Danger Mouse displays the following:

```
#+BEGIN_EXAMPLE
 0x92E3F6115435C65A  Thu Mar 15 13:17:44 2018  Danger Mouse <dm@secret.example.net>
  0x321E4E2373590E5D  Mon Nov 26 12:46:05 2018  Ben McGinnes <ben@adversary.org>
#+END_EXAMPLE
```

The two key signatures listed are for the self-certification of Danger Mouse's key made when the key was created in March, 2018; and the second is a signature made by the author and set to expire at the end of the year.  Note that the second signature was made with the following code (including the preceding code to display the output of the certifications or key signatures):

```
#+BEGIN_SRC python -i
import gpg
import math
import pendulum
import time

hd = "/home/dm/.gnupg"
c = gpg.Context()
d = gpg.Context(home_dir=hd)
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
dmuid = "Danger Mouse <dm@secret.example.net>"
dkeys = list(c.keylist(pattern=dmuid))
dmkey = dkeys[0]

c.key_import(d.key_export(pattern=None))

tp = pendulum.period(pendulum.now(tz="local"), pendulum.datetime(2019, 1, 1))
ts = tp.total_seconds()
total_secs = math.ceil(ts)
c.key_sign(dmkey, uids=dmuid, expires_in=total_secs)

d.key_import(c.key_export(pattern=dmuid))
keys
 = list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
   for sig in user.signatures:
       print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
            sig.uid)
#+END_SRC
```

Note that this final code block includes the use of a module which is /not/ part of Python's standard library, the [[https://pendulum.eustace.io/][pendulum module]].  Unlike the standard datetime module, pendulum makes working with dates and times significantly easier in Python; just as the requests module makes working with HTTP and HTTPS easier than the builtin modules do.

Though neither requests nor pendulum are required modules for using the GPGME Python bindings, they are both highly recommended more generally.

* Advanced or Experimental Use Cases
 :PROPERTIES:
 :CUSTOM_ID: advanced-use
 :END:

** C plus Python plus SWIG plus Cython
  :PROPERTIES:
  :CUSTOM_ID: cython
  :END:

In
 spite of the apparent incongruence of using Python bindings to a C
interface only to generate more C from the Python; it is in fact quite
possible to use the GPGME bindings with [[http://docs.cython.org/en/latest/index.html][Cython]].  Though in many cases
the benefits may not be obvious since the most computationally
intensive work never leaves the level of the C code with which GPGME
itself is interacting with.

Nevertheless, there are some situations where the benefits are
demonstrable.  One of the better and easier examples being the one of
the early examples in this HOWTO, the [[#howto-keys-counting][key counting]] code.  Running that
example as an executable Python script, =keycount.py= (available in
the =examples/howto/= directory), will take a noticeable amount of time
to run on most systems where the public keybox or keyring contains a
few thousand public keys.

Earlier in the evening, prior to starting this section, I ran that
script on my laptop; as I tend to do periodically
 and timed it using
=time= utility, with the following results:

#+BEGIN_SRC shell
 bash-4.4$ time keycount.py

 Number of secret keys:  23
 Number of public keys:  12112


 real 11m52.945s
 user 0m0.913s
 sys 0m0.752s

 bash-4.4$
#+END_SRC

Sometime after that I imported another key and followed it with a
little test of Cython.  This test was kept fairly basic, essentially
lifting the material from the [[http://docs.cython.org/en/latest/src/tutorial/cython_tutorial.html][Cython Basic Tutorial]] to demonstrate
compiling Python code to C.  The first step was to take the example
key counting code quoted previously, essentially from the importing of
the =gpg= module to the end of the script:

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

print("""
   Number of secret keys:  {0}
   Number
 of public keys:  {1}

""".format(secnum, pubnum))
#+END_SRC
```

Save that into a file called =keycount.pyx= and then create a
=setup.py= file which contains this:

```
#+BEGIN_SRC python -i
from distutils.core import setup
from Cython.Build import cythonize

setup(
   ext_modules = cythonize("keycount.pyx")
)
#+END_SRC
```

Compile it:

```
#+BEGIN_SRC shell
 bash-4.4$ python setup.py build_ext --inplace
 bash-4.4$
#+END_SRC
```

Then run it in a similar manner to =keycount.py=:

```
#+BEGIN_SRC shell
 bash-4.4$ time python3.7 -c "import keycount"

 Number of secret keys:  23
 Number of public keys:  12113


 real 6m47.905s
 user 0m0.785s
 sys 0m0.331s

 bash-4.4$
#+END_SRC
```

Cython turned =keycount.pyx= into an 81KB =keycount.o= file in the =build/= directory, a 24KB =keycount.cpython-37m-darwin.so= file to be imported into Python 3.7 and a 113KB =keycount.c= generated C source code file of nearly three thousand lines.  Quite a bit bigger than the 314 bytes of the =keycount.pyx= file or the full 1,452 bytes of the full executable =keycount.py= example script.

On the other hand it ran in nearly half the time; taking 6 minutes and 47.905 seconds to run.  As opposed to the 11 minutes and 52.945 seconds which the CPython script alone took.

The =keycount.pyx= and =setup.py= files used to generate this example have been added to the =examples/howto/advanced/cython/= directory The example versions include some additional options to annotate the existing code and to detect Cython's use.  The latter comes from the [[http://docs.cython.org/en/latest/src/tutorial/pure.html#magic-attributes-within-the-pxd][Magic Attributes]] section of the Cython documentation.

* Miscellaneous extras and work-arounds
 :PROPERTIES:
 :CUSTOM_ID: cheats-and-hacks
 :END:

Most of the things in the following sections are here simply because there was no better place to put them, even though some are only peripherally related to the GPGME Python bindings.  Some are also workarounds for functions not integrated with GPGME as yet.  This is especially true of the first of these, dealing with [[#group-lines][group lines]].

** Group lines
  :PROPERTIES:
  :CUSTOM_ID: group-lines
  :END:

There is not yet an easy way to access groups configured in the gpg.conf file from within GPGME.  As a consequence these central groupings of keys cannot be shared amongst multiple programs, such as MUAs readily.

The following code, however, provides a work-around for obtaining this information in Python.

```
#+BEGIN_SRC python -i
import subprocess
import sys

if sys.platform == "win32":
   gpgconfcmd = "gpgconf.exe --list-options gpg"
else:
   gpgconfcmd = "gpgconf --list-options gpg"

process = subprocess.Popen(gpgconfcmd.split(), stdout=subprocess.PIPE)
procom = process.communicate()

if sys.version_info[0] == 2:
   lines = procom[0].splitlines()
else:
   lines = procom[0].decode().splitlines()

for line in lines:
   if line.startswith("group") is True:
       break

groups = line.split(":")[-1].replace("",
 ").split(',')

group_lines = []
group_lists = []

for group in groups:
   group_lines.append(group.split("="))
   group_lists.append(group.split("="))

for glist in group_lists:
   glist[1] = glist[1].split()
```

#+END_SRC

The result of that code is that =group_lines= is a list of lists where =group_lines[i][0]= is the name of the group and =group_lines[i][1]= is the key IDs of the group as a string.

The =group_lists= result is very similar in that it is a list of lists. The first part, =group_lists[i][0]= matches =group_lines[i][0]= as the name of the group, but =group_lists[i][1]= is the key IDs of the group as a list.

A demonstration of using the =groups.py= module is also available in the form of the executable =mutt-groups.py= script. This second script reads all the group entries in a user's =gpg.conf= file and converts them into crypt-hooks suitable for use with the Mutt and Neomutt mail clients.

** Keyserver access for Python
:PROPERTIES:
:CUSTOM_ID:
hkp4py
:END:

The [[https://github.com/Selfnet/hkp4py][hkp4py]] module by Marcel Fest was originally a port of the old [[https://github.com/dgladkov/python-hkp][python-hkp]] module from Python 2 to Python 3 and updated to use the [[http://docs.python-requests.org/en/latest/index.html][requests]] module instead. It has since been modified to provide
support for Python 2.7 as well and is available via PyPI.

Since it rewrites the =hkp= protocol prefix as =http= and =hkps= as =https=, the module is able to be used even with servers which do not support the full scope of keyserver functions.[fn:5] It also works quite readily when incorporated into a [[#cython][Cython]] generated and compiled version of any code.

*** Key import format
:PROPERTIES:
:CUSTOM_ID: hkp4py-strings
:END:

The hkp4py module returns key data via requests as string literals (=r.text=) instead of byte literals (=r.content=). This means that the retrurned key data must be encoded to UTF-8 when importing that
key material using a =gpg.Context().key_import()= method.

For this reason an alternative method has been added to the =search= function of =hkp4py.KeyServer()= which returns the key in the correct format as expected by =key_import=.  When importing using this module, it is now possible to import with this:

```
#+BEGIN_SRC python -i
for key in keys:
  if key.revoked is False:
      gpg.Context().key_import(key.key_blob)
  else:
      pass
#+END_SRC
```

Without that recent addition it would have been necessary to encode the contents of each =hkp4py.KeyServer().search()[i].key= in =hkp4py.KeyServer().search()= before trying to import it.

An example of this is included in the [[#howto-import-key][Importing Keys]] section of this HOWTO and the corresponding executable version of that example is available in the =lang/python/examples/howto= directory as normal; the executable version is the =import-keys-hkp.py= file.

** GPGME version checking
  :PROPERTIES:
  :CUSTOM_ID: gpgme-version-check
  :END:

For various reasons it may be necessary to check which version of GPGME the bindings have been built against; including whether a minimum required version of GPGME is in use.

For the most part the =gpg.version.versionstr= and =gpg.version.versionlist= methods have been quite sufficient.  The former returns the same string as =gpgme-config --version=, while the latter returns the major, minor and patch values in a list.

To check if the installed bindings have actually been built against the current installed libgpgme version, this check can be performed:

```
#+BEGIN_SRC python -i
import gpg
import subprocess
import sys

gpgme_version_call = subprocess.Popen(["gpgme-config", "--version"],
                                      stdout=subprocess.PIPE,
                                      stderr=subprocess.PIPE)
```

```
gpgme_version_str = gpgme_version_call.communicate()

if sys.version_info[0] == 2:
   gpgme_version = gpgme_version_str[0].strip()
elif sys.version_info[0]
 >= 3:
   gpgme_version = gpgme_version_str[0].decode().strip()
else:
   gpgme_version = None

if gpgme_version is not None:
   if gpgme_version == gpg.version.versionstr:
      print("The GPGME Python bindings match libgpgme.")
   else:
      print("The GPGME Python bindings do NOT match libgpgme.")
else:
   print("Upgrade Python and reinstall the GPGME Python bindings.")
#+END_SRC
```

For many developers, however, the preferred checking means checking for a minimum version or point release. This is now readily available via the =gpg.version.versionintlist= method (added in version =1.12.1-beta79=). It is also now possible to easily check whether the installed GPGME Python bindings were built from a development or beta branch of the GPGME source code.

The following code demonstrates how both of those methods may be used:

```
#+BEGIN_SRC python -i
import gpg

try:
   if gpg.version.is_beta is True:
      print("The installed GPGME Python bindings were built from beta code.")
    else:
      print("The installed GPGME Python bindings are a released version.")
except Exception as e:
   print(e)

try:
   if gpg.version.versionintlist[0] == 1:
      if gpg.version.versionintlist[1] == 12:
         if gpg.version.versionintlist[2] == 1:
            print("This is the minimum version for using versionintlist.")
         elif gpg.version.versionintlist[2] > 1:
            print("The versionintlist method is available.")
         else:
            pass
```

```
        elif gpg.version.versionintlist[1] > 12:
            print("The versionintlist method is available.")
        else:
            pass
    elif gpg.version.versionintlist[0] > 1:
        print("The versionintlist method is available.")
    else:
        pass
except Exception as e:
    print(e)
#+END_SRC
```

The points where =pass= is used in the above example will most likely
also produce an =Exception= error since those results should only
occur in versions which do not have the =gpgme.version.is_beta=
 and
=gpgme.version.versionintlist= methods available.

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 :CUSTOM_ID: copyright-and-license
 :END:

** Copyright
  :PROPERTIES:
  :CUSTOM_ID: copyright
  :END:

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** Draft Editions of this HOWTO
  :PROPERTIES:
  :CUSTOM_ID: draft-editions
  :END:

Draft editions of this HOWTO may be periodically available directly
from the author at any of the following URLs:

- [[https://files.au.adversary.org/crypto/gpgme-python-howto.html][GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 SSL)]]
- [[http://files.au.adversary.org/crypto/gpgme-python-howto.html][GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 no SSL)]]
- [[https://files.au.adversary.org/crypto/gpgme-python-howto-split/index.html][GPGME Python Bindings HOWTO draft (HTML multiple files, AWS S3 SSL)]]
- [[http://files.au.adversary.org/crypto/gpgme-python-howto/index.html][GPGME Python Bindings HOWTO draft

(HTML
 multiple files, AWS S3 no SSL)]]

These draft versions have been generated from this document via GNU
Emacs [[https://orgmode.org/][Org mode]] to =.texi= and [[https://www.gnu.org/software/texinfo/][GNU Texinfo]]
to HTML.  Though it is
likely that the specific [[https://files.au.adversary.org/crypto/gpgme-python-howto][file]]
[[http://files.au.adversary.org/crypto/gpgme-python-howto.org][version]] used will be on the same server
with the generated output formats.  Occasionally I may include the Org
mode generated XHTML versions:

- [[https://files.au.adversary.org/crypto/gpgme-python-howto.xhtml][GPGME Python Bindings HOWTO draft
(HTML single file, AWS S3 SSL)]]
- [[http://files.au.adversary.org/crypto/gpgme-python-howto.xhtml][GPGME Python Bindings HOWTO draft
(HTML single file, AWS S3 no SSL)]]

That XHTML version, however, is exported in a way which inherits a
colour scheme from [[https://github.com/holomorph/emacs-zenburn][the author's Emacs theme]] (which is a higher
contrast
version
 of [[http://kippura.org/zenburnpage/][Zenburn]] ported by [[https://github.com/holomorph][Holomorph]]).  So it's
fine for people who
prefer dark themed web pages, but not so great for everyone else.

The GNU Texinfo and reStructured Text versions ship with the software,
while the GNU Emacs Info version is generated from the Texinfo
version using GNU Texinfo or GNU Makeinfo.  The Texinfo format is
generated from the original Org mode source file in Org mode itself
either within GNU Emacs or via the command line by invoking Emacs in
batch mode:

#+BEGIN_SRC shell
 emacs gpgme-python-howto.org --batch -f org-texinfo-export-to-texinfo --kill
 emacs gpgme-python-howto --batch -f org-texinfo-export-to-texinfo --kill
#+END_SRC

The reStructuredText format is also generated from the Org mode source
file, except it is generated using [[https://pandoc.org][Pandoc]] with either of the following
commands (depending on the filename):

#+BEGIN_SRC shell
 pandoc -f org -t rst+smart -o gpgme-python-howto.rst
 gpgme-python-howto.org
 pandoc -f org -t rst+smart -o gpgme-python-howto.rst gpgme-python-howto
#+END_SRC

Note that the Org mode source files are identified as such via a mode
line at the top of each file and have had their =.org= file extensions

dropped in order to make scripted generation of output formats easier
and not require renaming files post-conversion.

Due to a bug in Org mode's texinfo conversion method, the recommended
steps for generating the Texinfo files for all the files in the
=lang/python/doc/src/= directory are as follows:

```
#+BEGIN_SRC shell
 for x in * ; do
     emacs $x --batch -f org-texinfo-export-to-texinfo --kill
     cat $x.texi | sed -e 's/@documentencoding UTF-8/@documentencoding utf-8/g' > ../texinfo/$x.texi
     pandoc -f org -t rst+smart -o ../rst/$x.rst $x
 done ;
 rm -fv *.texi
 cd ../texinfo
 mkdir info
 mkdir html
 for x in *.texi ; do
     makeinfo -v $x
     makeinfo --html --no-split $x
 done ;
 mv *.info info/
 mv
 *.html html/
#+END_SRC
```

This code snippet includes the generation of the reStructuredText
files and would be expected to be run from the =doc/src/= directory
containing the Org mode source files.  It also assumes that the
commands are being run on POSIX compliant systems with basic tools
like sed, the Bourne shell and GNU Emacs[fn:6] available.  The code
snippet also includes the steps for generating the Emacs Info files
and HTML files from the Texinfo files.  Using reStructuredText files
with Sphinx is best left for the documentation of that project.

In addition to these there is a significantly less frequently updated
version as a HTML [[https://files.au.adversary.org/crypto/gpgme-python/dita/webhelp/index.html][WebHelp site]]
(AWS S3 SSL); generated from DITA XML
source files, which can be found in [[https://dev.gnupg.org/source/gpgme/browse/ben%252Fhowto-dita/][an
alternative branch]] of the GPGME
git repository.

Various generated output formats may occasionally be found in
subdirectories
 of the [[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python][gpgme-python]] directory.  In
particular within
the [[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/dita][DITA]],
[[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/rst][reStructuredText]] and

[[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/texinfo][Texinfo]] subdirectories. The =rst=
directory contains output files generated with Sphinx and may include a
considerable number of its possible output formats, but there are no
guarantees as to how recent these are or even if they are present.

These draft editions are not official documents and the version of
documentation in the master branch or which ships with released
versions is the only official documentation. Nevertheless, these
draft editions may occasionally be of use by providing more accessible
web versions which are updated between releases. They are provided on
the understanding
that they may contain errors or may contain content
subject to change prior to an official release.

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:END:

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WITHOUT ANY WARRANTY, to the extent permitted by law; without even the
implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR
PURPOSE.

* Footnotes

[fn:1] =short-history= and/or =short-history.html=.

[fn:2] With no issues reported specific to Python 3.7, the release of
Python 3.7.1 at around the same time as GPGME 1.12.0 and the testing
with Python 3.7.1rc1, there is no reason to delay moving 3.7 ahead of
3.6 now. Production environments with more conservative requirements
will always enforce their own policies anyway and installation to each
supported
minor release is quite possible too.

[fn:3] Yes, even if you use virtualenv with everything you do in
Python. If you want to install this module as just your user account
then you will need to manually configure, compile and install the
/entire/ GnuPG stack as that user as well. This includes libraries
which are not often installed that way. It can be done and there are

circumstances under which it is worthwhile, but generally only on
POSIX systems which utilise single user mode (some even require it).

[fn:4] You probably don't really want to do this. Searching the
keyservers for "gnupg.org" produces over 400 results, the majority of
which aren't actually at the gnupg.org domain, but just included a
comment regarding the project in their key somewhere.

[fn:5] Such as with ProtonMail servers. This also means that
restricted servers which only advertise either HTTP or HTTPS end
points and not HKP or HKPS end points must still be identified as as
HKP or HKPS within the Python
Code. The =hkp4py= module will rewrite
these appropriately when the connection is made to the server.

[fn:6] Okay, Emacs might not necessarily qualify as a basic tool, but
it is common enough that having it installed on a system isn't too
great an expectation, nor is it difficult to add to most POSIX
systems, even if the users of those systems do not personally use it.
2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting
on December 1st, 2011 we put change information only in the GIT
commit log, and generate a top-level ChangeLog file from logs at
"make dist". See doc/HACKING for details.

2011-10-25 Marcus Brinkmann <marcus@g10code.com>

* Makefile.am: Remove build rules for libgpgme-pth.
* gpgme.m4: Remove support for libgpgme-pth.

2011-05-26 Marcus Brinkmann <marcus@g10code.com>

* decrypt.c (gpgme_op_decrypt_start, gpgme_op_decrypt): Check CTX.
* decrypt-verify.c (gpgme_op_decrypt_verify_start)
(gpgme_op_decrypt_verify): Likewise.
* delete.c (gpgme_op_delete_start, gpgme_op_delete): Likewise.
* edit.c (gpgme_op_edit_start, gpgme_op_edit)
(gpgme_op_card_edit_start, gpgme_op_card_edit): Likewise.
* encrypt.c (gpgme_op_encrypt_start, gpgme_op_encrypt): Likewise.
* encrypt-sign.c (gpgme_op_encrypt_sign_start)
(gpgme_op_encrypt_sign): Likewise.
* export.c (gpgme_op_export_start,
gpgme_op_export)
(gpgme_op_export_ext_start, gpgme_op_export_ext)
(gpgme_op_export_keys_start, gpgme_op_export_keys): Likewise.
* genkey.c (gpgme_op_genkey_start, gpgme_op_genkey): Likewise.
* getauditlog.c (gpgme_op_getauditlog_start)

(gpgme_op_getauditlog): Likewise.
* gpgconf.c (gpgme_op_conf_load, gpgme_op_conf_save): Likewise.
* import.c (gpgme_op_import_start, gpgme_op_import_keys_start)
(gpgme_op_import_keys, gpgme_op_import): Likewise.
* keylist.c (gpgme_op_keylist_start, gpgme_op_keylist_ext_start):
Likewise.
* opassuan.c (gpgme_op_assuan_transact_start)
(gpgme_op_assuan_transact_ext): Likewise.
* passwd.c (gpgme_op_passwd_start, gpgme_op_passwd): Likewise.
* sign.c (gpgme_op_sign_start, gpgme_op_sign): Likewise.
* trustlist.c (gpgme_op_trustlist_start)
(gpgme_op_trustlist_next): Likewise.
* verify.c (gpgme_op_verify_start, gpgme_get_sig_key): Likewise.
* op-support.c (_gpgme_op_data_lookup): Likewise.
* vfs-create.c (gpgme_op_vfs_transact, gpgme_op_vfs_create):
Likewise.
* vfs-mount.c (gpgme_op_vfs_mount, gpgme_op_vfs_transact): Likewise.
* gpgme.c (gpgme_set_protocol)
(gpgme_set_sub_protocol)
(gpgme_set_armor, gpgme_set_include_certs)
(gpgme_set_keylist_mode, gpgme_set_passphrase_cb)
(gpgme_set_progress_cb, gpgme_set_io_cbs, gpgme_set_locale)
(gpgme_ctx_set_engine_info, gpgme_sig_notation_clear): Likewise.
* gpgme.c (gpgme_new): Check for valid R_CTX.
(gpgme_cancel, gpgme_cancel_async, gpgme_release): Likewise.

2011-04-06 Werner Koch <wk@g10code.com>

* gpgme-config.in: Add option --host. Change options --cflags and
--libs to collapse duplicate include and lib dirs. Try to put
extra libs at the end.

* gpgme.h.in: Use INSERT__TYPEDEFS_FOR_GPGME_H to include platform
specific typedefs.

2011-02-03 Werner Koch <wk@g10code.com>

* extra-stati.h: New.
* mkstatus: Extend to also process extra-stati.h
* Makefile.am (main_sources): Add extra-stati.h
(status-table.h): Depend on extra-stati.h and adjust rule.

2011-02-03
Marcus Brinkmann <marcus@g10code.com>

* w32-io.c (_gpgme_io_socket): Return fd, not res.

2011-02-02 Marcus Brinkmann <mb@g10code.com>

* assuan-support.c (my_socket, my_connect): New functions.
(_gpgme_assuan_system_hooks): Add my_Socket, my_connect.
* priv-io.h (_gpgme_io_socket): New prototype.
* w32-io.c (pid_to_handle, handle_to_oid, fd_to_handle): Remove macros.
(is_socket): Remove function.
(_gpgme_io_spawn) [HAVE_W32CE_SYSTEM]: Remove some dead code.
(_gpgme_io_spawn): Translate handles before DuplicateHandle them.

2011-02-02 Marcus Brinkmann <mb@g10code.com>

* w32-util.c (mkstemp): Don't use CreateFile instead of open (the
function is not used on Windows CE, and the callers were not
adjusted).

2011-01-21 Marcus Brinkmann <mb@g10code.com>

* engine-gpgconf.c (_gpgme_conf_opt_change): Fix the case that is
not self-assignment.

2010-12-08 Werner Koch <wk@g10code.com>

* gpgme-tool.c (strcpy_escaped_plus): New.
(DIM, xtoi_1, xtoi_2): New.
(cmd_keylist):
Allow for multiple patterns.

2010-11-23 Marcus Brinkmann <mb@g10code.com>

* w32-io.c (create_reader, create_writer): Use small stack size on
Windows CE.

2010-11-23 Marcus Brinkmann <mb@g10code.com>

* gpgme.h.in (gpgme_conf_arg_new): Make VALUE arg const void *.
* gpgconf.c (_gpgme_conf_arg_new): Likewise.
(gpgme_conf_arg_new): Likewise.
* engine-gpgconf.c (_gpgme_conf_arg_new): Likewise.
(gpgconf_write): Remove debug hack.

2010-11-19 Marcus Brinkmann <mb@g10code.com>

* engine-gpgconf.c (_gpgme_conf_opt_change): Support
self-assignment. Requested by Marc Mutz.

2010-11-17 Marcus Brinkmann <mb@g10code.com>

* vasprintf.c (int_vasprintf) [HAVE_W32CE_SYSTEM]: Just use a

fixed size buffer, as va_copy is not easy to fake.

2010-11-15  Marcus Brinkmann  <mb@g10code.com>

* w32-ce.h (strcasecmp, strdup) [_MSC_VER]: Define.
* genkey.c, passphrase.c: Include util.h.

* w32-util.c (_gpgme_w32ce_get_debug_envvar): Fix return value.

2010-11-15  Werner Koch  <wk@g10code.com>

*
data-compat.c (gpgme_data_new_from_filepart)
(gpgme_data_new_from_file) [W32CE && _MSC_VER]: Return not
GPG_ERR_NOT_IMPLEMENTED.

* w32-ce.h (HKEY_PERFORMANCE_DATA, HKEY_CURRENT_CONFIG, _IOLBF)
(abort) [_MSC_VER]: Provide these macros.

* ath.h [W32CE && _MSC_VER]: Include winsock2.h.

* ath.c (ath_read, ath_write) [W32CE && _MSC_VER]: Do not call
non-available functions.

2010-11-04  Werner Koch  <wk@g10code.com>

* w32-ce.h [_MSC_VER && W32CE]: Undef leave.
* export.c: Include util.h so that we get the above undef.

* memrchr.c: Remove.  Used to be a replacement function required
by the formerly included assuan code.

2010-11-03  Werner Koch  <wk@g10code.com>

* debug.c (_gpgme_debug) [W32CE]: Replace locatime by GetLocalTime.

* signers.c (gpgme_signers_clear): Remove useless return.
Reported by Patrick Spendrin.

* w32-util.c: s/__inline__/GPG_ERR_INLINE/

* setenv.c: Include string.h due to our strerror replacement.

* w32-ce.h (access, bsearch):
New macros.
* w32-ce.c (_gpgme_wince_access): New.
(RegQueryValueExA): Change DATA to a void*.
(_gpgme_wince_bsearch): New.  Taken from glibc 2.6.

Guard include of sys/stat.h and sys/types.h.

2010-11-02 Werner Koch <wk@g10code.com>

* data-fd.c (read, write, lseek) [W32CE && ! __MINGW32CE__]: New.
Taken from Pedro Alves Public Domain code.

* w32-ce.h (SHGetSpecialFolderPath): Remove our defines and
prototypes. We use the system provided prototypes now.
* w32-ce.c: Include shlobj.h
(_WIN32_IE): Define to 0x0400
(CreateFileA): New.
* w32-util.c: Explicitly include windows headers before util.h.
(_gpgme_w32ce_get_debug_envvar): Do not use wchar_t strings for
read_w32_registry_string.
(mkstemp): Use CreateFile instead of open.

* w32-io.c (handle_to_fd, fd_tohandle): Add. We need them for W32.
* w32-util.c (_WIN32_IE): Define to 0x0400.

* util.h [W32]: Include windows.h.
* w32-sema.c: Do not include windows.h directly.
* ath.c (ssize_t, pid_t)[_MSC_VER]: Add new
types.
* gpgme.c (gpgme_result_ref, gpgme_result_unref): Do not use a
void pointer in pointer arithmetic.
* w32-util.c: Include util.h prior to ath.h. Don't include
windows.h directly.
(F_OK): Define if not defined.
* w32-ce.c: Include string.h.
(RegQueryValueExA): Use WINAPI modifier to match the declaration.
* vfs-create.c: Include string.h because under W32CE with MSC we
get a warning related to our strerror replacement.
* encrypt-sign.c: Include stdlib.h, string.h and errno.h.
* priv-io.h [W32CE]: Include w32-ce.h
* w32-ce.h: Include winsock2.h and ws2tcpip.h.
(_MSV_VER): Remove useless macro.
(pid_t): Add typedef.

Guard all includes of unistd.h and sys/time.h.

2010-10-28 Marcus Brinkmann <marcus@g10code.com>

* opassuan.c (gpgme_op_assuan_transact_ext): Fix uninitialized
value use. Reported by Marc Mutz.

2010-10-07 Werner Koch <wk@g10code.com>

* gpgme-tool.c (ARGP_ERR_UNKNOWN): Use EDEADLK if available.

* w32-util.c (_gpgme_w32ce_get_debug_envvar) [W32CE]:
New.
* debug.c (debug_init) [W32CE]: Use new function.

2010-09-16 Werner Koch <wk@g10code.com>

* import.c: Include "util.h".
(parse_import): Return GPG_ERR_MISSING_ISSUER_CERT.

* util.h: Add fallback define for GPG_ERR_MISSING_ISSUER_CERT.
* op-support.c: Include "util.h".
(_gpgme_parse_inv_recp): Handle new code 12.

2010-09-02 Marcus Brinkmann <marcus@g10code.de>

* error.c (gpgme_err_code_to_errno): Fix cut and paste bug (thanks
to Marc Mutz).

2010-09-01 Marcus Brinkmann <marcus@g10code.de>

* w32-io.c: Revert change from 2009-06-18, as it created a race
condition.

2010-08-18 Marcus Brinkmann <marcus@g10code.de>

* gpgme.def: Add gpgme_err_code_from_syserror and gpgme_err_set_errno.
* libgpgme.vers: Likewise.
* gpgme.h.in (gpgme_error_from_errno): Fix return type to
gpgme_error_t.
(gpgme_err_code_from_syserror, gpgme_err_set_errno): New prototype.
(gpgme_error_from_syserror): New inline function (why are
gpgme_err_make_from_errno and gpgme_error_from_errno
not inline
functions?).
* error.c (gpgme_error_from_errno): Fix return type to gpgme_error_t.
(gpgme_err_set_errno, gpgme_err_code_from_syserror): New functions.

2010-08-03 Marcus Brinkmann <marcus@g10code.de>

* gpgme-tool.c (result_encrypt_to_xml, result_sign_to_xml)
(result_verify_to_xml, result_import_to_xml)
(result_genkey_to_xml): Check vigorously for null pointers.

* w32-io.c (GPGCEDEV_IOCTL_ASSIGN_RVID): New macro.
(_gpgme_io_spawn): Use ASSIGN_RVID.

2010-06-11  Marcus Brinkmann  <marcus@g10code.de>

* w32-io.c (_gpgme_io_spawn): Remove debug printf.

2010-06-10  Marcus Brinkmann  <marcus@g10code.de>

* gpgme-tool.c (gpgme_server): Use special hack for Windows CE to
get at stdin and stdout.

* engine-gpgsm.c (gpgsm_new): Translate returned achild_fds back
to child_fds.

* debug.h (TRACE_SUC6): New macro.
* w32-io.c (MAX_SLAFD): New macro.
(fd_table): New static variable.
(new_fd, release_fd): New functions.
(fd_to_handle, handle_to_fd, handle_to_socket):
Remove macros.
(MAX_READERS, MAX_WRITERS): Increase to 64.
(notify_table): Increase to MAX_SLAFD.
(struct reader_context_s, struct writer_context_s): Add member
file_sock.
(reader, writer): Use file_hd vs file_sock to decide if socket
operations to use.  Remove auto-detect mode.
(create_reader, create_writer): Set file_sock.  Unblock pending
thread only if this is a pipe fd.
(_gpgme_io_pipe): Allocate fds from table and return slot indices
instead of windows handles.  This allows to properly handle RVIDs.
(_gpgme_io_close): Handle dup'ed file descriptors.
(build_commandline) [HAVE_W32_SYSTEM]: Use RVID from fd table now.
(_gpgme_io_spawn): Use fd table now.
(_gpgme_io_fd2str): Use RVID from fd table now.
(_gpgme_io_dup): Implement using fd table.
(_gpgme_io_socket): Allocate fds from table.
(_gpgme_io_connect): Use fd from table.

* w32-glib-io.c (find_channel): Check that the slot is used.

2010-06-09  Marcus Brinkmann  <marcus@g10code.de>

* w32-io.c [HAVE_W32CE_SYSTEM]:
Include assuan.h and winioctl.h.
(GPGCEDEV_IOCTL_UNBLOCK) [HAVE_W32CE_SYSTEM]: Define.
(set_synchronize) [HAVE_W32CE_SYSTEM]: Stub it out.
(is_socket): Allow to return -1 for auto-detect (old behaviour).
(is_socket) [HAVE_W32CE_SYSTEM]: Return -1.
(reader): Handle auto-detect case.  Handle ctx->stop_me before

checking for EOF.
(destroy_reader) [HAVE_W32CE_SYSTEM]: Unblock a pending reader.
(writer): Handle auto-detect case.  Handle ctx->stop_me with
ERROR_BUSY.
(destroy_writer) [HAVE_W32CE_SYSTEM]: Unblock a pending writer.
(_gpgme_io_pipe) [HAVE_W32CE_SYSTEM]: Implement in terms of a
half-pipe.
(build_commandline) [HAVE_W32CE_SYSTEM]: New function.
(_gpgme_io_spawn) [HAVE_W32CE_SYSTEM]: Implement it differently
for this platform.
(_gpgme_io_fd2str) [HAVE_W32CE_SYSTEM]: Implement it for RVIDs.
(_gpgme_io_dup) [HAVE_W32CE_SYSTEM]: Stub it out.

* gpgme-tool.c (result_add_timestamp): Add missing NULL argument.
(result_sign_to_xml): Protect against NULL
fingerprint.
(struct server): New members input_fd, input_filename,
input_stream output_fd, output_filename, output_stream,
message_filename, message_stream.
(server_reset_fds): Deallocate those.
(server_parse_fd): New function.
(server_data_obj): Take optional filename argument and direction
argument.  Also take new argument to return a filestream that
needs to be closed after destroying the data object.
Change all callers, too.
(input_notify, output_notify): Removed.
(cmd_input, cmd_output): New functions.
(gpgme_server): Do not register input and output notifier.
(register_commands): Use cmd_input and cmd_output.
(cmd_message): Rewritten to use server_parse_fd.
(cmd_delete, cmd_keylist): Fix inverted option check.
(main) [HAVE_W32CE_SYSTEM]: Sleep a bit to work around bug in ssh.

* genkey.c (gpgme_op_genkey): Return err with TRACE_ERR.

2010-05-12  Marcus Brinkmann  <marcus@g10code.de>

* conversion.c (_gpgme_timegm) [HAVE_W32_SYSTEM]: New static
function.
(_gpgme_parse_timestamp)
[HAVE_W32_SYSTEM]: Use it.

* gpgme-tool.c (main): Protect call to setlocale with
HAVE_SETLOCALE.

* Makefile.am (system_components): Remove custom cppflags from
RCCOMPILE (because gpg-error adds -idirafter that makes RC bail.
[HAVE_W32CE_SYSTEM]: Add w32-ce.h and w32-ce.c, clear

libexec_PROGRAMS.
* w32-ce.h, w32-ce.c: New files.

* priv-io.h: Include <sys/types.h>
* util.h: Likewise.

2010-05-11  Marcus Brinkmann  <marcus@g10code.de>

* w32-util.c: Include ath.h
(HAVE_ALLOW_SET_FOREGROUND_WINDOW) [!HAVE_W32CE_SYSTEM]: Define
it.
(RTLD_LAZY, dlopen, dlsym,
dlclose) [!HAVE_ALLOW_SET_FORGROUND_WINDOW]: Don't define anymore.
(_gpgme_allow_set_foreground_window) [!HAVE_ALLOW_SET_FOREGROUND_WINDOW]:
Make it a stub.
(read_w32_registry_string): Use FooA variants of Windows functions
instead of Foo (which dispatches depending on UNICODE).
[!HAVE_W32CE_SYSTEM]: Don't check environment.
(w32_shgetfolderpath): Remove.
(find_program_at_standard_place): Call
SHGetSpecialFolderPath
(which is available on all Windows systems
and also Windows CE).
(mkstemp): Use ath_self instead of getpid.
(_gpgme_mkstemp): Use GetTempPathA instead of GetTempPath.

* gpgme.h.in: Use _WIN32 instead of _MSC_VER.  Include time.h for
time_t.

2010-05-07  Marcus Brinkmann  <marcus@g10code.de>

* engine-g13.c, gpgme.c, engine-gpgsm.c, engine-gpg.c,
op-support.c, engine-assuan.c, gpgme-tool.c: Include <locale.h>
only if available with HAVE_LOCALE_H and conditionalize use of
LC_CTYPE on its definition.
* engine-gpgconf.c: Do not include <locale.h>.

* engine-gpgsm.c (gpgsm_new, start): Cast between int and
assuan_fd_t.
* assuan-support.c (my_pipe, my_close, my_read, my_write): Likewise.
* gpgme-tool.c (server_data_obj, server_reset_fds, gpgme_server),
(my_recvmsg, my_sendmsg, my_spawn): Likewise.
* engine-assuan.c (start): Likewise.
* engine-g13.c (start): Likewise.

2010-05-06  Marcus Brinkmann  <marcus@g10code.de>

* w32-glib-io.c, w32-io.c, w32-qt-io.cpp,

w32-sema.c, w32-util.c:
Do not include <signal.h>.

* sign.c, data-user.c, conversion.c, debug.c, verify.c, data.c,
decrypt.c, delete.c, assuan-support.c, import.c, engine-gpgsm.c,
data-mem.c, op-support.c, w32-io.c, w32-util.c, data-compat.c: Use
gpg_error_from_syserror instead gpg_error_from_errno, and use
gpg_err_set_errno to set error number.
* setenv.c: Include <gpg-error.h> and define __set_errno to use
gpg_err_set_errno.
* gpgme-tool.c (ARGP_ERR_UNKNOWN): Define to EDEADLOCK (which is
mapped in Windows CE) instead of E2BIG (which is not).
(gt_import_keys): Initialize err.

2010-04-19 Marcus Brinkmann <marcus@g10code.de>

* assuan-support.c (my_spawn): Cast to avoid warning.
* engine-g13.c (g13_new): Make ARGV array of pointer to const
char.
(g13_assuan_simple_command) [!USE_DESCRIPTOR_FUNCTION]: Don't define.
* ops.h (_gpgme_key_append_name): Same in prototype.
* key.c (_gpgme_key_append_name): Make SRC argument pointer to
const char.
* posix-util.c
(_gpgme_get_uiserver_socket_path): Make HOMEDIR
const.
* vfs-mount.c (gpgme_op_vfs_transact_start): Never define this
potentially useful but currently unused function.
* vfs-create.c (gpgme_op_vfs_transact_start): Likewise.

2010-04-16 Werner Koch <wk@g10code.com>

* w32-io.c (is_socket): New.
(reader, writer): Use it to figure out the API to use.

2010-03-15 Werner Koch <wk@g10code.com>

* gpgme.h.in: Add autoconf template to set generated file to
read-only in an emacs buffer.

2010-03-12 Werner Koch <wk@g10code.com>

* gpgme.h.in (GPGME_STATUS_SUCCESS): Use the right file for the
change; see below.

* passwd.c (op_data_t): New.
(passwd_start): Setup OPD.
(passwd_status_handler): Return GPG_ERR_NOT_SUPPORTED if needed.

* context.h (OPDATA_PASSWD): New.
* gpgme.h (GPGME_STATUS_SUCCESS): New.

2010-03-09 Werner Koch <wk@g10code.com>

* engine-gpgsm.c (gpgsm_keylist): Try to start the agent.

2010-02-17 Werner Koch <wk@g10code.com>

* posix-io.c (notify_table):
Change implementation.
(notify_table_item_t, notify_table_size, notify_table_lock): New.
(_gpgme_io_close, _gpgme_io_set_close_notify): Adjust for new
implementation.

2010-02-16 Werner Koch <wk@g10code.com>

* gpgme-tool.c (spacep, has_option, skip_options): New.
(cmd_export): Implement option --minimal.

* gpgme.h.in (GPGME_EXPORT_MODE_MINIMAL): New.
* export.c (export_start, export_ext_start): Implement it.
* engine-gpg.c (export_common): Ditto.

2010-01-25 Werner Koch <wk@g10code.com>

* w32-io.c (_gpgme_io_connect): Fix return code check to make it work.

* version.c (do_subsystem_inits): Remove superfluous second
WSAStartup.

2010-01-22 Werner Koch <wk@g10code.com>

* w32-io.c (writer): Try to use send first.
(reader): Try to use recv first.

2010-01-08 Werner Koch <wk@g10code.com>

* engine-gpg.c (gpg_passwd): New.
(_gpgme_engine_ops_gpg): Register.
* passwd.c (parse_error): New.
(passwd_status_handler): Use it.

2010-01-07 Marcus Brinkmann <marcus@g10code.de>

*
gpgme-tool.c (result_xml_write_cb_t, struct result_xml_state):
New types.

(MAX_TAGS): New macro.
(result_init, result_xml_indent, result_xml_tag_start)
(result_xml_tag_data, result_xml_tag_end, result_add_error)
(result_add_pubkey_algo, result_add_hash_algo, result_add_keyid)
(result_add_fpr, result_add_timestamp, result_add_sig_mode)
(result_add_value, result_add_string, result_encrypt_to_xml)
(result_decrypt_to_xml, result_sign_to_xml)
(result_verify_to_xml, result_import_to_xml)
(result_genkey_to_xml, result_keylist_to_xml)
(result_vfs_mount_to_xml): New functions.
(gt_result): Rewritten.

2010-01-05 Werner Koch <wk@g10code.com>

* gpgme-tool.c (gt_passwd, cmd_passwd): New.
(register_commands): Register.

* gpgme.h.in (gpgme_op_passwd_start, gpgme_op_passwd): New.
* libgpgme.vers, gpgme.def: Add new functions.
* passwd.c: New.
* Makefile.am (main_sources): Add passwd.c
* engine.c, engine.h (_gpgme_engine_op_passwd): New.
* engine-backend.h (struct
engine_ops): Add PASSWD.
* engine-gpgsm.c (gpgsm_passwd): New.
(_gpgme_engine_ops_gpgsm): Register.
(gpgsm_reset): Reset only if we have a connection.

* gpgme.h.in (GPGME_PK_ECDSA, GPGME_PK_ECDH): New.
* gpgme.c (gpgme_pubkey_algo_name): Add them.

2009-12-22 Marcus Brinkmann <marcus@g10code.de>

* debug.c: Test for TLS, not __GNUC__

2009-12-15 Marcus Brinkmann <marcus@g10code.de>

* assuan-support.c (my_spawn): Calloc, not malloc, the fd_items.

2009-12-10 Werner Koch <wk@g10code.com>

* debug.c (debug_init): Test on sgid process.

2009-12-08 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (LTRCCOMPILE): Refactor with ...
(RCCOMPILE): ... this new macro.
(SUFFIXES): Add .lo.

(gpgme_res_ldflag): Removed.
(gpgme_res): Use libtool object file name here.
(libgpgme_la_LDFLAGS): Remove gpgme_res_ldflag usage.
(libgpgme_la_LIBADD): Add gpgme_res.

* ath.c (ath_self) [HAVE_W32_SYSTEM]: Fix typo.

2009-12-02 Werner Koch <wk@g10code.com>

* gpgconf.c (gpgme_conf_arg_release):
No return in a function
returning void. Reported by Wyllys Ingersoll.

2009-12-01 Werner Koch <wk@g10code.com>

* gpgme-tool.c (cmd_getauditlog): Add flag --html.
(hlp_getauditlog): New.

* gpgme-tool.c (GT_GCC_A_SENTINEL, GT_GCC_A_PRINTF): New.
(gt_write_status): Use sentinel.
(argp_error, log_error): Use printf attribute.
(argp_parse): Remove extra argument to argp_error.
(_gt_progress_cb, gt_get_engine_info, gt_get_keylist_mode)
(gt_result): Add NULL arg.

2009-11-26 Marcus Brinkmann <marcus@g10code.de>

* opassuan.c (opassuan_start): Allocate result structure before
beginning operation.

2009-11-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme-tool.c (gpgme_server): Use assuan_fd_t and assuan_fdopen
on fds.

2009-11-13 <wk@g10code.com>

* sign.c (_gpgme_sign_status_handler): Handle SIG_CREATED_SEEN.
* engine-uiserver.c (uiserver_sign): Make sending SENDER optional.

2009-11-10 Marcus Brinkmann <marcus@g10code.de>

* op-support.c (_gpgme_op_reset):
Instead of last change, only set
sub protocol if it is not the default.

2009-11-10 Werner Koch <wk@g10code.com>

* op-support.c (_gpgme_op_reset): Ignore GPG_ERR_NOT_IMPLEMENTED
while setting the sub protocol.

* engine-uiserver.c (uiserver_new): Pass fdpassing flag to
assuan_socket_connect.
(set_recipients): Replace fingerprint by user id.

* engine-gpgsm.c (set_recipients): Fix non-terminating loop in
case of a missing key.

2009-11-10  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c (gpgme_new): Set default sub protocol.
* gpgme-tool.c: Implement get sub protocol.

* gpgme.h.in (gpgme_get_sub_protocol): Add prototype.
* gpgme.def, libgpgme.vers: Add gpgme_get_sub_protocol.
* context.h (struct gpgme_context): New member sub_protocol.
* gpgme.c (gpgme_set_sub_protocol): Set CTX->sub_protocol.
(gpgme_get_sub_protocol): New function.
* op-support.c (_gpgme_op_reset): Set sub protocol.

* Makefile.am (uiserver_components): New variable.
(main_sources):
Add it.
* ops.h, key.c (_gpgme_key_append_name): Take CONVERT argument,
implement it.  Adjust callers.
(gpgme_key_from_uid): New function.
* gpgme.h.in (gpgme_protocol_t): Add GPGME_PROTOCOL_DEFAULT.
(gpgme_encrypt_flags_t): Add GPGME_ENCRYPT_PREPARE,
GPGME_ENCRYPT_EXPECT_SIGN.
(gpgme_set_sub_protocol, gpgme_key_from_uid): New functions.
* libgpgme.vers, gpgme.def: Add new functions.
* gpgme.c (gpgme_set_protocol): Add UIServer protocol.
(gpgme_set_sub_protocol): New function.
(gpgme_get_protocol_name): Add UIServer and default protocol.
* assuan-support.c: Return correct error values, implement
socketpair for POSIX.
* priv-io.h, posix-io.c, w32-io.c, w32-glib-io.c,
w32-qt-io.cpp (_gpgme_io_spawn): Add ATFORK and ATFORKVALUE
arguments.  Implement it for POSIX.  Adjust all callers.
* engine.h, engine-backend.h (_gpgme_engine_set_protocol)
(_gpgme_engine_op_decrypt_verify): New prototypes.  Adjust all
users.
* engine.c (engine_ops, gpgme_get_engine_info): Add UIServer
engine.
(_gpgme_engine_set_protocol,

_gpgme_engine_op_decrypt_verify): New
function.
* decrypt-verify.c (decrypt_verify_start): Call
_gpgme_engine_op_decrypt_verify.
* util.h, posix-util.c,
w32-util.c (_gpgme_get_uiserver_socket_path): New function.
* engine-gpgsm.c (gpgsm_set_fd): Fix _gpgme_io_pipe invocation.
* gpgme-tool.c: Some support for UIServer protocol.
* engine-uiserver.c: New file.

2009-11-09 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_new): Close server side FDs.

2009-11-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme-tool.c (struct gpgme_tool): New members write_data and
write_data_hook.
(gt_write_data): New function.
(gt_result): Output vfs_mount result.
(server_write_data): New function.
(gpgme_server): Initialize write_data members.

2009-11-05 Marcus Brinkmann <marcus@g10code.de>

* engine-g13.c (struct engine_g13): Remove members RESULT_CB and
RESULT_CB_VALUE.
(g13_assuan_simple_command, status_handler): Don't use those
anymore.
(g13_transact): Remove them from argument list, too.
* vfs-mount.c (_gpgme_vfs_mount_status_handler): New function.
(_gpgme_op_vfs_mount): Pass it to transact.

* engine-assuan.c (llass_new): Update use of assuan_socket_connect.
* engine-gpgsm.c (gpgsm_new): Update use of assuan_pipe_connect.
* engine-g13.c (g13_new): Likewise.

* priv-io.h (IOSPAWN_FLAG_NOCLOSE): New flag.
* w32-io.c (_gpgme_io_spawn): Implement this flag.
* posix-io.c (_gpgme_io_spawn): Likewise.
* w32-glib-io.c (_gpgme_io_spawn): Likewise.
* assuan-support.c (my_spawn): Set this flag.

* decrypt.c (gpgme_op_decrypt_start): Fix use of debug macro.
* decrypt-verify.c (gpgme_op_decrypt_verify_start): Likewise.
* delete.c (gpgme_op_delete_start): Likewise.
* edit.c (gpgme_op_edit_start, gpgme_op_card_edit_start):
Likewise.

* encrypt.c (gpgme_op_encrypt_start): Likewise.
* encrypt-sign.c (gpgme_op_encrypt_sign_start): Likewise.
* export.c (gpgme_op_export_start, gpgme_op_export_ext_start)
(gpgme_op_export_keys_start,
gpgme_op_export_keys): Likewise.
* genkey.c (gpgme_op_genkey_start): Likewise.
* getauditlog.c (gpgme_op_getauditlog_start): Likewise.
* import.c (gpgme_op_import_start, gpgme_op_import_keys_start):
Likewise.
* opassuan.c (gpgme_op_assuan_transact_start): Likewise.
* sign.c (gpgme_op_sign_start): Likewise.
* verify.c (gpgme_op_verify_start): Likewise.
* vfs-create.c (gpgme_op_vfs_create): Likewise.
* vfs-mount.c (gpgme_op_vfs_mount): Likewise.

2009-11-04 Marcus Brinkmann <marcus@g10code.de>

* ath.h (ath_self): New prototype. Include <stdint.h>
* ath.c, ath-pth.c, ath-pthread.c (ath_self): New function.
* debug.h: Rewrite most macros to beautify debug output.
(_gpgme_debug_buffer): Remove tagname and tag argument.
(_gpgme_debug_frame_begin, _gpgme_debug_frame_end): New prototypes.
* debug.c: Include <time.h>. Don't include assuan.h.
(frame_nr, FRAME_NR): New thread-specific variable and macro.
(debug_init): Do not initialize assuan.
Call _gpgme_debug after
initialization instead using printf directly.
(_gpgme_debug): Do not call debug_init (we now ensure proper
initialization by user). Add timestamp and thread/process ID.
(_gpgme_debug_buffer): Do not take tagname and tag argument.
(_gpgme_debug_frame_begin, _gpgme_debug_frame_end): New functions.
* version.c (gpgme_check_version_internal, gpgme_check_version):
Fix debug string. Do not initialize assuan.
* posix-io.c (get_max_fds): Use 0 not NULL (nicer debug output).

2009-11-04 Werner Koch <wk@g10code.com>

* gpgme-tool.c (register_commands): Add HELP feature.

2009-11-03 Werner Koch <wk@g10code.com>

* gpgme.h.in (GPGME_PROTOCOL_UISERVER): New.

2009-11-03 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (main_sources): Change g13.c to vfs-mount.c. Add
vfs-create.c
* vfs-create.c: New file.

* g13.c: Renamed to ...
* vfs-mount.c: ... this new file.
* gpgme.h.in (gpgme_op_vfs_create): New prototype.
* gpgme.def, libgpgme.vers: Add gpgme_op_vfs_create.
*
gpgme-tool.c (gt_vfs_create, cmd_vfs_create): New functions.
(register_commands): Add VFS_CREATE and CREAET.

2009-11-02 Marcus Brinkmann <marcus@g10code.de>

* debug.h (_gpgme_debug_buffer): Make TAG argument const const.
* debug.c (_gpgme_debug_buffer): Likewise.
* gpgme-tool.c (input_notify, output_notify): Adjust type to new
assuan interface.
* decrypt.c (gpgme_op_decrypt_result): Remove unused variable.
* opassuan.c (gpgme_op_assuan_transact): Fix return value.

2009-10-30 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (noinst_PROGRAMS): New target gpgme-tool.
(gpgme_tool_LDADD): New variable.
* gpgme-tool.c: New file.
* ops.h (_gpgme_sig_notation_clearm _gpgme_signers_clear): New
prototypes.
* gpgme.c (gpgme_set_protocol): Allow GPGME_PROTOCOL_GPGCONF (when
had that gone missing?).
(_gpgme_sig_notation_clear): New function without debug output.
(gpgme_release): Call it and _gpgme_signers_clear.
* signers.c (_gpgme_signers_clear): New
function without debug output.
* g13.c (gpgme_op_vfs_mount): Add debug output.
* assuan-support.c (my_spawn): Allow fd_child_list to be NULL.
* conversion.c (_gpgme_encode_percent_string): Fix infinite loop.
* debug.h: Put tag in front of debug lines, should make for nicer
output.
* engine-assuan.c (llass_new): Use our new system hooks for libassuan.
* engine-g13.c (g13_new): Remove redundant assuan context allocation.
* version.c (gpgme_check_version_internal): Delay debug output
until after gpgme_check_version was called.

2009-10-28 Marcus Brinkmann <marcus@g10code.de>

* signers.c, encrypt-sign.c, encrypt.c, delete.c, keylist.c,
edit.c, import.c, export.c: Fix last change in debug output.

2009-10-27 Marcus Brinkmann <marcus@g10code.de>

* edit.c (gpgme_op_edit_start, gpgme_op_edit)

(gpgme_op_card_edit_start, gpgme_op_card_edit): Add debug output.
* encrypt-sign.c (gpgme_op_encrypt_sign_start)
(gpgme_op_encrypt_sign): Likewise.
* encrypt.c (gpgme_op_encrypt_start,
gpgme_op_encrypt)
(gpgme_op_encrypt_result): Likewise.
* export.c (gpgme_op_export_start, gpgme_op_export)
(gpgme_op_export_ext_start, gpgme_op_export_ext)
(gpgme_op_export_keys_start, gpgme_op_export_keys): Likewise.
* genkey.c (gpgme_op_genkey_start, gpgme_op_genkey)
(gpgme_op_genkey_result): Likewise.
* getauditlog.c (gpgme_op_getauditlog_start)
(gpgme_op_getauditlog): Likewise.
* import.c (gpgme_op_import_result, gpgme_op_import_start)
(gpgme_op_import): Likewise.
* keylist.c (gpgme_op_keylist_result, keylist_colon_handler)
(gpgme_op_keylist_start, gpgme_op_keylist_ext_start)
(gpgme_op_keylist_next, gpgme_op_keylist_end, gpgme_get_key): Likewise.
* opassuan.c (gpgme_op_assuan_transact_start)
(gpgme_op_assuan_transact_ext, gpgme_op_assuan_result)
(gpgme_op_assuan_transact): Likewise.
* signers.c (gpgme_signers_add, gpgme_signers_clear): Likewise.
* trustlist.c (gpgme_op_trustlist_start)
(gpgme_op_trustlist_next, gpgme_op_trustlist_end): Likewise.
* verify.c (gpgme_op_verify_start,
gpgme_op_verify)
(gpgme_op_verify_result): Likewise.

2009-10-26 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h.in (struct gpgme_io_event_done_data)
(gpgme_io_event_done_data_t): New types.
(struct _gpgme_op_assuan_result): Deprecate the err member.
(gpgme_op_assuan_result): Deprecate (for now).
(gpgme_op_assuan_transact_ext): New prototype.
(gpgme_op_assuan_transact): Deprecate.
(struct _gpgme_op_g13_result): Replace with ...
(struct _gpgme_op_vfs_mount_result): ... this.
(gpgme_op_g13_mount): Replace with ...
(gpgme_op_vfs_mount): ... this.
* gpgme.def (gpgme_op_assuan_transact_ext, gpgme_wait_ext)
(gpgme_op_vfs_mount_result, gpgme_op_vfs_mount): New.
(gpgme_op_g13_mount): Remove.
* libgpgme.vers: Likewise.
* engine-backend.h (struct engine_ops): Remove RESULT_CB and
RESULT_CB_VALUE args in opassuan_transact member. Add CANCEL_OP
member.
* ops.h (_gpgme_cancel_with_err, _gpgme_wait_on_condition): Add

OP_ERR argument.
(_gpgme_wait_one_ext):
New prototype.
* context.h (ctx_op_data_id_t): Add OPDATA_VFS_MOUNT.
* engine-g13.c (g13_cancel_op): New function.
(parse_status): Remove declaration.
(g13_assuan_simple_command): Do nothing with status lines for now.
(status_handler): Update opaque value access.
(_gpgme_engine_ops_g13): Add new cancel_op member.
* gpgme.c (_gpgme_cancel_with_err): Add new parameter OP_ERR.
Handle operational errors.
(gpgme_cancel, gpgme_io_read, gpgme_io_write): Add debug output.
* data.c (_gpgme_data_inbound_handler)
(_gpgme_data_outbound_handler): Adjust opaque value access.
* engine-gpg.c (command_handler, status_handler)
(colon_line_handler): Likewise.
* engine-gpgsm.c (status_handler): Likewise.
* engine-gpg.c (_gpgme_engine_ops_gpg): Add cancel_op member.
* engine-gpgsm.c (_gpgme_engine_ops_gpgsm): Likewise.
* g13.c: Rewritten (and will be rewritten again).
* engine.h (_gpgme_engine_op_assuan_transact): Remove result_cb
and result_cb_value parameters from prototype.
(_gpgme_engine_cancel_op):
New prototype.
* engine.c (engine_ops) [! ENABLE_ASSUAN]: Add missing comma.
(_gpgme_engine_op_assuan_transact): Remove result_cb and
result_cb_value parameter.
(_gpgme_engine_cancel_op): New function.
* wait.h (_gpgme_run_io_cb): Add new argument OP_ERR.
(struct io_cb_data): New struct to pass opaque data and get a
op_err return value.  Needed because we can't modify I/O callback
handler signature because it is exposed to the user.
* wait.c (_gpgme_run_io_cb): Add OP_ERR parameter.  Handle
operational errors.
* wait-user.c (_gpgme_user_io_cb_handler): Handle operational
errors.
* wait-private.c (_gpgme_wait_on_condition): New argument to
retrieve the operational result.  Handle operational errors in
session based protocols.
(_gpgme_wait_one_ext): New function.
(_gpgme_wait_one): Pass argument in invocation of
_gpgme_wait_on_condition.
* wait-global.c (struct ctx_list_item): Add member OP_ERR.
(ctx_done): New argument OP_ERR.
(ctx_wait): New argument
OP_ERR.
(gpgme_wait_ext): New function based on gpgme_wait but handling
operational errors.

(gpgme_wait): Implement in term of gpgme_wait_ext.
* keylist.c (gpgme_op_keylist_next): Pass argument in invocation
of _gpgme_wait_on_condition.
* trustlist.c (gpgme_op_trustlist_next): Pass argument in
invocation of _gpgme_wait_on_condition.
* engine-assuan.c (struct engine_llass): Replace members RESULT_CB
and RESULT_CB_VALUE by LAST_OP_ERR.
(_gpgme_engine_assuan_last_op_err): Add this hack function.
(llass_cancel_op): New function.
(_gpgme_engine_llass_ops): Add cancel_op member.
(llass_status_handler): Update opaque value access.
(llass_transact): Remove RESULT_CB and RESULT_CB_VALUE arguments.
* opassuan.c: Move compat hacks to the end of file.
(opassuan_start): Do not set OPD->result.err.
Do not pass RESULT_Cb and CTX to _gpgme_engine_op_assuan_transact.
(gpgme_op_assuan_transact_ext): New function.

* debug.h (DEBUG_GLOBAL): New debug level.
* conversion.c (gnupg_errors,
_gpgme_map_gnupg_error): Removed.
* data-user.c (gpgme_data_new_from_cbs): Add debug output.
* data-fd.c (gpgme_data_new_from_fd): Likewise.
* data-stream.c (gpgme_data_new_from_stream): Likewise.
* decrypt.c (gpgme_op_decrypt_result, gpgme_op_decrypt_start)
(gpgme_op_decrypt): Likewise.
* delete.c (gpgme_op_delete_start, gpgme_op_delete): Likewise.
* decrypt-verify.c (gpgme_op_decrypt_verify_start)
(gpgme_op_decrypt_verify): Likewise.
* sign.c (gpgme_op_sign_result): Fix debug message.
* data-mem.c (gpgme_data_new): Improve debug output.
* verify.c (parse_trust): Use atoi instead of
_gpgme_map_gnupg_error.
* decrypt.c (_gpgme_decrypt_status_handler): Likewise.

2009-10-22 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am: Remove @NETLIBS@ from LIBADDs.
(g13_components): New variable.
(main_sources): Add $(g13_components).
* g13.c, engine-g13.c: New files.
* engine.c (engine_ops): Check for assuan for assuan engine, add
g13 engine.
* util.h (_gpgme_get_g13_path,
_gpgme_encode_percent_string): New
prototypes.
* conversion.c (_gpgme_encode_percent_string): New function.
* gpgme.h.in (gpgme_protocol_t): Add GPGME_PROTOCOL_G13.
(struct _gpgme_op_g13_result, gpgme_g13_result_t): New types.

(gpgme_op_g13_mount): New function.
* gpgme.def, libgpgme.vers: Add gpgme_op_g13_mount.
* gpgme.c (gpgme_set_protocol): Allow GPGME_PROTOCOL_G13.
(gpgme_get_protocol_name): Add GPGME_PROTOCOL_G13.
* posix-util.c (_gpgme_get_g13_path): New function.
* w32-util.c (_gpgme_get_g13_path): New function.
* engine-backend.h (_gpgme_engine_ops_g13): New declaration.

2009-10-20 Marcus Brinkmann <marcus@g10code.de>

* gpgme-config.in (netlibs): Remove.
(assuan_cflags, assuan_libs): Add.

* Makefile.am (assuan_cppflags, assuan_libobjs): Removed.
(gpgsm_components): Move engine-assuan.c to ...
(assuan_components): ... this new variable.
(main_sources): Add this new variable.
(AM_CPPFLAGS): Remove $(assuan_cppflags).
(AM_CFLAGS): Add @LIBASSUAN_CFLAGS@.
(libgpgme_la_DEPENDENCIES,
libgpgme_pth_la_DEPENDENCIES)
(libgpgme_glib_la_DEPENDENCIES, libgpgme_qt_la_DEPENDENCIES)
(libgpgme_pthread_la_DEPENDENCIES): Remove $(assuan_libobjs).
(libgpgme_la_LIBADD, libgpgme_pth_la_LIBADD)
(libgpgme_glib_la_LIBADD, libgpgme_qt_la_LIBADD))
(libgpgme_pthread_la_LIBADD): Replace $(assuan_libobjs) by
@LIBASSUAN_LIBS@.
* priv-io.h [!HAVE_W32_SYSTEM]: Declare _gpgme_io_recvmsg,
_gpgme_io_sendmsg, _gpgme_io_waitpid.
* engine-backend.h: Define with [ENABLE_ASSUAN] instead
of [ENABLE_GPGSM].
* posix-io.c (_gpgme_io_waitpid): Make non-static.
* util.h (ENABLE_ASSUAN): Declare _gpgme_assuan_system_hooks,
_gpgme_assuan_malloc_hooks, _gpgme_assuan_log_cb.
* engine-gpgsm.c: Don't map assuan error codes. Use
assuan_release instead of assuan_disconnect.
(map_assuan_error): Remove function.
(gpgsm_new): Use new assuan context interface.
* engine-assuan.c: Use assuan_release instead of
assuan_disconnect.
(llass_new): Use new assuan context
interface.

2009-10-07 <wk@g10code.com>

* priv-io.h [W32]: Include windows.h instead of sys/socket.h.

2009-08-06 Werner Koch <wk@g10code.com>

* op-support.c (_gpgme_parse_inv_recp): Allow for no fingerprint.

* engine-gpgsm.c (gpgsm_sign): Hook up the status func for the
SIGNER command.
* gpgme.h.in (GPGME_STATUS_INV_SGNR, GPGME_STATUS_NO_SGNR): New.
* sign.c (op_data_t): Add fields IGNORE_INV_RECP and INV_SGNR_SEEN.
(_gpgme_op_sign_init_result): Factor code out to ...
(sign_init_result): .. new. Init new fields.
(sign_start): Use sign_init_result.
(_gpgme_sign_status_handler): Take care of the new INV_SGNR.
Return an error if no signature has been created.

2009-07-07 Werner Koch <wk@g10code.com>

* engine-gpgsm.c (struct engine_gpgsm): Add fields
input_helper_data and input_helper_memory.
(close_notify_handler): Release these new fields.
(gpgsm_import): Implement the keyarray feature.

* engine-gpg.c (gpg_import): Actually return GPG_ERR_INV_VALUE.

*
engine-gpgsm.c (gpgsm_import): Return an error for unknown data
encodings.

2009-06-22 Marcus Brinkmann <marcus@g10code.de>

* debug.h: Everywhere, use %p instead of 0x%x to print pointer.
[HAVE_STDINT_H]: Include <stdint.h>.
(_TRACE, TRACE, TRACE0, TRACE1, TRACE2, TRACE3, TRACE6): Cast tag
to (uintptr_t) before casting it to (void*) to silence GCC
warning.

* gpgme.h.in (_GPGME_DEPRECATED_OUTSIDE_GPGME): New macro.
* sign.c (_GPGME_IN_GPGME): Define it.
* keylist.c (_GPGME_IN_GPGME): Define it.

* debug.c (_gpgme_debug_begin, _gpgme_debug_add): Handle error in
vasprintf and asprintf.

* priv-io.h: Include <sys/socket.h>. Declare _gpgme_io_connect.

2009-06-18 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h.in (GPGME_CONF_PATHNAME): Revert last change, it's
back! (GPA still uses it...).

* gpgme.def: Fix stupid typo.
* w32-io.c (_gpgme_io_pipe): Add missing declaration.

* gpgme.h.in (GPGME_CONF_PATHNAME): Remove obsolete macro.

* w32-io.c (_gpgme_io_pipe): Allocate
reader/writer thread right
away.
(_gpgme_io_read, _gpgme_io_write, _gpgme_io_select)
(_gpgme_io_dup): Never allocate threads here.
(find_writer, find_reader): Check return value of thread creation
function.

* context.h (CTX_OP_DATA_MAGIC): New macro.
(struct ctx_op_data): New member MAGIC.
* op-support.c (_gpgme_op_data_lookup): Initialize magic.
* gpgme.c (gpgme_result_unref, gpgme_result_ref): Check magic.

2009-06-16 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (gpgme_result_unref): Hot fix to release a lock.

* gpgme.c (result_ref_lock): New global variable.
(gpgme_result_ref, gpgme_result_unref): use it.

2009-06-16 Werner Koch <wk@g10code.com>

* version.c: Include stdlib.h.

* gpgme.h.in (gpgme_data_encoding_t): Add GPGME_DATA_ENCODING_URL,
GPGME_DATA_ENCODING_URLESC, GPGME_DATA_ENCODING_URL0.
* data.c (gpgme_data_set_encoding): Adjust for new values.
* engine-gpg.c (string_from_data): New.
(gpg_import): Implement --fetch-key feature.

* gpgme.h.in
(gpgme_op_export_keys_start, gpgme_op_export_keys): New.
* gpgme.def, libgpgme.vers: Add them.
* export.c (gpgme_op_export_keys_start, gpgme_op_export_keys): New.
(export_keys_start): New.

* gpgme.h.in (gpgme_export_mode_t, GPGME_EXPORT_MODE_EXTERN): New.
(gpgme_op_export_start, gpgme_op_export, gpgme_op_export_ext_start)
(gpgme_op_export_ext): Change arg RESERVED to MODE of new
compatible type.
* export.c (gpgme_export_ext_start, gpgme_op_export)
(gpgme_op_export_ext_start, gpgme_op_export_ext): Ditto.
(export_start): Ditto.

* engine.c (_gpgme_engine_op_export): Ditto.
* engine-backend.h (struct engine_ops): Ditto.
* engine-gpgsm.c (gpgsm_export, gpgsm_export_ext): Ditto.
* engine-gpg.c (gpg_export, gpg_export_ext): Ditto. Implement
mode EXTERN.
(gpg_export, gpg_export_ext): Factor common code out to ..
(export_common): .. this.

* gpgme.h.in (gpgme_op_import_keys_start, gpgme_op_import_keys): New.
* gpgme.def, libgpgme.vers: Add them.
* import.c (gpgme_op_import_keys_start,
gpgme_op_import_keys): New.
(_gpgme_op_import_keys_start): New.
* engine.c (_gpgme_engine_op_import): Add arg KEYARRAY.
* engine-backend.h (struct engine_ops): Ditto.
* engine-gpgsm.c (gpgsm_import): Ditto. Not functional.
* engine-gpg.c (gpg_import): Ditto. Implement it.

2009-06-15 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h.in (gpgme_result_ref, gpgme_result_unref): Add
prototypes.
* gpgme.def, libgpgme.vers (gpgme_result_ref, gpgme_result_unref):
Add these.
* context.h (struct ctx_op_data): Add member "references".
* gpgme.c (gpgme_result_ref, gpgme_result_unref): New functions.
(_gpgme_release_result): Use gpgme_result_unref.
* op-support.c (_gpgme_op_data_lookup): Initialize references.

2009-06-12 Werner Koch <wk@g10code.com>

* gpgme-w32spawn.c (translate_get_from_file): Parse optional spawn
flags. Add new arg R_FLAGS. Fix segv on file w/o LF.
(translate_handles): Add new arg R_FLAGS. Avoid possible segv.
(main): Pass flags for my_spawn.
(my_spawn):
Add arg FLAGS and implement AllowSetForegroundWindow.

* priv-io.h (IOSPAWN_FLAG_ALLOW_SET_FG): New.
* w32-io.c (_gpgme_io_spawn): Add arg FLAGS and implement it.
* w32-glib-io.c (_gpgme_io_spawn): Ditto.
* w32-qt-io.cpp (_gpgme_io_spawn): Ditto.
* posix-io.c (_gpgme_io_spawn): Add dummy arg FLAGS.
* engine-gpg.c (start): Call spawn with new flag.

* w32-util.c (_gpgme_allow_set_foregound_window): Rename to
_gpgme_allow_set_foreground_window. Change all callers.
* posix-util.c (_gpgme_allow_set_foreground_window): Ditto.

2009-06-10  Werner Koch  <wk@g10code.com>

* w32-util.c (_gpgme_allow_set_foregound_window): Add trace support.

2009-06-09  Werner Koch  <wk@g10code.com>

* engine-gpg.c (gpg_io_event): Test for cmd.fd.

* version.c (gpgme_check_version_internal): Make result const.

* gpgme.c: Include priv-io.h.
(gpgme_io_read, gpgme_io_write): New.
* libgpgme.vers (GPGME_1.1): Add them.
* gpgme.def: Ditto.

* Makefile.am (main_sources): Remove gpgme.h.
(include_HEADERS):
Rename to nodist_include_HEADERS so that a
VPATH build won't use the distributed one.

* util.h (GPG_ERR_NOT_OPERATIONAL): Define.

2009-05-28  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h.in (gpgme_check_version_internal): New prototype.
(gpgme_check_version): New macro, overriding function of the same
name.
* libgpgme.vers, gpgme.def: Add gpgme_check_version_internal.o
* context.h (_gpgme_selftest): New variable declaration.
* version.c: Include "context.h".
(gpgme_check_version): Set _gpgme_selftest on success.
(gpgme_check_version_internal): New function.
* gpgme.c (_gpgme_selftest): Define it.
(gpgme_new): Check the selftest result.

2009-05-18  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h.in (gpgme_encrypt_flags_t): Add
GPGME_ENCRYPT_NO_ENCRYPT_TO.
* engine-gpg.c (gpg_encrypt): Pass --no-encrypt-to to gpg if
GPGME_ENCRYPT_NO_ENCRYPT_TO flag is set.

2009-05-14  Werner Koch  <wk@g10code.com>

* gpgme.h.in (gpgme_status_code_t):
Explicitly initialize for
better maintainability and to help debugging.

2009-05-05  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h.in: Add compile time check for _FILE_OFFSET_BITS.

2009-04-15  Marcus Brinkmann  <marcus@g10code.de>

* posix-io.c (_gpgme_io_socket, _gpgme_io_connect): New functions.
* w32-io.c (_gpgme_io_connect): Fix stupid error.

2009-04-08  Marcus Brinkmann  <marcus@g10code.de>

* w32-glib-io.c (giochannel_table): New members used, fd, socket.
(find_channel): Drop CREATE argument.
(new_dummy_channel_from_fd, new_channel_from_fd)
(new_channel_from_socket): New functions.
(_gpgm_io_fd2str): Implement for sockets.
(_gpgme_io_write, _gpgme_io_read): Translate EAGAIN errors
correctly.
(_gpgme_io_pipe): Fix for new channel bookkeeping.
(_gpgme_io_close, _gpgme_io_dup): Likewise.
(wsa2errno, _gpgme_io_socket, _gpgme_io_connect): New.
* w32-io.c (MAX_READERS, MAX_WRITERS): Bump up to 40.
(wsa2errno, _gpgme_io_socket, _gpgme_io_connect): New.
* w32-qt-io.cpp
(_gpgme_io_socket, _gpgme_io_connect): New stubs.
* version.c [HAVE_W32_SYSTEM]: Include "windows.h.
(do_subsystem_inits) [HAVE_W32_SYSTEM]: Call WSAStartup.
* engine-assuan.c (llass_status_handler): Ignore EAGAIN errors.

2009-03-18  Werner Koch  <wk@g10code.com>

* gpgme.h.in (GPGME_KEYLIST_MODE_EPHEMERAL): New.
* engine-gpgsm.c (gpgsm_keylist): Send new option.

2009-03-13  Werner Koch  <wk@g10code.com>

* gpgme-config.in: Make sure locale is set to C.

2009-02-24  Werner Koch  <wk@g10code.com>

* gpgme.h.in (struct _gpgme_op_assuan_result): New.
(gpgme_assuan_result_t): New.
(gpgme_op_assuan_result): Change return type.
(struct _gpgme_assuan_sendfnc_ctx)
(gpgme_assuan_sendfnc_ctx_t, gpgme_assuan_sendfnc_t):Remove.
(gpgme_assuan_inquire_cb_t): Changed.
* opassuan.c (op_data_t): Make use of a result structure.

(gpgme_op_assuan_result): Change return type.
(opassuan_start): Use result structure.
(result_cb): Ditto.
* engine-assuan.c (struct _gpgme_assuan_sendfnc_ctx):
Remove.
(inquire_cb_sendfnc): Remove.
(inquire_cb): Change for new callback scheme. Not yet finished.
(llass_status_handler): Allow sending a CANCEL from the inquire CB.

2009-02-04 Werner Koch <wk@g10code.com>

* w32-glib-io.c (_gpgme_io_spawn): Make ARGV argument const to
match prototype.
* w32-qt-io.cpp (_gpgme_io_spawn): Ditto.

2009-02-03 Werner Koch <wk@g10code.com>

* gpgme.h.in (struct _gpgme_subkey): Add fields IS_CARDKEY and
CARD_NUMBER..
* key.c (gpgme_key_unref): Release field CARD_NUMBER.
* keylist.c (keylist_colon_handler): Factor common code out to ...
(parse_sec_field15): New. Set card number.

2009-01-26 Werner Koch <wk@g10code.com>

* opassuan.c, dirinfo.c, engine-assuan.c: New.
* Makefile.am: Add them.
* engine-backend.h: Add _gpgme_engine_ops_assuan.
(struct engine_ops): Add field OPASSUAN_TRANSACT. Update all
engine intializers.
* Makefile.am (gpgsm_components): Add engine-assuan.c.
* gpgme.h.in (gpgme_protocol_t): Add GPGME_PROTOCOL_ASSUAN.
(gpgme_assuan_data_cb_t,
gpgme_assuan_sendfnc_ctx_t)
(gpgme_assuan_inquire_cb_t, gpgme_assuan_status_cb_t): New.
(gpgme_op_assuan_transact_start, gpgme_op_assuan_transact): New.
* gpgme.c (gpgme_get_protocol_name): Ditto.
(gpgme_set_protocol): Support it.
* engine.c (gpgme_get_engine_info): Ditto.
(engine_ops): Register it.
(_gpgme_engine_op_assuan_transact): New.
* libgpgme.vers (gpgme_op_assuan_transact_start)
(gpgme_op_assuan_transact): New.
* gpgme.def (gpgme_op_assuan_transact_start)
(gpgme_op_assuan_transact): New.
* engine-backend.h (struct engine_ops): Add GET_HOME_DIR and
initialize to NULL for all engines.
* engine.c (engine_get_home_dir): New.

(gpgme_get_engine_info): Use it.
(_gpgme_set_engine_info): Use it.
* engine.h (engine_assuan_result_cb_t): New.
* context.h (ctx_op_data_id_t): Add OPDATA_ASSUAN.

* util.h (GPG_ERR_UNFINISHED): Define if not yet defined.

* version.c (gpgme_check_version): Protect trace arg against NULL.

2009-01-19 Werner
Koch <wk@g10code.com>

* rungpg.c: Rename to engine-gpg.c
* Makefile.am (main_sources): Ditto.

2008-12-03 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (status-table.h): Use $(builddir) to find gpgme.h.

2008-11-18 Werner Koch <wk@g10code.com>

* version.c (do_subsystem_inits): Always initialize I/O
subsystem. Fixes regression from 2007-08-02.

* decrypt.c (_gpgme_decrypt_status_handler): Use
_gpgme_map_gnupg_error to parse the error code for decrypt.algorithm.

2008-10-30 Marcus Brinkmann <marcus@g10code.de>

* wait-private.c (_gpgme_wait_on_condition): Remove unused
variable IDX.
* wait-global.c: Include ops.h to silence gcc warning.
(_gpgme_wait_global_event_cb): Pass error value directly.
* wait-user.c: Include ops.h to silence gcc warning.

* posix-io.c (_gpgme_io_spawn): Make ARGV argument const to
silence gcc warning. Cast argument to execv to silence warning.
* w32-io.c (_gpgme_io_spawn): Likewise.
* priv-io.h (_gpgme_io_spawn): Likewise for
prototype.

2008-10-24 Werner Koch <wk@g10code.com>

* rungpg.c (gpg_keylist_preprocess): Escape backslashes too.

2008-10-23 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (gpg_keylist_preprocess): Convert percent escaped

string to C coded string.

2008-10-20  Werner Koch  <wk@g10code.com>

* Makefile.am (EXTRA_DIST): Add gpgme.h.in.

* gpgme.h: Rename to gpgme.h.in.
* gpgme.h.in (GPGME_VERSION): Use autoconf substitution.

* posix-io.c: Include sys/uio.h.  Fixes bug #818.

2008-10-18  Marcus Brinkmann  <marcus@g10code.com>

* w32-util.c (find_program_in_registry): Don't define.
(_gpgme_get_gpg_path, _gpgme_get_gpgsm_path)
(_gpgme_get_gpgconf_path): Do not check for fooProgram in the
registry anymore.  It is now no longer possible to overwrite the
default location in that way.

2008-10-17  Werner Koch  <wk@g10code.com>

* w32-glib-io.c (_gpgme_io_fd2str): Use "%d" and not "%ld" to work
around a bug in mingw32.

2008-09-23  Marcus Brinkmann  <marcus@g10code.com>

*
gpgme.c (gpgme_sig_notation_clear): Clear CTX->sig_notations.
Submitted by "Daniel Mueller" <daniel@danm.de>

2008-09-16  Marcus Brinkmann  <marcus@g10code.com>

* rungpg.c (gpg_new): Don't use errno with ttyname_r.

2008-08-11  Marcus Brinkmann  <marcus@g10code.com>

* rungpg.c (gpg_cancel): Remove cmd fd before status fd.
* gpgme.c (_gpgme_cancel_with_err): New function.
(gpgme_cancel): Reimplement in terms of _gpgme_cancel_with_err.
* wait-private.c (_gpgme_wait_on_condition): Use
_gpgme_cancel_with_err.
* wait-user.c (_gpgme_user_io_cb_handler): Likewise.
* wait-global.c (_gpgme_wait_global_event_cb, gpgme_wait): Likewise.

2008-08-08  Marcus Brinkmann  <marcus@g10code.com>

* rungpg.c (command_handler): Remove I/O callback on error, too.

2008-06-29  Marcus Brinkmann  <marcus@g10code.com>

* gpgme.c (gpgme_cancel_async): Remove unused variable.

2008-06-27  Marcus Brinkmann  <marcus@g10code.de>

* libgpgme.vers: Add gpgme_cancel_async.
* gpgme.def: Likewise.

* context.h:
Include "sema.h".
(struct gpgme_context): New members lock and canceled.
* gpgme.c (gpgme_new): Initialize lock.
(gpgme_release): Destroy lock.
(gpgme_cancel_async): New function.
* op-support.c (_gpgme_op_reset): Reset the canceled flag.
* wait-global.c (gpgme_wait): Check cancel flag before processing
any I/O callbacks.
* wait-private.c (_gpgme_wait_on_condition): Likewise.
* wait-user.c (_gpgme_user_io_cb_handler): Likewise.

2008-06-26  Werner Koch  <wk@g10code.com>

* w32-util.c (_gpgme_mkstemp): Replace sprint by stpcpy.
(mkstemp): Need to use GetSystemTimeAsFileTime for better
compatibility.

2008-06-25  Marcus Brinkmann  <marcus@g10code.de>

* gpgme-w32spawn.c: New file.
* Makefile.am (libexec_PROGRAMS) [HAVE_W32_SYSTEM]: New variable
with gpgme-w32spawn.
* engine-gpgsm.c (gpgsm_new): Use server translated handles.
(gpgsm_set_locale): Return early if locale value is NULL.
* util.h (_gpgme_mkstemp)
(_gpgme_get_w32spawn_path) [HAVE_W32_SYSTEM]: New function
prototypes.
*
w32-util.c: Include <stdint.h>, <sys/stat.h> and <unistd.h>.
(letters, mkstemp, _gpgme_mkstemp, _gpgme_get_w32spawn_path): New
functions.
* rungpg.c (gpg_decrypt, gpg_encrypt, gpg_encrypt_sign)
(gpg_genkey, gpg_import, gpg_verify, gpg_sign): Pass data over
special filename FD rather than stdin.
(struct arg_and_data_s): Add member ARG_LOCP.
(struct fd_data_map_s): Add member ARG_LOC.
(struct engine_gpg): Add member ARG_LOC to status and colon.
(_add_arg, add_arg_with_locp): New function.

(add_arg_ext): Reimplement in terms of _add_arg.
(gpg_new): Remember argument location for status FD.
(build_argv): Set argument location if requested. Also set
argument location of fd_data_map for data items.
(start): Adjust caller of _gpgme_io_spawn.
* priv-io.h (struct spawn_fd_item_s): Add members peer_name and
arg_loc.
(_gpgme_io_spawn): Remove parent fd list argument.
* posix-io.c (get_max_fds): New function.
(_gpgme_io_dup): Add tracing.
(_gpgme_io_spawn):
Remove parent fd list. Change meaning of child
fd list to contain all child fds that should be inherited. Close
all other file descriptors after fork.
* w32-io.c, w32-glib-io.c, w32-qt-io.c(_gpgme_io_spawn): Remove
parent fd list. Change meaning of child fd list to contain all
child fds that should be inherited. Do not inherit any file
descriptors, but DuplicateHandle them. Spawn process through
wrapper process. Provide wrapper process with a temporary file
containing handle translation data. Return translated handle
names.
* w32-io.c (reader): Add more tracing output.
(_gpgme_io_read): Likewise.
* engine-gpgconf.c (gpgconf_read): Adjust caller of
_gpgme_io_spawn.
* version.c (_gpgme_get_program_version): Likewise.

2008-06-20 Werner Koch <wk@g10code.com>

* engine-gpgconf.c (gpgconf_read): Change ARGV initialization for
compatibility with old compilers. Fix amount of memmove. Fix
CR removal.

2008-06-19 Werner Koch <wk@g10code.com>

* gpgme.h (GPGME_CONF_PATHNAME):
Replace by GPGME_CONF_FILENAME,
change all callers and provide compatibility macro.
(gpgme_conf_type_t): Add complex types 34..37.
* engine-gpgconf.c (gpgconf_parse_option, arg_to_data)
(_gpgme_conf_arg_new, _gpgme_conf_arg_release): Add new types.

2008-06-19 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgconf.c (gpgconf_parse_option): Fix comma detection.

2008-05-09 Werner Koch <wk@g10code.com>

* engine-gpgconf.c (gpgconf_read): Do not pass empty lines to the
callback.

2008-05-07  Werner Koch  <wk@g10code.com>

* engine-gpgconf.c (gpgconf_write): Change argv[0] to a
self-explaining string.  Needs a proper fix, though.

* rungpg.c (gpg_keylist, gpg_keylist_ext): Factor common code out
to ..
(gpg_build_keylist_options): .. new. Allow combination of extern
and intern mode.
(gpg_new): DFT_TTYNAME is an array, thus check the first character.

2008-05-06  Werner Koch  <wk@g10code.com>

* version.c (extract_version_string): New.
(_gpgme_get_program_version):
Use it to allow for suffixes in the
version line.

2008-04-28  Werner Koch  <wk@g10code.com>

* engine-gpgconf.c (gpgconf_read): Fixed segv.  Avoid memmove for
each line.

2008-04-22  Marcus Brinkmann  <marcus@g10code.de>

* w32-qt-io.cpp, kdpipeiodevice.cpp: New versions from Frank
Osterfeld, implement blocking select.

2008-03-11  Marcus Brinkmann  <marcus@g10code.de>

* data.c (gpgme_data_read, gpgme_data_write): Retry on EINTR.

2008-03-06  Marcus Brinkmann  <marcus@g10code.de>

* key.c (_gpgme_key_add_sig): Terminate UID in case SRC is NULL.
Reported by Marc Mutz.

2008-03-05  Marcus Brinkmann  <marcus@g10code.de>

* decrypt.c (release_op_data): Release OPD->result.recipients.
* encrypt.c (release_op_data): Release invalid_recipient.

2008-02-15  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgconf.c (gpgconf_read): Fix end-of-line handline.

2008-02-14  Werner Koch  <wk@g10code.com>

* w32-io.c (_gpgme_io_spawn): Add arg R_PID to return the pid.
* posix-io.c
(_gpgme_io_spawn): Ditto.
* w32-glib-io.c (_gpgme_io_spawn): Ditto.
* w32-qt-io.cpp (_gpgme_io_spawn): Ditto.
* priv-io.h (_gpgme_io_spawn): Adjust prototyp and change all callers.
* rungpg.c (start): Call _gpgme_allow_set_foregound_window.

* w32-util.c (_gpgme_allow_set_foregound_window): New.
* posix-util.c (_gpgme_allow_set_foregound_window): New.
* engine-gpgsm.c (default_inq_cb): New.
(gpgsm_new) [W32]: Enable pinentry notifications.
(status_handler): Handle inquiries.

2008-01-30  Marcus Brinkmann  <marcus@g10code.de>

* kdpipeiodevice.cpp: New version by Frank Osterfeld, fixes race
condition.

2008-01-28  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (map_input_enc): Rename to ...
(map_data_enc): ... this.  Also change all callers.
(gpgsm_encrypt, gpgsm_export, gpgsm_export_ext, gpgsm_genkey)
(gpgsm_sign): Set encoding for output.

2008-01-28  Werner Koch  <wk@g10code.com>

* keylist.c (gpgme_get_key): Skip duplicated keys.  Fixes bug 876.

2008-01-14
Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgconf.c (gpgconf_config_load_cb): Fix program_name
field.

2008-01-10  Marcus Brinkmann  <marcus@g10code.de>

* kdpipeiodevice.cpp: New version from Frank Osterfeld.

* engine-gpgconf.c (gpgconf_config_load_cb2): Handle the flag
NO_ARG_DESC.

2008-01-04  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (gpgconf_components): New variable.
(main_sources): Add gpgconf.c.
* gpgme.h (gpgme_protocol_t): New protocol GPGME_PROTOCOL_GPGCONF.
(gpgme_conf_level_t, gpgme_conf_type_t, gpgme_conf_arg_t)
(gpgme_conf_opt_t, gpgme_conf_comp_t, gpgme_conf_arg_new)
(gpgme_conf_arg_release, gpgme_conf_opt_change)
(gpgme_conf_release, gpgme_op_conf_load, gpgme_op_conf_save): New
types.
* gpgconf.c, engine-gpgconf.c: New files.
* engine.h: (_gpgme_engine_op_conf_load,
(_gpgme_engine_op_conf_save): New prototypes.
* op-support.c (_gpgme_op_reset): Ignore not implemented locale
function.
* posix-util.c (_gpgme_get_gpgconf_path): New
function.
* w32-util.c (_gpgme_get_gpgconf_path): New function.
* engine-gpgsm.c:
(_gpgme_engine_ops_gpgsm): Add stubs for conf_load and conf_save.
* rungpg.c:
(_gpgme_engine_ops_gpg): Add stubs for conf_load and conf_save.
* gpgme.def: Add new gpgconf related interfaces.
* libgpgme.vers: Likewise.
* util.h (_gpgme_get_gpgconf_path): New prototype.
* gpgme.h (gpgme_protocol_t): Add GPGME_PROTOCOL_GPGCONF.
* engine-backend.h (_gpgme_engine_ops_gpgconf): New prototype.
(struct engine_ops): Add members for conf_load and conf_save.
* engine.c (engine_ops): Add _gpgme_engine_ops_gpgconf.
(_gpgme_engine_op_conf_load,
(_gpgme_engine_op_conf_save): New functions.
(gpgme_get_engine_info): Allow protocol GPGME_PROTOCOL_GPGCONF.

2007-11-28 Marcus Brinkmann <marcus@g10code.de>

* w32-util.c (_gpgme_get_gpg_path, _gpgme_get_gpgsm_path): Search
for installation directory. Remove old fallback default.
(find_program_in_inst_dir): New function.

2007-11-26 Werner Koch <wk@g10code.com>

*
engine-gpgsm.c (struct engine_gpgsm): Add field INLINE_DATA and
always reset it before calling start.
(gpgsm_new): Clear it.
(status_handler): Implement it.
(gpgsm_getauditlog) [USE_DESCRIPTOR_PASSING]: Use INLINE_DATA.

2007-11-23 Werner Koch <wk@g10code.com>

* op-support.c (_gpgme_op_reset): Implement a no-reset flag.
* getauditlog.c (getauditlog_start): Use that flag.

2007-11-20  Werner Koch  <wk@g10code.com>

* op-support.c (_gpgme_parse_inv_recp): Add new reason code 11.

2007-11-22  Werner Koch  <wk@g10code.com>

* gpgme.h (gpgme_op_getauditlog_start, gpgme_op_getauditlog): New.
* libgpgme.vers: Ditto.
* gpgme.def: Ditto.
* getauditlog.c: New.
* engine-backend.h (struct engine_ops): Add member GETAUDITLOG.
* engine-gpgsm.c (gpgsm_getauditlog): New.
(_gpgme_engine_ops_gpgsm): Insert new function.
(gpgsm_new): Try to enable audit log support.
* rungpg.c (_gpgme_engine_ops_gpg): Insert dummy entry.

2007-11-12  Marcus Brinkmann  <marcus@g10code.de>

*
kdpipeiodevice.cpp: New version from Frank Osterfeld.

2007-10-11  Marcus Brinkmann  <marcus@g10code.de>

* kdpipeiodevice.cpp: New version from Frank Osterfeld.

2007-10-09  Marcus Brinkmann  <marcus@g10code.de>

* kdpipeiodevice.cpp: New version from Frank Osterfeld and Marc
Mutz.

2007-10-05  Marcus Brinkmann  <marcus@g10code.de>

* kdpipeiodevice.cpp, w32-qt-io.cpp: New versions from Frank
Osterfeld.

2007-10-04  Marcus Brinkmann  <marcus@g10code.de>

* kdpipeiodevice.h, kdpipeiodevice.cpp, kdpipeiodevice.moc,
w32-qt-io.cpp: New versions from Frank Osterfeld.

2007-10-02  Marcus Brinkmann  <marcus@g10code.de>

* kdpipeiodevice.cpp, kdpipeiodevice.moc: New versions.
* w32-qt-io.cpp (_gpgme_io_fd2str): Print actual_fd if available.
(_gpgme_io_dup): Only acquire a reference, do not actually dup.

Submitted by Frank Osterfeld.

* priv-io.h, engine-gpgsm.c: Add comments.
* w32-qt-io.cpp (_gpgme_io_select): Remove code handling frozen FDs.
* w32-glib-io.c (_gpgme_io_close):
Always dereference the channel,
even if not primary.
(_gpgme_io_dup): Acquire a reference. Replace unused
implementation by assertion.

2007-09-28 Werner Koch <wk@g10code.com>

* engine-gpgsm.c (iocb_data_t): Add SERVER_FD_STR.
(gpgsm_new): Set it.
(gpgsm_set_fd): Use it.

* w32-glib-io.c (find_channel): Add a new primary flag.
(_gpgme_io_close): Close channel only if primary.
(_gpgme_io_dup): Put newfd into the table as shallow copy.

* priv-io.h (struct io_select_fd_s): Remove member FROZEN.
* w32-io.c (_gpgme_io_select): Ditto.
* w32-glib-io.c (_gpgme_io_select): Ditto.

* posix-io.c (_gpgme_io_select): Ditto.
* rungpg.c (read_status): Ditto.
* wait.c (fd_table_put): Ditto.

* rungpg.c (gpg_io_event): Add tracing.
(start): Use gpg_io_event for sending the start event.
* engine-gpgsm.c (gpgsm_io_event): Add tracing.
(start): Use gpgsm_io_event for sending the start event.
* wait.c (_gpgme_add_io_cb, _gpgme_run_io_cb): Add tracing.

2007-09-28 Marcus Brinkmann
<marcus@g10code.de>

* kdpipeiodevice.moc, w32-qt-io.cpp, kdpipeiodevice.cpp: New
versions from Frank Osterfeld.

2007-09-27 Marcus Brinkmann <marcus@g10code.de>

* w32-glib-io.c (_gpgme_io_spawn),
w32-qt-io.cpp (_gpgme_io_spawn), w32-io.c (_gpgme_io_spawn): Close
the process handle, return 0.

* gpgme.h (gpgme_protocol_t): Add GPGME_PROTOCOL_UNKNOWN.
* gpgme.c (gpgme_get_protocol_name): Implement support for

GPGME_PROTOCOL_UNKNOWN.

* kdpipeiodevice.h: Fix last change.

* w32-glib-io.c (_gpgme_io_pipe), w32-qt-io.c (_gpgme_io_pipe),
w32-io.c (_gpgme_io_pipe), posix-io.c (_gpgme_io_pipe): Fix debug
output.

2007-09-25  Marcus Brinkmann  <marcus@g10code.de>

* conversion.c, keylist.c: Include <sys/types.h>.

* kdpipeiodevice.h: Use namespace _gpgme_.
* kdpipeiodevice.cpp: Use namespace _gpgme_.
[Q_OS_WIN32 && NOMINMAX]: Do not define NOMINMAX again.
* w32-qt-io.cpp: Change namespace of KDPipeIODevice to
_gpgme_::KDPipeIODevice.

2007-09-17  Werner Koch  <wk@g10code.com>

*
rungpg.c (gpg_new): Make robust against undefined ttyname or
ttytype.

2007-09-14  Werner Koch  <wk@g10code.com>

* data-mem.c (gpgme_data_release_and_get_mem): Fix tracing bug.

2007-09-14  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c (gpgme_release): Call gpgme_sig_notation_clear.

2007-09-13  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (gpg_new): Handle return value of _gpgme_getenv (fixes
small memory leak).

2007-09-07  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (libgpgme_qt_la_SOURCES): Move
moc_kdpipeiodevice.cpp to EXTRA_DIST, as this is only included by
another file (it's more like a header file than a cpp file, but
automake doesn't know that).

* w32-qt-io.cpp (_gpgme_io_spawn): Fix several cast errors and typos.
* w32-io.c (_gpgme_io_write): Use TRACE_SYSRES instead of TRACE_SYS.
(libgpgme_qt_la_LIBADD): Add QT4_CORE_LIBS, not QT4_CORE_LIB.

* kdpipeiodevice.h, kdpipeiodevice.cpp, moc_kdpipeiodevice.cpp,
kdpipeiodevice.moc, w32-qt-io.c:
New files.
* Makefile.am (ltlib_gpgme_extra): Rename to ltlib_gpgme_glib.
(ltlib_gpgme_qt): New variable.
(lib_LTLIBRARIES): Add $(ltlib_gpgme_qt).
(libgpgme_qt_la_SOURCES): New variable.
(AM_CPPFLAGS): Add @QT4_CORE_INCLUDES@
(AM_CFLAGS): Add @QT4_CORE_CFLAGS@.
(libgpgme_qt_la_LDFLAGS, libgpgme_qt_la_DEPENDENCIES)
(libgpgme_qt_la_LIBADD): New variables.

* sema.h (struct critsect_s): Rename "private" to "priv" to make
C++ users happy. Change users.
* posix-sema.c (_gpgme_sema_cs_enter, _gpgme_sema_cs_leave)
(_gpgme_sema_cs_destroy): Likewise.
* w32-sema.c (critsect_init, _gpgme_sema_cs_enter)
(_gpgme_sema_cs_leave, _gpgme_sema_cs_destroy): Likewise.
* w32-glib-io.c (gpgme_get_giochannel): Change return type to
void*.
(gpgme_get_fdptr): New function.
* w32-io.c (gpgme_get_fdptr): New function
* gpgme.def: Add gpgme_get_fdptr.

2007-08-22 Marcus Brinkmann <marcus@g10code.de>

* w32-io.c (_gpgme_io_write): Return early if COUNT is zero.
(writer): Remove superfluous
check.

2007-08-20 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h: Move include of gpg-error.h out of extern "C".

2007-08-07 Werner Koch <wk@g10code.com>

* gpgme.h (struct _gpgme_signature): Add member CHAIN_MODEL.
* verify.c (parse_trust): Set Chain_MODEL.

2007-08-02 Werner Koch <wk@g10code.com>

* w32-glib-io.c (_gpgme_io_spawn): Use DETACHED_PROCESS flag.
* w32-io.c (_gpgme_io_spawn): Ditto.
(_gpgme_io_write): Map ERROR_NO_DATA to EPIPE.
* debug.c (_gpgme_debug): Enable assuan logging.
(_gpgme_debug_subsystem_init): New.
* version.c (do_subsystem_inits): Disable assuan logging and
initialize the debug system.

(gpgme_check_version): Do not trace before the subsystems are initialized.

2007-07-17 Marcus Brinkmann <marcus@g10code.de>

* debug.c: Include <errno.h> and "debug.h".
(_gpgme_debug): Save and restore ERRNO.
(TOHEX): New macro.
(_gpgme_debug_buffer): New function.
* conversion.c, data-compat.c, data-mem.c, data.c, engine-gpgsm.c, gpgme.c,
keylist.c, posix-io.c, rungpg.c, sign.c, version.c,
w32-io.c, wait.c: Replace DEBUG macros by TRACE_* variants. In most of these files, add many more tracepoints.

2007-07-16 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (status_handler): Do not send BYE here.

* w32-io.c (struct reader_context_s, struct writer_context_s): New members REFCOUNT.
(create_reader, create_writer): Initialize C->refcount to 1.
(destroy_reader, destroy_writer): Only destroy if C->refcount drops to 0.
(find_reader, find_writer, kill_reader, kill_writer): Beautify.
* priv-io.h (_gpgme_io_dup): New prototype.
* posix-io.c (_gpgme_io_dup): New function.
* w32-io.c (_gpgme_io_dup): Likewise.
* w32-glib-io.c (_gpgme_io_dup): Likewise.
* engine-gpgsm.c (start): Reverting to version 2007-07-10.

2007-07-13 Marcus Brinkmann <marcus@g10code.de>

* data-user.c (user_read, user_write, user_seek): Set errno and return -1 instead returning the error code directly.
* data-compat.c (old_user_seek):
Likewise.
* gpgme.c (gpgme_sig_notation_add): Return error properly.

* Revert the "close_notify_handler" returns int stuff. Always close in the _gpgme_io_close implementations.
* engine-gpgsm.c (status_handler): Try to terminate the connection in case of error.
* w32-io.c (_gpgme_io_read): Return C->error_code in ERRNO.
(_gpgme_io_write): Likewise.

* priv-io.h (_gpgme_io_set_close_notify): Change type of HANDLER to _gpgme_close_notify_handler.

(_gpgme_close_notify_handler): New type.
(_gpgme_io_dup): Remove prototype.
* posix-io.c (notify_table, _gpgme_io_set_close_notify): Change
type of HANDLER to _gpgme_close_notify_handler_t.
(_gpgme_io_close): Do not close the FD if handler returns 0.
(_gpgme_io_dup): Remove function.
* w32-io.c (notify_table, _gpgme_io_set_close_notify,
_gpgme_io_close): Change type of HANDLER to
_gpgme_close_notify_handler_t.
(_gpgme_io_close): Do not close the FD if handler returns 0.
(_gpgme_io_dup): Remove function.
* w32-glib-io.c
(_gpgme_io_dup): Remove function.
(_gpgme_io_set_close_notify, notify_table): Change type of HANDLER
to _gpgme_close_notify_handler_t.
(_gpgme_io_close): Do not close the FD if handler returns 0.
* rungpg.c (close_notify_handler): Change return type to int,
return 1.
* engine-gpgsm.c (close_notify_handler): Change return type to
int, return 0 for status FD and 1 for all other FDs.
(start): Do not duplicate the status FD.

2007-07-12 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am: Replace implicit rule by suffix rule. Add
SUFFIXES for that.

2007-07-12 Werner Koch <wk@g10code.com>

* version.c (do_subsystem_inits) [W32]: Make sure that the socket
system has been started.

2007-07-10 Marcus Brinkmann <marcus@g10code.de>

* priv-io.h (_gpgme_io_dup): New prototype.
* posix-io.c (_gpgme_io_dup): New function.
* w32-io.c (_gpgme_io_dup): Likewise.
* w32-glib-io.c (_gpgme_io_dup): Likewise.
* engine-gpgsm.c (start): Use _gpgme_dup() instead of dup().

2007-07-08
Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c [HAVE_W32_SYSTEM]: Enable the bunch of the file.
* funopen.c (funopen): Rename to _gpgme_funopen.

2007-04-30 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_new): Fix error handling for ttyname_r.
* rungpg.c (gpg_new): Likewise.
Submitted by Stephen Tether.

2007-02-26 Werner Koch <wk@g10code.com>

* verify.c (op_data_t): New element PLAINTEXT_SEEN.
(_gpgme_verify_status_handler): Return an error if more than one
plaintext has been seen.
(parse_error): New arg SET_STATUS. Also detect it based on an
ERROR status (gpg > 1.4.6).

2007-01-26 Werner Koch <wk@g10code.com>

* w32-io.c (build_commandline): Fixed stupid quoting bug.
* w32-glib-io.c (build_commandline): Ditto.

* rungpg.c (gpg_set_locale): Avoid dangling pointer after free.

* gpgme-config.in: New options --get-gpg and --get-gpgsm.

2007-01-18 Marcus Brinkmann <marcus@g10code.de>

* data.h (_gpgme_data_get_fd): Add prototype.
(gpgme_data_get_fd_cb):
New type.
(struct _gpgme_data_cbs): New member get_fd.
* data.c (_gpgme_data_get_fd): New function.
* data-fd.c (fd_get_fd): New function.
(fd_cbs): Add fd_get_fd.
* data-stream.c (stream_get_fd): New function.
(stream_cbs): Add stream_get_fd.
* data-mem.c (mem_cbs): Add NULL for get_fd callback.
* data-user.c (user_cbs): Likewise.
* engine-gpgsm.c (gpgsm_set_fd) [USE_DESCRIPTOR_PASSING]: Try to
short-cut by passing the data descriptor directly.

2007-01-17 Marcus Brinkmann <marcus@g10code.de>

* w32-io.c (build_commandline): Quote all command line arguments.
* w32-glib-io.c (build_commandline): Likewise.

2007-01-10 Werner Koch <wk@g10code.com>

* ttyname_r.c (ttyname_r) [W32]: Return a dummy name.

2007-01-08 Werner Koch <wk@g10code.com>

* version.c (do_subsystem_inits): Do assuan init only if building
with Assuan.
* setenv.c: Include assuan-def.h only if building with Assuan
support.

* op-support.c (_gpgme_op_reset): Set LC_MESSAGES only if
if
defined.
* engine-gpgsm.c (gpgsm_set_locale): Ditto.
* rungpg.c (gpg_set_locale): Ditto.

2006-12-17 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (gpgme_set_protocol): Shut down the engine when
switching protocols.
(gpgme_ctx_set_engine_info): Likewise for engine info.
* engine.h (_gpgme_engine_reset): New function prototype.
* engine.c (_gpgme_engine_reset): New function.
* engine-backend.h (struct engine_ops): New member RESET.
* rungpg.c (_gpgme_engine_ops_gpg): Add NULL for reset function.
* engine-gpgsm.c (_gpgme_engine_ops_gpgsm)
[USE_DESCRIPTOR_PASSING]: Add gpgsm_reset for reset.
(_gpgme_engine_ops_gpgsm) [!USE_DESCRIPTOR_PASSING]: Add NULL for
reset function.
(gpgsm_reset) [USE_DESCRIPTOR_PASSING]: New function.
* op-support.c (_gpgme_op_reset): Try to use the engine's reset
function if available.
* engine-gpgsm.c (gpgsm_new): Move code to dup status_fd to ...
(start): ... here.
* posix-io.c (_gpgme_io_recvmsg, _gpgme_io_sendmsg): New functions.

*
engine.h (_gpgme_engine_new): Remove arguments lc_ctype and
lc_messages from prototype.
(_gpgme_engine_set_locale): New prototype.
* engine.c (_gpgme_engine_set_locale): New function.
* op-support.c (_gpgme_op_reset): Call _gpgme_engine_set_locale.
* engine-backend.h (struct engine_ops): Add new member SET_LOCALE.
Remove arguments lc_messages and lc_ctype from member NEW.
* engine-gpgsm.c (struct engine_gpgsm): New members lc_ctype_set
and lc_messages_set.
(gpgsm_new): Remove lc_messages and lc_ctype
arguments.
(gpgsm_set_locale): New function.
(_gpgme_engine_ops_gpgsm): Add gpgsm_set_locale.
* rungpg.c (struct engine_gpg): Add new members lc_messages and
lc_ctype.
(gpg_release): Release lc_messages and lc_ctype if set.

(gpg_new): Remove lc_messages and lc_ctype arguments.
(gpg_set_locale): New function.
(_gpgme_engine_ops_gpg): Add gpg_set_locale.
(add_arg): Implement in terms of:
(add_arg_ext): New function.
(start): Set lc-messages and lc-ctype arguments here.

2006-12-03
Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (struct engine_gpgsm): Move members
input_fd_server, output_fd_server, message_fd_server to ...
(iocb_data): ... here (as server_fd).
(close_notify_handler): Reset tags as well.
(gpgsm_new): Implement support for descriptor
passing.
(fd_type_t): New type.
(gpgsm_clear_fd): New function. Use it instead of _gpgsm_io_close
for unused communication channels.
(gpgsm_set_fd): Rewritten to support descriptor passing. All
relevant callers adjusted as well (previously of _gpgme_io_close).

2006-12-02 Marcus Brinkmann <marcus@g10code.de>

* version.c: Include "assuan.h".
(do_subsystem_inits): Call assuan_set_assuan_err_source.

2006-12-01 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (libgpgme_real_la_SOURCES): Rename to main_sources.
(libgpgme_la_SOURCES, libgpgme_pthread_la_SOURCES,
libgpgme_glib_la_SOURCES, libgpgme_pth_la_SOURCES): Add
$(main_sources).
(libgpgme_la_DEPENDENCIES, libgpgme_la_LIBADD,
libgpgme_pthread_la_DEPENDENCIES,
libgpgme_pthread_la_LIBADD,
libgpgme_pth_la_DEPENDENCIES, libgpgme_pth_la_LIBADD,
libgpgme_glib_la_DEPENDENCIES, libgpgme_glib_la_LIBADD): Remove
libgpgme-real.la.
(noinst_LTLIBRARIES): Removed.
(libgpgme_glib_la_CFLAGS, libgpgme_pth_la_CFLAGS): Removed.
(AM_CFLAGS): New variable.

2006-11-30 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c: Replace AssuanError with gpg_error_t and
ASSUAN_CONTEXT with assuan_context_t.

2006-11-29  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_new): Check return value of
assuan_pipe_connect.

* rungpg.c: Include <unistd.h>.
(gpg_new): Support --display, --ttyname, --ttytype, --lc-ctype and
--lc-messages.  Fixes issue 734.

2006-10-24  Marcus Brinkmann  <marcus@g10code.de>

* trustlist.c (gpgme_op_trustlist_next): Return error if OPD is
NULL.

2006-10-23  Marcus Brinkmann  <marcus@g10code.de>

* wait-global.c (gpgme_wait): Unlock CTX_LIST_LOCK while calling
_gpgme_engine_io_event().

*
keylist.c (gpgme_op_keylist_next): Return error if OPD is NULL.

2006-09-25  Marcus Brinkmann  <marcus@g10code.de>

* data-mem.c (gpgme_data_release_and_get_mem): Release the data
object properly.

2006-09-22  Marcus Brinkmann  <marcus@g10code.de>

* keylist.c (keylist_colon_handler): Move debug output after
initialising KEY.

2006-07-29  Marcus Brinkmann  <marcus@g10code.de>

* gpgme-config.in (Options): Add NETLIBS.
* Makefile.am (libgpgme_la_LIBADD, libgpgme_pthread_la_LIBADD,
libgpgme_pth_la_LIBADD, libgpgme_glib_la_LIBADD): Add NETLIBS.

* rungpg.c (read_status): Fix comparison disguising as an
assignment.

2005-03-24  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c (gpgme_set_locale): Remove conditional on
HAVE_W32_SYSTEM, and just check for LC_MESSAGES.

2006-07-16  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (read_status): Strip potential carriage return.
* genkey.c (get_key_parameter): Skip potential carriage return.
* version.c (_gpgme_get_program_version):
Strip potential carriage
return.

* data.c (gpgme_data_set_file_name): Allow to clear the file name
by passing NULL.

2006-06-22  Marcus Brinkmann  <marcus@g10code.de>

* keylist.c (gpgme_get_key): Also clone the engine info.

2006-03-06  Marcus Brinkmann  <marcus@g10code.de>

* gpgme-config.in (cflags_pth): Revert accidental removal of
pthread support with last change.

2006-02-28  Marcus Brinkmann  <marcus@g10code.de>

* w32-glib-io.c (O_BINARY) [!O_BINARY]: New macro.
(_gpgme_io_pipe): Open pipes in binary mode.

2006-02-22  Marcus Brinkmann  <marcus@g10code.de>

* engine.c (gpgme_engine_check_version): Reimplemented to allow
checking the version correctly even after changing the engine
information.  Bug reported by Stphane Corthsy.

* rungpg.c (read_colon_line): Invoke colon preprocess handler if
it is set.
(colon_preprocessor_t): New type.
(struct engine_gpg): New member colon.preprocess_fnc.
(gpg_keylist_preprocess): New function.
* keylist.c
(keylist_colon_handler): Allow short key IDs.

2006-02-15  Marcus Brinkmann  <marcus@g10code.de>

* w32-io.c (create_writer): Make C->have_data a manually reset
event.
(writer): Move code from end of if block to beginning, so it
is also run the first time.
(_gpgme_io_write): Move assert check after error check.  Reset
the is_empty event, and also do it eagerly.
(_gpgme_io_select): Unconditionally wait for the is_empty event.

2006-01-26  Werner Koch  <wk@g10code.com>

* w32-util.c (_gpgme_get_conf_int): New.
* posix-util.c (_gpgme_get_conf_int): New.
* w32-io.c (get_desired_thread_priority): New.
(create_reader, create_writer): Use it here.

2006-01-04  Werner Koch  <wk@g10code.com>

* debug.h (_gpgme_debug_srcname): New. Use it with the debug macros.

* w32-glib-io.c (_gpgme_io_set_nonblocking): Add debug
statements. Disable error return for failed nonblocking call.

2006-01-03  Marcus Brinkmann  <marcus@g10code.de>

* w32-glib-io.c (_gpgme_io_close): Only close fd if there
is no
channel for it.

2005-12-31  Marcus Brinkmann  <marcus@g10code.de>

* w32-glib-io.c (find_channel): Set channel to unbuffered.
(_gpgme_io_select): Fix debug output.

2005-12-23  Werner Koch  <wk@g10code.com>

* gpgme.h (struct _gpgme_signature): Append field PKA_ADDRESS.
* verify.c (release_op_data, _gpgme_verify_status_handler): Set
this field.

2005-12-20  Werner Koch  <wk@g10code.com>

* gpgme.h (gpgme_status_code_t): Added GPGME_STATUS_PKA_TRUST_BAD
and GPGME_STATUS_PKA_TRUST_GOOD.
(struct _gpgme_signature): New field pka_trust.
* verify.c (_gpgme_verify_status_handler): Set pka_trust.

2005-12-06  Werner Koch  <wk@g10code.com>

* keylist.c (keylist_colon_handler): Store fingerprints of the
subkeys.  Reset the secret flag of subkeys for stub secret keys.
(NR_FIELDS): Bumped up to 16

2005-11-27  Marcus Brinkmann  <marcus@g10code.de>

* engine.c (_gpgme_set_engine_info): Use new_file_name in
engine_get_version invocation.  Reported by Stphane Corthsy.

2005-11-24
Marcus Brinkmann <marcus@g10code.de>

* w32-glib-io.c (_gpgme_io_fd2str): Remove debug printf.

2005-11-18 Werner Koch <wk@g10code.com>

* w32-glib-io.c: Include glib.h before windows to avoid a symbol
shadowing warning.
(find_channel): Better use g_io_channel_win32_new_fd instead of
the autodetection function g_io_channel_unix_new.
(_gpgme_io_select): Rewritten. It is now a fully working select
implementation.

2005-11-18 Marcus Brinkmann <marcus@g10code.de>

* priv-io.h (_gpgme_io_fd2str): New prototype.
* posix-io.c (_gpgme_io_fd2str): New function.
* w32-io.c (_gpgme_io_fd2str): New function.
* rungpg.c: Use this new function.
* w32-glib-io.c (_gpgme_io_fd2str): Rewrote the file handle code
again. Two's company, three's the musketeers.

* w32-glib-io.c: Rewrote the file handle code. We don't create
system fds for every handle (doesn't work for inherited handles),
but we create pseudo fds in a private namespace that designate a
handle and potentially
a giochannel.

2005-11-18 Werner Koch <wk@g10code.com>

* versioninfo.rc.in: Set file version to LT-version + Svn-revision.

2005-11-17 Marcus Brinkmann <marcus@g10code.de>

* w32-glib-io.c: New file.
* gpgme.def (gpgme_get_giochannel): Add symbol.
* Makefile.am (system_components) [HAVE_DOSISH_SYSTEM]: Remove
w32-io.c.
(ltlib_gpgme_extra): New variable.
(lib_LTLIBRARIES): Add $(ltlib_gpgme_extra).
(system_components_not_extra): New variable.
(libgpgme_la_SOURCES, libgpgme_pthread_la_SOURCES,
(libgpgme_pth_la_SOURCES): Add $(system_components_not_extra).
(libgpgme_glib_la_LDFLAGS, libgpgme_glib_la_DEPENDENCIES,
(libgpgme_glib_la_LIBADD, libgpgme_glib_la_CFLAGS)
[BUILD_W32_GLIB]: New variables.
* gpgme-config.in (glib): New option.

* gpgme.m4 (AM_PATH_GPGME_GLIB): New macro.

2005-11-17  Marcus Brinkmann  <marcus@g10code.de>

* priv-io.h (_gpgme_io_waitpid, _gpgme_io_kill): Removed.
* w32-io.c (_gpgme_io_waitpid, _gpgme_io_kill): Removed.
* posix-io.c (_gpgme_io_kill):
Removed.
(_gpgme_io_waitpid): Declare static.

2005-10-24  Marcus Brinkmann  <marcus@g10code.de>

* w32-io.c (_gpgme_io_spawn): Don't minimize window, hide it.

2005-10-21  Werner Koch  <wk@g10code.com>

* Makefile.am: Fixed cut+paste problem

2005-10-20  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am: Build versioninfo.lo, not versioninfo.o.  Also, fix
the whole mess.

2005-10-16  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (gpg_edit): Don't add a key argument if in card edit
mode.

2005-10-06  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (gpgme.dll gpgme.dll.a): Use $(srcdir) for
gpgme.def.

* gpgme.h (gpgme_free): New prototype.
* data-mem.c (gpgme_free): New function.
* libgpgme.vers (GPGME_1.1): Add gpgme_free.
* gpgme.def: Add gpgme_free.

2005-10-02  Marcus Brinkmann  <marcus@g10code.de>

* util.h (_gpgme_decode_percent_string): Add new argument BINARY
to prototype.
* verify.c (parse_notation): Likewise for invocation.
* conversion.c (_gpgme_decode_percent_string):
Likewise to
declaration.  If set, do not replace '\0' characters with a
printable string.
* gpgme.h (struct _gpgme_key_sig): New field notations.

* ops.h (_gpgme_parse_notation): New prototype.
* sig-notation.c (_gpgme_parse_notation): New function.
* key.c (gpgme_key_unref): Free all signature notations.
* keylist.c (op_data_t): New member tmp_keysig.
(finish_key): Clear OPD->tmp_keysig.
* gpgme.c (gpgme_set_keylist_mode): Remove check.
* rungpg.c (gpg_keylist): Support listing signature notations.
(gpg_keylist_ext): Likewise.

2005-10-01 Marcus Brinkmann <marcus@g10code.de>

* engine.h (_gpgme_set_engine_info): Add prototype.
* engine-backend.h (struct engine_ops): Change return type of
get_file_name() to const char * to silence gcc warning.
* engine.c (engine_get_file_name): Change return type to const
char * to silence gcc warning.
(gpgme_get_engine_info): Use transitional variable to go from
const char * to char * to silence gcc warning.
(_gpgme_set_engine_info):
Likewise.
* engine-gpgsm.c (struct engine_gpgsm): Change type of LINE to
char * to silence gcc warning.
(gpgsm_new): Make ARGV a pointer to const char.
(status_handler): Change type of SRC, END, DST, ALINE and NEWLINE
to char * to silence gcc warning.

* gpgme.def: Add gpgme_data_set_file_name,
gpgme_data_get_file_name, gpgme_sig_notation_clear,
gpgme_sig_notation_add and gpgme_sig_notation_get.
* libgpgme.vers: Add gpgme_sig_notation_clear,
gpgme_sig_notation_add and gpgme_sig_notation_get.
* Makefile.am (libgpgme_real_la_SOURCES): Add sig-notation.c.
* context.h (struct gpgme_context): New field sig_notations.
* gpgme.h (struct _gpgme_sig_notation): New member value_len and
critical.
(GPGME_SIG_NOTATION_CRITICAL): New symbol.
(gpgme_sig_notation_flags_t): New type.
(gpgme_sig_notation_add, gpgme_sig_notation_clear,
gpgme_sig_notation_get): New prototypes.
* ops.h (_gpgme_sig_notation_create, _gpgme_sig_notation_free):
New prototypes.
*
sig-notation.c (_gpgme_sig_notation_free): New file.
* verify.c (parse_notation): Use support functions.
(release_op_data): Likewise.
* rungpg.c (append_args_from_sig_notations): New function.
(gpg_encrypt_sign, gpg_sign): Call it.

2005-09-30  Marcus Brinkmann  <marcus@g10code.de>

* data.h (struct gpgme_data): New member file_name.
* data.c (gpgme_data_set_filename): New function.
(_gpgme_data_release): Free DH->filename if necessary.
(gpgme_data_get_filename): New function.
* rungpg.c (gpg_encrypt): Set filename option.
(gpg_encrypt_sign): Likewise.
(gpg_sign): Likewise.
* libgpgme.vers (GPGME_1.1): Add gpgme_data_set_file_name and gpgme_data_get_file_name.

* decrpyt.c, verify.c, gpgme.h: Replace plaintext_filename with file_name.

2005-09-29  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (struct _gpgme_key): Add field is_qualified.
(struct _gpgme_subkey): Likewise.
* keylist.c (set_subkey_capability, set_mainkey_capability): Set field is_qualified.

2005-09-23
Werner Koch  <wk@g10code.com>

* w32-io.c (_gpgme_io_pipe): Removed use of environment variable again.
(create_reader, create_writer): Set thread priority higher.

2005-09-19  Werner Koch  <wk@g10code.com>

* w32-io.c (_gpgme_io_pipe): New environment variable to change the size of the pipe buffer.

2005-09-13  Werner Koch  <wk@g10code.com>

* ath.c: Changes to make it work under W32.

2005-09-12  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (libgpgme_la_SOURCES): Set to ath.h and ath.c.
(ath_pth_src, ath_pthread_src): Removed.
(w32_o_files): Replace ath-compat.o with ath.o.
(libgpgme_pth_la_CFLAGS): New variable.
* ath-compat.c, ath-pthread-compat.c, ath-pth-compat.c: Removed.
* ath.h (ath_pthread_available, ath_pth_available): Removed.
(ath_init) [!_ATH_EXT_SYM_PREFIX]: Do not define macro.
(struct ath_ops, ath_init) [_ATH_COMPAT]: Removed.

(_ATH_COMPAT): Macro removed.
* posix-sema.c (_gpgme_sema_subsystem_init): Do not call
_gpgme_ath_init.

2005-09-12
Marcus Brinkmann <marcus@g10code.de>

* keylist.c (release_op_data): Do not free opd->tmp_uid.

2005-09-07 Werner Koch <wk@g10code.com>

* w32-io.c (build_commandline): Quote argv[0].

2005-08-26 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (command_handler): Use _gpgme_io_write instead of write.

* edit.c (command_handler): Do not depend on PROCESSED being
available.

* engine.h (engine_command_handler_t): Add new argument processed.
* ops.h (_gpgme_passphrase_command_handler_internal): Rename
prototype to ...
(_gpgme_passphrase_command_handler): ... this one.
* passphrase.c (_gpgme_passphrase_command_handler_internal):
Rename to ...
(_gpgme_passphrase_command_handler): ... this one.
* edit.c (command_handler): Add new argument processed. Remove
local variable with the same name. Always return processed as
true.
* rungpg.c (command_handler): Send a newline character if the
handler did not.

2005-08-26 Werner Koch <wk@g10code.com>

* w32-util.c (read_w32_registry_string):
Updated from code used by
GnuPG. This allows for expanding strings and features the
implicit fallback key.
(w32_shgetfolderpath, find_program_at_standard_place): New.
(_gpgme_get_gpg_path, _gpgme_get_gpgsm_path): With no registry
entry, locate the programs at the standard place.
(dlopen, dlsym, dlclose): New, so that we can keep on using what
we are accustomed to.

* debug.c (debug_init): Use PATHSEP_C so that under W32 a
semicolon is used which allows us to create files with drive
letters.

* w32-io.c (_gpgme_io_read, _gpgme_io_write): Print content in
debug mode too.

2005-07-27  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (gpgme_status_code_t): Add GPGME_STATUS_PLAINTEXT.
(struct _gpgme_op_decrypt_result): New member plaintext_filename.
(struct _gpgme_op_verify_result): Likewise.
* ops.h (_gpgme_parse_plaintext): Add prototype.
* op-support.c (_gpgme_parse_plaintext): New function.
* decrypt.c (release_op_data): Release
OPD->result.plaintext_filename.
(_gpgme_decrypt_status_handler):
Handle GPGME_STATUS_PLAINTEXT.
* verify.c (release_op_data): Release
OPD->result.plaintext_filename.
(_gpgme_verify_status_handler): Handle GPGME_STATUS_PLAINTEXT.

2005-08-08  Werner Koch  <wk@g10code.com>

* util.h (stpcpy): Renamed to ..
(_gpgme_stpcpy): .. this and made inline.  This avoids duplicate
definitions when linking statically.
* stpcpy.c: Removed.

2005-08-19  Werner Koch  <wk@g10code.com>

* gpgme.def: New.
* versioninfo.rc.in: New.
* Makefile.am: Adds support for building a W32 DLL.

* ttyname_r.c (ttyname_r) [W32]: Return error.
* ath-compat.c [W32]: select and co are not yet supported; return
error.
* data-stream.c (stream_seek): Use ftell if ftello is not available.

2005-07-26  Marcus Brinkmann  <marcus@g10code.de>

* keylist.c (gpgme_get_key): Allow key IDs.

2005-06-20  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.m4: Only call GPGME_CONFIG if found.

2005-06-03  Marcus Brinkmann  <marcus@g10code.de>

*

gpgme.h (struct _gpgme_signature): New members pubkey_algo and
hash_algo.
* verify.c (parse_valid_sig): Parse pubkey and hash algo numbers.
(parse_new_sig): Parse pubkey, hash algo and timestamp for ERRSIG.

(_gpgme_decrypt_status_handler): Fix last change.

* gpgme.h (struct _gpgme_recipient): New structure.
(gpgme_recipient_t): New type.
(struct _gpgme_op_decrypt_result): Add member recipients.
* decrypt.c (op_data_t): New member last_recipient_p.
(_gpgme_op_decrypt_init_result): Initialize last_recipient_p.
(parse_enc_to): New function.
(_gpgme_decrypt_status_handler): Handle status ENC_TO and
NO_SECKEY.

* wait-global.c (gpgme_wait): Break out of the fd processing loop
after an error.
Reported by Igor Belyi <gpgme@katehok.ac93.org>.

2005-06-02 Marcus Brinkmann <marcus@g10code.de>

* wait.h (_gpgme_run_io_cb): New prototype.
* wait.c (_gpgme_run_io_cb): New function.
* wait-global.c (gpgme_wait): Call it.
* wait-user.c (_gpgme_user_io_cb_handler): Likewise.
*
wait-private.c (_gpgme_wait_on_condition): Likewise.

2005-06-02 Werner Koch <wk@g10code.com>

* passphrase.c (_gpgme_passphrase_status_handler): Take care of
GPGME_STATUS_NEED_PASSPHRASE_PIN.
(_gpgme_passphrase_command_handler_internal): Also act on the key
"passphrase.pin.ask".

* gpgme.h: Added status codes GPGME_STATUS_SIG_SUBPACKET,
GPGME_STATUS_NEED_PASSPHRASE_PIN, GPGME_STATUS_SC_OP_FAILURE,
GPGME_STATUS_SC_OP_SUCCESS, GPGME_STATUS_CARDCTRL,
GPGME_STATUS_BACKUP_KEY_CREATED.

2005-05-28 Marcus Brinkmann <marcus@g10code.de>

* data-user.c: Include <errno.h>.

2005-05-17 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (gpgme_new): Set the CTX->include_certs default to the

default.

2005-05-11  Marcus Brinkmann  <marcus@g10code.de>

* w32-io.c (_gpgme_io_select): Fix loop increment.

2005-05-05  Marcus Brinkmann  <marcus@g10code.de>

* data-user.c (user_release): Only call user hook if provided.
(user_seek): Return EBADF if no user hook is provided.
(user_read):
Likewise.
(user_write): Likewise.

2005-04-28  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (GPGME_INCLUDE_CERTS_DEFAULT): New macro.
* engine-gpgsm.c (gpgsm_sign): Send the include-certs option after
the reset, just for cleanliness, and do not sent it at all if the
default is requested.
* gpgme.c (gpgme_set_include_certs): Allow to use
GPGME_INCLUDE_CERTS_DEFAULT.

2005-04-21  Werner Koch  <wk@g10code.com>

* verify.c (calc_sig_summary): Set the key revoked bit.

2005-04-14  Marcus Brinkmann  <marcus@g10code.de>

* wait-global.c (gpgme_wait): Use LI->ctx when checking a context
in the list, not the user-provided CTX.
Reported by Igor Belyi <gpgme@katehok.ac93.org>.

* wait-global.c (gpgme_wait): If no context is found, and we
should not hang, set *status to 0 and return NULL.
Reported by Igor Belyi <gpgme@katehok.ac93.org>.

2005-03-24  Marcus Brinkmann  <marcus@g10code.de>

* data.h (EOPNOTSUPP) [_WIN32]: Remove definition.
* data.c (EOPNOTSUPP) [HAVE_W32_SYSTEM]:
Remove definition.
(gpgme_data_read, gpgme_data_write, gpgme_data_seek): Return
ENOSYS instead EOPNOTSUPP.
* data-compat.c (EOPNOTSUPP) [HAVE_W32_SYSTEM]: Remove definition.
(gpgme_error_to_errno): Map GPG_ERR_NOT_SUPPORTED
to ENOSYS.

2005-03-24  Marcus Brinkmann  <marcus@g10code.de>

* io.h: Rename to ...
* priv-io.h: ... this.
* Makefile.am (libgpgme_real_la_SOURCES): Change io.h to priv-io.h.
* data.c, engine-gpgsm.c, posix-io.c, rungpg.c, version.c,
w32-io.c, wait-private.c, wait-global.c, wait-user.c, wait.c:
Change all includes of "io.h" to "priv-io.h"

2005-03-09  Werner Koch  <wk@g10code.com>

* w32-util.c (_gpgme_get_gpg_path, _gpgme_get_gpgsm_path): Do not
cast away type checks.

* io.h [W32]: Do not include stdio.h.  If it is needed do it at
the right place.

* data.h [W32]: Removed kludge for EOPNOTSUP.
* data.c, data-compat.c [W32]: Explicitly test for it here.

Replaced use of _WIN32 by HAVE_W32_SYSTEM except for public header
files.

2005-03-07
Timo Schulz  <twoaday@g10code.de>

* gpgme.h: [_WIN32] Removed ssize_t typedef.
* ath.h: [_WIN32] Added some (dummy) types.
* io.h: [_WIN32] include stdio.h.
* data.h: [_WIN32] Define EOPNOTSUPP.
* w32-io.c [_WIN32] (_gpgme_io_subsystem_init): New.
* gpgme.c [_WIN32] (gpgme_set_locale): Disabled.

2004-12-12  Marcus Brinkmann  <marcus@g10code.de>

* engine.c (_gpgme_set_engine_info): Fix assertion.

2004-12-11  Marcus Brinkmann  <marcus@g10code.de>

* util.h [HAVE_CONFIG_H && HAVE_TTYNAME_R] (ttyname_r): Define
prototype.
* ttyname_r.c: New file.

2004-12-07  Marcus Brinkmann  <marcus@g10code.de>

* putc_unlocked.c, funopen.c: I just claim copyright on these
files and change their license to LGPL, because they are totally
trivial wrapper functions.

* isascii.c: Change copyright notice to the one from ctype/ctype.h
in the GNU C Library (CVS Head 2004-10-10), where isascii is
defined as a macro doing exactly the same as the
function in this
file.
* memrchr.c: Update from the GNU C Library (CVS Head 2001-07-06).
* stpcpy.c: Update from the GNU C Library (CVS Head 2004-10-10).
* ath.c, ath-compat.c, ath.h, ath-pth.c, ath-pth-compat.c,
ath-pthread.c, ath-pthread-compat.c, context.h, conversion.c,
data.c, data-compat.c, data-fd.c, data.h, data-mem.c,
data-stream.c, data-user.c, debug.c, debug.h, decrypt.c,
decrypt-verify.c, delete.c, edit.c, encrypt.c, encrypt-sign.c,
engine-backend.h, engine.c, engine-gpgsm.c, engine.h, error.c,
export.c, genkey.c, get-env.c, gpgme.c, gpgme.h, import.c, io.h,
key.c, keylist.c, mkstatus, Makefile.am, ops.h, op-support.c,
passphrase.c, posix-io.c, posix-sema.c, posix-util.c, progress.c,
rungpg.c, sema.h, sign.c, signers.c, trust-item.c, trustlist.c,
util.h, verify.c, version.c, w32-io.c, w32-sema.c, w32-util.c,
wait.c, wait-global.c, wait.h, wait-private.c, wait-user.c: Change
license to LGPL.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

* libgpgme.vers
(GPGME_1.1): New version.
* engine-backend.h (struct engine_ops): Add argument FILE_NAME to
member get_version(). Add arguments FILE_NAME and HOME_DIR to
member new(). Change return type of get_file_name and get_version
to char *.
* engine-gpgsm.c (gpgsm_get_version): Change return type to char
pointer. Do not cache result.
(gpgsm_new): Add file_name and home_dir argument, and use them
instead of the defaults, if set.
* rungpg.c (struct engine_gpg): New member file_name.
(gpg_get_version): Change return type to char pointer, and do not
cache result.
(gpg_release): Free gpg->file_name.
(gpg_new): Take new arguments file_name and home_dir. Set the
--homedir argument if HOME_DIR is not NULL. Set gpg->file_name.
(start): Use gpg->file_name instead _gpgme_get_gpg_path, if set.
* engine.h (_gpgme_engine_info_copy, _gpgme_engine_info_release):
New prototypes.
(_gpgme_engine_new): Change first argument to gpgme_engine_info_t
info.
* engine.c: Include <assert.h>.
(gpgme_get_engine_info):
Set *INFO within the lock. Move
ENGINE_INFO and ENGINE_INFO_LOCK to ....

(engine_info, engine_info_lock): ... here.  New static variables.
(engine_get_version): Add file_name argument to
get_version invocation.  Change return type to char pointer.
(gpgme_engine_check_version): Rewritten to free() the return value
of engine_get_version after using it.
(_gpgme_engine_info_release): New function.
(gpgme_get_engine_info): Rewritten.
(_gpgme_engine_info_copy): New function.
(_gpgme_set_engine_info): New function.
(gpgme_set_engine_info): New function.
(_gpgme_engine_new): Change first argument to gpgme_engine_info_t
info, and use that.
* gpgme.h (struct _gpgme_engine_info): Change type of file_name
and version to char * (remove the const).  New member home_dir.
(gpgme_set_engine_info, gpgme_ctx_get_engine_info,
gpgme_ctx_set_engine_info): New prototypes.
* context.h (struct gpgme_context): New member engine_info.
* gpgme.c (gpgme_new): Allocate CTX->engine_info.
(gpgme_release):
Deallocate CTX->engine_info.
(gpgme_ctx_get_engine_info, gpgme_ctx_set_engine_info): New
functions.
* op-support.c (_gpgme_op_reset): Look for correct engine info and
pass it to _gpgme_engine_new.
* version.c (gpgme_check_version): Adjust to
_gpgme_compare_versions returning an int.
(_gpgme_compare_versions): Return an int value, not a const char
pointer.
* ops.h (_gpgme_compare_versions): Same for prototype.

2004-10-03  Marcus Brinkmann  <marcus@g10code.de>

* verify.c (parse_trust): If no reason is provided, set
SIG->validity_reason to 0.
(calc_sig_summary): Set GPGME_SIGSUM_CRL_TOO_OLD if appropriate.

2004-10-22  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (map_assuan_error): Return 0 if ERR is 0.
(start): Call map_assuan_error on return value of
assuan_write_line.

2004-10-05  Marcus Brinkmann  <marcus@g10code.de>

* op-support.c (_gpgme_op_data_lookup): Use char pointer for
pointer arithmetic.

2004-09-30  Marcus Brinkmann

<marcus@g10code.de>

* gpgme.m4: Implement the --api-version check.

* rungpg.c (read_status): Move the polling of the output data pipe
to just before removing the command fd, from just before adding
it. This avoids buffering problems.

* data.c (_gpgme_data_inbound_handler): Use _gpgme_io_read, not
read, to improve debug output.

2004-09-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (GPGME_IMPORT_NEW, GPGME_IMPORT_UID, GPGME_IMPORT_SIG,
GPGME_IMPORT_SUBKEY, GPGME_IMPORT_SECRET,
(GPGME_KEYLIST_MODE_LOCAL, GPGME_KEYLIST_MODERN_EXTERN,
GPGME_KEYLIST_MODE_SIGS, GPGME_KEYLIST_MODE_VALIDATE): Change from
enum to macros.
(gpgme_keylist_mode_t): Define as unsigned int.
(gpgme_key_t): Change type of keylist_mode to
gpgme_keylist_mode_t.

2004-09-23 Marcus Brinkmann <marcus@g10code.de>

* data.c (_gpgme_data_outbound_handler): Close the file descriptor
if we get an EPIPE.

* data-stream.c (stream_seek): Call ftello and return the current
offset.
* data.h (struct
gpgme_data): Change type of data.mem.offset to
off_t.
* data.c (gpgme_data_seek): Check dh->cbs->seek callback, not read
callback. If SEEK_CUR, adjust the offset by the pending buffer
size. Clear pending buffer on success.

2004-09-14 Marcus Brinkmann <marcus@g10code.de>

* gpgme.m4: Add copyright notice.

2004-08-18 Marcus Brinkmann <marcus@g10code.de>

* passphrase.c (_gpgme_passphrase_status_handler): Always run the
status handler.

2004-08-17 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (build_argv): Use --no-sk-comment, not --no-comment.

2004-06-23  Marcus Brinkmann  <marcus@g10code.de>

* key.c (_gpgme_key_append_name): Make sure tail points to the
byte following the uid.
(_gpgme_key_add_sig): Likewise.  Don't use calloc, but malloc and
memset.

2004-06-02  Marcus Brinkmann  <marcus@g10code.de>

* libgpgme.vers: Remove C-style comment, which is not supported by
older binutils.

2004-05-21  Marcus Brinkmann  <marcus@g10code.de>

* gpgme-config.in (Options):
Support --api-version.

* libgpgme.vers: List all gpgme symbols under version GPGME_1.0.

* decrypt.c (_gpgme_decrypt_status_handler): Fix last change.
* verify.c (parse_error): Likewise.

* verify.c (parse_error): Do not skip location of where token.

* gpgme.h (gpgme_status_code_t): Add GPGME_STATUS_REVKEYSIG.
* verify.c (_gpgme_verify_status_handler): Add handling of
GPGME_STATUS_REVKEYSIG.
(parse_trust): Likewise.

2004-05-21  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (struct _gpgme_decrypt_result): New fields
wrong_key_usage and _unused.
* decrypt.c (_gpgme_decrypt_status_handler): Don't skip over
character after a matched string, as in a protocol error this
could skip over the trailing binary zero.
Handle decrypt.keyusage error notifications.

* gpgme.h (struct _gpgme_key): New member keylist_mode.
* keylist.c (keylist_colon_handler): Set the keylist_mode of KEY.

2004-04-29  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (struct _gpgme_signature):
Change member WRONG_KEY_USAGE
to unsigned int.  Same for member _unused.

* keylist.c (set_mainkey_trust_info): Rewritten.
(set_subkey_capability): Handle 'd' (disabled).
(set_mainkey_capability): Rewritten.

2004-04-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.m4: Quote first argument to AC_DEFUN.

2004-04-21 Werner Koch <wk@gnupg.org>

* key.c (gpgme_key_unref): Allow passing NULL like free does.
The rule of least surprise.

2004-04-15 Werner Koch <wk@gnupg.org>

* verify.c (prepare_new_sig, _gpgme_verify_status_handler): Remove
unused result.signatures items.

* keylist.c (gpgme_get_key): Return an error if FPR is NULL.

2004-04-08 Werner Koch <wk@gnupg.org>

* verify.c (_gpgme_verify_status_handler): Ignore the error status
if we can't process it.
* decrypt-verify.c (decrypt_verify_status_handler): Backed out
yesterday's hack. It is not any longer required.

2004-04-07 Werner Koch <wk@gnupg.org>

* decrypt-verify.c (decrypt_verify_status_handler):
Hack to cope
with meaningless error codes from the verify status function.

2004-04-05 Werner Koch <wk@gnupg.org>

* gpgme.h: Add GPGME_STATUS_NEWSIG.

* verify.c (parse_error): Compare only the last part of the where
token.
(prepare_new_sig): New.
(parse_new_sig): Use prepare_new_sig when required.
(_gpgme_verify_status_handler): Handle STATUS_NEWSIG.

* engine-gpgsm.c (gpgsm_keylist_ext): Send with-validation
option. Fixed pattern construction.
(status_handler): Add debugging output.

2004-03-23  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_new): Protect _only_ tty related code with
isatty().  Submitted by Bernhard Herzog.

2004-03-11  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_new): Protect all tty related code with
isatty().

* rungpg.c (gpg_cancel): Set GPG->fd_data_map to NULL after
releasing it.
* engine-gpgsm.c (gpgsm_cancel): Only call assuan_disconnect if
GPGSM->assuan_ctx is not NULL.  Set it to NULL afterwards.

2004-03-07
Marcus Brinkmann  <marcus@g10code.de>

* gpgme-config.in: Do not emit include and lib directory for
prefix "/usr" or "".

2004-03-03  Werner Koch  <wk@gnupg.org>

* engine-gpgsm.c (gpgsm_export_ext): Properly insert a space
between patterns.

2004-02-18  Werner Koch  <wk@gnupg.org>

* gpgme-config.in: Ignore setting of --prefix.

2004-02-25  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (gpg_cancel): New function.
(gpg_release): Call it here.
(_gpgme_engine_ops_gpg): Add it here.
* engine-gpgsm.c (gpgsm_cancel): Fix last change.

2004-02-24  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c (gpgme_cancel): New function.
* engine-backend.h (struct engine_ops): New member cancel.
* engine.h (_gpgme_engine_cancel): New prototype.
* engine.c (_gpgme_engine_cancel): New function.
* engine-gpgsm.c (_gpgme_engine_ops_gpgsm): Add new member cancel.
(gpgsm_cancel): New function.
(gpgsm_release): Use it.
* rungpg.c (_gpgme_engine_ops_gpg): Add new member cancel.

2004-02-17
Werner Koch <wk@gnupg.org>

* gpgme.h: Add GPGME_KEYLIST_MODE_VALIDATE.
* engine-gpgsm.c (gpgsm_keylist): Send this to gpgsm.

2004-02-15 Werner Koch <wk@gnupg.org>

* memrchr.c (memrchr): Fixed implementation. Problem pointed out
by Adriaan de Groot.

2004-02-01 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (build_argv): Use --no-comment, not --comment "".

* data-compat.c (gpgme_data_new_from_filepart): Call fseeko if
available.
* data-stream.c (stream_seek): Likewise.

2004-01-16 Werner Koch <wk@gnupg.org>

* conversion.c (_gpgme_map_gnupg_error): Handle numerical codes as
used by GnuPG 1.9.x

2004-01-13 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (struct _gpgme_key_sig): Fix comment on REVOKED.

2004-01-12 Werner Koch <wk@gnupg.org>

* sign.c: Include util.h for prototype of _gpgme_parse_timestamp.

2003-12-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (_GPGME_D_CLASS): Revert this change.
(struct _gpgme_key_sig): For C++ compilers,
rename class
member to _obsolete_class. Add new member sig_class.
(struct _gpgme_new_signature): Same here.
* key.c (gpgme_key_sig_get_ulong_attr): Use CERTSIG->sig_class,
not CERTSIG->class.
* keylist.c (keylist_colon_handler): Likewise for KEYSIG, but keep
setting KEYSIG->class, too. Rename variable CLASS to SIG_CLASS.
* sign.c (parse_sig_created): Set SIG->sig_class.

2003-12-22 Werner Koch <wk@gnupg.org>

* gpgme.h (_GPGME_D_CLASS): Kludge for C++ compatibility without

changing the C API.

2003-11-19 Werner Koch <wk@gnupg.org>

* conversion.c (_gpgme_parse_timestamp): New.
(atoi_1, atoi_2, atoi_4): New.
* keylist.c (parse_timestamp): Removed. Changed all callers to use
the new function.
* verify.c (parse_valid_sig): Ditto. Repalced the errno check.
* sign.c (parse_sig_created): Ditto.

2003-10-31 Werner Koch <wk@gnupg.org>

* keylist.c (parse_timestamp): Detect ISO 8601 timestamps and try
to convert them.

2003-10-10 Marcus Brinkmann <marcus@g10code.de>

*
genkey.c (get_key_parameter): Make a copy of the key parameters.
Submitted by Miguel Coca <e970095@zipi.fi.upm.es>.

2003-10-06 Marcus Brinkmann <marcus@g10code.de>

* data-compat.c: Include <sys/time.h> before <sys/stat.h> for
broken systems.

* engine-gpgsm.c (map_assuan_error): If ERR is -1, return sensible
error.

* io.h (_gpgme_io_subsystem_init): New prototype.
* posix-io.c (_gpgme_io_subsystem_init): Add function.
(_gpgme_io_spawn): Do not fixup signal handler here.
* version.c (do_subsystem_inits): Call _gpgme_io_subsystem_init.

* debug.c (debug_init): Drop const qualifier from E.

* ath.h (struct ath_ops): Make ADDR argument of CONNECT prototype
const.
(ath_connect): Make ADDR argument const.
* ath-pthread.c (ath_connect): Likewise.
* ath-pth.c (ath_connect): Likewise.
* ath-compat.c (ath_connect): Likewise.
* ath.c (ath_connect): Likewise.

* ath.h [HAVE_SYS_SELECT_H]: Include <sys/select.h> for fd_set.
[!HAVE_SYS_SELECT_H]: Include <sys/time.h>.

*
conversion.c (_gpgme_hextobyte): Drop "unsigned" from type of
SRC argument.
* util.h (_gpgme_hextobyte): Likewise for prototype.

* gpgme.h: Remove trailing comma in enum.

* rungpg.c: Do not include <time.h>, <sys/time.h>, <sys/types.h>,
<signal.h>, <fcntl.h>, or "unistd.h".

2003-10-02 Marcus Brinkmann <marcus@g10code.de>

* engine-backend.h (struct engine_ops): Add argument TYPE.
* engine.c (_gpgme_engine_op_edit): Likewise.
* engine.h: Likewise.
* rungpg.c (gpg_edit): Likewise. Use it.
* edit.c (edit_start): Likewise. Pass it on.
(gpgme_op_edit_start, gpgme_op_edit): Likewise.
(gpgme_op_card_edit_start, gpgme_op_card_edit): New functions.

2003-09-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (gpg_strerror_r): Change prototype to match
gpg_strerror_r change.
* error.c (gpg_strerror_r): Likewise, also update implementation.

* gpgme.c (gpgme_hash_algo_name): Change name of RMD160 to
RIPEMD160, name of TIGER to TIGER192, name of CRC32-RFC1510 to
CRC32RFC1510,
and name of CRC24-RFC2440 to CRC24RFC2440.

2003-09-14 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h: Add prototype for gpgme_set_locale.

* gpgme.h: Define macro _GPGME_INLINE depending on the compiler
characteristics and use that instead __inline__.

* context.h (struct gpgme_context): New members lc_ctype and
lc_messages.
* gpgme.c: Include <locale.h>.
(def_lc_lock, def_lc_ctype, def_lc_messages): New static
variables.
(gpgme_set_locale): New function.
* engine.c (_gpgme_engine_new): Add arguments lc_ctype and
lc_messages.
* engine.h (_gpgme_engine_new): Likewise.
* engine-gpgsm.c (gpgsm_new): Likewise.

* rungpg.c (gpg_new): Likewise.
* engine-backend.h (struct engine_ops): Likewise to NEW.
* op-support.c (_gpgme_op_reset): Likewise to invocation of
_gpgme_engine_new.

2003-09-13 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (gpgme_strerror_r): New prototype.
* error.c (gpgme_strerror_r): New function.

* get-env.c: New file.
* util.h (_gpgme_getenv):
Add prototype.
* Makefile.am (libgpgme_real_la_SOURCES): Add get-env.c.
* rungpg.c (build_argv): Use _gpgme_getenv.
* debug.c (debug_init): Likewise.
* engine-gpgsm.c (gpgsm_new): Likewise.
(gpgsm_new): Use ttyname_r.
* w32-io.c (_gpgme_io_spawn): Disable debugging for now.

2003-09-03 Marcus Brinkmann <marcus@g10code.de>

* gpgme-config.in: Use $libdir, not @libdir@, for the echo
command.

* gpgme-config.in: Rewritten.
* gpgme.m4: Rewritten.

2003-08-19 Marcus Brinkmann <marcus@g10code.de>

The ath files (ath.h, ath.c, ath-pth.c, ath-pthread.c,
ath-compat.c, ath-pth-compat.c and ath-pthread-compat.c) have been
updated to have better thread support, and the Makefile.am was
changed to reflect that.

* util.h [!HAVE_FOPENCOOKIE]: Remove fopencookie declaration.
* engine-gpgsm.c (gpgsm_assuan_simple_command): Set ERR to return
value of status_fnc.
* rungpg.c (start): Return SAVED_ERRNO, not errno.

2003-08-18 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (start):
Use saved_errno instead errno.

2003-08-18 Marcus Brinkmann <marcus@g10code.de>

* funopen.c, putc_unlocked.c, isascii.c, memrchr.c: New files.

* fopencookie.c: File removed.

2003-08-15 Marcus Brinkmann <marcus@g10code.de>

* gpgme-config.in: Put gpg-error related flags after gpgme's.

2003-08-14 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (struct _gpgme_new_signature): Rename member CLASS to
_OBSOLETE_CLASS, add member CLASS with type unsigned int.
* sign.c (parse_sig_created): Also set SIG->_unused_class for
backward compatibility.

2003-08-04 Marcus Brinkmann <marcus@g10code.de>

* verify.c (parse_new_sig): Fix status parsing case.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (struct _gpgme_subkey): Add flag CAN_AUTHENTICATE.
Lower _UNUSED to 23 bits.
(struct _gpgme_key): Likewise.
* keylist.c (set_mainkey_capability): Support 'a' and 'A'.
(set_subkey_capability): Support 'a'.

* keylist.c (gpgme_get_key): Check if there is more than
one key
listed, and return GPG_ERR_AMBIGUOUS_NAME in that case.

* util.h (_gpgme_decode_c_string): Change type of LEN argument to
size_t.
(_gpgme_decode_percent_string): Likewise.
* conversion.c (_gpgme_decode_c_string): Likewise.
(_gpgme_decode_percent_string): Likewise.
(_gpgme_map_gnupg_error): Change type of I to unsigned int.
* signers.c (gpgme_signers_clear): Likewise.
(gpgme_signers_enum): New unsigned variable SEQNO, set to SEQ.
Use SEQNO instead SEQ.
* wait.c (fd_table_put): Change type of I and J to unsigned int.
* wait-global.c (_gpgme_wait_global_event_cb): Change type of IDX
to unsigned int.
(gpgme_wait): Change type of I and IDX to unsigned int.
* wait-private.c (_gpgme_wait_on_condition): Change type of IDX
and I to unsigned int.
* posix-io.c (_gpgme_io_close): Cast return value of macro DIM to
int to suppress gcc warning.
(_gpgme_io_set_close_notify): Likewise.
(_gpgme_io_select): Change type of I to unsigned int.

* engine.c (gpgme_get_engine_info):
Change type of PROTO to
unsigned int.
* wait-user.c (_gpgme_user_io_cb_handler): Change type of IDX and
I to unsigned int.

2003-07-29 Marcus Brinkmann <marcus@g10code.de>

* decrypt-verify.c (decrypt_verify_status_handler): Expand silly
and wrong expression.
* encrypt-sign.c (encrypt_sign_status_handler): Likewise.
* encrypt.c (encrypt_sym_status_handler): Likewise.
* sign.c (sign_status_handler): Likewise.
* verify.c (verify_status_handler): Likewise.
* decrypt.c (decrypt_status_handler): Likewise.

* engine.c (gpgme_get_engine_info): Initialize NULL.

2003-07-23 Marcus Brinkmann <marcus@g10code.de>

* gpgme-config.in (gpg_error_libs): Quote GPG_ERROR_CFLAGS and
GPG_ERROR_LIBS when setting the corresponding variables.
Reported by Stphane Corthsy.

2003-07-22 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (set_recipients): Move declaration of NEWLEN to
the beginning of the block.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

* data-mem.c (mem_write):
Copy original buffer content.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (gpgme_user_ids_release, gpgme_user_ids_append): Remove
prototypes.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (AM_CPPFLAGS): Add @GPG_ERROR_CFLAGS@.
* gpgme-config.in (gpg_error_libs, gpg_error_cflags): New variables.
Print them.

* op-support.c (_gpgme_parse_inv_userid): Rename to
_gpgme_parse_inv_recp and change to new datatype.
* ops.h (_gpgme_parse_inv_key): Fix prototype.

* gpgme.h (struct _gpgme_invalid_user_id): Rename to
__gpgme_invalid_key.  Rename field ID to KEY.
(gpgme_invalid_user_id_t): Rename to gpgme_invalid_key_t.
(struct _gpgme_op_encrypt_result): Here, too.
(struct _gpgme_op_sign_result): Likewise.
* encrypt.c (struct op_data): Likewise.
(release_op_data): Likewise.
* sign.c (struct op_data): Likewise.
(release_op_data): Likewise.

* posix-io.c (_gpgme_io_read): Save errno across debug calls.
(_gpgme_io_write): Likewise.
(_gpgme_io_pipe):
Likewise.
(_gpgme_io_select): Likewise.

* rungpg.c (struct engine_gpg): Remove arg_error.
(add_arg): Don't set arg_error.
(add_data): Likewise.
(start): Don't check arg_error.
(gpg_new): Check return value of add_arg.
* verify.c (parse_notation): Free allocated memory at error.

2003-06-05  Marcus Brinkmann  <marcus@g10code.de>

Everywhere: Use libgpg-error error codes.

* Makefile.am (EXTRA_DIST): Remove mkerrors.
(BUILT_SOURCES): Remove errors.c.
(MOSTLYCLEANFILES): Likewise.
(libgpgme_la_SOURCES): Likewise.  Add error.c.
(errors.c): Remove target.
* mkerrors: File removed.
* error.c: New file.

* gpgme.h (gpgme_error_t): Change to type gpg_error_t.
(gpgme_err_code_t, gpgme_err_source_t): New types.
(gpgme_err_code, gpgme_err_source, gpgme_error, gpgme_err_make):
New static inline functions.
(gpgme_strsource, gpgme_err_code_from_errno,
gpgme_err_code_to_errno, gpgme_err_make_from_errno,
gpgme_error_from_errno): New prototypes.

2003-05-29  Marcus
Brinkmann  <marcus@g10code.de>

* gpgme.h (gpgme_op_export_start): Change second arg to const char *.
(gpgme_op_export): Likewise.

(gpgme_op_export_ext_start): New prototype.
(gpgme_op_export_ext): Likewise.
* engine.h: Likewise for _gpgme_engine_op_export and
_gpgme_engine_op_export_ext.
* engine-backend.h (struct engine_ops): Change second argument of
prototype of export to const char *, and add reserved int as
third argument.  Add prototype for export_ext.
* engine.c (_gpgme_engine_op_export_ext): New function.
(_gpgme_engine_op_export): Change second argument of prototype of
export to const char *, and add reserved int as third argument.
* rungpg.c (gpg_export): Change second argument of prototype of
export to const char *, and add reserved int as third argument.
(gpg_export_ext): New function.
(gpg_keylist_ext): Break loop at error.
(_gpgme_engine_ops_gpg): Add gpg_export_ext.
* engine-gpgsm.c (gpgsm_export): Change second argument of
prototype of export to const
char *, and add reserved int as
third argument.
(gpgsm_export_ext): New function.
(_gpgme_engine_ops_gpgsm): Add gpgsm_export_ext.
* export.c (export_start): Change second argument of prototype of
export to const char *, and add reserved int as third argument.
(gpgme_op_export_start): Likewise.
(export_ext_start): New function.
(gpgme_op_export_ext_start): Likewise.
(gpgme_op_export_ext): Likewise.

* gpgme.h (gpgme_keylist_mode_t): New type for anonymous enum.
(gpgme_sigsum_t): New type for anonymous enum.

* encrypt-sign.c (encrypt_sign_start): Check for errors earlier,
and return an error if RECP is not set.

* Makefile.am (libgpgme_la_SOURCES): Remove user-id.c.
* user-id.c: Remove file.
* ops.h: Remove prototype for _gpgme_user_ids_all_valid.
* gpgme.h (gpgme_encrypt_flags_t): New type.
(gpgme_op_encrypt_start): Change second parameter to type
gpgme_key_t[], and add third parameter.
(gpgme_op_encrypt): Likewise.
(gpgme_op_encrypt_sign_start): Likewise.
(gpgme_op_encrypt_sign):
Likewise.
* encrypt.c (encrypt_start): Likewise.
(gpgme_op_encrypt_start): Likewise.
(gpgme_op_encrypt): Likewise.  Pass flags to engine.
* encrypt-sign.c (encrypt_sign_start): Likewise.

(gpgme_op_encrypt_sign_start): Likewise.
(gpgme_op_encrypt_sign): Likewise.
* engine-backend.h (struct engine_ops): Likewise for prototypes of
encrypt and encrypt_sign.
* engine.h: Likewise for prototypes of _gpgme_engine_op_encrypt
and _gpgme_engine_op_encrypt_sign.
* engine.c (_gpgme_engine_op_encrypt): Likewise.
(_gpgme_engine_op_encrypt_sign): Likewise.
* rungpg.c (gpg_encrypt): Likewise.
(gpg_encrypt_sign): Likewise.
* rungpg.c (gpg_encrypt): Check flags for always trust option.
* engine-gpgsm.c (gpgsm_encrypt): Likewise.
(set_recipients): Rewritten to use keys instead user IDs.
* rungpg.c (append_args_from_recipients): Rewritten to use keys
instead user IDs.
* encrypt.c (_gpgme_encrypt_status_handler): Change errors
returned to GPGME_Invalid_Key and GPGME_General_Error.

2003-05-28
Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c: Rename GpgsmObject to engine_gpgsm_t.
(struct gpgsm_object_s): Rename to struct engine_gpgsm.
* rungpg.c: Rename GpgObject to engine_gpg_t.
(struct gpg_object_s): Rename to struct engine_gpg.

* context.h (struct gpgme_context): Change EngineObject to
engine_object_t.
(enum ctx_op_data_type): Rename to ctx_op_data_id_t.
(ctx_op_data_t): New type.
(struct gpgme_context): Use it.
* ops.h (_gpgme_op_data_lookup): Use new type name.
* op-support.c (_gpgme_op_data_lookup): Likewise.
* engine.c: Rename EngineObject to engine_t in the file. Also
EngineStatusHandler to engine_status_handler_t,
EngineCommandHandler to engine_command_handler_t and
EngineColonLineHandler to engine_colon_line_handler.
* rungpg.c (start): Likewise.
* engine-gpgsm.c: Likewise.
* engine-backend.h (struct engine_ops): Likewise
* engine.h (struct engine_object_s): Rename to struct engine.
(EngineObject): Rename to
engine_t. Also everywhere else in the
file.
(EngineStatusHandler): Rename to engine_status_handler_t.
(EngineColonLineHandler): Rename to engine_colon_line_handler_t.
(EngineCommandHandler): Rename to engine_command_handler_t.

* engine-gpgsm.c (gpgsm_export): Fix bug in last change.

* Makefile.am (libgpgme_la_SOURCES): Remove recipient.c, add
user-id.c.
* gpgme.h (gpgme_recipients_t): Removed.
(gpgme_recipients_new, gpgme_recipients_release,
gpgme_recipients_add_name,
gpgme_recipients_add_name_with_validity, gpgme_recipients_count,
gpgme_recipients_enum_open, gpgme_recipients_enum_read,
gpgme_recipients_enum_close): Removed.
(gpgme_op_encrypt, gpgme_op_encrypt_start, gpgme_op_encrypt_sign,
gpgme_op_encrypt_sign_start, gpgme_op_export_start,
gpgme_op_export): Change second argument to gpgme_user_id_t.
(gpgme_user_ids_release): New prototype.
(gpgme_user_ids_append): Likewise.
* ops.h (_gpgme_recipients_all_valid): Remove.
(_gpgme_user_ids_all_valid): Add.
* context.h
(struct gpgme_recipients): Removed.
* user-id.c: New file.
* recipient.c: Removed file.
* rungpg.c (append_args_from_recipients): Change last arg to
gpgme_user_id_t.  Reimplement.
(gpg_encrypt): Change second arg to gpgme_user_id_t.
(gpg_encrypt_sign): Likewise.
(gpg_export): Likewise.  Rewrite user ID list code.
* engine.c (_gpgme_engine_op_encrypt): Change second arg to
gpgme_user_id_t.
(_gpgme_engine_op_encrypt_sign): Likewise.
(_gpgme_engine_op_export): Likewise.
* engine.h (_gpgme_engine_op_encrypt, _gpgme_engine_op_encrypt_sign,
_gpgme_engine_op_export): Likewise.
* engine-gpgsm.c (set_recipients): Likewise.  Rewrite loop code.
(gpgsm_encrypt): Likewise.
(gpgsm_export): Likewise.
* engine-backend.h (struct engine_ops): Likewise for members
ENCRYPT, ENCRYPT_SIGN and EXPORT.
* export.c (export_start, gpgme_op_export_start, gpgme_op_export):
Likewise.
* encrypt.c (encrypt_start): Likewise.  Don't check for count of
recipients.
(gpgme_op_encrypt_start): Likewise.
(gpgme_op_encrypt):
Likewise.
* encrypt-sign.c (encrypt_sign_start): Likewise.
(gpgme_op_encrypt_sign): Likewise.
(gpgme_op_encrypt_sign_start): Likewise.

2003-05-27  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (struct _gpgme_op_import_result): Add skipped_new_keys.
* import.c (parse_import_res): Add skipped_new_keys parser.

* op-support.c (_gpgme_parse_inv_userid): Add missing break
statements.
* encrypt.c (gpgme_op_encrypt): Use gpgme_error_t instead of int.

2003-05-27  Marcus Brinkmann  <marcus@g10code.de>

* encrypt.c (gpgme_op_encrypt_result): Use intermediate variable
HOOK to avoid compiler warning.  Don't ask, you don't want to know.
(_gpgme_encrypt_status_handler): Likewise.
(_gpgme_op_encrypt_init_result): Likewise.
* decrypt.c (gpgme_op_decrypt_result): Likewise.
(_gpgme_decrypt_status_handler): Likewise.
(_gpgme_op_decrypt_init_result): Likewise.
* verify.c (gpgme_op_verify_result): Likewise.
(_gpgme_verify_status_handler): Likewise.
(_gpgme_op_verify_init_result):
Likewise.
* edit.c (edit_status_handler): Likewise.
(command_handler): Likewise.
(edit_start): Likewise.
* genkey.c (gpgme_op_genkey_result): Likewise.
(genkey_status_handler): Likewise.
(genkey_start): Likewise.
* import.c (gpgme_op_import_result): Likewise.
(import_status_handler): Likewise.
(_gpgme_op_import_start): Likewise.
* trustlist.c (gpgme_op_trustlist_next): Likewise.
(_gpgme_op_trustlist_event_cb): Likewise.
(gpgme_op_trustlist_start): Likewise.
* keylist.c (gpgme_op_keylist_result): Likewise.
(keylist_colon_handler): Likewise.
(keylist_status_handler): Likewise.
(_gpgme_op_keylist_event_cb): Likewise.
(gpgme_op_keylist_start): Likewise.
(gpgme_op_keylist_ext_start): Likewise.
(gpgme_op_keylist_next): Likewise.
* passphrase.c (_gpgme_passphrase_status_handler): Likewise.
(_gpgme_passphrase_command_handler_internal): Likewise.
* sign.c (gpgme_op_sign_result): Likewise.
(_gpgme_sign_status_handler): Likewise.
(_gpgme_op_sign_init_result):
Likewise.

* passphrase.c (_gpgme_passphrase_command_handler_internal): Fix
access to pointer type.

2003-05-26 Marcus Brinkmann <marcus@g10code.de>

* engine.h (EngineCommandHandler): Change last argument to int fd.
* gpgme.h (gpgme_passphrase_cb_t): Rewritten to take parts of the
description and fd.
(gpgme_edit_cb_t): Change last argument to int fd.
* ops.h (_gpgme_passphrase_command_handler_internal): New prototype.
* passphrase.c: Include <assert.h>.
(op_data_t): Rename userid_hint to uid_hint, remove last_pw_handle.
(release_op_data): Check values before calling free.
(_gpgme_passphrase_status_handler): Likewise.
(_gpgme_passphrase_command_handler_internal): New function.
(_gpgme_passphrase_command_handler): Rewritten.
* edit.c (edit_status_handler): Pass -1 as fd argument.
(command_handler): Update prototype. New variable processed. Use
it to store return value of
_gpgme_passphrase_command_handler_internal which is now used
instead _gpgme_passphrase_command_handler.
Use it also to check
if we should call the user's edit function. Pass fd to user's
edit function.
* rungpg.c (struct gpg_object_s): Change type of cmd.cb_data to
void *.
(gpg_release): Check value before calling free. Do not release
cmd.cb_data.
(command_cb): Function removed.
(command_handler): New function. Thus we don't use a data object
for command handler stuff anymore, but handle it directly. This
allows proper error reporting (cancel of passphrase requests, for
example). Also all callbacks work via direct writes to the file
descriptor (so that passphrases are not kept in insecure memory).
(gpg_set_command_handler): Rewritten to use even more ugly hacks.
(read_status): Check cmd.keyword before calling free. Install
command_handler as the I/O callback handler with GPG as private
data.

* rungpg.c (gpg_new): Add --enable-progress-filter to gpg
invocation.
* decrypt-verify.c (_gpgme_op_decrypt_verify_start): Rename to
decrypt_verify_start.
(gpgme_op_decrypt_verify_start):
Call decrypt_verify_start.
(gpgme_op_decrypt_verify): Likewise.
* verify.c (verify_status_handler): New function that also calls
progress status handler.

(_gpgme_op_verify_start): Set status handler to verify_status_handler.
Rename to (verify_start).
(gpgme_op_verify_start): Call verify_start.
(gpgme_op_verify): Likewise.
* encrypt.c (encrypt_status_handler): New function.
(_gpgme_encrypt_sym_status_handler): Call progress status handler.
Make static.  Rename to encrypt_sym_status_handler.
(encrypt_start): Set status handler to encrypt_sym_status_handler
or encrypt_status_handler.
* sign.c (sign_status_handler): New function.
(sign_start): Set status handler to sign_status_handler.
* decrypt.c (decrypt_status_handler): New function that also calls
progress status handler.
(decrypt_start): Set status handler to decrypt_status_handler.
* encrypt-sign.c (encrypt_sign_status_handler): Likewise.
* decrypt-verify.c (decrypt_verify_status_handler):
Call
_gpgme_progress_status_handler.

* conversion.c (_gpgme_decode_c_string): Add missing break
statement.

* recipient.c (gpgme_recipients_add_name_with_validity): Add one
to buffer to allocate.

2003-05-19  Marcus Brinkmann  <marcus@g10code.de>

* verify.c (parse_new_sig): Fix ERRSIG case.
Submitted by Benjamin Lee <benjaminlee@users.sf.net>.

2003-05-18  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h: The following types are renamed.  The old name is kept
as a deprecated typedef.
(GpgmeCtx): Rename to gpgme_ctx_t.
(GpgmeData): Rename to gpgme_data_t.
(GpgmeRecipients): Rename to gpgme_recipients_t.
(GpgmeError): Rename to gpgme_error_t.
(GpgmeDataEncoding): Rename to gpgme_data_encoding_t.
(GpgmePubKeyAlgo): Rename to gpgme_pubkey_algo_t.
(GpgmeHashAlgo): Rename to gpgme_hash_algo_t.
(GpgmeSigStat): Rename to gpgme_sig_stat_t.
(GpgmeSigMode): Rename to gpgme_sig_mode_t.
(GpgmeAttr): Rename to gpgme_attr_t.
(GpgmeValidity): Rename to gpgme_validity_t.
(GpgmeProtocol):
Rename to gpgme_protocol_t.
(GpgmeStatusCode): Rename to gpgme_status_code_t.

(GpgmeEngineInfo): Rename to gpgme_engine_info_t.
(GpgmeSubkey): Rename to gpgme_subkey_t.
(GpgmeKeySig): Rename to gpgme_keysig_t.
(GpgmeUserID): Rename to gpgme_user_id_t.
(GpgmePassphraseCb): Rename to gpgme_passphrase_cb_t.
(GpgmeProgressCb): Rename to gpgme_progress_cb_t.
(GpgmeEditCb): Rename to gpgme_edit_cb_t.
(GpgmeIOCb): Rename to gpgme_io_cb_t.
(GpgmeRegisterIOCb): Rename to gpgme_register_io_cb_t.
(GpgmeRemoveIOCb): Rename to gpgme_remove_io_cb_t.
(GpgmeEventIO): Rename to gpgme_event_io_t.
(GpgmeEventIOCb): Rename to gpgme_event_io_cb_t.
(GpgmeIOCbs): Rename to gpgme_io_cbs.
(gpgme_io_cbs_t): New type.
(GpgmeDataReadCb): Rename to gpgme_data_read_cb_t.
(GpgmeDataWriteCb): Rename to gpgme_data_write_cb_t.
(GpgmeDataSeekCb): Rename to gpgme_data_seek_cb_t.
(GpgmeDataReleaseCb): Rename to gpgme_data_release_cb_t.
(GpgmeDataCbs): Rename to gpgme_data_cbs.
(gpgme_data_cbs_t):
New type.
(GpgmeInvalidUserID): Rename to gpgme_invalid_user_id_t.
(GpgmeEncryptResult): Rename to gpgme_encrypt_result_t.
(GpgmeDecryptResult): Rename to gpgme_decrypt_result_t.
(GpgmeNewSignature): Rename to gpgme_new_signature_t.
(GpgmeSignResult): Rename to gpgme_sign_result_t.
(GpgmeSigNotation): Rename to gpgme_sig_notation_t.
(GpgmeSignature): Rename to gpgme_signature_t.
(GpgmeVerifyResult): Rename to gpgme_verify_result_t.
(GpgmeImportStatus): Rename to gpgme_import_status_t.
(GpgmeImportResult): Rename to gpgme_import_result_t.
(GpgmeGenKeyResult): Rename to gpgme_genkey_result_t.
(GpgmeKeyListResult): Rename to gpgme_keylist_result_t.
(GpgmeTrustItem): Rename to gpgme_trust_item_t.
* gpgme.h (gpgme_deprecated_error_t): New type, swallowing macros
GPGME_No_Recipients, GPGME_Invalid_Recipient and
GPGME_No_Passphrase.
* data.h (struct gpgme_data_s): Rename to struct gpgme_data.
* context.h (struct gpgme_context_s): Rename to struct
gpgme_context.
(struct
gpgme_recipients_s): Rename to gpgme_recipients.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

* keylist.c (finish_key): Clear OPD->tmp_uid.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

* verify.c (_gpgme_verify_status_handler): Return GPGME_No_Data
for NODATA status without signatures.

2003-05-05  Marcus Brinkmann  <marcus@g10code.de>

* key.c (_gpgme_key_append_name): Use decoded string to parse user id.
(_gpgme_key_add_sig): Likewise.

2003-05-04  Marcus Brinkmann  <marcus@g10code.de>

* context.h (struct gpgme_context_s): Remove member op_info.

* key.c (_gpgme_key_add_sig): Initialize SIG->uid.

* gpgme.h (GpgmeError): Add deprecated values for
GPGME_Invalid_Type and GPGME_Invalid_Mode.

2003-04-30  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (gpgme_get_op_info): Remove prototype.
* ops.h (_gpgme_set_op_info,
_gpgme_data_release_and_return_string, _gpgme_data_get_as_string,
_gpgme_data_append, _gpgme_data_append_string,
_gpgme_data_append_string_for_xml,
_gpgme_data_append_for_xml,
_gpgme_data_append_percentstring_for_xml): Likewise.
(_gpgme_progress_status_handler): Change first arg to void *.
* progress.c (_gpgme_progress_status_handler): Likewise.
* conversion.c: Do not include <string.h>, <errno.h>, <ctype.h>,
and <sys/types.h>, but <string.h>.
(_gpgme_data_append): Remove function.
(_gpgme_data_append_string): Likewise.
(_gpgme_data_append_for_xml): Likewise.
(_gpgme_data_append_string_for_xml): Likewise.
(_gpgme_data_append_percentstring_for_xml): Likewise.
* data-mem.c (_gpgme_data_get_as_string): Likewise.
(_gpgme_data_release_and_return_string): Likewise.
* gpgme.c (gpgme_get_op_info): Likewise.
(_gpgme_set_op_info): Likewise.

* gpgme.h (struct _gpgme_key): New structure.
(GpgmeKey): Define using _gpgme_key.
(struct _gpgme_subkey): New structure.
(GpgmeSubKey): New type.
(struct _gpgme_key_sig): New structure.
(GpgmeKeySig): New type.
(struct _gpgme_user_id): New structure.

(GpgmeUserID):
New type.
(struct _gpgme_op_keylist_result): New structure.
(GpgmeKeyListResult): New type.
(gpgme_op_keylist_result): New function.
(gpgme_key_get_as_xml): Remove prototype.
* context.h (struct gpgme_context_s): Remove members tmp_key,
tmp_uid, key_cond and key_queue.
(struct key_queue_item_s): Remove structure.
(struct user_id_s): Remove structure.
(struct gpgme_recipients_s): Replace with simple
GpgmeUserID list.
* gpgme.c (gpgme_release): Do not release CTX->tmp_key.
* ops.h (_gpgme_key_add_subkey, _gpgme_key_append_name,
_gpgme_key_add_sig, _gpgme_trust_item_new): New prototypes.
* rungpg.c (command_cb): Return GpgmeError instead int.
New variable ERR. Use it to hold return value of cmd handler.
(gpg_delete): Access fingerprint of key directly.
(append_args_from_signers): Likewise.
(gpg_edit): Likewise.
(append_args_from_recipients): Use GpgmeUserID for recipient list.
* engine-gpgsm.c: Do not include "key.h".
(gpgsm_delete): Access fingerprint of key
directly.
(gpgsm_sign): Likewise.
(set_recipients): Use GpgmeUserID for recipients. Invert invalid
user ID flag.
* key.h: File removed.
* key.c: Completely reworked to use exposed GpgmeKey data types.
* keylist.c: Likewise.
* recipient.c: Completely reworked to use GpgmeUserID.

2003-04-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (gpgme_get_key): Remove force_update argument.
* key-cache.c: File removed.
* Makefile.am (libgpgme_la_SOURCES): Remove key-cache.c.
* ops.h (_gpgme_key_cache_add, _gpgme_key_cache_get): Remove
prototypes.
* keylist.c (_gpgme_op_keylist_event_cb): Don't call
_gpgme_key_cache_add.
(gpgme_get_key): New function.
* verify.c (gpgme_get_sig_key): Remove last argument to
gpgme_get_key invocation.

* gpgme.h (struct _gpgme_trust_item): New structure.
(GpgmeTrustItem): New type.
(gpgme_trust_item_ref, gpgme_trust_item_unref): New prototypes.

* context.h (struct trust_queue_item_s): Remove structure.
(struct gpgme_context_s): Remove trust_queue
member.
* Makefile.am (libgpgme_la_SOURCES): Add trust-item.c.
* trust-item.c: New file.
* trustlist.c: Do not include <stdio.h> or <time.h>, but
"gpgme.h".
(struct trust_queue_item_s): Change to new type op_data_t.
(trust_status_handler): Change first argument to void *.
(trust_colon_handler): Likewise.
(_gpgme_op_trustlist_event_cb): Use op_data_t type.
(gpgme_op_trustlist_start): Use op_data_t and rework error
handling.
(gpgme_op_trustlist_next): Use op_data_t.
(gpgme_trust_item_release): Remove function.
(gpgme_trust_item_get_string_attr): Likewise.
(gpgme_trust_item_get_int_attr): Likewise.

* verify.c (calc_sig_summary): Do not set GPGME_SIGSUM_SYS_ERROR
for bad signatures.

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* context.h: Remove OPDATA_VERIFY_COLLECTING.
(struct gpgme_context_s): Remove member notation.
* gpgme.h: Make enum for GPGME_KEYLIST_MODE_* values.

* gpgme.h (struct _gpgme_sig_notation): New structure.
(GpgmeSigNotation): New
type.
(struct _gpgme_signature): New structure.
(GpgmeSignature): New type.
(struct _gpgme_op_verify_result): New structure.
(GpgmeVerifyResult): New type.
(gpgme_op_verify_result): New prototype.
(gpgme_get_notation): Remove prototype.
* ops.h (_gpgme_op_verify_init_result): New prototype.
(_gpgme_verify_status_handler): Change first argument to void *.
* util.h (_gpgme_decode_percent_string, _gpgme_map_gnupg_error):
New prototypes.
* conversion.c (_gpgme_decode_percent_string): New function.
(gnupg_errors): New static global.
(_gpgme_map_gnupg_error): New function.
* gpgme.c (gpgme_release): Don't release CTX->notation.
(gpgme_get_notation): Remove function.
* decrypt-verify.c (_gpgme_op_decrypt_verify_start): Call
_gpgme_op_verify_init_result.
* verify.c: Do not include <stdio.h>, <assert.h> and "key.h", but

do include "gpgme.h".
(struct verify_result): Replace with ...
(op_data_t): ... this type.
(release_verify_result): Remove function.
(release_op_data):
New function.
(is_token): Remove function.
(skip_token): Remove function.
(copy_token): Remove function.
(gpgme_op_verify_result): New function.
(calc_sig_summary): Rewritten.
(finish_sig): Remove function.
(parse_new_sig): New function.
(parse_valid_sig): New function.
(parse_notation): New function.
(parse_trust): New function.
(parse_error): New function.
(_gpgme_verify_status_handler): Rewritten. Change first argument
to void *.
(_gpgme_op_verify_start): Rework error handling. Call
_gpgme_op_verify_init_result.
(gpgme_op_verify): Do not release or clear CTX->notation.
(gpgme_get_sig_status): Rewritten.
(gpgme_get_sig_string_attr): Likewise.
(gpgme_get_sig_ulong_attr): Likewise.
(gpgme_get_sig_key): Likewise.

* gpgme.h (struct _gpgme_op_decrypt_result): New structure.
(GpgmeDecryptResult): New type.
(gpgme_op_decrypt_result): New prototype.
* ops.h (_gpgme_op_decrypt_init_result): New prototype.
(_gpgme_decrypt_status_handler): Fix prototype.
(_gpgme_decrypt_start):
Remove prototype.
* decrypt-verify.c: Do not include <stdio.h>, <stdlib.h>,
<string.h> and <assert.h>, "util.h" and "context.h", but
"gpgme.h".
(decrypt_verify_status_handler): Change first argument to void *,
and rework error handling.
(_gpgme_op_decrypt_verify_start): New function.
(gpgme_op_decrypt_verify_start): Rewrite using
_gpgme_op_decrypt_verify_start.
(gpgme_op_decrypt_verify): Likewise.
* decrypt.c: Include <string.h>, "gpgme.h" and "util.h".
(struct decrypt_result): Change to typedef op_data_t, rewritten.
(is_token): Remove function.
(release_op_data): New function.
(skip_token): Remove function.

(gpgme_op_decrypt_result): New function.
(_gpgme_decrypt_status_handler): Change first argument to void *.
Rework error handling.
(_gpgme_decrypt_start): Rename to ...
(decrypt_start): ... this.  Call _gpgme_op_decrypt_init_result.
(_gpgme_op_decrypt_init_result): New function.
(gpgme_op_decrypt_start): Use decrypt_start.
(gpgme_op_decrypt): Likewise.

2003-04-27
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* encrypt-sign.c: Do not include <stddef.h>, <stdio.h>,
<stdlib.h>, <string.h>, <assert.h> and "util.h", but "gpgme.h".
(_gpgme_op_encrypt_sign_start): Rename to ...
(encrypt_sign_start): ... this.
(gpgme_op_encrypt_sign_start): Use encrypt_sign_start, not
_gpgme_op_encrypt_sign_start.
(gpgme_op_encrypt_sign): Likewise.

* gpgme.h (GpgmeEncryptResult): New data type.
(gpgme_op_encrypt_result): New prototype.
* ops.h (_gpgme_op_encrypt_init_result): New prototype.
(_gpgme_op_encrypt_status_handler): Fix prototype.
* encrypt-sign.c (_gpgme_op_encrypt_sign_start): Call
_gpgme_op_encrypt_init_result.
* encrypt.c: Do not include <stdio.h>, <assert.h>, "util.h" and
"wait.h".  Include <errno.h> and "gpgme.h".
(SKIP_TOKEN_OR_RETURN): Remove macro.
(struct encrypt_result): Rename to ...
(op_data_t): ... new data type.  Rewrite for user result data.
(append_xml_encinfo): Remove function.
(release_op_data): New function.
(gpgme_op_encrypt_result):
New function.
(_gpgme_op_encrypt_status_handler): Change first argument to void *.
Rewrite result parsing.
(_gpgme_op_encrypt_sym_status_handler): Change first argument to
void *.
(_gpgme_op_encrypt_init_result): New function.
(_gpgme_op_encrypt_start): Rename to ...
(encrypt_start): ... this.
(gpgme_op_encrypt_start): Use encrypt_start, not
gpgme_op_encrypt_start.
(gpgme_op_encrypt): Likewise.

* gpgme.h (GpgmePubKeyAlgo, GpgmeHashAlgo, GpgmeInvalidUserID,
GpgmeNewSignature, GpgmeSignResult): New data types.

(gpgme_op_sign_result, gpgme_pubkey_algo_name,
gpgme_hash_algo_name): New prototypes.
* gpgme.c (gpgme_pubkey_algo_name): New function.
(gpgme_hash_algo_name): Likewise.
* ops.h (_gpgme_parse_inv_userid, _gpgme_op_sign_init_result): New
prototype.
(_gpgme_op_sign_status_handler): Fix prototype.
* op-support.c: Include <errno.h> and <string.h>.
(_gpgme_parse_inv_userid): New function.
* sign.c: Include <errno.h> and "gpgme.h", but
not <stdio.h>,
<assert.h> and "util.h".
(SKIP_TOKEN_OR_RETURN): Remove macro.
(struct sign_result): Change to op_data_t type and rework it.
(release_sign_result): Rename to ...
(release_op_data): ... this and rewrite it.
(append_xml_info): Remove function.
(gpgme_op_sign_result): New function.
(parse_sig_created): New function.
(_gpgme_sign_status_handler): Change first argument to void *.
Rewrite the function to use the new result structure and functions.
(_gpgme_op_sign_init_result): New function.
(_gpgme_op_sign_start): Rename to ...
(sign_start): ... this.  Call _gpgme_op_sign_init_result.
(gpgme_op_sign_start): Use sign_start instead _gpgme_op_sign_start.
(gpgme_op_sign): Likewise.
* encrypt-sign.c (_gpgme_op_encrypt_sign_start): Call
_gpgme_op_sign_init_result.

* delete.c: Include <errno.h> and "gpgme.h", but not "util.h" or
"key.h".
(enum delete_problem): Move into function delete_status_handler.
(delete_status_handler): Change first argument to void *.  Parse
delete
problem with strtol instead atoi.  Return better error
values.
(_gpgme_op_delete_start): Rename to ...
(delete_start): ... this.  Rework error handling.
(gpgme_op_delete_start): Use delete_start instead
_gpgme_op_delete_start.
(gpgme_op_delete): Likewise.
* gpgme.h (GpgmeDataType): Removed.

2003-04-25  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h: Change GPGME_IMPORT_PRIVATE to GPGME_IMPORT_SECRET.
* import.c (parse_import_res): Parse unchanged field.

* gpgme.h: New enum for GPGME_IMPORT_NEW, GPGME_IMPORT_UID,
GPGME_IMPORT_SIG, GPGME_IMPORT_SUBKEY, GPGME_IMPORT_PRIVATE.
(GpgmeError): GPGME_Unknown_Reason, GPGME_Not_Found,
GPGME_Ambiguous_Specification, GPGME_Wrong_Key_Usage,
GPGME_Key_Revoked, GPGME_Key_Expired, GPGME_No_CRL_Known,
GPGME_CRL_Too_Old, GPGME_Policy_Mismatch, GPGME_No_Secret_Key,
GPGME_Key_Not_Trusted, GPGME_Issuer_Missing, GPGME_Chain_Too_Long,
GPGME_Unsupported_Algorithm, GPGME_Sig_Expired,
GPGME_Bad_Signature, GPGME_No_Public_Key added
as new error codes.
(struct _gpgme_import_status): New structure.
(GpgmeImportStatus): New type.
(struct _gpgme_op_import_result): New structure.
(GpgmeImportResult): New type.
(gpgme_op_import_result): New function.
* import.c: Include <errno.h> and "gpgme.h", but not "util.h".
(struct import_result): Change to type op_data_t.
(release_import_result): Rename to ...
(release_op_data): ... this.
(append_xml_impinfo): Function removed.
(gpgme_op_import_result): New function.
(parse_import): New function.
(parse_import_res): Likewise.
(import_status_handler): Change first argument to void *.  Rewrite
to use new functions.
(_gpgme_op_import_start): Rework error handling.

* edit.c: Do not include <assert.h>, "util.h", but "gpgme.h".
(edit_resut): Change to typedef for op_data_t.
(edit_status_handler): Change first argument to void *.
Rework error handling.
(command_handler): Rework error handling.
(_gpgme_op_edit_start): Rename to ...
(edit_start): ... this.  Rework
error handling.
(gpgme_op_edit_start): Rewrite using edit_start.
(gpgme_op_edit): Likewise.

* ops.h (_gpgme_passphrase_start): Remove prototype.
* passphrase.c: Do not include <assert.h>, "util.h" or
"debug.h", but "gpgme.h".
(struct passphrase_result): Change to typedef for op_data_t.
(release_passphrase_result): Rename to release_op_data.
(_gpgme_passphrase_status_handler): Change first argument to void *.
Use new op_data_t type.
(_gpgme_passphrase_command_handler): Use new op_data_t type.
(_gpgme_passphrase_start): Remove function.
* decrypt.c (_gpgme_decrypt_start): Rewrite error handling.  Do

not call _gpgme_passphrase_start, but install command handler.
* encrypt.c (_gpgme_op_encrypt_start): Likewise.
* encrypt-sign.c (_gpgme_op_encrypt_sign_start): Likewise.
* sign.c (_gpgme_op_sign_start): Likewise.

* context.h (struct gpgme_context_s): Remove member initialized,
use_cms and help_data_1. Add member protocol. Make use_armor and
use_textmode bit flags.
Make keylist_mode, include_certs,
signers_len and signers_size unsigned.
* gpgme.c (gpgme_new): Initialize CTX->protocol.
(gpgme_set_protocol): Do not check CTX. Use CTX->protocol.
(gpgme_get_protocol): Likewise.
(gpgme_release): Do not release CTX->help_data_1.
* op-support.c (_gpgme_op_reset): Use CTX->protocol.

* wait-private.c (_gpgme_wait_private_event_cb): Remove variable CTX.

* data.c: Do not include <assert.h>, but "gpgme.h".
(_gpgme_data_inbound_handler): Expand _gpgme_data_append, because
it will go. Do not assert DH.
(_gpgme_data_outbound_handler): Do not assert DH.

* export.c: Do not include <stdlib.h>, "debug.h" and "util.h", but
"gpgme.h".
(export_status_handler): Change type of first argument to void *.
(_gpgme_op_export_start): Rename to ...
(export_start): ... this. Rework error handling.
(gpgme_op_export_start): Rewritten to use export_start instead
_gpgme_op_export_start.
(gpgme_op_export): Likewise.

* gpgme.h (GpgmeError): Add GPGME_Busy,
GPGME_No_Request.
(GPGME_No_Recipients, GPGME_Invalid_Recipient,
GPGME_No_Passphrase): New macros.

* key.c (gpgme_key_get_string_attr): Fix validity attribute.

2003-04-24 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (struct _gpgme_op_genkey_result): New structure.
(GpgmeGenKeyResult): New type.
(gpgme_op_genkey): Drop last argument.
(gpgme_op_genkey_result): New function.
* genkey.c: Do not include "util.h", but "gpgme.h".
(struct genkey_result): Replace with ...
(op_data_t): ... this new type.

(release_genkey_result): Replace with ...
(release_op_data): ... this new function.
(gpgme_op_genkey_result): New function.
(genkey_status_handler): Rewritten using new op_data_t type.
(get_key_parameter): New function.
(_gpgme_op_genkey_start): Renamed to
(genkey_start): ... this and rewritten.
(gpgme_op_genkey_start): Use genkey_start instead
_gpgme_op_genkey_start.
(gpgme_op_genkey): Rewritten.  Remove FPR argument.

* context.h (struct gpgme_context_s): Remove member
verbosity.
* gpgme.c (gpgme_new): Do not set member verbosity.
* engine.h (_gpgme_engine_set_verbosity): Remove prototype.
* engine.c (_gpgme_engine_set_verbosity): Remove function.
* engine-backend.h (struct engine_ops): Remove set_verbosity.
* engine-gpgsm.c (_gpgme_engine_ops_gpgsm): Remove set_verbosity member.
* rungpg.c (_gpgme_engine_ops_gpg): Likewise.
(gpg_set_verbosity): Remove function.
* decrypt.c (_gpgme_decrypt_start): Don't call
_gpgme_engine_set_verbosity.
* delete.c (_gpgme_op_delete_start): Likewise.
* edit.c (_gpgme_op_edit_start): Likewise.
* encrypt.c (_gpgme_op_encrypt_start): Likewise.
* encrypt-sign.c (_gpgme_op_encrypt_sign_start): Likewise.
* export.c (_gpgme_op_export_start): Likewise.
* genkey.c (_gpgme_op_genkey_start): Likewise.
* import.c (_gpgme_op_import_start): Likewise.
* keylist.c (gpgme_op_keylist_start): Likewise.
(gpgme_op_keylist_ext_start): Likewise.
* sign.c (_gpgme_op_sign_start): Likewise.
* verify.c (_gpgme_op_verify_start):
Likewise.

* Makefile.am (libgpgme_la_SOURCES): Add key-cache.c.
* key.c (key_cache_initialized, key_cache_size,
key_cache_max_chain_length, ): Removed.
(struct key_cache_item_s, key_cache_lock, key_cache,
key_cache_unused_items, hash_key, _gpgme_key_cache_add,
_gpgme_key_cache_get, gpgme_get_key): Moved to ...
* key-cache.c: ... here.  New file.
* key.h (_gpgme_key_cache_init): Remove prototypes.
(_gpgme_key_cache_add,_gpgme_key_cache_get): Move to ...
* ops.h: ... here.
* version.c: Do not include "key.h".
(do_subsystem_inits): Do not call _gpgme_key_cache_init.

* mkstatus: Strip trailing comma.
* gpgme.h (GpgmeStatus): Pretty print.

* gpgme.h (GpgmeError): Rename GPGME_No_Passphrase to
GPGME_Bad_Passphrase.
* passphrase.c (_gpgme_passphrase_status_handler): Use
GPGME_Bad_Passphrase instead GPGME_No_Passphrase.

* gpgme.h (GpgmeError): Rename GPGME_No_Recipients to
GPGME_No_UserID and GPGME_Invalid_Recipient to
GPGME_Invalid_UserID.
* encrypt.c (_gpgme_encrypt_status_handler):
Use GPGME_No_UserID
instead GPGME_No_Recipients and GPGME_Invalid_UserID instead
GPGME_Invalid_Recipient.
(_gpgme_op_encrypt_start): Likewise.

* gpgme.h (GpgmeError): Remove GPGME_Busy and GPGME_No_Request.
* wait-user.c (_gpgme_wait_user_event_cb): Don't clear CTX->pending.
* wait-private.c (_gpgme_wait_private_event_cb): Likewise.
* wait-global.c (gpgme_wait): Likewise.
* verify.c (_gpgme_op_verify_start): Likewise.
(gpgme_get_sig_status): Don't check pending flag.
(gpgme_get_sig_string_attr): Likewise.
(gpgme_get_sig_ulong_attr): Likewise.
(gpgme_get_sig_key): Likewise.
* op-support.c (_gpgme_op_reset): Likewise.
* trustlist.c (gpgme_op_trustlist_start): Don't clear pending flag.
(gpgme_op_trustlist_next): Don't check or clear pending flag.
(gpgme_op_trustlist_end): Likewise.
* sign.c (_gpgme_op_sign_start): Likewise.
* context.h (struct gpgme_context_s): Remove member PENDING.
* decrypt.c (_gpgme_decrypt_start): Likewise.
* delete.c (_gpgme_op_delete_start):
Likewise.
* edit.c (_gpgme_op_edit_start): Likewise.
* encrypt.c (_gpgme_op_encrypt_start): Likewise.
* encrypt-sign.c (_gpgme_op_encrypt_sign_start): Likewise.
* export.c (_gpgme_op_export_start): Likewise.
* genkey.c (_gpgme_op_genkey_start): Likewise.
* import.c (_gpgme_op_import_start): Likewise.
* key.c (gpgme_get_key): Likewise.
* keylist.c (gpgme_op_keylist_start): Likewise.
(gpgme_op_keylist_ext_start): Likewise.
(gpgme_op_keylist_next): Likewise.
(gpgme_op_keylist_end): Likewise.
* data-compat.c (gpgme_error_to_errno): Don't convert EBUSY.

2003-02-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (GpgmePassphraseCb): Change type to return GpgmeError,
and add argument for returning the result string.
(gpgme_cancel): Remove prototype.
* gpgme.c (gpgme_cancel): Remove function.
* context.h (struct gpgme_context_s): Remove member cancel.
* passphrase.c (_gpgme_passphrase_command_handler): Call the
passphrase callback in the new way.

2003-01-30
Marcus Brinkmann <marcus@g10code.de>

* edit.c (_gpgme_edit_status_handler): Call the progress status
handler.

2003-02-05 Marcus Brinkmann <marcus@g10code.de>

* wait-user.c (_gpgme_wait_user_remove_io_cb): Move check for no
I/O handlers left to ...
(_gpgme_user_io_cb_handler): ... here.

2003-02-04 Marcus Brinkmann <marcus@g10code.de>

* trustlist.c (trustlist_colon_handler): Release ITEM if name
could not be allocated.
(gpgme_trust_item_release): Only release name if it is allocated.
Reported by Marc Mutz <Marc.Mutz@uni-bielefeld.de>.

2003-02-04 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (read_status): If he status handler returns an error,
return it.
(status_handler): If read_status fails, just return the error.

2003-02-01 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (start): Handle all errors, not only most of
them.
(xtoi_1, xtoi_2): Remove macro.
(status_handler): Replace use of xtoi_2 with _gpgme_hextobyte.

2003-02-01 Marcus
Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (map_assuan_error): Replace
ASSUAN_Bad_Certificate_Path with ASSUAN_Bad_Certificate_Chain.
(gpgsm_new): Use assuan_pipe_connect instead assuan_pipe_connect2.

* util.h (DIMof): Remove macro.

* ops.h (_gpgme_op_event_cb, _gpgme_op_event_cb_user,
_gpgme_data_unread): Prototypes removed.

2003-01-30 Marcus Brinkmann <marcus@g10code.de>

* types.h: File removed.
* Makefile.am (libgpgme_la_SOURCES): Remove types.h.
* io.h (struct spawn_fd_item_s): Do not include "types.h".
* key.h: Likewise.
* context.h: Likewise.
* cengine-gpgsm.h: Likewise.
* engine.h: Include "gpgme.h" instead "types.h". Add prototypes
for EngineStatusHandler, EngineColonLineHandler and
EngineCommandHandler.
(_gpgme_engine_set_status_handler): Change parameter type from
GpgmeStatusHandler to EngineStatusHandler.
(_gpgme_engine_set_command_handler): Change parameter type from
GpgmeCommandHandler to EngineCommandHandler.
(_gpgme_engine_set_colon_line_handler):
Change parameter type from
GpgmeColonLineHandler to EngineColonLineHandler.
* engine-backend.h: Include "engine.h" instead "types.h".
(struct engine_ops): Change Gpgme*Handler parameters in members
set_command_handler, set_colon_line_handler and set_status_handler
to Engine*Handler.
* engine.c (_gpgme_engine_set_status_handler): Change parameter
type from GpgmeStatusHandler to EngineStatusHandler.
(_gpgme_engine_set_command_handler): Change parameter type from
GpgmeCommandHandler to EngineCommandHandler.
(_gpgme_engine_set_colon_line_handler): Change parameter type from
GpgmeColonLineHandler to EngineColonLineHandler.
* rungpg.c (struct gpg_object_s): Change type of member status.fnc
from GpgmeStatusHandler to EngineStatusHandler. Change type of
member colon.fnc from GpgmeColonLineHandler to
EngineColonLineHandler. Change type of member cmd.fnc from
GpgmeCommandHandler to EngineCommandHandler.
* engine-gpgsm.c (struct gpgsm_object_s): Likewise.
* rungpg.c
(gpg_set_status_handler): Change parameter type from
GpgmeStatusHandler to EngineStatusHandler.
* engine-gpgsm.c (gpgsm_set_status_handler): Likewise.
(assuan_simple_command): Likewise.
* rungpg.c (gpg_set_colon_line_handler): Change parameter type
from GpgmeColonLineHandler to EngineColonLineHandler.
* engine-gpgsm.c (gpgsm_set_colon_line_handler): Likewise.

* rungpg.c (gpg_set_command_handler): Change parameter type from
GpgmeCommandHandler to EngineCommandHandler.

* engine-gpgsm.c (status_handler): Do not close status fd at end
of function.

* ops.h (_gpgme_op_data_lookup): Add prototype.
* op-support.c: Include <stdlib.h>.
(_gpgme_op_data_lookup): New function.
* decrypt.c (_gpgme_release_decrypt_result): Function removed.
(struct decrypt_result_s): Rename to ...
(struct decrypt_resul): ... this.
(DecryptResult): New type.
(_gpgme_decrypt_status_handler): Don't use
test_and_allocate_result, but use _gpgme_op_data_lookup to
retrieve result data object.
* sign.c
(_gpgme_release_sign_result): Function removed.
(release_sign_result): New function.
(struct sign_result_s): Rename to ...
(struct sign_result): ... this.
(SignResult): New type.
(_gpgme_sign_status_handler): Don't use
test_and_allocate_result, but use _gpgme_op_data_lookup to
retrieve result data object.
* encrypt.c (struct encrypt_result_s): Rename to ...
(struct encrypt_result): ... this.
(_gpgme_release_encrypt_result): Function removed.
(release_encrypt_result): New function.
(_gpgme_encrypt_status_handler): Don't use
test_and_allocate_result, but use _gpgme_op_data_lookup to
retrieve result data object.
* verify.c (struct verify_result_s): Rename to ...
(struct verify_result): ... this.  Remove member next.
(VerifyResult): New type.
(_gpgme_release_verify_result): Function removed.
(release_verify_result): New function.
(finish_sig): Change first argument to type VerifyResult.  Diddle
the type of the op_data structure.
(add_notation): Change first argument
to type VerifyResult.
(_gpgme_verify_status_handler): Don't use
test_and_allocate_result, but use _gpgme_op_data_lookup to
retrieve result data object.
* passphrase.c (struct passphrase_result_s): Rename to ...
(struct passphrase_result): ... this.  Remove member next.
(PassphraseResult): New type.
(_gpgme_release_passphrase_result): Function removed.

(release_passphrase_result): New function.
(_gpgme_passphrase_status_handler): Don't use
test_and_allocate_result, but use _gpgme_op_data_lookup to
retrieve result data object.
(_gpgme_passphrase_command_handler): Likewise.
* keylist.c (struct keylist_result_s): Rename to ...
(struct keylist_result): ... this.  Remove member next.
(KeylistResult): New type.
(_gpgme_release_keylist_result): Function removed.
(release_keylist_result): New function.
(keylist_status_handler): Don't use
test_and_allocate_result, but use _gpgme_op_data_lookup to
retrieve result data object.
* edit.c (struct edit_result_s): Rename to ...
(struct
edit_result): ... this.  Remove member next.
(EditResult): New type.
(_gpgme_release_edit_result): Function removed.
(release_edit_result): New function.
(edit_status_handler): Don't use
test_and_allocate_result, but use _gpgme_op_data_lookup to
retrieve result data object.
(command_handler): Likewise.
* types.h (DecryptResult, SignResult, EncryptResult,
PassphraseResult, ImportResult, DeleteResult, GenKeyResult,
KeylistResult, EditResult): Types removed.
* ops.h: Don't include "types.h", but "gpgme.h" and "context.h".
(test_and_allocate_result): Remove macro.
(_gpgme_release_decrypt_result): Remove prototype.
(_gpgme_decrypt_result): Remove prototype.
(_gpgme_release_sign_result): Remove prototype.
(_gpgme_release_encrypt_result): Remove prototype.
(_gpgme_release_passphrase_result): Remove prototype.
(_gpgme_release_import_result): Remove prototype.
(_gpgme_release_delete_result): Remove prototype.
(_gpgme_release_genkey_result): Remove prototype.
(_gpgme_release_keylist_result):
Remove prototype.
(_gpgme_release_edit_result): Remove prototype.
(_gpgme_release_verify_result): Remove prototype.
* gpgme.c (_gpgme_release_result): Rewritten.
* context.h (enum ctx_op_data_type): New enum.
(struct ctx_op_data): New structure.
(struct gpgme_context_s): Replace the member result with a member
op_data.
(fail_on_pending_request): Remove macro.
* op-support.c (_gpgme_op_reset): Expand macro
fail_on_pending_request.

* util.h: Don't include "types.h" or "debug.h", but include "gpgme.h".

2003-01-19  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (_gpgme_engine_ops_gpg): Remove gpg_start.
(gpg_start): Rename to ...
(start): ... this function.  Change arguments to GpgObject.
(gpg_decrypt): Call start.
(gpg_edit): Likewise.
(gpg_encrypt): Likewise.
(gpg_encrypt_sign): Likewise.
(gpg_export): Likewise.
(gpg_import): Likewise.
(gpg_keylist): Likewise.
(gpg_keylist_ext): Likewise.
(gpg_trustlist): Likewise.
(gpg_verify): Likewise.

*
engine-gpgsm.c (_gpgme_engine_ops_encrypt): Remove gpgsm_start.
(gpgsm_start): Rename to ...
(struct gpgsm_object_s): Remove member command.
(gpgsm_release): Don't free command.
(start): ... this function.  Change arguments to GpgsmObject and
const char *.
(gpgsm_decrypt): Call start.
(gpgsm_delete): Likewise.
(gpgsm_encrypt): Likewise.
(gpgsm_export): Likewise.
(gpgsm_genkey): Likewise.
(gpgsm_import): Likewise.
(gpgsm_keylist): Likewise.
(gpgsm_keylist_ext): Likewise.
(gpgsm_verify): Likewise.

* decrypt.c (_gpgme_decrypt_start): Don't call
_gpgme_engine_start.
* delete.c (_gpgme_op_delete_start): Likewise.
* edit.c (_gpgme_op_edit_start): Likewise.
* encrypt.c (_gpgme_op_encrypt_start):
* encrypt-sign.c (_gpgme_op_encrypt_sign_start):
* export.c (_gpgme_op_export_start): Likewise.
* genkey.c (_gpgme_op_genkey_start): Likewise.
* import.c (_gpgme_op_import_start): Likewise.
* keylist.c (gpgme_op_keylist_ext_start): Likewise.
(gpgme_op_keylist_start):
Likewise.
* sign.c (_gpgme_op_sign_start): Likewise.

* trustlist.c (gpgme_op_trustlist_start): Likewise.
* verify.c (_gpgme_op_verify_start): Likewise.

* engine-backend.h (struct engine_ops): Remove member start.

* engine.h (_gpgme_engine_start): Remove prototype.
* engine.c (_gpgme_engine_start): Remove function.

2003-01-19 Miguel Coca <mcoca@gnu.org>

* w32-io.c (_gpgme_io_select): Add missing argument in calls to
DEBUG_BEGIN.
* w32-util.c: Include "sema.h".
(find_program_in_registry): Change DEBUG1 to DEBUG2, fixes compilation
error.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

* types.h: Remove byte and ulong types.
* util.h (_gpgme_hextobyte): Change prototype to unsigned char
instead byte.
* conversion.c (_gpgme_hextobyte): Change argument to unsigned
char instead byte.
(_gpgme_decode_c_string): Likewise, and beautify. Also support a
few more escaped characters. Be more strict about buffer size.
(_gpgme_data_append_percentstring_for_xml): Change
type of SRC,
BUF and DST to unsigned char instead byte.
* progress.c (_gpgme_progress_status_handler): Use unsigned char
instead byte.
* debug.c (trim_spaces): Likewise.

* util.h (mk_error): Remove macro.
* conversion.c, data.c, data-compat.c, decrypt.c, delete.c,
edit.c, encrypt.c, encrypt-sign.c, engine.c, engine-gpgsm.c,
export.c, genkey.c, gpgme.c, import.c, key.c, keylist.c,
passphrase.c, progress.c, recipient.c, rungpg.c, sign.c,
signers.c, trustlist.c, verify.c, wait.c, wait-global.c,
wait-private (literally everywhere): Expand the mk_error macro.

* context.h (wait_on_request_or_fail): Remove macro.

* context.h (gpgme_context_s): Remove member ERROR.
* types.h (GpgmeStatusHandler): Change return type to GpgmeError.
(GpgmeCommandHandler): Change return type to GpgmeError and add
new argument RESULT.
* gpgme.h (GpgmeIOCb): Change return type to GpgmeError.
(GpgmeEventIO): New event GPGME_EVENT_START.

(GpgmeIdleFunc): Remove type.
(gpgme_register_idle): Remove
prototype.
* data.c: Include <assert.h>.
(_gpgme_data_inbound_handler): Change return type to GpgmeError.
Return any error instead ignoring it, don't close file descriptor
on error.
(_gpgme_data_outbound_handler): Likewise.
* decrypt.c: Do not include <stdio.h>, <string.h> and <assert.h>.
(_gpgme_decrypt_status_handler): Change return type to GpgmeError.
Return error instead setting ctx->error. Return success at end of
function.
(gpgme_op_decrypt): Don't work around the old kludge anymore.
* decrypt-verify.c (decrypt_verify_status_handler): Change return
type to GpgmeError. Return possible errors.
* delete.c: Do not include <stdio.h>, <string.h>, <time.h> and
<assert.h>.
(delete_status_handler): Change return type to GpgmeError. Return
error instead setting ctx->error. Return success at end of
function.
* edit.c: Do not include <stdio.h> and <string.h>.
(_gpgme_edit_status_handler): Change type to GpgmeError,
make static and rename to ...
(edit_status_handler):
... this. Return error directly.
(command_handler): Change return type to GpgmeError, add result
argument. Return error directly.
* encrypt.c (status_handler_finish): Remove function.
(_gpgme_encrypt_status_handler): Change return type to GpgmeError.
Return error directly.
(_gpgme_encrypt_sym_status_handler): Likewise.
* encrypt-sign.c (encrypt_sign_status_handler): Likewise.
* engine-gpgsm.c (close_notify_handler): Do not signal done event
anymore.
(status_handler): Change return type to GpgmeError. Diddle things
around a bit to return errors directly.
(start): Send start event.
* export.c: Do not include <stdio.h>, <string.h> and <assert.h>.
(export_status_handler): Change return type to GpgmeError. Don't
check ctx->error.
* genkey.c: Do not include <stdio.h> and <assert.h>.
(genkey_status_handler): Change return type to GpgmeError. Don't
check ctx->error. Return errors directly.
* gpgme.c (_gpgme_release_result): Do not initialize ctx->error.
(_gpgme_op_event_cb):
Function removed.
(_gpgme_op_event_cb_user): Likewise.
* import.c: Do not include <stdio.h>, <string.h> and <assert.h>.

(import_status_handler): Change return type to GpgmeError.  Don't
check ctx->error.
* keylist.c (keylist_colon_handler, keylist_status_handler, finish_key):
Change return type to GpgmeError, return error directly.
* Makefile (libgpgme_la_SOURCES): Add wait-global.c,
wait-private.c and wait-user.c
* ops.h (test_and_allocate_result): Return error instead setting
ctx->error.
(_gpgme_data_inbound_handler, _gpgme_data_outbound_handler,
_gpgme_verify_status_handler, _gpgme_decrypt_status_handler,
_gpgme_sign_status_handler, _gpgme_encrypt_staus_handler,
_gpgme_passphrase_status_handler, _gpgme_progress_status_handler):
Change return type to GpgmeError.
(_gpgme_passphease_command_handler): Change return type to
GpgmeError and add new argument RESULT.
* op-support.c: Use new callback functions, and change private
data to ctx everywhere.
* passphrase.c
(_gpgme_passphrase_status_handler): Change return
type to GpgmeError, return error directly.
(_gpgme_passphrase_command_handler): Change return type to
GpgmeError, add result argument.  Return results accordingly.
* progress.c (_gpgme_progress_status_handler): Change return type
to GpgmeError, return errors directly.
* rungpg.c (status_handler): Change return type to GpgmeError.
Return error directly.
(close_notify_handler): Don't send done event.
(colon_line_handler): Change return type to GpgmeError, return
errors directly.
* rungpg.c (start): Send start event.
* sign.c (_gpgme_sign_status_handler): Change return type to
GpgmeError, return errors directly.
* trustlist.c (trustlist_status_handler): Change return type to
GpgmeError.  Return 0.
(trustlist_colon_handler): Change return type GpgmeError.  Return
errors directly.
* verify.c (add_notation): Change return type to GpgmeError,
return errors directly.
(_gpgme_verify_status_handler): Likewise.
* wait.h
(struct fd_table): Remove lock member.
(struct wait_item_s): Moved here from wait.c.
(struct tag): New structure.
(_gpgme_wait_event_cb): Remove prototype.
(_gpgme_wait_private_event_cb, _gpgme_wait_global_event_cb,
_gpgme_wait_user_add_io_cb, _gpgme_wait_user_remove_io_cb,
_gpgme_wait_user_event_io_cb): New prototypes.
* wait.c: Don't include <stdio.h>.

(ftd_global, ctx_done_list, ctx_done_list_size,
ctx_done_list_length, ctx_done_list_lock, idle_function): Remove
global variable.
(gpgme_register_idle, do_select, _gpgme_wait_event_cb): Remove
function.
(gpgme_wait): Move to file wait-global.c.
(_gpgme_add_io_cb): Take ctx as private argument, initialize ctx
member in wait item and tag.
(_gpgme_remove_io_cb): Take ctx from tag.  Don't use FDT lock.
(_gpgme_wait_one, _gpgme_wait_on_condition): Move to
wait-private.c.
(gpgme_fd_table_init): Don't initialize FDT->lock.
(gpgme_fd_table_deinit): Don't destroy FDT->lock.
(_gpgme_fd_table_put): Make static and rename to
...
(fd_table_put): ... this function.  Don't use FDT->lock.
(struct wait_item_s): Move to wait.h.
* wait-global.c: New file.
* wait-private.c: New file.
* wait-user.c: New file.

* key.c (gpgme_key_sig_get_string_attr): Use validity_to_string
instead otrust_to_string to calculate validity.

2003-01-30  Marcus Brinkmann  <marcus@g10code.de>

* types.h (EngineObject): Move typedef to ...
* engine.h: ... here.
* types.h (GpgObject): Move typedef to ...
* rungpg.c: ... here.
* types.h (GpgsmObject): Move typedef to ...
* engine-gpgsm.c: ... here.

* util.h (return_if_fail, return_null_if_fail,
return_val_if_fail): Remove macro.
* gpgme.c (gpgme_cancel): Don't use return_if_fail.
* key.c (gpgme_key_ref): Likewise.
* signers.c (gpgme_signers_enum): Likewise.
(gpgme_signers_clear): Likewise.

* engine-backend.h (struct engine_ops): Rename get_path to
get_file_name.
* gpgme.h (struct _gpgme_engine_info): Rename member path to
file_name.
* version.c: Do not include <stdio.h>,
<stdlib.h>, context.h and
util.h.  Other clean ups.
(parse_version_number): Protect more seriously against

overflow.
(gpgme_get_engine_info): Move to ...
* engine.c (gpgme_get_engine_info): ... here.
(_gpgme_engine_get_info): Function removed.
(_gpgme_engine_get_path): Make static and rename to ...
(engine_get_file_name): .. this.
(_gpgme_engine_get_version): Make static and rename to ...
(engine_get_version): ... this.
(_gpgme_engine_get_req_version): Make static and rename to ...
(engine_get_req_version): ... this.
* engine.h (_gpgme_engine_get_path, _gpgme_engine_get_version,
_gpgme_engine_req_version, _gpgme_engine_get_info.): Remove
prototypes.

* gpgme.h (enum GpgmeProtocol): Remove GPGME_PROTOCOL_AUTO.
* gpgme.c (gpgme_set_protocol): Don't handle GPGME_PROTOCOL_AUTO.
(gpgme_get_protocol_name): New function.

* engine-backend.h (struct engine_ops): New member
get_req_version, remove member check_version.
* engine.h (_gpgme_Engine_get_version): New prototype.
*
rungpg.c (gpg_get_req_version): New function.
(gpg_check_version): Function removed.
(_gpgme_engine_ops_gpg): Add gpg_get_req_version, remove
gpg_check_version.
* engine-gpgsm.c (gpgsm_get_req_version): New function.
(gpgsm_check_version): Function removed.
(_gpgme_engine_ops_gpgsm): Add gpgsm_get_req_version, remove
gpgsm_check_version.
* engine.c: Include ops.h.
(_gpgme_engine_get_req_version): New function.
(gpgme_engine_check_version): Rewritten.
* version.c (gpgme_get_engine_info): Rewritten.
* gpgme.h (gpgme_engine_info): New structure.
(GpgmeEngineInfo): New type.

2003-01-06 Werner Koch <wk@gnupg.org>

* keylist.c (set_mainkey_capability): Handle 'd' and 'D' used
since gpg 1.3 to denote disabled keys.

2003-01-06 Marcus Brinkmann <marcus@g10code.de>

* data-mem.c: Include <string.h>.
* engine.c: Likewise.

2003-01-06 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (libgpgme_la_DEPENDENCIES): Correct bug in last change.

2002-12-24 Marcus
Brinkmann <marcus@g10code.de>

* gpgme.h (gpgme_op_verify, gpgme_op_decrypt_verify): Drop R_STAT
argument.
* decrypt-verify.c (gpgme_op_decrypt_verify): Drop R_STAT
argument.
* verify.c (gpgme_op_verify): Drop R_STAT argument.
(_gpgme_intersect_stati): Function removed.
* ops.h (_gpgme_intersect_stati): Remove prototype.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

* libgpgme.vers: New file.
* Makefile.am (EXTRA_DIST): Add libgpgme.vers.
(libgpgme_version_script_cmd): New variable.
(libgpgme_la_LDFLAGS): Add libgpgme_version_script_cmd here.
(libgpgme_la_DEPENDENCIES): New variable.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

* key.c (gpgme_key_get_string_attr): Don't accept GPGME_ATTR_IS_SECRET.
(otrust_to_string): New function.
(gpgme_key_get_as_xml): Use it.
(validity_to_string): New function.
(gpgme_key_get_string_attr): Beautify using above functions.
(gpgme_key_get_ulong_attr): Likewise.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

* data-mem.c
(mem_release): Fix gcc warning.
* data-user.c (user_release): Likewise.

2002-12-06 Marcus Brinkmann <marcus@g10code.de>

* data.h (gpgme_data_release_cb): Change return type to void.
(gpgme_data_read_cb): Change return type to ssize_t.
* data.c (gpgme_data_read): Likewise.
* data-stream.c (stream_read): Likewise.
* data-fd.c (fd_read): Likewise.
* data-mem.c (mem_read): Likewise.
(mem_release): Change return type to void.
* data-user.c (user_read): Change return type to ssize_t.
(user_release): Change return type to void.

* data-compat.c (old_user_read): Change return type to ssize_t.
* gpgme.h (GpgmeDataReadCb): Likewise.
(gpgme_data_read): Likewise.
(GpgmeDataSeekCb): Change return type to off_t.

2002-12-04 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h: Add prototype for gpgme_get_key.
* key.c (gpgme_get_key): New function.
* verify.c (gpgme_get_sig_key): Rewrite using gpgme_get_key.

* gpgme.h: Add prototypes for new interfaces
gpgme_key_sig_get_string_attr
and gpgme_key_get_ulong_attr.
(enum GpgmeAttr): New attribute GPGME_ATTR_SIG_CLASS.
* gpgme.c (gpgme_set_keylist_mode): Allow GPGME_KEYLIST_MODE_SIGS.
* key.h (struct certsig_s): New members ALGO, NAME_PART,
EMAIL_PART, COMMENT_PART, NAME, SIG_STAT and SIG_CLASS.

* conversion.c (_gpgme_decode_c_string): Add new parameter LEN.
Use that to determine if allocation is desired or not.
* util.h: Adjust prototype of _gpgme_decode_c_string.
* keylist.c (keylist_colon_handler): Adjust caller of
_gpgme_decode_c_string.

* key.h (struct gpgme_key_s): New member last_uid.
* key.c (_gpgme_key_append_name): Rewritten using
_gpgme_decode_c_string and the last_uid pointer.
(my_isdigit): Macro removed.
(ALLOC_CHUNK): Likewise.
* keylist.c (set_userid_flags): Use last_uid member of KEY.

* context.h (struct user_id_s): New member last_certsig.
* key.h: Add prototype for _gpgme_key_add_certsig.
* key.c (_gpgme_key_add_certsig): New function.
(set_user_id_part): Move function
before _gpgme_key_add_certsig.
(parse_user_id): Change first argument to SRC, add new arguments
NAME, EMAIL and COMMENT. Change code to use these arguments
instead going through UID. Move function before
_gpgme_add_certsig.
(parse_x509_user_id): Likewise.
(_gpgme_key_append_name): Adjust arguments to parse_x509_user_id
and parse_user_id invocation.
(one_certsig_as_xml): New function.
(one_uid_as_xml): Print signatures.
* context.h (struct gpgme_context_s): New member TMP_UID.
* keylist.c (keylist_colon_handler): Rewritten, implement "sig"

record entries.

* key.c (get_certsig): New function.
(gpgme_key_sig_get_string_attr): Likewise.
(gpgme_key_sig_get_ulong_attr): Likewise.

* keylist.c: Include <ctype.h>.
(my_isdigit): Macro removed.
(set_mainkey_trust_info): Use isdigit, not my_isdigit.
(set_userid_flags): Likewise.
(set_subkey_trust_info): Likewise.
(set_ownertrust): Likewise.
(finish_key): Move function up a bit and remove prototype.

* rungpg.c (gpg_keylist_ext):
Correct precedence of signature
listing mode.
(gpg_keylist_ext): Implement signature listing mode.

2002-11-25 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (_gpgme_gpg_spawn): Do not set parent fds to -1.
* posix-io.c (_gpgme_io_spawn): Call _gpgme_io_close instead close
for parent fds.
* w32-io.c (_gpgme_io_spawn): Call _gpgme_io_close instead
CloseHandle for parent fds.

2002-11-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h [_MSC_VER]: Define ssize_t as long.

2002-11-22 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_new): Save the result of a first
setlocale before doing another setlocale.

2002-11-21 Marcus Brinkmann <marcus@g10code.de>

* decrypt.c: Some beautyfication.

* verify.c (_gpgme_verify_status_handler): Treat
GPGME_STATUS_UNEXPECTED like GPGME_STATUS_NODATA.
Reported by Miguel Coca <e970095@zipi.fi.upm.es>.

2002-11-19 Marcus Brinkmann <marcus@g10code.de>

* genkey.c: Only include <config.h> if [HAVE_CONFIG_H].
(struct

genkey_result_s): Add new member FPR.
(_gpgme_release_genkey_result): Free RESULT->fpr if set.
(genkey_status_handler): Extract the fingerprint from the status
line.
(gpgme_op_genkey): Add new argument FPR and return the fingerprint
in it.
* gpgme.h: Adjust prototype of gpgme_op_genkey.

2002-11-19 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (gpg_keylist): Add --with-fingerprint to gpg invocation
twice, to get fingerprints on subkeys. Suggested by Timo Schulz
<twoaday@freakmail.de>.
(gpg_keylist_ext): Likewise.

2002-11-05 Marcus Brinkmann <marcus@g10code.de>

* import.c (append_xml_impinfo): Use
_gpgme_data_append_string_for_xml rather than
_gpgme_data_append_string for the field content.
Submitted by Miguel Coca <e970095@zipi.fi.upm.es>.

2002-10-10 Marcus Brinkmann <marcus@g10code.de>

* rungpg.h, engine-gpgsm.h: File removed.
* engine-backend.h: New file.
* Makefile.am (gpgsm_components): New variable, set depending on
automake conditional HAVE_GPGSM.
(libgpgme_la_SOURCES):
Add engine-backend.h, remove rungpg.h and
engine-gpgsm.h. Replace engine-gpgsm.c with ${gpgsm_components}.
(status-table.h): Depend on gpgme.h, not rungpg.h.
* conversion.c: Include <stdlib.h>.
* engine-gpgsm.c: Do not set ENABLE_GPGSM here. Include
"engine-backend.h" instead "engine-gpgsm.h". Reorder some
functions and remove all function prototypes.
(_gpgme_gpgsm_get_version): Make static and rename to ...
(gpgsm_get_version): ... this.
(_gpgme_gpgsm_check_version): Make static and rename to ...
(gpgsm_check_version): ... this.
(_gpgme_gpgsm_new): Make static. Change argument type from
GpgsmObject * to void **. Call gpgsm_release instead
_gpgme_gpgsm_release.
(_gpgme_gpgsm_op_decrypt): Make static and rename to ...
(gpgsm_check_decrypt): ... this.
(_gpgme_gpgsm_op_delete): Make static and rename to ...
(gpgsm_check_delete): ... this.
(_gpgme_gpgsm_set_recipients): Make static and rename to ...

(gpgsm_check_set_recipients): ... this.
(_gpgme_gpgsm_op_encrypt):
Make static and rename to ...
(gpgsm_encrypt): ... this.
(_gpgme_gpgsm_op_export): Make static and rename to ...
(gpgsm_export): ... this.
(_gpgme_gpgsm_op_genkey): Make static and rename to ...
(gpgsm_genkey): ... this.
(_gpgme_gpgsm_op_import): Make static and rename to ...
(gpgsm_import): ... this.
(_gpgme_gpgsm_op_keylist): Make static and rename to ...
(gpgsm_keylist): ... this.
(_gpgme_gpgsm_op_keylist_ext): Make static and rename to ...
(gpgsm_keylist_ext): ... this.
(_gpgme_gpgsm_op_sign): Make static and rename to ...
(gpgsm_sign): ... this.
(_gpgme_gpgsm_op_trustlist): Make static and rename to ...
(gpgsm_trustlist): ... this.
(_gpgme_gpgsm_op_verify): Make static and rename to ...
(gpgsm_verify): ... this.
(gpgsm_status_handler): Rename to ...
(status_handler): ... this.
(_gpgme_gpgsm_set_status_handler): Make static and rename to ...
(gpgsm_set_status_handler): ... this.
(_gpgme_gpgsm_set_colon_line_handler): Make static
and rename to ...
(gpgsm_set_colon_line_handler): ... this.
(_gpgme_gpgsm_add_io_cb): Rename to ...
(add_io_cb): ... this.
(_gpgme_gpgsm_start): Make static and rename to ...
(gpgsm_start): ... this.
(_gpgme_gpgsm_set_io_cb): Make static and rename to ...
(gpgsm_set_io_cb): ... this.
(_gpgme_gpgsm_io_event): Make static and rename to ...
(gpgsm_io_event): ... this.
(struct _gpgme_engine_ops_gpgsm): New variable.
[!ENABLE_GPGSM]: Removed.
* engine.c: Do not include <time.h>, <sys/types.h>, <string.h>,
<assert.h>, "io.h", "rungpg.h" and "engine-gpgsm.h". Include
<stdlib.h> and "engine-backend.h".
(struct engine_object_s): Rewritten.
(engine_ops): New variable.
* engine.c (_gpgme_engine_get_path, _gpgme_engine_get_version,
_gpgme_engine_check_version, _gpgme_engine_new,
_gpgme_engine_release, _gpgme_engine_set_verbosity,
_gpgme_engine_set_status_handler,
_gpgme_engine_set_command_handler,
_gpgme_engine_set_colon_line_handler, _gpgme_engine_op_decrypt,

_gpgme_engine_op_delete,
_gpgme_engine_op_edit,
_gpgme_engine_op_encrypt, _gpgme_engine_op_encrypt_sign,
_gpgme_engine_op_export, _gpgme_engine_op_genkey,
_gpgme_engine_op_import, _gpgme_engine_op_keylist,
_gpgme_engine_op_keylist_ext, _gpgme_engine_op_sign,
_gpgme_engine_op_trustlist, _gpgme_engine_op_verify,
_gpgme_engine_start, _gpgme_engine_set_io_cbs,
_gpgme_engine_io_event): Reimplement.
* engine.h: Fix a few comments and a variable name in a prototype.
* ops.h: Do not include "rungpg.h".
* passphrase.c: Include config.h only if [HAVE_CONFIG_H]. Do not
include "rungpg.h".
* recipient.c: Likewise.
* signers.c: Likewise.
* version.c: Likewise.
* rungpg.c: Likewise. Include "engine-backend.h". Reorder
functions and remove prototypes.
(_gpgme_gpg_get_version): Make static and rename to ...
(gpg_get_version): ... this.
(_gpgme_gpg_check_version): Make static and rename to ...
(gpg_check_version): ... this.
(_gpgme_gpg_new): Make static. Change argument type from
GpgObject
* to void **. Call gpg_release instead
_gpgme_gpg_release.
(_gpgme_gpg_op_decrypt): Make static and rename to ...
(gpg_check_decrypt): ... this.
(_gpgme_gpg_op_delete): Make static and rename to ...
(gpg_check_delete): ... this.
(_gpgme_gpg_set_recipients): Make static and rename to ...
(gpg_check_set_recipients): ... this.
(_gpgme_gpg_op_encrypt): Make static and rename to ...
(gpg_encrypt): ... this.
(_gpgme_gpg_op_export): Make static and rename to ...
(gpg_export): ... this.
(_gpgme_gpg_op_genkey): Make static and rename to ...
(gpg_genkey): ... this.
(_gpgme_gpg_op_import): Make static and rename to ...
(gpg_import): ... this.
(_gpgme_gpg_op_keylist): Make static and rename to ...
(gpg_keylist): ... this.
(_gpgme_gpg_op_keylist_ext): Make static and rename to ...
(gpg_keylist_ext): ... this.
(_gpgme_gpg_op_sign): Make static and rename to ...
(gpg_sign): ... this.
(_gpgme_gpg_op_trustlist): Make static and rename to ...
(gpg_trustlist): ... this.

(_gpgme_gpg_op_verify):
Make static and rename to ...
(gpg_verify): ... this.
(gpg_status_handler): Rename to ...
(status_handler): ... this.
(_gpgme_gpg_set_status_handler): Make static and rename to ...
(gpg_set_status_handler): ... this.
(_gpgme_gpg_set_colon_line_handler): Make static and rename to ...
(gpg_set_colon_line_handler): ... this.
(gpgme_gpg_add_io_cb): Rename to ...
(add_io_cb): ... this.
(_gpgme_gpg_start): Make static and rename to ...
(gpg_start): ... this.
(_gpgme_gpg_set_io_cb): Make static and rename to ...
(gpg_set_io_cb): ... this.
(_gpgme_gpg_io_event): Make static and rename to ...
(gpg_io_event): ... this.
(struct _gpgme_engine_ops_gpg): New variable.

2002-10-10 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_verify) [!ENABLE_GPGSM]: Add
missing argument.

2002-10-09 Marcus Brinkmann <marcus@g10code.de>

* data.h, data-user.c, data-stream.c, data-mem.c, data-fd.c,
data-compat.c: New file. Really check them in this time,
completes
2002-10-08 change.

* rungpg.h (GpgStatusHandler): Rename type to GpgmeStatusHandler
and move to ...
* types.h (GpgmeStatusHandler): ... here.
* rungpg.h (GpgColonLineHandler): Rename type to GpgmeColonLineHandler.
and move to ...
* types.h (GpgmeColonLineHandler): ... here.
* rungpg.h (GpgCommandHandler): Rename type to GpgmeCommandHandler.
and move to ...
* types.h (GpgmeCommandHandler): ... here.
* engine.h: Don't include "rungpg.h".
(_gpgme_engine_set_status_handler): Change type of
argument from GpgStatusHandler to GpgmeStatusHandler.
(_gpgme_engine_set_colon_line_handler): Change type of
argument from GpgColonLineHandler to GpgmeColonLineHandler.
(_gpgme_engine_set_command_handler): Change type of
argument from GpgCommandHandler to GpgmeCommandHandler.
* engine-gpgsm.h: Don't include "rungpg.h".

(_gpgme_gpgsm_set_status_handler): Change type of
argument from GpgStatusHandler to GpgmeStatusHandler.
(_gpgme_gpgsm_set_colon_line_handler): Change type
of
argument from GpgColonLineHandler to GpgmeColonLineHandler.
* engine-gpgsm.c: Do not include "rungpg.h".
(struct gpgsm_object_s): Change type of
status.fnc to GpgmeStatusHandler.  Change type of colon.fnc to
GpgmeColonLineHandler.
(gpgsm_assuan_simple_command): Change type of argument from
GpgStatusHandler to GpgmeStatusHandler.
(_gpgme_gpgsm_set_status_handler): Likewise.
(_gpgme_gpgsm_set_colon_line_handler): Change type of argument from
GpgColonLineHandler to GpgmeColonLineHandler.
* rungpg.h (_gpgme_gpg_set_status_handler): Change type of
argument from GpgStatusHandler to GpgmeStatusHandler.
(_gpgme_gpg_set_colon_line_handler): Change type of
argument from GpgColonLineHandler to GpgmeColonLineHandler.
(_gpgme_gpg_set_command_handler): Change type of
argument from GpgCommandHandler to GpgmeCommandHandler.
* rungpg.c (struct gpg_object_s): Change type of status.fnc to
GpgmeStatusHandler.  Change type of colon.fnc to
GpgmeColonLineHandler.  Change type of cmd.fnc
to
GpgmeCommandLineHandler.
(_gpgme_gpg_set_status_handler): Change type of argument FNC to
GpgmeStatusHandler.
(_gpgme_gpg_set_colon_line_handler): Change type of argument FNC
to GpgmeColonLineHandler.
(_gpgme_gpg_set_command_handler): Change type of argument FNC to
GpgmeCommandHandler.
* engine.c (_gpgme_engine_set_status_handler): Change type of
argument FNC to GpgmeStatusHandler.
(_gpgme_engine_set_colon_line_handler): Change type of argument FNC
to GpgmeColonLineHandler.
(_gpgme_engine_set_command_handler): Change type of argument FNC to
GpgmeCommandHandler.

* rungpg.h (_gpgme_gpg_enable_pipemode): Remove prototype.
* rungpg.c (struct gpg_object_s): Remove PM.
(pipemode_cb): Prototype removed.
(add_pm_data): Function removed.
(_gpgme_gpg_enable_pipemode): Likewise.
(pipemode_copy): Likewise.
(pipemode_cb): Likewise.
(add_arg): Don't check for pipemode.
(add_data): Likewise.
(_gpgme_gpg_set_status_handler): Likewise.

(_gpgme_gpg_set_colon_line_handler):
Likewise.
(_gpgme_gpg_set_command_handler): Likewise.
(_gpgme_gpg_spawn): Likewise.
(_gpgme_gpg_spawn): Don't set PM.active.
(_gpgme_gpg_op_verify): Remove pipemode case.
* verify.c (_gpgme_op_verify_start): Remove pipemode case.

* rungpg.h (_gpgme_gpg_add_arg, _gpgme_gpg_add_data,
_gpgme_gpg_add_pm_data, _gpgme_gpg_housecleaning,
_gpgme_gpg_set_simple_line_handler): Prototype removed.
(_gpgme_gpg_set_verbosity): New prototype.
* rungpg.c (_gpgme_gpg_add_data): Make static and rename to ...
(add_data): ... this.
(_gpgme_gpg_add_pm_data): Call add_data, not _gpgme_gpg_add_data.
(_gpgme_gpg_set_command_handler): Likewise.
(_gpgme_gpg_op_decrypt, _gpgme_gpg_op_edit, _gpgme_gpg_op_encrypt,
_gpgme_gpg_op_encrypt_sign, _gpgme_gpg_op_export,
_gpgme_gpg_op_genkey, _gpgme_gpg_op_import, _gpgme_gpg_op_sign,
_gpgme_gpg_op_verify): Likewise.
(_gpgme_gpg_add_pm_data): Rename to ...
(add_pm_data): ... this.
(_gpgme_gpg_op_verify): Call add_pm_data, not
_gpgme_gpg_add_pm_data.
(_gpgme_gpg_add_arg):
Make static and rename to ...
(add_arg): ... this.
(_gpgme_gpg_set_command_handler, _gpgme_gpg_new,
_gpgme_gpg_op_decrypt, _gpgme_gpg_op_delete,
_gpgme_append_gpg_args_from_signers, _gpgme_gpg_op_edit,
_gpgme_append_gpg_args_from_recipients, _gpgme_gpg_op_encrypt,
_gpgme_gpg_op_encrypt_sign, _gpgme_gpg_op_export,
_gpgme_gpg_op_genkey, _gpgme_gpg_op_import, _gpgme_gpg_op_keylist,
_gpgme_gpg_op_keylist_ext, _gpgme_gpg_op_trustlist,
_gpgme_gpg_op_sign, _gpgme_gpg_op_verify): Use add_arg, not
_gpgme_gpg_add_arg.
(_gpgme_gpg_set_verbosity): New function.
(struct gpg_object_s): Remove member simple from colon.
(_gpgme_gpg_set_colon_line_handler): Don't initialize simple.
(_gpgme_gpg_set_simple_line_handler): Removed function.
(read_colon_line): Don't check the GPG->colon.simple.
* engine.c (_gpgme_engine_set_verbosity): Call
_gpgme_gpg_set_verbosity instead _gpgme_gpg_add_arg.

2002-10-08 Marcus Brinkmann <marcus@g10code.de>

* util.h (_gpgme_malloc,

_gpgme_realloc, _gpgme_calloc,
_gpgme_strdup, _gpgme_free): Remove prototypes.
(xtrymalloc, xtrycalloc, xtryrealloc, xtrystrdup, xfree): Remove
macros.
* util.c: File removed.
* Makefile.am (libgpgme_la_SOURCES): Remove util.h.
* conversion.c (_gpgme_decode_c_string): Use malloc instead of
xtrymalloc, realloc instead of xtryrealloc, calloc instead of
xtrycalloc, free instead of xfree.
(_gpgme_data_append_percentstring_for_xml): Likewise.
* data.c (_gpgme_data_new, _gpgme_data_release): Likewise.
* data-compat.c (gpgme_data_new_from_filepart): Likewise.
* data-mem.c (mem_write, mem_release, gpgme_data_new_from_mem,
_gpgme_data_get_as_string): Likewise.
* debug.c (debug_init): Likewise.
* decrypt.c (_gpgme_release_decrypt_result): Likewise.
* delete.c (_gpgme_release_delete_result): Likewise.
* edit.c (_gpgme_release_edit_result, _gpgme_op_edit_start):
Likewise.
* encrypt.c (_gpgme_release_encrypt_result): Likewise.
* engine.c (_gpgme_engine_get_info, _gpgme_engine_new,
_gpgme_engine_release):
Likewise.
* engine-gpgsm.c (_gpgme_gpgsm_new, _gpgme_gpgsm_release,
_gpgme_gpgsm_op_decrypt, _gpgme_gpgsm_op_delete,
gpgsm_set_recipients, _gpgme_gpgsm_op_encrypt,
_gpgme_gpgsm_op_export, _gpgme_gpgsm_op_genkey,
_gpgme_gpgsm_op_import, _gpgme_gpgsm_op_keylist,
_gpgme_gpgsm_op_keylist_ext, _gpgme_gpgsm_op_sign,
_gpgme_gpgsm_op_verify, gpgsm_status_handler): Likewise.
* genkey.c (_gpgme_release_genkey_result): Likewise.
* gpgme.c (gpgme_new, gpgme_release): Likewise.
* import.c (_gpgme_release_import_result): Likewise.
* key.c (_gpgme_key_cache_init, _gpgme_key_cache_add, key_new,
add_subkey, gpgme_key_release, _gpgme_key_append_name): Likewise.
* keylist.c (_gpgme_release_keylist_result, keylist_colon_handler,
_gpgme_op_keylist_event_cb, gpgme_op_keylist_next): Likewise.
* ops.h (test_and_allocate_result): Likewise.
* passphrase.c (_gpgme_release_passphrase_result,
_gpgme_passphrase_status_handler,
_gpgme_passphrase_command_handler): Likewise.
*
progress.c (_gpgme_progress_status_handler): Likewise.
* recipient.c (gpgme_recipients_new, gpgme_recipients_release,
gpgme_recipients_add_name_with_validity): Likewise.
* rungpg.c (_gpgme_gpg_new, _gpgme_gpg_release,
_gpgme_gpg_add_arg, _gpgme_gpg_add_data,
_gpgme_gpg_set_colon_line_handler, free_argv, free_fd_data_map,

build_argv, _gpgme_gpg_spawn, read_status, read_colon_line):
Likewise.
* sign.c (_gpgme_release_sign_result): Likewise.
* signers.c (_gpgme_signers_add): Likewise.
* trustlist.c (trust_item_new, trustlist_colon_handler,
_gpgme_op_trustlist_event_cb, gpgme_op_trustlist_next,
gpgme_trustitem_release): Likewise.
* verify.c (_gpgme_release_verify_result, finish_sig): Likewise.
* version.c (gpgme_get_engine_info, _gpgme_get_program_version):
Likewise.
* w32-io.c (create_reader, create_writer, destroy_reader,
destroy_writer, build_commandline, _gpgme_io_spawn): Likewise.
* w32-sema.c (critsect_init, _gpgme_sema_cs_destroy): Likewise.
* w32-util.c (read_w32_registry_string):
Likewise.
* wait.c (_gpgme_fd_table_deinit, _gpgme_fd_table_put,
_gpgme_wait_event_cb, _gpgme_add_io_cb, _gpgme_remove_io_cb)
* data-compat.c: Include <stdlib.h>.

2002-10-08 Marcus Brinkmann <marcus@g10code.de>

New data object component:

* gpgme.h (GpgmeDataReadCb, GpgmeDataWriteCb, GpgmeDataSeekCb,
GpgmeDataReleaseCb): New types.
(struct GpgmeDataCbs): New structure.
(gpgme_data_read): Changed prototype to match that of read() closely.
(gpgme_data_write): Similar for write().
(gpgme_data_seek, gpgme_data_new_from_cbs, gpgme_data_new_from_fd,
gpgme_data_new_from_stream): New prototypes.
(gpgme_data_get_type, gpgme_check_engine): Prototype removed.

* Makefile.am (libgpgme_la_SOURCES): Add data.h, data-fd.c,
data-stream.c, data-mem.c, data-user.c and data-compat.c.
* data.c: Reimplemented from scratch.
* (data-compat.c, data-fd.c, data.h, data-mem.c, data-stream.c,
data-user.c): New file.
* context.h (struct gpgme_data_s): Removed.
* conversion.c:
Include <errno.h> and <sys/types.h>.
(_gpgme_data_append): New function.
* data.c (_gpgme_data_append_string): Move to ...
* conversion.c (_gpgme_data_append_string): ... here.
* data.c (_gpgme_data_append_for_xml): Move to ...
* conversion.c (_gpgme_data_append_for_xml): ... here.
* data.c (_gpgme_data_append_string_for_xml): Move to ...
* conversion.c (_gpgme_data_append_string_for_xml): ... here.
* data.c (_gpgme_data_append_percentstring_for_xml): Move to ...

* conversion.c (_gpgme_data_append_percentstring_for_xml): ... here.

* ops.h (_gpgme_data_get_mode, _gpgme_data_set_mode): Prototype
removed.
* types.h (GpgmeDataMode): Type removed.

* decrypt.c (_gpgme_decrypt_start): Don't check data type or mode.
* edit.c (_gpgme_op_edit_start): Likewise.
* encrypt.c (_gpgme_op_encrypt_start): Likewise.
* encrypt-sign.c (_gpgme_op_encrypt_sign_start): Likewise.
* encrypt-sign.c (_gpgme_op_encrypt_sign_start): Likewise.
* export.c (_gpgme_op_export_start): Likewise.
*
genkey.c (_gpgme_op_genkey_start): Likewise.
* import.c (_gpgme_op_import_start): Likewise.
* sign.c (_gpgme_op_sign_start): Likewise.
* verify.c (_gpgme_op_verify_start): Likewise.

* encrypt.c (gpgme_op_encrypt): Remove hack that returns invalid
no recipient if no data was returned.
* encrypt-sign.c (gpgme_op_encrypt_sign): Remove hack that returns
no recipient if no data was returned.
* encrypt-sign.c (gpgme_op_encrypt_sign): Remove hack that returns
no recipient if no data was returned.

* engine.c (_gpgme_engine_op_verify): Add new argument to
differentiate detached from normal signatures.
* engine.h (_gpgme_engine_op_verify): Likewise for prototype.
* engine-gpgsm.c (_gpgme_gpgsm_op_verify): Likewise. Don't check
mode of data argument.
* engine-gpgsm.h (_gpgme_gpgsm_op_verify): Likewise for prototype.
* gpgme.h (gpgme_op_verify_start): Likewise for prototype.
(gpgme_op_verify): Likewise for prototype.
* rungpg.c (_gpgme_gpg_op_verify): Likewise.
* rungpg.h
(_gpgme_gpg_op_verify): Likewise for prototype.
* verify.c (_gpgme_op_verify_start): Likewise.
(gpgme_op_verify_start): Likewise.
(gpgme_op_verify): Likewise.

* rungpg.c (struct arg_and_data_s): New member INBOUND to hold
direction of data object.
(_gpgme_gpg_add_data): Add new argument INBOUND. Use it to
determine direction of data object.
(_gpgme_gpg_add_pm_data, _gpgme_gpg_set_command_handler,
_gpgme_gpg_op_decrypt, _gpgme_gpg_op_edit, _gpgme_gpg_op_encrypt,
_gpgme_gpg_op_encrypt_sign, _gpgme_gpg_op_export,
_gpgme_gpg_op_genkey, _gpgme_gpg_op_import, _gpgme_gpg_op_sign,

_gpgme_gpg_op_verify): Add new argument to _gpgme_gpg_add_data
invocation.
(build_argv): Use new member INBOUND to determine direction of
file descriptor.  Don't check the data type.
* rungpg.h (_gpgme_gpg_add_data): Add new argument to prototype.

* gpgme.c (gpgme_get_op_info): Don't call
_gpgme_data_get_as_string if CTX->op_info is NULL.

* version.c (gpgme_check_engine): Function removed.

2002-09-30
Werner Koch  <wk@gnupg.org>

* keylist.c (keylist_colon_handler): Take care when printing a
NULL with the DEBUG.

* engine-gpgsm.c (struct gpgsm_object_s): New member ANY.
(gpgsm_status_handler): Run the colon function to indicate EOF.
(_gpgme_gpgsm_set_colon_line_handler): Better reset ANY here.

2002-09-28  Marcus Brinkmann  <marcus@g10code.de>

* conversion.c (_gpgme_hextobyte): Prevent superfluous
multiplication with base.  Reported by Stphane Corthsy.

* keylist.c (gpgme_op_keylist_ext_start): Use private asynchronous
operation type in invocation of _gpgme_op_reset.

2002-09-20  Werner Koch  <wk@gnupg.org>

* ath.c: Include sys/time.h if sys/select.h is not available.

2002-09-13  Marcus Brinkmann  <marcus@g10code.de>

* keylist.c (keylist_status_handler): Do not call finish_key() here.
(gpgme_op_keylist_ext_start): Set CTX->tmp_key to NULL.

2002-09-03  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (assuan_libobjs): Remove @LTLIBOBJS@ as we link
them
into gpgme unconditionally.
(libgpgme_la_LIBADD): Change @LIBOBJS@ into @LTLIBOBJS@.

2002-09-02  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (assuan_libobjs): Use @LTLIBOBJS@ instead @LIBOBJS@.

2002-09-02  Marcus Brinkmann  <marcus@g10code.de>

* debug.c (_gpgme_debug_add): Test *LINE, not LINE.
(_gpgme_debug_end): Likewise.
Reported by Dr. Stefan Dalibor <Dr.Stefan.Dalibor@bfa.de>.

2002-09-02  Marcus Brinkmann  <marcus@g10code.de>

* posix-io.c (_gpgme_io_select): Don't use a non-constant struct
initializer.
* version.c (_gpgme_get_program_version): Likewise.
Reported by Dr. Stefan Dalibor <Dr.Stefan.Dalibor@bfa.de>.

2002-09-02  Marcus Brinkmann  <marcus@g10code.de>

* conversion.c (_gpgme_decode_c_string): Set DESTP before
modifying DEST.

* conversion.c (_gpgme_decode_c_string): Fix off by one error in
last change.
* rungpg.c (_gpgme_append_gpg_args_from_signers): Move before
_gpgme_op_edit so its prototype is known early on.

* conversion.c: New
file.
* util.h: Add prototypes for _gpgme_decode_c_string and
_gpgme_hextobyte.
* keylist.c (keylist_colon_handler): Call _gpgme_decode_c_string
on issuer name.
* Makefile.am (libgpgme_la_SOURCES): Add conversion.c
* key.c (_gpgme_key_append_name): Replace calls to hextobyte by
calls to _gpgme_hextobyte.
(hash_key): Likewise.

2002-09-01  Marcus Brinkmann  <marcus@g10code.de>

* op-support.c (_gpgme_op_reset): Set CTX->pending after calling
_gpgme_engine_release, as this will reset pending to zero in the
event done callback on cancelled operations.

2002-08-30  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (_gpgme_gpg_op_edit): Add args from signers.
Suggested by Miguel Coca <e970095@zipi.fi.upm.es>.

* rungpg.c (_gpgme_gpg_op_edit): Add bogus ctx argument.
* rungpg.h: Also to prototype.

* engine.c (_gpgme_engine_op_edit): Likewise.
* engine.h: Likewise.
* edit.c (_gpgme_op_edit_start): Likewise.

2002-08-29 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_op_sign):
Implement signer
selection.
* vasprintf.c (va_copy): Define macro if not yet defined.

2002-08-29 Marcus Brinkmann <marcus@g10code.de>

* passphrase.c (_gpgme_passphrase_status_handler): Reset
CTX->result.passphrase->no_passphrase if passphrase is given (good
or bad). Submitted by Jean DIRAISON <jean.diraison@free.fr>.

2002-08-28 Marcus Brinkmann <marcus@g10code.de>

* posix-io.c (_gpgme_io_spawn): Use a double-fork approach.
Return 0 on success, -1 on error.
* version.c (_gpgme_get_program_version): Don't wait for the child.
* engine.c (_gpgme_engine_housecleaning): Function removed.
(do_reaping): Likewise.
(_gpgme_engine_add_child_to_reap_list): Likewise.
(struct reap_s): Removed.
(reap_list): Likewise.
(reap_list_lock): Likewise.
* engine.h (_gpgme_engine_io_event): Remove prototypes for
_gpgme_engine_housecleaning and
_gpgme_engine_add_child_to_reap_list.
* rungpg.c (_gpgme_gpg_release): Don't add child to reap list.
(struct gpg_object_s): Remove
PID member.
(_gpgme_gpg_new): Don't initialize GPG->pid.
(_gpgme_gpg_spawn): Don't set GPG->pid.
* wait.c (run_idle): Removed.
(gpgme_wait): Run idle_function directly.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

* encrypt-sign.c (encrypt_sign_status_handler): Remove dead
variables encrypt_info and encrypt_info_len.
* trustlist.c (gpgme_op_trustlist_start): Set colon line handler.
* posix-sema.c (sema_fatal): Remove function.
All these reported by Stphane Corthsy.

2002-08-23 Werner Koch <wk@gnupg.org>

* gpgme-config.in: Made --prefix work for --libs.

2002-08-21  Marcus Brinkmann  <marcus@g10code.de>

* ath.h: Update list of symbols that get a prefix: Rename the
ath_mutex_*_available symbols to ath_*_available.

2002-08-21  Marcus Brinkmann  <marcus@g10code.de>

* stpcpy.c: New file from gnulib.
* Makefile.am (assuan_libobjs): Remove jnlib.

2002-08-20  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h: Add prototype for gpgme_op_import_ext.
* import.c
(struct import_result_s): New member `nr_considered'.
Rename `any_imported' to `nr_imported'.
(import_status_handler): Increment nr_imported.  Set nr_considered
if appropriate.
(gpgme_op_import_ext): New function.
(gpgme_op_import): Implement in terms of gpgme_op_import_ext.

2002-08-20  Werner Koch  <wk@gnupg.org>

* gpgme.m4: Replaced with a new and faster version.  This does not
anymore try to build test programs.  If we really need test
programs, we should add an option to gpgme-config to do so.

* vasprintf.c (int_vasprintf): Hack to handle NULL passed for %s.

2002-08-20  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c (_gpgme_set_op_info): Append data on subsequent calls.
* encrypt-sign.c (encrypt_sign_status_handler): Remove op_info
handling.

2002-08-19  Werner Koch  <wk@gnupg.org>

* decrypt.c (is_token,skip_token): Duplicated from verify.c
(gpgme_op_decrypt): Hack to properly return Decryption_Failed..
(_gpgme_decrypt_status_handler): Create an operation info.

2002-08-14
Werner Koch  <wk@gnupg.org>

* key.h (struct certsig_s): New.  Use it in gpgme_key_s.

* key.c (gpgme_key_release): Release it. We need to add more code
of course.
(_gpgme_key_append_name): Use memset to initialize the struct.
* gpgme.h (GPGME_KEYLIST_MODE_SIGS): New.
* rungpg.c (_gpgme_gpg_op_keylist): Include sigs in listing depending
non the list mode.

* key.c (gpgme_key_get_string_attr): Use GPGME_ATTR_TYPE to return
information about the key type (PGP or X.509).
(gpgme_key_get_ulong_attr): Likewise.

* keylist.c (keylist_colon_handler): Include 1 in the check for
valid algorithms so that RSA is usable. Store the issuer name and
serial number also for "crs" records. Parse the expire date for
subkeys.
(set_userid_flags): Put them onto the last appended key.

2002-07-29 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (_gpgme_gpg_op_edit): Use --with-colons.

2002-07-28 Marcus Brinkmann <marcus@g10code.de>

* data.c (gpgme_data_read): For GPGME_DATA_TYPE_NONE,
return EOF
instead an error.

The following changes make it possible to flush an inbound data
pipe before invoking a command handler:

* posix-io.c (_gpgme_io_select): Accept new argument NONBLOCK to
_gpgme_io_select. Set timeout of 0 if this is set.
* w32-io.c (_gpgme_io_select): Likewise.
* io.h: Add new argument NONBLOCK to _gpgme_io_select prototype.
* wait.c (do_select): Add new argument to _gpgme_io_select
invocation.
* rungpg.h (_gpgme_gpg_set_command_handler): Add new argument
linked_data to prototype.
* engine.h (_gpgme_engine_set_command_handler): Likewise.
* engine.c (_gpgme_engine_set_command_handler): Likewise.
* passphrase.c (_gpgme_passphrase_start): Pass NULL as linked_data
argument to _gpgme_engine_set_command_handler.
* rungpg.c (struct gpg_object_s): New members linked_data and
linked_idx in CMD.
(_gpgme_gpg_new): Initialize those new members.
(_gpgme_gpg_set_command_handler): Accept new argument linked_data.
(build_argv): Handle linked_data

in the same hack as cb_data.
(read_status): If linked_data is in use, flush the pipe before
activating the command handler.
* gpgme.h: Add prototypes for gpgme_op_edit_start and
gpgme_op_edit.

The next changes export the status codes to the user:

* decrypt.c (_gpgme_decrypt_status_handler): Likewise, also prefix
all STATUS_ with GPGME_.
* delete.c (delete_status_handler): Likewise.
* decrypt-verify.c (decrypt_verify_status_handler): Likewise.
* encrypt.c (_gpgme_encrypt_status_handler): Likewise.
(_gpgme_encrypt_sym_status_handler): Likewise.
* encrypt-sign.c (encrypt_sign_status_handler): Likewise.
* engine-gpgsm.c (parse_status): Likewise.
(gpgsm_status_handler): Likewise.
(gpgsm_set_recipients): Likewise.
* export.c (export_status_handler): Likewise.
* genkey.c (genkey_status_handler): Likewise.
* import.c (append_xml_impinfo): Likewise.
(import_status_handler): Likewise.
* keylist.c (keylist_status_handler): Likewise.
* passphrase.c (_gpgme_passphrase_status_handler):
Likewise.
(command_handler): Likewise.
* progress.c (_gpgme_progress_status_handler): Likewise.
* sign.c (_gpgme_sign_status_handler): Likewise.
* trustlist.c (trustlist_status_handler): Likewise.
* verify.c (_gpgme_verify_status_handler): Likewise.
* gpgme.h (GpgmeEditCb): New type.
* rungpg.h (GpgStatusCode): Rename and move to ...
* gpgme.h (GpgmeStatusCode): ... this and here.
* Makefile.am (status-table.h): Run mkstatus on gpgme.h, not rungpg.h.
* mkstatus: Prefix STATUS with GPGME_.
* rungpg.h (GpgStatusHandler, GpgCommandHandler): Change type
accordingly.
* ops.h (_gpgme_verify_status_handler,
_gpgme_decrypt_status_handler, _gpgme_sign_status_handler,
_gpgme_encrypt_status_handler, _gpgme_passphrase_status_handler,
_gpgme_progress_status_handler): Likewise.
* rungpg.c (struct gpg_object_s): Likewise for CMD.code.

These changes add an edit operation to GPGME:

* context.h (struct gpgme_context_s): New member RESULT.edit. *
ops.h: Add prototype

for _gpgme_release_edit_result and
_gpgme_passphrase_command_handler.
* passphrase.c (command_handler): Make non-static and rename to ...
(_gpgme_passphrase_command_handler): ... this.
(_gpgme_passphrase_start): Use new name for command handler.
* types.h: Add EditResult type.
* gpgme.c (_gpgme_release_result): Release EDIT result.
* edit.c: New file.
* Makefile.am (libgpgme_la_SOURCES): Add edit.c.
(libgpgme_la_LDADD): Rename to libgpgme_la_LIBADD, and include
assuan_libobjs.
(assuan_libobjs): New variable, set this instead
libgpgme_la_LIBADD.
* engine.h (_gpgme_engine_op_edit): New prototype.
* engine.c (_gpgme_engine_op_edit): New function.
* rungpg.h (_gpgme_gpg_op_edit): New prototype.
* rungpg.c (_gpgme_gpg_op_edit): New function.

2002-07-27 Marcus Brinkmann <marcus@g10code.de>

* delete.c (delete_problem): New case ambiguous specification.
(delete_status_handler): Handle new case (poorly).

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c
(_gpgme_gpgsm_op_delete): Implement this.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (libgpgme_la_LDADD): Add @LIBOBJS@ for vasprintf and
fopencookie.
* vasprintf.c: Update to more recent libiberty version.
* debug.h: Replace #elsif with #elif.

Submitted by Stphane Corthsy:
* util.h (vasprintf): Correct prototype.
* encrypt-sign.c: Include <stddef.h>.
(encrypt_sign_status_handler): Change type of ENCRYPT_INFO_LEN to
size_t.
* ath-pthread.c: Include <stdlib.h>, not <malloc.h>.
* ath-pth.c: Likewise.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

* wait.c (fdt_global): Make static. Reported by Stphane
Corthsy.

* rungpg.c (_gpgme_gpg_op_keylist_ext): Skip empty string
patterns.  Reported by Stphane Corthsy.

* key.c (gpgme_key_get_as_xml): Add OTRUST attribute.  Requested
by Stphane Corthsy.
(gpgme_key_get_string_attr): Add GPGME_ATTR_SIG_SUMMARY case to
silence gcc warning.

* rungpg.c (_gpgme_gpg_new): Always set utf8 as charset.

2002-07-03
Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c (gpgme_set_io_cbs): Deal with CTX being NULL.

* gpgme.c (_gpgme_op_event_cb_user): New function.
* op-support.c (_gpgme_op_reset): Support a new mode of operation
for private or user event loop.  Use new user event callback
wrapper.
* trustlist.c (gpgme_op_trustlist_start): Use this new mode.
* keylist.c (gpgme_op_keylist_start): Likewise.

* rungpg.c (_gpgme_gpg_io_event): New function.
* rungpg.h (_gpgme_gpg_io_event): New prototype.
* engine-gpgsm.c (_gpgme_gpg_io_event): New function.
* engine-gpgsm.h (_gpgme_gpgsm_io_event): New prototype.
* engine.c (_gpgme_engine_io_event): New function.
* engine.h (_gpgme_engine_io_event): New prototype.
* keylist.c (finish_key): Call _gpgme_engine_io_event, and move
the real work for the default IO callback routines to ...
(_gpgme_op_keylist_event_cb): ... here.  New function.
* trustlist.c (trustlist_colon_handler): Signal
GPGME_EVENT_NEXT_TRUSTITEM.  Move queue
manipulation to ...
(_gpgme_op_trustlist_event_cb): ... here.  New function.
* gpgme.c (_gpgme_op_event_cb): Call _gpgme_op_keylist_event_cb
and _gpgme_op_trustlist_event_cb when appropriate.
* ops.h (_gpgme_op_keylist_event_cb): New prototype.
(_gpgme_op_trustlist_event_cb): Likewise.
* op-support.c (_gpgme_op_reset): Add comment why we don't use the
user provided event handler directly.
* gpgme.h (GpgmeRegisterIOCb): Return GpgmeError value, and TAG in
a pointer argument.
* wait.c (_gpgme_add_io_cb): Likewise.
* wait.h (_gpgme_add_io_cb): Likewise for prototype.
* rungpg.c (_gpgme_gpg_add_io_cb): Call IO_CBS->add with new
argument.  Fix up error handling.
* engine-gpgsm.c (_gpgme_gpgsm_add_io_cb): Call IO_CBS->add with

new argument, fix up error handling.

2002-07-03 Werner Koch <wk@gnupg.org>

* encrypt.c (status_handler_finish): New.
(_gpgme_encrypt_status_handler): Moved some code out to the new
function and call this function also in case we get into the
status
handler with an error which might happen due to a kludge in
engine-gpgsm.c

2002-06-28 Marcus Brinkmann <marcus@g10code.de>

* keylist.c (gpgme_op_keylist_ext_start): Always use our own FD
table (eg use synchronous mode).

2002-06-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h: Fix documentation of key attribute retrieval functions.

2002-06-28 Marcus Brinkmann <marcus@g10code.de>

* ops.h (_gpgme_wait_on_condition): Remove HANG argument from
prototype and change return type to GpgmeError.
(_gpgme_wait_one): New prototype.
* wait.c (gpgme_wait): Replace with the meat from
_gpgme_wait_on_condition here, and remove the support for
conditions.
(_gpgme_wait_on_condition): Remove HANG argument from prototype
and change return type to GpgmeError. Replace with meat from
_gpgme_wait_one and add support for conditions.
(_gpgme_wait_one): Just call _gpgme_wait_on_condition without
condition.
* keylist.c (gpgme_op_keylist_ext_start): Always use our own FD
table (eg
use synchronous mode).
(gpgme_op_keylist_next): Remove HANG argument from
_gpgme_wait_on_condition. Check its return value.
* trustlist.c (gpgme_op_trustlist_start): Always use our own FD
table (eg use synchronous mode).
(gpgme_op_trustlist_next): Remove HANG argument from
_gpgme_wait_on_condition. Check its return value.

2002-06-26 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (map_assuan_error): Map No_Data_Available to EOF.

* import.c (append_xml_impinfo): Kludge to print fingerprint

instead of keyid for use with gpgsm.
(import_status_handler): Set a flag to know whether any import
occurred.
(gpgme_op_import): Return -1 if no certificate ewas imported.

2002-06-25 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_set_io_cbs) [ENABLE_GPGSM]: Fixed
function arguments.

2002-06-25 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_export): Only export the keys
listed in RECP.
* export.c (gpgme_op_export): If no data was returned,
return
GPGME_No_Recipients.

2002-06-25 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_export): Implement.

2002-06-21 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_assuan_simple_command): Return ERR.
(parse_status): New function.
(gpgsm_status_handler): Use parse_status.
(gpgsm_assuan_simple_command): Accept new arguments STATUS_FNC and
STATUS_FNC_VALUE and process status messages.
(gpgsm_set_recipients): Pass new arguments to gpgsm_assuan_simple_command.
(gpgsm_set_fd): Likewise.
(_gpgme_gpgsm_op_keylist): Likewise.
(_gpgme_gpgsm_op_keylist_ext): Likewise.
(_gpgme_gpgsm_op_sign): Likewise.

2002-06-21 Marcus Brinkmann <marcus@g10code.de>

* wait.c (_gpgme_remove_io_cb): Unlock FDT->lock.

2002-06-20 Werner Koch <wk@gnupg.org>

* rungpg.c (build_argv): Ignore GPG_AGENT_INFO if set but empty.

* verify.c (calc_sig_summary): Set bad policy for wrong key usage.
(skip_token): New.
(_gpgme_verify_status_handler): Watch out
for wrong key usage.
(gpgme_get_sig_string_attr): Hack to return info on the key

usage. Does now make use of the former RESERVED argument which
has been renamed to WHATIDX.
(gpgme_get_sig_ulong_attr): Renamed RESERVED to WHATIDX.

2002-06-14 Marcus Brinkmann <marcus@g10code.de>

* wait.c (do_select): Return -1 on error, and 0 if nothing to run.
(_gpgme_wait_one): Only set HANG to zero if do_select returned an
error, or there are no more file descriptors to wait on.
(_gpgme_wait_on_condition): Ignore return value from do_select for
now.

2002-06-13 Werner Koch <wk@gnupg.org>

* verify.c (gpgme_op_verify): Make sure that we never access an
uninitialized result structure.

2002-06-12 Werner Koch <wk@gnupg.org>

* keylist.c (struct keylist_result_s): New.
(_gpgme_release_keylist_result): Release it here
(keylist_status_handler): Handle truncated.
(append_xml_keylistinfo): New.
* gpgme.c (_gpgme_release_result): and use it here.
* types.h: Declare the new type here.
*
context.h (struct gpgme_context_s): Use it here.

2002-06-11 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_release): Close status_cb.fd.
(_gpgme_gpgsm_new): Duplicate status file descriptor, so we can
use our own close notification mechanism without interfering with
assuan.

2002-06-11 Werner Koch <wk@gnupg.org>

* gpgme.h: Add GPGME_ATTR_SIG_SUMMARY and the GPGME_SIGSUM_
constants.
* verify.c (calc_sig_summary): New.
(gpgme_get_sig_ulong_attr): And use it here.

2002-06-10 Werner Koch <wk@gnupg.org>

* rungpg.h: Add new status codes TRUNCATED and ERROR.
* verify.c (is_token, copy_token): New.
(_gpgme_verify_status_handler): Use copy_token, handle the new
ERROR status and store the errorcode used withgpgsm and trust

status codes.
* gpgme.h: New attribute ERRTOK.
* key.c (gpgme_key_get_string_attr): Add dummy case for it.
(gpgme_get_sig_string_attr): Use it here to return the last error.

2002-06-10 Marcus Brinkmann <marcus@g10code.de>

*
engine-gpgsm.c (_gpgme_gpgsm_start): Move the code that sets the
close notification for the status fd to ...
(_gpgme_gpgsm_new): ... here.
* wait.h: Include "sema.h". Remove prototypes of
_gpgme_remove_proc_from_wait_queue and
_gpgme_register_pipe_handler. Add prototypes of
_gpgme_fd_table_init, _gpgme_fd_table_deinit, _gpgme_fd_table_put,
_gpgme_add_io_cb, _gpgme_remove_io_cb, _gpgme_wait_event_cb and
_gpgme_wait_one..
* wait.c: Remove global variables PROC_QUEUE, PROC_QUEUE_LOCK,
FD_TABLE_SIZE, FD_TABLE, FD_TABLE_LOCK. New global variables
FDT_GLOBAL, CTX_DONE_LIST, CTX_DONE_LIST_SIZE,
CTX_DONE_LIST_LENGTH and CTX_DONE_LIST_LOCK. Remove struct
proc_s. Replace struct wait_item_s.
(_gpgme_fd_table_init): New function.
(_gpgme_fd_table_deinit): Likewise.
(_gpgme_fd_table_put): Likewise.
(set_process_done): Remove function.
(do_select): Take argument FDT. Use that to decide which fds to
select on.
(_gpgme_remove_proc_from_wait_queue): Remove function.
(_gpgme_wait_event_cb):
New function.
(_gpgme_wait_one): Likewise.
(_gpgme_register_pipe_hanldler): Remove function.
(_gpgme_add_io_cb): New function.
(_gpgme_remove_io_cb): Likewise.
(_gpgme_freeze_fd): Remove function.
(_gpgme_thaw_fd): Remove function.
* rungpg.c (struct fd_data_map_s): Add new member TAG.
(struct gpg_object_s): Likewise for STATUS and COLON. Add member
IDX to CMD. Add new member IO_CBS.
(close_notify_handler): New variables POSSIBLY_DONE and NOT_DONE.
For each I/O callback, check if it should be unregistered. If all
callbacks have been unregistered, trigger GPGME_EVENT_DONE.
Remove member RUNNING.
(_gpgme_gpg_new): Initialize new members.
(_gpgme_gpg_release): Check PID not RUNNING. Don't call
_gpgme_remove_proc_from_wait_queue. Close GPG->CMD.FD if set.
(build_argv): Store away the index instead the file descriptor for

CMD.
(_gpgme_gpg_add_io_cb): New function.
(_gpgme_gpg_spawn): Use _gpgme_gpg_add_io_cb to register IO
callbacks.
(gpg_status_handler):
Change return type to void, remove PID
argument, close filedescriptor if EOF or error occurs.
(read_status): Use _gpgme_gpg_add_io_cb instead _gpgme_thaw_fd.
Use IO_CBS->remove instead _gpgme_freeze_fd.
(gpg_colon_line_handler): Change return type to void, remove PID
argument, close filedescriptor if EOF or error occurs.
(command_cb): Use IO_CBS->remove instead _gpgme_freeze_fd.
(_gpgme_gpg_set_io_cbs): New function.
* rungpg.h (_gpgme_gpg_set_io_cbs): Prototype for
_gpgme_gpg_set_io_cbs.
* gpgme.h (GpgmeIOCb): New type.
(GpgmeRegisterIOCb): Likewise.
(GpgmeRemoveIOCb): Likewise.
(GpgmeEventIO): Likewise.
(GpgmeEventIOCb): Likewise.
(struct GpgmeIOCbs): New structure to hold I/O callbacks.
(gpgme_set_op_io_cbs): New prototype.
(gpgme_get_op_io_cbs): Likewise.
* ops.h: New prototype for _gpgme_op_event_cb. Remove prototypes
for _gpgme_freeze_fd and _gpgme_thaw_fd. Remove PID argument from
_gpgme_data_inbound_handler and _gpgme_data_outbound_handler
prototype.
Add prototype for _gpgme_op_reset.
Add synchronous argument to _gpgme_decrypt_start prototype.
* io.h: Beautification.
* gpgme.c: Include "wait.h".
(gpgme_new): Initialize FDT.
(gpgme_set_io_cbs): New function.
(gpgme_get_io_cbs): Likewise.
(_gpgme_op_event_cb): Likewise.
* data.c (_gpgme_data_inbound_handler): Change return type to
void. Drop PID argument. Close FD on error and EOF.
(write_mem_data): Don't close FD here ...
(write_cb_data): ... or here ...
(_gpgme_data_outbound_handler): ... but here. Change return type
to void. Drop PID argument.
* context.h: Include "wait.h".
(struct gpgme_context_s): New members FDT and IO_CBS.
* op-support.c: New file.
* Makefile.am (libgpgme_la_SOURCES): Add op-support.c.
* ops.h: Add prototype for _gpgme_op_reset().
* decrypt.c (_gpgme_decrypt_start): New argument SYNCHRONOUS. Use
_gpgme_op_reset.

(gpgme_op_decrypt_start): Add synchronous argument.
(gpgme_op_decrypt): Likewise. Use _gpgme_wait_one instead
gpgme_wait.
*
delete.c (gpgme_op_delete_start): Rename to ...
(_gpgme_op_delete_start): ... this. New argument SYNCHRONOUS.
Use _gpgme_op_reset. Make function static.
(gpgme_op_delete_start): Just a wrapper around
_gpgme_op_delete_start now.
(gpgme_op_delete): Add synchronous argument. Use _gpgme_wait_one
instead gpgme_wait.
* encrypt.c: Include "wait.h".
(ggpgme_op_encrypt_start): Rename to ...
(_gpgme_op_encrypt_start): ... this. New argument SYNCHRONOUS.
Use _gpgme_op_reset. Make function static.
(gpgme_op_encrypt_start): Just a wrapper around
_gpgme_op_encrypt_start now.
(gpgme_op_encrypt): Add synchronous argument. Use _gpgme_wait_one
instead gpgme_wait.
* encrypt_sign.c (gpgme_op_encrypt_sign_start): Rename to ...
(_gpgme_op_encrypt_sign_start): ... this. New argument
SYNCHRONOUS. Use _gpgme_op_reset. Make function static.
(gpgme_op_encrypt_sign_start): Just a wrapper around
_gpgme_op_encrypt_sign_start now.
(gpgme_op_encrypt_sign): Add synchronous argument.
Use
_gpgme_wait_one instead gpgme_wait.
* export.c (gpgme_op_export_start): Rename to ...
(_gpgme_op_export_start): ... this. New argument SYNCHRONOUS.
Use _gpgme_op_reset. Make function static.
(gpgme_op_export_start): Just a wrapper around
_gpgme_op_export_start now.
(gpgme_op_export): Add synchronous argument. Use _gpgme_wait_one
instead gpgme_wait.
* genkey.c (gpgme_op_genkey_start): Rename to ...
(_gpgme_op_genkey_start): ... this. New argument SYNCHRONOUS.
Use _gpgme_op_reset. Make function static.
(gpgme_op_genkey_start): Just a wrapper around
_gpgme_op_genkey_start now.
(gpgme_op_genkey): Add synchronous argument. Use _gpgme_wait_one
instead gpgme_wait.
* import.c (gpgme_op_import_start): Rename to ...
(_gpgme_op_import_start): ... this. New argument SYNCHRONOUS.
Use _gpgme_op_reset. Make function static.
(gpgme_op_import_start): Just a wrapper around
_gpgme_op_import_start now.
(gpgme_op_import): Add synchronous argument. Use _gpgme_wait_one
instead

gpgme_wait.
* keylist.c (gpgme_op_keylist_start): Use _gpgme_op_reset.
(gpgme_op_keylist_ext_start): Likewise.
* sign.c (gpgme_op_sign_start): Rename to ...
(_gpgme_op_sign_start): ... this. New argument SYNCHRONOUS. Use
_gpgme_op_reset. Make function static.
(gpgme_op_sign_start): Just a wrapper around _gpgme_op_sign_start
now.
(gpgme_op_sign): Add synchronous argument. Use _gpgme_wait_one
instead gpgme_wait.
* trustlist.c (gpgme_op_trustlist_start): Use _gpgme_op_reset.
* verify.c (gpgme_op_verify_start): Rename to ...
(_gpgme_op_verify_start): ... this. New argument SYNCHRONOUS.
Use _gpgme_op_reset. Make function static.
(gpgme_op_verify_start): Just a wrapper around
_gpgme_op_verify_start now.
(gpgme_op_verify): Add synchronous argument. Use _gpgme_wait_one
instead gpgme_wait.
* engine-gpgsm.c (iocb_data_t): New type.
(struct gpgsm_object_s): New member status_cb. Replace input_fd
and input_data with input_cb. Replace output_fd and output_data
with
output_cb. Replace message_fd and message_data with
message_cb. New member io_cbs.
(_gpgme_gpgsm_new): Initialize all new members (and drop the old
ones).
(close_notify_handler): New variable POSSIBLY_DONE. For each I/O
callback, check if it should be unregistered. If all callbacks
have been unregistered, trigger GPGME_EVENT_DONE.
(_gpgme_gpgsm_release): Remove variable PID. Use new variable
names to close the file descriptors.
(_gpgme_gpgsm_op_decrypt): Use new variable names,
(_gpgme_gpgsm_op_encrypt): Likewise.
(_gpgme_gpgsm_op_genkey): Likewise.
(_gpgme_gpgsm_op_import): Likewise.
(_gpgme_gpgsm_op_keylist): Likewise.
(_gpgme_gpgsm_op_keylist_ext): Likewise.
(_gpgme_gpgsm_op_sign): Likewise.
(_gpgme_gpgsm_op_verify): Likewise.
(gpgsm_status_handler): Drop argument PID. Change return type to
void. Close status pipe before returning because of EOF or error.
(_gpgme_gpgsm_add_io_cb): New function.
(_gpgme_gpgsm_start): Use _gpgme_gpgsm_add_io_cb to register
callback
function.
(_gpgme_gpgsm_set_io_cbs): New function.
* engine-gpgsm.h: New prototype for _gpgme_gpgsm_set_io_cbs.
* engine.c (_gpgme_engine_set_io_cbs): New function.

* engine.h: New prototype for _gpgme_engine_set_io_cbs.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (libgpgme_la_SOURCES): Remove mutex.h.

2002-06-03 Marcus Brinkmann <marcus@g10code.de>

* key.c: Include <ctype.h>.
(_gpgme_key_append_name): Skip one more char when
processing escaped char. Submitted by Marc Mutz <mutz@kde.org>.
Handle hexadecimal encodings. Also reported by Marc. Thanks!

2002-06-02 Marcus Brinkmann <marcus@g10code.de>

* ath.h: Enable the _gpgme_ prefix. Fix all those prefix macros.
* posix-sema.c: Use that prefix here.
* posix-io.c: Include "ath.h".
(_gpgme_io_read): Use _gpgme_ath_read instead read.
(_gpgme_io_write): Use _gpgme_ath_write instead write.
(_gpgme_io_waitpid): Use _gpgme_ath_waitpid instead waitpid.
(_gpgme_io_select): Use _gpgme_ath_select
instead select.

2002-06-02 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (ath_components): New variable.
(ath_components_pthread): Likewise.
(ath_components_pth): Likewise.
(system_components): Add ath_componentes.

* ath.h: New file.
* ath.c: Likewise.
* ath-pthread.c: Likewise.
* ath-pth.c: Likewise.
* posix-sema.c (_gpgme_sema_cs_enter): Rework to use the ATH
interface.
* mutex.h: Remove file.

2002-05-30 Werner Koch <wk@gnupg.org>

* key.c (gpgme_key_get_string_attr): Return NULL when asking for
an issuer with IDX > 0. We don't support altIssuerNames for now.

2002-05-22 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_op_keylist_ext): Aehmm, added
missing variable definition. Oohh - Marcus was faster.

2002-05-22  Marcus Brinkmann  <marcus@gnu.org>

* engine-gpgsm.c (_gpgme_gpgsm_op_keylist_ext): Fix last change.

2002-05-21  Werner Koch  <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_op_keylist)
(_gpgme_gpgsm_op_keylist_ext):
Pass the keylist mode to gpgsm.

2002-05-10  Werner Koch  <wk@gnupg.org>

* key.h (gpgme_key_s): Add OTRUST.
* keylist.c (set_ownertrust): New.
(keylist_colon_handler): Get the ownertrust value
* key.c (gpgme_key_get_string_attr,gpgme_key_get_ulong_attr):
Return that value.

2002-05-08  Marcus Brinkmann  <marcus@g10code.de>

* w32-util.c: New static variable GET_PATH_LOCK.
(_gpgme_get_gpg_path): Remove superfluous NULL initializer.
Take lock while determining path.
(_gpgme_get_gpgsm_path): Likewise.
* version.c (do_subsystem_inits): Set DONE to 1 after
initialization.
(gpgme_get_engine_info): New variable ENGINE_INFO_LOCK.  Take lock
while determining engine info.
* rungpg.c (_gpgme_gpg_get_version): New variable
GPG_VERSION_LOCK.  Take the lock while determining the program
version.
* posix-io.c: Include "sema.h".
(_gpgme_io_spawn): New variable FIXED_SIGNALS_LOCK.  Take the lock
while fixing the signals.
(_gpgme_io_select): Make READFDS and WRITEFDS non-static.
*
key.c: Include "sema.h".  New globals KEY_CACHE_LOCK and
KEY_REF_LOCK.
(capabilities_to_string): Make STRINGS very const.
(_gpgme_key_cache_add): Lock the key cache.
(_gpgme_key_cache_get): Likewise.
(gpgme_key_ref, gpgme_key_release): Lock the key_ref_lock.
* import.c (append_xml_impinfo): Make IMPORTED_FIELDS and
IMPORT_RES_FIELDS very const.  Make FIELD and FIELD_NAME a little
const.
* engine.c (_gpgme_engine_get_info): New variable
ENGINE_INFO_LOCK.  Take lock while determining engine info.

* engine-gpgsm.c: Include "sema.h".
(_gpgme_gpgsm_get_version): New variable GPGSM_VERSION_LOCK. Take lock while getting program version.

2002-05-08 Marcus Brinkmann <marcus@g10code.de>

* debug.h: New file.
* Makefile.am (libgpgme_la_SOURCES): Add debug.h.
* util.h: Removed all prototypes and declarations related to debugging. Include "debug.h".

* debug.c (debug_level): Comment variable and remove superfluous zero initializer.
(errfp): Likewise.
(_gpgme_debug_enabled):
Function removed.
(struct debug_control_s): Definition removed.
(_gpgme_debug_level): Function removed.
(_gpgme_debug_begin): Rewritten to use vasprintf. Accept a pritnf-style format specification and a variable number of arguments.
(_gpgme_debug_add): Rewritten using vasprintf. Expect that format starts out with "%s" for simplicity.
(_gpgme_debug_end): Rewritten using vasprintf. Do not accept a TEXT argument anymore.

* posix-io.c (_gpgme_io_select): Use new level argument for DEBUG_BEGIN instead explicit if construct.

* debug.c (debug_init): Remove superfluous zero initializer, remove volatile flag of INITIALIZED. Do not use the double-checked locking algorithm, it is fundamentally flawed and will empty your fridge (on a more serious note, despite the volatile flag it doesn't give you the guarantee you would expect, for example on a DEC Alpha or an SMP machine. The volatile only serializes accesses to the volatile variable, but not to the other variables).

2002-05-03
Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_new): Redirect any gpgsm error output to /dev/null.

* verify.c (gpgme_get_sig_key): Set the protocol of the listctx.
* gpgme.c (gpgme_get_protocol): New.

* data.c (gpgme_data_write): Changed type of BUFFER to void*.

(gpgme_data_read): Ditto.

* verify.c (_gpgme_verify_status_handler): Handle TRUST_* status
lines so that a claim can be made without looking up the key.
(gpgme_get_sig_string_attr): New.
(gpgme_get_sig_ulong_attr): New.

* gpgme.h (GpgmeAttr): Added GPGME_ATTR_SIG_STATUS.

* rungpg.h: Add new status codes from gpg 1.0.7 and formatted the
list to align with the status.h file from gnupg.

* gpgme.h (GpgmeSigStat): Add _GOOD_EXP and _GOOD_EXPKEY.
* verify.c (_gpgme_verify_status_handler, finish_sig): Handle
these new status codes.  Store the expiration time

2002-04-27  Werner Koch  <wk@gnupg.org>

* gpgme.h (GpgmeData_Encoding): New.
* data.c (gpgme_data_get_encoding,gpgme_data_set_encoding):
New.
* engine-gpgsm.c (map_input_enc): New. Use it in all local
functions where the INPUT command gets send.

2002-04-27  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_verify): Close the output
descriptor only when we don't need it anymore.  Close the message
descriptor if we don't need it.

2002-04-26  Werner Koch  <wk@gnupg.org>

* Makefile.am (libgpgme_la_LIBADD): Use libtool libraries.

2002-04-25  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (_gpgme_gpg_release): Call gpgme_data_release on
GPG->cmd.cb_data, not xfree.

2002-04-25  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_new): Set the display, ttyname,
ttytype, lc_ctype and lc_messages options in the server.

2002-04-24  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (map_assuan_error): Add new error codes.

2002-04-23  Werner Koch  <wk@gnupg.org>

* key.c (gpgme_key_get_ulong_attr): Swapped use of can_encrypt and can_certify to return
the requested values.

2002-04-23  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c (gpgme_get_progress_cb): Allow either return parameter to be NULL.
(gpgme_get_passphrase_cb): Likewise.

2002-04-22  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c (gpgme_get_passphrase_cb): New function.
(gpgme_get_progress_cb): New function.
* gpgme.h: Add new prototypes for gpgme_get_passphrase_cb and gpgme_get_progress_cb.

2002-03-28  Werner Koch  <wk@gnupg.org>

* gpgme.h (GpgmeAttr): Add values for issuer and chaining.
* key.h (gpgme_key_s): Add issuer and chaining elements for X509.
* keylist.c (keylist_colon_handler): Store them.
* key.c (gpgme_key_release): Free them.
(gpgme_key_get_as_xml,gpgme_key_get_string_attr): Print them.

2002-03-26  Werner Koch  <wk@gnupg.org>

* Makefile.am (libgpgme_la_SOURCES): Add mutex.h

2002-03-21  Werner Koch  <wk@gnupg.org>

* util.h [!HAVE_FOPENCOOKIE]: Make sure off_t and ssize_t are defined.

2002-03-18  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (system_components): New variable, set depending on HAVE_DOSISH_SYSTEM.
(libgpgme_la_SOURCES): Use system_components.  Remove `syshdr.h'.
* syshdr.h: File removed.

* posix-io.c: Remove !HAVE_DOSISH_SYSTEM safeguard.  Clean up source.
* posix-sema.c: Likewise.
* posix-util.c: Likewise.

* w32-io.c: Remove HAVE_DOSISH_SYSTEM safeguard.
* w32-sema.c: Likewise.
* w32-util.c: Likewise.

* posix-io.c: Include `unistd.h', do not include `syshdr.h'.
* posix-sema.c: Likewise.
* w32-io.c: Include `io.h', do not include `syshdr.h'
* w32-sema.c: Likewise.
* w32-util.c: Likewise.
* data.c: Do not include `syshdr.h'.
* wait.c: Likewise.
* wait.h: Code cleanup.

* mutex.h: New file.
* posix-sema.c: Implement.

2002-03-08 Werner Koch <wk@gnupg.org>

* util.h [!HAVE_FOPENCOOKIE]: Fixed type. Thanks to Frank Heckenbach.

2002-03-07 Werner Koch <wk@gnupg.org>

* gpgme.h (gpgme_op_keylist_ext_start): Add prototype.

2002-03-06 Marcus Brinkmann <marcus@g10code.de>

*
encrypt.c (_gpgme_encrypt_sym_status_handler): New function.
(gpgme_op_encrypt_start): New variable SYMMETRIC, set it if RECP
is null, and if it is set, use _gpgme_encrypt_sym_status_handler
as status handler and run _gpgme_passphrase_start.
* rungpg.c (_gpgme_gpg_op_encrypt): If RECP is zero, do symmetric
encryption.
* engine-gpgsm.c (_gpgme_gpgsm_op_encrypt): If RECP is zero,
return error value.

* rungpg.c (_gpgme_gpg_op_verify): Add "--" argument.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

* passphrase.c (_gpgme_passphrase_status_handler): Also set the
error No_Passphrase if only a bad passphrase was provided.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (_gpgme_gpg_op_verify): If TEXT is of mode
GPGME_DATA_MODE_IN, construct a command line that stores the
plaintext in TEXT.

* verify.c (gpgme_op_verify_start): Accept TEXT being
uninitialized, and in this case interpret SIG as a normal or
cleartext signature and TEXT as a return
data object.
* engine-gpgsm.c (_gpgme_gpgsm_op_verify): Likewise.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_keylist_ext) [!ENABLE_GPGSM]:
Add stub function.

2002-02-28 Werner Koch <wk@gnupg.org>

* key.h (subkey_s): New member expires_at.
* keylist.c (keylist_colon_handler): Set it here
* key.c (gpgme_key_get_as_xml,gpgme_key_get_ulong_attr): Return it.

2002-02-27 Marcus Brinkmann <marcus@g10code.de>

* rungpg.h (_gpgme_gpg_op_keylist_ext): New prototype.
* rungpg.c (_gpgme_gpg_op_keylist_ext): New function.
* engine-gpgsm.h (_gpgme_gpgsm_op_keylist_ext): New prototype.
* engine-gpgsm.c (_gpgme_gpgsm_op_keylist_ext): New function.
* engine.h (_gpgme_engine_op_keylist_ext): New prototype.
* engine.c (_gpgme_engine_op_keylist_ext): New function.
* keylist.c (gpgme_op_keylist_ext_start): New function.

2002-02-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h: Add new error code GPGME_Invalid_Recipient.
* encrypt.c (struct
encrypt_result_s): New member invalid_recipients,
rename no_recipients to no_valid_recipients.
(_gpgme_encrypt_status_handler): Include error for invalid
recipients.
* engine-gpgsm.c (gpgsm_set_recipients): Change type of first
argument to GpgsmObject. Use that to report back the status about
the recipients.

2002-02-26 Marcus Brinkmann <marcus@g10code.de>

* verify.c (_gpgme_verify_status_handler): Fix the last change.

2002-02-25 Marcus Brinkmann <marcus@g10code.de>

* verify.c (_gpgme_verify_status_handler): Parse the args line to
see if the problem is due to a missing key, and report that back
to the user.

2002-02-25  Marcus Brinkmann  <marcus@g10code.de>

* engine.c (_gpgme_engine_op_encrypt_sign): New function.
* engine.h (_gpgme_engine_op_encrypt_sign): New prototype.
* rungpg.c (_gpgme_append_gpg_args_from_signers): New function.
(_gpgme_gpg_op_sign): Use that new function.
(_gpgme_gpg_op_encrypt_sign): New function.
* rungpg.h (_gpgme_gpg_op_encrypt_sign):
New prototype.
* gpgme.h (gpgme_op_encrypt_sign_start): New prototype.
(gpgme_op_encrypt_sign): Likewise.
* Makefile.am (libgpgme_la_SOURCES): Add encrypt-sign.c.
* ops.h (_gpgme_encrypt_status_handler): Add prototype.
(_gpgme_sign_status_handler): Add prototype.
* sign.c (sign_status_handler): Rename to ...
(_gpgme_sign_status_handler): ... this and make non-static.
* encrypt.c (encrypt_status_handler): Rename to ...
(_gpgme_encrypt_status_handler): ... this and make non-static.
* encrypt.c (gpgme_op_encrypt_start): Use new status handler name.
* sign.c (gpgme_op_sign_start): Likewise.

2002-02-25  Marcus Brinkmann  <marcus@g10code.de>

* context.h (struct gpgme_context_s): New member include_certs.
* gpgme.h (gpgme_set_include_certs): Add prototype.
(gpgme_get_include_certs): Likewise.
* gpgme.c (gpgme_set_include_certs): New function.
(gpgme_get_include_certs): Likewise.
(gpgme_new): Set include_certs to 1 (the default).
* engine.c (_gpgme_engine_op_sign): Accept
new argument include_certs,
and pass it to _gpgme_gpgsm_op_sign.
* engine.h (_gpgme_engine_op_sign): Likewise for prototype.
* engine-gpgsm.c (_gpgme_gpgsm_op_sign): Accept new argument
include_certs and handle it.
* engine-gpgsm.h (_gpgme_gpgsm_start): Add new argument include_certs.
* sign.c (gpgme_op_sign_start): Add new argument to
_gpgme_engine_op_sign call.

2002-02-14  Werner Koch  <wk@gnupg.org>

* keylist.c (gpgme_op_keylist_start): Do not use a verbose listing.

2002-02-13  Werner Koch  <wk@gnupg.org>

* vasprintf.c, fopencookie.c: Add replacement functions.
* util.h: Add prototypes for them.

2002-02-09  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_assuan_simple_command): Return 0 if we
reach the end of the function.

2002-02-09  Marcus Brinkmann  <marcus@g10code.de>

* genkey.c (gpgme_op_genkey_start): Fix logic in validity check.
(gpgme_op_genkey_start): Skip newlines after opening tag.

* engine-gpgsm.c (_gpgme_gpgsm_start): Remove cruft.

2002-02-08
Marcus Brinkmann  <marcus@g10code.de>

* genkey.c (gpgme_op_genkey_start): Allow PUBKEY and SECKEY to be
set, and pass them down to the crypto engine.
* engine-gpgsm.h (_gpgme_gpgsm_start): New arguments PUBKEY and SECKEY.
* engine.h: Likewise.
* rungpg.h (_gpgme_gpg_spawn): Likewise.
* engine.c (_gpgme_engine_op_genkey): Likewise.  Use those
arguments.
* rungpg.c (_gpgme_gpg_op_genkey): Likewise.  Complain if those
arguments are set.
* engine-gpgsm.c (_gpgme_gpgsm_op_genkey): Likewise.  Implement
function.

* engine-gpgsm.c (_gpgme_gpgsm_op_keylist): Beautify comment.

2002-02-06  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (_gpgme_gpg_op_keylist): Remove handling of keylist
mode (for now).

2002-02-06  Marcus Brinkmann  <marcus@g10code.de>

* wait.c (gpgme_wait): Add new argument STATUS, in which the
status of the returned context is returned.
(_gpgme_wait_on_condition): Rework the function a bit, to make it
aware of cancelled processes, and to
allow to use gpgme_wait with
CTX being NULL (as documented in the source).
(struct proc_s): New member REPORTED.
* gpgme.h: Fix prototype.
* verify.c (gpgme_op_verify): Fix use of gpgme_wait.
* sign.c (gpgme_op_sign): Likewise.
* import.c (gpgme_op_import): Likewise.

* genkey.c (gpgme_op_genkey): Likewise.
* export.c (gpgme_op_export): Likewise.
* encrypt.c (gpgme_op_encrypt): Likewise.
* delete.c (gpgme_op_delete): Likewise.
* decrypt-verify.c (gpgme_op_decrypt_verify): Likewise.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (gpgme_set_keylist_mode): Possibly return an error value.
(gpgme_get_keylist_mode): New function.
(gpgme_new): Set the default for keylist_mode member of CTX.

* gpgme.h (gpgme_set_keylist_mode): Fix prototype.
(gpgme_get_keylist_mode): New prototype.
(GPGME_KEYLIST_MODE_LOCAL): New macro.
(GPGME_KEYLIST_MODE_EXTERN): Likewise..

2002-02-02 Marcus Brinkmann <marcus@g10code.de>

This patch has gotten a bit large... mmh. The main thing that happens here is that error values are now not determined in the operation function after gpgme_wait completed, but in the status handler when EOF is received. It should always be the case that either an error is flagged or EOF is received, so that after a gpgme_wait you should never have the situation that no error is flagged and EOF is not received. One problem is that the engine status handlers don't have access to the context, a horrible kludge works around this for now. All errors that happen during a pending operation should be caught and reported in ctx->error, including out-of-core and cancellation. This rounds up neatly a couple of loose ends, and makes it possible to pass up any errors in the communication with the backend as well. As a bonus, there will be a function to access gpgme->wait, so that the operations can truly be implemented with their _start function.

* engine-gpgsm.c (gpgsm_status_handler): Horrible kludge to report error back to the context.
* rungpg.c (gpg_status_handler): Same horrible kludge applied here.

* engine-gpgsm.c (gpgsm_assuan_simple_command): Add error checking.

* wait.c (_gpgme_wait_on_condition): If canceled, set CTX->error to a value indication that.

* verify.c (add_notation): Set error, not out_of_core.

(finish_sig): Likewise.
(gpgme_op_verify_start): Don't clear out_of_core.
(_gpgme_verify_status_handler): At EOF, clean up the notation data.
(gpgme_op_verify): And don't do it here.

* trustlist.c (trustlist_status_handler): Check error, not out_of_core.
(gpgme_op_trustlist_start): Don't clear out_of_core.
(gpgme_op_trustlist_next): Check error, not out_of_core.
(gpgme_op_trustlist_end): Likewise.

* ops.h (test_and_allocate_result): New macro.
(_gpgme_passphrase_result): Remove prototype.
* delete.c (gpgme_op_delete): Return error from context.
(delete_status_handler): Use macro test_and_allocate_result.
Perform error checking at EOF.
(gpgme_op_delete_start): Release
result.
* passphrase.c (_gpgme_passphrase_status_handler): Use macro
test_and_allocate_result, and perform error checking here.
(_gpgme_passphrase_result): Function removed.
* sign.c (gpgme_op_sign_start): Do not set out_of_core to zero.
(gpgme_op_sign): Just return the error value from the context.
(sign_status_handler): Only progress if no error is set yet. If
we process an EOF, set the resulting error value (if any).
* decrypt.c (_gpgme_decrypt_result): Function removed.
(create_result_struct): Function removed.
(_gpgme_decrypt_status_handler): Use macro test_and_allocate_result,
caclulate error on EOF, do not progress with errors.
(_gpgme_decrypt_start): Do not set out_of_core to zero.
(gpgme_op_decrypt): Just return the error value from the context.
* encrypt.c (encrypt_status_handler): Perform the error checking
here.
(gpgme_op_encrypt_start): Do not clear out_of_core.
* export.c (export_status_handler): Return if error is set in context.
(gpgme_op_export_start):
Release result.
(gpgme_op_export): Return error from context.
* decrypt-verify.c (gpgme_op_decrypt_verify): Return the error in
the context.
* genkey.c (genkey_status_handler): Use macro
test_and_allocate_result. Perform error checking at EOF.
(gpgme_op_genkey): Just return the error from context.
* import.c (gpgme_op_import): Return the error from context.
(import_status_handler): Use macro test_and_allocate_result.
* keylist.c (gpgme_op_keylist_start): Do not clear out_of_core.
(gpgme_op_keylist_next): Return error of context.
(keylist_colon_handler): Set error instead out_of_code.
(finish_key): Likewise.

* context.h: Remove member out_of_core, add member error.
* gpgme.c (_gpgme_release_result): Clear error flag.

* engine.h (_gpgme_engine_get_error): New prototype.
* engine.c (_gpgme_engine_get_error): New function.
* engine-gpgsm.c (_gpgme_gpgsm_get_error): New function.

* engine-gpgsm.c (map_assuan_error): New function.
(gpgsm_assuan_simple_command): Change
return type to GpgmeError,
use the new function to map error values.
(gpgsm_set_fd): Change return type tp GpgmeError.
(_gpgme_gpgsm_op_decrypt): Change type of ERR to GpgmeError.
(gpgsm_set_recipients): Likewise. Change type of return value
equivalently. Adjust error values.
(_gpgme_gpgsm_op_import): Likewise.
(_gpgme_gpgsm_op_sign): Likewise.
(struct gpgsm_object_s): New member error.
(gpgsm_status_handler): Set error if error occurs. Determine
error number from ERR line received. If assuan_read_line fails,
terminate the connection.

2002-02-01 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (MOSTLYCLEANFILES): New variable.

2002-02-01 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_status_handler): At error, terminate the
connection to the server.

2002-01-31 Marcus Brinkmann <marcus@g10code.de>

* rungpg.h: Add STATUS_KEY_CREATED.

* progress.c: New file.
* Makefile.am (libgpgme_la_SOURCES): Add progress.c.

* genkey.c (genkey_status_handler):
Use
_gpgme_progress_status_handler. Add check for status.
(struct genkey_result_s): New structure.
(_gpgme_release_genkey_result): New function.
(gpgme_op_genkey): Check for error.
* gpgme.c (_gpgme_release_result): Call
_gpgme_release_genkey_result.
* ops.h (_gpgme_release_genkey_result): Add prototype.

* types.h (GenKeyResult): New type.
* context.h (gpgme_context_s): Add GenKeyResult to member result.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (_gpgme_release_result): Call
_gpgme_release_delete_result.
* ops.h (_gpgme_release_delete_result): Add prototype.
* types.h (DeleteResult): New type.
* context.h (gpgme_context_s): Add DeleteResult to member result.

* delete.c (enum delete_problem): New type.
(struct delete_result_s): New structure.
(_gpgme_release_delete_result): New function.
(delete_status_handler): Implement more status codes.
(gpgme_op_delete): Return error on failure.

* import.c (MAX_IMPORTED_FIELDS): Bump up to 14.

2002-01-30
Marcus Brinkmann <marcus@g10code.de>

* import.c (struct import_result_s): New structure.
(_gpgme_release_import_result): New function.
(append_xml_impinfo): Likewise.
(import_status_handler): Implement.
* gpgme.c (_gpgme_release_result): Add call to
_gpgme_release_import_result.
* ops.h (_gpgme_release_import_result): Add prototype.
* types.h (ImportResult): New type.
* context.h (gpgme_context_s): Add ImportResult to member result.

* encrypt.c (gpgme_op_encrypt): Code clean up.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h: Add lots of comment and fix the formatting. Add
gpgme_trustlist_end prototype.

2002-01-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h: Add new type GpgmeIdleFunc. Change type of
gpgme_register_idle to return and accept this type.
* wait.c (gpgme_register_idle): Fix type.
Save and return old value of idle_function.

2002-01-29 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_op_keylist): Implement
secret only mode.

* keylist.c (keylist_colon_handler): Add support for the new "crs"
record type.

2002-01-22  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_release): Call assuan_disconnect,
not assuan_pipe_disconnect.

* Makefile.am (libgpgme_la_LIBADD): Change to link assuan and
jnlib (needed by assuan) statically into libgpgme.  Linking a
static library into a shared library this way is not portable.

2002-01-22  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (GpgmePassphraseCb): Change type of R_HD from void* to
void**.

2002-01-22  Marcus Brinkmann  <marcus@g10code.de>

* data.c (gpgme_data_new_from_filepart): Change type of LENGTH
from off_t to size_t.
* gpgme.h: Likewise.

2002-01-22  Marcus Brinkmann  <marcus@g10code.de>

* wait.c (_gpgme_wait_on_condition): If the process finished,
reset the pending flag.  Also if the operation was cancelled.

(struct proc_s): Rename READY to DONE.
(wait_item_s): Likewise.
(set_process_ready): Rename
to ...
(set_process_done): ... this.
(_gpgme_remove_proc_from_wait_queue): Call set_process_done
instead set_process_ready.
(_gpgme_wait_on_condition): Likewise.
(do_select): Rename READY to DONE.

* verify.c (gpgme_op_verify): Do not set pending to zero here.
* sign.c (gpgme_op_sign): Likewise.
* import.c (gpgme_op_import): Likewise.
* genkey.c (gpgme_op_genkey): Likewise.
* export.c (gpgme_op_export): Likewise.
* encrypt.c (gpgme_op_encrypt): Likewise.
* delete.c (gpgme_op_delete): Likewise.

* decrypt-verify.c (gpgme_op_decrypt_verify): Likewise.
* decrypt.c (gpgme_op_decrypt): Likewise.

2002-01-22  Marcus Brinkmann  <marcus@g10code.de>

* export.c: Cleanup.

2002-01-15  Marcus Brinkmann  <marcus@g10code.de>

* trustlist.c: Various source clean ups.
(my_isdigit): Removed.
(gpgme_op_trustlist_end): New function.

2002-01-13  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c: Various source clean ups, like renaming C to CTX where
appropriate.
(gpgme_new): Clear
R_CTX before starting the work.
(my_isdigit): Removed.
(my_isxdigit): Likewise.

* data.c: Various source clean ups.
(gpgme_data_new_from_mem): Check BUFFER after clearing R_DH.
(gpgme_data_new_with_read_cb): Similar for READ_CB.
(gpgme_data_new_from_file): Loop over fread while EINTR.
(gpgme_data_new_from_filepart): Rediddled a bit.  Allow LENGTH to
be zero.  Loop over fread while EINTR.

(my_isdigit): Removed.
(my_isxdigit): Likewise.

2001-12-21  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_new): Replace General_Error with
Pipe_Error where appropriate.

2001-12-19  Marcus Brinkmann  <marcus@g10code.de>

* engine.c: Include `string.h'.  Reported by Stphane Corthsy.

* version.c (get_engine_info): Remove prototype.

2001-12-19  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_new): New variable CHILD_FDS.
Fill it with the servers fds, and pass it to assuan_pipe_connect.

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

*
keylist.c (gpgme_op_keylist_end): New function.
* gpgme.h (gpgme_op_keylist_end): New prototype.

* engine.h (gpgme_engine_check_version): Move prototype to ...
* gpgme.h (gpgme_engine_check_version): ... here.

* genkey.c (gpgme_op_genkey_start): Remove unused variable.

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

* version.c (gpgme_get_engine_info): Reimplemented.
(gpgme_check_engine): Reimplemented.
(_gpgme_compare_versions): Return NULL if MY_VERSION is NULL.

* engine.c: Include `io.h'.
(gpgme_engine_get_info): New function.
* engine.h (gpgme_engine_check_version, _gpgme_engine_get_info):
Add prototype.

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (struct reap_s, reap_list, reap_list_lock): Moved to ...
* engine.c (struct reap_s, reap_list, reap_list_lock): ... here.
Include `time.h', `sys/types.h', `assert.h', and `sema.h'.

* rungpg.c (_gpgme_engine_add_child_to_reap_list): New function.
(do_reaping, _gpgme_gpg_housecleaning): Moved to
...
* engine.c (do_reaping, _gpgme_engine_housecleaning): ... here.
* rungpg.c (_gpgme_gpg_release): Replace code that is now in its
own function by call to _gpgme_engine_add_child_to_reap_list().

* wait.c: Include `engine.h'.
(run_idle): Call _gpgme_engine_housecleaning(), not
_gpgme_gpg_housecleaning().

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

* key.c (_gpgme_key_append_name): Append, not prepend, the uid.
Initialize the next field of the uid structure.
(gpgme_key_get_as_xml): Do not list last uid first.

2001-12-17 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_set_colon_line_handler): New

function [!ENABLE_GPGSM].

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_verify): Put TEXT into
message_data, not SIG.
(_gpgme_gpgsm_op_sign): Use `--detached', not `--detach'.

* sign.c (sign_status_handler): Call
_gpgme_passphrase_status_handler early.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

*
engine-gpgsm.c: Revert last change.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_status_handler): Freeze the output file
handler when ending this operation, otherwise the wait function
will sit on it.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (struct gpgsm_object_s): New member colon.attic.
(_gpgme_gpgsm_new): Initialize some more members.
(_gpgme_gpgsm_release): Free the colon line handler's attic line.
(gpgsm_status_handler): Rework the inline-data processing.

2001-12-13 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (_gpgme_gpg_spawn): Do not add the fds to the child
list that are not dup'ed, for those the close-on-exec flag is set
now.
* version.c (_gpgme_get_program_version): Remove first entry in
CFD, as the close-on-exec flag is now set for this fd.

2001-12-13 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_encrypt): Do not add `armor'
option to `ENCRYPT'.
* engine-gpgsm.c
(gpgsm_set_recipients): Free LINE when returning
successfully.

2001-12-13 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (close_notify_handler): New function.

(_gpgme_gpgsm_new): Manage the file descriptors a
bit differently.  Do not set close-on-exec flags.
(_gpgme_gpgsm_op_decrypt): Do not set message_fd
to -1, this is done by the close handler.
(_gpgme_gpgsm_op_encrypt): Likewise.
(_gpgme_gpgsm_op_import): Likewise (also for output_fd).
(_gpgme_gpgsm_op_keylist): Likewise (also for input_fd and output_fd).
(_gpgme_gpgsm_op_sign): Likewise.
(_gpgme_gpgsm_op_verify): Likewise, but for output_fd.

* posix-io.c (_gpgme_io_pipe): Set the close-on-exec flag for the
non-inherited file descriptor index of the pipe.

2001-12-13  Werner Koch  <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_set_colon_line_handler): New.
(gpgsm_status_handler): Pass datalines to a colon handler
* engine.c (_gpgme_engine_set_colon_line_handler): Set the colon
handler for gpgsm.

* engine-gpgsm.c
(_gpgme_gpgsm_op_keylist): Allow NULL for
pattern.
(gpgsm_assuan_simple_command): Removed underscore from
assuan_write_line.
(_gpgme_gpgsm_start): Ditto.
(gpgsm_assuan_simple_command): Replaced internal Assuan read
function by the new assuan_read_line.  Removed the use of the
internal header.
(gpgsm_status_handler): Ditto. Use the new assuan_pending_line.
(_gpgme_gpgsm_start): Use the documented way to get an fd from
assuan.

* keylist.c (keylist_colon_handler): Handle "crt" records
* key.h (gpgme_key_s): Add an x509 flag.
* key.c (parse_x509_user_id): New.
(_gpgme_key_append_name): Handle x.509 names.

2001-12-05  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_status_handler): Make it work with current
version of assuan.

2001-12-05  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_set_fd): Accept one more argument OPT.
(_gpgme_gpgsm_op_encrypt): Pass armor argument to gpgsm_set_fd for
output descriptor.

(_gpgme_gpgsm_op_sign):
Likewise.

2001-12-05  Marcus Brinkmann  <marcus@g10code.de>

* keylist.c (gpgme_op_keylist_next): Set pending to 0 if EOF
occurs.

2001-11-26  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_sign): Fix stupid typo.

2001-11-24  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_status_handler): Don't break if bsearch fails.
Deal with assuan read line returning more than one line (for now).

2001-11-23  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_sign): Implement it according to
the current protocol definition.

2001-11-23  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_new): Set CLOEXEC flag for parent
ends of the pipe.

2001-11-22  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c: Include stdlib.h and string.h.  Also include,
for now, rungpg.h and status-table.h.
(gpgsm_status_handler): Implement more of the status handler.

2001-11-22  Marcus Brinkmann  <marcus@g10code.de>

*
engine.c (_gpgme_engine_op_decrypt): Implement CMS case.
(_gpgme_engine_op_delete): Likewise.
(_gpgme_engine_op_encrypt): Likewise.
(_gpgme_engine_op_export): Likewise.
(_gpgme_engine_op_genkey): Likewise.
(_gpgme_engine_op_keylist): Likewise.
(_gpgme_engine_op_sign): Likewise.
(_gpgme_engine_op_trustlist): Likewise.

* engine-gpgsm.c (_gpgme_gpgsm_op_encrypt): New function.
(gpgsm_assuan_simple_command): Likewise.
(gpgsm_set_recipients): Likewise.

(gpgsm_set_fd): Reimplement using gpgsm_assuan_simple_command.
(_gpgme_gpgsm_op_delete): New function.
(_gpgme_gpgsm_op_export): Likewise.
(_gpgme_gpgsm_op_genkey): Likewise.
(_gpgme_gpgsm_op_sign): Likewise.
(_gpgme_gpgsm_op_keylist): Likewise.
(_gpgme_gpgsm_op_trustlist): Likewise.
(_gpgme_gpgsm_release): Release command.
(_gpgme_gpgsm_op_decrypt): Allocate command.
(_gpgme_gpgsm_op_import): Likewise.
(gpgsm_status_handler): Also treat `ERR' strings as EOF.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h
(gpgme_set_protocol): New prototype.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_decrypt): New function.
(_gpgme_gpgsm_op_import): Likewise.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c: Shuffle around header inclusion a bit, to still
keep them separate.
(_gpgme_set_status_handler) [!ENABLE_GPGSM]: New function.

2001-11-22 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c: Include more headers so that NULL and mk_error
is defined even with an undefined GPGSM_PATH.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (gpg_inbound_handler, write_mem_data, write_cb_data,
gpg_outbound_handler): Moved to ...
* data.c (_gpgme_data_inbound_handler, write_mem_data,
write_cb_data, _gpgme_data_outbound_handler): ... here. Make the
_gpgme_* ones non-static.
* data.c: Include io.h.

* ops.h (_gpgme_data_inbound_handler): New prototype.
(_gpgme_data_outbound_handler): Likewise.
(_gpgme_gpg_spawn): Use
these new functions.

* engine-gpgsm.h (_gpgme_gpgsm_op_decrypt, _gpgme_gpgsm_op_delete,

_gpgme_gpgsm_op_encrypt, _gpgme_gpgsm_op_export,
_gpgme_gpgsm_op_genkey, _gpgme_gpgsm_op_import,
_gpgme_gpgsm_op_keylist, _gpgme_gpgsm_op_sign,
_gpgme_gpgsm_op_trustlist, _gpgme_gpgsm_op_verify,
_gpgme_gpgsm_start, _gpgme_gpgsm_set_status_handler): New prototype.
Include <rungpg.h> for status handler function.

* engine-gpgsm.c (struct gpgsm_object_s): New members input_fd,
input_data, output_fd, output_data, message_fd, message_data, command
and status.
(_gpgme_gpgsm_new): Open input, output and message pipes before
connecting to the client.  Close server's ends afterwards.
(_gpgme_gpgsm_release): Close open file descriptors.  Remove
server process from wait queue.
(_gpgme_gpgsm_op_verify, _gpgme_gpgsm_start,
_gpgme_gpgsm_set_status_handler, gpgms_status_handler): New function.

* engine.c (_gpgme_engine_start): Implement for GPGME_PROTOCOL_CMS.
(_gpgme_engine_set_status_handler):
Likewise.
(_gpgme_engine_op_verify): Likewise.

2001-11-21  Marcus Brinkmann  <marcus@g10code.de>

* context.h: Do not include rungpg.h, but engine.h.
(struct gpgme_context_s): Replace member gpg with engine.
* gpgme.c (gpgme_release): Release engine, not gpg.

* recipient.c (_gpgme_append_gpg_args_from_recifgpients): Function
moved ...
* rungpg.c (_gpgme_append_gpg_args_from_recipients): ... here.
Make static, change order of arguments, and return an error value.
* ops.h (_gpgme_append_gpg_args_from_recipients): Removed prototype.

* rungpg.h (_gpgme_gpg_op_verify): Add prototype.
(_gpgme_gpg_op_encrypt): Likewise.
(_gpgme_gpg_op_decrypt): Likewise.
(_gpgme_gpg_op_delete): Likewise.
(_gpgme_gpg_op_export): Likewise.
(_gpgme_gpg_op_genkey): Likewise.
(_gpgme_gpg_op_import): Likewise.
(_gpgme_gpg_op_keylist): Likewise.
(_gpgme_gpg_op_sign): Likewise.
(_gpgme_gpg_op_trustlist): Likewise.
* rungpg.c (_gpgme_gpg_op_verify): New function.
(_gpgme_gpg_op_encrypt): Likewise.
(_gpgme_gpg_op_decrypt):

Likewise.
(_gpgme_gpg_op_delete): Likewise.
(_gpgme_gpg_op_export): Likewise.
(_gpgme_gpg_op_genkey): Likewise.
(_gpgme_gpg_op_import): Likewise.
(_gpgme_gpg_op_keylist): Likewise.
(_gpgme_gpg_op_sign): Likewise.
(_gpgme_gpg_op_trustlist): Likewise.

* engine.h (_gpgme_engine_set_status_handler): Add prototype.
(_gpgme_engine_set_command_handler): Likewise.
(_gpgme_engine_set_colon_line_handler): Likewise.
(_gpgme_engine_op_decrypt): Likewise.
(_gpgme_engine_op_delete): Likewise.
(_gpgme_engine_op_encrypt): Likewise.
(_gpgme_engine_op_export): Likewise.
(_gpgme_engine_op_genkey): Likewise.
(_gpgme_engine_op_import): Likewise.
(_gpgme_engine_op_keylist): Likewise.
(_gpgme_engine_op_sign): Likewise.
(_gpgme_engine_op_trustlist): Likewise.
(_gpgme_engine_op_verify): Likewise.
(_gpgme_engine_start): Likewise.
* engine.c (_gpgme_engine_set_status_handler): New function.
(_gpgme_engine_set_command_handler): Likewise.
(_gpgme_engine_set_colon_line_handler):
Likewise.
(_gpgme_engine_op_decrypt): Likewise.
(_gpgme_engine_op_delete): Likewise.
(_gpgme_engine_op_encrypt): Likewise.
(_gpgme_engine_op_export): Likewise.
(_gpgme_engine_op_genkey): Likewise.
(_gpgme_engine_op_import): Likewise.
(_gpgme_engine_op_keylist): Likewise.
(_gpgme_engine_op_sign): Likewise.
(_gpgme_engine_op_trustlist): Likewise.
(_gpgme_engine_op_verify): Likewise.
(_gpgme_engine_start): Likewise.

* verify.c (gpgme_op_verify_start): Reimplement in terms of above
functions.
* encrypt.c (gpgme_op_encrypt_start): Likewise.
* decrypt.c (_gpgme_decrypt_start): Likewise.
* passphrase.c (_gpgme_passphrase_start): Likewise.
* keylist.c (gpgme_op_keylist_start): Likewise.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

* types.h: Add types EngineObject and GpgsmObject.

* Makefile.am (libgpgme_la_SOURCES): Add engine-gpgsm.h,
engine-gpgsm.c, engine.h and engine.c.
* engine.h: New file.
* engine.c: Likewise.
* engine-gpgsm.h: Likewise.
*
engine-gpgsm.c: Likewise.

* rungpg.c (_gpgme_gpg_get_version): New function.
(_gpgme_gpg_check_version): Likewise.
* rungpg.h: Add prototypes for _gpgme_gpg_get_version and
_gpgme_gpg_check_version.

* version.c (compare_versions): Rename to ...
(_gpgme_compare_versions): ... this. Make non-static.
(gpgme_check_version): Use _gpgme_compare_versions rather than
compare_versions.
(gpgme_check_engine): Likewise.
* ops.h (_gpgme_get_program_version): Add prototype.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (libgpgme_la_INCLUDES): Remove obsolete directive.
(AM_CPPFLAGS): New directive [BUILD_ASSUAN].
(libgpgme_la_LIBADD): Likewise.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

* version.c: Remove global variables lineno and
tmp_engine_version.
(version_handler): Removed.
(_gpgme_get_program_version): New function.
(get_engine_info): Don't use context and version_handler,
but _gpgme_get_program_version.
* ops.h (_gpgme_get_program_version):
Add prototype for
_gpgme_get_program_version (we expect to use it elsewhere soon).

2001-11-18 Marcus Brinkmann <marcus@g10code.de>

* version.c (get_engine_info): If GnuPG is not available, return
an error message.
* posix-util.c (_gpgme_get_gpg_path): Allow GPG_PATH to be
undefined.
(_gpgme_get_gpgsm_path): New function.
* w32-util.c (find_program_in_registry): New static function.

(_gpgme_get_gpg_path): Allow GPG_PATH to be undefined. Rework
to use find_program_in_registry.
(_gpgme_get_gpgsm_path): New function.
(util.h): Prototype _gpgme_get_gpgsm_path).
* rungpg.c (_gpgme_gpg_spawn): Verify that _gpgme_get_gpg_path()
returns non-null.

2001-11-16 Marcus Brinkmann <marcus@g10code.de>

* decrypt-verify.c: New file.
* Makefile.am (libgpgme_la_SOURCES): Add decrypt-verify.c.
* types.h: Add decrypt-verify types.
* ops.h: Likewise.
* context.h: Add result type for decrypt-verify.
* gpgme.h: Add decrypt-verify prototypes.

* decrypt.c (decrypt_status_handler):
Renamed to ...
(_gpgme_decrypt_status_handler): ... this. Make non-static.
(_gpgme_decrypt_start): New function, derived from
gpgme_op_decrypt_start.
(gpgme_op_decrypt_start): Reimplement in terms of
_gpgme_decrypt_start.
(_gpgme_decrypt_result): New function to retrieve error value.
(gpgme_op_decrypt): Use _gpgme_decrypt_result.
* ops.h: Add prototypes for new functions.

* verify.c (verify_status_handler): Renamed to ...
(_gpgme_verify_status_handler): ... this. Make non-static.
(gpgme_op_verify_start): Use new function name.
(intersect_stati): Renamed to ...
(_gpgme_intersect_stati): ... this. Make non-static.
(gpgme_op_verify): Use new name.
* ops.h: Add prototypes for new functions.

2001-11-16 Marcus Brinkmann <marcus@g10code.de>

* passphrase.c: New file.
* Makefile.am (libgpgme_la_SOURCES): Add passphrase.c.
* ops.h (_gpgme_passphrase_result): Add prototypes from
passphrase.c.
* types.h: Likewise.
* context.h: Add member passphrase to result.
*
gpgme.c (_gpgme_release_result): Release passphrase member.

* decrypt.c: Some formatting and variable name changes (like
CTX instead C).

(struct decrypt_result_s): Remove members now found in
passphrase result.
(_gpgme_release_decrypt_result): Don't release removed members.
(decrypt_status_handler): Call _gpgme_passphrase_status_handler,
and don't handle the cases caught there.
(command_handler): Removed.
(gpgme_op_decrypt_start): Don't set command handler, but invoke
_gpgme_passphrase_start which does it.
(gpgme_op_decrypt): Invoke _gpgme_passphrase_result and drop the
cases covered by it.

* sign.c Some formatting and variable name changes (like
CTX instead C).
(struct sign_result_s): Remove members now found in
passphrase result.
(_gpgme_release_sign_result): Don't release removed members.
(sign_status_handler): Call _gpgme_passphrase_status_handler,
and don't handle the cases caught there.
(command_handler): Removed.
(gpgme_op_sign_start): Don't set command
handler, but invoke
_gpgme_passphrase_start which does it.
(gpgme_op_sign): Invoke _gpgme_passphrase_result and drop the
cases covered by it.

2001-11-15 Marcus Brinkmann <marcus@g10code.de>

* decrypt.c (command_handler): Fix last change.

2001-11-15 Marcus Brinkmann <marcus@g10code.de>

* verify.c (_gpgme_release_verify_result): Rename RES to RESULT.
Rename R2 to NEXT_RESULT.
(intersect_stati): Rename RES to RESULT.
(gpgme_get_sig_status): Likewise. Do not check return_type, but
the member verify of result.
(gpgme_get_sig_key): Likewise.

* sign.c (_gpgme_release_sign_result): Rename RES to RESULT. If
RESULT is zero, return.
(sign_status_handler, command_handler): Do not check return_type,
but the member sign of result.
(gpgme_op_sign): Likewise. Drop assertion.

* encrypt.c (_gpgme_release_encrypt_result): Rename RES to RESULT.
If RESULT is zero, return.
(encrypt_status_handler): Do not check return_type, but the member
encrypt of result.

(gpgme_op_encrypt):
Likewise.  Drop assertion.

* decrypt.c (_gpgme_release_decrypt_result): Rename RES to RESULT.
(create_result_struct): Do not set result_type.
(command_handler, decrypt_status_handler): Do not check
return_type, but the member decrypt of result.
(gpgme_op_decrypt): Likewise.  Drop assertion.

* context.h (enum ResultType): Removed.
(struct gpgme_context_s): Remove member result_type.
(struct result): Replaces union result.
* gpgme.c: Include string.h.
(_gpgme_release_result): Release all members of c->result, which
is now a struct.  Zero out all members of the struct afterwards.

2001-11-11  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (_gpgme_gpg_release): Release GPG->cmd.cb_data.
Release all members of the list GPG->arglist.
Reported by Michael Schmidt <mschmidt@cs.uni-sb.de>.

2001-11-02  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (pipemode_copy): Change type of NBYTES to size_t.

* key.c: Include string.h.
* data.c: Likewise.
* recipient.c: Likewise.

2001-10-29
Marcus Brinkmann  <marcus@g10code.de>

* context.h: New member signers_len.
* signers.c (gpgme_signers_clear): Require that signers are
non-NULL with assertion.  Use signers_len to determine how much
keys to release.  Add documentation.
(gpgme_signers_add): Use signers_len to determine if the buffer is
large enough.  Use xtryrealloc rather than xtrymalloc and copying.
Add documentation.
(gpgme_signers_enum): Use signers_len to determine if key is
available.  Add documentation.

2001-10-22  Marcus Brinkmann  <marcus@g10code.de>

* data.c (_gpgme_data_append): Check if LENGTH is smaller than
ALLOC_CHUNK, not DH->length.

2001-10-17  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c (gpgme_set_protocol): Fix last change.

2001-10-15  Werner Koch  <wk@gnupg.org>

* gpgme.h (GpgmeProtocol): New.
* gpgme.c (gpgme_set_protocol): New.

2001-09-26  Werner Koch  <wk@gnupg.org>

* gpgme.c (gpgme_set_passphrase_cb): Ignore a NULL context.
(gpgme_set_progress_cb): Ditto.
Suggested by Mark Mutz.

2001-09-17  Werner Koch  <wk@gnupg.org>

* keylist.c (finish_key): Shortcut for no tmp_key.  Changed all
callers to use this function without a check for tmp_key.

* keylist.c (gpgme_op_keylist_next): Reset the key_cond after
emptying the queue.  Bug reported by Stphane Corthsy.

2001-09-12  Werner Koch  <wk@gnupg.org>

* data.c (gpgme_data_rewind): Allow rewind for callbacks.

2001-09-07  Werner Koch  <wk@gnupg.org>

* rungpg.h: Add NO_RECP.
* encrypt.c (encrypt_status_handler): Take on No_RECP.
(gpgme_op_encrypt): Better error return.

* verify.c (verify_status_handler): Take on NODATA.

2001-09-03  Werner Koch  <wk@gnupg.org>

* rungpg.h: Added STATUS_INV_RECP.
* gpgme.c (_gpgme_release_result): Add support for new
EncryptResult object.
* encrypt.c (append_xml_encinfo): New.
(encrypt_status_handler): Add some status parsing.
(_gpgme_release_encrypt_result): New.

2001-08-29  Werner Koch  <wk@gnupg.org>

* recipient.c (gpgme_recipients_release):

Free the list.  By Timo.

* keylist.c (keylist_colon_handler): Do a finish key if we receive
an EOF here.  This is probably the reason for a lot of bugs
related to keylisting.  It is so obvious.  Kudos to Enno Cramer
for pointing that out.

2001-08-28  Werner Koch  <wk@gnupg.org>

* gpgme.c, gpgme.h (gpgme_get_op_info): New.
(_gpgme_set_op_info): New.
(_gpgme_release_result): Reset the op_info here.
* sign.c (append_xml_siginfo): New.
(sign_status_handler): Store the sig create information.

2001-07-31  Werner Koch  <wk@gnupg.org>

* encrypt.c (gpgme_op_encrypt): Hack to detect no valid recipients.

2001-07-30  Werner Koch  <wk@gnupg.org>

* gpgme.c (gpgme_get_armor,gpgme_get_textmode): New.

* rungpg.c (build_argv): Disable armor comments
* w32-io.c (build_commandline): Need to add quotes here

2001-07-24  Werner Koch  <wk@gnupg.org>

* data.c (gpgme_data_read): Add a a way to return the available bytes.

2001-07-23  Werner Koch  <wk@gnupg.org>

* util.c: Removed
stpcpy() because we use the version from jnlib.

2001-07-19  Werner Koch  <wk@gnupg.org>

* mkstatus: Define the collating sequence for sort.

2001-06-26  Werner Koch  <wk@gnupg.org>

* rungpg.h: Add STATUS_UNEXPECTED as suggested by Timo.

2001-06-15  Werner Koch  <wk@gnupg.org>

* keylist.c (set_userid_flags): Fixed the assigned values. Kudos
to Timo for pointing this out.

2001-06-01  Werner Koch  <wk@gnupg.org>

* debug.c (_gpgme_debug_begin): Fixed a /tmp race.  Noted by
Johannes Poehlmann.

2001-05-28  Werner Koch  <wk@gnupg.org>

* version.c (gpgme_check_engine): Stop version number parsing at
the opening angle and not the closing one.  By Tommy Reynolds.

2001-05-01  Jos Carlos Garca Sogo <jose@jaimedelamo.eu.org>

* encrypt.c (gpgme_op_encrypt_start): Deleted the assert ( !c->gpg )
line, because it gave an error if another operation had been made
before using the same context.

* decrypt.c (gpgme_op_decrypt_start): The same as above. Also added
one line to release
the gpg object in the context (if any).

2001-04-26  Werner Koch  <wk@gnupg.org>

* key.c, key.h (_gpgme_key_cache_init): New.
(_gpgme_key_cache_add): New.
(_gpgme_key_cache_get): New.
* version.c (do_subsystem_inits): Init the cache.
* keylist.c (finish_key): Put key into the cache
* verify.c (gpgme_get_sig_key): First look into the cache.

2001-04-19  Werner Koch  <wk@gnupg.org>

* keylist.c (parse_timestamp): Adjusted for the changed
--fixed-list-mode of gpg 1.0.4h.

2001-04-05  Werner Koch  <wk@gnupg.org>

* verify.c (gpgme_op_verify_start): Enabled pipemode for detached sigs.

2001-04-04  Werner Koch  <wk@gnupg.org>

* w32-io.c (_gpgme_io_select): Don't select on the writer if there
are still bytes pending.  Timo found this not easy to track down
race condition.

2001-04-02  Werner Koch  <wk@gnupg.org>

* gpgme.h: Add GPGME_ATTR_KEY_{EXPIRED,DISABLED}.
* key.c (gpgme_key_get_ulong_attr): And return those attribs.

* verify.c (gpgme_get_sig_key): Set keyliosting mode
depending on
the mode set in the current context.  Suggested by Timo.

* key.c (gpgme_key_get_ulong_attr): Return can_certify and not
can_encrypt. By Timo.

2001-03-30  Werner Koch  <wk@gnupg.org>

* debug.c (debug_init): Allow to specify a debug file.
(_gpgme_debug_level): New.

* posix-io.c (_gpgme_io_read, _gpgme_io_write): Print output.
(_gpgme_io_select): Debug only with level > 2.

2001-03-15  Werner Koch  <wk@gnupg.org>

* rungpg.c: Included time.h.

* key.h: New keyflags for capabilities.
* keylist.c (set_mainkey_capability, set_subkey_capability): New.
(keylist_colon_handler): Parse them.
* gpgme.h: New attribute values for capabilities.
* key.c (gpgme_key_get_string_attr): Return them.
(capabilities_to_string): New.
(gpgme_key_get_ulong_attr): Return the global caps.

2001-03-14  Werner Koch  <wk@gnupg.org>

* w32-io.c (destroy_reader,destroy_writer): Fixed syntax error.
Thanks to Jan Oliver Wagner.

2001-03-13  Werner Koch  <wk@gnupg.org>

* context.h: Add
invalid and revoke flags to user_id structure.
* keylist.c (gpgme_op_keylist_start): Use --fixed-list-mode.
(keylist_colon_handler): Adjust for that.
(set_userid_flags): New.
(set_mainkey_trust_info): Handle new key invalid flag
(set_subkey_trust_info): Ditto.
* gpgme.h: Add new attributes for key and user ID flags.
* key.c (_gpgme_key_append_name): Init these flags
(gpgme_key_get_as_xml): Print them.
(one_uid_as_xml): New helper for above.
(gpgme_key_get_string_attr, gpgme_key_get_ulong_attr):
Return the new attributes.  Enhanced, so that subkey information

can be returned now.

2001-02-28  Werner Koch  <wk@gnupg.org>

* w32-io.c (destroy_reader): Set stop_me flag.
(writer,create_writer,destroy_writer,find_writer,kill_writer): New.
(_gpgme_io_write): Use a writer thread to avoid blocking.
(_gpgme_io_close): Cleanup a writer thread
(_gpgme_io_select): Repalce the faked wait on writing by a real
waiting which is now possible due to the use of a writer thread.

2001-02-20
Werner Koch  <wk@gnupg.org>

* w32-io.c (destroy_reader,kill_reader): New.
(create_reader, reader): Add a new event to stop the thread.
(_gpgme_io_close): Kill the reader thread.

* posix-io.c (_gpgme_io_select): Handle frozen fds here.
* 32-io.c (_gpgme_io_select): Ditto. Removed a bunch of unused code.

* wait.c: Reworked the whole thing.
* rungpg.c (_gpgme_gpg_new): Init pid to -1.
(_gpgme_gpg_release): Remove the process from the wait queue.

2001-02-19  Werner Koch  <wk@gnupg.org>

* w32-io.c (_gpgme_io_set_close_notify): New.
(_gpgme_io_close): Do the notification.

* posix-io.c (_gpgme_io_select): Use a 1 sec timeout and not 200
microseconds.

* wait.c (remove_process): Don't close the fd here.
(do_select): Set the fd to -1 and remove the is_closed flag everywhere.
(_gpgme_wait_on_condition): Remove the assert on the queue and
break out if we could not find the queue.  The whole thing should
be reworked.

* posix-io.c (_gpgme_io_set_close_notify): New.
(_gpgme_io_close):
Do the notification.

* rungpg.c (close_notify_handler): New.
(_gpgme_gpg_new): Register a callback for the fd.
(_gpgme_gpg_set_colon_line_handler): Ditto.
(build_argv): Ditto

2001-02-13  Werner Koch  <wk@gnupg.org>

* rungpg.c (struct reap_s): Replaced pid_t by int.

* types.h: Add ulong typedef.

* rungpg.c (do_reaping,_gpgme_gpg_housecleaning): New.
(_gpgme_gpg_release): Reap children.
* io.h, posix-io.c (_gpgme_io_kill): New.
* w32-io.c (_gpgme_io_kill): New (dummy).

* keylist.c (gpgme_op_keylist_start): Cancel a pending request.

* posix-io.c (_gpgme_io_read): Add some debug output.
(_gpgme_io_write): Ditto.
(_gpgme_io_select): Increased the timeout.

2001-02-12  Werner Koch  <wk@gnupg.org>

Enhanced the signature verification, so that it can how handle
more than one signature and is able to return more information on
the signatures.
* verify.c (gpgme_get_sig_key): New.
(gpgme_get_sig_status): New.

* gpgme.h: Add stdio.h.
(GpgmeSigStat):
New status DIFF.

2001-02-01  Werner Koch  <wk@gnupg.org>

* w32-io.c (set_synchronize): Add EVENT_MODIFY_STATE.  Add Debug
code to all Set/ResetEvent().

* rungpg.c (read_status): Check for end of stream only if we have
an r.  By Timo.

2001-01-31  Werner Koch  <wk@gnupg.org>

* wait.c (_gpgme_wait_on_condition): Removed all exit code processing.
(propagate_term_results,clear_active_fds): Removed.
(count_active_fds): Renamed to ..
(count_active_and_thawed_fds): .. this and count only thawed fds.

* rungpg.c (gpg_colon_line_handler): Return colon.eof and not
status.eof ;-)

2001-01-30  Werner Koch  <wk@gnupg.org>

* w32-io.c (_gpgme_io_spawn): Use the supplied path arg.

* version.c (get_engine_info): Return better error information.

* posix-util.c, w32-util.c: New.
(_gpgme_get_gpg_path): New, suggested by Jan-Oliver.
* rungpg.c (_gpgme_gpg_spawn): Use new function to get GPG's path.

* signers.c (gpgme_signers_add): Ooops, one should test code and
not just write it;
the newarr was not assigned. Thanks to Jos
for pointing this out. Hmmm, still not tested, why should a coder
test his fix :-)

* w32-io.c: Does now use reader threads, so that we can use
WaitForMultipleObjects.
* sema.h, posix-sema.c, w32-sema.c: Support for Critical sections.
Does currently only work for W32.

* debug.c, util.h : New. Changed all fprintfs to use this new
set of debugging functions.

2001-01-23 Werner Koch <wk@gnupg.org>

* data.c (_gpgme_data_release_and_return_string): Fixed string
termination.

2001-01-22 Werner Koch <wk@gnupg.org>

* delete.c: New.

* signers.c: New.
* key.c (gpgme_key_ref, gpgme_key_unref): New.
* sign.c (gpgme_op_sign_start): Allow the use of other keys.

* version.c (gpgme_get_engine_info,gpgme_check_engine): New.
* rungpg.c (_gpgme_gpg_set_simple_line_handler): New.

2001-01-05 Werner Koch <wk@gnupg.org>

* data.c (gpgme_data_rewind): Allow to rewind data_type_none.

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;;; 02111-1307, USA.

(defpackage #:gpgme-system
 (:use #:common-lisp #:asdf))

(in-package #:gpgme-system)

(defsystem gpgme
 :description "GnuPG Made Easy."
 :author "g10 Code GmbH"
  :version "1.15.1"
 :licence "GPL"
 :defsystem-depends-on ("cffi-grovel")
 :depends-on ("cffi" "gpg-error" "trivial-garbage")
 :components ((:file "gpgme-package")
              (:cffi-grovel-file "gpgme-grovel"
               :depends-on ("gpgme-package"))
       (:file "gpgme"
  :depends-on ("gpgme-package" "gpgme-grovel"))))
```

```
# -*- mode: org -*-
#+TITLE: GNU Privacy Guard (GnuPG) Made Easy Python Bindings
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltxtra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}


* GPGME Python Bindings
 :PROPERTIES:
 :CUSTOM_ID: top
 :END:


** Contents
  :PROPERTIES:
  :CUSTOM_ID: contents
  :END:


- [[file:short-history][A short history of the project]]
- [[file:what-is-new][What's New]]
 - [[file:maintenance-mode][Maintenance Mode]] (from January, 2019)
- [[file:what-was-new][What Was New]]
- [[file:gpgme-python-howto][GPGME Python Bindings HOWTO]]
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under certain conditions; type `show c' for details.

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`show c' should show the appropriate
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`Gnomovision' (which makes passes at compilers) written by James Hacker.

<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice

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consider it more useful to permit linking proprietary applications with the

library.  If this is what you want to do, use the GNU Library General
Public License instead of this License.
-----BEGIN PGP PUBLIC KEY BLOCK-----

mQENBFrsKEkBCADKw4Wt8J6M/88qD8PO6lSMCxH1cpwH8iK0uPaFFYsJkkXo7kWf
PTAtrV+REqF/o80dvYcdLvRsV21pvncZz/HXLu1yQ18mC3XObrKokbdgrTTKA5XE
BZkNsqyaMMJauT18H4hYkSg62/tTdO1cu/zWv/LFf7Xyn6+uA74ovXCJlO1s0N2c
PShtr98QRzPMf2owgVk37JnDNp4gGVDGHxSZOuUwxgYAZYnA8SFc+c+3ZrQfY870
+O4j3Mz4p7yD13AwP4buQLBsb/icxekeQCqpRJhLH9f7MdEcGXa1x36RcEkHdu+M
yJ392eMgD+dKNfRCtyTPhjZTxvbNELIBYICfABEBAAG0EHRlc3RAZXhhbXBsZS5v
cmeJAVQEEwEIAD4WIQTUFzW5Ejb9uIIEjFojAWNe7/DLBQUCWuwoSQIbAwUJA8Jn
AAULCQgHAgYVCgkICwIEFgIDAQIeAQIXgAAKCRAjAWNe7/DLBf9kB/wOQ/S60HGw
Fq07W9N01HWULyhHKoMmcHL6rfZ64oDqLxolPSasz7WAMW1jN4qtWJ0mFzwO83V6
kaBe+wF6Kqir6udFSBW9rPcFg6/VZXPltT0a6uacIHq6DyQ5iMW4YQWbVy9OR2rN
GkYo1JCBR0XdRJYCSX3yB4TWv/eXnZ37/WjmiTOIZh35rjs+NuU/S5JPDfAp2/k7
0DevQeBsv+UjVXjWpNTZmPbvDnd995uSmC6UY4hzyP84ORYMYn9n1QAR0goxDN6U
unOf9Rlp1oMzdxMool/d1MlCxg2h3jheuhv7lgUF4KpvHOuEPXQ7UO417E0TYcDZ
1J8Nsv87SZeEuQENBFrsKEkBCADjoEBhG/QPqZHg8VyoD1xYRAWGxyDJkX/GrSs6
yE+x2hk5FoQCajxKa/d4AVxOnJpdwhAfeXeSNaql5Ejgzax+Tdj9BV6vtGVJVv0p
O7bgAiZxkA6RHxtNqhpPnPQoXvUzkzpRgpuL+Nj4yIg7z1ITH6KQH4u5SI9vd+j/
8i9Taz67pdZwuJjac8qBuJHjzAo1bjYctFYUSG5pbmMQyNLySzgiNkFa4DajODlt
3RuqVGP316Fk+Sy2+60tC/HlX8jgMyMONfOGBQx6jk8tvAphS/LAqrrNepnagIyL
UGKU+L8cB2g1PGGp2biBFWqZbudZoyRBet/0yH/zirBdQJw1ABEBAAGJATwEGAEI
ACYWIQTUFzW5Ejb9uIIEjFojAWNe7/DLBQUCWuwoSQIbDAUJA8JnAAAKCRAjAWNe
7/DLBf0pCACPp5hBuUWngu2Hqvg+tNiujfsiYzId3MffFxEk3CbXeHcJ5F32NDJ9
PYCnra4L8wSv+NZt9gIa8lFwoFSFQCjzH7KE86XcV3MhfdJTNb/+9CR7Jq3e/4Iy
0N5ip7PNYMCyakcAsxvsNCJKrSaDuYe/OAoTXRBtgRWE2uyT315em02Lkr+2Cc/Q
k6H+vlNOHGRgnpI/OZZjnUuUfBUvMGHr1phW+y7aeymC9PnUGdViRdJe23nntMSD
A+0/I7ESO9JsWvJbyBmuiZpu9JjScOjYH9xpQLqRNyw4WHpZriN69F0t9Mmd7bM1
+UyPgbPEr0iWMeyctYsuOLeUyQKMscDT
=QyY6
-----END
 PGP PUBLIC KEY BLOCK-----
Using gpgme.js
---
At first, make sure that the environment you want to use gpgme.js in has access
and permissions for nativeMessaging, and gpgme-json installed. For details,
see the README.

The library itself is started via the {@link init} method. This will test the
nativeMessaging connection, and then resolve into an Object offering
the top level API:

* [encrypt]{@link GpgME#encrypt}
* [decrypt]{@link GpgME#decrypt}
* [sign]{@link GpgME#sign}
* [verify]{@link GpgME#verify}
* [Keyring]{@link GPGME_Keyring}

```
gpgmejs.init()
  .then(function(GPGME) {
      // using GPGME
  }, function(error){
      // error handling;
  })
```

All methods that require communication with nativeMessaging are asynchronous,
using Promises. Rejections will be instances of {@link GPGME_Error}.

An exaeption are Keys, which can be initialized in a 'sync' mode, allowing them
to be cached and used synchronously until manually refreshed.

Keyring and Keys
---
The gnupg keys
 can be accessed via the [Keyring]{@link GPGME_Keyring}.

The Keyring offers the methods for accessing information on all Keys known to
gnupg.

**Due to security constraints, the javascript-binding currently only offers
limited support for secret-Key interaction.**

The existence of secret Keys is not secret, and those secret Keys can be used
for signing, but Operations that may expose, modify or delete secret Keys are
not supported.

* [getKeysArmored]{@link GPGME_Keyring#getKeysArmored}
* [getKeys]{@link GPGME_Keyring#getKeys}
* [getDefaultKey]{@link GPGME_Keyring#getDefaultKey}
* [generateKey]{@link GPGME_Keyring#generateKey}
* [deleteKey]{@link GPGME_Keyring#deleteKey}

```
#!/usr/bin/env bash
# MIT licenses will each have a unique MD5 sum since they contain a unique copyright.
# This script will read the license file into memory, strip out the copyright, and then
# generate an MD5 that is not unique and can be matched against a known MIT MD5 sum.
set -e

calculate_md5_sum() {
 local FILE="$1"

 # Read the contents of the file into a variable
 local raw_license_text=$(<"$FILE")
```

```
 # Convert to lowercase
 local lowercase_license_text="${raw_license_text,,}"

 # Remove anything before the beginning of the license
 local stripped_license_text=$(awk '/permission is hereby granted,/{p=1} p' <<< "$lowercase_license_text")

 # Replace line breaks (Windows or Linux) with a single space
 local replaced_linebreaks=$(tr '\r\n' ' ' <<< "$stripped_license_text")

 # Replace multiple spaces with a single space
 local normalized_license_text=$(tr -s ' ' <<< "$replaced_linebreaks")

 # Strip away any non-printable, non-whitespace characters
 local clean_unprintable_license_text=$(tr
 -cd '[:print:][:space:]' <<< "$normalized_license_text")

 # Remove punctuation and special characters
 local clean_license_text=$(echo "$clean_unprintable_license_text" | sed 's/[^a-zA-Z ]//g')

 # Calculate the MD5 sum of the cleaned license text
 local MD5SUM=$(echo -n "$clean_license_text" | md5sum | awk '{print $1}')

 # Output the MD5 sum
 echo "$MD5SUM"
}

# Check if the FILE argument is provided
if [ -z "$1" ]; then
 echo "Please provide a FILE as an argument."
 exit 1
fi

# Invoke the function with the provided FILE argument
calculate_md5_sum "$1"
;;;; gpgme-grovel.lisp

;;; This file is part of GPGME-CL.
;;;
;;; GPGME-CL is free software; you can redistribute it and/or modify it
;;; under the terms of the GNU General Public License as published by
;;; the Free Software Foundation; either version 2 of the License, or
;;; (at your option) any later version.
;;;
;;; GPGME-CL is distributed in the hope that it will be useful, but
;;; WITHOUT ANY WARRANTY; without even the implied warranty of
;;; MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the GNU
;;; Lesser General Public License for more details.
;;;
```

```
;;; You should have received a copy of the GNU General Public License
;;; along with GPGME; if not, write to the Free Software Foundation,
;;; Inc., 59 Temple Place - Suite 330, Boston, MA 02111-1307, USA.


(in-package :gpgme)


(include "errno.h" "sys/types.h")

(constant (+ebadf+ "EBADF"))

(ctype off-t "off_t")
(ctype size-t "size_t")
(ctype ssize-t "ssize_t")

(cvar ("errno" *errno*) :int)
(21:protected-private-key(3:dsa(1:p129:_d8|po3s@!WGUOAXRC$_[8SN:y|o?2[.pVxn(kOc\Bk0zu&FnK)(1:q21:
vBeOP\P)(1:g129:fU/e(2hp@hjc2uE=Sg GO;ZkIyFnGM!GsG@
=  _SZklI)(1:y128:K:9tA]4SU1 }sG`nZpx/imV^>A;V%?5!!sS{!=-6@|
=d
)(9:protected25:openpgp-s2k3-sha1-aes-cbc((4:sha18:Li7:6452224)16:,kO{,)80:z7OCG/sB48(H9%*ojSO
OGSma`YUs1h<_)(12:protected-at15:20130812T105134)))
For a list of the authors of the source code of GPGME, please see the
file AUTHORS.  The following people supported GPGME development in
various ways (for example by finding bugs or giving advice), and we
want to thank them for their help.  If we forgot you, please let us
know.

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Timo Schulz             twoaday@freakmail.de
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```
% Created 2019-01-18 Fri 10:10
% Intended LaTeX compiler: xelatex
\documentclass[12pt]{article}
\usepackage{graphicx}
\usepackage{grffile}
\usepackage{longtable}
\usepackage{wrapfig}
\usepackage{rotating}
\usepackage[normalem]{ulem}
\usepackage{amsmath}
\usepackage{textcomp}
\usepackage{amssymb}
\usepackage{capt-of}
\usepackage{hyperref}
\usepackage{xltxtra}
\usepackage[margin=1in]{geometry}
\setmainfont[Ligatures={Common}]{Times New Roman}
\author{Ben McGinnes <ben@gnupg.org>}
\author{Ben McGinnes}
\date{\today}
\title{GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)}
\hypersetup{
pdfauthor={Ben McGinnes},
pdftitle={GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)},
pdfkeywords={},
pdfsubject={},
pdfcreator={Emacs 26.1 (Org mode 9.1.14)},
pdflang={English}}
\begin{document}

\maketitle
\tableofcontents



\section{Introduction}
\label{sec:org8e5fa02}
```

\begin{center}
\begin{tabular}{ll}
Version: & 0.1.4\\
GPGME Version: & 1.12.1\\
Author: & Ben
McGinnes <ben@gnupg.org>\\
Author GPG Key: & DB4724E6FA4286C92B4E55C4321E4E2373590E5D\\
Language: & Australian English, British English\\
Language codes: & en-AU, en-GB, en\\
\end{tabular}
\end{center}

This document provides basic instruction in how to use the GPGME
Python bindings to programmatically leverage the GPGME library.

\subsection{Python 2 versus Python 3}
\label{sec:org517cbf4}
Though the GPGME Python bindings themselves provide support for both
Python 2 and 3, the focus is unequivocally on Python 3 and
specifically from Python 3.4 and above.  As a consequence all the
examples and instructions in this guide use Python 3 code.

Much of it will work with Python 2, but much of it also deals with
Python 3 byte literals, particularly when reading and writing data.
Developers concentrating on Python 2.7, and possibly even 2.6, will
need to make the appropriate modifications to support the older string
and unicode types as opposed to bytes.

There are multiple reasons for concentrating
on Python 3; some of
which relate to the immediate integration of these bindings, some of
which relate to longer term plans for both GPGME and the python
bindings and some of which relate to the impending EOL period for
Python 2.7.  Essentially, though, there is little value in tying the
bindings to a version of the language which is a dead end and the
advantages offered by Python 3 over Python 2 make handling the data
types with which GPGME deals considerably easier.

\subsection{Examples}
\label{sec:org2c08d53}
All of the examples found in this document can be found as Python 3
scripts in the \texttt{lang/python/examples/howto} directory.

\subsection{Unofficial Drafts}
\label{sec:orgceb2216}

In addition to shipping with each release of GPGME, there is a section
on locations to read or download \hyperref[sec:org080a94a]{draft editions} of this document from
at the end of it.  These are unofficial versions produced in between
major releases.

\subsection{What's New}
\label{sec:orga79ddc2}
Full
 details of what is new are now available in the \href{what-is-new.org}{What's New} file
and archives of the preceding \emph{What's New} sections are available in
the \href{what-was-new}{What Was New} file.

\subsubsection{New in GPGME 1130}
\label{sec:org746b75d}
See the \href{what-is-new\#new-stuff-1-13-0}{What's New} document for what is new in version 1.13.0.

\subsubsection{New in GPGME 1120}
\label{sec:org7adcade}
See the \href{what-was-new\#new-stuff-1-12-0}{What Was New} document for what was new in version 1.12.0.

\section{GPGME Concepts}
\label{sec:orgb257fc1}
\subsection{A C API}
\label{sec:org4fe1dfa}
Unlike many modern APIs with which programmers will be more familiar
with these days, the GPGME API is a C API.  The API is intended for
use by C coders who would be able to access its features by including
the \texttt{gpgme.h} header file with their own C source code and then access
its functions just as they would any other C headers.

This is a very
 effective method of gaining complete access to the API
and in the most efficient manner possible.  It does, however, have the
drawback that it cannot be directly used by other languages without
some means of providing an interface to those languages.  This is
where the need for bindings in various languages stems.

\subsection{Python bindings}
\label{sec:org0e49e52}
The Python bindings for GPGME provide a higher level means of
accessing the complete feature set of GPGME itself.  It also provides
a more pythonic means of calling these API functions.

The bindings are generated dynamically with SWIG and the copy of
\texttt{gpgme.h} generated when GPGME is compiled.

This means that a version of the Python bindings is fundamentally tied
to the exact same version of GPGME used to generate that copy of
\texttt{gpgme.h}.

\subsection{Difference between the Python bindings and other GnuPG Python packages}
\label{sec:org97acfd7}
There have been numerous attempts to add GnuPG support to Python
over
the years. Some of the most well known are listed here, along with
what differentiates them.

\subsubsection{The python-gnupg package maintained by Vinay Sajip}
\label{sec:org0136847}
This is arguably the most popular means of integrating GPG with
Python. The package utilises the \texttt{subprocess} module to implement
wrappers for the \texttt{gpg} and \texttt{gpg2} executables normally invoked on the
command line (\texttt{gpg.exe} and \texttt{gpg2.exe} on Windows).

The popularity of this package stemmed from its ease of use and
capability in providing the most commonly required features.

Unfortunately it has been beset by a number of security issues in the
past; most of which stemmed from using unsafe methods of accessing the
command line via the \texttt{subprocess} calls. While some effort has been
made over the last two to three years (as of 2018) to mitigate this,
particularly by no longer providing shell access through those
subprocess calls, the wrapper is still somewhat
limited in the scope
of its GnuPG features coverage.

The python-gnupg package is available under the MIT license.

\subsubsection{The gnupg package created and maintained by Isis Lovecruft}
\label{sec:orgdc03987}
In 2015 Isis Lovecruft from the Tor Project forked and then
re-implemented the python-gnupg package as just gnupg. This new
package also relied on subprocess to call the \texttt{gpg} or \texttt{gpg2}
binaries, but did so somewhat more securely.

The naming and version numbering selected for this package, however,
resulted in conflicts with the original python-gnupg and since its
functions were called in a different manner to python-gnupg, the

release of this package also resulted in a great deal of consternation
when people installed what they thought was an upgrade that
subsequently broke the code relying on it.

The gnupg package is available under the GNU General Public License
version 3.0 (or any later version).

\subsubsection{The PyME package maintained by Martin
Albrecht}
\label{sec:org715600b}
This package is the origin of these bindings, though they are somewhat
different now. For details of when and how the PyME package was
folded back into GPGME itself see the \href{short-history.org}{Short History} document.\footnote{\texttt{short-history} and/or \texttt{short-history.html}.}

The PyME package was first released in 2002 and was also the first
attempt to implement a low level binding to GPGME. In doing so it
provided access to considerably more functionality than either the
\texttt{python-gnupg} or \texttt{gnupg} packages.

The PyME package is only available for Python 2.6 and 2.7.

Porting the PyME package to Python 3.4 in 2015 is what resulted in it
being folded into the GPGME project and the current bindings are the
end result of that effort.

The PyME package is available under the same dual licensing as GPGME
itself: the GNU General Public License version 2.0 (or any later
version) and the GNU Lesser General Public License version
2.1 (or any
later version).

\section{GPGME Python bindings installation}
\label{sec:org73d8d6f}
\subsection{No PyPI}
\label{sec:orgec9a038}
Most third-party Python packages and modules are available and
distributed through the Python Package Installer, known as PyPI.

Due to the nature of what these bindings are and how they work, it is
infeasible to install the GPGME Python bindings in the same way.

This is because the bindings use SWIG to dynamically generate C
bindings against \texttt{gpgme.h} and \texttt{gpgme.h} is generated from
\texttt{gpgme.h.in} at compile time when GPGME is built from source. Thus to
include a package in PyPI which actually built correctly would require

either statically built libraries for every architecture bundled with
it or a full implementation of C for each architecture.

See the additional notes regarding \hyperref[sec:org645735a]{CFFI and SWIG} at the end of this
section for further details.

\subsection{Requirements}
\label{sec:org2f7f06c}
The
GPGME Python bindings only have three requirements:

\begin{enumerate}
\item A suitable version of Python 2 or Python 3. With Python 2 that
means CPython 2.7 and with Python 3 that means CPython 3.4 or
higher.
\item \href{https://www.swig.org}{SWIG}.
\item GPGME itself. Which also means that all of GPGME's dependencies
must be installed too.
\end{enumerate}

\subsubsection{Recommended Additions}
\label{sec:org25bd7d4}
Though none of the following are absolute requirements, they are all
recommended for use with the Python bindings. In some cases these
recommendations refer to which version(s) of CPython to use the
bindings with, while others refer to third party modules which provide
a significant advantage in some way.

\begin{enumerate}
\item If possible, use Python 3 instead of 2.
\item Favour a more recent version of Python since even 3.4 is due to
reach EOL soon. In production systems and services, Python 3.6
should be robust enough to be relied on.
\item If possible add the
following Python modules which are not part of
the standard library: \href{http://docs.python-requests.org/en/latest/index.html}{Requests},
\href{https://cython.org/}{Cython}, \href{https://pendulum.eustace.io/}{Pendulum} and
\href{https://github.com/Selfnet/hkp4py}{hkp4py}.
\end{enumerate}

Chances are quite high that at least the first one and maybe two of
those will already be installed.

Note that, as with Cython, some of advanced use case scenarios will
bring with them additional requirements. Most of these will be fairly
well known and commonly installed ones, however, which are in many

cases likely to have already been installed on many systems or be
familiar to Python programmers.

\subsection{Installation}
\label{sec:orgf1c7587}
Installing the Python bindings is effectively achieved by compiling
and installing GPGME itself.

Once SWIG is installed with Python and all the dependencies for GPGME
are installed you only need to confirm that the version(s) of Python
you want the
bindings installed for are in your \texttt{\$PATH}.

By default GPGME will attempt to install the bindings for the most
recent or highest version number of Python 2 and Python 3 it detects
in \texttt{\$PATH}. It specifically checks for the \texttt{python} and \texttt{python3}
executables first and then checks for specific version numbers.

For Python 2 it checks for these executables in this order: \texttt{python},
\texttt{python2} and \texttt{python2.7}.

For Python 3 it checks for these executables in this order: \texttt{python3},
\texttt{python3.7}, \texttt{python3.6}, \texttt{python3.5} and \texttt{python3.4}.\footnote{With no issues reported
specific to Python 3.7, the release of
Python 3.7.1 at around the same time as GPGME 1.12.0 and the testing
with Python 3.7.1rc1, there is no reason to delay moving 3.7 ahead of
3.6 now. Production environments with more conservative requirements
will always enforce their own policies anyway and installation to each
supported minor release
is quite possible too.}

On systems where \texttt{python} is actually \texttt{python3} and not \texttt{python2} it
may be possible that \texttt{python2} may be overlooked, but there have been
no reports of that actually occurring as yet.

In the three months or so since the release of Python 3.7.0 there has
been extensive testing and work with these bindings with no issues
specifically relating to the new version of Python or any of the new
features of either the language or the bindings. This has also been
the case with Python 3.7.1rc1. With that in mind and given the
release of Python 3.7.1 is scheduled for around the same time as GPGME
1.12.0, the order of preferred Python versions has been changed to
move Python 3.7 ahead of Python 3.6.

\subsubsection{Installing GPGME}
\label{sec:org903bd67}

See the GPGME \texttt{README} file for details of how to install GPGME from
source.

\subsection{Known Issues}
\label{sec:org0d2a332}
There are a few known issues with the current build process
 and the
Python bindings.  For the most part these are easily addressed should
they be encountered.

\subsubsection{Breaking Builds}
\label{sec:orgbac75f3}
Occasionally when installing GPGME with the Python bindings included
it may be observed that the \texttt{make} portion of that process induces a
large very number of warnings and, eventually errors which end that
part of the build process.  Yet following that with \texttt{make check} and
\texttt{make install} appears to work seamlessly.

The cause of this is related to the way SWIG needs to be called to
dynamically generate the C bindings for GPGME in the first place.  So
the entire process will always produce \texttt{lang/python/python2-gpg/} and
\texttt{lang/python/python3-gpg/} directories.  These should contain the
build output generated during compilation, including the complete
bindings and module installed into \texttt{site-packages}.

Occasionally the errors in the early part or some other conflict
(e.g. not installing
 as \textbf{\emph{root}} or \textbf{\emph{su}}) may result in nothing
being installed to the relevant \texttt{site-packages} directory and the
build directory missing a lot of expected files.  Even when this
occurs, the solution is actually quite simple and will always work.

That solution is simply to run the following commands as either the
\textbf{root} user or prepended with \texttt{sudo -H}\footnote{Yes, even if you use virtualenv with everything you do in
Python.  If you want to install this module as just your user account
then you will need to manually configure, compile and install the
\emph{entire} GnuPG stack as that user as well.  This includes libraries
which are not often installed that way.  It can be done and there are
circumstances under which it is worthwhile, but generally only on
POSIX systems which utilise single user mode (some even require it).} in the \texttt{lang/python/}
directory:

\begin{verbatim}
/path/to/pythonX.Y setup.py build
/path/to/pythonX.Y setup.py

build
/path/to/pythonX.Y setup.py install
\end{verbatim}

Yes, the build command does need to be run twice. Yes, you still need
to run the potentially failing or incomplete steps during the
\texttt{configure}, \texttt{make} and \texttt{make install} steps with installing GPGME.
This is because those steps generate a lot of essential files needed,
both by and in order to create, the bindings (including both the
\texttt{setup.py} and \texttt{gpgme.h} files).

\begin{enumerate}
\item IMPORTANT Note
\label{sec:org37f3d4a}
If specifying a selected number of languages to create bindings for,
try to leave Python last. Currently the majority of the other
language bindings are also preceding Python of either version when
listed alphabetically (not counting the Qt bindings).

If Python is set to precede one of the other languages then it is
possible that the errors described here may interrupt the build
process before generating bindings for those other languages. In
these cases it may be preferable
to configure all preferred language
bindings separately with alternative \texttt{configure} steps for GPGME using
the \texttt{-{}-enable-languages=\$LANGUAGE} option.

Alternatively \texttt{make} (or \texttt{gmake}, depending on your platform) may be
run with the the \texttt{-k} option, which tells make to keep going even if
errors are encountered. In that case the failure of one language's
set of bindings to build should not hamper another language's bindings
to build.
\end{enumerate}

\subsubsection{Reinstalling Responsibly}
\label{sec:org21e4dec}
Regardless of whether you're installing for one version of Python or
several, there will come a point where reinstallation is required.
With most Python module installations, the installed files go into the
relevant site-packages directory and are then forgotten about. Then
the module is upgraded, the new files are copied over the old and
that's the end of the matter.

While the same is true of these bindings, there have been intermittent
issues

observed on some platforms which have benefited significantly
from removing all the previous installations of the bindings before
installing the updated versions.

Removing the previous version(s) is simply a matter of changing to the
relevant \texttt{site-packages} directory for the version of Python in
question and removing the \texttt{gpg/} directory and any accompanying
egg-info files for that module.

In most cases this will require root or administration privileges on
the system, but the same is true of installing the module in the first
place.

\subsubsection{Multiple installations}
\label{sec:org30b18bd}
For a variety of reasons it may be either necessary or just preferable
to install the bindings to alternative installed Python versions which
meet the requirements of these bindings.

On POSIX systems this will generally be most simply achieved by
running the manual installation commands (build, build, install) as
described in the previous section for each Python
installation the
bindings need to be installed to.

As per the SWIG documentation: the compilers, libraries and runtime
used to build GPGME and the Python Bindings \textbf{must} match those used to
compile Python itself, including the version number(s) (at least going
by major version numbers and probably minor numbers too).

On most POSIX systems, including OS X, this will very likely be the
case in most, if not all, cases.

Note that from GPGME \href{https://dev.gnupg.org/rMff6ff616aea6f59b7f2ce1176492850ecdf3851e}{1.12.1} the
default installation installs to each
version of Python it can find first. That is that it will currently
install for the first copies of Python versions 2.7, 3.4, 3.5, 3.6,
3.7 and 3.8 (dev branch) that it finds. Usually this will be in the
same prefix as GPGME itself, but is dictated by the \texttt{\$PATH} when the
installation is performed. The above instructions can still be
performed on other python installations which the installer does not
find,
including alternative prefixes.

\subsubsection{Won't Work With Windows}

\label{sec:org0ebae3a}
There are semi-regular reports of Windows users having considerable difficulty in installing and using the Python bindings at all. Very often, possibly even always, these reports come from Cygwin users and/or MinGW users and/or Msys2 users. Though not all of them have been confirmed, it appears that these reports have also come from people who installed Python using the Windows installer files from the \href{https://python.org}{Python website} (i.e. mostly MSI installers, sometimes self-extracting \texttt{.exe} files).

The Windows versions of Python are not built using Cygwin, MinGW or Msys2; they're built using Microsoft Visual Studio. Furthermore the version used is \emph{considerably} more advanced than the version which MinGW obtained a small number of files from many years ago in order to be able to compile anything at all. Not only that, but there are changes to the version of Visual Studio between some micro releases, though that is is particularly the case with Python 2.7, since it has been kept around far longer than it should have been.

There are two theoretical solutions to this issue:

\begin{enumerate}
\item Compile and install the GnuPG stack, including GPGME and the Python bindings using the same version of Microsoft Visual Studio used by the Python Foundation to compile the version of Python installed.

If there are multiple versions of Python then this will need to be done with each different version of Visual Studio used for those versions of Python.

\item Compile and install Python using the same tools used by choice, such as MinGW or Msys2.
\end{enumerate}

Do \textbf{not} use the official Windows installer for Python unless following the first method.

In this type of situation it may even be for the best to accept that there are less limitations on permissive software than free software and simply opt to use a recent version of the Community Edition of Microsoft Visual Studio to compile and build all of it, no matter what.

Investigations into the extent or the limitations of this issue are ongoing.

The following table lists the version of Microsoft Visual Studio which
needs to be used when compiling GPGME and the Python bindings with
each version of the CPython binary released \href{https://www.python.org/downloads/windows/}{for Windows}:

\begin{center}
\begin{tabular}{rll}
CPython & Microsoft product name & runtime filename\\
2.7.6 & Visual Studio 2008 & MSVCR90.DLL\\
3.4.0 & Visual Studio 2010 & MSVCR100.DLL\\
3.5.0 & Visual Studio 2015 & \textbf{see below}\\
3.6.0 & Visual Studio 2015 & \textbf{see below}\\
3.7.0 & Visual Studio 2017* & \textbf{see below}\\
\end{tabular}
\end{center}

It is important to note that MingW and Msys2 ship with the Visual C
runtime from Microsoft Visual Studio 2005 and are thus \textbf{incompatible}
with all the versions of CPython which can be used with the GPGME
Python bindings.

It is
also important to note that from CPython 3.5 onwards, the Python
Foundation has adopted the reworking of the Visual C runtime which was
performed for Visual Studio 2015 and aimed at resolving many of these
kinds of issues. Much greater detail on these issues and the correct
file(s) to link to are available from Matthew Brett's invaluable page,
\href{https://matthew-brett.github.io/pydagogue/python_msvc.html}{Using Microsoft Visual C with Python}. It is
also worth reading the
Microsoft Developer Network blog post on \href{http://blogs.msdn.com/b/vcblog/archive/2015/03/03/introducing-
the-universal-crt.aspx}{the universal CRT} and Steve
Dower's blog posts on Python extensions (\href{http://stevedower.id.au/blog/building-for-python-3-5}{part 1} and
\href{http://stevedower.id.au/blog/building-for-python-3-5-part-two}{part 2}).

The second of those two posts by Steve Dower contains the details of
specific configuration options required for compiling anything to be
used with official CPython
releases. In addition to those
configuration and compiler settings to use, the versions of Visual
Studio prior to Visual Studio 2015 did not support 64-bit systems by
default. So compiling a 64-bit version of these bindings for a 64-bit
version of CPython 2.7 or 3.4 requires additional work.

In addition to the blog posts, the \href{https://wiki.python.org/moin/WindowsCompilers}{Windows compilers}
wiki page on the
CPython wiki is another essential reference on the relevant versions
of Visual Studio to use and the degree of compatibility with CPython
releases.

Eventually someone will ask why there isn't an installable binary for
Windows, which the GPGME of the licenses do not preclude as long as
the source code is available in conjunction with such a release.

The sheer number of versions of Visual Studio in conjunction with
differing configuration options depending on the target Windows
version and whether the architecture is 64-bit or 32-bit makes it
difficult to provide a correct
binary installer for Windows users. At
the bare minimum doing so would require the GnuPG project compile ten
different versions of the bindings with each release; both 32-bit and
64-bit versions for CPython 2.7 and 3.4, with 64-bit versions for both
x86-64 (i.e. Intel and AMD) and ARM architectures for CPython 3.5,
3.6, 3.7 and later releases. That's the bare \textbf{minimum}, it'd probably
be higher.

Additionally, with only a binary installation used in conjunction with
the CPython installer from \texttt{python.org} the advanced options available
which utilise \hyperref[sec:org3b53926]{Cython} will not be able to be used at all. Cython
depends on being able to compile the C code it generates and that too
would need to utilise a matching runtime to both the installed version
of CPython and these bindings in order to work with the bindings.

Considering all of that, what do we recommend?

\begin{enumerate}
\item Use a recent version of CPython; at least 3.5, but ideally 3.6 or
later.

\item
Use Visual Studio 2015 or the standalone build tools for Visual
Studio 2017 (or later).

\item Compile both CPython and GPGME with these bindings using the tools
selected in step 2.

\item Ignore MingW, Msys2 and the official CPython binary installers.

\item Be thankful the answer to this question wasn't simply to say
something like, install Linux or install FreeBSD (or even
Apple's OS X).
\end{enumerate}

\subsubsection{CFFI is the Best and GPGME should use it instead of SWIG}
\label{sec:org645735a}
There are many reasons for favouring \href{https://cffi.readthedocs.io/en/latest/overview.html}{CFFI} and

proponents of it are
quite happy to repeat these things as if all it would take to switch
from SWIG to CFFI is repeating that list as if it were a new concept.

The fact is that there are things which Python's CFFI implementation
cannot handle in the GPGME C code. Beyond that there are features of
SWIG which are simply not available with CFFI at all. SWIG generates
the
bindings to Python using the \texttt{gpgme.h} file, but that file is not
a single version shipped with each release, it too is generated when
GPGME is compiled.

CFFI is currently unable to adapt to such a potentially mutable
codebase. If there were some means of applying SWIG's dynamic code
generation to produce the Python/CFFI API modes of accessing the GPGME
libraries (or the source source code directly), but such a thing does
not exist yet either and it currently appears that work is needed in
at least one of CFFI's dependencies before any of this can be
addressed.

So if you're a massive fan of CFFI; that's great, but if you want this
project to switch to CFFI then rather than just insisting that it
should, I'd suggest you volunteer to bring CFFI up to the level this
project needs.

If you're actually seriously considering doing so, then I'd suggest
taking the \texttt{gpgme-tool.c} file in the GPGME \texttt{src/} directory and
getting that to work with any of the CFFI API methods
(not the ABI
methods, they'll work with pretty much anything). When you start
running into trouble with "ifdefs" then you'll know what sort of
things are lacking. That doesn't even take into account the amount of
work saved via SWIG's code generation techniques either.

\subsubsection{Virtualised Environments}
\label{sec:orgb0d56f5}
It is fairly common practice amongst Python developers to, as much as
possible, use packages like virtualenv to keep various things that are
to be installed from interfering with each other. Given how much of
the GPGME bindings is often at odds with the usual pythonic way of
doing things, it stands to reason that this would be called into
question too.

As it happens the answer as to whether or not the bindings can be used
with virtualenv, the answer is both yes and no.

In general we recommend installing to the relevant path and matching

prefix of GPGME itself. Which means that when GPGME, and ideally the
rest of the GnuPG stack, is installed to a prefix
like \texttt{/usr/local} or
\texttt{/opt/local} then the bindings would need to be installed to the main
Python installation and not a virtualised abstraction. Attempts to
separate the two in the past have been known to cause weird and
intermittent errors ranging from minor annoyances to complete failures
in the build process.

As a consequence we only recommend building with and installing to the
main Python installations within the same prefix as GPGME is installed
to or which are found by GPGME's configuration stage immediately prior
to running the make commands. Which is exactly what the compiling and
installing process of GPGME does by default.

Once that is done, however, it appears that a copy of the compiled
module may be installed into a virtualenv of the same major and minor
version matching the build. Alternatively it is possible to utilise a
\texttt{sites.pth} file in the \texttt{site-packages/} directory of a virtualenv
installation, which links back to the system
installations
corresponding directory in order to import anything installed system
wide. This may or may not be appropriate on a case by case basis.

Though extensive testing of either of these options is not yet
complete, preliminary testing of them indicates that both are viable
as long as the main installation is complete. Which means that
certain other options normally restricted to virtual environments are
also available, including integration with pythonic test suites
(e.g. \href{https://docs.pytest.org/en/latest/index.html}{pytest}) and other large projects.

That said, it is worth reiterating the warning regarding non-standard
installations. If one were to attempt to install the bindings only to
a virtual environment without somehow also including the full GnuPG
stack (or enough of it as to include GPGME) then it is highly likely
that errors would be encountered at some point and more than a little
likely that the build process itself would break.

If a degree of separation
from the main operating system is still
required in spite of these warnings, then consider other forms of
virtualisation. Either a virtual machine (e.g. \href{https://www.virtualbox.org/}{VirtualBox}), a
hardware emulation layer (e.g. \href{https://www.qemu.org/}{QEMU}) or an application container
(e.g. \href{https://www.docker.com/why-docker}{Docker}).

Finally it should be noted that the limited tests conducted thus far
have been using the \texttt{virtualenv} command in a new directory to create
the virtual python environment. As opposed to the standard \texttt{python3

-m venv} and it is possible that this will make a difference depending
on the system and version of Python in use.  Another option is to run
the command \texttt{python3 -m virtualenv /path/to/install/virtual/thingy}
instead.

\section{Fundamentals}
\label{sec:org832642e}
Before we can get to the fun stuff, there are a few matters regarding
GPGME's design which hold true whether you're dealing with the C code
directly
 or these Python bindings.

\subsection{No REST}
\label{sec:org3d694ba}
The first part of which is or will be fairly blatantly obvious upon
viewing the first example, but it's worth reiterating anyway.  That
being that this API is \emph{\textbf{not}} a REST API.  Nor indeed could it ever
be one.

Most, if not all, Python programmers (and not just Python programmers)
know how easy it is to work with a RESTful API.  In fact they've
become so popular that many other APIs attempt to emulate REST-like
behaviour as much as they are able.  Right down to the use of JSON
formatted output to facilitate the use of their API without having to
retrain developers.

This API does not do that.  It would not be able to do that and also
provide access to the entire C API on which it's built.  It does,
however, provide a very pythonic interface on top of the direct
bindings and it's this pythonic layer that this HOWTO deals with.

\subsection{Context}
\label{sec:org10e4004}
One of the reasons which prevents
 this API from being RESTful is that
most operations require more than one instruction to the API to
perform the task.  Sure, there are certain functions which can be
performed simultaneously, particularly if the result known or strongly
anticipated (e.g. selecting and encrypting to a key known to be in the
public keybox).

There are many more, however, which cannot be manipulated so readily:
they must be performed in a specific sequence and the result of one
operation has a direct bearing on the outcome of subsequent
operations.  Not merely by generating an error either.

When dealing with this type of persistent state on the web, full of
both the RESTful and REST-like, it's most commonly referred to as a
session.  In GPGME, however, it is called a context and every
operation type has one.

\section{Working with keys}
\label{sec:orgff114ca}
\subsection{Key selection}
\label{sec:org6589217}
Selecting keys to encrypt to or to sign with will be a common
occurrence when working with
 GPGMe and the means available for doing
so are quite simple.

They do depend on utilising a Context; however once the data is
recorded in another variable, that Context does not need to be the
same one which subsequent operations are performed.

The easiest way to select a specific key is by searching for that
key's key ID or fingerprint, preferably the full fingerprint without
any spaces in it.  A long key ID will probably be okay, but is not
advised and short key IDs are already a problem with some being
generated to match specific patterns.  It does not matter whether the
pattern is upper or lower case.

So this is the best method:

\begin{verbatim}
import gpg

k = gpg.Context().keylist(pattern="258E88DCBD3CD44D8E7AB43F6ECB6AF0DEADBEEF")
keys = list(k)
\end{verbatim}

This is passable and very likely to be common:

\begin{verbatim}
import gpg

k = gpg.Context().keylist(pattern="0x6ECB6AF0DEADBEEF")
keys = list(k)
\end{verbatim}

And this is a really bad idea:

\begin{verbatim}

```
import
 gpg

k = gpg.Context().keylist(pattern="0xDEADBEEF")
keys = list(k)
\end{verbatim}
```

Alternatively it may be that the intention is to create a list of keys
which all match a particular search string.  For instance all the
addresses at a particular domain, like this:

```
\begin{verbatim}
import gpg

ncsc = gpg.Context().keylist(pattern="ncsc.mil")
nsa = list(ncsc)
\end{verbatim}
```

```
\subsubsection{Counting keys}
\label{sec:org63a3d62}
```

Counting the number of keys in your public keybox (\texttt{pubring.kbx}), the
format which has superseded the old keyring format (\texttt{pubring.gpg} and
\texttt{secring.gpg}), or the number of secret keys is a very simple task.

```
\begin{verbatim}
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

print("""
 Number of secret keys:  {0}
 Number of public keys:  {1}
""".format(secnum, pubnum))
\end{verbatim}
```

NOTE:
 The \hyperref[sec:org3b53926]{Cython} introduction in the \hyperref[sec:org944cc00]{Advanced and Experimental}
section uses this same key counting code with Cython to demonstrate

some areas where Cython can improve performance even with the
bindings.  Users with large public keyrings or keyboxes, for instance,
should consider these options if they are comfortable with using
Cython.

\subsection{Get key}
\label{sec:org26adb2e}
An alternative method of getting a single key via its fingerprint is
available directly within a Context with \texttt{Context().get_key}.  This is
the preferred method of selecting a key in order to modify it, sign or
certify it and for obtaining relevant data about a single key as a
part of other functions; when verifying a signature made by that key,
for instance.

By default this method will select public keys, but it can select
secret keys as well.

This first example demonstrates selecting the current key of Werner
Koch, which is due
 to expire at the end of 2018:

\begin{verbatim}
import gpg

fingerprint = "80615870F5BAD690333686D0F2AD85AC1E42B367"
key = gpg.Context().get_key(fingerprint)
\end{verbatim}

Whereas this example demonstrates selecting the author's current key
with the \texttt{secret} key word argument set to \texttt{True}:

\begin{verbatim}
import gpg

fingerprint = "DB4724E6FA4286C92B4E55C4321E4E2373590E5D"
key = gpg.Context().get_key(fingerprint, secret=True)
\end{verbatim}

It is, of course, quite possible to select expired, disabled and
revoked keys with this function, but only to effectively display
information about those keys.

It is also possible to use both unicode or string literals and byte
literals with the fingerprint when getting a key in this way.

\subsection{Importing keys}

\label{sec:org1ad598a}
Importing keys is possible with the \texttt{key_import()} method and takes one argument which is a bytes literal object containing either the binary or ASCII armoured key data for one or more keys.

The following example retrieves one or more keys from the SKS keyservers via the web using the requests module. Since requests returns the content as a bytes literal object, we can then use that directly to import the resulting data into our keybox.

```
\begin{verbatim}
import gpg
import os.path
import requests

c = gpg.Context()
url = "https://sks-keyservers.net/pks/lookup"
pattern = input("Enter the pattern to search for key or user IDs: ")
payload = {"op": "get", "search": pattern}

r = requests.get(url, verify=True, params=payload)
result = c.key_import(r.content)

if result is not None and hasattr(result, "considered") is False:
   print(result)
elif result is not None and hasattr(result, "considered") is True:
   num_keys = len(result.imports)
   new_revs = result.new_revocations
   new_sigs = result.new_signatures
   new_subs = result.new_sub_keys
   new_uids = result.new_user_ids
   new_scrt = result.secret_imported
   nochange = result.unchanged
   print("""
  The total number of keys considered for import was:  {0}

    Number of keys revoked:  {1}
  Number of new signatures:  {2}
     Number of new subkeys:  {3}
    Number of new user IDs:  {4}
 Number of new secret keys:  {5}
  Number of unchanged keys:  {6}

 The key IDs for all considered keys were:
""".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scrt,
          nochange))
   for i in range(num_keys):
```

```
    print("{0}\n".format(result.imports[i].fpr))
else:
  pass
\end{verbatim}
```

NOTE: When searching for a key ID of any length or a fingerprint (without spaces), the SKS servers require the the leading \texttt{0x} indicative of hexadecimal be included. Also note that the old short key IDs (e.g. \texttt{0xDEADBEEF}) should no longer be used due to the relative ease by which such key IDs can be reproduced, as demonstrated by the Evil32 Project in 2014 (which was subsequently exploited in 2016).

Testing for whether a string in any given search is or may be a hexadecimal
value which may be missing the leading \texttt{0x} is a simple matter of using a try/except statement which attempts to convert the string as hex to an integer and then back to hex; then using that to search with. Raising a ValueError simply results in treating the string as a string. This is the method and logic utilised in the \texttt{import-keys-hkp.py} script (see below).

\subsubsection{Working with ProtonMail}
\label{sec:org27b0d6f}
Here is a variation on the example above which checks the constrained ProtonMail keyserver for ProtonMail public keys.

```
\begin{verbatim}
import gpg
import requests
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it.
""")

c = gpg.Context(armor=True)
url = "https://api.protonmail.ch/pks/lookup"
ksearch = []

if len(sys.argv) >= 2:
  keyterm = sys.argv[1]
else:
  keyterm = input("Enter the key ID, UID or search string: ")

if keyterm.count("@") == 2 and keyterm.startswith("@") is
```

```
 True:
   ksearch.append(keyterm[1:])
   ksearch.append(keyterm[1:])
   ksearch.append(keyterm[1:])
elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
   ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
   ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
   ksearch.append("{0}@pm.me".format(keyterm[1:]))
elif keyterm.count("@") == 0:
   ksearch.append("{0}@protonmail.com".format(keyterm))
   ksearch.append("{0}@protonmail.ch".format(keyterm))
   ksearch.append("{0}@pm.me".format(keyterm))
elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
   uidlist = keyterm.split("@")
   for uid in uidlist:
       ksearch.append("{0}@protonmail.com".format(uid))
       ksearch.append("{0}@protonmail.ch".format(uid))
       ksearch.append("{0}@pm.me".format(uid))
elif keyterm.count("@") > 2:
   uidlist = keyterm.split("@")
   for uid in uidlist:
       ksearch.append("{0}@protonmail.com".format(uid))
       ksearch.append("{0}@protonmail.ch".format(uid))
        ksearch.append("{0}@pm.me".format(uid))
else:
   ksearch.append(keyterm)

for k in ksearch:
   payload = {"op": "get", "search": k}
   try:
       r = requests.get(url, verify=True, params=payload)
       if r.ok is True:
           result = c.key_import(r.content)
       elif r.ok is False:
           result = r.content
   except Exception as e:
       result = None

   if result is not None and hasattr(result, "considered") is False:
       print("{0} for {1}".format(result.decode(), k))
   elif result is not None and hasattr(result, "considered") is True:
       num_keys = len(result.imports)
       new_revs = result.new_revocations
       new_sigs = result.new_signatures
       new_subs = result.new_sub_keys
       new_uids = result.new_user_ids
       new_scrt = result.secret_imported
       nochange = result.unchanged
```

```
        print("""
The total number of keys considered for import was:  {0}

With UIDs wholely or partially matching the
 following string:

        {1}

  Number of keys revoked:  {2}
Number of new signatures:  {3}
   Number of new subkeys:  {4}
  Number of new user IDs:  {5}
Number of new secret keys:  {6}
Number of unchanged keys:  {7}

The key IDs for all considered keys were:
""".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scrt,
           nochange))
        for i in range(num_keys):
            print(result.imports[i].fpr)
        print("")
    elif result is None:
        print(e)
\end{verbatim}
```

Both the above example, \href{../examples/howto/pmkey-import.py}{pmkey-import.py}, and a version which prompts
for an alternative GnuPG home directory, \href{../examples/howto/pmkey-import-alt.py}{pmkey-import-alt.py}, are available with the other examples and are executable scripts.

Note that while the ProtonMail servers are based on the SKS servers,
their server is related more to their API and is not feature complete
by comparison to the servers in the SKS pool.  One notable difference
being
 that the ProtonMail server does not permit non ProtonMail users
to update their own keys, which could be a vector for attacking
ProtonMail users who may not receive a key's revocation if it had been
compromised.

\subsubsection{Importing with HKP for Python}
\label{sec:org592d7ab}
Performing the same tasks with the \href{https://github.com/Selfnet/hkp4py}{hkp4py module} (available via PyPI)
is not too much different, but does provide a number of options of
benefit to end users.  Not least of which being the ability to perform
some checks on a key before importing it or not.  For instance it may
be the policy of a site or project to only import keys which have not
been revoked.  The hkp4py module permits such checks prior to the

importing of the keys found.

\begin{verbatim}

```
import gpg
import hkp4py
import sys

c = gpg.Context()
server = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")
results = []
keys = []

if len(sys.argv) > 2:
   pattern = " ".join(sys.argv[1:])
elif
 len(sys.argv) == 2:
   pattern = sys.argv[1]
else:
   pattern = input("Enter the pattern to search for keys or user IDs: ")


if pattern is not None:
   try:
      key = server.search(hex(int(pattern, 16)))
      keyed = True
   except ValueError as ve:
      key = server.search(pattern)
      keyed = False

   if key is not None:
      keys.append(key[0])
      if keyed is True:
         try:
            fob = server.search(pattern)
         except:
            fob = None
         if fob is not None:
            keys.append(fob[0])
      else:
         pass
   else:
      pass

   for logrus in pattern.split():
      try:
         key = server.search(hex(int(logrus, 16)))
         hexed = True
      except ValueError as ve:
```

```
            key = server.search(logrus)
            hexed = False

        if key is not None:
            keys.append(key[0])
            if hexed is True:
                try:

 fob = server.search(logrus)
                except:
                    fob = None
                if fob is not None:
                    keys.append(fob[0])
            else:
                pass
        else:
            pass


if len(keys) > 0:
    for key in keys:
        import_result = c.key_import(key.key_blob)
        results.append(import_result)

for result in results:
    if result is not None and hasattr(result, "considered") is False:
        print(result)
    elif result is not None and hasattr(result, "considered") is True:
        num_keys = len(result.imports)
        new_revs = result.new_revocations
        new_sigs = result.new_signatures
        new_subs = result.new_sub_keys
        new_uids = result.new_user_ids
        new_scrt = result.secret_imported
        nochange = result.unchanged
        print("""
The total number of keys considered for import was:  {0}

  Number of keys revoked:  {1}
Number of new signatures:  {2}
   Number of new subkeys:  {3}
  Number
 of new user IDs:  {4}
Number of new secret keys:  {5}
Number of unchanged keys:  {6}

The key IDs for all considered keys were:
""".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scrt,
```

```
        nochange))
    for i in range(num_keys):
        print(result.imports[i].fpr)
    print("")
  else:
    pass
\end{verbatim}
```

Since the hkp4py module handles multiple keys just as effectively as one (\texttt{keys} is a list of responses per matching key), the example above is able to do a little bit more with the returned data before anything is actually imported.

\subsubsection{Importing from ProtonMail with HKP for Python}
\label{sec:org3966a76}
Though this can provide certain benefits even when working with ProtonMail, the scope is somewhat constrained there due to the limitations of the ProtonMail keyserver.

For instance, searching the SKS keyserver pool for the term "gnupg" produces hundreds of results from any time the word appears in any part of
 a user ID.  Performing the same search on the ProtonMail keyserver returns zero results, even though there are at least two test accounts which include it as part of the username.

The cause of this discrepancy is the deliberate configuration of that server by ProtonMail to require an exact match of the full email address of the ProtonMail user whose key is being requested. Presumably this is intended to reduce breaches of privacy of their users as an email address must already be known before a key for that address can be obtained.

\begin{enumerate}
\item Import from ProtonMail via HKP for Python Example no. 1
\label{sec:org6cd15c3}
The following script is available with the rest of the examples under the somewhat less than original name, \texttt{pmkey-import-hkp.py}.

```
\begin{verbatim}
import gpg
import hkp4py
import os.path
import sys

print("""
```

```
This script searches the ProtonMail key server for the specified key and
imports it.

Usage:  pmkey-import-hkp.py [search strings]
""")

c
 = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None

if len(sys.argv) > 2:
   keyterms = sys.argv[1:]
elif len(sys.argv) == 2:
   keyterm = sys.argv[1]
   keyterms.append(keyterm)
else:
   key_term = input("Enter the key ID, UID or search string: ")
   keyterms = key_term.split()

for keyterm in keyterms:
   if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
       ksearch.append(keyterm[1:])
       ksearch.append(keyterm[1:])
       ksearch.append(keyterm[1:])
   elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
       ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
       ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
       ksearch.append("{0}@pm.me".format(keyterm[1:]))
   elif keyterm.count("@") == 0:
       ksearch.append("{0}@protonmail.com".format(keyterm))
       ksearch.append("{0}@protonmail.ch".format(keyterm))
        ksearch.append("{0}@pm.me".format(keyterm))
   elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
       uidlist = keyterm.split("@")
       for uid in uidlist:
           ksearch.append("{0}@protonmail.com".format(uid))
           ksearch.append("{0}@protonmail.ch".format(uid))
           ksearch.append("{0}@pm.me".format(uid))
   elif keyterm.count("@") > 2:
       uidlist = keyterm.split("@")
       for uid in uidlist:
           ksearch.append("{0}@protonmail.com".format(uid))
```

```
            ksearch.append("{0}@protonmail.ch".format(uid))
            ksearch.append("{0}@pm.me".format(uid))
    else:
        ksearch.append(keyterm)

for k in ksearch:
    print("Checking for key for: {0}".format(k))
    try:
        keys = server.search(k)
        if isinstance(keys, list) is True:
            for key in keys:
                allkeys.append(key)
                try:
                    import_result = c.key_import(key.key_blob)

 except Exception as e:
                    import_result = c.key_import(key.key)
        else:
            paradox.append(keys)
            import_result = None
    except Exception as e:
        import_result = None
    results.append(import_result)

for result in results:
    if result is not None and hasattr(result, "considered") is False:
        print("{0} for {1}".format(result.decode(), k))
    elif result is not None and hasattr(result, "considered") is True:
        num_keys = len(result.imports)
        new_revs = result.new_revocations
        new_sigs = result.new_signatures
        new_subs = result.new_sub_keys
        new_uids = result.new_user_ids
        new_scrt = result.secret_imported
        nochange = result.unchanged
        print("""
The total number of keys considered for import was:  {0}

With UIDs wholely or partially matching the following string:

        {1}

  Number of keys revoked:  {2}
Number of new signatures:  {3}
   Number of new subkeys:  {4}

  Number of new user IDs:  {5}
Number of new secret keys:  {6}
```

```
Number of unchanged keys:  {7}

The key IDs for all considered keys were:
""".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scrt,
         nochange))
      for i in range(num_keys):
          print(result.imports[i].fpr)
      print("")
   elif result is None:
      pass
\end{verbatim}


\item Import from ProtonMail via HKP for Python Example no. 2
\label{sec:org3b674e5}
Like its counterpart above, this script can also be found with the
rest of the examples, by the name pmkey-import-hkp-alt.py.

With this script a modicum of effort has been made to treat anything
passed as a \texttt{homedir} which either does not exist or which is not a
directory, as also being a pssible user ID to check for.  It's not
guaranteed to pick up on all such cases, but it should cover most of
them.

\begin{verbatim}
import gpg
import hkp4py
import os.path
import sys

print("""
This script searches the ProtonMail key server
 for the specified key and
imports it.  Optionally enables specifying a different GnuPG home directory.

Usage:  pmkey-import-hkp.py [homedir] [search string]
  or:  pmkey-import-hkp.py [search string]
""")

c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None
```

```
if len(sys.argv) > 3:
   homedir = sys.argv[1]
   keyterms = sys.argv[2:]
elif len(sys.argv) == 3:
   homedir = sys.argv[1]
   keyterm = sys.argv[2]
   keyterms.append(keyterm)
elif len(sys.argv) == 2:
   homedir = ""
   keyterm = sys.argv[1]
   keyterms.append(keyterm)
else:
   keyterm = input("Enter the key ID, UID or search string: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")
   keyterms.append(keyterm)

if len(homedir) == 0:
   homedir = None
   homeless = False

if homedir is not None:
   if homedir.startswith("~"):
      if os.path.exists(os.path.expanduser(homedir))
 is True:
         if os.path.isdir(os.path.expanduser(homedir)) is True:
            c.home_dir = os.path.realpath(os.path.expanduser(homedir))
         else:
            homeless = True
      else:
         homeless = True
   elif os.path.exists(os.path.realpath(homedir)) is True:
      if os.path.isdir(os.path.realpath(homedir)) is True:
         c.home_dir = os.path.realpath(homedir)
      else:
         homeless = True
   else:
      homeless = True

# First check to see if the homedir really is a homedir and if not, treat it as
# a search string.
if homeless is True:
   keyterms.append(homedir)
   c.home_dir = None
else:
   pass

for keyterm in keyterms:
   if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
```

```
        ksearch.append(keyterm[1:])
        ksearch.append(keyterm[1:])
        ksearch.append(keyterm[1:])
    elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
        ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
         ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
        ksearch.append("{0}@pm.me".format(keyterm[1:]))
    elif keyterm.count("@") == 0:
        ksearch.append("{0}@protonmail.com".format(keyterm))
        ksearch.append("{0}@protonmail.ch".format(keyterm))
        ksearch.append("{0}@pm.me".format(keyterm))
    elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
        uidlist = keyterm.split("@")
        for uid in uidlist:
            ksearch.append("{0}@protonmail.com".format(uid))
            ksearch.append("{0}@protonmail.ch".format(uid))
            ksearch.append("{0}@pm.me".format(uid))
    elif keyterm.count("@") > 2:
        uidlist = keyterm.split("@")
        for uid in uidlist:
            ksearch.append("{0}@protonmail.com".format(uid))
            ksearch.append("{0}@protonmail.ch".format(uid))
            ksearch.append("{0}@pm.me".format(uid))
    else:
        ksearch.append(keyterm)

for k in ksearch:
    print("Checking
 for key for: {0}".format(k))
    try:
        keys = server.search(k)
        if isinstance(keys, list) is True:
            for key in keys:
                allkeys.append(key)
                try:
                    import_result = c.key_import(key.key_blob)
                except Exception as e:
                    import_result = c.key_import(key.key)
        else:
            paradox.append(keys)
            import_result = None
    except Exception as e:
        import_result = None
    results.append(import_result)

for result in results:
    if result is not None and hasattr(result, "considered") is False:
        print("{0} for {1}".format(result.decode(), k))
```

```
   elif result is not None and hasattr(result, "considered") is True:
       num_keys = len(result.imports)
       new_revs = result.new_revocations
       new_sigs = result.new_signatures
       new_subs = result.new_sub_keys
       new_uids = result.new_user_ids
       new_scrt = result.secret_imported
        nochange = result.unchanged
       print("""
The total number of keys considered for import was:  {0}

With UIDs wholely or partially matching the following string:

       {1}

  Number of keys revoked:  {2}
Number of new signatures:  {3}
   Number of new subkeys:  {4}
  Number of new user IDs:  {5}
Number of new secret keys:  {6}
Number of unchanged keys:  {7}

The key IDs for all considered keys were:
""".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scrt,
          nochange))
       for i in range(num_keys):
           print(result.imports[i].fpr)
       print("")
   elif result is None:
       pass
\end{verbatim}
\end{enumerate}


\subsection{Exporting keys}
\label{sec:org4596a77}
Exporting keys remains a reasonably simple task, but has been
separated into three different functions for the OpenPGP cryptographic
engine.  Two of those functions are for exporting public keys and the
third is for exporting secret keys.


\subsubsection{Exporting
 public keys}
\label{sec:org873704f}
There are two methods of exporting public keys, both of which are very
similar to the other.  The default method, \texttt{key\_export()}, will export
a public key or keys matching a specified pattern as normal.  The
```

alternative, the \texttt{key_export_minimal()} method, will do the same thing
except producing a minimised output with extra signatures and third
party signatures or certifications removed.

```
\begin{verbatim}
import gpg
import os.path
import sys

print("""
This script exports one or more public keys.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = sys.argv[3]
elif len(sys.argv) == 3:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
   keyfile = sys.argv[1]
   logrus = input("Enter the UID matching the key(s) to export: ")
   homedir = input("Enter the
 GPG configuration directory path (optional): ")
else:
   keyfile = input("Enter the path and filename to save the secret key to: ")
   logrus = input("Enter the UID matching the key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
   if os.path.exists(os.path.expanduser(homedir)) is True:
       c.home_dir = os.path.expanduser(homedir)
   else:
       pass
elif os.path.exists(homedir) is True:
   c.home_dir = homedir
else:
   pass

try:
   result = c.key_export(pattern=logrus)
except:
   result = c.key_export(pattern=None)
```

```
if result is not None:
   with open(keyfile, "wb") as f:
       f.write(result)
else:
   pass
\end{verbatim}
```

It should be noted that the result will only return \texttt{None} when a search pattern has been entered, but has not matched any keys.  When the search pattern itself is set to \texttt{None} this triggers the exporting of the entire public keybox.

```
\begin{verbatim}
import
 gpg
import os.path
import sys

print("""
This script exports one or more public keys in minimised form.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = sys.argv[3]
elif len(sys.argv) == 3:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
   keyfile = sys.argv[1]
   logrus = input("Enter the UID matching the key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")
else:
   keyfile = input("Enter the path and filename to save the secret key to: ")
   logrus = input("Enter the UID matching the key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
   if os.path.exists(os.path.expanduser(homedir)) is True:
       c.home_dir = os.path.expanduser(homedir)
   else:
       pass
elif os.path.exists(homedir)
```

```
 is True:
   c.home_dir = homedir
else:
   pass

try:
   result = c.key_export_minimal(pattern=logrus)
except:
   result = c.key_export_minimal(pattern=None)

if result is not None:
   with open(keyfile, "wb") as f:
       f.write(result)
else:
   pass
\end{verbatim}
```

\subsubsection{Exporting secret keys}
\label{sec:org6c28d3d}
Exporting secret keys is, functionally, very similar to exporting
public keys; save for the invocation of \texttt{pinentry} via \texttt{gpg-agent} in
order to securely enter the key's passphrase and authorise the export.

The following example exports the secret key to a file which is then
set with the same permissions as the output files created by the
command line secret key export options.

```
\begin{verbatim}
import gpg
import os
import os.path
import sys

print("""
This script exports one or more secret keys.

The gpg-agent and pinentry are invoked to authorise the export.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
   keyfile
 = sys.argv[1]
   logrus = sys.argv[2]
   homedir = sys.argv[3]
elif len(sys.argv) == 3:
```

```
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
    keyfile = sys.argv[1]
    logrus = input("Enter the UID matching the secret key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")
else:
    keyfile = input("Enter the path and filename to save the secret key to: ")
    logrus = input("Enter the UID matching the secret key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
    homedir = None
elif homedir.startswith("~"):
    userdir = os.path.expanduser(homedir)
    if os.path.exists(userdir) is True:
        homedir = os.path.realpath(userdir)
    else:
        homedir = None
else:
    homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
    homedir =
 None
else:
    if os.path.isdir(homedir) is False:
        homedir = None
    else:
        pass

if homedir is not None:
    c.home_dir = homedir
else:
    pass

try:
    result = c.key_export_secret(pattern=logrus)
except:
    result = c.key_export_secret(pattern=None)

if result is not None:
    with open(keyfile, "wb") as f:
        f.write(result)
    os.chmod(keyfile, 0o600)
else:
    pass
```

\end{verbatim}

Alternatively the approach of the following script can be used. This longer example saves the exported secret key(s) in files in the GnuPG home directory, in addition to setting the file permissions as only readable and writable by the user. It also exports the secret key(s) twice in order to output both GPG binary (\texttt{.gpg}) and ASCII armoured (\texttt{.asc}) files.

\begin{verbatim}
```
import gpg
import os
import os.path
import subprocess
import sys

print("""
This script exports one or more secret keys as both ASCII armored and binary
file formats, saved in files within the
 user's GPG home directory.

The gpg-agent and pinentry are invoked to authorise the export.
""")

if sys.platform == "win32":
   gpgconfcmd = "gpgconf.exe --list-dirs homedir"
else:
   gpgconfcmd = "gpgconf --list-dirs homedir"

a = gpg.Context(armor=True)
b = gpg.Context()
c = gpg.Context()

if len(sys.argv) >= 4:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = sys.argv[3]
elif len(sys.argv) == 3:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
   keyfile = sys.argv[1]
   logrus = input("Enter the UID matching the secret key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")
else:
   keyfile = input("Enter the filename to save the secret key to: ")
   logrus = input("Enter the UID matching the secret key(s) to export: ")
```

```
    homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir)
 == 0:
    homedir = None
elif homedir.startswith("~"):
    userdir = os.path.expanduser(homedir)
    if os.path.exists(userdir) is True:
        homedir = os.path.realpath(userdir)
    else:
        homedir = None
else:
    homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
    homedir = None
else:
    if os.path.isdir(homedir) is False:
        homedir = None
    else:
        pass

if homedir is not None:
    c.home_dir = homedir
else:
    pass

if c.home_dir is not None:
    if c.home_dir.endswith("/"):
        gpgfile = "{0}{1}.gpg".format(c.home_dir, keyfile)
        ascfile = "{0}{1}.asc".format(c.home_dir, keyfile)
    else:
        gpgfile = "{0}/{1}.gpg".format(c.home_dir, keyfile)
        ascfile = "{0}/{1}.asc".format(c.home_dir, keyfile)
else:
    if os.path.exists(os.environ["GNUPGHOME"]) is True:
        hd = os.environ["GNUPGHOME"]
    else:
        try:
            hd = subprocess.getoutput(gpgconfcmd)
        except:
            process = subprocess.Popen(gpgconfcmd.split(),
                                       stdout=subprocess.PIPE)
            procom = process.communicate()
            if sys.version_info[0] == 2:
                hd = procom[0].strip()
            else:
                hd = procom[0].decode().strip()
```

```
   gpgfile = "{0}/{1}.gpg".format(hd, keyfile)
   ascfile = "{0}/{1}.asc".format(hd, keyfile)

try:
   a_result = a.key_export_secret(pattern=logrus)
   b_result = b.key_export_secret(pattern=logrus)
except:
   a_result = a.key_export_secret(pattern=None)
   b_result = b.key_export_secret(pattern=None)

if a_result is not None:
   with open(ascfile, "wb") as f:
       f.write(a_result)
   os.chmod(ascfile, 0o600)
else:
   pass

if b_result is not None:
   with open(gpgfile, "wb") as f:
       f.write(b_result)
   os.chmod(gpgfile, 0o600)
else:
   pass
\end{verbatim}
```

\subsubsection{Sending public keys to the SKS Keyservers}
\label{sec:org82d4958}
As with the previous section on importing
 keys, the \texttt{hkp4py} module
adds another option with exporting keys in order to send them to the
public keyservers.

The following example demonstrates how this may be done.

```
\begin{verbatim}
import gpg
import hkp4py
import os.path
import sys

print("""
This script sends one or more public keys to the SKS keyservers and is
essentially a slight variation on the export-key.py script.
""")

c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")
```

```
if len(sys.argv) > 2:
  logrus = " ".join(sys.argv[1:])
elif len(sys.argv) == 2:
  logrus = sys.argv[1]
else:
  logrus = input("Enter the UID matching the key(s) to send: ")

if len(logrus) > 0:
  try:
    export_result = c.key_export(pattern=logrus)
  except Exception as e:
    print(e)
    export_result = None
else:
  export_result = c.key_export(pattern=None)

if export_result is not None:
  try:
    try:
      send_result = server.add(export_result)
    except:
       send_result = server.add(export_result.decode())
    if send_result is not None:
      print(send_result)
    else:
      pass
  except Exception as e:
    print(e)
else:
  pass
\end{verbatim}
```

An expanded version of this script with additional functions for specifying an alternative homedir location is in the examples directory as \texttt{send-key-to-keyserver.py}.

The \texttt{hkp4py} module appears to handle both string and byte literal text data equally well, but the GPGME bindings deal primarily with byte literal data only and so this script sends in that format first, then tries the string literal form.

\section{Basic Functions}
\label{sec:orgb40b488}
The most frequently called features of any cryptographic library will be the most fundamental tasks for encryption software.  In this section we will look at how to programmatically encrypt data, decrypt

it, sign it and verify signatures.

\subsection{Encryption}
\label{sec:org3170365}
Encrypting
 is very straight forward.  In the first example below the
message, \texttt{text}, is encrypted to a single recipient's key.  In the
second example the message will be encrypted to multiple recipients.

\subsubsection{Encrypting to one key}
\label{sec:org8098c64}
Once the the Context is set the main issues with encrypting data is
essentially reduced to key selection and the keyword arguments
specified in the \texttt{gpg.Context().encrypt()} method.

Those keyword arguments are: \texttt{recipients}, a list of keys encrypted to
(covered in greater detail in the following section); \texttt{sign}, whether
or not to sign the plaintext data, see subsequent sections on signing
and verifying signatures below (defaults to \texttt{True}); \texttt{sink}, to write
results or partial results to a secure sink instead of returning it
(defaults to \texttt{None}); \texttt{passphrase}, only used when utilising symmetric
encryption (defaults to \texttt{None}); \texttt{always_trust}, used to override
 the
trust model settings for recipient keys (defaults to \texttt{False});
\texttt{add_encrypt_to}, utilises any preconfigured \texttt{encrypt-to} or
\texttt{default-key} settings in the user's \texttt{gpg.conf} file (defaults to
\texttt{False}); \texttt{prepare}, prepare for encryption (defaults to \texttt{False});
\texttt{expect_sign}, prepare for signing (defaults to \texttt{False}); \texttt{compress},
compresses the plaintext prior to encryption (defaults to \texttt{True}).

\begin{verbatim}
import gpg

a_key = "0x12345678DEADBEEF"
text = b"""Some text to test with.

Since the text in this case must be bytes, it is most likely that
the input form will be a separate file which is opened with "rb"
as this is the simplest method of obtaining the correct data format.
"""

c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext, result, sign_result = c.encrypt(text, recipients=rkey, sign=False)

with open("secret_plans.txt.asc", "wb") as afile:

```
    afile.write(ciphertext)
\end{verbatim}
```

Though this is even more likely to be used like this; with the
plaintext input read from a file, the recipient keys used for
encryption regardless of key trust status and the encrypted output
also encrypted to any preconfigured keys set in the \texttt{gpg.conf} file:

```
\begin{verbatim}
import gpg

a_key = "0x12345678DEADBEEF"

with open("secret_plans.txt", "rb") as afile:
   text = afile.read()

c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext, result, sign_result = c.encrypt(text, recipients=rkey, sign=True,
                                    always_trust=True,
                                    add_encrypt_to=True)

with open("secret_plans.txt.asc", "wb") as afile:
   afile.write(ciphertext)
\end{verbatim}
```

If the \texttt{recipients} parameter is empty then the plaintext is encrypted
symmetrically.  If no \texttt{passphrase} is supplied as a parameter or via a
callback registered with
 the \texttt{Context()} then an out-of-band prompt
for the passphrase via pinentry will be invoked.

```
\subsubsection{Encrypting to multiple keys}
\label{sec:orgdcf6e47}
```

Encrypting to multiple keys essentially just expands upon the key
selection process and the recipients from the previous examples.

The following example encrypts a message (\texttt{text}) to everyone with an
email address on the \texttt{gnupg.org} domain,\footnote{You probably don't really want to do this.  Searching the
keyservers for "gnupg.org" produces over 400 results, the majority of
which aren't actually at the gnupg.org domain, but just included a
comment regarding the project in their key somewhere.} but does \emph{not} encrypt
to a default key or other key which is configured to normally encrypt
to.

```
\begin{verbatim}
import gpg
```

```
text = b"""Oh look, another test message.

The same rules apply as with the previous example and more likely
than not, the message will actually be drawn from reading the
contents
 of a file or, maybe, from entering data at an input()
prompt.

Since the text in this case must be bytes, it is most likely that
the input form will be a separate file which is opened with "rb"
as this is the simplest method of obtaining the correct data
format.
"""

c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org", secret=False))
logrus = []

for i in range(len(rpattern)):
   if rpattern[i].can_encrypt == 1:
       logrus.append(rpattern[i])

ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
                                    sign=False, always_trust=True)

with open("secret_plans.txt.asc", "wb") as afile:
   afile.write(ciphertext)
\end{verbatim}

All it would take to change the above example to sign the message
and also encrypt the message to any configured default keys would
be to change the \texttt{c.encrypt} line to this:

\begin{verbatim}
ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,

                          always_trust=True,
                                    add_encrypt_to=True)
\end{verbatim}

The only keyword arguments requiring modification are those for which
the default values are changing.  The default value of \texttt{sign} is
\texttt{True}, the default of \texttt{always\_trust} is \texttt{False}, the default of
\texttt{add\_encrypt\_to} is \texttt{False}.

If \texttt{always\_trust} is not set to \texttt{True} and any of the recipient keys
are not trusted (e.g. not signed or locally signed) then the
```

encryption will raise an error.  It is possible to mitigate this
somewhat with something more like this:

```
\begin{verbatim}
import gpg

with open("secret_plans.txt.asc", "rb") as afile:
   text = afile.read()

c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org", secret=False))
logrus = []

for i in range(len(rpattern)):
   if rpattern[i].can_encrypt == 1:
       logrus.append(rpattern[i])

   try:
       ciphertext, result,
 sign_result = c.encrypt(text, recipients=logrus,
                                        add_encrypt_to=True)
   except gpg.errors.InvalidRecipients as e:
       for i in range(len(e.recipients)):
           for n in range(len(logrus)):
               if logrus[n].fpr == e.recipients[i].fpr:
                   logrus.remove(logrus[n])
               else:
                   pass
       try:
           ciphertext, result, sign_result = c.encrypt(text,
                                          recipients=logrus,
                                          add_encrypt_to=True)
           with open("secret_plans.txt.asc", "wb") as afile:
               afile.write(ciphertext)
       except:
           pass
\end{verbatim}
```

This will attempt to encrypt to all the keys searched for, then remove
invalid recipients if it fails and try again.

```
\subsection{Decryption}
\label{sec:org1282b3d}
```

Decrypting something encrypted to a key in one's secret
 keyring is
fairly straight forward.

In this example code, however, preconfiguring either \texttt{gpg.Context()}
or \texttt{gpg.core.Context()} as \texttt{c} is unnecessary because there is no need
to modify the Context prior to conducting the decryption and since the
Context is only used once, setting it to \texttt{c} simply adds lines for no
gain.

```
\begin{verbatim}
import gpg

ciphertext = input("Enter path and filename of encrypted file: ")
newfile = input("Enter path and filename of file to save decrypted data to: ")

with open(ciphertext, "rb") as cfile:
  try:
      plaintext, result, verify_result = gpg.Context().decrypt(cfile)
  except gpg.errors.GPGMEError as e:
      plaintext = None
      print(e)

if plaintext is not None:
  with open(newfile, "wb") as nfile:
    nfile.write(plaintext)
  else:
      pass
\end{verbatim}
```

The data available in \texttt{plaintext} in this example is the decrypted
content as a byte object, the recipient key IDs and algorithms
in
\texttt{result} and the results of verifying any signatures of the data in
\texttt{verify_result}.

If \texttt{gpg.Context().decrypt(cfile, verify=False)} is called instead,
then \texttt{verify_result} will be returned as \texttt{None} and the rest remains
as described here.

\subsection{Signing text and files}
\label{sec:org59f1262}
The following sections demonstrate how to specify keys to sign with.

\subsubsection{Signing key selection}
\label{sec:org909cb3c}
By default GPGME and the Python bindings will use the default key
configured for the user invoking the GPGME API.  If there is no
default key specified and there is more than one secret key available
it may be necessary to specify the key or keys with which to sign

messages and files.

\begin{verbatim}
import gpg

logrus = input("Enter the email address or string to match signing keys to: ")
hancock = gpg.Context().keylist(pattern=logrus, secret=True)
sig_src = list(hancock)
\end{verbatim}

The signing examples in the
following sections include the explicitly
designated \texttt{signers} parameter in two of the five examples; once where
the resulting signature would be ASCII armoured and once where it
would not be armoured.

While it would be possible to enter a key ID or fingerprint here to
match a specific key, it is not possible to enter two fingerprints and
match two keys since the patten expects a string, bytes or None and
not a list.  A string with two fingerprints won't match any single
key.

\subsubsection{Normal or default signing messages or files}
\label{sec:org6ee259d}
The normal or default signing process is essentially the same as is
most often invoked when also encrypting a message or file.  So when
the encryption component is not utilised, the result is to produce an
encoded and signed output which may or may not be ASCII armoured and
which may or may not also be compressed.

By default compression will be used unless GnuPG detects that the
plaintext is already compressed.  ASCII armouring
will be determined
according to the value of \texttt{gpg.Context().armor}.

The compression algorithm is selected in much the same way as the
symmetric encryption algorithm or the hash digest algorithm is when
multiple keys are involved; from the preferences saved into the key
itself or by comparison with the preferences with all other keys
involved.

\begin{verbatim}
import gpg

text0 = """Declaration of ... something.

"""

```
text = text0.encode()

c = gpg.Context(armor=True, signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.asc", "w") as afile:
   afile.write(signed_data.decode())
\end{verbatim}
```

Though everything in this example is accurate, it is more likely that reading the input data from another file and writing the result to a new file will be performed more like the way it is done in the next example.  Even if the output format is ASCII armoured.

```
\begin{verbatim}
import gpg

with open("/path/to/statement.txt",
 "rb") as tfile:
   text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.sig", "wb") as afile:
   afile.write(signed_data)
\end{verbatim}
```

\subsubsection{Detached signing messages and files}
\label{sec:org51049d4}

Detached signatures will often be needed in programmatic uses of GPGME, either for signing files (e.g. tarballs of code releases) or as a component of message signing (e.g. PGP/MIME encoded email).

```
\begin{verbatim}
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context(armor=True)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.asc", "w") as afile:
   afile.write(signed_data.decode())
```

\end{verbatim}

As with normal signatures, detached signatures are best handled as
byte literals, even when the output is ASCII armoured.

\begin{verbatim}
import gpg

with open("/path/to/statement.txt",
 "rb") as tfile:
   text = tfile.read()

c = gpg.Context(signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.sig", "wb") as afile:
   afile.write(signed_data)
\end{verbatim}

\subsubsection{Clearsigning messages or text}
\label{sec:orgf528a20}
Though PGP/in-line messages are no longer encouraged in favour of
PGP/MIME, there is still sometimes value in utilising in-line
signatures.  This is where clear-signed messages or text is of value.

\begin{verbatim}
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)

with open("/path/to/statement.txt.asc", "w") as afile:
   afile.write(signed_data.decode())
\end{verbatim}

In spite of the appearance of a clear-signed message, the data handled
by GPGME in signing it must still be byte literals.

\begin{verbatim}
import gpg

with open("/path/to/statement.txt",

```
 "rb") as tfile:
   text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)

with open("/path/to/statement.txt.asc", "wb") as afile:
   afile.write(signed_data)
\end{verbatim}
```

\subsection{Signature verification}
\label{sec:org6cd81af}
Essentially there are two principal methods of verification of a signature. The first of these is for use with the normal or default signing method and for clear-signed messages. The second is for use with files and data with detached signatures.

The following example is intended for use with the default signing method where the file was not ASCII armoured:

```
\begin{verbatim}
import gpg
import time

filename = "statement.txt"
gpg_file = "statement.txt.gpg"

c = gpg.Context()

try:
   data, result = c.verify(open(gpg_file))
   verified = True
except gpg.errors.BadSignatures as e:
   verified = False
   print(e)

if verified is True:
   for i in range(len(result.signatures)):

      sign = result.signatures[i]
       print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
         time.ctime(sign.timestamp)))
else:
```

```
   pass
\end{verbatim}
```

Whereas this next example, which is almost identical would work with
normal ASCII armoured files and with clear-signed files:

```
\begin{verbatim}
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
   data, result = c.verify(open(asc_file))
   verified = True
except gpg.errors.BadSignatures as e:
   verified = False
   print(e)

if verified is True:
   for i in range(len(result.signatures)):
       sign = result.signatures[i]
       print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
          time.ctime(sign.timestamp)))
else:
   pass
\end{verbatim}
```

In both of the previous examples it is also possible to compare the
original data that was signed
 against the signed data in \texttt{data} to see
if it matches with something like this:

```
\begin{verbatim}
with open(filename, "rb") as afile:
   text = afile.read()

if text == data:
   print("Good signature.")
else:
   pass
```

\end{verbatim}

The following two examples, however, deal with detached signatures.
With his method of verification the data that was signed does not get
returned since it is already being explicitly referenced in the first
argument of \texttt{c.verify}.  So \texttt{data} is \texttt{None} and only the information
in \texttt{result} is available.

```
\begin{verbatim}
import gpg
import time

filename = "statement.txt"
sig_file = "statement.txt.sig"

c = gpg.Context()

try:
   data, result = c.verify(open(filename), open(sig_file))
   verified = True
except gpg.errors.BadSignatures as e:
   verified = False
   print(e)

if verified is True:
   for i in range(len(result.signatures)):
       sign = result.signatures[i]
       print("""Good signature from:
{0}
with
 key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
          time.ctime(sign.timestamp)))
else:
   pass
\end{verbatim}

\begin{verbatim}
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
```

```
   data, result = c.verify(open(filename), open(asc_file))
   verified = True
except gpg.errors.BadSignatures as e:
   verified = False
   print(e)

if verified is True:
   for i in range(len(result.signatures)):
      sign = result.signatures[i]
      print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
         time.ctime(sign.timestamp)))
else:
   pass
\end{verbatim}
```

\section{Creating keys and subkeys}
\label{sec:org754c6df}
The one thing, aside from GnuPG itself, that GPGME depends on, of course, is the keys themselves. So it is necessary to be able to generate them and modify them by adding subkeys, revoking or disabling them, sometimes
deleting them and doing the same for user IDs.

In the following examples a key will be created for the world's greatest secret agent, Danger Mouse. Since Danger Mouse is a secret agent he needs to be able to protect information to \texttt{SECRET} level clearance, so his keys will be 3072-bit keys.

The pre-configured \texttt{gpg.conf} file which sets cipher, digest and other preferences contains the following configuration parameters:

```
\begin{verbatim}
expert
allow-freeform-uid
allow-secret-key-import
trust-model tofu+pgp
tofu-default-policy unknown
enable-large-rsa
enable-dsa2
cert-digest-algo SHA512
default-preference-list TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128 AES
BLOWFISH IDEA CAST5 3DES SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1 ZLIB BZIP2 ZIP
Uncompressed
```

```
personal-cipher-preferences TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128 AES
BLOWFISH IDEA CAST5 3DES
personal-digest-preferences SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1
personal-compress-preferences
 ZLIB BZIP2 ZIP Uncompressed
\end{verbatim}
```

\subsection{Primary key}
\label{sec:org0185c23}
Generating a primary key uses the \texttt{create_key} method in a Context.
It contains multiple arguments and keyword arguments, including:
\texttt{userid}, \texttt{algorithm}, \texttt{expires_in}, \texttt{expires}, \texttt{sign}, \texttt{encrypt},
\texttt{certify}, \texttt{authenticate}, \texttt{passphrase} and \texttt{force}. The defaults for
all of those except \texttt{userid}, \texttt{algorithm}, \texttt{expires_in}, \texttt{expires} and
\texttt{passphrase} is \texttt{False}. The defaults for \texttt{algorithm} and
\texttt{passphrase} is \texttt{None}. The default for \texttt{expires_in} is \texttt{0}. The
default for \texttt{expires} is \texttt{True}. There is no default for \texttt{userid}.

If \texttt{passphrase} is left as \texttt{None} then the key will not be generated
with a passphrase, if \texttt{passphrase} is set to a string then that will
be the passphrase and if
 \texttt{passphrase} is set to \texttt{True} then gpg-agent
will launch pinentry to prompt for a passphrase. For the sake of
convenience, these examples will keep \texttt{passphrase} set to \texttt{None}.

```
\begin{verbatim}
import gpg

c = gpg.Context()

c.home_dir = "~/.gnupg-dm"
userid = "Danger Mouse <dm@secret.example.net>"

dmkey = c.create_key(userid, algorithm="rsa3072", expires_in=31536000,
                 sign=True, certify=True)
\end{verbatim}
```

One thing to note here is the use of setting the \texttt{c.home_dir}
parameter. This enables generating the key or keys in a different
location. In this case to keep the new key data created for this
example in a separate location rather than adding it to existing and
active key store data. As with the default directory, \texttt{\textasciitilde{}/.gnupg}, any
temporary or separate directory needs the permissions set to only
permit access by the directory owner. On posix systems this means
setting the directory permissions to
 700.

The \texttt{temp-homedir-config.py} script in the HOWTO examples directory
will create an alternative homedir with these configuration options
already set and the correct directory and file permissions.

The successful generation of the key can be confirmed via the returned
\texttt{GenkeyResult} object, which includes the following data:

```
\begin{verbatim}
print("""
Fingerprint:  {0}
Primary Key:  {1}
 Public Key:  {2}
 Secret Key:  {3}
Sub Key:  {4}
User IDs:  {5}
""".format(dmkey.fpr, dmkey.primary, dmkey.pubkey, dmkey.seckey, dmkey.sub,
        dmkey.uid))
\end{verbatim}
```

Alternatively the information can be confirmed using the command line
program:

```
\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx
----------------------
sec   rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
     177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid           [ultimate] Danger Mouse <dm@secret.example.net>

bash-4.4$
\end{verbatim}
```

As with generating keys manually,
 to preconfigure expanded preferences
for the cipher, digest and compression algorithms, the \texttt{gpg.conf} file
must contain those details in the home directory in which the new key
is being generated.  I used a cut down version of my own \texttt{gpg.conf}
file in order to be able to generate this:

```
\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm --edit-key 177B7C25DB99745EE2EE13ED026D2F19E99E63AA showpref
quit
Secret key is available.

sec  rsa3072/026D2F19E99E63AA
    created: 2018-03-15  expires: 2019-03-15  usage: SC
    trust: ultimate      validity: ultimate
```

```
[ultimate] (1). Danger Mouse <dm@secret.example.net>

[ultimate] (1). Danger Mouse <dm@secret.example.net>
    Cipher: TWOFISH, CAMELLIA256, AES256, CAMELLIA192, AES192, CAMELLIA128, AES, BLOWFISH,
IDEA, CAST5, 3DES
    Digest: SHA512, SHA384, SHA256, SHA224, RIPEMD160, SHA1
    Compression: ZLIB, BZIP2, ZIP, Uncompressed
    Features: MDC, Keyserver no-modify

bash-4.4$
\end{verbatim}


\subsection{Subkeys}
\label{sec:org5e2acbc}
Adding
 subkeys to a primary key is fairly similar to creating the
primary key with the \texttt{create\_subkey} method.  Most of the arguments
are the same, but not quite all.  Instead of the \texttt{userid} argument
there is now a \texttt{key} argument for selecting which primary key to add
the subkey to.

In the following example an encryption subkey will be added to the
primary key.  Since Danger Mouse is a security conscious secret agent,
this subkey will only be valid for about six months, half the length
of the primary key.

\begin{verbatim}
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

key = c.get_key(dmkey.fpr, secret=True)
dmsub = c.create_subkey(key, algorithm="rsa3072", expires_in=15768000,
                        encrypt=True)
\end{verbatim}

As with the primary key, the results here can be checked with:

\begin{verbatim}
print("""
Fingerprint:  {0}
Primary Key:  {1}
 Public Key:  {2}
 Secret Key:  {3}
Sub Key:  {4}
User IDs:  {5}
```

```
""".format(dmsub.fpr,
 dmsub.primary, dmsub.pubkey, dmsub.seckey, dmsub.sub,
        dmsub.uid))
\end{verbatim}
```

As well as on the command line with:

```
\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx
----------------------
sec   rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
    177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid          [ultimate] Danger Mouse <dm@secret.example.net>
ssb   rsa3072 2018-03-15 [E] [expires: 2018-09-13]

bash-4.4$
\end{verbatim}
```

```
\subsection{User IDs}
\label{sec:org4869c58}
\subsubsection{Adding User IDs}
\label{sec:orgebb13ca}
By comparison to creating primary keys and subkeys, adding a new user
ID to an existing key is much simpler.  The method used to do this is
\texttt{key\_add\_uid} and the only arguments it takes are for the \texttt{key} and
the new \texttt{uid}.

\begin{verbatim}
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid
 = "Danger Mouse <danger.mouse@secret.example.net>"

c.key_add_uid(key, uid)
\end{verbatim}
```

Unsurprisingly the result of this is:

```
\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx
```

```
----------------------
sec   rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
      177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid           [ultimate] Danger Mouse <danger.mouse@secret.example.net>
uid           [ultimate] Danger Mouse <dm@secret.example.net>
ssb   rsa3072 2018-03-15 [E] [expires: 2018-09-13]

bash-4.4$
\end{verbatim}


\subsubsection{Revoking User IDs}
\label{sec:org1683695}
Revoking a user ID is a fairly similar process, except that it uses
the \texttt{key\_revoke\_uid} method.

\begin{verbatim}
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid = "Danger Mouse <danger.mouse@secret.example.net>"

c.key_revoke_uid(key, uid)
\end{verbatim}


\subsection{Key certification}
\label{sec:orgf431bf8}
Since
 key certification is more frequently referred to as key signing,
the method used to perform this function is \texttt{key\_sign}.

The \texttt{key\_sign} method takes four arguments: \texttt{key}, \texttt{uids},
\texttt{expires\_in} and \texttt{local}.  The default value of \texttt{uids} is \texttt{None} and
which results in all user IDs being selected.  The default value of
both \texttt{expires\_in} and \texttt{local} is \texttt{False}; which results in the
signature never expiring and being able to be exported.

The \texttt{key} is the key being signed rather than the key doing the
signing.  To change the key doing the signing refer to the signing key
selection above for signing messages and files.

If the \texttt{uids} value is not \texttt{None} then it must either be a string to
match a single user ID or a list of strings to match multiple user
```

IDs.  In this case the matching of those strings must be precise and
it is case sensitive.

To sign Danger
 Mouse's key for just the initial user ID with a
signature which will last a little over a month, do this:

```
\begin{verbatim}
import gpg

c = gpg.Context()
uid = "Danger Mouse <dm@secret.example.net>"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
c.key_sign(key, uids=uid, expires_in=2764800)
\end{verbatim}
```

```
\subsubsection{Verifying key certifications}
\label{sec:org87abdd3}
\begin{verbatim}
import gpg
import time

c = gpg.Context()
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
keys = list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
   for sig in user.signatures:
       print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
            sig.uid)
\end{verbatim}
```

Which for Danger Mouse displays the following:

```
\begin{verbatim}
0x92E3F6115435C65A  Thu Mar 15 13:17:44 2018  Danger Mouse <dm@secret.example.net>
0x321E4E2373590E5D  Mon Nov 26 12:46:05 2018  Ben McGinnes <ben@adversary.org>
\end{verbatim}
```

The
 two key signatures listed are for the self-certification of Danger
Mouse's key made when the key was created in March, 2018; and the
second is a signature made by the author and set to expire at the end
of the year.  Note that the second signature was made with the

following code (including the preceding code to display the output of
the certifications or key signatures):

```
\begin{verbatim}
import gpg
import math
import pendulum
import time

hd = "/home/dm/.gnupg"
c = gpg.Context()
d = gpg.Context(home_dir=hd)
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
dmuid = "Danger Mouse <dm@secret.example.net>"
dkeys = list(c.keylist(pattern=dmuid))
dmkey = dkeys[0]

c.key_import(d.key_export(pattern=None))

tp = pendulum.period(pendulum.now(tz="local"), pendulum.datetime(2019, 1, 1))
ts = tp.total_seconds()
total_secs = math.ceil(ts)
c.key_sign(dmkey, uids=dmuid, expires_in=total_secs)

d.key_import(c.key_export(pattern=dmuid))
keys = list(c.keylist(pattern=dmuid,
 mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
   for sig in user.signatures:
       print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
             sig.uid)
\end{verbatim}
```

Note that this final code block includes the use of a module which is
\emph{not} part of Python's standard library, the \href{https://pendulum.eustace.io/}{pendulum module}. Unlike
the standard datetime module, pendulum makes working with dates and
times significantly easier in Python; just as the requests module
makes working with HTTP and HTTPS easier than the builtin modules do.

Though neither requests nor pendulum are required modules for using
the GPGME Python bindings, they are both highly recommended more
generally.

\section{Advanced or Experimental Use Cases}
\label{sec:org944cc00}

\subsection{C plus Python plus SWIG plus Cython}
\label{sec:org3b53926}
In spite of the apparent incongruence of using Python bindings to a C
interface only to generate
more C from the Python; it is in fact quite
possible to use the GPGME bindings with \href{http://docs.cython.org/en/latest/index.html}{Cython}. Though in many cases
the benefits may not be obvious since the most computationally
intensive work never leaves the level of the C code with which GPGME
itself is interacting with.

Nevertheless, there are some situations where the benefits are
demonstrable. One of the better and easier examples being the one of
the early examples in this HOWTO, the \hyperref[sec:org63a3d62]{key counting} code. Running that
example as an executable Python script, \texttt{keycount.py} (available in
the \texttt{examples/howto/} directory), will take a noticeable amount of time
to run on most systems where the public keybox or keyring contains a
few thousand public keys.

Earlier in the evening, prior to starting this section, I ran that
script on my laptop; as I tend to do periodically and timed it using
\texttt{time} utility, with the following results:

\begin{verbatim}
bash-4.4$
 time keycount.py

Number of secret keys:  23
Number of public keys:  12112


real 11m52.945s
user 0m0.913s
sys 0m0.752s

bash-4.4$
\end{verbatim}

Sometime after that I imported another key and followed it with a
little test of Cython. This test was kept fairly basic, essentially
lifting the material from the \href{http://docs.cython.org/en/latest/src/tutorial/cython_tutorial.html}{Cython Basic Tutorial} to demonstrate
compiling Python code to C. The first step was to take the example
key counting code quoted previously, essentially from the importing of
the \texttt{gpg} module to the end of the script:

\begin{verbatim}
import gpg

```
c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

print("""
   Number of secret keys:  {0}
   Number of public keys:  {1}

""".format(secnum, pubnum))
\end{verbatim}
```

Save
 that into a file called \texttt{keycount.pyx} and then create a
\texttt{setup.py} file which contains this:

```
\begin{verbatim}
from distutils.core import setup
from Cython.Build import cythonize

setup(
   ext_modules = cythonize("keycount.pyx")
)
\end{verbatim}
```

Compile it:

```
\begin{verbatim}
bash-4.4$ python setup.py build_ext --inplace
bash-4.4$
\end{verbatim}
```

Then run it in a similar manner to \texttt{keycount.py}:

```
\begin{verbatim}
bash-4.4$ time python3.7 -c "import keycount"

Number of secret keys:  23
Number of public keys:  12113


real 6m47.905s
```

user 0m0.785s
sys 0m0.331s

bash-4.4$
\end{verbatim}

Cython turned \texttt{keycount.pyx} into an 81KB \texttt{keycount.o} file in the
\texttt{build/} directory, a 24KB \texttt{keycount.cpython-37m-darwin.so} file to be
imported into Python 3.7 and a 113KB \texttt{keycount.c} generated C source
code file of nearly three thousand lines. Quite a bit bigger than the
314 bytes of the \texttt{keycount.pyx} file or the full 1,452 bytes
of the
full executable \texttt{keycount.py} example script.

On the other hand it ran in nearly half the time; taking 6 minutes and
47.905 seconds to run. As opposed to the 11 minutes and 52.945 seconds
which the CPython script alone took.

The \texttt{keycount.pyx} and \texttt{setup.py} files used to generate this example
have been added to the \texttt{examples/howto/advanced/cython/} directory
The example versions include some additional options to annotate the
existing code and to detect Cython's use. The latter comes from the
\href{http://docs.cython.org/en/latest/src/tutorial/pure.html\#magic-attributes-within-the-pxd}{Magic Attributes}
section of the Cython documentation.

\section{Miscellaneous extras and work-arounds}
\label{sec:orgd72f7de}
Most of the things in the following sections are here simply because
there was no better place to put them, even though some are only
peripherally related to the GPGME Python bindings. Some are also
workarounds for functions not integrated
with GPGME as yet. This is
especially true of the first of these, dealing with \hyperref[sec:org83f4d00]{group lines}.

\subsection{Group lines}
\label{sec:org83f4d00}
There is not yet an easy way to access groups configured in the
gpg.conf file from within GPGME. As a consequence these central
groupings of keys cannot be shared amongst multiple programs, such as
MUAs readily.

The following code, however, provides a work-around for obtaining this
information in Python.

\begin{verbatim}
import subprocess

```
import sys

if sys.platform == "win32":
   gpgconfcmd = "gpgconf.exe --list-options gpg"
else:
   gpgconfcmd = "gpgconf --list-options gpg"

process = subprocess.Popen(gpgconfcmd.split(), stdout=subprocess.PIPE)
procom = process.communicate()

if sys.version_info[0] == 2:
   lines = procom[0].splitlines()
else:
   lines = procom[0].decode().splitlines()

for line in lines:
   if line.startswith("group") is True:
       break

groups = line.split(":")[-1].replace("", "").split(',')

group_lines
 = []
group_lists = []

for i in range(len(groups)):
   group_lines.append(groups[i].split("="))
   group_lists.append(groups[i].split("="))

for i in range(len(group_lists)):
   group_lists[i][1] = group_lists[i][1].split()
\end{verbatim}
```

The result of that code is that \texttt{group_lines} is a list of lists where \texttt{group_lines[i][0]} is the name of the group and \texttt{group_lines[i][1]} is the key IDs of the group as a string.

The \texttt{group_lists} result is very similar in that it is a list of lists.  The first part, \texttt{group_lists[i][0]} matches \texttt{group_lines[i][0]} as the name of the group, but \texttt{group_lists[i][1]} is the key IDs of the group as a list.

A demonstration of using the \texttt{groups.py} module is also available in the form of the executable \texttt{mutt-groups.py} script.  This second script reads all the group entries in a user's \texttt{gpg.conf} file and converts them into crypt-hooks suitable for use
 with the Mutt and
Neomutt mail clients.

\subsection{Keyserver access for Python}
\label{sec:org5ad99aa}
The \href{https://github.com/Selfnet/hkp4py}{hkp4py} module by Marcel Fest was originally a port of the old
\href{https://github.com/dgladkov/python-hkp}{python-hkp} module from Python 2 to Python 3 and updated to use the
\href{http://docs.python-requests.org/en/latest/index.html}{requests} module instead. It has since been modified to provide
support for Python 2.7 as well and is available via PyPI.

Since it rewrites the \texttt{hkp} protocol prefix as \texttt{http} and \texttt{hkps} as
\texttt{https}, the module is able to be used even with servers which do not
support the full scope of keyserver functions.\footnote{Such as with ProtonMail servers. This also means that
restricted servers which only advertise either HTTP or HTTPS end
points and not HKP or HKPS end points must still be identified as as
HKP or HKPS within the Python Code. The \texttt{hkp4py} module will rewrite
these
appropriately when the connection is made to the server.} It also works quite
readily when incorporated into a \hyperref[sec:org3b53926]{Cython} generated and compiled version
of any code.

\subsubsection{Key import format}
\label{sec:org1e47c97}
The hkp4py module returns key data via requests as string literals
(\texttt{r.text}) instead of byte literals (\texttt{r.content}). This means that
the retrurned key data must be encoded to UTF-8 when importing that
key material using a \texttt{gpg.Context().key_import()} method.

For this reason an alternative method has been added to the \texttt{search}
function of \texttt{hkp4py.KeyServer()} which returns the key in the correct
format as expected by \texttt{key_import}. When importing using this module,
it is now possible to import with this:

\begin{verbatim}
for key in keys:
  if key.revoked is False:
      gpg.Context().key_import(key.key_blob)
  else:
      pass
\end{verbatim}

Without that recent addition it would
have been necessary to encode
the contents of each \texttt{hkp4py.KeyServer().search()[i].key} in
\texttt{hkp4py.KeyServer().search()} before trying to import it.

An example of this is included in the \hyperref[sec:org1ad598a]{Importing Keys} section of this HOWTO and the corresponding executable version of that example is available in the \texttt{lang/python/examples/howto} directory as normal; the executable version is the \texttt{import-keys-hkp.py} file.

\subsection{GPGME version checking}
\label{sec:org18b8ef8}
For various reasons it may be necessary to check which version of GPGME the bindings have been built against; including whether a minimum required version of GPGME is in use.

For the most part the \texttt{gpg.version.versionstr} and \texttt{gpg.version.versionlist} methods have been quite sufficient. The former returns the same string as \texttt{gpgme-config -{}-version}, while the latter returns the major, minor and patch values in a list.

To check if the installed bindings
have actually been built against
the current installed libgpgme version, this check can be performed:

\begin{verbatim}
import gpg
import subprocess
import sys

gpgme_version_call = subprocess.Popen(["gpgme-config", "--version"],
                                      stdout=subprocess.PIPE,
                                      stderr=subprocess.PIPE)
gpgme_version_str = gpgme_version_call.communicate()

if sys.version_info[0] == 2:
  gpgme_version = gpgme_version_str[0].strip()
elif sys.version_info[0] >= 3:
  gpgme_version = gpgme_version_str[0].decode().strip()
else:
  gpgme_version = None

if gpgme_version is not None:
  if gpgme_version == gpg.version.versionstr:
    print("The GPGME Python bindings match libgpgme.")
  else:
    print("The GPGME Python bindings do NOT match libgpgme.")
else:
  print("Upgrade Python and reinstall the GPGME Python bindings.")
\end{verbatim}

For many developers, however, the preferred checking means checking

for a minimum
 version or point release.  This is now readily available
via the \texttt{gpg.version.versionintlist} method (added in version
\texttt{1.12.1-beta79}).  It is also now possible to easily check whether the
installed GPGME Python bindings were built from a development or beta
branch of the GPGME source code.

The following code demonstrates how both of those methods may be used:

```
\begin{verbatim}
import gpg

try:
  if gpg.version.is_beta is True:
     print("The installed GPGME Python bindings were built from beta code.")
  else:
     print("The installed GPGME Python bindings are a released version.")
except Exception as e:
  print(e)

try:
  if gpg.version.versionintlist[0] == 1:
     if gpg.version.versionintlist[1] == 12:
        if gpg.version.versionintlist[2] == 1:
           print("This is the minimum version for using versionintlist.")
        elif gpg.version.versionintlist[2] > 1:
           print("The versionintlist method is available.")

        else:
           pass
     elif gpg.version.versionintlist[1] > 12:
        print("The versionintlist method is available.")
     else:
        pass
  elif gpg.version.versionintlist[0] > 1:
     print("The versionintlist method is available.")
  else:
     pass
except Exception as e:
  print(e)
\end{verbatim}
```

The points where \texttt{pass} is used in the above example will most likely
also produce an \texttt{Exception} error since those results should only
occur in versions which do not have the \texttt{gpgme.version.is_beta} and
\texttt{gpgme.version.versionintlist} methods available.

\section{Copyright and Licensing}
\label{sec:org9d52a23}
\subsection{Copyright}
\label{sec:org26ed04d}
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\subsection{Draft Editions of this HOWTO}
\label{sec:org080a94a}
Draft editions of this HOWTO may be periodically available directly
from the author at any of the following URLs:

\begin{itemize}
\item
 \href{https://files.au.adversary.org/crypto/gpgme-python-howto.html}{GPGME Python Bindings HOWTO draft (XHTML single file, AWS S3 SSL)}
\item \href{http://files.au.adversary.org/crypto/gpgme-python-howto.html}{GPGME Python Bindings HOWTO draft (XHTML single file, AWS S3 no SSL)}
\item \href{https://files.au.adversary.org/crypto/gpgme-python-howto-split/index.html}{GPGME Python Bindings HOWTO draft (XHTML multiple files, AWS S3 SSL)}
\item \href{http://files.au.adversary.org/crypto/gpgme-python-howto/index.html}{GPGME Python Bindings HOWTO draft (XHTML multiple files, AWS S3 no SSL)}
\end{itemize}

All of these draft versions except for one have been generated from
this document via GNU Emacs \href{https://orgmode.org/}{Org mode} and
\href{https://www.gnu.org/software/texinfo/}{GNU Texinfo}.  Though it is
likely that the specific \href{https://files.au.adversary.org/crypto/gpgme-python-howto}{file}
\href{http://files.au.adversary.org/crypto/gpgme-python-howto.org}{version}
 used will be on the same server
with the generated output formats.

The GNU Texinfo and reStructured Text versions ship with the software,
while the GNU Emacs Info verseion is generated from the Texinfo
version using GNU Texinfo or GNU Makeinfo.  The Texinfo format is
generated from the original Org mode source file in Org mode itself
either within GNU Emacs or via the command line by invoking Emacs in
batch mode:

\begin{verbatim}
emacs gpgme-python-howto.org --batch -f org-texinfo-export-to-texinfo --kill
emacs gpgme-python-howto --batch -f org-texinfo-export-to-texinfo --kill
\end{verbatim}

The reStructuredText format is also generated from the Org-mode source
file, except it is generated using \href{https://pandoc.org}{Pandoc} with either of the following

commands:

\begin{verbatim}
pandoc -f org -t rst+smart -o gpgme-python-howto.rst gpgme-python-howto.org
pandoc -f org -t rst+smart -o gpgme-python-howto.rst gpgme-python-howto
\end{verbatim}

In addition to these there is
a significantly less frequently updated
version as a HTML \href{https://files.au.adversary.org/crypto/gpgme-python/dita/webhelp/index.html}{WebHelp site} (AWS S3 SSL); generated from DITA XML
source files, which can be found in \href{https://dev.gnupg.org/source/gpgme/browse/ben\%252Fhowto-dita/}{an alternative branch} of the GPGME
git repository.

Various generated output formats may occasionally be found in
subdirectories of the \href{https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python}{gpgme-python} directory. In particular within
the \href{https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/dita}{DITA},
\href{https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/rst}{reStructuredText} and
\href{https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/texinfo}{Texinfo} subdirectories. The \texttt{rst}
directory contains output files generated with Sphix and may include a
considerable number of its possible output formats.

These
draft editions are not official documents and the version of
documentation in the master branch or which ships with released
versions is the only official documentation. Nevertheless, these
draft editions may occasionally be of use by providing more accessible
web versions which are updated between releases. They are provided on
the understanding that they may contain errors or may contain content
subject to change prior to an official release.

\subsection{License GPL compatible}
\label{sec:orge78f3b7}
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WITHOUT ANY WARRANTY, to the extent permitted by law; without even the
implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR
PURPOSE.
\end{document}
# This is a template. The dist target uses it to create the real file.
Summary: GPGME - GnuPG Made Easy

```
Name: gpgme
Version: 1.15.1
Release: 1
URL: https://gnupg.org/gpgme.html
Source: https://www.gnupg.org/ftp/gcrypt/gpgme/%{name}-%{version}.tar.gz
Group: Development/Libraries
Copyright: GPL
BuildRoot: %{_tmppath}/%{name}-%{version}
BuildRequires: make
Prereq: /sbin/ldconfig /sbin/install-info
Requires: gnupg

%description
GnuPG Made Easy (GPGME) is a library designed to make access to GnuPG easier
for applications. It provides a High-Level Crypto API for encryption,
decryption, signing, signature verification and key management.

%prep
%setup -q

%build
CFLAGS="$RPM_OPT_FLAGS"; export CFLAGS
./configure --prefix=/usr
make

%install
rm -fr $RPM_BUILD_ROOT
mkdir -p $RPM_BUILD_ROOT
make install prefix=$RPM_BUILD_ROOT/usr infodir=$RPM_BUILD_ROOT%{_infodir}
rm -f $RPM_BUILD_ROOT%{_infodir}/dir

%clean
rm -fr $RPM_BUILD_ROOT
make distclean

%post
/sbin/ldconfig
/sbin/install-info %{_infodir}/gpgme.info.gz
 %{_infodir}/dir
/sbin/install-info %{_infodir}/gpgme-python-howto.info.gz %{_infodir}/dir

%preun
if [ "$1" = 0 ]; then
/sbin/install-info --delete %{_infodir}/gpgme.info.gz %{_infodir}/dir
/sbin/install-info --delete %{_infodir}/gpgme-python-howto.info.gz %{_infodir}/dir
fi

%postun
```

```
/sbin/ldconfig

%files
%defattr(-,root,root)
%doc COPYING COPYING.LESSER AUTHORS README INSTALL NEWS ChangeLog TODO THANKS
%attr(0755,root,root) %{_bindir}/gpgme-config
%attr(0755,root,root) %{_libdir}/*gpgme.so*
%attr(0755,root,root) %{_libdir}/*gpgme.la
%attr(0644,root,root) %{_libdir}/*gpgme.a
%{_includedir}/gpgme.h
%{_datadir}/aclocal/gpgme.m4
%{_infodir}/gpgme.info*
%{_infodir}/gpgme-python-howto.info*

%changelog
* Sat Aug 30 2003 Robert Schiele <rschiele@uni-mannheim.de>
- %{_infodir}/dir is not packaged, remove to prevent checking failure
* Mon Jul 01 2002 Wojciech Polak <polak@lodz.pdi.net>
- initial specfile release for GPGME.

# EOF
```

# 1.1116 go-compute-metadata 0.7.0

## 1.1116.1 Available under license :

```
// Copyright 2025 Google LLC
//
// Licensed under the Apache License, Version 2.0 (the "License");
// you may not use this file except in compliance with the License.
// You may obtain a copy of the License at
//
//     https://www.apache.org/licenses/LICENSE-2.0
//
// Unless required by applicable law or agreed to in writing, software
// distributed under the License is distributed on an "AS IS" BASIS,
// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
// See the License for the specific language governing permissions and
// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

// [START discoveryengine_v1_generated_UserLicenseService_ListUserLicenses_sync]

package main

import (
 "context"
```

```
 discoveryengine "cloud.google.com/go/discoveryengine/apiv1"
 discoveryenginepb "cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb"
 "google.golang.org/api/iterator"
)

func main() {
 ctx := context.Background()
 // This snippet
 has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &discoveryenginepb.ListUserLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb#ListUserLicensesRequest.
 }
 it := c.ListUserLicenses(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove
 this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*discoveryenginepb.ListUserLicensesResponse)
 }
}

// [END discoveryengine_v1_generated_UserLicenseService_ListUserLicenses_sync]
// Copyright 2025 Google LLC
//
```

```
// Licensed under the Apache License, Version 2.0 (the "License");
// you may not use this file except in compliance with the License.
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//
//     https://www.apache.org/licenses/LICENSE-2.0
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// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package procurement

import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
 "math"
 "net/http"
 "net/url"

 procurementpb "cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 gtransport
 "google.golang.org/api/transport/grpc"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var newLicenseManagementClientHook clientHook

// LicenseManagementCallOptions contains the retry settings for each method of LicenseManagementClient.
type LicenseManagementCallOptions struct {
 GetLicensePool         []gax.CallOption
 UpdateLicensePool      []gax.CallOption
 Assign                 []gax.CallOption
 Unassign               []gax.CallOption
 EnumerateLicensedUsers []gax.CallOption
```

```
 GetOperation          []gax.CallOption
}

func defaultLicenseManagementGRPCClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("cloudcommerceconsumerprocurement.googleapis.com:443"),
internaloption.WithDefaultEndpointTemplate("cloudcommerceconsumerprocurement.UNIVERSE_DOMAIN:443")
,
  internaloption.WithDefaultMTLSEndpoint("cloudcommerceconsumerprocurement.mtls.googleapis.com:443"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://cloudcommerceconsumerprocurement.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableJwtWithScope(),
  internaloption.EnableNewAuthLibrary(),
  option.WithGRPCDialOption(grpc.WithDefaultCallOptions(
   grpc.MaxCallRecvMsgSize(math.MaxInt32))),
 }
}

func
 defaultLicenseManagementCallOptions() *LicenseManagementCallOptions {
 return &LicenseManagementCallOptions{
  GetLicensePool:        []gax.CallOption{},
  UpdateLicensePool:     []gax.CallOption{},
  Assign:                []gax.CallOption{},
  Unassign:              []gax.CallOption{},
  EnumerateLicensedUsers: []gax.CallOption{},
  GetOperation:          []gax.CallOption{},
 }
}

func defaultLicenseManagementRESTCallOptions() *LicenseManagementCallOptions {
 return
 &LicenseManagementCallOptions{
  GetLicensePool:        []gax.CallOption{},
  UpdateLicensePool:     []gax.CallOption{},
  Assign:                []gax.CallOption{},
  Unassign:              []gax.CallOption{},
  EnumerateLicensedUsers: []gax.CallOption{},
  GetOperation:          []gax.CallOption{},
 }
}

// internalLicenseManagementClient is an interface that defines the methods available from Cloud Commerce
Consumer Procurement API.
type internalLicenseManagementClient interface {
 Close() error
 setGoogleClientInfo(...string)
```

```
 Connection() *grpc.ClientConn
 GetLicensePool(context.Context, *procurementpb.GetLicensePoolRequest, ...gax.CallOption)
(*procurementpb.LicensePool, error)
 UpdateLicensePool(context.Context, *procurementpb.UpdateLicensePoolRequest, ...gax.CallOption)
(*procurementpb.LicensePool, error)
 Assign(context.Context, *procurementpb.AssignRequest, ...gax.CallOption) (*procurementpb.AssignResponse,
error)
 Unassign(context.Context, *procurementpb.UnassignRequest,
 ...gax.CallOption) (*procurementpb.UnassignResponse, error)
 EnumerateLicensedUsers(context.Context, *procurementpb.EnumerateLicensedUsersRequest, ...gax.CallOption)
*LicensedUserIterator
 GetOperation(context.Context, *longrunningpb.GetOperationRequest, ...gax.CallOption)
(*longrunningpb.Operation, error)
}

// LicenseManagementClient is a client for interacting with Cloud Commerce Consumer Procurement API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// Service for managing licenses.
type LicenseManagementClient struct {
 // The internal transport-dependent client.
 internalClient internalLicenseManagementClient

 // The call options for this service.
 CallOptions *LicenseManagementCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicenseManagementClient)
 Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *LicenseManagementClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
```

```
func (c *LicenseManagementClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// GetLicensePool gets the license pool.
func (c *LicenseManagementClient) GetLicensePool(ctx context.Context, req
*procurementpb.GetLicensePoolRequest, opts ...gax.CallOption) (*procurementpb.LicensePool, error) {
 return c.internalClient.GetLicensePool(ctx, req, opts...)
}

// UpdateLicensePool updates the license pool if one exists for this Order.
func (c *LicenseManagementClient)
 UpdateLicensePool(ctx context.Context, req *procurementpb.UpdateLicensePoolRequest, opts ...gax.CallOption)
(*procurementpb.LicensePool, error) {
 return c.internalClient.UpdateLicensePool(ctx, req, opts...)
}

// Assign assigns a license to a user.
func (c *LicenseManagementClient) Assign(ctx context.Context, req *procurementpb.AssignRequest, opts
...gax.CallOption) (*procurementpb.AssignResponse, error) {
 return c.internalClient.Assign(ctx, req, opts...)
}

// Unassign unassigns a license from a user.
func (c *LicenseManagementClient) Unassign(ctx context.Context, req *procurementpb.UnassignRequest, opts
...gax.CallOption) (*procurementpb.UnassignResponse, error) {
 return c.internalClient.Unassign(ctx, req, opts...)
}

// EnumerateLicensedUsers enumerates all users assigned a license.
func (c *LicenseManagementClient) EnumerateLicensedUsers(ctx context.Context, req
*procurementpb.EnumerateLicensedUsersRequest, opts ...gax.CallOption) *LicensedUserIterator {
 return c.internalClient.EnumerateLicensedUsers(ctx,
 req, opts...)
}

// GetOperation is a utility method from google.longrunning.Operations.
func (c *LicenseManagementClient) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest,
opts ...gax.CallOption) (*longrunningpb.Operation, error) {
 return c.internalClient.GetOperation(ctx, req, opts...)
}

// licenseManagementGRPCClient is a client for interacting with Cloud Commerce Consumer Procurement API
over gRPC transport.
//
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type licenseManagementGRPCClient struct {
```

```
 // Connection pool of gRPC connections to the service.
 connPool gtransport.ConnPool

 // Points back to the CallOptions field of the containing LicenseManagementClient
 CallOptions **LicenseManagementCallOptions

 // The gRPC API client.
 licenseManagementClient procurementpb.LicenseManagementServiceClient

 operationsClient longrunningpb.OperationsClient

 //
 The x-goog-* metadata to be sent with each request.
 xGoogHeaders []string

 logger *slog.Logger
}

// NewLicenseManagementClient creates a new license management service client based on gRPC.
// The returned client must be Closed when it is done being used to clean up its underlying connections.
//
// Service for managing licenses.
func NewLicenseManagementClient(ctx context.Context, opts ...option.ClientOption) (*LicenseManagementClient,
error) {
 clientOpts := defaultLicenseManagementGRPCClientOptions()
 if newLicenseManagementClientHook != nil {
  hookOpts, err := newLicenseManagementClientHook(ctx, clientHookParams{})
  if err != nil {
   return nil, err
  }
  clientOpts = append(clientOpts, hookOpts...)
 }

 connPool, err := gtransport.DialPool(ctx, append(clientOpts, opts...)...)
 if err != nil {
  return nil, err
 }
 client := LicenseManagementClient{CallOptions: defaultLicenseManagementCallOptions()}

 c := &licenseManagementGRPCClient{
  connPool:
      connPool,
  licenseManagementClient: procurementpb.NewLicenseManagementServiceClient(connPool),
  CallOptions:            &client.CallOptions,
  logger:                 internaloption.GetLogger(opts),
  operationsClient:       longrunningpb.NewOperationsClient(connPool),
 }
 c.setGoogleClientInfo()
```

```
 client.internalClient = c

 return &client, nil
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *licenseManagementGRPCClient) Connection() *grpc.ClientConn {
 return c.connPool.Conn()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licenseManagementGRPCClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "grpc",
 grpc.Version, "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licenseManagementGRPCClient) Close() error {
 return c.connPool.Close()
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type licenseManagementRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicenseManagementClient
 CallOptions **LicenseManagementCallOptions

 logger *slog.Logger
```

```
}

// NewLicenseManagementRESTClient creates a new license management service rest client.
//
// Service for managing licenses.
func NewLicenseManagementRESTClient(ctx context.Context,
 opts ...option.ClientOption) (*LicenseManagementClient, error) {
 clientOpts := append(defaultLicenseManagementRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicenseManagementRESTCallOptions()
 c := &licenseManagementRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 return &LicenseManagementClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicenseManagementRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://cloudcommerceconsumerprocurement.googleapis.com"),
internaloption.WithDefaultEndpointTemplate("https://cloudcommerceconsumerprocurement.UNIVERSE_DOMAI
N"),
  internaloption.WithDefaultMTLSEndpoint("https://cloudcommerceconsumerprocurement.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://cloudcommerceconsumerprocurement.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licenseManagementRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
```

```
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licenseManagementRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient
 = nil
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licenseManagementRESTClient) Connection() *grpc.ClientConn {
 return nil
}
func (c *licenseManagementGRPCClient) GetLicensePool(ctx context.Context, req
*procurementpb.GetLicensePoolRequest, opts ...gax.CallOption) (*procurementpb.LicensePool, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).GetLicensePool[0:len((*c.CallOptions).GetLicensePool):len((*c.CallOptions).GetLicenseP
ool)], opts...)
 var resp *procurementpb.LicensePool
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.licenseManagementClient.GetLicensePool, req, settings.GRPC, c.logger,
"GetLicensePool")
  return err
 },
 opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *licenseManagementGRPCClient) UpdateLicensePool(ctx context.Context, req
*procurementpb.UpdateLicensePoolRequest, opts ...gax.CallOption) (*procurementpb.LicensePool, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "license_pool.name",
url.QueryEscape(req.GetLicensePool().GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
```

```
append((*c.CallOptions).UpdateLicensePool[0:len((*c.CallOptions).UpdateLicensePool):len((*c.CallOptions).Upda
teLicensePool)], opts...)
 var resp *procurementpb.LicensePool
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.licenseManagementClient.UpdateLicensePool, req, settings.GRPC, c.logger,
"UpdateLicensePool")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *licenseManagementGRPCClient)
 Assign(ctx context.Context, req *procurementpb.AssignRequest, opts ...gax.CallOption)
(*procurementpb.AssignResponse, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts = append((*c.CallOptions).Assign[0:len((*c.CallOptions).Assign):len((*c.CallOptions).Assign)], opts...)
 var resp *procurementpb.AssignResponse
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.licenseManagementClient.Assign, req, settings.GRPC, c.logger, "Assign")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *licenseManagementGRPCClient) Unassign(ctx context.Context, req *procurementpb.UnassignRequest,
opts ...gax.CallOption) (*procurementpb.UnassignResponse, error) {
 hds := []string{"x-goog-request-params",
 fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts = append((*c.CallOptions).Unassign[0:len((*c.CallOptions).Unassign):len((*c.CallOptions).Unassign)], opts...)
 var resp *procurementpb.UnassignResponse
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.licenseManagementClient.Unassign, req, settings.GRPC, c.logger, "Unassign")
  return err
```

```
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *licenseManagementGRPCClient) EnumerateLicensedUsers(ctx context.Context, req
*procurementpb.EnumerateLicensedUsersRequest, opts ...gax.CallOption) *LicensedUserIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts
 =
append((*c.CallOptions).EnumerateLicensedUsers[0:len((*c.CallOptions).EnumerateLicensedUsers):len((*c.CallOp
tions).EnumerateLicensedUsers)], opts...)
 it := &LicensedUserIterator{}
 req = proto.Clone(req).(*procurementpb.EnumerateLicensedUsersRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*procurementpb.LicensedUser, string, error) {
  resp := &procurementpb.EnumerateLicensedUsersResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx, c.licenseManagementClient.EnumerateLicensedUsers, req, settings.GRPC, c.logger,
"EnumerateLicensedUsers")
   return err
  }, opts...)
  if err != nil {
   return nil, "", err
  }

  it.Response = resp
  return resp.GetLicensedUsers(), resp.GetNextPageToken(),
 nil
 }
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
```

```
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

func (c *licenseManagementGRPCClient) GetOperation(ctx context.Context, req
*longrunningpb.GetOperationRequest, opts ...gax.CallOption) (*longrunningpb.Operation, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).GetOperation[0:len((*c.CallOptions).GetOperation):len((*c.CallOptions).GetOperation)],
opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx,
 func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.operationsClient.GetOperation, req, settings.GRPC, c.logger, "GetOperation")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

// GetLicensePool gets the license pool.
func (c *licenseManagementRESTClient) GetLicensePool(ctx context.Context, req
*procurementpb.GetLicensePoolRequest, opts ...gax.CallOption) (*procurementpb.LicensePool, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
```

```
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx,
 hds...)
 opts =
append((*c.CallOptions).GetLicensePool[0:len((*c.CallOptions).GetLicensePool):len((*c.CallOptions).GetLicenseP
ool)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &procurementpb.LicensePool{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetLicensePool")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// UpdateLicensePool updates the license pool if one exists for this Order.
func (c *licenseManagementRESTClient) UpdateLicensePool(ctx
 context.Context, req *procurementpb.UpdateLicensePoolRequest, opts ...gax.CallOption)
(*procurementpb.LicensePool, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 body := req.GetLicensePool()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
```

```
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetLicensePool().GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")
 if req.GetUpdateMask() != nil {
  field, err := protojson.Marshal(req.GetUpdateMask())
  if err != nil {
   return nil, err
  }
  params.Add("updateMask", string(field[1:len(field)-1]))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "license_pool.name",
url.QueryEscape(req.GetLicensePool().GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds,
 "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).UpdateLicensePool[0:len((*c.CallOptions).UpdateLicensePool):len((*c.CallOptions).Upda
teLicensePool)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &procurementpb.LicensePool{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("PATCH", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "UpdateLicensePool")
  if err != nil {
   return err
  }
```

```
 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
}

// Assign assigns a license to a user.
func
 (c *licenseManagementRESTClient) Assign(ctx context.Context, req *procurementpb.AssignRequest, opts
...gax.CallOption) (*procurementpb.AssignResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 jsonReq, err := m.Marshal(req)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:assign", req.GetParent())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Assign[0:len((*c.CallOptions).Assign):len((*c.CallOptions).Assign)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial:
 true, DiscardUnknown: true}
 resp := &procurementpb.AssignResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
```

```
 httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Assign")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
}

// Unassign unassigns a license from a user.
func (c *licenseManagementRESTClient) Unassign(ctx context.Context, req *procurementpb.UnassignRequest,
opts ...gax.CallOption) (*procurementpb.UnassignResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 jsonReq, err :=
 m.Marshal(req)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:unassign", req.GetParent())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}
```

```
 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Unassign[0:len((*c.CallOptions).Unassign):len((*c.CallOptions).Unassign)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &procurementpb.UnassignResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq,
 err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Unassign")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// EnumerateLicensedUsers enumerates all users assigned a license.
func (c *licenseManagementRESTClient) EnumerateLicensedUsers(ctx context.Context, req
*procurementpb.EnumerateLicensedUsersRequest, opts ...gax.CallOption) *LicensedUserIterator {
 it := &LicensedUserIterator{}
 req = proto.Clone(req).(*procurementpb.EnumerateLicensedUsersRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*procurementpb.LicensedUser, string, error) {
  resp := &procurementpb.EnumerateLicensedUsersResponse{}
  if
 pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
```

```
 req.PageSize = math.MaxInt32
} else if pageSize != 0 {
 req.PageSize = int32(pageSize)
}
baseUrl, err := url.Parse(c.endpoint)
if err != nil {
 return nil, "", err
}
baseUrl.Path += fmt.Sprintf("/v1/%v:enumerateLicensedUsers", req.GetParent())

params := url.Values{}
params.Add("$alt", "json;enum-encoding=int")
if req.GetPageSize() != 0 {
 params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
}
if req.GetPageToken() != "" {
 params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
}

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := append(c.xGoogHeaders, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path
= settings.Path
 }
 httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
 if err != nil {
  return err
 }
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "EnumerateLicensedUsers")
 if err != nil {
  return err
 }
 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, "", e
}
```

```
 it.Response = resp
 return resp.GetLicensedUsers(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// GetOperation is a utility method from
 google.longrunning.Operations.
func (c *licenseManagementRESTClient) GetOperation(ctx context.Context, req
*longrunningpb.GetOperationRequest, opts ...gax.CallOption) (*longrunningpb.Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetOperation[0:len((*c.CallOptions).GetOperation):len((*c.CallOptions).GetOperation)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &longrunningpb.Operation{}
 e := gax.Invoke(ctx,
```

```
 func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetOperation")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute

import (
 "bytes"
 "context"
```

```
 "fmt"
 "log/slog"
 "math"
 "net/http"
 "net/url"
 "time"

 computepb "cloud.google.com/go/compute/apiv1/computepb"
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var
 newLicensesClientHook clientHook

// LicensesCallOptions contains the retry settings for each method of LicensesClient.
type LicensesCallOptions struct {
 Delete             []gax.CallOption
 Get                []gax.CallOption
 GetIamPolicy       []gax.CallOption
 Insert             []gax.CallOption
 List               []gax.CallOption
 SetIamPolicy       []gax.CallOption
 TestIamPermissions []gax.CallOption
 Update             []gax.CallOption
}

func defaultLicensesRESTCallOptions() *LicensesCallOptions {
 return &LicensesCallOptions{
  Delete: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  Get: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier:
 1.30,
    },
     http.StatusGatewayTimeout,
```

```
    http.StatusServiceUnavailable)
   }),
  },
  GetIamPolicy: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  Insert: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  List: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  SetIamPolicy: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  TestIamPermissions: []gax.CallOption{
   gax.WithTimeout(600000
 * time.Millisecond),
  },
  Update: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
 }
}

// internalLicensesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicensesClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
```

```
 Delete(context.Context, *computepb.DeleteLicenseRequest, ...gax.CallOption) (*Operation, error)
 Get(context.Context, *computepb.GetLicenseRequest, ...gax.CallOption) (*computepb.License, error)
 GetIamPolicy(context.Context, *computepb.GetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 Insert(context.Context, *computepb.InsertLicenseRequest, ...gax.CallOption) (*Operation, error)
 List(context.Context, *computepb.ListLicensesRequest, ...gax.CallOption) *LicenseIterator
 SetIamPolicy(context.Context, *computepb.SetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 TestIamPermissions(context.Context,
 *computepb.TestIamPermissionsLicenseRequest, ...gax.CallOption) (*computepb.TestPermissionsResponse, error)
 Update(context.Context, *computepb.UpdateLicenseRequest, ...gax.CallOption) (*Operation, error)
}

// LicensesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// The Licenses API.
type LicensesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicensesClient

 // The call options for this service.
 CallOptions *LicensesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicensesClient) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed
 on each request. Intended for
// use by Google-written clients.
func (c *LicensesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicensesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
```

```
}

// Delete deletes the specified license. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 return c.internalClient.Delete(ctx, req, opts...)
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Get(ctx context.Context, req
 *computepb.GetLicenseRequest, opts ...gax.CallOption) (*computepb.License, error) {
 return c.internalClient.Get(ctx, req, opts...)
}

// GetIamPolicy gets the access control policy for a resource. May be empty if no such policy or resource exists. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest, opts ...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.GetIamPolicy(ctx, req, opts...)
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 return c.internalClient.Insert(ctx, req, opts...)
}

// List retrieves the list of licenses available in the
 specified project. This method does not get any licenses that belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-cloud or windows-cloud. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts ...gax.CallOption) *LicenseIterator {
 return c.internalClient.List(ctx, req, opts...)
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest, opts ...gax.CallOption) (*computepb.Policy, error) {
 return
 c.internalClient.SetIamPolicy(ctx, req, opts...)
}
```

```
// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is
intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse,
error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}

// Update updates a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Update(ctx context.Context, req *computepb.UpdateLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 return c.internalClient.Update(ctx, req, opts...)
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type
 licensesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // operationClient is used to call the operation-specific management service.
 operationClient *GlobalOperationsClient

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicensesClient
 CallOptions **LicensesCallOptions

 logger *slog.Logger
}

// NewLicensesRESTClient creates a new licenses rest client.
//
// The Licenses API.
func NewLicensesRESTClient(ctx context.Context, opts ...option.ClientOption) (*LicensesClient, error) {
 clientOpts := append(defaultLicensesRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicensesRESTCallOptions()
```

```
 c := &licensesRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:
   internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 o := []option.ClientOption{
  option.WithHTTPClient(httpClient),
  option.WithEndpoint(endpoint),
 }
 opC, err := NewGlobalOperationsRESTClient(ctx, o...)
 if err != nil {
  return nil, err
 }
 c.operationClient = opC

 return &LicensesClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicensesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

// setGoogleClientInfo sets the name and version of the application in
//
 the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licensesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
```

```
func (c *licensesRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 if err := c.operationClient.Close(); err != nil {
  return err
 }
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licensesRESTClient) Connection() *grpc.ClientConn {
 return nil
}

// Delete deletes the specified license. Caution This resource is intended for use
 only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Delete[0:len((*c.CallOptions).Delete):len((*c.CallOptions).Delete)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
```

```
 httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Delete")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
op := &Operation{
 &globalOperationsHandle{
  c:       c.operationClient,
  proto:   resp,
  project: req.GetProject(),
 },
}
return op, nil
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners
who are creating
 Cloud Marketplace images.
func (c *licensesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption)
(*computepb.License, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
```

```
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.License{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error
 {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Get")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// GetIamPolicy gets the access control policy for a resource. May be empty if no such policy or resource exists.
Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/getIamPolicy",
 req.GetProject(), req.GetResource())

 params := url.Values{}
 if req != nil && req.OptionsRequestedPolicyVersion != nil {
  params.Add("optionsRequestedPolicyVersion", fmt.Sprintf("%v", req.GetOptionsRequestedPolicyVersion()))
 }
```

```
 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetIamPolicy[0:len((*c.CallOptions).GetIamPolicy):len((*c.CallOptions).GetIamPolicy)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if
 settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetIamPolicy")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
```

```
m := protojson.MarshalOptions{AllowPartial: true}
body := req.GetLicenseResource()
jsonReq, err := m.Marshal(body)
if err != nil {
 return nil, err
}

baseUrl, err := url.Parse(c.endpoint)
if
err != nil {
 return nil, err
}
baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

params := url.Values{}
if req != nil && req.RequestId != nil {
 params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
}

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "project", url.QueryEscape(req.GetProject()))}

hds = append(c.xGoogHeaders, hds...)
hds = append(hds, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
opts = append((*c.CallOptions).Insert[0:len((*c.CallOptions).Insert):len((*c.CallOptions).Insert)], opts...)
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
resp := &computepb.Operation{}
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err
:= http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Insert")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
```

```
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
op := &Operation{
 &globalOperationsHandle{
  c:       c.operationClient,
  proto:   resp,
  project: req.GetProject(),
 },
}
return op, nil
}

// List retrieves the list of licenses available in the specified project. This method does not get any licenses that
belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a
list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-
cloud or windows-cloud. Caution This resource is intended for
 use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts
...gax.CallOption) *LicenseIterator {
 it := &LicenseIterator{}
 req = proto.Clone(req).(*computepb.ListLicensesRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*computepb.License, string, error) {
  resp := &computepb.LicensesListResponse{}
  if pageToken != "" {
   req.PageToken = proto.String(pageToken)
  }
  if pageSize > math.MaxInt32 {
   req.MaxResults = proto.Uint32(uint32(math.MaxInt32))
  } else if pageSize != 0 {
   req.MaxResults = proto.Uint32(uint32(pageSize))
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
   return nil, "", err
  }
  baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

  params := url.Values{}
  if req != nil && req.Filter != nil {
   params.Add("filter",
```

```
fmt.Sprintf("%v", req.GetFilter()))
 }
 if req != nil && req.MaxResults != nil {
  params.Add("maxResults", fmt.Sprintf("%v", req.GetMaxResults()))
 }
 if req != nil && req.OrderBy != nil {
  params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
 }
 if req != nil && req.PageToken != nil {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }
 if req != nil && req.ReturnPartialSuccess != nil {
  params.Add("returnPartialSuccess", fmt.Sprintf("%v", req.GetReturnPartialSuccess()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header
= headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "List")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetItems(), resp.GetNextPageToken(), nil
}
```

```
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetMaxResults())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This
resource is intended for use only by third-party partners who are creating Cloud Marketplace
 images.
func (c *licensesRESTClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetGlobalSetPolicyRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/setIamPolicy", req.GetProject(),
req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).SetIamPolicy[0:len((*c.CallOptions).SetIamPolicy):len((*c.CallOptions).SetIamPolicy)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
```

```
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "SetIamPolicy")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is
intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) TestIamPermissions(ctx
 context.Context, req *computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption)
(*computepb.TestPermissionsResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetTestPermissionsRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/testIamPermissions", req.GetProject(),
req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
```

```
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "TestIamPermissions")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// Update updates a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Update(ctx context.Context,
 req *computepb.UpdateLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetLicenseResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
```

```
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }
 if req != nil && req.UpdateMask != nil {
  params.Add("updateMask", fmt.Sprintf("%v", req.GetUpdateMask()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds,
 "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Update[0:len((*c.CallOptions).Update):len((*c.CallOptions).Update)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("PATCH", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Update")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }
```

```
 return nil
}, opts...)
if e != nil {
 return nil, e
}
op := &Operation{
 &globalOperationsHandle{
  c:       c.operationClient,
  proto:   resp,
  project: req.GetProject(),
 },
}
return
op, nil
}
```

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comment syntax for the file format. We also recommend that a
file or class name and description of purpose be included on the
same "printed page" as the copyright notice for easier
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// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.
```

```
package compute

import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
 "net/http"
 "net/url"
 "time"

 computepb "cloud.google.com/go/compute/apiv1beta/computepb"
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
)

var
 newLicenseCodesClientHook clientHook

// LicenseCodesCallOptions contains the retry settings for each method of LicenseCodesClient.
type LicenseCodesCallOptions struct {
 Get              []gax.CallOption
 TestIamPermissions []gax.CallOption
}

func defaultLicenseCodesRESTCallOptions() *LicenseCodesCallOptions {
 return &LicenseCodesCallOptions{
  Get: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  TestIamPermissions: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
 }
```

```
}

// internalLicenseCodesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicenseCodesClient interface
 {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Get(context.Context, *computepb.GetLicenseCodeRequest, ...gax.CallOption) (*computepb.LicenseCode, error)
 TestIamPermissions(context.Context, *computepb.TestIamPermissionsLicenseCodeRequest, ...gax.CallOption)
(*computepb.TestPermissionsResponse, error)
}

// LicenseCodesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// The LicenseCodes API.
type LicenseCodesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicenseCodesClient

 // The call options for this service.
 CallOptions *LicenseCodesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicenseCodesClient) Close() error {
 return
 c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *LicenseCodesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicenseCodesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
```

```
}

// Get return a specified license code. License codes are mirrored across all projects that have permissions to read the License Code. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicenseCodesClient) Get(ctx context.Context, req *computepb.GetLicenseCodeRequest, opts ...gax.CallOption) (*computepb.LicenseCode, error) {
 return c.internalClient.Get(ctx,
 req, opts...)
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicenseCodesClient) TestIamPermissions(ctx context.Context, req *computepb.TestIamPermissionsLicenseCodeRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse, error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with method calls.
type licenseCodesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicenseCodesClient
 CallOptions **LicenseCodesCallOptions

 logger *slog.Logger
}

// NewLicenseCodesRESTClient
 creates a new license codes rest client.
//
// The LicenseCodes API.
func NewLicenseCodesRESTClient(ctx context.Context, opts ...option.ClientOption) (*LicenseCodesClient, error) {
 clientOpts := append(defaultLicenseCodesRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }
```

```
 callOpts := defaultLicenseCodesRESTCallOptions()
 c := &licenseCodesRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 return &LicenseCodesClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicenseCodesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licenseCodesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licenseCodesRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 return
 nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
```

```
func (c *licenseCodesRESTClient) Connection() *grpc.ClientConn {
 return nil
}

// Get return a specified license code. License codes are mirrored across all projects that have permissions to read the License Code. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licenseCodesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseCodeRequest, opts ...gax.CallOption) (*computepb.LicenseCode, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenseCodes/%v", req.GetProject(), req.GetLicenseCode())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project", url.QueryEscape(req.GetProject()), "license_code", url.QueryEscape(req.GetLicenseCode()))}

 hds
 = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.LicenseCode{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Get")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
```

```
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// TestIamPermissions returns permissions that
 a caller has on the specified resource. Caution This resource is intended for use only by third-party partners who are
creating Cloud Marketplace images.
func (c *licenseCodesRESTClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseCodeRequest, opts ...gax.CallOption)
(*computepb.TestPermissionsResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetTestPermissionsRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenseCodes/%v/testIamPermissions",
req.GetProject(), req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds
 = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
```

```
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "TestIamPermissions")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute

import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
 "net/http"
 "net/url"
 "time"

 computepb "cloud.google.com/go/compute/apiv1/computepb"
 gax "github.com/googleapis/gax-go/v2"
```

```
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
)

var
 newLicenseCodesClientHook clientHook

// LicenseCodesCallOptions contains the retry settings for each method of LicenseCodesClient.
type LicenseCodesCallOptions struct {
 Get              []gax.CallOption
 TestIamPermissions []gax.CallOption
}

func defaultLicenseCodesRESTCallOptions() *LicenseCodesCallOptions {
 return &LicenseCodesCallOptions{
  Get: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  TestIamPermissions: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
 }
}

// internalLicenseCodesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicenseCodesClient interface {
 Close()
 error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Get(context.Context, *computepb.GetLicenseCodeRequest, ...gax.CallOption) (*computepb.LicenseCode, error)
 TestIamPermissions(context.Context, *computepb.TestIamPermissionsLicenseCodeRequest, ...gax.CallOption)
(*computepb.TestPermissionsResponse, error)
 }

// LicenseCodesClient is a client for interacting with Google Compute Engine API.
```

```
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// The LicenseCodes API.
type LicenseCodesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicenseCodesClient

 // The call options for this service.
 CallOptions *LicenseCodesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicenseCodesClient) Close() error {
 return c.internalClient.Close()
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *LicenseCodesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicenseCodesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// Get return a specified license code. License codes are mirrored across all projects that have permissions to read the
License Code. Caution This resource is intended for use only by third-party partners who are creating Cloud
Marketplace images.
func (c *LicenseCodesClient) Get(ctx context.Context, req *computepb.GetLicenseCodeRequest, opts
...gax.CallOption) (*computepb.LicenseCode, error) {
 return c.internalClient.Get(ctx,
 req, opts...)
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is
intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicenseCodesClient) TestIamPermissions(ctx context.Context, req
```

```
*computepb.TestIamPermissionsLicenseCodeRequest, opts ...gax.CallOption)
(*computepb.TestPermissionsResponse, error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type licenseCodesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicenseCodesClient
 CallOptions **LicenseCodesCallOptions

 logger *slog.Logger
}

// NewLicenseCodesRESTClient
 creates a new license codes rest client.
//
// The LicenseCodes API.
func NewLicenseCodesRESTClient(ctx context.Context, opts ...option.ClientOption) (*LicenseCodesClient, error) {
 clientOpts := append(defaultLicenseCodesRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicenseCodesRESTCallOptions()
 c := &licenseCodesRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 return &LicenseCodesClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicenseCodesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
```

```
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licenseCodesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licenseCodesRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 return
 nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licenseCodesRESTClient) Connection() *grpc.ClientConn {
 return nil
}

// Get return a specified license code. License codes are mirrored across all projects that have permissions to read the
License Code. Caution This resource is intended for use only by third-party partners who are creating Cloud
Marketplace images.
func (c *licenseCodesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseCodeRequest, opts
...gax.CallOption) (*computepb.LicenseCode, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenseCodes/%v", req.GetProject(),
```

```
req.GetLicenseCode())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license_code", url.QueryEscape(req.GetLicenseCode()))}

 hds
 = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.LicenseCode{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Get")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// TestIamPermissions returns permissions that a
 caller has on the specified resource. Caution This resource is intended for use only by third-party partners who are
creating Cloud Marketplace images.
func (c *licenseCodesRESTClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseCodeRequest, opts ...gax.CallOption)
(*computepb.TestPermissionsResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
```

```
 body := req.GetTestPermissionsRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenseCodes/%v/testIamPermissions",
req.GetProject(), req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds =
 append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "TestIamPermissions")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
```

```
 if e != nil {
  return nil, e
 }
 return resp, nil
}
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//     http://www.apache.org/licenses/LICENSE-2.0
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// distributed under the License is distributed on an "AS IS" BASIS,
// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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// limitations under the License.

// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.35.2
//  protoc        v4.25.7
// source: google/ai/generativelanguage/v1alpha/permission.proto

package generativelanguagepb

import (
 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
 reflect "reflect"
 sync
 "sync"
)

const (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Defines types of the grantee of this permission.
type Permission_GranteeType int32

const (
 // The default value. This value is unused.
```

```
 Permission_GRANTEE_TYPE_UNSPECIFIED Permission_GranteeType = 0
 // Represents a user. When set, you must provide email_address for the user.
 Permission_USER Permission_GranteeType = 1
 // Represents a group. When set, you must provide email_address for the
 // group.
 Permission_GROUP Permission_GranteeType = 2
 // Represents access to everyone. No extra information is required.
 Permission_EVERYONE Permission_GranteeType = 3
)

// Enum value maps for Permission_GranteeType.
var (
 Permission_GranteeType_name = map[int32]string{
  0: "GRANTEE_TYPE_UNSPECIFIED",
  1: "USER",
  2:
 "GROUP",
  3: "EVERYONE",
 }
 Permission_GranteeType_value = map[string]int32{
  "GRANTEE_TYPE_UNSPECIFIED": 0,
  "USER":                     1,
  "GROUP":                    2,
  "EVERYONE":                 3,
 }
)

func (x Permission_GranteeType) Enum() *Permission_GranteeType {
 p := new(Permission_GranteeType)
 *p = x
 return p
}

func (x Permission_GranteeType) String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_GranteeType) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[0].Descriptor()
}

func (Permission_GranteeType) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[0]
}

func (x Permission_GranteeType) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}
```

```
// Deprecated: Use Permission_GranteeType.Descriptor instead.
func (Permission_GranteeType) EnumDescriptor() ([]byte,
 []int) {
 return file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescGZIP(), []int{0, 0}
}

// Defines the role granted by this permission.
type Permission_Role int32

const (
 // The default value. This value is unused.
 Permission_ROLE_UNSPECIFIED Permission_Role = 0
 // Owner can use, update, share and delete the resource.
 Permission_OWNER Permission_Role = 1
 // Writer can use, update and share the resource.
 Permission_WRITER Permission_Role = 2
 // Reader can use the resource.
 Permission_READER Permission_Role = 3
)

// Enum value maps for Permission_Role.
var (
 Permission_Role_name = map[int32]string{
  0: "ROLE_UNSPECIFIED",
  1: "OWNER",
  2: "WRITER",
  3: "READER",
 }
 Permission_Role_value = map[string]int32{
  "ROLE_UNSPECIFIED": 0,
  "OWNER":            1,
  "WRITER":           2,
  "READER":           3,
 }
)

func (x Permission_Role) Enum() *Permission_Role {
 p := new(Permission_Role)
 *p = x
 return p
}

func (x Permission_Role) String() string {
 return
 protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}
```

```
func (Permission_Role) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[1].Descriptor()
}

func (Permission_Role) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[1]
}

func (x Permission_Role) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_Role.Descriptor instead.
func (Permission_Role) EnumDescriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescGZIP(), []int{0, 1}
}

// Permission resource grants user, group or the rest of the world access to the
// PaLM API resource (e.g. a tuned model, corpus).
//
// A role is a collection of permitted operations that allows users to perform
// specific actions on PaLM API resources. To make them available to users,
// groups, or service
 accounts, you assign roles. When you assign a role, you
// grant permissions that the role contains.
//
// There are three concentric roles. Each role is a superset of the previous
// role's permitted operations:
//
// - reader can use the resource (e.g. tuned model, corpus) for inference
// - writer has reader's permissions and additionally can edit and share
// - owner has writer's permissions and additionally can delete
type Permission struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Output only. Identifier. The permission name. A unique name will be
 // generated on create. Examples:
 //
 // tunedModels/{tuned_model}/permissions/{permission}
 // corpora/{corpus}/permissions/{permission}
 //
 // Output only.
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Optional. Immutable. The type of the grantee.
 GranteeType *Permission_GranteeType
`protobuf:"varint,2,opt,name=grantee_type,json=granteeType,proto3,enum=google.ai.generativelanguage.v1alpha.P
```

```
ermission_GranteeType,oneof"
 json:"grantee_type,omitempty"`
 // Optional. Immutable. The email address of the user of group which this
 // permission refers. Field is not set when permission's grantee type is
 // EVERYONE.
 EmailAddress *string `protobuf:"bytes,3,opt,name=email_address,json=emailAddress,proto3,oneof"
json:"email_address,omitempty"`
 // Required. The role granted by this permission.
 Role *Permission_Role
`protobuf:"varint,4,opt,name=role,proto3,enum=google.ai.generativelanguage.v1alpha.Permission_Role,oneof"
json:"role,omitempty"`
}

func (x *Permission) Reset() {
 *x = Permission{}
 mi := &file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes[0]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *Permission) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*Permission) ProtoMessage() {}

func (x *Permission) ProtoReflect() protoreflect.Message
 {
 mi := &file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use Permission.ProtoReflect.Descriptor instead.
func (*Permission) Descriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescGZIP(), []int{0}
}

func (x *Permission) GetName() string {
 if x != nil {
  return x.Name
 }
```

```
 return ""
}

func (x *Permission) GetGranteeType() Permission_GranteeType {
 if x != nil && x.GranteeType != nil {
  return *x.GranteeType
 }
 return Permission_GRANTEE_TYPE_UNSPECIFIED
}

func (x *Permission) GetEmailAddress() string {
 if x != nil && x.EmailAddress != nil {
  return *x.EmailAddress
 }
 return ""
}

func (x *Permission) GetRole() Permission_Role {
 if x != nil && x.Role != nil {
  return *x.Role
 }
 return Permission_ROLE_UNSPECIFIED
}

var
 File_google_ai_generativelanguage_v1alpha_permission_proto protoreflect.FileDescriptor

var file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc = []byte{
 0x0a, 0x35, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65,
 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x76,
 0x31, 0x61, 0x6c, 0x70, 0x68, 0x61, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f,
 0x6e, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x12, 0x24, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e,
 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e,
 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x61, 0x6c, 0x70, 0x68, 0x61, 0x1a, 0x1f, 0x67,
 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64, 0x5f,
 0x62, 0x65, 0x68, 0x61, 0x76, 0x69, 0x6f, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x19,
 0x67, 0x6f, 0x6f, 0x67, 0x6c,
 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x72, 0x65, 0x73, 0x6f, 0x75,
 0x72, 0x63, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x22, 0x87, 0x05, 0x0a, 0x0a, 0x50, 0x65,
 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x1a, 0x0a, 0x04, 0x6e, 0x61, 0x6d, 0x65,
 0x18, 0x01, 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x03, 0xe0, 0x41, 0x08, 0x52, 0x04,
 0x6e, 0x61, 0x6d, 0x65, 0x12, 0x6c, 0x0a, 0x0c, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f,
 0x74, 0x79, 0x70, 0x65, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0e, 0x32, 0x3c, 0x2e, 0x67, 0x6f, 0x6f,
 0x67, 0x6c, 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76,
 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x61, 0x6c, 0x70, 0x68,
 0x61, 0x2e, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x2e, 0x47, 0x72, 0x61,
 0x6e, 0x74, 0x65, 0x65, 0x54, 0x79, 0x70, 0x65, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05,
 0x48, 0x00, 0x52, 0x0b, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65,
```

```
0x65, 0x54, 0x79, 0x70, 0x65, 0x88,
0x01, 0x01, 0x12, 0x30, 0x0a, 0x0d, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x5f, 0x61, 0x64, 0x64, 0x72,
0x65, 0x73, 0x73, 0x18, 0x03, 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41,
0x05, 0x48, 0x01, 0x52, 0x0c, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x41, 0x64, 0x64, 0x72, 0x65, 0x73,
0x73, 0x88, 0x01, 0x01, 0x12, 0x53, 0x0a, 0x04, 0x72, 0x6f, 0x6c, 0x65, 0x18, 0x04, 0x20, 0x01,
0x28, 0x0e, 0x32, 0x35, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67,
0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67,
0x65, 0x2e, 0x76, 0x31, 0x61, 0x6c, 0x70, 0x68, 0x61, 0x2e, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73,
0x73, 0x69, 0x6f, 0x6e, 0x2e, 0x52, 0x6f, 0x6c, 0x65, 0x42, 0x03, 0xe0, 0x41, 0x02, 0x48, 0x02,
0x52, 0x04, 0x72, 0x6f, 0x6c, 0x65, 0x88, 0x01, 0x01, 0x22, 0x4e, 0x0a, 0x0b, 0x47, 0x72, 0x61,
0x6e, 0x74, 0x65, 0x65, 0x54, 0x79, 0x70, 0x65, 0x12, 0x1c, 0x0a, 0x18, 0x47, 0x52, 0x41,
0x4e,
0x54, 0x45, 0x45, 0x5f, 0x54, 0x59, 0x50, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49,
0x46, 0x49, 0x45, 0x44, 0x10, 0x00, 0x12, 0x08, 0x0a, 0x04, 0x55, 0x53, 0x45, 0x52, 0x10, 0x01,
0x12, 0x09, 0x0a, 0x05, 0x47, 0x52, 0x4f, 0x55, 0x50, 0x10, 0x02, 0x12, 0x0c, 0x0a, 0x08, 0x45,
0x56, 0x45, 0x52, 0x59, 0x4f, 0x4e, 0x45, 0x10, 0x03, 0x22, 0x3f, 0x0a, 0x04, 0x52, 0x6f, 0x6c,
0x65, 0x12, 0x14, 0x0a, 0x10, 0x52, 0x4f, 0x4c, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43,
0x49, 0x46, 0x49, 0x45, 0x44, 0x10, 0x00, 0x12, 0x09, 0x0a, 0x05, 0x4f, 0x57, 0x4e, 0x45, 0x52,
0x10, 0x01, 0x12, 0x0a, 0x0a, 0x06, 0x57, 0x52, 0x49, 0x54, 0x45, 0x52, 0x10, 0x02, 0x12, 0x0a,
0x0a, 0x06, 0x52, 0x45, 0x41, 0x44, 0x45, 0x52, 0x10, 0x03, 0x3a, 0xaa, 0x01, 0xea, 0x41, 0xa6,
0x01, 0x0a, 0x2c, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e,
0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73,
0x2e, 0x63, 0x6f, 0x6d,
0x2f, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12,
0x32, 0x74, 0x75, 0x6e, 0x65, 0x64, 0x4d, 0x6f, 0x64, 0x65, 0x6c, 0x73, 0x2f, 0x7b, 0x74, 0x75,
0x6e, 0x65, 0x64, 0x5f, 0x6d, 0x6f, 0x64, 0x65, 0x6c, 0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69,
0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x2f, 0x7b, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69,
0x6f, 0x6e, 0x7d, 0x12, 0x29, 0x63, 0x6f, 0x72, 0x70, 0x6f, 0x72, 0x61, 0x2f, 0x7b, 0x63, 0x6f,
0x72, 0x70, 0x75, 0x73, 0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
0x73, 0x2f, 0x7b, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x7d, 0x2a, 0x0b,
0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x32, 0x0a, 0x70, 0x65, 0x72,
0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x42, 0x0f, 0x0a, 0x0d, 0x5f, 0x67, 0x72, 0x61, 0x6e,
0x74, 0x65, 0x65, 0x5f, 0x74, 0x79, 0x70, 0x65, 0x42, 0x10, 0x0a, 0x0e, 0x5f, 0x65, 0x6d, 0x61,
0x69, 0x6c, 0x5f, 0x61, 0x64, 0x64, 0x72, 0x65, 0x73,
0x73, 0x42, 0x07, 0x0a, 0x05, 0x5f, 0x72,
0x6f, 0x6c, 0x65, 0x42, 0x9d, 0x01, 0x0a, 0x28, 0x63, 0x6f, 0x6d, 0x2e, 0x67, 0x6f, 0x6f, 0x67,
0x6c, 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65,
0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x61, 0x6c, 0x70, 0x68, 0x61,
0x42, 0x0f, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x50, 0x72, 0x6f, 0x74,
0x6f, 0x50, 0x01, 0x5a, 0x5e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c,
0x65, 0x2e, 0x63, 0x6f, 0x6d, 0x2f, 0x67, 0x6f, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65,
0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x61,
0x70, 0x69, 0x76, 0x31, 0x61, 0x6c, 0x70, 0x68, 0x61, 0x2f, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61,
0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x3b, 0x67,
0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75,
0x61, 0x67,
0x65, 0x70, 0x62, 0x62, 0x06, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x33,
}
```

```
var (
 file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescOnce sync.Once
 file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData =
file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc
)

func file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescGZIP() []byte {
 file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescOnce.Do(func() {
  file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData)
 })
 return file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData
}

var file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes = make([]protoimpl.EnumInfo, 2)
var file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes = make([]protoimpl.MessageInfo, 1)
var file_google_ai_generativelanguage_v1alpha_permission_proto_goTypes
 = []any{
 (Permission_GranteeType)(0), // 0: google.ai.generativelanguage.v1alpha.Permission.GranteeType
 (Permission_Role)(0),        // 1: google.ai.generativelanguage.v1alpha.Permission.Role
 (*Permission)(nil),          // 2: google.ai.generativelanguage.v1alpha.Permission
}
var file_google_ai_generativelanguage_v1alpha_permission_proto_depIdxs = []int32{
 0, // 0: google.ai.generativelanguage.v1alpha.Permission.grantee_type:type_name ->
google.ai.generativelanguage.v1alpha.Permission.GranteeType
 1, // 1: google.ai.generativelanguage.v1alpha.Permission.role:type_name ->
google.ai.generativelanguage.v1alpha.Permission.Role
 2, // [2:2] is the sub-list for method output_type
 2, // [2:2] is the sub-list for method input_type
 2, // [2:2] is the sub-list for extension type_name
 2, // [2:2] is the sub-list for extension extendee
 0, // [0:2] is the sub-list for field type_name
}

func init() { file_google_ai_generativelanguage_v1alpha_permission_proto_init()
 }
func file_google_ai_generativelanguage_v1alpha_permission_proto_init() {
 if File_google_ai_generativelanguage_v1alpha_permission_proto != nil {
  return
 }
 file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes[0].OneofWrappers = []any{}
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor: file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc,
   NumEnums:      2,
```

```
  NumMessages:   1,
  NumExtensions: 0,
  NumServices:   0,
 },
 GoTypes:          file_google_ai_generativelanguage_v1alpha_permission_proto_goTypes,
 DependencyIndexes: file_google_ai_generativelanguage_v1alpha_permission_proto_depIdxs,
 EnumInfos:         file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes,
 MessageInfos:      file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes,
}.Build()
File_google_ai_generativelanguage_v1alpha_permission_proto = out.File
file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc
= nil
file_google_ai_generativelanguage_v1alpha_permission_proto_goTypes = nil
file_google_ai_generativelanguage_v1alpha_permission_proto_depIdxs = nil
}
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// You may obtain a copy of the License at
//
//     https://www.apache.org/licenses/LICENSE-2.0
//
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// distributed under the License is distributed on an "AS IS" BASIS,
// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
// See the License for the specific language governing permissions and
// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1beta"
 computepb "cloud.google.com/go/compute/apiv1beta/computepb"
)

func ExampleLicensesClient_List_all() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require
 modifications to work:
 // - It may require correct/in-range values for request initialization.
```

```
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.ListLicensesRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#ListLicensesRequest.
}
for resp, err := range c.List(ctx, req).All() {
 if err != nil {
  // TODO: Handle error and break/return/continue. Iteration will stop after any error.
 }
 // TODO: Use resp.
 _ = resp
}
}
// Copyright 2025 Google LLC
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// Licensed under the Apache License, Version 2.0 (the "License");
// you may not use this file except in compliance with the License.
// You may obtain a copy of the License at
//
//     http://www.apache.org/licenses/LICENSE-2.0
//
// Unless required by applicable law or agreed to in writing, software
// distributed under the License is distributed on an "AS IS" BASIS,
// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
// See the License for the specific language governing permissions and
// limitations under the License.

// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.35.2
//  protoc        v4.25.7
// source: google/cloud/discoveryengine/v1/user_license_service.proto

package discoveryenginepb

import (
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 context "context"
 _ "google.golang.org/genproto/googleapis/api/annotations"
 status "google.golang.org/genproto/googleapis/rpc/status"
 grpc
```

```
 "google.golang.org/grpc"
 codes "google.golang.org/grpc/codes"
 status1 "google.golang.org/grpc/status"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
 fieldmaskpb "google.golang.org/protobuf/types/known/fieldmaskpb"
 timestamppb "google.golang.org/protobuf/types/known/timestamppb"
 reflect "reflect"
 sync "sync"
)

const (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Request message for
// [UserLicenseService.ListUserLicenses][google.cloud.discoveryengine.v1.UserLicenseService.ListUserLicenses].
type ListUserLicensesRequest struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. The parent [UserStore][] resource name,
 format:
 // `projects/{project}/locations/{location}/userStores/{user_store_id}`.
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Optional. Requested page size. Server may return fewer items than
 // requested. If unspecified, defaults to 10. The maximum value is 50; values
 // above 50 will be coerced to 50.
 //
 // If this field is negative, an INVALID_ARGUMENT error is returned.
 PageSize int32 `protobuf:"varint,2,opt,name=page_size,json=pageSize,proto3" json:"page_size,omitempty"`
 // Optional. A page token, received from a previous `ListUserLicenses` call.
 // Provide this to retrieve the subsequent page.
 //
 // When paginating, all other parameters provided to `ListUserLicenses`
 // must match the call that provided the page token.
 PageToken string `protobuf:"bytes,3,opt,name=page_token,json=pageToken,proto3" json:"page_token,omitempty"`
 // Optional. Filter for the list request.
 //
 // Supported fields:
 //
 // * `license_assignment_state`
 //
 //
```

```
 Examples:
 //
 // * `license_assignment_state = ASSIGNED` to list assigned user licenses.
 // * `license_assignment_state = NO_LICENSE` to list not licensed users.
 // * `license_assignment_state = NO_LICENSE_ATTEMPTED_LOGIN` to list users
 // who attempted login but no license assigned.
 // * `license_assignment_state != NO_LICENSE_ATTEMPTED_LOGIN` to filter
 // out users who attempted login but no license assigned.
 Filter string `protobuf:"bytes,4,opt,name=filter,proto3" json:"filter,omitempty"`
}

func (x *ListUserLicensesRequest) Reset() {
 *x = ListUserLicensesRequest{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[0]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *ListUserLicensesRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*ListUserLicensesRequest) ProtoMessage() {}

func (x *ListUserLicensesRequest) ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[0]
 if
 x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use ListUserLicensesRequest.ProtoReflect.Descriptor instead.
func (*ListUserLicensesRequest) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP(), []int{0}
}

func (x *ListUserLicensesRequest) GetParent() string {
 if x != nil {
  return x.Parent
 }
 return ""
}
```

```
func (x *ListUserLicensesRequest) GetPageSize() int32 {
 if x != nil {
  return x.PageSize
 }
 return 0
}

func (x *ListUserLicensesRequest) GetPageToken() string {
 if x != nil {
  return x.PageToken
 }
 return ""
}

func (x *ListUserLicensesRequest) GetFilter() string {
 if x != nil {
  return x.Filter
 }
 return ""
}

// Response message for
// [UserLicenseService.ListUserLicenses][google.cloud.discoveryengine.v1.UserLicenseService.ListUserLicenses].
type
 ListUserLicensesResponse struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // All the customer's
 // [UserLicense][google.cloud.discoveryengine.v1.UserLicense]s.
 UserLicenses []*UserLicense `protobuf:"bytes,1,rep,name=user_licenses,json=userLicenses,proto3"
json:"user_licenses,omitempty"`
 // A token, which can be sent as `page_token` to retrieve the next page. If
 // this field is omitted, there are no subsequent pages.
 NextPageToken string `protobuf:"bytes,2,opt,name=next_page_token,json=nextPageToken,proto3"
json:"next_page_token,omitempty"`
}

func (x *ListUserLicensesResponse) Reset() {
 *x = ListUserLicensesResponse{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[1]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *ListUserLicensesResponse) String() string {
```

```
 return protoimpl.X.MessageStringOf(x)
}

func
 (*ListUserLicensesResponse) ProtoMessage() {}

func (x *ListUserLicensesResponse) ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[1]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use ListUserLicensesResponse.ProtoReflect.Descriptor instead.
func (*ListUserLicensesResponse) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP(), []int{1}
}

func (x *ListUserLicensesResponse) GetUserLicenses() []*UserLicense {
 if x != nil {
  return x.UserLicenses
 }
 return nil
}

func (x *ListUserLicensesResponse) GetNextPageToken() string {
 if x != nil {
  return x.NextPageToken
 }
 return ""
}

// Request message for
//
[UserLicenseService.BatchUpdateUserLicenses][google.cloud.discoveryengine.v1.UserLicenseService.BatchUpdat
eUserLicenses]
//
 method.
type BatchUpdateUserLicensesRequest struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields
```

```
 // Required. The source of the input.
 //
 // Types that are assignable to Source:
 //
 // *BatchUpdateUserLicensesRequest_InlineSource_
 Source isBatchUpdateUserLicensesRequest_Source `protobuf_oneof:"source"`
 // Required. The parent [UserStore][] resource name, format:
 // `projects/{project}/locations/{location}/userStores/{user_store_id}`.
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Optional. If true, if user licenses removed associated license config, the
 // user license will be deleted. By default which is false, the user license
 // will be updated to unassigned state.
 DeleteUnassignedUserLicenses bool
`protobuf:"varint,4,opt,name=delete_unassigned_user_licenses,json=deleteUnassignedUserLicenses,proto3"
json:"delete_unassigned_user_licenses,omitempty"`
}

func
 (x *BatchUpdateUserLicensesRequest) Reset() {
 *x = BatchUpdateUserLicensesRequest{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[2]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *BatchUpdateUserLicensesRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*BatchUpdateUserLicensesRequest) ProtoMessage() {}

func (x *BatchUpdateUserLicensesRequest) ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[2]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use BatchUpdateUserLicensesRequest.ProtoReflect.Descriptor instead.
func (*BatchUpdateUserLicensesRequest) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP(),
 []int{2}
}
```

```
func (m *BatchUpdateUserLicensesRequest) GetSource() isBatchUpdateUserLicensesRequest_Source {
 if m != nil {
  return m.Source
 }
 return nil
}

func (x *BatchUpdateUserLicensesRequest) GetInlineSource() *BatchUpdateUserLicensesRequest_InlineSource {
 if x, ok := x.GetSource().(*BatchUpdateUserLicensesRequest_InlineSource_); ok {
  return x.InlineSource
 }
 return nil
}

func (x *BatchUpdateUserLicensesRequest) GetParent() string {
 if x != nil {
  return x.Parent
 }
 return ""
}

func (x *BatchUpdateUserLicensesRequest) GetDeleteUnassignedUserLicenses() bool {
 if x != nil {
  return x.DeleteUnassignedUserLicenses
 }
 return false
}

type isBatchUpdateUserLicensesRequest_Source interface {
 isBatchUpdateUserLicensesRequest_Source()
}

type BatchUpdateUserLicensesRequest_InlineSource_ struct {
 // The inline source for the input content for document embeddings.
 InlineSource *BatchUpdateUserLicensesRequest_InlineSource
`protobuf:"bytes,2,opt,name=inline_source,json=inlineSource,proto3,oneof"`
}

func
 (*BatchUpdateUserLicensesRequest_InlineSource_) isBatchUpdateUserLicensesRequest_Source() {}

// Metadata related to the progress of the
//
[UserLicenseService.BatchUpdateUserLicenses][google.cloud.discoveryengine.v1.UserLicenseService.BatchUpdat
eUserLicenses]
// operation. This will be returned by the google.longrunning.Operation.metadata
// field.
```

```
type BatchUpdateUserLicensesMetadata struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Operation create time.
 CreateTime *timestamppb.Timestamp `protobuf:"bytes,1,opt,name=create_time,json=createTime,proto3"
json:"create_time,omitempty"`
 // Operation last update time. If the operation is done, this is also the
 // finish time.
 UpdateTime *timestamppb.Timestamp `protobuf:"bytes,2,opt,name=update_time,json=updateTime,proto3"
json:"update_time,omitempty"`
 // Count of user licenses successfully updated.
 SuccessCount
 int64 `protobuf:"varint,3,opt,name=success_count,json=successCount,proto3" json:"success_count,omitempty"`
 // Count of user licenses that failed to be updated.
 FailureCount int64 `protobuf:"varint,4,opt,name=failure_count,json=failureCount,proto3"
json:"failure_count,omitempty"`
}

func (x *BatchUpdateUserLicensesMetadata) Reset() {
 *x = BatchUpdateUserLicensesMetadata{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[3]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *BatchUpdateUserLicensesMetadata) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*BatchUpdateUserLicensesMetadata) ProtoMessage() {}

func (x *BatchUpdateUserLicensesMetadata) ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[3]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return
 ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use BatchUpdateUserLicensesMetadata.ProtoReflect.Descriptor instead.
func (*BatchUpdateUserLicensesMetadata) Descriptor() ([]byte, []int) {
```

```
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP(), []int{3}
}

func (x *BatchUpdateUserLicensesMetadata) GetCreateTime() *timestamppb.Timestamp {
 if x != nil {
  return x.CreateTime
 }
 return nil
}

func (x *BatchUpdateUserLicensesMetadata) GetUpdateTime() *timestamppb.Timestamp {
 if x != nil {
  return x.UpdateTime
 }
 return nil
}

func (x *BatchUpdateUserLicensesMetadata) GetSuccessCount() int64 {
 if x != nil {
  return x.SuccessCount
 }
 return 0
}

func (x *BatchUpdateUserLicensesMetadata) GetFailureCount() int64 {
 if x != nil {
  return x.FailureCount
 }
 return 0
}

// Response message for
//
[UserLicenseService.BatchUpdateUserLicenses][google.cloud.discoveryengine.v1.UserLicenseService.BatchUpdat
eUserLicenses]
// method.
type
 BatchUpdateUserLicensesResponse struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // UserLicenses successfully updated.
 UserLicenses []*UserLicense `protobuf:"bytes,1,rep,name=user_licenses,json=userLicenses,proto3"
json:"user_licenses,omitempty"`
 // A sample of errors encountered while processing the request.
 ErrorSamples []*status.Status `protobuf:"bytes,2,rep,name=error_samples,json=errorSamples,proto3"
json:"error_samples,omitempty"`
```

```
}

func (x *BatchUpdateUserLicensesResponse) Reset() {
 *x = BatchUpdateUserLicensesResponse{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[4]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *BatchUpdateUserLicensesResponse) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*BatchUpdateUserLicensesResponse) ProtoMessage() {}

func (x *BatchUpdateUserLicensesResponse) ProtoReflect()
 protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[4]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use BatchUpdateUserLicensesResponse.ProtoReflect.Descriptor instead.
func (*BatchUpdateUserLicensesResponse) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP(), []int{4}
}

func (x *BatchUpdateUserLicensesResponse) GetUserLicenses() []*UserLicense {
 if x != nil {
  return x.UserLicenses
 }
 return nil
}

func (x *BatchUpdateUserLicensesResponse) GetErrorSamples() []*status.Status {
 if x != nil {
  return x.ErrorSamples
 }
 return nil
}

// The inline source for the input config for BatchUpdateUserLicenses
```

```
// method.
type BatchUpdateUserLicensesRequest_InlineSource struct {
 state         protoimpl.MessageState
 sizeCache
     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. A list of user licenses to update. Each user license
 // must have a valid
 // [UserLicense.user_principal][google.cloud.discoveryengine.v1.UserLicense.user_principal].
 UserLicenses []*UserLicense `protobuf:"bytes,1,rep,name=user_licenses,json=userLicenses,proto3"
json:"user_licenses,omitempty"`
 // Optional. The list of fields to update.
 UpdateMask *fieldmaskpb.FieldMask `protobuf:"bytes,2,opt,name=update_mask,json=updateMask,proto3"
json:"update_mask,omitempty"`
}

func (x *BatchUpdateUserLicensesRequest_InlineSource) Reset() {
 *x = BatchUpdateUserLicensesRequest_InlineSource{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[5]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *BatchUpdateUserLicensesRequest_InlineSource) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*BatchUpdateUserLicensesRequest_InlineSource)
 ProtoMessage() {}

func (x *BatchUpdateUserLicensesRequest_InlineSource) ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[5]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use BatchUpdateUserLicensesRequest_InlineSource.ProtoReflect.Descriptor instead.
func (*BatchUpdateUserLicensesRequest_InlineSource) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP(), []int{2, 0}
}
```

```
func (x *BatchUpdateUserLicensesRequest_InlineSource) GetUserLicenses() []*UserLicense {
 if x != nil {
  return x.UserLicenses
 }
 return nil
}

func (x *BatchUpdateUserLicensesRequest_InlineSource) GetUpdateMask() *fieldmaskpb.FieldMask {
 if x != nil {
  return x.UpdateMask
 }
 return nil
}

var File_google_cloud_discoveryengine_v1_user_license_service_proto
 protoreflect.FileDescriptor

var file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDesc = []byte{
 0x0a, 0x3a, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2f, 0x64,
 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2f, 0x76,
 0x31, 0x2f, 0x75, 0x73, 0x65, 0x72, 0x5f, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x5f, 0x73,
 0x65, 0x72, 0x76, 0x69, 0x63, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x12, 0x1f, 0x67, 0x6f,
 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x64, 0x69, 0x73, 0x63, 0x6f,
 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2e, 0x76, 0x31, 0x1a, 0x1c, 0x67,
 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x61, 0x6e, 0x6e, 0x6f, 0x74, 0x61,
 0x74, 0x69, 0x6f, 0x6e, 0x73, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x17, 0x67, 0x6f, 0x6f,
 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x63, 0x6c, 0x69, 0x65, 0x6e, 0x74,
 0x2e, 0x70,
 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x1f, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69,
 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64, 0x5f, 0x62, 0x65, 0x68, 0x61, 0x76, 0x69, 0x6f, 0x72, 0x2e,
 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x19, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70,
 0x69, 0x2f, 0x72, 0x65, 0x73, 0x6f, 0x75, 0x72, 0x63, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f,
 0x1a, 0x32, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2f, 0x64,
 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2f, 0x76,
 0x31, 0x2f, 0x75, 0x73, 0x65, 0x72, 0x5f, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x2e, 0x70,
 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x23, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x6c, 0x6f, 0x6e,
 0x67, 0x72, 0x75, 0x6e, 0x6e, 0x69, 0x6e, 0x67, 0x2f, 0x6f, 0x70, 0x65, 0x72, 0x61, 0x74, 0x69,
 0x6f, 0x6e, 0x73, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x20, 0x67, 0x6f, 0x6f, 0x67, 0x6c,
 0x65, 0x2f, 0x70,
 0x72, 0x6f, 0x74, 0x6f, 0x62, 0x75, 0x66, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64,
 0x5f, 0x6d, 0x61, 0x73, 0x6b, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x1f, 0x67, 0x6f, 0x6f,
 0x67, 0x6c, 0x65, 0x2f, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x62, 0x75, 0x66, 0x2f, 0x74, 0x69, 0x6d,
 0x65, 0x73, 0x74, 0x61, 0x6d, 0x70, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x17, 0x67, 0x6f,
 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x72, 0x70, 0x63, 0x2f, 0x73, 0x74, 0x61, 0x74, 0x75, 0x73, 0x2e,
 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x22, 0xc6, 0x01, 0x0a, 0x17, 0x4c, 0x69, 0x73, 0x74, 0x55, 0x73,
 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x73, 0x52, 0x65, 0x71, 0x75, 0x65, 0x73,
 0x74, 0x12, 0x48, 0x0a, 0x06, 0x70, 0x61, 0x72, 0x65, 0x6e, 0x74, 0x18, 0x01, 0x20, 0x01, 0x28,
 0x09, 0x42, 0x30, 0xe0, 0x41, 0x02, 0xfa, 0x41, 0x2a, 0x0a, 0x28, 0x64, 0x69, 0x73, 0x63, 0x6f,
```

0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c,
0x65, 0x61, 0x70, 0x69, 0x73, 0x2e, 0x63, 0x6f,
0x6d, 0x2f, 0x55, 0x73, 0x65, 0x72, 0x53, 0x74,
0x6f, 0x72, 0x65, 0x52, 0x06, 0x70, 0x61, 0x72, 0x65, 0x6e, 0x74, 0x12, 0x20, 0x0a, 0x09, 0x70,
0x61, 0x67, 0x65, 0x5f, 0x73, 0x69, 0x7a, 0x65, 0x18, 0x02, 0x20, 0x01, 0x28, 0x05, 0x42, 0x03,
0xe0, 0x41, 0x01, 0x52, 0x08, 0x70, 0x61, 0x67, 0x65, 0x53, 0x69, 0x7a, 0x65, 0x12, 0x22, 0x0a,
0x0a, 0x70, 0x61, 0x67, 0x65, 0x5f, 0x74, 0x6f, 0x6b, 0x65, 0x6e, 0x18, 0x03, 0x20, 0x01, 0x28,
0x09, 0x42, 0x03, 0xe0, 0x41, 0x01, 0x52, 0x09, 0x70, 0x61, 0x67, 0x65, 0x54, 0x6f, 0x6b, 0x65,
0x6e, 0x12, 0x1b, 0x0a, 0x06, 0x66, 0x69, 0x6c, 0x74, 0x65, 0x72, 0x18, 0x04, 0x20, 0x01, 0x28,
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0x6e, 0x73, 0x65, 0x53, 0x65, 0x72, 0x76, 0x69, 0x63, 0x65, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x50,
0x01, 0x5a, 0x4d, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e,
0x63, 0x6f, 0x6d, 0x2f, 0x67, 0x6f, 0x2f, 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79,
0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x76, 0x31, 0x2f, 0x64, 0x69, 0x73,
0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x70, 0x62, 0x3b, 0x64,
0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x70, 0x62,
0xa2, 0x02, 0x0f,
0x44, 0x49, 0x53, 0x43, 0x4f, 0x56, 0x45, 0x52, 0x59, 0x45, 0x4e, 0x47, 0x49,
0x4e, 0x45, 0xaa, 0x02, 0x1f, 0x47, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x43, 0x6c, 0x6f, 0x75,
0x64, 0x2e, 0x44, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x45, 0x6e, 0x67, 0x69, 0x6e,
0x65, 0x2e, 0x56, 0x31, 0xca, 0x02, 0x1f, 0x47, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x5c, 0x43, 0x6c,
0x6f, 0x75, 0x64, 0x5c, 0x44, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x45, 0x6e, 0x67,

```
 0x69, 0x6e, 0x65, 0x5c, 0x56, 0x31, 0xea, 0x02, 0x22, 0x47, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x3a,
 0x3a, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x3a, 0x3a, 0x44, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72,
 0x79, 0x45, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x3a, 0x3a, 0x56, 0x31, 0x62, 0x06, 0x70, 0x72, 0x6f,
 0x74, 0x6f, 0x33,
}

var (
 file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescOnce sync.Once
 file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescData =
file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDesc
)

func
 file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP() []byte {
 file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescOnce.Do(func() {
  file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescData)
 })
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescData
}

var file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes =
make([]protoimpl.MessageInfo, 6)
var file_google_cloud_discoveryengine_v1_user_license_service_proto_goTypes = []any{
 (*ListUserLicensesRequest)(nil),                    // 0: google.cloud.discoveryengine.v1.ListUserLicensesRequest
 (*ListUserLicensesResponse)(nil),                    // 1: google.cloud.discoveryengine.v1.ListUserLicensesResponse
 (*BatchUpdateUserLicensesRequest)(nil),              // 2:
google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest
 (*BatchUpdateUserLicensesMetadata)(nil),
             // 3: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesMetadata
 (*BatchUpdateUserLicensesResponse)(nil),             // 4:
google.cloud.discoveryengine.v1.BatchUpdateUserLicensesResponse
 (*BatchUpdateUserLicensesRequest_InlineSource)(nil), // 5:
google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest.InlineSource
 (*UserLicense)(nil),                                 // 6: google.cloud.discoveryengine.v1.UserLicense
 (*timestamppb.Timestamp)(nil),                       // 7: google.protobuf.Timestamp
 (*status.Status)(nil),                               // 8: google.rpc.Status
 (*fieldmaskpb.FieldMask)(nil),                       // 9: google.protobuf.FieldMask
 (*longrunningpb.Operation)(nil),                     // 10: google.longrunning.Operation
}
var file_google_cloud_discoveryengine_v1_user_license_service_proto_depIdxs = []int32{
 6,  // 0: google.cloud.discoveryengine.v1.ListUserLicensesResponse.user_licenses:type_name
 -> google.cloud.discoveryengine.v1.UserLicense
 5,  // 1: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest.inline_source:type_name ->
google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest.InlineSource
 7,  // 2: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesMetadata.create_time:type_name ->
google.protobuf.Timestamp
 7,  // 3: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesMetadata.update_time:type_name ->
```

```
google.protobuf.Timestamp
 6,  // 4: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesResponse.user_licenses:type_name ->
google.cloud.discoveryengine.v1.UserLicense
 8,  // 5: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesResponse.error_samples:type_name ->
google.rpc.Status
 6,  // 6: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest.InlineSource.user_licenses:type_name -
> google.cloud.discoveryengine.v1.UserLicense
 9,  // 7: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest.InlineSource.update_mask:type_name
 -> google.protobuf.FieldMask
 0,  // 8: google.cloud.discoveryengine.v1.UserLicenseService.ListUserLicenses:input_type ->
google.cloud.discoveryengine.v1.ListUserLicensesRequest
 2,  // 9: google.cloud.discoveryengine.v1.UserLicenseService.BatchUpdateUserLicenses:input_type ->
google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest
 1,  // 10: google.cloud.discoveryengine.v1.UserLicenseService.ListUserLicenses:output_type ->
google.cloud.discoveryengine.v1.ListUserLicensesResponse
 10, // 11: google.cloud.discoveryengine.v1.UserLicenseService.BatchUpdateUserLicenses:output_type ->
google.longrunning.Operation
 10, // [10:12] is the sub-list for method output_type
 8,  // [8:10] is the sub-list for method input_type
 8,  // [8:8] is the sub-list for extension type_name
 8,  // [8:8] is the sub-list for extension extendee
 0,  // [0:8] is the sub-list for field type_name
}

func init() { file_google_cloud_discoveryengine_v1_user_license_service_proto_init()
 }
func file_google_cloud_discoveryengine_v1_user_license_service_proto_init() {
 if File_google_cloud_discoveryengine_v1_user_license_service_proto != nil {
  return
 }
 file_google_cloud_discoveryengine_v1_user_license_proto_init()
 file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[2].OneofWrappers = []any{
  (*BatchUpdateUserLicensesRequest_InlineSource_)(nil),
 }
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor: file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDesc,
   NumEnums:      0,
   NumMessages:   6,
   NumExtensions: 0,
   NumServices:   1,
  },
  GoTypes:           file_google_cloud_discoveryengine_v1_user_license_service_proto_goTypes,
  DependencyIndexes: file_google_cloud_discoveryengine_v1_user_license_service_proto_depIdxs,
  MessageInfos:      file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes,
 }.Build()
```

```
 File_google_cloud_discoveryengine_v1_user_license_service_proto
 = out.File
 file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDesc = nil
 file_google_cloud_discoveryengine_v1_user_license_service_proto_goTypes = nil
 file_google_cloud_discoveryengine_v1_user_license_service_proto_depIdxs = nil
}

// Reference imports to suppress errors if they are not otherwise used.
var _ context.Context
var _ grpc.ClientConnInterface

// This is a compile-time assertion to ensure that this generated file
// is compatible with the grpc package it is being compiled against.
const _ = grpc.SupportPackageIsVersion6

// UserLicenseServiceClient is the client API for UserLicenseService service.
//
// For semantics around ctx use and closing/ending streaming RPCs, please refer to
https://godoc.org/google.golang.org/grpc#ClientConn.NewStream.
type UserLicenseServiceClient interface {
 // Lists the User Licenses.
 ListUserLicenses(ctx context.Context, in *ListUserLicensesRequest,
 opts ...grpc.CallOption) (*ListUserLicensesResponse, error)
 // Updates the User License.
 // This method is used for batch assign/unassign licenses to users.
 BatchUpdateUserLicenses(ctx context.Context, in *BatchUpdateUserLicensesRequest, opts ...grpc.CallOption)
(*longrunningpb.Operation, error)
}

type userLicenseServiceClient struct {
 cc grpc.ClientConnInterface
}

func NewUserLicenseServiceClient(cc grpc.ClientConnInterface) UserLicenseServiceClient {
 return &userLicenseServiceClient{cc}
}

func (c *userLicenseServiceClient) ListUserLicenses(ctx context.Context, in *ListUserLicensesRequest, opts
...grpc.CallOption) (*ListUserLicensesResponse, error) {
 out := new(ListUserLicensesResponse)
 err := c.cc.Invoke(ctx, "/google.cloud.discoveryengine.v1.UserLicenseService/ListUserLicenses", in, out, opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

func (c *userLicenseServiceClient) BatchUpdateUserLicenses(ctx context.Context, in
```

```
*BatchUpdateUserLicensesRequest,
 opts ...grpc.CallOption) (*longrunningpb.Operation, error) {
 out := new(longrunningpb.Operation)
 err := c.cc.Invoke(ctx, "/google.cloud.discoveryengine.v1.UserLicenseService/BatchUpdateUserLicenses", in, out,
opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

// UserLicenseServiceServer is the server API for UserLicenseService service.
type UserLicenseServiceServer interface {
 // Lists the User Licenses.
 ListUserLicenses(context.Context, *ListUserLicensesRequest) (*ListUserLicensesResponse, error)
 // Updates the User License.
 // This method is used for batch assign/unassign licenses to users.
 BatchUpdateUserLicenses(context.Context, *BatchUpdateUserLicensesRequest) (*longrunningpb.Operation, error)
}

// UnimplementedUserLicenseServiceServer can be embedded to have forward compatible implementations.
type UnimplementedUserLicenseServiceServer struct {
}

func (*UnimplementedUserLicenseServiceServer) ListUserLicenses(context.Context, *ListUserLicensesRequest)
 (*ListUserLicensesResponse, error) {
 return nil, status1.Errorf(codes.Unimplemented, "method ListUserLicenses not implemented")
}
func (*UnimplementedUserLicenseServiceServer) BatchUpdateUserLicenses(context.Context,
*BatchUpdateUserLicensesRequest) (*longrunningpb.Operation, error) {
 return nil, status1.Errorf(codes.Unimplemented, "method BatchUpdateUserLicenses not implemented")
}

func RegisterUserLicenseServiceServer(s *grpc.Server, srv UserLicenseServiceServer) {
 s.RegisterService(&_UserLicenseService_serviceDesc, srv)
}

func _UserLicenseService_ListUserLicenses_Handler(srv interface{}, ctx context.Context, dec func(interface{})
error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(ListUserLicensesRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(UserLicenseServiceServer).ListUserLicenses(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
```

```
 FullMethod: "/google.cloud.discoveryengine.v1.UserLicenseService/ListUserLicenses",
 }
 handler
 := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(UserLicenseServiceServer).ListUserLicenses(ctx, req.(*ListUserLicensesRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _UserLicenseService_BatchUpdateUserLicenses_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(BatchUpdateUserLicensesRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(UserLicenseServiceServer).BatchUpdateUserLicenses(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: "/google.cloud.discoveryengine.v1.UserLicenseService/BatchUpdateUserLicenses",
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(UserLicenseServiceServer).BatchUpdateUserLicenses(ctx, req.(*BatchUpdateUserLicensesRequest))
 }
 return interceptor(ctx,
 in, info, handler)
}

var _UserLicenseService_serviceDesc = grpc.ServiceDesc{
 ServiceName: "google.cloud.discoveryengine.v1.UserLicenseService",
 HandlerType: (*UserLicenseServiceServer)(nil),
 Methods: []grpc.MethodDesc{
  {
   MethodName: "ListUserLicenses",
   Handler:    _UserLicenseService_ListUserLicenses_Handler,
  },
  {
   MethodName: "BatchUpdateUserLicenses",
   Handler:    _UserLicenseService_BatchUpdateUserLicenses_Handler,
  },
 },
 Streams:  []grpc.StreamDesc{},
 Metadata: "google/cloud/discoveryengine/v1/user_license_service.proto",
}
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```

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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package discoveryengine_test

import (
 "context"

 discoveryengine "cloud.google.com/go/discoveryengine/apiv1"
 discoveryenginepb "cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 "google.golang.org/api/iterator"
)

func ExampleNewUserLicenseClient() {
 ctx := context.Background()
 //
 This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleNewUserLicenseRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
```

```
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseRESTClient(ctx)
 if
 err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleUserLicenseClient_BatchUpdateUserLicenses() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &discoveryenginepb.BatchUpdateUserLicensesRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb#BatchUpdateUserLicensesReque
st.
 }
 op, err := c.BatchUpdateUserLicenses(ctx, req)
 if err != nil {
  //
 TODO: Handle error.
 }

 resp, err := op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleUserLicenseClient_ListUserLicenses() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
```

```
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := discoveryengine.NewUserLicenseClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &discoveryenginepb.ListUserLicensesRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb#ListUserLicensesRequest.
}
it := c.ListUserLicenses(ctx, req)
for {
 resp, err := it.Next()
 if err == iterator.Done
 {
  break
 }
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp

 // If you need to access the underlying RPC response,
 // you can do so by casting the `Response` as below.
 // Otherwise, remove this line. Only populated after
 // first call to Next(). Not safe for concurrent access.
 _ = it.Response.(*discoveryenginepb.ListUserLicensesResponse)
}
}

func ExampleUserLicenseClient_CancelOperation() {
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := discoveryengine.NewUserLicenseClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()
```

```
 req := &longrunningpb.CancelOperationRequest{
  //
 TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#CancelOperationRequest.
 }
 err = c.CancelOperation(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleUserLicenseClient_GetOperation() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &longrunningpb.GetOperationRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#GetOperationRequest.
 }
 resp,
 err := c.GetOperation(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleUserLicenseClient_ListOperations() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
```

```
 defer c.Close()

 req := &longrunningpb.ListOperationsRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#ListOperationsRequest.
 }
 it := c.ListOperations(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   //
 TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*longrunningpb.ListOperationsResponse)
 }
}

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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1beta"
 computepb "cloud.google.com/go/compute/apiv1beta/computepb"
)

func ExampleNewLicenseCodesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications
 to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicenseCodesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()
```

```
 req := &computepb.GetLicenseCodeRequest{
  // TODO:
 Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#GetLicenseCodeRequest.
 }
 resp, err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicenseCodesClient_TestIamPermissions() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.TestIamPermissionsLicenseCodeRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#TestIamPermissionsLicenseCodeRequest.
 }
 resp,
 err := c.TestIamPermissions(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
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//go:build go1.23

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
)

func ExampleLicensesClient_List_all() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications
 to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.ListLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#ListLicensesRequest.
```

```
 }
 for resp, err := range c.List(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}
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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.35.2
//  protoc        v4.25.7
// source: google/cloud/discoveryengine/v1/user_license.proto

package discoveryenginepb

import (
 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
 timestamppb "google.golang.org/protobuf/types/known/timestamppb"
 reflect
 "reflect"
 sync "sync"
)

const (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)
```

```
// License assignment state enumeration.
type UserLicense_LicenseAssignmentState int32

const (
 // Default value.
 UserLicense_LICENSE_ASSIGNMENT_STATE_UNSPECIFIED UserLicense_LicenseAssignmentState = 0
 // License assigned to the user.
 UserLicense_ASSIGNED UserLicense_LicenseAssignmentState = 1
 // No license assigned to the user.
 // Deprecated, translated to NO_LICENSE.
 UserLicense_UNASSIGNED UserLicense_LicenseAssignmentState = 2
 // No license assigned to the user.
 UserLicense_NO_LICENSE UserLicense_LicenseAssignmentState = 3
 // User attempted to login but no license assigned to the user.
 // This state is only used for no user first time login attempt
 but cannot
 // get license assigned.
 // Users already logged in but cannot get license assigned will be assigned
 // NO_LICENSE state(License could be unassigned by admin).
 UserLicense_NO_LICENSE_ATTEMPTED_LOGIN UserLicense_LicenseAssignmentState = 4
)

// Enum value maps for UserLicense_LicenseAssignmentState.
var (
 UserLicense_LicenseAssignmentState_name = map[int32]string{
  0: "LICENSE_ASSIGNMENT_STATE_UNSPECIFIED",
  1: "ASSIGNED",
  2: "UNASSIGNED",
  3: "NO_LICENSE",
  4: "NO_LICENSE_ATTEMPTED_LOGIN",
 }
 UserLicense_LicenseAssignmentState_value = map[string]int32{
  "LICENSE_ASSIGNMENT_STATE_UNSPECIFIED": 0,
  "ASSIGNED":                             1,
  "UNASSIGNED":                           2,
  "NO_LICENSE":                           3,
  "NO_LICENSE_ATTEMPTED_LOGIN":           4,
 }
)

func (x UserLicense_LicenseAssignmentState) Enum() *UserLicense_LicenseAssignmentState {
 p := new(UserLicense_LicenseAssignmentState)
 *p = x
 return p
}

func (x UserLicense_LicenseAssignmentState)
```

```
 String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (UserLicense_LicenseAssignmentState) Descriptor() protoreflect.EnumDescriptor {
 return file_google_cloud_discoveryengine_v1_user_license_proto_enumTypes[0].Descriptor()
}

func (UserLicense_LicenseAssignmentState) Type() protoreflect.EnumType {
 return &file_google_cloud_discoveryengine_v1_user_license_proto_enumTypes[0]
}

func (x UserLicense_LicenseAssignmentState) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use UserLicense_LicenseAssignmentState.Descriptor instead.
func (UserLicense_LicenseAssignmentState) EnumDescriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_proto_rawDescGZIP(), []int{0, 0}
}

// User License information assigned by the admin.
type UserLicense struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 //
 Required. Immutable. The user principal of the User, could be email address
 // or other prinical identifier. This field is immutable. Admin assign
 // licenses based on the user principal.
 UserPrincipal string `protobuf:"bytes,1,opt,name=user_principal,json=userPrincipal,proto3"
json:"user_principal,omitempty"`
 // Optional. The user profile.
 // We user user full name(First name + Last name) as user profile.
 UserProfile string `protobuf:"bytes,3,opt,name=user_profile,json=userProfile,proto3"
json:"user_profile,omitempty"`
 // Output only. License assignment state of the user.
 // If the user is assigned with a license config, the user loggin will be
 // assigned with the license;
 // If the user's license assignment state is unassigned or unspecified, no
 // license config will be associated to the user;
 LicenseAssignmentState UserLicense_LicenseAssignmentState
`protobuf:"varint,4,opt,name=license_assignment_state,json=licenseAssignmentState,proto3,enum=google.cloud.dis
coveryengine.v1.UserLicense_LicenseAssignmentState"
 json:"license_assignment_state,omitempty"`
 // Optional. The full resource name of the Subscription(LicenseConfig)
 // assigned to the user.
```

```
 LicenseConfig string `protobuf:"bytes,5,opt,name=license_config,json=licenseConfig,proto3"
json:"license_config,omitempty"`
 // Output only. User created timestamp.
 CreateTime *timestamppb.Timestamp `protobuf:"bytes,6,opt,name=create_time,json=createTime,proto3"
json:"create_time,omitempty"`
 // Output only. User update timestamp.
 UpdateTime *timestamppb.Timestamp `protobuf:"bytes,7,opt,name=update_time,json=updateTime,proto3"
json:"update_time,omitempty"`
 // Output only. User last logged in time.
 // If the user has not logged in yet, this field will be empty.
 LastLoginTime *timestamppb.Timestamp
`protobuf:"bytes,8,opt,name=last_login_time,json=lastLoginTime,proto3" json:"last_login_time,omitempty"`
}

func (x *UserLicense) Reset() {
 *x = UserLicense{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_proto_msgTypes[0]
 ms
 := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *UserLicense) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UserLicense) ProtoMessage() {}

func (x *UserLicense) ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use UserLicense.ProtoReflect.Descriptor instead.
func (*UserLicense) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_proto_rawDescGZIP(), []int{0}
}

func (x *UserLicense) GetUserPrincipal() string {
 if x != nil {
  return x.UserPrincipal
```

```
 }
 return ""
}

func (x *UserLicense) GetUserProfile() string {
 if x != nil {
  return x.UserProfile
 }
 return ""
}

func (x *UserLicense) GetLicenseAssignmentState()
 UserLicense_LicenseAssignmentState {
 if x != nil {
  return x.LicenseAssignmentState
 }
 return UserLicense_LICENSE_ASSIGNMENT_STATE_UNSPECIFIED
}

func (x *UserLicense) GetLicenseConfig() string {
 if x != nil {
  return x.LicenseConfig
 }
 return ""
}

func (x *UserLicense) GetCreateTime() *timestamppb.Timestamp {
 if x != nil {
  return x.CreateTime
 }
 return nil
}

func (x *UserLicense) GetUpdateTime() *timestamppb.Timestamp {
 if x != nil {
  return x.UpdateTime
 }
 return nil
}

func (x *UserLicense) GetLastLoginTime() *timestamppb.Timestamp {
 if x != nil {
  return x.LastLoginTime
 }
 return nil
}

var File_google_cloud_discoveryengine_v1_user_license_proto protoreflect.FileDescriptor
```

```
var file_google_cloud_discoveryengine_v1_user_license_proto_rawDesc = []byte{
 0x0a, 0x32, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2f, 0x64,
 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2f, 0x76,
 0x31,
 0x2f, 0x75, 0x73, 0x65, 0x72, 0x5f, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x2e, 0x70,
 0x72, 0x6f, 0x74, 0x6f, 0x12, 0x1f, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f,
 0x75, 0x64, 0x2e, 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69,
 0x6e, 0x65, 0x2e, 0x76, 0x31, 0x1a, 0x1f, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70,
 0x69, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64, 0x5f, 0x62, 0x65, 0x68, 0x61, 0x76, 0x69, 0x6f, 0x72,
 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x19, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61,
 0x70, 0x69, 0x2f, 0x72, 0x65, 0x73, 0x6f, 0x75, 0x72, 0x63, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74,
 0x6f, 0x1a, 0x1f, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x62,
 0x75, 0x66, 0x2f, 0x74, 0x69, 0x6d, 0x65, 0x73, 0x74, 0x61, 0x6d, 0x70, 0x2e, 0x70, 0x72, 0x6f,
 0x74, 0x6f, 0x22, 0xa6, 0x05, 0x0a, 0x0b, 0x55, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e,
 0x73, 0x65, 0x12, 0x2d, 0x0a, 0x0e,
 0x75, 0x73, 0x65, 0x72, 0x5f, 0x70, 0x72, 0x69, 0x6e, 0x63,
 0x69, 0x70, 0x61, 0x6c, 0x18, 0x01, 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x05, 0xe0,
 0x41, 0x02, 0x52, 0x0d, 0x75, 0x73, 0x65, 0x72, 0x50, 0x72, 0x69, 0x6e, 0x63, 0x69, 0x70, 0x61,
 0x6c, 0x12, 0x26, 0x0a, 0x0c, 0x75, 0x73, 0x65, 0x72, 0x5f, 0x70, 0x72, 0x6f, 0x66, 0x69, 0x6c,
 0x65, 0x18, 0x03, 0x20, 0x01, 0x28, 0x09, 0x42, 0x03, 0xe0, 0x41, 0x01, 0x52, 0x0b, 0x75, 0x73,
 0x65, 0x72, 0x50, 0x72, 0x6f, 0x66, 0x69, 0x6c, 0x65, 0x12, 0x82, 0x01, 0x0a, 0x18, 0x6c, 0x69,
 0x63, 0x65, 0x6e, 0x73, 0x65, 0x5f, 0x61, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65, 0x6e, 0x74,
 0x5f, 0x73, 0x74, 0x61, 0x74, 0x65, 0x18, 0x04, 0x20, 0x01, 0x28, 0x0e, 0x32, 0x43, 0x2e, 0x67,
 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x64, 0x69, 0x73, 0x63,
 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2e, 0x76, 0x31, 0x2e, 0x55,
 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x2e,
 0x4c, 0x69, 0x63, 0x65, 0x6e,
 0x73, 0x65, 0x41, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65, 0x6e, 0x74, 0x53, 0x74, 0x61, 0x74,
 0x65, 0x42, 0x03, 0xe0, 0x41, 0x03, 0x52, 0x16, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x41,
 0x73, 0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65, 0x6e, 0x74, 0x53, 0x74, 0x61, 0x74, 0x65, 0x12, 0x5b,
 0x0a, 0x0e, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x5f, 0x63, 0x6f, 0x6e, 0x66, 0x69, 0x67,
 0x18, 0x05, 0x20, 0x01, 0x28, 0x09, 0x42, 0x34, 0xe0, 0x41, 0x01, 0xfa, 0x41, 0x2e, 0x0a, 0x2c,
 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2e,
 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73, 0x2e, 0x63, 0x6f, 0x6d, 0x2f, 0x4c,
 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x43, 0x6f, 0x6e, 0x66, 0x69, 0x67, 0x52, 0x0d, 0x6c, 0x69,
 0x63, 0x65, 0x6e, 0x73, 0x65, 0x43, 0x6f, 0x6e, 0x66, 0x69, 0x67, 0x12, 0x40, 0x0a, 0x0b, 0x63,
 0x72, 0x65, 0x61, 0x74, 0x65, 0x5f, 0x74, 0x69, 0x6d, 0x65, 0x18, 0x06, 0x20, 0x01, 0x28, 0x0b,
 0x32,
 0x1a, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x62,
 0x75, 0x66, 0x2e, 0x54, 0x69, 0x6d, 0x65, 0x73, 0x74, 0x61, 0x6d, 0x70, 0x42, 0x03, 0xe0, 0x41,
 0x03, 0x52, 0x0a, 0x63, 0x72, 0x65, 0x61, 0x74, 0x65, 0x54, 0x69, 0x6d, 0x65, 0x12, 0x40, 0x0a,
 0x0b, 0x75, 0x70, 0x64, 0x61, 0x74, 0x65, 0x5f, 0x74, 0x69, 0x6d, 0x65, 0x18, 0x07, 0x20, 0x01,
 0x28, 0x0b, 0x32, 0x1a, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74,
 0x6f, 0x62, 0x75, 0x66, 0x2e, 0x54, 0x69, 0x6d, 0x65, 0x73, 0x74, 0x61, 0x6d, 0x70, 0x42, 0x03,
 0xe0, 0x41, 0x03, 0x52, 0x0a, 0x75, 0x70, 0x64, 0x61, 0x74, 0x65, 0x54, 0x69, 0x6d, 0x65, 0x12,
 0x47, 0x0a, 0x0f, 0x6c, 0x61, 0x73, 0x74, 0x5f, 0x6c, 0x6f, 0x67, 0x69, 0x6e, 0x5f, 0x74, 0x69,
 0x6d, 0x65, 0x18, 0x08, 0x20, 0x01, 0x28, 0x0b, 0x32, 0x1a, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c,
```

```
 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x62, 0x75, 0x66, 0x2e, 0x54, 0x69, 0x6d, 0x65, 0x73,
 0x74, 0x61, 0x6d, 0x70, 0x42,
 0x03, 0xe0, 0x41, 0x03, 0x52, 0x0d, 0x6c, 0x61, 0x73, 0x74, 0x4c,
 0x6f, 0x67, 0x69, 0x6e, 0x54, 0x69, 0x6d, 0x65, 0x22, 0x90, 0x01, 0x0a, 0x16, 0x4c, 0x69, 0x63,
 0x65, 0x6e, 0x73, 0x65, 0x41, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65, 0x6e, 0x74, 0x53, 0x74,
 0x61, 0x74, 0x65, 0x12, 0x28, 0x0a, 0x24, 0x4c, 0x49, 0x43, 0x45, 0x4e, 0x53, 0x45, 0x5f, 0x41,
 0x53, 0x53, 0x49, 0x47, 0x4e, 0x4d, 0x45, 0x4e, 0x54, 0x5f, 0x53, 0x54, 0x41, 0x54, 0x45, 0x5f,
 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49, 0x46, 0x49, 0x45, 0x44, 0x10, 0x00, 0x12, 0x0c, 0x0a,
 0x08, 0x41, 0x53, 0x53, 0x49, 0x47, 0x4e, 0x45, 0x44, 0x10, 0x01, 0x12, 0x0e, 0x0a, 0x0a, 0x55,
 0x4e, 0x41, 0x53, 0x53, 0x49, 0x47, 0x4e, 0x45, 0x44, 0x10, 0x02, 0x12, 0x0e, 0x0a, 0x0a, 0x4e,
 0x4f, 0x5f, 0x4c, 0x49, 0x43, 0x45, 0x4e, 0x53, 0x45, 0x10, 0x03, 0x12, 0x1e, 0x0a, 0x1a, 0x4e,
 0x4f, 0x5f, 0x4c, 0x49, 0x43, 0x45, 0x4e, 0x53, 0x45, 0x5f, 0x41, 0x54, 0x54, 0x45, 0x4d, 0x50,
 0x54, 0x45, 0x44, 0x5f, 0x4c, 0x4f, 0x47, 0x49, 0x4e, 0x10,
 0x04, 0x42, 0x83, 0x02, 0x0a, 0x23,
 0x63, 0x6f, 0x6d, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64,
 0x2e, 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65,
 0x2e, 0x76, 0x31, 0x42, 0x10, 0x55, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65,
 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x50, 0x01, 0x5a, 0x4d, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x67,
 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6f, 0x6d, 0x2f, 0x67, 0x6f, 0x2f, 0x64, 0x69, 0x73,
 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2f, 0x61, 0x70, 0x69,
 0x76, 0x31, 0x2f, 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69,
 0x6e, 0x65, 0x70, 0x62, 0x3b, 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e,
 0x67, 0x69, 0x6e, 0x65, 0x70, 0x62, 0xa2, 0x02, 0x0f, 0x44, 0x49, 0x53, 0x43, 0x4f, 0x56, 0x45,
 0x52, 0x59, 0x45, 0x4e, 0x47, 0x49, 0x4e, 0x45, 0xaa, 0x02, 0x1f, 0x47, 0x6f, 0x6f, 0x67,
 0x6c,
 0x65, 0x2e, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x44, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72,
 0x79, 0x45, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2e, 0x56, 0x31, 0xca, 0x02, 0x1f, 0x47, 0x6f, 0x6f,
 0x67, 0x6c, 0x65, 0x5c, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x5c, 0x44, 0x69, 0x73, 0x63, 0x6f, 0x76,
 0x65, 0x72, 0x79, 0x45, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x5c, 0x56, 0x31, 0xea, 0x02, 0x22, 0x47,
 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x3a, 0x3a, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x3a, 0x3a, 0x44, 0x69,
 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x45, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x3a, 0x3a, 0x56,
 0x31, 0x62, 0x06, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x33,
}

var (
 file_google_cloud_discoveryengine_v1_user_license_proto_rawDescOnce sync.Once
 file_google_cloud_discoveryengine_v1_user_license_proto_rawDescData =
file_google_cloud_discoveryengine_v1_user_license_proto_rawDesc
)

func file_google_cloud_discoveryengine_v1_user_license_proto_rawDescGZIP() []byte {
 file_google_cloud_discoveryengine_v1_user_license_proto_rawDescOnce.Do(func()
 {
  file_google_cloud_discoveryengine_v1_user_license_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_cloud_discoveryengine_v1_user_license_proto_rawDescData)
 })
 return file_google_cloud_discoveryengine_v1_user_license_proto_rawDescData
}
```

```
var file_google_cloud_discoveryengine_v1_user_license_proto_enumTypes = make([]protoimpl.EnumInfo, 1)
var file_google_cloud_discoveryengine_v1_user_license_proto_msgTypes = make([]protoimpl.MessageInfo, 1)
var file_google_cloud_discoveryengine_v1_user_license_proto_goTypes = []any{
 (UserLicense_LicenseAssignmentState)(0), // 0:
google.cloud.discoveryengine.v1.UserLicense.LicenseAssignmentState
 (*UserLicense)(nil),                    // 1: google.cloud.discoveryengine.v1.UserLicense
 (*timestamppb.Timestamp)(nil),          // 2: google.protobuf.Timestamp
}
var file_google_cloud_discoveryengine_v1_user_license_proto_depIdxs = []int32{
 0, // 0: google.cloud.discoveryengine.v1.UserLicense.license_assignment_state:type_name
 -> google.cloud.discoveryengine.v1.UserLicense.LicenseAssignmentState
 2, // 1: google.cloud.discoveryengine.v1.UserLicense.create_time:type_name -> google.protobuf.Timestamp
 2, // 2: google.cloud.discoveryengine.v1.UserLicense.update_time:type_name -> google.protobuf.Timestamp
 2, // 3: google.cloud.discoveryengine.v1.UserLicense.last_login_time:type_name -> google.protobuf.Timestamp
 4, // [4:4] is the sub-list for method output_type
 4, // [4:4] is the sub-list for method input_type
 4, // [4:4] is the sub-list for extension type_name
 4, // [4:4] is the sub-list for extension extendee
 0, // [0:4] is the sub-list for field type_name
}

func init() { file_google_cloud_discoveryengine_v1_user_license_proto_init() }
func file_google_cloud_discoveryengine_v1_user_license_proto_init() {
 if File_google_cloud_discoveryengine_v1_user_license_proto != nil {
  return
 }
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor:
 file_google_cloud_discoveryengine_v1_user_license_proto_rawDesc,
   NumEnums:      1,
   NumMessages:   1,
   NumExtensions: 0,
   NumServices:   0,
  },
  GoTypes:           file_google_cloud_discoveryengine_v1_user_license_proto_goTypes,
  DependencyIndexes: file_google_cloud_discoveryengine_v1_user_license_proto_depIdxs,
  EnumInfos:         file_google_cloud_discoveryengine_v1_user_license_proto_enumTypes,
  MessageInfos:      file_google_cloud_discoveryengine_v1_user_license_proto_msgTypes,
 }.Build()
 File_google_cloud_discoveryengine_v1_user_license_proto = out.File
 file_google_cloud_discoveryengine_v1_user_license_proto_rawDesc = nil
 file_google_cloud_discoveryengine_v1_user_license_proto_goTypes = nil
 file_google_cloud_discoveryengine_v1_user_license_proto_depIdxs = nil
}
```

```
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package procurement_test

import (
 "context"

 procurement "cloud.google.com/go/commerce/consumer/procurement/apiv1"
 procurementpb "cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 "google.golang.org/api/iterator"
)

func ExampleNewLicenseManagementClient() {
 ctx
 := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleNewLicenseManagementRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
```

```
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c,
 err := procurement.NewLicenseManagementRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicenseManagementClient_Assign() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.AssignRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#AssignRequest.
 }
 resp, err := c.Assign(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 //
 TODO: Use resp.
 _ = resp
}

func ExampleLicenseManagementClient_EnumerateLicensedUsers() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
```

```
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.EnumerateLicensedUsersRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#EnumerateLicense
dUsersRequest.
 }
 it := c.EnumerateLicensedUsers(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  //
 TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*procurementpb.EnumerateLicensedUsersResponse)
 }
}

func ExampleLicenseManagementClient_GetLicensePool() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.GetLicensePoolRequest{
```

```
  // TODO: Fill request struct fields.
  //
 See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#GetLicensePoolRe
quest.
 }
 resp, err := c.GetLicensePool(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicenseManagementClient_Unassign() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.UnassignRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#UnassignRequest.
 }
 resp,
 err := c.Unassign(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicenseManagementClient_UpdateLicensePool() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
```

```
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.UpdateLicensePoolRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#UpdateLicensePoo
lRequest.
 }
 resp, err := c.UpdateLicensePool(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 //
 TODO: Use resp.
 _ = resp
}

func ExampleLicenseManagementClient_GetOperation() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &longrunningpb.GetOperationRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#GetOperationRequest.
 }
 resp, err := c.GetOperation(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
```

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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package compute_test
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1beta"
 computepb "cloud.google.com/go/compute/apiv1beta/computepb"
 "google.golang.org/api/iterator"
)

func ExampleNewLicensesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 //
 It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicensesClient_Delete() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
```

```
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.DeleteLicenseRequest{
  //
 TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#DeleteLicenseRequest.
 }
 op, err := c.Delete(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleLicensesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#GetLicenseRequest.
 }
 resp,
 err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_GetIamPolicy() {
```

```
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetIamPolicyLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#GetIamPolicyLicenseRequest.
 }
 resp, err := c.GetIamPolicy(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_Insert()
 {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.InsertLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#InsertLicenseRequest.
 }
 op, err := c.Insert(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
```

```
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleLicensesClient_List() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded
 as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.ListLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#ListLicensesRequest.
 }
 it := c.List(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _
 = it.Response.(*computepb.LicensesListResponse)
 }
}

func ExampleLicensesClient_SetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
```

```
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.SetIamPolicyLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#SetIamPolicyLicenseRequest.
}
resp, err := c.SetIamPolicy(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleLicensesClient_TestIamPermissions() {
ctx := context.Background()
//
This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.TestIamPermissionsLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#TestIamPermissionsLicenseRequest.
}
resp, err := c.TestIamPermissions(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleLicensesClient_Update() {
```

```
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require
 modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.UpdateLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#UpdateLicenseRequest.
 }
 op, err := c.Update(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute_test

import (
 "context"
```

```
 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
)

func ExampleNewLicenseCodesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 //
 - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicenseCodesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetLicenseCodeRequest{
  // TODO: Fill request
 struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseCodeRequest.
 }
 resp, err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
```

```
func ExampleLicenseCodesClient_TestIamPermissions() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.TestIamPermissionsLicenseCodeRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseCodeRequest.
 }
 resp,
 err := c.TestIamPermissions(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
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package discoveryengine

import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
```

```
 "math"
 "net/http"
 "net/url"
 "time"

 discoveryenginepb "cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb"
 "cloud.google.com/go/longrunning"
 lroauto "cloud.google.com/go/longrunning/autogen"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 gax
 "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 gtransport "google.golang.org/api/transport/grpc"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/grpc/codes"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var newUserLicenseClientHook clientHook

// UserLicenseCallOptions contains the retry settings for each method of UserLicenseClient.
type UserLicenseCallOptions struct {
 ListUserLicenses        []gax.CallOption
 BatchUpdateUserLicenses []gax.CallOption
 CancelOperation         []gax.CallOption
 GetOperation            []gax.CallOption
 ListOperations          []gax.CallOption
}

func defaultUserLicenseGRPCClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("discoveryengine.googleapis.com:443"),
  internaloption.WithDefaultEndpointTemplate("discoveryengine.UNIVERSE_DOMAIN:443"),
  internaloption.WithDefaultMTLSEndpoint("discoveryengine.mtls.googleapis.com:443"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://discoveryengine.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableJwtWithScope(),
  internaloption.EnableNewAuthLibrary(),
  option.WithGRPCDialOption(grpc.WithDefaultCallOptions(
   grpc.MaxCallRecvMsgSize(math.MaxInt32))),
 }
}
```

```
func
 defaultUserLicenseCallOptions() *UserLicenseCallOptions {
 return &UserLicenseCallOptions{
  ListUserLicenses:        []gax.CallOption{},
  BatchUpdateUserLicenses: []gax.CallOption{},
  CancelOperation: []gax.CallOption{
   gax.WithTimeout(30000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnCodes([]codes.Code{
     codes.Unavailable,
    }, gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        10000 * time.Millisecond,
     Multiplier:
 1.30,
    })
   }),
  },
  GetOperation: []gax.CallOption{
   gax.WithTimeout(30000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnCodes([]codes.Code{
     codes.Unavailable,
    }, gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        10000 * time.Millisecond,
     Multiplier: 1.30,
    })
   }),
  },
  ListOperations: []gax.CallOption{
   gax.WithTimeout(300000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnCodes([]codes.Code{
     codes.Unavailable,
    }, gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        30000 * time.Millisecond,
     Multiplier: 1.30,
    })
   }),
  },
 }
}

func defaultUserLicenseRESTCallOptions() *UserLicenseCallOptions {
 return &UserLicenseCallOptions{
  ListUserLicenses:        []gax.CallOption{},
```

```
 BatchUpdateUserLicenses: []gax.CallOption{},
 CancelOperation: []gax.CallOption{
  gax.WithTimeout(30000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer
{
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusServiceUnavailable)
  }),
 },
 GetOperation: []gax.CallOption{
  gax.WithTimeout(30000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusServiceUnavailable)
  }),
 },
 ListOperations: []gax.CallOption{
  gax.WithTimeout(300000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:        30000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusServiceUnavailable)
  }),
 },
}
}

// internalUserLicenseClient is an interface that defines the methods available from Discovery Engine API.
type internalUserLicenseClient
 interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 ListUserLicenses(context.Context, *discoveryenginepb.ListUserLicensesRequest, ...gax.CallOption)
*UserLicenseIterator
 BatchUpdateUserLicenses(context.Context, *discoveryenginepb.BatchUpdateUserLicensesRequest,
...gax.CallOption) (*BatchUpdateUserLicensesOperation, error)
```

```
 BatchUpdateUserLicensesOperation(name string) *BatchUpdateUserLicensesOperation
 CancelOperation(context.Context, *longrunningpb.CancelOperationRequest, ...gax.CallOption) error
 GetOperation(context.Context, *longrunningpb.GetOperationRequest, ...gax.CallOption)
(*longrunningpb.Operation, error)
 ListOperations(context.Context, *longrunningpb.ListOperationsRequest, ...gax.CallOption) *OperationIterator
}

// UserLicenseClient is a client for interacting with Discovery Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// Service for managing
 User Licenses.
type UserLicenseClient struct {
 // The internal transport-dependent client.
 internalClient internalUserLicenseClient

 // The call options for this service.
 CallOptions *UserLicenseCallOptions

 // LROClient is used internally to handle long-running operations.
 // It is exposed so that its CallOptions can be modified if required.
 // Users should not Close this client.
 LROClient *lroauto.OperationsClient
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *UserLicenseClient) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *UserLicenseClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns
 a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *UserLicenseClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
```

```
}

// ListUserLicenses lists the User Licenses.
func (c *UserLicenseClient) ListUserLicenses(ctx context.Context, req
*discoveryenginepb.ListUserLicensesRequest, opts ...gax.CallOption) *UserLicenseIterator {
 return c.internalClient.ListUserLicenses(ctx, req, opts...)
}

// BatchUpdateUserLicenses updates the User License.
// This method is used for batch assign/unassign licenses to users.
func (c *UserLicenseClient) BatchUpdateUserLicenses(ctx context.Context, req
*discoveryenginepb.BatchUpdateUserLicensesRequest, opts ...gax.CallOption)
(*BatchUpdateUserLicensesOperation, error) {
 return c.internalClient.BatchUpdateUserLicenses(ctx, req, opts...)
}

// BatchUpdateUserLicensesOperation returns a new BatchUpdateUserLicensesOperation from a given name.
//
 The name must be that of a previously created BatchUpdateUserLicensesOperation, possibly from a different
process.
func (c *UserLicenseClient) BatchUpdateUserLicensesOperation(name string)
*BatchUpdateUserLicensesOperation {
 return c.internalClient.BatchUpdateUserLicensesOperation(name)
}

// CancelOperation is a utility method from google.longrunning.Operations.
func (c *UserLicenseClient) CancelOperation(ctx context.Context, req *longrunningpb.CancelOperationRequest,
opts ...gax.CallOption) error {
 return c.internalClient.CancelOperation(ctx, req, opts...)
}

// GetOperation is a utility method from google.longrunning.Operations.
func (c *UserLicenseClient) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest, opts
...gax.CallOption) (*longrunningpb.Operation, error) {
 return c.internalClient.GetOperation(ctx, req, opts...)
}

// ListOperations is a utility method from google.longrunning.Operations.
func (c *UserLicenseClient) ListOperations(ctx context.Context,
 req *longrunningpb.ListOperationsRequest, opts ...gax.CallOption) *OperationIterator {
 return c.internalClient.ListOperations(ctx, req, opts...)
}

// userLicenseGRPCClient is a client for interacting with Discovery Engine API over gRPC transport.
//
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type userLicenseGRPCClient struct {
```

```
 // Connection pool of gRPC connections to the service.
 connPool gtransport.ConnPool

 // Points back to the CallOptions field of the containing UserLicenseClient
 CallOptions **UserLicenseCallOptions

 // The gRPC API client.
 userLicenseClient discoveryenginepb.UserLicenseServiceClient

 // LROClient is used internally to handle long-running operations.
 // It is exposed so that its CallOptions can be modified if required.
 // Users should not Close this client.
 LROClient **lroauto.OperationsClient

 operationsClient longrunningpb.OperationsClient

 // The x-goog-* metadata
 to be sent with each request.
 xGoogHeaders []string

 logger *slog.Logger
}

// NewUserLicenseClient creates a new user license service client based on gRPC.
// The returned client must be Closed when it is done being used to clean up its underlying connections.
//
// Service for managing User Licenses.
func NewUserLicenseClient(ctx context.Context, opts ...option.ClientOption) (*UserLicenseClient, error) {
 clientOpts := defaultUserLicenseGRPCClientOptions()
 if newUserLicenseClientHook != nil {
  hookOpts, err := newUserLicenseClientHook(ctx, clientHookParams{})
  if err != nil {
   return nil, err
  }
  clientOpts = append(clientOpts, hookOpts...)
 }

 connPool, err := gtransport.DialPool(ctx, append(clientOpts, opts...)...)
 if err != nil {
  return nil, err
 }
 client := UserLicenseClient{CallOptions: defaultUserLicenseCallOptions()}

 c := &userLicenseGRPCClient{
  connPool:        connPool,
  userLicenseClient: discoveryenginepb.NewUserLicenseServiceClient(connPool),
  CallOptions:
```

```
      &client.CallOptions,
  logger:           internaloption.GetLogger(opts),
  operationsClient:  longrunningpb.NewOperationsClient(connPool),
 }
 c.setGoogleClientInfo()

 client.internalClient = c

 client.LROClient, err = lroauto.NewOperationsClient(ctx, gtransport.WithConnPool(connPool))
 if err != nil {
  // This error "should not happen", since we are just reusing old connection pool
  // and never actually need to dial.
  // If this does happen, we could leak connp. However, we cannot close conn:
  // If the user invoked the constructor with option.WithGRPCConn,
  // we would close a connection that's still in use.
  // TODO: investigate error conditions.
  return nil, err
 }
 c.LROClient = &client.LROClient
 return &client, nil
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *userLicenseGRPCClient) Connection() *grpc.ClientConn {
 return c.connPool.Conn()
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *userLicenseGRPCClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "grpc", grpc.Version, "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *userLicenseGRPCClient) Close() error {
 return c.connPool.Close()
}
```

```
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type userLicenseRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // LROClient is used internally
 to handle long-running operations.
 // It is exposed so that its CallOptions can be modified if required.
 // Users should not Close this client.
 LROClient **lroauto.OperationsClient

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing UserLicenseClient
 CallOptions **UserLicenseCallOptions

 logger *slog.Logger
}

// NewUserLicenseRESTClient creates a new user license service rest client.
//
// Service for managing User Licenses.
func NewUserLicenseRESTClient(ctx context.Context, opts ...option.ClientOption) (*UserLicenseClient, error) {
 clientOpts := append(defaultUserLicenseRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultUserLicenseRESTCallOptions()
 c := &userLicenseRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 lroOpts
 := []option.ClientOption{
  option.WithHTTPClient(httpClient),
  option.WithEndpoint(endpoint),
 }
```

```
 opClient, err := lroauto.NewOperationsRESTClient(ctx, lroOpts...)
 if err != nil {
  return nil, err
 }
 c.LROClient = &opClient

 return &UserLicenseClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultUserLicenseRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://discoveryengine.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://discoveryengine.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://discoveryengine.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://discoveryengine.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

// setGoogleClientInfo
 sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *userLicenseRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *userLicenseRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *userLicenseRESTClient) Connection() *grpc.ClientConn {
 return nil
}
func (c *userLicenseGRPCClient) ListUserLicenses(ctx context.Context, req
```

```
*discoveryenginepb.ListUserLicensesRequest,
 opts ...gax.CallOption) *UserLicenseIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).ListUserLicenses[0:len((*c.CallOptions).ListUserLicenses):len((*c.CallOptions).ListUser
Licenses)], opts...)
 it := &UserLicenseIterator{}
 req = proto.Clone(req).(*discoveryenginepb.ListUserLicensesRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*discoveryenginepb.UserLicense, string, error) {
  resp := &discoveryenginepb.ListUserLicensesResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx,
 c.userLicenseClient.ListUserLicenses, req, settings.GRPC, c.logger, "ListUserLicenses")
   return err
  }, opts...)
  if err != nil {
   return nil, "", err
  }

  it.Response = resp
  return resp.GetUserLicenses(), resp.GetNextPageToken(), nil
 }
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
```

```
}

func (c *userLicenseGRPCClient) BatchUpdateUserLicenses(ctx context.Context, req
*discoveryenginepb.BatchUpdateUserLicensesRequest, opts ...gax.CallOption)
(*BatchUpdateUserLicensesOperation, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders,
 hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).BatchUpdateUserLicenses[0:len((*c.CallOptions).BatchUpdateUserLicenses):len((*c.Call
Options).BatchUpdateUserLicenses)], opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.userLicenseClient.BatchUpdateUserLicenses, req, settings.GRPC, c.logger,
"BatchUpdateUserLicenses")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return &BatchUpdateUserLicensesOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, resp),
 }, nil
}

func (c *userLicenseGRPCClient) CancelOperation(ctx context.Context, req
*longrunningpb.CancelOperationRequest, opts ...gax.CallOption) error {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx,
 hds...)
 opts =
append((*c.CallOptions).CancelOperation[0:len((*c.CallOptions).CancelOperation):len((*c.CallOptions).CancelOp
eration)], opts...)
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  _, err = executeRPC(ctx, c.operationsClient.CancelOperation, req, settings.GRPC, c.logger, "CancelOperation")
  return err
 }, opts...)
 return err
}

func (c *userLicenseGRPCClient) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest,
opts ...gax.CallOption) (*longrunningpb.Operation, error) {
```

```
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).GetOperation[0:len((*c.CallOptions).GetOperation):len((*c.CallOptions).GetOperation)],
opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context,
 settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.operationsClient.GetOperation, req, settings.GRPC, c.logger, "GetOperation")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *userLicenseGRPCClient) ListOperations(ctx context.Context, req *longrunningpb.ListOperationsRequest,
opts ...gax.CallOption) *OperationIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).ListOperations[0:len((*c.CallOptions).ListOperations):len((*c.CallOptions).ListOperations
)], opts...)
 it := &OperationIterator{}
 req = proto.Clone(req).(*longrunningpb.ListOperationsRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*longrunningpb.Operation, string, error) {
  resp := &longrunningpb.ListOperationsResponse{}
  if pageToken !=
 "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx, c.operationsClient.ListOperations, req, settings.GRPC, c.logger, "ListOperations")
   return err
  }, opts...)
  if err != nil {
```

```
  return nil, "", err
 }

 it.Response = resp
 return resp.GetOperations(), resp.GetNextPageToken(), nil
}
fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// ListUserLicenses lists the
 User Licenses.
func (c *userLicenseRESTClient) ListUserLicenses(ctx context.Context, req
*discoveryenginepb.ListUserLicensesRequest, opts ...gax.CallOption) *UserLicenseIterator {
 it := &UserLicenseIterator{}
 req = proto.Clone(req).(*discoveryenginepb.ListUserLicensesRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*discoveryenginepb.UserLicense, string, error) {
  resp := &discoveryenginepb.ListUserLicensesResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
   return nil, "", err
  }
  baseUrl.Path += fmt.Sprintf("/v1/%v/userLicenses", req.GetParent())

  params := url.Values{}
  params.Add("$alt", "json;enum-encoding=int")
  if req.GetFilter() != "" {
```

```
  params.Add("filter", fmt.Sprintf("%v",
req.GetFilter()))
 }
 if req.GetPageSize() != 0 {
  params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
 }
 if req.GetPageToken() != "" {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "ListUserLicenses")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response
= resp
 return resp.GetUserLicenses(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
```

```
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// BatchUpdateUserLicenses updates the User License.
// This method is used for batch assign/unassign licenses to users.
func (c *userLicenseRESTClient) BatchUpdateUserLicenses(ctx context.Context, req
*discoveryenginepb.BatchUpdateUserLicensesRequest, opts ...gax.CallOption)
(*BatchUpdateUserLicensesOperation, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 jsonReq, err := m.Marshal(req)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if
 err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:batchUpdateUserLicenses", req.GetParent())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &longrunningpb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
```

```
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err
:= executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "BatchUpdateUserLicenses")
 if err != nil {
  return err
 }
 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}

override := fmt.Sprintf("/v1/%s", resp.GetName())
return &BatchUpdateUserLicensesOperation{
 lro:      longrunning.InternalNewOperation(*c.LROClient, resp),
 pollPath: override,
}, nil
}

// CancelOperation is a utility method from google.longrunning.Operations.
func (c *userLicenseRESTClient) CancelOperation(ctx context.Context, req
*longrunningpb.CancelOperationRequest, opts ...gax.CallOption) error {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 jsonReq, err := m.Marshal(req)
 if err != nil {
  return err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:cancel", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery
 = params.Encode()
```

```
 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 return gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  _, err = executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "CancelOperation")
  return err
 }, opts...)
}

// GetOperation is a utility method from google.longrunning.Operations.
func (c *userLicenseRESTClient) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest,
opts ...gax.CallOption)
 (*longrunningpb.Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetOperation[0:len((*c.CallOptions).GetOperation):len((*c.CallOptions).GetOperation)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &longrunningpb.Operation{}
```

```
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET",
 baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetOperation")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// ListOperations is a utility method from google.longrunning.Operations.
func (c *userLicenseRESTClient) ListOperations(ctx context.Context, req *longrunningpb.ListOperationsRequest,
opts ...gax.CallOption) *OperationIterator {
 it := &OperationIterator{}
 req = proto.Clone(req).(*longrunningpb.ListOperationsRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*longrunningpb.Operation, string, error) {
  resp := &longrunningpb.ListOperationsResponse{}
  if pageToken != "" {
   req.PageToken
 = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
```

```
 return nil, "", err
}
baseUrl.Path += fmt.Sprintf("/v1/%v/operations", req.GetName())

params := url.Values{}
params.Add("$alt", "json;enum-encoding=int")
if req.GetFilter() != "" {
 params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
}
if req.GetPageSize() != 0 {
 params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
}
if req.GetPageToken() != "" {
 params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
}

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := append(c.xGoogHeaders, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path
= settings.Path
 }
 httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
 if err != nil {
  return err
 }
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "ListOperations")
 if err != nil {
  return err
 }
 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, "", e
}
it.Response = resp
return resp.GetOperations(), resp.GetNextPageToken(), nil
}
```

```
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

// BatchUpdateUserLicensesOperation returns a new
 BatchUpdateUserLicensesOperation from a given name.
// The name must be that of a previously created BatchUpdateUserLicensesOperation, possibly from a different
process.
func (c *userLicenseGRPCClient) BatchUpdateUserLicensesOperation(name string)
*BatchUpdateUserLicensesOperation {
 return &BatchUpdateUserLicensesOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
 }
}

// BatchUpdateUserLicensesOperation returns a new BatchUpdateUserLicensesOperation from a given name.
// The name must be that of a previously created BatchUpdateUserLicensesOperation, possibly from a different
process.
func (c *userLicenseRESTClient) BatchUpdateUserLicensesOperation(name string)
*BatchUpdateUserLicensesOperation {
 override := fmt.Sprintf("/v1/%s", name)
 return &BatchUpdateUserLicensesOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
  pollPath: override,
 }
}
// Copyright 2025 Google LLC
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package procurement_test

import (
 "context"

 procurement "cloud.google.com/go/commerce/consumer/procurement/apiv1"
 procurementpb "cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb"
)

func ExampleLicenseManagementClient_EnumerateLicensedUsers_all() {
 ctx := context.Background()
 // This snippet has been automatically
 generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.EnumerateLicensedUsersRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#EnumerateLicense
dUsersRequest.
 }
 for resp, err := range c.EnumerateLicensedUsers(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}
// Copyright 2025 Google LLC
//
```

```
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// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute

import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
 "math"
 "net/http"
 "net/url"
 "time"

 computepb "cloud.google.com/go/compute/apiv1beta/computepb"
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var
 newLicensesClientHook clientHook

// LicensesCallOptions contains the retry settings for each method of LicensesClient.
type LicensesCallOptions struct {
 Delete          []gax.CallOption
 Get             []gax.CallOption
 GetIamPolicy    []gax.CallOption
 Insert          []gax.CallOption
 List            []gax.CallOption
 SetIamPolicy    []gax.CallOption
```

```
 TestIamPermissions []gax.CallOption
 Update             []gax.CallOption
}

func defaultLicensesRESTCallOptions() *LicensesCallOptions {
 return &LicensesCallOptions{
  Delete: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  Get: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier:
 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  GetIamPolicy: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  Insert: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  List: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
```

```
  },
  SetIamPolicy: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  TestIamPermissions: []gax.CallOption{
   gax.WithTimeout(600000
 * time.Millisecond),
  },
  Update: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
 }
}

// internalLicensesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicensesClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Delete(context.Context, *computepb.DeleteLicenseRequest, ...gax.CallOption) (*Operation, error)
 Get(context.Context, *computepb.GetLicenseRequest, ...gax.CallOption) (*computepb.License, error)
 GetIamPolicy(context.Context, *computepb.GetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 Insert(context.Context, *computepb.InsertLicenseRequest, ...gax.CallOption) (*Operation, error)
 List(context.Context, *computepb.ListLicensesRequest, ...gax.CallOption) *LicenseIterator
 SetIamPolicy(context.Context, *computepb.SetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 TestIamPermissions(context.Context,
 *computepb.TestIamPermissionsLicenseRequest, ...gax.CallOption) (*computepb.TestPermissionsResponse, error)
 Update(context.Context, *computepb.UpdateLicenseRequest, ...gax.CallOption) (*Operation, error)
}

// LicensesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// The Licenses API.
type LicensesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicensesClient

 // The call options for this service.
 CallOptions *LicensesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
```

```
// the client is no longer required.
func (c *LicensesClient) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header
 passed on each request. Intended for
// use by Google-written clients.
func (c *LicensesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicensesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// Delete deletes the specified license. Caution This resource is intended for use only by third-party partners who are
creating Cloud Marketplace images.
func (c *LicensesClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts ...gax.CallOption)
(*Operation, error) {
 return c.internalClient.Delete(ctx, req, opts...)
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners
who are creating Cloud Marketplace images.
func (c *LicensesClient) Get(ctx context.Context,
 req *computepb.GetLicenseRequest, opts ...gax.CallOption) (*computepb.License, error) {
 return c.internalClient.Get(ctx, req, opts...)
}

// GetIamPolicy gets the access control policy for a resource. May be empty if no such policy or resource exists.
Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest, opts
...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.GetIamPolicy(ctx, req, opts...)
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts ...gax.CallOption)
(*Operation, error) {
 return c.internalClient.Insert(ctx, req, opts...)
}
```

// List retrieves the list of licenses available
 in the specified project. This method does not get any licenses that belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-cloud or windows-cloud. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts ...gax.CallOption) *LicenseIterator {
 return c.internalClient.List(ctx, req, opts...)
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest, opts ...gax.CallOption) (*computepb.Policy, error) {
 return
 c.internalClient.SetIamPolicy(ctx, req, opts...)
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) TestIamPermissions(ctx context.Context, req *computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse, error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}

// Update updates a License resource in the specified project. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Update(ctx context.Context, req *computepb.UpdateLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 return c.internalClient.Update(ctx, req, opts...)
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with method calls.
type
 licensesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // operationClient is used to call the operation-specific management service.
 operationClient *GlobalOperationsClient

 // The x-goog-* headers to be sent with each request.

```
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicensesClient
 CallOptions **LicensesCallOptions

 logger *slog.Logger
}

// NewLicensesRESTClient creates a new licenses rest client.
//
// The Licenses API.
func NewLicensesRESTClient(ctx context.Context, opts ...option.ClientOption) (*LicensesClient, error) {
 clientOpts := append(defaultLicensesRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicensesRESTCallOptions()
 c := &licensesRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:
      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 o := []option.ClientOption{
  option.WithHTTPClient(httpClient),
  option.WithEndpoint(endpoint),
 }
 opC, err := NewGlobalOperationsRESTClient(ctx, o...)
 if err != nil {
  return nil, err
 }
 c.operationClient = opC

 return &LicensesClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicensesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
```

```
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

// setGoogleClientInfo sets the name and version of the application
 in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licensesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licensesRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 if err := c.operationClient.Close(); err != nil {
  return err
 }
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licensesRESTClient) Connection() *grpc.ClientConn {
 return nil
}

// Delete deletes the specified license. Caution This resource is intended for
 use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
```

```
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Delete[0:len((*c.CallOptions).Delete):len((*c.CallOptions).Delete)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Delete")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 op := &Operation{
  &globalOperationsHandle{
   c:       c.operationClient,
   proto:   resp,
   project: req.GetProject(),
  },
 }
 return op, nil
```

```
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners
who are creating
 Cloud Marketplace images.
func (c *licensesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption)
(*computepb.License, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.License{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings)
 error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Get")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
```

```
 }
 return resp, nil
}

// GetIamPolicy gets the access control policy for a resource. May be empty if no such policy or resource exists.
Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses/%v/getIamPolicy",
 req.GetProject(), req.GetResource())

 params := url.Values{}
 if req != nil && req.OptionsRequestedPolicyVersion != nil {
  params.Add("optionsRequestedPolicyVersion", fmt.Sprintf("%v", req.GetOptionsRequestedPolicyVersion()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetIamPolicy[0:len((*c.CallOptions).GetIamPolicy):len((*c.CallOptions).GetIamPolicy)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error
 {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetIamPolicy")
  if err != nil {
```

```
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetLicenseResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err
 := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "project", url.QueryEscape(req.GetProject()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Insert[0:len((*c.CallOptions).Insert):len((*c.CallOptions).Insert)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
```

```
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq,
 err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Insert")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 op := &Operation{
  &globalOperationsHandle{
   c:       c.operationClient,
   proto:   resp,
   project: req.GetProject(),
  },
 }
 return op, nil
}

// List retrieves the list of licenses available in the specified project. This method does not get any licenses that
belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a
list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-
cloud or windows-cloud. Caution This resource is intended
 for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts
...gax.CallOption) *LicenseIterator {
 it := &LicenseIterator{}
 req = proto.Clone(req).(*computepb.ListLicensesRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*computepb.License, string, error) {
```

```
 resp := &computepb.LicensesListResponse{}
 if pageToken != "" {
  req.PageToken = proto.String(pageToken)
 }
 if pageSize > math.MaxInt32 {
  req.MaxResults = proto.Uint32(uint32(math.MaxInt32))
 } else if pageSize != 0 {
  req.MaxResults = proto.Uint32(uint32(pageSize))
 }
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, "", err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if req != nil && req.Filter !=
nil {
  params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
 }
 if req != nil && req.MaxResults != nil {
  params.Add("maxResults", fmt.Sprintf("%v", req.GetMaxResults()))
 }
 if req != nil && req.OrderBy != nil {
  params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
 }
 if req != nil && req.PageToken != nil {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }
 if req != nil && req.ReturnPartialSuccess != nil {
  params.Add("returnPartialSuccess", fmt.Sprintf("%v", req.GetReturnPartialSuccess()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return
err
  }
  httpReq.Header = headers
```

```
  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "List")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetItems(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetMaxResults())
it.pageInfo.Token = req.GetPageToken()

return it
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This
resource is intended for use only by third-party partners who are creating
 Cloud Marketplace images.
func (c *licensesRESTClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetGlobalSetPolicyRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
```

```
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses/%v/setIamPolicy", req.GetProject(),
req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).SetIamPolicy[0:len((*c.CallOptions).SetIamPolicy):len((*c.CallOptions).SetIamPolicy)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "SetIamPolicy")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is
intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient)
```

```
 TestIamPermissions(ctx context.Context, req *computepb.TestIamPermissionsLicenseRequest, opts
...gax.CallOption) (*computepb.TestPermissionsResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetTestPermissionsRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses/%v/testIamPermissions", req.GetProject(),
req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "TestIamPermissions")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }
```

```
 return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// Update updates a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient)
 Update(ctx context.Context, req *computepb.UpdateLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetLicenseResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }
 if req != nil && req.UpdateMask != nil {
  params.Add("updateMask", fmt.Sprintf("%v", req.GetUpdateMask()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds
 = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Update[0:len((*c.CallOptions).Update):len((*c.CallOptions).Update)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
```

```
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("PATCH", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Update")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 op := &Operation{
  &globalOperationsHandle{
   c:       c.operationClient,
   proto:   resp,
   project:
 req.GetProject(),
  },
 }
 return op, nil
}
// Copyright 2025 Google LLC
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// you may not use this file except in compliance with the License.
// You may obtain a copy of the License at
//
//     http://www.apache.org/licenses/LICENSE-2.0
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// distributed under the License is distributed on an "AS IS" BASIS,
// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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// limitations under the License.
```

```
// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.35.2
//  protoc        v4.25.7
// source: google/ai/generativelanguage/v1beta/permission.proto

package generativelanguagepb

import (
 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
 reflect "reflect"
 sync
 "sync"
)

const (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Defines types of the grantee of this permission.
type Permission_GranteeType int32

const (
 // The default value. This value is unused.
 Permission_GRANTEE_TYPE_UNSPECIFIED Permission_GranteeType = 0
 // Represents a user. When set, you must provide email_address for the user.
 Permission_USER Permission_GranteeType = 1
 // Represents a group. When set, you must provide email_address for the
 // group.
 Permission_GROUP Permission_GranteeType = 2
 // Represents access to everyone. No extra information is required.
 Permission_EVERYONE Permission_GranteeType = 3
)

// Enum value maps for Permission_GranteeType.
var (
 Permission_GranteeType_name = map[int32]string{
  0: "GRANTEE_TYPE_UNSPECIFIED",
  1: "USER",
  2:
 "GROUP",
  3: "EVERYONE",
 }
```

```
 Permission_GranteeType_value = map[string]int32{
  "GRANTEE_TYPE_UNSPECIFIED": 0,
  "USER":                     1,
  "GROUP":                    2,
  "EVERYONE":                 3,
 }
)

func (x Permission_GranteeType) Enum() *Permission_GranteeType {
 p := new(Permission_GranteeType)
 *p = x
 return p
}

func (x Permission_GranteeType) String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_GranteeType) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0].Descriptor()
}

func (Permission_GranteeType) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0]
}

func (x Permission_GranteeType) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_GranteeType.Descriptor instead.
func (Permission_GranteeType) EnumDescriptor() ([]byte,
 []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 0}
}

// Defines the role granted by this permission.
type Permission_Role int32

const (
 // The default value. This value is unused.
 Permission_ROLE_UNSPECIFIED Permission_Role = 0
 // Owner can use, update, share and delete the resource.
 Permission_OWNER Permission_Role = 1
 // Writer can use, update and share the resource.
 Permission_WRITER Permission_Role = 2
 // Reader can use the resource.
 Permission_READER Permission_Role = 3
```

```
)

// Enum value maps for Permission_Role.
var (
 Permission_Role_name = map[int32]string{
  0: "ROLE_UNSPECIFIED",
  1: "OWNER",
  2: "WRITER",
  3: "READER",
 }
 Permission_Role_value = map[string]int32{
  "ROLE_UNSPECIFIED": 0,
  "OWNER":            1,
  "WRITER":           2,
  "READER":           3,
 }
)

func (x Permission_Role) Enum() *Permission_Role {
 p := new(Permission_Role)
 *p = x
 return p
}

func (x Permission_Role) String() string {
 return
 protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_Role) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1].Descriptor()
}

func (Permission_Role) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1]
}

func (x Permission_Role) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_Role.Descriptor instead.
func (Permission_Role) EnumDescriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 1}
}

// Permission resource grants user, group or the rest of the world access to the
// PaLM API resource (e.g. a tuned model, corpus).
```

```
//
// A role is a collection of permitted operations that allows users to perform
// specific actions on PaLM API resources. To make them available to users,
// groups, or service accounts,
 you assign roles. When you assign a role, you
// grant permissions that the role contains.
//
// There are three concentric roles. Each role is a superset of the previous
// role's permitted operations:
//
// - reader can use the resource (e.g. tuned model, corpus) for inference
// - writer has reader's permissions and additionally can edit and share
// - owner has writer's permissions and additionally can delete
type Permission struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Output only. Identifier. The permission name. A unique name will be
 // generated on create. Examples:
 //
 // tunedModels/{tuned_model}/permissions/{permission}
 // corpora/{corpus}/permissions/{permission}
 //
 // Output only.
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Optional. Immutable. The type of the grantee.
 GranteeType *Permission_GranteeType
`protobuf:"varint,2,opt,name=grantee_type,json=granteeType,proto3,enum=google.ai.generativelanguage.v1beta.Pe
rmission_GranteeType,oneof"
 json:"grantee_type,omitempty"`
 // Optional. Immutable. The email address of the user of group which this
 // permission refers. Field is not set when permission's grantee type is
 // EVERYONE.
 EmailAddress *string `protobuf:"bytes,3,opt,name=email_address,json=emailAddress,proto3,oneof"
json:"email_address,omitempty"`
 // Required. The role granted by this permission.
 Role *Permission_Role
`protobuf:"varint,4,opt,name=role,proto3,enum=google.ai.generativelanguage.v1beta.Permission_Role,oneof"
json:"role,omitempty"`
}

func (x *Permission) Reset() {
 *x = Permission{}
 mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}
```

```
func (x *Permission) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*Permission) ProtoMessage() {}

func (x *Permission) ProtoReflect() protoreflect.Message
 {
 mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use Permission.ProtoReflect.Descriptor instead.
func (*Permission) Descriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0}
}

func (x *Permission) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
}

func (x *Permission) GetGranteeType() Permission_GranteeType {
 if x != nil && x.GranteeType != nil {
  return *x.GranteeType
 }
 return Permission_GRANTEE_TYPE_UNSPECIFIED
}

func (x *Permission) GetEmailAddress() string {
 if x != nil && x.EmailAddress != nil {
  return *x.EmailAddress
 }
 return ""
}

func (x *Permission) GetRole() Permission_Role {
 if x != nil && x.Role != nil {
```

```
 return *x.Role
 }
 return Permission_ROLE_UNSPECIFIED
}

var
 File_google_ai_generativelanguage_v1beta_permission_proto protoreflect.FileDescriptor

var file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = []byte{
 0x0a, 0x34, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65,
 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x76,
 0x31, 0x62, 0x65, 0x74, 0x61, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x12, 0x23, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61,
 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67,
 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x1a, 0x1f, 0x67, 0x6f, 0x6f,
 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64, 0x5f, 0x62, 0x65,
 0x68, 0x61, 0x76, 0x69, 0x6f, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x19, 0x67, 0x6f,
 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69,
 0x2f, 0x72, 0x65, 0x73, 0x6f, 0x75, 0x72, 0x63,
 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x22, 0x85, 0x05, 0x0a, 0x0a, 0x50, 0x65, 0x72, 0x6d,
 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x1a, 0x0a, 0x04, 0x6e, 0x61, 0x6d, 0x65, 0x18, 0x01,
 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x03, 0xe0, 0x41, 0x08, 0x52, 0x04, 0x6e, 0x61,
 0x6d, 0x65, 0x12, 0x6b, 0x0a, 0x0c, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f, 0x74, 0x79,
 0x70, 0x65, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0e, 0x32, 0x3b, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c,
 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c,
 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x2e, 0x50,
 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x2e, 0x47, 0x72, 0x61, 0x6e, 0x74, 0x65,
 0x65, 0x54, 0x79, 0x70, 0x65, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05, 0x48, 0x00, 0x52,
 0x0b, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x54, 0x79, 0x70, 0x65, 0x88,
 0x01, 0x01, 0x12,
 0x30, 0x0a, 0x0d, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x5f, 0x61, 0x64, 0x64, 0x72, 0x65, 0x73, 0x73,
 0x18, 0x03, 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05, 0x48, 0x01,
 0x52, 0x0c, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x41, 0x64, 0x64, 0x72, 0x65, 0x73, 0x73, 0x88, 0x01,
 0x01, 0x12, 0x52, 0x0a, 0x04, 0x72, 0x6f, 0x6c, 0x65, 0x18, 0x04, 0x20, 0x01, 0x28, 0x0e, 0x32,
 0x34, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65,
 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76,
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 0x2e, 0x52, 0x6f, 0x6c, 0x65, 0x42, 0x03, 0xe0, 0x41, 0x02, 0x48, 0x02, 0x52, 0x04, 0x72, 0x6f,
 0x6c, 0x65, 0x88, 0x01, 0x01, 0x22, 0x4e, 0x0a, 0x0b, 0x47, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65,
 0x54, 0x79, 0x70, 0x65, 0x12, 0x1c, 0x0a, 0x18, 0x47, 0x52, 0x41, 0x4e, 0x54, 0x45, 0x45, 0x5f,
 0x54, 0x59,
 0x50, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49, 0x46, 0x49, 0x45, 0x44,
 0x10, 0x00, 0x12, 0x08, 0x0a, 0x04, 0x55, 0x53, 0x45, 0x52, 0x10, 0x01, 0x12, 0x09, 0x0a, 0x05,
 0x47, 0x52, 0x4f, 0x55, 0x50, 0x10, 0x02, 0x12, 0x0c, 0x0a, 0x08, 0x45, 0x56, 0x45, 0x52, 0x59,
 0x4f, 0x4e, 0x45, 0x10, 0x03, 0x22, 0x3f, 0x0a, 0x04, 0x52, 0x6f, 0x6c, 0x65, 0x12, 0x14, 0x0a,
 0x10, 0x52, 0x4f, 0x4c, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49, 0x46, 0x49, 0x45,
 0x44, 0x10, 0x00, 0x12, 0x09, 0x0a, 0x05, 0x4f, 0x57, 0x4e, 0x45, 0x52, 0x10, 0x01, 0x12, 0x0a,
 0x0a, 0x06, 0x57, 0x52, 0x49, 0x54, 0x45, 0x52, 0x10, 0x02, 0x12, 0x0a, 0x0a, 0x06, 0x52, 0x45,
```

```
 0x41, 0x44, 0x45, 0x52, 0x10, 0x03, 0x3a, 0xaa, 0x01, 0xea, 0x41, 0xa6, 0x01, 0x0a, 0x2c, 0x67,
 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67,
 0x65, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73, 0x2e, 0x63, 0x6f, 0x6d,
 0x2f, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73,
 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x32, 0x74, 0x75, 0x6e,
 0x65, 0x64, 0x4d, 0x6f, 0x64, 0x65, 0x6c, 0x73, 0x2f, 0x7b, 0x74, 0x75, 0x6e, 0x65, 0x64, 0x5f,
 0x6d, 0x6f, 0x64, 0x65, 0x6c, 0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f,
 0x6e, 0x73, 0x2f, 0x7b, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x7d, 0x12,
 0x29, 0x63, 0x6f, 0x72, 0x70, 0x6f, 0x72, 0x61, 0x2f, 0x7b, 0x63, 0x6f, 0x72, 0x70, 0x75, 0x73,
 0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x2f, 0x7b, 0x70,
 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x7d, 0x2a, 0x0b, 0x70, 0x65, 0x72, 0x6d,
 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x32, 0x0a, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73,
 0x69, 0x6f, 0x6e, 0x42, 0x0f, 0x0a, 0x0d, 0x5f, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f,
 0x74, 0x79, 0x70, 0x65, 0x42, 0x10, 0x0a, 0x0e, 0x5f, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x5f, 0x61,
 0x64, 0x64, 0x72, 0x65, 0x73, 0x73, 0x42, 0x07, 0x0a, 0x05, 0x5f, 0x72,
 0x6f, 0x6c, 0x65, 0x42,
 0x9b, 0x01, 0x0a, 0x27, 0x63, 0x6f, 0x6d, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61,
 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67,
 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x42, 0x0f, 0x50, 0x65, 0x72,
 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x50, 0x01, 0x5a, 0x5d,
 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6f, 0x6d,
 0x2f, 0x67, 0x6f, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76,
 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x76, 0x31, 0x62,
 0x65, 0x74, 0x61, 0x2f, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61,
 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x3b, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74,
 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x62, 0x06, 0x70,
 0x72,
 0x6f, 0x74, 0x6f, 0x33,
}

var (
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce sync.Once
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc
)

func file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP() []byte {
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce.Do(func() {
  file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData)
 })
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData
}

var file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes = make([]protoimpl.EnumInfo, 2)
var file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes = make([]protoimpl.MessageInfo, 1)
var file_google_ai_generativelanguage_v1beta_permission_proto_goTypes = []any{
 (Permission_GranteeType)(0),
```

```
 // 0: google.ai.generativelanguage.v1beta.Permission.GranteeType
 (Permission_Role)(0),        // 1: google.ai.generativelanguage.v1beta.Permission.Role
 (*Permission)(nil),          // 2: google.ai.generativelanguage.v1beta.Permission
}
var file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = []int32{
 0, // 0: google.ai.generativelanguage.v1beta.Permission.grantee_type:type_name ->
google.ai.generativelanguage.v1beta.Permission.GranteeType
 1, // 1: google.ai.generativelanguage.v1beta.Permission.role:type_name ->
google.ai.generativelanguage.v1beta.Permission.Role
 2, // [2:2] is the sub-list for method output_type
 2, // [2:2] is the sub-list for method input_type
 2, // [2:2] is the sub-list for extension type_name
 2, // [2:2] is the sub-list for extension extendee
 0, // [0:2] is the sub-list for field type_name
}

func init() { file_google_ai_generativelanguage_v1beta_permission_proto_init() }
func file_google_ai_generativelanguage_v1beta_permission_proto_init()
 {
 if File_google_ai_generativelanguage_v1beta_permission_proto != nil {
  return
 }
 file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0].OneofWrappers = []any{}
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor: file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc,
   NumEnums:      2,
   NumMessages:   1,
   NumExtensions: 0,
   NumServices:   0,
  },
  GoTypes:           file_google_ai_generativelanguage_v1beta_permission_proto_goTypes,
  DependencyIndexes: file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs,
  EnumInfos:         file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes,
  MessageInfos:      file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes,
 }.Build()
 File_google_ai_generativelanguage_v1beta_permission_proto = out.File
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = nil
 file_google_ai_generativelanguage_v1beta_permission_proto_goTypes
 = nil
 file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = nil
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package discoveryengine_test

import (
 "context"

 discoveryengine "cloud.google.com/go/discoveryengine/apiv1"
 discoveryenginepb "cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
)

func ExampleUserLicenseClient_ListUserLicenses_all() {
 ctx := context.Background()
 //
 This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &discoveryenginepb.ListUserLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb#ListUserLicensesRequest.
 }
 for resp, err := range c.ListUserLicenses(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
```

```
 }
}

func ExampleUserLicenseClient_ListOperations_all() {
 ctx := context.Background()
 //
 This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &longrunningpb.ListOperationsRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#ListOperationsRequest.
 }
 for resp, err := range c.ListOperations(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}
```

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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.35.2
//  protoc        v4.25.7
// source: google/cloud/commerce/consumer/procurement/v1/license_management_service.proto

package procurementpb

import (
 context "context"
 _ "google.golang.org/genproto/googleapis/api/annotations"
 grpc "google.golang.org/grpc"
 codes "google.golang.org/grpc/codes"
 status "google.golang.org/grpc/status"
 protoreflect
 "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
 durationpb "google.golang.org/protobuf/types/known/durationpb"
 fieldmaskpb "google.golang.org/protobuf/types/known/fieldmaskpb"
 timestamppb "google.golang.org/protobuf/types/known/timestamppb"
 reflect "reflect"
 sync "sync"
)

const (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Assignment protocol for a license pool.
type AssignmentProtocol struct {
 state         protoimpl.MessageState
```

```
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // The type of assignment protocol.
 //
 // Types that are assignable to AssignmentType:
 //
 // *AssignmentProtocol_ManualAssignmentType_
 // *AssignmentProtocol_AutoAssignmentType_
 AssignmentType
 isAssignmentProtocol_AssignmentType `protobuf_oneof:"assignment_type"`
}

func (x *AssignmentProtocol) Reset() {
 *x = AssignmentProtocol{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[0]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *AssignmentProtocol) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*AssignmentProtocol) ProtoMessage() {}

func (x *AssignmentProtocol) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use AssignmentProtocol.ProtoReflect.Descriptor instead.
func (*AssignmentProtocol) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
 []int{0}
}

func (m *AssignmentProtocol) GetAssignmentType() isAssignmentProtocol_AssignmentType {
```

```
 if m != nil {
  return m.AssignmentType
 }
 return nil
}

func (x *AssignmentProtocol) GetManualAssignmentType() *AssignmentProtocol_ManualAssignmentType {
 if x, ok := x.GetAssignmentType().(*AssignmentProtocol_ManualAssignmentType_); ok {
  return x.ManualAssignmentType
 }
 return nil
}

func (x *AssignmentProtocol) GetAutoAssignmentType() *AssignmentProtocol_AutoAssignmentType {
 if x, ok := x.GetAssignmentType().(*AssignmentProtocol_AutoAssignmentType_); ok {
  return x.AutoAssignmentType
 }
 return nil
}

type isAssignmentProtocol_AssignmentType interface {
 isAssignmentProtocol_AssignmentType()
}

type AssignmentProtocol_ManualAssignmentType_ struct {
 // Allow manual assignments triggered by administrative operations only.
 ManualAssignmentType *AssignmentProtocol_ManualAssignmentType
`protobuf:"bytes,2,opt,name=manual_assignment_type,json=manualAssignmentType,proto3,oneof"`
}

type
 AssignmentProtocol_AutoAssignmentType_ struct {
 // Allow automatic assignments triggered by data plane operations.
 AutoAssignmentType *AssignmentProtocol_AutoAssignmentType
`protobuf:"bytes,3,opt,name=auto_assignment_type,json=autoAssignmentType,proto3,oneof"`
}

func (*AssignmentProtocol_ManualAssignmentType_) isAssignmentProtocol_AssignmentType() {}

func (*AssignmentProtocol_AutoAssignmentType_) isAssignmentProtocol_AssignmentType() {}

// A license pool represents a pool of licenses that can be assigned to users.
type LicensePool struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Identifier. Format:
```

```
 // `billingAccounts/{billing_account}/orders/{order}/licensePool`
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Required. Assignment protocol for the license pool.
 LicenseAssignmentProtocol *AssignmentProtocol
`protobuf:"bytes,2,opt,name=license_assignment_protocol,json=licenseAssignmentProtocol,proto3"
 json:"license_assignment_protocol,omitempty"`
 // Output only. Licenses count that are available to be assigned.
 AvailableLicenseCount int32
`protobuf:"varint,3,opt,name=available_license_count,json=availableLicenseCount,proto3"
json:"available_license_count,omitempty"`
 // Output only. Total number of licenses in the pool.
 TotalLicenseCount int32 `protobuf:"varint,4,opt,name=total_license_count,json=totalLicenseCount,proto3"
json:"total_license_count,omitempty"`
}

func (x *LicensePool) Reset() {
 *x = LicensePool{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[1]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *LicensePool) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*LicensePool) ProtoMessage() {}

func (x *LicensePool) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[1]
 if
 x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use LicensePool.ProtoReflect.Descriptor instead.
func (*LicensePool) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{1}
```

```
}

func (x *LicensePool) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
}

func (x *LicensePool) GetLicenseAssignmentProtocol() *AssignmentProtocol {
 if x != nil {
  return x.LicenseAssignmentProtocol
 }
 return nil
}

func (x *LicensePool) GetAvailableLicenseCount() int32 {
 if x != nil {
  return x.AvailableLicenseCount
 }
 return 0
}

func (x *LicensePool) GetTotalLicenseCount() int32 {
 if x != nil {
  return x.TotalLicenseCount
 }
 return 0
}

// Request message for getting a
 license pool.
type GetLicensePoolRequest struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. The name of the license pool to get.
 // Format: `billingAccounts/{billing_account}/orders/{order}/licensePool`
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
}

func (x *GetLicensePoolRequest) Reset() {
 *x = GetLicensePoolRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[2]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
```

```
}

func (x *GetLicensePoolRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*GetLicensePoolRequest) ProtoMessage() {}

func (x *GetLicensePoolRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[2]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if
 ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use GetLicensePoolRequest.ProtoReflect.Descriptor instead.
func (*GetLicensePoolRequest) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{2}
}

func (x *GetLicensePoolRequest) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
}

// Request message for updating a license pool.
type UpdateLicensePoolRequest struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. The license pool to update.
 //
 // The license pool's name field is used to identify the license pool to
 // update. Format:
 // `billingAccounts/{billing_account}/orders/{order}/licensePool`.
 LicensePool *LicensePool `protobuf:"bytes,1,opt,name=license_pool,json=licensePool,proto3"
```

```
json:"license_pool,omitempty"`
 //
 Required. The list of fields to update.
 UpdateMask *fieldmaskpb.FieldMask `protobuf:"bytes,2,opt,name=update_mask,json=updateMask,proto3"
json:"update_mask,omitempty"`
}

func (x *UpdateLicensePoolRequest) Reset() {
 *x = UpdateLicensePoolRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[3]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *UpdateLicensePoolRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UpdateLicensePoolRequest) ProtoMessage() {}

func (x *UpdateLicensePoolRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[3]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use UpdateLicensePoolRequest.ProtoReflect.Descriptor
 instead.
func (*UpdateLicensePoolRequest) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{3}
}

func (x *UpdateLicensePoolRequest) GetLicensePool() *LicensePool {
 if x != nil {
  return x.LicensePool
 }
 return nil
}
```

```
func (x *UpdateLicensePoolRequest) GetUpdateMask() *fieldmaskpb.FieldMask {
 if x != nil {
  return x.UpdateMask
 }
 return nil
}

// Request message for
//
[LicenseManagementService.Assign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementServic
e.Assign].
type AssignRequest struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. License pool name.
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Required. Username.
 // Format: `name@domain.com`.
 Usernames []string `protobuf:"bytes,2,rep,name=usernames,proto3" json:"usernames,omitempty"`
}

func
 (x *AssignRequest) Reset() {
 *x = AssignRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[4]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *AssignRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*AssignRequest) ProtoMessage() {}

func (x *AssignRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[4]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
```

```
 }
 return mi.MessageOf(x)
}

// Deprecated: Use AssignRequest.ProtoReflect.Descriptor instead.
func (*AssignRequest) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{4}
}

func (x *AssignRequest) GetParent()
 string {
 if x != nil {
  return x.Parent
 }
 return ""
}

func (x *AssignRequest) GetUsernames() []string {
 if x != nil {
  return x.Usernames
 }
 return nil
}

// Response message for
//
[LicenseManagementService.Assign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementServic
e.Assign].
type AssignResponse struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields
}

func (x *AssignResponse) Reset() {
 *x = AssignResponse{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[5]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *AssignResponse) String() string {
 return protoimpl.X.MessageStringOf(x)
}
```

```
func (*AssignResponse) ProtoMessage() {}

func (x *AssignResponse) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[5]
 if x
 != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use AssignResponse.ProtoReflect.Descriptor instead.
func (*AssignResponse) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{5}
}

// Request message for
//
[LicenseManagementService.Unassign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementSer
vice.Unassign].
type UnassignRequest struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. License pool name.
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Required. Username.
 // Format: `name@domain.com`.
 Usernames []string `protobuf:"bytes,2,rep,name=usernames,proto3" json:"usernames,omitempty"`
}

func (x *UnassignRequest) Reset()
 {
 *x = UnassignRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[6]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}
```

```
func (x *UnassignRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UnassignRequest) ProtoMessage() {}

func (x *UnassignRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[6]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use UnassignRequest.ProtoReflect.Descriptor instead.
func (*UnassignRequest) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{6}
}

func (x *UnassignRequest) GetParent() string {
 if x != nil {
  return
 x.Parent
 }
 return ""
}

func (x *UnassignRequest) GetUsernames() []string {
 if x != nil {
  return x.Usernames
 }
 return nil
}

// Response message for
//
[LicenseManagementService.Unassign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementSer
vice.Unassign].
type UnassignResponse struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
```

```
 unknownFields protoimpl.UnknownFields
}

func (x *UnassignResponse) Reset() {
 *x = UnassignResponse{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[7]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *UnassignResponse) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UnassignResponse) ProtoMessage() {}

func (x *UnassignResponse) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[7]
 if x != nil {
  ms
 := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use UnassignResponse.ProtoReflect.Descriptor instead.
func (*UnassignResponse) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{7}
}

// Request message for
//
[LicenseManagementService.EnumerateLicensedUsers][google.cloud.commerce.consumer.procurement.v1.License
ManagementService.EnumerateLicensedUsers].
type EnumerateLicensedUsersRequest struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. License pool name.
```

```
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Optional. The maximum number of users to return. The service may return
 // fewer than this value.
 PageSize int32 `protobuf:"varint,2,opt,name=page_size,json=pageSize,proto3"
 json:"page_size,omitempty"`
 // Optional. A page token, received from a previous `EnumerateLicensedUsers`
 // call. Provide this to retrieve the subsequent page.
 PageToken string `protobuf:"bytes,3,opt,name=page_token,json=pageToken,proto3" json:"page_token,omitempty"`
}

func (x *EnumerateLicensedUsersRequest) Reset() {
 *x = EnumerateLicensedUsersRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[8]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *EnumerateLicensedUsersRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*EnumerateLicensedUsersRequest) ProtoMessage() {}

func (x *EnumerateLicensedUsersRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[8]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo()
 == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use EnumerateLicensedUsersRequest.ProtoReflect.Descriptor instead.
func (*EnumerateLicensedUsersRequest) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{8}
}

func (x *EnumerateLicensedUsersRequest) GetParent() string {
 if x != nil {
  return x.Parent
```

```
 }
 return ""
}

func (x *EnumerateLicensedUsersRequest) GetPageSize() int32 {
 if x != nil {
  return x.PageSize
 }
 return 0
}

func (x *EnumerateLicensedUsersRequest) GetPageToken() string {
 if x != nil {
  return x.PageToken
 }
 return ""
}

// A licensed user.
type LicensedUser struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Username.
 // Format: `name@domain.com`.
 Username string `protobuf:"bytes,1,opt,name=username,proto3" json:"username,omitempty"`
 //
 Output only. Timestamp when the license was assigned.
 AssignTime *timestamppb.Timestamp `protobuf:"bytes,2,opt,name=assign_time,json=assignTime,proto3"
json:"assign_time,omitempty"`
 // Output only. Timestamp when the license was recently used. This may not be
 // the most recent usage time, and will be updated regularly (within 24
 // hours).
 RecentUsageTime *timestamppb.Timestamp
`protobuf:"bytes,3,opt,name=recent_usage_time,json=recentUsageTime,proto3"
json:"recent_usage_time,omitempty"`
}

func (x *LicensedUser) Reset() {
 *x = LicensedUser{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[9]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *LicensedUser) String() string {
```

```
 return protoimpl.X.MessageStringOf(x)
}

func (*LicensedUser) ProtoMessage() {}

func (x *LicensedUser) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[9]
 if
 x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use LicensedUser.ProtoReflect.Descriptor instead.
func (*LicensedUser) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{9}
}

func (x *LicensedUser) GetUsername() string {
 if x != nil {
  return x.Username
 }
 return ""
}

func (x *LicensedUser) GetAssignTime() *timestamppb.Timestamp {
 if x != nil {
  return x.AssignTime
 }
 return nil
}

func (x *LicensedUser) GetRecentUsageTime() *timestamppb.Timestamp {
 if x != nil {
  return x.RecentUsageTime
 }
 return nil
}

// Response message for
```

```
//
[LicenseManagementService.EnumerateLicensedUsers][google.cloud.commerce.consumer.procurement.v1.License
ManagementService.EnumerateLicensedUsers].
type EnumerateLicensedUsersResponse
 struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // The list of licensed users.
 LicensedUsers []*LicensedUser `protobuf:"bytes,1,rep,name=licensed_users,json=licensedUsers,proto3"
json:"licensed_users,omitempty"`
 // A token that can be sent as `page_token` to retrieve the next page.
 // If this field is omitted, there are no subsequent pages.
 NextPageToken string `protobuf:"bytes,2,opt,name=next_page_token,json=nextPageToken,proto3"
json:"next_page_token,omitempty"`
}

func (x *EnumerateLicensedUsersResponse) Reset() {
 *x = EnumerateLicensedUsersResponse{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[10]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *EnumerateLicensedUsersResponse) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*EnumerateLicensedUsersResponse) ProtoMessage() {}

func
 (x *EnumerateLicensedUsersResponse) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[10]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use EnumerateLicensedUsersResponse.ProtoReflect.Descriptor instead.
func (*EnumerateLicensedUsersResponse) Descriptor() ([]byte, []int) {
```

```
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{10}
}

func (x *EnumerateLicensedUsersResponse) GetLicensedUsers() []*LicensedUser {
 if x != nil {
  return x.LicensedUsers
 }
 return nil
}

func (x *EnumerateLicensedUsersResponse) GetNextPageToken() string {
 if x != nil {
  return x.NextPageToken
 }
 return ""
}

// Allow manual assignments triggered by administrative operations only.
type AssignmentProtocol_ManualAssignmentType
 struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields
}

func (x *AssignmentProtocol_ManualAssignmentType) Reset() {
 *x = AssignmentProtocol_ManualAssignmentType{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[11]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *AssignmentProtocol_ManualAssignmentType) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*AssignmentProtocol_ManualAssignmentType) ProtoMessage() {}

func (x *AssignmentProtocol_ManualAssignmentType) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[11]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
```

```
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated:
 Use AssignmentProtocol_ManualAssignmentType.ProtoReflect.Descriptor instead.
func (*AssignmentProtocol_ManualAssignmentType) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{0, 0}
}

// Configuration for automatic assignments handled by data plane operations.
type AssignmentProtocol_AutoAssignmentType struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Optional. The time to live for an inactive license. After this time has
 // passed, the license will be automatically unassigned from the user. Must
 // be at least 7 days, if set. If unset, the license will never expire.
 InactiveLicenseTtl *durationpb.Duration
`protobuf:"bytes,1,opt,name=inactive_license_ttl,json=inactiveLicenseTtl,proto3"
json:"inactive_license_ttl,omitempty"`
}

func (x *AssignmentProtocol_AutoAssignmentType) Reset() {
 *x = AssignmentProtocol_AutoAssignmentType{}
 mi
 := &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[12]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *AssignmentProtocol_AutoAssignmentType) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*AssignmentProtocol_AutoAssignmentType) ProtoMessage() {}

func (x *AssignmentProtocol_AutoAssignmentType) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[12]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
```

```
  ms.StoreMessageInfo(mi)
 }
 return ms
}
return mi.MessageOf(x)
}

// Deprecated: Use AssignmentProtocol_AutoAssignmentType.ProtoReflect.Descriptor instead.
func (*AssignmentProtocol_AutoAssignmentType) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
 []int{0, 1}
}

func (x *AssignmentProtocol_AutoAssignmentType) GetInactiveLicenseTtl() *durationpb.Duration {
 if x != nil {
  return x.InactiveLicenseTtl
 }
 return nil
}

var File_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto
protoreflect.FileDescriptor

var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc =
[]byte{
 0x0a, 0x4e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2f, 0x63,
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0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65,
0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x76, 0x31, 0x42, 0x1d, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65,
0x4d, 0x61, 0x6e, 0x61, 0x67, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x53, 0x65, 0x72, 0x76, 0x69, 0x63,
0x65, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x50, 0x01, 0x5a, 0x53, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e,
0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6f, 0x6d, 0x2f, 0x67, 0x6f, 0x2f, 0x63, 0x6f,
0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2f, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x2f,
0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2f, 0x61, 0x70, 0x69, 0x76,
0x31, 0x2f, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x70, 0x62, 0x3b,
0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x70, 0x62, 0xaa, 0x02, 0x2d,
0x47, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x2e,
0x43, 0x6f, 0x6d,
0x6d, 0x65, 0x72, 0x63, 0x65, 0x2e, 0x43, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x2e, 0x50,
0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x56, 0x31, 0xca, 0x02, 0x2d,
0x47, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x5c, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x5c, 0x43, 0x6f, 0x6d,
0x6d, 0x65, 0x72, 0x63, 0x65, 0x5c, 0x43, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x5c, 0x50,
0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x5c, 0x56, 0x31, 0xea, 0x02, 0x32,

```
 0x47, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x3a, 0x3a, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x3a, 0x3a, 0x43,
 0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x3a, 0x3a, 0x43, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65,
 0x72, 0x3a, 0x3a, 0x50, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x3a, 0x3a,
 0x56, 0x31, 0x62, 0x06, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x33,
}

var (
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescOnce
sync.Once
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescData
 = file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc
)

func
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP()
[]byte {
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescOnce.Do(f
unc() {
  file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_cloud_commerce_consumer_procurement_v1_license_management_servi
ce_proto_rawDescData)
 })
 return file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescData
}

var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes =
make([]protoimpl.MessageInfo, 13)
var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_goTypes =
[]any{
 (*AssignmentProtocol)(nil),
        // 0: google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol
 (*LicensePool)(nil),                        // 1: google.cloud.commerce.consumer.procurement.v1.LicensePool
 (*GetLicensePoolRequest)(nil),                  // 2:
google.cloud.commerce.consumer.procurement.v1.GetLicensePoolRequest
 (*UpdateLicensePoolRequest)(nil),               // 3:
google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest
 (*AssignRequest)(nil),                      // 4: google.cloud.commerce.consumer.procurement.v1.AssignRequest
 (*AssignResponse)(nil),                      // 5: google.cloud.commerce.consumer.procurement.v1.AssignResponse
 (*UnassignRequest)(nil),                     // 6: google.cloud.commerce.consumer.procurement.v1.UnassignRequest
 (*UnassignResponse)(nil),                     // 7: google.cloud.commerce.consumer.procurement.v1.UnassignResponse
 (*EnumerateLicensedUsersRequest)(nil),          // 8:
google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersRequest
 (*LicensedUser)(nil),
                        // 9: google.cloud.commerce.consumer.procurement.v1.LicensedUser
 (*EnumerateLicensedUsersResponse)(nil),         // 10:
google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersResponse
 (*AssignmentProtocol_ManualAssignmentType)(nil), // 11:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.ManualAssignmentType
```

```
 (*AssignmentProtocol_AutoAssignmentType)(nil),   // 12:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.AutoAssignmentType
 (*fieldmaskpb.FieldMask)(nil),                   // 13: google.protobuf.FieldMask
 (*timestamppb.Timestamp)(nil),                   // 14: google.protobuf.Timestamp
 (*durationpb.Duration)(nil),                     // 15: google.protobuf.Duration
}
var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_depIdxs =
[]int32{
 11, // 0:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.manual_assignment_type:type_name
 -> google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.ManualAssignmentType
 12, // 1: google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.auto_assignment_type:type_name -
> google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.AutoAssignmentType
 0,  // 2: google.cloud.commerce.consumer.procurement.v1.LicensePool.license_assignment_protocol:type_name ->
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol
 1,  // 3: google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest.license_pool:type_name ->
google.cloud.commerce.consumer.procurement.v1.LicensePool
 13, // 4: google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest.update_mask:type_name ->
google.protobuf.FieldMask
 14, // 5: google.cloud.commerce.consumer.procurement.v1.LicensedUser.assign_time:type_name ->
google.protobuf.Timestamp
 14, // 6: google.cloud.commerce.consumer.procurement.v1.LicensedUser.recent_usage_time:type_name
 -> google.protobuf.Timestamp
 9,  // 7:
google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersResponse.licensed_users:type_name ->
google.cloud.commerce.consumer.procurement.v1.LicensedUser
 15, // 8:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.AutoAssignmentType.inactive_license_ttl:t
ype_name -> google.protobuf.Duration
 2,  // 9: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.GetLicensePool:input_type -
> google.cloud.commerce.consumer.procurement.v1.GetLicensePoolRequest
 3,  // 10:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.UpdateLicensePool:input_type ->
google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest
 4,  // 11: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Assign:input_type ->
google.cloud.commerce.consumer.procurement.v1.AssignRequest
 6,  // 12: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Unassign:input_type
 -> google.cloud.commerce.consumer.procurement.v1.UnassignRequest
 8,  // 13:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.EnumerateLicensedUsers:input_typ
e -> google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersRequest
 1,  // 14:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.GetLicensePool:output_type ->
google.cloud.commerce.consumer.procurement.v1.LicensePool
 1,  // 15:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.UpdateLicensePool:output_type ->
google.cloud.commerce.consumer.procurement.v1.LicensePool
 5,  // 16: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Assign:output_type ->
```

```
google.cloud.commerce.consumer.procurement.v1.AssignResponse
 7,  // 17: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Unassign:output_type ->
google.cloud.commerce.consumer.procurement.v1.UnassignResponse
 10, // 18:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.EnumerateLicensedUsers:output_ty
pe
 -> google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersResponse
 14, // [14:19] is the sub-list for method output_type
 9,  // [9:14] is the sub-list for method input_type
 9,  // [9:9] is the sub-list for extension type_name
 9,  // [9:9] is the sub-list for extension extendee
 0,  // [0:9] is the sub-list for field type_name
}

func init() {
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_init()
}
func file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_init() {
 if File_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto != nil {
  return
 }
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[0].Oneof
Wrappers = []any{
  (*AssignmentProtocol_ManualAssignmentType_)(nil),
  (*AssignmentProtocol_AutoAssignmentType_)(nil),
 }
 type x struct{}
 out := protoimpl.TypeBuilder{
  File:
 protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor:
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc,
   NumEnums:      0,
   NumMessages:   13,
   NumExtensions: 0,
   NumServices:   1,
  },
  GoTypes:
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_goTypes,
  DependencyIndexes:
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_depIdxs,
  MessageInfos:
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes,
 }.Build()
 File_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto = out.File
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc = nil
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_goTypes = nil
```

```
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_depIdxs
 = nil
}

// Reference imports to suppress errors if they are not otherwise used.
var _ context.Context
var _ grpc.ClientConnInterface

// This is a compile-time assertion to ensure that this generated file
// is compatible with the grpc package it is being compiled against.
const _ = grpc.SupportPackageIsVersion6

// LicenseManagementServiceClient is the client API for LicenseManagementService service.
//
// For semantics around ctx use and closing/ending streaming RPCs, please refer to
https://godoc.org/google.golang.org/grpc#ClientConn.NewStream.
type LicenseManagementServiceClient interface {
 // Gets the license pool.
 GetLicensePool(ctx context.Context, in *GetLicensePoolRequest, opts ...grpc.CallOption) (*LicensePool, error)
 // Updates the license pool if one exists for this Order.
 UpdateLicensePool(ctx context.Context, in *UpdateLicensePoolRequest, opts ...grpc.CallOption) (*LicensePool,
error)
 // Assigns a license to a user.
 Assign(ctx context.Context,
 in *AssignRequest, opts ...grpc.CallOption) (*AssignResponse, error)
 // Unassigns a license from a user.
 Unassign(ctx context.Context, in *UnassignRequest, opts ...grpc.CallOption) (*UnassignResponse, error)
 // Enumerates all users assigned a license.
 EnumerateLicensedUsers(ctx context.Context, in *EnumerateLicensedUsersRequest, opts ...grpc.CallOption)
(*EnumerateLicensedUsersResponse, error)
}

type licenseManagementServiceClient struct {
 cc grpc.ClientConnInterface
}

func NewLicenseManagementServiceClient(cc grpc.ClientConnInterface) LicenseManagementServiceClient {
 return &licenseManagementServiceClient{cc}
}

func (c *licenseManagementServiceClient) GetLicensePool(ctx context.Context, in *GetLicensePoolRequest, opts
...grpc.CallOption) (*LicensePool, error) {
 out := new(LicensePool)
 err := c.cc.Invoke(ctx,
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/GetLicensePool", in, out, opts...)
 if err != nil {
  return nil, err
 }
```

```
 return out, nil
}

func
 (c *licenseManagementServiceClient) UpdateLicensePool(ctx context.Context, in *UpdateLicensePoolRequest,
opts ...grpc.CallOption) (*LicensePool, error) {
 out := new(LicensePool)
 err := c.cc.Invoke(ctx,
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/UpdateLicensePool", in, out,
opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

func (c *licenseManagementServiceClient) Assign(ctx context.Context, in *AssignRequest, opts ...grpc.CallOption)
(*AssignResponse, error) {
 out := new(AssignResponse)
 err := c.cc.Invoke(ctx, "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Assign", in,
out, opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

func (c *licenseManagementServiceClient) Unassign(ctx context.Context, in *UnassignRequest, opts
...grpc.CallOption) (*UnassignResponse, error) {
 out := new(UnassignResponse)
 err := c.cc.Invoke(ctx, "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Unassign",
 in, out, opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

func (c *licenseManagementServiceClient) EnumerateLicensedUsers(ctx context.Context, in
*EnumerateLicensedUsersRequest, opts ...grpc.CallOption) (*EnumerateLicensedUsersResponse, error) {
 out := new(EnumerateLicensedUsersResponse)
 err := c.cc.Invoke(ctx,
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/EnumerateLicensedUsers", in, out,
opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
```

```
}

// LicenseManagementServiceServer is the server API for LicenseManagementService service.
type LicenseManagementServiceServer interface {
 // Gets the license pool.
 GetLicensePool(context.Context, *GetLicensePoolRequest) (*LicensePool, error)
 // Updates the license pool if one exists for this Order.
 UpdateLicensePool(context.Context, *UpdateLicensePoolRequest) (*LicensePool, error)
 // Assigns a license to a user.
 Assign(context.Context, *AssignRequest) (*AssignResponse,
 error)
 // Unassigns a license from a user.
 Unassign(context.Context, *UnassignRequest) (*UnassignResponse, error)
 // Enumerates all users assigned a license.
 EnumerateLicensedUsers(context.Context, *EnumerateLicensedUsersRequest)
(*EnumerateLicensedUsersResponse, error)
}

// UnimplementedLicenseManagementServiceServer can be embedded to have forward compatible
implementations.
type UnimplementedLicenseManagementServiceServer struct {
}

func (*UnimplementedLicenseManagementServiceServer) GetLicensePool(context.Context,
*GetLicensePoolRequest) (*LicensePool, error) {
 return nil, status.Errorf(codes.Unimplemented, "method GetLicensePool not implemented")
}
func (*UnimplementedLicenseManagementServiceServer) UpdateLicensePool(context.Context,
*UpdateLicensePoolRequest) (*LicensePool, error) {
 return nil, status.Errorf(codes.Unimplemented, "method UpdateLicensePool not implemented")
}
func (*UnimplementedLicenseManagementServiceServer) Assign(context.Context, *AssignRequest)
 (*AssignResponse, error) {
 return nil, status.Errorf(codes.Unimplemented, "method Assign not implemented")
}
func (*UnimplementedLicenseManagementServiceServer) Unassign(context.Context, *UnassignRequest)
(*UnassignResponse, error) {
 return nil, status.Errorf(codes.Unimplemented, "method Unassign not implemented")
}
func (*UnimplementedLicenseManagementServiceServer) EnumerateLicensedUsers(context.Context,
*EnumerateLicensedUsersRequest) (*EnumerateLicensedUsersResponse, error) {
 return nil, status.Errorf(codes.Unimplemented, "method EnumerateLicensedUsers not implemented")
}

func RegisterLicenseManagementServiceServer(s *grpc.Server, srv LicenseManagementServiceServer) {
 s.RegisterService(&_LicenseManagementService_serviceDesc, srv)
}
```

```
func _LicenseManagementService_GetLicensePool_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(GetLicensePoolRequest)
 if err := dec(in); err != nil
 {
  return nil, err
 }
 if interceptor == nil {
  return srv.(LicenseManagementServiceServer).GetLicensePool(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/GetLicensePool",
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(LicenseManagementServiceServer).GetLicensePool(ctx, req.(*GetLicensePoolRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_UpdateLicensePool_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(UpdateLicensePoolRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(LicenseManagementServiceServer).UpdateLicensePool(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/UpdateLicensePool",
 }
 handler
 := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(LicenseManagementServiceServer).UpdateLicensePool(ctx, req.(*UpdateLicensePoolRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_Assign_Handler(srv interface{}, ctx context.Context, dec func(interface{})
error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(AssignRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(LicenseManagementServiceServer).Assign(ctx, in)
```

```
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Assign",
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(LicenseManagementServiceServer).Assign(ctx, req.(*AssignRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_Unassign_Handler(srv
 interface{}, ctx context.Context, dec func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{},
error) {
 in := new(UnassignRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(LicenseManagementServiceServer).Unassign(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Unassign",
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(LicenseManagementServiceServer).Unassign(ctx, req.(*UnassignRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_EnumerateLicensedUsers_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(EnumerateLicensedUsersRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor
 == nil {
  return srv.(LicenseManagementServiceServer).EnumerateLicensedUsers(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod:
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/EnumerateLicensedUsers",
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(LicenseManagementServiceServer).EnumerateLicensedUsers(ctx,
```

```
req.(*EnumerateLicensedUsersRequest))
 }
 return interceptor(ctx, in, info, handler)
}

var _LicenseManagementService_serviceDesc = grpc.ServiceDesc{
 ServiceName: "google.cloud.commerce.consumer.procurement.v1.LicenseManagementService",
 HandlerType: (*LicenseManagementServiceServer)(nil),
 Methods: []grpc.MethodDesc{
  {
   MethodName: "GetLicensePool",
   Handler:    _LicenseManagementService_GetLicensePool_Handler,
  },
  {
   MethodName: "UpdateLicensePool",
   Handler:    _LicenseManagementService_UpdateLicensePool_Handler,
  },
  {
   MethodName: "Assign",
   Handler:    _LicenseManagementService_Assign_Handler,
  },
  {
   MethodName:
 "Unassign",
   Handler:    _LicenseManagementService_Unassign_Handler,
  },
  {
   MethodName: "EnumerateLicensedUsers",
   Handler:    _LicenseManagementService_EnumerateLicensedUsers_Handler,
  },
 },
 Streams:  []grpc.StreamDesc{},
 Metadata: "google/cloud/commerce/consumer/procurement/v1/license_management_service.proto",
}
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```

```
// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

// [START discoveryengine_v1_generated_UserLicenseService_BatchUpdateUserLicenses_sync]

package main

import (
 "context"

 discoveryengine "cloud.google.com/go/discoveryengine/apiv1"
 discoveryenginepb "cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb"
)

func main() {
 ctx := context.Background()
 // This snippet has been automatically generated
 and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &discoveryenginepb.BatchUpdateUserLicensesRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb#BatchUpdateUserLicensesReque
st.
 }
 op, err := c.BatchUpdateUserLicenses(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 resp, err := op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

// [END discoveryengine_v1_generated_UserLicenseService_BatchUpdateUserLicenses_sync]
```

```go
// Copyright 2025 Google LLC
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// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
// See the License for the specific language governing permissions and
// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
 "google.golang.org/api/iterator"
)

func ExampleNewLicensesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will
 require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicensesClient_Delete() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
```

```
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.DeleteLicenseRequest{
 //
TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#DeleteLicenseRequest.
}
op, err := c.Delete(ctx, req)
if err != nil {
 // TODO: Handle error.
}

err = op.Wait(ctx)
if err != nil {
 // TODO: Handle error.
}
}

func ExampleLicensesClient_Get() {
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.GetLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseRequest.
}
resp,
err := c.Get(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
```

```
 _ = resp
}

func ExampleLicensesClient_GetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetIamPolicyLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetIamPolicyLicenseRequest.
 }
 resp, err := c.GetIamPolicy(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_Insert()
 {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.InsertLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#InsertLicenseRequest.
 }
 op, err := c.Insert(ctx, req)
 if err != nil {
```

```
 // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleLicensesClient_List() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template
 only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.ListLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#ListLicensesRequest.
 }
 it := c.List(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*computepb.LicensesListResponse)
 }
}

func
```

```
ExampleLicensesClient_SetIamPolicy() {
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
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//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.SetIamPolicyLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#SetIamPolicyLicenseRequest.
}
resp, err := c.SetIamPolicy(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleLicensesClient_TestIamPermissions() {
ctx := context.Background()
// This snippet has been automatically
generated and should be regarded as a code template only.
// It will require modifications to work:
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// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.TestIamPermissionsLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseRequest.
}
resp, err := c.TestIamPermissions(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
```

```
 _ = resp
}

func ExampleLicensesClient_Update() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may
 require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
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 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.UpdateLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#UpdateLicenseRequest.
 }
 op, err := c.Update(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}
```

# 1.1117 deepcopy 0.0.0-20170929034955-c48cc78d4826

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# 1.1118 bash 5.1.8-9.el9

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# 1.1130 slog-shim 0.1.0

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# 1.1131 xorg-randr 1.5.2-8.el9

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# 1.1132 highwayhash 1.0.3

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# 1.1133 docker 28.3.3+incompatible

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// OtherLicense is an Other License Information section of an
// SPDX Document for version 2.2 of the spec.

```
type OtherLicense struct {
 // 10.1: License Identifier: "LicenseRef-[idstring]"
 // Cardinality: conditional (mandatory, one) if license is not
 //              on SPDX License List
 LicenseIdentifier string `json:"licenseId"`

 // 10.2: Extracted Text
 // Cardinality: conditional (mandatory, one) if there is a
 //              License Identifier assigned
 ExtractedText string `json:"extractedText"`

 // 10.3: License Name: single line of text or "NOASSERTION"
 // Cardinality: conditional (mandatory, one) if license is not
 //              on SPDX License List
 LicenseName string `json:"name,omitempty"`

 // 10.4: License Cross Reference
 // Cardinality: conditional (optional, one or many) if license
 //              is not on SPDX License List
 LicenseCrossReferences []string `json:"seeAlsos,omitempty"`

 //
 10.5: License Comment
 // Cardinality: optional, one
 LicenseComment string `json:"comment,omitempty"`
}
```

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Go support for Protocol Buffers - Google's data interchange format

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package v2_1

// OtherLicense is an Other License Information section of an
// SPDX Document for version 2.1 of the spec.
type OtherLicense struct {
 // 6.1: License Identifier: "LicenseRef-[idstring]"
 // Cardinality: conditional (mandatory, one) if license is not
 //              on SPDX License List
 LicenseIdentifier string `json:"licenseId"`

 // 6.2: Extracted Text
 // Cardinality: conditional (mandatory, one) if there is a
 //              License Identifier assigned
 ExtractedText string `json:"extractedText"`

 // 6.3: License Name: single line of text or "NOASSERTION"
 // Cardinality: conditional (mandatory, one) if license is not
 //              on SPDX License List
 LicenseName string `json:"name,omitempty"`
```

```
// 6.4: License Cross Reference
// Cardinality: conditional (optional, one or many) if license
//              is not on SPDX License List
LicenseCrossReferences []string `json:"seeAlsos,omitempty"`

// 6.5:
License Comment
// Cardinality: optional, one
LicenseComment string `json:"comment,omitempty"`
}
```

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// 10.1: License Identifier: "LicenseRef-[idstring]"

```
// Cardinality: conditional (mandatory, one) if license is not
//             on SPDX License List
LicenseIdentifier string `json:"licenseId"`

// 10.2: Extracted Text
// Cardinality: conditional (mandatory, one) if there is a
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ExtractedText string `json:"extractedText"`

// 10.3: License Name: single line of text or "NOASSERTION"
// Cardinality: conditional (mandatory, one) if license is not
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LicenseName string `json:"name,omitempty"`

// 10.4: License Cross Reference
// Cardinality: conditional (optional, one or many) if license
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LicenseCrossReferences []string `json:"seeAlsos,omitempty"`

// 10.5: License Comment
// Cardinality:
optional, one
LicenseComment string `json:"comment,omitempty"`
}
```

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procfs provides functions to retrieve system, kernel and process metrics from the pseudo-filesystem proc.

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localtime.go, localtime_test.go:

Originals:
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Changes:
* Renamed files from civil* to localtime*.
* Package changed from civil to toml.
* 'Local' prefix added to all structs.
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# 1.1142 libconfig 1.7.2-9.el9

## 1.1142.1 Available under license :

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Upstream-Name: ls-config
Source: https://github.com/lucas-net-pl/ls-config

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@c
@c %**start of header

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derived from the library, whereas the latter must
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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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customarily used for software interchange.

If distribution of object code is made by offering access to copy from a
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code from the same place satisfies the requirement to distribute the
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A program that contains no derivative of any portion of the Library, but
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it, is called a ``work that uses the Library''. Such a work, in
isolation, is not a derivative work of the Library, and therefore falls
outside the scope of this License.

However, linking a ``work that uses the Library'' with the Library
creates
an executable that is a derivative of the Library (because it contains
portions of the Library), rather than a ``work that uses the library''.
The executable is therefore covered by this License. Section 6 states
terms for distribution of such executables.

When a ``work that uses the Library'' uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be linked
without the Library, or if the work is itself a library. The threshold
for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure
layouts and accessors, and small macros and small inline functions (ten
lines or less in length), then the use of the object file is
unrestricted, regardless of whether it is legally a derivative work.
(Executables containing this object code plus portions
of the Library
will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may
distribute the object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6, whether
or not they are linked directly with the Library itself.

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@item
As an exception to the Sections above, you may also combine or link a
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directing the user to the copy of this License. Also, you must do one
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work (which must be distributed under Sections 1 and 2 above); and, if
the work is an executable linked with the Library, with the complete
machine-readable ``work that uses the Library'', as object code and/or
source code, so that the user can modify the Library and then relink to
produce a modified executable containing the modified Library. (It is
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in the Library will not necessarily be able to recompile the application
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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any

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#define __VTV_H__

/* We could have used an enumeration here but it just makes it more
  difficult for the compiler to generate a call to this.  These are
  used as arguments to the function __VLTChangePermission, declared
  below.  */
#define __VLTP_READ_ONLY  0
#define __VLTP_READ_WRITE 1

#ifdef __cplusplus
extern "C" void __VLTChangePermission (int);
#else
extern void __VLTChangePermission (int);
#endif

#ifdef BIG_PAGE_SIZE
/* TODO - Replace '4096' below with correct big page size.  */
#define VTV_PAGE_SIZE 4096
#else
#if defined(__sun__) && defined(__svr4__) && defined(__sparc__)
#define VTV_PAGE_SIZE 8192
#else
#define VTV_PAGE_SIZE 4096
#endif
#endif
```

#endif /* __VTV_H__ */

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Version 2.1, February 1999

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```
#define __VTV_H__

/* We could have used an enumeration here but it just makes it more
  difficult for the compiler to generate a call to this.  These are
  used as arguments to the function __VLTChangePermission, declared
  below.  */
#define __VLTP_READ_ONLY  0
#define __VLTP_READ_WRITE 1

#ifdef __cplusplus
extern "C" void __VLTChangePermission (int);
#else
extern void __VLTChangePermission (int);
#endif

#ifdef BIG_PAGE_SIZE
/* TODO - Replace '4096' below with correct big page size.  */
#define VTV_PAGE_SIZE 4096
#else
#if defined(__sun__) && defined(__svr4__) && defined(__sparc__)
#define VTV_PAGE_SIZE 8192
#else
#define VTV_PAGE_SIZE 4096
#endif
#endif



#endif /* __VTV_H__ */
```

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/* Use the Sequent Symmetry assembler syntax.  */

/* Define the syntax of pseudo-ops, labels and comments.  */

/* Prefix for internally generated assembler
 labels.  If we aren't using
  underscores, we are using prefix `.'s to identify labels that should
  be ignored, as in `i386/gas.h' --karl@cs.umb.edu  */

#define LPREFIX "L"

/* Assembler pseudos to introduce constants of various size.  */

#define ASM_BYTE "\t.byte\t"
#define ASM_SHORT "\t.word\t"
#define ASM_LONG "\t.long\t"
#define ASM_QUAD "\t.quad\t"  /* Should not be used for 32bit compilation.  */

/* This was suggested, but it shouldn't be right for DBX output. -- RMS
  #define ASM_OUTPUT_SOURCE_FILENAME(FILE, NAME) */


/* Define the syntax of labels and symbol definitions/declarations.  */
```

```
/* This is how to output an assembler line
   that says to advance the location counter by SIZE bytes.  */

#define ASM_OUTPUT_SKIP(FILE,SIZE)  \
 fprintf (FILE, "\t.space " HOST_WIDE_INT_PRINT_UNSIGNED"\n", (SIZE))

/* Define the syntax of labels and symbol definitions/declarations.  */

/* This says how to output an assembler line
   to define a global common symbol.  */

#define
 ASM_OUTPUT_COMMON(FILE, NAME, SIZE, ROUNDED)  \
( fputs (".comm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u\n", (int)(ROUNDED)))

/* This says how to output an assembler line
   to define a local common symbol.  */

#define ASM_OUTPUT_LOCAL(FILE, NAME, SIZE, ROUNDED)  \
( fputs (".lcomm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u\n", (int)(ROUNDED)))

#ifdef HAVE_GAS_LCOMM_WITH_ALIGNMENT
#define ASM_OUTPUT_ALIGNED_LOCAL(FILE, NAME, SIZE, ALIGNMENT)  \
( fputs (".lcomm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u,%u\n", (int)(SIZE), (int)(ALIGNMENT) / BITS_PER_UNIT))
#endif

/* This is how to output an assembler line
   that says to advance the location counter
   to a multiple of 2**LOG bytes.  */

#define ASM_OUTPUT_ALIGN(FILE,LOG) \
 if ((LOG)!=0) fprintf ((FILE), "\t.align %d\n", (LOG))

/* This is how to store into the string BUF
   the symbol_ref name of an internal numbered label
  where
   PREFIX is the class of label and NUM is the number within the class.
   This is suitable for output with `assemble_name'.  */

#define ASM_GENERATE_INTERNAL_LABEL(BUF,PREFIX,NUMBER) \
    sprintf ((BUF), "*%s%ld", (PREFIX), (long)(NUMBER))
```

/* The prefix to add to user-visible assembler symbols.  */

#define USER_LABEL_PREFIX "_"

/* Sequent has some changes in the format of DBX symbols.  */
#define DBX_NO_XREFS 1

/* Don't split DBX symbols into continuations.  */
#define DBX_CONTIN_LENGTH 0
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the same source package, or built from a separate same source package.
Packaging is done by the Debian GCC Maintainers
<debian-gcc@lists.debian.org>, with sources obtained from:

ftp://gcc.gnu.org/pub/gcc/releases/ (for full releases)
svn://gcc.gnu.org/svn/gcc/ (for prereleases)
ftp://sourceware.org/pub/newlib/ (for newlib)
git://git.savannah.gnu.org/gm2.git (for Modula-2)

The current gcc-12 source package is taken from the git gcc-12-branch.

Changes: See changelog.Debian.gz

Debian splits the GNU Compiler Collection into packages for each language,

library, and documentation as follows:

| Language | Compiler package | Library package | Documentation |
|---|---|---|---|
| Ada | gnat-12 | libgnat-12 | gnat-12-doc |
| C | gcc-12 | | gcc-12-doc |
| C++ | g++-12 | libstdc++6 | libstdc++6-12-doc |
| D | gdc-12 | | |
| Fortran 95 | gfortran-12 | libgfortran5 | gfortran-12-doc |
| Go | gccgo-12 | libgo0 | |
| Objective C | gobjc-12 | libobjc4 | |
| Objective C++ | gobjc++-12 | | |
| Modula-2 | gm2-12 | libgm2 | |

For some language run-time libraries, Debian provides source files, development files, debugging symbols and libraries containing position-independent code in separate packages:

| Language | Sources | Development | Debugging | Position-Independent |
|---|---|---|---|---|
| C++ | | | libstdc++6-12-dbg | libstdc++6-12-pic |
| D | libphobos-12-dev | | | |

Additional packages include:

All languages:

| | |
|---|---|
| libgcc1, libgcc2, libgcc4 | GCC intrinsics (platform-dependent) |
| gcc-12-base | Base files common to all compilers |
| gcc-12-soft-float | Software floating point (ARM only) |
| gcc-12-source | The sources with patches |

Ada:

| | |
|---|---|
| libgnat-util12-dev, libgnat-util12 | GNAT version library |

C:

| | |
|---|---|
| cpp-12, cpp-12-doc | GNU C Preprocessor |
| libssp0-dev, libssp0 | GCC stack smashing protection library |
| libquadmath0 | Math routines for the __float128 type |
| fixincludes | Fix non-ANSI header files |

C, C++ and Fortran 95:

| | |
|---|---|
| libgomp1-dev, libgomp1 | GCC OpenMP (GOMP) support library |
| libitm1-dev, libitm1 | GNU Transactional Memory Library |

Biarch support: On some 64-bit platforms which can also run 32-bit code, Debian provides additional packages containing 32-bit versions of some

libraries. These packages have names beginning with 'lib32' instead of 'lib', for example lib32stdc++6. Similarly, on some 32-bit platforms which can also run 64-bit code, Debian provides additional packages with names beginning with 'lib64' instead of 'lib'. These packages contain 64-bit versions of the libraries. (At this time, not all platforms and not all libraries support biarch.) The license terms for these lib32 or lib64 packages are identical to the ones for the lib packages.

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- libatomic
- libdecnumber
- libgomp

- libitm
- libssp
- libstdc++-v3
- libobjc
- libgfortran
- The libgnat-12 Ada support library and libgnat-util12 library.
- Various config files in gcc/config/
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D:

| | |
|---|---|
| gdc-12 | GNU D Compiler |
| libphobos-12-dev | D standard runtime library |

The D source package is made up of the following components.

The D front-end for GCC:
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The Phobos standard runtime library:
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iconv (Charset Conversion Library) v2.0

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The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General

Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

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   "Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any

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performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or

link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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<!-- Creator : groff version 1.20.1 -->
<!-- CreationDate: Fri Jan 14 19:57:50 2011 -->
<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN"
"http://www.w3.org/TR/html4/loose.dtd">
<html>
<head>
<meta name="generator" content="groff -Thtml, see www.gnu.org">
<meta http-equiv="Content-Type" content="text/html; charset=US-ASCII">
<meta name="Content-Style" content="text/css">
<link rel="stylesheet" type="text/css" href="texi2tr.css" />
<title>GNU Modula-2</title>
</head>

```
<body>
 <!-- site wide top running header menu -->

 <ul id="overview">
   <li class="home">
     HOME_HREF
   </li>
   <li class="release">
     12_HREF
   </li>

   <li>
     <a href="news.html" title="News">News</a>
   </li>
   <li>
     <a href="development.html" title="Development">Development</a>
   </li>
   <li>
     <a href="community.html" title="Community">Community</a>
   </li>
 </ul>

 <div id="header">
   <h1>
     <span style="display:inline-block; vertical-align:middle">
 <img
 src="200px-Heckert_GNU_white.png" alt="Heckert_GNU_white.png">
     </span>
     <span style="display:inline-block; vertical-align:middle; font-size: 50px">
 GNU Modula-2
     </span>
   </h1>

   <!-- homepage tab menu -->

   <div id="tabmenu">
     <ul id="tab">
 <li><a href="about.html"><span>About</span></a></li>
 <li><a href="download.html"><span>Download</span></a></li>
 <li><a href="release.html"><span>Latest Release</span></a></li>
 <li class="selected"><a href="license.html"><span>License</span></a></li>
 <li><a href="platforms.html"><span>Platforms</span></a></li>
 <li><a href="users.html"><span>Users</span></a></li>
     </ul>
   </div>
 </div>
```

```
<div id="page">
 <div class="plain">
   <h2>The home of the GNU Modula-2 compiler</h2>
   <p>The compiler is held under the GNU Public Licence v3.</p>
   <p>The ISO and PIM libraries are under the GPL v3.1 with GCC runtime extensions.  Copies of the
     licences can be found on the
     <a href="http://www.gnu.org/licenses">GNU</a>
 web site.</p>
 </div>
</div>
</body>
</html>
```



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# 1.1145 fresh 0.5.2

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# 1.1146 on-headers 1.1.0

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# 1.1147 @npmcli/agent 4.0.0

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# 1.1148 libmodulemd 2.13.0-2.el9

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# 1.1149 genproto-googleapis-rpc 0.0.0-20250324211829-b45e905df463

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# 1.1150 masterminds-goutils 1.1.1

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# 1.1158 network-manager-applet 1.26.0-2.el9

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localtime.go, localtime_test.go:

Originals:

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Changes:
* Renamed files from civil* to localtime*.
* Package changed from civil to toml.
* 'Local' prefix added to all structs.
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package spec

// License information for the exposed API.
//
// For more information: http://goo.gl/8us55a#licenseObject
type License struct {
 Name string `json:"name,omitempty"`
 URL  string `json:"url,omitempty"`
}
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Protocol Buffers for Go with Gadgets

Go support for Protocol Buffers - Google's data interchange format

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* github.com/BurntSushi/toml - https://github.com/BurntSushi/toml

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* gogrep - https://github.com/mvdan/gogrep

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==========
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# 1.1166 google-uuid 1.6.0

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# 1.1171 go-openapi-jsonpointer 0.21.1

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# 1.1173 @jest/schemas 29.6.3

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# 1.1174 hibernate-validator 9.0.1.Final

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```
/**
* <p>
* A method-level constraint, that evaluates a script expression against the
* annotated method or constructor. This constraint can be used to implement
* validation routines that depend on several parameters of the annotated
* executable.
* </p>
* <p>
* Script expressions can be written in any scripting or expression language,
* for which a <a href="http://jcp.org/en/jsr/detail?id=223">JSR 223</a>
* ("Scripting for the Java<sup>TM</sup> Platform") compatible engine can be
* found on the classpath. To refer to a parameter within the scripting
* expression, use its name as obtained by the active
* {@link jakarta.validation.ParameterNameProvider}. The default provider will
* return the actual parameter names, if the -parameters compiler option
* has been enabled, and {@code arg0}, {@code arg1} etc. otherwise.
* </p>
* <p>
* The following listing shows an example using the JavaScript engine which
 * comes with the JDK:
* </p>
* <pre>
* {@code @ParameterScriptAssert(script = "start.before(end)", lang = "javascript")
* public void createEvent(Date start, Date end) { ... }
* }
* </pre>
* <p>
* Can be specified on any method or constructor.
* </p>
```

*
* @author Gunnar Morling
*/

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/**
 * Retrieves constraint related meta data for the parameters of the given
 * executable.
 *
 * @param javaBeanExecutable The executable of interest.
 *
 * @return A list with parameter meta data for the given executable.
 */

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# 1.1175 ncurses 6.5_p20241006-r3

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-- vile: txtmode file-encoding=utf-8
Upstream source https://invisible-island.net/ncurses/ncurses.html
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-- vile:txtmode fc=72
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Upstream source https://invisible-island.net/ncurses/Ada95.html

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-- vile: txtmode file-encoding=utf-8
Upstream source https://invisible-island.net/ncurses/ncurses-examples.html

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-- vile: txtmode file-encoding=utf-8

# 1.1176 xfsdump 3.1.12-4.el9_3

## 1.1176.1 Available under license :

---

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/lksctp-tools-1.0.19-3.el9_4.src.rpm-cosi-expand-archive-q2FeiFXL/lksctp-tools-1.0.19.tar.gz-cosi-expand-archive-SiaCILyW/lksctp-tools-1.0.19.tar.gz: binary file matches

Found in path(s):
* /bin/grep
No license file was found, but licenses were detected in source scan.

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Found in path(s):
* /lksctp-tools-1.0.19-3.el9_4.src.rpm-cosi-expand-archive-q2FeiFXL/lksctp-tools.spec
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From df0cd18b5d81a7f8c661e6e565e5e35e00fbb9d8 Mon Sep 17 00:00:00 2001
From: Xin Long <lucien.xin@gmail.com>
Date: Mon, 27 Feb 2023 17:57:20 -0500
Subject: [PATCH 5/6] man: add the missing options in SOCKET OPTIONS in sctp.7

There are a lot of options missing in in SOCKET OPTIONS in sctp.7,
and this patch adds them all.

Signed-off-by: Xin Long <lucien.xin@gmail.com>
---
man/sctp.7 | 508 ++++++

```
+unchanged.
+
+The parameter type is struct sctp_sack_info. For reading, sack_assoc_id is
+a specified assoc_id or SCTP_FUTURE_ASSOC. For writing, sack_assoc_id is a
+specified assoc_id or SCTP_{FUTURE|CURRENT|ALL}_ASSOC.
+
+Default: sackdelay=sysctl_net.sctp.sack_timeout,sackfreq=2.
+.TP
+.B SCTP_CONTEXT
+This option allows the setting, on an association basis, of a default
+context that will be received on reading messages from the peer.
+This is especially helpful for an application when using one-to-many
+style sockets to keep some reference to an internal state machine that
+is processing messages on the association.  Note that the setting of
+this value only affects received messages from the peer and does not
+affect
 the value that is saved with outbound messages.
+
+The parameter type is struct sctp_assoc_value. For reading, assoc_id
+is a specified assoc_id or SCTP_FUTURE_ASSOC. For writing, assoc_id
+is a specified assoc_id or SCTP_{FUTURE|CURRENT|ALL}_ASSOC.
+
+Default: 0.
+.TP
+.B SCTP_FRAGMENT_INTERLEAVE
+Fragmented interleave controls how the presentation of messages
+occurs for the message receiver. There are three levels of fragment
+interleave defined: level 0: SCTP_FRAGMENT_INTERLEAVE = 0; level 1:
+SCTP_FRAGMENT_INTERLEAVE = 1; level 2: SCTP_FRAGMENT_INTERLEAVE = 1
+& SCTP_INTERLEAVING_SUPPORTED = 1.
+
+The parameter type is int boolean, for reading and writing.
+
+Default: 0.
+.TP
+.B SCTP_PARTIAL_DELIVERY_POINT
+This option will set or get the SCTP partial delivery point.  This
+point is the size of a message where the partial delivery API will be
+invoked to help free up rwnd space for the peer.  Setting this to a
+lower value will cause partial deliveries to happen more often.
  This
+option expects an integer that sets or gets the partial delivery
+point in bytes.  Note also that the call will fail if the user
+attempts to set this value larger than the socket receive buffer
+size. Note that any single message having a length smaller than or equal
+to the SCTP partial delivery point will be delivered in a single read
+call as long as the user-provided buffer is large enough to hold the
+message.
```

```
+
+The parameter type is uint32_t, for reading and writing.
+
+Default: 0.
+.TP
+.B SCTP_MAX_BURST
+This option will allow a user to change the maximum burst of packets
+that can be emitted by this association.
+
+The parameter type is struct sctp_assoc_value. For reading, assoc_id
+is a specified assoc_id or SCTP_FUTURE_ASSOC. For writing, assoc_id
+is a specified assoc_id or SCTP_{FUTURE|CURRENT|ALL}_ASSOC.
+
+Default: sysctl_net.sctp.max_burst.
+.TP
+.B SCTP_AUTH_CHUNK
+This option adds a chunk type that the user is requesting to be received
+only in an authenticated
 way, and it only affects the future associations.
+
+The parameter type is struct sauth_chunk, for writing only.
+
+Default: no chunks.
+Require: SCTP_AUTH_SUPPORTED.
+RFC: RFC4895.
+.TP
+.B SCTP_HMAC_IDENT
+This option gets or sets the list of Hashed Message Authentication
+Code (HMAC) algorithms that the local endpoint requires the peer
+to use.
+
+The parameter type is struct sctp_hmacalgo, for reading and writing.
+shmac_idents can include SCTP_AUTH_HMAC_ID_{SHA1|SHA256}.
+
+Default: SCTP_AUTH_HMAC_ID_SHA1.
+Require: SCTP_AUTH_SUPPORTED.
+.TP
+.B SCTP_AUTH_KEY
+This option will set a shared secret key that is used to build an
+association shared key.
+
+The parameter type is struct sctp_authkey, for writing only. sca_assoc_id
+is a specified assoc_id or SCTP_{FUTURE|CURRENT|ALL}_ASSOC.
+
+Default: null_key.
+Require: SCTP_AUTH_SUPPORTED.
+.TP
+.B SCTP_AUTH_ACTIVE_KEY
```

```
+This option will get or set the active shared key to be used to build
+the association shared key.
+
+The parameter
 type is struct sctp_authkeyid, for writing only.
+scact_assoc_id is a specified assoc_id or
+SCTP_{FUTURE|CURRENT|ALL}_ASSOC.
+
+Default: 0.
+Require: SCTP_AUTH_SUPPORTED.
+.TP
+.B SCTP_AUTH_DEACTIVATE_KEY
+This set option indicates that the application will no longer send
+user messages using the indicated key identifier.
+
+The parameter type is struct sctp_authkeyid, for writing only.
+scact_assoc_id is a specified assoc_id or
+SCTP_{FUTURE|CURRENT|ALL}_ASSOC.
+
+Require: SCTP_AUTH_SUPPORTED.
+.TP
+.B SCTP_AUTH_DELETE_KEY
+This set option will delete an SCTP association's shared secret key
+that has been deactivated.
+
+The parameter type is struct sctp_authkeyid, for writing only.
+scact_assoc_id is a specified assoc_id or
+SCTP_{FUTURE|CURRENT|ALL}_ASSOC.
+
+Require: SCTP_AUTH_SUPPORTED.
+.TP
+.B SCTP_PEER_AUTH_CHUNKS
+This option gets a list of chunk types for a specified association
+that the peer requires to be received authenticated only.
+
+The parameter type is struct
 sctp_authchunks, for reading only.
+gauth_assoc_id is a specified assoc_id.
+
+Require: SCTP_AUTH_SUPPORTED.
+.TP
+.B SCTP_LOCAL_AUTH_CHUNKS
+This option gets a list of chunk types for a specified association that
+the local endpoint requires to be received authenticated only.
+
+The parameter type is struct sctp_authchunks, for reading only.
+gauth_assoc_id is a specified assoc_id or SCTP_FUTURE_ASSOC.
+
```

```
+Require: SCTP_AUTH_SUPPORTED.
+.TP
+.B SCTP_GET_ASSOC_NUMBER
+This option gets the current number of associations that are attached
+to a one-to-many style socket. Note that this number is only a snapshot.
+This means that the number of associations may have changed when the
+caller gets back the option result.
+
+The parameter type is uint32_t, for reading only.
+.TP
+.B SCTP_GET_ASSOC_ID_LIST
+This option gets the current list of SCTP association identifiers of
+the SCTP associations handled by a one-to-many style socket. It uses
+struct sctp_assoc_ids and must provide a large enough
 buffer to hold
+all association identifiers. If the buffer is too small, an error must
+be returned. The user can use the SCTP_GET_ASSOC_NUMBER socket option
+to get an idea of how large the buffer has to be.
+
+The parameter type is struct sctp_assoc_ids, for reading only.
+.TP
+.B SCTP_EXPOSE_POTENTIALLY_FAILED_STATE, SCTP_EXPOSE_PF_STATE
+Applications can control the exposure of the PF path state in the
+SCTP_PEER_ADDR_CHANGE event, and if pf_expose is not 'enabled', no
+notification will be sent for a transport state change to SCTP_PF.
+It also affects the SCTP_GET_PEER_ADDR_INFO socket option, and if
+pf_expose is 'disabled', users can not access the transport info via
+SCTP_GET_PEER_ADDR_INFO option.
+
+The parameter type is struct sctp_assoc_value, for reading and writing.
+assoc_id is a specified assoc_id or SCTP_FUTURE_ASSOC.
+
+Default: sysctl_net.sctp.pf_expose.
+.TP
+.B SCTP_PEER_ADDR_THLDS
+Applications can control the SCTP-PF behavior by getting or setting
+the number
 of consecutive timeouts before a peer address is
+considered PF or unreachable..
+
+The parameter type is struct sctp_paddrthlds, for reading and writing.
+spt_address is a specified transport address or 0, spt_assoc_id
+is a specified assoc_id or SCTP_FUTURE_ASSOC.
+
+Default: pathmaxrxt=sysctl_net.sctp.path_max_retrans,
+ps_retrans=sysctl_net.sctp.ps_retrans.
+.TP
+.B SCTP_PEER_ADDR_THLDS_V2
```

```
+Similar to SCTP_PEER_ADDR_THLDS, but it can also be used by applications
+to set and get the number of timeouts before the primary path is changed
+automatically by the Primary Path Switchover function.
+
+The parameter type is struct sctp_paddrthlds_v2, for reading and writing.
+spt_address is a specified transport address or 0, spt_assoc_id is a
+specified assoc_id or SCTP_FUTURE_ASSOC.
+
+Default: pathmaxrxt=sysctl_net.sctp.path_max_retrans,
+ps_retrans=sysctl_net.sctp.ps_retrans, pf_retrans=sysctl_net.sctp.pf_retrans.
+.TP
+.B SCTP_RECVRCVINFO
+Setting this option specifies that SCTP_RCVINFO
 (SCTP receive information
+about a received message) is returned as ancillary data by recvmsg(). See
+.B CONTROL MSGS
+for more details.
+
+The parameter type is int, for reading and writing.
+
+Default: 0.
+.TP
+.B SCTP_RECVNXTINFO
+Setting this option specifies that SCTP_NXTINFO (SCTP receive information
+of the next message) is returned as ancillary data by recvmsg(). See
+.B CONTROL MSGS
+for details.
+
+The parameter type is int, for reading and writing.
+
+Default: 0.
+.TP
+.B SCTP_DEFAULT_SNDINFO
+This option obsoletes SCTP_DEFAULT_SEND_PARAM.
+
+The parameter type is struct sctp_sndinfo. For reading, snd_assoc_id is
+a specified assoc_id or SCTP_FUTURE_ASSOC. For writing, snd_assoc_id is
+a specified assoc_id or SCTP_{FUTURE|CURRENT|ALL}_ASSOC.
+
+Default: default_stream=0, default_flags=0, default_ppid=0, default_context=0.
+.TP
+.B SCTP_REUSE_PORT
+This option is similar to the socket level option SO_REUSEADDR, besides
+only supports one-to-one style SCTP sockets and must not
 be used after
+calling bind() or sctp_bindx().
+
+The parameter type is int, for reading and writing.
```

+
+Default: 0.
+.TP
+.B SCTP_SOCKOPT_BINDX_ADD
+This option allows the user to bind a specific subset of addresses or,
+if the SCTP extension ASCONF is supported (see SCTP_ASCONF_SUPPORTED),
+add specific addresses. The API sctp_bindx() is based on this.
+
+The parameter type is struct sockaddr[], for writing only.
+.TP
+.B SCTP_SOCKOPT_BINDX_REM
+Similar to SCTP_SOCKOPT_BINDX_ADD, but delete specific addresses. The API
+sctp_bindx() is based on this.
+
+The parameter type is struct sockaddr[], for writing only.
+.TP
+.B SCTP_SOCKOPT_PEELOFF
+This option branches off an UDP type association into a separate socket
+returned back to users. The API sctp_peeloff() is based on this option.
+
+The parameter type is sctp_peeloff_arg_t, for reading only. associd is a
+specified assoc_id.
+.TP
+.B SCTP_SOCKOPT_PEELOFF_FLAGS
+Peel off an UDP type association from a socket similar to SCTP_SOCKOPT_PEELOFF
+option,
 but it allows the flags like O_CLOEXEC and O_NONBLOCK to be used when
+creating the new socket. The API sctp_peeloff_flags() is based on this option.
+
+The parameter type is sctp_peeloff_flags_arg_t, for reading only. associd
+is a specified assoc_id.
+.TP
+.B SCTP_SOCKOPT_CONNECTX_OLD
+This option allows a user to specify multiple addresses at which a peer can
+be reached, and the kernel stack will use the list of addresses to set up
+the association. The API sctp_connectx() is based on this option.
+
+The parameter type is struct sockaddr[], for writing only.
+.TP
+.B SCTP_SOCKOPT_CONNECTX
+Similar to SCTP_SOCKOPT_CONNECTX_OLD, but it returns the new assoc's id.
+The API sctp_connectx2() is based on this option.
+
+The parameter type is struct sockaddr[], for writing only. The new assoc's
+id is passed to users by the return value.
+.TP
+.B SCTP_SOCKOPT_CONNECTX3
+Similar to SCTP_SOCKOPT_CONNECTX, but it uses different type parameter. The

```
+API sctp_connectx3() is
 based on this option.
+
+The parameter type is struct sctp_getaddrs_old, for reading only. assoc_id
+is set to the new assoc's id by kernel and passed to users.
+.TP
+.B SCTP_GET_PEER_ADDRS
+This option is used to gets all peer addresses in an association. The API
+sctp_getpaddrs() is based on this option.
+
+The parameter type is struct sctp_getaddrs, for reading only. assoc_id
+is a specified assoc_id.
+.TP
+.B SCTP_GET_LOCAL_ADDRS
+This option is used to get all local addresses in an association. The API
+sctp_getladdrs() is based on this option.
+
+The parameter type is struct sctp_getaddrs, for reading only. assoc_id
+is a specified assoc_id or SCTP_FUTURE_ASSOC.
+.TP
+.B SCTP_ADAPTATION_LAYER
+This option requests that the local endpoint set the specified
+Adaptation Layer Indication parameter for all future INIT and
+INIT-ACK exchanges.
+
+The parameter type is struct sctp_setadaptation, for reading and writing.
+
+Default: 0.
+.TP
+.B SCTP_EVENT
+This option obsoletes SCTP_EVENTS
 socket option, and it can set or get
+one specific type of event for a specified association.
+
+The parameter type is struct sctp_event. For reading, se_assoc_id is
+a specified assoc_id or SCTP_FUTURE_ASSOC. For writing, se_assoc_id
+is a specified assoc_id or SCTP_{FUTURE|CURRENT|ALL}_ASSOC. se_type
+can be one of enum sctp_sn_type.
+
+Default: 0.
+.TP
+.B SCTP_PR_SUPPORTED
+This socket option allows the enabling or disabling of the negotiation of
+PR-SCTP support for future associations.
+
+The parameter type is struct sctp_assoc_value. For reading, assoc_id
+is a specified assoc_id or SCTP_FUTURE_ASSOC. For writing, assoc_id
+is SCTP_FUTURE_ASSOC.
```

```
+
+Default: sysctl_net.sctp.prsctp_enable.
+RFC: RFC7496.
+.TP
+.B SCTP_DEFAULT_PRINFO
+This option sets and gets the default parameters for PR-SCTP.
+
+The parameter type is struct sctp_default_prinfo. For reading, pr_assoc_id
+is a specified assoc_id or SCTP_FUTURE_ASSOC. For writing, pr_assoc_id is
+a specified assoc_id or SCTP_{FUTURE|CURRENT|ALL}_ASSOC.
 pr_policy can be
+SCTP_PR_SCTP_{NONE|TTL|RTX|PRIO}.
+
+Default: SCTP_PR_SCTP_NONE.
+Require: SCTP_DEFAULT_PRINFO.
+.TP
+.B SCTP_PR_ASSOC_STATUS
+This option is used to get Association-Specific PR-SCTP Status.
+
+The parameter type is struct sctp_prstatus, for reading only.
+sprstat_assoc_id is a specified assoc_id, sprstat_policy
+can be SCTP_PR_SCTP_{TTL|RTX|PRIO|ALL}.
+.TP
+.B SCTP_PR_STREAM_STATUS
+This option is used to get Stream-Specific PR-SCTP Status.
+
+The parameter type is struct sctp_prstatus, for reading only.
+sprstat_assoc_id is a specified assoc_id, sprstat_policy
+can be SCTP_PR_SCTP_{TTL|RTX|PRIO|ALL}.
+.TP
+.B SCTP_RECONFIG_SUPPORTED
+Enable the Stream Reconfiguration(RECONF) for the future associations.
+For different type of requests enabling, see SCTP_ENABLE_STREAM_RESET
+option.
+
+The parameter type is struct sctp_assoc_value. For reading, assoc_id
+is a specified assoc_id or SCTP_FUTURE_ASSOC. For writing, assoc_id
+is SCTP_FUTURE_ASSOC.
+
+Default:
 sysctl_net.sctp.reconf_enable.
+RFC: RFC6525.
+.TP
+.B SCTP_ENABLE_STREAM_RESET
+This option allows a user to control whether the kernel processes or denies
+incoming requests in RECONF chunks.
+
+The parameter type is struct sctp_assoc_value. For reading, assoc_id is
```

```
+a specified assoc_id or SCTP_FUTURE_ASSOC. For writing, assoc_id is
+a specified assoc_id or SCTP_{FUTURE|CURRENT|ALL}_ASSOC. assoc_value
+can be SCTP_ENABLE_{RESET_STREAM_REQ|RESET_ASSOC_REQ|CHANGE_ASSOC_REQ}.
+
+Default: 0.
+Require: SCTP_RECONFIG_SUPPORTED.
+.TP
+.B SCTP_RESET_STREAMS
+This option allows the user to request the reset of incoming and/or
+outgoing streams.
+
+The parameter type is struct sctp_reset_streams, for writing only.
+srs_assoc_id is a specified assoc_id.
+
+Require: SCTP_ENABLE_STREAM_RESET.
+.TP
+.B SCTP_RESET_ASSOC
+This option allows a user to request the reset of the SSN/TSN.
+
+The parameter type is sctp_assoc_t, for writing only. It is a specified
+assoc_id.
+
+Require: SCTP_ENABLE_STREAM_RESET.
+.TP
+.B
 SCTP_ADD_STREAMS
+This option allows a user to request the addition of a number of incoming
+and/or outgoing streams.
+
+The parameter type is struct sctp_add_streams, for writing only.
+sas_assoc_id is a specified assoc_id.
+
+Require: SCTP_ENABLE_STREAM_RESET.
+.TP
+.B SCTP_STREAM_SCHEDULER
+This option is used to select a stream scheduler for data sending.
+
+The parameter type is struct sctp_assoc_value. For reading, assoc_id is
+a specified assoc_id or SCTP_FUTURE_ASSOC. For writing, assoc_id is a
+specified assoc_id or SCTP_{FUTURE|CURRENT|ALL}_ASSOC. assoc_value can
+be SCTP_SS_{FCFS|PRIO|RR|FC|WFQ}.
+
+Default: SCTP_SS_FCFS.
+RFC: RFC8260.
+.TP
+.B SCTP_STREAM_SCHEDULER_VALUE
+Some stream schedulers require additional information to be set for
+individual streams.
```

```
+
+The parameter type is struct sctp_assoc_value. For reading, assoc_id is
+a specified assoc_id. For writing, assoc_id is a specified assoc_id or
+SCTP_CURRENT_ASSOC.
+
+Require: SCTP_STREAM_SCHEDULER.
+.TP
+.B
 SCTP_INTERLEAVING_SUPPORTED
+This socket option allows the enabling or disabling of the negotiation of
+user message interleaving support for future associations.
+
+The parameter type is struct sctp_assoc_value. For reading, assoc_id
+is a specified assoc_id or SCTP_FUTURE_ASSOC. For writing, assoc_id
+is SCTP_FUTURE_ASSOC.
+
+Default: sysctl_net.sctp.intl_enable.
+Require: SCTP_FRAGMENT_INTERLEAVE.
+RFC: RFC8260.
+.TP
+.B SCTP_ASCONF_SUPPORTED
+Enable the Dynamic Address Reconfiguration(ASCONF) for the future
+associations.
+
+The parameter type is struct sctp_assoc_value. For reading, assoc_id
+is a specified assoc_id or SCTP_FUTURE_ASSOC. For writing, assoc_id
+is SCTP_FUTURE_ASSOC.
+
+Default: sysctl_net.sctp.addip_enable.
+RFC: RFC5061.
+.TP
+.B SCTP_AUTO_ASCONF
+This option will enable or disable the use of the automatic generation of
+ASCONF chunks to add and delete addresses to an existing association.
+Note that this option has two caveats, namely
 a) it only affects sockets
+that are bound to all addresses available to the SCTP stack, and b) the
+system administrator may have an overriding control that turns the ASCONF
+feature off no matter what setting the socket option may have.
+
+The parameter type is int boolean, for reading and writing.
+
+Default: sysctl_net.sctp.default_auto_asconf.
+.TP
+.B SCTP_AUTH_SUPPORTED
+Enable AUTH for the future associations.
+
+The parameter type is struct sctp_assoc_value. For reading, assoc_id
```

```
+is a specified assoc_id or SCTP_FUTURE_ASSOC. For writing, ssoc_id
+is SCTP_FUTURE_ASSOC.
+
+Default: sysctl_net.sctp.auth_enable.
+RFC: RFC4895.
+.TP
+.B SCTP_ECN_SUPPORTED
+Enable ECN for the future associations.
+
+The parameter type is struct sctp_assoc_value. For reading, assoc_id
+is a specified assoc_id or SCTP_FUTURE_ASSOC. For writing, assoc_id
+is SCTP_FUTURE_ASSOC.
+
+Default: sysctl_net.sctp.ecn_enable.
+.TP
+.B SCTP_REMOTE_UDP_ENCAPS_PORT
+This option is used to set the encapsulation port(a
 remote listening or
+dest port) for SCTP over UDP, which allows SCTP traffic to pass through
+legacy NATs that do not provide native SCTP support.
+
+The parameter type is struct sctp_udpencaps, for reading and writing.
+sue_address is a specified transport address or 0, sue_assoc_id
+is a specified assoc_id or SCTP_FUTURE_ASSOC.
+
+Default: sysctl_net.sctp.encap_port.
+RFC: RFC6951.
+.TP
+.B SCTP_PLPMTUD_PROBE_INTERVAL
+This option is used to configure the PROBE_INTERVAL for the Packetization
+Layer Path MTU Discovery(PLPMTUD). It can be set to a value >= 5000 or
+0(disabled).
+
+The parameter type is struct sctp_probeinterval, for reading and writing.
+spi_address is a specified transport address or 0, spi_assoc_id is
+a specified assoc_id or SCTP_FUTURE_ASSOC.
+
+Default: 0(disabled).
+RFC: RFC8899.
.SH AUTHORS
Sridhar Samudrala <sri@us.ibm.com>
.SH "SEE ALSO"
--
2.39.1
```

Found in path(s):
* /lksctp-tools-1.0.19-3.el9_4.src.rpm-cosi-expand-archive-q2FeiFXL/man-add-the-missing-options-in-SOCKET-OPTIONS-in-sct.patch

# 1.1178 docker 28.1.1+incompatible

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procfs provides functions to retrieve system, kernel and process
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# 1.1179 md5-simd 1.1.2

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# 1.1181 node-addon-api 7.1.1

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# 1.1183 toidentifier 1.0.1

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# 1.1187 arp 0.0.0-20220512170110-6706a2966875

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# 1.1188 libseccomp 2.5.2-2.el9

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# 1.1189 knftables 0.0.18

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# 1.1190 p-map 4.0.0

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# 1.1191 libgusb 0.3.8-2.el9

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b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly
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the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

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# 1.1192 python-pip 23.2.1

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ca-bundle.crt -- Bundle of CA Root Certificates

Certificate data from Mozilla as of: Thu Nov 3 19:04:19 2011#
This is a bundle of X.509 certificates of public Certificate Authorities
(CA). These were automatically extracted from Mozilla's root certificates
file (certdata.txt). This file can be found in the mozilla source tree:
https://hg.mozilla.org/mozilla-central/file/tip/security/nss/lib/ckfw/builtins/certdata.txt
It contains the certificates in PEM format and therefore
can be directly used with curl / libcurl / php_curl, or with
an Apache+mod_ssl webserver for SSL client authentication.
Just configure this file as the SSLCACertificateFile.#

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@(#) $RCSfile: certdata.txt,v
$ $Revision: 1.80 $ $Date: 2011/11/03 15:11:58 $
A. HISTORY OF THE SOFTWARE
==========

Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see https://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see https://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same

year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see https://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

All Python releases are Open Source (see https://opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
| 2.2 and above | 2.1.1 | 2001-now | PSF | yes |

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(2) According to Richard Stallman, 1.6.1 is not GPL-compatible, because its license has a choice of law clause. According to CNRI, however, Stallman's lawyer has told CNRI's lawyer that 1.6.1 is "not incompatible" with the GPL.

Thanks to the many outside volunteers who have worked under Guido's direction to make these releases possible.

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A. HISTORY OF THE SOFTWARE
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Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations (now Zope

Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.2 | 2.1.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
| 2.2.1 | 2.2 | 2002 | PSF | yes |
| 2.2.2 | 2.2.1 | 2002 | PSF | yes |
| 2.2.3 | 2.2.2 | 2003 | PSF | yes |
| 2.3 | 2.2.2 | 2002-2003 | PSF | yes |
| 2.3.1 | 2.3 | 2002-2003 | PSF | yes |
| 2.3.2 | 2.3.1 | 2002-2003 | PSF | yes |
| 2.3.3 | 2.3.2 | 2002-2003 | PSF | yes |
| 2.3.4 | 2.3.3 | 2004 | PSF | yes |
| 2.3.5 | 2.3.4 | 2005 | PSF | yes |
| 2.4 | 2.3 | 2004 | PSF | yes |
| 2.4.1 | 2.4 | 2005 | PSF | yes |
| 2.4.2 | 2.4.1 | 2005 | PSF | yes |
| 2.4.3 | 2.4.2 | 2006 | PSF | yes |
| 2.4.4 | 2.4.3 | 2006 | PSF | yes |
| 2.5 | 2.4 | 2006 | PSF | yes |
| 2.5.1 | 2.5 | 2007 | PSF | yes |
| 2.5.2 | 2.5.1 | 2008 | PSF | yes |
| 2.5.3 | 2.5.2 | 2008 | PSF | yes |
| 2.6 | 2.5 | 2008 | PSF | yes |
| 2.6.1 | 2.6 | 2008 | PSF | yes |
| 2.6.2 | 2.6.1 | 2009 | PSF | yes |

| | | | | |
|---|---|---|---|---|
| 2.6.3 | 2.6.2 | 2009 | PSF | yes |
| 2.6.4 | 2.6.3 | 2009 | PSF | yes |
| 2.6.5 | 2.6.4 | 2010 | PSF | yes |
| 3.0 | 2.6 | 2008 | PSF | yes |
| 3.0.1 | 3.0 | 2009 | PSF | yes |
| 3.1 | 3.0.1 | 2009 | PSF | yes |
| 3.1.1 | 3.1 | 2009 | PSF | yes |
| 3.1.2 | 3.1 | 2010 | PSF | yes |
| 3.2 | 3.1 | 2010 | PSF | yes |

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# 1.1193 antlr 4.13.2

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*/

// args must be <object-model-object>, <fields-resulting-in-STs>

ParserFile(file, parser, namedActions, contextSuperClass) ::= <<
<fileHeader(file.grammarFileName, file.ANTLRVersion)>
<if(file.genPackage)>
namespace <file.genPackage> {
<endif>
<namedActions.header>
using System;
using System.IO;
using System.Text;
using System.Diagnostics;
using System.Collections.Generic;
using
 Antlr4.Runtime;
using Antlr4.Runtime.Atn;
using Antlr4.Runtime.Misc;
using Antlr4.Runtime.Tree;
using DFA = Antlr4.Runtime.Dfa.DFA;

<parser>
<if(file.genPackage)>
} // namespace <file.genPackage>
<endif>
>>

ListenerFile(file, header, namedActions) ::= <<
<fileHeader(file.grammarFileName, file.ANTLRVersion)>
<if(file.genPackage)>
namespace <file.genPackage> {
```

```
<endif>
<header>
using Antlr4.Runtime.Misc;
using IParseTreeListener = Antlr4.Runtime.Tree.IParseTreeListener;
using IToken = Antlr4.Runtime.IToken;

/// \<summary>
/// This interface defines a complete listener for a parse tree produced by
/// \<see cref="<file.parserName>"/>.
/// \</summary>
[System.CodeDom.Compiler.GeneratedCode("ANTLR", "<file.ANTLRVersion>")]
[System.CLSCompliant(false)]
public interface I<file.grammarName>Listener : IParseTreeListener {
 <file.listenerNames:{lname |
/// \<summary>
<if(file.listenerLabelRuleNames.(lname))>
/// Enter a parse tree produced by the \<c><lname>\</c>
/// labeled alternative in
 \<see cref="<file.parserName>.<file.listenerLabelRuleNames.(lname)>"/>.
<else>
/// Enter a parse tree produced by \<see cref="<file.parserName>.<lname>"/>.
<endif>
/// \</summary>
/// \<param name="context">The parse tree.\</param>
void Enter<lname; format="cap">([NotNull] <file.parserName>.<lname; format="cap">Context context);
/// \<summary>
<if(file.listenerLabelRuleNames.(lname))>
/// Exit a parse tree produced by the \<c><lname>\</c>
/// labeled alternative in \<see cref="<file.parserName>.<file.listenerLabelRuleNames.(lname)>"/>.
<else>
/// Exit a parse tree produced by \<see cref="<file.parserName>.<lname>"/>.
<endif>
/// \</summary>
/// \<param name="context">The parse tree.\</param>
void Exit<lname; format="cap">([NotNull] <file.parserName>.<lname; format="cap">Context context);};
separator="\n">
}
<if(file.genPackage)>
} // namespace <file.genPackage>
<endif>
>>

BaseListenerFile(file, header, namedActions) ::= <<
<fileHeader(file.grammarFileName, file.ANTLRVersion)>
<if(file.genPackage)>
namespace
 <file.genPackage> {
<endif>
```

```
<header>

using Antlr4.Runtime.Misc;
using IErrorNode = Antlr4.Runtime.Tree.IErrorNode;
using ITerminalNode = Antlr4.Runtime.Tree.ITerminalNode;
using IToken = Antlr4.Runtime.IToken;
using ParserRuleContext = Antlr4.Runtime.ParserRuleContext;

/// \<summary>
/// This class provides an empty implementation of \<see cref="I<file.grammarName>Listener"/>,
/// which can be extended to create a listener which only needs to handle a subset
/// of the available methods.
/// \</summary>
[System.CodeDom.Compiler.GeneratedCode("ANTLR", "<file.ANTLRVersion>")]
[System.Diagnostics.DebuggerNonUserCode]
[System.CLSCompliant(false)]
public partial class <file.grammarName>BaseListener : I<file.grammarName>Listener {
 <file.listenerNames:{lname |
/// \<summary>
<if(file.listenerLabelRuleNames.(lname))>
/// Enter a parse tree produced by the \<c><lname>\</c>
/// labeled alternative in \<see cref="<file.parserName>.<file.listenerLabelRuleNames.(lname)>"/>.
<else>
///
 Enter a parse tree produced by \<see cref="<file.parserName>.<lname>"/>.
<endif>
/// \<para>The default implementation does nothing.\</para>
/// \</summary>
/// \<param name="context">The parse tree.\</param>
public virtual void Enter<lname; format="cap">([NotNull] <file.parserName>.<lname; format="cap">Context
context) { \}
/// \<summary>
<if(file.listenerLabelRuleNames.(lname))>
/// Exit a parse tree produced by the \<c><lname>\</c>
/// labeled alternative in \<see cref="<file.parserName>.<file.listenerLabelRuleNames.(lname)>"/>.
<else>
/// Exit a parse tree produced by \<see cref="<file.parserName>.<lname>"/>.
<endif>
/// \<para>The default implementation does nothing.\</para>
/// \</summary>
/// \<param name="context">The parse tree.\</param>
public virtual void Exit<lname; format="cap">([NotNull] <file.parserName>.<lname; format="cap">Context
context) { \}}; separator="\n">

 /// \<inheritdoc/>
 /// \<remarks>The default implementation does nothing.\</remarks>
 public
```

```
 virtual void EnterEveryRule([NotNull] ParserRuleContext context) { }
 /// \<inheritdoc/>
 /// \<remarks>The default implementation does nothing.\</remarks>
 public virtual void ExitEveryRule([NotNull] ParserRuleContext context) { }
 /// \<inheritdoc/>
 /// \<remarks>The default implementation does nothing.\</remarks>
 public virtual void VisitTerminal([NotNull] ITerminalNode node) { }
 /// \<inheritdoc/>
 /// \<remarks>The default implementation does nothing.\</remarks>
 public virtual void VisitErrorNode([NotNull] IErrorNode node) { }
}
<if(file.genPackage)>
} // namespace <file.genPackage>
<endif>
>>

VisitorFile(file, header, namedActions) ::= <<
<fileHeader(file.grammarFileName, file.ANTLRVersion)>
<if(file.genPackage)>
namespace <file.genPackage> {
<endif>
<header>
using Antlr4.Runtime.Misc;
using Antlr4.Runtime.Tree;
using IToken = Antlr4.Runtime.IToken;

/// \<summary>
/// This interface defines a complete generic visitor for a parse tree produced
/// by \<see cref="<file.parserName>"/>.
///
 \</summary>
/// \<typeparam name="Result">The return type of the visit operation.\</typeparam>
[System.CodeDom.Compiler.GeneratedCode("ANTLR", "<file.ANTLRVersion>")]
[System.CLSCompliant(false)]
public interface I<file.grammarName>Visitor\<Result> : IParseTreeVisitor\<Result> {
 <file.visitorNames:{lname |
/// \<summary>
<if(file.visitorLabelRuleNames.(lname))>
/// Visit a parse tree produced by the \<c><lname>\</c>
/// labeled alternative in \<see cref="<file.parserName>.<file.visitorLabelRuleNames.(lname)>"/>.
<else>
/// Visit a parse tree produced by \<see cref="<file.parserName>.<lname>"/>.
<endif>
/// \</summary>
/// \<param name="context">The parse tree.\</param>
/// \<return>The visitor result.\</return>
Result Visit<lname; format="cap">([NotNull] <file.parserName>.<lname; format="cap">Context context);};
separator="\n">
```

```
}
<if(file.genPackage)>
} // namespace <file.genPackage>
<endif>
>>

BaseVisitorFile(file, header, namedActions) ::= <<
<fileHeader(file.grammarFileName,
 file.ANTLRVersion)>
<if(file.genPackage)>
namespace <file.genPackage> {
<endif>
<header>
using Antlr4.Runtime.Misc;
using Antlr4.Runtime.Tree;
using IToken = Antlr4.Runtime.IToken;
using ParserRuleContext = Antlr4.Runtime.ParserRuleContext;

/// \<summary>
/// This class provides an empty implementation of \<see cref="I<file.grammarName>Visitor{Result}"/>,
/// which can be extended to create a visitor which only needs to handle a subset
/// of the available methods.
/// \</summary>
/// \<typeparam name="Result">The return type of the visit operation.\</typeparam>
[System.CodeDom.Compiler.GeneratedCode("ANTLR", "<file.ANTLRVersion>")]
[System.Diagnostics.DebuggerNonUserCode]
[System.CLSCompliant(false)]
public partial class <file.grammarName>BaseVisitor\<Result> : AbstractParseTreeVisitor\<Result>,
I<file.grammarName>Visitor\<Result> {
 <file.visitorNames:{lname |
/// \<summary>
<if(file.visitorLabelRuleNames.(lname))>
/// Visit a parse tree produced by the \<c><lname>\</c>
///
 labeled alternative in \<see cref="<file.parserName>.<file.visitorLabelRuleNames.(lname)>"/>.
<else>
/// Visit a parse tree produced by \<see cref="<file.parserName>.<lname>"/>.
<endif>
/// \<para>
/// The default implementation returns the result of calling \<see
cref="AbstractParseTreeVisitor{Result\}.VisitChildren(IRuleNode)"/>
/// on \<paramref name="context"/>.
/// \</para>
/// \</summary>
/// \<param name="context">The parse tree.\</param>
/// \<return>The visitor result.\</return>
public virtual Result Visit<lname; format="cap">([NotNull] <file.parserName>.<lname; format="cap">Context
context) { return VisitChildren(context); \}}; separator="\n">
```

```
}
<if(file.genPackage)>
} // namespace <file.genPackage>
<endif>
>>

fileHeader(grammarFileName, ANTLRVersion) ::= <<
//------------------------------------------------------------------------------
// \<auto-generated>
//     This code was generated by a tool.
//     ANTLR Version: <ANTLRVersion>
//
//     Changes to this file may
 cause incorrect behavior and will be lost if
//     the code is regenerated.
// \</auto-generated>
//------------------------------------------------------------------------------

// Generated from <grammarFileName> by ANTLR <ANTLRVersion>

// Unreachable code detected
#pragma warning disable 0162
// The variable '...' is assigned but its value is never used
#pragma warning disable 0219
// Missing XML comment for publicly visible type or member '...'
#pragma warning disable 1591
// Ambiguous reference in cref attribute
#pragma warning disable 419

>>

Parser(parser, funcs, atn, sempredFuncs, superClass) ::= <<
<Parser_(ctor="parser_ctor", ...)>
>>

Parser_(parser, funcs, atn, sempredFuncs, ctor, superClass) ::= <<
[System.CodeDom.Compiler.GeneratedCode("ANTLR", "<file.ANTLRVersion>")]
[System.CLSCompliant(false)]
public partial class <parser.name> : <superClass; null="Parser"> {
 protected static DFA[] decisionToDFA;
 protected static PredictionContextCache sharedContextCache = new PredictionContextCache();
 <if(parser.tokens)>
 public
 const int
  <parser.tokens:{k | <k>=<parser.tokens.(k)>}; separator=", ", wrap, anchor>;
 <endif>
 <if(parser.rules)>
 public const int
```

```
 <parser.rules:{r | RULE_<r.name> = <r.index>}; separator=", ", wrap, anchor>;
<endif>
public static readonly string[] ruleNames = {
 <parser.ruleNames:{r | "<r>"}; separator=", ", wrap, anchor>
};

<vocabulary(parser.literalNames, parser.symbolicNames)>

public override string GrammarFileName { get { return "<parser.grammarFileName>"; } }

public override string[] RuleNames { get { return ruleNames; } }

public override int[] SerializedAtn { get { return _serializedATN; } }

static <parser.name>() {
 decisionToDFA = new DFA[_ATN.NumberOfDecisions];
 for (int i = 0; i \< _ATN.NumberOfDecisions; i++) {
  decisionToDFA[i] = new DFA(_ATN.GetDecisionState(i), i);
 }
}

<namedActions.members>
<parser:(ctor)()>
<funcs; separator="\n">

<if(sempredFuncs)>
public override bool Sempred(RuleContext
_localctx, int ruleIndex, int predIndex) {
 switch (ruleIndex) {
 <parser.sempredFuncs.values:{f|
case <f.ruleIndex>: return <f.name>_sempred((<f.ctxType>)_localctx, predIndex);}; separator="\n">
 }
 return true;
}
<sempredFuncs.values; separator="\n">
<endif>

<atn>
}
>>

vocabulary(literalNames, symbolicNames) ::= <<
private static readonly string[] _LiteralNames = {
 <literalNames:{t | <t>}; null="null", separator=", ", wrap, anchor>
};
private static readonly string[] _SymbolicNames = {
 <symbolicNames:{t | <t>}; null="null", separator=", ", wrap, anchor>
};
```

```
public static readonly IVocabulary DefaultVocabulary = new Vocabulary(_LiteralNames, _SymbolicNames);

[NotNull]
public override IVocabulary Vocabulary
{
 get
 {
  return DefaultVocabulary;
 }
}
>>

dumpActions(recog, argFuncs, actionFuncs, sempredFuncs) ::= <<
<if(actionFuncs)>
public override void Action(RuleContext _localctx, int ruleIndex, int actionIndex) {
 switch (ruleIndex) {
 <recog.actionFuncs.values:{f|
case
 <f.ruleIndex> : <f.name>_action(<if(!recog.modes)>(<f.ctxType>)<endif>_localctx, actionIndex); break;};
separator="\n">
 }
}
<actionFuncs.values; separator="\n">
<endif>
<if(sempredFuncs)>
public override bool Sempred(RuleContext _localctx, int ruleIndex, int predIndex) {
 switch (ruleIndex) {
 <recog.sempredFuncs.values:{f|
case <f.ruleIndex> : return <f.name>_sempred(<if(!recog.modes)>(<f.ctxType>)<endif>_localctx, predIndex);};
separator="\n">
 }
 return true;
}
<sempredFuncs.values; separator="\n">
<endif>
>>

parser_ctor(parser) ::= <<
 public <parser.name>(ITokenStream input) : this(input, Console.Out, Console.Error) { }

 public <parser.name>(ITokenStream input, TextWriter output, TextWriter errorOutput)
 : base(input, output, errorOutput)
{
 Interpreter = new ParserATNSimulator(this, _ATN, decisionToDFA, sharedContextCache);
}
>>

/* This generates a private method since the actionIndex is generated, making an
```

```
* overriding implementation impossible to maintain.
*/
RuleActionFunction(r,
 actions) ::= <<
private void <r.name>_action(<r.ctxType> _localctx, int actionIndex) {
 switch (actionIndex) {
 <actions:{index|
case <index>: <actions.(index)> break;}; separator="\n">
 }
}
>>

/* This generates a private method since the predIndex is generated, making an
* overriding implementation impossible to maintain.
*/
RuleSempredFunction(r, actions) ::= <<
private bool <r.name>_sempred(<r.ctxType> _localctx, int predIndex) {
 switch (predIndex) {
 <actions:{index|
case <index>: return <actions.(index)>;}; separator="\n">
 }
 return true;
}
>>

RuleFunction(currentRule,args,code,locals,ruleCtx,altLabelCtxs,namedActions,finallyAction,postamble,exceptions)
::= <<

<if(ruleCtx)>
<ruleCtx>
<endif>
<altLabelCtxs:{l | <altLabelCtxs.(l)>}; separator="\n">

[RuleVersion(<namedActions.version; null="0">)]
<if(currentRule.modifiers)><currentRule.modifiers:{f | <f> }><else>public <endif><currentRule.ctxType>
<currentRule.escapedName>(<args; separator=", ">) {
 <currentRule.ctxType>
 _localctx = new <currentRule.ctxType>(Context, State<currentRule.args:{a | , <a.escapedName>}>);
 EnterRule(_localctx, <currentRule.startState>, RULE_<currentRule.name>);
 <namedActions.init>
 <locals; separator="\n">
 try {
<if(currentRule.hasLookaheadBlock)>
  int _alt;
<endif>
  <code>
  <postamble; separator="\n">
  <namedActions.after>
```

```
 }
 <if(exceptions)>
 <exceptions; separator="\n">
 <else>
 catch (RecognitionException re) {
  _localctx.exception = re;
  ErrorHandler.ReportError(this, re);
  ErrorHandler.Recover(this, re);
 }
 <endif>
 finally {
  <finallyAction>
  ExitRule();
 }
 return _localctx;
}
>>

LeftFactoredRuleFunction(currentRule,args,code,locals,namedActions,finallyAction,postamble) ::=
<<

<if(currentRule.modifiers)><currentRule.modifiers:{f | <f> }><else>private <endif><currentRule.ctxType>
<currentRule.escapedName>(<args; separator=", ">) {
 <currentRule.ctxType> _localctx = new <currentRule.ctxType>(Context, State<currentRule.args:{a | ,
<a.escapedName>}>);
 EnterLeftFactoredRule(_localctx,
 <currentRule.startState>, RULE_<currentRule.variantOf>);
 <namedActions.init>
 <locals; separator="\n">
 try {
<if(currentRule.hasLookaheadBlock)>
  int _alt;
<endif>
  <code>
  <postamble; separator="\n">
  <namedActions.after>
 }
 catch (RecognitionException re) {
  _localctx.exception = re;
  ErrorHandler.ReportError(this, re);
  ErrorHandler.Recover(this, re);
 }
 finally {
  <finallyAction>
  ExitRule();
 }
 return _localctx;
}
```

```
>>

// This behaves similar to RuleFunction (enterRule is called, and no adjustments
// are made to the parse tree), but since it's still a variant no context class
// needs to be generated.
LeftUnfactoredRuleFunction(currentRule,args,code,locals,namedActions,finallyAction,postamble) ::=
<<

<if(currentRule.modifiers)><currentRule.modifiers:{f | <f> }><else>private <endif><currentRule.ctxType>
<currentRule.escapedName>(<args; separator=", ">) {
 <currentRule.ctxType> _localctx = new <currentRule.ctxType>(Context,
 State<currentRule.args:{a | , <a.escapedName>}>);
 EnterRule(_localctx, <currentRule.startState>, RULE_<currentRule.variantOf>);
 <namedActions.init>
 <locals; separator="\n">
 try {
<if(currentRule.hasLookaheadBlock)>
  int _alt;
<endif>
  <code>
  <postamble; separator="\n">
  <namedActions.after>
 }
 catch (RecognitionException re) {
  _localctx.exception = re;
  ErrorHandler.ReportError(this, re);
  ErrorHandler.Recover(this, re);
 }
 finally {
  <finallyAction>
  ExitRule();
 }
 return _localctx;
}
>>

LeftRecursiveRuleFunction(currentRule,args,code,locals,ruleCtx,altLabelCtxs,
 namedActions,finallyAction,postamble) ::=
<<

<ruleCtx>
<altLabelCtxs:{l | <altLabelCtxs.(l)>}; separator="\n">

[RuleVersion(<namedActions.version; null="0">)]
<if(currentRule.modifiers)><currentRule.modifiers:{f | <f> }><else>public <endif><currentRule.ctxType>
<currentRule.escapedName>(<args; separator=", ">) {
 return <currentRule.escapedName>(0<currentRule.args:{a | , <a.escapedName>}>);
}
```

```
private <currentRule.ctxType>
 <currentRule.escapedName>(int _p<args:{a | , <a>}>) {
 ParserRuleContext _parentctx = Context;
 int _parentState = State;
 <currentRule.ctxType> _localctx = new <currentRule.ctxType>(Context, _parentState<currentRule.args:{a | ,
<a.escapedName>}>);
 <currentRule.ctxType> _prevctx = _localctx;
 int _startState = <currentRule.startState>;
 EnterRecursionRule(_localctx, <currentRule.startState>, RULE_<currentRule.name>, _p);
 <namedActions.init>
 <locals; separator="\n">
 try {
<if(currentRule.hasLookaheadBlock)>
  int _alt;
<endif>
  <code>
  <postamble; separator="\n">
  <namedActions.after>
 }
 catch (RecognitionException re) {
  _localctx.exception = re;
  ErrorHandler.ReportError(this, re);
  ErrorHandler.Recover(this, re);
 }
 finally {
  <finallyAction>
  UnrollRecursionContexts(_parentctx);
 }
 return _localctx;
}
>>

CodeBlockForOuterMostAlt(currentOuterMostAltCodeBlock, locals, preamble, ops) ::= <<
<if(currentOuterMostAltCodeBlock.altLabel)>_localctx = new
 <currentOuterMostAltCodeBlock.altLabel; format="cap">Context(_localctx);<endif>
EnterOuterAlt(_localctx, <currentOuterMostAltCodeBlock.alt.altNum>);
<CodeBlockForAlt(currentAltCodeBlock=currentOuterMostAltCodeBlock, ...)>
>>

CodeBlockForAlt(currentAltCodeBlock, locals, preamble, ops) ::= <<
{
<locals; separator="\n">
<preamble; separator="\n">
<ops; separator="\n">
}
>>
```

```
LL1AltBlock(choice, preamble, alts, error) ::= <<
State = <choice.stateNumber>;
ErrorHandler.Sync(this);
<if(choice.label)><labelref(choice.label)> = TokenStream.LT(1);<endif>
<preamble; separator="\n">
switch (TokenStream.LA(1)) {
<choice.altLook,alts:{look,alt| <cases(tokens=look)>
 <alt>
 break;}; separator="\n">
default:
 <error>
}
>>

LL1OptionalBlock(choice, alts, error) ::= <<
State = <choice.stateNumber>;
ErrorHandler.Sync(this);
switch (TokenStream.LA(1)) {
<choice.altLook,alts:{look,alt| <cases(tokens=look)>
 <alt>
 break;}; separator="\n">
default:
 break;
}
>>

LL1OptionalBlockSingleAlt(choice, expr, alts,
 preamble, error, followExpr) ::= <<
State = <choice.stateNumber>;
ErrorHandler.Sync(this);
<preamble; separator="\n">
if (<expr>) {
 <alts; separator="\n">
}
<!else if ( !(<followExpr>) ) <error>!>
>>

LL1StarBlockSingleAlt(choice, loopExpr, alts, preamble, iteration) ::= <<
State = <choice.stateNumber>;
ErrorHandler.Sync(this);
<preamble; separator="\n">
while (<loopExpr>) {
 <alts; separator="\n">
 State = <choice.loopBackStateNumber>;
 ErrorHandler.Sync(this);
 <iteration>
}
>>
```

```
LL1PlusBlockSingleAlt(choice, loopExpr, alts, preamble, iteration) ::= <<
State = <choice.blockStartStateNumber>;<! alt block decision !>
ErrorHandler.Sync(this);
<preamble; separator="\n">
do {
 <alts; separator="\n">
 State = <choice.stateNumber>;<! loopback/exit decision !>
 ErrorHandler.Sync(this);
 <iteration>
} while ( <loopExpr> );
>>

// LL(*) stuff

AltBlock(choice, preamble, alts, error) ::= <<
State = <choice.stateNumber>;
ErrorHandler.Sync(this);
<if(choice.label)><labelref(choice.label)> = TokenStream.LT(1);<endif>
<preamble;
 separator="\n">
switch ( Interpreter.AdaptivePredict(TokenStream,<choice.decision>,Context) ) {
<alts:{alt |
case <i>:
 <alt>
 break;}; separator="\n">
}
>>

OptionalBlock(choice, alts, error) ::= <<
State = <choice.stateNumber>;
ErrorHandler.Sync(this);
switch ( Interpreter.AdaptivePredict(TokenStream,<choice.decision>,Context) ) {
<alts:{alt |
case <i><if(!choice.ast.greedy)>+1<endif>:
 <alt>
 break;}; separator="\n">
}
>>

StarBlock(choice, alts, sync, iteration) ::= <<
State = <choice.stateNumber>;
ErrorHandler.Sync(this);
_alt = Interpreter.AdaptivePredict(TokenStream,<choice.decision>,Context);
while ( _alt!=<choice.exitAlt> && _alt!=global::Antlr4.Runtime.Atn.ATN.INVALID_ALT_NUMBER ) {
 if ( _alt==1<if(!choice.ast.greedy)>+1<endif> ) {
  <iteration>
  <alts> <! should only be one !>
```

```
 }
 State = <choice.loopBackStateNumber>;
 ErrorHandler.Sync(this);
 _alt = Interpreter.AdaptivePredict(TokenStream,<choice.decision>,Context);
}
>>

PlusBlock(choice,
 alts, error) ::= <<
State = <choice.blockStartStateNumber>;<! alt block decision !>
ErrorHandler.Sync(this);
_alt = 1<if(!choice.ast.greedy)>+1<endif>;
do {
 switch (_alt) {
 <alts:{alt|
case <i><if(!choice.ast.greedy)>+1<endif>:
 <alt>
 break;}; separator="\n">
 default:
  <error>
 }
 State = <choice.loopBackStateNumber>;<! loopback/exit decision !>
 ErrorHandler.Sync(this);
 _alt = Interpreter.AdaptivePredict(TokenStream,<choice.decision>,Context);
} while ( _alt!=<choice.exitAlt> && _alt!=global::Antlr4.Runtime.Atn.ATN.INVALID_ALT_NUMBER );
>>

Sync(s) ::= "Sync(<s.expecting.name>);"

ThrowNoViableAlt(t) ::= "throw new NoViableAltException(this);"

TestSetInline(s) ::= <<
<s.bitsets:{bits | <if(rest(rest(bits.tokens)))><bitsetBitfieldComparison(s, bits)><else><bitsetInlineComparison(s,
bits)><endif>}; separator=" || ">
>>

// Java language spec 15.19 - shift operators mask operands rather than overflow to 0... need range test
testShiftInRange(shiftAmount) ::= <<
((<shiftAmount>) &
 ~0x3f) == 0
>>

// produces smaller bytecode only when bits.tokens contains more than two items
bitsetBitfieldComparison(s, bits) ::= <%
(<testShiftInRange({<offsetShift(s.varName, bits.shift)>})> && ((1L \<\< <offsetShift(s.varName, bits.shift)>) &
<bits.calculated>L) != 0)
%>
```

```
isZero ::= [
"0":true,
default:false
]

offsetShift(shiftAmount, offset) ::= <%
<if(!isZero.(offset))>(<shiftAmount> - <offset>)<else><shiftAmount><endif>
%>

bitsetInlineComparison(s, bits) ::= <%
<bits.tokens:{t | <s.varName>==<tokenType.(t.name)>}; separator=" || ">
%>

cases(tokens) ::= <<
<tokens:{t | case <tokenType.(t.name)>:}; separator="\n">
>>

InvokeRule(r, argExprsChunks) ::= <<
State = <r.stateNumber>;
<if(r.labels)><r.labels:{l | <labelref(l)> =
}><endif><r.escapedName>(<if(r.ast.options.p)><r.ast.options.p><if(argExprsChunks)>,<endif><endif><argExprs
Chunks>);
>>

MatchToken(m) ::= <<
State = <m.stateNumber>;
<if(m.labels)><m.labels:{l | <labelref(l)> = }><endif>Match(<tokenType.(m.name)>);
>>

MatchSet(m,
 expr, capture) ::= "<CommonSetStuff(m, expr, capture, false)>"

MatchNotSet(m, expr, capture) ::= "<CommonSetStuff(m, expr, capture, true)>"

CommonSetStuff(m, expr, capture, invert) ::= <<
State = <m.stateNumber>;
<if(m.labels)><m.labels:{l | <labelref(l)> = }>TokenStream.LT(1);<endif>
<capture>
if ( <if(invert)><m.varName> \<= 0 || <else>!<endif>(<expr>) ) {
 <if(m.labels)><m.labels:{l | <labelref(l)> = }><endif>ErrorHandler.RecoverInline(this);
}
else {
 ErrorHandler.ReportMatch(this);
   Consume();
}
>>

Wildcard(w) ::= <<
```

```
State = <w.stateNumber>;
<if(w.labels)><w.labels:{l | <labelref(l)> = }><endif>MatchWildcard();
>>

// ACTION STUFF

Action(a, foo, chunks) ::= "<chunks>"

ArgAction(a, chunks) ::= "<chunks>"

SemPred(p, chunks, failChunks) ::= <<
State = <p.stateNumber>;
if (!(<chunks>)) throw new FailedPredicateException(this, <p.predicate><if(failChunks)>,
<failChunks><elseif(p.msg)>, <p.msg><endif>);
>>

ExceptionClause(e, catchArg, catchAction) ::= <<
catch (<catchArg>)
 {
 <catchAction>
}
>>

// lexer actions are not associated with model objects

LexerSkipCommand()  ::= "Skip();"
LexerMoreCommand()  ::= "More();"
LexerPopModeCommand() ::= "PopMode();"

LexerTypeCommand(arg, grammar)      ::= "_type = <tokenType.(arg)>;"
LexerChannelCommand(arg, grammar)   ::= "_channel = <channelName.(arg)>;"
LexerModeCommand(arg, grammar)      ::= "_mode = <modeName.(arg)>;"
LexerPushModeCommand(arg, grammar)  ::= "PushMode(<modeName.(arg)>);"

ActionText(t) ::= "<t.text>"
ActionTemplate(t) ::= "<t.st>"
ArgRef(a) ::= "_localctx.<a.escapedName>"
LocalRef(a) ::= "_localctx.<a.escapedName>"
RetValueRef(a) ::= "_localctx.<a.escapedName>"
QRetValueRef(a) ::= "<ctx(a)>.<a.dict>.<a.escapedName>"
/** How to translate $tokenLabel */
TokenRef(t) ::= "<ctx(t)>.<tokenType.(t.escapedName)>"
LabelRef(t) ::= "<ctx(t)>.<t.escapedName>"
ListLabelRef(t) ::= "<ctx(t)>.<ListLabelName(t.escapedName)>"
SetAttr(s,rhsChunks) ::= "<ctx(s)>.<s.escapedName> = <rhsChunks>;"

TokenLabelType()
```

```
 ::= "<file.TokenLabelType; null={IToken}>"
InputSymbolType() ::= "<file.InputSymbolType; null={IToken}>"

TokenPropertyRef_text(t) ::= "(<ctx(t)>.<tokenType.(t.label)>!=null?<ctx(t)>.<tokenType.(t.label)>.Text:null)"
TokenPropertyRef_type(t) ::= "(<ctx(t)>.<tokenType.(t.label)>!=null?<ctx(t)>.<tokenType.(t.label)>.Type:0)"
TokenPropertyRef_line(t) ::= "(<ctx(t)>.<tokenType.(t.label)>!=null?<ctx(t)>.<tokenType.(t.label)>.Line:0)"
TokenPropertyRef_pos(t) ::=
"(<ctx(t)>.<tokenType.(t.label)>!=null?<ctx(t)>.<tokenType.(t.label)>.CharPositionInLine:0)"
TokenPropertyRef_channel(t) ::=
"(<ctx(t)>.<tokenType.(t.label)>!=null?<ctx(t)>.<tokenType.(t.label)>.Channel:0)"
TokenPropertyRef_index(t) ::=
"(<ctx(t)>.<tokenType.(t.label)>!=null?<ctx(t)>.<tokenType.(t.label)>.TokenIndex:0)"
TokenPropertyRef_int(t) ::=
"(<ctx(t)>.<tokenType.(t.label)>!=null?int.Parse(<ctx(t)>.<tokenType.(t.label)>.Text):0)"

RulePropertyRef_start(r) ::= "(<ctx(r)>.<r.label>!=null?(<ctx(r)>.<r.label>.Start):null)"
RulePropertyRef_stop(r)
 ::= "(<ctx(r)>.<r.label>!=null?(<ctx(r)>.<r.label>.Stop):null)"
RulePropertyRef_text(r)  ::=
"(<ctx(r)>.<r.label>!=null?TokenStream.GetText(<ctx(r)>.<r.label>.Start,<ctx(r)>.<r.label>.Stop):null)"
RulePropertyRef_ctx(r)  ::= "<ctx(r)>.<r.label>"
RulePropertyRef_parser(r)  ::= "this"

ThisRulePropertyRef_start(r) ::= "_localctx.Start"
ThisRulePropertyRef_stop(r)  ::= "_localctx.Stop"
ThisRulePropertyRef_text(r)  ::= "TokenStream.GetText(_localctx.Start, TokenStream.LT(-1))"
ThisRulePropertyRef_ctx(r)  ::= "_localctx"
ThisRulePropertyRef_parser(r)  ::= "this"

NonLocalAttrRef(s)   ::= <%((<s.ruleName;
format="cap">Context)GetInvokingContext(<s.ruleIndex>)).<s.escapedName>%>
SetNonLocalAttr(s, rhsChunks)   ::=
 <%((<s.ruleName; format="cap">Context)GetInvokingContext(<s.ruleIndex>)).<s.escapedName> =
<rhsChunks>;%>

AddToLabelList(a) ::= "<ctx(a.label)>.<a.listName>.Add(<labelref(a.label)>);"

TokenDecl(t) ::= "<TokenLabelType()> <tokenType.(t.escapedName)>"
TokenTypeDecl(t)
 ::= "int <tokenType.(t.escapedName)>;"
TokenListDecl(t) ::= "IList\<IToken> <tokenType.(t.escapedName)> = new List\<IToken>()"
RuleContextDecl(r) ::= "<r.ctxName> <r.escapedName>"
RuleContextListDecl(rdecl) ::= "IList\<<rdecl.ctxName>> <rdecl.escapedName> = new List\<<rdecl.ctxName>>()"

contextGetterCollection(elementType) ::= <%
<elementType>[]
%>
```

```
ContextTokenGetterDecl(t)      ::=
   "[System.Diagnostics.DebuggerNonUserCode] public ITerminalNode <tokenType.(t.name)>() { return
GetToken(<parser.name>.<tokenType.(t.name)>, 0); }"
ContextTokenListGetterDecl(t)  ::= <<
[System.Diagnostics.DebuggerNonUserCode] public <contextGetterCollection("ITerminalNode")>
<tokenType.(t.name)>() { return GetTokens(<parser.name>.<tokenType.(t.name)>); }
>>
ContextTokenListIndexedGetterDecl(t)  ::= <<
[System.Diagnostics.DebuggerNonUserCode] public ITerminalNode <tokenType.(t.name)>(int i) {
 return GetToken(<parser.name>.<tokenType.(t.name)>, i);
}
>>
ContextRuleGetterDecl(r)       ::= <<
[System.Diagnostics.DebuggerNonUserCode]
 public <r.ctxName> <r.escapedName>() {
 return GetRuleContext\<<r.ctxName>\>(0);
}
>>
ContextRuleListGetterDecl(r)   ::= <<
[System.Diagnostics.DebuggerNonUserCode] public <contextGetterCollection({<r.ctxName>})>
<r.escapedName>() {
 return GetRuleContexts\<<r.ctxName>\>();
}
>>
ContextRuleListIndexedGetterDecl(r)   ::= <<
[System.Diagnostics.DebuggerNonUserCode] public <r.ctxName> <r.escapedName>(int i) {
 return GetRuleContext\<<r.ctxName>\>(i);
}
>>

LexerRuleContext() ::= "RuleContext"

/** The rule context name is the rule followed by a suffix; e.g.,
* r becomes rContext.
*/
RuleContextNameSuffix() ::= "Context"

ImplicitTokenLabel(tokenName) ::= "_<tokenType.(tokenName)>"
ImplicitRuleLabel(ruleName)   ::= "_<ruleName>"
ImplicitSetLabel(id)    ::= "_tset<id>"
ListLabelName(label)    ::= "_<label>"

CaptureNextToken(d) ::= "<d.varName> = TokenStream.LT(1);"
CaptureNextTokenType(d) ::= "<d.varName> = TokenStream.LA(1);"

StructDecl(struct,ctorAttrs,attrs,getters,dispatchMethods,interfaces,extensionMembers,signatures,
        superClass={ParserRuleContext}) ::= <<
public partial class <struct.escapedName> :
```

```
<if(contextSuperClass)><contextSuperClass><else>ParserRuleContext<endif><if(interfaces)>, <interfaces;
separator=", "><endif> {
 <attrs:{a | public <a>;}; separator="\n">
 <getters:{g | <g>}; separator="\n">
 <if(ctorAttrs)>public <struct.escapedName>(ParserRuleContext parent, int invokingState) : base(parent,
invokingState) { }<endif>
 public <struct.escapedName>(ParserRuleContext parent, int invokingState<ctorAttrs:{a | , <a>}>)
  : base(parent, invokingState)
 {
  <struct.ctorAttrs:{a | this.<a.escapedName> = <a.escapedName>;}; separator="\n">
 }
 public override int RuleIndex { get { return RULE_<struct.derivedFromName>; } }
<if(struct.provideCopyFrom)> <! don't need copy unless we have subclasses !>
 public <struct.escapedName>() { }
 public virtual void CopyFrom(<struct.escapedName> context) {
  base.CopyFrom(context);
  <struct.attrs:{a
 | this.<a.escapedName> = context.<a.escapedName>;}; separator="\n">
 }
<endif>
 <dispatchMethods; separator="\n">
 <extensionMembers; separator="\n">
}
>>

AltLabelStructDecl(struct,attrs,getters,dispatchMethods) ::= <<
public partial class <struct.escapedName> : <currentRule.name; format="cap">Context {
 <attrs:{a | public <a>;}; separator="\n">
 <getters:{g | <g>}; separator="\n">
 public <struct.escapedName>(<currentRule.name; format="cap">Context context) { CopyFrom(context); }
 <dispatchMethods; separator="\n">
}
>>

ListenerDispatchMethod(method) ::= <<
[System.Diagnostics.DebuggerNonUserCode]
public override void <if(method.isEnter)>Enter<else>Exit<endif>Rule(IParseTreeListener listener) {
 I<parser.grammarName>Listener typedListener = listener as I<parser.grammarName>Listener;
 if (typedListener != null) typedListener.<if(method.isEnter)>Enter<else>Exit<endif><struct.derivedFromName;
format="cap">(this);
}
>>

VisitorDispatchMethod(method) ::= <<
[System.Diagnostics.DebuggerNonUserCode]
public
 override TResult Accept\<TResult>(IParseTreeVisitor\<TResult> visitor) {
 I<parser.grammarName>Visitor\<TResult> typedVisitor = visitor as I<parser.grammarName>Visitor\<TResult>;
```

```
 if (typedVisitor != null) return typedVisitor.Visit<struct.derivedFromName; format="cap">(this);
 else return visitor.VisitChildren(this);
}
>>

AttributeDecl(d) ::= "<d.type> <d.escapedName><if(d.initValue)> = <d.initValue><endif>"

/** If we don't know location of label def x, use this template */
labelref(x) ::= "<if(!x.isLocal)><typedContext(x.ctx)>.<endif><x.escapedName>"

/** For any action chunk, what is correctly-typed context struct ptr? */
ctx(actionChunk) ::= "<typedContext(actionChunk.ctx)>"

// only casts _localctx to the type when the cast isn't redundant (i.e. to a sub-context for a labeled alt)
typedContext(ctx) ::= "<if(ctx.provideCopyFrom)>((<ctx.name>)_localctx)<else>_localctx<endif>"

// used for left-recursive rules
recRuleAltPredicate(ruleName,opPrec)
  ::= "Precpred(Context, <opPrec>)"
recRuleSetReturnAction(src,name)   ::= "$<name>=$<src>.<name>;"
recRuleSetStopToken()              ::= "Context.Stop = TokenStream.LT(-1);"

recRuleAltStartAction(ruleName, ctxName, label, isListLabel) ::= <<
_localctx = new <ctxName>Context(_parentctx, _parentState);
<if(label)>
<if(isListLabel)>
_localctx.<label>.Add(_prevctx);
<else>
_localctx.<label> = _prevctx;
<endif>
<endif>
PushNewRecursionContext(_localctx, _startState, RULE_<ruleName>);
>>

recRuleLabeledAltStartAction(ruleName, currentAltLabel, label, isListLabel) ::= <<
_localctx = new <currentAltLabel; format="cap">Context(new <ruleName; format="cap">Context(_parentctx,
_parentState));
<if(label)>
<if(isListLabel)>
((<currentAltLabel; format="cap">Context)_localctx).<label>.Add(_prevctx);
<else>
((<currentAltLabel; format="cap">Context)_localctx).<label> = _prevctx;
<endif>
<endif>
PushNewRecursionContext(_localctx, _startState, RULE_<ruleName>);
>>

recRuleReplaceContext(ctxName)
```

```
 ::= <<
_localctx = new <ctxName>Context(_localctx);
Context = _localctx;
_prevctx = _localctx;
>>

recRuleSetPrevCtx() ::= <<
if ( ParseListeners!=null )
 TriggerExitRuleEvent();
_prevctx = _localctx;
>>


LexerFile(file, lexer, namedActions) ::= <<
<fileHeader(file.grammarFileName, file.ANTLRVersion)>
<if(file.genPackage)>
namespace <file.genPackage> {
<endif>
<namedActions.header>
using System;
using System.IO;
using System.Text;
using Antlr4.Runtime;
using Antlr4.Runtime.Atn;
using Antlr4.Runtime.Misc;
using DFA = Antlr4.Runtime.Dfa.DFA;

<lexer>
<if(file.genPackage)>
} // namespace <file.genPackage>
<endif>
>>

Lexer(lexer, atn, actionFuncs, sempredFuncs, superClass) ::= <<
[System.CodeDom.Compiler.GeneratedCode("ANTLR", "<file.ANTLRVersion>")]
[System.CLSCompliant(false)]
public partial class <lexer.name> : <superClass; null="Lexer"> {
 protected static DFA[] decisionToDFA;
 protected static PredictionContextCache sharedContextCache = new PredictionContextCache();
 <if(lexer.tokens)>
 public
 const int
  <lexer.tokens:{k | <tokenType.(k)>=<lexer.tokens.(k)>}; separator=", ", wrap, anchor>;
 <endif>
 <if(lexer.escapedChannels)>
 public const int
  <lexer.escapedChannels:{k | <k>=<lexer.escapedChannels.(k)>}; separator=", ", wrap, anchor>;
 <endif>
```

```
<if(rest(lexer.escapedModeNames))>
public const int
 <rest(lexer.escapedModeNames):{m | <m>=<i>}; separator=", ", wrap, anchor>;
<endif>
public static string[] channelNames = {
 "DEFAULT_TOKEN_CHANNEL", "HIDDEN"<if (lexer.channelNames)>, <lexer.channelNames:{c| "<c>"};
separator=", ", wrap, anchor><endif>
};

public static string[] modeNames = {
 <lexer.modes:{m| "<m>"}; separator=", ", wrap, anchor>
};

public static readonly string[] ruleNames = {
 <lexer.ruleNames:{r | "<r>"}; separator=", ", wrap, anchor>
};

<namedActions.members>

public <lexer.name>(ICharStream input)
: this(input, Console.Out, Console.Error) { }

public <lexer.name>(ICharStream input, TextWriter output, TextWriter errorOutput)
:
base(input, output, errorOutput)
{
 Interpreter = new LexerATNSimulator(this, _ATN, decisionToDFA, sharedContextCache);
}

<vocabulary(lexer.literalNames, lexer.symbolicNames)>

public override string GrammarFileName { get { return "<lexer.grammarFileName>"; } }

public override string[] RuleNames { get { return ruleNames; } }

public override string[] ChannelNames { get { return channelNames; } }

public override string[] ModeNames { get { return modeNames; } }

public override int[] SerializedAtn { get { return _serializedATN; } }

static <lexer.name>() {
 decisionToDFA = new DFA[_ATN.NumberOfDecisions];
 for (int i = 0; i \< _ATN.NumberOfDecisions; i++) {
  decisionToDFA[i] = new DFA(_ATN.GetDecisionState(i), i);
 }
}
<dumpActions(lexer, "", actionFuncs, sempredFuncs)>
```

```
 <atn>
}
>>

SerializedATN(model) ::= <<
private static int[] _serializedATN = {
 <model.serialized: {s | <s>}; separator=",", wrap>
};

public static readonly ATN _ATN =
 new ATNDeserializer().Deserialize(_serializedATN);


>>

initValue(typeName)
 ::= <<
default(<typeName>)
>>

codeFileExtension() ::= ".cs"

modeName ::= [
 "DEFAULT_MODE" : "DefaultMode",
 default : key
]

channelName ::= [
 "HIDDEN" : "Hidden",
 "DEFAULT_TOKEN_CHANNEL" : "DefaultTokenChannel",
 default : key
]

tokenType ::= [
 "EOF" : "Eof",
 default : key
]
```

Found in path(s):
* /antlr4-4-13-2-jar/org/antlr/v4/tool/templates/codegen/CSharp/CSharp.stg
No license file was found, but licenses were detected in source scan.

```
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*  Copyright (c) 2012 Sam Harwell
*  Copyright (c) 2014 Tiago Mazzutti
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```

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*/

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* /antlr4-4-13-2-jar/org/antlr/v4/tool/templates/codegen/Dart/Dart.stg
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*/
/*
This file contains the actual layout of the messages emitted by ANTLR.
The text itself is coming out of the languages/*stg files, according to the chosen locale.
This file contains the format that mimicks GCC output.
*/

location(file, line, column) ::= "<file>:<line>:<column>:"

message(id, text) ::= "<text> [error <id>]"

report(location, message, type) ::= "<location> <type>: <message>"

wantsSingleLineMessage() ::= "true"

Found in path(s):
* /antlr4-4-13-2-jar/org/antlr/v4/tool/templates/messages/formats/gnu.stg
No license file was found, but licenses were detected in source scan.

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*  THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
*/

/** ANTLR tool checks output templates are compatible with tool code generation.
*  For now, a simple string match used on x.y of x.y.z scheme.
*  Must match Tool.VERSION during load to templates.
*
*  REQUIRED.
*/

pythonTypeInitMap ::= [
 "bool":"False",
 "int":"0",
 "float":"0.0",
 "str":"",
 default:"None" // anything other
 than a primitive type is an object
]

// args must be <object-model-object>, <fields-resulting-in-STs>

ParserFile(file, parser, namedActions, contextSuperClass) ::= <<
<fileHeader(file.grammarFileName, file.ANTLRVersion)>
# encoding: utf-8
from antlr4 import *
from io import StringIO
import sys
if sys.version_info[1] > 5:
 from typing import TextIO
else:
 from typing.io import TextIO

<namedActions.header>
<parser>

>>

ListenerFile(file, header, namedActions) ::= <<
```

```
<fileHeader(file.grammarFileName, file.ANTLRVersion)>
from antlr4 import *
if "." in __name__:
   from .<file.parserName> import <file.parserName>
else:
   from <file.parserName> import <file.parserName>
<header>

# This class defines a complete listener for a parse tree produced by <file.parserName>.
class <file.grammarName>Listener(ParseTreeListener):

   <file.listenerNames:{lname |
# Enter a parse tree produced by <file.parserName>#<lname>.
def enter<lname; format="cap">(self, ctx:<file.parserName>.<lname; format="cap">Context):
    pass

# Exit a parse tree produced by <file.parserName>#<lname>.
def exit<lname; format="cap">(self, ctx:<file.parserName>.<lname; format="cap">Context):
   pass

}; separator="\n">

del <file.parserName>
>>


VisitorFile(file, header, namedActions) ::= <<
<fileHeader(file.grammarFileName, file.ANTLRVersion)>
from antlr4 import *
if "." in __name__:
   from .<file.parserName> import <file.parserName>
else:
   from <file.parserName> import <file.parserName>
<header>

# This class defines a complete generic visitor for a parse tree produced by <file.parserName>.

class <file.grammarName>Visitor(ParseTreeVisitor):

   <file.visitorNames:{lname |
# Visit a parse tree produced by <file.parserName>#<lname>.
def visit<lname; format="cap">(self, ctx:<file.parserName>.<lname; format="cap">Context):
   return self.visitChildren(ctx)

}; separator="\n">

del <file.parserName>
>>
```

```
fileHeader(grammarFileName, ANTLRVersion) ::= <<
# Generated from <grammarFileName> by ANTLR
 <ANTLRVersion>
>>

Parser(parser, funcs, atn, sempredFuncs, superClass) ::= <<
<Parser_(ctor="parser_ctor", ...)>
>>

Parser_(parser, funcs, atn, sempredFuncs, ctor, superClass) ::= <<
<if(superClass)>
if "." in __name__:
   from .<superClass> import <superClass>
else:
   from <superClass> import <superClass>

<endif>
<atn>

class <parser.name> ( <if(superClass)><superClass><else>Parser<endif> ):

   grammarFileName = "<parser.grammarFileName>"

   atn = ATNDeserializer().deserialize(serializedATN())

   decisionsToDFA = [ DFA(ds, i) for i, ds in enumerate(atn.decisionToState) ]

   sharedContextCache = PredictionContextCache()

   literalNames = [ <parser.literalNames:{t | <t>}; null="\"\<INVALID>\"", separator=", ", wrap, anchor> ]

   symbolicNames = [ <parser.symbolicNames:{t | <t>}; null="\"\<INVALID>\"", separator=", ", wrap, anchor> ]

   <if(parser.rules)>
   <parser.rules:{r | RULE_<r.name> = <r.index>}; separator="\n", wrap, anchor>
   <endif>

   ruleNames =
  [ <parser.ruleNames:{r | "<r>"}; separator=", ", wrap, anchor> ]

   EOF = <TokenLabelType()>.EOF
   <if(parser.tokens)>
   <parser.tokens:{k | <k>=<parser.tokens.(k)>}; separator="\n", wrap, anchor>
   <endif>

   <parser:(ctor)()>
```

```
  <namedActions.members>

  <funcs; separator="\n">


<if(sempredFuncs)>
  def sempred(self, localctx:RuleContext, ruleIndex:int, predIndex:int):
      if self._predicates == None:
          self._predicates = dict()
<parser.sempredFuncs.values:{f |
      self._predicates[<f.ruleIndex>] = self.<f.name>_sempred}; separator="\n        ">
      pred = self._predicates.get(ruleIndex, None)
      if pred is None:
          raise Exception("No predicate with index:" + str(ruleIndex))
      else:
          return pred(localctx, predIndex)

  <sempredFuncs.values; separator="\n">
<endif>



>>

dumpActions(recog, argFuncs, actionFuncs, sempredFuncs) ::= <<
<if(actionFuncs)>
def action(self, localctx:RuleContext, ruleIndex:int, actionIndex:int):
   if self._actions is None:
      actions = dict()
<recog.actionFuncs.values:{f|
      actions[<f.ruleIndex>] = self.<f.name>_action }; separator="\n">
      self._actions = actions
  action = self._actions.get(ruleIndex, None)
  if action is not None:
      action(localctx, actionIndex)
  else:
      raise Exception("No registered action for:" + str(ruleIndex))

<actionFuncs.values; separator="\n">

<endif>
<if(sempredFuncs)>
def sempred(self, localctx:RuleContext, ruleIndex:int, predIndex:int):
  if self._predicates is None:
      preds = dict()
<recog.sempredFuncs.values:{f|
      preds[<f.ruleIndex>] = self.<f.name>_sempred}; separator="\n">
```

```
        self._predicates = preds
    pred = self._predicates.get(ruleIndex, None)
    if pred is not None:
        return pred(localctx, predIndex)
    else:
        raise Exception("No registered predicate for:" + str(ruleIndex))

<sempredFuncs.values; separator="\n">
<endif>
>>

parser_ctor(p) ::= <<
def __init__(self,
 input:TokenStream, output:TextIO = sys.stdout):
    super().__init__(input, output)
    self.checkVersion("<file.ANTLRVersion>")
    self._interp = ParserATNSimulator(self, self.atn, self.decisionsToDFA, self.sharedContextCache)
    self._predicates = None

>>

/* This generates a private method since the actionIndex is generated, making an
* overriding implementation impossible to maintain.
*/
RuleActionFunction(r, actions) ::= <<

def <r.name>_action(self, localctx:<r.ctxType> , actionIndex:int):
<actions:{index|
<if(first(actions))>
    if actionIndex == <index>:
        <actions.(index)>
<elseif(rest(actions))>
    elif actionIndex == <index>:
        <actions.(index)>
<endif> }; separator="\n">
>>

/* This generates a private method since the predIndex is generated, making an
* overriding implementation impossible to maintain.
*/
RuleSempredFunction(r, actions) ::= <<
def <r.name>_sempred(self, localctx:<r.ctxType>, predIndex:int):
    <actions:{index|
<if(first(actions))>
     if predIndex == <index>:
        return <actions.(index)>
<elseif(rest(actions))>
    elif predIndex == <index>:
```

```
    return <actions.(index)>
<endif> }; separator="\n">

>>

RuleFunction(currentRule,args,code,locals,ruleCtx,altLabelCtxs,namedActions,finallyAction,postamble,exceptions)
::= <<

<ruleCtx>

<altLabelCtxs:{l | <altLabelCtxs.(l)>}; separator="\n">

def <currentRule.escapedName>(self<currentRule.args:{a | , <a.escapedName><if(a.type)>:<a.type><endif>}>):

  localctx = <parser.name>.<currentRule.ctxType>(self, self._ctx, self.state<currentRule.args:{a | ,
<a.escapedName>}>)
  self.enterRule(localctx, <currentRule.startState>, self.RULE_<currentRule.name>)
  <namedActions.init>
  <locals; separator="\n">
  try:
    <code>
    <postamble; separator="\n">
    <namedActions.after>
  <if(exceptions)>
  <exceptions; separator="\n">
  <else>
  except RecognitionException as re:
    localctx.exception = re
    self._errHandler.reportError(self,
 re)
    self._errHandler.recover(self, re)
  <endif>
  finally:
    <finallyAction>
    self.exitRule()
  return localctx

>>

LeftRecursiveRuleFunction(currentRule,args,code,locals,ruleCtx,altLabelCtxs,
 namedActions,finallyAction,postamble) ::=
<<

<ruleCtx>
<altLabelCtxs:{l | <altLabelCtxs.(l)>}; separator="\n">

def <currentRule.escapedName>(self, _p:int=0<if(currentRule.args)>, <args:{a | , <a>}><endif>):
  _parentctx = self._ctx
```

```
  _parentState = self.state
  localctx = <parser.name>.<currentRule.ctxType>(self, self._ctx, _parentState<args:{a | , <a.escapedName>}>)
  _prevctx = localctx
  _startState = <currentRule.startState>
  self.enterRecursionRule(localctx, <currentRule.startState>, self.RULE_<currentRule.name>, _p)
  <namedActions.init>
  <locals; separator="\n">
  try:
     <code>
     <postamble; separator="\n">
     <namedActions.after>
  except RecognitionException as re:
     localctx.exception = re

  self._errHandler.reportError(self, re)
     self._errHandler.recover(self, re)
  finally:
     <finallyAction>
     self.unrollRecursionContexts(_parentctx)
  return localctx

>>

CodeBlockForOuterMostAlt(currentOuterMostAltCodeBlock, locals, preamble, ops) ::= <<
<if(currentOuterMostAltCodeBlock.altLabel)>localctx = <parser.name>.<currentOuterMostAltCodeBlock.altLabel;
format="cap">Context(self, localctx)<endif>
self.enterOuterAlt(localctx, <currentOuterMostAltCodeBlock.alt.altNum>)
<CodeBlockForAlt(currentAltCodeBlock=currentOuterMostAltCodeBlock, ...)>
>>

CodeBlockForAlt(currentAltCodeBlock, locals, preamble, ops) ::= <<
<locals; separator="\n">
<preamble; separator="\n">
<ops; separator="\n">
>>

LL1AltBlock(choice, preamble, alts, error) ::= <<
self.state = <choice.stateNumber>
self._errHandler.sync(self)
<if(choice.label)><labelref(choice.label)> = _input.LT(1)<endif>
<preamble; separator="\n">
token = self._input.LA(1)
<choice.altLook,alts:{look,alt| <cases(tokens=look)>
   <alt>
  pass}; separator="\nel">
else:
  <error>
```

```
>>

LL1OptionalBlock(choice, alts, error) ::= <<
self.state = <choice.stateNumber>
self._errHandler.sync(self)
token = self._input.LA(1)
<choice.altLook,alts:{look,alt| <cases(tokens=look)>
   <alt>
   pass}; separator="\nel">
else:
   pass
>>

LL1OptionalBlockSingleAlt(choice, expr, alts, preamble, error, followExpr) ::= <<
self.state = <choice.stateNumber>
self._errHandler.sync(self)
<preamble; separator="\n">
if <expr>:
   <alts; separator="\n">

<!else if ( !(<followExpr>) ) <error>!>
>>


LL1StarBlockSingleAlt(choice, loopExpr, alts, preamble, iteration) ::= <<
self.state = <choice.stateNumber>
self._errHandler.sync(self)
<preamble; separator="\n">
while <loopExpr>:
   <alts; separator="\n">
   self.state = <choice.loopBackStateNumber>
   self._errHandler.sync(self)
   <iteration>

>>

LL1PlusBlockSingleAlt(choice, loopExpr, alts, preamble, iteration) ::= <<
self.state = <choice.blockStartStateNumber> <! alt
 block decision !>
self._errHandler.sync(self)
<preamble; separator="\n">
while True:
   <alts; separator="\n">
   self.state = <choice.stateNumber> <! loopback/exit decision !>
   self._errHandler.sync(self)
   <iteration>
   if not (<loopExpr>):
       break
```

```
>>

// LL(*) stuff

AltBlock(choice, preamble, alts, error) ::= <<
self.state = <choice.stateNumber>
self._errHandler.sync(self)
<if(choice.label)><labelref(choice.label)> = _input.LT(1)<endif>
<preamble; separator="\n">
la_ = self._interp.adaptivePredict(self._input,<choice.decision>,self._ctx)
<alts:{alt |
if la_ == <i>:
   <alt>
   pass
}; separator="\nel">

>>

OptionalBlock(choice, alts, error) ::= <<
self.state = <choice.stateNumber>
self._errHandler.sync(self)
la_ = self._interp.adaptivePredict(self._input,<choice.decision>,self._ctx)
<alts:{alt |
if la_ == <i><if(!choice.ast.greedy)>+1<endif>:
   <alt>
}; separator="\nel">

>>

StarBlock(choice, alts, sync, iteration) ::= <<
self.state = <choice.stateNumber>
self._errHandler.sync(self)
_alt
 = self._interp.adaptivePredict(self._input,<choice.decision>,self._ctx)
while _alt!=<choice.exitAlt> and _alt!=ATN.INVALID_ALT_NUMBER:
   if _alt==1<if(!choice.ast.greedy)>+1<endif>:
       <iteration>
       <alts> <! should only be one !>
   self.state = <choice.loopBackStateNumber>
   self._errHandler.sync(self)
   _alt = self._interp.adaptivePredict(self._input,<choice.decision>,self._ctx)

>>

PlusBlock(choice, alts, error) ::= <<
self.state = <choice.blockStartStateNumber> <! alt block decision !>
self._errHandler.sync(self)
```

```
_alt = 1<if(!choice.ast.greedy)>+1<endif>
while _alt!=<choice.exitAlt> and _alt!=ATN.INVALID_ALT_NUMBER:
   <alts:{alt|
if _alt == <i><if(!choice.ast.greedy)>+1<endif>:
   <alt>
}; separator="\nel">
   else:
       <error>
   self.state = <choice.loopBackStateNumber> <! loopback/exit decision !>
   self._errHandler.sync(self)
   _alt = self._interp.adaptivePredict(self._input,<choice.decision>,self._ctx)

>>

Sync(s)
 ::= "sync(<s.expecting.name>)"

ThrowNoViableAlt(t) ::= "raise NoViableAltException(self)"

TestSetInline(s) ::= <<
<s.bitsets:{bits | <if(rest(rest(bits.tokens)))><bitsetBitfieldComparison(s, bits)><else><bitsetInlineComparison(s,
bits)><endif>}; separator=" or ">
>>

// Java language spec 15.19 - shift operators mask operands rather than overflow to 0... need range test
testShiftInRange(shiftAmount) ::= <<
((<shiftAmount>) & ~0x3f) == 0
>>

bitsetBitfieldComparison(s, bits) ::= <%
(<testShiftInRange({<offsetShiftVar(s.varName, bits.shift)>})> and ((1 \<\< <offsetShiftVar(s.varName,
bits.shift)>) & <bits.calculated>) != 0)
%>

isZero ::= [
"0":true,
default:false
]

offsetShiftVar(shiftAmount, offset) ::= <%
<if(!isZero.(offset))>(<shiftAmount> - <offset>)<else><shiftAmount><endif>
%>

offsetShiftType(shiftAmount, offset) ::= <%
<if(!isZero.(offset))>(<parser.name>.<shiftAmount> - <offset>)<else><parser.name>.<shiftAmount><endif>
%>

bitsetInlineComparison(s, bits) ::= <%
```

```
<bits.tokens:{t
 | <s.varName>==<t.type>}; separator=" or ">
%>

cases(tokens) ::= <<
if token in [<tokens:{t | <t.type>}; separator=", ">]:
>>

InvokeRule(r, argExprsChunks) ::= <<
self.state = <r.stateNumber>
<if(r.labels)><r.labels:{l | <labelref(l)> =
}><endif>self.<r.escapedName>(<if(r.ast.options.p)><r.ast.options.p><if(argExprsChunks)>,<endif><endif><argE
xprsChunks>)
>>

MatchToken(m) ::= <<
self.state = <m.stateNumber>
<if(m.labels)><m.labels:{l | <labelref(l)> = }><endif>self.match(<parser.name>.<m.name>)
>>

MatchSet(m, expr, capture) ::= "<CommonSetStuff(m, expr, capture, false)>"

MatchNotSet(m, expr, capture) ::= "<CommonSetStuff(m, expr, capture, true)>"

CommonSetStuff(m, expr, capture, invert) ::= <<
self.state = <m.stateNumber>
<if(m.labels)><m.labels:{l | <labelref(l)> = }>self._input.LT(1)<endif>
<capture>
<if(invert)>if <m.varName> \<= 0 or <expr><else>if not(<expr>)<endif>:
<if(m.labels)><m.labels:{l |     <labelref(l)> = }><else>    <endif>self._errHandler.recoverInline(self)
else:
    self._errHandler.reportMatch(self)
   self.consume()
>>

Wildcard(w) ::= <<
self.state = <w.stateNumber>
<if(w.labels)><w.labels:{l | <labelref(l)> = }><endif>self.matchWildcard()
>>

// ACTION STUFF

Action(a, foo, chunks) ::= "<chunks>"

ArgAction(a, chunks) ::= "<chunks>"

SemPred(p, chunks, failChunks) ::= <<
self.state = <p.stateNumber>
```

```
if not <chunks>:
   from antlr4.error.Errors import FailedPredicateException
   raise FailedPredicateException(self, <p.predicate><if(failChunks)>, <failChunks><elseif(p.msg)>,
<p.msg><endif>)
>>

ExceptionClause(e, catchArg, catchAction) ::= <<
except <catchArg>:
   <catchAction>
>>

// lexer actions are not associated with model objects

LexerSkipCommand()  ::= "skip()"
LexerMoreCommand()  ::= "more()"
LexerPopModeCommand() ::= "popMode()"

LexerTypeCommand(arg, grammar)      ::= "_type = <arg>"
LexerChannelCommand(arg, grammar)   ::= "_channel = <arg>"
LexerModeCommand(arg, grammar)      ::= "_mode = <arg>"
LexerPushModeCommand(arg,
 grammar)  ::= "pushMode(<arg>)"

ActionText(t) ::= "<t.text>"
ActionTemplate(t) ::= "<t.st>"
ArgRef(a) ::= "localctx.<a.escapedName>"
LocalRef(a) ::= "localctx.<a.escapedName>"
RetValueRef(a) ::= "localctx.<a.escapedName>"
QRetValueRef(a) ::= "<ctx(a)>.<a.dict>.<a.escapedName>"
/** How to translate $tokenLabel */
TokenRef(t) ::= "<ctx(t)>.<t.escapedName>"
LabelRef(t) ::= "<ctx(t)>.<t.escapedName>"
ListLabelRef(t) ::= "<ctx(t)>.<ListLabelName(t.escapedName)>"
SetAttr(s,rhsChunks) ::= "<ctx(s)>.<s.escapedName> = <rhsChunks>"

TokenLabelType() ::= "<file.TokenLabelType; null={Token}>"
InputSymbolType() ::= "<file.InputSymbolType; null={Token}>"

TokenPropertyRef_text(t) ::= "(None if <ctx(t)>.<t.label> is None else <ctx(t)>.<t.label>.text)"
TokenPropertyRef_type(t) ::= "(0 if <ctx(t)>.<t.label> is None else <ctx(t)>.<t.label>.type)"
TokenPropertyRef_line(t) ::= "(0 if <ctx(t)>.<t.label> is None else <ctx(t)>.<t.label>.line)"
TokenPropertyRef_pos(t) ::= "(0 if <ctx(t)>.<t.label> is None
 else <ctx(t)>.<t.label>.column)"
TokenPropertyRef_channel(t) ::= "(0 if <ctx(t)>.<t.label> is None else <ctx(t)>.<t.label>.channel)"
TokenPropertyRef_index(t) ::= "(0 if <ctx(t)>.<t.label> is None else <ctx(t)>.<t.label>.tokenIndex)"
TokenPropertyRef_int(t) ::= "(0 if <ctx(t)>.<t.label> is None else int(<ctx(t)>.<t.label>.text))"

RulePropertyRef_start(r) ::= "(None if <ctx(r)>.<r.label> is None else <ctx(r)>.<r.label>.start)"
```

```
RulePropertyRef_stop(r)  ::= "(None if <ctx(r)>.<r.label> is None else <ctx(r)>.<r.label>.stop)"
RulePropertyRef_text(r)  ::= "(None if <ctx(r)>.<r.label> is None else
self._input.getText(<ctx(r)>.<r.label>.start,<ctx(r)>.<r.label>.stop))"
RulePropertyRef_ctx(r)  ::= "<ctx(r)>.<r.label>"
RulePropertyRef_parser(r)  ::= "self"

ThisRulePropertyRef_start(r) ::= "localctx.start"
ThisRulePropertyRef_stop(r)  ::= "localctx.stop"
ThisRulePropertyRef_text(r)  ::= "self._input.getText(localctx.start, self._input.LT(-1))"
ThisRulePropertyRef_ctx(r)  ::= "localctx"
ThisRulePropertyRef_parser(r)
 ::= "self"

NonLocalAttrRef(s)     ::= "self.getInvokingContext(<s.ruleIndex>).<s.escapedName>"
SetNonLocalAttr(s, rhsChunks)  ::= "self.getInvokingContext(<s.ruleIndex>).<s.escapedName> = <rhsChunks>"

AddToLabelList(a) ::= "<ctx(a.label)>.<a.listName>.append(<labelref(a.label)>)"

TokenDecl(t) ::= "self.<t.escapedName> = None # <TokenLabelType()>"
TokenTypeDecl(t) ::= "self.<t.escapedName> = 0 # <TokenLabelType()> type"
TokenListDecl(t) ::= "self.<t.escapedName> = list() # of <TokenLabelType()>s"
RuleContextDecl(r) ::= "self.<r.escapedName> = None # <r.ctxName>"
RuleContextListDecl(rdecl) ::= "self.<rdecl.escapedName> = list() # of <rdecl.ctxName>s"

ContextTokenGetterDecl(t)      ::= <<
def <t.escapedName>(self):
   return self.getToken(<parser.name>.<t.name>, 0)
>>

// should never be called
ContextTokenListGetterDecl(t)  ::= <<
def <t.name>_list(self):
   return self.getTokens(<parser.name>.<t.name>)
>>

ContextTokenListIndexedGetterDecl(t)  ::= <<
def <t.escapedName>(self,
 i:int=None):
   if i is None:
       return self.getTokens(<parser.name>.<t.name>)
   else:
       return self.getToken(<parser.name>.<t.name>, i)
>>

ContextRuleGetterDecl(r)       ::= <<
def <r.escapedName>(self):
   return self.getTypedRuleContext(<parser.name>.<r.ctxName>,0)
```

```
>>

// should never be called
ContextRuleListGetterDecl(r)   ::= <<
def <r.name>_list(self):
   return self.getTypedRuleContexts(<parser.name>.<r.ctxName>)

>>

ContextRuleListIndexedGetterDecl(r)   ::= <<
def <r.escapedName>(self, i:int=None):
   if i is None:
      return self.getTypedRuleContexts(<parser.name>.<r.ctxName>)
   else:
      return self.getTypedRuleContext(<parser.name>.<r.ctxName>,i)

>>

LexerRuleContext() ::= "RuleContext"

/** The rule context name is the rule followed by a suffix; e.g.,
*  r becomes rContext.
*/
RuleContextNameSuffix() ::= "Context"

ImplicitTokenLabel(tokenName) ::= "_<tokenName>"
ImplicitRuleLabel(ruleName)   ::= "_<ruleName>"
ImplicitSetLabel(id)
  ::= "_tset<id>"
ListLabelName(label)    ::= "<label>"

CaptureNextToken(d) ::= "<d.varName> = self._input.LT(1)"
CaptureNextTokenType(d) ::= "<d.varName> = self._input.LA(1)"

StructDecl(struct,ctorAttrs,attrs,getters,dispatchMethods,interfaces,extensionMembers,signatures) ::= <<
class <struct.escapedName>(<if(contextSuperClass)><contextSuperClass><else>ParserRuleContext<endif>):
   __slots__ = 'parser'

   def __init__(self, parser, parent:ParserRuleContext=None, invokingState:int=-1<struct.ctorAttrs:{a | ,
<a.escapedName><if(a.type)>:<a.type><endif>=None}>):
      super().__init__(parent, invokingState)
      self.parser = parser
      <attrs:{a | <a>}; separator="\n">
      <struct.ctorAttrs:{a | self.<a.escapedName> = <a.escapedName>}; separator="\n">

   <getters:{g | <g>}; separator="\n\n">

   def getRuleIndex(self):
```

```
        return <parser.name>.RULE_<struct.derivedFromName>

<if(struct.provideCopyFrom)> <! don't need copy unless we have subclasses !>
    def copyFrom(self, ctx:ParserRuleContext):
        super().copyFrom(ctx)
        <struct.attrs:{a | self.<a.escapedName> = ctx.<a.escapedName>}; separator="\n">

<endif>
   <dispatchMethods; separator="\n">
   <extensionMembers; separator="\n">

>>

AltLabelStructDecl(struct,attrs,getters,dispatchMethods) ::= <<
class <struct.escapedName>(<currentRule.name; format="cap">Context):

   def __init__(self, parser, ctx:ParserRuleContext): # actually a <parser.name>.<currentRule.name;
format="cap">Context
        super().__init__(parser)
        <attrs:{a | <a>}; separator="\n">
        self.copyFrom(ctx)

   <getters:{g | <g>}; separator="\n">

   <dispatchMethods; separator="\n">

>>

ListenerDispatchMethod(method) ::= <<
def <if(method.isEnter)>enter<else>exit<endif>Rule(self, listener:ParseTreeListener):
   if hasattr( listener, "<if(method.isEnter)>enter<else>exit<endif><struct.derivedFromName; format="cap">" ):
        listener.<if(method.isEnter)>enter<else>exit<endif><struct.derivedFromName;
 format="cap">(self)

>>

VisitorDispatchMethod(method) ::= <<
def accept(self, visitor:ParseTreeVisitor):
   if hasattr( visitor, "visit<struct.derivedFromName; format="cap">" ):
        return visitor.visit<struct.derivedFromName; format="cap">(self)
   else:
        return visitor.visitChildren(self)

>>

AttributeDecl(d) ::= "self.<d.escapedName> = <if(d.initValue)><d.initValue><else>None<endif>"

/** If we don't know location of label def x, use this template */
```

```
labelref(x) ::= "<if(!x.isLocal)>localctx.<endif><x.escapedName>"

/** For any action chunk, what is correctly-typed context struct ptr? */
ctx(actionChunk) ::= "localctx"

// used for left-recursive rules
recRuleAltPredicate(ruleName,opPrec)  ::= "self.precpred(self._ctx, <opPrec>)"
recRuleSetReturnAction(src,name)   ::= "$<name>=$<src>.<name>"
recRuleSetStopToken()                ::= "self._ctx.stop = self._input.LT(-1)"

recRuleAltStartAction(ruleName, ctxName, label, isListLabel) ::= <<
localctx =
 <parser.name>.<ctxName>Context(self, _parentctx, _parentState)
<if(label)>
<if(isListLabel)>
localctx.<label>.append(_prevctx)
<else>
localctx.<label> = _prevctx
<endif>
<endif>
self.pushNewRecursionContext(localctx, _startState, self.RULE_<ruleName>)
>>

recRuleLabeledAltStartAction(ruleName, currentAltLabel, label, isListLabel) ::= <<
localctx = <parser.name>.<currentAltLabel; format="cap">Context(self, <parser.name>.<ruleName;
format="cap">Context(self, _parentctx, _parentState))
<if(label)>
<if(isListLabel)>
localctx.<label>.append(_prevctx)
<else>
localctx.<label> = _prevctx
<endif>
<endif>
self.pushNewRecursionContext(localctx, _startState, self.RULE_<ruleName>)
>>

recRuleReplaceContext(ctxName) ::= <<
localctx = <parser.name>.<ctxName>Context(self, localctx)
self._ctx = localctx
_prevctx = localctx
>>

recRuleSetPrevCtx() ::= <<
if self._parseListeners is not None:
   self.triggerExitRuleEvent()
_prevctx = localctx
>>
```

```
LexerFile(lexerFile, lexer, namedActions) ::= <<
<fileHeader(lexerFile.grammarFileName,
 lexerFile.ANTLRVersion)>
from antlr4 import *
from io import StringIO
import sys
if sys.version_info[1] > 5:
   from typing import TextIO
else:
   from typing.io import TextIO

<namedActions.header>

<lexer>
>>

Lexer(lexer, atn, actionFuncs, sempredFuncs, superClass) ::= <<
<if(superClass)>
if "." in __name__:
   from .<superClass> import <superClass>
else:
   from <superClass> import <superClass>

<endif>
<atn>

class <lexer.name>(<if(superClass)><superClass><else>Lexer<endif>):

   atn = ATNDeserializer().deserialize(serializedATN())

   decisionsToDFA = [ DFA(ds, i) for i, ds in enumerate(atn.decisionToState) ]

<if(lexer.escapedChannels)>
   <lexer.escapedChannels:{c| <c> = <lexer.escapedChannels.(c)>}; separator="\n">

<endif>
<if(rest(lexer.escapedModeNames))>
   <rest(lexer.escapedModeNames):{m| <m> = <i>}; separator="\n">

<endif>
   <if(lexer.tokens)>
   <lexer.tokens:{k | <k> = <lexer.tokens.(k)>}; separator="\n", wrap, anchor>
   <endif>

    channelNames = [ u"DEFAULT_TOKEN_CHANNEL", u"HIDDEN"<if (lexer.channelNames)>,
<lexer.channelNames:{c| u"<c>"}; separator=", ", wrap, anchor><endif> ]
```

```
  modeNames = [ <lexer.modes:{m| "<m>"}; separator=", ", wrap, anchor> ]

  literalNames = [ "\<INVALID>",
        <lexer.literalNames:{t | <t>}; separator=", ", wrap, anchor> ]

  symbolicNames = [ "\<INVALID>",
        <lexer.symbolicNames:{t | <t>}; separator=", ", wrap, anchor> ]

  ruleNames = [ <lexer.ruleNames:{r | "<r>"}; separator=", ", wrap, anchor> ]

  grammarFileName = "<lexer.grammarFileName>"

  def __init__(self, input=None, output:TextIO = sys.stdout):
     super().__init__(input, output)
     self.checkVersion("<lexerFile.ANTLRVersion>")
     self._interp = LexerATNSimulator(self, self.atn, self.decisionsToDFA, PredictionContextCache())
     self._actions = None
     self._predicates = None

  <namedActions.members>

  <dumpActions(lexer, "", actionFuncs, sempredFuncs)>

>>

SerializedATN(model)
 ::= <<
def serializedATN():
  return [
     <model.serialized: {s | <s>}; separator=",", wrap>
  ]
>>

/** Using a type to init value map, try to init a type; if not in table
*  must be an object, default value is "null".
*/
initValue(typeName) ::= <<
<pythonTypeInitMap.(typeName)>
>>

codeFileExtension() ::= ".py"
```

Found in path(s):
* /antlr4-4-13-2-jar/org/antlr/v4/tool/templates/codegen/Python3/Python3.stg
No license file was found, but licenses were detected in source scan.

```
/*
* [The "BSD license"]
```

*  Copyright (c) 2016, Mike Lischke
*  All rights reserved.
*
*  Redistribution and use in source and binary forms, with or without
*  modification, are permitted provided that the following conditions
*  are met:
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*  THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT
*  (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF
*  THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
*/

Found in path(s):
* /antlr4-4-13-2-jar/org/antlr/v4/tool/templates/codegen/Cpp/Files.stg
No license file was found, but licenses were detected in source scan.

// Copyright 2016-2022 The ANTLR Project. All rights reserved.
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Found in path(s):
* /antlr4-4-13-2-jar/org/antlr/v4/tool/templates/codegen/TypeScript/TypeScript.stg
No license file was found, but licenses were detected in source scan.

/*
* [The "BSD license"]
*  Copyright (c) 2012-2016 Terence Parr
*  Copyright (c) 2012-2016 Sam Harwell
*  All rights reserved.
*
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*  modification, are permitted provided that the following conditions
*  are met:

```
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*  NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE,
*  DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY
*  THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT
*  (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF
*  THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
*/

phpTypeInitMap ::= [
 "int":"0",
 "long":"0",
 "float":"0.0",
 "double":"0.0",
 "boolean":"false",
 default:"null"
]

// args must be <object-model-object>, <fields-resulting-in-STs>

ParserFile(file, parser, namedActions, contextSuperClass) ::= <<
<fileHeader(file.grammarFileName, file.ANTLRVersion)>
<parser>
>>

ListenerFile(file, header, namedActions) ::= <<
<fileHeader(file.grammarFileName,
 file.ANTLRVersion)>
<if(file.genPackage)>
namespace <file.genPackage>;
<endif>
<header>
use Antlr\\Antlr4\\Runtime\\Tree\\ParseTreeListener;

/**
```

```
* This interface defines a complete listener for a parse tree produced by
* {@see <file.parserName>}.
*/
interface <file.grammarName>Listener extends ParseTreeListener {
 <file.listenerNames:{lname |
/**
<if(file.listenerLabelRuleNames.(lname))>
* Enter a parse tree produced by the `<lname>`
* labeled alternative in {@see <file.parserName>::<file.listenerLabelRuleNames.(lname)>()\}.
<else>
* Enter a parse tree produced by {@see <file.parserName>::<lname>()\}.
<endif>
* @param $context The parse tree.
*/
public function enter<lname; format="cap">(Context\\<lname; format="cap">Context $context): void;
/**
<if(file.listenerLabelRuleNames.(lname))>
* Exit a parse tree produced by the `<lname>` labeled alternative
* in {@see <file.parserName>::<file.listenerLabelRuleNames.(lname)>()\}.
<else>
* Exit a parse
 tree produced by {@see <file.parserName>::<lname>()\}.
<endif>
* @param $context The parse tree.
*/
public function exit<lname; format="cap">(Context\\<lname; format="cap">Context $context): void;};
separator="\n">
}
>>

BaseListenerFile(file, header, namedActions) ::= <<
<fileHeader(file.grammarFileName, file.ANTLRVersion)>
<if(file.genPackage)>
namespace <file.genPackage>;
<endif>
<header>

use Antlr\\Antlr4\\Runtime\\ParserRuleContext;
use Antlr\\Antlr4\\Runtime\\Tree\\ErrorNode;
use Antlr\\Antlr4\\Runtime\\Tree\\TerminalNode;

/**
* This class provides an empty implementation of {@see <file.grammarName>Listener},
* which can be extended to create a listener which only needs to handle a subset
* of the available methods.
*/
class <file.grammarName>BaseListener implements <file.grammarName>Listener
{
```

```
 <file.listenerNames:{lname |
/**
* {@inheritdoc\}
*
* The default implementation does nothing.
*/
public function enter<lname; format="cap">(Context\\<lname; format="cap">Context
 $context): void {\}

/**
* {@inheritdoc\}
*
* The default implementation does nothing.
*/
public function exit<lname; format="cap">(Context\\<lname; format="cap">Context $context): void {\}};
separator="\n">

 /**
  * {@inheritdoc\}
  *
  * The default implementation does nothing.
  */
 public function enterEveryRule(ParserRuleContext $context): void {}

 /**
  * {@inheritdoc\}
  *
  * The default implementation does nothing.
  */
 public function exitEveryRule(ParserRuleContext $context): void {}

 /**
  * {@inheritdoc\}
  *
  * The default implementation does nothing.
  */
 public function visitTerminal(TerminalNode $node): void {}

 /**
  * {@inheritdoc\}
  *
  * The default implementation does nothing.
  */
 public function visitErrorNode(ErrorNode $node): void {}
}
>>

VisitorFile(file, header, namedActions) ::= <<
```

```
<fileHeader(file.grammarFileName, file.ANTLRVersion)>
<if(file.genPackage)>
namespace <file.genPackage>;
<endif>

<header>
use Antlr\\Antlr4\\Runtime\\Tree\\ParseTreeVisitor;

/**
 * This interface defines a complete generic visitor for a parse tree produced by {@see <file.parserName>}.
*/
interface <file.grammarName>Visitor extends ParseTreeVisitor
{
 <file.visitorNames:{lname |
/**
<if(file.visitorLabelRuleNames.(lname))>
* Visit a parse tree produced by the `<lname>` labeled alternative
* in {@see <file.parserName>::<file.visitorLabelRuleNames.(lname)>()\}.
<else>
* Visit a parse tree produced by {@see <file.parserName>::<lname>()\}.
<endif>
*
* @param Context\\<lname; format="cap">Context $context The parse tree.
*
* @return mixed The visitor result.
*/
public function visit<lname; format="cap">(Context\\<lname; format="cap">Context $context);};
separator="\n\n">
}
>>

BaseVisitorFile(file, header, namedActions) ::= <<
<fileHeader(file.grammarFileName, file.ANTLRVersion)>
<if(file.genPackage)>
namespace <file.genPackage>;
<endif>
<header>
use Antlr\\Antlr4\\Runtime\\Tree\\AbstractParseTreeVisitor;

/**
* This class provides an
 empty implementation of {@see <file.grammarName>Visitor},
* which can be extended to create a visitor which only needs to handle a subset
* of the available methods.
*/
class <file.grammarName>BaseVisitor extends AbstractParseTreeVisitor implements <file.grammarName>Visitor
{
 <file.visitorNames:{lname |
```

```
/**
* {@inheritdoc\}
*
* The default implementation returns the result of calling
* {@see self::visitChildren()\} on `context`.
*/
public function visit<lname; format="cap">(Context\\<lname; format="cap">Context $context)
{
   return $this->visitChildren($context);
\}}; separator="\n\n">
}
>>

fileHeader(grammarFileName, ANTLRVersion) ::= <<
\<?php

/*
* Generated from <grammarFileName> by ANTLR <ANTLRVersion>
*/

>>
Parser(parser, funcs, atn, sempredFuncs, superClass) ::= <<
<Parser_(ctor="parser_ctor", ...)>
>>

Parser_(parser, funcs, atn, sempredFuncs, ctor, superClass) ::= <<
namespace<if(file.genPackage)> <file.genPackage><endif> {
<if(namedActions.header)><namedActions.header><endif>
 use
 Antlr\\Antlr4\\Runtime\\Atn\\ATN;
 use Antlr\\Antlr4\\Runtime\\Atn\\ATNDeserializer;
 use Antlr\\Antlr4\\Runtime\\Atn\\ParserATNSimulator;
 use Antlr\\Antlr4\\Runtime\\Dfa\\DFA;
 use Antlr\\Antlr4\\Runtime\\Error\\Exceptions\\FailedPredicateException;
 use Antlr\\Antlr4\\Runtime\\Error\\Exceptions\\NoViableAltException;
 use Antlr\\Antlr4\\Runtime\\PredictionContexts\\PredictionContextCache;
 use Antlr\\Antlr4\\Runtime\\Error\\Exceptions\\RecognitionException;
 use Antlr\\Antlr4\\Runtime\\RuleContext;
 use Antlr\\Antlr4\\Runtime\\Token;
 use Antlr\\Antlr4\\Runtime\\TokenStream;
 use Antlr\\Antlr4\\Runtime\\Vocabulary;
 use Antlr\\Antlr4\\Runtime\\VocabularyImpl;
 use Antlr\\Antlr4\\Runtime\\RuntimeMetaData;
 use Antlr\\Antlr4\\Runtime\\Parser;
<if(namedActions.definitions)><namedActions.definitions><endif>

 final class <parser.name> extends <superClass; null="Parser">
 {
```

```
<if(parser.tokens)>
public const <parser.tokens:{k | <k> = <parser.tokens.(k)>}; separator=",
", wrap, anchor>;
<endif>

<if(parser.rules)>
public const <parser.rules:{r | RULE_<r.name> = <r.index>}; separator=", ", wrap, anchor>;
<endif>

/**
 * @var array\<string>
 */
public const RULE_NAMES = [
 <parser.ruleNames:{r | '<r>'}; separator=", ", wrap, anchor>
];

<vocabulary(parser.literalNames, parser.symbolicNames)>

<atn>
protected static $atn;
protected static $decisionToDFA;
protected static $sharedContextCache;
<if(namedActions.members)>

<namedActions.members>
<endif>


<parser:(ctor)()>

private static function initialize(): void
{
 if (self::$atn !== null) {
  return;
 }

 RuntimeMetaData::checkVersion('<file.ANTLRVersion>', RuntimeMetaData::VERSION);

 $atn = (new ATNDeserializer())->deserialize(self::SERIALIZED_ATN);

 $decisionToDFA = [];
 for ($i = 0, $count = $atn->getNumberOfDecisions(); $i \< $count; $i++) {
  $decisionToDFA[] = new DFA($atn->getDecisionState($i), $i);
 }

 self::$atn = $atn;
 self::$decisionToDFA
```

```
= $decisionToDFA;
  self::$sharedContextCache = new PredictionContextCache();
 }

 public function getGrammarFileName(): string
 {
  return "<parser.grammarFileName>";
 }

 public function getRuleNames(): array
 {
  return self::RULE_NAMES;
 }

 public function getSerializedATN(): array
 {
  return self::SERIALIZED_ATN;
 }

 public function getATN(): ATN
 {
  return self::$atn;
 }

 public function getVocabulary(): Vocabulary
     {
         static $vocabulary;

  return $vocabulary = $vocabulary ?? new VocabularyImpl(self::LITERAL_NAMES, self::SYMBOLIC_NAMES);
     }
<if(funcs)>

  <funcs; separator="\n\n">
<endif>
<if(sempredFuncs)>

 public function sempred(?RuleContext $localContext, int $ruleIndex, int $predicateIndex): bool
 {
  switch ($ruleIndex) {
  <parser.sempredFuncs.values:{f|
 case <f.ruleIndex>:
  return $this->sempred<f.name; format="cap">($localContext, $predicateIndex);}; separator="\n\n">

   default:
    return
 true;
   }
 }
```

```
  <sempredFuncs.values; separator="\n\n">
<endif>
 }
}

namespace <if(file.genPackage)><file.genPackage>\\<endif>Context {
 use Antlr\\Antlr4\\Runtime\\ParserRuleContext;
 use Antlr\\Antlr4\\Runtime\\Token;
 use Antlr\\Antlr4\\Runtime\\Tree\\ParseTreeVisitor;
 use Antlr\\Antlr4\\Runtime\\Tree\\TerminalNode;
 use Antlr\\Antlr4\\Runtime\\Tree\\ParseTreeListener;
 use <if(file.genPackage)><file.genPackage>\\<endif><parser.name>;
 <if (file.genVisitor)>use <if(file.genPackage)><file.genPackage>\\<endif><file.grammarName>Visitor;<endif>
 <if (file.genListener)>use <if(file.genPackage)><file.genPackage>\\<endif><file.grammarName>Listener;<endif>
 <namedActions.contexts>

 <funcs :{ func | <func.ruleCtx><if(func.altLabelCtxs)>

<func.altLabelCtxs:{l | <func.altLabelCtxs.(l)>}; separator="\n\n"><endif> }; separator="\n\n">
}
>>

vocabulary(literalNames, symbolicNames) ::= <<
/**
* @var array\<string|null>
*/
private const LITERAL_NAMES = [
   <literalNames:{t | <t>}; null="null",
 separator=", ", wrap, anchor>
];

/**
* @var array\<string>
*/
private const SYMBOLIC_NAMES = [
   <symbolicNames:{t | <t>}; null="null", separator=", ", wrap, anchor>
];
>>

dumpActions(recog, argFuncs, actionFuncs, sempredFuncs) ::= <<
<if(actionFuncs)>

public function action(?RuleContext $localContext, int $ruleIndex, int $actionIndex): void
{
 switch ($ruleIndex) {
 <recog.actionFuncs.values:{f|
 case <f.ruleIndex>:
```

```
  $this->action<f.name; format="cap">($localContext, $actionIndex);
  break;}; separator="\n\n">
 }
}

<actionFuncs.values; separator="\n">
<endif>
<if(sempredFuncs)>

public function sempred(?RuleContext $localContext, int $ruleIndex, int $predicateIndex): bool
{
 switch ($ruleIndex) {
 <recog.sempredFuncs.values:{f|
   case <f.ruleIndex>:
       return $this->sempred<f.name; format="cap">($localContext, $predicateIndex);}; separator="\n\n">
 }

 return true;
}
<sempredFuncs.values; separator="\n\n">
<endif>
>>

parser_ctor(p) ::= <<
public function __construct(TokenStream
 $input)
{
 parent::__construct($input);

 self::initialize();

 $this->interp = new ParserATNSimulator($this, self::$atn, self::$decisionToDFA, self::$sharedContextCache);
}
>>

/**
* This generates a private method since the actionIndex is generated, making
* an overriding implementation impossible to maintain.
*/
RuleActionFunction(r, actions) ::= <<
private function action<r.name; format="cap">(?<r.ctxType> $localContext, int $actionIndex): void
{
 switch ($actionIndex) {
 <actions:{index|
 case <index>:
 <actions.(index)>

 break;}; separator="\n\n">
```

```
 }
}
>>

/**
* This generates a private method since the predicateIndex is generated, making
* an overriding implementation impossible to maintain.
*/
RuleSempredFunction(r, actions) ::= <<
private function sempred<r.name; format="cap">(?Context\\<r.ctxType> $localContext, int $predicateIndex): bool
{
 switch ($predicateIndex) {
 <actions:{index|
   case <index>:
       return <actions.(index)>;}; separator="\n\n">
 }

 return
 true;
}
>>

RuleFunction(currentRule,args,code,locals,ruleCtx,altLabelCtxs,namedActions,finallyAction,exceptions,postamble)
::= <<
/**
* @throws RecognitionException
*/
<if(currentRule.modifiers)><currentRule.modifiers:{f | <f> }><endif>public function
<currentRule.escapedName>(<args; separator=",">): Context\\<currentRule.ctxType>
{
   $localContext = new Context\\<currentRule.ctxType>($this->ctx, $this->getState()<currentRule.args:{a | ,
$<a.name>}>);

   $this->enterRule($localContext, <currentRule.startState>, self::RULE_<currentRule.name>);
   <namedActions.init>
   <locals; separator="\n">

   try {
       <code>
       <postamble; separator="\n">
       <namedActions.after>
   }<if(exceptions)><exceptions; separator="\n"><else> catch (RecognitionException $exception) {
       $localContext->exception = $exception;
       $this->errorHandler->reportError($this, $exception);
       $this->errorHandler->recover($this, $exception);
   }<endif> finally
 {
       <finallyAction>
```

```
      $this->exitRule();
   }

   return $localContext;
}
>>

LeftRecursiveRuleFunction(currentRule,args,code,locals,ruleCtx,altLabelCtxs,namedActions,finallyAction,postamb
le) ::= <<
/**
* @throws RecognitionException
*/
<if(currentRule.modifiers)><currentRule.modifiers:{f | <f> }><endif>public function <currentRule.name>(<args;
separator=", ">): Context\\<currentRule.ctxType>
{
 return $this->recursive<currentRule.name; format="cap">(0<currentRule.args:{a | , <a.name>}>);
}

/**
* @throws RecognitionException
*/
private function recursive<currentRule.name; format="cap">(int $precedence<args:{a | , <a>}>):
Context\\<currentRule.ctxType>
{
 $parentContext = $this->ctx;
 $parentState = $this->getState();
 $localContext = new Context\\<currentRule.ctxType>($this->ctx, $parentState<currentRule.args:{a | ,
<a.name>}>);
 $previousContext = $localContext;
 $startState = <currentRule.startState>;
 $this->enterRecursionRule($localContext, <currentRule.startState>,
 self::RULE_<currentRule.name>, $precedence);
 <namedActions.init>
 <locals; separator="\n">

 try {
  <code>
  <postamble; separator="\n">
  <namedActions.after>
 } catch (RecognitionException $exception) {
  $localContext->exception = $exception;
  $this->errorHandler->reportError($this, $exception);
  $this->errorHandler->recover($this, $exception);
 } finally {
  <finallyAction>
  $this->unrollRecursionContexts($parentContext);
 }
```

```
 return $localContext;
}
>>

CodeBlockForOuterMostAlt(currentOuterMostAltCodeBlock, locals, preamble, ops) ::= <<
<if(currentOuterMostAltCodeBlock.altLabel)>$localContext = new
Context\\<currentOuterMostAltCodeBlock.altLabel; format="cap">Context($localContext);<endif>
$this->enterOuterAlt($localContext, <currentOuterMostAltCodeBlock.alt.altNum>);
<CodeBlockForAlt(currentAltCodeBlock=currentOuterMostAltCodeBlock, ...)>
>>

CodeBlockForAlt(currentAltCodeBlock, locals, preamble, ops) ::= <<
<locals; separator="\n">
<preamble; separator="\n">
<ops; separator="\n">
>>

LL1AltBlock(choice,
 preamble, alts, error) ::= <<
$this->setState(<choice.stateNumber>);
$this->errorHandler->sync($this);
<if(choice.label)><labelref(choice.label)> = $this->input->LT(1);<endif>
<preamble; separator="\n">

switch ($this->input->LA(1)) {
   <choice.altLook,alts:{look,alt| <cases(tokens=look)>
 <alt>
 break;}; separator="\n\n">

default:
 <error>
}
>>

LL1OptionalBlock(choice, alts, error) ::= <<
$this->setState(<choice.stateNumber>);
$this->errorHandler->sync($this);

switch ($this->input->LA(1)) {
   <choice.altLook,alts:{look,alt| <cases(tokens=look)>
 <alt>
 break;}; separator="\n\n">

default:
 break;
}
>>
```

```
LL1OptionalBlockSingleAlt(choice, expr, alts, preamble, error, followExpr) ::= <<
$this->setState(<choice.stateNumber>);
$this->errorHandler->sync($this);
<preamble; separator="\n">

if (<expr>) {
 <alts; separator="\n">
}
>>

LL1StarBlockSingleAlt(choice, loopExpr, alts, preamble, iteration) ::= <<
$this->setState(<choice.stateNumber>);
$this->errorHandler->sync($this);

<preamble;
 separator="\n">
while (<loopExpr>) {
 <alts; separator="\n">
 $this->setState(<choice.loopBackStateNumber>);
 $this->errorHandler->sync($this);
 <iteration>
}
>>

LL1PlusBlockSingleAlt(choice, loopExpr, alts, preamble, iteration) ::= <<
$this->setState(<choice.blockStartStateNumber>); <! alt block decision !>
$this->errorHandler->sync($this);

<preamble; separator="\n">
do {
 <alts; separator="\n">
 $this->setState(<choice.stateNumber>); <! loopback/exit decision !>
 $this->errorHandler->sync($this);
 <iteration>
} while (<loopExpr>);
>>

// LL(*) stuff

AltBlock(choice, preamble, alts, error) ::= <<
$this->setState(<choice.stateNumber>);
$this->errorHandler->sync($this);
<if(choice.label)><labelref(choice.label)> = $this->input->LT(1);<endif>
<preamble; separator="\n">

switch ($this->getInterpreter()->adaptivePredict($this->input, <choice.decision>, $this->ctx)) {
 <alts:{alt |
case <i>:
```

```
   <alt>
break;}; separator="\n\n">
}
>>

OptionalBlock(choice,
 alts, error) ::= <<
$this->setState(<choice.stateNumber>);
$this->errorHandler->sync($this);

switch ($this->getInterpreter()->adaptivePredict($this->input, <choice.decision>, $this->ctx)) {
<alts:{alt |
   case <i><if(!choice.ast.greedy)>+1<endif>:
     <alt>
 break;}; separator="\n\n">
}
>>

StarBlock(choice, alts, sync, iteration) ::= <<
$this->setState(<choice.stateNumber>);
$this->errorHandler->sync($this);

$alt = $this->getInterpreter()->adaptivePredict($this->input, <choice.decision>, $this->ctx);

while ($alt !== <choice.exitAlt> && $alt !== ATN::INVALID_ALT_NUMBER) {
 if ($alt === 1<if(!choice.ast.greedy)>+1<endif>) {
  <iteration>
  <alts> <! should only be one !>
 }

 $this->setState(<choice.loopBackStateNumber>);
 $this->errorHandler->sync($this);

 $alt = $this->getInterpreter()->adaptivePredict($this->input, <choice.decision>, $this->ctx);
}
>>

PlusBlock(choice, alts, error) ::= <<
$this->setState(<choice.blockStartStateNumber>); <! alt block decision !>
$this->errorHandler->sync($this);

$alt
 = 1<if(!choice.ast.greedy)>+1<endif>;

do {
 switch ($alt) {
 <alts:{alt|
case <i><if(!choice.ast.greedy)>+1<endif>:
```

```
 <alt>
 break;}; separator="\n\n">
 default:
  <error>
 }

 $this->setState(<choice.loopBackStateNumber>); <! loopback/exit decision !>
 $this->errorHandler->sync($this);

 $alt = $this->getInterpreter()->adaptivePredict($this->input, <choice.decision>, $this->ctx);
} while ($alt !== <choice.exitAlt> && $alt !== ATN::INVALID_ALT_NUMBER);
>>

Sync(s) ::= "sync(<s.expecting.name>);"

ThrowNoViableAlt(t) ::= "throw new NoViableAltException($this);"

TestSetInline(s) ::= <<
<s.bitsets:{bits | <if(rest(rest(bits.tokens)))><bitsetBitfieldComparison(s, bits)><else><bitsetInlineComparison(s,
bits)><endif>}; separator=" || ">
>>

// Java language spec 15.19 - shift operators mask operands rather than overflow to 0... need range test
testShiftInRange(shiftAmount) ::= <<
((<shiftAmount>) & ~0x3f) === 0
>>

bitsetBitfieldComparison(s, bits) ::= <%
(<testShiftInRange({<offsetShiftVar(s.varName,
 bits.shift)>})> && ((1 \<\< <offsetShiftVar(s.varName, bits.shift)>) & <bits.calculated>) !== 0)
%>

isZero ::= [
"0":true,
default:false
]

offsetShiftVar(shiftAmount, offset) ::= <%
<if(!isZero.(offset))>($<shiftAmount> - <offset>)<else>$<shiftAmount><endif>
%>
offsetShiftConst(shiftAmount, offset) ::= <%
<if(!isZero.(offset))>(self::<shiftAmount> - <offset>)<else>self::<shiftAmount><endif>
%>

bitsetInlineComparison(s, bits) ::= <%
<bits.tokens:{t | $<s.varName> === self::<t.name>}; separator=" || ">
%>
```

```
cases(tokens) ::= <<
<tokens:{t | case self::<t.name>:}; separator="\n">
>>

InvokeRule(r, argExprsChunks) ::= <<
$this->setState(<r.stateNumber>);
<if(r.labels)><r.labels:{l | <labelref(l)> = }><endif>$this-><if(r.ast.options.p)>recursive<r.name;
format="cap"><else><r.escapedName><endif>(<if(r.ast.options.p)><r.ast.options.p><if(argExprsChunks)>,<endif>
<endif><argExprsChunks>);
>>

MatchToken(m) ::= <<
$this->setState(<m.stateNumber>);
<if(m.labels)><m.labels:{l
 | <labelref(l)> = }><endif>$this->match(self::<m.name>);
>>

MatchSet(m, expr, capture) ::= "<CommonSetStuff(m, expr, capture, false)>"

MatchNotSet(m, expr, capture) ::= "<CommonSetStuff(m, expr, capture, true)>"

CommonSetStuff(m, expr, capture, invert) ::= <<
$this->setState(<m.stateNumber>);

<if(m.labels)><m.labels:{l | <labelref(l)> = }>$this->input->LT(1);<endif>
<capture>

if (<if(invert)>$<m.varName> \<= 0 || <else>!<endif>(<expr>)) {
    <if(m.labels)><m.labels:{l | <labelref(l)> = }><endif>$this->errorHandler->recoverInline($this);
} else {
 if ($this->input->LA(1) === Token::EOF) {
    $this->matchedEOF = true;
   }

 $this->errorHandler->reportMatch($this);
 $this->consume();
}
>>

Wildcard(w) ::= <<
$this->setState(<w.stateNumber>);
<if(w.labels)><w.labels:{l | <labelref(l)> = }><endif>$this->matchWildcard();
>>

// ACTION STUFF

Action(a, foo, chunks) ::= "<chunks>"
```

```
ArgAction(a, chunks) ::= "<chunks>"

SemPred(p, chunks, failChunks) ::= <<
$this->setState(<p.stateNumber>);

if
 (!(<chunks>)) {
   throw new FailedPredicateException($this, <p.predicate><if(failChunks)>, <failChunks><elseif(p.msg)>,
<p.msg><endif>);
}
>>

ExceptionClause(e, catchArg, catchAction) ::= <<
catch (<catchArg>) {
 <catchAction>
}
>>

// lexer actions are not associated with model objects

LexerSkipCommand()  ::= "$this->skip();"
LexerMoreCommand()  ::= "$this->more();"
LexerPopModeCommand() ::= "$this->popMode();"

LexerTypeCommand(arg, grammar)      ::= "$this->type = <arg>;"
LexerChannelCommand(arg, grammar)   ::= "$this->channel = <arg>;"
LexerModeCommand(arg, grammar)      ::= "$this->mode = <arg>;"
LexerPushModeCommand(arg, grammar)  ::= "$this->pushMode(<arg>);"

ActionText(t) ::= "<t.text>"
ActionTemplate(t) ::= "<t.st>"
ArgRef(a) ::= "$localContext-><a.name>"
LocalRef(a) ::= "$localContext-><a.name>"
RetValueRef(a) ::= "$localContext-><a.name>"
QRetValueRef(a) ::= "<ctx(a)>-><a.dict>-><a.name>"
/** How to translate $tokenLabel */
TokenRef(t)
 ::= "<ctx(t)>-><t.name>"
LabelRef(t) ::= "<ctx(t)>-><t.name>"
ListLabelRef(t) ::= "<ctx(t)>-><ListLabelName(t.name)>"
SetAttr(s,rhsChunks) ::= "<ctx(s)>-><s.name> = <rhsChunks>;"

TokenLabelType() ::= "<file.TokenLabelType; null={Token}>"
InputSymbolType() ::= "<file.InputSymbolType; null={Token}>"

TokenPropertyRef_text(t) ::= "(<ctx(t)>-><t.label> !== null ? <ctx(t)>-><t.label>->getText() : null)"
TokenPropertyRef_type(t) ::= "(<ctx(t)>-><t.label> !== null ? <ctx(t)>-><t.label>->getType() : 0)"
TokenPropertyRef_line(t) ::= "(<ctx(t)>-><t.label> !== null ? <ctx(t)>-><t.label>->getLine() : 0)"
```

```
TokenPropertyRef_pos(t) ::= "(<ctx(t)>-><t.label> !== null ? <ctx(t)>-><t.label>->getCharPositionInLine() : 0)"
TokenPropertyRef_channel(t) ::= "(<ctx(t)>-><t.label> !== null ? <ctx(t)>-><t.label>->getChannel() : 0)"
TokenPropertyRef_index(t) ::= "(<ctx(t)>-><t.label> !== null ? <ctx(t)>-><t.label>->getTokenIndex() : 0)"
TokenPropertyRef_int(t) ::= "(<ctx(t)>-><t.label> !== null ? (int) <ctx(t)>-><t.label>->getText()
 : 0)"

RulePropertyRef_start(r) ::= "(<ctx(r)>-><r.label> !== null ? (<ctx(r)>-><r.label>->start) : null)"
RulePropertyRef_stop(r)  ::= "(<ctx(r)>-><r.label> !== null ? (<ctx(r)>-><r.label>->stop) : null)"
RulePropertyRef_text(r)  ::= "(<ctx(r)>-><r.label> !== null ? $this->input->getTextByTokens(<ctx(r)>-><r.label>-
>start, <ctx(r)>-><r.label>->stop) : null)"
RulePropertyRef_ctx(r)  ::= "<ctx(r)>-><r.label>"
RulePropertyRef_parser(r)::= "\$this"

ThisRulePropertyRef_start(r) ::= "$localContext->start"
ThisRulePropertyRef_stop(r)  ::= "$localContext->stop"
ThisRulePropertyRef_text(r)  ::= "$this->input->getTextByTokens($localContext->start, $this->input->LT(-1))"
ThisRulePropertyRef_ctx(r)  ::= "$localContext"
ThisRulePropertyRef_parser(r)::= "$this"

NonLocalAttrRef(s)        ::= "\$this->getInvokingContext(<s.ruleIndex>)-><s.name>"
SetNonLocalAttr(s, rhsChunks) ::= "\$this->getInvokingContext(<s.ruleIndex>)-><s.name> = <rhsChunks>;"

AddToLabelList(a) ::= "<ctx(a.label)>-><a.listName>[]
 = <labelref(a.label)>;"

TokenDecl(t) ::= "<TokenLabelType()> $<t.name>"
TokenTypeDecl(t) ::= ""
TokenListDecl(t) ::= "array $<t.name> = []"
RuleContextDecl(r) ::= "<r.ctxName> $<r.name>"
RuleContextListDecl(rdecl) ::= "array $<rdecl.name> = []"
AttributeDecl(d) ::= "<d.type> $<d.name><if(d.initValue)> = <d.initValue><endif>"

PropertiesDecl(struct) ::= <<
<if(struct.tokenListDecls)>
 <struct.tokenListDecls : {d | /**
* @var array\<Token>|null $<d.name>
*/
public $<d.name>;}; separator="\n\n">
<endif>
<if(struct.tokenDecls)>
<if(struct.tokenListDecls)>

<endif>
 <struct.tokenDecls : {d | /**
* @var <TokenLabelType()>|null $<d.name>
*/
public $<d.name>;}; separator="\n\n">
<endif>
```

```
<if(struct.ruleContextDecls)>
<if(struct.tokenListDecls || struct.tokenDecls)>

<endif>
 <struct.ruleContextDecls : {d | /**
* @var <d.ctxName>|null $<d.name>
*/
public $<d.name>;}; separator="\n\n">
<endif>
<if(struct.ruleContextListDecls)>
<if(struct.tokenListDecls || struct.tokenDecls
 || struct.ruleContextDecls)>

<endif>
 <struct.ruleContextListDecls : {d | /**
* @var array\<<d.ctxName>\>|null $<d.name>
*/
public $<d.name>;}; separator="\n\n">
<endif>
<if(struct.attributeDecls)>
<if(struct.tokenListDecls || struct.tokenDecls || struct.ruleContextDecls || struct.ruleContextListDecls)>

<endif>
 <struct.attributeDecls : {d | /**
* @var <d.type><if(!d.initValue)>|null<endif> $<d.name>
*/
public $<d.name><if(d.initValue)> = <d.initValue><endif>;}; separator="\n\n">
<endif>

>>

ContextTokenGetterDecl(t) ::= <<
public function <t.name>(): ?TerminalNode
{
   return $this->getToken(<parser.name>::<t.name>, 0);
}
>>

ContextTokenListGetterDecl(t)  ::= <<
>>

ContextTokenListIndexedGetterDecl(t)  ::= <<
/**
* @return array\<TerminalNode>|TerminalNode|null
*/
public function <t.name>(?int $index = null)
{
 if ($index === null) {
```

```
  return $this->getTokens(<parser.name>::<t.name>);
 }

   return $this->getToken(<parser.name>::<t.name>, $index);
}
>>

ContextRuleGetterDecl(r)
       ::= <<
public function <r.name>(): ?<r.ctxName>
{
 return $this->getTypedRuleContext(<r.ctxName>::class, 0);
}
>>

ContextRuleListGetterDecl(r)   ::= <<
>>

ContextRuleListIndexedGetterDecl(r)   ::= <<
/**
* @return array\<<r.ctxName>\>|<r.ctxName>|null
*/
public function <r.name>(?int $index = null)
{
 if ($index === null) {
  return $this->getTypedRuleContexts(<r.ctxName>::class);
 }

   return $this->getTypedRuleContext(<r.ctxName>::class, $index);
}
>>

LexerRuleContext() ::= "RuleContext"

/**
* The rule context name is the rule followed by a suffix; e.g., r becomes rContext.
*/
RuleContextNameSuffix() ::= "Context"

ImplicitTokenLabel(tokenName) ::= "<tokenName>"
ImplicitRuleLabel(ruleName)   ::= "<ruleName>"
ImplicitSetLabel(id)    ::= "_tset<id>"
ListLabelName(label)    ::= "<label>"

CaptureNextToken(d) ::= "$<d.varName> = \$this->input->LT(1);"
CaptureNextTokenType(d) ::= "$<d.varName> = $this->input->LA(1);"

StructDecl(struct,ctorAttrs,attrs,getters,dispatchMethods,interfaces,extensionMembers,signatures)
```

```
 ::= <<
class <struct.name> extends
<if(contextSuperClass)><contextSuperClass><else>ParserRuleContext<endif><if(interfaces)> implements
<interfaces; separator=", "><endif>
{
<PropertiesDecl(struct)>
 public function __construct(?ParserRuleContext $parent, ?int $invokingState = null<ctorAttrs:{a | , ?<a> = null}>)
 {
  parent::__construct($parent, $invokingState);
<if(struct.ctorAttrs)>

  <struct.ctorAttrs:{a | $this-><a.name> = $<a.name> ?? $this-><a.name>;}; separator="\n">
<endif>
 }

 public function getRuleIndex(): int
 {
     return <parser.name>::RULE_<struct.derivedFromName>;
   }
<if(getters)>

   <getters:{g | <g>}; separator="\n\n">
<endif>
<if(struct.provideCopyFrom)> <! don't need copy unless we have subclasses !>
 public function copyFrom(ParserRuleContext $context): void
 {
  parent::copyFrom($context);

  <struct.attrs:{a | $this-><a.name> = $context-><a.name>;}; separator="\n">
 }
<endif>
<if(dispatchMethods)>

 <dispatchMethods;
 separator="\n\n">
<endif>
<if(extensionMembers)>

 <extensionMembers; separator="\n\n">
<endif>
}
>>

AltLabelStructDecl(struct,attrs,getters,dispatchMethods) ::= <<
class <struct.name> extends <struct.parentRule; format="cap">Context
{
<PropertiesDecl(struct)>
 public function __construct(<struct.parentRule; format="cap">Context $context)
```

```
 {
     parent::__construct($context);

     $this->copyFrom($context);
   }
<if(getters)>

   <getters:{g | <g>}; separator="\n\n">
<endif>
<if(dispatchMethods)>

 <dispatchMethods; separator="\n\n">
<endif>
}
>>

ListenerDispatchMethod(method) ::= <<
public function <if(method.isEnter)>enter<else>exit<endif>Rule(ParseTreeListener $listener): void
{
 if ($listener instanceof <parser.grammarName>Listener) {
     $listener-><if(method.isEnter)>enter<else>exit<endif><struct.derivedFromName; format="cap">($this);
   }
}
>>

VisitorDispatchMethod(method) ::= <<
public function accept(ParseTreeVisitor $visitor): mixed
{
 if ($visitor
 instanceof <parser.grammarName>Visitor) {
     return $visitor->visit<struct.derivedFromName; format="cap">($this);
   }

 return $visitor->visitChildren($this);
}
>>

/** If we don't know location of label def x, use this template */
labelref(x) ::= "<if(!x.isLocal)>$localContext-><endif><x.name>"

/** For any action chunk, what is correctly-typed context struct ptr? */
ctx(actionChunk) ::= "$localContext"

// used for left-recursive rules
recRuleAltPredicate(ruleName,opPrec)  ::= "\$this->precpred(\$this->ctx, <opPrec>)"

recRuleSetReturnAction(src,name)   ::= "\$<name> = \$<src>-><name>;"
```

```
recRuleSetStopToken()                ::= "$this->ctx->stop = $this->input->LT(-1);"

recRuleAltStartAction(ruleName, ctxName, label, isListLabel) ::= <<
$localContext = new Context\\<ctxName>Context($parentContext, $parentState);
<if(label)>
<if(isListLabel)>
$localContext-><label>[] = $previousContext;
<else>
$localContext-><label> = $previousContext;
<endif>
<endif>

$this->pushNewRecursionContext($localContext,
 $startState, self::RULE_<ruleName>);
>>

recRuleLabeledAltStartAction(ruleName, currentAltLabel, label, isListLabel) ::= <<
$localContext = new Context\\<currentAltLabel; format="cap">Context(new Context\\<ruleName;
format="cap">Context($parentContext, $parentState));
<if(label)>
<if(isListLabel)>
$localContext-><label>[] = $previousContext;
<else>
$localContext-><label> = $previousContext;
<endif>
<endif>

$this->pushNewRecursionContext($localContext, $startState, self::RULE_<ruleName>);
>>

recRuleReplaceContext(ctxName) ::= <<
$localContext = new Context\\<ctxName>Context($localContext);
$this->ctx = $localContext;
$previousContext = $localContext;
>>

recRuleSetPrevCtx() ::= <<
if ($this->getParseListeners() !== null) {
   $this->triggerExitRuleEvent();
}

$previousContext = $localContext;
>>


LexerFile(lexerFile, lexer, namedActions) ::= <<
<fileHeader(lexerFile.grammarFileName, lexerFile.ANTLRVersion)>
<lexer>
```

```
>>

Lexer(lexer, atn, actionFuncs, sempredFuncs,
 superClass) ::= <<
namespace<if(lexerFile.genPackage)> <lexerFile.genPackage><endif> {
<if(namedActions.header)><namedActions.header><endif>
 use Antlr\\Antlr4\\Runtime\\Atn\\ATNDeserializer;
 use Antlr\\Antlr4\\Runtime\\Atn\\LexerATNSimulator;
 use Antlr\\Antlr4\\Runtime\\Lexer;
 use Antlr\\Antlr4\\Runtime\\CharStream;
 use Antlr\\Antlr4\\Runtime\\PredictionContexts\\PredictionContextCache;
 use Antlr\\Antlr4\\Runtime\\RuleContext;
 use Antlr\\Antlr4\\Runtime\\Atn\\ATN;
 use Antlr\\Antlr4\\Runtime\\Dfa\\DFA;
 use Antlr\\Antlr4\\Runtime\\Vocabulary;
 use Antlr\\Antlr4\\Runtime\\RuntimeMetaData;
 use Antlr\\Antlr4\\Runtime\\VocabularyImpl;
<if(namedActions.definitions)><namedActions.definitions><endif>

 final class <lexer.name> extends <superClass; null="Lexer">
 {
  <if(lexer.tokens)>
  public const <lexer.tokens:{k | <k> = <lexer.tokens.(k)>}; separator=", ", wrap, anchor>;
  <endif>

  <if(lexer.escapedChannels)>
  public const <lexer.escapedChannels:{c | <c> = <lexer.escapedChannels.(c)>};
 separator=", ", wrap, anchor>;
  <endif>

  <if(rest(lexer.escapedModeNames))>
  public const <rest(lexer.escapedModeNames):{m | <m>=<i>}; separator=", ", wrap, anchor>;
  <endif>

  /**
   * @var array\<string>
   */
  public const CHANNEL_NAMES = [
   'DEFAULT_TOKEN_CHANNEL', 'HIDDEN'<if (lexer.channelNames)>, <lexer.channelNames:{c| '<c>'};
separator=", ", wrap, anchor><endif>
  ];

  /**
   * @var array\<string>
   */
  public const MODE_NAMES = [
   <lexer.modes:{m| '<m>'}; separator=", ", wrap, anchor>
  ];
```

```
 /**
  * @var array\<string>
  */
 public const RULE_NAMES = [
  <lexer.ruleNames:{r | '<r>'}; separator=", ", wrap, anchor>
 ];

 <vocabulary(lexer.literalNames, lexer.symbolicNames)>

 <atn>
 protected static $atn;
 protected static $decisionToDFA;
 protected static $sharedContextCache;
<if(namedActions.members)>

 <namedActions.members>
<endif>

 public function __construct(CharStream $input)
 {
  parent::__construct($input);

  self::initialize();

  $this->interp
= new LexerATNSimulator($this, self::$atn, self::$decisionToDFA, self::$sharedContextCache);
 }

 private static function initialize(): void
 {
  if (self::$atn !== null) {
   return;
  }

  RuntimeMetaData::checkVersion('<lexerFile.ANTLRVersion>', RuntimeMetaData::VERSION);

  $atn = (new ATNDeserializer())->deserialize(self::SERIALIZED_ATN);

  $decisionToDFA = [];
  for ($i = 0, $count = $atn->getNumberOfDecisions(); $i \< $count; $i++) {
   $decisionToDFA[] = new DFA($atn->getDecisionState($i), $i);
  }

  self::$atn = $atn;
  self::$decisionToDFA = $decisionToDFA;
  self::$sharedContextCache = new PredictionContextCache();
 }
```

```
 public static function vocabulary(): Vocabulary
 {
  static $vocabulary;

  return $vocabulary = $vocabulary ?? new VocabularyImpl(self::LITERAL_NAMES, self::SYMBOLIC_NAMES);
 }

 public function getGrammarFileName(): string
 {
  return '<lexer.grammarFileName>';
 }

 public function getRuleNames(): array
 {
  return
self::RULE_NAMES;
 }

 public function getSerializedATN(): array
 {
  return self::SERIALIZED_ATN;
 }

 /**
  * @return array\<string>
  */
 public function getChannelNames(): array
 {
  return self::CHANNEL_NAMES;
 }

 /**
  * @return array\<string>
  */
 public function getModeNames(): array
 {
  return self::MODE_NAMES;
 }

 public function getATN(): ATN
 {
  return self::$atn;
 }

 public function getVocabulary(): Vocabulary
 {
  return self::vocabulary();
```

```
  }
  <dumpActions(lexer, "", actionFuncs, sempredFuncs)>
 }
}
>>

SerializedATN(model) ::= <<
private const SERIALIZED_ATN =
 [<model.serialized: {s | <s>}; separator=", ", wrap={<\n>    }>];
>>

/**
* Using a type to init value map, try to init a type; if not in table
* must be an object, default value is `null`.
*/
initValue(typeName) ::= <<
<phpTypeInitMap.(typeName)>
>>

codeFileExtension() ::= ".php"
```

Found in path(s):
* /antlr4-4-13-2-jar/org/antlr/v4/tool/templates/codegen/PHP/PHP.stg
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*/

atn(startState, states, edges, rankdir, decisionRanks, useBox) ::= <<
digraph ATN {
rankdir=LR;
<decisionRanks; separator="\n">
<states; separator="\n">
<edges; separator="\n">
}
>>

dfa(name, startState, states, edges, rankdir, decisionRanks, useBox) ::= <<
digraph <name>  {
<if(rankdir)>rankdir=<rankdir>;<endif>
<decisionRanks; separator="\n">
<states; separator="\n">
<edges;
 separator="\n">
}
>>

decision-rank(states) ::= <<
{rank=same; rankdir=TB; <states:{s | s<s>}; separator="; ">}
>>

edge(src,target,label,arrowhead,transitionIndex) ::= <<
<src><if(transitionIndex)>:p<transitionIndex><endif> -> <target> [fontsize=11, fontname="Courier", arrowsize=.7,
label = "<label>"<if(arrowhead)>, arrowhead = <arrowhead><endif>];
>>

action-edge(src,target,label,arrowhead,transitionIndex) ::= <<
<src><if(transitionIndex)>:p<transitionIndex><endif> -> <target> [fontsize=11, fontname="Courier", arrowsize=.7,
label = "<label>"<if(arrowhead)>, arrowhead = <arrowhead><endif>];
>>

epsilon-edge(src,label,target,arrowhead,transitionIndex,loopback=false) ::= <<
<src><if(transitionIndex)>:p<transitionIndex><endif> -> <target> [fontname="Times-Italic",
label="&epsilon;"<if(loopback)>, style="dashed"<endif>];
>>

state(state, label, name, transitions) ::= <%
<name>[fontsize=11,
```

```
  label="
      <! rest(transition) tests for decision states: these nodes have a non-empty
set of transitions after the first one. !>
      <if(rest(transitions))>
         {
         <! Label on the left side of the record node. !>
         <label>
         |
         <! Named ports in order on right side of record node, no display text. !>
         {<transitions:{t|\<p<i0>>}; separator="|">}}
      <else>
         <label>
      <endif>
      "
  <if(rest(transitions))>
      , shape=record, fixedsize=false
  <else>
      , shape=circle, fixedsize=true, width=.55
  <endif>
  , peripheries=1];
%>

stopstate(name,label,actionIndex,useBox) ::= <<
<name>[fontsize=11, label="<label><if(actionIndex)>,\naction:<actionIndex><endif>",
<if(useBox)>shape=polygon,sides=4,peripheries=2,fixedsize=false<else>shape=doublecircle, fixedsize=true,
width=.6<endif>];
>>
```

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* /antlr4-4-13-2-jar/org/antlr/v4/tool/templates/dot/graphs.stg
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*/

/** How to generate rules derived from left-recursive rules.
*  These rely on recRuleAltPredicate(),
*  recRuleArg(), recRuleSetResultAction(), recRuleSetReturnAction()
*  templates in main language.stg
*/
group LeftRecursiveRules;

recRule(ruleName, argName, primaryAlts, opAlts, setResultAction,
      userRetvals, leftRecursiveRuleRefLabels) ::=
<<
<ruleName><if(userRetvals)>
 returns [<userRetvals>]<endif>
  :   ( {} <primaryAlts:{alt | <alt.altText> }; separator="\n        | ">
      )
      (
        <opAlts; separator="\n        | ">
      )*
  ;
>>

recRuleAlt(alt, precOption, opPrec, pred) ::= <<
{<pred>}?\<<precOption>=<opPrec>\> <alt.altText>
>>
```

Found in path(s):
* /antlr4-4-13-2-jar/org/antlr/v4/tool/templates/LeftRecursiveRules.stg
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*/
/*
This file contains the actual layout of the messages emitted by ANTLR.
The text itself is coming out of the languages/*stg files, according to the chosen locale.
This file contains the default format ANTLR uses.
*/

location(file, line, column) ::= "<file>(<line>,<column>)"

message(id, text) ::= "error <id> : <text>"

report(location, message, type) ::= "<location> : <type> <message.id> : <message.text>"

wantsSingleLineMessage() ::= "true"

Found in path(s):
* /antlr4-4-13-2-jar/org/antlr/v4/tool/templates/messages/formats/vs2005.stg
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*/

/** ANTLR tool checks output templates are compatible with tool code generation.
*  For now, a simple string match used on x.y of x.y.z scheme.
*  Must match Tool.VERSION during load to templates.
*
*  REQUIRED.
*/

javascriptTypeInitMap ::= [
 "bool":"false",
 "int":"0",
 "float":"0.0",
 "str":"",
 default:"{}" // anything
 other than a primitive type is an object
]

// args must be <object-model-object>, <fields-resulting-in-STs>

ParserFile(file, parser, namedActions, contextSuperClass) ::= <<
<fileHeader(file.grammarFileName, file.ANTLRVersion)>
import antlr4 from 'antlr4';
<if(file.genListener)>
import <file.grammarName>Listener from './<file.grammarName>Listener.js';
<endif>
```

```
<if(file.genVisitor)>
import <file.grammarName>Visitor from './<file.grammarName>Visitor.js';
<endif>

<namedActions.header>
<parser>
>>

ListenerFile(file, header, namedActions) ::= <<
<fileHeader(file.grammarFileName, file.ANTLRVersion)>
import antlr4 from 'antlr4';

// This class defines a complete listener for a parse tree produced by <file.parserName>.
export default class <file.grammarName>Listener extends antlr4.tree.ParseTreeListener {

<file.listenerNames:{lname |
 // Enter a parse tree produced by <file.parserName>#<lname>.
 enter<lname; format="cap">(ctx) {
 \}

 // Exit a parse tree produced by <file.parserName>#<lname>.
 exit<lname;
 format="cap">(ctx) {
 \}

}; separator="\n">

}
>>


VisitorFile(file, header, namedActions) ::= <<
<fileHeader(file.grammarFileName, file.ANTLRVersion)>
import antlr4 from 'antlr4';

// This class defines a complete generic visitor for a parse tree produced by <file.parserName>.

export default class <file.grammarName>Visitor extends antlr4.tree.ParseTreeVisitor {

<file.visitorNames:{lname |
 // Visit a parse tree produced by <file.parserName>#<lname>.
 visit<lname; format="cap">(ctx) {
   return this.visitChildren(ctx);
 \}

}; separator="\n">

}
```

```
>>


fileHeader(grammarFileName, ANTLRVersion) ::= <<
// Generated from <grammarFileName> by ANTLR <ANTLRVersion>
// jshint ignore: start
>>

Parser(parser, funcs, atn, sempredFuncs, superClass) ::= <<
<if(superClass)>
import <superClass> from './<superClass>.js';
<endif>

<atn>

const atn = new antlr4.atn.ATNDeserializer().deserialize(serializedATN);

const decisionsToDFA = atn.decisionToState.map( (ds, index) => new antlr4.dfa.DFA(ds,
 index) );

const sharedContextCache = new antlr4.atn.PredictionContextCache();

export default class <parser.name> extends <superClass; null="antlr4.Parser"> {

  static grammarFileName = "<parser.grammarFileName>";
  static literalNames = [ <parser.literalNames:{t | <t>}; null="null", separator=", ", wrap, anchor> ];
  static symbolicNames = [ <parser.symbolicNames:{t | <t>}; null="null", separator=", ", wrap, anchor> ];
  static ruleNames = [ <parser.ruleNames:{r | "<r>"}; separator=", ", wrap, anchor> ];

  constructor(input) {
     super(input);
     this._interp = new antlr4.atn.ParserATNSimulator(this, atn, decisionsToDFA, sharedContextCache);
     this.ruleNames = <parser.name>.ruleNames;
     this.literalNames = <parser.name>.literalNames;
     this.symbolicNames = <parser.name>.symbolicNames;
     <namedActions.members>
  }

  <if(sempredFuncs)>
  sempred(localctx, ruleIndex, predIndex) {
   switch(ruleIndex) {
   <parser.sempredFuncs.values:{f
| case <f.ruleIndex>:
    return this.<f.name>_sempred(localctx, predIndex);}; separator="\n">
     default:
        throw "No predicate with index:" + ruleIndex;
    }
  }
```

```
  <sempredFuncs.values; separator="\n">
  <endif>

 <funcs; separator="\n">

}

<parser.name>.EOF = antlr4.Token.EOF;
<if(parser.tokens)>
<parser.tokens:{k | <parser.name>.<k> = <parser.tokens.(k)>;}; separator="\n", wrap, anchor>
<endif>

<if(parser.rules)>
<parser.rules:{r | <parser.name>.RULE_<r.name> = <r.index>;}; separator="\n", wrap, anchor>
<endif>

<funcs:{f | <ruleContexts(f)>}; separator="\n">

<! Define fields of this parser to export the context classes !>
<parser.funcs:{f | <parser.name>.<f.ctxType> = <f.ctxType>; }; separator="\n">

>>

ruleContexts(currentRule) ::= <<
<currentRule.ruleCtx>

<currentRule.altLabelCtxs:{l | <currentRule.altLabelCtxs.(l)>}; separator="\n">
>>

dumpActions(recog, argFuncs, actionFuncs, sempredFuncs) ::= <<
<if(actionFuncs)>
<lexer.name>.prototype.action
 = function(localctx, ruleIndex, actionIndex) {
 switch (ruleIndex) {
 <recog.actionFuncs.values:{f|
case <f.ruleIndex>:
 this.<f.name>_action(localctx, actionIndex);
 break;}; separator="\n">
 default:
  throw "No registered action for:" + ruleIndex;
 }
};

<actionFuncs.values; separator="\n">
<endif>
<if(sempredFuncs)>
<lexer.name>.prototype.sempred = function(localctx, ruleIndex, predIndex) {
```

```
 switch (ruleIndex) {
  <recog.sempredFuncs.values:{f| case <f.ruleIndex>:
 return this.<f.name>_sempred(localctx, predIndex);}; separator="\n">
    default:
     throw "No registered predicate for:" + ruleIndex;
   }
};

<sempredFuncs.values; separator="\n">
<endif>
>>


/* This generates a private method since the actionIndex is generated, making an
* overriding implementation impossible to maintain.
*/
RuleActionFunction(r, actions) ::= <<

<lexer.name>.prototype.<r.name>_action = function(localctx , actionIndex) {
 switch (actionIndex) {
 <actions:{index|
case <index>:
 <actions.(index)>
 break;};
 separator="\n">
 default:
  throw "No registered action for:" + actionIndex;
 }
};
>>

/* This generates a private method since the predIndex is generated, making an
* overriding implementation impossible to maintain.
*/
RuleSempredFunction(r, actions) ::= <<
<if (r.factory.g.lexer)><lexer.name>.prototype.<r.name>_sempred =
function<else><r.name>_sempred<endif>(localctx, predIndex) {
 switch(predIndex) {
  <actions:{index| case <index>:
 return <actions.(index)>;}; separator="\n">
  default:
   throw "No predicate with index:" + predIndex;
 }
};

>>

RuleFunction(currentRule,args,code,locals,ruleCtx,altLabelCtxs,namedActions,finallyAction,postamble,exceptions)
```

```
::= <<


<currentRule.escapedName>(<currentRule.args:{a | <a.escapedName>}; separator=", ">) {
  let localctx = new <currentRule.ctxType>(this, this._ctx, this.state<currentRule.args:{a | , <a.escapedName>}>);
  this.enterRule(localctx, <currentRule.startState>, <parser.name>.RULE_<currentRule.name>);
   <namedActions.init>
  <locals; separator="\n">
  try {
      <code>
      <postamble; separator="\n">
      <namedActions.after>
  }<if(exceptions)>
  <exceptions; separator="\n">
  <else> catch (re) {
   if(re instanceof antlr4.error.RecognitionException) {
        localctx.exception = re;
        this._errHandler.reportError(this, re);
        this._errHandler.recover(this, re);
    } else {
     throw re;
    }
  }<endif> finally {
      <finallyAction>
      this.exitRule();
  }
  return localctx;
}

>>

LeftRecursiveRuleFunction(currentRule,args,code,locals,ruleCtx,altLabelCtxs,
 namedActions,finallyAction,postamble) ::=
<<

<currentRule.escapedName>(_p<if(currentRule.args)>, <args:{a | , <a>}><endif>) {
 if(_p===undefined) {
    _p = 0;
 }
  const _parentctx = this._ctx;
  const _parentState = this.state;
  let localctx = new <currentRule.ctxType>(this, this._ctx, _parentState<args:{a | , <a.escapedName>}>);
  let _prevctx
 = localctx;
  const _startState = <currentRule.startState>;
  this.enterRecursionRule(localctx, <currentRule.startState>, <parser.name>.RULE_<currentRule.name>, _p);
  <namedActions.init>
  <locals; separator="\n">
```

```
  try {
      <code>
      <postamble; separator="\n">
      <namedActions.after>
  } catch( error) {
      if(error instanceof antlr4.error.RecognitionException) {
        localctx.exception = error;
        this._errHandler.reportError(this, error);
        this._errHandler.recover(this, error);
    } else {
    throw error;
    }
  } finally {
      <finallyAction>
      this.unrollRecursionContexts(_parentctx)
  }
  return localctx;
}

>>

CodeBlockForOuterMostAlt(currentOuterMostAltCodeBlock, locals, preamble, ops) ::= <<
<if(currentOuterMostAltCodeBlock.altLabel)>localctx = new <currentOuterMostAltCodeBlock.altLabel;
format="cap">Context(this, localctx);<endif>
this.enterOuterAlt(localctx, <currentOuterMostAltCodeBlock.alt.altNum>);
<CodeBlockForAlt(currentAltCodeBlock=currentOuterMostAltCodeBlock,
 ...)>
>>

CodeBlockForAlt(currentAltCodeBlock, locals, preamble, ops) ::= <<
<locals; separator="\n">
<preamble; separator="\n">
<ops; separator="\n">
>>

LL1AltBlock(choice, preamble, alts, error) ::= <<
this.state = <choice.stateNumber>;
this._errHandler.sync(this);
<if(choice.label)><labelref(choice.label)> = this._input.LT(1);<endif>
<preamble; separator="\n">
switch(this._input.LA(1)) {
<choice.altLook,alts:{look,alt| <cases(tokens=look)>
  <alt>
  break;}; separator="\n">
default:
  <error>
}
>>
```

```
LL1OptionalBlock(choice, alts, error) ::= <<
this.state = <choice.stateNumber>;
this._errHandler.sync(this);
switch (this._input.LA(1)) {
<choice.altLook,alts:{look,alt| <cases(tokens=look)>
 <alt>
 break;}; separator="\n">
default:
 break;
}
>>

LL1OptionalBlockSingleAlt(choice, expr, alts, preamble, error, followExpr) ::= <<
this.state = <choice.stateNumber>;
this._errHandler.sync(this);
<preamble; separator="\n">
if(<expr>)
 {
   <alts; separator="\n">
}
<!else if ( !(<followExpr>) ) <error>!>
>>

LL1StarBlockSingleAlt(choice, loopExpr, alts, preamble, iteration) ::= <<
this.state = <choice.stateNumber>;
this._errHandler.sync(this);
<preamble; separator="\n">
while(<loopExpr>) {
   <alts; separator="\n">
   this.state = <choice.loopBackStateNumber>;
   this._errHandler.sync(this);
   <iteration>
}
>>

LL1PlusBlockSingleAlt(choice, loopExpr, alts, preamble, iteration) ::= <<
this.state = <choice.blockStartStateNumber>; <! alt block decision !>
this._errHandler.sync(this);
<preamble; separator="\n">
do {
   <alts; separator="\n">
   this.state = <choice.stateNumber>; <! loopback/exit decision !>
   this._errHandler.sync(this);
   <iteration>
} while(<loopExpr>);
>>
```

```
// LL(*) stuff

AltBlock(choice, preamble, alts, error) ::= <<
this.state = <choice.stateNumber>;
this._errHandler.sync(this);
<if(choice.label)><labelref(choice.label)> = _input.LT(1)<endif>
<preamble; separator="\n">
var
 la_ = this._interp.adaptivePredict(this._input,<choice.decision>,this._ctx);
switch(la_) {
<alts:{alt |
case <i>:
   <alt>
   break;
}; separator="\n">
}
>>

OptionalBlock(choice, alts, error) ::= <<
this.state = <choice.stateNumber>;
this._errHandler.sync(this);
var la_ = this._interp.adaptivePredict(this._input,<choice.decision>,this._ctx);
<alts:{alt |
if(la_===<i><if(!choice.ast.greedy)>+1<endif>) {
   <alt>
}; separator="\n} else ">
}
>>

StarBlock(choice, alts, sync, iteration) ::= <<
this.state = <choice.stateNumber>;
this._errHandler.sync(this);
var _alt = this._interp.adaptivePredict(this._input,<choice.decision>,this._ctx)
while(_alt!=<choice.exitAlt> && _alt!=antlr4.atn.ATN.INVALID_ALT_NUMBER) {
   if(_alt===1<if(!choice.ast.greedy)>+1<endif>) {
       <iteration>
       <alts> <! should only be one !>
   }
   this.state = <choice.loopBackStateNumber>;
   this._errHandler.sync(this);
   _alt = this._interp.adaptivePredict(this._input,<choice.decision>,this._ctx);
}

>>

PlusBlock(choice,
 alts, error) ::= <<
this.state = <choice.blockStartStateNumber>; <! alt block decision !>
```

```
this._errHandler.sync(this);
var _alt = 1<if(!choice.ast.greedy)>+1<endif>;
do {
 switch (_alt) {
 <alts:{alt|
case <i><if(!choice.ast.greedy)>+1<endif>:
 <alt>
 break;}; separator="\n">
 default:
  <error>
 }
 this.state = <choice.loopBackStateNumber>; <! loopback/exit decision !>
 this._errHandler.sync(this);
 _alt = this._interp.adaptivePredict(this._input,<choice.decision>, this._ctx);
} while ( _alt!=<choice.exitAlt> && _alt!=antlr4.atn.ATN.INVALID_ALT_NUMBER );
>>

Sync(s) ::= "sync(<s.expecting.name>)"

ThrowNoViableAlt(t) ::= "throw new antlr4.error.NoViableAltException(this);"

TestSetInline(s) ::= <<
<s.bitsets:{bits | <if(rest(rest(bits.tokens)))><bitsetBitfieldComparison(s, bits)><else><bitsetInlineComparison(s,
bits)><endif>}; separator=" || ">
>>

// Javascript language spec - shift operators are 32 bits long max
testShiftInRange(shiftAmount) ::= <<
((<shiftAmount>)
 & ~0x1f) === 0
>>

bitsetBitfieldComparison(s, bits) ::= <%
(<testShiftInRange({<offsetShiftVar(s.varName, bits.shift)>})> && ((1 \<\< <offsetShiftVar(s.varName,
bits.shift)>) & <bits.calculated>) !== 0)
%>

isZero ::= [
"0":true,
default:false
]

offsetShiftVar(shiftAmount, offset) ::= <%
<if(!isZero.(offset))>(<shiftAmount> - <offset>)<else><shiftAmount><endif>
%>

offsetShiftType(shiftAmount, offset) ::= <%
<if(!isZero.(offset))>(<parser.name>.<shiftAmount> - <offset>)<else><parser.name>.<shiftAmount><endif>
```

```
%>

bitsetInlineComparison(s, bits) ::= <%
<bits.tokens:{t | <s.varName>===<t.type>}; separator=" || ">
%>

cases(tokens) ::= <<
<tokens:{t | case <t.type>:}; separator="\n">
>>

InvokeRule(r, argExprsChunks) ::= <<
this.state = <r.stateNumber>;
<if(r.labels)><r.labels:{l | <labelref(l)> =
}><endif>this.<r.escapedName>(<if(r.ast.options.p)><r.ast.options.p><if(argExprsChunks)>,<endif><endif><argE
xprsChunks>);
>>

MatchToken(m) ::= <<
this.state = <m.stateNumber>;
<if(m.labels)><m.labels:{l
 | <labelref(l)> = }><endif>this.match(<parser.name>.<m.name>);
>>

MatchSet(m, expr, capture) ::= "<CommonSetStuff(m, expr, capture, false)>"

MatchNotSet(m, expr, capture) ::= "<CommonSetStuff(m, expr, capture, true)>"

CommonSetStuff(m, expr, capture, invert) ::= <<
this.state = <m.stateNumber>;
<if(m.labels)><m.labels:{l | <labelref(l)> = }>this._input.LT(1);<endif>
<capture>
<if(invert)>if(<m.varName>\<=0 || <expr>)<else>if(!(<expr>))<endif> {
   <if(m.labels)><m.labels:{l | <labelref(l)> = }><endif>this._errHandler.recoverInline(this);
}
else {
 this._errHandler.reportMatch(this);
   this.consume();
}
>>

Wildcard(w) ::= <<
this.state = <w.stateNumber>;
<if(w.labels)><w.labels:{l | <labelref(l)> = }><endif>this.matchWildcard();
>>

// ACTION STUFF

Action(a, foo, chunks) ::= "<chunks>"
```

```
ArgAction(a, chunks) ::= "<chunks>"

SemPred(p, chunks, failChunks) ::= <<
this.state = <p.stateNumber>;
if (!( <chunks>)) {
   throw new antlr4.error.FailedPredicateException(this,
 <p.predicate><if(failChunks)>, <failChunks><elseif(p.msg)>, <p.msg><endif>);
}
>>

ExceptionClause(e, catchArg, catchAction) ::= <<
catch (<catchArg>) {
 <catchAction>
}
>>

// lexer actions are not associated with model objects

LexerSkipCommand()  ::= "this.skip();"
LexerMoreCommand()  ::= "this.more();"
LexerPopModeCommand() ::= "this.popMode();"
LexerTypeCommand(arg, grammar)      ::= "this._type = <arg>;"
LexerChannelCommand(arg, grammar)   ::= "this._channel = <arg>;"
LexerModeCommand(arg, grammar)      ::= "this._mode = <arg>;"
LexerPushModeCommand(arg, grammar)  ::= "this.pushMode(<arg>);"

ActionText(t) ::= "<t.text>"
ActionTemplate(t) ::= "<t.st>"
ArgRef(a) ::= "localctx.<a.escapedName>"
LocalRef(a) ::= "localctx.<a.escapedName>"
RetValueRef(a) ::= "localctx.<a.escapedName>"
QRetValueRef(a) ::= "<ctx(a)>.<a.dict>.<a.escapedName>"
/** How to translate $tokenLabel */
TokenRef(t) ::= "<ctx(t)>.<t.escapedName>"
LabelRef(t) ::= "<ctx(t)>.<t.escapedName>"
ListLabelRef(t) ::=
 "<ctx(t)>.<ListLabelName(t.escapedName)>"
SetAttr(s,rhsChunks) ::= "<ctx(s)>.<s.escapedName> = <rhsChunks>"

TokenLabelType() ::= "<file.TokenLabelType; null={Token}>"
InputSymbolType() ::= "<file.InputSymbolType; null={Token}>"

TokenPropertyRef_text(t) ::= "(<ctx(t)>.<t.label> == null ? null : <ctx(t)>.<t.label>.text)"
TokenPropertyRef_type(t) ::= "(<ctx(t)>.<t.label> == null ? 0 : <ctx(t)>.<t.label>.type)"
TokenPropertyRef_line(t) ::= "(<ctx(t)>.<t.label> == null ? 0 : <ctx(t)>.<t.label>.line)"
TokenPropertyRef_pos(t) ::= "(<ctx(t)>.<t.label> == null ? 0 : <ctx(t)>.<t.label>.column)"
TokenPropertyRef_channel(t) ::= "(<ctx(t)>.<t.label> == null ? 0 : <ctx(t)>.<t.label>.channel)"
```

```
TokenPropertyRef_index(t) ::= "(<ctx(t)>.<t.label> == null ? 0 : <ctx(t)>.<t.label>.tokenIndex)"
TokenPropertyRef_int(t) ::= "(<ctx(t)>.<t.label> == null ? 0 : parseInt(<ctx(t)>.<t.label>.text))"

RulePropertyRef_start(r) ::= "(<ctx(r)>.<r.label> == null ? null : <ctx(r)>.<r.label>.start)"
RulePropertyRef_stop(r)
 ::= "(<ctx(r)>.<r.label> == null ? null : <ctx(r)>.<r.label>.stop)"
RulePropertyRef_text(r)  ::= "(<ctx(r)>.<r.label> == null ? null : this._input.getText(new
antlr4.Interval(<ctx(r)>.<r.label>.start,<ctx(r)>.<r.label>.stop)))"
RulePropertyRef_ctx(r)  ::= "<ctx(r)>.<r.label>"
RulePropertyRef_parser(r)  ::= "this"

ThisRulePropertyRef_start(r) ::= "localctx.start"
ThisRulePropertyRef_stop(r)  ::= "localctx.stop"
ThisRulePropertyRef_text(r)  ::= "this._input.getText(new antlr4.Interval(localctx.start, this._input.LT(-1)))"
ThisRulePropertyRef_ctx(r)  ::= "localctx"
ThisRulePropertyRef_parser(r)  ::= "this"

NonLocalAttrRef(s)     ::= "this.getInvokingContext(<s.ruleIndex>).<s.escapedName>"
SetNonLocalAttr(s, rhsChunks)  ::= "this.getInvokingContext(<s.ruleIndex>).<s.escapedName> = <rhsChunks>"

AddToLabelList(a) ::= "<ctx(a.label)>.<a.listName>.push(<labelref(a.label)>);"

TokenDecl(t) ::= "this.<t.escapedName> = null;"
TokenTypeDecl(t) ::= "var <t.escapedName> = 0;"
TokenListDecl(t)
 ::= "this.<t.escapedName> = [];"
RuleContextDecl(r) ::= "this.<r.escapedName> = null;"
RuleContextListDecl(rdecl) ::= "this.<rdecl.escapedName> = [];"

ContextTokenGetterDecl(t)      ::= <<
<t.escapedName>() {
   return this.getToken(<parser.name>.<t.name>, 0);
};
>>

// should never be called
ContextTokenListGetterDecl(t)  ::= <<
<t.escapedName>_list() {
   return this.getTokens(<parser.name>.<t.name>);
}
>>

ContextTokenListIndexedGetterDecl(t)  ::= <<
<t.escapedName> = function(i) {
 if(i===undefined) {
  i = null;
 }
   if(i===null) {
```

```
        return this.getTokens(<parser.name>.<t.name>);
    } else {
        return this.getToken(<parser.name>.<t.name>, i);
    }
};

>>

ContextRuleGetterDecl(r)       ::= <<
<r.escapedName>() {
    return this.getTypedRuleContext(<r.ctxName>,0);
};
>>

// should never be called
ContextRuleListGetterDecl(r)   ::= <<
<r.escapedName>_list() {
    return this.getTypedRuleContexts(<parser.name>.<r.ctxName>);
}
>>

ContextRuleListIndexedGetterDecl(r)
    ::= <<
<r.escapedName> = function(i) {
    if(i===undefined) {
        i = null;
    }
    if(i===null) {
        return this.getTypedRuleContexts(<r.ctxName>);
    } else {
        return this.getTypedRuleContext(<r.ctxName>,i);
    }
};
>>

LexerRuleContext() ::= "RuleContext"

/** The rule context name is the rule followed by a suffix; e.g.,
* r becomes rContext.
*/
RuleContextNameSuffix() ::= "Context"

ImplicitTokenLabel(tokenName) ::= "_<tokenName>"
ImplicitRuleLabel(ruleName)   ::= "_<ruleName>"
ImplicitSetLabel(id)    ::= "_tset<id>"
ListLabelName(label)    ::= "<label>"

CaptureNextToken(d) ::= "<d.varName> = self._input.LT(1)"
```

```
CaptureNextTokenType(d) ::= "<d.varName> = this._input.LA(1);"

StructDecl(struct,ctorAttrs,attrs,getters,dispatchMethods,interfaces,extensionMembers,signatures) ::= <<
class <struct.escapedName> extends
<if(contextSuperClass)><contextSuperClass><else>antlr4.ParserRuleContext<endif> {

  constructor(parser, parent, invokingState<struct.ctorAttrs:{a
| , <a.escapedName>}>) {
      if(parent===undefined) {
          parent = null;
      }
      if(invokingState===undefined || invokingState===null) {
          invokingState = -1;
      }
      super(parent, invokingState);
      this.parser = parser;
      this.ruleIndex = <parser.name>.RULE_<struct.derivedFromName>;
      <attrs:{a | <a>}; separator="\n">
      <struct.ctorAttrs:{a | this.<a.escapedName> = <a.escapedName> || null;}; separator="\n">
  }

 <getters:{g | <g>}; separator="\n\n">

 <if(struct.provideCopyFrom)> <! don't need copy unless we have subclasses !>
 copyFrom(ctx) {
  super.copyFrom(ctx);
  <struct.attrs:{a | this.<a.escapedName> = ctx.<a.escapedName>;}; separator="\n">
 }
 <endif>
 <dispatchMethods; separator="\n">
 <extensionMembers; separator="\n">

}

>>

AltLabelStructDecl(struct,attrs,getters,dispatchMethods) ::= <<
class <struct.escapedName> extends <struct.parentRule; format="cap">Context {

  constructor(parser, ctx) {

     super(parser);
      <attrs:{a | <a>;}; separator="\n">
      super.copyFrom(ctx);
  }

 <getters:{g | <g>}; separator="\n\n">
```

```
 <dispatchMethods; separator="\n">

}

<! Define fields of this parser to export this struct/context class !>
<parser.name>.<struct.name> = <struct.escapedName>;

>>

ListenerDispatchMethod(method) ::= <<
<if(method.isEnter)>enter<else>exit<endif>Rule(listener) {
   if(listener instanceof <parser.grammarName>Listener ) {
       listener.<if(method.isEnter)>enter<else>exit<endif><struct.derivedFromName; format="cap">(this);
 }
}

>>

VisitorDispatchMethod(method) ::= <<
accept(visitor) {
   if ( visitor instanceof <parser.grammarName>Visitor ) {
       return visitor.visit<struct.derivedFromName; format="cap">(this);
   } else {
       return visitor.visitChildren(this);
   }
}

>>

AttributeDecl(d) ::= "this.<d.escapedName> = <if(d.initValue)><d.initValue><else>null<endif>"

/** If we don't know location of label def x, use this template */
labelref(x)
 ::= "<if(!x.isLocal)>localctx.<endif><x.escapedName>"

/** For any action chunk, what is correctly-typed context struct ptr? */
ctx(actionChunk) ::= "localctx"

// used for left-recursive rules
recRuleAltPredicate(ruleName,opPrec)  ::= "this.precpred(this._ctx, <opPrec>)"
recRuleSetReturnAction(src,name)   ::= "$<name>=$<src>.<name>"
recRuleSetStopToken()                ::= "this._ctx.stop = this._input.LT(-1);"

recRuleAltStartAction(ruleName, ctxName, label, isListLabel) ::= <<
localctx = new <ctxName>Context(this, _parentctx, _parentState);
<if(label)>
<if(isListLabel)>
localctx.<label>.push(_prevctx);
```

```
<else>
localctx.<label> = _prevctx;
<endif>
<endif>
this.pushNewRecursionContext(localctx, _startState, <parser.name>.RULE_<ruleName>);
>>

recRuleLabeledAltStartAction(ruleName, currentAltLabel, label, isListLabel) ::= <<
localctx = new <currentAltLabel; format="cap">Context(this, new <ruleName; format="cap">Context(this,
_parentctx, _parentState));
<if(label)>
<if(isListLabel)>
localctx.<label>.push(_prevctx);
<else>
localctx.<label>
 = _prevctx;
<endif>
<endif>
this.pushNewRecursionContext(localctx, _startState, <parser.name>.RULE_<ruleName>);
>>

recRuleReplaceContext(ctxName) ::= <<
localctx = new <ctxName>Context(this, localctx);
this._ctx = localctx;
_prevctx = localctx;
>>

recRuleSetPrevCtx() ::= <<
if(this._parseListeners!==null) {
   this.triggerExitRuleEvent();
}
_prevctx = localctx;
>>


LexerFile(lexerFile, lexer, namedActions) ::= <<
<fileHeader(lexerFile.grammarFileName, lexerFile.ANTLRVersion)>
import antlr4 from 'antlr4';

<namedActions.header>

<lexer>

>>

Lexer(lexer, atn, actionFuncs, sempredFuncs, superClass) ::= <<
<if(superClass)>
import <superClass> from './<superClass>.js';
```

```
<endif>
<atn>

const atn = new antlr4.atn.ATNDeserializer().deserialize(serializedATN);

const decisionsToDFA = atn.decisionToState.map( (ds, index) => new antlr4.dfa.DFA(ds, index) );

export default class <lexer.name> extends <if(superClass)><superClass><else>antlr4.Lexer<endif>
 {

   static grammarFileName = "<lexer.grammarFileName>";
   static channelNames = [ "DEFAULT_TOKEN_CHANNEL", "HIDDEN"<if (lexer.channelNames)>,
<lexer.channelNames:{c| "<c>"}; separator=", ", wrap, anchor><endif> ];
 static modeNames = [ <lexer.modes:{m| "<m>"}; separator=", ", wrap, anchor> ];
 static literalNames = [ <lexer.literalNames:{t | <t>}; null="null", separator=", ", wrap, anchor> ];
 static symbolicNames = [ <lexer.symbolicNames:{t | <t>}; null="null", separator=", ", wrap, anchor> ];
 static ruleNames = [ <lexer.ruleNames:{r | "<r>"}; separator=", ", wrap, anchor> ];

   constructor(input) {
       super(input)
       this._interp = new antlr4.atn.LexerATNSimulator(this, atn, decisionsToDFA, new
antlr4.atn.PredictionContextCache());
       <namedActions.members>
   }
}

<lexer.name>.EOF = antlr4.Token.EOF;
<if(lexer.tokens)>
<lexer.tokens:{k | <lexer.name>.<k> = <lexer.tokens.(k)>;}; separator="\n", wrap, anchor>
<endif>

<if(lexer.escapedChannels)>
<lexer.escapedChannels:{c|
 <lexer.name>.<c> = <lexer.escapedChannels.(c)>;}; separator="\n">

<endif>
<if(rest(lexer.escapedModeNames))>
<rest(lexer.escapedModeNames):{m| <lexer.name>.<m> = <i>;}; separator="\n">

<endif>

<dumpActions(lexer, "", actionFuncs, sempredFuncs)>


>>

SerializedATN(model) ::= <<
```

```
const serializedATN = [<model.serialized: {s | <s>}; separator=",", wrap>];

>>

/** Using a type to init value map, try to init a type; if not in table
* must be an object, default value is "null".
*/
initValue(typeName) ::= <<
<javacriptTypeInitMap.(typeName)>
>>

codeFileExtension() ::= ".js"
```

Found in path(s):
* /antlr4-4-13-2-jar/org/antlr/v4/tool/templates/codegen/JavaScript/JavaScript.stg
No license file was found, but licenses were detected in source scan.

```
<!--
 ~ Copyright (c) 2012-2017 The ANTLR Project. All rights reserved.
 ~ Use of this file is governed by the BSD 3-clause license that
 ~ can be found in the LICENSE.txt file in the project root.
 -->
```

Found in path(s):
* /antlr4-4-13-2-jar/META-INF/maven/org.antlr/antlr4/pom.xml
No license file was found, but licenses were detected in source scan.

```
/*
* [The "BSD license"]
*  Copyright (c) 2015 Dan McLaughlin, Mike Lischke
*  All rights reserved.
*
*  Redistribution and use in source and binary forms, with or without
*  modification, are permitted provided that the following conditions
*  are met:
*
*  1. Redistributions of source code must retain the above copyright
*     notice, this list of conditions and the following disclaimer.
*  2. Redistributions in binary form must reproduce the above copyright
*     notice, this list of conditions and the following disclaimer in the
*     documentation and/or other materials provided with the distribution.
*  3. The name of the author may not be used to endorse or promote products
*     derived from this software without specific prior written permission.
*
*  THIS SOFTWARE IS PROVIDED BY THE AUTHOR ``AS IS" AND ANY EXPRESS OR
*  IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES
 *  OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED.
*  IN NO EVENT SHALL THE AUTHOR BE LIABLE FOR ANY DIRECT, INDIRECT,
```

```
*  INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT
*  NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE,
*  DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY
*  THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT
*  (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF
*  THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
*/

import "Files.stg" // All file specific stuff.

cppTypeInitMap ::= [
   "int":"0",
   "long":"0",
   "float":"0.0f",
   "double":"0.0",
   "bool":"false",
   "short":"0",
   "char":"0",
   default: "nullptr" // anything other than a primitive type is an object
]

LexerHeader(lexer, atn, actionFuncs, sempredFuncs, superClass = {antlr4::Lexer}) ::= <<
<namedActions.context>

class <file.exportMacro>
 <lexer.name> : public <superClass> {
public:
<if (lexer.tokens)>
 enum {
   <lexer.tokens: {k | <k> = <lexer.tokens.(k)>}; separator=", ", wrap, anchor>
 };
<endif>

<if (lexer.escapedChannels)>
 enum {
   <lexer.escapedChannels: {k | <k> = <lexer.escapedChannels.(k)>}; separator=", ", wrap, anchor>
 };
<endif>

<if (rest(lexer.escapedModeNames))>
 enum {
   <rest(lexer.escapedModeNames): {m | <m> = <i>}; separator=", ", wrap, anchor>
 };
<endif>

 explicit <lexer.name>(antlr4::CharStream *input);

 ~<lexer.name>() override;
```

```
 <namedActions.members>

 std::string getGrammarFileName() const override;

 const std::vector\<std::string>& getRuleNames() const override;

 const std::vector\<std::string>& getChannelNames() const override;

 const std::vector\<std::string>& getModeNames() const override;

 const antlr4::dfa::Vocabulary& getVocabulary() const override;

 antlr4::atn::SerializedATNView getSerializedATN() const override;

 const antlr4::atn::ATN& getATN()
 const override;

 <if (actionFuncs)>
 void action(antlr4::RuleContext *context, size_t ruleIndex, size_t actionIndex) override;
 <endif>

 <if (sempredFuncs)>
 bool sempred(antlr4::RuleContext *_localctx, size_t ruleIndex, size_t predicateIndex) override;
 <endif>

 // By default the static state used to implement the lexer is lazily initialized during the first
 // call to the constructor. You can call this function if you wish to initialize the static state
 // ahead of time.
 static void initialize();

private:
 <namedActions.declarations>

 // Individual action functions triggered by action() above.
 <actionFuncs.values; separator="\n">

 // Individual semantic predicate functions triggered by sempred() above.
 <sempredFuncs.values; separator="\n">

 <atn>
};
>>

Lexer(lexer, atn, actionFuncs, sempredFuncs, superClass = {Lexer}) ::= <<

using namespace antlr4;
```

```
namespace {

struct <lexer.name; format = "cap">StaticData final {
 <lexer.name; format = "cap">StaticData(std::vector\<std::string>
 ruleNames,
                    std::vector\<std::string> channelNames,
                    std::vector\<std::string> modeNames,
                    std::vector\<std::string> literalNames,
                    std::vector\<std::string> symbolicNames)
    : ruleNames(std::move(ruleNames)), channelNames(std::move(channelNames)),
      modeNames(std::move(modeNames)), literalNames(std::move(literalNames)),
      symbolicNames(std::move(symbolicNames)),
      vocabulary(this->literalNames, this->symbolicNames) {}

 <lexer.name; format = "cap">StaticData(const <lexer.name; format = "cap">StaticData&) = delete;
 <lexer.name; format = "cap">StaticData(<lexer.name; format = "cap">StaticData&&) = delete;
 <lexer.name; format = "cap">StaticData& operator=(const <lexer.name; format = "cap">StaticData&) = delete;
 <lexer.name; format = "cap">StaticData& operator=(<lexer.name; format = "cap">StaticData&&) = delete;

 std::vector\<antlr4::dfa::DFA>
 decisionToDFA;
 antlr4::atn::PredictionContextCache sharedContextCache;
 const std::vector\<std::string> ruleNames;
 const std::vector\<std::string> channelNames;
 const std::vector\<std::string> modeNames;
 const std::vector\<std::string> literalNames;
 const std::vector\<std::string> symbolicNames;
 const antlr4::dfa::Vocabulary vocabulary;
 antlr4::atn::SerializedATNView serializedATN;
 std::unique_ptr\<antlr4::atn::ATN> atn;
};

::antlr4::internal::OnceFlag <lexer.grammarName; format = "lower">LexerOnceFlag;
#if ANTLR4_USE_THREAD_LOCAL_CACHE
static thread_local
#endif
std::unique_ptr\<<lexer.name; format = "cap">StaticData> <lexer.grammarName; format =
"lower">LexerStaticData = nullptr;

void <lexer.grammarName; format = "lower">LexerInitialize() {
#if ANTLR4_USE_THREAD_LOCAL_CACHE
 if (<lexer.grammarName; format = "lower">LexerStaticData != nullptr) {
   return;
 }
#else
 assert(<lexer.grammarName; format = "lower">LexerStaticData == nullptr);
#endif
```

```
  auto staticData = std::make_unique\<<lexer.name; format = "cap">StaticData>(
   std::vector\<std::string>{
     <lexer.ruleNames: {r | "<r>"}; separator = ", ", wrap, anchor>
   },
   std::vector\<std::string>{
     "DEFAULT_TOKEN_CHANNEL", "HIDDEN"<if (lexer.channels)>, <lexer.channels: {c | "<c>"}; separator =
", ", wrap, anchor><endif>
   },
   std::vector\<std::string>{
     <lexer.modes: {m | "<m>"}; separator = ", ", wrap, anchor>
   },
   std::vector\<std::string>{
     <lexer.literalNames: {t | <t>}; null = "\"\"", separator = ", ", wrap, anchor>
   },
   std::vector\<std::string>{
     <lexer.symbolicNames: {t | <t>}; null = "\"\"", separator = ", ", wrap, anchor>
   }
 );
 <atn>
 <lexer.grammarName; format = "lower">LexerStaticData = std::move(staticData);
}

}

<lexer.name>::<lexer.name>(CharStream *input) : <superClass>(input) {
 <lexer.name>::initialize();
 _interpreter = new atn::LexerATNSimulator(this, *<lexer.grammarName; format = "lower">LexerStaticData->atn,
 <lexer.grammarName; format = "lower">LexerStaticData->decisionToDFA, <lexer.grammarName; format =
"lower">LexerStaticData->sharedContextCache);
}

<lexer.name>::~<lexer.name>() {
 delete _interpreter;
}

std::string <lexer.name>::getGrammarFileName() const {
 return "<lexer.grammarFileName>";
}

const std::vector\<std::string>& <lexer.name>::getRuleNames() const {
 return <lexer.grammarName; format = "lower">LexerStaticData->ruleNames;
}

const std::vector\<std::string>& <lexer.name>::getChannelNames() const {
 return <lexer.grammarName; format = "lower">LexerStaticData->channelNames;
}

const std::vector\<std::string>& <lexer.name>::getModeNames() const {
```

```
 return <lexer.grammarName; format = "lower">LexerStaticData->modeNames;
}

const dfa::Vocabulary& <lexer.name>::getVocabulary() const {
 return <lexer.grammarName; format = "lower">LexerStaticData->vocabulary;
}

antlr4::atn::SerializedATNView <lexer.name>::getSerializedATN() const {
 return <lexer.grammarName;
 format = "lower">LexerStaticData->serializedATN;
}

const atn::ATN& <lexer.name>::getATN() const {
 return *<lexer.grammarName; format = "lower">LexerStaticData->atn;
}

<namedActions.definitions>

<if (actionFuncs)>
void <lexer.name>::action(RuleContext *context, size_t ruleIndex, size_t actionIndex) {
 switch (ruleIndex) {
   <lexer.actionFuncs.values: {f | case <f.ruleIndex>: <f.name>Action(antlrcpp::downCast\<<f.ctxType>
*>(context), actionIndex); break;}; separator="\n">

 default:
   break;
 }
}
<endif>

<if (sempredFuncs)>
bool <lexer.name>::sempred(RuleContext *context, size_t ruleIndex, size_t predicateIndex) {
 switch (ruleIndex) {
   <lexer.sempredFuncs.values: {f | case <f.ruleIndex>: return <f.name>Sempred(antlrcpp::downCast\<<f.ctxType>
*>(context), predicateIndex);}; separator="\n">

 default:
   break;
 }
 return true;
}
<endif>

<actionFuncs.values; separator="\n">

<sempredFuncs.values; separator="\n">

void <lexer.name>::initialize() {
```

```
#if ANTLR4_USE_THREAD_LOCAL_CACHE
  <lexer.grammarName; format = "lower">LexerInitialize();
#else
 ::antlr4::internal::call_once(<lexer.grammarName; format = "lower">LexerOnceFlag, <lexer.grammarName;
format = "lower">LexerInitialize);
#endif
}
>>

RuleActionFunctionHeader(r, actions) ::= <<
void <r.name>Action(<r.ctxType> *context, size_t actionIndex);
>>

RuleActionFunction(r, actions) ::= <<
void <r.factory.grammar.name>::<r.name>Action(<r.ctxType> *context, size_t actionIndex) {
 switch (actionIndex) {
   <actions: {index | case <index>: <actions.(index)> break;}; separator="\n">

 default:
   break;
 }
}

>>

RuleSempredFunctionHeader(r, actions) ::= <<
bool <r.name>Sempred(<r.ctxType> *_localctx, size_t predicateIndex);
>>

RuleSempredFunction(r, actions) ::= <<
<! Called for both lexer and parser. But only one of them is actually available. Testing for the parser directly
  generates a warning, however. So do the check via the factory instead. !>
bool <if (r.factory.g.lexer)><lexer.name><else><parser.name><endif>::<r.name>Sempred(<r.ctxType>
 *_localctx, size_t predicateIndex) {
 switch (predicateIndex) {
   <actions: {index | case <index>: return <actions.(index)>}; separator=";\n">;

 default:
   break;
 }
 return true;
}

>>

//-----------------------------------------------------------------------------------------------

ParserHeader(parser, funcs, atn, sempredFuncs, superClass = {antlr4::Parser}) ::= <<
```

```
<namedActions.context>

class <file.exportMacro> <parser.name> : public <superClass> {
public:
<if (parser.tokens)>
 enum {
   <parser.tokens: {k | <k> = <parser.tokens.(k)>}; separator=", ", wrap, anchor>
 };
<endif>

<if (parser.rules)>
 enum {
   <parser.rules: {r | Rule<r.name; format="cap"> = <r.index>}; separator=", ", wrap, anchor>
 };
<endif>

 explicit <parser.name>(antlr4::TokenStream *input);

 <parser.name>(antlr4::TokenStream *input, const antlr4::atn::ParserATNSimulatorOptions &options);

 ~<parser.name>() override;

 std::string getGrammarFileName()
 const override;

 const antlr4::atn::ATN& getATN() const override;

 const std::vector\<std::string>& getRuleNames() const override;

 const antlr4::dfa::Vocabulary& getVocabulary() const override;

 antlr4::atn::SerializedATNView getSerializedATN() const override;

 <namedActions.members>

 <parser.funcs: {f | class <f.name; format = "cap">Context;};  separator = "\n"> <! Forward declare context classes.
!>

 <funcs; separator = "\n">

 <if (sempredFuncs)>
 bool sempred(antlr4::RuleContext *_localctx, size_t ruleIndex, size_t predicateIndex) override;

 <sempredFuncs.values; separator = "\n">
 <endif>

 // By default the static state used to implement the parser is lazily initialized during the first
 // call to the constructor. You can call this function if you wish to initialize the static state
```

```
 // ahead of time.
 static void initialize();

private:
 <namedActions.declarations>
};
>>

Parser(parser, funcs, atn, sempredFuncs, superClass = {Parser})
 ::= <<

using namespace antlr4;

namespace {

struct <parser.name; format = "cap">StaticData final {
 <parser.name; format = "cap">StaticData(std::vector\<std::string> ruleNames,
                    std::vector\<std::string> literalNames,
                    std::vector\<std::string> symbolicNames)
    : ruleNames(std::move(ruleNames)), literalNames(std::move(literalNames)),
      symbolicNames(std::move(symbolicNames)),
      vocabulary(this->literalNames, this->symbolicNames) {}

 <parser.name; format = "cap">StaticData(const <parser.name; format = "cap">StaticData&) = delete;
 <parser.name; format = "cap">StaticData(<parser.name; format = "cap">StaticData&&) = delete;
 <parser.name; format = "cap">StaticData& operator=(const <parser.name; format = "cap">StaticData&) = delete;
 <parser.name; format = "cap">StaticData& operator=(<parser.name; format = "cap">StaticData&&) = delete;

 std::vector\<antlr4::dfa::DFA> decisionToDFA;
 antlr4::atn::PredictionContextCache
 sharedContextCache;
 const std::vector\<std::string> ruleNames;
 const std::vector\<std::string> literalNames;
 const std::vector\<std::string> symbolicNames;
 const antlr4::dfa::Vocabulary vocabulary;
 antlr4::atn::SerializedATNView serializedATN;
 std::unique_ptr\<antlr4::atn::ATN> atn;
};

::antlr4::internal::OnceFlag <parser.grammarName; format = "lower">ParserOnceFlag;
#if ANTLR4_USE_THREAD_LOCAL_CACHE
static thread_local
#endif
std::unique_ptr\<<parser.name; format = "cap">StaticData> <parser.grammarName; format =
"lower">ParserStaticData = nullptr;

void <parser.grammarName; format = "lower">ParserInitialize() {
#if ANTLR4_USE_THREAD_LOCAL_CACHE
```

```
 if (<parser.grammarName; format = "lower">ParserStaticData != nullptr) {
   return;
 }
#else
 assert(<parser.grammarName; format = "lower">ParserStaticData == nullptr);
#endif
 auto staticData = std::make_unique\<<parser.name; format = "cap">StaticData>(
   std::vector\<std::string>{
     <parser.ruleNames: {r | "<r>"}; separator
 = ", ", wrap, anchor>
   },
   std::vector\<std::string>{
     <parser.literalNames: {t | <t>}; null = "\"\"", separator = ", ", wrap, anchor>
   },
   std::vector\<std::string>{
     <parser.symbolicNames: {t | <t>}; null = "\"\"", separator = ", ", wrap, anchor>
   }
 );
 <atn>
 <parser.grammarName; format = "lower">ParserStaticData = std::move(staticData);
}

}

<parser.name>::<parser.name>(TokenStream *input) : <parser.name>(input,
antlr4::atn::ParserATNSimulatorOptions()) {}

<parser.name>::<parser.name>(TokenStream *input, const antlr4::atn::ParserATNSimulatorOptions &options) :
<superClass>(input) {
 <parser.name>::initialize();
 _interpreter = new atn::ParserATNSimulator(this, *<parser.grammarName; format = "lower">ParserStaticData-
>atn, <parser.grammarName; format = "lower">ParserStaticData->decisionToDFA, <parser.grammarName; format
= "lower">ParserStaticData->sharedContextCache, options);
}

<parser.name>::~<parser.name>() {
 delete _interpreter;
}

const
 atn::ATN& <parser.name>::getATN() const {
 return *<parser.grammarName; format = "lower">ParserStaticData->atn;
}

std::string <parser.name>::getGrammarFileName() const {
 return "<parser.grammarFileName>";
}
```

```
const std::vector\<std::string>& <parser.name>::getRuleNames() const {
 return <parser.grammarName; format = "lower">ParserStaticData->ruleNames;
}

const dfa::Vocabulary& <parser.name>::getVocabulary() const {
 return <parser.grammarName; format = "lower">ParserStaticData->vocabulary;
}

antlr4::atn::SerializedATNView <parser.name>::getSerializedATN() const {
 return <parser.grammarName; format = "lower">ParserStaticData->serializedATN;
}

<namedActions.definitions>

<funcs; separator = "\n\n">

<if (sempredFuncs)>
bool <parser.name>::sempred(RuleContext *context, size_t ruleIndex, size_t predicateIndex) {
 switch (ruleIndex) {
 <parser.sempredFuncs.values: {f |
 case <f.ruleIndex>: return <f.name>Sempred(antlrcpp::downCast\<<f.ctxType> *>(context), predicateIndex);};
 separator="\n">

 default:
   break;
 }
 return true;
}

<sempredFuncs.values; separator="\n"><endif>

void <parser.name>::initialize() {
#if ANTLR4_USE_THREAD_LOCAL_CACHE
 <parser.grammarName; format = "lower">ParserInitialize();
#else
 ::antlr4::internal::call_once(<parser.grammarName; format = "lower">ParserOnceFlag, <parser.grammarName;
format = "lower">ParserInitialize);
#endif
}
>>

SerializedATNHeader(model) ::= <<
>>

SerializedATN(model) ::= <<
static const int32_t serializedATNSegment[] = {
 <model.serialized: {s | <s>}; separator=",", wrap>
};
```

```
staticData->serializedATN = antlr4::atn::SerializedATNView(serializedATNSegment,
sizeof(serializedATNSegment) / sizeof(serializedATNSegment[0]));

antlr4::atn::ATNDeserializer deserializer;
staticData->atn = deserializer.deserialize(staticData->serializedATN);

const size_t count = staticData->atn->getNumberOfDecisions();
staticData->decisionToDFA.reserve(count);
for (size_t i = 0; i \< count; i++) { <! Rework class ATN to allow
 standard iterations. !>
 staticData->decisionToDFA.emplace_back(staticData->atn->getDecisionState(i), i);
}
>>

RuleFunctionHeader(currentRule, args, code, locals, ruleCtx, altLabelCtxs, namedActions, finallyAction,
postamble, exceptions) ::= <<
<ruleCtx>
<! TODO: untested !><if (altLabelCtxs)><altLabelCtxs: {l | <altLabelCtxs.(l)>}; separator="\n"><endif>
<currentRule.ctxType>* <currentRule.escapedName>(<args; separator=",">);

>>

RuleFunction(currentRule, args, code, locals, ruleCtx, altLabelCtxs, namedActions, finallyAction, postamble,
exceptions) ::= <<
<ruleCtx>
<! TODO: untested !><altLabelCtxs: {l | <altLabelCtxs.(l)>}; separator = "\n">
<parser.name>::<currentRule.ctxType>* <parser.name>::<currentRule.escapedName>(<args; separator=",">) {
 <currentRule.ctxType> *_localctx = _tracker.createInstance\<<currentRule.ctxType>\>(_ctx,
getState()<currentRule.args:{a | , <a.escapedName>}>);
 enterRule(_localctx, <currentRule.startState>, <parser.name>::Rule<currentRule.name; format
 = "cap">);
 <namedActions.init>
 <locals; separator = "\n">

#if __cplusplus > 201703L
 auto onExit = finally([=, this] {
#else
 auto onExit = finally([=] {
#endif
 <finallyAction>
   exitRule();
 });
 try {
<! TODO: untested !><if (currentRule.hasLookaheadBlock)>
   size_t alt;
   <endif>
   <code>
<! TODO: untested !>   <postamble; separator = "\n">
```

```
  <namedActions.after>
 }
 <if (exceptions)>
 <exceptions; separator="\n">
 <else>
 catch (RecognitionException &e) {
   _errHandler->reportError(this, e);
   _localctx->exception = std::current_exception();
   _errHandler->recover(this, _localctx->exception);
 }
 <endif>

 return _localctx;
}
>>

LeftRecursiveRuleFunctionHeader(currentRule, args, code, locals, ruleCtx, altLabelCtxs, namedActions,
finallyAction, postamble) ::= <<
<ruleCtx>
<! TODO: untested !><altLabelCtxs: {l | <altLabelCtxs.(l)>}; separator="\n">
<currentRule.ctxType>* <currentRule.escapedName>(<currentRule.args; separator = ", ">);
<currentRule.ctxType>*
 <currentRule.escapedName>(int precedence<currentRule.args: {a | , <a>}>);
>>

LeftRecursiveRuleFunction(currentRule, args, code, locals, ruleCtx, altLabelCtxs, namedActions, finallyAction,
postamble) ::= <<
<ruleCtx>
<altLabelCtxs: {l | <altLabelCtxs.(l)>}; separator="\n">

<parser.name>::<currentRule.ctxType>* <parser.name>::<currentRule.escapedName>(<currentRule.args;
separator=", ">) {
<! TODO: currentRule.args untested !>   return <currentRule.escapedName>(0<currentRule.args: {a | ,
<a.escapedName>}>);
}

<parser.name>::<currentRule.ctxType>* <parser.name>::<currentRule.escapedName>(int
precedence<currentRule.args:{a | , <a>}>) {
 ParserRuleContext *parentContext = _ctx;
 size_t parentState = getState();
 <parser.name>::<currentRule.ctxType> *_localctx = _tracker.createInstance\<<currentRule.ctxType>\>(_ctx,
parentState<currentRule.args: {a | , <a.escapedName>}>);
 <parser.name>::<currentRule.ctxType> *previousContext = _localctx;
 (void)previousContext; // Silence compiler,
 in case the context is not used by generated code.
 size_t startState = <currentRule.startState>;
 enterRecursionRule(_localctx, <currentRule.startState>, <parser.name>::Rule<currentRule.name; format = "cap">,
precedence);
```

```
   <namedActions.init>
<! TODO: untested !>    <locals; separator = "\n">

#if __cplusplus > 201703L
 auto onExit = finally([=, this] {
#else
 auto onExit = finally([=] {
#endif
 <if (finallyAction)><finallyAction><endif>
   unrollRecursionContexts(parentContext);
 });
 try {
   <if (currentRule.hasLookaheadBlock)>size_t alt;<endif>
   <code>
<! TODO: untested !><postamble; separator = "\n">
   <namedActions.after>
 }
 catch (RecognitionException &e) {
   _errHandler->reportError(this, e);
   _localctx->exception = std::current_exception();
   _errHandler->recover(this, _localctx->exception);
 }
 return _localctx;
}
>>

StructDeclHeader(struct, ctorAttrs, attrs, getters, dispatchMethods, interfaces, extensionMembers) ::= <<
class <file.exportMacro>
 <struct.escapedName> : public <if
(contextSuperClass)><contextSuperClass><else>antlr4::ParserRuleContext<endif><if(interfaces)>, <interfaces;
separator=", "><endif> {
public:
 <attrs: {a | <a>;}; separator = "\n">
 <if (ctorAttrs)><struct.escapedName>(antlr4::ParserRuleContext *parent, size_t invokingState);<endif>
 <struct.escapedName>(antlr4::ParserRuleContext *parent, size_t invokingState<ctorAttrs: {a | , <a>}>);
<if (struct.provideCopyFrom)> <! don't need copy unless we have subclasses !>
 <struct.escapedName>() = default;
 void copyFrom(<struct.escapedName> *context);
 using antlr4::ParserRuleContext::copyFrom;
<endif>

 virtual size_t getRuleIndex() const override;
 <getters: {g | <g>}; separator = "\n">

 <dispatchMethods; separator = "\n">
<! TODO: untested !> <extensionMembers; separator = "\n">
};
```

```
>>

StructDecl(struct, ctorAttrs, attrs, getters, dispatchMethods, interfaces, extensionMembers, signatures) ::= <<
//----------------- <struct.escapedName> ------------------------------------------------------------------

<if
 (ctorAttrs)>
<parser.name>::<struct.escapedName>::<struct.escapedName>(ParserRuleContext *parent, size_t invokingState)
 : <if (contextSuperClass)><contextSuperClass><else>ParserRuleContext<endif>(parent, invokingState) {
}
<endif>

<parser.name>::<struct.escapedName>::<struct.escapedName>(ParserRuleContext *parent, size_t
invokingState<ctorAttrs: {a | , <a>}>)
 : <if (contextSuperClass)><contextSuperClass><else>ParserRuleContext<endif>(parent, invokingState) {
 <struct.ctorAttrs: {a | this-><a.escapedName> = <a.escapedName>;}; separator="\n">
}

<getters: {g | <g>}; separator = "\n">

size_t <parser.name>::<struct.escapedName>::getRuleIndex() const {
 return <parser.name>::Rule<struct.derivedFromName; format = "cap">;
}

<if (struct.provideCopyFrom)>
void <parser.name>::<struct.escapedName>::copyFrom(<struct.escapedName> *ctx) {
 <if (contextSuperClass)><contextSuperClass><else>ParserRuleContext<endif>::copyFrom(ctx);
  <struct.attrs: {a | this-><a.escapedName> = ctx-><a.escapedName>;}; separator = "\n">
}
<endif>
<dispatchMethods; separator = "\n\n">
<! TODO: untested !><extensionMembers; separator = "\n\n">

>>

AltLabelStructDeclHeader(struct, attrs, getters, dispatchMethods) ::= <<
class <file.exportMacro> <struct.escapedName> : public <currentRule.name; format = "cap">Context {
public:
 <struct.escapedName>(<currentRule.name; format = "cap">Context *ctx);

 <if (attrs)><attrs: {a | <a>;}; separator = "\n"><endif>
 <getters: {g | <g>}; separator = "\n">
 <dispatchMethods; separator = "\n">
};

>>
```

```
AltLabelStructDecl(struct, attrs, getters, dispatchMethods) ::= <<
//----------------- <struct.escapedName> ------------------------------------------------------------------

<! TODO: untested !><if (attrs)><attrs: {a | <a>}; separator = "\n"><endif>
<getters: {g | <g>}; separator = "\n">
<parser.name>::<struct.escapedName>::<struct.escapedName>(<currentRule.name; format = "cap">Context *ctx)
 { copyFrom(ctx); }

<dispatchMethods; separator="\n">
>>


CodeBlockForOuterMostAltHeader(currentOuterMostAltCodeBlock, locals, preamble, ops) ::= "<! Required to
exist, but unused. !>"
CodeBlockForOuterMostAlt(currentOuterMostAltCodeBlock, locals, preamble, ops) ::= <<
<if (currentOuterMostAltCodeBlock.altLabel)>
_localctx = _tracker.createInstance\<<parser.name>::<currentOuterMostAltCodeBlock.altLabel; format =
"cap">Context>(_localctx);
<endif>
enterOuterAlt(_localctx, <currentOuterMostAltCodeBlock.alt.altNum>);
<CodeBlockForAlt(currentAltCodeBlock = currentOuterMostAltCodeBlock, ...)>
>>

CodeBlockForAltHeader(currentAltCodeBlock, locals, preamble, ops) ::= "<! Required to exist, but unused. !>"
CodeBlockForAlt(currentAltCodeBlock, locals, preamble, ops) ::= <<
<! TODO: untested !><locals; separator = "\n">
<! TODO: untested !><preamble; separator = "\n">
<ops; separator = "\n">
>>

LL1AltBlockHeader(choice, preamble, alts, error) ::= "<! Required to exist, but unused. !>"
LL1AltBlock(choice,
 preamble, alts, error) ::= <<
setState(<choice.stateNumber>);
_errHandler->sync(this);
<! TODO: untested !><if (choice.label)>LL1AltBlock(choice, preamble, alts, error) <labelref(choice.label)> =
_input->LT(1);<endif>
<preamble; separator="\n">
switch (_input->LA(1)) {
 <choice.altLook, alts: {look, alt | <cases(tokens = look)> {
 <alt>
 break;
\}
}; separator = "\n">
default:
 <error>
}
>>
```

```
LL1OptionalBlockHeader(choice, alts, error) ::= "<! Required but unused. !>"
LL1OptionalBlock(choice, alts, error) ::= <<
setState(<choice.stateNumber>);
_errHandler->sync(this);
switch (_input->LA(1)) {
 <choice.altLook, alts: {look, alt | <cases(tokens = look)> {
 <alt>
 break;
\}
}; separator="\n">
default:
 break;
}
>>

LL1OptionalBlockSingleAltHeader(choice, expr, alts, preamble, error, followExpr) ::= "<! Required but unused. !>"
LL1OptionalBlockSingleAlt(choice, expr, alts, preamble, error, followExpr) ::= <<
setState(<choice.stateNumber>);
_errHandler->sync(this);

<preamble;
 separator = "\n">
if (<expr>) {
 <alts; separator = "\n">
}
>>

LL1StarBlockSingleAltHeader(choice, loopExpr, alts, preamble, iteration) ::= "<! Required but unused. !>"
LL1StarBlockSingleAlt(choice, loopExpr, alts, preamble, iteration) ::= <<
setState(<choice.stateNumber>);
_errHandler->sync(this);
<preamble; separator="\n">
while (<loopExpr>) {
 <alts; separator="\n">
 setState(<choice.loopBackStateNumber>);
 _errHandler->sync(this);
 <iteration>
}
>>

LL1PlusBlockSingleAltHeader(choice, loopExpr, alts, preamble, iteration) ::= "<! Required but unused. !>"
LL1PlusBlockSingleAlt(choice, loopExpr, alts, preamble, iteration) ::= <<
setState(<choice.blockStartStateNumber>); <! alt block decision !>
_errHandler->sync(this);
<preamble; separator="\n">
do {
 <alts; separator="\n">
```

```
 setState(<choice.stateNumber>); <! loopback/exit decision !>
 _errHandler->sync(this);
 <iteration>
} while (<loopExpr>);
>>

// LL(*) stuff

AltBlockHeader(choice, preamble, alts, error) ::= "<!
 Unused but must be present. !>"
AltBlock(choice, preamble, alts, error) ::= <<
setState(<choice.stateNumber>);
_errHandler->sync(this);
<! TODO: untested !><if (choice.label)><labelref(choice.label)> = _input->LT(1);<endif>
<! TODO: untested !><preamble; separator = "\n">
switch (getInterpreter\<atn::ParserATNSimulator>()->adaptivePredict(_input, <choice.decision>, _ctx)) {
<alts: {alt | case <i>: {
 <alt>
 break;
\}
}; separator="\n">
default:
 break;
}
>>

OptionalBlockHeader(choice, alts, error) ::= "<! Unused but must be present. !>"
OptionalBlock(choice, alts, error) ::= <<
setState(<choice.stateNumber>);
_errHandler->sync(this);

switch (getInterpreter\<atn::ParserATNSimulator>()->adaptivePredict(_input, <choice.decision>, _ctx)) {
<alts: {alt | case <i><if (!choice.ast.greedy)> + 1<endif>: {
 <alt>
 break;
\}
}; separator = "\n">
default:
 break;
}
>>

StarBlockHeader(choice, alts, sync, iteration) ::= "<! Unused but must be present. !>"
StarBlock(choice, alts, sync, iteration)
 ::= <<
setState(<choice.stateNumber>);
_errHandler->sync(this);
alt = getInterpreter\<atn::ParserATNSimulator>()->adaptivePredict(_input, <choice.decision>, _ctx);
```

```
while (alt != <choice.exitAlt> && alt != atn::ATN::INVALID_ALT_NUMBER) {
 if (alt == 1<if(!choice.ast.greedy)> + 1<endif>) {
   <iteration>
   <alts> <! should only be one !>
 }
 setState(<choice.loopBackStateNumber>);
 _errHandler->sync(this);
 alt = getInterpreter\<atn::ParserATNSimulator>()->adaptivePredict(_input, <choice.decision>, _ctx);
}
>>

PlusBlockHeader(choice, alts, error) ::= "<! Required to exist, but unused. !>"
PlusBlock(choice, alts, error) ::= <<
setState(<choice.blockStartStateNumber>); <! alt block decision !>
_errHandler->sync(this);
alt = 1<if(!choice.ast.greedy)> + 1<endif>;
do {
 switch (alt) {
   <alts: {alt | case <i><if (!choice.ast.greedy)> + 1<endif>: {
     <alt>
     break;
   \}
}; separator="\n">
 default:
   <error>
 }
 setState(<choice.loopBackStateNumber>); <! loopback/exit
 decision !>
 _errHandler->sync(this);
 alt = getInterpreter\<atn::ParserATNSimulator>()->adaptivePredict(_input, <choice.decision>, _ctx);
} while (alt != <choice.exitAlt> && alt != atn::ATN::INVALID_ALT_NUMBER);
>>

Sync(s) ::= "Sync(s) sync(<s.expecting.name>);"

ThrowNoViableAltHeader(t) ::= "<! Unused but must be present. !>"
ThrowNoViableAlt(t) ::= "throw NoViableAltException(this);"

TestSetInlineHeader(s) ::= "<! Required but unused. !>"
TestSetInline(s) ::= <<
<s.bitsets: {bits | <if (rest(rest(bits.tokens)))><bitsetBitfieldComparison(s, bits)><else><bitsetInlineComparison(s,
bits)><endif>}; separator=" || ">
>>

// Java language spec 15.19 - shift operators mask operands rather than overflow to 0... need range test
testShiftInRange(shiftAmount) ::= <<
((<shiftAmount> & ~ 0x3fULL) == 0)
>>
```

```
bitsetBitfieldComparison(s, bits) ::= <<
(<testShiftInRange({<offsetShift(s.varName, bits.shift)>})> &&
 ((1ULL \<\< <offsetShift(s.varName, bits.shift)>) & <bits.calculated>)
 != 0)
>>

isZero ::= [
 "0": true,
 default: false
]

offsetShift(shiftAmount, offset, prefix = false) ::= <%
<if (!isZero.(offset))>(<if (prefix)><parser.name>::<endif><shiftAmount> - <offset>)<else><if
(prefix)><parser.name>::<endif><shiftAmount><endif>
%>

bitsetInlineComparison(s, bits) ::= <%
<bits.tokens: {t | <s.varName> == <parser.name>::<t.name>}; separator = "\n\n|| ">
%>

cases(tokens) ::= <<
<tokens: {t | case <parser.name>::<t.name>:}; separator="\n">
>>

InvokeRuleHeader(r, argExprsChunks) ::= "InvokeRuleHeader"
InvokeRule(r, argExprsChunks) ::= <<
setState(<r.stateNumber>);
<if(r.labels)><r.labels: {l | <labelref(l)> =
}><endif><r.escapedName>(<if(r.ast.options.p)><r.ast.options.p><if(argExprsChunks)>,<endif><endif><argExprs
Chunks>);
>>

MatchTokenHeader(m) ::= "<! Required but unused. !>"
MatchToken(m) ::= <<
setState(<m.stateNumber>);
<if (m.labels)><m.labels: {l | <labelref(l)> = }><endif>match(<parser.name>::<m.escapedName>);
>>

MatchSetHeader(m, expr, capture) ::=
 "<! Required but unused. !>"
MatchSet(m, expr, capture) ::= "<CommonSetStuff(m, expr, capture, false)>"

MatchNotSetHeader(m, expr, capture) ::= "<! Required but unused. !>"
MatchNotSet(m, expr, capture) ::= "<CommonSetStuff(m, expr, capture, true)>"

CommonSetStuff(m, expr, capture, invert) ::= <<
setState(<m.stateNumber>);
```

```
<if (m.labels)><m.labels: {l | <labelref(l)> = }>_input->LT(1);<endif>
<capture>
if (<if (invert)><m.varName> == 0 || <m.varName> == Token::EOF || <else>!<endif>(<expr>)) {
 <if (m.labels)><m.labels: {l | <labelref(l)> = }><endif>_errHandler->recoverInline(this);
}
else {
 _errHandler->reportMatch(this);
 consume();
}
>>

WildcardHeader(w) ::= "<! Required but unused. !>"
Wildcard(w) ::= <<
setState(<w.stateNumber>);
<if (w.labels)><w.labels: {l | <labelref(l)> = }><endif>matchWildcard();
>>

// ACTION STUFF

ActionHeader(a, foo, chunks) ::= "<chunks>"
Action(a, foo, chunks) ::= "<chunks>"

ArgAction(a, chunks) ::= "ArgAction(a, chunks) <chunks>"

SemPredHeader(p,
 chunks, failChunks) ::= "<! Required but unused. !>"
SemPred(p, chunks, failChunks) ::= <<
setState(<p.stateNumber>);

if (!(<chunks>)) throw FailedPredicateException(this, <p.predicate><if (failChunks)>, <failChunks><elseif
(p.msg)>, <p.msg><endif>);
>>

ExceptionClauseHeader(e, catchArg, catchAction) ::= "<! Required but unused. !>"
ExceptionClause(e, catchArg, catchAction) ::= <<
catch (<catchArg>) {
 <catchAction>
}
>>

// Lexer actions are not associated with model objects.

LexerSkipCommand()  ::= "skip();"
LexerMoreCommand()  ::= "more();"
LexerPopModeCommand() ::= "popMode();"

LexerTypeCommand(arg, grammar)      ::= "type = <grammar.name>::<arg>;"
LexerChannelCommand(arg, grammar)   ::= "channel = <arg>;"
```

```
LexerModeCommand(arg, grammar)      ::= "mode = <grammar.name>Mode::<arg>;"
LexerPushModeCommand(arg, grammar)  ::= "pushMode(<grammar.name>Mode::<arg>);"

ActionTextHeader(t) ::= "<t.text>"
ActionText(t) ::= "<t.text>"

ActionTemplateHeader(t) ::= "<! Required but unused.
 !>"
ActionTemplate(t) ::= "<t.st>"

ArgRefHeader(t) ::= "<! Required but unused. !>"
ArgRef(a) ::= "_localctx-><a.escapedName>"

LocalRefHeader(t) ::= "<! Required but unused. !>"
LocalRef(a) ::= "_localctx-><a.escapedName>"

RetValueRefHeader(t) ::= "<! Required but unused. !>"
RetValueRef(a) ::= "_localctx-><a.escapedName>"

QRetValueRefHeader(t) ::= "<! Required but unused. !>"
QRetValueRef(a) ::= "<ctx(a)>-><a.dict>-><a.escapedName>"
/** How to translate $tokenLabel */

TokenRefHeader(t) ::= "<! Required but unused. !>"
TokenRef(t) ::= "<ctx(t)>-><t.escapedName>"

LabelRefHeader(t) ::= "<! Required but unused. !>"
LabelRef(t) ::= "<ctx(t)>-><t.escapedName>"

ListLabelRefHeader(t) ::= "<! Required but unused. !>"
ListLabelRef(t) ::= "<ctx(t)>-><ListLabelName(t.escapedName)>"

SetAttrHeader(t) ::= "<! Required but unused. !>"
SetAttr(s,rhsChunks) ::= "<ctx(s)>-><s.escapedName> = <rhsChunks>;"

InputSymbolType() ::= "<file.InputSymbolType; null = {Token}> *"

TokenPropertyRef_textHeader(t)
 ::= "<! Required but unused. !>"
TokenPropertyRef_text(t) ::= <<(<ctx(t)>-><t.label> != nullptr ? <ctx(t)>-><t.label>->getText() : "")>>

TokenPropertyRef_typeHeader(t) ::= "<! Required but unused. !>"
TokenPropertyRef_type(t) ::= "(<ctx(t)>-><t.label> != nullptr ? <ctx(t)>-><t.label>->getType() : 0)"

TokenPropertyRef_lineHeader(t) ::= "<! Required but unused. !>"
TokenPropertyRef_line(t) ::= "(<ctx(t)>-><t.label> != nullptr ? <ctx(t)>-><t.label>->getLine() : 0)"

TokenPropertyRef_posHeader(t) ::= "<! Required but unused. !>"
```

```
TokenPropertyRef_pos(t) ::= "(<ctx(t)>-><t.label> != nullptr ? <ctx(t)>-><t.label>->getCharPositionInLine() : 0)"

TokenPropertyRef_channelHeader(t) ::= "<! Required but unused. !>"
TokenPropertyRef_channel(t) ::= "(<ctx(t)>-><t.label> != nullptr ? <ctx(t)>-><t.label>->getChannel() : 0)"

TokenPropertyRef_indexHeader(t) ::= "<! Required but unused. !>"
TokenPropertyRef_index(t) ::= "(<ctx(t)>-><t.label> != nullptr ? <ctx(t)>-><t.label>->getTokenIndex()
 : 0)"

TokenPropertyRef_intHeader(t) ::= "<! Required but unused. !>"
TokenPropertyRef_int(t) ::= "(<ctx(t)>-><t.label> != nullptr ? std::stoi(<ctx(t)>-><t.label>->getText()) : 0)"

RulePropertyRef_startHeader(r)  ::= "<! Required but unused. !>"
RulePropertyRef_start(r) ::= "(<ctx(r)>-><r.label> != nullptr ? (<ctx(r)>-><r.label>->start) : nullptr)"

RulePropertyRef_stopHeader(r)  ::= "<! Required but unused. !>"
RulePropertyRef_stop(r)  ::= "(<ctx(r)>-><r.label> != nullptr ? (<ctx(r)>-><r.label>->stop) : nullptr)"

RulePropertyRef_textHeader(r)  ::= "<! Required but unused. !>"
RulePropertyRef_text(r)  ::= "(<ctx(r)>-><r.label> != nullptr ? _input->getText(<ctx(r)>-><r.label>->start,
<ctx(r)>-><r.label>->stop) : nullptr)"

RulePropertyRef_ctxHeader(r)   ::= "<! Required but unused. !>"
RulePropertyRef_ctx(r)   ::= "<ctx(r)>-><r.label>"

ThisRulePropertyRef_start(r) ::= "ThisRulePropertyRef_start(r) _localctx->start"
ThisRulePropertyRef_stop(r)  ::= "ThisRulePropertyRef_stop(r) _localctx->stop"

ThisRulePropertyRef_textHeader(r)
  ::= "<! Required but unused. !>"
ThisRulePropertyRef_text(r)  ::= "_input->getText(_localctx->start, _input->LT(-1))"

ThisRulePropertyRef_ctxHeader(r)   ::= "<! Required but unused. !>"
ThisRulePropertyRef_ctx(r)   ::= "_localctx"

ThisRulePropertyRef_parserHeader(r)  ::= "<! Required but unused. !>"
ThisRulePropertyRef_parser(r)  ::= "this"

NonLocalAttrRef(s) ::= "NonLocalAttrRef(s) ((<s.ruleName;
format=\"cap\">Context)getInvokingContext(<s.ruleIndex>)).<s.escapedName>"
SetNonLocalAttr(s, rhsChunks) ::=
 "SetNonLocalAttr(s, rhsChunks) ((<s.ruleName;
format=\"cap\">Context)getInvokingContext(<s.ruleIndex>)).<s.escapedName> = <rhsChunks>;"

AddToLabelListHeader(a) ::= "<! Required but unused. !>"
AddToLabelList(a) ::= <<
<ctx(a.label)>-><a.listName>.push_back(<labelref(a.label)>);
>>
```

```
TokenLabelType() ::= "<file.TokenLabelType; null = {Token}> *"

TokenDeclHeader(t) ::= "antlr4::<TokenLabelType()><t.escapedName> = nullptr"
TokenDecl(t) ::=
 "<! Variable Declaration !>"

TokenTypeDeclHeader(t) ::= "<! Local Variable !>"
TokenTypeDecl(t) ::= "size_t <t.escapedName> = 0;"

TokenListDeclHeader(t) ::= "std::vector\<antlr4::Token *> <t.escapedName>"
TokenListDecl(t) ::= "<! Variable Declaration !>"

RuleContextDeclHeader(r) ::= "<parser.name>::<r.ctxName> *<r.escapedName> = nullptr"
RuleContextDecl(r) ::= "<! Variable Declaration !>"

RuleContextListDeclHeader(rdecl) ::= "std::vector\<<rdecl.ctxName> *> <rdecl.escapedName>"
RuleContextListDecl(rdecl) ::= "<! Variable Declaration !>"

ContextTokenGetterDeclHeader(t) ::= "antlr4::tree::TerminalNode *<t.escapedName>();"
ContextTokenGetterDecl(t) ::= <<
tree::TerminalNode* <parser.name>::<t.ctx.name>::<t.escapedName>() {
 return getToken(<parser.name>::<t.escapedName>, 0);
}

>>

ContextTokenListGetterDeclHeader(t) ::= "std::vector\<antlr4::tree::TerminalNode *> <t.escapedName>();"
ContextTokenListGetterDecl(t) ::= <<
std::vector\<tree::TerminalNode *> <parser.name>::<t.ctx.name>::<t.escapedName>()
 {
 return getTokens(<parser.name>::<t.escapedName>);
}

>>

ContextTokenListIndexedGetterDeclHeader(t) ::= "antlr4::tree::TerminalNode* <t.escapedName>(size_t i);"
ContextTokenListIndexedGetterDecl(t)  ::= <<
tree::TerminalNode* <parser.name>::<t.ctx.name>::<t.escapedName>(size_t i) {
 return getToken(<parser.name>::<t.escapedName>, i);
}

>>

ContextRuleGetterDeclHeader(r) ::= "<r.ctxName> *<r.escapedName>();"
ContextRuleGetterDecl(r) ::= <<
<! Note: ctxName is the name of the context to return, while ctx is the owning context. !>
<parser.name>::<r.ctxName>* <parser.name>::<r.ctx.name>::<r.escapedName>() {
```

```
 return getRuleContext\<<parser.name>::<r.ctxName>\>(0);
}

>>

ContextRuleListGetterDeclHeader(r) ::= "std::vector\<<r.ctxName> *> <r.escapedName>();"
ContextRuleListGetterDecl(r) ::= <<
std::vector\<<parser.name>::<r.ctxName> *> <parser.name>::<r.ctx.name>::<r.escapedName>() {
 return getRuleContexts\<<parser.name>::<r.ctxName>\>();
}

>>

ContextRuleListIndexedGetterDeclHeader(r)
 ::= "<r.ctxName>* <r.escapedName>(size_t i);"
ContextRuleListIndexedGetterDecl(r) ::= <<
<parser.name>::<r.ctxName>* <parser.name>::<r.ctx.name>::<r.escapedName>(size_t i) {
 return getRuleContext\<<parser.name>::<r.ctxName>\>(i);
}

>>

LexerRuleContext() ::= "antlr4::RuleContext"

// The rule context name is the rule followed by a suffix; e.g. r becomes rContext.
RuleContextNameSuffix() ::= "Context"

ImplicitTokenLabel(tokenName) ::= <<
<tokenName; format = "lower">Token
>>

ImplicitRuleLabel(ruleName) ::= "<ruleName>Context"
ImplicitSetLabel(id) ::= "_tset<id>"
ListLabelName(label) ::= "<label>"

CaptureNextToken(d) ::= "CaptureNextToken(d) <d.varName> = _input->LT(1);"

CaptureNextTokenTypeHeader(d) ::= "<! Required but unused. !>"
CaptureNextTokenType(d) ::= "<d.varName> = _input->LA(1);"

ListenerDispatchMethodHeader(method) ::= <<
virtual void <if (method.isEnter)>enter<else>exit<endif>Rule(antlr4::tree::ParseTreeListener *listener) override;
>>
ListenerDispatchMethod(method)
 ::= <<
void <parser.name>::<struct.escapedName>::<if
(method.isEnter)>enter<else>exit<endif>Rule(tree::ParseTreeListener *listener) {
 auto parserListener = dynamic_cast\<<parser.grammarName>Listener *>(listener);
```

```
 if (parserListener != nullptr)
   parserListener-><if(method.isEnter)>enter<else>exit<endif><struct.derivedFromName; format="cap">(this);
}
>>

VisitorDispatchMethodHeader(method) ::= <<

virtual std::any accept(antlr4::tree::ParseTreeVisitor *visitor) override;
>>
VisitorDispatchMethod(method) ::=  <<

std::any <parser.name>::<struct.escapedName>::accept(tree::ParseTreeVisitor *visitor) {
 if (auto parserVisitor = dynamic_cast\<<parser.grammarName>Visitor*>(visitor))
   return parserVisitor->visit<struct.derivedFromName; format="cap">(this);
 else
   return visitor->visitChildren(this);
}
>>

AttributeDeclHeader(d) ::= "<d.type> <d.escapedName><if(d.initValue)> = <d.initValue><endif>"
AttributeDecl(d) ::= "<d.type> <d.escapedName>"

/** If
 we don't know location of label def x, use this template */
labelref(x) ::= "<if (!x.isLocal)>antlrcpp::downCast\<<x.ctx.name> *>(_localctx)-><endif><x.escapedName>"

/** For any action chunk, what is correctly-typed context struct ptr? */
ctx(actionChunk) ::= "antlrcpp::downCast\<<actionChunk.ctx.name> *>(_localctx)"

// used for left-recursive rules
recRuleAltPredicate(ruleName,opPrec) ::= "precpred(_ctx, <opPrec>)"
recRuleSetReturnAction(src,name) ::= "recRuleSetReturnAction(src,name) $<name>=$<src>.<name>;"
recRuleSetStopToken() ::= "_ctx->stop = _input->LT(-1);"

recRuleAltStartAction(ruleName, ctxName, label, isListLabel) ::= <<
_localctx = _tracker.createInstance\<<ctxName>Context>(parentContext, parentState);
<if(label)>
<if(isListLabel)>
_localctx-><label>.push_back(previousContext);
<else>
_localctx-><label> = previousContext;
<endif>
<endif>
pushNewRecursionContext(_localctx, startState, Rule<ruleName; format = "cap">);
>>

// Separate context variable to avoid frequent pointer
```

```
 type casts.
recRuleLabeledAltStartAction(ruleName, currentAltLabel, label, isListLabel) ::= <<
auto newContext = _tracker.createInstance\<<currentAltLabel; format =
"cap">Context>(_tracker.createInstance\<<ruleName; format="cap">Context>(parentContext, parentState));
_localctx = newContext;
<if(label)>
<if(isListLabel)>
newContext-><label>.push_back(previousContext);
<else>
newContext-><label> = previousContext;
<endif>
<endif>
pushNewRecursionContext(newContext, startState, Rule<ruleName; format = "cap">);
>>

recRuleReplaceContext(ctxName) ::= <<
_localctx = _tracker.createInstance\<<ctxName>Context>(_localctx);
_ctx = _localctx;
previousContext = _localctx;
>>

recRuleSetPrevCtx() ::= <<
if (!_parseListeners.empty())
 triggerExitRuleEvent();
previousContext = _localctx;
>>

/** Using a type to init value map, try to init a type; if not in table
*  must be an object, default value is "null".
*/
initValue(typeName) ::= <<
<cppTypeInitMap.(typeName)>
>>
```

Found in path(s):
* /antlr4-4-13-2-jar/org/antlr/v4/tool/templates/codegen/Cpp/Cpp.stg
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*  THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
*/

SwiftTypeInitMap ::= [
 "Int":"0",
 "Int64":"0",
 "Float":"0.0",
 "Double":"0.0",
 "Bool":"false",
 default:"nil" // anything other than a primitive type is an object
]
SwiftTypeMap ::= [
 "int":"Int",
 "float":"Float",
 "long":"Int64",
 "double":"Double",
 "bool":"Bool",
 "boolean":"Bool",
 default : key
]
// args must be <object-model-object>,
 <fields-resulting-in-STs>

accessLevelOpenOK(obj) ::= "<obj.accessLevel; null=\"open\">"
accessLevelNotOpen(obj) ::= "<obj.accessLevel; null=\"public\">"

ParserFile(file, parser, namedActions,contextSuperClass) ::= <<
<fileHeader(file.grammarFileName, file.ANTLRVersion)>
<if(file.genPackage)>
```

```
<!package <file.genPackage>;!>
<endif>
<namedActions.header>
import Antlr4

<parser>
>>

ListenerFile(file, header, namedActions) ::= <<
<fileHeader(file.grammarFileName, file.ANTLRVersion)>
<if(file.genPackage)>
<!package <file.genPackage>;!>
<endif>
<header>
import Antlr4

/**
* This interface defines a complete listener for a parse tree produced by
* {@link <file.parserName>}.
*/
<accessLevelNotOpen(file)> protocol <file.grammarName>Listener: ParseTreeListener {
 <file.listenerNames:{lname |
/**
<if(file.listenerLabelRuleNames.(lname))>
* Enter a parse tree produced by the {@code <lname>\}
* labeled alternative in {@link <file.parserName>#<file.listenerLabelRuleNames.(lname)>\}.
<else>
 * Enter a parse tree produced by {@link <file.parserName>#<lname>\}.
<endif>
- Parameters:
  - ctx: the parse tree
*/
func enter<lname; format="cap">(_ ctx: <file.parserName>.<lname; format="cap">Context)
/**
<if(file.listenerLabelRuleNames.(lname))>
* Exit a parse tree produced by the {@code <lname>\}
* labeled alternative in {@link <file.parserName>#<file.listenerLabelRuleNames.(lname)>\}.
<else>
* Exit a parse tree produced by {@link <file.parserName>#<lname>\}.
<endif>
- Parameters:
  - ctx: the parse tree
*/
func exit<lname; format="cap">(_ ctx: <file.parserName>.<lname; format="cap">Context)}; separator="\n">
}
>>

BaseListenerFile(file, header, namedActions) ::= <<
```

```
<fileHeader(file.grammarFileName, file.ANTLRVersion)>
<if(file.genPackage)>
<!package <file.genPackage>;!>
<endif>
<header>

import Antlr4


/**
* This class provides an empty implementation of {@link <file.grammarName>Listener},
* which can be extended to create a listener which only needs to handle
 a subset
* of the available methods.
*/
<accessLevelOpenOK(file)> class <file.grammarName>BaseListener: <file.grammarName>Listener {
    <accessLevelNotOpen(file)> init() { \}
 <file.listenerNames:{lname |

/**
* {@inheritDoc\}
*
* \<p>The default implementation does nothing.\</p>
*/
<accessLevelOpenOK(file)> func enter<lname; format="cap">(_ ctx: <file.parserName>.<lname;
format="cap">Context) { \}
/**
* {@inheritDoc\}
*
* \<p>The default implementation does nothing.\</p>
*/
<accessLevelOpenOK(file)> func exit<lname; format="cap">(_ ctx: <file.parserName>.<lname;
format="cap">Context) { \}}; separator="\n">

 /**
  * {@inheritDoc\}
  *
  * \<p>The default implementation does nothing.\</p>
  */
 <accessLevelOpenOK(file)> func enterEveryRule(_ ctx: ParserRuleContext) throws { }
 /**
  * {@inheritDoc\}
  *
  * \<p>The default implementation does nothing.\</p>
  */
 <accessLevelOpenOK(file)> func exitEveryRule(_ ctx: ParserRuleContext) throws { }
 /**
  * {@inheritDoc\}
```

```
 *

 * \<p>The default implementation does nothing.\</p>
 */
 <accessLevelOpenOK(file)> func visitTerminal(_ node: TerminalNode) { }
 /**
  * {@inheritDoc\}
  *
  * \<p>The default implementation does nothing.\</p>
  */
 <accessLevelOpenOK(file)> func visitErrorNode(_ node: ErrorNode) { }
}
>>

VisitorFile(file, header, namedActions) ::= <<
<fileHeader(file.grammarFileName, file.ANTLRVersion)>
<if(file.genPackage)>
<!package <file.genPackage>;!>
<endif>
<header>
import Antlr4

/**
* This interface defines a complete generic visitor for a parse tree produced
* by {@link <file.parserName>}.
*
* @param \<T> The return type of the visit operation. Use {@link Void} for
* operations with no return type.
*/
<accessLevelOpenOK(file)> class <file.grammarName>Visitor\<T>: ParseTreeVisitor\<T> {
 <file.visitorNames:{lname |
/**
<if(file.visitorLabelRuleNames.(lname))>
* Visit a parse tree produced by the {@code <lname>\}
* labeled alternative in {@link <file.parserName>#<file.visitorLabelRuleNames.(lname)>\}.
<else>
 * Visit a parse tree produced by {@link <file.parserName>#<lname>\}.
<endif>
- Parameters:
 - ctx: the parse tree
- returns: the visitor result
*/
<accessLevelOpenOK(file)> func visit<lname; format="cap">(_ ctx: <file.parserName>.<lname;
format="cap">Context) -> T {
 fatalError(#function + " must be overridden")
\}
}; separator="\n">
}
```

```
>>

BaseVisitorFile(file, header, namedActions) ::= <<
<fileHeader(file.grammarFileName, file.ANTLRVersion)>
<if(file.genPackage)>
<!package <file.genPackage>;!>
<endif>
<header>
import Antlr4

/**
* This class provides an empty implementation of {@link <file.grammarName>Visitor},
* which can be extended to create a visitor which only needs to handle a subset
* of the available methods.
*
* @param \<T> The return type of the visit operation. Use {@link Void} for
* operations with no return type.
*/
<accessLevelOpenOK(file)> class <file.grammarName>BaseVisitor\<T>: AbstractParseTreeVisitor\<T> {
 <file.visitorNames:{lname
 |
/**
* {@inheritDoc\}
*
* \<p>The default implementation returns the result of calling
* {@link #visitChildren\} on {@code ctx\}.\</p>
*/
<accessLevelOpenOK(file)> func visit<lname; format="cap">(_ ctx: <file.parserName>.<lname;
format="cap">Context) -> T? { return visitChildren(ctx) \}}; separator="\n">
}
>>

fileHeader(grammarFileName, ANTLRVersion) ::= <<
// Generated from <grammarFileName> by ANTLR <ANTLRVersion>
>>

Parser(parser, funcs, atn, sempredFuncs, superClass) ::= <<
<Parser_(ctor="parser_ctor", ...)>
>>

Parser_(parser, funcs, atn, sempredFuncs, ctor, superClass) ::= <<
<!//@SuppressWarnings({"all", "warnings", "unchecked", "unused", "cast"})!>
<accessLevelOpenOK(parser)> class <parser.name>: <superClass; null="Parser"> {

 internal static var _decisionToDFA: [DFA] = {
        var decisionToDFA = [DFA]()
        let length = <parser.name>._ATN.getNumberOfDecisions()
        for i in 0..\<length {
```

```
        <!// decisionToDFA[i] = DFA(<parser.name>._ATN.getDecisionState(i)!,
i);!>
         decisionToDFA.append(DFA(<parser.name>._ATN.getDecisionState(i)!, i))
        }
        return decisionToDFA
   }()

internal static let _sharedContextCache = PredictionContextCache()

<if(parser.tokens)>
<accessLevelNotOpen(parser)>
enum Tokens: Int {
 case EOF = -1, <parser.tokens:{k | <k> = <parser.tokens.(k)>}; separator=", ", wrap, anchor>
}
<endif>

<accessLevelNotOpen(parser)>
<if(parser.rules)>
static let <parser.rules:{r | RULE_<r.name> = <r.index>}; separator=", ", wrap, anchor>
<endif>

<accessLevelNotOpen(parser)>
static let ruleNames: [String] = [
 <parser.ruleNames:{r | "<r>"}; separator=", ", wrap, anchor>
]

<vocabulary(parser.literalNames, parser.symbolicNames,
                accessLevelNotOpen(parser))>

override <accessLevelOpenOK(parser)>
func getGrammarFileName() -> String { return "<parser.grammarFileName>" }

override <accessLevelOpenOK(parser)>
func getRuleNames() -> [String] { return <parser.name>.ruleNames
}

override <accessLevelOpenOK(parser)>
func getSerializedATN() -> [Int] { return <parser.name>._serializedATN }

override <accessLevelOpenOK(parser)>
func getATN() -> ATN { return <parser.name>._ATN }

<namedActions.members>
<parser:(ctor)()>
<funcs; separator="\n">

<if(sempredFuncs)>
override <accessLevelOpenOK(parser)>
```

```
 func sempred(_ _localctx: RuleContext?, _ ruleIndex: Int,  _ predIndex: Int)throws -> Bool {
  switch (ruleIndex) {
  <parser.sempredFuncs.values:{f|
case  <f.ruleIndex>:
 return try <f.name>_sempred(_localctx?.castdown(<f.ctxType>.self), predIndex)}; separator="\n">
     default: return true
  }
  <!return true;!>
 }
 <sempredFuncs.values; separator="\n">
<endif>

 <atn>

 <accessLevelNotOpen(parser)>
 static let _ATN = try! ATNDeserializer().deserialize(_serializedATN)
}
>>

vocabulary(literalNames, symbolicNames, accessLevel) ::= <<
private static let _LITERAL_NAMES: [String?] = [
 <literalNames:{t | <t>}; null="nil", separator=", ", wrap,
 anchor>
]
private static let _SYMBOLIC_NAMES: [String?] = [
 <symbolicNames:{t | <t>}; null="nil", separator=", ", wrap, anchor>
]
<accessLevel>
static let VOCABULARY = Vocabulary(_LITERAL_NAMES, _SYMBOLIC_NAMES)
>>

dumpActions(recog, argFuncs, actionFuncs, sempredFuncs) ::= <<
<if(actionFuncs)>
override <accessLevelOpenOK(parser)>
func action(_ _localctx: RuleContext?,  _ ruleIndex: Int, _ actionIndex: Int) throws {
 switch (ruleIndex) {
 <recog.actionFuncs.values:{f|
case <f.ruleIndex>:
 try <f.name>_action((_localctx as <f.ctxType>?), actionIndex)
  }; separator="\n">
 default: break
 }
}
<actionFuncs.values; separator="\n">
<endif>
<if(sempredFuncs)>
override <accessLevelOpenOK(parser)>
func sempred(_ _localctx: RuleContext?, _  ruleIndex: Int,_   predIndex: Int) throws -> Bool {
```

```
 switch (ruleIndex) {
 <recog.sempredFuncs.values:{f|
case <f.ruleIndex>:
 return try <f.name>_sempred(_localctx?.castdown(<f.ctxType>.self), predIndex)}; separator="\n">
 default: return true
 }
 <!return
 true;!>
}
<sempredFuncs.values; separator="\n">
<endif>
>>

parser_ctor(p) ::= <<

override <accessLevelOpenOK(parser)>
func getVocabulary() -> Vocabulary {
   return <p.name>.VOCABULARY
}

override <accessLevelNotOpen(parser)>
init(_ input:TokenStream) throws {
   RuntimeMetaData.checkVersion("<file.ANTLRVersion>", RuntimeMetaData.VERSION)
 try super.init(input)
 _interp = ParserATNSimulator(self,<p.name>._ATN,<p.name>._decisionToDFA,
<parser.name>._sharedContextCache)
}

>>

/* This generates a private method since the actionIndex is generated, making an
* overriding implementation impossible to maintain.
*/
RuleActionFunction(r, actions) ::= <<
private func <r.name>_action(_ _localctx: <r.ctxType>?,  _ actionIndex: Int) throws {
 switch (actionIndex) {
 <actions:{index|
case <index>:
 <actions.(index)>
  }; separator="\n">
  default: break
 }
}
>>

/* This generates a private method since the predIndex is generated, making an
* overriding implementation impossible to maintain.
```

```
 */
RuleSempredFunction(r, actions) ::= <<
private func <r.name>_sempred(_ _localctx: <r.ctxType>!,  _ predIndex: Int) throws -> Bool {
 switch (predIndex) {
 <actions:{index|
   case <index>:return <actions.(index)>}; separator="\n">
     default: return true
 }
 <!return true;!>
}
>>

RuleFunction(currentRule,args,code,locals,ruleCtx,altLabelCtxs,namedActions,finallyAction,postamble,exceptions)
::= <<
<ruleCtx>
<altLabelCtxs:{l | <altLabelCtxs.(l)>}; separator="\n">
@discardableResult
<if(currentRule.modifiers)><currentRule.modifiers:{f | <f> }><else> <accessLevelOpenOK(parser)> func
<endif><currentRule.escapedName>(<if(first(args))>_ <endif><args; separator=", _">) throws ->
<currentRule.ctxType> {
 var _localctx: <currentRule.ctxType>
 _localctx = <currentRule.ctxType>(_ctx, getState()<currentRule.args:{a | , <a.escapedName>}>)
 try enterRule(_localctx, <currentRule.startState>, <parser.name>.RULE_<currentRule.name>)
 <namedActions.init>
 <locals; separator="\n">
 defer {

    <finallyAction>
     try! exitRule()
   }
 do {
<if(currentRule.hasLookaheadBlock)>
  var _alt:Int
<endif>
   <code>
  <postamble; separator="\n">
   <namedActions.after>
 }
 <if(exceptions)>
 <exceptions; separator="\n">
 <else>
 catch ANTLRException.recognition(let re) {
  _localctx.exception = re
  _errHandler.reportError(self, re)
  try _errHandler.recover(self, re)
 }
 <endif>
```

```
 return _localctx
}
>>

LeftRecursiveRuleFunction(currentRule,args,code,locals,ruleCtx,altLabelCtxs,
 namedActions,finallyAction,postamble) ::=
<<

<ruleCtx>
<altLabelCtxs:{l | <altLabelCtxs.(l)>}; separator="\n">

<if(currentRule.modifiers)><currentRule.modifiers:{f | <f> }><else> <accessLevelNotOpen(parser)> final <endif>
func <currentRule.escapedName>( <if(first(args))>_ <endif><args; separator=", _">) throws ->
<currentRule.ctxType>   {
 return try <currentRule.escapedName>(0<currentRule.args:{a | , <a.escapedName>}>)
}
@discardableResult
private func <currentRule.escapedName>(_ _p<args:{a | , <a>}>:
 Int) throws -> <currentRule.ctxType>   {
 let _parentctx: ParserRuleContext? = _ctx
 let _parentState: Int = getState()
 var _localctx: <currentRule.ctxType>
 _localctx = <currentRule.ctxType>(_ctx, _parentState<currentRule.args:{a | , <a.escapedName>}>)
 var _prevctx: <currentRule.ctxType> = _localctx
 let _startState: Int = <currentRule.startState>
 try enterRecursionRule(_localctx, <currentRule.startState>, <parser.name>.RULE_<currentRule.name>, _p)
 <namedActions.init>
 <locals; separator="\n">
 defer {
    <finallyAction>
    try! unrollRecursionContexts(_parentctx)
   }
 do {
<if(currentRule.hasLookaheadBlock)>
  var _alt: Int
<endif>
  <code>
  <postamble; separator="\n">
  <namedActions.after>
 }
 catch ANTLRException.recognition(let re) {
  _localctx.exception = re
  _errHandler.reportError(self, re)
  try _errHandler.recover(self, re)
 }

 return _localctx;
}
```

```
>>

CodeBlockForOuterMostAlt(currentOuterMostAltCodeBlock, locals, preamble, ops) ::= <<
<if(currentOuterMostAltCodeBlock.altLabel)>_localctx
 =  <currentOuterMostAltCodeBlock.altLabel; format="cap">Context(_localctx);<endif>
try enterOuterAlt(_localctx, <currentOuterMostAltCodeBlock.alt.altNum>)
<CodeBlockForAlt(currentAltCodeBlock=currentOuterMostAltCodeBlock, ...)>
>>

CodeBlockForAlt(currentAltCodeBlock, locals, preamble, ops) ::= <<
<!//{!>
<locals; separator="\n">
<preamble; separator="\n">
<ops; separator="\n">
<!//}!>
>>

LL1AltBlock(choice, preamble, alts, error) ::= <<
setState(<choice.stateNumber>)
try _errHandler.sync(self)
<if(choice.label)><labelref(choice.label)> = try _input.LT(1)<endif>
<preamble; separator="\n">
switch (<parser.name>.Tokens(rawValue: try _input.LA(1))!) {
<choice.altLook,alts:{look,alt | <cases(tokens=look)>
 <alt>
 break}; separator="\n">
default:
 <error>
}
>>

LL1OptionalBlock(choice, alts, error) ::= <<
setState(<choice.stateNumber>)
try _errHandler.sync(self)
switch (<parser.name>.Tokens(rawValue: try _input.LA(1))!) {
<choice.altLook,alts:{look,alt| <cases(tokens=look)>
  <alt>
 break}; separator="\n">
default:
 break
}
>>

LL1OptionalBlockSingleAlt(choice, expr, alts, preamble, error, followExpr) ::= <<
setState(<choice.stateNumber>)
try _errHandler.sync(self)
<preamble; separator="\n">
if (<expr>) {
```

```
 <alts; separator="\n">
}
<!else if ( !(<followExpr>) ) <error>!>
>>

LL1StarBlockSingleAlt(choice, loopExpr, alts, preamble, iteration) ::= <<
setState(<choice.stateNumber>)
try _errHandler.sync(self)
<preamble; separator="\n">
while (<loopExpr>) {
 <alts; separator="\n">
 setState(<choice.loopBackStateNumber>)
 try _errHandler.sync(self)
 <iteration>
}
>>

LL1PlusBlockSingleAlt(choice, loopExpr, alts, preamble, iteration) ::= <<
setState(<choice.blockStartStateNumber>) <! alt block decision !>
try _errHandler.sync(self)
<preamble; separator="\n">
repeat {
 <alts; separator="\n">
 setState(<choice.stateNumber>); <! loopback/exit decision !>
 try _errHandler.sync(self)
 <iteration>
} while (<loopExpr>)
>>

// LL(*) stuff

AltBlock(choice,
 preamble, alts, error) ::= <<
setState(<choice.stateNumber>)
try _errHandler.sync(self)
<if(choice.label)><labelref(choice.label)> = try _input.LT(1)<endif>
<preamble; separator="\n">
switch(try getInterpreter().adaptivePredict(_input,<choice.decision>, _ctx)) {
<alts:{alt |
case <i>:
 <alt>
 break}; separator="\n">
default: break
}
>>

OptionalBlock(choice, alts, error) ::= <<
setState(<choice.stateNumber>)
```

```
try _errHandler.sync(self)
switch (try getInterpreter().adaptivePredict(_input,<choice.decision>,_ctx)) {
<alts:{alt |
case <i><if(!choice.ast.greedy)>+1<endif>:
 <alt>
 break}; separator="\n">
default: break
}
>>

StarBlock(choice, alts, sync, iteration) ::= <<
setState(<choice.stateNumber>)
try _errHandler.sync(self)
_alt = try getInterpreter().adaptivePredict(_input,<choice.decision>,_ctx)
while (_alt != <choice.exitAlt> && _alt != ATN.INVALID_ALT_NUMBER) {
 if ( _alt==1<if(!choice.ast.greedy)>+1<endif> ) {
  <iteration>
  <alts> <! should only be one !>
 }
 setState(<choice.loopBackStateNumber>)
 try
 _errHandler.sync(self)
 _alt = try getInterpreter().adaptivePredict(_input,<choice.decision>,_ctx)
}
>>

PlusBlock(choice, alts, error) ::= <<
setState(<choice.blockStartStateNumber>); <! alt block decision !>
try _errHandler.sync(self)
_alt = 1<if(!choice.ast.greedy)>+1<endif>;
repeat {
 switch (_alt) {
 <alts:{alt|
case <i><if(!choice.ast.greedy)>+1<endif>:
 <alt>
 break}; separator="\n">
 default:
  <error>
 }
 setState(<choice.loopBackStateNumber>); <! loopback/exit decision !>
 try _errHandler.sync(self)
 _alt = try getInterpreter().adaptivePredict(_input,<choice.decision>,_ctx)
} while (_alt != <choice.exitAlt> && _alt !=  ATN.INVALID_ALT_NUMBER)
>>

Sync(s) ::= "sync(<s.expecting.name>);"

ThrowNoViableAlt(t) ::= "throw ANTLRException.recognition(e: NoViableAltException(self))"
```

```
TestSetInline(s) ::= <<
<s.bitsets:{bits | <if(rest(rest(bits.tokens)))><bitsetBitfieldComparison(s, bits)><else><bitsetInlineComparison(s,
bits)><endif>}; separator=" || ">
>>

//
 Java language spec 15.19 - shift operators mask operands rather than overflow to 0... need range test
testShiftInRange(shiftAmount) ::= <<
(Int64(<shiftAmount>) & ~0x3f) == 0
>>

bitsetBitfieldComparison(s, bits) ::= <<
(<testShiftInRange({<offsetShift(s.varName, bits.shift)>})> && ((Int64(1) \<\< <offsetShift(s.varName,
bits.shift)>) & <bits.calculated>) != 0)
>>

isZero ::= [
"0": true,
default: false
]
parserName(t) ::= <%
<parser.name>.Tokens.<t.name>.rawValue
%>
offsetShift(shiftAmount, offset) ::= <%
<if(!isZero.(offset))>(<shiftAmount> - <offset>)<else><shiftAmount><endif>
%>

bitsetInlineComparison(s, bits) ::= <%
<bits.tokens:{t | <s.varName> == <parser.name>.Tokens.<t.name>.rawValue}; separator=" || ">
%>

cases(tokens) ::= <<
<trunc(tokens): {t | case .<t.name>:fallthrough}  ; separator="\n">
<last(tokens): {t | case .<t.name>:}  ; separator="\n">
>>

InvokeRule(r, argExprsChunks) ::= <<
setState(<r.stateNumber>)
<if(r.labels)>
try {
  let assignmentValue = try
<r.escapedName>(<if(r.ast.options.p)><r.ast.options.p><if(argExprsChunks)>,<endif><endif><argExprsChunks>)
  <r.labels:{l
 | <labelref(l)> = assignmentValue} ; separator="\n">
    }()
<else>try
<r.escapedName>(<if(r.ast.options.p)><r.ast.options.p><if(argExprsChunks)>,<endif><endif><argExprsChunks>)<
```

```
endif>
>>

MatchToken(m) ::= <<
setState(<m.stateNumber>)
<if(m.labels)>
try {
  let assignmentValue = try match(<parser.name>.Tokens.<m.escapedName>.rawValue)
  <m.labels:{l | <labelref(l)> = assignmentValue}  ; separator="\n">
    }()
<else>try match(<parser.name>.Tokens.<m.escapedName>.rawValue)<endif>
>>

MatchSet(m, expr, capture) ::= "<CommonSetStuff(m, expr, capture, false)>"

MatchNotSet(m, expr, capture) ::= "<CommonSetStuff(m, expr, capture, true)>"

CommonSetStuff(m, expr, capture, invert) ::= <<
setState(<m.stateNumber>)
<if(m.labels)><m.labels:{l | <labelref(l)> = }>try _input.LT(1)<endif>
<capture>
if (<if(invert)><m.varName> \<= 0 || <else>!<endif>(<expr>)) {
 <if(m.labels)><m.labels:{l
 | <labelref(l)> = }><endif>try _errHandler.recoverInline(self)<if(m.labels)> as Token<endif>
}
else {
 _errHandler.reportMatch(self)
 try consume()
}
>>

Wildcard(w) ::= <<
setState(<w.stateNumber>)
<if(w.labels)><w.labels:{l | <labelref(l)> = }><endif>try matchWildcard();
>>

// ACTION STUFF

Action(a, foo, chunks) ::= "<chunks>"

ArgAction(a, chunks) ::= "<chunks>"

SemPred(p, chunks, failChunks) ::= <<
setState(<p.stateNumber>)
if (!(<chunks>)) {
   throw ANTLRException.recognition(e:FailedPredicateException(self, <p.predicate><if(failChunks)>,
<failChunks><elseif(p.msg)>, <p.msg><endif>))
}
```

```
>>

ExceptionClause(e, catchArg, catchAction) ::= <<
catch (<catchArg>) {
 <catchAction>
}
>>

// lexer actions are not associated with model objects

LexerSkipCommand()  ::= "skip()"
LexerMoreCommand()  ::= "more()"
LexerPopModeCommand() ::= "popMode()"

LexerTypeCommand(arg)      ::= "_type = <arg>"
LexerChannelCommand(arg)   ::= "_channel = <arg>"
LexerModeCommand(arg)      ::= "_mode =
 <arg>"
LexerPushModeCommand(arg)  ::= "pushMode(<arg>)"

ActionText(t) ::= "<t.text>"
ActionTemplate(t) ::= "<t.st>"
ArgRef(a) ::= "_localctx.<a.escapedName>"
LocalRef(a) ::= "_localctx.<a.escapedName>"
RetValueRef(a) ::= "_localctx.<a.escapedName>"
QRetValueRef(a) ::= "<ctx(a)>.<a.dict>.<a.escapedName>"
/** How to translate $tokenLabel */
TokenRef(t) ::= "<ctx(t)>.<t.escapedName>"
LabelRef(t) ::= "<ctx(t)>.<t.escapedName>"
ListLabelRef(t) ::= "<ctx(t)>.<ListLabelName(t.escapedName)>"
SetAttr(s,rhsChunks) ::= "<ctx(s)>.<s.escapedName> = <rhsChunks>"

TokenLabelType() ::= "<file.TokenLabelType; null={Token}>"
InputSymbolType() ::= "<file.InputSymbolType; null={Token}>"

TokenPropertyRef_text(t) ::= "(<ctx(t)>.<t.label> != nil ? <ctx(t)>.<t.label>!.getText()! : \"\")"
TokenPropertyRef_type(t) ::= "(<ctx(t)>.<t.label> != nil ? <ctx(t)>.<t.label>!.getType() : 0)"
TokenPropertyRef_line(t) ::= "(<ctx(t)>.<t.label> != nil ? <ctx(t)>.<t.label>!.getLine() : 0)"
TokenPropertyRef_pos(t) ::= "(<ctx(t)>.<t.label>
 != nil ? <ctx(t)>.<t.label>!.getCharPositionInLine() : 0)"
TokenPropertyRef_channel(t) ::= "(<ctx(t)>.<t.label> != nil ? <ctx(t)>.<t.label>!.getChannel() : 0)"
TokenPropertyRef_index(t) ::= "(<ctx(t)>.<t.label> != nil ? <ctx(t)>.<t.label>!.getTokenIndex() : 0)"
TokenPropertyRef_int(t) ::= "(<ctx(t)>.<t.label> != nil ? Int(<ctx(t)>.<t.label>!.getText()!) : 0)"

RulePropertyRef_start(r) ::= "(<ctx(r)>.<r.label> != nil ? (<ctx(r)>.<r.label>!.start?.description ?? \"\") : \"\")"
RulePropertyRef_stop(r)  ::= "(<ctx(r)>.<r.label> != nil ? (<ctx(r)>.<r.label>!.stop?.description ?? \"\") : \"\")"
RulePropertyRef_text(r)  ::= "(<ctx(r)>.<r.label> != nil ? try
_input.getText(<ctx(r)>.<r.label>!.start,<ctx(r)>.<r.label>!.stop) : \"\")"
```

```
RulePropertyRef_ctx(r)  ::= "<ctx(r)>.<r.label>"
RulePropertyRef_parser(r)  ::= "self"

ThisRulePropertyRef_start(r) ::= "_localctx.start"
ThisRulePropertyRef_stop(r)  ::= "_localctx.stop"
ThisRulePropertyRef_text(r)  ::= "(try _input.getText(_localctx.start,
 try _input.LT(-1)))"
ThisRulePropertyRef_ctx(r)  ::= "_localctx"
ThisRulePropertyRef_parser(r)  ::= "self"

NonLocalAttrRef(s)   ::= "((<s.ruleName;
format=\"cap\">Context)getInvokingContext(<s.ruleIndex>)).<s.escapedName>"
SetNonLocalAttr(s, rhsChunks)   ::=
 "((<s.ruleName; format=\"cap\">Context)getInvokingContext(<s.ruleIndex>)).<s.escapedName> = <rhsChunks>"

AddToLabelList(a) ::= "<ctx(a.label)>.<a.listName>.append(<labelref(a.label)>)"

TokenDecl(t) ::= "<t.escapedName>: <SwiftTypeMap.(TokenLabelType())>!"
TokenTypeDecl(t) ::= "var <t.escapedName>: Int = 0"
TokenListDecl(t) ::= "<t.escapedName>: [Token] = [Token]()"
RuleContextDecl(r) ::= "<r.escapedName>: <r.ctxName>!"
RuleContextListDecl(rdecl) ::= "<rdecl.escapedName>: [<rdecl.ctxName>] = [<rdecl.ctxName>]()"

ContextTokenGetterDecl(t) ::= <<
 <accessLevelOpenOK(parser)>
 func <t.escapedName>() -> TerminalNode? {
  return getToken(<parser.name>.Tokens.<t.escapedName>.rawValue, 0)
 }
>>
ContextTokenListGetterDecl(t)
 ::= <<
 <accessLevelOpenOK(parser)>
 func <t.escapedName>() -> [TerminalNode] {
  return getTokens(<parser.name>.Tokens.<t.escapedName>.rawValue)
 }
>>
ContextTokenListIndexedGetterDecl(t) ::= <<
 <accessLevelOpenOK(parser)>
 func <t.escapedName>(_ i:Int) -> TerminalNode? {
  return getToken(<parser.name>.Tokens.<t.escapedName>.rawValue, i)
 }
>>
ContextRuleGetterDecl(r) ::= <<
 <accessLevelOpenOK(parser)>
 func <r.escapedName>() -> <r.ctxName>? {
  return getRuleContext(<r.ctxName>.self, 0)
 }
>>
```

```
ContextRuleListGetterDecl(r) ::= <<
 <accessLevelOpenOK(parser)>
 func <r.escapedName>() -> [<r.ctxName>] {
  return getRuleContexts(<r.ctxName>.self)
 }
>>
ContextRuleListIndexedGetterDecl(r)   ::= <<
 <accessLevelOpenOK(parser)>
 func <r.escapedName>(_ i: Int) -> <r.ctxName>? {
  return getRuleContext(<r.ctxName>.self, i)
 }
>>

LexerRuleContext() ::= "RuleContext"

/** The rule context name is the rule followed by a suffix; e.g.,
* r becomes rContext.
*/
RuleContextNameSuffix() ::= "Context"

ImplicitTokenLabel(tokenName)
 ::= "_<tokenName>"
ImplicitRuleLabel(ruleName)   ::= "_<ruleName>"
ImplicitSetLabel(id)    ::= "_tset<id>"
ListLabelName(label)    ::= "<label>"

CaptureNextToken(d) ::= "<d.varName> = try _input.LT(1)"
CaptureNextTokenType(d) ::= "<d.varName> = try _input.LA(1)"

StructDecl(struct,ctorAttrs,attrs,getters,dispatchMethods,interfaces,extensionMembers,signatures,
        superClass={ParserRuleContext}) ::= <<

<accessLevelNotOpen(parser)> class <struct.escapedName>:
<if(contextSuperClass)><contextSuperClass><else>ParserRuleContext<endif><if(interfaces)>, <interfaces;
separator=", "><endif> {
 <attrs:{a | <accessLevelOpenOK(parser)> var <a>}; separator="\n">
 <getters:{g | <g>}; separator="\n">
 <! <if(ctorAttrs)> <accessLevelNotOpen(parser)> init(_ parent: ParserRuleContext,_ invokingState: Int) {
super.init(parent, invokingState)  }<endif> !>
 <if(ctorAttrs)>
 <accessLevelNotOpen(parser)> convenience init(_ parent: ParserRuleContext?, _ invokingState:
 Int<ctorAttrs:{a | , _ <a>}>) {
  self.init(parent, invokingState)
  <struct.ctorAttrs:{a | self.<a.escapedName> = <a.escapedName>;}; separator="\n">
 }
 <endif>

 override <accessLevelOpenOK(parser)>
```

```
 func getRuleIndex() -> Int {
  return <parser.name>.RULE_<struct.derivedFromName>
 }
<if(struct.provideCopyFrom && struct.attrs)> <! don't need copy unless we have subclasses !>
 <accessLevelOpenOK(parser)>
 override func copyFrom(_ ctx_: ParserRuleContext) {
  super.copyFrom(ctx_)
  let ctx = ctx_ as! <struct.escapedName>
  <struct.attrs:{a | self.<a.escapedName> = ctx.<a.escapedName>;}; separator="\n">
 }
<endif>
 <dispatchMethods; separator="\n">
 <extensionMembers; separator="\n">
}
>>

AltLabelStructDecl(struct,attrs,getters,dispatchMethods) ::= <<
<accessLevelNotOpen(parser)> class <struct.escapedName>: <currentRule.name; format="cap">Context {
 <attrs:{a | <accessLevelNotOpen(parser)> var <a>}; separator="\n">
 <getters:{g | <g>}; separator="\n">

 <accessLevelNotOpen(parser)>
 init(_
 ctx: <currentRule.name; format="cap">Context) {
  super.init()
  copyFrom(ctx)
 }
 <dispatchMethods; separator="\n">
}
>>

ListenerDispatchMethod(method) ::= <<
override <accessLevelOpenOK(parser)>
func <if(method.isEnter)>enter<else>exit<endif>Rule(_ listener: ParseTreeListener) {
 if let listener = listener as? <parser.grammarName>Listener {
  listener.<if(method.isEnter)>enter<else>exit<endif><struct.derivedFromName; format="cap">(self)
 }
}
>>

VisitorDispatchMethod(method) ::= <<
override <accessLevelOpenOK(parser)>
func accept\<T>(_ visitor: ParseTreeVisitor\<T>) -> T? {
 if let visitor = visitor as? <parser.grammarName>Visitor {
    return visitor.visit<struct.derivedFromName; format="cap">(self)
 }
 else if let visitor = visitor as? <parser.grammarName>BaseVisitor {
    return visitor.visit<struct.derivedFromName; format="cap">(self)
```

```
 }
 else {
     return visitor.visitChildren(self)
 }
}
>>

AttributeDecl(d) ::= "<d.escapedName>: <SwiftTypeMap.(d.type)><if(d.initValue)>
 = <d.initValue><else>!<endif>"

/** If we don't know location of label def x, use this template (_localctx as! <x.ctx.name> */
labelref(x) ::= "<if(!x.isLocal)>_localctx.castdown(<x.ctx.name>.self).<endif><x.escapedName>"

/** For any action chunk, what is correctly-typed context struct ptr?    */
ctx(actionChunk) ::= "_localctx.castdown(<actionChunk.ctx.name>.self)"

// used for left-recursive rules
recRuleAltPredicate(ruleName,opPrec)  ::= "precpred(_ctx, <opPrec>)"
recRuleSetReturnAction(src,name)   ::= "$<name>=$<src>.<name>"
recRuleSetStopToken()                ::= "_ctx!.stop = try _input.LT(-1)"

recRuleAltStartAction(ruleName, ctxName, label, isListLabel) ::= <<
_localctx = <ctxName>Context(_parentctx, _parentState);
<if(label)>
<if(isListLabel)>
_localctx.<label>.append(_prevctx)
<else>
_localctx.<label> = _prevctx
<endif>
<endif>
try pushNewRecursionContext(_localctx, _startState, <parser.name>.RULE_<ruleName>)
>>

recRuleLabeledAltStartAction(ruleName, currentAltLabel,
 label, isListLabel) ::= <<
_localctx = <currentAltLabel; format="cap">Context(  <ruleName; format="cap">Context(_parentctx,
_parentState))
<if(label)>
<if(isListLabel)>
(_localctx as! <currentAltLabel; format="cap">Context).<label>.append(_prevctx)
<else>
(_localctx as! <currentAltLabel; format="cap">Context).<label> = _prevctx
<endif>
<endif>
try pushNewRecursionContext(_localctx, _startState, <parser.name>.RULE_<ruleName>)
>>

recRuleReplaceContext(ctxName) ::= <<
```

```
_localctx = <ctxName>Context(_localctx)
_ctx = _localctx
_prevctx = _localctx
>>

recRuleSetPrevCtx() ::= <<
if _parseListeners != nil {
  try triggerExitRuleEvent()
}
_prevctx = _localctx
>>


LexerFile(lexerFile, lexer, namedActions) ::= <<
<fileHeader(lexerFile.grammarFileName, lexerFile.ANTLRVersion)>
<if(lexerFile.genPackage)>
<!package <lexerFile.genPackage>;!>
<endif>
<namedActions.header>
import Antlr4

<lexer>
>>
Lexer(lexer, atn, actionFuncs, sempredFuncs, superClass) ::= <<
<accessLevelOpenOK(lexer)> class <lexer.name>:
 <superClass; null="Lexer"> {

 internal static var _decisionToDFA: [DFA] = {
        var decisionToDFA = [DFA]()
        let length = <lexer.name>._ATN.getNumberOfDecisions()
        for i in 0..\<length {
          <! decisionToDFA[i] = DFA(<lexer.name>._ATN.getDecisionState(i)!, i);!>
             decisionToDFA.append(DFA(<lexer.name>._ATN.getDecisionState(i)!, i))
        }
         return decisionToDFA
   }()

 internal static let _sharedContextCache = PredictionContextCache()

 <accessLevelNotOpen(lexer)>
 <if(lexer.tokens)>
 static let <lexer.tokens:{k | <k>=<lexer.tokens.(k)>}; separator=", ", wrap, anchor>
 <endif>

 <if(lexer.escapedChannels)>
 <accessLevelNotOpen(lexer)>
 static let <lexer.escapedChannels:{k | <k>=<lexer.escapedChannels.(k)>}; separator=", ", wrap, anchor>
 <endif>
```

```
<if(rest(lexer.escapedModeNames))>
<accessLevelNotOpen(lexer)>
static let <rest(lexer.escapedModeNames):{m| <m>=<i>}; separator=", ", wrap, anchor>
<endif>
<accessLevelNotOpen(lexer)>
static
let channelNames: [String] = [
 "DEFAULT_TOKEN_CHANNEL", "HIDDEN"<if (lexer.channelNames)>, <lexer.channelNames:{c| "<c>"};
separator=", ", wrap, anchor><endif>
]

<accessLevelNotOpen(lexer)>
static let modeNames: [String] = [
 <lexer.modes:{m| "<m>"}; separator=", ", wrap, anchor>
]

<accessLevelNotOpen(lexer)>
static let ruleNames: [String] = [
 <lexer.ruleNames:{r | "<r>"}; separator=", ", wrap, anchor>
]

<vocabulary(lexer.literalNames, lexer.symbolicNames,
            accessLevelNotOpen(lexer))>

<namedActions.members>

override <accessLevelOpenOK(lexer)>
func getVocabulary() -> Vocabulary {
 return <lexer.name>.VOCABULARY
}

<accessLevelNotOpen(lexer)>
required init(_ input: CharStream) {
    RuntimeMetaData.checkVersion("<lexerFile.ANTLRVersion>", RuntimeMetaData.VERSION)
 super.init(input)
 _interp = LexerATNSimulator(self, <lexer.name>._ATN, <lexer.name>._decisionToDFA,
<lexer.name>._sharedContextCache)
}

override <accessLevelOpenOK(lexer)>
func
getGrammarFileName() -> String { return "<lexer.grammarFileName>" }

override <accessLevelOpenOK(lexer)>
func getRuleNames() -> [String] { return <lexer.name>.ruleNames }

override <accessLevelOpenOK(lexer)>
func getSerializedATN() -> [Int] { return <lexer.name>._serializedATN }
```

```
 override <accessLevelOpenOK(lexer)>
 func getChannelNames() -> [String] { return <lexer.name>.channelNames }

 override <accessLevelOpenOK(lexer)>
 func getModeNames() -> [String] { return <lexer.name>.modeNames }

 override <accessLevelOpenOK(lexer)>
 func getATN() -> ATN { return <lexer.name>._ATN }

 <dumpActions(lexer, "", actionFuncs, sempredFuncs)>
 <atn>

 <accessLevelNotOpen(lexer)>
 static let _ATN: ATN = try! ATNDeserializer().deserialize(_serializedATN)
}
>>

SerializedATN(model) ::= <<
static let _serializedATN:[Int] = [
 <model.serialized: {s | <s>}; separator=",", wrap>
]
>>

/** Using a type to init value map, try to init a type; if not in table
* must be an object,
 default value is "null".
*/
initValue(typeName) ::= <<
<SwiftTypeInitMap.(typeName)>
>>

codeFileExtension() ::= ".swift"
```

Found in path(s):
* /antlr4-4-13-2-jar/org/antlr/v4/tool/templates/codegen/Swift/Swift.stg
No license file was found, but licenses were detected in source scan.

/*
[The "BSD licence"]
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modification, are permitted provided that the following conditions
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*/
/*
This file contains the actual layout of the messages emitted by ANTLR.
This file contains the default format ANTLR uses.
*/

location(file, line, column) ::= "<file>:<line>:<column>:"

message(id, text) ::= "(<id>) <text>"

report(location, message, type) ::= "<type>(<message.id>): <location> <message.text>"

wantsSingleLineMessage() ::= "false"

Found in path(s):
* /antlr4-4-13-2-jar/org/antlr/v4/tool/templates/messages/formats/antlr.stg
No license file was found, but licenses were detected in source scan.

/*
* [The "BSD license"]
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*  Copyright (c) 2012-2016 Sam Harwell
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*  DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY
*  THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT
*  (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF
*  THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
*/

javaTypeInitMap ::= [
 "int":"0",
 "long":"0",
 "float":"0.0f",
 "double":"0.0",
 "boolean":"false",
 "byte":"0",
 "short":"0",
 "char":"0",
 default:"null" // anything other than a primitive type is an object
]

// args must be <object-model-object>, <fields-resulting-in-STs>

ParserFile(file, parser, namedActions, contextSuperClass) ::= <<
<fileHeader(file.grammarFileName,
 file.ANTLRVersion)>
<if(file.genPackage)>
package <file.genPackage>;
<endif>
<namedActions.header>
import org.antlr.v4.runtime.atn.*;
import org.antlr.v4.runtime.dfa.DFA;
import org.antlr.v4.runtime.*;
import org.antlr.v4.runtime.misc.*;
import org.antlr.v4.runtime.tree.*;
import java.util.List;
import java.util.Iterator;
import java.util.ArrayList;

<parser>
```

```
>>

ListenerFile(file, header, namedActions) ::= <<
<fileHeader(file.grammarFileName, file.ANTLRVersion)>
<if(file.genPackage)>
package <file.genPackage>;
<endif>
<header>
import org.antlr.v4.runtime.tree.ParseTreeListener;

/**
* This interface defines a complete listener for a parse tree produced by
* {@link <file.parserName>}.
*/
public interface <file.grammarName>Listener extends ParseTreeListener {
 <file.listenerNames:{lname |
/**
<if(file.listenerLabelRuleNames.(lname))>
* Enter a parse tree produced by the {@code <lname>\}
* labeled alternative in {@link <file.parserName>#<file.listenerLabelRuleNames.(lname)>\}.
<else>
 * Enter a parse tree produced by {@link <file.parserName>#<lname>\}.
<endif>
* @param ctx the parse tree
*/
void enter<lname; format="cap">(<file.parserName>.<lname; format="cap">Context ctx);
/**
<if(file.listenerLabelRuleNames.(lname))>
* Exit a parse tree produced by the {@code <lname>\}
* labeled alternative in {@link <file.parserName>#<file.listenerLabelRuleNames.(lname)>\}.
<else>
* Exit a parse tree produced by {@link <file.parserName>#<lname>\}.
<endif>
* @param ctx the parse tree
*/
void exit<lname; format="cap">(<file.parserName>.<lname; format="cap">Context ctx);}; separator="\n">
}
>>

BaseListenerFile(file, header, namedActions) ::= <<
<fileHeader(file.grammarFileName, file.ANTLRVersion)>
<if(file.genPackage)>
package <file.genPackage>;
<endif>
<header>

import org.antlr.v4.runtime.ParserRuleContext;
import org.antlr.v4.runtime.tree.ErrorNode;
```

```
import org.antlr.v4.runtime.tree.TerminalNode;

/**
* This class provides an empty implementation of {@link <file.grammarName>Listener},
 * which can be extended to create a listener which only needs to handle a subset
* of the available methods.
*/
@SuppressWarnings("CheckReturnValue")
public class <file.grammarName>BaseListener implements <file.grammarName>Listener {
 <file.listenerNames:{lname |
/**
* {@inheritDoc\}
*
* \<p>The default implementation does nothing.\</p>
*/
@Override public void enter<lname; format="cap">(<file.parserName>.<lname; format="cap">Context ctx) { \}
/**
* {@inheritDoc\}
*
* \<p>The default implementation does nothing.\</p>
*/
@Override public void exit<lname; format="cap">(<file.parserName>.<lname; format="cap">Context ctx) { \}};
separator="\n">

 /**
  * {@inheritDoc\}
  *
  * \<p>The default implementation does nothing.\</p>
  */
 @Override public void enterEveryRule(ParserRuleContext ctx) { }
 /**
  * {@inheritDoc\}
  *
  * \<p>The default implementation does nothing.\</p>
  */
 @Override public void exitEveryRule(ParserRuleContext ctx) { }
 /**
  *
 {@inheritDoc\}
  *
  * \<p>The default implementation does nothing.\</p>
  */
 @Override public void visitTerminal(TerminalNode node) { }
 /**
  * {@inheritDoc\}
  *
  * \<p>The default implementation does nothing.\</p>
  */
```

```
 @Override public void visitErrorNode(ErrorNode node) { }
}
>>

VisitorFile(file, header, namedActions) ::= <<
<fileHeader(file.grammarFileName, file.ANTLRVersion)>
<if(file.genPackage)>
package <file.genPackage>;
<endif>
<header>
import org.antlr.v4.runtime.tree.ParseTreeVisitor;

/**
* This interface defines a complete generic visitor for a parse tree produced
* by {@link <file.parserName>}.
*
* @param \<T> The return type of the visit operation. Use {@link Void} for
* operations with no return type.
*/
public interface <file.grammarName>Visitor\<T> extends ParseTreeVisitor\<T> {
 <file.visitorNames:{lname |
/**
<if(file.visitorLabelRuleNames.(lname))>
* Visit a parse tree produced by the {@code <lname>\}
* labeled alternative in {@link <file.parserName>#<file.visitorLabelRuleNames.(lname)>\}.
<else>
 * Visit a parse tree produced by {@link <file.parserName>#<lname>\}.
<endif>
* @param ctx the parse tree
* @return the visitor result
*/
T visit<lname; format="cap">(<file.parserName>.<lname; format="cap">Context ctx);}; separator="\n">
}
>>

BaseVisitorFile(file, header, namedActions) ::= <<
<fileHeader(file.grammarFileName, file.ANTLRVersion)>
<if(file.genPackage)>
package <file.genPackage>;
<endif>
<header>
import org.antlr.v4.runtime.tree.AbstractParseTreeVisitor;

/**
* This class provides an empty implementation of {@link <file.grammarName>Visitor},
* which can be extended to create a visitor which only needs to handle a subset
* of the available methods.
*
```

```
* @param \<T> The return type of the visit operation. Use {@link Void} for
* operations with no return type.
*/
@SuppressWarnings("CheckReturnValue")
public class <file.grammarName>BaseVisitor\<T> extends AbstractParseTreeVisitor\<T> implements
<file.grammarName>Visitor\<T>
 {
 <file.visitorNames:{lname |
/**
* {@inheritDoc\}
*
* \<p>The default implementation returns the result of calling
* {@link #visitChildren\} on {@code ctx\}.\</p>
*/
@Override public T visit<lname; format="cap">(<file.parserName>.<lname; format="cap">Context ctx) { return
visitChildren(ctx); \}}; separator="\n">
}
>>

fileHeader(grammarFileName, ANTLRVersion) ::= <<
// Generated from <grammarFileName> by ANTLR <ANTLRVersion>
>>

Parser(parser, funcs, atn, sempredFuncs, superClass) ::= <<
<Parser_(ctor="parser_ctor", ...)>
>>

Parser_(parser, funcs, atn, sempredFuncs, ctor, superClass) ::= <<
@SuppressWarnings({"all", "warnings", "unchecked", "unused", "cast", "CheckReturnValue", "this-escape"})
public class <parser.name> extends <superClass; null="Parser"> {
 static { RuntimeMetaData.checkVersion("<file.ANTLRVersion>", RuntimeMetaData.VERSION); }

 protected static final DFA[] _decisionToDFA;
 protected static final PredictionContextCache _sharedContextCache =
  new PredictionContextCache();
 <if(parser.tokens)>
 public
 static final int
  <parser.tokens:{k | <k>=<parser.tokens.(k)>}; separator=", ", wrap, anchor>;
 <endif>
 <if(parser.rules)>
 public static final int
  <parser.rules:{r | RULE_<r.name> = <r.index>}; separator=", ", wrap, anchor>;
 <endif>
 private static String[] makeRuleNames() {
  return new String[] {
   <parser.ruleNames:{r | "<r>"}; separator=", ", wrap, anchor>
  };
```

```
 }
 public static final String[] ruleNames = makeRuleNames();

 <vocabulary(parser.literalNames, parser.symbolicNames)>

 @Override
 public String getGrammarFileName() { return "<parser.grammarFileName>"; }

 @Override
 public String[] getRuleNames() { return ruleNames; }

 @Override
 public String getSerializedATN() { return _serializedATN; }

 @Override
 public ATN getATN() { return _ATN; }

 <namedActions.members>
 <parser:(ctor)()>
 <funcs; separator="\n">

<if(sempredFuncs)>
 public boolean sempred(RuleContext _localctx, int ruleIndex, int predIndex) {
  switch (ruleIndex)
 {
  <parser.sempredFuncs.values:{f|
case <f.ruleIndex>:
 return <f.name>_sempred((<f.ctxType>)_localctx, predIndex);}; separator="\n">
  }
  return true;
 }
 <sempredFuncs.values; separator="\n">
<endif>

 <atn>
}
>>

vocabulary(literalNames, symbolicNames) ::= <<
private static String[] makeLiteralNames() {
 return new String[] {
  <literalNames:{t | <t>}; null="null", separator=", ", wrap, anchor>
 };
}
private static final String[] _LITERAL_NAMES = makeLiteralNames();
private static String[] makeSymbolicNames() {
 return new String[] {
  <symbolicNames:{t | <t>}; null="null", separator=", ", wrap, anchor>
```

```
 };
}
private static final String[] _SYMBOLIC_NAMES = makeSymbolicNames();
public static final Vocabulary VOCABULARY = new VocabularyImpl(_LITERAL_NAMES,
_SYMBOLIC_NAMES);

/**
* @deprecated Use {@link #VOCABULARY} instead.
*/
@Deprecated
public static final String[] tokenNames;
static {
 tokenNames = new String[_SYMBOLIC_NAMES.length];
 for (int i = 0; i \< tokenNames.length;
 i++) {
  tokenNames[i] = VOCABULARY.getLiteralName(i);
  if (tokenNames[i] == null) {
   tokenNames[i] = VOCABULARY.getSymbolicName(i);
  }

  if (tokenNames[i] == null) {
   tokenNames[i] = "\<INVALID>";
  }
 }
}

@Override
@Deprecated
public String[] getTokenNames() {
 return tokenNames;
}

@Override

public Vocabulary getVocabulary() {
 return VOCABULARY;
}
>>

dumpActions(recog, argFuncs, actionFuncs, sempredFuncs) ::= <<
<if(actionFuncs)>
@Override
public void action(RuleContext _localctx, int ruleIndex, int actionIndex) {
 switch (ruleIndex) {
 <recog.actionFuncs.values:{f|
case <f.ruleIndex>:
 <f.name>_action((<f.ctxType>)_localctx, actionIndex);
 break;}; separator="\n">
```

```
 }
}
<actionFuncs.values; separator="\n">
<endif>
<if(sempredFuncs)>
@Override
public boolean sempred(RuleContext _localctx, int ruleIndex, int predIndex) {
 switch (ruleIndex) {
 <recog.sempredFuncs.values:{f|
case <f.ruleIndex>:
 return <f.name>_sempred((<f.ctxType>)_localctx, predIndex);}; separator="\n">
 }
 return
 true;
}
<sempredFuncs.values; separator="\n">
<endif>
>>

parser_ctor(p) ::= <<
public <p.name>(TokenStream input) {
 super(input);
 _interp = new ParserATNSimulator(this,_ATN,_decisionToDFA,_sharedContextCache);
}
>>

/* This generates a private method since the actionIndex is generated, making an
* overriding implementation impossible to maintain.
*/
RuleActionFunction(r, actions) ::= <<
private void <r.name>_action(<r.ctxType> _localctx, int actionIndex) {
 switch (actionIndex) {
 <actions:{index|
case <index>:
 <actions.(index)>
 break;}; separator="\n">
 }
}
>>

/* This generates a private method since the predIndex is generated, making an
* overriding implementation impossible to maintain.
*/
RuleSempredFunction(r, actions) ::= <<
private boolean <r.name>_sempred(<r.ctxType> _localctx, int predIndex) {
 switch (predIndex) {
 <actions:{index|
case <index>:
```

```
 return <actions.(index)>;}; separator="\n">
 }
 return true;
}
>>

RuleFunction(currentRule,args,code,locals,ruleCtx,altLabelCtxs,namedActions,finallyAction,postamble,exceptions)
 ::= <<

<ruleCtx>
<altLabelCtxs:{l | <altLabelCtxs.(l)>}; separator="\n">

<if(currentRule.modifiers)><currentRule.modifiers:{f | <f> }><else>public final <endif><currentRule.ctxType>
<currentRule.escapedName>(<args; separator=",">) throws RecognitionException {
 <currentRule.ctxType> _localctx = new <currentRule.ctxType>(_ctx, getState()<currentRule.args:{a | ,
<a.escapedName>}>);
 enterRule(_localctx, <currentRule.startState>, RULE_<currentRule.name>);
 <namedActions.init>
 <locals; separator="\n">
 try {
<if(currentRule.hasLookaheadBlock)>
  int _alt;
<endif>
  <code>
  <postamble; separator="\n">
  <namedActions.after>
 }
 <if(exceptions)>
 <exceptions; separator="\n">
 <else>
 catch (RecognitionException re) {
  _localctx.exception = re;
  _errHandler.reportError(this, re);
  _errHandler.recover(this, re);
 }
 <endif>
 finally {
  <finallyAction>
  exitRule();
 }
 return _localctx;
}
>>

LeftRecursiveRuleFunction(currentRule,args,code,locals,ruleCtx,altLabelCtxs,
 namedActions,finallyAction,postamble)
 ::=
<<
```

```
<ruleCtx>
<altLabelCtxs:{l | <altLabelCtxs.(l)>}; separator="\n">

<if(currentRule.modifiers)><currentRule.modifiers:{f | <f> }><else>public final <endif><currentRule.ctxType>
<currentRule.escapedName>(<args; separator=", ">) throws RecognitionException {
 return <currentRule.escapedName>(0<currentRule.args:{a | , <a.escapedName>}>);
}

private <currentRule.ctxType> <currentRule.escapedName>(int _p<args:{a | , <a>}>) throws RecognitionException
{
 ParserRuleContext _parentctx = _ctx;
 int _parentState = getState();
 <currentRule.ctxType> _localctx = new <currentRule.ctxType>(_ctx, _parentState<currentRule.args:{a | ,
<a.escapedName>}>);
 <currentRule.ctxType> _prevctx = _localctx;
 int _startState = <currentRule.startState>;
 enterRecursionRule(_localctx, <currentRule.startState>, RULE_<currentRule.name>, _p);
 <namedActions.init>
 <locals; separator="\n">
 try {
<if(currentRule.hasLookaheadBlock)>
  int
 _alt;
<endif>
  <code>
  <postamble; separator="\n">
  <namedActions.after>
 }
 catch (RecognitionException re) {
  _localctx.exception = re;
  _errHandler.reportError(this, re);
  _errHandler.recover(this, re);
 }
 finally {
  <finallyAction>
  unrollRecursionContexts(_parentctx);
 }
 return _localctx;
}
>>

CodeBlockForOuterMostAlt(currentOuterMostAltCodeBlock, locals, preamble, ops) ::= <<
<if(currentOuterMostAltCodeBlock.altLabel)>_localctx = new <currentOuterMostAltCodeBlock.altLabel;
format="cap">Context(_localctx);<endif>
enterOuterAlt(_localctx, <currentOuterMostAltCodeBlock.alt.altNum>);
<CodeBlockForAlt(currentAltCodeBlock=currentOuterMostAltCodeBlock, ...)>
>>
```

```
CodeBlockForAlt(currentAltCodeBlock, locals, preamble, ops) ::= <<
{
<locals; separator="\n">
<preamble; separator="\n">
<ops; separator="\n">
}
>>

LL1AltBlock(choice, preamble, alts, error) ::= <<
setState(<choice.stateNumber>);
_errHandler.sync(this);
<if(choice.label)><labelref(choice.label)>
 = _input.LT(1);<endif>
<preamble; separator="\n">
switch (_input.LA(1)) {
<choice.altLook,alts:{look,alt| <cases(tokens=look)>
 <alt>
 break;}; separator="\n">
default:
 <error>
}
>>

LL1OptionalBlock(choice, alts, error) ::= <<
setState(<choice.stateNumber>);
_errHandler.sync(this);
switch (_input.LA(1)) {
<choice.altLook,alts:{look,alt| <cases(tokens=look)>
 <alt>
 break;}; separator="\n">
default:
 break;
}
>>

LL1OptionalBlockSingleAlt(choice, expr, alts, preamble, error, followExpr) ::= <<
setState(<choice.stateNumber>);
_errHandler.sync(this);
<preamble; separator="\n">
if (<expr>) {
 <alts; separator="\n">
}
<!else if ( !(<followExpr>) ) <error>!>
>>

LL1StarBlockSingleAlt(choice, loopExpr, alts, preamble, iteration) ::= <<
setState(<choice.stateNumber>);
```

```
_errHandler.sync(this);
<preamble; separator="\n">
while (<loopExpr>) {
 <alts; separator="\n">
 setState(<choice.loopBackStateNumber>);
 _errHandler.sync(this);
 <iteration>
}
>>

LL1PlusBlockSingleAlt(choice, loopExpr, alts,
 preamble, iteration) ::= <<
setState(<choice.blockStartStateNumber>); <! alt block decision !>
_errHandler.sync(this);
<preamble; separator="\n">
do {
 <alts; separator="\n">
 setState(<choice.stateNumber>); <! loopback/exit decision !>
 _errHandler.sync(this);
 <iteration>
} while ( <loopExpr> );
>>

// LL(*) stuff

AltBlock(choice, preamble, alts, error) ::= <<
setState(<choice.stateNumber>);
_errHandler.sync(this);
<if(choice.label)><labelref(choice.label)> = _input.LT(1);<endif>
<preamble; separator="\n">
switch ( getInterpreter().adaptivePredict(_input,<choice.decision>,_ctx) ) {
<alts:{alt |
case <i>:
 <alt>
 break;}; separator="\n">
}
>>

OptionalBlock(choice, alts, error) ::= <<
setState(<choice.stateNumber>);
_errHandler.sync(this);
switch ( getInterpreter().adaptivePredict(_input,<choice.decision>,_ctx) ) {
<alts:{alt |
case <i><if(!choice.ast.greedy)>+1<endif>:
 <alt>
 break;}; separator="\n">
}
>>
```

```
StarBlock(choice, alts, sync, iteration) ::= <<
setState(<choice.stateNumber>);
_errHandler.sync(this);
_alt
 = getInterpreter().adaptivePredict(_input,<choice.decision>,_ctx);
while ( _alt!=<choice.exitAlt> && _alt!=org.antlr.v4.runtime.atn.ATN.INVALID_ALT_NUMBER ) {
 if ( _alt==1<if(!choice.ast.greedy)>+1<endif> ) {
  <iteration>
  <alts> <! should only be one !>
 }
 setState(<choice.loopBackStateNumber>);
 _errHandler.sync(this);
 _alt = getInterpreter().adaptivePredict(_input,<choice.decision>,_ctx);
}
>>

PlusBlock(choice, alts, error) ::= <<
setState(<choice.blockStartStateNumber>); <! alt block decision !>
_errHandler.sync(this);
_alt = 1<if(!choice.ast.greedy)>+1<endif>;
do {
 switch (_alt) {
 <alts:{alt|
case <i><if(!choice.ast.greedy)>+1<endif>:
 <alt>
 break;}; separator="\n">
 default:
  <error>
 }
 setState(<choice.loopBackStateNumber>); <! loopback/exit decision !>
 _errHandler.sync(this);
 _alt = getInterpreter().adaptivePredict(_input,<choice.decision>,_ctx);
} while ( _alt!=<choice.exitAlt> && _alt!=org.antlr.v4.runtime.atn.ATN.INVALID_ALT_NUMBER
 );
>>

Sync(s) ::= "sync(<s.expecting.name>);"

ThrowNoViableAlt(t) ::= "throw new NoViableAltException(this);"

TestSetInline(s) ::= <<
<s.bitsets:{bits | <if(rest(rest(bits.tokens)))><bitsetBitfieldComparison(s, bits)><else><bitsetInlineComparison(s,
bits)><endif>}; separator=" || ">
>>

// Java language spec 15.19 - shift operators mask operands rather than overflow to 0... need range test
testShiftInRange(shiftAmount) ::= <<
```

```
((<shiftAmount>) & ~0x3f) == 0
>>

bitsetBitfieldComparison(s, bits) ::= <%
(<testShiftInRange({<offsetShift(s.varName, bits.shift)>})> && ((1L \<\< <offsetShift(s.varName, bits.shift)>) &
<bits.calculated>L) != 0)
%>

isZero ::= [
"0":true,
default:false
]

offsetShift(shiftAmount, offset) ::= <%
<if(!isZero.(offset))>(<shiftAmount> - <offset>)<else><shiftAmount><endif>
%>

bitsetInlineComparison(s, bits) ::= <%
<bits.tokens:{t | <s.varName>==<t.name>}; separator=" || ">
%>

cases(tokens) ::= <<
<tokens:{t | case <t.name>:}; separator="\n">
>>

InvokeRule(r,
 argExprsChunks) ::= <<
setState(<r.stateNumber>);
<if(r.labels)><r.labels:{l | <labelref(l)> =
}><endif><r.escapedName>(<if(r.ast.options.p)><r.ast.options.p><if(argExprsChunks)>,<endif><endif><argExprs
Chunks>);
>>

MatchToken(m) ::= <<
setState(<m.stateNumber>);
<if(m.labels)><m.labels:{l | <labelref(l)> = }><endif>match(<m.escapedName>);
>>

MatchSet(m, expr, capture) ::= "<CommonSetStuff(m, expr, capture, false)>"

MatchNotSet(m, expr, capture) ::= "<CommonSetStuff(m, expr, capture, true)>"

CommonSetStuff(m, expr, capture, invert) ::= <<
setState(<m.stateNumber>);
<if(m.labels)><m.labels:{l | <labelref(l)> = }>_input.LT(1);<endif>
<capture>
if ( <if(invert)><m.varName> \<= 0 || <else>!<endif>(<expr>) ) {
 <if(m.labels)><m.labels:{l | <labelref(l)> = (Token)}><endif>_errHandler.recoverInline(this);
```

```
}
else {
 if ( _input.LA(1)==Token.EOF ) matchedEOF = true;
 _errHandler.reportMatch(this);
 consume();
}
>>

Wildcard(w) ::= <<
setState(<w.stateNumber>);
<if(w.labels)><w.labels:{l |
 <labelref(l)> = }><endif>matchWildcard();
>>

// ACTION STUFF

Action(a, foo, chunks) ::= "<chunks>"

ArgAction(a, chunks) ::= "<chunks>"

SemPred(p, chunks, failChunks) ::= <<
setState(<p.stateNumber>);
if (!(<chunks>)) throw new FailedPredicateException(this, <p.predicate><if(failChunks)>,
<failChunks><elseif(p.msg)>, <p.msg><endif>);
>>

ExceptionClause(e, catchArg, catchAction) ::= <<
catch (<catchArg>) {
 <catchAction>
}
>>

// lexer actions are not associated with model objects

LexerSkipCommand()  ::= "skip();"
LexerMoreCommand()  ::= "more();"
LexerPopModeCommand() ::= "popMode();"

LexerTypeCommand(arg, grammar)      ::= "_type = <arg>;"
LexerChannelCommand(arg, grammar)   ::= "_channel = <arg>;"
LexerModeCommand(arg, grammar)      ::= "_mode = <arg>;"
LexerPushModeCommand(arg, grammar)  ::= "pushMode(<arg>);"

ActionText(t) ::= "<t.text>"
ActionTemplate(t) ::= "<t.st>"
ArgRef(a) ::= "_localctx.<a.escapedName>"
LocalRef(a) ::= "_localctx.<a.escapedName>"
RetValueRef(a) ::= "_localctx.<a.escapedName>"
```

```
QRetValueRef(a)
 ::= "<ctx(a)>.<a.dict>.<a.escapedName>"
/** How to translate $tokenLabel */
TokenRef(t) ::= "<ctx(t)>.<t.escapedName>"
LabelRef(t) ::= "<ctx(t)>.<t.escapedName>"
ListLabelRef(t) ::= "<ctx(t)>.<ListLabelName(t.escapedName)>"
SetAttr(s,rhsChunks) ::= "<ctx(s)>.<s.escapedName> = <rhsChunks>;"

TokenLabelType() ::= "<file.TokenLabelType; null={Token}>"
InputSymbolType() ::= "<file.InputSymbolType; null={Token}>"

TokenPropertyRef_text(t) ::= "(<ctx(t)>.<t.label>!=null?<ctx(t)>.<t.label>.getText():null)"
TokenPropertyRef_type(t) ::= "(<ctx(t)>.<t.label>!=null?<ctx(t)>.<t.label>.getType():0)"
TokenPropertyRef_line(t) ::= "(<ctx(t)>.<t.label>!=null?<ctx(t)>.<t.label>.getLine():0)"
TokenPropertyRef_pos(t) ::= "(<ctx(t)>.<t.label>!=null?<ctx(t)>.<t.label>.getCharPositionInLine():0)"
TokenPropertyRef_channel(t) ::= "(<ctx(t)>.<t.label>!=null?<ctx(t)>.<t.label>.getChannel():0)"
TokenPropertyRef_index(t) ::= "(<ctx(t)>.<t.label>!=null?<ctx(t)>.<t.label>.getTokenIndex():0)"
TokenPropertyRef_int(t)
 ::= "(<ctx(t)>.<t.label>!=null?Integer.valueOf(<ctx(t)>.<t.label>.getText()):0)"

RulePropertyRef_start(r) ::= "(<ctx(r)>.<r.label>!=null?(<ctx(r)>.<r.label>.start):null)"
RulePropertyRef_stop(r)  ::= "(<ctx(r)>.<r.label>!=null?(<ctx(r)>.<r.label>.stop):null)"
RulePropertyRef_text(r)  ::=
"(<ctx(r)>.<r.label>!=null?_input.getText(<ctx(r)>.<r.label>.start,<ctx(r)>.<r.label>.stop):null)"
RulePropertyRef_ctx(r)  ::= "<ctx(r)>.<r.label>"
RulePropertyRef_parser(r)  ::= "this"

ThisRulePropertyRef_start(r) ::= "_localctx.start"
ThisRulePropertyRef_stop(r)  ::= "_localctx.stop"
ThisRulePropertyRef_text(r)  ::= "_input.getText(_localctx.start, _input.LT(-1))"
ThisRulePropertyRef_ctx(r)  ::= "_localctx"
ThisRulePropertyRef_parser(r)  ::= "this"

NonLocalAttrRef(s)   ::= "((<s.ruleName;
format=\"cap\">Context)getInvokingContext(<s.ruleIndex>)).<s.escapedName>"
SetNonLocalAttr(s, rhsChunks)   ::=
 "((<s.ruleName; format=\"cap\">Context)getInvokingContext(<s.ruleIndex>)).<s.escapedName>
 = <rhsChunks>;"

AddToLabelList(a) ::= "<ctx(a.label)>.<a.listName>.add(<labelref(a.label)>);"

TokenDecl(t) ::= "<TokenLabelType()> <t.escapedName>"
TokenTypeDecl(t) ::= "int <t.escapedName>;"
TokenListDecl(t) ::= "List\<Token> <t.escapedName> = new ArrayList\<Token>()"
RuleContextDecl(r) ::= "<r.ctxName> <r.escapedName>"
RuleContextListDecl(rdecl) ::= "List\<<rdecl.ctxName>> <rdecl.escapedName> = new
ArrayList\<<rdecl.ctxName>>()"
```

```
ContextTokenGetterDecl(t)      ::=
   "public TerminalNode <t.name>() { return getToken(<parser.name>.<t.name>, 0); }"
ContextTokenListGetterDecl(t)  ::=
   "public List\<TerminalNode> <t.name>() { return getTokens(<parser.name>.<t.name>); }"
ContextTokenListIndexedGetterDecl(t)  ::= <<
public TerminalNode <t.name>(int i) {
 return getToken(<parser.name>.<t.name>, i);
}
>>
ContextRuleGetterDecl(r)       ::= <<
public <r.ctxName> <r.escapedName>() {
 return getRuleContext(<r.ctxName>.class,0);
}
>>
ContextRuleListGetterDecl(r)
   ::= <<
public List\<<r.ctxName>\> <r.escapedName>() {
 return getRuleContexts(<r.ctxName>.class);
}
>>
ContextRuleListIndexedGetterDecl(r)   ::= <<
public <r.ctxName> <r.escapedName>(int i) {
 return getRuleContext(<r.ctxName>.class,i);
}
>>

LexerRuleContext() ::= "RuleContext"

/** The rule context name is the rule followed by a suffix; e.g.,
* r becomes rContext.
*/
RuleContextNameSuffix() ::= "Context"

ImplicitTokenLabel(tokenName) ::= "<tokenName>"
ImplicitRuleLabel(ruleName)   ::= "<ruleName>"
ImplicitSetLabel(id)    ::= "_tset<id>"
ListLabelName(label)    ::= "<label>"

CaptureNextToken(d) ::= "<d.varName> = _input.LT(1);"
CaptureNextTokenType(d) ::= "<d.varName> = _input.LA(1);"

StructDecl(struct,ctorAttrs,attrs,getters,dispatchMethods,interfaces,extensionMembers,signatures)
 ::= <<
@SuppressWarnings("CheckReturnValue")
public static class <struct.escapedName> extends
<if(contextSuperClass)><contextSuperClass><else>ParserRuleContext<endif><if(interfaces)> implements
<interfaces;
```

```
 separator=", "><endif> {
 <attrs:{a | public <a>;}; separator="\n">
 <getters:{g | <g>}; separator="\n">
 <if(ctorAttrs)>public <struct.escapedName>(ParserRuleContext parent, int invokingState) { super(parent,
invokingState); }<endif>
 public <struct.escapedName>(ParserRuleContext parent, int invokingState<ctorAttrs:{a | , <a>}>) {
  super(parent, invokingState);
  <struct.ctorAttrs:{a | this.<a.escapedName> = <a.escapedName>;}; separator="\n">
 }
 @Override public int getRuleIndex() { return RULE_<struct.derivedFromName>; }
<if(struct.provideCopyFrom)> <! don't need copy unless we have subclasses !>
 public <struct.escapedName>() { }
 public void copyFrom(<struct.escapedName> ctx) {
  super.copyFrom(ctx);
  <struct.attrs:{a | this.<a.escapedName> = ctx.<a.escapedName>;}; separator="\n">
 }
<endif>
 <dispatchMethods; separator="\n">
 <extensionMembers; separator="\n">
}
>>

AltLabelStructDecl(struct,attrs,getters,dispatchMethods) ::= <<
@SuppressWarnings("CheckReturnValue")
public
 static class <struct.escapedName> extends <currentRule.name; format="cap">Context {
 <attrs:{a | public <a>;}; separator="\n">
 <getters:{g | <g>}; separator="\n">
 public <struct.escapedName>(<currentRule.name; format="cap">Context ctx) { copyFrom(ctx); }
 <dispatchMethods; separator="\n">
}
>>

ListenerDispatchMethod(method) ::= <<
@Override
public void <if(method.isEnter)>enter<else>exit<endif>Rule(ParseTreeListener listener) {
 if ( listener instanceof <parser.grammarName>Listener )
((<parser.grammarName>Listener)listener).<if(method.isEnter)>enter<else>exit<endif><struct.derivedFromName;
format="cap">(this);
}
>>

VisitorDispatchMethod(method) ::= <<
@Override
public \<T> T accept(ParseTreeVisitor\<? extends T> visitor) {
 if ( visitor instanceof <parser.grammarName>Visitor ) return ((<parser.grammarName>Visitor\<? extends
T>)visitor).visit<struct.derivedFromName; format="cap">(this);
 else return visitor.visitChildren(this);
```

```
}
>>

AttributeDecl(d) ::= "<d.type> <d.escapedName><if(d.initValue)>
 = <d.initValue><endif>"

/** If we don't know location of label def x, use this template */
labelref(x) ::= "<if(!x.isLocal)>((<x.ctx.name>)_localctx).<endif><x.escapedName>"

/** For any action chunk, what is correctly-typed context struct ptr? */
ctx(actionChunk) ::= "((<actionChunk.ctx.name>)_localctx)"

// used for left-recursive rules
recRuleAltPredicate(ruleName,opPrec)  ::= "precpred(_ctx, <opPrec>)"
recRuleSetReturnAction(src,name)   ::= "$<name>=$<src>.<name>;"
recRuleSetStopToken()                ::= "_ctx.stop = _input.LT(-1);"

recRuleAltStartAction(ruleName, ctxName, label, isListLabel) ::= <<
_localctx = new <ctxName>Context(_parentctx, _parentState);
<if(label)>
<if(isListLabel)>
_localctx.<label>.add(_prevctx);
<else>
_localctx.<label> = _prevctx;
<endif>
<endif>
pushNewRecursionContext(_localctx, _startState, RULE_<ruleName>);
>>

recRuleLabeledAltStartAction(ruleName, currentAltLabel, label, isListLabel) ::= <<
_localctx = new <currentAltLabel;
 format="cap">Context(new <ruleName; format="cap">Context(_parentctx, _parentState));
<if(label)>
<if(isListLabel)>
((<currentAltLabel; format="cap">Context)_localctx).<label>.add(_prevctx);
<else>
((<currentAltLabel; format="cap">Context)_localctx).<label> = _prevctx;
<endif>
<endif>
pushNewRecursionContext(_localctx, _startState, RULE_<ruleName>);
>>

recRuleReplaceContext(ctxName) ::= <<
_localctx = new <ctxName>Context(_localctx);
_ctx = _localctx;
_prevctx = _localctx;
>>
```

```
recRuleSetPrevCtx() ::= <<
if ( _parseListeners!=null ) triggerExitRuleEvent();
_prevctx = _localctx;
>>


LexerFile(lexerFile, lexer, namedActions) ::= <<
<fileHeader(lexerFile.grammarFileName, lexerFile.ANTLRVersion)>
<if(lexerFile.genPackage)>
package <lexerFile.genPackage>;
<endif>
<namedActions.header>
import org.antlr.v4.runtime.Lexer;
import org.antlr.v4.runtime.CharStream;
import org.antlr.v4.runtime.Token;
import org.antlr.v4.runtime.TokenStream;
import org.antlr.v4.runtime.*;
import org.antlr.v4.runtime.atn.*;
import
 org.antlr.v4.runtime.dfa.DFA;
import org.antlr.v4.runtime.misc.*;

<lexer>
>>

Lexer(lexer, atn, actionFuncs, sempredFuncs, superClass) ::= <<
@SuppressWarnings({"all", "warnings", "unchecked", "unused", "cast", "CheckReturnValue", "this-escape"})
public class <lexer.name> extends <superClass; null="Lexer"> {
 static { RuntimeMetaData.checkVersion("<lexerFile.ANTLRVersion>", RuntimeMetaData.VERSION); }

 protected static final DFA[] _decisionToDFA;
 protected static final PredictionContextCache _sharedContextCache =
  new PredictionContextCache();
 <if(lexer.tokens)>
 public static final int
  <lexer.tokens:{k | <k>=<lexer.tokens.(k)>}; separator=", ", wrap, anchor>;
 <endif>
 <if(lexer.escapedChannels)>
 public static final int
  <lexer.escapedChannels:{c | <c>=<lexer.escapedChannels.(c)>}; separator=", ", wrap, anchor>;
 <endif>
 <if(rest(lexer.escapedModeNames))>
 public static final int
  <rest(lexer.escapedModeNames):{m | <m>=<i>}; separator=", ", wrap, anchor>;
 <endif>
 public
 static String[] channelNames = {
  "DEFAULT_TOKEN_CHANNEL", "HIDDEN"<if (lexer.channelNames)>, <lexer.channelNames:{c| "<c>"};
```

```
separator=", ", wrap, anchor><endif>
 };

 public static String[] modeNames = {
  <lexer.modes:{m| "<m>"}; separator=", ", wrap, anchor>
 };

 private static String[] makeRuleNames() {
  return new String[] {
   <lexer.ruleNames:{r | "<r>"}; separator=", ", wrap, anchor>
  };
 }
 public static final String[] ruleNames = makeRuleNames();

 <vocabulary(lexer.literalNames, lexer.symbolicNames)>

 <namedActions.members>

 public <lexer.name>(CharStream input) {
  super(input);
  _interp = new LexerATNSimulator(this,_ATN,_decisionToDFA,_sharedContextCache);
 }

 @Override
 public String getGrammarFileName() { return "<lexer.grammarFileName>"; }

 @Override
 public String[] getRuleNames() { return ruleNames; }

 @Override
 public String getSerializedATN() { return _serializedATN; }

 @Override
 public String[] getChannelNames() { return channelNames; }

 @Override
 public
 String[] getModeNames() { return modeNames; }

 @Override
 public ATN getATN() { return _ATN; }

 <dumpActions(lexer, "", actionFuncs, sempredFuncs)>
 <atn>
}
>>

SerializedJavaATN(model) ::= <<
```

```
<if(rest(model.segments))>
<! requires segmented representation !>
<model.segments:{segment|private static final String _serializedATNSegment<i0> =
 "<segment; wrap={"+<\n><\t>"}>";}; separator="\n">
public static final String _serializedATN = Utils.join(
 new String[] {
  <model.segments:{segment | _serializedATNSegment<i0>}; separator=",\n">
 },
 ""
);
<else>
<! only one segment, can be inlined !>
public static final String _serializedATN =
 "<model.serialized; wrap={"+<\n><\t>"}>";
<endif>
public static final ATN _ATN =
 new ATNDeserializer().deserialize(_serializedATN.toCharArray());
static {
 _decisionToDFA = new DFA[_ATN.getNumberOfDecisions()];
 for (int i = 0; i \< _ATN.getNumberOfDecisions(); i++) {
  _decisionToDFA[i] = new DFA(_ATN.getDecisionState(i), i);
 }
<! org.antlr.v4.tool.DOTGenerator
 dot = new org.antlr.v4.tool.DOTGenerator(null);!>
<! System.out.println(dot.getDOT(_ATN.decisionToState.get(0), ruleNames, false));!>
<! System.out.println(dot.getDOT(_ATN.ruleToStartState[2], ruleNames, false));!>
}
>>

/** Using a type to init value map, try to init a type; if not in table
* must be an object, default value is "null".
*/
initValue(typeName) ::= <<
<javaTypeInitMap.(typeName)>
>>

codeFileExtension() ::= ".java"
```

Found in path(s):
* /antlr4-4-13-2-jar/org/antlr/v4/tool/templates/codegen/Java/Java.stg
No license file was found, but licenses were detected in source scan.

```
/*
* [The "BSD license"]
*  Copyright (c) 2012-2016 Terence Parr
*  Copyright (c) 2012-2016 Sam Harwell
*  All rights reserved.
*
```

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*/

/** templates used to generate make-compatible dependencies */

/** Generate "f : x, y, z" dependencies for input
*  dependencies and generated files. in and out
*  are File objects.  For example, you can say
*  <f.canonicalPath>
*/
dependencies(grammarFileName,in,out) ::= <<
<if(in)><grammarFileName>: <in; separator=", "><endif>
<out:{f | <f> : <grammarFileName>};
 separator="\n">
>>

Found in path(s):
* /antlr4-4-13-2-jar/org/antlr/v4/tool/templates/depend.stg
```

# 1.1194 libkcapi 1.4.0-2.el9

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# 1.1197 term 0.5.0

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# 1.1198 types-react-dom 18.2.7

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```
{
  "compilerOptions": {
    "module": "commonjs",
    "lib": [
      "es6"
    ],
    "noImplicitAny": true,
    "noImplicitThis": true,
    "strictNullChecks": true,
    "strictFunctionTypes": true,
    "baseUrl": "../",
    "typeRoots": [
      "../"
    ],
    "types": [],
    "noEmit": true,
    "forceConsistentCasingInFileNames": true
  },
  "files": [
    "index.d.ts",
    "npm-license-crawler-tests.ts"
  ]
}
{
  "extends": "@definitelytyped/dtslint/dt.json",
  "rules": {
    "npm-naming": [true,{"mode":"code","errors":[["NeedsExportEquals",false]]}]
  }
}
{
  "extends": "@definitelytyped/dtslint/dt.json"
```

}
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```
{ "extends": "@definitelytyped/dtslint/dt.json" }
{
  "compilerOptions": {
    "module": "commonjs",
    "lib": [
      "es6"
    ],
    "noImplicitAny": true,
    "noImplicitThis": true,
    "strictNullChecks": true,
    "strictFunctionTypes": true,
    "baseUrl": "../",
    "typeRoots": [
      "../"
    ],
    "types": [],
    "noEmit": true,
    "forceConsistentCasingInFileNames": true
  },
  "files": [
    "index.d.ts",
    "nodejs-license-file-tests.ts"
  ]
}
{
  "compilerOptions": {
    "module": "commonjs",
    "lib": [
      "es6"
```

```
    ],
    "noImplicitAny": true,
    "noImplicitThis": true,
    "strictNullChecks": true,
    "strictFunctionTypes": true,
    "baseUrl": "../",
    "typeRoots": [
      "../"
    ],
    "types": [],
    "noEmit": true,
    "forceConsistentCasingInFileNames": true
  },
  "files": [
    "index.d.ts",
    "license-checker-tests.ts"
  ]
}
{
  "extends": "@definitelytyped/dtslint/dt.json",
  "rules": {
    "interface-name": false,
    "no-consecutive-blank-lines": false,
    "no-padding": false,
    "no-redundant-jsdoc-2": false,
    "no-reference-import": false,
    "no-unnecessary-qualifier": false,
    "no-var-keyword": false,
    "only-arrow-functions": false,
    "prefer-const": false,
    "space-before-function-paren": false,
    "strict-export-declare-modifiers": false,
    "typedef-whitespace": false,
    "unified-signatures": false
  }
}
```

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```
{
  "files": [
    "index.d.ts",
    "angular-permission-tests.ts"
  ],
  "compilerOptions": {
    "module": "commonjs",
    "lib": [
      "es6",
      "dom"
    ],
```

```
    "noImplicitAny": true,
    "noImplicitThis": true,
    "strictNullChecks": false,
    "strictFunctionTypes": true,
    "baseUrl": "../",
    "typeRoots": [
      "../"
    ],
    "types": [],
    "noEmit": true,
    "forceConsistentCasingInFileNames": true
  }
}
{
  "compilerOptions": {
    "module": "commonjs",
    "lib": [
      "es6"
    ],
    "noImplicitAny": true,
    "noImplicitThis": true,
    "strictNullChecks": true,
    "strictFunctionTypes": true,
    "baseUrl": "../",
    "typeRoots": [
      "../"
    ],
    "types": [],
    "noEmit": true,
    "forceConsistentCasingInFileNames": true
  },
  "files": [
    "index.d.ts",
    "legal-eagle-tests.ts"
  ]
}
```

ISC

```
{
  "compilerOptions": {
    "module": "commonjs",
    "lib": [
      "es6"
    ],
    "noImplicitAny": true,
    "noImplicitThis": true,
    "strictFunctionTypes": true,
    "strictNullChecks": true,
    "baseUrl": "../",
```

```
    "typeRoots": [
      "../"
    ],
    "types": [],
    "noEmit": true,
    "forceConsistentCasingInFileNames": true
  },
  "files": [
    "index.d.ts",
    "license-key-gen-tests.ts"
  ]
}
```

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```
{
  "compilerOptions": {
    "module": "commonjs",
    "lib": [
      "es6"
    ],
    "noImplicitAny": true,
    "noImplicitThis": true,
    "strictFunctionTypes": true,
    "strictNullChecks": true,
    "baseUrl": "../",
    "typeRoots": [
      "../"
    ],
    "types": [],
    "noEmit": true,
    "forceConsistentCasingInFileNames": true
  },
  "files": [
    "index.d.ts",
    "oslicense-tests.ts"
  ]
```

```
}
{
  "rules": {
    "dt-header": "off",
    "trim-file": "off",
    "no-any-union": "off",
    "no-declare-current-package": "off"
  }
}
{
  "compilerOptions": {
    "module": "commonjs",
    "lib": [
      "es6"
    ],
    "noImplicitAny": true,
    "noImplicitThis": true,
    "strictNullChecks": true,
    "strictFunctionTypes": true,
    "baseUrl": "../",
    "typeRoots": [
      "../"
    ],
    "paths": {
      "webpack": [
        "webpack/v4"
      ],
      "tapable": [
        "tapable/v1"
      ]
    },
    "types": [],
    "noEmit": true,
    "forceConsistentCasingInFileNames": true
  },
  "files": [
    "index.d.ts",
    "license-checker-webpack-plugin-tests.ts"
  ]
}
{
  "compilerOptions": {
    "module": "commonjs",
    "lib": [
      "es6"
    ],
    "noImplicitAny": true,
    "noImplicitThis": true,
```

```
    "strictFunctionTypes": true,
    "strictNullChecks": true,
    "baseUrl": "../",
    "typeRoots": [
      "../"
    ],
    "types": [],
    "noEmit": true,
    "forceConsistentCasingInFileNames": true
  },
  "files": [
    "index.d.ts",
    "validate-npm-package-license-tests.ts"
  ]
}
```

# 1.1199 dhcp 12:4.4.2-19.b1.el9

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<!-- Generate ISC copyright comments from Docbook copyright metadata. -->

<xsl:stylesheet version="1.0"
 xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
 xmlns:xi="http://www.w3.org/2001/XInclude"
 xmlns:db="http://docbook.org/ns/docbook">
```

```
<xsl:template name="isc.copyright.format">
  <xsl:param name="text"/>
  <xsl:value-of select="$isc.copyright.leader"/>
  <xsl:value-of select="normalize-space(substring-before($text, '&#10;'))"/>
  <xsl:text>&#10;</xsl:text>
  <xsl:variable name="rest" select="substring-after($text, '&#10;')"/>
  <xsl:if test="translate($rest, '&#9;&#32;', '')">

    <xsl:call-template name="isc.copyright.format">
      <xsl:with-param name="text" select="$rest"/>
    </xsl:call-template>
  </xsl:if>
</xsl:template>

<xsl:variable name="isc.copyright.text">
  <xsl:text>
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  </xsl:text>
</xsl:variable>

<xsl:variable name="isc.copyright">
  <xsl:call-template name="isc.copyright.format">
    <xsl:with-param name="text">
      <xsl:for-each select="book/info/copyright | refentry/docinfo/copyright">
  <xsl:text>Copyright (C) </xsl:text>
  <xsl:call-template name="copyright.years">
    <xsl:with-param name="years" select="year"/>
  </xsl:call-template>
  <xsl:text> </xsl:text>
  <xsl:value-of select="holder"/>
        <xsl:value-of select="$isc.copyright.breakline"/>
  <xsl:text>&#10;</xsl:text>
</xsl:for-each>
<xsl:value-of
select="$isc.copyright.text"/>
    </xsl:with-param>
  </xsl:call-template>
</xsl:variable>
</xsl:stylesheet>

<!--
 - Local variables:
 - mode: sgml
 - End:
-->
```

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# 1.1200 spec 0.21.0

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# 1.1201 swag 0.23.0

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# 1.1203 etcd-api 3.6.2

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# Features

This document provides an overview of etcd features and general development guidelines for adding and deprecating them. The project maintainers can override these guidelines per the need of the project following the project governance.

## Overview

The etcd features fall into three stages, experimental, stable, and unsafe.

### Experimental

Any new feature is usually added as an experimental feature. An experimental feature is characterized as below:
- Might be buggy due to a lack of user testing. Enabling the feature may not work as expected.
- Disabled by default when added initially.
- Support for such a feature may be dropped at any time without notice
  - Feature-related issues may be given lower priorities.
  - It can be removed in the next minor or major release without following the feature deprecation policy unless it graduates to a stable future.

### Stable

A stable feature is characterized as below:
- Supported as part of the supported releases of etcd.
-
 May be enabled by default.
- Discontinuation of support must follow the feature deprecation policy.

### Unsafe

Unsafe features are rare and listed under the `Unsafe feature:` section in the etcd usage documentation. By default, they are disabled. They should be used with caution following documentation. An unsafe feature can be removed in the next minor or major release without following the feature deprecation policy.

## Development Guidelines

### Adding a new feature

Any new enhancements to the etcd are typically added as an experimental feature. The general development requirements are listed below. They can be somewhat flexible depending on the scope of the feature and review discussions and will evolve over time.
- Open an issue
  - It must provide a clear need for the proposed feature.

- It should list development work items as checkboxes. There must be one work item towards future graduation to a stable future.
  - Label the issue with `type/feature` and `experimental`.
  - Keep the issue open for tracking purposes until a decision is made on graduation.
- Open a Pull Request (PR)
  - Provide unit tests. Integration tests are also recommended as possible.
  - Provide robust e2e test coverage. If the feature being added is complicated or quickly needed, maintainers can decide to go with e2e tests for basic coverage initially and have robust coverage added at a later time before the feature graduation to the stable feature.
  - Provide logs for proper debugging.
  - Provide metrics and benchmarks as needed.
  - The Feature should be disabled by default.
  - Any configuration flags related to the implementation of the feature must be prefixed with `experimental` e.g. `--experimental-feature-name`.
  - Add a CHANGELOG entry.
- At least two maintainers must approve feature requirements and related code changes.

### Graduating an Experimental feature to Stable

It is important that experimental features don't get stuck in that stage.
They should be revisited and moved to the stable stage following the graduation steps as described here.

#### Locate graduation candidate
Decide if an experimental feature is ready for graduation to the stable stage.
- Find the issue that was used to enable the experimental feature initially. One way to find such issues is to search for issues with `type/feature` and `experimental` labels.
- Fix any known open issues against the feature.
- Make sure the feature was enabled for at least one previous release. Check the PR(s) reference from the issue to see when the feature-related code changes were merged.

#### Provide implementation
If an experimental feature is found ready for graduation to the stable stage, open a Pull Request (PR) with the following changes.
- Add robust e2e tests if not already provided.
- Add a new stable feature flag identical to the experimental feature flag but without the `--experimental` prefix.
- Deprecate the experimental feature following the [feature deprecation policy](#Deprecating-a-feature).
- Implementation must ensure that both the graduated and deprecated experimental feature flags work as expected. Note that both these flags will co-exist for the timeframe described in the feature deprecation policy.
- Enable the graduated feature by default if needed.

At least two maintainers must approve the work. Patch releases should not be considered for graduation.

### Deprecating a feature

#### Experimental
An experimental feature deprecates when it graduates to the stable stage.
- Add a deprecation message in the documentation of the experimental feature with a recommendation to use a

related stable feature. e.g. `DEPRECATED. Use <feature-name> instead.`
- Add a `deprecated` label in the issue that was initially used to enable the experimental feature.

#### Stable
As the project evolves, a stable feature may sometimes need to be deprecated and removed. Such a situation should be handled using the steps below:
- Create an issue for tracking
 purposes.
- Add a deprecation message in the feature usage documentation before a planned release for feature deprecation. e.g. `To be deprecated in <release>.`. If a new feature replaces the `To be deprecated` feature, then also provide a message saying so. e.g. `Use <feature-name> instead.`.
- Deprecate the feature in the planned release with a message as part of the feature usage documentation. e.g. `DEPRECATED`. If a new feature replaces the deprecated feature, then also provide a message saying so. e.g. `DEPRECATED. Use <feature-name> instead.`.
- Add a `deprecated` label in the related issue.

Remove the deprecated feature in the following release. Close any related issue(s). At least two maintainers must approve the work. Patch releases should not be considered for deprecation.
# Set up the local cluster

For testing and development deployments, the quickest and easiest way is to configure a local cluster. For a production deployment, refer to the [clustering][clustering] section.

## Local standalone cluster

### Starting a cluster

Run the following to deploy an etcd cluster as a standalone cluster:

```
$ ./etcd
...
```

If the `etcd` binary is not present in the current working directory, it might be located either at `$GOPATH/bin/etcd` or at `/usr/local/bin/etcd`. Run the command appropriately.

The running etcd member listens on `localhost:2379` for client requests.

### Interacting with the cluster

Use `etcdctl` to interact with the running cluster:

1. Store an example key-value pair in the cluster:

   ```
   $ ./etcdctl put foo bar
   OK
   ```

```

If OK is printed, storing the key-value pair is successful.

2. Retrieve the value of `foo`:

```
$ ./etcdctl get foo
bar
```

If `bar` is returned, interaction with the etcd
cluster is working as expected.

## Local multi-member cluster

### Starting a cluster

A `Procfile` at the base of the etcd git repository is provided to easily configure a local multi-member cluster. To start a multi-member cluster, navigate to the root of the etcd source tree and perform the following:

1. Install `goreman` to control Procfile-based applications:

```
$ go install github.com/mattn/goreman@latest
```

The installation will place executables in the $GOPATH/bin. If $GOPATH environment variable is not set, the tool will be installed into the $HOME/go/bin. Make sure that $PATH is set accordingly in your environment.

2. Start a cluster with `goreman` using etcd's stock Procfile:

```
$ goreman -f Procfile start
```

The members start running. They listen on `localhost:2379`, `localhost:22379`, and `localhost:32379` respectively for client requests.

### Interacting with the cluster

Use `etcdctl` to interact with the running cluster:

1. Print
the list of members:

```
$ etcdctl --write-out=table --endpoints=localhost:2379 member list
```
```

The list of etcd members is displayed as follows:

```
+------------------+---------+--------+------------------------+------------------------+
|       ID         | STATUS  |  NAME  |       PEER ADDRS       |      CLIENT ADDRS      |
+------------------+---------+--------+------------------------+------------------------+
| 8211f1d0f64f3269 | started | infra1 | http://127.0.0.1:2380  | http://127.0.0.1:2379  |
| 91bc3c398fb3c146 | started | infra2 | http://127.0.0.1:22380 | http://127.0.0.1:22379 |
| fd422379fda50e48 | started | infra3 | http://127.0.0.1:32380 | http://127.0.0.1:32379 |
+------------------+---------+--------+------------------------+------------------------+
```

2. Store an example key-value pair in the cluster:

```
$ etcdctl put foo bar
OK
```

If OK is printed, storing the key-value pair is successful.

### Testing fault tolerance

To exercise etcd's fault tolerance, kill a member and attempt to retrieve the key.

1. Identify the process name of the member to be stopped.

The `Procfile` lists the properties of the multi-member cluster. For example, consider the member with the process name, `etcd2`.

2. Stop the member:

```
# kill etcd2
$ goreman run stop etcd2
```

3. Store a key:

```
$ etcdctl put key hello
OK
```

4. Retrieve the key that is stored in the previous step:

```
```

```
$ etcdctl get key
hello
```

5. Retrieve a key from the stopped member:

```
$ etcdctl --endpoints=localhost:22379 get key
```

The command should display an error caused by connection failure:

```
2017/06/18 23:07:35 grpc: Conn.resetTransport failed to create client transport: connection error: desc = "transport: dial tcp 127.0.0.1:22379: getsockopt: connection refused"; Reconnecting to "localhost:22379"
Error:  grpc:
timed out trying to connect
```

6. Restart the stopped member:

```
$ goreman run restart etcd2
```

7. Get the key from the restarted member:

```
$ etcdctl --endpoints=localhost:22379 get key
hello
```

Restarting the member re-establishs the connection. `etcdctl` will now be able to retrieve the key successfully. To learn more about interacting with etcd, read [interacting with etcd section][interacting].

[clustering]: https://etcd.io/docs/latest/op-guide/clustering/
[interacting]: https://etcd.io/docs/latest/dev-guide/interacting_v3/
# Branch management

## Guide

* New development occurs on the [main branch][main].
* The main branch should always have a green build!
* Backwards-compatible bug fixes should target the main branch and subsequently be ported to stable branches.
* Once the main branch is ready for release, it will be tagged and become the new stable branch.

The etcd team has adopted a *rolling release model* and supports two stable versions of etcd.

### Main branch

The `main` branch is our development branch. All new features land here first.

To try new and experimental features, pull `main` and play with it. Note that `main` may not be stable because new features may introduce bugs.

Before the release of the next stable version, feature PRs will be frozen. A [release manager](./release.md#release-management) will be assigned to the major/minor version and will lead the etcd community in testing, bug-fix, and documentation of the release for one to two weeks.

### Stable branches

All branches with
 the prefix `release-` are considered _stable_ branches.

After every minor release ([semver.org](https://semver.org/)), we will have a new stable branch for that release, managed by a [patch release manager](./release.md#release-management). We will keep fixing the backward-compatible bugs for the latest two stable releases. A _patch_ release to each supported release branch, incorporating any bug fixes, will be once every two weeks, given any patches.

[main]: https://github.com/etcd-io/etcd/tree/main
# Issue triage guidelines

## Purpose

Speed up issue management.

The `etcd` issues are listed at <https://github.com/etcd-io/etcd/issues> and are identified with labels. For example, an issue that is identified as a bug will be set to the label `type/bug`.

The etcd project uses labels to indicate common attributes such as `area`, `type`, and `priority` of incoming issues.

New issues will often start without any labels, but typically `etcd` maintainers, reviewers, and members will add labels by following these triage guidelines. The detailed list of labels can be found at <https://github.com/etcd-io/etcd/labels>.

## Scope

This document serves as the primary guidelines for triaging incoming issues in `etcd`.

All contributors are encouraged and welcome to help manage issues which will help reduce the burden on project maintainers, though the work and responsibilities discussed in this document are created with `etcd` project reviewers and members in mind as these individuals will have
 triage access to the etcd project which is a requirement for actions like applying labels or closing issues.

Refer to [etcd community membership](https://github.com/etcd-io/etcd/blob/main/Documentation/contributor-guide/community-membership.md) for guidance on becoming an etcd project member or reviewer.

## Step 1 - Find an issue to triage

To get started you can use the following recommended issue searches to identify issues that are in need of triage:

* [Issues that have no labels](https://github.com/etcd-io/etcd/issues?q=is%3Aissue+is%3Aopen+sort%3Aupdated+no%3Alabel)
* [Issues created recently](https://github.com/etcd-io/etcd/issues?q=is%3Aissue+is%3Aopen+)
* [Issues not assigned but linked pr](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+no%3Aassignee+linked%3Apr)
* [Issues with no comments](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+comments%3A0+)
* [Issues with help wanted](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+label%3A%22help+wanted%22+)

## Step 2 - Check the issue is valid

Before we start adding labels or trying to work out a priority, our first triage step needs to be working out if the issue actually belongs to the etcd project and is not a duplicate.

### Issues that don't belong to etcd

Sometimes issues are reported that belong to other projects that `etcd` use. For example, `grpc` or `golang` issues. Such issues should be addressed by asking the reporter to open issues in the appropriate other projects.

These issues can generally be closed unless a maintainer and issue reporter see a need to keep it open for tracking purposes. If you have triage permissions please close it, alternatively mention the @etcd-io/members group to request a member with triage access to close the issue.

### Duplicate issues

If an issue is a duplicate, add a comment stating so along with a reference for the original issue and if you have triage permissions please close it, alternatively mention the @etcd-io/members group to request a member with triage access close the issue.

## Step 3 - Apply the appropriate type of label

Adding a `type` label to an issue helps create visibility on the health of the project and helps contributors identify potential priorities, i.e. addressing existing bugs or test flakes before implementing new features.

### Support requests

As a general rule, the focus for etcd support is to address common themes in a broad way that helps all users, i.e. through channels like known issues, frequently asked questions, and high-quality documentation. To make the best use of project members time we should avoid providing 1:1 support if a broad approach is available.

Some people mistakenly use our GitHub bug report or feature request templates to file support requests. Usually, they are asking for help operating or configuring some aspect of etcd. Support requests for etcd should instead be raised as [discussions](https://github.com/etcd-io/etcd/discussions).

Common
types of support requests are:

1. Questions about configuring or operating existing well-documented etcd features, for example, <https://github.com/etcd-io/etcd/issues/15945>. Note - If an existing feature is not well documented please apply the `area/documentation` label and propose documentation improvements that would prevent future users from stumbling on the problem again.

2. Bug reports or questions about unsupported versions of etcd, for example <https://github.com/etcd-io/etcd/issues/15796>. When responding to these issues please refer to our [supported versions documentation](https://etcd.io/docs/latest/op-guide/versioning) and encourage the reporter to upgrade to a recent patch release of a supported version as soon as possible. We should limit the effort supporting users that do not make the effort to run a supported version of etcd or ensure their version is patched.

3. Bug reports that do not provide a complete list of steps to reproduce the issue and/or contributors
are not able to reproduce the issue, for example, <https://github.com/etcd-io/etcd/issues/15740>. We should limit the effort we put into reproducing issues ourselves and motivate users to provide the necessary information to accept the bug report.

4. General questions that are filed using feature request or bug report issue templates, for example, <https://github.com/etcd-io/etcd/issues/15914>. Note - These types of requests may surface good additions to our [frequently asked questions](https://etcd.io/docs/v3.5/faq).

If you identify that an issue is a support request please:

1. Add the `type/support` or `type/question` label.

2. Add the following comment to inform the issue creator that discussions should be used instead and that this issue will be converted to a discussion.

> Thank you for your question, this support issue will be moved to our [Discussion Forums](https://github.com/etcd-io/etcd/discussions).
>
> We are trying to consolidate the channels to which
questions for help/support are posted so that we can improve our efficiency in responding to your requests, and make it easier for you to find answers to frequently asked questions and how to address common use cases.
>
> We regularly see messages posted in multiple forums, with the full response thread only in one place or, worse, spread across multiple forums. Also, the large volume of support issues on GitHub is making it difficult for us to use issues to identify real bugs.
>
> Members of the etcd community use Discussion Forums to field support requests. Before posting a new question, please search these for answers to similar questions, and also familiarize yourself with:
>
> 1. [user documentation](https://etcd.io/docs/latest)
> 2. [frequently asked questions](https://etcd.io/docs/v3.5/faq)
>

> Again, thanks for using etcd and raising this question.
>
> The etcd team

3. Finally, click `Convert to discussion` on the right-hand panel,
 selecting the appropriate discussion category.

### Bug reports

If an issue has been raised as a bug it should already have the `type/bug` label, however, if this is missing for an issue you determine to be a bug please add the label manually.

The next step is to validate if the issue is indeed a bug. If not, add a comment with the findings and close the trivial issue. For non-trivial issues, wait to hear back from the issue reporter and see if there is any objection. If the issue reporter does not reply in 30 days, close the issue.

If the problem can not be reproduced or requires more information, leave a comment for the issue reporter as soon as possible while the issue is fresh for the issue reporter.

### Feature requests

New feature requests should be created via the etcd feature request template and in theory already have the `type/feature` label, however, if this is missing for an issue you determine to be a feature please add the label manually.

### Test flakes

Test flakes
 are a specific type of bug that the etcd project tracks separately as these are a priority to address. These should be created via the test flake template and in theory already have the `type/flake` label, however, if this is missing for an issue you determine to be related to a flaking test please add the label manually.

## Step 4 - Define the areas impacted

Adding an `area` label to an issue helps create visibility on which areas of the etcd project require attention and helps contributors find issues to work on relating to their particular skills or knowledge of the etcd codebase.

If an issue crosses multiple domains please add additional `area` labels to reflect that.

Below is a brief summary of the area labels in active use by the etcd project along with any notes on their use:

| Label | Notes |
| --- | --- |
| area/external | Tracking label for issues raised that are external to etcd. |
| area/community | |
| area/raft | |
| area/clientv3 | |

| area/performance | |
| area/security | |
| area/tls | |
| area/auth | |
| area/etcdctl | |
| area/etcdutl | |
| area/contrib | Not to be confused with `area/community` this label is specifically used for issues relating to community-maintained scripts or files in the `contrib/` directory which aren't part of the core etcd project. |
| area/documentation | |
| area/tooling | Generally used in relation to the third party / external utilities or tools that are used in various stages of the etcd build, test, or release process, for example, tooling to create sboms. |
| area/testing | |
| area/robustness-testing | |

## Step 5 - Prioritise the issue

If an issue lacks a priority label it has not been formally prioritized yet.

Adding a `priority` label helps the etcd project understand what is important and should be worked on now, and conversely, what is not as important and is on the project backlog.

|Priority label|What it means|Examples|
|---|---|---|
| `priority/critical-urgent` | Maintainers are responsible for making sure that these issues (in their area) are being actively worked oni.e., drop what you're doing. The stuff is burning. These should be fixed before the next release. | user-visible critical bugs in core features <br> broken builds on tier1 supported platforms <br> tests and critical security issues |
| `priority/important-soon` | Must be staffed and worked on either currently or very soonideally in time for the next release. | |
| `priority/important-longterm` | Important over the long term, but may not be currently staffed and/or may require multiple releases to complete. | |
| `priority/backlog` | General agreement that this is a nice-to-have, but no one's available to work on it anytime soon. Community contributions would be most welcome in the meantime, though it might take a while to get them reviewed if reviewers are fully occupied with higher-priority issuesfor example, immediately before a release.| |
| `priority/awaiting-more-evidence` | Possibly useful, but not yet enough support to actually get it done. | Mostly placeholders for potentially good ideas, so that they don't get completely forgotten, and can be referenced or deduped every time they come up |

## Step 6 - Support new contributors

As part of the `etcd` triage process once the `kind` and `area` have been determined, please consider if the issue would be suitable for a less experienced contributor. The `good first issue` label is a subset of the `help wanted` label, indicating that members have committed to providing extra assistance for new contributors. All `good first issue` items also have the `help wanted` label.

### Help wanted

Items marked with the `help wanted` label need to ensure that they meet these criteria:

* **Low Barrier to Entry** - It should be easy for new contributors.

* **Clear** - The task is agreed upon and does not require further discussions in the community.

* **Goldilocks priority** - The priority
should not be so high that a core contributor should do it, but not too low that it isnt useful enough for a core contributor to spend time reviewing it, answering questions, helping get it into a release, etc.

### Good first issue

Items marked with `good first issue` are intended for first-time contributors. It indicates that members will keep an eye out for these pull requests and shepherd it through our processes.

New contributors should not be left to find an approver, ping for reviews, decipher test commands, or identify that their build failed due to a flake. It is important to make new contributors feel welcome and valued. We should assure them that they will have an extra level of help with their first contribution.

After a contributor has successfully completed one or two `good first issue` items, they should be ready to move on to `help wanted` items.

* **No Barrier to Entry** - The task is something that a new contributor can tackle without advanced setup or domain knowledge.

*
**Solution Explained** - The recommended solution is clearly described in the issue.

* **Gives Examples** - Link to examples of similar implementations so new contributors have a reference guide for their changes.

* **Identifies Relevant Code** - The relevant code and tests to be changed should be linked in the issue.

* **Ready to Test** - There should be existing tests that can be modified, or existing test cases fit to be copied. If the area of code doesnt have tests, before labeling the issue, add a test fixture. This prep often makes a great help wanted task!

## Step 7 - Follow up

Once initial triage has been completed, issues need to be re-evaluated over time to ensure they don't become stale incorrectly.

### Track important issues

If an issue is at risk of being closed by the stale bot in the future, but is an important issue for the etcd project, then please apply the `stage/tracked` label and remove any `stale` labels that exist. This will ensure the project does
not lose sight of the issue.

### Close incomplete issues

Issues that lack enough information from the issue reporter should be closed if the issue reporter does not provide information in 30 days. Issues can always be re-opened at a later date if new information is provided.

### Check for incomplete work

If an issue owned by a developer has no pull request created in 30 days, contact the issue owner and kindly ask about the status of their work, or to release ownership on the issue if needed.
# PR management

## Purpose

Speed up PR management.

The `etcd` PRs are listed at https://github.com/etcd-io/etcd/pulls
A PR can have various labels, milestones, reviewers, etc. The detailed list of labels can be found at https://github.com/kubernetes/kubernetes/labels

Following are a few example searches on PR for convenience:
* [Open PRS for milestone etcd-v3.6](https://github.com/etcd-io/etcd/pulls?utf8=%E2%9C%93&q=is%3Apr+is%3Aopen+milestone%3Aetcd-v3.6)
* [PRs under investigation](https://github.com/etcd-io/etcd/labels/Investigating)

## Scope

These guidelines serve as a primary document for managing PRs in `etcd`. Everyone is welcome to help manage PRs but the work and responsibilities discussed in this document are created with `etcd` maintainers and active contributors in mind.

## Ensure tests are run

The etcd project use Kubernetes Prow and GitHub Actions to run tests. To ensure all required tests run if a pull request is ready for testing and still has the `needs-ok-to-test`
label then please comment on the pull request `/ok-to-test`.

## Handle inactive PRs
Poke PR owner if review comments are not addressed in 15 days. If the PR owner does not reply in 90 days, update the PR with a new commit if possible. If not, inactive PR should be closed after 180 days.

## Poke reviewer if needed

Reviewers are responsive in a timely fashion, but considering everyone is busy, give them some time after requesting a review if a quick response is not provided. If the response is not provided in 10 days, feel free to contact them via adding a comment in the PR or sending an email or message on Slack.

## Verify important labels are in place

Make sure that appropriate reviewers are added to the PR. Also, make sure that a milestone is identified. If any of these or other important labels are missing, add them. If a correct label cannot be decided, leave a comment for the maintainers to do so as needed.
# Roadmap

etcd uses GitHub milestones to track all tasks in each major or minor release. The `roadmap.md` file only records the
most important tasks for each release. The list is based on the current maintainer capacity that may shift over time. Proposed milestones are what we think we can deliver with the people we have. If we have more support on the important
stuff, we could pick up more items from the backlog. Note that etcd will continue to mainly focus on technical debt over
the next few major or minor releases.

Each item has an assigned priority. Refer to [priority definitions](https://github.com/etcd-io/etcd/blob/main/Documentation/contributor-guide/triage_issues.md#step-5---prioritise-the-issue).

## v3.6.0

For a full list of tasks in `v3.6.0`, please see [milestone etcd-v3.6](https://github.com/etcd-io/etcd/milestone/38).

| Title | Priority | Status | Note |
|---|---|---|---|
| [Support downgrade](https://github.com/etcd-io/etcd/issues/11716) | priority/important-soon | In progress | etcd will support downgrade starting from 3.6.0. But it will also support offline downgrade from 3.5 to 3.4. |
| [StoreV2 deprecation](https://github.com/etcd-io/etcd/issues/12913) | priority/important-soon | In progress | This task will be covered in both 3.6 and 3.7. |
| [Release raft 3.6.0](https://github.com/etcd-io/raft/issues/89) | priority/important-soon | Not started | etcd 3.6.0 will depends on raft 3.6.0 |
| [Release bbolt 1.4.0](https://github.com/etcd-io/bbolt/issues/553) | priority/important-soon | Not started | etcd 3.6.0 will depends on bbolt 1.4.0 |
| [Support /livez and /readyz endpoints](https://github.com/etcd-io/etcd/issues/16007) | priority/important-longterm | In progress | It provides clearer APIs, and can also work around the stalled writes issue |
| [Bump gRPC](https://github.com/etcd-io/etcd/issues/16290) | priority/important-longterm | Completed | It isn't guaranteed to be resolved in 3.6, and might be postponed to 3.7 depending on the effort and risk. |
| [Deprecate grpc-gateway or bump it](https://github.com/etcd-io/etcd/issues/14499) | priority/important-longterm | Completed | It isn't guaranteed to be resolved in 3.6, and might be postponed to 3.7 depending on the effort and risk. |
| [bbolt: Add logger into bbolt](https://github.com/etcd-io/bbolt/issues/509) | priority/important-longterm | Completed | It's important to diagnose bbolt issues |

|
| [bbolt: Add surgery commands](https://github.com/etcd-io/bbolt/issues/370) | priority/important-longterm | Completed | Surgery commands are important for fixing corrupted db files |
| [Evaluate and (Gradulate or deprecate/remove) experimental features](https://github.com/etcd-io/etcd/issues/16292) | priority/backlog | Not started | This task will be covered in both 3.6 and 3.7. |

## v3.7.0

For a full list of tasks in `v3.7.0`, please see [milestone etcd-v3.7](https://github.com/etcd-io/etcd/milestone/39).

| Title | Priority | Note |
|---|---|---|
| [StoreV2 deprecation](https://github.com/etcd-io/etcd/issues/12913) | P0 | Finish the remaining tasks 3.7. |
| [Refactor lease: Lease might be revoked by mistake by old leader](https://github.com/etcd-io/etcd/issues/15247) | P1 | to be investigated & discussed |
| [Integrate raft's new feature (async write) into etcd](https://github.com/etcd-io/etcd/issues/16291) | P1 | It should improve the performance |
| [bbolt: Support customizing the bbolt rebalance threshold](https://github.com/etcd-io/bbolt/issues/422) | P2 | It may get rid of etcd's defragmentation. Both bbolt and etcd need to be changed. |
| [Evaluate and (graduate or deprecate/remove) experimental features](https://github.com/etcd-io/etcd/issues/16292) | P2 | Finish the remaining tasks 3.7. |

## Backlog (future releases)

| Title | Priority | Note |
|---|---|---|
| [Remove the dependency on grpc-go's experimental API](https://github.com/etcd-io/etcd/issues/15145) | | |
| [Protobuf: cleanup both golang/protobuf and gogo/protobuf](https://github.com/etcd-io/etcd/issues/14533) | | |
| [Proposals should include a merkle root](https://github.com/etcd-io/etcd/issues/13839) | | |
| [Add Distributed Tracing using OpenTelemetry](https://github.com/etcd-io/etcd/issues/12460) | | |
| [Support CA rotation](https://github.com/etcd-io/etcd/issues/11555) | | |
| [bbolt: Migrate all commands to cobra style commands](https://github.com/etcd-io/bbolt/issues/472) | | |
| [raft: enhance the configuration change validation](https://github.com/etcd-io/raft/issues/80) | | |

# Release

The guide talks about how to release a new version of etcd.

The procedure includes some manual steps for sanity checking, but it can probably be further scripted. Please keep this document up-to-date if making changes to the release process.

## Release management

The following pool of release candidates manages the release of each etcd major/minor version as well as manages patches
to each stable release branch. They are responsible for communicating the timelines and status of each release and for ensuring the stability of the release branch.

- Benjamin Wang [@ahrtr](https://github.com/ahrtr)
- James Blair [@jmhbnz](https://github.com/jmhbnz)
- Marek Siarkowicz [@serathius](https://github.com/serathius)
- Sahdev Zala [@spzala](https://github.com/spzala)
- Wenjia Zhang [@wenjiaswe](https://github.com/wenjiaswe)

All release version numbers follow the format of [semantic versioning 2.0.0](http://semver.org/).

### Major, minor version release, or its pre-release

- Ensure
 the relevant [milestone](https://github.com/etcd-io/etcd/milestones) on GitHub is complete. All referenced issues should be closed or moved elsewhere.
- Ensure the latest [upgrade documentation](https://etcd.io/docs/next/upgrades) is available.
- Bump [hardcoded MinClusterVerion in the repository](https://github.com/etcd-io/etcd/blob/v3.4.15/version/version.go#L29), if necessary.
- Add feature capability maps for the new version, if necessary.

### Patch version release

- To request a backport, developers submit cherry-pick PRs targeting the release branch. The commits should not include merge commits. The commits should be restricted to bug fixes and security patches.
- The cherrypick PRs should target the appropriate release branch (`base:release-<major>-<minor>`). The k8s infra cherry pick robot `/cherrypick <branch>` PR chatops command may be used to automatically generate cherrypick PRs.
- The release patch manager reviews the cherrypick PRs. Please discuss carefully what is backported
 to the patch release. Each patch release should be strictly better than its predecessor.
- The release patch manager will cherry-pick these commits starting from the oldest one into stable branch.

## Write a release note

- Write an introduction for the new release. For example, what major bug we fix, what new features we introduce, or what performance improvement we make.
- Put `[GH XXXX]` at the head of the change line to reference the Pull Request that introduces the change. Moreover, add a link on it to jump to the Pull Request.
- Find PRs with the `release-note` label and explain them in the `NEWS` file, as a straightforward summary of changes for end-users.

## Patch release criteria

The etcd project aims to release a new patch version if any of the following conditions are met:

- Fixed one or more major CVEs (>=7.5).
- Fixed one or more critical bugs.
- Fixed three or more major bugs.
- Fixed five or more minor bugs.

## Release guide

### Prerequisites

There are some
 prerequisites, which should be done before the release process. These are one-time operations,
which don't need to be executed before releasing each version.
1. Generate a GPG key and add it to your GitHub account. Refer to the links on
[settings](https://github.com/settings/keys).
2. Ensure you have a Linux machine, on which the git, Golang, and docker have been installed.
   - Ensure the Golang version matches the version defined in `.go-version` file.
   - Ensure non-privileged users can run docker commands, refer to the [Linux
postinstall](https://docs.docker.com/engine/install/linux-postinstall/).
   - Ensure there is at least 5GB of free space on your Linux machine.
3. Install gsutil, refer to [gsutil_install](https://cloud.google.com/storage/docs/gsutil_install). When asked about
cloud project to use, pick `etcd-development`.
4. Authenticate the image registry, refer to [Authentication methods](https://cloud.google.com/container-
registry/docs/advanced-authentication).
  - `gcloud
 auth login`
  - `gcloud auth configure-docker`
5. Install gh, refer to [GitHub's documentation](https://github.com/cli/cli#installation). Ensure that running
  `gh auth login` succeeds for the GitHub account you use to contribute to etcd,
  and that `gh auth status` has a clean exit and doesn't show any issues.

### Release steps

1. Raise an issue to publish the release plan, e.g. [issues/17350](https://github.com/etcd-io/etcd/issues/17350).
2. Raise a `kubernetes/org` pull request to temporarily elevate permissions for the GitHub release team.
3. Once permissions are elevated, temporarily relax [branch protections](https://github.com/etcd-
io/etcd/settings/branches) to allow pushing changes directly to `release-*` branches in GitHub.
4. Verify you can pass the authentication to the image registries,
  - `docker login gcr.io`
  - `docker login quay.io`
    - If the release person doesn't have access to 1password, one of the owners (@ahrtr, @ivanvc, @jmhbnz,
@serathius) needs
 to share the password with them per [this guide](https://support.1password.com/share-items/). See rough steps
below,
      - [Sign in](https://team-etcd.1password.com/home) to your account on 1password.com.
      - Click `Your Vault Items` on the right side.
      - Select `Password of quay.io`.

- Click `Share` on the top right, and set expiration as `1 hour` and only available to the release person using his/her email.
- Click `Copy Link` then send the link to the release person via slack or email.

5. Clone the etcd repository and checkout the target branch,
 - `git clone --branch release-3.X git@github.com:etcd-io/etcd.git`
6. Run the release script under the repository's root directory, replacing `${VERSION}` with a value without the `v` prefix, i.e. `3.5.13`.
 - `DRY_RUN=false ./scripts/release.sh ${VERSION}`
 - **NOTE:** When doing a pre-release (i.e., a version from the main branch, 3.6.0-alpha.2), you will need to explicitly set the branch to main:

 ```
  DRY_RUN=false BRANCH=main ./scripts/release.sh ${VERSION}
  ```

 It generates all release binaries under the directory `/tmp/etcd-release-${VERSION}/etcd/release/` and images. Binaries are pushed to the Google Cloud bucket
 under project `etcd-development`, and images are pushed to `quay.io` and `gcr.io`.
7. Publish the release page on GitHub
 - Open the **draft** release URL shown by the release script
 - Click the pen button at the top right to edit the release
 - Review that it looks correct, reviewing that the bottom checkboxes are checked depending on the release version (v3.4 no checkboxes, v3.5 has the set as latest release checkbox checked, v3.6 has the set as pre-release checkbox checked)
 - Then, publish the release
8. Announce to the etcd-dev googlegroup

 Follow the format of previous release emails sent to etcd-dev@googlegroups.com, see an example below. After sending out the email, ask one of the mailing list maintainers to approve the
 email from the pending list. Additionally, label the release email as `Release`.

```text
Hello,

etcd v3.4.30 is now public!

https://github.com/etcd-io/etcd/releases/tag/v3.4.30

Thanks to everyone who contributed to the release!

etcd team
```

9. Update the changelog to reflect the correct release date.
10. Paste the release link to the issue raised in Step 1 and close the issue.
11. Restore standard branch protection settings and raise a follow-up `kubernetes/org` pull request to return to least privilege permissions.
12. Crease a new stable branch through `git push origin release-${VERSION_MAJOR}.${VERSION_MINOR}` if

this is a new major or minor stable release.
13. Re-generate a new password for quay.io if needed (e.g. shared to a contributor who isn't in the release team, and we should rotate the password at least once every 3 months).

#### Release known issues

1. Timeouts pushing binaries - If binaries fail to fully upload to Google Cloud storage, the script must be re-run using the same command. Any artifacts that are already pushed will be overwritten to ensure they are correct. The storage bucket does not use object versioning so incorrect files cannot remain.

2. Timeouts pushing images - It is rare, although possible for connection timeouts to occur when publishing etcd release images to `quay.io` or `gcr.io`. If this occurs, it is known to be safe to rerun the release script command appending the `--no-upload` flag, and image uploads will gracefully resume.

3. GPG vs SSH signing - The release scripts assume that git tags will be signed with a GPG key. Since 2022 GitHub has supported [signing commits and tags using ssh](https://github.blog/changelog/2022-08-23-ssh-commit-verification-now-supported). Until further release script updates are completed you will need to disable this feature in your `~/.gitconfig` and revert to signing via GPG to perform etcd releases.
# Golang modules

The etcd project (since version 3.5) is organized into multiple
[golang modules](https://golang.org/ref/mod) hosted in a [single repository](https://golang.org/ref/mod#vcs-dir).

![modules graph](modules.svg)

There are the following modules:

- **go.etcd.io/etcd/api/v3** - contains API definitions
(like protos & proto-generated libraries) that defines communication protocol
between etcd clients and servers.

- **go.etcd.io/etcd/pkg/v3** - a collection of utility packages used by etcd
without being specific to etcd itself. A package belongs here
only if it could possibly be moved out into its own repository in the future.
Please avoid adding here code that has a lot of dependencies on its own, as
they automatically become dependencies of the client library
(that we want to keep lightweight).

- **go.etcd.io/etcd/client/v3** - client library used to contact etcd over
the network (grpc). Recommended for all new usage of etcd.

- **go.etcd.io/raft/v3**
- implementation of distributed consensus
protocol. Should have no etcd specific code. Hosted in a separate repository:
https://github.com/etcd-io/raft.

- **go.etcd.io/etcd/server/v3** - etcd implementation.
The code in this package is internal to etcd and should not be consumed

by external projects. The package layout and API can change within the minor versions.

- **go.etcd.io/etcd/etcdctl/v3** - a command line tool to access and manage etcd.

- **go.etcd.io/etcd/tests/v3** - a module that contains all integration tests of etcd.
  Notice: All unit tests (fast and not requiring cross-module dependencies)
  should be kept in the local modules of the code under the test.

- **go.etcd.io/bbolt** - implementation of persistent b-tree.
  Hosted in a separate repository: https://github.com/etcd-io/bbolt.

### Operations

1. All etcd modules should be released in the same versions, e.g.
   `go.etcd.io/etcd/client/v3@v3.5.10` must depend on `go.etcd.io/etcd/api/v3@v3.5.10`.

   The consistent updating of versions can be performed using:
   ```shell script
   % DRY_RUN=false TARGET_VERSION="v3.5.10" ./scripts/release_mod.sh update_versions
   ```
2. The released modules should be tagged according to https://golang.org/ref/mod#vcs-version rules,
   i.e. each module should get its own tag.
   The tagging can be performed using:
   ```shell script
   % DRY_RUN=false REMOTE_REPO="origin" ./scripts/release_mod.sh push_mod_tags
   ```

3. All etcd modules should depend on the same versions of underlying dependencies.
   This can be verified using:
   ```shell script
   % PASSES="dep" ./test.sh
   ```

4. The go.mod files must not contain dependencies not being used and must
   conform to `go mod tidy` format.
   This is being verified by:
   ```
   % PASSES="mod_tidy" ./test.sh
   ```

5. To trigger actions across all modules (e.g. auto-format all files), please
   use/expand the following script:
   ```shell script
   % ./scripts/fix.sh
   ```

###

Future

As a North Star, we would like to evaluate etcd modules towards the following model:

![modules graph](modules-future.svg)

This assumes:
- Splitting etcdmigrate/etcdadm out of etcdctl binary.
  Thanks to this etcdctl would become clearly a command-line wrapper
  around network client API,
  while etcdmigrate/etcdadm would support direct physical operations on the
  etcd storage files.
- Splitting etcd-proxy out of ./etcd binary, as it contains more experimental code
  so carries additional risk & dependencies.
- Deprecation of support for v2 protocol.

# Reporting bugs

If any part of the etcd project has bugs or documentation mistakes, please let us know by [opening an issue][etcd-issue]. We treat bugs and mistakes very seriously and believe no issue is too small. Before creating a bug report, please check that an issue reporting the same problem does not already exist.

To make the bug report accurate and easy to understand, please try to create bug reports that are:

- Specific. Include as many details as possible: which version, what environment, what configuration, etc. If the bug is related to running the etcd server, please attach the etcd log (the starting log with the etcd configuration is especially important).

- Reproducible. Include the steps to reproduce the problem. We understand some issues might be hard to reproduce, please include the steps that might lead to the problem. If possible, please attach the affected etcd data dir and stack trace to the bug report.

- Isolated. Please try to isolate and reproduce the bug with
minimum dependencies. It would significantly slow down the speed to fix a bug if too many dependencies are involved in a bug report. Debugging external systems that rely on etcd is out of scope, but we are happy to provide guidance in the right direction or help with using etcd itself.

- Unique. Do not duplicate existing bug reports.

- Scoped. One bug per report. Do not follow up with another bug inside one report.

It may be worthwhile to read [Elika Etemads article on filing good bug reports][filing-good-bugs] before creating a bug report.

We might ask for further information to locate a bug. A duplicated bug report will be closed.

## Frequently asked questions

### How to get a stack trace

```bash
$ kill -QUIT $PID
```

### How to get the etcd version

```bash
$ etcd --version
```

### How to get etcd configuration and log when it runs as systemd service etcd2.service

```bash
$ sudo systemctl cat etcd2
$ sudo journalctl -u etcd2
```

Due to an upstream systemd bug, journald
may miss the last few log lines when its processes exit. If journalctl says etcd stopped without a fatal or panic message, try `sudo journalctl -f -t etcd2` to get the full log.

[etcd-issue]: https://github.com/etcd-io/etcd/issues/new
[filing-good-bugs]: http://fantasai.inkedblade.net/style/talks/filing-good-bugs/
# Community membership

This doc outlines the various responsibilities of contributor roles in etcd.

| Role | Responsibilities | Requirements | Defined by |
|---|---|---|---|
| Member | Active contributor in the community | Sponsored by 2 reviewers and multiple contributions | etcd GitHub org member |
| Reviewer | Review contributions from other members | History of review and authorship | [OWNERS] file reviewer entry |
| Maintainer | Set direction and priorities for the project | Demonstrated responsibility and excellent technical judgement | [OWNERS] file approver entry |

## New contributors

New contributors should be welcomed to the community by existing members,
helped with
PR workflow, and directed to relevant documentation and
communication channels.

## Established community members

Established community members are expected to demonstrate their adherence to the principles in this document, familiarity with project organization, roles, policies, procedures, conventions, etc., and technical and/or writing ability. Role-specific expectations, responsibilities, and requirements are enumerated below.

## Member

Members are continuously active contributors to the community. They can have issues and PRs assigned to them. Members are expected to remain active contributors to the community.

**Defined by:** Member of the etcd GitHub organization.

### Requirements

- Enabled [two-factor authentication] on their GitHub account
- Have made multiple contributions to the project or community. Contribution may include, but is not limited to:
  - Authoring or reviewing PRs on GitHub. At least one PR must be **merged**.
  - Filing or commenting on issues on GitHub
  - Contributing to community discussions (e.g. meetings, Slack, email discussion forums, Stack Overflow)
- Subscribed to [etcd-dev@googlegroups.com](https://groups.google.com/g/etcd-dev)
- Have read the [contributor guide]
- Sponsored by two active maintainers or reviewers.
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
  - With no objections from other maintainers
- Open a [membership nomination] issue against the `kubernetes/org` repo
  - Ensure your sponsors are @mentioned on the issue
  - Make sure that the list of contributions included is representative of your work on the project.
- Members can be removed by a supermajority of the maintainers or can resign by notifying the maintainers.

### Responsibilities and privileges

- Responsive to issues and PRs assigned to them
- Granted "triage access" to etcd project
- Active owner of code they have contributed (unless ownership is explicitly transferred)
  - Code is well-tested
  - Tests consistently pass
  - Addresses bugs or issues discovered after code is accepted

**Note:** Members who frequently contribute code are expected to proactively perform code reviews and work towards becoming a *reviewer*.

## Reviewers

Reviewers are contributors who have demonstrated greater skill in
reviewing the code from other contributors. They are knowledgeable about both
the codebase and software engineering principles. Their LGTM counts towards
merging a code change into the project. A reviewer is generally on the ladder towards
maintainership.

**Defined by:** *reviewers* entry in the [OWNERS] file.

### Requirements

- member for at least 3 months.
- Primary reviewer for at least 5 PRs to the codebase.
- Reviewed or contributed at least 20 substantial PRs to the codebase.
- Knowledgeable about the codebase.
- Sponsored by two active maintainers.
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
  - With no objections from other maintainers
- Reviewers can be removed by a supermajority of the maintainers or can resign by notifying the maintainers.

### Responsibilities and privileges

- Code reviewer status may be a precondition to accepting large code contributions
- Responsible for project quality control via code reviews
  - Focus on code quality and correctness, including testing and factoring
  - May also review for more holistic issues, but not a requirement
- Expected to be responsive to review requests
- Assigned PRs to review related to area of expertise
- Assigned test bugs related to area of expertise
- Granted "triage access" to etcd project

## Maintainers

Maintainers are first and foremost contributors who have shown they
are committed to the long-term success of a project. Maintainership is about building
trust with the current maintainers and being a person that they can
depend on to make decisions in the best interest of the project in a consistent
manner.

**Defined by:** *approvers* entry in the [OWNERS] file.

### Requirements

- Deep understanding of the technical goals and direction of the project
- Deep understanding of the technical domain of the project
- Sustained contributions to design and direction by doing all of:
  - Authoring and reviewing proposals

  - Initiating, contributing, and resolving discussions (emails, GitHub issues, meetings)
  - Identifying subtle or complex issues in the designs and implementation of PRs
- Directly contributed to the project through implementation and/or review
- Sponsored by two active maintainers and elected by supermajority
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
- To become a maintainer send an email with your candidacy to etcd-maintainers-private@googlegroups.com
  - Ensure your sponsors are @mentioned in the email
  - Include a list of contributions representative of your work on the project.
  -
 Existing maintainers vote will privately and respond to the email with either acceptance or feedback for suggested improvement.
- With your membership approved you are expected to:
 - Open a PR and add an entry to the [OWNERS] file
 - Subscribe to etcd-maintainers@googlegroups.com and etcd-maintainers-private@googlegroups.com
 - Request to join [etcd-maintainer teams of etcd organization of GitHub](https://github.com/orgs/etcd-io/teams/maintainers-etcd)
 - Request to join the private slack channel for etcd maintainers on [kubernetes slack](http://slack.kubernetes.io/)
 - Request access to etcd-development GCP project where we publish releases
 - Request access to passwords shared between maintainers

### Responsibilities and privileges

- Make and approve technical design decisions
- Set technical direction and priorities
- Define milestones and releases
- Mentor and guide reviewers, and contributors to the project.
- Participate when called upon in the [security disclosure and
 release process]
- Ensure the continued health of the project
  - Adequate test coverage to confidently release
  - Tests are passing reliably (i.e. not flaky) and are fixed when they fail
- Ensure a healthy process for discussion and decision-making is in place.
- Work with other maintainers to maintain the project's overall health and success holistically

### Retiring

Life priorities, interests, and passions can change. Maintainers can retire and
move to [emeritus maintainers]. If a maintainer needs to step down, they should
inform other maintainers and, if possible, help find someone to pick up the related
work. At the very least, ensure the related work can be continued. Afterward,
they can remove themselves from the list of existing maintainers.

If a maintainer has not been performing their duties for 12 months,
they can be removed by other maintainers. In that case, the inactive maintainer will
be first notified via an email. If the situation doesn't improve, they will be
removed.
 If an emeritus maintainer wants to regain an active role, they can do
so by renewing their contributions. Active maintainers should welcome such a move.

Retiring other maintainers or regaining the status should require the approval
of at least two active maintainers.

## Acknowledgements

Contributor roles and responsibilities were written based on [Kubernetes community membership]

[OWNERS]: /OWNERS
[contributor guide]: /CONTRIBUTING.md
[membership nomination]: https://github.com/kubernetes/org/issues/new?assignees=&labels=area%2Fgithub-membership&projects=&template=membership.yml&title=REQUEST%3A+New+membership+for+%3Cyour-GH-handle%3E
[Kubernetes community membership]: https://github.com/kubernetes/community/blob/master/community-membership.md
[emeritus maintainers]: /README.md#etcd-emeritus-maintainers
[security disclosure and release process]: /security/README.md
[two-factor authentication]: https://docs.github.com/en/authentication/securing-your-account-with-two-factor-authentication-2fa/about-two-factor-authentication

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limitations under the License.
# Logging Conventions

etcd uses the [zap][zap] library for logging application output categorized into *levels*. A log message's level is determined according to these conventions:

* Debug: Everything is still fine, but even common operations may be logged, and less helpful but more quantity of notices. Usually not used in production.
 * Examples:
  * Send a normal message to a remote peer
  * Write a log entry to disk

* Info: Normal, working log information, everything is fine, but helpful notices for auditing or common operations. Should rather not be logged more frequently than once per a few seconds in a normal server's operation.
 * Examples:
   * Startup configuration
   * Start to do a snapshot

* Warning: (Hopefully) Temporary conditions that may cause errors, but may work fine. A replica disappearing (that may reconnect) is a warning.
 * Examples:
   * Failure to send a raft message to a remote peer
   * Failure to receive heartbeat message within the configured election
 timeout

* Error: Data has been lost, a request has failed for a bad reason, or a required resource has been lost.
 * Examples:
   * Failure to allocate disk space for WAL

* Panic: Unrecoverable or unexpected error situation that requires stopping execution.
 * Examples:
   * Failure to create the database

* Fatal: Unrecoverable or unexpected error situation that requires immediate exit. Mostly used in the test.
 * Examples:
   * Failure to find the data directory
   * Failure to run a test function

[zap]: https://github.com/uber-go/zap
# Dependency management

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 - [Indirect dependencies](#indirect-dependencies)
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## Main branch

The dependabot is enabled & [configured](https://github.com/etcd-io/etcd/blob/main/.github/dependabot.yml) to manage dependencies for etcd `main` branch. But dependabot doesn't work well for multi-module repository like `etcd`,

see [dependabot-core/issues/6678](https://github.com/dependabot/dependabot-core/issues/6678).
Usually, human intervention is required
each time when dependabot automatically opens some PRs to bump dependencies.
Please see the guidance below.

### Dependencies used in workflows

The PRs that automatically bump dependencies (see examples below) used in workflows are fine and can be approved & merged directly as long as all checks are successful.

- [build(deps): bump github/codeql-action from 2.2.11 to 2.2.12](https://github.com/etcd-io/etcd/pull/15736)
- [build(deps): bump actions/checkout from 3.5.0 to 3.5.2](https://github.com/etcd-io/etcd/pull/15735)
- [build(deps): bump ossf/scorecard-action from 2.1.2 to 2.1.3](https://github.com/etcd-io/etcd/pull/15607)

### Bumping order

When multiple etcd modules depend on the same package, please bump the package version for all the modules in the correct order. The rule is simple:
if module A depends on module B, then bump the dependency for module B before module A. If the two modules do not depend on each other, then
it doesn't matter to bump which module first. For
example, multiple modules depend on `github.com/spf13/cobra`, so we need to bump the dependency
in the following order,

- go.etcd.io/etcd/pkg/v3
- go.etcd.io/etcd/server/v3
- go.etcd.io/etcd/etcdctl/v3
- go.etcd.io/etcd/etcdutl/v3
- go.etcd.io/etcd/tests/v3
- go.etcd.io/etcd/v3
- go.etcd.io/etcd/tools/v3

For more details about etcd Golang modules, please check <https://etcd.io/docs/next/dev-internal/modules>

Note the module `go.etcd.io/etcd/tools/v3` doesn't depend on any other modules, nor by any other modules, so it doesn't matter when to bump dependencies for it.

### Steps to bump a dependency

Use the `github.com/spf13/cobra` as an example, follow the steps below to bump it from 1.6.1 to 1.7.0 for module `go.etcd.io/etcd/etcdctl/v3`,

```bash
cd ${ETCD_ROOT_DIR}/etcdctl
go get github.com/spf13/cobra@v1.7.0
go mod tidy
cd ..
./scripts/fix.sh
```

Execute the same steps for all other modules. When you finish bumping the dependency for all modules, then commit the change,

```bash
git
 add .
git commit --signoff -m "dependency: bump github.com/spf13/cobra from 1.6.1 to 1.7.0"
```

Please close the related PRs which were automatically opened by dependabot.

When you bump multiple dependencies in one PR, it's recommended to create a separate commit for each dependency. But it isn't a must; for example,
you can get all dependencies bumping for the module `go.etcd.io/etcd/tools/v3` included in one commit.

#### Troubleshooting

In an event of bumping the version of protoc, protoc plugins or grpc-gateway, it might change `*.proto` file which can result in the following error:

```bash
[0;31mFAIL: 'genproto' FAILED at Wed Jul 31 07:09:08 UTC 2024
make: *** [Makefile:134: verify-genproto] Error 255
```

To fix the above error, run the following script from the root of etcd repository:

```bash
./scripts/genproto.sh
```

### Indirect dependencies

Usually, we don't bump a dependency if all modules just indirectly depend on it, such as `github.com/go-logr/logr`.

If
 an indirect dependency (e.g. `D1`) causes any CVE or bugs that affect etcd, usually the module (e.g. `M1`, not part of etcd, but used by etcd)
which depends on it should bump the dependency (`D1`), and then etcd just needs to bump `M1`. However, if the module (`M1`) somehow doesn't
bump the problematic dependency, then etcd can still bump it (`D1`) directly following the same steps above. But as a long-term solution, etcd should
try to remove the dependency on such module (`M1`) that lack maintenance.

For mixed cases, in which some modules directly while others indirectly depend on a dependency, we have multiple options,

- Bump the dependency for all modules, no matter it's direct or indirect dependency.
- Bump the dependency only for modules that directly depend on it.

We should try to follow the first way, and temporarily fall back to the second one if we run into any issue on the first way. Eventually we
should fix the issue and ensure all modules depend on the same version of the
dependency.

### Known incompatible dependency updates

#### arduino/setup-protoc

Please refer to [build(deps): bump arduino/setup-protoc from 1.3.0 to 2.0.0](https://github.com/etcd-io/etcd/pull/16016)

### Rotation worksheet

The dependabot scheduling interval is weekly; it means dependabot will automatically raise a bunch of PRs per week.
Usually, human intervention is required each time. We have a [rotation worksheet](https://docs.google.com/spreadsheets/d/1jodHIO7Dk2VWTs1IRnfMFaRktS9IH8XRyifOnPdSY8I/edit#gid=1394774387),
and everyone is welcome to participate; you just need to register your name in the worksheet.

## Stable branches

Usually, we don't proactively bump dependencies for stable releases unless there are any CVEs or bugs that affect etcd.

If we have to do it, then follow the same guidance above. Note that there is no `./scripts/fix.sh` in release-3.4, so no need to
execute it for 3.4.

## Golang versions

The etcd project aims to maintain a development branch that
is on the latest [Go version](https://go.dev/dl), ideally, this will align with the Go version in use for Kubernetes project development. For an example of how to update etcd to a new minor release of Go refer to issue <https://github.com/etcd-io/etcd/issues/16393> and the linked pull requests.

Suggested steps for performing a minor version upgrade for the etcd development branch:

1. Carefully review new Go version release notes and potentially related blog posts for any deprecations, performance impacts, or other considerations.
2. Create a GitHub issue to signal intent to upgrade and invite discussion, for example, <https://github.com/etcd-io/etcd/issues/16393>.
3. Complete the upgrade locally in your development environment by editing `.go-version` and running `make fix`.
4. Run performance benchmarks locally to compare before and after.

5. Raise a pull request for the changes, for example, <https://github.com/etcd-io/etcd/pull/16394>.

Stable etcd release branches will be maintained
 to stay on the latest patch release of a supported Go version. Upgrading minor versions will be completed before the minor version in use currently is no longer supported. Refer to the [Go release
policy](https://go.dev/doc/devel/release).

For an example of how to update etcd to a new patch release of Go refer to issue <https://github.com/etcd-io/etcd/issues/16343> and the linked pull requests.

References:

- <https://github.com/kubernetes/sig-release/blob/master/release-engineering/handbooks/go.md>

## Core dependencies mappings

[bbolt](https://github.com/etcd-io/bbolt) and [raft](https://github.com/etcd-io/raft) are two core dependencies of etcd.

Both etcd 3.4.x and 3.5.x depend on bbolt 1.3.x, and etcd 3.6.x (`main` branch) depends on bbolt 1.4.x.

raft is included in the etcd repository for release-3.4 and release-3.5 branches, so etcd 3.4.x and 3.5.x do not depend on any
external raft module. We moved raft into [a separate repository](https://github.com/etcd-io/raft) starting
 from 3.6 (`main` branch), and the first raft
release will be v3.6.0, so etcd 3.6.x will depend on raft 3.6.x.

Please see the table below:

| etcd versions | bbolt versions | raft versions |
|---|---|---|
| 3.4.x | v1.3.x | N/A |
| 3.5.x | v1.3.x | N/A |
| 3.6.x | v1.4.x | v3.6.x |

# 1.1204 datadog-datadog-agent-pkg-trace 0.66.1

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```
---
name: Handle External Contributor PRs

on:
 # run in the context of the base branch, so that it still works in PR from forks
 pull_request_target:
   types: [opened, reopened]

permissions: {}

jobs:
 external-contributor-prs:
   name: Handle Fork PRs
   runs-on: ubuntu-latest
   permissions:
     pull-requests: write
   if: github.event.pull_request.head.repo.full_name != github.repository
   steps:
     - name: Checkout repository
       uses: actions/checkout@11bd71901bbe5b1630ceea73d27597364c9af683 # v4.2.2
       with:
         ref: main
         fetch-depth: 0
         persist-credentials: false
     - name: Install dda
       uses: ./.github/actions/install-dda
       with:
         features: legacy-tasks
     - name: Set label on external contributor PRs
       run: |
         dda inv -- -e github.handle-community-pr --repo="$GH_REPO" --pr-id="$NUMBER" --labels="$LABELS"
       env:
         GH_TOKEN: ${{ secrets.GITHUB_TOKEN }}
         GITHUB_TOKEN:
 ${{ secrets.GITHUB_TOKEN }}
         SLACK_DATADOG_AGENT_BOT_TOKEN: ${{ secrets.SLACK_DATADOG_AGENT_BOT_TOKEN }}
         GH_REPO: ${{ github.repository }}
         NUMBER: ${{ github.event.number }}
         # labels is a comma-separated list of tags
         LABELS: community
Component,Origin,License
devenv,github.com/StefanScherer/packer-windows,MIT
```

devenv,github.com/luciusbono/Packer-Windows10,MIT

# 1.1205 ipaddr.js 1.9.1

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```
package main

import (
 "bufio"
 "bytes"
 "flag"
 "fmt"
 "io"
 "log"
 "os"
 "path/filepath"
 "strings"
```

```
)

const crUsageString = `xb copyright [options] <path>....

The xb copyright command adds a copyright remark to all go files below path.

 -h  prints this message and exits
`

func crUsage(w io.Writer) {
 fmt.Fprint(w, crUsageString)
}

const copyrightText = `
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`

func goComment(text string) string {
 buf := new(bytes.Buffer)
 scanner := bufio.NewScanner(strings.NewReader(text))
 var err error
 for scanner.Scan() {
  s := strings.TrimSpace(scanner.Text())
  if len(s) == 0 {
   continue
  }
  if _, err = fmt.Fprintln(buf, "//", s); err != nil {
   panic(err)
  }
 }
 if err
 = scanner.Err(); err != nil {
  panic(err)
 }
 if _, err = fmt.Fprintln(buf); err != nil {
  panic(err)
 }
 return buf.String()
}

var goCopyright = goComment(copyrightText)

func addCopyright(path string) (err error) {
 log.Printf("adding copyright to %s", path)
 src, err := os.Open(path)
 if err != nil {
```

```
 return err
}
defer func() {
 cerr := src.Close()
 if cerr != nil && err == nil {
  err = cerr
 }
}()
newPath := path + ".new"
dst, err := os.Create(newPath)
if err != nil {
 return err
}
defer func() {
 cerr := dst.Close()
 if cerr != nil && err == nil {
  err = cerr
 }
}()
out := bufio.NewWriter(dst)
fmt.Fprint(out, goCopyright)
scanner := bufio.NewScanner(src)
line := 0
del := false
for scanner.Scan() {
 line++
 txt := scanner.Text()
 if line == 1 && strings.Contains(txt, "Copyright") {
  del = true
  continue
 }
 if del {
  s := strings.TrimSpace(txt)
  if len(s) == 0 {
   del = false
  }
  continue
 }
 fmt.Fprintln(out, txt)
}
if err = scanner.Err();
err != nil {
 return err
}
if err = out.Flush(); err != nil {
 return
}
err = os.Rename(newPath, path)
```

```
 return
}

func walkCopyrights(path string, info os.FileInfo, err error) error {
 if err != nil {
  return err
 }
 if info.IsDir() {
  return nil
 }
 if !strings.HasSuffix(info.Name(), ".go") {
  return nil
 }
 return addCopyright(path)
}

func copyright() {
 cmdName := os.Args[0]
 log.SetPrefix(fmt.Sprintf("%s: ", cmdName))
 log.SetFlags(0)

 flag.CommandLine = flag.NewFlagSet(cmdName, flag.ExitOnError)
 flag.Usage = func() { crUsage(os.Stderr); os.Exit(1) }

 help := flag.Bool("h", false, "")

 flag.Parse()

 if *help {
  crUsage(os.Stdout)
  os.Exit(0)
 }

 for _, path := range flag.Args() {
  fi, err := os.Stat(path)
  if err != nil {
   log.Print(err)
   continue
  }
  if !fi.IsDir() {
   log.Printf("%s is not a directory", path)
   continue
  }
  if err = filepath.Walk(path, walkCopyrights); err != nil {
   log.Fatalf("%s error %s", path, err)
  }
 }
}
```

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`

# 1.1207 strip-ansi 6.0.1

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# 1.1209 args 5.0.3

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# 1.1211 cel-go 0.22.1

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==========
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# 1.1216 etcd-client-pkg 3.6.2

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# Features

This document provides an overview of etcd features and general development guidelines for adding and deprecating them. The project maintainers can override these guidelines per the need of the project following the

project governance.

## Overview

The etcd features fall into three stages, experimental, stable, and unsafe.

### Experimental

Any new feature is usually added as an experimental feature. An experimental feature is characterized as below:
- Might be buggy due to a lack of user testing. Enabling the feature may not work as expected.
- Disabled by default when added initially.
- Support for such a feature may be dropped at any time without notice
  - Feature-related issues may be given lower priorities.
  - It can be removed in the next minor or major release without following the feature deprecation policy unless it graduates to a stable future.

### Stable

A stable feature is characterized as below:
- Supported as part of the supported releases of etcd.
-
 May be enabled by default.
- Discontinuation of support must follow the feature deprecation policy.

### Unsafe

Unsafe features are rare and listed under the `Unsafe feature:` section in the etcd usage documentation. By default, they are disabled. They should be used with caution following documentation. An unsafe feature can be removed in the next minor or major release without following the feature deprecation policy.

## Development Guidelines

### Adding a new feature

Any new enhancements to the etcd are typically added as an experimental feature. The general development requirements are listed below. They can be somewhat flexible depending on the scope of the feature and review discussions and will evolve over time.
- Open an issue
  - It must provide a clear need for the proposed feature.
  - It should list development work items as checkboxes. There must be one work item towards future graduation to a stable future.
  - Label the issue with `type/feature` and `experimental`.
  - Keep the issue open for tracking purposes until a decision is made on graduation.
- Open a Pull Request (PR)
  - Provide unit tests. Integration tests are also recommended as possible.
  - Provide robust e2e test coverage. If the feature being added is complicated or quickly needed, maintainers can decide to go with e2e tests for basic coverage initially and have robust coverage added at a later time before the feature graduation to the stable feature.

- Provide logs for proper debugging.
- Provide metrics and benchmarks as needed.
- The Feature should be disabled by default.
- Any configuration flags related to the implementation of the feature must be prefixed with `experimental` e.g. `--experimental-feature-name`.
- Add a CHANGELOG entry.

- At least two maintainers must approve feature requirements and related code changes.

### Graduating an Experimental feature to Stable

It is important that experimental features don't get stuck in that stage.
They should be revisited and moved to the stable stage following the graduation steps as described here.

#### Locate graduation candidate

Decide if an experimental feature is ready for graduation to the stable stage.

- Find the issue that was used to enable the experimental feature initially. One way to find such issues is to search for issues with `type/feature` and `experimental` labels.
- Fix any known open issues against the feature.
- Make sure the feature was enabled for at least one previous release. Check the PR(s) reference from the issue to see when the feature-related code changes were merged.

#### Provide implementation

If an experimental feature is found ready for graduation to the stable stage, open a Pull Request (PR) with the following changes.

- Add robust e2e tests if not already provided.
- Add a new stable feature flag identical to the experimental feature flag but without the `--experimental` prefix.
- Deprecate the experimental feature following the [feature deprecation policy](#Deprecating-a-feature).
- Implementation must ensure that both the graduated and deprecated experimental feature flags work as expected. Note that both these flags will co-exist for the timeframe described in the feature deprecation policy.
- Enable the graduated feature by default if needed.

At least two maintainers must approve the work. Patch releases should not be considered for graduation.

### Deprecating a feature

#### Experimental

An experimental feature deprecates when it graduates to the stable stage.

- Add a deprecation message in the documentation of the experimental feature with a recommendation to use a related stable feature. e.g. `DEPRECATED. Use <feature-name> instead.`
- Add a `deprecated` label in the issue that was initially used to enable the experimental feature.

#### Stable

As the project evolves, a stable feature may sometimes need to be deprecated and removed. Such a situation should be handled using the steps below:

- Create an issue for tracking purposes.
- Add a deprecation message in the feature usage documentation before a planned release for feature deprecation.

e.g. `To be deprecated in <release>.`. If a new feature replaces the `To be deprecated` feature, then also provide a message saying so. e.g. `Use <feature-name> instead.`.
- Deprecate the feature in the planned release with a message as part of the feature usage documentation. e.g. `DEPRECATED`. If a new feature replaces the deprecated feature, then also provide a message saying so. e.g. `DEPRECATED. Use <feature-name> instead.`.
- Add a `deprecated` label in the related issue.

Remove the deprecated feature in the following release. Close any related issue(s). At least two maintainers must approve the work. Patch releases should not be considered for deprecation.
# Set up the local cluster

For testing and development deployments, the quickest and easiest way is to configure a local cluster. For a production deployment, refer to the [clustering][clustering] section.

## Local standalone cluster

### Starting a cluster

Run the following to deploy an etcd cluster as a standalone cluster:

```
$ ./etcd
...
```

If the `etcd` binary is not present in the current working directory, it might be located either at `$GOPATH/bin/etcd` or at `/usr/local/bin/etcd`. Run the command appropriately.

The running etcd member listens on `localhost:2379` for client requests.

### Interacting with the cluster

Use `etcdctl` to interact with the running cluster:

1. Store an example key-value pair in the cluster:

   ```
   $ ./etcdctl put foo bar
   OK
   ```

   If OK is printed, storing the key-value pair is successful.

2. Retrieve the value of `foo`:

   ```
   $ ./etcdctl get foo
   bar
   ```

```

If `bar` is returned, interaction with the etcd
cluster is working as expected.

## Local multi-member cluster

### Starting a cluster

A `Procfile` at the base of the etcd git repository is provided to easily configure a local multi-member cluster. To start a multi-member cluster, navigate to the root of the etcd source tree and perform the following:

1. Install `goreman` to control Procfile-based applications:

```
$ go install github.com/mattn/goreman@latest
```

The installation will place executables in the $GOPATH/bin. If $GOPATH environment variable is not set, the tool will be installed into the $HOME/go/bin. Make sure that $PATH is set accordingly in your environment.

2. Start a cluster with `goreman` using etcd's stock Procfile:

```
$ goreman -f Procfile start
```

The members start running. They listen on `localhost:2379`, `localhost:22379`, and `localhost:32379` respectively for client requests.

### Interacting with the cluster

Use `etcdctl` to interact with the running cluster:

1. Print
the list of members:

```
$ etcdctl --write-out=table --endpoints=localhost:2379 member list
```

The list of etcd members is displayed as follows:

```
+------------------+---------+--------+------------------------+------------------------+
|       ID         | STATUS  |  NAME  |       PEER ADDRS       |      CLIENT ADDRS      |
+------------------+---------+--------+------------------------+------------------------+
| 8211f1d0f64f3269 | started | infra1 | http://127.0.0.1:2380  | http://127.0.0.1:2379  |
| 91bc3c398fb3c146 | started | infra2 | http://127.0.0.1:22380 | http://127.0.0.1:22379 |
| fd422379fda50e48 | started | infra3 | http://127.0.0.1:32380 | http://127.0.0.1:32379 |
```
```

```
+------------------+---------+--------+-----------------------+-----------------------+
```

2. Store an example key-value pair in the cluster:

```
$ etcdctl put foo bar
OK
```

If OK is printed, storing the key-value pair is successful.

### Testing fault tolerance

To exercise etcd's fault tolerance, kill a member and attempt to retrieve the key.

1. Identify the process name of the member to be stopped.

The `Procfile` lists the properties of the multi-member cluster. For example, consider the member with the process name, `etcd2`.

2. Stop the member:

```
# kill etcd2
$ goreman run stop etcd2
```

3. Store a key:

```
$ etcdctl put key hello
OK
```

4. Retrieve the key that is stored in the previous step:

```
$ etcdctl get key
hello
```

5. Retrieve a key from the stopped member:

```
$ etcdctl --endpoints=localhost:22379 get key
```

The command should display an error caused by connection failure:

```
2017/06/18 23:07:35 grpc: Conn.resetTransport failed to create client transport: connection error: desc = "transport: dial tcp 127.0.0.1:22379: getsockopt: connection refused"; Reconnecting to "localhost:22379"
Error:  grpc:
timed out trying to connect
```

6. Restart the stopped member:

```
$ goreman run restart etcd2
```

7. Get the key from the restarted member:

```
$ etcdctl --endpoints=localhost:22379 get key
hello
```

Restarting the member re-establishs the connection. `etcdctl` will now be able to retrieve the key successfully. To learn more about interacting with etcd, read [interacting with etcd section][interacting].

[clustering]: https://etcd.io/docs/latest/op-guide/clustering/
[interacting]: https://etcd.io/docs/latest/dev-guide/interacting_v3/
# Branch management

## Guide

* New development occurs on the [main branch][main].
* The main branch should always have a green build!
* Backwards-compatible bug fixes should target the main branch and subsequently be ported to stable branches.
* Once the main branch is ready for release, it will be tagged and become the new stable branch.

The etcd team has adopted a *rolling release model* and supports two stable versions of etcd.

### Main branch

The `main` branch is our development branch. All new features land here first.

To try new and experimental features, pull `main` and play with it. Note that `main` may not be stable because new features may introduce bugs.

Before the release of the next stable version, feature PRs will be frozen. A [release manager](./release.md#release-management) will be assigned to the major/minor version and will lead the etcd community in testing, bug-fix, and documentation of the release for one to two weeks.

### Stable branches

All branches with
 the prefix `release-` are considered _stable_ branches.

After every minor release ([semver.org](https://semver.org/)), we will have a new stable branch for that release, managed by a [patch release manager](./release.md#release-management). We will keep fixing the backward-compatible bugs for the latest two stable releases. A _patch_ release to each supported release branch, incorporating any bug fixes, will be once every two weeks, given any patches.

[main]: https://github.com/etcd-io/etcd/tree/main
# Issue triage guidelines

## Purpose

Speed up issue management.

The `etcd` issues are listed at <https://github.com/etcd-io/etcd/issues> and are identified with labels. For example, an issue that is identified as a bug will be set to the label `type/bug`.

The etcd project uses labels to indicate common attributes such as `area`, `type`, and `priority` of incoming issues.

New issues will often start without any labels, but typically `etcd` maintainers, reviewers, and members will add labels by following these triage guidelines. The detailed list of labels can be found at <https://github.com/etcd-io/etcd/labels>.

## Scope

This document serves as the primary guidelines for triaging incoming issues in `etcd`.

All contributors are encouraged and welcome to help manage issues which will help reduce the burden on project maintainers, though the work and responsibilities discussed in this document are created with `etcd` project reviewers and members in mind as these individuals will have
 triage access to the etcd project which is a requirement for actions like applying labels or closing issues.

Refer to [etcd community membership](https://github.com/etcd-io/etcd/blob/main/Documentation/contributor-guide/community-membership.md) for guidance on becoming an etcd project member or reviewer.

## Step 1 - Find an issue to triage

To get started you can use the following recommended issue searches to identify issues that are in need of triage:

* [Issues that have no labels](https://github.com/etcd-io/etcd/issues?q=is%3Aissue+is%3Aopen+sort%3Aupdated+no%3Alabel)
* [Issues created recently](https://github.com/etcd-io/etcd/issues?q=is%3Aissue+is%3Aopen+)
* [Issues not assigned but linked pr](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+no%3Aassignee+linked%3Apr)

* [Issues with no comments](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+comments%3A0+)
* [Issues with help wanted](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+label%3A%22help+wanted%22+)

## Step 2 - Check the issue is valid

Before we start adding labels or trying to work out a priority, our first triage step needs to be working out if the issue actually belongs to the etcd project and is not a duplicate.

### Issues that don't belong to etcd

Sometimes issues are reported that belong to other projects that `etcd` use. For example, `grpc` or `golang` issues. Such issues should be addressed by asking the reporter to open issues in the appropriate other projects.

These issues can generally be closed unless a maintainer and issue reporter see a need to keep it open for tracking purposes. If you have triage permissions please close it, alternatively mention the @etcd-io/members group to request a member with triage access to close the issue.

### Duplicate issues

If an issue is a duplicate, add a comment stating so along with a reference for the original issue and if you have triage permissions please close it, alternatively mention the @etcd-io/members group to request a member with triage access close the issue.

## Step 3 - Apply the appropriate type of label

Adding a `type` label to an issue helps create visibility on the health of the project and helps contributors identify potential priorities, i.e. addressing existing bugs or test flakes before implementing new features.

### Support requests

As a general rule, the focus for etcd support is to address common themes in a broad way that helps all users, i.e. through channels like known issues, frequently asked questions, and high-quality documentation. To make the best use of project members time we should avoid providing 1:1 support if a broad approach is available.

Some people mistakenly use our GitHub bug report or feature request templates to file support requests. Usually, they are asking for help operating or configuring some aspect of etcd. Support requests for etcd should instead be raised as [discussions](https://github.com/etcd-io/etcd/discussions).

Common types of support requests are:

1. Questions about configuring or operating existing well-documented etcd features, for example, <https://github.com/etcd-io/etcd/issues/15945>. Note - If an existing feature is not well documented please apply the `area/documentation` label and propose documentation improvements that would prevent future users from stumbling on the problem again.

2. Bug reports or questions about unsupported versions of etcd, for example <https://github.com/etcd-io/etcd/issues/15796>. When responding to these issues please refer to our [supported versions documentation](https://etcd.io/docs/latest/op-guide/versioning) and encourage the reporter to upgrade to a recent patch release of a supported version as soon as possible. We should limit the effort supporting users that do not make the effort to run a supported version of etcd or ensure their version is patched.

3. Bug reports that do not provide a complete list of steps to reproduce the issue and/or contributors are not able to reproduce the issue, for example, <https://github.com/etcd-io/etcd/issues/15740>. We should limit the effort we put into reproducing issues ourselves and motivate users to provide the necessary information to accept the bug report.

4. General questions that are filed using feature request or bug report issue templates, for example, <https://github.com/etcd-io/etcd/issues/15914>. Note - These types of requests may surface good additions to our [frequently asked questions](https://etcd.io/docs/v3.5/faq).

If you identify that an issue is a support request please:

1. Add the `type/support` or `type/question` label.

2. Add the following comment to inform the issue creator that discussions should be used instead and that this issue will be converted to a discussion.

> Thank you for your question, this support issue will be moved to our [Discussion Forums](https://github.com/etcd-io/etcd/discussions).
>
> We are trying to consolidate the channels to which questions for help/support are posted so that we can improve our efficiency in responding to your requests, and make it easier for you to find answers to frequently asked questions and how to address common use cases.
>
> We regularly see messages posted in multiple forums, with the full response thread only in one place or, worse, spread across multiple forums. Also, the large volume of support issues on GitHub is making it difficult for us to use issues to identify real bugs.
>
> Members of the etcd community use Discussion Forums to field support requests. Before posting a new question, please search these for answers to similar questions, and also familiarize yourself with:
>
> 1. [user documentation](https://etcd.io/docs/latest)
> 2. [frequently asked questions](https://etcd.io/docs/v3.5/faq)
>
> Again, thanks for using etcd and raising this question.
>
> The etcd team

3. Finally, click `Convert to discussion` on the right-hand panel, selecting the appropriate discussion category.

### Bug reports

If an issue has been raised as a bug it should already have the `type/bug` label, however, if this is missing for an issue you determine to be a bug please add the label manually.

The next step is to validate if the issue is indeed a bug. If not, add a comment with the findings and close the trivial issue. For non-trivial issues, wait to hear back from the issue reporter and see if there is any objection. If the issue reporter does not reply in 30 days, close the issue.

If the problem can not be reproduced or requires more information, leave a comment for the issue reporter as soon as possible while the issue is fresh for the issue reporter.

### Feature requests

New feature requests should be created via the etcd feature request template and in theory already have the `type/feature` label, however, if this is missing for an issue you determine to be a feature please add the label manually.

### Test flakes

Test flakes
are a specific type of bug that the etcd project tracks separately as these are a priority to address. These should be created via the test flake template and in theory already have the `type/flake` label, however, if this is missing for an issue you determine to be related to a flaking test please add the label manually.

## Step 4 - Define the areas impacted

Adding an `area` label to an issue helps create visibility on which areas of the etcd project require attention and helps contributors find issues to work on relating to their particular skills or knowledge of the etcd codebase.

If an issue crosses multiple domains please add additional `area` labels to reflect that.

Below is a brief summary of the area labels in active use by the etcd project along with any notes on their use:

| Label | Notes |
| --- | --- |
| area/external | Tracking label for issues raised that are external to etcd. |
| area/community | |
| area/raft | |
| area/clientv3 | |
| area/performance | |
| area/security | |
| area/tls | |
| area/auth | |
| area/etcdctl | |
| area/etcdutl | |
| area/contrib | Not to be confused with `area/community` this label is specifically used for issues relating to community-maintained scripts or files in the `contrib/` directory which aren't part of the core etcd project. |

| area/documentation | |
| area/tooling | Generally used in relation to the third party / external utilities or tools that are used in various stages of the etcd build, test, or release process, for example, tooling to create sboms. |
| area/testing | |
| area/robustness-testing | |

## Step 5 - Prioritise the issue

If an issue lacks a priority label it has not been formally prioritized yet.

Adding a `priority` label helps the etcd project understand what is important and should be worked on now, and conversely, what is not as important and is on the project backlog.

|Priority label|What it means|Examples|
|---|---|---|
| `priority/critical-urgent`
 | Maintainers are responsible for making sure that these issues (in their area) are being actively worked oni.e., drop what you're doing. The stuff is burning. These should be fixed before the next release. | user-visible critical bugs in core features <br> broken builds on tier1 supported platforms <br> tests and critical security issues |
| `priority/important-soon` | Must be staffed and worked on either currently or very soonideally in time for the next release. | |
| `priority/important-longterm` | Important over the long term, but may not be currently staffed and/or may require multiple releases to complete. | |
| `priority/backlog` | General agreement that this is a nice-to-have, but no one's available to work on it anytime soon. Community contributions would be most welcome in the meantime, though it might take a while to get them reviewed if reviewers are fully occupied with higher-priority issuesfor example, immediately before a release.| |
| `priority/awaiting-more-evidence`
 | Possibly useful, but not yet enough support to actually get it done. | Mostly placeholders for potentially good ideas, so that they don't get completely forgotten, and can be referenced or deduped every time they come up |

## Step 6 - Support new contributors

As part of the `etcd` triage process once the `kind` and `area` have been determined, please consider if the issue would be suitable for a less experienced contributor. The `good first issue` label is a subset of the `help wanted` label, indicating that members have committed to providing extra assistance for new contributors. All `good first issue` items also have the `help wanted` label.

### Help wanted

Items marked with the `help wanted` label need to ensure that they meet these criteria:

* **Low Barrier to Entry** - It should be easy for new contributors.

* **Clear** - The task is agreed upon and does not require further discussions in the community.

* **Goldilocks priority** - The priority
 should not be so high that a core contributor should do it, but not too low that it isnt useful enough for a core contributor to spend time reviewing it, answering questions, helping get it into a release, etc.

### Good first issue

Items marked with `good first issue` are intended for first-time contributors. It indicates that members will keep an eye out for these pull requests and shepherd it through our processes.

New contributors should not be left to find an approver, ping for reviews, decipher test commands, or identify that their build failed due to a flake. It is important to make new contributors feel welcome and valued. We should assure them that they will have an extra level of help with their first contribution.

After a contributor has successfully completed one or two `good first issue` items, they should be ready to move on to `help wanted` items.

* **No Barrier to Entry** - The task is something that a new contributor can tackle without advanced setup or domain knowledge.

* **Solution Explained** - The recommended solution is clearly described in the issue.

* **Gives Examples** - Link to examples of similar implementations so new contributors have a reference guide for their changes.

* **Identifies Relevant Code** - The relevant code and tests to be changed should be linked in the issue.

* **Ready to Test** - There should be existing tests that can be modified, or existing test cases fit to be copied. If the area of code doesnt have tests, before labeling the issue, add a test fixture. This prep often makes a great help wanted task!

## Step 7 - Follow up

Once initial triage has been completed, issues need to be re-evaluated over time to ensure they don't become stale incorrectly.

### Track important issues

If an issue is at risk of being closed by the stale bot in the future, but is an important issue for the etcd project, then please apply the `stage/tracked` label and remove any `stale` labels that exist. This will ensure the project does not lose sight of the issue.

### Close incomplete issues

Issues that lack enough information from the issue reporter should be closed if the issue reporter does not provide information in 30 days. Issues can always be re-opened at a later date if new information is provided.

### Check for incomplete work

If an issue owned by a developer has no pull request created in 30 days, contact the issue owner and kindly ask about the status of their work, or to release ownership on the issue if needed.

# PR management

## Purpose

Speed up PR management.

The `etcd` PRs are listed at https://github.com/etcd-io/etcd/pulls
A PR can have various labels, milestones, reviewers, etc. The detailed list of labels can be found at https://github.com/kubernetes/kubernetes/labels

Following are a few example searches on PR for convenience:
* [Open PRS for milestone etcd-v3.6](https://github.com/etcd-io/etcd/pulls?utf8=%E2%9C%93&q=is%3Apr+is%3Aopen+milestone%3Aetcd-v3.6)
* [PRs under investigation](https://github.com/etcd-io/etcd/labels/Investigating)

## Scope

These guidelines serve as a primary document for managing PRs in `etcd`. Everyone is welcome to help manage PRs but the work and responsibilities discussed in this document are created with `etcd` maintainers and active contributors in mind.

## Ensure tests are run

The etcd project use Kubernetes Prow and GitHub Actions to run tests. To ensure all required tests run if a pull request is ready for testing and still has the `needs-ok-to-test`
label then please comment on the pull request `/ok-to-test`.

## Handle inactive PRs
Poke PR owner if review comments are not addressed in 15 days. If the PR owner does not reply in 90 days, update the PR with a new commit if possible. If not, inactive PR should be closed after 180 days.

## Poke reviewer if needed

Reviewers are responsive in a timely fashion, but considering everyone is busy, give them some time after requesting a review if a quick response is not provided. If the response is not provided in 10 days, feel free to contact them via adding a comment in the PR or sending an email or message on Slack.

## Verify important labels are in place

Make sure that appropriate reviewers are added to the PR. Also, make sure that a milestone is identified. If any of these or other important labels are missing, add them. If a correct label cannot be decided, leave a comment for the maintainers to do so as needed.
# Roadmap

etcd uses GitHub milestones to track all tasks in each major or minor release. The `roadmap.md` file only records the
most important tasks for each release. The list is based on the current maintainer capacity that may shift over time. Proposed milestones are what we think we can deliver with the people we have. If we have more support on the

important
stuff, we could pick up more items from the backlog. Note that etcd will continue to mainly focus on technical debt over
the next few major or minor releases.

Each item has an assigned priority. Refer to [priority definitions](https://github.com/etcd-io/etcd/blob/main/Documentation/contributor-guide/triage_issues.md#step-5---prioritise-the-issue).

## v3.6.0

For a full list of tasks in `v3.6.0`, please see [milestone etcd-v3.6](https://github.com/etcd-io/etcd/milestone/38).

| Title | Priority | Status | Note |
|---|---|---|---|
| [Support downgrade](https://github.com/etcd-io/etcd/issues/11716) | priority/important-soon | In progress | etcd will support downgrade starting from 3.6.0. But it will also support offline downgrade from 3.5 to 3.4. |
| [StoreV2 deprecation](https://github.com/etcd-io/etcd/issues/12913) | priority/important-soon | In progress | This task will be covered in both 3.6 and 3.7. |
| [Release raft 3.6.0](https://github.com/etcd-io/raft/issues/89) | priority/important-soon | Not started | etcd 3.6.0 will depends on raft 3.6.0 |
| [Release bbolt 1.4.0](https://github.com/etcd-io/bbolt/issues/553) | priority/important-soon | Not started | etcd 3.6.0 will depends on bbolt 1.4.0 |
| [Support /livez and /readyz endpoints](https://github.com/etcd-io/etcd/issues/16007) | priority/important-longterm | In progress | It provides clearer APIs, and can also work around the stalled writes issue |
| [Bump gRPC](https://github.com/etcd-io/etcd/issues/16290) | priority/important-longterm | Completed | It isn't guaranteed to be resolved in 3.6, and might be postponed to 3.7 depending on the effort and risk. |
| [Deprecate grpc-gateway or bump it](https://github.com/etcd-io/etcd/issues/14499) | priority/important-longterm | Completed | It isn't guaranteed to be resolved in 3.6, and might be postponed to 3.7 depending on the effort and risk. |
| [bbolt: Add logger into bbolt](https://github.com/etcd-io/bbolt/issues/509) | priority/important-longterm | Completed | It's important to diagnose bbolt issues |
| [bbolt: Add surgery commands](https://github.com/etcd-io/bbolt/issues/370) | priority/important-longterm | Completed | Surgery commands are important for fixing corrupted db files |
| [Evaluate and (Gradulate or deprecate/remove) experimental features](https://github.com/etcd-io/etcd/issues/16292) | priority/backlog | Not started | This task will be covered in both 3.6 and 3.7. |

## v3.7.0

For a full list of tasks in `v3.7.0`, please see [milestone etcd-v3.7](https://github.com/etcd-io/etcd/milestone/39).

| Title | Priority | Note |
|---|---|---|
| [StoreV2 deprecation](https://github.com/etcd-io/etcd/issues/12913) | P0 | Finish the remaining tasks 3.7. |
| [Refactor lease: Lease might be revoked by mistake by old leader](https://github.com/etcd-io/etcd/issues/15247) | P1 | to be investigated & discussed |
| [Integrate raft's new feature (async write) into etcd](https://github.com/etcd-io/etcd/issues/16291) | P1 | It should improve the performance |
| [bbolt: Support customizing the bbolt rebalance threshold](https://github.com/etcd-io/bbolt/issues/422) | P2 | It may get rid of etcd's defragmentation. Both bbolt and etcd need to be changed. |
| [Evaluate and (graduate or deprecate/remove) experimental features](https://github.com/etcd-io/etcd/issues/16292) | P2 | Finish the remaining tasks 3.7. |

## Backlog (future releases)

| Title | Priority | Note |
|---|---|---|
| [Remove the dependency on grpc-go's experimental API](https://github.com/etcd-io/etcd/issues/15145) | | |
| [Protobuf: cleanup both golang/protobuf and gogo/protobuf](https://github.com/etcd-io/etcd/issues/14533) | | |
| [Proposals should include a merkle root](https://github.com/etcd-io/etcd/issues/13839) | | |
| [Add Distributed Tracing using OpenTelemetry](https://github.com/etcd-io/etcd/issues/12460) | | |
| [Support CA rotation](https://github.com/etcd-io/etcd/issues/11555) | | |
| [bbolt: Migrate all commands to cobra style commands](https://github.com/etcd-io/bbolt/issues/472) | | |
| [raft: enhance the configuration change validation](https://github.com/etcd-io/raft/issues/80) | | |

# Release

The guide talks about how to release a new version of etcd.

The procedure includes some manual steps for sanity checking, but it can probably be further scripted. Please keep this document up-to-date if making changes to the release process.

## Release management

The following pool of release candidates manages the release of each etcd major/minor version as well as manages patches
to each stable release branch. They are responsible for communicating the timelines and status of each release and for ensuring the stability of the release branch.

- Benjamin Wang [@ahrtr](https://github.com/ahrtr)

- James Blair [@jmhbnz](https://github.com/jmhbnz)
- Marek Siarkowicz [@serathius](https://github.com/serathius)
- Sahdev Zala [@spzala](https://github.com/spzala)
- Wenjia Zhang [@wenjiaswe](https://github.com/wenjiaswe)

All release version numbers follow the format of [semantic versioning 2.0.0](http://semver.org/).

### Major, minor version release, or its pre-release

- Ensure
 the relevant [milestone](https://github.com/etcd-io/etcd/milestones) on GitHub is complete. All referenced issues should be closed or moved elsewhere.
- Ensure the latest [upgrade documentation](https://etcd.io/docs/next/upgrades) is available.
- Bump [hardcoded MinClusterVerion in the repository](https://github.com/etcd-io/etcd/blob/v3.4.15/version/version.go#L29), if necessary.
- Add feature capability maps for the new version, if necessary.

### Patch version release

- To request a backport, developers submit cherry-pick PRs targeting the release branch. The commits should not include merge commits. The commits should be restricted to bug fixes and security patches.
- The cherrypick PRs should target the appropriate release branch (`base:release-<major>-<minor>`). The k8s infra cherry pick robot `/cherrypick <branch>` PR chatops command may be used to automatically generate cherrypick PRs.
- The release patch manager reviews the cherrypick PRs. Please discuss carefully what is backported
 to the patch release. Each patch release should be strictly better than its predecessor.
- The release patch manager will cherry-pick these commits starting from the oldest one into stable branch.

## Write a release note

- Write an introduction for the new release. For example, what major bug we fix, what new features we introduce, or what performance improvement we make.
- Put `[GH XXXX]` at the head of the change line to reference the Pull Request that introduces the change. Moreover, add a link on it to jump to the Pull Request.
- Find PRs with the `release-note` label and explain them in the `NEWS` file, as a straightforward summary of changes for end-users.

## Patch release criteria

The etcd project aims to release a new patch version if any of the following conditions are met:

- Fixed one or more major CVEs (>=7.5).
- Fixed one or more critical bugs.
- Fixed three or more major bugs.
- Fixed five or more minor bugs.

## Release guide

### Prerequisites

There are some
 prerequisites, which should be done before the release process. These are one-time operations,
which don't need to be executed before releasing each version.
1. Generate a GPG key and add it to your GitHub account. Refer to the links on
[settings](https://github.com/settings/keys).
2. Ensure you have a Linux machine, on which the git, Golang, and docker have been installed.
   - Ensure the Golang version matches the version defined in `.go-version` file.
   - Ensure non-privileged users can run docker commands, refer to the [Linux
postinstall](https://docs.docker.com/engine/install/linux-postinstall/).
   - Ensure there is at least 5GB of free space on your Linux machine.
3. Install gsutil, refer to [gsutil_install](https://cloud.google.com/storage/docs/gsutil_install). When asked about
cloud project to use, pick `etcd-development`.
4. Authenticate the image registry, refer to [Authentication methods](https://cloud.google.com/container-
registry/docs/advanced-authentication).
  - `gcloud
 auth login`
  - `gcloud auth configure-docker`
5. Install gh, refer to [GitHub's documentation](https://github.com/cli/cli#installation). Ensure that running
  `gh auth login` succeeds for the GitHub account you use to contribute to etcd,
  and that `gh auth status` has a clean exit and doesn't show any issues.

### Release steps

1. Raise an issue to publish the release plan, e.g. [issues/17350](https://github.com/etcd-io/etcd/issues/17350).
2. Raise a `kubernetes/org` pull request to temporarily elevate permissions for the GitHub release team.
3. Once permissions are elevated, temporarily relax [branch protections](https://github.com/etcd-
io/etcd/settings/branches) to allow pushing changes directly to `release-*` branches in GitHub.
4. Verify you can pass the authentication to the image registries,
  - `docker login gcr.io`
  - `docker login quay.io`
    - If the release person doesn't have access to 1password, one of the owners (@ahrtr, @ivanvc, @jmhbnz,
@serathius) needs
 to share the password with them per [this guide](https://support.1password.com/share-items/). See rough steps
below,
      - [Sign in](https://team-etcd.1password.com/home) to your account on 1password.com.
      - Click `Your Vault Items` on the right side.
      - Select `Password of quay.io`.
      - Click `Share` on the top right, and set expiration as `1 hour` and only available to the release person using
his/her email.
      - Click `Copy Link` then send the link to the release person via slack or email.
5. Clone the etcd repository and checkout the target branch,
  - `git clone --branch release-3.X git@github.com:etcd-io/etcd.git`
6. Run the release script under the repository's root directory, replacing `${VERSION}` with a value without the `v`
prefix, i.e. `3.5.13`.
  - `DRY_RUN=false ./scripts/release.sh ${VERSION}`
  - **NOTE:** When doing a pre-release (i.e., a version from the main branch, 3.6.0-alpha.2), you will need to

explicitly set the branch to main:

```
DRY_RUN=false BRANCH=main ./scripts/release.sh ${VERSION}
```

It generates all release binaries under the directory `/tmp/etcd-release-${VERSION}/etcd/release/` and images. Binaries are pushed to the Google Cloud bucket under project `etcd-development`, and images are pushed to `quay.io` and `gcr.io`.

7. Publish the release page on GitHub
   - Open the **draft** release URL shown by the release script
   - Click the pen button at the top right to edit the release
   - Review that it looks correct, reviewing that the bottom checkboxes are checked depending on the release version (v3.4 no checkboxes, v3.5 has the set as latest release checkbox checked, v3.6 has the set as pre-release checkbox checked)
   - Then, publish the release
8. Announce to the etcd-dev googlegroup

Follow the format of previous release emails sent to etcd-dev@googlegroups.com, see an example below. After sending out the email, ask one of the mailing list maintainers to approve the email from the pending list. Additionally, label the release email as `Release`.

```text
Hello,

etcd v3.4.30 is now public!

https://github.com/etcd-io/etcd/releases/tag/v3.4.30

Thanks to everyone who contributed to the release!

etcd team
```

9. Update the changelog to reflect the correct release date.
10. Paste the release link to the issue raised in Step 1 and close the issue.
11. Restore standard branch protection settings and raise a follow-up `kubernetes/org` pull request to return to least privilege permissions.
12. Crease a new stable branch through `git push origin release-${VERSION_MAJOR}.${VERSION_MINOR}` if this is a new major or minor stable release.
13. Re-generate a new password for quay.io if needed (e.g. shared to a contributor who isn't in the release team, and we should rotate the password at least once every 3 months).

#### Release known issues

1. Timeouts pushing binaries - If binaries fail to fully upload to Google Cloud storage, the script must be re-run using the same command. Any artifacts that are already pushed will be overwritten to ensure they are correct. The storage bucket does not use object versioning so incorrect files cannot remain.

2. Timeouts pushing images - It is rare, although possible for connection timeouts to occur when publishing etcd release images to `quay.io` or `gcr.io`. If this occurs, it is known to be safe to rerun the release script command appending the `--no-upload` flag, and image uploads will gracefully resume.

3. GPG vs SSH signing - The release scripts assume that git tags will be signed with a GPG key. Since 2022 GitHub has supported [signing commits and tags using ssh](https://github.blog/changelog/2022-08-23-ssh-commit-verification-now-supported). Until further release script updates are completed you will need to disable this feature in your `~/.gitconfig` and revert to signing via GPG to perform etcd releases.
# Golang modules

The etcd project (since version 3.5) is organized into multiple
[golang modules](https://golang.org/ref/mod) hosted in a [single repository](https://golang.org/ref/mod#vcs-dir).

![modules graph](modules.svg)

There are the following modules:

- **go.etcd.io/etcd/api/v3** - contains API definitions
(like protos & proto-generated libraries) that defines communication protocol
between etcd clients and servers.

- **go.etcd.io/etcd/pkg/v3** - a collection of utility packages used by etcd
without being specific to etcd itself. A package belongs here
only if it could possibly be moved out into its own repository in the future.
Please avoid adding here code that has a lot of dependencies on its own, as
they automatically become dependencies of the client library
(that we want to keep lightweight).

- **go.etcd.io/etcd/client/v3** - client library used to contact etcd over
the network (grpc). Recommended for all new usage of etcd.

- **go.etcd.io/raft/v3**
- implementation of distributed consensus
protocol. Should have no etcd specific code. Hosted in a separate repository:
https://github.com/etcd-io/raft.

- **go.etcd.io/etcd/server/v3** - etcd implementation.
The code in this package is internal to etcd and should not be consumed
by external projects. The package layout and API can change within the minor versions.

- **go.etcd.io/etcd/etcdctl/v3** - a command line tool to access and manage etcd.

- **go.etcd.io/etcd/tests/v3** - a module that contains all integration tests of etcd.
Notice: All unit tests (fast and not requiring cross-module dependencies)
should be kept in the local modules of the code under the test.

- **go.etcd.io/bbolt** - implementation of persistent b-tree.

Hosted in a separate repository: https://github.com/etcd-io/bbolt.

### Operations

1. All etcd modules should be released in the same versions, e.g.
   `go.etcd.io/etcd/client/v3@v3.5.10` must depend on `go.etcd.io/etcd/api/v3@v3.5.10`.

   The consistent updating of versions can be performed using:
   ```shell script
   % DRY_RUN=false TARGET_VERSION="v3.5.10" ./scripts/release_mod.sh update_versions
   ```
2. The released modules should be tagged according to https://golang.org/ref/mod#vcs-version rules,
   i.e. each module should get its own tag.
   The tagging can be performed using:
   ```shell script
   % DRY_RUN=false REMOTE_REPO="origin" ./scripts/release_mod.sh push_mod_tags
   ```

3. All etcd modules should depend on the same versions of underlying dependencies.
   This can be verified using:
   ```shell script
   % PASSES="dep" ./test.sh
   ```

4. The go.mod files must not contain dependencies not being used and must
   conform to `go mod tidy` format.
   This is being verified by:
   ```
   % PASSES="mod_tidy" ./test.sh
   ```

5. To trigger actions across all modules (e.g. auto-format all files), please
   use/expand the following script:
   ```shell script
   % ./scripts/fix.sh
   ```

### Future

As a North Star, we would like to evaluate etcd modules towards the following model:

![modules graph](modules-future.svg)

This assumes:
- Splitting etcdmigrate/etcdadm out of etcdctl binary.
  Thanks to this etcdctl would become clearly a command-line wrapper

around network client API,
while etcdmigrate/etcdadm would support direct physical operations on the
etcd storage files.
- Splitting etcd-proxy out of ./etcd binary, as it contains more experimental code
so carries additional risk & dependencies.
- Deprecation of support for v2 protocol.

# Reporting bugs

If any part of the etcd project has bugs or documentation mistakes, please let us know by [opening an issue][etcd-issue]. We treat bugs and mistakes very seriously and believe no issue is too small. Before creating a bug report, please check that an issue reporting the same problem does not already exist.

To make the bug report accurate and easy to understand, please try to create bug reports that are:

- Specific. Include as many details as possible: which version, what environment, what configuration, etc. If the bug is related to running the etcd server, please attach the etcd log (the starting log with the etcd configuration is especially important).

- Reproducible. Include the steps to reproduce the problem. We understand some issues might be hard to reproduce, please include the steps that might lead to the problem. If possible, please attach the affected etcd data dir and stack trace to the bug report.

- Isolated. Please try to isolate and reproduce the bug with
minimum dependencies. It would significantly slow down the speed to fix a bug if too many dependencies are involved in a bug report. Debugging external systems that rely on etcd is out of scope, but we are happy to provide guidance in the right direction or help with using etcd itself.

- Unique. Do not duplicate existing bug reports.

- Scoped. One bug per report. Do not follow up with another bug inside one report.

It may be worthwhile to read [Elika Etemads article on filing good bug reports][filing-good-bugs] before creating a bug report.

We might ask for further information to locate a bug. A duplicated bug report will be closed.

## Frequently asked questions

### How to get a stack trace

```bash
$ kill -QUIT $PID
```

### How to get the etcd version

```bash
$ etcd --version
```

```

### How to get etcd configuration and log when it runs as systemd service etcd2.service

```bash
$ sudo systemctl cat etcd2
$ sudo journalctl -u etcd2
```

Due to an upstream systemd bug, journald
 may miss the last few log lines when its processes exit. If journalctl says etcd stopped without a fatal or panic message, try `sudo journalctl -f -t etcd2` to get the full log.

[etcd-issue]: https://github.com/etcd-io/etcd/issues/new
[filing-good-bugs]: http://fantasai.inkedblade.net/style/talks/filing-good-bugs/
# Community membership

This doc outlines the various responsibilities of contributor roles in etcd.

| Role | Responsibilities | Requirements | Defined by |
|---|---|---|---|
| Member | Active contributor in the community | Sponsored by 2 reviewers and multiple contributions | etcd GitHub org member |
| Reviewer | Review contributions from other members | History of review and authorship | [OWNERS] file reviewer entry |
| Maintainer | Set direction and priorities for the project | Demonstrated responsibility and excellent technical judgement | [OWNERS] file approver entry |

## New contributors

New contributors should be welcomed to the community by existing members,
helped with
 PR workflow, and directed to relevant documentation and
communication channels.

## Established community members

Established community members are expected to demonstrate their adherence to the
principles in this document, familiarity with project organization, roles,
policies, procedures, conventions, etc., and technical and/or writing ability.
Role-specific expectations, responsibilities, and requirements are enumerated
below.

## Member

Members are continuously active contributors to the community.  They can have
```

issues and PRs assigned to them. Members are expected to remain active
contributors to the community.

**Defined by:** Member of the etcd GitHub organization.

### Requirements

- Enabled [two-factor authentication] on their GitHub account
- Have made multiple contributions to the project or community.  Contribution may include, but is not limited to:
  - Authoring or reviewing PRs on GitHub. At least one PR must be **merged**.
  - Filing or commenting on issues on
 GitHub
  - Contributing to community discussions (e.g. meetings, Slack, email discussion
    forums, Stack Overflow)
- Subscribed to [etcd-dev@googlegroups.com](https://groups.google.com/g/etcd-dev)
- Have read the [contributor guide]
- Sponsored by two active maintainers or reviewers.
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
  - With no objections from other maintainers
- Open a [membership nomination] issue against the `kubernetes/org` repo
  - Ensure your sponsors are @mentioned on the issue
  - Make sure that the list of contributions included is representative of your work on the project.
- Members can be removed by a supermajority of the maintainers or can resign by notifying
 the maintainers.

### Responsibilities and privileges

- Responsive to issues and PRs assigned to them
- Granted "triage access" to etcd project
- Active owner of code they have contributed (unless ownership is explicitly transferred)
  - Code is well-tested
  - Tests consistently pass
  - Addresses bugs or issues discovered after code is accepted

**Note:** Members who frequently contribute code are expected to proactively
perform code reviews and work towards becoming a *reviewer*.

## Reviewers

Reviewers are contributors who have demonstrated greater skill in
reviewing the code from other contributors. They are knowledgeable about both
the codebase and software engineering principles. Their LGTM counts towards
merging a code change into the project. A reviewer is generally on the ladder towards
maintainership.

**Defined by:** *reviewers* entry in the [OWNERS] file.

### Requirements

- member for at least 3 months.
- Primary reviewer for at least 5 PRs to the codebase.
- Reviewed or contributed at least 20 substantial PRs to the codebase.
- Knowledgeable about the codebase.
- Sponsored by two active maintainers.
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
  - With no objections from other maintainers
- Reviewers can be removed by a supermajority of the maintainers or can resign by notifying the maintainers.

### Responsibilities and privileges

- Code reviewer status may be a precondition to accepting large code contributions
- Responsible for project quality control via code reviews
  - Focus on code quality and correctness, including testing and factoring
  - May also review for more holistic issues, but not a requirement
- Expected to be responsive to review requests
- Assigned PRs to review related to area of expertise
- Assigned test bugs related to area of expertise
- Granted "triage access" to etcd project

## Maintainers

Maintainers are first and foremost contributors who have shown they are committed to the long-term success of a project. Maintainership is about building trust with the current maintainers and being a person that they can depend on to make decisions in the best interest of the project in a consistent manner.

**Defined by:** *approvers* entry in the [OWNERS] file.

### Requirements

- Deep understanding of the technical goals and direction of the project
- Deep understanding of the technical domain of the project
- Sustained contributions to design and direction by doing all of:
  - Authoring and reviewing proposals
  - Initiating, contributing, and resolving discussions (emails, GitHub issues, meetings)
  - Identifying subtle or complex issues in the designs and implementation of PRs
- Directly contributed to the project through implementation and/or review
- Sponsored by two active maintainers and elected by supermajority
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
- To become a maintainer send an email with your candidacy to etcd-maintainers-private@googlegroups.com
  - Ensure your sponsors are @mentioned in the email
  - Include a list of contributions representative of your work on the project.
  -

Existing maintainers vote will privately and respond to the email with either acceptance or feedback for suggested improvement.
- With your membership approved you are expected to:
 - Open a PR and add an entry to the [OWNERS] file
 - Subscribe to etcd-maintainers@googlegroups.com and etcd-maintainers-private@googlegroups.com
 - Request to join [etcd-maintainer teams of etcd organization of GitHub](https://github.com/orgs/etcd-io/teams/maintainers-etcd)
 - Request to join the private slack channel for etcd maintainers on [kubernetes slack](http://slack.kubernetes.io/)
 - Request access to etcd-development GCP project where we publish releases
 - Request access to passwords shared between maintainers

### Responsibilities and privileges

- Make and approve technical design decisions
- Set technical direction and priorities
- Define milestones and releases
- Mentor and guide reviewers, and contributors to the project.
- Participate when called upon in the [security disclosure and release process]
- Ensure the continued health of the project
  - Adequate test coverage to confidently release
  - Tests are passing reliably (i.e. not flaky) and are fixed when they fail
- Ensure a healthy process for discussion and decision-making is in place.
- Work with other maintainers to maintain the project's overall health and success holistically

### Retiring

Life priorities, interests, and passions can change. Maintainers can retire and move to [emeritus maintainers]. If a maintainer needs to step down, they should inform other maintainers and, if possible, help find someone to pick up the related work. At the very least, ensure the related work can be continued. Afterward, they can remove themselves from the list of existing maintainers.

If a maintainer has not been performing their duties for 12 months, they can be removed by other maintainers. In that case, the inactive maintainer will be first notified via an email. If the situation doesn't improve, they will be removed.
If an emeritus maintainer wants to regain an active role, they can do so by renewing their contributions. Active maintainers should welcome such a move. Retiring other maintainers or regaining the status should require the approval of at least two active maintainers.

## Acknowledgements

Contributor roles and responsibilities were written based on [Kubernetes community membership]

[OWNERS]: /OWNERS
[contributor guide]: /CONTRIBUTING.md

[membership nomination]: https://github.com/kubernetes/org/issues/new?assignees=&labels=area%2Fgithub-membership&projects=&template=membership.yml&title=REQUEST%3A+New+membership+for+%3Cyour-GH-handle%3E
[Kubernetes community membership]: https://github.com/kubernetes/community/blob/master/community-membership.md
[emeritus maintainers]: /README.md#etcd-emeritus-maintainers
[security disclosure and release process]: /security/README.md
[two-factor authentication]: https://docs.github.com/en/authentication/securing-your-account-with-two-factor-authentication-2fa/about-two-factor-authentication


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# Logging Conventions

etcd uses the [zap][zap] library for logging application output categorized into *levels*. A log message's level is determined according to these conventions:

* Debug: Everything is still fine, but even common operations may be logged, and less helpful but more quantity of notices. Usually not used in production.
  * Examples:
    * Send a normal message to a remote peer
    * Write a log entry to disk

* Info: Normal, working log information, everything is fine, but helpful notices for auditing or common operations. Should rather not be logged more frequently than once per a few seconds in a normal server's operation.
  * Examples:
    * Startup configuration
    * Start to do a snapshot

* Warning: (Hopefully) Temporary conditions that may cause errors, but may work fine. A replica disappearing (that may reconnect) is a warning.
  * Examples:
    * Failure to send a raft message to a remote peer

  * Failure to receive heartbeat message within the configured election
timeout

* Error: Data has been lost, a request has failed for a bad reason, or a required resource has been lost.
 * Examples:
  * Failure to allocate disk space for WAL

* Panic: Unrecoverable or unexpected error situation that requires stopping execution.
 * Examples:
  * Failure to create the database

* Fatal: Unrecoverable or unexpected error situation that requires immediate exit. Mostly used in the test.
 * Examples:
  * Failure to find the data directory
  * Failure to run a test function

[zap]: https://github.com/uber-go/zap
# Dependency management

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## Main branch

The dependabot is enabled & [configured](https://github.com/etcd-io/etcd/blob/main/.github/dependabot.yml) to manage dependencies for etcd `main` branch. But dependabot doesn't work well for multi-module repository like `etcd`,
see [dependabot-core/issues/6678](https://github.com/dependabot/dependabot-core/issues/6678).
Usually, human intervention is required
 each time when dependabot automatically opens some PRs to bump dependencies.
Please see the guidance below.

### Dependencies used in workflows

The PRs that automatically bump dependencies (see examples below) used in workflows are fine and can be approved & merged directly as long as all checks are successful.

- [build(deps): bump github/codeql-action from 2.2.11 to 2.2.12](https://github.com/etcd-io/etcd/pull/15736)
- [build(deps): bump actions/checkout from 3.5.0 to 3.5.2](https://github.com/etcd-io/etcd/pull/15735)
- [build(deps): bump ossf/scorecard-action from 2.1.2 to 2.1.3](https://github.com/etcd-io/etcd/pull/15607)

### Bumping order

When multiple etcd modules depend on the same package, please bump the package version for all the modules in the correct order. The rule is simple:
if module A depends on module B, then bump the dependency for module B before module A. If the two modules do not depend on each other, then
it doesn't matter to bump which module first. For
example, multiple modules depend on `github.com/spf13/cobra`, so we need to bump the dependency
in the following order,

- go.etcd.io/etcd/pkg/v3
- go.etcd.io/etcd/server/v3
- go.etcd.io/etcd/etcdctl/v3
- go.etcd.io/etcd/etcdutl/v3
- go.etcd.io/etcd/tests/v3
- go.etcd.io/etcd/v3
- go.etcd.io/etcd/tools/v3

For more details about etcd Golang modules, please check <https://etcd.io/docs/next/dev-internal/modules>

Note the module `go.etcd.io/etcd/tools/v3` doesn't depend on any other modules, nor by any other modules, so it doesn't matter when to bump dependencies for it.

### Steps to bump a dependency

Use the `github.com/spf13/cobra` as an example, follow the steps below to bump it from 1.6.1 to 1.7.0 for module `go.etcd.io/etcd/etcdctl/v3`,

```bash
cd ${ETCD_ROOT_DIR}/etcdctl
go get github.com/spf13/cobra@v1.7.0
go mod tidy
cd ..
./scripts/fix.sh
```

Execute the same steps for all other modules. When you finish bumping the dependency for all modules, then commit the change,

```bash
git
 add .
git commit --signoff -m "dependency: bump github.com/spf13/cobra from 1.6.1 to 1.7.0"
```

Please close the related PRs which were automatically opened by dependabot.

When you bump multiple dependencies in one PR, it's recommended to create a separate commit for each dependency. But it isn't a must; for example,
you can get all dependencies bumping for the module `go.etcd.io/etcd/tools/v3` included in one commit.

#### Troubleshooting

In an event of bumping the version of protoc, protoc plugins or grpc-gateway, it might change `*.proto` file which can result in the following error:

```bash
[0;31mFAIL: 'genproto' FAILED at Wed Jul 31 07:09:08 UTC 2024
make: *** [Makefile:134: verify-genproto] Error 255
```

To fix the above error, run the following script from the root of etcd repository:

```bash
./scripts/genproto.sh
```

### Indirect dependencies

Usually, we don't bump a dependency if all modules just indirectly depend on it, such as `github.com/go-logr/logr`.

If
 an indirect dependency (e.g. `D1`) causes any CVE or bugs that affect etcd, usually the module (e.g. `M1`, not part of etcd, but used by etcd)
which depends on it should bump the dependency (`D1`), and then etcd just needs to bump `M1`. However, if the module (`M1`) somehow doesn't
bump the problematic dependency, then etcd can still bump it (`D1`) directly following the same steps above. But as a long-term solution, etcd should
try to remove the dependency on such module (`M1`) that lack maintenance.

For mixed cases, in which some modules directly while others indirectly depend on a dependency, we have multiple options,

- Bump the dependency for all modules, no matter it's direct or indirect dependency.
- Bump the dependency only for modules that directly depend on it.

We should try to follow the first way, and temporarily fall back to the second one if we run into any issue on the first way. Eventually we
should fix the issue and ensure all modules depend on the same version of the
 dependency.

### Known incompatible dependency updates

#### arduino/setup-protoc

Please refer to [build(deps): bump arduino/setup-protoc from 1.3.0 to 2.0.0](https://github.com/etcd-io/etcd/pull/16016)

### Rotation worksheet

The dependabot scheduling interval is weekly; it means dependabot will automatically raise a bunch of PRs per week.
Usually, human intervention is required each time. We have a [rotation worksheet](https://docs.google.com/spreadsheets/d/1jodHIO7Dk2VWTs1IRnfMFaRktS9IH8XRyifOnPdSY8I/edit#gid=1394774387),
and everyone is welcome to participate; you just need to register your name in the worksheet.

## Stable branches

Usually, we don't proactively bump dependencies for stable releases unless there are any CVEs or bugs that affect etcd.

If we have to do it, then follow the same guidance above. Note that there is no `./scripts/fix.sh` in release-3.4, so no need to
execute it for 3.4.

## Golang versions

The etcd project aims to maintain a development branch that
is on the latest [Go version](https://go.dev/dl), ideally, this will align with the Go version in use for Kubernetes project development. For an example of how to update etcd to a new minor release of Go refer to issue <https://github.com/etcd-io/etcd/issues/16393> and the linked pull requests.

Suggested steps for performing a minor version upgrade for the etcd development branch:

1. Carefully review new Go version release notes and potentially related blog posts for any deprecations, performance impacts, or other considerations.
2. Create a GitHub issue to signal intent to upgrade and invite discussion, for example, <https://github.com/etcd-io/etcd/issues/16393>.
3. Complete the upgrade locally in your development environment by editing `.go-version` and running `make fix`.
4. Run performance benchmarks locally to compare before and after.
5. Raise a pull request for the changes, for example, <https://github.com/etcd-io/etcd/pull/16394>.

Stable etcd release branches will be maintained
to stay on the latest patch release of a supported Go version. Upgrading minor versions will be completed before the minor version in use currently is no longer supported. Refer to the [Go release policy](https://go.dev/doc/devel/release).

For an example of how to update etcd to a new patch release of Go refer to issue <https://github.com/etcd-io/etcd/issues/16343> and the linked pull requests.

References:

- <https://github.com/kubernetes/sig-release/blob/master/release-engineering/handbooks/go.md>

## Core dependencies mappings

[bbolt](https://github.com/etcd-io/bbolt) and [raft](https://github.com/etcd-io/raft) are two core dependencies of etcd.

Both etcd 3.4.x and 3.5.x depend on bbolt 1.3.x, and etcd 3.6.x (`main` branch) depends on bbolt 1.4.x.

raft is included in the etcd repository for release-3.4 and release-3.5 branches, so etcd 3.4.x and 3.5.x do not depend on any
external raft module. We moved raft into [a separate repository](https://github.com/etcd-io/raft) starting
 from 3.6 (`main` branch), and the first raft
release will be v3.6.0, so etcd 3.6.x will depend on raft 3.6.x.

Please see the table below:

| etcd versions | bbolt versions | raft versions |
|---|---|---|
| 3.4.x | v1.3.x | N/A |
| 3.5.x | v1.3.x | N/A |
| 3.6.x | v1.4.x | v3.6.x |

# 1.1217 libdrm 2.4.123-2.el9

## 1.1217.1 Available under license :

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```
/*
* Copyright (c) 2015 Emil Velikov <emil.l.velikov@gmail.com>
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```

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* IN THE SOFTWARE.
*
*/

Found in path(s):
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/drmdevice.c
No license file was found, but licenses were detected in source scan.

/* xf86drmHash.c -- Small hash table support for integer -> integer mapping
* Created: Sun Apr 18 09:35:45 1999 by faith@precisioninsight.com
*
* Copyright 1999 Precision Insight, Inc., Cedar Park, Texas.
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* DEALINGS IN THE SOFTWARE.
*
* Authors: Rickard E. (Rik) Faith <faith@valinux.com>
*
* DESCRIPTION
*
* This file contains a straightforward implementation of a fixed-sized
* hash table using self-organizing linked lists [Knuth73, pp. 398-399] for
* collision resolution. There are two potentially interesting things
* about this implementation:
*
* 1) The table is power-of-two sized. Prime sized tables are more

```
* traditional, but do not have a significant advantage over power-of-two
* sized table, especially when double hashing is not used for collision
* resolution.
*
* 2) The hash computation
 uses a table of random integers [Hanson97,
* pp. 39-41].
*
* FUTURE ENHANCEMENTS
*
* With a table size of 512, the current implementation is sufficient for a
* few hundred keys.  Since this is well above the expected size of the
* tables for which this implementation was designed, the implementation of
* dynamic hash tables was postponed until the need arises.  A common (and
* naive) approach to dynamic hash table implementation simply creates a
* new hash table when necessary, rehashes all the data into the new table,
* and destroys the old table.  The approach in [Larson88] is superior in
* two ways: 1) only a portion of the table is expanded when needed,
* distributing the expansion cost over several insertions, and 2) portions
* of the table can be locked, enabling a scalable thread-safe
* implementation.
*
* REFERENCES
*
* [Hanson97] David R. Hanson.  C Interfaces and Implementations:
* Techniques for Creating Reusable Software.  Reading, Massachusetts:
 * Addison-Wesley, 1997.
*
* [Knuth73] Donald E. Knuth. The Art of Computer Programming.  Volume 3:
* Sorting and Searching.  Reading, Massachusetts: Addison-Wesley, 1973.
*
* [Larson88] Per-Ake Larson. "Dynamic Hash Tables".  CACM 31(4), April
* 1988, pp. 446-457.
*
*/
```

Found in path(s):
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/xf86drmHash.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/hash.c
No license file was found, but licenses were detected in source scan.

```
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*
*/

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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/amdgpu/handle_table.h
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/amdgpu/handle_table.c
No license file was found, but licenses were detected in source scan.

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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/radeon/radeon_cs.h
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/tegra/vic42.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/tegra/vic42.h
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/tegra/vic-clear.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/tegra/vic-flip.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/tegra/syncpt-wait.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/tegra/vic40.c
*

/libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/tegra/vic41.h
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/tegra/vic30.h
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/tegra/vic-blit.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/tegra/vic.h
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/tegra/vic41.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/tegra/vic30.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/tegra/syncpt-timeout.c
*
/libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/tegra/vic.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/tegra/host1x.h
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```
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*/
```

Found in path(s):
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/include/drm/vc4_drm.h

No license file was found, but licenses were detected in source scan.

```
/* radeon_drm.h -- Public header for the radeon driver -*- linux-c -*-
*
* Copyright 2000 Precision Insight, Inc., Cedar Park, Texas.
* Copyright 2000 VA Linux Systems, Inc., Fremont, California.
* Copyright 2002 Tungsten Graphics, Inc., Cedar Park, Texas.
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*
* Authors:
*    Kevin E. Martin <martin@valinux.com>
*    Gareth Hughes <gareth@valinux.com>
*    Keith Whitwell <keith@tungstengraphics.com>
*/
```

Found in path(s):
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/include/drm/radeon_drm.h
No license file was found, but licenses were detected in source scan.

```
/* mga_drm.h -- Public header for the Matrox g200/g400 driver -*- linux-c -*-
* Created: Tue Jan 25 01:50:01 1999 by jhartmann@precisioninsight.com
*
* Copyright 1999 Precision Insight, Inc., Cedar Park, Texas.
* Copyright 2000 VA Linux Systems, Inc., Sunnyvale, California.
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/amdgpu/amdgpu_vm.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/exynos/exynos_fimg2d_perf.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/etnaviv/write_bmp.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/amdgpu/amdgpu_device.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/amdgpu/amdgpu.h
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/omap/omap_drm.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/omap/omap_drm.h
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/omap/omap_drmif.h
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* Authors:
*    Eric Anholt <eric@anholt.net>
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/intel/intel_bufmgr.h
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* Authors:
*    Gareth Hughes <gareth@valinux.com>
*    Kevin E. Martin <martin@valinux.com>
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/include/drm/r128_drm.h
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The release criteria for libdrm is essentially "if you need a release, make one". There is no designated release engineer or maintainer. Anybody is free to make a release if there's a certain feature or bug fix they need in a released version of libdrm.

When new ioctl definitions are merged into drm-next, we will add support to libdrm, at which point we typically create a new release. However, this is up to whoever is driving the feature in question.

Follow these steps to release a new version of libdrm:

1) Bump the version number in meson.build. We seem to have settled for 2.4.x as the versioning scheme for libdrm, so just bump the micro version.

2) Run `ninja -C builddir/ dist` to generate the tarballs. Make sure that the version number of the tarball name in builddir/meson-dist/ matches the number you bumped to. Move that tarball to the libdrm repo root for the release script to pick up.

3) Push the updated main branch with the bumped version number:

```
git push origin main
```

assuming the remote for the upstream libdrm repo is called origin.

4) Use the release.sh script from the xorg/util/modular repo to upload the tarballs to the freedesktop.org download area and create an announce email template. The script takes one argument: the path to the libdrm checkout. So, if a checkout of modular is at the same level than the libdrm repo:

```
./modular/release.sh libdrm
```

This copies the two tarballs to freedesktop.org and creates libdrm-2.4.16.announce which has a detailed summary of the changes, links to the tarballs, MD5 and SHA1 sums and pre-filled out email headers. Fill out the blank between the email headers and the list of changes with a brief message of what changed or what prompted this release. Send out the email and you're done!

Found in path(s):
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/RELEASING
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/exynos/exynos_fimg2d_test.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/exynos/exynos_fimg2d.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/exynos/exynos_fimg2d.h
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/etnaviv/etnaviv_drmif.h
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/etnaviv/etnaviv_2d_test.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/etnaviv/etnaviv_cmd_stream.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/etnaviv/etnaviv_priv.h
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/etnaviv/etnaviv_device.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/freedreno/freedreno_priv.h
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/freedreno/freedreno_bo.c
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*
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/freedreno/freedreno_pipe.c
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Contributing to libdrm
==========

Submitting Patches
---

Patches should be sent to dri-devel@lists.freedesktop.org, using git
send-email. For patches only touching driver specific code one of the driver
mailing lists (like amd-gfx@lists.freedesktop.org) is also appropriate. See git
documentation for help:

http://git-scm.com/documentation

Since dri-devel is a very busy mailing list please use --subject-prefix="PATCH libdrm" to make it easier to find libdrm patches. This is best done by running

```
git config --local format.subjectprefix "PATCH libdrm"
```

The first line of a commit message should contain a prefix indicating what part is affected by the patch followed by one sentence that describes the change. For examples:

```
amdgpu: Use uint32_t i in amdgpu_find_bo_by_cpu_mapping
```

The body of the commit message should describe what the patch changes and why, and also note any particular
side effects. For a recommended reading on
writing commit messages, see:

http://who-t.blogspot.de/2009/12/on-commit-messages.html

Your patches should also include a Signed-off-by line with your name and email address. If you're not the patch's original author, you should also gather
S-o-b's by them (and/or whomever gave the patch to you.) The significance of this is that it certifies that you created the patch, that it was created under
an appropriate open source license, or provided to you under those terms. This lets us indicate a chain of responsibility for the copyright status of the code.
For more details:

https://developercertificate.org/

We won't reject patches that lack S-o-b, but it is strongly recommended.

Review and Merging
---

Patches should have at least one positive review (Reviewed-by: tag) or indication of approval (Acked-by: tag) before merging. For any code shared between drivers this is mandatory.

Please note that kernel/userspace API header files
have special rules, see
include/drm/README.

Coding style in the project loosely follows the CodingStyle of the linux kernel:

https://www.kernel.org/doc/html/latest/process/coding-style.html?highlight=coding%20style

Commit Rights
---

Commit rights will be granted to anyone who requests them and fulfills the below criteria:

- Submitted a few (5-10 as a rule of thumb) non-trivial (not just simple spelling fixes and whitespace adjustment) patches that have been merged already. Since libdrm is just a glue library between the kernel and userspace drivers, merged patches to those components also count towards the commit criteria.

- Are actively participating on discussions about their work (on the mailing list or IRC). This should not be interpreted as a requirement to review other peoples patches but just make sure that patch submission isn't one-way communication. Cross-review is still highly encouraged.

- Will be regularly contributing further patches. This includes regular contributors to other parts of the open source graphics stack who only do the oddball rare patch within libdrm itself.

- Agrees to use their commit rights in accordance with the documented merge criteria, tools, and processes.

To apply for commit rights ("Developer" role in gitlab) send a mail to dri-devel@lists.freedesktop.org and please ping the maintainers if your request is stuck.

Committers are encouraged to request their commit rights get removed when they no longer contribute to the project. Commit rights will be reinstated when they come back to the project.

Maintainers and committers should encourage contributors to request commit rights, as especially junior contributors tend to underestimate their skills.

Code of Conduct
---

Please be aware the fd.o Code of Conduct also applies to libdrm:

https://www.freedesktop.org/wiki/CodeOfConduct/

See the gitlab project owners for contact details of the libdrm maintainers.

Abuse of commit rights, like engaging in commit fights or willfully pushing patches that violate the documented merge criteria, will also be handled through

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*
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*    Paulo Zanoni <paulo.r.zanoni@intel.com>
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```
prebuilt_etc {
  name: "amdgpu.ids",
  proprietary: true,
  sub_dir: "hwdata",
  src: "amdgpu.ids",
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/etnaviv/state_2d.xml.h
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/radeon/radeon_bo.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/amdgpu/bo_tests.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/amdgpu/basic_tests.c
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* Authors: Rickard E. (Rik) Faith <faith@valinux.com>
*
* DESCRIPTION
*
* This file contains a straightforward skip list implementation.n
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* REFERENCES
*
* [Pugh90] William Pugh.  Skip Lists: A Probabilistic Alternative to
* Balanced Trees. CACM 33(6), June 1990, pp. 668-676.
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/radeon/radeon_surface.h
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* Authors:
* Jerome Glisse <j.glisse@gmail.com>
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/radeon/rbo.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/radeon/radeon_ttm.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-

4oQHCRMH/libdrm-2.4.123/include/drm/qxl_drm.h
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* Authors: Ben Skeggs
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/nouveau/pushbuf.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/nouveau/abi16.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/nouveau/nouveau.c
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```
/* xf86drmRandom.c -- "Minimal Standard" PRNG Implementation
* Created: Mon Apr 19 08:28:13 1999 by faith@precisioninsight.com
*
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*
* Authors: Rickard E. (Rik) Faith <faith@valinux.com>
*
* DESCRIPTION
*
* This file contains a simple, straightforward implementation of the Park
* & Miller "Minimal Standard" PRNG [PM88, PMS93], which is a Lehmer
* multiplicative linear congruential generator (MLCG) with a period of
* 2^31-1.
*
* This implementation is intended to provide a reliable, portable PRNG
* that is suitable for testing a hash table implementation and for
* implementing skip lists.
*
* FUTURE ENHANCEMENTS
*
* If initial seeds are not selected randomly, two instances of the PRNG
* can be correlated.
  [Knuth81, pp. 32-33] describes a shuffling technique
* that can eliminate this problem.
*
* If PRNGs are used for simulation, the period of the current
* implementation may be too short.  [LE88] discusses methods of combining
* MLCGs to produce much longer periods, and suggests some alternative
* values for A and M.  [LE90 and Sch92] also provide information on
* long-period PRNGs.
*
* REFERENCES
*
* [Knuth81] Donald E. Knuth. The Art of Computer Programming.  Volume 2:
* Seminumerical Algorithms.  Reading, Massachusetts: Addison-Wesley, 1981.
*

```
* [LE88] Pierre L'Ecuyer. "Efficient and Portable Combined Random Number
* Generators".  CACM 31(6), June 1988, pp. 742-774.
*
* [LE90] Pierre L'Ecuyer. "Random Numbers for Simulation". CACM 33(10,
* October 1990, pp. 85-97.
*
* [PM88] Stephen K. Park and Keith W. Miller. "Random Number Generators:
* Good Ones are Hard to Find". CACM 31(10), October 1988, pp. 1192-1201.
*
* [Sch92] Bruce Schneier. "Pseudo-Ransom Sequence
 Generator for 32-Bit
* CPUs".  Dr. Dobb's Journal 17(2), February 1992, pp. 34, 37-38, 40.
*
* [PMS93] Stephen K. Park, Keith W. Miller, and Paul K. Stockmeyer.  In
* "Technical Correspondence: Remarks on Choosing and Implementing Random
* Number Generators". CACM 36(7), July 1993, pp. 105-110.
*
*/
```

Found in path(s):
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/xf86drmRandom.c
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*/
/*
```

```
* Arm Framebuffer Compression (AFBC) modifiers
*
* AFBC is a proprietary lossless image compression protocol and format.
* It provides fine-grained random access and minimizes the amount of data
* transferred between IP blocks.
*
* AFBC has several features which may be supported and/or used, which are
* represented using bits in the modifier. Not all combinations are valid,
* and different devices or use-cases may support different combinations.
*
* Further information on the use of AFBC modifiers can be found in
* Documentation/gpu/afbc.rst
*/
/*
* Arm Fixed-Rate Compression (AFRC) modifiers
*
* AFRC is a proprietary fixed rate image compression protocol and format,
* designed to provide guaranteed bandwidth and memory footprint
* reductions
 in graphics and media use-cases.
*
* AFRC buffers consist of one or more planes, with the same components
* and meaning as an uncompressed buffer using the same pixel format.
*
* Within each plane, the pixel/luma/chroma values are grouped into
* "coding unit" blocks which are individually compressed to a
* fixed size (in bytes). All coding units within a given plane of a buffer
* store the same number of values, and have the same compressed size.
*
* The coding unit size is configurable, allowing different rates of compression.
*
* The start of each AFRC buffer plane must be aligned to an alignment granule which
* depends on the coding unit size.
*
* Coding Unit Size   Plane Alignment
* ----------------   ---------------
* 16 bytes           1024 bytes
* 24 bytes           512  bytes
* 32 bytes           2048 bytes
*
* Coding units are grouped into paging tiles. AFRC buffer dimensions must be aligned
* to a multiple of the paging tile dimensions.
* The dimensions
 of each paging tile depend on whether the buffer is optimised for
* scanline (SCAN layout) or rotated (ROT layout) access.
*
* Layout   Paging Tile Width   Paging Tile Height
* ------   -----------------   ------------------
```

```
* SCAN     16 coding units     4 coding units
* ROT      8  coding units     8 coding units
*
* The dimensions of each coding unit depend on the number of components
* in the compressed plane and whether the buffer is optimised for
* scanline (SCAN layout) or rotated (ROT layout) access.
*
* Number of Components in Plane   Layout      Coding Unit Width   Coding Unit Height
* ----------------------------   ---------   -----------------   ------------------
* 1                               SCAN        16 samples          4 samples
* Example: 16x4 luma samples in a 'Y' plane
*         16x4 chroma 'V' values, in the 'V' plane of a fully-planar YUV buffer
* ----------------------------   ---------   -----------------   ------------------
* 1
                                  ROT         8 samples           8 samples
* Example: 8x8 luma samples in a 'Y' plane
*         8x8 chroma 'V' values, in the 'V' plane of a fully-planar YUV buffer
* ----------------------------   ---------   -----------------   ------------------
* 2                               DONT CARE   8 samples           4 samples
* Example: 8x4 chroma pairs in the 'UV' plane of a semi-planar YUV buffer
* ----------------------------   ---------   -----------------   ------------------
* 3                               DONT CARE   4 samples           4 samples
* Example: 4x4 pixels in an RGB buffer without alpha
* ----------------------------   ---------   -----------------   ------------------
* 4                               DONT CARE   4 samples           4 samples
* Example: 4x4 pixels in an RGB buffer with alpha
*/
/*
* Amlogic Video Framebuffer Compression modifiers
*
* Amlogic uses a proprietary lossless image compression protocol and format
 * for their hardware video codec accelerators, either video decoders or
* video input encoders.
*
* It considerably reduces memory bandwidth while writing and reading
* frames in memory.
*
* The underlying storage is considered to be 3 components, 8bit or 10-bit
* per component YCbCr 420, single plane :
* - DRM_FORMAT_YUV420_8BIT
* - DRM_FORMAT_YUV420_10BIT
*
* The first 8 bits of the mode defines the layout, then the following 8 bits
* defines the options changing the layout.
*
* Not all combinations are valid, and different SoCs may support different
* combinations of layout and options.
*/
```

```
/*
* 64K_S is the same for GFX9/GFX10/GFX10_RBPLUS and hence has GFX9 as canonical
* version.
*/
```

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*
* Authors: Rickard E. (Rik) Faith <faith@valinux.com>
*
* DESCRIPTION
*
* This file contains a straightforward skip list implementation.n
*
* FUTURE ENHANCEMENTS
*
* REFERENCES
*
* [Pugh90] William Pugh.  Skip Lists: A Probabilistic Alternative to
* Balanced Trees. CACM 33(6), June 1990, pp. 668-676.
*
*/

Found in path(s):
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/xf86drmSL.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/amdgpu/meson.build
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/intel/meson.build
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/radeon/meson.build
*
/libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/vc4/meson.build
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/omap/meson.build
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/tegra/meson.build
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-

4oQHCRMH/libdrm-2.4.123/meson_options.txt
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/man/meson.build
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/meson.build
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/exynos/meson.build
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/proptest/meson.build
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/meson.build
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tegra/meson.build
*
/libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/modetest/meson.build
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/freedreno/meson.build
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/radeon/meson.build
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/nouveau/meson.build
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/data/meson.build
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/amdgpu/meson.build
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/util/meson.build
*
/libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/nouveau/meson.build
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/etnaviv/meson.build
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/freedreno/msm/msm_pipe.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/freedreno/kgsl/kgsl_ringbuffer.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/freedreno/kgsl/kgsl_pipe.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/freedreno/kgsl/kgsl_device.c
*
 /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/freedreno/msm/msm_ringbuffer.c

* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/freedreno/kgsl/kgsl_bo.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/freedreno/msm/msm_bo.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/freedreno/msm/msm_device.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/etnaviv/etnaviv_bo_cache_test.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/etnaviv/etnaviv_cmd_stream_test.c
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/util/kms.c
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/util/format.h
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/util/common.h
* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/util/kms.h
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* /libdrm-2.4.123-2.el9.src.rpm-cosi-expand-archive-at8Bf9ad/libdrm-2.4.123.tar.xz-cosi-expand-archive-4oQHCRMH/libdrm-2.4.123/tests/util/format.c

# 1.1218 define-data-property 1.1.4

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# 1.1219 kind-of 6.0.3

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# 1.1220 icu 67.1-10.el9_6

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## Commands to generate dependency files
GEN_DEPS.c= $(CC) -E -MM $(DEFS) $(CPPFLAGS)
GEN_DEPS.cc= $(CXX) -E -MM $(DEFS) $(CPPFLAGS)
```

```
## Flags for position independent code
SHAREDLIBCFLAGS = -fPIC
SHAREDLIBCXXFLAGS = -fPIC
SHAREDLIBCPPFLAGS = -DPIC

## Additional flags when building libraries and with threads
THREADSCPPFLAGS = -D_REENTRANT
LIBCPPFLAGS =

## Compiler switch to embed a runtime search path
LD_RPATH=
LD_RPATH_PRE= -Wl,-rpath,

## Compiler switch to embed a library name
LD_SONAME = -Wl,-soname -Wl,$(notdir $(MIDDLE_SO_TARGET))

## Shared library options
LD_SOOPTIONS= -Wl,-Bsymbolic

## Shared object suffix
SO = so
## Non-shared intermediate object suffix
STATIC_O = ao

## Compilation
 rules
%.$(STATIC_O): $(srcdir)/%.c
 $(COMPILE.c) $(STATICCPPFLAGS) $(STATICCFLAGS) -o $@ $<
%.o: $(srcdir)/%.c
 $(COMPILE.c) $(DYNAMICCPPFLAGS) $(DYNAMICCFLAGS) -o $@ $<

%.$(STATIC_O): $(srcdir)/%.cpp
 $(COMPILE.cc) $(STATICCPPFLAGS) $(STATICCXXFLAGS) -o $@ $<
%.o: $(srcdir)/%.cpp
 $(COMPILE.cc) $(DYNAMICCPPFLAGS) $(DYNAMICCXXFLAGS) -o $@ $<


## Dependency rules
%.d: $(srcdir)/%.c
 @echo "generating dependency information for $<"
 @$(SHELL) -ec '$(GEN_DEPS.c) $< \
  | sed '\"s/\($*\)\.o[ :]*/\1.o $@ : /g'\" > $@; \
  [ -s $@ ] || rm -f $@'

%.d: $(srcdir)/%.cpp
 @echo "generating dependency information for $<"
 @$(SHELL) -ec '$(GEN_DEPS.cc) $< \
  | sed '\"s/\($*\)\.o[ :]*/\1.o $@ : /g'\" > $@; \
```

```
  [ -s $@ ] || rm -f $@'

## Versioned libraries rules

%.$(SO).$(SO_TARGET_VERSION_MAJOR): %.$(SO).$(SO_TARGET_VERSION)
 $(RM) $@ && ln -s ${<F} $@
%.$(SO): %.$(SO).$(SO_TARGET_VERSION_MAJOR)
 $(RM) $@ && ln -s ${*F}.$(SO).$(SO_TARGET_VERSION) $@

##  Bind internal references

# LDflags that pkgdata will use
BIR_LDFLAGS= -Wl,-Bsymbolic

# Dependencies [i.e. map files] for the final library
BIR_DEPS=

## Remove shared library 's'
STATIC_PREFIX_WHEN_USED =
STATIC_PREFIX =

## End BSD-specific setup
```

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/* This is auto-generated file. See bpf_doc.py for details. */

```
/* Forward declarations of BPF structs */
struct bpf_fib_lookup;
struct bpf_sk_lookup;
struct bpf_perf_event_data;
struct bpf_perf_event_value;
struct bpf_pidns_info;
struct bpf_redir_neigh;
struct bpf_sock;
struct bpf_sock_addr;
struct bpf_sock_ops;
struct bpf_sock_tuple;
struct bpf_spin_lock;
struct bpf_sysctl;
struct bpf_tcp_sock;
struct bpf_tunnel_key;
struct bpf_xfrm_state;
struct linux_binprm;
struct pt_regs;
struct sk_reuseport_md;
struct sockaddr;
struct tcphdr;
struct seq_file;
struct tcp6_sock;
struct tcp_sock;
struct tcp_timewait_sock;
struct tcp_request_sock;
struct udp6_sock;
struct unix_sock;
struct task_struct;
struct cgroup;
struct __sk_buff;
struct sk_msg_md;
struct xdp_md;
struct path;
struct btf_ptr;
struct inode;
struct socket;
```

```
struct file;
struct bpf_timer;
struct mptcp_sock;
struct bpf_dynptr;
struct iphdr;
struct ipv6hdr;

/*
* bpf_map_lookup_elem
*
*  Perform a lookup in *map* for an entry associated
 to *key*.
*
* Returns
*  Map value associated to *key*, or **NULL** if no entry was
*  found.
*/
static void *(* const bpf_map_lookup_elem)(void *map, const void *key) = (void *) 1;

/*
* bpf_map_update_elem
*
*  Add or update the value of the entry associated to *key* in
*  *map* with *value*. *flags* is one of:
*
*  **BPF_NOEXIST**
*   The entry for *key* must not exist in the map.
*  **BPF_EXIST**
*   The entry for *key* must already exist in the map.
*  **BPF_ANY**
*   No condition on the existence of the entry for *key*.
*
*  Flag value **BPF_NOEXIST** cannot be used for maps of types
*  **BPF_MAP_TYPE_ARRAY** or **BPF_MAP_TYPE_PERCPU_ARRAY**  (all
*  elements always exist), the helper would return an error.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_map_update_elem)(void *map, const void *key, const void *value, __u64 flags) = (void *)
2;

/*
* bpf_map_delete_elem
*
*  Delete entry with *key* from
 *map*.
*
```

```
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_map_delete_elem)(void *map, const void *key) = (void *) 3;

/*
* bpf_probe_read
*
*  For tracing programs, safely attempt to read *size* bytes from
*  kernel space address *unsafe_ptr* and store the data in *dst*.
*
*  Generally, use **bpf_probe_read_user**\ () or
*  **bpf_probe_read_kernel**\ () instead.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_probe_read)(void *dst, __u32 size, const void *unsafe_ptr) = (void *) 4;

/*
* bpf_ktime_get_ns
*
*  Return the time elapsed since system boot, in nanoseconds.
*  Does not include time the system was suspended.
*  See: **clock_gettime**\ (**CLOCK_MONOTONIC**)
*
* Returns
*  Current *ktime*.
*/
static __u64 (* const bpf_ktime_get_ns)(void) = (void *) 5;

/*
* bpf_trace_printk
*
*  This helper is a "printk()-like" facility for debugging. It
*  prints a message
 defined by format *fmt* (of size *fmt_size*)
*  to file *\/sys/kernel/tracing/trace* from TraceFS, if
*  available. It can take up to three additional **u64**
*  arguments (as an eBPF helpers, the total number of arguments is
*  limited to five).
*
*  Each time the helper is called, it appends a line to the trace.
*  Lines are discarded while *\/sys/kernel/tracing/trace* is
*  open, use *\/sys/kernel/tracing/trace_pipe* to avoid this.
*  The format of the trace is customizable, and the exact output
*  one will get depends on the options set in
*  *\/sys/kernel/tracing/trace_options* (see also the
```

```
*  *README* file under the same directory). However, it usually
*  defaults to something like:
*
*  ::
*
*   telnet-470   [001] .N.. 419421.045894: 0x00000001: <formatted msg>
*
*  In the above:
*
*   * ``telnet`` is the name of the current task.
*   * ``470`` is the PID of the current task.
*   * ``001`` is the CPU number on which the task is
*     running.
*   * In
 ``.N..``, each character refers to a set of
*     options (whether irqs are enabled, scheduling
*     options, whether hard/softirqs are running, level of
*     preempt_disabled respectively). **N** means that
*     **TIF_NEED_RESCHED** and **PREEMPT_NEED_RESCHED**
*     are set.
*   * ``419421.045894`` is a timestamp.
*   * ``0x00000001`` is a fake value used by BPF for the
*     instruction pointer register.
*   * ``<formatted msg>`` is the message formatted with
*     *fmt*.
*
*  The conversion specifiers supported by *fmt* are similar, but
*  more limited than for printk(). They are **%d**, **%i**,
*  **%u**, **%x**, **%ld**, **%li**, **%lu**, **%lx**, **%lld**,
*  **%lli**, **%llu**, **%llx**, **%p**, **%s**. No modifier (size
*  of field, padding with zeroes, etc.) is available, and the
*  helper will return **-EINVAL** (but print nothing) if it
*  encounters an unknown specifier.
*
*  Also, note that **bpf_trace_printk**\ () is slow, and should
*  only be used
 for debugging purposes. For this reason, a notice
*  block (spanning several lines) is printed to kernel logs and
*  states that the helper should not be used "for production use"
*  the first time this helper is used (or more precisely, when
*  **trace_printk**\ () buffers are allocated). For passing values
*  to user space, perf events should be preferred.
*
* Returns
*  The number of bytes written to the buffer, or a negative error
*  in case of failure.
*/
static long (* const bpf_trace_printk)(const char *fmt, __u32 fmt_size, ...) = (void *) 6;
```

```
/*
* bpf_get_prandom_u32
*
*  Get a pseudo-random number.
*
*  From a security point of view, this helper uses its own
*  pseudo-random internal state, and cannot be used to infer the
*  seed of other random functions in the kernel. However, it is
*  essential to note that the generator used by the helper is not
*  cryptographically secure.
*
* Returns
*  A random 32-bit unsigned value.
*/
static __u32 (* const bpf_get_prandom_u32)(void)
 = (void *) 7;

/*
* bpf_get_smp_processor_id
*
*  Get the SMP (symmetric multiprocessing) processor id. Note that
*  all programs run with migration disabled, which means that the
*  SMP processor id is stable during all the execution of the
*  program.
*
* Returns
*  The SMP id of the processor running the program.
*/
static __u32 (* const bpf_get_smp_processor_id)(void) = (void *) 8;

/*
* bpf_skb_store_bytes
*
*  Store *len* bytes from address *from* into the packet
*  associated to *skb*, at *offset*. *flags* are a combination of
*  **BPF_F_RECOMPUTE_CSUM** (automatically recompute the
*  checksum for the packet after storing the bytes) and
*  **BPF_F_INVALIDATE_HASH** (set *skb*\ **->hash**, *skb*\
*  **->swhash** and *skb*\ **->l4hash** to 0).
*
*  A call to this helper is susceptible to change the underlying
*  packet buffer. Therefore, at load time, all checks on pointers
*  previously done by the verifier are invalidated and must
 be
*  performed again, if the helper is used in combination with
*  direct packet access.
*
```

```
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_skb_store_bytes)(struct __sk_buff *skb, __u32 offset, const void *from, __u32 len, __u64
flags) = (void *) 9;

/*
* bpf_l3_csum_replace
*
*  Recompute the layer 3 (e.g. IP) checksum for the packet
*  associated to *skb*. Computation is incremental, so the helper
*  must know the former value of the header field that was
*  modified (*from*), the new value of this field (*to*), and the
*  number of bytes (2 or 4) for this field, stored in *size*.
*  Alternatively, it is possible to store the difference between
*  the previous and the new values of the header field in *to*, by
*  setting *from* and *size* to 0. For both methods, *offset*
*  indicates the location of the IP checksum within the packet.
*
*  This helper works in combination with **bpf_csum_diff**\ (),
*  which does not update
 the checksum in-place, but offers more
*  flexibility and can handle sizes larger than 2 or 4 for the
*  checksum to update.
*
*  A call to this helper is susceptible to change the underlying
*  packet buffer. Therefore, at load time, all checks on pointers
*  previously done by the verifier are invalidated and must be
*  performed again, if the helper is used in combination with
*  direct packet access.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_l3_csum_replace)(struct __sk_buff *skb, __u32 offset, __u64 from, __u64 to, __u64 size) =
(void *) 10;

/*
* bpf_l4_csum_replace
*
*  Recompute the layer 4 (e.g. TCP, UDP or ICMP) checksum for the
*  packet associated to *skb*. Computation is incremental, so the
*  helper must know the former value of the header field that was
*  modified (*from*), the new value of this field (*to*), and the
*  number of bytes (2 or 4) for this field, stored on the lowest
*  four bits
 of *flags*. Alternatively, it is possible to store
*  the difference between the previous and the new values of the
```

```
*  header field in *to*, by setting *from* and the four lowest
*  bits of *flags* to 0. For both methods, *offset* indicates the
*  location of the IP checksum within the packet. In addition to
*  the size of the field, *flags* can be added (bitwise OR) actual
*  flags. With **BPF_F_MARK_MANGLED_0**, a null checksum is left
*  untouched (unless **BPF_F_MARK_ENFORCE** is added as well), and
*  for updates resulting in a null checksum the value is set to
*  **CSUM_MANGLED_0** instead. Flag **BPF_F_PSEUDO_HDR** indicates
*  the checksum is to be computed against a pseudo-header.
*
*  This helper works in combination with **bpf_csum_diff**\ (),
*  which does not update the checksum in-place, but offers more
*  flexibility and can handle sizes larger than 2 or 4 for the
*  checksum to update.
*
*  A call to this helper is susceptible to change the underlying
 *  packet buffer. Therefore, at load time, all checks on pointers
*  previously done by the verifier are invalidated and must be
*  performed again, if the helper is used in combination with
*  direct packet access.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_l4_csum_replace)(struct __sk_buff *skb, __u32 offset, __u64 from, __u64 to, __u64 flags)
= (void *) 11;

/*
* bpf_tail_call
*
*  This special helper is used to trigger a "tail call", or in
*  other words, to jump into another eBPF program. The same stack
*  frame is used (but values on stack and in registers for the
*  caller are not accessible to the callee). This mechanism allows
*  for program chaining, either for raising the maximum number of
*  available eBPF instructions, or to execute given programs in
*  conditional blocks. For security reasons, there is an upper
*  limit to the number of successive tail calls that can be
*  performed.
*
*  Upon call
 of this helper, the program attempts to jump into a
*  program referenced at index *index* in *prog_array_map*, a
*  special map of type **BPF_MAP_TYPE_PROG_ARRAY**, and passes
*  *ctx*, a pointer to the context.
*
*  If the call succeeds, the kernel immediately runs the first
*  instruction of the new program. This is not a function call,
```

```
*  and it never returns to the previous program. If the call
*  fails, then the helper has no effect, and the caller continues
*  to run its subsequent instructions. A call can fail if the
*  destination program for the jump does not exist (i.e. *index*
*  is superior to the number of entries in *prog_array_map*), or
*  if the maximum number of tail calls has been reached for this
*  chain of programs. This limit is defined in the kernel by the
*  macro **MAX_TAIL_CALL_CNT** (not accessible to user space),
*  which is currently set to 33.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const
 bpf_tail_call)(void *ctx, void *prog_array_map, __u32 index) = (void *) 12;

/*
* bpf_clone_redirect
*
*  Clone and redirect the packet associated to *skb* to another
*  net device of index *ifindex*. Both ingress and egress
*  interfaces can be used for redirection. The **BPF_F_INGRESS**
*  value in *flags* is used to make the distinction (ingress path
*  is selected if the flag is present, egress path otherwise).
*  This is the only flag supported for now.
*
*  In comparison with **bpf_redirect**\ () helper,
*  **bpf_clone_redirect**\ () has the associated cost of
*  duplicating the packet buffer, but this can be executed out of
*  the eBPF program. Conversely, **bpf_redirect**\ () is more
*  efficient, but it is handled through an action code where the
*  redirection happens only after the eBPF program has returned.
*
*  A call to this helper is susceptible to change the underlying
*  packet buffer. Therefore, at load time, all checks on pointers
*  previously
 done by the verifier are invalidated and must be
*  performed again, if the helper is used in combination with
*  direct packet access.
*
* Returns
*  0 on success, or a negative error in case of failure. Positive
*  error indicates a potential drop or congestion in the target
*  device. The particular positive error codes are not defined.
*/
static long (* const bpf_clone_redirect)(struct __sk_buff *skb, __u32 ifindex, __u64 flags) = (void *) 13;

/*
```

```
* bpf_get_current_pid_tgid
*
*  Get the current pid and tgid.
*
* Returns
*  A 64-bit integer containing the current tgid and pid, and
*  created as such:
*  *current_task*\ **->tgid << 32 \|**
*  *current_task*\ **->pid**.
*/
static __u64 (* const bpf_get_current_pid_tgid)(void) = (void *) 14;

/*
* bpf_get_current_uid_gid
*
*  Get the current uid and gid.
*
* Returns
*  A 64-bit integer containing the current GID and UID, and
*  created as such: *current_gid* **<< 32 \|** *current_uid*.
*/
static __u64 (* const
 bpf_get_current_uid_gid)(void) = (void *) 15;

/*
* bpf_get_current_comm
*
*  Copy the **comm** attribute of the current task into *buf* of
*  *size_of_buf*. The **comm** attribute contains the name of
*  the executable (excluding the path) for the current task. The
*  *size_of_buf* must be strictly positive. On success, the
*  helper makes sure that the *buf* is NUL-terminated. On failure,
*  it is filled with zeroes.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_get_current_comm)(void *buf, __u32 size_of_buf) = (void *) 16;

/*
* bpf_get_cgroup_classid
*
*  Retrieve the classid for the current task, i.e. for the net_cls
*  cgroup to which *skb* belongs.
*
*  This helper can be used on TC egress path, but not on ingress.
*
*  The net_cls cgroup provides an interface to tag network packets
```

```
*  based on a user-provided identifier for all traffic coming from
*  the tasks belonging to the related cgroup. See also the
 related
*  kernel documentation, available from the Linux sources in file
*  *Documentation/admin-guide/cgroup-v1/net_cls.rst*.
*
*  The Linux kernel has two versions for cgroups: there are
*  cgroups v1 and cgroups v2. Both are available to users, who can
*  use a mixture of them, but note that the net_cls cgroup is for
*  cgroup v1 only. This makes it incompatible with BPF programs
*  run on cgroups, which is a cgroup-v2-only feature (a socket can
*  only hold data for one version of cgroups at a time).
*
*  This helper is only available is the kernel was compiled with
*  the **CONFIG_CGROUP_NET_CLASSID** configuration option set to
*  "**y**" or to "**m**".
*
* Returns
*  The classid, or 0 for the default unconfigured classid.
*/
static __u32 (* const bpf_get_cgroup_classid)(struct __sk_buff *skb) = (void *) 17;

/*
* bpf_skb_vlan_push
*
*  Push a *vlan_tci* (VLAN tag control information) of protocol
*  *vlan_proto* to the packet associated to *skb*, then update
 *  the checksum. Note that if *vlan_proto* is different from
*  **ETH_P_8021Q** and **ETH_P_8021AD**, it is considered to
*  be **ETH_P_8021Q**.
*
*  A call to this helper is susceptible to change the underlying
*  packet buffer. Therefore, at load time, all checks on pointers
*  previously done by the verifier are invalidated and must be
*  performed again, if the helper is used in combination with
*  direct packet access.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_skb_vlan_push)(struct __sk_buff *skb, __be16 vlan_proto, __u16 vlan_tci) = (void *) 18;

/*
* bpf_skb_vlan_pop
*
*  Pop a VLAN header from the packet associated to *skb*.
*
*  A call to this helper is susceptible to change the underlying
```

```
*  packet buffer. Therefore, at load time, all checks on pointers
*  previously done by the verifier are invalidated and must be
*  performed again, if the helper is used in combination with
*  direct packet access.
 *
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_skb_vlan_pop)(struct __sk_buff *skb) = (void *) 19;

/*
* bpf_skb_get_tunnel_key
*
*  Get tunnel metadata. This helper takes a pointer *key* to an
*  empty **struct bpf_tunnel_key** of **size**, that will be
*  filled with tunnel metadata for the packet associated to *skb*.
*  The *flags* can be set to **BPF_F_TUNINFO_IPV6**, which
*  indicates that the tunnel is based on IPv6 protocol instead of
*  IPv4.
*
*  The **struct bpf_tunnel_key** is an object that generalizes the
*  principal parameters used by various tunneling protocols into a
*  single struct. This way, it can be used to easily make a
*  decision based on the contents of the encapsulation header,
*  "summarized" in this struct. In particular, it holds the IP
*  address of the remote end (IPv4 or IPv6, depending on the case)
*  in *key*\ **->remote_ipv4** or *key*\ **->remote_ipv6**. Also,
*  this struct
 exposes the *key*\ **->tunnel_id**, which is
*  generally mapped to a VNI (Virtual Network Identifier), making
*  it programmable together with the **bpf_skb_set_tunnel_key**\
*  () helper.
*
*  Let's imagine that the following code is part of a program
*  attached to the TC ingress interface, on one end of a GRE
*  tunnel, and is supposed to filter out all messages coming from
*  remote ends with IPv4 address other than 10.0.0.1:
*
*  ::
*
*   int ret;
*   struct bpf_tunnel_key key = {};
*
*   ret = bpf_skb_get_tunnel_key(skb, &key, sizeof(key), 0);
*   if (ret < 0)
*    return TC_ACT_SHOT; // drop packet
*
*   if (key.remote_ipv4 != 0x0a000001)
```

```
*    return TC_ACT_SHOT; // drop packet
*
*   return TC_ACT_OK;  // accept packet
*
*  This interface can also be used with all encapsulation devices
*  that can operate in "collect metadata" mode: instead of having
*  one network device per specific configuration, the "collect
*  metadata" mode only requires a single
 device where the
*  configuration can be extracted from this helper.
*
*  This can be used together with various tunnels such as VXLan,
*  Geneve, GRE or IP in IP (IPIP).
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_skb_get_tunnel_key)(struct __sk_buff *skb, struct bpf_tunnel_key *key, __u32 size, __u64
flags) = (void *) 20;

/*
* bpf_skb_set_tunnel_key
*
*  Populate tunnel metadata for packet associated to *skb.* The
*  tunnel metadata is set to the contents of *key*, of *size*. The
*  *flags* can be set to a combination of the following values:
*
*  **BPF_F_TUNINFO_IPV6**
*   Indicate that the tunnel is based on IPv6 protocol
*   instead of IPv4.
*  **BPF_F_ZERO_CSUM_TX**
*   For IPv4 packets, add a flag to tunnel metadata
*   indicating that checksum computation should be skipped
*   and checksum set to zeroes.
*  **BPF_F_DONT_FRAGMENT**
*   Add a flag to tunnel metadata indicating that the
*   packet should
 not be fragmented.
*  **BPF_F_SEQ_NUMBER**
*   Add a flag to tunnel metadata indicating that a
*   sequence number should be added to tunnel header before
*   sending the packet. This flag was added for GRE
*   encapsulation, but might be used with other protocols
*   as well in the future.
*  **BPF_F_NO_TUNNEL_KEY**
*   Add a flag to tunnel metadata indicating that no tunnel
*   key should be set in the resulting tunnel header.
*
```

```
*  Here is a typical usage on the transmit path:
*
*  ::
*
*   struct bpf_tunnel_key key;
*       populate key ...
*   bpf_skb_set_tunnel_key(skb, &key, sizeof(key), 0);
*   bpf_clone_redirect(skb, vxlan_dev_ifindex, 0);
*
*  See also the description of the **bpf_skb_get_tunnel_key**\ ()
*  helper for additional information.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_skb_set_tunnel_key)(struct __sk_buff *skb, struct bpf_tunnel_key *key, __u32 size, __u64
flags) = (void *) 21;

/*
 * bpf_perf_event_read
*
*  Read the value of a perf event counter. This helper relies on a
*  *map* of type **BPF_MAP_TYPE_PERF_EVENT_ARRAY**. The nature of
*  the perf event counter is selected when *map* is updated with
*  perf event file descriptors. The *map* is an array whose size
*  is the number of available CPUs, and each cell contains a value
*  relative to one CPU. The value to retrieve is indicated by
*  *flags*, that contains the index of the CPU to look up, masked
*  with **BPF_F_INDEX_MASK**. Alternatively, *flags* can be set to
*  **BPF_F_CURRENT_CPU** to indicate that the value for the
*  current CPU should be retrieved.
*
*  Note that before Linux 4.13, only hardware perf event can be
*  retrieved.
*
*  Also, be aware that the newer helper
*  **bpf_perf_event_read_value**\ () is recommended over
*  **bpf_perf_event_read**\ () in general. The latter has some ABI
*  quirks where error and counter value are used as a return code
*  (which is wrong
 to do since ranges may overlap). This issue is
*  fixed with **bpf_perf_event_read_value**\ (), which at the same
*  time provides more features over the **bpf_perf_event_read**\
*  () interface. Please refer to the description of
*  **bpf_perf_event_read_value**\ () for details.
*
* Returns
*  The value of the perf event counter read from the map, or a
```

```
*  negative error code in case of failure.
*/
static __u64 (* const bpf_perf_event_read)(void *map, __u64 flags) = (void *) 22;

/*
* bpf_redirect
*
*  Redirect the packet to another net device of index *ifindex*.
*  This helper is somewhat similar to **bpf_clone_redirect**\
*  (), except that the packet is not cloned, which provides
*  increased performance.
*
*  Except for XDP, both ingress and egress interfaces can be used
*  for redirection. The **BPF_F_INGRESS** value in *flags* is used
*  to make the distinction (ingress path is selected if the flag
*  is present, egress path otherwise). Currently, XDP only
*
  supports redirection to the egress interface, and accepts no
*  flag at all.
*
*  The same effect can also be attained with the more generic
*  **bpf_redirect_map**\ (), which uses a BPF map to store the
*  redirect target instead of providing it directly to the helper.
*
* Returns
*  For XDP, the helper returns **XDP_REDIRECT** on success or
*  **XDP_ABORTED** on error. For other program types, the values
*  are **TC_ACT_REDIRECT** on success or **TC_ACT_SHOT** on
*  error.
*/
static long (* const bpf_redirect)(__u32 ifindex, __u64 flags) = (void *) 23;

/*
* bpf_get_route_realm
*
*  Retrieve the realm or the route, that is to say the
*  **tclassid** field of the destination for the *skb*. The
*  identifier retrieved is a user-provided tag, similar to the
*  one used with the net_cls cgroup (see description for
*  **bpf_get_cgroup_classid**\ () helper), but here this tag is
*  held by a route (a destination entry), not by a task.
*
*  Retrieving this identifier
 works with the clsact TC egress hook
*  (see also **tc-bpf(8)**), or alternatively on conventional
*  classful egress qdiscs, but not on TC ingress path. In case of
*  clsact TC egress hook, this has the advantage that, internally,
*  the destination entry has not been dropped yet in the transmit
```

```
*  path. Therefore, the destination entry does not need to be
*  artificially held via **netif_keep_dst**\ () for a classful
*  qdisc until the *skb* is freed.
*
*  This helper is available only if the kernel was compiled with
*  **CONFIG_IP_ROUTE_CLASSID** configuration option.
*
* Returns
*  The realm of the route for the packet associated to *skb*, or 0
*  if none was found.
*/
static __u32 (* const bpf_get_route_realm)(struct __sk_buff *skb) = (void *) 24;

/*
* bpf_perf_event_output
*
*  Write raw *data* blob into a special BPF perf event held by
*  *map* of type **BPF_MAP_TYPE_PERF_EVENT_ARRAY**. This perf
*  event must have the following attributes: **PERF_SAMPLE_RAW**
*  as **sample_type**, **PERF_TYPE_SOFTWARE** as **type**, and
*  **PERF_COUNT_SW_BPF_OUTPUT** as **config**.
*
*  The *flags* are used to indicate the index in *map* for which
*  the value must be put, masked with **BPF_F_INDEX_MASK**.
*  Alternatively, *flags* can be set to **BPF_F_CURRENT_CPU**
*  to indicate that the index of the current CPU core should be
*  used.
*
*  The value to write, of *size*, is passed through eBPF stack and
*  pointed by *data*.
*
*  The context of the program *ctx* needs also be passed to the
*  helper.
*
*  On user space, a program willing to read the values needs to
*  call **perf_event_open**\ () on the perf event (either for
*  one or for all CPUs) and to store the file descriptor into the
*  *map*. This must be done before the eBPF program can send data
*  into it. An example is available in file
*  *samples/bpf/trace_output_user.c* in the Linux kernel source
*  tree (the eBPF program counterpart is in
*  *samples/bpf/trace_output_kern.c*).
*
*  **bpf_perf_event_output**\ () achieves better performance
*  than **bpf_trace_printk**\ () for sharing data with user
*  space, and is much better suitable for streaming data from eBPF
*  programs.
*
```

```
*  Note that this helper is not restricted to tracing use cases
*  and can be used with programs attached to TC or XDP as well,
*  where it allows for passing data to user space listeners. Data
*  can be:
*
*  * Only custom structs,
*  * Only the packet payload, or
*  * A combination of both.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_perf_event_output)(void *ctx, void *map, __u64 flags, void *data, __u64 size) = (void *)
25;

/*
* bpf_skb_load_bytes
*
*  This helper was provided as an easy way to load data from a
*  packet. It can be used to load *len* bytes from *offset* from
*  the packet associated to *skb*, into the buffer pointed by
*  *to*.
*
*  Since Linux 4.7, usage of this helper
 has mostly been replaced
*  by "direct packet access", enabling packet data to be
*  manipulated with *skb*\ **->data** and *skb*\ **->data_end**
*  pointing respectively to the first byte of packet data and to
*  the byte after the last byte of packet data. However, it
*  remains useful if one wishes to read large quantities of data
*  at once from a packet into the eBPF stack.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_skb_load_bytes)(const void *skb, __u32 offset, void *to, __u32 len) = (void *) 26;

/*
* bpf_get_stackid
*
*  Walk a user or a kernel stack and return its id. To achieve
*  this, the helper needs *ctx*, which is a pointer to the context
*  on which the tracing program is executed, and a pointer to a
*  *map* of type **BPF_MAP_TYPE_STACK_TRACE**.
*
*  The last argument, *flags*, holds the number of stack frames to
*  skip (from 0 to 255), masked with
*  **BPF_F_SKIP_FIELD_MASK**. The next bits can
```

```
 be used to set
*  a combination of the following flags:
*
*  **BPF_F_USER_STACK**
*   Collect a user space stack instead of a kernel stack.
*  **BPF_F_FAST_STACK_CMP**
*   Compare stacks by hash only.
*  **BPF_F_REUSE_STACKID**
*   If two different stacks hash into the same *stackid*,
*   discard the old one.
*
*  The stack id retrieved is a 32 bit long integer handle which
*  can be further combined with other data (including other stack
*  ids) and used as a key into maps. This can be useful for
*  generating a variety of graphs (such as flame graphs or off-cpu
*  graphs).
*
*  For walking a stack, this helper is an improvement over
*  **bpf_probe_read**\ (), which can be used with unrolled loops
*  but is not efficient and consumes a lot of eBPF instructions.
*  Instead, **bpf_get_stackid**\ () can collect up to
*  **PERF_MAX_STACK_DEPTH** both kernel and user frames. Note that
*  this limit can be controlled with the **sysctl** program, and
*  that it should
 be manually increased in order to profile long
*  user stacks (such as stacks for Java programs). To do so, use:
*
*  ::
*
*   # sysctl kernel.perf_event_max_stack=<new value>
*
* Returns
*  The positive or null stack id on success, or a negative error
*  in case of failure.
*/
static long (* const bpf_get_stackid)(void *ctx, void *map, __u64 flags) = (void *) 27;

/*
* bpf_csum_diff
*
*  Compute a checksum difference, from the raw buffer pointed by
*  *from*, of length *from_size* (that must be a multiple of 4),
*  towards the raw buffer pointed by *to*, of size *to_size*
*  (same remark). An optional *seed* can be added to the value
*  (this can be cascaded, the seed may come from a previous call
*  to the helper).
*
*  This is flexible enough to be used in several ways:
```

```
*
*  * With *from_size* == 0, *to_size* > 0 and *seed* set to
*    checksum, it can be used when pushing new data.
*  * With *from_size* > 0, *to_size* == 0 and *seed* set to
*    checksum,
 it can be used when removing data from a packet.
*  * With *from_size* > 0, *to_size* > 0 and *seed* set to 0, it
*    can be used to compute a diff. Note that *from_size* and
*    *to_size* do not need to be equal.
*
*  This helper can be used in combination with
*  **bpf_l3_csum_replace**\ () and **bpf_l4_csum_replace**\ (), to
*  which one can feed in the difference computed with
*  **bpf_csum_diff**\ ().
*
* Returns
*  The checksum result, or a negative error code in case of
*  failure.
*/
static __s64 (* const bpf_csum_diff)(__be32 *from, __u32 from_size, __be32 *to, __u32 to_size, __wsum seed) =
(void *) 28;

/*
* bpf_skb_get_tunnel_opt
*
*  Retrieve tunnel options metadata for the packet associated to
*  *skb*, and store the raw tunnel option data to the buffer *opt*
*  of *size*.
*
*  This helper can be used with encapsulation devices that can
*  operate in "collect metadata" mode (please refer to the related
*  note in the description of **bpf_skb_get_tunnel_key**\
 () for
*  more details). A particular example where this can be used is
*  in combination with the Geneve encapsulation protocol, where it
*  allows for pushing (with **bpf_skb_get_tunnel_opt**\ () helper)
*  and retrieving arbitrary TLVs (Type-Length-Value headers) from
*  the eBPF program. This allows for full customization of these
*  headers.
*
* Returns
*  The size of the option data retrieved.
*/
static long (* const bpf_skb_get_tunnel_opt)(struct __sk_buff *skb, void *opt, __u32 size) = (void *) 29;

/*
* bpf_skb_set_tunnel_opt
*
```

```
*  Set tunnel options metadata for the packet associated to *skb*
*  to the option data contained in the raw buffer *opt* of *size*.
*
*  See also the description of the **bpf_skb_get_tunnel_opt**\ ()
*  helper for additional information.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_skb_set_tunnel_opt)(struct __sk_buff *skb, void *opt, __u32 size) = (void *) 30;

/*
*
 bpf_skb_change_proto
*
*  Change the protocol of the *skb* to *proto*. Currently
*  supported are transition from IPv4 to IPv6, and from IPv6 to
*  IPv4. The helper takes care of the groundwork for the
*  transition, including resizing the socket buffer. The eBPF
*  program is expected to fill the new headers, if any, via
*  **skb_store_bytes**\ () and to recompute the checksums with
*  **bpf_l3_csum_replace**\ () and **bpf_l4_csum_replace**\
*  (). The main case for this helper is to perform NAT64
*  operations out of an eBPF program.
*
*  Internally, the GSO type is marked as dodgy so that headers are
*  checked and segments are recalculated by the GSO/GRO engine.
*  The size for GSO target is adapted as well.
*
*  All values for *flags* are reserved for future usage, and must
*  be left at zero.
*
*  A call to this helper is susceptible to change the underlying
*  packet buffer. Therefore, at load time, all checks on pointers
*  previously done by the verifier are
 invalidated and must be
*  performed again, if the helper is used in combination with
*  direct packet access.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_skb_change_proto)(struct __sk_buff *skb, __be16 proto, __u64 flags) = (void *) 31;

/*
* bpf_skb_change_type
*
*  Change the packet type for the packet associated to *skb*. This
```

```
*  comes down to setting *skb*\ **->pkt_type** to *type*, except
*  the eBPF program does not have a write access to *skb*\
*  **->pkt_type** beside this helper. Using a helper here allows
*  for graceful handling of errors.
*
*  The major use case is to change incoming *skb*s to
*  **PACKET_HOST** in a programmatic way instead of having to
*  recirculate via **redirect**\ (..., **BPF_F_INGRESS**), for
*  example.
*
*  Note that *type* only allows certain values. At this time, they
*  are:
*
*  **PACKET_HOST**
*   Packet is for us.
*  **PACKET_BROADCAST**
*   Send packet to all.
 *  **PACKET_MULTICAST**
*   Send packet to group.
*  **PACKET_OTHERHOST**
*   Send packet to someone else.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_skb_change_type)(struct __sk_buff *skb, __u32 type) = (void *) 32;

/*
* bpf_skb_under_cgroup
*
*  Check whether *skb* is a descendant of the cgroup2 held by
*  *map* of type **BPF_MAP_TYPE_CGROUP_ARRAY**, at *index*.
*
* Returns
*  The return value depends on the result of the test, and can be:
*
*  * 0, if the *skb* failed the cgroup2 descendant test.
*  * 1, if the *skb* succeeded the cgroup2 descendant test.
*  * A negative error code, if an error occurred.
*/
static long (* const bpf_skb_under_cgroup)(struct __sk_buff *skb, void *map, __u32 index) = (void *) 33;

/*
* bpf_get_hash_recalc
*
*  Retrieve the hash of the packet, *skb*\ **->hash**. If it is
*  not set, in particular if the hash was cleared due to mangling,
*  recompute this hash. Later accesses
```

```
 to the hash can be done
*  directly with *skb*\ **->hash**.
*
*  Calling **bpf_set_hash_invalid**\ (), changing a packet
*  prototype with **bpf_skb_change_proto**\ (), or calling
*  **bpf_skb_store_bytes**\ () with the
*  **BPF_F_INVALIDATE_HASH** are actions susceptible to clear
*  the hash and to trigger a new computation for the next call to
*  **bpf_get_hash_recalc**\ ().
*
* Returns
*  The 32-bit hash.
*/
static __u32 (* const bpf_get_hash_recalc)(struct __sk_buff *skb) = (void *) 34;

/*
* bpf_get_current_task
*
*  Get the current task.
*
* Returns
*  A pointer to the current task struct.
*/
static __u64 (* const bpf_get_current_task)(void) = (void *) 35;

/*
* bpf_probe_write_user
*
*  Attempt in a safe way to write *len* bytes from the buffer
*  *src* to *dst* in memory. It only works for threads that are in
*  user context, and *dst* must be a valid user space address.
*
*  This helper should not be used to implement any kind of
*  security mechanism
 because of TOC-TOU attacks, but rather to
*  debug, divert, and manipulate execution of semi-cooperative
*  processes.
*
*  Keep in mind that this feature is meant for experiments, and it
*  has a risk of crashing the system and running programs.
*  Therefore, when an eBPF program using this helper is attached,
*  a warning including PID and process name is printed to kernel
*  logs.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_probe_write_user)(void *dst, const void *src, __u32 len) = (void *) 36;
```

```
/*
* bpf_current_task_under_cgroup
*
*  Check whether the probe is being run is the context of a given
*  subset of the cgroup2 hierarchy. The cgroup2 to test is held by
*  *map* of type **BPF_MAP_TYPE_CGROUP_ARRAY**, at *index*.
*
* Returns
*  The return value depends on the result of the test, and can be:
*
*  * 1, if current task belongs to the cgroup2.
*  * 0, if current task does not belong to the cgroup2.
 *  * A negative error code, if an error occurred.
*/
static long (* const bpf_current_task_under_cgroup)(void *map, __u32 index) = (void *) 37;

/*
* bpf_skb_change_tail
*
*  Resize (trim or grow) the packet associated to *skb* to the
*  new *len*. The *flags* are reserved for future usage, and must
*  be left at zero.
*
*  The basic idea is that the helper performs the needed work to
*  change the size of the packet, then the eBPF program rewrites
*  the rest via helpers like **bpf_skb_store_bytes**\ (),
*  **bpf_l3_csum_replace**\ (), **bpf_l3_csum_replace**\ ()
*  and others. This helper is a slow path utility intended for
*  replies with control messages. And because it is targeted for
*  slow path, the helper itself can afford to be slow: it
*  implicitly linearizes, unclones and drops offloads from the
*  *skb*.
*
*  A call to this helper is susceptible to change the underlying
*  packet buffer. Therefore, at load time, all checks on pointers
*  previously done
 by the verifier are invalidated and must be
*  performed again, if the helper is used in combination with
*  direct packet access.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_skb_change_tail)(struct __sk_buff *skb, __u32 len, __u64 flags) = (void *) 38;

/*
* bpf_skb_pull_data
```

```
*
*  Pull in non-linear data in case the *skb* is non-linear and not
*  all of *len* are part of the linear section. Make *len* bytes
*  from *skb* readable and writable. If a zero value is passed for
*  *len*, then all bytes in the linear part of *skb* will be made
*  readable and writable.
*
*  This helper is only needed for reading and writing with direct
*  packet access.
*
*  For direct packet access, testing that offsets to access
*  are within packet boundaries (test on *skb*\ **->data_end**) is
*  susceptible to fail if offsets are invalid, or if the requested
*  data is in non-linear parts of the *skb*. On failure the
*  program
 can just bail out, or in the case of a non-linear
*  buffer, use a helper to make the data available. The
*  **bpf_skb_load_bytes**\ () helper is a first solution to access
*  the data. Another one consists in using **bpf_skb_pull_data**
*  to pull in once the non-linear parts, then retesting and
*  eventually access the data.
*
*  At the same time, this also makes sure the *skb* is uncloned,
*  which is a necessary condition for direct write. As this needs
*  to be an invariant for the write part only, the verifier
*  detects writes and adds a prologue that is calling
*  **bpf_skb_pull_data()** to effectively unclone the *skb* from
*  the very beginning in case it is indeed cloned.
*
*  A call to this helper is susceptible to change the underlying
*  packet buffer. Therefore, at load time, all checks on pointers
*  previously done by the verifier are invalidated and must be
*  performed again, if the helper is used in combination with
*  direct packet access.
*
*
 Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_skb_pull_data)(struct __sk_buff *skb, __u32 len) = (void *) 39;

/*
* bpf_csum_update
*
*  Add the checksum *csum* into *skb*\ **->csum** in case the
*  driver has supplied a checksum for the entire packet into that
*  field. Return an error otherwise. This helper is intended to be
*  used in combination with **bpf_csum_diff**\ (), in particular
```

```
*  when the checksum needs to be updated after data has been
*  written into the packet through direct packet access.
*
* Returns
*  The checksum on success, or a negative error code in case of
*  failure.
*/
static __s64 (* const bpf_csum_update)(struct __sk_buff *skb, __wsum csum) = (void *) 40;

/*
* bpf_set_hash_invalid
*
*  Invalidate the current *skb*\ **->hash**. It can be used after
*  mangling on headers through direct packet access, in order to
*  indicate that the hash is outdated and to trigger a
*  recalculation the next
 time the kernel tries to access this
*  hash or when the **bpf_get_hash_recalc**\ () helper is called.
*
* Returns
*  void.
*/
static void (* const bpf_set_hash_invalid)(struct __sk_buff *skb) = (void *) 41;

/*
* bpf_get_numa_node_id
*
*  Return the id of the current NUMA node. The primary use case
*  for this helper is the selection of sockets for the local NUMA
*  node, when the program is attached to sockets using the
*  **SO_ATTACH_REUSEPORT_EBPF** option (see also **socket(7)**),
*  but the helper is also available to other eBPF program types,
*  similarly to **bpf_get_smp_processor_id**\ ().
*
* Returns
*  The id of current NUMA node.
*/
static long (* const bpf_get_numa_node_id)(void) = (void *) 42;

/*
* bpf_skb_change_head
*
*  Grows headroom of packet associated to *skb* and adjusts the
*  offset of the MAC header accordingly, adding *len* bytes of
*  space. It automatically extends and reallocates memory as
*  required.
*
*  This helper can be used
```

```
 on a layer 3 *skb* to push a MAC header
*  for redirection into a layer 2 device.
*
*  All values for *flags* are reserved for future usage, and must
*  be left at zero.
*
*  A call to this helper is susceptible to change the underlying
*  packet buffer. Therefore, at load time, all checks on pointers
*  previously done by the verifier are invalidated and must be
*  performed again, if the helper is used in combination with
*  direct packet access.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_skb_change_head)(struct __sk_buff *skb, __u32 len, __u64 flags) = (void *) 43;

/*
* bpf_xdp_adjust_head
*
*  Adjust (move) *xdp_md*\ **->data** by *delta* bytes. Note that
*  it is possible to use a negative value for *delta*. This helper
*  can be used to prepare the packet for pushing or popping
*  headers.
*
*  A call to this helper is susceptible to change the underlying
*  packet buffer. Therefore, at load time, all
 checks on pointers
*  previously done by the verifier are invalidated and must be
*  performed again, if the helper is used in combination with
*  direct packet access.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_xdp_adjust_head)(struct xdp_md *xdp_md, int delta) = (void *) 44;

/*
* bpf_probe_read_str
*
*  Copy a NUL terminated string from an unsafe kernel address
*  *unsafe_ptr* to *dst*. See **bpf_probe_read_kernel_str**\ () for
*  more details.
*
*  Generally, use **bpf_probe_read_user_str**\ () or
*  **bpf_probe_read_kernel_str**\ () instead.
*
* Returns
```

```
*  On success, the strictly positive length of the string,
*  including the trailing NUL character. On error, a negative
*  value.
*/
static long (* const bpf_probe_read_str)(void *dst, __u32 size, const void *unsafe_ptr) = (void *) 45;

/*
* bpf_get_socket_cookie
*
*  If the **struct sk_buff** pointed by *skb* has a known socket,
*  retrieve the cookie
 (generated by the kernel) of this socket.
*  If no cookie has been set yet, generate a new cookie. Once
*  generated, the socket cookie remains stable for the life of the
*  socket. This helper can be useful for monitoring per socket
*  networking traffic statistics as it provides a global socket
*  identifier that can be assumed unique.
*
* Returns
*  A 8-byte long unique number on success, or 0 if the socket
*  field is missing inside *skb*.
*/
static __u64 (* const bpf_get_socket_cookie)(void *ctx) = (void *) 46;

/*
* bpf_get_socket_uid
*
*  Get the owner UID of the socked associated to *skb*.
*
* Returns
*  The owner UID of the socket associated to *skb*. If the socket
*  is **NULL**, or if it is not a full socket (i.e. if it is a
*  time-wait or a request socket instead), **overflowuid** value
*  is returned (note that **overflowuid** might also be the actual
*  UID value for the socket).
*/
static __u32 (* const bpf_get_socket_uid)(struct __sk_buff *skb) =
 (void *) 47;

/*
* bpf_set_hash
*
*  Set the full hash for *skb* (set the field *skb*\ **->hash**)
*  to value *hash*.
*
* Returns
*  0
*/
```

```
static long (* const bpf_set_hash)(struct __sk_buff *skb, __u32 hash) = (void *) 48;

/*
* bpf_setsockopt
*
*  Emulate a call to **setsockopt()** on the socket associated to
*  *bpf_socket*, which must be a full socket. The *level* at
*  which the option resides and the name *optname* of the option
*  must be specified, see **setsockopt(2)** for more information.
*  The option value of length *optlen* is pointed by *optval*.
*
*  *bpf_socket* should be one of the following:
*
*  * **struct bpf_sock_ops** for **BPF_PROG_TYPE_SOCK_OPS**.
*  * **struct bpf_sock_addr** for **BPF_CGROUP_INET4_CONNECT**,
*    **BPF_CGROUP_INET6_CONNECT** and **BPF_CGROUP_UNIX_CONNECT**.
*
*  This helper actually implements a subset of **setsockopt()**.
*  It supports the following *level*\ s:
*
*  * **SOL_SOCKET**, which supports the following *optname*\
 s:
*    **SO_RCVBUF**, **SO_SNDBUF**, **SO_MAX_PACING_RATE**,
*    **SO_PRIORITY**, **SO_RCVLOWAT**, **SO_MARK**,
*    **SO_BINDTODEVICE**, **SO_KEEPALIVE**, **SO_REUSEADDR**,
*    **SO_REUSEPORT**, **SO_BINDTOIFINDEX**, **SO_TXREHASH**.
*  * **IPPROTO_TCP**, which supports the following *optname*\ s:
*    **TCP_CONGESTION**, **TCP_BPF_IW**,
*    **TCP_BPF_SNDCWND_CLAMP**, **TCP_SAVE_SYN**,
*    **TCP_KEEPIDLE**, **TCP_KEEPINTVL**, **TCP_KEEPCNT**,
*    **TCP_SYNCNT**, **TCP_USER_TIMEOUT**, **TCP_NOTSENT_LOWAT**,
*    **TCP_NODELAY**, **TCP_MAXSEG**, **TCP_WINDOW_CLAMP**,
*    **TCP_THIN_LINEAR_TIMEOUTS**, **TCP_BPF_DELACK_MAX**,
*    **TCP_BPF_RTO_MIN**.
*  * **IPPROTO_IP**, which supports *optname* **IP_TOS**.
*  * **IPPROTO_IPV6**, which supports the following *optname*\ s:
*    **IPV6_TCLASS**, **IPV6_AUTOFLOWLABEL**.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_setsockopt)(void *bpf_socket, int level,
 int optname, void *optval, int optlen) = (void *) 49;

/*
* bpf_skb_adjust_room
*
*  Grow or shrink the room for data in the packet associated to
```

```
*  *skb* by *len_diff*, and according to the selected *mode*.
*
*  By default, the helper will reset any offloaded checksum
*  indicator of the skb to CHECKSUM_NONE. This can be avoided
*  by the following flag:
*
*  * **BPF_F_ADJ_ROOM_NO_CSUM_RESET**: Do not reset offloaded
*    checksum data of the skb to CHECKSUM_NONE.
*
*  There are two supported modes at this time:
*
*  * **BPF_ADJ_ROOM_MAC**: Adjust room at the mac layer
*    (room space is added or removed between the layer 2 and
*    layer 3 headers).
*
*  * **BPF_ADJ_ROOM_NET**: Adjust room at the network layer
*    (room space is added or removed between the layer 3 and
*    layer 4 headers).
*
*  The following flags are supported at this time:
*
*  * **BPF_F_ADJ_ROOM_FIXED_GSO**: Do not adjust gso_size.
*    Adjusting mss in this way is not allowed for datagrams.
 *
*  * **BPF_F_ADJ_ROOM_ENCAP_L3_IPV4**,
*    **BPF_F_ADJ_ROOM_ENCAP_L3_IPV6**:
*    Any new space is reserved to hold a tunnel header.
*    Configure skb offsets and other fields accordingly.
*
*  * **BPF_F_ADJ_ROOM_ENCAP_L4_GRE**,
*    **BPF_F_ADJ_ROOM_ENCAP_L4_UDP**:
*    Use with ENCAP_L3 flags to further specify the tunnel type.
*
*  * **BPF_F_ADJ_ROOM_ENCAP_L2**\ (*len*):
*    Use with ENCAP_L3/L4 flags to further specify the tunnel
*    type; *len* is the length of the inner MAC header.
*
*  * **BPF_F_ADJ_ROOM_ENCAP_L2_ETH**:
*    Use with BPF_F_ADJ_ROOM_ENCAP_L2 flag to further specify the
*    L2 type as Ethernet.
*
*  * **BPF_F_ADJ_ROOM_DECAP_L3_IPV4**,
*    **BPF_F_ADJ_ROOM_DECAP_L3_IPV6**:
*    Indicate the new IP header version after decapsulating the outer
*    IP header. Used when the inner and outer IP versions are different.
*
*  A call to this helper is susceptible to change the underlying
*  packet buffer. Therefore, at load time, all
```

```
 checks on pointers
*  previously done by the verifier are invalidated and must be
*  performed again, if the helper is used in combination with
*  direct packet access.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_skb_adjust_room)(struct __sk_buff *skb, __s32 len_diff, __u32 mode, __u64 flags) = (void
*) 50;

/*
* bpf_redirect_map
*
*  Redirect the packet to the endpoint referenced by *map* at
*  index *key*. Depending on its type, this *map* can contain
*  references to net devices (for forwarding packets through other
*  ports), or to CPUs (for redirecting XDP frames to another CPU;
*  but this is only implemented for native XDP (with driver
*  support) as of this writing).
*
*  The lower two bits of *flags* are used as the return code if
*  the map lookup fails. This is so that the return value can be
*  one of the XDP program return codes up to **XDP_TX**, as chosen
*  by the caller. The higher bits of *flags*
 can be set to
*  BPF_F_BROADCAST or BPF_F_EXCLUDE_INGRESS as defined below.
*
*  With BPF_F_BROADCAST the packet will be broadcasted to all the
*  interfaces in the map, with BPF_F_EXCLUDE_INGRESS the ingress
*  interface will be excluded when do broadcasting.
*
*  See also **bpf_redirect**\ (), which only supports redirecting
*  to an ifindex, but doesn't require a map to do so.
*
* Returns
*  **XDP_REDIRECT** on success, or the value of the two lower bits
*  of the *flags* argument on error.
*/
static long (* const bpf_redirect_map)(void *map, __u64 key, __u64 flags) = (void *) 51;

/*
* bpf_sk_redirect_map
*
*  Redirect the packet to the socket referenced by *map* (of type
*  **BPF_MAP_TYPE_SOCKMAP**) at index *key*. Both ingress and
*  egress interfaces can be used for redirection. The
*  **BPF_F_INGRESS** value in *flags* is used to make the
```

```
*  distinction (ingress path is selected if the flag is present,
*  egress path otherwise). This is the only flag supported
 for now.
*
* Returns
*  **SK_PASS** on success, or **SK_DROP** on error.
*/
static long (* const bpf_sk_redirect_map)(struct __sk_buff *skb, void *map, __u32 key, __u64 flags) = (void *) 52;

/*
* bpf_sock_map_update
*
*  Add an entry to, or update a *map* referencing sockets. The
*  *skops* is used as a new value for the entry associated to
*  *key*. *flags* is one of:
*
*  **BPF_NOEXIST**
*   The entry for *key* must not exist in the map.
*  **BPF_EXIST**
*   The entry for *key* must already exist in the map.
*  **BPF_ANY**
*   No condition on the existence of the entry for *key*.
*
*  If the *map* has eBPF programs (parser and verdict), those will
*  be inherited by the socket being added. If the socket is
*  already attached to eBPF programs, this results in an error.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_sock_map_update)(struct bpf_sock_ops *skops, void *map, void *key, __u64 flags) = (void
*)
 53;

/*
* bpf_xdp_adjust_meta
*
*  Adjust the address pointed by *xdp_md*\ **->data_meta** by
*  *delta* (which can be positive or negative). Note that this
*  operation modifies the address stored in *xdp_md*\ **->data**,
*  so the latter must be loaded only after the helper has been
*  called.
*
*  The use of *xdp_md*\ **->data_meta** is optional and programs
*  are not required to use it. The rationale is that when the
*  packet is processed with XDP (e.g. as DoS filter), it is
*  possible to push further meta data along with it before passing
*  to the stack, and to give the guarantee that an ingress eBPF
```

```
*  program attached as a TC classifier on the same device can pick
*  this up for further post-processing. Since TC works with socket
*  buffers, it remains possible to set from XDP the **mark** or
*  **priority** pointers, or other pointers for the socket buffer.
*  Having this scratch space generic and programmable allows for
*  more flexibility as the user is
 free to store whatever meta
*  data they need.
*
*  A call to this helper is susceptible to change the underlying
*  packet buffer. Therefore, at load time, all checks on pointers
*  previously done by the verifier are invalidated and must be
*  performed again, if the helper is used in combination with
*  direct packet access.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_xdp_adjust_meta)(struct xdp_md *xdp_md, int delta) = (void *) 54;

/*
* bpf_perf_event_read_value
*
*  Read the value of a perf event counter, and store it into *buf*
*  of size *buf_size*. This helper relies on a *map* of type
*  **BPF_MAP_TYPE_PERF_EVENT_ARRAY**. The nature of the perf event
*  counter is selected when *map* is updated with perf event file
*  descriptors. The *map* is an array whose size is the number of
*  available CPUs, and each cell contains a value relative to one
*  CPU. The value to retrieve is indicated by *flags*, that
 *  contains the index of the CPU to look up, masked with
*  **BPF_F_INDEX_MASK**. Alternatively, *flags* can be set to
*  **BPF_F_CURRENT_CPU** to indicate that the value for the
*  current CPU should be retrieved.
*
*  This helper behaves in a way close to
*  **bpf_perf_event_read**\ () helper, save that instead of
*  just returning the value observed, it fills the *buf*
*  structure. This allows for additional data to be retrieved: in
*  particular, the enabled and running times (in *buf*\
*  **->enabled** and *buf*\ **->running**, respectively) are
*  copied. In general, **bpf_perf_event_read_value**\ () is
*  recommended over **bpf_perf_event_read**\ (), which has some
*  ABI issues and provides fewer functionalities.
*
*  These values are interesting, because hardware PMU (Performance
*  Monitoring Unit) counters are limited resources. When there are
*  more PMU based perf events opened than available counters,
```

```
*  kernel will multiplex these events so each event
 gets certain
*  percentage (but not all) of the PMU time. In case that
*  multiplexing happens, the number of samples or counter value
*  will not reflect the case compared to when no multiplexing
*  occurs. This makes comparison between different runs difficult.
*  Typically, the counter value should be normalized before
*  comparing to other experiments. The usual normalization is done
*  as follows.
*
*  ::
*
*   normalized_counter = counter * t_enabled / t_running
*
*  Where t_enabled is the time enabled for event and t_running is
*  the time running for event since last normalization. The
*  enabled and running times are accumulated since the perf event
*  open. To achieve scaling factor between two invocations of an
*  eBPF program, users can use CPU id as the key (which is
*  typical for perf array usage model) to remember the previous
*  value and do the calculation inside the eBPF program.
*
* Returns
*  0 on success, or a negative error in case of failure.
 */
static long (* const bpf_perf_event_read_value)(void *map, __u64 flags, struct bpf_perf_event_value *buf, __u32
buf_size) = (void *) 55;

/*
* bpf_perf_prog_read_value
*
*  For an eBPF program attached to a perf event, retrieve the
*  value of the event counter associated to *ctx* and store it in
*  the structure pointed by *buf* and of size *buf_size*. Enabled
*  and running times are also stored in the structure (see
*  description of helper **bpf_perf_event_read_value**\ () for
*  more details).
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_perf_prog_read_value)(struct bpf_perf_event_data *ctx, struct bpf_perf_event_value *buf,
__u32 buf_size) = (void *) 56;

/*
* bpf_getsockopt
*
*  Emulate a call to **getsockopt()** on the socket associated to
```

```
*  *bpf_socket*, which must be a full socket. The *level* at
*  which the option resides and the name *optname* of the option
*  must be specified, see **getsockopt(2)**
 for more information.
*  The retrieved value is stored in the structure pointed by
*  *opval* and of length *optlen*.
*
*  *bpf_socket* should be one of the following:
*
*  * **struct bpf_sock_ops** for **BPF_PROG_TYPE_SOCK_OPS**.
*  * **struct bpf_sock_addr** for **BPF_CGROUP_INET4_CONNECT**,
*    **BPF_CGROUP_INET6_CONNECT** and **BPF_CGROUP_UNIX_CONNECT**.
*
*  This helper actually implements a subset of **getsockopt()**.
*  It supports the same set of *optname*\ s that is supported by
*  the **bpf_setsockopt**\ () helper.  The exceptions are
*  **TCP_BPF_*** is **bpf_setsockopt**\ () only and
*  **TCP_SAVED_SYN** is **bpf_getsockopt**\ () only.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_getsockopt)(void *bpf_socket, int level, int optname, void *optval, int optlen) = (void *) 57;

/*
* bpf_override_return
*
*  Used for error injection, this helper uses kprobes to override
*  the return value of the probed
 function, and to set it to *rc*.
*  The first argument is the context *regs* on which the kprobe
*  works.
*
*  This helper works by setting the PC (program counter)
*  to an override function which is run in place of the original
*  probed function. This means the probed function is not run at
*  all. The replacement function just returns with the required
*  value.
*
*  This helper has security implications, and thus is subject to
*  restrictions. It is only available if the kernel was compiled
*  with the **CONFIG_BPF_KPROBE_OVERRIDE** configuration
*  option, and in this case it only works on functions tagged with
*  **ALLOW_ERROR_INJECTION** in the kernel code.
*
*  Also, the helper is only available for the architectures having
*  the CONFIG_FUNCTION_ERROR_INJECTION option. As of this writing,
*  x86 architecture is the only one to support this feature.
```

```
*
* Returns
*  0
*/
static long (* const bpf_override_return)(struct pt_regs *regs, __u64 rc) = (void
 *) 58;

/*
* bpf_sock_ops_cb_flags_set
*
*  Attempt to set the value of the **bpf_sock_ops_cb_flags** field
*  for the full TCP socket associated to *bpf_sock_ops* to
*  *argval*.
*
*  The primary use of this field is to determine if there should
*  be calls to eBPF programs of type
*  **BPF_PROG_TYPE_SOCK_OPS** at various points in the TCP
*  code. A program of the same type can change its value, per
*  connection and as necessary, when the connection is
*  established. This field is directly accessible for reading, but
*  this helper must be used for updates in order to return an
*  error if an eBPF program tries to set a callback that is not
*  supported in the current kernel.
*
*  *argval* is a flag array which can combine these flags:
*
*  * **BPF_SOCK_OPS_RTO_CB_FLAG** (retransmission time out)
*  * **BPF_SOCK_OPS_RETRANS_CB_FLAG** (retransmission)
*  * **BPF_SOCK_OPS_STATE_CB_FLAG** (TCP state change)
*  * **BPF_SOCK_OPS_RTT_CB_FLAG** (every RTT)
*
*  Therefore,
 this function can be used to clear a callback flag by
*  setting the appropriate bit to zero. e.g. to disable the RTO
*  callback:
*
*  **bpf_sock_ops_cb_flags_set(bpf_sock,**
*   **bpf_sock->bpf_sock_ops_cb_flags & ~BPF_SOCK_OPS_RTO_CB_FLAG)**
*
*  Here are some examples of where one could call such eBPF
*  program:
*
*  * When RTO fires.
*  * When a packet is retransmitted.
*  * When the connection terminates.
*  * When a packet is sent.
*  * When a packet is received.
*
```

```
* Returns
*  Code **-EINVAL** if the socket is not a full TCP socket;
*  otherwise, a positive number containing the bits that could not
*  be set is returned (which comes down to 0 if all bits were set
*  as required).
*/
static long (* const bpf_sock_ops_cb_flags_set)(struct bpf_sock_ops *bpf_sock, int argval) = (void *) 59;

/*
* bpf_msg_redirect_map
*
*  This helper is used in programs implementing policies at the
*  socket level. If the message *msg* is allowed to pass (i.e. if
 *  the verdict eBPF program returns **SK_PASS**), redirect it to
*  the socket referenced by *map* (of type
*  **BPF_MAP_TYPE_SOCKMAP**) at index *key*. Both ingress and
*  egress interfaces can be used for redirection. The
*  **BPF_F_INGRESS** value in *flags* is used to make the
*  distinction (ingress path is selected if the flag is present,
*  egress path otherwise). This is the only flag supported for now.
*
* Returns
*  **SK_PASS** on success, or **SK_DROP** on error.
*/
static long (* const bpf_msg_redirect_map)(struct sk_msg_md *msg, void *map, __u32 key, __u64 flags) = (void *)
60;

/*
* bpf_msg_apply_bytes
*
*  For socket policies, apply the verdict of the eBPF program to
*  the next *bytes* (number of bytes) of message *msg*.
*
*  For example, this helper can be used in the following cases:
*
*  * A single **sendmsg**\ () or **sendfile**\ () system call
*    contains multiple logical messages that the eBPF program is
*    supposed to read and for which
 it should apply a verdict.
*  * An eBPF program only cares to read the first *bytes* of a
*    *msg*. If the message has a large payload, then setting up
*    and calling the eBPF program repeatedly for all bytes, even
*    though the verdict is already known, would create unnecessary
*    overhead.
*
*  When called from within an eBPF program, the helper sets a
*  counter internal to the BPF infrastructure, that is used to
*  apply the last verdict to the next *bytes*. If *bytes* is
```

```
*  smaller than the current data being processed from a
*  **sendmsg**\ () or **sendfile**\ () system call, the first
*  *bytes* will be sent and the eBPF program will be re-run with
*  the pointer for start of data pointing to byte number *bytes*
*  **+ 1**. If *bytes* is larger than the current data being
*  processed, then the eBPF verdict will be applied to multiple
*  **sendmsg**\ () or **sendfile**\ () calls until *bytes* are
*  consumed.
*
*  Note that if a socket closes with the
 internal counter holding
*  a non-zero value, this is not a problem because data is not
*  being buffered for *bytes* and is sent as it is received.
*
* Returns
*  0
*/
static long (* const bpf_msg_apply_bytes)(struct sk_msg_md *msg, __u32 bytes) = (void *) 61;

/*
* bpf_msg_cork_bytes
*
*  For socket policies, prevent the execution of the verdict eBPF
*  program for message *msg* until *bytes* (byte number) have been
*  accumulated.
*
*  This can be used when one needs a specific number of bytes
*  before a verdict can be assigned, even if the data spans
*  multiple **sendmsg**\ () or **sendfile**\ () calls. The extreme
*  case would be a user calling **sendmsg**\ () repeatedly with
*  1-byte long message segments. Obviously, this is bad for
*  performance, but it is still valid. If the eBPF program needs
*  *bytes* bytes to validate a header, this helper can be used to
*  prevent the eBPF program to be called again until *bytes* have
*  been accumulated.
*
* Returns
 *  0
*/
static long (* const bpf_msg_cork_bytes)(struct sk_msg_md *msg, __u32 bytes) = (void *) 62;

/*
* bpf_msg_pull_data
*
*  For socket policies, pull in non-linear data from user space
*  for *msg* and set pointers *msg*\ **->data** and *msg*\
*  **->data_end** to *start* and *end* bytes offsets into *msg*,
*  respectively.
```

```
*
*  If a program of type **BPF_PROG_TYPE_SK_MSG** is run on a
*  *msg* it can only parse data that the (**data**, **data_end**)
*  pointers have already consumed. For **sendmsg**\ () hooks this
*  is likely the first scatterlist element. But for calls relying
*  on the **sendpage** handler (e.g. **sendfile**\ ()) this will
*  be the range (**0**, **0**) because the data is shared with
*  user space and by default the objective is to avoid allowing
*  user space to modify data while (or after) eBPF verdict is
*  being decided. This helper can be used to pull in data and to
*  set the start and end pointer to given values. Data will be
 *  copied if necessary (i.e. if data was not linear and if start
*  and end pointers do not point to the same chunk).
*
*  A call to this helper is susceptible to change the underlying
*  packet buffer. Therefore, at load time, all checks on pointers
*  previously done by the verifier are invalidated and must be
*  performed again, if the helper is used in combination with
*  direct packet access.
*
*  All values for *flags* are reserved for future usage, and must
*  be left at zero.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_msg_pull_data)(struct sk_msg_md *msg, __u32 start, __u32 end, __u64 flags) = (void *)
63;

/*
* bpf_bind
*
*  Bind the socket associated to *ctx* to the address pointed by
*  *addr*, of length *addr_len*. This allows for making outgoing
*  connection from the desired IP address, which can be useful for
*  example when all processes inside a cgroup should use one
*  single IP address on a host
 that has multiple IP configured.
*
*  This helper works for IPv4 and IPv6, TCP and UDP sockets. The
*  domain (*addr*\ **->sa_family**) must be **AF_INET** (or
*  **AF_INET6**). It's advised to pass zero port (**sin_port**
*  or **sin6_port**) which triggers IP_BIND_ADDRESS_NO_PORT-like
*  behavior and lets the kernel efficiently pick up an unused
*  port as long as 4-tuple is unique. Passing non-zero port might
*  lead to degraded performance.
*
* Returns
```

```
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_bind)(struct bpf_sock_addr *ctx, struct sockaddr *addr, int addr_len) = (void *) 64;

/*
* bpf_xdp_adjust_tail
*
*  Adjust (move) *xdp_md*\ **->data_end** by *delta* bytes. It is
*  possible to both shrink and grow the packet tail.
*  Shrink done via *delta* being a negative integer.
*
*  A call to this helper is susceptible to change the underlying
*  packet buffer. Therefore, at load time, all checks on pointers
*  previously
 done by the verifier are invalidated and must be
*  performed again, if the helper is used in combination with
*  direct packet access.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_xdp_adjust_tail)(struct xdp_md *xdp_md, int delta) = (void *) 65;

/*
* bpf_skb_get_xfrm_state
*
*  Retrieve the XFRM state (IP transform framework, see also
*  **ip-xfrm(8)**) at *index* in XFRM "security path" for *skb*.
*
*  The retrieved value is stored in the **struct bpf_xfrm_state**
*  pointed by *xfrm_state* and of length *size*.
*
*  All values for *flags* are reserved for future usage, and must
*  be left at zero.
*
*  This helper is available only if the kernel was compiled with
*  **CONFIG_XFRM** configuration option.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_skb_get_xfrm_state)(struct __sk_buff *skb, __u32 index, struct bpf_xfrm_state *xfrm_state,
__u32 size, __u64
 flags) = (void *) 66;

/*
* bpf_get_stack
*
```

```
*  Return a user or a kernel stack in bpf program provided buffer.
*  To achieve this, the helper needs *ctx*, which is a pointer
*  to the context on which the tracing program is executed.
*  To store the stacktrace, the bpf program provides *buf* with
*  a nonnegative *size*.
*
*  The last argument, *flags*, holds the number of stack frames to
*  skip (from 0 to 255), masked with
*  **BPF_F_SKIP_FIELD_MASK**. The next bits can be used to set
*  the following flags:
*
*  **BPF_F_USER_STACK**
*   Collect a user space stack instead of a kernel stack.
*  **BPF_F_USER_BUILD_ID**
*   Collect (build_id, file_offset) instead of ips for user
*   stack, only valid if **BPF_F_USER_STACK** is also
*   specified.
*
*   *file_offset* is an offset relative to the beginning
*   of the executable or shared object file backing the vma
*   which the *ip* falls in. It is *not* an offset relative
*   to that object's base address. Accordingly,
 it must be
*   adjusted by adding (sh_addr - sh_offset), where
*   sh_{addr,offset} correspond to the executable section
*   containing *file_offset* in the object, for comparisons
*   to symbols' st_value to be valid.
*
*  **bpf_get_stack**\ () can collect up to
*  **PERF_MAX_STACK_DEPTH** both kernel and user frames, subject
*  to sufficient large buffer size. Note that
*  this limit can be controlled with the **sysctl** program, and
*  that it should be manually increased in order to profile long
*  user stacks (such as stacks for Java programs). To do so, use:
*
*  ::
*
*   # sysctl kernel.perf_event_max_stack=<new value>
*
* Returns
*  The non-negative copied *buf* length equal to or less than
*  *size* on success, or a negative error in case of failure.
*/
static long (* const bpf_get_stack)(void *ctx, void *buf, __u32 size, __u64 flags) = (void *) 67;

/*
* bpf_skb_load_bytes_relative
*
```

```
*  This helper is similar to **bpf_skb_load_bytes**\ () in that
 *  it provides an easy way to load *len* bytes from *offset*
*  from the packet associated to *skb*, into the buffer pointed
*  by *to*. The difference to **bpf_skb_load_bytes**\ () is that
*  a fifth argument *start_header* exists in order to select a
*  base offset to start from. *start_header* can be one of:
*
*  **BPF_HDR_START_MAC**
*   Base offset to load data from is *skb*'s mac header.
*  **BPF_HDR_START_NET**
*   Base offset to load data from is *skb*'s network header.
*
*  In general, "direct packet access" is the preferred method to
*  access packet data, however, this helper is in particular useful
*  in socket filters where *skb*\ **->data** does not always point
*  to the start of the mac header and where "direct packet access"
*  is not available.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_skb_load_bytes_relative)(const void *skb, __u32 offset, void *to, __u32 len, __u32
start_header) = (void *) 68;

/*
 * bpf_fib_lookup
*
*  Do FIB lookup in kernel tables using parameters in *params*.
*  If lookup is successful and result shows packet is to be
*  forwarded, the neighbor tables are searched for the nexthop.
*  If successful (ie., FIB lookup shows forwarding and nexthop
*  is resolved), the nexthop address is returned in ipv4_dst
*  or ipv6_dst based on family, smac is set to mac address of
*  egress device, dmac is set to nexthop mac address, rt_metric
*  is set to metric from route (IPv4/IPv6 only), and ifindex
*  is set to the device index of the nexthop from the FIB lookup.
*
*  *plen* argument is the size of the passed in struct.
*  *flags* argument can be a combination of one or more of the
*  following values:
*
*  **BPF_FIB_LOOKUP_DIRECT**
*   Do a direct table lookup vs full lookup using FIB
*   rules.
*  **BPF_FIB_LOOKUP_TBID**
*   Used with BPF_FIB_LOOKUP_DIRECT.
*   Use the routing table ID present in *params*->tbid
*   for the fib lookup.
```

```
*  **BPF_FIB_LOOKUP_OUTPUT**
 *   Perform lookup from an egress perspective (default is
*   ingress).
*  **BPF_FIB_LOOKUP_SKIP_NEIGH**
*   Skip the neighbour table lookup. *params*->dmac
*   and *params*->smac will not be set as output. A common
*   use case is to call **bpf_redirect_neigh**\ () after
*   doing **bpf_fib_lookup**\ ().
*  **BPF_FIB_LOOKUP_SRC**
*   Derive and set source IP addr in *params*->ipv{4,6}_src
*   for the nexthop. If the src addr cannot be derived,
*   **BPF_FIB_LKUP_RET_NO_SRC_ADDR** is returned. In this
*   case, *params*->dmac and *params*->smac are not set either.
*
*  *ctx* is either **struct xdp_md** for XDP programs or
*  **struct sk_buff** tc cls_act programs.
*
* Returns
*  * < 0 if any input argument is invalid
*  *   0 on success (packet is forwarded, nexthop neighbor exists)
*  * > 0 one of **BPF_FIB_LKUP_RET_** codes explaining why the
*    packet is not forwarded or needs assist from full stack
*
*  If lookup fails with BPF_FIB_LKUP_RET_FRAG_NEEDED,
 then the MTU
*  was exceeded and output params->mtu_result contains the MTU.
*/
static long (* const bpf_fib_lookup)(void *ctx, struct bpf_fib_lookup *params, int plen, __u32 flags) = (void *) 69;

/*
* bpf_sock_hash_update
*
*  Add an entry to, or update a sockhash *map* referencing sockets.
*  The *skops* is used as a new value for the entry associated to
*  *key*. *flags* is one of:
*
*  **BPF_NOEXIST**
*   The entry for *key* must not exist in the map.
*  **BPF_EXIST**
*   The entry for *key* must already exist in the map.
*  **BPF_ANY**
*   No condition on the existence of the entry for *key*.
*
*  If the *map* has eBPF programs (parser and verdict), those will
*  be inherited by the socket being added. If the socket is
*  already attached to eBPF programs, this results in an error.
*
* Returns
```

```
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_sock_hash_update)(struct bpf_sock_ops *skops, void *map, void
 *key, __u64 flags) = (void *) 70;

/*
* bpf_msg_redirect_hash
*
*  This helper is used in programs implementing policies at the
*  socket level. If the message *msg* is allowed to pass (i.e. if
*  the verdict eBPF program returns **SK_PASS**), redirect it to
*  the socket referenced by *map* (of type
*  **BPF_MAP_TYPE_SOCKHASH**) using hash *key*. Both ingress and
*  egress interfaces can be used for redirection. The
*  **BPF_F_INGRESS** value in *flags* is used to make the
*  distinction (ingress path is selected if the flag is present,
*  egress path otherwise). This is the only flag supported for now.
*
* Returns
*  **SK_PASS** on success, or **SK_DROP** on error.
*/
static long (* const bpf_msg_redirect_hash)(struct sk_msg_md *msg, void *map, void *key, __u64 flags) = (void *)
71;

/*
* bpf_sk_redirect_hash
*
*  This helper is used in programs implementing policies at the
*  skb socket level. If the sk_buff *skb* is allowed to pass (i.e.
*  if the verdict eBPF
 program returns **SK_PASS**), redirect it
*  to the socket referenced by *map* (of type
*  **BPF_MAP_TYPE_SOCKHASH**) using hash *key*. Both ingress and
*  egress interfaces can be used for redirection. The
*  **BPF_F_INGRESS** value in *flags* is used to make the
*  distinction (ingress path is selected if the flag is present,
*  egress otherwise). This is the only flag supported for now.
*
* Returns
*  **SK_PASS** on success, or **SK_DROP** on error.
*/
static long (* const bpf_sk_redirect_hash)(struct __sk_buff *skb, void *map, void *key, __u64 flags) = (void *) 72;

/*
* bpf_lwt_push_encap
*
*  Encapsulate the packet associated to *skb* within a Layer 3
*  protocol header. This header is provided in the buffer at
```

```
*  address *hdr*, with *len* its size in bytes. *type* indicates
*  the protocol of the header and can be one of:
*
*  **BPF_LWT_ENCAP_SEG6**
*   IPv6 encapsulation with Segment Routing Header
*   (**struct ipv6_sr_hdr**). *hdr* only contains the SRH,
 *   the IPv6 header is computed by the kernel.
*  **BPF_LWT_ENCAP_SEG6_INLINE**
*   Only works if *skb* contains an IPv6 packet. Insert a
*   Segment Routing Header (**struct ipv6_sr_hdr**) inside
*   the IPv6 header.
*  **BPF_LWT_ENCAP_IP**
*   IP encapsulation (GRE/GUE/IPIP/etc). The outer header
*   must be IPv4 or IPv6, followed by zero or more
*   additional headers, up to **LWT_BPF_MAX_HEADROOM**
*   total bytes in all prepended headers. Please note that
*   if **skb_is_gso**\ (*skb*) is true, no more than two
*   headers can be prepended, and the inner header, if
*   present, should be either GRE or UDP/GUE.
*
*  **BPF_LWT_ENCAP_SEG6**\ \* types can be called by BPF programs
*  of type **BPF_PROG_TYPE_LWT_IN**; **BPF_LWT_ENCAP_IP** type can
*  be called by bpf programs of types **BPF_PROG_TYPE_LWT_IN** and
*  **BPF_PROG_TYPE_LWT_XMIT**.
*
*  A call to this helper is susceptible to change the underlying
*  packet buffer. Therefore, at load time, all checks on
 pointers
*  previously done by the verifier are invalidated and must be
*  performed again, if the helper is used in combination with
*  direct packet access.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_lwt_push_encap)(struct __sk_buff *skb, __u32 type, void *hdr, __u32 len) = (void *) 73;

/*
* bpf_lwt_seg6_store_bytes
*
*  Store *len* bytes from address *from* into the packet
*  associated to *skb*, at *offset*. Only the flags, tag and TLVs
*  inside the outermost IPv6 Segment Routing Header can be
*  modified through this helper.
*
*  A call to this helper is susceptible to change the underlying
*  packet buffer. Therefore, at load time, all checks on pointers
*  previously done by the verifier are invalidated and must be
```

```
*  performed again, if the helper is used in combination with
*  direct packet access.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_lwt_seg6_store_bytes)(struct
 __sk_buff *skb, __u32 offset, const void *from, __u32 len) = (void *) 74;

/*
* bpf_lwt_seg6_adjust_srh
*
*  Adjust the size allocated to TLVs in the outermost IPv6
*  Segment Routing Header contained in the packet associated to
*  *skb*, at position *offset* by *delta* bytes. Only offsets
*  after the segments are accepted. *delta* can be as well
*  positive (growing) as negative (shrinking).
*
*  A call to this helper is susceptible to change the underlying
*  packet buffer. Therefore, at load time, all checks on pointers
*  previously done by the verifier are invalidated and must be
*  performed again, if the helper is used in combination with
*  direct packet access.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_lwt_seg6_adjust_srh)(struct __sk_buff *skb, __u32 offset, __s32 delta) = (void *) 75;

/*
* bpf_lwt_seg6_action
*
*  Apply an IPv6 Segment Routing action of type *action* to the
 *  packet associated to *skb*. Each action takes a parameter
*  contained at address *param*, and of length *param_len* bytes.
*  *action* can be one of:
*
*  **SEG6_LOCAL_ACTION_END_X**
*   End.X action: Endpoint with Layer-3 cross-connect.
*   Type of *param*: **struct in6_addr**.
*  **SEG6_LOCAL_ACTION_END_T**
*   End.T action: Endpoint with specific IPv6 table lookup.
*   Type of *param*: **int**.
*  **SEG6_LOCAL_ACTION_END_B6**
*   End.B6 action: Endpoint bound to an SRv6 policy.
*   Type of *param*: **struct ipv6_sr_hdr**.
*  **SEG6_LOCAL_ACTION_END_B6_ENCAP**
*   End.B6.Encap action: Endpoint bound to an SRv6
```

```
*   encapsulation policy.
*   Type of *param*: **struct ipv6_sr_hdr**.
*
*  A call to this helper is susceptible to change the underlying
*  packet buffer. Therefore, at load time, all checks on pointers
*  previously done by the verifier are invalidated and must be
*  performed again, if the helper is used in combination with
*  direct packet access.
 *
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_lwt_seg6_action)(struct __sk_buff *skb, __u32 action, void *param, __u32 param_len) =
(void *) 76;

/*
* bpf_rc_repeat
*
*  This helper is used in programs implementing IR decoding, to
*  report a successfully decoded repeat key message. This delays
*  the generation of a key up event for previously generated
*  key down event.
*
*  Some IR protocols like NEC have a special IR message for
*  repeating last button, for when a button is held down.
*
*  The *ctx* should point to the lirc sample as passed into
*  the program.
*
*  This helper is only available is the kernel was compiled with
*  the **CONFIG_BPF_LIRC_MODE2** configuration option set to
*  "**y**".
*
* Returns
*  0
*/
static long (* const bpf_rc_repeat)(void *ctx) = (void *) 77;

/*
* bpf_rc_keydown
*
*  This helper is used in programs implementing IR decoding, to
*  report a successfully decoded key
 press with *scancode*,
*  *toggle* value in the given *protocol*. The scancode will be
*  translated to a keycode using the rc keymap, and reported as
*  an input key down event. After a period a key up event is
*  generated. This period can be extended by calling either
```

```
*  **bpf_rc_keydown**\ () again with the same values, or calling
*  **bpf_rc_repeat**\ ().
*
*  Some protocols include a toggle bit, in case the button was
*  released and pressed again between consecutive scancodes.
*
*  The *ctx* should point to the lirc sample as passed into
*  the program.
*
*  The *protocol* is the decoded protocol number (see
*  **enum rc_proto** for some predefined values).
*
*  This helper is only available is the kernel was compiled with
*  the **CONFIG_BPF_LIRC_MODE2** configuration option set to
*  "**y**".
*
* Returns
*  0
*/
static long (* const bpf_rc_keydown)(void *ctx, __u32 protocol, __u64 scancode, __u32 toggle) = (void *) 78;

/*
* bpf_skb_cgroup_id
*
*  Return
 the cgroup v2 id of the socket associated with the *skb*.
*  This is roughly similar to the **bpf_get_cgroup_classid**\ ()
*  helper for cgroup v1 by providing a tag resp. identifier that
*  can be matched on or used for map lookups e.g. to implement
*  policy. The cgroup v2 id of a given path in the hierarchy is
*  exposed in user space through the f_handle API in order to get
*  to the same 64-bit id.
*
*  This helper can be used on TC egress path, but not on ingress,
*  and is available only if the kernel was compiled with the
*  **CONFIG_SOCK_CGROUP_DATA** configuration option.
*
* Returns
*  The id is returned or 0 in case the id could not be retrieved.
*/
static __u64 (* const bpf_skb_cgroup_id)(struct __sk_buff *skb) = (void *) 79;

/*
* bpf_get_current_cgroup_id
*
*  Get the current cgroup id based on the cgroup within which
*  the current task is running.
*
```

```
* Returns
*  A 64-bit integer containing the current cgroup id based
*  on the cgroup within which
 the current task is running.
*/
static __u64 (* const bpf_get_current_cgroup_id)(void) = (void *) 80;

/*
* bpf_get_local_storage
*
*  Get the pointer to the local storage area.
*  The type and the size of the local storage is defined
*  by the *map* argument.
*  The *flags* meaning is specific for each map type,
*  and has to be 0 for cgroup local storage.
*
*  Depending on the BPF program type, a local storage area
*  can be shared between multiple instances of the BPF program,
*  running simultaneously.
*
*  A user should care about the synchronization by himself.
*  For example, by using the **BPF_ATOMIC** instructions to alter
*  the shared data.
*
* Returns
*  A pointer to the local storage area.
*/
static void *(* const bpf_get_local_storage)(void *map, __u64 flags) = (void *) 81;

/*
* bpf_sk_select_reuseport
*
*  Select a **SO_REUSEPORT** socket from a
*  **BPF_MAP_TYPE_REUSEPORT_SOCKARRAY** *map*.
*  It checks the selected socket is matching the incoming
 *  request in the socket buffer.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_sk_select_reuseport)(struct sk_reuseport_md *reuse, void *map, void *key, __u64 flags) =
(void *) 82;

/*
* bpf_skb_ancestor_cgroup_id
*
*  Return id of cgroup v2 that is ancestor of cgroup associated
*  with the *skb* at the *ancestor_level*.  The root cgroup is at
```

```
*  *ancestor_level* zero and each step down the hierarchy
*  increments the level. If *ancestor_level* == level of cgroup
*  associated with *skb*, then return value will be same as that
*  of **bpf_skb_cgroup_id**\ ().
*
*  The helper is useful to implement policies based on cgroups
*  that are upper in hierarchy than immediate cgroup associated
*  with *skb*.
*
*  The format of returned id and helper limitations are same as in
*  **bpf_skb_cgroup_id**\ ().
*
* Returns
*  The id is returned or 0 in case the id could not be retrieved.
*/
static __u64 (* const bpf_skb_ancestor_cgroup_id)(struct
 __sk_buff *skb, int ancestor_level) = (void *) 83;

/*
* bpf_sk_lookup_tcp
*
*  Look for TCP socket matching *tuple*, optionally in a child
*  network namespace *netns*. The return value must be checked,
*  and if non-**NULL**, released via **bpf_sk_release**\ ().
*
*  The *ctx* should point to the context of the program, such as
*  the skb or socket (depending on the hook in use). This is used
*  to determine the base network namespace for the lookup.
*
*  *tuple_size* must be one of:
*
*  **sizeof**\ (*tuple*\ **->ipv4**)
*   Look for an IPv4 socket.
*  **sizeof**\ (*tuple*\ **->ipv6**)
*   Look for an IPv6 socket.
*
*  If the *netns* is a negative signed 32-bit integer, then the
*  socket lookup table in the netns associated with the *ctx*
*  will be used. For the TC hooks, this is the netns of the device
*  in the skb. For socket hooks, this is the netns of the socket.
*  If *netns* is any other signed 32-bit value greater than or
 *  equal to zero then it specifies the ID of the netns relative to
*  the netns associated with the *ctx*. *netns* values beyond the
*  range of 32-bit integers are reserved for future use.
*
*  All values for *flags* are reserved for future usage, and must
*  be left at zero.
*
```

```
*  This helper is available only if the kernel was compiled with
*  **CONFIG_NET** configuration option.
*
* Returns
*  Pointer to **struct bpf_sock**, or **NULL** in case of failure.
*  For sockets with reuseport option, the **struct bpf_sock**
*  result is from *reuse*\ **->socks**\ [] using the hash of the
*  tuple.
*/
static struct bpf_sock *(* const bpf_sk_lookup_tcp)(void *ctx, struct bpf_sock_tuple *tuple, __u32 tuple_size,
__u64 netns, __u64 flags) = (void *) 84;

/*
* bpf_sk_lookup_udp
*
*  Look for UDP socket matching *tuple*, optionally in a child
*  network namespace *netns*. The return value must be checked,
*  and if non-**NULL**, released via **bpf_sk_release**\ ().
*
*  The
 *ctx* should point to the context of the program, such as
*  the skb or socket (depending on the hook in use). This is used
*  to determine the base network namespace for the lookup.
*
*  *tuple_size* must be one of:
*
*  **sizeof**\ (*tuple*\ **->ipv4**)
*   Look for an IPv4 socket.
*  **sizeof**\ (*tuple*\ **->ipv6**)
*   Look for an IPv6 socket.
*
*  If the *netns* is a negative signed 32-bit integer, then the
*  socket lookup table in the netns associated with the *ctx*
*  will be used. For the TC hooks, this is the netns of the device
*  in the skb. For socket hooks, this is the netns of the socket.
*  If *netns* is any other signed 32-bit value greater than or
*  equal to zero then it specifies the ID of the netns relative to
*  the netns associated with the *ctx*. *netns* values beyond the
*  range of 32-bit integers are reserved for future use.
*
*  All values for *flags* are reserved for future usage, and must
*  be left at zero.
*
*  This helper is available
 only if the kernel was compiled with
*  **CONFIG_NET** configuration option.
*
* Returns
```

```
*  Pointer to **struct bpf_sock**, or **NULL** in case of failure.
*  For sockets with reuseport option, the **struct bpf_sock**
*  result is from *reuse*\ **->socks**\ [] using the hash of the
*  tuple.
*/
static struct bpf_sock *(* const bpf_sk_lookup_udp)(void *ctx, struct bpf_sock_tuple *tuple, __u32 tuple_size,
__u64 netns, __u64 flags) = (void *) 85;

/*
* bpf_sk_release
*
*  Release the reference held by *sock*. *sock* must be a
*  non-**NULL** pointer that was returned from
*  **bpf_sk_lookup_xxx**\ ().
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_sk_release)(void *sock) = (void *) 86;

/*
* bpf_map_push_elem
*
*  Push an element *value* in *map*. *flags* is one of:
*
*  **BPF_EXIST**
*   If the queue/stack is full, the oldest element is
*   removed to make room for this.
*
* Returns
*  0 on success, or
 a negative error in case of failure.
*/
static long (* const bpf_map_push_elem)(void *map, const void *value, __u64 flags) = (void *) 87;

/*
* bpf_map_pop_elem
*
*  Pop an element from *map*.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_map_pop_elem)(void *map, void *value) = (void *) 88;

/*
* bpf_map_peek_elem
*
```

```
*  Get an element from *map* without removing it.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_map_peek_elem)(void *map, void *value) = (void *) 89;

/*
* bpf_msg_push_data
*
*  For socket policies, insert *len* bytes into *msg* at offset
*  *start*.
*
*  If a program of type **BPF_PROG_TYPE_SK_MSG** is run on a
*  *msg* it may want to insert metadata or options into the *msg*.
*  This can later be read and used by any of the lower layer BPF
*  hooks.
*
*  This helper may fail if under memory pressure (a malloc
*  fails) in these cases BPF programs
 will get an appropriate
*  error and BPF programs will need to handle them.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_msg_push_data)(struct sk_msg_md *msg, __u32 start, __u32 len, __u64 flags) = (void *)
90;

/*
* bpf_msg_pop_data
*
*  Will remove *len* bytes from a *msg* starting at byte *start*.
*  This may result in **ENOMEM** errors under certain situations if
*  an allocation and copy are required due to a full ring buffer.
*  However, the helper will try to avoid doing the allocation
*  if possible. Other errors can occur if input parameters are
*  invalid either due to *start* byte not being valid part of *msg*
*  payload and/or *pop* value being to large.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_msg_pop_data)(struct sk_msg_md *msg, __u32 start, __u32 len, __u64 flags) = (void *) 91;

/*
* bpf_rc_pointer_rel
*
```

```
*  This helper is used in programs implementing
 IR decoding, to
*  report a successfully decoded pointer movement.
*
*  The *ctx* should point to the lirc sample as passed into
*  the program.
*
*  This helper is only available is the kernel was compiled with
*  the **CONFIG_BPF_LIRC_MODE2** configuration option set to
*  "**y**".
*
* Returns
*  0
*/
static long (* const bpf_rc_pointer_rel)(void *ctx, __s32 rel_x, __s32 rel_y) = (void *) 92;

/*
* bpf_spin_lock
*
*  Acquire a spinlock represented by the pointer *lock*, which is
*  stored as part of a value of a map. Taking the lock allows to
*  safely update the rest of the fields in that value. The
*  spinlock can (and must) later be released with a call to
*  **bpf_spin_unlock**\ (\ *lock*\ ).
*
*  Spinlocks in BPF programs come with a number of restrictions
*  and constraints:
*
*  * **bpf_spin_lock** objects are only allowed inside maps of
*    types **BPF_MAP_TYPE_HASH** and **BPF_MAP_TYPE_ARRAY** (this
*    list could be extended in the future).
 *  * BTF description of the map is mandatory.
*  * The BPF program can take ONE lock at a time, since taking two
*    or more could cause dead locks.
*  * Only one **struct bpf_spin_lock** is allowed per map element.
*  * When the lock is taken, calls (either BPF to BPF or helpers)
*    are not allowed.
*  * The **BPF_LD_ABS** and **BPF_LD_IND** instructions are not
*    allowed inside a spinlock-ed region.
*  * The BPF program MUST call **bpf_spin_unlock**\ () to release
*    the lock, on all execution paths, before it returns.
*  * The BPF program can access **struct bpf_spin_lock** only via
*    the **bpf_spin_lock**\ () and **bpf_spin_unlock**\ ()
*    helpers. Loading or storing data into the **struct
*    bpf_spin_lock** *lock*\ **;** field of a map is not allowed.
*  * To use the **bpf_spin_lock**\ () helper, the BTF description
*    of the map value must be a struct and have **struct
*    bpf_spin_lock** *anyname*\ **;** field at the top level.
```

```
*    Nested
 lock inside another struct is not allowed.
*  * The **struct bpf_spin_lock** *lock* field in a map value must
*    be aligned on a multiple of 4 bytes in that value.
*  * Syscall with command **BPF_MAP_LOOKUP_ELEM** does not copy
*    the **bpf_spin_lock** field to user space.
*  * Syscall with command **BPF_MAP_UPDATE_ELEM**, or update from
*    a BPF program, do not update the **bpf_spin_lock** field.
*  * **bpf_spin_lock** cannot be on the stack or inside a
*    networking packet (it can only be inside of a map values).
*  * **bpf_spin_lock** is available to root only.
*  * Tracing programs and socket filter programs cannot use
*    **bpf_spin_lock**\ () due to insufficient preemption checks
*    (but this may change in the future).
*  * **bpf_spin_lock** is not allowed in inner maps of map-in-map.
*
* Returns
*  0
*/
static long (* const bpf_spin_lock)(struct bpf_spin_lock *lock) = (void *) 93;

/*
* bpf_spin_unlock
*
*  Release the *lock* previously locked
 by a call to
*  **bpf_spin_lock**\ (\ *lock*\ ).
*
* Returns
*  0
*/
static long (* const bpf_spin_unlock)(struct bpf_spin_lock *lock) = (void *) 94;

/*
* bpf_sk_fullsock
*
*  This helper gets a **struct bpf_sock** pointer such
*  that all the fields in this **bpf_sock** can be accessed.
*
* Returns
*  A **struct bpf_sock** pointer on success, or **NULL** in
*  case of failure.
*/
static struct bpf_sock *(* const bpf_sk_fullsock)(struct bpf_sock *sk) = (void *) 95;

/*
* bpf_tcp_sock
*
```

```
*  This helper gets a **struct bpf_tcp_sock** pointer from a
*  **struct bpf_sock** pointer.
*
* Returns
*  A **struct bpf_tcp_sock** pointer on success, or **NULL** in
*  case of failure.
*/
static struct bpf_tcp_sock *(* const bpf_tcp_sock)(struct bpf_sock *sk) = (void *) 96;

/*
* bpf_skb_ecn_set_ce
*
*  Set ECN (Explicit Congestion Notification) field of IP header
*  to **CE** (Congestion Encountered) if current value is **ECT**
*  (ECN Capable Transport). Otherwise, do nothing.
 Works with IPv6
*  and IPv4.
*
* Returns
*  1 if the **CE** flag is set (either by the current helper call
*  or because it was already present), 0 if it is not set.
*/
static long (* const bpf_skb_ecn_set_ce)(struct __sk_buff *skb) = (void *) 97;

/*
* bpf_get_listener_sock
*
*  Return a **struct bpf_sock** pointer in **TCP_LISTEN** state.
*  **bpf_sk_release**\ () is unnecessary and not allowed.
*
* Returns
*  A **struct bpf_sock** pointer on success, or **NULL** in
*  case of failure.
*/
static struct bpf_sock *(* const bpf_get_listener_sock)(struct bpf_sock *sk) = (void *) 98;

/*
* bpf_skc_lookup_tcp
*
*  Look for TCP socket matching *tuple*, optionally in a child
*  network namespace *netns*. The return value must be checked,
*  and if non-**NULL**, released via **bpf_sk_release**\ ().
*
*  This function is identical to **bpf_sk_lookup_tcp**\ (), except
*  that it also returns timewait or request sockets. Use
*  **bpf_sk_fullsock**\ () or **bpf_tcp_sock**\
 () to access the
*  full structure.
```

```
*
*  This helper is available only if the kernel was compiled with
*  **CONFIG_NET** configuration option.
*
* Returns
*  Pointer to **struct bpf_sock**, or **NULL** in case of failure.
*  For sockets with reuseport option, the **struct bpf_sock**
*  result is from *reuse*\ **->socks**\ [] using the hash of the
*  tuple.
*/
static struct bpf_sock *(* const bpf_skc_lookup_tcp)(void *ctx, struct bpf_sock_tuple *tuple, __u32 tuple_size,
__u64 netns, __u64 flags) = (void *) 99;

/*
* bpf_tcp_check_syncookie
*
*  Check whether *iph* and *th* contain a valid SYN cookie ACK for
*  the listening socket in *sk*.
*
*  *iph* points to the start of the IPv4 or IPv6 header, while
*  *iph_len* contains **sizeof**\ (**struct iphdr**) or
*  **sizeof**\ (**struct ipv6hdr**).
*
*  *th* points to the start of the TCP header, while *th_len*
*  contains the length of the TCP header (at least
*  **sizeof**\ (**struct tcphdr**)).
*
* Returns
 *  0 if *iph* and *th* are a valid SYN cookie ACK, or a negative
*  error otherwise.
*/
static long (* const bpf_tcp_check_syncookie)(void *sk, void *iph, __u32 iph_len, struct tcphdr *th, __u32 th_len)
= (void *) 100;

/*
* bpf_sysctl_get_name
*
*  Get name of sysctl in /proc/sys/ and copy it into provided by
*  program buffer *buf* of size *buf_len*.
*
*  The buffer is always NUL terminated, unless it's zero-sized.
*
*  If *flags* is zero, full name (e.g. "net/ipv4/tcp_mem") is
*  copied. Use **BPF_F_SYSCTL_BASE_NAME** flag to copy base name
*  only (e.g. "tcp_mem").
*
* Returns
*  Number of character copied (not including the trailing NUL).
```

```
*
*  **-E2BIG** if the buffer wasn't big enough (*buf* will contain
*  truncated name in this case).
*/
static long (* const bpf_sysctl_get_name)(struct bpf_sysctl *ctx, char *buf, unsigned long buf_len, __u64 flags) =
(void *) 101;

/*
* bpf_sysctl_get_current_value
*
*  Get current value of sysctl as it is presented in
 /proc/sys
*  (incl. newline, etc), and copy it as a string into provided
*  by program buffer *buf* of size *buf_len*.
*
*  The whole value is copied, no matter what file position user
*  space issued e.g. sys_read at.
*
*  The buffer is always NUL terminated, unless it's zero-sized.
*
* Returns
*  Number of character copied (not including the trailing NUL).
*
*  **-E2BIG** if the buffer wasn't big enough (*buf* will contain
*  truncated name in this case).
*
*  **-EINVAL** if current value was unavailable, e.g. because
*  sysctl is uninitialized and read returns -EIO for it.
*/
static long (* const bpf_sysctl_get_current_value)(struct bpf_sysctl *ctx, char *buf, unsigned long buf_len) = (void
*) 102;

/*
* bpf_sysctl_get_new_value
*
*  Get new value being written by user space to sysctl (before
*  the actual write happens) and copy it as a string into
*  provided by program buffer *buf* of size *buf_len*.
*
*  User space may write new value at file position >
 0.
*
*  The buffer is always NUL terminated, unless it's zero-sized.
*
* Returns
*  Number of character copied (not including the trailing NUL).
*
*  **-E2BIG** if the buffer wasn't big enough (*buf* will contain
```

```
*  truncated name in this case).
*
*  **-EINVAL** if sysctl is being read.
*/
static long (* const bpf_sysctl_get_new_value)(struct bpf_sysctl *ctx, char *buf, unsigned long buf_len) = (void *)
103;

/*
* bpf_sysctl_set_new_value
*
*  Override new value being written by user space to sysctl with
*  value provided by program in buffer *buf* of size *buf_len*.
*
*  *buf* should contain a string in same form as provided by user
*  space on sysctl write.
*
*  User space may write new value at file position > 0. To override
*  the whole sysctl value file position should be set to zero.
*
* Returns
*  0 on success.
*
*  **-E2BIG** if the *buf_len* is too big.
*
*  **-EINVAL** if sysctl is being read.
*/
static long (* const bpf_sysctl_set_new_value)(struct
 bpf_sysctl *ctx, const char *buf, unsigned long buf_len) = (void *) 104;

/*
* bpf_strtol
*
*  Convert the initial part of the string from buffer *buf* of
*  size *buf_len* to a long integer according to the given base
*  and save the result in *res*.
*
*  The string may begin with an arbitrary amount of white space
*  (as determined by **isspace**\ (3)) followed by a single
*  optional '**-**' sign.
*
*  Five least significant bits of *flags* encode base, other bits
*  are currently unused.
*
*  Base must be either 8, 10, 16 or 0 to detect it automatically
*  similar to user space **strtol**\ (3).
*
* Returns
*  Number of characters consumed on success. Must be positive but
```

```
*  no more than *buf_len*.
*
*  **-EINVAL** if no valid digits were found or unsupported base
*  was provided.
*
*  **-ERANGE** if resulting value was out of range.
*/
static long (* const bpf_strtol)(const char *buf, unsigned long buf_len, __u64 flags, long *res) = (void *) 105;

/*
*
 bpf_strtoul
*
*  Convert the initial part of the string from buffer *buf* of
*  size *buf_len* to an unsigned long integer according to the
*  given base and save the result in *res*.
*
*  The string may begin with an arbitrary amount of white space
*  (as determined by **isspace**\ (3)).
*
*  Five least significant bits of *flags* encode base, other bits
*  are currently unused.
*
*  Base must be either 8, 10, 16 or 0 to detect it automatically
*  similar to user space **strtoul**\ (3).
*
* Returns
*  Number of characters consumed on success. Must be positive but
*  no more than *buf_len*.
*
*  **-EINVAL** if no valid digits were found or unsupported base
*  was provided.
*
*  **-ERANGE** if resulting value was out of range.
*/
static long (* const bpf_strtoul)(const char *buf, unsigned long buf_len, __u64 flags, unsigned long *res) = (void *)
106;

/*
* bpf_sk_storage_get
*
*  Get a bpf-local-storage from a *sk*.
*
*  Logically, it could be thought of getting
 the value from
*  a *map* with *sk* as the **key**.  From this
*  perspective,  the usage is not much different from
*  **bpf_map_lookup_elem**\ (*map*, **&**\ *sk*) except this
```

```
*  helper enforces the key must be a full socket and the map must
*  be a **BPF_MAP_TYPE_SK_STORAGE** also.
*
*  Underneath, the value is stored locally at *sk* instead of
*  the *map*.  The *map* is used as the bpf-local-storage
*  "type". The bpf-local-storage "type" (i.e. the *map*) is
*  searched against all bpf-local-storages residing at *sk*.
*
*  *sk* is a kernel **struct sock** pointer for LSM program.
*  *sk* is a **struct bpf_sock** pointer for other program types.
*
*  An optional *flags* (**BPF_SK_STORAGE_GET_F_CREATE**) can be
*  used such that a new bpf-local-storage will be
*  created if one does not exist.  *value* can be used
*  together with **BPF_SK_STORAGE_GET_F_CREATE** to specify
*  the initial value of a bpf-local-storage.  If *value* is
*  **NULL**, the new bpf-local-storage
 will be zero initialized.
*
* Returns
*  A bpf-local-storage pointer is returned on success.
*
*  **NULL** if not found or there was an error in adding
*  a new bpf-local-storage.
*/
static void *(* const bpf_sk_storage_get)(void *map, void *sk, void *value, __u64 flags) = (void *) 107;

/*
* bpf_sk_storage_delete
*
*  Delete a bpf-local-storage from a *sk*.
*
* Returns
*  0 on success.
*
*  **-ENOENT** if the bpf-local-storage cannot be found.
*  **-EINVAL** if sk is not a fullsock (e.g. a request_sock).
*/
static long (* const bpf_sk_storage_delete)(void *map, void *sk) = (void *) 108;

/*
* bpf_send_signal
*
*  Send signal *sig* to the process of the current task.
*  The signal may be delivered to any of this process's threads.
*
* Returns
*  0 on success or successfully queued.
```

```
*
*  **-EBUSY** if work queue under nmi is full.
*
*  **-EINVAL** if *sig* is invalid.
*
*  **-EPERM** if no permission to send the *sig*.
*
*  **-EAGAIN** if bpf
 program can try again.
*/
static long (* const bpf_send_signal)(__u32 sig) = (void *) 109;

/*
* bpf_tcp_gen_syncookie
*
*  Try to issue a SYN cookie for the packet with corresponding
*  IP/TCP headers, *iph* and *th*, on the listening socket in *sk*.
*
*  *iph* points to the start of the IPv4 or IPv6 header, while
*  *iph_len* contains **sizeof**\ (**struct iphdr**) or
*  **sizeof**\ (**struct ipv6hdr**).
*
*  *th* points to the start of the TCP header, while *th_len*
*  contains the length of the TCP header with options (at least
*  **sizeof**\ (**struct tcphdr**)).
*
* Returns
*  On success, lower 32 bits hold the generated SYN cookie in
*  followed by 16 bits which hold the MSS value for that cookie,
*  and the top 16 bits are unused.
*
*  On failure, the returned value is one of the following:
*
*  **-EINVAL** SYN cookie cannot be issued due to error
*
*  **-ENOENT** SYN cookie should not be issued (no SYN flood)
*
*  **-EOPNOTSUPP** kernel configuration
 does not enable SYN cookies
*
*  **-EPROTONOSUPPORT** IP packet version is not 4 or 6
*/
static __s64 (* const bpf_tcp_gen_syncookie)(void *sk, void *iph, __u32 iph_len, struct tcphdr *th, __u32 th_len) =
(void *) 110;

/*
* bpf_skb_output
*
```

```
*  Write raw *data* blob into a special BPF perf event held by
*  *map* of type **BPF_MAP_TYPE_PERF_EVENT_ARRAY**. This perf
*  event must have the following attributes: **PERF_SAMPLE_RAW**
*  as **sample_type**, **PERF_TYPE_SOFTWARE** as **type**, and
*  **PERF_COUNT_SW_BPF_OUTPUT** as **config**.
*
*  The *flags* are used to indicate the index in *map* for which
*  the value must be put, masked with **BPF_F_INDEX_MASK**.
*  Alternatively, *flags* can be set to **BPF_F_CURRENT_CPU**
*  to indicate that the index of the current CPU core should be
*  used.
*
*  The value to write, of *size*, is passed through eBPF stack and
*  pointed by *data*.
*
*  *ctx* is a pointer to in-kernel struct sk_buff.
*
*  This helper is similar to
 **bpf_perf_event_output**\ () but
*  restricted to raw_tracepoint bpf programs.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_skb_output)(void *ctx, void *map, __u64 flags, void *data, __u64 size) = (void *) 111;

/*
* bpf_probe_read_user
*
*  Safely attempt to read *size* bytes from user space address
*  *unsafe_ptr* and store the data in *dst*.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_probe_read_user)(void *dst, __u32 size, const void *unsafe_ptr) = (void *) 112;

/*
* bpf_probe_read_kernel
*
*  Safely attempt to read *size* bytes from kernel space address
*  *unsafe_ptr* and store the data in *dst*.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_probe_read_kernel)(void *dst, __u32 size, const void *unsafe_ptr) = (void *) 113;
```

```
/*
* bpf_probe_read_user_str
*
*  Copy a NUL terminated string from an unsafe
 user address
*  *unsafe_ptr* to *dst*. The *size* should include the
*  terminating NUL byte. In case the string length is smaller than
*  *size*, the target is not padded with further NUL bytes. If the
*  string length is larger than *size*, just *size*-1 bytes are
*  copied and the last byte is set to NUL.
*
*  On success, returns the number of bytes that were written,
*  including the terminal NUL. This makes this helper useful in
*  tracing programs for reading strings, and more importantly to
*  get its length at runtime. See the following snippet:
*
*  ::
*
*   SEC("kprobe/sys_open")
*   void bpf_sys_open(struct pt_regs *ctx)
*   {
*           char buf[PATHLEN]; // PATHLEN is defined to 256
*           int res = bpf_probe_read_user_str(buf, sizeof(buf),
*                                   ctx->di);
*
*    // Consume buf, for example push it to
*    // userspace via bpf_perf_event_output(); we
*    // can use res (the string length) as event
*    // size,
 after checking its boundaries.
*   }
*
*  In comparison, using **bpf_probe_read_user**\ () helper here
*  instead to read the string would require to estimate the length
*  at compile time, and would often result in copying more memory
*  than necessary.
*
*  Another useful use case is when parsing individual process
*  arguments or individual environment variables navigating
*  *current*\ **->mm->arg_start** and *current*\
*  **->mm->env_start**: using this helper and the return value,
*  one can quickly iterate at the right offset of the memory area.
*
* Returns
*  On success, the strictly positive length of the output string,
*  including the trailing NUL character. On error, a negative
*  value.
*/
```

```
static long (* const bpf_probe_read_user_str)(void *dst, __u32 size, const void *unsafe_ptr) = (void *) 114;

/*
* bpf_probe_read_kernel_str
*
*  Copy a NUL terminated string from an unsafe kernel address *unsafe_ptr*
*  to *dst*. Same semantics as with **bpf_probe_read_user_str**\
 () apply.
*
* Returns
*  On success, the strictly positive length of the string, including
*  the trailing NUL character. On error, a negative value.
*/
static long (* const bpf_probe_read_kernel_str)(void *dst, __u32 size, const void *unsafe_ptr) = (void *) 115;

/*
* bpf_tcp_send_ack
*
*  Send out a tcp-ack. *tp* is the in-kernel struct **tcp_sock**.
*  *rcv_nxt* is the ack_seq to be sent out.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_tcp_send_ack)(void *tp, __u32 rcv_nxt) = (void *) 116;

/*
* bpf_send_signal_thread
*
*  Send signal *sig* to the thread corresponding to the current task.
*
* Returns
*  0 on success or successfully queued.
*
*  **-EBUSY** if work queue under nmi is full.
*
*  **-EINVAL** if *sig* is invalid.
*
*  **-EPERM** if no permission to send the *sig*.
*
*  **-EAGAIN** if bpf program can try again.
*/
static long (* const bpf_send_signal_thread)(__u32 sig) = (void
 *) 117;

/*
* bpf_jiffies64
*
```

```
*  Obtain the 64bit jiffies
*
* Returns
*  The 64 bit jiffies
*/
static __u64 (* const bpf_jiffies64)(void) = (void *) 118;

/*
* bpf_read_branch_records
*
*  For an eBPF program attached to a perf event, retrieve the
*  branch records (**struct perf_branch_entry**) associated to *ctx*
*  and store it in the buffer pointed by *buf* up to size
*  *size* bytes.
*
* Returns
*  On success, number of bytes written to *buf*. On error, a
*  negative value.
*
*  The *flags* can be set to **BPF_F_GET_BRANCH_RECORDS_SIZE** to
*  instead return the number of bytes required to store all the
*  branch entries. If this flag is set, *buf* may be NULL.
*
*  **-EINVAL** if arguments invalid or **size** not a multiple
*  of **sizeof**\ (**struct perf_branch_entry**\ ).
*
*  **-ENOENT** if architecture does not support branch records.
*/
static long (* const bpf_read_branch_records)(struct bpf_perf_event_data *ctx, void *buf, __u32 size, __u64
 flags) = (void *) 119;

/*
* bpf_get_ns_current_pid_tgid
*
*  Returns 0 on success, values for *pid* and *tgid* as seen from the current
*  *namespace* will be returned in *nsdata*.
*
* Returns
*  0 on success, or one of the following in case of failure:
*
*  **-EINVAL** if dev and inum supplied don't match dev_t and inode number
*  with nsfs of current task, or if dev conversion to dev_t lost high bits.
*
*  **-ENOENT** if pidns does not exists for the current task.
*/
static long (* const bpf_get_ns_current_pid_tgid)(__u64 dev, __u64 ino, struct bpf_pidns_info *nsdata, __u32 size)
= (void *) 120;
```

```
/*
* bpf_xdp_output
*
*  Write raw *data* blob into a special BPF perf event held by
*  *map* of type **BPF_MAP_TYPE_PERF_EVENT_ARRAY**. This perf
*  event must have the following attributes: **PERF_SAMPLE_RAW**
*  as **sample_type**, **PERF_TYPE_SOFTWARE** as **type**, and
*  **PERF_COUNT_SW_BPF_OUTPUT** as **config**.
*
*  The *flags* are used to indicate the index
 in *map* for which
*  the value must be put, masked with **BPF_F_INDEX_MASK**.
*  Alternatively, *flags* can be set to **BPF_F_CURRENT_CPU**
*  to indicate that the index of the current CPU core should be
*  used.
*
*  The value to write, of *size*, is passed through eBPF stack and
*  pointed by *data*.
*
*  *ctx* is a pointer to in-kernel struct xdp_buff.
*
*  This helper is similar to **bpf_perf_eventoutput**\ () but
*  restricted to raw_tracepoint bpf programs.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_xdp_output)(void *ctx, void *map, __u64 flags, void *data, __u64 size) = (void *) 121;

/*
* bpf_get_netns_cookie
*
*  Retrieve the cookie (generated by the kernel) of the network
*  namespace the input *ctx* is associated with. The network
*  namespace cookie remains stable for its lifetime and provides
*  a global identifier that can be assumed unique. If *ctx* is
*  NULL, then the helper returns the cookie
 for the initial
*  network namespace. The cookie itself is very similar to that
*  of **bpf_get_socket_cookie**\ () helper, but for network
*  namespaces instead of sockets.
*
* Returns
*  A 8-byte long opaque number.
*/
static __u64 (* const bpf_get_netns_cookie)(void *ctx) = (void *) 122;

/*
```

```
* bpf_get_current_ancestor_cgroup_id
*
*  Return id of cgroup v2 that is ancestor of the cgroup associated
*  with the current task at the *ancestor_level*. The root cgroup
*  is at *ancestor_level* zero and each step down the hierarchy
*  increments the level. If *ancestor_level* == level of cgroup
*  associated with the current task, then return value will be the
*  same as that of **bpf_get_current_cgroup_id**\ ().
*
*  The helper is useful to implement policies based on cgroups
*  that are upper in hierarchy than immediate cgroup associated
*  with the current task.
*
*  The format of returned id and helper limitations are same as in
*  **bpf_get_current_cgroup_id**\
 ().
*
* Returns
*  The id is returned or 0 in case the id could not be retrieved.
*/
static __u64 (* const bpf_get_current_ancestor_cgroup_id)(int ancestor_level) = (void *) 123;

/*
* bpf_sk_assign
*
*  Helper is overloaded depending on BPF program type. This
*  description applies to **BPF_PROG_TYPE_SCHED_CLS** and
*  **BPF_PROG_TYPE_SCHED_ACT** programs.
*
*  Assign the *sk* to the *skb*. When combined with appropriate
*  routing configuration to receive the packet towards the socket,
*  will cause *skb* to be delivered to the specified socket.
*  Subsequent redirection of *skb* via  **bpf_redirect**\ (),
*  **bpf_clone_redirect**\ () or other methods outside of BPF may
*  interfere with successful delivery to the socket.
*
*  This operation is only valid from TC ingress path.
*
*  The *flags* argument must be zero.
*
* Returns
*  0 on success, or a negative error in case of failure:
*
*  **-EINVAL** if specified *flags* are not supported.
*
*  **-ENOENT**
 if the socket is unavailable for assignment.
*
```

```
*  **-ENETUNREACH** if the socket is unreachable (wrong netns).
*
*  **-EOPNOTSUPP** if the operation is not supported, for example
*  a call from outside of TC ingress.
*/
static long (* const bpf_sk_assign)(void *ctx, void *sk, __u64 flags) = (void *) 124;

/*
* bpf_ktime_get_boot_ns
*
*  Return the time elapsed since system boot, in nanoseconds.
*  Does include the time the system was suspended.
*  See: **clock_gettime**\ (**CLOCK_BOOTTIME**)
*
* Returns
*  Current *ktime*.
*/
static __u64 (* const bpf_ktime_get_boot_ns)(void) = (void *) 125;

/*
* bpf_seq_printf
*
*  **bpf_seq_printf**\ () uses seq_file **seq_printf**\ () to print
*  out the format string.
*  The *m* represents the seq_file. The *fmt* and *fmt_size* are for
*  the format string itself. The *data* and *data_len* are format string
*  arguments. The *data* are a **u64** array and corresponding format string
*  values are stored in the array. For strings
 and pointers where pointees
*  are accessed, only the pointer values are stored in the *data* array.
*  The *data_len* is the size of *data* in bytes - must be a multiple of 8.
*
*  Formats **%s**, **%p{i,I}{4,6}** requires to read kernel memory.
*  Reading kernel memory may fail due to either invalid address or
*  valid address but requiring a major memory fault. If reading kernel memory
*  fails, the string for **%s** will be an empty string, and the ip
*  address for **%p{i,I}{4,6}** will be 0. Not returning error to
*  bpf program is consistent with what **bpf_trace_printk**\ () does for now.
*
* Returns
*  0 on success, or a negative error in case of failure:
*
*  **-EBUSY** if per-CPU memory copy buffer is busy, can try again
*  by returning 1 from bpf program.
*
*  **-EINVAL** if arguments are invalid, or if *fmt* is invalid/unsupported.
*
*  **-E2BIG** if *fmt* contains too many format specifiers.
```

```
*
*  **-EOVERFLOW** if an overflow happened: The same
 object will be tried again.
*/
static long (* const bpf_seq_printf)(struct seq_file *m, const char *fmt, __u32 fmt_size, const void *data, __u32
data_len) = (void *) 126;

/*
* bpf_seq_write
*
*  **bpf_seq_write**\ () uses seq_file **seq_write**\ () to write the data.
*  The *m* represents the seq_file. The *data* and *len* represent the
*  data to write in bytes.
*
* Returns
*  0 on success, or a negative error in case of failure:
*
*  **-EOVERFLOW** if an overflow happened: The same object will be tried again.
*/
static long (* const bpf_seq_write)(struct seq_file *m, const void *data, __u32 len) = (void *) 127;

/*
* bpf_sk_cgroup_id
*
*  Return the cgroup v2 id of the socket *sk*.
*
*  *sk* must be a non-**NULL** pointer to a socket, e.g. one
*  returned from **bpf_sk_lookup_xxx**\ (),
*  **bpf_sk_fullsock**\ (), etc. The format of returned id is
*  same as in **bpf_skb_cgroup_id**\ ().
*
*  This helper is available only if the kernel was compiled with
*  the
 **CONFIG_SOCK_CGROUP_DATA** configuration option.
*
* Returns
*  The id is returned or 0 in case the id could not be retrieved.
*/
static __u64 (* const bpf_sk_cgroup_id)(void *sk) = (void *) 128;

/*
* bpf_sk_ancestor_cgroup_id
*
*  Return id of cgroup v2 that is ancestor of cgroup associated
*  with the *sk* at the *ancestor_level*.  The root cgroup is at
*  *ancestor_level* zero and each step down the hierarchy
*  increments the level. If *ancestor_level* == level of cgroup
*  associated with *sk*, then return value will be same as that
```

```
*  of **bpf_sk_cgroup_id**\ ().
*
*  The helper is useful to implement policies based on cgroups
*  that are upper in hierarchy than immediate cgroup associated
*  with *sk*.
*
*  The format of returned id and helper limitations are same as in
*  **bpf_sk_cgroup_id**\ ().
*
* Returns
*  The id is returned or 0 in case the id could not be retrieved.
*/
static __u64 (* const bpf_sk_ancestor_cgroup_id)(void *sk, int ancestor_level)
 = (void *) 129;

/*
* bpf_ringbuf_output
*
*  Copy *size* bytes from *data* into a ring buffer *ringbuf*.
*  If **BPF_RB_NO_WAKEUP** is specified in *flags*, no notification
*  of new data availability is sent.
*  If **BPF_RB_FORCE_WAKEUP** is specified in *flags*, notification
*  of new data availability is sent unconditionally.
*  If **0** is specified in *flags*, an adaptive notification
*  of new data availability is sent.
*
*  An adaptive notification is a notification sent whenever the user-space
*  process has caught up and consumed all available payloads. In case the user-space
*  process is still processing a previous payload, then no notification is needed
*  as it will process the newly added payload automatically.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_ringbuf_output)(void *ringbuf, void *data, __u64 size, __u64 flags) = (void *) 130;

/*
* bpf_ringbuf_reserve
*
*  Reserve *size* bytes of payload
 in a ring buffer *ringbuf*.
*  *flags* must be 0.
*
* Returns
*  Valid pointer with *size* bytes of memory available; NULL,
*  otherwise.
*/
static void *(* const bpf_ringbuf_reserve)(void *ringbuf, __u64 size, __u64 flags) = (void *) 131;
```

```
/*
* bpf_ringbuf_submit
*
*  Submit reserved ring buffer sample, pointed to by *data*.
*  If **BPF_RB_NO_WAKEUP** is specified in *flags*, no notification
*  of new data availability is sent.
*  If **BPF_RB_FORCE_WAKEUP** is specified in *flags*, notification
*  of new data availability is sent unconditionally.
*  If **0** is specified in *flags*, an adaptive notification
*  of new data availability is sent.
*
*  See 'bpf_ringbuf_output()' for the definition of adaptive notification.
*
* Returns
*  Nothing. Always succeeds.
*/
static void (* const bpf_ringbuf_submit)(void *data, __u64 flags) = (void *) 132;

/*
* bpf_ringbuf_discard
*
*  Discard reserved ring buffer sample, pointed to by *data*.
*  If **BPF_RB_NO_WAKEUP**
 is specified in *flags*, no notification
*  of new data availability is sent.
*  If **BPF_RB_FORCE_WAKEUP** is specified in *flags*, notification
*  of new data availability is sent unconditionally.
*  If **0** is specified in *flags*, an adaptive notification
*  of new data availability is sent.
*
*  See 'bpf_ringbuf_output()' for the definition of adaptive notification.
*
* Returns
*  Nothing. Always succeeds.
*/
static void (* const bpf_ringbuf_discard)(void *data, __u64 flags) = (void *) 133;

/*
* bpf_ringbuf_query
*
*  Query various characteristics of provided ring buffer. What
*  exactly is queries is determined by *flags*:
*
*  * **BPF_RB_AVAIL_DATA**: Amount of data not yet consumed.
*  * **BPF_RB_RING_SIZE**: The size of ring buffer.
*  * **BPF_RB_CONS_POS**: Consumer position (can wrap around).
*  * **BPF_RB_PROD_POS**: Producer(s) position (can wrap around).
```

```
*
*  Data returned is just a momentary snapshot of actual values
*  and could be inaccurate,
 so this facility should be used to
*  power heuristics and for reporting, not to make 100% correct
*  calculation.
*
* Returns
*  Requested value, or 0, if *flags* are not recognized.
*/
static __u64 (* const bpf_ringbuf_query)(void *ringbuf, __u64 flags) = (void *) 134;

/*
* bpf_csum_level
*
*  Change the skbs checksum level by one layer up or down, or
*  reset it entirely to none in order to have the stack perform
*  checksum validation. The level is applicable to the following
*  protocols: TCP, UDP, GRE, SCTP, FCOE. For example, a decap of
*  | ETH | IP | UDP | GUE | IP | TCP | into | ETH | IP | TCP |
*  through **bpf_skb_adjust_room**\ () helper with passing in
*  **BPF_F_ADJ_ROOM_NO_CSUM_RESET** flag would require one call
*  to **bpf_csum_level**\ () with **BPF_CSUM_LEVEL_DEC** since
*  the UDP header is removed. Similarly, an encap of the latter
*  into the former could be accompanied by a helper call to
*  **bpf_csum_level**\ () with **BPF_CSUM_LEVEL_INC**
 if the
*  skb is still intended to be processed in higher layers of the
*  stack instead of just egressing at tc.
*
*  There are three supported level settings at this time:
*
*  * **BPF_CSUM_LEVEL_INC**: Increases skb->csum_level for skbs
*    with CHECKSUM_UNNECESSARY.
*  * **BPF_CSUM_LEVEL_DEC**: Decreases skb->csum_level for skbs
*    with CHECKSUM_UNNECESSARY.
*  * **BPF_CSUM_LEVEL_RESET**: Resets skb->csum_level to 0 and
*    sets CHECKSUM_NONE to force checksum validation by the stack.
*  * **BPF_CSUM_LEVEL_QUERY**: No-op, returns the current
*    skb->csum_level.
*
* Returns
*  0 on success, or a negative error in case of failure. In the
*  case of **BPF_CSUM_LEVEL_QUERY**, the current skb->csum_level
*  is returned or the error code -EACCES in case the skb is not
*  subject to CHECKSUM_UNNECESSARY.
*/
static long (* const bpf_csum_level)(struct __sk_buff *skb, __u64 level) = (void *) 135;
```

```
/*
* bpf_skc_to_tcp6_sock
*
*  Dynamically cast a *sk* pointer to
 a *tcp6_sock* pointer.
*
* Returns
*  *sk* if casting is valid, or **NULL** otherwise.
*/
static struct tcp6_sock *(* const bpf_skc_to_tcp6_sock)(void *sk) = (void *) 136;

/*
* bpf_skc_to_tcp_sock
*
*  Dynamically cast a *sk* pointer to a *tcp_sock* pointer.
*
* Returns
*  *sk* if casting is valid, or **NULL** otherwise.
*/
static struct tcp_sock *(* const bpf_skc_to_tcp_sock)(void *sk) = (void *) 137;

/*
* bpf_skc_to_tcp_timewait_sock
*
*  Dynamically cast a *sk* pointer to a *tcp_timewait_sock* pointer.
*
* Returns
*  *sk* if casting is valid, or **NULL** otherwise.
*/
static struct tcp_timewait_sock *(* const bpf_skc_to_tcp_timewait_sock)(void *sk) = (void *) 138;

/*
* bpf_skc_to_tcp_request_sock
*
*  Dynamically cast a *sk* pointer to a *tcp_request_sock* pointer.
*
* Returns
*  *sk* if casting is valid, or **NULL** otherwise.
*/
static struct tcp_request_sock *(* const bpf_skc_to_tcp_request_sock)(void *sk) = (void *) 139;

/*
* bpf_skc_to_udp6_sock
 *
*  Dynamically cast a *sk* pointer to a *udp6_sock* pointer.
*
* Returns
```

```
*  *sk* if casting is valid, or **NULL** otherwise.
*/
static struct udp6_sock *(* const bpf_skc_to_udp6_sock)(void *sk) = (void *) 140;

/*
* bpf_get_task_stack
*
*  Return a user or a kernel stack in bpf program provided buffer.
*  Note: the user stack will only be populated if the *task* is
*  the current task; all other tasks will return -EOPNOTSUPP.
*  To achieve this, the helper needs *task*, which is a valid
*  pointer to **struct task_struct**. To store the stacktrace, the
*  bpf program provides *buf* with a nonnegative *size*.
*
*  The last argument, *flags*, holds the number of stack frames to
*  skip (from 0 to 255), masked with
*  **BPF_F_SKIP_FIELD_MASK**. The next bits can be used to set
*  the following flags:
*
*  **BPF_F_USER_STACK**
*   Collect a user space stack instead of a kernel stack.
*   The *task* must be the current task.
*  **BPF_F_USER_BUILD_ID**
*   Collect
 buildid+offset instead of ips for user stack,
*   only valid if **BPF_F_USER_STACK** is also specified.
*
*  **bpf_get_task_stack**\ () can collect up to
*  **PERF_MAX_STACK_DEPTH** both kernel and user frames, subject
*  to sufficient large buffer size. Note that
*  this limit can be controlled with the **sysctl** program, and
*  that it should be manually increased in order to profile long
*  user stacks (such as stacks for Java programs). To do so, use:
*
*  ::
*
*   # sysctl kernel.perf_event_max_stack=<new value>
*
* Returns
*  The non-negative copied *buf* length equal to or less than
*  *size* on success, or a negative error in case of failure.
*/
static long (* const bpf_get_task_stack)(struct task_struct *task, void *buf, __u32 size, __u64 flags) = (void *) 141;

/*
* bpf_load_hdr_opt
*
*  Load header option.  Support reading a particular TCP header
```

```
*  option for bpf program (**BPF_PROG_TYPE_SOCK_OPS**).
*
*  If *flags* is 0, it will search the option from
 the
*  *skops*\ **->skb_data**.  The comment in **struct bpf_sock_ops**
*  has details on what skb_data contains under different
*  *skops*\ **->op**.
*
*  The first byte of the *searchby_res* specifies the
*  kind that it wants to search.
*
*  If the searching kind is an experimental kind
*  (i.e. 253 or 254 according to RFC6994).  It also
*  needs to specify the "magic" which is either
*  2 bytes or 4 bytes.  It then also needs to
*  specify the size of the magic by using
*  the 2nd byte which is "kind-length" of a TCP
*  header option and the "kind-length" also
*  includes the first 2 bytes "kind" and "kind-length"
*  itself as a normal TCP header option also does.
*
*  For example, to search experimental kind 254 with
*  2 byte magic 0xeB9F, the searchby_res should be
*  [ 254, 4, 0xeB, 0x9F, 0, 0, .... 0 ].
*
*  To search for the standard window scale option (3),
*  the *searchby_res* should be [ 3, 0, 0, .... 0 ].
*  Note, kind-length must be 0 for regular
 option.
*
*  Searching for No-Op (0) and End-of-Option-List (1) are
*  not supported.
*
*  *len* must be at least 2 bytes which is the minimal size
*  of a header option.
*
*  Supported flags:
*
*  * **BPF_LOAD_HDR_OPT_TCP_SYN** to search from the
*    saved_syn packet or the just-received syn packet.
*
*
* Returns
*  > 0 when found, the header option is copied to *searchby_res*.
*  The return value is the total length copied. On failure, a
*  negative error code is returned:
*
*  **-EINVAL** if a parameter is invalid.
```

```
*
*  **-ENOMSG** if the option is not found.
*
*  **-ENOENT** if no syn packet is available when
*  **BPF_LOAD_HDR_OPT_TCP_SYN** is used.
*
*  **-ENOSPC** if there is not enough space.  Only *len* number of
*  bytes are copied.
*
*  **-EFAULT** on failure to parse the header options in the
*  packet.
*
*  **-EPERM** if the helper cannot be used under the current
*  *skops*\ **->op**.
*/
static long (* const bpf_load_hdr_opt)(struct bpf_sock_ops
 *skops, void *searchby_res, __u32 len, __u64 flags) = (void *) 142;

/*
* bpf_store_hdr_opt
*
*  Store header option.  The data will be copied
*  from buffer *from* with length *len* to the TCP header.
*
*  The buffer *from* should have the whole option that
*  includes the kind, kind-length, and the actual
*  option data.  The *len* must be at least kind-length
*  long.  The kind-length does not have to be 4 byte
*  aligned.  The kernel will take care of the padding
*  and setting the 4 bytes aligned value to th->doff.
*
*  This helper will check for duplicated option
*  by searching the same option in the outgoing skb.
*
*  This helper can only be called during
*  **BPF_SOCK_OPS_WRITE_HDR_OPT_CB**.
*
*
* Returns
*  0 on success, or negative error in case of failure:
*
*  **-EINVAL** If param is invalid.
*
*  **-ENOSPC** if there is not enough space in the header.
*  Nothing has been written
*
*  **-EEXIST** if the option already exists.
*
```

```
*  **-EFAULT**
 on failure to parse the existing header options.
*
*  **-EPERM** if the helper cannot be used under the current
*  *skops*\ **->op**.
*/
static long (* const bpf_store_hdr_opt)(struct bpf_sock_ops *skops, const void *from, __u32 len, __u64 flags) =
(void *) 143;

/*
* bpf_reserve_hdr_opt
*
*  Reserve *len* bytes for the bpf header option.  The
*  space will be used by **bpf_store_hdr_opt**\ () later in
*  **BPF_SOCK_OPS_WRITE_HDR_OPT_CB**.
*
*  If **bpf_reserve_hdr_opt**\ () is called multiple times,
*  the total number of bytes will be reserved.
*
*  This helper can only be called during
*  **BPF_SOCK_OPS_HDR_OPT_LEN_CB**.
*
*
* Returns
*  0 on success, or negative error in case of failure:
*
*  **-EINVAL** if a parameter is invalid.
*
*  **-ENOSPC** if there is not enough space in the header.
*
*  **-EPERM** if the helper cannot be used under the current
*  *skops*\ **->op**.
*/
static long (* const bpf_reserve_hdr_opt)(struct bpf_sock_ops *skops,
 __u32 len, __u64 flags) = (void *) 144;

/*
* bpf_inode_storage_get
*
*  Get a bpf_local_storage from an *inode*.
*
*  Logically, it could be thought of as getting the value from
*  a *map* with *inode* as the **key**.  From this
*  perspective,  the usage is not much different from
*  **bpf_map_lookup_elem**\ (*map*, **&**\ *inode*) except this
*  helper enforces the key must be an inode and the map must also
*  be a **BPF_MAP_TYPE_INODE_STORAGE**.
*
```

```
*  Underneath, the value is stored locally at *inode* instead of
*  the *map*.  The *map* is used as the bpf-local-storage
*  "type". The bpf-local-storage "type" (i.e. the *map*) is
*  searched against all bpf_local_storage residing at *inode*.
*
*  An optional *flags* (**BPF_LOCAL_STORAGE_GET_F_CREATE**) can be
*  used such that a new bpf_local_storage will be
*  created if one does not exist.  *value* can be used
*  together with **BPF_LOCAL_STORAGE_GET_F_CREATE** to specify
*  the initial value of a bpf_local_storage.
  If *value* is
*  **NULL**, the new bpf_local_storage will be zero initialized.
*
* Returns
*  A bpf_local_storage pointer is returned on success.
*
*  **NULL** if not found or there was an error in adding
*  a new bpf_local_storage.
*/
static void *(* const bpf_inode_storage_get)(void *map, void *inode, void *value, __u64 flags) = (void *) 145;

/*
* bpf_inode_storage_delete
*
*  Delete a bpf_local_storage from an *inode*.
*
* Returns
*  0 on success.
*
*  **-ENOENT** if the bpf_local_storage cannot be found.
*/
static int (* const bpf_inode_storage_delete)(void *map, void *inode) = (void *) 146;

/*
* bpf_d_path
*
*  Return full path for given **struct path** object, which
*  needs to be the kernel BTF *path* object. The path is
*  returned in the provided buffer *buf* of size *sz* and
*  is zero terminated.
*
*
* Returns
*  On success, the strictly positive length of the string,
*  including the trailing NUL character. On error, a negative
*  value.
 */
static long (* const bpf_d_path)(struct path *path, char *buf, __u32 sz) = (void *) 147;
```

```
/*
* bpf_copy_from_user
*
*  Read *size* bytes from user space address *user_ptr* and store
*  the data in *dst*. This is a wrapper of **copy_from_user**\ ().
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_copy_from_user)(void *dst, __u32 size, const void *user_ptr) = (void *) 148;

/*
* bpf_snprintf_btf
*
*  Use BTF to store a string representation of *ptr*->ptr in *str*,
*  using *ptr*->type_id.  This value should specify the type
*  that *ptr*->ptr points to. LLVM __builtin_btf_type_id(type, 1)
*  can be used to look up vmlinux BTF type ids. Traversing the
*  data structure using BTF, the type information and values are
*  stored in the first *str_size* - 1 bytes of *str*.  Safe copy of
*  the pointer data is carried out to avoid kernel crashes during
*  operation.  Smaller types can use string space on the stack;
*  larger
 programs can use map data to store the string
*  representation.
*
*  The string can be subsequently shared with userspace via
*  bpf_perf_event_output() or ring buffer interfaces.
*  bpf_trace_printk() is to be avoided as it places too small
*  a limit on string size to be useful.
*
*  *flags* is a combination of
*
*  **BTF_F_COMPACT**
*   no formatting around type information
*  **BTF_F_NONAME**
*   no struct/union member names/types
*  **BTF_F_PTR_RAW**
*   show raw (unobfuscated) pointer values;
*   equivalent to printk specifier %px.
*  **BTF_F_ZERO**
*   show zero-valued struct/union members; they
*   are not displayed by default
*
*
* Returns
*  The number of bytes that were written (or would have been
```

```
*  written if output had to be truncated due to string size),
*  or a negative error in cases of failure.
*/
static long (* const bpf_snprintf_btf)(char *str, __u32 str_size, struct btf_ptr *ptr, __u32 btf_ptr_size, __u64 flags) =
(void *) 149;

/*
 * bpf_seq_printf_btf
*
*  Use BTF to write to seq_write a string representation of
*  *ptr*->ptr, using *ptr*->type_id as per bpf_snprintf_btf().
*  *flags* are identical to those used for bpf_snprintf_btf.
*
* Returns
*  0 on success or a negative error in case of failure.
*/
static long (* const bpf_seq_printf_btf)(struct seq_file *m, struct btf_ptr *ptr, __u32 ptr_size, __u64 flags) = (void
*) 150;

/*
* bpf_skb_cgroup_classid
*
*  See **bpf_get_cgroup_classid**\ () for the main description.
*  This helper differs from **bpf_get_cgroup_classid**\ () in that
*  the cgroup v1 net_cls class is retrieved only from the *skb*'s
*  associated socket instead of the current process.
*
* Returns
*  The id is returned or 0 in case the id could not be retrieved.
*/
static __u64 (* const bpf_skb_cgroup_classid)(struct __sk_buff *skb) = (void *) 151;

/*
* bpf_redirect_neigh
*
*  Redirect the packet to another net device of index *ifindex*
*  and fill in L2 addresses from neighboring
 subsystem. This helper
*  is somewhat similar to **bpf_redirect**\ (), except that it
*  populates L2 addresses as well, meaning, internally, the helper
*  relies on the neighbor lookup for the L2 address of the nexthop.
*
*  The helper will perform a FIB lookup based on the skb's
*  networking header to get the address of the next hop, unless
*  this is supplied by the caller in the *params* argument. The
*  *plen* argument indicates the len of *params* and should be set
*  to 0 if *params* is NULL.
*
```

```
*  The *flags* argument is reserved and must be 0. The helper is
*  currently only supported for tc BPF program types, and enabled
*  for IPv4 and IPv6 protocols.
*
* Returns
*  The helper returns **TC_ACT_REDIRECT** on success or
*  **TC_ACT_SHOT** on error.
*/
static long (* const bpf_redirect_neigh)(__u32 ifindex, struct bpf_redir_neigh *params, int plen, __u64 flags) =
(void *) 152;

/*
* bpf_per_cpu_ptr
*
*  Take a pointer to a percpu ksym, *percpu_ptr*,
 and return a
*  pointer to the percpu kernel variable on *cpu*. A ksym is an
*  extern variable decorated with '__ksym'. For ksym, there is a
*  global var (either static or global) defined of the same name
*  in the kernel. The ksym is percpu if the global var is percpu.
*  The returned pointer points to the global percpu var on *cpu*.
*
*  bpf_per_cpu_ptr() has the same semantic as per_cpu_ptr() in the
*  kernel, except that bpf_per_cpu_ptr() may return NULL. This
*  happens if *cpu* is larger than nr_cpu_ids. The caller of
*  bpf_per_cpu_ptr() must check the returned value.
*
* Returns
*  A pointer pointing to the kernel percpu variable on *cpu*, or
*  NULL, if *cpu* is invalid.
*/
static void *(* const bpf_per_cpu_ptr)(const void *percpu_ptr, __u32 cpu) = (void *) 153;

/*
* bpf_this_cpu_ptr
*
*  Take a pointer to a percpu ksym, *percpu_ptr*, and return a
*  pointer to the percpu kernel variable on this cpu. See the
*  description of 'ksym' in **bpf_per_cpu_ptr**\
 ().
*
*  bpf_this_cpu_ptr() has the same semantic as this_cpu_ptr() in
*  the kernel. Different from **bpf_per_cpu_ptr**\ (), it would
*  never return NULL.
*
* Returns
*  A pointer pointing to the kernel percpu variable on this cpu.
*/
```

```
static void *(* const bpf_this_cpu_ptr)(const void *percpu_ptr) = (void *) 154;

/*
* bpf_redirect_peer
*
*  Redirect the packet to another net device of index *ifindex*.
*  This helper is somewhat similar to **bpf_redirect**\ (), except
*  that the redirection happens to the *ifindex*' peer device and
*  the netns switch takes place from ingress to ingress without
*  going through the CPU's backlog queue.
*
*  The *flags* argument is reserved and must be 0. The helper is
*  currently only supported for tc BPF program types at the
*  ingress hook and for veth and netkit target device types. The
*  peer device must reside in a different network namespace.
*
* Returns
*  The helper returns **TC_ACT_REDIRECT** on success or
*
  **TC_ACT_SHOT** on error.
*/
static long (* const bpf_redirect_peer)(__u32 ifindex, __u64 flags) = (void *) 155;

/*
* bpf_task_storage_get
*
*  Get a bpf_local_storage from the *task*.
*
*  Logically, it could be thought of as getting the value from
*  a *map* with *task* as the **key**.  From this
*  perspective,  the usage is not much different from
*  **bpf_map_lookup_elem**\ (*map*, **&**\ *task*) except this
*  helper enforces the key must be a task_struct and the map must also
*  be a **BPF_MAP_TYPE_TASK_STORAGE**.
*
*  Underneath, the value is stored locally at *task* instead of
*  the *map*.  The *map* is used as the bpf-local-storage
*  "type". The bpf-local-storage "type" (i.e. the *map*) is
*  searched against all bpf_local_storage residing at *task*.
*
*  An optional *flags* (**BPF_LOCAL_STORAGE_GET_F_CREATE**) can be
*  used such that a new bpf_local_storage will be
*  created if one does not exist.  *value* can be used
*  together with **BPF_LOCAL_STORAGE_GET_F_CREATE**
 to specify
*  the initial value of a bpf_local_storage.  If *value* is
*  **NULL**, the new bpf_local_storage will be zero initialized.
*
```

```
* Returns
*  A bpf_local_storage pointer is returned on success.
*
*  **NULL** if not found or there was an error in adding
*  a new bpf_local_storage.
*/
static void *(* const bpf_task_storage_get)(void *map, struct task_struct *task, void *value, __u64 flags) = (void *)
156;

/*
* bpf_task_storage_delete
*
*  Delete a bpf_local_storage from a *task*.
*
* Returns
*  0 on success.
*
*  **-ENOENT** if the bpf_local_storage cannot be found.
*/
static long (* const bpf_task_storage_delete)(void *map, struct task_struct *task) = (void *) 157;

/*
* bpf_get_current_task_btf
*
*  Return a BTF pointer to the "current" task.
*  This pointer can also be used in helpers that accept an
*  *ARG_PTR_TO_BTF_ID* of type *task_struct*.
*
* Returns
*  Pointer to the current task.
*/
static struct task_struct *(* const
 bpf_get_current_task_btf)(void) = (void *) 158;

/*
* bpf_bprm_opts_set
*
*  Set or clear certain options on *bprm*:
*
*  **BPF_F_BPRM_SECUREEXEC** Set the secureexec bit
*  which sets the **AT_SECURE** auxv for glibc. The bit
*  is cleared if the flag is not specified.
*
* Returns
*  **-EINVAL** if invalid *flags* are passed, zero otherwise.
*/
static long (* const bpf_bprm_opts_set)(struct linux_binprm *bprm, __u64 flags) = (void *) 159;
```

```
/*
* bpf_ktime_get_coarse_ns
*
*  Return a coarse-grained version of the time elapsed since
*  system boot, in nanoseconds. Does not include time the system
*  was suspended.
*
*  See: **clock_gettime**\ (**CLOCK_MONOTONIC_COARSE**)
*
* Returns
*  Current *ktime*.
*/
static __u64 (* const bpf_ktime_get_coarse_ns)(void) = (void *) 160;

/*
* bpf_ima_inode_hash
*
*  Returns the stored IMA hash of the *inode* (if it's available).
*  If the hash is larger than *size*, then only *size*
*  bytes will be copied to *dst*
*
* Returns
 *  The **hash_algo** is returned on success,
*  **-EOPNOTSUP** if IMA is disabled or **-EINVAL** if
*  invalid arguments are passed.
*/
static long (* const bpf_ima_inode_hash)(struct inode *inode, void *dst, __u32 size) = (void *) 161;

/*
* bpf_sock_from_file
*
*  If the given file represents a socket, returns the associated
*  socket.
*
* Returns
*  A pointer to a struct socket on success or NULL if the file is
*  not a socket.
*/
static struct socket *(* const bpf_sock_from_file)(struct file *file) = (void *) 162;

/*
* bpf_check_mtu
*
*  Check packet size against exceeding MTU of net device (based
*  on *ifindex*).  This helper will likely be used in combination
*  with helpers that adjust/change the packet size.
*
*  The argument *len_diff* can be used for querying with a planned
```

```
*  size change. This allows to check MTU prior to changing packet
*  ctx. Providing a *len_diff* adjustment that is larger than the
*  actual packet size (resulting in negative
 packet size) will in
*  principle not exceed the MTU, which is why it is not considered
*  a failure.  Other BPF helpers are needed for performing the
*  planned size change; therefore the responsibility for catching
*  a negative packet size belongs in those helpers.
*
*  Specifying *ifindex* zero means the MTU check is performed
*  against the current net device.  This is practical if this isn't
*  used prior to redirect.
*
*  On input *mtu_len* must be a valid pointer, else verifier will
*  reject BPF program.  If the value *mtu_len* is initialized to
*  zero then the ctx packet size is use.  When value *mtu_len* is
*  provided as input this specify the L3 length that the MTU check
*  is done against. Remember XDP and TC length operate at L2, but
*  this value is L3 as this correlate to MTU and IP-header tot_len
*  values which are L3 (similar behavior as bpf_fib_lookup).
*
*  The Linux kernel route table can configure MTUs on a more
*  specific per route level,
 which is not provided by this helper.
*  For route level MTU checks use the **bpf_fib_lookup**\ ()
*  helper.
*
*  *ctx* is either **struct xdp_md** for XDP programs or
*  **struct sk_buff** for tc cls_act programs.
*
*  The *flags* argument can be a combination of one or more of the
*  following values:
*
*  **BPF_MTU_CHK_SEGS**
*   This flag will only works for *ctx* **struct sk_buff**.
*   If packet context contains extra packet segment buffers
*   (often knows as GSO skb), then MTU check is harder to
*   check at this point, because in transmit path it is
*   possible for the skb packet to get re-segmented
*   (depending on net device features).  This could still be
*   a MTU violation, so this flag enables performing MTU
*   check against segments, with a different violation
*   return code to tell it apart. Check cannot use len_diff.
*
*  On return *mtu_len* pointer contains the MTU value of the net
*  device.  Remember the net device configured MTU is the
 L3 size,
*  which is returned here and XDP and TC length operate at L2.
```

```
*  Helper take this into account for you, but remember when using
*  MTU value in your BPF-code.
*
*
* Returns
*  * 0 on success, and populate MTU value in *mtu_len* pointer.
*
*  * < 0 if any input argument is invalid (*mtu_len* not updated)
*
*  MTU violations return positive values, but also populate MTU
*  value in *mtu_len* pointer, as this can be needed for
*  implementing PMTU handing:
*
*  * **BPF_MTU_CHK_RET_FRAG_NEEDED**
*  * **BPF_MTU_CHK_RET_SEGS_TOOBIG**
*/
static long (* const bpf_check_mtu)(void *ctx, __u32 ifindex, __u32 *mtu_len, __s32 len_diff, __u64 flags) = (void
*) 163;

/*
* bpf_for_each_map_elem
*
*  For each element in **map**, call **callback_fn** function with
*  **map**, **callback_ctx** and other map-specific parameters.
*  The **callback_fn** should be a static function and
*  the **callback_ctx** should be a pointer to the stack.
*  The **flags** is used to control
 certain aspects of the helper.
*  Currently, the **flags** must be 0.
*
*  The following are a list of supported map types and their
*  respective expected callback signatures:
*
*  BPF_MAP_TYPE_HASH, BPF_MAP_TYPE_PERCPU_HASH,
*  BPF_MAP_TYPE_LRU_HASH, BPF_MAP_TYPE_LRU_PERCPU_HASH,
*  BPF_MAP_TYPE_ARRAY, BPF_MAP_TYPE_PERCPU_ARRAY
*
*  long (\*callback_fn)(struct bpf_map \*map, const void \*key, void \*value, void \*ctx);
*
*  For per_cpu maps, the map_value is the value on the cpu where the
*  bpf_prog is running.
*
*  If **callback_fn** return 0, the helper will continue to the next
*  element. If return value is 1, the helper will skip the rest of
*  elements and return. Other return values are not used now.
*
*
* Returns
```

```
*  The number of traversed map elements for success, **-EINVAL** for
*  invalid **flags**.
*/
static long (* const bpf_for_each_map_elem)(void *map, void *callback_fn, void *callback_ctx, __u64 flags) =
(void *) 164;

/*
* bpf_snprintf
 *
*  Outputs a string into the **str** buffer of size **str_size**
*  based on a format string stored in a read-only map pointed by
*  **fmt**.
*
*  Each format specifier in **fmt** corresponds to one u64 element
*  in the **data** array. For strings and pointers where pointees
*  are accessed, only the pointer values are stored in the *data*
*  array. The *data_len* is the size of *data* in bytes - must be
*  a multiple of 8.
*
*  Formats **%s** and **%p{i,I}{4,6}** require to read kernel
*  memory. Reading kernel memory may fail due to either invalid
*  address or valid address but requiring a major memory fault. If
*  reading kernel memory fails, the string for **%s** will be an
*  empty string, and the ip address for **%p{i,I}{4,6}** will be 0.
*  Not returning error to bpf program is consistent with what
*  **bpf_trace_printk**\ () does for now.
*
*
* Returns
*  The strictly positive length of the formatted string, including
*  the trailing zero character. If
 the return value is greater than
*  **str_size**, **str** contains a truncated string, guaranteed to
*  be zero-terminated except when **str_size** is 0.
*
*  Or **-EBUSY** if the per-CPU memory copy buffer is busy.
*/
static long (* const bpf_snprintf)(char *str, __u32 str_size, const char *fmt, __u64 *data, __u32 data_len) = (void *)
165;

/*
* bpf_sys_bpf
*
*  Execute bpf syscall with given arguments.
*
* Returns
*  A syscall result.
*/
```

```
static long (* const bpf_sys_bpf)(__u32 cmd, void *attr, __u32 attr_size) = (void *) 166;

/*
* bpf_btf_find_by_name_kind
*
*  Find BTF type with given name and kind in vmlinux BTF or in module's BTFs.
*
* Returns
*  Returns btf_id and btf_obj_fd in lower and upper 32 bits.
*/
static long (* const bpf_btf_find_by_name_kind)(char *name, int name_sz, __u32 kind, int flags) = (void *) 167;

/*
* bpf_sys_close
*
*  Execute close syscall for given FD.
*
* Returns
*  A syscall result.
*/
static long (* const bpf_sys_close)(__u32
 fd) = (void *) 168;

/*
* bpf_timer_init
*
*  Initialize the timer.
*  First 4 bits of *flags* specify clockid.
*  Only CLOCK_MONOTONIC, CLOCK_REALTIME, CLOCK_BOOTTIME are allowed.
*  All other bits of *flags* are reserved.
*  The verifier will reject the program if *timer* is not from
*  the same *map*.
*
* Returns
*  0 on success.
*  **-EBUSY** if *timer* is already initialized.
*  **-EINVAL** if invalid *flags* are passed.
*  **-EPERM** if *timer* is in a map that doesn't have any user references.
*  The user space should either hold a file descriptor to a map with timers
*  or pin such map in bpffs. When map is unpinned or file descriptor is
*  closed all timers in the map will be cancelled and freed.
*/
static long (* const bpf_timer_init)(struct bpf_timer *timer, void *map, __u64 flags) = (void *) 169;

/*
* bpf_timer_set_callback
*
*  Configure the timer to call *callback_fn* static function.
```

```
*
* Returns
*  0 on success.
*  **-EINVAL** if *timer* was not
 initialized with bpf_timer_init() earlier.
*  **-EPERM** if *timer* is in a map that doesn't have any user references.
*  The user space should either hold a file descriptor to a map with timers
*  or pin such map in bpffs. When map is unpinned or file descriptor is
*  closed all timers in the map will be cancelled and freed.
*/
static long (* const bpf_timer_set_callback)(struct bpf_timer *timer, void *callback_fn) = (void *) 170;

/*
* bpf_timer_start
*
*  Set timer expiration N nanoseconds from the current time. The
*  configured callback will be invoked in soft irq context on some cpu
*  and will not repeat unless another bpf_timer_start() is made.
*  In such case the next invocation can migrate to a different cpu.
*  Since struct bpf_timer is a field inside map element the map
*  owns the timer. The bpf_timer_set_callback() will increment refcnt
*  of BPF program to make sure that callback_fn code stays valid.
*  When user space reference to a map reaches zero all
 timers
*  in a map are cancelled and corresponding program's refcnts are
*  decremented. This is done to make sure that Ctrl-C of a user
*  process doesn't leave any timers running. If map is pinned in
*  bpffs the callback_fn can re-arm itself indefinitely.
*  bpf_map_update/delete_elem() helpers and user space sys_bpf commands
*  cancel and free the timer in the given map element.
*  The map can contain timers that invoke callback_fn-s from different
*  programs. The same callback_fn can serve different timers from
*  different maps if key/value layout matches across maps.
*  Every bpf_timer_set_callback() can have different callback_fn.
*
*  *flags* can be one of:
*
*  **BPF_F_TIMER_ABS**
*   Start the timer in absolute expire value instead of the
*   default relative one.
*  **BPF_F_TIMER_CPU_PIN**
*   Timer will be pinned to the CPU of the caller.
*
*
* Returns
*  0 on success.
*  **-EINVAL** if *timer* was not initialized with bpf_timer_init() earlier
*  or
```

```
 invalid *flags* are passed.
*/
static long (* const bpf_timer_start)(struct bpf_timer *timer, __u64 nsecs, __u64 flags) = (void *) 171;

/*
* bpf_timer_cancel
*
*  Cancel the timer and wait for callback_fn to finish if it was running.
*
* Returns
*  0 if the timer was not active.
*  1 if the timer was active.
*  **-EINVAL** if *timer* was not initialized with bpf_timer_init() earlier.
*  **-EDEADLK** if callback_fn tried to call bpf_timer_cancel() on its
*  own timer which would have led to a deadlock otherwise.
*/
static long (* const bpf_timer_cancel)(struct bpf_timer *timer) = (void *) 172;

/*
* bpf_get_func_ip
*
*  Get address of the traced function (for tracing and kprobe programs).
*
*  When called for kprobe program attached as uprobe it returns
*  probe address for both entry and return uprobe.
*
*
* Returns
*  Address of the traced function for kprobe.
*  0 for kprobes placed within the function (not at the entry).
*  Address of the probe for uprobe
 and return uprobe.
*/
static __u64 (* const bpf_get_func_ip)(void *ctx) = (void *) 173;

/*
* bpf_get_attach_cookie
*
*  Get bpf_cookie value provided (optionally) during the program
*  attachment. It might be different for each individual
*  attachment, even if BPF program itself is the same.
*  Expects BPF program context *ctx* as a first argument.
*
*  Supported for the following program types:
*   - kprobe/uprobe;
*   - tracepoint;
*   - perf_event.
*
```

```
* Returns
*  Value specified by user at BPF link creation/attachment time
*  or 0, if it was not specified.
*/
static __u64 (* const bpf_get_attach_cookie)(void *ctx) = (void *) 174;

/*
* bpf_task_pt_regs
*
*  Get the struct pt_regs associated with **task**.
*
* Returns
*  A pointer to struct pt_regs.
*/
static long (* const bpf_task_pt_regs)(struct task_struct *task) = (void *) 175;

/*
* bpf_get_branch_snapshot
*
*  Get branch trace from hardware engines like Intel LBR. The
*  hardware engine is stopped
 shortly after the helper is
*  called. Therefore, the user need to filter branch entries
*  based on the actual use case. To capture branch trace
*  before the trigger point of the BPF program, the helper
*  should be called at the beginning of the BPF program.
*
*  The data is stored as struct perf_branch_entry into output
*  buffer *entries*. *size* is the size of *entries* in bytes.
*  *flags* is reserved for now and must be zero.
*
*
* Returns
*  On success, number of bytes written to *buf*. On error, a
*  negative value.
*
*  **-EINVAL** if *flags* is not zero.
*
*  **-ENOENT** if architecture does not support branch records.
*/
static long (* const bpf_get_branch_snapshot)(void *entries, __u32 size, __u64 flags) = (void *) 176;

/*
* bpf_trace_vprintk
*
*  Behaves like **bpf_trace_printk**\ () helper, but takes an array of u64
*  to format and can handle more format args as a result.
*
```

```
*  Arguments are to be used as in **bpf_seq_printf**\ () helper.
*
*
 Returns
*  The number of bytes written to the buffer, or a negative error
*  in case of failure.
*/
static long (* const bpf_trace_vprintk)(const char *fmt, __u32 fmt_size, const void *data, __u32 data_len) = (void
*) 177;

/*
* bpf_skc_to_unix_sock
*
*  Dynamically cast a *sk* pointer to a *unix_sock* pointer.
*
* Returns
*  *sk* if casting is valid, or **NULL** otherwise.
*/
static struct unix_sock *(* const bpf_skc_to_unix_sock)(void *sk) = (void *) 178;

/*
* bpf_kallsyms_lookup_name
*
*  Get the address of a kernel symbol, returned in *res*. *res* is
*  set to 0 if the symbol is not found.
*
* Returns
*  On success, zero. On error, a negative value.
*
*  **-EINVAL** if *flags* is not zero.
*
*  **-EINVAL** if string *name* is not the same size as *name_sz*.
*
*  **-ENOENT** if symbol is not found.
*
*  **-EPERM** if caller does not have permission to obtain kernel address.
*/
static long (* const bpf_kallsyms_lookup_name)(const char *name, int name_sz, int
 flags, __u64 *res) = (void *) 179;

/*
* bpf_find_vma
*
*  Find vma of *task* that contains *addr*, call *callback_fn*
*  function with *task*, *vma*, and *callback_ctx*.
*  The *callback_fn* should be a static function and
*  the *callback_ctx* should be a pointer to the stack.
*  The *flags* is used to control certain aspects of the helper.
```

```
*  Currently, the *flags* must be 0.
*
*  The expected callback signature is
*
*  long (\*callback_fn)(struct task_struct \*task, struct vm_area_struct \*vma, void \*callback_ctx);
*
*
* Returns
*  0 on success.
*  **-ENOENT** if *task->mm* is NULL, or no vma contains *addr*.
*  **-EBUSY** if failed to try lock mmap_lock.
*  **-EINVAL** for invalid **flags**.
*/
static long (* const bpf_find_vma)(struct task_struct *task, __u64 addr, void *callback_fn, void *callback_ctx,
__u64 flags) = (void *) 180;

/*
* bpf_loop
*
*  For **nr_loops**, call **callback_fn** function
*  with **callback_ctx** as the context parameter.
*  The
 **callback_fn** should be a static function and
*  the **callback_ctx** should be a pointer to the stack.
*  The **flags** is used to control certain aspects of the helper.
*  Currently, the **flags** must be 0. Currently, nr_loops is
*  limited to 1 << 23 (~8 million) loops.
*
*  long (\*callback_fn)(u32 index, void \*ctx);
*
*  where **index** is the current index in the loop. The index
*  is zero-indexed.
*
*  If **callback_fn** returns 0, the helper will continue to the next
*  loop. If return value is 1, the helper will skip the rest of
*  the loops and return. Other return values are not used now,
*  and will be rejected by the verifier.
*
*
* Returns
*  The number of loops performed, **-EINVAL** for invalid **flags**,
*  **-E2BIG** if **nr_loops** exceeds the maximum number of loops.
*/
static long (* const bpf_loop)(__u32 nr_loops, void *callback_fn, void *callback_ctx, __u64 flags) = (void *) 181;

/*
* bpf_strncmp
*
```

```
*  Do strncmp() between **s1** and
 **s2**. **s1** doesn't need
*  to be null-terminated and **s1_sz** is the maximum storage
*  size of **s1**. **s2** must be a read-only string.
*
* Returns
*  An integer less than, equal to, or greater than zero
*  if the first **s1_sz** bytes of **s1** is found to be
*  less than, to match, or be greater than **s2**.
*/
static long (* const bpf_strncmp)(const char *s1, __u32 s1_sz, const char *s2) = (void *) 182;

/*
* bpf_get_func_arg
*
*  Get **n**-th argument register (zero based) of the traced function (for tracing programs)
*  returned in **value**.
*
*
* Returns
*  0 on success.
*  **-EINVAL** if n >= argument register count of traced function.
*/
static long (* const bpf_get_func_arg)(void *ctx, __u32 n, __u64 *value) = (void *) 183;

/*
* bpf_get_func_ret
*
*  Get return value of the traced function (for tracing programs)
*  in **value**.
*
*
* Returns
*  0 on success.
*  **-EOPNOTSUPP** for tracing programs other than BPF_TRACE_FEXIT or BPF_MODIFY_RETURN.
 */
static long (* const bpf_get_func_ret)(void *ctx, __u64 *value) = (void *) 184;

/*
* bpf_get_func_arg_cnt
*
*  Get number of registers of the traced function (for tracing programs) where
*  function arguments are stored in these registers.
*
*
* Returns
*  The number of argument registers of the traced function.
*/
```

```
static long (* const bpf_get_func_arg_cnt)(void *ctx) = (void *) 185;

/*
* bpf_get_retval
*
*  Get the BPF program's return value that will be returned to the upper layers.
*
*  This helper is currently supported by cgroup programs and only by the hooks
*  where BPF program's return value is returned to the userspace via errno.
*
* Returns
*  The BPF program's return value.
*/
static int (* const bpf_get_retval)(void) = (void *) 186;

/*
* bpf_set_retval
*
*  Set the BPF program's return value that will be returned to the upper layers.
*
*  This helper is currently supported by cgroup programs and only by the hooks
*  where BPF program's
 return value is returned to the userspace via errno.
*
*  Note that there is the following corner case where the program exports an error
*  via bpf_set_retval but signals success via 'return 1':
*
*   bpf_set_retval(-EPERM);
*   return 1;
*
*  In this case, the BPF program's return value will use helper's -EPERM. This
*  still holds true for cgroup/bind{4,6} which supports extra 'return 3' success case.
*
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static int (* const bpf_set_retval)(int retval) = (void *) 187;

/*
* bpf_xdp_get_buff_len
*
*  Get the total size of a given xdp buff (linear and paged area)
*
* Returns
*  The total size of a given xdp buffer.
*/
static __u64 (* const bpf_xdp_get_buff_len)(struct xdp_md *xdp_md) = (void *) 188;
```

```
/*
* bpf_xdp_load_bytes
*
*  This helper is provided as an easy way to load data from a
*  xdp buffer. It can be used to load *len* bytes from *offset* from
*  the frame associated to *xdp_md*,
 into the buffer pointed by
*  *buf*.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_xdp_load_bytes)(struct xdp_md *xdp_md, __u32 offset, void *buf, __u32 len) = (void *)
189;

/*
* bpf_xdp_store_bytes
*
*  Store *len* bytes from buffer *buf* into the frame
*  associated to *xdp_md*, at *offset*.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_xdp_store_bytes)(struct xdp_md *xdp_md, __u32 offset, void *buf, __u32 len) = (void *)
190;

/*
* bpf_copy_from_user_task
*
*  Read *size* bytes from user space address *user_ptr* in *tsk*'s
*  address space, and stores the data in *dst*. *flags* is not
*  used yet and is provided for future extensibility. This helper
*  can only be used by sleepable programs.
*
* Returns
*  0 on success, or a negative error in case of failure. On error
*  *dst* buffer is zeroed out.
*/
static long (* const bpf_copy_from_user_task)(void *dst,
 __u32 size, const void *user_ptr, struct task_struct *tsk, __u64 flags) = (void *) 191;

/*
* bpf_skb_set_tstamp
*
*  Change the __sk_buff->tstamp_type to *tstamp_type*
*  and set *tstamp* to the __sk_buff->tstamp together.
```

```
*
*  If there is no need to change the __sk_buff->tstamp_type,
*  the tstamp value can be directly written to __sk_buff->tstamp
*  instead.
*
*  BPF_SKB_TSTAMP_DELIVERY_MONO is the only tstamp that
*  will be kept during bpf_redirect_*().  A non zero
*  *tstamp* must be used with the BPF_SKB_TSTAMP_DELIVERY_MONO
*  *tstamp_type*.
*
*  A BPF_SKB_TSTAMP_UNSPEC *tstamp_type* can only be used
*  with a zero *tstamp*.
*
*  Only IPv4 and IPv6 skb->protocol are supported.
*
*  This function is most useful when it needs to set a
*  mono delivery time to __sk_buff->tstamp and then
*  bpf_redirect_*() to the egress of an iface.  For example,
*  changing the (rcv) timestamp in __sk_buff->tstamp at
*  ingress to a mono delivery time and then bpf_redirect_*()
 *  to sch_fq@phy-dev.
*
* Returns
*  0 on success.
*  **-EINVAL** for invalid input
*  **-EOPNOTSUPP** for unsupported protocol
*/
static long (* const bpf_skb_set_tstamp)(struct __sk_buff *skb, __u64 tstamp, __u32 tstamp_type) = (void *) 192;

/*
* bpf_ima_file_hash
*
*  Returns a calculated IMA hash of the *file*.
*  If the hash is larger than *size*, then only *size*
*  bytes will be copied to *dst*
*
* Returns
*  The **hash_algo** is returned on success,
*  **-EOPNOTSUP** if the hash calculation failed or **-EINVAL** if
*  invalid arguments are passed.
*/
static long (* const bpf_ima_file_hash)(struct file *file, void *dst, __u32 size) = (void *) 193;

/*
* bpf_kptr_xchg
*
*  Exchange kptr at pointer *map_value* with *ptr*, and return the
*  old value. *ptr* can be NULL, otherwise it must be a referenced
```

```
*  pointer which will be released when this helper is called.
*
* Returns
*  The old value of kptr (which can be NULL). The returned pointer
*  if
 not NULL, is a reference which must be released using its
*  corresponding release function, or moved into a BPF map before
*  program exit.
*/
static void *(* const bpf_kptr_xchg)(void *map_value, void *ptr) = (void *) 194;

/*
* bpf_map_lookup_percpu_elem
*
*  Perform a lookup in *percpu map* for an entry associated to
*  *key* on *cpu*.
*
* Returns
*  Map value associated to *key* on *cpu*, or **NULL** if no entry
*  was found or *cpu* is invalid.
*/
static void *(* const bpf_map_lookup_percpu_elem)(void *map, const void *key, __u32 cpu) = (void *) 195;

/*
* bpf_skc_to_mptcp_sock
*
*  Dynamically cast a *sk* pointer to a *mptcp_sock* pointer.
*
* Returns
*  *sk* if casting is valid, or **NULL** otherwise.
*/
static struct mptcp_sock *(* const bpf_skc_to_mptcp_sock)(void *sk) = (void *) 196;

/*
* bpf_dynptr_from_mem
*
*  Get a dynptr to local memory *data*.
*
*  *data* must be a ptr to a map value.
*  The maximum *size* supported is DYNPTR_MAX_SIZE.
*  *flags*
 is currently unused.
*
* Returns
*  0 on success, -E2BIG if the size exceeds DYNPTR_MAX_SIZE,
*  -EINVAL if flags is not 0.
*/
static long (* const bpf_dynptr_from_mem)(void *data, __u32 size, __u64 flags, struct bpf_dynptr *ptr) = (void *)
```

```
197;

/*
* bpf_ringbuf_reserve_dynptr
*
*  Reserve *size* bytes of payload in a ring buffer *ringbuf*
*  through the dynptr interface. *flags* must be 0.
*
*  Please note that a corresponding bpf_ringbuf_submit_dynptr or
*  bpf_ringbuf_discard_dynptr must be called on *ptr*, even if the
*  reservation fails. This is enforced by the verifier.
*
* Returns
*  0 on success, or a negative error in case of failure.
*/
static long (* const bpf_ringbuf_reserve_dynptr)(void *ringbuf, __u32 size, __u64 flags, struct bpf_dynptr *ptr) =
(void *) 198;

/*
* bpf_ringbuf_submit_dynptr
*
*  Submit reserved ring buffer sample, pointed to by *data*,
*  through the dynptr interface. This is a no-op if the dynptr is
*  invalid/null.
*
*
  For more information on *flags*, please see
*  'bpf_ringbuf_submit'.
*
* Returns
*  Nothing. Always succeeds.
*/
static void (* const bpf_ringbuf_submit_dynptr)(struct bpf_dynptr *ptr, __u64 flags) = (void *) 199;

/*
* bpf_ringbuf_discard_dynptr
*
*  Discard reserved ring buffer sample through the dynptr
*  interface. This is a no-op if the dynptr is invalid/null.
*
*  For more information on *flags*, please see
*  'bpf_ringbuf_discard'.
*
* Returns
*  Nothing. Always succeeds.
*/
static void (* const bpf_ringbuf_discard_dynptr)(struct bpf_dynptr *ptr, __u64 flags) = (void *) 200;
```

```
/*
* bpf_dynptr_read
*
*  Read *len* bytes from *src* into *dst*, starting from *offset*
*  into *src*.
*  *flags* is currently unused.
*
* Returns
*  0 on success, -E2BIG if *offset* + *len* exceeds the length
*  of *src*'s data, -EINVAL if *src* is an invalid dynptr or if
*  *flags* is not 0.
*/
static long (* const bpf_dynptr_read)(void *dst, __u32 len, const struct bpf_dynptr
 *src, __u32 offset, __u64 flags) = (void *) 201;

/*
* bpf_dynptr_write
*
*  Write *len* bytes from *src* into *dst*, starting from *offset*
*  into *dst*.
*
*  *flags* must be 0 except for skb-type dynptrs.
*
*  For skb-type dynptrs:
*      *  All data slices of the dynptr are automatically
*         invalidated after **bpf_dynptr_write**\ (). This is
*         because writing may pull the skb and change the
*         underlying packet buffer.
*
*      *  For *flags*, please see the flags accepted by
*         **bpf_skb_store_bytes**\ ().
*
* Returns
*  0 on success, -E2BIG if *offset* + *len* exceeds the length
*  of *dst*'s data, -EINVAL if *dst* is an invalid dynptr or if *dst*
*  is a read-only dynptr or if *flags* is not correct. For skb-type dynptrs,
*  other errors correspond to errors returned by **bpf_skb_store_bytes**\ ().
*/
static long (* const bpf_dynptr_write)(const struct bpf_dynptr *dst, __u32 offset, void *src, __u32 len, __u64 flags)
= (void *)
 202;

/*
* bpf_dynptr_data
*
*  Get a pointer to the underlying dynptr data.
*
*  *len* must be a statically known value. The returned data slice
```

```
*  is invalidated whenever the dynptr is invalidated.
*
*  skb and xdp type dynptrs may not use bpf_dynptr_data. They should
*  instead use bpf_dynptr_slice and bpf_dynptr_slice_rdwr.
*
* Returns
*  Pointer to the underlying dynptr data, NULL if the dynptr is
*  read-only, if the dynptr is invalid, or if the offset and length
*  is out of bounds.
*/
static void *(* const bpf_dynptr_data)(const struct bpf_dynptr *ptr, __u32 offset, __u32 len) = (void *) 203;

/*
* bpf_tcp_raw_gen_syncookie_ipv4
*
*  Try to issue a SYN cookie for the packet with corresponding
*  IPv4/TCP headers, *iph* and *th*, without depending on a
*  listening socket.
*
*  *iph* points to the IPv4 header.
*
*  *th* points to the start of the TCP header, while *th_len*
*  contains the length of the TCP header (at least
*  **sizeof**\ (**struct tcphdr**)).
 *
* Returns
*  On success, lower 32 bits hold the generated SYN cookie in
*  followed by 16 bits which hold the MSS value for that cookie,
*  and the top 16 bits are unused.
*
*  On failure, the returned value is one of the following:
*
*  **-EINVAL** if *th_len* is invalid.
*/
static __s64 (* const bpf_tcp_raw_gen_syncookie_ipv4)(struct iphdr *iph, struct tcphdr *th, __u32 th_len) = (void
*) 204;

/*
* bpf_tcp_raw_gen_syncookie_ipv6
*
*  Try to issue a SYN cookie for the packet with corresponding
*  IPv6/TCP headers, *iph* and *th*, without depending on a
*  listening socket.
*
*  *iph* points to the IPv6 header.
*
*  *th* points to the start of the TCP header, while *th_len*
*  contains the length of the TCP header (at least
```

```
*  **sizeof**\ (**struct tcphdr**)).
*
* Returns
*  On success, lower 32 bits hold the generated SYN cookie in
*  followed by 16 bits which hold the MSS value for that cookie,
*  and the top 16 bits are unused.
*
*  On failure,
 the returned value is one of the following:
*
*  **-EINVAL** if *th_len* is invalid.
*
*  **-EPROTONOSUPPORT** if CONFIG_IPV6 is not builtin.
*/
static __s64 (* const bpf_tcp_raw_gen_syncookie_ipv6)(struct ipv6hdr *iph, struct tcphdr *th, __u32 th_len) =
(void *) 205;

/*
* bpf_tcp_raw_check_syncookie_ipv4
*
*  Check whether *iph* and *th* contain a valid SYN cookie ACK
*  without depending on a listening socket.
*
*  *iph* points to the IPv4 header.
*
*  *th* points to the TCP header.
*
* Returns
*  0 if *iph* and *th* are a valid SYN cookie ACK.
*
*  On failure, the returned value is one of the following:
*
*  **-EACCES** if the SYN cookie is not valid.
*/
static long (* const bpf_tcp_raw_check_syncookie_ipv4)(struct iphdr *iph, struct tcphdr *th) = (void *) 206;

/*
* bpf_tcp_raw_check_syncookie_ipv6
*
*  Check whether *iph* and *th* contain a valid SYN cookie ACK
*  without depending on a listening socket.
*
*  *iph* points to the IPv6 header.
*
*  *th*
 points to the TCP header.
*
* Returns
```

```
*  0 if *iph* and *th* are a valid SYN cookie ACK.
*
*  On failure, the returned value is one of the following:
*
*  **-EACCES** if the SYN cookie is not valid.
*
*  **-EPROTONOSUPPORT** if CONFIG_IPV6 is not builtin.
*/
static long (* const bpf_tcp_raw_check_syncookie_ipv6)(struct ipv6hdr *iph, struct tcphdr *th) = (void *) 207;

/*
* bpf_ktime_get_tai_ns
*
*  A nonsettable system-wide clock derived from wall-clock time but
*  ignoring leap seconds.  This clock does not experience
*  discontinuities and backwards jumps caused by NTP inserting leap
*  seconds as CLOCK_REALTIME does.
*
*  See: **clock_gettime**\ (**CLOCK_TAI**)
*
* Returns
*  Current *ktime*.
*/
static __u64 (* const bpf_ktime_get_tai_ns)(void) = (void *) 208;

/*
* bpf_user_ringbuf_drain
*
*  Drain samples from the specified user ring buffer, and invoke
*  the provided callback for each such sample:
*
*  long (\*callback_fn)(const struct bpf_dynptr \*dynptr,
 void \*ctx);
*
*  If **callback_fn** returns 0, the helper will continue to try
*  and drain the next sample, up to a maximum of
*  BPF_MAX_USER_RINGBUF_SAMPLES samples. If the return value is 1,
*  the helper will skip the rest of the samples and return. Other
*  return values are not used now, and will be rejected by the
*  verifier.
*
* Returns
*  The number of drained samples if no error was encountered while
*  draining samples, or 0 if no samples were present in the ring
*  buffer. If a user-space producer was epoll-waiting on this map,
*  and at least one sample was drained, they will receive an event
*  notification notifying them of available space in the ring
*  buffer. If the BPF_RB_NO_WAKEUP flag is passed to this
```

```
*  function, no wakeup notification will be sent. If the
*  BPF_RB_FORCE_WAKEUP flag is passed, a wakeup notification will
*  be sent even if no sample was drained.
*
*  On failure, the returned value is one of the following:
*
*  **-EBUSY**
 if the ring buffer is contended, and another calling
*  context was concurrently draining the ring buffer.
*
*  **-EINVAL** if user-space is not properly tracking the ring
*  buffer due to the producer position not being aligned to 8
*  bytes, a sample not being aligned to 8 bytes, or the producer
*  position not matching the advertised length of a sample.
*
*  **-E2BIG** if user-space has tried to publish a sample which is
*  larger than the size of the ring buffer, or which cannot fit
*  within a struct bpf_dynptr.
*/
static long (* const bpf_user_ringbuf_drain)(void *map, void *callback_fn, void *ctx, __u64 flags) = (void *) 209;

/*
* bpf_cgrp_storage_get
*
*  Get a bpf_local_storage from the *cgroup*.
*
*  Logically, it could be thought of as getting the value from
*  a *map* with *cgroup* as the **key**.  From this
*  perspective,  the usage is not much different from
*  **bpf_map_lookup_elem**\ (*map*, **&**\ *cgroup*) except this
*  helper enforces the
 key must be a cgroup struct and the map must also
*  be a **BPF_MAP_TYPE_CGRP_STORAGE**.
*
*  In reality, the local-storage value is embedded directly inside of the
*  *cgroup* object itself, rather than being located in the
*  **BPF_MAP_TYPE_CGRP_STORAGE** map. When the local-storage value is
*  queried for some *map* on a *cgroup* object, the kernel will perform an
*  O(n) iteration over all of the live local-storage values for that
*  *cgroup* object until the local-storage value for the *map* is found.
*
*  An optional *flags* (**BPF_LOCAL_STORAGE_GET_F_CREATE**) can be
*  used such that a new bpf_local_storage will be
*  created if one does not exist.  *value* can be used
*  together with **BPF_LOCAL_STORAGE_GET_F_CREATE** to specify
*  the initial value of a bpf_local_storage.  If *value* is
*  **NULL**, the new bpf_local_storage will be zero initialized.
*
```

```
* Returns
*  A bpf_local_storage pointer is returned on success.
*
*  **NULL** if not found or there was
 an error in adding
*  a new bpf_local_storage.
*/
static void *(* const bpf_cgrp_storage_get)(void *map, struct cgroup *cgroup, void *value, __u64 flags) = (void *)
210;

/*
* bpf_cgrp_storage_delete
*
*  Delete a bpf_local_storage from a *cgroup*.
*
* Returns
*  0 on success.
*
*  **-ENOENT** if the bpf_local_storage cannot be found.
*/
static long (* const bpf_cgrp_storage_delete)(void *map, struct cgroup *cgroup) = (void *) 211;
```

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```
/* SPDX-License-Identifier: (LGPL-2.1 OR BSD-2-Clause) */
#ifndef __BPF_TRACING_H__
#define __BPF_TRACING_H__

#include "bpf_helpers.h"

/* Scan the ARCH passed in from ARCH env variable (see Makefile) */
#if defined(__TARGET_ARCH_x86)
 #define bpf_target_x86
 #define bpf_target_defined
#elif defined(__TARGET_ARCH_s390)
 #define bpf_target_s390
 #define bpf_target_defined
#elif defined(__TARGET_ARCH_arm)
 #define bpf_target_arm
 #define bpf_target_defined
#elif defined(__TARGET_ARCH_arm64)
 #define bpf_target_arm64
 #define bpf_target_defined
#elif defined(__TARGET_ARCH_mips)
 #define bpf_target_mips
 #define bpf_target_defined
#elif defined(__TARGET_ARCH_powerpc)
 #define bpf_target_powerpc
 #define bpf_target_defined
#elif defined(__TARGET_ARCH_sparc)
 #define bpf_target_sparc
 #define bpf_target_defined
#elif defined(__TARGET_ARCH_riscv)
 #define bpf_target_riscv
 #define bpf_target_defined
#elif defined(__TARGET_ARCH_arc)
 #define bpf_target_arc
 #define bpf_target_defined
```

```
#elif defined(__TARGET_ARCH_loongarch)
 #define
 bpf_target_loongarch
 #define bpf_target_defined
#else

/* Fall back to what the compiler says */
#if defined(__x86_64__)
 #define bpf_target_x86
 #define bpf_target_defined
#elif defined(__s390__)
 #define bpf_target_s390
 #define bpf_target_defined
#elif defined(__arm__)
 #define bpf_target_arm
 #define bpf_target_defined
#elif defined(__aarch64__)
 #define bpf_target_arm64
 #define bpf_target_defined
#elif defined(__mips__)
 #define bpf_target_mips
 #define bpf_target_defined
#elif defined(__powerpc__)
 #define bpf_target_powerpc
 #define bpf_target_defined
#elif defined(__sparc__)
 #define bpf_target_sparc
 #define bpf_target_defined
#elif defined(__riscv) && __riscv_xlen == 64
 #define bpf_target_riscv
 #define bpf_target_defined
#elif defined(__arc__)
 #define bpf_target_arc
 #define bpf_target_defined
#elif defined(__loongarch__)
 #define bpf_target_loongarch
 #define bpf_target_defined
#endif /* no compiler target */

#endif

#ifndef __BPF_TARGET_MISSING
#define
 __BPF_TARGET_MISSING "GCC error \"Must specify a BPF target arch via __TARGET_ARCH_xxx\""
#endif

#if defined(bpf_target_x86)
```

```
/*
* https://en.wikipedia.org/wiki/X86_calling_conventions#System_V_AMD64_ABI
*/

#if defined(__KERNEL__) || defined(__VMLINUX_H__)

#define __PT_PARM1_REG di
#define __PT_PARM2_REG si
#define __PT_PARM3_REG dx
#define __PT_PARM4_REG cx
#define __PT_PARM5_REG r8
#define __PT_PARM6_REG r9
/*
* Syscall uses r10 for PARM4. See arch/x86/entry/entry_64.S:entry_SYSCALL_64
* comments in Linux sources. And refer to syscall(2) manpage.
*/
#define __PT_PARM1_SYSCALL_REG __PT_PARM1_REG
#define __PT_PARM2_SYSCALL_REG __PT_PARM2_REG
#define __PT_PARM3_SYSCALL_REG __PT_PARM3_REG
#define __PT_PARM4_SYSCALL_REG r10
#define __PT_PARM5_SYSCALL_REG __PT_PARM5_REG
#define __PT_PARM6_SYSCALL_REG __PT_PARM6_REG

#define __PT_RET_REG sp
#define __PT_FP_REG bp
#define __PT_RC_REG ax
#define __PT_SP_REG sp
#define __PT_IP_REG ip

#else

#ifdef __i386__

/*
 i386 kernel is built with -mregparm=3 */
#define __PT_PARM1_REG eax
#define __PT_PARM2_REG edx
#define __PT_PARM3_REG ecx
/* i386 syscall ABI is very different, refer to syscall(2) manpage */
#define __PT_PARM1_SYSCALL_REG ebx
#define __PT_PARM2_SYSCALL_REG ecx
#define __PT_PARM3_SYSCALL_REG edx
#define __PT_PARM4_SYSCALL_REG esi
#define __PT_PARM5_SYSCALL_REG edi
#define __PT_PARM6_SYSCALL_REG ebp

#define __PT_RET_REG esp
#define __PT_FP_REG ebp
```

```
#define __PT_RC_REG eax
#define __PT_SP_REG esp
#define __PT_IP_REG eip

#else /* __i386__ */

#define __PT_PARM1_REG rdi
#define __PT_PARM2_REG rsi
#define __PT_PARM3_REG rdx
#define __PT_PARM4_REG rcx
#define __PT_PARM5_REG r8
#define __PT_PARM6_REG r9

#define __PT_PARM1_SYSCALL_REG __PT_PARM1_REG
#define __PT_PARM2_SYSCALL_REG __PT_PARM2_REG
#define __PT_PARM3_SYSCALL_REG __PT_PARM3_REG
#define __PT_PARM4_SYSCALL_REG r10
#define __PT_PARM5_SYSCALL_REG __PT_PARM5_REG
#define __PT_PARM6_SYSCALL_REG __PT_PARM6_REG

#define __PT_RET_REG rsp
#define
 __PT_FP_REG rbp
#define __PT_RC_REG rax
#define __PT_SP_REG rsp
#define __PT_IP_REG rip

#endif /* __i386__ */

#endif /* __KERNEL__ || __VMLINUX_H__ */

#elif defined(bpf_target_s390)

/*
* https://github.com/IBM/s390x-abi/releases/download/v1.6/lzsabi_s390x.pdf
*/

struct pt_regs___s390 {
 unsigned long orig_gpr2;
};

/* s390 provides user_pt_regs instead of struct pt_regs to userspace */
#define __PT_REGS_CAST(x) ((const user_pt_regs *)(x))
#define __PT_PARM1_REG gprs[2]
#define __PT_PARM2_REG gprs[3]
#define __PT_PARM3_REG gprs[4]
#define __PT_PARM4_REG gprs[5]
#define __PT_PARM5_REG gprs[6]
```

```
#define __PT_PARM1_SYSCALL_REG orig_gpr2
#define __PT_PARM2_SYSCALL_REG __PT_PARM2_REG
#define __PT_PARM3_SYSCALL_REG __PT_PARM3_REG
#define __PT_PARM4_SYSCALL_REG __PT_PARM4_REG
#define __PT_PARM5_SYSCALL_REG __PT_PARM5_REG
#define __PT_PARM6_SYSCALL_REG gprs[7]
#define PT_REGS_PARM1_SYSCALL(x) PT_REGS_PARM1_CORE_SYSCALL(x)
#define PT_REGS_PARM1_CORE_SYSCALL(x) \
 BPF_CORE_READ((const
 struct pt_regs___s390 *)(x), __PT_PARM1_SYSCALL_REG)

#define __PT_RET_REG gprs[14]
#define __PT_FP_REG gprs[11] /* Works only with CONFIG_FRAME_POINTER */
#define __PT_RC_REG gprs[2]
#define __PT_SP_REG gprs[15]
#define __PT_IP_REG psw.addr

#elif defined(bpf_target_arm)

/*
* https://github.com/ARM-software/abi-aa/blob/main/aapcs32/aapcs32.rst#machine-registers
*/

#define __PT_PARM1_REG uregs[0]
#define __PT_PARM2_REG uregs[1]
#define __PT_PARM3_REG uregs[2]
#define __PT_PARM4_REG uregs[3]

#define __PT_PARM1_SYSCALL_REG __PT_PARM1_REG
#define __PT_PARM2_SYSCALL_REG __PT_PARM2_REG
#define __PT_PARM3_SYSCALL_REG __PT_PARM3_REG
#define __PT_PARM4_SYSCALL_REG __PT_PARM4_REG
#define __PT_PARM5_SYSCALL_REG uregs[4]
#define __PT_PARM6_SYSCALL_REG uregs[5]
#define __PT_PARM7_SYSCALL_REG uregs[6]

#define __PT_RET_REG uregs[14]
#define __PT_FP_REG uregs[11] /* Works only with CONFIG_FRAME_POINTER */
#define __PT_RC_REG uregs[0]
#define __PT_SP_REG uregs[13]
#define __PT_IP_REG uregs[12]

#elif
 defined(bpf_target_arm64)

/*
* https://github.com/ARM-software/abi-aa/blob/main/aapcs64/aapcs64.rst#machine-registers
```

```
*/

struct pt_regs___arm64 {
 unsigned long orig_x0;
};

/* arm64 provides struct user_pt_regs instead of struct pt_regs to userspace */
#define __PT_REGS_CAST(x) ((const struct user_pt_regs *)(x))
#define __PT_PARM1_REG regs[0]
#define __PT_PARM2_REG regs[1]
#define __PT_PARM3_REG regs[2]
#define __PT_PARM4_REG regs[3]
#define __PT_PARM5_REG regs[4]
#define __PT_PARM6_REG regs[5]
#define __PT_PARM7_REG regs[6]
#define __PT_PARM8_REG regs[7]

#define __PT_PARM1_SYSCALL_REG orig_x0
#define __PT_PARM2_SYSCALL_REG __PT_PARM2_REG
#define __PT_PARM3_SYSCALL_REG __PT_PARM3_REG
#define __PT_PARM4_SYSCALL_REG __PT_PARM4_REG
#define __PT_PARM5_SYSCALL_REG __PT_PARM5_REG
#define __PT_PARM6_SYSCALL_REG __PT_PARM6_REG
#define PT_REGS_PARM1_SYSCALL(x) PT_REGS_PARM1_CORE_SYSCALL(x)
#define PT_REGS_PARM1_CORE_SYSCALL(x) \
 BPF_CORE_READ((const struct pt_regs___arm64 *)(x),
 __PT_PARM1_SYSCALL_REG)

#define __PT_RET_REG regs[30]
#define __PT_FP_REG regs[29] /* Works only with CONFIG_FRAME_POINTER */
#define __PT_RC_REG regs[0]
#define __PT_SP_REG sp
#define __PT_IP_REG pc

#elif defined(bpf_target_mips)

/*
* N64 ABI is assumed right now.
* https://en.wikipedia.org/wiki/MIPS_architecture#Calling_conventions
*/

#define __PT_PARM1_REG regs[4]
#define __PT_PARM2_REG regs[5]
#define __PT_PARM3_REG regs[6]
#define __PT_PARM4_REG regs[7]
#define __PT_PARM5_REG regs[8]
#define __PT_PARM6_REG regs[9]
#define __PT_PARM7_REG regs[10]
```

```
#define __PT_PARM8_REG regs[11]

#define __PT_PARM1_SYSCALL_REG __PT_PARM1_REG
#define __PT_PARM2_SYSCALL_REG __PT_PARM2_REG
#define __PT_PARM3_SYSCALL_REG __PT_PARM3_REG
#define __PT_PARM4_SYSCALL_REG __PT_PARM4_REG
#define __PT_PARM5_SYSCALL_REG __PT_PARM5_REG /* only N32/N64 */
#define __PT_PARM6_SYSCALL_REG __PT_PARM6_REG /* only N32/N64 */

#define __PT_RET_REG regs[31]
#define __PT_FP_REG regs[30] /* Works only with CONFIG_FRAME_POINTER
 */
#define __PT_RC_REG regs[2]
#define __PT_SP_REG regs[29]
#define __PT_IP_REG cp0_epc

#elif defined(bpf_target_powerpc)

/*
* http://refspecs.linux-foundation.org/elf/elfspec_ppc.pdf (page 3-14,
* section "Function Calling Sequence")
*/

#define __PT_PARM1_REG gpr[3]
#define __PT_PARM2_REG gpr[4]
#define __PT_PARM3_REG gpr[5]
#define __PT_PARM4_REG gpr[6]
#define __PT_PARM5_REG gpr[7]
#define __PT_PARM6_REG gpr[8]
#define __PT_PARM7_REG gpr[9]
#define __PT_PARM8_REG gpr[10]

/* powerpc does not select ARCH_HAS_SYSCALL_WRAPPER. */
#define PT_REGS_SYSCALL_REGS(ctx) ctx
#define __PT_PARM1_SYSCALL_REG orig_gpr3
#define __PT_PARM2_SYSCALL_REG __PT_PARM2_REG
#define __PT_PARM3_SYSCALL_REG __PT_PARM3_REG
#define __PT_PARM4_SYSCALL_REG __PT_PARM4_REG
#define __PT_PARM5_SYSCALL_REG __PT_PARM5_REG
#define __PT_PARM6_SYSCALL_REG __PT_PARM6_REG
#if !defined(__arch64__)
#define __PT_PARM7_SYSCALL_REG __PT_PARM7_REG /* only powerpc (not powerpc64) */
#endif

#define __PT_RET_REG regs[31]
#define
 __PT_FP_REG __unsupported__
#define __PT_RC_REG gpr[3]
```

```
#define __PT_SP_REG sp
#define __PT_IP_REG nip

#elif defined(bpf_target_sparc)

/*
* https://en.wikipedia.org/wiki/Calling_convention#SPARC
*/

#define __PT_PARM1_REG u_regs[UREG_I0]
#define __PT_PARM2_REG u_regs[UREG_I1]
#define __PT_PARM3_REG u_regs[UREG_I2]
#define __PT_PARM4_REG u_regs[UREG_I3]
#define __PT_PARM5_REG u_regs[UREG_I4]
#define __PT_PARM6_REG u_regs[UREG_I5]

#define __PT_PARM1_SYSCALL_REG __PT_PARM1_REG
#define __PT_PARM2_SYSCALL_REG __PT_PARM2_REG
#define __PT_PARM3_SYSCALL_REG __PT_PARM3_REG
#define __PT_PARM4_SYSCALL_REG __PT_PARM4_REG
#define __PT_PARM5_SYSCALL_REG __PT_PARM5_REG
#define __PT_PARM6_SYSCALL_REG __PT_PARM6_REG

#define __PT_RET_REG u_regs[UREG_I7]
#define __PT_FP_REG __unsupported__
#define __PT_RC_REG u_regs[UREG_I0]
#define __PT_SP_REG u_regs[UREG_FP]
/* Should this also be a bpf_target check for the sparc case? */
#if defined(__arch64__)
#define __PT_IP_REG tpc
#else
#define
 __PT_IP_REG pc
#endif

#elif defined(bpf_target_riscv)

/*
* https://github.com/riscv-non-isa/riscv-elf-psabi-doc/blob/master/riscv-cc.adoc#risc-v-calling-conventions
*/

/* riscv provides struct user_regs_struct instead of struct pt_regs to userspace */
#define __PT_REGS_CAST(x) ((const struct user_regs_struct *)(x))
#define __PT_PARM1_REG a0
#define __PT_PARM2_REG a1
#define __PT_PARM3_REG a2
#define __PT_PARM4_REG a3
#define __PT_PARM5_REG a4
```

```
#define __PT_PARM6_REG a5
#define __PT_PARM7_REG a6
#define __PT_PARM8_REG a7

#define __PT_PARM1_SYSCALL_REG __PT_PARM1_REG
#define __PT_PARM2_SYSCALL_REG __PT_PARM2_REG
#define __PT_PARM3_SYSCALL_REG __PT_PARM3_REG
#define __PT_PARM4_SYSCALL_REG __PT_PARM4_REG
#define __PT_PARM5_SYSCALL_REG __PT_PARM5_REG
#define __PT_PARM6_SYSCALL_REG __PT_PARM6_REG

#define __PT_RET_REG ra
#define __PT_FP_REG s0
#define __PT_RC_REG a0
#define __PT_SP_REG sp
#define __PT_IP_REG pc

#elif defined(bpf_target_arc)

/*
* Section "Function Calling Sequence" (page
 24):
* https://raw.githubusercontent.com/wiki/foss-for-synopsys-dwc-arc-processors/toolchain/files/ARCv2_ABI.pdf
*/

/* arc provides struct user_regs_struct instead of struct pt_regs to userspace */
#define __PT_REGS_CAST(x) ((const struct user_regs_struct *)(x))
#define __PT_PARM1_REG scratch.r0
#define __PT_PARM2_REG scratch.r1
#define __PT_PARM3_REG scratch.r2
#define __PT_PARM4_REG scratch.r3
#define __PT_PARM5_REG scratch.r4
#define __PT_PARM6_REG scratch.r5
#define __PT_PARM7_REG scratch.r6
#define __PT_PARM8_REG scratch.r7

/* arc does not select ARCH_HAS_SYSCALL_WRAPPER. */
#define PT_REGS_SYSCALL_REGS(ctx) ctx
#define __PT_PARM1_SYSCALL_REG __PT_PARM1_REG
#define __PT_PARM2_SYSCALL_REG __PT_PARM2_REG
#define __PT_PARM3_SYSCALL_REG __PT_PARM3_REG
#define __PT_PARM4_SYSCALL_REG __PT_PARM4_REG
#define __PT_PARM5_SYSCALL_REG __PT_PARM5_REG
#define __PT_PARM6_SYSCALL_REG __PT_PARM6_REG

#define __PT_RET_REG scratch.blink
#define __PT_FP_REG scratch.fp
#define __PT_RC_REG scratch.r0
```

```
#define
 __PT_SP_REG scratch.sp
#define __PT_IP_REG scratch.ret

#elif defined(bpf_target_loongarch)

/*
* https://docs.kernel.org/loongarch/introduction.html
* https://loongson.github.io/LoongArch-Documentation/LoongArch-ELF-ABI-EN.html
*/

/* loongarch provides struct user_pt_regs instead of struct pt_regs to userspace */
#define __PT_REGS_CAST(x) ((const struct user_pt_regs *)(x))
#define __PT_PARM1_REG regs[4]
#define __PT_PARM2_REG regs[5]
#define __PT_PARM3_REG regs[6]
#define __PT_PARM4_REG regs[7]
#define __PT_PARM5_REG regs[8]
#define __PT_PARM6_REG regs[9]
#define __PT_PARM7_REG regs[10]
#define __PT_PARM8_REG regs[11]

/* loongarch does not select ARCH_HAS_SYSCALL_WRAPPER. */
#define PT_REGS_SYSCALL_REGS(ctx) ctx
#define __PT_PARM1_SYSCALL_REG __PT_PARM1_REG
#define __PT_PARM2_SYSCALL_REG __PT_PARM2_REG
#define __PT_PARM3_SYSCALL_REG __PT_PARM3_REG
#define __PT_PARM4_SYSCALL_REG __PT_PARM4_REG
#define __PT_PARM5_SYSCALL_REG __PT_PARM5_REG
#define __PT_PARM6_SYSCALL_REG
 __PT_PARM6_REG

#define __PT_RET_REG regs[1]
#define __PT_FP_REG regs[22]
#define __PT_RC_REG regs[4]
#define __PT_SP_REG regs[3]
#define __PT_IP_REG csr_era

#endif

#if defined(bpf_target_defined)

struct pt_regs;

/* allow some architectures to override `struct pt_regs` */
#ifndef __PT_REGS_CAST
#define __PT_REGS_CAST(x) (x)
#endif
```

```
/*
* Different architectures support different number of arguments passed
* through registers. i386 supports just 3, some arches support up to 8.
*/
#ifndef __PT_PARM4_REG
#define __PT_PARM4_REG __unsupported__
#endif
#ifndef __PT_PARM5_REG
#define __PT_PARM5_REG __unsupported__
#endif
#ifndef __PT_PARM6_REG
#define __PT_PARM6_REG __unsupported__
#endif
#ifndef __PT_PARM7_REG
#define __PT_PARM7_REG __unsupported__
#endif
#ifndef __PT_PARM8_REG
#define __PT_PARM8_REG __unsupported__
#endif
/*
* Similarly, syscall-specific conventions might differ between function call
* conventions within each architecutre. All supported architectures pass
* either
 6 or 7 syscall arguments in registers.
*
* See syscall(2) manpage for succinct table with information on each arch.
*/
#ifndef __PT_PARM7_SYSCALL_REG
#define __PT_PARM7_SYSCALL_REG __unsupported__
#endif

#define PT_REGS_PARM1(x) (__PT_REGS_CAST(x)->__PT_PARM1_REG)
#define PT_REGS_PARM2(x) (__PT_REGS_CAST(x)->__PT_PARM2_REG)
#define PT_REGS_PARM3(x) (__PT_REGS_CAST(x)->__PT_PARM3_REG)
#define PT_REGS_PARM4(x) (__PT_REGS_CAST(x)->__PT_PARM4_REG)
#define PT_REGS_PARM5(x) (__PT_REGS_CAST(x)->__PT_PARM5_REG)
#define PT_REGS_PARM6(x) (__PT_REGS_CAST(x)->__PT_PARM6_REG)
#define PT_REGS_PARM7(x) (__PT_REGS_CAST(x)->__PT_PARM7_REG)
#define PT_REGS_PARM8(x) (__PT_REGS_CAST(x)->__PT_PARM8_REG)
#define PT_REGS_RET(x) (__PT_REGS_CAST(x)->__PT_RET_REG)
#define PT_REGS_FP(x) (__PT_REGS_CAST(x)->__PT_FP_REG)
#define PT_REGS_RC(x) (__PT_REGS_CAST(x)->__PT_RC_REG)
#define PT_REGS_SP(x) (__PT_REGS_CAST(x)->__PT_SP_REG)
#define PT_REGS_IP(x) (__PT_REGS_CAST(x)->__PT_IP_REG)

#define PT_REGS_PARM1_CORE(x)
```

```
 BPF_CORE_READ(__PT_REGS_CAST(x), __PT_PARM1_REG)
#define PT_REGS_PARM2_CORE(x) BPF_CORE_READ(__PT_REGS_CAST(x), __PT_PARM2_REG)
#define PT_REGS_PARM3_CORE(x) BPF_CORE_READ(__PT_REGS_CAST(x), __PT_PARM3_REG)
#define PT_REGS_PARM4_CORE(x) BPF_CORE_READ(__PT_REGS_CAST(x), __PT_PARM4_REG)
#define PT_REGS_PARM5_CORE(x) BPF_CORE_READ(__PT_REGS_CAST(x), __PT_PARM5_REG)
#define PT_REGS_PARM6_CORE(x) BPF_CORE_READ(__PT_REGS_CAST(x), __PT_PARM6_REG)
#define PT_REGS_PARM7_CORE(x) BPF_CORE_READ(__PT_REGS_CAST(x), __PT_PARM7_REG)
#define PT_REGS_PARM8_CORE(x) BPF_CORE_READ(__PT_REGS_CAST(x), __PT_PARM8_REG)
#define PT_REGS_RET_CORE(x) BPF_CORE_READ(__PT_REGS_CAST(x), __PT_RET_REG)
#define PT_REGS_FP_CORE(x) BPF_CORE_READ(__PT_REGS_CAST(x), __PT_FP_REG)
#define PT_REGS_RC_CORE(x) BPF_CORE_READ(__PT_REGS_CAST(x), __PT_RC_REG)
#define PT_REGS_SP_CORE(x) BPF_CORE_READ(__PT_REGS_CAST(x), __PT_SP_REG)
#define PT_REGS_IP_CORE(x) BPF_CORE_READ(__PT_REGS_CAST(x), __PT_IP_REG)

#if defined(bpf_target_powerpc)

#define
 BPF_KPROBE_READ_RET_IP(ip, ctx)  ({ (ip) = (ctx)->link; })
#define BPF_KRETPROBE_READ_RET_IP  BPF_KPROBE_READ_RET_IP

#elif defined(bpf_target_sparc)

#define BPF_KPROBE_READ_RET_IP(ip, ctx)  ({ (ip) = PT_REGS_RET(ctx); })
#define BPF_KRETPROBE_READ_RET_IP  BPF_KPROBE_READ_RET_IP

#else

#define BPF_KPROBE_READ_RET_IP(ip, ctx)        \
 ({ bpf_probe_read_kernel(&(ip), sizeof(ip), (void *)PT_REGS_RET(ctx)); })
#define BPF_KRETPROBE_READ_RET_IP(ip, ctx)       \
 ({ bpf_probe_read_kernel(&(ip), sizeof(ip), (void *)(PT_REGS_FP(ctx) + sizeof(ip))); })

#endif

#ifndef PT_REGS_PARM1_SYSCALL
#define PT_REGS_PARM1_SYSCALL(x) (__PT_REGS_CAST(x)->__PT_PARM1_SYSCALL_REG)
#define PT_REGS_PARM1_CORE_SYSCALL(x) BPF_CORE_READ(__PT_REGS_CAST(x),
__PT_PARM1_SYSCALL_REG)
#endif
#ifndef PT_REGS_PARM2_SYSCALL
#define PT_REGS_PARM2_SYSCALL(x) (__PT_REGS_CAST(x)->__PT_PARM2_SYSCALL_REG)
#define PT_REGS_PARM2_CORE_SYSCALL(x) BPF_CORE_READ(__PT_REGS_CAST(x),
__PT_PARM2_SYSCALL_REG)
#endif
#ifndef
 PT_REGS_PARM3_SYSCALL
#define PT_REGS_PARM3_SYSCALL(x) (__PT_REGS_CAST(x)->__PT_PARM3_SYSCALL_REG)
#define PT_REGS_PARM3_CORE_SYSCALL(x) BPF_CORE_READ(__PT_REGS_CAST(x),
```

```
__PT_PARM3_SYSCALL_REG)
#endif
#ifndef PT_REGS_PARM4_SYSCALL
#define PT_REGS_PARM4_SYSCALL(x) (__PT_REGS_CAST(x)->__PT_PARM4_SYSCALL_REG)
#define PT_REGS_PARM4_CORE_SYSCALL(x) BPF_CORE_READ(__PT_REGS_CAST(x),
__PT_PARM4_SYSCALL_REG)
#endif
#ifndef PT_REGS_PARM5_SYSCALL
#define PT_REGS_PARM5_SYSCALL(x) (__PT_REGS_CAST(x)->__PT_PARM5_SYSCALL_REG)
#define PT_REGS_PARM5_CORE_SYSCALL(x) BPF_CORE_READ(__PT_REGS_CAST(x),
__PT_PARM5_SYSCALL_REG)
#endif
#ifndef PT_REGS_PARM6_SYSCALL
#define PT_REGS_PARM6_SYSCALL(x) (__PT_REGS_CAST(x)->__PT_PARM6_SYSCALL_REG)
#define PT_REGS_PARM6_CORE_SYSCALL(x) BPF_CORE_READ(__PT_REGS_CAST(x),
__PT_PARM6_SYSCALL_REG)
#endif
#ifndef PT_REGS_PARM7_SYSCALL
#define PT_REGS_PARM7_SYSCALL(x) (__PT_REGS_CAST(x)->__PT_PARM7_SYSCALL_REG)
#define PT_REGS_PARM7_CORE_SYSCALL(x) BPF_CORE_READ(__PT_REGS_CAST(x),
 __PT_PARM7_SYSCALL_REG)
#endif

#else /* defined(bpf_target_defined) */

#define PT_REGS_PARM1(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_PARM2(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_PARM3(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_PARM4(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_PARM5(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_PARM6(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_PARM7(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_PARM8(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_RET(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_FP(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_RC(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_SP(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_IP(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })

#define PT_REGS_PARM1_CORE(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l;
 })
#define PT_REGS_PARM2_CORE(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_PARM3_CORE(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_PARM4_CORE(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_PARM5_CORE(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_PARM6_CORE(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_PARM7_CORE(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_PARM8_CORE(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
```

```
#define PT_REGS_RET_CORE(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_FP_CORE(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_RC_CORE(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_SP_CORE(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_IP_CORE(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })

#define BPF_KPROBE_READ_RET_IP(ip, ctx) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define BPF_KRETPROBE_READ_RET_IP(ip, ctx) ({ _Pragma(__BPF_TARGET_MISSING);
 0l; })

#define PT_REGS_PARM1_SYSCALL(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_PARM2_SYSCALL(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_PARM3_SYSCALL(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_PARM4_SYSCALL(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_PARM5_SYSCALL(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_PARM6_SYSCALL(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_PARM7_SYSCALL(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })

#define PT_REGS_PARM1_CORE_SYSCALL(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_PARM2_CORE_SYSCALL(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_PARM3_CORE_SYSCALL(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_PARM4_CORE_SYSCALL(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_PARM5_CORE_SYSCALL(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define PT_REGS_PARM6_CORE_SYSCALL(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })
#define
 PT_REGS_PARM7_CORE_SYSCALL(x) ({ _Pragma(__BPF_TARGET_MISSING); 0l; })

#endif /* defined(bpf_target_defined) */

/*
* When invoked from a syscall handler kprobe, returns a pointer to a
* struct pt_regs containing syscall arguments and suitable for passing to
* PT_REGS_PARMn_SYSCALL() and PT_REGS_PARMn_CORE_SYSCALL().
*/
#ifndef PT_REGS_SYSCALL_REGS
/* By default, assume that the arch selects ARCH_HAS_SYSCALL_WRAPPER. */
#define PT_REGS_SYSCALL_REGS(ctx) ((struct pt_regs *)PT_REGS_PARM1(ctx))
#endif

#ifndef ___bpf_concat
#define ___bpf_concat(a, b) a ## b
#endif
#ifndef ___bpf_apply
#define ___bpf_apply(fn, n) ___bpf_concat(fn, n)
#endif
#ifndef ___bpf_nth
#define ___bpf_nth(_, _1, _2, _3, _4, _5, _6, _7, _8, _9, _a, _b, _c, N, ...) N
#endif
```

```
#ifndef ___bpf_narg
#define ___bpf_narg(...) ___bpf_nth(_, ##__VA_ARGS__, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1, 0)
#endif

#define ___bpf_ctx_cast0()          ctx
#define ___bpf_ctx_cast1(x)         ___bpf_ctx_cast0(), (void *)ctx[0]
#define
 ___bpf_ctx_cast2(x, args...)  ___bpf_ctx_cast1(args), (void *)ctx[1]
#define ___bpf_ctx_cast3(x, args...)  ___bpf_ctx_cast2(args), (void *)ctx[2]
#define ___bpf_ctx_cast4(x, args...)  ___bpf_ctx_cast3(args), (void *)ctx[3]
#define ___bpf_ctx_cast5(x, args...)  ___bpf_ctx_cast4(args), (void *)ctx[4]
#define ___bpf_ctx_cast6(x, args...)  ___bpf_ctx_cast5(args), (void *)ctx[5]
#define ___bpf_ctx_cast7(x, args...)  ___bpf_ctx_cast6(args), (void *)ctx[6]
#define ___bpf_ctx_cast8(x, args...)  ___bpf_ctx_cast7(args), (void *)ctx[7]
#define ___bpf_ctx_cast9(x, args...)  ___bpf_ctx_cast8(args), (void *)ctx[8]
#define ___bpf_ctx_cast10(x, args...) ___bpf_ctx_cast9(args), (void *)ctx[9]
#define ___bpf_ctx_cast11(x, args...) ___bpf_ctx_cast10(args), (void *)ctx[10]
#define ___bpf_ctx_cast12(x, args...) ___bpf_ctx_cast11(args), (void *)ctx[11]
#define ___bpf_ctx_cast(args...)      ___bpf_apply(___bpf_ctx_cast, ___bpf_narg(args))(args)

/*
* BPF_PROG is a convenience wrapper for generic
 tp_btf/fentry/fexit and
* similar kinds of BPF programs, that accept input arguments as a single
* pointer to untyped u64 array, where each u64 can actually be a typed
* pointer or integer of different size. Instead of requring user to write
* manual casts and work with array elements by index, BPF_PROG macro
* allows user to declare a list of named and typed input arguments in the
* same syntax as for normal C function. All the casting is hidden and
* performed transparently, while user code can just assume working with
* function arguments of specified type and name.
*
* Original raw context argument is preserved as well as 'ctx' argument.
* This is useful when using BPF helpers that expect original context
* as one of the parameters (e.g., for bpf_perf_event_output()).
*/
#define BPF_PROG(name, args...)         \
name(unsigned long long *ctx);          \
static __always_inline typeof(name(0))        \
____##name(unsigned long long *ctx, ##args);       \
typeof(name(0))
 name(unsigned long long *ctx)       \
{            \
 _Pragma("GCC diagnostic push")        \
 _Pragma("GCC diagnostic ignored \"-Wint-conversion\"")      \
 return ____##name(___bpf_ctx_cast(args));       \
 _Pragma("GCC diagnostic pop")        \
}            \
```

```
static __always_inline typeof(name(0))        \
____##name(unsigned long long *ctx, ##args)

#ifndef ___bpf_nth2
#define ___bpf_nth2(_, _1, _2, _3, _4, _5, _6, _7, _8, _9, _10, _11, _12, _13, \
     _14, _15, _16, _17, _18, _19, _20, _21, _22, _23, _24, N, ...) N
#endif
#ifndef ___bpf_narg2
#define ___bpf_narg2(...) \
 ___bpf_nth2(_, ##__VA_ARGS__, 12, 12, 11, 11, 10, 10, 9, 9, 8, 8, 7, 7, \
     6, 6, 5, 5, 4, 4, 3, 3, 2, 2, 1, 1, 0)
#endif

#define ___bpf_treg_cnt(t) \
 __builtin_choose_expr(sizeof(t) == 1, 1, \
 __builtin_choose_expr(sizeof(t) == 2, 1, \
 __builtin_choose_expr(sizeof(t) == 4, 1, \
 __builtin_choose_expr(sizeof(t) == 8, 1, \
 __builtin_choose_expr(sizeof(t) == 16, 2, \
        (void)0)))))

#define
 ___bpf_reg_cnt0()  (0)
#define ___bpf_reg_cnt1(t, x)  (___bpf_reg_cnt0() + ___bpf_treg_cnt(t))
#define ___bpf_reg_cnt2(t, x, args...) (___bpf_reg_cnt1(args) + ___bpf_treg_cnt(t))
#define ___bpf_reg_cnt3(t, x, args...) (___bpf_reg_cnt2(args) + ___bpf_treg_cnt(t))
#define ___bpf_reg_cnt4(t, x, args...) (___bpf_reg_cnt3(args) + ___bpf_treg_cnt(t))
#define ___bpf_reg_cnt5(t, x, args...) (___bpf_reg_cnt4(args) + ___bpf_treg_cnt(t))
#define ___bpf_reg_cnt6(t, x, args...) (___bpf_reg_cnt5(args) + ___bpf_treg_cnt(t))
#define ___bpf_reg_cnt7(t, x, args...) (___bpf_reg_cnt6(args) + ___bpf_treg_cnt(t))
#define ___bpf_reg_cnt8(t, x, args...) (___bpf_reg_cnt7(args) + ___bpf_treg_cnt(t))
#define ___bpf_reg_cnt9(t, x, args...) (___bpf_reg_cnt8(args) + ___bpf_treg_cnt(t))
#define ___bpf_reg_cnt10(t, x, args...) (___bpf_reg_cnt9(args) + ___bpf_treg_cnt(t))
#define ___bpf_reg_cnt11(t, x, args...) (___bpf_reg_cnt10(args) + ___bpf_treg_cnt(t))
#define ___bpf_reg_cnt12(t, x, args...) (___bpf_reg_cnt11(args)
 + ___bpf_treg_cnt(t))
#define ___bpf_reg_cnt(args...)  ___bpf_apply(___bpf_reg_cnt, ___bpf_narg2(args))(args)

#define ___bpf_union_arg(t, x, n) \
 __builtin_choose_expr(sizeof(t) == 1, ({ union { __u8 z[1]; t x; } ___t = { .z = {ctx[n]}}; ___t.x; }), \
 __builtin_choose_expr(sizeof(t) == 2, ({ union { __u16 z[1]; t x; } ___t = { .z = {ctx[n]} }; ___t.x; }), \
 __builtin_choose_expr(sizeof(t) == 4, ({ union { __u32 z[1]; t x; } ___t = { .z = {ctx[n]} }; ___t.x; }), \
 __builtin_choose_expr(sizeof(t) == 8, ({ union { __u64 z[1]; t x; } ___t = {.z = {ctx[n]} }; ___t.x; }), \
 __builtin_choose_expr(sizeof(t) == 16, ({ union { __u64 z[2]; t x; } ___t = {.z = {ctx[n], ctx[n + 1]} }; ___t.x; }), \
        (void)0)))))

#define ___bpf_ctx_arg0(n, args...)
#define ___bpf_ctx_arg1(n, t, x)  , ___bpf_union_arg(t, x, n - ___bpf_reg_cnt1(t, x))
```

```
#define ___bpf_ctx_arg2(n, t, x, args...) , ___bpf_union_arg(t, x, n - ___bpf_reg_cnt2(t, x, args)) ___bpf_ctx_arg1(n, args)
#define ___bpf_ctx_arg3(n,
 t, x, args...) , ___bpf_union_arg(t, x, n - ___bpf_reg_cnt3(t, x, args)) ___bpf_ctx_arg2(n, args)
#define ___bpf_ctx_arg4(n, t, x, args...) , ___bpf_union_arg(t, x, n - ___bpf_reg_cnt4(t, x, args)) ___bpf_ctx_arg3(n, args)
#define ___bpf_ctx_arg5(n, t, x, args...) , ___bpf_union_arg(t, x, n - ___bpf_reg_cnt5(t, x, args)) ___bpf_ctx_arg4(n, args)
#define ___bpf_ctx_arg6(n, t, x, args...) , ___bpf_union_arg(t, x, n - ___bpf_reg_cnt6(t, x, args)) ___bpf_ctx_arg5(n, args)
#define ___bpf_ctx_arg7(n, t, x, args...) , ___bpf_union_arg(t, x, n - ___bpf_reg_cnt7(t, x, args)) ___bpf_ctx_arg6(n, args)
#define ___bpf_ctx_arg8(n, t, x, args...) , ___bpf_union_arg(t, x, n - ___bpf_reg_cnt8(t, x, args)) ___bpf_ctx_arg7(n, args)
#define ___bpf_ctx_arg9(n, t, x, args...) , ___bpf_union_arg(t, x, n - ___bpf_reg_cnt9(t, x, args)) ___bpf_ctx_arg8(n, args)
#define ___bpf_ctx_arg10(n, t, x, args...) , ___bpf_union_arg(t, x, n - ___bpf_reg_cnt10(t, x, args)) ___bpf_ctx_arg9(n, args)
#define ___bpf_ctx_arg11(n,
 t, x, args...) , ___bpf_union_arg(t, x, n - ___bpf_reg_cnt11(t, x, args)) ___bpf_ctx_arg10(n, args)
#define ___bpf_ctx_arg12(n, t, x, args...) , ___bpf_union_arg(t, x, n - ___bpf_reg_cnt12(t, x, args)) ___bpf_ctx_arg11(n, args)
#define ___bpf_ctx_arg(args...) ___bpf_apply(___bpf_ctx_arg, ___bpf_narg2(args))(___bpf_reg_cnt(args), args)

#define ___bpf_ctx_decl0()
#define ___bpf_ctx_decl1(t, x)   , t x
#define ___bpf_ctx_decl2(t, x, args...)  , t x ___bpf_ctx_decl1(args)
#define ___bpf_ctx_decl3(t, x, args...)  , t x ___bpf_ctx_decl2(args)
#define ___bpf_ctx_decl4(t, x, args...)  , t x ___bpf_ctx_decl3(args)
#define ___bpf_ctx_decl5(t, x, args...)  , t x ___bpf_ctx_decl4(args)
#define ___bpf_ctx_decl6(t, x, args...)  , t x ___bpf_ctx_decl5(args)
#define ___bpf_ctx_decl7(t, x, args...)  , t x ___bpf_ctx_decl6(args)
#define ___bpf_ctx_decl8(t, x, args...)  , t x ___bpf_ctx_decl7(args)
#define ___bpf_ctx_decl9(t, x, args...)  , t x ___bpf_ctx_decl8(args)
#define ___bpf_ctx_decl10(t,
 x, args...) , t x ___bpf_ctx_decl9(args)
#define ___bpf_ctx_decl11(t, x, args...) , t x ___bpf_ctx_decl10(args)
#define ___bpf_ctx_decl12(t, x, args...) , t x ___bpf_ctx_decl11(args)
#define ___bpf_ctx_decl(args...) ___bpf_apply(___bpf_ctx_decl, ___bpf_narg2(args))(args)

/*
* BPF_PROG2 is an enhanced version of BPF_PROG in order to handle struct
* arguments. Since each struct argument might take one or two u64 values
* in the trampoline stack, argument type size is needed to place proper number
* of u64 values for each argument. Therefore, BPF_PROG2 has different
* syntax from BPF_PROG. For example, for the following BPF_PROG syntax:
*
*   int BPF_PROG(test2, int a, int b) { ... }
```

```
*
* the corresponding BPF_PROG2 syntax is:
*
*   int BPF_PROG2(test2, int, a, int, b) { ... }
*
* where type and the corresponding argument name are separated by comma.
*
* Use BPF_PROG2 macro if one of the arguments might be a struct/union larger
* than 8 bytes:
*
*   int BPF_PROG2(test_struct_arg,
 struct bpf_testmod_struct_arg_1, a, int, b,
*     int, c, int, d, struct bpf_testmod_struct_arg_2, e, int, ret)
*   {
*       // access a, b, c, d, e, and ret directly
*       ...
*   }
*/
#define BPF_PROG2(name, args...)      \
name(unsigned long long *ctx);       \
static __always_inline typeof(name(0))      \
____##name(unsigned long long *ctx ___bpf_ctx_decl(args));   \
typeof(name(0)) name(unsigned long long *ctx)     \
{         \
 return ____##name(ctx ___bpf_ctx_arg(args));    \
}         \
static __always_inline typeof(name(0))      \
____##name(unsigned long long *ctx ___bpf_ctx_decl(args))

struct pt_regs;

#define ___bpf_kprobe_args0()           ctx
#define ___bpf_kprobe_args1(x)          ___bpf_kprobe_args0(), (void *)PT_REGS_PARM1(ctx)
#define ___bpf_kprobe_args2(x, args...) ___bpf_kprobe_args1(args), (void *)PT_REGS_PARM2(ctx)
#define ___bpf_kprobe_args3(x, args...) ___bpf_kprobe_args2(args), (void *)PT_REGS_PARM3(ctx)
#define ___bpf_kprobe_args4(x,
 args...) ___bpf_kprobe_args3(args), (void *)PT_REGS_PARM4(ctx)
#define ___bpf_kprobe_args5(x, args...) ___bpf_kprobe_args4(args), (void *)PT_REGS_PARM5(ctx)
#define ___bpf_kprobe_args6(x, args...) ___bpf_kprobe_args5(args), (void *)PT_REGS_PARM6(ctx)
#define ___bpf_kprobe_args7(x, args...) ___bpf_kprobe_args6(args), (void *)PT_REGS_PARM7(ctx)
#define ___bpf_kprobe_args8(x, args...) ___bpf_kprobe_args7(args), (void *)PT_REGS_PARM8(ctx)
#define ___bpf_kprobe_args(args...)     ___bpf_apply(___bpf_kprobe_args, ___bpf_narg(args))(args)

/*
* BPF_KPROBE serves the same purpose for kprobes as BPF_PROG for
* tp_btf/fentry/fexit BPF programs. It hides the underlying platform-specific
* low-level way of getting kprobe input arguments from struct pt_regs, and
* provides a familiar typed and named function arguments syntax and
```

```
* semantics of accessing kprobe input paremeters.
*
* Original struct pt_regs* context is preserved as 'ctx' argument. This might
* be necessary when using BPF helpers
 like bpf_perf_event_output().
*/
#define BPF_KPROBE(name, args...)        \
name(struct pt_regs *ctx);         \
static __always_inline typeof(name(0))        \
____##name(struct pt_regs *ctx, ##args);        \
typeof(name(0)) name(struct pt_regs *ctx)        \
{            \
 _Pragma("GCC diagnostic push")        \
 _Pragma("GCC diagnostic ignored \"-Wint-conversion\"")      \
 return ____##name(___bpf_kprobe_args(args));       \
 _Pragma("GCC diagnostic pop")        \
}            \
static __always_inline typeof(name(0))        \
____##name(struct pt_regs *ctx, ##args)

#define ___bpf_kretprobe_args0()       ctx
#define ___bpf_kretprobe_args1(x)      ___bpf_kretprobe_args0(), (void *)PT_REGS_RC(ctx)
#define ___bpf_kretprobe_args(args...) ___bpf_apply(___bpf_kretprobe_args, ___bpf_narg(args))(args)

/*
* BPF_KRETPROBE is similar to BPF_KPROBE, except, it only provides optional
* return value (in addition to `struct pt_regs *ctx`), but no input
* arguments, because they
 will be clobbered by the time probed function
* returns.
*/
#define BPF_KRETPROBE(name, args...)        \
name(struct pt_regs *ctx);         \
static __always_inline typeof(name(0))        \
____##name(struct pt_regs *ctx, ##args);        \
typeof(name(0)) name(struct pt_regs *ctx)        \
{            \
 _Pragma("GCC diagnostic push")        \
 _Pragma("GCC diagnostic ignored \"-Wint-conversion\"")      \
 return ____##name(___bpf_kretprobe_args(args));       \
 _Pragma("GCC diagnostic pop")        \
}            \
static __always_inline typeof(name(0)) ____##name(struct pt_regs *ctx, ##args)

/* If kernel has CONFIG_ARCH_HAS_SYSCALL_WRAPPER, read pt_regs directly */
#define ___bpf_syscall_args0()          ctx
#define ___bpf_syscall_args1(x)         ___bpf_syscall_args0(), (void *)PT_REGS_PARM1_SYSCALL(regs)
#define ___bpf_syscall_args2(x, args...) ___bpf_syscall_args1(args), (void *)PT_REGS_PARM2_SYSCALL(regs)
```

```
#define ___bpf_syscall_args3(x, args...) ___bpf_syscall_args2(args),
 (void *)PT_REGS_PARM3_SYSCALL(regs)
#define ___bpf_syscall_args4(x, args...) ___bpf_syscall_args3(args), (void *)PT_REGS_PARM4_SYSCALL(regs)
#define ___bpf_syscall_args5(x, args...) ___bpf_syscall_args4(args), (void *)PT_REGS_PARM5_SYSCALL(regs)
#define ___bpf_syscall_args6(x, args...) ___bpf_syscall_args5(args), (void *)PT_REGS_PARM6_SYSCALL(regs)
#define ___bpf_syscall_args7(x, args...) ___bpf_syscall_args6(args), (void *)PT_REGS_PARM7_SYSCALL(regs)
#define ___bpf_syscall_args(args...)     ___bpf_apply(___bpf_syscall_args, ___bpf_narg(args))(args)

/* If kernel doesn't have CONFIG_ARCH_HAS_SYSCALL_WRAPPER, we have to BPF_CORE_READ from
pt_regs */
#define ___bpf_syswrap_args0()          ctx
#define ___bpf_syswrap_args1(x)         ___bpf_syswrap_args0(), (void
*)PT_REGS_PARM1_CORE_SYSCALL(regs)
#define ___bpf_syswrap_args2(x, args...) ___bpf_syswrap_args1(args), (void
*)PT_REGS_PARM2_CORE_SYSCALL(regs)
#define ___bpf_syswrap_args3(x, args...) ___bpf_syswrap_args2(args), (void
 *)PT_REGS_PARM3_CORE_SYSCALL(regs)
#define ___bpf_syswrap_args4(x, args...) ___bpf_syswrap_args3(args), (void
*)PT_REGS_PARM4_CORE_SYSCALL(regs)
#define ___bpf_syswrap_args5(x, args...) ___bpf_syswrap_args4(args), (void
*)PT_REGS_PARM5_CORE_SYSCALL(regs)
#define ___bpf_syswrap_args6(x, args...) ___bpf_syswrap_args5(args), (void
*)PT_REGS_PARM6_CORE_SYSCALL(regs)
#define ___bpf_syswrap_args7(x, args...) ___bpf_syswrap_args6(args), (void
*)PT_REGS_PARM7_CORE_SYSCALL(regs)
#define ___bpf_syswrap_args(args...)     ___bpf_apply(___bpf_syswrap_args, ___bpf_narg(args))(args)

/*
* BPF_KSYSCALL is a variant of BPF_KPROBE, which is intended for
* tracing syscall functions, like __x64_sys_close. It hides the underlying
* platform-specific low-level way of getting syscall input arguments from
* struct pt_regs, and provides a familiar typed and named function arguments
* syntax and semantics of accessing syscall input parameters.
*
* Original struct pt_regs * context is preserved as 'ctx' argument.
 This might
* be necessary when using BPF helpers like bpf_perf_event_output().
*
* At the moment BPF_KSYSCALL does not transparently handle all the calling
* convention quirks for the following syscalls:
*
* - mmap(): __ARCH_WANT_SYS_OLD_MMAP.
* - clone(): CONFIG_CLONE_BACKWARDS, CONFIG_CLONE_BACKWARDS2 and
*            CONFIG_CLONE_BACKWARDS3.
* - socket-related syscalls: __ARCH_WANT_SYS_SOCKETCALL.
* - compat syscalls.
*
* This may or may not change in the future. User needs to take extra measures
```

```
* to handle such quirks explicitly, if necessary.
*
* This macro relies on BPF CO-RE support and virtual __kconfig externs.
*/
#define BPF_KSYSCALL(name, args...)        \
name(struct pt_regs *ctx);         \
extern _Bool LINUX_HAS_SYSCALL_WRAPPER __kconfig;       \
static __always_inline typeof(name(0))        \
____##name(struct pt_regs *ctx, ##args);        \
typeof(name(0)) name(struct pt_regs *ctx)        \
{            \
 struct pt_regs *regs = LINUX_HAS_SYSCALL_WRAPPER
    \
         ? (struct pt_regs *)PT_REGS_PARM1(ctx)     \
         : ctx;        \
 _Pragma("GCC diagnostic push")        \
 _Pragma("GCC diagnostic ignored \"-Wint-conversion\"")      \
 if (LINUX_HAS_SYSCALL_WRAPPER)        \
  return ____##name(___bpf_syswrap_args(args));      \
 else           \
  return ____##name(___bpf_syscall_args(args));      \
 _Pragma("GCC diagnostic pop")        \
}            \
static __always_inline typeof(name(0))        \
____##name(struct pt_regs *ctx, ##args)

#define BPF_KPROBE_SYSCALL BPF_KSYSCALL

/* BPF_UPROBE and BPF_URETPROBE are identical to BPF_KPROBE and BPF_KRETPROBE,
* but are named way less confusingly for SEC("uprobe") and SEC("uretprobe")
* use cases.
*/
#define BPF_UPROBE(name, args...)  BPF_KPROBE(name, ##args)
#define BPF_URETPROBE(name, args...)  BPF_KRETPROBE(name, ##args)

#endif
```

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#ifndef __BPF_HELPERS__
#define __BPF_HELPERS__

/*
* Note that bpf programs need to include either
* vmlinux.h (auto-generated from BTF) or linux/types.h
* in advance since bpf_helper_defs.h uses such types
* as __u64.
*/
#include "bpf_helper_defs.h"

#define __uint(name, val) int (*name)[val]
#define __type(name, val) typeof(val) *name
#define __array(name, val) typeof(val) *name[]
#define __ulong(name, val) enum { ___bpf_concat(__unique_value, __COUNTER__) = val } name

/*
* Helper macro to place programs, maps, license in
* different sections in elf_bpf file. Section names
* are interpreted by libbpf depending on the context (BPF programs, BPF maps,
* extern variables, etc).
* To allow use of SEC() with externs (e.g., for extern .maps declarations),
* make sure __attribute__((unused)) doesn't trigger compilation warning.
*/
#if __GNUC__ && !__clang__

/*
* Pragma macros are broken on GCC
* https://gcc.gnu.org/bugzilla/show_bug.cgi?id=55578
 * https://gcc.gnu.org/bugzilla/show_bug.cgi?id=90400
*/
#define SEC(name) __attribute__((section(name), used))

#else

#define SEC(name) \
 _Pragma("GCC diagnostic push")         \
 _Pragma("GCC diagnostic ignored \"-Wignored-attributes\"")     \
 __attribute__((section(name), used))        \
 _Pragma("GCC diagnostic pop")         \

#endif
```

```
/* Avoid 'linux/stddef.h' definition of '__always_inline'. */
#undef __always_inline
#define __always_inline inline __attribute__((always_inline))

#ifndef __noinline
#define __noinline __attribute__((noinline))
#endif
#ifndef __weak
#define __weak __attribute__((weak))
#endif

/*
* Use __hidden attribute to mark a non-static BPF subprogram effectively
* static for BPF verifier's verification algorithm purposes, allowing more
* extensive and permissive BPF verification process, taking into account
* subprogram's caller context.
*/
#define __hidden __attribute__((visibility("hidden")))

/* When utilizing vmlinux.h
 with BPF CO-RE, user BPF programs can't include
* any system-level headers (such as stddef.h, linux/version.h, etc), and
* commonly-used macros like NULL and KERNEL_VERSION aren't available through
* vmlinux.h. This just adds unnecessary hurdles and forces users to re-define
* them on their own. So as a convenience, provide such definitions here.
*/
#ifndef NULL
#define NULL ((void *)0)
#endif

#ifndef KERNEL_VERSION
#define KERNEL_VERSION(a, b, c) (((a) << 16) + ((b) << 8) + ((c) > 255 ? 255 : (c)))
#endif

/*
* Helper macros to manipulate data structures
*/

/* offsetof() definition that uses __builtin_offset() might not preserve field
* offset CO-RE relocation properly, so force-redefine offsetof() using
* old-school approach which works with CO-RE correctly
*/
#undef offsetof
#define offsetof(type, member) ((unsigned long)&((type *)0)->member)

/* redefined container_of() to ensure we use the above offsetof() macro */
#undef container_of
```

```
#define container_of(ptr, type, member)    \
 ({       \
  void
 *__mptr = (void *)(ptr);   \
  ((type *)(__mptr - offsetof(type, member))); \
 })

/*
* Compiler (optimization) barrier.
*/
#ifndef barrier
#define barrier() asm volatile("" ::: "memory")
#endif

/* Variable-specific compiler (optimization) barrier. It's a no-op which makes
* compiler believe that there is some black box modification of a given
* variable and thus prevents compiler from making extra assumption about its
* value and potential simplifications and optimizations on this variable.
*
* E.g., compiler might often delay or even omit 32-bit to 64-bit casting of
* a variable, making some code patterns unverifiable. Putting barrier_var()
* in place will ensure that cast is performed before the barrier_var()
* invocation, because compiler has to pessimistically assume that embedded
* asm section might perform some extra operations on that variable.
*
* This is a variable-specific variant of more global barrier().
*/
#ifndef barrier_var
#define
 barrier_var(var) asm volatile("" : "+r"(var))
#endif

/*
* Helper macro to throw a compilation error if __bpf_unreachable() gets
* built into the resulting code. This works given BPF back end does not
* implement __builtin_trap(). This is useful to assert that certain paths
* of the program code are never used and hence eliminated by the compiler.
*
* For example, consider a switch statement that covers known cases used by
* the program. __bpf_unreachable() can then reside in the default case. If
* the program gets extended such that a case is not covered in the switch
* statement, then it will throw a build error due to the default case not
* being compiled out.
*/
#ifndef __bpf_unreachable
# define __bpf_unreachable() __builtin_trap()
#endif
```

```
/*
* Helper function to perform a tail call with a constant/immediate map slot.
*/
#if __clang_major__ >= 8 && defined(__bpf__)
static __always_inline void
bpf_tail_call_static(void *ctx, const void *map, const __u32 slot)
{
 if
 (!__builtin_constant_p(slot))
  __bpf_unreachable();

 /*
  * Provide a hard guarantee that LLVM won't optimize setting r2 (map
  * pointer) and r3 (constant map index) from _different paths_ ending
  * up at the _same_ call insn as otherwise we won't be able to use the
  * jmpq/nopl retpoline-free patching by the x86-64 JIT in the kernel
  * given they mismatch. See also d2e4c1e6c294 ("bpf: Constant map key
  * tracking for prog array pokes") for details on verifier tracking.
  *
  * Note on clobber list: we need to stay in-line with BPF calling
  * convention, so even if we don't end up using r0, r4, r5, we need
  * to mark them as clobber so that LLVM doesn't end up using them
  * before / after the call.
  */
 asm volatile("r1 = %[ctx]\n\t"
      "r2 = %[map]\n\t"
      "r3 = %[slot]\n\t"
      "call 12"
      :: [ctx]"r"(ctx), [map]"r"(map), [slot]"i"(slot)
      : "r0", "r1", "r2", "r3", "r4", "r5");
}
#endif

enum libbpf_pin_type {
 LIBBPF_PIN_NONE,
 /* PIN_BY_NAME: pin
 maps by name (in /sys/fs/bpf by default) */
 LIBBPF_PIN_BY_NAME,
};

enum libbpf_tristate {
 TRI_NO = 0,
 TRI_YES = 1,
 TRI_MODULE = 2,
};

#define __kconfig __attribute__((section(".kconfig")))
#define __ksym __attribute__((section(".ksyms")))
```

```
#define __kptr_untrusted __attribute__((btf_type_tag("kptr_untrusted")))
#define __kptr __attribute__((btf_type_tag("kptr")))
#define __percpu_kptr __attribute__((btf_type_tag("percpu_kptr")))

#define bpf_ksym_exists(sym) ({         \
 _Static_assert(!__builtin_constant_p(!!sym), #sym " should be marked as __weak"); \
 !!sym;          \
})

#define __arg_ctx __attribute__((btf_decl_tag("arg:ctx")))
#define __arg_nonnull __attribute((btf_decl_tag("arg:nonnull")))
#define __arg_nullable __attribute((btf_decl_tag("arg:nullable")))
#define __arg_trusted __attribute((btf_decl_tag("arg:trusted")))
#define __arg_arena __attribute((btf_decl_tag("arg:arena")))

#ifndef ___bpf_concat
#define ___bpf_concat(a, b) a ## b
#endif
#ifndef ___bpf_apply
#define
 ___bpf_apply(fn, n) ___bpf_concat(fn, n)
#endif
#ifndef ___bpf_nth
#define ___bpf_nth(_, _1, _2, _3, _4, _5, _6, _7, _8, _9, _a, _b, _c, N, ...) N
#endif
#ifndef ___bpf_narg
#define ___bpf_narg(...) \
 ___bpf_nth(_, ##__VA_ARGS__, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1, 0)
#endif

#define ___bpf_fill0(arr, p, x) do {} while (0)
#define ___bpf_fill1(arr, p, x) arr[p] = x
#define ___bpf_fill2(arr, p, x, args...) arr[p] = x; ___bpf_fill1(arr, p + 1, args)
#define ___bpf_fill3(arr, p, x, args...) arr[p] = x; ___bpf_fill2(arr, p + 1, args)
#define ___bpf_fill4(arr, p, x, args...) arr[p] = x; ___bpf_fill3(arr, p + 1, args)
#define ___bpf_fill5(arr, p, x, args...) arr[p] = x; ___bpf_fill4(arr, p + 1, args)
#define ___bpf_fill6(arr, p, x, args...) arr[p] = x; ___bpf_fill5(arr, p + 1, args)
#define ___bpf_fill7(arr, p, x, args...) arr[p] = x; ___bpf_fill6(arr, p + 1, args)
#define ___bpf_fill8(arr, p, x, args...) arr[p] = x; ___bpf_fill7(arr, p + 1, args)
#define ___bpf_fill9(arr, p, x, args...)
 arr[p] = x; ___bpf_fill8(arr, p + 1, args)
#define ___bpf_fill10(arr, p, x, args...) arr[p] = x; ___bpf_fill9(arr, p + 1, args)
#define ___bpf_fill11(arr, p, x, args...) arr[p] = x; ___bpf_fill10(arr, p + 1, args)
#define ___bpf_fill12(arr, p, x, args...) arr[p] = x; ___bpf_fill11(arr, p + 1, args)
#define ___bpf_fill(arr, args...) \
 ___bpf_apply(___bpf_fill, ___bpf_narg(args))(arr, 0, args)

/*
```

```
* BPF_SEQ_PRINTF to wrap bpf_seq_printf to-be-printed values
* in a structure.
*/
#define BPF_SEQ_PRINTF(seq, fmt, args...)   \
({        \
 static const char ___fmt[] = fmt;   \
 unsigned long long ___param[___bpf_narg(args)];  \
        \
 _Pragma("GCC diagnostic push")    \
 _Pragma("GCC diagnostic ignored \"-Wint-conversion\"") \
 ___bpf_fill(___param, args);    \
 _Pragma("GCC diagnostic pop")    \
        \
 bpf_seq_printf(seq, ___fmt, sizeof(___fmt),  \
         ___param, sizeof(___param));  \
})

/*
* BPF_SNPRINTF wraps the bpf_snprintf helper with variadic arguments instead of
 * an array of u64.
*/
#define BPF_SNPRINTF(out, out_size, fmt, args...)  \
({        \
 static const char ___fmt[] = fmt;   \
 unsigned long long ___param[___bpf_narg(args)];  \
        \
 _Pragma("GCC diagnostic push")    \
 _Pragma("GCC diagnostic ignored \"-Wint-conversion\"") \
 ___bpf_fill(___param, args);    \
 _Pragma("GCC diagnostic pop")    \
        \
 bpf_snprintf(out, out_size, ___fmt,   \
       ___param, sizeof(___param));  \
})

#ifdef BPF_NO_GLOBAL_DATA
#define BPF_PRINTK_FMT_MOD
#else
#define BPF_PRINTK_FMT_MOD static const
#endif

#define __bpf_printk(fmt, ...)    \
({       \
 BPF_PRINTK_FMT_MOD char ____fmt[] = fmt; \
 bpf_trace_printk(____fmt, sizeof(____fmt), \
    ##__VA_ARGS__);  \
})
```

```
/*
* __bpf_vprintk wraps the bpf_trace_vprintk helper with variadic arguments
* instead of an array of u64.
*/
#define __bpf_vprintk(fmt, args...)    \
({        \
 static const char ___fmt[] = fmt;   \
 unsigned long long ___param[___bpf_narg(args)];  \
        \
 _Pragma("GCC
 diagnostic push")    \
 _Pragma("GCC diagnostic ignored \"-Wint-conversion\"") \
 ___bpf_fill(___param, args);    \
 _Pragma("GCC diagnostic pop")    \
        \
 bpf_trace_vprintk(___fmt, sizeof(___fmt),  \
     ___param, sizeof(___param));  \
})

/* Use __bpf_printk when bpf_printk call has 3 or fewer fmt args
* Otherwise use __bpf_vprintk
*/
#define ___bpf_pick_printk(...) \
 ___bpf_nth(_, ##__VA_ARGS__, __bpf_vprintk, __bpf_vprintk, __bpf_vprintk, \
     __bpf_vprintk, __bpf_vprintk, __bpf_vprintk, __bpf_vprintk,  \
     __bpf_vprintk, __bpf_vprintk, __bpf_printk /*3*/, __bpf_printk /*2*/,\
     __bpf_printk /*1*/, __bpf_printk /*0*/)

/* Helper macro to print out debug messages */
#define bpf_printk(fmt, args...) ___bpf_pick_printk(args)(fmt, ##args)

struct bpf_iter_num;

extern int bpf_iter_num_new(struct bpf_iter_num *it, int start, int end) __weak __ksym;
extern int *bpf_iter_num_next(struct bpf_iter_num *it) __weak __ksym;
extern void bpf_iter_num_destroy(struct bpf_iter_num
 *it) __weak __ksym;

#ifndef bpf_for_each
/* bpf_for_each(iter_type, cur_elem, args...) provides generic construct for
* using BPF open-coded iterators without having to write mundane explicit
* low-level loop logic. Instead, it provides for()-like generic construct
* that can be used pretty naturally. E.g., for some hypothetical cgroup
* iterator, you'd write:
*
* struct cgroup *cg, *parent_cg = <...>;
*
* bpf_for_each(cgroup, cg, parent_cg, CG_ITER_CHILDREN) {
```

```
*     bpf_printk("Child cgroup id = %d", cg->cgroup_id);
*     if (cg->cgroup_id == 123)
*         break;
* }
*
* I.e., it looks almost like high-level for each loop in other languages,
* supports continue/break, and is verifiable by BPF verifier.
*
* For iterating integers, the difference betwen bpf_for_each(num, i, N, M)
* and bpf_for(i, N, M) is in that bpf_for() provides additional proof to
* verifier that i is in [N, M) range, and in bpf_for_each() case i is `int
* *`, not just `int`. So for integers
 bpf_for() is more convenient.
*
* Note: this macro relies on C99 feature of allowing to declare variables
* inside for() loop, bound to for() loop lifetime. It also utilizes GCC
* extension: __attribute__((cleanup(<func>))), supported by both GCC and
* Clang.
*/
#define bpf_for_each(type, cur, args...) for (       \
 /* initialize and define destructor */       \
 struct bpf_iter_##type ___it __attribute__((aligned(8), /* enforce, just in case */, \
         cleanup(bpf_iter_##type##_destroy))), \
 /* ___p pointer is just to call bpf_iter_##type##_new() *once* to init ___it */  \
         *___p __attribute__((unused)) = (    \
     bpf_iter_##type##_new(&___it, ##args),   \
 /* this is a workaround for Clang bug: it currently doesn't emit BTF */   \
 /* for bpf_iter_##type##_destroy() when used from cleanup() attribute */  \
     (void)bpf_iter_##type##_destroy, (void *)0);  \
 /* iteration and termination check */       \
 (((cur) = bpf_iter_##type##_next(&___it)));      \
)
#endif
 /* bpf_for_each */

#ifndef bpf_for
/* bpf_for(i, start, end) implements a for()-like looping construct that sets
* provided integer variable *i* to values starting from *start* through,
* but not including, *end*. It also proves to BPF verifier that *i* belongs
* to range [start, end), so this can be used for accessing arrays without
* extra checks.
*
* Note: *start* and *end* are assumed to be expressions with no side effects
* and whose values do not change throughout bpf_for() loop execution. They do
* not have to be statically known or constant, though.
*
* Note: similarly to bpf_for_each(), it relies on C99 feature of declaring for()
* loop bound variables and cleanup attribute, supported by GCC and Clang.
```

```
*/
#define bpf_for(i, start, end) for (        \
 /* initialize and define destructor */       \
 struct bpf_iter_num ___it __attribute__((aligned(8), /* enforce, just in case */ \
       cleanup(bpf_iter_num_destroy))),  \
 /* ___p pointer is necessary to
 call bpf_iter_num_new() *once* to init ___it */  \
       *___p __attribute__((unused)) = (     \
    bpf_iter_num_new(&___it, (start), (end)),   \
 /* this is a workaround for Clang bug: it currently doesn't emit BTF */   \
 /* for bpf_iter_num_destroy() when used from cleanup() attribute */   \
    (void)bpf_iter_num_destroy, (void *)0);    \
 ({           \
  /* iteration step */        \
  int *___t = bpf_iter_num_next(&___it);      \
  /* termination and bounds check */      \
  (___t && ((i) = *___t, (i) >= (start) && (i) < (end)));    \
 });           \
)
#endif /* bpf_for */

#ifndef bpf_repeat
/* bpf_repeat(N) performs N iterations without exposing iteration number
*
* Note: similarly to bpf_for_each(), it relies on C99 feature of declaring for()
* loop bound variables and cleanup attribute, supported by GCC and Clang.
*/
#define bpf_repeat(N) for (         \
 /* initialize and define destructor */       \
 struct bpf_iter_num ___it __attribute__((aligned(8), /* enforce,
 just in case */ \
       cleanup(bpf_iter_num_destroy))),  \
 /* ___p pointer is necessary to call bpf_iter_num_new() *once* to init ___it */  \
       *___p __attribute__((unused)) = (     \
    bpf_iter_num_new(&___it, 0, (N)),    \
 /* this is a workaround for Clang bug: it currently doesn't emit BTF */   \
 /* for bpf_iter_num_destroy() when used from cleanup() attribute */   \
    (void)bpf_iter_num_destroy, (void *)0);    \
 bpf_iter_num_next(&___it);        \
 /* nothing here  */         \
)
#endif /* bpf_repeat */

#endif
```

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Protocol Buffers for Go with Gadgets

Go support for Protocol Buffers - Google's data interchange format

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https://github.com/golang/protobuf

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it
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@enumerate a
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@page
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running the Program is not restricted, and the output from the Program
is covered only if its contents constitute a work based on the
Program (independent of having been
made by running the Program).
Whether that is true depends on what the Program does.

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above, provided that you also meet all of these conditions:

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You must cause the modified files to carry prominent notices
stating
that you changed the files and the date of any change.

@item
You must cause any work that you distribute or publish, that in

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If the modified program normally reads commands interactively
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License. (Exception: if the Program itself is interactive but
does not normally print such an announcement, your work based on
the Program is not required to print an announcement.)
@end enumerate

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a whole. If
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sections when you distribute them as separate works. But when you
distribute the same sections as part of a whole which is a work based
on the Program, the distribution of the whole must be on the terms of
this License, whose permissions for other licensees extend to the
entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest
your rights to work written entirely by you; rather, the intent is to
exercise the right to control the distribution of derivative or
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a storage or distribution medium does not bring
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Sections 1 and 2 above provided that you also do one of the following:

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@item
Accompany it with the complete corresponding machine-readable
source code, which must be distributed under the terms of Sections

1 and 2 above on a medium customarily used for software interchange; or,

@item
Accompany it with a written offer, valid for at least three
years, to give any third party, for a charge no more than your
cost of physically performing source distribution, a complete
machine-readable copy of the corresponding source code, to be
distributed under the terms of Sections 1 and 2 above on a medium
customarily used for software interchange; or,

@item
Accompany it with the information you received as to the offer
to distribute corresponding source code. (This alternative is
allowed only for noncommercial
distribution and only if you
received the program in object code or executable form with such
an offer, in accord with Subsection b above.)
@end enumerate

The source code for a work means the preferred form of the work for
making modifications to it. For an executable work, complete source
code means all the source code for all modules it contains, plus any
associated interface definition files, plus the scripts used to
control compilation and installation of the executable. However, as a
special exception, the source code distributed need not include
anything that is normally distributed (in either source or binary
form) with the major components (compiler, kernel, and so on) of the
operating system on which the executable runs, unless that component
itself accompanies the executable.

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as
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@end enumerate

@iftex
@heading END OF TERMS AND CONDITIONS
@end iftex
@ifinfo
@center END OF TERMS AND CONDITIONS

@end ifinfo

@page
@heading Appendix: How to Apply These Terms to Your New Programs

If you develop a new program, and you want it to be of the greatest
possible use to the public, the best way to achieve this is to make it
free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest
to attach them to the start of each source file to most effectively
convey the exclusion of warranty; and each file should have at least
the ``copyright'' line and a pointer to where the full notice is found.

@smallexample
@var{one line to give the program's name
and a brief idea of what it does.}
Copyright (C) @var{yyyy} @var{name of author}

This program is free software; you can redistribute it and/or modify
it under the terms of the GNU General Public License as published by
the Free Software Foundation; either version 2 of the License, or
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@end smallexample

Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this
when it starts in an interactive mode:

@smallexample
Gnomovision version
69, Copyright (C) @var{year} @var{name of author}
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
@end smallexample

The hypothetical commands @samp{show w} and @samp{show c} should show
the appropriate parts of the General Public License. Of course, the
commands you use may be called something other than @samp{show w} and
@samp{show c}; they could even be mouse-clicks or menu items---whatever
suits your program.

You should also get your employer (if you work as a programmer) or your
school, if any, to sign a ``copyright disclaimer'' for the program, if
necessary. Here is a sample; alter the names:

@example
Yoyodyne, Inc., hereby disclaims all copyright interest in the program
`Gnomovision' (which makes passes at compilers) written by James Hacker.

@var{signature of Ty Coon}, 1 April 1989
Ty Coon, President of Vice
@end example

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Version 2.1, February 1999

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as the successor of the GNU Library Public License, version 2, hence
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We protect your rights with a two-step method: (1) we copyright the library, and (2) we offer you this license, which gives you legal permission to copy, distribute and/or modify the library.

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^L
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any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

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When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

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In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in
order to run.
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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly
into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation
and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

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2. You may modify your copy or copies of the Library or any portion
of it, thus forming a work based on the Library, and copy and
distribute such modifications or work under the terms of Section 1
above, provided that you also meet all of these conditions:

a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices
stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no
charge to all third parties under
the terms of this License.

d) If a facility in the modified Library refers to a function or a
table of data to be supplied by an application program that uses
the facility, other than as an argument passed when the facility
is invoked, then you must make a good faith effort to ensure that,
in the event an application does not supply such function or
table, the facility still operates, and performs whatever part of
its purpose remains meaningful.

(For example, a function in a library to compute square roots has
a purpose that is entirely well-defined independent of the
application. Therefore, Subsection 2d requires that any
application-supplied function or table used by this function must
be optional: if the application does not supply it, the square
root function must still compute square roots.)

These requirements apply to the modified work as a whole. If
identifiable sections of that work are not derived from the Library,
and
can be reasonably considered independent and separate works in
themselves, then this License, and its terms, do not apply to those
sections when you distribute them as separate works. But when you
distribute the same sections as part of a whole which is a work based
on the Library, the distribution of the whole must be on the terms of

this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a

work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library
creates an executable that is a derivative of the Library (because it
contains portions of the Library), rather than a
"work that uses the
library". The executable is therefore covered by this License.
Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library. The
threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small inline
functions (ten lines or less in length), then the use of the object
file is unrestricted, regardless of whether it is legally a derivative
work. (Executables containing this object code plus portions of the
Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may
distribute
the object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.
^L
6. As an exception to the Sections above, you may also combine or
link a "work that uses the Library" with the Library to produce a
work containing portions of the Library, and distribute that work
under terms of your choice, provided that the terms permit
modification of the work for the customer's own use and reverse
engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the
Library is used in it and that the Library and its use are covered by
this License. You must supply a copy of this License. If the work
during execution displays copyright notices, you must include the
copyright notice for the Library among them, as well as a reference
directing the user to the copy of this License. Also, you must do one
of these things:

a) Accompany the work with the complete corresponding
machine-readable source code for the Library including whatever

changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will
operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is
normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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^L
7. You may place library facilities that are a work based on the

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# 1.1234 urllib3 1.26.16

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# 1.1236 webrtc-audio-processing 0.3.1-8.el9

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common_audio/signal_processing/spl_sqrt_floor_arm.S
modules/audio_coding/codecs/g711/main/source/g711.c
modules/audio_coding/codecs/g711/main/source/g711.h
modules/audio_coding/codecs/g722/main/source/g722_decode.c
modules/audio_coding/codecs/g722/main/source/g722_enc_dec.h
modules/audio_coding/codecs/g722/main/source/g722_encode.c
modules/audio_coding/codecs/isac/main/source/fft.c
modules/audio_device/mac/portaudio/pa_memorybarrier.h
modules/audio_device/mac/portaudio/pa_ringbuffer.c
modules/audio_device/mac/portaudio/pa_ringbuffer.h
modules/audio_processing/aec/aec_rdft.c
system_wrappers/source/condition_variable_event_win.cc
system_wrappers/source/set_thread_name_win.h
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common_audio/signal_processing/spl_sqrt_floor_arm.S

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* Written by Wilco Dijkstra, 1996. The following email exchange establishes the
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*
* From: Wilco Dijkstra <Wilco.Dijkstra@ntlworld.com>
* Date: Fri, Jun 24, 2011 at 3:20 AM
* Subject: Re: sqrt routine
* To: Kevin Ma <kma@google.com>
* Hi Kevin,
* Thanks for asking. Those routines are public domain (originally posted to
* comp.sys.arm a long time ago), so you can use them freely for any purpose.
* Cheers,
* Wilco
*
* ----- Original Message -----
* From: "Kevin Ma" <kma@google.com>
* To: <Wilco.Dijkstra@ntlworld.com>

* Sent: Thursday, June 23, 2011 11:44 PM
* Subject: Fwd: sqrt routine
* Hi Wilco,
* I saw your sqrt routine from several web sites, including
* http://www.finesse.demon.co.uk/steven/sqrt.html.
* Just wonder if there's any copyright information with your Successive
* approximation routines, or if I can freely use it for any purpose.
* Thanks.
* Kevin
*/

---

Files:
modules/audio_coding/codecs/g711/main/source/g711.c
modules/audio_coding/codecs/g711/main/source/g711.h

License:

```
/*
* SpanDSP - a series of DSP components for telephony
*
* g711.h - In line A-law and u-law conversion routines
*
* Written by Steve Underwood <steveu@coppice.org>
*
* Copyright (C) 2001 Steve Underwood
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*  public domain for the benefit of all mankind - even the slimy
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Files:
modules/audio_coding/codecs/g722/main/source/g722_decode.c
modules/audio_coding/codecs/g722/main/source/g722_enc_dec.h
modules/audio_coding/codecs/g722/main/source/g722_encode.c

License:

```
/*
 * SpanDSP - a series of DSP components for telephony
*
* g722_decode.c - The ITU G.722 codec, decode part.
*
* Written by Steve Underwood <steveu@coppice.org>
*
* Copyright (C) 2005 Steve Underwood
*
*  Despite my general liking of the GPL, I place my own contributions
*  to this code in the public domain for the benefit of all mankind -
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*  even the slimy ones who might try to proprietize my work and use it
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*
* Based in part on a single channel G.722 codec which is:
*
* Copyright (c) CMU 1993
* Computer Science, Speech Group
* Chengxiang Lu and Alex Hauptmann
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modules/audio_device/mac/portaudio/pa_ringbuffer.c
modules/audio_device/mac/portaudio/pa_ringbuffer.h

License:
/*

```
 * $Id: pa_memorybarrier.h 1240 2007-07-17 13:05:07Z bjornroche $
* Portable Audio I/O Library
* Memory barrier utilities
*
* Author: Bjorn Roche, XO Audio, LLC
*
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/*
* $Id: pa_ringbuffer.c 1421 2009-11-18 16:09:05Z bjornroche $
* Portable Audio I/O Library
* Ring Buffer utility.
*
```

* Author: Phil Burk, http://www.softsynth.com
* modified for SMP safety on Mac OS X by Bjorn Roche
* modified for SMP safety on Linux by Leland Lucius
* also, allowed for const where possible
* modified for multiple-byte-sized data elements by Sven Fischer
*
* Note that this is safe only for a single-thread reader and a
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modules/audio_processing/aec/aec_rdft.c

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# 1.1238 xdg-desktop-portal 1.12.6-1.el9

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# 1.1245 gnutls 3.8.3-1.1ubuntu3.3

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```
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## version 0.1
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# 1.1246 flynn-go-shlex 0.0.0-20150515145356-3f9db97f8568

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# 1.1247 gobject-introspection 1.68.0-11.el9

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# 1.1263 types-json5 0.0.29

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```
{
  "compilerOptions": {
    "module": "commonjs",
    "lib": [
      "es6"
    ],
    "noImplicitAny": true,
    "noImplicitThis": true,
    "strictNullChecks": true,
    "strictFunctionTypes": true,
    "baseUrl": "../",
    "typeRoots": [
      "../"
    ],
    "types": [],
    "noEmit": true,
    "forceConsistentCasingInFileNames": true
  },
  "files": [
    "index.d.ts",
    "npm-license-crawler-tests.ts"
  ]
}
```


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{ "extends": "dtslint/dt.json" }
{
  "compilerOptions": {
    "module": "commonjs",
    "lib": [
      "es6"
    ],
    "noImplicitAny": true,
    "noImplicitThis": true,
    "strictNullChecks": true,
    "strictFunctionTypes": true,
    "baseUrl": "../",
    "typeRoots": [
      "../"
    ],
    "types": [],
    "noEmit": true,
    "forceConsistentCasingInFileNames": true
  },
  "files": [
    "index.d.ts",
    "nodejs-license-file-tests.ts"
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}
{
  "extends": "dtslint/dt.json"
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{
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  "rules": {
    "npm-naming": [true,{"mode":"code","errors":[["NeedsExportEquals",false]]}]
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{
  "extends": "dtslint/dt.json",
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    "no-consecutive-blank-lines": false,
    "no-declare-current-package": false,
```

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      "no-padding": false,
      "no-redundant-jsdoc-2": false,
      "no-reference-import": false,
      "no-unnecessary-qualifier": false,
      "no-var-keyword": false,
      "only-arrow-functions": false,
      "prefer-const": false,
      "space-before-function-paren": false,
      "strict-export-declare-modifiers": false,
      "trim-file": false,
      "typedef-whitespace": false,
      "unified-signatures": false
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}
{
  "compilerOptions": {
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      ],
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      "noImplicitThis": true,
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      "strictFunctionTypes": true,
      "baseUrl": "../",
      "typeRoots": [
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      "types": [],
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      "forceConsistentCasingInFileNames": true
  },
  "files": [
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      "license-checker-tests.ts"
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}
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      "strictNullChecks": true,
      "strictFunctionTypes": true,
      "baseUrl": "../",
```

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    ],
    "types": [],
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    "forceConsistentCasingInFileNames": true
  },
  "files": [
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    "license-checker-webpack-plugin-tests.ts"
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  ],
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    "noImplicitThis": true,
    "strictNullChecks": false,
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    "typeRoots": [
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    ],
    "types": [],
    "noEmit": true,
    "forceConsistentCasingInFileNames": true
  }
}
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  "compilerOptions": {
    "module": "commonjs",
    "lib": [
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    ],
    "noImplicitAny": true,
    "noImplicitThis": true,
    "strictNullChecks": true,
    "strictFunctionTypes": true,
    "baseUrl": "../",
    "typeRoots": [
```

```
        "../"
      ],
      "types": [],
      "noEmit": true,
      "forceConsistentCasingInFileNames": true
    },
    "files": [
      "index.d.ts",
      "legal-eagle-tests.ts"
    ]
  }
  {
    "compilerOptions": {
      "module": "commonjs",
      "lib": [
        "es6"
      ],
      "noImplicitAny": true,
      "noImplicitThis": true,
      "strictFunctionTypes": true,
      "strictNullChecks": true,
      "baseUrl": "../",
      "typeRoots": [
        "../"
      ],
      "types": [],
      "noEmit": true,
      "forceConsistentCasingInFileNames": true
    },
    "files": [
      "index.d.ts",
      "license-key-gen-tests.ts"
    ]
  }
```

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```
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    "lib": [
      "es6"
    ],
    "noImplicitAny": true,
    "noImplicitThis": true,
    "strictFunctionTypes": true,
    "strictNullChecks": true,
    "baseUrl": "../",
    "typeRoots": [
      "../"
    ],
    "types": [],
    "noEmit": true,
    "forceConsistentCasingInFileNames": true
  },
  "files": [
    "index.d.ts",
    "validate-npm-package-license-tests.ts"
  ]
}
```

# 1.1264 miekg-dns 1.1.63

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# 1.1269 go-autorest-autorest-to 0.2.0

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# 1.1270 contrib-instrumentation-google.golang.org-grpc-otelgrpc 0.60.0

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# 1.1271 babel-helper-compilation-targets 7.22.15

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=====================================================================
--- tdbsa.orig/tdb.c
+++ tdbsa/tdb.c
@@ -4,11 +4,11 @@ Rev: 23371
Last Changed Date: 2007-06-06 20:14:06 -0400 (Wed, 06 Jun 2007)
*/
 /*
-   Unix SMB/CIFS implementation.
+   trivial database library - standalone version

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-
-   Copyright (C) Andrew Tridgell            2005
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Theodore Ts'o
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That's all there is to it!
#
# This is a Makefile stub which handles the creation of BSD shared
# libraries.
#
# In order to use this stub, the following makefile variables must be defined.
#
# BSDLIB_VERSION = 1.0
# BSDLIB_IMAGE = libce
# BSDLIB_MYDIR = et
# BSDLIB_INSTALL_DIR = $(SHLIBDIR)
#

all:: image

real-subdirs:: Makefile
 @echo " MKDIR pic"
 @mkdir -p pic
```

```
BSD_LIB = $(BSDLIB_IMAGE).so.$(BSDLIB_VERSION)
BSDLIB_PIC_FLAG = -fpic

image:  $(BSD_LIB)

$(BSD_LIB): $(OBJS)
 (cd pic; ld -Bshareable -o $(BSD_LIB) $(LDFLAGS_SHLIB) $(OBJS))
 $(MV) pic/$(BSD_LIB) .
 $(RM) -f ../$(BSD_LIB)
 (cd ..; $(LN) $(LINK_BUILD_FLAGS) \
  `echo $(my_dir) | sed -e 's;lib/;;'`/$(BSD_LIB) $(BSD_LIB))

install-shlibs install:: $(BSD_LIB)
 @echo " INSTALL_PROGRAM $(BSDLIB_INSTALL_DIR)/$(BSD_LIB)"
 @$(INSTALL_PROGRAM) $(BSD_LIB) \
  $(DESTDIR)$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)
 @-$(LDCONFIG)

install-strip: install

install-shlibs-strip:: install-shlibs

uninstall-shlibs uninstall::
 $(RM) -f $(DESTDIR)$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)

clean::
 $(RM)
 -rf pic
 $(RM) -f $(BSD_LIB)
 $(RM) -f ../$(BSD_LIB)
```

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# 1.1275 @babel/helper-simple-access 7.22.5

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# 1.1276 @babel/parser 7.22.16

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# 1.1277 graceful-fs 4.2.11

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# 1.1286 python-setuptools 53.0.0

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# Contributions to the urllib3 project

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## Contributors

In chronological order:

* victor.vde <http://code.google.com/u/victor.vde/>
 * HTTPS patch (which inspired HTTPSConnectionPool)

* erikcederstrand <http://code.google.com/u/erikcederstrand/>
 * NTLM-authenticated HTTPSConnectionPool
 * Basic-authenticated HTTPSConnectionPool (merged into make_headers)

* niphlod <niphlod@gmail.com>
 * Client-verified SSL certificates for HTTPSConnectionPool
 * Response gzip and deflate encoding support
 * Better unicode support for filepost using StringIO buffers

* btoconnor <brian@btoconnor.net>
 * Non-multipart encoding for POST requests

* p.dobrogost <http://code.google.com/u/@WBRSRlBZDhBFXQB6/>
 * Code review, PEP8 compliance, benchmark fix

* kennethreitz <me@kennethreitz.com>
 * Bugfixes, suggestions, Requests integration

* georgemarshall <https://github.com/georgemarshall>
 * Bugfixes, Improvements and Test
 coverage

* Thomas Kluyver <thomas@kluyver.me.uk>
 * Python 3 support

* brandon-rhodes <http://rhodesmill.org/brandon>
 * Design review, bugfixes, test coverage.

* studer <theo.studer@gmail.com>
 * IPv6 url support and test coverage

* Shivaram Lingamneni <slingamn@cs.stanford.edu>
 * Support for explicitly closing pooled connections

* hartator <hartator@gmail.com>
 * Corrected multipart behavior for params

* Thomas Weischuh <thomas@t-8ch.de>
 * Support for TLS SNI
 * API unification of ssl_version/cert_reqs
 * SSL fingerprint and alternative hostname verification
 * Bugfixes in testsuite

* Sune Kirkeby <mig@ibofobi.dk>
 * Optional SNI-support for Python 2 via PyOpenSSL.

* Marc Schlaich <marc.schlaich@gmail.com>
 * Various bugfixes and test improvements.

* Bryce Boe <bbzbryce@gmail.com>
 * Correct six.moves conflict
 * Fixed pickle support of some exceptions

* Boris Figovsky <boris.figovsky@ravellosystems.com>
 * Allowed to skip SSL hostname verification

* Cory Benfield
 <https://lukasa.co.uk/about/>
 * Stream method for Response objects.
 * Return native strings in header values.
 * Generate 'Host' header when using proxies.

* Jason Robinson <jaywink@basshero.org>
 * Add missing WrappedSocket.fileno method in PyOpenSSL

* Audrius Butkevicius <audrius.butkevicius@elastichosts.com>
 * Fixed a race condition

* Stanislav Vitkovskiy <stas.vitkovsky@gmail.com>
 * Added HTTPS (CONNECT) proxy support

* Stephen Holsapple <sholsapp@gmail.com>
 * Added abstraction for granular control of request fields

* Martin von Gagern <Martin.vGagern@gmx.net>
 * Support for non-ASCII header parameters

* Kevin Burke <kev@inburke.com> and Pavel Kirichenko <juanych@yandex-team.ru>
 * Support for separate connect and request timeouts

* Peter Waller <p@pwaller.net>

* HTTPResponse.tell() for determining amount received over the wire

* Nipunn Koorapati <nipunn1313@gmail.com>
* Ignore default ports when comparing hosts for equality

* Danilo @dbrgn <https://dbrgn.ch/>
* Disabled TLS compression by default on Python 3.2+
* Disabled TLS compression in pyopenssl contrib module
* Configurable cipher suites in pyopenssl contrib module

* Roman Bogorodskiy <roman.bogorodskiy@ericsson.com>
* Account retries on proxy errors

* Nicolas Delaby <nicolas.delaby@ezeep.com>
* Use the platform-specific CA certificate locations

* Josh Schneier <https://github.com/jschneier>
* HTTPHeaderDict and associated tests and docs
* Bugfixes, docs, test coverage

* Tahia Khan <http://tahia.tk/>
* Added Timeout examples in docs

* Arthur Grunseid <https://grunseid.com>
* source_address support and tests (with https://github.com/bui)

* Ian Cordasco <graffatcolmingov@gmail.com>
* PEP8 Compliance and Linting
* Add ability to pass socket options to an HTTP Connection

* Erik Tollerud <erik.tollerud@gmail.com>
* Support for standard library io module.

* Krishna Prasad <kprasad.iitd@gmail.com>
* Google App Engine documentation

* Aaron Meurer
<asmeurer@gmail.com>
* Added Url.url, which unparses a Url

* Evgeny Kapun <abacabadabacaba@gmail.com>
* Bugfixes

* Benjamen Meyer <bm_witness@yahoo.com>
* Security Warning Documentation update for proper capture

* Shivan Sornarajah <github@sornars.com>
* Support for using ConnectionPool and PoolManager as context managers.

* Alex Gaynor <alex.gaynor@gmail.com>
 * Updates to the default SSL configuration

* Tomas Tomecek <ttomecek@redhat.com>
 * Implemented generator for getting chunks from chunked responses.

* tlynn <https://github.com/tlynn>
 * Respect the warning preferences at import.

* David D. Riddle <ddriddle@illinois.edu>
 * IPv6 bugfixes in testsuite

* Thea Flowers <magicalgirl@google.com>
 * App Engine environment tests.
 * Documentation re-write.

* John Krauss <https://github.com/talos>
 * Clues to debugging problems with `cryptography` dependency in docs

* Disassem <https://github.com/Disassem>
 * Fix pool-default headers not applying for url-encoded
 requests like GET.

* James Atherfold <jlatherfold@hotmail.com>
 * Bugfixes relating to cleanup of connections during errors.

* Christian Pedersen <https://github.com/chripede>
 * IPv6 HTTPS proxy bugfix

* Jordan Moldow <https://github.com/jmoldow>
 * Fix low-level exceptions leaking from ``HTTPResponse.stream()``.
 * Bugfix for ``ConnectionPool.urlopen(release_conn=False)``.
 * Creation of ``HTTPConnectionPool.ResponseCls``.

* Predrag Gruevski <https://github.com/obi1kenobi>
 * Made cert digest comparison use a constant-time algorithm.

* Adam Talsma <https://github.com/a-tal>
 * Bugfix to ca_cert file paths.

* Evan Meagher <https://evanmeagher.net>
 * Bugfix related to `memoryview` usage in PyOpenSSL adapter

* John Vandenberg <jayvdb@gmail.com>
 * Python 2.6 fixes; pyflakes and pep8 compliance

* Andy Caldwell <andy.m.caldwell@googlemail.com>

* Bugfix related to reusing connections in indeterminate states.

* Ville Skytt <ville.skytta@iki.fi>
* Logging efficiency
improvements, spelling fixes, Travis config.

* Shige Takeda <smtakeda@gmail.com>
* Started Recipes documentation and added a recipe about handling concatenated gzip data in HTTP response

* Jess Shapiro <jesse@jesseshapiro.net>
* Various character-encoding fixes/tweaks
* Disabling IPv6 DNS when IPv6 connections not supported

* David Foster <http://dafoster.net/>
* Ensure order of request and response headers are preserved.

* Jeremy Cline <jeremy@jcline.org>
* Added connection pool keys by scheme

* Aviv Palivoda <palaviv@gmail.com>
* History list to Retry object.
* HTTPResponse contains the last Retry object.

* Nate Prewitt <nate.prewitt@gmail.com>
* Ensure timeouts are not booleans and greater than zero.
* Fixed infinite loop in ``stream`` when amt=None.
* Added length_remaining to determine remaining data to be read.
* Added enforce_content_length to raise exception when incorrect content-length received.

* Seth Michael Larson <sethmichaellarson@protonmail.com>
* Created selectors backport that supports PEP 475.

* Alexandre Dias <alex.dias@smarkets.com>
* Don't retry on timeout if method not in whitelist

* Moinuddin Quadri <moin18@gmail.com>
* Lazily load idna package

* Tom White <s6yg1ez3@mail2tor.com>
* Made SOCKS handler differentiate socks5h from socks5 and socks4a from socks4.

* Tim Burke <tim.burke@gmail.com>
* Stop buffering entire deflate-encoded responses.

* Tuukka Mustonen <tuukka.mustonen@gmail.com>
* Add counter for status_forcelist retries.

* Erik Rose <erik@mozilla.com>

* Bugfix to pyopenssl vendoring

* Wolfgang Richter <wolfgang.richter@gmail.com>
* Bugfix related to loading full certificate chains with PyOpenSSL backend.

* Mike Miller <github@mikeage.net>
* Logging improvements to include the HTTP(S) port when opening a new connection

* Ioannis Tziakos <mail@itziakos.gr>
* Fix ``util.selectors._fileobj_to_fd`` to accept ``long``.
* Update appveyor tox setup to use the 64bit python.

* Akamai
(through Jess Shapiro) <jshapiro@akamai.com>
* Ongoing maintenance; 2017-2018

* Dominique Leuenberger <dimstar@opensuse.org>
* Minor fixes in the test suite

* Will Bond <will@wbond.net>
* Add Python 2.6 support to ``contrib.securetransport``

* Aleksei Alekseev <alekseev.yeskela@gmail.com>
* using auth info for socks proxy

* Chris Wilcox <git@crwilcox.com>
* Improve contribution guide
* Add ``HTTPResponse.geturl`` method to provide ``urllib2.urlopen().geturl()`` behavior

* Bruce Merry <https://www.brucemerry.org.za>
* Fix leaking exceptions when system calls are interrupted with zero timeout

* Hugo van Kemenade <https://github.com/hugovk>
* Drop support for EOL Python 2.6

* Tim Bell <https://github.com/timb07>
* Bugfix for responses with Content-Type: message/* logging warnings

* Justin Bramley <https://github.com/jbramleycl>
* Add ability to handle multiple Content-Encodings

* Katsuhiko YOSHIDA <https://github.com/kyoshidajp>
* Remove Authorization header
regardless of case when redirecting to cross-site

* James Meickle <https://permadeath.com/>
* Improve handling of Retry-After header

* Chris Jerdonek <chris.jerdonek@gmail.com>
 * Remove a spurious TypeError from the exception chain inside
   HTTPConnectionPool._make_request(), also for BaseExceptions.

* Jorge Lopez Silva <https://github.com/jalopezsilva>
 * Added support for forwarding requests through HTTPS proxies.

* Benno Rice <benno@jeamland.net>
 * Allow cadata parameter to be passed to underlying ``SSLContext.load_verify_locations()``.

* Keiichi Kobayashi <abok.1k@gmail.com>
 * Rename VerifiedHTTPSConnection to HTTPSConnection

* Himanshu Garg <garg_himanshu@outlook.com>
 * DOC & LICENSE Update

* Hod Bin Noon <bin.noon.hod@gmail.com>
 * Test improvements

* Chris Olufson <tycarac@gmail.com>
 * Fix for connection not being released on HTTP redirect and response not preloaded

* [Bastiaan Bakker] <https://github.com/bastiaanb>
 * Support for logging session keys
 via environment variable ``SSLKEYLOGFILE`` (Python 3.8+)

* [Ezzeri Esa] <https://github.com/savarin>
 * Ports and extends on types from typeshed

* [Your name or handle] <[email or website]>
 * [Brief summary of your changes]
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# 1.1295 shared-mime-info 2.1-5.el9

## 1.1295.1 Available under license :

```
#!/usr/bin/env bash
# MIT licenses will each have a unique MD5 sum since they contain a unique copyright.
# This script will read the license file into memory, strip out the copyright, and then
# generate an MD5 that is not unique and can be matched against a known MIT MD5 sum.
set -e

calculate_md5_sum() {
 local FILE="$1"

 # Read the contents of the file into a variable
 local raw_license_text=$(<"$FILE")

 # Convert to lowercase
 local lowercase_license_text="${raw_license_text,,}"

 # Remove anything before the beginning of the license
 local stripped_license_text=$(awk '/permission is hereby granted,/{p=1} p' <<< "$lowercase_license_text")

 # Replace line breaks (Windows or Linux) with a single space
 local replaced_linebreaks=$(tr '\r\n' ' ' <<< "$stripped_license_text")

 # Replace multiple spaces with a single space
 local normalized_license_text=$(tr -s ' ' <<< "$replaced_linebreaks")

 # Strip away any non-printable, non-whitespace characters
 local clean_unprintable_license_text=$(tr
 -cd '[:print:][:space:]' <<< "$normalized_license_text")

 # Remove punctuation and special characters
 local clean_license_text=$(echo "$clean_unprintable_license_text" | sed 's/[^a-zA-Z ]//g')

 # Calculate the MD5 sum of the cleaned license text
 local MD5SUM=$(echo -n "$clean_license_text" | md5sum | awk '{print $1}')

 # Output the MD5 sum
 echo "$MD5SUM"
}
```

```
# Check if the FILE argument is provided
if [ -z "$1" ]; then
 echo "Please provide a FILE as an argument."
 exit 1
fi

# Invoke the function with the provided FILE argument
calculate_md5_sum "$1"
```

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# 1.1299 sjson 1.2.5

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# 1.1305 libxmlb 0.3.10-1.el9

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And Very Special Thanks To:
Norman Margolis, who started the whole thing

# 1.1315 go-digest 1.0.0

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# 1.1318 express-rate-limit 7.5.1

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# 1.1319 go-retryablehttp 0.7.8

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# 1.1321 otel-metric 1.35.0

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# 1.1322 go-grpc-middleware-providers-prometheus 1.0.1

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go 1.16

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procfs provides functions to retrieve system, kernel and process
metrics from the pseudo-filesystem proc.

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localtime.go, localtime_test.go:

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Changes:
* Renamed files from civil* to localtime*.
* Package changed from civil to toml.
* 'Local' prefix added to all structs.
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tomb - support for clean goroutine termination in Go.

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# 1.1329 @octokit/plugin-rest-endpoint-methods 13.3.2-cjs.1

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# 1.1331 opentelemetry-operations-go-exporter-metric 0.53.0

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# 1.1338 go-textseg 15.0.0

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# 1.1340 libvorbis 1:1.3.7-5.el9

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# 1.1341 go-secure-stdlib-strutil 0.1.2

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# 1.1342 gnupg 1.15.1

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(21:protected-private-key(3:elg(1:p129:|B36I(s7}+ZJ/pvE;"tg7N ca"Gxvnyu&bB#h'7=89&oG
R<hO)(1:g1:)(1:y128:Ji]WU_UP}AQ\YMhAl|2e{_tcMNDg]{QnWsK 4pY{$bDCs)(9:protected25:openpgp-s2k3-
sha1-aes-cbc((4:sha18:JcE7:6452224)16: i[Q*vK)192:FJA!O!ZAF
biJ&Tsb!t
&9@R\~V+x>?sedDz-W(yqf?u^e?s1saV8<T0:tC5%ZMh?$|,y_e[1D)(12:protected-at15:20130812T105135)))
{
  "op": "keylist",
  "keys": [ "bravo@example.net", "alpha@example.net" ],
  "with-secret": true
}
(21:protected-private-key(3:elg(1:p129:W#}}l;;m>
;4YV$Qg
LoLy~*Tru*+ID8"-9,:17^g*({ #7)(1:g1:)(1:y128:2o62,Tj/
rRi3sSS iCAYNYbVtAHKi7(UPp)?Od{'R^f)(9:protected25:openpgp-s2k3-sha1-aes-
cbc((4:sha18:fw`E7:5242880)16:aqR)192:5f1a-`{^EV699WoB\,:Rs1*W6Lu iZ
:=ZqURM47;pA3#DL
so8O)Th^P@lP0&.DR;"rkN7)(12:protected-at15:20101008T070216)))
#+TITLE: GPGME Python Bindings HOWTO Examples
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltxtra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

* Examples
 :PROPERTIES:
 :CUSTOM_ID: gpgme-python3-examples
 :END:

 The contents of this directory are the examples included in the /GNU
 Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO/ file.  Each
 script is explicitly for Python 3 and specifically for Python 3.4 or
 later.

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 =__future__= module to facilitate that if possible.

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cython
{
  "op": "config",
  "component": "gpg"
}
;;;; gpgme-package.lisp

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;;; Conventions:
;;;
;;; gpg-error is used for error handling.
;;;
;;; Standard I/O streams are used for input and output.

(defpackage #:gpgme
 (:use #:common-lisp #:cffi #:gpg-error)
  (:import-from #:trivial-garbage
             #:finalize)
 (:export #:check-version
   #:*version*
   #:context
   #:protocol
   #:armorp
   #:textmodep
   #:+include-certs-default+
   #:include-certs
   #:keylist-mode
   #:signers
   #:sig-notations
   #:with-context
   #:key-data
   #:get-key
   #:op-encrypt
   #:op-decrypt
   #:op-sign
   #:op-verify
   #:op-import
   #:op-export))
{
  "op": "encrypt",
  "keys": ["bravo@example.net", "alpha@example.net"],
  "data": "Hello world",
  "file_name": "test.txt",
```

```
  "armor": false,
  "always-trust": true
}
{
 "type": "signature",
 "base64":      false,
 "data": "*"
}
```

2011-12-02  Werner Koch  <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained.  Starting
on December 1st, 2011 we put change information only in the GIT
commit log, and generate a top-level ChangeLog file from logs at
"make dist".  See doc/HACKING for details.

2011-05-12  Marcus Brinkmann  <marcus@g10code.com>

* gpgme.texi (I/O Callback Example): Fix example code.

* gpgme.texi (Generating Keys): Fix OpenPGP parameters and reference
GPG and GPGSM manual.

2010-01-05  Werner Koch  <wk@g10code.com>

* gpgme.texi (Changing Passphrases): New.

2009-07-21  Werner Koch  <wk@g10code.com>

* uiserver.texi (UI Server Encrypt): Add --expect-sign option to
PREP_ENCRYPT.

2009-06-16  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Result Management): New section.

2009-06-16  Werner Koch  <wk@g10code.com>

* gpgme.texi (Exporting Keys): Document gpgme_op_export_keys.
(Importing Keys): Document gpgme_op_import_keys.
(Data Buffer Meta-Data): Document URL encodings.

2009-05-28
 Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Library Version Check): Document selftest error.
(Creating Contexts): Likewise.

2009-05-18  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document
GPGME_ENCRYPT_NO_ENCRYPT_TO.

2009-05-05 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Engine Information): Replace path by file_name.

2008-11-28 Werner Koch <wk@g10code.com>

* gpgme.texi (Listing Keys): Change description of the return
value to match the code. Spotted by Colin Leroy.

2008-10-15 Werner Koch <wk@g10code.com>

* uiserver.texi (Miscellaneous UI Server Commands): Add option
--protocol to the SENDER command.

2008-07-17 Werner Koch <wk@g10code.com>

* module-overview.sk: New.

2008-07-04 Werner Koch <wk@g10code.com>

* gpgme.texi (Algorithms): Add a hint on symmetric only encryption.

2008-06-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Cancellation): Document gpgme_cancel_async.

2008-06-25
Werner Koch <wk@g10code.com>

* gpgme.texi (Listing Keys): Updated example to the current API.
Noted by Nico Schottelius.

2008-06-05 Werner Koch <wk@g10code.com>

* uiserver.texi (Miscellaneous UI Server Commands): Describe
START_CONFDIALOG.

2008-06-04 Werner Koch <wk@g10code.com>

* gpgme.texi: Use @copying command. Change license to
GPLv3. Include protocol specis from GpgOL and GPGEx. Minor
cleanups.

2008-03-11 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (File Based Data Buffers): Document the need for
blocking operations.
(Callback Based Data Buffers): Likewise.

2008-03-05  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Library Version Check): Rename snippet function to
init_gpgme.
(I/O Callback Example): Call it here.

2008-01-28  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi: Document that data encoding affects some output data
objects now.

2007-09-27  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Protocols and Engines):
Document GPGME_PROTOCOL_UNKNOWN.

2007-09-11  Werner Koch  <wk@g10code.com>

* gpgme.texi (I/O Callback Example): Typo fix.

2007-08-07  Werner Koch  <wk@g10code.com>

* gpgme.texi (Verify): Describe chain_model.

2007-07-12  Werner Koch  <wk@g10code.com>

* gpgme.texi (Library Version Check): Add remark that the socket
layer will get initialized.

2007-06-05  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Advanced Key Editing): New section.

2007-05-21  Werner Koch  <wk@g10code.com>

* Makefile.am (online): New target.

2007-05-18  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Error Strings): Fix documentation of
gpgme_strerror_r.

2006-11-01  Moritz Schulte  <moritz@g10code.com>

* gpgme.texi (Data Buffer I/O Operations): Fixed entry for
gpgme_data_seek: OFFSET is not a pointer; some s/whence/offset/.

2006-09-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Destroying Data Buffers): Clarify that
gpgme_data_release_and_get_mem destroys DH unconditionally.

2005-03-24
Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Library Version Check): Make example code compatible
to W32 systems.

2006-06-21 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Fix inverted condition in
description.

2005-12-20 Werner Koch <wk@g10code.com>

* gpgme.texi (Verify): Document pka_trust.

2005-12-06 Werner Koch <wk@g10code.com>

* gpgme.texi (Key Management): Updated to match the fixes for
subkey fingerprints and theg secret flag.

2005-10-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Destroying Data Buffers): Document gpgme_free.

2005-10-02 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Add the new member notations of
gpgme_sig_key_t.
(Key Listing Mode): Document GPGME_KEYLIST_MODE_SIG_NOTATIONS.

2005-10-01 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Enclose all return parameters of deftypefuns in
curly brackets.

* gpgme.texi (Signature Notation Data): New
section.
(Verify): Added more about the notation data structure.

2005-09-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Data Buffer I/O Operations, Data Buffer Meta-Data):
New subsections.

* gpgme.texi: Replace plaintext_filename with file_name.

* gpgme.texi (Key Management): Document is_qualified.

2005-07-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Decrypt): Add plaintext_filename to
gpgme_decrypt_result_t.
(Verify): Likewise for gpgme_verify_result_t.

2005-06-03 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Add information about new fields in
gpgme_signature_t.

* gpgme.texi (Decrypt): Add gpgme_recipient_t.

2005-05-28 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Listing Mode): Fix return type of
gpgme_set_keylist_mode.
Reported by "Sergio" <ml_sergico@virgilio.it>.

2005-04-28 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Included Certificates): Document
GPGME_INCLUDE_CERTS_DEFAULT.

2005-01-12 Marcus
Brinkmann <marcus@g10code.de>

* gpgme.texi (Engine Configuration): New section.
(Crypto Engine): New subsection.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

* lesser.texi (Library Copying): Change from @appendixsec to
@appendix.
* gpgme.texi (Features): Change reference to GPL to one to LGPL.

* Makefile.am: Change license to LGPL.
(gpgme_TEXINFOS): Replace gpl.texi with lesser.texi.

* gpgme.texi: Change license to LGPL (also for documentation of GPGME's license).
* lesser.texi: New file.
* gpl.texi: File removed.

* gpgme.texi (Creating Contexts): Fix cut&paste error. Reported by Noel Torres <envite@rolamasao.org>.

2004-09-30 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (gpgme_TEXINFOS): Remove fdl.texi.
* gpgme.texi: Do not include fdl.texi. Change license to GPL.
* fdl.texi: File removed.

2004-09-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Change type of keylist_mode in gpgme_key_t to gpgme_keylist_mode_t.

2004-09-28
Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Fix last change.

2004-09-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Document GPG_ERR_NOT_IMPLEMENTED.

* gpgme.texi: Update copyright year for tex version.

2004-07-29 Moritz Schulte <moritz@g10code.com>

* gpgme.texi (Verify): Fix gpgme_get_key example (ancient force_update argument was still there).

2004-06-08 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Listing Keys): Elaborate on the length restrictions on search patterns.

* gpgme.texi (Decrypt and Verify): Document the NO_DATA error code.
(Verify): Document the relationship between gpgme_op_verify_result and the decrypt and verify operations.

2004-05-21 Marcus Brinkmann <marcus@g10code.de>

* gpgme.text (Verify): Document GPG_ERR_CERT_REVOKED status.

* gpgme.texi (Decrypt): Add note about new field wrong_key_usage
of gpgme_decrypt_result_t.

* gpgme.texi (Key Management): Add
note about new field
keylist_mode of gpgme_key_t.

2004-04-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Correct type of member wrong_key_usage.

2004-03-29 Moritz Schulte <moritz@duesseldorf.ccc.de>

* gpgme.texi (Verify): Fix type of gpgme_op_verify_result.
* gpgme.texi (Key Listing Mode): Typo fix.

2004-03-23 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Library Version Check): Fix the instruction when to
set the locale.

2004-03-03 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (I/O Callback Example Qt): New section by Marc Mutz.

2004-02-24 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (cancellation): New section.

2004-02-17 Werner Koch <wk@gnupg.org>

* gpgme.texi (Key Listing Mode): Doc KEYLIST_MODE_VALIDATE.

2004-02-06 Moritz Schulte <mo@g10code.com>

* gpgme.texi: A couple of small fixes regarding the Largfile
Support section.

2004-02-01 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Largefile Support): New
section.

2004-01-13 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Fix exportable field.

2003-12-25  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Key Management): Rename member class in
gpgme_key_sig_t to sig_class.
(Creating a Signature): Likewise for gpgme_signature_t.

2003-12-23  Moritz Schulte  <mo@g10code.com>

* gpgme.texi (Listing Keys): Minor clarification for
gpgme_get_key.

2003-10-06  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Signal Handling): New section.

2003-09-14  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Multi Threading): Correct documentation on memory
synchronization requirement.

* gpgme.texi (Locale): New section.
(Multi Threading): Set locale in example.

2003-09-13  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Error Strings): Add gpgme_strerror_r.

2003-09-13  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Multi Threading): Update documentation.

2003-09-03  Marcus Brinkmann  <marcus@g10code.de>

*
gpgme.texi (Header): We don't use the assuan namespace anymore.
Document new thread options.

2003-08-14  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Creating a Signature): Change type of member class
to unsigned int.

2003-08-04  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Verify): Get error code from SIG->status in the code
for gpgme_get_sig_status.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Add can_authenticate flag.

* gpgme.texi (Listing Keys): Document GPG_ERR_AMBIGUOUS_NAME for
gpgme_get_key.

2003-07-29 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (EXTRA_DIST): Remove variable.

* gpgme.texi (Encrypting a Plaintext): Bad passphrase is only
possible with symmetric encryption, change the wording to reflect
that.

* gpgme.texi (Creating a Signature): Document
GPG_ERR_UNUSABLE_SECKEY.

* gpgme.texi (Encrypting a Plaintext): Mention encrypt and sign
operations in result function.
(Creating
a Signature): Likewise.

2003-07-23 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Listing Mode): Remove word duplication.
(Listing Keys): Remove mentioning of force argument.
(Verify): Don't mention r_stat. Fix some typos.
(Decrypt and Verify): Correct info how to get the result. Don't
mention r_stat.
(Manipulating Data Buffers): Fix documentation of return value.
(Listing Keys): Update examples.
(Decrypt): Result might also be available when operation failed.
(Verify): Result might also be available when operation failed.
All spotted by Stphane Corthsy.

2003-07-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Error Sources): Fix cut and paste error.

2003-07-09 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Clarify difference between can_sign
and can_certify.
(Information About Keys): Likewise for GPGME_ATTR_CAN_SIGN and
GPGME_ATTR_CAN_CERTIFY.

2003-07-08 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Progress
Meter Callback): Change return type of
gpgme_progress_cb_t to void.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Add 2003 to copyright notice.

* gpgme.texi (Header): Fix name space documentation on
libgpg-error.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Remove reference to
gpgme_recipients_t.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Crypto Operations): Rename gpgme_invalid_user_id_t
to gpgme_invalid_key_t.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Change error codes to GPG_ERR_* variants.
(Error Handling): Rewritten.

2003-05-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Exporting Keys): Change and document prototypes.
Add new gpgme_op_export_ext and gpgme_op_export_ext_start
variants.
(Selecting Recipients): Section removed.
(Encrypting a Plaintext): Change prototypes and document the
changes.

2003-05-28 Marcus Brinkmann <marcus@g10code.de>

*
gpgme.texi (Exporting Keys): Change argument type from
gpgme_recipient_t to gpgme_user_id_t.
(Encrypting a Plaintext): Likewise.
(Selecting Recipients): Rewritten.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Protocol Selection): Do not use @acronym in @node
because that breaks texi2dvi.

* gpgme.texi (Passphrase Callback): Document new prototype.

2003-05-18  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Header): Remove Gpgme as namespace prefix.  Add
_GPGME to namespace prefix.
* gpgme.texi (Multi Threading): Add note about link order.

2003-05-04  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Listing Keys): Document what happens if key is not
found.

* gpgme.texi (Importing Keys): Fix cut and paste error.

2003-04-30  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Remove reference to
gpgme_get_op_info.
(Detailed Results): Subsection removed.

* gpgme.texi (Key Listing Mode): Add GPGME_KEYLIST_MODE_SIGS.
(Manipulating
Keys): Add obsoleteness note.
(Key Signatures): Likewise.
(Information About Keys): Likewise.
(Key Management): Add new data types GpgmeSubkey, GpgmeKeySig,
GpgmeUserID, and all the information about GpgmeKey.

2003-04-29  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Listing Keys): Remove force_update argument from
gpgme_get_key.

* gpgme.texi (Trust Item Management): Add data members of
GpgmeTrustItem type.
(Information About Trust Items): Add note about obsoleteness.
(Manipulating Trust Items): Add gpgme_trust_item_ref and
gpgme_trust_item_unref.

2003-04-28  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Verify): Rewritten to take into account new and
deprecated functions and data types.

* gpgme.texi (Decrypt): Descript gpgme_op_decrypt_result and
GpgmeDecryptResult.

2003-04-27  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Add info about
GpgmeEncryptResult and gpgme_op_encrypt_result.

* gpgme.texi
(Creating a Signature): Add info about
GpgmeNewSignature, GpgmeSignResult and gpgme_op_sign_result.
(Crypto Operations): Add GpgmeInvalidUserID.
(Algorithms): New chapter.

* gpgme.texi (Deleting Keys): Document
GPGME_Ambiguous_Specification.
(Error Values): Remove GPGME_Invalid_Type and GPGME_Invalid_Mode.
Add GPGME_Unknown_Reason, GPGME_Not_Found,
GPGME_Ambiguous_Specification, GPGME_Wrong_Key_Usage,
GPGME_Key_Revoked, GPGME_Key_Expired, GPGME_No_CRL_Known,
GPGME_CRL_Too_Old, GPGME_Policy_Mismatch, GPGME_No_Secret_Key,
GPGME_Key_Not_Trusted, GPGME_Issuer_Missing, GPGME_Chain_Too_Long,
GPGME_Unsupported_Algorithm, GPGME_Sig_Expired,
GPGME_Bad_Signature, GPGME_No_Public_Key.

2003-04-25  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Importing Keys): Change GPGME_IMPORT_PRIVATE to
GPGME_IMPORT_SECRET.

* gpgme.texi (Importing Keys): Remove note about gpgme_get_op_info.
(Detailed Results): Remove note about import.

* gpgme.texi (Importing Keys): Add documentation
for
GpgmeImportStatus, GpgmeImportResult and gpgme_op_import_result.

* gpgme.texi (Generating Keys): Fix documentation of public and
secret arguments.

2003-04-24  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Generating Keys): Document changed gpgme_op_genkey
and new gpgme_op_genkey_result function.  Document
GpgmeGenKeyResult data type.

* gpgme.texi (Error Values): Rename GPGME_No_Passphrase to
GPGME_Bad_Passphrase.
* gpgme.texi (Decrypt): Likewise.
(Decrypt and Verify): Likewise.

(Creating a Signature): Likewise.
(Encrypting a Plaintext): Likewise.

* gpgme.texi (Error Values): Rename GPGME_No_Recipients to
GPGME_No_UserID and GPGME_Invalid_Recipient to
GPGME_Invalid_UserID.
(Encrypting a Plaintext): Likewise.

* gpgme.texi (Error Values): Remove GPGME_Busy and GPGME_No_Request.
(Listing Keys): Likewise.
(Listing Trust Items): Likewise.

2003-02-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Cancelling an Operation): Removed.
(Passphrase
Callback): Document new type for GpgmePassphraseCb.

2003-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Engine Information): Rename member part to
file_name.

* gpgme.texi (Protocols and Engines): Document
gpgme_get_protocol_name.

* gpgme.texi (Engine Information): Rewritten.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (I/O Callback Interface): Document new even
GPGME_EVENT_START.
(Waiting For Completion): Document new possible return values.
(I/O Callback Interface): Document return type of GpgmeIOCb.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Hooking Up Into Idle Time): Section removed.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Drop R_STAT argument in gpgme_op_verify.
* gpgme.texi (Decrypt and Verify): Likewise for
gpgme_op_decrypt_verify.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Information About Keys): Document that

GPGME_ATTR_IS_SECRET is not representable
as a string anymore.

2002-12-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Signatures): New section.
(Listing Keys): Add gpgme_get_key.

2002-12-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Memory Based Data Buffers): New subsection.
(File Based Data Buffers): Likewise.
(Callback Based Data Buffers): Likewise.
(Manipulating Data Buffers): Update interfaces. Add
gpgme_data_seek.
* gpgme.texi (Engine Version Check): Remove gpgme_check_engine.

2002-11-21 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Document the new interface.

2002-11-19 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Generating Keys): Document new argument to
gpgme_op_genkey.

2002-11-05 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Fix prototype of gpgme_get_sig_key.
Reported by Miguel Coca <e970095@zipi.fi.upm.es>.

2002-08-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Selecting Signers): Fix reference count.

2002-08-21
Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Header): Document name space.

2002-08-20 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Importing Keys): Document gpgme_op_import_ext.

* gpgme.texi (Importing Keys): Undocument EOF.

2002-08-14 Werner Koch <wk@gnupg.org>

* gpgme.texi (Information About Keys): Changed GPGME_ATTR_TYPE.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Deleting Keys): Say that secret keys might not be deleted.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Information About Keys): Document (badly) the new key attributes.

* gpgme.texi (Manipulating Data Buffers): Mention that backend tries to detect encoding automatically.

2002-07-03 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Run Control): Update this section.
(Waiting For Completion): Likewise for this subsection.
(Cancelling an Operation): Likewise for this subsection.
(Using External Event Loops): New subsection with several subsubsections.

2002-06-28
Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Remove item about the need to synchronize anything against gpgme_wait (except gpgme_wait itself).

2002-06-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Information About Keys): Fix documentation for IDX.
(Information About Trust Items): Likewise.

2002-06-26 Werner Koch <wk@gnupg.org>

* gpgme.texi (Importing Keys): Document the return value -1 of gpgme_op_import.

2002-06-20 Werner Koch <wk@gnupg.org>

* gpgme.texi (Verify): Explain the new whatidx variable.

2002-06-10 Werner Koch <wk@gnupg.org>

* gpgme.texi (Verify): Document attribute GPGME_ATTR_ERRTOK.

2002-06-04  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Multi Threading): Document new autodetection.

2002-06-04  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (DISTCLEANFILES): New variable.

2002-05-26  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi: Some typographical corrections
throughout.

2002-05-09  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Using Automake): New section.

2002-05-09  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Multi Threading): Escape { and }.

2002-05-09  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Overview): Replace note about thread-safeness.
(Multi Threading): New section.

2002-05-03  Werner Koch  <wk@gnupg.org>

* gpgme.texi (Manipulating Data Buffers): Changed some data types
to void*.
(Protocol Selection): Added gpgme_get_protocol.
(Verify): Updated to include the new attribute functions and
status codes.

2002-04-27  Werner Koch  <wk@gnupg.org>

* gpgme.texi (Manipulating Data Buffers): New type GpgmeDataEncoding.

2002-04-23  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Document that either return
argument can be NULL.
(Progress Meter Callback): Likewise.

2002-04-22  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Fix small

typo. Document the
new function gpgme_get_passphrase_cb.
(Progress Meter Callback): Document the new function
gpgme_get_progress_cb.

2002-04-16 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Creating a Signature): Fix function name. Reported
by Wichert Ackerman <wichert@debian.org>.

2002-03-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (direntry): End index entry with a full stop.
Patch submitted by Jose Carlos Garcia Sogo <jsogo@debian.org>.

2002-03-17 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Detailed Results): Fix syntax error in last change.

2002-03-08 Werner Koch <wk@gnupg.org>

* gpgme.texi (Detailed Results): Import does also return info.

2002-03-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document symmetric
encryption.

2002-03-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Error Strings): Add example.
* gpgme.texi (Listing Keys): Likewise.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

*
gpgme.texi (Information About Keys): Document GPGME_ATTR_EXPIRE.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Document verification of normal and
cleartext signatures.

2002-02-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Listing Keys): Document gpgme_op_keylist_ext_start.

2002-02-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document
GPGME_Invalid_Recipients.
(Error Values): Likewise.

2002-02-26 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document
gpgme_op_encrypt_sign and gpgme_op_encrypt_sign_start.

2002-02-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Creating a Signature): Add a note about
certificates to include.
(Included Certificates): New section.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Detailed Results): Remove literal tags.
(Generating Keys): Update documentation.

* gpgme.texi (Generating Keys):
Fix syntax error.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Waiting For Completion): Adjust doc to changes in
the code.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Listing Mode): Update documentation.

2002-01-31 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Generating Keys): Document error at creation
failure.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Deleting Keys): Document new error values.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Importing Keys): Add reference to gpgme_get_op_info.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Some spell checking.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Add all the gpgme_op_*_start functions.
Fill the concept index with many, many entries.

2002-01-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Run Control): New section.
(Verify): Document gpgme_get_notation.
(More Information):
New section describing gpgme_get_op_info.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase callback): Change GpgmePassphraseCb's
R_HD type from void* to void**.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Creating data buffers): Change
gpgme_data_new_from_filepart's LENGTH type from off_t to size_t.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Generating keys): New subsection.
(Exporting keys): Likewise.
(Importing keys): Likewise.
(Deleting keys): Likewise.

2002-01-16 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: g10Code -> g10 Code

* gpgme.texi (Top): Complete detailmenu.

* gpgme.texi: Convert embarrassing cruft to the real thing.

2002-01-16 Marcus Brinkmann <marcus@g10code.de>

* ChangeLog: New file.
* gpgme.texi: Likewise.
* gpl.texi: Likewise.
* fdl.texi: Likewise.
* Makefile.am (info_TEXINFOS): New variable.
(gpgme_TEXINFOS): Likewise.

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(private-key
(oid.1.2.840.113549.1.1.1
(n
#00e0ce96f90b6c9e02f3922beada93fe50a875eac6bcc18bb9a9cf2e84965caa2d1ff95a7f542465c6c0c19d276e4526ce
048868a7a914fd343cc3a87dd74291ffc565506d5bbb25cbac6a0e2dd1f8bcaab0d4a29c2f37c950f363484bf269f78914
40464baf79827e03a36e70b814938eebdc63e964247be75dc58b014b7ea251#)
(e #010001#)
(d
#046129F2489D71579BE0A75FE029BD6CDB574EBF57EA8A5B0FDA942CAB943B117D7BB95E5D28875E0F
9FC5FCC06A72F6D502464DABDED78EF6B716177B83D5BDC543DC5D3FED932E59F5897E92E6F58A0F334
24106A3B6FA2CBF877510E4AC21C3EE47851E97D12996222AC3566D4CCB0B83D164074ABF7DE655FC244
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(p
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58eed3ce84f469b81b50d358407b4ad361#)
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#304559a9ead56d2309d203811a641bb1a09626bc8eb36fffa23c968ec5bd891eebbafc73ae666e01ba7c8990bae06cc2
bbe10b75e69fcacb353a6473079d8e9b#)
)
)
This is gpgme.info, produced by makeinfo version 6.5 from gpgme.texi.

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INFO-DIR-SECTION GNU Libraries
START-INFO-DIR-ENTRY
* GPGME: (gpgme). Adding support for cryptography to your program.
END-INFO-DIR-ENTRY

This file documents the GPGME library.

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The GnuPG Made Easy Reference Manual, for Version 1.14.1-beta35.

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File: gpgme.info, Node: Top, Next: Introduction, Up: (dir)

Main Menu
*********

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The GnuPG Made Easy Reference Manual, for Version 1.14.1-beta35 of the GPGME library.

* Menu:

* Introduction:: How to use this manual.
* Preparation:: What you should do before using the library.
* Protocols and Engines:: Supported crypto protocols.
* Algorithms:: Supported algorithms.
* Error Handling:: Error numbers and their meanings.
* Exchanging Data:: Passing data to and from GPGME.
* Contexts:: Handling GPGME contexts.

Appendices

* UI Server Protocol:: The GnuPG UI Server Protocol.

* Debugging:: How to solve problems.
* Deprecated Functions:: Documentation of deprecated functions.

* Library Copying:: The GNU Lesser General Public License says how you can copy and share GnuPG Made Easy.
* Copying:: The GNU General Public License says how you can copy and share this manual.

Indices

* Concept Index:: Index of concepts and programs.
* Function and Data Index:: Index of functions, variables and data types.

The Detailed Node Listing

Introduction

* Getting Started:: Purpose of the manual, and how to use it.
* Features:: Reasons to install and use GPGME.
* Overview:: Basic architecture of the GPGME library.

Preparation

* Header:: What header file you need to include.
* Building the Source:: Compiler options to be used.
* Largefile Support (LFS):: How to use GPGME with LFS.
* Using Automake:: Compiler options to be used the easy way.
* Using Libtool:: Avoiding compiler options entirely.
* Library Version Check:: Getting and verifying the library version.
* Signal Handling:: How GPGME affects signal handling.
* Multi-Threading:: How GPGME can be used in an MT environment.

Protocols and Engines

* Engine Version Check:: Verifying the engine version.
* Engine Information:: Obtaining more information about the engines.
* Engine Configuration:: Changing the engine configuration.
* OpenPGP:: Support for the OpenPGP protocol.
* Cryptographic Message Syntax:: Support for the CMS.

Algorithms

* Public Key Algorithms:: A list of all public key algorithms.
* Hash Algorithms:: A list of all hash algorithms.

Error Handling

* Error Values:: The error value and what it means.
* Error Codes:: A list of important error codes.
* Error Sources:: A list of important error sources.
* Error Strings:: How to get a descriptive string from a value.

Exchanging Data

* Creating Data Buffers:: Creating new data buffers.
* Destroying Data Buffers:: Releasing data buffers.
* Manipulating Data Buffers:: Operations on data buffers.

Creating Data Buffers

* Memory Based Data Buffers:: Creating memory based data buffers.
* File Based Data Buffers:: Creating file based data buffers.
* Callback Based Data Buffers:: Creating callback based data buffers.

Manipulating Data Buffers

* Data Buffer I/O Operations:: I/O operations on data buffers.
* Data Buffer Meta-Data:: Meta-data manipulation of data buffers.
* Data Buffer Convenience:: Convenience function for data buffers.

Contexts

* Creating Contexts:: Creating new GPGME contexts.
* Destroying Contexts:: Releasing GPGME contexts.
* Result Management:: Managing the result of crypto operations.
* Context Attributes:: Setting properties of a context.
* Key Management:: Managing keys with GPGME.
* Crypto Operations:: Using a context for cryptography.
* Miscellaneous:: Miscellaneous operations.
* Run Control:: Controlling how operations are run.

Context Attributes

* Protocol Selection:: Selecting the protocol used by a context.
* Crypto Engine:: Configuring the crypto engine.
* Setting the Sender:: How to tell the engine the sender.
* ASCII Armor:: Requesting ASCII armored output.
* Text Mode:: Choosing canonical text mode.
* Offline Mode:: Choosing offline mode.
* Included Certificates:: Including a number of certificates.
* Key Listing Mode:: Selecting key listing mode.
* Passphrase Callback:: Getting the passphrase from the user.
* Progress Meter Callback:: Being informed about the progress.

* Status Message Callback:: Status messages received from gpg.
* Locale:: Setting the locale of a context.

Key Management

* Key objects:: Description of the key structures.
* Listing Keys:: Browsing the list of available keys.
* Information About Keys:: Requesting detailed information about keys.
* Manipulating Keys:: Operations on keys.
* Generating Keys::
Creating new key pairs.
* Signing Keys:: Adding key signatures to public keys.
* Exporting Keys:: Retrieving key data from the key ring.
* Importing Keys:: Adding keys to the key ring.
* Deleting Keys:: Removing keys from the key ring.
* Changing Passphrases:: Change the passphrase of a key.
* Changing TOFU Data:: Changing data pertaining to TOFU.
* Advanced Key Editing:: Advanced key edit operation.

Crypto Operations

* Decrypt:: Decrypting a ciphertext.
* Verify:: Verifying a signature.
* Decrypt and Verify:: Decrypting a signed ciphertext.
* Sign:: Creating a signature.
* Encrypt:: Encrypting a plaintext.

Sign

* Selecting Signers:: How to choose the keys to sign with.
* Creating a Signature:: How to create a signature.
* Signature Notation Data::
How to add notation data to a signature.

Encrypt

* Encrypting a Plaintext:: How to encrypt a plaintext.

Miscellaneous

* Running other Programs:: Running other Programs.
* Using the Assuan protocol:: Using the Assuan protocol.
* Checking for updates:: How to check for software updates.

Run Control

* Waiting For Completion:: Waiting until an operation is completed.
* Using External Event Loops:: Advanced control over what happens when.

* Cancellation:: How to end pending operations prematurely.

Using External Event Loops

* I/O Callback Interface:: How I/O callbacks are registered.
* Registering I/O Callbacks:: How to use I/O callbacks for a context.
* I/O Callback Example:: An example how to use I/O callbacks.
* I/O Callback Example GTK+:: How to integrate GPGME in GTK+.
* I/O Callback Example GDK:: How to integrate GPGME in GDK.
* I/O Callback Example Qt:: How to integrate GPGME in Qt.

File:
gpgme.info, Node: Introduction, Next: Preparation, Prev: Top, Up: Top

# 1 Introduction

GnuPG Made Easy (GPGME) is a C language library that allows to add support for cryptography to a program. It is designed to make access to public key crypto engines like GnuPG or GpgSM easier for applications. GPGME provides a high-level crypto API for encryption, decryption, signing, signature verification and key management.

GPGME uses GnuPG and GpgSM as its backends to support OpenPGP and the Cryptographic Message Syntax (CMS).

* Menu:

* Getting Started:: Purpose of the manual, and how to use it.
* Features:: Reasons to install and use GPGME.
* Overview:: Basic architecture of the GPGME library.

File: gpgme.info, Node: Getting Started, Next: Features, Up: Introduction

## 1.1 Getting Started

This manual documents the GPGME library programming interface. All functions and data types provided
by the library are explained.

The reader is assumed to possess basic knowledge about cryptography in general, and public key cryptography in particular. The underlying cryptographic engines that are used by the library are not explained, but where necessary, special features or requirements by an engine are

mentioned as far as they are relevant to GPGME or its users.

This manual can be used in several ways. If read from the beginning to the end, it gives a good introduction into the library and how it can be used in an application. Forward references are included where necessary. Later on, the manual can be used as a reference manual to get just the information needed about any particular interface of the library. Experienced programmers might want to start looking at the examples at the end of the manual, and then only read up those parts of the interface which are unclear.

The documentation for the language bindings is currently not included in this manual. Those
languages bindings follow the general programming
model of GPGME but may provide some extra high level abstraction on top of the GPGME style API. For now please see the README files in the lang/ directory of the source distribution.

File: gpgme.info, Node: Features, Next: Overview, Prev: Getting Started, Up: Introduction

## 1.2 Features

GPGME has a couple of advantages over other libraries doing a similar job, and over implementing support for GnuPG or other crypto engines into your application directly.

its free software
: Anybody can use, modify, and redistribute it under the terms of the GNU Lesser General Public License (*note Library Copying::).

its flexible
: GPGME provides transparent support for several cryptographic protocols by different engines. Currently, GPGME supports the OpenPGP protocol using GnuPG as the backend, and the Cryptographic Message Syntax using GpgSM as the backend.

its easy
: GPGME hides the differences
between the protocols and engines from
the programmer behind an easy-to-use interface. This way the programmer can focus on the other parts of the program, and still integrate strong cryptography in his application. Once support for GPGME has been added to a program, it is easy to add support for other crypto protocols once GPGME backends provide them.

its language friendly

GPGME comes with languages bindings for several common programming languages: Common Lisp, C++, Python 2, and Python 3.

File: gpgme.info, Node: Overview, Prev: Features, Up: Introduction

## 1.3 Overview

GPGME provides a data abstraction that is used to pass data to the crypto engine, and receive returned data from it. Data can be read from memory or from files, but it can also be provided by a callback function.

The actual cryptographic operations are always set within a context. A context provides configuration parameters that define the behaviour of all operations performed within it. Only one operation per context is allowed at any time, but when one operation is finished, you can run the next operation in the same context. There can be more than one context, and all can run different operations at the same time.

Furthermore, GPGME has rich key management facilities including listing keys, querying their attributes, generating, importing, exporting and deleting keys, and acquiring information about the trust path.

With some precautions, GPGME can be used in a multi-threaded environment, although it is not completely thread safe and thus needs the support of the application.

File: gpgme.info, Node: Preparation, Next: Protocols and Engines, Prev: Introduction, Up: Top

# 2 Preparation

To use GPGME, you have to perform some changes to your sources and the build system. The necessary changes are small and explained in the following sections. At the end of this chapter, it is described how the library is initialized, and how the requirements of the library are verified.

* Menu:

* Header:: What header file you need to include.
* Building the Source:: Compiler options to be used.

* Largefile Support (LFS):: How to use GPGME with LFS.
* Using Automake:: Compiler options to be used the easy way.
* Using Libtool:: Avoiding compiler options entirely.
* Library Version Check:: Getting and verifying the library version.
* Signal Handling:: How GPGME affects signal handling.
* Multi-Threading:: How GPGME can be used in an MT environment.

File: gpgme.info, Node: Header, Next: Building the Source, Up: Preparation

## 2.1 Header

All interfaces (data types and functions) of the library are defined in the header file gpgme.h. You must include this in all programs using the library, either directly or through some other header file, like this:

```
#include <gpgme.h>
```

The name space of GPGME is gpgme_* for function names and data types and GPGME_* for other symbols. Symbols internal to GPGME take the form _gpgme_* and _GPGME_*.

Because GPGME makes use of the GPG Error library, using GPGME will also use the GPG_ERR_* name space directly, and the gpg_err*, gpg_str*, and gpgrt_* name space indirectly.

File: gpgme.info, Node: Building the Source, Next: Largefile Support (LFS), Prev: Header, Up: Preparation

## 2.2 Building the Source

If you want to compile a source file including the gpgme.h header file, you must make sure that the compiler can find it in the directory hierarchy. This is accomplished by adding the path to the directory in which the header file is located to the compilers include file search path (via the -I option).

However, the path to the include file is determined at the time the source is configured. To solve this problem, gpgme ships with a small helper program gpgme-config that knows about the path to the include file and other configuration options. The options that need to be added to the compiler invocation at compile time are output by the --cflags option to gpgme-config. The following example shows how it can be

used at the command line:

```
gcc -c foo.c `gpgme-config --cflags`
```

Adding the output of gpgme-config --cflags to the compiler command line will ensure that the compiler can find the GPGME header file.

A similar problem occurs when linking the program with the library. Again, the compiler has to find the library files. For this to work, the path to the library files has to be added to the library search path (via the -L option). For this, the option --libs to gpgme-config can be used. For convenience, this option also outputs all other options that are required to link the program with GPGME (in particular, the -lgpgme option). The example shows how to link foo.o with the GPGME library to a program foo.

```
gcc -o foo foo.o `gpgme-config --libs`
```

Of course you can also combine both examples to a single command by specifying both options to gpgme-config:

```
gcc -o foo foo.c `gpgme-config --cflags --libs`
```

If you need to detect the installed language bindings you can use list them using:

```
gpgme-config --print-lang
```

or test for the availability using

```
gpgme-config --have-lang=python && echo 'Bindings for Pythons available'
```

File: gpgme.info, Node: Largefile Support (LFS), Next: Using Automake, Prev: Building the Source, Up: Preparation

## 2.3 Largefile Support (LFS)

GPGME is compiled with largefile support by default, if it is available on the system. This means that GPGME supports files larger than two gigabyte in size, if the underlying operating system can. On some systems, largefile support is already the default. On such systems, nothing special is required. However, some systems provide only support for files up to two gigabyte in size by default. Support for larger file sizes

has to be specifically enabled.

To make a difficult situation even more complex, such systems provide two different types of largefile support. You can either get all relevant functions replaced with alternatives that are largefile capable, or you can get new functions and data types for largefile support added. Those new functions have the same name as their smallfile counterparts, but with a suffix of 64.

An example: The data type off_t is 32 bit wide on GNU/Linux PC systems. To address offsets in large files, you can either enable largefile support add-on. Then a new data type off64_t is provided, which is 64 bit wide. Or you can replace the existing off_t data type with its 64 bit wide counterpart. All occurrences of off_t are then automagically replaced.

As if matters were not complex enough, there are also two different types of file descriptors in such systems. This is important because if file descriptors are exchanged between programs that use a different maximum
file size, certain errors must be produced on some file descriptors to prevent subtle overflow bugs from occurring.

As you can see, supporting two different maximum file sizes at the same time is not at all an easy task. However, the maximum file size does matter for GPGME, because some data types it uses in its interfaces are affected by that. For example, the off_t data type is used in the gpgme_data_seek function, to match its POSIX counterpart. This affects the call-frame of the function, and thus the ABI of the library. Furthermore, file descriptors can be exchanged between GPGME and the application.

For you as the user of the library, this means that your program must be compiled in the same file size mode as the library. Luckily, there is absolutely no valid reason for new programs to not enable largefile support by default and just use that. The compatibility modes (small file sizes or dual mode) can be considered an historic artefact, only useful to allow
for a transitional period.

On POSIX platforms GPGME is compiled using largefile support by default. This means that your application must do the same, at least as far as it is relevant for using the gpgme.h header file. All types in this header files refer to their largefile counterparts, if they are different from any default types on the system.

On 32 and 64 bit Windows platforms off_t is declared as 32 bit signed integer. There is no specific support for LFS in the C library.

The recommendation from Microsoft is to use the native interface (CreateFile et al.) for large files. Released binary versions of GPGME (libgpgme-11.dll) have always been build with a 32 bit off_t. To avoid an ABI break we stick to this convention for 32 bit Windows by using long there. GPGME versions for 64 bit Windows have never been released and thus we are able to use int64_t instead of off_t there. For easier migration the typedef gpgme_off_t has been defined. The reason we cannot use off_t directly is that some toolchains (e.g. mingw64) introduce a POSIX compatible hack for off_t. Some widely used toolkits make use of this hack and in turn GPGME would need to use it also. However, this would introduce an ABI break and existing software making use of libgpgme might suffer from a severe break. Thus with version 1.4.2 we redefined all functions using off_t to use gpgme_off_t which is defined as explained above. This way we keep the ABI well defined and independent of any toolchain hacks. The bottom line is that LFS support in GPGME is only available on 64 bit versions of Windows.

On POSIX platforms you can enable largefile support, if it is different from the default on the system the application is compiled on, by using the Autoconf macro AC_SYS_LARGEFILE. If you do this, then you dont need to worry about anything else: It will just work. In this case you might also want to use AC_FUNC_FSEEKO to take advantage of some new interfaces, and AC_TYPE_OFF_T (just in case).

If you do not use Autoconf, you can define the preprocessor symbol _FILE_OFFSET_BITS to 64 _before_ including any header files, for example by specifying the option -D_FILE_OFFSET_BITS=64 on the compiler command line. You will also want to define the preprocessor symbol LARGEFILE_SOURCE to 1 in this case, to take advantage of some new interfaces.

If you do not want to do either of the above, you probably know enough about the issue to invent your own solution. Just keep in mind that the GPGME header file expects that largefile support is enabled, if it is available. In particular, we do not support dual mode (_LARGEFILE64_SOURCE).

File: gpgme.info, Node: Using Automake, Next: Using Libtool, Prev: Largefile Support (LFS), Up: Preparation

## 2.4 Using Automake

It is much easier if you use GNU Automake instead of writing your own Makefiles. If you do that you do not have to worry about finding and

invoking the gpgme-config script at all. GPGME
provides an extension
to Automake that does all the work for you.

-- Macro: AM_PATH_GPGME ([MINIMUM-VERSION], [ACTION-IF-FOUND],
[ACTION-IF-NOT-FOUND])
-- Macro: AM_PATH_GPGME_PTH ([MINIMUM-VERSION], [ACTION-IF-FOUND],
[ACTION-IF-NOT-FOUND])
-- Macro: AM_PATH_GPGME_PTHREAD ([MINIMUM-VERSION], [ACTION-IF-FOUND],
[ACTION-IF-NOT-FOUND])
Check whether GPGME (at least version MINIMUM-VERSION, if given)
exists on the host system. If it is found, execute
ACTION-IF-FOUND, otherwise do ACTION-IF-NOT-FOUND, if given.

Additionally, the function defines GPGME_CFLAGS to the flags
needed for compilation of the program to find the gpgme.h header
file, and GPGME_LIBS to the linker flags needed to link the
program to the GPGME library. If the used helper script does not
match the target type you are building for a warning is printed and
the string libgcrypt is appended to the variable
gpg_config_script_warn.

AM_PATH_GPGME_PTH
checks for the version of GPGME that can be
used with GNU Pth, and defines GPGME_PTH_CFLAGS and
GPGME_PTH_LIBS.

AM_PATH_GPGME_PTHREAD checks for the version of GPGME that can be
used with the native pthread implementation, and defines
GPGME_PTHREAD_CFLAGS and GPGME_PTHREAD_LIBS. Since version
1.8.0 this is no longer required to GPGME_PTHREAD as GPGME itself
is thread safe.

This macro searches for gpgme-config along the PATH. If you are
cross-compiling, it is useful to set the environment variable
SYSROOT to the top directory of your target. The macro will then
first look for the helper program in the bin directory below that
top directory. An absolute directory name must be used for
SYSROOT. Finally, if the configure command line option
--with-gpgme-prefix is used, only its value is used for the top
directory below which the helper script is expected.

You can use the defined Autoconf variables
like this in your
Makefile.am:

```
AM_CPPFLAGS = $(GPGME_CFLAGS)
LDADD = $(GPGME_LIBS)
```

File: gpgme.info, Node: Using Libtool, Next: Library Version Check, Prev: Using Automake, Up: Preparation

## 2.5 Using Libtool

The easiest way is to just use GNU Libtool. If you use libtool, and link to libgpgme.la, libgpgme-pth.la or libgpgme-pthread.la respectively, everything will be done automatically by Libtool.

File: gpgme.info, Node: Library Version Check, Next: Signal Handling, Prev: Using Libtool, Up: Preparation

## 2.6 Library Version Check

-- Function: const char * gpgme_check_version
(const char *REQUIRED_VERSION)

The function gpgme_check_version has four purposes. It can be used to retrieve the version number of the library. In addition it can verify that the version number is higher than a certain required version number. In either case, the function initializes some sub-systems, and for this reason alone it must be invoked early in your program, before you make use of the other functions in GPGME. The last purpose is to run selftests.

As a side effect for W32 based systems, the socket layer will get initialized.

If REQUIRED_VERSION is NULL, the function returns a pointer to a statically allocated string containing the version number of the library.

If REQUIRED_VERSION is not NULL, it should point to a string containing a version number, and the function checks that the version of the library is at least as high as the version number provided. In this case, the function returns a pointer to a statically allocated string containing the version number of the library. If REQUIRED_VERSION is not a valid version number, or if the version requirement is not met, the function returns NULL.

If you use a version of a library that is backwards compatible with older releases, but contains additional interfaces which your program uses, this function provides a run-time check if the necessary features are provided by the installed version of the

library.

If a selftest fails, the function may still succeed. Selftest errors are returned later when invoking gpgme_new or gpgme-data_new, so that a detailed error code can be returned (historically, gpgme_check_version does not return a detailed error code).

-- Function: int gpgme_set_global_flag (const char *NAME, const char *VALUE)

SINCE: 1.4.0

On some systems it is not easy to set environment variables and thus hard to use GPGMEs internal trace facility for debugging. This function has been introduced as an alternative way to enable debugging and for a couple of other rarely used tweaks. It is important to assure that only one thread accesses GPGME functions between a call to this function and after the return from the call to
gpgme_check_version.

All currently supported features require that this function is called as early as possible even before gpgme_check_version. The features are identified by the following values for NAME:

debug
To enable debugging use the string debug for NAME and VALUE identical to the value used with the environment variable GPGME_DEBUG.

disable-gpgconf
Using this feature with any VALUE disables the detection of the gpgconf program and thus forces GPGME to fallback into the simple OpenPGP only mode. It may be used to force the use of GnuPG-1 on systems which have both GPG versions installed. Note that in general the use of gpgme_set_engine_info is a better way to select a specific engine version.

gpgconf-name
gpg-name
Set the name of the gpgconf respective gpg binary. The defaults are GNU/GnuPG/gpgconf and GNU/GnuPG/gpg. Under

Unix the leading directory part is ignored. Under Windows the leading directory part is used as the default installation directory; the .exe suffix is added by GPGME. Use forward slashed even under Windows.

require-gnupg
Set the minimum version of the required GnuPG engine. If that version is not met, GPGME fails early instead of trying to use the existent version. The given version must be a string with major, minor, and micro number. Example: "2.1.0".

w32-inst-dir
On Windows GPGME needs to know its installation directory to find its spawn helper. This is in general no problem because a DLL has this information. Some applications however link statically to GPGME and thus GPGME can only figure out the installation directory of this application which may be wrong in certain cases. By supplying an installation directory as

value to this flag, GPGME will assume that that directory is the installation directory. This flag has no effect on non-Windows platforms.

This function returns 0 on success. In contrast to other functions the non-zero return value on failure does not convey any error code. For setting debug the only possible error cause is an out of memory condition; which would exhibit itself later anyway. Thus the return value may be ignored.

After initializing GPGME, you should set the locale information to the locale required for your output terminal. This locale information is needed for example for the curses and Gtk pinentry. Here is an example of a complete initialization:

```
#include <locale.h>
#include <gpgme.h>

void
init_gpgme (void)
{
  /* Initialize the locale environment.  */
  setlocale (LC_ALL, "");
  gpgme_check_version (NULL);
  gpgme_set_locale (NULL, LC_CTYPE, setlocale (LC_CTYPE, NULL));
 #ifdef LC_MESSAGES
  gpgme_set_locale (NULL, LC_MESSAGES, setlocale (LC_MESSAGES, NULL));
#endif
}
```

Note that you are highly recommended to initialize the locale settings like this. GPGME can not do this for you because it would not be thread safe. The conditional on LC_MESSAGES is only necessary for

portability to W32 systems.

File: gpgme.info, Node: Signal Handling, Next: Multi-Threading, Prev: Library Version Check, Up: Preparation

## 2.7 Signal Handling

The GPGME library communicates with child processes (the crypto engines). If a child process dies unexpectedly, for example due to a bug, or system problem, a SIGPIPE signal will be delivered to the application. The default action is to abort the program. To protect against this, gpgme_check_version sets the SIGPIPE signal action to SIG_IGN, which means that the signal will be ignored.

GPGME will only do that if the signal action for SIGPIPE is SIG_DEF at the time gpgme_check_version is called. If it is something different, GPGME will take no action.

This means that if your application does not install any signal handler for SIGPIPE, you dont need to take any precautions. If you do install a signal handler for SIGPIPE, you must be prepared to handle any SIGPIPE events that occur due to GPGME writing to a defunct pipe. Furthermore, if your application is multi-threaded, and you install a signal action for SIGPIPE, you must make sure you do this either before gpgme_check_version is called or afterwards.

File: gpgme.info, Node: Multi-Threading, Prev: Signal Handling, Up: Preparation

## 2.8 Multi-Threading

The GPGME library is mostly thread-safe, and can be used in a multi-threaded environment but there are some requirements for multi-threaded use:

The function gpgme_check_version must be called before any other function in the library, because it initializes the thread support subsystem in GPGME. To achieve this in multi-threaded programs, you must synchronize the memory with respect to other threads that also want to use GPGME. For this, it is sufficient to call gpgme_check_version before creating the other threads using GPGME(1).

Any gpgme_data_t and gpgme_ctx_t object must only be accessed

by one thread at a time. If multiple threads want to deal with the same object, the caller has to make sure that operations on that object are fully synchronized.

Only one thread at any time is allowed to call gpgme_wait. If multiple threads call this function, the caller must make sure that all invocations are fully synchronized. It is safe to start asynchronous operations while a thread is running in gpgme_wait.

The function gpgme_strerror is not thread safe. You have to use gpgme_strerror_r instead.

---------- Footnotes ----------

(1) At least this is true for POSIX threads, as pthread_create is a function that synchronizes memory with respects to other threads. There are many functions which have this property, a complete list can be found in POSIX, IEEE Std 1003.1-2003, Base Definitions, Issue 6, in the definition of the term Memory Synchronization. For other thread packages other, more relaxed or more strict rules may apply.

File: gpgme.info, Node: Protocols and Engines, Next: Algorithms, Prev: Preparation, Up: Top

# 3 Protocols and Engines

GPGME supports several cryptographic protocols, however, it does not implement them. Rather it uses backends (also called engines) which implement the protocol. GPGME uses inter-process communication to pass data back and forth between the application and the backend, but the details of the communication protocol and invocation of the backend is completely hidden by the interface. All complexity is handled by GPGME. Where an exchange of information between the application and the backend is necessary, GPGME provides the necessary callback function hooks and further interfaces.

-- Data type: enum gpgme_protocol_t

The gpgme_protocol_t type specifies the set of possible protocol values that are supported by GPGME. The following protocols are supported:

GPGME_PROTOCOL_OpenPGP
GPGME_PROTOCOL_OPENPGP
This specifies the OpenPGP protocol.

GPGME_PROTOCOL_CMS
This specifies the Cryptographic Message Syntax.

GPGME_PROTOCOL_GPGCONF
Under development. Please ask on <gnupg-devel@gnupg.org> for help.

GPGME_PROTOCOL_ASSUAN
SINCE: 1.2.0

This specifies the raw Assuan protocol.

GPGME_PROTOCOL_G13
SINCE: 1.3.0

Under development. Please ask on <gnupg-devel@gnupg.org> for help.

GPGME_PROTOCOL_UISERVER
Under development. Please ask on <gnupg-devel@gnupg.org> for help.

GPGME_PROTOCOL_SPAWN
SINCE: 1.5.0

Special protocol for use with gpgme_op_spawn.

GPGME_PROTOCOL_UNKNOWN
Reserved for future extension. You may use this to indicate that the used protocol is not known to the application. Currently, GPGME does not accept this value in any operation, though, except for gpgme_get_protocol_name.

-- Function: const char * gpgme_get_protocol_name (gpgme_protocol_t PROTOCOL)
The function gpgme_get_protocol_name returns a statically allocated string describing the protocol PROTOCOL, or NULL if the protocol number is not valid.

* Menu:

* Engine Version Check:: Verifying the engine version.
* Engine Information:: Obtaining more information about the engines.
* Engine Configuration:: Changing the engine configuration.
* OpenPGP:: Support for the OpenPGP protocol.
* Cryptographic Message Syntax:: Support for the CMS.
* Assuan:: Support for the raw Assuan protocol.

File: gpgme.info,
Node: Engine Version Check, Next: Engine Information, Up: Protocols and Engines

## 3.1 Engine Version Check

-- Function: const char * gpgme_get_dirinfo (cons char *WHAT)
SINCE: 1.5.0

The function gpgme_get_dirinfo returns a statically allocated string with the value associated to WHAT. The returned values are the defaults and wont change even after gpgme_set_engine_info has been used to configure a different engine. NULL is returned if no value is available. Commonly supported values for WHAT are:

homedir
Return the default home directory.

sysconfdir
Return the name of the system configuration directory

bindir
Return the name of the directory with GnuPG program files.

libdir
Return the name of the directory with GnuPG related library files.

libexecdir
Return the name of the directory with GnuPG helper program files.

datadir
Return the name of the directory with GnuPG shared data.

localedir
Return the name of the directory with GnuPG locale data.

agent-socket
Return the name of the socket to connect to the gpg-agent.

agent-ssh-socket
Return the name of the socket to connect to the ssh-agent component of gpg-agent.

dirmngr-socket
Return the name of the socket to connect to the dirmngr.

uiserver-socket
Return the name of the socket to connect to the user interface server.

gpgconf-name
Return the file name of the engine configuration tool.

gpg-name
Return the file name of the OpenPGP engine.

gpgsm-name
Return the file name of the CMS engine.

g13-name
Return the name of the file container encryption engine.

gpg-wks-client-name
Return the name of the Web Key Service tool.

-- Function: gpgme_error_t gpgme_engine_check_version
(gpgme_protocol_t PROTOCOL)
The function gpgme_engine_check_version verifies that the engine implementing the protocol PROTOCOL is installed in the expected path and meets the version requirement of GPGME.

This function returns the error code GPG_ERR_NO_ERROR if the engine is available and GPG_ERR_INV_ENGINE if it is not.

File: gpgme.info, Node: Engine Information, Next: Engine Configuration, Prev: Engine Version Check, Up: Protocols and Engines

3.2 Engine Information
==========

-- Data type: gpgme_engine_info_t
The gpgme_engine_info_t type specifies a pointer to a structure describing a crypto engine. The structure contains the following elements:

gpgme_engine_info_t next
This is a pointer to the next engine info structure in the linked list, or NULL if this is the last element.

gpgme_protocol_t protocol

This is the protocol for which the crypto engine is used. You can convert this to a string with gpgme_get_protocol_name for printing.

const char *file_name
This is a string holding the file name of the executable of the crypto engine. Currently, it is never NULL, but using NULL is reserved for future use, so always check before you use it.

const char *home_dir
This is a string holding the directory name of the crypto engines configuration directory. If it is NULL, then the default directory is used. See gpgme_get_dirinfo on how to get the default directory.

const char *version
This is a string containing the version number of the crypto engine. It might be NULL if the version number can not be determined, for example because the executable doesnt exist or is invalid.

const char *req_version
This is a string containing the minimum required version number of the crypto engine for GPGME to work correctly. This is the version number that gpgme_engine_check_version verifies against. Currently, it is never NULL, but using NULL is reserved for future use, so always check before you use it.

-- Function: gpgme_error_t gpgme_get_engine_info (gpgme_engine_info_t *INFO)
The function gpgme_get_engine_info returns a linked list of engine info structures in INFO. Each info structure describes the defaults of one configured backend.

The memory for the info structures is allocated the first time this function is invoked, and must not be freed by the caller.

This function returns the error code GPG_ERR_NO_ERROR if successful, and a system error if the memory could not be allocated.

Here is an example how you can provide more diagnostics if you receive an error message which indicates that the crypto engine is invalid.

```
   gpgme_ctx_t ctx;
   gpgme_error_t
err;

   [...]

   if (gpgme_err_code (err) == GPG_ERR_INV_ENGINE)
     {
       gpgme_engine_info_t info;
       err = gpgme_get_engine_info (&info);
       if (!err)
         {
           while (info && info->protocol != gpgme_get_protocol (ctx))
             info = info->next;
           if (!info)
             fprintf (stderr, "GPGME compiled without support for protocol %s",
                      gpgme_get_protocol_name (info->protocol));
           else if (info->file_name && !info->version)
             fprintf (stderr, "Engine %s not installed properly",
                      info->file_name);
           else if (info->file_name && info->version && info->req_version)
             fprintf (stderr, "Engine %s version %s installed, "
                      "but at least version %s required", info->file_name,
                      info->version, info->req_version);
           else
             fprintf (stderr, "Unknown problem with engine
for protocol %s",
                      gpgme_get_protocol_name (info->protocol));
         }
     }
```

File: gpgme.info, Node: Engine Configuration, Next: OpenPGP, Prev: Engine Information, Up: Protocols and Engines

## 3.3 Engine Configuration

You can change the configuration of a backend engine, and thus change the executable program and configuration directory to be used. You can make these changes the default or set them for some contexts individually.

-- Function: gpgme_error_t gpgme_set_engine_info
(gpgme_protocol_t PROTO, const char *FILE_NAME,
const char *HOME_DIR)

SINCE: 1.1.0

The function gpgme_set_engine_info changes the default configuration of the crypto engine implementing the protocol PROTO.

FILE_NAME is the file name of the executable program implementing this protocol, and HOME_DIR is the directory name of the configuration directory for this crypto engine. If HOME_DIR is

NULL, the engines default will be used.

The new defaults are not applied to already created GPGME contexts.

This function returns the error code GPG_ERR_NO_ERROR if successful, or an error code on failure.

The functions gpgme_ctx_get_engine_info and gpgme_ctx_set_engine_info can be used to change the engine configuration per context. *Note Crypto Engine::.

File: gpgme.info, Node: OpenPGP, Next: Cryptographic Message Syntax, Prev: Engine Configuration, Up: Protocols and Engines

## 3.4 OpenPGP

OpenPGP is implemented by GnuPG, the GNU Privacy Guard. This is the first protocol that was supported by GPGME.

The OpenPGP protocol is specified by GPGME_PROTOCOL_OpenPGP.

File: gpgme.info, Node: Cryptographic Message Syntax, Next: Assuan, Prev: OpenPGP, Up: Protocols and Engines

## 3.5 Cryptographic Message Syntax

CMS is implemented by GpgSM, the S/MIME implementation for GnuPG.

The CMS protocol is specified by GPGME_PROTOCOL_CMS.

File: gpgme.info, Node: Assuan, Prev: Cryptographic Message Syntax, Up: Protocols and Engines

## 3.6 Assuan

Assuan is the RPC library used by the various GnuPG components. The Assuan protocol allows one to talk to arbitrary Assuan servers using GPGME. *Note Using the Assuan protocol::.

The ASSUAN protocol is specified by GPGME_PROTOCOL_ASSUAN.

File: gpgme.info, Node: Algorithms, Next: Error Handling, Prev: Protocols and Engines, Up: Top

# 4 Algorithms

The crypto backends support a variety of algorithms used in public key cryptography.(1) The following sections list the identifiers used to denote such an algorithm.

* Menu:

* Public Key Algorithms:: A list of all public key algorithms.
* Hash Algorithms:: A list of all hash algorithms.

---------- Footnotes ----------

(1) Some engines also provide symmetric only encryption; see the description of the encryption function on how to use this.

File: gpgme.info, Node: Public Key Algorithms, Next: Hash Algorithms, Up: Algorithms

## 4.1 Public Key Algorithms

Public key algorithms are used for encryption, decryption, signing and verification of signatures.

-- Data type: enum gpgme_pubkey_algo_t
The gpgme_pubkey_algo_t type specifies the set of all public key algorithms that are supported by GPGME. Possible values are:

GPGME_PK_RSA
This value indicates the RSA (Rivest, Shamir, Adleman) algorithm.

GPGME_PK_RSA_E
Deprecated. This value indicates the RSA (Rivest, Shamir, Adleman) algorithm for encryption and decryption only.

GPGME_PK_RSA_S
Deprecated. This value indicates the RSA (Rivest, Shamir, Adleman) algorithm for signing and verification only.

GPGME_PK_DSA
This value indicates DSA, the Digital Signature Algorithm.

GPGME_PK_ELG
This value indicates ElGamal.

GPGME_PK_ELG_E

This value also indicates ElGamal and is used specifically in GnuPG.

GPGME_PK_ECC
SINCE: 1.5.0

This value is a generic indicator for ellipic curve algorithms.

GPGME_PK_ECDSA
SINCE: 1.3.0

This value indicates ECDSA, the Elliptic Curve Digital Signature Algorithm as defined by FIPS 186-2 and RFC-6637.

GPGME_PK_ECDH
SINCE: 1.3.0

This value indicates ECDH, the Eliptic Curve Diffie-Hellmann encryption algorithm as defined by RFC-6637.

GPGME_PK_EDDSA
SINCE: 1.7.0

This value indicates the EdDSA algorithm.

-- Function: const char * gpgme_pubkey_algo_name (gpgme_pubkey_algo_t ALGO)
The function gpgme_pubkey_algo_name returns a pointer to a statically allocated string containing a description of the public key algorithm ALGO. This string can be used to output the name of the public key algorithm to the user.

If ALGO is not a valid public key algorithm, NULL is returned.

-- Function: char * gpgme_pubkey_algo_string (gpgme_subkey_t KEY)
SINCE: 1.7.0

The function gpgme_pubkey_algo_string is a convenience function to build and return an algorithm string in the same way GnuPG does (e.g. rsa2048 or ed25519). The caller must free the result using gpgme_free. On error (e.g. invalid argument or memory exhausted), the function returns NULL and sets ERRNO.

File: gpgme.info, Node: Hash Algorithms, Prev: Public Key Algorithms, Up: Algorithms

## 4.2 Hash Algorithms

Hash (message digest) algorithms are used to compress a long message to make it suitable for public key cryptography.

-- Data type: enum gpgme_hash_algo_t
The gpgme_hash_algo_t type specifies the set of all hash algorithms that are supported by GPGME. Possible values are:

GPGME_MD_MD5
GPGME_MD_SHA1
GPGME_MD_RMD160
GPGME_MD_MD2
GPGME_MD_TIGER
GPGME_MD_HAVAL
GPGME_MD_SHA256
GPGME_MD_SHA384
GPGME_MD_SHA512
GPGME_MD_SHA224
SINCE: 1.5.0

GPGME_MD_MD4
GPGME_MD_CRC32
GPGME_MD_CRC32_RFC1510
GPGME_MD_CRC24_RFC2440

-- Function: const char * gpgme_hash_algo_name (gpgme_hash_algo_t ALGO)
The function gpgme_hash_algo_name returns a pointer to a statically allocated string containing a description of the hash algorithm ALGO. This string can be used to output the name of the hash algorithm to the user.

If ALGO is not a valid hash algorithm, NULL is returned.

File: gpgme.info, Node: Error Handling, Next: Exchanging Data, Prev: Algorithms, Up: Top

# 5 Error Handling

Many functions in GPGME can return an error if they fail. For this reason, the application should always catch the error condition and take appropriate measures, for example by releasing the resources and passing the error up to the caller, or by displaying a descriptive message to the user and cancelling the operation.

Some error values do not indicate a system error or an error in the operation, but the result of an operation that failed properly. For example, if you try to decrypt a tempered message, the decryption will fail. Another error value actually means that the end of a data buffer or list has been reached. The following descriptions explain for many error codes what they mean usually. Some error values have specific meanings if returned by a certain functions. Such cases are described in the documentation of those functions.

GPGME uses the libgpg-error library. This allows to share the error codes with other components of the GnuPG system, and thus pass error values transparently from the crypto engine, or some helper application of the crypto engine, to the user. This way no information is lost. As a consequence, GPGME does not use its own identifiers for error codes, but uses those provided by libgpg-error. They usually start with GPG_ERR_.

However, GPGME does provide aliases for the functions defined in libgpg-error, which might be preferred for name space consistency.

* Menu:


* Error Values:: The error value and what it means.
* Error Sources:: A list of important error sources.
* Error Codes:: A list of important error codes.
* Error Strings:: How to get a descriptive string from a value.


File: gpgme.info, Node: Error Values, Next: Error Sources, Up: Error Handling

## 5.1 Error Values

-- Data type: gpgme_err_code_t
The gpgme_err_code_t type is an alias for the libgpg-error type

gpg_err_code_t. The error code indicates the type of an error, or the reason why an operation failed.

A list of important error codes can be found in the next section.

-- Data type: gpgme_err_source_t
The gpgme_err_source_t type is an alias for the libgpg-error type gpg_err_source_t. The error source has not a precisely defined meaning. Sometimes it is the place where the error happened, sometimes it is the place where an error was encoded into an error value. Usually the error source will give an indication to where to look for the problem. This is not always true, but it is attempted to achieve this goal.

A list of important error sources can be found in the next section.

-- Data type: gpgme_error_t
The gpgme_error_t type is an alias for the libgpg-error type gpg_error_t. An error value like this has always two components, an error code and an error source. Both together form the error value.

Thus, the error value can not be directly compared against an error code, but the accessor functions described below must be used. However, it is guaranteed that only 0 is used to indicate success (GPG_ERR_NO_ERROR), and that in this case all other parts of the error value are set to 0, too.

Note that in GPGME, the error source is used purely for diagnostical purposes. Only the error code should be checked to test for a certain outcome of a function. The manual only documents the error code part of an error value. The error source is left unspecified and might be anything.

-- Function: static inline gpgme_err_code_t gpgme_err_code (gpgme_error_t ERR)
The static inline function gpgme_err_code returns the gpgme_err_code_t component of the error value ERR. This function must be used to extract the error code from an error value in order to compare it with the GPG_ERR_* error code macros.

-- Function: static inline gpgme_err_source_t gpgme_err_source (gpgme_error_t ERR)
The static inline function gpgme_err_source returns the gpgme_err_source_t component of the error value ERR. This function must be used to extract the error source from an error

value in order to compare it with the GPG_ERR_SOURCE_*
error
source macros.

-- Function: static inline gpgme_error_t gpgme_err_make
(gpgme_err_source_t SOURCE, gpgme_err_code_t CODE)
The static inline function gpgme_err_make returns the error value
consisting of the error source SOURCE and the error code CODE.

This function can be used in callback functions to construct an
error value to return it to the library.

-- Function: static inline gpgme_error_t gpgme_error
(gpgme_err_code_t CODE)
The static inline function gpgme_error returns the error value
consisting of the default error source and the error code CODE.

For GPGME applications, the default error source is
GPG_ERR_SOURCE_USER_1. You can define GPGME_ERR_SOURCE_DEFAULT
before including gpgme.h to change this default.

This function can be used in callback functions to construct an
error value to return it to the library.

The libgpg-error library provides error codes for all system error
numbers
it knows about. If ERR is an unknown error number, the error
code GPG_ERR_UNKNOWN_ERRNO is used. The following functions can be
used to construct error values from system errnor numbers.

-- Function: gpgme_error_t gpgme_err_make_from_errno
(gpgme_err_source_t SOURCE, int ERR)
The function gpgme_err_make_from_errno is like gpgme_err_make,
but it takes a system error like errno instead of a
gpgme_err_code_t error code.

-- Function: gpgme_error_t gpgme_error_from_errno (int ERR)
The function gpgme_error_from_errno is like gpgme_error, but it
takes a system error like errno instead of a gpgme_err_code_t
error code.

Sometimes you might want to map system error numbers to error codes
directly, or map an error code representing a system error back to the
system error number. The following functions can be used to do that.

-- Function: gpgme_err_code_t gpgme_err_code_from_errno (int ERR)
The function gpgme_err_code_from_errno returns

the error code for
the system error ERR. If ERR is not a known system error, the function returns GPG_ERR_UNKNOWN_ERRNO.

-- Function: int gpgme_err_code_to_errno (gpgme_err_code_t ERR)
The function gpgme_err_code_to_errno returns the system error for the error code ERR. If ERR is not an error code representing a system error, or if this system error is not defined on this system, the function returns 0.

File: gpgme.info, Node: Error Sources, Next: Error Codes, Prev: Error Values, Up: Error Handling

## 5.2 Error Sources

The library libgpg-error defines an error source for every component of the GnuPG system. The error source part of an error value is not well defined. As such it is mainly useful to improve the diagnostic error message for the user.

If the error code part of an error value is 0, the whole error value will be 0. In this case the error source part is of course GPG_ERR_SOURCE_UNKNOWN.

The list of error sources that might occur in applications using GPGME is:

GPG_ERR_SOURCE_UNKNOWN
The error source is not known. The value of this error source is 0.

GPG_ERR_SOURCE_GPGME
The error source is GPGME itself. This is the default for errors that occur in the GPGME library.

GPG_ERR_SOURCE_GPG
The error source is GnuPG, which is the crypto engine used for the OpenPGP protocol.

GPG_ERR_SOURCE_GPGSM
The error source is GPGSM, which is the crypto engine used for the CMS protocol.

GPG_ERR_SOURCE_GCRYPT
The error source is libgcrypt, which is used by crypto engines to perform cryptographic operations.

GPG_ERR_SOURCE_GPGAGENT
The error source is gpg-agent, which is used by crypto engines to perform operations with the secret key.

GPG_ERR_SOURCE_PINENTRY
The error source is pinentry, which is used by gpg-agent to query the passphrase to unlock a secret key.

GPG_ERR_SOURCE_SCD
The error source is the SmartCard Daemon, which is used by gpg-agent to delegate operations with the secret key to a SmartCard.

GPG_ERR_SOURCE_KEYBOX
The error source is libkbx, a library used by the crypto engines to manage local keyrings.

GPG_ERR_SOURCE_USER_1
GPG_ERR_SOURCE_USER_2
GPG_ERR_SOURCE_USER_3
GPG_ERR_SOURCE_USER_4
These error sources are not used by any GnuPG component and can be used by other software. For example, applications using GPGME can use them to mark error values coming from callback handlers. Thus GPG_ERR_SOURCE_USER_1 is the default for errors created with gpgme_error and gpgme_error_from_errno, unless you define GPGME_ERR_SOURCE_DEFAULT before including gpgme.h.

File: gpgme.info, Node: Error Codes, Next: Error Strings, Prev: Error Sources, Up: Error Handling

## 5.3 Error Codes

The library libgpg-error defines many error values. Most of them are not used by GPGME directly, but might be returned by GPGME because it received them from the crypto engine. The below list only includes such error codes that have a specific meaning in GPGME, or which are so common that you should know about them.

GPG_ERR_EOF
This value indicates the end of a list, buffer or file.

GPG_ERR_NO_ERROR
This value indicates success. The value of this error code is 0.

Also, it is guaranteed that an error value made from the error code 0 will be 0 itself (as a whole). This means that the error source information is lost for this error code, however, as this error code indicates that no error occurred, this is generally not a problem.

GPG_ERR_GENERAL
This value means that something went wrong, but either there is not enough information about the problem to return a more useful error value, or there is no separate error value for this type of problem.

GPG_ERR_ENOMEM
This value means that an out-of-memory condition occurred.

GPG_ERR_E...
System errors are mapped to GPG_ERR_FOO where FOO is the symbol for the system error.

GPG_ERR_INV_VALUE
This value means that some user provided data was out of range. This can also refer to objects. For example, if an empty gpgme_data_t object was expected, but one containing data was provided, this error value is returned.

GPG_ERR_UNUSABLE_PUBKEY
This value means that some recipients for a message were invalid.

GPG_ERR_UNUSABLE_SECKEY
This value means that some signers were invalid.

GPG_ERR_NO_DATA
This value means that a gpgme_data_t object which was expected to have content was found empty.

GPG_ERR_CONFLICT
This value means that a conflict of some sort occurred.

GPG_ERR_NOT_IMPLEMENTED
This value indicates that the specific function (or operation) is not implemented. This error should never happen. It can only occur if you use certain values or configuration options which do not work, but for which we think that they should work at some later time.

GPG_ERR_DECRYPT_FAILED
This value indicates that a decryption operation was unsuccessful.

GPG_ERR_BAD_PASSPHRASE
This value means that the user did not provide a correct passphrase when requested.

GPG_ERR_CANCELED
This value means that the operation was canceled.

GPG_ERR_INV_ENGINE
This value means that the engine that implements the desired protocol is currently not available. This can either be because the sources were configured to exclude support for this engine, or because the engine is not installed properly.

GPG_ERR_AMBIGUOUS_NAME
This value indicates that a user ID or other specifier did not specify a unique key.

GPG_ERR_WRONG_KEY_USAGE
This value indicates that a key is not used appropriately.

GPG_ERR_CERT_REVOKED
This value indicates that a key signature was revoced.

GPG_ERR_CERT_EXPIRED
This value indicates that a key signature expired.

GPG_ERR_NO_CRL_KNOWN
This value indicates
that no certificate revocation list is known
for the certificate.

GPG_ERR_NO_POLICY_MATCH
This value indicates that a policy issue occurred.

GPG_ERR_NO_SECKEY
This value indicates that no secret key for the user ID is available.

GPG_ERR_MISSING_CERT
This value indicates that a key could not be imported because the issuer certificate is missing.

GPG_ERR_BAD_CERT_CHAIN
This value indicates that a key could not be imported because its certificate chain is not good, for example it could be too long.

GPG_ERR_UNSUPPORTED_ALGORITHM

This value means a verification failed because the cryptographic algorithm is not supported by the crypto backend.

GPG_ERR_BAD_SIGNATURE
This value means a verification failed because the signature is bad.

GPG_ERR_NO_PUBKEY
This value means a verification failed because the public key is not available.

GPG_ERR_USER_1
GPG_ERR_USER_2
...
GPG_ERR_USER_16
These error codes are not used by any GnuPG component and can be freely used by other software. Applications using GPGME might use them to mark specific errors returned by callback handlers if no suitable error codes (including the system errors) for these errors exist already.

File: gpgme.info, Node: Error Strings, Prev: Error Codes, Up: Error Handling

## 5.4 Error Strings

-- Function: const char * gpgme_strerror (gpgme_error_t ERR)
The function gpgme_strerror returns a pointer to a statically allocated string containing a description of the error code contained in the error value ERR. This string can be used to output a diagnostic message to the user.

This function is not thread safe. Use gpgme_strerror_r in multi-threaded programs.

-- Function: int gpgme_strerror_r (gpgme_error_t ERR, char *BUF, size_t BUFLEN)
The function gpgme_strerror_r returns the error string for ERR in the user-supplied buffer BUF of size BUFLEN.
This function is, in contrast to gpgme_strerror, thread-safe if a thread-safe strerror_r function is provided by the system. If the function succeeds, 0 is returned and BUF contains the string describing the error. If the buffer was not large enough, ERANGE is returned and BUF contains as much of the beginning of the error string as fits into the buffer.

-- Function: const char * gpgme_strsource (gpgme_error_t ERR)
The function gpgme_strerror returns a pointer to a statically allocated string containing a description of the error source contained in the error value ERR. This string can be used to output a diagnostic message to the user.

The following example illustrates the use of gpgme_strerror:

```
gpgme_ctx_t ctx;
gpgme_error_t err = gpgme_new (&ctx);
if (err)
  {
    fprintf (stderr, "%s: creating GpgME context failed: %s: %s\n",
             argv[0], gpgme_strsource (err), gpgme_strerror (err));
     exit (1);
  }
```

File: gpgme.info, Node: Exchanging Data, Next: Contexts, Prev: Error Handling, Up: Top

# 6 Exchanging Data

A lot of data has to be exchanged between the user and the crypto engine, like plaintext messages, ciphertext, signatures and information about the keys. The technical details about exchanging the data information are completely abstracted by GPGME. The user provides and receives the data via gpgme_data_t objects, regardless of the communication protocol between GPGME and the crypto engine in use.

-- Data type: gpgme_data_t
The gpgme_data_t type is a handle for a container for generic data, which is used by GPGME to exchange data with the user.

gpgme_data_t objects do not provide notifications on events. It is assumed that read and write operations are blocking until data is available. If this is undesirable, the application must ensure that all GPGME data operations always have data available, for example by using memory buffers or files rather than pipes or sockets. This might be relevant, for example, if the external event loop mechanism is used.

-- Data type: gpgme_off_t
SINCE: 1.4.1

On POSIX platforms the gpgme_off_t type is an alias for off_t; it may be used interchangeable. On Windows platforms gpgme_off_t

is defined as a long (i.e. 32 bit) for 32 bit Windows and as a 64
bit signed integer for 64 bit Windows.

-- Data type: gpgme_ssize_t
The gpgme_ssize_t type is an alias for ssize_t. It has only
been introduced to overcome portability problems pertaining to the
declaration of ssize_t by different toolchains.

* Menu:

* Creating Data Buffers:: Creating new data buffers.
* Destroying Data Buffers:: Releasing data buffers.
* Manipulating Data Buffers:: Operations on data buffers.

File: gpgme.info, Node: Creating Data Buffers, Next: Destroying Data Buffers, Up: Exchanging Data

## 6.1 Creating Data Buffers

Data
objects can be based on memory, files, or callback functions
provided by the user. Not all operations are supported by all objects.

* Menu:

* Memory Based Data Buffers:: Creating memory based data buffers.
* File Based Data Buffers:: Creating file based data buffers.
* Callback Based Data Buffers:: Creating callback based data buffers.

File: gpgme.info, Node: Memory Based Data Buffers, Next: File Based Data Buffers, Up: Creating Data Buffers

### 6.1.1 Memory Based Data Buffers

Memory based data objects store all data in allocated memory. This is
convenient, but only practical for an amount of data that is a fraction
of the available physical memory. The data has to be copied from its
source and to its destination, which can often be avoided by using one
of the other data object

-- Function: gpgme_error_t gpgme_data_new (gpgme_data_t *DH)
The function gpgme_data_new creates a new gpgme_data_t object

and returns a handle for it in DH. The data object is memory based
and initially empty.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, GPG_ERR_INV_VALUE if DH is not a valid pointer, and GPG_ERR_ENOMEM if not enough memory is available.

-- Function: gpgme_error_t gpgme_data_new_from_mem (gpgme_data_t *DH, const char *BUFFER, size_t SIZE, int COPY)

The function gpgme_data_new_from_mem creates a new gpgme_data_t object and fills it with SIZE bytes starting from BUFFER.

If COPY is not zero, a private copy of the data is made. If COPY is zero, the data is taken from the specified buffer as needed, and the user has to ensure that the buffer remains valid for the whole life span of the data object.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, GPG_ERR_INV_VALUE if DH or BUFFER is not a valid pointer, and
GPG_ERR_ENOMEM if not enough
memory is available.

-- Function: gpgme_error_t gpgme_data_new_from_file (gpgme_data_t *DH, const char *FILENAME, int COPY)

The function gpgme_data_new_from_file creates a new gpgme_data_t object and fills it with the content of the file FILENAME.

If COPY is not zero, the whole file is read in at initialization time and the file is not used anymore after that. This is the only mode supported currently. Later, a value of zero for COPY might cause all reads to be delayed until the data is needed, but this is not yet implemented.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, GPG_ERR_INV_VALUE if DH or FILENAME is not a valid pointer, GPG_ERR_NOT_IMPLEMENTED if CODE is zero, and GPG_ERR_ENOMEM if not enough memory is available.

-- Function: gpgme_error_t gpgme_data_new_from_filepart (gpgme_data_t *DH, const char *FILENAME,
FILE *FP,
off_t OFFSET, size_t LENGTH)

The function gpgme_data_new_from_filepart creates a new gpgme_data_t object and fills it with a part of the file specified by FILENAME or FP.

Exactly one of FILENAME and FP must be non-zero, the other must be zero. The argument that is not zero specifies the file from which

LENGTH bytes are read into the data object, starting from OFFSET.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, GPG_ERR_INV_VALUE if DH and exactly one of FILENAME and FP is not a valid pointer, and GPG_ERR_ENOMEM if not enough memory is available.

File: gpgme.info, Node: File Based Data Buffers, Next: Callback Based Data Buffers, Prev: Memory Based Data Buffers, Up: Creating Data Buffers

### 6.1.2 File Based Data Buffers

File based data objects operate directly on file descriptors or streams. Only a small amount of data is stored in core at any time, so the size of the data objects is not limited by GPGME.

-- Function: gpgme_error_t gpgme_data_new_from_fd (gpgme_data_t *DH, int FD)

The function gpgme_data_new_from_fd creates a new gpgme_data_t object and uses the file descriptor FD to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the file descriptor than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the file descriptor is set to blocking mode. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, and GPG_ERR_ENOMEM if not enough memory is available.

-- Function: gpgme_error_t gpgme_data_new_from_stream (gpgme_data_t *DH, FILE *STREAM)

The function gpgme_data_new_from_stream creates a new gpgme_data_t object and uses the I/O stream STREAM to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the stream than is actually needed by the crypto engine in the desired operation because of internal

buffering.

Note that GPGME assumes that the stream is in blocking mode.
Errors during I/O operations, except for EINTR, are usually fatal
for crypto operations.

The function returns the error code GPG_ERR_NO_ERROR if the data
object was successfully created, and GPG_ERR_ENOMEM if not enough
memory is available.

-- Function: gpgme_error_t gpgme_data_new_from_estream
(gpgme_data_t *DH, gpgrt_stream_t STREAM)
The function gpgme_data_new_from_estream creates
a new
gpgme_data_t object and uses the gpgrt stream STREAM to read from
(if used as an input data object) and write to (if used as an
output data object).

When using the data object as an input buffer, the function might
read a bit more from the stream than is actually needed by the
crypto engine in the desired operation because of internal
buffering.

Note that GPGME assumes that the stream is in blocking mode.
Errors during I/O operations, except for EINTR, are usually fatal
for crypto operations.

The function returns the error code GPG_ERR_NO_ERROR if the data
object was successfully created, and GPG_ERR_ENOMEM if not enough
memory is available.

File: gpgme.info, Node: Callback Based Data Buffers, Prev: File Based Data Buffers, Up: Creating Data Buffers

6.1.3 Callback Based Data Buffers
---

If neither memory nor file based data objects are a good fit for your
application, you can
implement the functions a data object provides
yourself and create a data object from these callback functions.

-- Data type: ssize_t (*gpgme_data_read_cb_t) (void *HANDLE,
void *BUFFER, size_t SIZE)
The gpgme_data_read_cb_t type is the type of functions which
GPGME calls if it wants to read data from a user-implemented data
object. The function should read up to SIZE bytes from the current
read position into the space starting at BUFFER. The HANDLE is

provided by the user at data object creation time.

Note that GPGME assumes that the read blocks until data is available. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function should return the number of bytes read, 0 on EOF, and -1 on error. If an error occurs, ERRNO should be set to describe the type of the error.

-- Data type: ssize_t (*gpgme_data_write_cb_t) (void *HANDLE, const void *BUFFER, size_t SIZE)

The gpgme_data_write_cb_t type is the type of functions which GPGME calls if it wants to write data to a user-implemented data object. The function should write up to SIZE bytes to the current write position from the space starting at BUFFER. The HANDLE is provided by the user at data object creation time.

Note that GPGME assumes that the write blocks until data is available. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function should return the number of bytes written, and -1 on error. If an error occurs, ERRNO should be set to describe the type of the error.

-- Data type: off_t (*gpgme_data_seek_cb_t) (void *HANDLE, off_t OFFSET, int WHENCE)

The gpgme_data_seek_cb_t type is the type of functions which GPGME calls if it wants to change the current read/write position in a user-implemented data object, just like the lseek function.

The function should return the new read/write position, and -1 on error. If an error occurs, ERRNO should be set to describe the type of the error.

-- Data type: void (*gpgme_data_release_cb_t) (void *HANDLE)

The gpgme_data_release_cb_t type is the type of functions which GPGME calls if it wants to destroy a user-implemented data object. The HANDLE is provided by the user at data object creation time.

-- Data type: struct gpgme_data_cbs

This structure is used to store the data callback interface functions described above. It has the following members:

gpgme_data_read_cb_t read

This is the function called by GPGME to read data from the

data object.  It is only required for input data object.

gpgme_data_write_cb_t write
This is the function called by GPGME to write data to the data object.  It is only required for output data object.

gpgme_data_seek_cb_t seek
This is the function called by GPGME to change the current read/write pointer in the data object (if available).  It is optional.

gpgme_data_release_cb_t release
This is the function called by GPGME to release a data object. It is optional.

-- Function: gpgme_error_t gpgme_data_new_from_cbs (gpgme_data_t *DH, gpgme_data_cbs_t CBS, void *HANDLE)
The function gpgme_data_new_from_cbs creates a new gpgme_data_t object and uses the user-provided callback functions to operate on the data object.

The handle HANDLE is passed as first argument to the callback functions.  This can be used to identify this data object.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, and GPG_ERR_ENOMEM if not enough memory is available.

File: gpgme.info,  Node: Destroying Data Buffers,  Next: Manipulating Data Buffers,  Prev: Creating Data Buffers, Up: Exchanging Data

## 6.2 Destroying Data Buffers

-- Function: void gpgme_data_release (gpgme_data_t DH)
The function gpgme_data_release destroys the data object with the handle DH.  It releases all associated resources that were not provided by the user in the first place.

-- Function: char * gpgme_data_release_and_get_mem (gpgme_data_t DH, size_t *LENGTH)
The function gpgme_data_release_and_get_mem is like gpgme_data_release, except that it returns the data buffer and its length that was provided by the object.

The user has to release the buffer with gpgme_free.  In case the

user provided the data buffer in non-copy mode, a copy will be made for this purpose.

In case an error returns, or there is no suitable data buffer that can be returned to the user, the function will return NULL. In any case, the data object DH is destroyed.

-- Function: void gpgme_free (void *BUFFER)
SINCE: 1.1.1

The function gpgme_free releases the memory returned by gpgme_data_release_and_get_mem and gpgme_pubkey_algo_string. It should be used instead of the system libraries free function in case different allocators are used by a program. This is often the case if gpgme is used under Windows as a DLL.

File: gpgme.info, Node: Manipulating Data Buffers, Prev: Destroying Data Buffers, Up: Exchanging Data

## 6.3 Manipulating Data Buffers

Data buffers contain data and meta-data. The following operations can be used to manipulate both.

* Menu:

* Data Buffer I/O Operations:: I/O operations on data buffers.
* Data Buffer Meta-Data:: Meta-data manipulation of data buffers.
* Data Buffer Convenience:: Convenience function for data buffers.

File: gpgme.info, Node: Data Buffer I/O Operations, Next: Data Buffer Meta-Data, Up: Manipulating Data Buffers

### 6.3.1 Data Buffer I/O Operations

-- Function: ssize_t gpgme_data_read
(gpgme_data_t DH, void *BUFFER,
size_t LENGTH)
The function gpgme_data_read reads up to LENGTH bytes from the data object with the handle DH into the space starting at BUFFER.

If no error occurs, the actual amount read is returned. If the end of the data object is reached, the function returns 0.

In all other cases, the function returns -1 and sets ERRNO.

-- Function: ssize_t gpgme_data_write (gpgme_data_t DH,
const void *BUFFER, size_t SIZE)

The function gpgme_data_write writes up to SIZE bytes starting from BUFFER into the data object with the handle DH at the current write position.

The function returns the number of bytes actually written, or -1 if an error occurs. If an error occurs, ERRNO is set.

-- Function: off_t gpgme_data_seek (gpgme_data_t DH, off_t OFFSET,
int WHENCE)

The function gpgme_data_seek changes the current read/write position.

The WHENCE argument specifies how the OFFSET should be interpreted. It must be one of the following symbolic constants:

SEEK_SET
Specifies that OFFSET is a count of characters from the beginning of the data object.

SEEK_CUR
Specifies that OFFSET is a count of characters from the current file position. This count may be positive or negative.

SEEK_END
Specifies that OFFSET is a count of characters from the end of the data object. A negative count specifies a position within the current extent of the data object; a positive count specifies a position past the current end. If you set the position past the current end, and actually write data, you will extend the data object with zeros up to that position.

If successful, the function returns the resulting file position, measured in bytes from the beginning of the data object. You can use this feature together with SEEK_CUR to read the current read/write position.

If the function fails, -1 is returned and ERRNO is set.

File: gpgme.info, Node: Data Buffer Meta-Data, Next: Data Buffer Convenience, Prev: Data Buffer I/O Operations, Up: Manipulating Data Buffers

6.3.2 Data Buffer Meta-Data
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-- Function: char * gpgme_data_get_file_name (gpgme_data_t DH)
SINCE: 1.1.0

The function gpgme_data_get_file_name returns a pointer to a string containing the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting or verifying the output data.

If no error occurs, the string containing the file name is returned. Otherwise, NULL will be returned.

-- Function: gpgme_error_t gpgme_data_set_file_name (gpgme_data_t DH, const char *FILE_NAME)
SINCE: 1.1.0

The function gpgme_data_set_file_name sets the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting or verifying the output data.

The function returns the error code GPG_ERR_INV_VALUE if DH is not a valid pointer and GPG_ERR_ENOMEM if not enough memory is available.

-- Data type: enum gpgme_data_encoding_t
The gpgme_data_encoding_t type specifies the encoding of a gpgme_data_t object. For input data objects, the encoding is useful to give the backend a hint on the type of data. For output data objects, the encoding can specify the output data format on certain operations. Please note that not all backends support all encodings on all operations. The following data types are available:

GPGME_DATA_ENCODING_NONE
This specifies that the encoding is not known. This is the default for a new data object. The backend will try its best to detect the encoding automatically.

GPGME_DATA_ENCODING_BINARY
This specifies that the data is encoding in binary form; i.e. there is no special encoding.

GPGME_DATA_ENCODING_BASE64

This specifies that the data is encoded using the Base-64 encoding scheme as used by MIME and other protocols.

GPGME_DATA_ENCODING_ARMOR

This specifies that the data is encoded in an armored form as used by OpenPGP and PEM.

GPGME_DATA_ENCODING_MIME

SINCE: 1.7.0

This specifies that the data is encoded as a MIME part.

GPGME_DATA_ENCODING_URL

SINCE: 1.2.0

The data is a list of linefeed delimited URLs. This is only useful with gpgme_op_import.

GPGME_DATA_ENCODING_URL0

SINCE: 1.2.0

The data is a list of binary zero delimited URLs. This is only useful with gpgme_op_import.

GPGME_DATA_ENCODING_URLESC

SINCE: 1.2.0

The data is a list of linefeed delimited URLs with all control and space characters percent escaped. This mode is is not yet implemented.

-- Function: gpgme_data_encoding_t gpgme_data_get_encoding (gpgme_data_t DH)

The function gpgme_data_get_encoding returns the encoding of the data object with the handle DH. If DH is not a valid pointer (e.g. NULL) GPGME_DATA_ENCODING_NONE is returned.

-- Function: gpgme_error_t gpgme_data_set_encoding (gpgme_data_t DH, gpgme_data_encoding_t ENC)

The function gpgme_data_set_encoding changes the encoding of the data object with the handle DH to ENC.

-- Function: gpgme_error_t gpgme_data_set_flag (gpgme_data_t DH, const char *NAME, const char *VALUE)

SINCE: 1.7.0

Some minor properties of the data object can be controlled with flags set by this function. The properties are identified by the following values for NAME:

size-hint
The value is a decimal number with the length gpgme shall assume for this data object. This is useful if the data is provided by callbacks or via file descriptors but the applications knows the total size of the data. If this is set the OpenPGP engine may use this to decide on buffer allocation strategies and to provide a total value for its progress information.

This function returns 0 on success.

File: gpgme.info, Node: Data Buffer Convenience, Prev: Data Buffer Meta-Data, Up: Manipulating Data Buffers

6.3.3 Data Buffer Convenience Functions
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-- Data type: enum gpgme_data_type_t
SINCE: 1.4.3

The gpgme_data_type_t type is used to return the detected type of the content of a data buffer.

GPGME_DATA_TYPE_INVALID
This is returned by gpgme_data_identify if it was not possible to identify the data. Reasons for this might be a non-seekable stream
or a memory problem. The value is 0.
GPGME_DATA_TYPE_UNKNOWN
The type of the data is not known.
GPGME_DATA_TYPE_PGP_SIGNED
The data is an OpenPGP signed message. This may be a binary signature, a detached one or a cleartext signature.
GPGME_DATA_TYPE_PGP_ENCRYPTED
SINCE: 1.7.0

The data is an OpenPGP encrypted message.
GPGME_DATA_TYPE_PGP_SIGNATURE
SINCE: 1.7.0

The data is an OpenPGP detached signature.
GPGME_DATA_TYPE_PGP_OTHER

This is a generic OpenPGP message. In most cases this will be encrypted data.

GPGME_DATA_TYPE_PGP_KEY
This is an OpenPGP key (private or public).

GPGME_DATA_TYPE_CMS_SIGNED
This is a CMS signed message.

GPGME_DATA_TYPE_CMS_ENCRYPTED
This is a CMS encrypted (enveloped data) message.

GPGME_DATA_TYPE_CMS_OTHER
This is used for other CMS message types.

GPGME_DATA_TYPE_X509_CERT
The data is a X.509 certificate

GPGME_DATA_TYPE_PKCS12
The data is a PKCS#12 message. This is commonly used to exchange private keys for X.509.

-- Function: gpgme_data_type_t gpgme_data_identify (gpgme_data_t DH)
SINCE: 1.4.3

The function gpgme_data_identify returns the type of the data with the handle DH. If it is not possible to perform the identification, the function returns zero (GPGME_DATA_TYPE_INVALID). Note that depending on how the data object has been created the identification may not be possible or the data object may change its internal state (file pointer moved). For file or memory based data object, the state should not change.

File: gpgme.info, Node: Contexts, Next: UI Server Protocol, Prev: Exchanging Data, Up: Top

# 7 Contexts

All cryptographic operations in GPGME are performed within a context, which contains the internal state of the operation as well as configuration parameters. By using several contexts you can run several cryptographic operations in parallel, with different configuration.

-- Data type: gpgme_ctx_t
The gpgme_ctx_t type is a handle for a GPGME context, which is used to hold the configuration, status and result of cryptographic operations.

* Menu:

* Creating Contexts:: Creating new GPGME contexts.
* Destroying Contexts:: Releasing GPGME contexts.

* Result Management:: Managing the result of crypto operations.
* Context Attributes:: Setting properties of a context.
* Key Management:: Managing keys with GPGME.
* Crypto Operations:: Using a context for cryptography.
* Miscellaneous:: Miscellaneous operations
* Run Control:: Controlling how operations are run.

File: gpgme.info, Node: Creating Contexts, Next: Destroying Contexts, Up: Contexts

## 7.1 Creating Contexts

-- Function: gpgme_error_t gpgme_new (gpgme_ctx_t *CTX)
The function gpgme_new creates a new gpgme_ctx_t object and
returns a handle
for it in CTX.

The function returns the error code GPG_ERR_NO_ERROR if the
context was successfully created, GPG_ERR_INV_VALUE if CTX is not
a valid pointer, and GPG_ERR_ENOMEM if not enough memory is
available. Also, it returns GPG_ERR_NOT_OPERATIONAL if
gpgme_check_version was not called to initialize GPGME, and
GPG_ERR_SELFTEST_FAILED if a selftest failed. Currently, the
only selftest is for Windows MingW32 targets to see if
-mms-bitfields was used (as required).

File: gpgme.info, Node: Destroying Contexts, Next: Result Management, Prev: Creating Contexts, Up: Contexts

## 7.2 Destroying Contexts

-- Function: void gpgme_release (gpgme_ctx_t CTX)
The function gpgme_release destroys the context with the handle
CTX and releases all associated resources.

File: gpgme.info, Node: Result Management, Next: Context Attributes, Prev: Destroying Contexts, Up: Contexts

## 7.3 Result Management

The
detailed result of an operation is returned in operation-specific
structures such as gpgme_decrypt_result_t. The corresponding
retrieval functions such as gpgme_op_decrypt_result provide static
access to the results after an operation completes. Those structures

shall be considered read-only and an application must not allocate such a structure on its own. The following interfaces make it possible to detach a result structure from its associated context and give it a lifetime beyond that of the current operation or context.

-- Function: void gpgme_result_ref (void *RESULT)
SINCE: 1.2.0

The function gpgme_result_ref acquires an additional reference for the result RESULT, which may be of any type gpgme_*_result_t. As long as the user holds a reference, the result structure is guaranteed to be valid and unmodified.

-- Function: void gpgme_result_unref (void *RESULT)
SINCE: 1.2.0

The function gpgme_result_unref releases a reference for the result RESULT. If this was the last reference, the result structure will be destroyed and all resources associated to it will be released.

Note that a context may hold its own references to result structures, typically until the context is destroyed or the next operation is started. In fact, these references are accessed through the gpgme_op_*_result functions.

File: gpgme.info, Node: Context Attributes, Next: Key Management, Prev: Result Management, Up: Contexts

## 7.4 Context Attributes

* Menu:

* Protocol Selection:: Selecting the protocol used by a context.
* Crypto Engine:: Configuring the crypto engine.
* Setting the Sender:: How to tell the engine the sender.
* ASCII Armor:: Requesting ASCII armored output.
* Text Mode:: Choosing canonical text mode.
* Offline Mode:: Choosing offline mode.
* Pinentry Mode:: Choosing the pinentry mode.
* Included Certificates:: Including a number of certificates.
* Key Listing Mode:: Selecting key listing mode.
* Passphrase Callback:: Getting the passphrase from the user.
* Progress Meter Callback:: Being informed about the progress.
* Status Message Callback:: Status messages received from gpg.

* Context Flags:: Additional flags for a context.
* Locale:: Setting the locale of a context.
* Additional Logs:: Additional logs of a context.

File: gpgme.info, Node: Protocol Selection, Next: Crypto Engine, Up: Context Attributes

7.4.1 Protocol Selection
---

-- Function: gpgme_error_t gpgme_set_protocol (gpgme_ctx_t CTX,
gpgme_protocol_t PROTO)
The function gpgme_set_protocol sets the protocol used within the context CTX to PROTO. All crypto operations will be performed by the crypto engine configured for that protocol. *Note Protocols and Engines::.

Setting the protocol with gpgme_set_protocol does intentionally not check if the crypto engine for that protocol is available and installed correctly. *Note Engine Version Check::.

The function returns the error code GPG_ERR_NO_ERROR if the protocol could be set successfully, and GPG_ERR_INV_VALUE if PROTOCOL is not a valid protocol.

-- Function: gpgme_protocol_t gpgme_get_protocol (gpgme_ctx_t CTX)
The function gpgme_get_protocol retrieves the protocol currently use with the context CTX.

File: gpgme.info, Node: Crypto Engine, Next: Setting the Sender, Prev: Protocol Selection, Up: Context Attributes

7.4.2 Crypto Engine
---

The following functions can be used to set and retrieve the configuration of the crypto engines of a specific context. The default can also be retrieved without any particular context. *Note Engine Information::. The default can also be changed globally. *Note Engine Configuration::.

-- Function: gpgme_engine_info_t gpgme_ctx_get_engine_info
(gpgme_ctx_t CTX)
SINCE: 1.1.0

The function gpgme_ctx_get_engine_info returns a linked list of engine info structures. Each info structure describes the configuration of one configured backend, as used by the context CTX.

The result is valid until the next invocation of gpgme_ctx_set_engine_info for this particular context.

This function can not fail.

-- Function: gpgme_error_t gpgme_ctx_set_engine_info (gpgme_ctx_t CTX, gpgme_protocol_t PROTO, const char *FILE_NAME, const char *HOME_DIR)
SINCE: 1.1.0

The function gpgme_ctx_set_engine_info changes the configuration of the crypto engine implementing the protocol PROTO for the context CTX.

FILE_NAME is the file name of the executable program implementing this protocol, and HOME_DIR is the directory name of the configuration directory for this crypto engine. If HOME_DIR is NULL, the engines default will be used.

Currently this function must be used before starting the first crypto operation. It is unspecified if and when the changes will take effect if the function is called after starting the first operation on the context CTX.

This function returns the error code GPG_ERR_NO_ERROR if successful, or an error code on failure.

File: gpgme.info, Node: Setting the Sender, Next: ASCII Armor, Prev: Crypto Engine, Up: Context Attributes

7.4.3 How to tell the engine the sender.
---

Some engines can make use of the senders address, for example to figure out the best user id in certain trust models. For verification and signing of mails, it is thus suggested to let the engine know the sender ("From:") address. GPGME provides two functions to accomplish that. Note that the esoteric use of multiple "From:" addresses is not supported.

-- Function: gpgme_error_t

gpgme_set_sender (gpgme_ctx_t CTX,
int ADDRESS)

SINCE: 1.8.0

The function gpgme_set_sender specifies the sender address for use in sign and verify operations. ADDRESS is expected to be the addr-spec part of an address but my also be a complete mailbox address, in which case this function extracts the addr-spec from it. Using NULL for ADDRESS clears the sender address.

The function returns 0 on success or an error code on failure. The most likely failure is that no valid addr-spec was found in ADDRESS.

-- Function: const char * gpgme_get_sender (gpgme_ctx_t CTX)

SINCE: 1.8.0

The function gpgme_get_sender returns the current sender address from the context, or NULL if none was set. The returned value is valid as long as the CTX is valid and gpgme_set_sender has not been called again.

File: gpgme.info, Node: ASCII Armor, Next: Text Mode, Prev: Setting the Sender, Up: Context Attributes

7.4.4
ASCII Armor
---

-- Function: void gpgme_set_armor (gpgme_ctx_t CTX, int YES)
The function gpgme_set_armor specifies if the output should be ASCII armored. By default, output is not ASCII armored.

ASCII armored output is disabled if YES is zero, and enabled otherwise.

-- Function: int gpgme_get_armor (gpgme_ctx_t CTX)
The function gpgme_get_armor returns 1 if the output is ASCII armored, and 0 if it is not, or if CTX is not a valid pointer.

File: gpgme.info, Node: Text Mode, Next: Offline Mode, Prev: ASCII Armor, Up: Context Attributes

7.4.5 Text Mode
---

-- Function: void gpgme_set_textmode (gpgme_ctx_t CTX, int YES)
The function gpgme_set_textmode specifies if canonical text mode should be used. By default, text mode is not used.

Text mode is for example used for the RFC2015 signatures; note that the updated RFC 3156 mandates that the mail user agent does some preparations so that
text mode is not needed anymore.

This option is only relevant to the OpenPGP crypto engine, and ignored by all other engines.

Canonical text mode is disabled if YES is zero, and enabled otherwise.

-- Function: int gpgme_get_textmode (gpgme_ctx_t CTX)
The function gpgme_get_textmode returns 1 if canonical text mode is enabled, and 0 if it is not, or if CTX is not a valid pointer.

File: gpgme.info, Node: Offline Mode, Next: Pinentry Mode, Prev: Text Mode, Up: Context Attributes

7.4.6 Offline Mode
---

-- Function: void gpgme_set_offline (gpgme_ctx_t CTX, int YES)
SINCE: 1.6.0

The function gpgme_set_offline specifies if offline mode should be used. Offline mode is disabled if YES is zero, and enabled otherwise. By default, offline mode is disabled.

The details of the offline mode depend on the used protocol and its backend engine. It may eventually be extended to be more stricter and for example
completely disable the use of Dirmngr for any
engine.

For the CMS protocol the offline mode specifies whether Dirmngr shall be used to do additional validation that might require connecting external services (e.g. CRL / OCSP checks). Here the offline mode only affects the keylist mode GPGME_KEYLIST_MODE_VALIDATE.

For the OpenPGP protocol offline mode entirely disables the use of the Dirmngr and will thus guarantee that no network connections are done as part of an operation on this context. It has only an effect with GnuPG versions 2.1.23 or later.

For all other protocols the offline mode is currently ignored.

-- Function: int gpgme_get_offline (gpgme_ctx_t CTX)
SINCE: 1.6.0

The function gpgme_get_offline returns 1 if offline mode is enabled, and 0 if it is not, or if CTX is not a valid pointer.

File: gpgme.info, Node: Pinentry Mode, Next: Included Certificates, Prev: Offline Mode, Up: Context Attributes

7.4.7
Pinentry Mode
---

-- Function: gpgme_error_t gpgme_set_pinentry_mode (gpgme_ctx_t CTX, gpgme_pinentry_mode_t MODE)

SINCE: 1.4.0

The function gpgme_set_pinentry_mode specifies the pinentry mode to be used.

For GnuPG >= 2.1 this option is required to be set to GPGME_PINENTRY_MODE_LOOPBACK to enable the passphrase callback mechanism in GPGME through gpgme_set_passphrase_cb.

-- Function: gpgme_pinentry_mode_t gpgme_get_pinentry_mode (gpgme_ctx_t CTX)
SINCE: 1.4.0

The function gpgme_get_pinenty_mode returns the mode set for the context.

-- Data type: enum gpgme_pinentry_mode_t
SINCE: 1.4.0

The gpgme_minentry_mode_t type specifies the set of possible pinentry modes that are supported by GPGME if GnuPG >= 2.1 is used. The following modes are supported:

GPGME_PINENTRY_MODE_DEFAULT
SINCE: 1.4.0

Use the default of the agent, which is ask.

GPGME_PINENTRY_MODE_ASK

SINCE: 1.4.0

Force the use of the Pinentry.

GPGME_PINENTRY_MODE_CANCEL
SINCE: 1.4.0

Emulate use of Pinentrys cancel button.

GPGME_PINENTRY_MODE_ERROR
SINCE: 1.4.0

Return a Pinentry error No Pinentry.

GPGME_PINENTRY_MODE_LOOPBACK
SINCE: 1.4.0

Redirect Pinentry queries to the caller. This enables the use of gpgme_set_passphrase_cb because pinentry queries are redirected to gpgme.

Note: For 2.1.0 - 2.1.12 this mode requires allow-loopback-pinentry to be enabled in the gpg-agent.conf or an agent started with that option.

File: gpgme.info, Node: Included Certificates, Next: Key Listing Mode, Prev: Pinentry Mode, Up: Context Attributes

7.4.8 Included Certificates
---

-- Function: void gpgme_set_include_certs (gpgme_ctx_t CTX, int NR_OF_CERTS)

The function gpgme_set_include_certs specifies how many certificates should be included in an S/MIME signed message. By default, only the senders certificate is included. The possible values of NR_OF_CERTS are:

GPGME_INCLUDE_CERTS_DEFAULT
SINCE: 1.0.3

Fall back to the default of the crypto backend. This is the default for GPGME.

-2
Include all certificates except the root certificate.

-1

Include all certificates.

0

Include no certificates.

1

Include the senders certificate only.

n

Include the first n certificates of the certificates path, starting from the senders certificate. The number n must be positive.

Values of NR_OF_CERTS smaller than -2 are undefined.

This option is only relevant to the CMS crypto engine, and ignored by all other engines.

-- Function: int gpgme_get_include_certs (gpgme_ctx_t CTX)

The function gpgme_get_include_certs returns the number of certificates to include into an S/MIME signed message.

File: gpgme.info, Node: Key Listing Mode, Next: Passphrase Callback, Prev: Included Certificates, Up: Context Attributes

### 7.4.9 Key Listing Mode

-- Function: gpgme_error_t gpgme_set_keylist_mode (gpgme_ctx_t CTX, gpgme_keylist_mode_t MODE)

The function gpgme_set_keylist_mode changes the default behaviour of the key listing functions. The value in MODE is a bitwise-or combination of one or multiple of the following bit values:

GPGME_KEYLIST_MODE_LOCAL

The GPGME_KEYLIST_MODE_LOCAL symbol specifies that the local keyring should be searched for keys in the keylisting operation. This is the default.

Using only this option results in a --list-keys.

GPGME_KEYLIST_MODE_EXTERN

The GPGME_KEYLIST_MODE_EXTERN symbol specifies that an external source should be searched for keys in the keylisting operation. The type of external source is dependent on the crypto engine used and whether it is combined with GPGME_KEYLIST_MODE_LOCAL. For example, it can be a remote keyserver or LDAP certificate server.

Using only this option results in a --search-keys for
GPGME_PROTOCOL_OpenPGP and something similar to
--list-external-keys for GPGME_PROTOCOL_CMS.

GPGME_KEYLIST_MODE_LOCATE
This is a shortcut for the combination of
GPGME_KEYLIST_MODE_LOCAL and GPGME_KEYLIST_MODE_EXTERN,
which results in a --locate-keys for
GPGME_PROTOCOL_OpenPGP.

GPGME_KEYLIST_MODE_SIGS
The GPGME_KEYLIST_MODE_SIGS symbol specifies that the key
signatures should be included in the listed keys.

GPGME_KEYLIST_MODE_SIG_NOTATIONS
SINCE: 1.1.1

The GPGME_KEYLIST_MODE_SIG_NOTATIONS symbol specifies that
the signature notations on key signatures
should be included
in the listed keys. This only works if
GPGME_KEYLIST_MODE_SIGS is also enabled.

GPGME_KEYLIST_MODE_WITH_TOFU
SINCE: 1.7.0

The GPGME_KEYLIST_MODE_WITH_TOFU symbol specifies that
information pertaining to the TOFU trust model should be
included in the listed keys.

GPGME_KEYLIST_MODE_WITH_KEYGRIP
SINCE: 1.14.0

The GPGME_KEYLIST_MODE_WITH_KEYRIP symbol specifies that the
keygrip is always included in the listing. The default
depends on the version of the backend and the used protocol.

GPGME_KEYLIST_MODE_WITH_SECRET
SINCE: 1.5.1

The GPGME_KEYLIST_MODE_WITH_SECRET returns information about
the presence of a corresponding secret key in a public key
listing. A public key listing with this mode is slower than a
standard listing but can be used instead of a second run to
list the secret keys.
This is only supported for GnuPG
versions >= 2.1. Note that using this option also makes sure
that the keygrip is available in the output.

GPGME_KEYLIST_MODE_EPHEMERAL
SINCE: 1.2.0

The GPGME_KEYLIST_MODE_EPHEMERAL symbol specifies that keys flagged as ephemeral are included in the listing.

GPGME_KEYLIST_MODE_VALIDATE
SINCE: 0.4.5

The GPGME_KEYLIST_MODE_VALIDATE symbol specifies that the backend should do key or certificate validation and not just get the validity information from an internal cache. This might be an expensive operation and is in general not useful. Currently only implemented for the S/MIME backend and ignored for other backends.

At least one of GPGME_KEYLIST_MODE_LOCAL and GPGME_KEYLIST_MODE_EXTERN must be specified. For future binary compatibility, you should get the current mode with gpgme_get_keylist_mode and modify it by setting or clearing the appropriate bits, and then using that calculated value in the gpgme_set_keylisting_mode operation. This will leave all other bits in the mode value intact (in particular those that are not used in the current version of the library).

The function returns the error code GPG_ERR_NO_ERROR if the mode could be set correctly, and GPG_ERR_INV_VALUE if CTX is not a valid pointer or MODE is not a valid mode.

-- Function: gpgme_keylist_mode_t gpgme_get_keylist_mode (gpgme_ctx_t CTX)

The function gpgme_get_keylist_mode returns the current key listing mode of the context CTX. This value can then be modified and used in a subsequent gpgme_set_keylist_mode operation to only affect the desired bits (and leave all others intact).

The function returns 0 if CTX is not a valid pointer, and the current mode otherwise. Note that 0 is not a valid mode value.

File: gpgme.info, Node: Passphrase Callback, Next: Progress Meter Callback, Prev: Key Listing Mode, Up: Context Attributes

7.4.10 Passphrase Callback
---

-- Data type: gpgme_error_t (*gpgme_passphrase_cb_t)(void *HOOK, const
char *UID_HINT, const char *PASSPHRASE_INFO, int PREV_WAS_BAD,
int FD)

The gpgme_passphrase_cb_t type is the type of functions usable as passphrase callback function.

The argument UID_HINT might contain a string that gives an indication for which user ID the passphrase is required. If this is not available, or not applicable (in the case of symmetric encryption, for example), UID_HINT will be NULL.

The argument PASSPHRASE_INFO, if not NULL, will give further information about the context in which the passphrase is required. This information is engine and operation specific.

If this is the repeated attempt to get the passphrase, because previous attempts failed, then PREV_WAS_BAD is 1, otherwise it will be 0.

The user must write the passphrase, followed by a newline character, to the file descriptor FD. The function gpgme_io_writen should be used for the write operation. Note that if the user returns 0 to indicate success, the user must at least write a newline character before returning from the callback.

If an error occurs, return the corresponding gpgme_error_t value. You can use the error code GPG_ERR_CANCELED to abort the operation. Otherwise, return 0.

Note: The passphrase_cb only works with GnuPG 1.x and 2.1.x and not with the 2.0.x series. See gpgme_set_pinentry_mode for more details on 2.1.x usage.

-- Function: void gpgme_set_passphrase_cb (gpgme_ctx_t CTX,
gpgme_passphrase_cb_t PASSFUNC, void *HOOK_VALUE)

The function gpgme_set_passphrase_cb sets the function that is used when a passphrase needs to be provided by the user to PASSFUNC. The function PASSFUNC needs to implemented by the user, and whenever it is called, it is called with its first argument being HOOK_VALUE. By default, no passphrase callback function is set.

Not all crypto engines require this callback to retrieve the passphrase. It is better if the engine retrieves the passphrase from a trusted agent (a daemon process), rather than having each user to implement their own passphrase query. Some engines do not

even support an external passphrase callback at all, in this case
the error code GPG_ERR_NOT_SUPPORTED is returned.

For GnuPG >= 2.1 the pinentry mode has to be set to
GPGME_PINENTRY_MODE_LOOPBACK to enable the passphrase callback.
See gpgme_set_pinentry_mode.

The user can disable the use of a passphrase callback function by
calling gpgme_set_passphrase_cb with PASSFUNC being NULL.

-- Function: void gpgme_get_passphrase_cb (gpgme_ctx_t CTX,
gpgme_passphrase_cb_t *PASSFUNC, void **HOOK_VALUE)
The function gpgme_get_passphrase_cb returns the function that is
used when a passphrase needs to be provided by the user in
*PASSFUNC, and the first argument for this function in *HOOK_VALUE.
If no passphrase callback is set, or CTX is not a valid pointer,
NULL is returned in both variables.

PASSFUNC or HOOK_VALUE can be NULL. In this case, the
corresponding value will not be returned.

File: gpgme.info, Node: Progress Meter Callback, Next: Status Message Callback, Prev: Passphrase Callback, Up: Context Attributes

7.4.11 Progress Meter Callback
---

-- Data type: void (*gpgme_progress_cb_t)(void *HOOK, const char *WHAT,
int TYPE, int CURRENT, int TOTAL)
The gpgme_progress_cb_t type is the type of functions usable as
progress callback function.

The arguments are specific to the crypto engine. More information
about the progress information returned from the GnuPG engine can
be
found in the GnuPG source code in the file doc/DETAILS in the
section PROGRESS.

-- Function: void gpgme_set_progress_cb (gpgme_ctx_t CTX,
gpgme_progress_cb_t PROGFUNC, void *HOOK_VALUE)
The function gpgme_set_progress_cb sets the function that is used
when progress information about a cryptographic operation is
available. The function PROGFUNC needs to implemented by the user,
and whenever it is called, it is called with its first argument
being HOOK_VALUE. By default, no progress callback function is
set.

Setting a callback function allows an interactive program to
display progress information about a long operation to the user.

The user can disable the use of a progress callback function by
calling gpgme_set_progress_cb with PROGFUNC being NULL.

-- Function: void gpgme_get_progress_cb (gpgme_ctx_t CTX,
gpgme_progress_cb_t *PROGFUNC, void **HOOK_VALUE)
The function gpgme_get_progress_cb returns the
function that is
used to inform the user about the progress made in *PROGFUNC, and
the first argument for this function in *HOOK_VALUE. If no
progress callback is set, or CTX is not a valid pointer, NULL is
returned in both variables.

PROGFUNC or HOOK_VALUE can be NULL. In this case, the
corresponding value will not be returned.

File: gpgme.info, Node: Status Message Callback, Next: Context Flags, Prev: Progress Meter Callback, Up: Context Attributes

7.4.12 Status Message Callback
---

-- Data type: gpgme_error_t (*gpgme_status_cb_t)(void *HOOK, const char
*KEYWORD, const char *ARGS)
The gpgme_status_cb_t type is the type of function usable as a
status message callback function.

The argument KEYWORD is the name of the status message while the
ARGS argument contains any arguments for the status message.

If an error occurs, return the corresponding gpgme_error_t value.
Otherwise,
return 0.

-- Function: void gpgme_set_status_cb (gpgme_ctx_t CTX,
gpgme_status_cb_t STATUSFUNC, void *HOOK_VALUE)
SINCE: 1.6.0

The function gpgme_set_status_cb sets the function that is used
when a status message is received from gpg to STATUSFUNC. The
function STATUSFUNC needs to be implemented by the user, and
whenever it is called, it is called with its first argument being
HOOK_VALUE. By default, no status message callback function is
set.

The user can disable the use of a status message callback function by calling gpgme_set_status_cb with STATUSFUNC being NULL.

-- Function: void gpgme_get_status_cb (gpgme_ctx_t CTX, gpgme_status_cb_t *STATUSFUNC, void **HOOK_VALUE)

SINCE: 1.6.0

The function gpgme_get_status_cb returns the function that is used to process status messages from gpg in *STATUSFUNC, and the first argument for this function in *HOOK_VALUE. If no status message callback is set, or CTX is not a valid pointer, NULL is returned in both variables.

File: gpgme.info, Node: Context Flags, Next: Locale, Prev: Status Message Callback, Up: Context Attributes

7.4.13 Context Flags
---

-- Function: gpgme_error_t gpgme_set_ctx_flag (gpgme_ctx_t CTX, const char *NAME, const char *VALUE)

SINCE: 1.7.0

Some minor properties of the context can be controlled with flags set by this function. The properties are identified by the following values for NAME:

"redraw"
This flag is normally not changed by the caller because GPGME sets and clears it automatically: The flag is cleared before an operation and set if an operation noticed that the engine has launched a Pinentry. A Curses based application may use this information to redraw the screen; for example:

```
err = gpgme_op_keylist_start (ctx, "foo@example.org", 0);
while
(!err)
  {
    err = gpgme_op_keylist_next (ctx, &key);
    if (err)
      break;
    show_key (key);
    gpgme_key_release (key);
  }
if ((s = gpgme_get_ctx_flag (ctx, "redraw")) && *s)
  redraw_screen ();
```

```
gpgme_release (ctx);
```

"full-status"
Using a VALUE of "1" the status callback set by gpgme_set_status_cb returns all status lines with the exception of PROGRESS lines. With the default of "0" the status callback is only called in certain situations.

"raw-description"
Setting the VALUE to "1" returns human readable strings in a raw format. For example the non breaking space characters ("~") will not be removed from the description field of the gpgme_tofu_info_t object.

"export-session-key"

Using a VALUE of "1" specifies that the context should try to export the symmetric session key when decrypting data. By default, or when using an empty string or "0" for VALUE, session keys are not exported.

"override-session-key"
The string given in VALUE is passed to the GnuPG engine to override the session key for decryption. The format of that session key is specific to GnuPG and can be retrieved during a decrypt operation when the context flag "export-session-key" is enabled. Please be aware that using this feature with GnuPG < 2.1.16 will leak the session key on many platforms via ps(1).

"auto-key-retrieve"
Setting the VALUE to "1" asks the backend to automatically retrieve a key for signature verification if possible. Note that this option makes a "web bug" like behavior possible. Keyserver or Web Key Directory operators can
see which keys
you request, so by sending you a message signed by a brand new key (which you naturally will not have on your local keyring), the operator can tell both your IP address and the time when you verified the signature.

"auto-key-import"
Setting the VALUE to "1" forces the GPG backend to automatically import a missing key for signature verification from the signature.

"include-key-block"
Setting the VALUE to "1" forces the GPG backend to embed the

signing key as well as an encryption subkey into the the signature.

"request-origin"

The string given in VALUE is passed to the GnuPG engines to request restrictions based on the origin of the request. Valid values are documented in the GnuPG manual and the gpg man page under the option --request-origin. Requires at least GnuPG 2.2.6 to have an effect.

"no-symkey-cache"

For OpenPGP disable the passphrase cache used for symmetrical en- and decryption. This cache is based on the message specific salt value. Requires at least GnuPG 2.2.7 to have an effect.

"ignore-mdc-error"

This flag passes the option --ignore-mdc-error to gpg. This can be used to force decryption of a message which failed due to a missing integrity check. This flag must be used with great caution and only if it is a known non-corrupted old message and the decryption result of the former try had the decryption result flag legacy_cipher_nomdc set. For failsafe reasons this flag is reset after each operation.

"auto-key-locate"

The string given in VALUE is passed to gpg. This can be used to change the behavior of a GPGME_KEYLIST_MODE_LOCATE keylisting. Valid values are documented in the GnuPG manual and the gpg
man page under the option --auto-key-locate.
Requires at least GnuPG 2.1.18.

Note: Keys retrieved through auto-key-locate are automatically imported in the keyring.

trust-model

SINCE: 1.11.2

Change the trust-model for all GnuPG engine operations. An empty string sets the trust-model back to the users default. If the trust-model is not supported by GnuPG the behavior is undefined and will likely cause all operations to fail. Example: "tofu+pgp".

This options should be used carefully with a strict version requirement. In some versions of GnuPG setting the trust-model changes the default trust-model for future

operations. A change in the trust-model also can have
unintended side effects, like rebuilding the trust-db.

"extended-edit"
This flag passes the option --expert to gpg key edit. This
can be used to get additional
callbacks in gpgme_op_edit.

This function returns 0 on success.

-- Function: const char * gpgme_get_ctx_flag (gpgme_ctx_t CTX,
const char *NAME)

SINCE: 1.8.0

The value of flags settable by gpgme_set_ctx_flag can be
retrieved by this function. If NAME is unknown the function
returns NULL. For boolean flags an empty string is returned for
False and the string "1" is returned for True; either atoi(3) or a
test for an empty string can be used to get the boolean value.

File: gpgme.info, Node: Locale, Next: Additional Logs, Prev: Context Flags, Up: Context Attributes

7.4.14 Locale
---

A locale setting can be associated with a context. This locale is
passed to the crypto engine, and used for applications like the PIN
entry, which is displayed to the user when entering a passphrase is
required.

The default locale is used to initialize the locale setting of all
contexts created afterwards.

-- Function: gpgme_error_t
gpgme_set_locale (gpgme_ctx_t CTX,
int CATEGORY, const char *VALUE)
SINCE: 0.4.3

The function gpgme_set_locale sets the locale of the context CTX,
or the default locale if CTX is a null pointer.

The locale settings that should be changed are specified by
CATEGORY. Supported categories are LC_CTYPE, LC_MESSAGES, and
LC_ALL, which is a wildcard you can use if you want to change all
the categories at once.

The value to be used for the locale setting is VALUE, which will be copied to GPGMEs internal data structures. VALUE can be a null pointer, which disables setting the locale, and will make PIN entry and other applications use their default setting, which is usually not what you want.

Note that the settings are only used if the application runs on a text terminal, and that the settings should fit the configuration of the output terminal. Normally, it is sufficient to initialize the default value at startup.

The function returns an error if not enough memory is available.

File: gpgme.info, Node: Additional Logs, Prev: Locale, Up: Context Attributes

7.4.15 Additional Logs
---

Additional logs can be associated with a context. These logs are engine specific and can be be obtained with gpgme_op_getauditlog.

-- Function: gpgme_error_t gpgme_op_getauditlog (gpgme_ctx_t CTX, gpgme_data_t OUTPUT, unsigned int FLAGS)
SINCE: 1.1.1

The function gpgme_op_getauditlog is used to obtain additional logs as specified by FLAGS into the OUTPUT data. If

The function returns the error code GPG_ERR_NO_ERROR if a log could be queried from the engine, and GPG_ERR_NOT_IMPLEMENTED if the log specified in FLAGS is not available for this engine. If no log is available GPG_ERR_NO_DATA is returned.

The value in FLAGS is a bitwise-or combination of one or multiple of the following bit values:

GPGME_AUDITLOG_DIAG
SINCE: 1.11.2

Obtain diagnostic output which would be written to stderr in interactive use of the engine. This can be used to provide additional diagnostic information in case of errors in other operations.

Note: If log-file has been set in the configuration the log will be empty and GPG_ERR_NO_DATA will be returned.

Implemented for: GPGME_PROTOCOL_OpenPGP

GPGME_AUDITLOG_DEFAULT
SINCE: 1.11.2

This flag has the value 0 for compatibility reasons. Obtains additional information from the engine by issuing the GETAUDITLOG command. For GPGME_PROTOCOL_CMS this provides additional information about the X509 certificate chain.

Implemented for: GPGME_PROTOCOL_CMS

GPGME_AUDITLOG_HTML
SINCE: 1.1.1

Same as GPGME_AUDITLOG_DEFAULT but in HTML.

Implemented for: GPGME_PROTOCOL_CMS

-- Function: gpgme_error_t
gpgme_op_getauditlog_start (gpgme_ctx_t CTX,
gpgme_data_t OUTPUT, unsigned int FLAGS)
SINCE: 1.1.1

This is the asynchronous variant of gpgme_op_getauditlog.

File: gpgme.info, Node: Key Management, Next: Crypto Operations, Prev: Context Attributes, Up: Contexts

## 7.5 Key Management

Some of the cryptographic operations require that recipients or signers are specified. This is always done by specifying the respective keys that should be used for the operation. The following section describes how such keys can be selected and manipulated.

* Menu:

* Key objects:: Description of the key structures.
* Listing Keys:: Browsing the list of available keys.
* Information About Keys:: Requesting detailed information about keys.
* Manipulating Keys:: Operations on keys.
* Generating Keys:: Creating new key pairs.
* Signing Keys:: Adding key signatures to public keys.
* Exporting Keys:: Retrieving key data from the key ring.

* Importing Keys:: Adding keys to the key ring.
* Deleting Keys:: Removing keys from the key ring.
* Changing Passphrases:: Change the passphrase of a key.
* Changing TOFU Data:: Changing data pertaining to TOFU.
* Advanced Key Editing:: Advanced key edit operation.

File: gpgme.info, Node: Key objects, Next: Listing Keys, Up: Key Management

### 7.5.1 Key objects

The keys are represented in GPGME by structures which may only be read by the application but never be allocated or changed. They are valid as long as the key object itself is valid.

-- Data type: gpgme_key_t

The gpgme_key_t type is a pointer to a key object. It has the following members:

gpgme_keylist_mode_t keylist_mode
SINCE: 0.9.0

The keylist mode that was active when the key was retrieved.

unsigned int revoked : 1
This is true if the key is revoked.

unsigned int expired : 1
This is true if the key is expired.

unsigned int disabled : 1
This is true if the key is disabled.

unsigned int invalid : 1
This is true if the key is invalid. This might have several reasons, for a example for the S/MIME backend, it will be set during key listings if the key could not be validated due to missing certificates or unmatched policies.

unsigned int can_encrypt : 1
This is true if the key (ie one of its subkeys) can be used for encryption.

unsigned int can_sign : 1
This is true if the key (ie one of its subkeys) can be used to create data signatures.

unsigned int can_certify : 1

This is true if the key (ie one of its subkeys) can be used to create key certificates.

unsigned int can_authenticate : 1

SINCE: 0.4.5

This is true if the key (ie one of its subkeys) can be used for authentication.

unsigned int is_qualified : 1

SINCE: 1.1.0

This is true if the key can be used for qualified signatures according to local government regulations.

unsigned int secret : 1

This is true if the key is a secret key. Note, that this will always be true even if the corresponding subkey flag may be false (offline/stub keys). This is only set if a listing of secret keys has been requested or if GPGME_KEYLIST_MODE_WITH_SECRET is active.

unsigned int origin : 5

SINCE: 1.8.0

Reserved for the origin of this key.

gpgme_protocol_t protocol

This is the protocol supported by this key.

char *issuer_serial

If protocol is GPGME_PROTOCOL_CMS, then this is the issuer serial.

char *issuer_name

If protocol is GPGME_PROTOCOL_CMS, then this is the issuer name.

char *chain_id

If protocol is GPGME_PROTOCOL_CMS, then this is the chain ID, which can be used to built the certificate chain.

gpgme_validity_t owner_trust

If protocol is GPGME_PROTOCOL_OpenPGP, then this is the owner trust.

gpgme_subkey_t subkeys
This is a linked list with the subkeys of the key. The first subkey in the list is the primary key and usually available.

gpgme_user_id_t uids
This is a linked list with the user IDs of the key. The first user ID in the list is the main (or primary) user ID.

char *fpr
SINCE: 1.7.0

This field gives the fingerprint of the primary key. Note that this is a copy of the fingerprint of the first subkey. For an incomplete key (for example from a verification result) a subkey may be missing but this field may be set nevertheless.

unsigned long last_update

SINCE: 1.8.0

Reserved for the time of the last update of this key.

-- Data type: gpgme_subkey_t
SINCE: 1.5.0

The gpgme_subkey_t type is a pointer to a subkey structure. Subkeys are one component of a gpgme_key_t object. In fact, subkeys are those parts that contains the real information about the individual cryptographic keys that belong to the same key object. One gpgme_key_t can contain several subkeys. The first subkey in the linked list is also called the primary key.

The subkey structure has the following members:

gpgme_subkey_t next
This is a pointer to the next subkey structure in the linked list, or NULL if this is the last element.

unsigned int revoked : 1
This is true if the subkey is revoked.

unsigned int expired : 1
This is true if the subkey is expired.

unsigned int disabled : 1
This is true if the subkey is disabled.

unsigned int
invalid : 1
This is true if the subkey is invalid.

unsigned int can_encrypt : 1
This is true if the subkey can be used for encryption.

unsigned int can_sign : 1
This is true if the subkey can be used to create data signatures.

unsigned int can_certify : 1
This is true if the subkey can be used to create key certificates.

unsigned int can_authenticate : 1
SINCE: 0.4.5

This is true if the subkey can be used for authentication.

unsigned int is_qualified : 1
SINCE: 1.1.0

This is true if the subkey can be used for qualified signatures according to local government regulations.

unsigned int is_de_vs : 1
SINCE: 1.8.0

This is true if the subkey complies with the rules for classified information in Germany at the restricted level (VS-NfD). This are currently RSA keys of at least 2048 bits or ECDH/ECDSA
keys using a Brainpool curve.

unsigned int secret : 1
This is true if the subkey is a secret key. Note that it will be false if the key is actually a stub key; i.e. a secret key operation is currently not possible (offline-key). This is only set if a listing of secret keys has been requested or if GPGME_KEYLIST_MODE_WITH_SECRET is active.

gpgme_pubkey_algo_t pubkey_algo
This is the public key algorithm supported by this subkey.

unsigned int length
This is the length of the subkey (in bits).

char *keyid
This is the key ID of the subkey in hexadecimal digits.

char *fpr
This is the fingerprint of the subkey in hexadecimal digits, if available.

char *keygrip
SINCE: 1.7.0

The keygrip of the subkey in hex digit form or NULL if not available.

long int timestamp
This is the creation timestamp of the subkey. This is -1 if the timestamp is invalid, and 0 if it is not available.

long int expires
This is the expiration timestamp of the subkey, or 0 if the subkey does not expire.

unsigned int is_cardkey : 1
SINCE: 1.2.0

True if the secret key is stored on a smart card.

char *card_number
SINCE: 1.2.0

The serial number of a smart card holding this key or NULL.

char *curve
For ECC algorithms the name of the curve.

-- Data type: gpgme_user_id_t

A user ID is a component of a gpgme_key_t object. One key can have many user IDs. The first one in the list is the main (or primary) user ID.

The user ID structure has the following members.

gpgme_user_id_t next
This is a pointer to the next user ID structure in the linked list, or NULL if this is the last element.

unsigned int revoked : 1

This is true if the user ID is revoked.

unsigned int invalid : 1

This is true if the user ID is invalid.

gpgme_validity_t validity

This specifies the validity of the user ID.

char *uid

This is the user ID string.

char *name

This is the name component of uid, if available.

char *comment

This is the comment component of uid, if available.

char *email

This is the email component of uid, if available.

char *address;

The mail address (addr-spec from RFC-5322) of the user ID string. This is general the same as the email part of this structure but might be slightly different. If no mail address is available NULL is stored.

gpgme_tofu_info_t tofu

SINCE: 1.7.0

If not NULL information from the TOFU database pertaining to this user id.

gpgme_key_sig_t signatures

This is a linked list with the signatures on this user ID.

unsigned int origin :
5

SINCE: 1.8.0

Reserved for the origin of this user ID.

unsigned long last_update

SINCE: 1.8.0

Reserved for the time of the last update of this user ID.

char *uidhash;

A string used by gpg to identify a user ID. This string can be used at certain prompts of gpgme_op_edit to select a user ID. Users must be prepared to see a NULL value here. The format of the value is not specified and may depend on the GPGME or GnuPG version.

-- Data type: gpgme_tofu_info_t

SINCE: 1.7.0

The gpgme_tofu_info_t type is a pointer to a tofu info structure. Tofu info structures are one component of a gpgme_user_id_t object, and provide information from the TOFU database pertaining to the user ID.

The tofu info structure has the following members:

gpgme_key_sig_t next

This is a pointer to the next tofu info structure in the linked list, or NULL if this is the last element.

unsigned int validity : 3

This is the TOFU validity. It can have the following values:

0

The value 0 indicates a conflict.

1

The value 1 indicates a key without history.

2

The value 2 indicates a key with too little history.

3

The value 3 indicates a key with enough history for basic trust.

4

The value 4 indicates a key with a lot of history.

unsigned int policy : 4

This is the TOFU policy, see gpgme_tofu_policy_t.

unsigned short signcount

This is the number of signatures seen for this binding (or USHRT_MAX if there are more than that).

unsigned short encrcount
This is the number of encryptions done with this binding (or USHRT_MAX if there are more than that).

unsigned long signfirst
Number of seconds since Epoch when the first signature was seen with this binding.

unsigned long signlast
Number of seconds since Epoch when the last signature was seen with this binding.

unsigned long encrfirst
Number of seconds since Epoch when the first encryption was done with this binding.

unsigned long encrlast
Number of seconds since Epoch when the last encryption was done with this binding.

char *description
A human-readable string summarizing the TOFU data (or NULL).

-- Data type: gpgme_key_sig_t

The gpgme_key_sig_t type is a pointer to a key signature structure. Key signatures are one component of a gpgme_key_t object, and validate user IDs on the key in the OpenPGP protocol.

The signatures on a key are only available if the key was retrieved via a listing operation with the GPGME_KEYLIST_MODE_SIGS mode enabled, because it can be expensive to retrieve all signatures of

a key.

The signature notations on a key signature are only available if the key was retrieved via a listing operation with the GPGME_KEYLIST_MODE_SIG_NOTATIONS mode enabled, because it can be expensive to retrieve all signature notations.

The key signature structure has the following members:

gpgme_key_sig_t next
This is a pointer to the next key signature structure in the linked list, or NULL if this is the last element.

unsigned int revoked : 1
This is true if the key signature is a revocation signature.

unsigned int expired : 1
This is true if the key signature is expired.

unsigned int invalid : 1
This is true if the key signature is invalid.

unsigned int exportable : 1
This is true if the key signature is exportable.

gpgme_pubkey_algo_t pubkey_algo
This is the public key algorithm used to create the signature.

char *keyid
This is the
key ID of the key (in hexadecimal digits) used to
create the signature.

long int timestamp
This is the creation timestamp of the key signature. This is
-1 if the timestamp is invalid, and 0 if it is not available.

long int expires
This is the expiration timestamp of the key signature, or 0 if
the key signature does not expire.

gpgme_error_t status
This is the status of the signature and has the same meaning
as the member of the same name in a gpgme_signature_t
object.

unsigned int sig_class
This specifies the signature class of the key signature. The
meaning is specific to the crypto engine.

char *uid
This is the main user ID of the key used to create the
signature.

char *name
This is the name component of uid, if available.

char *comment
This is the comment component of uid, if available.

char *email

This is the email component of uid, if available.

gpgme_sig_notation_t notations
This is a linked list with the notation data and policy URLs.

File: gpgme.info, Node: Listing Keys, Next: Information About Keys, Prev: Key objects, Up: Key Management

7.5.2 Listing Keys
---

-- Function: gpgme_error_t gpgme_op_keylist_start (gpgme_ctx_t CTX,
const char *PATTERN, int SECRET_ONLY)

The function gpgme_op_keylist_start initiates a key listing operation inside the context CTX. It sets everything up so that subsequent invocations of gpgme_op_keylist_next return the keys in the list.

If PATTERN is NULL, all available keys are returned. Otherwise, PATTERN contains an engine specific expression that is used to limit the list to all keys matching the pattern. Note that the total length of the pattern is restricted to an engine-specific maximum (a couple of hundred characters are usually accepted). The pattern should be used to restrict the search to a certain common name or user, not to list many specific keys at once by listing their fingerprints or key IDs.

If SECRET_ONLY is not 0, the list is restricted to secret keys only.

The context will be busy until either all keys are received (and gpgme_op_keylist_next returns GPG_ERR_EOF), or gpgme_op_keylist_end is called to finish the operation.

The function returns the error code GPG_ERR_INV_VALUE if CTX is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_keylist_ext_start (gpgme_ctx_t CTX,
const char *PATTERN[], int SECRET_ONLY, int RESERVED)

The function gpgme_op_keylist_ext_start initiates an extended key listing operation inside the context CTX. It sets everything up so that subsequent invocations of gpgme_op_keylist_next return the

keys in the list.

If PATTERN or *PATTERN is NULL, all available keys are returned. Otherwise, PATTERN is a NULL terminated array of strings that are used to limit the list to all keys matching at least one of the patterns verbatim. Note that the total length of all patterns is restricted to an engine-specific maximum (the exact limit also depends on the number of patterns and amount of quoting required, but a couple of hundred characters are usually accepted). Patterns should be used to restrict the search to a certain common name or user, not to list many specific keys at once by listing their fingerprints or key IDs.

If SECRET_ONLY is not 0, the list is restricted to secret keys only.

The value of RESERVED must be 0.

The context will be busy until either all keys are received (and gpgme_op_keylist_next returns GPG_ERR_EOF), or gpgme_op_keylist_end is called to finish the operation.

The function
returns the error code GPG_ERR_INV_VALUE if CTX is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_keylist_from_data_start
(gpgme_ctx_t CTX, gpgme_data_t DATA, int RESERVED)

SINCE: 1.8.0

The function gpgme_op_keylist_from_data_start initiates a key listing operation inside the context CTX. In contrast to the other key listing operation the keys are read from the supplied DATA and not from the local key database. The keys are also not imported into the local key database. The function sets everything up so that subsequent invocations of gpgme_op_keylist_next return the keys from DATA.

The value of RESERVED must be 0.

This function requires at least GnuPG version 2.1.14 and currently works only with OpenPGP keys.

The context will be busy until either all keys are received (and gpgme_op_keylist_next

returns GPG_ERR_EOF), or
gpgme_op_keylist_end is called to finish the operation. While
the context is busy DATA may not be released.

The function returns the error code GPG_ERR_INV_VALUE if CTX is
not a valid pointer, and passes through any errors that are
reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_keylist_next (gpgme_ctx_t CTX,
gpgme_key_t *R_KEY)

The function gpgme_op_keylist_next returns the next key in the
list created by a previous gpgme_op_keylist_start operation in
the context CTX. The key will have one reference for the user.
*Note Manipulating Keys::.

This is the only way to get at gpgme_key_t objects in GPGME.

If the last key in the list has already been returned,
gpgme_op_keylist_next returns GPG_ERR_EOF.

The function returns the error code GPG_ERR_INV_VALUE if CTX or
R_KEY is not a valid pointer, and GPG_ERR_ENOMEM if there is not
enough memory
for the operation.

-- Function: gpgme_error_t gpgme_op_keylist_end (gpgme_ctx_t CTX)

The function gpgme_op_keylist_end ends a pending key list
operation in the context CTX.

After the operation completed successfully, the result of the key
listing operation can be retrieved with gpgme_op_keylist_result.

The function returns the error code GPG_ERR_INV_VALUE if CTX is
not a valid pointer, and GPG_ERR_ENOMEM if at some time during
the operation there was not enough memory available.

The following example illustrates how all keys containing a certain
string (g10code) can be listed with their key ID and the name and
email address of the main user ID:

```
gpgme_ctx_t ctx;
gpgme_key_t key;
gpgme_error_t err = gpgme_new (&ctx);

if (!err)
  {
```

```
      err = gpgme_op_keylist_start (ctx, "g10code", 0);
      while (!err)
        {
          err = gpgme_op_keylist_next (ctx, &key);
          if (err)

 break;
          printf ("%s:", key->subkeys->keyid);
          if (key->uids && key->uids->name)
            printf (" %s", key->uids->name);
          if (key->uids && key->uids->email)
            printf (" <%s>", key->uids->email);
          putchar ('\n');
          gpgme_key_release (key);
        }
      gpgme_release (ctx);
    }
  if (gpg_err_code (err) != GPG_ERR_EOF)
    {
      fprintf (stderr, "can not list keys: %s\n", gpgme_strerror (err));
      exit (1);
    }
```

-- Data type: gpgme_keylist_result_t

This is a pointer to a structure used to store the result of a gpgme_op_keylist_* operation. After successfully ending a key listing operation, you can retrieve the pointer to the result with gpgme_op_keylist_result. The structure contains the following member:

unsigned int truncated : 1

This is true if the crypto backend had to truncate the result, and less than the desired keys could be listed.

-- Function: gpgme_keylist_result_t gpgme_op_keylist_result (gpgme_ctx_t CTX)

The function gpgme_op_keylist_result returns a gpgme_keylist_result_t pointer to a structure holding the result of a gpgme_op_keylist_* operation. The pointer is only valid if the last operation on the context was a key listing operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

In a simple program, for which a blocking operation is acceptable, the following function can be used to retrieve a single key.

-- Function: gpgme_error_t gpgme_get_key (gpgme_ctx_t CTX,

const char *FPR, gpgme_key_t *R_KEY, int SECRET)

The function gpgme_get_key gets the key with the fingerprint (or key ID) FPR from the crypto backend and return it in R_KEY. If SECRET is true, get the secret key. The currently active keylist mode is used to retrieve the key. The key will have one reference for the user.

If the key is not found in the keyring, gpgme_get_key returns the error code GPG_ERR_EOF and *R_KEY will be set to NULL.

The function returns the error code GPG_ERR_INV_VALUE if CTX or R_KEY is not a valid pointer or FPR is not a fingerprint or key ID, GPG_ERR_AMBIGUOUS_NAME if the key ID was not a unique specifier for a key, and GPG_ERR_ENOMEM if at some time during the operation there was not enough memory available.

File: gpgme.info, Node: Information About Keys, Next: Manipulating Keys, Prev: Listing Keys, Up: Key Management

7.5.3 Information About Keys
---

Please see the beginning of this section for more information about gpgme_key_t objects.

-- Data type: gpgme_validity_t

The gpgme_validity_t type is used to specify the validity of a user ID in a key. The following validities are defined:

GPGME_VALIDITY_UNKNOWN

The user ID is of unknown validity. The string representation of this validity is ?.

GPGME_VALIDITY_UNDEFINED

The validity of the user ID is undefined. The string representation of this validity is q.

GPGME_VALIDITY_NEVER

The user ID is never valid. The string representation of this validity is n.

GPGME_VALIDITY_MARGINAL

The user ID is marginally valid. The string representation of this validity is m.

GPGME_VALIDITY_FULL
The user ID is fully valid. The string representation of this validity is f.

GPGME_VALIDITY_ULTIMATE
The user ID is ultimately valid. The string representation of this validity is u.

File: gpgme.info, Node: Manipulating Keys, Next: Generating Keys, Prev: Information About Keys, Up: Key Management

7.5.4 Manipulating Keys
---

-- Function: void gpgme_key_ref (gpgme_key_t KEY)
The function gpgme_key_ref acquires an additional reference for the key KEY.

-- Function: void gpgme_key_unref (gpgme_key_t KEY)
The function gpgme_key_unref releases a reference for the key KEY. If this was the last reference, the key will be destroyed and all resources associated to it will be released.

-- Function: gpgme_error_t gpgme_op_setexpire (gpgme_ctx_t CTX, gpgme_key_t KEY, unsigned long EXPIRES, const char *SUBFPRS, unsigned int RESERVED);

SINCE: 1.14.1

The function gpgme_op_setexpire sets the expiration time of the key KEY or of the specified subkeys. This function requires at least version 2.1.22 of GnuPG.

KEY specifies the key to operate on.

EXPIRES specifies the expiration time in seconds from now. To be similar to other usages where expiration times are provided in unsigned long this is similar to the key creation date and so it is in seconds from NOW.

The common case is to use 0 to not set an expiration time. Note that this parameter takes an unsigned long value and not a time_t to avoid problems on systems which use a signed 32 bit time_t. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

SUBFPRS selects the subkey(s) for which the expiration time should be set. If SUBFPRS is set to NULL, then the expiration time of the primary key is set. If SUBFPRS is an asterisk (*), then the expiration times of all non-revoked and not yet expired subkeys are set. To select more than one subkey put all subkey fingerprints into one string separated by linefeeds characters (\n).

RESERVED is reserved for later use and must be 0.

-- Function: gpgme_error_t gpgme_op_setexpire_start (gpgme_ctx_t CTX, gpgme_key_t KEY, unsigned long EXPIRES, const char *SUBFPRS, unsigned int FLAGS);

SINCE: 1.14.1

The function gpgme_op_setexpire_start initiates a gpgme_op_setexpire operation; see there for details. It must be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

-- Function: gpgme_error_t gpgme_op_revuid_start (gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);

SINCE: 1.14.1

The function gpgme_op_setexpire_start initiates a gpgme_op_setexpire operation; see there for details. It must be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

File: gpgme.info, Node: Generating Keys, Next: Signing Keys, Prev: Manipulating Keys, Up: Key Management

7.5.5 Generating Keys
---

GPGME provides a set of functions to create public key pairs. Most of these functions require the use of GnuPG 2.1 and later; for older GnuPG versions the gpgme_op_genkey function can be used. Existing code which wants to update to the new functions or new code which shall supports older GnuPG versions may try the new functions first and provide a fallback to the old function if the error code GPG_ERR_NOT_SUPPORTED is received.

-- Function: gpgme_error_t gpgme_op_createkey (gpgme_ctx_t CTX,

```
    const char *USERID, const char *ALGO, unsigned long RESERVED,
    unsigned long EXPIRES, gpgme_key_t EXTRAKEY,
    unsigned int FLAGS);
```

SINCE: 1.7.0

The function gpgme_op_createkey generates a new key for the
procotol active in the context CTX. As of now this function does
only work for OpenPGP and requires at least version 2.1.13 of
GnuPG.

USERID is commonly the mail address associated with the key. GPGME
does not require a specific syntax but if more than a mail address
is given, RFC-822 style format is suggested. The value is expected
to be in UTF-8 encoding (i.e. no IDN encoding for mail addresses).
This is a required parameter.

ALGO specifies the algorithm for the new key (actually a keypair
of
public and private key). For a list of supported algorithms, see
the GnuPG manual. If ALGO is NULL or the string "default", the
key is generated using the default algorithm of the engine. If the
string "future-default" is used the engine may use an algorithm
which is planned to be the default in a future release of the
engine; however existing implementation of the protocol may not be
able to already handle such future algorithms. For the OpenPGP
protocol, the specification of a default algorithm, without
requesting a non-default usage via FLAGS, triggers the creation of
a primary key plus a secondary key (subkey).

RESERVED must be set to zero.

EXPIRES specifies the expiration time in seconds. If you supply 0,
a reasonable expiration time is chosen. Use the flag
GPGME_CREATE_NOEXPIRE to create keys that do not expire. Note
that this parameter takes an unsigned long value and not a time_t
to
avoid problems on systems which use a signed 32 bit time_t.
Note further that the OpenPGP protocol uses 32 bit values for
timestamps and thus can only encode dates up to the year 2106.

EXTRAKEY is currently not used and must be set to NULL. A future
version of GPGME may use this parameter to create X.509 keys.

FLAGS can be set to the bit-wise OR of the following flags:

GPGME_CREATE_SIGN
GPGME_CREATE_ENCR

GPGME_CREATE_CERT
GPGME_CREATE_AUTH
SINCE: 1.7.0

Do not create the key with the default capabilities (key usage) of the requested algorithm but use those explicitly given by these flags: signing, encryption, certification, or authentication. The allowed combinations depend on the algorithm.

If any of these flags are set and a default algorithm has been selected only one key is created in the case of the OpenPGP protocol.

GPGME_CREATE_NOPASSWD
SINCE: 1.7.0

Request generation of the key without password protection.

GPGME_CREATE_SELFSIGNED
SINCE: 1.7.0

For an X.509 key do not create a CSR but a self-signed certificate. This has not yet been implemented.

GPGME_CREATE_NOSTORE
SINCE: 1.7.0

Do not store the created key in the local key database. This has not yet been implemented.

GPGME_CREATE_WANTPUB
GPGME_CREATE_WANTSEC
SINCE: 1.7.0

Return the public or secret key as part of the result structure. This has not yet been implemented.

GPGME_CREATE_FORCE
SINCE: 1.7.0

The engine does not allow the creation of a key with a user ID already existing in the local key database. This flag can be used to override this check.

GPGME_CREATE_NOEXPIRE
SINCE: 1.9.0

Request generation of keys that do not expire.

After the operation
completed successfully, information about the
created key can be retrieved with gpgme_op_genkey_result.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if
the engine does not support the command, or a bunch of other error
codes.

-- Function: gpgme_error_t gpgme_op_createkey_start (gpgme_ctx_t CTX,
const char *USERID, const char *ALGO, unsigned long RESERVED,
unsigned long EXPIRES, gpgme_key_t EXTRAKEY,
unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_createkey_start initiates a
gpgme_op_createkey operation; see there for details. It must be
completed by calling gpgme_wait on the context. *Note Waiting
For Completion::.

-- Function: gpgme_error_t gpgme_op_createsubkey (gpgme_ctx_t CTX,
gpgme_key_t KEY, const char *ALGO, unsigned long RESERVED,
unsigned long EXPIRES, unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_createsubkey creates and adds
a new subkey
to the primary OpenPGP key given by KEY. The only allowed protocol
in CTX is GPGME_PROTOCOL_OPENPGP. Subkeys (aka secondary keys)
are a concept in the OpenPGP protocol to bind several keys to a
primary key. As of now this function requires at least version
2.1.13 of GnuPG.

KEY specifies the key to operate on.

ALGO specifies the algorithm for the new subkey. For a list of
supported algorithms, see the GnuPG manual. If ALGO is NULL or
the string "default", the subkey is generated using the default
algorithm for an encryption subkey of the engine. If the string
"future-default" is used the engine may use an encryption algorithm
which is planned to be the default in a future release of the
engine; however existing implementation of the protocol may not be
able to already handle such future algorithms.

RESERVED must be set to zero.

EXPIRES specifies the expiration time in seconds. If you
supply 0,
a reasonable expiration time is chosen. Use the flag
GPGME_CREATE_NOEXPIRE to create keys that do not expire. Note
that this parameter takes an unsigned long value and not a time_t
to avoid problems on systems which use a signed 32 bit time_t.
Note further that the OpenPGP protocol uses 32 bit values for
timestamps and thus can only encode dates up to the year 2106.

FLAGS takes the same values as described above for
gpgme_op_createkey.

After the operation completed successfully, information about the
created key can be retrieved with gpgme_op_genkey_result.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if
the engine does not support the command, or a bunch of other error
codes.

-- Function: gpgme_error_t gpgme_op_createsubkey_start
(gpgme_ctx_t CTX, gpgme_key_t KEY, const char *ALGO,
unsigned long RESERVED, unsigned long EXPIRES,
unsigned int FLAGS);

SINCE:
1.7.0

The function gpgme_op_createsubkey_start initiates a
gpgme_op_createsubkey operation; see there for details. It must
be completed by calling gpgme_wait on the context. *Note Waiting
For Completion::.

-- Function: gpgme_error_t gpgme_op_adduid (gpgme_ctx_t CTX,
gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_adduid adds a new user ID to the OpenPGP
key given by KEY. Adding additional user IDs after key creation is
a feature of the OpenPGP protocol and thus the protocol for the
context CTX must be set to OpenPGP. As of now this function
requires at least version 2.1.13 of GnuPG.

KEY specifies the key to operate on.

USERID is the user ID to add to the key. A user ID is commonly the
mail address to be associated with the key. GPGME does not require

a specific syntax but if more than a mail address is given, RFC-822 style format is suggested.
The value is expected to be in UTF-8 encoding (i.e. no IDN encoding for mail addresses). This is a required parameter.

FLAGS are currently not used and must be set to zero.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

-- Function: gpgme_error_t gpgme_op_adduid_start (gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_adduid_start initiates a gpgme_op_adduid operation; see there for details. It must be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

-- Function: gpgme_error_t gpgme_op_revuid (gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_revuid revokes a user ID from the OpenPGP key given by KEY. Revoking user IDs after key creation is a feature
of the OpenPGP protocol and thus the protocol for the context CTX must be set to OpenPGP. As of now this function requires at least version 2.1.13 of GnuPG.

KEY specifies the key to operate on.

USERID is the user ID to be revoked from the key. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the uid field from the user ID object (gpgme_user_id_t) is to be used. This is a required parameter.

FLAGS are currently not used and must be set to zero.

Note that the engine wont allow to revoke the last valid user ID. To change a user ID is better to first add the new user ID, then revoke the old one, and finally publish the key.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error

codes.

-- Function: gpgme_error_t gpgme_op_revuid_start (gpgme_ctx_t CTX,
gpgme_key_t KEY, const
char *USERID, unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_revuid_start initiates a gpgme_op_revuid operation; see there for details. It must be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

-- Function: gpgme_error_t gpgme_op_set_ui_flag (gpgme_ctx_t CTX,
gpgme_key_t KEY, const char *USERID, cons char * NAME,
cons char * VALUE);

SINCE: 1.8.0

The function gpgme_op_set_uid_flag is used to set flags on a user ID from the OpenPGP key given by KEY. Setting flags on user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context CTX must be set to OpenPGP.

KEY specifies the key to operate on. This parameters is required.

USERID is the user ID of the key to be manipulated. This user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the uid field from the user ID object

(gpgme_user_id_t) is to be used. This is a required parameter.

NAME names the flag which is to be changed. The only currently supported flag is:

primary
This sets the primary key flag on the given user ID. All other primary key flag on other user IDs are removed. VALUE must be given as NULL. For technical reasons this functions bumps the creation timestamp of all affected self-signatures up by one second. At least GnuPG version 2.1.20 is required.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

-- Function: gpgme_error_t gpgme_op_set_uid_flag_start
(gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID,
cons char * NAME, cons char * VALUE);

SINCE: 1.8.0

The function gpgme_op_set_uid_flag_start initiates a
gpgme_op_set_uid_flag operation; see there for details. It must

be completed by calling gpgme_wait on the context. *Note Waiting
For Completion::.

-- Function: gpgme_error_t gpgme_op_genkey (gpgme_ctx_t CTX,
const char *PARMS, gpgme_data_t PUBLIC, gpgme_data_t SECRET)

The function gpgme_op_genkey generates a new key pair in the
context CTX. The meaning of PUBLIC and SECRET depends on the
crypto backend.

GPG does not support PUBLIC and SECRET, they should be NULL.
GnuPG will generate a key pair and add it to the standard key ring.
The fingerprint of the generated key is available with
gpgme_op_genkey_result.

GpgSM requires PUBLIC to be a writable data object. GpgSM will
generate a secret key (which will be stored by gpg-agent, and
return a certificate request in PUBLIC, which then needs to be
signed by the certification authority and imported before it can be
used. GpgSM does not make the fingerprint available.

The argument PARMS specifies parameters for the
key in an string
that looks something like XML. The details about the format of
PARMS are specific to the crypto engine used by CTX. The first
line of the parameters must be <GnupgKeyParams format="internal">
and the last line must be </GnupgKeyParams>. Every line in
between the first and last lines is treated as a Header: Value
pair. In particular, no XML escaping is necessary if you need to
include the characters <, >, or &.

Here is an example for GnuPG as the crypto engine (all parameters
of OpenPGP key generation are documented in the GPG manual):

```
<GnupgKeyParms format="internal">
Key-Type: default
Subkey-Type: default
Name-Real: Joe Tester
Name-Comment: with stupid passphrase
Name-Email: joe@foo.bar
Expire-Date: 0
Passphrase: abc
```

```
</GnupgKeyParms>
```

Here is an example for GpgSM as the crypto engine (all parameters of OpenPGP key generation are documented in the GPGSM manual):

```
<GnupgKeyParms format="internal">
Key-Type: RSA
Key-Length: 1024
Name-DN: C=de,O=g10 code,OU=Testlab,CN=Joe 2 Tester
Name-Email: joe@foo.bar
</GnupgKeyParms>
```

Strings should be given in UTF-8 encoding. The only format supported for now is internal. The content of the GnupgKeyParms container is passed verbatim to the crypto backend. Control statements are not allowed.

After the operation completed successfully, the result can be retrieved with gpgme_op_genkey_result.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, GPG_ERR_INV_VALUE if PARMS is not a well-formed string (e.g. does not have the expected tag-like headers and footers), GPG_ERR_NOT_SUPPORTED if PUBLIC or SECRET is not valid, and GPG_ERR_GENERAL if no key was created by the backend.

-- Function: gpgme_error_t
gpgme_op_genkey_start (gpgme_ctx_t CTX,
const char *PARMS, gpgme_data_t PUBLIC, gpgme_data_t SECRET)

The function gpgme_op_genkey_start initiates a gpgme_op_genkey operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, GPG_ERR_INV_VALUE if PARMS is not a valid XML string, and GPG_ERR_NOT_SUPPORTED if PUBLIC or SECRET is not NULL.

-- Data type: gpgme_genkey_result_t

This is a pointer to a structure used to store the result of a gpgme_op_genkey operation. After successfully generating a key, you can retrieve the pointer to the result with gpgme_op_genkey_result. The structure contains the following members:

unsigned int primary : 1
This flag is set to 1 if a primary key was created and to 0 if not.

unsigned int sub : 1
This flag is set to 1 if a subkey was created and to 0 if not.

unsigned int uid : 1
This flag is set to 1 if a user ID was created and to 0 if not.

char *fpr
This is the fingerprint of the key that was created. If both a primary and a subkey were generated, the fingerprint of the primary key will be returned. If the crypto engine does not provide the fingerprint, fpr will be a null pointer.

gpgme_data_t pubkey
SINCE: 1.7.0

This will eventually be used to return the public key. It is currently not used.

gpgme_data_t seckey
SINCE: 1.7.0

This will eventually be used to return the secret key. It is currently not used.

-- Function: gpgme_genkey_result_t gpgme_op_genkey_result (gpgme_ctx_t CTX)

The function gpgme_op_genkey_result returns a gpgme_genkey_result_t pointer to a structure holding the result of a gpgme_op_genkey operation. The pointer is only valid if the last operation on the context was a gpgme_op_genkey or gpgme_op_genkey_start operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

File: gpgme.info, Node: Signing Keys, Next: Exporting Keys, Prev: Generating Keys, Up: Key Management

7.5.6 Signing Keys
---

Key signatures are a unique concept of the OpenPGP protocol. They can be used to certify the validity of a key and are used to create the Web-of-Trust (WoT). Instead of using the gpgme_op_interact function along with a finite state machine, GPGME provides a convenient function to create key signatures when using modern GnuPG versions.

-- Function: gpgme_error_t gpgme_op_keysign (gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID, unsigned long EXPIRES, unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_keysign adds a new key signature to the public key KEY. This function requires at least version 2.1.12 of GnuPG.

CTX is the usual context which describes the protocol to use (which must be OpenPGP) and has also the list of signer keys to be used for the signature. The common case is to use the default key for signing other keys. If another key or more than one key shall be used for a key signature, gpgme_signers_add can be used. *Note Selecting Signers::.

KEY specifies the key to operate on.

USERID selects the user ID or user IDs to be signed. If USERID is set to NULL all valid user IDs are signed. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the uid field from the user ID object (gpgme_user_id_t) is to be used. To select more than one user ID put them all into one string separated by linefeeds characters (\n) and set the flag GPGME_KEYSIGN_LFSEP.

EXPIRES specifies the expiration time of the new signature in seconds. The common case is to use 0 to not set an expiration date. However, if the configuration of the engine defines a default expiration for key signatures, that is still used unless the flag GPGME_KEYSIGN_NOEXPIRE is used. Note that this parameter takes an unsigned long value and not a time_t to avoid problems on systems which use a signed 32 bit time_t. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

FLAGS can be set to the bit-wise OR of the following flags:

GPGME_KEYSIGN_LOCAL
SINCE: 1.7.0

Instead of creating an exportable key signature, create a key signature which is is marked as non-exportable.

GPGME_KEYSIGN_LFSEP
SINCE: 1.7.0

Although linefeeds are uncommon in user IDs this flag is required to explicitly declare that
USERID may contain several
linefeed separated user IDs.

GPGME_KEYSIGN_NOEXPIRE
Force the creation of a key signature without an expiration date. This overrides EXPIRE and any local configuration of the engine.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

-- Function: gpgme_error_t gpgme_op_keysign_start (gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID, unsigned long EXPIRES, unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_keysign_start initiates a gpgme_op_keysign operation; see there for details. It must be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

-- Function: gpgme_error_t gpgme_op_revsig (gpgme_ctx_t CTX, gpgme_key_t KEY, gpgme_key_t SIGNING_KEY, const char *USERID, unsigned int FLAGS);

SINCE: 1.14.1

The function gpgme_op_revsig revokes key signatures of the public key KEY made with the key SIGNING_KEY. This function requires at least version 2.2.24 of GnuPG.

KEY specifies the key to operate on.

SIGNING_KEY specifies the key whose signatures shall be revoked.

USERID selects the user ID or user IDs whose signatures shall be revoked. If USERID is set to NULL the signatures on all user IDs are revoked. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the uid field from the user ID object (gpgme_user_id_t) is to be used. To select more than one user ID put them all into one string separated by linefeeds characters (\n) and set the flag GPGME_REVSIG_LFSEP.

FLAGS can be set to the bit-wise OR of the following flags:

GPGME_REVSIG_LFSEP
SINCE: 1.14.1

Although linefeeds are uncommon in user IDs this flag is required to explicitly declare
that USERID may contain several
linefeed separated user IDs.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

-- Function: gpgme_error_t gpgme_op_revsig_start (gpgme_ctx_t CTX, gpgme_key_t KEY, gpgme_key_t SIGNING_KEY, const char *USERID, unsigned int FLAGS);

SINCE: 1.14.1

The function gpgme_op_revsig_start initiates a gpgme_op_revsig operation; see there for details. It must be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

File: gpgme.info, Node: Exporting Keys, Next: Importing Keys, Prev: Signing Keys, Up: Key Management

7.5.7 Exporting Keys
---

Exporting keys means the same as running gpg with the command --export. However, a mode flag can be used to change the way the export works. The available mode flags are described below, they may be or-ed together.

GPGME_EXPORT_MODE_EXTERN
If this bit is set, the output is send directly to the default keyserver. This is currently only allowed for OpenPGP keys. It is good practise to not send more than a few dozens key to a keyserver at one time. Using this flag requires that the KEYDATA argument of

the export function is set to NULL.

GPGME_EXPORT_MODE_MINIMAL
SINCE: 1.3.1

If this bit is set, the smallest possible key is exported. For OpenPGP keys it removes all signatures except for the latest self-signatures. For X.509 keys it has no effect.

GPGME_EXPORT_MODE_SSH
SINCE: 1.4.0

If this bit is set, the latest authentication key of the requested OpenPGP key is exported in the OpenSSH public key format. This accepts just a single key; to force the export of a specific subkey a fingerprint pattern with an appended exclamation mark may be used.

GPGME_EXPORT_MODE_SECRET
SINCE: 1.6.0

Instead of exporting the public
key, the secret key is exported.
This may not be combined with GPGME_EXPORT_MODE_EXTERN. For X.509 the export format is PKCS#8.

GPGME_EXPORT_MODE_RAW
SINCE: 1.6.0

If this flag is used with GPGME_EXPORT_MODE_SECRET for an X.509 key the export format will be changed to PKCS#1. This flag may not be used with OpenPGP.

GPGME_EXPORT_MODE_PKCS12
SINCE: 1.6.0

If this flag is used with GPGME_EXPORT_MODE_SECRET for an X.509 key the export format will be changed to PKCS#12 which also includes the certificate. This flag may not be used with OpenPGP.

GPGME_EXPORT_MODE_NOUID
SINCE: 1.12.0 - experimental Do not export user ids. Works only with certain gpg version.

-- Function: gpgme_error_t gpgme_op_export (gpgme_ctx_t CTX,
const char *PATTERN, gpgme_export_mode_t MODE,
gpgme_data_t KEYDATA)
The function gpgme_op_export extracts public keys and returns

them in the data buffer KEYDATA. The output
format of the key data
returned is determined by the ASCII armor attribute set for the
context CTX, or, if that is not set, by the encoding specified for
KEYDATA.

If PATTERN is NULL, all available keys are returned. Otherwise,
PATTERN contains an engine specific expression that is used to
limit the list to all keys matching the pattern.

MODE is usually 0; other values are described above.

The function returns the error code GPG_ERR_NO_ERROR if the
operation completed successfully, GPG_ERR_INV_VALUE if KEYDATA is
not a valid empty data buffer, and passes through any errors that
are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_export_start (gpgme_ctx_t CTX,
const char *PATTERN, gpgme_export_mode_t MODE,
gpgme_data_t KEYDATA)
The function gpgme_op_export_start initiates a gpgme_op_export
operation. It can be completed by calling gpgme_wait on the
context.
*Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the
operation could be started successfully, and GPG_ERR_INV_VALUE if
KEYDATA is not a valid empty data buffer.

-- Function: gpgme_error_t gpgme_op_export_ext (gpgme_ctx_t CTX,
const char *PATTERN[], gpgme_export_mode_t MODE,
gpgme_data_t KEYDATA)
The function gpgme_op_export extracts public keys and returns
them in the data buffer KEYDATA. The output format of the key data
returned is determined by the ASCII armor attribute set for the
context CTX, or, if that is not set, by the encoding specified for
KEYDATA.

If PATTERN or *PATTERN is NULL, all available keys are returned.
Otherwise, PATTERN is a NULL terminated array of strings that are
used to limit the list to all keys matching at least one of the
patterns verbatim.

MODE is usually 0; other values are described above.

The function returns the error
code GPG_ERR_NO_ERROR if the
operation completed successfully, GPG_ERR_INV_VALUE if KEYDATA is

not a valid empty data buffer, and passes through any errors that
are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_export_ext_start (gpgme_ctx_t CTX,
const char *PATTERN[], gpgme_export_mode_t MODE,
gpgme_data_t KEYDATA)
The function gpgme_op_export_ext_start initiates a
gpgme_op_export_ext operation. It can be completed by calling
gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the
operation could be started successfully, and GPG_ERR_INV_VALUE if
KEYDATA is not a valid empty data buffer.

-- Function: gpgme_error_t gpgme_op_export_keys (gpgme_ctx_t CTX,
gpgme_key_t keys[], gpgme_export_mode_t MODE,
gpgme_data_t KEYDATA)
SINCE: 1.2.0

The function gpgme_op_export_keys extracts public keys
and
returns them in the data buffer KEYDATA. The output format of the
key data returned is determined by the ASCII armor attribute set
for the context CTX, or, if that is not set, by the encoding
specified for KEYDATA.

The keys to export are taken form the NULL terminated array KEYS.
Only keys of the currently selected protocol of CTX which do have a
fingerprint set are considered for export. Other keys specified by
the KEYS are ignored. In particular OpenPGP keys retrieved via an
external key listing are not included.

MODE is usually 0; other values are described above.

The function returns the error code GPG_ERR_NO_ERROR if the
operation completed successfully, GPG_ERR_INV_VALUE if KEYDATA is
not a valid empty data buffer, GPG_ERR_NO_DATA if no useful keys
are in KEYS and passes through any errors that are reported by the
crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_export_keys_start
(gpgme_ctx_t CTX,
gpgme_key_t KEYS[], gpgme_export_mode_t MODE,
gpgme_data_t KEYDATA)
SINCE: 1.2.0

The function gpgme_op_export_keys_start initiates a
gpgme_op_export_ext operation. It can be completed by calling

gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, and GPG_ERR_INV_VALUE if KEYDATA is not a valid empty data buffer, GPG_ERR_NO_DATA if no useful keys are in KEYS and passes through any errors that are reported by the crypto engine support routines.

File: gpgme.info, Node: Importing Keys, Next: Deleting Keys, Prev: Exporting Keys, Up: Key Management

### 7.5.8 Importing Keys

Importing keys means the same as running gpg with the command --import.

-- Function: gpgme_error_t gpgme_op_import (gpgme_ctx_t CTX, gpgme_data_t KEYDATA)

The function gpgme_op_import adds the keys in the data buffer KEYDATA to the key ring of the crypto engine used by CTX. The format of KEYDATA can be ASCII armored, for example, but the details are specific to the crypto engine.

After the operation completed successfully, the result can be retrieved with gpgme_op_import_result.

The function returns the error code GPG_ERR_NO_ERROR if the import was completed successfully, GPG_ERR_INV_VALUE if KEYDATA if CTX or KEYDATA is not a valid pointer, and GPG_ERR_NO_DATA if KEYDATA is an empty data buffer.

-- Function: gpgme_error_t gpgme_op_import_start (gpgme_ctx_t CTX, gpgme_data_t KEYDATA)

The function gpgme_op_import_start initiates a gpgme_op_import operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the import could be started successfully, GPG_ERR_INV_VALUE if CTX or KEYDATA is not a valid pointer, and GPG_ERR_NO_DATA if KEYDATA is an empty data buffer.

-- Function: gpgme_error_t gpgme_op_import_keys (gpgme_ctx_t CTX, gpgme_key_t *KEYS)

SINCE: 1.2.0

The function gpgme_op_import_keys adds the keys described by the NULL terminated array KEYS to the key ring of the crypto engine used by CTX. It is used to actually import and make keys permanent which have been retrieved from an external source (i.e. using GPGME_KEYLIST_MODE_EXTERN) earlier. The external keylisting must have been made with the same context configuration (in particular the same home directory). (1) Note that for OpenPGP this may require another access to the keyserver over the network.

Only keys of the currently selected protocol of CTX are considered for import. Other keys specified by the KEYS are ignored. As of now all considered keys must have been retrieved using the same method, i.e. the used key
listing mode must be identical.

After the operation completed successfully, the result can be retrieved with gpgme_op_import_result.

To move keys from one home directory to another, export and import the keydata using gpgme_op_export and gpgme_op_import.

The function returns the error code GPG_ERR_NO_ERROR if the import was completed successfully, GPG_ERR_INV_VALUE if CTX is not a valid pointer, GPG_ERR_CONFLICT if the key listing mode does not match, and GPG_ERR_NO_DATA if no keys are considered for export.

-- Function: gpgme_error_t gpgme_op_import_keys_start (gpgme_ctx_t CTX, gpgme_key_t *KEYS)
SINCE: 1.2.0

The function gpgme_op_import_keys_start initiates a gpgme_op_import_keys operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the import was completed successfully, GPG_ERR_INV_VALUE
if KEYDATA
if CTX or KEYDATA is not a valid pointer, GPG_ERR_CONFLICT if the key listing mode does not match, and GPG_ERR_NO_DATA if no keys are considered for export.

-- Data type: gpgme_import_status_t
This is a pointer to a structure used to store a part of the result of a gpgme_op_import operation. For each considered key one status is added that contains information about the result of the import. The structure contains the following members:

gpgme_import_status_t next
This is a pointer to the next status structure in the linked list, or NULL if this is the last element.

char *fpr
This is the fingerprint of the key that was considered.

gpgme_error_t result
If the import was not successful, this is the error value that caused the import to fail. Otherwise the error code is GPG_ERR_NO_ERROR.

unsigned int status
This is a bit-wise OR of the following flags that give more information about what part of the key was imported. If the key was already known, this might be 0.

GPGME_IMPORT_NEW
The key was new.

GPGME_IMPORT_UID
The key contained new user IDs.

GPGME_IMPORT_SIG
The key contained new signatures.

GPGME_IMPORT_SUBKEY
The key contained new sub keys.

GPGME_IMPORT_SECRET
The key contained a secret key.

-- Data type: gpgme_import_result_t
This is a pointer to a structure used to store the result of a gpgme_op_import operation. After a successful import operation, you can retrieve the pointer to the result with gpgme_op_import_result. The structure contains the following members:

int considered
The total number of considered keys.

int no_user_id
The number of keys without user ID.

int imported

The total number
of imported keys.

int imported_rsa
The number of imported RSA keys.

int unchanged
The number of unchanged keys.

int new_user_ids
The number of new user IDs.

int new_sub_keys
The number of new sub keys.

int new_signatures
The number of new signatures.

int new_revocations
The number of new revocations.

int secret_read
The total number of secret keys read.

int secret_imported
The number of imported secret keys.

int secret_unchanged
The number of unchanged secret keys.

int not_imported
The number of keys not imported.

gpgme_import_status_t imports
A list of gpgme_import_status_t objects which contain more information about the keys for which an import was attempted.

int skipped_v3_keys
For security reasons modern versions of GnuPG do not anymore support v3 keys (created with PGP
2.x) and ignores them on
import. This counter provides the number of such skipped v3 keys.

-- Function: gpgme_import_result_t gpgme_op_import_result
(gpgme_ctx_t CTX)
The function gpgme_op_import_result returns a
gpgme_import_result_t pointer to a structure holding the result

of a gpgme_op_import operation. The pointer is only valid if the last operation on the context was a gpgme_op_import or gpgme_op_import_start operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

---------- Footnotes ----------

(1) Thus it is a replacement for the usual workaround of exporting and then importing a key to make an X.509 key permanent.

File: gpgme.info, Node: Deleting Keys, Next: Changing Passphrases, Prev: Importing Keys, Up: Key Management

7.5.9 Deleting Keys
---

-- Function: gpgme_error_t gpgme_op_delete_ext
(gpgme_ctx_t CTX,
const gpgme_key_t KEY, unsigned int FLAGS)
SINCE: 1.9.1

The function gpgme_op_delete_ext deletes the key KEY from the key ring of the crypto engine used by CTX.

FLAGS can be set to the bit-wise OR of the following flags:

GPGME_DELETE_ALLOW_SECRET
SINCE: 1.9.1

If not set, only public keys are deleted. If set, secret keys are deleted as well, if that is supported.

GPGME_DELETE_FORCE
SINCE: 1.9.1

If set, the user is not asked to confirm the deletion.

The function returns the error code GPG_ERR_NO_ERROR if the key was deleted successfully, GPG_ERR_INV_VALUE if CTX or KEY is not a valid pointer, GPG_ERR_NO_PUBKEY if KEY could not be found in the keyring, GPG_ERR_AMBIGUOUS_NAME if the key was not specified unambiguously, and GPG_ERR_CONFLICT if the secret key for KEY is available, but ALLOW_SECRET is zero.

-- Function: gpgme_error_t gpgme_op_delete_ext_start

(gpgme_ctx_t CTX,
const gpgme_key_t KEY, unsigned int FLAGS)
SINCE: 1.9.1

The function gpgme_op_delete_ext_start initiates a gpgme_op_delete operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation was started successfully, and GPG_ERR_INV_VALUE if CTX or KEY is not a valid pointer.

The following functions allow only to use one particular flag.

-- Function: gpgme_error_t gpgme_op_delete (gpgme_ctx_t CTX,
const gpgme_key_t KEY, int ALLOW_SECRET)
Similar to gpgme_op_delete_ext, but only the flag GPGME_DELETE_ALLOW_SECRET can be provided.

-- Function: gpgme_error_t gpgme_op_delete_start (gpgme_ctx_t CTX,
const gpgme_key_t KEY, int ALLOW_SECRET)
Similar to gpgme_op_delete_ext_start, but only the flag GPGME_DELETE_ALLOW_SECRET can be provided.

File: gpgme.info, Node:
Changing Passphrases, Next: Changing TOFU Data, Prev: Deleting Keys, Up: Key Management

7.5.10 Changing Passphrases
---

-- Function: gpgme_error_t gpgme_op_passwd (gpgme_ctx_t CTX,
const gpgme_key_t KEY, unsigned int FLAGS)

SINCE: 1.3.0

The function gpgme_op_passwd changes the passphrase of the private key associated with KEY. The only allowed value for FLAGS is 0. The backend engine will usually popup a window to ask for the old and the new passphrase. Thus this function is not useful in a server application (where passphrases are not required anyway).

Note that old gpg engines (before version 2.0.15) do not support this command and will silently ignore it.

-- Function: gpgme_error_t gpgme_op_passwd_start (gpgme_ctx_t CTX,
const gpgme_key_t KEY, unsigned int FLAGS)

SINCE: 1.3.0

The function gpgme_op_passwd_start initiates a gpgme_op_passwd operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns 0 if the operation was started successfully, and an error code if one of the arguments is not valid or the oepration could not be started.

File: gpgme.info, Node: Changing TOFU Data, Next: Advanced Key Editing, Prev: Changing Passphrases, Up: Key Management

7.5.11 Changing TOFU Data
---

The OpenPGP engine features a Trust-On-First-Use (TOFU) key validation model. For resolving conflicts it is necessary to declare the policy for a key. See the GnuPG manual for details on the TOFU implementation.

-- Data type: enum gpgme_tofu_policy_t
SINCE: 1.7.0

The gpgme_tofu_policy_t type specifies the set of possible policy values that are supported by GPGME:

GPGME_TOFU_POLICY_AUTO
Set the policy to auto.
GPGME_TOFU_POLICY_GOOD
Set the policy to good.
GPGME_TOFU_POLICY_BAD
Set the policy to bad.
GPGME_TOFU_POLICY_ASK
Set the policy to ask.
GPGME_TOFU_POLICY_UNKNOWN
Set the policy to unknown.

To change the policy for a key the following functions can be used:

-- Function: gpgme_error_t gpgme_op_tofu_policy (gpgme_ctx_t CTX, const gpgme_key_t KEY, gpgme_tofu_policy_t POLICY)

SINCE: 1.7.0

The function gpgme_op_tofu_policy changes the TOFU policy of KEY. The valid values for POLICY are listed above. As of now this function does only work for OpenPGP and requires at least version 2.1.10 of GnuPG.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

-- Function: gpgme_error_t gpgme_op_tofu_policy_start (gpgme_ctx_t CTX, const gpgme_key_t KEY, gpgme_tofu_policy_t POLICY)

SINCE: 1.7.0

The function gpgme_op_tofu_policy_start initiates a gpgme_op_tofu_policy operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns 0 if the operation was started successfully, and an error code if one of the arguments is not valid or the oepration could not be started.

File: gpgme.info, Node: Advanced Key Editing, Prev: Changing TOFU Data, Up: Key Management

7.5.12 Advanced Key Editing
---

-- Data type: gpgme_error_t (*gpgme_interact_cb_t) (void *HANDLE, const char *STATUS, const char *ARGS, int FD)

SINCE: 1.7.0

The gpgme_interact_cb_t type is the type of functions which GPGME calls if it a key interact operation is on-going. The status keyword STATUS and the argument line ARGS are passed through by GPGME from the crypto engine. An empty string represents EOF. The file descriptor FD is -1 for normal status messages. If STATUS indicates a command rather than a status message, the response to the command should be written to FD. The HANDLE is provided by the user at start of operation.

The function should return GPG_ERR_FALSE if it did not handle the status code, 0 for success, or any other error value.

-- Function: gpgme_error_t gpgme_op_interact (gpgme_ctx_t CTX,

gpgme_key_t KEY, unsigned int FLAGS, gpgme_interact_cb_t FNC,
void *HANDLE, gpgme_data_t OUT)

SINCE: 1.7.0

The function gpgme_op_interact processes the key KEY interactively, using the interact callback function FNC with the handle HANDLE. The callback is invoked for every status and command request from the crypto engine. The output of the crypto engine is written to the data object OUT.

Note that the protocol between the callback function and the crypto engine is specific to the crypto engine and no further support in implementing this protocol correctly is provided by GPGME.

FLAGS modifies the behaviour of the function; the only defined bit value is:

GPGME_INTERACT_CARD
SINCE: 1.7.0

This is used for smartcard based keys and uses gpgs --card-edit command.

The function returns 0 if the edit operation completes successfully, GPG_ERR_INV_VALUE if CTX or KEY is not a valid pointer, and any error returned by the crypto engine or the edit callback handler.

-- Function: gpgme_error_t gpgme_op_interact_start (gpgme_ctx_t CTX,
gpgme_key_t KEY, unsigned int FLAGS, gpgme_interact_cb_t FNC,
void *HANDLE, gpgme_data_t OUT)

SINCE: 1.7.0

The function gpgme_op_interact_start initiates a gpgme_op_interact operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns 0 if the operation was started successfully, and GPG_ERR_INV_VALUE if CTX or KEY is not a valid pointer.

File: gpgme.info, Node: Crypto Operations, Next: Miscellaneous, Prev: Key Management, Up: Contexts

7.6 Crypto Operations

==========

Sometimes, the result of a crypto operation returns a list of invalid keys encountered in processing the request. The following structure is used to hold information about such a key.

-- Data type: gpgme_invalid_key_t
This is a pointer to a structure used to store a part of the result of a crypto operation which takes user IDs as one input parameter. The structure contains the following members:

gpgme_invalid_key_t next
This is a pointer to the next invalid key structure in the linked list, or NULL if this is the last element.

char *fpr
The fingerprint or key ID of the invalid key encountered.

gpgme_error_t reason
An error code describing the reason why the key was found invalid.

* Menu:

* Decrypt:: Decrypting a ciphertext.
* Verify:: Verifying a signature.
* Decrypt and Verify:: Decrypting a signed ciphertext.
* Sign:: Creating a signature.
* Encrypt:: Encrypting a plaintext.

File: gpgme.info, Node: Decrypt, Next: Verify, Up: Crypto Operations

7.6.1 Decrypt
---

-- Function: gpgme_error_t gpgme_op_decrypt (gpgme_ctx_t CTX, gpgme_data_t CIPHER, gpgme_data_t PLAIN)
The function gpgme_op_decrypt decrypts the ciphertext in the data object CIPHER and stores it into the data object PLAIN.

The function returns the error code GPG_ERR_NO_ERROR if the ciphertext could be decrypted successfully, GPG_ERR_INV_VALUE if CTX, CIPHER or PLAIN is not a valid pointer, GPG_ERR_NO_DATA if CIPHER does not contain any data to decrypt, GPG_ERR_DECRYPT_FAILED if CIPHER is not a valid cipher text, GPG_ERR_BAD_PASSPHRASE if the passphrase for the secret key could

not be retrieved, and passes through some errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_decrypt_start (gpgme_ctx_t CTX, gpgme_data_t CIPHER, gpgme_data_t PLAIN)

The function gpgme_op_decrypt_start initiates a gpgme_op_decrypt operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, and GPG_ERR_INV_VALUE if CIPHER or PLAIN is not a valid pointer.

-- Function: gpgme_error_t gpgme_op_decrypt_ext ( gpgme_ctx_t CTX, gpgme_decrypt_flags_t FLAGS, gpgme_data_t CIPHER, gpgme_data_t PLAIN)

SINCE: 1.8.0

The function gpgme_op_decrypt_ext is the same as gpgme_op_decrypt but has an additional argument FLAGS. If FLAGS is 0 both function behave identically.

The value in FLAGS is a bitwise-or combination of one or multiple of the following bit values:

GPGME_DECRYPT_VERIFY
SINCE: 1.8.0

The GPGME_DECRYPT_VERIFY symbol specifies that this function shall exactly act as gpgme_op_decrypt_verify.

GPGME_DECRYPT_UNWRAP
SINCE: 1.8.0

The GPGME_DECRYPT_UNWRAP symbol specifies that the output shall be an OpenPGP message with only the encryption layer removed. This requires GnuPG 2.1.12 and works only for OpenPGP. This is the counterpart to GPGME_ENCRYPT_WRAP.

The function returns the error codes as described for gpgme_op_decrypt.

-- Function: gpgme_error_t gpgme_op_decrypt_ext_start ( gpgme_ctx_t CTX, gpgme_decrypt_flags_t FLAGS, gpgme_data_t CIPHER, gpgme_data_t PLAIN)

SINCE: 1.8.0

The function gpgme_op_decrypt_ext_start initiates a gpgme_op_decrypt_ext operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, and GPG_ERR_INV_VALUE if CIPHER or PLAIN is not a valid pointer.

-- Data type: gpgme_recipient_t
SINCE: 1.1.0

This is a pointer to a structure used to store information about the recipient of an encrypted text which is decrypted in a gpgme_op_decrypt operation. This information (except for the status field) is even available before the operation finished successfully, for example in a passphrase callback. The structure contains the following members:

gpgme_recipient_t next
This is a pointer to the next recipient structure in the linked list, or NULL if this is the last element.

gpgme_pubkey_algo_t
The public key algorithm used in the encryption.

char *keyid
This is the key ID of the key (in hexadecimal digits) used as recipient.

gpgme_error_t status
This is an error number with the error code GPG_ERR_NO_SECKEY if the secret key for this recipient is not available, and 0 otherwise.

-- Data type: gpgme_decrypt_result_t
This is a pointer to a structure used to store the result of a gpgme_op_decrypt operation. After successfully decrypting data, you can retrieve the pointer to the result with gpgme_op_decrypt_result. As with all result structures, it this structure shall be considered read-only and an application must not allocate such a strucure on its own. The structure contains the following members:

char *unsupported_algorithm

If an unsupported algorithm was encountered, this string
describes the algorithm that is not supported.

unsigned int wrong_key_usage : 1
SINCE: 0.9.0 This is true if the key was not used according to
its policy.

unsigned int legacy_cipher_nomdc : 1
SINCE: 1.11.2 The message was made by a legacy algorithm
without any integrity protection. This might be an old but

legitimate message.

unsigned int is_mime : 1;
SINCE: 1.11.0 The message claims that the content is a MIME
object.

unsigned int is_de_vs : 1;
SINCE: 1.10.0 The message was encrypted in a VS-NfD compliant
way. This is a specification in Germany for a restricted
communication level.

gpgme_recipient_t recipients
SINCE: 1.1.0

This is a linked list of recipients to which this message was
encrypted.

char *file_name
This is the filename of the original plaintext message file if
it is known, otherwise this is a null pointer.

char *session_key
SINCE: 1.8.0

A textual representation (nul-terminated string) of the
session key used in symmetric encryption of the message, if
the context has been set to export session keys (see
gpgme_set_ctx_flag, "export-session-key"), and a session key
was available for the
most recent decryption operation.
Otherwise, this is a null pointer.

You must not try to access this member of the struct unless
gpgme_set_ctx_flag (ctx, "export-session-key") returns
success or gpgme_get_ctx_flag (ctx, "export-session-key")
returns true (non-empty string).

char *symkey_algo
SINCE: 1.11.0

A string with the symmetric encryption algorithm and mode using the format "<algo>.<mode>". Note that the deprecated non-MDC encryption mode of OpenPGP is given as "PGPCFB".

-- Function: gpgme_decrypt_result_t gpgme_op_decrypt_result (gpgme_ctx_t CTX)
The function gpgme_op_decrypt_result returns a gpgme_decrypt_result_t pointer to a structure holding the result of a gpgme_op_decrypt operation. The pointer is only valid if the last operation on the context was a gpgme_op_decrypt or gpgme_op_decrypt_start operation. If the operation failed this

might be a NULL pointer. The returned pointer is only valid until the next operation is started on the context.

File: gpgme.info, Node: Verify, Next: Decrypt and Verify, Prev: Decrypt, Up: Crypto Operations

7.6.2 Verify
---

-- Function: gpgme_error_t gpgme_op_verify (gpgme_ctx_t CTX, gpgme_data_t SIG, gpgme_data_t SIGNED_TEXT, gpgme_data_t PLAIN)
The function gpgme_op_verify verifies that the signature in the data object SIG is a valid signature. If SIG is a detached signature, then the signed text should be provided in SIGNED_TEXT and PLAIN should be a null pointer. Otherwise, if SIG is a normal (or cleartext) signature, SIGNED_TEXT should be a null pointer and PLAIN should be a writable data object that will contain the plaintext after successful verification.

The results of the individual signature verifications can be retrieved with gpgme_op_verify_result.

The function returns the error
code GPG_ERR_NO_ERROR if the
operation could be completed successfully, GPG_ERR_INV_VALUE if CTX, SIG or PLAIN is not a valid pointer, GPG_ERR_NO_DATA if SIG does not contain any data to verify, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_verify_start (gpgme_ctx_t CTX, gpgme_data_t SIG, gpgme_data_t SIGNED_TEXT, gpgme_data_t PLAIN)

The function gpgme_op_verify_start initiates a gpgme_op_verify operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, GPG_ERR_INV_VALUE if CTX, SIG or PLAIN is not a valid pointer, and GPG_ERR_NO_DATA if SIG or PLAIN does not contain any data to verify.

-- Data type: gpgme_sig_notation_t
This is a pointer to a structure used to store a part of the result of a gpgme_op_verify operation. The structure contains the following members:

gpgme_sig_notation_t next
This is a pointer to the next new signature notation structure in the linked list, or NULL if this is the last element.

char *name
The name of the notation field. If this is NULL, then the member value will contain a policy URL.

int name_len
The length of the name field. For strings the length is counted without the trailing binary zero.

char *value
The value of the notation field. If name is NULL, then this is a policy URL.

int value_len
The length of the value field. For strings the length is counted without the trailing binary zero.

gpgme_sig_notation_flags_t flags
The accumulated flags field. This field contains the flags associated with the notation data in an accumulated form which can be used
as an argument to the function
gpgme_sig_notation_add. The value flags is a bitwise-or combination of one or multiple of the following bit values:

GPGME_SIG_NOTATION_HUMAN_READABLE
SINCE: 1.1.0

The GPGME_SIG_NOTATION_HUMAN_READABLE symbol specifies that the notation data is in human readable form

GPGME_SIG_NOTATION_CRITICAL
SINCE: 1.1.0

The GPGME_SIG_NOTATION_CRITICAL symbol specifies that the notation data is critical.

unsigned int human_readable : 1
This is true if the GPGME_SIG_NOTATION_HUMAN_READABLE flag is set and false otherwise. This flag is only valid for notation data, not for policy URLs.

unsigned int critical : 1
This is true if the GPGME_SIG_NOTATION_CRITICAL flag is set and false otherwise. This flag is valid for notation data and policy URLs.

-- Data type: gpgme_signature_t
This is a pointer to a structure used to store a part of the result of a gpgme_op_verify operation. The structure contains the following members:

gpgme_signature_t next
This is a pointer to the next new signature structure in the linked list, or NULL if this is the last element.

gpgme_sigsum_t summary
This is a bit vector giving a summary of the signature status. It provides an easy interface to a defined semantic of the signature status. Checking just one bit is sufficient to see whether a signature is valid without any restrictions. This means that you can check for GPGME_SIGSUM_VALID like this:

```
if ((sig.summary & GPGME_SIGSUM_VALID))
{
  ..do stuff if valid..
}
else
{
  ..do stuff if not fully valid..
}
```

The defined bits are:
GPGME_SIGSUM_VALID
The signature is fully valid.

GPGME_SIGSUM_GREEN
The signature is good but one might want to display some extra information. Check the other bits.

GPGME_SIGSUM_RED
The signature is bad. It might be useful to check other bits and display more information, i.e. a revoked certificate might not render a signature invalid when the message was received prior to the cause for the revocation.

GPGME_SIGSUM_KEY_REVOKED
The key or at least one certificate has been revoked.

GPGME_SIGSUM_KEY_EXPIRED
The key or one of the certificates has expired. It is probably a good idea to display the date of the expiration.

GPGME_SIGSUM_SIG_EXPIRED
The signature has expired.

GPGME_SIGSUM_KEY_MISSING
Cant verify due to a missing key or certificate.

GPGME_SIGSUM_CRL_MISSING
The CRL (or an equivalent mechanism) is not available.

GPGME_SIGSUM_CRL_TOO_OLD
Available CRL is too old.

GPGME_SIGSUM_BAD_POLICY
A policy requirement was not met.

GPGME_SIGSUM_SYS_ERROR
A system error occurred.

GPGME_SIGSUM_TOFU_CONFLICT
A TOFU conflict was detected.

char *fpr
This is the fingerprint or key ID of the signature.

gpgme_error_t status
This is the status of the signature. In particular, the following status codes are of interest:

GPG_ERR_NO_ERROR
This status indicates that the signature could be verified or that there is no signature. For the combined

result this status means that all signatures could be verified.

Note: This does not mean that a valid signature could be found. Check the summary field for that.

For example a gpgme_op_decrypt_verify returns a verification result with GPG_ERR_NO_ERROR for encrypted but unsigned data.

GPG_ERR_SIG_EXPIRED
This status indicates that the signature is valid but expired. For the combined result this status means that all signatures are valid and expired.

GPG_ERR_KEY_EXPIRED
This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.

GPG_ERR_CERT_REVOKED
This status indicates that the signature is valid but the key used to verify the signature has been revoked. For the combined result this status means that all signatures

are valid and all keys are revoked.

GPG_ERR_BAD_SIGNATURE
This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

GPG_ERR_NO_PUBKEY
This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

GPG_ERR_GENERAL
This status indicates that there was some other error which prevented the signature verification.

gpgme_sig_notation_t notations
This is a linked list with the notation data and policy URLs.

unsigned long timestamp

The creation timestamp of this signature.

unsigned long exp_timestamp
The expiration timestamp of this signature, or 0 if the signature
does not expire.

unsigned int wrong_key_usage : 1
This is true if the key was not used according to its policy.

unsigned int pka_trust : 2
This is set to the trust information gained by means of the PKA system. Values are:

0
No PKA information available or verification not possible.

1
PKA verification failed.

2
PKA verification succeeded.

3
Reserved for future use.

Depending on the configuration of the engine, this metric may also be reflected by the validity of the signature.

unsigned int chain_model : 1
SINCE: 1.1.6

This is true if the validity of the signature has been checked using the chain model. In the chain model the time the signature has been created must be within the validity period of the certificate and the time the certificate itself has been created must be within the validity period of the issuing certificate. In contrast the default validation model checks the validity of signature as well at the entire certificate chain at the current time.

gpgme_validity_t validity
The validity of the signature.

gpgme_error_t validity_reason
If a signature is not valid, this provides a reason why.

gpgme_pubkey_algo_t
The public key algorithm used to create this signature.

gpgme_hash_algo_t
The hash algorithm used to create this signature.

char *pka_address
The mailbox from the PKA information or NULL.

gpgme_key_t key
SINCE: 1.7.0

An object describing the key used to create the signature. This key object may be incomplete in that it only conveys information availabale directly with a signature. It may also be NULL if such information is not readily available.

-- Data type: gpgme_verify_result_t
This is a pointer to a structure used to store the result of a gpgme_op_verify operation. After verifying a signature, you can retrieve the pointer to the result with gpgme_op_verify_result. If the operation failed this might be a NULL pointer. The structure contains the following member:

gpgme_signature_t signatures
A linked list with information about all signatures for which a verification was attempted.

char *file_name
This is the filename of the original plaintext message file if it is known, otherwise this is a null pointer. Warning: The filename is not covered by the signature.

unsigned int is_mime : 1;
SINCE: 1.11.0

The message claims that the content is a MIME object. Warning: This flag is not covered by the signature.

-- Function: gpgme_verify_result_t gpgme_op_verify_result
(gpgme_ctx_t CTX)

The function gpgme_op_verify_result returns a gpgme_verify_result_t pointer to a structure holding the result of a gpgme_op_verify operation. The pointer is only valid if the last operation on the context was a gpgme_op_verify, gpgme_op_verify_start, gpgme_op_decrypt_verify or gpgme_op_decrypt_verify_start operation, and if this operation finished successfully (for gpgme_op_decrypt_verify and gpgme_op_decrypt_verify_start, the error code GPG_ERR_NO_DATA counts as successful in this context). The returned pointer is only valid until the next operation is started on the context.

### 7.6.3 Decrypt and Verify

-- Function: gpgme_error_t gpgme_op_decrypt_verify (gpgme_ctx_t CTX, gpgme_data_t CIPHER, gpgme_data_t PLAIN)

The function gpgme_op_decrypt_verify decrypts the ciphertext in the data object CIPHER and stores it into the data object PLAIN.

If CIPHER contains signatures, they will be verified.

After the operation completed, gpgme_op_decrypt_result and gpgme_op_verify_result can be used to retrieve more information about the signatures.

If the error code GPG_ERR_NO_DATA is returned, CIPHER does not contain any data to decrypt. However, it might still be signed. The information about detected signatures is available with gpgme_op_verify_result in this case.

The function returns the error code GPG_ERR_NO_ERROR if the ciphertext could be decrypted successfully, GPG_ERR_INV_VALUE if CTX, CIPHER or PLAIN is not a valid pointer, GPG_ERR_NO_DATA if CIPHER does not contain any data to decrypt, GPG_ERR_DECRYPT_FAILED if CIPHER is not a valid cipher text, GPG_ERR_BAD_PASSPHRASE if the passphrase for the secret key could not be retrieved, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_decrypt_verify_start (gpgme_ctx_t CTX, gpgme_data_t CIPHER, gpgme_data_t PLAIN)

The function gpgme_op_decrypt_verify_start initiates a gpgme_op_decrypt_verify operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, GPG_ERR_INV_VALUE if CTX, CIPHER, PLAIN or R_STAT is not a valid pointer, and GPG_ERR_NO_DATA if CIPHER does not contain any data to decrypt.

When processing mails it is sometimes useful to extract the actual mail address (the addr-spec) from a string. GPGME provides this helper function which uses the same semantics as the internal functions in GPGME and GnuPG:

-- Function: char * gpgme_addrspec_from_uid (const char *UID)

SINCE: 1.7.1

Return the mail address (called addr-spec in RFC-5322) from the string
UID which is assumed to be a user id (called address in RFC-5322). All plain ASCII characters (i.e. those with bit 7 cleared) in the result are converted to lowercase. Caller must free the result using gpgme_free. Returns NULL if no valid address was found (in which case ERRNO is set to EINVAL) or for other errors.

File: gpgme.info, Node: Sign, Next: Encrypt, Prev: Decrypt and Verify, Up: Crypto Operations

7.6.4 Sign
---

A signature can contain signatures by one or more keys. The set of keys used to create a signatures is contained in a context, and is applied to all following signing operations in this context (until the set is changed).

* Menu:

* Selecting Signers:: How to choose the keys to sign with.
* Creating a Signature:: How to create a signature.
* Signature Notation Data:: How to add notation data to a signature.

File: gpgme.info, Node: Selecting Signers, Next: Creating a Signature, Up: Sign

7.6.4.1 Selecting Signers
.....

The key or the keys used to create a signature are stored in the context. The following functions can be used to manipulate this list. If no signer has been set into the context a default key is used for signing.

-- Function: void gpgme_signers_clear (gpgme_ctx_t CTX)
The function gpgme_signers_clear releases a reference for each key on the signers list and removes the list of signers from the context CTX.

Every context starts with an empty list.

-- Function: gpgme_error_t gpgme_signers_add (gpgme_ctx_t CTX,
const gpgme_key_t KEY)
The function gpgme_signers_add adds the key KEY to the list of signers in the context CTX.

Calling this function acquires an additional reference for the key.

-- Function: unsigned int gpgme_signers_count (const gpgme_ctx_t CTX)
SINCE: 1.4.3

The function gpgme_signers_count returns the number of signer keys in the context CTX.

-- Function:
gpgme_key_t gpgme_signers_enum (const gpgme_ctx_t CTX,
int SEQ)
The function gpgme_signers_enum returns the SEQth key in the list of signers in the context CTX. An additional reference is acquired for the user.

If SEQ is out of range, NULL is returned.

File: gpgme.info, Node: Creating a Signature, Next: Signature Notation Data, Prev: Selecting Signers, Up: Sign

7.6.4.2 Creating a Signature
.....

-- Data type: enum gpgme_sig_mode_t
The gpgme_sig_mode_t type is used to specify the desired type of a signature. The following modes are available:

GPGME_SIG_MODE_NORMAL
A normal signature is made, the output includes the plaintext and the signature.

GPGME_SIG_MODE_DETACH
A detached signature is made.

GPGME_SIG_MODE_CLEAR
A clear text signature is made. The ASCII armor and text mode settings of the context are ignored.

-- Function: gpgme_error_t gpgme_op_sign
(gpgme_ctx_t CTX,
gpgme_data_t PLAIN, gpgme_data_t SIG, gpgme_sig_mode_t MODE)

The function gpgme_op_sign creates a signature for the text in the data object PLAIN and returns it in the data object SIG. The type of the signature created is determined by the ASCII armor (or, if that is not set, by the encoding specified for SIG), the text mode attributes set for the context CTX and the requested signature mode MODE.

After the operation completed successfully, the result can be retrieved with gpgme_op_sign_result.

If an S/MIME signed message is created using the CMS crypto engine, the number of certificates to include in the message can be specified with gpgme_set_include_certs. *Note Included Certificates::.

The function returns the error code GPG_ERR_NO_ERROR if the signature could be created successfully, GPG_ERR_INV_VALUE if CTX, PLAIN or SIG is not a valid pointer, GPG_ERR_NO_DATA if the signature could not be created, GPG_ERR_BAD_PASSPHRASE if the passphrase for the secret key could not be retrieved, GPG_ERR_UNUSABLE_SECKEY if there are invalid signers, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_sign_start (gpgme_ctx_t CTX, gpgme_data_t PLAIN, gpgme_data_t SIG, gpgme_sig_mode_t MODE)

The function gpgme_op_sign_start initiates a gpgme_op_sign operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, and GPG_ERR_INV_VALUE if CTX, PLAIN or SIG is not a valid pointer.

-- Data type: gpgme_new_signature_t

This is a pointer to a structure used to store a part of the result of a gpgme_op_sign operation. The structure contains the following members:

gpgme_new_signature_t next

This is a pointer to the next new signature structure in the linked list, or NULL if this is the last element.

gpgme_sig_mode_t type

The type of this signature.

gpgme_pubkey_algo_t pubkey_algo
The public key algorithm used to create this signature.

gpgme_hash_algo_t hash_algo
The hash algorithm used to create this signature.

unsigned int sig_class
The signature class of this signature.

long int timestamp
The creation timestamp of this signature.

char *fpr
The fingerprint of the key which was used to create this signature.

-- Data type: gpgme_sign_result_t
This is a pointer to a structure used to store the result of a gpgme_op_sign operation. After successfully generating a signature, you can retrieve the pointer to the result with gpgme_op_sign_result. The structure contains the following members:

gpgme_invalid_key_t
invalid_signers
A linked list with information about all invalid keys for which a signature could not be created.

gpgme_new_signature_t signatures
A linked list with information about all signatures created.

-- Function: gpgme_sign_result_t gpgme_op_sign_result (gpgme_ctx_t CTX)
The function gpgme_op_sign_result returns a gpgme_sign_result_t pointer to a structure holding the result of a gpgme_op_sign operation. The pointer is only valid if the last operation on the context was a gpgme_op_sign, gpgme_op_sign_start, gpgme_op_encrypt_sign or gpgme_op_encrypt_sign_start operation. If that operation failed, the function might return a NULL pointer. The returned pointer is only valid until the next operation is started on the context.

File: gpgme.info, Node: Signature Notation Data, Prev: Creating a Signature, Up: Sign

7.6.4.3 Signature Notation Data
.....

Using the following

functions, you can attach arbitrary notation data to
a signature. This information is then available to the user when the
signature is verified.

-- Function: void gpgme_sig_notation_clear (gpgme_ctx_t CTX)
SINCE: 1.1.0

The function gpgme_sig_notation_clear removes the notation data
from the context CTX. Subsequent signing operations from this
context will not include any notation data.

Every context starts with an empty notation data list.

-- Function: gpgme_error_t gpgme_sig_notation_add (gpgme_ctx_t CTX,
const char *NAME, const char *VALUE,
gpgme_sig_notation_flags_t FLAGS)
SINCE: 1.1.0

The function gpgme_sig_notation_add adds the notation data with
the name NAME and the value VALUE to the context CTX.

Subsequent signing operations will include this notation data, as
well as any other notation data that was added since the creation
of the context or the last gpgme_sig_notation_clear operation.

The arguments NAME and VALUE must be NUL-terminated strings in
human-readable form. The flag GPGME_SIG_NOTATION_HUMAN_READABLE
is implied (non-human-readable notation data is currently not
supported). The strings must be in UTF-8 encoding.

If NAME is NULL, then VALUE should be a policy URL.

The function gpgme_sig_notation_add returns the error code
GPG_ERR_NO_ERROR if the notation data could be added
successfully, GPG_ERR_INV_VALUE if CTX is not a valid pointer, or
if NAME, VALUE and FLAGS are an invalid combination. The function
also passes through any errors that are reported by the crypto
engine support routines.

-- Function: gpgme_sig_notation_t gpgme_sig_notation_get
(const gpgme_ctx_t CTX)
SINCE: 1.1.0

The function gpgme_sig_notation_get returns the linked list of
notation data structures that are contained in the context CTX.

If CTX is not a valid pointer, or there is no notation data added

for this context, NULL is returned.

File: gpgme.info, Node: Encrypt, Prev: Sign, Up: Crypto Operations

7.6.5 Encrypt
---

One plaintext can be encrypted for several recipients at the same time. The list of recipients is created independently of any context, and then passed to the encryption operation.

* Menu:

* Encrypting a Plaintext:: How to encrypt a plaintext.

File: gpgme.info, Node: Encrypting a Plaintext, Up: Encrypt

7.6.5.1 Encrypting a Plaintext
.....

-- Function: gpgme_error_t gpgme_op_encrypt (gpgme_ctx_t CTX, gpgme_key_t RECP[], gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN, gpgme_data_t CIPHER)

The function gpgme_op_encrypt encrypts the plaintext in the data object PLAIN for the recipients RECP and stores the ciphertext in the data object CIPHER. The type of the ciphertext created is determined by the ASCII armor (or, if that is not set, by the encoding specified
for CIPHER) and the text mode attributes set for the context CTX.

RECP must be a NULL-terminated array of keys. The user must keep references for all keys during the whole duration of the call (but see gpgme_op_encrypt_start for the requirements with the asynchronous variant).

The value in FLAGS is a bitwise-or combination of one or multiple of the following bit values:

GPGME_ENCRYPT_ALWAYS_TRUST

The GPGME_ENCRYPT_ALWAYS_TRUST symbol specifies that all the recipients in RECP should be trusted, even if the keys do not have a high enough validity in the keyring. This flag should be used with care; in general it is not a good idea to use any untrusted keys.

GPGME_ENCRYPT_NO_ENCRYPT_TO
SINCE: 1.2.0

The GPGME_ENCRYPT_NO_ENCRYPT_TO symbol specifies that no default or hidden default recipients as configured in the crypto backend should be included. This can be useful for managing different user profiles.

GPGME_ENCRYPT_NO_COMPRESS
SINCE: 1.5.0

The GPGME_ENCRYPT_NO_COMPRESS symbol specifies that the plaintext shall not be compressed before it is encrypted. This is in some cases useful if the length of the encrypted message may reveal information about the plaintext.

GPGME_ENCRYPT_PREPARE
GPGME_ENCRYPT_EXPECT_SIGN
The GPGME_ENCRYPT_PREPARE symbol is used with the UI Server protocol to prepare an encryption (i.e. sending the PREP_ENCRYPT command). With the GPGME_ENCRYPT_EXPECT_SIGN symbol the UI Server is advised to also expect a sign command.

GPGME_ENCRYPT_SYMMETRIC
SINCE: 1.7.0

The GPGME_ENCRYPT_SYMMETRIC symbol specifies that the output should be additionally encrypted symmetrically even if recipients are provided. This feature is only supported for the OpenPGP crypto engine.

GPGME_ENCRYPT_THROW_KEYIDS
SINCE: 1.8.0

The GPGME_ENCRYPT_THROW_KEYIDS symbols requests that the identifiers for the decrption keys are not included in the ciphertext. On the receiving side, the use of this flag may slow down the decryption process because all available secret keys must be tried. This flag is only honored for OpenPGP encryption.

GPGME_ENCRYPT_WRAP
SINCE: 1.8.0

The GPGME_ENCRYPT_WRAP symbol specifies that the input is an OpenPGP message and not a plain data. This is the counterpart

to GPGME_DECRYPT_UNWRAP.

GPGME_ENCRYPT_WANT_ADDRESS
SINCE: 1.11.0

The GPGME_ENCRYPT_WANT_ADDRESS symbol requests that all supplied keys or key specifications include a syntactically valid mail address. If this is not the case the operation is not even tried and the error code GPG_ERR_INV_USER_ID is returned. Only the address part of the key specification is conveyed to the backend. As of now the key must be specified using the RECPSTRING argument of the extended encrypt functions. This feature is currently only supported for the OpenPGP crypto engine.

If GPG_ERR_UNUSABLE_PUBKEY is returned, some recipients in RECP are invalid, but not all. In this case the plaintext might be encrypted for all valid recipients and returned in CIPHER (if this happens depends on the crypto engine). More information about the invalid recipients is available with gpgme_op_encrypt_result.

If RECP is NULL, symmetric rather than public key encryption is performed. Symmetrically encrypted cipher text can be deciphered with gpgme_op_decrypt. Note that in this case the crypto backend needs to retrieve a passphrase from the user. Symmetric encryption is currently only supported for the OpenPGP crypto backend.

The function returns the error code GPG_ERR_NO_ERROR if the ciphertext could be created successfully, GPG_ERR_INV_VALUE if CTX, RECP, PLAIN or CIPHER is not a valid pointer, GPG_ERR_UNUSABLE_PUBKEY if RECP contains some invalid recipients, GPG_ERR_BAD_PASSPHRASE if the passphrase for the symmetric key could not be retrieved, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_encrypt_start (gpgme_ctx_t CTX, gpgme_key_t RECP[], gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN, gpgme_data_t CIPHER)

The function gpgme_op_encrypt_start initiates a gpgme_op_encrypt operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

References to the keys only need to be held for the duration of this call. The user can release its references to the keys after this function returns, even

if the operation is not yet finished.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, GPG_ERR_INV_VALUE if CTX, RSET, PLAIN or CIPHER is not a valid pointer, and GPG_ERR_UNUSABLE_PUBKEY if RSET does not contain any valid recipients.

-- Function: gpgme_error_t gpgme_op_encrypt_ext (gpgme_ctx_t CTX, gpgme_key_t RECP[], const char *RECPSTRING, gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN, gpgme_data_t CIPHER)

SINCE: 1.11.0

This is an extended version of gpgme_op_encrypt with RECPSTRING as additional parameter. If RECP is NULL and RECPSTRING is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to RECP the keys are given directly as strings and there is no need to first create key objects. Leading and trailing white space is remove from each line in RECPSTRING. The keys
are then passed verbatim to the backend
engine.

For the OpenPGP backend several special keywords are supported to modify the operation. These keywords are given instead of a key specification. The currently supported keywords are:

--hidden
--no-hidden
These keywords toggle between normal and hidden recipients for all following key specifications. When a hidden recipient is requested the gpg option -R (or -F in file mode) is used instead of -r (-f in file mode).

--file
--no-file
These keywords toggle between regular and file mode for all following key specification. In file mode the option -f or -F is passed to gpg. At least GnuPG version 2.1.14 is required to handle these options. The GPGME_ENCRYPT_WANT_ADDRESS flag is ignored in file mode.

--
This keyword disables all keyword detection up to the end of the string. All

keywords are treated as verbatim arguments.

To create a RECPSTRING it is often useful to employ a strconcat style function. For example this function creates a string to encrypt to two keys:

```
char *
xbuild_recpstring (const char *key1, const char *key2)
{
  char *result = gpgrt_strconcat ("--\n", key1, "\n", key2, NULL);
  if (!result)
    { perror ("strconcat failed"); exit (2); }
  return result;
}
```

Note the use of the double dash here; unless you want to specify a keyword, it is a good idea to avoid any possible trouble with key specifications starting with a double dash. The used strconcat function is available in Libgpg-error 1.28 and later; Libgpg-error (aka Gpgrt) is a dependency of GPGME. The number of arguments to gpgrt_strconcat is limited to 47 but that should always be sufficient. In case a larger and non-fixed number of keys are to be
supplied the following code can be used:

```
char *
xbuild_long_recpstring (void)
{
  gpgrt_stream_t memfp;
  const char *s;
  void *result;

  memfp = gpgrt_fopenmem (0, "w+b");
  if (!memfp)
    { perror ("fopenmem failed"); exit (2); }
  gpgrt_fputs ("--", memfp);
  while ((s = get_next_keyspec ()))
    {
      gpgrt_fputc ('\n', memfp);
      gpgrt_fputs (s, memfp);
    }
  gpgrt_fputc (0, memfp);
  if (gpgrt_ferror (memfp))
    { perror ("writing to memstream failed"); exit (2); }
  if (gpgrt_fclose_snatch (memfp, &result, NULL))
    { perror ("fclose_snatch failed"); exit (2); }
  return result;
}
```

In this example get_next_keyspec is expected to return the next key to be added to the string. Please take care: Encrypting to a large number of recipients is often questionable due to security reasons and also for the technicality that all keys are currently passed on the command line to gpg which has as a platform specific length limitation.

-- Function: gpgme_error_t gpgme_op_encrypt_ext_start (gpgme_ctx_t CTX, gpgme_key_t RECP[], const char *RECPSTRING, gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN, gpgme_data_t CIPHER)

SINCE: 1.11.0

This is an extended version of gpgme_op_encrypt_start with RECPSTRING as additional parameter. If RECP is NULL and RECPSTRING is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to RECP the keys are given directly as strings and there is no need to first create key objects. The keys are passed verbatim to the backend engine.

-- Data type: gpgme_encrypt_result_t

This is a pointer to a structure used to store the result of a gpgme_op_encrypt operation. After successfully encrypting data, you can retrieve the pointer to the result with gpgme_op_encrypt_result. The structure contains the following members:

gpgme_invalid_key_t invalid_recipients

A linked list with information about all invalid keys for which the data could not be encrypted.

-- Function: gpgme_encrypt_result_t gpgme_op_encrypt_result (gpgme_ctx_t CTX)

The function gpgme_op_encrypt_result returns a gpgme_encrypt_result_t pointer to a structure holding the result of a gpgme_op_encrypt operation. The pointer is only valid if the last operation on the context was a gpgme_op_encrypt, gpgme_op_encrypt_start, gpgme_op_sign or gpgme_op_sign_start operation. If this operation failed, this might be a NULL pointer. The returned pointer is only valid until the next operation is started on the context.

-- Function: gpgme_error_t gpgme_op_encrypt_sign (gpgme_ctx_t CTX,

gpgme_key_t RECP[], gpgme_encrypt_flags_t FLAGS,
gpgme_data_t PLAIN, gpgme_data_t CIPHER)

The function gpgme_op_encrypt_sign does a combined encrypt and sign operation. It is used like gpgme_op_encrypt, but the ciphertext also contains signatures for the signers listed in CTX.

The combined encrypt and sign operation is currently only available for the OpenPGP crypto engine.

-- Function: gpgme_error_t gpgme_op_encrypt_sign_start
(gpgme_ctx_t CTX, gpgme_key_t RECP[],
gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN,
gpgme_data_t CIPHER)

The function gpgme_op_encrypt_sign_start initiates a gpgme_op_encrypt_sign operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, and GPG_ERR_INV_VALUE if CTX, RSET, PLAIN or CIPHER is not a valid pointer.

-- Function: gpgme_error_t gpgme_op_encrypt_sign_ext (gpgme_ctx_t CTX,
gpgme_key_t RECP[], const char *RECPSTRING,
gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN,
gpgme_data_t CIPHER)

SINCE: 1.11.0

This is an extended version of gpgme_op_encrypt_sign with RECPSTRING as additional parameter. If RECP is NULL and RECPSTRING is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to RECP the keys are given directly as strings and there is no need to first create the key objects. The keys are passed verbatim to the backend engine.

-- Function: gpgme_error_t gpgme_op_encrypt_sign_ext_start
(gpgme_ctx_t CTX, gpgme_key_t RECP[], const char *RECPSTRING,
gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN,
gpgme_data_t CIPHER)

SINCE: 1.11.0

This is an extended version of gpgme_op_encrypt_sign_start with RECPSTRING
as additional parameter. If RECP is NULL and RECPSTRING is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to RECP the

keys are given directly as strings and there is no need to first create the key objects. The keys are passed verbatim to the backend engine.

File: gpgme.info, Node: Miscellaneous, Next: Run Control, Prev: Crypto Operations, Up: Contexts

## 7.7 Miscellaneous operations

Here are some support functions which are sometimes useful.

* Menu:

* Running other Programs:: Running other Programs
* Using the Assuan protocol:: Using the Assuan protocol
* Checking for updates:: How to check for software updates

File: gpgme.info, Node: Running other Programs, Next: Using the Assuan protocol, Up: Miscellaneous

### 7.7.1 Running other Programs

GPGME features an internal subsystem to run the actual backend engines. Along with data abstraction object this subsystem can be used to run arbitrary simple programs which even need not be related to cryptographic features. It may for example be used to run tools which are part of the GnuPG system but are not directly accessible with the GPGME API.

-- Function: gpgme_error_t gpgme_op_spawn (gpgme_ctx_t CTX, const char *FILE, const char *ARGV[], gpgme_data_t DATAIN, gpgme_data_t DATAOUT, gpgme_data_t DATAERR, unsigned int FLAGS)

SINCE: 1.5.0

The function gpgme_op_spawn runs the program FILE with the arguments taken from the NULL terminated array ARGV. If no arguments are required ARGV may be given as NULL. In the latter case or if argv[0] is the empty string, GPGME uses the basename of FILE for argv[0]. The file descriptors stdin, stdout, and stderr are connected to the data objects DATAIN, DATAOUT, and DATAERR. If NULL is passed for one of these data objects the corresponding

file descriptor is connected to /dev/null.

The value in FLAGS is a bitwise-or combination of one or multiple of the following bit values:

GPGME_SPAWN_DETACHED
SINCE: 1.5.0

Under Windows this flag inhibits the allocation of a new console for the program. This is useful for a GUI application which needs to call a command line helper tool.

GPGME_SPAWN_ALLOW_SET_FG
SINCE: 1.5.0

Under Windows this flag allows the called program to put itself into the foreground.

-- Function: gpgme_error_t gpgme_op_spawn_start (gpgme_ctx_t CTX, const char *FILE, const char *ARGV[], gpgme_data_t DATAIN, gpgme_data_t DATAOUT, gpgme_data_t DATAERR, unsigned int FLAGS)

SINCE: 1.5.0

This is the asynchronous variant of gpgme_op_spawn.

File: gpgme.info, Node: Using the Assuan protocol, Next: Checking for updates, Prev: Running other Programs, Up: Miscellaneous

7.7.2
Using the Assuan protocol
---

The Assuan protocol can be used to talk to arbitrary Assuan servers. By default it is connected to the GnuPG agent, but it may be connected to arbitrary servers by using gpgme_ctx_set_engine_info, passing the location of the servers socket as FILE_NAME argument, and an empty string as HOME_DIR argument.

The Assuan protocol functions use three kinds of callbacks to transfer data:

-- Data type: gpgme_error_t (*gpgme_assuan_data_cb_t) (void *OPAQUE, const void *DATA, size_t DATALEN)

SINCE: 1.2.0

This callback receives any data sent by the server. OPAQUE is the pointer passed to gpgme_op_assuan_transact_start, DATA of length DATALEN refers to the data sent.

-- Data type: gpgme_error_t (*gpgme_assuan_inquire_cb_t) (void *OPAQUE, const char *NAME, const char *ARGS, gpgme_data_t *R_DATA)

SINCE: 1.2.0

This callback is used to provide additional data to the Assuan

server. OPAQUE is the pointer passed to gpgme_op_assuan_transact_start, NAME and ARGS specify what kind of data the server requested, and R_DATA is used to return the actual data.

Note: Returning data is currently not implemented in GPGME.

-- Data type: gpgme_error_t (*gpgme_assuan_status_cb_t) (void *OPAQUE, const char *STATUS, const char *ARGS)

SINCE: 1.2.0

This callback receives any status lines sent by the server. OPAQUE is the pointer passed to gpgme_op_assuan_transact_start, STATUS and ARGS denote the status update sent.

-- Function: gpgme_error_t gpgme_op_assuan_transact_start (gpgme_ctx_t CTX, const char *COMMAND, gpgme_assuan_data_cb_t DATA_CB, void * DATA_CB_VALUE, gpgme_assuan_inquire_cb_t INQUIRE_CB, void * INQUIRE_CB_VALUE, gpgme_assuan_status_cb_t STATUS_CB, void * STATUS_CB_VALUE)

SINCE: 1.2.0

Send the Assuan COMMAND and return results via the callbacks. Any callback may be NULL. The result of the operation may be retrieved using gpgme_wait_ext.

Asynchronous variant.

-- Function: gpgme_error_t gpgme_op_assuan_transact_ext (gpgme_ctx_t CTX, const char *COMMAND, gpgme_assuan_data_cb_t DATA_CB, void * DATA_CB_VALUE, gpgme_assuan_inquire_cb_t INQUIRE_CB, void * INQUIRE_CB_VALUE, gpgme_assuan_status_cb_t STATUS_CB, void * STATUS_CB_VALUE, gpgme_error_t *OP_ERR)

Send the Assuan COMMAND and return results via the callbacks. The result of the operation is returned in OP_ERR.

Synchronous variant.

File: gpgme.info, Node: Checking for updates, Prev: Using the Assuan protocol, Up: Miscellaneous

7.7.3 How to check for software updates
---

The GnuPG Project operates a server to query the current versions of software packages related to GnuPG. GPGME can be used to access this online database and check whether a new version of a software package is available.

-- Data type: gpgme_query_swdb_result_t
SINCE: 1.8.0

This is a pointer to a structure used to store the result of a gpgme_op_query_swdb operation. After success full call to that function, you can retrieve the pointer to the result with gpgme_op_query_swdb_result. The structure contains the following member:

name
This is the name of the package.

iversion
The currently installed version or an empty string. This value is either a copy of the argument given to gpgme_op_query_swdb or the version of the installed software as figured out by GPGME or GnuPG.

created
This gives the date the file with the list of version numbers has originally be created by the GnuPG project.

retrieved
This gives the date the file was downloaded.

warning
If this flag is set either an error has occurred or some of the information in this structure are not properly set. For example if the version number of the installed software could

not be figured out, the update flag may not reflect a required update status.

update
If this flag is set an update of the software is available.

urgent
If this flag is set an available update is important.

noinfo
If this flag is set, no valid information could be retrieved.

unknown
If this flag is set the given name is not known.

toold
If this flag is set the available information is not fresh enough.

error
If this flag is set some other error has occurred.

version
The version string of the latest released version.

reldate
The release date of the latest released version.

-- Function: gpgme_error_t gpgme_op_query_swdb (gpgme_ctx_t CTX, const char *NAME, const char *IVERSION, gpgme_data_t RESERVED)

SINCE: 1.8.0

Query the software version database for software package NAME and check against the installed version given by IVERSION. If IVERSION is given as NULL a check is only done if GPGME can figure out the version by itself (for example when using "gpgme" or "gnupg"). If NULL is used for NAME the current gpgme version is checked. RESERVED must be set to 0.

-- Function: gpgme_query_swdb_result_t gpgme_op_query_swdb_result (gpgme_ctx_t CTX)

SINCE: 1.8.0

The function gpgme_op_query_swdb_result returns a gpgme_query_swdb_result_t pointer to a structure holding the result of a gpgme_op_query_swdb operation. The pointer is only

valid if the last operation on the context was a successful call to gpgme_op_query_swdb. If that call failed, the result might be a NULL pointer. The returned pointer is only valid until the next operation is started on the context CTX.

Here is an example on
how to check whether GnuPG is current:

```
#include <gpgme.h>

int
main (void)
{
  gpg_error_t err;
  gpgme_ctx_t ctx;
  gpgme_query_swdb_result_t result;

  gpgme_check_version (NULL);
  err = gpgme_new (&ctx);
  if (err)
    fprintf (stderr, "error creating context: %s\n", gpg_strerror (err));
  else
    {
      gpgme_set_protocol (ctx, GPGME_PROTOCOL_GPGCONF);

      err = gpgme_op_query_swdb (ctx, "gnupg", NULL, 0);
      if (err)
        fprintf (stderr, "error querying swdb: %s\n", gpg_strerror (err));
      else
        {
          result = gpgme_op_query_swdb_result (ctx);
          if (!result)
            fprintf (stderr, "error querying swdb\n");
          if (!result->warning && !result->update)
            printf ("GnuPG version %s is current\n",
                    result->iversion);
          else if (!result->warning && result->update)

      printf ("GnuPG version %s can be updated to %s\n",
                    result->iversion, result->version);
          else
            fprintf (stderr, "error finding the update status\n");
        }
      gpgme_release (ctx);
    }
  return 0;
}
```

File: gpgme.info,  Node: Run Control,  Prev: Miscellaneous,  Up: Contexts

## 7.8 Run Control

GPGME supports running operations synchronously and asynchronously.  You can use asynchronous operation to set up a context up to initiating the desired operation, but delay performing it to a later point.

Furthermore, you can use an external event loop to control exactly when GPGME runs.  This ensures that GPGME only runs when necessary and also prevents it from blocking for a long time.

* Menu:

* Waiting For Completion::  Waiting until an operation is completed.
* Using External Event Loops::  Advanced control over what happens when.
* Cancellation::  How to end pending operations prematurely.

File: gpgme.info,  Node: Waiting For Completion,  Next: Using External Event Loops,  Up: Run Control

### 7.8.1 Waiting For Completion

-- Function: gpgme_ctx_t gpgme_wait (gpgme_ctx_t CTX, gpgme_error_t *STATUS, int HANG)

The function gpgme_wait continues the pending operation within the context CTX.  In particular, it ensures the data exchange between GPGME and the crypto backend and watches over the run time status of the backend process.

If HANG is true, the function does not return until the operation is completed or cancelled.  Otherwise the function will not block for a long time.

The error status of the finished operation is returned in STATUS if gpgme_wait does not return NULL.

The CTX argument can be NULL.  In that case, gpgme_wait waits for any context to complete its operation.

gpgme_wait can be used only in conjunction with any context that has a pending operation initiated with one of the gpgme_op_*_start functions except gpgme_op_keylist_start and

gpgme_op_trustlist_start (for which you should use the corresponding gpgme_op_*_next functions). If CTX is NULL, all of such contexts are waited upon and possibly returned. Synchronous operations running in parallel, as well as key and trust item list operations, do not affect gpgme_wait.

In a multi-threaded environment, only one thread should ever call gpgme_wait at any time, regardless of whether CTX is specified or not. This means that all calls to this function should be fully synchronized by locking primitives. It is safe to start asynchronous operations while a thread is running in gpgme_wait.

The function returns the CTX of the context which has finished the operation. If HANG is false, and the timeout expires, NULL is returned and *status will be set to 0. If an error occurs, NULL
is returned and the error is returned in *status.

File: gpgme.info, Node: Using External Event Loops, Next: Cancellation, Prev: Waiting For Completion, Up: Run Control

7.8.2 Using External Event Loops
---

GPGME hides the complexity of the communication between the library and the crypto engine. The price of this convenience is that the calling thread can block arbitrary long waiting for the data returned by the crypto engine. In single-threaded programs, in particular if they are interactive, this is an unwanted side-effect. OTOH, if gpgme_wait is used without the HANG option being enabled, it might be called unnecessarily often, wasting CPU time that could be used otherwise.

The I/O callback interface described in this section lets the user take control over what happens when. GPGME will provide the user with the file descriptors that should be monitored, and the callback functions that should be invoked when a file descriptor is ready for reading
or writing. It is then the users responsibility to decide when to check the file descriptors and when to invoke the callback functions. Usually this is done in an event loop, that also checks for events in other parts of the program. If the callback functions are only called when the file descriptors are ready, GPGME will never block. This gives the user more control over the program flow, and allows to perform other tasks when GPGME would block otherwise.

By using this advanced mechanism, GPGME can be integrated smoothly into GUI toolkits like GTK+ even for single-threaded programs.

* Menu:

* I/O Callback Interface:: How I/O callbacks are registered.
* Registering I/O Callbacks:: How to use I/O callbacks for a context.
* I/O Callback Example:: An example how to use I/O callbacks.
* I/O Callback Example GTK+:: How to use GPGME with GTK+.
* I/O Callback Example GDK:: How to use GPGME with GDK.
* I/O Callback Example Qt:: How to use
GPGME with Qt.

File: gpgme.info, Node: I/O Callback Interface, Next: Registering I/O Callbacks, Up: Using External Event Loops

7.8.2.1 I/O Callback Interface
.....

-- Data type: gpgme_error_t (*gpgme_io_cb_t) (void *DATA, int FD)
The gpgme_io_cb_t type is the type of functions which GPGME wants to register as I/O callback handlers using the gpgme_register_io_cb_t functions provided by the user.

DATA and FD are provided by GPGME when the I/O callback handler is registered, and should be passed through to the handler when it is invoked by the user because it noticed activity on the file descriptor FD.

The callback handler always returns 0, but you should consider the return value to be reserved for later use.

-- Data type: gpgme_error_t (*gpgme_register_io_cb_t) (void *DATA, int FD, int DIR, gpgme_io_cb_t FNC, void *FNC_DATA, void **TAG)
The gpgme_register_io_cb_t type is the type of functions which can be called by GPGME to register an I/O callback function FNC for the file descriptor FD with the user. FNC_DATA should be passed as the first argument to FNC when the handler is invoked (the second argument should be FD). If DIR is 0, FNC should be called by the user when FD is ready for writing. If DIR is 1, FNC should be called when FD is ready for reading.

DATA was provided by the user when registering the gpgme_register_io_cb_t function with GPGME and will always be passed as the first argument when registering a callback function. For example, the user can use this to determine the event loop to which the file descriptor should be added.

GPGME will call this function when a crypto operation is initiated in a context for which the user has registered I/O callback handler functions with gpgme_set_io_cbs. It can also call this function when it is in an I/O callback handler for a file descriptor associated to this context.

The user should return a unique handle in TAG identifying this I/O callback registration, which will be passed to the gpgme_register_io_cb_t function without interpretation when the file descriptor should not be monitored anymore.

-- Data type: void (*gpgme_remove_io_cb_t) (void *TAG)
The gpgme_remove_io_cb_t type is the type of functions which can be called by GPGME to remove an I/O callback handler that was registered before. TAG is the handle that was returned by the gpgme_register_io_cb_t for this I/O callback.

GPGME can call this function when a crypto operation is in an I/O callback. It will also call this function when the context is destroyed while an operation is pending.

-- Data type: enum gpgme_event_io_t
The gpgme_event_io_t type specifies the type of an event that is reported to the user by GPGME as a consequence of an I/O operation. The following events are defined:

GPGME_EVENT_START
The operation is fully initialized now, and you can start to run the registered I/O callback handlers now. Note that registered I/O callback handlers must not be run before this event is signalled. TYPE_DATA is NULL and reserved for later use.

GPGME_EVENT_DONE
The operation is finished, the last I/O callback for this operation was removed. The accompanying TYPE_DATA points to a struct gpgme_io_event_done_data variable that contains the status of the operation that finished. This event is signalled after the last I/O callback has been removed.

GPGME_EVENT_NEXT_KEY
In a gpgme_op_keylist_start operation, the next key was received from the crypto engine. The accompanying TYPE_DATA is a gpgme_key_t variable that contains the key with one reference for the user.

-- Data type: void (*gpgme_event_io_cb_t)
(void *DATA,
gpgme_event_io_t TYPE, void *TYPE_DATA)

The gpgme_event_io_cb_t type is the type of functions which can be called by GPGME to signal an event for an operation running in a context which has I/O callback functions registered by the user.

DATA was provided by the user when registering the gpgme_event_io_cb_t function with GPGME and will always be passed as the first argument when registering a callback function. For example, the user can use this to determine the context in which this event has occurred.

TYPE will specify the type of event that has occurred. TYPE_DATA specifies the event further, as described in the above list of possible gpgme_event_io_t types.

GPGME can call this function in an I/O callback handler.

File: gpgme.info, Node: Registering I/O Callbacks, Next: I/O Callback Example, Prev: I/O Callback Interface, Up: Using External Event Loops

7.8.2.2 Registering I/O Callbacks
.....

-- Data type: struct gpgme_io_cbs

This structure is used to store the I/O callback interface functions described in the previous section. It has the following members:

gpgme_register_io_cb_t add
This is the function called by GPGME to register an I/O callback handler. It must be specified.

void *add_priv
This is passed as the first argument to the add function when it is called by GPGME. For example, it can be used to determine the event loop to which the file descriptor should be added.

gpgme_remove_io_cb_t remove
This is the function called by GPGME to remove an I/O callback handler. It must be specified.

gpgme_event_io_cb_t event
This is the function called by GPGME to signal an event for an operation. It must be specified, because at least the start

event must be processed.

void *event_priv
This is passed as the first argument to the event function when it is called by GPGME. For example, it can be used to determine the context in which the event has occurred.

-- Function: void gpgme_set_io_cbs (gpgme_ctx_t CTX, struct gpgme_io_cbs *IO_CBS)
The function gpgme_set_io_cbs enables the I/O callback interface for the context CTX. The I/O callback functions are specified by IO_CBS.

If IO_CBS->add is NULL, the I/O callback interface is disabled for the context, and normal operation is restored.

-- Function: void gpgme_get_io_cbs (gpgme_ctx_t CTX, struct gpgme_io_cbs *IO_CBS)
The function gpgme_get_io_cbs returns the I/O callback functions set with gpgme_set_io_cbs in IO_CBS.

File: gpgme.info, Node: I/O Callback Example, Next: I/O Callback Example GTK+, Prev: Registering I/O Callbacks, Up: Using External Event Loops

7.8.2.3 I/O Callback Example
.....

To actually use an external event loop, you have to implement the I/O callback functions that are used by GPGME to register and unregister file descriptors. Furthermore, you have to actually monitor these file descriptors for activity and call the appropriate I/O callbacks.

The following example illustrates how to do that. The example uses locking to show in which way the callbacks and the event loop can run concurrently. For the event loop, we use a fixed array. For a real-world implementation, you should use a dynamically sized structure because the number of file descriptors needed for a crypto operation in GPGME is not predictable.

```
#include <assert.h>
#include <errno.h>
#include <stdlib.h>
#include <pthread.h>
#include <sys/types.h>
#include <gpgme.h>
```

```
  /* The following structure holds the result of a crypto operation.  */
  struct op_result
  {
    int done;
    gpgme_error_t err;
  };

  /* The following structure holds the
data associated with one I/O
  callback.  */
  struct one_fd
  {
    int fd;
    int dir;
    gpgme_io_cb_t fnc;
    void *fnc_data;
    void *loop;
  };

  struct event_loop
  {
    pthread_mutex_t lock;
  #define MAX_FDS 32
    /* Unused slots are marked with FD being -1.  */
    struct one_fd fds[MAX_FDS];
  };
```

The following functions implement the I/O callback interface.

```
  gpgme_error_t
  add_io_cb (void *data, int fd, int dir, gpgme_io_cb_t fnc, void *fnc_data,
      void **r_tag)
  {
    struct event_loop *loop = data;
    struct one_fd *fds = loop->fds;
    int i;

    pthread_mutex_lock (&loop->lock);
    for (i = 0; i < MAX_FDS; i++)
      {
        if (fds[i].fd == -1)
   {
     fds[i].fd = fd;
     fds[i].dir = dir;
     fds[i].fnc = fnc;
     fds[i].fnc_data = fnc_data;
     fds[i].loop = loop;
     break;
```

```
  }
    }
  pthread_mutex_unlock (&loop->lock);
   if (i == MAX_FDS)
    return gpg_error (GPG_ERR_GENERAL);
  *r_tag = &fds[i];
  return 0;
}

void
remove_io_cb (void *tag)
{
  struct one_fd *fd = tag;
  struct event_loop *loop = fd->loop;

  pthread_mutex_lock (&loop->lock);
  fd->fd = -1;
  pthread_mutex_unlock (&loop->lock);
}

void
event_io_cb (void *data, gpgme_event_io_t type, void *type_data)
{
  struct op_result *result = data;

  /* We don't support list operations here.  */
  if (type == GPGME_EVENT_DONE)
    {
      result->done = 1;
      result->err = *type_data;
    }
}
```

The final missing piece is the event loop, which will be presented next. We only support waiting for the success of a single operation.

```
int
do_select (struct event_loop *loop)
{
  fd_set rfds;
  fd_set wfds;
  int i, n;
  int any = 0;
  struct timeval tv;
  struct one_fd *fdlist
= loop->fds;

  pthread_mutex_lock (&loop->lock);
```

```
  FD_ZERO (&rfds);
  FD_ZERO (&wfds);
  for (i = 0; i < MAX_FDS; i++)
    if (fdlist[i].fd != -1)
      FD_SET (fdlist[i].fd, fdlist[i].dir ? &rfds : &wfds);
  pthread_mutex_unlock (&loop->lock);

  tv.tv_sec = 0;
  tv.tv_usec = 1000;

  do
    {
      n = select (FD_SETSIZE, &rfds, &wfds, NULL, &tv);
    }
  while (n < 0 && errno == EINTR);

  if (n < 0)
    return n; /* Error or timeout.  */

  pthread_mutex_lock (&loop->lock);
  for (i = 0; i < MAX_FDS && n; i++)
    {
      if (fdlist[i].fd != -1)
 {
   if (FD_ISSET (fdlist[i].fd, fdlist[i].dir ? &rfds : &wfds))
     {
       assert (n);
       n--;
       any = 1;
             /* The I/O callback handler can register/remove callbacks,
                so we have to unlock the file descriptor list.  */
             pthread_mutex_unlock (&loop->lock);
        (*fdlist[i].fnc) (fdlist[i].fnc_data, fdlist[i].fd);
             pthread_mutex_lock (&loop->lock);
     }
 }
    }
  pthread_mutex_unlock (&loop->lock);
  return any;
}

void
wait_for_op (struct event_loop *loop, struct op_result *result)
{
  int ret;

  do
    {
```

```
      ret = do_select (loop);
    }
  while (ret >= 0 && !result->done);
}
```

The main function shows how to put it all together.

```
int
main (int argc, char *argv[])
{
  struct event_loop loop;
  struct op_result result;
  gpgme_ctx_t ctx;
  gpgme_error_t err;
  gpgme_data_t sig, text;
  int i;
  pthread_mutexattr_t attr;
  struct gpgme_io_cbs io_cbs =
  {
    add_io_cb,
    &loop,
    remove_io_cb,
    event_io_cb,
    &result
  };

  init_gpgme ();

  /* Initialize the loop structure.  */

  /* The mutex must be
recursive, since remove_io_cb (which acquires a
     lock) can be called while holding a lock acquired in do_select.  */
  pthread_mutexattr_init (&attr);
  pthread_mutexattr_settype (&attr, PTHREAD_MUTEX_RECURSIVE);
  pthread_mutex_init (&loop.lock, &attr);
  pthread_mutexattr_destroy (&attr);

  for (i = 0; i < MAX_FDS; i++)
    loop.fds[i].fd = -1;

  /* Initialize the result structure.  */
  result.done = 0;

  err = gpgme_data_new_from_file (&sig, "signature", 1);
  if (!err)
    err = gpgme_data_new_from_file (&text, "text", 1);
  if (!err)
```

```
    err = gpgme_new (&ctx);
  if (!err)
    {
      gpgme_set_io_cbs (ctx, &io_cbs);
      err = gpgme_op_verify_start (ctx, sig, text, NULL);
    }
  if (err)
    {
      fprintf (stderr, "gpgme error: %s: %s\n",
               gpgme_strsource (err), gpgme_strerror (err));
      exit (1);
    }

  wait_for_op (&loop,
&result);
  if (!result.done)
    {
      fprintf (stderr, "select error\n");
      exit (1);
    }
  if (!result.err)
    {
      fprintf (stderr, "verification failed: %s: %s\n",
               gpgme_strsource (result.err), gpgme_strerror (result.err));
      exit (1);
    }
  /* Evaluate verify result.  */
  ...
  return 0;
}
```

File: gpgme.info, Node: I/O Callback Example GTK+, Next: I/O Callback Example GDK, Prev: I/O Callback Example, Up: Using External Event Loops

7.8.2.4 I/O Callback Example GTK+
.....

The I/O callback interface can be used to integrate GPGME with the GTK+ event loop. The following code snippets shows how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any GTK+ specific
setup.

```
#include <gtk/gtk.h>
```

```
struct my_gpgme_io_cb
{
  gpgme_io_cb_t fnc;
  void *fnc_data;
  guint input_handler_id
};

void
my_gpgme_io_cb (gpointer data, gint source, GdkInputCondition condition)
{
  struct my_gpgme_io_cb *iocb = data;
  (*(iocb->fnc)) (iocb->data, source);
}

void
my_gpgme_remove_io_cb (void *data)
{
  struct my_gpgme_io_cb *iocb = data;
  gtk_input_remove (data->input_handler_id);
}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
                               void *fnc_data, void **tag)
{
  struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
  iocb->fnc = fnc;
  iocb->data = fnc_data;
  iocb->input_handler_id = gtk_input_add_full (fd, dir
                                               ? GDK_INPUT_READ
                                               : GDK_INPUT_WRITE,
                                              my_gpgme_io_callback,
                                              0, iocb, NULL);
  *tag = iocb;
  return 0;
}
```

File: gpgme.info, Node: I/O Callback Example GDK, Next: I/O Callback Example Qt, Prev: I/O Callback Example GTK+, Up: Using External Event Loops

7.8.2.5 I/O Callback Example GDK
.....

The I/O callback interface can also be used to integrate GPGME with the GDK event loop. The following code snippets shows how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is

unused. The event notifications is missing because it does not require any GDK specific setup.

It is very similar to the GTK+ example in the previous section.

```
#include <gdk/gdk.h>

struct my_gpgme_io_cb
{
  gpgme_io_cb_t fnc;
  void *fnc_data;
  gint tag;

};

void
my_gpgme_io_cb (gpointer data, gint source, GdkInputCondition condition)
{
  struct my_gpgme_io_cb *iocb = data;
  (*(iocb->fnc)) (iocb->data, source);
}

void
my_gpgme_remove_io_cb (void *data)
{
  struct my_gpgme_io_cb *iocb = data;
  gdk_input_remove (data->tag);
}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
                               void *fnc_data, void **tag)
{
  struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
  iocb->fnc = fnc;
  iocb->data = fnc_data;
  iocb->tag = gtk_input_add_full (fd, dir ? GDK_INPUT_READ : GDK_INPUT_WRITE,
                                  my_gpgme_io_callback, iocb, NULL);
  *tag = iocb;
  return 0;
}
```

File: gpgme.info, Node: I/O Callback Example Qt, Prev: I/O Callback Example GDK, Up: Using External Event Loops

7.8.2.6 I/O Callback Example Qt
.....

The
I/O callback interface can also be used to integrate GPGME with the Qt event loop. The following code snippets show how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any Qt specific setup.

```
#include <qsocketnotifier.h>
#include <qapplication.h>

struct IOCB {
  IOCB( GpgmeIOCb f, void * d, QSocketNotifier * n )
    : func( f ), data( d ), notifier( n ) {}
  GpgmeIOCb func;
  void * data;
  QSocketNotifier * notifier;
}

class MyApp : public QApplication {

  // ...

  static void registerGpgmeIOCallback( void * data, int fd, int dir,
                                       GpgmeIOCb func, void * func_data,
                                       void ** tag ) {
    QSocketNotifier * n =
      new QSocketNotifier(
fd, dir ? QSocketNotifier::Read
                                     : QSocketNotifier::Write );
    connect( n, SIGNAL(activated(int)),
             qApp, SLOT(slotGpgmeIOCallback(int)) );
    qApp->mIOCBs.push_back( IOCB( func, func_data, n ) );
    *tag = (void*)n;
  }

  static void removeGpgmeIOCallback( void * tag ) {
    if ( !tag ) return;
    QSocketNotifier * n = static_cast<QSocketNotifier*>( tag );
    for ( QValueList<IOCB>::iterator it = qApp->mIOCBs.begin() ;
          it != qApp->mIOCBs.end() ; ++it )
      if ( it->notifier == n ) {
        delete it->notifier;
        qApp->mIOCBs.erase( it );
        return;
      }
  }
```

```
  public slots:
    void slotGpgmeIOCallback( int fd ) {
      for ( QValueList<IOCB>::const_iterator it = mIOCBs.begin() ;
            it != mIOCBs.end() ; ++it )
        if ( it->notifier && it->notifier->socket() == fd )
          (*(it->func))
( it->func_data, fd );
    }

    // ...

  private:
    QValueList<IOCB> mIOCBs;
    // ...
  };
```

File: gpgme.info,  Node: Cancellation,  Prev: Using External Event Loops,  Up: Run Control

### 7.8.3 Cancellation

Sometimes you do not want to wait for an operation to finish.  GPGME provides two different functions to achieve that.  The function gpgme_cancel takes effect immediately.  When it returns, the operation is effectively canceled.  However, it has some limitations and can not be used with synchronous operations.  In contrast, the function gpgme_cancel_async can be used with any context and from any thread, but it is not guaranteed to take effect immediately.  Instead, cancellation occurs at the next possible time (typically the next time I/O occurs in the target context).

-- Function: gpgme_ctx_t gpgme_cancel (gpgme_ctx_t CTX)
  SINCE: 0.4.5

  The function gpgme_cancel attempts to cancel a pending operation in the context
CTX.  This only works if you use the global event loop or your own event loop.

  If you use the global event loop, you must not call gpgme_wait during cancellation.  After successful cancellation, you can call gpgme_wait (optionally waiting on CTX), and the context CTX will appear as if it had finished with the error code GPG_ERR_CANCEL.

  If you use an external event loop, you must ensure that no I/O callbacks are invoked for this context (for example by halting the

event loop). On successful cancellation, all registered I/O callbacks for this context will be unregistered, and a GPGME_EVENT_DONE event with the error code GPG_ERR_CANCEL will be signalled.

The function returns an error code if the cancellation failed (in this case the state of CTX is not modified).

-- Function: gpgme_ctx_t gpgme_cancel_async (gpgme_ctx_t CTX)
SINCE: 1.1.7

The function gpgme_cancel_async attempts to cancel a pending operation
in the context CTX. This can be called by any thread at any time after starting an operation on the context, but will not take effect immediately. The actual cancellation happens at the next time GPGME processes I/O in that context.

The function returns an error code if the cancellation failed (in this case the state of CTX is not modified).

File: gpgme.info, Node: UI Server Protocol, Next: Debugging, Prev: Contexts, Up: Top

# Appendix A The GnuPG UI Server Protocol

This section specifies the protocol used between clients and a User Interface Server (UI server). This protocol helps to build a system where all cryptographic operations are done by a server and the server is responsible for all dialogs. Although GPGME has no direct support for this protocol it is believed that servers will utilize the GPGME library; thus having the specification included in this manual is an appropriate choice. This protocol
should be referenced as The GnuPG UI
Server Protocol.

A server needs to implement these commands:(1)

* Menu:

* UI Server Encrypt:: Encrypt a message.
* UI Server Sign:: Sign a message.
* UI Server Decrypt:: Decrypt a message.
* UI Server Verify:: Verify a message.
* UI Server Set Input Files:: Specifying the input files to operate on.
* UI Server Sign/Encrypt Files:: Encrypting and signing files.
* UI Server Verify/Decrypt Files:: Decrypting and verifying files.

* UI Server Import/Export Keys:: Managing certificates.
* UI Server Checksum Files:: Create and verify checksums for files.
* Miscellaneous UI Server Commands:: Commands not related to a specific operation.

---------- Footnotes ----------

(1) In all examples we assume that the connection has already been established; see the Assuan manual for details.

File: gpgme.info, Node: UI Server Encrypt, Next: UI Server Sign, Up: UI Server Protocol

## A.1 UI Server: Encrypt a Message

Before encryption can be done the recipients must be set using the command:

-- Command: RECIPIENT STRING

Set the recipient for the encryption. STRING is an RFC-2822 recipient name ("mailbox" as per section 3.4). This command may or may not check the recipient for validity right away; if it does not all recipients are expected to be checked at the time of the ENCRYPT command. All RECIPIENT commands are cumulative until a successful ENCRYPT command or until a RESET command. Linefeeds are obviously not allowed in STRING and should be folded into spaces (which are equivalent).

To tell the server the source and destination of the data, the next two commands are to be used:

-- Command: INPUT FD=N

Set the file descriptor for the message to be encrypted to N. The message send to the server is binary encoded.

GpgOL is a Windows only program, thus N is not a libc file descriptor but a regular system handle. Given that the Assuan connection works over a socket, it is not possible to use regular inheritance to make the file descriptor available to the server. Thus DuplicateHandle needs to be used to duplicate a handle to the server process. This is the reason that the server needs to implement the GETINFO pid command. Sending this command a second time replaces the file descriptor set by the last one.

-- Command: OUTPUT FD=N [--binary]

Set the file descriptor to be used for the output (i.e. the encrypted message) to N. If the option --binary is given the output shall be in binary format; if not given, the output for OpenPGP needs to be ASCII armored and for CMS Base-64 encoded. For details on the file descriptor, see the INPUT command.

The setting of the recipients, the data source and destination may happen in any order, even intermixed. If this has been done the actual encryption operation is called using:

-- Command: ENCRYPT --protocol=NAME

This command reads the plaintext from the file descriptor set by the INPUT command, encrypts it and writes the ciphertext to the file descriptor set by the OUTPUT command. The server may (and should) overlap reading and writing. The recipients used for the encryption are all the recipients set so far. If any recipient is not usable the server should take appropriate measures to notify the user about the problem and may cancel the operation by returning an error code. The used file descriptors are void after this command; the recipient list is only cleared if the server returns success.

Because GpgOL uses a streaming mode of operation the server is not allowed to auto select the protocol and must obey to the mandatory PROTOCOL parameter:

OpenPGP
Use the OpenPGP protocol (RFC-2440).
CMS
Use the CMS (PKCS#7) protocol (RFC-3852).

To support automagically selection of the protocol depending on the selected keys, the server MAY implement the command:

-- Command: PREP_ENCRYPT [--protocol=NAME] [--expect-sign]

This commands considers all recipients set so far and decides whether it is able to take input and start the actual encryption. This is kind of a dry-run ENCRYPT without requiring or using the input and output file descriptors. The server shall cache the result of any user selection to avoid asking this again when the actual ENCRYPT command is send. The --protocol option is optional; if it is not given, the server should allow the user to select the protocol to be used based on the recipients given or by any other means.

If --expect-sign is given the server should expect that the
message will also be signed and use this hint to present a unified
recipient and signer selection dialog if possible and desired.
A
selected signer should then be cached for the expected SIGN command
(which is expected in the same session but possible on another
connection).

If this command is given again before a successful ENCRYPT
command, the second one takes effect.

Before sending the OK response the server shall tell the client the
protocol to be used (either the one given by the argument or the
one selected by the user) by means of a status line:

-- Status line: PROTOCOL NAME
Advise the client to use the protocol NAME for the ENCRYPT
command. The valid protocol names are listed under the description
of the ENCRYPT command. The server shall emit exactly one
PROTOCOL status line.

Here is an example of a complete encryption sequence; client lines are
indicated by a C:, server responses by C::

```
C: RESET
S: OK
C: RECIPIENT foo@example.net
S: OK
C: RECIPIENT bar@example.com
S: OK
C: PREP_ENCRYPT
 S: S PROTOCOL OpenPGP
S: OK
C: INPUT FD=17
S: OK
C: OUTPUT FD=18
S: OK
C: ENCRYPT
S: OK
```

File: gpgme.info, Node: UI Server Sign, Next: UI Server Decrypt, Prev: UI Server Encrypt, Up: UI Server Protocol

A.2 UI Server: Sign a Message
==========

The server needs to implement opaque signing as well as detached signing. Due to the nature of OpenPGP messages it is always required to send the entire message to the server; sending just the hash is not possible. The following two commands are required to set the input and output file descriptors:

-- Command: INPUT FD=N
Set the file descriptor for the message to be signed to N. The message send to the server is binary encoded. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: OUTPUT FD=N [--binary]
Set the file descriptor to be used for the output. The output
is
either the complete signed message or in case of a detached signature just that detached signature. If the option --binary is given the output shall be in binary format; if not given, the output for OpenPGP needs to be ASCII armored and for CMS Base-64 encoded. For details on the file descriptor, see the INPUT command.

To allow the server the selection of a non-default signing key the client may optionally use the SENDER command, see *note command SENDER::.

The signing operation is then initiated by:

-- Command: SIGN --protocol=NAME [--detached]
Sign the data set with the INPUT command and write it to the sink set by OUTPUT. NAME is the signing protocol used for the message. For a description of the allowed protocols see the ENCRYPT command. With option --detached given, a detached signature is created; this is actually the usual way the command is used.

The client expects the server to send at least this status information
before
the final OK response:

-- Status line: MICALG STRING
The STRING represents the hash algorithm used to create the signature. It is used with RFC-1847 style signature messages and defined by PGP/MIME (RFC-3156) and S/MIME (RFC-3851). The GPGME library has a supporting function gpgme_hash_algo_name to return the algorithm name as a string. This string needs to be lowercased and for OpenPGP prefixed with "pgp-".
{
"op": "export",

"keys": "victor@example.org",
"armor": true
}
-----BEGIN PGP PRIVATE KEY BLOCK-----

lQOYBFrsKEkBCADKw4Wt8J6M/88qD8PO6lSMCxH1cpwH8iK0uPaFFYsJkkXo7kWf
PTAtrV+REqF/o80dvYcdLvRsV21pvncZz/HXLu1yQ18mC3XObrKokbdgrTTKA5XE
BZkNsqyaMMJauT18H4hYkSg62/tTdO1cu/zWv/LFf7Xyn6+uA74ovXCJlO1s0N2c
PShtr98QRzPMf2owgVk37JnDNp4gGVDGHxSZOuUwxgYAZYnA8SFc+c+3ZrQfY870
+O4j3Mz4p7yD13AwP4buQLBsb/icxekeQCqpRJhLH9f7MdEcGXa1x36RcEkHdu+M
yJ392eMgD+dKNfRCtyTPhjZTxvbNELIBYICfABEBAAEAB/wLJ0gyMjs2fFfT83wM
5Lzz2yQIwV4t3bblBAujdHTqeN5Zmsm/oakFyjSokULK96Kv0R4ej9eoIgMFvxFk
HRkrggxTrbsNJ7I6QcKYHTPeIIj318ykNL6fj0WJUcdPIENukXl5jbqNyk3/4D2y
TTDySyq6jHTgvMH4K4KJUSpglvSJPntTk9RhuFGHAF+sNR9atygDYctAaERMRtSg
LCoSt/AoX5GRMlQjXT9oqQjwSQoZyF4s8HMC8wdTFIE/E0L4IVdHVp8sz2UszNtT
W/evmCA+KVruKjRH/Fhrq4hHkEamW28+j4L6uAyagONP7BONs+S5Oo2zTT9+tV2R
ILTZBADdgLuAgF6C5Lu9jCF6DfFgaT/uafMyQNkEGNlxOHMWHTgLHe475V2eG9gA
amd4yXKyEFKU1PWnvlGuicQSGdzVcwmq61msvXgYD0FK3LP3yWzKnE4X1tzrC9Vp
/uHJxKjewCuyt1f5in919v+T8TbUxBYKC0zX/qWtX+10cTx77QQA6leqhToJ95Yc
u4UBrKMEO+y2v8Svb3LG7yI5oY8tkw0EkJ/kpZ8xTAfZYCe6fXdvVE3PHg2lrxyc
Wv/EU3QY/qA3G82mbXYeJ2jNZaTNYo4MylMrt4Mx25x4ke7JlsE8SVrQ+4CrHkqp
OjSIa7fppLrQ78uW980AtN8NNQGrlTsD/A9aoA60Igxy1Q3K2uSyDCyjLknv57ym
ZSBD3/t7m0l6Q6gbdfhNGosT+Hd4y3actqEqzXZHW2VG4dKZ/wRNkxtSm9adU9vs
EHyzxjb6mKIH32zAG5TaFT20hC+NK6lsyHr9UE2ZrS6ma2sLxGW2O40hqNsdD+5m
NrqeBc2I/js1PMK0EHRlc3RAZXhhbXBsZS5vcmeJAVQEEwEIAD4WIQTUFzW5Ejb9
uIIEjFojAWNe7/DLBQUCWuwoSQIbAwUJA8JnAAULCQgHAgYVCgkICwIEFgIDAQIe
AQIXgAAKCRAjAWNe7/DLBf9kB/wOQ/S60HGwFq07W9N01HWULyhHKoMmcHL6rfZ6
4oDqLxolPSasz7WAMW1jN4qtWJ0mFzwO83V6kaBe+wF6Kqir6udFSBW9rPcFg6/V
ZXPltT0a6uacIHq6DyQ5iMW4YQWbVy9OR2rNGkYo1JCBR0XdRJYCSX3yB4TWv/eX
nZ37/WjmiTOIZh35rjs+NuU/S5JPDfAp2/k70DevQeBsv+UjVXjWpNTZmPbvDnd9
95uSmC6UY4hzyP84ORYMYn9n1QAR0goxDN6UunOf9Rlp1oMzdxMool/d1MlCxg2h
3jheuhv7lgUF4KpvHOuEPXQ7UO417E0TYcDZ1J8Nsv87SZeEnQOYBFrsKEkBCADj
oEBhG/QPqZHg8VyoD1xYRAWGxyDJkX/GrSs6yE+x2hk5FoQCajxKa/d4AVxOnJpd
whAfeXeSNaql5Ejgzax+Tdj9BV6vtGVJVv0pO7bgAiZxkA6RHxtNqhpPnPQoXvUz
kzpRgpuL+Nj4yIg7z1ITH6KQH4u5SI9vd+j/8i9Taz67pdZwuJjac8qBuJHjzAo1
bjYctFYUSG5pbmMQyNLySzgiNkFa4DajODlt3RuqVGP316Fk+Sy2+60tC/HlX8jg
MyMONfOGBQx6jk8tvAphS/LAqrrNepnagIyLUGKU+L8cB2g1PGGp2biBFWqZbudZ
oyRBet/0yH/zirBdQJw1ABEBAAEAB/4lN3gXOI4OuoOcsvHak4pebx61Mt0YP9cT
qZASIBqxok5x8E28pFh/tYfkYdqRCtdNYZOnxcEoUWh5j6nfwZkEnJ9P/T8GPNk7
pMKnKXmExi05b5uGHD8nU1rSbf/YkvAF0vpbxd4/RDxbbtQhbUwGzusSI+pBLM0w
5TreEB+vRGBc2gOvXXOtKLNEa7M9rH2EwbAkP3jOGGwgk6adxbQdBcRxq4merqhL
YrVz73bCj8TDc0fsNJyIaZZJ++ejfBFYavsF1pvx9z7FNFi8rSXoiB3SBtaWGfhr
bwNaMZrDc7TRIq/fgGaL6g//bzcWrr1YaHXZ10Bgx6UymDOlYkCpBADm0Hv46sPw
07SO8+IACcaQliOto1pndOPwTimCeo58/7rf8I2a5uuJloGrnPwAX65bKDnUALp6
X3lnXRNMhnB3Uewx4i00LQmjsxhJfQiGLpMv0j58tn64s7GqQzGVV1JKcQm992RV
jFOydyjZ+K4LGWEOITG/bZrMEVNGCM+OnQQA/Haz8xN0NFSlq7tyfFc0pkx/TiCX
xGfBqbO0wU2b5GMnZbY/06HENpidIzpa231VQaw5/nPTvfhlLKW1iGAkc148cX1q
lL9w2ksXuaHR3LXud2VcfVTIdxU/7h7u1dD/85+c0+7jlGObD9cXKxlM6OjpIJz1

l5/1h3C5S0TuxHkEAL/3BGihkhNfv1Xx0rWu0/732usX/nE/A9C26hGu41FUf3fp
0ilonKpKZUEwWt5hWSEFCSrznNVekiO0rxvuu3RVegvzThPNU4Pf4JZtJpRVhvUQ
d9ulxJw7V9rs75uNBatTNC0kXuGoXhehw4Bn93xa67gYGd3LfrH+oT0GCDpTSHCJ
ATwEGAEIACYWIQTUFzW5Ejb9uIIEjFojAWNe7/DLBQUCWuwoSQIbDAUJA8JnAAAK
CRAjAWNe7/DLBf0pCACPp5hBuUWngu2Hqvg+tNiujfsiYzId3MffFxEk3CbXeHcJ
5F32NDJ9PYCnra4L8wSv+NZt9gIa8lFwoFSFQCjzH7KE86XcV3MhfdJTNb/+9CR7
Jq3e/4Iy0N5ip7PNYMCyakcAsxvsNCJKrSaDuYe/OAoTXRBtgRWE2uyT315em02L
kr+2Cc/Qk6H+vlNOHGRgnpI/OZZjnUuUfBUvMGHr1phW+y7aeymC9PnUGdViRdJe
23nntMSDA+0/I7ESO9JsWvJbyBmuiZpu9JjScOjYH9xpQLqRNyw4WHpZriN69F0t
9Mmd7bM1+UyPgbPEr0iWMeyctYsuOLeUyQKMscDT
=hkUm
-----END
 PGP PRIVATE KEY BLOCK-----

```
{
  "manifest_version": 2,

  "name": "Browsertests for gpgmejs",
  "description": "Run the browsertests.",
  "version": "0.1",
  "content_security_policy": "default-src 'self' filesystem:",
  "browser_action": {
    "default_icon": "testicon.png",
    "default_popup": "popup.html"
  },
  "permissions": ["nativeMessaging", "activeTab"]
 }
from __future__ import absolute_import

import cython
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

if cython.compiled is True:
  cc = "Powered by Cython compiled C code."
else:
  cc = "Powered by Python."

print("""
  Number of secret keys:  {0}
```

```
  Number of public keys:  {1}

 {2}
""".format(secnum, pubnum, cc))
{
  "info": {
    "is_mime":    false,
    "signatures":  [{
      "summary":    {
        "sigsum":    [],
        "valid":    false,
        "green":    false,
        "red":  false,
        "revoked":    false,
        "key-expired":  false,
        "sig-expired":  false,
        "key-missing":  false,
        "crl-missing":  false,
        "crl-too-old":  false,
        "bad-policy":  false,
        "sys-error":  false
      },
      "wrong_key_usage":    false,
      "chain_model":  false,
      "is_de_vs":    false,
      "status_string":    "Success",
      "fingerprint":  "A0FF4590BB6122EDEF6E3C542D727CC768697734",
      "validity_string":    "unknown",
      "pubkey_algo_name":    "DSA",
      "hash_algo_name":    "SHA1",
      "status_code":  0,
      "timestamp":  1542213871,
       "exp_timestamp":    0,
      "pka_trust":  0,
      "validity":    0,
      "validity_reason":    0,
      "notations":  [{
        "human_readable":    false,
        "critical":    false,
        "value":    "https://www.gnu.org/policy/",
        "flags":    0
      }, {
      "human_readable":    true,
      "critical":    false,
      "name": "laughing@me",
      "value":    "Just Squeeze Me",
      "flags":    1
      }, {
```

"human_readable": true,
"critical": true,
"name": "preferred-email-encoding@pgp.com",
"value": "pgpmime",
"flags": 3
}]
}]
},
"type": "plaintext",
"base64": false,
"data": "Hallo Leute\n"
}
This is gpgme.info, produced by makeinfo version 6.5 from gpgme.texi.

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INFO-DIR-SECTION GNU Libraries
START-INFO-DIR-ENTRY
* GPGME: (gpgme). Adding support for cryptography to your program.
END-INFO-DIR-ENTRY

This file documents the GPGME library.

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The GnuPG Made Easy Reference Manual, for Version 1.14.1-beta35.

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gpgme.info-1: 1688
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End Tag Table

Local Variables:
coding: utf-8
End:
000
*H
010 UDE1!0U
Deutsches Forschungsnetz10UDFN-PCA1.0,U%DFN Top Level Certification Authority1!0 *H
certify@pca.dfn.de0
001102164724Z

011230180000Z010 UDE1!0U
Deutsches Forschungsnetz10UDFN-PCA1+0)U"DFN Server Certification Authority1!0 *H
 certify@pca.dfn.de0"0
 *H
0
W`r;wXu)QYHm1t]4?|-.B(iw6G01N>[mQSwC'muw~E'l-M
+<[A|F)F%
ZiRaW=OC,,meKW@J-*<,L}:Bnm-kv
EYBmu tt[-%,R+n0j0U00U0U{upz*D\
v0Ux0v09753http://www.pca.dfn.de/dfnpca/certify/ssl/dfnpca.crx09753http://www.pca.dfn.de/dfnpca/certify/ssl/dfn
pca.crl0 `HB0) `HBhttps://mystic.pca.dfn.de/0A `HB42http://www.pca.dfn.de/dfnpca/policy/wwwpolicy.html0 `HB
This certificate was issued by the DFN-PCA, the Top
Level Certification Authority of the German Research
Network (Deutsches Forschungsnetz, DFN).
The key owner's identity was authenticated in
accordance with the DFN World Wide Web Policy, v1.00! `HBcgi/check-rev.cgi?0
 *H
\C)2
+ZYG| UCA|PzYFnTj@SA)/<HU+4t?@g?pb5w'Z;dqLi9\(d=
,}h?c(MeM44=Qe/_^^JyYN/61&jPFXifP&#;/KZ
1 xOK?ps
\input texinfo @c -*- mode: texinfo; coding: utf-8; -*-
@documentencoding UTF-8
@setfilename gpgme.info
@include defs.inc
@settitle The `GnuPG Made Easy' Reference Manual

@dircategory GNU Libraries
@direntry
* @acronym{GPGME}: (gpgme). Adding support for cryptography to your program.
@end direntry

@c Unify some of the indices.
@syncodeindex tp fn
@syncodeindex pg fn

@copying
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@quotation
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@end copying

@c Macros used by the description of the UI server protocol
@macro clnt{string}
@sc{c:} \string\
@end macro
@macro srvr{string}
@sc{s:} \string\
@end macro

@c API version.
@macro since{string}
@sc{Since:} \string\
@end macro

@c
@c T I T L E P A G E
@c
@ifinfo
This file documents the @acronym{GPGME} library.

This is Edition @value{EDITION}, last updated @value{UPDATED}, of
@cite{The `GnuPG Made Easy' Reference Manual}, for Version
@value{VERSION}.

@c NOTE: Don't forget to update the year for the TeX version, too.
@insertcopying

@end ifinfo

@c We do not want that bastard short titlepage.
@c @iftex
@c @shorttitlepage The `GnuPG Made Easy' Reference Manual
@c @end iftex
@titlepage
@center @titlefont{The `GnuPG Made Easy'}
@sp 1
@center @titlefont{Reference Manual}
@sp 6
@center Edition @value{EDITION}
@sp 1
@center last updated @value{UPDATED}
@sp 1

@center for version @value{VERSION}
@page
@vskip 0pt plus 1filll
Published
by The GnuPG Project@* c/o g10 Code GmbH@* Httenstr. 61@* 40699 Erkrath, Germany

@insertcopying
@end titlepage
@page

@summarycontents
@contents

@ifnottex
@node Top
@top Main Menu
This is Edition @value{EDITION}, last updated @value{UPDATED}, of
@cite{The `GnuPG Made Easy' Reference Manual}, for Version
@value{VERSION} of the @acronym{GPGME} library.
@end ifnottex

@menu
* Introduction:: How to use this manual.
* Preparation:: What you should do before using the library.
* Protocols and Engines:: Supported crypto protocols.
* Algorithms:: Supported algorithms.
* Error Handling:: Error numbers and their meanings.
* Exchanging Data:: Passing data to and from @acronym{GPGME}.
* Contexts:: Handling @acronym{GPGME} contexts.

Appendices

* UI Server Protocol:: The GnuPG UI Server Protocol.
* Debugging:: How to solve problems.
* Deprecated
Functions:: Documentation of deprecated functions.

* Library Copying:: The GNU Lesser General Public License says
how you can copy and share `GnuPG Made Easy'.
* Copying:: The GNU General Public License says how you
can copy and share this manual.

Indices

* Concept Index:: Index of concepts and programs.
* Function and Data Index:: Index of functions, variables and data types.

@detailmenu

--- The Detailed Node Listing ---

Introduction

* Getting Started:: Purpose of the manual, and how to use it.
* Features:: Reasons to install and use @acronym{GPGME}.
* Overview:: Basic architecture of the @acronym{GPGME} library.

Preparation

* Header:: What header file you need to include.
* Building the Source:: Compiler options to be used.
* Largefile Support (LFS):: How to use @acronym{GPGME} with LFS.
* Using Automake:: Compiler options to be used the easy way.
* Using Libtool:: Avoiding compiler options entirely.
* Library Version Check:: Getting and verifying the library version.
* Signal Handling:: How @acronym{GPGME} affects signal handling.
* Multi-Threading:: How @acronym{GPGME} can be used in an MT environment.

Protocols and Engines

* Engine Version Check:: Verifying the engine version.
* Engine Information:: Obtaining more information about the engines.
* Engine Configuration:: Changing the engine configuration.
* OpenPGP:: Support for the OpenPGP protocol.
* Cryptographic Message Syntax:: Support for the CMS.

Algorithms

* Public Key Algorithms:: A list of all public key algorithms.
* Hash Algorithms:: A list of all hash algorithms.

Error Handling

* Error Values:: The error value and what it means.
* Error Codes:: A list of important error codes.
* Error Sources:: A list of important error sources.
* Error Strings:: How to get a descriptive string from a value.

Exchanging Data

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* Destroying Data Buffers:: Releasing data buffers.
* Manipulating Data Buffers:: Operations on data buffers.

Creating Data Buffers

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* Callback Based Data Buffers:: Creating callback based data buffers.

Manipulating Data Buffers

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Contexts

* Creating Contexts:: Creating new @acronym{GPGME} contexts.
*
Destroying Contexts:: Releasing @acronym{GPGME} contexts.
* Result Management:: Managing the result of crypto operations.
* Context Attributes:: Setting properties of a context.
* Key Management:: Managing keys with @acronym{GPGME}.
* Crypto Operations:: Using a context for cryptography.
* Miscellaneous:: Miscellaneous operations.
* Run Control:: Controlling how operations are run.

Context Attributes

* Protocol Selection:: Selecting the protocol used by a context.
* Crypto Engine:: Configuring the crypto engine.
* Setting the Sender:: How to tell the engine the sender.
* ASCII Armor:: Requesting @acronym{ASCII} armored output.
* Text Mode:: Choosing canonical text mode.
* Offline Mode:: Choosing offline mode.
* Included Certificates:: Including a number of certificates.
* Key Listing Mode::
Selecting key listing mode.
* Passphrase Callback:: Getting the passphrase from the user.
* Progress Meter Callback:: Being informed about the progress.
* Status Message Callback:: Status messages received from gpg.
* Locale:: Setting the locale of a context.

Key Management

* Key objects:: Description of the key structures.
* Listing Keys:: Browsing the list of available keys.
* Information About Keys:: Requesting detailed information about keys.
* Manipulating Keys:: Operations on keys.
* Generating Keys:: Creating new key pairs.
* Signing Keys:: Adding key signatures to public keys.
* Exporting Keys:: Retrieving key data from the key ring.

* Importing Keys:: Adding keys to the key ring.
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* Changing Passphrases:: Change the passphrase of
a key.
* Changing TOFU Data:: Changing data pertaining to TOFU.
* Advanced Key Editing:: Advanced key edit operation.

Crypto Operations

* Decrypt:: Decrypting a ciphertext.
* Verify:: Verifying a signature.
* Decrypt and Verify:: Decrypting a signed ciphertext.
* Sign:: Creating a signature.
* Encrypt:: Encrypting a plaintext.

Sign

* Selecting Signers:: How to choose the keys to sign with.
* Creating a Signature:: How to create a signature.
* Signature Notation Data:: How to add notation data to a signature.

Encrypt

* Encrypting a Plaintext:: How to encrypt a plaintext.

Miscellaneous

* Running other Programs:: Running other Programs.
* Using the Assuan protocol:: Using the Assuan protocol.
* Checking for updates:: How to check for software updates.

Run Control

* Waiting For Completion:: Waiting
until an operation is completed.
* Using External Event Loops:: Advanced control over what happens when.
* Cancellation:: How to end pending operations prematurely.

Using External Event Loops

* I/O Callback Interface:: How I/O callbacks are registered.
* Registering I/O Callbacks:: How to use I/O callbacks for a context.
* I/O Callback Example:: An example how to use I/O callbacks.
* I/O Callback Example GTK+:: How to integrate @acronym{GPGME} in GTK+.
* I/O Callback Example GDK:: How to integrate @acronym{GPGME} in GDK.
* I/O Callback Example Qt:: How to integrate @acronym{GPGME} in Qt.

@end detailmenu

@end menu

@node Introduction
@chapter Introduction

`GnuPG Made Easy' (@acronym{GPGME}) is a C language library that allows to add support for cryptography to a program. It is designed to make access to public key crypto engines like GnuPG or GpgSM easier for applications. @acronym{GPGME} provides a high-level crypto API for
encryption, decryption, signing, signature verification and key management.

@acronym{GPGME} uses GnuPG and GpgSM as its backends to support OpenPGP and the Cryptographic Message Syntax (CMS).

@menu
* Getting Started:: Purpose of the manual, and how to use it.
* Features:: Reasons to install and use @acronym{GPGME}.
* Overview:: Basic architecture of the @acronym{GPGME} library.
@end menu

@node Getting Started
@section Getting Started

This manual documents the @acronym{GPGME} library programming interface. All functions and data types provided by the library are explained.

The reader is assumed to possess basic knowledge about cryptography in general, and public key cryptography in particular. The underlying cryptographic engines that are used by the library are not explained, but where necessary, special features or requirements by an engine are mentioned as far as they are relevant to @acronym{GPGME} or its users.

This manual
can be used in several ways. If read from the beginning to the end, it gives a good introduction into the library and how it can be used in an application. Forward references are included where necessary. Later on, the manual can be used as a reference manual to get just the information needed about any particular interface of the library. Experienced programmers might want to start looking at the examples at the end of the manual, and then only read up those parts of the interface which are unclear.

The documentation for the language bindings is currently not included in this manual. Those languages bindings follow the general

programming model of @acronym{GPGME} but may provide some extra high level abstraction on top of the @acronym{GPGME} style API. For now please see the README files in the @file{lang/} directory of the source distribution.

@node Features
@section Features

@acronym{GPGME} has a couple of advantages over other libraries doing a similar job, and over
implementing support for GnuPG or other crypto
engines into your application directly.

@table @asis
@item it's free software
Anybody can use, modify, and redistribute it under the terms of the GNU Lesser General Public License (@pxref{Library Copying}).

@item it's flexible
@acronym{GPGME} provides transparent support for several cryptographic protocols by different engines. Currently, @acronym{GPGME} supports the OpenPGP protocol using GnuPG as the backend, and the Cryptographic Message Syntax using GpgSM as the backend.

@item it's easy
@acronym{GPGME} hides the differences between the protocols and engines from the programmer behind an easy-to-use interface. This way the programmer can focus on the other parts of the program, and still integrate strong cryptography in his application. Once support for @acronym{GPGME} has been added to a program, it is easy to add support for other crypto protocols once @acronym{GPGME} backends provide them.

@item it's language friendly
@acronym{GPGME}
comes with languages bindings for several common
programming languages: Common Lisp, C++, Python 2, and Python 3.
@end table

@node Overview
@section Overview

@acronym{GPGME} provides a data abstraction that is used to pass data to the crypto engine, and receive returned data from it. Data can be read from memory or from files, but it can also be provided by a callback function.

The actual cryptographic operations are always set within a context.

A context provides configuration parameters that define the behaviour
of all operations performed within it.  Only one operation per context
is allowed at any time, but when one operation is finished, you can
run the next operation in the same context.  There can be more than
one context, and all can run different operations at the same time.

Furthermore, @acronym{GPGME} has rich key management facilities
including listing keys, querying their attributes, generating,
importing, exporting and deleting keys, and acquiring information
about
 the trust path.

With some precautions, @acronym{GPGME} can be used in a multi-threaded
environment, although it is not completely thread safe and thus needs
the support of the application.

@node Preparation
@chapter Preparation

To use @acronym{GPGME}, you have to perform some changes to your
sources and the build system.  The necessary changes are small and
explained in the following sections.  At the end of this chapter, it
is described how the library is initialized, and how the requirements
of the library are verified.

@menu
* Header::  What header file you need to include.
* Building the Source::  Compiler options to be used.
* Largefile Support (LFS)::  How to use @acronym{GPGME} with LFS.
* Using Automake::  Compiler options to be used the easy way.
* Using Libtool::  Avoiding compiler options entirely.
* Library Version Check::  Getting and verifying the library version.
* Signal Handling::
  How @acronym{GPGME} affects signal handling.
* Multi-Threading::  How @acronym{GPGME} can be used in an MT environment.
@end menu

@node Header
@section Header
@cindex header file
@cindex include file

All interfaces (data types and functions) of the library are defined
in the header file `gpgme.h'.  You must include this in all programs
using the library, either directly or through some other header file,
like this:

@example
#include <gpgme.h>
@end example

The name space of @acronym{GPGME} is @code{gpgme_*} for function names
and data types and @code{GPGME_*} for other symbols.  Symbols internal
to @acronym{GPGME} take the form @code{_gpgme_*} and @code{_GPGME_*}.

Because @acronym{GPGME} makes use of the GPG Error library, using
@acronym{GPGME} will also use the @code{GPG_ERR_*} name space
directly, and the @code{gpg_err*}, @code{gpg_str*}, and @code{gpgrt_*}
name space indirectly.

@node Building the Source
@section Building the Source
@cindex compiler options
@cindex
 compiler flags

If you want to compile a source file including the `gpgme.h' header
file, you must make sure that the compiler can find it in the
directory hierarchy.  This is accomplished by adding the path to the
directory in which the header file is located to the compilers include
file search path (via the @option{-I} option).

However, the path to the include file is determined at the time the
source is configured.  To solve this problem, gpgme ships with a small
helper program @command{gpgme-config} that knows about the path to the
include file and other configuration options.  The options that need
to be added to the compiler invocation at compile time are output by
the @option{--cflags} option to @command{gpgme-config}.  The following
example shows how it can be used at the command line:

@example
gcc -c foo.c `gpgme-config --cflags`
@end example

Adding the output of @samp{gpgme-config --cflags} to the compiler
command line will ensure that the compiler can find the
@acronym{GPGME}
 header file.

A similar problem occurs when linking the program with the library.
Again, the compiler has to find the library files.  For this to work,
the path to the library files has to be added to the library search
path (via the @option{-L} option).  For this, the option

@option{--libs} to @command{gpgme-config} can be used. For
convenience, this option also outputs all other options that are
required to link the program with @acronym{GPGME} (in particular, the
@samp{-lgpgme} option). The example shows how to link @file{foo.o}
with the @acronym{GPGME} library to a program @command{foo}.

@example
gcc -o foo foo.o `gpgme-config --libs`
@end example

Of course you can also combine both examples to a single command by
specifying both options to @command{gpgme-config}:

@example
gcc -o foo foo.c `gpgme-config --cflags --libs`
@end example

If you need to detect the installed language bindings you can use list
them using:

@example
gpgme-config --print-lang
@end example

or
 test for the availability using

@example
gpgme-config --have-lang=python && echo 'Bindings for Pythons available'
@end example

@node Largefile Support (LFS)
@section Largefile Support (LFS)
@cindex largefile support
@cindex LFS

@acronym{GPGME} is compiled with largefile support by default, if it
is available on the system. This means that GPGME supports files
larger than two gigabyte in size, if the underlying operating system
can. On some systems, largefile support is already the default. On
such systems, nothing special is required. However, some systems
provide only support for files up to two gigabyte in size by default.
Support for larger file sizes has to be specifically enabled.

To make a difficult situation even more complex, such systems provide
two different types of largefile support. You can either get all
relevant functions replaced with alternatives that are largefile

capable, or you can get new functions and data types for largefile support added. Those new functions have the same name as their smallfile counterparts, but with a suffix of 64.

An example: The data type @code{off_t} is 32 bit wide on GNU/Linux PC systems. To address offsets in large files, you can either enable largefile support add-on. Then a new data type @code{off64_t} is provided, which is 64 bit wide. Or you can replace the existing @code{off_t} data type with its 64 bit wide counterpart. All occurrences of @code{off_t} are then automagically replaced.

As if matters were not complex enough, there are also two different types of file descriptors in such systems. This is important because if file descriptors are exchanged between programs that use a different maximum file size, certain errors must be produced on some file descriptors to prevent subtle overflow bugs from occurring.

As you can see, supporting two different maximum file sizes at the same time is not at all an easy task. However, the maximum file size does matter for @acronym{GPGME}, because some data types it uses in its interfaces are affected by that. For example, the @code{off_t} data type is used in the @code{gpgme_data_seek} function, to match its @acronym{POSIX} counterpart. This affects the call-frame of the function, and thus the ABI of the library. Furthermore, file descriptors can be exchanged between GPGME and the application.

For you as the user of the library, this means that your program must be compiled in the same file size mode as the library. Luckily, there is absolutely no valid reason for new programs to not enable largefile support by default and just use that. The compatibility modes (small file sizes or dual mode) can be considered an historic artefact, only useful to allow for a transitional period.

On POSIX platforms @acronym{GPGME} is compiled using largefile support by default. This means that your application must do the same, at least as far as it is relevant for using the @file{gpgme.h} header file. All types in this header files refer to their largefile counterparts, if they are different from any default types on the system.

On 32 and 64 bit Windows platforms @code{off_t} is declared as 32 bit signed integer. There is no specific support for LFS in the C library. The recommendation from Microsoft is to use the native interface (@code{CreateFile} et al.) for large files. Released binary versions of @acronym{GPGME} (libgpgme-11.dll) have always been build

with a 32 bit @code{off_t}.  To avoid an ABI break we stick to this
convention for 32 bit Windows by using @code{long} there.
@acronym{GPGME} versions for 64 bit Windows have never been released
and thus we are able to use @code{int64_t} instead of @code{off_t}
there.  For easier migration the typedef @code{gpgme_off_t} has been
defined.  The reason we cannot use @code{off_t} directly is that some
toolchains (e.g. mingw64) introduce a POSIX compatible hack for
@code{off_t}.  Some widely used toolkits make use of this hack and in
turn @acronym{GPGME} would need
 to use it also.  However, this would
introduce an ABI break and existing software making use of libgpgme
might suffer from a severe break.  Thus with version 1.4.2 we
redefined all functions using @code{off_t} to use @code{gpgme_off_t}
which is defined as explained above.  This way we keep the ABI well
defined and independent of any toolchain hacks.  The bottom line is
that LFS support in @acronym{GPGME} is only available on 64 bit
versions of Windows.

On POSIX platforms you can enable largefile support, if it is
different from the default on the system the application is compiled
on, by using the Autoconf macro @code{AC_SYS_LARGEFILE}.  If you do
this, then you don't need to worry about anything else: It will just
work.  In this case you might also want to use @code{AC_FUNC_FSEEKO}
to take advantage of some new interfaces, and @code{AC_TYPE_OFF_T}
(just in case).

If you do not use Autoconf, you can define the preprocessor symbol
@code{_FILE_OFFSET_BITS} to 64 @emph{before} including
 any header
files, for example by specifying the option
@code{-D_FILE_OFFSET_BITS=64} on the compiler command line.  You will
also want to define the preprocessor symbol @code{LARGEFILE_SOURCE} to
1 in this case, to take advantage of some new interfaces.

If you do not want to do either of the above, you probably know enough
about the issue to invent your own solution.  Just keep in mind that
the @acronym{GPGME} header file expects that largefile support is
enabled, if it is available.  In particular, we do not support dual
mode (@code{_LARGEFILE64_SOURCE}).

@node Using Automake
@section Using Automake
@cindex automake
@cindex autoconf

It is much easier if you use GNU Automake instead of writing your own
Makefiles.  If you do that you do not have to worry about finding and

invoking the @command{gpgme-config} script at all.  @acronym{GPGME}
provides an extension to Automake that does all the work for you.

@c A simple macro for optional variables.
@macro ovar{varname}
@r{[}@var{\varname\}@r{]}
@end
 macro
@defmac AM_PATH_GPGME (@ovar{minimum-version}, @ovar{action-if-found}, @ovar{action-if-not-found})
@defmacx AM_PATH_GPGME_PTH (@ovar{minimum-version}, @ovar{action-if-found}, @ovar{action-if-not-found})
@defmacx AM_PATH_GPGME_PTHREAD (@ovar{minimum-version}, @ovar{action-if-found}, @ovar{action-if-not-found})
Check whether @acronym{GPGME} (at least version @var{minimum-version},
if given) exists on the host system.  If it is found, execute
@var{action-if-found}, otherwise do @var{action-if-not-found}, if
given.

Additionally, the function defines @code{GPGME_CFLAGS} to the flags
needed for compilation of the program to find the @file{gpgme.h}
header file, and @code{GPGME_LIBS} to the linker flags needed to link
the program to the @acronym{GPGME} library.  If the used helper script
does not match the target type you are building for a warning is
printed and the string @code{libgcrypt} is appended to the variable
@code{gpg_config_script_warn}.

@code{AM_PATH_GPGME_PTH}
 checks for the version of @acronym{GPGME}
that can be used with GNU Pth, and defines @code{GPGME_PTH_CFLAGS} and
@code{GPGME_PTH_LIBS}.

@code{AM_PATH_GPGME_PTHREAD} checks for the version of @acronym{GPGME}
that can be used with the native pthread implementation, and defines
@code{GPGME_PTHREAD_CFLAGS} and @code{GPGME_PTHREAD_LIBS}. Since
version 1.8.0 this is no longer required to GPGME_PTHREAD as
@acronym{GPGME} itself is thread safe.

This macro searches for @command{gpgme-config} along the PATH.  If
you are cross-compiling, it is useful to set the environment variable
@code{SYSROOT} to the top directory of your target.  The macro will
then first look for the helper program in the @file{bin} directory
below that top directory.  An absolute directory name must be used for
@code{SYSROOT}.  Finally, if the configure command line option
@code{--with-gpgme-prefix} is used, only its value is used for the top
directory below which the helper script is expected.

@end defmac

You can
use the defined Autoconf variables like this in your
@file{Makefile.am}:

@example
AM_CPPFLAGS = $(GPGME_CFLAGS)
LDADD = $(GPGME_LIBS)
@end example

@node Using Libtool
@section Using Libtool
@cindex libtool

The easiest way is to just use GNU Libtool. If you use libtool, and
link to @code{libgpgme.la}, @code{libgpgme-pth.la} or
@code{libgpgme-pthread.la} respectively, everything will be done
automatically by Libtool.

@node Library Version Check
@section Library Version Check
@cindex version check, of the library

@deftypefun {const char *} gpgme_check_version (@w{const char *@var{required_version}})
The function @code{gpgme_check_version} has four purposes. It can be
used to retrieve the version number of the library. In addition it
can verify that the version number is higher than a certain required
version number. In either case, the function initializes some
sub-systems, and for this reason alone it must be invoked early in
your program, before you make use of the other functions
in
@acronym{GPGME}. The last purpose is to run selftests.

As a side effect for W32 based systems, the socket layer will get
initialized.

If @var{required_version} is @code{NULL}, the function returns a
pointer to a statically allocated string containing the version number
of the library.

If @var{required_version} is not @code{NULL}, it should point to a
string containing a version number, and the function checks that the
version of the library is at least as high as the version number
provided. In this case, the function returns a pointer to a
statically allocated string containing the version number of the
library. If @var{REQUIRED_VERSION} is not a valid version number, or

if the version requirement is not met, the function returns
@code{NULL}.

If you use a version of a library that is backwards compatible with
older releases, but contains additional interfaces which your program
uses, this function provides a run-time check if the necessary
features are provided by the
installed version of the library.

If a selftest fails, the function may still succeed. Selftest errors
are returned later when invoking @code{gpgme_new} or
@code{gpgme-data_new}, so that a detailed error code can be returned
(historically, @code{gpgme_check_version} does not return a detailed
error code).
@end deftypefun

@deftypefun {int} gpgme_set_global_flag @
(@w{const char *@var{name}}, @
@w{const char *@var{value}})

@since{1.4.0}

On some systems it is not easy to set environment variables and thus
hard to use @acronym{GPGME}'s internal trace facility for debugging.
This function has been introduced as an alternative way to enable
debugging and for a couple of other rarely used tweaks. It is
important to assure that only one thread accesses @acronym{GPGME}
functions between a call to this function and after the return from
the call to @code{gpgme_check_version}.

All currently supported features require that this function is called
as early as possible
--- even before @code{gpgme_check_version}. The
features are identified by the following values for @var{name}:

@table @code
@item debug
To enable debugging use the string ``debug'' for @var{name} and
@var{value} identical to the value used with the environment variable
@code{GPGME_DEBUG}.

@item disable-gpgconf
Using this feature with any @var{value} disables the detection of the
gpgconf program and thus forces GPGME to fallback into the simple
OpenPGP only mode. It may be used to force the use of GnuPG-1 on
systems which have both GPG versions installed. Note that in general
the use of @code{gpgme_set_engine_info} is a better way to select a

specific engine version.

@item gpgconf-name
@itemx gpg-name
Set the name of the gpgconf respective gpg binary.  The defaults are
@code{GNU/GnuPG/gpgconf} and @code{GNU/GnuPG/gpg}.  Under Unix the
leading directory part is ignored.  Under Windows the leading
directory part is used as the default installation directory; the
@code{.exe} suffix
 is added by GPGME.  Use forward slashed even under
Windows.

@item require-gnupg
Set the minimum version of the required GnuPG engine.  If that version
is not met, GPGME fails early instead of trying to use the existent
version.  The given version must be a string with major, minor, and
micro number.  Example: "2.1.0".

@item w32-inst-dir
On Windows GPGME needs to know its installation directory to find its
spawn helper.  This is in general no problem because a DLL has this
information.  Some applications however link statically to GPGME and
thus GPGME can only figure out the installation directory of this
application which may be wrong in certain cases.  By supplying an
installation directory as value to this flag, GPGME will assume that
that directory is the installation directory.  This flag has no effect
on non-Windows platforms.

@end table

This function returns @code{0} on success.  In contrast to other
functions the non-zero return value on failure does not convey any
error
 code.  For setting ``debug'' the only possible error cause is an
out of memory condition; which would exhibit itself later anyway.
Thus the return value may be ignored.
@end deftypefun

After initializing @acronym{GPGME}, you should set the locale
information to the locale required for your output terminal.  This
locale information is needed for example for the curses and Gtk
pinentry.  Here is an example of a complete initialization:

@example
#include <locale.h>
#include <gpgme.h>

```
void
init_gpgme (void)
@{
 /* Initialize the locale environment.  */
 setlocale (LC_ALL, "");
 gpgme_check_version (NULL);
 gpgme_set_locale (NULL, LC_CTYPE, setlocale (LC_CTYPE, NULL));
#ifdef LC_MESSAGES
 gpgme_set_locale (NULL, LC_MESSAGES, setlocale (LC_MESSAGES, NULL));
#endif
@}
@end example
```

Note that you are highly recommended to initialize the locale settings like this. @acronym{GPGME} can not do this for you because it would not be thread safe. The conditional on LC_MESSAGES is only necessary for
 portability to W32 systems.

@node Signal Handling
@section Signal Handling
@cindex signals
@cindex signal handling

The @acronym{GPGME} library communicates with child processes (the crypto engines). If a child process dies unexpectedly, for example due to a bug, or system problem, a @code{SIGPIPE} signal will be delivered to the application. The default action is to abort the program. To protect against this, @code{gpgme_check_version} sets the @code{SIGPIPE} signal action to @code{SIG_IGN}, which means that the signal will be ignored.

@acronym{GPGME} will only do that if the signal action for @code{SIGPIPE} is @code{SIG_DEF} at the time @code{gpgme_check_version} is called. If it is something different, @code{GPGME} will take no action.

This means that if your application does not install any signal handler for @code{SIGPIPE}, you don't need to take any precautions. If you do install a signal handler for @code{SIGPIPE}, you must be prepared to handle any @code{SIGPIPE}
 events that occur due to
@acronym{GPGME} writing to a defunct pipe. Furthermore, if your application is multi-threaded, and you install a signal action for @code{SIGPIPE}, you must make sure you do this either before @code{gpgme_check_version} is called or afterwards.

@node Multi-Threading
@section Multi-Threading
@cindex thread-safeness
@cindex multi-threading

The @acronym{GPGME} library is mostly thread-safe, and can be used
in a multi-threaded environment but there are some requirements
for multi-threaded use:

@itemize @bullet
@item
The function @code{gpgme_check_version} must be called before any
other function in the library, because it initializes the thread
support subsystem in @acronym{GPGME}. To achieve this in
multi-threaded programs, you must synchronize the memory with respect
to other threads that also want to use @acronym{GPGME}. For this, it
is sufficient to call @code{gpgme_check_version} before creating the
other threads using @acronym{GPGME}@footnote{At least
this is true for
POSIX threads, as @code{pthread_create} is a function that
synchronizes memory with respects to other threads. There are many
functions which have this property, a complete list can be found in
POSIX, IEEE Std 1003.1-2003, Base Definitions, Issue 6, in the
definition of the term ``Memory Synchronization''. For other thread
packages other, more relaxed or more strict rules may apply.}.

@item
Any @code{gpgme_data_t} and @code{gpgme_ctx_t} object must only be
accessed by one thread at a time. If multiple threads want to deal
with the same object, the caller has to make sure that operations on
that object are fully synchronized.

@item
Only one thread at any time is allowed to call @code{gpgme_wait}. If
multiple threads call this function, the caller must make sure that
all invocations are fully synchronized. It is safe to start
asynchronous operations while a thread is running in gpgme_wait.

@item
The function @code{gpgme_strerror} is not thread safe. You have
to
use @code{gpgme_strerror_r} instead.
@end itemize

@node Protocols and Engines
@chapter Protocols and Engines

@cindex protocol
@cindex engine
@cindex crypto engine
@cindex backend
@cindex crypto backend

@acronym{GPGME} supports several cryptographic protocols, however, it does not implement them. Rather it uses backends (also called engines) which implement the protocol. @acronym{GPGME} uses inter-process communication to pass data back and forth between the application and the backend, but the details of the communication protocol and invocation of the backend is completely hidden by the interface. All complexity is handled by @acronym{GPGME}. Where an exchange of information between the application and the backend is necessary, @acronym{GPGME} provides the necessary callback function hooks and further interfaces.

@deftp {Data type} {enum gpgme_protocol_t}
@tindex gpgme_protocol_t
The @code{gpgme_protocol_t} type specifies the set of possible protocol values that are supported
by @acronym{GPGME}. The following protocols
are supported:

@table @code
@item GPGME_PROTOCOL_OpenPGP
@itemx GPGME_PROTOCOL_OPENPGP
This specifies the OpenPGP protocol.

@item GPGME_PROTOCOL_CMS
This specifies the Cryptographic Message Syntax.

@item GPGME_PROTOCOL_GPGCONF
Under development. Please ask on @email{gnupg-devel@@gnupg.org} for help.

@item GPGME_PROTOCOL_ASSUAN
@since{1.2.0}

This specifies the raw Assuan protocol.

@item GPGME_PROTOCOL_G13
@since{1.3.0}

Under development. Please ask on @email{gnupg-devel@@gnupg.org} for help.

@item GPGME_PROTOCOL_UISERVER
Under development. Please ask on @email{gnupg-devel@@gnupg.org} for help.

```
@item GPGME_PROTOCOL_SPAWN
@since{1.5.0}

Special protocol for use with @code{gpgme_op_spawn}.

@item GPGME_PROTOCOL_UNKNOWN
Reserved for future extension.  You may use this to indicate that the
used protocol is not known to the application.  Currently,
@acronym{GPGME} does not accept this value in any operation, though,
except for @code{gpgme_get_protocol_name}.
@end
 table
@end deftp


@deftypefun {const char *} gpgme_get_protocol_name (@w{gpgme_protocol_t @var{protocol}})
The function @code{gpgme_get_protocol_name} returns a statically
allocated string describing the protocol @var{protocol}, or
@code{NULL} if the protocol number is not valid.
@end deftypefun

@menu
* Engine Version Check::          Verifying the engine version.
* Engine Information::            Obtaining more information about the engines.
* Engine Configuration::          Changing the engine configuration.
* OpenPGP::                       Support for the OpenPGP protocol.
* Cryptographic Message Syntax::  Support for the CMS.
* Assuan::                        Support for the raw Assuan protocol.
@end menu


@node Engine Version Check
@section Engine Version Check
@cindex version check, of the engines

@deftypefun @w{const char *} gpgme_get_dirinfo (@w{cons char *@var{what}})
@since{1.5.0}

The function @code{gpgme_get_dirinfo} returns a statically
 allocated
string with the value associated to @var{what}.  The returned values
are the defaults and won't change even after
@code{gpgme_set_engine_info} has been used to configure a different
engine.  @code{NULL} is returned if no value is available.  Commonly
supported values for @var{what} are:

@table @code
@item homedir
```

Return the default home directory.

@item sysconfdir
Return the name of the system configuration directory

@item bindir
Return the name of the directory with GnuPG program files.

@item libdir
Return the name of the directory with GnuPG related library files.

@item libexecdir
Return the name of the directory with GnuPG helper program files.

@item datadir
Return the name of the directory with GnuPG shared data.

@item localedir
Return the name of the directory with GnuPG locale data.

@item agent-socket
Return the name of the socket to connect to the gpg-agent.

@item agent-ssh-socket
Return the name of the socket to connect to the ssh-agent component of
gpg-agent.

@item
dirmngr-socket
Return the name of the socket to connect to the dirmngr.

@item uiserver-socket
Return the name of the socket to connect to the user interface server.

@item gpgconf-name
Return the file name of the engine configuration tool.

@item gpg-name
Return the file name of the OpenPGP engine.

@item gpgsm-name
Return the file name of the CMS engine.

@item g13-name
Return the name of the file container encryption engine.

@item gpg-wks-client-name
Return the name of the Web Key Service tool.

@end table

@end deftypefun

@deftypefun gpgme_error_t gpgme_engine_check_version (@w{gpgme_protocol_t @var{protocol}})
The function @code{gpgme_engine_check_version} verifies that the
engine implementing the protocol @var{PROTOCOL} is installed in the
expected path and meets the version requirement of @acronym{GPGME}.

This function returns the error code @code{GPG_ERR_NO_ERROR} if the
engine is available and @code{GPG_ERR_INV_ENGINE} if it is not.
@end deftypefun

@node Engine
 Information
@section Engine Information
@cindex engine, information about

@deftp {Data type} {gpgme_engine_info_t}
@tindex gpgme_protocol_t
The @code{gpgme_engine_info_t} type specifies a pointer to a structure
describing a crypto engine.  The structure contains the following
elements:

@table @code
@item gpgme_engine_info_t next
This is a pointer to the next engine info structure in the linked
list, or @code{NULL} if this is the last element.

@item gpgme_protocol_t protocol
This is the protocol for which the crypto engine is used.  You can
convert this to a string with @code{gpgme_get_protocol_name} for
printing.

@item const char *file_name
This is a string holding the file name of the executable of the crypto
engine.  Currently, it is never @code{NULL}, but using @code{NULL} is
reserved for future use, so always check before you use it.

@item const char *home_dir
This is a string holding the directory name of the crypto engine's
configuration directory.  If it is @code{NULL}, then
 the default
directory is used.  See @code{gpgme_get_dirinfo} on how to get the
default directory.

@item const char *version
This is a string containing the version number of the crypto engine.
It might be @code{NULL} if the version number can not be determined,
for example because the executable doesn't exist or is invalid.

@item const char *req_version
This is a string containing the minimum required version number of the
crypto engine for @acronym{GPGME} to work correctly.  This is the
version number that @code{gpgme_engine_check_version} verifies
against.  Currently, it is never @code{NULL}, but using @code{NULL} is
reserved for future use, so always check before you use it.
@end table
@end deftp

@deftypefun gpgme_error_t gpgme_get_engine_info (@w{gpgme_engine_info_t *@var{info}})
The function @code{gpgme_get_engine_info} returns a linked list of
engine info structures in @var{info}.  Each info structure describes
the defaults of one configured backend.

The memory for the info
 structures is allocated the first time this
function is invoked, and must not be freed by the caller.

This function returns the error code @code{GPG_ERR_NO_ERROR} if
successful, and a system error if the memory could not be allocated.
@end deftypefun

Here is an example how you can provide more diagnostics if you receive
an error message which indicates that the crypto engine is invalid.

@example
gpgme_ctx_t ctx;
gpgme_error_t err;

[...]

```
if (gpgme_err_code (err) == GPG_ERR_INV_ENGINE)
 @{
   gpgme_engine_info_t info;
   err = gpgme_get_engine_info (&info);
   if (!err)
     @{
       while (info && info->protocol != gpgme_get_protocol (ctx))
         info = info->next;
       if (!info)
         fprintf (stderr, "GPGME compiled without support for protocol %s",
                  gpgme_get_protocol_name (info->protocol));
```

```
      else if (info->file_name && !info->version)
        fprintf (stderr, "Engine %s not installed properly",
                 info->file_name);
       else if (info->file_name && info->version && info->req_version)
        fprintf (stderr, "Engine %s version %s installed, "
                 "but at least version %s required", info->file_name,
                 info->version, info->req_version);
      else
        fprintf (stderr, "Unknown problem with engine for protocol %s",
                 gpgme_get_protocol_name (info->protocol));
    @}
 @}
@end example
```

@node Engine Configuration
@section Engine Configuration
@cindex engine, configuration of
@cindex configuration of crypto backend

You can change the configuration of a backend engine, and thus change the executable program and configuration directory to be used. You can make these changes the default or set them for some contexts individually.

@deftypefun gpgme_error_t gpgme_set_engine_info (@w{gpgme_protocol_t @var{proto}}, @w{const char *@var{file_name}}, @w{const char *@var{home_dir}})
@since{1.1.0}

The function @code{gpgme_set_engine_info} changes
the default
configuration of the crypto engine implementing the protocol
@var{proto}.

@var{file_name} is the file name of the executable program implementing this protocol, and @var{home_dir} is the directory name of the configuration directory for this crypto engine. If @var{home_dir} is @code{NULL}, the engine's default will be used.

The new defaults are not applied to already created GPGME contexts.

This function returns the error code @code{GPG_ERR_NO_ERROR} if successful, or an error code on failure.
@end deftypefun

The functions @code{gpgme_ctx_get_engine_info} and @code{gpgme_ctx_set_engine_info} can be used to change the engine configuration per context. @xref{Crypto Engine}.

@node OpenPGP
@section OpenPGP
@cindex OpenPGP
@cindex GnuPG
@cindex protocol, GnuPG
@cindex engine, GnuPG

OpenPGP is implemented by GnuPG, the @acronym{GNU} Privacy Guard.
This is the first protocol that was supported by @acronym{GPGME}.

The OpenPGP protocol is specified by @code{GPGME_PROTOCOL_OpenPGP}.

@node
Cryptographic Message Syntax
@section Cryptographic Message Syntax
@cindex CMS
@cindex cryptographic message syntax
@cindex GpgSM
@cindex protocol, CMS
@cindex engine, GpgSM
@cindex S/MIME
@cindex protocol, S/MIME

@acronym{CMS} is implemented by GpgSM, the S/MIME implementation for
GnuPG.

The @acronym{CMS} protocol is specified by @code{GPGME_PROTOCOL_CMS}.

@node Assuan
@section Assuan
@cindex ASSUAN
@cindex protocol, ASSUAN
@cindex engine, ASSUAN

Assuan is the RPC library used by the various @acronym{GnuPG}
components. The Assuan protocol allows one to talk to arbitrary
Assuan servers using @acronym{GPGME}. @xref{Using the Assuan
protocol}.

The ASSUAN protocol is specified by @code{GPGME_PROTOCOL_ASSUAN}.

@node Algorithms
@chapter Algorithms

@cindex algorithms

The crypto backends support a variety of algorithms used in public key cryptography.@footnote{Some engines also provide symmetric only encryption; see the description of the encryption function on how to use this.} The following sections list the identifiers used to denote such an algorithm.

@menu
* Public Key Algorithms:: A list of all public key algorithms.
* Hash Algorithms:: A list of all hash algorithms.
@end menu

@node Public Key Algorithms
@section Public Key Algorithms
@cindex algorithms, public key
@cindex public key algorithms

Public key algorithms are used for encryption, decryption, signing and verification of signatures.

@deftp {Data type} {enum gpgme_pubkey_algo_t}
@tindex gpgme_pubkey_algo_t
The @code{gpgme_pubkey_algo_t} type specifies the set of all public key algorithms that are supported by @acronym{GPGME}. Possible values are:

@table @code
@item GPGME_PK_RSA
This value indicates the RSA (Rivest, Shamir, Adleman) algorithm.

@item GPGME_PK_RSA_E
Deprecated. This value indicates the RSA (Rivest, Shamir, Adleman) algorithm for encryption and decryption only.

@item GPGME_PK_RSA_S
Deprecated. This value indicates the RSA (Rivest, Shamir, Adleman) algorithm for signing and verification only.

@item GPGME_PK_DSA
This value indicates DSA, the Digital Signature Algorithm.

@item GPGME_PK_ELG
This value indicates ElGamal.

@item GPGME_PK_ELG_E
This value also indicates ElGamal and is used specifically in GnuPG.

@item GPGME_PK_ECC
@since{1.5.0}

This value is a generic indicator for ellipic curve algorithms.

@item GPGME_PK_ECDSA
@since{1.3.0}

This value indicates ECDSA, the Elliptic Curve Digital Signature
Algorithm as defined by FIPS 186-2 and RFC-6637.

@item GPGME_PK_ECDH
@since{1.3.0}

This value indicates ECDH, the Eliptic Curve Diffie-Hellmann
encryption algorithm as defined by RFC-6637.

@item GPGME_PK_EDDSA
@since{1.7.0}

This value indicates the EdDSA algorithm.

@end table
@end deftp

@deftypefun {const char *} gpgme_pubkey_algo_name (@w{gpgme_pubkey_algo_t @var{algo}})
The function @code{gpgme_pubkey_algo_name} returns a pointer to a
statically allocated string containing a description of the public key
algorithm
 @var{algo}.  This string can be used to output the name of
the public key algorithm to the user.

If @var{algo} is not a valid public key algorithm, @code{NULL} is
returned.
@end deftypefun

@deftypefun {char *} gpgme_pubkey_algo_string (@w{gpgme_subkey_t @var{key}})
@since{1.7.0}

The function @code{gpgme_pubkey_algo_string} is a convenience function
to build and return an algorithm string in the same way GnuPG does
(e.g. ``rsa2048'' or ``ed25519'').  The caller must free the result
using @code{gpgme_free}.  On error (e.g. invalid argument or memory
exhausted), the function returns NULL and sets @code{ERRNO}.
@end deftypefun

```
@node Hash Algorithms
@section Hash Algorithms
@cindex algorithms, hash
@cindex algorithms, message digest
@cindex hash algorithms
@cindex message digest algorithms

Hash (message digest) algorithms are used to compress a long message
to make it suitable for public key cryptography.

@deftp {Data type} {enum gpgme_hash_algo_t}
@tindex gpgme_hash_algo_t
The
 @code{gpgme_hash_algo_t} type specifies the set of all hash algorithms
that are supported by @acronym{GPGME}.  Possible values are:

@table @code
@item GPGME_MD_MD5
@item GPGME_MD_SHA1
@item GPGME_MD_RMD160
@item GPGME_MD_MD2
@item GPGME_MD_TIGER
@item GPGME_MD_HAVAL
@item GPGME_MD_SHA256
@item GPGME_MD_SHA384
@item GPGME_MD_SHA512
@item GPGME_MD_SHA224
@since{1.5.0}

@item GPGME_MD_MD4
@item GPGME_MD_CRC32
@item GPGME_MD_CRC32_RFC1510
@item GPGME_MD_CRC24_RFC2440
@end table
@end deftp

@deftypefun {const char *} gpgme_hash_algo_name (@w{gpgme_hash_algo_t @var{algo}})
The function @code{gpgme_hash_algo_name} returns a pointer to a
statically allocated string containing a description of the hash
algorithm @var{algo}.  This string can be used to output the name of
the hash algorithm to the user.

If @var{algo} is not a valid hash algorithm, @code{NULL} is returned.
@end deftypefun
```

@node Error Handling
@chapter Error Handling
@cindex error handling

Many functions in @acronym{GPGME}
can return an error if they fail.
For this reason, the application should always catch the error
condition and take appropriate measures, for example by releasing the
resources and passing the error up to the caller, or by displaying a
descriptive message to the user and cancelling the operation.

Some error values do not indicate a system error or an error in the
operation, but the result of an operation that failed properly. For
example, if you try to decrypt a tempered message, the decryption will
fail. Another error value actually means that the end of a data
buffer or list has been reached. The following descriptions explain
for many error codes what they mean usually. Some error values have
specific meanings if returned by a certain functions. Such cases are
described in the documentation of those functions.

@acronym{GPGME} uses the @code{libgpg-error} library. This allows to
share the error codes with other components of the GnuPG system, and
thus pass error values transparently
from the crypto engine, or some
helper application of the crypto engine, to the user. This way no
information is lost. As a consequence, @acronym{GPGME} does not use
its own identifiers for error codes, but uses those provided by
@code{libgpg-error}. They usually start with @code{GPG_ERR_}.

However, @acronym{GPGME} does provide aliases for the functions
defined in libgpg-error, which might be preferred for name space
consistency.

@menu
* Error Values:: The error value and what it means.
* Error Sources:: A list of important error sources.
* Error Codes:: A list of important error codes.
* Error Strings:: How to get a descriptive string from a value.
@end menu

@node Error Values
@section Error Values
@cindex error values
@cindex error codes
@cindex error sources

@deftp {Data type} {gpgme_err_code_t}

The @code{gpgme_err_code_t} type is an alias for the @code{libgpg-error}
type @code{gpg_err_code_t}. The
error code indicates the type of an
error, or the reason why an operation failed.

A list of important error codes can be found in the next section.
@end deftp

@deftp {Data type} {gpgme_err_source_t}
The @code{gpgme_err_source_t} type is an alias for the
@code{libgpg-error} type @code{gpg_err_source_t}. The error source
has not a precisely defined meaning. Sometimes it is the place where
the error happened, sometimes it is the place where an error was
encoded into an error value. Usually the error source will give an
indication to where to look for the problem. This is not always true,
but it is attempted to achieve this goal.

A list of important error sources can be found in the next section.
@end deftp

@deftp {Data type} {gpgme_error_t}
The @code{gpgme_error_t} type is an alias for the @code{libgpg-error}
type @code{gpg_error_t}. An error value like this has always two
components, an error code and an error source. Both together form the
error value.

Thus, the error value
can not be directly compared against an error
code, but the accessor functions described below must be used.
However, it is guaranteed that only 0 is used to indicate success
(@code{GPG_ERR_NO_ERROR}), and that in this case all other parts of
the error value are set to 0, too.

Note that in @acronym{GPGME}, the error source is used purely for
diagnostical purposes. Only the error code should be checked to test
for a certain outcome of a function. The manual only documents the
error code part of an error value. The error source is left
unspecified and might be anything.
@end deftp

@deftypefun {static inline gpgme_err_code_t} gpgme_err_code (@w{gpgme_error_t @var{err}})
The static inline function @code{gpgme_err_code} returns the
@code{gpgme_err_code_t} component of the error value @var{err}. This
function must be used to extract the error code from an error value in
order to compare it with the @code{GPG_ERR_*} error code macros.
@end deftypefun

@deftypefun {static inline gpgme_err_source_t}

gpgme_err_source (@w{gpgme_error_t @var{err}})
The static inline function @code{gpgme_err_source} returns the
@code{gpgme_err_source_t} component of the error value @var{err}. This
function must be used to extract the error source from an error value in
order to compare it with the @code{GPG_ERR_SOURCE_*} error source macros.
@end deftypefun

@deftypefun {static inline gpgme_error_t} gpgme_err_make (@w{gpgme_err_source_t @var{source}},
@w{gpgme_err_code_t @var{code}})
The static inline function @code{gpgme_err_make} returns the error
value consisting of the error source @var{source} and the error code
@var{code}.

This function can be used in callback functions to construct an error
value to return it to the library.
@end deftypefun

@deftypefun {static inline gpgme_error_t} gpgme_error (@w{gpgme_err_code_t @var{code}})
The static inline function @code{gpgme_error} returns the error value
consisting of the default error source and the error code @var{code}.

For @acronym{GPGME}
applications, the default error source is
@code{GPG_ERR_SOURCE_USER_1}. You can define
@code{GPGME_ERR_SOURCE_DEFAULT} before including @file{gpgme.h} to
change this default.

This function can be used in callback functions to construct an error
value to return it to the library.
@end deftypefun

The @code{libgpg-error} library provides error codes for all system
error numbers it knows about. If @var{err} is an unknown error
number, the error code @code{GPG_ERR_UNKNOWN_ERRNO} is used. The
following functions can be used to construct error values from system
errnor numbers.

@deftypefun {gpgme_error_t} gpgme_err_make_from_errno (@w{gpgme_err_source_t @var{source}}, @w{int
@var{err}})
The function @code{gpgme_err_make_from_errno} is like
@code{gpgme_err_make}, but it takes a system error like @code{errno}
instead of a @code{gpgme_err_code_t} error code.
@end deftypefun

@deftypefun {gpgme_error_t} gpgme_error_from_errno (@w{int @var{err}})
The function @code{gpgme_error_from_errno}
is like @code{gpgme_error},
but it takes a system error like @code{errno} instead of a

@code{gpgme_err_code_t} error code.
@end deftypefun

Sometimes you might want to map system error numbers to error codes
directly, or map an error code representing a system error back to the
system error number.  The following functions can be used to do that.

@deftypefun {gpgme_err_code_t} gpgme_err_code_from_errno (@w{int @var{err}})
The function @code{gpgme_err_code_from_errno} returns the error code
for the system error @var{err}.  If @var{err} is not a known system
error, the function returns @code{GPG_ERR_UNKNOWN_ERRNO}.
@end deftypefun

@deftypefun {int} gpgme_err_code_to_errno (@w{gpgme_err_code_t @var{err}})
The function @code{gpgme_err_code_to_errno} returns the system error
for the error code @var{err}.  If @var{err} is not an error code
representing a system error, or if this system error is not defined on
this system, the function returns @code{0}.
@end deftypefun

@node Error Sources
@section
 Error Sources
@cindex error codes, list of

The library @code{libgpg-error} defines an error source for every
component of the GnuPG system.  The error source part of an error
value is not well defined.  As such it is mainly useful to improve the
diagnostic error message for the user.

If the error code part of an error value is @code{0}, the whole error
value will be @code{0}.  In this case the error source part is of
course @code{GPG_ERR_SOURCE_UNKNOWN}.

The list of error sources that might occur in applications using
@acronym{GPGME} is:

@table @code
@item GPG_ERR_SOURCE_UNKNOWN
The error source is not known.  The value of this error source is
@code{0}.

@item GPG_ERR_SOURCE_GPGME
The error source is @acronym{GPGME} itself.  This is the default for
errors that occur in the @acronym{GPGME} library.

@item GPG_ERR_SOURCE_GPG

The error source is GnuPG, which is the crypto engine used for the
OpenPGP protocol.

@item GPG_ERR_SOURCE_GPGSM
The error source is GPGSM, which is
the crypto engine used for the
CMS protocol.

@item GPG_ERR_SOURCE_GCRYPT
The error source is @code{libgcrypt}, which is used by crypto engines
to perform cryptographic operations.

@item GPG_ERR_SOURCE_GPGAGENT
The error source is @command{gpg-agent}, which is used by crypto
engines to perform operations with the secret key.

@item GPG_ERR_SOURCE_PINENTRY
The error source is @command{pinentry}, which is used by
@command{gpg-agent} to query the passphrase to unlock a secret key.

@item GPG_ERR_SOURCE_SCD
The error source is the SmartCard Daemon, which is used by
@command{gpg-agent} to delegate operations with the secret key to a
SmartCard.

@item GPG_ERR_SOURCE_KEYBOX
The error source is @code{libkbx}, a library used by the crypto
engines to manage local keyrings.

@item GPG_ERR_SOURCE_USER_1
@item GPG_ERR_SOURCE_USER_2
@item GPG_ERR_SOURCE_USER_3
@item GPG_ERR_SOURCE_USER_4
These error sources are not used by any GnuPG component and can be
used by other software. For example, applications
using
@acronym{GPGME} can use them to mark error values coming from callback
handlers. Thus @code{GPG_ERR_SOURCE_USER_1} is the default for errors
created with @code{gpgme_error} and @code{gpgme_error_from_errno},
unless you define @code{GPGME_ERR_SOURCE_DEFAULT} before including
@file{gpgme.h}.
@end table

@node Error Codes
@section Error Codes
@cindex error codes, list of

The library @code{libgpg-error} defines many error values. Most of them are not used by @code{GPGME} directly, but might be returned by @acronym{GPGME} because it received them from the crypto engine. The below list only includes such error codes that have a specific meaning in @code{GPGME}, or which are so common that you should know about them.

@table @code
@item GPG_ERR_EOF
This value indicates the end of a list, buffer or file.

@item GPG_ERR_NO_ERROR
This value indicates success. The value of this error code is @code{0}. Also, it is guaranteed that an error value made from the error code @code{0}
will be @code{0} itself (as a whole). This means that the error source information is lost for this error code, however, as this error code indicates that no error occurred, this is generally not a problem.

@item GPG_ERR_GENERAL
This value means that something went wrong, but either there is not enough information about the problem to return a more useful error value, or there is no separate error value for this type of problem.

@item GPG_ERR_ENOMEM
This value means that an out-of-memory condition occurred.

@item GPG_ERR_E...
System errors are mapped to GPG_ERR_FOO where FOO is the symbol for the system error.

@item GPG_ERR_INV_VALUE
This value means that some user provided data was out of range. This can also refer to objects. For example, if an empty @code{gpgme_data_t} object was expected, but one containing data was provided, this error value is returned.

@item GPG_ERR_UNUSABLE_PUBKEY
This value means that some recipients for a message were invalid.

@item GPG_ERR_UNUSABLE_SECKEY
This
value means that some signers were invalid.

@item GPG_ERR_NO_DATA
This value means that a @code{gpgme_data_t} object which was expected to have content was found empty.

@item GPG_ERR_CONFLICT
This value means that a conflict of some sort occurred.

@item GPG_ERR_NOT_IMPLEMENTED
This value indicates that the specific function (or operation) is not implemented. This error should never happen. It can only occur if you use certain values or configuration options which do not work, but for which we think that they should work at some later time.

@item GPG_ERR_DECRYPT_FAILED
This value indicates that a decryption operation was unsuccessful.

@item GPG_ERR_BAD_PASSPHRASE
This value means that the user did not provide a correct passphrase when requested.

@item GPG_ERR_CANCELED
This value means that the operation was canceled.

@item GPG_ERR_INV_ENGINE
This value means that the engine that implements the desired protocol is currently not available. This can either be because
the sources
were configured to exclude support for this engine, or because the engine is not installed properly.

@item GPG_ERR_AMBIGUOUS_NAME
This value indicates that a user ID or other specifier did not specify a unique key.

@item GPG_ERR_WRONG_KEY_USAGE
This value indicates that a key is not used appropriately.

@item GPG_ERR_CERT_REVOKED
This value indicates that a key signature was revoced.

@item GPG_ERR_CERT_EXPIRED
This value indicates that a key signature expired.

@item GPG_ERR_NO_CRL_KNOWN
This value indicates that no certificate revocation list is known for the certificate.

@item GPG_ERR_NO_POLICY_MATCH
This value indicates that a policy issue occurred.

@item GPG_ERR_NO_SECKEY

This value indicates that no secret key for the user ID is available.

@item GPG_ERR_MISSING_CERT
This value indicates that a key could not be imported because the
issuer certificate is missing.

@item GPG_ERR_BAD_CERT_CHAIN
This value indicates that a key could not be imported because its
certificate
 chain is not good, for example it could be too long.

@item GPG_ERR_UNSUPPORTED_ALGORITHM
This value means a verification failed because the cryptographic
algorithm is not supported by the crypto backend.

@item GPG_ERR_BAD_SIGNATURE
This value means a verification failed because the signature is bad.

@item GPG_ERR_NO_PUBKEY
This value means a verification failed because the public key is not
available.

@item GPG_ERR_USER_1
@item GPG_ERR_USER_2
@item ...
@item GPG_ERR_USER_16
These error codes are not used by any GnuPG component and can be
freely used by other software.  Applications using @acronym{GPGME}
might use them to mark specific errors returned by callback handlers
if no suitable error codes (including the system errors) for
these errors exist already.
@end table

@node Error Strings
@section Error Strings
@cindex error values, printing of
@cindex error codes, printing of
@cindex error sources, printing of
@cindex error strings

@deftypefun {const char *} gpgme_strerror
 (@w{gpgme_error_t @var{err}})
The function @code{gpgme_strerror} returns a pointer to a statically
allocated string containing a description of the error code contained
in the error value @var{err}.  This string can be used to output a
diagnostic message to the user.

This function is not thread safe.  Use @code{gpgme_strerror_r} in
multi-threaded programs.
@end deftypefun

@deftypefun {int} gpgme_strerror_r (@w{gpgme_error_t @var{err}}, @w{char *@var{buf}}, @w{size_t @var{buflen}})
The function @code{gpgme_strerror_r} returns the error string for
@var{err} in the user-supplied buffer @var{buf} of size @var{buflen}.
This function is, in contrast to @code{gpgme_strerror}, thread-safe if
a thread-safe @code{strerror_r} function is provided by the system.
If the function succeeds, 0 is returned and @var{buf} contains the
string describing the error.  If the buffer was not large enough,
ERANGE is returned and @var{buf} contains as much of the beginning of
the error string as fits into
 the buffer.
@end deftypefun

@deftypefun {const char *} gpgme_strsource (@w{gpgme_error_t @var{err}})
The function @code{gpgme_strerror} returns a pointer to a statically
allocated string containing a description of the error source
contained in the error value @var{err}.  This string can be used to
output a diagnostic message to the user.
@end deftypefun

The following example illustrates the use of @code{gpgme_strerror}:

```
@example
gpgme_ctx_t ctx;
gpgme_error_t err = gpgme_new (&ctx);
if (err)
 @{
   fprintf (stderr, "%s: creating GpgME context failed: %s: %s\n",
            argv[0], gpgme_strsource (err), gpgme_strerror (err));
   exit (1);
 @}
@end example
```

@node Exchanging Data
@chapter Exchanging Data
@cindex data, exchanging

A lot of data has to be exchanged between the user and the crypto
engine, like plaintext messages, ciphertext, signatures and
information about the keys.  The technical details about exchanging
the data information are completely abstracted by @acronym{GPGME}.

The
 user provides and receives the data via @code{gpgme_data_t} objects,
regardless of the communication protocol between @acronym{GPGME} and
the crypto engine in use.

@deftp {Data type} {gpgme_data_t}
The @code{gpgme_data_t} type is a handle for a container for generic
data, which is used by @acronym{GPGME} to exchange data with the user.
@end deftp

@code{gpgme_data_t} objects do not provide notifications on events.
It is assumed that read and write operations are blocking until data
is available.  If this is undesirable, the application must ensure
that all GPGME data operations always have data available, for example
by using memory buffers or files rather than pipes or sockets.  This
might be relevant, for example, if the external event loop mechanism
is used.

@deftp {Data type} {gpgme_off_t}
@since{1.4.1}

On POSIX platforms the @code{gpgme_off_t} type is an alias for
@code{off_t}; it may be used interchangeable.  On Windows platforms
@code{gpgme_off_t} is defined as
 a long (i.e. 32 bit) for 32 bit
Windows and as a 64 bit signed integer for 64 bit Windows.
@end deftp

@deftp {Data type} {gpgme_ssize_t}
The @code{gpgme_ssize_t} type is an alias for @code{ssize_t}.  It has
only been introduced to overcome portability problems pertaining to
the declaration of @code{ssize_t} by different toolchains.
@end deftp

@menu
* Creating Data Buffers::  Creating new data buffers.
* Destroying Data Buffers::  Releasing data buffers.
* Manipulating Data Buffers::  Operations on data buffers.
@end menu

@node Creating Data Buffers
@section Creating Data Buffers
@cindex data buffer, creation

Data objects can be based on memory, files, or callback functions
provided by the user.  Not all operations are supported by all

objects.

@menu
* Memory Based Data Buffers:: Creating memory based data buffers.
* File Based Data Buffers:: Creating file based data buffers.
* Callback Based Data Buffers:: Creating callback based data buffers.
@end menu

@node
Memory Based Data Buffers
@subsection Memory Based Data Buffers

Memory based data objects store all data in allocated memory. This is
convenient, but only practical for an amount of data that is a
fraction of the available physical memory. The data has to be copied
from its source and to its destination, which can often be avoided by
using one of the other data object

@deftypefun gpgme_error_t gpgme_data_new (@w{gpgme_data_t *@var{dh}})
The function @code{gpgme_data_new} creates a new @code{gpgme_data_t}
object and returns a handle for it in @var{dh}. The data object is
memory based and initially empty.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, @code{GPG_ERR_INV_VALUE} if
@var{dh} is not a valid pointer, and @code{GPG_ERR_ENOMEM} if not
enough memory is available.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_new_from_mem (@w{gpgme_data_t *@var{dh}}, @w{const char
*@var{buffer}}, @w{size_t @var{size}},
@w{int @var{copy}})
The function @code{gpgme_data_new_from_mem} creates a new
@code{gpgme_data_t} object and fills it with @var{size} bytes starting
from @var{buffer}.

If @var{copy} is not zero, a private copy of the data is made. If
@var{copy} is zero, the data is taken from the specified buffer as
needed, and the user has to ensure that the buffer remains valid for
the whole life span of the data object.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, @code{GPG_ERR_INV_VALUE} if
@var{dh} or @var{buffer} is not a valid pointer, and
@code{GPG_ERR_ENOMEM} if not enough memory is available.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_new_from_file (@w{gpgme_data_t *@var{dh}}, @w{const char *@var{filename}}, @w{int @var{copy}})
The function @code{gpgme_data_new_from_file} creates a new
@code{gpgme_data_t} object and fills it with the content of the file
@var{filename}.

If @var{copy} is not zero, the whole file is
read in at initialization
time and the file is not used anymore after that. This is the only
mode supported currently. Later, a value of zero for @var{copy} might
cause all reads to be delayed until the data is needed, but this is
not yet implemented.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, @code{GPG_ERR_INV_VALUE} if
@var{dh} or @var{filename} is not a valid pointer,
@code{GPG_ERR_NOT_IMPLEMENTED} if @var{code} is zero, and
@code{GPG_ERR_ENOMEM} if not enough memory is available.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_new_from_filepart (@w{gpgme_data_t *@var{dh}}, @w{const char *@var{filename}}, @w{FILE *@var{fp}}, @w{off_t @var{offset}}, @w{size_t @var{length}})
The function @code{gpgme_data_new_from_filepart} creates a new
@code{gpgme_data_t} object and fills it with a part of the file specified
by @var{filename} or @var{fp}.

Exactly one of @var{filename} and @var{fp} must be non-zero, the other
must
be zero. The argument that is not zero specifies the file from
which @var{length} bytes are read into the data object, starting from
@var{offset}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, @code{GPG_ERR_INV_VALUE} if
@var{dh} and exactly one of @var{filename} and @var{fp} is not a valid
pointer, and @code{GPG_ERR_ENOMEM} if not enough memory is available.
@end deftypefun

@node File Based Data Buffers
@subsection File Based Data Buffers

File based data objects operate directly on file descriptors or
streams. Only a small amount of data is stored in core at any time,
so the size of the data objects is not limited by @acronym{GPGME}.

@deftypefun gpgme_error_t gpgme_data_new_from_fd (@w{gpgme_data_t *@var{dh}}, @w{int @var{fd}})

The function @code{gpgme_data_new_from_fd} creates a new
@code{gpgme_data_t} object and uses the file descriptor @var{fd} to read
from (if used as an input data object) and write to (if used as
an
output data object).

When using the data object as an input buffer, the function might read
a bit more from the file descriptor than is actually needed by the
crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the file descriptor is set to blocking
mode. Errors during I/O operations, except for EINTR, are usually
fatal for crypto operations.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, and @code{GPG_ERR_ENOMEM} if not
enough memory is available.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_new_from_stream (@w{gpgme_data_t *@var{dh}}, @w{FILE
*@var{stream}})
The function @code{gpgme_data_new_from_stream} creates a new
@code{gpgme_data_t} object and uses the I/O stream @var{stream} to read
from (if used as an input data object) and write to (if used as an
output data object).

When using the data object as an input buffer, the function might read
a bit more from the
stream than is actually needed by the crypto
engine in the desired operation because of internal buffering.

Note that GPGME assumes that the stream is in blocking mode. Errors
during I/O operations, except for EINTR, are usually fatal for crypto
operations.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, and @code{GPG_ERR_ENOMEM} if not
enough memory is available.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_new_from_estream (@w{gpgme_data_t *@var{dh}},
@w{gpgrt_stream_t @var{stream}})
The function @code{gpgme_data_new_from_estream} creates a new
@code{gpgme_data_t} object and uses the gpgrt stream @var{stream} to read
from (if used as an input data object) and write to (if used as an
output data object).

When using the data object as an input buffer, the function might read

a bit more from the stream than is actually needed by the crypto
engine in the desired operation because of internal buffering.

Note that GPGME
 assumes that the stream is in blocking mode.  Errors
during I/O operations, except for EINTR, are usually fatal for crypto
operations.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, and @code{GPG_ERR_ENOMEM} if not
enough memory is available.
@end deftypefun

@node Callback Based Data Buffers
@subsection Callback Based Data Buffers

If neither memory nor file based data objects are a good fit for your
application, you can implement the functions a data object provides
yourself and create a data object from these callback functions.

@deftp {Data type} {ssize_t (*gpgme_data_read_cb_t) (@w{void *@var{handle}}, @w{void @var{*buffer}},
@w{size_t @var{size}})}
@tindex gpgme_data_read_cb_t
The @code{gpgme_data_read_cb_t} type is the type of functions which
@acronym{GPGME} calls if it wants to read data from a user-implemented
data object.  The function should read up to @var{size} bytes from the
current read position into the space
 starting at @var{buffer}.  The
@var{handle} is provided by the user at data object creation time.

Note that GPGME assumes that the read blocks until data is available.
Errors during I/O operations, except for EINTR, are usually fatal for
crypto operations.

The function should return the number of bytes read, 0 on EOF, and -1
on error.  If an error occurs, @var{errno} should be set to describe
the type of the error.
@end deftp

@deftp {Data type} {ssize_t (*gpgme_data_write_cb_t) (@w{void *@var{handle}}, @w{const void
@var{*buffer}}, @w{size_t @var{size}})}
@tindex gpgme_data_write_cb_t
The @code{gpgme_data_write_cb_t} type is the type of functions which
@acronym{GPGME} calls if it wants to write data to a user-implemented
data object.  The function should write up to @var{size} bytes to the
current write position from the space starting at @var{buffer}.  The
@var{handle} is provided by the user at data object creation time.

Note that GPGME assumes that the write blocks until data
is available.
Errors during I/O operations, except for EINTR, are usually fatal for
crypto operations.

The function should return the number of bytes written, and -1 on
error. If an error occurs, @var{errno} should be set to describe the
type of the error.
@end deftp

@deftp {Data type} {off_t (*gpgme_data_seek_cb_t) (@w{void *@var{handle}}, @w{off_t @var{offset}},
@w{int @var{whence}})}
@tindex gpgme_data_seek_cb_t
The @code{gpgme_data_seek_cb_t} type is the type of functions which
@acronym{GPGME} calls if it wants to change the current read/write
position in a user-implemented data object, just like the @code{lseek}
function.

The function should return the new read/write position, and -1 on
error. If an error occurs, @var{errno} should be set to describe the
type of the error.
@end deftp

@deftp {Data type} {void (*gpgme_data_release_cb_t) (@w{void *@var{handle}})}
@tindex gpgme_data_release_cb_t
The @code{gpgme_data_release_cb_t} type is the type of functions which
@acronym{GPGME}
calls if it wants to destroy a user-implemented data
object. The @var{handle} is provided by the user at data object
creation time.
@end deftp

@deftp {Data type} {struct gpgme_data_cbs}
This structure is used to store the data callback interface functions
described above. It has the following members:

@table @code
@item gpgme_data_read_cb_t read
This is the function called by @acronym{GPGME} to read data from the
data object. It is only required for input data object.

@item gpgme_data_write_cb_t write
This is the function called by @acronym{GPGME} to write data to the
data object. It is only required for output data object.

@item gpgme_data_seek_cb_t seek
This is the function called by @acronym{GPGME} to change the current

read/write pointer in the data object (if available).  It is optional.

@item gpgme_data_release_cb_t release
This is the function called by @acronym{GPGME} to release a data
object.  It is optional.
@end table
@end deftp

@deftypefun gpgme_error_t gpgme_data_new_from_cbs
 (@w{gpgme_data_t *@var{dh}}, @w{gpgme_data_cbs_t @var{cbs}}, @w{void *@var{handle}})
The function @code{gpgme_data_new_from_cbs} creates a new
@code{gpgme_data_t} object and uses the user-provided callback functions
to operate on the data object.

The handle @var{handle} is passed as first argument to the callback
functions.  This can be used to identify this data object.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, and @code{GPG_ERR_ENOMEM} if not
enough memory is available.
@end deftypefun

@node Destroying Data Buffers
@section Destroying Data Buffers
@cindex data buffer, destruction

@deftypefun void gpgme_data_release (@w{gpgme_data_t @var{dh}})
The function @code{gpgme_data_release} destroys the data object with
the handle @var{dh}.  It releases all associated resources that were
not provided by the user in the first place.
@end deftypefun

@deftypefun {char *} gpgme_data_release_and_get_mem (@w{gpgme_data_t
 @var{dh}}, @w{size_t *@var{length}})
The function @code{gpgme_data_release_and_get_mem} is like
@code{gpgme_data_release}, except that it returns the data buffer and
its length that was provided by the object.

The user has to release the buffer with @code{gpgme_free}.  In case
the user provided the data buffer in non-copy mode, a copy will be
made for this purpose.

In case an error returns, or there is no suitable data buffer that can
be returned to the user, the function will return @code{NULL}.  In any
case, the data object @var{dh} is destroyed.
@end deftypefun

@deftypefun void gpgme_free (@w{void *@var{buffer}})
@since{1.1.1}

The function @code{gpgme_free} releases the memory returned by
@code{gpgme_data_release_and_get_mem} and
@code{gpgme_pubkey_algo_string}. It should be used instead of the
system libraries @code{free} function in case different allocators are
used by a program. This is often the case if gpgme is used under
Windows as a DLL.
@end deftypefun

@node
Manipulating Data Buffers
@section Manipulating Data Buffers
@cindex data buffer, manipulation

Data buffers contain data and meta-data. The following operations can
be used to manipulate both.

@menu
* Data Buffer I/O Operations:: I/O operations on data buffers.
* Data Buffer Meta-Data:: Meta-data manipulation of data buffers.
* Data Buffer Convenience:: Convenience function for data buffers.
@end menu

@node Data Buffer I/O Operations
@subsection Data Buffer I/O Operations
@cindex data buffer, I/O operations
@cindex data buffer, read
@cindex data buffer, write
@cindex data buffer, seek

@deftypefun ssize_t gpgme_data_read (@w{gpgme_data_t @var{dh}}, @w{void *@var{buffer}}, @w{size_t @var{length}})
The function @code{gpgme_data_read} reads up to @var{length} bytes
from the data object with the handle @var{dh} into the space starting
at @var{buffer}.

If no error occurs, the actual amount read is returned. If the end of
the data object is reached, the function returns
0.

In all other cases, the function returns -1 and sets @var{errno}.
@end deftypefun

@deftypefun ssize_t gpgme_data_write (@w{gpgme_data_t @var{dh}}, @w{const void *@var{buffer}}, @w{size_t @var{size}})
The function @code{gpgme_data_write} writes up to @var{size} bytes
starting from @var{buffer} into the data object with the handle
@var{dh} at the current write position.

The function returns the number of bytes actually written, or -1 if an
error occurs.  If an error occurs, @var{errno} is set.
@end deftypefun

@deftypefun off_t gpgme_data_seek (@w{gpgme_data_t @var{dh}}, @w{off_t @var{offset}}, @w{int @var{whence}})
The function @code{gpgme_data_seek} changes the current read/write
position.

The @var{whence} argument specifies how the @var{offset} should be
interpreted.  It must be one of the following symbolic constants:

@table @code
@item SEEK_SET
Specifies that @var{offset} is a count of characters from the
beginning of the data object.

@item SEEK_CUR
Specifies that @var{offset}
 is a count of characters from the current
file position.  This count may be positive or negative.

@item SEEK_END
Specifies that @var{offset} is a count of characters from the end of
the data object.  A negative count specifies a position within the
current extent of the data object; a positive count specifies a
position past the current end.  If you set the position past the
current end, and actually write data, you will extend the data object
with zeros up to that position.
@end table

If successful, the function returns the resulting file position,
measured in bytes from the beginning of the data object.  You can use
this feature together with @code{SEEK_CUR} to read the current
read/write position.

If the function fails, -1 is returned and @var{errno} is set.
@end deftypefun

@node Data Buffer Meta-Data

@subsection Data Buffer Meta-Data
@cindex data buffer, meta-data
@cindex data buffer, file name
@cindex data buffer, encoding

@deftypefun {char *} gpgme_data_get_file_name
(@w{gpgme_data_t @var{dh}})
@since{1.1.0}

The function @code{gpgme_data_get_file_name} returns a pointer to a string containing the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting or verifying the output data.

If no error occurs, the string containing the file name is returned. Otherwise, @code{NULL} will be returned.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_set_file_name (@w{gpgme_data_t @var{dh}}, @w{const char *@var{file_name}})
@since{1.1.0}

The function @code{gpgme_data_set_file_name} sets the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting or verifying the output data.

The function returns the error code @code{GPG_ERR_INV_VALUE} if @var{dh} is not a valid pointer and @code{GPG_ERR_ENOMEM} if not enough memory is available.
@end
deftypefun

@deftp {Data type} {enum gpgme_data_encoding_t}
@tindex gpgme_data_encoding_t
The @code{gpgme_data_encoding_t} type specifies the encoding of a @code{gpgme_data_t} object. For input data objects, the encoding is useful to give the backend a hint on the type of data. For output data objects, the encoding can specify the output data format on certain operations. Please note that not all backends support all encodings on all operations. The following data types are available:

@table @code
@item GPGME_DATA_ENCODING_NONE
This specifies that the encoding is not known. This is the default

for a new data object.  The backend will try its best to detect the
encoding automatically.

@item GPGME_DATA_ENCODING_BINARY
This specifies that the data is encoding in binary form; i.e. there is
no special encoding.

@item GPGME_DATA_ENCODING_BASE64
This specifies that the data is encoded using the Base-64 encoding
scheme as used by @acronym{MIME} and other protocols.

@item
GPGME_DATA_ENCODING_ARMOR
This specifies that the data is encoded in an armored form as used by
OpenPGP and PEM.

@item GPGME_DATA_ENCODING_MIME
@since{1.7.0}

This specifies that the data is encoded as a MIME part.

@item GPGME_DATA_ENCODING_URL
@since{1.2.0}

The data is a list of linefeed delimited URLs.  This is only useful with
@code{gpgme_op_import}.

@item GPGME_DATA_ENCODING_URL0
@since{1.2.0}

The data is a list of binary zero delimited URLs.  This is only useful
with @code{gpgme_op_import}.

@item GPGME_DATA_ENCODING_URLESC
@since{1.2.0}

The data is a list of linefeed delimited URLs with all control and space
characters percent escaped.  This mode is is not yet implemented.

@end table
@end deftp

@deftypefun gpgme_data_encoding_t gpgme_data_get_encoding (@w{gpgme_data_t @var{dh}})
The function @code{gpgme_data_get_encoding} returns the encoding of
the data object with the handle @var{dh}.  If @var{dh} is not a valid
pointer (e.g. @code{NULL}) @code{GPGME_DATA_ENCODING_NONE}
is
returned.

@end deftypefun

@deftypefun gpgme_error_t gpgme_data_set_encoding (@w{gpgme_data_t @var{dh}, gpgme_data_encoding_t @var{enc}})
The function @code{gpgme_data_set_encoding} changes the encoding of
the data object with the handle @var{dh} to @var{enc}.
@end deftypefun

@deftypefun {gpgme_error_t} gpgme_data_set_flag @
(@w{gpgme_data_t @var{dh}}, @
@w{const char *@var{name}}, @
@w{const char *@var{value}})

@since{1.7.0}

Some minor properties of the data object can be controlled with flags
set by this function. The properties are identified by the following
values for @var{name}:

@table @code
@item size-hint
The value is a decimal number with the length gpgme shall assume for
this data object. This is useful if the data is provided by callbacks
or via file descriptors but the applications knows the total size of
the data. If this is set the OpenPGP engine may use this to decide on
buffer allocation strategies and to provide a total
value for its
progress information.

@end table

This function returns @code{0} on success.
@end deftypefun

@node Data Buffer Convenience
@subsection Data Buffer Convenience Functions
@cindex data buffer, convenience
@cindex type of data
@cindex identify

@deftp {Data type} {enum gpgme_data_type_t}
@tindex gpgme_data_type_t
@since{1.4.3}

The @code{gpgme_data_type_t} type is used to return the detected type
of the content of a data buffer.
@end deftp

@table @code
@item GPGME_DATA_TYPE_INVALID
This is returned by @code{gpgme_data_identify} if it was not possible
to identify the data.  Reasons for this might be a non-seekable stream
or a memory problem.  The value is 0.
@item GPGME_DATA_TYPE_UNKNOWN
The type of the data is not known.
@item GPGME_DATA_TYPE_PGP_SIGNED
The data is an OpenPGP signed message.  This may be a binary
signature, a detached one or a cleartext signature.
@item GPGME_DATA_TYPE_PGP_ENCRYPTED
@since{1.7.0}

The data is an OpenPGP encrypted message.
@item GPGME_DATA_TYPE_PGP_SIGNATURE
@since{1.7.0}

The
 data is an OpenPGP detached signature.
@item GPGME_DATA_TYPE_PGP_OTHER
This is a generic OpenPGP message.  In most cases this will be
encrypted data.
@item GPGME_DATA_TYPE_PGP_KEY
This is an OpenPGP key (private or public).
@item GPGME_DATA_TYPE_CMS_SIGNED
This is a CMS signed message.
@item GPGME_DATA_TYPE_CMS_ENCRYPTED
This is a CMS encrypted (enveloped data) message.
@item GPGME_DATA_TYPE_CMS_OTHER
This is used for other CMS message types.
@item GPGME_DATA_TYPE_X509_CERT
The data is a X.509 certificate
@item GPGME_DATA_TYPE_PKCS12
The data is a PKCS#12 message.  This is commonly used to exchange
private keys for X.509.
@end table

@deftypefun gpgme_data_type_t gpgme_data_identify (@w{gpgme_data_t @var{dh}})
@since{1.4.3}

The function @code{gpgme_data_identify} returns the type of the data
with the handle @var{dh}.  If it is not possible to perform the
identification, the function returns zero
(@code{GPGME_DATA_TYPE_INVALID}).  Note that depending
 on how the data
object has been created the identification may not be possible or the
data object may change its internal state (file pointer moved).  For

file or memory based data object, the state should not change.
@end deftypefun

@c
@c  Chapter Contexts
@c
@node Contexts
@chapter Contexts
@cindex context

All cryptographic operations in @acronym{GPGME} are performed within a context, which contains the internal state of the operation as well as configuration parameters.  By using several contexts you can run several cryptographic operations in parallel, with different configuration.

@deftp {Data type} {gpgme_ctx_t}
The @code{gpgme_ctx_t} type is a handle for a @acronym{GPGME} context, which is used to hold the configuration, status and result of cryptographic operations.
@end deftp

@menu
* Creating Contexts::  Creating new @acronym{GPGME} contexts.
* Destroying Contexts::  Releasing @acronym{GPGME} contexts.
* Result Management::  Managing the
 result of crypto operations.
* Context Attributes::  Setting properties of a context.
* Key Management::  Managing keys with @acronym{GPGME}.
* Crypto Operations::  Using a context for cryptography.
* Miscellaneous::  Miscellaneous operations
* Run Control::  Controlling how operations are run.
@end menu

@node Creating Contexts
@section Creating Contexts
@cindex context, creation

@deftypefun gpgme_error_t gpgme_new (@w{gpgme_ctx_t *@var{ctx}})
The function @code{gpgme_new} creates a new @code{gpgme_ctx_t} object and returns a handle for it in @var{ctx}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the context was successfully created, @code{GPG_ERR_INV_VALUE} if @var{ctx} is not a valid pointer, and @code{GPG_ERR_ENOMEM} if not enough memory is available.  Also, it returns

@code{GPG_ERR_NOT_OPERATIONAL} if @code{gpgme_check_version} was not
called to initialize GPGME, and @code{GPG_ERR_SELFTEST_FAILED}
if a
selftest failed. Currently, the only selftest is for Windows MingW32
targets to see if @code{-mms-bitfields} was used (as required).
@end deftypefun

@node Destroying Contexts
@section Destroying Contexts
@cindex context, destruction

@deftypefun void gpgme_release (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_release} destroys the context with the handle
@var{ctx} and releases all associated resources.
@end deftypefun

@node Result Management
@section Result Management
@cindex context, result of operation

The detailed result of an operation is returned in operation-specific
structures such as @code{gpgme_decrypt_result_t}. The corresponding
retrieval functions such as @code{gpgme_op_decrypt_result} provide
static access to the results after an operation completes. Those
structures shall be considered read-only and an application must not
allocate such a structure on its own. The following interfaces make
it possible to detach a result structure from its associated
context
and give it a lifetime beyond that of the current operation or
context.

@deftypefun void gpgme_result_ref (@w{void *@var{result}})
@since{1.2.0}

The function @code{gpgme_result_ref} acquires an additional reference
for the result @var{result}, which may be of any type
@code{gpgme_*_result_t}. As long as the user holds a reference, the
result structure is guaranteed to be valid and unmodified.
@end deftypefun

@deftypefun void gpgme_result_unref (@w{void *@var{result}})
@since{1.2.0}

The function @code{gpgme_result_unref} releases a reference for the
result @var{result}. If this was the last reference, the result
structure will be destroyed and all resources associated to it will be

released.
@end deftypefun

Note that a context may hold its own references to result structures,
typically until the context is destroyed or the next operation is
started.  In fact, these references are accessed through the
@code{gpgme_op_*_result} functions.

@node Context Attributes
@section
 Context Attributes
@cindex context, attributes

@menu
* Protocol Selection::  Selecting the protocol used by a context.
* Crypto Engine::  Configuring the crypto engine.
* Setting the Sender::  How to tell the engine the sender.
* ASCII Armor::  Requesting @acronym{ASCII} armored output.
* Text Mode::  Choosing canonical text mode.
* Offline Mode::  Choosing offline mode.
* Pinentry Mode::  Choosing the pinentry mode.
* Included Certificates::  Including a number of certificates.
* Key Listing Mode::  Selecting key listing mode.
* Passphrase Callback::  Getting the passphrase from the user.
* Progress Meter Callback::  Being informed about the progress.
* Status Message Callback::  Status messages received from gpg.
* Context Flags::  Additional flags for a context.
* Locale::  Setting the locale of a context.
*
 Additional Logs::  Additional logs of a context.
@end menu

@node Protocol Selection
@subsection Protocol Selection
@cindex context, selecting protocol
@cindex protocol, selecting

@deftypefun gpgme_error_t gpgme_set_protocol (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_protocol_t @var{proto}})
The function @code{gpgme_set_protocol} sets the protocol used within
the context @var{ctx} to @var{proto}.  All crypto operations will be
performed by the crypto engine configured for that protocol.
@xref{Protocols and Engines}.

Setting the protocol with @code{gpgme_set_protocol} does intentionally
not check if the crypto engine for that protocol is available and

installed correctly.  @xref{Engine Version Check}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
protocol could be set successfully, and @code{GPG_ERR_INV_VALUE} if
@var{protocol} is not a valid protocol.
@end deftypefun

@deftypefun gpgme_protocol_t gpgme_get_protocol (@w{gpgme_ctx_t @var{ctx}})
The
 function @code{gpgme_get_protocol} retrieves the protocol currently
use with the context @var{ctx}.
@end deftypefun

@node Crypto Engine
@subsection Crypto Engine
@cindex context, configuring engine
@cindex engine, configuration per context

The following functions can be used to set and retrieve the
configuration of the crypto engines of a specific context.  The
default can also be retrieved without any particular context.
@xref{Engine Information}.  The default can also be changed globally.
@xref{Engine Configuration}.

@deftypefun gpgme_engine_info_t gpgme_ctx_get_engine_info (@w{gpgme_ctx_t @var{ctx}})
@since{1.1.0}

The function @code{gpgme_ctx_get_engine_info} returns a linked list of
engine info structures.  Each info structure describes the
configuration of one configured backend, as used by the context
@var{ctx}.

The result is valid until the next invocation of
@code{gpgme_ctx_set_engine_info} for this particular context.

This function can not fail.
@end deftypefun

@deftypefun
 gpgme_error_t gpgme_ctx_set_engine_info (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_protocol_t
@var{proto}}, @w{const char *@var{file_name}}, @w{const char *@var{home_dir}})
@since{1.1.0}

The function @code{gpgme_ctx_set_engine_info} changes the
configuration of the crypto engine implementing the protocol
@var{proto} for the context @var{ctx}.

@var{file_name} is the file name of the executable program
implementing this protocol, and @var{home_dir} is the directory name
of the configuration directory for this crypto engine.  If
@var{home_dir} is @code{NULL}, the engine's default will be used.

Currently this function must be used before starting the first crypto
operation.  It is unspecified if and when the changes will take effect
if the function is called after starting the first operation on the
context @var{ctx}.

This function returns the error code @code{GPG_ERR_NO_ERROR} if
successful, or an error code on failure.
@end deftypefun

@node Setting the Sender
@subsection How to tell
 the engine the sender.
@cindex context, sender
@cindex sender
@cindex From:

Some engines can make use of the senders address, for example to
figure out the best user id in certain trust models.  For verification
and signing of mails, it is thus suggested to let the engine know the
sender ("From:") address.  @acronym{GPGME} provides two functions to
accomplish that.  Note that the esoteric use of multiple "From:"
addresses is not supported.

@deftypefun gpgme_error_t gpgme_set_sender @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{int @var{address}})

@since{1.8.0}

The function @code{gpgme_set_sender} specifies the sender address for
use in sign and verify operations.  @var{address} is expected to be
the ``addr-spec'' part of an address but my also be a complete mailbox
address, in which case this function extracts the ``addr-spec'' from
it.  Using @code{NULL} for @var{address} clears the sender address.

The function returns 0 on success or an error code on failure.  The
most likely
 failure is that no valid ``addr-spec'' was found in
@var{address}.

@end deftypefun

```
@deftypefun @w{const char *} gpgme_get_sender @
    (@w{gpgme_ctx_t @var{ctx}})

@since{1.8.0}

The function @code{gpgme_get_sender} returns the current sender
address from the context, or NULL if none was set.  The returned
value is valid as long as the @var{ctx} is valid and
@code{gpgme_set_sender} has not been called again.

@end deftypefun



@c FIXME: Unfortunately, using @acronym here breaks texi2dvi.
@node ASCII Armor
@subsection @acronym{ASCII} Armor
@cindex context, armor mode
@cindex @acronym{ASCII} armor
@cindex armor mode

@deftypefun void gpgme_set_armor (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{yes}})
The function @code{gpgme_set_armor} specifies if the output should be
@acronym{ASCII} armored.  By default, output is not @acronym{ASCII}
armored.

@acronym{ASCII} armored output is disabled if @var{yes} is zero, and
enabled otherwise.
@end deftypefun

@deftypefun int gpgme_get_armor (@w{gpgme_ctx_t
 @var{ctx}})
The function @code{gpgme_get_armor} returns 1 if the output is
@acronym{ASCII} armored, and @code{0} if it is not, or if @var{ctx} is
not a valid pointer.
@end deftypefun


@node Text Mode
@subsection Text Mode
@cindex context, text mode
@cindex text mode
@cindex canonical text mode

@deftypefun void gpgme_set_textmode (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{yes}})
The function @code{gpgme_set_textmode} specifies if canonical text mode
should be used.  By default, text mode is not used.
```

Text mode is for example used for the RFC2015 signatures; note that
the updated RFC 3156 mandates that the mail user agent does some
preparations so that text mode is not needed anymore.

This option is only relevant to the OpenPGP crypto engine, and ignored
by all other engines.

Canonical text mode is disabled if @var{yes} is zero, and enabled
otherwise.
@end deftypefun

@deftypefun int gpgme_get_textmode (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_get_textmode} returns
 1 if canonical text
mode is enabled, and @code{0} if it is not, or if @var{ctx} is not a
valid pointer.
@end deftypefun

@node Offline Mode
@subsection Offline Mode
@cindex context, offline mode
@cindex offline mode

@deftypefun void gpgme_set_offline (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{yes}})
@since{1.6.0}

The function @code{gpgme_set_offline} specifies if offline mode should
be used.  Offline mode is disabled if @var{yes} is zero, and enabled
otherwise.  By default, offline mode is disabled.

The details of the offline mode depend on the used protocol and its
backend engine.  It may eventually be extended to be more stricter and
for example completely disable the use of Dirmngr for any engine.

For the CMS protocol the offline mode specifies whether Dirmngr shall
be used to do additional validation that might require connecting
external services (e.g. CRL / OCSP checks).  Here the offline mode
only affects the keylist mode @code{GPGME_KEYLIST_MODE_VALIDATE}.

For the OpenPGP
 protocol offline mode entirely disables the use of the
Dirmngr and will thus guarantee that no network connections are done
as part of an operation on this context.  It has only an effect with
GnuPG versions 2.1.23 or later.

For all other protocols the offline mode is currently ignored.

@end deftypefun

@deftypefun int gpgme_get_offline (@w{gpgme_ctx_t @var{ctx}})
@since{1.6.0}

The function @code{gpgme_get_offline} returns 1 if offline
mode is enabled, and @code{0} if it is not, or if @var{ctx} is not a
valid pointer.
@end deftypefun

@node Pinentry Mode
@subsection Pinentry Mode
@cindex context, pinentry mode
@cindex pinentry mode

@deftypefun gpgme_error_t gpgme_set_pinentry_mode (@w{gpgme_ctx_t @var{ctx}},
@w{gpgme_pinentry_mode_t @var{mode}})

@since{1.4.0}

The function @code{gpgme_set_pinentry_mode} specifies the pinentry mode
to be used.

For GnuPG >= 2.1 this option is required to be set to
@code{GPGME_PINENTRY_MODE_LOOPBACK} to enable the passphrase callback
mechanism in GPGME
 through @code{gpgme_set_passphrase_cb}.
@end deftypefun

@deftypefun gpgme_pinentry_mode_t gpgme_get_pinentry_mode (@w{gpgme_ctx_t @var{ctx}})
@since{1.4.0}

The function @code{gpgme_get_pinenty_mode} returns the
mode set for the context.
@end deftypefun

@deftp {Data type} {enum gpgme_pinentry_mode_t}
@tindex gpgme_pinentry_mode_t
@since{1.4.0}

The @code{gpgme_minentry_mode_t} type specifies the set of possible pinentry
modes that are supported by @acronym{GPGME} if GnuPG >= 2.1 is used.
The following modes are supported:

@table @code
@item GPGME_PINENTRY_MODE_DEFAULT
@since{1.4.0}

Use the default of the agent, which is ask.

@item GPGME_PINENTRY_MODE_ASK
@since{1.4.0}

Force the use of the Pinentry.

@item GPGME_PINENTRY_MODE_CANCEL
@since{1.4.0}

Emulate use of Pinentry's cancel button.

@item GPGME_PINENTRY_MODE_ERROR
@since{1.4.0}

Return a Pinentry error @code{No Pinentry}.

@item GPGME_PINENTRY_MODE_LOOPBACK
@since{1.4.0}

Redirect Pinentry queries to the caller.
This enables
 the use of @code{gpgme_set_passphrase_cb} because pinentry
queries are redirected to gpgme.

Note: For 2.1.0 - 2.1.12 this mode requires @code{allow-loopback-pinentry}
to be enabled in the @file{gpg-agent.conf} or an agent started with that option.

@end table
@end deftp

@node Included Certificates
@subsection Included Certificates
@cindex certificates, included

@deftypefun void gpgme_set_include_certs (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{nr_of_certs}})
The function @code{gpgme_set_include_certs} specifies how many
certificates should be included in an S/MIME signed message.  By
default, only the sender's certificate is included.  The possible
values of @var{nr_of_certs} are:

@table @code
@item GPGME_INCLUDE_CERTS_DEFAULT
@since{1.0.3}

Fall back to the default of the crypto backend.  This is the default

for GPGME.
@item -2
Include all certificates except the root certificate.
@item -1
Include all certificates.
@item 0
Include no certificates.
@item 1
Include the sender's
certificate only.
@item n
Include the first n certificates of the certificates path, starting
from the sender's certificate. The number @code{n} must be positive.
@end table

Values of @var{nr_of_certs} smaller than -2 are undefined.

This option is only relevant to the CMS crypto engine, and ignored by
all other engines.
@end deftypefun

@deftypefun int gpgme_get_include_certs (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_get_include_certs} returns the number of
certificates to include into an S/MIME signed message.
@end deftypefun

@node Key Listing Mode
@subsection Key Listing Mode
@cindex key listing mode
@cindex key listing, mode of

@deftypefun gpgme_error_t gpgme_set_keylist_mode (@w{gpgme_ctx_t @var{ctx}},
@w{gpgme_keylist_mode_t @var{mode}})
The function @code{gpgme_set_keylist_mode} changes the default
behaviour of the key listing functions. The value in @var{mode} is a
bitwise-or combination of one or multiple of the following bit values:

@table @code
@item GPGME_KEYLIST_MODE_LOCAL
The
@code{GPGME_KEYLIST_MODE_LOCAL} symbol specifies that the local
keyring should be searched for keys in the keylisting operation. This
is the default.

Using only this option results in a @code{--list-keys}.

@item GPGME_KEYLIST_MODE_EXTERN

The @code{GPGME_KEYLIST_MODE_EXTERN} symbol specifies that an external source should be searched for keys in the keylisting operation. The type of external source is dependent on the crypto engine used and whether it is combined with @code{GPGME_KEYLIST_MODE_LOCAL}. For example, it can be a remote keyserver or LDAP certificate server.

Using only this option results in a @code{--search-keys} for @code{GPGME_PROTOCOL_OpenPGP} and something similar to @code{--list-external-keys} for @code{GPGME_PROTOCOL_CMS}.

@item GPGME_KEYLIST_MODE_LOCATE
This is a shortcut for the combination of @code{GPGME_KEYLIST_MODE_LOCAL} and @code{GPGME_KEYLIST_MODE_EXTERN}, which results in a @code{--locate-keys} for @code{GPGME_PROTOCOL_OpenPGP}.

@item
GPGME_KEYLIST_MODE_SIGS
The @code{GPGME_KEYLIST_MODE_SIGS} symbol specifies that the key signatures should be included in the listed keys.

@item GPGME_KEYLIST_MODE_SIG_NOTATIONS
@since{1.1.1}

The @code{GPGME_KEYLIST_MODE_SIG_NOTATIONS} symbol specifies that the signature notations on key signatures should be included in the listed keys. This only works if @code{GPGME_KEYLIST_MODE_SIGS} is also enabled.

@item GPGME_KEYLIST_MODE_WITH_TOFU
@since{1.7.0}

The @code{GPGME_KEYLIST_MODE_WITH_TOFU} symbol specifies that information pertaining to the TOFU trust model should be included in the listed keys.

@item GPGME_KEYLIST_MODE_WITH_KEYGRIP
@since{1.14.0}

The @code{GPGME_KEYLIST_MODE_WITH_KEYRIP} symbol specifies that the keygrip is always included in the listing. The default depends on the version of the backend and the used protocol.

@item GPGME_KEYLIST_MODE_WITH_SECRET
@since{1.5.1}

The @code{GPGME_KEYLIST_MODE_WITH_SECRET} returns information about the presence of a corresponding

secret key in a public key listing. A
public key listing with this mode is slower than a standard listing
but can be used instead of a second run to list the secret keys. This
is only supported for GnuPG versions >= 2.1. Note that using this
option also makes sure that the keygrip is available in the output.

@item GPGME_KEYLIST_MODE_EPHEMERAL
@since{1.2.0}

The @code{GPGME_KEYLIST_MODE_EPHEMERAL} symbol specifies that keys
flagged as ephemeral are included in the listing.

@item GPGME_KEYLIST_MODE_VALIDATE
@since{0.4.5}

The @code{GPGME_KEYLIST_MODE_VALIDATE} symbol specifies that the
backend should do key or certificate validation and not just get the
validity information from an internal cache. This might be an
expensive operation and is in general not useful. Currently only
implemented for the S/MIME backend and ignored for other backends.

@end table

At least one of @code{GPGME_KEYLIST_MODE_LOCAL} and
@code{GPGME_KEYLIST_MODE_EXTERN} must be specified. For future binary
compatibility,
you should get the current mode with
@code{gpgme_get_keylist_mode} and modify it by setting or clearing the
appropriate bits, and then using that calculated value in the
@code{gpgme_set_keylisting_mode} operation. This will leave all other
bits in the mode value intact (in particular those that are not used
in the current version of the library).

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
mode could be set correctly, and @code{GPG_ERR_INV_VALUE} if @var{ctx}
is not a valid pointer or @var{mode} is not a valid mode.
@end deftypefun

@deftypefun gpgme_keylist_mode_t gpgme_get_keylist_mode (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_get_keylist_mode} returns the current key
listing mode of the context @var{ctx}. This value can then be
modified and used in a subsequent @code{gpgme_set_keylist_mode}
operation to only affect the desired bits (and leave all others
intact).

The function returns 0 if @var{ctx} is not a valid pointer, and

the
current mode otherwise.  Note that 0 is not a valid mode value.
@end deftypefun

@node Passphrase Callback
@subsection Passphrase Callback
@cindex callback, passphrase
@cindex passphrase callback

@deftp {Data type} {gpgme_error_t (*gpgme_passphrase_cb_t)(void *@var{hook}, const char *@var{uid_hint}, const char *@var{passphrase_info}, @w{int @var{prev_was_bad}}, @w{int @var{fd}})}
@tindex gpgme_passphrase_cb_t
The @code{gpgme_passphrase_cb_t} type is the type of functions usable as
passphrase callback function.

The argument @var{uid_hint} might contain a string that gives an
indication for which user ID the passphrase is required.  If this is
not available, or not applicable (in the case of symmetric encryption,
for example), @var{uid_hint} will be @code{NULL}.

The argument @var{passphrase_info}, if not @code{NULL}, will give
further information about the context in which the passphrase is
required.  This information is engine and operation specific.

If this is the repeated attempt
to get the passphrase, because
previous attempts failed, then @var{prev_was_bad} is 1, otherwise it
will be 0.

The user must write the passphrase, followed by a newline character,
to the file descriptor @var{fd}.  The function @code{gpgme_io_writen}
should be used for the write operation.  Note that if the user returns
0 to indicate success, the user must at least write a newline
character before returning from the callback.

If an error occurs, return the corresponding @code{gpgme_error_t}
value.  You can use the error code @code{GPG_ERR_CANCELED} to abort
the operation.  Otherwise, return @code{0}.

Note: The passphrase_cb only works with GnuPG 1.x and 2.1.x and not
with the 2.0.x series. See @code{gpgme_set_pinentry_mode} for more
details on 2.1.x usage.
@end deftp

@deftypefun void gpgme_set_passphrase_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_passphrase_cb_t @var{passfunc}}, @w{void *@var{hook_value}})
The function @code{gpgme_set_passphrase_cb} sets the function that is

used
when a passphrase needs to be provided by the user to
@var{passfunc}. The function @var{passfunc} needs to implemented by
the user, and whenever it is called, it is called with its first
argument being @var{hook_value}. By default, no passphrase callback
function is set.

Not all crypto engines require this callback to retrieve the
passphrase. It is better if the engine retrieves the passphrase from
a trusted agent (a daemon process), rather than having each user to
implement their own passphrase query. Some engines do not even
support an external passphrase callback at all, in this case the error
code @code{GPG_ERR_NOT_SUPPORTED} is returned.

For GnuPG >= 2.1 the pinentry mode has to be set to
@code{GPGME_PINENTRY_MODE_LOOPBACK} to enable the passphrase callback.
See @code{gpgme_set_pinentry_mode}.

The user can disable the use of a passphrase callback function by
calling @code{gpgme_set_passphrase_cb} with @var{passfunc} being
@code{NULL}.
@end deftypefun

@deftypefun void gpgme_get_passphrase_cb
(@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_passphrase_cb_t *@var{passfunc}}, @w{void
**@var{hook_value}})
The function @code{gpgme_get_passphrase_cb} returns the function that
is used when a passphrase needs to be provided by the user in
@var{*passfunc}, and the first argument for this function in
@var{*hook_value}. If no passphrase callback is set, or @var{ctx} is
not a valid pointer, @code{NULL} is returned in both variables.

@var{passfunc} or @var{hook_value} can be @code{NULL}. In this case,
the corresponding value will not be returned.
@end deftypefun

@node Progress Meter Callback
@subsection Progress Meter Callback
@cindex callback, progress meter
@cindex progress meter callback

@deftp {Data type} {void (*gpgme_progress_cb_t)(void *@var{hook}, const char *@var{what}, int @var{type},
int @var{current}, int @var{total})}
@tindex gpgme_progress_cb_t
The @code{gpgme_progress_cb_t} type is the type of functions usable as
progress callback function.

The arguments are
specific to the crypto engine. More information
about the progress information returned from the GnuPG engine can be
found in the GnuPG source code in the file @file{doc/DETAILS} in the
section PROGRESS.
@end deftp

@deftypefun void gpgme_set_progress_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_progress_cb_t @var{progfunc}}, @w{void *@var{hook_value}})
The function @code{gpgme_set_progress_cb} sets the function that is
used when progress information about a cryptographic operation is
available. The function @var{progfunc} needs to implemented by the
user, and whenever it is called, it is called with its first argument
being @var{hook_value}. By default, no progress callback function
is set.

Setting a callback function allows an interactive program to display
progress information about a long operation to the user.

The user can disable the use of a progress callback function by
calling @code{gpgme_set_progress_cb} with @var{progfunc} being
@code{NULL}.
@end deftypefun

@deftypefun void
gpgme_get_progress_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_progress_cb_t *@var{progfunc}}, @w{void **@var{hook_value}})
The function @code{gpgme_get_progress_cb} returns the function that is
used to inform the user about the progress made in @var{*progfunc},
and the first argument for this function in @var{*hook_value}. If no
progress callback is set, or @var{ctx} is not a valid pointer,
@code{NULL} is returned in both variables.

@var{progfunc} or @var{hook_value} can be @code{NULL}. In this case,
the corresponding value will not be returned.
@end deftypefun

@node Status Message Callback
@subsection Status Message Callback
@cindex callback, status message
@cindex status message callback

@deftp {Data type} {gpgme_error_t (*gpgme_status_cb_t)(void *@var{hook}, const char *@var{keyword}, const char *@var{args})}
@tindex gpgme_status_cb_t
The @code{gpgme_status_cb_t} type is the type of function usable as
a status message callback function.

The argument @var{keyword} is the name
of the status message while the
@var{args} argument contains any arguments for the status message.

If an error occurs, return the corresponding @code{gpgme_error_t}
value. Otherwise, return @code{0}.
@end deftp

@deftypefun void gpgme_set_status_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_status_cb_t
@var{statusfunc}}, @w{void *@var{hook_value}})
@since{1.6.0}

The function @code{gpgme_set_status_cb} sets the function that is used when a
status message is received from gpg to @var{statusfunc}. The function
@var{statusfunc} needs to be implemented by the user, and whenever it is
called, it is called with its first argument being @var{hook_value}. By
default, no status message callback function is set.

The user can disable the use of a status message callback function by calling
@code{gpgme_set_status_cb} with @var{statusfunc} being @code{NULL}.
@end deftypefun

@deftypefun void gpgme_get_status_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_status_cb_t
*@var{statusfunc}}, @w{void **@var{hook_value}})
@since{1.6.0}

The
function @code{gpgme_get_status_cb} returns the function that is used to
process status messages from gpg in @var{*statusfunc}, and the first argument
for this function in @var{*hook_value}. If no status message callback is set,
or @var{ctx} is not a valid pointer, @code{NULL} is returned in both
variables.
@end deftypefun

@node Context Flags
@subsection Context Flags
@cindex flags, of a context

@deftypefun {gpgme_error_t} gpgme_set_ctx_flag @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{const char *@var{name}}, @
@w{const char *@var{value}})

@since{1.7.0}

Some minor properties of the context can be controlled with flags set
by this function. The properties are identified by the following

values for @var{name}:

@table @code
@item "redraw"
This flag is normally not changed by the caller because GPGME sets and
clears it automatically: The flag is cleared before an operation and
set if an operation noticed that the engine has launched
 a Pinentry.
A Curses based application may use this information to redraw the
screen; for example:

```
@example
  err = gpgme_op_keylist_start (ctx, "foo@@example.org", 0);
  while (!err)
    @{
      err = gpgme_op_keylist_next (ctx, &key);
      if (err)
        break;
      show_key (key);
      gpgme_key_release (key);
    @}
  if ((s = gpgme_get_ctx_flag (ctx, "redraw")) && *s)
    redraw_screen ();
  gpgme_release (ctx);
@end example
```

@item "full-status"
Using a @var{value} of "1" the status callback set by
gpgme_set_status_cb returns all status lines with the exception of
PROGRESS lines.  With the default of "0" the status callback is only
called in certain situations.

@item "raw-description"
Setting the @var{value} to "1" returns human readable strings in a raw
format.  For example the non breaking space characters ("~") will not
be removed from the @code{description} field of the
@code{gpgme_tofu_info_t} object.

@item "export-session-key"
Using a @var{value}
 of "1" specifies that the context should try to
export the symmetric session key when decrypting data.  By default, or
when using an empty string or "0" for @var{value}, session keys are
not exported.

@item "override-session-key"
The string given in @var{value} is passed to the GnuPG engine to override

the session key for decryption.  The format of that session key is
specific to GnuPG and can be retrieved during a decrypt operation when
the context flag "export-session-key" is enabled.  Please be aware that
using this feature with GnuPG < 2.1.16 will leak the session key on
many platforms via ps(1).

@item "auto-key-retrieve"
Setting the @var{value} to "1" asks the backend to automatically
retrieve a key for signature verification if possible.  Note that this
option makes a "web bug" like behavior possible.  Keyserver or Web Key
Directory operators can see which keys you request, so by sending you
a message signed by a brand new key (which you naturally will not have
on your
 local keyring), the operator can tell both your IP address and
the time when you verified the signature.

@item "auto-key-import"
Setting the @var{value} to "1" forces the GPG backend to automatically
import a missing key for signature verification from the signature.

@item "include-key-block"
Setting the @var{value} to "1" forces the GPG backend to embed the
signing key as well as an encryption subkey into the the signature.

@item "request-origin"
The string given in @var{value} is passed to the GnuPG engines to
request restrictions based on the origin of the request.  Valid values
are documented in the GnuPG manual and the gpg man page under the
option @option{--request-origin}.  Requires at least GnuPG 2.2.6 to have an
effect.

@item "no-symkey-cache"
For OpenPGP disable the passphrase cache used for symmetrical en- and
decryption.  This cache is based on the message specific salt value.
Requires at least GnuPG 2.2.7 to have an effect.

@item "ignore-mdc-error"
This flag passes
 the option @option{--ignore-mdc-error} to gpg.  This
can be used to force decryption of a message which failed due to a
missing integrity check.  This flag must be used with great caution
and only if it is a known non-corrupted old message and the decryption
result of the former try had the decryption result flag
@code{legacy_cipher_nomdc} set.  For failsafe reasons this flag is
reset after each operation.

@item "auto-key-locate"
The string given in @var{value} is passed to gpg.  This can be used

to change the behavior of a @code{GPGME_KEYLIST_MODE_LOCATE} keylisting.
Valid values are documented in the GnuPG manual and the gpg man page under
the option @option{--auto-key-locate}.
Requires at least GnuPG 2.1.18.

Note: Keys retrieved through @code{auto-key-locate} are automatically
imported in the keyring.

@item trust-model
@since{1.11.2}

Change the trust-model for all GnuPG engine operations.  An empty
string sets the trust-model back to the users default.  If the
trust-model is not
 supported by GnuPG the behavior is undefined
and will likely cause all operations to fail.  Example: "tofu+pgp".

This options should be used carefully with a strict version
requirement.  In some versions of GnuPG setting the
trust-model changes the default trust-model for future operations.
A change in the trust-model also can have unintended side effects, like
rebuilding the trust-db.

@item "extended-edit"
This flag passes the option @option{--expert} to gpg key edit.  This
can be used to get additional callbacks in @code{gpgme_op_edit}.

@end table

This function returns @code{0} on success.
@end deftypefun


@deftypefun {const char *} gpgme_get_ctx_flag  @
        (@w{gpgme_ctx_t @var{ctx}}, @
        @w{const char *@var{name}})

@since{1.8.0}

The value of flags settable by @code{gpgme_set_ctx_flag} can be
retrieved by this function.  If @var{name} is unknown the function
returns @code{NULL}.  For boolean flags an empty string is returned
for False and the string "1" is
 returned for True; either atoi(3) or a
test for an empty string can be used to get the boolean value.

@end deftypefun

@node Locale
@subsection Locale
@cindex locale, default
@cindex locale, of a context

A locale setting can be associated with a context.  This locale is passed to the crypto engine, and used for applications like the PIN entry, which is displayed to the user when entering a passphrase is required.

The default locale is used to initialize the locale setting of all contexts created afterwards.

@deftypefun gpgme_error_t gpgme_set_locale (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{category}}, @w{const char *@var{value}})
@since{0.4.3}

The function @code{gpgme_set_locale} sets the locale of the context @var{ctx}, or the default locale if @var{ctx} is a null pointer.

The locale settings that should be changed are specified by @var{category}.  Supported categories are @code{LC_CTYPE}, @code{LC_MESSAGES}, and @code{LC_ALL}, which is a wildcard you can use if you want to change
 all the categories at once.

The value to be used for the locale setting is @var{value}, which will be copied to @acronym{GPGME}'s internal data structures.  @var{value} can be a null pointer, which disables setting the locale, and will make PIN entry and other applications use their default setting, which is usually not what you want.

Note that the settings are only used if the application runs on a text terminal, and that the settings should fit the configuration of the output terminal.  Normally, it is sufficient to initialize the default value at startup.

The function returns an error if not enough memory is available.
@end deftypefun

@node Additional Logs
@subsection Additional Logs
@cindex auditlog, of the engine
@cindex auditlog

Additional logs can be associated with a context.  These logs are

engine specific and can be be obtained with @code{gpgme_op_getauditlog}.

@deftypefun gpgme_error_t gpgme_op_getauditlog @
(@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{output}},
@
@w{unsigned int @var{flags}})
@since{1.1.1}

The function @code{gpgme_op_getauditlog} is used to obtain additional
logs as specified by @var{flags} into the @var{output} data. If

The function returns the error code @code{GPG_ERR_NO_ERROR} if a
log could be queried from the engine, and @code{GPG_ERR_NOT_IMPLEMENTED}
if the log specified in @var{flags} is not available for this engine.
If no log is available @code{GPG_ERR_NO_DATA} is returned.

The value in @var{flags} is a bitwise-or combination of one or
multiple of the following bit values:

@table @code
@item GPGME_AUDITLOG_DIAG
@since{1.11.2}

Obtain diagnostic output which would be written to @code{stderr} in
interactive use of the engine. This can be used to provide additional
diagnostic information in case of errors in other operations.

Note: If log-file has been set in the configuration the log will
be empty and @code{GPG_ERR_NO_DATA} will be returned.

Implemented for: @code{GPGME_PROTOCOL_OpenPGP}

@item
GPGME_AUDITLOG_DEFAULT
@since{1.11.2}

This flag has the value 0 for compatibility reasons. Obtains additional
information from the engine by issuing the @code{GETAUDITLOG} command.
For @code{GPGME_PROTOCOL_CMS} this provides additional information about
the X509 certificate chain.

Implemented for: @code{GPGME_PROTOCOL_CMS}

@item GPGME_AUDITLOG_HTML
@since{1.1.1}

Same as @code{GPGME_AUDITLOG_DEFAULT} but in HTML.

```
Implemented for: @code{GPGME_PROTOCOL_CMS}
@end table
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_getauditlog_start @
        (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{output}}, @
        @w{unsigned int @var{flags}})
@since{1.1.1}

This is the asynchronous variant of @code{gpgme_op_getauditlog}.
@end deftypefun

@node Key Management
@section Key Management
@cindex key management

Some of the cryptographic operations require that recipients or
signers are specified.  This is always done by specifying the
respective keys that should be used
 for the operation.  The following
section describes how such keys can be selected and manipulated.


@menu
* Key objects::                 Description of the key structures.
* Listing Keys::                Browsing the list of available keys.
* Information About Keys::      Requesting detailed information about keys.
* Manipulating Keys::           Operations on keys.
* Generating Keys::             Creating new key pairs.
* Signing Keys::                Adding key signatures to public keys.
* Exporting Keys::              Retrieving key data from the key ring.
* Importing Keys::              Adding keys to the key ring.
* Deleting Keys::               Removing keys from the key ring.
* Changing Passphrases::        Change the passphrase of a key.
* Changing TOFU Data::          Changing data pertaining to TOFU.
* Advanced Key Editing::        Advanced key edit operation.
@end menu

@node Key objects
@subsection Key objects

The keys are represented in GPGME by
 structures which may only be read
by the application but never be allocated or changed.  They are valid
as long as the key object itself is valid.

@deftp {Data type} gpgme_key_t
```

The @code{gpgme_key_t} type is a pointer to a key object.  It has the following members:

@table @code
@item gpgme_keylist_mode_t keylist_mode
@since{0.9.0}

The keylist mode that was active when the key was retrieved.

@item unsigned int revoked : 1
This is true if the key is revoked.

@item unsigned int expired : 1
This is true if the key is expired.

@item unsigned int disabled : 1
This is true if the key is disabled.

@item unsigned int invalid : 1
This is true if the key is invalid. This might have several reasons, for a example for the S/MIME backend, it will be set during key listings if the key could not be validated due to missing certificates or unmatched policies.

@item unsigned int can_encrypt : 1
This is true if the key (ie one of its subkeys) can be used for encryption.

@item unsigned int can_sign
 : 1
This is true if the key (ie one of its subkeys) can be used to create data signatures.

@item unsigned int can_certify : 1
This is true if the key (ie one of its subkeys) can be used to create key certificates.

@item unsigned int can_authenticate : 1
@since{0.4.5}

This is true if the key (ie one of its subkeys) can be used for authentication.

@item unsigned int is_qualified : 1
@since{1.1.0}

This is true if the key can be used for qualified signatures according to local government regulations.

@item unsigned int secret : 1
This is true if the key is a secret key.  Note, that this will always
be true even if the corresponding subkey flag may be false
(offline/stub keys).  This is only set if a listing of secret keys has
been requested or if @code{GPGME_KEYLIST_MODE_WITH_SECRET} is active.

@item unsigned int origin : 5
@since{1.8.0}

Reserved for the origin of this key.

@item gpgme_protocol_t protocol
This is the protocol supported by this key.

@item char *issuer_serial
If
 @code{protocol} is @code{GPGME_PROTOCOL_CMS}, then this is the
issuer serial.

@item char *issuer_name
If @code{protocol} is @code{GPGME_PROTOCOL_CMS}, then this is the
issuer name.

@item char *chain_id
If @code{protocol} is @code{GPGME_PROTOCOL_CMS}, then this is the
chain ID, which can be used to built the certificate chain.

@item gpgme_validity_t owner_trust
If @code{protocol} is @code{GPGME_PROTOCOL_OpenPGP}, then this is the
owner trust.

@item gpgme_subkey_t subkeys
This is a linked list with the subkeys of the key.  The first subkey
in the list is the primary key and usually available.

@item gpgme_user_id_t uids
This is a linked list with the user IDs of the key.  The first user ID
in the list is the main (or primary) user ID.

@item char *fpr
@since{1.7.0}

This field gives the fingerprint of the primary key.  Note that
this is a copy of the fingerprint of the first subkey.  For an
incomplete key (for example from a verification result) a subkey may
be missing but this field

may be set nevertheless.

@item unsigned long last_update
@since{1.8.0}

Reserved for the time of the last update of this key.

@end table
@end deftp

@deftp {Data type} gpgme_subkey_t
@since{1.5.0}

The @code{gpgme_subkey_t} type is a pointer to a subkey structure. Subkeys are one component of a @code{gpgme_key_t} object. In fact, subkeys are those parts that contains the real information about the individual cryptographic keys that belong to the same key object. One @code{gpgme_key_t} can contain several subkeys. The first subkey in the linked list is also called the primary key.

The subkey structure has the following members:

@table @code
@item gpgme_subkey_t next
This is a pointer to the next subkey structure in the linked list, or @code{NULL} if this is the last element.

@item unsigned int revoked : 1
This is true if the subkey is revoked.

@item unsigned int expired : 1
This is true if the subkey is expired.

@item unsigned int disabled : 1
This is true if the subkey
is disabled.

@item unsigned int invalid : 1
This is true if the subkey is invalid.

@item unsigned int can_encrypt : 1
This is true if the subkey can be used for encryption.

@item unsigned int can_sign : 1
This is true if the subkey can be used to create data signatures.

@item unsigned int can_certify : 1

This is true if the subkey can be used to create key certificates.

@item unsigned int can_authenticate : 1
@since{0.4.5}

This is true if the subkey can be used for authentication.

@item unsigned int is_qualified : 1
@since{1.1.0}

This is true if the subkey can be used for qualified signatures
according to local government regulations.

@item unsigned int is_de_vs : 1
@since{1.8.0}

This is true if the subkey complies with the rules for classified
information in Germany at the restricted level (VS-NfD). This are
currently RSA keys of at least 2048 bits or ECDH/ECDSA keys using a
Brainpool curve.

@item unsigned int secret : 1
This is true if the subkey is a secret key. Note that
it will be
false if the key is actually a stub key; i.e. a secret key operation
is currently not possible (offline-key). This is only set if a
listing of secret keys has been requested or if
@code{GPGME_KEYLIST_MODE_WITH_SECRET} is active.

@item gpgme_pubkey_algo_t pubkey_algo
This is the public key algorithm supported by this subkey.

@item unsigned int length
This is the length of the subkey (in bits).

@item char *keyid
This is the key ID of the subkey in hexadecimal digits.

@item char *fpr
This is the fingerprint of the subkey in hexadecimal digits, if
available.

@item char *keygrip
@since{1.7.0}

The keygrip of the subkey in hex digit form or @code{NULL} if not
available.

@item long int timestamp
This is the creation timestamp of the subkey.  This is -1 if the
timestamp is invalid, and 0 if it is not available.

@item long int expires
This is the expiration timestamp of the subkey, or 0 if the subkey
does not expire.

@item unsigned int is_cardkey : 1
@since{1.2.0}

True if
 the secret key is stored on a smart card.

@item char *card_number
@since{1.2.0}

The serial number of a smart card holding this key or @code{NULL}.

@item char *curve
For ECC algorithms the name of the curve.

@end table
@end deftp

@deftp {Data type} gpgme_user_id_t

A user ID is a component of a @code{gpgme_key_t} object.  One key can
have many user IDs.  The first one in the list is the main (or
primary) user ID.

The user ID structure has the following members.

@table @code
@item gpgme_user_id_t next
This is a pointer to the next user ID structure in the linked list, or
@code{NULL} if this is the last element.

@item unsigned int revoked : 1
This is true if the user ID is revoked.

@item unsigned int invalid : 1
This is true if the user ID is invalid.

@item gpgme_validity_t validity
This specifies the validity of the user ID.

@item char *uid

This is the user ID string.

@item char *name
This is the name component of @code{uid}, if available.

@item char *comment
This is the comment
component of @code{uid}, if available.

@item char *email
This is the email component of @code{uid}, if available.

@item char *address;
The mail address (addr-spec from RFC-5322) of the user ID string.
This is general the same as the @code{email} part of this structure
but might be slightly different. If no mail address is available
@code{NULL} is stored.

@item gpgme_tofu_info_t tofu
@since{1.7.0}

If not @code{NULL} information from the TOFU database pertaining to
this user id.

@item gpgme_key_sig_t signatures
This is a linked list with the signatures on this user ID.

@item unsigned int origin : 5
@since{1.8.0}

Reserved for the origin of this user ID.

@item unsigned long last_update
@since{1.8.0}

Reserved for the time of the last update of this user ID.

@item char *uidhash;
A string used by gpg to identify a user ID. This string can be used
at certain prompts of @code{gpgme_op_edit} to select a user ID. Users
must be prepared to see a @code{NULL} value here. The format
of the
value is not specified and may depend on the GPGME or GnuPG version.

@end table
@end deftp

@deftp {Data type} gpgme_tofu_info_t

@since{1.7.0}

The @code{gpgme_tofu_info_t} type is a pointer to a tofu info
structure.  Tofu info structures are one component of a
@code{gpgme_user_id_t} object, and provide information from the TOFU
database pertaining to the user ID.

The tofu info structure has the following members:

@table @code
@item gpgme_key_sig_t next
This is a pointer to the next tofu info structure in the linked
list, or @code{NULL} if this is the last element.

@item unsigned int validity : 3
This is the TOFU validity.  It can have the following values:

@table @code
@item 0
The value @code{0} indicates a conflict.

@item 1
The value @code{1} indicates a key without history.

@item 2
The value @code{2} indicates a key with too little history.

@item 3
The value @code{3} indicates a key with enough history for basic trust.

@item 4
The value @code{4} indicates a key
 with a lot of history.

@end table

@item unsigned int policy : 4
This is the TOFU policy, see @code{gpgme_tofu_policy_t}.

@item unsigned short signcount
This is the number of signatures seen for this binding (or
@code{USHRT_MAX} if there are more than that).

@item unsigned short encrcount
This is the number of encryptions done with this binding (or
@code{USHRT_MAX} if there are more than that).

@item unsigned long signfirst
Number of seconds since Epoch when the first signature was seen with
this binding.

@item unsigned long signlast
Number of seconds since Epoch when the last signature was seen with
this binding.

@item unsigned long encrfirst
Number of seconds since Epoch when the first encryption was done with
this binding.

@item unsigned long encrlast
Number of seconds since Epoch when the last encryption was done with
this binding.

@item char *description
A human-readable string summarizing the TOFU data (or NULL).

@end table
@end deftp

@deftp {Data type} gpgme_key_sig_t

The
@code{gpgme_key_sig_t} type is a pointer to a key signature structure.
Key signatures are one component of a @code{gpgme_key_t} object, and
validate user IDs on the key in the OpenPGP protocol.

The signatures on a key are only available if the key was retrieved
via a listing operation with the @code{GPGME_KEYLIST_MODE_SIGS} mode
enabled, because it can be expensive to retrieve all signatures of a
key.

The signature notations on a key signature are only available if the
key was retrieved via a listing operation with the
@code{GPGME_KEYLIST_MODE_SIG_NOTATIONS} mode enabled, because it can
be expensive to retrieve all signature notations.

The key signature structure has the following members:

@table @code
@item gpgme_key_sig_t next
This is a pointer to the next key signature structure in the linked
list, or @code{NULL} if this is the last element.

@item unsigned int revoked : 1
This is true if the key signature is a revocation signature.

@item unsigned int expired : 1
This is
true if the key signature is expired.

@item unsigned int invalid : 1
This is true if the key signature is invalid.

@item unsigned int exportable : 1
This is true if the key signature is exportable.

@item gpgme_pubkey_algo_t pubkey_algo
This is the public key algorithm used to create the signature.

@item char *keyid
This is the key ID of the key (in hexadecimal digits) used to create
the signature.

@item long int timestamp
This is the creation timestamp of the key signature. This is -1 if
the timestamp is invalid, and 0 if it is not available.

@item long int expires
This is the expiration timestamp of the key signature, or 0 if the key
signature does not expire.

@item gpgme_error_t status
This is the status of the signature and has the same meaning as the
member of the same name in a @code{gpgme_signature_t} object.

@item unsigned int sig_class
This specifies the signature class of the key signature. The meaning
is specific to the crypto engine.

@item char *uid
This is the main
user ID of the key used to create the signature.

@item char *name
This is the name component of @code{uid}, if available.

@item char *comment
This is the comment component of @code{uid}, if available.

@item char *email
This is the email component of @code{uid}, if available.

@item gpgme_sig_notation_t notations
This is a linked list with the notation data and policy URLs.
@end table
@end deftp

@node Listing Keys
@subsection Listing Keys
@cindex listing keys
@cindex key listing
@cindex key listing, start
@cindex key ring, list
@cindex key ring, search

@deftypefun gpgme_error_t gpgme_op_keylist_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{pattern}}, @w{int @var{secret_only}})

The function @code{gpgme_op_keylist_start} initiates a key listing
operation inside the context @var{ctx}. It sets everything up so that
subsequent invocations of @code{gpgme_op_keylist_next} return the keys
in the list.

If @var{pattern} is @code{NULL}, all available keys are returned.
Otherwise,
@var{pattern} contains an engine specific expression that
is used to limit the list to all keys matching the pattern. Note that
the total length of the pattern is restricted to an engine-specific
maximum (a couple of hundred characters are usually accepted). The
pattern should be used to restrict the search to a certain common name
or user, not to list many specific keys at once by listing their
fingerprints or key IDs.

If @var{secret_only} is not @code{0}, the list is restricted to secret
keys only.

The context will be busy until either all keys are received (and
@code{gpgme_op_keylist_next} returns @code{GPG_ERR_EOF}), or
@code{gpgme_op_keylist_end} is called to finish the operation.

The function returns the error code @code{GPG_ERR_INV_VALUE} if
@var{ctx} is not a valid pointer, and passes through any errors that
are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_keylist_ext_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char

*@var{pattern}[]}, @w{int @var{secret_only}}, @w{int @var{reserved}})

The function @code{gpgme_op_keylist_ext_start} initiates an extended key listing operation inside the context @var{ctx}. It sets everything up so that subsequent invocations of @code{gpgme_op_keylist_next} return the keys in the list.

If @var{pattern} or @var{*pattern} is @code{NULL}, all available keys are returned. Otherwise, @var{pattern} is a @code{NULL} terminated array of strings that are used to limit the list to all keys matching at least one of the patterns verbatim. Note that the total length of all patterns is restricted to an engine-specific maximum (the exact limit also depends on the number of patterns and amount of quoting required, but a couple of hundred characters are usually accepted). Patterns should be used to restrict the search to a certain common name or user, not to list many specific keys at once by listing their fingerprints or key IDs.

If @var{secret_only} is not @code{0}, the list is restricted to secret keys only.

The value of @var{reserved} must be @code{0}.

The context will be busy until either all keys are received (and @code{gpgme_op_keylist_next} returns @code{GPG_ERR_EOF}), or @code{gpgme_op_keylist_end} is called to finish the operation.

The function returns the error code @code{GPG_ERR_INV_VALUE} if @var{ctx} is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_keylist_from_data_start @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{gpgme_data_t @var{data}}, @
@w{int @var{reserved}})

@since{1.8.0}

The function @code{gpgme_op_keylist_from_data_start} initiates a key listing operation inside the context @var{ctx}. In contrast to the other key listing operation the keys are read from the supplied @var{data} and not from the local key database. The keys are also not imported into the local key database. The function sets everything up so that subsequent invocations of @code{gpgme_op_keylist_next} return the keys from @var{data}.

The value of @var{reserved} must be @code{0}.

This function requires at least GnuPG version 2.1.14 and currently
works only with OpenPGP keys.

The context will be busy until either all keys are received (and
@code{gpgme_op_keylist_next} returns @code{GPG_ERR_EOF}), or
@code{gpgme_op_keylist_end} is called to finish the operation.
While the context is busy @var{data} may not be released.

The function returns the error code @code{GPG_ERR_INV_VALUE} if
@var{ctx} is not a valid pointer, and passes through any errors that
are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_keylist_next (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
*@var{r_key}})

The function @code{gpgme_op_keylist_next} returns the next key in the
list created by a previous @code{gpgme_op_keylist_start} operation in
the context @var{ctx}.  The key will have
 one reference for the user.
@xref{Manipulating Keys}.

This is the only way to get at @code{gpgme_key_t} objects in
@acronym{GPGME}.

If the last key in the list has already been returned,
@code{gpgme_op_keylist_next} returns @code{GPG_ERR_EOF}.

The function returns the error code @code{GPG_ERR_INV_VALUE} if
@var{ctx} or @var{r_key} is not a valid pointer, and
@code{GPG_ERR_ENOMEM} if there is not enough memory for the operation.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_keylist_end (@w{gpgme_ctx_t @var{ctx}})

The function @code{gpgme_op_keylist_end} ends a pending key list
operation in the context @var{ctx}.

After the operation completed successfully, the result of the key
listing operation can be retrieved with
@code{gpgme_op_keylist_result}.

The function returns the error code @code{GPG_ERR_INV_VALUE} if
@var{ctx} is not a valid pointer, and @code{GPG_ERR_ENOMEM} if at some
time during the operation there was not enough memory available.

@end deftypefun

The following
example illustrates how all keys containing a certain
string (@code{g10code}) can be listed with their key ID and the name
and email address of the main user ID:

```
@example
gpgme_ctx_t ctx;
gpgme_key_t key;
gpgme_error_t err = gpgme_new (&ctx);

if (!err)
 @{
   err = gpgme_op_keylist_start (ctx, "g10code", 0);
   while (!err)
     @{
       err = gpgme_op_keylist_next (ctx, &key);
       if (err)
         break;
       printf ("%s:", key->subkeys->keyid);
       if (key->uids && key->uids->name)
         printf (" %s", key->uids->name);
       if (key->uids && key->uids->email)
         printf (" <%s>", key->uids->email);
       putchar ('\n');
       gpgme_key_release (key);
     @}
   gpgme_release (ctx);
 @}
if (gpg_err_code (err) != GPG_ERR_EOF)
 @{
   fprintf (stderr, "can not list keys: %s\n", gpgme_strerror (err));
   exit (1);
 @}
@end example
```

@deftp {Data type} {gpgme_keylist_result_t}
This is a pointer to a structure used to store the result of a
@code{gpgme_op_keylist_*}
operation.  After successfully ending a key
listing operation, you can retrieve the pointer to the result with
@code{gpgme_op_keylist_result}.  The structure contains the following
member:

@table @code
@item unsigned int truncated : 1
This is true if the crypto backend had to truncate the result, and

less than the desired keys could be listed.
@end table
@end deftp

@deftypefun gpgme_keylist_result_t gpgme_op_keylist_result (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_op_keylist_result} returns a
@code{gpgme_keylist_result_t} pointer to a structure holding the
result of a @code{gpgme_op_keylist_*} operation. The pointer is only
valid if the last operation on the context was a key listing
operation, and if this operation finished successfully. The returned
pointer is only valid until the next operation is started on the
context.
@end deftypefun

In a simple program, for which a blocking operation is acceptable, the
following function can be used to retrieve
a single key.

@deftypefun gpgme_error_t gpgme_get_key (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{fpr}},
@w{gpgme_key_t *@var{r_key}}, @w{int @var{secret}})
The function @code{gpgme_get_key} gets the key with the fingerprint
(or key ID) @var{fpr} from the crypto backend and return it in
@var{r_key}. If @var{secret} is true, get the secret key. The
currently active keylist mode is used to retrieve the key. The key
will have one reference for the user.

If the key is not found in the keyring, @code{gpgme_get_key} returns
the error code @code{GPG_ERR_EOF} and *@var{r_key} will be set to
@code{NULL}.

The function returns the error code @code{GPG_ERR_INV_VALUE} if
@var{ctx} or @var{r_key} is not a valid pointer or @var{fpr} is not a
fingerprint or key ID, @code{GPG_ERR_AMBIGUOUS_NAME} if the key ID was
not a unique specifier for a key, and @code{GPG_ERR_ENOMEM} if at some
time during the operation there was not enough memory available.
@end deftypefun

@node Information About Keys
@subsection
Information About Keys
@cindex key, information about
@cindex key, attributes
@cindex attributes, of a key

Please see the beginning of this section for more information about
@code{gpgme_key_t} objects.

@deftp {Data type} gpgme_validity_t
The @code{gpgme_validity_t} type is used to specify the validity of a user ID
in a key.  The following validities are defined:

@table @code
@item GPGME_VALIDITY_UNKNOWN
The user ID is of unknown validity.  The string representation of this
validity is ``?''.

@item GPGME_VALIDITY_UNDEFINED
The validity of the user ID is undefined.  The string representation of this
validity is ``q''.

@item GPGME_VALIDITY_NEVER
The user ID is never valid.  The string representation of this
validity is ``n''.

@item GPGME_VALIDITY_MARGINAL
The user ID is marginally valid.  The string representation of this
validity is ``m''.

@item GPGME_VALIDITY_FULL
The user ID is fully valid.  The string representation of this
validity is ``f''.

@item GPGME_VALIDITY_ULTIMATE
The
 user ID is ultimately valid.  The string representation of this
validity is ``u''.
@end table
@end deftp

@node Manipulating Keys
@subsection Manipulating Keys
@cindex key, manipulation

@deftypefun void gpgme_key_ref (@w{gpgme_key_t @var{key}})
The function @code{gpgme_key_ref} acquires an additional reference for
the key @var{key}.
@end deftypefun

@deftypefun void gpgme_key_unref (@w{gpgme_key_t @var{key}})
The function @code{gpgme_key_unref} releases a reference for the key
@var{key}.  If this was the last reference, the key will be destroyed
and all resources associated to it will be released.

```
@end deftypefun

@c
@c  gpgme_op_setexpire
@c
@deftypefun gpgme_error_t gpgme_op_setexpire @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{unsigned long @var{expires}}, @
     @w{const char *@var{subfprs}}, @
     @w{unsigned int @var{reserved}});

@since{1.14.1}

The function @code{gpgme_op_setexpire} sets the expiration time of
the
 key @var{key} or of the specified subkeys.
This function requires at least version 2.1.22 of GnuPG.

@var{key} specifies the key to operate on.

@var{expires} specifies the expiration time in seconds from now.
To be similar to other usages where expiration times are provided
in unsigned long this is similar to the key creation date
and so it is in seconds from NOW.

The common case is to use 0 to not set an expiration time.
Note that this parameter takes an unsigned long value and not
a @code{time_t} to avoid problems on systems which use a signed
32 bit @code{time_t}.  Note further that the OpenPGP protocol
uses 32 bit values for timestamps and thus can
only encode dates up to the year 2106.

@var{subfprs} selects the subkey(s) for which the expiration time
should be set.  If @var{subfprs} is set to @code{NULL}, then the
expiration time of the primary key is set.  If @var{subfprs} is
an asterisk (@code{*}), then the expiration times of all non-revoked
and not yet expired subkeys are set.
  To select more than one subkey
put all subkey fingerprints into one string separated by linefeeds
characters (@code{\n}).

@var{reserved} is reserved for later use and must be @code{0}.

@end deftypefun


@deftypefun gpgme_error_t gpgme_op_setexpire_start @
```

```
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{unsigned long @var{expires}}, @
     @w{const char *@var{subfprs}}, @
     @w{unsigned int @var{flags}});

@since{1.14.1}

The function @code{gpgme_op_setexpire_start} initiates a
@code{gpgme_op_setexpire} operation; see there for details.  It must
be completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun


@deftypefun gpgme_error_t gpgme_op_revuid_start @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}}, @
     @w{unsigned int @var{flags}});

@since{1.14.1}

The function @code{gpgme_op_setexpire_start} initiates a
@code{gpgme_op_setexpire}
 operation; see there for details.  It must
be completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun


@node Generating Keys
@subsection Generating Keys
@cindex key, creation
@cindex key ring, add

GPGME provides a set of functions to create public key pairs.  Most of
these functions require the use of GnuPG 2.1 and later; for older
GnuPG versions the @code{gpgme_op_genkey} function can be used.
Existing code which wants to update to the new functions or new code
which shall supports older GnuPG versions may try the new functions
first and provide a fallback to the old function if the error code
@code{GPG_ERR_NOT_SUPPORTED} is received.

@c
@c  gpgme_op_createkey
```

```
@c
@deftypefun gpgme_error_t gpgme_op_createkey @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{const char *@var{userid}}, @
     @w{const char *@var{algo}}, @
     @w{unsigned long @var{reserved}}, @
     @w{unsigned long @var{expires}}, @
     @w{gpgme_key_t @var{extrakey}},
 @
     @w{unsigned int @var{flags}});

@since{1.7.0}

The function @code{gpgme_op_createkey} generates a new key for the
procotol active in the context @var{ctx}.  As of now this function
does only work for OpenPGP and requires at least version 2.1.13 of
GnuPG.

@var{userid} is commonly the mail address associated with the key.
GPGME does not require a specific syntax but if more than a mail
address is given, RFC-822 style format is suggested.  The value is
expected to be in UTF-8 encoding (i.e. no IDN encoding for mail
addresses).  This is a required parameter.

@var{algo} specifies the algorithm for the new key (actually a keypair
of public and private key).  For a list of supported algorithms, see
the GnuPG manual.  If @var{algo} is @code{NULL} or the string
"default", the key is generated using the default algorithm of the
engine.  If the string "future-default" is used the engine may use an
algorithm which is planned to be the default in a future release of
the engine;
 however existing implementation of the protocol may not be
able to already handle such future algorithms.  For the OpenPGP
protocol, the specification of a default algorithm, without requesting
a non-default usage via @var{flags}, triggers the creation of a
primary key plus a secondary key (subkey).

@var{reserved} must be set to zero.

@var{expires} specifies the expiration time in seconds.  If you supply
0, a reasonable expiration time is chosen.  Use the flag
@code{GPGME_CREATE_NOEXPIRE} to create keys that do not expire.  Note
that this parameter takes an unsigned long value and not a
@code{time_t} to avoid problems on systems which use a signed 32 bit
@code{time_t}.  Note further that the OpenPGP protocol uses 32 bit
values for timestamps and thus can only encode dates up to the year
2106.
```

@var{extrakey} is currently not used and must be set to @code{NULL}.
A future version of GPGME may use this parameter to create X.509 keys.

@var{flags} can be set to the bit-wise OR of the following
flags:

@table @code
@item GPGME_CREATE_SIGN
@itemx GPGME_CREATE_ENCR
@itemx GPGME_CREATE_CERT
@itemx GPGME_CREATE_AUTH
@since{1.7.0}

Do not create the key with the default capabilities (key usage) of the
requested algorithm but use those explicitly given by these flags:
``signing'', ``encryption'', ``certification'', or ``authentication''.
The allowed combinations depend on the algorithm.

If any of these flags are set and a default algorithm has been
selected only one key is created in the case of the OpenPGP
protocol.

@item GPGME_CREATE_NOPASSWD
@since{1.7.0}

Request generation of the key without password protection.

@item GPGME_CREATE_SELFSIGNED
@since{1.7.0}

For an X.509 key do not create a CSR but a self-signed certificate.
This has not yet been implemented.

@item GPGME_CREATE_NOSTORE
@since{1.7.0}

Do not store the created key in the local key database.
This has not yet been implemented.

@item GPGME_CREATE_WANTPUB
@itemx GPGME_CREATE_WANTSEC
@since{1.7.0}

Return
the public or secret key as part of the result structure.
This has not yet been implemented.

@item GPGME_CREATE_FORCE

```
@since{1.7.0}

The engine does not allow the creation of a key with a user ID
already existing in the local key database.  This flag can be used to
override this check.

@item GPGME_CREATE_NOEXPIRE
@since{1.9.0}

Request generation of keys that do not expire.

@end table

After the operation completed successfully, information about the
created key can be retrieved with @code{gpgme_op_genkey_result}.

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if
the engine does not support the command, or a bunch of other error
codes.

@end deftypefun


@deftypefun gpgme_error_t gpgme_op_createkey_start @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{const char *@var{userid}}, @
     @w{const char *@var{algo}}, @
     @w{unsigned long @var{reserved}}, @
     @w{unsigned long @var{expires}}, @
     @w{gpgme_key_t @var{extrakey}}, @
     @w{unsigned int
 @var{flags}});

@since{1.7.0}

The function @code{gpgme_op_createkey_start} initiates a
@code{gpgme_op_createkey} operation; see there for details.  It must
be completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun

@c
@c  gpgme_op_createsubkey
@c
@deftypefun gpgme_error_t gpgme_op_createsubkey @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
```

@w{const char *@var{algo}}, @
@w{unsigned long @var{reserved}}, @
@w{unsigned long @var{expires}}, @
@w{unsigned int @var{flags}});

@since{1.7.0}

The function @code{gpgme_op_createsubkey} creates and adds a new subkey to the primary OpenPGP key given by @var{KEY}. The only allowed protocol in @var{ctx} is @code{GPGME_PROTOCOL_OPENPGP}. Subkeys (aka secondary keys) are a concept in the OpenPGP protocol to bind several keys to a primary key. As of now this function requires at least version 2.1.13 of GnuPG.

@var{key} specifies the key to operate on.

@var{algo} specifies the algorithm for the new subkey. For a list of supported algorithms, see the GnuPG manual. If @var{algo} is @code{NULL} or the string "default", the subkey is generated using the default algorithm for an encryption subkey of the engine. If the string "future-default" is used the engine may use an encryption algorithm which is planned to be the default in a future release of the engine; however existing implementation of the protocol may not be able to already handle such future algorithms.

@var{reserved} must be set to zero.

@var{expires} specifies the expiration time in seconds. If you supply 0, a reasonable expiration time is chosen. Use the flag @code{GPGME_CREATE_NOEXPIRE} to create keys that do not expire. Note that this parameter takes an unsigned long value and not a @code{time_t} to avoid problems on systems which use a signed 32 bit @code{time_t}. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

@var{flags} takes the same values as described above for @code{gpgme_op_createkey}.

After the operation completed successfully, information about the created key can be retrieved with @code{gpgme_op_genkey_result}.

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if the engine does not support the command, or a bunch of other error codes.

```
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_createsubkey_start @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{algo}}, @
     @w{unsigned long @var{reserved}}, @
     @w{unsigned long @var{expires}}, @
     @w{unsigned int @var{flags}});

@since{1.7.0}

The function @code{gpgme_op_createsubkey_start} initiates a
@code{gpgme_op_createsubkey} operation; see there for details.  It must
be completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun


@c
@c  gpgme_op_adduid
@c
@deftypefun gpgme_error_t
 gpgme_op_adduid @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}}, @
     @w{unsigned int @var{flags}});

@since{1.7.0}

The function @code{gpgme_op_adduid} adds a new user ID to the OpenPGP
key given by @var{KEY}.  Adding additional user IDs after key creation
is a feature of the OpenPGP protocol and thus the protocol for the
context @var{ctx} must be set to OpenPGP.  As of now this function
requires at least version 2.1.13 of GnuPG.

@var{key} specifies the key to operate on.

@var{userid} is the user ID to add to the key.  A user ID is commonly
the mail address to be associated with the key.  GPGME does not
require a specific syntax but if more than a mail address is given,
RFC-822 style format is suggested.  The value is expected to be in
UTF-8 encoding (i.e. no IDN encoding for mail addresses).  This is a
required parameter.
```

@var{flags} are currently not used and must be set to zero.

The function returns zero
 on success, @code{GPG_ERR_NOT_SUPPORTED} if
the engine does not support the command, or a bunch of other error
codes.

@end deftypefun

@deftypefun gpgme_error_t gpgme_op_adduid_start @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}}, @
     @w{unsigned int @var{flags}});

@since{1.7.0}

The function @code{gpgme_op_adduid_start} initiates a
@code{gpgme_op_adduid} operation; see there for details.  It must
be completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun

@c
@c  gpgme_op_revuid
@c
@deftypefun gpgme_error_t gpgme_op_revuid @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}}, @
     @w{unsigned int @var{flags}});

@since{1.7.0}

The function @code{gpgme_op_revuid} revokes a user ID from the OpenPGP
key given by @var{KEY}.  Revoking user IDs after key creation is a
feature of the OpenPGP protocol and thus the protocol
 for the context
@var{ctx} must be set to OpenPGP.  As of now this function requires at
least version 2.1.13 of GnuPG.

@var{key} specifies the key to operate on.

@var{userid} is the user ID to be revoked from the key.  The user ID
must be given verbatim because the engine does an exact and case
sensitive match.  Thus the @code{uid} field from the user ID object

(@code{gpgme_user_id_t}) is to be used.  This is a required parameter.

@var{flags} are currently not used and must be set to zero.

Note that the engine won't allow to revoke the last valid user ID.  To
change a user ID is better to first add the new user ID, then revoke
the old one, and finally publish the key.

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if
the engine does not support the command, or a bunch of other error
codes.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_revuid_start @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}},
 @
     @w{unsigned int @var{flags}});
```

@since{1.7.0}

The function @code{gpgme_op_revuid_start} initiates a
@code{gpgme_op_revuid} operation; see there for details.  It must
be completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun

```
@c
@c  gpgme_op_set_uid_flag
@c
@deftypefun gpgme_error_t gpgme_op_set_ui_flag @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}}, @
     @w{cons char * @var{name}}, @
     @w{cons char * @var{value}});
```

@since{1.8.0}

The function @code{gpgme_op_set_uid_flag} is used to set flags on a
user ID from the OpenPGP key given by @var{KEY}.  Setting flags on
user IDs after key creation is a feature of the OpenPGP protocol and
thus the protocol for the context @var{ctx} must be set to OpenPGP.

@var{key} specifies the key to operate on.  This parameters is required.

@var{userid} is the user ID of the key to be manipulated.  This user ID
must
 be given verbatim because the engine does an exact and case
sensitive match.  Thus the @code{uid} field from the user ID object
(@code{gpgme_user_id_t}) is to be used.  This is a required parameter.

@var{name} names the flag which is to be changed.  The only currently
supported flag is:

@table @code
@item primary
This sets the primary key flag on the given user ID.  All other
primary key flag on other user IDs are removed.  @var{value} must be
given as NULL.  For technical reasons this functions bumps the
creation timestamp of all affected self-signatures up by one second.
At least GnuPG version 2.1.20 is required.

@end table

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if
the engine does not support the command, or a bunch of other error
codes.

@end deftypefun

@deftypefun gpgme_error_t gpgme_op_set_uid_flag_start @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}}, @
     @w{cons char * @var{name}},
 @
     @w{cons char * @var{value}});

@since{1.8.0}

The function @code{gpgme_op_set_uid_flag_start} initiates a
@code{gpgme_op_set_uid_flag} operation; see there for details.  It must
be completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun

@c
@c  gpgme_op_genkey
@c
@deftypefun gpgme_error_t gpgme_op_genkey @

(@w{gpgme_ctx_t @var{ctx}}, @
@w{const char *@var{parms}}, @
@w{gpgme_data_t @var{public}}, @
@w{gpgme_data_t @var{secret}})

The function @code{gpgme_op_genkey} generates a new key pair in the context @var{ctx}. The meaning of @var{public} and @var{secret} depends on the crypto backend.

GPG does not support @var{public} and @var{secret}, they should be @code{NULL}. GnuPG will generate a key pair and add it to the standard key ring. The fingerprint of the generated key is available with @code{gpgme_op_genkey_result}.

GpgSM requires @var{public} to be a writable data object. GpgSM will generate
a secret key (which will be stored by @command{gpg-agent}, and return a certificate request in @var{public}, which then needs to be signed by the certification authority and imported before it can be used. GpgSM does not make the fingerprint available.

The argument @var{parms} specifies parameters for the key in an string that looks something like XML. The details about the format of @var{parms} are specific to the crypto engine used by @var{ctx}. The first line of the parameters must be @code{<GnupgKeyParams format="internal">} and the last line must be @code{</GnupgKeyParams>}. Every line in between the first and last lines is treated as a Header: Value pair. In particular, no XML escaping is necessary if you need to include the characters @code{<}, @code{>}, or @code{&}.

Here is an example for GnuPG as the crypto engine (all parameters of OpenPGP key generation are documented in the GPG manual):

@example
<GnupgKeyParms format="internal">
Key-Type: default
Subkey-Type: default
Name-Real:
Joe Tester
Name-Comment: with stupid passphrase
Name-Email: joe@@foo.bar
Expire-Date: 0
Passphrase: abc
</GnupgKeyParms>
@end example

Here is an example for GpgSM as the crypto engine (all parameters of

OpenPGP key generation are documented in the GPGSM manual):

@example
<GnupgKeyParms format="internal">
Key-Type: RSA
Key-Length: 1024
Name-DN: C=de,O=g10 code,OU=Testlab,CN=Joe 2 Tester
Name-Email: joe@@foo.bar
</GnupgKeyParms>
@end example

Strings should be given in UTF-8 encoding. The only format supported
for now is ``internal''. The content of the @code{GnupgKeyParms}
container is passed verbatim to the crypto backend. Control
statements are not allowed.

After the operation completed successfully, the result can be
retrieved with @code{gpgme_op_genkey_result}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, @code{GPG_ERR_INV_VALUE} if
@var{parms} is not a well-formed string (e.g. does not have the
expected
tag-like headers and footers), @code{GPG_ERR_NOT_SUPPORTED}
if @var{public} or @var{secret} is not valid, and
@code{GPG_ERR_GENERAL} if no key was created by the backend.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_genkey_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char
*@var{parms}}, @w{gpgme_data_t @var{public}}, @w{gpgme_data_t @var{secret}})

The function @code{gpgme_op_genkey_start} initiates a
@code{gpgme_op_genkey} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, @code{GPG_ERR_INV_VALUE} if
@var{parms} is not a valid XML string, and
@code{GPG_ERR_NOT_SUPPORTED} if @var{public} or @var{secret} is not
@code{NULL}.
@end deftypefun

@c
@c gpgme_op_genkey_result
@c
@deftp {Data type} {gpgme_genkey_result_t}

This is a pointer to a structure used to store the result of a
@code{gpgme_op_genkey} operation.
After successfully generating a
key, you can retrieve the pointer to the result with
@code{gpgme_op_genkey_result}. The structure contains the following
members:

@table @code
@item unsigned int primary : 1
This flag is set to 1 if a primary key was created and to 0
if not.

@item unsigned int sub : 1
This flag is set to 1 if a subkey was created and to 0 if not.

@item unsigned int uid : 1
This flag is set to 1 if a user ID was created and to 0 if not.

@item char *fpr
This is the fingerprint of the key that was created. If both a
primary and a subkey were generated, the fingerprint of the primary
key will be returned. If the crypto engine does not provide the
fingerprint, @code{fpr} will be a null pointer.

@item gpgme_data_t pubkey
@since{1.7.0}

This will eventually be used to return the public key. It is
currently not used.

@item gpgme_data_t seckey
@since{1.7.0}

This will eventually be used to return the secret key. It is
currently not used.

@end table
@end deftp

@deftypefun
gpgme_genkey_result_t gpgme_op_genkey_result (@w{gpgme_ctx_t @var{ctx}})

The function @code{gpgme_op_genkey_result} returns a
@code{gpgme_genkey_result_t} pointer to a structure holding the result of
a @code{gpgme_op_genkey} operation. The pointer is only valid if the
last operation on the context was a @code{gpgme_op_genkey} or
@code{gpgme_op_genkey_start} operation, and if this operation finished
successfully. The returned pointer is only valid until the next

operation is started on the context.

@end deftypefun

@c
@c  SIGNING KEYS
@c
@node Signing Keys
@subsection Signing Keys
@cindex key, signing

Key signatures are a unique concept of the OpenPGP protocol.  They can be used to certify the validity of a key and are used to create the Web-of-Trust (WoT).  Instead of using the @code{gpgme_op_interact} function along with a finite state machine, GPGME provides a convenient function to create key signatures when using modern GnuPG versions.

@c
@c  gpgme_op_keysign
@c
@deftypefun
 gpgme_error_t gpgme_op_keysign @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}}, @
     @w{unsigned long @var{expires}}, @
     @w{unsigned int @var{flags}});

@since{1.7.0}

The function @code{gpgme_op_keysign} adds a new key signature to the public key @var{KEY}.  This function requires at least version 2.1.12 of GnuPG.

@var{CTX} is the usual context which describes the protocol to use (which must be OpenPGP) and has also the list of signer keys to be used for the signature.  The common case is to use the default key for signing other keys.  If another key or more than one key shall be used for a key signature, @code{gpgme_signers_add} can be used. @xref{Selecting Signers}.

@var{key} specifies the key to operate on.

@var{userid} selects the user ID or user IDs to be signed.  If @var{userid} is set to @code{NULL} all valid user IDs are signed.  The

user ID must be given verbatim because the engine does an exact
 and
case sensitive match.  Thus the @code{uid} field from the user ID
object (@code{gpgme_user_id_t}) is to be used.  To select more than
one user ID put them all into one string separated by linefeeds
characters (@code{\n}) and set the flag @code{GPGME_KEYSIGN_LFSEP}.

@var{expires} specifies the expiration time of the new signature in
seconds.  The common case is to use 0 to not set an expiration date.
However, if the configuration of the engine defines a default
expiration for key signatures, that is still used unless the flag
@code{GPGME_KEYSIGN_NOEXPIRE} is used.  Note that this parameter takes
an unsigned long value and not a @code{time_t} to avoid problems on
systems which use a signed 32 bit @code{time_t}.  Note further that
the OpenPGP protocol uses 32 bit values for timestamps and thus can
only encode dates up to the year 2106.

@var{flags} can be set to the bit-wise OR of the following flags:

@table @code
@item GPGME_KEYSIGN_LOCAL
@since{1.7.0}

Instead of creating an exportable
 key signature, create a key
signature which is is marked as non-exportable.

@item GPGME_KEYSIGN_LFSEP
@since{1.7.0}

Although linefeeds are uncommon in user IDs this flag is required to
explicitly declare that @var{userid} may contain several linefeed
separated user IDs.

@item GPGME_KEYSIGN_NOEXPIRE
Force the creation of a key signature without an expiration date.  This
overrides @var{expire} and any local configuration of the engine.

@end table

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if
the engine does not support the command, or a bunch of other error
codes.

@end deftypefun

@deftypefun gpgme_error_t gpgme_op_keysign_start @

```
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}}, @
     @w{unsigned long @var{expires}}, @
     @w{unsigned int @var{flags}});

@since{1.7.0}

The function @code{gpgme_op_keysign_start} initiates a
@code{gpgme_op_keysign} operation; see there for details.  It must
be
 completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun



@c
@c  gpgme_op_revsig
@c
@deftypefun gpgme_error_t gpgme_op_revsig @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{gpgme_key_t @var{signing_key}}, @
     @w{const char *@var{userid}}, @
     @w{unsigned int @var{flags}});

@since{1.14.1}

The function @code{gpgme_op_revsig} revokes key signatures of the
public key @var{key} made with the key @var{signing_key}.   This
function requires at least version 2.2.24 of GnuPG.

@var{key} specifies the key to operate on.

@var{signing_key} specifies the key whose signatures shall be revoked.

@var{userid} selects the user ID or user IDs whose signatures shall
be revoked.  If @var{userid} is set to @code{NULL} the signatures
on all user IDs are revoked.  The user ID must be given verbatim
because the engine does an exact and case sensitive match.  Thus the
@code{uid} field from the user ID object
 (@code{gpgme_user_id_t}) is to
be used.  To select more than one user ID put them all into one string
separated by linefeeds characters (@code{\n}) and set the flag
@code{GPGME_REVSIG_LFSEP}.

@var{flags} can be set to the bit-wise OR of the following flags:
```

```
@table @code
@item GPGME_REVSIG_LFSEP
@since{1.14.1}

Although linefeeds are uncommon in user IDs this flag is required to
explicitly declare that @var{userid} may contain several linefeed
separated user IDs.

@end table

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if
the engine does not support the command, or a bunch of other error
codes.

@end deftypefun


@deftypefun gpgme_error_t gpgme_op_revsig_start @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{gpgme_key_t @var{signing_key}}, @
     @w{const char *@var{userid}}, @
     @w{unsigned int @var{flags}});

@since{1.14.1}

The function @code{gpgme_op_revsig_start} initiates a
@code{gpgme_op_revsig} operation; see there
 for details.  It must
be completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun


@c
@c  EXPORTING KEYS
@c
@node Exporting Keys
@subsection Exporting Keys
@cindex key, export
@cindex key ring, export from

Exporting keys means the same as running @command{gpg} with the command
@option{--export}.  However, a mode flag can be used to change the way
the export works.  The available mode flags are described below, they
may be or-ed together.
```

@table @code

@item GPGME_EXPORT_MODE_EXTERN
If this bit is set, the output is send directly to the default
keyserver. This is currently only allowed for OpenPGP keys.  It is good
practise to not send more than a few dozens key to a keyserver at one
time.  Using this flag requires that the @var{keydata} argument of the
export function is set to @code{NULL}.

@item GPGME_EXPORT_MODE_MINIMAL
@since{1.3.1}

If this bit is set, the smallest possible key is exported.  For OpenPGP
keys it removes all signatures
 except for the latest self-signatures.
For X.509 keys it has no effect.

@item GPGME_EXPORT_MODE_SSH
@since{1.4.0}

If this bit is set, the latest authentication key of the requested
OpenPGP key is exported in the OpenSSH public key format.  This
accepts just a single key; to force the export of a specific subkey
a fingerprint pattern with an appended exclamation mark may be used.

@item GPGME_EXPORT_MODE_SECRET
@since{1.6.0}

Instead of exporting the public key, the secret key is exported.  This
may not be combined with @code{GPGME_EXPORT_MODE_EXTERN}.  For X.509
the export format is PKCS#8.

@item GPGME_EXPORT_MODE_RAW
@since{1.6.0}

If this flag is used with @code{GPGME_EXPORT_MODE_SECRET} for an X.509
key the export format will be changed to PKCS#1.  This flag may not be
used with OpenPGP.

@item GPGME_EXPORT_MODE_PKCS12
@since{1.6.0}

If this flag is used with @code{GPGME_EXPORT_MODE_SECRET} for an X.509
key the export format will be changed to PKCS#12 which also includes
the

certificate.  This flag may not be used with OpenPGP.

@item GPGME_EXPORT_MODE_NOUID
@since{1.12.0 - experimental}
Do not export user ids.  Works only with certain gpg version.

@end table

@deftypefun gpgme_error_t gpgme_op_export (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{pattern}}, @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
The function @code{gpgme_op_export} extracts public keys and returns
them in the data buffer @var{keydata}.  The output format of the key
data returned is determined by the @acronym{ASCII} armor attribute set
for the context @var{ctx}, or, if that is not set, by the encoding
specified for @var{keydata}.

If @var{pattern} is @code{NULL}, all available keys are returned.
Otherwise, @var{pattern} contains an engine specific expression that
is used to limit the list to all keys matching the pattern.

@var{mode} is usually 0; other values are described above.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation
completed successfully, @code{GPG_ERR_INV_VALUE} if
@var{keydata} is not a valid empty data buffer, and passes through any
errors that are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_export_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{pattern}}, @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
The function @code{gpgme_op_export_start} initiates a
@code{gpgme_op_export} operation.  It can be completed by calling
@code{gpgme_wait} on the context.  @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, and @code{GPG_ERR_INV_VALUE}
if @var{keydata} is not a valid empty data buffer.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_export_ext (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{pattern}[]}, @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
The function @code{gpgme_op_export} extracts public
keys and returns
them in the data buffer @var{keydata}.  The output format of the key
data returned is determined by the @acronym{ASCII} armor attribute set

for the context @var{ctx}, or, if that is not set, by the encoding
specified for @var{keydata}.

If @var{pattern} or @var{*pattern} is @code{NULL}, all available keys
are returned.  Otherwise, @var{pattern} is a @code{NULL} terminated
array of strings that are used to limit the list to all keys matching
at least one of the patterns verbatim.

@var{mode} is usually 0; other values are described above.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation completed successfully, @code{GPG_ERR_INV_VALUE} if
@var{keydata} is not a valid empty data buffer, and passes through any
errors that are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_export_ext_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char
*@var{pattern}[]}, @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t
 @var{keydata}})
The function @code{gpgme_op_export_ext_start} initiates a
@code{gpgme_op_export_ext} operation.  It can be completed by calling
@code{gpgme_wait} on the context.  @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, and @code{GPG_ERR_INV_VALUE}
if @var{keydata} is not a valid empty data buffer.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_export_keys (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t keys[]},
@w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
@since{1.2.0}

The function @code{gpgme_op_export_keys} extracts public keys and returns
them in the data buffer @var{keydata}.  The output format of the key
data returned is determined by the @acronym{ASCII} armor attribute set
for the context @var{ctx}, or, if that is not set, by the encoding
specified for @var{keydata}.

The keys to export are taken form the @code{NULL} terminated array
@var{keys}.  Only
 keys of the currently selected protocol of
@var{ctx} which do have a fingerprint set are considered for export.
Other keys specified by the @var{keys} are ignored.  In particular
OpenPGP keys retrieved via an external key listing are not included.

@var{mode} is usually 0; other values are described above.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation completed successfully, @code{GPG_ERR_INV_VALUE} if
@var{keydata} is not a valid empty data buffer, @code{GPG_ERR_NO_DATA}
if no useful keys are in @var{keys} and passes through any errors that
are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_export_keys_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
@var{keys}[]}, @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
@since{1.2.0}

The function @code{gpgme_op_export_keys_start} initiates a
@code{gpgme_op_export_ext} operation.  It can be completed by calling
@code{gpgme_wait} on the
 context.  @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, and @code{GPG_ERR_INV_VALUE}
if @var{keydata} is not a valid empty data buffer, @code{GPG_ERR_NO_DATA}
if no useful keys are in @var{keys} and passes through any errors that
are reported by the crypto engine support routines.
@end deftypefun

@node Importing Keys
@subsection Importing Keys
@cindex key, import
@cindex key ring, import to

Importing keys means the same as running @command{gpg} with the command
@option{--import}.

@deftypefun gpgme_error_t gpgme_op_import (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t
@var{keydata}})
The function @code{gpgme_op_import} adds the keys in the data buffer
@var{keydata} to the key ring of the crypto engine used by @var{ctx}.
The format of @var{keydata} can be @acronym{ASCII} armored, for example,
but the details are specific to the crypto engine.

After the operation completed successfully, the result
 can be
retrieved with @code{gpgme_op_import_result}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
import was completed successfully, @code{GPG_ERR_INV_VALUE} if
@var{keydata} if @var{ctx} or @var{keydata} is not a valid pointer,
and @code{GPG_ERR_NO_DATA} if @var{keydata} is an empty data buffer.

@end deftypefun

@deftypefun gpgme_error_t gpgme_op_import_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{keydata}})
The function @code{gpgme_op_import_start} initiates a
@code{gpgme_op_import} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
import could be started successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx} or @var{keydata} is not a valid pointer, and
@code{GPG_ERR_NO_DATA} if @var{keydata} is an empty data buffer.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_import_keys (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t *@var{keys}})
@since{1.2.0}

The
function @code{gpgme_op_import_keys} adds the keys described by
the @code{NULL} terminated array @var{keys} to the key ring of the
crypto engine used by @var{ctx}. It is used to actually import and
make keys permanent which have been retrieved from an external source
(i.e. using @code{GPGME_KEYLIST_MODE_EXTERN}) earlier. The external
keylisting must have been made with the same context configuration (in
particular the same home directory). @footnote{Thus it is a
replacement for the usual workaround of exporting and then importing a
key to make an X.509 key permanent.} Note that for OpenPGP this may
require another access to the keyserver over the network.

Only keys of the currently selected protocol of @var{ctx} are
considered for import. Other keys specified by the @var{keys} are
ignored. As of now all considered keys must have been retrieved using
the same method, i.e. the used key listing mode must be identical.

After the operation completed successfully,
the result can be
retrieved with @code{gpgme_op_import_result}.

To move keys from one home directory to another, export and import the
keydata using @code{gpgme_op_export} and @code{gpgme_op_import}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
import was completed successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx} is not a valid pointer, @code{GPG_ERR_CONFLICT} if the key
listing mode does not match, and @code{GPG_ERR_NO_DATA} if no keys are
considered for export.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_import_keys_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t *@var{keys}})
@since{1.2.0}

The function @code{gpgme_op_import_keys_start} initiates a
@code{gpgme_op_import_keys} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
import was completed successfully, @code{GPG_ERR_INV_VALUE} if
@var{keydata} if @var{ctx}
or @var{keydata} is not a valid pointer,
@code{GPG_ERR_CONFLICT} if the key listing mode does not match, and
@code{GPG_ERR_NO_DATA} if no keys are considered for export.
@end deftypefun

@deftp {Data type} {gpgme_import_status_t}
This is a pointer to a structure used to store a part of the result of
a @code{gpgme_op_import} operation. For each considered key one
status is added that contains information about the result of the
import. The structure contains the following members:

@table @code
@item gpgme_import_status_t next
This is a pointer to the next status structure in the linked list, or
@code{NULL} if this is the last element.

@item char *fpr
This is the fingerprint of the key that was considered.

@item gpgme_error_t result
If the import was not successful, this is the error value that caused
the import to fail. Otherwise the error code is
@code{GPG_ERR_NO_ERROR}.

@item unsigned int status
This is a bit-wise OR of the following flags that give more
information about what
part of the key was imported. If the key was
already known, this might be 0.

@table @code
@item GPGME_IMPORT_NEW
The key was new.

@item GPGME_IMPORT_UID
The key contained new user IDs.

@item GPGME_IMPORT_SIG
The key contained new signatures.

@item GPGME_IMPORT_SUBKEY
The key contained new sub keys.

@item GPGME_IMPORT_SECRET
The key contained a secret key.
@end table
@end table
@end deftp

@deftp {Data type} {gpgme_import_result_t}
This is a pointer to a structure used to store the result of a
@code{gpgme_op_import} operation. After a successful import
operation, you can retrieve the pointer to the result with
@code{gpgme_op_import_result}. The structure contains the following
members:

@table @code
@item int considered
The total number of considered keys.

@item int no_user_id
The number of keys without user ID.

@item int imported
The total number of imported keys.

@item int imported_rsa
The number of imported RSA keys.

@item int unchanged
The number of unchanged keys.

@item
int new_user_ids
The number of new user IDs.

@item int new_sub_keys
The number of new sub keys.

@item int new_signatures
The number of new signatures.

@item int new_revocations
The number of new revocations.

@item int secret_read
The total number of secret keys read.

@item int secret_imported
The number of imported secret keys.

@item int secret_unchanged
The number of unchanged secret keys.

@item int not_imported
The number of keys not imported.

@item gpgme_import_status_t imports
A list of gpgme_import_status_t objects which contain more information
about the keys for which an import was attempted.

@item int skipped_v3_keys
For security reasons modern versions of GnuPG do not anymore support
v3 keys (created with PGP 2.x) and ignores them on import. This
counter provides the number of such skipped v3 keys.

@end table
@end deftp

@deftypefun gpgme_import_result_t gpgme_op_import_result (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_op_import_result} returns a
@code{gpgme_import_result_t}
pointer to a structure holding the result
of a @code{gpgme_op_import} operation. The pointer is only valid if
the last operation on the context was a @code{gpgme_op_import} or
@code{gpgme_op_import_start} operation, and if this operation finished
successfully. The returned pointer is only valid until the next
operation is started on the context.
@end deftypefun

@node Deleting Keys
@subsection Deleting Keys
@cindex key, delete
@cindex key ring, delete from

@deftypefun gpgme_error_t gpgme_op_delete_ext (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t
@var{key}}, @w{unsigned int @var{flags}})
@since{1.9.1}

The function @code{gpgme_op_delete_ext} deletes the key @var{key} from
the key ring of the crypto engine used by @var{ctx}.

@var{flags} can be set to the bit-wise OR of the following flags:

@table @code
@item GPGME_DELETE_ALLOW_SECRET
@since{1.9.1}

If not set, only public keys are deleted. If set, secret keys are
deleted as well, if that is supported.

@item
GPGME_DELETE_FORCE
@since{1.9.1}

If set, the user is not asked to confirm the deletion.
@end table

The function returns the error code @code{GPG_ERR_NO_ERROR} if the key
was deleted successfully, @code{GPG_ERR_INV_VALUE} if @var{ctx} or
@var{key} is not a valid pointer, @code{GPG_ERR_NO_PUBKEY} if
@var{key} could not be found in the keyring,
@code{GPG_ERR_AMBIGUOUS_NAME} if the key was not specified
unambiguously, and @code{GPG_ERR_CONFLICT} if the secret key for
@var{key} is available, but @var{allow_secret} is zero.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_delete_ext_start (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t
@var{key}}, @w{unsigned int @var{flags}})
@since{1.9.1}

The function @code{gpgme_op_delete_ext_start} initiates a
@code{gpgme_op_delete} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation was started successfully,
and @code{GPG_ERR_INV_VALUE} if
@var{ctx} or @var{key} is not a valid pointer.
@end deftypefun

The following functions allow only to use one particular flag.

@deftypefun gpgme_error_t gpgme_op_delete (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t
@var{key}}, @w{int @var{allow_secret}})
Similar to @code{gpgme_op_delete_ext}, but only the flag
@code{GPGME_DELETE_ALLOW_SECRET} can be provided.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_delete_start (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t

```
@var{key}}, @w{int @var{allow_secret}})
Similar to @code{gpgme_op_delete_ext_start}, but only the flag
@code{GPGME_DELETE_ALLOW_SECRET} can be provided.
@end deftypefun


@node Changing Passphrases
@subsection Changing Passphrases
@cindex passphrase, change

@deftypefun gpgme_error_t gpgme_op_passwd      @
          (@w{gpgme_ctx_t @var{ctx}},       @
           @w{const gpgme_key_t @var{key}}, @
           @w{unsigned int @var{flags}})

@since{1.3.0}

The function @code{gpgme_op_passwd}
 changes the passphrase of the
private key associated with @var{key}.  The only allowed value for
@var{flags} is @code{0}.  The backend engine will usually popup a window
to ask for the old and the new passphrase.  Thus this function is not
useful in a server application (where passphrases are not required
anyway).

Note that old @code{gpg} engines (before version 2.0.15) do not support
this command and will silently ignore it.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_passwd_start      @
          (@w{gpgme_ctx_t @var{ctx}},       @
           @w{const gpgme_key_t @var{key}}, @
           @w{unsigned int @var{flags}})

@since{1.3.0}

The function @code{gpgme_op_passwd_start} initiates a
@code{gpgme_op_passwd} operation.    It can be completed by calling
@code{gpgme_wait} on the context.  @xref{Waiting For Completion}.

The function returns @code{0} if the operation was started successfully,
and an error code if one of the arguments is not valid or the
 oepration
could not be started.
@end deftypefun


@c
```

```
@c  CHANGING TOFU DATA
@c
@node Changing TOFU Data
@subsection Changing TOFU Data
@cindex validity, TOFU

The OpenPGP engine features a Trust-On-First-Use (TOFU) key validation
model.  For resolving conflicts it is necessary to declare the policy
for a key.  See the GnuPG manual for details on the TOFU
implementation.

@deftp {Data type} {enum gpgme_tofu_policy_t}
@since{1.7.0}

@tindex gpgme_tofu_policy_t
The @code{gpgme_tofu_policy_t} type specifies the set of possible
policy values that are supported by @acronym{GPGME}:

@table @code
@item GPGME_TOFU_POLICY_AUTO
Set the policy to ``auto''.
@item GPGME_TOFU_POLICY_GOOD
Set the policy to ``good''.
@item GPGME_TOFU_POLICY_BAD
Set the policy to ``bad''.
@item GPGME_TOFU_POLICY_ASK
Set the policy to ``ask''.
@item GPGME_TOFU_POLICY_UNKNOWN
Set the policy to ``unknown''.
@end table

@end deftp

To change the policy for a key the following functions can be used:

@deftypefun gpgme_error_t
 gpgme_op_tofu_policy @
          (@w{gpgme_ctx_t @var{ctx}},       @
           @w{const gpgme_key_t @var{key}}, @
           @w{gpgme_tofu_policy_t @var{policy}})

@since{1.7.0}

The function @code{gpgme_op_tofu_policy} changes the TOFU policy of
@var{key}.  The valid values for @var{policy} are listed above.  As of
now this function does only work for OpenPGP and requires at least
version 2.1.10 of GnuPG.
```

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if
the engine does not support the command, or a bunch of other error
codes.

@end deftypefun

@deftypefun gpgme_error_t gpgme_op_tofu_policy_start @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{const gpgme_key_t @var{key}}, @
@w{gpgme_tofu_policy_t @var{policy}})

@since{1.7.0}

The function @code{gpgme_op_tofu_policy_start} initiates a
@code{gpgme_op_tofu_policy} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The
function returns @code{0} if the operation was started successfully,
and an error code if one of the arguments is not valid or the oepration
could not be started.

@end deftypefun

@node Advanced Key Editing
@subsection Advanced Key Editing
@cindex key, edit

@deftp {Data type} {gpgme_error_t (*gpgme_interact_cb_t) @
(@w{void *@var{handle}}, @
@w{const char *@var{status}}, @
@w{const char *@var{args}}, @
@w{int @var{fd}})}

@since{1.7.0}

@tindex gpgme_interact_cb_t
The @code{gpgme_interact_cb_t} type is the type of functions which
@acronym{GPGME} calls if it a key interact operation is on-going. The
status keyword @var{status} and the argument line @var{args} are
passed through by @acronym{GPGME} from the crypto engine. An empty
string represents EOF. The file descriptor @var{fd} is -1 for normal
status messages. If @var{status} indicates a command rather than a
status message, the response to the command should be written to
@var{fd}. The @var{handle} is
provided by the user at start of
operation.

The function should return @code{GPG_ERR_FALSE} if it did not handle
the status code, @code{0} for success, or any other error value.
@end deftp

@deftypefun gpgme_error_t gpgme_op_interact (@w{gpgme_ctx_t @var{ctx}}, @
  @w{gpgme_key_t @var{key}}, @
  @w{unsigned int @var{flags}}, @
  @w{gpgme_interact_cb_t @var{fnc}}, @
  @w{void *@var{handle}}, @
  @w{gpgme_data_t @var{out}})

@since{1.7.0}

The function @code{gpgme_op_interact} processes the key @var{KEY}
interactively, using the interact callback function @var{FNC} with the
handle @var{HANDLE}.  The callback is invoked for every status and
command request from the crypto engine.  The output of the crypto
engine is written to the data object @var{out}.

Note that the protocol between the callback function and the crypto
engine is specific to the crypto engine and no further support in
implementing this protocol correctly is provided by @acronym{GPGME}.

@var{flags} modifies the behaviour
 of the function; the only defined
bit value is:

@table @code
@item GPGME_INTERACT_CARD
@since{1.7.0}

This is used for smartcard based keys and uses gpgs
@code{--card-edit} command.

@end table

The function returns @code{0} if the edit operation completes
successfully, @code{GPG_ERR_INV_VALUE} if @var{ctx} or @var{key} is
not a valid pointer, and any error returned by the crypto engine or
the edit callback handler.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_interact_start (@w{gpgme_ctx_t @var{ctx}}, @
  @w{gpgme_key_t @var{key}}, @
  @w{unsigned int @var{flags}}, @
  @w{gpgme_interact_cb_t @var{fnc}}, @

```
  @w{void *@var{handle}}, @
  @w{gpgme_data_t @var{out}})

@since{1.7.0}

The function @code{gpgme_op_interact_start} initiates a
@code{gpgme_op_interact} operation.  It can be completed by calling
@code{gpgme_wait} on the context.  @xref{Waiting For Completion}.

The function returns @code{0} if the operation was started
successfully, and @code{GPG_ERR_INV_VALUE}
 if @var{ctx} or @var{key}
is not a valid pointer.
@end deftypefun


@node Crypto Operations
@section Crypto Operations
@cindex cryptographic operation

Sometimes, the result of a crypto operation returns a list of invalid
keys encountered in processing the request.  The following structure
is used to hold information about such a key.

@deftp {Data type} {gpgme_invalid_key_t}
This is a pointer to a structure used to store a part of the result of
a crypto operation which takes user IDs as one input parameter.  The
structure contains the following members:

@table @code
@item gpgme_invalid_key_t next
This is a pointer to the next invalid key structure in the linked
list, or @code{NULL} if this is the last element.

@item char *fpr
The fingerprint or key ID of the invalid key encountered.

@item gpgme_error_t reason
An error code describing the reason why the key was found invalid.
@end table
@end deftp


@menu
* Decrypt::                    Decrypting a ciphertext.
* Verify::
                Verifying a signature.
* Decrypt and Verify::          Decrypting a signed ciphertext.
```

```
* Sign::                    Creating a signature.
* Encrypt::                  Encrypting a plaintext.
@end menu


@node Decrypt
@subsection Decrypt
@cindex decryption
@cindex cryptographic operation, decryption

@deftypefun gpgme_error_t gpgme_op_decrypt (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t
@var{cipher}}, @w{gpgme_data_t @var{plain}})
The function @code{gpgme_op_decrypt} decrypts the ciphertext in the
data object @var{cipher} and stores it into the data object
@var{plain}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
ciphertext could be decrypted successfully, @code{GPG_ERR_INV_VALUE}
if @var{ctx}, @var{cipher} or @var{plain} is not a valid pointer,
@code{GPG_ERR_NO_DATA} if @var{cipher} does not contain any data to
decrypt, @code{GPG_ERR_DECRYPT_FAILED} if @var{cipher} is not a valid
cipher text, @code{GPG_ERR_BAD_PASSPHRASE} if the passphrase
 for the
secret key could not be retrieved, and passes through some errors that
are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_decrypt_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t
@var{cipher}}, @w{gpgme_data_t @var{plain}})
The function @code{gpgme_op_decrypt_start} initiates a
@code{gpgme_op_decrypt} operation.  It can be completed by calling
@code{gpgme_wait} on the context.  @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, and @code{GPG_ERR_INV_VALUE}
if @var{cipher} or @var{plain} is not a valid pointer.
@end deftypefun


@deftypefun gpgme_error_t gpgme_op_decrypt_ext ( @
        @w{gpgme_ctx_t @var{ctx}}, @
        @w{gpgme_decrypt_flags_t @var{flags}}, @
        @w{gpgme_data_t @var{cipher}}, @
        @w{gpgme_data_t @var{plain}})

@since{1.8.0}

The function @code{gpgme_op_decrypt_ext} is the same as
```

@code{gpgme_op_decrypt}
but has an additional argument
@var{flags}. If @var{flags} is 0 both function behave identically.

The value in @var{flags} is a bitwise-or combination of one or
multiple of the following bit values:

@table @code
@item GPGME_DECRYPT_VERIFY
@since{1.8.0}

The @code{GPGME_DECRYPT_VERIFY} symbol specifies that this function
shall exactly act as @code{gpgme_op_decrypt_verify}.

@item GPGME_DECRYPT_UNWRAP
@since{1.8.0}

The @code{GPGME_DECRYPT_UNWRAP} symbol specifies that the output shall
be an OpenPGP message with only the encryption layer removed. This
requires GnuPG 2.1.12 and works only for OpenPGP. This is the
counterpart to @code{GPGME_ENCRYPT_WRAP}.

@end table

The function returns the error codes as described for
@code{gpgme_op_decrypt}.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_decrypt_ext_start ( @
    @w{gpgme_ctx_t @var{ctx}}, @
    @w{gpgme_decrypt_flags_t @var{flags}}, @
    @w{gpgme_data_t @var{cipher}}, @

@w{gpgme_data_t @var{plain}})

@since{1.8.0}

The function @code{gpgme_op_decrypt_ext_start} initiates a
@code{gpgme_op_decrypt_ext} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, and @code{GPG_ERR_INV_VALUE}
if @var{cipher} or @var{plain} is not a valid pointer.
@end deftypefun

@deftp {Data type} {gpgme_recipient_t}

@since{1.1.0}

This is a pointer to a structure used to store information about the
recipient of an encrypted text which is decrypted in a
@code{gpgme_op_decrypt} operation.  This information (except for the
status field) is even available before the operation finished
successfully, for example in a passphrase callback.  The structure
contains the following members:

@table @code
@item gpgme_recipient_t next
This is a pointer to the next recipient structure in the linked list,
or @code{NULL} if this is
 the last element.

@item gpgme_pubkey_algo_t
The public key algorithm used in the encryption.

@item char *keyid
This is the key ID of the key (in hexadecimal digits) used as
recipient.

@item gpgme_error_t status
This is an error number with the error code GPG_ERR_NO_SECKEY if the
secret key for this recipient is not available, and 0 otherwise.
@end table
@end deftp

@deftp {Data type} {gpgme_decrypt_result_t}
This is a pointer to a structure used to store the result of a
@code{gpgme_op_decrypt} operation.  After successfully decrypting
data, you can retrieve the pointer to the result with
@code{gpgme_op_decrypt_result}.  As with all result structures, it
this structure shall be considered read-only and an application must
not allocate such a strucure on its own.  The structure contains the
following members:

@table @code
@item char *unsupported_algorithm
If an unsupported algorithm was encountered, this string describes the
algorithm that is not supported.

@item unsigned int wrong_key_usage
 : 1
@since{0.9.0}
This is true if the key was not used according to its policy.

@item unsigned int legacy_cipher_nomdc : 1

@since{1.11.2}
The message was made by a legacy algorithm without any integrity
protection.  This might be an old but legitimate message.

@item unsigned int is_mime : 1;
@since{1.11.0}
The message claims that the content is a MIME object.

@item unsigned int is_de_vs : 1;
@since{1.10.0}
The message was encrypted in a VS-NfD compliant way.  This is a
specification in Germany for a restricted communication level.

@item gpgme_recipient_t recipients
@since{1.1.0}

This is a linked list of recipients to which this message was encrypted.

@item char *file_name
This is the filename of the original plaintext message file if it is
known, otherwise this is a null pointer.

@item char *session_key
@since{1.8.0}

A textual representation (nul-terminated string) of the session key
used in symmetric encryption of the message, if the context has been
set to export session
 keys (see @code{gpgme_set_ctx_flag,
"export-session-key"}), and a session key was available for the most
recent decryption operation.  Otherwise, this is a null pointer.

You must not try to access this member of the struct unless
@code{gpgme_set_ctx_flag (ctx, "export-session-key")} returns success
or @code{gpgme_get_ctx_flag (ctx, "export-session-key")} returns true
(non-empty string).

@item char *symkey_algo
@since{1.11.0}

A string with the symmetric encryption algorithm and mode using the
format "<algo>.<mode>".  Note that the deprecated non-MDC encryption mode of
OpenPGP is given as "PGPCFB".

@end table
@end deftp

@deftypefun gpgme_decrypt_result_t gpgme_op_decrypt_result (@w{gpgme_ctx_t @var{ctx}})

The function @code{gpgme_op_decrypt_result} returns a
@code{gpgme_decrypt_result_t} pointer to a structure holding the
result of a @code{gpgme_op_decrypt} operation. The pointer is only
valid if the last operation on the context was a
@code{gpgme_op_decrypt} or @code{gpgme_op_decrypt_start}
operation.
If the operation failed this might be a @code{NULL} pointer. The
returned pointer is only valid until the next operation is started on
the context.
@end deftypefun

@node Verify
@subsection Verify
@cindex verification
@cindex signature, verification
@cindex cryptographic operation, verification
@cindex cryptographic operation, signature check
@cindex signature notation data
@cindex notation data

@deftypefun gpgme_error_t gpgme_op_verify (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{sig}},
@w{gpgme_data_t @var{signed_text}}, @w{gpgme_data_t @var{plain}})
The function @code{gpgme_op_verify} verifies that the signature in the
data object @var{sig} is a valid signature. If @var{sig} is a
detached signature, then the signed text should be provided in
@var{signed_text} and @var{plain} should be a null pointer.
Otherwise, if @var{sig} is a normal (or cleartext) signature,
@var{signed_text} should be a null pointer and @var{plain} should be a
writable data object
that will contain the plaintext after successful
verification.

The results of the individual signature verifications can be retrieved
with @code{gpgme_op_verify_result}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be completed successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx}, @var{sig} or @var{plain} is not a valid pointer,
@code{GPG_ERR_NO_DATA} if @var{sig} does not contain any data to
verify, and passes through any errors that are reported by the crypto
engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_verify_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t
@var{sig}}, @w{gpgme_data_t @var{signed_text}}, @w{gpgme_data_t @var{plain}})
The function @code{gpgme_op_verify_start} initiates a
@code{gpgme_op_verify} operation. It can be completed by calling

@code{gpgme_wait} on the context.  @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the operation could be started
 successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx}, @var{sig} or @var{plain} is not a valid pointer, and
@code{GPG_ERR_NO_DATA} if @var{sig} or @var{plain} does not contain any data to verify.
@end deftypefun

@deftp {Data type} {gpgme_sig_notation_t}
This is a pointer to a structure used to store a part of the result of a @code{gpgme_op_verify} operation.  The structure contains the following members:

@table @code
@item gpgme_sig_notation_t next
This is a pointer to the next new signature notation structure in the linked list, or @code{NULL} if this is the last element.

@item char *name
The name of the notation field.  If this is @code{NULL}, then the member @code{value} will contain a policy URL.

@item int name_len
The length of the @code{name} field.  For strings the length is counted without the trailing binary zero.

@item char *value
The value of the notation field.  If @code{name} is @code{NULL}, then this is a policy URL.

@item int value_len
The length of the @code{value}
 field.  For strings the length is
counted without the trailing binary zero.

@item gpgme_sig_notation_flags_t flags
The accumulated flags field.  This field contains the flags associated with the notation data in an accumulated form which can be used as an argument to the function @code{gpgme_sig_notation_add}.  The value @code{flags} is a bitwise-or combination of one or multiple of the following bit values:

@table @code
@item GPGME_SIG_NOTATION_HUMAN_READABLE
@since{1.1.0}

The @code{GPGME_SIG_NOTATION_HUMAN_READABLE} symbol specifies that the
notation data is in human readable form

@item GPGME_SIG_NOTATION_CRITICAL
@since{1.1.0}

The @code{GPGME_SIG_NOTATION_CRITICAL} symbol specifies that the
notation data is critical.

@end table

@item unsigned int human_readable : 1
This is true if the @code{GPGME_SIG_NOTATION_HUMAN_READABLE} flag is
set and false otherwise.  This flag is only valid for notation data,
not for policy URLs.

@item unsigned int critical : 1
This is true if the
 @code{GPGME_SIG_NOTATION_CRITICAL} flag is set and
false otherwise.  This flag is valid for notation data and policy URLs.

@end table
@end deftp

@deftp {Data type} {gpgme_signature_t}
This is a pointer to a structure used to store a part of the result of
a @code{gpgme_op_verify} operation.  The structure contains the
following members:

@table @code
@item gpgme_signature_t next
This is a pointer to the next new signature structure in the linked
list, or @code{NULL} if this is the last element.

@item gpgme_sigsum_t summary
This is a bit vector giving a summary of the signature status.  It
provides an easy interface to a defined semantic of the signature
status.  Checking just one bit is sufficient to see whether a
signature is valid without any restrictions. This means that
you can check for GPGME_SIGSUM_VALID like this:

@example
if ((sig.summary & GPGME_SIGSUM_VALID))
@{
  ..do stuff if valid..
@}
else
@{

..do stuff if not fully valid..
@}
@end example

The defined bits are:
@table @code
@item GPGME_SIGSUM_VALID
The signature is fully valid.

@item GPGME_SIGSUM_GREEN
The signature is good but one might want to display some extra information. Check the other bits.

@item GPGME_SIGSUM_RED
The signature is bad. It might be useful to check other bits and display more information, i.e. a revoked certificate might not render a signature invalid when the message was received prior to the cause for the revocation.

@item GPGME_SIGSUM_KEY_REVOKED
The key or at least one certificate has been revoked.

@item GPGME_SIGSUM_KEY_EXPIRED
The key or one of the certificates has expired. It is probably a good idea to display the date of the expiration.

@item GPGME_SIGSUM_SIG_EXPIRED
The signature has expired.

@item GPGME_SIGSUM_KEY_MISSING
Can't verify due to a missing key or certificate.

@item GPGME_SIGSUM_CRL_MISSING
The CRL (or an equivalent mechanism) is not available.

@item GPGME_SIGSUM_CRL_TOO_OLD
Available CRL is too
old.

@item GPGME_SIGSUM_BAD_POLICY
A policy requirement was not met.

@item GPGME_SIGSUM_SYS_ERROR
A system error occurred.

@item GPGME_SIGSUM_TOFU_CONFLICT
A TOFU conflict was detected.
@end table

@item char *fpr
This is the fingerprint or key ID of the signature.

@item gpgme_error_t status
This is the status of the signature. In particular, the following
status codes are of interest:

@table @code
@item GPG_ERR_NO_ERROR
This status indicates that the signature could be verified or that
there is no signature. For the combined result this status
means that all signatures could be verified.

Note: This does not mean that a valid signature could be found. Check
the @code{summary} field for that.

For example a @code{gpgme_op_decrypt_verify} returns a verification
result with GPG_ERR_NO_ERROR for encrypted but unsigned data.

@item GPG_ERR_SIG_EXPIRED
This status indicates that the signature is valid but expired. For
the combined result this
status means that all signatures are valid
and expired.

@item GPG_ERR_KEY_EXPIRED
This status indicates that the signature is valid but the key used to
verify the signature has expired. For the combined result this status
means that all signatures are valid and all keys are expired.

@item GPG_ERR_CERT_REVOKED
This status indicates that the signature is valid but the key used
to verify the signature has been revoked. For the combined result
this status means that all signatures are valid and all keys are
revoked.

@item GPG_ERR_BAD_SIGNATURE
This status indicates that the signature is invalid. For the combined
result this status means that all signatures are invalid.

@item GPG_ERR_NO_PUBKEY
This status indicates that the signature could not be verified due to
a missing key. For the combined result this status means that all
signatures could not be checked due to missing keys.

@item GPG_ERR_GENERAL
This status indicates that there was some other

error which prevented
the signature verification.
@end table

@item gpgme_sig_notation_t notations
This is a linked list with the notation data and policy URLs.

@item unsigned long timestamp
The creation timestamp of this signature.

@item unsigned long exp_timestamp
The expiration timestamp of this signature, or 0 if the signature does
not expire.

@item unsigned int wrong_key_usage : 1
This is true if the key was not used according to its policy.

@item unsigned int pka_trust : 2
This is set to the trust information gained by means of the PKA system.
Values are:
@table @code
@item 0
No PKA information available or verification not possible.
@item 1
PKA verification failed.
@item 2
PKA verification succeeded.
@item 3
Reserved for future use.
@end table
Depending on the configuration of the engine, this metric may also be
reflected by the validity of the signature.

@item unsigned int chain_model : 1
@since{1.1.6}

This is true if the
validity of the signature has been checked using the
chain model. In the chain model the time the signature has been created
must be within the validity period of the certificate and the time the
certificate itself has been created must be within the validity period
of the issuing certificate. In contrast the default validation model
checks the validity of signature as well at the entire certificate chain
at the current time.

@item gpgme_validity_t validity
The validity of the signature.

@item gpgme_error_t validity_reason
If a signature is not valid, this provides a reason why.

@item gpgme_pubkey_algo_t
The public key algorithm used to create this signature.

@item gpgme_hash_algo_t
The hash algorithm used to create this signature.

@item char *pka_address
The mailbox from the PKA information or @code{NULL}.

@item gpgme_key_t key
@since{1.7.0}

An object describing the key used to create the signature. This key
object may be incomplete in that it only conveys information
availabale
directly with a signature. It may also be @code{NULL} if
such information is not readily available.

@end table
@end deftp

@deftp {Data type} {gpgme_verify_result_t}
This is a pointer to a structure used to store the result of a
@code{gpgme_op_verify} operation. After verifying a signature, you
can retrieve the pointer to the result with
@code{gpgme_op_verify_result}. If the operation failed this might be
a @code{NULL} pointer. The structure contains the following member:

@table @code
@item gpgme_signature_t signatures
A linked list with information about all signatures for which a
verification was attempted.

@item char *file_name
This is the filename of the original plaintext message file if it is
known, otherwise this is a null pointer. Warning: The filename is
not covered by the signature.

@item unsigned int is_mime : 1;
@since{1.11.0}

The message claims that the content is a MIME object. Warning: This
flag is not covered by the signature.

@end table
@end deftp

@deftypefun
 gpgme_verify_result_t gpgme_op_verify_result (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_op_verify_result} returns a
@code{gpgme_verify_result_t} pointer to a structure holding the result
of a @code{gpgme_op_verify} operation.  The pointer is only valid if
the last operation on the context was a @code{gpgme_op_verify},
@code{gpgme_op_verify_start}, @code{gpgme_op_decrypt_verify} or
@code{gpgme_op_decrypt_verify_start} operation, and if this operation
finished successfully (for @code{gpgme_op_decrypt_verify} and
@code{gpgme_op_decrypt_verify_start}, the error code
@code{GPG_ERR_NO_DATA} counts as successful in this context).  The
returned pointer is only valid until the next operation is started on
the context.
@end deftypefun

@node Decrypt and Verify
@subsection Decrypt and Verify
@cindex decryption and verification
@cindex verification and decryption
@cindex signature check
@cindex cryptographic operation, decryption and verification

@deftypefun gpgme_error_t gpgme_op_decrypt_verify
 (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{cipher}}, @w{gpgme_data_t @var{plain}})
The function @code{gpgme_op_decrypt_verify} decrypts the ciphertext in
the data object @var{cipher} and stores it into the data object
@var{plain}.  If @var{cipher} contains signatures, they will be
verified.

After the operation completed, @code{gpgme_op_decrypt_result} and
@code{gpgme_op_verify_result} can be used to retrieve more information
about the signatures.

If the error code @code{GPG_ERR_NO_DATA} is returned, @var{cipher}
does not contain any data to decrypt.  However, it might still be
signed.  The information about detected signatures is available with
@code{gpgme_op_verify_result} in this case.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
ciphertext could be decrypted successfully, @code{GPG_ERR_INV_VALUE}
if @var{ctx}, @var{cipher} or @var{plain} is not a valid pointer,
@code{GPG_ERR_NO_DATA} if @var{cipher} does not contain any data to
decrypt,

@code{GPG_ERR_DECRYPT_FAILED} if @var{cipher} is not a valid
cipher text, @code{GPG_ERR_BAD_PASSPHRASE} if the passphrase for the
secret key could not be retrieved, and passes through any errors that
are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_decrypt_verify_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{cipher}}, @w{gpgme_data_t @var{plain}})
The function @code{gpgme_op_decrypt_verify_start} initiates a
@code{gpgme_op_decrypt_verify} operation. It can be completed by
calling @code{gpgme_wait} on the context. @xref{Waiting For
Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx}, @var{cipher}, @var{plain} or @var{r_stat} is not a valid
pointer, and @code{GPG_ERR_NO_DATA} if @var{cipher} does not contain
any data to decrypt.
@end deftypefun

When processing mails it is sometimes useful to extract the actual
mail
address (the ``addr-spec'') from a string. GPGME provides this
helper function which uses the same semantics as the internal
functions in GPGME and GnuPG:

@deftypefun @w{char *} gpgme_addrspec_from_uid (@w{const char *@var{uid}})

@since{1.7.1}

Return the mail address (called ``addr-spec'' in RFC-5322) from the
string @var{uid} which is assumed to be a user id (called ``address''
in RFC-5322). All plain ASCII characters (i.e. those with bit 7
cleared) in the result are converted to lowercase. Caller must free
the result using @code{gpgme_free}. Returns @code{NULL} if no valid
address was found (in which case @code{ERRNO} is set to @code{EINVAL})
or for other errors.

@end deftypefun

@node Sign
@subsection Sign
@cindex signature, creation
@cindex sign
@cindex cryptographic operation, signing

A signature can contain signatures by one or more keys. The set of

keys used to create a signatures is contained in a context, and is
applied to all following signing operations in
this context (until the
set is changed).

@menu
* Selecting Signers:: How to choose the keys to sign with.
* Creating a Signature:: How to create a signature.
* Signature Notation Data:: How to add notation data to a signature.
@end menu

@node Selecting Signers
@subsubsection Selecting Signers
@cindex signature, selecting signers
@cindex signers, selecting

The key or the keys used to create a signature are stored in the
context. The following functions can be used to manipulate this list.
If no signer has been set into the context a default key is used for
signing.

@deftypefun void gpgme_signers_clear (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_signers_clear} releases a reference for each
key on the signers list and removes the list of signers from the
context @var{ctx}.

Every context starts with an empty list.
@end deftypefun

@deftypefun gpgme_error_t gpgme_signers_add (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t
@var{key}})
The function
@code{gpgme_signers_add} adds the key @var{key} to the
list of signers in the context @var{ctx}.

Calling this function acquires an additional reference for the key.
@end deftypefun

@deftypefun @w{unsigned int} gpgme_signers_count (@w{const gpgme_ctx_t @var{ctx}})
@since{1.4.3}

The function @code{gpgme_signers_count} returns the number of signer keys in
the context @var{ctx}.
@end deftypefun

@deftypefun gpgme_key_t gpgme_signers_enum (@w{const gpgme_ctx_t @var{ctx}}, @w{int @var{seq}})
The function @code{gpgme_signers_enum} returns the @var{seq}th key in

the list of signers in the context @var{ctx}.  An additional reference
is acquired for the user.

If @var{seq} is out of range, @code{NULL} is returned.
@end deftypefun

@node Creating a Signature
@subsubsection Creating a Signature

@deftp {Data type} {enum gpgme_sig_mode_t}
@tindex gpgme_sig_mode_t
The @code{gpgme_sig_mode_t} type is used to specify the desired type of a
signature.  The following modes are available:

@table @code
@item
 GPGME_SIG_MODE_NORMAL
A normal signature is made, the output includes the plaintext and the
signature.

@item GPGME_SIG_MODE_DETACH
A detached signature is made.

@item GPGME_SIG_MODE_CLEAR
A clear text signature is made.  The @acronym{ASCII} armor and text
mode settings of the context are ignored.
@end table
@end deftp

@deftypefun gpgme_error_t gpgme_op_sign (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{plain}},
@w{gpgme_data_t @var{sig}}, @w{gpgme_sig_mode_t @var{mode}})
The function @code{gpgme_op_sign} creates a signature for the text in
the data object @var{plain} and returns it in the data object
@var{sig}.  The type of the signature created is determined by the
@acronym{ASCII} armor (or, if that is not set, by the encoding
specified for @var{sig}), the text mode attributes set for the context
@var{ctx} and the requested signature mode @var{mode}.

After the operation completed successfully, the result can be
retrieved with @code{gpgme_op_sign_result}.

If an S/MIME
 signed message is created using the CMS crypto engine,
the number of certificates to include in the message can be specified
with @code{gpgme_set_include_certs}.  @xref{Included Certificates}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the

signature could be created successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx}, @var{plain} or @var{sig} is not a valid pointer,
@code{GPG_ERR_NO_DATA} if the signature could not be created,
@code{GPG_ERR_BAD_PASSPHRASE} if the passphrase for the secret key
could not be retrieved, @code{GPG_ERR_UNUSABLE_SECKEY} if there are
invalid signers, and passes through any errors that are reported by the
crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_sign_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t
@var{plain}}, @w{gpgme_data_t @var{sig}}, @w{gpgme_sig_mode_t @var{mode}})
The function @code{gpgme_op_sign_start} initiates a
@code{gpgme_op_sign} operation. It can be completed by calling
@code{gpgme_wait}
on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the operation could be
started successfully, and @code{GPG_ERR_INV_VALUE} if @var{ctx},
@var{plain} or @var{sig} is not a valid pointer.
@end deftypefun

@deftp {Data type} {gpgme_new_signature_t}
This is a pointer to a structure used to store a part of the result of
a @code{gpgme_op_sign} operation. The structure contains the
following members:

@table @code
@item gpgme_new_signature_t next
This is a pointer to the next new signature structure in the linked
list, or @code{NULL} if this is the last element.

@item gpgme_sig_mode_t type
The type of this signature.

@item gpgme_pubkey_algo_t pubkey_algo
The public key algorithm used to create this signature.

@item gpgme_hash_algo_t hash_algo
The hash algorithm used to create this signature.

@item unsigned int sig_class
The signature class of this signature.

@item long int timestamp
The creation timestamp of this signature.

@item

char *fpr
The fingerprint of the key which was used to create this signature.
@end table
@end deftp

@deftp {Data type} {gpgme_sign_result_t}
This is a pointer to a structure used to store the result of a
@code{gpgme_op_sign} operation. After successfully generating a
signature, you can retrieve the pointer to the result with
@code{gpgme_op_sign_result}. The structure contains the following
members:

@table @code
@item gpgme_invalid_key_t invalid_signers
A linked list with information about all invalid keys for which a
signature could not be created.

@item gpgme_new_signature_t signatures
A linked list with information about all signatures created.
@end table
@end deftp

@deftypefun gpgme_sign_result_t gpgme_op_sign_result (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_op_sign_result} returns a
@code{gpgme_sign_result_t} pointer to a structure holding the result
of a @code{gpgme_op_sign} operation. The pointer is only valid if the
last operation on the context was
a @code{gpgme_op_sign},
@code{gpgme_op_sign_start}, @code{gpgme_op_encrypt_sign} or
@code{gpgme_op_encrypt_sign_start} operation. If that operation
failed, the function might return a @code{NULL} pointer. The returned
pointer is only valid until the next operation is started on the
context.
@end deftypefun

@node Signature Notation Data
@subsubsection Signature Notation Data
@cindex notation data
@cindex signature notation data
@cindex policy URL

Using the following functions, you can attach arbitrary notation data
to a signature. This information is then available to the user when
the signature is verified.

@deftypefun void gpgme_sig_notation_clear (@w{gpgme_ctx_t @var{ctx}})
@since{1.1.0}

The function @code{gpgme_sig_notation_clear} removes the notation data
from the context @var{ctx}.  Subsequent signing operations from this
context will not include any notation data.

Every context starts with an empty notation data list.
@end deftypefun

@deftypefun gpgme_error_t gpgme_sig_notation_add
 (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{name}}, @w{const char *@var{value}},
@w{gpgme_sig_notation_flags_t @var{flags}})
@since{1.1.0}

The function @code{gpgme_sig_notation_add} adds the notation data with
the name @var{name} and the value @var{value} to the context
@var{ctx}.

Subsequent signing operations will include this notation data, as well
as any other notation data that was added since the creation of the
context or the last @code{gpgme_sig_notation_clear} operation.

The arguments @var{name} and @var{value} must be @code{NUL}-terminated
strings in human-readable form.  The flag
@code{GPGME_SIG_NOTATION_HUMAN_READABLE} is implied
(non-human-readable notation data is currently not supported).  The
strings must be in UTF-8 encoding.

If @var{name} is @code{NULL}, then @var{value} should be a policy URL.

The function @code{gpgme_sig_notation_add} returns the error code
@code{GPG_ERR_NO_ERROR} if the notation data could be added
successfully, @code{GPG_ERR_INV_VALUE}
 if @var{ctx} is not a valid
pointer, or if @var{name}, @var{value} and @var{flags} are an invalid
combination.  The function also passes through any errors that are
reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_sig_notation_t gpgme_sig_notation_get (@w{const gpgme_ctx_t @var{ctx}})
@since{1.1.0}

The function @code{gpgme_sig_notation_get} returns the linked list of
notation data structures that are contained in the context @var{ctx}.

If @var{ctx} is not a valid pointer, or there is no notation data
added for this context, @code{NULL} is returned.
@end deftypefun

@node Encrypt
@subsection Encrypt
@cindex encryption
@cindex cryptographic operation, encryption

One plaintext can be encrypted for several recipients at the same
time. The list of recipients is created independently of any context,
and then passed to the encryption operation.

@menu
* Encrypting a Plaintext:: How to encrypt a plaintext.
@end menu

@node Encrypting a
Plaintext
@subsubsection Encrypting a Plaintext

@deftypefun gpgme_error_t gpgme_op_encrypt (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{recp}[]}, @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
The function @code{gpgme_op_encrypt} encrypts the plaintext in the
data object @var{plain} for the recipients @var{recp} and stores the
ciphertext in the data object @var{cipher}. The type of the
ciphertext created is determined by the @acronym{ASCII} armor (or, if
that is not set, by the encoding specified for @var{cipher}) and the
text mode attributes set for the context @var{ctx}.

@var{recp} must be a @code{NULL}-terminated array of keys. The user
must keep references for all keys during the whole duration of the
call (but see @code{gpgme_op_encrypt_start} for the requirements with
the asynchronous variant).

The value in @var{flags} is a bitwise-or combination of one or
multiple of the following bit values:

@table @code
@item GPGME_ENCRYPT_ALWAYS_TRUST
The
@code{GPGME_ENCRYPT_ALWAYS_TRUST} symbol specifies that all the
recipients in @var{recp} should be trusted, even if the keys do not
have a high enough validity in the keyring. This flag should be used
with care; in general it is not a good idea to use any untrusted keys.

@item GPGME_ENCRYPT_NO_ENCRYPT_TO
@since{1.2.0}

The @code{GPGME_ENCRYPT_NO_ENCRYPT_TO} symbol specifies that no
default or hidden default recipients as configured in the crypto
backend should be included.  This can be useful for managing different
user profiles.

@item GPGME_ENCRYPT_NO_COMPRESS
@since{1.5.0}

The @code{GPGME_ENCRYPT_NO_COMPRESS} symbol specifies that the
plaintext shall not be compressed before it is encrypted.  This is
in some cases useful if the length of the encrypted message
may reveal information about the plaintext.

@item GPGME_ENCRYPT_PREPARE
@itemx GPGME_ENCRYPT_EXPECT_SIGN
The @code{GPGME_ENCRYPT_PREPARE} symbol is used with the UI Server
protocol to prepare an encryption
 (i.e. sending the
@code{PREP_ENCRYPT} command).  With the
@code{GPGME_ENCRYPT_EXPECT_SIGN} symbol the UI Server is advised to
also expect a sign command.

@item GPGME_ENCRYPT_SYMMETRIC
@since{1.7.0}

The @code{GPGME_ENCRYPT_SYMMETRIC} symbol specifies that the
output should be additionally encrypted symmetrically even
if recipients are provided. This feature is only supported
for the OpenPGP crypto engine.

@item GPGME_ENCRYPT_THROW_KEYIDS
@since{1.8.0}

The @code{GPGME_ENCRYPT_THROW_KEYIDS} symbols requests that the
identifiers for the decrption keys are not included in the ciphertext.
On the receiving side, the use of this flag may slow down the
decryption process because all available secret keys must be tried.
This flag is only honored for OpenPGP encryption.

@item GPGME_ENCRYPT_WRAP
@since{1.8.0}

The @code{GPGME_ENCRYPT_WRAP} symbol specifies that the input is an
OpenPGP message and not a plain data.  This is the counterpart to
@code{GPGME_DECRYPT_UNWRAP}.

@item GPGME_ENCRYPT_WANT_ADDRESS
@since{1.11.0}

The
@code{GPGME_ENCRYPT_WANT_ADDRESS} symbol requests that all
supplied keys or key specifications include a syntactically valid mail
address. If this is not the case the operation is not even tried and
the error code @code{GPG_ERR_INV_USER_ID} is returned. Only the
address part of the key specification is conveyed to the backend. As
of now the key must be specified using the @var{recpstring} argument
of the extended encrypt functions. This feature is currently only
supported for the OpenPGP crypto engine.

@end table

If @code{GPG_ERR_UNUSABLE_PUBKEY} is returned, some recipients in
@var{recp} are invalid, but not all. In this case the plaintext might
be encrypted for all valid recipients and returned in @var{cipher} (if
this happens depends on the crypto engine). More information about
the invalid recipients is available with
@code{gpgme_op_encrypt_result}.

If @var{recp} is @code{NULL}, symmetric rather than public key
encryption is performed.
Symmetrically encrypted cipher text can be
deciphered with @code{gpgme_op_decrypt}. Note that in this case the
crypto backend needs to retrieve a passphrase from the user.
Symmetric encryption is currently only supported for the OpenPGP
crypto backend.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
ciphertext could be created successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx}, @var{recp}, @var{plain} or @var{cipher} is not a valid
pointer, @code{GPG_ERR_UNUSABLE_PUBKEY} if @var{recp} contains some
invalid recipients, @code{GPG_ERR_BAD_PASSPHRASE} if the passphrase
for the symmetric key could not be retrieved, and passes through any
errors that are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_encrypt_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
@var{recp}[]}, @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t
@var{cipher}})
The function @code{gpgme_op_encrypt_start} initiates
a
@code{gpgme_op_encrypt} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

References to the keys only need to be held for the duration of this
call. The user can release its references to the keys after this
function returns, even if the operation is not yet finished.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx}, @var{rset}, @var{plain} or @var{cipher} is not a valid
pointer, and @code{GPG_ERR_UNUSABLE_PUBKEY} if @var{rset} does not
contain any valid recipients.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_encrypt_ext @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{gpgme_key_t @var{recp}[]}, @
@w{const char *@var{recpstring}}, @
@w{gpgme_encrypt_flags_t @var{flags}}, @
@w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})

@since{1.11.0}

This is an extended
version of @code{gpgme_op_encrypt} with
@var{recpstring} as additional parameter. If @var{recp} is NULL and
@var{recpstring} is not NULL, the latter is expected to be a linefeed
delimited string with the set of key specifications. In contrast to
@var{recp} the keys are given directly as strings and there is no need
to first create key objects. Leading and trailing white space is
remove from each line in @var{recpstring}. The keys are then passed
verbatim to the backend engine.

For the OpenPGP backend several special keywords are supported to
modify the operation. These keywords are given instead of a key
specification. The currently supported keywords are:

@table @code
@item --hidden
@itemx --no-hidden
These keywords toggle between normal and hidden recipients for all
following key specifications. When a hidden recipient is requested
the gpg option @option{-R} (or @option{-F} in file mode) is used
instead of @option{-r} (@option{-f} in file mode).

@item --file
@itemx
--no-file
These keywords toggle between regular and file mode for all following
key specification. In file mode the option @option{-f} or @option{-F}
is passed to gpg. At least GnuPG version 2.1.14 is required to handle
these options. The @code{GPGME_ENCRYPT_WANT_ADDRESS} flag is ignored
in file mode.

@item --
This keyword disables all keyword detection up to the end of the string.  All keywords are treated as verbatim arguments.

@end table

To create a @var{recpstring} it is often useful to employ a strconcat style function.  For example this function creates a string to encrypt to two keys:

```
@example
char *
xbuild_recpstring (const char *key1, const char *key2)
@{
 char *result = gpgrt_strconcat ("--\n", key1, "\n", key2, NULL);
 if (!result)
   @{ perror ("strconcat failed"); exit (2); @}
 return result;
@}
@end example
```

Note the use of the double dash here; unless you want to specify a keyword, it is a good idea to avoid any possible trouble with key specifications starting
 with a double dash.  The used strconcat
function is available in Libgpg-error 1.28 and later; Libgpg-error (aka Gpgrt) is a dependency of GPGME.  The number of arguments to @code{gpgrt_strconcat} is limited to 47 but that should always be sufficient.  In case a larger and non-fixed number of keys are to be supplied the following code can be used:

```
@example
char *
xbuild_long_recpstring (void)
@{
 gpgrt_stream_t memfp;
 const char *s;
 void *result;

 memfp = gpgrt_fopenmem (0, "w+b");
 if (!memfp)
   @{ perror ("fopenmem failed"); exit (2); @}
 gpgrt_fputs ("--", memfp);
 while ((s = get_next_keyspec ()))
   @{
     gpgrt_fputc ('\n', memfp);
     gpgrt_fputs (s, memfp);
   @}
```

```
 gpgrt_fputc (0, memfp);
 if (gpgrt_ferror (memfp))
   @{ perror ("writing to memstream failed"); exit (2); @}
 if (gpgrt_fclose_snatch (memfp, &result, NULL))
   @{ perror ("fclose_snatch failed"); exit (2); @}
 return result;
@}
@end example

In this example @code{get_next_keyspec} is expected
 to return the next
key to be added to the string.  Please take care: Encrypting to a
large number of recipients is often questionable due to security
reasons and also for the technicality that all keys are currently
passed on the command line to @command{gpg} which has as a platform
specific length limitation.
@end deftypefun


@deftypefun gpgme_error_t gpgme_op_encrypt_ext_start @
        (@w{gpgme_ctx_t @var{ctx}}, @
         @w{gpgme_key_t @var{recp}[]}, @
         @w{const char *@var{recpstring}}, @
         @w{gpgme_encrypt_flags_t @var{flags}}, @
         @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})

@since{1.11.0}

This is an extended version of @code{gpgme_op_encrypt_start} with
@var{recpstring} as additional parameter.  If @var{recp} is NULL and
@var{recpstring} is not NULL, the latter is expected to be a linefeed
delimited string with the set of key specifications.  In contrast to
@var{recp} the keys are given directly as strings and there
 is no need
to first create key objects.  The keys are passed verbatim to the
backend engine.

@end deftypefun

@deftp {Data type} {gpgme_encrypt_result_t}
This is a pointer to a structure used to store the result of a
@code{gpgme_op_encrypt} operation.  After successfully encrypting
data, you can retrieve the pointer to the result with
@code{gpgme_op_encrypt_result}.  The structure contains the following
members:

@table @code
@item gpgme_invalid_key_t invalid_recipients
```

A linked list with information about all invalid keys for which
the data could not be encrypted.
@end table
@end deftp

@deftypefun gpgme_encrypt_result_t gpgme_op_encrypt_result (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_op_encrypt_result} returns a
@code{gpgme_encrypt_result_t} pointer to a structure holding the
result of a @code{gpgme_op_encrypt} operation. The pointer is only
valid if the last operation on the context was a
@code{gpgme_op_encrypt}, @code{gpgme_op_encrypt_start},
@code{gpgme_op_sign} or
@code{gpgme_op_sign_start} operation. If this
operation failed, this might be a @code{NULL} pointer. The returned
pointer is only valid until the next operation is started on the
context.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_encrypt_sign (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{recp}[]}, @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
The function @code{gpgme_op_encrypt_sign} does a combined encrypt and
sign operation. It is used like @code{gpgme_op_encrypt}, but the
ciphertext also contains signatures for the signers listed in
@var{ctx}.

The combined encrypt and sign operation is currently only available
for the OpenPGP crypto engine.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_encrypt_sign_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{recp}[]}, @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
The function @code{gpgme_op_encrypt_sign_start}
initiates a
@code{gpgme_op_encrypt_sign} operation. It can be completed by
calling @code{gpgme_wait} on the context. @xref{Waiting For
Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, and @code{GPG_ERR_INV_VALUE}
if @var{ctx}, @var{rset}, @var{plain} or @var{cipher} is not a valid
pointer.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_encrypt_sign_ext @
(@w{gpgme_ctx_t @var{ctx}}, @

@w{gpgme_key_t @var{recp}[]}, @
@w{const char *@var{recpstring}}, @
@w{gpgme_encrypt_flags_t @var{flags}}, @
@w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})

@since{1.11.0}

This is an extended version of @code{gpgme_op_encrypt_sign} with
@var{recpstring} as additional parameter. If @var{recp} is NULL and
@var{recpstring} is not NULL, the latter is expected to be a linefeed
delimited string with the set of key specifications. In contrast to
@var{recp}
the keys are given directly as strings and there is no need
to first create the key objects. The keys are passed verbatim to the
backend engine.

@end deftypefun

@deftypefun gpgme_error_t gpgme_op_encrypt_sign_ext_start @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{gpgme_key_t @var{recp}[]}, @
@w{const char *@var{recpstring}}, @
@w{gpgme_encrypt_flags_t @var{flags}}, @
@w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})

@since{1.11.0}

This is an extended version of @code{gpgme_op_encrypt_sign_start} with
@var{recpstring} as additional parameter. If @var{recp} is NULL and
@var{recpstring} is not NULL, the latter is expected to be a linefeed
delimited string with the set of key specifications. In contrast to
@var{recp} the keys are given directly as strings and there is no need
to first create the key objects. The keys are passed verbatim to the
backend engine.

@end deftypefun

@node Miscellaneous
@section Miscellaneous
operations

Here are some support functions which are sometimes useful.

@menu
* Running other Programs:: Running other Programs
* Using the Assuan protocol:: Using the Assuan protocol
* Checking for updates:: How to check for software updates

@end menu

@node Running other Programs
@subsection Running other Programs

GPGME features an internal subsystem to run the actual backend engines. Along with data abstraction object this subsystem can be used to run arbitrary simple programs which even need not be related to cryptographic features. It may for example be used to run tools which are part of the GnuPG system but are not directly accessible with the GPGME API.

@deftypefun gpgme_error_t gpgme_op_spawn @
(@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{file}}, @
@w{const char *@var{argv}[]}, @w{gpgme_data_t @var{datain}}, @
@w{gpgme_data_t @var{dataout}}, @w{gpgme_data_t @var{dataerr}}, @
@w{unsigned int @var{flags}})

@since{1.5.0}

The function @code{gpgme_op_spawn} runs the program @var{file} with the arguments taken from the NULL terminated array @var{argv}. If no arguments are required @var{argv} may be given as @code{NULL}. In the latter case or if @code{argv[0]} is the empty string, GPGME uses the basename of @var{file} for @code{argv[0]}. The file descriptors @code{stdin}, @code{stdout}, and @code{stderr} are connected to the data objects @var{datain}, @var{dataout}, and @var{dataerr}. If NULL is passed for one of these data objects the corresponding file descriptor is connected to @file{/dev/null}.

The value in @var{flags} is a bitwise-or combination of one or multiple of the following bit values:

@table @code
@item GPGME_SPAWN_DETACHED
@since{1.5.0}

Under Windows this flag inhibits the allocation of a new console for the program. This is useful for a GUI application which needs to call a command line helper tool.

@item GPGME_SPAWN_ALLOW_SET_FG
@since{1.5.0}

Under Windows

this flag allows the called program to put itself into
the foreground.
@end table
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_spawn_start @
(@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{file}}, @
@w{const char *@var{argv}[]}, @w{gpgme_data_t @var{datain}}, @
@w{gpgme_data_t @var{dataout}}, @w{gpgme_data_t @var{dataerr}}, @
@w{unsigned int @var{flags}})

@since{1.5.0}

This is the asynchronous variant of @code{gpgme_op_spawn}.
@end deftypefun

@node Using the Assuan protocol
@subsection Using the Assuan protocol

The Assuan protocol can be used to talk to arbitrary Assuan servers.
By default it is connected to the GnuPG agent, but it may be connected
to arbitrary servers by using @code{gpgme_ctx_set_engine_info},
passing the location of the servers socket as @var{file_name}
argument, and an empty string as @var{home_dir} argument.

The Assuan protocol functions use three kinds of callbacks to transfer
data:

@deftp {Data type}
{gpgme_error_t (*gpgme_assuan_data_cb_t) @
(@w{void *@var{opaque}}, @w{const void *@var{data}}, @
@w{size_t @var{datalen}})}

@since{1.2.0}

This callback receives any data sent by the server. @var{opaque} is
the pointer passed to @code{gpgme_op_assuan_transact_start},
@var{data} of length @var{datalen} refers to the data sent.
@end deftp

@deftp {Data type} {gpgme_error_t (*gpgme_assuan_inquire_cb_t) @
(@w{void *@var{opaque}}, @w{const char *@var{name}}, @
@w{const char *@var{args}}, @w{gpgme_data_t *@var{r_data}})}

@since{1.2.0}

This callback is used to provide additional data to the Assuan server.

```
@var{opaque} is the pointer passed to
@code{gpgme_op_assuan_transact_start}, @var{name} and @var{args}
specify what kind of data the server requested, and @var{r_data} is
used to return the actual data.

Note: Returning data is currently not implemented in @acronym{GPGME}.
@end deftp

@deftp {Data type} {gpgme_error_t (*gpgme_assuan_status_cb_t) @

  (@w{void *@var{opaque}}, @w{const char *@var{status}}, @
      @w{const char *@var{args}})}

@since{1.2.0}

This callback receives any status lines sent by the server.
@var{opaque} is the pointer passed to
@code{gpgme_op_assuan_transact_start}, @var{status} and @var{args}
denote the status update sent.
@end deftp

@deftypefun gpgme_error_t gpgme_op_assuan_transact_start @
        (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{command}}, @
         @w{gpgme_assuan_data_cb_t @var{data_cb}}, @
         @w{void * @var{data_cb_value}}, @
         @w{gpgme_assuan_inquire_cb_t @var{inquire_cb}}, @
         @w{void * @var{inquire_cb_value}}, @
         @w{gpgme_assuan_status_cb_t @var{status_cb}}, @
         @w{void * @var{status_cb_value}})

@since{1.2.0}

Send the Assuan @var{command} and return results via the callbacks.
Any callback may be @code{NULL}.  The result of the operation may be
retrieved using @code{gpgme_wait_ext}.

Asynchronous variant.
@end deftypefun

@deftypefun
 gpgme_error_t gpgme_op_assuan_transact_ext @
        (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{command}}, @
         @w{gpgme_assuan_data_cb_t @var{data_cb}}, @
         @w{void * @var{data_cb_value}}, @
         @w{gpgme_assuan_inquire_cb_t @var{inquire_cb}}, @
         @w{void * @var{inquire_cb_value}}, @
         @w{gpgme_assuan_status_cb_t @var{status_cb}}, @
         @w{void * @var{status_cb_value}}, @
```

@w{gpgme_error_t *@var{op_err}})

Send the Assuan @var{command} and return results via the callbacks.
The result of the operation is returned in @var{op_err}.

Synchronous variant.
@end deftypefun

@node Checking for updates
@subsection How to check for software updates

The GnuPG Project operates a server to query the current versions of
software packages related to GnuPG.  GPGME can be used to
access this online database and check whether a new version of a
software package is available.

@deftp {Data type} {gpgme_query_swdb_result_t}
@since{1.8.0}

This
 is a pointer to a structure used to store the result of a
@code{gpgme_op_query_swdb} operation.  After success full call to that
function, you can retrieve the pointer to the result with
@code{gpgme_op_query_swdb_result}.  The structure contains the
following member:

@table @code
@item name
This is the name of the package.

@item iversion
The currently installed version or an empty string.  This value is
either a copy of the argument given to @code{gpgme_op_query_swdb} or
the version of the installed software as figured out by GPGME or GnuPG.

@item created
This gives the date the file with the list of version numbers has
originally be created by the GnuPG project.

@item retrieved
This gives the date the file was downloaded.

@item warning
If this flag is set either an error has occurred or some of the
information in this structure are not properly set.  For example if
the version number of the installed software could not be figured out,
the

@code{update} flag may not reflect a required update status.

@item update
If this flag is set an update of the software is available.

@item urgent
If this flag is set an available update is important.

@item noinfo
If this flag is set, no valid information could be retrieved.

@item unknown
If this flag is set the given @code{name} is not known.

@item toold
If this flag is set the available information is not fresh enough.

@item error
If this flag is set some other error has occurred.

@item version
The version string of the latest released version.

@item reldate
The release date of the latest released version.

@end table
@end deftp

@deftypefun gpgme_error_t gpgme_op_query_swdb @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{const char *@var{name}}, @
@w{const char *@var{iversion}}, @
@w{gpgme_data_t @var{reserved}})

@since{1.8.0}

Query the software version database for software package @var{name}
and check against the installed
version given by @var{iversion}. If
@var{iversion} is given as @code{NULL} a check is only done if GPGME
can figure out the version by itself (for example when using
"gpgme" or "gnupg"). If @code{NULL} is used for @var{name} the
current gpgme version is checked. @var{reserved} must be set to 0.

@end deftypefun

@deftypefun gpgme_query_swdb_result_t gpgme_op_query_swdb_result @

```
        (@w{gpgme_ctx_t @var{ctx}})

@since{1.8.0}

The function @code{gpgme_op_query_swdb_result} returns a
@code{gpgme_query_swdb_result_t} pointer to a structure holding the
result of a @code{gpgme_op_query_swdb} operation.  The pointer is only
valid if the last operation on the context was a successful call to
@code{gpgme_op_query_swdb}.  If that call failed, the result might
be a @code{NULL} pointer.  The returned pointer is only valid until
the next operation is started on the context @var{ctx}.
@end deftypefun

@noindent
Here is an example on how to check whether GnuPG is current:

@example
#include
 <gpgme.h>

int
main (void)
@{
 gpg_error_t err;
 gpgme_ctx_t ctx;
 gpgme_query_swdb_result_t result;

 gpgme_check_version (NULL);
 err = gpgme_new (&ctx);
 if (err)
   fprintf (stderr, "error creating context: %s\n", gpg_strerror (err));
 else
   @{
     gpgme_set_protocol (ctx, GPGME_PROTOCOL_GPGCONF);

     err = gpgme_op_query_swdb (ctx, "gnupg", NULL, 0);
     if (err)
       fprintf (stderr, "error querying swdb: %s\n", gpg_strerror (err));
     else
       @{
         result = gpgme_op_query_swdb_result (ctx);
         if (!result)
           fprintf (stderr, "error querying swdb\n");
         if (!result->warning && !result->update)
           printf ("GnuPG version %s is current\n",
                   result->iversion);
         else if (!result->warning && result->update)
           printf ("GnuPG version %s can be updated to %s\n",
```

```
                result->iversion, result->version);
        else
          fprintf (stderr, "error finding the
 update status\n");
      @}
    gpgme_release (ctx);
  @}
 return 0;
@}
@end example
```

@node Run Control
@section Run Control
@cindex run control
@cindex cryptographic operation, running

@acronym{GPGME} supports running operations synchronously and asynchronously. You can use asynchronous operation to set up a context up to initiating the desired operation, but delay performing it to a later point.

Furthermore, you can use an external event loop to control exactly when @acronym{GPGME} runs. This ensures that @acronym{GPGME} only runs when necessary and also prevents it from blocking for a long time.

@menu
* Waiting For Completion:: Waiting until an operation is completed.
* Using External Event Loops:: Advanced control over what happens when.
* Cancellation:: How to end pending operations prematurely.
@end menu

@node Waiting For Completion
@subsection Waiting For Completion
@cindex cryptographic operation, wait for
@cindex wait for completion

@deftypefun
 gpgme_ctx_t gpgme_wait (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_error_t *@var{status}}, @w{int @var{hang}})
The function @code{gpgme_wait} continues the pending operation within the context @var{ctx}. In particular, it ensures the data exchange between @acronym{GPGME} and the crypto backend and watches over the run time status of the backend process.

If @var{hang} is true, the function does not return until the

operation is completed or cancelled.  Otherwise the function will not
block for a long time.

The error status of the finished operation is returned in @var{status}
if @code{gpgme_wait} does not return @code{NULL}.

The @var{ctx} argument can be @code{NULL}.  In that case,
@code{gpgme_wait} waits for any context to complete its operation.

@code{gpgme_wait} can be used only in conjunction with any context
that has a pending operation initiated with one of the
@code{gpgme_op_*_start} functions except @code{gpgme_op_keylist_start}
and @code{gpgme_op_trustlist_start} (for
 which you should use the
corresponding @code{gpgme_op_*_next} functions).  If @var{ctx} is
@code{NULL}, all of such contexts are waited upon and possibly
returned.  Synchronous operations running in parallel, as well as key
and trust item list operations, do not affect @code{gpgme_wait}.

In a multi-threaded environment, only one thread should ever call
@code{gpgme_wait} at any time, regardless of whether @var{ctx} is specified
or not.  This means that all calls to this function should be fully
synchronized by locking primitives.  It is safe to start asynchronous
operations while a thread is running in @code{gpgme_wait}.

The function returns the @var{ctx} of the context which has finished
the operation.  If @var{hang} is false, and the timeout expires,
@code{NULL} is returned and @code{*status} will be set to 0.  If an
error occurs, @code{NULL} is returned and the error is returned in
@code{*status}.
@end deftypefun


@node Using External Event Loops
@subsection Using External Event
 Loops
@cindex event loop, external

@acronym{GPGME} hides the complexity of the communication between the
library and the crypto engine.  The price of this convenience is that
the calling thread can block arbitrary long waiting for the data
returned by the crypto engine.  In single-threaded programs, in
particular if they are interactive, this is an unwanted side-effect.
OTOH, if @code{gpgme_wait} is used without the @var{hang} option being
enabled, it might be called unnecessarily often, wasting CPU time that
could be used otherwise.

The I/O callback interface described in this section lets the user

take control over what happens when.  @acronym{GPGME} will provide the
user with the file descriptors that should be monitored, and the
callback functions that should be invoked when a file descriptor is
ready for reading or writing.  It is then the user's responsibility to
decide when to check the file descriptors and when to invoke the
callback functions.  Usually this is done in an event
 loop, that also
checks for events in other parts of the program.  If the callback
functions are only called when the file descriptors are ready,
@acronym{GPGME} will never block.  This gives the user more control
over the program flow, and allows to perform other tasks when
@acronym{GPGME} would block otherwise.

By using this advanced mechanism, @acronym{GPGME} can be integrated
smoothly into GUI toolkits like GTK+ even for single-threaded
programs.

@menu
* I/O Callback Interface::  How I/O callbacks are registered.
* Registering I/O Callbacks::  How to use I/O callbacks for a context.
* I/O Callback Example::  An example how to use I/O callbacks.
* I/O Callback Example GTK+::  How to use @acronym{GPGME} with GTK+.
* I/O Callback Example GDK::  How to use @acronym{GPGME} with GDK.
* I/O Callback Example Qt::  How to use @acronym{GPGME} with Qt.
@end menu


@node I/O Callback Interface
@subsubsection I/O Callback Interface

@deftp {Data type} {gpgme_error_t
 (*gpgme_io_cb_t) (@w{void *@var{data}}, @w{int @var{fd}})}
@tindex gpgme_io_cb_t
The @code{gpgme_io_cb_t} type is the type of functions which
@acronym{GPGME} wants to register as I/O callback handlers using the
@code{gpgme_register_io_cb_t} functions provided by the user.

@var{data} and @var{fd} are provided by @acronym{GPGME} when the I/O
callback handler is registered, and should be passed through to the
handler when it is invoked by the user because it noticed activity on
the file descriptor @var{fd}.

The callback handler always returns @code{0}, but you should consider
the return value to be reserved for later use.
@end deftp

@deftp {Data type} {gpgme_error_t (*gpgme_register_io_cb_t) (@w{void *@var{data}}, @w{int @var{fd}},
@w{int @var{dir}}, @w{gpgme_io_cb_t @var{fnc}}, @w{void *@var{fnc_data}}, @w{void **@var{tag}})}

@tindex gpgme_register_io_cb_t
The @code{gpgme_register_io_cb_t} type is the type of functions which can be called by @acronym{GPGME} to register an I/O callback function
@var{fnc} for the file descriptor @var{fd} with the user.
@var{fnc_data} should be passed as the first argument to @var{fnc} when the handler is invoked (the second argument should be @var{fd}).
If @var{dir} is 0, @var{fnc} should be called by the user when @var{fd} is ready for writing. If @var{dir} is 1, @var{fnc} should be called when @var{fd} is ready for reading.

@var{data} was provided by the user when registering the @code{gpgme_register_io_cb_t} function with @acronym{GPGME} and will always be passed as the first argument when registering a callback function.
For example, the user can use this to determine the event loop to which the file descriptor should be added.

@acronym{GPGME} will call this function when a crypto operation is initiated in a context for which the user has registered I/O callback handler functions with @code{gpgme_set_io_cbs}. It can also call this function when it is in an I/O callback handler for a file descriptor associated to this context.

The user should return a unique handle in @var{tag} identifying this I/O callback registration, which will be passed to the @code{gpgme_register_io_cb_t} function without interpretation when the file descriptor should not be monitored anymore.
@end deftp

@deftp {Data type} {void (*gpgme_remove_io_cb_t) (@w{void *@var{tag}})}
The @code{gpgme_remove_io_cb_t} type is the type of functions which can be called by @acronym{GPGME} to remove an I/O callback handler that was registered before. @var{tag} is the handle that was returned by the @code{gpgme_register_io_cb_t} for this I/O callback.

@acronym{GPGME} can call this function when a crypto operation is in an I/O callback. It will also call this function when the context is destroyed while an operation is pending.
@end deftp

@deftp {Data type} {enum gpgme_event_io_t}
@tindex gpgme_event_io_t
The @code{gpgme_event_io_t} type specifies the type of an event that is reported to the user by @acronym{GPGME} as a consequence of an I/O operation.
The following events are defined:

@table @code
@item GPGME_EVENT_START
The operation is fully initialized now, and you can start to run the
registered I/O callback handlers now.  Note that registered I/O
callback handlers must not be run before this event is signalled.
@var{type_data} is @code{NULL} and reserved for later use.

@item GPGME_EVENT_DONE
The operation is finished, the last I/O callback for this operation
was removed.  The accompanying @var{type_data} points to a
@code{struct gpgme_io_event_done_data} variable that contains the
status of the operation that finished.  This event is signalled after
the last I/O callback has been removed.

@item GPGME_EVENT_NEXT_KEY
In a @code{gpgme_op_keylist_start} operation, the next key was
received from the crypto engine.  The accompanying @var{type_data} is
a @code{gpgme_key_t} variable that contains the key with one reference
for the user.

@end table
@end deftp

@deftp {Data type} {void (*gpgme_event_io_cb_t) (@w{void *@var{data}},
 @w{gpgme_event_io_t @var{type}}, @w{void *@var{type_data}})}
The @code{gpgme_event_io_cb_t} type is the type of functions which can be
called by @acronym{GPGME} to signal an event for an operation running
in a context which has I/O callback functions registered by the user.

@var{data} was provided by the user when registering the
@code{gpgme_event_io_cb_t} function with @acronym{GPGME} and will always be
passed as the first argument when registering a callback function.
For example, the user can use this to determine the context in which
this event has occurred.

@var{type} will specify the type of event that has occurred.
@var{type_data} specifies the event further, as described in the above
list of possible @code{gpgme_event_io_t} types.

@acronym{GPGME} can call this function in an I/O callback handler.
@end deftp

@node Registering I/O Callbacks
@subsubsection Registering I/O Callbacks

@deftp {Data type} {struct gpgme_io_cbs}
@tindex gpgme_event_io_t

This structure
is used to store the I/O callback interface functions
described in the previous section. It has the following members:

@table @code
@item gpgme_register_io_cb_t add
This is the function called by @acronym{GPGME} to register an I/O
callback handler. It must be specified.

@item void *add_priv
This is passed as the first argument to the @code{add} function when
it is called by @acronym{GPGME}. For example, it can be used to
determine the event loop to which the file descriptor should be added.

@item gpgme_remove_io_cb_t remove
This is the function called by @acronym{GPGME} to remove an I/O
callback handler. It must be specified.

@item gpgme_event_io_cb_t event
This is the function called by @acronym{GPGME} to signal an event for
an operation. It must be specified, because at least the start event
must be processed.

@item void *event_priv
This is passed as the first argument to the @code{event} function when
it is called by @acronym{GPGME}. For example, it can be used to
determine
the context in which the event has occurred.
@end table
@end deftp

@deftypefun void gpgme_set_io_cbs (@w{gpgme_ctx_t @var{ctx}}, @w{struct gpgme_io_cbs *@var{io_cbs}})
The function @code{gpgme_set_io_cbs} enables the I/O callback
interface for the context @var{ctx}. The I/O callback functions are
specified by @var{io_cbs}.

If @var{io_cbs}->@code{add} is @code{NULL}, the I/O callback interface
is disabled for the context, and normal operation is restored.
@end deftypefun

@deftypefun void gpgme_get_io_cbs (@w{gpgme_ctx_t @var{ctx}}, @w{struct gpgme_io_cbs *@var{io_cbs}})
The function @code{gpgme_get_io_cbs} returns the I/O callback
functions set with @code{gpgme_set_io_cbs} in @var{io_cbs}.
@end deftypefun

@node I/O Callback Example
@subsubsection I/O Callback Example

To actually use an external event loop, you have to implement the I/O callback functions that are used by @acronym{GPGME} to register and unregister file descriptors.  Furthermore, you have to actually monitor these
 file descriptors for activity and call the appropriate
I/O callbacks.

The following example illustrates how to do that.  The example uses locking to show in which way the callbacks and the event loop can run concurrently.  For the event loop, we use a fixed array.  For a real-world implementation, you should use a dynamically sized structure because the number of file descriptors needed for a crypto operation in @acronym{GPGME} is not predictable.

```
@example
#include <assert.h>
#include <errno.h>
#include <stdlib.h>
#include <pthread.h>
#include <sys/types.h>
#include <gpgme.h>

/* The following structure holds the result of a crypto operation.  */
struct op_result
@{
 int done;
 gpgme_error_t err;
@};

/* The following structure holds the data associated with one I/O
callback.  */
struct one_fd
@{
 int fd;
 int dir;
 gpgme_io_cb_t fnc;
 void *fnc_data;
 void *loop;
@};

struct event_loop
@{
 pthread_mutex_t lock;
#define MAX_FDS 32
 /* Unused slots are marked with FD being
 -1.  */
 struct one_fd fds[MAX_FDS];
```

```
@};
@end example
```

The following functions implement the I/O callback interface.

```
@example
gpgme_error_t
add_io_cb (void *data, int fd, int dir, gpgme_io_cb_t fnc, void *fnc_data,
    void **r_tag)
@{
 struct event_loop *loop = data;
 struct one_fd *fds = loop->fds;
 int i;

 pthread_mutex_lock (&loop->lock);
 for (i = 0; i < MAX_FDS; i++)
   @{
     if (fds[i].fd == -1)
 @{
   fds[i].fd = fd;
   fds[i].dir = dir;
   fds[i].fnc = fnc;
   fds[i].fnc_data = fnc_data;
   fds[i].loop = loop;
   break;
 @}
   @}
 pthread_mutex_unlock (&loop->lock);
 if (i == MAX_FDS)
   return gpg_error (GPG_ERR_GENERAL);
 *r_tag = &fds[i];
 return 0;
@}

void
remove_io_cb (void *tag)
@{
 struct one_fd *fd = tag;
 struct event_loop *loop = fd->loop;

 pthread_mutex_lock (&loop->lock);
 fd->fd = -1;
 pthread_mutex_unlock (&loop->lock);
@}

void
event_io_cb (void *data, gpgme_event_io_t type, void *type_data)
@{
```

```
 struct op_result *result = data;

 /* We
 don't support list operations here.  */
 if (type == GPGME_EVENT_DONE)
   @{
     result->done = 1;
     result->err = *type_data;
   @}
@}
@end example
```

The final missing piece is the event loop, which will be presented next.  We only support waiting for the success of a single operation.

```
@example
int
do_select (struct event_loop *loop)
@{
 fd_set rfds;
 fd_set wfds;
 int i, n;
 int any = 0;
 struct timeval tv;
 struct one_fd *fdlist = loop->fds;

 pthread_mutex_lock (&loop->lock);
 FD_ZERO (&rfds);
 FD_ZERO (&wfds);
 for (i = 0; i < MAX_FDS; i++)
   if (fdlist[i].fd != -1)
     FD_SET (fdlist[i].fd, fdlist[i].dir ? &rfds : &wfds);
 pthread_mutex_unlock (&loop->lock);

 tv.tv_sec = 0;
 tv.tv_usec = 1000;

 do
   @{
     n = select (FD_SETSIZE, &rfds, &wfds, NULL, &tv);
   @}
 while (n < 0 && errno == EINTR);

 if (n < 0)
   return n; /* Error or timeout.  */

 pthread_mutex_lock (&loop->lock);
 for (i = 0; i < MAX_FDS && n; i++)
```

```
  @{
    if (fdlist[i].fd
 != -1)
 @{
  if (FD_ISSET (fdlist[i].fd, fdlist[i].dir ? &rfds : &wfds))
    @{
      assert (n);
      n--;
      any = 1;
           /* The I/O callback handler can register/remove callbacks,
              so we have to unlock the file descriptor list.  */
           pthread_mutex_unlock (&loop->lock);
      (*fdlist[i].fnc) (fdlist[i].fnc_data, fdlist[i].fd);
           pthread_mutex_lock (&loop->lock);
    @}
 @}
  @}
 pthread_mutex_unlock (&loop->lock);
 return any;
@}

void
wait_for_op (struct event_loop *loop, struct op_result *result)
@{
 int ret;

 do
  @{
    ret = do_select (loop);
  @}
 while (ret >= 0 && !result->done);
@}
@end example
```

The main function shows how to put it all together.

```
@example
int
main (int argc, char *argv[])
@{
 struct event_loop loop;
 struct op_result result;
 gpgme_ctx_t ctx;
 gpgme_error_t err;
 gpgme_data_t sig, text;
 int i;
 pthread_mutexattr_t attr;
 struct gpgme_io_cbs io_cbs =
```

```
@{
  add_io_cb,
   &loop,
  remove_io_cb,
  event_io_cb,
  &result
@};

init_gpgme ();

/* Initialize the loop structure.  */

/* The mutex must be recursive, since remove_io_cb (which acquires a
   lock) can be called while holding a lock acquired in do_select.  */
pthread_mutexattr_init (&attr);
pthread_mutexattr_settype (&attr, PTHREAD_MUTEX_RECURSIVE);
pthread_mutex_init (&loop.lock, &attr);
pthread_mutexattr_destroy (&attr);

for (i = 0; i < MAX_FDS; i++)
  loop.fds[i].fd = -1;

/* Initialize the result structure.  */
result.done = 0;

err = gpgme_data_new_from_file (&sig, "signature", 1);
if (!err)
  err = gpgme_data_new_from_file (&text, "text", 1);
if (!err)
  err = gpgme_new (&ctx);
if (!err)
  @{
     gpgme_set_io_cbs (ctx, &io_cbs);
     err = gpgme_op_verify_start (ctx, sig, text, NULL);
  @}
if (err)
  @{
    fprintf (stderr, "gpgme error: %s: %s\n",
             gpgme_strsource (err), gpgme_strerror (err));
    exit (1);

  @}

wait_for_op (&loop, &result);
if (!result.done)
  @{
    fprintf (stderr, "select error\n");
    exit (1);
```

```
  @}
 if (!result.err)
  @{
    fprintf (stderr, "verification failed: %s: %s\n",
             gpgme_strsource (result.err), gpgme_strerror (result.err));
    exit (1);
  @}
 /* Evaluate verify result.  */
 @dots{}
 return 0;
@}
@end example
```

```
@node I/O Callback Example GTK+
@subsubsection I/O Callback Example GTK+
@cindex GTK+, using @acronym{GPGME} with

The I/O callback interface can be used to integrate @acronym{GPGME}
with the GTK+ event loop.  The following code snippets shows how this
can be done using the appropriate register and remove I/O callback
functions.  In this example, the private data of the register I/O
callback function is unused.  The event notifications is missing
because it does not require any GTK+ specific setup.

@example
#include <gtk/gtk.h>

struct my_gpgme_io_cb
@{
 gpgme_io_cb_t fnc;
 void *fnc_data;
 guint input_handler_id
@};

void
my_gpgme_io_cb
 (gpointer data, gint source, GdkInputCondition condition)
@{
 struct my_gpgme_io_cb *iocb = data;
 (*(iocb->fnc)) (iocb->data, source);
@}

void
my_gpgme_remove_io_cb (void *data)
@{
 struct my_gpgme_io_cb *iocb = data;
 gtk_input_remove (data->input_handler_id);
```

```
@}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
                               void *fnc_data, void **tag)
@{
 struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
 iocb->fnc = fnc;
 iocb->data = fnc_data;
 iocb->input_handler_id = gtk_input_add_full (fd, dir
                                              ? GDK_INPUT_READ
                                              : GDK_INPUT_WRITE,
                                              my_gpgme_io_callback,
                                              0, iocb, NULL);
 *tag = iocb;
 return 0;
@}
@end example


@node I/O Callback Example GDK
@subsubsection I/O Callback Example
 GDK
@cindex GDK, using @acronym{GPGME} with

The I/O callback interface can also be used to integrate
@acronym{GPGME} with the GDK event loop.  The following code snippets
shows how this can be done using the appropriate register and remove
I/O callback functions.  In this example, the private data of the
register I/O callback function is unused.  The event notifications is
missing because it does not require any GDK specific setup.

It is very similar to the GTK+ example in the previous section.

@example
#include <gdk/gdk.h>

struct my_gpgme_io_cb
@{
 gpgme_io_cb_t fnc;
 void *fnc_data;
 gint tag;
@};

void
my_gpgme_io_cb (gpointer data, gint source, GdkInputCondition condition)
@{
 struct my_gpgme_io_cb *iocb = data;
```

```
 (*(iocb->fnc)) (iocb->data, source);
@}

void
my_gpgme_remove_io_cb (void *data)
@{
 struct my_gpgme_io_cb *iocb = data;
 gdk_input_remove (data->tag);
@}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,

                void *fnc_data, void **tag)
@{
 struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
 iocb->fnc = fnc;
 iocb->data = fnc_data;
 iocb->tag = gtk_input_add_full (fd, dir ? GDK_INPUT_READ : GDK_INPUT_WRITE,
                                 my_gpgme_io_callback, iocb, NULL);
 *tag = iocb;
 return 0;
@}
@end example
```

@node I/O Callback Example Qt
@subsubsection I/O Callback Example Qt
@cindex Qt, using @acronym{GPGME} with

The I/O callback interface can also be used to integrate
@acronym{GPGME} with the Qt event loop.  The following code snippets
show how this can be done using the appropriate register and remove
I/O callback functions.  In this example, the private data of the
register I/O callback function is unused.  The event notifications is
missing because it does not require any Qt specific setup.

```
@example
#include <qsocketnotifier.h>
#include <qapplication.h>

struct IOCB @{
 IOCB( GpgmeIOCb f, void * d, QSocketNotifier * n )
   : func(
 f ), data( d ), notifier( n ) @{@}
 GpgmeIOCb func;
 void * data;
 QSocketNotifier * notifier;
```

```
@}

class MyApp : public QApplication @{

 // ...

 static void registerGpgmeIOCallback( void * data, int fd, int dir,
                                  GpgmeIOCb func, void * func_data,
                                  void ** tag ) @{
   QSocketNotifier * n =
     new QSocketNotifier( fd, dir ? QSocketNotifier::Read
                                : QSocketNotifier::Write );
   connect( n, SIGNAL(activated(int)),
            qApp, SLOT(slotGpgmeIOCallback(int)) );
   qApp->mIOCBs.push_back( IOCB( func, func_data, n ) );
   *tag = (void*)n;
 @}

 static void removeGpgmeIOCallback( void * tag ) @{
   if ( !tag ) return;
   QSocketNotifier * n = static_cast<QSocketNotifier*>( tag );
   for ( QValueList<IOCB>::iterator it = qApp->mIOCBs.begin() ;
         it != qApp->mIOCBs.end() ; ++it )
     if ( it->notifier == n ) @{
       delete it->notifier;
       qApp->mIOCBs.erase(
 it );
       return;
     @}
 @}

public slots:
 void slotGpgmeIOCallback( int fd ) @{
   for ( QValueList<IOCB>::const_iterator it = mIOCBs.begin() ;
         it != mIOCBs.end() ; ++it )
     if ( it->notifier && it->notifier->socket() == fd )
       (*(it->func)) ( it->func_data, fd );
 @}

 // ...

private:
 QValueList<IOCB> mIOCBs;
 // ...
@};
@end example
```

@node Cancellation
@subsection Cancellation
@cindex cryptographic operation, aborting
@cindex cryptographic operation, cancelling
@cindex aborting operations
@cindex cancelling operations

Sometimes you do not want to wait for an operation to finish.
@acronym{GPGME} provides two different functions to achieve that. The
function @code{gpgme_cancel} takes effect immediately. When it
returns, the operation is effectively canceled. However, it has some
limitations and can not be used with synchronous operations. In
contrast, the function @code{gpgme_cancel_async} can be used with any
context and from
any thread, but it is not guaranteed to take effect
immediately. Instead, cancellation occurs at the next possible time
(typically the next time I/O occurs in the target context).

@deftypefun gpgme_ctx_t gpgme_cancel (@w{gpgme_ctx_t @var{ctx}})
@since{0.4.5}

The function @code{gpgme_cancel} attempts to cancel a pending
operation in the context @var{ctx}. This only works if you use the
global event loop or your own event loop.

If you use the global event loop, you must not call @code{gpgme_wait}
during cancellation. After successful
cancellation, you can call @code{gpgme_wait} (optionally waiting on
@var{ctx}), and the context @var{ctx} will appear as if it had
finished with the error code @code{GPG_ERR_CANCEL}.

If you use an external event loop, you must ensure that no I/O
callbacks are invoked for this context (for example by halting the
event loop). On successful cancellation, all registered I/O callbacks
for this context will be unregistered, and a @code{GPGME_EVENT_DONE}
event
with the error code @code{GPG_ERR_CANCEL} will be signalled.

The function returns an error code if the cancellation failed (in this
case the state of @var{ctx} is not modified).
@end deftypefun

@deftypefun gpgme_ctx_t gpgme_cancel_async (@w{gpgme_ctx_t @var{ctx}})
@since{1.1.7}

The function @code{gpgme_cancel_async} attempts to cancel a pending
operation in the context @var{ctx}. This can be called by any thread

at any time after starting an operation on the context, but will not
take effect immediately.  The actual cancellation happens at the next
time GPGME processes I/O in that context.

The function returns an error code if the cancellation failed (in this
case the state of @var{ctx} is not modified).
@end deftypefun

@c ************************************************************
@c *******************  Appendices  *************************
@c ************************************************************

@include uiserver.texi

@node Debugging
@appendix How to solve problems
@cindex
 debug
@cindex GPGME_DEBUG

Everyone knows that software often does not do what it should do and thus
there is a need to track down problems.  This is in particular true
for applications using a complex library like @acronym{GPGME} and of
course also for the library itself.  Here we give a few hints on how
to solve such problems.

First of all you should make sure that the keys you want to use are
installed in the GnuPG engine and are usable.  Thus the first test is
to run the desired operation using @command{gpg} or @command{gpgsm} on
the command line.  If you can't figure out why things don't work, you
may use @acronym{GPGME}'s built in trace feature.  This feature is
either enabled using the environment variable @code{GPGME_DEBUG} or,
if this is not possible, by calling the function
@code{gpgme_set_global_flag}.  The value is the trace level and
an optional file name.  If no file name is given the trace output is
printed to @code{stderr}.

@noindent
For example
@smallexample
GPGME_DEBUG=9:/home/user/mygpgme.log
@end
 smallexample
@noindent
(Note that under Windows you use a semicolon in place of the colon to
separate the fields.)

A trace level of 9 is pretty verbose and thus you may want to start

```
off with a lower level.  The exact definition of the trace levels and
the output format may change with any release; you need to check the
source code for details.  In any case the trace log should be helpful
to understand what is going going on.  Warning: The trace log may
reveal sensitive details like passphrases or other data you use in
your application.  If you are asked to send a log file, make sure that
you run your tests only with play data.


@node Deprecated Functions
@appendix Deprecated Functions
@cindex deprecated

For backward compatibility @acronym{GPGME} has a number of functions,
data types and constants which are deprecated and should not be used
anymore.  We document here those which are really old to help
understanding old code and to allow migration
 to their modern
counterparts.

@strong{Warning:} These interfaces will be removed in a future version
of @acronym{GPGME}.

@deftypefun void gpgme_key_release (@w{gpgme_key_t @var{key}})
The function @code{gpgme_key_release} is equivalent to
@code{gpgme_key_unref}.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_import_ext (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t
@var{keydata}}, @w{int *@var{nr}})
@since{0.3.9}

The function @code{gpgme_op_import_ext} is equivalent to:

@example
 gpgme_error_t err = gpgme_op_import (ctx, keydata);
 if (!err)
   @{
     gpgme_import_result_t result = gpgme_op_import_result (ctx);
     *nr = result->considered;
   @}
@end example
@end deftypefun


@deftp {Data type} {gpgme_error_t (*gpgme_edit_cb_t) @
  (@w{void *@var{handle}}, @
   @w{gpgme_status_code_t @var{status}}, @
```

@w{const char *@var{args}}, @
@w{int @var{fd}})}
@tindex gpgme_edit_cb_t
The @code{gpgme_edit_cb_t} type is the type of functions which
@acronym{GPGME} calls
if it a key edit operation is on-going. The
status code @var{status} and the argument line @var{args} are passed
through by @acronym{GPGME} from the crypto engine. The file
descriptor @var{fd} is -1 for normal status messages. If @var{status}
indicates a command rather than a status message, the response to the
command should be written to @var{fd}. The @var{handle} is provided
by the user at start of operation.

The function should return @code{GPG_ERR_FALSE} if it did not handle
the status code, @code{0} for success, or any other error value.
@end deftp

@deftypefun gpgme_error_t gpgme_op_edit (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{key}},
@w{gpgme_edit_cb_t @var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})
@since{0.3.9}

Note: This function is deprecated, please use
@code{gpgme_op_interact} instead.

The function @code{gpgme_op_edit} processes the key @var{KEY}
interactively, using the edit callback function @var{FNC} with the
handle @var{HANDLE}. The callback
is invoked for every status and
command request from the crypto engine. The output of the crypto
engine is written to the data object @var{out}.

Note that the protocol between the callback function and the crypto
engine is specific to the crypto engine and no further support in
implementing this protocol correctly is provided by @acronym{GPGME}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
edit operation completes successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx} or @var{key} is not a valid pointer, and any error returned
by the crypto engine or the edit callback handler.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_edit_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
@var{key}}, @w{gpgme_edit_cb_t @var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})

@since{0.3.9}

Note: This function is deprecated, please use
@code{gpgme_op_interact_start} instead.

The function @code{gpgme_op_edit_start} initiates a
@code{gpgme_op_edit} operation.
It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation was started successfully, and @code{GPG_ERR_INV_VALUE} if
@var{ctx} or @var{key} is not a valid pointer.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_card_edit (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{key}}, @w{gpgme_edit_cb_t @var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})
Note: This function is deprecated, please use @code{gpgme_op_interact}
with the flag @code{GPGME_INTERACT_CARD} instead.

The function @code{gpgme_op_card_edit} is analogous to
@code{gpgme_op_edit}, but should be used to process the smart card corresponding to the key @var{key}.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_card_edit_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{key}}, @w{gpgme_edit_cb_t @var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})
Note: This function is deprecated,
please use @code{gpgme_op_interact_start}
with the flag @code{GPGME_INTERACT_CARD} instead.

The function @code{gpgme_op_card_edit_start} initiates a
@code{gpgme_op_card_edit} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation was started successfully, and @code{GPG_ERR_INV_VALUE} if
@var{ctx} or @var{key} is not a valid pointer.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_new_with_read_cb (@w{gpgme_data_t *@var{dh}}, @w{int (*@var{readfunc})} (@w{void *@var{hook}}, @w{char *@var{buffer}}, @w{size_t @var{count}}, @w{size_t *@var{nread}}), @w{void *@var{hook_value}})
The function @code{gpgme_data_new_with_read_cb} creates a new
@code{gpgme_data_t} object and uses the callback function @var{readfunc}
to retrieve the data on demand. As the callback function can supply
the data in any way it wants, this is the most flexible data type
@acronym{GPGME}
provides. However, it can not be used to write data.

The callback function receives @var{hook_value} as its first argument
whenever it is invoked.  It should return up to @var{count} bytes in
@var{buffer}, and return the number of bytes actually read in
@var{nread}.  It may return @code{0} in @var{nread} if no data is
currently available.  To indicate @code{EOF} the function should
return with an error code of @code{-1} and set @var{nread} to
@code{0}.  The callback function may support to reset its internal
read pointer if it is invoked with @var{buffer} and @var{nread} being
@code{NULL} and @var{count} being @code{0}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, @code{GPG_ERR_INV_VALUE} if
@var{dh} or @var{readfunc} is not a valid pointer, and
@code{GPG_ERR_ENOMEM} if not enough memory is available.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_rewind (@w{gpgme_data_t @var{dh}})
The function @code{gpgme_data_rewind}
 is equivalent to:

@example
 return (gpgme_data_seek (dh, 0, SEEK_SET) == -1)
   ? gpgme_error_from_errno (errno) : 0;
@end example
@end deftypefun

@deftp {Data type} gpgme_attr_t
The @code{gpgme_attr_t} type is used to specify a key or trust item
attribute.  The following attributes are defined:

@table @code
@item GPGME_ATTR_KEYID
This is the key ID of a sub key.  It is representable as a string.

@item GPGME_ATTR_FPR
This is the fingerprint of a sub key.  It is representable as a
string.

@item GPGME_ATTR_ALGO
This is the crypto algorithm for which the sub key can be used.  It
is representable as a string and as a number.  The numbers correspond
to the @code{enum gcry_pk_algos} values in the gcrypt library.

@item GPGME_ATTR_LEN
This is the key length of a sub key.  It is representable as a
number.

@item GPGME_ATTR_CREATED
This is the timestamp at creation time of a sub key. It is
representable as a number.

@item GPGME_ATTR_EXPIRE
This is the expiration time of
a sub key. It is representable as a
number.

@item GPGME_ATTR_USERID
This is a user ID. There can be more than one user IDs in a
@var{gpgme_key_t} object. The first one (with index 0) is the primary
user ID. The user ID is representable as a number.

@item GPGME_ATTR_NAME
This is the name belonging to a user ID. It is representable as a string.

@item GPGME_ATTR_EMAIL
This is the email address belonging to a user ID. It is representable
as a string.

@item GPGME_ATTR_COMMENT
This is the comment belonging to a user ID. It is representable as a
string.

@item GPGME_ATTR_VALIDITY
This is the validity belonging to a user ID. It is representable as a
string and as a number. See below for a list of available validities.

@item GPGME_ATTR_UID_REVOKED
This specifies if a user ID is revoked. It is representable as a
number, and is @code{1} if the user ID is revoked, and @code{0}
otherwise.

@item GPGME_ATTR_UID_INVALID
This specifies if a user ID is invalid. It is representable as a
number,
and is @code{1} if the user ID is invalid, and @code{0}
otherwise.

@item GPGME_ATTR_TYPE
This returns information about the type of key. For the string function
this will eother be "PGP" or "X.509". The integer function returns 0
for PGP and 1 for X.509.

@item GPGME_ATTR_IS_SECRET
This specifies if the key is a secret key. It is representable as a
number, and is @code{1} if the key is revoked, and @code{0} otherwise.

@item GPGME_ATTR_KEY_REVOKED
This specifies if a sub key is revoked.  It is representable as a
number, and is @code{1} if the key is revoked, and @code{0} otherwise.

@item GPGME_ATTR_KEY_INVALID
This specifies if a sub key is invalid.  It is representable as a
number, and is @code{1} if the key is invalid, and @code{0} otherwise.

@item GPGME_ATTR_KEY_EXPIRED
This specifies if a sub key is expired.  It is representable as a
number, and is @code{1} if the key is expired, and @code{0} otherwise.

@item GPGME_ATTR_KEY_DISABLED
This specifies if a sub key is disabled.
  It is representable as a
number, and is @code{1} if the key is disabled, and @code{0} otherwise.

@item GPGME_ATTR_KEY_CAPS
This is a description of the capabilities of a sub key.  It is
representable as a string.  The string contains the letter ``e'' if
the key can be used for encryption, ``s'' if the key can be used for
signatures, and ``c'' if the key can be used for certifications.

@item GPGME_ATTR_CAN_ENCRYPT
This specifies if a sub key can be used for encryption.  It is
representable as a number, and is @code{1} if the sub key can be used
for encryption, and @code{0} otherwise.

@item GPGME_ATTR_CAN_SIGN
This specifies if a sub key can be used to create data signatures.  It
is representable as a number, and is @code{1} if the sub key can be
used for signatures, and @code{0} otherwise.

@item GPGME_ATTR_CAN_CERTIFY
This specifies if a sub key can be used to create key certificates.
It is representable as a number, and is @code{1} if the sub key can be
used for certifications,
 and @code{0} otherwise.

@item GPGME_ATTR_SERIAL
The X.509 issuer serial attribute of the key.  It is representable as
a string.

@item GPGME_ATTR_ISSUE
The X.509 issuer name attribute of the key.  It is representable as a
string.

@item GPGME_ATTR_CHAINID
The X.509 chain ID can be used to build the certification chain. It
is representable as a string.
@end table
@end deftp

@deftypefun {const char *} gpgme_key_get_string_attr (@w{gpgme_key_t @var{key}}, @w{gpgme_attr_t
@var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
The function @code{gpgme_key_get_string_attr} returns the value of the
string-representable attribute @var{what} of key @var{key}. If the
attribute is an attribute of a sub key or an user ID, @var{idx}
specifies the sub key or user ID of which the attribute value is
returned. The argument @var{reserved} is reserved for later use and
should be @code{NULL}.

The string returned is only valid as long as the key is valid.

The function returns @code{0}
if an attribute can't be returned as a
string, @var{key} is not a valid pointer, @var{idx} out of range,
or @var{reserved} not @code{NULL}.
@end deftypefun

@deftypefun {unsigned long} gpgme_key_get_ulong_attr (@w{gpgme_key_t @var{key}}, @w{gpgme_attr_t
@var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
The function @code{gpgme_key_get_ulong_attr} returns the value of the
number-representable attribute @var{what} of key @var{key}. If the
attribute is an attribute of a sub key or an user ID, @var{idx}
specifies the sub key or user ID of which the attribute value is
returned. The argument @var{reserved} is reserved for later use and
should be @code{NULL}.

The function returns @code{0} if the attribute can't be returned as a
number, @var{key} is not a valid pointer, @var{idx} out of range, or
@var{reserved} not @code{NULL}.
@end deftypefun

@c
@c Key Signatures
@c
The signatures on a key are only available if the key was retrieved
via a listing operation with the @code{GPGME_KEYLIST_MODE_SIGS}
mode
enabled, because it is expensive to retrieve all signatures of a key.

So, before using the below interfaces to retrieve the signatures on a
key, you have to make sure that the key was listed with signatures

enabled.  One convenient, but blocking, way to do this is to use the function @code{gpgme_get_key}.

@deftp {Data type} gpgme_attr_t
The @code{gpgme_attr_t} type is used to specify a key signature attribute.  The following attributes are defined:

@table @code
@item GPGME_ATTR_KEYID
This is the key ID of the key which was used for the signature.  It is representable as a string.

@item GPGME_ATTR_ALGO
This is the crypto algorithm used to create the signature.  It is representable as a string and as a number.  The numbers correspond to the @code{enum gcry_pk_algos} values in the gcrypt library.

@item GPGME_ATTR_CREATED
This is the timestamp at creation time of the signature.  It is representable as a number.

@item GPGME_ATTR_EXPIRE
This is the expiration
 time of the signature.  It is representable as
a number.

@item GPGME_ATTR_USERID
This is the user ID associated with the signing key.  The user ID is representable as a number.

@item GPGME_ATTR_NAME
This is the name belonging to a user ID.  It is representable as a string.

@item GPGME_ATTR_EMAIL
This is the email address belonging to a user ID.  It is representable as a string.

@item GPGME_ATTR_COMMENT
This is the comment belonging to a user ID.  It is representable as a string.

@item GPGME_ATTR_KEY_REVOKED
This specifies if a key signature is a revocation signature.  It is representable as a number, and is @code{1} if the key is revoked, and @code{0} otherwise.

@c @item GPGME_ATTR_KEY_EXPIRED
@c This specifies if a key signature is expired.  It is representable as

@c a number, and is @code{1} if the key is revoked, and @code{0}
@c otherwise.
@c
@item GPGME_ATTR_SIG_CLASS
This specifies the signature class of a key signature. It is
representable as a number. The meaning is specific
to the crypto
engine.

@item GPGME_ATTR_SIG_CLASS
This specifies the signature class of a key signature. It is
representable as a number. The meaning is specific to the crypto
engine.

@item GPGME_ATTR_SIG_STATUS
This is the same value as returned by @code{gpgme_get_sig_status}.
@end table
@end deftp

@deftypefun {const char *} gpgme_key_sig_get_string_attr (@w{gpgme_key_t @var{key}}, @w{int
@var{uid_idx}}, @w{gpgme_attr_t @var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
The function @code{gpgme_key_sig_get_string_attr} returns the value of
the string-representable attribute @var{what} of the signature
@var{idx} on the user ID @var{uid_idx} in the key @var{key}. The
argument @var{reserved} is reserved for later use and should be
@code{NULL}.

The string returned is only valid as long as the key is valid.

The function returns @code{0} if an attribute can't be returned as a
string, @var{key} is not a valid pointer, @var{uid_idx} or @var{idx}
out of range, or @var{reserved}
not @code{NULL}.
@end deftypefun

@deftypefun {unsigned long} gpgme_key_sig_get_ulong_attr (@w{gpgme_key_t @var{key}}, @w{int
@var{uid_idx}}, @w{gpgme_attr_t @var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
The function @code{gpgme_key_sig_get_ulong_attr} returns the value of
the number-representable attribute @var{what} of the signature
@var{idx} on the user ID @var{uid_idx} in the key @var{key}. The
argument @var{reserved} is reserved for later use and should be
@code{NULL}.

The function returns @code{0} if an attribute can't be returned as a
string, @var{key} is not a valid pointer, @var{uid_idx} or @var{idx}
out of range, or @var{reserved} not @code{NULL}.
@end deftypefun

@deftp {Data type} {enum gpgme_sig_stat_t}
@tindex gpgme_sig_stat_t
The @code{gpgme_sig_stat_t} type holds the result of a signature check, or the combined result of all signatures. The following results are possible:

@table @code
@item GPGME_SIG_STAT_NONE
This status should not occur
in normal operation.

@item GPGME_SIG_STAT_GOOD
This status indicates that the signature is valid. For the combined result this status means that all signatures are valid.

@item GPGME_SIG_STAT_GOOD_EXP
This status indicates that the signature is valid but expired. For the combined result this status means that all signatures are valid and expired.

@item GPGME_SIG_STAT_GOOD_EXPKEY
This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.

@item GPGME_SIG_STAT_BAD
This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

@item GPGME_SIG_STAT_NOKEY
This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

@item GPGME_SIG_STAT_NOSIG
This
status indicates that the signature data provided was not a real signature.

@item GPGME_SIG_STAT_ERROR
This status indicates that there was some other error which prevented the signature verification.

@item GPGME_SIG_STAT_DIFF
For the combined result this status means that at least two signatures have a different status. You can get each key's status with @code{gpgme_get_sig_status}.

```
@end table
@end deftp

@deftypefun {const char *} gpgme_get_sig_status (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}},
@w{gpgme_sig_stat_t *@var{r_stat}}, @w{time_t *@var{r_created}})
The function @code{gpgme_get_sig_status} is equivalent to:

@example
 gpgme_verify_result_t result;
 gpgme_signature_t sig;

 result = gpgme_op_verify_result (ctx);
 sig = result->signatures;

 while (sig && idx)
   @{
     sig = sig->next;
     idx--;
   @}
 if (!sig || idx)
   return NULL;

 if (r_stat)
   @{
     switch (gpg_err_code (sig->status))
 @{
 case GPG_ERR_NO_ERROR:
   *r_stat = GPGME_SIG_STAT_GOOD;

  break;

 case GPG_ERR_BAD_SIGNATURE:
   *r_stat = GPGME_SIG_STAT_BAD;
   break;

 case GPG_ERR_NO_PUBKEY:
   *r_stat = GPGME_SIG_STAT_NOKEY;
   break;

 case GPG_ERR_NO_DATA:
   *r_stat = GPGME_SIG_STAT_NOSIG;
   break;

 case GPG_ERR_SIG_EXPIRED:
   *r_stat = GPGME_SIG_STAT_GOOD_EXP;
   break;

 case GPG_ERR_KEY_EXPIRED:
```

```
  *r_stat = GPGME_SIG_STAT_GOOD_EXPKEY;
  break;

 default:
  *r_stat = GPGME_SIG_STAT_ERROR;
  break;
 @}
  @}
 if (r_created)
  *r_created = sig->timestamp;
 return sig->fpr;
@end example
@end deftypefun

@deftypefun {const char *} gpgme_get_sig_string_attr (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}},
@w{gpgme_attr_t @var{what}}, @w{int @var{whatidx}})
The function @code{gpgme_get_sig_string_attr} is equivalent to:

@example
 gpgme_verify_result_t result;
 gpgme_signature_t sig;

 result = gpgme_op_verify_result (ctx);
 sig = result->signatures;

 while (sig && idx)
  @{
   sig = sig->next;
   idx--;
  @}
 if (!sig || idx)
  return
 NULL;

 switch (what)
  @{
  case GPGME_ATTR_FPR:
   return sig->fpr;

  case GPGME_ATTR_ERRTOK:
   if (whatidx == 1)
    return sig->wrong_key_usage ? "Wrong_Key_Usage" : "";
   else
 return "";
  default:
   break;
  @}
```

```
 return NULL;
@end example
@end deftypefun

@deftypefun {const char *} gpgme_get_sig_ulong_attr (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}},
@w{gpgme_attr_t @var{what}}, @w{int @var{whatidx}})
The function @code{gpgme_get_sig_ulong_attr} is equivalent to:

@example
 gpgme_verify_result_t result;
 gpgme_signature_t sig;

 result = gpgme_op_verify_result (ctx);
 sig = result->signatures;

 while (sig && idx)
   @{
     sig = sig->next;
     idx--;
   @}
 if (!sig || idx)
   return 0;

 switch (what)
   @{
   case GPGME_ATTR_CREATED:
     return sig->timestamp;

   case GPGME_ATTR_EXPIRE:
     return sig->exp_timestamp;

   case GPGME_ATTR_VALIDITY:
     return (unsigned long) sig->validity;

   case GPGME_ATTR_SIG_STATUS:
      switch (sig->status)
 @{
 case GPG_ERR_NO_ERROR:
   return GPGME_SIG_STAT_GOOD;

 case GPG_ERR_BAD_SIGNATURE:
   return GPGME_SIG_STAT_BAD;

 case GPG_ERR_NO_PUBKEY:
   return GPGME_SIG_STAT_NOKEY;

 case GPG_ERR_NO_DATA:
   return GPGME_SIG_STAT_NOSIG;
```

```
 case GPG_ERR_SIG_EXPIRED:
   return GPGME_SIG_STAT_GOOD_EXP;

 case GPG_ERR_KEY_EXPIRED:
   return GPGME_SIG_STAT_GOOD_EXPKEY;

 default:
   return GPGME_SIG_STAT_ERROR;
 @}

   case GPGME_ATTR_SIG_SUMMARY:
     return sig->summary;

   default:
     break;
   @}
 return 0;
@end example
@end deftypefun

@deftypefun {const char *} gpgme_get_sig_key (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}},
@w{gpgme_key_t *@var{r_key}})
The function @code{gpgme_get_sig_key} is equivalent to:

@example
 gpgme_verify_result_t result;
 gpgme_signature_t sig;

 result = gpgme_op_verify_result (ctx);
 sig = result->signatures;

 while (sig && idx)
   @{
     sig = sig->next;
     idx--;
   @}
 if (!sig || idx)
   return gpg_error
 (GPG_ERR_EOF);

 return gpgme_get_key (ctx, sig->fpr, r_key, 0);
@end example
@end deftypefun
```

@include lesser.texi

@include gpl.texi

@node Concept Index
@unnumbered Concept Index

@printindex cp

@node Function and Data Index
@unnumbered Function and Data Index

@printindex fn

@bye
(21:protected-private-key(3:elg(1:p193:5*n^f"Q'R0_6<ymec \=c7S8u[5
ZF'xf5yi9F@T=KhZdU0(k5nZEI/ R]njVITPU$W<xs-Yx)(1:g1:)(1:y192:O9GNR{?]Y_W[FD*zuRmk%'R\'>>e9pe
eU)uS%VJ!5F)yH*O
]l'7{@wJmQP^jurx'V2H2j[G{q_"8()(9:protected25:openpgp-s2k3-sha1-aes-cbc((4:sha18:o"%7:5242880)16:Hs*}u
)256:Gzk3%\Kb2=oOO@,}eBBI3F|OQP3eD%n,;~L-6UH^=64i);l
e+sG"(mlH_2sn_BBO7hRcZUt(p6,{5|37C3m8EY9=gQ )(12:protected-at15:20101008T070148)))
{
  "dec_info":  {
    "symkey_algo":  "TWOFISH.CFB",
    "wrong_key_usage":  false,
    "is_de_vs":  false,
    "is_mime":  false,
    "legacy_cipher_nomdc":  false,
    "recipients":  [{
      "keyid":  "6AE6D7EE46A871F8",
      "pubkey_algo_name":  "ELG-E",
      "status_string":  "Success",
      "status_code":  0
    }]
  },
  "info": {
    "is_mime":  false,
    "signatures":  [{
      "summary":  {
        "sigsum":  [],
        "valid":  false,
        "green":  false,
        "red":  false,
        "revoked":  false,
        "key-expired":  false,
        "sig-expired":  false,

"key-missing": false,
"crl-missing": false,
"crl-too-old": false,
"bad-policy": false,
"sys-error": false
},

"wrong_key_usage": false,
"chain_model": false,
"is_de_vs": false,
"status_string": "Success",
"fingerprint": "A0FF4590BB6122EDEF6E3C542D727CC768697734",
"validity_string": "unknown",
"pubkey_algo_name": "DSA",
"hash_algo_name": "RIPEMD160",
"status_code": 0,
"timestamp": 1542200353,
"exp_timestamp": 0,
"pka_trust": 0,
"validity": 0,
"validity_reason": 0
}]
},
"type": "plaintext",
"base64": false,
"data": "Hello world"
}
{
"type": "ciphertext",
"base64": false
}
-----BEGIN PGP PUBLIC KEY BLOCK-----

mQENBFsMHecBCACqdJgqa+CeNYwPCK+MpOwAV6uFVjDyO2LmOs6+XfDWRBU/Zjtz
8zdYNKSbLjkWN4ujV5aiyA7MtEofszzYLEoKUt1wiDScHMpW8qmEFDvl9g26MeAV
rTno9D5KodHvEIs8wnrqBs8ix0WLbh6J1Dtt8HQgIbN+v3gaRQrgBFe6z2ZYpHHx
ZfOu3iFKlm2WE/NekRkvvFIo3ApGvRhGIYw6JMmugBlo7s5xosJK0I9dkPGlEEtt
aF1RkcMj8sWG9vHAXcjlGgFfXSN9YLppydXpkuZGm4+gjLB2a3rbQCZVFnxCyG4O
ybjkP8Jw6Udm89bK2ucYFfjdrmYn/nJqRxeNABEBAAG0I1Rlc3QgTm9Qcml2S2V5
IDxub2JvZHlAZXhhbXBsZS5vcmc+iQFOBBMBCAA4FiEE4Fmh4IZtMa4TEXCITZou
EzBBU9EFAlsMHecCGwMFCwkIBwIGFQoJCAsCBBYCAwECHgECF4AACgkQTZouEzBB
U9F+qwf/SHj4uRnTWgyJ71FBxQDYCBq3jbi6e7hMkRPbJyJdnPIMAb2p0PJjBgjW
0pp4+kDPZans3UDHbma1u/SFI4/y6isJiK94Bk5xp5YliLGnUceTjgDFe6lBhfQ1
zVWZC/NF3tPgbziIxXQTNt34nS+9dbV/QFDLW0POcN7C0jR/hgkBjMEH2PezWhSj
mL/yLfLfUYAoxVpXjfC5aPJKqw0tR7m5ibznjCphE+FUMRg8EOmJcg6soeJ5QspU
k2dPN3+Y0zCTNRgAHEI+yIQbM6pio6v2c+UCtT1QhW4xSI38/kcEG8QiM55r1TUy
FcWAY5n5t1nNZtMxxse3LqEon3rKiLkBDQRbDB3nAQgAqfAjSjcngERtM+ZYOwN0
QF2v2FuEuMe8mhju7Met7SN2zGv1LnjhTNshEa9IABEfjZirE2Tqx4xCWDwDedK4

u1ToFvcnuAMnq2O47Sh+eTypsf6WPFtPBWf6ctKY31hFXjgoyDBULBvl43XU/D9C
Mt7nsKDPYHVrrnge/qWPYVcb+cO0sSwNImMcwQSdTQ3VBq7MeNS9ZeBcXi+XCjhN
kjNum2AQqpkHHDQV7871yQ8RIILvZSSfkLb0/SNDU+bGaw2G3lcyKdIfZi2EWWZT
oCbH38I/+LV7nAEe4zFpHwW8X0Dkx2aLgxe6UszDH9L3eGhTLpJhOSiaanG+zZKm
+QARAQABiQE2BBgBCAAgFiEE4Fmh4IZtMa4TEXCITZouEzBBU9EFAlsMHecCGwwA
CgkQTZouEzBBU9H5TQgAolWvIsez/WW8N2tmZEnX0LOFNB+1S4L4X983njwNdoVI
w19pbj+8RIHF/H9kcPGi7jK96gvlykQn3uez/95D2AiRFW5KYdOouFisKgHpv8Ay
BrhclHv11yK+X/0iTD0scYaG7np5162xLkaxSO9hsz2fGv20RKaXCWkI69fWw0BR
XlI5pZh2YFei2ZhH/tIMIW65h3w0gtgaZBBdpZTOOW4zvghyN+0MSObqkI1BvUJu
caDFI4d6ZTmp5SY+pZyktZ4bg/vMH5VFxdIKgbLx9uVeTvOupvbAW0TNulYGUBQE
nm+S0zr3W18t64e4sS3oHse8zCqo1iiImpba6F1Oaw==
=y6DD
-----END
 PGP PUBLIC KEY BLOCK-----

```
;;;; gpgme.lisp

;;; Copyright (C) 2006 g10 Code GmbH
;;;
;;; This file is part of GPGME-CL.
;;;
;;; GPGME-CL is free software; you can redistribute it and/or modify it
;;; under the terms of the GNU General Public License as published by
;;; the Free Software Foundation; either version 2 of the License, or
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;;;
;;; GPGME-CL is distributed in the hope that it will be useful, but
;;; WITHOUT ANY WARRANTY; without even the implied warranty of
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;;; Lesser General Public License for more details.
;;;
;;; You should have received a copy of the GNU General Public License
;;; along with GPGME; if not, write to the Free Software Foundation,
;;; Inc., 59 Temple Place - Suite 330, Boston, MA 02111-1307, USA.

;;; TODO

;;; Set up the library.

(in-package :gpgme)

(deftype byte-array ()
 '(simple-array (unsigned-byte 8) (*)))

(deftype character-array ()
 '(simple-array character (*)))

;;;
```

```
 Debugging.

(defvar *debug* nil "If debugging output should be given or not.")

;;; Load the foreign library.

(define-foreign-library libgpgme
 (:unix "libgpgme.so")
 (t (:default "libgpgme")))

(use-foreign-library libgpgme)

;;; System dependencies.

; Access to ERRNO.
(defcfun ("strerror" c-strerror) :string
 (err :int))

(defun get-errno ()
 *errno*)

(defun set-errno (errno)
 (setf *errno* errno))

(define-condition system-error (error)
 ((errno :initarg :errno :reader system-error-errno))
 (:report (lambda (c stream)
     (format stream "System error: ~A: ~A"
      (system-error-errno c)
      (c-strerror (system-error-errno c)))))
 (:documentation "Signalled when an errno is encountered."))

; Needed to write passphrases.
(defcfun ("write" c-write) ssize-t
 (fd :int)
 (buffer :string) ; Actually :pointer, but we only need string.
 (size size-t))

(defun system-write (fd buffer size)
 (let ((res (c-write fd buffer size)))
   (when (< res 0) (error 'system-error
 :errno (get-errno)))
   res))

;;;
;;; C Interface Definitions
;;;
```

```
;;; Data Type Interface

;;; Some new data types used for easier translation.

;;; The number of include certs.  Translates to NIL for default.
(defctype cert-int-t
   (:wrapper :int
    :from-c translate-cert-int-t-from-foreign
    :to-c translate-cert-int-t-to-foreign))

;;; A string that may be NIL to indicate a null pointer.
(defctype string-or-nil-t
   (:wrapper :string
    :to-c translate-string-or-nil-t-to-foreign))

;;; Some opaque data types used by GPGME.

(defctype gpgme-ctx-t
   (:wrapper :pointer
    :to-c translate-gpgme-ctx-t-to-foreign)
 "The GPGME context type.")

(defctype gpgme-data-t
   (:wrapper :pointer
    :to-c translate-gpgme-data-t-to-foreign)
 "The GPGME data object type.")

;;; Wrappers for the libgpg-error library.

(defctype gpgme-error-t
   (:wrapper gpg-error::gpg-error-t
    :from-c translate-gpgme-error-t-from-foreign
    :to-c translate-gpgme-error-t-to-foreign)
 "The
 GPGME error type.")

(defctype gpgme-error-no-signal-t
   (:wrapper gpg-error::gpg-error-t
    :from-c translate-gpgme-error-no-signal-t-from-foreign)
 "The GPGME error type (this version does not signal conditions in translation.")

(defctype gpgme-err-code-t gpg-error::gpg-err-code-t
 "The GPGME error code type.")

(defctype gpgme-err-source-t gpg-error::gpg-err-source-t
 "The GPGME error source type.")

(defun gpgme-err-make (source code)
```

```
 "Construct an error value from an error code and source."
 (gpg-err-make source code))

(defun gpgme-error (code)
 "Construct an error value from an error code."
 (gpgme-err-make :gpg-err-source-gpgme code))

(defun gpgme-err-code (err)
 "Retrieve an error code from the error value ERR."
 (gpg-err-code err))

(defun gpgme-err-source (err)
 "Retrieve an error source from the error value ERR."
 (gpg-err-source err))

(defun gpgme-strerror (err)
 "Return a string containing a description of the error code."
 (gpg-strerror err))

(defun
 gpgme-strsource (err)
 "Return a string containing a description of the error source."
 (gpg-strsource err))

(defun gpgme-err-code-from-errno (err)
 "Retrieve the error code for the system error.  If the system error
  is not mapped, :gpg-err-unknown-errno is returned."
 (gpg-err-code-from-errno err))

(defun gpgme-err-code-to-errno (code)
 "Retrieve the system error for the error code.  If this is not a
  system error, 0 is returned."
 (gpg-err-code-to-errno code))

(defun gpgme-err-make-from-errno (source err)
 (gpg-err-make-from-errno source err))

(defun gpgme-error-from-errno (err)
 (gpg-error-from-errno err))

;;;

(defcenum gpgme-data-encoding-t
 "The possible encoding mode of gpgme-data-t objects."
 (:none 0)
 (:binary 1)
 (:base64 2)
 (:armor 3)
```

```
 (:url 4)
 (:urlesc 5)
 (:url0 6)
 (:mime 7))

;;;

(defcenum gpgme-pubkey-algo-t
 "Public key algorithms from libgcrypt."
 (:rsa 1)
 (:rsa-e 2)
 (:rsa-s 3)
 (:elg-e 16)
 (:dsa 17)
 (:ecc 18)
 (:elg 20)
  (:ecdsa 301)
 (:ecdh 302)
 (:eddsa 303))

(defcenum gpgme-hash-algo-t
 "Hash algorithms from libgcrypt."
 (:none 0)
 (:md5 1)
 (:sha1 2)
 (:rmd160 3)
 (:md2 5)
 (:tiger 6)
 (:haval 7)
 (:sha256 8)
 (:sha384 9)
 (:sha512 10)
 (:sha224 11)
 (:md4 301)
 (:crc32 302)
 (:crc32-rfc1510 303)
 (:crc24-rfc2440 304))

;;;

(defcenum gpgme-sig-mode-t
 "The available signature modes."
 (:none 0)
 (:detach 1)
 (:clear 2))

;;;
```

```
(defcenum gpgme-validity-t
 "The available validities for a trust item or key."
 (:unknown 0)
 (:undefined 1)
 (:never 2)
 (:marginal 3)
 (:full 4)
 (:ultimate 5))

;;;

(defcenum gpgme-protocol-t
 "The available protocols."
 (:openpgp 0)
 (:cms 1)
 (:gpgconf 2)
 (:assuan 3)
 (:g13 4)
 (:uiserver 5)
 (:spawn 6)
 (:default 254)
 (:unknown 255))

;;;

(defbitfield (gpgme-keylist-mode-t :unsigned-int)
 "The available keylist mode flags."
 (:local 1)
 (:extern 2)
 (:sigs 4)
 (:sig-notations)
 (:with-secret 16)
 (:with-tofu 32)
 (:ephemeral
 128)
 (:validate 256))

;;;

(defbitfield (gpgme-sig-notation-flags-t :unsigned-int)
 "The available signature notation flags."
 (:human-readable 1)
 (:critical 2))

(defctype gpgme-sig-notation-t
   (:wrapper :pointer
    :from-c translate-gpgme-sig-notation-t-from-foreign)
 "Signature notation pointer type.")
```

```
;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-sig-notation-bitfield :unsigned-int)
 (:human-readable 1)
 (:critical 2))

(defcstruct gpgme-sig-notation
 "Signature notations."
 (next gpgme-sig-notation-t)
 (name :pointer)
 (value :pointer)
 (name-len :int)
 (value-len :int)
 (flags gpgme-sig-notation-flags-t)
 (bitfield gpgme-sig-notation-bitfield))

;;;

(defcenum gpgme-status-code-t
 "The possible status codes for the edit operation."
 (:eof 0)
 (:enter 1)
 (:leave 2)
 (:abort 3)
 (:goodsig 4)
 (:badsig 5)
 (:errsig 6)
 (:badarmor 7)
 (:rsa-or-idea 8)
 (:keyexpired 9)
 (:keyrevoked 10)
 (:trust-undefined 11)
 (:trust-never
 12)
 (:trust-marginal 13)
 (:trust-fully 14)
 (:trust-ultimate 15)
 (:shm-info 16)
 (:shm-get 17)
 (:shm-get-bool 18)
 (:shm-get-hidden 19)
 (:need-passphrase 20)
 (:validsig 21)
 (:sig-id 22)
 (:enc-to 23)
 (:nodata 24)
 (:bad-passphrase 25)
 (:no-pubkey 26)
```

(:no-seckey 27)
(:need-passphrase-sym 28)
(:decryption-failed 29)
(:decryption-okay 30)
(:missing-passphrase 31)
(:good-passphrase 32)
(:goodmdc 33)
(:badmdc 34)
(:errmdc 35)
(:imported 36)
(:import-ok 37)
(:import-problem 38)
(:import-res 39)
(:file-start 40)
(:file-done 41)
(:file-error 42)
(:begin-decryption 43)
(:end-decryption 44)
(:begin-encryption 45)
(:end-encryption 46)
(:delete-problem 47)
(:get-bool 48)
(:get-line 49)
(:get-hidden 50)
(:got-it 51)
(:progress 52)
(:sig-created 53)
(:session-key 54)
(:notation-name 55)
(:notation-data 56)
(:policy-url 57)
(:begin-stream 58)
(:end-stream 59)
(:key-created 60)
(:userid-hint 61)
(:unexpected
62)
(:inv-recp 63)
(:no-recp 64)
(:already-signed 65)
(:sigexpired 66)
(:expsig 67)
(:expkeysig 68)
(:truncated 69)
(:error 70)
(:newsig 71)
(:revkeysig 72)
(:sig-subpacket 73)

```
 (:need-passphrase-pin 74)
 (:sc-op-failure 75)
 (:sc-op-success 76)
 (:cardctrl 77)
 (:backup-key-created 78)
 (:pka-trust-bad 79)
 (:pka-trust-good 80)
 (:plaintext 81)
 (:inv-sgnr 82)
 (:no-sgnr 83)
 (:success 84)
 (:decryption-info 85)
 (:plaintext-length 86)
 (:mountpoint 87)
 (:pinentry-launched 88)
 (:attribute 89)
 (:begin-signing 90)
 (:key-not-created 91)
 (:inquire-maxlen 92)
 (:failure 93)
 (:key-considered 94)
 (:tofu-user 95)
 (:tofu-stats 96)
 (:tofu-stats-long 97)
 (:notation-flags 98)
 (:decryption-compliance-mode 99)
 (:verification-compliance-mode 100))

;;;

(defctype gpgme-engine-info-t
   (:wrapper :pointer
    :from-c translate-gpgme-engine-info-t-to-foreign)
 "The engine information structure pointer type.")

(defcstruct gpgme-engine-info
  "Engine information."
 (next gpgme-engine-info-t)
 (protocol gpgme-protocol-t)
 (file-name :string)
 (version :string)
 (req-version :string)
 (home-dir :string))

;;;

(defctype gpgme-subkey-t
   (:wrapper :pointer
```

```
   :from-c translate-gpgme-subkey-t-from-foreign)
 "A subkey from a key.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-subkey-bitfield :unsigned-int)
 "The subkey bitfield."
 (:revoked 1)
 (:expired 2)
 (:disabled 4)
 (:invalid 8)
 (:can-encrypt 16)
 (:can-sign 32)
 (:can-certify 64)
 (:secret 128)
 (:can-authenticate 256)
 (:is-qualified 512)
 (:is-cardkey 1024)
 (:is-de-vs 2048))

(defcstruct gpgme-subkey
 "Subkey from a key."
 (next gpgme-subkey-t)
 (bitfield gpgme-subkey-bitfield)
 (pubkey-algo gpgme-pubkey-algo-t)
 (length :unsigned-int)
 (keyid :string)
 (-keyid :char :count 17)
 (fpr :string)
 (timestamp :long)
 (expires :long))


(defctype gpgme-key-sig-t
   (:wrapper :pointer
    :from-c translate-gpgme-key-sig-t-from-foreign)
  "A signature on a user ID.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-key-sig-bitfield :unsigned-int)
 "The key signature bitfield."
 (:revoked 1)
 (:expired 2)
 (:invalid 4)
 (:exportable 16))

(defcstruct gpgme-key-sig
 "A signature on a user ID."
 (next gpgme-key-sig-t)
```

```
 (bitfield gpgme-key-sig-bitfield)
 (pubkey-algo gpgme-pubkey-algo-t)
 (keyid :string)
 (-keyid :char :count 17)
 (timestamp :long)
 (expires :long)
 (status gpgme-error-no-signal-t)
 (-class :unsigned-int)
 (uid :string)
 (name :string)
 (email :string)
 (comment :string)
 (sig-class :unsigned-int))


(defctype gpgme-user-id-t
   (:wrapper :pointer
    :from-c translate-gpgme-user-id-t-from-foreign)
 "A user ID from a key.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-user-id-bitfield :unsigned-int)
 "The user ID bitfield."
 (:revoked 1)
 (:invalid 2))

(defcstruct gpgme-user-id
 "A user ID from a key."
 (next
 gpgme-user-id-t)
 (bitfield gpgme-user-id-bitfield)
 (validity gpgme-validity-t)
 (uid :string)
 (name :string)
 (email :string)
 (comment :string)
 (signatures gpgme-key-sig-t)
 (-last-keysig gpgme-key-sig-t))


(defctype gpgme-key-t
   (:wrapper :pointer
    :from-c translate-gpgme-key-t-from-foreign
    :to-c translate-gpgme-key-t-to-foreign)
 "A key from the keyring.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-key-bitfield :unsigned-int)
```

```
 "The key bitfield."
 (:revoked 1)
 (:expired 2)
 (:disabled 4)
 (:invalid 8)
 (:can-encrypt 16)
 (:can-sign 32)
 (:can-certify 64)
 (:secret 128)
 (:can-authenticate 256)
 (:is-qualified 512))

(defcstruct gpgme-key
 "A signature on a user ID."
 (-refs :unsigned-int)
 (bitfield gpgme-key-bitfield)
 (protocol gpgme-protocol-t)
 (issuer-serial :string)
 (issuer-name :string)
 (chain-id :string)
 (owner-trust gpgme-validity-t)
 (subkeys gpgme-subkey-t)
 (uids gpgme-user-id-t)
 (-last-subkey gpgme-subkey-t)
  (-last-uid gpgme-user-id-t)
 (keylist-mode gpgme-keylist-mode-t))

;;;

;;; There is no support in CFFI to define callback C types and have
;;; automatic type checking with the callback definition.

(defctype gpgme-passphrase-cb-t :pointer)

(defctype gpgme-progress-cb-t :pointer)

(defctype gpgme-edit-cb-t :pointer)


;;;
;;; Function Interface
;;;

;;; Context management functions.

(defcfun ("gpgme_new" c-gpgme-new) gpgme-error-t
 (ctx :pointer))
```

```
(defcfun ("gpgme_release" c-gpgme-release) :void
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_protocol" c-gpgme-set-protocol) gpgme-error-t
 (ctx gpgme-ctx-t)
 (proto gpgme-protocol-t))

(defcfun ("gpgme_get_protocol" c-gpgme-get-protocol) gpgme-protocol-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_get_protocol_name" c-gpgme-get-protocol-name) :string
 (proto gpgme-protocol-t))

(defcfun ("gpgme_set_armor" c-gpgme-set-armor) :void
 (ctx gpgme-ctx-t)
 (yes :boolean))

(defcfun ("gpgme_get_armor" c-gpgme-get-armor) :boolean
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_textmode" c-gpgme-set-textmode) :void
 (ctx gpgme-ctx-t)
 (yes :boolean))

(defcfun ("gpgme_get_textmode" c-gpgme-get-textmode) :boolean
 (ctx gpgme-ctx-t))

(defconstant +include-certs-default+ -256)

(defcfun ("gpgme_set_include_certs" c-gpgme-set-include-certs) :void
 (ctx gpgme-ctx-t)
 (nr-of-certs cert-int-t))

(defcfun ("gpgme_get_include_certs" c-gpgme-get-include-certs) cert-int-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_keylist_mode" c-gpgme-set-keylist-mode) gpgme-error-t
 (ctx gpgme-ctx-t)
 (mode gpgme-keylist-mode-t))

(defcfun ("gpgme_get_keylist_mode" c-gpgme-get-keylist-mode)
   gpgme-keylist-mode-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_passphrase_cb" c-gpgme-set-passphrase-cb) :void
 (ctx gpgme-ctx-t)
 (cb gpgme-passphrase-cb-t)
 (hook-value :pointer))
```

```
(defcfun ("gpgme_get_passphrase_cb" c-gpgme-get-passphrase-cb) :void
 (ctx gpgme-ctx-t)
 (cb-p :pointer)
 (hook-value-p :pointer))

(defcfun ("gpgme_set_progress_cb"
 c-gpgme-set-progress-cb) :void
 (ctx gpgme-ctx-t)
 (cb gpgme-progress-cb-t)
 (hook-value :pointer))

(defcfun ("gpgme_get_progress_cb" c-gpgme-get-progress-cb) :void
 (ctx gpgme-ctx-t)
 (cb-p :pointer)
 (hook-value-p :pointer))

(defcfun ("gpgme_set_locale" c-gpgme-set-locale) gpgme-error-t
 (ctx gpgme-ctx-t)
 (category :int)
 (value string-or-nil-t))

(defcfun ("gpgme_ctx_get_engine_info" c-gpgme-ctx-get-engine-info)
   gpgme-engine-info-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_ctx_set_engine_info" c-gpgme-ctx-set-engine-info)
   gpgme-error-t
 (ctx gpgme-ctx-t)
 (proto gpgme-protocol-t)
 (file-name string-or-nil-t)
 (home-dir string-or-nil-t))

;;;

(defcfun ("gpgme_pubkey_algo_name" c-gpgme-pubkey-algo-name) :string
 (algo gpgme-pubkey-algo-t))

(defcfun ("gpgme_hash_algo_name" c-gpgme-hash-algo-name) :string
 (algo gpgme-hash-algo-t))

;;;

(defcfun ("gpgme_signers_clear" c-gpgme-signers-clear) :void
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_signers_add" c-gpgme-signers-add)
```

```
 gpgme-error-t
 (ctx gpgme-ctx-t)
 (key gpgme-key-t))

(defcfun ("gpgme_signers_enum" c-gpgme-signers-enum) gpgme-key-t
 (ctx gpgme-ctx-t)
 (seq :int))

;;;

(defcfun ("gpgme_sig_notation_clear" c-gpgme-sig-notation-clear) :void
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_sig_notation_add" c-gpgme-sig-notation-add) gpgme-error-t
 (ctx gpgme-ctx-t)
 (name :string)
 (value string-or-nil-t)
 (flags gpgme-sig-notation-flags-t))

(defcfun ("gpgme_sig_notation_get" c-gpgme-sig-notation-get)
   gpgme-sig-notation-t
 (ctx gpgme-ctx-t))

;;; Run Control.

;;; There is no support in CFFI to define callback C types and have
;;; automatic type checking with the callback definition.

(defctype gpgme-io-cb-t :pointer)

(defctype gpgme-register-io-cb-t :pointer)

(defctype gpgme-remove-io-cb-t :pointer)

(defcenum gpgme-event-io-t
 "The possible events on I/O event callbacks."
 (:start 0)
 (:done 1)
 (:next-key 2)
 (:next-trustitem 3))

(defctype gpgme-event-io-cb-t :pointer)

(defcstruct
 gpgme-io-cbs
 "I/O callbacks."
 (add gpgme-register-io-cb-t)
 (add-priv :pointer)
```

```
 (remove gpgme-remove-io-cb-t)
 (event gpgme-event-io-cb-t)
 (event-priv :pointer))

(defctype gpgme-io-cbs-t :pointer)

(defcfun ("gpgme_set_io_cbs" c-gpgme-set-io-cbs) :void
 (ctx gpgme-ctx-t)
 (io-cbs gpgme-io-cbs-t))

(defcfun ("gpgme_get_io_cbs" c-gpgme-get-io-cbs) :void
 (ctx gpgme-ctx-t)
 (io-cbs gpgme-io-cbs-t))

(defcfun ("gpgme_wait" c-gpgme-wait) gpgme-ctx-t
 (ctx gpgme-ctx-t)
 (status-p :pointer)
 (hang :int))

;;; Functions to handle data objects.

;;; There is no support in CFFI to define callback C types and have
;;; automatic type checking with the callback definition.

(defctype gpgme-data-read-cb-t :pointer)
(defctype gpgme-data-write-cb-t :pointer)
(defctype gpgme-data-seek-cb-t :pointer)
(defctype gpgme-data-release-cb-t :pointer)

(defcstruct gpgme-data-cbs
 "Data callbacks."
 (read gpgme-data-read-cb-t)
 (write gpgme-data-write-cb-t)
 (seek gpgme-data-seek-cb-t)
  (release gpgme-data-release-cb-t))

(defctype gpgme-data-cbs-t :pointer
 "Data callbacks pointer.")

(defcfun ("gpgme_data_read" c-gpgme-data-read) ssize-t
 (dh gpgme-data-t)
 (buffer :pointer)
 (size size-t))

(defcfun ("gpgme_data_write" c-gpgme-data-write) ssize-t
 (dh gpgme-data-t)
 (buffer :pointer)
 (size size-t))
```

```
(defcfun ("gpgme_data_seek" c-gpgme-data-seek) off-t
 (dh gpgme-data-t)
 (offset off-t)
 (whence :int))

(defcfun ("gpgme_data_new" c-gpgme-data-new) gpgme-error-t
 (dh-p :pointer))

(defcfun ("gpgme_data_release" c-gpgme-data-release) :void
 (dh gpgme-data-t))

(defcfun ("gpgme_data_new_from_mem" c-gpgme-data-new-from-mem) gpgme-error-t
 (dh-p :pointer)
 (buffer :pointer)
 (size size-t)
 (copy :int))

(defcfun ("gpgme_data_release_and_get_mem" c-gpgme-data-release-and-get-mem)
   :pointer
 (dh gpgme-data-t)
 (len-p :pointer))

(defcfun ("gpgme_data_new_from_cbs" c-gpgme-data-new-from-cbs) gpgme-error-t
 (dh-p :pointer)
 (cbs gpgme-data-cbs-t)
  (handle :pointer))

(defcfun ("gpgme_data_new_from_fd" c-gpgme-data-new-from-fd) gpgme-error-t
 (dh-p :pointer)
 (fd :int))

(defcfun ("gpgme_data_new_from_stream" c-gpgme-data-new-from-stream)
   gpgme-error-t
 (dh-p :pointer)
 (stream :pointer))

(defcfun ("gpgme_data_get_encoding" c-gpgme-data-get-encoding)
   gpgme-data-encoding-t
 (dh gpgme-data-t))

(defcfun ("gpgme_data_set_encoding" c-gpgme-data-set-encoding)
   gpgme-error-t
 (dh gpgme-data-t)
 (enc gpgme-data-encoding-t))

(defcfun ("gpgme_data_get_file_name" c-gpgme-data-get-file-name) :string
 (dh gpgme-data-t))
```

```
(defcfun ("gpgme_data_set_file_name" c-gpgme-data-set-file-name) gpgme-error-t
 (dh gpgme-data-t)
 (file-name string-or-nil-t))

(defcfun ("gpgme_data_new_from_file" c-gpgme-data-new-from-file) gpgme-error-t
 (dh-p :pointer)
 (fname :string)
 (copy :int))

(defcfun ("gpgme_data_new_from_filepart" c-gpgme-data-new-from-filepart)
   gpgme-error-t
 (dh-p :pointer)
 (fname :string)
 (fp
 :pointer)
 (offset off-t)
 (length size-t))

;;; Key and trust functions.

(defcfun ("gpgme_get_key" c-gpgme-get-key) gpgme-error-t
 (ctx gpgme-ctx-t)
 (fpr :string)
 (key-p :pointer)
 (secret :boolean))

(defcfun ("gpgme_key_ref" c-gpgme-key-ref) :void
 (key gpgme-key-t))

(defcfun ("gpgme_key_unref" c-gpgme-key-unref) :void
 (key gpgme-key-t))

;;; Crypto operations.

(defcfun ("gpgme_cancel" c-gpgme-cancel) gpgme-error-t
 (ctx gpgme-ctx-t))

;;;

(defctype gpgme-invalid-key-t
   (:wrapper :pointer
    :from-c translate-gpgme-invalid-key-t-from-foreign)
 "An invalid key structure.")

(defcstruct gpgme-invalid-key
 "An invalid key structure."
 (next gpgme-invalid-key-t)
```

```
 (fpr :string)
 (reason gpgme-error-no-signal-t))

;;; Encryption.

(defcstruct gpgme-op-encrypt-result
 "Encryption result structure."
 (invalid-recipients gpgme-invalid-key-t))

(defctype gpgme-op-encrypt-result-t
   (:wrapper :pointer
    :from-c translate-gpgme-op-encrypt-result-t-from-foreign)
  "An encryption result structure.")

(defcfun ("gpgme_op_encrypt_result" c-gpgme-op-encrypt-result)
   gpgme-op-encrypt-result-t
 (ctx gpgme-ctx-t))

(defbitfield gpgme-encrypt-flags-t
 (:always-trust 1)
 (:no-encrypt-to 2)
 (:prepare 4)
 (:expect-sign 8)
 (:no-compress 16)
 (:symmetric 32)
 (:throw-keyids 64)
 (:wrap 128)
 (:want-address 256))

(defcfun ("gpgme_op_encrypt_start" c-gpgme-op-encrypt-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (recp :pointer) ; Key array.
 (flags gpgme-encrypt-flags-t)
 (plain gpgme-data-t)
 (cipher gpgme-data-t))

(defcfun ("gpgme_op_encrypt" c-gpgme-op-encrypt) gpgme-error-t
 (ctx gpgme-ctx-t)
 (recp :pointer) ; Key array.
 (flags gpgme-encrypt-flags-t)
 (plain gpgme-data-t)
 (cipher gpgme-data-t))

(defcfun ("gpgme_op_encrypt_sign_start" c-gpgme-op-encrypt-sign-start)
   gpgme-error-t
 (ctx gpgme-ctx-t)
 (recp :pointer) ; Key array.
 (flags gpgme-encrypt-flags-t)
```

```
 (plain gpgme-data-t)
 (cipher gpgme-data-t))

(defcfun ("gpgme_op_encrypt_sign"
 c-gpgme-op-encrypt-sign) gpgme-error-t
 (ctx gpgme-ctx-t)
 (recp :pointer) ; Key array.
 (flags gpgme-encrypt-flags-t)
 (plain gpgme-data-t)
 (cipher gpgme-data-t))

;;; Decryption.

(defctype gpgme-recipient-t
   (:wrapper :pointer
    :from-c translate-gpgme-recipient-t-from-foreign)
 "A recipient structure.")

(defcstruct gpgme-recipient
 "Recipient structure."
 (next gpgme-recipient-t)
 (keyid :string)
 (-keyid :char :count 17)
 (pubkey-algo gpgme-pubkey-algo-t)
 (status gpgme-error-no-signal-t))

(defbitfield gpgme-op-decrypt-result-bitfield
 "Decryption result structure bitfield."
 (:wrong-key-usage 1)
 (:is-de-vs 2)
 (:is-mine 4))

(defcstruct gpgme-op-decrypt-result
 "Decryption result structure."
 (unsupported-algorithm :string)
 (bitfield gpgme-op-decrypt-result-bitfield)
 (recipients gpgme-recipient-t)
 (file-name :string))

(defctype gpgme-op-decrypt-result-t
   (:wrapper :pointer
    :from-c translate-gpgme-op-decrypt-result-t-from-foreign)
  "A decryption result structure.")

(defcfun ("gpgme_op_decrypt_result" c-gpgme-op-decrypt-result)
   gpgme-op-decrypt-result-t
 (ctx gpgme-ctx-t))
```

```
(defcfun ("gpgme_op_decrypt_start" c-gpgme-op-decrypt-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (cipher gpgme-data-t)
 (plain gpgme-data-t))

(defcfun ("gpgme_op_decrypt" c-gpgme-op-decrypt) gpgme-error-t
 (ctx gpgme-ctx-t)
 (cipher gpgme-data-t)
 (plain gpgme-data-t))

(defcfun ("gpgme_op_decrypt_verify_start" c-gpgme-op-decrypt-verify-start)
   gpgme-error-t
 (ctx gpgme-ctx-t)
 (cipher gpgme-data-t)
 (plain gpgme-data-t))

(defcfun ("gpgme_op_decrypt_verify" c-gpgme-op-decrypt-verify) gpgme-error-t
 (ctx gpgme-ctx-t)
 (cipher gpgme-data-t)
 (plain gpgme-data-t))

;;; Signing.

(defctype gpgme-new-signature-t
   (:wrapper :pointer
    :from-c translate-gpgme-new-signature-t-from-foreign)
 "A new signature structure.")

(defcstruct gpgme-new-signature
 "New signature structure."
 (next gpgme-new-signature-t)
  (type gpgme-sig-mode-t)
 (pubkey-algo gpgme-pubkey-algo-t)
 (hash-algo gpgme-hash-algo-t)
 (-obsolete-class :unsigned-long)
 (timestamp :long)
 (fpr :string)
 (-obsolete-class-2 :unsigned-int)
 (sig-class :unsigned-int))

(defcstruct gpgme-op-sign-result
 "Signing result structure."
 (invalid-signers gpgme-invalid-key-t)
 (signatures gpgme-new-signature-t))

(defctype gpgme-op-sign-result-t
   (:wrapper :pointer
    :from-c translate-gpgme-op-sign-result-t-from-foreign)
```

```
 "A signing result structure.")

(defcfun ("gpgme_op_sign_result" c-gpgme-op-sign-result)
   gpgme-op-sign-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_sign_start" c-gpgme-op-sign-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (plain gpgme-data-t)
 (sig gpgme-data-t)
 (mode gpgme-sig-mode-t))

(defcfun ("gpgme_op_sign" c-gpgme-op-sign) gpgme-error-t
 (ctx gpgme-ctx-t)
 (plain gpgme-data-t)
 (sig gpgme-data-t)
 (mode gpgme-sig-mode-t))

;;; Verify.

(defbitfield (gpgme-sigsum-t :unsigned-int)
 "Flags
 used for the summary field in a gpgme-signature-t."
 (:valid #x0001)
 (:green #x0002)
 (:red #x0004)
 (:key-revoked #x0010)
 (:key-expired #x0020)
 (:sig-expired #x0040)
 (:key-missing #x0080)
 (:crl-missing #x0100)
 (:crl-too-old #x0200)
 (:bad-policy #x0400)
 (:sys-error #x0800)
 (:tofu-conflict #x1000))

(defctype gpgme-signature-t
   (:wrapper :pointer
    :from-c translate-gpgme-signature-t-from-foreign)
 "A signature structure.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-signature-bitfield :unsigned-int)
 "The signature bitfield."
 (:wrong-key-usage 1)
 (:pka-trust 2)
 (:chain-model 4)
 (:is-de-vs 8))
```

```
(defcstruct gpgme-signature
 "Signature structure."
 (next gpgme-signature-t)
 (summary gpgme-sigsum-t)
 (fpr :string)
 (status gpgme-error-no-signal-t)
 (notations gpgme-sig-notation-t)
 (timestamp :unsigned-long)
 (exp-timestamp :unsigned-long)
 (bitfield gpgme-signature-bitfield)
 (validity gpgme-validity-t)
 (validity-reason
 gpgme-error-no-signal-t)
 (pubkey-algo gpgme-pubkey-algo-t)
 (hash-algo gpgme-hash-algo-t))

(defcstruct gpgme-op-verify-result
 "Verify result structure."
 (signatures gpgme-signature-t)
 (file-name :string))

(defctype gpgme-op-verify-result-t
   (:wrapper :pointer
    :from-c translate-gpgme-op-verify-result-t-from-foreign)
 "A verify result structure.")

(defcfun ("gpgme_op_verify_result" c-gpgme-op-verify-result)
   gpgme-op-verify-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_verify_start" c-gpgme-op-verify-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (sig gpgme-data-t)
 (signed-text gpgme-data-t)
 (plaintext gpgme-data-t))

(defcfun ("gpgme_op_verify" c-gpgme-op-verify) gpgme-error-t
 (ctx gpgme-ctx-t)
 (sig gpgme-data-t)
 (signed-text gpgme-data-t)
 (plaintext gpgme-data-t))

;;; Import.

(defbitfield (gpgme-import-flags-t :unsigned-int)
 "Flags used for the import status field."
 (:new #x0001)
```

```
 (:uid #x0002)
 (:sig #x0004)
 (:subkey #x0008)
 (:secret
 #x0010))

(defctype gpgme-import-status-t
   (:wrapper :pointer
    :from-c translate-gpgme-import-status-t-from-foreign)
 "An import status structure.")

(defcstruct gpgme-import-status
 "New import status structure."
 (next gpgme-import-status-t)
 (fpr :string)
 (result gpgme-error-no-signal-t)
 (status :unsigned-int))

(defcstruct gpgme-op-import-result
 "Import result structure."
 (considered :int)
 (no-user-id :int)
 (imported :int)
 (imported-rsa :int)
 (unchanged :int)
 (new-user-ids :int)
 (new-sub-keys :int)
 (new-signatures :int)
 (new-revocations :int)
 (secret-read :int)
 (secret-imported :int)
 (secret-unchanged :int)
 (skipped-new-keys :int)
 (not-imported :int)
 (imports gpgme-import-status-t))

(defctype gpgme-op-import-result-t
   (:wrapper :pointer
    :from-c translate-gpgme-op-import-result-t-from-foreign)
 "An import status result structure.")

(defcfun ("gpgme_op_import_result" c-gpgme-op-import-result)
   gpgme-op-import-result-t
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_import_start" c-gpgme-op-import-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (keydata gpgme-data-t))
```

```
(defcfun ("gpgme_op_import" c-gpgme-op-import) gpgme-error-t
 (ctx gpgme-ctx-t)
 (keydata gpgme-data-t))

;;; Export.

(defcfun ("gpgme_op_export_start" c-gpgme-op-export-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (pattern :string)
 (reserved :unsigned-int)
 (keydata gpgme-data-t))

(defcfun ("gpgme_op_export" c-gpgme-op-export) gpgme-error-t
 (ctx gpgme-ctx-t)
 (pattern :string)
 (reserved :unsigned-int)
 (keydata gpgme-data-t))

;;; FIXME: Extended export interfaces require array handling.

;;; Key generation.

(defbitfield (gpgme-genkey-flags-t :unsigned-int)
 "Flags used for the key generation result bitfield."
 (:primary #x0001)
 (:sub #x0002)
 (:uid #x0004))

(defcstruct gpgme-op-genkey-result
 "Key generation result structure."
 (bitfield gpgme-genkey-flags-t)
 (fpr :string))

(defctype gpgme-op-genkey-result-t :pointer
 "A
 key generation result structure.")

(defcfun ("gpgme_op_genkey_result" c-gpgme-op-genkey-result)
   gpgme-op-genkey-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_genkey_start" c-gpgme-op-genkey-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (parms :string)
 (pubkey gpgme-data-t)
 (seckey gpgme-data-t))
```

```
(defcfun ("gpgme_op_genkey" c-gpgme-op-genkey) gpgme-error-t
 (ctx gpgme-ctx-t)
 (parms :string)
 (pubkey gpgme-data-t)
 (seckey gpgme-data-t))

;;; Key deletion.

(defcfun ("gpgme_op_delete_start" c-gpgme-op-delete-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (key gpgme-key-t)
 (allow-secret :int))

(defcfun ("gpgme_op_delete" c-gpgme-op-delete) gpgme-error-t
 (ctx gpgme-ctx-t)
 (key gpgme-key-t)
 (allow-secret :int))

;;; FIXME: Add edit interfaces.

;;; Keylist interface.

(defbitfield (gpgme-keylist-flags-t :unsigned-int)
 "Flags used for the key listing result bitfield."
 (:truncated #x0001))

(defcstruct gpgme-op-keylist-result
 "Key listing result structure."
 (bitfield
 gpgme-keylist-flags-t))

(defctype gpgme-op-keylist-result-t :pointer
 "A key listing result structure.")

(defcfun ("gpgme_op_keylist_result" c-gpgme-op-keylist-result)
   gpgme-op-keylist-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_keylist_start" c-gpgme-op-keylist-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (pattern :string)
 (secret_only :boolean))

;;; FIXME: Extended keylisting requires array handling.

(defcfun ("gpgme_op_keylist_next" c-gpgme-op-keylist-next) gpgme-error-t
 (ctx gpgme-ctx-t)
 (r-key :pointer))
```

```
(defcfun ("gpgme_op_keylist_end" c-gpgme-op-keylist-end) gpgme-error-t
 (ctx gpgme-ctx-t))

;;; Various functions.

(defcfun ("gpgme_check_version" c-gpgme-check-version) :string
 (req-version string-or-nil-t))

(defcfun ("gpgme_get_engine_info" c-gpgme-get-engine-info) gpgme-error-t
 (engine-info-p :pointer))

(defcfun ("gpgme_set_engine_info" c-gpgme-set-engine-info) gpgme-error-t
 (proto gpgme-protocol-t)
 (file-name string-or-nil-t)
 (home-dir
 string-or-nil-t))

(defcfun ("gpgme_engine_check_version" c-gpgme-engine-check-verson)
   gpgme-error-t
 (proto gpgme-protocol-t))

;;;
;;;  L I S P   I N T E R F A C E
;;;

;;;
;;; Lisp type translators.
;;;

;;; Both directions.

;;; cert-int-t is a helper type that takes care of representing the
;;; default number of certs as NIL.

(defun translate-cert-int-t-from-foreign (value)
 (cond
   ((eql value +include-certs-default+) nil)
   (t value)))

(defun translate-cert-int-t-to-foreign (value)
 (cond
   (value value)
   (t +include-certs-default+)))

;;; string-or-nil-t translates a null pointer to NIL and vice versa.
;;; Translation from foreign null pointer already works as expected.
```

```
(defun translate-string-or-nil-t-to-foreign (value)
 (cond
   (value value)
   (t (null-pointer))))

;;; Output only.

;;; These type translators only convert from foreign type, because we
;;; never use these types in the other direction.

;;; Convert gpgme-engine-info-t linked lists into a
 list of property
;;; lists.  Note that this converter will automatically be invoked
;;; recursively.
;;;
;;; FIXME: Should we use a hash table (or struct, or clos) instead of
;;; property list, as recommended by the Lisp FAQ?

(defun translate-gpgme-engine-info-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next protocol file-name version req-version home-dir)
     value (:struct gpgme-engine-info))
  (append (list protocol (list
        :file-name file-name
        :version version
        :req-version req-version
        :home-dir home-dir))
   next)))))

(defun translate-gpgme-invalid-key-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next fpr reason)
     value (:struct gpgme-invalid-key))
  (append (list (list :fpr fpr
        :reason reason))
   next)))))

(defun translate-gpgme-op-encrypt-result-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots

   ((invalid-recipients)
     value (:struct gpgme-op-encrypt-result))
```

```
  (list :encrypt
        (list :invalid-recipients invalid-recipients))))))

(defun translate-gpgme-recipient-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next keyid pubkey-algo status)
     value (:struct gpgme-recipient))
  (append (list (list :keyid keyid
        :pubkey-algo pubkey-algo
        :status status))
   next)))))

(defun translate-gpgme-op-decrypt-result-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((unsupported-algorithm bitfield recipients file-name)
     value (:struct gpgme-op-decrypt-result))
  (list :decrypt (list :unsupported-algorithm unsupported-algorithm
         :bitfield bitfield
         :recipients recipients
         :file-name file-name))))))

(defun translate-gpgme-new-signature-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next
 type pubkey-algo hash-algo timestamp fpr sig-class)
     value (:struct gpgme-new-signature))
  (append (list (list :type type
        :pubkey-algo pubkey-algo
        :hash-algo hash-algo
        :timestamp timestamp
        :fpr fpr
        :sig-class sig-class))
   next)))))

(defun translate-gpgme-op-sign-result-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((invalid-signers signatures)
     value (:struct gpgme-op-sign-result))
  (list :sign (list :invalid-signers invalid-signers
      :signatures signatures))))))
```

```
(defun translate-gpgme-signature-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next summary fpr status notations timestamp
    exp-timestamp bitfield validity validity-reason
    pubkey-algo hash-algo)
     value (:struct gpgme-signature))
  (append (list (list :summary summary
        :fpr fpr
        :status status
        :notations notations
        :timestamp timestamp

     :exp-timestamp exp-timestamp
        :bitfield bitfield
        :validity validity
        :validity-reason validity-reason
        :pubkey-algo pubkey-algo))
   next)))))

(defun translate-gpgme-op-verify-result-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((signatures file-name)
     value (:struct gpgme-op-verify-result))
  (list :verify (list :signatures signatures
        :file-name file-name))))))

(defun translate-gpgme-import-status-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next fpr result status)
     value (:struct gpgme-import-status))
  (append (list (list :fpr fpr
        :result result
        :status status))
   next)))))

(defun translate-gpgme-op-import-result-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((considered no-user-id imported imported-rsa unchanged
   new-user-ids new-sub-keys new-signatures
```

```
  new-revocations
 secret-read secret-imported
  secret-unchanged skipped-new-keys not-imported
  imports)
    value (:struct gpgme-op-import-result))
 (list :verify (list :considered considered
       :no-user-id no-user-id
       :imported imported
       :imported-rsa imported-rsa
       :unchanged unchanged
       :new-user-ids new-user-ids
       :new-sub-keys new-sub-keys
       :new-signatures new-signatures
       :new-revocations new-revocations
       :secret-read secret-read
       :secret-imported secret-imported
       :secret-unchanged secret-unchanged
       :skipped-new-keys skipped-new-keys
       :not-imported not-imported
       :imports imports))))))

;;; Error handling.

;;; Use gpgme-error-no-signal-t to suppress automatic error handling
;;; at translation time.
;;;
;;; FIXME: Part of this probably should be in gpg-error!

(define-condition gpgme-error (error)
 ((value :initarg :gpgme-error :reader gpgme-error-value))
 (:report (lambda (c stream)

    (format stream "GPGME returned error: ~A (~A)"
      (gpgme-strerror (gpgme-error-value c))
      (gpgme-strsource (gpgme-error-value c)))))
 (:documentation "Signalled when a GPGME function returns an error."))

(defun translate-gpgme-error-t-from-foreign (value)
 "Raise a GPGME-ERROR if VALUE is non-zero."
 (when (not (eql (gpgme-err-code value) :gpg-err-no-error))
   (error 'gpgme-error :gpgme-error value))
 (gpg-err-canonicalize value))

(defun translate-gpgme-error-t-to-foreign (value)
 "Canonicalize the error value."
 (if (eql (gpgme-err-code value) :gpg-err-no-error)
    0
    (gpg-err-as-value value)))
```

```
(defun translate-gpgme-error-no-signal-t-from-foreign (value)
 "Canonicalize the error value."
 (gpg-err-canonicalize value))


;;; *INTERNAL* Lispy Function Interface that is still close to the C
;;; interface.

;;; Passphrase callback management.

;;; Maybe: Instead, use subclassing, and provide a customizable
;;; default implementation for ease-of-use.

(defvar
 *passphrase-handles* (make-hash-table)
 "Hash table with GPGME context address as key and the corresponding
  passphrase callback object as value.")

(defcallback passphrase-cb gpgme-error-t ((handle :pointer)
       (uid-hint :string)
       (passphrase-info :string)
       (prev-was-bad :boolean)
       (fd :int))
 (handler-case
     (let* ((passphrase-cb
       (gethash (pointer-address handle) *passphrase-handles*))
      (passphrase
       (cond
  ((functionp passphrase-cb)
   (concatenate 'string
         (funcall passphrase-cb uid-hint passphrase-info
           prev-was-bad)
         '(#\Newline)))
  (t (concatenate 'string passphrase-cb '(#\Newline)))))
      (passphrase-len (length passphrase))
      ;; FIXME: Could be more robust.
      (res (system-write fd passphrase passphrase-len)))
 (cond
   ((< res passphrase-len) ; FIXME: Blech.  A weak attempt to be robust.
    (gpgme-error :gpg-err-inval))
   (t (gpgme-error :gpg-err-no-error))))
   (gpgme-error (err)
 (gpgme-error-value err))
   (system-error (err) (gpgme-error-from-errno (system-error-errno err)))
   ;; FIXME: The original error gets lost here.
   (condition (err) (progn
         (when *debug*
```

```
    (format t "DEBUG: passphrase-cb: Unexpressable: ~A~%"
     err))
        (gpgme-error :gpg-err-general)))))

;;; CTX is a C-pointer to the context.
(defun gpgme-set-passphrase-cb (ctx cb)
 "Set the passphrase callback for CTX."
 (let ((handle (pointer-address ctx)))
   (cond
     (cb (setf (gethash handle *passphrase-handles*) cb)
   (c-gpgme-set-passphrase-cb ctx (callback passphrase-cb) ctx))
     (t (c-gpgme-set-passphrase-cb ctx (null-pointer) (null-pointer))
  (remhash handle *passphrase-handles*)))))

;;; Progress callback management.

;;; Maybe: Instead, use subclassing, and provide a customizable
;;; default implementation for ease-of-use.

(defvar *progress-handles* (make-hash-table)
 "Hash table with GPGME context address as key and the corresponding
  progress callback
 object as value.")

(defcallback progress-cb :void ((handle :pointer)
    (what :string)
    (type :int)
    (current :int)
    (total :int))
 (handler-case
     (let* ((progress-cb
       (gethash (pointer-address handle) *progress-handles*)))
 (funcall progress-cb what type current total))
   ;; FIXME: The original error gets lost here.
   (condition (err) (when *debug*
        (format t "DEBUG: progress-cb: Unexpressable: ~A~%"
         err)))))

;;; CTX is a C-pointer to the context.
(defun gpgme-set-progress-cb (ctx cb)
 "Set the progress callback for CTX."
 (let ((handle (pointer-address ctx)))
   (cond
     (cb (setf (gethash handle *progress-handles*) cb)
   (c-gpgme-set-progress-cb ctx (callback progress-cb) ctx))
     (t (c-gpgme-set-progress-cb ctx (null-pointer) (null-pointer))
  (remhash handle *progress-handles*)))))
```

```
;;; Context management.

(defun gpgme-new (&key (protocol :openpgp) armor textmode include-certs
    keylist-mode passphrase progress file-name
 home-dir)
 "Allocate a new GPGME context."
 (with-foreign-object (ctx-p 'gpgme-ctx-t)
   (c-gpgme-new ctx-p)
   (let ((ctx (mem-ref ctx-p 'gpgme-ctx-t)))
     ;;; Set locale?
     (gpgme-set-protocol ctx protocol)
     (gpgme-set-armor ctx armor)
     (gpgme-set-textmode ctx textmode)
     (when include-certs (gpgme-set-include-certs ctx include-certs))
     (when keylist-mode (gpgme-set-keylist-mode ctx keylist-mode))
     (gpgme-set-passphrase-cb ctx passphrase)
     (gpgme-set-progress-cb ctx progress)
     (gpgme-set-engine-info ctx protocol
        :file-name file-name :home-dir home-dir)
     (when *debug* (format t "DEBUG: gpgme-new: ~A~%" ctx))
     ctx)))

(defun gpgme-release (ctx)
 "Release a GPGME context."
 (when *debug* (format t "DEBUG: gpgme-release: ~A~%" ctx))
 (c-gpgme-release ctx))

(defun gpgme-set-protocol (ctx proto)
 "Set the protocol to be used by CTX to PROTO."
 (c-gpgme-set-protocol ctx proto))

(defun gpgme-get-protocol (ctx)
 "Get
 the protocol used with CTX."
 (c-gpgme-get-protocol ctx))

;;; FIXME: How to do pretty printing?
;;;
;;; gpgme-get-protocol-name

(defun gpgme-set-armor (ctx armor)
 "If ARMOR is true, enable armor mode in CTX, disable it otherwise."
(c-gpgme-set-armor ctx armor))

(defun gpgme-armor-p (ctx)
 "Return true if armor mode is set for CTX."
 (c-gpgme-get-armor ctx))
```

```
(defun gpgme-set-textmode (ctx textmode)
 "If TEXTMODE is true, enable text mode mode in CTX, disable it otherwise."
(c-gpgme-set-textmode ctx textmode))

(defun gpgme-textmode-p (ctx)
 "Return true if text mode mode is set for CTX."
 (c-gpgme-get-textmode ctx))

(defun gpgme-set-include-certs (ctx &optional certs)
 "Include up to CERTS certificates in an S/MIME message."
 (c-gpgme-set-include-certs ctx certs))

(defun gpgme-get-include-certs (ctx)
 "Return the number of certs to include in an S/MIME message,
  or NIL if the default is used."
 (c-gpgme-get-include-certs ctx))

(defun gpgme-get-keylist-mode (ctx)
  "Get the keylist mode in CTX."
 (c-gpgme-get-keylist-mode ctx))

(defun gpgme-set-keylist-mode (ctx mode)
 "Set the keylist mode in CTX."
 (c-gpgme-set-keylist-mode ctx mode))


;;; FIXME: How to handle locale?  cffi-grovel?

(defun gpgme-get-engine-info (&optional ctx)
 "Retrieve the engine info for CTX, or the default if CTX is omitted."
 (cond
   (ctx (c-gpgme-ctx-get-engine-info ctx))
   (t (with-foreign-object (info-p 'gpgme-engine-info-t)
  (c-gpgme-get-engine-info info-p)
  (mem-ref info-p 'gpgme-engine-info-t)))))

(defun gpgme-set-engine-info (ctx proto &key file-name home-dir)
 "Set the engine info for CTX, or the default if CTX is NIL."
 (cond
   (ctx (c-gpgme-ctx-set-engine-info ctx proto file-name home-dir))
   (t (c-gpgme-set-engine-info proto file-name home-dir))))

;;; FIXME: How to do pretty printing?
;;;
;;; gpgme_pubkey_algo_name, gpgme_hash_algo_name

(defun gpgme-set-signers (ctx keys)
 "Set the signers for the context CTX."
```

```
 (c-gpgme-signers-clear ctx)
  (dolist (key keys) (c-gpgme-signers-add ctx key)))

;;;

(defun gpgme-set-sig-notation (ctx notations)
 "Set the sig notation for the context CTX."
 (c-gpgme-sig-notation-clear ctx)
 (dolist (notation notations)
   (c-gpgme-sig-notation-add
    ctx (first notation) (second notation) (third notation))))

(defun gpgme-get-sig-notation (ctx)
 "Get the signature notation data for the context CTX."
 (c-gpgme-sig-notation-get ctx))

;;; FIXME: Add I/O callback interface, for integration with clg.

;;; FIXME: Add gpgme_wait?

;;; Streams
;;; -------
;;;
;;; GPGME uses standard streams.  You can define your own streams, or
;;; use the existing file or string streams.
;;;
;;; A stream-spec is either a stream, or a list with a stream as its
;;; first argument followed by keyword parameters: encoding,
;;; file-name.
;;;
;;; FIXME: Eventually, we should provide a class that can be mixed
;;; into stream classes and which provides accessors for encoding and
;;; file-names.  This interface
 should be provided in addition to the
;;; above sleazy interface, because the sleazy interface is easier to
;;; use (less typing), and is quite sufficient in a number of cases.
;;;
;;; For best results, streams with element type (unsigned-byte 8)
;;; should be used.  Character streams may work if armor mode is used.

;;; Do we need to provide access to GPGME data objects through streams
;;; as well?  It seems to me that specific optimizations, like
;;; directly writing to file descriptors, is better done by extending
;;; the sleazy syntax (stream-spec) instead of customized streams.
;;; Customized streams do buffering, and this may mess up things.  Mmh.

(defvar *data-handles* (make-hash-table)
 "Hash table with GPGME data user callback handle address as key
```

```
  and the corresponding stream as value.")

;;; The release callback removes the stream from the *data-handles*
;;; hash and releases the CBS structure that is used as the key in
;;; that hash.  It is implicitly invoked (through
 GPGME) by
;;; gpgme-data-release.
(defcallback data-release-cb :void ((handle :pointer))
 (unwind-protect (remhash (pointer-address handle) *data-handles*)
   (when (not (null-pointer-p handle)) (foreign-free handle))))

(defcallback data-read-cb ssize-t ((handle :pointer) (buffer :pointer)
                                   (size size-t))
 (when *debug* (format t "DEBUG: gpgme-data-read-cb: want ~A~%" size))
 (let ((stream (gethash (pointer-address handle) *data-handles*)))
   (cond
     (stream
      (let* ((stream-type (stream-element-type stream))
             (seq (make-array size :element-type stream-type))
             (read (read-sequence seq stream)))
        (cond
          ((equal stream-type '(unsigned-byte 8))
           (dotimes (i read)
             (setf (mem-aref buffer :unsigned-char i)
                   (aref (the byte-array seq) i))))
          ((eql stream-type 'character)
           (dotimes (i read)
             (setf (mem-aref buffer :unsigned-char
 i)
                   (char-code (aref (the character-array seq) i)))))
          (t
           (dotimes (i read)
             (setf (mem-aref buffer :unsigned-char i)
                   (coerce (aref seq i) '(unsigned-byte 8))))))
        (when *debug* (format t "DEBUG: gpgme-data-read-cb: read ~A~%" read))
        read))
     (t
      (set-errno +ebadf+)
      -1))))

(defcallback data-write-cb ssize-t ((handle :pointer) (buffer :pointer)
                                    (size size-t))
 (when *debug* (format t "DEBUG: gpgme-data-write-cb: want ~A~%" size))
 (let ((stream (gethash (pointer-address handle) *data-handles*)))
   (cond
     (stream
      (let* ((stream-type (stream-element-type stream))
             (seq (make-array size :element-type stream-type)))
```

```
        (cond
          ((equal stream-type '(unsigned-byte 8))
           (dotimes (i size)
             (setf (aref (the byte-array seq) i)
                   (mem-aref buffer :unsigned-char i))))
           ((eql stream-type 'character)
           (dotimes (i size)
             (setf (aref (the character-array seq) i)
                   (code-char (mem-aref buffer :unsigned-char i)))))
          (t
           (dotimes (i size)
             (setf (aref seq i)
                   (coerce (mem-aref buffer :unsigned-char i) stream-type)))))
        (write-sequence seq stream)
        size))
      (t
       (set-errno +ebadf+)
       -1))))

;;; This little helper macro allows us to swallow the cbs structure by
;;; simply setting it to a null pointer, but still protect against
;;; conditions.
(defmacro with-cbs-swallowed ((cbs) &body body)
 `(let ((,cbs (foreign-alloc '(:struct gpgme-data-cbs))))
   (unwind-protect (progn ,@body)
     (when (not (null-pointer-p ,cbs)) (foreign-free ,cbs)))))

(defun gpgme-data-new (stream &key encoding file-name)
 "Allocate a new GPGME data object for STREAM."
 (with-foreign-object (dh-p 'gpgme-data-t)
   ;;; We allocate one CBS structure
 for each stream we wrap in a
   ;;; data object.  Although we could also share all these
   ;;; structures, as they contain the very same callbacks, we need a
   ;;; unique C pointer as handle anyway to look up the stream in the
   ;;; callback.  This is a convenient one to use.
   (with-cbs-swallowed (cbs)
     (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'read)
           (callback data-read-cb))
     (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'write)
           (callback data-write-cb))
     (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'seek)
           (null-pointer))
     (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'release)
           (callback data-release-cb))
     (c-gpgme-data-new-from-cbs dh-p cbs cbs)
     (let ((dh (mem-ref dh-p 'gpgme-data-t)))
 (when encoding (gpgme-data-set-encoding dh encoding))
```

```
 (when file-name (gpgme-data-set-file-name dh file-name))
 ;;; Install the stream into the hash table and
 swallow the cbs
      ;;; structure while protecting against any errors.
 (unwind-protect
     (progn
       (setf (gethash (pointer-address cbs) *data-handles*) stream)
       (setf cbs (null-pointer)))
   (when (not (null-pointer-p cbs)) (c-gpgme-data-release dh)))
 (when *debug* (format t "DEBUG: gpgme-data-new: ~A~%" dh))
 dh))))

;;; This function releases a GPGME data object.  It implicitly
;;; invokes the data-release-cb function to clean up associated junk.
(defun gpgme-data-release (dh)
 "Release a GPGME data object."
 (when *debug* (format t "DEBUG: gpgme-data-release: ~A~%" dh))
 (c-gpgme-data-release dh))

(defclass data ()
 (c-data)  ; The C data object pointer
 (:documentation "The GPGME data type."))

(defmethod initialize-instance :after ((data data) &key streamspec
                                       &allow-other-keys)
 (let ((c-data (if (listp streamspec)
                   (apply #'gpgme-data-new streamspec)
                   (gpgme-data-new streamspec)))
       (cleanup t))
   (unwind-protect
       (progn
         (setf (slot-value data 'c-data) c-data)
         (finalize data (lambda () (gpgme-data-release c-data)))
         (setf cleanup nil))
     (if cleanup (gpgme-data-release c-data)))))

(defun translate-gpgme-data-t-to-foreign (value)
 ;; Allow a pointer to be passed directly for the finalizer to work.
 (cond
   ((null value) (null-pointer))
   ((pointerp value) value)
   (t (slot-value value 'c-data))))

(defmacro with-gpgme-data ((dh streamspec) &body body)
 `(let ((,dh (make-instance 'data :streamspec ,streamspec)))
    ,@body))

(defun gpgme-data-get-encoding (dh)
```

```
 "Get the encoding associated with the data object DH."
 (c-gpgme-data-get-encoding dh))

(defun gpgme-data-set-encoding (dh encoding)
 "Set the encoding associated with the data object DH to ENCODING."
 (c-gpgme-data-set-encoding dh encoding))

(defun gpgme-data-get-file-name (dh)
 "Get the file name associated with the data object
 DH."
 (c-gpgme-data-get-file-name dh))

(defun gpgme-data-set-file-name (dh file-name)
 "Set the file name associated with the data object DH to FILE-NAME."
 (c-gpgme-data-set-file-name dh file-name))

;;; FIXME: Add key accessor interfaces.

(defun gpgme-get-key (ctx fpr &optional secret)
 "Get the key with the fingerprint FPR from the context CTX."
 (with-foreign-object (key-p 'gpgme-key-t)
   (c-gpgme-get-key ctx fpr key-p secret)
   (mem-ref key-p 'gpgme-key-t)))

(defun gpgme-key-ref (key)
 "Acquire an additional reference to the key KEY."
 (when *debug* (format t "DEBUG: gpgme-key-ref: ~A~%" key))
 (c-gpgme-key-ref key))

(defun gpgme-key-unref (key)
 "Release a reference to the key KEY."
 (when *debug* (format t "DEBUG: gpgme-key-unref: ~A~%" key))
 (c-gpgme-key-unref key))

;;; FIXME: We REALLY need pretty printing for keys and all the other
;;; big structs.

;;; Various interfaces.

(defun gpgme-check-version (&optional req-version)
 (c-gpgme-check-version req-version))

;;;
;;;
 The *EXPORTED* CLOS interface.
;;;

;;; The context type.
```

```
;;; We wrap the C context pointer into a class object to be able to
;;; stick a finalizer on it.

(defclass context ()
 (c-ctx  ; The C context object pointer.
  signers ; The list of signers.
  sig-notation) ; The list of signers.
 (:documentation "The GPGME context type."))

(defmethod initialize-instance :after ((ctx context) &rest rest
          &key &allow-other-keys)
 (let ((c-ctx (apply #'gpgme-new rest))
 (cleanup t))
   (unwind-protect
  (progn (setf (slot-value ctx 'c-ctx) c-ctx)
  (finalize ctx (lambda () (gpgme-release c-ctx)))
  (setf cleanup nil))
     (if cleanup (gpgme-release c-ctx)))))

(defun translate-gpgme-ctx-t-to-foreign (value)
 ;; Allow a pointer to be passed directly for the finalizer to work.
 (if (pointerp value) value (slot-value value 'c-ctx)))

(defmacro context (&rest rest)
 "Create a new GPGME context."
 `(make-instance 'context ,@rest))

;;; The context type: Accessor
 functions.

;;; The context type: Accessor functions: Protocol.

(defgeneric protocol (ctx)
 (:documentation "Get the protocol of CONTEXT."))

(defmethod protocol ((ctx context))
 (gpgme-get-protocol ctx))

(defgeneric (setf protocol) (protocol ctx)
 (:documentation "Set the protocol of CONTEXT to PROTOCOL."))

;;; FIXME: Adjust translator to reject invalid protocols.  Currently,
;;; specifying an invalid protocol throws a "NIL is not 32 signed int"
;;; error.  This is suboptimal.
(defmethod (setf protocol) (protocol (ctx context))
 (gpgme-set-protocol ctx protocol))
```

```
;;; The context type: Accessor functions: Armor.
;;; FIXME: Is it good style to make foop setf-able?  Or should it be
;;; foo/foop for set/get?

(defgeneric armorp (ctx)
 (:documentation "Get the armor flag of CONTEXT."))

(defmethod armorp ((ctx context))
 (gpgme-armor-p ctx))

(defgeneric (setf armorp) (armor ctx)
 (:documentation "Set the armor flag of CONTEXT to ARMOR."))

(defmethod (setf armorp) (armor (ctx
 context))
 (gpgme-set-armor ctx armor))

;;; The context type: Accessor functions: Textmode.
;;; FIXME: Is it good style to make foop setf-able?  Or should it be
;;; foo/foop for set/get?

(defgeneric textmodep (ctx)
 (:documentation "Get the text mode flag of CONTEXT."))

(defmethod textmodep ((ctx context))
 (gpgme-textmode-p ctx))

(defgeneric (setf textmodep) (textmode ctx)
 (:documentation "Set the text mode flag of CONTEXT to TEXTMODE."))

(defmethod (setf textmodep) (textmode (ctx context))
 (gpgme-set-textmode ctx textmode))

;;; The context type: Accessor functions: Include Certs.

(defgeneric include-certs (ctx)
 (:documentation "Get the number of included certificates in an
                 S/MIME message, or NIL if the default is used."))

(defmethod include-certs ((ctx context))
 (gpgme-get-include-certs ctx))

(defgeneric (setf include-certs) (certs ctx)
 (:documentation "Return the number of certificates to include in an
                 S/MIME message, or
 NIL if the default is used."))

(defmethod (setf include-certs) (certs (ctx context))
```

```
 (gpgme-set-include-certs ctx certs))

;;; The context type: Accessor functions: Engine info.

(defgeneric engine-info (ctx)
 (:documentation "Retrieve the engine info for CTX."))

(defmethod engine-info ((ctx context))
 (gpgme-get-engine-info ctx))

(defgeneric (setf engine-info) (info ctx)
 (:documentation "Set the engine info for CTX."))

(defmethod (setf engine-info) (info (ctx context))
 (dolist (proto '(:openpgp :cms))
   (let ((pinfo (getf info proto)))
     (when pinfo
 (gpgme-set-engine-info ctx proto :file-name (getf pinfo :file-name)
         :home-dir (getf pinfo :home-dir))))))

;;; The context type: Accessor functions: Keylist mode.

(defgeneric keylist-mode (ctx)
 (:documentation "Get the keylist mode of CTX."))

(defmethod keylist-mode ((ctx context))
 (gpgme-get-keylist-mode ctx))

(defgeneric (setf keylist-mode) (mode ctx)
 (:documentation "Set the keylist mode of CTX to MODE."))

(defmethod
 (setf keylist-mode) (mode (ctx context))
 (gpgme-set-keylist-mode ctx mode))

;;; The context type: Accessor functions: Signers.

(defgeneric signers (ctx)
 (:documentation "Get the signers of CTX."))

(defmethod signers ((ctx context))
 (slot-value ctx 'signers))

(defgeneric (setf signers) (signers ctx)
 (:documentation "Set the signers of CTX to SIGNERS."))

(defmethod (setf keylist-mode) (signers (ctx context))
 (gpgme-set-signers ctx signers)
```

```
 (setf (slot-value ctx 'signers) signers))

;;; The context type: Accessor functions: Sig notations.

(defgeneric sig-notations (ctx)
 (:documentation "Get the signature notations of CTX."))

(defmethod sig-notations ((ctx context))
 (slot-value ctx 'signers))

(defgeneric (setf sig-notations) (notations ctx)
 (:documentation "Set the signatire notations of CTX to NOTATIONS."))

(defmethod (setf sig-notations) (notations (ctx context))
 (gpgme-set-signers ctx notations)
 (setf (slot-value ctx 'notations) notations))

;;;
 The context type: Support macros.

(defmacro with-context ((ctx &rest rest) &body body)
 `(let ((,ctx (make-instance 'context ,@rest)))
   ,@body))

;;; The key type.

(defclass key ()
 (c-key)  ; The C key object pointer.
 (:documentation "The GPGME key type."))

;;; In the initializer, we swallow the c-key argument.
(defmethod initialize-instance :after ((key key) &key c-key
          &allow-other-keys)
 (setf (slot-value key 'c-key) c-key)
 (finalize key (lambda () (gpgme-key-unref c-key))))

(defun translate-gpgme-key-t-from-foreign (value)
 (when *debug* (format t "DEBUG: import key: ~A~%" value))
 (make-instance 'key :c-key value))

(defun translate-gpgme-key-t-to-foreign (value)
 ;; Allow a pointer to be passed directly for the finalizer to work.
 (if (pointerp value) value (slot-value value 'c-key)))

(defmethod print-object ((key key) stream)
 (print-unreadable-object (key stream :type t :identity t)
   (format stream "~s" (fpr key))))
```

```
;;; The key type:
 Accessor functions.

;;; FIXME: The bitfield and flags contain redundant information at
;;; this point.  FIXME: Deal nicer with zero-length name (policy url)
;;; and zero length value (omit?) and human-readable (convert to string).
;;; FIXME: Turn binary data into sequence or vector or what it should be.
;;; FIXME: Turn the whole thing into a hash?
(defun translate-gpgme-sig-notation-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next name value name-len value-len flags bitfield)
     value (:struct gpgme-sig-notation))
  (append (list (list
   :name name
   :value value
   :name-len name-len
   :value-len value-len
   :flags flags
   :bitfield bitfield))
   next)))))

;;; FIXME: Deal nicer with timestamps.  bitfield field name?
(defun translate-gpgme-subkey-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next bitfield pubkey-algo length keyid fpr timestamp expires)
     value (:struct gpgme-subkey))

 (append (list (list
   :bitfield bitfield
   :pubkey-algo pubkey-algo
   :length length
   :keyid keyid
   :fpr fpr
   :timestamp timestamp
   :expires expires))
   next)))))

(defun translate-gpgme-key-sig-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next bitfield pubkey-algo keyid timestamp expires status
    uid name email comment sig-class)
     value (:struct gpgme-key-sig))
```

```
  (append (list (list
   :bitfield bitfield
   :pubkey-algo pubkey-algo
   :keyid keyid
   :timestamp timestamp
   :expires expires
   :status status
   :uid uid
   :name name
   :email email
   :comment comment
   :sig-class sig-class))
   next)))))

(defun translate-gpgme-user-id-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next bitfield validity uid name email comment signatures)
     value (:struct gpgme-user-id))
  (append (list (list
   :bitfield bitfield
   :validity validity
   :uid uid
   :name
 name
   :email email
   :comment comment
   :signatures signatures))
   next)))))

(defun key-data (key)
 (with-slots (c-key) key
   (with-foreign-slots
 ((bitfield protocol issuer-serial issuer-name chain-id
     owner-trust subkeys uids keylist-mode)
  c-key (:struct gpgme-key))
     (list
      :bitfield bitfield
      :protocol protocol
      :issuer-serial issuer-serial
      :issuer-name issuer-name
      :chain-id chain-id
      :owner-trust owner-trust
      :subkeys subkeys
      :uids uids
      :keylist-mode keylist-mode))
   ))
```

```
(defgeneric fpr (key)
 (:documentation "Get the primary fingerprint of the key."))

(defmethod fpr ((key key))
 (getf (car (getf (key-data key) :subkeys)) :fpr))


;;; The context type: Crypto-Operations.

(defgeneric get-key (ctx fpr &optional secret)
 (:documentation "Get the (secret) key FPR from CTX."))

(defmethod get-key ((ctx context) fpr &optional secret)
 (gpgme-get-key ctx fpr secret))

;;; Encrypt.

(defgeneric
 op-encrypt (ctx recp plain cipher &key always-trust sign)
 (:documentation "Encrypt."))

(defmethod op-encrypt ((ctx context) recp plain cipher
        &key always-trust sign)
 (with-foreign-object (c-recp :pointer (+ 1 (length recp)))
   (dotimes (i (length recp))
     (setf (mem-aref c-recp 'gpgme-key-t i) (elt recp i)))
   (setf (mem-aref c-recp :pointer (length recp)) (null-pointer))
   (with-gpgme-data (in plain)
     (with-gpgme-data (out cipher)
 (let ((flags))
   (if always-trust (push :always-trust flags))
   (cond
     (sign
      (c-gpgme-op-encrypt-sign ctx c-recp flags in out)
      (append (c-gpgme-op-encrypt-result ctx)
       (c-gpgme-op-sign-result ctx)))
     (t
      (c-gpgme-op-encrypt ctx c-recp flags in out)
      (c-gpgme-op-encrypt-result ctx))))))))

;;; Decrypt.

(defgeneric op-decrypt (ctx cipher plain &key verify)
 (:documentation "Decrypt."))

(defmethod op-decrypt ((ctx context) cipher plain &key verify)
```

```
 (with-gpgme-data (in cipher)
   (with-gpgme-data
 (out plain)
     (cond
 (verify
  (c-gpgme-op-decrypt-verify ctx in out)
  (append (c-gpgme-op-decrypt-result ctx)
   (c-gpgme-op-verify-result ctx)))
 (t
  (c-gpgme-op-decrypt ctx in out)
  (c-gpgme-op-decrypt-result ctx))))))

;;; Signing.

(defgeneric op-sign (ctx plain sig &optional mode)
 (:documentation "Sign."))

(defmethod op-sign ((ctx context) plain sig &optional (mode :none))
 (with-gpgme-data (in plain)
   (with-gpgme-data (out sig)
     (c-gpgme-op-sign ctx in out mode)
     (c-gpgme-op-sign-result ctx))))

;;; Verify.

(defgeneric op-verify (ctx sig text &key detached)
 (:documentation "Verify."))

(defmethod op-verify ((ctx context) sig text &key detached)
 (with-gpgme-data (in sig)
   (with-gpgme-data (on text)
     (c-gpgme-op-verify ctx in (if detached on nil)
    (if detached nil on))
     (c-gpgme-op-verify-result ctx))))

;;; Import.

(defgeneric op-import (ctx keydata)
 (:documentation "Import."))

(defmethod op-import ((ctx context) keydata)
  (with-gpgme-data (in keydata)
   (c-gpgme-op-import ctx in)
   (c-gpgme-op-import-result ctx)))

;;; Export.

(defgeneric op-export (ctx pattern keydata)
```

```
 (:documentation "Export public key data matching PATTERN to the
                  stream KEYDATA."))

(defmethod op-export ((ctx context) pattern keydata)
 (with-gpgme-data (dh keydata)
   (c-gpgme-op-export ctx pattern 0 dh)))

;;; Key generation.



;;;
;;; Initialization
;;;

(defun check-version (&optional req-version)
 "Check that the GPGME version requirement is satisfied."
 (gpgme-check-version req-version))

(defparameter *version* (check-version)
 "The version number of GPGME used.")
```


```
{
   "op": "import",
   "data": "-----BEGIN PGP PUBLIC KEY BLOCK-----
\n\nmQGiBDbjs5oRBACjAxqGzA6j190iiN/1vJvS5jYLQ1H3xxhzXdZ6ZxjPJkslX1ox\nFqBINhjzBJnV9/7b1FFe5
089NiCcGUVZa2xD3Vu+niLTAGNTQeNy6Y0E6wEfvplQ\nLJbpVGOmuVeZyShHNCKjrsZFtS1mr7o19SUb5Q
WS3gZHabFTbmhibcFBXwCg36qG\nVAnGcZzvnUTGpRy3xjp+zuED/2qTJNpnPhicKSksVwb6EJFXH7mQSZly
blAnOAVF\nMx19GUijW4MWP5FUdcTd5KzIDgkenRLBrpCLIFVkQ4/baP/hOiCLOmCoRu3xnFyo\nRPM/Jn94
Qy3Jo2wigwkhQU+zyOU5C85QBD9ctkbYp/0mu9bpxmYTchHwD1v3dXUX\nEVajA/9lnEz1GiI0bwKpm8VKXp
0YYP5hea8Jh5fNVb1QW2QqGd+XNHnRGSqX5smG\nyrs+xoYxD8+jv1FhmGaSv+6+n+JBVK4TuWrQpZ0cgZ
L5jZnX27TOYXeY4d5YKgE+\n7ZO57TwCIfF/P6puflGm+t5GcFwj4kkfohMEaeNhm1S+xf29q7QrVmljdG9yIFR
l\nc3QgKGRlbW8ga2V5KSA8dmljdG9yQGV4YW1wbGUub3JnPohVBBMRAgAVBQI247Oa\nAwsKAwMVAw
IDFgIBAheAAAoJEEevS2lh8EeEzEkAoMA+KfY9bA8EdfvWwa8zUM1S\nMs5rAKDS+6X3HVuCaLtVxzXOob
+DKbB7b7kBDQQ247O+EAQAh5FAgdvaTJL3jBGc\njYiiJosxeTWf3L/dUY99fZN8R39DSVoUKf9Rt/EsS5Dyw
XVnKAeJiUTYw8lbMRVF\n70VhSDHpMC9KtbB0lk3CcAqULPiyirT5g9ywN24W7k0naWIJisttUh+Hqbm6gc5P
\nz9Nfd5ll8x4Ehi3lKE6Nze3gUNMAAwUD/AtUN1hqwWTTphVZctHq3JaUEb9agmu/\nOcsf24/bq9i8R8FaMwB
F4fI5qIimcqAM+2BZ6dvZEdqrVaZR9aHjzchcHmaiI7Zm\nW4gmk+LHFFWf9y7mG8YDKFBXkaBuJpxFb1FIfJp
maLzJmRa76dLqI3A7H2E8dFQa\n/MGsYCa4NmILiEUEGBECAAYFAjbjs74ACgkQR69LaWHwR4RT3QCgn
MlRAiGtvL5l\nD4Gdo5F0KEP5zZEAlA6Ri9WmZ9Xiqw5R3Bsg+As8sJ4=\n=FRd4\n-----END
 PGP PUBLIC KEY BLOCK-----\n"
}
```


```
# -*- mode: org -*-
#+TITLE: A Short History of the GPGME bindings for Python
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltxtra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
```

* Overview
 :PROPERTIES:
 :CUSTOM_ID: overview
 :END:

| Version: | 0.0.1 |
| GPGME Version: | 1.13.0 |
| Author: | Ben McGinnes <ben@gnupg.org> |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language: | Australian English, British English |
| xml:lang: | en-AU, en-GB, en |

The GPGME Python bindings passed through many hands and numerous phases before, after a fifteen year journey, coming full circle to return to the source. This is a short explanation of that journey.

** In the beginning
  :PROPERTIES:
  :CUSTOM_ID: in-the-begining
  :END:

  In 2002 John Goerzen released PyME; Python bindings for the GPGME module which utilised the current release of Python of the time and SWIG.[fn:1] Shortly after creating it and ensuring it worked he stopped supporting it, though he left his work available on his Gopher site.

** Keeping the flame alive
  :PROPERTIES:
  :CUSTOM_ID: keeping-the-flame-alive
  :END:

  A couple of years later the project was picked up by Igor Belyi and actively developed and maintained by him from 2004 to 2008. Igor's whereabouts at the time of this document's creation are unknown, but the current authors do hope he is well. We're assuming (or hoping) that life did what life does and made continuing untenable.

** Passing the torch
  :PROPERTIES:
  :CUSTOM_ID: passing-the-torch
  :END:

  In 2014 Martin Albrecht wanted to patch a bug in the PyME code and discovered the absence of Igor. Following a discussion on the PyME

mailing list he
became the new maintainer for PyME, releasing
version 0.9.0 in May of that year. He remains the maintainer of
the original PyME release in Python 2.6 and 2.7 (available via
PyPI).

** Coming full circle
:PROPERTIES:
:CUSTOM_ID: ouroboros
:END:

In 2015 Ben McGinnes approached Martin about a Python 3 version,
while investigating how complex a task this would be the task ended
up being completed. A subsequent discussion with Werner Koch led
to the decision to fold the Python 3 port back into the original
GPGME release in the languages subdirectory for non-C bindings
under the module name of =pyme3=.

In 2016 this PyME module was integrated back into the GPGME project
by Justus Winter. During the course of this work Justus adjusted
the port to restore limited support for Python 2, but not as many
minor point releases as the original PyME package supports. During
the course of this integration the package was renamed to more
accurately
reflect its status as a component of GPGME. The =pyme3=
module was renamed to =gpg= and adopted by the upstream GnuPG team.

In 2017 Justus departed G10code and the GnuPG team. Following this
Ben returned to maintain of gpgme Python bindings and continue
building them from that point.

* Relics of the past
:PROPERTIES:
:CUSTOM_ID: relics-past
:END:

There are a few things, in addition to code specific factors, such as
SWIG itself, which are worth noting here.

** The Annoyances of Git
:PROPERTIES:
:CUSTOM_ID: the-annoyances-of-git
:END:

As anyone who has ever worked with git knows, submodules are
horrible way to deal with pretty much anything. In the interests

of avoiding migraines, that was skipped with addition of the PyME code to GPGME.

Instead the files were added to a subdirectory of the =lang/= directory, along with a copy of the entire git log up to that point as a separate file within the =lang/python/docs/= directory.[fn:2] As the log for PyME is nearly 100KB and the log for GPGME is approximately 1MB, this would cause considerable bloat, as well as some confusion, should the two be merged.

Hence the unfortunate, but necessary, step to simply move the files. A regular repository version has been maintained should it be possible to implement this better in the future.

** The Perils of PyPI
:PROPERTIES:
:CUSTOM_ID: the-perils-of-pypi
:END:

The early port of the Python 2 =pyme= module as =pyme3= was never added to PyPI while the focus remained on development and testing during 2015 and early 2016. Later in 2016, however, when Justus completed his major integration work and subsequently renamed the module from =pyme3= to =gpg=, some prior releases were also provided through PyPI.

Since these bindings require a matching release of the GPGME libraries in order to function, it was determined that there was little benefit in also providing a copy through PyPI since anyone obtaining the GPGME source code would obtain the Python bindings source code at the same time. Whereas there was the potential to sew confusion amongst Python users installing the module from PyPI, only to discover that without the relevant C files, header files or SWIG compiled binaries, the Python module did them little good.

There are only two files on PyPI which might turn up in a search for this module or a sample of its content:

1. gpg (1.8.0) - Python bindings for GPGME GnuPG cryptography library
2. pyme (0.9.0) - Python support for GPGME GnuPG cryptography library

*** GPG 180 - Python bindings for GPGME GnuPG cryptography library
:PROPERTIES:
:CUSTOM_ID: pypi-gpgme-180
:END:

This is the most recent version to reach PyPI and is the version
of the official Pyhon bindings which shipped with GPGME 1.8.0. If
you have GPGME 1.8.0 installed and /only/ 1.8.0 installed, then it
is probably safe to use
this copy from PyPI.

As there have been a lot of changes since the release of GPGME
1.8.0, the GnuPG Project recommends not using this version of the
module and instead installing the current version of GPGME along
with the Python bindings included with that package.

*** PyME 090 - Python support for GPGME GnuPG cryptography library
:PROPERTIES:
:CUSTOM_ID: pypi-gpgme-90
:END:

This is the last release of the PyME bindings maintained by Martin
Albrecht and is only compatible with Python 2, it will not work
with Python 3. This is the version of the software from which the
port from Python 2 to Python 3 code was made in 2015.

Users of the more recent Python bindings will recognise numerous
points of similarity, but also significant differences. It is
likely that the more recent official bindings will feel "more
pythonic."

For those using Python 2, there is essentially no harm in using
this module, but it may lack
a number of more recent features
added to GPGME.

* Footnotes

[fn:1] In all likelihood this would have been Python 2.2 or possibly
Python 2.3.

[fn:2] The entire PyME git log and other preceding VCS logs are
located in the =gpgme/lang/python/docs/old-commits.log= file.
{
"manifest_version": 2,

"name": "gpgme-json with native Messaging",
"description": "A simple demo application",
"version": "0.1",
"content_security_policy": "default-src 'self' filesystem:",
"browser_action": {

"default_icon": "testicon.png",
"default_title": "gpgme.js",
"default_popup": "popup.html"
},
"permissions": ["nativeMessaging", "activeTab"]
}
{
"op": "verify",
"data": "-----BEGIN PGP MESSAGE-----
\n\nowGbwMvMwCSoW1RzPCOz3ITxtFASQ/SbgPceiTk5+Qo+qaUlqVwd51kYBJkY+sUU\nWRb8d52wO1Hp7
fs8mxCYHlYmkAaDKQ0MQKDAwF5QlJqWWlSUmqKbmpuYmaObmpec\nn5KZl+5QkF6gl5yfC6RyM3NTlU
XAGrgZ+HMSS9MzQApyU71Ki0sUggtLU1OrUhV8\nU2WkMkpKCoqt9PXLy8v10vNK9fKL0vUL8nMykyv1G
bg4BWBuYP7OMN9VdOep8HTD\nKQLOd+7+Cshs6jVTfsMwT3sje7Pmui779IU/657Lb575u9z/LgA=\n=iqJ/\n--
---END PGP MESSAGE-----\n\n"
}
# HACKING -*- org -*-
#+TITLE: Hacking notes for GPGME
#+STARTUP: showall

* How to contribute
** No more ChangeLog files

Do not modify any of the ChangeLog files in GPGME. Starting
on December 1st, 2011 we put change information only in the GIT
commit log, and generate a top-level ChangeLog file from logs at
"make dist" time. As such, there are strict requirements on the
form of the commit log messages. The old ChangeLog files have all
be renamed to ChangeLog-2011

** Commit log requirements

Your commit log should always start with a one-line summary, the
second line should be blank, and the remaining lines are usually
ChangeLog-style entries for all affected files. However, it's fine
-- even recommended -- to write a few lines of prose describing the
change, when the summary and ChangeLog entries don't give enough of
the big picture. Omit the leading TABs that you're used to seeing
in a "real" ChangeLog
file, but keep the maximum line length at 72
or smaller, so that the generated ChangeLog lines, each with its
leading TAB, will not exceed 80 columns. If you want to add text
which shall not be copied to the ChangeLog, separate it by a line
consisting of two dashes at the begin of a line.

Note that ./autogen.sh installs a git hook to do some basic syntax
checking on the commit log message.

Typo fixes and documentation updates don't need a ChangeLog entry;
thus you would use a commit message like

#+begin_example
Fix typo in a comment

--
#+end_example

The marker line here is important; without it the first line would
appear in the ChangeLog.

If you exceptionally need to have longer lines in a commit log you may
do this after this scissor line:
#+begin_example
# ------------------------ >8 ------------------------
#+end_example
(hash, blank, 24 dashes, blank, scissor, blank, 24 dashes).
Note that such a comment will be removed if the
git commit option
=--cleanup-scissor= is used.

** License policy

GPGME is currently licensed under the LGPLv2.1+ with tools and the
manual being under the GPLv3+. We may eventually update to a newer
version of the licenses or a combination of them. It is thus
important, that all contributed code allows for an update of the
license; for example we can't accept code under the LGPLv2(only).

If you want to contribute code or documentation to GPGME you are
asked to assert that the contribution is in accordance to the "GPGME
Developer's Certificate of Origin" as found in the file "DCO".
Except for a slight wording change, this DCO is identical to the one
used by the Linux kernel. Please take these simple steps:

- Decide which mail address you want to use. Please have your real
  name in the address and not a pseudonym. Anonymous contributions
  can only be done if you find a proxy who certifies for you.

- If your employer or school might claim ownership
of code written
  by you; you need to talk to them to make sure that you have the
  right to contribute under the DCO.

- Send an OpenPGP signed mail to the gnupg-devel@gnupg.org public
  mailing list from your mail address. Include a copy of the DCO as
  found in the official master branch. Insert your name and email

address into the DCO in the same way you want to use it later.
Example:

Signed-off-by: Joe R. Hacker <joe@example.org>

If you need it, you may perform simple transformations on the mail address: Replacing "@" by " at " or "." by " dot ".)

- That's it. From now on you only need to add a "Signed-off-by:" line with your name and mail address to the GIT commit message. It is recommended to send the patches using a PGP/MIME signed mail.

** Coding standards

Please follow the GNU coding standards. If you are in doubt consult the existing code as an example. Do no re-indent code without a need. If you really need to
do it, use a separate commit for such a
change.

- C99 syntax should not be used; stick to C90.
- Please do not use C++ =//= style comments.
- Try to fit lines into 80 columns.
- Ignore signed/unsigned pointer mismatches
- No arithmetic on void pointers; cast to char* first.

** Commit log keywords

- GnuPG-bug-id :: Values are comma or space delimited bug numbers
  from bug.gnupg.org pertaining to this commit.
- Debian-bug-id :: Same as above but from the Debian bug tracker.
- CVE-id :: CVE id number pertaining to this commit.
- Regression-due-to :: Commit id of the regression fixed by this commit.
- Fixes-commit :: Commit id this commit fixes.
- Reported-by :: Value is a name or mail address of a bug reporte.
- Suggested-by :: Value is a name or mail address of someone how
  suggested this change.
- Co-authored-by :: Name or mail address of a co-author
- Some-comments-by :: Name or mail address of the author of

  additional comments (commit log or code).
- Proofread-by :: Sometimes used by translation commits.
- Signed-off-by :: Name or mail address of the developer

* Debug hints

- Use gpgme-tool for manual tests.

- The envvar GPGME_DEBUG enables debugging; see debug.[ch] for
  details.


```
{
  "info": [{
            "protocol":     "OpenPGP"
        }, {
            "protocol":     "spawn",
            "fname":        "/nonexistent",
            "version":      "1.0.0",
            "req_version":  "1.0.0"
        }]
}
```


Configuration files may go here.  Note that config.h.in is
auto-generated so that this file is not in git.

2011-12-02  Werner Koch  <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained.  Starting
on December 1st, 2011 we put change information only in the GIT
commit log, and generate a top-level ChangeLog file from logs at
"make dist".  See doc/HACKING for details.

2011-04-06  Werner Koch  <wk@g10code.com>

* gpg-error.m4: Update from current libgpg-error repo.

2010-05-07  Werner Koch  <wk@g10code.com>

* libassuan.m4: Update from libassuan svn.

2009-11-10  Marcus Brinkmann  <marcus@g10code.de>

* libassuan.m4: Fix LIBASSUAN_VERSION.

2006-06-08  Marcus Brinkmann  <marcus@g10code.de>

* pth.m4: Add --all to pth-config invocation.

2006-02-22  Marcus Brinkmann  <marcus@g10code.de>

* pth.m4: Fix code generation (required for Max OS X).
Submitted by Emanuele Giaquinta <exg@gentoo.org>.

2005-11-17  Marcus Brinkmann  <marcus@g10code.de>

* glib-2.0.m4: New file.

2004-12-28  Werner Koch  <wk@g10code.com>

* pth.m4: Changed quoting for use with automake 1.9.

2004-09-14
Marcus Brinkmann <marcus@g10code.de>

* pth.m4: Disable _ac_pth_line, and don't fail if Pth is not
found.

* glibc21.m4: New file.
* gpg-error.m4: New file.
* pth.m4: New file.

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1.15.1
GPGME Developer's Certificate of Origin. Version 1.0
==========

By making a contribution to the GPGME project, I certify that:

(a) The contribution was created in whole or in part by me and I
have the right to submit it under the free software license
indicated in the file; or

(b) The contribution is based upon previous work that, to the
best of my knowledge, is covered under an appropriate free
software license and I have the right under that license to
submit that work with modifications, whether created in whole
or in part by me, under the same free software license
(unless I am permitted to submit under a different license),
as indicated in the file; or

(c) The contribution was provided directly to me by some other
person who certified (a), (b) or (c) and I have not modified
it.

(d) I understand and agree that this project and the contribution
are public and that a record of the contribution
(including
all personal information I submit with it, including my

sign-off) is maintained indefinitely and may be redistributed
consistent with this project or the free software license(s)
involved.

Signed-off-by: [Your name and mail address]
2011-12-02  Werner Koch  <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained.  Starting
on December 1st, 2011 we put change information only in the GIT
commit log, and generate a top-level ChangeLog file from logs at
"make dist".  See doc/HACKING for details.

2008-11-08  Moritz  <moritz@gnu.org>

* gpgme.lisp (size-t): Wrong call to defctype: function accepts
optional, not keyword argument.
(ssize-t): Likewise.
(off-t): Likewise.
(gpgme-data-t, gpgme-ctx-t): Likewise.
(gpgme-error-t): Likewise.
(gpgme-error-no-signal-t): Likewise.
(gpgme-err-code-t): Likewise.
(gpgme-err-source-t): Likewise.
(gpgme-sig-notation-t, gpgme-engine-info-t): Likewise.
(gpgme-subkey-t): Likewise.
(gpgme-key-sig-t): Likewise.
(gpgme-user-id-t): Likewise.
(gpgme-key-t): Likewise.
(gpgme-data-cbs-t): Likewise.
(gpgme-invalid-key-t): Likewise.
(gpgme-op-encrypt-result-t): Likewise.
(gpgme-recipient-t): Likewise.
(gpgme-op-decrypt-result-t): Likewise.
(gpgme-new-signature-t):
Likewise.
(gpgme-op-sign-result-t): Likewise.
(gpgme-signature-t): Likewise.
(gpgme-op-verify-result-t): Likewise.
(gpgme-import-status-t): Likewise.
(gpgme-op-import-result-t): Likewise.
(gpgme-op-genkey-result-t): Likewise.
(gpgme-op-keylist-result-t): Likewise.

2006-07-06  Marcus Brinkmann  <marcus@g10code.de>

* Initial release.

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WITHOUT ANY WARRANTY, to the extent permitted by law; without even the
implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
{
  "op": "keylist",
  "keys": [ "zulu@example.net" ],
  "with-secret": false
}
{
  "op": "keylist",
  "keys": ["alpha@example.net", "bravo@example.net"],
  "chunksize": 64
}
000
 *H
010 UDE1!0U
Deutsches Forschungsnetz10UDFN-PCA1.0,U%DFN Top Level Certification Authority1!0 *H
 certify@pca.dfn.de0
981029180310Z
011231180310Z010 UDE1!0U
Deutsches Forschungsnetz10UDFN-PCA1.0,U%DFN Top Level Certification Authority1!0 *H
 certify@pca.dfn.de0"0
 *H
0
nskvS2r#iA4H|*/
:Sd;v
tD}L+~IWWD|eP&qH)
!1\p%,1.tIsmnQ,g-W)@\(t<kvm5j(d)9M_KGQJ0:qTE 00 `HB0) `HBhttps://mystic.pca.dfn.de/0A
`HB42http://www.pca.dfn.de/dfnpca/policy/wwwpolicy.html08 `HB
+)The DFN Top Level Certification Authority0! `HBcgi/check-rev.cgi?0 `HB
dfnpca.crl0U00U0
 *H
`^[:8\e7*%QC?:/JVgwPUB
OgGqjGVxl50%<`Pb18 z;t~r0U<A%3#l'8b"<iX"V!k"*Q8&hAPI"3 00KUb&Qq'46_{D[JZ!i<=T
/OF
{
  "type": "keys",
  "base64": false,
  "data": "-----BEGIN PGP PUBLIC KEY BLOCK-----
\n\nmQGiBDbjs5oRBACjAxqGzA6j190iiN/1vJvS5jYLQ1H3xxhzXdZ6ZxjPJkslX1ox\nFqBINhjzBJnV9/7b1FFe5
089NiCcGUVZa2xD3Vu+niLTAGNTQeNy6Y0E6wEfvplQ\nLJbpVGOmuVeZyShHNCKjrsZFtS1mr7o19SUb5Q
WS3gZHabFTbmhibcFBXwCg36qG\nVAnGcZzvnUTGpRy3xjp+zuED/2qTJNpnPhicKSksVwb6EJFXH7mQSZly
blAnOAVF\nMx19GUijW4MWP5FUdcTd5KzIDgkenRLBrpCLIFVkQ4/baP/hOiCLOmCoRu3xnFyo\nRPM/Jn94

Qy3Jo2wigwkhQU+zyOU5C85QBD9ctkbYp/0mu9bpxmYTchHwD1v3dXUX\nEVajA/9lnEz1GiI0bwKpm8VKXp
0YYP5hea8Jh5fNVb1QW2QqGd+XNHnRGSqX5smG\nyrs+xoYxD8+jv1FhmGaSv+6+n+JBVK4TuWrQpZ0cgZ
L5jZnX27TOYXeY4d5YKgE+\n7ZO57TwCIfF/P6puflGm+t5GcFwj4kkfohMEaeNhm1S+xf29q7QrVmljdG9yIFR
l\nc3QgKGRlbW8ga2V5KSA8dmljdG9yQGV4YW1wbGUub3JnPohVBBMRAgAVBQI247Oa\nAwsKAwMVAw
IDFgIBAheAAAoJEEevS2lh8EeEzEkAoMA+KfY9bA8EdfvWwa8zUM1S\nMs5rAKDS+6X3HVuCaLtVxzXOob
+DKbB7b7kBDQQ247O+EAQAh5FAgdvaTJL3jBGc\njYiiJosxeTWf3L/dUY99fZN8R39DSVoUKf9Rt/EsS5Dyw
XVnKAeJiUTYw8lbMRVF\n70VhSDHpMC9KtbB0lk3CcAqULPiyirT5g9ywN24W7k0naWIJisttUh+Hqbm6gc5P
\nz9Nfd5ll8x4Ehi3lKE6Nze3gUNMAAwUD/AtUN1hqwWTTphVZctHq3JaUEb9agmu/\nOcsf24/bq9i8R8FaMwB
F4fI5qIimcqAM+2BZ6dvZEdqrVaZR9aHjzchcHmaiI7Zm\nW4gmk+LHFFWf9y7mG8YDKFBXkaBuJpxFb1FIfJp
maLzJmRa76dLqI3A7H2E8dFQa\n/MGsYCa4NmILiEUEGBECAAYFAjbjs74ACgkQR69LaWHwR4RT3QCgn
MlRAiGtvL5l\nD4Gdo5F0KEP5zZEAlA6Ri9WmZ9Xiqw5R3Bsg+As8sJ4=\n=FRd4\n-----END
PGP PUBLIC KEY BLOCK-----\n"
}
{
"op": "encrypt",
"keys": ["alpha@example.net", "victor@example.org"],
"signing_keys": ["A0FF4590BB6122EDEF6E3C542D727CC768697734"],
"data": "Hello world",
"armor": true,
"always-trust": true
}
{
"option": {
"name": "default-key",
"argname": "NAME"
}
}
# -*- mode: org -*-
#+TITLE: What Was New in the GPGME Python Bindings and Documentation
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltxtra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

* What Was New
:PROPERTIES:
:CUSTOM_ID: new-stuff
:END:

| Version: | 0.0.1 |
| GPGME Version: | 1.13.0 |
| Author: | Ben McGinnes <ben@gnupg.org> |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |

| Language: | Australian English, British English |
| xml:lang: | en-AU, en-GB, en |

The following are all the past /What's New/ sections for the Python
Bindings HOWTO and other documentation.

** What Was New in GPGME 1120
:PROPERTIES:

:CUSTOM_ID: gpgme-1-12-0
:END:

The most obviously new point for those reading this guide is this
section on other new things, but thats hardly important. Not given
all the other things which spurred the need for adding this section
and its subsections.

*** New in GPGME 1120
:PROPERTIES:
:CUSTOM_ID: new-stuff-1-12-0
:END:

There have been quite a number of additions to GPGME and the Python
bindings to it since the last release of GPGME with versions 1.11.0
and 1.11.1 in April, 2018.

The bullet points of new additiions are:

- an expanded section on [[file:gpgme-python-howto#installation][installing]] and [[file:gpgme-python-howto#snafu][troubleshooting]] the Python
bindings.
- The release of Python 3.7.0; which appears to be working just fine
with our bindings, in spite of intermittent reports of problems for
many other Python projects with that new release.
- Python 3.7 has been moved to the head of the specified python
versions list in the build process.
- In
order to fix some other issues, there are certain underlying
functions which are more exposed through the [[file:gpgme-python-howto#howto-get-context][gpg.Context()]], but
ongoing documentation ought to clarify that or otherwise provide the
best means of using the bindings. Some additions to =gpg.core= and
the =Context()=, however, were intended (see below).
- Continuing work in identifying and confirming the cause of
oft-reported [[file:gpgme-python-howto#snafu-runtime-not-funtime][problems installing the Python bindings on Windows]].
- GSOC: Google's Surreptitiously Ordered Conscription ... erm ... oh,

right; Google's Summer of Code. Though there were two hopeful
candidates this year; only one ended up involved with the GnuPG
Project directly, the other concentrated on an unrelated third party
project with closer ties to one of the GNU/Linux distributions than
to the GnuPG Project. Thus the Python bindings benefited from GSOC
participant Jacob Adams, who added
the key_import function; building
on prior work by Tobias Mueller.
- Several new methods functions were added to the gpg.Context(),
including: [[file:gpgme-python-howto#howto-import-key][key_import]], [[file:gpgme-python-howto#howto-export-key][key_export]], [[file:gpgme-python-howto#howto-export-public-key][key_export_minimal]] and
[[file:gpgme-python-howto#howto-export-secret-key][key_export_secret]].
- Importing and exporting examples include versions integrated with
Marcel Fest's recently released [[https://github.com/Selfnet/hkp4py][HKP for Python]] module. Some
[[file:gpgme-python-howto#hkp4py][additional notes on this module]] are included at the end of the HOWTO.
- Instructions for dealing with semi-walled garden implementations
like ProtonMail are also included. This is intended to make things
a little easier when communicating with users of ProtonMail's
services and should not be construed as an endorsement of said
service. The GnuPG Project neither favours,
nor disfavours
ProtonMail and the majority of this deals with interacting with the
ProtonMail keyserver.
- Semi-formalised the location where [[file:gpgme-python-howto#draft-editions][draft versions]] of this HOWTO may
periodically be accessible. This is both for the reference of
others and testing the publishing of the document itself. Renamed
this file at around the same time.
- The Texinfo documentation build configuration has been replicated
from the parent project in order to make to maintain consistency
with that project (and actually ship with each release).
- a reStructuredText (=.rst=) version is also generated for Python
developers more used to and comfortable with that format as it is
the standard Python documentation format and Python developers may
wish to use it with Sphinx. Please note that there has been no
testing of the reStructuredText version with Sphinx at all. The
reST file was generated by the simple expedient of using [[https://pandoc.org/][Pandoc]].
-
Added a new section for [[file:gpgme-python-howto#advanced-use][advanced or experimental use]].
- Began the advanced use cases with [[file:gpgme-python-howto#cython][a section]] on using the module with
[[https://cython.org/][Cython]].
- Added a number of new scripts to the =example/howto/= directory;
some of which may be in advance of their planned sections of the
HOWTO (and some are just there because it seemed like a good idea at
the time).
- Cleaned up a lot of things under the hood.
This is gpgme.info, produced by makeinfo version 6.5 from gpgme.texi.

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Public License for more details.
INFO-DIR-SECTION GNU Libraries
START-INFO-DIR-ENTRY
* GPGME: (gpgme). Adding support for cryptography to your program.
END-INFO-DIR-ENTRY

This file documents the GPGME library.

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The
GnuPG Made Easy Reference Manual, for Version
1.14.1-beta35.

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Public License for more details.

File: gpgme.info, Node: UI Server Decrypt, Next: UI Server Verify, Prev: UI Server Sign, Up: UI Server Protocol

## A.3 UI Server: Decrypt a Message

Decryption may include the verification of OpenPGP messages. This is
due to the often used combined signing/encryption modus of OpenPGP. The
client may pass an option
to the server to inhibit the signature
verification. The following two commands are required to set the input
and output file descriptors:

-- Command: INPUT FD=N
Set the file descriptor for the message to be decrypted to N. The message send to the server is either binary encoded or in the case of OpenPGP ASCII armored. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: OUTPUT FD=N
Set the file descriptor to be used for the output. The output is binary encoded. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

The decryption is started with the command:

-- Command: DECRYPT --protocol=NAME [--no-verify]
[--export-session-key]
NAME is the encryption protocol used for the message. For a description of the allowed protocols see the ENCRYPT command. This argument is mandatory. If the option --no-verify is given, the server
should not try to verify a signature, in case the input data is an OpenPGP combined message. If the option --export-session-key is given and the underlying engine knows how to export the session key, it will appear on a status line

File: gpgme.info, Node: UI Server Verify, Next: UI Server Set Input Files, Prev: UI Server Decrypt, Up: UI Server Protocol

A.4 UI Server: Verify a Message
==========

The server needs to support the verification of opaque signatures as well as detached signatures. The kind of input sources controls what kind message is to be verified.

-- Command: MESSAGE FD=N
This command is used with detached signatures to set the file descriptor for the signed data to N. The data is binary encoded (used verbatim). For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: INPUT FD=N
Set the file descriptor for the opaque message or the signature part
of a detached signature to N. The message send to the server is either binary encoded or in the case of OpenPGP ASCII

armored. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: OUTPUT FD=N
Set the file descriptor to be used for the output. The output is binary encoded and only used for opaque signatures. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

The verification is then started using:

-- Command: VERIFY --protocol=NAME [--silent]
NAME is the signing protocol used for the message. For a description of the allowed protocols see the ENCRYPT command. This argument is mandatory. Depending on the combination of MESSAGE INPUT and OUTPUT commands, the server needs to select the appropriate verification mode:

MESSAGE and INPUT
This indicates a detached signature. Output data is not applicable.

INPUT
This indicates an opaque signature. As no output command has been given, the server is only required to check the signature.

INPUT and OUTPUT
This indicates an opaque signature. The server shall write the signed data to the file descriptor set by the output command. This data shall even be written if the signatures cant be verified.

With --silent the server shall not display any dialog; this is for example used by the client to get the content of opaque signed messages. The client expects the server to send at least this status information before the final OK response:

-- Status line: SIGSTATUS FLAG DISPLAYSTRING
Returns the status for the signature and a short string explaining the status. Valid values for FLAG are:

none
The message has a signature but it could not not be verified due to a missing key.

green
The signature is fully valid.

yellow
The signature is valid but additional information was shown regarding the validity of the key.

red
The signature is not valid.

DISPLAYSTRING is a percent-and-plus-encoded string with a short human readable description of the status. For example

S SIGSTATUS green Good+signature+from+Keith+Moon+<keith@example.net>

Note that this string needs to fit into an Assuan line and should be short enough to be displayed as short one-liner on the clients window. As usual the encoding of this string is UTF-8 and it should be send in its translated form.

The server shall send one status line for every signature found on the message.

File: gpgme.info, Node: UI Server Set Input Files, Next: UI Server Sign/Encrypt Files, Prev: UI Server Verify, Up: UI Server Protocol

A.5 UI Server: Specifying the input files to operate on.
==========

All file related UI server commands operate on a number of input files or directories, specified by one or more FILE commands:

-- Command: FILE [--clear] NAME
Add the file or directory NAME to the list of pathnames to be processed by the server. The parameter NAME must be an absolute path name (including the drive letter) and is percent espaced (in particular, the characters %, = and white space characters are always escaped). If the option --clear is given, the list of files is cleared before adding NAME.

Historical note: The original spec did not define --clear but the keyword --continued after the file name to indicate that more files are to be expected. However, this has never been used and thus removed from the specs.

File: gpgme.info, Node: UI Server Sign/Encrypt Files, Next: UI Server Verify/Decrypt Files, Prev: UI Server Set Input Files, Up: UI Server Protocol

A.6 UI Server: Encrypting and signing files.

==========

First,
 the input files need to be specified by one or more FILE
commands.  Afterwards, the actual operation is requested:

-- Command: ENCRYPT_FILES --nohup
-- Command: SIGN_FILES --nohup
-- Command: ENCRYPT_SIGN_FILES --nohup
Request that the files specified by FILE are encrypted and/or
signed.  The command selects the default action.  The UI server may
allow the user to change this default afterwards interactively, and
even abort the operation or complete it only on some of the
selected files and directories.

What it means to encrypt or sign a file or directory is specific to
the preferences of the user, the functionality the UI server
provides, and the selected protocol.  Typically, for each input
file a new file is created under the original filename plus a
protocol specific extension (like .gpg or .sig), which contain
the encrypted/signed file or a detached signature.  For
directories, the server may offer
multiple options to the user (for
example ignore or process recursively).

The ENCRYPT_SIGN_FILES command requests a combined sign and
encrypt operation.  It may not be available for all protocols (for
example, it is available for OpenPGP but not for CMS).

The option --nohup is mandatory.  It is currently unspecified
what should happen if --nohup is not present.  Because --nohup
is present, the server always returns OK promptly, and completes
the operation asynchronously.

File: gpgme.info,  Node: UI Server Verify/Decrypt Files,  Next: UI Server Import/Export Keys,  Prev: UI Server Sign/Encrypt Files,  Up: UI Server Protocol

A.7 UI Server: Decrypting and verifying files.
==========

First, the input files need to be specified by one or more FILE
commands.  Afterwards, the actual operation is requested:

-- Command: DECRYPT_FILES --nohup
-- Command: VERIFY_FILES --nohup
-- Command: DECRYPT_VERIFY_FILES

--nohup
Request that the files specified by FILE are decrypted and/or verified. The command selects the default action. The UI server may allow the user to change this default afterwards interactively, and even abort the operation or complete it only on some of the selected files and directories.

What it means to decrypt or verify a file or directory is specific to the preferences of the user, the functionality the UI server provides, and the selected protocol. Typically, for decryption, a new file is created for each input file under the original filename minus a protocol specific extension (like .gpg) which contains the original plaintext. For verification a status is displayed for each signed input file, indicating if it is signed, and if yes, if the signature is valid. For files that are signed and encrypted, the VERIFY command transiently decrypts the file to verify the enclosed signature. For directories,
the server may offer multiple
options to the user (for example ignore or process recursively).

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

File: gpgme.info, Node: UI Server Import/Export Keys, Next: UI Server Checksum Files, Prev: UI Server Verify/Decrypt Files, Up: UI Server Protocol

A.8 UI Server: Managing certificates.
==========

First, the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

-- Command: IMPORT_FILES --nohup
Request that the certificates contained in the files specified by FILE are imported into the local certificate databases.

For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The
option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

FIXME: It may be nice to support an EXPORT command as well, which is enabled by the context menu of the background of a directory.

File: gpgme.info, Node: UI Server Checksum Files, Next: Miscellaneous UI Server Commands, Prev: UI Server Import/Export Keys, Up: UI Server Protocol

## A.9 UI Server: Create and verify checksums for files.

First, the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

-- Command: CHECKSUM_CREATE_FILES --nohup
Request that checksums are created for the files specified by FILE. The choice of checksum algorithm and the destination storage and format for the created checksums depend on the

preferences of the user and the functionality provided by the UI server. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

-- Command: CHECKSUM_VERIFY_FILES --nohup
Request that checksums are created for the files specified by FILE and verified against previously created and stored checksums. The choice of checksum algorithm and the source storage and format for previously created checksums depend on the preferences of the user and the functionality provided by the UI server. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

If the source storage of previously created checksums is available
to the user through the Windows shell, this command may also accept such checksum files as FILE arguments. In this case, the UI server should instead verify the checksum of the referenced files as if they were given as INPUT files.

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

## A.10 Miscellaneous UI Server Commands

The server needs to implement the following commands which are not related to a specific command:

-- Command: GETINFO WHAT
This is a multi purpose command, commonly used to return a variety of information. The required subcommands as described by the WHAT parameter are:

pid
Return the process id of the server in decimal notation using an Assuan data line.

To allow the server to pop up the windows in the correct relation to the client, the client is advised to tell the server by sending the option:

-- Command option: window-id NUMBER
The NUMBER represents the native window ID of the clients current window. On Windows systems this is a windows handle (HWND) and on X11 systems it is the X Window ID. The number needs to be given as a hexadecimal value so that it is easier to convey pointer values (e.g. HWND).

A client may want to fire up the certificate manager of the server. To do this it uses the Assuan command:

-- Command: START_KEYMANAGER
The server shall pop up the main window of the key manager (aka certificate manager). The client expects that the key manager is brought into the foregound and that this command immediately returns (does not wait until the key manager has been fully brought up).

A client may want to fire up the configuration dialog of the server. To do this it uses the Assuan command:

-- Command: START_CONFDIALOG
The server shall pop up its configuration dialog. The client expects that this dialog is brought into the foregound and that this command immediately returns (i.e. it does not wait until the dialog has been fully brought up).

When doing an operation on a mail, it is useful to let the server know the address of the sender:

-- Command: SENDER [--info] [--protocol=NAME] EMAIL
EMAIL is the plain ASCII encoded address ("addr-spec" as per RFC-2822) enclosed in angle brackets. The address set with this command is valid until a successful completion of the operation or until a RESET command. A second command overrides the effect of the first one; if EMAIL is not given and --info is not used, the server shall use the default signing key.

If option --info is not given, the server shall also suggest a protocol to use for signing. The client may use this suggested protocol on its own discretion. The same status line as with PREP_ENCRYPT is used for this.

The option --protocol may be used to give the server a hint on which signing protocol should be preferred.

To allow the UI-server to visually identify a running operation or to associate operations the server MAY support the command:

-- Command: SESSION NUMBER [STRING]
The NUMBER is an arbitrary value, a server may use to associate simultaneous running sessions. It is a 32 bit unsigned integer with 0 as a special value indicating that no session association shall be done.

If STRING is given, the server may use this as the title of a window or, in the case of an email operation, to extract the senders address. The string may contain spaces; thus no plus-escaping is used.

This command may be used at any time and overrides the effect of the last command. A RESET undoes the effect of this command.

File: gpgme.info, Node: Debugging, Next: Deprecated Functions, Prev: UI Server Protocol, Up: Top

## Appendix B How to solve problems

Everyone knows that software often does not do what it should do and thus there is a need to track down problems. This is in particular true for applications using a complex library like GPGME and of course also

for the library itself. Here we give a few hints on how to solve such problems.

First of all you should make sure that the keys you want to use are installed in the GnuPG engine and are usable. Thus the first test is to run the desired operation using gpg or gpgsm on the command line. If you cant figure out why things dont work, you may use GPGMEs built in trace feature. This feature is either enabled using the environment variable GPGME_DEBUG or, if this is not possible, by calling the function gpgme_set_global_flag. The value is the trace level and an optional file name. If no file name is given the trace output is printed to stderr.

For example

```
GPGME_DEBUG=9:/home/user/mygpgme.log
```

(Note that under Windows you use a semicolon in place of the colon to separate the fields.)

A trace level of 9 is pretty verbose and thus you may want to start off with a lower level. The exact definition of the trace levels and the output format may change with any release; you need to check the source code for details. In any case the trace log should be helpful to understand what is going going on. Warning: The trace log may reveal sensitive details like passphrases or other data you use in your application. If you are asked to send a log file, make sure that you run your tests only with play data.

File: gpgme.info, Node: Deprecated Functions, Next: Library Copying, Prev: Debugging, Up: Top

## Appendix C Deprecated Functions

For backward compatibility GPGME has a number of functions, data types and constants which are deprecated and should not be used anymore. We document here those which are really old to help understanding old code and to allow migration to their modern counterparts.

*Warning:* These interfaces will be removed in a future version of GPGME.

-- Function: void gpgme_key_release (gpgme_key_t KEY)
The function gpgme_key_release is equivalent to gpgme_key_unref.

-- Function: gpgme_error_t gpgme_op_import_ext (gpgme_ctx_t CTX,

gpgme_data_t KEYDATA, int *NR)
SINCE: 0.3.9

The function gpgme_op_import_ext is equivalent to:

```
gpgme_error_t err = gpgme_op_import (ctx, keydata);
if (!err)
  {
    gpgme_import_result_t result = gpgme_op_import_result (ctx);
    *nr = result->considered;
  }
```

-- Data type: gpgme_error_t (*gpgme_edit_cb_t) (void *HANDLE,
gpgme_status_code_t STATUS, const char *ARGS, int FD)
The gpgme_edit_cb_t
type is the type of functions which GPGME
calls if it a key edit operation is on-going. The status code
STATUS and the argument line ARGS are passed through by GPGME from
the crypto engine. The file descriptor FD is -1 for normal status
messages. If STATUS indicates a command rather than a status
message, the response to the command should be written to FD. The
HANDLE is provided by the user at start of operation.

The function should return GPG_ERR_FALSE if it did not handle the
status code, 0 for success, or any other error value.

-- Function: gpgme_error_t gpgme_op_edit (gpgme_ctx_t CTX,
gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE,
gpgme_data_t OUT)
SINCE: 0.3.9

Note: This function is deprecated, please use gpgme_op_interact
instead.

The function gpgme_op_edit processes the key KEY interactively,
using the edit callback function FNC with the handle HANDLE. The
callback is
invoked for every status and command request from the
crypto engine. The output of the crypto engine is written to the
data object OUT.

Note that the protocol between the callback function and the crypto
engine is specific to the crypto engine and no further support in
implementing this protocol correctly is provided by GPGME.

The function returns the error code GPG_ERR_NO_ERROR if the edit
operation completes successfully, GPG_ERR_INV_VALUE if CTX or KEY
is not a valid pointer, and any error returned by the crypto engine

or the edit callback handler.

-- Function: gpgme_error_t gpgme_op_edit_start (gpgme_ctx_t CTX,
gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE,
gpgme_data_t OUT)

SINCE: 0.3.9

Note: This function is deprecated, please use
gpgme_op_interact_start instead.

The function gpgme_op_edit_start initiates a gpgme_op_edit
operation. It can be completed by calling gpgme_wait on
the
context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the
operation was started successfully, and GPG_ERR_INV_VALUE if CTX
or KEY is not a valid pointer.

-- Function: gpgme_error_t gpgme_op_card_edit (gpgme_ctx_t CTX,
gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE,
gpgme_data_t OUT)
Note: This function is deprecated, please use gpgme_op_interact
with the flag GPGME_INTERACT_CARD instead.

The function gpgme_op_card_edit is analogous to gpgme_op_edit,
but should be used to process the smart card corresponding to the
key KEY.

-- Function: gpgme_error_t gpgme_op_card_edit_start (gpgme_ctx_t CTX,
gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE,
gpgme_data_t OUT)
Note: This function is deprecated, please use
gpgme_op_interact_start with the flag GPGME_INTERACT_CARD
instead.

The function gpgme_op_card_edit_start initiates a

gpgme_op_card_edit operation. It can be completed by calling
gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the
operation was started successfully, and GPG_ERR_INV_VALUE if CTX
or KEY is not a valid pointer.

-- Function: gpgme_error_t gpgme_data_new_with_read_cb
(gpgme_data_t *DH, int (*READFUNC) (void *HOOK, char *BUFFER,

size_t COUNT, size_t *NREAD), void *HOOK_VALUE)
The function gpgme_data_new_with_read_cb creates a new gpgme_data_t object and uses the callback function READFUNC to retrieve the data on demand. As the callback function can supply the data in any way it wants, this is the most flexible data type GPGME provides. However, it can not be used to write data.

The callback function receives HOOK_VALUE as its first argument whenever it is invoked. It should return up to COUNT bytes in BUFFER, and return the number of bytes actually read in NREAD. It may return 0 in NREAD if no data is currently available. To indicate EOF the function should return with an error code of -1 and set NREAD to 0. The callback function may support to reset its internal read pointer if it is invoked with BUFFER and NREAD being NULL and COUNT being 0.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, GPG_ERR_INV_VALUE if DH or READFUNC is not a valid pointer, and GPG_ERR_ENOMEM if not enough memory is available.

-- Function: gpgme_error_t gpgme_data_rewind (gpgme_data_t DH)
The function gpgme_data_rewind is equivalent to:

```
return (gpgme_data_seek (dh, 0, SEEK_SET) == -1)
  ? gpgme_error_from_errno (errno) : 0;
```

-- Data type: gpgme_attr_t
The gpgme_attr_t type is used to specify a key or trust item attribute. The following attributes are defined:

GPGME_ATTR_KEYID
This is the key ID of a sub key. It is representable as a string.

GPGME_ATTR_FPR
This is the fingerprint of a sub key. It is representable as a string.

GPGME_ATTR_ALGO
This is the crypto algorithm for which the sub key can be used. It is representable as a string and as a number. The numbers correspond to the enum gcry_pk_algos values in the gcrypt library.

GPGME_ATTR_LEN

This is the key length of a sub key. It is representable as a number.

GPGME_ATTR_CREATED
This is the timestamp at creation time of a sub key. It is representable as a number.

GPGME_ATTR_EXPIRE
This is the expiration time of a sub key. It is representable as a number.

GPGME_ATTR_USERID
This is a user ID. There can be more than one user IDs in a GPGME_KEY_T object. The first one (with index 0) is the primary user ID. The user ID
is representable as a number.

GPGME_ATTR_NAME
This is the name belonging to a user ID. It is representable as a string.

GPGME_ATTR_EMAIL
This is the email address belonging to a user ID. It is representable as a string.

GPGME_ATTR_COMMENT
This is the comment belonging to a user ID. It is representable as a string.

GPGME_ATTR_VALIDITY
This is the validity belonging to a user ID. It is representable as a string and as a number. See below for a list of available validities.

GPGME_ATTR_UID_REVOKED
This specifies if a user ID is revoked. It is representable as a number, and is 1 if the user ID is revoked, and 0 otherwise.

GPGME_ATTR_UID_INVALID
This specifies if a user ID is invalid. It is representable as a number, and is 1 if the user ID is invalid, and 0 otherwise.

GPGME_ATTR_TYPE
This
returns information about the type of key. For the
string function this will eother be "PGP" or "X.509". The

integer function returns 0 for PGP and 1 for X.509.

GPGME_ATTR_IS_SECRET
This specifies if the key is a secret key. It is representable as a number, and is 1 if the key is revoked, and 0 otherwise.

GPGME_ATTR_KEY_REVOKED
This specifies if a sub key is revoked. It is representable as a number, and is 1 if the key is revoked, and 0 otherwise.

GPGME_ATTR_KEY_INVALID
This specifies if a sub key is invalid. It is representable as a number, and is 1 if the key is invalid, and 0 otherwise.

GPGME_ATTR_KEY_EXPIRED
This specifies if a sub key is expired. It is representable as a number, and is 1 if the key is expired, and 0 otherwise.

GPGME_ATTR_KEY_DISABLED
This specifies if a sub key is disabled. It is representable as a number, and is 1 if the key is disabled, and 0 otherwise.

GPGME_ATTR_KEY_CAPS
This is a description of the capabilities of a sub key. It is representable as a string. The string contains the letter e if the key can be used for encryption, s if the key can be used for signatures, and c if the key can be used for certifications.

GPGME_ATTR_CAN_ENCRYPT
This specifies if a sub key can be used for encryption. It is representable as a number, and is 1 if the sub key can be used for encryption, and 0 otherwise.

GPGME_ATTR_CAN_SIGN
This specifies if a sub key can be used to create data signatures. It is representable as a number, and is 1 if the sub key can be used for signatures, and 0 otherwise.

GPGME_ATTR_CAN_CERTIFY
This specifies if a sub key can be used to create key certificates. It is representable

as a number, and is 1 if
the sub key can be used for certifications, and 0 otherwise.

GPGME_ATTR_SERIAL
The X.509 issuer serial attribute of the key. It is
representable as a string.

GPGME_ATTR_ISSUE
The X.509 issuer name attribute of the key. It is
representable as a string.

GPGME_ATTR_CHAINID
The X.509 chain ID can be used to build the certification
chain. It is representable as a string.

-- Function: const char * gpgme_key_get_string_attr (gpgme_key_t KEY,
gpgme_attr_t WHAT, const void *RESERVED, int IDX)
The function gpgme_key_get_string_attr returns the value of the
string-representable attribute WHAT of key KEY. If the attribute
is an attribute of a sub key or an user ID, IDX specifies the sub
key or user ID of which the attribute value is returned. The
argument RESERVED is reserved for later use and should be NULL.

The string returned is
only valid as long as the key is valid.

The function returns 0 if an attribute cant be returned as a
string, KEY is not a valid pointer, IDX out of range, or RESERVED
not NULL.

-- Function: unsigned long gpgme_key_get_ulong_attr (gpgme_key_t KEY,
gpgme_attr_t WHAT, const void *RESERVED, int IDX)
The function gpgme_key_get_ulong_attr returns the value of the
number-representable attribute WHAT of key KEY. If the attribute
is an attribute of a sub key or an user ID, IDX specifies the sub
key or user ID of which the attribute value is returned. The
argument RESERVED is reserved for later use and should be NULL.

The function returns 0 if the attribute cant be returned as a
number, KEY is not a valid pointer, IDX out of range, or RESERVED
not NULL.

The signatures on a key are only available if the key was retrieved
via a listing operation with the GPGME_KEYLIST_MODE_SIGS mode enabled,
because it is expensive to retrieve
all signatures of a key.

So, before using the below interfaces to retrieve the signatures on a

key, you have to make sure that the key was listed with signatures enabled. One convenient, but blocking, way to do this is to use the function gpgme_get_key.

-- Data type: gpgme_attr_t

The gpgme_attr_t type is used to specify a key signature attribute. The following attributes are defined:

GPGME_ATTR_KEYID

This is the key ID of the key which was used for the signature. It is representable as a string.

GPGME_ATTR_ALGO

This is the crypto algorithm used to create the signature. It is representable as a string and as a number. The numbers correspond to the enum gcry_pk_algos values in the gcrypt library.

GPGME_ATTR_CREATED

This is the timestamp at creation time of the signature. It is representable as a number.

GPGME_ATTR_EXPIRE

This is the expiration time of the signature. It is representable as a number.

GPGME_ATTR_USERID

This is the user ID associated with the signing key. The user ID is representable as a number.

GPGME_ATTR_NAME

This is the name belonging to a user ID. It is representable as a string.

GPGME_ATTR_EMAIL

This is the email address belonging to a user ID. It is representable as a string.

GPGME_ATTR_COMMENT

This is the comment belonging to a user ID. It is representable as a string.

GPGME_ATTR_KEY_REVOKED

This specifies if a key signature is a revocation signature. It is representable as a number, and is 1 if the key is revoked, and 0 otherwise.

GPGME_ATTR_SIG_CLASS
This specifies the signature class of a key signature. It is representable as a number. The meaning is specific to the crypto engine.

GPGME_ATTR_SIG_CLASS
This
specifies the signature class of a key signature. It is
representable as a number. The meaning is specific to the
crypto engine.

GPGME_ATTR_SIG_STATUS
This is the same value as returned by gpgme_get_sig_status.

-- Function: const char * gpgme_key_sig_get_string_attr
(gpgme_key_t KEY, int UID_IDX, gpgme_attr_t WHAT,
const void *RESERVED, int IDX)
The function gpgme_key_sig_get_string_attr returns the value of the string-representable attribute WHAT of the signature IDX on the user ID UID_IDX in the key KEY. The argument RESERVED is reserved for later use and should be NULL.

The string returned is only valid as long as the key is valid.

The function returns 0 if an attribute cant be returned as a string, KEY is not a valid pointer, UID_IDX or IDX out of range, or RESERVED not NULL.

-- Function: unsigned long gpgme_key_sig_get_ulong_attr
(gpgme_key_t KEY, int UID_IDX, gpgme_attr_t
WHAT,
const void *RESERVED, int IDX)
The function gpgme_key_sig_get_ulong_attr returns the value of the number-representable attribute WHAT of the signature IDX on the user ID UID_IDX in the key KEY. The argument RESERVED is reserved for later use and should be NULL.

The function returns 0 if an attribute cant be returned as a string, KEY is not a valid pointer, UID_IDX or IDX out of range, or RESERVED not NULL.

-- Data type: enum gpgme_sig_stat_t
The gpgme_sig_stat_t type holds the result of a signature check, or the combined result of all signatures. The following results are possible:

GPGME_SIG_STAT_NONE
This status should not occur in normal operation.

GPGME_SIG_STAT_GOOD
This status indicates that the signature is valid. For the combined result this status means that all signatures are valid.

GPGME_SIG_STAT_GOOD_EXP
This status indicates that
the signature is valid but expired.
For the combined result this status means that all signatures are valid and expired.

GPGME_SIG_STAT_GOOD_EXPKEY
This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.

GPGME_SIG_STAT_BAD
This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

GPGME_SIG_STAT_NOKEY
This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

GPGME_SIG_STAT_NOSIG
This status indicates that the signature data provided was not a real signature.

GPGME_SIG_STAT_ERROR
This status indicates that there was some other error which prevented the signature verification.

GPGME_SIG_STAT_DIFF
For the combined result this status means that at least two signatures have a different status. You can get each keys status with gpgme_get_sig_status.

-- Function: const char * gpgme_get_sig_status (gpgme_ctx_t CTX, int IDX, gpgme_sig_stat_t *R_STAT, time_t *R_CREATED)
The function gpgme_get_sig_status is equivalent to:

```
gpgme_verify_result_t result;
gpgme_signature_t sig;
```

```
 result = gpgme_op_verify_result (ctx);
 sig = result->signatures;

 while (sig && idx)
   {
     sig = sig->next;
     idx--;
   }
 if (!sig || idx)
   return NULL;

 if (r_stat)
   {
     switch (gpg_err_code (sig->status))
{
case GPG_ERR_NO_ERROR:
   *r_stat = GPGME_SIG_STAT_GOOD;
  break;

case GPG_ERR_BAD_SIGNATURE:
  *r_stat = GPGME_SIG_STAT_BAD;
  break;

case GPG_ERR_NO_PUBKEY:
  *r_stat = GPGME_SIG_STAT_NOKEY;
  break;

case GPG_ERR_NO_DATA:
  *r_stat = GPGME_SIG_STAT_NOSIG;
  break;

case GPG_ERR_SIG_EXPIRED:
  *r_stat = GPGME_SIG_STAT_GOOD_EXP;
  break;

case GPG_ERR_KEY_EXPIRED:
  *r_stat = GPGME_SIG_STAT_GOOD_EXPKEY;
  break;

default:
  *r_stat = GPGME_SIG_STAT_ERROR;
  break;
}
   }
 if (r_created)
   *r_created = sig->timestamp;
 return sig->fpr;
```

-- Function: const char * gpgme_get_sig_string_attr (gpgme_ctx_t CTX,
int IDX, gpgme_attr_t WHAT, int WHATIDX)

The function gpgme_get_sig_string_attr is equivalent to:

```
gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
  {
    sig = sig->next;
    idx--;
  }
if (!sig || idx)
  return NULL;

switch (what)
  {
  case GPGME_ATTR_FPR:
    return sig->fpr;

  case GPGME_ATTR_ERRTOK:
    if (whatidx == 1)
      return sig->wrong_key_usage ? "Wrong_Key_Usage" : "";
    else
return "";
  default:
    break;
  }

return NULL;
```

-- Function: const char * gpgme_get_sig_ulong_attr (gpgme_ctx_t CTX,
int IDX, gpgme_attr_t WHAT, int WHATIDX)

The function gpgme_get_sig_ulong_attr is equivalent to:

```
gpgme_verify_result_t result;
gpgme_signature_t sig;


result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
```

```
        {
          sig = sig->next;
          idx--;
        }
      if (!sig || idx)
        return 0;

      switch (what)
        {
        case GPGME_ATTR_CREATED:
          return sig->timestamp;

        case GPGME_ATTR_EXPIRE:
          return sig->exp_timestamp;

        case GPGME_ATTR_VALIDITY:
          return (unsigned long) sig->validity;

        case GPGME_ATTR_SIG_STATUS:
          switch (sig->status)
      {
      case GPG_ERR_NO_ERROR:
        return GPGME_SIG_STAT_GOOD;

      case GPG_ERR_BAD_SIGNATURE:
        return GPGME_SIG_STAT_BAD;

      case GPG_ERR_NO_PUBKEY:
        return GPGME_SIG_STAT_NOKEY;

      case GPG_ERR_NO_DATA:
        return GPGME_SIG_STAT_NOSIG;

      case GPG_ERR_SIG_EXPIRED:

  return GPGME_SIG_STAT_GOOD_EXP;

      case GPG_ERR_KEY_EXPIRED:
        return GPGME_SIG_STAT_GOOD_EXPKEY;

      default:
        return GPGME_SIG_STAT_ERROR;
      }

        case GPGME_ATTR_SIG_SUMMARY:
          return sig->summary;

        default:
```

```
      break;
    }
  return 0;
```

-- Function: const char * gpgme_get_sig_key (gpgme_ctx_t CTX, int IDX, gpgme_key_t *R_KEY)

The function gpgme_get_sig_key is equivalent to:

```
  gpgme_verify_result_t result;
  gpgme_signature_t sig;

  result = gpgme_op_verify_result (ctx);
  sig = result->signatures;

  while (sig && idx)
    {
      sig = sig->next;
      idx--;
    }
  if (!sig || idx)
    return gpg_error (GPG_ERR_EOF);

  return gpgme_get_key (ctx, sig->fpr, r_key, 0);
```

File: gpgme.info, Node: Library Copying, Next: Copying, Prev: Deprecated Functions, Up: Top

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Wenn Sie dies lesen knnen, ist es wohl nicht
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"name": "gpgmejson",
"description": "Integration with GnuPG",
"path": "/usr/bin/gpgme-json",
"type": "stdio",
"allowed_extensions": [
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"signatures": [{
"summary": {
"sigsum": [],
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"green": false,
"red": false,
"revoked": false,
"key-expired": false,
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"key-missing": false,

"crl-missing": false,
"crl-too-old": false,
"bad-policy": false,
"sys-error": false
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"is_de_vs": false,
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"hash_algo_name": "SHA1",
"status_code": 0,
"timestamp": 1542201053,
"exp_timestamp": 0,
"pka_trust": 0,
"validity": 0,
"validity_reason": 0
}]
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"base64": true,
"data":
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uO5+lTsunfxav1TwaMkBOiK6usRz2zt3rjozNrh3vXn3o2WpFKebwhIUF0q2qPw3OKIGq9jFT63t+DPjpbSorAev
mVqXWdmaqDPJZ/QIY6NkBhprTdIGPSTFh66eggQLz+BBUVx2myM7AqgcD/3PnOGIiqINQzFkfa6lHiV/TZ8A
aMNfvyx4FFG4Zi45ZnDwLCJZ+J7ATXzECauEDLzhjk8M9OP0PwFT1WsnWefKDSLzbO5hEnf8NYdY6i8f2MJ
KYcnpeI4PZA3OK9ovmAoJl31K+/vBJRP4kiJ4Weu7fzMi6Zz87tfHDEpbRR7N80qoBTlT7I044LG5OJKgQukb7
HOv+c668i56UzZVgz+LCsFpjYEFTlrPVR5Me3PjSSb8M+tt9NUjenNnghJEcxeD902YJcqgRWPotouzx5fKDTay/
LofFqckEWGlP5pnkeNfYIBIaSSrG/KcdQ0rPOAxKrZzIifYVwnJm/ISxU6uMpNfDJGOJppf4xqXgTKBdIsCljg5Ll
gNvGhNMYaXQkGQInzXvLSUbxLerWw=="
}
Additional license notices for GPGME. -*- org -*-

This file contains the copying permission notices for various files in
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in the accompanying documentation and be distributed with binary
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* MIT License

For files:
- cJSON.c, cJSON.h

#+begin_quote
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#+end_quote
# -*- mode: org -*-
#+TITLE: Maintenance Mode
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltxtra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

* Maintenance Mode from 2019
:PROPERTIES:
:CUSTOM_ID: maintenance-mode
:END:

| Version: | 0.0.1 |
| --- | --- |
| GPGME Version: | 1.13.0 |
| Author: | Ben McGinnes <ben@gnupg.org> |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language: | Australian English, British English |
| xml:lang: | en-AU, en-GB, en |

From the beginning of 2019 the Python bindings to GPGME will enter maintenance mode, meaning that new features will not be added and only bug fixes and security fixes will be made.
This also means that
documentation beyond that existing at the end of 2018 will not be developed further except to correct errors.

Though use of these bindings appears to have been quite well received, there has been no indication of what demand there is, if any for either financial backing of the current Python bindings development or support contracts with g10code GmbH citing the necessity of including the bindings.

** Maintainer from 2019 onward
:PROPERTIES:
:CUSTOM_ID: maintenance-mode-bm
:END:

How does this affect the position of GnuPG Python Bindings Maintainer?

Well, I will remain as maintainer of the bindings; but without funding for that position, the amount of time I will be able to dedicate solely to this task will be limited and reduced to volunteered time.
As with all volunteered time and effort in free software projects, this will be subject to numerous external imperatives.

** Using the Python Bindings from 2019 and beyond
:PROPERTIES:
:CUSTOM_ID:
maintenance-mode-blade-runner
:END:

For most, if not all, Python developers using these bindings; they will continue to just work the same as they always have. Expansions of GPGME itself are usually handled by SWIG with the existing code and thus bindings are generated properly when the bindings are installed alongside GPGME and when the latter is built from source.

In the rare circumstances where that is not enough to address some new addition to GPGME, then that is a bug and thus subject to the maintenance mode provisions (i.e. it will be fixed following a bug report being raised and your humble author will need to remember where the timesheet template was filed, depending on how many years off such an event is).

All the GPGME functionality will continue to be accessible via the lower level, dynamically generated methods which match the GPGME C documentation. While the more intuitively Pythonic higher level layer already covers the vast majority of functionality people require with key generation, signatures, certifications (key signing), encryption, decryption, verification, validation, trust levels and so on.

Any wanted features lacking in the Python bindings are usually lacking because they are missing from GPGME itself (e.g. revoking keys via the API) and in such cases they are usually deliberately excluded. More discussion of these issues can be found in the archives of the [[https://lists.gnupg.org/mailman/listinfo/gnupg-devel][gnupg-devel mailing list]].

Any features existing in the dynamically generated layer for which people want a specific, higher level function included to make it more Pythonic (e.g. to avoid needing to learn or memorise cryptographic mode values or GnuPG status code numbers), would be a feature request and /not/ a bug.

It is still worthwhile requesting it, but the addition of such a feature would not be guaranteed and provided on a purely volunteer basis. Expediting such a request would require funding that request.

Those with a commercial interest in expediting such a feature request already know how to [[https://gnupg.org/cgi-bin/procdonate.cgi?mode=preset][expedite it]] (use the message field to state what feature is being requested).

** Documentation formats
:PROPERTIES:
:CUSTOM_ID: docs
:END:

The documentation has been written in Org mode for GNU Emacs, with both Texinfo and reStructuredText formats generated from that. The Texinfo files are intended for use with the rest of the GnuPG documentation; while the reStructuredText files are intended for use with Docutils and Sphinx, as with other Python projects.

*** Cautionary Notes regarding Sphinx and EPUB
:PROPERTIES:
:CUSTOM_ID: sphinx-made-epubs-suck
:END:

Though Python's Docutils in conjunction with Sphinx is capable of
generating some very useful HTML sites, as proven by [[https://readthedocs.org/][Read the Docs]] and
the [[https://docs.python.org/][Python documentation]], there are a number of output formats it does
not
handle well. At the top of the list of things it manages to break
so atrociously as to be embarassing is the [[http://idpf.org/epub][EPUB 3]] format.

The automatically generated EPUB of the CPython documentation always
contains hundreds of validation errors and even the modest amount of
documentation here [[https://files.au.adversary.org.s3.amazonaws.com/crypto/gpgme-
python/rst/epub/GPGMEPythonBindings.epub][produced a file]] with approximately thirty
validation errors. As the volume of documentation content increases,
so does the induced errors. Whereas Texinfo doesn't produce EPUB
output at all, nor does Org-mode.

Should there ever be genuine demand for this format, lodge a
[[https://dev.gnupg.org/maniphest/task/edit/form/4/][feature
request]] case marked for [[https://dev.gnupg.org/p/BenM/][my]] attention. The means of generating such
files flawlessly is already available, but is not yet part of the
GnuPG build system. Nor is it integrated with a means of converting
Org
mode input files to the relevant base format automatically, as can
already be done when converting Org to reStructuredText or Org to
Texinfo. As a certain amount of work would be required to get it
done, there would need to be clear demand for that work to be done.
Just GNU it!
2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting
on December 1st, 2011 we put change information only in the GIT
commit log, and generate a top-level ChangeLog file from logs at
"make dist". See doc/HACKING for details.

2011-10-25 Marcus Brinkmann <marcus@g10code.com>

* m4/pth.m4: Removed.
* configure.ac: Remove check for pth and automake conditional
HAVE_PTH.

2011-06-16 Marcus Brinkmann <marcus@g10code.com>

Release 1.3.1

* configure.ac: Set LT version to C19/A8/R0.

2011-05-06 Marcus Brinkmann <marcus@g10code.com>

* Makefile.am (SUBDIRS): Remove complus.

* configure.ac (AC_CONFIG_FILES): Remove complus/Makefile.
(BUILD_COMPLUS): Remove AM_CONDITIONAL.
* complus/: Remove very old and stale component.

* acinclude.m4 (GNUPG_FIX_HDR_VERSION): Remove.

2011-04-14 Werner Koch <wk@g10code.com>

* configure.ac: Require automake 1.11.

2011-04-06 Werner Koch <wk@g10code.com>

* autogen.sh (--build-w32):
Support option --build-w64.
* configure.ac (HAVE_W64_SYSTEM): Define.
(INSERT__TYPEDEFS_FOR_GPGME_H): New.
(GPGME_CONFIG_HOST): New.

2011-02-02 Marcus Brinkmann <mb@g10code.com>

* configure.ac (NEED_LIBASSUAN_VERSION): Bump to 2.0.2 for system hooks.

2010-12-30 Werner Koch <wk@g10code.com>

* configure.ac: Support a git revision.

2010-11-03 Werner Koch <wk@g10code.com>

* configure.ac (AC_CHECK_HEADERS): Check for sys/types.h and
sys.stat.h.

2010-11-02 Werner Koch <wk@g10code.com>

* configure.ac (AC_CHECK_HEADERS): Check for sys.time.h.

2010-08-19 Werner Koch <wk@g10code.com>

* configure.ac (AH_BOTTOM): Define GPG_ERR_ENABLE_ERRNO_MACROS.

2010-05-12 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Check for setlocale.

2010-05-07  Werner Koch  <wk@g10code.com>

* configure.ac: Change checks to always require libassuan.

2010-05-07  Marcus Brinkmann  <marcus@g10code.de>

* autogen.sh: Update the thing.

* configure.ac: Check for locale.h.

2010-05-06
Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Detect Windows CE.
(HAVE_W32CE_SYSTEM): New symbol and automake conditional.
* ltmain.sh, m4/libtool.m4: Patch so that it works for Windows CE.

* configure.ac: Require libgpg-error 1.8.

2010-03-15  Werner Koch  <wk@g10code.com>

* configure.ac (emacs_local_vars_begin)
(emacs_local_vars_read_only, emacs_local_vars_end): New.

2010-01-22  Werner Koch  <wk@g10code.com>

* autogen.sh (--build-w32): Add --with-libassuan-prefix.

2010-01-11  Marcus Brinkmann  <marcus@g10code.de>

Release 1.3.0.

2009-12-22  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Do not use echo -n.  Test for __thread.

2009-12-17  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Make largefile check more robust.

2009-12-10  Werner Koch  <wk@g10code.com>

* configure.ac: Check for getgid and getegid.

2009-12-08  Marcus Brinkmann  <marcus@g10code.de>

Update to libtool 2.2.6a.
* configure.ac: Invoke AC_CONFIG_MACRO_DIR.
(AC_LIBTOOL_WIN32_DLL,
AC_LIBTOOL_RC): Replace by ...
(LT_PREREQ, LT_INIT, LT_LANG): ... these.
* config.guess, config.sub, install-sh, ltmain.sh, m4/libtool.m4:
Updated to libtool 2.2.6a.
* m4/ltoptions.m4, m4/ltsugar.m4, m4/ltversion.m4,
m4/lt~obsolete.m4: New files from libtool 2.2.6a.

2009-11-10 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Activate UIServer if FD passing is enabled and
Assuan is available.

2009-10-30 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Check for argp.h and error_t.

2009-10-26 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (NEED_GPG_VERSION_DEFAULT): Bump to 1.4.0 as 1.3.0
was development versions only.

2009-10-22 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Add support for G13.

2009-10-20 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (AC_CONFIG_FILES): Remove assuan/Makefile.

2009-10-20 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Replace internal libassuan by external libassuan.
* m4/libassuan.m4:
New file.
* Makefile.am (assuan): Remove variable.
(SUBDIRS): Remove ${assuan}.
* assuan/: Removed.

2009-06-22 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Add AC_TYPE_UINTPTR_T.

* assuan/assuan.h [_ASSUAN_IN_GPGME_BUILD_ASSUAN]: Declare
_gpgme_io_connect.

2009-06-18  Marcus Brinkmann  <marcus@g10code.de>

Released GPGME 1.2.0.

* configure.ac (my_version): Set to 1.2.0.
(LIBGPGME_LT_CURRENT, LIBGPGME_LT_AGE): Bump.
(LIBGPGME_LT_REVISION): Reset.

2009-05-05  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Add infrastructure for compile time check of
_FILE_OFFSET_BITS.

2009-04-19  Moritz  <moritz@gnu.org>

* Makefile.am (DISTCHECK_CONFIGURE_FLAGS): Specify --with-gpg.

2009-03-06  Marcus Brinkmann  <marcus@g10code.de>

* assuan/: Update to libassuan SVN 2009-03-06.

2009-01-26  Werner Koch  <wk@g10code.com>

* configure.ac (AC_CONFIG_FILES): Add tests/opassuan/Makefile.

2008-12-08  Marcus Brinkmann  <marcus@g10code.de>

Release GPGME
1.1.8.

* configure.ac: Bump API revision.

2008-11-03  Marcus Brinkmann  <marcus@g10code.com>

* configure.ac: Replace gpgme paths with src.
* gpgme: Move to ...
* src: ... this new directory.

2008-10-20  Werner Koch  <wk@g10code.com>

* configure.ac (AC_CONFIG_FILES): Add gpgme.h.
(GNUPG_FIX_HDR_VERSION): Remove.

2008-10-17  Marcus Brinkmann  <marcus@g10code.com>

Release GPGME 1.1.7.

* configure.ac (LIBGPGME_LT_REVISION): Bump for release.

2008-09-19  Moritz  <moritz@gnu.org>

* configure.ac: Remove bogus "esac".

2008-09-16  Marcus Brinkmann  <marcus@g10code.com>

* configure.ac (_XOPEN_SOURCE) [apple-darwin]: Define it.

2008-07-04  Werner Koch  <wk@g10code.com>

* config.guess, config.sub: Update to 2007-11-19.  Also update
missing et al scripts.

2008-04-01  Werner Koch  <wk@g10code.com>

* configure.ac (AC_INIT): Fix quoting.

2008-01-30  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Bump required version of automake up to 1.10.
* autogen.sh: Fix
aclocal check.

2008-01-04  Marcus Brinkmann  <marcus@g10code.de>

Release GPGME 1.1.6.

* configure.ac: Support gpgconf.

2007-09-27  Marcus Brinkmann  <marcus@g10code.de>

* assuan-pipe-connect.c (pipe_connect_gpgme): Do not close process
handle here.  Use this function also on Unix systems.

* assuan-pipe-connect.c (pipe_connect_gpgme): Fix last change.

* assuan-pipe-connect.c (pipe_connect_gpgme): New function, use it
if _ASSUAN_IN_GPGME_BUILD_ASSUAN.

2007-09-17  Werner Koch  <wk@g10code.com>

* configure.ac: Use the svn version magic.

2007-09-07  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Check for C++, Qt and support --enable-w32-qt.

* m4/pkg.m4: New file.

2007-08-21  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (--enable-w32-glib): Use --enableval, not
--withval.

2007-07-16  Marcus Brinkmann  <marcus@g10code.de>

* assuan/assuan-socket.c (_assuan_close): Always use close().
* assuan/assuan.h (_gpgme_io_close): New prototype.
(close): New
macro, define as _gpgme_io_close.

2007-07-13  Marcus Brinkmann  <marcus@g10code.de>

* assuan/assuan-io.c (_assuan_simple_read, _assuan_simple_write):
Always use read/write (which means _gpgme_io_read and
_gpgme_io_write).

2007-07-09  Marcus Brinkmann  <marcus@g10code.de>

Released 1.1.5.

* configure.ac (LIBGPGME_LT_REVISION): Bump for release.

2007-07-08  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (GPGSM_DEFAULT) [*-mingw32*]: Initialize it.
(HAVE_ASSUAN_H): Set to 1 if we have it.
(funopen): Use AC_REPLACE_FUNCS.
(USE_DESCRIPTOR_PASSING): Define to 1 if we have it.  Do not
define it at all if we don't.
(NETLIBS) [have_w32_system]: Add -lws2_32.
(DIRSEP_C, DIRSEP_S, EXPSEP_C, EXPSEP_S, PATHSEP_S)
[HAVE_DOSISH_SYSTEM]: Remove definitions.

* assuan/assuan.h (_assuan_funopen): Define to _gpgme_funopen.
* assuan/funopen.c: Move to ../gpgme/funopen.c.
* assuan/Makefile.am (libassuan_la_SOURCES): Remove funopen.c.

2007-07-04  Marcus Brinkmann  <marcus@g10code.de>

*
assuan/Makefile.am (INCLUDES): Include $(top_srcdir)/gpgme.
* assuan/assuan.h: Include <ath.h> instead of trying to duplicate
the definitions.

* assuan/: Update files to 2007-07-04 version of assuan.

* autogen.sh: Use = not == in test.

2007-03-05  Werner Koch  <wk@g10code.com>

Released 1.1.4.

* configure.ac (LIBGPGME_LT_REVISION): Bump for release.

* autogen.sh: New option --force.

2007-01-29  Marcus Brinkmann  <marcus@g10code.de>

Released 1.1.3.

* configure.ac (LIBGPGME_LT_REVISION): Bump for release.

2007-01-26  Werner Koch  <wk@g10code.com>

* configure.ac: Changed gpg and gpgsm version checks to work with
arbitrary names of the gpg binary. New option --disable-gpg-test
and --disable-gpgsm-test.

2007-01-09  Werner Koch  <wk@g10code.com>

* configure.ac (NEED_GPG_VERSION, NEED_GPGSM_VERSION): Must define
after it may have been changed by an option.

2007-01-08  Werner Koch  <wk@g10code.com>

* configure.ac: Require gpg-error 1.4 due to the use of
gpg_error_from_syserror.
(HAVE_ASSUAN_H):
New.

2007-01-05  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Add options --with-gpg-version and
--with-gpgsm-version to allow overriding the minimum version
requirements.

2006-12-17  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Fix two typos in last change.

2006-12-03  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Use descriptor passing only if --enable-fd-passing
is provided.

* configure.ac: Add check for use of descriptor passing.

2006-11-29  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (NEED_GPG_VERSION): Bump to 1.3.0.

2006-09-19  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Turn stpcpy into a replacement function.
Check for unistd.h and add setenv as replacement function.

2006-07-29  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Check for network libraries and set NETLIBS.

2006-07-06  Marcus Brinkmann  <marcus@g10code.de>

* lang, lang/cl: New subdirectories.
*
lang/Makefile.am, lang/README: New files.
* configure.ac (AC_CONFIG_FILES): Add lang/Makefile,
lang/cl/Makefile and lang/cl/gpgme.asd.
* Makefile.am (SUBDIRS): Add lang.

2006-03-02  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (LIBGPGME_LT_REVISION): Bump for release.

2006-02-22  Marcus Brinkmann  <marcus@g10code.de>

Released 1.1.1.

* configure.ac (LIBGPGME_LT_CURRENT, LIBGPGME_LT_AGE): Bump for
release.
(LIBGPGME_LT_REVISION): Reset to 0 for release.

2006-01-05  Werner Koch  <wk@g10code.com>

* configure.ac: Test for inline feature.
(AH_BOTTOM): New to define the pure attribute.

2006-01-03  Werner Koch  <wk@g10code.com>

* configure.ac: Append SVN revision to the version.

2005-11-18  Werner Koch  <wk@g10code.com>

* configure.ac (BUILD_REVISION): New.

2005-11-17  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Add support for --enable-w32-glib (disabled by
default).  Invoke AM_PATH_GLIB_2_0.

2005-11-16  Werner Koch  <wk@g10code.com>

* configure.ac
(CFLAGS) [W32]: Make sure that -mms-bitfields are used.

2005-11-15  Werner Koch  <wk@g10code.com>

* configure.ac: Create BUILD_FILEVERSION from SVN Revision.

* autogen.sh [W32]: Build shared and static versions of the library.

2005-10-20  Marcus Brinkmann  <marcus@g10code.de>

* w32-dll/ChangeLog, w32-dll/build-dll, w32-dll/gpgme.def: Remove
files.

* configure.ac: Instead checking for windres and dlltool, invoke
AC_LIBTOOL_WIN32_DLL and AC_LIBTOOL_RC.
* src/Makefile.am [HAVE_W32_SYSTEM]: Use libtool, which simplifies
the rules.

2005-10-01  Marcus Brinkmann  <marcus@g10code.de>

Released 1.1.0.

* configure.ac (LIBGPGME_LT_CURRENT, LIBGPGME_LT_AGE): Bump for
release.
(LIBGPGME_LT_REVISION): Reset to 0 for release.

2005-09-12  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (HAVE_PTH): Don't add $PTH_CFLAGS to $CFLAGS here.

2005-08-26  Werner Koch  <wk@g10code.com>

* configure.ac (SEPCONSTANTS): New to define DIRSEP_C et al.

2005-08-19  Werner Koch  <wk@g10code.com>

*
configure.ac [W32]: Create values for versioninfo.rc and list
substuture versioninfo.rc.
* configure.ac: Define ENABLE_GPGSM.

2005-08-08  Werner Koch  <wk@g10code.com>

* configure.ac (stpcpy): Changed from replace to test.

2005-03-24  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (AH_BOTTOM): Removed.

2005-03-09  Werner Koch  <wk@g10code.com>

* acinclude.m4 (GNUPG_CHECK_VA_COPY): Assume no when cross-compiling.

* Makefile.am (EXTRA_DIST): Include autogen.sh

* autogen.sh: Added the usual code to build for W32 (--build-w32).

* configure.ac: Fixed the mingw32 host string, removed OS/2 stuff.
(HAVE_DRIVE_LETTERS): Removed.
(HAVE_W32_SYSTEM): Added.
(AC_GNU_SOURCE): New to replace the identical AH_VERBATIM.
(AH_BOTTOM): Added.

2004-12-28  Werner Koch  <wk@g10code.com>

Released 1.0.2.

* Makefile.am (AUTOMAKE_OPTIONS): Build bzip 2 version.
(ACLOCAL_AMFLAGS): Add -I m4.
* configure.ac: Require automake 1.9.3 and autoconf 2.59.
* acinclude.m4:
Changed quoting for automake 1.9.
* README: Use SHA1 instead of MD5.

2004-12-11  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Replace ttyname_r if it doesn't exist (and warn in
that case).

2004-12-07  Marcus Brinkmann  <marcus@g10code.de>

* README: Refer to COPYING.LESSER and "each file" instead of
COPYING.
* COPYING.LESSER: New file.

* gpgme.spec.in (%doc): Add COPYING.LESSER.
* acinclude.m4, configure.ac, Makefile.am: Change license to LGPL
2.1 or later.
* TODO: Add copyright notice.
* README.CVS: Likewise.

* configure.ac (GPGSM_VERSION): Fix filter to get it.

2004-10-22 Marcus Brinkmann <marcus@g10code.de>

Released 1.0.1.

* configure.ac (LIBGPGME_LT_REVISION): Bump up to 2.
(AC_INIT): Set version to 1.0.1.

* configure.ac: Set HAVE_GPGSM to true only if $GPGSM is not "no".

2004-09-30 Marcus Brinkmann <marcus@g10code.de>

Released 1.0.0.

* configure.ac (LIBGPGME_LT_REVISION): Bump up to 1.
(AC_INIT): Set version to 1.0.0.

* Makefile.am
(EXTRA_DIST): Remove README-alpha.
* README-alpha: Remove file.

2004-09-17 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Disable AC_CONFIG_MACRO_DIR for now.

2004-09-14 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Improve diagnostics with version check.

* configure.ac: Print diagnostics about found thread libraries at
the end. Check for the versions of GPG and GPGSM and print the
found versions at the end.
(HAVE_GPGSM): Do not require GPGSM to exist and be readable.
(AC_CONFIG_MACRO_DIR): Invoke with argument m4.

* acinclude.m4: Add copyright notice.
(jm_GLIBC21, AM_PATH_GPG_ERROR, _AC_PTH_ERROR, _AC_PTH_VERBOSE,
AC_CHECK_PTH): Removed.

2004-06-23 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Check for <sys/uio.h>.

2004-06-08 Marcus Brinkmann <marcus@g10code.de>

Released 0.9.0.

* configure.ac (AC_INIT): Set version number to 0.9.0.
(LIBGPGME_LT_CURRENT, LIBGPGME_LT_AGE): Bump up by one.
(LIBGPGME_LT_REVISION): Reset to zero.

2004-05-21
Marcus Brinkmann <marcus@g10code.de>

* configure.ac (GPGME_CONFIG_API_VERSION): New variable,
substitute it.

2004-04-29 Marcus Brinkmann <marcus@g10code.de>

Released 0.4.7.

* configure.ac (LIBGPGME_LT_REVISION): Bump it up.

2004-04-02 Thomas Schwinge <schwinge@nic-nac-project.de>

* autogen.sh: Added ACLOCAL_FLAGS.

2004-04-06 Werner Koch <wk@gnupg.org>

Released 0.4.6.

* config.guess, config.sub, ltmain.sh: Updated to those from
libtools 1.5.4.

2004-03-07 Marcus Brinkmann <marcus@g10code.de>

Released 0.4.5.

* configure.ac (NEED_GPGSM_VERSION): Bump up to 1.9.6.

* Makefile.am (EXTRA_DIST): Remove autogen.sh and README.CVS.

2004-02-18 Werner Koch <wk@gnupg.org>

* configure.ac: Make the check for funopen fail with just a
warning.

2004-02-11 Werner Koch <wk@gnupg.org>

* autogen.sh (check_version): Removed bashism and simplified.

2004-02-10 Werner Koch <wk@gnupg.org>

* configure.ac: Fixed funopen test change.

2004-02-06 Moritz Schulte
<mo@g10code.com>

* configure.ac: Fix funopen replacement mechanism.

2004-01-31 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Add invocation of AC_SYS_LARGEFILE, AC_TYPE_OFF_T
and AC_FUNC_FSEEKO.

2004-01-12 Werner Koch <wk@gnupg.org>

Released 0.4.4.

* configure.ac: Bumbed LT_Revision; now at C12/A1/R1.
(NEED_GPGSM_VERSION): Set to 1.9.3.
(min_automake_version): Added.
* README.CVS: New.
* Makefile.am (EXTRA_DIST): Added README.CVS.
* autogen.sh: Updated.

2003-11-19 Werner Koch <wk@gnupg.org>

* acinclude.m4: Add AM_PATH_GPG_ERROR.
* configure.ac: Check for timegm. Made warning messages more
prominent.

2003-10-06 Marcus Brinkmann <marcus@g10code.de>

Released 0.4.3.

* configure.ac (LIBGPGME_LT_CURRENT, LIBGPGME_LT_AGE): Bump up by 1.
(LIBGPGME_LT_REVISION): Set to 0.

2003-09-13 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Require libgpg-error 0.5.

* acinclude.m4: Remove libtool cruft, add jm_GLIBC21.
* configure.ac: Add check for
getenv_r, and call jm_GLIBC21.
Define HAVE_THREAD_SAFE_GETENV if appropriate.

2003-09-03  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Remove GPGME_CONFIG_LIBS and GPGME_CONFIG_CFLAGS.

2003-09-02  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Move invocation of AC_CANONICAL_HOST up to
suppress warning by autoconf.

2003-08-30  Robert Schiele <rschiele@uni-mannheim.de>

* gpgme.spec.in: %{_infodir}/dir is not packaged,
remove to prevent checking failure.

2003-08-18  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: If building Assuan, check for funopen and
fopencookie, and make isascii, putc_unlocked and memrchr
replacement functions.
(AM_PATH_GPG_ERROR): Require 0.3.

2003-07-31  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (AC_INIT): Bump version to 0.4.3.

2003-07-30  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (LIBGPGME_LT_REVISION): Bump up to 1.

Released 0.4.2.

2003-07-08  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac:
Complain if libgpg-error is not found.

2003-06-22  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (AC_INIT): Bump version to 0.4.2.

2003-06-06  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (LIBGPGME_LT_CURRENT): Bump up to 11.

* configure.ac: Use AM_PATH_GPG_ERROR.

* configure.ac: Check for libgpg-error.  Define

GPG_ERR_SOURCE_DEFAULT.

2003-05-26 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (NEED_GPG_VERSION): Bump up to 1.2.2.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

In all files, replace the Gpgme* type names with the new gpgme_*
type names.

2003-02-01 Marcus Brinkmann <marcus@g10code.de>

* assuan/: Update files to 2002-11-10 version of assuan.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

* bonobo/gpgme.c, bonobo/main.c, bonobo/main.h, bonobo/Makefile,
bonobo/Makefile.am, bonobo/Makefile.in: Dead files removed.
* configure.ac: Remove automake conditional BUILD_BONOBO
(AC_CONFIG_FILES): Remove bonobo/Makefile.
*
Makefile.am (bonobo): Remove variable.
(SUBDIRS): Remove ${bonobo}.

* configure.ac: Remove all uses of GNUPG_CHECK_TYPEDEF, for byte,
ushort, ulong, u16 and u32.
* acinclude.m4 (GNUPG_CHECK_TYPEDEF): Remove macro.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: New conditional HAVE_LD_VERSION_SCRIPT.
Call AC_CANONICAL_HOST, use host instead target.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Bump up to 0.4.1.

Released 0.4.0.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

* autogen.sh (automake_vers): Require 1.7 (really 1.7.1) for the
conditional source distribution bug fix.

2002-12-08 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (LIBGPGME_LT_CURRENT): Increase by one.

(LIBGPGME_LT_AGE, LIBGPGME_LT_REVISION): Set to 0.

2002-11-28 Marcus Brinkmann <marcus@g10code.de>

* NEWS: Add note about moving "gpgmeplug" to the "cryptplug" package.
* README: Remove instructions related to "gpgmeplug".
* configure.ac:
Remove enable option "gpgmeplug" and automake conditional BUILD_GPGMEPLUG, as well as the status info about it.
(GPGMEPLUG): Remove variable.
* Makefile.am (gpgmeplug): Remove variable.
(SUBDIRS): Remove ${gpgmeplug}.
* cryptplug.h, gpgme-openpgp.c, gpgmeplug.dox, gpgme-smime.c, Makefile.am, gpgmeplug.c, ChangeLog: Files removed.

2002-11-22 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Disable GPGSM for all dosish systems.

2002-10-12 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Add automake conditional HAVE_GPGSM.

2002-10-08 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (AC_INIT): Bump version up to 0.4.0.
(NEED_GPG_VERSION): Bump up to 1.2.0.
(NEED_GPGSM_VERSION): Bump up to 0.9.0.
* README: Update version numbers.
* NEWS: Start entry for 0.4.0.

2002-09-20 Werner Koch <wk@gnupg.org>

Released 0.3.11.

* configure.ac: Bump up LIBGPGME_LT_REVISION.

* configure.ac (AC_CHECK_HEADERS): Check for sys/select.h.

2002-09-04 Marcus Brinkmann
<marcus@g10code.de>

* autogen.sh (autoconf_vers): Bump up to 2.53 to get the @&t@ quadrigraph. Always cutting the edge!

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Create and substitute LTLIBOBJS.

2002-09-02  Marcus Brinkmann  <marcus@g10code.de>

Released 0.3.10.

* NEWS: Update for 0.3.9 release.
* configure.ac: Bump up LIBGPGME_LT_REVISION.

2002-08-29  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.spec.in: Changed user name in Wojciech Polak's email
address from ghostface to polak per request by himself.

2002-08-28  Werner Koch  <wk@gnupg.org>

* acinclude.m4 (GNUPG_CHECK_VA_COPY): New.
* configure.ac: Use it.

2002-08-23  Werner Koch  <wk@gnupg.org>

* configure.ac (GPGME_CONFIG_CFLAGS): Renamed from GPGME_CFLAGS
and removed the libpath because it is set by the config script.

2002-08-21  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Bump version number to 0.3.10.

* NEWS: Add template for development version.

2002-08-21
Marcus Brinkmann  <marcus@g10code.de>

Released 0.3.9.

* NEWS: Update for 0.3.9 release.
* Makefile.am (EXTRA_DIST): Add gpgme.spec.in.

2002-08-21  Marcus Brinkmann  <marcus@g10code.de>

* jnlib/argparse.c, jnlib/argparse.h, jnlib/ChangeLog,
jnlib/dotlock.c, jnlib/dotlock.h, jnlib/libjnlib-config.h,
jnlib/logging.c, jnlib/logging.h,jnlib/Makefile.am,
jnlib/mischelp.h, jnlib/README, jnlib/stringhelp.c,
jnlib/stringhelp.h, jnlib/strlist.c, jnlib/strlist.h,
jnlib/types.h, jnlib/xmalloc.c, jnlib/xmalloc.h: Remove files.

2002-08-21  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (SUBDIRS): Remove jnlib.
* configure.ac: Don't check for unsigned short or unsigned long.
Don't check for memicmp, strlwr, strtoul, memmove, stricmp.
Make stpcpy a replaced function.
Don't define HAVE_JNLIB_LOGGING.
Don't generate jnlib/Makefile.

2002-07-02 Werner Koch <wk@gnupg.org>

* configure.ac: Bumbed version number to 0.3.9; add a comment on
when to change it.

* gpgme.spec.in:
New. Contributed by Wojciech Polak.
* Makefile.am (dist-hook): New.

* AUTHORS: Added Wojciech and bug reporting addresses.

2002-06-25 Werner Koch <wk@gnupg.org>

Released 0.3.8.

* configure.ac: Bumbed LT version to 9/3/0.
(NEED_GPGSM_VERSION): Need 0.3.8 due to fixed export command.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

Released 0.3.7.

* configure.ac (AC_INIT): Set version to 0.3.7.
(LIBGPGME_LT_REVISION): Add one.

* README: Document version requirement correctly.

2002-06-02 Marcus Brinkmann <marcus@g10code.de>

* acinclude.m4: Fix Pth check so that it doesn't error out if pth
is not found.

2002-06-02 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Add checks for Pth and pthreads.
* acinclude.m4: Add slightly hacked check for pth (seems to be an
autoconf version problem).

2002-05-21 Werner Koch <wk@gnupg.org>

* configure.ac (NEED_GPGSM_VERSION): We need gpgsm 0.3.7.

2002-05-03  Werner Koch  <wk@gnupg.org>

Released 0.3.6.

2002-04-05
Marcus Brinkmann  <marcus@g10code.de>

* acconfig.h: File removed.
* configure.ac (NEED_GPG_VERSION): Add description.
(NEED_GPGSM_VERSION): Likewise.
(HAVE_DOSISH_SYSTEM): Likewise.
(HAVE_DRIVE_LETTERS): Likewise.
(GPG_PATH): Likewise.
(GPGSM_PATH): Likewise.
* acinclude.m4 (GNUPG_CHECK_TYPEDEF): Likewise.

2002-04-01  Werner Koch  <wk@gnupg.org>

Released 0.3.5.

2002-03-17  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Add automake conditional HAVE_DOSISH_SYSTEM.

2002-03-04  Werner Koch  <wk@gnupg.org>

* configure.ac: Bumbed version to 0.3.4-cvs to continue development.

Released 0.3.4.

* configure.ac: Bumbed LT version numbers to (7,1,0), requires
gpgsm 0.3.1.

2002-03-03  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (AC_INIT): Change version number to snapshot CVS
version.

2002-02-13  Werner Koch  <wk@gnupg.org>

* configure.ac (vasprintf,fopencookie): Add checks.

2002-02-12  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (AC_INIT):

Bump version to 0.3.3.
* jnlib/Makefile.am: Rever to older version that includes xmalloc
but not dotlock and some other files.  Reported by Stphane
Corthsy.

2002-02-10  Marcus Brinkmann  <marcus@g10code.de>

* Released 0.3.2.

* configure.ac (AC_INIT): Bump version to 0.3.2.
* jnlib/libjnlibconfig.h: Revert to older version that doesn't
expect libgcrypt.  Reported by Jose Carlos Garcia Sogo
<jsogo@debian.org>.

2002-02-09  Marcus Brinkmann  <marcus@g10code.de>

* Released 0.3.1.

* configure.ac (LIBGPGME_LT_CURRENT): Bump it up to 6!
(NEED_GPGSM_VERSION): Bump it up to 0.3.0!
(AC_INIT): Bump version to 0.3.1

2002-01-22  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (HAVE_JNLIB_LOGGING): Define always for assuan.

2001-12-19  Werner Koch  <wk@gnupg.org>

* configure.ac (VERSION,PACKAGE): Defined and subst.  Used for
AM_INIT_AUTOMAKE and moved all version number more to the top.

2001-12-18  Marcus Brinkmann  <marcus@g10code.de>

* autogen.sh (libtool_vers):
Bump to 1.4.

* configure.ac (LIBGPGME_LT_CURRENT): Increment.
(LIBGPGME_LT_AGE): Reset.
Improve comment.
Fix wrong comment character.

2001-12-18  Werner Koch  <wk@gnupg.org>

* acinclude.m4 (GNUPG_FIX_HDR_VERSION): Fixed for new automake.

2001-12-14  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (GPG): Substitute this variable.

(GPGSM): Likewise.

2001-11-22  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (AC_CONFIG_FILES): Add tests/gpg/Makefile and
tests/gpgsm/Makefile.

2001-11-21  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (gpgmeplug): New variable, set to gpgmeplug if
[BUILD_GPGMEPLUG].
* configure.ac (AC_CONFIG_FILES): Add gpgmeplug/Makefile.
Support --enable-gpgmeplug.

2001-11-21  Marcus Brinkmann  <marcus@g10code.de>

* autogen.sh: Tighten version dependencies.

2001-11-20  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (SUBDIRS): Support building the assuan library
(currently if GPGSM_PATH is set)..
* configure.ac: Support building
the assuan library.
* assuan: New directory, populated with the Assuan library
(copied from the newpg repository).

2001-11-20  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (NEED_GPGSM_VERSION): New variable.  Treat it
similarly to NEED_GPG_VERSION.
* acconfig.h: Likewise.

2001-11-18  Marcus Brinkmann  <marcus@g10code.de>

* configure.in: Renamed to ...
* configure.ac: ... this.  Update to autoconf 2.52.  Lots of small
changes in the transition.  Support --with-gpg=PATH and
--with-gpgsm=PATH options.  Check if test suites can be run.
* acconfig.h: Add GPGSM_PATH.
* Makefile.am: New variable `tests', set to `tests' if
RUN_GPG_TESTS.
(SUBDIRS): Replace string `tests' with variable `tests'.

2001-10-22  Marcus Brinkmann  <marcus@g10code.de>

* autogen.sh: Invoke automake with `-a' (add missing files).
Do not invoke configure.

2001-09-17  Werner Koch  <wk@gnupg.org>

Released 0.2.3.

* configure.in (NEED_GPG_VERSION): Set to 1.0.6. Incremented LT
current
and age.

* Makefile.am (SUBDIRS): Add doc

2001-06-12  Werner Koch  <wk@gnupg.org>

Released 0.2.2.

2001-04-05  Werner Koch  <wk@gnupg.org>

* configure.in (NEED_GPG_VERSION): Set to 1.0.4g

2001-04-02  Werner Koch  <wk@gnupg.org>

Released 0.2.1.

Changed the copyright notices all over the place.

2001-02-28  Werner Koch  <wk@gnupg.org>

Released 0.2.0.

2001-01-18  Werner Koch  <wk@gnupg.org>

* autogen.sh: Added option --build-w32.

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2011-12-02  Werner Koch  <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained.  Starting
on December 1st, 2011 we put change information only in the GIT

commit log, and generate a top-level ChangeLog file from logs at
"make dist". See doc/HACKING for details.

2011-05-11 Marcus Brinkmann <marcus@g10code.com>

* gpgsm/Makefile.am (DISTCLEANFILES): Move to ...
(CLEANFILES): ... here.
(clean-local): New rule.
* gpg/Makefile.am (DISTCLEANFILES): Move to ...
(CLEANFILES): ... here.

2011-05-05 Marcus Brinkmann <marcus@g10code.com>

* gpg/Makefile.am: Unset GPG_AGENT_INFO when setting up local
configuration.
(clean-local): Shut down local gpg-agent.

2011-05-04 Marcus Brinkmann <marcus@g10code.com>

* gpg/t-import.c (check_result): Complete secret key pair counting
and disable status check, as GPG 2.1 currently emits two IMPORT_OK
lines and we only look at the first.

2011-04-27 Marcus Brinkmann <marcus@g10code.com>

* gpg/Makefile.am (DISTCLEANFILES):
Add S.gpg-agent.
(mkdemodirs, ./Alpha/Secret.gpg): Remove targets.
(GNUPGHOME): Export as absolute build directory (for gpg-agent).
(./pubring.gpg): Remove --homedir option, import secdemo.asc.
(clean-local): Rewrite.
* gpg/secdemo.asc: New file.
* gpg/pubkey-1.asc, gpg/seckey-1.asc: Change passphrase to
"abc" (now needed as GnuPG 2.1 asks for secret key passphrase on
import).
* gpg/t-keylist.c (keys): Update key info for Joe Random Hacker.
(main): Disable check for can_encrypt, as this is now in a
different subkey.
* gpg/t-encrypt-sign.c (check_result): Allow RMD160 hash
algorithm.
* gpg/t-import.c (check_result): One secret key pair now counts as
two secret keys, allow that.

2009-11-03 Werner Koch <wk@g10code.com>

* run-support.h (fail_if_err): Include program name.

* run-sign.c (main): Add option --uiserver.

2009-10-26  Marcus Brinkmann  <marcus@g10code.de>

* opassuan/t-command.c: Update to new interface.

2009-10-15  Werner Koch  <wk@g10code.com>

* run-verify.c:
New.

2009-08-06  Werner Koch  <wk@g10code.com>

* run-sign.c: New.

2009-07-07  Werner Koch  <wk@g10code.com>

* run-keylist.c (main):  Add options --cms and --openpgp.

* gpg/pgp-keylist.c: Rename to ...
* run-keylist.c: ... this.
* gpg/pgp-import.c: Rename to ...
* run-import.c: ... this.
* gpg/pgp-export.c: Rename to ...
* run-export.c: ... this.
* run-support.h: New. Copied from gpg/t-support.h.
* gpg/Makefile.am (noinst_PROGRAMS): Remove them.
* Makefile.am (noinst_PROGRAMS): Add them.
(noinst_HEADERS): New.

2009-06-22  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-support.h (passphrase_cb): Implement write() according to
the book to silence compiler warning.
* gpgsm/t-support.h (passphrase_cb): Likewise.

2009-06-16  Werner Koch  <wk@g10code.com>

* gpg/pgp-import.c: New.
* gpg/t-support.h (print_import_result, nonnull): Factored out
from other tools.

* gpg/pgp-export.c, gpg/pgp-keylist.c: New.

2009-06-09  Werner Koch  <wk@g10code.com>

* gpg/Makefile.am
(./pubring.gpg): Ignore errors in case of
already imported keys.  Add --no-permission-warning and remove

obsolete --allow-secret-key-import.
* gpg/mkdemodirs.in (GPG): Add --no-permission-warning.

* gpg/t-edit.c (edit_fnc): Use gpgme_io_write.

2009-04-19 Moritz <moritz@gnu.org>

* gpg/Makefile.am (EXTRA_DIST): Replaced mkdemodirs with mkdemodirs.in.
(mkdemodirs): New target.
(clean-local): Added command for removing mkdemodirs script.
(./Alpha/Secret.gpg): Added dependency on mkdemodirs.

* gpg/mkdemodirs: Renamed to ...
* gpg/mkdemodirs.in: ... here.
* gpg/mkdemodirs.in (GPG): Derive value from @GPG@ instead of
hard-coding "gpg".

2009-02-24 Werner Koch <wk@g10code.com>

* opassuan/t-command.c: Adjust for changed new op_assuan interface.

2009-02-03 Werner Koch <wk@g10code.com>

* gpg/t-keylist.c (main): Check that new fields is_cardkey and
card_number are not set.

2009-01-26 Werner Koch <wk@g10code.com>

* opassuan/: New.
* opassuan/Makefile.am:
New.
* opassuan/t-command.c: New.

2008-12-03 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (INCLUDES): Fix path to include file.
* gpg/Makefile.am (INCLUDES), gpgsm/Makefile.am (INCLUDES): Likewise.

2008-11-18 Werner Koch <wk@g10code.com>

* gpgsm/cms-decrypt.c: New.

2008-11-03 Marcus Brinkmann <marcus@g10code.com>

* gpgsm/Makefile.am (INCLUDES, LDADD): Replace gpgme path with src.
* gpg/Makefile.am (INCLUDES, LDADD, t_thread1_LDADD): Likewise.
* Makefile.am (LDADD): Likewise.

2008-10-30  Werner Koch  <wk@g10code.com>

* gpgsm/cms-keylist.c: New.

2008-06-19  Werner Koch  <wk@g10code.com>

* gpg/t-gpgconf.c (dump_arg): Add new types.  Print strings in
quotes.

2008-01-28  Marcus Brinkmann  <marcus@g10code.de>

* gpg/Makefile.am (DISTCLEANFILES): Add pubring.kbx~.

2008-01-10  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-gpgconf.c (main): Allow for dirmngr not to be available.

* gpg/Makefile.am (./gpg-agent.conf): Correct pinentry path.

* gpg/pinentry:
New file.
* gpg/Makefile.am (DISTCLEANFILES, all-local): Add gpg-agent.conf
(./gpg-agent.conf): New target.
(EXTRA_DIST): Add pinentry.

* gpg/t-gpgconf.c (main): Exit early if compiled without gpgconf.

2008-01-04  Marcus Brinkmann  <marcus@g10code.de>

* gpg/Makefile.am (CLEANFILES): Add pubring.kbx and dirmngr.conf.

* Makefile.am (TESTS_ENVIRONMENT): Use absolute path for
GNUPGHOME.
* gpg/Makefile.am (TESTS_ENVIRONMENT): Use absolute path for
GNUPGHOME.
* gpgsm/Makefile.am (TESTS_ENVIRONMENT): Use absolute path for
GNUPGHOME.
* gpg/Makefile.am (TESTS): Add t-gpgconf.
t-gpgconf.c: New file.

2007-11-23  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/t-verify.c (show_auditlog): Check for GPG_ERR_ASS_UNKNOWN_CMD.

2007-11-23  Werner Koch  <wk@g10code.com>

* gpgsm/t-verify.c (check_result): Don't exit on error but set a flag.
(main): Cosnult flag for return value.

(show_auditlog): New.
(main): Use it.

2007-09-27  Marcus Brinkmann  <marcus@g10code.de>

* t-engine-info.c
(check_engine_info): Fix debug output.
* gpg/Makefile.am (tests_unix): New variable.
(TESTS): Use it.
* gpg/t-support.h (passphrase_cb) [HAVE_W32_SYSTEM]: Use WriteFile instead of write.
* gpg/t-wait.c [HAVE_W32_SYSTEM]: Define sleep as _sleep.

2007-09-14  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/t-verify.c (main): Release TEXT and SIG.

2007-07-12  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/Makefile.am (key_id): Change := into =.

2007-07-12  Werner Koch  <wk@g10code.com>

* gpgsm/t-support.h (init_gpgme) [W32]: Do not init the locales as
the constants are not available.

2007-02-26  Werner Koch  <wk@g10code.com>

* gpg/t-verify.c (double_plaintext_sig): New.
(main): Check it.

2006-12-02  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/t-keylist.c (main): Skip unknown keys.  Newer versions of
GPGSM import more keys than older ones.

2005-12-06  Werner Koch  <wk@g10code.com>

* gpg/t-keylist.c (main): Changed for that secondary keys now have
a fingerprint.
*
gpg/t-keylist-sig.c (main): Ditto.
* gpgsm/t-keylist.c (main): Ditto.  The test used to be wrong.

2005-10-18  Werner Koch  <wk@g10code.com>

* gpg/pubdemo.asc, gpg/secdemo.asc: Add 2 expired subkeys to
Whisky.
* gpg/t-keylist.c: Reordered list to match new demo keyring.  Add

arg for number of subkeys and for extra checking function.
(main): Enhanced a few error outputs. Changed subkey
counting. Call extra checking function.
(check_whisky): New.

2005-10-07 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-keylist.c (main): Allow for an email address as a second
uid.

* gpg/t-sig-notation.c: Change critical notation to something
GnuPG understands.

2005-10-01 Marcus Brinkmann <marcus@g10code.de>

* gpg/Makefile.am (EXTRA_DIST): Remove gpg.conf.
(DISTCLEANFILES): Add gpg.conf.
(all-local): Add gpg.conf.
(./gpg.conf): New target.
* gpg/gpg.conf: Remove file.

* gpg/Makefile.am (EXTRA_DIST): Add gpg.conf.

* gpg/Makefile.am (TESTS): Add t-sig-notation.
* gpg/t-sig-notation.c
(check_result): New file.
* gpg/t-verify.c (check_result): Also check the length of the
notation data.
* gpg/gpg.conf: New file.

2005-09-30 Marcus Brinkmann <marcus@g10code.de>

* gpg/Makefile.am (TESTS): Add t-filename.
* gpg/t-filename.c: New file.

2005-09-23 Werner Koch <wk@g10code.com>

* gpg/t-support.h (init_gpgme) [W32]: Don't use LC_MESSAGES.

* gpg/t-encrypt-large.c: New test.
* gpg/Makefile.am (TESTS): Add t-encrypt-large.

2005-06-03 Marcus Brinkmann <marcus@g10code.de>

* gpg/Makefile.am (TESTS): Add t-wait.
* gpg/t-wait.c (main): New test.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

* gpg/mkdemodirs: Add copyright notice.

* gpgsm/Makefile.am, gpgsm/t-support.h, gpgsm/t-decrypt.c,
gpgsm/t-encrypt.c, gpgsm/t-export.c, gpgsm/t-genkey.c,
gpgsm/t-import.c, gpgsm/t-keylist.c, gpgsm/t-sign.c,
gpgsm/t-verify.c, gpg/Makefile.am, gpg/t-decrypt.c,
gpg/t-decrypt-verify.c, gpg/t-edit.c, gpg/t-encrypt.c,
gpg/t-encrypt-sign.c, gpg/t-encrypt-sym.c,
gpg/t-eventloop.c,
gpg/t-export.c, gpg/t-genkey.c, gpg/t-import.c, gpg/t-keylist.c,
gpg/t-keylist-sig.c, gpg/t-sign.c, gpg/t-signers.c,
gpg/t-support.h, gpg/t-thread1.c, gpg/t-trustlist.c,
gpg/t-verify.c, Makefile.am, t-data.c, t-engine-info.c,
t-version.c: Change license to LGPL.

2004-08-17 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-keylist.c (struct): Add new fields VALIDITY and
KEY_LENGTH.
(main): Use them.
* gpgsm/t-import.c (check_result): New argument total_stat.
(main): Pass this argument. Reduce number of total considered
keys to 1 for the second test.

2004-04-05 Werner Koch <wk@gnupg.org>

* gpgsm/Makefile.am: Changed the faked system time to 20011213T12000.

2004-03-07 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-keylist.c: Add chain IDs.

2004-03-03 Werner Koch <wk@gnupg.org>

* gpgsm/t-export.c (main): Also check exporting 2 certificates.

2004-02-17 Werner Koch <wk@gnupg.org>

* gpgsm/t-import.c (check_result): gpgsm does now
return info in
the result->imports; adjust for that.

* gpgsm/Makefile.am (TESTS_ENVIRONMENT): Reset the GPG_AGENT_INFO.

Include config.h at the top of each C source. This is required
due to LFS support.

* gpg/t-keylist-sig.c (main): s/class/sig_class/.
* gpg/t-signers.c (check_result): Ditto.
* gpg/t-sign.c (check_result): Ditto.
* gpg/t-encrypt-sign.c (check_result): Ditto.
* gpgsm/t-sign.c (check_result): Ditto.

2004-01-12 Werner Koch <wk@gnupg.org>

* gpg/t-keylist-sig.c (main): Temporary disabled one test due top
gpg 1.3.4 problems.
* gpg/t-import.c (check_result): Likewise.

2003-11-19 Werner Koch <wk@gnupg.org>

* gpg/t-support.h (DIM): Added.

* gpg/t-verify.c (check_result): Rewrote test for notations
because the order of notaions is not guaranteed.

* gpgsm/t-support.h (fail_if_err): Also print the numeric values.

2003-10-06 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-eventloop.c: Include <sys/types.h> for old systems.

* gpgsm/Makefile.am
(DISTCLEANFILES): Add random_seed.

* gpg/t-thread1.c (thread_one): Do not call initialize_gpgme.
Likewise.

2003-09-14 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-thread1.c (main): Call init_gpgme here.
(initialize_gpgme): Function removed.

* gpg/t-thread1.c: New file.
* gpg/Makefile.am (TESTS): Add t-thread1.c.
(t_thread1_LDADD): New variable.
(LDADD): Remove GPG Error lib.
* gpgsm/Makefile.am (LDADD): Likewise.

* gpg/t-import.c (main): Likewise.
* gpg/t-keylist-sig.c (main): Likewise.
* gpg/t-keylist.c (main): Likewise.
* gpg/t-sign.c (main): Likewise.
* gpg/t-signers.c (main): Likewise.
* gpg/t-trustlist.c (main): Likewise.

* gpgsm/t-support.h: Include <stdlib.h> and <locale.h>.
(init_gpgme): New function.
* gpg/t-support.h: Likewise.
* gpgsm/t-verify.c (main): Call init_gpgme.
* gpgsm/t-decrypt.c (main): Likewise.
* gpgsm/t-encrypt.c (main): Likewise.
* gpgsm/t-export.c (main): Likewise.
* gpgsm/t-genkey.c (main): Likewise.
* gpgsm/t-import.c (main):
Likewise.
* gpgsm/t-keylist.c (main): Likewise.
* gpgsm/t-sign.c (main): Likewise.
* gpg/t-verify.c (main): Call init_gpgme.
* gpg/t-decrypt-verify.c (main): Likewise.
* gpg/t-decrypt.c (main): Likewise.
* gpg/t-edit.c (main): Likewise.
* gpg/t-encrypt-sign.c (main): Likewise.
* gpg/t-encrypt-sym.c (main): Likewise.
* gpg/t-encrypt.c (main): Likewise.
* gpg/t-eventloop.c (main): Likewise.
* gpg/t-export.c (main): Likewise.
* gpg/t-genkey.c (main): Likewise.

2003-08-14 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-sign.c (check_result): Change output format for signature
class to unsigned int.
* gpg/t-signers.c (check_result): Likewise.
* gpg/t-encrypt-sign.c (check_result): Likewise.
* gpgsm/t-sign.c (check_result): Likewise.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-verify.c (check_result): Change type of SUMMARY to
unsigned int.
* gpg/t-decrypt-verify.c (check_verify_result): Likewise.
* gpg/t-keylist-sig.c (keys): Change type of member CLASS
to
unsigned int.
* t-data.c (read_cb): Change type of AMOUNT to unsigned int.
* t-version.c (version): Remove unused variable.

2003-07-22 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (AM_CPPFLAGS): New variable.
(LDADD): Add @GPG_ERROR_LIBS@.
* gpg/Makefile.am (AM_CPPFLAGS): New variable.
(LDADD): Add @GPG_ERROR_LIBS@.

* gpgsm/Makefile.am (AM_CPPFLAGS): New variable.
(LDADD): Add @GPG_ERROR_LIBS@.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

Everywhere: Use libgpg-error error codes.

* gpg/Makefile.am (noinst_HEADERS): New variable.
* gpg/t-support.h: New file.
* gpgsm/Makefile.am (noinst_HEADERS): New variable.
* gpgsm/t-support.h: New file.

2003-05-29 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-encrypt-sym.c (main): Adapt to new syntax.
* gpg/t-encrypt.c (main): Likewise.
* gpg/t-eventloop.c (main): Likewise.
* gpg/t-encrypt-sign.c (main): Likewise.
* gpgsm/t-export.c (main): Likewise.
* gpgsm/t-encrypt.c (main): Likewise.

2003-05-28 Marcus
Brinkmann <marcus@g10code.de>

* gpg/t-eventloop.c (main): Rewrite recipient management.
* gpg/t-encrypt-sign.c (main): Likewise.
* gpg/t-encrypt.c (main): Likewise.
* gpg/t-export.c (main): Likewise.
* gpgsm/t-encrypt.c (main): Likewise.
* gpgsm/t-export.c (main): Likewise.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

* gpg/Makefile.am (TESTS): Order t-keylist and t-keylist-sig after
t-import.
* gpg/t-edit.c (edit_fnc): Fix primary UID for keylisting tests.
* gpg/t-keylist.c: Change order of user IDs.
* gpg/t-keylist-sig.c: Likewise.
* gpg/t-import.c: Add support for gpg in CVS.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

* t-data.c: Remove TEST_OUT_CB.
(main): Likewise.
* gpg/t-trustlist.c (main): Access ITEM directly.

* (t-decrypt-verify.c, t-decrypt.c, t-edit.c, t-encrypt-sign.c,
t-encrypt-sym.c, t-sign.c, t-signers.c): Include <unistd.h>.

(passphrase_cb): Rewritten.
* t-edit.c (edit_fnc): Rewritten.

2003-05-04 Marcus Brinkmann <marcus@g10code.de>

*
gpg/t-keylist-sig.c (main): Remove timestamp check.

* gpgsm/t-keylist.c: Add check for timestamp.

* gpg/Makefile.am (TESTS): Add t-keylist-sig.
* gpg/t-keylist-sig.c: New file.

2003-04-30 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-eventloop.c (main): Do not call print_op_info.
(print_op_info): Function removed.

* gpg/t-keylist.c: Rewritten.
* gpgsm/t-keylist.c (main): Rewritten.
* gpg/t-edit.c (main): Do not use gpgme_key_get_as_xml. Use
gpgme_key_unref instead gpgme_key_release.
* gpg/t-signers.c (main): Use gpgme_key_unref instead
gpgme_key_release.

2003-04-29 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-trustlist.c: Rewritten.

* gpg/t-verify.c (main): Rewritten.
* gpg/t-decrypt-verify.c: Rewritten.
* gpgsm/t-verify.c (main): Rewritten.

2003-04-28 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-decrypt.c (main): Rewritten.

* gpg/t-decrypt.c: Rewritten.

* gpg/t-signers.c: Rewritten.

2003-04-27 Marcus Brinkmann <marcus@g10code.de>

*
gpg/t-encrypt-sign.c (check_result): Rewritten.

* gpg/t-sign.c: Rewritten.
* gpgsm/t-sign.c: Rewritten.

* gpg/t-encrypt.c: Check for invalid recipients.
* gpgsm/t-encrypt.c: Likewise.

* gpg/t-import.c (check_result): Really use FPR.
* gpgsm/t-import.c (check_result): Rewritten.

2003-04-25 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-import.c: Rewritten.

* gpgsm/t-genkey.c: Rewritten.
* gpgsm/Makefile.am (noinst_PROGRAMS): Add t-genkey.
* gpg/t-genkey.c: Include <stdlib.h>.
(main): Check result->fpr before checking its length.

2003-04-24 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-genkey.c: Rewritten to match new semantics.

2003-02-06 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-decrypt.c (passphrase_cb): Fix to new prototype.
* gpg/t-decrypt-verify.c (passphrase_cb): Likewise.
* gpg/t-edit.c (passphrase_cb): Likewise.
* gpg/t-encrypt-sign.c (passphrase_cb): Likewise.
* gpg/t-encrypt-sym.c (passphrase_cb): Likewise.
* gpg/t-sign.c (passphrase_cb): Likewise.
*
gpg/t-signers.c (passphrase_cb): Likewise.

2003-01-30 Marcus Brinkmann <marcus@g10code.de>

* t-engine-info.c: Use file_name instead path throughout.

* Makefile.am (TESTS): Add t-engine-info.
* t-engine-info.c: New file.
* gpg/t-encrypt.c (main): Don't print engine info.
* gpg/t-eventloop.c (main): Likewise.
* gpg/t-encrypt-sign.c (main): Likewise.
* gpgsm/t-encrypt.c (main): Likewise.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-verify.c (main): Adjust caller of gpgme_op_verify.
* gpg/t-verify.c (main): Likewise.
* gpg/t-decrypt-verify.c (main): Likewise for
gpgme_op_decrypt_verify.

2002-12-23  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/Makefile.am (./gpgsm.conf): Add a faked system time to
avoid certification's expiry.
* gpgsm/t-encrypt.c (main): Use the short certification name.

2002-11-19  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-genkey.c (main): Add missing argument to gpgme_op_genkey
invocation.

2002-10-09  Marcus Brinkmann
<marcus@g10code.de>

* gpg/t-decrypt.c (print_data): Update to new gpgme_data_read
interface, and use gpgme_engine_check_version instead
gpgme_check_version.
* gpg/t-decrypt-verify.c (print_data): Likewise.
* gpg/t-edit.c (main): Likewise.
* gpg/t-encrypt.c (print_data): Likewise.
* gpg/t-encrypt-sign.c (print_data): Likewise.
* gpg/t-encrypt-sym.c (print_data): Likewise.
* gpg/t-eventloop.c (print_data): Likewise.
* gpg/t-export.c (print_data): Likewise.
* gpg/t-sign.c (print_data): Likewise.
* gpg/t-signers.c (print_data): Likewise.
* gpgsm/t-decrypt.c (print_data): Likewise.
* gpgsm/t-encrypt.c (print_data): Likewise.
* gpgsm/t-export.c (print_data): Likewise.
* gpgsm/t-sign.c (print_data): Likewise.
* gpg/t-verify.c (main): Likewise for gpgme_op_verify.
* gpgsm/t-verify.c (main): Likewise for gpgme_op_verify.
* t-data.c (read_once_test): Likewise.
(write_test): Update for new behaviour of data objects.
(main): Remove type test.

2002-09-30  Werner Koch  <wk@gnupg.org>

*
gpgsm/t-keylist.c (doit): Add arg SECRET.
(main): Add option --secret.

2002-09-28  Marcus Brinkmann  <marcus@g10code.de>

* t-version.c: Include <string.h>.  Reported by Stphane Corthsy.

2002-09-02  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-keylist.c (main): Test PATTERN for NULL before printing.
Reported by Dr. Stefan Dalibor <Dr.Stefan.Dalibor@bfa.de>.

2002-08-01  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-edit.c: Also add a test for the expire command (testing
the passphrase callback).

2002-07-28  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-edit.c: New file.
* gpg/Makefile (TESTS): Add t-edit.

2002-07-25  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-encrypt-sym.c (main): Change type of I to size_t and
rename to LEN.
* gpg/t-verify.c (main): Likewise.  Submitted by Stphane
Corthsy.

2002-07-03  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-eventloop.c: New file.
* gpg/Makefile (TESTS): Add t-eventloop.

2002-06-26  Werner Koch  <wk@gnupg.org>

*
gpgsm/t-import.c (print_op_info): New.
(main): Print operation info.

2002-06-25  Werner Koch  <wk@gnupg.org>

* gpgsm/Makefile.am (DISTCLEANFILES): new.

2002-06-25  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/Makefile.am (TESTS): Add t-export.
gpgsm/t-export.c: New file.

2002-06-20  Werner Koch  <wk@gnupg.org>

* gpgsm/t-sign.c (main): Also test a normal signature.

* gpg/Makefile (TESTS_ENVIRONMENT): Set GPG_AGENT_INFO empty.
* gpg/t-signers.c, gpg/t-sign.c, gpg/t-encrypt-sym.c
* gpg/t-encrypt-sign.c, gpg/t-decrypt.c
* gpg/t-decrypt-verify.c (main): Changed the GPG_AGENT_INFO check to

match the one in ../../gpgme/rungpg.c.

2002-06-12  Werner Koch  <wk@gnupg.org>

* gpgsm/t-keylist.c (doit): Print operation info if available.

2002-06-10  Werner Koch  <wk@gnupg.org>

* gpgsm/t-verify.c (print_sig_stat): Print the error token.

2002-06-04  Werner Koch  <wk@gnupg.org>

* gpgsm/t-encrypt.c (main): Add a simple option parser and allow
to specify an encryption
key.

2002-05-26  Marcus Brinkmann  <marcus@g10code.de>

* gpg/Makefile.am (all-local): Remove dependency on ./secring.gpg.
(./secring.gpg): Remove target, and move all rules for this target
to ...
(./pubring.gpg): ... here.  This was necessary because GnuPG 1.0.7
does create an empty secring.gpg file when importing public keys.

2002-05-08  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/t-verify.c (validity_string): New.
(print_sig_stat): Print expire time and validity.
(status_string): Add new exipred stati.

2002-05-03  Werner Koch  <wk@gnupg.org>

* gpg/t-verify.c (validity_string): New.
(print_sig_stat): Print expire time and validity.
(status_string): Add new exipred stati.

2002-04-05  Marcus Brinkmann  <marcus@g10code,de>

* gpgsm/Makefile.am (./trustlist.txt): Put more into this file to
prevent use of gpg-agent.
(./gpg-agent.conf): Remove target.
(all-local): Remove ./gpg-agent.conf.

2002-04-05  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/t-keylist.c
(main): Use gpgme_engine_check_version instead
gpgme_check_engine.

* gpgsm/t-encrypt.c (main): Likewise.

2002-03-06 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-encrypt-sym.c: New file.
* gpg/Makefile.am (TESTS): Add t-encrypt-sym.

2002-03-05 Marcus Brinkmann <marcus@g10code.de>

* gpg/Makefile.am (CLEANFILES): Remove random_seed, which is now
in DISTCLEANFILES.

2002-03-04 Werner Koch <wk@gnupg.org>

* gpg/Makefile.am (DISTCLEANFILES): Added.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-verify.c (main): Add a few more sanity checks, and a check
for normal signatures.

2002-02-26 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-encrypt-sign.c: New file.
* gpg/Makefile.am (TESTS): Add t-encrypt-sign.

2002-02-13 Werner Koch <wk@gnupg.org>

* gpgsm/Makefile.am (private-keys-v1.d): Don't
fail when the directory already exists.

2002-02-12 Marcus Brinkmann <marcus@g10code.de>

* gpg/Makefile.am (CLEANFILES): New target.
(distclean-local): Rename to
...
(clean-local): ... this.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/Makefile.am (./private-keys-v1.d/$(key_id).key): Fix rule.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-genkey.c: New file (not added to Makefile.am because of
gpg-agent bug).

2002-02-08 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/Makefile.am (key_id): Update value.
(all-local): Add .key to keyid filename.
(./private-keys-v1.d/$(key_id)): Renamed to ...
(./private-keys-v1.d/$(key_id).key): ... this.
(all-local): Add ./gpgsm.conf, ./trustlist.txt.
(./gpgsm.conf, ./trustlist.txt): New target.
* gpgsm/567064FE6D14A17B2D811ABB407728BC558AA455: Renamed to ...
* gpgsm/32100C27173EF6E9C4E9A25D3D69F86D37A4F939: ... this.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-import.c (print_op_info): New function.
(main): Use it.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-signers.c (passphrase_cb): Change type of r_hd to void**.
* gpg/t-sign.c (passphrase_cb):
Likewise.
* gpg/t-decrypt-verify.c (passphrase_cb): Likewise.
* gpg/t-decrypt.c (passphrase_cb): Likewise.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-decrypt-verify.c: Don't include `mcheck.h'. Reported by
Stphane Corthsy.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

* gpg/Makefile.am (EXTRA_DIST): Add missing line continuation.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/Makefile.am (EXTRA_DIST): Add $(key_id).

2001-12-16 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/Makefile: Rename `pubcerts.kbx' to `pubring.kbx'.

2001-12-15 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-keylist.c (check_two_contexts): Set protocols.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-sign.c: New file.
* gpgsm/Makefile.am (TESTS): Add t-sign.

2001-12-14  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/t-decrypt.c: New file.
* gpgsm/567064FE6D14A17B2D811ABB407728BC558AA455: Likewise.
* gpgsm/Makefile.am (TESTS): Add
t-decrypt.
(key_id): New variable.
(all-local): New target ./private-keys-v1.d/$(key_id) added.
(./private-keys-v1.d/$(key_id)): New target.

2001-12-14  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/t-verify.c: New file.
* gpgsm/Makefile.am (TESTS): Add t-verify.

2001-12-14  Marcus Brinkmann  <marcus@g10code.de>

* gpg/Makefile.am (GPG): Set to @GPG_PATH@.
(./pubring.gpg): Use $(GPG) instead gpg.
(./secring.gpg): Likewise.

* gpgsm/t-import.c (main): Remove third test case.
* gpgsm/Makefile.am (GPGSM): Set to @GPGSM@.
(all-local): New target.
(./pubcerts.kbx): Likewise.
* gpgsm/t-encrypt.c: New file.
* gpgsm/Makefile.am (TESTS): Add t-encrypt.

2001-12-14  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/t-keylist.c: New file.
* gpgsm/Makefile.am (TESTS): Add t-keylist.

2001-12-13  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/cert_dfn_pca01.der: New file.
* gpgsm/cert_dfn_pca15.der: Likewise.
* gpgsm/cert_g10code_test1.der: Likewise.
* gpgsm/t-import.c: Likewise.
*
gpgsm/Makefile.am (EXTRADIST): Add new files.
(TESTS): Add t-import.

2001-11-22  Marcus Brinkmann  <marcus@g10code.de>

* gpg/: New directory.
* Makefile.am, t-verify.c, t-encrypt.c, t-signers.c, t-trustlist.c,

t-sign.c, t-keylist.c, t-import.c, t-genkey.c, t-export.c,
t-decrypt-verify.c, t-decrypt.c, t-version.c, t-data.c, mkdemodirs.
cipher-1.asc, cipher-2.asc, geheim.txt, pubdemo.asc, pubkey-1.asc,
secdemo.asc, seckey-1.asc): Move to sub directory gpg/.

* gpg/Makefile.am (INCLUDES): Include gpgme/, not include/ and
intl/.
(LDD): Correct relative path to gpgme library.
(TESTS): Remove t-version and t-data.
* gpg/t-verify.c, gpg/t-encrypt.c, gpg/t-signers.c, gpg/t-trustlist.c,
gpg/t-sign.c, gpg/t-keylist.c, gpg/t-import.c, gpg/t-genkey.c,
gpg/t-export.c, gpg/t-decrypt-verify.c, gpg/t-decrypt.c,
t-version.c, t-data.c): Include gpgme.h, not "../gpgme/gpgme.h".

* Makefile.am: New file.
* gpgsm/: New directory.
* gpgsm/Makefile.am: New file.

2001-11-16 Marcus
Brinkmann <marcus@g10code.de>

* Makefile.am (TESTS): Add t-decrypt-verify.
* t-decrypt-verify.c: New file.
* cipher-2.asc: Likewise.

2001-11-02 Marcus Brinkmann <marcus@g10code.de>

* t-data.c: Include stddef.h.
(read_once_test): Change type of READ to size_t.
(read_test): Likewise.
(write_test): Likewise.

2001-10-29 Marcus Brinkmann <marcus@g10code.de>

* t-signers.c: New file.
* Makefile.am (TESTS): Add t-signers.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (TEST_ENVIRONMENT): Revert last change.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (TEST_ENVIRONMENT): Set environment to $(srcdir),
not current directory.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

* t-data.c (write_test): New function.
(main): Invoke write_test for all rounds except TEST_OUT_CB.

2001-10-22  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (INCLUDES): Remove spurious duplicate to silence
automake.

2001-10-16  Marcus Brinkmann  <marcus@g10code.de>

*
t-version.c: New file.
* t-data.c: Likewise.
* t-data-1.txt: Likewise.
* t-data-2.txt: Likewise.
* Makefile.am (TESTS): Add t-version, t-data.

2001-09-17  Werner Koch  <wk@gnupg.org>

* t-keylist.c (check_two_contexts): New.

2001-09-03  Werner Koch  <wk@gnupg.org>

* t-encrypt.c (print_op_info): New and use it after each operation.

2001-08-28  Werner Koch  <wk@gnupg.org>

* t-sign.c (print_op_info): New and use it after each operation.

2001-03-15  Werner Koch  <wk@gnupg.org>

* t-keylist.c (doit): List subkeys too, show caps.

2001-02-13  Werner Koch  <wk@gnupg.org>

* t-verify.c (print_sig_stat): Repaled ulong by unsigned long
because we don't use the config stuff here.

2001-02-12  Werner Koch  <wk@gnupg.org>

* tests/t-verify.c (print_sig_stat): Print info about the keys.

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(11:private-key(3:dsa(1:p129:eC_L&$2,6tx.gh1VirlqI9
,^g3.$DveUvX1'oIj)(1:q21: #UFK2z(tuVG)(1:g128:zu^Rab;qeQQA B?/6/aspfE/
gx!Mr0YY*oMrJc2xWG:.r6)(1:y128:Uf]j^@oEn4j#QrRq" RcEa E/}4C[3A
5+~~.#!+
)W&5d)ij)(1:x21:` )))
{
  "type": "ciphertext",
  "base64":      true
}
{
  "success":     true
}
# libgpgme.vers - List of symbols to export.
# Copyright (C) 2002, 2004, 2005, 2009, 2012 g10 Code GmbH
#
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#
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#-------------------------------------------------------
# Please remember to add new functions also to gpgme.def
#-------------------------------------------------------

GPGME_1.1 {
 global:
   gpgme_set_engine_info;

    gpgme_ctx_get_engine_info;
   gpgme_ctx_set_engine_info;

   gpgme_data_set_file_name;
```

```
gpgme_data_get_file_name;
gpgme_data_identify;

gpgme_sig_notation_clear;
gpgme_sig_notation_add;
gpgme_sig_notation_get;

gpgme_free;

gpgme_op_getauditlog_start;
gpgme_op_getauditlog;

gpgme_conf_release;
gpgme_conf_arg_new;
gpgme_conf_arg_release;
gpgme_conf_opt_change;
gpgme_op_conf_load;
gpgme_op_conf_save;
gpgme_op_conf_dir;

gpgme_cancel_async;

gpgme_op_assuan_result;
gpgme_op_assuan_transact;
gpgme_op_assuan_transact_start;

gpgme_check_version_internal;

gpgme_io_read;
gpgme_io_write;

gpgme_result_ref;
gpgme_result_unref;

gpgme_op_import_keys;
gpgme_op_import_keys_start;
gpgme_op_export_keys;
gpgme_op_export_keys_start;

gpgme_op_assuan_transact_ext;

gpgme_wait_ext;

gpgme_op_vfs_mount_result;
gpgme_op_vfs_mount;
gpgme_op_vfs_create;

gpgme_key_from_uid;
```

gpgme_set_sub_protocol;
gpgme_get_sub_protocol;

gpgme_op_passwd_start;
gpgme_op_passwd;

gpgme_set_global_flag;

gpgme_io_writen;

gpgme_set_pinentry_mode;
gpgme_get_pinentry_mode;

gpgme_get_dirinfo;

gpgme_op_spawn_start;
gpgme_op_spawn;

gpgme_set_offline;
gpgme_get_offline;

gpgme_set_status_cb;
gpgme_get_status_cb;

gpgme_pubkey_algo_string;
gpgme_set_ctx_flag;
gpgme_get_ctx_flag;
gpgme_data_set_flag;

gpgme_op_createkey_start;
gpgme_op_createkey;
gpgme_op_createsubkey_start;
gpgme_op_createsubkey;
gpgme_op_adduid_start;
gpgme_op_adduid;
gpgme_op_revuid_start;
gpgme_op_revuid;
gpgme_op_keysign_start;
gpgme_op_keysign;
gpgme_op_tofu_policy_start;
gpgme_op_tofu_policy;
gpgme_op_interact_start;
gpgme_op_interact;

gpgme_addrspec_from_uid;

gpgme_set_sender;
gpgme_get_sender;

```
  gpgme_op_query_swdb;
  gpgme_op_query_swdb_result;

   gpgme_op_set_uid_flag_start;
  gpgme_op_set_uid_flag;

  gpgme_op_decrypt_ext;
  gpgme_op_decrypt_ext_start;

  gpgme_data_new_from_estream;

};


GPGME_1.0 {
 global:
  gpgme_check_version;
  gpgme_get_engine_info;
  gpgme_engine_check_version;

  gpgme_err_code_from_errno;
  gpgme_err_code_to_errno;
  gpgme_err_make_from_errno;
  gpgme_error_from_errno;
  gpgme_strerror;
  gpgme_strerror_r;
  gpgme_strsource;

  gpgme_data_get_encoding;
  gpgme_data_new;
  gpgme_data_new_from_cbs;
  gpgme_data_new_from_fd;
  gpgme_data_new_from_file;
  gpgme_data_new_from_filepart;
  gpgme_data_new_from_mem;
  gpgme_data_new_from_stream;
  gpgme_data_read;
  gpgme_data_release;
  gpgme_data_release_and_get_mem;
  gpgme_data_seek;
  gpgme_data_set_encoding;
  gpgme_data_write;

  gpgme_get_protocol_name;
  gpgme_hash_algo_name;
  gpgme_pubkey_algo_name;
```

gpgme_new;
gpgme_get_armor;
gpgme_get_include_certs;
gpgme_get_io_cbs;
gpgme_get_keylist_mode;
gpgme_get_passphrase_cb;
gpgme_get_progress_cb;
gpgme_get_protocol;
gpgme_get_textmode;
gpgme_release;
gpgme_set_armor;
gpgme_set_include_certs;
gpgme_set_io_cbs;
gpgme_set_keylist_mode;
gpgme_set_locale;
gpgme_set_passphrase_cb;
gpgme_set_progress_cb;
gpgme_set_protocol;
gpgme_set_textmode;
gpgme_signers_add;
gpgme_signers_clear;
gpgme_signers_count;
gpgme_signers_enum;

gpgme_key_ref;
gpgme_key_unref;
gpgme_key_release;

gpgme_trust_item_ref;
gpgme_trust_item_unref;

gpgme_cancel;
gpgme_op_card_edit;
gpgme_op_card_edit_start;
gpgme_op_decrypt;
gpgme_op_decrypt_result;
gpgme_op_decrypt_start;
gpgme_op_decrypt_verify;
gpgme_op_decrypt_verify_start;
gpgme_op_delete;
gpgme_op_delete_start;
gpgme_op_delete_ext;
gpgme_op_delete_ext_start;
gpgme_op_edit;
gpgme_op_edit_start;
gpgme_op_encrypt;
gpgme_op_encrypt_start;

gpgme_op_encrypt_ext;
gpgme_op_encrypt_ext_start;
gpgme_op_encrypt_sign;
gpgme_op_encrypt_sign_ext;
gpgme_op_encrypt_sign_start;
gpgme_op_encrypt_sign_ext_start;
gpgme_op_encrypt_result;

gpgme_op_export;
gpgme_op_export_ext;
gpgme_op_export_ext_start;
gpgme_op_export_start;
gpgme_op_genkey;
gpgme_op_genkey_result;
gpgme_op_genkey_start;
gpgme_get_key;
gpgme_op_import;
gpgme_op_import_result;
gpgme_op_import_start;
gpgme_op_keylist_end;
gpgme_op_keylist_ext_start;
gpgme_op_keylist_from_data_start;
gpgme_op_keylist_next;
gpgme_op_keylist_result;
gpgme_op_keylist_start;
gpgme_op_sign;
gpgme_op_sign_result;
gpgme_op_sign_start;
gpgme_op_trustlist_end;
gpgme_op_trustlist_next;
gpgme_op_trustlist_start;
gpgme_op_verify;
gpgme_op_verify_result;
gpgme_op_verify_start;
gpgme_wait;

gpgme_data_new_with_read_cb;
gpgme_data_rewind;
gpgme_get_sig_status;
gpgme_get_sig_string_attr;
gpgme_get_sig_ulong_attr;
gpgme_get_sig_key;
gpgme_key_get_string_attr;
gpgme_key_get_ulong_attr;
gpgme_key_sig_get_string_attr;
gpgme_key_sig_get_ulong_attr;
gpgme_op_import_ext;
gpgme_trust_item_get_int_attr;

```
  gpgme_trust_item_get_string_attr;
  gpgme_trust_item_release;

  gpgme_err_code_from_syserror;
  gpgme_err_set_errno;

  gpgme_op_setexpire;
  gpgme_op_setexpire_start;

  gpgme_op_revsig;
  gpgme_op_revsig_start;

 local:
  *;

};
# -*- mode: org -*-
#+TITLE: What's New in the GPGME Python Bindings and Documentation
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltxtra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}


* What's New
 :PROPERTIES:
 :CUSTOM_ID: new-stuff
 :END:

| Version:        | 0.0.1                                |
| GPGME Version:  | 1.13.0                               |
| Author:         | Ben McGinnes <ben@gnupg.org>         |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language:       | Australian English, British English  |
| xml:lang:       | en-AU, en-GB, en                     |

Last time the most obviously new thing was adding the /What's New/
section to the HOWTO.  Now it's moving it out of the HOWTO.


** New in GPGME 1130
  :PROPERTIES:
   :CUSTOM_ID: new-stuff-1-13-0
  :END:
```

Additions since GPGME 1.12.0 include:

- Moving the /What's New/ section out of the basic [[file:gpgme-python-howto.org][HOWTO]] document and into its own file so as to more readily include other documents beyond that HOWTO.
- Moving the preceding, archival, segments into [[file:what-was-new.org][another file]].
- Added =gpg.version.versionintlist= to make it easier for Python developers to check for a specific version number, even with beta versions (it will drop the "-betaN" part).
- Added expanded detail on issues pertaining to installing for Windows users.
- Bindings enter [[file:maintenance-mode][maintenance mode]] from January, 2019.
- Added documentation on maintenance mode and what changes can be made to the code when in that status. Essentially that boils down to bug fixes only and no feature requests.
- The import-keys-hkp.py example script, which uses the =hkp4py= module to search the SKS servers for a key, has been tightened up to search for both hexadecimal key IDs and user ID strings with reduced chance of unnecessary repitition. There may still be some repetition if a key includes a user ID matching the hexadecimal value of a key ID.

{
  "base64": true,
  "more": true,
  "response": "*"
}
d97206d060321451439b7c122cd4e699

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Version 2.1, February 1999

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[This is the first released version of the Lesser GPL. It also counts as the successor of the GNU Library Public License, version 2, hence the version number 2.1.]

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^L
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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will
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That's all there is to it!
{
"op": "config_opt",
"component": "gpg",
"option": "default-key"
}
1603972630
{
"type": "keys",
"base64": false,
"data": "-----BEGIN PGP PUBLIC KEY BLOCK-----
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HUvUkLOQ0s8rOlu15nhw4azc30rTP1LsIkn5zORNnFdgYC6RKy\nhOeim/63+/yGtdnTm49lVfaCqwsEmBCEkXa
eWDGq+ie1b89J89T6n/JquwCgoQkj\nVeVGG+B/SzJ6+yifdHWQVkcD/RXDyLXX4+WHGP2aet51XlKojWGws

Zmc9LPPYhwU\n/RcUO7ce1QQb0XFlUVFBhY0JQpM/ty/kNi+aGWFzigbQ+HAWZkUvA8+VIAVneN+p\n+SH
hGIyLTXKpAYTq46AwvllZ5Cpvf02Cp/+W1aVyA0qnBWMyeIxXmR9HOi6lxxn5\ncjajA/9VZufOXWqCXkBvz
4Oy3Q5FbjQQ0/+ty8rDn8OTaiPi41FyUnEi6LO+qyBS\n09FjnZj++PkcRcXW99SNxmEJRY7MuNHt5wIvEH2jN
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GVz\ndCAoZGVtbyBrZXkpIDxhbHBoYUBleGFtcGxlLm5ldD6IVQQTEQIAFQUCNuOOngML\nCgMDFQMC
AxYCAQIXgAAKCRAtcnzHaGl3NDl4AKCBLmRplv/8ZfSqep5IjqEAuaXv\nWwCgl6NEzT+/WewPTGcwZY+p
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n7QCghW65cZTQlD1bBlIq/QM8bz9AN4G0J0FsZmEgVGVzdCAoZGVtbyBrZXkpIDxh\nbGZhQGV4YW1wbG
UubmV0PohVBBMRAgAVBQI247hYAwsKAwMVAwIDFgIBAheAAAoJ\nEC1yfMdoaXc0t8IAoJPwa6j+Vm5V
i3Nvuo8JZri4PJ/DAJ9dqbmaJdB8FdJnHfGh\n1rXK3y/JcrkBDQQ2448PEAQAnI3XH1f0uyN9fZnw72zsHMw706
g7EW29nD4UDQG4\nOzRZViSrUa5n39eI7QrfTO+1meVvs0y8F/PvFst5jH68rPLnGSrXz4sTl1T4cop1\nFBkquvC
AKwPLy0lE7jjtCyItOSwIOo8xoTfY4JEEXmcqsbm+KHv9yYSF/YK4Cf7b\nIzcAAwcD/Rnl5jKxoucDA96pD282
9TKsLFQSau+Xiy8bvOSSDdlyABsOkNBSaeKO\n3eAQEKgDM7dzjVNTnAlpQ0EQ8Y9Z8pxOWYEQYlaMrnR
BC4DZ2IadzEhLlIOz5BVp\n/jfhrr8oVVBwKZXsrz9PZLz+e4Yn+siUUvlei9boD9L2ZgSOHakPiEYEGBECAAY
F\nAjbjjw8ACgkQLXJ8x2hpdzQgqQCfcDXmD8uNVdKg/C9vqI3JSndqknsAnRxzVeHi\n/iJ73OCKtvFrHbV9Gog
q\n=6f6v\n-----END
 PGP PUBLIC KEY BLOCK-----\n",
  "sec-fprs":  ["A0FF4590BB6122EDEF6E3C542D727CC768697734"]
}
{
  "dec_info":  {
    "wrong_key_usage":  false,
      "is_de_vs":  false,
      "is_mime":  false,
      "legacy_cipher_nomdc":  false,
      "recipients":  [{
        "pubkey_algo_name":  "ELG-E",
        "status_string":  "Success",
        "status_code":  0
      }]
  },
  "type": "plaintext",
  "base64": false,
  "data": "Hello\n"
}
##Sketch 1 2
document()
layout('A4',1)
fp((0,0,0))
ft(1)
Fn('Helvetica-Bold')
Fs(18)
dstyle('Text')
fp((0,1,0.498))
ft(1)
lp((0,0,0))

```
lw(0.283465)
lc(1)
lj(0)
ld(())
la1()
la2()
dstyle('Application Box')
layer('Layer 1',1,1,0,0,(0,0,0))
lw(1)
r(0,0,0,0,688.145,44.1554)
lw(1)
r(0,0,0,0,682.363,85.0359)
lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(605.383,329.758,0)
bs(605.383,230.546,0)
lw(1)
r(0,0,0,0,807.414,53.6148)
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(480.134,240.945,0)
bs(480.358,325.277,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(474.803,432.284,0)
bs(475.334,360.243,0)
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(354.331,432.284,0)
bs(352.806,361.417,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(212.598,432.284,0)
bs(212.598,361.417,0)
fp((0.999,1,0.4))
lw(0.283465)
r(70.5968,0,0,-56.6929,191.608,488.976,0.0603744,0.151107)
lw(1)
```

```
r(0,0,0,0,88.5492,390.805)
lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(226.772,524.409,0)
bs(226.772,488.976,0)
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(403.937,528.718,0)
bs(403.937,488.976,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1,
 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(240.945,432.284,0)
bs(240.574,394.994,0)
bs(595.276,396.85,0)
bs(595.276,361.417,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(333.071,432.284,0)
bs(333.07,425.196,0)
bs(333.07,382.677,0)
bs(240.945,382.677,0)
bs(240.945,361.417,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.347,318.897,354.331,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica-Bold')
Fs(10)
txt('GPG',(1,0,0,0.905764,344.004,335.686))
G_()
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.3464,446.763,354.33,0.0670228,0.151107)
fp((0,0,0))
le()
```

```
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('GpgConf',(0.552654,0,0,0.500564,481.802,340.184),1,1)
G_()
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.347,191.338,354.331,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('GpgSM',(0.552654,0,0,0.500574,226.376,340.185),1,1)
G_()
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(347.244,325.984,0)
bs(347.244,325.984,0)
bs(347.244,255.118,0)
bs(304.724,255.118,0)
bs(304.724,226.771,0)
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(233.858,325.984,0)
bs(233.858,255.118,0)
bs(276.378,255.118,0)
bs(276.378,226.771,0)
fp((0,0,0))
le()
lw(1)
Fn('Palatino-Roman')
txt('2008-07-17',(0.608301,0,0,0.608301,708.661,65.8308))
lw(1)
r(0,0,0,0,750.427,153.265)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1,
 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(219.685,325.984,0)
bs(219.685,198.425,0)
```

```
bs(219.685,162.992,0)
G()
fp((1,1,1))
lw(0.283465)
r(113.386,0,0,-42.5196,35.4333,162.992,0.0670228,0.151107)
fp((0,0,0))
lw(0.283465)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('LDAP
 Server',(0.552654,0,0,0.552654,92.1261,148.819),1,1)
fp((0,0,0))
lw(0.283465)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('(CRLs, Certificates)',(0.552654,0,0,0.552654,92.1261,134.646),1,1)
G_()
G()
fp((1,1,1))
lw(0.283465)
r(113.386,0,0,-42.5196,35.4331,99.2125,0.0670228,0.151107)
fp((0,0,0))
lw(0.283465)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('HTTP Server',(0.552654,0,0,0.552654,92.1259,85.0394),1,1)
fp((0,0,0))
lw(0.283465)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('(CRLs)',(0.552654,0,0,0.552654,92.1259,70.8662),1,1)
G_()
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.866,0,0,-31.2962,191.338,158.855,0.0670228,0.151107)
```

```
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('DirMngr',(0.552654,0,0,0.552654,224.02,142.978),1,1)
G_()
lw(2)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(219.15,126.18,0)
bs(219.685,77.9528,0)
bs(155.906,77.9528,0)
lp((0.392,0.584,0.929))
lw(3)
b()
bs(233.858,127.559,0)
bs(233.858,99.2125,0)
bs(276.378,99.2125,0)
bs(276.378,85.0393,0)
lp((0.392,0.584,0.929))
lw(3)
b()
bs(248.031,127.559,0)
bs(248.031,113.386,0)
bs(375.59,113.386,0)
bs(375.59,85.0393,0)
G()
fp((1,0.647,0.31))
lw(0.283465)
r(99.2124,0,0,-28.3464,333.07,85.0393,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Certificate
 Cache',(0.552654,0,0,0.552654,382.606,69.8548),1,1)
fp((1,0.647,0.31))
lw(0.283465)
r(70.5589,0,0,-28.3464,248.031,85.0393,0.0670228,0.151107)
fp((0,0,0))
le()
```

```
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('CRL Cache',(0.552654,0,0,0.552654,284.147,70.6936),1,1)
G_()
lw(1)
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(503.149,240.945,0)
bs(503.149,283.464,0)
bs(588.189,283.465,0)
bs(588.189,325.984,0)
lw(1)
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(503.149,283.464,0)
bs(503.149,283.464,0)
bs(361.417,283.464,0)
bs(361.417,325.984,0)
lw(1)
la2(([(-4.0,
 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(361.417,283.464,0)
bs(205.512,283.465,0)
bs(205.512,325.984,0)
lw(1)
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(574.015,85.0393,0)
bs(574.015,141.732,0)
bs(262.204,141.732,0)
lw(1)
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(602.361,85.0393,0)
bs(602.361,170.079,0)
bs(439.37,170.079,0)
bs(439.37,311.811,0)
bs(460.629,311.811,0)
bs(460.629,325.984,0)
lw(1)
ld((5, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(389.763,240.945,0)
bs(389.763,269.291,0)
```

```
bs(290.551,269.291,0)
bs(290.551,340.157,0)
bs(262.204,340.157,0)
lw(1)
ld((5, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(389.763,269.291,0)
bs(559.843,269.291,0)
bs(559.843,333.071,0)
bs(574.016,333.071,0)
lw(1)
ld((5, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(488.976,85.0393,0)
bs(488.976,127.559,0)
bs(389.763,127.559,0)
bs(389.763,212.598,0)
lw(2)
ld((1,
 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(205.512,127.559,0)
bs(205.512,113.386,0)
bs(170.079,113.386,0)
bs(170.079,141.732,0)
bs(155.906,141.732,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(622.961,356.76,0)
bs(622.961,518.503,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.3459,573.199,354.33,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('GpgAgent',(0.552654,0,0,0.500554,608.238,340.185),1,1)
G_()
```

```
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(721.712,467.717,0)
bs(721.712,297.838,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.3464,686.278,297.637,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('SCdaemon',(0.552654,0,0,0.500564,721.316,283.492),1,1)
G_()
fp((1,0.647,0.31))
lw(0.283465)
lj(1)
r(86.162,0,0,-117.493,679.192,566.929,0.181818,0.333333)
G()
fp((0,0,0))
le()
lw(1)
Fn('Helvetica-Bold')
Fs(18)
txt('Smartcard',(0.552654,0,0,0.552654,698.127,491.036))
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-31.2962,686.279,557.593,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('Card
 Reader',(0.552654,0,0,0.552654,721.318,541.975),1,1)
G_()
G()
fp((0.999,1,0.4))
lw(0.283465)
r(73.6353,0,0,-41.2944,587.066,565.703,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
```

```
Fs(14)
style('Text')
txt('PIN Entry',(0.57675,0,0,0.729211,623.632,545.097),1,1)
G_()
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(643.758,340.157,0)
bs(643.758,340.157,0)
bs(707.539,340.158,0)
bs(707.539,304.724,0)
lw(1)
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(574.016,283.465,0)
bs(587.066,283.464,0)
bs(686.278,283.464,0)
G()
lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(98.9053,325.985,0)
bs(98.9053,240.945,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.3464,63.7795,354.331,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('WatchGnuPG',(0.552654,0,0,0.552654,98.8185,338.713),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(70.5589,0,0,-28.1194,63.7795,240.718,0.0670228,0.168178)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('Log
```

```
 Socket',(0.552654,0,0,0.552654,98.8175,225.1),1,1)
G_()
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(85.0392,0,0,-28.3464,446.457,240.945,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Config Files',(0.552654,0,0,0.552654,485.621,226.772),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(85.0392,0,0,-28.3464,545.669,85.0394,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Config Files',(0.552654,0,0,0.552654,584.834,70.8662),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(84.6546,0,0,-27.3609,347.245,239.959,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Help
 Files',(0.552654,0,0,0.552654,388.252,224.705),1,1)
G_()
G()
fp((1,0.647,0.31))
```

```
lw(0.283465)
r(84.6546,0,0,-27.3609,446.457,85.0394,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Help Files',(0.552654,0,0,0.552654,487.464,69.7854),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(85.0392,0,0,-28.3464,248.032,240.945,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Keybox Files',(0.552654,0,0,0.552654,289.59,226.322),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(70.866,0,0,-28.3464,574.016,240.945,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Private Keys',(0.552654,0,0,0.552654,609.449,226.772),1,1)
G_()
G()
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
```

```
Fs(24)
txt('Scute',(0.552654,0,0,0.599958,224.978,465.775),1,1)
fp((0,0,0))
le()
lw(1)
Fn('Times-Roman')
Fs(10)
txt('(pkcs#11)',(1,0,0,1.08559,206.081,445.011))
G_()
G()
fp((0.999,1,0.4))
lw(0.283465)
r(198.827,0,0,-56.6929,304.322,488.976,0.0603744,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(36)
txt('GPGME
 Library',(0.552654,0,0,0.552654,404.952,457.853),1,1)
G_()
G()
lw(1)
style('Application Box')
r(197.598,0,0,-42.5187,304.724,566.928,0.0152672,0.0677968)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
txt('GPGME aware Application',(0.98062,0,0,0.937018,334.892,540.985))
G_()
G()
lw(1)
style('Application Box')
r(127.829,0,0,-41.7496,162.992,566.159,0.0152672,0.0677968)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
txt('Legacy Application',(174.688,540.01))
G_()
G()
G()
lp((0.392,0.584,0.929))
lw(4.25197)
```

```
b()
bs(749.296,162.296,0)
bs(705.89,162.296,0)
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0,
 -3.0), (-4.0, 3.0)], 1))
b()
bs(705.89,100.083,0)
bs(744.472,100.083,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(705.89,131.189,0)
bs(744.472,131.189,0)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('execute/access',(0.31891,0,0,0.280771,726.951,87.3768),1,1)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('closely linked',(0.31891,0,0,0.280771,724.715,149.589),1,1)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('Assuan protocol',(0.31891,0,0,0.280771,728.535,118.483),1,1)
G_()
lw(1)
r(56.6929,0,0,-92.126,701.575,170.079)
G_()
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(248.031,325.984,0)
```

bs(248.031,297.638,0)
bs(538.583,297.638,0)
bs(538.583,340.157,0)
bs(566.929,340.157,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(375.591,325.984,0)
bs(375.591,304.724,0)
bs(531.496,304.724,0)
bs(531.496,347.244,0)
bs(566.929,347.244,0)
guidelayer('Guide
 Lines',1,0,0,1,(0,0,1))
grid((0,0,7.08661,7.08661),1,(0,0,1),'Grid')
00~0
 *H
0k10 UDE10U
Dsseldorf10U

g10 Code GmbH10UAegypten Project10Utest cert 10
011203093638Z
021203093638Z0k10 UDE10U
Dsseldorf10U

g10 Code GmbH10UAegypten Project10Utest cert 100
 *H
0l+Pu.\-ZT$e'nE&h4<}BePm[%j-/7PcHKi@FKy~npcd${]K~Q00U37Tq8_eK40U#037Tq8_eK4om0k10 UDE10U
Dsseldorf10U

g10 Code GmbH10UAegypten Project10Utest cert 10U00
 *H
l8gD Z
wYL,M'j
pk2pf|L ;Rl}#h$~O!9;3e\A'v&P^$'Oc.-TS~A>:fQY<
# -*- mode: org -*-
#+TITLE: GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltxtra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

* Introduction
 :PROPERTIES:
 :CUSTOM_ID: intro
 :END:

| Version: | 0.1.5 |
| GPGME Version: | 1.13.0 |
| Author: | Ben McGinnes <ben@gnupg.org> |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language: | Australian English, British English |
| Language codes: | en-AU, en-GB, en |

This document provides basic instruction in how to use the GPGME
Python bindings to programmatically leverage the GPGME library.

** Python 2 versus Python
 3
  :PROPERTIES:
  :CUSTOM_ID: py2-vs-py3
  :END:

Though the GPGME Python bindings themselves provide support for both
Python 2 and 3, the focus is unequivocally on Python 3 and
specifically from Python 3.4 and above.  As a consequence all the
examples and instructions in this guide use Python 3 code.

Much of it will work with Python 2, but much of it also deals with
Python 3 byte literals, particularly when reading and writing data.
Developers concentrating on Python 2.7, and possibly even 2.6, will
need to make the appropriate modifications to support the older string
and unicode types as opposed to bytes.

There are multiple reasons for concentrating on Python 3; some of
which relate to the immediate integration of these bindings, some of
which relate to longer term plans for both GPGME and the python
bindings and some of which relate to the impending EOL period for
Python 2.7.  Essentially, though, there is little value in tying the
bindings to a version of the language which
 is a dead end and the
advantages offered by Python 3 over Python 2 make handling the data
types with which GPGME deals considerably easier.

** Examples
  :PROPERTIES:
  :CUSTOM_ID: howto-python3-examples

:END:

All of the examples found in this document can be found as Python 3
scripts in the =lang/python/examples/howto= directory.

** Unofficial Drafts
:PROPERTIES:
:CUSTOM_ID: unofficial-drafts
:END:

In addition to shipping with each release of GPGME, there is a section
on locations to read or download [[#draft-editions][draft editions]] of this document from
at the end of it. These are unofficial versions produced in between
major releases.

** What's New
:PROPERTIES:
:CUSTOM_ID: new-stuff
:END:

Full details of what is new are now available in the [[file:what-is-new.org][What's New]] file
and archives of the preceding /What's New/ sections are available in
the [[file:what-was-new][What Was New]] file.

*** New in GPGME 1130
:PROPERTIES:
:CUSTOM_ID:
new-stuff-1-13-0
:END:

See the [[file:what-is-new#new-stuff-1-13-0][What's New]] document for what is new in version 1.13.0.

*** New in GPGME 1120
:PROPERTIES:
:CUSTOM_ID: new-stuff-1-12-0
:END:

See the [[file:what-was-new#new-stuff-1-12-0][What Was New]] document for what was new in version 1.12.0.

* GPGME Concepts
:PROPERTIES:
:CUSTOM_ID: gpgme-concepts
:END:

** A C API
:PROPERTIES:
:CUSTOM_ID: gpgme-c-api
:END:

Unlike many modern APIs with which programmers will be more familiar with these days, the GPGME API is a C API. The API is intended for use by C coders who would be able to access its features by including the =gpgme.h= header file with their own C source code and then access its functions just as they would any other C headers.

This is a very effective method of gaining complete access to the API and in the most efficient manner possible. It does, however, have the drawback that it cannot be directly used by other languages without some
means of providing an interface to those languages. This is where the need for bindings in various languages stems.

** Python bindings
:PROPERTIES:
:CUSTOM_ID: gpgme-python-bindings
:END:

The Python bindings for GPGME provide a higher level means of accessing the complete feature set of GPGME itself. It also provides a more pythonic means of calling these API functions.

The bindings are generated dynamically with SWIG and the copy of =gpgme.h= generated when GPGME is compiled.

This means that a version of the Python bindings is fundamentally tied to the exact same version of GPGME used to generate that copy of =gpgme.h=.

** Difference between the Python bindings and other GnuPG Python packages
:PROPERTIES:
:CUSTOM_ID: gpgme-python-bindings-diffs
:END:

There have been numerous attempts to add GnuPG support to Python over the years. Some of the most well known are listed here, along with what differentiates them.

*** The python-gnupg package maintained
by Vinay Sajip
:PROPERTIES:
:CUSTOM_ID: diffs-python-gnupg
:END:

This is arguably the most popular means of integrating GPG with Python. The package utilises the =subprocess= module to implement wrappers for the =gpg= and =gpg2= executables normally invoked on the command line (=gpg.exe= and =gpg2.exe= on Windows).

The popularity of this package stemmed from its ease of use and capability in providing the most commonly required features.

Unfortunately it has been beset by a number of security issues in the past; most of which stemmed from using unsafe methods of accessing the command line via the =subprocess= calls. While some effort has been made over the last two to three years (as of 2018) to mitigate this, particularly by no longer providing shell access through those subprocess calls, the wrapper is still somewhat limited in the scope of its GnuPG features coverage.

The python-gnupg package is available under the MIT license.

*** The gnupg package created
and maintained by Isis Lovecruft
:PROPERTIES:
:CUSTOM_ID: diffs-isis-gnupg
:END:

In 2015 Isis Lovecruft from the Tor Project forked and then re-implemented the python-gnupg package as just gnupg. This new package also relied on subprocess to call the =gpg= or =gpg2= binaries, but did so somewhat more securely.

The naming and version numbering selected for this package, however, resulted in conflicts with the original python-gnupg and since its functions were called in a different manner to python-gnupg, the release of this package also resulted in a great deal of consternation when people installed what they thought was an upgrade that subsequently broke the code relying on it.

The gnupg package is available under the GNU General Public License version 3.0 (or any later version).

*** The PyME package maintained by Martin Albrecht

:PROPERTIES:
:CUSTOM_ID: diffs-pyme
:END:

This package is the origin of these bindings, though they are somewhat different now.
For details of when and how the PyME package was folded back into GPGME itself see the [[file:short-history.org][Short History]] document.[fn:1]

The PyME package was first released in 2002 and was also the first attempt to implement a low level binding to GPGME. In doing so it provided access to considerably more functionality than either the =python-gnupg= or =gnupg= packages.

The PyME package is only available for Python 2.6 and 2.7.

Porting the PyME package to Python 3.4 in 2015 is what resulted in it being folded into the GPGME project and the current bindings are the end result of that effort.

The PyME package is available under the same dual licensing as GPGME itself: the GNU General Public License version 2.0 (or any later version) and the GNU Lesser General Public License version 2.1 (or any later version).

* GPGME Python bindings installation
:PROPERTIES:
:CUSTOM_ID: gpgme-python-install
:END:

** No PyPI
:PROPERTIES:
:CUSTOM_ID: do-not-use-pypi
:END:

Most third-party Python packages and modules are available and distributed through the Python Package Installer, known as PyPI.

Due to the nature of what these bindings are and how they work, it is infeasible to install the GPGME Python bindings in the same way.

This is because the bindings use SWIG to dynamically generate C bindings against =gpgme.h= and =gpgme.h= is generated from =gpgme.h.in= at compile time when GPGME is built from source. Thus to include a package in PyPI which actually built correctly would require

either statically built libraries for every architecture bundled with
it or a full implementation of C for each architecture.

See the additional notes regarding [[#snafu-cffi][CFFI and SWIG]] at the end of this
section for further details.

** Requirements
  :PROPERTIES:
  :CUSTOM_ID: gpgme-python-requirements
  :END:

The GPGME Python bindings only have three requirements:

1. A suitable version of Python 2 or Python 3.  With Python 2 that
  means CPython
 2.7 and with Python 3 that means CPython 3.4 or
  higher.
2. [[https://www.swig.org][SWIG]].
3. GPGME itself.  Which also means that all of GPGME's dependencies
  must be installed too.

*** Recommended Additions
  :PROPERTIES:
  :CUSTOM_ID: gpgme-python-recommendations
  :END:

Though none of the following are absolute requirements, they are all
recommended for use with the Python bindings.  In some cases these
recommendations refer to which version(s) of CPython to use the
bindings with, while others refer to third party modules which provide
a significant advantage in some way.

1. If possible, use Python 3 instead of 2.
2. Favour a more recent version of Python since even 3.4 is due to
  reach EOL soon.  In production systems and services, Python 3.6
  should be robust enough to be relied on.
3. If possible add the following Python modules which are not part of
  the standard library: [[http://docs.python-requests.org/en/latest/index.html][Requests]],
[[https://cython.org/][Cython]],
 [[https://pendulum.eustace.io/][Pendulum]] and [[https://github.com/Selfnet/hkp4py][hkp4py]].

Chances are quite high that at least the first one and maybe two of
those will already be installed.

Note that, as with Cython, some of advanced use case scenarios will
bring with them additional requirements.  Most of these will be fairly

well known and commonly installed ones, however, which are in many cases likely to have already been installed on many systems or be familiar to Python programmers.

** Installation
:PROPERTIES:
:CUSTOM_ID: installation
:END:

Installing the Python bindings is effectively achieved by compiling and installing GPGME itself.

Once SWIG is installed with Python and all the dependencies for GPGME are installed you only need to confirm that the version(s) of Python you want the bindings installed for are in your =$PATH=.

By default GPGME will attempt to install the bindings for the most recent or highest version number of Python 2 and Python 3 it detects in =$PATH=. It specifically checks for the =python= and =python3= executables first and then checks for specific version numbers.

For Python 2 it checks for these executables in this order: =python=, =python2= and =python2.7=.

For Python 3 it checks for these executables in this order: =python3=, =python3.7=, =python3.6=, =python3.5= and =python3.4=.[fn:2]

On systems where =python= is actually =python3= and not =python2= it may be possible that =python2= may be overlooked, but there have been no reports of that actually occurring as yet.

In the three months or so since the release of Python 3.7.0 there has been extensive testing and work with these bindings with no issues specifically relating to the new version of Python or any of the new features of either the language or the bindings. This has also been the case with Python 3.7.1rc1. With that in mind and given the release of Python 3.7.1 is scheduled for around the same time as GPGME 1.12.0, the order of preferred Python versions has been changed to move Python 3.7 ahead of Python 3.6.

*** Installing GPGME
:PROPERTIES:
:CUSTOM_ID: install-gpgme
:END:

See the GPGME =README= file for details of how to install GPGME from source.

** Known Issues
:PROPERTIES:
:CUSTOM_ID: snafu
:END:

There are a few known issues with the current build process and the Python bindings. For the most part these are easily addressed should they be encountered.

*** Breaking Builds
:PROPERTIES:
:CUSTOM_ID: snafu-a-swig-of-this-builds-character
:END:

Occasionally when installing GPGME with the Python bindings included it may be observed that the =make= portion of that process induces a large very number of warnings and, eventually errors which end that part of the build process. Yet following that with =make check= and =make install= appears to work seamlessly.

The cause of this is related to the way SWIG needs to be called to dynamically generate the C bindings for GPGME in the first place. So the entire process will always produce =lang/python/python2-gpg/= and =lang/python/python3-gpg/= directories. These should contain the build output generated during compilation, including the complete bindings and module installed into =site-packages=.

Occasionally the errors in the early part or some other conflict (e.g. not installing as */root/* or */su/*) may result in nothing being installed to the relevant =site-packages= directory and the build directory missing a lot of expected files. Even when this occurs, the solution is actually quite simple and will always work.

That solution is simply to run the following commands as either the *root* user or prepended with =sudo -H=[fn:3] in the =lang/python/= directory:

#+BEGIN_SRC shell
/path/to/pythonX.Y setup.py build
/path/to/pythonX.Y setup.py build
/path/to/pythonX.Y setup.py install

#+END_SRC

Yes, the build command does need to be run twice.  Yes, you still need
to run the potentially failing or
 incomplete steps during the
=configure=, =make= and =make install= steps with installing GPGME.
This is because those steps generate a lot of essential files needed,
both by and in order to create, the bindings (including both the
=setup.py= and =gpgme.h= files).

**** IMPORTANT Note
:PROPERTIES:
:CUSTOM_ID: snafu-swig-build-note
:END:

If specifying a selected number of languages to create bindings for,
try to leave Python last.  Currently the majority of the other
language bindings are also preceding Python of either version when
listed alphabetically (not counting the Qt bindings).

If Python is set to precede one of the other languages then it is
possible that the errors described here may interrupt the build
process before generating bindings for those other languages.  In
these cases it may be preferable to configure all preferred language
bindings separately with alternative =configure= steps for GPGME using
the =--enable-languages=$LANGUAGE= option.

Alternatively
 =make= (or =gmake=, depending on your platform) may be
run with the the =-k= option, which tells make to keep going even if
errors are encountered.  In that case the failure of one language's
set of bindings to build should not hamper another language's bindings
to build.

*** Reinstalling Responsibly
:PROPERTIES:
:CUSTOM_ID: snafu-lessons-for-the-lazy
:END:

Regardless of whether you're installing for one version of Python or
several, there will come a point where reinstallation is required.
With most Python module installations, the installed files go into the
relevant site-packages directory and are then forgotten about.  Then
the module is upgraded, the new files are copied over the old and
that's the end of the matter.

While the same is true of these bindings, there have been intermittent issues observed on some platforms which have benefited significantly from removing all the previous installations of the bindings before installing the updated versions.

Removing
 the previous version(s) is simply a matter of changing to the relevant =site-packages= directory for the version of Python in question and removing the =gpg/= directory and any accompanying egg-info files for that module.

In most cases this will require root or administration privileges on the system, but the same is true of installing the module in the first place.

*** Multiple installations
  :PROPERTIES:
  :CUSTOM_ID: snafu-the-full-monty
  :END:

For a variety of reasons it may be either necessary or just preferable to install the bindings to alternative installed Python versions which meet the requirements of these bindings.

On POSIX systems this will generally be most simply achieved by running the manual installation commands (build, build, install) as described in the previous section for each Python installation the bindings need to be installed to.

As per the SWIG documentation: the compilers, libraries and runtime used to build GPGME and the Python Bindings *must*
 match those used to
compile Python itself, including the version number(s) (at least going by major version numbers and probably minor numbers too).

On most POSIX systems, including OS X, this will very likely be the case in most, if not all, cases.

Note that from GPGME [[https://dev.gnupg.org/rMff6ff616aea6f59b7f2ce1176492850ecdf3851e][1.12.1]] the default installation installs to each
version of Python it can find first.  That is that it will currently install for the first copies of Python versions 2.7, 3.4, 3.5, and so on up until the current dev branch that it finds.  Usually this will be in the same prefix as GPGME itself, but is dictated by the =$PATH= when the installation is performed.  The above instructions can still be performed on other python installations which the installer does not find, including alternative prefixes.

*** Won't Work With Windows
:PROPERTIES:
:CUSTOM_ID: snafu-runtime-not-funtime
:END:

There are semi-regular reports of Windows users
having considerable
difficulty in installing and using the Python bindings at all. Very
often, possibly even always, these reports come from Cygwin users
and/or MinGW users and/or Msys2 users. Though not all of them have
been confirmed, it appears that these reports have also come from
people who installed Python using the Windows installer files from the
[[https://python.org][Python website]] (i.e. mostly MSI installers, sometimes self-extracting
=.exe= files).

The Windows versions of Python are not built using Cygwin, MinGW or
Msys2; they're built using Microsoft Visual Studio. Furthermore the
version used is /considerably/ more advanced than the version which
MinGW obtained a small number of files from many years ago in order to
be able to compile anything at all. Not only that, but there are
changes to the version of Visual Studio between some micro releases,
though that is is particularly the case with Python 2.7, since it has
been kept around far longer than it should have
been.

There are two theoretical solutions to this issue:

1. Compile and install the GnuPG stack, including GPGME and the
   Python bindings using the same version of Microsoft Visual Studio
   used by the Python Foundation to compile the version of Python
   installed.

   If there are multiple versions of Python then this will need to be
   done with each different version of Visual Studio used for those
   versions of Python.

2. Compile and install Python using the same tools used by choice,
   such as MinGW or Msys2.

Do *not* use the official Windows installer for Python unless
following the first method.

In this type of situation it may even be for the best to accept that
there are less limitations on permissive software than free software
and simply opt to use a recent version of the Community Edition of

Microsoft Visual Studio to compile and build all of it, no matter what.

Investigations into the extent or the limitations of this issue are ongoing.

The following table lists the version of Microsoft Visual Studio which needs to be used when compiling GPGME and the Python bindings with each version of the CPython binary released [[https://www.python.org/downloads/windows/][for Windows]]:

| CPython | Microsoft product name | runtime filename |
|---|---|---|
| 2.7.6 | Visual Studio 2008 | MSVCR90.DLL |
| 3.4.0 | Visual Studio 2010 | MSVCR100.DLL |
| 3.5.0 | Visual Studio 2015 | *see below* |
| 3.6.0 | Visual Studio 2015 | *see below* |
| 3.7.0 | Visual Studio 2017* | *see below* |

It is important to note that MingW and Msys2 ship with the Visual C runtime from Microsoft Visual Studio 2005 and are thus *incompatible* with all the versions of CPython which can be used with the GPGME Python bindings.

It is also important to note that from CPython 3.5 onwards, the Python Foundation has adopted the reworking of the Visual C runtime which was performed for Visual Studio 2015 and aimed at resolving many of these kinds of issues. Much greater detail on these issues and the correct file(s) to link to are available from Matthew Brett's invaluable page, [[https://matthew-brett.github.io/pydagogue/python_msvc.html][Using Microsoft Visual C with Python]]. It is also worth reading the Microsoft Developer Network blog post on [[http://blogs.msdn.com/b/vcblog/archive/2015/03/03/introducing-the-universal-crt.aspx][the universal CRT]] and Steve Dower's blog posts on Python extensions ([[http://stevedower.id.au/blog/building-for-python-3-5][part 1]] and [[http://stevedower.id.au/blog/building-for-python-3-5-part-two][part 2]]).

The second of those two posts by Steve Dower contains the details of specific configuration options required for compiling anything to be used with official CPython releases. In addition to those configuration and compiler settings to use, the versions of Visual Studio prior to Visual Studio 2015 did not support 64-bit systems by default. So compiling a 64-bit version of these bindings for a 64-bit version of CPython 2.7 or 3.4 requires additional work.

In addition to the blog posts, the [[https://wiki.python.org/moin/WindowsCompilers][Windows compilers]] wiki page on the CPython wiki is another essential reference on the relevant versions

of Visual Studio to use and the degree of compatibility with CPython releases.

Eventually someone will ask why there isn't an installable binary for Windows, which the GPGME of the licenses do not preclude as long as the source code is available in conjunction with such a release.

The sheer number of versions of Visual Studio in conjunction with differing configuration options depending on the target Windows version and whether the architecture is 64-bit or 32-bit makes it difficult to provide a correct binary installer for Windows users. At the bare minimum doing so would require the GnuPG project compile ten different versions of the bindings with each release; both 32-bit and 64-bit versions for CPython 2.7 and 3.4,
with 64-bit versions for both
x86-64 (i.e. Intel and AMD) and ARM architectures for CPython 3.5, 3.6, 3.7 and later releases. That's the bare *minimum*, it'd probably be higher.

Additionally, with only a binary installation used in conjunction with the CPython installer from =python.org= the advanced options available which utilise [[#cython][Cython]] will not be able to be used at all. Cython depends on being able to compile the C code it generates and that too would need to utilise a matching runtime to both the installed version of CPython and these bindings in order to work with the bindings.

Considering all of that, what do we recommend?

1. Use a recent version of CPython; at least 3.5, but ideally 3.6 or later.

2. Use Visual Studio 2015 or the standalone build tools for Visual Studio 2017 (or later).

3. Compile both CPython and GPGME with these bindings using the tools selected in step 2.

4. Ignore MingW, Msys2 and the official CPython binary installers.

5. Be thankful the answer to this question wasn't simply to say something like, install Linux or install FreeBSD (or even Apple's OS X).

*** CFFI is the Best and GPGME should use it instead of SWIG
:PROPERTIES:
:CUSTOM_ID: snafu-cffi
:END:

There are many reasons for favouring [[https://cffi.readthedocs.io/en/latest/overview.html][CFFI]] and proponents of it are
quite happy to repeat these things as if all it would take to switch
from SWIG to CFFI is repeating that list as if it were a new concept.

The fact is that there are things which Python's CFFI implementation
cannot handle in the GPGME C code. Beyond that there are features of
SWIG which are simply not available with CFFI at all. SWIG generates
the bindings to Python using the =gpgme.h= file, but that file is not
a single version shipped with each release, it too is generated when
GPGME is compiled.

CFFI is currently unable to adapt to such a potentially mutable
codebase. If there were some means of
applying SWIG's dynamic code
generation to produce the Python/CFFI API modes of accessing the GPGME
libraries (or the source source code directly), but such a thing does
not exist yet either and it currently appears that work is needed in
at least one of CFFI's dependencies before any of this can be
addressed.

So if you're a massive fan of CFFI; that's great, but if you want this
project to switch to CFFI then rather than just insisting that it
should, I'd suggest you volunteer to bring CFFI up to the level this
project needs.

If you're actually seriously considering doing so, then I'd suggest
taking the =gpgme-tool.c= file in the GPGME =src/= directory and
getting that to work with any of the CFFI API methods (not the ABI
methods, they'll work with pretty much anything). When you start
running into trouble with "ifdefs" then you'll know what sort of
things are lacking. That doesn't even take into account the amount of
work saved via SWIG's code generation techniques either.

***
Virtualised Environments
:PROPERTIES:
:CUSTOM_ID: snafu-venv
:END:

It is fairly common practice amongst Python developers to, as much as
possible, use packages like virtualenv to keep various things that are
to be installed from interfering with each other. Given how much of
the GPGME bindings is often at odds with the usual pythonic way of
doing things, it stands to reason that this would be called into
question too.

As it happens the answer as to whether or not the bindings can be used
with virtualenv, the answer is both yes and no.

In general we recommend installing to the relevant path and matching
prefix of GPGME itself. Which means that when GPGME, and ideally the
rest of the GnuPG stack, is installed to a prefix like =/usr/local= or
=/opt/local= then the bindings would need to be installed to the main
Python installation and not a virtualised abstraction. Attempts to
separate the two in the past have been known to cause weird and
intermittent errors ranging from
minor annoyances to complete failures
in the build process.

As a consequence we only recommend building with and installing to the
main Python installations within the same prefix as GPGME is installed
to or which are found by GPGME's configuration stage immediately prior
to running the make commands. Which is exactly what the compiling and
installing process of GPGME does by default.

Once that is done, however, it appears that a copy of the compiled
module may be installed into a virtualenv of the same major and minor
version matching the build. Alternatively it is possible to utilise a
=sites.pth= file in the =site-packages/= directory of a virtualenv
installation, which links back to the system installations
corresponding directory in order to import anything installed system
wide. This may or may not be appropriate on a case by case basis.

Though extensive testing of either of these options is not yet
complete, preliminary testing of them indicates that both are viable
as
long as the main installation is complete. Which means that
certain other options normally restricted to virtual environments are
also available, including integration with pythonic test suites
(e.g. [[https://docs.pytest.org/en/latest/index.html][pytest]]) and other large projects.

That said, it is worth reiterating the warning regarding non-standard
installations. If one were to attempt to install the bindings only to
a virtual environment without somehow also including the full GnuPG
stack (or enough of it as to include GPGME) then it is highly likely
that errors would be encountered at some point and more than a little
likely that the build process itself would break.

If a degree of separation from the main operating system is still
required in spite of these warnings, then consider other forms of
virtualisation. Either a virtual machine (e.g. [[https://www.virtualbox.org/][VirtualBox]]), a
hardware emulation layer (e.g. [[https://www.qemu.org/][QEMU]]) or an application container
(e.g.

[[https://www.docker.com/why-docker][Docker]]).

Finally it should be noted that the limited tests conducted thus far have been using the =virtualenv= command in a new directory to create the virtual python environment. As opposed to the standard =python3 -m venv= and it is possible that this will make a difference depending on the system and version of Python in use. Another option is to run the command =python3 -m virtualenv /path/to/install/virtual/thingy= instead.

*** Post installation
:PROPERTIES:
:CUSTOM_ID: snafu-docs
:END:

Following installation it is recommended to move the =post_installer.py= script from the =lang/python/examples/howto/= directory to the =lang/python/= directory and run it. This will fix or restore files needed by Sphinx which may be removed during a distribution build for release. It will also generate reST files from Org mode files with Pandoc and generate Texinfo files from Org mode files with GNU Emacs and Org mode (in batch mode). Additionally it will fix the UTF-8 declaration line in the Texinfo files (Emacs expects "UTF-8" to be "utf-8").

* Fundamentals
:PROPERTIES:
:CUSTOM_ID: howto-fund-a-mental
:END:

Before we can get to the fun stuff, there are a few matters regarding GPGME's design which hold true whether you're dealing with the C code directly or these Python bindings.

** No REST
:PROPERTIES:
:CUSTOM_ID: no-rest-for-the-wicked
:END:

The first part of which is or will be fairly blatantly obvious upon viewing the first example, but it's worth reiterating anyway. That being that this API is /*not*/ a REST API. Nor indeed could it ever be one.

Most, if not all, Python programmers (and not just Python programmers) know how easy it is to work with a RESTful API. In fact they've become so popular that many other APIs attempt to emulate REST-like behaviour as much as they are able. Right down to the use of JSON formatted output to facilitate the use of their API without having to retrain developers.

This API does not do that. It would not be able to do that and also provide access to the entire C API on which it's built. It does, however, provide a very pythonic interface on top of the direct bindings and it's this pythonic layer that this HOWTO deals with.

** Context
:PROPERTIES:
:CUSTOM_ID: howto-get-context
:END:

One of the reasons which prevents this API from being RESTful is that most operations require more than one instruction to the API to perform the task. Sure, there are certain functions which can be performed simultaneously, particularly if the result known or strongly anticipated (e.g. selecting and encrypting to a key known to be in the public keybox).

There are many more, however, which cannot be manipulated so readily: they must be performed in a specific sequence and the result of one operation has a direct bearing on the outcome of subsequent operations. Not merely by generating an error either.

When dealing with this type of persistent state on the web, full of both the RESTful and REST-like, it's most commonly referred to as a session. In GPGME, however, it is called a context and every operation type has one.

* Working with keys
:PROPERTIES:
:CUSTOM_ID: howto-keys
:END:

** Key selection
:PROPERTIES:
:CUSTOM_ID: howto-keys-selection
:END:

Selecting keys to encrypt to or to sign with will be a common occurrence when working with GPGMe and the means available for doing so are quite simple.

They do depend on utilising a Context; however once the data is recorded in another variable, that Context does not need to be the same one which subsequent operations are performed.

The easiest way to select a specific key is by searching for that key's key ID or fingerprint, preferably the full fingerprint without any spaces in it. A long key ID will probably be okay, but is not advised and short key IDs are already a problem with some being generated to match specific patterns. It does not matter whether the pattern is upper or lower case.

So this is the best method:

```
#+BEGIN_SRC python -i
import gpg

k = gpg.Context().keylist(pattern="258E88DCBD3CD44D8E7AB43F6ECB6AF0DEADBEEF")
keys = list(k)
#+END_SRC
```

This is passable and very likely to be common:

```
#+BEGIN_SRC python -i
import gpg

k = gpg.Context().keylist(pattern="0x6ECB6AF0DEADBEEF")
keys = list(k)
#+END_SRC
```

And this is a really bad idea:

```
#+BEGIN_SRC python -i
import gpg

k = gpg.Context().keylist(pattern="0xDEADBEEF")
keys = list(k)
#+END_SRC
```

Alternatively it may be that the intention is to create a list of keys which all match a particular search string. For instance all the addresses at a particular domain, like this:

```
#+BEGIN_SRC python -i
import gpg

ncsc = gpg.Context().keylist(pattern="ncsc.mil")
nsa = list(ncsc)
#+END_SRC
```

*** Counting keys
:PROPERTIES:
:CUSTOM_ID: howto-keys-counting
:END:

Counting the number of keys in your public keybox (=pubring.kbx=), the format which has superseded the old keyring format (=pubring.gpg= and =secring.gpg=), or the number of secret keys is a very simple task.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

print("""
 Number of secret keys:  {0}
 Number of public keys:  {1}
""".format(secnum, pubnum))
#+END_SRC
```

NOTE: The [[#cython][Cython]] introduction in the [[#advanced-use][Advanced and Experimental]] section uses this same key counting code with Cython to demonstrate some areas where Cython can improve performance even with the bindings.  Users with large public keyrings or keyboxes, for instance, should consider these options if they are comfortable with using Cython.

** Get key
:PROPERTIES:
:CUSTOM_ID: howto-get-key

:END:

An alternative method of getting a single key via its fingerprint is available directly within a Context with =Context().get_key=. This is the preferred method of selecting a key in order to modify it, sign or certify it and for obtaining relevant data about a single key as a part of other functions; when verifying a signature made by that key, for instance.

By default this method will select public keys, but it can select secret keys as well.

This first example demonstrates selecting the current key of Werner Koch, which is due to expire at the end of 2018:

```
#+BEGIN_SRC python -i
import gpg

fingerprint = "80615870F5BAD690333686D0F2AD85AC1E42B367"
key = gpg.Context().get_key(fingerprint)
#+END_SRC
```

Whereas this example demonstrates selecting the author's current key with the =secret= key word argument set to =True=:

```
#+BEGIN_SRC python -i
import gpg

fingerprint = "DB4724E6FA4286C92B4E55C4321E4E2373590E5D"
key = gpg.Context().get_key(fingerprint, secret=True)
#+END_SRC
```

It is, of course, quite possible to select expired, disabled and revoked keys with this function, but only to effectively display information about those keys.

It is also possible to use both unicode or string literals and byte literals with the fingerprint when getting a key in this way.

** Importing keys
:PROPERTIES:
:CUSTOM_ID: howto-import-key
:END:

Importing keys is possible with the =key_import()= method and takes

one argument which is a bytes literal object containing either the binary or ASCII armoured key data for one or more keys.

The following example retrieves one or more keys from the SKS keyservers via the web using the requests module. Since requests returns the content as a bytes literal object, we can then use that directly to import the resulting data into our keybox.

```
#+BEGIN_SRC python -i
import gpg
import os.path
import requests

c = gpg.Context()
url = "https://sks-keyservers.net/pks/lookup"
pattern = input("Enter the pattern to search for key or user IDs: ")
payload = {"op": "get", "search": pattern}

r = requests.get(url, verify=True, params=payload)
result
 = c.key_import(r.content)

if result is not None and hasattr(result, "considered") is False:
   print(result)
elif result is not None and hasattr(result, "considered") is True:
   num_keys = len(result.imports)
   new_revs = result.new_revocations
   new_sigs = result.new_signatures
   new_subs = result.new_sub_keys
   new_uids = result.new_user_ids
   new_scrt = result.secret_imported
   nochange = result.unchanged
   print("""
 The total number of keys considered for import was:  {0}

    Number of keys revoked:  {1}
  Number of new signatures:  {2}
     Number of new subkeys:  {3}
    Number of new user IDs:  {4}
 Number of new secret keys:  {5}
  Number of unchanged keys:  {6}

 The key IDs for all considered keys were:
""".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scrt,
          nochange))
   for i in range(num_keys):
       print("{0}\n".format(result.imports[i].fpr))
else:
```

```
   pass
#+END_SRC
```

NOTE: When searching for a key ID of any length
 or a fingerprint
(without spaces), the SKS servers require the the leading =0x=
indicative of hexadecimal be included.  Also note that the old short
key IDs (e.g. =0xDEADBEEF=) should no longer be used due to the
relative ease by which such key IDs can be reproduced, as demonstrated
by the Evil32 Project in 2014 (which was subsequently exploited in
2016).

Testing for whether a string in any given search is or may be a
hexadecimal value which may be missing the leading =0x= is a simple
matter of using a try/except statement which attempts to convert the
string as hex to an integer and then back to hex; then using that to
search with.  Raising a ValueError simply results in treating the
string as a string.  This is the method and logic utilised in the
=import-keys-hkp.py= script (see below).

*** Working with ProtonMail
```
   :PROPERTIES:
   :CUSTOM_ID: import-protonmail
   :END:
```

Here is a variation on the example above which checks the constrained
ProtonMail keyserver for ProtonMail
 public keys.

```
#+BEGIN_SRC python -i
import gpg
import requests
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it.
""")

c = gpg.Context(armor=True)
url = "https://api.protonmail.ch/pks/lookup"
ksearch = []

if len(sys.argv) >= 2:
   keyterm = sys.argv[1]
else:
   keyterm = input("Enter the key ID, UID or search string: ")
```

```
if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
   ksearch.append(keyterm[1:])
   ksearch.append(keyterm[1:])
   ksearch.append(keyterm[1:])
elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
   ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
   ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
   ksearch.append("{0}@pm.me".format(keyterm[1:]))
elif keyterm.count("@") == 0:
   ksearch.append("{0}@protonmail.com".format(keyterm))
   ksearch.append("{0}@protonmail.ch".format(keyterm))
   ksearch.append("{0}@pm.me".format(keyterm))
elif keyterm.count("@") ==
 2 and keyterm.startswith("@") is False:
   uidlist = keyterm.split("@")
   for uid in uidlist:
       ksearch.append("{0}@protonmail.com".format(uid))
       ksearch.append("{0}@protonmail.ch".format(uid))
       ksearch.append("{0}@pm.me".format(uid))
elif keyterm.count("@") > 2:
   uidlist = keyterm.split("@")
   for uid in uidlist:
       ksearch.append("{0}@protonmail.com".format(uid))
       ksearch.append("{0}@protonmail.ch".format(uid))
       ksearch.append("{0}@pm.me".format(uid))
else:
   ksearch.append(keyterm)

for k in ksearch:
   payload = {"op": "get", "search": k}
   try:
       r = requests.get(url, verify=True, params=payload)
       if r.ok is True:
           result = c.key_import(r.content)
       elif r.ok is False:
           result = r.content
   except Exception as e:
       result = None

   if result is not None and hasattr(result, "considered") is False:
       print("{0} for {1}".format(result.decode(), k))
   elif result is not None
 and hasattr(result, "considered") is True:
       num_keys = len(result.imports)
       new_revs = result.new_revocations
       new_sigs = result.new_signatures
       new_subs = result.new_sub_keys
```

```
        new_uids = result.new_user_ids
        new_scrt = result.secret_imported
        nochange = result.unchanged
        print("""
The total number of keys considered for import was:  {0}

With UIDs wholely or partially matching the following string:

        {1}

  Number of keys revoked:  {2}
Number of new signatures:  {3}
   Number of new subkeys:  {4}
  Number of new user IDs:  {5}
Number of new secret keys:  {6}
Number of unchanged keys:  {7}

The key IDs for all considered keys were:
""".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scrt,
           nochange))
        for i in range(num_keys):
            print(result.imports[i].fpr)
        print("")
    elif result is None:
        print(e)
#+END_SRC
```

Both the above example, [[../examples/howto/pmkey-import.py][pmkey-import.py]],
 and a version which prompts
for an alternative GnuPG home directory, [[../examples/howto/pmkey-import-alt.py][pmkey-import-alt.py]], are
available with the other examples and are executable scripts.

Note that while the ProtonMail servers are based on the SKS servers,
their server is related more to their API and is not feature complete
by comparison to the servers in the SKS pool.  One notable difference
being that the ProtonMail server does not permit non ProtonMail users
to update their own keys, which could be a vector for attacking
ProtonMail users who may not receive a key's revocation if it had been
compromised.

*** Importing with HKP for Python
   :PROPERTIES:
   :CUSTOM_ID: import-hkp4py
   :END:

Performing the same tasks with the [[https://github.com/Selfnet/hkp4py][hkp4py module]] (available via PyPI)
is not too much different, but does provide a number of options of

benefit to end users.  Not least of which being the ability to perform some
 checks on a key before importing it or not.  For instance it may be the policy of a site or project to only import keys which have not been revoked.  The hkp4py module permits such checks prior to the importing of the keys found.

```
#+BEGIN_SRC python -i
import gpg
import hkp4py
import sys

c = gpg.Context()
server = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")
results = []
keys = []

if len(sys.argv) > 2:
   pattern = " ".join(sys.argv[1:])
elif len(sys.argv) == 2:
   pattern = sys.argv[1]
else:
   pattern = input("Enter the pattern to search for keys or user IDs: ")


if pattern is not None:
   try:
      key = server.search(hex(int(pattern, 16)))
      keyed = True
   except ValueError as ve:
      key = server.search(pattern)
      keyed = False

   if key is not None:
      keys.append(key[0])
      if keyed is True:
         try:
            fob = server.search(pattern)
         except:
            fob = None
         if fob is not
 None:
            keys.append(fob[0])
      else:
         pass
   else:
      pass
```

```
  for logrus in pattern.split():
      try:
          key = server.search(hex(int(logrus, 16)))
          hexed = True
      except ValueError as ve:
          key = server.search(logrus)
          hexed = False

      if key is not None:
          keys.append(key[0])
          if hexed is True:
              try:
                  fob = server.search(logrus)
              except:
                  fob = None
              if fob is not None:
                  keys.append(fob[0])
          else:
              pass
      else:
          pass


if len(keys) > 0:
  for key in keys:
      import_result = c.key_import(key.key_blob)
      results.append(import_result)

for result in results:
  if result is not None and hasattr(result, "considered") is False:
      print(result)
  elif result is not None and hasattr(result, "considered") is True:
       num_keys = len(result.imports)
      new_revs = result.new_revocations
      new_sigs = result.new_signatures
      new_subs = result.new_sub_keys
      new_uids = result.new_user_ids
      new_scrt = result.secret_imported
      nochange = result.unchanged
      print("""
The total number of keys considered for import was:  {0}

  Number of keys revoked:  {1}
Number of new signatures:  {2}
   Number of new subkeys:  {3}
  Number of new user IDs:  {4}
Number of new secret keys:  {5}
Number of unchanged keys:  {6}
```

```
The key IDs for all considered keys were:
""".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scrt,
        nochange))
      for i in range(num_keys):
         print(result.imports[i].fpr)
      print("")
   else:
      pass
#+END_SRC
```

Since the hkp4py module handles multiple keys just as effectively as one (=keys= is a list of responses per matching key), the example above is able to do a little bit more with the returned data before anything is actually imported.

*** Importing from ProtonMail with HKP for Python
:PROPERTIES:
:CUSTOM_ID: import-protonmail-hkp4py
:END:

Though this can provide certain benefits even when working with ProtonMail, the scope is somewhat constrained there due to the limitations of the ProtonMail keyserver.

For instance, searching the SKS keyserver pool for the term "gnupg" produces hundreds of results from any time the word appears in any part of a user ID. Performing the same search on the ProtonMail keyserver returns zero results, even though there are at least two test accounts which include it as part of the username.

The cause of this discrepancy is the deliberate configuration of that server by ProtonMail to require an exact match of the full email address of the ProtonMail user whose key is being requested. Presumably this is intended to reduce breaches of privacy of their users as an email address must already be known before a key for that address can be obtained.

**** Import from ProtonMail via HKP for Python Example no. 1
:PROPERTIES:
:CUSTOM_ID: import-hkp4py-pm1
:END:

The following script is available with the rest of the examples under

the somewhat less than original name, =pmkey-import-hkp.py=.

```
#+BEGIN_SRC python -i
import gpg
import hkp4py
import os.path
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it.

Usage:  pmkey-import-hkp.py [search strings]
""")

c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None

if len(sys.argv) > 2:
  keyterms = sys.argv[1:]
elif len(sys.argv) == 2:
  keyterm = sys.argv[1]
  keyterms.append(keyterm)
else:
  key_term = input("Enter the key ID, UID or search string: ")
  keyterms = key_term.split()

for keyterm in keyterms:
  if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
      ksearch.append(keyterm[1:])
       ksearch.append(keyterm[1:])
      ksearch.append(keyterm[1:])
  elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
      ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
      ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
      ksearch.append("{0}@pm.me".format(keyterm[1:]))
  elif keyterm.count("@") == 0:
      ksearch.append("{0}@protonmail.com".format(keyterm))
      ksearch.append("{0}@protonmail.ch".format(keyterm))
      ksearch.append("{0}@pm.me".format(keyterm))
  elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
      uidlist = keyterm.split("@")
```

```
        for uid in uidlist:
            ksearch.append("{0}@protonmail.com".format(uid))
            ksearch.append("{0}@protonmail.ch".format(uid))
            ksearch.append("{0}@pm.me".format(uid))
    elif keyterm.count("@") > 2:
        uidlist = keyterm.split("@")
        for uid in uidlist:
            ksearch.append("{0}@protonmail.com".format(uid))
             ksearch.append("{0}@protonmail.ch".format(uid))
            ksearch.append("{0}@pm.me".format(uid))
    else:
        ksearch.append(keyterm)

for k in ksearch:
    print("Checking for key for: {0}".format(k))
    try:
        keys = server.search(k)
        if isinstance(keys, list) is True:
            for key in keys:
                allkeys.append(key)
                try:
                    import_result = c.key_import(key.key_blob)
                except Exception as e:
                    import_result = c.key_import(key.key)
        else:
            paradox.append(keys)
            import_result = None
    except Exception as e:
        import_result = None
    results.append(import_result)

for result in results:
    if result is not None and hasattr(result, "considered") is False:
        print("{0} for {1}".format(result.decode(), k))
    elif result is not None and hasattr(result, "considered") is True:
        num_keys = len(result.imports)
         new_revs = result.new_revocations
        new_sigs = result.new_signatures
        new_subs = result.new_sub_keys
        new_uids = result.new_user_ids
        new_scrt = result.secret_imported
        nochange = result.unchanged
        print("""
The total number of keys considered for import was:  {0}

With UIDs wholely or partially matching the following string:

        {1}
```

```
  Number of keys revoked:  {2}
Number of new signatures:  {3}
   Number of new subkeys:  {4}
  Number of new user IDs:  {5}
Number of new secret keys:  {6}
Number of unchanged keys:  {7}

The key IDs for all considered keys were:
""".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scrt,
         nochange))
       for i in range(num_keys):
           print(result.imports[i].fpr)
       print("")
   elif result is None:
       pass
#+END_SRC
```

**** Import from ProtonMail via HKP for Python Example no. 2
:PROPERTIES:
:CUSTOM_ID: import-hkp4py-pm2
:END:

Like
its counterpart above, this script can also be found with the
rest of the examples, by the name pmkey-import-hkp-alt.py.

With this script a modicum of effort has been made to treat anything
passed as a =homedir= which either does not exist or which is not a
directory, as also being a pssible user ID to check for.  It's not
guaranteed to pick up on all such cases, but it should cover most of
them.

```
#+BEGIN_SRC python -i
import gpg
import hkp4py
import os.path
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it.  Optionally enables specifying a different GnuPG home directory.

Usage:  pmkey-import-hkp.py [homedir] [search string]
  or:  pmkey-import-hkp.py [search string]
""")
```

```
c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None

if len(sys.argv) > 3:
   homedir = sys.argv[1]
   keyterms = sys.argv[2:]
elif len(sys.argv)
 == 3:
   homedir = sys.argv[1]
   keyterm = sys.argv[2]
   keyterms.append(keyterm)
elif len(sys.argv) == 2:
   homedir = ""
   keyterm = sys.argv[1]
   keyterms.append(keyterm)
else:
   keyterm = input("Enter the key ID, UID or search string: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")
   keyterms.append(keyterm)

if len(homedir) == 0:
   homedir = None
   homeless = False

if homedir is not None:
   if homedir.startswith("~"):
      if os.path.exists(os.path.expanduser(homedir)) is True:
         if os.path.isdir(os.path.expanduser(homedir)) is True:
            c.home_dir = os.path.realpath(os.path.expanduser(homedir))
         else:
            homeless = True
      else:
         homeless = True
   elif os.path.exists(os.path.realpath(homedir)) is True:
      if os.path.isdir(os.path.realpath(homedir)) is True:
         c.home_dir = os.path.realpath(homedir)
      else:
         homeless = True
    else:
      homeless = True

# First check to see if the homedir really is a homedir and if not, treat it as
```

```
# a search string.
if homeless is True:
  keyterms.append(homedir)
  c.home_dir = None
else:
  pass

for keyterm in keyterms:
  if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
    ksearch.append(keyterm[1:])
    ksearch.append(keyterm[1:])
    ksearch.append(keyterm[1:])
  elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
    ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
    ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
    ksearch.append("{0}@pm.me".format(keyterm[1:]))
  elif keyterm.count("@") == 0:
    ksearch.append("{0}@protonmail.com".format(keyterm))
    ksearch.append("{0}@protonmail.ch".format(keyterm))
    ksearch.append("{0}@pm.me".format(keyterm))
  elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
    uidlist = keyterm.split("@")

  for uid in uidlist:
      ksearch.append("{0}@protonmail.com".format(uid))
      ksearch.append("{0}@protonmail.ch".format(uid))
      ksearch.append("{0}@pm.me".format(uid))
  elif keyterm.count("@") > 2:
    uidlist = keyterm.split("@")
    for uid in uidlist:
      ksearch.append("{0}@protonmail.com".format(uid))
      ksearch.append("{0}@protonmail.ch".format(uid))
      ksearch.append("{0}@pm.me".format(uid))
  else:
    ksearch.append(keyterm)

for k in ksearch:
  print("Checking for key for: {0}".format(k))
  try:
    keys = server.search(k)
    if isinstance(keys, list) is True:
      for key in keys:
        allkeys.append(key)
        try:
          import_result = c.key_import(key.key_blob)
        except Exception as e:
          import_result = c.key_import(key.key)
    else:
```

```
            paradox.append(keys)
            import_result = None
    except Exception
  as e:
        import_result = None
    results.append(import_result)

for result in results:
    if result is not None and hasattr(result, "considered") is False:
        print("{0} for {1}".format(result.decode(), k))
    elif result is not None and hasattr(result, "considered") is True:
        num_keys = len(result.imports)
        new_revs = result.new_revocations
        new_sigs = result.new_signatures
        new_subs = result.new_sub_keys
        new_uids = result.new_user_ids
        new_scrt = result.secret_imported
        nochange = result.unchanged
        print("""
The total number of keys considered for import was:  {0}

With UIDs wholely or partially matching the following string:

        {1}

  Number of keys revoked:  {2}
Number of new signatures:  {3}
   Number of new subkeys:  {4}
  Number of new user IDs:  {5}
Number of new secret keys:  {6}
Number of unchanged keys:  {7}

The key IDs for all considered keys were:
""".format(num_keys, k, new_revs, new_sigs,
 new_subs, new_uids, new_scrt,
           nochange))
        for i in range(num_keys):
            print(result.imports[i].fpr)
        print("")
    elif result is None:
        pass
#+END_SRC
```

** Exporting keys
  :PROPERTIES:
  :CUSTOM_ID: howto-export-key
  :END:

Exporting keys remains a reasonably simple task, but has been separated into three different functions for the OpenPGP cryptographic engine. Two of those functions are for exporting public keys and the third is for exporting secret keys.

*** Exporting public keys
:PROPERTIES:
:CUSTOM_ID: howto-export-public-key
:END:

There are two methods of exporting public keys, both of which are very similar to the other. The default method, =key_export()=, will export a public key or keys matching a specified pattern as normal. The alternative, the =key_export_minimal()= method, will do the same thing except producing a minimised output with extra signatures and third party signatures or certifications removed.

#+BEGIN_SRC
```
 python -i
import gpg
import os.path
import sys

print("""
This script exports one or more public keys.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = sys.argv[3]
elif len(sys.argv) == 3:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
   keyfile = sys.argv[1]
   logrus = input("Enter the UID matching the key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")
else:
   keyfile = input("Enter the path and filename to save the secret key to: ")
   logrus = input("Enter the UID matching the key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")
```

```
if homedir.startswith("~"):
   if os.path.exists(os.path.expanduser(homedir)) is True:
       c.home_dir = os.path.expanduser(homedir)
   else:
       pass
elif
 os.path.exists(homedir) is True:
   c.home_dir = homedir
else:
   pass

try:
   result = c.key_export(pattern=logrus)
except:
   result = c.key_export(pattern=None)

if result is not None:
   with open(keyfile, "wb") as f:
       f.write(result)
else:
   pass
#+END_SRC
```

It should be noted that the result will only return =None= when a search pattern has been entered, but has not matched any keys.  When the search pattern itself is set to =None= this triggers the exporting of the entire public keybox.

```
#+BEGIN_SRC python -i
import gpg
import os.path
import sys

print("""
This script exports one or more public keys in minimised form.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = sys.argv[3]
elif len(sys.argv) == 3:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
```

```
   keyfile = sys.argv[1]
   logrus
 = input("Enter the UID matching the key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")
else:
   keyfile = input("Enter the path and filename to save the secret key to: ")
   logrus = input("Enter the UID matching the key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
   if os.path.exists(os.path.expanduser(homedir)) is True:
       c.home_dir = os.path.expanduser(homedir)
   else:
       pass
elif os.path.exists(homedir) is True:
   c.home_dir = homedir
else:
   pass

try:
   result = c.key_export_minimal(pattern=logrus)
except:
   result = c.key_export_minimal(pattern=None)

if result is not None:
   with open(keyfile, "wb") as f:
       f.write(result)
else:
   pass
#+END_SRC
```

*** Exporting secret keys
   :PROPERTIES:
   :CUSTOM_ID: howto-export-secret-key
   :END:

Exporting secret keys is, functionally, very similar to exporting public
 keys; save for the invocation of =pinentry= via =gpg-agent= in order to securely enter the key's passphrase and authorise the export.

The following example exports the secret key to a file which is then set with the same permissions as the output files created by the command line secret key export options.

```
#+BEGIN_SRC python -i
import gpg
```

```
import os
import os.path
import sys

print("""
This script exports one or more secret keys.

The gpg-agent and pinentry are invoked to authorise the export.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = sys.argv[3]
elif len(sys.argv) == 3:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
   keyfile = sys.argv[1]
   logrus = input("Enter the UID matching the secret key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")
else:
    keyfile = input("Enter the path and filename to save the secret key to: ")
   logrus = input("Enter the UID matching the secret key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
   homedir = None
elif homedir.startswith("~"):
   userdir = os.path.expanduser(homedir)
   if os.path.exists(userdir) is True:
       homedir = os.path.realpath(userdir)
   else:
       homedir = None
else:
   homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
   homedir = None
else:
   if os.path.isdir(homedir) is False:
       homedir = None
   else:
       pass
```

```
if homedir is not None:
   c.home_dir = homedir
else:
   pass

try:
   result = c.key_export_secret(pattern=logrus)
except:
   result = c.key_export_secret(pattern=None)

if result is not None:
   with open(keyfile, "wb") as f:
       f.write(result)
   os.chmod(keyfile, 0o600)
else:
   pass
#+END_SRC
```

Alternatively the approach
 of the following script can be used.  This
longer example saves the exported secret key(s) in files in the GnuPG
home directory, in addition to setting the file permissions as only
readable and writable by the user.  It also exports the secret key(s)
twice in order to output both GPG binary (=.gpg=) and ASCII armoured
(=.asc=) files.

```
#+BEGIN_SRC python -i
import gpg
import os
import os.path
import subprocess
import sys

print("""
This script exports one or more secret keys as both ASCII armored and binary
file formats, saved in files within the user's GPG home directory.

The gpg-agent and pinentry are invoked to authorise the export.
""")

if sys.platform == "win32":
   gpgconfcmd = "gpgconf.exe --list-dirs homedir"
else:
   gpgconfcmd = "gpgconf --list-dirs homedir"

a = gpg.Context(armor=True)
b = gpg.Context()
c = gpg.Context()
```

```
if len(sys.argv) >= 4:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = sys.argv[3]
elif len(sys.argv) == 3:
   keyfile = sys.argv[1]
    logrus = sys.argv[2]
   homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
   keyfile = sys.argv[1]
   logrus = input("Enter the UID matching the secret key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")
else:
   keyfile = input("Enter the filename to save the secret key to: ")
   logrus = input("Enter the UID matching the secret key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
   homedir = None
elif homedir.startswith("~"):
   userdir = os.path.expanduser(homedir)
   if os.path.exists(userdir) is True:
       homedir = os.path.realpath(userdir)
   else:
       homedir = None
else:
   homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
   homedir = None
else:
   if os.path.isdir(homedir) is False:
       homedir = None
   else:
       pass

if homedir is not None:
   c.home_dir
 = homedir
else:
   pass

if c.home_dir is not None:
   if c.home_dir.endswith("/"):
       gpgfile = "{0}{1}.gpg".format(c.home_dir, keyfile)
       ascfile = "{0}{1}.asc".format(c.home_dir, keyfile)
   else:
```

```
        gpgfile = "{0}/{1}.gpg".format(c.home_dir, keyfile)
        ascfile = "{0}/{1}.asc".format(c.home_dir, keyfile)
else:
    if os.path.exists(os.environ["GNUPGHOME"]) is True:
        hd = os.environ["GNUPGHOME"]
    else:
        try:
            hd = subprocess.getoutput(gpgconfcmd)
        except:
            process = subprocess.Popen(gpgconfcmd.split(),
                                       stdout=subprocess.PIPE)
            procom = process.communicate()
            if sys.version_info[0] == 2:
                hd = procom[0].strip()
            else:
                hd = procom[0].decode().strip()
    gpgfile = "{0}/{1}.gpg".format(hd, keyfile)
    ascfile = "{0}/{1}.asc".format(hd, keyfile)

try:
    a_result = a.key_export_secret(pattern=logrus)
    b_result
 = b.key_export_secret(pattern=logrus)
except:
    a_result = a.key_export_secret(pattern=None)
    b_result = b.key_export_secret(pattern=None)

if a_result is not None:
    with open(ascfile, "wb") as f:
        f.write(a_result)
    os.chmod(ascfile, 0o600)
else:
    pass

if b_result is not None:
    with open(gpgfile, "wb") as f:
        f.write(b_result)
    os.chmod(gpgfile, 0o600)
else:
    pass
#+END_SRC
```

*** Sending public keys to the SKS Keyservers

```
    :PROPERTIES:
    :CUSTOM_ID: howto-send-public-key
    :END:
```

As with the previous section on importing keys, the =hkp4py= module adds another option with exporting keys in order to send them to the public keyservers.

The following example demonstrates how this may be done.

```
#+BEGIN_SRC python -i
import gpg
import hkp4py
import os.path
import sys

print("""
This script sends one or more public keys to the SKS keyservers and is
essentially a slight variation on the export-key.py script.
""")

c = gpg.Context(armor=True)
server
 = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")

if len(sys.argv) > 2:
   logrus = " ".join(sys.argv[1:])
elif len(sys.argv) == 2:
   logrus = sys.argv[1]
else:
   logrus = input("Enter the UID matching the key(s) to send: ")

if len(logrus) > 0:
   try:
      export_result = c.key_export(pattern=logrus)
   except Exception as e:
      print(e)
      export_result = None
else:
   export_result = c.key_export(pattern=None)

if export_result is not None:
   try:
      try:
         send_result = server.add(export_result)
      except:
         send_result = server.add(export_result.decode())
      if send_result is not None:
         print(send_result)
      else:
         pass
   except Exception as e:
```

```
    print(e)
else:
  pass
#+END_SRC
```

An expanded version of this script with additional functions for specifying an alternative homedir location is in the examples directory as =send-key-to-keyserver.py=.

The =hkp4py= module appears to handle both string and byte literal text data equally well, but the GPGME bindings deal primarily with byte literal data only and so this script sends in that format first, then tries the string literal form.

```
* Basic Functions
 :PROPERTIES:
 :CUSTOM_ID: howto-the-basics
 :END:
```

The most frequently called features of any cryptographic library will be the most fundamental tasks for encryption software. In this section we will look at how to programmatically encrypt data, decrypt it, sign it and verify signatures.

```
** Encryption
  :PROPERTIES:
  :CUSTOM_ID: howto-basic-encryption
  :END:
```

Encrypting is very straight forward. In the first example below the message, =text=, is encrypted to a single recipient's key. In the second example the message will be encrypted to multiple recipients.

```
*** Encrypting to one key
   :PROPERTIES:
   :CUSTOM_ID: howto-basic-encryption-single
   :END:
```

Once the the Context is set the main issues with encrypting data is essentially reduced to key selection and the keyword arguments specified in the =gpg.Context().encrypt()= method.

Those keyword arguments are: =recipients=, a list of keys encrypted to

(covered in greater detail in the following section); =sign=, whether
or not to sign the plaintext data, see subsequent sections on signing
and verifying signatures below (defaults to =True=); =sink=, to write
results or partial results to a secure sink instead of returning it
(defaults to =None=); =passphrase=, only used when utilising symmetric
encryption (defaults to =None=); =always_trust=, used to override the
trust model settings for recipient keys (defaults to =False=);
=add_encrypt_to=, utilises any preconfigured =encrypt-to= or
=default-key= settings in the user's =gpg.conf= file (defaults to
=False=); =prepare=, prepare for encryption (defaults to =False=);
=expect_sign=, prepare for signing (defaults to =False=); =compress=,
compresses the plaintext prior to encryption (defaults to =True=).

```
#+BEGIN_SRC python -i
import
 gpg

a_key = "0x12345678DEADBEEF"
text = b"""Some text to test with.

Since the text in this case must be bytes, it is most likely that
the input form will be a separate file which is opened with "rb"
as this is the simplest method of obtaining the correct data format.
"""

c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext, result, sign_result = c.encrypt(text, recipients=rkey, sign=False)

with open("secret_plans.txt.asc", "wb") as afile:
   afile.write(ciphertext)
#+END_SRC
```

Though this is even more likely to be used like this; with the
plaintext input read from a file, the recipient keys used for
encryption regardless of key trust status and the encrypted output
also encrypted to any preconfigured keys set in the =gpg.conf= file:

```
#+BEGIN_SRC python -i
import gpg

a_key = "0x12345678DEADBEEF"

with open("secret_plans.txt", "rb") as afile:
   text = afile.read()

c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
```

```
ciphertext,
 result, sign_result = c.encrypt(text, recipients=rkey, sign=True,
                                 always_trust=True,
                                 add_encrypt_to=True)

with open("secret_plans.txt.asc", "wb") as afile:
   afile.write(ciphertext)
#+END_SRC
```

If the =recipients= parameter is empty then the plaintext is encrypted symmetrically.  If no =passphrase= is supplied as a parameter or via a callback registered with the =Context()= then an out-of-band prompt for the passphrase via pinentry will be invoked.

*** Encrypting to multiple keys
   :PROPERTIES:
   :CUSTOM_ID: howto-basic-encryption-multiple
   :END:

Encrypting to multiple keys essentially just expands upon the key selection process and the recipients from the previous examples.

The following example encrypts a message (=text=) to everyone with an email address on the =gnupg.org= domain,[fn:4] but does /not/ encrypt to a default key or other key which is configured to
 normally encrypt
to.

```
#+BEGIN_SRC python -i
import gpg

text = b"""Oh look, another test message.

The same rules apply as with the previous example and more likely
than not, the message will actually be drawn from reading the
contents of a file or, maybe, from entering data at an input()
prompt.

Since the text in this case must be bytes, it is most likely that
the input form will be a separate file which is opened with "rb"
as this is the simplest method of obtaining the correct data
format.
"""

c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org", secret=False))
logrus = []
```

```
for i in range(len(rpattern)):
   if rpattern[i].can_encrypt == 1:
       logrus.append(rpattern[i])

ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
                                    sign=False, always_trust=True)

with open("secret_plans.txt.asc", "wb") as afile:
   afile.write(ciphertext)
#+END_SRC
```

All it would take to change the above example to sign
 the message
and also encrypt the message to any configured default keys would
be to change the =c.encrypt= line to this:

```
#+BEGIN_SRC python -i
ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
                                    always_trust=True,
                                    add_encrypt_to=True)
#+END_SRC
```

The only keyword arguments requiring modification are those for which
the default values are changing.  The default value of =sign= is
=True=, the default of =always_trust= is =False=, the default of
=add_encrypt_to= is =False=.

If =always_trust= is not set to =True= and any of the recipient keys
are not trusted (e.g. not signed or locally signed) then the
encryption will raise an error.  It is possible to mitigate this
somewhat with something more like this:

```
#+BEGIN_SRC python -i
import gpg

with open("secret_plans.txt.asc", "rb") as afile:
   text = afile.read()

c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org",
 secret=False))
logrus = []

for i in range(len(rpattern)):
   if rpattern[i].can_encrypt == 1:
       logrus.append(rpattern[i])
```

```
  try:
     ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
                                         add_encrypt_to=True)
  except gpg.errors.InvalidRecipients as e:
     for i in range(len(e.recipients)):
        for n in range(len(logrus)):
           if logrus[n].fpr == e.recipients[i].fpr:
              logrus.remove(logrus[n])
           else:
              pass
     try:
        ciphertext, result, sign_result = c.encrypt(text,
                                         recipients=logrus,
                                         add_encrypt_to=True)
        with open("secret_plans.txt.asc", "wb") as afile:
           afile.write(ciphertext)
     except:
        pass
#+END_SRC
```

This will attempt to encrypt to all the keys searched
 for, then remove
invalid recipients if it fails and try again.

** Decryption
  :PROPERTIES:
  :CUSTOM_ID: howto-basic-decryption
  :END:

Decrypting something encrypted to a key in one's secret keyring is
fairly straight forward.

In this example code, however, preconfiguring either =gpg.Context()=
or =gpg.core.Context()= as =c= is unnecessary because there is no need
to modify the Context prior to conducting the decryption and since the
Context is only used once, setting it to =c= simply adds lines for no
gain.

```
#+BEGIN_SRC python -i
import gpg

ciphertext = input("Enter path and filename of encrypted file: ")
newfile = input("Enter path and filename of file to save decrypted data to: ")

with open(ciphertext, "rb") as cfile:
  try:
     plaintext, result, verify_result = gpg.Context().decrypt(cfile)
```

```
   except gpg.errors.GPGMEError as e:
       plaintext = None
       print(e)

if plaintext is not None:
   with open(newfile, "wb") as nfile:
     nfile.write(plaintext)

   else:
       pass
#+END_SRC
```

The data available in =plaintext= in this example is the decrypted content as a byte object, the recipient key IDs and algorithms in =result= and the results of verifying any signatures of the data in =verify_result=.

If =gpg.Context().decrypt(cfile, verify=False)= is called instead, then =verify_result= will be returned as =None= and the rest remains as described here.

** Signing text and files
  :PROPERTIES:
  :CUSTOM_ID: howto-basic-signing
  :END:

The following sections demonstrate how to specify keys to sign with.

*** Signing key selection
   :PROPERTIES:
   :CUSTOM_ID: howto-basic-signing-signers
   :END:

By default GPGME and the Python bindings will use the default key configured for the user invoking the GPGME API.  If there is no default key specified and there is more than one secret key available it may be necessary to specify the key or keys with which to sign messages and files.

```
#+BEGIN_SRC python -i
import gpg

logrus = input("Enter
 the email address or string to match signing keys to: ")
hancock = gpg.Context().keylist(pattern=logrus, secret=True)
sig_src = list(hancock)
```

#+END_SRC

The signing examples in the following sections include the explicitly designated =signers= parameter in two of the five examples; once where the resulting signature would be ASCII armoured and once where it would not be armoured.

While it would be possible to enter a key ID or fingerprint here to match a specific key, it is not possible to enter two fingerprints and match two keys since the patten expects a string, bytes or None and not a list.  A string with two fingerprints won't match any single key.

*** Normal or default signing messages or files
  :PROPERTIES:
  :CUSTOM_ID: howto-basic-signing-normal
  :END:

The normal or default signing process is essentially the same as is most often invoked when also encrypting a message or file.  So when the encryption component is not utilised, the result is to produce an encoded
 and signed output which may or may not be ASCII armoured and which may or may not also be compressed.

By default compression will be used unless GnuPG detects that the plaintext is already compressed.  ASCII armouring will be determined according to the value of =gpg.Context().armor=.

The compression algorithm is selected in much the same way as the symmetric encryption algorithm or the hash digest algorithm is when multiple keys are involved; from the preferences saved into the key itself or by comparison with the preferences with all other keys involved.

#+BEGIN_SRC python -i
```
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context(armor=True, signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.asc", "w") as afile:
```

```
   afile.write(signed_data.decode())
#+END_SRC
```

Though everything in this example is accurate, it is more likely that
reading the input data from another
 file and writing the result to a
new file will be performed more like the way it is done in the next
example.  Even if the output format is ASCII armoured.

```
#+BEGIN_SRC python -i
import gpg

with open("/path/to/statement.txt", "rb") as tfile:
   text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.sig", "wb") as afile:
   afile.write(signed_data)
#+END_SRC
```

*** Detached signing messages and files
   :PROPERTIES:
   :CUSTOM_ID: howto-basic-signing-detached
   :END:

Detached signatures will often be needed in programmatic uses of
GPGME, either for signing files (e.g. tarballs of code releases) or as
a component of message signing (e.g. PGP/MIME encoded email).

```
#+BEGIN_SRC python -i
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context(armor=True)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.asc",
 "w") as afile:
   afile.write(signed_data.decode())
#+END_SRC
```

As with normal signatures, detached signatures are best handled as
byte literals, even when the output is ASCII armoured.

```
#+BEGIN_SRC python -i
import gpg

with open("/path/to/statement.txt", "rb") as tfile:
  text = tfile.read()

c = gpg.Context(signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.sig", "wb") as afile:
  afile.write(signed_data)
#+END_SRC
```

*** Clearsigning messages or text
  :PROPERTIES:
  :CUSTOM_ID: howto-basic-signing-clear
  :END:

Though PGP/in-line messages are no longer encouraged in favour of
PGP/MIME, there is still sometimes value in utilising in-line
signatures.  This is where clear-signed messages or text is of value.

```
#+BEGIN_SRC python -i
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)

with
 open("/path/to/statement.txt.asc", "w") as afile:
  afile.write(signed_data.decode())
#+END_SRC
```

In spite of the appearance of a clear-signed message, the data handled
by GPGME in signing it must still be byte literals.

```
#+BEGIN_SRC python -i
import gpg
```

```
with open("/path/to/statement.txt", "rb") as tfile:
   text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)

with open("/path/to/statement.txt.asc", "wb") as afile:
   afile.write(signed_data)
#+END_SRC
```

** Signature verification
  :PROPERTIES:
  :CUSTOM_ID: howto-basic-verification
  :END:

Essentially there are two principal methods of verification of a signature. The first of these is for use with the normal or default signing method and for clear-signed messages. The second is for use with files and data with detached signatures.

The following example is intended for use with the default signing method where the file was not ASCII armoured:

```
#+BEGIN_SRC python
 -i
import gpg
import time

filename = "statement.txt"
gpg_file = "statement.txt.gpg"

c = gpg.Context()

try:
   data, result = c.verify(open(gpg_file))
   verified = True
except gpg.errors.BadSignatures as e:
   verified = False
   print(e)

if verified is True:
   for i in range(len(result.signatures)):
       sign = result.signatures[i]
       print("""Good signature from:
{0}
with key {1}
made at {2}
```

```
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
        time.ctime(sign.timestamp)))
else:
  pass
#+END_SRC
```

Whereas this next example, which is almost identical would work with normal ASCII armoured files and with clear-signed files:

```
#+BEGIN_SRC python -i
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
  data, result = c.verify(open(asc_file))
  verified = True
except gpg.errors.BadSignatures as e:
  verified = False
  print(e)

if verified is True:
  for i in range(len(result.signatures)):
      sign = result.signatures[i]
     print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
        time.ctime(sign.timestamp)))
else:
  pass
#+END_SRC
```

In both of the previous examples it is also possible to compare the original data that was signed against the signed data in =data= to see if it matches with something like this:

```
#+BEGIN_SRC python -i
with open(filename, "rb") as afile:
  text = afile.read()

if text == data:
  print("Good signature.")
```

```
else:
   pass
#+END_SRC
```

The following two examples, however, deal with detached signatures. With his method of verification the data that was signed does not get returned since it is already being explicitly referenced in the first argument of =c.verify=.  So =data= is =None= and only the information in =result= is available.

```
#+BEGIN_SRC python -i
import gpg
import time

filename = "statement.txt"
sig_file = "statement.txt.sig"

c = gpg.Context()

try:
   data,
 result = c.verify(open(filename), open(sig_file))
   verified = True
except gpg.errors.BadSignatures as e:
   verified = False
   print(e)

if verified is True:
   for i in range(len(result.signatures)):
       sign = result.signatures[i]
       print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
          time.ctime(sign.timestamp)))
else:
   pass
#+END_SRC

#+BEGIN_SRC python -i
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()
```

```
try:
   data, result = c.verify(open(filename), open(asc_file))
   verified = True
except gpg.errors.BadSignatures as e:
   verified = False
   print(e)

if verified is True:
   for i in range(len(result.signatures)):
       sign = result.signatures[i]
       print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
          time.ctime(sign.timestamp)))
else:
   pass
#+END_SRC
```

*
 Creating keys and subkeys
 :PROPERTIES:
 :CUSTOM_ID: key-generation
 :END:

The one thing, aside from GnuPG itself, that GPGME depends on, of course, is the keys themselves.  So it is necessary to be able to generate them and modify them by adding subkeys, revoking or disabling them, sometimes deleting them and doing the same for user IDs.

In the following examples a key will be created for the world's greatest secret agent, Danger Mouse.  Since Danger Mouse is a secret agent he needs to be able to protect information to =SECRET= level clearance, so his keys will be 3072-bit keys.

The pre-configured =gpg.conf= file which sets cipher, digest and other preferences contains the following configuration parameters:

```
#+BEGIN_SRC conf
 expert
 allow-freeform-uid
 allow-secret-key-import
 trust-model tofu+pgp
 tofu-default-policy unknown
 enable-large-rsa
```

```
 enable-dsa2
 cert-digest-algo SHA512
 default-preference-list TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128
 AES BLOWFISH IDEA CAST5 3DES SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1 ZLIB BZIP2 ZIP
Uncompressed
 personal-cipher-preferences TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128 AES
BLOWFISH IDEA CAST5 3DES
 personal-digest-preferences SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1
 personal-compress-preferences ZLIB BZIP2 ZIP Uncompressed
#+END_SRC
```

```
** Primary key
  :PROPERTIES:
  :CUSTOM_ID: keygen-primary
  :END:
```

Generating a primary key uses the =create_key= method in a Context.
It contains multiple arguments and keyword arguments, including:
=userid=, =algorithm=, =expires_in=, =expires=, =sign=, =encrypt=,
=certify=, =authenticate=, =passphrase= and =force=.  The defaults for
all of those except =userid=, =algorithm=, =expires_in=, =expires= and
=passphrase= is =False=.  The defaults for =algorithm= and
=passphrase= is =None=.  The default for =expires_in= is =0=.  The
default for =expires= is =True=.  There is no default for =userid=.

If =passphrase= is left as =None=
 then the key will not be generated
with a passphrase, if =passphrase= is set to a string then that will
be the passphrase and if =passphrase= is set to =True= then gpg-agent
will launch pinentry to prompt for a passphrase.  For the sake of
convenience, these examples will keep =passphrase= set to =None=.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()

c.home_dir = "~/.gnupg-dm"
userid = "Danger Mouse <dm@secret.example.net>"

dmkey = c.create_key(userid, algorithm="rsa3072", expires_in=31536000,
                     sign=True, certify=True)
#+END_SRC
```

One thing to note here is the use of setting the =c.home_dir=
parameter.  This enables generating the key or keys in a different
location.  In this case to keep the new key data created for this

example in a separate location rather than adding it to existing and
active key store data.  As with the default directory, =~/.gnupg=, any
temporary or separate directory needs the permissions set to only
permit access by the directory
 owner.  On posix systems this means
setting the directory permissions to 700.

The =temp-homedir-config.py= script in the HOWTO examples directory
will create an alternative homedir with these configuration options
already set and the correct directory and file permissions.

The successful generation of the key can be confirmed via the returned
=GenkeyResult= object, which includes the following data:

```
#+BEGIN_SRC python -i
print("""
Fingerprint:  {0}
Primary Key:  {1}
 Public Key:  {2}
 Secret Key:  {3}
Sub Key:  {4}
User IDs:  {5}
""".format(dmkey.fpr, dmkey.primary, dmkey.pubkey, dmkey.seckey, dmkey.sub,
        dmkey.uid))
#+END_SRC
```

Alternatively the information can be confirmed using the command line
program:

```
#+BEGIN_SRC shell
 bash-4.4$ gpg --homedir ~/.gnupg-dm -K
 ~/.gnupg-dm/pubring.kbx
 ----------------------
 sec   rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
 177B7C25DB99745EE2EE13ED026D2F19E99E63AA
 uid          [ultimate] Danger Mouse <dm@secret.example.net>

  bash-4.4$
#+END_SRC
```

As with generating keys manually, to preconfigure expanded preferences
for the cipher, digest and compression algorithms, the =gpg.conf= file
must contain those details in the home directory in which the new key
is being generated.  I used a cut down version of my own =gpg.conf=
file in order to be able to generate this:

```
#+BEGIN_SRC shell
 bash-4.4$ gpg --homedir ~/.gnupg-dm --edit-key 177B7C25DB99745EE2EE13ED026D2F19E99E63AA showpref
```

```
quit
 Secret key is available.

 sec  rsa3072/026D2F19E99E63AA
      created: 2018-03-15  expires: 2019-03-15  usage: SC
      trust: ultimate      validity: ultimate
 [ultimate] (1). Danger Mouse <dm@secret.example.net>

 [ultimate] (1). Danger Mouse <dm@secret.example.net>
      Cipher: TWOFISH, CAMELLIA256, AES256, CAMELLIA192, AES192, CAMELLIA128, AES, BLOWFISH,
IDEA, CAST5, 3DES
      Digest: SHA512, SHA384, SHA256, SHA224, RIPEMD160, SHA1
      Compression: ZLIB, BZIP2, ZIP, Uncompressed
      Features: MDC, Keyserver
 no-modify

 bash-4.4$
#+END_SRC
```

** Subkeys
  :PROPERTIES:
  :CUSTOM_ID: keygen-subkeys
  :END:

Adding subkeys to a primary key is fairly similar to creating the primary key with the =create_subkey= method.  Most of the arguments are the same, but not quite all.  Instead of the =userid= argument there is now a =key= argument for selecting which primary key to add the subkey to.

In the following example an encryption subkey will be added to the primary key.  Since Danger Mouse is a security conscious secret agent, this subkey will only be valid for about six months, half the length of the primary key.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

key = c.get_key(dmkey.fpr, secret=True)
dmsub = c.create_subkey(key, algorithm="rsa3072", expires_in=15768000,
                        encrypt=True)
#+END_SRC
```

As with the primary key, the results here can be checked with:

```
#+BEGIN_SRC python -i
print("""
Fingerprint:  {0}
Primary Key:  {1}
  Public Key:  {2}
 Secret Key:  {3}
Sub Key:  {4}
User IDs:  {5}
""".format(dmsub.fpr, dmsub.primary, dmsub.pubkey, dmsub.seckey, dmsub.sub,
         dmsub.uid))
#+END_SRC
```

As well as on the command line with:

```
#+BEGIN_SRC shell
 bash-4.4$ gpg --homedir ~/.gnupg-dm -K
 ~/.gnupg-dm/pubring.kbx
 ----------------------
 sec   rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
 177B7C25DB99745EE2EE13ED026D2F19E99E63AA
 uid           [ultimate] Danger Mouse <dm@secret.example.net>
 ssb   rsa3072 2018-03-15 [E] [expires: 2018-09-13]

 bash-4.4$
#+END_SRC
```

```
** User IDs
  :PROPERTIES:
  :CUSTOM_ID: keygen-uids
  :END:


*** Adding User IDs
   :PROPERTIES:
   :CUSTOM_ID: keygen-uids-add
   :END:
```

By comparison to creating primary keys and subkeys, adding a new user ID to an existing key is much simpler.  The method used to do this is =key_add_uid= and the only arguments it takes are for the =key= and the new =uid=.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
```

```
c.home_dir = "~/.gnupg-dm"

dmfpr
 = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid = "Danger Mouse <danger.mouse@secret.example.net>"

c.key_add_uid(key, uid)
#+END_SRC
```

Unsurprisingly the result of this is:

```
#+BEGIN_SRC shell
 bash-4.4$ gpg --homedir ~/.gnupg-dm -K
 ~/.gnupg-dm/pubring.kbx
 ----------------------
 sec   rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
 177B7C25DB99745EE2EE13ED026D2F19E99E63AA
 uid           [ultimate] Danger Mouse <danger.mouse@secret.example.net>
 uid           [ultimate] Danger Mouse <dm@secret.example.net>
 ssb   rsa3072 2018-03-15 [E] [expires: 2018-09-13]

 bash-4.4$
#+END_SRC
```

*** Revoking User IDs

```
   :PROPERTIES:
   :CUSTOM_ID: keygen-uids-revoke
   :END:
```

Revoking a user ID is a fairly similar process, except that it uses
the =key_revoke_uid= method.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid
 = "Danger Mouse <danger.mouse@secret.example.net>"

c.key_revoke_uid(key, uid)
#+END_SRC
```

** Key certification
  :PROPERTIES:
  :CUSTOM_ID: key-sign
  :END:

Since key certification is more frequently referred to as key signing, the method used to perform this function is =key_sign=.

The =key_sign= method takes four arguments: =key=, =uids=, =expires_in= and =local=. The default value of =uids= is =None= and which results in all user IDs being selected. The default value of both =expires_in= and =local= is =False=; which results in the signature never expiring and being able to be exported.

The =key= is the key being signed rather than the key doing the signing. To change the key doing the signing refer to the signing key selection above for signing messages and files.

If the =uids= value is not =None= then it must either be a string to match a single user ID or a list of strings to match multiple user IDs. In this case the matching of those strings must be precise and it
 is case sensitive.

To sign Danger Mouse's key for just the initial user ID with a signature which will last a little over a month, do this:

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
uid = "Danger Mouse <dm@secret.example.net>"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
c.key_sign(key, uids=uid, expires_in=2764800)
#+END_SRC
```

*** Verifying key certifications
   :PROPERTIES:
   :CUSTOM_ID: key-sign-verify
   :END:

```
#+BEGIN_SRC python -i
import gpg
import time
```

```
c = gpg.Context()
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
keys = list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
   for sig in user.signatures:
      print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
           sig.uid)
#+END_SRC
```

Which for Danger Mouse displays the following:

```
#+BEGIN_EXAMPLE
 0x92E3F6115435C65A  Thu Mar 15 13:17:44 2018  Danger Mouse <dm@secret.example.net>
  0x321E4E2373590E5D  Mon Nov 26 12:46:05 2018  Ben McGinnes <ben@adversary.org>
#+END_EXAMPLE
```

The two key signatures listed are for the self-certification of Danger Mouse's key made when the key was created in March, 2018; and the second is a signature made by the author and set to expire at the end of the year.  Note that the second signature was made with the following code (including the preceding code to display the output of the certifications or key signatures):

```
#+BEGIN_SRC python -i
import gpg
import math
import pendulum
import time

hd = "/home/dm/.gnupg"
c = gpg.Context()
d = gpg.Context(home_dir=hd)
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
dmuid = "Danger Mouse <dm@secret.example.net>"
dkeys = list(c.keylist(pattern=dmuid))
dmkey = dkeys[0]

c.key_import(d.key_export(pattern=None))

tp = pendulum.period(pendulum.now(tz="local"), pendulum.datetime(2019, 1, 1))
ts = tp.total_seconds()
total_secs = math.ceil(ts)
c.key_sign(dmkey, uids=dmuid, expires_in=total_secs)

d.key_import(c.key_export(pattern=dmuid))
```

```
keys
 = list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
   for sig in user.signatures:
       print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
            sig.uid)
#+END_SRC
```

Note that this final code block includes the use of a module which is
/not/ part of Python's standard library, the [[https://pendulum.eustace.io/][pendulum module]]. Unlike
the standard datetime module, pendulum makes working with dates and
times significantly easier in Python; just as the requests module
makes working with HTTP and HTTPS easier than the builtin modules do.

Though neither requests nor pendulum are required modules for using
the GPGME Python bindings, they are both highly recommended more
generally.

* Advanced or Experimental Use Cases
 :PROPERTIES:
 :CUSTOM_ID: advanced-use
 :END:

** C plus Python plus SWIG plus Cython
  :PROPERTIES:
  :CUSTOM_ID: cython
  :END:

In
 spite of the apparent incongruence of using Python bindings to a C
interface only to generate more C from the Python; it is in fact quite
possible to use the GPGME bindings with [[http://docs.cython.org/en/latest/index.html][Cython]]. Though in many cases
the benefits may not be obvious since the most computationally
intensive work never leaves the level of the C code with which GPGME
itself is interacting with.

Nevertheless, there are some situations where the benefits are
demonstrable. One of the better and easier examples being the one of
the early examples in this HOWTO, the [[#howto-keys-counting][key counting]] code. Running that
example as an executable Python script, =keycount.py= (available in
the =examples/howto/= directory), will take a noticeable amount of time
to run on most systems where the public keybox or keyring contains a
few thousand public keys.

Earlier in the evening, prior to starting this section, I ran that
script on my laptop; as I tend to do periodically
 and timed it using
=time= utility, with the following results:

```
#+BEGIN_SRC shell
 bash-4.4$ time keycount.py

 Number of secret keys:  23
 Number of public keys:  12112


 real 11m52.945s
 user 0m0.913s
 sys 0m0.752s

 bash-4.4$
#+END_SRC
```

Sometime after that I imported another key and followed it with a
little test of Cython.  This test was kept fairly basic, essentially
lifting the material from the [[http://docs.cython.org/en/latest/src/tutorial/cython_tutorial.html][Cython Basic Tutorial]] to demonstrate
compiling Python code to C.  The first step was to take the example
key counting code quoted previously, essentially from the importing of
the =gpg= module to the end of the script:

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

print("""
   Number of secret keys:  {0}
   Number
 of public keys:  {1}

""".format(secnum, pubnum))
#+END_SRC
```

Save that into a file called =keycount.pyx= and then create a
=setup.py= file which contains this:

```
#+BEGIN_SRC python -i
from distutils.core import setup
from Cython.Build import cythonize

setup(
   ext_modules = cythonize("keycount.pyx")
)
#+END_SRC
```

Compile it:

```
#+BEGIN_SRC shell
 bash-4.4$ python setup.py build_ext --inplace
 bash-4.4$
#+END_SRC
```

Then run it in a similar manner to =keycount.py=:

```
#+BEGIN_SRC shell
 bash-4.4$ time python3.7 -c "import keycount"

 Number of secret keys:  23
 Number of public keys:  12113


 real 6m47.905s
 user 0m0.785s
 sys 0m0.331s

 bash-4.4$
#+END_SRC
```

Cython turned =keycount.pyx= into an 81KB =keycount.o= file in the
=build/= directory, a 24KB =keycount.cpython-37m-darwin.so= file to be
imported into Python 3.7 and a 113KB =keycount.c= generated C source
code file of nearly three thousand lines.  Quite a bit bigger than the
314 bytes of the =keycount.pyx= file or the full
 1,452 bytes of the
full executable =keycount.py= example script.

On the other hand it ran in nearly half the time; taking 6 minutes and
47.905 seconds to run.  As opposed to the 11 minutes and 52.945 seconds
which the CPython script alone took.

The =keycount.pyx= and =setup.py= files used to generate this example
have been added to the =examples/howto/advanced/cython/= directory
The example versions include some additional options to annotate the
existing code and to detect Cython's use.  The latter comes from the
[[http://docs.cython.org/en/latest/src/tutorial/pure.html#magic-attributes-within-the-pxd][Magic Attributes]] section
of the Cython documentation.

* Miscellaneous extras and work-arounds
 :PROPERTIES:
 :CUSTOM_ID: cheats-and-hacks
 :END:

Most of the things in the following sections are here simply because
there was no better place to put them, even though some are only
peripherally related to the GPGME Python bindings.  Some are also
workarounds for functions not integrated
 with GPGME as yet.  This is
especially true of the first of these, dealing with [[#group-lines][group lines]].

** Group lines
  :PROPERTIES:
  :CUSTOM_ID: group-lines
  :END:

There is not yet an easy way to access groups configured in the
gpg.conf file from within GPGME.  As a consequence these central
groupings of keys cannot be shared amongst multiple programs, such as
MUAs readily.

The following code, however, provides a work-around for obtaining this
information in Python.

```
#+BEGIN_SRC python -i
import subprocess
import sys

if sys.platform == "win32":
   gpgconfcmd = "gpgconf.exe --list-options gpg"
else:
   gpgconfcmd = "gpgconf --list-options gpg"

process = subprocess.Popen(gpgconfcmd.split(), stdout=subprocess.PIPE)
procom = process.communicate()

if sys.version_info[0] == 2:
   lines = procom[0].splitlines()
```

```
else:
   lines = procom[0].decode().splitlines()

for line in lines:
   if line.startswith("group") is True:
       break

groups = line.split(":")[-1].replace("",
 ").split(',')

group_lines = []
group_lists = []

for group in groups:
   group_lines.append(group.split("="))
   group_lists.append(group.split("="))

for glist in group_lists:
   glist[1] = glist[1].split()
#+END_SRC
```

The result of that code is that =group_lines= is a list of lists where =group_lines[i][0]= is the name of the group and =group_lines[i][1]= is the key IDs of the group as a string.

The =group_lists= result is very similar in that it is a list of lists.  The first part, =group_lists[i][0]= matches =group_lines[i][0]= as the name of the group, but =group_lists[i][1]= is the key IDs of the group as a list.

A demonstration of using the =groups.py= module is also available in the form of the executable =mutt-groups.py= script.  This second script reads all the group entries in a user's =gpg.conf= file and converts them into crypt-hooks suitable for use with the Mutt and Neomutt mail clients.

** Keyserver access for Python
  :PROPERTIES:
  :CUSTOM_ID:
 hkp4py
  :END:

The [[https://github.com/Selfnet/hkp4py][hkp4py]] module by Marcel Fest was originally a port of the old [[https://github.com/dgladkov/python-hkp][python-hkp]] module from Python 2 to Python 3 and updated to use the [[http://docs.python-requests.org/en/latest/index.html][requests]] module instead.  It has since been modified to provide
support for Python 2.7 as well and is available via PyPI.

Since it rewrites the =hkp= protocol prefix as =http= and =hkps= as
=https=, the module is able to be used even with servers which do not
support the full scope of keyserver functions.[fn:5]  It also works quite
readily when incorporated into a [[#cython][Cython]] generated and compiled version
of any code.

*** Key import format
  :PROPERTIES:
  :CUSTOM_ID: hkp4py-strings
  :END:

The hkp4py module returns key data via requests as string literals
(=r.text=) instead of byte literals (=r.content=).  This means that
the retrurned key data must be encoded to UTF-8 when importing
 that
key material using a =gpg.Context().key_import()= method.

For this reason an alternative method has been added to the =search=
function of =hkp4py.KeyServer()= which returns the key in the correct
format as expected by =key_import=.  When importing using this module,
it is now possible to import with this:

#+BEGIN_SRC python -i
for key in keys:
  if key.revoked is False:
    gpg.Context().key_import(key.key_blob)
  else:
    pass
#+END_SRC

Without that recent addition it would have been necessary to encode
the contents of each =hkp4py.KeyServer().search()[i].key= in
=hkp4py.KeyServer().search()= before trying to import it.

An example of this is included in the [[#howto-import-key][Importing Keys]] section of this
HOWTO and the corresponding executable version of that example is
available in the =lang/python/examples/howto= directory as normal; the
executable version is the =import-keys-hkp.py= file.

** GPGME version checking
  :PROPERTIES:
  :CUSTOM_ID: gpgme-version-check
  :END:

For various reasons it may be necessary to check which version of

GPGME the bindings have been built against; including whether a minimum required version of GPGME is in use.

For the most part the =gpg.version.versionstr= and =gpg.version.versionlist= methods have been quite sufficient. The former returns the same string as =gpgme-config --version=, while the latter returns the major, minor and patch values in a list.

To check if the installed bindings have actually been built against the current installed libgpgme version, this check can be performed:

```
#+BEGIN_SRC python -i
import gpg
import subprocess
import sys

gpgme_version_call = subprocess.Popen(["gpgme-config", "--version"],
                                      stdout=subprocess.PIPE,
                                      stderr=subprocess.PIPE)
gpgme_version_str = gpgme_version_call.communicate()

if sys.version_info[0] == 2:
  gpgme_version = gpgme_version_str[0].strip()
elif sys.version_info[0]
 >= 3:
  gpgme_version = gpgme_version_str[0].decode().strip()
else:
  gpgme_version = None

if gpgme_version is not None:
  if gpgme_version == gpg.version.versionstr:
    print("The GPGME Python bindings match libgpgme.")
  else:
    print("The GPGME Python bindings do NOT match libgpgme.")
else:
  print("Upgrade Python and reinstall the GPGME Python bindings.")
#+END_SRC
```

For many developers, however, the preferred checking means checking for a minimum version or point release. This is now readily available via the =gpg.version.versionintlist= method (added in version =1.12.1-beta79=). It is also now possible to easily check whether the installed GPGME Python bindings were built from a development or beta branch of the GPGME source code.

The following code demonstrates how both of those methods may be used:

```
#+BEGIN_SRC python -i
```

```
import gpg

try:
   if gpg.version.is_beta is True:
      print("The installed GPGME Python bindings were built from beta code.")
    else:
      print("The installed GPGME Python bindings are a released version.")
except Exception as e:
   print(e)

try:
   if gpg.version.versionintlist[0] == 1:
      if gpg.version.versionintlist[1] == 12:
         if gpg.version.versionintlist[2] == 1:
            print("This is the minimum version for using versionintlist.")
         elif gpg.version.versionintlist[2] > 1:
            print("The versionintlist method is available.")
         else:
            pass
      elif gpg.version.versionintlist[1] > 12:
         print("The versionintlist method is available.")
      else:
         pass
   elif gpg.version.versionintlist[0] > 1:
      print("The versionintlist method is available.")
   else:
      pass
except Exception as e:
   print(e)
#+END_SRC
```

The points where =pass= is used in the above example will most likely
also produce an =Exception= error since those results should only
occur in versions which do not have the =gpgme.version.is_beta=
 and
=gpgme.version.versionintlist= methods available.

* Copyright and Licensing
 :PROPERTIES:
 :CUSTOM_ID: copyright-and-license
 :END:

** Copyright
  :PROPERTIES:
  :CUSTOM_ID: copyright
  :END:

Copyright  The GnuPG Project, 2018.

** Draft Editions of this HOWTO
  :PROPERTIES:
  :CUSTOM_ID: draft-editions
  :END:

Draft editions of this HOWTO may be periodically available directly
from the author at any of the following URLs:

- [[https://files.au.adversary.org/crypto/gpgme-python-howto.html][GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 SSL)]]
- [[http://files.au.adversary.org/crypto/gpgme-python-howto.html][GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 no SSL)]]
- [[https://files.au.adversary.org/crypto/gpgme-python-howto-split/index.html][GPGME Python Bindings HOWTO draft (HTML multiple files, AWS S3 SSL)]]
- [[http://files.au.adversary.org/crypto/gpgme-python-howto/index.html][GPGME Python Bindings HOWTO draft (HTML
 multiple files, AWS S3 no SSL)]]

These draft versions have been generated from this document via GNU
Emacs [[https://orgmode.org/][Org mode]] to =.texi= and [[https://www.gnu.org/software/texinfo/][GNU Texinfo]] to HTML.  Though it is
likely that the specific [[https://files.au.adversary.org/crypto/gpgme-python-howto][file]]
[[http://files.au.adversary.org/crypto/gpgme-python-howto.org][version]] used will be on the same server
with the generated output formats.  Occasionally I may include the Org
mode generated XHTML versions:

- [[https://files.au.adversary.org/crypto/gpgme-python-howto.xhtml][GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 SSL)]]
- [[http://files.au.adversary.org/crypto/gpgme-python-howto.xhtml][GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 no SSL)]]

That XHTML version, however, is exported in a way which inherits a
colour scheme from [[https://github.com/holomorph/emacs-zenburn][the author's Emacs theme]] (which is a higher contrast
version
 of [[http://kippura.org/zenburnpage/][Zenburn]] ported by [[https://github.com/holomorph][Holomorph]]).  So it's fine for people who
prefer dark themed web pages, but not so great for everyone else.

The GNU Texinfo and reStructured Text versions ship with the software,
while the GNU Emacs Info version is generated from the Texinfo
version using GNU Texinfo or GNU Makeinfo.  The Texinfo format is
generated from the original Org mode source file in Org mode itself
either within GNU Emacs or via the command line by invoking Emacs in

batch mode:

```
#+BEGIN_SRC shell
 emacs gpgme-python-howto.org --batch -f org-texinfo-export-to-texinfo --kill
 emacs gpgme-python-howto --batch -f org-texinfo-export-to-texinfo --kill
#+END_SRC
```

The reStructuredText format is also generated from the Org mode source
file, except it is generated using [[https://pandoc.org][Pandoc]] with either of the following
commands (depending on the filename):

```
#+BEGIN_SRC shell
 pandoc -f org -t rst+smart -o gpgme-python-howto.rst
 gpgme-python-howto.org
 pandoc -f org -t rst+smart -o gpgme-python-howto.rst gpgme-python-howto
#+END_SRC
```

Note that the Org mode source files are identified as such via a mode
line at the top of each file and have had their =.org= file extensions
dropped in order to make scripted generation of output formats easier
and not require renaming files post-conversion.

Due to a bug in Org mode's texinfo conversion method, the recommended
steps for generating the Texinfo files for all the files in the
=lang/python/doc/src/= directory are as follows:

```
#+BEGIN_SRC shell
 for x in * ; do
    emacs $x --batch -f org-texinfo-export-to-texinfo --kill
    cat $x.texi | sed -e 's/@documentencoding UTF-8/@documentencoding utf-8/g' > ../texinfo/$x.texi
    pandoc -f org -t rst+smart -o ../rst/$x.rst $x
 done ;
 rm -fv *.texi
 cd ../texinfo
 mkdir info
 mkdir html
 for x in *.texi ; do
    makeinfo -v $x
    makeinfo --html --no-split $x
 done ;
 mv *.info info/
 mv
 *.html html/
#+END_SRC
```

This code snippet includes the generation of the reStructuredText
files and would be expected to be run from the =doc/src/= directory
containing the Org mode source files.  It also assumes that the

commands are being run on POSIX compliant systems with basic tools
like sed, the Bourne shell and GNU Emacs[fn:6] available. The code
snippet also includes the steps for generating the Emacs Info files
and HTML files from the Texinfo files. Using reStructuredText files
with Sphinx is best left for the documentation of that project.

In addition to these there is a significantly less frequently updated
version as a HTML [[https://files.au.adversary.org/crypto/gpgme-python/dita/webhelp/index.html][WebHelp site]]
(AWS S3 SSL); generated from DITA XML
source files, which can be found in [[https://dev.gnupg.org/source/gpgme/browse/ben%252Fhowto-dita/][an
alternative branch]] of the GPGME
git repository.

Various generated output formats may occasionally be found in
subdirectories
of the [[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python][gpgme-python]] directory. In
particular within
the [[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/dita][DITA]],
[[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/rst][reStructuredText]] and
[[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/texinfo][Texinfo]] subdirectories. The
=rst=
directory contains output files generated with Sphinx and may include a
considerable number of its possible output formats, but there are no
guarantees as to how recent these are or even if they are present.

These draft editions are not official documents and the version of
documentation in the master branch or which ships with released
versions is the only official documentation. Nevertheless, these
draft editions may occasionally be of use by providing more accessible
web versions which are updated between releases. They are provided on
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:CUSTOM_ID: license
:END:

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PURPOSE.

* Footnotes

[fn:1] =short-history= and/or =short-history.html=.

[fn:2] With no issues reported specific to Python 3.7, the release of Python 3.7.1 at around the same time as GPGME 1.12.0 and the testing with Python 3.7.1rc1, there is no reason to delay moving 3.7 ahead of 3.6 now. Production environments with more conservative requirements will always enforce their own policies anyway and installation to each supported
minor release is quite possible too.

[fn:3] Yes, even if you use virtualenv with everything you do in Python. If you want to install this module as just your user account then you will need to manually configure, compile and install the /entire/ GnuPG stack as that user as well. This includes libraries which are not often installed that way. It can be done and there are circumstances under which it is worthwhile, but generally only on POSIX systems which utilise single user mode (some even require it).

[fn:4] You probably don't really want to do this. Searching the keyservers for "gnupg.org" produces over 400 results, the majority of which aren't actually at the gnupg.org domain, but just included a comment regarding the project in their key somewhere.

[fn:5] Such as with ProtonMail servers. This also means that restricted servers which only advertise either HTTP or HTTPS end points and not HKP or HKPS end points must still be identified as as HKP or HKPS within the Python
Code. The =hkp4py= module will rewrite
these appropriately when the connection is made to the server.

[fn:6] Okay, Emacs might not necessarily qualify as a basic tool, but it is common enough that having it installed on a system isn't too great an expectation, nor is it difficult to add to most POSIX systems, even if the users of those systems do not personally use it.
{
  "fingerprint": "*"
}
{
  "op": "delete",
  "key": "E8143C489C8D41124DC40D0B47AF4B6961F04784"
}
{
  "op": "createkey",
  "userid": "foo@bar.baz",

"algo": "rsa1024"
}
{
"op": "sign",
"keys": "A0FF4590BB6122EDEF6E3C542D727CC768697734",
"sender": "alpha@example.net",
"data": "Hello world",
"armor": true,
"base64": false
}

2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting
on December 1st, 2011 we put change information only in the GIT
commit log, and generate a top-level ChangeLog file from logs at
"make dist". See doc/HACKING for details.

2011-10-25 Marcus Brinkmann <marcus@g10code.com>

* Makefile.am: Remove build rules for libgpgme-pth.
* gpgme.m4: Remove support for libgpgme-pth.

2011-05-26 Marcus Brinkmann <marcus@g10code.com>

* decrypt.c (gpgme_op_decrypt_start, gpgme_op_decrypt): Check CTX.
* decrypt-verify.c (gpgme_op_decrypt_verify_start)
(gpgme_op_decrypt_verify): Likewise.
* delete.c (gpgme_op_delete_start, gpgme_op_delete): Likewise.
* edit.c (gpgme_op_edit_start, gpgme_op_edit)
(gpgme_op_card_edit_start, gpgme_op_card_edit): Likewise.
* encrypt.c (gpgme_op_encrypt_start, gpgme_op_encrypt): Likewise.
* encrypt-sign.c (gpgme_op_encrypt_sign_start)
(gpgme_op_encrypt_sign): Likewise.
* export.c (gpgme_op_export_start,
gpgme_op_export)
(gpgme_op_export_ext_start, gpgme_op_export_ext)
(gpgme_op_export_keys_start, gpgme_op_export_keys): Likewise.
* genkey.c (gpgme_op_genkey_start, gpgme_op_genkey): Likewise.
* getauditlog.c (gpgme_op_getauditlog_start)
(gpgme_op_getauditlog): Likewise.
* gpgconf.c (gpgme_op_conf_load, gpgme_op_conf_save): Likewise.
* import.c (gpgme_op_import_start, gpgme_op_import_keys_start)
(gpgme_op_import_keys, gpgme_op_import): Likewise.
* keylist.c (gpgme_op_keylist_start, gpgme_op_keylist_ext_start):
Likewise.
* opassuan.c (gpgme_op_assuan_transact_start)
(gpgme_op_assuan_transact_ext): Likewise.
* passwd.c (gpgme_op_passwd_start, gpgme_op_passwd): Likewise.

* sign.c (gpgme_op_sign_start, gpgme_op_sign): Likewise.
* trustlist.c (gpgme_op_trustlist_start)
(gpgme_op_trustlist_next): Likewise.
* verify.c (gpgme_op_verify_start, gpgme_get_sig_key): Likewise.
* op-support.c (_gpgme_op_data_lookup): Likewise.
* vfs-create.c (gpgme_op_vfs_transact, gpgme_op_vfs_create):
Likewise.
* vfs-mount.c (gpgme_op_vfs_mount, gpgme_op_vfs_transact): Likewise.
* gpgme.c (gpgme_set_protocol)
(gpgme_set_sub_protocol)
(gpgme_set_armor, gpgme_set_include_certs)
(gpgme_set_keylist_mode, gpgme_set_passphrase_cb)
(gpgme_set_progress_cb, gpgme_set_io_cbs, gpgme_set_locale)
(gpgme_ctx_set_engine_info, gpgme_sig_notation_clear): Likewise.
* gpgme.c (gpgme_new): Check for valid R_CTX.
(gpgme_cancel, gpgme_cancel_async, gpgme_release): Likewise.

2011-04-06 Werner Koch <wk@g10code.com>

* gpgme-config.in: Add option --host. Change options --cflags and
--libs to collapse duplicate include and lib dirs. Try to put
extra libs at the end.

* gpgme.h.in: Use INSERT__TYPEDEFS_FOR_GPGME_H to include platform
specific typedefs.

2011-02-03 Werner Koch <wk@g10code.com>

* extra-stati.h: New.
* mkstatus: Extend to also process extra-stati.h
* Makefile.am (main_sources): Add extra-stati.h
(status-table.h): Depend on extra-stati.h and adjust rule.

2011-02-03
Marcus Brinkmann <marcus@g10code.com>

* w32-io.c (_gpgme_io_socket): Return fd, not res.

2011-02-02 Marcus Brinkmann <mb@g10code.com>

* assuan-support.c (my_socket, my_connect): New functions.
(_gpgme_assuan_system_hooks): Add my_Socket, my_connect.
* priv-io.h (_gpgme_io_socket): New prototype.
* w32-io.c (pid_to_handle, handle_to_oid, fd_to_handle): Remove macros.
(is_socket): Remove function.
(_gpgme_io_spawn) [HAVE_W32CE_SYSTEM]: Remove some dead code.
(_gpgme_io_spawn): Translate handles before DuplicateHandle them.

2011-02-02  Marcus Brinkmann  <mb@g10code.com>

* w32-util.c (mkstemp): Don't use CreateFile instead of open (the
function is not used on Windows CE, and the callers were not
adjusted).

2011-01-21  Marcus Brinkmann  <mb@g10code.com>

* engine-gpgconf.c (_gpgme_conf_opt_change): Fix the case that is
not self-assignment.

2010-12-08  Werner Koch  <wk@g10code.com>

* gpgme-tool.c (strcpy_escaped_plus): New.
(DIM, xtoi_1, xtoi_2): New.
(cmd_keylist):
Allow for multiple patterns.

2010-11-23  Marcus Brinkmann  <mb@g10code.com>

* w32-io.c (create_reader, create_writer): Use small stack size on
Windows CE.

2010-11-23  Marcus Brinkmann  <mb@g10code.com>

* gpgme.h.in (gpgme_conf_arg_new): Make VALUE arg const void *.
* gpgconf.c (_gpgme_conf_arg_new): Likewise.
(gpgme_conf_arg_new): Likewise.
* engine-gpgconf.c (_gpgme_conf_arg_new): Likewise.
(gpgconf_write): Remove debug hack.

2010-11-19  Marcus Brinkmann  <mb@g10code.com>

* engine-gpgconf.c (_gpgme_conf_opt_change): Support
self-assignment.  Requested by Marc Mutz.

2010-11-17  Marcus Brinkmann  <mb@g10code.com>

* vasprintf.c (int_vasprintf) [HAVE_W32CE_SYSTEM]: Just use a
fixed size buffer, as va_copy is not easy to fake.

2010-11-15  Marcus Brinkmann  <mb@g10code.com>

* w32-ce.h (strcasecmp, strdup) [_MSC_VER]: Define.
* genkey.c, passphrase.c: Include util.h.

* w32-util.c (_gpgme_w32ce_get_debug_envvar): Fix return value.

2010-11-15  Werner Koch  <wk@g10code.com>

*
data-compat.c (gpgme_data_new_from_filepart)
(gpgme_data_new_from_file) [W32CE && _MSC_VER]: Return not
GPG_ERR_NOT_IMPLEMENTED.

* w32-ce.h (HKEY_PERFORMANCE_DATA, HKEY_CURRENT_CONFIG, _IOLBF)
(abort) [_MSC_VER]: Provide these macros.

* ath.h [W32CE && _MSC_VER]: Include winsock2.h.

* ath.c (ath_read, ath_write) [W32CE && _MSC_VER]: Do not call
non-available functions.

2010-11-04  Werner Koch  <wk@g10code.com>

* w32-ce.h [_MSC_VER && W32CE]: Undef leave.
* export.c: Include util.h so that we get the above undef.

* memrchr.c: Remove.  Used to be a replacement function required
by the formerly included assuan code.

2010-11-03  Werner Koch  <wk@g10code.com>

* debug.c (_gpgme_debug) [W32CE]: Replace locatime by GetLocalTime.

* signers.c (gpgme_signers_clear): Remove useless return.
Reported by Patrick Spendrin.

* w32-util.c: s/__inline__/GPG_ERR_INLINE/

* setenv.c: Include string.h due to our strerror replacement.

* w32-ce.h (access, bsearch):
New macros.
* w32-ce.c (_gpgme_wince_access): New.
(RegQueryValueExA): Change DATA to a void*.
(_gpgme_wince_bsearch): New.  Taken from glibc 2.6.

Guard include of sys/stat.h and sys/types.h.

2010-11-02  Werner Koch  <wk@g10code.com>

* data-fd.c (read, write, lseek) [W32CE && ! __MINGW32CE__]: New.
Taken from Pedro Alves Public Domain code.

* w32-ce.h (SHGetSpecialFolderPath): Remove our defines and

prototypes.  We use the system provided prototypes now.
* w32-ce.c: Include shlobj.h
(_WIN32_IE): Define to 0x0400
(CreateFileA): New.
* w32-util.c: Explicitly include windows headers before util.h.
(_gpgme_w32ce_get_debug_envvar): Do not use wchar_t strings for
read_w32_registry_string.
(mkstemp): Use CreateFile instead of open.

* w32-io.c (handle_to_fd, fd_tohandle): Add.  We need them for W32.
* w32-util.c (_WIN32_IE): Define to 0x0400.

* util.h [W32]: Include windows.h.
* w32-sema.c: Do not include windows.h directly.
* ath.c (ssize_t, pid_t)[_MSC_VER]: Add new
types.
* gpgme.c (gpgme_result_ref, gpgme_result_unref): Do not use a
void pointer in pointer arithmetic.
* w32-util.c: Include util.h prior to ath.h.  Don't include
windows.h directly.
(F_OK): Define if not defined.
* w32-ce.c: Include string.h.
(RegQueryValueExA): Use WINAPI modifier to match the declaration.
* vfs-create.c: Include string.h because under W32CE with MSC we
get a warning related to our strerror replacement.
* encrypt-sign.c: Include stdlib.h, string.h and errno.h.
* priv-io.h [W32CE]: Include w32-ce.h
* w32-ce.h: Include winsock2.h and ws2tcpip.h.
(_MSV_VER): Remove useless macro.
(pid_t): Add typedef.

Guard all includes of unistd.h and sys/time.h.

2010-10-28  Marcus Brinkmann  <marcus@g10code.com>

* opassuan.c (gpgme_op_assuan_transact_ext): Fix uninitialized
value use.  Reported by Marc Mutz.

2010-10-07  Werner Koch  <wk@g10code.com>

* gpgme-tool.c (ARGP_ERR_UNKNOWN): Use EDEADLK if available.

* w32-util.c (_gpgme_w32ce_get_debug_envvar) [W32CE]:
New.
* debug.c (debug_init) [W32CE]: Use new function.

2010-09-16  Werner Koch  <wk@g10code.com>

* import.c: Include "util.h".
(parse_import): Return GPG_ERR_MISSING_ISSUER_CERT.

* util.h: Add fallback define for GPG_ERR_MISSING_ISSUER_CERT.
* op-support.c: Include "util.h".
(_gpgme_parse_inv_recp): Handle new code 12.

2010-09-02 Marcus Brinkmann <marcus@g10code.de>

* error.c (gpgme_err_code_to_errno): Fix cut and paste bug (thanks
to Marc Mutz).

2010-09-01 Marcus Brinkmann <marcus@g10code.de>

* w32-io.c: Revert change from 2009-06-18, as it created a race
condition.

2010-08-18 Marcus Brinkmann <marcus@g10code.de>

* gpgme.def: Add gpgme_err_code_from_syserror and gpgme_err_set_errno.
* libgpgme.vers: Likewise.
* gpgme.h.in (gpgme_error_from_errno): Fix return type to
gpgme_error_t.
(gpgme_err_code_from_syserror, gpgme_err_set_errno): New prototype.
(gpgme_error_from_syserror): New inline function (why are
gpgme_err_make_from_errno and gpgme_error_from_errno
not inline
functions?).
* error.c (gpgme_error_from_errno): Fix return type to gpgme_error_t.
(gpgme_err_set_errno, gpgme_err_code_from_syserror): New functions.

2010-08-03 Marcus Brinkmann <marcus@g10code.de>

* gpgme-tool.c (result_encrypt_to_xml, result_sign_to_xml)
(result_verify_to_xml, result_import_to_xml)
(result_genkey_to_xml): Check vigorously for null pointers.

* w32-io.c (GPGCEDEV_IOCTL_ASSIGN_RVID): New macro.
(_gpgme_io_spawn): Use ASSIGN_RVID.

2010-06-11 Marcus Brinkmann <marcus@g10code.de>

* w32-io.c (_gpgme_io_spawn): Remove debug printf.

2010-06-10 Marcus Brinkmann <marcus@g10code.de>

* gpgme-tool.c (gpgme_server): Use special hack for Windows CE to
get at stdin and stdout.

* engine-gpgsm.c (gpgsm_new): Translate returned achild_fds back
to child_fds.

* debug.h (TRACE_SUC6): New macro.
* w32-io.c (MAX_SLAFD): New macro.
(fd_table): New static variable.
(new_fd, release_fd): New functions.
(fd_to_handle, handle_to_fd, handle_to_socket):
Remove macros.
(MAX_READERS, MAX_WRITERS): Increase to 64.
(notify_table): Increase to MAX_SLAFD.
(struct reader_context_s, struct writer_context_s): Add member
file_sock.
(reader, writer): Use file_hd vs file_sock to decide if socket
operations to use.  Remove auto-detect mode.
(create_reader, create_writer): Set file_sock.  Unblock pending
thread only if this is a pipe fd.
(_gpgme_io_pipe): Allocate fds from table and return slot indices
instead of windows handles.  This allows to properly handle RVIDs.
(_gpgme_io_close): Handle dup'ed file descriptors.
(build_commandline) [HAVE_W32_SYSTEM]: Use RVID from fd table now.
(_gpgme_io_spawn): Use fd table now.
(_gpgme_io_fd2str): Use RVID from fd table now.
(_gpgme_io_dup): Implement using fd table.
(_gpgme_io_socket): Allocate fds from table.
(_gpgme_io_connect): Use fd from table.

* w32-glib-io.c (find_channel): Check that the slot is used.

2010-06-09  Marcus Brinkmann  <marcus@g10code.de>

* w32-io.c [HAVE_W32CE_SYSTEM]:
Include assuan.h and winioctl.h.
(GPGCEDEV_IOCTL_UNBLOCK) [HAVE_W32CE_SYSTEM]: Define.
(set_synchronize) [HAVE_W32CE_SYSTEM]: Stub it out.
(is_socket): Allow to return -1 for auto-detect (old behaviour).
(is_socket) [HAVE_W32CE_SYSTEM]: Return -1.
(reader): Handle auto-detect case.  Handle ctx->stop_me before
checking for EOF.
(destroy_reader) [HAVE_W32CE_SYSTEM]: Unblock a pending reader.
(writer): Handle auto-detect case.  Handle ctx->stop_me with
ERROR_BUSY.
(destroy_writer) [HAVE_W32CE_SYSTEM]: Unblock a pending writer.
(_gpgme_io_pipe) [HAVE_W32CE_SYSTEM]: Implement in terms of a
half-pipe.
(build_commandline) [HAVE_W32CE_SYSTEM]: New function.
(_gpgme_io_spawn) [HAVE_W32CE_SYSTEM]: Implement it differently

for this platform.
(_gpgme_io_fd2str) [HAVE_W32CE_SYSTEM]: Implement it for RVIDs.
(_gpgme_io_dup) [HAVE_W32CE_SYSTEM]: Stub it out.

* gpgme-tool.c (result_add_timestamp): Add missing NULL argument.
(result_sign_to_xml): Protect against NULL
fingerprint.
(struct server): New members input_fd, input_filename,
input_stream output_fd, output_filename, output_stream,
message_filename, message_stream.
(server_reset_fds): Deallocate those.
(server_parse_fd): New function.
(server_data_obj): Take optional filename argument and direction
argument. Also take new argument to return a filestream that
needs to be closed after destroying the data object.
Change all callers, too.
(input_notify, output_notify): Removed.
(cmd_input, cmd_output): New functions.
(gpgme_server): Do not register input and output notifier.
(register_commands): Use cmd_input and cmd_output.
(cmd_message): Rewritten to use server_parse_fd.
(cmd_delete, cmd_keylist): Fix inverted option check.
(main) [HAVE_W32CE_SYSTEM]: Sleep a bit to work around bug in ssh.

* genkey.c (gpgme_op_genkey): Return err with TRACE_ERR.

2010-05-12 Marcus Brinkmann <marcus@g10code.de>

* conversion.c (_gpgme_timegm) [HAVE_W32_SYSTEM]: New static
function.
(_gpgme_parse_timestamp)
[HAVE_W32_SYSTEM]: Use it.

* gpgme-tool.c (main): Protect call to setlocale with
HAVE_SETLOCALE.

* Makefile.am (system_components): Remove custom cppflags from
RCCOMPILE (because gpg-error adds -idirafter that makes RC bail.
[HAVE_W32CE_SYSTEM]: Add w32-ce.h and w32-ce.c, clear
libexec_PROGRAMS.
* w32-ce.h, w32-ce.c: New files.

* priv-io.h: Include <sys/types.h>
* util.h: Likewise.

2010-05-11 Marcus Brinkmann <marcus@g10code.de>

* w32-util.c: Include ath.h

(HAVE_ALLOW_SET_FOREGROUND_WINDOW) [!HAVE_W32CE_SYSTEM]: Define
it.
(RTLD_LAZY, dlopen, dlsym,
dlclose) [!HAVE_ALLOW_SET_FORGROUND_WINDOW]: Don't define anymore.
(_gpgme_allow_set_foreground_window) [!HAVE_ALLOW_SET_FOREGROUND_WINDOW]:
Make it a stub.
(read_w32_registry_string): Use FooA variants of Windows functions
instead of Foo (which dispatches depending on UNICODE).
[!HAVE_W32CE_SYSTEM]: Don't check environment.
(w32_shgetfolderpath): Remove.
(find_program_at_standard_place): Call
SHGetSpecialFolderPath
(which is available on all Windows systems
and also Windows CE).
(mkstemp): Use ath_self instead of getpid.
(_gpgme_mkstemp): Use GetTempPathA instead of GetTempPath.

* gpgme.h.in: Use _WIN32 instead of _MSC_VER. Include time.h for
time_t.

2010-05-07 Marcus Brinkmann <marcus@g10code.de>

* engine-g13.c, gpgme.c, engine-gpgsm.c, engine-gpg.c,
op-support.c, engine-assuan.c, gpgme-tool.c: Include <locale.h>
only if available with HAVE_LOCALE_H and conditionalize use of
LC_CTYPE on its definition.
* engine-gpgconf.c: Do not include <locale.h>.

* engine-gpgsm.c (gpgsm_new, start): Cast between int and
assuan_fd_t.
* assuan-support.c (my_pipe, my_close, my_read, my_write): Likewise.
* gpgme-tool.c (server_data_obj, server_reset_fds, gpgme_server),
(my_recvmsg, my_sendmsg, my_spawn): Likewise.
* engine-assuan.c (start): Likewise.
* engine-g13.c (start): Likewise.

2010-05-06 Marcus Brinkmann <marcus@g10code.de>

* w32-glib-io.c, w32-io.c, w32-qt-io.cpp,
w32-sema.c, w32-util.c:
Do not include <signal.h>.

* sign.c, data-user.c, conversion.c, debug.c, verify.c, data.c,
decrypt.c, delete.c, assuan-support.c, import.c, engine-gpgsm.c,
data-mem.c, op-support.c, w32-io.c, w32-util.c, data-compat.c: Use
gpg_error_from_syserror instead gpg_error_from_errno, and use
gpg_err_set_errno to set error number.
* setenv.c: Include <gpg-error.h> and define __set_errno to use

gpg_err_set_errno.
* gpgme-tool.c (ARGP_ERR_UNKNOWN): Define to EDEADLOCK (which is
mapped in Windows CE) instead of E2BIG (which is not).
(gt_import_keys): Initialize err.

2010-04-19 Marcus Brinkmann <marcus@g10code.de>

* assuan-support.c (my_spawn): Cast to avoid warning.
* engine-g13.c (g13_new): Make ARGV array of pointer to const
char.
(g13_assuan_simple_command) [!USE_DESCRIPTOR_FUNCTION]: Don't define.
* ops.h (_gpgme_key_append_name): Same in prototype.
* key.c (_gpgme_key_append_name): Make SRC argument pointer to
const char.
* posix-util.c
(_gpgme_get_uiserver_socket_path): Make HOMEDIR
const.
* vfs-mount.c (gpgme_op_vfs_transact_start): Never define this
potentially useful but currently unused function.
* vfs-create.c (gpgme_op_vfs_transact_start): Likewise.

2010-04-16 Werner Koch <wk@g10code.com>

* w32-io.c (is_socket): New.
(reader, writer): Use it to figure out the API to use.

2010-03-15 Werner Koch <wk@g10code.com>

* gpgme.h.in: Add autoconf template to set generated file to
read-only in an emacs buffer.

2010-03-12 Werner Koch <wk@g10code.com>

* gpgme.h.in (GPGME_STATUS_SUCCESS): Use the right file for the
change; see below.

* passwd.c (op_data_t): New.
(passwd_start): Setup OPD.
(passwd_status_handler): Return GPG_ERR_NOT_SUPPORTED if needed.
* context.h (OPDATA_PASSWD): New.
* gpgme.h (GPGME_STATUS_SUCCESS): New.

2010-03-09 Werner Koch <wk@g10code.com>

* engine-gpgsm.c (gpgsm_keylist): Try to start the agent.

2010-02-17 Werner Koch <wk@g10code.com>

* posix-io.c (notify_table):
Change implementation.
(notify_table_item_t, notify_table_size, notify_table_lock): New.
(_gpgme_io_close, _gpgme_io_set_close_notify): Adjust for new
implementation.

2010-02-16 Werner Koch <wk@g10code.com>

* gpgme-tool.c (spacep, has_option, skip_options): New.
(cmd_export): Implement option --minimal.

* gpgme.h.in (GPGME_EXPORT_MODE_MINIMAL): New.
* export.c (export_start, export_ext_start): Implement it.
* engine-gpg.c (export_common): Ditto.

2010-01-25 Werner Koch <wk@g10code.com>

* w32-io.c (_gpgme_io_connect): Fix return code check to make it work.

* version.c (do_subsystem_inits): Remove superfluous second
WSAStartup.

2010-01-22 Werner Koch <wk@g10code.com>

* w32-io.c (writer): Try to use send first.
(reader): Try to use recv first.

2010-01-08 Werner Koch <wk@g10code.com>

* engine-gpg.c (gpg_passwd): New.
(_gpgme_engine_ops_gpg): Register.
* passwd.c (parse_error): New.
(passwd_status_handler): Use it.

2010-01-07 Marcus Brinkmann <marcus@g10code.de>

*
gpgme-tool.c (result_xml_write_cb_t, struct result_xml_state):
New types.
(MAX_TAGS): New macro.
(result_init, result_xml_indent, result_xml_tag_start)
(result_xml_tag_data, result_xml_tag_end, result_add_error)
(result_add_pubkey_algo, result_add_hash_algo, result_add_keyid)
(result_add_fpr, result_add_timestamp, result_add_sig_mode)
(result_add_value, result_add_string, result_encrypt_to_xml)
(result_decrypt_to_xml, result_sign_to_xml)
(result_verify_to_xml, result_import_to_xml)
(result_genkey_to_xml, result_keylist_to_xml)

(result_vfs_mount_to_xml): New functions.
(gt_result): Rewritten.

2010-01-05 Werner Koch <wk@g10code.com>

* gpgme-tool.c (gt_passwd, cmd_passwd): New.
(register_commands): Register.

* gpgme.h.in (gpgme_op_passwd_start, gpgme_op_passwd): New.
* libgpgme.vers, gpgme.def: Add new functions.
* passwd.c: New.
* Makefile.am (main_sources): Add passwd.c
* engine.c, engine.h (_gpgme_engine_op_passwd): New.
* engine-backend.h (struct
engine_ops): Add PASSWD.
* engine-gpgsm.c (gpgsm_passwd): New.
(_gpgme_engine_ops_gpgsm): Register.
(gpgsm_reset): Reset only if we have a connection.

* gpgme.h.in (GPGME_PK_ECDSA, GPGME_PK_ECDH): New.
* gpgme.c (gpgme_pubkey_algo_name): Add them.

2009-12-22 Marcus Brinkmann <marcus@g10code.de>

* debug.c: Test for TLS, not __GNUC__

2009-12-15 Marcus Brinkmann <marcus@g10code.de>

* assuan-support.c (my_spawn): Calloc, not malloc, the fd_items.

2009-12-10 Werner Koch <wk@g10code.com>

* debug.c (debug_init): Test on sgid process.

2009-12-08 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (LTRCCOMPILE): Refactor with ...
(RCCOMPILE): ... this new macro.
(SUFFIXES): Add .lo.
(gpgme_res_ldflag): Removed.
(gpgme_res): Use libtool object file name here.
(libgpgme_la_LDFLAGS): Remove gpgme_res_ldflag usage.
(libgpgme_la_LIBADD): Add gpgme_res.

* ath.c (ath_self) [HAVE_W32_SYSTEM]: Fix typo.

2009-12-02 Werner Koch <wk@g10code.com>

* gpgconf.c (gpgme_conf_arg_release):
No return in a function
returning void.  Reported by Wyllys Ingersoll.

2009-12-01  Werner Koch  <wk@g10code.com>

* gpgme-tool.c (cmd_getauditlog): Add flag --html.
(hlp_getauditlog): New.

* gpgme-tool.c (GT_GCC_A_SENTINEL, GT_GCC_A_PRINTF): New.
(gt_write_status): Use sentinel.
(argp_error, log_error): Use printf attribute.
(argp_parse): Remove extra argument to argp_error.
(_gt_progress_cb, gt_get_engine_info, gt_get_keylist_mode)
(gt_result): Add NULL arg.

2009-11-26  Marcus Brinkmann  <marcus@g10code.de>

* opassuan.c (opassuan_start): Allocate result structure before
beginning operation.

2009-11-25  Marcus Brinkmann  <marcus@g10code.de>

* gpgme-tool.c (gpgme_server): Use assuan_fd_t and assuan_fdopen
on fds.

2009-11-13  <wk@g10code.com>

* sign.c (_gpgme_sign_status_handler): Handle SIG_CREATED_SEEN.
* engine-uiserver.c (uiserver_sign): Make sending SENDER optional.

2009-11-10  Marcus Brinkmann  <marcus@g10code.de>

* op-support.c (_gpgme_op_reset):
Instead of last change, only set
sub protocol if it is not the default.

2009-11-10  Werner Koch  <wk@g10code.com>

* op-support.c (_gpgme_op_reset): Ignore GPG_ERR_NOT_IMPLEMENTED
while setting the sub protocol.

* engine-uiserver.c (uiserver_new): Pass fdpassing flag to
assuan_socket_connect.
(set_recipients): Replace fingerprint by user id.

* engine-gpgsm.c (set_recipients): Fix non-terminating loop in
case of a missing key.

2009-11-10  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c (gpgme_new): Set default sub protocol.
* gpgme-tool.c: Implement get sub protocol.

* gpgme.h.in (gpgme_get_sub_protocol): Add prototype.
* gpgme.def, libgpgme.vers: Add gpgme_get_sub_protocol.
* context.h (struct gpgme_context): New member sub_protocol.
* gpgme.c (gpgme_set_sub_protocol): Set CTX->sub_protocol.
(gpgme_get_sub_protocol): New function.
* op-support.c (_gpgme_op_reset): Set sub protocol.

* Makefile.am (uiserver_components): New variable.
(main_sources):
Add it.
* ops.h, key.c (_gpgme_key_append_name): Take CONVERT argument,
implement it.  Adjust callers.
(gpgme_key_from_uid): New function.
* gpgme.h.in (gpgme_protocol_t): Add GPGME_PROTOCOL_DEFAULT.
(gpgme_encrypt_flags_t): Add GPGME_ENCRYPT_PREPARE,
GPGME_ENCRYPT_EXPECT_SIGN.
(gpgme_set_sub_protocol, gpgme_key_from_uid): New functions.
* libgpgme.vers, gpgme.def: Add new functions.
* gpgme.c (gpgme_set_protocol): Add UIServer protocol.
(gpgme_set_sub_protocol): New function.
(gpgme_get_protocol_name): Add UIServer and default protocol.
* assuan-support.c: Return correct error values, implement
socketpair for POSIX.
* priv-io.h, posix-io.c, w32-io.c, w32-glib-io.c,
w32-qt-io.cpp (_gpgme_io_spawn): Add ATFORK and ATFORKVALUE
arguments.  Implement it for POSIX.  Adjust all callers.
* engine.h, engine-backend.h (_gpgme_engine_set_protocol)
(_gpgme_engine_op_decrypt_verify): New prototypes.  Adjust all
users.
* engine.c (engine_ops, gpgme_get_engine_info): Add UIServer
engine.
(_gpgme_engine_set_protocol,
_gpgme_engine_op_decrypt_verify): New
function.
* decrypt-verify.c (decrypt_verify_start): Call
_gpgme_engine_op_decrypt_verify.
* util.h, posix-util.c,
w32-util.c (_gpgme_get_uiserver_socket_path): New function.
* engine-gpgsm.c (gpgsm_set_fd): Fix _gpgme_io_pipe invocation.
* gpgme-tool.c: Some support for UIServer protocol.
* engine-uiserver.c: New file.

2009-11-09  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_new): Close server side FDs.

2009-11-06  Marcus Brinkmann  <marcus@g10code.de>

* gpgme-tool.c (struct gpgme_tool): New members write_data and
write_data_hook.
(gt_write_data): New function.
(gt_result): Output vfs_mount result.
(server_write_data): New function.
(gpgme_server): Initialize write_data members.

2009-11-05  Marcus Brinkmann  <marcus@g10code.de>

* engine-g13.c (struct engine_g13): Remove members RESULT_CB and
RESULT_CB_VALUE.
(g13_assuan_simple_command, status_handler): Don't use those
anymore.
(g13_transact): Remove them from argument list, too.
* vfs-mount.c (_gpgme_vfs_mount_status_handler): New function.
(_gpgme_op_vfs_mount): Pass it to transact.

* engine-assuan.c (llass_new): Update use of assuan_socket_connect.
* engine-gpgsm.c (gpgsm_new): Update use of assuan_pipe_connect.
* engine-g13.c (g13_new): Likewise.

* priv-io.h (IOSPAWN_FLAG_NOCLOSE): New flag.
* w32-io.c (_gpgme_io_spawn): Implement this flag.
* posix-io.c (_gpgme_io_spawn): Likewise.
* w32-glib-io.c (_gpgme_io_spawn): Likewise.
* assuan-support.c (my_spawn): Set this flag.

* decrypt.c (gpgme_op_decrypt_start): Fix use of debug macro.
* decrypt-verify.c (gpgme_op_decrypt_verify_start): Likewise.
* delete.c (gpgme_op_delete_start): Likewise.
* edit.c (gpgme_op_edit_start, gpgme_op_card_edit_start):
Likewise.
* encrypt.c (gpgme_op_encrypt_start): Likewise.
* encrypt-sign.c (gpgme_op_encrypt_sign_start): Likewise.
* export.c (gpgme_op_export_start, gpgme_op_export_ext_start)
(gpgme_op_export_keys_start,
gpgme_op_export_keys): Likewise.
* genkey.c (gpgme_op_genkey_start): Likewise.
* getauditlog.c (gpgme_op_getauditlog_start): Likewise.
* import.c (gpgme_op_import_start, gpgme_op_import_keys_start):
Likewise.
* opassuan.c (gpgme_op_assuan_transact_start): Likewise.

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* sign.c (gpgme_op_sign_start): Likewise.
* verify.c (gpgme_op_verify_start): Likewise.
* vfs-create.c (gpgme_op_vfs_create): Likewise.
* vfs-mount.c (gpgme_op_vfs_mount): Likewise.

2009-11-04  Marcus Brinkmann  <marcus@g10code.de>

* ath.h (ath_self): New prototype.  Include <stdint.h>
* ath.c, ath-pth.c, ath-pthread.c (ath_self): New function.
* debug.h: Rewrite most macros to beautify debug output.
(_gpgme_debug_buffer): Remove tagname and tag argument.
(_gpgme_debug_frame_begin, _gpgme_debug_frame_end): New prototypes.
* debug.c: Include <time.h>.  Don't include assuan.h.
(frame_nr, FRAME_NR): New thread-specific variable and macro.
(debug_init): Do not initialize assuan.
Call _gpgme_debug after
initialization instead using printf directly.
(_gpgme_debug): Do not call debug_init (we now ensure proper
initialization by user).  Add timestamp and thread/process ID.
(_gpgme_debug_buffer): Do not take tagname and tag argument.
(_gpgme_debug_frame_begin, _gpgme_debug_frame_end): New functions.
* version.c (gpgme_check_version_internal, gpgme_check_version):
Fix debug string.  Do not initialize assuan.
* posix-io.c (get_max_fds): Use 0 not NULL (nicer debug output).

2009-11-04  Werner Koch  <wk@g10code.com>

* gpgme-tool.c (register_commands): Add HELP feature.

2009-11-03  Werner Koch  <wk@g10code.com>

* gpgme.h.in (GPGME_PROTOCOL_UISERVER): New.

2009-11-03  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (main_sources): Change g13.c to vfs-mount.c.  Add
vfs-create.c
* vfs-create.c: New file.
* g13.c: Renamed to ...
* vfs-mount.c: ... this new file.
* gpgme.h.in (gpgme_op_vfs_create): New prototype.
* gpgme.def, libgpgme.vers: Add gpgme_op_vfs_create.
*
gpgme-tool.c (gt_vfs_create, cmd_vfs_create): New functions.
(register_commands): Add VFS_CREATE and CREAET.

2009-11-02  Marcus Brinkmann  <marcus@g10code.de>
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* debug.h (_gpgme_debug_buffer): Make TAG argument const const.
* debug.c (_gpgme_debug_buffer): Likewise.
* gpgme-tool.c (input_notify, output_notify): Adjust type to new
assuan interface.
* decrypt.c (gpgme_op_decrypt_result): Remove unused variable.
* opassuan.c (gpgme_op_assuan_transact): Fix return value.

2009-10-30 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (noinst_PROGRAMS): New target gpgme-tool.
(gpgme_tool_LDADD): New variable.
* gpgme-tool.c: New file.
* ops.h (_gpgme_sig_notation_clearm _gpgme_signers_clear): New
prototypes.
* gpgme.c (gpgme_set_protocol): Allow GPGME_PROTOCOL_GPGCONF (when
had that gone missing?).
(_gpgme_sig_notation_clear): New function without debug output.
(gpgme_release): Call it and _gpgme_signers_clear.
* signers.c (_gpgme_signers_clear): New
function without debug output.
* g13.c (gpgme_op_vfs_mount): Add debug output.
* assuan-support.c (my_spawn): Allow fd_child_list to be NULL.
* conversion.c (_gpgme_encode_percent_string): Fix infinite loop.
* debug.h: Put tag in front of debug lines, should make for nicer
output.
* engine-assuan.c (llass_new): Use our new system hooks for libassuan.
* engine-g13.c (g13_new): Remove redundant assuan context allocation.
* version.c (gpgme_check_version_internal): Delay debug output
until after gpgme_check_version was called.

2009-10-28 Marcus Brinkmann <marcus@g10code.de>

* signers.c, encrypt-sign.c, encrypt.c, delete.c, keylist.c,
edit.c, import.c, export.c: Fix last change in debug output.

2009-10-27 Marcus Brinkmann <marcus@g10code.de>

* edit.c (gpgme_op_edit_start, gpgme_op_edit)
(gpgme_op_card_edit_start, gpgme_op_card_edit): Add debug output.
* encrypt-sign.c (gpgme_op_encrypt_sign_start)
(gpgme_op_encrypt_sign): Likewise.
* encrypt.c (gpgme_op_encrypt_start,
gpgme_op_encrypt)
(gpgme_op_encrypt_result): Likewise.
* export.c (gpgme_op_export_start, gpgme_op_export)
(gpgme_op_export_ext_start, gpgme_op_export_ext)
(gpgme_op_export_keys_start, gpgme_op_export_keys): Likewise.
* genkey.c (gpgme_op_genkey_start, gpgme_op_genkey)

(gpgme_op_genkey_result): Likewise.
* getauditlog.c (gpgme_op_getauditlog_start)
(gpgme_op_getauditlog): Likewise.
* import.c (gpgme_op_import_result, gpgme_op_import_start)
(gpgme_op_import): Likewise.
* keylist.c (gpgme_op_keylist_result, keylist_colon_handler)
(gpgme_op_keylist_start, gpgme_op_keylist_ext_start)
(gpgme_op_keylist_next, gpgme_op_keylist_end, gpgme_get_key): Likewise.
* opassuan.c (gpgme_op_assuan_transact_start)
(gpgme_op_assuan_transact_ext, gpgme_op_assuan_result)
(gpgme_op_assuan_transact): Likewise.
* signers.c (gpgme_signers_add, gpgme_signers_clear): Likewise.
* trustlist.c (gpgme_op_trustlist_start)
(gpgme_op_trustlist_next, gpgme_op_trustlist_end): Likewise.
* verify.c (gpgme_op_verify_start,
gpgme_op_verify)
(gpgme_op_verify_result): Likewise.

2009-10-26 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h.in (struct gpgme_io_event_done_data)
(gpgme_io_event_done_data_t): New types.
(struct _gpgme_op_assuan_result): Deprecate the err member.
(gpgme_op_assuan_result): Deprecate (for now).
(gpgme_op_assuan_transact_ext): New prototype.
(gpgme_op_assuan_transact): Deprecate.
(struct _gpgme_op_g13_result): Replace with ...
(struct _gpgme_op_vfs_mount_result): ... this.
(gpgme_op_g13_mount): Replace with ...
(gpgme_op_vfs_mount): ... this.
* gpgme.def (gpgme_op_assuan_transact_ext, gpgme_wait_ext)
(gpgme_op_vfs_mount_result, gpgme_op_vfs_mount): New.
(gpgme_op_g13_mount): Remove.
* libgpgme.vers: Likewise.
* engine-backend.h (struct engine_ops): Remove RESULT_CB and
RESULT_CB_VALUE args in opassuan_transact member. Add CANCEL_OP
member.
* ops.h (_gpgme_cancel_with_err, _gpgme_wait_on_condition): Add
OP_ERR argument.
(_gpgme_wait_one_ext):
New prototype.
* context.h (ctx_op_data_id_t): Add OPDATA_VFS_MOUNT.
* engine-g13.c (g13_cancel_op): New function.
(parse_status): Remove declaration.
(g13_assuan_simple_command): Do nothing with status lines for now.
(status_handler): Update opaque value access.
(_gpgme_engine_ops_g13): Add new cancel_op member.
* gpgme.c (_gpgme_cancel_with_err): Add new parameter OP_ERR.

Handle operational errors.
(gpgme_cancel, gpgme_io_read, gpgme_io_write): Add debug output.
* data.c (_gpgme_data_inbound_handler)
(_gpgme_data_outbound_handler): Adjust opaque value access.
* engine-gpg.c (command_handler, status_handler)
(colon_line_handler): Likewise.
* engine-gpgsm.c (status_handler): Likewise.
* engine-gpg.c (_gpgme_engine_ops_gpg): Add cancel_op member.
* engine-gpgsm.c (_gpgme_engine_ops_gpgsm): Likewise.
* g13.c: Rewritten (and will be rewritten again).
* engine.h (_gpgme_engine_op_assuan_transact): Remove result_cb
and result_cb_value parameters from prototype.
(_gpgme_engine_cancel_op):
New prototype.
* engine.c (engine_ops) [! ENABLE_ASSUAN]: Add missing comma.
(_gpgme_engine_op_assuan_transact): Remove result_cb and
result_cb_value parameter.
(_gpgme_engine_cancel_op): New function.
* wait.h (_gpgme_run_io_cb): Add new argument OP_ERR.
(struct io_cb_data): New struct to pass opaque data and get a
op_err return value.  Needed because we can't modify I/O callback
handler signature because it is exposed to the user.
* wait.c (_gpgme_run_io_cb): Add OP_ERR parameter.  Handle
operational errors.
* wait-user.c (_gpgme_user_io_cb_handler): Handle operational
errors.
* wait-private.c (_gpgme_wait_on_condition): New argument to
retrieve the operational result.  Handle operational errors in
session based protocols.
(_gpgme_wait_one_ext): New function.
(_gpgme_wait_one): Pass argument in invocation of
_gpgme_wait_on_condition.
* wait-global.c (struct ctx_list_item): Add member OP_ERR.
(ctx_done): New argument OP_ERR.
(ctx_wait): New argument
OP_ERR.
(gpgme_wait_ext): New function based on gpgme_wait but handling
operational errors.
(gpgme_wait): Implement in term of gpgme_wait_ext.
* keylist.c (gpgme_op_keylist_next): Pass argument in invocation
of _gpgme_wait_on_condition.
* trustlist.c (gpgme_op_trustlist_next): Pass argument in
invocation of _gpgme_wait_on_condition.
* engine-assuan.c (struct engine_llass): Replace members RESULT_CB
and RESULT_CB_VALUE by LAST_OP_ERR.
(_gpgme_engine_assuan_last_op_err): Add this hack function.
(llass_cancel_op): New function.
(_gpgme_engine_llass_ops): Add cancel_op member.

(llass_status_handler): Update opaque value access.
(llass_transact): Remove RESULT_CB and RESULT_CB_VALUE arguments.
* opassuan.c: Move compat hacks to the end of file.
(opassuan_start): Do not set OPD->result.err.
Do not pass RESULT_Cb and CTX to _gpgme_engine_op_assuan_transact.
(gpgme_op_assuan_transact_ext): New function.

* debug.h (DEBUG_GLOBAL): New debug level.
* conversion.c (gnupg_errors,
_gpgme_map_gnupg_error): Removed.
* data-user.c (gpgme_data_new_from_cbs): Add debug output.
* data-fd.c (gpgme_data_new_from_fd): Likewise.
* data-stream.c (gpgme_data_new_from_stream): Likewise.
* decrypt.c (gpgme_op_decrypt_result, gpgme_op_decrypt_start)
(gpgme_op_decrypt): Likewise.
* delete.c (gpgme_op_delete_start, gpgme_op_delete): Likewise.
* decrypt-verify.c (gpgme_op_decrypt_verify_start)
(gpgme_op_decrypt_verify): Likewise.
* sign.c (gpgme_op_sign_result): Fix debug message.
* data-mem.c (gpgme_data_new): Improve debug output.
* verify.c (parse_trust): Use atoi instead of
_gpgme_map_gnupg_error.
* decrypt.c (_gpgme_decrypt_status_handler): Likewise.

2009-10-22 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am: Remove @NETLIBS@ from LIBADDs.
(g13_components): New variable.
(main_sources): Add $(g13_components).
* g13.c, engine-g13.c: New files.
* engine.c (engine_ops): Check for assuan for assuan engine, add
g13 engine.
* util.h (_gpgme_get_g13_path,
_gpgme_encode_percent_string): New
prototypes.
* conversion.c (_gpgme_encode_percent_string): New function.
* gpgme.h.in (gpgme_protocol_t): Add GPGME_PROTOCOL_G13.
(struct _gpgme_op_g13_result, gpgme_g13_result_t): New types.
(gpgme_op_g13_mount): New function.
* gpgme.def, libgpgme.vers: Add gpgme_op_g13_mount.
* gpgme.c (gpgme_set_protocol): Allow GPGME_PROTOCOL_G13.
(gpgme_get_protocol_name): Add GPGME_PROTOCOL_G13.
* posix-util.c (_gpgme_get_g13_path): New function.
* w32-util.c (_gpgme_get_g13_path): New function.
* engine-backend.h (_gpgme_engine_ops_g13): New declaration.

2009-10-20 Marcus Brinkmann <marcus@g10code.de>

* gpgme-config.in (netlibs): Remove.
(assuan_cflags, assuan_libs): Add.

* Makefile.am (assuan_cppflags, assuan_libobjs): Removed.
(gpgsm_components): Move engine-assuan.c to ...
(assuan_components): ... this new variable.
(main_sources): Add this new variable.
(AM_CPPFLAGS): Remove $(assuan_cppflags).
(AM_CFLAGS): Add @LIBASSUAN_CFLAGS@.
(libgpgme_la_DEPENDENCIES,
libgpgme_pth_la_DEPENDENCIES)
(libgpgme_glib_la_DEPENDENCIES, libgpgme_qt_la_DEPENDENCIES)
(libgpgme_pthread_la_DEPENDENCIES): Remove $(assuan_libobjs).
(libgpgme_la_LIBADD, libgpgme_pth_la_LIBADD)
(libgpgme_glib_la_LIBADD, libgpgme_qt_la_LIBADD))
(libgpgme_pthread_la_LIBADD): Replace $(assuan_libobjs) by
@LIBASSUAN_LIBS@.
* priv-io.h [!HAVE_W32_SYSTEM]: Declare _gpgme_io_recvmsg,
_gpgme_io_sendmsg, _gpgme_io_waitpid.
* engine-backend.h: Define with [ENABLE_ASSUAN] instead
of [ENABLE_GPGSM].
* posix-io.c (_gpgme_io_waitpid): Make non-static.
* util.h (ENABLE_ASSUAN): Declare _gpgme_assuan_system_hooks,
_gpgme_assuan_malloc_hooks, _gpgme_assuan_log_cb.
* engine-gpgsm.c: Don't map assuan error codes. Use
assuan_release instead of assuan_disconnect.
(map_assuan_error): Remove function.
(gpgsm_new): Use new assuan context interface.
* engine-assuan.c: Use assuan_release instead of
assuan_disconnect.
(llass_new): Use new assuan context
interface.

2009-10-07 <wk@g10code.com>

* priv-io.h [W32]: Include windows.h instead of sys/socket.h.

2009-08-06 Werner Koch <wk@g10code.com>

* op-support.c (_gpgme_parse_inv_recp): Allow for no fingerprint.

* engine-gpgsm.c (gpgsm_sign): Hook up the status func for the
SIGNER command.
* gpgme.h.in (GPGME_STATUS_INV_SGNR, GPGME_STATUS_NO_SGNR): New.
* sign.c (op_data_t): Add fields IGNORE_INV_RECP and INV_SGNR_SEEN.
(_gpgme_op_sign_init_result): Factor code out to ...
(sign_init_result): .. new. Init new fields.
(sign_start): Use sign_init_result.

(_gpgme_sign_status_handler): Take care of the new INV_SGNR.
Return an error if no signature has been created.

2009-07-07 Werner Koch <wk@g10code.com>

* engine-gpgsm.c (struct engine_gpgsm): Add fields
input_helper_data and input_helper_memory.
(close_notify_handler): Release these new fields.
(gpgsm_import): Implement the keyarray feature.

* engine-gpg.c (gpg_import): Actually return GPG_ERR_INV_VALUE.

*
engine-gpgsm.c (gpgsm_import): Return an error for unknown data
encodings.

2009-06-22 Marcus Brinkmann <marcus@g10code.de>

* debug.h: Everywhere, use %p instead of 0x%x to print pointer.
[HAVE_STDINT_H]: Include <stdint.h>.
(_TRACE, TRACE, TRACE0, TRACE1, TRACE2, TRACE3, TRACE6): Cast tag
to (uintptr_t) before casting it to (void*) to silence GCC
warning.

* gpgme.h.in (_GPGME_DEPRECATED_OUTSIDE_GPGME): New macro.
* sign.c (_GPGME_IN_GPGME): Define it.
* keylist.c (_GPGME_IN_GPGME): Define it.

* debug.c (_gpgme_debug_begin, _gpgme_debug_add): Handle error in
vasprintf and asprintf.

* priv-io.h: Include <sys/socket.h>. Declare _gpgme_io_connect.

2009-06-18 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h.in (GPGME_CONF_PATHNAME): Revert last change, it's
back! (GPA still uses it...).

* gpgme.def: Fix stupid typo.
* w32-io.c (_gpgme_io_pipe): Add missing declaration.

* gpgme.h.in (GPGME_CONF_PATHNAME): Remove obsolete macro.

* w32-io.c (_gpgme_io_pipe): Allocate
reader/writer thread right
away.
(_gpgme_io_read, _gpgme_io_write, _gpgme_io_select)
(_gpgme_io_dup): Never allocate threads here.

(find_writer, find_reader): Check return value of thread creation
function.

* context.h (CTX_OP_DATA_MAGIC): New macro.
(struct ctx_op_data): New member MAGIC.
* op-support.c (_gpgme_op_data_lookup): Initialize magic.
* gpgme.c (gpgme_result_unref, gpgme_result_ref): Check magic.

2009-06-16 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (gpgme_result_unref): Hot fix to release a lock.

* gpgme.c (result_ref_lock): New global variable.
(gpgme_result_ref, gpgme_result_unref): use it.

2009-06-16 Werner Koch <wk@g10code.com>

* version.c: Include stdlib.h.

* gpgme.h.in (gpgme_data_encoding_t): Add GPGME_DATA_ENCODING_URL,
GPGME_DATA_ENCODING_URLESC, GPGME_DATA_ENCODING_URL0.
* data.c (gpgme_data_set_encoding): Adjust for new values.
* engine-gpg.c (string_from_data): New.
(gpg_import): Implement --fetch-key feature.

* gpgme.h.in
(gpgme_op_export_keys_start, gpgme_op_export_keys): New.
* gpgme.def, libgpgme.vers: Add them.
* export.c (gpgme_op_export_keys_start, gpgme_op_export_keys): New.
(export_keys_start): New.

* gpgme.h.in (gpgme_export_mode_t, GPGME_EXPORT_MODE_EXTERN): New.
(gpgme_op_export_start, gpgme_op_export, gpgme_op_export_ext_start)
(gpgme_op_export_ext): Change arg RESERVED to MODE of new
compatible type.
* export.c (gpgme_export_ext_start, gpgme_op_export)
(gpgme_op_export_ext_start, gpgme_op_export_ext): Ditto.
(export_start): Ditto.
* engine.c (_gpgme_engine_op_export): Ditto.
* engine-backend.h (struct engine_ops): Ditto.
* engine-gpgsm.c (gpgsm_export, gpgsm_export_ext): Ditto.
* engine-gpg.c (gpg_export, gpg_export_ext): Ditto. Implement
mode EXTERN.
(gpg_export, gpg_export_ext): Factor common code out to ..
(export_common): .. this.

* gpgme.h.in (gpgme_op_import_keys_start, gpgme_op_import_keys): New.
* gpgme.def, libgpgme.vers: Add them.

* import.c (gpgme_op_import_keys_start,
gpgme_op_import_keys): New.
(_gpgme_op_import_keys_start): New.
* engine.c (_gpgme_engine_op_import): Add arg KEYARRAY.
* engine-backend.h (struct engine_ops): Ditto.
* engine-gpgsm.c (gpgsm_import): Ditto. Not functional.
* engine-gpg.c (gpg_import): Ditto. Implement it.

2009-06-15 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h.in (gpgme_result_ref, gpgme_result_unref): Add
prototypes.
* gpgme.def, libgpgme.vers (gpgme_result_ref, gpgme_result_unref):
Add these.
* context.h (struct ctx_op_data): Add member "references".
* gpgme.c (gpgme_result_ref, gpgme_result_unref): New functions.
(_gpgme_release_result): Use gpgme_result_unref.
* op-support.c (_gpgme_op_data_lookup): Initialize references.

2009-06-12 Werner Koch <wk@g10code.com>

* gpgme-w32spawn.c (translate_get_from_file): Parse optional spawn
flags. Add new arg R_FLAGS. Fix segv on file w/o LF.
(translate_handles): Add new arg R_FLAGS. Avoid possible segv.
(main): Pass flags for my_spawn.
(my_spawn):
Add arg FLAGS and implement AllowSetForegroundWindow.

* priv-io.h (IOSPAWN_FLAG_ALLOW_SET_FG): New.
* w32-io.c (_gpgme_io_spawn): Add arg FLAGS and implement it.
* w32-glib-io.c (_gpgme_io_spawn): Ditto.
* w32-qt-io.cpp (_gpgme_io_spawn): Ditto.
* posix-io.c (_gpgme_io_spawn): Add dummy arg FLAGS.
* engine-gpg.c (start): Call spawn with new flag.

* w32-util.c (_gpgme_allow_set_foregound_window): Rename to
_gpgme_allow_set_foreground_window. Change all callers.
* posix-util.c (_gpgme_allow_set_foreground_window): Ditto.

2009-06-10 Werner Koch <wk@g10code.com>

* w32-util.c (_gpgme_allow_set_foregound_window): Add trace support.

2009-06-09 Werner Koch <wk@g10code.com>

* engine-gpg.c (gpg_io_event): Test for cmd.fd.

* version.c (gpgme_check_version_internal): Make result const.

```
* gpgme.c: Include priv-io.h.
(gpgme_io_read, gpgme_io_write): New.
* libgpgme.vers (GPGME_1.1): Add them.
* gpgme.def: Ditto.

* Makefile.am (main_sources): Remove gpgme.h.
(include_HEADERS):
Rename to nodist_include_HEADERS so that a
VPATH build won't use the distributed one.

* util.h (GPG_ERR_NOT_OPERATIONAL): Define.

2009-05-28  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h.in (gpgme_check_version_internal): New prototype.
(gpgme_check_version): New macro, overriding function of the same
name.
* libgpgme.vers, gpgme.def: Add gpgme_check_version_internal.o
* context.h (_gpgme_selftest): New variable declaration.
* version.c: Include "context.h".
(gpgme_check_version): Set _gpgme_selftest on success.
(gpgme_check_version_internal): New function.
* gpgme.c (_gpgme_selftest): Define it.
(gpgme_new): Check the selftest result.

2009-05-18  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h.in (gpgme_encrypt_flags_t): Add
GPGME_ENCRYPT_NO_ENCRYPT_TO.
* engine-gpg.c (gpg_encrypt): Pass --no-encrypt-to to gpg if
GPGME_ENCRYPT_NO_ENCRYPT_TO flag is set.

2009-05-14  Werner Koch  <wk@g10code.com>

* gpgme.h.in (gpgme_status_code_t):
Explicitly initialize for
better maintainability and to help debugging.

2009-05-05  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h.in: Add compile time check for _FILE_OFFSET_BITS.

2009-04-15  Marcus Brinkmann  <marcus@g10code.de>

* posix-io.c (_gpgme_io_socket, _gpgme_io_connect): New functions.
* w32-io.c (_gpgme_io_connect): Fix stupid error.
```

2009-04-08  Marcus Brinkmann  <marcus@g10code.de>

* w32-glib-io.c (giochannel_table): New members used, fd, socket.
(find_channel): Drop CREATE argument.
(new_dummy_channel_from_fd, new_channel_from_fd)
(new_channel_from_socket): New functions.
(_gpgm_io_fd2str): Implement for sockets.
(_gpgme_io_write, _gpgme_io_read): Translate EAGAIN errors
correctly.
(_gpgme_io_pipe): Fix for new channel bookkeeping.
(_gpgme_io_close, _gpgme_io_dup): Likewise.
(wsa2errno, _gpgme_io_socket, _gpgme_io_connect): New.
* w32-io.c (MAX_READERS, MAX_WRITERS): Bump up to 40.
(wsa2errno, _gpgme_io_socket, _gpgme_io_connect): New.
* w32-qt-io.cpp
(_gpgme_io_socket, _gpgme_io_connect): New stubs.
* version.c [HAVE_W32_SYSTEM]: Include "windows.h.
(do_subsystem_inits) [HAVE_W32_SYSTEM]: Call WSAStartup.
* engine-assuan.c (llass_status_handler): Ignore EAGAIN errors.

2009-03-18  Werner Koch  <wk@g10code.com>

* gpgme.h.in (GPGME_KEYLIST_MODE_EPHEMERAL): New.
* engine-gpgsm.c (gpgsm_keylist): Send new option.

2009-03-13  Werner Koch  <wk@g10code.com>

* gpgme-config.in: Make sure locale is set to C.

2009-02-24  Werner Koch  <wk@g10code.com>

* gpgme.h.in (struct _gpgme_op_assuan_result): New.
(gpgme_assuan_result_t): New.
(gpgme_op_assuan_result): Change return type.
(struct _gpgme_assuan_sendfnc_ctx)
(gpgme_assuan_sendfnc_ctx_t, gpgme_assuan_sendfnc_t):Remove.
(gpgme_assuan_inquire_cb_t): Changed.
* opassuan.c (op_data_t): Make use of a result structure.
(gpgme_op_assuan_result): Change return type.
(opassuan_start): Use result structure.
(result_cb): Ditto.
* engine-assuan.c (struct _gpgme_assuan_sendfnc_ctx):
Remove.
(inquire_cb_sendfnc): Remove.
(inquire_cb): Change for new callback scheme.  Not yet finished.
(llass_status_handler): Allow sending a CANCEL from the inquire CB.

2009-02-04  Werner Koch  <wk@g10code.com>

* w32-glib-io.c (_gpgme_io_spawn): Make ARGV argument const to
match prototype.
* w32-qt-io.cpp (_gpgme_io_spawn): Ditto.

2009-02-03  Werner Koch  <wk@g10code.com>

* gpgme.h.in (struct _gpgme_subkey): Add fields IS_CARDKEY and
CARD_NUMBER..
* key.c (gpgme_key_unref): Release field CARD_NUMBER.
* keylist.c (keylist_colon_handler): Factor common code out to ...
(parse_sec_field15): New.  Set card number.

2009-01-26  Werner Koch  <wk@g10code.com>

* opassuan.c, dirinfo.c, engine-assuan.c: New.
* Makefile.am:  Add them.
* engine-backend.h: Add _gpgme_engine_ops_assuan.
(struct engine_ops): Add field OPASSUAN_TRANSACT.  Update all
engine intializers.
* Makefile.am (gpgsm_components): Add engine-assuan.c.
* gpgme.h.in (gpgme_protocol_t): Add GPGME_PROTOCOL_ASSUAN.
(gpgme_assuan_data_cb_t,
gpgme_assuan_sendfnc_ctx_t)
(gpgme_assuan_inquire_cb_t, gpgme_assuan_status_cb_t): New.
(gpgme_op_assuan_transact_start, gpgme_op_assuan_transact): New.
* gpgme.c (gpgme_get_protocol_name): Ditto.
(gpgme_set_protocol): Support it.
* engine.c (gpgme_get_engine_info): Ditto.
(engine_ops): Register it.
(_gpgme_engine_op_assuan_transact): New.
* libgpgme.vers (gpgme_op_assuan_transact_start)
(gpgme_op_assuan_transact): New.
* gpgme.def (gpgme_op_assuan_transact_start)
(gpgme_op_assuan_transact): New.
* engine-backend.h (struct engine_ops): Add GET_HOME_DIR and
initialize to NULL for all engines.
* engine.c (engine_get_home_dir): New.
(gpgme_get_engine_info): Use it.
(_gpgme_set_engine_info): Use it.
* engine.h (engine_assuan_result_cb_t): New.
* context.h (ctx_op_data_id_t): Add OPDATA_ASSUAN.

* util.h (GPG_ERR_UNFINISHED): Define if not yet defined.

* version.c (gpgme_check_version): Protect trace arg against NULL.

2009-01-19  Werner

Koch <wk@g10code.com>

* rungpg.c: Rename to engine-gpg.c
* Makefile.am (main_sources): Ditto.

2008-12-03 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (status-table.h): Use $(builddir) to find gpgme.h.

2008-11-18 Werner Koch <wk@g10code.com>

* version.c (do_subsystem_inits): Always initialize I/O
subsystem. Fixes regression from 2007-08-02.

* decrypt.c (_gpgme_decrypt_status_handler): Use
_gpgme_map_gnupg_error to parse the error code for decrypt.algorithm.

2008-10-30 Marcus Brinkmann <marcus@g10code.de>

* wait-private.c (_gpgme_wait_on_condition): Remove unused
variable IDX.
* wait-global.c: Include ops.h to silence gcc warning.
(_gpgme_wait_global_event_cb): Pass error value directly.
* wait-user.c: Include ops.h to silence gcc warning.

* posix-io.c (_gpgme_io_spawn): Make ARGV argument const to
silence gcc warning. Cast argument to execv to silence warning.
* w32-io.c (_gpgme_io_spawn): Likewise.
* priv-io.h (_gpgme_io_spawn): Likewise for
prototype.

2008-10-24 Werner Koch <wk@g10code.com>

* rungpg.c (gpg_keylist_preprocess): Escape backslashes too.

2008-10-23 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (gpg_keylist_preprocess): Convert percent escaped
string to C coded string.

2008-10-20 Werner Koch <wk@g10code.com>

* Makefile.am (EXTRA_DIST): Add gpgme.h.in.

* gpgme.h: Rename to gpgme.h.in.
* gpgme.h.in (GPGME_VERSION): Use autoconf substitution.

* posix-io.c: Include sys/uio.h. Fixes bug #818.

2008-10-18  Marcus Brinkmann  <marcus@g10code.com>

* w32-util.c (find_program_in_registry): Don't define.
(_gpgme_get_gpg_path, _gpgme_get_gpgsm_path)
(_gpgme_get_gpgconf_path): Do not check for fooProgram in the
registry anymore.  It is now no longer possible to overwrite the
default location in that way.

2008-10-17  Werner Koch  <wk@g10code.com>

* w32-glib-io.c (_gpgme_io_fd2str): Use "%d" and not "%ld" to work
around a bug in mingw32.

2008-09-23  Marcus Brinkmann  <marcus@g10code.com>

*
gpgme.c (gpgme_sig_notation_clear): Clear CTX->sig_notations.
Submitted by "Daniel Mueller" <daniel@danm.de>

2008-09-16  Marcus Brinkmann  <marcus@g10code.com>

* rungpg.c (gpg_new): Don't use errno with ttyname_r.

2008-08-11  Marcus Brinkmann  <marcus@g10code.com>

* rungpg.c (gpg_cancel): Remove cmd fd before status fd.
* gpgme.c (_gpgme_cancel_with_err): New function.
(gpgme_cancel): Reimplement in terms of _gpgme_cancel_with_err.
* wait-private.c (_gpgme_wait_on_condition): Use
_gpgme_cancel_with_err.
* wait-user.c (_gpgme_user_io_cb_handler): Likewise.
* wait-global.c (_gpgme_wait_global_event_cb, gpgme_wait): Likewise.

2008-08-08  Marcus Brinkmann  <marcus@g10code.com>

* rungpg.c (command_handler): Remove I/O callback on error, too.

2008-06-29  Marcus Brinkmann  <marcus@g10code.com>

* gpgme.c (gpgme_cancel_async): Remove unused variable.

2008-06-27  Marcus Brinkmann  <marcus@g10code.de>

* libgpgme.vers: Add gpgme_cancel_async.
* gpgme.def: Likewise.

* context.h:

Include "sema.h".
(struct gpgme_context): New members lock and canceled.
* gpgme.c (gpgme_new): Initialize lock.
(gpgme_release): Destroy lock.
(gpgme_cancel_async): New function.
* op-support.c (_gpgme_op_reset): Reset the canceled flag.
* wait-global.c (gpgme_wait): Check cancel flag before processing
any I/O callbacks.
* wait-private.c (_gpgme_wait_on_condition): Likewise.
* wait-user.c (_gpgme_user_io_cb_handler): Likewise.

2008-06-26 Werner Koch <wk@g10code.com>

* w32-util.c (_gpgme_mkstemp): Replace sprint by stpcpy.
(mkstemp): Need to use GetSystemTimeAsFileTime for better
compatibility.

2008-06-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme-w32spawn.c: New file.
* Makefile.am (libexec_PROGRAMS) [HAVE_W32_SYSTEM]: New variable
with gpgme-w32spawn.
* engine-gpgsm.c (gpgsm_new): Use server translated handles.
(gpgsm_set_locale): Return early if locale value is NULL.
* util.h (_gpgme_mkstemp)
(_gpgme_get_w32spawn_path) [HAVE_W32_SYSTEM]: New function
prototypes.
*
w32-util.c: Include <stdint.h>, <sys/stat.h> and <unistd.h>.
(letters, mkstemp, _gpgme_mkstemp, _gpgme_get_w32spawn_path): New
functions.
* rungpg.c (gpg_decrypt, gpg_encrypt, gpg_encrypt_sign)
(gpg_genkey, gpg_import, gpg_verify, gpg_sign): Pass data over
special filename FD rather than stdin.
(struct arg_and_data_s): Add member ARG_LOCP.
(struct fd_data_map_s): Add member ARG_LOC.
(struct engine_gpg): Add member ARG_LOC to status and colon.
(_add_arg, add_arg_with_locp): New function.
(add_arg_ext): Reimplement in terms of _add_arg.
(gpg_new): Remember argument location for status FD.
(build_argv): Set argument location if requested. Also set
argument location of fd_data_map for data items.
(start): Adjust caller of _gpgme_io_spawn.
* priv-io.h (struct spawn_fd_item_s): Add members peer_name and
arg_loc.
(_gpgme_io_spawn): Remove parent fd list argument.
* posix-io.c (get_max_fds): New function.
(_gpgme_io_dup): Add tracing.

(_gpgme_io_spawn):
Remove parent fd list.  Change meaning of child
fd list to contain all child fds that should be inherited.  Close
all other file descriptors after fork.
* w32-io.c, w32-glib-io.c, w32-qt-io.c(_gpgme_io_spawn): Remove
parent fd list.  Change meaning of child fd list to contain all
child fds that should be inherited.  Do not inherit any file
descriptors, but DuplicateHandle them.  Spawn process through
wrapper process.  Provide wrapper process with a temporary file
containing handle translation data.  Return translated handle
names.
* w32-io.c (reader): Add more tracing output.
(_gpgme_io_read): Likewise.
* engine-gpgconf.c (gpgconf_read): Adjust caller of
_gpgme_io_spawn.
* version.c (_gpgme_get_program_version): Likewise.

2008-06-20  Werner Koch  <wk@g10code.com>

* engine-gpgconf.c (gpgconf_read): Change ARGV initialization for
compatibility with old compilers.  Fix amount of memmove.  Fix
CR removal.

2008-06-19  Werner Koch  <wk@g10code.com>

* gpgme.h (GPGME_CONF_PATHNAME):
Replace by GPGME_CONF_FILENAME,
change all callers and provide compatibility macro.
(gpgme_conf_type_t): Add complex types 34..37.
* engine-gpgconf.c (gpgconf_parse_option, arg_to_data)
(_gpgme_conf_arg_new, _gpgme_conf_arg_release): Add new types.

2008-06-19  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgconf.c (gpgconf_parse_option): Fix comma detection.

2008-05-09  Werner Koch  <wk@g10code.com>

* engine-gpgconf.c (gpgconf_read): Do not pass empty lines to the
callback.

2008-05-07  Werner Koch  <wk@g10code.com>

* engine-gpgconf.c (gpgconf_write): Change argv[0] to a
self-explaining string.  Needs a proper fix, though.

* rungpg.c (gpg_keylist, gpg_keylist_ext): Factor common code out
to ..

(gpg_build_keylist_options): .. new. Allow combination of extern
and intern mode.
(gpg_new): DFT_TTYNAME is an array, thus check the first character.

2008-05-06 Werner Koch <wk@g10code.com>

* version.c (extract_version_string): New.
(_gpgme_get_program_version):
Use it to allow for suffixes in the
version line.

2008-04-28 Werner Koch <wk@g10code.com>

* engine-gpgconf.c (gpgconf_read): Fixed segv. Avoid memmove for
each line.

2008-04-22 Marcus Brinkmann <marcus@g10code.de>

* w32-qt-io.cpp, kdpipeiodevice.cpp: New versions from Frank
Osterfeld, implement blocking select.

2008-03-11 Marcus Brinkmann <marcus@g10code.de>

* data.c (gpgme_data_read, gpgme_data_write): Retry on EINTR.

2008-03-06 Marcus Brinkmann <marcus@g10code.de>

* key.c (_gpgme_key_add_sig): Terminate UID in case SRC is NULL.
Reported by Marc Mutz.

2008-03-05 Marcus Brinkmann <marcus@g10code.de>

* decrypt.c (release_op_data): Release OPD->result.recipients.
* encrypt.c (release_op_data): Release invalid_recipient.

2008-02-15 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgconf.c (gpgconf_read): Fix end-of-line handline.

2008-02-14 Werner Koch <wk@g10code.com>

* w32-io.c (_gpgme_io_spawn): Add arg R_PID to return the pid.
* posix-io.c
(_gpgme_io_spawn): Ditto.
* w32-glib-io.c (_gpgme_io_spawn): Ditto.
* w32-qt-io.cpp (_gpgme_io_spawn): Ditto.
* priv-io.h (_gpgme_io_spawn): Adjust prototyp and change all callers.
* rungpg.c (start): Call _gpgme_allow_set_foregound_window.

* w32-util.c (_gpgme_allow_set_foregound_window): New.
* posix-util.c (_gpgme_allow_set_foregound_window): New.
* engine-gpgsm.c (default_inq_cb): New.
(gpgsm_new) [W32]: Enable pinentry notifications.
(status_handler): Handle inquiries.

2008-01-30 Marcus Brinkmann <marcus@g10code.de>

* kdpipeiodevice.cpp: New version by Frank Osterfeld, fixes race
condition.

2008-01-28 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (map_input_enc): Rename to ...
(map_data_enc): ... this. Also change all callers.
(gpgsm_encrypt, gpgsm_export, gpgsm_export_ext, gpgsm_genkey)
(gpgsm_sign): Set encoding for output.

2008-01-28 Werner Koch <wk@g10code.com>

* keylist.c (gpgme_get_key): Skip duplicated keys. Fixes bug 876.

2008-01-14
Marcus Brinkmann <marcus@g10code.de>

* engine-gpgconf.c (gpgconf_config_load_cb): Fix program_name
field.

2008-01-10 Marcus Brinkmann <marcus@g10code.de>

* kdpipeiodevice.cpp: New version from Frank Osterfeld.

* engine-gpgconf.c (gpgconf_config_load_cb2): Handle the flag
NO_ARG_DESC.

2008-01-04 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (gpgconf_components): New variable.
(main_sources): Add gpgconf.c.
* gpgme.h (gpgme_protocol_t): New protocol GPGME_PROTOCOL_GPGCONF.
(gpgme_conf_level_t, gpgme_conf_type_t, gpgme_conf_arg_t)
(gpgme_conf_opt_t, gpgme_conf_comp_t, gpgme_conf_arg_new)
(gpgme_conf_arg_release, gpgme_conf_opt_change)
(gpgme_conf_release, gpgme_op_conf_load, gpgme_op_conf_save): New
types.
* gpgconf.c, engine-gpgconf.c: New files.
* engine.h: (_gpgme_engine_op_conf_load,

(_gpgme_engine_op_conf_save): New prototypes.
* op-support.c (_gpgme_op_reset): Ignore not implemented locale
function.
* posix-util.c (_gpgme_get_gpgconf_path): New
function.
* w32-util.c (_gpgme_get_gpgconf_path): New function.
* engine-gpgsm.c:
(_gpgme_engine_ops_gpgsm): Add stubs for conf_load and conf_save.
* rungpg.c:
(_gpgme_engine_ops_gpg): Add stubs for conf_load and conf_save.
* gpgme.def: Add new gpgconf related interfaces.
* libgpgme.vers: Likewise.
* util.h (_gpgme_get_gpgconf_path): New prototype.
* gpgme.h (gpgme_protocol_t): Add GPGME_PROTOCOL_GPGCONF.
* engine-backend.h (_gpgme_engine_ops_gpgconf): New prototype.
(struct engine_ops): Add members for conf_load and conf_save.
* engine.c (engine_ops): Add _gpgme_engine_ops_gpgconf.
(_gpgme_engine_op_conf_load,
(_gpgme_engine_op_conf_save): New functions.
(gpgme_get_engine_info): Allow protocol GPGME_PROTOCOL_GPGCONF.

2007-11-28 Marcus Brinkmann <marcus@g10code.de>

* w32-util.c (_gpgme_get_gpg_path, _gpgme_get_gpgsm_path): Search
for installation directory. Remove old fallback default.
(find_program_in_inst_dir): New function.

2007-11-26 Werner Koch <wk@g10code.com>

*
engine-gpgsm.c (struct engine_gpgsm): Add field INLINE_DATA and
always reset it before calling start.
(gpgsm_new): Clear it.
(status_handler): Implement it.
(gpgsm_getauditlog) [USE_DESCRIPTOR_PASSING]: Use INLINE_DATA.

2007-11-23 Werner Koch <wk@g10code.com>

* op-support.c (_gpgme_op_reset): Implement a no-reset flag.
* getauditlog.c (getauditlog_start): Use that flag.

2007-11-20 Werner Koch <wk@g10code.com>

* op-support.c (_gpgme_parse_inv_recp): Add new reason code 11.

2007-11-22 Werner Koch <wk@g10code.com>

* gpgme.h (gpgme_op_getauditlog_start, gpgme_op_getauditlog): New.

* libgpgme.vers: Ditto.
* gpgme.def: Ditto.
* getauditlog.c: New.
* engine-backend.h (struct engine_ops): Add member GETAUDITLOG.
* engine-gpgsm.c (gpgsm_getauditlog): New.
(_gpgme_engine_ops_gpgsm): Insert new function.
(gpgsm_new): Try to enable audit log support.
* rungpg.c (_gpgme_engine_ops_gpg): Insert dummy entry.

2007-11-12 Marcus Brinkmann <marcus@g10code.de>

*
kdpipeiodevice.cpp: New version from Frank Osterfeld.

2007-10-11 Marcus Brinkmann <marcus@g10code.de>

* kdpipeiodevice.cpp: New version from Frank Osterfeld.

2007-10-09 Marcus Brinkmann <marcus@g10code.de>

* kdpipeiodevice.cpp: New version from Frank Osterfeld and Marc
Mutz.

2007-10-05 Marcus Brinkmann <marcus@g10code.de>

* kdpipeiodevice.cpp, w32-qt-io.cpp: New versions from Frank
Osterfeld.

2007-10-04 Marcus Brinkmann <marcus@g10code.de>

* kdpipeiodevice.h, kdpipeiodevice.cpp, kdpipeiodevice.moc,
w32-qt-io.cpp: New versions from Frank Osterfeld.

2007-10-02 Marcus Brinkmann <marcus@g10code.de>

* kdpipeiodevice.cpp, kdpipeiodevice.moc: New versions.
* w32-qt-io.cpp (_gpgme_io_fd2str): Print actual_fd if available.
(_gpgme_io_dup): Only acquire a reference, do not actually dup.
Submitted by Frank Osterfeld.

* priv-io.h, engine-gpgsm.c: Add comments.
* w32-qt-io.cpp (_gpgme_io_select): Remove code handling frozen FDs.
* w32-glib-io.c (_gpgme_io_close):
Always dereference the channel,
even if not primary.
(_gpgme_io_dup): Acquire a reference. Replace unused
implementation by assertion.

2007-09-28  Werner Koch  <wk@g10code.com>

* engine-gpgsm.c (iocb_data_t): Add SERVER_FD_STR.
(gpgsm_new): Set it.
(gpgsm_set_fd): Use it.

* w32-glib-io.c (find_channel): Add a new primary flag.
(_gpgme_io_close): Close channel only if primary.
(_gpgme_io_dup): Put newfd into the table as shallow copy.

* priv-io.h (struct io_select_fd_s): Remove member FROZEN.
* w32-io.c (_gpgme_io_select): Ditto.
* w32-glib-io.c (_gpgme_io_select): Ditto.

* posix-io.c (_gpgme_io_select): Ditto.
* rungpg.c (read_status): Ditto.
* wait.c (fd_table_put): Ditto.

* rungpg.c (gpg_io_event): Add tracing.
(start): Use gpg_io_event for sending the start event.
* engine-gpgsm.c (gpgsm_io_event): Add tracing.
(start): Use gpgsm_io_event for sending the start event.
* wait.c (_gpgme_add_io_cb, _gpgme_run_io_cb): Add tracing.

2007-09-28  Marcus Brinkmann
<marcus@g10code.de>

* kdpipeiodevice.moc, w32-qt-io.cpp, kdpipeiodevice.cpp: New
versions from Frank Osterfeld.

2007-09-27  Marcus Brinkmann  <marcus@g10code.de>

* w32-glib-io.c (_gpgme_io_spawn),
w32-qt-io.cpp (_gpgme_io_spawn), w32-io.c (_gpgme_io_spawn): Close
the process handle, return 0.

* gpgme.h (gpgme_protocol_t): Add GPGME_PROTOCOL_UNKNOWN.
* gpgme.c (gpgme_get_protocol_name): Implement support for
GPGME_PROTOCOL_UNKNOWN.

* kdpipeiodevice.h: Fix last change.

* w32-glib-io.c (_gpgme_io_pipe), w32-qt-io.c (_gpgme_io_pipe),
w32-io.c (_gpgme_io_pipe), posix-io.c (_gpgme_io_pipe): Fix debug
output.

2007-09-25  Marcus Brinkmann  <marcus@g10code.de>

* conversion.c, keylist.c: Include <sys/types.h>.

* kdpipeiodevice.h: Use namespace _gpgme_.
* kdpipeiodevice.cpp: Use namespace _gpgme_.
[Q_OS_WIN32 && NOMINMAX]: Do not define NOMINMAX again.
* w32-qt-io.cpp: Change namespace of KDPipeIODevice to
_gpgme_::KDPipeIODevice.

2007-09-17 Werner Koch <wk@g10code.com>

*
rungpg.c (gpg_new): Make robust against undefined ttyname or
ttytype.

2007-09-14 Werner Koch <wk@g10code.com>

* data-mem.c (gpgme_data_release_and_get_mem): Fix tracing bug.

2007-09-14 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (gpgme_release): Call gpgme_sig_notation_clear.

2007-09-13 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (gpg_new): Handle return value of _gpgme_getenv (fixes
small memory leak).

2007-09-07 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (libgpgme_qt_la_SOURCES): Move
moc_kdpipeiodevice.cpp to EXTRA_DIST, as this is only included by
another file (it's more like a header file than a cpp file, but
automake doesn't know that).

* w32-qt-io.cpp (_gpgme_io_spawn): Fix several cast errors and typos.
* w32-io.c (_gpgme_io_write): Use TRACE_SYSRES instead of TRACE_SYS.
(libgpgme_qt_la_LIBADD): Add QT4_CORE_LIBS, not QT4_CORE_LIB.

* kdpipeiodevice.h, kdpipeiodevice.cpp, moc_kdpipeiodevice.cpp,
kdpipeiodevice.moc, w32-qt-io.c:
New files.
* Makefile.am (ltlib_gpgme_extra): Rename to ltlib_gpgme_glib.
(ltlib_gpgme_qt): New variable.
(lib_LTLIBRARIES): Add $(ltlib_gpgme_qt).
(libgpgme_qt_la_SOURCES): New variable.
(AM_CPPFLAGS): Add @QT4_CORE_INCLUDES@
(AM_CFLAGS): Add @QT4_CORE_CFLAGS@.
(libgpgme_qt_la_LDFLAGS, libgpgme_qt_la_DEPENDENCIES)

(libgpgme_qt_la_LIBADD): New variables.

* sema.h (struct critsect_s): Rename "private" to "priv" to make
C++ users happy.  Change users.
* posix-sema.c (_gpgme_sema_cs_enter, _gpgme_sema_cs_leave)
(_gpgme_sema_cs_destroy): Likewise.
* w32-sema.c (critsect_init, _gpgme_sema_cs_enter)
(_gpgme_sema_cs_leave, _gpgme_sema_cs_destroy): Likewise.
* w32-glib-io.c (gpgme_get_giochannel): Change return type to
void*.
(gpgme_get_fdptr): New function.
* w32-io.c (gpgme_get_fdptr): New function
* gpgme.def: Add gpgme_get_fdptr.

2007-08-22  Marcus Brinkmann  <marcus@g10code.de>

* w32-io.c (_gpgme_io_write): Return early if COUNT is zero.
(writer): Remove superfluous
check.

2007-08-20  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h: Move include of gpg-error.h out of extern "C".

2007-08-07  Werner Koch  <wk@g10code.com>

* gpgme.h (struct _gpgme_signature): Add member CHAIN_MODEL.
* verify.c (parse_trust): Set Chain_MODEL.

2007-08-02  Werner Koch  <wk@g10code.com>

* w32-glib-io.c (_gpgme_io_spawn): Use DETACHED_PROCESS flag.
* w32-io.c (_gpgme_io_spawn): Ditto.
(_gpgme_io_write): Map ERROR_NO_DATA to EPIPE.
* debug.c (_gpgme_debug): Enable assuan logging.
(_gpgme_debug_subsystem_init): New.
* version.c (do_subsystem_inits): Disable assuan logging and
initialize the debug system.
(gpgme_check_version): Do not trace before the subsystems are
initialized.

2007-07-17  Marcus Brinkmann  <marcus@g10code.de>

* debug.c: Include <errno.h> and "debug.h".
(_gpgme_debug): Save and restore ERRNO.
(TOHEX): New macro.
(_gpgme_debug_buffer): New function.
* conversion.c, data-compat.c, data-mem.c, data.c, engine-gpgsm.c,

gpgme.c,
keylist.c, posix-io.c, rungpg.c, sign.c, version.c,
w32-io.c, wait.c: Replace DEBUG macros by TRACE_* variants. In
most of these files, add many more tracepoints.

2007-07-16 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (status_handler): Do not send BYE here.

* w32-io.c (struct reader_context_s, struct writer_context_s): New
members REFCOUNT.
(create_reader, create_writer): Initialize C->refcount to 1.
(destroy_reader, destroy_writer): Only destroy if C->refcount
drops to 0.
(find_reader, find_writer, kill_reader, kill_writer): Beautify.
* priv-io.h (_gpgme_io_dup): New prototype.
* posix-io.c (_gpgme_io_dup): New function.
* w32-io.c (_gpgme_io_dup): Likewise.
* w32-glib-io.c (_gpgme_io_dup): Likewise.
* engine-gpgsm.c (start): Reverting to version 2007-07-10.

2007-07-13 Marcus Brinkmann <marcus@g10code.de>

* data-user.c (user_read, user_write, user_seek): Set errno and
return -1 instead returning the error code directly.
* data-compat.c (old_user_seek):
Likewise.
* gpgme.c (gpgme_sig_notation_add): Return error properly.

* Revert the "close_notify_handler" returns int stuff. Always
close in the _gpgme_io_close implementations.
* engine-gpgsm.c (status_handler): Try to terminate the connection
in case of error.
* w32-io.c (_gpgme_io_read): Return C->error_code in ERRNO.
(_gpgme_io_write): Likewise.

* priv-io.h (_gpgme_io_set_close_notify): Change type of HANDLER
to _gpgme_close_notify_handler.
(_gpgme_close_notify_handler): New type.
(_gpgme_io_dup): Remove prototype.
* posix-io.c (notify_table, _gpgme_io_set_close_notify): Change
type of HANDLER to _gpgme_close_notify_handler_t.
(_gpgme_io_close): Do not close the FD if handler returns 0.
(_gpgme_io_dup): Remove function.
* w32-io.c (notify_table, _gpgme_io_set_close_notify,
_gpgme_io_close): Change type of HANDLER to
_gpgme_close_notify_handler_t.
(_gpgme_io_close): Do not close the FD if handler returns 0.

(_gpgme_io_dup): Remove function.
* w32-glib-io.c
(_gpgme_io_dup): Remove function.
(_gpgme_io_set_close_notify, notify_table): Change type of HANDLER
to _gpgme_close_notify_handler_t.
(_gpgme_io_close): Do not close the FD if handler returns 0.
* rungpg.c (close_notify_handler): Change return type to int,
return 1.
* engine-gpgsm.c (close_notify_handler): Change return type to
int, return 0 for status FD and 1 for all other FDs.
(start): Do not duplicate the status FD.

2007-07-12 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am: Replace implicit rule by suffix rule. Add
SUFFIXES for that.

2007-07-12 Werner Koch <wk@g10code.com>

* version.c (do_subsystem_inits) [W32]: Make sure that the socket
system has been started.

2007-07-10 Marcus Brinkmann <marcus@g10code.de>

* priv-io.h (_gpgme_io_dup): New prototype.
* posix-io.c (_gpgme_io_dup): New function.
* w32-io.c (_gpgme_io_dup): Likewise.
* w32-glib-io.c (_gpgme_io_dup): Likewise.
* engine-gpgsm.c (start): Use _gpgme_dup() instead of dup().

2007-07-08
Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c [HAVE_W32_SYSTEM]: Enable the bunch of the file.
* funopen.c (funopen): Rename to _gpgme_funopen.

2007-04-30 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_new): Fix error handling for ttyname_r.
* rungpg.c (gpg_new): Likewise.
Submitted by Stephen Tether.

2007-02-26 Werner Koch <wk@g10code.com>

* verify.c (op_data_t): New element PLAINTEXT_SEEN.
(_gpgme_verify_status_handler): Return an error if more than one
plaintext has been seen.
(parse_error): New arg SET_STATUS. Also detect it based on an

ERROR status (gpg > 1.4.6).

2007-01-26 Werner Koch <wk@g10code.com>

* w32-io.c (build_commandline): Fixed stupid quoting bug.
* w32-glib-io.c (build_commandline): Ditto.

* rungpg.c (gpg_set_locale): Avoid dangling pointer after free.

* gpgme-config.in: New options --get-gpg and --get-gpgsm.

2007-01-18 Marcus Brinkmann <marcus@g10code.de>

* data.h (_gpgme_data_get_fd): Add prototype.
(gpgme_data_get_fd_cb):
New type.
(struct _gpgme_data_cbs): New member get_fd.
* data.c (_gpgme_data_get_fd): New function.
* data-fd.c (fd_get_fd): New function.
(fd_cbs): Add fd_get_fd.
* data-stream.c (stream_get_fd): New function.
(stream_cbs): Add stream_get_fd.
* data-mem.c (mem_cbs): Add NULL for get_fd callback.
* data-user.c (user_cbs): Likewise.
* engine-gpgsm.c (gpgsm_set_fd) [USE_DESCRIPTOR_PASSING]: Try to
short-cut by passing the data descriptor directly.

2007-01-17 Marcus Brinkmann <marcus@g10code.de>

* w32-io.c (build_commandline): Quote all command line arguments.
* w32-glib-io.c (build_commandline): Likewise.

2007-01-10 Werner Koch <wk@g10code.com>

* ttyname_r.c (ttyname_r) [W32]: Return a dummy name.

2007-01-08 Werner Koch <wk@g10code.com>

* version.c (do_subsystem_inits): Do assuan init only if building
with Assuan.
* setenv.c: Include assuan-def.h only if building with Assuan
support.

* op-support.c (_gpgme_op_reset): Set LC_MESSAGES only if
if
defined.
* engine-gpgsm.c (gpgsm_set_locale): Ditto.
* rungpg.c (gpg_set_locale): Ditto.

2006-12-17 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (gpgme_set_protocol): Shut down the engine when
switching protocols.
(gpgme_ctx_set_engine_info): Likewise for engine info.
* engine.h (_gpgme_engine_reset): New function prototype.
* engine.c (_gpgme_engine_reset): New function.
* engine-backend.h (struct engine_ops): New member RESET.
* rungpg.c (_gpgme_engine_ops_gpg): Add NULL for reset function.
* engine-gpgsm.c (_gpgme_engine_ops_gpgsm)
[USE_DESCRIPTOR_PASSING]: Add gpgsm_reset for reset.
(_gpgme_engine_ops_gpgsm) [!USE_DESCRIPTOR_PASSING]: Add NULL for
reset function.
(gpgsm_reset) [USE_DESCRIPTOR_PASSING]: New function.
* op-support.c (_gpgme_op_reset): Try to use the engine's reset
function if available.
* engine-gpgsm.c (gpgsm_new): Move code to dup status_fd to ...
(start): ... here.
* posix-io.c (_gpgme_io_recvmsg, _gpgme_io_sendmsg): New functions.

*
engine.h (_gpgme_engine_new): Remove arguments lc_ctype and
lc_messages from prototype.
(_gpgme_engine_set_locale): New prototype.
* engine.c (_gpgme_engine_set_locale): New function.
* op-support.c (_gpgme_op_reset): Call _gpgme_engine_set_locale.
* engine-backend.h (struct engine_ops): Add new member SET_LOCALE.
Remove arguments lc_messages and lc_ctype from member NEW.
* engine-gpgsm.c (struct engine_gpgsm): New members lc_ctype_set
and lc_messages_set.
(gpgsm_new): Remove lc_messages and lc_ctype
arguments.
(gpgsm_set_locale): New function.
(_gpgme_engine_ops_gpgsm): Add gpgsm_set_locale.
* rungpg.c (struct engine_gpg): Add new members lc_messages and
lc_ctype.
(gpg_release): Release lc_messages and lc_ctype if set.
(gpg_new): Remove lc_messages and lc_ctype arguments.
(gpg_set_locale): New function.
(_gpgme_engine_ops_gpg): Add gpg_set_locale.
(add_arg): Implement in terms of:
(add_arg_ext): New function.
(start): Set lc-messages and lc-ctype arguments here.

2006-12-03
Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (struct engine_gpgsm): Move members
input_fd_server, output_fd_server, message_fd_server to ...
(iocb_data): ... here (as server_fd).
(close_notify_handler): Reset tags as well.
(gpgsm_new): Implement support for descriptor
passing.
(fd_type_t): New type.
(gpgsm_clear_fd): New function. Use it instead of _gpgsm_io_close
for unused communication channels.
(gpgsm_set_fd): Rewritten to support descriptor passing. All
relevant callers adjusted as well (previously of _gpgme_io_close).

2006-12-02 Marcus Brinkmann <marcus@g10code.de>

* version.c: Include "assuan.h".
(do_subsystem_inits): Call assuan_set_assuan_err_source.

2006-12-01 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (libgpgme_real_la_SOURCES): Rename to main_sources.
(libgpgme_la_SOURCES, libgpgme_pthread_la_SOURCES,
libgpgme_glib_la_SOURCES, libgpgme_pth_la_SOURCES): Add
$(main_sources).
(libgpgme_la_DEPENDENCIES, libgpgme_la_LIBADD,
libgpgme_pthread_la_DEPENDENCIES,
libgpgme_pthread_la_LIBADD,
libgpgme_pth_la_DEPENDENCIES, libgpgme_pth_la_LIBADD,
libgpgme_glib_la_DEPENDENCIES, libgpgme_glib_la_LIBADD): Remove
libgpgme-real.la.
(noinst_LTLIBRARIES): Removed.
(libgpgme_glib_la_CFLAGS, libgpgme_pth_la_CFLAGS): Removed.
(AM_CFLAGS): New variable.

2006-11-30 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c: Replace AssuanError with gpg_error_t and
ASSUAN_CONTEXT with assuan_context_t.

2006-11-29 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_new): Check return value of
assuan_pipe_connect.

* rungpg.c: Include <unistd.h>.
(gpg_new): Support --display, --ttyname, --ttytype, --lc-ctype and
--lc-messages. Fixes issue 734.

2006-10-24 Marcus Brinkmann <marcus@g10code.de>

* trustlist.c (gpgme_op_trustlist_next): Return error if OPD is
NULL.

2006-10-23  Marcus Brinkmann  <marcus@g10code.de>

* wait-global.c (gpgme_wait): Unlock CTX_LIST_LOCK while calling
_gpgme_engine_io_event().

*
keylist.c (gpgme_op_keylist_next): Return error if OPD is NULL.

2006-09-25  Marcus Brinkmann  <marcus@g10code.de>

* data-mem.c (gpgme_data_release_and_get_mem): Release the data
object properly.

2006-09-22  Marcus Brinkmann  <marcus@g10code.de>

* keylist.c (keylist_colon_handler): Move debug output after
initialising KEY.

2006-07-29  Marcus Brinkmann  <marcus@g10code.de>

* gpgme-config.in (Options): Add NETLIBS.
* Makefile.am (libgpgme_la_LIBADD, libgpgme_pthread_la_LIBADD,
libgpgme_pth_la_LIBADD, libgpgme_glib_la_LIBADD): Add NETLIBS.

* rungpg.c (read_status): Fix comparison disguising as an
assignment.

2005-03-24  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c (gpgme_set_locale): Remove conditional on
HAVE_W32_SYSTEM, and just check for LC_MESSAGES.

2006-07-16  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (read_status): Strip potential carriage return.
* genkey.c (get_key_parameter): Skip potential carriage return.
* version.c (_gpgme_get_program_version):
Strip potential carriage
return.

* data.c (gpgme_data_set_file_name): Allow to clear the file name
by passing NULL.

2006-06-22  Marcus Brinkmann  <marcus@g10code.de>

* keylist.c (gpgme_get_key): Also clone the engine info.

2006-03-06  Marcus Brinkmann  <marcus@g10code.de>

* gpgme-config.in (cflags_pth): Revert accidental removal of
pthread support with last change.

2006-02-28  Marcus Brinkmann  <marcus@g10code.de>

* w32-glib-io.c (O_BINARY) [!O_BINARY]: New macro.
(_gpgme_io_pipe): Open pipes in binary mode.

2006-02-22  Marcus Brinkmann  <marcus@g10code.de>

* engine.c (gpgme_engine_check_version): Reimplemented to allow
checking the version correctly even after changing the engine
information.  Bug reported by Stphane Corthsy.

* rungpg.c (read_colon_line): Invoke colon preprocess handler if
it is set.
(colon_preprocessor_t): New type.
(struct engine_gpg): New member colon.preprocess_fnc.
(gpg_keylist_preprocess): New function.
* keylist.c
(keylist_colon_handler): Allow short key IDs.

2006-02-15  Marcus Brinkmann  <marcus@g10code.de>

* w32-io.c (create_writer): Make C->have_data a manually reset
event.
(writer): Move code from end of if block to beginning, so it
is also run the first time.
(_gpgme_io_write): Move assert check after error check.  Reset
the is_empty event, and also do it eagerly.
(_gpgme_io_select): Unconditionally wait for the is_empty event.

2006-01-26  Werner Koch  <wk@g10code.com>

* w32-util.c (_gpgme_get_conf_int): New.
* posix-util.c (_gpgme_get_conf_int): New.
* w32-io.c (get_desired_thread_priority): New.
(create_reader, create_writer): Use it here.

2006-01-04  Werner Koch  <wk@g10code.com>

* debug.h (_gpgme_debug_srcname): New. Use it with the debug macros.

* w32-glib-io.c (_gpgme_io_set_nonblocking): Add debug
statements. Disable error return for failed nonblocking call.

2006-01-03  Marcus Brinkmann  <marcus@g10code.de>

* w32-glib-io.c (_gpgme_io_close): Only close fd if there
is no
channel for it.

2005-12-31  Marcus Brinkmann  <marcus@g10code.de>

* w32-glib-io.c (find_channel): Set channel to unbuffered.
(_gpgme_io_select): Fix debug output.

2005-12-23  Werner Koch  <wk@g10code.com>

* gpgme.h (struct _gpgme_signature): Append field PKA_ADDRESS.
* verify.c (release_op_data, _gpgme_verify_status_handler): Set
this field.

2005-12-20  Werner Koch  <wk@g10code.com>

* gpgme.h (gpgme_status_code_t): Added GPGME_STATUS_PKA_TRUST_BAD
and GPGME_STATUS_PKA_TRUST_GOOD.
(struct _gpgme_signature): New field pka_trust.
* verify.c (_gpgme_verify_status_handler): Set pka_trust.

2005-12-06  Werner Koch  <wk@g10code.com>

* keylist.c (keylist_colon_handler): Store fingerprints of the
subkeys.  Reset the secret flag of subkeys for stub secret keys.
(NR_FIELDS): Bumped up to 16

2005-11-27  Marcus Brinkmann  <marcus@g10code.de>

* engine.c (_gpgme_set_engine_info): Use new_file_name in
engine_get_version invocation.  Reported by Stphane Corthsy.

2005-11-24
Marcus Brinkmann  <marcus@g10code.de>

* w32-glib-io.c (_gpgme_io_fd2str): Remove debug printf.

2005-11-18  Werner Koch  <wk@g10code.com>

* w32-glib-io.c: Include glib.h before windows to avoid a symbol
shadowing warning.
(find_channel): Better use g_io_channel_win32_new_fd instead of

the autodetection function g_io_channel_unix_new.
(_gpgme_io_select): Rewritten. It is now a fully working select
implementation.

2005-11-18 Marcus Brinkmann <marcus@g10code.de>

* priv-io.h (_gpgme_io_fd2str): New prototype.
* posix-io.c (_gpgme_io_fd2str): New function.
* w32-io.c (_gpgme_io_fd2str): New function.
* rungpg.c: Use this new function.
* w32-glib-io.c (_gpgme_io_fd2str): Rewrote the file handle code
again. Two's company, three's the musketeers.

* w32-glib-io.c: Rewrote the file handle code. We don't create
system fds for every handle (doesn't work for inherited handles),
but we create pseudo fds in a private namespace that designate a
handle and potentially
a giochannel.

2005-11-18 Werner Koch <wk@g10code.com>

* versioninfo.rc.in: Set file version to LT-version + Svn-revision.

2005-11-17 Marcus Brinkmann <marcus@g10code.de>

* w32-glib-io.c: New file.
* gpgme.def (gpgme_get_giochannel): Add symbol.
* Makefile.am (system_components) [HAVE_DOSISH_SYSTEM]: Remove
w32-io.c.
(ltlib_gpgme_extra): New variable.
(lib_LTLIBRARIES): Add $(ltlib_gpgme_extra).
(system_components_not_extra): New variable.
(libgpgme_la_SOURCES, libgpgme_pthread_la_SOURCES,
(libgpgme_pth_la_SOURCES): Add $(system_components_not_extra).
(libgpgme_glib_la_LDFLAGS, libgpgme_glib_la_DEPENDENCIES,
(libgpgme_glib_la_LIBADD, libgpgme_glib_la_CFLAGS)
[BUILD_W32_GLIB]: New variables.
* gpgme-config.in (glib): New option.
* gpgme.m4 (AM_PATH_GPGME_GLIB): New macro.

2005-11-17 Marcus Brinkmann <marcus@g10code.de>

* priv-io.h (_gpgme_io_waitpid, _gpgme_io_kill): Removed.
* w32-io.c (_gpgme_io_waitpid, _gpgme_io_kill): Removed.
* posix-io.c (_gpgme_io_kill):
Removed.
(_gpgme_io_waitpid): Declare static.

2005-10-24  Marcus Brinkmann  <marcus@g10code.de>

* w32-io.c (_gpgme_io_spawn): Don't minimize window, hide it.

2005-10-21  Werner Koch  <wk@g10code.com>

* Makefile.am: Fixed cut+paste problem

2005-10-20  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am: Build versioninfo.lo, not versioninfo.o.  Also, fix
the whole mess.

2005-10-16  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (gpg_edit): Don't add a key argument if in card edit
mode.

2005-10-06  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (gpgme.dll gpgme.dll.a): Use $(srcdir) for
gpgme.def.

* gpgme.h (gpgme_free): New prototype.
* data-mem.c (gpgme_free): New function.
* libgpgme.vers (GPGME_1.1): Add gpgme_free.
* gpgme.def: Add gpgme_free.

2005-10-02  Marcus Brinkmann  <marcus@g10code.de>

* util.h (_gpgme_decode_percent_string): Add new argument BINARY
to prototype.
* verify.c (parse_notation): Likewise for invocation.
* conversion.c (_gpgme_decode_percent_string):
Likewise to
declaration.  If set, do not replace '\0' characters with a
printable string.
* gpgme.h (struct _gpgme_key_sig): New field notations.
* ops.h (_gpgme_parse_notation): New prototype.
* sig-notation.c (_gpgme_parse_notation): New function.
* key.c (gpgme_key_unref): Free all signature notations.
* keylist.c (op_data_t): New member tmp_keysig.
(finish_key): Clear OPD->tmp_keysig.
* gpgme.c (gpgme_set_keylist_mode): Remove check.
* rungpg.c (gpg_keylist): Support listing signature notations.
(gpg_keylist_ext): Likewise.

2005-10-01  Marcus Brinkmann  <marcus@g10code.de>

* engine.h (_gpgme_set_engine_info): Add prototype.
* engine-backend.h (struct engine_ops): Change return type of
get_file_name() to const char * to silence gcc warning.
* engine.c (engine_get_file_name): Change return type to const
char * to silence gcc warning.
(gpgme_get_engine_info): Use transitional variable to go from
const char * to char * to silence gcc warning.
(_gpgme_set_engine_info):
Likewise.
* engine-gpgsm.c (struct engine_gpgsm): Change type of LINE to
char * to silence gcc warning.
(gpgsm_new): Make ARGV a pointer to const char.
(status_handler): Change type of SRC, END, DST, ALINE and NEWLINE
to char * to silence gcc warning.

* gpgme.def: Add gpgme_data_set_file_name,
gpgme_data_get_file_name, gpgme_sig_notation_clear,
gpgme_sig_notation_add and gpgme_sig_notation_get.
* libgpgme.vers: Add gpgme_sig_notation_clear,
gpgme_sig_notation_add and gpgme_sig_notation_get.
* Makefile.am (libgpgme_real_la_SOURCES): Add sig-notation.c.
* context.h (struct gpgme_context): New field sig_notations.
* gpgme.h (struct _gpgme_sig_notation): New member value_len and
critical.
(GPGME_SIG_NOTATION_CRITICAL): New symbol.
(gpgme_sig_notation_flags_t): New type.
(gpgme_sig_notation_add, gpgme_sig_notation_clear,
gpgme_sig_notation_get): New prototypes.
* ops.h (_gpgme_sig_notation_create, _gpgme_sig_notation_free):
New prototypes.
*
sig-notation.c (_gpgme_sig_notation_free): New file.
* verify.c (parse_notation): Use support functions.
(release_op_data): Likewise.
* rungpg.c (append_args_from_sig_notations): New function.
(gpg_encrypt_sign, gpg_sign): Call it.

2005-09-30 Marcus Brinkmann <marcus@g10code.de>

* data.h (struct gpgme_data): New member file_name.
* data.c (gpgme_data_set_filename): New function.
(_gpgme_data_release): Free DH->filename if necessary.
(gpgme_data_get_filename): New function.
* rungpg.c (gpg_encrypt): Set filename option.
(gpg_encrypt_sign): Likewise.
(gpg_sign): Likewise.
* libgpgme.vers (GPGME_1.1): Add gpgme_data_set_file_name and

gpgme_data_get_file_name.

* decrpyt.c, verify.c, gpgme.h: Replace plaintext_filename with
file_name.

2005-09-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (struct _gpgme_key): Add field is_qualified.
(struct _gpgme_subkey): Likewise.
* keylist.c (set_subkey_capability, set_mainkey_capability): Set
field is_qualified.

2005-09-23
Werner Koch <wk@g10code.com>

* w32-io.c (_gpgme_io_pipe): Removed use of environment variable
again.
(create_reader, create_writer): Set thread priority higher.

2005-09-19 Werner Koch <wk@g10code.com>

* w32-io.c (_gpgme_io_pipe): New environment variable to change
the size of the pipe buffer.

2005-09-13 Werner Koch <wk@g10code.com>

* ath.c: Changes to make it work under W32.

2005-09-12 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (libgpgme_la_SOURCES): Set to ath.h and ath.c.
(ath_pth_src, ath_pthread_src): Removed.
(w32_o_files): Replace ath-compat.o with ath.o.
(libgpgme_pth_la_CFLAGS): New variable.
* ath-compat.c, ath-pthread-compat.c, ath-pth-compat.c: Removed.
* ath.h (ath_pthread_available, ath_pth_available): Removed.
(ath_init) [!_ATH_EXT_SYM_PREFIX]: Do not define macro.
(struct ath_ops, ath_init) [_ATH_COMPAT]: Removed.
(_ATH_COMPAT): Macro removed.
* posix-sema.c (_gpgme_sema_subsystem_init): Do not call
_gpgme_ath_init.

2005-09-12
Marcus Brinkmann <marcus@g10code.de>

* keylist.c (release_op_data): Do not free opd->tmp_uid.

2005-09-07 Werner Koch <wk@g10code.com>

* w32-io.c (build_commandline): Quote argv[0].

2005-08-26  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (command_handler): Use _gpgme_io_write instead of write.

* edit.c (command_handler): Do not depend on PROCESSED being
available.

* engine.h (engine_command_handler_t): Add new argument processed.
* ops.h (_gpgme_passphrase_command_handler_internal): Rename
prototype to ...
(_gpgme_passphrase_command_handler): ... this one.
* passphrase.c (_gpgme_passphrase_command_handler_internal):
Rename to ...
(_gpgme_passphrase_command_handler): ... this one.
* edit.c (command_handler): Add new argument processed.  Remove
local variable with the same name.  Always return processed as
true.
* rungpg.c (command_handler): Send a newline character if the
handler did not.

2005-08-26  Werner Koch  <wk@g10code.com>

* w32-util.c (read_w32_registry_string):
Updated from code used by
GnuPG.  This allows for expanding strings and features the
implicit fallback key.
(w32_shgetfolderpath, find_program_at_standard_place): New.
(_gpgme_get_gpg_path, _gpgme_get_gpgsm_path): With no registry
entry, locate the programs at the standard place.
(dlopen, dlsym, dlclose): New, so that we can keep on using what
we are accustomed to.

* debug.c (debug_init): Use PATHSEP_C so that under W32 a
semicolon is used which allows us to create files with drive
letters.

* w32-io.c (_gpgme_io_read, _gpgme_io_write): Print content in
debug mode too.

2005-07-27  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (gpgme_status_code_t): Add GPGME_STATUS_PLAINTEXT.
(struct _gpgme_op_decrypt_result): New member plaintext_filename.
(struct _gpgme_op_verify_result): Likewise.
* ops.h (_gpgme_parse_plaintext): Add prototype.

* op-support.c (_gpgme_parse_plaintext): New function.
* decrypt.c (release_op_data): Release
OPD->result.plaintext_filename.
(_gpgme_decrypt_status_handler):
Handle GPGME_STATUS_PLAINTEXT.
* verify.c (release_op_data): Release
OPD->result.plaintext_filename.
(_gpgme_verify_status_handler): Handle GPGME_STATUS_PLAINTEXT.

2005-08-08 Werner Koch <wk@g10code.com>

* util.h (stpcpy): Renamed to ..
(_gpgme_stpcpy): .. this and made inline. This avoids duplicate
definitions when linking statically.
* stpcpy.c: Removed.

2005-08-19 Werner Koch <wk@g10code.com>

* gpgme.def: New.
* versioninfo.rc.in: New.
* Makefile.am: Adds support for building a W32 DLL.

* ttyname_r.c (ttyname_r) [W32]: Return error.
* ath-compat.c [W32]: select and co are not yet supported; return
error.
* data-stream.c (stream_seek): Use ftell if ftello is not available.

2005-07-26 Marcus Brinkmann <marcus@g10code.de>

* keylist.c (gpgme_get_key): Allow key IDs.

2005-06-20 Marcus Brinkmann <marcus@g10code.de>

* gpgme.m4: Only call GPGME_CONFIG if found.

2005-06-03 Marcus Brinkmann <marcus@g10code.de>

*
gpgme.h (struct _gpgme_signature): New members pubkey_algo and
hash_algo.
* verify.c (parse_valid_sig): Parse pubkey and hash algo numbers.
(parse_new_sig): Parse pubkey, hash algo and timestamp for ERRSIG.

(_gpgme_decrypt_status_handler): Fix last change.

* gpgme.h (struct _gpgme_recipient): New structure.
(gpgme_recipient_t): New type.
(struct _gpgme_op_decrypt_result): Add member recipients.

* decrypt.c (op_data_t): New member last_recipient_p.
(_gpgme_op_decrypt_init_result): Initialize last_recipient_p.
(parse_enc_to): New function.
(_gpgme_decrypt_status_handler): Handle status ENC_TO and
NO_SECKEY.

* wait-global.c (gpgme_wait): Break out of the fd processing loop
after an error.
Reported by Igor Belyi <gpgme@katehok.ac93.org>.

2005-06-02 Marcus Brinkmann <marcus@g10code.de>

* wait.h (_gpgme_run_io_cb): New prototype.
* wait.c (_gpgme_run_io_cb): New function.
* wait-global.c (gpgme_wait): Call it.
* wait-user.c (_gpgme_user_io_cb_handler): Likewise.
*
wait-private.c (_gpgme_wait_on_condition): Likewise.

2005-06-02 Werner Koch <wk@g10code.com>

* passphrase.c (_gpgme_passphrase_status_handler): Take care of
GPGME_STATUS_NEED_PASSPHRASE_PIN.
(_gpgme_passphrase_command_handler_internal): Also act on the key
"passphrase.pin.ask".

* gpgme.h: Added status codes GPGME_STATUS_SIG_SUBPACKET,
GPGME_STATUS_NEED_PASSPHRASE_PIN, GPGME_STATUS_SC_OP_FAILURE,
GPGME_STATUS_SC_OP_SUCCESS, GPGME_STATUS_CARDCTRL,
GPGME_STATUS_BACKUP_KEY_CREATED.

2005-05-28 Marcus Brinkmann <marcus@g10code.de>

* data-user.c: Include <errno.h>.

2005-05-17 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (gpgme_new): Set the CTX->include_certs default to the
default.

2005-05-11 Marcus Brinkmann <marcus@g10code.de>

* w32-io.c (_gpgme_io_select): Fix loop increment.

2005-05-05 Marcus Brinkmann <marcus@g10code.de>

* data-user.c (user_release): Only call user hook if provided.
(user_seek): Return EBADF if no user hook is provided.

(user_read):
Likewise.
(user_write): Likewise.

2005-04-28  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (GPGME_INCLUDE_CERTS_DEFAULT): New macro.
* engine-gpgsm.c (gpgsm_sign): Send the include-certs option after
the reset, just for cleanliness, and do not sent it at all if the
default is requested.
* gpgme.c (gpgme_set_include_certs): Allow to use
GPGME_INCLUDE_CERTS_DEFAULT.

2005-04-21  Werner Koch  <wk@g10code.com>

* verify.c (calc_sig_summary): Set the key revoked bit.

2005-04-14  Marcus Brinkmann  <marcus@g10code.de>

* wait-global.c (gpgme_wait): Use LI->ctx when checking a context
in the list, not the user-provided CTX.
Reported by Igor Belyi <gpgme@katehok.ac93.org>.

* wait-global.c (gpgme_wait): If no context is found, and we
should not hang, set *status to 0 and return NULL.
Reported by Igor Belyi <gpgme@katehok.ac93.org>.

2005-03-24  Marcus Brinkmann  <marcus@g10code.de>

* data.h (EOPNOTSUPP) [_WIN32]: Remove definition.
* data.c (EOPNOTSUPP) [HAVE_W32_SYSTEM]:
Remove definition.
(gpgme_data_read, gpgme_data_write, gpgme_data_seek): Return
ENOSYS instead EOPNOTSUPP.
* data-compat.c (EOPNOTSUPP) [HAVE_W32_SYSTEM]: Remove definition.
(gpgme_error_to_errno): Map GPG_ERR_NOT_SUPPORTED
to ENOSYS.

2005-03-24  Marcus Brinkmann  <marcus@g10code.de>

* io.h: Rename to ...
* priv-io.h: ... this.
* Makefile.am (libgpgme_real_la_SOURCES): Change io.h to priv-io.h.
* data.c, engine-gpgsm.c, posix-io.c, rungpg.c, version.c,
w32-io.c, wait-private.c, wait-global.c, wait-user.c, wait.c:
Change all includes of "io.h" to "priv-io.h"

2005-03-09  Werner Koch  <wk@g10code.com>

* w32-util.c (_gpgme_get_gpg_path, _gpgme_get_gpgsm_path): Do not
cast away type checks.

* io.h [W32]: Do not include stdio.h.  If it is needed do it at
the right place.

* data.h [W32]: Removed kludge for EOPNOTSUP.
* data.c, data-compat.c [W32]: Explicitly test for it here.

Replaced use of _WIN32 by HAVE_W32_SYSTEM except for public header
files.

2005-03-07
Timo Schulz  <twoaday@g10code.de>

* gpgme.h: [_WIN32] Removed ssize_t typedef.
* ath.h: [_WIN32] Added some (dummy) types.
* io.h: [_WIN32] include stdio.h.
* data.h: [_WIN32] Define EOPNOTSUPP.
* w32-io.c [_WIN32] (_gpgme_io_subsystem_init): New.
* gpgme.c [_WIN32] (gpgme_set_locale): Disabled.

2004-12-12  Marcus Brinkmann  <marcus@g10code.de>

* engine.c (_gpgme_set_engine_info): Fix assertion.

2004-12-11  Marcus Brinkmann  <marcus@g10code.de>

* util.h [HAVE_CONFIG_H && HAVE_TTYNAME_R] (ttyname_r): Define
prototype.
* ttyname_r.c: New file.

2004-12-07  Marcus Brinkmann  <marcus@g10code.de>

* putc_unlocked.c, funopen.c: I just claim copyright on these
files and change their license to LGPL, because they are totally
trivial wrapper functions.
* isascii.c: Change copyright notice to the one from ctype/ctype.h
in the GNU C Library (CVS Head 2004-10-10), where isascii is
defined as a macro doing exactly the same as the
function in this
file.
* memrchr.c: Update from the GNU C Library (CVS Head 2001-07-06).
* stpcpy.c: Update from the GNU C Library (CVS Head 2004-10-10).
* ath.c, ath-compat.c, ath.h, ath-pth.c, ath-pth-compat.c,
ath-pthread.c, ath-pthread-compat.c, context.h, conversion.c,
data.c, data-compat.c, data-fd.c, data.h, data-mem.c,

data-stream.c, data-user.c, debug.c, debug.h, decrypt.c,
decrypt-verify.c, delete.c, edit.c, encrypt.c, encrypt-sign.c,
engine-backend.h, engine.c, engine-gpgsm.c, engine.h, error.c,
export.c, genkey.c, get-env.c, gpgme.c, gpgme.h, import.c, io.h,
key.c, keylist.c, mkstatus, Makefile.am, ops.h, op-support.c,
passphrase.c, posix-io.c, posix-sema.c, posix-util.c, progress.c,
rungpg.c, sema.h, sign.c, signers.c, trust-item.c, trustlist.c,
util.h, verify.c, version.c, w32-io.c, w32-sema.c, w32-util.c,
wait.c, wait-global.c, wait.h, wait-private.c, wait-user.c: Change
license to LGPL.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

* libgpgme.vers
(GPGME_1.1): New version.
* engine-backend.h (struct engine_ops): Add argument FILE_NAME to
member get_version(). Add arguments FILE_NAME and HOME_DIR to
member new(). Change return type of get_file_name and get_version
to char *.
* engine-gpgsm.c (gpgsm_get_version): Change return type to char
pointer. Do not cache result.
(gpgsm_new): Add file_name and home_dir argument, and use them
instead of the defaults, if set.
* rungpg.c (struct engine_gpg): New member file_name.
(gpg_get_version): Change return type to char pointer, and do not
cache result.
(gpg_release): Free gpg->file_name.
(gpg_new): Take new arguments file_name and home_dir. Set the
--homedir argument if HOME_DIR is not NULL. Set gpg->file_name.
(start): Use gpg->file_name instead _gpgme_get_gpg_path, if set.
* engine.h (_gpgme_engine_info_copy, _gpgme_engine_info_release):
New prototypes.
(_gpgme_engine_new): Change first argument to gpgme_engine_info_t
info.
* engine.c: Include <assert.h>.
(gpgme_get_engine_info):
Set *INFO within the lock. Move
ENGINE_INFO and ENGINE_INFO_LOCK to ....
(engine_info, engine_info_lock): ... here. New static variables.
(engine_get_version): Add file_name argument to
get_version invocation. Change return type to char pointer.
(gpgme_engine_check_version): Rewritten to free() the return value
of engine_get_version after using it.
(_gpgme_engine_info_release): New function.
(gpgme_get_engine_info): Rewritten.
(_gpgme_engine_info_copy): New function.
(_gpgme_set_engine_info): New function.
(gpgme_set_engine_info): New function.

(_gpgme_engine_new): Change first argument to gpgme_engine_info_t
info, and use that.
* gpgme.h (struct _gpgme_engine_info): Change type of file_name
and version to char * (remove the const). New member home_dir.
(gpgme_set_engine_info, gpgme_ctx_get_engine_info,
gpgme_ctx_set_engine_info): New prototypes.
* context.h (struct gpgme_context): New member engine_info.
* gpgme.c (gpgme_new): Allocate CTX->engine_info.
(gpgme_release):
Deallocate CTX->engine_info.
(gpgme_ctx_get_engine_info, gpgme_ctx_set_engine_info): New
functions.
* op-support.c (_gpgme_op_reset): Look for correct engine info and
pass it to _gpgme_engine_new.
* version.c (gpgme_check_version): Adjust to
_gpgme_compare_versions returning an int.
(_gpgme_compare_versions): Return an int value, not a const char
pointer.
* ops.h (_gpgme_compare_versions): Same for prototype.

2004-10-03 Marcus Brinkmann <marcus@g10code.de>

* verify.c (parse_trust): If no reason is provided, set
SIG->validity_reason to 0.
(calc_sig_summary): Set GPGME_SIGSUM_CRL_TOO_OLD if appropriate.

2004-10-22 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (map_assuan_error): Return 0 if ERR is 0.
(start): Call map_assuan_error on return value of
assuan_write_line.

2004-10-05 Marcus Brinkmann <marcus@g10code.de>

* op-support.c (_gpgme_op_data_lookup): Use char pointer for
pointer arithmetic.

2004-09-30 Marcus Brinkmann
<marcus@g10code.de>

* gpgme.m4: Implement the --api-version check.

* rungpg.c (read_status): Move the polling of the output data pipe
to just before removing the command fd, from just before adding
it. This avoids buffering problems.

* data.c (_gpgme_data_inbound_handler): Use _gpgme_io_read, not
read, to improve debug output.

2004-09-29  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (GPGME_IMPORT_NEW, GPGME_IMPORT_UID, GPGME_IMPORT_SIG,
GPGME_IMPORT_SUBKEY, GPGME_IMPORT_SECRET,
(GPGME_KEYLIST_MODE_LOCAL, GPGME_KEYLIST_MODERN_EXTERN,
GPGME_KEYLIST_MODE_SIGS, GPGME_KEYLIST_MODE_VALIDATE): Change from
enum to macros.
(gpgme_keylist_mode_t): Define as unsigned int.
(gpgme_key_t): Change type of keylist_mode to
gpgme_keylist_mode_t.

2004-09-23  Marcus Brinkmann  <marcus@g10code.de>

* data.c (_gpgme_data_outbound_handler): Close the file descriptor
if we get an EPIPE.

* data-stream.c (stream_seek): Call ftello and return the current
offset.
* data.h (struct
gpgme_data): Change type of data.mem.offset to
off_t.
* data.c (gpgme_data_seek): Check dh->cbs->seek callback, not read
callback.  If SEEK_CUR, adjust the offset by the pending buffer
size.  Clear pending buffer on success.

2004-09-14  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.m4: Add copyright notice.

2004-08-18  Marcus Brinkmann  <marcus@g10code.de>

* passphrase.c (_gpgme_passphrase_status_handler): Always run the
status handler.

2004-08-17  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (build_argv): Use --no-sk-comment, not --no-comment.

2004-06-23  Marcus Brinkmann  <marcus@g10code.de>

* key.c (_gpgme_key_append_name): Make sure tail points to the
byte following the uid.
(_gpgme_key_add_sig): Likewise.  Don't use calloc, but malloc and
memset.

2004-06-02  Marcus Brinkmann  <marcus@g10code.de>

* libgpgme.vers: Remove C-style comment, which is not supported by
older binutils.

2004-05-21  Marcus Brinkmann  <marcus@g10code.de>

* gpgme-config.in (Options):
Support --api-version.

* libgpgme.vers: List all gpgme symbols under version GPGME_1.0.

* decrypt.c (_gpgme_decrypt_status_handler): Fix last change.
* verify.c (parse_error): Likewise.

* verify.c (parse_error): Do not skip location of where token.

* gpgme.h (gpgme_status_code_t): Add GPGME_STATUS_REVKEYSIG.
* verify.c (_gpgme_verify_status_handler): Add handling of
GPGME_STATUS_REVKEYSIG.
(parse_trust): Likewise.

2004-05-21  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (struct _gpgme_decrypt_result): New fields
wrong_key_usage and _unused.
* decrypt.c (_gpgme_decrypt_status_handler): Don't skip over
character after a matched string, as in a protocol error this
could skip over the trailing binary zero.
Handle decrypt.keyusage error notifications.

* gpgme.h (struct _gpgme_key): New member keylist_mode.
* keylist.c (keylist_colon_handler): Set the keylist_mode of KEY.

2004-04-29  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (struct _gpgme_signature):
Change member WRONG_KEY_USAGE
to unsigned int.  Same for member _unused.

* keylist.c (set_mainkey_trust_info): Rewritten.
(set_subkey_capability): Handle 'd' (disabled).
(set_mainkey_capability): Rewritten.

2004-04-22  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.m4: Quote first argument to AC_DEFUN.

2004-04-21  Werner Koch  <wk@gnupg.org>

* key.c (gpgme_key_unref): Allow passing NULL like free does.
The rule of least surprise.

2004-04-15 Werner Koch <wk@gnupg.org>

* verify.c (prepare_new_sig, _gpgme_verify_status_handler): Remove
unused result.signatures items.

* keylist.c (gpgme_get_key): Return an error if FPR is NULL.

2004-04-08 Werner Koch <wk@gnupg.org>

* verify.c (_gpgme_verify_status_handler): Ignore the error status
if we can't process it.
* decrypt-verify.c (decrypt_verify_status_handler): Backed out
yesterday's hack. It is not any longer required.

2004-04-07 Werner Koch <wk@gnupg.org>

* decrypt-verify.c (decrypt_verify_status_handler):
Hack to cope
with meaningless error codes from the verify status function.

2004-04-05 Werner Koch <wk@gnupg.org>

* gpgme.h: Add GPGME_STATUS_NEWSIG.

* verify.c (parse_error): Compare only the last part of the where
token.
(prepare_new_sig): New.
(parse_new_sig): Use prepare_new_sig when required.
(_gpgme_verify_status_handler): Handle STATUS_NEWSIG.

* engine-gpgsm.c (gpgsm_keylist_ext): Send with-validation
option. Fixed pattern construction.
(status_handler): Add debugging output.

2004-03-23 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_new): Protect _only_ tty related code with
isatty(). Submitted by Bernhard Herzog.

2004-03-11 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_new): Protect all tty related code with
isatty().

* rungpg.c (gpg_cancel): Set GPG->fd_data_map to NULL after
releasing it.
* engine-gpgsm.c (gpgsm_cancel): Only call assuan_disconnect if
GPGSM->assuan_ctx is not NULL.  Set it to NULL afterwards.

2004-03-07
Marcus Brinkmann  <marcus@g10code.de>

* gpgme-config.in: Do not emit include and lib directory for
prefix "/usr" or "".

2004-03-03  Werner Koch  <wk@gnupg.org>

* engine-gpgsm.c (gpgsm_export_ext): Properly insert a space
between patterns.

2004-02-18  Werner Koch  <wk@gnupg.org>

* gpgme-config.in: Ignore setting of --prefix.

2004-02-25  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (gpg_cancel): New function.
(gpg_release): Call it here.
(_gpgme_engine_ops_gpg): Add it here.
* engine-gpgsm.c (gpgsm_cancel): Fix last change.

2004-02-24  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c (gpgme_cancel): New function.
* engine-backend.h (struct engine_ops): New member cancel.
* engine.h (_gpgme_engine_cancel): New prototype.
* engine.c (_gpgme_engine_cancel): New function.
* engine-gpgsm.c (_gpgme_engine_ops_gpgsm): Add new member cancel.
(gpgsm_cancel): New function.
(gpgsm_release): Use it.
* rungpg.c (_gpgme_engine_ops_gpg): Add new member cancel.

2004-02-17
Werner Koch  <wk@gnupg.org>

* gpgme.h: Add GPGME_KEYLIST_MODE_VALIDATE.
* engine-gpgsm.c (gpgsm_keylist): Send this to gpgsm.

2004-02-15  Werner Koch  <wk@gnupg.org>

* memrchr.c (memrchr): Fixed implementation.  Problem pointed out
by Adriaan de Groot.

2004-02-01  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (build_argv): Use --no-comment, not --comment "".

* data-compat.c (gpgme_data_new_from_filepart): Call fseeko if
available.
* data-stream.c (stream_seek): Likewise.

2004-01-16  Werner Koch  <wk@gnupg.org>

* conversion.c (_gpgme_map_gnupg_error): Handle numerical codes as
used by GnuPG 1.9.x

2004-01-13  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (struct _gpgme_key_sig): Fix comment on REVOKED.

2004-01-12  Werner Koch  <wk@gnupg.org>

* sign.c: Include util.h for prototype of _gpgme_parse_timestamp.

2003-12-25  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (_GPGME_D_CLASS): Revert this change.
(struct _gpgme_key_sig): For C++ compilers,
rename class
member to _obsolete_class.  Add new member sig_class.
(struct _gpgme_new_signature): Same here.
* key.c (gpgme_key_sig_get_ulong_attr): Use CERTSIG->sig_class,
not CERTSIG->class.
* keylist.c (keylist_colon_handler): Likewise for KEYSIG, but keep
setting KEYSIG->class, too.  Rename variable CLASS to SIG_CLASS.
* sign.c (parse_sig_created): Set SIG->sig_class.

2003-12-22  Werner Koch  <wk@gnupg.org>

* gpgme.h (_GPGME_D_CLASS): Kludge for C++ compatibility without
changing the C API.

2003-11-19  Werner Koch  <wk@gnupg.org>

* conversion.c (_gpgme_parse_timestamp): New.
(atoi_1, atoi_2, atoi_4): New.
* keylist.c (parse_timestamp): Removed. Changed all callers to use
the new function.
* verify.c (parse_valid_sig): Ditto.  Repalced the errno check.
* sign.c (parse_sig_created): Ditto.

2003-10-31 Werner Koch <wk@gnupg.org>

* keylist.c (parse_timestamp): Detect ISO 8601 timestamps and try
to convert them.

2003-10-10 Marcus Brinkmann <marcus@g10code.de>

*
genkey.c (get_key_parameter): Make a copy of the key parameters.
Submitted by Miguel Coca <e970095@zipi.fi.upm.es>.

2003-10-06 Marcus Brinkmann <marcus@g10code.de>

* data-compat.c: Include <sys/time.h> before <sys/stat.h> for
broken systems.

* engine-gpgsm.c (map_assuan_error): If ERR is -1, return sensible
error.

* io.h (_gpgme_io_subsystem_init): New prototype.
* posix-io.c (_gpgme_io_subsystem_init): Add function.
(_gpgme_io_spawn): Do not fixup signal handler here.
* version.c (do_subsystem_inits): Call _gpgme_io_subsystem_init.

* debug.c (debug_init): Drop const qualifier from E.

* ath.h (struct ath_ops): Make ADDR argument of CONNECT prototype
const.
(ath_connect): Make ADDR argument const.
* ath-pthread.c (ath_connect): Likewise.
* ath-pth.c (ath_connect): Likewise.
* ath-compat.c (ath_connect): Likewise.
* ath.c (ath_connect): Likewise.

* ath.h [HAVE_SYS_SELECT_H]: Include <sys/select.h> for fd_set.
[!HAVE_SYS_SELECT_H]: Include <sys/time.h>.

*
conversion.c (_gpgme_hextobyte): Drop "unsigned" from type of
SRC argument.
* util.h (_gpgme_hextobyte): Likewise for prototype.

* gpgme.h: Remove trailing comma in enum.

* rungpg.c: Do not include <time.h>, <sys/time.h>, <sys/types.h>,
<signal.h>, <fcntl.h>, or "unistd.h".

2003-10-02  Marcus Brinkmann  <marcus@g10code.de>

* engine-backend.h (struct engine_ops): Add argument TYPE.
* engine.c (_gpgme_engine_op_edit): Likewise.
* engine.h: Likewise.
* rungpg.c (gpg_edit): Likewise.  Use it.
* edit.c (edit_start): Likewise.  Pass it on.
(gpgme_op_edit_start, gpgme_op_edit): Likewise.
(gpgme_op_card_edit_start, gpgme_op_card_edit): New functions.

2003-09-30  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (gpg_strerror_r): Change prototype to match
gpg_strerror_r change.
* error.c (gpg_strerror_r): Likewise, also update implementation.

* gpgme.c (gpgme_hash_algo_name): Change name of RMD160 to
RIPEMD160, name of TIGER to TIGER192, name of CRC32-RFC1510 to
CRC32RFC1510,
and name of CRC24-RFC2440 to CRC24RFC2440.

2003-09-14  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h: Add prototype for gpgme_set_locale.

* gpgme.h: Define macro _GPGME_INLINE depending on the compiler
characteristics and use that instead __inline__.

* context.h (struct gpgme_context): New members lc_ctype and
lc_messages.
* gpgme.c: Include <locale.h>.
(def_lc_lock, def_lc_ctype, def_lc_messages): New static
variables.
(gpgme_set_locale): New function.
* engine.c (_gpgme_engine_new): Add arguments lc_ctype and
lc_messages.
* engine.h (_gpgme_engine_new): Likewise.
* engine-gpgsm.c (gpgsm_new): Likewise.
* rungpg.c (gpg_new): Likewise.
* engine-backend.h (struct engine_ops): Likewise to NEW.
* op-support.c (_gpgme_op_reset): Likewise to invocation of
_gpgme_engine_new.

2003-09-13  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (gpgme_strerror_r): New prototype.
* error.c (gpgme_strerror_r): New function.

* get-env.c: New file.
* util.h (_gpgme_getenv):
Add prototype.
* Makefile.am (libgpgme_real_la_SOURCES): Add get-env.c.
* rungpg.c (build_argv): Use _gpgme_getenv.
* debug.c (debug_init): Likewise.
* engine-gpgsm.c (gpgsm_new): Likewise.
(gpgsm_new): Use ttyname_r.
* w32-io.c (_gpgme_io_spawn): Disable debugging for now.

2003-09-03 Marcus Brinkmann <marcus@g10code.de>

* gpgme-config.in: Use $libdir, not @libdir@, for the echo
command.

* gpgme-config.in: Rewritten.
* gpgme.m4: Rewritten.

2003-08-19 Marcus Brinkmann <marcus@g10code.de>

The ath files (ath.h, ath.c, ath-pth.c, ath-pthread.c,
ath-compat.c, ath-pth-compat.c and ath-pthread-compat.c) have been
updated to have better thread support, and the Makefile.am was
changed to reflect that.

* util.h [!HAVE_FOPENCOOKIE]: Remove fopencookie declaration.
* engine-gpgsm.c (gpgsm_assuan_simple_command): Set ERR to return
value of status_fnc.
* rungpg.c (start): Return SAVED_ERRNO, not errno.

2003-08-18 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (start):
Use saved_errno instead errno.

2003-08-18 Marcus Brinkmann <marcus@g10code.de>

* funopen.c, putc_unlocked.c, isascii.c, memrchr.c: New files.
* fopencookie.c: File removed.

2003-08-15 Marcus Brinkmann <marcus@g10code.de>

* gpgme-config.in: Put gpg-error related flags after gpgme's.

2003-08-14 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (struct _gpgme_new_signature): Rename member CLASS to
_OBSOLETE_CLASS, add member CLASS with type unsigned int.

* sign.c (parse_sig_created): Also set SIG->_unused_class for
backward compatibility.

2003-08-04 Marcus Brinkmann <marcus@g10code.de>

* verify.c (parse_new_sig): Fix status parsing case.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (struct _gpgme_subkey): Add flag CAN_AUTHENTICATE.
Lower _UNUSED to 23 bits.
(struct _gpgme_key): Likewise.
* keylist.c (set_mainkey_capability): Support 'a' and 'A'.
(set_subkey_capability): Support 'a'.

* keylist.c (gpgme_get_key): Check if there is more than
one key
listed, and return GPG_ERR_AMBIGUOUS_NAME in that case.

* util.h (_gpgme_decode_c_string): Change type of LEN argument to
size_t.
(_gpgme_decode_percent_string): Likewise.
* conversion.c (_gpgme_decode_c_string): Likewise.
(_gpgme_decode_percent_string): Likewise.
(_gpgme_map_gnupg_error): Change type of I to unsigned int.
* signers.c (gpgme_signers_clear): Likewise.
(gpgme_signers_enum): New unsigned variable SEQNO, set to SEQ.
Use SEQNO instead SEQ.
* wait.c (fd_table_put): Change type of I and J to unsigned int.
* wait-global.c (_gpgme_wait_global_event_cb): Change type of IDX
to unsigned int.
(gpgme_wait): Change type of I and IDX to unsigned int.
* wait-private.c (_gpgme_wait_on_condition): Change type of IDX
and I to unsigned int.
* posix-io.c (_gpgme_io_close): Cast return value of macro DIM to
int to suppress gcc warning.
(_gpgme_io_set_close_notify): Likewise.
(_gpgme_io_select): Change type of I to unsigned int.
* engine.c (gpgme_get_engine_info):
Change type of PROTO to
unsigned int.
* wait-user.c (_gpgme_user_io_cb_handler): Change type of IDX and
I to unsigned int.

2003-07-29 Marcus Brinkmann <marcus@g10code.de>

* decrypt-verify.c (decrypt_verify_status_handler): Expand silly
and wrong expression.

* encrypt-sign.c (encrypt_sign_status_handler): Likewise.
* encrypt.c (encrypt_sym_status_handler): Likewise.
* sign.c (sign_status_handler): Likewise.
* verify.c (verify_status_handler): Likewise.
* decrypt.c (decrypt_status_handler): Likewise.

* engine.c (gpgme_get_engine_info): Initialize NULL.

2003-07-23 Marcus Brinkmann <marcus@g10code.de>

* gpgme-config.in (gpg_error_libs): Quote GPG_ERROR_CFLAGS and
GPG_ERROR_LIBS when setting the corresponding variables.
Reported by Stphane Corthsy.

2003-07-22 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (set_recipients): Move declaration of NEWLEN to
the beginning of the block.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

* data-mem.c (mem_write):
Copy original buffer content.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (gpgme_user_ids_release, gpgme_user_ids_append): Remove
prototypes.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (AM_CPPFLAGS): Add @GPG_ERROR_CFLAGS@.
* gpgme-config.in (gpg_error_libs, gpg_error_cflags): New variables.
Print them.

* op-support.c (_gpgme_parse_inv_userid): Rename to
_gpgme_parse_inv_recp and change to new datatype.
* ops.h (_gpgme_parse_inv_key): Fix prototype.
* gpgme.h (struct _gpgme_invalid_user_id): Rename to
__gpgme_invalid_key. Rename field ID to KEY.
(gpgme_invalid_user_id_t): Rename to gpgme_invalid_key_t.
(struct _gpgme_op_encrypt_result): Here, too.
(struct _gpgme_op_sign_result): Likewise.
* encrypt.c (struct op_data): Likewise.
(release_op_data): Likewise.
* sign.c (struct op_data): Likewise.
(release_op_data): Likewise.

* posix-io.c (_gpgme_io_read): Save errno across debug calls.
(_gpgme_io_write): Likewise.
(_gpgme_io_pipe):
Likewise.
(_gpgme_io_select): Likewise.

* rungpg.c (struct engine_gpg): Remove arg_error.
(add_arg): Don't set arg_error.
(add_data): Likewise.
(start): Don't check arg_error.
(gpg_new): Check return value of add_arg.
* verify.c (parse_notation): Free allocated memory at error.

2003-06-05 Marcus Brinkmann <marcus@g10code.de>

Everywhere: Use libgpg-error error codes.

* Makefile.am (EXTRA_DIST): Remove mkerrors.
(BUILT_SOURCES): Remove errors.c.
(MOSTLYCLEANFILES): Likewise.
(libgpgme_la_SOURCES): Likewise. Add error.c.
(errors.c): Remove target.
* mkerrors: File removed.
* error.c: New file.

* gpgme.h (gpgme_error_t): Change to type gpg_error_t.
(gpgme_err_code_t, gpgme_err_source_t): New types.
(gpgme_err_code, gpgme_err_source, gpgme_error, gpgme_err_make):
New static inline functions.
(gpgme_strsource, gpgme_err_code_from_errno,
gpgme_err_code_to_errno, gpgme_err_make_from_errno,
gpgme_error_from_errno): New prototypes.

2003-05-29 Marcus
Brinkmann <marcus@g10code.de>

* gpgme.h (gpgme_op_export_start): Change second arg to const char *.
(gpgme_op_export): Likewise.
(gpgme_op_export_ext_start): New prototype.
(gpgme_op_export_ext): Likewise.
* engine.h: Likewise for _gpgme_engine_op_export and
_gpgme_engine_op_export_ext.
* engine-backend.h (struct engine_ops): Change second argument of
prototype of export to const char *, and add reserved int as
third argument. Add prototype for export_ext.
* engine.c (_gpgme_engine_op_export_ext): New function.
(_gpgme_engine_op_export): Change second argument of prototype of
export to const char *, and add reserved int as third argument.

* rungpg.c (gpg_export): Change second argument of prototype of
export to const char *, and add reserved int as third argument.
(gpg_export_ext): New function.
(gpg_keylist_ext): Break loop at error.
(_gpgme_engine_ops_gpg): Add gpg_export_ext.
* engine-gpgsm.c (gpgsm_export): Change second argument of
prototype of export to const
char *, and add reserved int as
third argument.
(gpgsm_export_ext): New function.
(_gpgme_engine_ops_gpgsm): Add gpgsm_export_ext.
* export.c (export_start): Change second argument of prototype of
export to const char *, and add reserved int as third argument.
(gpgme_op_export_start): Likewise.
(export_ext_start): New function.
(gpgme_op_export_ext_start): Likewise.
(gpgme_op_export_ext): Likewise.

* gpgme.h (gpgme_keylist_mode_t): New type for anonymous enum.
(gpgme_sigsum_t): New type for anonymous enum.

* encrypt-sign.c (encrypt_sign_start): Check for errors earlier,
and return an error if RECP is not set.

* Makefile.am (libgpgme_la_SOURCES): Remove user-id.c.
* user-id.c: Remove file.
* ops.h: Remove prototype for _gpgme_user_ids_all_valid.
* gpgme.h (gpgme_encrypt_flags_t): New type.
(gpgme_op_encrypt_start): Change second parameter to type
gpgme_key_t[], and add third parameter.
(gpgme_op_encrypt): Likewise.
(gpgme_op_encrypt_sign_start): Likewise.
(gpgme_op_encrypt_sign):
Likewise.
* encrypt.c (encrypt_start): Likewise.
(gpgme_op_encrypt_start): Likewise.
(gpgme_op_encrypt): Likewise.  Pass flags to engine.
* encrypt-sign.c (encrypt_sign_start): Likewise.
(gpgme_op_encrypt_sign_start): Likewise.
(gpgme_op_encrypt_sign): Likewise.
* engine-backend.h (struct engine_ops): Likewise for prototypes of
encrypt and encrypt_sign.
* engine.h: Likewise for prototypes of _gpgme_engine_op_encrypt
and _gpgme_engine_op_encrypt_sign.
* engine.c (_gpgme_engine_op_encrypt): Likewise.
(_gpgme_engine_op_encrypt_sign): Likewise.
* rungpg.c (gpg_encrypt): Likewise.
(gpg_encrypt_sign): Likewise.

* rungpg.c (gpg_encrypt): Check flags for always trust option.
* engine-gpgsm.c (gpgsm_encrypt): Likewise.
(set_recipients): Rewritten to use keys instead user IDs.
* rungpg.c (append_args_from_recipients): Rewritten to use keys
instead user IDs.
* encrypt.c (_gpgme_encrypt_status_handler): Change errors
returned to GPGME_Invalid_Key and GPGME_General_Error.

2003-05-28
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* engine-gpgsm.c: Rename GpgsmObject to engine_gpgsm_t.
(struct gpgsm_object_s): Rename to struct engine_gpgsm.
* rungpg.c: Rename GpgObject to engine_gpg_t.
(struct gpg_object_s): Rename to struct engine_gpg.

* context.h (struct gpgme_context): Change EngineObject to
engine_object_t.
(enum ctx_op_data_type): Rename to ctx_op_data_id_t.
(ctx_op_data_t): New type.
(struct gpgme_context): Use it.
* ops.h (_gpgme_op_data_lookup): Use new type name.
* op-support.c (_gpgme_op_data_lookup): Likewise.
* engine.c: Rename EngineObject to engine_t in the file. Also
EngineStatusHandler to engine_status_handler_t,
EngineCommandHandler to engine_command_handler_t and
EngineColonLineHandler to engine_colon_line_handler.
* rungpg.c (start): Likewise.
* engine-gpgsm.c: Likewise.
* engine-backend.h (struct engine_ops): Likewise
* engine.h (struct engine_object_s): Rename to struct engine.
(EngineObject): Rename to
engine_t. Also everywhere else in the
file.
(EngineStatusHandler): Rename to engine_status_handler_t.
(EngineColonLineHandler): Rename to engine_colon_line_handler_t.
(EngineCommandHandler): Rename to engine_command_handler_t.

* engine-gpgsm.c (gpgsm_export): Fix bug in last change.

* Makefile.am (libgpgme_la_SOURCES): Remove recipient.c, add
user-id.c.
* gpgme.h (gpgme_recipients_t): Removed.
(gpgme_recipients_new, gpgme_recipients_release,
gpgme_recipients_add_name,
gpgme_recipients_add_name_with_validity, gpgme_recipients_count,
gpgme_recipients_enum_open, gpgme_recipients_enum_read,
gpgme_recipients_enum_close): Removed.

(gpgme_op_encrypt, gpgme_op_encrypt_start, gpgme_op_encrypt_sign,
gpgme_op_encrypt_sign_start, gpgme_op_export_start,
gpgme_op_export): Change second argument to gpgme_user_id_t.
(gpgme_user_ids_release): New prototype.
(gpgme_user_ids_append): Likewise.
* ops.h (_gpgme_recipients_all_valid): Remove.
(_gpgme_user_ids_all_valid): Add.
* context.h
(struct gpgme_recipients): Removed.
* user-id.c: New file.
* recipient.c: Removed file.
* rungpg.c (append_args_from_recipients): Change last arg to
gpgme_user_id_t. Reimplement.
(gpg_encrypt): Change second arg to gpgme_user_id_t.
(gpg_encrypt_sign): Likewise.
(gpg_export): Likewise. Rewrite user ID list code.
* engine.c (_gpgme_engine_op_encrypt): Change second arg to
gpgme_user_id_t.
(_gpgme_engine_op_encrypt_sign): Likewise.
(_gpgme_engine_op_export): Likewise.
* engine.h (_gpgme_engine_op_encrypt, _gpgme_engine_op_encrypt_sign,
_gpgme_engine_op_export): Likewise.
* engine-gpgsm.c (set_recipients): Likewise. Rewrite loop code.
(gpgsm_encrypt): Likewise.
(gpgsm_export): Likewise.
* engine-backend.h (struct engine_ops): Likewise for members
ENCRYPT, ENCRYPT_SIGN and EXPORT.
* export.c (export_start, gpgme_op_export_start, gpgme_op_export):
Likewise.
* encrypt.c (encrypt_start): Likewise. Don't check for count of
recipients.
(gpgme_op_encrypt_start): Likewise.
(gpgme_op_encrypt):
Likewise.
* encrypt-sign.c (encrypt_sign_start): Likewise.
(gpgme_op_encrypt_sign): Likewise.
(gpgme_op_encrypt_sign_start): Likewise.

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* gpgme.h (struct _gpgme_op_import_result): Add skipped_new_keys.
* import.c (parse_import_res): Add skipped_new_keys parser.

* op-support.c (_gpgme_parse_inv_userid): Add missing break
statements.
* encrypt.c (gpgme_op_encrypt): Use gpgme_error_t instead of int.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

* encrypt.c (gpgme_op_encrypt_result): Use intermediate variable
HOOK to avoid compiler warning.  Don't ask, you don't want to know.
(_gpgme_encrypt_status_handler): Likewise.
(_gpgme_op_encrypt_init_result): Likewise.
* decrypt.c (gpgme_op_decrypt_result): Likewise.
(_gpgme_decrypt_status_handler): Likewise.
(_gpgme_op_decrypt_init_result): Likewise.
* verify.c (gpgme_op_verify_result): Likewise.
(_gpgme_verify_status_handler): Likewise.
(_gpgme_op_verify_init_result):
Likewise.
* edit.c (edit_status_handler): Likewise.
(command_handler): Likewise.
(edit_start): Likewise.
* genkey.c (gpgme_op_genkey_result): Likewise.
(genkey_status_handler): Likewise.
(genkey_start): Likewise.
* import.c (gpgme_op_import_result): Likewise.
(import_status_handler): Likewise.
(_gpgme_op_import_start): Likewise.
* trustlist.c (gpgme_op_trustlist_next): Likewise.
(_gpgme_op_trustlist_event_cb): Likewise.
(gpgme_op_trustlist_start): Likewise.
* keylist.c (gpgme_op_keylist_result): Likewise.
(keylist_colon_handler): Likewise.
(keylist_status_handler): Likewise.
(_gpgme_op_keylist_event_cb): Likewise.
(gpgme_op_keylist_start): Likewise.
(gpgme_op_keylist_ext_start): Likewise.
(gpgme_op_keylist_next): Likewise.
* passphrase.c (_gpgme_passphrase_status_handler): Likewise.
(_gpgme_passphrase_command_handler_internal): Likewise.
* sign.c (gpgme_op_sign_result): Likewise.
(_gpgme_sign_status_handler): Likewise.
(_gpgme_op_sign_init_result):
Likewise.

* passphrase.c (_gpgme_passphrase_command_handler_internal): Fix
access to pointer type.

2003-05-26  Marcus Brinkmann  <marcus@g10code.de>

* engine.h (EngineCommandHandler): Change last argument to int fd.
* gpgme.h (gpgme_passphrase_cb_t): Rewritten to take parts of the
description and fd.
(gpgme_edit_cb_t): Change last argument to int fd.
* ops.h (_gpgme_passphrase_command_handler_internal): New prototype.

* passphrase.c: Include <assert.h>.
(op_data_t): Rename userid_hint to uid_hint, remove last_pw_handle.
(release_op_data): Check values before calling free.
(_gpgme_passphrase_status_handler): Likewise.
(_gpgme_passphrase_command_handler_internal): New function.
(_gpgme_passphrase_command_handler): Rewritten.
* edit.c (edit_status_handler): Pass -1 as fd argument.
(command_handler): Update prototype. New variable processed. Use
it to store return value of
_gpgme_passphrase_command_handler_internal which is now used
instead _gpgme_passphrase_command_handler.
Use it also to check
if we should call the user's edit function. Pass fd to user's
edit function.
* rungpg.c (struct gpg_object_s): Change type of cmd.cb_data to
void *.
(gpg_release): Check value before calling free. Do not release
cmd.cb_data.
(command_cb): Function removed.
(command_handler): New function. Thus we don't use a data object
for command handler stuff anymore, but handle it directly. This
allows proper error reporting (cancel of passphrase requests, for
example). Also all callbacks work via direct writes to the file
descriptor (so that passphrases are not kept in insecure memory).
(gpg_set_command_handler): Rewritten to use even more ugly hacks.
(read_status): Check cmd.keyword before calling free. Install
command_handler as the I/O callback handler with GPG as private
data.

* rungpg.c (gpg_new): Add --enable-progress-filter to gpg
invocation.
* decrypt-verify.c (_gpgme_op_decrypt_verify_start): Rename to
decrypt_verify_start.
(gpgme_op_decrypt_verify_start):
Call decrypt_verify_start.
(gpgme_op_decrypt_verify): Likewise.
* verify.c (verify_status_handler): New function that also calls
progress status handler.
(_gpgme_op_verify_start): Set status handler to verify_status_handler.
Rename to (verify_start).
(gpgme_op_verify_start): Call verify_start.
(gpgme_op_verify): Likewise.
* encrypt.c (encrypt_status_handler): New function.
(_gpgme_encrypt_sym_status_handler): Call progress status handler.
Make static. Rename to encrypt_sym_status_handler.
(encrypt_start): Set status handler to encrypt_sym_status_handler
or encrypt_status_handler.
* sign.c (sign_status_handler): New function.

(sign_start): Set status handler to sign_status_handler.
* decrypt.c (decrypt_status_handler): New function that also calls
progress status handler.
(decrypt_start): Set status handler to decrypt_status_handler.
* encrypt-sign.c (encrypt_sign_status_handler): Likewise.
* decrypt-verify.c (decrypt_verify_status_handler):
Call
_gpgme_progress_status_handler.

* conversion.c (_gpgme_decode_c_string): Add missing break
statement.

* recipient.c (gpgme_recipients_add_name_with_validity): Add one
to buffer to allocate.

2003-05-19 Marcus Brinkmann <marcus@g10code.de>

* verify.c (parse_new_sig): Fix ERRSIG case.
Submitted by Benjamin Lee <benjaminlee@users.sf.net>.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h: The following types are renamed. The old name is kept
as a deprecated typedef.
(GpgmeCtx): Rename to gpgme_ctx_t.
(GpgmeData): Rename to gpgme_data_t.
(GpgmeRecipients): Rename to gpgme_recipients_t.
(GpgmeError): Rename to gpgme_error_t.
(GpgmeDataEncoding): Rename to gpgme_data_encoding_t.
(GpgmePubKeyAlgo): Rename to gpgme_pubkey_algo_t.
(GpgmeHashAlgo): Rename to gpgme_hash_algo_t.
(GpgmeSigStat): Rename to gpgme_sig_stat_t.
(GpgmeSigMode): Rename to gpgme_sig_mode_t.
(GpgmeAttr): Rename to gpgme_attr_t.
(GpgmeValidity): Rename to gpgme_validity_t.
(GpgmeProtocol):
Rename to gpgme_protocol_t.
(GpgmeStatusCode): Rename to gpgme_status_code_t.
(GpgmeEngineInfo): Rename to gpgme_engine_info_t.
(GpgmeSubkey): Rename to gpgme_subkey_t.
(GpgmeKeySig): Rename to gpgme_keysig_t.
(GpgmeUserID): Rename to gpgme_user_id_t.
(GpgmePassphraseCb): Rename to gpgme_passphrase_cb_t.
(GpgmeProgressCb): Rename to gpgme_progress_cb_t.
(GpgmeEditCb): Rename to gpgme_edit_cb_t.
(GpgmeIOCb): Rename to gpgme_io_cb_t.
(GpgmeRegisterIOCb): Rename to gpgme_register_io_cb_t.
(GpgmeRemoveIOCb): Rename to gpgme_remove_io_cb_t.

(GpgmeEventIO): Rename to gpgme_event_io_t.
(GpgmeEventIOCb): Rename to gpgme_event_io_cb_t.
(GpgmeIOCbs): Rename to gpgme_io_cbs.
(gpgme_io_cbs_t): New type.
(GpgmeDataReadCb): Rename to gpgme_data_read_cb_t.
(GpgmeDataWriteCb): Rename to gpgme_data_write_cb_t.
(GpgmeDataSeekCb): Rename to gpgme_data_seek_cb_t.
(GpgmeDataReleaseCb): Rename to gpgme_data_release_cb_t.
(GpgmeDataCbs): Rename to gpgme_data_cbs.
(gpgme_data_cbs_t):
New type.
(GpgmeInvalidUserID): Rename to gpgme_invalid_user_id_t.
(GpgmeEncryptResult): Rename to gpgme_encrypt_result_t.
(GpgmeDecryptResult): Rename to gpgme_decrypt_result_t.
(GpgmeNewSignature): Rename to gpgme_new_signature_t.
(GpgmeSignResult): Rename to gpgme_sign_result_t.
(GpgmeSigNotation): Rename to gpgme_sig_notation_t.
(GpgmeSignature): Rename to gpgme_signature_t.
(GpgmeVerifyResult): Rename to gpgme_verify_result_t.
(GpgmeImportStatus): Rename to gpgme_import_status_t.
(GpgmeImportResult): Rename to gpgme_import_result_t.
(GpgmeGenKeyResult): Rename to gpgme_genkey_result_t.
(GpgmeKeyListResult): Rename to gpgme_keylist_result_t.
(GpgmeTrustItem): Rename to gpgme_trust_item_t.
* gpgme.h (gpgme_deprecated_error_t): New type, swallowing macros
GPGME_No_Recipients, GPGME_Invalid_Recipient and
GPGME_No_Passphrase.
* data.h (struct gpgme_data_s): Rename to struct gpgme_data.
* context.h (struct gpgme_context_s): Rename to struct
gpgme_context.
(struct
gpgme_recipients_s): Rename to gpgme_recipients.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

* keylist.c (finish_key): Clear OPD->tmp_uid.

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* verify.c (_gpgme_verify_status_handler): Return GPGME_No_Data
for NODATA status without signatures.

2003-05-05 Marcus Brinkmann <marcus@g10code.de>

* key.c (_gpgme_key_append_name): Use decoded string to parse user id.
(_gpgme_key_add_sig): Likewise.

2003-05-04 Marcus Brinkmann <marcus@g10code.de>

* context.h (struct gpgme_context_s): Remove member op_info.

* key.c (_gpgme_key_add_sig): Initialize SIG->uid.

* gpgme.h (GpgmeError): Add deprecated values for
GPGME_Invalid_Type and GPGME_Invalid_Mode.

2003-04-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (gpgme_get_op_info): Remove prototype.
* ops.h (_gpgme_set_op_info,
_gpgme_data_release_and_return_string, _gpgme_data_get_as_string,
_gpgme_data_append, _gpgme_data_append_string,
_gpgme_data_append_string_for_xml,
_gpgme_data_append_for_xml,
_gpgme_data_append_percentstring_for_xml): Likewise.
(_gpgme_progress_status_handler): Change first arg to void *.
* progress.c (_gpgme_progress_status_handler): Likewise.
* conversion.c: Do not include <string.h>, <errno.h>, <ctype.h>,
and <sys/types.h>, but <string.h>.
(_gpgme_data_append): Remove function.
(_gpgme_data_append_string): Likewise.
(_gpgme_data_append_for_xml): Likewise.
(_gpgme_data_append_string_for_xml): Likewise.
(_gpgme_data_append_percentstring_for_xml): Likewise.
* data-mem.c (_gpgme_data_get_as_string): Likewise.
(_gpgme_data_release_and_return_string): Likewise.
* gpgme.c (gpgme_get_op_info): Likewise.
(_gpgme_set_op_info): Likewise.

* gpgme.h (struct _gpgme_key): New structure.
(GpgmeKey): Define using _gpgme_key.
(struct _gpgme_subkey): New structure.
(GpgmeSubKey): New type.
(struct _gpgme_key_sig): New structure.
(GpgmeKeySig): New type.
(struct _gpgme_user_id): New structure.
(GpgmeUserID):
New type.
(struct _gpgme_op_keylist_result): New structure.
(GpgmeKeyListResult): New type.
(gpgme_op_keylist_result): New function.
(gpgme_key_get_as_xml): Remove prototype.
* context.h (struct gpgme_context_s): Remove members tmp_key,
tmp_uid, key_cond and key_queue.
(struct key_queue_item_s): Remove structure.
(struct user_id_s): Remove structure.

(struct gpgme_recipients_s): Replace with simple
GpgmeUserID list.
* gpgme.c (gpgme_release): Do not release CTX->tmp_key.
* ops.h (_gpgme_key_add_subkey, _gpgme_key_append_name,
_gpgme_key_add_sig, _gpgme_trust_item_new): New prototypes.
* rungpg.c (command_cb): Return GpgmeError instead int.
New variable ERR. Use it to hold return value of cmd handler.
(gpg_delete): Access fingerprint of key directly.
(append_args_from_signers): Likewise.
(gpg_edit): Likewise.
(append_args_from_recipients): Use GpgmeUserID for recipient list.
* engine-gpgsm.c: Do not include "key.h".
(gpgsm_delete): Access fingerprint of key
directly.
(gpgsm_sign): Likewise.
(set_recipients): Use GpgmeUserID for recipients. Invert invalid
user ID flag.
* key.h: File removed.
* key.c: Completely reworked to use exposed GpgmeKey data types.
* keylist.c: Likewise.
* recipient.c: Completely reworked to use GpgmeUserID.

2003-04-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (gpgme_get_key): Remove force_update argument.
* key-cache.c: File removed.
* Makefile.am (libgpgme_la_SOURCES): Remove key-cache.c.
* ops.h (_gpgme_key_cache_add, _gpgme_key_cache_get): Remove
prototypes.
* keylist.c (_gpgme_op_keylist_event_cb): Don't call
_gpgme_key_cache_add.
(gpgme_get_key): New function.
* verify.c (gpgme_get_sig_key): Remove last argument to
gpgme_get_key invocation.

* gpgme.h (struct _gpgme_trust_item): New structure.
(GpgmeTrustItem): New type.
(gpgme_trust_item_ref, gpgme_trust_item_unref): New prototypes.
* context.h (struct trust_queue_item_s): Remove structure.
(struct gpgme_context_s): Remove trust_queue
member.
* Makefile.am (libgpgme_la_SOURCES): Add trust-item.c.
* trust-item.c: New file.
* trustlist.c: Do not include <stdio.h> or <time.h>, but
"gpgme.h".
(struct trust_queue_item_s): Change to new type op_data_t.
(trust_status_handler): Change first argument to void *.
(trust_colon_handler): Likewise.

(_gpgme_op_trustlist_event_cb): Use op_data_t type.
(gpgme_op_trustlist_start): Use op_data_t and rework error
handling.
(gpgme_op_trustlist_next): Use op_data_t.
(gpgme_trust_item_release): Remove function.
(gpgme_trust_item_get_string_attr): Likewise.
(gpgme_trust_item_get_int_attr): Likewise.

* verify.c (calc_sig_summary): Do not set GPGME_SIGSUM_SYS_ERROR
for bad signatures.

2003-04-28 Marcus Brinkmann <marcus@g10code.de>

* context.h: Remove OPDATA_VERIFY_COLLECTING.
(struct gpgme_context_s): Remove member notation.
* gpgme.h: Make enum for GPGME_KEYLIST_MODE_* values.

* gpgme.h (struct _gpgme_sig_notation): New structure.
(GpgmeSigNotation): New
type.
(struct _gpgme_signature): New structure.
(GpgmeSignature): New type.
(struct _gpgme_op_verify_result): New structure.
(GpgmeVerifyResult): New type.
(gpgme_op_verify_result): New prototype.
(gpgme_get_notation): Remove prototype.
* ops.h (_gpgme_op_verify_init_result): New prototype.
(_gpgme_verify_status_handler): Change first argument to void *.
* util.h (_gpgme_decode_percent_string, _gpgme_map_gnupg_error):
New prototypes.
* conversion.c (_gpgme_decode_percent_string): New function.
(gnupg_errors): New static global.
(_gpgme_map_gnupg_error): New function.
* gpgme.c (gpgme_release): Don't release CTX->notation.
(gpgme_get_notation): Remove function.
* decrypt-verify.c (_gpgme_op_decrypt_verify_start): Call
_gpgme_op_verify_init_result.
* verify.c: Do not include <stdio.h>, <assert.h> and "key.h", but
do include "gpgme.h".
(struct verify_result): Replace with ...
(op_data_t): ... this type.
(release_verify_result): Remove function.
(release_op_data):
New function.
(is_token): Remove function.
(skip_token): Remove function.
(copy_token): Remove function.
(gpgme_op_verify_result): New function.

(calc_sig_summary): Rewritten.
(finish_sig): Remove function.
(parse_new_sig): New function.
(parse_valid_sig): New function.
(parse_notation): New function.
(parse_trust): New function.
(parse_error): New function.
(_gpgme_verify_status_handler): Rewritten. Change first argument to void *.
(_gpgme_op_verify_start): Rework error handling. Call _gpgme_op_verify_init_result.
(gpgme_op_verify): Do not release or clear CTX->notation.
(gpgme_get_sig_status): Rewritten.
(gpgme_get_sig_string_attr): Likewise.
(gpgme_get_sig_ulong_attr): Likewise.
(gpgme_get_sig_key): Likewise.

* gpgme.h (struct _gpgme_op_decrypt_result): New structure.
(GpgmeDecryptResult): New type.
(gpgme_op_decrypt_result): New prototype.
* ops.h (_gpgme_op_decrypt_init_result): New prototype.
(_gpgme_decrypt_status_handler): Fix prototype.
(_gpgme_decrypt_start):
Remove prototype.
* decrypt-verify.c: Do not include <stdio.h>, <stdlib.h>, <string.h> and <assert.h>, "util.h" and "context.h", but "gpgme.h".
(decrypt_verify_status_handler): Change first argument to void *, and rework error handling.
(_gpgme_op_decrypt_verify_start): New function.
(gpgme_op_decrypt_verify_start): Rewrite using _gpgme_op_decrypt_verify_start.
(gpgme_op_decrypt_verify): Likewise.
* decrypt.c: Include <string.h>, "gpgme.h" and "util.h".
(struct decrypt_result): Change to typedef op_data_t, rewritten.
(is_token): Remove function.
(release_op_data): New function.
(skip_token): Remove function.
(gpgme_op_decrypt_result): New function.
(_gpgme_decrypt_status_handler): Change first argument to void *.
Rework error handling.
(_gpgme_decrypt_start): Rename to ...
(decrypt_start): ... this. Call _gpgme_op_decrypt_init_result.
(_gpgme_op_decrypt_init_result): New function.
(gpgme_op_decrypt_start): Use decrypt_start.
(gpgme_op_decrypt): Likewise.

2003-04-27

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* encrypt-sign.c: Do not include <stddef.h>, <stdio.h>,
<stdlib.h>, <string.h>, <assert.h> and "util.h", but "gpgme.h".
(_gpgme_op_encrypt_sign_start): Rename to ...
(encrypt_sign_start): ... this.
(gpgme_op_encrypt_sign_start): Use encrypt_sign_start, not
_gpgme_op_encrypt_sign_start.
(gpgme_op_encrypt_sign): Likewise.

* gpgme.h (GpgmeEncryptResult): New data type.
(gpgme_op_encrypt_result): New prototype.
* ops.h (_gpgme_op_encrypt_init_result): New prototype.
(_gpgme_op_encrypt_status_handler): Fix prototype.
* encrypt-sign.c (_gpgme_op_encrypt_sign_start): Call
_gpgme_op_encrypt_init_result.
* encrypt.c: Do not include <stdio.h>, <assert.h>, "util.h" and
"wait.h". Include <errno.h> and "gpgme.h".
(SKIP_TOKEN_OR_RETURN): Remove macro.
(struct encrypt_result): Rename to ...
(op_data_t): ... new data type. Rewrite for user result data.
(append_xml_encinfo): Remove function.
(release_op_data): New function.
(gpgme_op_encrypt_result):
New function.
(_gpgme_op_encrypt_status_handler): Change first argument to void *.
Rewrite result parsing.
(_gpgme_op_encrypt_sym_status_handler): Change first argument to
void *.
(_gpgme_op_encrypt_init_result): New function.
(_gpgme_op_encrypt_start): Rename to ...
(encrypt_start): ... this.
(gpgme_op_encrypt_start): Use encrypt_start, not
gpgme_op_encrypt_start.
(gpgme_op_encrypt): Likewise.

* gpgme.h (GpgmePubKeyAlgo, GpgmeHashAlgo, GpgmeInvalidUserID,
GpgmeNewSignature, GpgmeSignResult): New data types.
(gpgme_op_sign_result, gpgme_pubkey_algo_name,
gpgme_hash_algo_name): New prototypes.
* gpgme.c (gpgme_pubkey_algo_name): New function.
(gpgme_hash_algo_name): Likewise.
* ops.h (_gpgme_parse_inv_userid, _gpgme_op_sign_init_result): New
prototype.
(_gpgme_op_sign_status_handler): Fix prototype.
* op-support.c: Include <errno.h> and <string.h>.
(_gpgme_parse_inv_userid): New function.
* sign.c: Include <errno.h> and "gpgme.h", but

not <stdio.h>,
<assert.h> and "util.h".
(SKIP_TOKEN_OR_RETURN): Remove macro.
(struct sign_result): Change to op_data_t type and rework it.
(release_sign_result): Rename to ...
(release_op_data): ... this and rewrite it.
(append_xml_info): Remove function.
(gpgme_op_sign_result): New function.
(parse_sig_created): New function.
(_gpgme_sign_status_handler): Change first argument to void *.
Rewrite the function to use the new result structure and functions.
(_gpgme_op_sign_init_result): New function.
(_gpgme_op_sign_start): Rename to ...
(sign_start): ... this.  Call _gpgme_op_sign_init_result.
(gpgme_op_sign_start): Use sign_start instead _gpgme_op_sign_start.
(gpgme_op_sign): Likewise.
* encrypt-sign.c (_gpgme_op_encrypt_sign_start): Call
_gpgme_op_sign_init_result.

* delete.c: Include <errno.h> and "gpgme.h", but not "util.h" or
"key.h".
(enum delete_problem): Move into function delete_status_handler.
(delete_status_handler): Change first argument to void *.  Parse
delete
problem with strtol instead atoi.  Return better error
values.
(_gpgme_op_delete_start): Rename to ...
(delete_start): ... this.  Rework error handling.
(gpgme_op_delete_start): Use delete_start instead
_gpgme_op_delete_start.
(gpgme_op_delete): Likewise.
* gpgme.h (GpgmeDataType): Removed.

2003-04-25  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h: Change GPGME_IMPORT_PRIVATE to GPGME_IMPORT_SECRET.
* import.c (parse_import_res): Parse unchanged field.

* gpgme.h: New enum for GPGME_IMPORT_NEW, GPGME_IMPORT_UID,
GPGME_IMPORT_SIG, GPGME_IMPORT_SUBKEY, GPGME_IMPORT_PRIVATE.
(GpgmeError): GPGME_Unknown_Reason, GPGME_Not_Found,
GPGME_Ambiguous_Specification, GPGME_Wrong_Key_Usage,
GPGME_Key_Revoked, GPGME_Key_Expired, GPGME_No_CRL_Known,
GPGME_CRL_Too_Old, GPGME_Policy_Mismatch, GPGME_No_Secret_Key,
GPGME_Key_Not_Trusted, GPGME_Issuer_Missing, GPGME_Chain_Too_Long,
GPGME_Unsupported_Algorithm, GPGME_Sig_Expired,
GPGME_Bad_Signature, GPGME_No_Public_Key added

as new error codes.
(struct _gpgme_import_status): New structure.
(GpgmeImportStatus): New type.
(struct _gpgme_op_import_result): New structure.
(GpgmeImportResult): New type.
(gpgme_op_import_result): New function.
* import.c: Include <errno.h> and "gpgme.h", but not "util.h".
(struct import_result): Change to type op_data_t.
(release_import_result): Rename to ...
(release_op_data): ... this.
(append_xml_impinfo): Function removed.
(gpgme_op_import_result): New function.
(parse_import): New function.
(parse_import_res): Likewise.
(import_status_handler): Change first argument to void *.  Rewrite
to use new functions.
(_gpgme_op_import_start): Rework error handling.

* edit.c: Do not include <assert.h>, "util.h", but "gpgme.h".
(edit_resut): Change to typedef for op_data_t.
(edit_status_handler): Change first argument to void *.
Rework error handling.
(command_handler): Rework error handling.
(_gpgme_op_edit_start): Rename to ...
(edit_start): ... this.  Rework
error handling.
(gpgme_op_edit_start): Rewrite using edit_start.
(gpgme_op_edit): Likewise.

* ops.h (_gpgme_passphrase_start): Remove prototype.
* passphrase.c: Do not include <assert.h>, "util.h" or
"debug.h", but "gpgme.h".
(struct passphrase_result): Change to typedef for op_data_t.
(release_passphrase_result): Rename to release_op_data.
(_gpgme_passphrase_status_handler): Change first argument to void *.
Use new op_data_t type.
(_gpgme_passphrase_command_handler): Use new op_data_t type.
(_gpgme_passphrase_start): Remove function.
* decrypt.c (_gpgme_decrypt_start): Rewrite error handling.  Do
not call _gpgme_passphrase_start, but install command handler.
* encrypt.c (_gpgme_op_encrypt_start): Likewise.
* encrypt-sign.c (_gpgme_op_encrypt_sign_start): Likewise.
* sign.c (_gpgme_op_sign_start): Likewise.

* context.h (struct gpgme_context_s): Remove member initialized,
use_cms and help_data_1.  Add member protocol.  Make use_armor and
use_textmode bit flags.

Make keylist_mode, include_certs,
signers_len and signers_size unsigned.
* gpgme.c (gpgme_new): Initialize CTX->protocol.
(gpgme_set_protocol): Do not check CTX. Use CTX->protocol.
(gpgme_get_protocol): Likewise.
(gpgme_release): Do not release CTX->help_data_1.
* op-support.c (_gpgme_op_reset): Use CTX->protocol.

* wait-private.c (_gpgme_wait_private_event_cb): Remove variable CTX.

* data.c: Do not include <assert.h>, but "gpgme.h".
(_gpgme_data_inbound_handler): Expand _gpgme_data_append, because
it will go. Do not assert DH.
(_gpgme_data_outbound_handler): Do not assert DH.

* export.c: Do not include <stdlib.h>, "debug.h" and "util.h", but
"gpgme.h".
(export_status_handler): Change type of first argument to void *.
(_gpgme_op_export_start): Rename to ...
(export_start): ... this. Rework error handling.
(gpgme_op_export_start): Rewritten to use export_start instead
_gpgme_op_export_start.
(gpgme_op_export): Likewise.

* gpgme.h (GpgmeError): Add GPGME_Busy,
GPGME_No_Request.
(GPGME_No_Recipients, GPGME_Invalid_Recipient,
GPGME_No_Passphrase): New macros.

* key.c (gpgme_key_get_string_attr): Fix validity attribute.

2003-04-24 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (struct _gpgme_op_genkey_result): New structure.
(GpgmeGenKeyResult): New type.
(gpgme_op_genkey): Drop last argument.
(gpgme_op_genkey_result): New function.
* genkey.c: Do not include "util.h", but "gpgme.h".
(struct genkey_result): Replace with ...
(op_data_t): ... this new type.
(release_genkey_result): Replace with ...
(release_op_data): ... this new function.
(gpgme_op_genkey_result): New function.
(genkey_status_handler): Rewritten using new op_data_t type.
(get_key_parameter): New function.
(_gpgme_op_genkey_start): Renamed to
(genkey_start): ... this and rewritten.
(gpgme_op_genkey_start): Use genkey_start instead

_gpgme_op_genkey_start.
(gpgme_op_genkey): Rewritten.  Remove FPR argument.

* context.h (struct gpgme_context_s): Remove member
verbosity.
* gpgme.c (gpgme_new): Do not set member verbosity.
* engine.h (_gpgme_engine_set_verbosity): Remove prototype.
* engine.c (_gpgme_engine_set_verbosity): Remove function.
* engine-backend.h (struct engine_ops): Remove set_verbosity.
* engine-gpgsm.c (_gpgme_engine_ops_gpgsm): Remove set_verbosity member.
* rungpg.c (_gpgme_engine_ops_gpg): Likewise.
(gpg_set_verbosity): Remove function.
* decrypt.c (_gpgme_decrypt_start): Don't call
_gpgme_engine_set_verbosity.
* delete.c (_gpgme_op_delete_start): Likewise.
* edit.c (_gpgme_op_edit_start): Likewise.
* encrypt.c (_gpgme_op_encrypt_start): Likewise.
* encrypt-sign.c (_gpgme_op_encrypt_sign_start): Likewise.
* export.c (_gpgme_op_export_start): Likewise.
* genkey.c (_gpgme_op_genkey_start): Likewise.
* import.c (_gpgme_op_import_start): Likewise.
* keylist.c (gpgme_op_keylist_start): Likewise.
(gpgme_op_keylist_ext_start): Likewise.
* sign.c (_gpgme_op_sign_start): Likewise.
* verify.c (_gpgme_op_verify_start):
Likewise.

* Makefile.am (libgpgme_la_SOURCES): Add key-cache.c.
* key.c (key_cache_initialized, key_cache_size,
key_cache_max_chain_length, ): Removed.
(struct key_cache_item_s, key_cache_lock, key_cache,
key_cache_unused_items, hash_key, _gpgme_key_cache_add,
_gpgme_key_cache_get, gpgme_get_key): Moved to ...
* key-cache.c: ... here.  New file.
* key.h (_gpgme_key_cache_init): Remove prototypes.
(_gpgme_key_cache_add,_gpgme_key_cache_get): Move to ...
* ops.h: ... here.
* version.c: Do not include "key.h".
(do_subsystem_inits): Do not call _gpgme_key_cache_init.

* mkstatus: Strip trailing comma.
* gpgme.h (GpgmeStatus): Pretty print.

* gpgme.h (GpgmeError): Rename GPGME_No_Passphrase to
GPGME_Bad_Passphrase.
* passphrase.c (_gpgme_passphrase_status_handler): Use
GPGME_Bad_Passphrase instead GPGME_No_Passphrase.

* gpgme.h (GpgmeError): Rename GPGME_No_Recipients to
GPGME_No_UserID and GPGME_Invalid_Recipient to
GPGME_Invalid_UserID.
* encrypt.c (_gpgme_encrypt_status_handler):
Use GPGME_No_UserID
instead GPGME_No_Recipients and GPGME_Invalid_UserID instead
GPGME_Invalid_Recipient.
(_gpgme_op_encrypt_start): Likewise.

* gpgme.h (GpgmeError): Remove GPGME_Busy and GPGME_No_Request.
* wait-user.c (_gpgme_wait_user_event_cb): Don't clear CTX->pending.
* wait-private.c (_gpgme_wait_private_event_cb): Likewise.
* wait-global.c (gpgme_wait): Likewise.
* verify.c (_gpgme_op_verify_start): Likewise.
(gpgme_get_sig_status): Don't check pending flag.
(gpgme_get_sig_string_attr): Likewise.
(gpgme_get_sig_ulong_attr): Likewise.
(gpgme_get_sig_key): Likewise.
* op-support.c (_gpgme_op_reset): Likewise.
* trustlist.c (gpgme_op_trustlist_start): Don't clear pending flag.
(gpgme_op_trustlist_next): Don't check or clear pending flag.
(gpgme_op_trustlist_end): Likewise.
* sign.c (_gpgme_op_sign_start): Likewise.
* context.h (struct gpgme_context_s): Remove member PENDING.
* decrypt.c (_gpgme_decrypt_start): Likewise.
* delete.c (_gpgme_op_delete_start):
Likewise.
* edit.c (_gpgme_op_edit_start): Likewise.
* encrypt.c (_gpgme_op_encrypt_start): Likewise.
* encrypt-sign.c (_gpgme_op_encrypt_sign_start): Likewise.
* export.c (_gpgme_op_export_start): Likewise.
* genkey.c (_gpgme_op_genkey_start): Likewise.
* import.c (_gpgme_op_import_start): Likewise.
* key.c (gpgme_get_key): Likewise.
* keylist.c (gpgme_op_keylist_start): Likewise.
(gpgme_op_keylist_ext_start): Likewise.
(gpgme_op_keylist_next): Likewise.
(gpgme_op_keylist_end): Likewise.
* data-compat.c (gpgme_error_to_errno): Don't convert EBUSY.

2003-02-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (GpgmePassphraseCb): Change type to return GpgmeError,
and add argument for returning the result string.
(gpgme_cancel): Remove prototype.
* gpgme.c (gpgme_cancel): Remove function.
* context.h (struct gpgme_context_s): Remove member cancel.
* passphrase.c (_gpgme_passphrase_command_handler): Call the

passphrase callback in the new way.

2003-01-30
Marcus Brinkmann <marcus@g10code.de>

* edit.c (_gpgme_edit_status_handler): Call the progress status
handler.

2003-02-05 Marcus Brinkmann <marcus@g10code.de>

* wait-user.c (_gpgme_wait_user_remove_io_cb): Move check for no
I/O handlers left to ...
(_gpgme_user_io_cb_handler): ... here.

2003-02-04 Marcus Brinkmann <marcus@g10code.de>

* trustlist.c (trustlist_colon_handler): Release ITEM if name
could not be allocated.
(gpgme_trust_item_release): Only release name if it is allocated.
Reported by Marc Mutz <Marc.Mutz@uni-bielefeld.de>.

2003-02-04 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (read_status): If he status handler returns an error,
return it.
(status_handler): If read_status fails, just return the error.

2003-02-01 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (start): Handle all errors, not only most of
them.
(xtoi_1, xtoi_2): Remove macro.
(status_handler): Replace use of xtoi_2 with _gpgme_hextobyte.

2003-02-01 Marcus
Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (map_assuan_error): Replace
ASSUAN_Bad_Certificate_Path with ASSUAN_Bad_Certificate_Chain.
(gpgsm_new): Use assuan_pipe_connect instead assuan_pipe_connect2.

* util.h (DIMof): Remove macro.

* ops.h (_gpgme_op_event_cb, _gpgme_op_event_cb_user,
_gpgme_data_unread): Prototypes removed.

2003-01-30 Marcus Brinkmann <marcus@g10code.de>

* types.h: File removed.
* Makefile.am (libgpgme_la_SOURCES): Remove types.h.
* io.h (struct spawn_fd_item_s): Do not include "types.h".
* key.h: Likewise.
* context.h: Likewise.
* cengine-gpgsm.h: Likewise.
* engine.h: Include "gpgme.h" instead "types.h". Add prototypes
for EngineStatusHandler, EngineColonLineHandler and
EngineCommandHandler.
(_gpgme_engine_set_status_handler): Change parameter type from
GpgmeStatusHandler to EngineStatusHandler.
(_gpgme_engine_set_command_handler): Change parameter type from
GpgmeCommandHandler to EngineCommandHandler.
(_gpgme_engine_set_colon_line_handler):
Change parameter type from
GpgmeColonLineHandler to EngineColonLineHandler.
* engine-backend.h: Include "engine.h" instead "types.h".
(struct engine_ops): Change Gpgme*Handler parameters in members
set_command_handler, set_colon_line_handler and set_status_handler
to Engine*Handler.
* engine.c (_gpgme_engine_set_status_handler): Change parameter
type from GpgmeStatusHandler to EngineStatusHandler.
(_gpgme_engine_set_command_handler): Change parameter type from
GpgmeCommandHandler to EngineCommandHandler.
(_gpgme_engine_set_colon_line_handler): Change parameter type from
GpgmeColonLineHandler to EngineColonLineHandler.
* rungpg.c (struct gpg_object_s): Change type of member status.fnc
from GpgmeStatusHandler to EngineStatusHandler. Change type of
member colon.fnc from GpgmeColonLineHandler to
EngineColonLineHandler. Change type of member cmd.fnc from
GpgmeCommandHandler to EngineCommandHandler.
* engine-gpgsm.c (struct gpgsm_object_s): Likewise.
* rungpg.c
(gpg_set_status_handler): Change parameter type from
GpgmeStatusHandler to EngineStatusHandler.
* engine-gpgsm.c (gpgsm_set_status_handler): Likewise.
(assuan_simple_command): Likewise.
* rungpg.c (gpg_set_colon_line_handler): Change parameter type
from GpgmeColonLineHandler to EngineColonLineHandler.
* engine-gpgsm.c (gpgsm_set_colon_line_handler): Likewise.
* rungpg.c (gpg_set_command_handler): Change parameter type from
GpgmeCommandHandler to EngineCommandHandler.

* engine-gpgsm.c (status_handler): Do not close status fd at end
of function.

* ops.h (_gpgme_op_data_lookup): Add prototype.
* op-support.c: Include <stdlib.h>.

(_gpgme_op_data_lookup): New function.
* decrypt.c (_gpgme_release_decrypt_result): Function removed.
(struct decrypt_result_s): Rename to ...
(struct decrypt_resul): ... this.
(DecryptResult): New type.
(_gpgme_decrypt_status_handler): Don't use
test_and_allocate_result, but use _gpgme_op_data_lookup to
retrieve result data object.
* sign.c
(_gpgme_release_sign_result): Function removed.
(release_sign_result): New function.
(struct sign_result_s): Rename to ...
(struct sign_result): ... this.
(SignResult): New type.
(_gpgme_sign_status_handler): Don't use
test_and_allocate_result, but use _gpgme_op_data_lookup to
retrieve result data object.
* encrypt.c (struct encrypt_result_s): Rename to ...
(struct encrypt_result): ... this.
(_gpgme_release_encrypt_result): Function removed.
(release_encrypt_result): New function.
(_gpgme_encrypt_status_handler): Don't use
test_and_allocate_result, but use _gpgme_op_data_lookup to
retrieve result data object.
* verify.c (struct verify_result_s): Rename to ...
(struct verify_result): ... this.  Remove member next.
(VerifyResult): New type.
(_gpgme_release_verify_result): Function removed.
(release_verify_result): New function.
(finish_sig): Change first argument to type VerifyResult.  Diddle
the type of the op_data structure.
(add_notation): Change first argument
to type VerifyResult.
(_gpgme_verify_status_handler): Don't use
test_and_allocate_result, but use _gpgme_op_data_lookup to
retrieve result data object.
* passphrase.c (struct passphrase_result_s): Rename to ...
(struct passphrase_result): ... this.  Remove member next.
(PassphraseResult): New type.
(_gpgme_release_passphrase_result): Function removed.
(release_passphrase_result): New function.
(_gpgme_passphrase_status_handler): Don't use
test_and_allocate_result, but use _gpgme_op_data_lookup to
retrieve result data object.
(_gpgme_passphrase_command_handler): Likewise.
* keylist.c (struct keylist_result_s): Rename to ...
(struct keylist_result): ... this.  Remove member next.
(KeylistResult): New type.

(_gpgme_release_keylist_result): Function removed.
(release_keylist_result): New function.
(keylist_status_handler): Don't use
test_and_allocate_result, but use _gpgme_op_data_lookup to
retrieve result data object.
* edit.c (struct edit_result_s): Rename to ...
(struct
edit_result): ... this.  Remove member next.
(EditResult): New type.
(_gpgme_release_edit_result): Function removed.
(release_edit_result): New function.
(edit_status_handler): Don't use
test_and_allocate_result, but use _gpgme_op_data_lookup to
retrieve result data object.
(command_handler): Likewise.
* types.h (DecryptResult, SignResult, EncryptResult,
PassphraseResult, ImportResult, DeleteResult, GenKeyResult,
KeylistResult, EditResult): Types removed.
* ops.h: Don't include "types.h", but "gpgme.h" and "context.h".
(test_and_allocate_result): Remove macro.
(_gpgme_release_decrypt_result): Remove prototype.
(_gpgme_decrypt_result): Remove prototype.
(_gpgme_release_sign_result): Remove prototype.
(_gpgme_release_encrypt_result): Remove prototype.
(_gpgme_release_passphrase_result): Remove prototype.
(_gpgme_release_import_result): Remove prototype.
(_gpgme_release_delete_result): Remove prototype.
(_gpgme_release_genkey_result): Remove prototype.
(_gpgme_release_keylist_result):
Remove prototype.
(_gpgme_release_edit_result): Remove prototype.
(_gpgme_release_verify_result): Remove prototype.
* gpgme.c (_gpgme_release_result): Rewritten.
* context.h (enum ctx_op_data_type): New enum.
(struct ctx_op_data): New structure.
(struct gpgme_context_s): Replace the member result with a member
op_data.
(fail_on_pending_request): Remove macro.
* op-support.c (_gpgme_op_reset): Expand macro
fail_on_pending_request.
* util.h: Don't include "types.h" or "debug.h", but include "gpgme.h".

2003-01-19  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (_gpgme_engine_ops_gpg): Remove gpg_start.
(gpg_start): Rename to ...
(start): ... this function.  Change arguments to GpgObject.
(gpg_decrypt): Call start.

(gpg_edit): Likewise.
(gpg_encrypt): Likewise.
(gpg_encrypt_sign): Likewise.
(gpg_export): Likewise.
(gpg_import): Likewise.
(gpg_keylist): Likewise.
(gpg_keylist_ext): Likewise.
(gpg_trustlist): Likewise.
(gpg_verify): Likewise.

*
engine-gpgsm.c (_gpgme_engine_ops_encrypt): Remove gpgsm_start.
(gpgsm_start): Rename to ...
(struct gpgsm_object_s): Remove member command.
(gpgsm_release): Don't free command.
(start): ... this function.  Change arguments to GpgsmObject and
const char *.
(gpgsm_decrypt): Call start.
(gpgsm_delete): Likewise.
(gpgsm_encrypt): Likewise.
(gpgsm_export): Likewise.
(gpgsm_genkey): Likewise.
(gpgsm_import): Likewise.
(gpgsm_keylist): Likewise.
(gpgsm_keylist_ext): Likewise.
(gpgsm_verify): Likewise.

* decrypt.c (_gpgme_decrypt_start): Don't call
_gpgme_engine_start.
* delete.c (_gpgme_op_delete_start): Likewise.
* edit.c (_gpgme_op_edit_start): Likewise.
* encrypt.c (_gpgme_op_encrypt_start):
* encrypt-sign.c (_gpgme_op_encrypt_sign_start):
* export.c (_gpgme_op_export_start): Likewise.
* genkey.c (_gpgme_op_genkey_start): Likewise.
* import.c (_gpgme_op_import_start): Likewise.
* keylist.c (gpgme_op_keylist_ext_start): Likewise.
(gpgme_op_keylist_start):
Likewise.
* sign.c (_gpgme_op_sign_start): Likewise.
* trustlist.c (gpgme_op_trustlist_start): Likewise.
* verify.c (_gpgme_op_verify_start): Likewise.

* engine-backend.h (struct engine_ops): Remove member start.

* engine.h (_gpgme_engine_start): Remove prototype.
* engine.c (_gpgme_engine_start): Remove function.

2003-01-19 Miguel Coca <mcoca@gnu.org>

* w32-io.c (_gpgme_io_select): Add missing argument in calls to
DEBUG_BEGIN.
* w32-util.c: Include "sema.h".
(find_program_in_registry): Change DEBUG1 to DEBUG2, fixes compilation
error.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

* types.h: Remove byte and ulong types.
* util.h (_gpgme_hextobyte): Change prototype to unsigned char
instead byte.
* conversion.c (_gpgme_hextobyte): Change argument to unsigned
char instead byte.
(_gpgme_decode_c_string): Likewise, and beautify. Also support a
few more escaped characters. Be more strict about buffer size.
(_gpgme_data_append_percentstring_for_xml): Change
type of SRC,
BUF and DST to unsigned char instead byte.
* progress.c (_gpgme_progress_status_handler): Use unsigned char
instead byte.
* debug.c (trim_spaces): Likewise.

* util.h (mk_error): Remove macro.
* conversion.c, data.c, data-compat.c, decrypt.c, delete.c,
edit.c, encrypt.c, encrypt-sign.c, engine.c, engine-gpgsm.c,
export.c, genkey.c, gpgme.c, import.c, key.c, keylist.c,
passphrase.c, progress.c, recipient.c, rungpg.c, sign.c,
signers.c, trustlist.c, verify.c, wait.c, wait-global.c,
wait-private (literally everywhere): Expand the mk_error macro.

* context.h (wait_on_request_or_fail): Remove macro.

* context.h (gpgme_context_s): Remove member ERROR.
* types.h (GpgmeStatusHandler): Change return type to GpgmeError.
(GpgmeCommandHandler): Change return type to GpgmeError and add
new argument RESULT.
* gpgme.h (GpgmeIOCb): Change return type to GpgmeError.
(GpgmeEventIO): New event GPGME_EVENT_START.
(GpgmeIdleFunc): Remove type.
(gpgme_register_idle): Remove
prototype.
* data.c: Include <assert.h>.
(_gpgme_data_inbound_handler): Change return type to GpgmeError.
Return any error instead ignoring it, don't close file descriptor
on error.
(_gpgme_data_outbound_handler): Likewise.

* decrypt.c: Do not include <stdio.h>, <string.h> and <assert.h>.
(_gpgme_decrypt_status_handler): Change return type to GpgmeError.
Return error instead setting ctx->error.  Return success at end of
function.
(gpgme_op_decrypt): Don't work around the old kludge anymore.
* decrypt-verify.c (decrypt_verify_status_handler): Change return
type to GpgmeError.  Return possible errors.
* delete.c: Do not include <stdio.h>, <string.h>, <time.h> and
<assert.h>.
(delete_status_handler): Change return type to GpgmeError.  Return
error instead setting ctx->error.  Return success at end of
function.
* edit.c: Do not include <stdio.h> and <string.h>.
(_gpgme_edit_status_handler): Change type to GpgmeError,
make static and rename to ...
(edit_status_handler):
... this.  Return error directly.
(command_handler): Change return type to GpgmeError, add result
argument.  Return error directly.
* encrypt.c (status_handler_finish): Remove function.
(_gpgme_encrypt_status_handler): Change return type to GpgmeError.
Return error directly.
(_gpgme_encrypt_sym_status_handler): Likewise.
* encrypt-sign.c (encrypt_sign_status_handler): Likewise.
* engine-gpgsm.c (close_notify_handler): Do not signal done event
anymore.
(status_handler): Change return type to GpgmeError.  Diddle things
around a bit to return errors directly.
(start): Send start event.
* export.c: Do not include <stdio.h>, <string.h> and <assert.h>.
(export_status_handler): Change return type to GpgmeError.  Don't
check ctx->error.
* genkey.c: Do not include <stdio.h> and <assert.h>.
(genkey_status_handler): Change return type to GpgmeError.  Don't
check ctx->error.  Return errors directly.
* gpgme.c (_gpgme_release_result): Do not initialize ctx->error.
(_gpgme_op_event_cb):
Function removed.
(_gpgme_op_event_cb_user): Likewise.
* import.c: Do not include <stdio.h>, <string.h> and <assert.h>.
(import_status_handler): Change return type to GpgmeError.  Don't
check ctx->error.
* keylist.c (keylist_colon_handler, keylist_status_handler, finish_key):
Change return type to GpgmeError, return error directly.
* Makefile (libgpgme_la_SOURCES): Add wait-global.c,
wait-private.c and wait-user.c
* ops.h (test_and_allocate_result): Return error instead setting
ctx->error.

(_gpgme_data_inbound_handler, _gpgme_data_outbound_handler,
_gpgme_verify_status_handler, _gpgme_decrypt_status_handler,
_gpgme_sign_status_handler, _gpgme_encrypt_staus_handler,
_gpgme_passphrase_status_handler, _gpgme_progress_status_handler):
Change return type to GpgmeError.
(_gpgme_passphease_command_handler): Change return type to
GpgmeError and add new argument RESULT.
* op-support.c: Use new callback functions, and change private
data to ctx everywhere.
* passphrase.c
(_gpgme_passphrase_status_handler): Change return
type to GpgmeError, return error directly.
(_gpgme_passphrase_command_handler): Change return type to
GpgmeError, add result argument. Return results accordingly.
* progress.c (_gpgme_progress_status_handler): Change return type
to GpgmeError, return errors directly.
* rungpg.c (status_handler): Change return type to GpgmeError.
Return error directly.
(close_notify_handler): Don't send done event.
(colon_line_handler): Change return type to GpgmeError, return
errors directly.
* rungpg.c (start): Send start event.
* sign.c (_gpgme_sign_status_handler): Change return type to
GpgmeError, return errors directly.
* trustlist.c (trustlist_status_handler): Change return type to
GpgmeError. Return 0.
(trustlist_colon_handler): Change return type GpgmeError. Return
errors directly.
* verify.c (add_notation): Change return type to GpgmeError,
return errors directly.
(_gpgme_verify_status_handler): Likewise.
* wait.h
(struct fd_table): Remove lock member.
(struct wait_item_s): Moved here from wait.c.
(struct tag): New structure.
(_gpgme_wait_event_cb): Remove prototype.
(_gpgme_wait_private_event_cb, _gpgme_wait_global_event_cb,
_gpgme_wait_user_add_io_cb, _gpgme_wait_user_remove_io_cb,
_gpgme_wait_user_event_io_cb): New prototypes.
* wait.c: Don't include <stdio.h>.
(ftd_global, ctx_done_list, ctx_done_list_size,
ctx_done_list_length, ctx_done_list_lock, idle_function): Remove
global variable.
(gpgme_register_idle, do_select, _gpgme_wait_event_cb): Remove
function.
(gpgme_wait): Move to file wait-global.c.
(_gpgme_add_io_cb): Take ctx as private argument, initialize ctx
member in wait item and tag.

(_gpgme_remove_io_cb): Take ctx from tag.  Don't use FDT lock.
(_gpgme_wait_one, _gpgme_wait_on_condition): Move to
wait-private.c.
(gpgme_fd_table_init): Don't initialize FDT->lock.
(gpgme_fd_table_deinit): Don't destroy FDT->lock.
(_gpgme_fd_table_put): Make static and rename to
...
(fd_table_put): ... this function.  Don't use FDT->lock.
(struct wait_item_s): Move to wait.h.
* wait-global.c: New file.
* wait-private.c: New file.
* wait-user.c: New file.

* key.c (gpgme_key_sig_get_string_attr): Use validity_to_string
instead otrust_to_string to calculate validity.

2003-01-30  Marcus Brinkmann  <marcus@g10code.de>

* types.h (EngineObject): Move typedef to ...
* engine.h: ... here.
* types.h (GpgObject): Move typedef to ...
* rungpg.c: ... here.
* types.h (GpgsmObject): Move typedef to ...
* engine-gpgsm.c: ... here.

* util.h (return_if_fail, return_null_if_fail,
return_val_if_fail): Remove macro.
* gpgme.c (gpgme_cancel): Don't use return_if_fail.
* key.c (gpgme_key_ref): Likewise.
* signers.c (gpgme_signers_enum): Likewise.
(gpgme_signers_clear): Likewise.

* engine-backend.h (struct engine_ops): Rename get_path to
get_file_name.
* gpgme.h (struct _gpgme_engine_info): Rename member path to
file_name.
* version.c: Do not include <stdio.h>,
<stdlib.h>, context.h and
util.h.  Other clean ups.
(parse_version_number): Protect more seriously against
overflow.
(gpgme_get_engine_info): Move to ...
* engine.c (gpgme_get_engine_info): ... here.
(_gpgme_engine_get_info): Function removed.
(_gpgme_engine_get_path): Make static and rename to ...
(engine_get_file_name): .. this.
(_gpgme_engine_get_version): Make static and rename to ...
(engine_get_version): ... this.

(_gpgme_engine_get_req_version): Make static and rename to ...
(engine_get_req_version): ... this.
* engine.h (_gpgme_engine_get_path, _gpgme_engine_get_version,
_gpgme_engine_req_version, _gpgme_engine_get_info.): Remove
prototypes.

* gpgme.h (enum GpgmeProtocol): Remove GPGME_PROTOCOL_AUTO.
* gpgme.c (gpgme_set_protocol): Don't handle GPGME_PROTOCOL_AUTO.
(gpgme_get_protocol_name): New function.

* engine-backend.h (struct engine_ops): New member
get_req_version, remove member check_version.
* engine.h (_gpgme_Engine_get_version): New prototype.
*
rungpg.c (gpg_get_req_version): New function.
(gpg_check_version): Function removed.
(_gpgme_engine_ops_gpg): Add gpg_get_req_version, remove
gpg_check_version.
* engine-gpgsm.c (gpgsm_get_req_version): New function.
(gpgsm_check_version): Function removed.
(_gpgme_engine_ops_gpgsm): Add gpgsm_get_req_version, remove
gpgsm_check_version.
* engine.c: Include ops.h.
(_gpgme_engine_get_req_version): New function.
(gpgme_engine_check_version): Rewritten.
* version.c (gpgme_get_engine_info): Rewritten.
* gpgme.h (gpgme_engine_info): New structure.
(GpgmeEngineInfo): New type.

2003-01-06 Werner Koch <wk@gnupg.org>

* keylist.c (set_mainkey_capability): Handle 'd' and 'D' used
since gpg 1.3 to denote disabled keys.

2003-01-06 Marcus Brinkmann <marcus@g10code.de>

* data-mem.c: Include <string.h>.
* engine.c: Likewise.

2003-01-06 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (libgpgme_la_DEPENDENCIES): Correct bug in last change.

2002-12-24 Marcus
Brinkmann <marcus@g10code.de>

* gpgme.h (gpgme_op_verify, gpgme_op_decrypt_verify): Drop R_STAT
argument.

* decrypt-verify.c (gpgme_op_decrypt_verify): Drop R_STAT
argument.
* verify.c (gpgme_op_verify): Drop R_STAT argument.
(_gpgme_intersect_stati): Function removed.
* ops.h (_gpgme_intersect_stati): Remove prototype.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

* libgpgme.vers: New file.
* Makefile.am (EXTRA_DIST): Add libgpgme.vers.
(libgpgme_version_script_cmd): New variable.
(libgpgme_la_LDFLAGS): Add libgpgme_version_script_cmd here.
(libgpgme_la_DEPENDENCIES): New variable.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

* key.c (gpgme_key_get_string_attr): Don't accept GPGME_ATTR_IS_SECRET.
(otrust_to_string): New function.
(gpgme_key_get_as_xml): Use it.
(validity_to_string): New function.
(gpgme_key_get_string_attr): Beautify using above functions.
(gpgme_key_get_ulong_attr): Likewise.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

* data-mem.c
(mem_release): Fix gcc warning.
* data-user.c (user_release): Likewise.

2002-12-06 Marcus Brinkmann <marcus@g10code.de>

* data.h (gpgme_data_release_cb): Change return type to void.
(gpgme_data_read_cb): Change return type to ssize_t.
* data.c (gpgme_data_read): Likewise.
* data-stream.c (stream_read): Likewise.
* data-fd.c (fd_read): Likewise.
* data-mem.c (mem_read): Likewise.
(mem_release): Change return type to void.
* data-user.c (user_read): Change return type to ssize_t.
(user_release): Change return type to void.
* data-compat.c (old_user_read): Change return type to ssize_t.
* gpgme.h (GpgmeDataReadCb): Likewise.
(gpgme_data_read): Likewise.
(GpgmeDataSeekCb): Change return type to off_t.

2002-12-04 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h: Add prototype for gpgme_get_key.

* key.c (gpgme_get_key): New function.
* verify.c (gpgme_get_sig_key): Rewrite using gpgme_get_key.

* gpgme.h: Add prototypes for new interfaces
gpgme_key_sig_get_string_attr
and gpgme_key_get_ulong_attr.
(enum GpgmeAttr): New attribute GPGME_ATTR_SIG_CLASS.
* gpgme.c (gpgme_set_keylist_mode): Allow GPGME_KEYLIST_MODE_SIGS.
* key.h (struct certsig_s): New members ALGO, NAME_PART,
EMAIL_PART, COMMENT_PART, NAME, SIG_STAT and SIG_CLASS.

* conversion.c (_gpgme_decode_c_string): Add new parameter LEN.
Use that to determine if allocation is desired or not.
* util.h: Adjust prototype of _gpgme_decode_c_string.
* keylist.c (keylist_colon_handler): Adjust caller of
_gpgme_decode_c_string.

* key.h (struct gpgme_key_s): New member last_uid.
* key.c (_gpgme_key_append_name): Rewritten using
_gpgme_decode_c_string and the last_uid pointer.
(my_isdigit): Macro removed.
(ALLOC_CHUNK): Likewise.
* keylist.c (set_userid_flags): Use last_uid member of KEY.

* context.h (struct user_id_s): New member last_certsig.
* key.h: Add prototype for _gpgme_key_add_certsig.
* key.c (_gpgme_key_add_certsig): New function.
(set_user_id_part): Move function
before _gpgme_key_add_certsig.
(parse_user_id): Change first argument to SRC, add new arguments
NAME, EMAIL and COMMENT.  Change code to use these arguments
instead going through UID.  Move function before
_gpgme_add_certsig.
(parse_x509_user_id): Likewise.
(_gpgme_key_append_name): Adjust arguments to parse_x509_user_id
and parse_user_id invocation.
(one_certsig_as_xml): New function.
(one_uid_as_xml): Print signatures.
* context.h (struct gpgme_context_s): New member TMP_UID.
* keylist.c (keylist_colon_handler): Rewritten, implement "sig"
record entries.

* key.c (get_certsig): New function.
(gpgme_key_sig_get_string_attr): Likewise.
(gpgme_key_sig_get_ulong_attr): Likewise.

* keylist.c: Include <ctype.h>.
(my_isdigit): Macro removed.

(set_mainkey_trust_info): Use isdigit, not my_isdigit.
(set_userid_flags): Likewise.
(set_subkey_trust_info): Likewise.
(set_ownertrust): Likewise.
(finish_key): Move function up a bit and remove prototype.

* rungpg.c (gpg_keylist_ext):
Correct precedence of signature
listing mode.
(gpg_keylist_ext): Implement signature listing mode.

2002-11-25 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (_gpgme_gpg_spawn): Do not set parent fds to -1.
* posix-io.c (_gpgme_io_spawn): Call _gpgme_io_close instead close
for parent fds.
* w32-io.c (_gpgme_io_spawn): Call _gpgme_io_close instead
CloseHandle for parent fds.

2002-11-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h [_MSC_VER]: Define ssize_t as long.

2002-11-22 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_new): Save the result of a first
setlocale before doing another setlocale.

2002-11-21 Marcus Brinkmann <marcus@g10code.de>

* decrypt.c: Some beautyfication.

* verify.c (_gpgme_verify_status_handler): Treat
GPGME_STATUS_UNEXPECTED like GPGME_STATUS_NODATA.
Reported by Miguel Coca <e970095@zipi.fi.upm.es>.

2002-11-19 Marcus Brinkmann <marcus@g10code.de>

* genkey.c: Only include <config.h> if [HAVE_CONFIG_H].
(struct
genkey_result_s): Add new member FPR.
(_gpgme_release_genkey_result): Free RESULT->fpr if set.
(genkey_status_handler): Extract the fingerprint from the status
line.
(gpgme_op_genkey): Add new argument FPR and return the fingerprint
in it.
* gpgme.h: Adjust prototype of gpgme_op_genkey.

2002-11-19  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (gpg_keylist): Add --with-fingerprint to gpg invocation
twice, to get fingerprints on subkeys.  Suggested by Timo Schulz
<twoaday@freakmail.de>.
(gpg_keylist_ext): Likewise.

2002-11-05  Marcus Brinkmann  <marcus@g10code.de>

* import.c (append_xml_impinfo): Use
_gpgme_data_append_string_for_xml rather than
_gpgme_data_append_string for the field content.
Submitted by Miguel Coca <e970095@zipi.fi.upm.es>.

2002-10-10  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.h, engine-gpgsm.h: File removed.
* engine-backend.h: New file.
* Makefile.am (gpgsm_components): New variable, set depending on
automake conditional HAVE_GPGSM.
(libgpgme_la_SOURCES):
Add engine-backend.h, remove rungpg.h and
engine-gpgsm.h.  Replace engine-gpgsm.c with ${gpgsm_components}.
(status-table.h): Depend on gpgme.h, not rungpg.h.
* conversion.c: Include <stdlib.h>.
* engine-gpgsm.c: Do not set ENABLE_GPGSM here.  Include
"engine-backend.h" instead "engine-gpgsm.h".  Reorder some
functions and remove all function prototypes.
(_gpgme_gpgsm_get_version): Make static and rename to ...
(gpgsm_get_version): ... this.
(_gpgme_gpgsm_check_version): Make static and rename to ...
(gpgsm_check_version): ... this.
(_gpgme_gpgsm_new): Make static.  Change argument type from
GpgsmObject * to void **.  Call gpgsm_release instead
_gpgme_gpgsm_release.
(_gpgme_gpgsm_op_decrypt): Make static and rename to ...
(gpgsm_check_decrypt): ... this.
(_gpgme_gpgsm_op_delete): Make static and rename to ...
(gpgsm_check_delete): ... this.
(_gpgme_gpgsm_set_recipients): Make static and rename to ...
(gpgsm_check_set_recipients): ... this.
(_gpgme_gpgsm_op_encrypt):
Make static and rename to ...
(gpgsm_encrypt): ... this.
(_gpgme_gpgsm_op_export): Make static and rename to ...
(gpgsm_export): ... this.
(_gpgme_gpgsm_op_genkey): Make static and rename to ...
(gpgsm_genkey): ... this.

(_gpgme_gpgsm_op_import): Make static and rename to ...
(gpgsm_import): ... this.
(_gpgme_gpgsm_op_keylist): Make static and rename to ...
(gpgsm_keylist): ... this.
(_gpgme_gpgsm_op_keylist_ext): Make static and rename to ...
(gpgsm_keylist_ext): ... this.
(_gpgme_gpgsm_op_sign): Make static and rename to ...
(gpgsm_sign): ... this.
(_gpgme_gpgsm_op_trustlist): Make static and rename to ...
(gpgsm_trustlist): ... this.
(_gpgme_gpgsm_op_verify): Make static and rename to ...
(gpgsm_verify): ... this.
(gpgsm_status_handler): Rename to ...
(status_handler): ... this.
(_gpgme_gpgsm_set_status_handler): Make static and rename to ...
(gpgsm_set_status_handler): ... this.
(_gpgme_gpgsm_set_colon_line_handler): Make static
and rename to ...
(gpgsm_set_colon_line_handler): ... this.
(_gpgme_gpgsm_add_io_cb): Rename to ...
(add_io_cb): ... this.
(_gpgme_gpgsm_start): Make static and rename to ...
(gpgsm_start): ... this.
(_gpgme_gpgsm_set_io_cb): Make static and rename to ...
(gpgsm_set_io_cb): ... this.
(_gpgme_gpgsm_io_event): Make static and rename to ...
(gpgsm_io_event): ... this.
(struct _gpgme_engine_ops_gpgsm): New variable.
[!ENABLE_GPGSM]: Removed.
* engine.c: Do not include <time.h>, <sys/types.h>, <string.h>,
<assert.h>, "io.h", "rungpg.h" and "engine-gpgsm.h". Include
<stdlib.h> and "engine-backend.h".
(struct engine_object_s): Rewritten.
(engine_ops): New variable.
* engine.c (_gpgme_engine_get_path, _gpgme_engine_get_version,
_gpgme_engine_check_version, _gpgme_engine_new,
_gpgme_engine_release, _gpgme_engine_set_verbosity,
_gpgme_engine_set_status_handler,
_gpgme_engine_set_command_handler,
_gpgme_engine_set_colon_line_handler, _gpgme_engine_op_decrypt,
_gpgme_engine_op_delete,
_gpgme_engine_op_edit,
_gpgme_engine_op_encrypt, _gpgme_engine_op_encrypt_sign,
_gpgme_engine_op_export, _gpgme_engine_op_genkey,
_gpgme_engine_op_import, _gpgme_engine_op_keylist,
_gpgme_engine_op_keylist_ext, _gpgme_engine_op_sign,
_gpgme_engine_op_trustlist, _gpgme_engine_op_verify,
_gpgme_engine_start, _gpgme_engine_set_io_cbs,

_gpgme_engine_io_event): Reimplement.
* engine.h: Fix a few comments and a variable name in a prototype.
* ops.h: Do not include "rungpg.h".
* passphrase.c: Include config.h only if [HAVE_CONFIG_H]. Do not
include "rungpg.h".
* recipient.c: Likewise.
* signers.c: Likewise.
* version.c: Likewise.
* rungpg.c: Likewise. Include "engine-backend.h". Reorder
functions and remove prototypes.
(_gpgme_gpg_get_version): Make static and rename to ...
(gpg_get_version): ... this.
(_gpgme_gpg_check_version): Make static and rename to ...
(gpg_check_version): ... this.
(_gpgme_gpg_new): Make static. Change argument type from
GpgObject
* to void **. Call gpg_release instead
_gpgme_gpg_release.
(_gpgme_gpg_op_decrypt): Make static and rename to ...
(gpg_check_decrypt): ... this.
(_gpgme_gpg_op_delete): Make static and rename to ...
(gpg_check_delete): ... this.
(_gpgme_gpg_set_recipients): Make static and rename to ...
(gpg_check_set_recipients): ... this.
(_gpgme_gpg_op_encrypt): Make static and rename to ...
(gpg_encrypt): ... this.
(_gpgme_gpg_op_export): Make static and rename to ...
(gpg_export): ... this.
(_gpgme_gpg_op_genkey): Make static and rename to ...
(gpg_genkey): ... this.
(_gpgme_gpg_op_import): Make static and rename to ...
(gpg_import): ... this.
(_gpgme_gpg_op_keylist): Make static and rename to ...
(gpg_keylist): ... this.
(_gpgme_gpg_op_keylist_ext): Make static and rename to ...
(gpg_keylist_ext): ... this.
(_gpgme_gpg_op_sign): Make static and rename to ...
(gpg_sign): ... this.
(_gpgme_gpg_op_trustlist): Make static and rename to ...
(gpg_trustlist): ... this.
(_gpgme_gpg_op_verify):
Make static and rename to ...
(gpg_verify): ... this.
(gpg_status_handler): Rename to ...
(status_handler): ... this.
(_gpgme_gpg_set_status_handler): Make static and rename to ...
(gpg_set_status_handler): ... this.
(_gpgme_gpg_set_colon_line_handler): Make static and rename to ...

(gpg_set_colon_line_handler): ... this.
(gpgme_gpg_add_io_cb): Rename to ...
(add_io_cb): ... this.
(_gpgme_gpg_start): Make static and rename to ...
(gpg_start): ... this.
(_gpgme_gpg_set_io_cb): Make static and rename to ...
(gpg_set_io_cb): ... this.
(_gpgme_gpg_io_event): Make static and rename to ...
(gpg_io_event): ... this.
(struct _gpgme_engine_ops_gpg): New variable.

2002-10-10 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_verify) [!ENABLE_GPGSM]: Add
missing argument.

2002-10-09 Marcus Brinkmann <marcus@g10code.de>

* data.h, data-user.c, data-stream.c, data-mem.c, data-fd.c,
data-compat.c: New file. Really check them in this time,
completes
2002-10-08 change.

* rungpg.h (GpgStatusHandler): Rename type to GpgmeStatusHandler
and move to ...
* types.h (GpgmeStatusHandler): ... here.
* rungpg.h (GpgColonLineHandler): Rename type to GpgmeColonLineHandler.
and move to ...
* types.h (GpgmeColonLineHandler): ... here.
* rungpg.h (GpgCommandHandler): Rename type to GpgmeCommandHandler.
and move to ...
* types.h (GpgmeCommandHandler): ... here.
* engine.h: Don't include "rungpg.h".
(_gpgme_engine_set_status_handler): Change type of
argument from GpgStatusHandler to GpgmeStatusHandler.
(_gpgme_engine_set_colon_line_handler): Change type of
argument from GpgColonLineHandler to GpgmeColonLineHandler.
(_gpgme_engine_set_command_handler): Change type of
argument from GpgCommandHandler to GpgmeCommandHandler.
* engine-gpgsm.h: Don't include "rungpg.h".
(_gpgme_gpgsm_set_status_handler): Change type of
argument from GpgStatusHandler to GpgmeStatusHandler.
(_gpgme_gpgsm_set_colon_line_handler): Change type
of
argument from GpgColonLineHandler to GpgmeColonLineHandler.
* engine-gpgsm.c: Do not include "rungpg.h".
(struct gpgsm_object_s): Change type of
status.fnc to GpgmeStatusHandler. Change type of colon.fnc to

GpgmeColonLineHandler.
(gpgsm_assuan_simple_command): Change type of argument from
GpgStatusHandler to GpgmeStatusHandler.
(_gpgme_gpgsm_set_status_handler): Likewise.
(_gpgme_gpgsm_set_colon_line_handler): Change type of argument from
GpgColonLineHandler to GpgmeColonLineHandler.
* rungpg.h (_gpgme_gpg_set_status_handler): Change type of
argument from GpgStatusHandler to GpgmeStatusHandler.
(_gpgme_gpg_set_colon_line_handler): Change type of
argument from GpgColonLineHandler to GpgmeColonLineHandler.
(_gpgme_gpg_set_command_handler): Change type of
argument from GpgCommandHandler to GpgmeCommandHandler.
* rungpg.c (struct gpg_object_s): Change type of status.fnc to
GpgmeStatusHandler. Change type of colon.fnc to
GpgmeColonLineHandler. Change type of cmd.fnc
to
GpgmeCommandLineHandler.
(_gpgme_gpg_set_status_handler): Change type of argument FNC to
GpgmeStatusHandler.
(_gpgme_gpg_set_colon_line_handler): Change type of argument FNC
to GpgmeColonLineHandler.
(_gpgme_gpg_set_command_handler): Change type of argument FNC to
GpgmeCommandHandler.
* engine.c (_gpgme_engine_set_status_handler): Change type of
argument FNC to GpgmeStatusHandler.
(_gpgme_engine_set_colon_line_handler): Change type of argument FNC
to GpgmeColonLineHandler.
(_gpgme_engine_set_command_handler): Change type of argument FNC to
GpgmeCommandHandler.

* rungpg.h (_gpgme_gpg_enable_pipemode): Remove prototype.
* rungpg.c (struct gpg_object_s): Remove PM.
(pipemode_cb): Prototype removed.
(add_pm_data): Function removed.
(_gpgme_gpg_enable_pipemode): Likewise.
(pipemode_copy): Likewise.
(pipemode_cb): Likewise.
(add_arg): Don't check for pipemode.
(add_data): Likewise.
(_gpgme_gpg_set_status_handler): Likewise.
(_gpgme_gpg_set_colon_line_handler):
Likewise.
(_gpgme_gpg_set_command_handler): Likewise.
(_gpgme_gpg_spawn): Likewise.
(_gpgme_gpg_spawn): Don't set PM.active.
(_gpgme_gpg_op_verify): Remove pipemode case.
* verify.c (_gpgme_op_verify_start): Remove pipemode case.

* rungpg.h (_gpgme_gpg_add_arg, _gpgme_gpg_add_data,
_gpgme_gpg_add_pm_data, _gpgme_gpg_housecleaning,
_gpgme_gpg_set_simple_line_handler): Prototype removed.
(_gpgme_gpg_set_verbosity): New prototype.
* rungpg.c (_gpgme_gpg_add_data): Make static and rename to ...
(add_data): ... this.
(_gpgme_gpg_add_pm_data): Call add_data, not _gpgme_gpg_add_data.
(_gpgme_gpg_set_command_handler): Likewise.
(_gpgme_gpg_op_decrypt, _gpgme_gpg_op_edit, _gpgme_gpg_op_encrypt,
_gpgme_gpg_op_encrypt_sign, _gpgme_gpg_op_export,
_gpgme_gpg_op_genkey, _gpgme_gpg_op_import, _gpgme_gpg_op_sign,
_gpgme_gpg_op_verify): Likewise.
(_gpgme_gpg_add_pm_data): Rename to ...
(add_pm_data): ... this.
(_gpgme_gpg_op_verify): Call add_pm_data, not
_gpgme_gpg_add_pm_data.
(_gpgme_gpg_add_arg):
Make static and rename to ...
(add_arg): ... this.
(_gpgme_gpg_set_command_handler, _gpgme_gpg_new,
_gpgme_gpg_op_decrypt, _gpgme_gpg_op_delete,
_gpgme_append_gpg_args_from_signers, _gpgme_gpg_op_edit,
_gpgme_append_gpg_args_from_recipients, _gpgme_gpg_op_encrypt,
_gpgme_gpg_op_encrypt_sign, _gpgme_gpg_op_export,
_gpgme_gpg_op_genkey, _gpgme_gpg_op_import, _gpgme_gpg_op_keylist,
_gpgme_gpg_op_keylist_ext, _gpgme_gpg_op_trustlist,
_gpgme_gpg_op_sign, _gpgme_gpg_op_verify): Use add_arg, not
_gpgme_gpg_add_arg.
(_gpgme_gpg_set_verbosity): New function.
(struct gpg_object_s): Remove member simple from colon.
(_gpgme_gpg_set_colon_line_handler): Don't initialize simple.
(_gpgme_gpg_set_simple_line_handler): Removed function.
(read_colon_line): Don't check the GPG->colon.simple.
* engine.c (_gpgme_engine_set_verbosity): Call
_gpgme_gpg_set_verbosity instead _gpgme_gpg_add_arg.

2002-10-08 Marcus Brinkmann <marcus@g10code.de>

* util.h (_gpgme_malloc,
_gpgme_realloc, _gpgme_calloc,
_gpgme_strdup, _gpgme_free): Remove prototypes.
(xtrymalloc, xtrycalloc, xtryrealloc, xtrystrdup, xfree): Remove
macros.
* util.c: File removed.
* Makefile.am (libgpgme_la_SOURCES): Remove util.h.
* conversion.c (_gpgme_decode_c_string): Use malloc instead of
xtrymalloc, realloc instead of xtryrealloc, calloc instead of
xtrycalloc, free instead of xfree.

(_gpgme_data_append_percentstring_for_xml): Likewise.
* data.c (_gpgme_data_new, _gpgme_data_release): Likewise.
* data-compat.c (gpgme_data_new_from_filepart): Likewise.
* data-mem.c (mem_write, mem_release, gpgme_data_new_from_mem,
_gpgme_data_get_as_string): Likewise.
* debug.c (debug_init): Likewise.
* decrypt.c (_gpgme_release_decrypt_result): Likewise.
* delete.c (_gpgme_release_delete_result): Likewise.
* edit.c (_gpgme_release_edit_result, _gpgme_op_edit_start):
Likewise.
* encrypt.c (_gpgme_release_encrypt_result): Likewise.
* engine.c (_gpgme_engine_get_info, _gpgme_engine_new,
_gpgme_engine_release):
Likewise.
* engine-gpgsm.c (_gpgme_gpgsm_new, _gpgme_gpgsm_release,
_gpgme_gpgsm_op_decrypt, _gpgme_gpgsm_op_delete,
gpgsm_set_recipients, _gpgme_gpgsm_op_encrypt,
_gpgme_gpgsm_op_export, _gpgme_gpgsm_op_genkey,
_gpgme_gpgsm_op_import, _gpgme_gpgsm_op_keylist,
_gpgme_gpgsm_op_keylist_ext, _gpgme_gpgsm_op_sign,
_gpgme_gpgsm_op_verify, gpgsm_status_handler): Likewise.
* genkey.c (_gpgme_release_genkey_result): Likewise.
* gpgme.c (gpgme_new, gpgme_release): Likewise.
* import.c (_gpgme_release_import_result): Likewise.
* key.c (_gpgme_key_cache_init, _gpgme_key_cache_add, key_new,
add_subkey, gpgme_key_release, _gpgme_key_append_name): Likewise.
* keylist.c (_gpgme_release_keylist_result, keylist_colon_handler,
_gpgme_op_keylist_event_cb, gpgme_op_keylist_next): Likewise.
* ops.h (test_and_allocate_result): Likewise.
* passphrase.c (_gpgme_release_passphrase_result,
_gpgme_passphrase_status_handler,
_gpgme_passphrase_command_handler): Likewise.
*
progress.c (_gpgme_progress_status_handler): Likewise.
* recipient.c (gpgme_recipients_new, gpgme_recipients_release,
gpgme_recipients_add_name_with_validity): Likewise.
* rungpg.c (_gpgme_gpg_new, _gpgme_gpg_release,
_gpgme_gpg_add_arg, _gpgme_gpg_add_data,
_gpgme_gpg_set_colon_line_handler, free_argv, free_fd_data_map,
build_argv, _gpgme_gpg_spawn, read_status, read_colon_line):
Likewise.
* sign.c (_gpgme_release_sign_result): Likewise.
* signers.c (_gpgme_signers_add): Likewise.
* trustlist.c (trust_item_new, trustlist_colon_handler,
_gpgme_op_trustlist_event_cb, gpgme_op_trustlist_next,
gpgme_trustitem_release): Likewise.
* verify.c (_gpgme_release_verify_result, finish_sig): Likewise.
* version.c (gpgme_get_engine_info, _gpgme_get_program_version):

Likewise.
* w32-io.c (create_reader, create_writer, destroy_reader,
destroy_writer, build_commandline, _gpgme_io_spawn): Likewise.
* w32-sema.c (critsect_init, _gpgme_sema_cs_destroy): Likewise.
* w32-util.c (read_w32_registry_string):
Likewise.
* wait.c (_gpgme_fd_table_deinit, _gpgme_fd_table_put,
_gpgme_wait_event_cb, _gpgme_add_io_cb, _gpgme_remove_io_cb)
* data-compat.c: Include <stdlib.h>.

2002-10-08 Marcus Brinkmann <marcus@g10code.de>

New data object component:

* gpgme.h (GpgmeDataReadCb, GpgmeDataWriteCb, GpgmeDataSeekCb,
GpgmeDataReleaseCb): New types.
(struct GpgmeDataCbs): New structure.
(gpgme_data_read): Changed prototype to match that of read() closely.
(gpgme_data_write): Similar for write().
(gpgme_data_seek, gpgme_data_new_from_cbs, gpgme_data_new_from_fd,
gpgme_data_new_from_stream): New prototypes.
(gpgme_data_get_type, gpgme_check_engine): Prototype removed.

* Makefile.am (libgpgme_la_SOURCES): Add data.h, data-fd.c,
data-stream.c, data-mem.c, data-user.c and data-compat.c.
* data.c: Reimplemented from scratch.
* (data-compat.c, data-fd.c, data.h, data-mem.c, data-stream.c,
data-user.c): New file.
* context.h (struct gpgme_data_s): Removed.
* conversion.c:
Include <errno.h> and <sys/types.h>.
(_gpgme_data_append): New function.
* data.c (_gpgme_data_append_string): Move to ...
* conversion.c (_gpgme_data_append_string): ... here.
* data.c (_gpgme_data_append_for_xml): Move to ...
* conversion.c (_gpgme_data_append_for_xml): ... here.
* data.c (_gpgme_data_append_string_for_xml): Move to ...
* conversion.c (_gpgme_data_append_string_for_xml): ... here.
* data.c (_gpgme_data_append_percentstring_for_xml): Move to ...
* conversion.c (_gpgme_data_append_percentstring_for_xml): ... here.

* ops.h (_gpgme_data_get_mode, _gpgme_data_set_mode): Prototype
removed.
* types.h (GpgmeDataMode): Type removed.

* decrypt.c (_gpgme_decrypt_start): Don't check data type or mode.
* edit.c (_gpgme_op_edit_start): Likewise.
* encrypt.c (_gpgme_op_encrypt_start): Likewise.

* encrypt-sign.c (_gpgme_op_encrypt_sign_start): Likewise.
* encrypt-sign.c (_gpgme_op_encrypt_sign_start): Likewise.
* export.c (_gpgme_op_export_start): Likewise.
*
genkey.c (_gpgme_op_genkey_start): Likewise.
* import.c (_gpgme_op_import_start): Likewise.
* sign.c (_gpgme_op_sign_start): Likewise.
* verify.c (_gpgme_op_verify_start): Likewise.

* encrypt.c (gpgme_op_encrypt): Remove hack that returns invalid
no recipient if no data was returned.
* encrypt-sign.c (gpgme_op_encrypt_sign): Remove hack that returns
no recipient if no data was returned.
* encrypt-sign.c (gpgme_op_encrypt_sign): Remove hack that returns
no recipient if no data was returned.

* engine.c (_gpgme_engine_op_verify): Add new argument to
differentiate detached from normal signatures.
* engine.h (_gpgme_engine_op_verify): Likewise for prototype.
* engine-gpgsm.c (_gpgme_gpgsm_op_verify): Likewise. Don't check
mode of data argument.
* engine-gpgsm.h (_gpgme_gpgsm_op_verify): Likewise for prototype.
* gpgme.h (gpgme_op_verify_start): Likewise for prototype.
(gpgme_op_verify): Likewise for prototype.
* rungpg.c (_gpgme_gpg_op_verify): Likewise.
* rungpg.h
(_gpgme_gpg_op_verify): Likewise for prototype.
* verify.c (_gpgme_op_verify_start): Likewise.
(gpgme_op_verify_start): Likewise.
(gpgme_op_verify): Likewise.

* rungpg.c (struct arg_and_data_s): New member INBOUND to hold
direction of data object.
(_gpgme_gpg_add_data): Add new argument INBOUND. Use it to
determine direction of data object.
(_gpgme_gpg_add_pm_data, _gpgme_gpg_set_command_handler,
_gpgme_gpg_op_decrypt, _gpgme_gpg_op_edit, _gpgme_gpg_op_encrypt,
_gpgme_gpg_op_encrypt_sign, _gpgme_gpg_op_export,
_gpgme_gpg_op_genkey, _gpgme_gpg_op_import, _gpgme_gpg_op_sign,
_gpgme_gpg_op_verify): Add new argument to _gpgme_gpg_add_data
invocation.
(build_argv): Use new member INBOUND to determine direction of
file descriptor. Don't check the data type.
* rungpg.h (_gpgme_gpg_add_data): Add new argument to prototype.

* gpgme.c (gpgme_get_op_info): Don't call
_gpgme_data_get_as_string if CTX->op_info is NULL.

* version.c (gpgme_check_engine): Function removed.

2002-09-30
Werner Koch <wk@gnupg.org>

* keylist.c (keylist_colon_handler): Take care when printing a
NULL with the DEBUG.

* engine-gpgsm.c (struct gpgsm_object_s): New member ANY.
(gpgsm_status_handler): Run the colon function to indicate EOF.
(_gpgme_gpgsm_set_colon_line_handler): Better reset ANY here.

2002-09-28 Marcus Brinkmann <marcus@g10code.de>

* conversion.c (_gpgme_hextobyte): Prevent superfluous
multiplication with base. Reported by Stphane Corthsy.

* keylist.c (gpgme_op_keylist_ext_start): Use private asynchronous
operation type in invocation of _gpgme_op_reset.

2002-09-20 Werner Koch <wk@gnupg.org>

* ath.c: Include sys/time.h if sys/select.h is not available.

2002-09-13 Marcus Brinkmann <marcus@g10code.de>

* keylist.c (keylist_status_handler): Do not call finish_key() here.
(gpgme_op_keylist_ext_start): Set CTX->tmp_key to NULL.

2002-09-03 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (assuan_libobjs): Remove @LTLIBOBJS@ as we link
them
into gpgme unconditionally.
(libgpgme_la_LIBADD): Change @LIBOBJS@ into @LTLIBOBJS@.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (assuan_libobjs): Use @LTLIBOBJS@ instead @LIBOBJS@.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

* debug.c (_gpgme_debug_add): Test *LINE, not LINE.
(_gpgme_debug_end): Likewise.
Reported by Dr. Stefan Dalibor <Dr.Stefan.Dalibor@bfa.de>.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

* posix-io.c (_gpgme_io_select): Don't use a non-constant struct
initializer.
* version.c (_gpgme_get_program_version): Likewise.
Reported by Dr. Stefan Dalibor <Dr.Stefan.Dalibor@bfa.de>.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

* conversion.c (_gpgme_decode_c_string): Set DESTP before
modifying DEST.

* conversion.c (_gpgme_decode_c_string): Fix off by one error in
last change.
* rungpg.c (_gpgme_append_gpg_args_from_signers): Move before
_gpgme_op_edit so its prototype is known early on.

* conversion.c: New
file.
* util.h: Add prototypes for _gpgme_decode_c_string and
_gpgme_hextobyte.
* keylist.c (keylist_colon_handler): Call _gpgme_decode_c_string
on issuer name.
* Makefile.am (libgpgme_la_SOURCES): Add conversion.c
* key.c (_gpgme_key_append_name): Replace calls to hextobyte by
calls to _gpgme_hextobyte.
(hash_key): Likewise.

2002-09-01 Marcus Brinkmann <marcus@g10code.de>

* op-support.c (_gpgme_op_reset): Set CTX->pending after calling
_gpgme_engine_release, as this will reset pending to zero in the
event done callback on cancelled operations.

2002-08-30 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (_gpgme_gpg_op_edit): Add args from signers.
Suggested by Miguel Coca <e970095@zipi.fi.upm.es>.

* rungpg.c (_gpgme_gpg_op_edit): Add bogus ctx argument.
* rungpg.h: Also to prototype.
* engine.c (_gpgme_engine_op_edit): Likewise.
* engine.h: Likewise.
* edit.c (_gpgme_op_edit_start): Likewise.

2002-08-29 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_op_sign):
Implement signer
selection.

* vasprintf.c (va_copy): Define macro if not yet defined.

2002-08-29  Marcus Brinkmann  <marcus@g10code.de>

* passphrase.c (_gpgme_passphrase_status_handler): Reset
CTX->result.passphrase->no_passphrase if passphrase is given (good
or bad).  Submitted by Jean DIRAISON <jean.diraison@free.fr>.

2002-08-28  Marcus Brinkmann  <marcus@g10code.de>

* posix-io.c (_gpgme_io_spawn): Use a double-fork approach.
Return 0 on success, -1 on error.
* version.c (_gpgme_get_program_version): Don't wait for the child.
* engine.c (_gpgme_engine_housecleaning): Function removed.
(do_reaping): Likewise.
(_gpgme_engine_add_child_to_reap_list): Likewise.
(struct reap_s): Removed.
(reap_list): Likewise.
(reap_list_lock): Likewise.
* engine.h (_gpgme_engine_io_event): Remove prototypes for
_gpgme_engine_housecleaning and
_gpgme_engine_add_child_to_reap_list.
* rungpg.c (_gpgme_gpg_release): Don't add child to reap list.
(struct gpg_object_s): Remove
PID member.
(_gpgme_gpg_new): Don't initialize GPG->pid.
(_gpgme_gpg_spawn): Don't set GPG->pid.
* wait.c (run_idle): Removed.
(gpgme_wait): Run idle_function directly.

2002-08-21  Marcus Brinkmann  <marcus@g10code.de>

* encrypt-sign.c (encrypt_sign_status_handler): Remove dead
variables encrypt_info and encrypt_info_len.
* trustlist.c (gpgme_op_trustlist_start): Set colon line handler.
* posix-sema.c (sema_fatal): Remove function.
All these reported by Stphane Corthsy.

2002-08-23  Werner Koch  <wk@gnupg.org>

* gpgme-config.in: Made --prefix work for --libs.

2002-08-21  Marcus Brinkmann  <marcus@g10code.de>

* ath.h: Update list of symbols that get a prefix: Rename the
ath_mutex_*_available symbols to ath_*_available.

2002-08-21  Marcus Brinkmann  <marcus@g10code.de>

* stpcpy.c: New file from gnulib.
* Makefile.am (assuan_libobjs): Remove jnlib.

2002-08-20 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h: Add prototype for gpgme_op_import_ext.
* import.c
(struct import_result_s): New member `nr_considered'.
Rename `any_imported' to `nr_imported'.
(import_status_handler): Increment nr_imported. Set nr_considered
if appropriate.
(gpgme_op_import_ext): New function.
(gpgme_op_import): Implement in terms of gpgme_op_import_ext.

2002-08-20 Werner Koch <wk@gnupg.org>

* gpgme.m4: Replaced with a new and faster version. This does not
anymore try to build test programs. If we really need test
programs, we should add an option to gpgme-config to do so.

* vasprintf.c (int_vasprintf): Hack to handle NULL passed for %s.

2002-08-20 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (_gpgme_set_op_info): Append data on subsequent calls.
* encrypt-sign.c (encrypt_sign_status_handler): Remove op_info
handling.

2002-08-19 Werner Koch <wk@gnupg.org>

* decrypt.c (is_token,skip_token): Duplicated from verify.c
(gpgme_op_decrypt): Hack to properly return Decryption_Failed..
(_gpgme_decrypt_status_handler): Create an operation info.

2002-08-14
Werner Koch <wk@gnupg.org>

* key.h (struct certsig_s): New. Use it in gpgme_key_s.
* key.c (gpgme_key_release): Release it. We need to add more code
of course.
(_gpgme_key_append_name): Use memset to initialize the struct.
* gpgme.h (GPGME_KEYLIST_MODE_SIGS): New.
* rungpg.c (_gpgme_gpg_op_keylist): Include sigs in listing depending
non the list mode.

* key.c (gpgme_key_get_string_attr): Use GPGME_ATTR_TYPE to return
information about the key type (PGP or X.509).

(gpgme_key_get_ulong_attr): Likewise.

* keylist.c (keylist_colon_handler): Include 1 in the check for
valid algorithms so that RSA is usable.  Store the issuer name and
serial number also for "crs" records.  Parse the expire date for
subkeys.
(set_userid_flags): Put them onto the last appended key.

2002-07-29  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (_gpgme_gpg_op_edit): Use --with-colons.

2002-07-28  Marcus Brinkmann  <marcus@g10code.de>

* data.c (gpgme_data_read): For GPGME_DATA_TYPE_NONE,
return EOF
instead an error.

The following changes make it possible to flush an inbound data
pipe before invoking a command handler:

* posix-io.c (_gpgme_io_select): Accept new argument NONBLOCK to
_gpgme_io_select.  Set timeout of 0 if this is set.
* w32-io.c (_gpgme_io_select): Likewise.
* io.h: Add new argument NONBLOCK to _gpgme_io_select prototype.
* wait.c (do_select): Add new argument to _gpgme_io_select
invocation.
* rungpg.h (_gpgme_gpg_set_command_handler): Add new argument
linked_data to prototype.
* engine.h (_gpgme_engine_set_command_handler): Likewise.
* engine.c (_gpgme_engine_set_command_handler): Likewise.
* passphrase.c (_gpgme_passphrase_start): Pass NULL as linked_data
argument to _gpgme_engine_set_command_handler.
* rungpg.c (struct gpg_object_s): New members linked_data and
linked_idx in CMD.
(_gpgme_gpg_new): Initialize those new members.
(_gpgme_gpg_set_command_handler): Accept new argument linked_data.
(build_argv): Handle linked_data
in the same hack as cb_data.
(read_status): If linked_data is in use, flush the pipe before
activating the command handler.
* gpgme.h: Add prototypes for gpgme_op_edit_start and
gpgme_op_edit.

The next changes export the status codes to the user:

* decrypt.c (_gpgme_decrypt_status_handler): Likewise, also prefix
all STATUS_ with GPGME_.

* delete.c (delete_status_handler): Likewise.
* decrypt-verify.c (decrypt_verify_status_handler): Likewise.
* encrypt.c (_gpgme_encrypt_status_handler): Likewise.
(_gpgme_encrypt_sym_status_handler): Likewise.
* encrypt-sign.c (encrypt_sign_status_handler): Likewise.
* engine-gpgsm.c (parse_status): Likewise.
(gpgsm_status_handler): Likewise.
(gpgsm_set_recipients): Likewise.
* export.c (export_status_handler): Likewise.
* genkey.c (genkey_status_handler): Likewise.
* import.c (append_xml_impinfo): Likewise.
(import_status_handler): Likewise.
* keylist.c (keylist_status_handler): Likewise.
* passphrase.c (_gpgme_passphrase_status_handler):
Likewise.
(command_handler): Likewise.
* progress.c (_gpgme_progress_status_handler): Likewise.
* sign.c (_gpgme_sign_status_handler): Likewise.
* trustlist.c (trustlist_status_handler): Likewise.
* verify.c (_gpgme_verify_status_handler): Likewise.
* gpgme.h (GpgmeEditCb): New type.
* rungpg.h (GpgStatusCode): Rename and move to ...
* gpgme.h (GpgmeStatusCode): ... this and here.
* Makefile.am (status-table.h): Run mkstatus on gpgme.h, not rungpg.h.
* mkstatus: Prefix STATUS with GPGME_.
* rungpg.h (GpgStatusHandler, GpgCommandHandler): Change type
accordingly.
* ops.h (_gpgme_verify_status_handler,
_gpgme_decrypt_status_handler, _gpgme_sign_status_handler,
_gpgme_encrypt_status_handler, _gpgme_passphrase_status_handler,
_gpgme_progress_status_handler): Likewise.
* rungpg.c (struct gpg_object_s): Likewise for CMD.code.

These changes add an edit operation to GPGME:

* context.h (struct gpgme_context_s): New member RESULT.edit. *
ops.h: Add prototype
for _gpgme_release_edit_result and
_gpgme_passphrase_command_handler.
* passphrase.c (command_handler): Make non-static and rename to ...
(_gpgme_passphrase_command_handler): ... this.
(_gpgme_passphrase_start): Use new name for command handler.
* types.h: Add EditResult type.
* gpgme.c (_gpgme_release_result): Release EDIT result.
* edit.c: New file.
* Makefile.am (libgpgme_la_SOURCES): Add edit.c.
(libgpgme_la_LDADD): Rename to libgpgme_la_LIBADD, and include
assuan_libobjs.

(assuan_libobjs): New variable, set this instead
libgpgme_la_LIBADD.
* engine.h (_gpgme_engine_op_edit): New prototype.
* engine.c (_gpgme_engine_op_edit): New function.
* rungpg.h (_gpgme_gpg_op_edit): New prototype.
* rungpg.c (_gpgme_gpg_op_edit): New function.

2002-07-27 Marcus Brinkmann <marcus@g10code.de>

* delete.c (delete_problem): New case ambiguous specification.
(delete_status_handler): Handle new case (poorly).

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c
(_gpgme_gpgsm_op_delete): Implement this.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (libgpgme_la_LDADD): Add @LIBOBJS@ for vasprintf and
fopencookie.
* vasprintf.c: Update to more recent libiberty version.
* debug.h: Replace #elsif with #elif.

Submitted by Stphane Corthsy:
* util.h (vasprintf): Correct prototype.
* encrypt-sign.c: Include <stddef.h>.
(encrypt_sign_status_handler): Change type of ENCRYPT_INFO_LEN to
size_t.
* ath-pthread.c: Include <stdlib.h>, not <malloc.h>.
* ath-pth.c: Likewise.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

* wait.c (fdt_global): Make static. Reported by Stphane
Corthsy.

* rungpg.c (_gpgme_gpg_op_keylist_ext): Skip empty string
patterns. Reported by Stphane Corthsy.

* key.c (gpgme_key_get_as_xml): Add OTRUST attribute. Requested
by Stphane Corthsy.
(gpgme_key_get_string_attr): Add GPGME_ATTR_SIG_SUMMARY case to
silence gcc warning.

* rungpg.c (_gpgme_gpg_new): Always set utf8 as charset.

2002-07-03

Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (gpgme_set_io_cbs): Deal with CTX being NULL.

* gpgme.c (_gpgme_op_event_cb_user): New function.
* op-support.c (_gpgme_op_reset): Support a new mode of operation
for private or user event loop. Use new user event callback
wrapper.
* trustlist.c (gpgme_op_trustlist_start): Use this new mode.
* keylist.c (gpgme_op_keylist_start): Likewise.

* rungpg.c (_gpgme_gpg_io_event): New function.
* rungpg.h (_gpgme_gpg_io_event): New prototype.
* engine-gpgsm.c (_gpgme_gpg_io_event): New function.
* engine-gpgsm.h (_gpgme_gpgsm_io_event): New prototype.
* engine.c (_gpgme_engine_io_event): New function.
* engine.h (_gpgme_engine_io_event): New prototype.
* keylist.c (finish_key): Call _gpgme_engine_io_event, and move
the real work for the default IO callback routines to ...
(_gpgme_op_keylist_event_cb): ... here. New function.
* trustlist.c (trustlist_colon_handler): Signal
GPGME_EVENT_NEXT_TRUSTITEM. Move queue
manipulation to ...
(_gpgme_op_trustlist_event_cb): ... here. New function.
* gpgme.c (_gpgme_op_event_cb): Call _gpgme_op_keylist_event_cb
and _gpgme_op_trustlist_event_cb when appropriate.
* ops.h (_gpgme_op_keylist_event_cb): New prototype.
(_gpgme_op_trustlist_event_cb): Likewise.
* op-support.c (_gpgme_op_reset): Add comment why we don't use the
user provided event handler directly.
* gpgme.h (GpgmeRegisterIOCb): Return GpgmeError value, and TAG in
a pointer argument.
* wait.c (_gpgme_add_io_cb): Likewise.
* wait.h (_gpgme_add_io_cb): Likewise for prototype.
* rungpg.c (_gpgme_gpg_add_io_cb): Call IO_CBS->add with new
argument. Fix up error handling.
* engine-gpgsm.c (_gpgme_gpgsm_add_io_cb): Call IO_CBS->add with
new argument, fix up error handling.

2002-07-03 Werner Koch <wk@gnupg.org>

* encrypt.c (status_handler_finish): New.
(_gpgme_encrypt_status_handler): Moved some code out to the new
function and call this function also in case we get into the
status
handler with an error which might happen due to a kludge in
engine-gpgsm.c

2002-06-28  Marcus Brinkmann  <marcus@g10code.de>

* keylist.c (gpgme_op_keylist_ext_start): Always use our own FD
table (eg use synchronous mode).

2002-06-27  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h: Fix documentation of key attribute retrieval functions.

2002-06-28  Marcus Brinkmann  <marcus@g10code.de>

* ops.h (_gpgme_wait_on_condition): Remove HANG argument from
prototype and change return type to GpgmeError.
(_gpgme_wait_one): New prototype.
* wait.c (gpgme_wait): Replace with the meat from
_gpgme_wait_on_condition here, and remove the support for
conditions.
(_gpgme_wait_on_condition): Remove HANG argument from prototype
and change return type to GpgmeError.  Replace with meat from
_gpgme_wait_one and add support for conditions.
(_gpgme_wait_one): Just call _gpgme_wait_on_condition without
condition.
* keylist.c (gpgme_op_keylist_ext_start): Always use our own FD
table (eg
use synchronous mode).
(gpgme_op_keylist_next): Remove HANG argument from
_gpgme_wait_on_condition.  Check its return value.
* trustlist.c (gpgme_op_trustlist_start): Always use our own FD
table (eg use synchronous mode).
(gpgme_op_trustlist_next): Remove HANG argument from
_gpgme_wait_on_condition.  Check its return value.

2002-06-26  Werner Koch  <wk@gnupg.org>

* engine-gpgsm.c (map_assuan_error): Map No_Data_Available to EOF.

* import.c (append_xml_impinfo): Kludge to print fingerprint
instead of keyid for use with gpgsm.
(import_status_handler): Set a flag to know whether any import
occurred.
(gpgme_op_import): Return -1 if no certificate ewas imported.

2002-06-25  Werner Koch  <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_set_io_cbs) [ENABLE_GPGSM]: Fixed
function arguments.

2002-06-25  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_export): Only export the keys
listed in RECP.
* export.c (gpgme_op_export): If no data was returned,
return
GPGME_No_Recipients.

2002-06-25 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_export): Implement.

2002-06-21 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_assuan_simple_command): Return ERR.
(parse_status): New function.
(gpgsm_status_handler): Use parse_status.
(gpgsm_assuan_simple_command): Accept new arguments STATUS_FNC and
STATUS_FNC_VALUE and process status messages.
(gpgsm_set_recipients): Pass new arguments to gpgsm_assuan_simple_command.
(gpgsm_set_fd): Likewise.
(_gpgme_gpgsm_op_keylist): Likewise.
(_gpgme_gpgsm_op_keylist_ext): Likewise.
(_gpgme_gpgsm_op_sign): Likewise.

2002-06-21 Marcus Brinkmann <marcus@g10code.de>

* wait.c (_gpgme_remove_io_cb): Unlock FDT->lock.

2002-06-20 Werner Koch <wk@gnupg.org>

* rungpg.c (build_argv): Ignore GPG_AGENT_INFO if set but empty.

* verify.c (calc_sig_summary): Set bad policy for wrong key usage.
(skip_token): New.
(_gpgme_verify_status_handler): Watch out
for wrong key usage.
(gpgme_get_sig_string_attr): Hack to return info on the key
usage. Does now make use of the former RESERVED argument which
has been renamed to WHATIDX.
(gpgme_get_sig_ulong_attr): Renamed RESERVED to WHATIDX.

2002-06-14 Marcus Brinkmann <marcus@g10code.de>

* wait.c (do_select): Return -1 on error, and 0 if nothing to run.
(_gpgme_wait_one): Only set HANG to zero if do_select returned an
error, or there are no more file descriptors to wait on.
(_gpgme_wait_on_condition): Ignore return value from do_select for
now.

2002-06-13 Werner Koch <wk@gnupg.org>

* verify.c (gpgme_op_verify): Make sure that we never access an
uninitialized result structure.

2002-06-12 Werner Koch <wk@gnupg.org>

* keylist.c (struct keylist_result_s): New.
(_gpgme_release_keylist_result): Release it here
(keylist_status_handler): Handle truncated.
(append_xml_keylistinfo): New.
* gpgme.c (_gpgme_release_result): and use it here.
* types.h: Declare the new type here.
*
context.h (struct gpgme_context_s): Use it here.

2002-06-11 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_release): Close status_cb.fd.
(_gpgme_gpgsm_new): Duplicate status file descriptor, so we can
use our own close notification mechanism without interfering with
assuan.

2002-06-11 Werner Koch <wk@gnupg.org>

* gpgme.h: Add GPGME_ATTR_SIG_SUMMARY and the GPGME_SIGSUM_
constants.
* verify.c (calc_sig_summary): New.
(gpgme_get_sig_ulong_attr): And use it here.

2002-06-10 Werner Koch <wk@gnupg.org>

* rungpg.h: Add new status codes TRUNCATED and ERROR.
* verify.c (is_token, copy_token): New.
(_gpgme_verify_status_handler): Use copy_token, handle the new
ERROR status and store the errorcode used withgpgsm and trust
status codes.
* gpgme.h: New attribute ERRTOK.
* key.c (gpgme_key_get_string_attr): Add dummy case for it.
(gpgme_get_sig_string_attr): Use it here to return the last error.

2002-06-10 Marcus Brinkmann <marcus@g10code.de>

*
engine-gpgsm.c (_gpgme_gpgsm_start): Move the code that sets the
close notification for the status fd to ...
(_gpgme_gpgsm_new): ... here.

* wait.h: Include "sema.h". Remove prototypes of
_gpgme_remove_proc_from_wait_queue and
_gpgme_register_pipe_handler. Add prototypes of
_gpgme_fd_table_init, _gpgme_fd_table_deinit, _gpgme_fd_table_put,
_gpgme_add_io_cb, _gpgme_remove_io_cb, _gpgme_wait_event_cb and
_gpgme_wait_one..
* wait.c: Remove global variables PROC_QUEUE, PROC_QUEUE_LOCK,
FD_TABLE_SIZE, FD_TABLE, FD_TABLE_LOCK. New global variables
FDT_GLOBAL, CTX_DONE_LIST, CTX_DONE_LIST_SIZE,
CTX_DONE_LIST_LENGTH and CTX_DONE_LIST_LOCK. Remove struct
proc_s. Replace struct wait_item_s.
(_gpgme_fd_table_init): New function.
(_gpgme_fd_table_deinit): Likewise.
(_gpgme_fd_table_put): Likewise.
(set_process_done): Remove function.
(do_select): Take argument FDT. Use that to decide which fds to
select on.
(_gpgme_remove_proc_from_wait_queue): Remove function.
(_gpgme_wait_event_cb):
New function.
(_gpgme_wait_one): Likewise.
(_gpgme_register_pipe_hanldler): Remove function.
(_gpgme_add_io_cb): New function.
(_gpgme_remove_io_cb): Likewise.
(_gpgme_freeze_fd): Remove function.
(_gpgme_thaw_fd): Remove function.
* rungpg.c (struct fd_data_map_s): Add new member TAG.
(struct gpg_object_s): Likewise for STATUS and COLON. Add member
IDX to CMD. Add new member IO_CBS.
(close_notify_handler): New variables POSSIBLY_DONE and NOT_DONE.
For each I/O callback, check if it should be unregistered. If all
callbacks have been unregistered, trigger GPGME_EVENT_DONE.
Remove member RUNNING.
(_gpgme_gpg_new): Initialize new members.
(_gpgme_gpg_release): Check PID not RUNNING. Don't call
_gpgme_remove_proc_from_wait_queue. Close GPG->CMD.FD if set.
(build_argv): Store away the index instead the file descriptor for
CMD.
(_gpgme_gpg_add_io_cb): New function.
(_gpgme_gpg_spawn): Use _gpgme_gpg_add_io_cb to register IO
callbacks.
(gpg_status_handler):
Change return type to void, remove PID
argument, close filedescriptor if EOF or error occurs.
(read_status): Use _gpgme_gpg_add_io_cb instead _gpgme_thaw_fd.
Use IO_CBS->remove instead _gpgme_freeze_fd.
(gpg_colon_line_handler): Change return type to void, remove PID
argument, close filedescriptor if EOF or error occurs.

(command_cb): Use IO_CBS->remove instead _gpgme_freeze_fd.
(_gpgme_gpg_set_io_cbs): New function.
* rungpg.h (_gpgme_gpg_set_io_cbs): Prototype for
_gpgme_gpg_set_io_cbs.
* gpgme.h (GpgmeIOCb): New type.
(GpgmeRegisterIOCb): Likewise.
(GpgmeRemoveIOCb): Likewise.
(GpgmeEventIO): Likewise.
(GpgmeEventIOCb): Likewise.
(struct GpgmeIOCbs): New structure to hold I/O callbacks.
(gpgme_set_op_io_cbs): New prototype.
(gpgme_get_op_io_cbs): Likewise.
* ops.h: New prototype for _gpgme_op_event_cb. Remove prototypes
for _gpgme_freeze_fd and _gpgme_thaw_fd. Remove PID argument from
_gpgme_data_inbound_handler and _gpgme_data_outbound_handler
prototype.
Add prototype for _gpgme_op_reset.
Add synchronous argument to _gpgme_decrypt_start prototype.
* io.h: Beautification.
* gpgme.c: Include "wait.h".
(gpgme_new): Initialize FDT.
(gpgme_set_io_cbs): New function.
(gpgme_get_io_cbs): Likewise.
(_gpgme_op_event_cb): Likewise.
* data.c (_gpgme_data_inbound_handler): Change return type to
void. Drop PID argument. Close FD on error and EOF.
(write_mem_data): Don't close FD here ...
(write_cb_data): ... or here ...
(_gpgme_data_outbound_handler): ... but here. Change return type
to void. Drop PID argument.
* context.h: Include "wait.h".
(struct gpgme_context_s): New members FDT and IO_CBS.
* op-support.c: New file.
* Makefile.am (libgpgme_la_SOURCES): Add op-support.c.
* ops.h: Add prototype for _gpgme_op_reset().
* decrypt.c (_gpgme_decrypt_start): New argument SYNCHRONOUS. Use
_gpgme_op_reset.
(gpgme_op_decrypt_start): Add synchronous argument.
(gpgme_op_decrypt): Likewise. Use _gpgme_wait_one instead
gpgme_wait.
*
delete.c (gpgme_op_delete_start): Rename to ...
(_gpgme_op_delete_start): ... this. New argument SYNCHRONOUS.
Use _gpgme_op_reset. Make function static.
(gpgme_op_delete_start): Just a wrapper around
_gpgme_op_delete_start now.
(gpgme_op_delete): Add synchronous argument. Use _gpgme_wait_one
instead gpgme_wait.

* encrypt.c: Include "wait.h".
(ggpgme_op_encrypt_start): Rename to ...
(_gpgme_op_encrypt_start): ... this.  New argument SYNCHRONOUS.
Use _gpgme_op_reset.  Make function static.
(gpgme_op_encrypt_start): Just a wrapper around
_gpgme_op_encrypt_start now.
(gpgme_op_encrypt): Add synchronous argument.  Use _gpgme_wait_one
instead gpgme_wait.
* encrypt_sign.c (gpgme_op_encrypt_sign_start): Rename to ...
(_gpgme_op_encrypt_sign_start): ... this.  New argument
SYNCHRONOUS.  Use _gpgme_op_reset.  Make function static.
(gpgme_op_encrypt_sign_start): Just a wrapper around
_gpgme_op_encrypt_sign_start now.
(gpgme_op_encrypt_sign): Add synchronous argument.
 Use
_gpgme_wait_one instead gpgme_wait.
* export.c (gpgme_op_export_start): Rename to ...
(_gpgme_op_export_start): ... this.  New argument SYNCHRONOUS.
Use _gpgme_op_reset.  Make function static.
(gpgme_op_export_start): Just a wrapper around
_gpgme_op_export_start now.
(gpgme_op_export): Add synchronous argument.  Use _gpgme_wait_one
instead gpgme_wait.
* genkey.c (gpgme_op_genkey_start): Rename to ...
(_gpgme_op_genkey_start): ... this.  New argument SYNCHRONOUS.
Use _gpgme_op_reset.  Make function static.
(gpgme_op_genkey_start): Just a wrapper around
_gpgme_op_genkey_start now.
(gpgme_op_genkey): Add synchronous argument.  Use _gpgme_wait_one
instead gpgme_wait.
* import.c (gpgme_op_import_start): Rename to ...
(_gpgme_op_import_start): ... this.  New argument SYNCHRONOUS.
Use _gpgme_op_reset.  Make function static.
(gpgme_op_import_start): Just a wrapper around
_gpgme_op_import_start now.
(gpgme_op_import): Add synchronous argument.  Use _gpgme_wait_one
instead
gpgme_wait.
* keylist.c (gpgme_op_keylist_start): Use _gpgme_op_reset.
(gpgme_op_keylist_ext_start): Likewise.
* sign.c (gpgme_op_sign_start): Rename to ...
(_gpgme_op_sign_start): ... this.  New argument SYNCHRONOUS.  Use
_gpgme_op_reset.  Make function static.
(gpgme_op_sign_start): Just a wrapper around _gpgme_op_sign_start
now.
(gpgme_op_sign): Add synchronous argument.  Use _gpgme_wait_one
instead gpgme_wait.
* trustlist.c (gpgme_op_trustlist_start): Use _gpgme_op_reset.

* verify.c (gpgme_op_verify_start): Rename to ...
(_gpgme_op_verify_start): ... this. New argument SYNCHRONOUS.
Use _gpgme_op_reset. Make function static.
(gpgme_op_verify_start): Just a wrapper around
_gpgme_op_verify_start now.
(gpgme_op_verify): Add synchronous argument. Use _gpgme_wait_one
instead gpgme_wait.
* engine-gpgsm.c (iocb_data_t): New type.
(struct gpgsm_object_s): New member status_cb. Replace input_fd
and input_data with input_cb. Replace output_fd and output_data
with
output_cb. Replace message_fd and message_data with
message_cb. New member io_cbs.
(_gpgme_gpgsm_new): Initialize all new members (and drop the old
ones).
(close_notify_handler): New variable POSSIBLY_DONE. For each I/O
callback, check if it should be unregistered. If all callbacks
have been unregistered, trigger GPGME_EVENT_DONE.
(_gpgme_gpgsm_release): Remove variable PID. Use new variable
names to close the file descriptors.
(_gpgme_gpgsm_op_decrypt): Use new variable names,
(_gpgme_gpgsm_op_encrypt): Likewise.
(_gpgme_gpgsm_op_genkey): Likewise.
(_gpgme_gpgsm_op_import): Likewise.
(_gpgme_gpgsm_op_keylist): Likewise.
(_gpgme_gpgsm_op_keylist_ext): Likewise.
(_gpgme_gpgsm_op_sign): Likewise.
(_gpgme_gpgsm_op_verify): Likewise.
(gpgsm_status_handler): Drop argument PID. Change return type to
void. Close status pipe before returning because of EOF or error.
(_gpgme_gpgsm_add_io_cb): New function.
(_gpgme_gpgsm_start): Use _gpgme_gpgsm_add_io_cb to register
callback
function.
(_gpgme_gpgsm_set_io_cbs): New function.
* engine-gpgsm.h: New prototype for _gpgme_gpgsm_set_io_cbs.
* engine.c (_gpgme_engine_set_io_cbs): New function.
* engine.h: New prototype for _gpgme_engine_set_io_cbs.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (libgpgme_la_SOURCES): Remove mutex.h.

2002-06-03 Marcus Brinkmann <marcus@g10code.de>

* key.c: Include <ctype.h>.
(_gpgme_key_append_name): Skip one more char when
processing escaped char. Submitted by Marc Mutz <mutz@kde.org>.

Handle hexadecimal encodings.  Also reported by Marc.  Thanks!

2002-06-02  Marcus Brinkmann  <marcus@g10code.de>

* ath.h: Enable the _gpgme_ prefix.  Fix all those prefix macros.
* posix-sema.c: Use that prefix here.
* posix-io.c: Include "ath.h".
(_gpgme_io_read): Use _gpgme_ath_read instead read.
(_gpgme_io_write): Use _gpgme_ath_write instead write.
(_gpgme_io_waitpid): Use _gpgme_ath_waitpid instead waitpid.
(_gpgme_io_select): Use _gpgme_ath_select
instead select.

2002-06-02  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (ath_components): New variable.
(ath_components_pthread): Likewise.
(ath_components_pth): Likewise.
(system_components): Add ath_componentes.

* ath.h: New file.
* ath.c: Likewise.
* ath-pthread.c: Likewise.
* ath-pth.c: Likewise.
* posix-sema.c (_gpgme_sema_cs_enter): Rework to use the ATH
interface.
* mutex.h: Remove file.

2002-05-30  Werner Koch  <wk@gnupg.org>

* key.c (gpgme_key_get_string_attr): Return NULL when asking for
an issuer with IDX > 0.  We don't support altIssuerNames for now.

2002-05-22  Werner Koch  <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_op_keylist_ext): Aehmm, added
missing variable definition.  Oohh - Marcus was faster.

2002-05-22  Marcus Brinkmann  <marcus@gnu.org>

* engine-gpgsm.c (_gpgme_gpgsm_op_keylist_ext): Fix last change.

2002-05-21  Werner Koch  <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_op_keylist)
(_gpgme_gpgsm_op_keylist_ext):
Pass the keylist mode to gpgsm.

2002-05-10 Werner Koch <wk@gnupg.org>

* key.h (gpgme_key_s): Add OTRUST.
* keylist.c (set_ownertrust): New.
(keylist_colon_handler): Get the ownertrust value
* key.c (gpgme_key_get_string_attr,gpgme_key_get_ulong_attr):
Return that value.

2002-05-08 Marcus Brinkmann <marcus@g10code.de>

* w32-util.c: New static variable GET_PATH_LOCK.
(_gpgme_get_gpg_path): Remove superfluous NULL initializer.
Take lock while determining path.
(_gpgme_get_gpgsm_path): Likewise.
* version.c (do_subsystem_inits): Set DONE to 1 after
initialization.
(gpgme_get_engine_info): New variable ENGINE_INFO_LOCK. Take lock
while determining engine info.
* rungpg.c (_gpgme_gpg_get_version): New variable
GPG_VERSION_LOCK. Take the lock while determining the program
version.
* posix-io.c: Include "sema.h".
(_gpgme_io_spawn): New variable FIXED_SIGNALS_LOCK. Take the lock
while fixing the signals.
(_gpgme_io_select): Make READFDS and WRITEFDS non-static.
*
key.c: Include "sema.h". New globals KEY_CACHE_LOCK and
KEY_REF_LOCK.
(capabilities_to_string): Make STRINGS very const.
(_gpgme_key_cache_add): Lock the key cache.
(_gpgme_key_cache_get): Likewise.
(gpgme_key_ref, gpgme_key_release): Lock the key_ref_lock.
* import.c (append_xml_impinfo): Make IMPORTED_FIELDS and
IMPORT_RES_FIELDS very const. Make FIELD and FIELD_NAME a little
const.
* engine.c (_gpgme_engine_get_info): New variable
ENGINE_INFO_LOCK. Take lock while determining engine info.
* engine-gpgsm.c: Include "sema.h".
(_gpgme_gpgsm_get_version): New variable GPGSM_VERSION_LOCK. Take
lock while getting program version.

2002-05-08 Marcus Brinkmann <marcus@g10code.de>

* debug.h: New file.
* Makefile.am (libgpgme_la_SOURCES): Add debug.h.
* util.h: Removed all prototypes and declarations related to
debugging. Include "debug.h".

* debug.c (debug_level): Comment variable and remove superfluous zero initializer.
(errfp): Likewise.
(_gpgme_debug_enabled):
Function removed.
(struct debug_control_s): Definition removed.
(_gpgme_debug_level): Function removed.
(_gpgme_debug_begin): Rewritten to use vasprintf. Accept a pritnf-style format specification and a variable number of arguments.
(_gpgme_debug_add): Rewritten using vasprintf. Expect that format starts out with "%s" for simplicity.
(_gpgme_debug_end): Rewritten using vasprintf. Do not accept a TEXT argument anymore.

* posix-io.c (_gpgme_io_select): Use new level argument for DEBUG_BEGIN instead explicit if construct.

* debug.c (debug_init): Remove superfluous zero initializer, remove volatile flag of INITIALIZED. Do not use the double-checked locking algorithm, it is fundamentally flawed and will empty your fridge (on a more serious note, despite the volatile flag it doesn't give you the guarantee you would expect, for example on a DEC Alpha or an SMP machine. The volatile only serializes accesses to the volatile variable, but not to the other variables).

2002-05-03
Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_new): Redirect any gpgsm error output to /dev/null.

* verify.c (gpgme_get_sig_key): Set the protocol of the listctx.
* gpgme.c (gpgme_get_protocol): New.

* data.c (gpgme_data_write): Changed type of BUFFER to void*.
(gpgme_data_read): Ditto.

* verify.c (_gpgme_verify_status_handler): Handle TRUST_* status lines so that a claim can be made without looking up the key.
(gpgme_get_sig_string_attr): New.
(gpgme_get_sig_ulong_attr): New.

* gpgme.h (GpgmeAttr): Added GPGME_ATTR_SIG_STATUS.

* rungpg.h: Add new status codes from gpg 1.0.7 and formatted the list to align with the status.h file from gnupg.

* gpgme.h (GpgmeSigStat): Add _GOOD_EXP and _GOOD_EXPKEY.
* verify.c (_gpgme_verify_status_handler, finish_sig): Handle
these new status codes.  Store the expiration time

2002-04-27  Werner Koch  <wk@gnupg.org>

* gpgme.h (GpgmeData_Encoding): New.
* data.c (gpgme_data_get_encoding,gpgme_data_set_encoding):
New.
* engine-gpgsm.c (map_input_enc): New. Use it in all local
functions where the INPUT command gets send.

2002-04-27  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_verify): Close the output
descriptor only when we don't need it anymore.  Close the message
descriptor if we don't need it.

2002-04-26  Werner Koch  <wk@gnupg.org>

* Makefile.am (libgpgme_la_LIBADD): Use libtool libraries.

2002-04-25  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (_gpgme_gpg_release): Call gpgme_data_release on
GPG->cmd.cb_data, not xfree.

2002-04-25  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_new): Set the display, ttyname,
ttytype, lc_ctype and lc_messages options in the server.

2002-04-24  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (map_assuan_error): Add new error codes.

2002-04-23  Werner Koch  <wk@gnupg.org>

* key.c (gpgme_key_get_ulong_attr): Swapped use of can_encrypt and
can_certify to return
the requested values.

2002-04-23  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c (gpgme_get_progress_cb): Allow either return parameter
to be NULL.
(gpgme_get_passphrase_cb): Likewise.

2002-04-22  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c (gpgme_get_passphrase_cb): New function.
(gpgme_get_progress_cb): New function.
* gpgme.h: Add new prototypes for gpgme_get_passphrase_cb and
gpgme_get_progress_cb.

2002-03-28  Werner Koch  <wk@gnupg.org>

* gpgme.h (GpgmeAttr): Add values for issuer and chaining.
* key.h (gpgme_key_s): Add issuer and chaining elements for X509.
* keylist.c (keylist_colon_handler): Store them.
* key.c (gpgme_key_release): Free them.
(gpgme_key_get_as_xml,gpgme_key_get_string_attr): Print them.

2002-03-26  Werner Koch  <wk@gnupg.org>

* Makefile.am (libgpgme_la_SOURCES): Add mutex.h

2002-03-21  Werner Koch  <wk@gnupg.org>

* util.h [!HAVE_FOPENCOOKIE]: Make sure off_t and ssize_t are
defined.

2002-03-18  Marcus Brinkmann  <marcus@g10code.de>

*
Makefile.am (system_components): New variable, set depending on
HAVE_DOSISH_SYSTEM.
(libgpgme_la_SOURCES): Use system_components.  Remove `syshdr.h'.
* syshdr.h: File removed.

* posix-io.c: Remove !HAVE_DOSISH_SYSTEM safeguard.  Clean up source.
* posix-sema.c: Likewise.
* posix-util.c: Likewise.

* w32-io.c: Remove HAVE_DOSISH_SYSTEM safeguard.
* w32-sema.c: Likewise.
* w32-util.c: Likewise.

* posix-io.c: Include `unistd.h', do not include `syshdr.h'.
* posix-sema.c: Likewise.
* w32-io.c: Include `io.h', do not include `syshdr.h'
* w32-sema.c: Likewise.
* w32-util.c: Likewise.
* data.c: Do not include `syshdr.h'.
* wait.c: Likewise.

* wait.h: Code cleanup.

* mutex.h: New file.
* posix-sema.c: Implement.

2002-03-08 Werner Koch <wk@gnupg.org>

* util.h [!HAVE_FOPENCOOKIE]: Fixed type. Thanks to Frank Heckenbach.

2002-03-07 Werner Koch <wk@gnupg.org>

* gpgme.h (gpgme_op_keylist_ext_start): Add prototype.

2002-03-06 Marcus Brinkmann <marcus@g10code.de>

*
encrypt.c (_gpgme_encrypt_sym_status_handler): New function.
(gpgme_op_encrypt_start): New variable SYMMETRIC, set it if RECP
is null, and if it is set, use _gpgme_encrypt_sym_status_handler
as status handler and run _gpgme_passphrase_start.
* rungpg.c (_gpgme_gpg_op_encrypt): If RECP is zero, do symmetric
encryption.
* engine-gpgsm.c (_gpgme_gpgsm_op_encrypt): If RECP is zero,
return error value.

* rungpg.c (_gpgme_gpg_op_verify): Add "--" argument.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

* passphrase.c (_gpgme_passphrase_status_handler): Also set the
error No_Passphrase if only a bad passphrase was provided.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (_gpgme_gpg_op_verify): If TEXT is of mode
GPGME_DATA_MODE_IN, construct a command line that stores the
plaintext in TEXT.
* verify.c (gpgme_op_verify_start): Accept TEXT being
uninitialized, and in this case interpret SIG as a normal or
cleartext signature and TEXT as a return
data object.
* engine-gpgsm.c (_gpgme_gpgsm_op_verify): Likewise.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_keylist_ext) [!ENABLE_GPGSM]:
Add stub function.

2002-02-28  Werner Koch  <wk@gnupg.org>

* key.h (subkey_s): New member expires_at.
* keylist.c (keylist_colon_handler): Set it here
* key.c (gpgme_key_get_as_xml,gpgme_key_get_ulong_attr): Return it.

2002-02-27  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.h (_gpgme_gpg_op_keylist_ext): New prototype.
* rungpg.c (_gpgme_gpg_op_keylist_ext): New function.
* engine-gpgsm.h (_gpgme_gpgsm_op_keylist_ext): New prototype.
* engine-gpgsm.c (_gpgme_gpgsm_op_keylist_ext): New function.
* engine.h (_gpgme_engine_op_keylist_ext): New prototype.
* engine.c (_gpgme_engine_op_keylist_ext): New function.
* keylist.c (gpgme_op_keylist_ext_start): New function.

2002-02-27  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h: Add new error code GPGME_Invalid_Recipient.
* encrypt.c (struct
encrypt_result_s): New member invalid_recipients,
rename no_recipients to no_valid_recipients.
(_gpgme_encrypt_status_handler): Include error for invalid
recipients.
* engine-gpgsm.c (gpgsm_set_recipients): Change type of first
argument to GpgsmObject.  Use that to report back the status about
the recipients.

2002-02-26  Marcus Brinkmann  <marcus@g10code.de>

* verify.c (_gpgme_verify_status_handler): Fix the last change.

2002-02-25  Marcus Brinkmann  <marcus@g10code.de>

* verify.c (_gpgme_verify_status_handler): Parse the args line to
see if the problem is due to a missing key, and report that back
to the user.

2002-02-25  Marcus Brinkmann  <marcus@g10code.de>

* engine.c (_gpgme_engine_op_encrypt_sign): New function.
* engine.h (_gpgme_engine_op_encrypt_sign): New prototype.
* rungpg.c (_gpgme_append_gpg_args_from_signers): New function.
(_gpgme_gpg_op_sign): Use that new function.
(_gpgme_gpg_op_encrypt_sign): New function.
* rungpg.h (_gpgme_gpg_op_encrypt_sign):
New prototype.
* gpgme.h (gpgme_op_encrypt_sign_start): New prototype.

(gpgme_op_encrypt_sign): Likewise.
* Makefile.am (libgpgme_la_SOURCES): Add encrypt-sign.c.
* ops.h (_gpgme_encrypt_status_handler): Add prototype.
(_gpgme_sign_status_handler): Add prototype.
* sign.c (sign_status_handler): Rename to ...
(_gpgme_sign_status_handler): ... this and make non-static.
* encrypt.c (encrypt_status_handler): Rename to ...
(_gpgme_encrypt_status_handler): ... this and make non-static.
* encrypt.c (gpgme_op_encrypt_start): Use new status handler name.
* sign.c (gpgme_op_sign_start): Likewise.

2002-02-25 Marcus Brinkmann <marcus@g10code.de>

* context.h (struct gpgme_context_s): New member include_certs.
* gpgme.h (gpgme_set_include_certs): Add prototype.
(gpgme_get_include_certs): Likewise.
* gpgme.c (gpgme_set_include_certs): New function.
(gpgme_get_include_certs): Likewise.
(gpgme_new): Set include_certs to 1 (the default).
* engine.c (_gpgme_engine_op_sign): Accept
new argument include_certs,
and pass it to _gpgme_gpgsm_op_sign.
* engine.h (_gpgme_engine_op_sign): Likewise for prototype.
* engine-gpgsm.c (_gpgme_gpgsm_op_sign): Accept new argument
include_certs and handle it.
* engine-gpgsm.h (_gpgme_gpgsm_start): Add new argument include_certs.
* sign.c (gpgme_op_sign_start): Add new argument to
_gpgme_engine_op_sign call.

2002-02-14 Werner Koch <wk@gnupg.org>

* keylist.c (gpgme_op_keylist_start): Do not use a verbose listing.

2002-02-13 Werner Koch <wk@gnupg.org>

* vasprintf.c, fopencookie.c: Add replacement functions.
* util.h: Add prototypes for them.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_assuan_simple_command): Return 0 if we
reach the end of the function.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

* genkey.c (gpgme_op_genkey_start): Fix logic in validity check.
(gpgme_op_genkey_start): Skip newlines after opening tag.

* engine-gpgsm.c (_gpgme_gpgsm_start): Remove cruft.

2002-02-08
Marcus Brinkmann <marcus@g10code.de>

* genkey.c (gpgme_op_genkey_start): Allow PUBKEY and SECKEY to be
set, and pass them down to the crypto engine.
* engine-gpgsm.h (_gpgme_gpgsm_start): New arguments PUBKEY and SECKEY.
* engine.h: Likewise.
* rungpg.h (_gpgme_gpg_spawn): Likewise.
* engine.c (_gpgme_engine_op_genkey): Likewise. Use those
arguments.
* rungpg.c (_gpgme_gpg_op_genkey): Likewise. Complain if those
arguments are set.
* engine-gpgsm.c (_gpgme_gpgsm_op_genkey): Likewise. Implement
function.

* engine-gpgsm.c (_gpgme_gpgsm_op_keylist): Beautify comment.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (_gpgme_gpg_op_keylist): Remove handling of keylist
mode (for now).

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

* wait.c (gpgme_wait): Add new argument STATUS, in which the
status of the returned context is returned.
(_gpgme_wait_on_condition): Rework the function a bit, to make it
aware of cancelled processes, and to
allow to use gpgme_wait with
CTX being NULL (as documented in the source).
(struct proc_s): New member REPORTED.
* gpgme.h: Fix prototype.
* verify.c (gpgme_op_verify): Fix use of gpgme_wait.
* sign.c (gpgme_op_sign): Likewise.
* import.c (gpgme_op_import): Likewise.
* genkey.c (gpgme_op_genkey): Likewise.
* export.c (gpgme_op_export): Likewise.
* encrypt.c (gpgme_op_encrypt): Likewise.
* delete.c (gpgme_op_delete): Likewise.
* decrypt-verify.c (gpgme_op_decrypt_verify): Likewise.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (gpgme_set_keylist_mode): Possibly return an error
value.
(gpgme_get_keylist_mode): New function.

(gpgme_new): Set the default for keylist_mode member of CTX.

* gpgme.h (gpgme_set_keylist_mode): Fix prototype.
(gpgme_get_keylist_mode): New prototype.
(GPGME_KEYLIST_MODE_LOCAL): New macro.
(GPGME_KEYLIST_MODE_EXTERN): Likewise..

2002-02-02 Marcus Brinkmann <marcus@g10code.de>

This patch has gotten a bit large... mmh. The
main thing that
happens here is that error values are now not determined in the
operation function after gpgme_wait completed, but in the status
handler when EOF is received. It should always be the case that
either an error is flagged or EOF is received, so that after a
gpgme_wait you should never have the situation that no error is
flagged and EOF is not received. One problem is that the engine
status handlers don't have access to the context, a horrible
kludge works around this for now. All errors that happen during a
pending operation should be caught and reported in ctx->error,
including out-of-core and cancellation. This rounds up neatly a
couple of loose ends, and makes it possible to pass up any errors
in the communication with the backend as well. As a bonus, there
will be a function to access gpgme->wait, so that the operations
can truly be implemented with their _start function.

* engine-gpgsm.c (gpgsm_status_handler): Horrible kludge to report
error back
to the context.
* rungpg.c (gpg_status_handler): Same horrible kludge applied here.

* engine-gpgsm.c (gpgsm_assuan_simple_command): Add error checking.

* wait.c (_gpgme_wait_on_condition): If canceled, set CTX->error
to a value indication that.

* verify.c (add_notation): Set error, not out_of_core.
(finish_sig): Likewise.
(gpgme_op_verify_start): Don't clear out_of_core.
(_gpgme_verify_status_handler): At EOF, clean up the notation data.
(gpgme_op_verify): And don't do it here.

* trustlist.c (trustlist_status_handler): Check error, not out_of_core.
(gpgme_op_trustlist_start): Don't clear out_of_core.
(gpgme_op_trustlist_next): Check error, not out_of_core.
(gpgme_op_trustlist_end): Likewise.

* ops.h (test_and_allocate_result): New macro.

(_gpgme_passphrase_result): Remove prototype.
* delete.c (gpgme_op_delete): Return error from context.
(delete_status_handler): Use macro test_and_allocate_result.
Perform error checking at EOF.
(gpgme_op_delete_start): Release
result.
* passphrase.c (_gpgme_passphrase_status_handler): Use macro
test_and_allocate_result, and perform error checking here.
(_gpgme_passphrase_result): Function removed.
* sign.c (gpgme_op_sign_start): Do not set out_of_core to zero.
(gpgme_op_sign): Just return the error value from the context.
(sign_status_handler): Only progress if no error is set yet. If
we process an EOF, set the resulting error value (if any).
* decrypt.c (_gpgme_decrypt_result): Function removed.
(create_result_struct): Function removed.
(_gpgme_decrypt_status_handler): Use macro test_and_allocate_result,
caclulate error on EOF, do not progress with errors.
(_gpgme_decrypt_start): Do not set out_of_core to zero.
(gpgme_op_decrypt): Just return the error value from the context.
* encrypt.c (encrypt_status_handler): Perform the error checking
here.
(gpgme_op_encrypt_start): Do not clear out_of_core.
* export.c (export_status_handler): Return if error is set in context.
(gpgme_op_export_start):
Release result.
(gpgme_op_export): Return error from context.
* decrypt-verify.c (gpgme_op_decrypt_verify): Return the error in
the context.
* genkey.c (genkey_status_handler): Use macro
test_and_allocate_result. Perform error checking at EOF.
(gpgme_op_genkey): Just return the error from context.
* import.c (gpgme_op_import): Return the error from context.
(import_status_handler): Use macro test_and_allocate_result.
* keylist.c (gpgme_op_keylist_start): Do not clear out_of_core.
(gpgme_op_keylist_next): Return error of context.
(keylist_colon_handler): Set error instead out_of_code.
(finish_key): Likewise.

* context.h: Remove member out_of_core, add member error.
* gpgme.c (_gpgme_release_result): Clear error flag.

* engine.h (_gpgme_engine_get_error): New prototype.
* engine.c (_gpgme_engine_get_error): New function.
* engine-gpgsm.c (_gpgme_gpgsm_get_error): New function.

* engine-gpgsm.c (map_assuan_error): New function.
(gpgsm_assuan_simple_command): Change

return type to GpgmeError,
use the new function to map error values.
(gpgsm_set_fd): Change return type tp GpgmeError.
(_gpgme_gpgsm_op_decrypt): Change type of ERR to GpgmeError.
(gpgsm_set_recipients): Likewise. Change type of return value
equivalently. Adjust error values.
(_gpgme_gpgsm_op_import): Likewise.
(_gpgme_gpgsm_op_sign): Likewise.
(struct gpgsm_object_s): New member error.
(gpgsm_status_handler): Set error if error occurs. Determine
error number from ERR line received. If assuan_read_line fails,
terminate the connection.

2002-02-01 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (MOSTLYCLEANFILES): New variable.

2002-02-01 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_status_handler): At error, terminate the
connection to the server.

2002-01-31 Marcus Brinkmann <marcus@g10code.de>

* rungpg.h: Add STATUS_KEY_CREATED.

* progress.c: New file.
* Makefile.am (libgpgme_la_SOURCES): Add progress.c.

* genkey.c (genkey_status_handler):
Use
_gpgme_progress_status_handler. Add check for status.
(struct genkey_result_s): New structure.
(_gpgme_release_genkey_result): New function.
(gpgme_op_genkey): Check for error.
* gpgme.c (_gpgme_release_result): Call
_gpgme_release_genkey_result.
* ops.h (_gpgme_release_genkey_result): Add prototype.
* types.h (GenKeyResult): New type.
* context.h (gpgme_context_s): Add GenKeyResult to member result.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (_gpgme_release_result): Call
_gpgme_release_delete_result.
* ops.h (_gpgme_release_delete_result): Add prototype.
* types.h (DeleteResult): New type.
* context.h (gpgme_context_s): Add DeleteResult to member result.

* delete.c (enum delete_problem): New type.
(struct delete_result_s): New structure.
(_gpgme_release_delete_result): New function.
(delete_status_handler): Implement more status codes.
(gpgme_op_delete): Return error on failure.

* import.c (MAX_IMPORTED_FIELDS): Bump up to 14.

2002-01-30
Marcus Brinkmann <marcus@g10code.de>

* import.c (struct import_result_s): New structure.
(_gpgme_release_import_result): New function.
(append_xml_impinfo): Likewise.
(import_status_handler): Implement.
* gpgme.c (_gpgme_release_result): Add call to
_gpgme_release_import_result.
* ops.h (_gpgme_release_import_result): Add prototype.
* types.h (ImportResult): New type.
* context.h (gpgme_context_s): Add ImportResult to member result.

* encrypt.c (gpgme_op_encrypt): Code clean up.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h: Add lots of comment and fix the formatting. Add
gpgme_trustlist_end prototype.

2002-01-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h: Add new type GpgmeIdleFunc. Change type of
gpgme_register_idle to return and accept this type.
* wait.c (gpgme_register_idle): Fix type.
Save and return old value of idle_function.

2002-01-29 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_op_keylist): Implement
secret only mode.

* keylist.c (keylist_colon_handler): Add support for the new "crs"
record type.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_release): Call assuan_disconnect,
not assuan_pipe_disconnect.

* Makefile.am (libgpgme_la_LIBADD): Change to link assuan and
jnlib (needed by assuan) statically into libgpgme.  Linking a
static library into a shared library this way is not portable.

2002-01-22  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (GpgmePassphraseCb): Change type of R_HD from void* to
void**.

2002-01-22  Marcus Brinkmann  <marcus@g10code.de>

* data.c (gpgme_data_new_from_filepart): Change type of LENGTH
from off_t to size_t.
* gpgme.h: Likewise.

2002-01-22  Marcus Brinkmann  <marcus@g10code.de>

* wait.c (_gpgme_wait_on_condition): If the process finished,
reset the pending flag.  Also if the operation was cancelled.

(struct proc_s): Rename READY to DONE.
(wait_item_s): Likewise.
(set_process_ready): Rename
to ...
(set_process_done): ... this.
(_gpgme_remove_proc_from_wait_queue): Call set_process_done
instead set_process_ready.
(_gpgme_wait_on_condition): Likewise.
(do_select): Rename READY to DONE.

* verify.c (gpgme_op_verify): Do not set pending to zero here.
* sign.c (gpgme_op_sign): Likewise.
* import.c (gpgme_op_import): Likewise.
* genkey.c (gpgme_op_genkey): Likewise.
* export.c (gpgme_op_export): Likewise.
* encrypt.c (gpgme_op_encrypt): Likewise.
* delete.c (gpgme_op_delete): Likewise.
* decrypt-verify.c (gpgme_op_decrypt_verify): Likewise.
* decrypt.c (gpgme_op_decrypt): Likewise.

2002-01-22  Marcus Brinkmann  <marcus@g10code.de>

* export.c: Cleanup.

2002-01-15  Marcus Brinkmann  <marcus@g10code.de>

* trustlist.c: Various source clean ups.

(my_isdigit): Removed.
(gpgme_op_trustlist_end): New function.

2002-01-13 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c: Various source clean ups, like renaming C to CTX where appropriate.
(gpgme_new): Clear
R_CTX before starting the work.
(my_isdigit): Removed.
(my_isxdigit): Likewise.

* data.c: Various source clean ups.
(gpgme_data_new_from_mem): Check BUFFER after clearing R_DH.
(gpgme_data_new_with_read_cb): Similar for READ_CB.
(gpgme_data_new_from_file): Loop over fread while EINTR.
(gpgme_data_new_from_filepart): Rediddled a bit. Allow LENGTH to be zero. Loop over fread while EINTR.

(my_isdigit): Removed.
(my_isxdigit): Likewise.

2001-12-21 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_new): Replace General_Error with Pipe_Error where appropriate.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

* engine.c: Include `string.h'. Reported by Stphane Corthsy.

* version.c (get_engine_info): Remove prototype.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_new): New variable CHILD_FDS.
Fill it with the servers fds, and pass it to assuan_pipe_connect.

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

*
keylist.c (gpgme_op_keylist_end): New function.
* gpgme.h (gpgme_op_keylist_end): New prototype.

* engine.h (gpgme_engine_check_version): Move prototype to ...
* gpgme.h (gpgme_engine_check_version): ... here.

* genkey.c (gpgme_op_genkey_start): Remove unused variable.

2001-12-18  Marcus Brinkmann  <marcus@g10code.de>

* version.c (gpgme_get_engine_info): Reimplemented.
(gpgme_check_engine): Reimplemented.
(_gpgme_compare_versions): Return NULL if MY_VERSION is NULL.

* engine.c: Include `io.h'.
(gpgme_engine_get_info): New function.
* engine.h (gpgme_engine_check_version, _gpgme_engine_get_info):
Add prototype.

2001-12-18  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (struct reap_s, reap_list, reap_list_lock): Moved to ...
* engine.c (struct reap_s, reap_list, reap_list_lock): ... here.
Include `time.h', `sys/types.h', `assert.h', and `sema.h'.

* rungpg.c (_gpgme_engine_add_child_to_reap_list): New function.
(do_reaping, _gpgme_gpg_housecleaning): Moved to
...
* engine.c (do_reaping, _gpgme_engine_housecleaning): ... here.
* rungpg.c (_gpgme_gpg_release): Replace code that is now in its
own function by call to _gpgme_engine_add_child_to_reap_list().

* wait.c: Include `engine.h'.
(run_idle): Call _gpgme_engine_housecleaning(), not
_gpgme_gpg_housecleaning().

2001-12-18  Marcus Brinkmann  <marcus@g10code.de>

* key.c (_gpgme_key_append_name): Append, not prepend, the uid.
Initialize the next field of the uid structure.
(gpgme_key_get_as_xml): Do not list last uid first.

2001-12-17  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_set_colon_line_handler): New
function [!ENABLE_GPGSM].

2001-12-14  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_verify): Put TEXT into
message_data, not SIG.
(_gpgme_gpgsm_op_sign): Use `--detached', not `--detach'.

* sign.c (sign_status_handler): Call
_gpgme_passphrase_status_handler early.

2001-12-14  Marcus Brinkmann  <marcus@g10code.de>

*
engine-gpgsm.c: Revert last change.

2001-12-14  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_status_handler): Freeze the output file
handler when ending this operation, otherwise the wait function
will sit on it.

2001-12-14  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (struct gpgsm_object_s): New member colon.attic.
(_gpgme_gpgsm_new): Initialize some more members.
(_gpgme_gpgsm_release): Free the colon line handler's attic line.
(gpgsm_status_handler): Rework the inline-data processing.

2001-12-13  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (_gpgme_gpg_spawn): Do not add the fds to the child
list that are not dup'ed, for those the close-on-exec flag is set
now.
* version.c (_gpgme_get_program_version): Remove first entry in
CFD, as the close-on-exec flag is now set for this fd.

2001-12-13  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_encrypt): Do not add `armor'
option to `ENCRYPT'.
* engine-gpgsm.c
(gpgsm_set_recipients): Free LINE when returning
successfully.

2001-12-13  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (close_notify_handler): New function.
(_gpgme_gpgsm_new): Manage the file descriptors a
bit differently.  Do not set close-on-exec flags.
(_gpgme_gpgsm_op_decrypt): Do not set message_fd
to -1, this is done by the close handler.
(_gpgme_gpgsm_op_encrypt): Likewise.
(_gpgme_gpgsm_op_import): Likewise (also for output_fd).
(_gpgme_gpgsm_op_keylist): Likewise (also for input_fd and output_fd).
(_gpgme_gpgsm_op_sign): Likewise.
(_gpgme_gpgsm_op_verify): Likewise, but for output_fd.

* posix-io.c (_gpgme_io_pipe): Set the close-on-exec flag for the
non-inherited file descriptor index of the pipe.

2001-12-13  Werner Koch  <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_set_colon_line_handler): New.
(gpgsm_status_handler): Pass datalines to a colon handler
* engine.c (_gpgme_engine_set_colon_line_handler): Set the colon
handler for gpgsm.

* engine-gpgsm.c
(_gpgme_gpgsm_op_keylist): Allow NULL for
pattern.
(gpgsm_assuan_simple_command): Removed underscore from
assuan_write_line.
(_gpgme_gpgsm_start): Ditto.
(gpgsm_assuan_simple_command): Replaced internal Assuan read
function by the new assuan_read_line.  Removed the use of the
internal header.
(gpgsm_status_handler): Ditto. Use the new assuan_pending_line.
(_gpgme_gpgsm_start): Use the documented way to get an fd from
assuan.

* keylist.c (keylist_colon_handler): Handle "crt" records
* key.h (gpgme_key_s): Add an x509 flag.
* key.c (parse_x509_user_id): New.
(_gpgme_key_append_name): Handle x.509 names.

2001-12-05  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_status_handler): Make it work with current
version of assuan.

2001-12-05  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_set_fd): Accept one more argument OPT.
(_gpgme_gpgsm_op_encrypt): Pass armor argument to gpgsm_set_fd for
output descriptor.
(_gpgme_gpgsm_op_sign):
Likewise.

2001-12-05  Marcus Brinkmann  <marcus@g10code.de>

* keylist.c (gpgme_op_keylist_next): Set pending to 0 if EOF
occurs.

2001-11-26  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_sign): Fix stupid typo.

2001-11-24  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_status_handler): Don't break if bsearch fails.
Deal with assuan read line returning more than one line (for now).

2001-11-23  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_sign): Implement it according to
the current protocol definition.

2001-11-23  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_new): Set CLOEXEC flag for parent
ends of the pipe.

2001-11-22  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c: Include stdlib.h and string.h.  Also include,
for now, rungpg.h and status-table.h.
(gpgsm_status_handler): Implement more of the status handler.

2001-11-22  Marcus Brinkmann  <marcus@g10code.de>

*
engine.c (_gpgme_engine_op_decrypt): Implement CMS case.
(_gpgme_engine_op_delete): Likewise.
(_gpgme_engine_op_encrypt): Likewise.
(_gpgme_engine_op_export): Likewise.
(_gpgme_engine_op_genkey): Likewise.
(_gpgme_engine_op_keylist): Likewise.
(_gpgme_engine_op_sign): Likewise.
(_gpgme_engine_op_trustlist): Likewise.

* engine-gpgsm.c (_gpgme_gpgsm_op_encrypt): New function.
(gpgsm_assuan_simple_command): Likewise.
(gpgsm_set_recipients): Likewise.
(gpgsm_set_fd): Reimplement using gpgsm_assuan_simple_command.
(_gpgme_gpgsm_op_delete): New function.
(_gpgme_gpgsm_op_export): Likewise.
(_gpgme_gpgsm_op_genkey): Likewise.
(_gpgme_gpgsm_op_sign): Likewise.
(_gpgme_gpgsm_op_keylist): Likewise.
(_gpgme_gpgsm_op_trustlist): Likewise.
(_gpgme_gpgsm_release): Release command.
(_gpgme_gpgsm_op_decrypt): Allocate command.
(_gpgme_gpgsm_op_import): Likewise.

(gpgsm_status_handler): Also treat `ERR' strings as EOF.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h
(gpgme_set_protocol): New prototype.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_decrypt): New function.
(_gpgme_gpgsm_op_import): Likewise.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c: Shuffle around header inclusion a bit, to still
keep them separate.
(_gpgme_set_status_handler) [!ENABLE_GPGSM]: New function.

2001-11-22 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c: Include more headers so that NULL and mk_error
is defined even with an undefined GPGSM_PATH.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (gpg_inbound_handler, write_mem_data, write_cb_data,
gpg_outbound_handler): Moved to ...
* data.c (_gpgme_data_inbound_handler, write_mem_data,
write_cb_data, _gpgme_data_outbound_handler): ... here. Make the
_gpgme_* ones non-static.
* data.c: Include io.h.

* ops.h (_gpgme_data_inbound_handler): New prototype.
(_gpgme_data_outbound_handler): Likewise.
(_gpgme_gpg_spawn): Use
these new functions.

* engine-gpgsm.h (_gpgme_gpgsm_op_decrypt, _gpgme_gpgsm_op_delete,
_gpgme_gpgsm_op_encrypt, _gpgme_gpgsm_op_export,
_gpgme_gpgsm_op_genkey, _gpgme_gpgsm_op_import,
_gpgme_gpgsm_op_keylist, _gpgme_gpgsm_op_sign,
_gpgme_gpgsm_op_trustlist, _gpgme_gpgsm_op_verify,
_gpgme_gpgsm_start, _gpgme_gpgsm_set_status_handler): New prototype.
Include <rungpg.h> for status handler function.

* engine-gpgsm.c (struct gpgsm_object_s): New members input_fd,
input_data, output_fd, output_data, message_fd, message_data, command
and status.

(_gpgme_gpgsm_new): Open input, output and message pipes before
connecting to the client.  Close server's ends afterwards.
(_gpgme_gpgsm_release): Close open file descriptors.  Remove
server process from wait queue.
(_gpgme_gpgsm_op_verify, _gpgme_gpgsm_start,
_gpgme_gpgsm_set_status_handler, gpgms_status_handler): New function.

* engine.c (_gpgme_engine_start): Implement for GPGME_PROTOCOL_CMS.
(_gpgme_engine_set_status_handler):
Likewise.
(_gpgme_engine_op_verify): Likewise.

2001-11-21  Marcus Brinkmann  <marcus@g10code.de>

* context.h: Do not include rungpg.h, but engine.h.
(struct gpgme_context_s): Replace member gpg with engine.
* gpgme.c (gpgme_release): Release engine, not gpg.

* recipient.c (_gpgme_append_gpg_args_from_recifgpients): Function
moved ...
* rungpg.c (_gpgme_append_gpg_args_from_recipients): ... here.
Make static, change order of arguments, and return an error value.
* ops.h (_gpgme_append_gpg_args_from_recipients): Removed prototype.

* rungpg.h (_gpgme_gpg_op_verify): Add prototype.
(_gpgme_gpg_op_encrypt): Likewise.
(_gpgme_gpg_op_decrypt): Likewise.
(_gpgme_gpg_op_delete): Likewise.
(_gpgme_gpg_op_export): Likewise.
(_gpgme_gpg_op_genkey): Likewise.
(_gpgme_gpg_op_import): Likewise.
(_gpgme_gpg_op_keylist): Likewise.
(_gpgme_gpg_op_sign): Likewise.
(_gpgme_gpg_op_trustlist): Likewise.
* rungpg.c (_gpgme_gpg_op_verify): New function.
(_gpgme_gpg_op_encrypt): Likewise.
(_gpgme_gpg_op_decrypt):
Likewise.
(_gpgme_gpg_op_delete): Likewise.
(_gpgme_gpg_op_export): Likewise.
(_gpgme_gpg_op_genkey): Likewise.
(_gpgme_gpg_op_import): Likewise.
(_gpgme_gpg_op_keylist): Likewise.
(_gpgme_gpg_op_sign): Likewise.
(_gpgme_gpg_op_trustlist): Likewise.

* engine.h (_gpgme_engine_set_status_handler): Add prototype.
(_gpgme_engine_set_command_handler): Likewise.

(_gpgme_engine_set_colon_line_handler): Likewise.
(_gpgme_engine_op_decrypt): Likewise.
(_gpgme_engine_op_delete): Likewise.
(_gpgme_engine_op_encrypt): Likewise.
(_gpgme_engine_op_export): Likewise.
(_gpgme_engine_op_genkey): Likewise.
(_gpgme_engine_op_import): Likewise.
(_gpgme_engine_op_keylist): Likewise.
(_gpgme_engine_op_sign): Likewise.
(_gpgme_engine_op_trustlist): Likewise.
(_gpgme_engine_op_verify): Likewise.
(_gpgme_engine_start): Likewise.
* engine.c (_gpgme_engine_set_status_handler): New function.
(_gpgme_engine_set_command_handler): Likewise.
(_gpgme_engine_set_colon_line_handler):
Likewise.
(_gpgme_engine_op_decrypt): Likewise.
(_gpgme_engine_op_delete): Likewise.
(_gpgme_engine_op_encrypt): Likewise.
(_gpgme_engine_op_export): Likewise.
(_gpgme_engine_op_genkey): Likewise.
(_gpgme_engine_op_import): Likewise.
(_gpgme_engine_op_keylist): Likewise.
(_gpgme_engine_op_sign): Likewise.
(_gpgme_engine_op_trustlist): Likewise.
(_gpgme_engine_op_verify): Likewise.
(_gpgme_engine_start): Likewise.

* verify.c (gpgme_op_verify_start): Reimplement in terms of above
functions.
* encrypt.c (gpgme_op_encrypt_start): Likewise.
* decrypt.c (_gpgme_decrypt_start): Likewise.
* passphrase.c (_gpgme_passphrase_start): Likewise.
* keylist.c (gpgme_op_keylist_start): Likewise.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

* types.h: Add types EngineObject and GpgsmObject.

* Makefile.am (libgpgme_la_SOURCES): Add engine-gpgsm.h,
engine-gpgsm.c, engine.h and engine.c.
* engine.h: New file.
* engine.c: Likewise.
* engine-gpgsm.h: Likewise.
*
engine-gpgsm.c: Likewise.

* rungpg.c (_gpgme_gpg_get_version): New function.

(_gpgme_gpg_check_version): Likewise.
* rungpg.h: Add prototypes for _gpgme_gpg_get_version and
_gpgme_gpg_check_version.

* version.c (compare_versions): Rename to ...
(_gpgme_compare_versions): ... this. Make non-static.
(gpgme_check_version): Use _gpgme_compare_versions rather than
compare_versions.
(gpgme_check_engine): Likewise.
* ops.h (_gpgme_get_program_version): Add prototype.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (libgpgme_la_INCLUDES): Remove obsolete directive.
(AM_CPPFLAGS): New directive [BUILD_ASSUAN].
(libgpgme_la_LIBADD): Likewise.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

* version.c: Remove global variables lineno and
tmp_engine_version.
(version_handler): Removed.
(_gpgme_get_program_version): New function.
(get_engine_info): Don't use context and version_handler,
but _gpgme_get_program_version.
* ops.h (_gpgme_get_program_version):
Add prototype for
_gpgme_get_program_version (we expect to use it elsewhere soon).

2001-11-18 Marcus Brinkmann <marcus@g10code.de>

* version.c (get_engine_info): If GnuPG is not available, return
an error message.
* posix-util.c (_gpgme_get_gpg_path): Allow GPG_PATH to be
undefined.
(_gpgme_get_gpgsm_path): New function.
* w32-util.c (find_program_in_registry): New static function.
(_gpgme_get_gpg_path): Allow GPG_PATH to be undefined. Rework
to use find_program_in_registry.
(_gpgme_get_gpgsm_path): New function.
(util.h): Prototype _gpgme_get_gpgsm_path).
* rungpg.c (_gpgme_gpg_spawn): Verify that _gpgme_get_gpg_path()
returns non-null.

2001-11-16 Marcus Brinkmann <marcus@g10code.de>

* decrypt-verify.c: New file.
* Makefile.am (libgpgme_la_SOURCES): Add decrypt-verify.c.

```
* types.h: Add decrypt-verify types.
* ops.h: Likewise.
* context.h: Add result type for decrypt-verify.
* gpgme.h: Add decrypt-verify prototypes.

* decrypt.c (decrypt_status_handler):
Renamed to ...
(_gpgme_decrypt_status_handler): ... this.  Make non-static.
(_gpgme_decrypt_start): New function, derived from
gpgme_op_decrypt_start.
(gpgme_op_decrypt_start): Reimplement in terms of
_gpgme_decrypt_start.
(_gpgme_decrypt_result): New function to retrieve error value.
(gpgme_op_decrypt): Use _gpgme_decrypt_result.
* ops.h: Add prototypes for new functions.

* verify.c (verify_status_handler): Renamed to ...
(_gpgme_verify_status_handler): ... this.  Make non-static.
(gpgme_op_verify_start): Use new function name.
(intersect_stati): Renamed to ...
(_gpgme_intersect_stati): ... this.  Make non-static.
(gpgme_op_verify): Use new name.
* ops.h: Add prototypes for new functions.

2001-11-16  Marcus Brinkmann  <marcus@g10code.de>

* passphrase.c: New file.
* Makefile.am (libgpgme_la_SOURCES): Add passphrase.c.
* ops.h (_gpgme_passphrase_result): Add prototypes from
passphrase.c.
* types.h: Likewise.
* context.h: Add member passphrase to result.
*
gpgme.c (_gpgme_release_result): Release passphrase member.

* decrypt.c: Some formatting and variable name changes (like
CTX instead C).
(struct decrypt_result_s): Remove members now found in
passphrase result.
(_gpgme_release_decrypt_result): Don't release removed members.
(decrypt_status_handler): Call _gpgme_passphrase_status_handler,
and don't handle the cases caught there.
(command_handler): Removed.
(gpgme_op_decrypt_start): Don't set command handler, but invoke
_gpgme_passphrase_start which does it.
(gpgme_op_decrypt): Invoke _gpgme_passphrase_result and drop the
cases covered by it.
```

* sign.c Some formatting and variable name changes (like
CTX instead C).
(struct sign_result_s): Remove members now found in
passphrase result.
(_gpgme_release_sign_result): Don't release removed members.
(sign_status_handler): Call _gpgme_passphrase_status_handler,
and don't handle the cases caught there.
(command_handler): Removed.
(gpgme_op_sign_start): Don't set command
handler, but invoke
_gpgme_passphrase_start which does it.
(gpgme_op_sign): Invoke _gpgme_passphrase_result and drop the
cases covered by it.

2001-11-15 Marcus Brinkmann <marcus@g10code.de>

* decrypt.c (command_handler): Fix last change.

2001-11-15 Marcus Brinkmann <marcus@g10code.de>

* verify.c (_gpgme_release_verify_result): Rename RES to RESULT.
Rename R2 to NEXT_RESULT.
(intersect_stati): Rename RES to RESULT.
(gpgme_get_sig_status): Likewise. Do not check return_type, but
the member verify of result.
(gpgme_get_sig_key): Likewise.

* sign.c (_gpgme_release_sign_result): Rename RES to RESULT. If
RESULT is zero, return.
(sign_status_handler, command_handler): Do not check return_type,
but the member sign of result.
(gpgme_op_sign): Likewise. Drop assertion.

* encrypt.c (_gpgme_release_encrypt_result): Rename RES to RESULT.
If RESULT is zero, return.
(encrypt_status_handler): Do not check return_type, but the member
encrypt of result.
(gpgme_op_encrypt):
Likewise. Drop assertion.

* decrypt.c (_gpgme_release_decrypt_result): Rename RES to RESULT.
(create_result_struct): Do not set result_type.
(command_handler, decrypt_status_handler): Do not check
return_type, but the member decrypt of result.
(gpgme_op_decrypt): Likewise. Drop assertion.

* context.h (enum ResultType): Removed.
(struct gpgme_context_s): Remove member result_type.

(struct result): Replaces union result.
* gpgme.c: Include string.h.
(_gpgme_release_result): Release all members of c->result, which
is now a struct.  Zero out all members of the struct afterwards.

2001-11-11  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (_gpgme_gpg_release): Release GPG->cmd.cb_data.
Release all members of the list GPG->arglist.
Reported by Michael Schmidt <mschmidt@cs.uni-sb.de>.

2001-11-02  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (pipemode_copy): Change type of NBYTES to size_t.

* key.c: Include string.h.
* data.c: Likewise.
* recipient.c: Likewise.

2001-10-29
Marcus Brinkmann  <marcus@g10code.de>

* context.h: New member signers_len.
* signers.c (gpgme_signers_clear): Require that signers are
non-NULL with assertion.  Use signers_len to determine how much
keys to release.  Add documentation.
(gpgme_signers_add): Use signers_len to determine if the buffer is
large enough.  Use xtryrealloc rather than xtrymalloc and copying.
Add documentation.
(gpgme_signers_enum): Use signers_len to determine if key is
available.  Add documentation.

2001-10-22  Marcus Brinkmann  <marcus@g10code.de>

* data.c (_gpgme_data_append): Check if LENGTH is smaller than
ALLOC_CHUNK, not DH->length.

2001-10-17  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c (gpgme_set_protocol): Fix last change.

2001-10-15  Werner Koch  <wk@gnupg.org>

* gpgme.h (GpgmeProtocol): New.
* gpgme.c (gpgme_set_protocol): New.

2001-09-26  Werner Koch  <wk@gnupg.org>

* gpgme.c (gpgme_set_passphrase_cb): Ignore a NULL context.
(gpgme_set_progress_cb): Ditto.
Suggested by Mark Mutz.

2001-09-17 Werner Koch <wk@gnupg.org>

* keylist.c (finish_key): Shortcut for no tmp_key. Changed all
callers to use this function without a check for tmp_key.

* keylist.c (gpgme_op_keylist_next): Reset the key_cond after
emptying the queue. Bug reported by Stphane Corthsy.

2001-09-12 Werner Koch <wk@gnupg.org>

* data.c (gpgme_data_rewind): Allow rewind for callbacks.

2001-09-07 Werner Koch <wk@gnupg.org>

* rungpg.h: Add NO_RECP.
* encrypt.c (encrypt_status_handler): Take on No_RECP.
(gpgme_op_encrypt): Better error return.

* verify.c (verify_status_handler): Take on NODATA.

2001-09-03 Werner Koch <wk@gnupg.org>

* rungpg.h: Added STATUS_INV_RECP.
* gpgme.c (_gpgme_release_result): Add support for new
EncryptResult object.
* encrypt.c (append_xml_encinfo): New.
(encrypt_status_handler): Add some status parsing.
(_gpgme_release_encrypt_result): New.

2001-08-29 Werner Koch <wk@gnupg.org>

* recipient.c (gpgme_recipients_release):
Free the list. By Timo.

* keylist.c (keylist_colon_handler): Do a finish key if we receive
an EOF here. This is probably the reason for a lot of bugs
related to keylisting. It is so obvious. Kudos to Enno Cramer
for pointing that out.

2001-08-28 Werner Koch <wk@gnupg.org>

* gpgme.c, gpgme.h (gpgme_get_op_info): New.
(_gpgme_set_op_info): New.
(_gpgme_release_result): Reset the op_info here.

* sign.c (append_xml_siginfo): New.
(sign_status_handler): Store the sig create information.

2001-07-31  Werner Koch  <wk@gnupg.org>

* encrypt.c (gpgme_op_encrypt): Hack to detect no valid recipients.

2001-07-30  Werner Koch  <wk@gnupg.org>

* gpgme.c (gpgme_get_armor,gpgme_get_textmode): New.

* rungpg.c (build_argv): Disable armor comments
* w32-io.c (build_commandline): Need to add quotes here

2001-07-24  Werner Koch  <wk@gnupg.org>

* data.c (gpgme_data_read): Add a a way to return the available bytes.

2001-07-23  Werner Koch  <wk@gnupg.org>

* util.c: Removed
stpcpy() because we use the version from jnlib.

2001-07-19  Werner Koch  <wk@gnupg.org>

* mkstatus: Define the collating sequence for sort.

2001-06-26  Werner Koch  <wk@gnupg.org>

* rungpg.h: Add STATUS_UNEXPECTED as suggested by Timo.

2001-06-15  Werner Koch  <wk@gnupg.org>

* keylist.c (set_userid_flags): Fixed the assigned values. Kudos
to Timo for pointing this out.

2001-06-01  Werner Koch  <wk@gnupg.org>

* debug.c (_gpgme_debug_begin): Fixed a /tmp race.  Noted by
Johannes Poehlmann.

2001-05-28  Werner Koch  <wk@gnupg.org>

* version.c (gpgme_check_engine): Stop version number parsing at
the opening angle and not the closing one.  By Tommy Reynolds.

2001-05-01  Jos Carlos Garca Sogo <jose@jaimedelamo.eu.org>

* encrypt.c (gpgme_op_encrypt_start): Deleted the assert ( !c->gpg )
line, because it gave an error if another operation had been made
before using the same context.

* decrypt.c (gpgme_op_decrypt_start): The same as above. Also added
one line to release
the gpg object in the context (if any).

2001-04-26  Werner Koch  <wk@gnupg.org>

* key.c, key.h (_gpgme_key_cache_init): New.
(_gpgme_key_cache_add): New.
(_gpgme_key_cache_get): New.
* version.c (do_subsystem_inits): Init the cache.
* keylist.c (finish_key): Put key into the cache
* verify.c (gpgme_get_sig_key): First look into the cache.

2001-04-19  Werner Koch  <wk@gnupg.org>

* keylist.c (parse_timestamp): Adjusted for the changed
--fixed-list-mode of gpg 1.0.4h.

2001-04-05  Werner Koch  <wk@gnupg.org>

* verify.c (gpgme_op_verify_start): Enabled pipemode for detached sigs.

2001-04-04  Werner Koch  <wk@gnupg.org>

* w32-io.c (_gpgme_io_select): Don't select on the writer if there
are still bytes pending.  Timo found this not easy to track down
race condition.

2001-04-02  Werner Koch  <wk@gnupg.org>

* gpgme.h: Add GPGME_ATTR_KEY_{EXPIRED,DISABLED}.
* key.c (gpgme_key_get_ulong_attr): And return those attribs.

* verify.c (gpgme_get_sig_key): Set keyliosting mode
depending on
the mode set in the current context.  Suggested by Timo.

* key.c (gpgme_key_get_ulong_attr): Return can_certify and not
can_encrypt. By Timo.

2001-03-30  Werner Koch  <wk@gnupg.org>

* debug.c (debug_init): Allow to specify a debug file.
(_gpgme_debug_level): New.

* posix-io.c (_gpgme_io_read, _gpgme_io_write): Print output.
(_gpgme_io_select): Debug only with level > 2.

2001-03-15 Werner Koch <wk@gnupg.org>

* rungpg.c: Included time.h.

* key.h: New keyflags for capabilities.
* keylist.c (set_mainkey_capability, set_subkey_capability): New.
(keylist_colon_handler): Parse them.
* gpgme.h: New attribute values for capabilities.
* key.c (gpgme_key_get_string_attr): Return them.
(capabilities_to_string): New.
(gpgme_key_get_ulong_attr): Return the global caps.

2001-03-14 Werner Koch <wk@gnupg.org>

* w32-io.c (destroy_reader,destroy_writer): Fixed syntax error.
Thanks to Jan Oliver Wagner.

2001-03-13 Werner Koch <wk@gnupg.org>

* context.h: Add
invalid and revoke flags to user_id structure.
* keylist.c (gpgme_op_keylist_start): Use --fixed-list-mode.
(keylist_colon_handler): Adjust for that.
(set_userid_flags): New.
(set_mainkey_trust_info): Handle new key invalid flag
(set_subkey_trust_info): Ditto.
* gpgme.h: Add new attributes for key and user ID flags.
* key.c (_gpgme_key_append_name): Init these flags
(gpgme_key_get_as_xml): Print them.
(one_uid_as_xml): New helper for above.
(gpgme_key_get_string_attr, gpgme_key_get_ulong_attr):
Return the new attributes. Enhanced, so that subkey information
can be returned now.

2001-02-28 Werner Koch <wk@gnupg.org>

* w32-io.c (destroy_reader): Set stop_me flag.
(writer,create_writer,destroy_writer,find_writer,kill_writer): New.
(_gpgme_io_write): Use a writer thread to avoid blocking.
(_gpgme_io_close): Cleanup a writer thread
(_gpgme_io_select): Repalce the faked wait on writing by a real
waiting which is now possible due to the use of a writer thread.

2001-02-20

Werner Koch <wk@gnupg.org>

* w32-io.c (destroy_reader,kill_reader): New.
(create_reader, reader): Add a new event to stop the thread.
(_gpgme_io_close): Kill the reader thread.

* posix-io.c (_gpgme_io_select): Handle frozen fds here.
* 32-io.c (_gpgme_io_select): Ditto. Removed a bunch of unused code.

* wait.c: Reworked the whole thing.
* rungpg.c (_gpgme_gpg_new): Init pid to -1.
(_gpgme_gpg_release): Remove the process from the wait queue.

2001-02-19 Werner Koch <wk@gnupg.org>

* w32-io.c (_gpgme_io_set_close_notify): New.
(_gpgme_io_close): Do the notification.

* posix-io.c (_gpgme_io_select): Use a 1 sec timeout and not 200
microseconds.

* wait.c (remove_process): Don't close the fd here.
(do_select): Set the fd to -1 and remove the is_closed flag everywhere.
(_gpgme_wait_on_condition): Remove the assert on the queue and
break out if we could not find the queue. The whole thing should
be reworked.

* posix-io.c (_gpgme_io_set_close_notify): New.
(_gpgme_io_close):
Do the notification.

* rungpg.c (close_notify_handler): New.
(_gpgme_gpg_new): Register a callback for the fd.
(_gpgme_gpg_set_colon_line_handler): Ditto.
(build_argv): Ditto

2001-02-13 Werner Koch <wk@gnupg.org>

* rungpg.c (struct reap_s): Replaced pid_t by int.

* types.h: Add ulong typedef.

* rungpg.c (do_reaping,_gpgme_gpg_housecleaning): New.
(_gpgme_gpg_release): Reap children.
* io.h, posix-io.c (_gpgme_io_kill): New.
* w32-io.c (_gpgme_io_kill): New (dummy).

* keylist.c (gpgme_op_keylist_start): Cancel a pending request.

* posix-io.c (_gpgme_io_read): Add some debug output.
(_gpgme_io_write): Ditto.
(_gpgme_io_select): Increased the timeout.

2001-02-12 Werner Koch <wk@gnupg.org>

Enhanced the signature verification, so that it can how handle
more than one signature and is able to return more information on
the signatures.
* verify.c (gpgme_get_sig_key): New.
(gpgme_get_sig_status): New.

* gpgme.h: Add stdio.h.
(GpgmeSigStat):
New status DIFF.

2001-02-01 Werner Koch <wk@gnupg.org>

* w32-io.c (set_synchronize): Add EVENT_MODIFY_STATE. Add Debug
code to all Set/ResetEvent().

* rungpg.c (read_status): Check for end of stream only if we have
an r. By Timo.

2001-01-31 Werner Koch <wk@gnupg.org>

* wait.c (_gpgme_wait_on_condition): Removed all exit code processing.
(propagate_term_results,clear_active_fds): Removed.
(count_active_fds): Renamed to ..
(count_active_and_thawed_fds): .. this and count only thawed fds.

* rungpg.c (gpg_colon_line_handler): Return colon.eof and not
status.eof ;-)

2001-01-30 Werner Koch <wk@gnupg.org>

* w32-io.c (_gpgme_io_spawn): Use the supplied path arg.

* version.c (get_engine_info): Return better error information.

* posix-util.c, w32-util.c: New.
(_gpgme_get_gpg_path): New, suggested by Jan-Oliver.
* rungpg.c (_gpgme_gpg_spawn): Use new function to get GPG's path.

* signers.c (gpgme_signers_add): Ooops, one should test code and
not just write it;

the newarr was not assigned. Thanks to Jos
for pointing this out. Hmmm, still not tested, why should a coder
test his fix :-)

* w32-io.c: Does now use reader threads, so that we can use
WaitForMultipleObjects.
* sema.h, posix-sema.c, w32-sema.c: Support for Critical sections.
Does currently only work for W32.

* debug.c, util.h : New. Changed all fprintfs to use this new
set of debugging functions.

2001-01-23 Werner Koch <wk@gnupg.org>

* data.c (_gpgme_data_release_and_return_string): Fixed string
termination.

2001-01-22 Werner Koch <wk@gnupg.org>

* delete.c: New.

* signers.c: New.
* key.c (gpgme_key_ref, gpgme_key_unref): New.
* sign.c (gpgme_op_sign_start): Allow the use of other keys.

* version.c (gpgme_get_engine_info,gpgme_check_engine): New.
* rungpg.c (_gpgme_gpg_set_simple_line_handler): New.

2001-01-05 Werner Koch <wk@gnupg.org>

* data.c (gpgme_data_rewind): Allow to rewind data_type_none.

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;;; -*- Mode: lisp -*-

```
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;;; 02111-1307, USA.

(defpackage #:gpgme-system
 (:use #:common-lisp #:asdf))

(in-package #:gpgme-system)

(defsystem gpgme
 :description "GnuPG Made Easy."
 :author "g10 Code GmbH"
  :version "1.15.1"
 :licence "GPL"
 :defsystem-depends-on ("cffi-grovel")
 :depends-on ("cffi" "gpg-error" "trivial-garbage")
 :components ((:file "gpgme-package")
              (:cffi-grovel-file "gpgme-grovel"
               :depends-on ("gpgme-package"))
       (:file "gpgme"
  :depends-on ("gpgme-package" "gpgme-grovel"))))
# -*- mode: org -*-
#+TITLE: GNU Privacy Guard (GnuPG) Made Easy Python Bindings
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltxtra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}
```

* GPGME Python Bindings
 :PROPERTIES:
 :CUSTOM_ID: top
 :END:

** Contents
  :PROPERTIES:
  :CUSTOM_ID: contents
  :END:

- [[file:short-history][A short history of the project]]
- [[file:what-is-new][What's New]]
 - [[file:maintenance-mode][Maintenance Mode]] (from January, 2019)
- [[file:what-was-new][What Was New]]
- [[file:gpgme-python-howto][GPGME Python Bindings HOWTO]]


```
{
   "components":   [{
       "name": "gpg",
           "description":  "OpenPGP",
           "options":      [{
               "name": "Monitor",
               "flags":        1,
               "level":        0,
               "type": 0,
               "alt_type":     0
           }, {
               "name": "verbose",
               "description":  "verbose",
               "level":        0,
               "type": 0,
               "alt_type":     0
           }]
   }]
}
{
   "keys": [{
       "revoked":      false,
           "expired":      false,
           "disabled":     false,
           "invalid":      false,
           "can_encrypt":  true,
           "can_sign":     true,
           "can_certify":  true,
           "can_authenticate":     true,
           "secret":       false,
           "is_qualified": false,
```

"protocol": "OpenPGP",
"fingerprint": "23FD347A419429BACCD5E72D6BC4778054ACD246",
"subkeys": [{
"revoked": false,
"expired": false,
"disabled": false,
"invalid": false,
"can_encrypt": false,
"can_sign": true,
"can_certify": true,
"can_authenticate": true,
"secret": false,
"is_qualified": false,
"is_cardkey": false,
"is_de_vs": false,
"pubkey_algo_name":
"DSA",
"pubkey_algo_string": "dsa1024",
"pubkey_algo": 17,
"length": 1024,
"timestamp": 920892875,
"expires": 0
}, {
"revoked": false,
"expired": false,
"disabled": false,
"invalid": false,
"can_encrypt": true,
"can_sign": false,
"can_certify": false,
"can_authenticate": false,
"secret": false,
"is_qualified": false,
"is_cardkey": false,
"is_de_vs": false,
"pubkey_algo_name": "ELG-E",
"pubkey_algo_string": "elg1024",
"pubkey_algo": 16,
"length": 1024,
"timestamp": 920892914,
"expires": 0
}],
"userids": [{
"revoked": false,
"invalid": false,
"validity": "unknown",
"uid": "Zulu Test (demo key) <zulu@example.net>",
"name": "Zulu Test",

```
            "email":       "zulu@example.net",
            "comment":      "demo key",
            "address":      "zulu@example.net"
         }]
   }]
}
{
   "op": "verify",
   "data": "Hello world",
   "signature": "-----BEGIN PGP SIGNATURE-----
\n\niHAEABECADAWIQSg/0WQu2Ei7e9uPFQtcnzHaGl3NAUCW+we3RIcYWxwaGFAZXhh\nbXBsZS5uZXQ
ACgkQLXJ8x2hpdzSwIgCfdfk+n6SsYwa9SYfBwr/o4FmWsa8Anj3V\n8p3ahr3rxNbK7cDbSk/p1zD0\n=oS5d\n---
--END PGP SIGNATURE-----"
}
{
   "env": {
      "browser": true,
      "es6": true
   },
   "extends": "eslint:recommended",
   "parserOptions": {
      "sourceType": "module"
   },
   "rules": {
      "indent": [
         "warn",
         4
      ],
      "linebreak-style": [
         "error",
         "unix"
      ],
      "quotes": [
         "error",
         "single"
      ],
      "semi": [
         "error",
         "always"
      ],
      "no-var": [
         "warn"
      ],
      "max-len": 1,
      "default-case": 2,
      "no-invalid-this": 2,
      "no-lone-blocks": 1,
      "no-self-compare": 2,
```

"radix": 2,
"no-use-before-define": ["error", {
"functions": false,
"classes": false,
"variables": true
}],
"no-useless-constructor": 1,
"space-before-function-paren": ["error", "always"],
"keyword-spacing": 2,
"spaced-comment": 1,
"space-unary-ops":
2,
"object-curly-spacing": ["error", "always"],
"array-bracket-spacing": ["error", "never"]
}
}
{
"result": {
"considered": 1,
"no_user_id": 0,
"imported_rsa": 0,
"new_user_ids": 0,
"new_sub_keys": 0,
"new_signatures": 0,
"new_revocations": 0,
"secret_read": 0,
"secret_imported": 0,
"secret_unchanged": 0,
"skipped_new_keys": 0,
"not_imported": 0,
"skipped_v3_keys": 0,
"imports": [{
"fingerprint": "E8143C489C8D41124DC40D0B47AF4B6961F04784",
"error_string": "Success",
"status": 1
}]
}
}

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```
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```

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```
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under certain conditions; type `show c' for details.
```

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`Gnomovision' (which makes passes at compilers) written by James Hacker.

<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice

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```
{
  "keys": [{
    "revoked":      false,
      "expired":      false,
      "disabled":     false,
      "invalid":      false,
      "can_encrypt":  true,
      "can_sign":     true,
      "can_certify":  true,
      "can_authenticate":     true,
      "secret":       true,
      "is_qualified": false,
      "protocol":     "OpenPGP",
      "fingerprint":  "A0FF4590BB6122EDEF6E3C542D727CC768697734",
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        "expired":      false,
        "disabled":     false,
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        "is_cardkey":   false,
        "is_de_vs":     false,
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   "pubkey_algo_string":   "dsa1024",
        "keyid":        "2D727CC768697734",
        "keygrip":      "76F7E2B35832976B50A27A282D9B87E44577EB66",
        "pubkey_algo":  17,
        "length":       1024,
        "timestamp":    920882846,
        "expires":      0
      }, {
        "revoked":      false,
```

"expired": false,
"disabled": false,
"invalid": false,
"can_encrypt": true,
"can_sign": false,
"can_certify": false,
"can_authenticate": false,
"is_qualified": false,
"is_cardkey": false,
"is_de_vs": false,
"pubkey_algo_name": "ELG-E",
"pubkey_algo_string": "elg1024",
"keyid": "6AE6D7EE46A871F8",
"keygrip":
"A0747D5F9425E6664F4FFBEED20FBCA79FDED2BD",
"pubkey_algo": 16,
"length": 1024,
"timestamp": 920882959,
"expires": 0
}],
"userids": [{
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"uid": "Alfa Test (demo key) <alfa@example.net>",
"name": "Alfa Test",
"email": "alfa@example.net",
"comment": "demo key",
"address": "alfa@example.net"
}, {
"revoked": false,
"invalid": false,
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"uid": "Alpha Test (demo key) <alpha@example.net>",
"name": "Alpha Test",
"email": "alpha@example.net",
"comment": "demo key",
"address":
"alpha@example.net"
}, {
"revoked": false,
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"uid": "Alice (demo key)",
"name": "Alice",
"email": "",
"comment": "demo key",
"origin": 0,

"last_update": 0
}]
}, {
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"expired": false,
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"invalid": false,
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"can_sign": true,
"can_certify": true,
"can_authenticate": true,
"is_qualified": false,
"protocol": "OpenPGP",
"fingerprint": "D695676BDCEDCC2CDD6152BCFE180B1DA9E3B0B2",
"owner_trust": "unknown",
"origin": 0,
"last_update": 0,
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"expired": false,
"disabled": false,
"invalid": false,
"can_encrypt": false,
"can_sign": true,
"can_certify": true,
"can_authenticate": true,
"secret": false,
"is_qualified": false,
"is_cardkey": false,
"is_de_vs": false,
"pubkey_algo_name": "DSA",
"pubkey_algo_string": "dsa1024",
"keyid": "FE180B1DA9E3B0B2",
"pubkey_algo": 17,
"length": 1024,
"timestamp": 920888034,
"expires": 0
}, {
"revoked": false,
"expired": false,
"disabled": false,
"invalid": false,
"can_encrypt":
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"can_sign": false,
"can_certify": false,
"can_authenticate": false,

"secret": false,
"is_qualified": false,
"is_cardkey": false,
"is_de_vs": false,
"pubkey_algo_name": "ELG-E",
"pubkey_algo_string": "elg1024",
"keyid": "5381EA4EE29BA37F",
"pubkey_algo": 16,
"length": 1024,
"timestamp": 920888071,
"expires": 0
}],
"userids": [{
"revoked": false,
"invalid": false,
"validity": "unknown",
"uid": "Bob (demo key)",
"name": "Bob",
"email": "",
"comment": "demo key"
}, {

"revoked": false,
"invalid": false,
"validity": "unknown",
"uid": "Bravo Test (demo key) <bravo@example.net>",
"name": "Bravo Test",
"email": "bravo@example.net",
"comment": "demo key",
"address": "bravo@example.net"
}]
}]
}
{
"op": "export",
"keys": "alpha@example.net",
"armor": true,
"with-sec-fprs":true
}
{
"name": "gpgmejson",
"description": "Integration with GnuPG",
"path": "/usr/bin/gpgme-json",
"type": "stdio",
"allowed_origins": [
"chrome-extension://kajibbejlbohfaggdiogboambcijhkke/"
]
}

-----BEGIN PGP PUBLIC KEY BLOCK-----

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PTAtrV+REqF/o80dvYcdLvRsV21pvncZz/HXLu1yQ18mC3XObrKokbdgrTTKA5XE
BZkNsqyaMMJauT18H4hYkSg62/tTdO1cu/zWv/LFf7Xyn6+uA74ovXCJlO1s0N2c
PShtr98QRzPMf2owgVk37JnDNp4gGVDGHxSZOuUwxgYAZYnA8SFc+c+3ZrQfY870
+O4j3Mz4p7yD13AwP4buQLBsb/icxekeQCqpRJhLH9f7MdEcGXa1x36RcEkHdu+M
yJ392eMgD+dKNfRCtyTPhjZTxvbNELIBYICfABEBAAG0EHRlc3RAZXhhbXBsZS5v
cmeJAVQEEwEIAD4WIQTUFzW5Ejb9uIIEjFojAWNe7/DLBQUCWuwoSQIbAwUJA8Jn
AAULCQgHAgYVCgkICwIEFgIDAQIeAQIXgAAKCRAjAWNe7/DLBf9kB/wOQ/S60HGw
Fq07W9N01HWULyhHKoMmcHL6rfZ64oDqLxolPSasz7WAMW1jN4qtWJ0mFzwO83V6
kaBe+wF6Kqir6udFSBW9rPcFg6/VZXPltT0a6uacIHq6DyQ5iMW4YQWbVy9OR2rN
GkYo1JCBR0XdRJYCSX3yB4TWv/eXnZ37/WjmiTOIZh35rjs+NuU/S5JPDfAp2/k7
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1J8Nsv87SZeEuQENBFrsKEkBCADjoEBhG/QPqZHg8VyoD1xYRAWGxyDJkX/GrSs6
yE+x2hk5FoQCajxKa/d4AVxOnJpdwhAfeXeSNaql5Ejgzax+Tdj9BV6vtGVJVv0p
O7bgAiZxkA6RHxtNqhpPnPQoXvUzkzpRgpuL+Nj4yIg7z1ITH6KQH4u5SI9vd+j/
8i9Taz67pdZwuJjac8qBuJHjzAo1bjYctFYUSG5pbmMQyNLySzgiNkFa4DajODlt
3RuqVGP316Fk+Sy2+60tC/HlX8jgMyMONfOGBQx6jk8tvAphS/LAqrrNepnagIyL
UGKU+L8cB2g1PGGp2biBFWqZbudZoyRBet/0yH/zirBdQJw1ABEBAAGJATwEGAEI
ACYWIQTUFzW5Ejb9uIIEjFojAWNe7/DLBQUCWuwoSQIbDAUJA8JnAAAKCRAjAWNe
7/DLBf0pCACPp5hBuUWngu2Hqvg+tNiujfsiYzId3MffFxEk3CbXeHcJ5F32NDJ9
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k6H+vlNOHGRgnpI/OZZjnUuUfBUvMGHr1phW+y7aeymC9PnUGdViRdJe23nntMSD
A+0/I7ESO9JsWvJbyBmuiZpu9JjScOjYH9xpQLqRNyw4WHpZriN69F0t9Mmd7bM1
+UyPgbPEr0iWMeyctYsuOLeUyQKMscDT
=QyY6
-----END
 PGP PUBLIC KEY BLOCK-----
Using gpgme.js
---
At first, make sure that the environment you want to use gpgme.js in has access
and permissions for nativeMessaging, and gpgme-json installed. For details,
see the README.

The library itself is started via the {@link init} method. This will test the
nativeMessaging connection, and then resolve into an Object offering
the top level API:

* [encrypt]{@link GpgME#encrypt}
* [decrypt]{@link GpgME#decrypt}
* [sign]{@link GpgME#sign}
* [verify]{@link GpgME#verify}
* [Keyring]{@link GPGME_Keyring}

```
```

```
gpgmejs.init()
  .then(function(GPGME) {
      // using GPGME
  }, function(error){
      // error handling;
  })
```

All methods that require communication with nativeMessaging are asynchronous, using Promises. Rejections will be instances of {@link GPGME_Error}.

An exaeption are Keys, which can be initialized in a 'sync' mode, allowing them to be cached and used synchronously until manually refreshed.

Keyring and Keys
---
The gnupg keys
 can be accessed via the [Keyring]{@link GPGME_Keyring}.

The Keyring offers the methods for accessing information on all Keys known to gnupg.

**Due to security constraints, the javascript-binding currently only offers limited support for secret-Key interaction.**

The existence of secret Keys is not secret, and those secret Keys can be used for signing, but Operations that may expose, modify or delete secret Keys are not supported.

* [getKeysArmored]{@link GPGME_Keyring#getKeysArmored}
* [getKeys]{@link GPGME_Keyring#getKeys}
* [getDefaultKey]{@link GPGME_Keyring#getDefaultKey}
* [generateKey]{@link GPGME_Keyring#generateKey}
* [deleteKey]{@link GPGME_Keyring#deleteKey}

{
  "op": "decrypt",
  "data":
"hQEOA2rm1+5GqHH4EAQAhzzu7VYpE9vFVdqkAALRHSyz8698b8MES7j5ldzXGVnGSWmN0+YXGyWyeB
5tnAXAvUiV10tzoiNaPXoNeOFrHQOWrDsQ1vYukdtblDc3FW/Ywf7aelcFIGh9qydmkPX/EPeULsbgdZp6sybGo
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SZMvMHCu8YVlV40rHFjjoKQ1ox9DHHyvaZkwAZbI/U7+CYZoPoXMAARjCCCW4TIB3VrM70QLjnLSVfW
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azyBy74ibvrXrIvHnhHQvPCkZFRdbgYhV/+KQIQ==",
  "base64": true
}
;;;; gpgme-grovel.lisp

;;; This file is part of GPGME-CL.

```
;;;
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;;; under the terms of the GNU General Public License as published by
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(in-package :gpgme)


(include "errno.h" "sys/types.h")

(constant (+ebadf+ "EBADF"))

(ctype off-t "off_t")
(ctype size-t "size_t")
(ctype ssize-t "ssize_t")

(cvar ("errno" *errno*) :int)
```


```
{
  "op": "version"
}
(21:protected-private-key(3:dsa(1:p129:_d8|po3s@!WGUOAXRC$_[8SN:y|o?2[.pVxn(kOc\Bk0zu&FnK)(1:q21:
vBeOP\P)(1:g129:fU/e(2hp@hjc2uE=Sg GO;ZkIyFnGM!GsG@
=  _SZklI)(1:y128:K:9tA]4SU1 }sG`nZpx/imV^>A;V%?5!!sS{!=-6@|
=d
)(9:protected25:openpgp-s2k3-sha1-aes-cbc((4:sha18:Li7:6452224)16:,kO{,)80:z7OCG/sB48(H9%*ojSO
OGSma`YUs1h<_)(12:protected-at15:20130812T105134)))
```


```
For a list of the authors of the source code of GPGME, please see the
file AUTHORS.  The following people supported GPGME development in
various ways (for example by finding bugs or giving advice), and we
want to thank them for their help.  If we forgot you, please let us
know.

Adriaan de Groot        adridg@cs.kun.nl
Albrecht Dre  albrecht.dress@arcor.de
Alfons Hoogervorst      alfons@proteus.demon.nl
Daniel Mueller  daniel@danm.de
Enno Cramer             uebergeek@web.de
```

Frank Heckenbach frank@g-n-u.de
Igor Belyi gpgme@katehok.ac93.org
Jan-Oliver Wagner jan@intevation.de
Johannes Poehlmann jhp@caldera.de
Jose C. Garca Sogo jose@jaimedelamo.eu.org
Leo Gaspard ekleog@gmail.com
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Timo Schulz twoaday@freakmail.de
Tommy Reynolds reynolds@redhat.com
W.
Trevor King wking@tremily.us

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\usepackage{graphicx}
\usepackage{grffile}
\usepackage{longtable}
\usepackage{wrapfig}
\usepackage{rotating}
\usepackage[normalem]{ulem}
\usepackage{amsmath}
\usepackage{textcomp}
\usepackage{amssymb}
\usepackage{capt-of}
\usepackage{hyperref}
\usepackage{xltxtra}
\usepackage[margin=1in]{geometry}
\setmainfont[Ligatures={Common}]{Times New Roman}
\author{Ben McGinnes <ben@gnupg.org>}
\author{Ben McGinnes}
\date{\today}
\title{GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)}
\hypersetup{
pdfauthor={Ben McGinnes},

pdftitle={GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)},
pdfkeywords={},
pdfsubject={},
pdfcreator={Emacs 26.1 (Org mode 9.1.14)},
pdflang={English}}
\begin{document}

\maketitle
\tableofcontents

\section{Introduction}
\label{sec:org8e5fa02}
\begin{center}
\begin{tabular}{ll}
Version: & 0.1.4\\
GPGME Version: & 1.12.1\\
Author: & Ben
 McGinnes <ben@gnupg.org>\\
Author GPG Key: & DB4724E6FA4286C92B4E55C4321E4E2373590E5D\\
Language: & Australian English, British English\\
Language codes: & en-AU, en-GB, en\\
\end{tabular}
\end{center}

This document provides basic instruction in how to use the GPGME
Python bindings to programmatically leverage the GPGME library.

\subsection{Python 2 versus Python 3}
\label{sec:org517cbf4}
Though the GPGME Python bindings themselves provide support for both
Python 2 and 3, the focus is unequivocally on Python 3 and
specifically from Python 3.4 and above.  As a consequence all the
examples and instructions in this guide use Python 3 code.

Much of it will work with Python 2, but much of it also deals with
Python 3 byte literals, particularly when reading and writing data.
Developers concentrating on Python 2.7, and possibly even 2.6, will
need to make the appropriate modifications to support the older string
and unicode types as opposed to bytes.

There are multiple reasons for concentrating
 on Python 3; some of
which relate to the immediate integration of these bindings, some of
which relate to longer term plans for both GPGME and the python
bindings and some of which relate to the impending EOL period for

Python 2.7.  Essentially, though, there is little value in tying the
bindings to a version of the language which is a dead end and the
advantages offered by Python 3 over Python 2 make handling the data
types with which GPGME deals considerably easier.

\subsection{Examples}
\label{sec:org2c08d53}
All of the examples found in this document can be found as Python 3
scripts in the \texttt{lang/python/examples/howto} directory.

\subsection{Unofficial Drafts}
\label{sec:orgceb2216}
In addition to shipping with each release of GPGME, there is a section
on locations to read or download \hyperref[sec:org080a94a]{draft editions} of this document from
at the end of it.  These are unofficial versions produced in between
major releases.

\subsection{What's New}
\label{sec:orga79ddc2}
Full
 details of what is new are now available in the \href{what-is-new.org}{What's New} file
and archives of the preceding \emph{What's New} sections are available in
the \href{what-was-new}{What Was New} file.

\subsubsection{New in GPGME 1130}
\label{sec:org746b75d}
See the \href{what-is-new\#new-stuff-1-13-0}{What's New} document for what is new in version 1.13.0.

\subsubsection{New in GPGME 1120}
\label{sec:org7adcade}
See the \href{what-was-new\#new-stuff-1-12-0}{What Was New} document for what was new in version 1.12.0.

\section{GPGME Concepts}
\label{sec:orgb257fc1}
\subsection{A C API}
\label{sec:org4fe1dfa}
Unlike many modern APIs with which programmers will be more familiar
with these days, the GPGME API is a C API.  The API is intended for
use by C coders who would be able to access its features by including
the \texttt{gpgme.h} header file with their own C source code and then access
its functions just as they would any other C headers.

This is a very
effective method of gaining complete access to the API
and in the most efficient manner possible. It does, however, have the
drawback that it cannot be directly used by other languages without
some means of providing an interface to those languages. This is
where the need for bindings in various languages stems.

\subsection{Python bindings}
\label{sec:org0e49e52}
The Python bindings for GPGME provide a higher level means of
accessing the complete feature set of GPGME itself. It also provides
a more pythonic means of calling these API functions.

The bindings are generated dynamically with SWIG and the copy of
\texttt{gpgme.h} generated when GPGME is compiled.

This means that a version of the Python bindings is fundamentally tied
to the exact same version of GPGME used to generate that copy of
\texttt{gpgme.h}.

\subsection{Difference between the Python bindings and other GnuPG Python packages}
\label{sec:org97acfd7}
There have been numerous attempts to add GnuPG support to Python
over
the years. Some of the most well known are listed here, along with
what differentiates them.

\subsubsection{The python-gnupg package maintained by Vinay Sajip}
\label{sec:org0136847}
This is arguably the most popular means of integrating GPG with
Python. The package utilises the \texttt{subprocess} module to implement
wrappers for the \texttt{gpg} and \texttt{gpg2} executables normally invoked on the
command line (\texttt{gpg.exe} and \texttt{gpg2.exe} on Windows).

The popularity of this package stemmed from its ease of use and
capability in providing the most commonly required features.

Unfortunately it has been beset by a number of security issues in the
past; most of which stemmed from using unsafe methods of accessing the
command line via the \texttt{subprocess} calls. While some effort has been
made over the last two to three years (as of 2018) to mitigate this,
particularly by no longer providing shell access through those
subprocess calls, the wrapper is still somewhat
limited in the scope
of its GnuPG features coverage.

The python-gnupg package is available under the MIT license.

\subsubsection{The gnupg package created and maintained by Isis Lovecruft}
\label{sec:orgdc03987}
In 2015 Isis Lovecruft from the Tor Project forked and then
re-implemented the python-gnupg package as just gnupg.  This new
package also relied on subprocess to call the \texttt{gpg} or \texttt{gpg2}
binaries, but did so somewhat more securely.

The naming and version numbering selected for this package, however,
resulted in conflicts with the original python-gnupg and since its
functions were called in a different manner to python-gnupg, the
release of this package also resulted in a great deal of consternation
when people installed what they thought was an upgrade that
subsequently broke the code relying on it.

The gnupg package is available under the GNU General Public License
version 3.0 (or any later version).

\subsubsection{The PyME package maintained by Martin
Albrecht}
\label{sec:org715600b}
This package is the origin of these bindings, though they are somewhat
different now.  For details of when and how the PyME package was
folded back into GPGME itself see the \href{short-history.org}{Short History} document.\footnote{\texttt{short-history} and/or \texttt{short-history.html}.}

The PyME package was first released in 2002 and was also the first
attempt to implement a low level binding to GPGME.  In doing so it
provided access to considerably more functionality than either the
\texttt{python-gnupg} or \texttt{gnupg} packages.

The PyME package is only available for Python 2.6 and 2.7.

Porting the PyME package to Python 3.4 in 2015 is what resulted in it
being folded into the GPGME project and the current bindings are the
end result of that effort.

The PyME package is available under the same dual licensing as GPGME
itself: the GNU General Public License version 2.0 (or any later
version) and the GNU Lesser General Public License version
2.1 (or any
later version).

\section{GPGME Python bindings installation}
\label{sec:org73d8d6f}
\subsection{No PyPI}
\label{sec:orgec9a038}
Most third-party Python packages and modules are available and
distributed through the Python Package Installer, known as PyPI.

Due to the nature of what these bindings are and how they work, it is
infeasible to install the GPGME Python bindings in the same way.

This is because the bindings use SWIG to dynamically generate C
bindings against \texttt{gpgme.h} and \texttt{gpgme.h} is generated from
\texttt{gpgme.h.in} at compile time when GPGME is built from source.  Thus to
include a package in PyPI which actually built correctly would require
either statically built libraries for every architecture bundled with
it or a full implementation of C for each architecture.

See the additional notes regarding \hyperref[sec:org645735a]{CFFI and SWIG} at the end of this
section for further details.

\subsection{Requirements}
\label{sec:org2f7f06c}
The
 GPGME Python bindings only have three requirements:

\begin{enumerate}
\item A suitable version of Python 2 or Python 3.  With Python 2 that
means CPython 2.7 and with Python 3 that means CPython 3.4 or
higher.
\item \href{https://www.swig.org}{SWIG}.
\item GPGME itself.  Which also means that all of GPGME's dependencies
must be installed too.
\end{enumerate}

\subsubsection{Recommended Additions}
\label{sec:org25bd7d4}
Though none of the following are absolute requirements, they are all
recommended for use with the Python bindings.  In some cases these
recommendations refer to which version(s) of CPython to use the
bindings with, while others refer to third party modules which provide
a significant advantage in some way.

\begin{enumerate}
\item If possible, use Python 3 instead of 2.
\item Favour a more recent version of Python since even 3.4 is due to
reach EOL soon.  In production systems and services, Python 3.6

should be robust enough to be relied on.
\item If possible add the
following Python modules which are not part of
the standard library: \href{http://docs.python-requests.org/en/latest/index.html}{Requests},
\href{https://cython.org/}{Cython}, \href{https://pendulum.eustace.io/}{Pendulum} and
\href{https://github.com/Selfnet/hkp4py}{hkp4py}.
\end{enumerate}

Chances are quite high that at least the first one and maybe two of
those will already be installed.

Note that, as with Cython, some of advanced use case scenarios will
bring with them additional requirements. Most of these will be fairly
well known and commonly installed ones, however, which are in many
cases likely to have already been installed on many systems or be
familiar to Python programmers.

\subsection{Installation}
\label{sec:orgf1c7587}
Installing the Python bindings is effectively achieved by compiling
and installing GPGME itself.

Once SWIG is installed with Python and all the dependencies for GPGME
are installed you only need to confirm that the version(s) of Python
you want the
bindings installed for are in your \texttt{\$PATH}.

By default GPGME will attempt to install the bindings for the most
recent or highest version number of Python 2 and Python 3 it detects
in \texttt{\$PATH}. It specifically checks for the \texttt{python} and \texttt{python3}
executables first and then checks for specific version numbers.

For Python 2 it checks for these executables in this order: \texttt{python},
\texttt{python2} and \texttt{python2.7}.

For Python 3 it checks for these executables in this order: \texttt{python3},
\texttt{python3.7}, \texttt{python3.6}, \texttt{python3.5} and \texttt{python3.4}.\footnote{With no issues reported
specific to Python 3.7, the release of
Python 3.7.1 at around the same time as GPGME 1.12.0 and the testing
with Python 3.7.1rc1, there is no reason to delay moving 3.7 ahead of
3.6 now. Production environments with more conservative requirements
will always enforce their own policies anyway and installation to each
supported minor release
is quite possible too.}

On systems where \texttt{python} is actually \texttt{python3} and not \texttt{python2} it
may be possible that \texttt{python2} may be overlooked, but there have been

no reports of that actually occurring as yet.

In the three months or so since the release of Python 3.7.0 there has
been extensive testing and work with these bindings with no issues
specifically relating to the new version of Python or any of the new
features of either the language or the bindings.  This has also been
the case with Python 3.7.1rc1.  With that in mind and given the
release of Python 3.7.1 is scheduled for around the same time as GPGME
1.12.0, the order of preferred Python versions has been changed to
move Python 3.7 ahead of Python 3.6.

\subsubsection{Installing GPGME}
\label{sec:org903bd67}
See the GPGME \texttt{README} file for details of how to install GPGME from
source.

\subsection{Known Issues}
\label{sec:org0d2a332}
There are a few known issues with the current build process
 and the
Python bindings.  For the most part these are easily addressed should
they be encountered.

\subsubsection{Breaking Builds}
\label{sec:orgbac75f3}
Occasionally when installing GPGME with the Python bindings included
it may be observed that the \texttt{make} portion of that process induces a
large very number of warnings and, eventually errors which end that
part of the build process.  Yet following that with \texttt{make check} and
\texttt{make install} appears to work seamlessly.

The cause of this is related to the way SWIG needs to be called to
dynamically generate the C bindings for GPGME in the first place.  So
the entire process will always produce \texttt{lang/python/python2-gpg/} and
\texttt{lang/python/python3-gpg/} directories.  These should contain the
build output generated during compilation, including the complete
bindings and module installed into \texttt{site-packages}.

Occasionally the errors in the early part or some other conflict
(e.g. not installing
 as \textbf{\emph{root}} or \textbf{\emph{su}}) may result in nothing
being installed to the relevant \texttt{site-packages} directory and the
build directory missing a lot of expected files.  Even when this
occurs, the solution is actually quite simple and will always work.

That solution is simply to run the following commands as either the
\textbf{root} user or prepended with \texttt{sudo -H}\footnote{Yes, even if you use virtualenv with everything you do in
Python.  If you want to install this module as just your user account
then you will need to manually configure, compile and install the
\emph{entire} GnuPG stack as that user as well.  This includes libraries
which are not often installed that way.  It can be done and there are
circumstances under which it is worthwhile, but generally only on
POSIX systems which utilise single user mode (some even require it).} in the \texttt{lang/python/}
directory:

\begin{verbatim}
/path/to/pythonX.Y setup.py build
/path/to/pythonX.Y setup.py
 build
/path/to/pythonX.Y setup.py install
\end{verbatim}

Yes, the build command does need to be run twice.  Yes, you still need
to run the potentially failing or incomplete steps during the
\texttt{configure}, \texttt{make} and \texttt{make install} steps with installing GPGME.
This is because those steps generate a lot of essential files needed,
both by and in order to create, the bindings (including both the
\texttt{setup.py} and \texttt{gpgme.h} files).


\begin{enumerate}
\item IMPORTANT Note
\label{sec:org37f3d4a}
If specifying a selected number of languages to create bindings for,
try to leave Python last.  Currently the majority of the other
language bindings are also preceding Python of either version when
listed alphabetically (not counting the Qt bindings).

If Python is set to precede one of the other languages then it is
possible that the errors described here may interrupt the build
process before generating bindings for those other languages.  In
these cases it may be preferable
 to configure all preferred language
bindings separately with alternative \texttt{configure} steps for GPGME using
the \texttt{-{}-enable-languages=\$LANGUAGE} option.

Alternatively \texttt{make} (or \texttt{gmake}, depending on your platform) may be
run with the the \texttt{-k} option, which tells make to keep going even if
errors are encountered.  In that case the failure of one language's
set of bindings to build should not hamper another language's bindings
to build.
\end{enumerate}

\subsubsection{Reinstalling Responsibly}
\label{sec:org21e4dec}
Regardless of whether you're installing for one version of Python or several, there will come a point where reinstallation is required. With most Python module installations, the installed files go into the relevant site-packages directory and are then forgotten about. Then the module is upgraded, the new files are copied over the old and that's the end of the matter.

While the same is true of these bindings, there have been intermittent issues
observed on some platforms which have benefited significantly from removing all the previous installations of the bindings before installing the updated versions.

Removing the previous version(s) is simply a matter of changing to the relevant \texttt{site-packages} directory for the version of Python in question and removing the \texttt{gpg/} directory and any accompanying egg-info files for that module.

In most cases this will require root or administration privileges on the system, but the same is true of installing the module in the first place.

\subsubsection{Multiple installations}
\label{sec:org30b18bd}
For a variety of reasons it may be either necessary or just preferable to install the bindings to alternative installed Python versions which meet the requirements of these bindings.

On POSIX systems this will generally be most simply achieved by running the manual installation commands (build, build, install) as described in the previous section for each Python
installation the
bindings need to be installed to.

As per the SWIG documentation: the compilers, libraries and runtime used to build GPGME and the Python Bindings \textbf{must} match those used to compile Python itself, including the version number(s) (at least going by major version numbers and probably minor numbers too).

On most POSIX systems, including OS X, this will very likely be the case in most, if not all, cases.

Note that from GPGME \href{https://dev.gnupg.org/rMff6ff616aea6f59b7f2ce1176492850ecdf3851e}{1.12.1} the

default installation installs to each
version of Python it can find first.  That is that it will currently
install for the first copies of Python versions 2.7, 3.4, 3.5, 3.6,
3.7 and 3.8 (dev branch) that it finds.  Usually this will be in the
same prefix as GPGME itself, but is dictated by the \texttt{\$PATH} when the
installation is performed.  The above instructions can still be
performed on other python installations which the installer does not
find,
 including alternative prefixes.

\subsubsection{Won't Work With Windows}
\label{sec:org0ebae3a}
There are semi-regular reports of Windows users having considerable
difficulty in installing and using the Python bindings at all.  Very
often, possibly even always, these reports come from Cygwin users
and/or MinGW users and/or Msys2 users.  Though not all of them have
been confirmed, it appears that these reports have also come from
people who installed Python using the Windows installer files from the
\href{https://python.org}{Python website} (i.e. mostly MSI installers, sometimes self-extracting
\texttt{.exe} files).

The Windows versions of Python are not built using Cygwin, MinGW or
Msys2; they're built using Microsoft Visual Studio.  Furthermore the
version used is \emph{considerably} more advanced than the version which
MinGW obtained a small number of files from many years ago in order to
be able to compile anything at all.  Not only that, but there are
changes to the version of
 Visual Studio between some micro releases,
though that is is particularly the case with Python 2.7, since it has
been kept around far longer than it should have been.

There are two theoretical solutions to this issue:

\begin{enumerate}
\item Compile and install the GnuPG stack, including GPGME and the
Python bindings using the same version of Microsoft Visual Studio
used by the Python Foundation to compile the version of Python
installed.

If there are multiple versions of Python then this will need to be
done with each different version of Visual Studio used for those
versions of Python.

\item Compile and install Python using the same tools used by choice,
such as MinGW or Msys2.
\end{enumerate}

Do \textbf{not} use the official Windows installer for Python unless following the first method.

In this type of situation it may even be for the best to accept that there are less limitations on permissive software than free software and simply opt to use a recent version of the Community Edition of Microsoft Visual Studio to compile and build all of it, no matter what.

Investigations into the extent or the limitations of this issue are ongoing.

The following table lists the version of Microsoft Visual Studio which needs to be used when compiling GPGME and the Python bindings with each version of the CPython binary released \href{https://www.python.org/downloads/windows/}{for Windows}:

\begin{center}
\begin{tabular}{rll}
CPython & Microsoft product name & runtime filename\\
2.7.6 & Visual Studio 2008 & MSVCR90.DLL\\
3.4.0 & Visual Studio 2010 & MSVCR100.DLL\\
3.5.0 & Visual Studio 2015 & \textbf{see below}\\
3.6.0 & Visual Studio 2015 & \textbf{see below}\\
3.7.0 & Visual Studio 2017* & \textbf{see below}\\
\end{tabular}
\end{center}

It is important to note that MingW and Msys2 ship with the Visual C runtime from Microsoft Visual Studio 2005 and are thus \textbf{incompatible} with all the versions of CPython which can be used with the GPGME Python bindings.

It is also important to note that from CPython 3.5 onwards, the Python Foundation has adopted the reworking of the Visual C runtime which was performed for Visual Studio 2015 and aimed at resolving many of these kinds of issues. Much greater detail on these issues and the correct file(s) to link to are available from Matthew Brett's invaluable page, \href{https://matthew-brett.github.io/pydagogue/python_msvc.html}{Using Microsoft Visual C with Python}. It is also worth reading the Microsoft Developer Network blog post on \href{http://blogs.msdn.com/b/vcblog/archive/2015/03/03/introducing-the-universal-crt.aspx}{the universal CRT} and Steve Dower's blog posts on Python extensions (\href{http://stevedower.id.au/blog/building-for-python-3-5}{part 1} and \href{http://stevedower.id.au/blog/building-for-python-3-5-part-two}{part 2}).

The second of those two posts by Steve Dower contains the details of

specific configuration options required for compiling anything to be
used with official CPython
releases. In addition to those
configuration and compiler settings to use, the versions of Visual
Studio prior to Visual Studio 2015 did not support 64-bit systems by
default. So compiling a 64-bit version of these bindings for a 64-bit
version of CPython 2.7 or 3.4 requires additional work.

In addition to the blog posts, the \href{https://wiki.python.org/moin/WindowsCompilers}{Windows compilers}
wiki page on the
CPython wiki is another essential reference on the relevant versions
of Visual Studio to use and the degree of compatibility with CPython
releases.

Eventually someone will ask why there isn't an installable binary for
Windows, which the GPGME of the licenses do not preclude as long as
the source code is available in conjunction with such a release.

The sheer number of versions of Visual Studio in conjunction with
differing configuration options depending on the target Windows
version and whether the architecture is 64-bit or 32-bit makes it
difficult to provide a correct
binary installer for Windows users. At
the bare minimum doing so would require the GnuPG project compile ten
different versions of the bindings with each release; both 32-bit and
64-bit versions for CPython 2.7 and 3.4, with 64-bit versions for both
x86-64 (i.e. Intel and AMD) and ARM architectures for CPython 3.5,
3.6, 3.7 and later releases. That's the bare \textbf{minimum}, it'd probably
be higher.

Additionally, with only a binary installation used in conjunction with
the CPython installer from \texttt{python.org} the advanced options available
which utilise \hyperref[sec:org3b53926]{Cython} will not be able to be used at all. Cython
depends on being able to compile the C code it generates and that too
would need to utilise a matching runtime to both the installed version
of CPython and these bindings in order to work with the bindings.

Considering all of that, what do we recommend?

\begin{enumerate}
\item Use a recent version of CPython; at least 3.5, but ideally 3.6 or
later.

\item
Use Visual Studio 2015 or the standalone build tools for Visual
Studio 2017 (or later).

\item Compile both CPython and GPGME with these bindings using the tools

selected in step 2.

\item Ignore MingW, Msys2 and the official CPython binary installers.

\item Be thankful the answer to this question wasn't simply to say
something like, install Linux or install FreeBSD (or even
Apple's OS X).
\end{enumerate}

\subsubsection{CFFI is the Best and GPGME should use it instead of SWIG}
\label{sec:org645735a}
There are many reasons for favouring \href{https://cffi.readthedocs.io/en/latest/overview.html}{CFFI} and proponents of it are
quite happy to repeat these things as if all it would take to switch
from SWIG to CFFI is repeating that list as if it were a new concept.

The fact is that there are things which Python's CFFI implementation
cannot handle in the GPGME C code. Beyond that there are features of
SWIG which are simply not available with CFFI at all. SWIG generates
the
bindings to Python using the \texttt{gpgme.h} file, but that file is not
a single version shipped with each release, it too is generated when
GPGME is compiled.

CFFI is currently unable to adapt to such a potentially mutable
codebase. If there were some means of applying SWIG's dynamic code
generation to produce the Python/CFFI API modes of accessing the GPGME
libraries (or the source source code directly), but such a thing does
not exist yet either and it currently appears that work is needed in
at least one of CFFI's dependencies before any of this can be
addressed.

So if you're a massive fan of CFFI; that's great, but if you want this
project to switch to CFFI then rather than just insisting that it
should, I'd suggest you volunteer to bring CFFI up to the level this
project needs.

If you're actually seriously considering doing so, then I'd suggest
taking the \texttt{gpgme-tool.c} file in the GPGME \texttt{src/} directory and
getting that to work with any of the CFFI API methods
(not the ABI
methods, they'll work with pretty much anything). When you start
running into trouble with "ifdefs" then you'll know what sort of
things are lacking. That doesn't even take into account the amount of
work saved via SWIG's code generation techniques either.

\subsubsection{Virtualised Environments}
\label{sec:orgb0d56f5}
It is fairly common practice amongst Python developers to, as much as possible, use packages like virtualenv to keep various things that are to be installed from interfering with each other. Given how much of the GPGME bindings is often at odds with the usual pythonic way of doing things, it stands to reason that this would be called into question too.

As it happens the answer as to whether or not the bindings can be used with virtualenv, the answer is both yes and no.

In general we recommend installing to the relevant path and matching prefix of GPGME itself. Which means that when GPGME, and ideally the rest of the GnuPG stack, is installed to a prefix like \texttt{/usr/local} or \texttt{/opt/local} then the bindings would need to be installed to the main Python installation and not a virtualised abstraction. Attempts to separate the two in the past have been known to cause weird and intermittent errors ranging from minor annoyances to complete failures in the build process.

As a consequence we only recommend building with and installing to the main Python installations within the same prefix as GPGME is installed to or which are found by GPGME's configuration stage immediately prior to running the make commands. Which is exactly what the compiling and installing process of GPGME does by default.

Once that is done, however, it appears that a copy of the compiled module may be installed into a virtualenv of the same major and minor version matching the build. Alternatively it is possible to utilise a \texttt{sites.pth} file in the \texttt{site-packages/} directory of a virtualenv installation, which links back to the system installations corresponding directory in order to import anything installed system wide. This may or may not be appropriate on a case by case basis.

Though extensive testing of either of these options is not yet complete, preliminary testing of them indicates that both are viable as long as the main installation is complete. Which means that certain other options normally restricted to virtual environments are also available, including integration with pythonic test suites (e.g. \href{https://docs.pytest.org/en/latest/index.html}{pytest}) and other large projects.

That said, it is worth reiterating the warning regarding non-standard installations. If one were to attempt to install the bindings only to a virtual environment without somehow also including the full GnuPG stack (or enough of it as to include GPGME) then it is highly likely

that errors would be encountered at some point and more than a little
likely that the build process itself would break.

If a degree of separation
 from the main operating system is still
required in spite of these warnings, then consider other forms of
virtualisation.  Either a virtual machine (e.g. \href{https://www.virtualbox.org/}{VirtualBox}), a
hardware emulation layer (e.g. \href{https://www.qemu.org/}{QEMU}) or an application container
(e.g. \href{https://www.docker.com/why-docker}{Docker}).

Finally it should be noted that the limited tests conducted thus far
have been using the \texttt{virtualenv} command in a new directory to create
the virtual python environment.  As opposed to the standard \texttt{python3
-m venv} and it is possible that this will make a difference depending
on the system and version of Python in use.  Another option is to run
the command \texttt{python3 -m virtualenv /path/to/install/virtual/thingy}
instead.

\section{Fundamentals}
\label{sec:org832642e}
Before we can get to the fun stuff, there are a few matters regarding
GPGME's design which hold true whether you're dealing with the C code
directly
 or these Python bindings.

\subsection{No REST}
\label{sec:org3d694ba}
The first part of which is or will be fairly blatantly obvious upon
viewing the first example, but it's worth reiterating anyway.  That
being that this API is \emph{\textbf{not}} a REST API.  Nor indeed could it ever
be one.

Most, if not all, Python programmers (and not just Python programmers)
know how easy it is to work with a RESTful API.  In fact they've
become so popular that many other APIs attempt to emulate REST-like
behaviour as much as they are able.  Right down to the use of JSON
formatted output to facilitate the use of their API without having to
retrain developers.

This API does not do that.  It would not be able to do that and also
provide access to the entire C API on which it's built.  It does,
however, provide a very pythonic interface on top of the direct
bindings and it's this pythonic layer that this HOWTO deals with.

\subsection{Context}

\label{sec:org10e4004}
One of the reasons which prevents
this API from being RESTful is that
most operations require more than one instruction to the API to
perform the task.  Sure, there are certain functions which can be
performed simultaneously, particularly if the result known or strongly
anticipated (e.g. selecting and encrypting to a key known to be in the
public keybox).

There are many more, however, which cannot be manipulated so readily:
they must be performed in a specific sequence and the result of one
operation has a direct bearing on the outcome of subsequent
operations.  Not merely by generating an error either.

When dealing with this type of persistent state on the web, full of
both the RESTful and REST-like, it's most commonly referred to as a
session.  In GPGME, however, it is called a context and every
operation type has one.

\section{Working with keys}
\label{sec:orgff114ca}
\subsection{Key selection}
\label{sec:org6589217}
Selecting keys to encrypt to or to sign with will be a common
occurrence when working with
GPGMe and the means available for doing
so are quite simple.

They do depend on utilising a Context; however once the data is
recorded in another variable, that Context does not need to be the
same one which subsequent operations are performed.

The easiest way to select a specific key is by searching for that
key's key ID or fingerprint, preferably the full fingerprint without
any spaces in it.  A long key ID will probably be okay, but is not
advised and short key IDs are already a problem with some being
generated to match specific patterns.  It does not matter whether the
pattern is upper or lower case.

So this is the best method:

\begin{verbatim}
import gpg

k = gpg.Context().keylist(pattern="258E88DCBD3CD44D8E7AB43F6ECB6AF0DEADBEEF")
keys = list(k)
\end{verbatim}

This is passable and very likely to be common:

```
\begin{verbatim}
import gpg

k = gpg.Context().keylist(pattern="0x6ECB6AF0DEADBEEF")
keys = list(k)
\end{verbatim}
```

And this is a really bad idea:

```
\begin{verbatim}
import
 gpg

k = gpg.Context().keylist(pattern="0xDEADBEEF")
keys = list(k)
\end{verbatim}
```

Alternatively it may be that the intention is to create a list of keys
which all match a particular search string.  For instance all the
addresses at a particular domain, like this:

```
\begin{verbatim}
import gpg

ncsc = gpg.Context().keylist(pattern="ncsc.mil")
nsa = list(ncsc)
\end{verbatim}
```

```
\subsubsection{Counting keys}
\label{sec:org63a3d62}
Counting the number of keys in your public keybox (\texttt{pubring.kbx}), the
format which has superseded the old keyring format (\texttt{pubring.gpg} and
\texttt{secring.gpg}), or the number of secret keys is a very simple task.

\begin{verbatim}
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)
```

```
publist = list(pubkeys)
pubnum = len(publist)

print("""
 Number of secret keys:  {0}
 Number of public keys:  {1}
""".format(secnum, pubnum))
\end{verbatim}
```

NOTE:
The \hyperref[sec:org3b53926]{Cython} introduction in the \hyperref[sec:org944cc00]{Advanced and Experimental}
section uses this same key counting code with Cython to demonstrate
some areas where Cython can improve performance even with the
bindings.  Users with large public keyrings or keyboxes, for instance,
should consider these options if they are comfortable with using
Cython.

\subsection{Get key}
\label{sec:org26adb2e}
An alternative method of getting a single key via its fingerprint is
available directly within a Context with \texttt{Context().get_key}.  This is
the preferred method of selecting a key in order to modify it, sign or
certify it and for obtaining relevant data about a single key as a
part of other functions; when verifying a signature made by that key,
for instance.

By default this method will select public keys, but it can select
secret keys as well.

This first example demonstrates selecting the current key of Werner
Koch, which is due
to expire at the end of 2018:

```
\begin{verbatim}
import gpg

fingerprint = "80615870F5BAD690333686D0F2AD85AC1E42B367"
key = gpg.Context().get_key(fingerprint)
\end{verbatim}
```

Whereas this example demonstrates selecting the author's current key
with the \texttt{secret} key word argument set to \texttt{True}:

```
\begin{verbatim}
import gpg
```

```
fingerprint = "DB4724E6FA4286C92B4E55C4321E4E2373590E5D"
key = gpg.Context().get_key(fingerprint, secret=True)
\end{verbatim}
```

It is, of course, quite possible to select expired, disabled and revoked keys with this function, but only to effectively display information about those keys.

It is also possible to use both unicode or string literals and byte literals with the fingerprint when getting a key in this way.

\subsection{Importing keys}
\label{sec:org1ad598a}
Importing keys is possible with the \texttt{key_import()} method and takes one argument which is a bytes literal object containing either the binary or ASCII armoured key data for one or more
 keys.

The following example retrieves one or more keys from the SKS keyservers via the web using the requests module.  Since requests returns the content as a bytes literal object, we can then use that directly to import the resulting data into our keybox.

```
\begin{verbatim}
import gpg
import os.path
import requests

c = gpg.Context()
url = "https://sks-keyservers.net/pks/lookup"
pattern = input("Enter the pattern to search for key or user IDs: ")
payload = {"op": "get", "search": pattern}

r = requests.get(url, verify=True, params=payload)
result = c.key_import(r.content)

if result is not None and hasattr(result, "considered") is False:
   print(result)
elif result is not None and hasattr(result, "considered") is True:
   num_keys = len(result.imports)
   new_revs = result.new_revocations
   new_sigs = result.new_signatures
   new_subs = result.new_sub_keys
   new_uids = result.new_user_ids
   new_scrt = result.secret_imported
   nochange = result.unchanged
   print("""
```

```
  The total number of keys considered for import was:  {0}

    Number of keys revoked:  {1}
  Number of new signatures:  {2}
     Number of new subkeys:  {3}
    Number of new user IDs:  {4}
 Number of new secret keys:  {5}
  Number of unchanged keys:  {6}

 The key IDs for all considered keys were:
""".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scrt,
         nochange))
   for i in range(num_keys):
       print("{0}\n".format(result.imports[i].fpr))
else:
   pass
\end{verbatim}
```

NOTE: When searching for a key ID of any length or a fingerprint (without spaces), the SKS servers require the the leading \texttt{0x} indicative of hexadecimal be included.  Also note that the old short key IDs (e.g. \texttt{0xDEADBEEF}) should no longer be used due to the relative ease by which such key IDs can be reproduced, as demonstrated by the Evil32 Project in 2014 (which was subsequently exploited in 2016).

Testing for whether a string in any given search is or may be a hexadecimal
 value which may be missing the leading \texttt{0x} is a simple matter of using a try/except statement which attempts to convert the string as hex to an integer and then back to hex; then using that to search with.  Raising a ValueError simply results in treating the string as a string.  This is the method and logic utilised in the \texttt{import-keys-hkp.py} script (see below).

\subsubsection{Working with ProtonMail}
\label{sec:org27b0d6f}
Here is a variation on the example above which checks the constrained ProtonMail keyserver for ProtonMail public keys.

```
\begin{verbatim}
import gpg
import requests
import sys

print("""
This script searches the ProtonMail key server for the specified key and
```

```
imports it.
""")

c = gpg.Context(armor=True)
url = "https://api.protonmail.ch/pks/lookup"
ksearch = []

if len(sys.argv) >= 2:
   keyterm = sys.argv[1]
else:
   keyterm = input("Enter the key ID, UID or search string: ")

if keyterm.count("@") == 2 and keyterm.startswith("@") is
 True:
   ksearch.append(keyterm[1:])
   ksearch.append(keyterm[1:])
   ksearch.append(keyterm[1:])
elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
   ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
   ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
   ksearch.append("{0}@pm.me".format(keyterm[1:]))
elif keyterm.count("@") == 0:
   ksearch.append("{0}@protonmail.com".format(keyterm))
   ksearch.append("{0}@protonmail.ch".format(keyterm))
   ksearch.append("{0}@pm.me".format(keyterm))
elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
   uidlist = keyterm.split("@")
   for uid in uidlist:
       ksearch.append("{0}@protonmail.com".format(uid))
       ksearch.append("{0}@protonmail.ch".format(uid))
       ksearch.append("{0}@pm.me".format(uid))
elif keyterm.count("@") > 2:
   uidlist = keyterm.split("@")
   for uid in uidlist:
       ksearch.append("{0}@protonmail.com".format(uid))
       ksearch.append("{0}@protonmail.ch".format(uid))
        ksearch.append("{0}@pm.me".format(uid))
else:
   ksearch.append(keyterm)

for k in ksearch:
   payload = {"op": "get", "search": k}
   try:
       r = requests.get(url, verify=True, params=payload)
       if r.ok is True:
           result = c.key_import(r.content)
       elif r.ok is False:
           result = r.content
```

```
   except Exception as e:
       result = None

   if result is not None and hasattr(result, "considered") is False:
       print("{0} for {1}".format(result.decode(), k))
   elif result is not None and hasattr(result, "considered") is True:
       num_keys = len(result.imports)
       new_revs = result.new_revocations
       new_sigs = result.new_signatures
       new_subs = result.new_sub_keys
       new_uids = result.new_user_ids
       new_scrt = result.secret_imported
       nochange = result.unchanged
       print("""
The total number of keys considered for import was:  {0}

With UIDs wholely or partially matching the
 following string:

       {1}

  Number of keys revoked:  {2}
Number of new signatures:  {3}
   Number of new subkeys:  {4}
  Number of new user IDs:  {5}
Number of new secret keys:  {6}
Number of unchanged keys:  {7}

The key IDs for all considered keys were:
""".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scrt,
          nochange))
       for i in range(num_keys):
           print(result.imports[i].fpr)
       print("")
   elif result is None:
       print(e)
\end{verbatim}
```

Both the above example, \href{../examples/howto/pmkey-import.py}{pmkey-import.py}, and a version which prompts
for an alternative GnuPG home directory, \href{../examples/howto/pmkey-import-alt.py}{pmkey-import-alt.py}, are available with the other examples and are executable scripts.

Note that while the ProtonMail servers are based on the SKS servers,
their server is related more to their API and is not feature complete
by comparison to the servers in the SKS pool.  One notable difference
being

that the ProtonMail server does not permit non ProtonMail users
to update their own keys, which could be a vector for attacking
ProtonMail users who may not receive a key's revocation if it had been
compromised.

\subsubsection{Importing with HKP for Python}
\label{sec:org592d7ab}
Performing the same tasks with the \href{https://github.com/Selfnet/hkp4py}{hkp4py module} (available via PyPI)
is not too much different, but does provide a number of options of
benefit to end users.  Not least of which being the ability to perform
some checks on a key before importing it or not.  For instance it may
be the policy of a site or project to only import keys which have not
been revoked.  The hkp4py module permits such checks prior to the
importing of the keys found.

```
\begin{verbatim}
import gpg
import hkp4py
import sys

c = gpg.Context()
server = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")
results = []
keys = []

if len(sys.argv) > 2:
   pattern = " ".join(sys.argv[1:])
elif
 len(sys.argv) == 2:
   pattern = sys.argv[1]
else:
   pattern = input("Enter the pattern to search for keys or user IDs: ")


if pattern is not None:
   try:
      key = server.search(hex(int(pattern, 16)))
      keyed = True
   except ValueError as ve:
      key = server.search(pattern)
      keyed = False

   if key is not None:
      keys.append(key[0])
      if keyed is True:
         try:
            fob = server.search(pattern)
```

```
            except:
                fob = None
            if fob is not None:
                keys.append(fob[0])
        else:
            pass
    else:
        pass

    for logrus in pattern.split():
        try:
            key = server.search(hex(int(logrus, 16)))
            hexed = True
        except ValueError as ve:
            key = server.search(logrus)
            hexed = False

        if key is not None:
            keys.append(key[0])
            if hexed is True:
                try:

 fob = server.search(logrus)
                except:
                    fob = None
                if fob is not None:
                    keys.append(fob[0])
            else:
                pass
        else:
            pass


if len(keys) > 0:
    for key in keys:
        import_result = c.key_import(key.key_blob)
        results.append(import_result)

for result in results:
    if result is not None and hasattr(result, "considered") is False:
        print(result)
    elif result is not None and hasattr(result, "considered") is True:
        num_keys = len(result.imports)
        new_revs = result.new_revocations
        new_sigs = result.new_signatures
        new_subs = result.new_sub_keys
        new_uids = result.new_user_ids
        new_scrt = result.secret_imported
```

```
        nochange = result.unchanged
        print("""
The total number of keys considered for import was:  {0}

  Number of keys revoked:  {1}
Number of new signatures:  {2}
   Number of new subkeys:  {3}
  Number
 of new user IDs:  {4}
Number of new secret keys:  {5}
Number of unchanged keys:  {6}

The key IDs for all considered keys were:
""".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scrt,
          nochange))
        for i in range(num_keys):
            print(result.imports[i].fpr)
        print("")
    else:
        pass
\end{verbatim}
```

Since the hkp4py module handles multiple keys just as effectively as one (\texttt{keys} is a list of responses per matching key), the example above is able to do a little bit more with the returned data before anything is actually imported.

\subsubsection{Importing from ProtonMail with HKP for Python}
\label{sec:org3966a76}
Though this can provide certain benefits even when working with ProtonMail, the scope is somewhat constrained there due to the limitations of the ProtonMail keyserver.

For instance, searching the SKS keyserver pool for the term "gnupg" produces hundreds of results from any time the word appears in any part of
 a user ID.  Performing the same search on the ProtonMail keyserver returns zero results, even though there are at least two test accounts which include it as part of the username.

The cause of this discrepancy is the deliberate configuration of that server by ProtonMail to require an exact match of the full email address of the ProtonMail user whose key is being requested. Presumably this is intended to reduce breaches of privacy of their users as an email address must already be known before a key for that address can be obtained.

```
\begin{enumerate}
\item Import from ProtonMail via HKP for Python Example no. 1
\label{sec:org6cd15c3}
The following script is available with the rest of the examples under
the somewhat less than original name, \texttt{pmkey-import-hkp.py}.

\begin{verbatim}
import gpg
import hkp4py
import os.path
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it.

Usage:  pmkey-import-hkp.py [search strings]
""")

c
 = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None

if len(sys.argv) > 2:
   keyterms = sys.argv[1:]
elif len(sys.argv) == 2:
   keyterm = sys.argv[1]
   keyterms.append(keyterm)
else:
   key_term = input("Enter the key ID, UID or search string: ")
   keyterms = key_term.split()

for keyterm in keyterms:
   if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
       ksearch.append(keyterm[1:])
       ksearch.append(keyterm[1:])
       ksearch.append(keyterm[1:])
   elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
       ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
       ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
       ksearch.append("{0}@pm.me".format(keyterm[1:]))
```

```
  elif keyterm.count("@") == 0:
      ksearch.append("{0}@protonmail.com".format(keyterm))
      ksearch.append("{0}@protonmail.ch".format(keyterm))
       ksearch.append("{0}@pm.me".format(keyterm))
  elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
      uidlist = keyterm.split("@")
      for uid in uidlist:
          ksearch.append("{0}@protonmail.com".format(uid))
          ksearch.append("{0}@protonmail.ch".format(uid))
          ksearch.append("{0}@pm.me".format(uid))
  elif keyterm.count("@") > 2:
      uidlist = keyterm.split("@")
      for uid in uidlist:
          ksearch.append("{0}@protonmail.com".format(uid))
          ksearch.append("{0}@protonmail.ch".format(uid))
          ksearch.append("{0}@pm.me".format(uid))
  else:
      ksearch.append(keyterm)

for k in ksearch:
  print("Checking for key for: {0}".format(k))
  try:
      keys = server.search(k)
      if isinstance(keys, list) is True:
          for key in keys:
              allkeys.append(key)
              try:
                  import_result = c.key_import(key.key_blob)

 except Exception as e:
                  import_result = c.key_import(key.key)
      else:
          paradox.append(keys)
          import_result = None
  except Exception as e:
      import_result = None
  results.append(import_result)

for result in results:
  if result is not None and hasattr(result, "considered") is False:
      print("{0} for {1}".format(result.decode(), k))
  elif result is not None and hasattr(result, "considered") is True:
      num_keys = len(result.imports)
      new_revs = result.new_revocations
      new_sigs = result.new_signatures
      new_subs = result.new_sub_keys
      new_uids = result.new_user_ids
      new_scrt = result.secret_imported
```

```
        nochange = result.unchanged
        print("""
The total number of keys considered for import was:  {0}

With UIDs wholely or partially matching the following string:

        {1}

  Number of keys revoked:  {2}
Number of new signatures:  {3}
   Number of new subkeys:  {4}

  Number of new user IDs:  {5}
Number of new secret keys:  {6}
Number of unchanged keys:  {7}

The key IDs for all considered keys were:
""".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scrt,
           nochange))
        for i in range(num_keys):
            print(result.imports[i].fpr)
        print("")
    elif result is None:
        pass
\end{verbatim}


\item Import from ProtonMail via HKP for Python Example no. 2
\label{sec:org3b674e5}
Like its counterpart above, this script can also be found with the
rest of the examples, by the name pmkey-import-hkp-alt.py.

With this script a modicum of effort has been made to treat anything
passed as a \texttt{homedir} which either does not exist or which is not a
directory, as also being a pssible user ID to check for.  It's not
guaranteed to pick up on all such cases, but it should cover most of
them.

\begin{verbatim}
import gpg
import hkp4py
import os.path
import sys

print("""
This script searches the ProtonMail key server
 for the specified key and
imports it.  Optionally enables specifying a different GnuPG home directory.
```

```
Usage:  pmkey-import-hkp.py [homedir] [search string]
  or:  pmkey-import-hkp.py [search string]
""")

c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None

if len(sys.argv) > 3:
   homedir = sys.argv[1]
   keyterms = sys.argv[2:]
elif len(sys.argv) == 3:
   homedir = sys.argv[1]
   keyterm = sys.argv[2]
   keyterms.append(keyterm)
elif len(sys.argv) == 2:
   homedir = ""
   keyterm = sys.argv[1]
   keyterms.append(keyterm)
else:
   keyterm = input("Enter the key ID, UID or search string: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")
   keyterms.append(keyterm)

if len(homedir) == 0:
   homedir = None
   homeless = False

if homedir is not None:
   if homedir.startswith("~"):
       if os.path.exists(os.path.expanduser(homedir))
 is True:
           if os.path.isdir(os.path.expanduser(homedir)) is True:
               c.home_dir = os.path.realpath(os.path.expanduser(homedir))
           else:
               homeless = True
       else:
           homeless = True
   elif os.path.exists(os.path.realpath(homedir)) is True:
       if os.path.isdir(os.path.realpath(homedir)) is True:
           c.home_dir = os.path.realpath(homedir)
       else:
```

```
        homeless = True
    else:
        homeless = True

# First check to see if the homedir really is a homedir and if not, treat it as
# a search string.
if homeless is True:
    keyterms.append(homedir)
    c.home_dir = None
else:
    pass

for keyterm in keyterms:
    if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
        ksearch.append(keyterm[1:])
        ksearch.append(keyterm[1:])
        ksearch.append(keyterm[1:])
    elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
        ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
         ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
        ksearch.append("{0}@pm.me".format(keyterm[1:]))
    elif keyterm.count("@") == 0:
        ksearch.append("{0}@protonmail.com".format(keyterm))
        ksearch.append("{0}@protonmail.ch".format(keyterm))
        ksearch.append("{0}@pm.me".format(keyterm))
    elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
        uidlist = keyterm.split("@")
        for uid in uidlist:
            ksearch.append("{0}@protonmail.com".format(uid))
            ksearch.append("{0}@protonmail.ch".format(uid))
            ksearch.append("{0}@pm.me".format(uid))
    elif keyterm.count("@") > 2:
        uidlist = keyterm.split("@")
        for uid in uidlist:
            ksearch.append("{0}@protonmail.com".format(uid))
            ksearch.append("{0}@protonmail.ch".format(uid))
            ksearch.append("{0}@pm.me".format(uid))
    else:
        ksearch.append(keyterm)

for k in ksearch:
    print("Checking
 for key for: {0}".format(k))
    try:
        keys = server.search(k)
        if isinstance(keys, list) is True:
            for key in keys:
                allkeys.append(key)
```

```
            try:
                import_result = c.key_import(key.key_blob)
            except Exception as e:
                import_result = c.key_import(key.key)
        else:
            paradox.append(keys)
            import_result = None
    except Exception as e:
        import_result = None
    results.append(import_result)

for result in results:
    if result is not None and hasattr(result, "considered") is False:
        print("{0} for {1}".format(result.decode(), k))
    elif result is not None and hasattr(result, "considered") is True:
        num_keys = len(result.imports)
        new_revs = result.new_revocations
        new_sigs = result.new_signatures
        new_subs = result.new_sub_keys
        new_uids = result.new_user_ids
        new_scrt = result.secret_imported
         nochange = result.unchanged
        print("""
The total number of keys considered for import was:  {0}

With UIDs wholely or partially matching the following string:

        {1}

  Number of keys revoked:  {2}
Number of new signatures:  {3}
   Number of new subkeys:  {4}
  Number of new user IDs:  {5}
Number of new secret keys:  {6}
Number of unchanged keys:  {7}

The key IDs for all considered keys were:
""".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scrt,
           nochange))
        for i in range(num_keys):
            print(result.imports[i].fpr)
        print("")
    elif result is None:
        pass
\end{verbatim}
\end{enumerate}
```

\subsection{Exporting keys}
\label{sec:org4596a77}
Exporting keys remains a reasonably simple task, but has been
separated into three different functions for the OpenPGP cryptographic
engine.  Two of those functions are for exporting public keys and the
third is for exporting secret keys.

\subsubsection{Exporting
 public keys}
\label{sec:org873704f}
There are two methods of exporting public keys, both of which are very
similar to the other.  The default method, \texttt{key_export()}, will export
a public key or keys matching a specified pattern as normal.  The
alternative, the \texttt{key_export_minimal()} method, will do the same thing
except producing a minimised output with extra signatures and third
party signatures or certifications removed.

```
\begin{verbatim}
import gpg
import os.path
import sys

print("""
This script exports one or more public keys.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = sys.argv[3]
elif len(sys.argv) == 3:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
   keyfile = sys.argv[1]
   logrus = input("Enter the UID matching the key(s) to export: ")
   homedir = input("Enter the
 GPG configuration directory path (optional): ")
else:
   keyfile = input("Enter the path and filename to save the secret key to: ")
   logrus = input("Enter the UID matching the key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
```

```
   if os.path.exists(os.path.expanduser(homedir)) is True:
      c.home_dir = os.path.expanduser(homedir)
   else:
      pass
elif os.path.exists(homedir) is True:
   c.home_dir = homedir
else:
   pass

try:
   result = c.key_export(pattern=logrus)
except:
   result = c.key_export(pattern=None)

if result is not None:
   with open(keyfile, "wb") as f:
      f.write(result)
else:
   pass
\end{verbatim}
```

It should be noted that the result will only return \texttt{None} when a search pattern has been entered, but has not matched any keys.  When the search pattern itself is set to \texttt{None} this triggers the exporting of the entire public keybox.

```
\begin{verbatim}
import
 gpg
import os.path
import sys

print("""
This script exports one or more public keys in minimised form.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = sys.argv[3]
elif len(sys.argv) == 3:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
   keyfile = sys.argv[1]
```

```
   logrus = input("Enter the UID matching the key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")
else:
   keyfile = input("Enter the path and filename to save the secret key to: ")
   logrus = input("Enter the UID matching the key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
   if os.path.exists(os.path.expanduser(homedir)) is True:
       c.home_dir = os.path.expanduser(homedir)
   else:
       pass
elif os.path.exists(homedir)
 is True:
   c.home_dir = homedir
else:
   pass

try:
   result = c.key_export_minimal(pattern=logrus)
except:
   result = c.key_export_minimal(pattern=None)

if result is not None:
   with open(keyfile, "wb") as f:
       f.write(result)
else:
   pass
\end{verbatim}


\subsubsection{Exporting secret keys}
\label{sec:org6c28d3d}
Exporting secret keys is, functionally, very similar to exporting
public keys; save for the invocation of \texttt{pinentry} via \texttt{gpg-agent} in
order to securely enter the key's passphrase and authorise the export.

The following example exports the secret key to a file which is then
set with the same permissions as the output files created by the
command line secret key export options.

\begin{verbatim}
import gpg
import os
import os.path
import sys

print("""
```

```
This script exports one or more secret keys.

The gpg-agent and pinentry are invoked to authorise the export.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
   keyfile
 = sys.argv[1]
   logrus = sys.argv[2]
   homedir = sys.argv[3]
elif len(sys.argv) == 3:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
   keyfile = sys.argv[1]
   logrus = input("Enter the UID matching the secret key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")
else:
   keyfile = input("Enter the path and filename to save the secret key to: ")
   logrus = input("Enter the UID matching the secret key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
   homedir = None
elif homedir.startswith("~"):
   userdir = os.path.expanduser(homedir)
   if os.path.exists(userdir) is True:
       homedir = os.path.realpath(userdir)
   else:
       homedir = None
else:
   homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
   homedir =
 None
else:
   if os.path.isdir(homedir) is False:
       homedir = None
   else:
       pass

if homedir is not None:
   c.home_dir = homedir
else:
```

```
   pass

try:
   result = c.key_export_secret(pattern=logrus)
except:
   result = c.key_export_secret(pattern=None)

if result is not None:
   with open(keyfile, "wb") as f:
       f.write(result)
   os.chmod(keyfile, 0o600)
else:
   pass
\end{verbatim}
```

Alternatively the approach of the following script can be used. This longer example saves the exported secret key(s) in files in the GnuPG home directory, in addition to setting the file permissions as only readable and writable by the user. It also exports the secret key(s) twice in order to output both GPG binary (\texttt{.gpg}) and ASCII armoured (\texttt{.asc}) files.

```
\begin{verbatim}
import gpg
import os
import os.path
import subprocess
import sys

print("""
This script exports one or more secret keys as both ASCII armored and binary
file formats, saved in files within the
 user's GPG home directory.

The gpg-agent and pinentry are invoked to authorise the export.
""")

if sys.platform == "win32":
   gpgconfcmd = "gpgconf.exe --list-dirs homedir"
else:
   gpgconfcmd = "gpgconf --list-dirs homedir"

a = gpg.Context(armor=True)
b = gpg.Context()
c = gpg.Context()

if len(sys.argv) >= 4:
   keyfile = sys.argv[1]
```

```
    logrus = sys.argv[2]
    homedir = sys.argv[3]
elif len(sys.argv) == 3:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
    keyfile = sys.argv[1]
    logrus = input("Enter the UID matching the secret key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")
else:
    keyfile = input("Enter the filename to save the secret key to: ")
    logrus = input("Enter the UID matching the secret key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir)
 == 0:
    homedir = None
elif homedir.startswith("~"):
    userdir = os.path.expanduser(homedir)
    if os.path.exists(userdir) is True:
        homedir = os.path.realpath(userdir)
    else:
        homedir = None
else:
    homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
    homedir = None
else:
    if os.path.isdir(homedir) is False:
        homedir = None
    else:
        pass

if homedir is not None:
    c.home_dir = homedir
else:
    pass

if c.home_dir is not None:
    if c.home_dir.endswith("/"):
        gpgfile = "{0}{1}.gpg".format(c.home_dir, keyfile)
        ascfile = "{0}{1}.asc".format(c.home_dir, keyfile)
    else:
        gpgfile = "{0}/{1}.gpg".format(c.home_dir, keyfile)
        ascfile = "{0}/{1}.asc".format(c.home_dir, keyfile)
else:
```

```
  if os.path.exists(os.environ["GNUPGHOME"]) is True:
     hd = os.environ["GNUPGHOME"]
  else:
     try:
        hd = subprocess.getoutput(gpgconfcmd)
     except:
        process = subprocess.Popen(gpgconfcmd.split(),
                                   stdout=subprocess.PIPE)
        procom = process.communicate()
        if sys.version_info[0] == 2:
           hd = procom[0].strip()
        else:
           hd = procom[0].decode().strip()
  gpgfile = "{0}/{1}.gpg".format(hd, keyfile)
  ascfile = "{0}/{1}.asc".format(hd, keyfile)

try:
  a_result = a.key_export_secret(pattern=logrus)
  b_result = b.key_export_secret(pattern=logrus)
except:
  a_result = a.key_export_secret(pattern=None)
  b_result = b.key_export_secret(pattern=None)

if a_result is not None:
  with open(ascfile, "wb") as f:
     f.write(a_result)
  os.chmod(ascfile, 0o600)
else:
  pass

if b_result is not None:
  with open(gpgfile, "wb") as f:
     f.write(b_result)
  os.chmod(gpgfile, 0o600)
else:
  pass
\end{verbatim}
```

\subsubsection{Sending public keys to the SKS Keyservers}
\label{sec:org82d4958}
As with the previous section on importing
 keys, the \texttt{hkp4py} module
adds another option with exporting keys in order to send them to the
public keyservers.

The following example demonstrates how this may be done.

```
\begin{verbatim}
import gpg
import hkp4py
import os.path
import sys

print("""
This script sends one or more public keys to the SKS keyservers and is
essentially a slight variation on the export-key.py script.
""")

c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")

if len(sys.argv) > 2:
  logrus = " ".join(sys.argv[1:])
elif len(sys.argv) == 2:
  logrus = sys.argv[1]
else:
  logrus = input("Enter the UID matching the key(s) to send: ")

if len(logrus) > 0:
  try:
    export_result = c.key_export(pattern=logrus)
  except Exception as e:
    print(e)
    export_result = None
else:
  export_result = c.key_export(pattern=None)

if export_result is not None:
  try:
    try:
      send_result = server.add(export_result)
    except:
       send_result = server.add(export_result.decode())
    if send_result is not None:
      print(send_result)
    else:
      pass
  except Exception as e:
    print(e)
else:
  pass
\end{verbatim}
```

An expanded version of this script with additional functions for specifying an alternative homedir location is in the examples

directory as \texttt{send-key-to-keyserver.py}.

The \texttt{hkp4py} module appears to handle both string and byte literal text
data equally well, but the GPGME bindings deal primarily with byte
literal data only and so this script sends in that format first, then
tries the string literal form.

\section{Basic Functions}
\label{sec:orgb40b488}
The most frequently called features of any cryptographic library will
be the most fundamental tasks for encryption software.  In this
section we will look at how to programmatically encrypt data, decrypt
it, sign it and verify signatures.

\subsection{Encryption}
\label{sec:org3170365}
Encrypting
 is very straight forward.  In the first example below the
message, \texttt{text}, is encrypted to a single recipient's key.  In the
second example the message will be encrypted to multiple recipients.

\subsubsection{Encrypting to one key}
\label{sec:org8098c64}
Once the the Context is set the main issues with encrypting data is
essentially reduced to key selection and the keyword arguments
specified in the \texttt{gpg.Context().encrypt()} method.

Those keyword arguments are: \texttt{recipients}, a list of keys encrypted to
(covered in greater detail in the following section); \texttt{sign}, whether
or not to sign the plaintext data, see subsequent sections on signing
and verifying signatures below (defaults to \texttt{True}); \texttt{sink}, to write
results or partial results to a secure sink instead of returning it
(defaults to \texttt{None}); \texttt{passphrase}, only used when utilising symmetric
encryption (defaults to \texttt{None}); \texttt{always_trust}, used to override
 the
trust model settings for recipient keys (defaults to \texttt{False});
\texttt{add_encrypt_to}, utilises any preconfigured \texttt{encrypt-to} or
\texttt{default-key} settings in the user's \texttt{gpg.conf} file (defaults to
\texttt{False}); \texttt{prepare}, prepare for encryption (defaults to \texttt{False});
\texttt{expect_sign}, prepare for signing (defaults to \texttt{False}); \texttt{compress},
compresses the plaintext prior to encryption (defaults to \texttt{True}).

\begin{verbatim}
import gpg

```
a_key = "0x12345678DEADBEEF"
text = b"""Some text to test with.

Since the text in this case must be bytes, it is most likely that
the input form will be a separate file which is opened with "rb"
as this is the simplest method of obtaining the correct data format.
"""

c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext, result, sign_result = c.encrypt(text, recipients=rkey, sign=False)

with open("secret_plans.txt.asc", "wb") as afile:
    afile.write(ciphertext)
\end{verbatim}

Though this is even more likely to be used like this; with the
plaintext input read from a file, the recipient keys used for
encryption regardless of key trust status and the encrypted output
also encrypted to any preconfigured keys set in the \texttt{gpg.conf} file:

\begin{verbatim}
import gpg

a_key = "0x12345678DEADBEEF"

with open("secret_plans.txt", "rb") as afile:
   text = afile.read()

c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext, result, sign_result = c.encrypt(text, recipients=rkey, sign=True,
                                always_trust=True,
                                add_encrypt_to=True)

with open("secret_plans.txt.asc", "wb") as afile:
   afile.write(ciphertext)
\end{verbatim}

If the \texttt{recipients} parameter is empty then the plaintext is encrypted
symmetrically.  If no \texttt{passphrase} is supplied as a parameter or via a
callback registered with
 the \texttt{Context()} then an out-of-band prompt
for the passphrase via pinentry will be invoked.


\subsubsection{Encrypting to multiple keys}
\label{sec:orgdcf6e47}
```

Encrypting to multiple keys essentially just expands upon the key
selection process and the recipients from the previous examples.

The following example encrypts a message (\texttt{text}) to everyone with an
email address on the \texttt{gnupg.org} domain,\footnote{You probably don't really want to do this.  Searching the
keyservers for "gnupg.org" produces over 400 results, the majority of
which aren't actually at the gnupg.org domain, but just included a
comment regarding the project in their key somewhere.} but does \emph{not} encrypt
to a default key or other key which is configured to normally encrypt
to.

```
\begin{verbatim}
import gpg

text = b"""Oh look, another test message.

The same rules apply as with the previous example and more likely
than not, the message will actually be drawn from reading the
contents
 of a file or, maybe, from entering data at an input()
prompt.

Since the text in this case must be bytes, it is most likely that
the input form will be a separate file which is opened with "rb"
as this is the simplest method of obtaining the correct data
format.
"""

c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org", secret=False))
logrus = []

for i in range(len(rpattern)):
   if rpattern[i].can_encrypt == 1:
       logrus.append(rpattern[i])

ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
                                    sign=False, always_trust=True)

with open("secret_plans.txt.asc", "wb") as afile:
   afile.write(ciphertext)
\end{verbatim}
```

All it would take to change the above example to sign the message
and also encrypt the message to any configured default keys would
be to change the \texttt{c.encrypt} line to this:

```
\begin{verbatim}
```

```
ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,

                        always_trust=True,
                                add_encrypt_to=True)
\end{verbatim}
```

The only keyword arguments requiring modification are those for which
the default values are changing.  The default value of \texttt{sign} is
\texttt{True}, the default of \texttt{always_trust} is \texttt{False}, the default of
\texttt{add_encrypt_to} is \texttt{False}.

If \texttt{always_trust} is not set to \texttt{True} and any of the recipient keys
are not trusted (e.g. not signed or locally signed) then the
encryption will raise an error.  It is possible to mitigate this
somewhat with something more like this:

```
\begin{verbatim}
import gpg

with open("secret_plans.txt.asc", "rb") as afile:
  text = afile.read()

c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org", secret=False))
logrus = []

for i in range(len(rpattern)):
  if rpattern[i].can_encrypt == 1:
    logrus.append(rpattern[i])

  try:
    ciphertext, result,
 sign_result = c.encrypt(text, recipients=logrus,
                                    add_encrypt_to=True)
  except gpg.errors.InvalidRecipients as e:
    for i in range(len(e.recipients)):
      for n in range(len(logrus)):
        if logrus[n].fpr == e.recipients[i].fpr:
          logrus.remove(logrus[n])
        else:
          pass
    try:
      ciphertext, result, sign_result = c.encrypt(text,
                                    recipients=logrus,
                                    add_encrypt_to=True)
      with open("secret_plans.txt.asc", "wb") as afile:
        afile.write(ciphertext)
    except:
```

```
        pass
\end{verbatim}
```

This will attempt to encrypt to all the keys searched for, then remove
invalid recipients if it fails and try again.

```
\subsection{Decryption}
\label{sec:org1282b3d}
```

Decrypting something encrypted to a key in one's secret
keyring is
fairly straight forward.

In this example code, however, preconfiguring either \texttt{gpg.Context()}
or \texttt{gpg.core.Context()} as \texttt{c} is unnecessary because there is no need
to modify the Context prior to conducting the decryption and since the
Context is only used once, setting it to \texttt{c} simply adds lines for no
gain.

```
\begin{verbatim}
import gpg

ciphertext = input("Enter path and filename of encrypted file: ")
newfile = input("Enter path and filename of file to save decrypted data to: ")

with open(ciphertext, "rb") as cfile:
  try:
      plaintext, result, verify_result = gpg.Context().decrypt(cfile)
  except gpg.errors.GPGMEError as e:
      plaintext = None
      print(e)

if plaintext is not None:
  with open(newfile, "wb") as nfile:
    nfile.write(plaintext)
  else:
      pass
\end{verbatim}
```

The data available in \texttt{plaintext} in this example is the decrypted
content as a byte object, the recipient key IDs and algorithms
in
\texttt{result} and the results of verifying any signatures of the data in
\texttt{verify_result}.

If \texttt{gpg.Context().decrypt(cfile, verify=False)} is called instead,
then \texttt{verify_result} will be returned as \texttt{None} and the rest remains
as described here.

\subsection{Signing text and files}
\label{sec:org59f1262}
The following sections demonstrate how to specify keys to sign with.

\subsubsection{Signing key selection}
\label{sec:org909cb3c}
By default GPGME and the Python bindings will use the default key
configured for the user invoking the GPGME API.  If there is no
default key specified and there is more than one secret key available
it may be necessary to specify the key or keys with which to sign
messages and files.

\begin{verbatim}
import gpg

logrus = input("Enter the email address or string to match signing keys to: ")
hancock = gpg.Context().keylist(pattern=logrus, secret=True)
sig_src = list(hancock)
\end{verbatim}

The signing examples in the
 following sections include the explicitly
designated \texttt{signers} parameter in two of the five examples; once where
the resulting signature would be ASCII armoured and once where it
would not be armoured.

While it would be possible to enter a key ID or fingerprint here to
match a specific key, it is not possible to enter two fingerprints and
match two keys since the patten expects a string, bytes or None and
not a list.  A string with two fingerprints won't match any single
key.

\subsubsection{Normal or default signing messages or files}
\label{sec:org6ee259d}
The normal or default signing process is essentially the same as is
most often invoked when also encrypting a message or file.  So when
the encryption component is not utilised, the result is to produce an
encoded and signed output which may or may not be ASCII armoured and
which may or may not also be compressed.

By default compression will be used unless GnuPG detects that the
plaintext is already compressed.  ASCII armouring
 will be determined
according to the value of \texttt{gpg.Context().armor}.

The compression algorithm is selected in much the same way as the symmetric encryption algorithm or the hash digest algorithm is when multiple keys are involved; from the preferences saved into the key itself or by comparison with the preferences with all other keys involved.

```
\begin{verbatim}
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context(armor=True, signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.asc", "w") as afile:
   afile.write(signed_data.decode())
\end{verbatim}
```

Though everything in this example is accurate, it is more likely that reading the input data from another file and writing the result to a new file will be performed more like the way it is done in the next example.  Even if the output format is ASCII armoured.

```
\begin{verbatim}
import gpg

with open("/path/to/statement.txt",
 "rb") as tfile:
   text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.sig", "wb") as afile:
   afile.write(signed_data)
\end{verbatim}
```

\subsubsection{Detached signing messages and files}
\label{sec:org51049d4}

Detached signatures will often be needed in programmatic uses of GPGME, either for signing files (e.g. tarballs of code releases) or as a component of message signing (e.g. PGP/MIME encoded email).

```
\begin{verbatim}
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context(armor=True)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.asc", "w") as afile:
   afile.write(signed_data.decode())
\end{verbatim}
```

As with normal signatures, detached signatures are best handled as
byte literals, even when the output is ASCII armoured.

```
\begin{verbatim}
import gpg

with open("/path/to/statement.txt",
 "rb") as tfile:
   text = tfile.read()

c = gpg.Context(signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.sig", "wb") as afile:
   afile.write(signed_data)
\end{verbatim}
```

```
\subsubsection{Clearsigning messages or text}
\label{sec:orgf528a20}
```

Though PGP/in-line messages are no longer encouraged in favour of
PGP/MIME, there is still sometimes value in utilising in-line
signatures.  This is where clear-signed messages or text is of value.

```
\begin{verbatim}
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context()
```

```
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)

with open("/path/to/statement.txt.asc", "w") as afile:
   afile.write(signed_data.decode())
\end{verbatim}
```

In spite of the appearance of a clear-signed message, the data handled by GPGME in signing it must still be byte literals.

```
\begin{verbatim}
import gpg

with open("/path/to/statement.txt",
 "rb") as tfile:
   text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)

with open("/path/to/statement.txt.asc", "wb") as afile:
   afile.write(signed_data)
\end{verbatim}
```

```
\subsection{Signature verification}
\label{sec:org6cd81af}
```

Essentially there are two principal methods of verification of a signature.  The first of these is for use with the normal or default signing method and for clear-signed messages.  The second is for use with files and data with detached signatures.

The following example is intended for use with the default signing method where the file was not ASCII armoured:

```
\begin{verbatim}
import gpg
import time

filename = "statement.txt"
gpg_file = "statement.txt.gpg"

c = gpg.Context()

try:
   data, result = c.verify(open(gpg_file))
   verified = True
except gpg.errors.BadSignatures as e:
   verified = False
```

```
   print(e)

if verified is True:
   for i in range(len(result.signatures)):

      sign = result.signatures[i]
       print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
         time.ctime(sign.timestamp)))
else:
   pass
\end{verbatim}
```

Whereas this next example, which is almost identical would work with normal ASCII armoured files and with clear-signed files:

```
\begin{verbatim}
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
   data, result = c.verify(open(asc_file))
   verified = True
except gpg.errors.BadSignatures as e:
   verified = False
   print(e)

if verified is True:
   for i in range(len(result.signatures)):
       sign = result.signatures[i]
       print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
         time.ctime(sign.timestamp)))
else:
   pass
\end{verbatim}
```

In both of the previous examples it is also possible to compare the
original data that was signed
 against the signed data in \texttt{data} to see
if it matches with something like this:

```
\begin{verbatim}
with open(filename, "rb") as afile:
   text = afile.read()

if text == data:
   print("Good signature.")
else:
   pass
\end{verbatim}
```

The following two examples, however, deal with detached signatures.
With his method of verification the data that was signed does not get
returned since it is already being explicitly referenced in the first
argument of \texttt{c.verify}.  So \texttt{data} is \texttt{None} and only the information
in \texttt{result} is available.

```
\begin{verbatim}
import gpg
import time

filename = "statement.txt"
sig_file = "statement.txt.sig"

c = gpg.Context()

try:
   data, result = c.verify(open(filename), open(sig_file))
   verified = True
except gpg.errors.BadSignatures as e:
   verified = False
   print(e)

if verified is True:
   for i in range(len(result.signatures)):
       sign = result.signatures[i]
       print("""Good signature from:
{0}
with
 key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
          time.ctime(sign.timestamp)))
else:
```

```
   pass
\end{verbatim}

\begin{verbatim}
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
   data, result = c.verify(open(filename), open(asc_file))
   verified = True
except gpg.errors.BadSignatures as e:
   verified = False
   print(e)

if verified is True:
   for i in range(len(result.signatures)):
       sign = result.signatures[i]
       print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
          time.ctime(sign.timestamp)))
else:
   pass
\end{verbatim}
```

\section{Creating keys and subkeys}
\label{sec:org754c6df}
The one thing, aside from GnuPG itself, that GPGME depends on, of course, is the keys themselves. So it is necessary to be able to generate them and modify them by adding subkeys, revoking or disabling them, sometimes
deleting them and doing the same for user IDs.

In the following examples a key will be created for the world's greatest secret agent, Danger Mouse. Since Danger Mouse is a secret agent he needs to be able to protect information to \texttt{SECRET} level clearance, so his keys will be 3072-bit keys.

The pre-configured \texttt{gpg.conf} file which sets cipher, digest and other preferences contains the following configuration parameters:

\begin{verbatim}
expert
allow-freeform-uid
allow-secret-key-import
trust-model tofu+pgp
tofu-default-policy unknown
enable-large-rsa
enable-dsa2
cert-digest-algo SHA512
default-preference-list TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128 AES BLOWFISH IDEA CAST5 3DES SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1 ZLIB BZIP2 ZIP Uncompressed
personal-cipher-preferences TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128 AES BLOWFISH IDEA CAST5 3DES
personal-digest-preferences SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1
personal-compress-preferences
 ZLIB BZIP2 ZIP Uncompressed
\end{verbatim}

\subsection{Primary key}
\label{sec:org0185c23}
Generating a primary key uses the \texttt{create_key} method in a Context.
It contains multiple arguments and keyword arguments, including:
\texttt{userid}, \texttt{algorithm}, \texttt{expires_in}, \texttt{expires}, \texttt{sign}, \texttt{encrypt}, \texttt{certify}, \texttt{authenticate}, \texttt{passphrase} and \texttt{force}.  The defaults for all of those except \texttt{userid}, \texttt{algorithm}, \texttt{expires_in}, \texttt{expires} and \texttt{passphrase} is \texttt{False}.  The defaults for \texttt{algorithm} and \texttt{passphrase} is \texttt{None}.  The default for \texttt{expires_in} is \texttt{0}.  The default for \texttt{expires} is \texttt{True}.  There is no default for \texttt{userid}.

If \texttt{passphrase} is left as \texttt{None} then the key will not be generated with a passphrase, if \texttt{passphrase} is set to a string then that will be the passphrase and if
 \texttt{passphrase} is set to \texttt{True} then gpg-agent will launch pinentry to prompt for a passphrase.  For the sake of convenience, these examples will keep \texttt{passphrase} set to \texttt{None}.

\begin{verbatim}
import gpg

c = gpg.Context()

c.home_dir = "~/.gnupg-dm"
userid = "Danger Mouse <dm@secret.example.net>"

dmkey = c.create_key(userid, algorithm="rsa3072", expires_in=31536000,

```
                sign=True, certify=True)
\end{verbatim}
```

One thing to note here is the use of setting the \texttt{c.home_dir}
parameter.  This enables generating the key or keys in a different
location.  In this case to keep the new key data created for this
example in a separate location rather than adding it to existing and
active key store data.  As with the default directory, \texttt{\textasciitilde{}/.gnupg}, any
temporary or separate directory needs the permissions set to only
permit access by the directory owner.  On posix systems this means
setting the directory permissions to
 700.

The \texttt{temp-homedir-config.py} script in the HOWTO examples directory
will create an alternative homedir with these configuration options
already set and the correct directory and file permissions.

The successful generation of the key can be confirmed via the returned
\texttt{GenkeyResult} object, which includes the following data:

```
\begin{verbatim}
print("""
Fingerprint:  {0}
Primary Key:  {1}
 Public Key:  {2}
 Secret Key:  {3}
Sub Key:  {4}
User IDs:  {5}
""".format(dmkey.fpr, dmkey.primary, dmkey.pubkey, dmkey.seckey, dmkey.sub,
        dmkey.uid))
\end{verbatim}
```

Alternatively the information can be confirmed using the command line
program:

```
\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx
----------------------
sec   rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
    177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid          [ultimate] Danger Mouse <dm@secret.example.net>

bash-4.4$
\end{verbatim}
```

As with generating keys manually,

to preconfigure expanded preferences
for the cipher, digest and compression algorithms, the \texttt{gpg.conf} file
must contain those details in the home directory in which the new key
is being generated.  I used a cut down version of my own \texttt{gpg.conf}
file in order to be able to generate this:

\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm --edit-key 177B7C25DB99745EE2EE13ED026D2F19E99E63AA showpref
quit
Secret key is available.

sec  rsa3072/026D2F19E99E63AA
    created: 2018-03-15  expires: 2019-03-15  usage: SC
    trust: ultimate      validity: ultimate
[ultimate] (1). Danger Mouse <dm@secret.example.net>

[ultimate] (1). Danger Mouse <dm@secret.example.net>
    Cipher: TWOFISH, CAMELLIA256, AES256, CAMELLIA192, AES192, CAMELLIA128, AES, BLOWFISH,
IDEA, CAST5, 3DES
    Digest: SHA512, SHA384, SHA256, SHA224, RIPEMD160, SHA1
    Compression: ZLIB, BZIP2, ZIP, Uncompressed
    Features: MDC, Keyserver no-modify

bash-4.4$
\end{verbatim}


\subsection{Subkeys}
\label{sec:org5e2acbc}
Adding
 subkeys to a primary key is fairly similar to creating the
primary key with the \texttt{create_subkey} method.  Most of the arguments
are the same, but not quite all.  Instead of the \texttt{userid} argument
there is now a \texttt{key} argument for selecting which primary key to add
the subkey to.

In the following example an encryption subkey will be added to the
primary key.  Since Danger Mouse is a security conscious secret agent,
this subkey will only be valid for about six months, half the length
of the primary key.

\begin{verbatim}
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

key = c.get_key(dmkey.fpr, secret=True)

```
dmsub = c.create_subkey(key, algorithm="rsa3072", expires_in=15768000,
                        encrypt=True)
\end{verbatim}
```

As with the primary key, the results here can be checked with:

```
\begin{verbatim}
print("""
Fingerprint:  {0}
Primary Key:  {1}
 Public Key:  {2}
 Secret Key:  {3}
Sub Key:  {4}
User IDs:  {5}
""".format(dmsub.fpr,
 dmsub.primary, dmsub.pubkey, dmsub.seckey, dmsub.sub,
         dmsub.uid))
\end{verbatim}
```

As well as on the command line with:

```
\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx
----------------------
sec   rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
     177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid           [ultimate] Danger Mouse <dm@secret.example.net>
ssb   rsa3072 2018-03-15 [E] [expires: 2018-09-13]

bash-4.4$
\end{verbatim}
```

```
\subsection{User IDs}
\label{sec:org4869c58}
\subsubsection{Adding User IDs}
\label{sec:orgebb13ca}
By comparison to creating primary keys and subkeys, adding a new user
ID to an existing key is much simpler.  The method used to do this is
\texttt{key\_add\_uid} and the only arguments it takes are for the \texttt{key} and
the new \texttt{uid}.

\begin{verbatim}
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"
```

```
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid
 = "Danger Mouse <danger.mouse@secret.example.net>"

c.key_add_uid(key, uid)
\end{verbatim}
```

Unsurprisingly the result of this is:

```
\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx
-----------------------
sec   rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
     177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid           [ultimate] Danger Mouse <danger.mouse@secret.example.net>
uid           [ultimate] Danger Mouse <dm@secret.example.net>
ssb   rsa3072 2018-03-15 [E] [expires: 2018-09-13]

bash-4.4$
\end{verbatim}
```

```
\subsubsection{Revoking User IDs}
\label{sec:org1683695}
Revoking a user ID is a fairly similar process, except that it uses
the \texttt{key\_revoke\_uid} method.

\begin{verbatim}
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid = "Danger Mouse <danger.mouse@secret.example.net>"

c.key_revoke_uid(key, uid)
\end{verbatim}
```

```
\subsection{Key certification}
\label{sec:orgf431bf8}
Since
```

key certification is more frequently referred to as key signing,
the method used to perform this function is \texttt{key_sign}.

The \texttt{key_sign} method takes four arguments: \texttt{key}, \texttt{uids},
\texttt{expires_in} and \texttt{local}. The default value of \texttt{uids} is \texttt{None} and
which results in all user IDs being selected. The default value of
both \texttt{expires_in} and \texttt{local} is \texttt{False}; which results in the
signature never expiring and being able to be exported.

The \texttt{key} is the key being signed rather than the key doing the
signing. To change the key doing the signing refer to the signing key
selection above for signing messages and files.

If the \texttt{uids} value is not \texttt{None} then it must either be a string to
match a single user ID or a list of strings to match multiple user
IDs. In this case the matching of those strings must be precise and
it is case sensitive.

To sign Danger
Mouse's key for just the initial user ID with a
signature which will last a little over a month, do this:

```
\begin{verbatim}
import gpg

c = gpg.Context()
uid = "Danger Mouse <dm@secret.example.net>"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
c.key_sign(key, uids=uid, expires_in=2764800)
\end{verbatim}


\subsubsection{Verifying key certifications}
\label{sec:org87abdd3}
\begin{verbatim}
import gpg
import time

c = gpg.Context()
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
keys = list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
  for sig in user.signatures:
    print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
```

```
            sig.uid)
\end{verbatim}
```

Which for Danger Mouse displays the following:

```
\begin{verbatim}
0x92E3F6115435C65A  Thu Mar 15 13:17:44 2018  Danger Mouse <dm@secret.example.net>
0x321E4E2373590E5D  Mon Nov 26 12:46:05 2018  Ben McGinnes <ben@adversary.org>
\end{verbatim}
```

The
 two key signatures listed are for the self-certification of Danger
Mouse's key made when the key was created in March, 2018; and the
second is a signature made by the author and set to expire at the end
of the year.  Note that the second signature was made with the
following code (including the preceding code to display the output of
the certifications or key signatures):

```
\begin{verbatim}
import gpg
import math
import pendulum
import time

hd = "/home/dm/.gnupg"
c = gpg.Context()
d = gpg.Context(home_dir=hd)
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
dmuid = "Danger Mouse <dm@secret.example.net>"
dkeys = list(c.keylist(pattern=dmuid))
dmkey = dkeys[0]

c.key_import(d.key_export(pattern=None))

tp = pendulum.period(pendulum.now(tz="local"), pendulum.datetime(2019, 1, 1))
ts = tp.total_seconds()
total_secs = math.ceil(ts)
c.key_sign(dmkey, uids=dmuid, expires_in=total_secs)

d.key_import(c.key_export(pattern=dmuid))
keys = list(c.keylist(pattern=dmuid,
 mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
   for sig in user.signatures:
       print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
            sig.uid)
```

\end{verbatim}

Note that this final code block includes the use of a module which is
\emph{not} part of Python's standard library, the \href{https://pendulum.eustace.io/}{pendulum module}. Unlike the standard datetime module, pendulum makes working with dates and
times significantly easier in Python; just as the requests module
makes working with HTTP and HTTPS easier than the builtin modules do.

Though neither requests nor pendulum are required modules for using
the GPGME Python bindings, they are both highly recommended more
generally.

\section{Advanced or Experimental Use Cases}
\label{sec:org944cc00}
\subsection{C plus Python plus SWIG plus Cython}
\label{sec:org3b53926}
In spite of the apparent incongruence of using Python bindings to a C
interface only to generate
more C from the Python; it is in fact quite
possible to use the GPGME bindings with \href{http://docs.cython.org/en/latest/index.html}{Cython}. Though in many cases
the benefits may not be obvious since the most computationally
intensive work never leaves the level of the C code with which GPGME
itself is interacting with.

Nevertheless, there are some situations where the benefits are
demonstrable. One of the better and easier examples being the one of
the early examples in this HOWTO, the \hyperref[sec:org63a3d62]{key counting} code. Running that example as an executable Python script, \texttt{keycount.py} (available in
the \texttt{examples/howto/} directory), will take a noticeable amount of time
to run on most systems where the public keybox or keyring contains a
few thousand public keys.

Earlier in the evening, prior to starting this section, I ran that
script on my laptop; as I tend to do periodically and timed it using
\texttt{time} utility, with the following results:

\begin{verbatim}
bash-4.4$
 time keycount.py

Number of secret keys:  23
Number of public keys:  12112


real 11m52.945s
user 0m0.913s

```
sys 0m0.752s

bash-4.4$
```
\end{verbatim}

Sometime after that I imported another key and followed it with a
little test of Cython.  This test was kept fairly basic, essentially
lifting the material from the \href{http://docs.cython.org/en/latest/src/tutorial/cython_tutorial.html}{Cython Basic Tutorial} to demonstrate
compiling Python code to C.  The first step was to take the example
key counting code quoted previously, essentially from the importing of
the \texttt{gpg} module to the end of the script:

\begin{verbatim}
```
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

print("""
   Number of secret keys:  {0}
   Number of public keys:  {1}

""".format(secnum, pubnum))
```
\end{verbatim}

Save
 that into a file called \texttt{keycount.pyx} and then create a
\texttt{setup.py} file which contains this:

\begin{verbatim}
```
from distutils.core import setup
from Cython.Build import cythonize

setup(
   ext_modules = cythonize("keycount.pyx")
)
```
\end{verbatim}

Compile it:

\begin{verbatim}
bash-4.4$ python setup.py build_ext --inplace
bash-4.4$
\end{verbatim}

Then run it in a similar manner to \texttt{keycount.py}:

\begin{verbatim}
bash-4.4$ time python3.7 -c "import keycount"

Number of secret keys:  23
Number of public keys:  12113


real 6m47.905s
user 0m0.785s
sys 0m0.331s

bash-4.4$
\end{verbatim}

Cython turned \texttt{keycount.pyx} into an 81KB \texttt{keycount.o} file in the
\texttt{build/} directory, a 24KB \texttt{keycount.cpython-37m-darwin.so} file to be
imported into Python 3.7 and a 113KB \texttt{keycount.c} generated C source
code file of nearly three thousand lines.  Quite a bit bigger than the
314 bytes of the \texttt{keycount.pyx} file or the full 1,452 bytes
 of the
full executable \texttt{keycount.py} example script.

On the other hand it ran in nearly half the time; taking 6 minutes and
47.905 seconds to run.  As opposed to the 11 minutes and 52.945 seconds
which the CPython script alone took.

The \texttt{keycount.pyx} and \texttt{setup.py} files used to generate this example
have been added to the \texttt{examples/howto/advanced/cython/} directory
The example versions include some additional options to annotate the
existing code and to detect Cython's use.  The latter comes from the
\href{http://docs.cython.org/en/latest/src/tutorial/pure.html\#magic-attributes-within-the-pxd}{Magic Attributes}
section of the Cython documentation.


\section{Miscellaneous extras and work-arounds}
\label{sec:orgd72f7de}
Most of the things in the following sections are here simply because
there was no better place to put them, even though some are only
peripherally related to the GPGME Python bindings.  Some are also
workarounds for functions not integrated

with GPGME as yet. This is
especially true of the first of these, dealing with \hyperref[sec:org83f4d00]{group lines}.

\subsection{Group lines}
\label{sec:org83f4d00}
There is not yet an easy way to access groups configured in the
gpg.conf file from within GPGME. As a consequence these central
groupings of keys cannot be shared amongst multiple programs, such as
MUAs readily.

The following code, however, provides a work-around for obtaining this
information in Python.

```
\begin{verbatim}
import subprocess
import sys

if sys.platform == "win32":
   gpgconfcmd = "gpgconf.exe --list-options gpg"
else:
   gpgconfcmd = "gpgconf --list-options gpg"

process = subprocess.Popen(gpgconfcmd.split(), stdout=subprocess.PIPE)
procom = process.communicate()

if sys.version_info[0] == 2:
   lines = procom[0].splitlines()
else:
   lines = procom[0].decode().splitlines()

for line in lines:
   if line.startswith("group") is True:
       break

groups = line.split(":")[-1].replace("", ").split(',')

group_lines
 = []
group_lists = []

for i in range(len(groups)):
   group_lines.append(groups[i].split("="))
   group_lists.append(groups[i].split("="))

for i in range(len(group_lists)):
   group_lists[i][1] = group_lists[i][1].split()
\end{verbatim}
```

The result of that code is that \texttt{group_lines} is a list of lists where
\texttt{group_lines[i][0]} is the name of the group and \texttt{group_lines[i][1]}
is the key IDs of the group as a string.

The \texttt{group_lists} result is very similar in that it is a list of
lists.  The first part, \texttt{group_lists[i][0]} matches
\texttt{group_lines[i][0]} as the name of the group, but \texttt{group_lists[i][1]}
is the key IDs of the group as a list.

A demonstration of using the \texttt{groups.py} module is also available in
the form of the executable \texttt{mutt-groups.py} script.  This second
script reads all the group entries in a user's \texttt{gpg.conf} file and
converts them into crypt-hooks suitable for use
 with the Mutt and
Neomutt mail clients.

\subsection{Keyserver access for Python}
\label{sec:org5ad99aa}
The \href{https://github.com/Selfnet/hkp4py}{hkp4py} module by Marcel Fest was originally a port of the old
\href{https://github.com/dgladkov/python-hkp}{python-hkp} module from Python 2 to Python 3 and updated to use
the
\href{http://docs.python-requests.org/en/latest/index.html}{requests} module instead.  It has since been modified to
provide
support for Python 2.7 as well and is available via PyPI.

Since it rewrites the \texttt{hkp} protocol prefix as \texttt{http} and \texttt{hkps} as
\texttt{https}, the module is able to be used even with servers which do not
support the full scope of keyserver functions.\footnote{Such as with ProtonMail servers.  This also means that
restricted servers which only advertise either HTTP or HTTPS end
points and not HKP or HKPS end points must still be identified as as
HKP or HKPS within the Python Code.  The \texttt{hkp4py} module will rewrite
these
 appropriately when the connection is made to the server.}  It also works quite
readily when incorporated into a \hyperref[sec:org3b53926]{Cython} generated and compiled version
of any code.

\subsubsection{Key import format}
\label{sec:org1e47c97}
The hkp4py module returns key data via requests as string literals
(\texttt{r.text}) instead of byte literals (\texttt{r.content}).  This means that
the retrurned key data must be encoded to UTF-8 when importing that
key material using a \texttt{gpg.Context().key_import()} method.

For this reason an alternative method has been added to the \texttt{search}
function of \texttt{hkp4py.KeyServer()} which returns the key in the correct

format as expected by \texttt{key_import}.  When importing using this module,
it is now possible to import with this:

\begin{verbatim}
for key in keys:
  if key.revoked is False:
    gpg.Context().key_import(key.key_blob)
  else:
    pass
\end{verbatim}

Without that recent addition it would
 have been necessary to encode
the contents of each \texttt{hkp4py.KeyServer().search()[i].key} in
\texttt{hkp4py.KeyServer().search()} before trying to import it.

An example of this is included in the \hyperref[sec:org1ad598a]{Importing Keys} section of this
HOWTO and the corresponding executable version of that example is
available in the \texttt{lang/python/examples/howto} directory as normal; the
executable version is the \texttt{import-keys-hkp.py} file.

\subsection{GPGME version checking}
\label{sec:org18b8ef8}
For various reasons it may be necessary to check which version of
GPGME the bindings have been built against; including whether a
minimum required version of GPGME is in use.

For the most part the \texttt{gpg.version.versionstr} and
\texttt{gpg.version.versionlist} methods have been quite sufficient.  The
former returns the same string as \texttt{gpgme-config -{}-version}, while the
latter returns the major, minor and patch values in a list.

To check if the installed bindings
 have actually been built against
the current installed libgpgme version, this check can be performed:

\begin{verbatim}
import gpg
import subprocess
import sys

gpgme_version_call = subprocess.Popen(["gpgme-config", "--version"],
                                      stdout=subprocess.PIPE,
                                      stderr=subprocess.PIPE)
gpgme_version_str = gpgme_version_call.communicate()

if sys.version_info[0] == 2:

```
   gpgme_version = gpgme_version_str[0].strip()
elif sys.version_info[0] >= 3:
   gpgme_version = gpgme_version_str[0].decode().strip()
else:
   gpgme_version = None

if gpgme_version is not None:
   if gpgme_version == gpg.version.versionstr:
      print("The GPGME Python bindings match libgpgme.")
   else:
      print("The GPGME Python bindings do NOT match libgpgme.")
else:
   print("Upgrade Python and reinstall the GPGME Python bindings.")
\end{verbatim}
```

For many developers, however, the preferred checking means checking
for a minimum
 version or point release.  This is now readily available
via the \texttt{gpg.version.versionintlist} method (added in version
\texttt{1.12.1-beta79}).  It is also now possible to easily check whether the
installed GPGME Python bindings were built from a development or beta
branch of the GPGME source code.

The following code demonstrates how both of those methods may be used:

```
\begin{verbatim}
import gpg

try:
   if gpg.version.is_beta is True:
      print("The installed GPGME Python bindings were built from beta code.")
   else:
      print("The installed GPGME Python bindings are a released version.")
except Exception as e:
   print(e)

try:
   if gpg.version.versionintlist[0] == 1:
      if gpg.version.versionintlist[1] == 12:
         if gpg.version.versionintlist[2] == 1:
            print("This is the minimum version for using versionintlist.")
         elif gpg.version.versionintlist[2] > 1:
            print("The versionintlist method is available.")

         else:
            pass
      elif gpg.version.versionintlist[1] > 12:
         print("The versionintlist method is available.")
```

```
        else:
            pass
    elif gpg.version.versionintlist[0] > 1:
        print("The versionintlist method is available.")
    else:
        pass
except Exception as e:
    print(e)
\end{verbatim}
```

The points where \texttt{pass} is used in the above example will most likely
also produce an \texttt{Exception} error since those results should only
occur in versions which do not have the \texttt{gpgme.version.is_beta} and
\texttt{gpgme.version.versionintlist} methods available.

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\subsection{Copyright}
\label{sec:org26ed04d}
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\subsection{Draft Editions of this HOWTO}
\label{sec:org080a94a}
Draft editions of this HOWTO may be periodically available directly
from the author at any of the following URLs:

\begin{itemize}
\item
 \href{https://files.au.adversary.org/crypto/gpgme-python-howto.html}{GPGME Python Bindings HOWTO draft (XHTML single file, AWS S3 SSL)}
\item \href{http://files.au.adversary.org/crypto/gpgme-python-howto.html}{GPGME Python Bindings HOWTO draft (XHTML single file, AWS S3 no SSL)}
\item \href{https://files.au.adversary.org/crypto/gpgme-python-howto-split/index.html}{GPGME Python Bindings HOWTO draft (XHTML multiple files, AWS S3 SSL)}
\item \href{http://files.au.adversary.org/crypto/gpgme-python-howto/index.html}{GPGME Python Bindings HOWTO draft (XHTML multiple files, AWS S3 no SSL)}
\end{itemize}

All of these draft versions except for one have been generated from
this document via GNU Emacs \href{https://orgmode.org/}{Org mode} and
\href{https://www.gnu.org/software/texinfo/}{GNU Texinfo}.  Though it is
likely that the specific \href{https://files.au.adversary.org/crypto/gpgme-python-howto}{file}
\href{http://files.au.adversary.org/crypto/gpgme-python-howto.org}{version}

used will be on the same server
with the generated output formats.

The GNU Texinfo and reStructured Text versions ship with the software,
while the GNU Emacs Info verseion is generated from the Texinfo
version using GNU Texinfo or GNU Makeinfo. The Texinfo format is
generated from the original Org mode source file in Org mode itself
either within GNU Emacs or via the command line by invoking Emacs in
batch mode:

\begin{verbatim}
emacs gpgme-python-howto.org --batch -f org-texinfo-export-to-texinfo --kill
emacs gpgme-python-howto --batch -f org-texinfo-export-to-texinfo --kill
\end{verbatim}

The reStructuredText format is also generated from the Org-mode source
file, except it is generated using \href{https://pandoc.org}{Pandoc} with either of the following
commands:

\begin{verbatim}
pandoc -f org -t rst+smart -o gpgme-python-howto.rst gpgme-python-howto.org
pandoc -f org -t rst+smart -o gpgme-python-howto.rst gpgme-python-howto
\end{verbatim}

In addition to these there is
a significantly less frequently updated
version as a HTML \href{https://files.au.adversary.org/crypto/gpgme-python/dita/webhelp/index.html}{WebHelp
site} (AWS S3 SSL); generated from DITA XML
source files, which can be found in \href{https://dev.gnupg.org/source/gpgme/browse/ben\%252Fhowto-dita/}{an
alternative branch} of the GPGME
git repository.

Various generated output formats may occasionally be found in
subdirectories of the \href{https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python}{gpgme-python}
directory. In particular within
the \href{https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/dita}{DITA},
\href{https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/rst}{reStructuredText} and
\href{https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/texinfo}{Texinfo} subdirectories. The
\texttt{rst}
directory contains output files generated with Sphix and may include a
considerable number of its possible output formats.

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\end{document}
# This is a template.  The dist target uses it to create the real file.
Summary: GPGME - GnuPG Made Easy
Name: gpgme
Version: 1.15.1
Release: 1
URL: https://gnupg.org/gpgme.html
Source: https://www.gnupg.org/ftp/gcrypt/gpgme/%{name}-%{version}.tar.gz
Group: Development/Libraries
Copyright: GPL
BuildRoot: %{_tmppath}/%{name}-%{version}
BuildRequires: make
Prereq: /sbin/ldconfig /sbin/install-info
Requires: gnupg

%description
GnuPG Made Easy (GPGME) is a library designed to make access to GnuPG easier
for applications. It provides a High-Level Crypto API for encryption,
decryption, signing, signature verification and key management.

%prep
%setup -q

%build
CFLAGS="$RPM_OPT_FLAGS"; export CFLAGS
./configure --prefix=/usr
make

%install
rm -fr $RPM_BUILD_ROOT
mkdir -p $RPM_BUILD_ROOT
make install prefix=$RPM_BUILD_ROOT/usr infodir=$RPM_BUILD_ROOT%{_infodir}
rm -f $RPM_BUILD_ROOT%{_infodir}/dir

```
%clean
rm -fr $RPM_BUILD_ROOT
make distclean

%post
/sbin/ldconfig
/sbin/install-info %{_infodir}/gpgme.info.gz
 %{_infodir}/dir
/sbin/install-info %{_infodir}/gpgme-python-howto.info.gz %{_infodir}/dir

%preun
if [ "$1" = 0 ]; then
/sbin/install-info --delete %{_infodir}/gpgme.info.gz %{_infodir}/dir
/sbin/install-info --delete %{_infodir}/gpgme-python-howto.info.gz %{_infodir}/dir
fi

%postun
/sbin/ldconfig

%files
%defattr(-,root,root)
%doc COPYING COPYING.LESSER AUTHORS README INSTALL NEWS ChangeLog TODO THANKS
%attr(0755,root,root) %{_bindir}/gpgme-config
%attr(0755,root,root) %{_libdir}/*gpgme.so*
%attr(0755,root,root) %{_libdir}/*gpgme.la
%attr(0644,root,root) %{_libdir}/*gpgme.a
%{_includedir}/gpgme.h
%{_datadir}/aclocal/gpgme.m4
%{_infodir}/gpgme.info*
%{_infodir}/gpgme-python-howto.info*

%changelog
* Sat Aug 30 2003 Robert Schiele <rschiele@uni-mannheim.de>
- %{_infodir}/dir is not packaged, remove to prevent checking failure
* Mon Jul 01 2002 Wojciech Polak <polak@lodz.pdi.net>
- initial specfile release for GPGME.

# EOF
```

# 1.1343 ms 2.1.3

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# 1.1344 epel-release 9-9.el9

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Public License instead of this License. But first, please read
<http://www.gnu.org/philosophy/why-not-lgpl.html>.

# 1.1350 cachefilesd 0.10.10-12.el9

## 1.1350.1 Available under license :

No license file was found, but licenses were detected in source scan.

License: GPLv2+

Found in path(s):
* /cachefilesd-0.10.10-12.el9.src.rpm-cosi-expand-archive-FDcQrVkL/cachefilesd.spec
* /cachefilesd-0.10.10-12.el9.src.rpm-cosi-expand-archive-FDcQrVkL/cachefilesd-0.10.10.tar.bz2-cosi-expand-archive-UDCtWSpt/cachefilesd-0.10.10/redhat/cachefilesd.spec
No license file was found, but licenses were detected in source scan.

```
################################################################################
#
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# Written by David Howells (dhowells@redhat.com)
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# modify it under the terms of the GNU General Public License
# as published by the Free Software Foundation; either version
# 2 of the License, or (at your option) any later version.
#
################################################################################
```

Found in path(s):
* /cachefilesd-0.10.10-12.el9.src.rpm-cosi-expand-archive-FDcQrVkL/cachefilesd-0.10.10.tar.bz2-cosi-expand-archive-UDCtWSpt/cachefilesd-0.10.10/cachefilesd.conf
No license file was found, but licenses were detected in source scan.

```
/* CacheFiles userspace management daemon
*
* Copyright (C) 2006-2007 Red Hat, Inc. All Rights Reserved.
* Written by David Howells (dhowells@redhat.com)
*
* This program is free software; you can redistribute it and/or
```

```
* modify it under the terms of the GNU General Public License
* as published by the Free Software Foundation; either version
* 2 of the License, or (at your option) any later version.
*
*
* Configuration file goes in /etc/cachefiles.conf and is of the form:
*
* dir /var/cache/fscache
* tag mycache
* brun 10%
* bcull 7%
* bstop 3%
* frun 10%
* fcull 7%
* fstop 3%
*
* Only "dir" is mandatory
* Blank lines and lines beginning with a hash are comments
* Trailing spaces are significant
* There is no character escaping mechanism
* NUL characters are cause for error
*/
```

Found in path(s):
* /cachefilesd-0.10.10-12.el9.src.rpm-cosi-expand-archive-FDcQrVkL/cachefilesd-0.10.10.tar.bz2-cosi-expand-archive-UDCtWSpt/cachefilesd-0.10.10/cachefilesd.c
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```

Found in path(s):
* /cachefilesd-0.10.10-12.el9.src.rpm-cosi-expand-archive-FDcQrVkL/cachefilesd-0.10.10.tar.bz2-cosi-expand-archive-UDCtWSpt/cachefilesd-0.10.10/cachefilesd.conf.5
* /cachefilesd-0.10.10-12.el9.src.rpm-cosi-expand-archive-FDcQrVkL/cachefilesd-0.10.10.tar.bz2-cosi-expand-archive-UDCtWSpt/cachefilesd-0.10.10/cachefilesd.8
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# Written by David Howells (dhowells@redhat.com)
#           Karl MacMillan (kmacmill@redhat.com)
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#
################################################################################

Found in path(s):
* /cachefilesd-0.10.10-12.el9.src.rpm-cosi-expand-archive-FDcQrVkL/cachefilesd-0.10.10.tar.bz2-cosi-expand-archive-UDCtWSpt/cachefilesd-0.10.10/selinux/cachefilesd.fc
* /cachefilesd-0.10.10-12.el9.src.rpm-cosi-expand-archive-FDcQrVkL/cachefilesd-0.10.10.tar.bz2-cosi-expand-archive-UDCtWSpt/cachefilesd-0.10.10/selinux/cachefilesd.if
No license file was found, but licenses were detected in source scan.

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# Written by David Howells (dhowells@redhat.com)
#  Karl MacMillan (kmacmill@redhat.com)
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#
################################################################################

Found in path(s):
* /cachefilesd-0.10.10-12.el9.src.rpm-cosi-expand-archive-FDcQrVkL/cachefilesd-0.10.10.tar.bz2-cosi-expand-archive-UDCtWSpt/cachefilesd-0.10.10/selinux/cachefilesd.te

# 1.1351 go-osc52 2.0.1

## 1.1351.1 Available under license :

```
# Contributor: Patrycja Rosa <alpine@ptrcnull.me>
# Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=bsd-compat-headers
pkgver=0.7.2
pkgrel=6
pkgdesc="BSD compatibility headers (cdefs, queue, tree)"
url="https://gitlab.alpinelinux.org/alpine/aports"
arch="noarch"
license="BSD-2-Clause AND BSD-3-Clause"
source="
 cdefs.h
 queue.h
 tree.h
"
```

```
builddir="$srcdir"
options="!check" # just headers

package() {
 mkdir -p "$pkgdir"
 install -Dm644 -t "$pkgdir"/usr/include/sys \
  cdefs.h queue.h tree.h
}
sha512sums="
37c8fc73c7aea7b490f7850927e2bb91d12137c9e59e22c084146d515696dbc7973b5de92f4c987ba080dd2502ba8312
7006442c3f019b6447a620c0cae73178  cdefs.h
2f0d5e6e4dc3350285cf17009265dddcbe12431c111868eea39bc8cb038ab7c1f2acacbb21735c4e9d4a1fd106a8fc0f86
11ea33987d4faba37dde5ce6da0750  queue.h
d9ac210d81feb8ad2655bc80fb065d3fe20ae4417b32b4a1711e6738a4870140005c13373b5d1846ef3ce5ae6da45f2da
cef2092881eded0a2e94f6a07752ef3  tree.h
"
```

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The text rotation code in w_rottext.c was written by Alan Richardson.
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The Kohonen neural network code for color optimization was written by Anthony Dekker.

Parts Copyright (c) 1995 by C. Blanc and C. Schlick
The X-Spline code was written Carole Blanc (blanc@labri.u-bordeaux.fr) and Christophe Schlick (schlick@labri.u-bordeaux.fr) starting from an initial implementation done by C. Feuille, S. Grosbois, L. Maziere and L. Minihot as a student practice (Universite Bordeaux, France). For additional information about X-splines, see:
"X-Splines: A Spline Model Designed for the End User" by C. Blanc and C. Schlick, Proceedings of SIGGRAPH'95
http://dept-info.labri.u-bordeaux.fr/~schlick/DOC/sig1.html
# Contributor: Carlo Landmeter <clandmeter@alpinelinux.org>
# Maintainer: Kevin Daudt <kdaudt@alpinelinux.org>
pkgname=spdx-licenses

```
pkgver=3.22
pkgrel=1
pkgdesc="Various data formats for the SPDX License List"
url="https://spdx.org/"
arch="noarch"
options="!check" # no test suite
license="CC-BY-3.0"
source="license-list-data-$pkgver.tar.gz::https://github.com/spdx/license-list-data/archive/v$pkgver.tar.gz"
builddir="$srcdir/license-list-data-$pkgver"
subpackages="$pkgname-list"

_types="html json rdfa rdfnt rdfturtle rdfxml template text"

for type in $_types; do
 subpackages="$subpackages $pkgname-$type:_subpkg"
done

package() {
 mkdir -p "$pkgdir"
}

_subpkg() {
 local type=${subpkgname/$pkgname-/}
 pkgdesc="$pkgdesc ($type)"
 install_if="$pkgname=$pkgver-r$pkgrel"
 mkdir -p "$subpkgdir"/usr/share/spdx
 cp -r "$builddir"/$type "$subpkgdir"/usr/share/spdx/
}

list() {
 pkgdesc="$pkgdesc (licence list)"
 mkdir -p "$subpkgdir"/usr/share/spdx
 local i; for i in "$builddir"/text/*.txt; do
  local
 license=${i##*/}
  echo ${license%.*} >> "$subpkgdir"/usr/share/spdx/license.lst
 done
}

sha512sums="
b213fe66699770d75a4c994a01a5c08325751423516c2fb871088a47e7e7ce605736064f5ce3a63dc1d3c462271832db
7bc464ac968df1888f9823787964c786  license-list-data-3.22.tar.gz
"
# Contributor: Maxim Karasev <begs@disroot.org>
# Maintainer: mio <miyopan@e.email>
pkgname=bsd-games
pkgver=3.3
pkgrel=1
```

```
pkgdesc="traditional text mode games from BSD"
url="https://bsd-games.sourceforge.io/"
arch="all"
license="BSD-3-Clause"
install="$pkgname.post-install"
makedepends="ncurses-dev coreutils" # configure causes busybox expr error
subpackages="$pkgname-doc"
source="https://sourceforge.net/projects/bsd-games/files/bsd-games-$pkgver.tar.gz"
options="!check" # no tests

build() {
 # some GNU autoconf options are ignored, but it works
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr \
  --sysconfdir=/etc \
  --mandir=/usr/share/man \
  --localstatedir=/var/lib # it really shouldn't be in /var
 make
}

package() {
 make DESTDIR="$pkgdir" install
 install -Dm644 LICENSE "$pkgdir"/usr/share/licenses/bsd-games/LICENSE
}

sha512sums="
aaf36d09d4fe68514a5c279063d7e77a9a9a84c447037cba974b29faa07eb80c2aab2379d0699c196b5c27ffe1b2bb2c6
8d3390143e0e62d5e3d210ccfb61294
  bsd-games-3.3.tar.gz
"
# Contributor: Fabian Affolter <fabian@affolter-engineering.ch>
# Maintainer: Fabian Affolter <fabian@affolter-engineering.ch>
pkgname=py3-flake8-copyright
_pkgname=flake8-copyright
pkgver=0.2.4
pkgrel=3
pkgdesc="Extension for flake8 which checks for copyrights"
options="!check" # No testsuite
url="https://github.com/savoirfairelinux/flake8-copyright"
arch="noarch"
license="MIT"
depends="py3-flake8 py3-setuptools"
makedepends="py3-gpep517 py3-wheel"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/${_pkgname:0:1}/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir"/$_pkgname-$pkgver
```

```
replaces="py-flake8-copyright"                  # Backwards compatibility
provides="py-flake8-copyright=$pkgver-r$pkgrel" # Backwards compatibility

build() {
 gpep517 build-wheel \
  --wheel-dir .dist \
  --output-fd 3 3>&1 >&2
}

package() {
 gpep517 install-wheel --destdir "$pkgdir" \
  .dist/*.whl
}

sha512sums="
a6ab47e1bb715618f075c51f398e18180404871b3b0faf1c2d30701d5203db6bc23771bf22ffb5bafcd8ee856b9b64237
b316bd503ae7dceed6ca284ccd5a74d
  flake8-copyright-0.2.4.tar.gz
"
# Maintainer: fossdd <fossdd@pwned.life>
pkgname=cargo-license
pkgver=0.6.1
pkgrel=1
pkgdesc="Cargo subcommand to see license of dependencies"
url="https://github.com/onur/cargo-license"
arch="all"
license="MIT"
makedepends="cargo cargo-auditable"
source="$pkgname-$pkgver.tar.gz::https://crates.io/api/v1/crates/cargo-license/$pkgver/download"

prepare() {
 default_prepare

 cargo fetch --target="$CTARGET" --locked
}

build() {
 cargo auditable build --release --frozen
}

check() {
 cargo test --frozen
}

package() {
 install -Dm755 target/release/cargo-license -t "$pkgdir"/usr/bin
}
```

```
sha512sums="
36215145e79965be090ae2f5ce6f5eb208465eb67a94c26bed1fe70a131c46c6dc35695e30852759b7366883fbc3caf00
272d796ac634f0a5e1d49232b6b29d5  cargo-license-0.6.1.tar.gz
"
# Contributor: Dhruvin Gandhi <contact@dhruvin.dev>
# Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=py3-license-expression
_pkgname=license-expression
pkgver=30.3.0
pkgrel=1
pkgdesc="Library to parse, compare, simplify and normalize license expressions"
url="https://github.com/nexB/license-expression"
arch="noarch"
license="Apache-2.0"
depends="python3 py3-boolean.py"
makedepends="py3-setuptools py3-setuptools_scm py3-gpep517 py3-wheel"
checkdepends="py3-pytest py3-pytest-xdist"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/l/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir/$_pkgname-$pkgver"

build() {
 gpep517 build-wheel \
  --wheel-dir .dist \
  --output-fd 3 3>&1 >&2
}

check() {
 python3 -m venv --clear --without-pip --system-site-packages .testenv
 .testenv/bin/python3 -m installer .dist/*.whl
 .testenv/bin/python3 -m pytest
}

package() {
 python3 -m installer -d "$pkgdir" \
  .dist/*.whl
}

sha512sums="
3fe4ac8830085fe38d8ee713a332047941b2a7a8ff5f31810b124c5903335a8343a222926aefe000da66a49b4d6f8b934
af3cc350448b075a4ec6aa1fdb51aef
  license-expression-30.3.0.tar.gz
"
```

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http://www.geocities.com/SiliconValley/Campus/8645/index.html
http://members.nbci.com/silicon39/
http://www.mp3.com/silicon39
https://analoguesque.x10host.com/
# Automatically generated by apkbuild-cpan, template 4
# Contributor: Valery Kartel <valery.kartel@gmail.com>
# Maintainer: Celeste <cielesti@protonmail.com>
pkgname=perl-bsd-resource
pkgver=1.2911
pkgrel=9
#_pkgreal is used by apkbuild-cpan to find modules at MetaCpan
_pkgreal=BSD-Resource
pkgdesc="Perl extension implements the BSD process resource limit functions"

```
url="https://metacpan.org/release/BSD-Resource/"
arch="all"
license="Artistic-2.0 OR LGPL-2.0"
depends="perl"
makedepends="perl-dev"
subpackages="$pkgname-doc"
source="https://cpan.metacpan.org/authors/id/J/JH/JHI/BSD-Resource-$pkgver.tar.gz"
builddir="$srcdir/$_pkgreal-$pkgver"

build() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 PERL_MM_USE_DEFAULT=1 perl -I. Makefile.PL \
  INSTALLDIRS=vendor \
  NO_PACKLIST=1 \
  NO_PERLLOCAL=1
 make
}

check() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 make test
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="
d0032d41c7c0468ed1c6d8f57b885f6cb97a5039d754c8cb60b2067daedaf53bd15fb6561a3d0f828df16dfa5417f663b
8065ba65f4fea16dc9262728b3b6b85
  BSD-Resource-1.2911.tar.gz
"
```

mini_sendmail - accept email on behalf of real sendmail

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# Maintainer: Natanael Copa <ncopa@alpinelinux.org>
pkgname=libart-lgpl
pkgver=2.3.21
pkgrel=8
pkgdesc="A library for high-performance 2D graphics"
url="https://www.levien.com/libart/"
arch="all"
options="!check"  # No test suite.
license="LGPL-2.0-or-later"
subpackages="$pkgname-dev"
source="https://download.gnome.org/sources/libart_lgpl/2.3/libart_lgpl-$pkgver.tar.bz2
 "

builddir="$srcdir"/libart_lgpl-$pkgver

prepare() {
 update_config_sub
 default_prepare
}

build() {
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr
 make
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="8a632a6a4da59e5e8c02ec2f5a57e36d182b325b46513765425e5f171ff9ae326af1b133725beba28f7e7
6654309e001aee9bace727b5b4c8589405256a3c020  libart_lgpl-2.3.21.tar.bz2"
```

# 1.1352 afero 1.14.0

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Sphinx is written and maintained by Georg Brandl <georg@python.org>.

Substantial parts of the templates were written by Armin Ronacher
<armin.ronacher@active-4.com>.

Other contributors, listed alphabetically, are:

* Andi Albrecht -- agogo theme
* Henrique Bastos -- SVG support for graphviz extension
* Daniel Bltmann -- todo extension
* Etienne

Desautels -- apidoc module
* Michael Droettboom -- inheritance_diagram extension
* Charles Duffy -- original graphviz extension
* Kevin Dunn -- MathJax extension
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* Dan MacKinlay -- metadata fixes
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* Ezio Melotti -- collapsible sidebar JavaScript
* Daniel Neuhuser -- JavaScript domain, Python 3 support (GSOC)
* Christopher Perkins -- autosummary integration
* Benjamin Peterson -- unittests
* T. Powers -- HTML output improvements
*
Stefan Seefeld -- toctree improvements
* Shibukawa Yoshiki -- pluggable search API and Japanese search
* Antonio Valentino -- qthelp builder
* Pauli Virtanen -- autodoc improvements, autosummary extension
* Stefan van der Walt -- autosummary extension
* Thomas Waldmann -- apidoc module fixes
* John Waltman -- Texinfo builder
* Barry Warsaw -- setup command improvements
* Sebastian Wiesner -- image handling, distutils support
* Joel Wurtz -- cellspanning support in LaTeX

Many thanks for all contributions!

There are also a few modules or functions incorporated from other
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Local Variables:

coding: utf-8
fill-column: 70
End:

# 1.1367 fulcio 1.6.6

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# 1.1370 busboy 1.6.0

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# 1.1372 raulk-go-watchdog 1.3.0

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# 1.1373 oras-go 2.6.0

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name: License Checker

on:
 push:
   branches:
     - main
     - release-*
 pull_request:
   branches:
```

```
    - main
    - release-*

permissions:
 contents: write
 pull-requests: write

jobs:
 check-license:
   runs-on: ubuntu-latest
   steps:
     - name: Checkout
       uses: actions/checkout@v4
     - name: Check license header
       uses: apache/skywalking-eyes/header@v0.7.0
       with:
         mode:
 check
         config: .github/licenserc.yml
     - name: Check dependencies license
       uses: apache/skywalking-eyes/dependency@v0.7.0
       with:
         config: .github/licenserc.yml
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# 1.1374 locafero 0.7.0

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# 1.1375 otel-trace 1.36.0

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# 1.1376 npth 1.6-8.el9

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# 1.1377 glob-parent 6.0.2

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# 1.1378 kubernetes-cliruntime 0.33.5

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# 1.1383 iprutils 2.4.19-5.el9

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# 1.1384 define-properties 1.2.1

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# 1.1386 tiny-invariant 1.3.1

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# 1.1387 http-proxy-agent 4.0.1

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http-proxy-agent
==========
### An HTTP(s) proxy `http.Agent` implementation for HTTP
[![Build Status](https://github.com/TooTallNate/node-http-proxy-agent/workflows/Node%20CI/badge.svg)](https://github.com/TooTallNate/node-http-proxy-agent/actions?workflow=Node+CI)

This module provides an `http.Agent` implementation that connects to a specified
HTTP or HTTPS proxy server, and can be used with the built-in `http` module.

__Note:__ For HTTP proxy usage with the `https` module, check out
[`node-https-proxy-agent`](https://github.com/TooTallNate/node-https-proxy-agent).

Installation
---

Install with `npm`:

``` bash
$ npm install http-proxy-agent
```

Example
---

``` js
var url = require('url');
var http = require('http');
var HttpProxyAgent = require('http-proxy-agent');

// HTTP/HTTPS proxy to connect to
var proxy = process.env.http_proxy || 'http://168.63.76.32:3128';
console.log('using proxy
 server %j', proxy);

// HTTP endpoint for the proxy to connect to
var endpoint = process.argv[2] || 'http://nodejs.org/api/';
console.log('attempting to GET %j', endpoint);
var opts = url.parse(endpoint);
```

```
// create an instance of the `HttpProxyAgent` class with the proxy server information
var agent = new HttpProxyAgent(proxy);
opts.agent = agent;

http.get(opts, function (res) {
 console.log('"response" event!', res.headers);
 res.pipe(process.stdout);
});
```

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---

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# 1.1388 dennwc-ioctl 1.0.0

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If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

```
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```

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A. HISTORY OF THE SOFTWARE
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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC.  Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the

software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.2 | 2.1.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
| 2.2.1 | 2.2 | 2002 | PSF | yes |
| 2.2.2 | 2.2.1 | 2002 | PSF | yes |
| 2.2.3 | 2.2.2 | 2003 | PSF | yes |
| 2.3 | 2.2.2 | 2002-2003 | PSF | yes |
| 2.3.1 | 2.3 | 2002-2003 | PSF | yes |
| 2.3.2 | 2.3.1 | 2002-2003 | PSF | yes |
| 2.3.3 | 2.3.2 | 2002-2003 | PSF | yes |
| 2.3.4 | 2.3.3 | 2004 | PSF | yes |
| 2.3.5 | 2.3.4 | 2005 | PSF | yes |
| 2.4 | 2.3 | 2004 | PSF | yes |
| 2.4.1 | 2.4 | 2005 | PSF | yes |
| 2.4.2 | 2.4.1 | 2005 | PSF | yes |
| 2.4.3 | 2.4.2 | 2006 | PSF | yes |
| 2.4.4 | 2.4.3 | 2006 | PSF | yes |
| 2.5 | 2.4 | 2006 | PSF | yes |
| 2.5.1 | 2.5 | 2007 | PSF | yes |

| | | | | |
|---|---|---|---|---|
| 2.5.2 | 2.5.1 | 2008 | PSF | yes |
| 2.5.3 | 2.5.2 | 2008 | PSF | yes |
| 2.6 | 2.5 | 2008 | PSF | yes |
| 2.6.1 | 2.6 | 2008 | PSF | yes |
| 2.6.2 | 2.6.1 | 2009 | PSF | yes |
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| 2.6.4 | 2.6.3 | 2009 | PSF | yes |
| 2.6.5 | 2.6.4 | 2010 | PSF | yes |
| 3.0 | 2.6 | 2008 | PSF | yes |
| 3.0.1 | 3.0 | 2009 | PSF | yes |
| 3.1 | 3.0.1 | 2009 | PSF | yes |
| 3.1.1 | 3.1 | 2009 | PSF | yes |
| 3.1.2 | 3.1 | 2010 | PSF | yes |
| 3.2 | 3.1 | 2010 | PSF | yes |

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- Nicolas Cadou
- Godefroid Chapelle
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When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

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c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

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This option is useful when you wish to copy part of the code of
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it with the complete corresponding machine-readable source code, which
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medium customarily used for software interchange.

If distribution of object code is made by offering access to copy
from a designated place, then offering equivalent access to copy the
source code from the same place satisfies the requirement to
distribute the source code, even though third parties are not
compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the
Library, but is designed to work with the Library by being compiled or
linked with it, is called a "work that uses the Library". Such a
work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library
creates an executable that is a derivative of the Library (because it
contains portions of the Library), rather than a "work that uses the
library". The executable is therefore covered by
this License.
Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any
executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable
source code for the Library including whatever
changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

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For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

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d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it

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When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

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a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified

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b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly
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```
// This file was generated by gir (https://github.com/gtk-rs/gir)
// from gir-files (https://github.com/gtk-rs/gir-files)
// DO NOT EDIT

use gio_sys;
use glib;
use glib::object::Cast;
use glib::object::IsA;
use glib::signal::connect_raw;
use glib::signal::SignalHandlerId;
use glib::translate::*;
use glib_sys;
use gobject_sys;
```

```
use std::boxed::Box as Box_;
use std::fmt;
use std::mem::transmute;
use std::pin::Pin;
use std::ptr;
use Cancellable;

glib_wrapper! {
  pub struct Permission(Object<gio_sys::GPermission, gio_sys::GPermissionClass, PermissionClass>);

  match fn {
    get_type => || gio_sys::g_permission_get_type(),
  }
}

pub const NONE_PERMISSION: Option<&Permission> = None;

pub trait PermissionExt: 'static {
  fn acquire<P: IsA<Cancellable>>(&self, cancellable: Option<&P>) -> Result<(), glib::Error>;

  fn acquire_async<P: IsA<Cancellable>, Q: FnOnce(Result<(), glib::Error>) + Send + 'static>(
    &self,
    cancellable: Option<&P>,
    callback: Q,
  );

  fn acquire_async_future(
    &self,
  ) -> Pin<Box_<dyn std::future::Future<Output = Result<(), glib::Error>> + 'static>>;

  fn get_allowed(&self) -> bool;

  fn get_can_acquire(&self) -> bool;

  fn get_can_release(&self) -> bool;

  fn impl_update(&self, allowed: bool, can_acquire: bool, can_release: bool);

  fn release<P: IsA<Cancellable>>(&self, cancellable: Option<&P>) -> Result<(), glib::Error>;

  fn release_async<P: IsA<Cancellable>, Q: FnOnce(Result<(), glib::Error>) + Send + 'static>(
    &self,
    cancellable: Option<&P>,
    callback: Q,
  );

  fn release_async_future(
    &self,
```

```
  ) -> Pin<Box_<dyn std::future::Future<Output = Result<(), glib::Error>> + 'static>>;

  fn connect_property_allowed_notify<F: Fn(&Self) + 'static>(&self, f: F) -> SignalHandlerId;

  fn connect_property_can_acquire_notify<F: Fn(&Self) + 'static>(&self, f: F) -> SignalHandlerId;

  fn connect_property_can_release_notify<F: Fn(&Self) + 'static>(&self,
 f: F) -> SignalHandlerId;
}

impl<O: IsA<Permission>> PermissionExt for O {
  fn acquire<P: IsA<Cancellable>>(&self, cancellable: Option<&P>) -> Result<(), glib::Error> {
    unsafe {
      let mut error = ptr::null_mut();
      let _ = gio_sys::g_permission_acquire(
        self.as_ref().to_glib_none().0,
        cancellable.map(|p| p.as_ref()).to_glib_none().0,
        &mut error,
      );
      if error.is_null() {
        Ok(())
      } else {
        Err(from_glib_full(error))
      }
    }
  }

  fn acquire_async<P: IsA<Cancellable>, Q: FnOnce(Result<(), glib::Error>) + Send + 'static>(
    &self,
    cancellable: Option<&P>,
    callback: Q,
  ) {
    let user_data: Box_<Q> = Box_::new(callback);
    unsafe extern "C" fn acquire_async_trampoline<
      Q: FnOnce(Result<(), glib::Error>) + Send + 'static,
    >(
      _source_object: *mut gobject_sys::GObject,
       res: *mut gio_sys::GAsyncResult,
      user_data: glib_sys::gpointer,
    ) {
      let mut error = ptr::null_mut();
      let _ = gio_sys::g_permission_acquire_finish(_source_object as *mut _, res, &mut error);
      let result = if error.is_null() {
        Ok(())
      } else {
        Err(from_glib_full(error))
      };
      let callback: Box_<Q> = Box_::from_raw(user_data as *mut _);
```

```
            callback(result);
        }
        let callback = acquire_async_trampoline::<Q>;
        unsafe {
            gio_sys::g_permission_acquire_async(
                self.as_ref().to_glib_none().0,
                cancellable.map(|p| p.as_ref()).to_glib_none().0,
                Some(callback),
                Box_::into_raw(user_data) as *mut _,
            );
        }
    }

    fn acquire_async_future(
        &self,
    ) -> Pin<Box_<dyn std::future::Future<Output = Result<(), glib::Error>> +
'static>> {
        Box_::pin(crate::GioFuture::new(self, move |obj, send| {
            let cancellable = Cancellable::new();
            obj.acquire_async(Some(&cancellable), move |res| {
                send.resolve(res);
            });

            cancellable
        }))
    }

    fn get_allowed(&self) -> bool {
        unsafe {
            from_glib(gio_sys::g_permission_get_allowed(
                self.as_ref().to_glib_none().0,
            ))
        }
    }

    fn get_can_acquire(&self) -> bool {
        unsafe {
            from_glib(gio_sys::g_permission_get_can_acquire(
                self.as_ref().to_glib_none().0,
            ))
        }
    }

    fn get_can_release(&self) -> bool {
        unsafe {
            from_glib(gio_sys::g_permission_get_can_release(
                self.as_ref().to_glib_none().0,
            ))
```

```
    }
}

fn impl_update(&self, allowed: bool, can_acquire: bool, can_release: bool) {
    unsafe {
        gio_sys::g_permission_impl_update(
            self.as_ref().to_glib_none().0,
            allowed.to_glib(),
            can_acquire.to_glib(),
            can_release.to_glib(),
        );
    }
}

fn release<P: IsA<Cancellable>>(&self, cancellable: Option<&P>) -> Result<(), glib::Error> {
    unsafe {
        let mut error = ptr::null_mut();
        let _ = gio_sys::g_permission_release(
            self.as_ref().to_glib_none().0,
            cancellable.map(|p| p.as_ref()).to_glib_none().0,
            &mut error,
        );
        if error.is_null() {
            Ok(())
        } else {
            Err(from_glib_full(error))
        }
    }
}

fn release_async<P: IsA<Cancellable>, Q: FnOnce(Result<(), glib::Error>) + Send + 'static>(
    &self,
    cancellable: Option<&P>,
    callback: Q,
) {
    let user_data: Box_<Q> = Box_::new(callback);
    unsafe extern "C" fn release_async_trampoline<
        Q: FnOnce(Result<(), glib::Error>) + Send + 'static,
    >(
        _source_object: *mut gobject_sys::GObject,
        res: *mut gio_sys::GAsyncResult,
        user_data: glib_sys::gpointer,
    ) {
        let mut error = ptr::null_mut();
        let _ = gio_sys::g_permission_release_finish(_source_object as *mut _, res, &mut error);
        let result = if error.is_null() {
            Ok(())
        } else {
```

```
            Err(from_glib_full(error))
        };
        let callback: Box_<Q> = Box_::from_raw(user_data as *mut _);
        callback(result);
    }
    let callback = release_async_trampoline::<Q>;
    unsafe {
        gio_sys::g_permission_release_async(
            self.as_ref().to_glib_none().0,
            cancellable.map(|p| p.as_ref()).to_glib_none().0,
            Some(callback),
            Box_::into_raw(user_data) as *mut _,
        );
    }
}

 fn release_async_future(
    &self,
) -> Pin<Box_<dyn std::future::Future<Output = Result<(), glib::Error>> + 'static>> {
    Box_::pin(crate::GioFuture::new(self, move |obj, send| {
        let cancellable = Cancellable::new();
        obj.release_async(Some(&cancellable), move |res| {
            send.resolve(res);
        });

        cancellable
    }))
}

fn connect_property_allowed_notify<F: Fn(&Self) + 'static>(&self, f: F) -> SignalHandlerId {
    unsafe extern "C" fn notify_allowed_trampoline<P, F: Fn(&P) + 'static>(
        this: *mut gio_sys::GPermission,
        _param_spec: glib_sys::gpointer,
        f: glib_sys::gpointer,
    ) where
        P: IsA<Permission>,
    {
        let f: &F = &*(f as *const F);
        f(&Permission::from_glib_borrow(this).unsafe_cast())
    }
    unsafe {
        let f: Box_<F> = Box_::new(f);
        connect_raw(
            self.as_ptr() as
*mut _,
            b"notify::allowed\0".as_ptr() as *const _,
            Some(transmute(notify_allowed_trampoline::<Self, F> as usize)),
            Box_::into_raw(f),
```

```
        )
    }
}

fn connect_property_can_acquire_notify<F: Fn(&Self) + 'static>(&self, f: F) -> SignalHandlerId {
    unsafe extern "C" fn notify_can_acquire_trampoline<P, F: Fn(&P) + 'static>(
        this: *mut gio_sys::GPermission,
        _param_spec: glib_sys::gpointer,
        f: glib_sys::gpointer,
    ) where
        P: IsA<Permission>,
    {
        let f: &F = &*(f as *const F);
        f(&Permission::from_glib_borrow(this).unsafe_cast())
    }
    unsafe {
        let f: Box_<F> = Box_::new(f);
        connect_raw(
            self.as_ptr() as *mut _,
            b"notify::can-acquire\0".as_ptr() as *const _,
            Some(transmute(notify_can_acquire_trampoline::<Self, F> as usize)),
            Box_::into_raw(f),
         )
    }
}

fn connect_property_can_release_notify<F: Fn(&Self) + 'static>(&self, f: F) -> SignalHandlerId {
    unsafe extern "C" fn notify_can_release_trampoline<P, F: Fn(&P) + 'static>(
        this: *mut gio_sys::GPermission,
        _param_spec: glib_sys::gpointer,
        f: glib_sys::gpointer,
    ) where
        P: IsA<Permission>,
    {
        let f: &F = &*(f as *const F);
        f(&Permission::from_glib_borrow(this).unsafe_cast())
    }
    unsafe {
        let f: Box_<F> = Box_::new(f);
        connect_raw(
            self.as_ptr() as *mut _,
            b"notify::can-release\0".as_ptr() as *const _,
            Some(transmute(notify_can_release_trampoline::<Self, F> as usize)),
            Box_::into_raw(f),
        )
    }
}
}
```

```
impl fmt::Display for Permission {
  fn fmt(&self, f: &mut fmt::Formatter) -> fmt::Result {
      write!(f, "Permission")
  }
}
```

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# 1.1408 is-stream 2.0.1

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# 1.1409 platforms 1.0.0-rc.1

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# 1.1410 pb 3.1.6

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# 1.1411 netkit-ftp 0.17-89.el9

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Found in path(s):
* /ftp-0.17-89.el9.src.rpm-cosi-expand-archive-ozssGgRr/netkit-ftp-0.17.tar.gz-cosi-expand-archive-iTvXN2J9/netkit-ftp-0.17/ftp/netrc.5
* /ftp-0.17-89.el9.src.rpm-cosi-expand-archive-ozssGgRr/netkit-ftp-0.17.tar.gz-cosi-expand-archive-iTvXN2J9/netkit-ftp-0.17/ftp/ftp.1
No license file was found, but licenses were detected in source scan.

Summary: The standard UNIX FTP (File Transfer Protocol) client
Name: ftp
Version: 0.17
Release: 89%{?dist}
License: BSD with advertising
Source0: ftp://ftp.linux.org.uk/pub/linux/Networking/netkit/netkit-ftp-%{version}.tar.gz
URL: ftp://ftp.linux.org.uk/pub/linux/Networking/netkit
Patch1: netkit-ftp-0.17-pre20000412.pasv-security.patch
Patch2: netkit-ftp-0.17-acct.patch
Patch3: netkit-ftp.usagi-ipv6.patch
Patch4: netkit-ftp-0.17-segv.patch
Patch5: netkit-ftp-0.17-volatile.patch
Patch6: netkit-ftp-0.17-runique_mget.patch
Patch7: netkit-ftp-locale.patch
Patch8: netkit-ftp-0.17-printf.patch
Patch9: netkit-ftp-0.17-longint.patch
Patch10: netkit-ftp-0.17-vsftp165083.patch
Patch11: netkit-ftp-0.17-C-Frame121.patch
Patch12: netkit-ftp-0.17-data.patch
Patch13: netkit-ftp-0.17-multihome.patch
Patch14: netkit-ftp-0.17-longnames.patch
Patch15: netkit-ftp-0.17-multiipv6.patch
Patch16: netkit-ftp-0.17-nodebug.patch
Patch17: netkit-ftp-0.17-stamp.patch
Patch18:
 netkit-ftp-0.17-sigseg.patch
Patch19: netkit-ftp-0.17-size.patch
Patch20: netkit-ftp-0.17-fdleak.patch
Patch21: netkit-ftp-0.17-fprintf.patch
Patch22: netkit-ftp-0.17-bitrate.patch
Patch23: netkit-ftp-0.17-arg_max.patch
Patch24: netkit-ftp-0.17-case.patch
Patch25: netkit-ftp-0.17-chkmalloc.patch
Patch26: netkit-ftp-0.17-man.patch
Patch27: netkit-ftp-0.17-acct_ovl.patch
Patch28: netkit-ftp-0.17-remove-nested-include.patch
Patch29: netkit-ftp-0.17-linelen.patch

```
Patch30: netkit-ftp-0.17-active-mode-option.patch
Patch31: netkit-ftp-0.17-commands-leaks.patch
Patch32: netkit-ftp-0.17-lsn-timeout.patch
Patch33: netkit-ftp-0.17-getlogin.patch
Patch34: netkit-ftp-0.17-token.patch
Patch35: netkit-ftp-0.17-linelen-segfault.patch
Patch36: netkit-ftp-0.17-out-of-memory.patch

BuildRequires: glibc-devel, readline-devel, ncurses-devel
BuildRequires: perl-interpreter, gcc
BuildRequires: make

%description
The ftp package provides the standard UNIX command-line FTP (File
Transfer
 Protocol) client.  FTP is a widely used protocol for
transferring files over the Internet and for archiving files.

If your system is on a network, you should install ftp in order to do
file transfers.

%prep
%setup -q -n netkit-ftp-%{version}
%patch1 -p1
%patch2 -p1 -b .acct
%patch3 -p1 -b .ipv6
%patch4 -p1 -b .segv
%patch5 -p1 -b .volatile
%patch6 -p1 -b .runique_mget
%patch7 -p1 -b .locale
%patch8 -p1 -b .printf
%patch9 -p1 -b .longint
%patch10 -p1 -b .vsftp165083
%patch11 -p1 -b .C-Frame121
%patch12 -p1 -b .data
%patch13 -p1 -b .multihome
%patch14 -p1 -b .patch
%patch15 -p1 -b .multiipv6
%patch16 -p1 -b .nodebug
%patch17 -p1 -b .stamp
%patch18 -p1 -b .sigseg
%patch19 -p1 -b .size
%patch20 -p1 -b .fdleak
%patch21 -p1 -b .fprintf
%patch22 -p1 -b .bitrate
%patch23 -p1 -b .arg_max
%patch24 -p1 -b .case
%patch25 -p1 -b .chkmalloc
```

```
%patch26 -p1 -b .man
%patch27 -p1 -b .acct_ovl
%patch28 -p1
%patch29 -p1 -b .linelen
%patch30 -p1 -b .activemode
%patch31 -p1 -b .cmds-leaks
%patch32
 -p1 -b .lsn-timeout
%patch33 -p1 -b .getlogin
%patch34 -p1 -b .token
%patch35 -p1 -b .linelen-segfault
%patch36 -p1 -b .out-of-memory

%build
sh configure --with-c-compiler=%{__cc} --enable-ipv6
perl -pi -e '
   s,^CC=.*$,CC=cc,;
   s,-O2,\$(RPM_OPT_FLAGS) -D_GNU_SOURCE -D_LARGEFILE_SOURCE -D_LARGEFILE64_SOURCE -
D_FILE_OFFSET_BITS=64,;
   s,^LDFLAGS=.*$,LDFLAGS=\$(RPM_LD_FLAGS),;
   s,^BINDIR=.*$,BINDIR=%{_bindir},;
   s,^MANDIR=.*$,MANDIR=%{_mandir},;
   s,^SBINDIR=.*$,SBINDIR=%{_sbindir},;
   ' MCONFIG

%{make_build}

%install
mkdir -p ${RPM_BUILD_ROOT}%{_bindir}
mkdir -p ${RPM_BUILD_ROOT}%{_mandir}/man1
mkdir -p ${RPM_BUILD_ROOT}%{_mandir}/man5

make INSTALLROOT=${RPM_BUILD_ROOT} install

%files
%{_bindir}/ftp
%{_bindir}/pftp
%{_mandir}/man1/ftp.*
%{_mandir}/man1/pftp.*
%{_mandir}/man5/netrc.*

%changelog
* Mon Aug 09 2021 Mohan Boddu <mboddu@redhat.com> - 0.17-89
- Rebuilt for IMA sigs, glibc 2.34, aarch64 flags
 Related: rhbz#1991688

* Wed Apr 21 2021 Michal Ruprich <mruprich@redhat.com>
```

- 0.17-88
- Resolves: #1949120 - ftp put failed with 'ftp: Out of memory' when stacksize set to unlimited

* Thu Apr 15 2021 Mohan Boddu <mboddu@redhat.com> - 0.17-87
- Rebuilt for RHEL 9 BETA on Apr 15th 2021. Related: rhbz#1947937

* Tue Jan 26 2021 Fedora Release Engineering <releng@fedoraproject.org> - 0.17-86
- Rebuilt for https://fedoraproject.org/wiki/Fedora_34_Mass_Rebuild

* Thu Nov 19 2020 Michal Ruprich <mruprich@redhat.com> - 0.17-85
- Use make_build macro and remove hard-coded gcc
- https://docs.fedoraproject.org/en-US/packaging-guidelines/#_parallel_make

* Mon Jul 27 2020 Fedora Release Engineering <releng@fedoraproject.org> - 0.17-84
- Rebuilt for https://fedoraproject.org/wiki/Fedora_33_Mass_Rebuild

* Tue Jan 28 2020 Fedora Release Engineering <releng@fedoraproject.org> - 0.17-83
- Rebuilt for https://fedoraproject.org/wiki/Fedora_32_Mass_Rebuild

* Thu Jul 25 2019 Fedora Release Engineering <releng@fedoraproject.org> - 0.17-82
- Rebuilt for https://fedoraproject.org/wiki/Fedora_31_Mass_Rebuild

*
Sun Feb 17 2019 Igor Gnatenko <ignatenkobrain@fedoraproject.org> - 0.17-81
- Rebuild for readline 8.0

* Thu Jan 31 2019 Fedora Release Engineering <releng@fedoraproject.org> - 0.17-80
- Rebuilt for https://fedoraproject.org/wiki/Fedora_30_Mass_Rebuild

* Tue Dec 18 2018 Michal Ruprich <mruprich@redhat.com> - 0.17-79
- Resolves: #1624949 - netkit ftp client buffer overflow in makeargv()

* Mon Jul 23 2018 Michal Ruprich <mruprich@redhat.com> - 0.17-78
- Resolves: #1604015 - ftp: FTBFS in Fedora rawhide

* Fri Jul 13 2018 Fedora Release Engineering <releng@fedoraproject.org> - 0.17-77
- Rebuilt for https://fedoraproject.org/wiki/Fedora_29_Mass_Rebuild

* Wed Mar 14 2018 Michal Ruprich <mruprich@redhat.com> - 0.17-76
- use distribution LDFLAGS during build (#1548427) - fix by jsynacek
- fixed bogus dates in changelog

* Wed Feb 07 2018 Fedora Release Engineering <releng@fedoraproject.org> - 0.17-75
- Rebuilt for https://fedoraproject.org/wiki/Fedora_28_Mass_Rebuild

*
Wed Aug 02 2017 Fedora Release Engineering <releng@fedoraproject.org> - 0.17-74
- Rebuilt for https://fedoraproject.org/wiki/Fedora_27_Binutils_Mass_Rebuild

* Wed Jul 26 2017 Fedora Release Engineering <releng@fedoraproject.org> - 0.17-73
- Rebuilt for https://fedoraproject.org/wiki/Fedora_27_Mass_Rebuild

* Fri Feb 10 2017 Fedora Release Engineering <releng@fedoraproject.org> - 0.17-72
- Rebuilt for https://fedoraproject.org/wiki/Fedora_26_Mass_Rebuild

* Thu Jan 12 2017 Igor Gnatenko <ignatenko@redhat.com> - 0.17-71
- Rebuild for readline 7.x

* Wed Feb 03 2016 Fedora Release Engineering <releng@fedoraproject.org> - 0.17-70
- Rebuilt for https://fedoraproject.org/wiki/Fedora_24_Mass_Rebuild

* Wed Jun 17 2015 Fedora Release Engineering <rel-eng@lists.fedoraproject.org> - 0.17-69
- Rebuilt for https://fedoraproject.org/wiki/Fedora_23_Mass_Rebuild

* Sat Feb 21 2015 Till Maas <opensource@till.name> - 0.17-68
- Rebuilt for Fedora 23 Change
https://fedoraproject.org/wiki/Changes/Harden_all_packages_with_position-independent_code

*
Sat Aug 16 2014 Fedora Release Engineering <rel-eng@lists.fedoraproject.org> - 0.17-67
- Rebuilt for https://fedoraproject.org/wiki/Fedora_21_22_Mass_Rebuild

* Sat Jun 07 2014 Fedora Release Engineering <rel-eng@lists.fedoraproject.org> - 0.17-66
- Rebuilt for https://fedoraproject.org/wiki/Fedora_21_Mass_Rebuild

* Sat Aug 03 2013 Fedora Release Engineering <rel-eng@lists.fedoraproject.org> - 0.17-65
- Rebuilt for https://fedoraproject.org/wiki/Fedora_20_Mass_Rebuild

* Wed Feb 13 2013 Fedora Release Engineering <rel-eng@lists.fedoraproject.org> - 0.17-64
- Rebuilt for https://fedoraproject.org/wiki/Fedora_19_Mass_Rebuild

* Tue Oct 30 2012 Jan Synáek <jsynacek@redhat.com> - 0.17-63
- Fix buffer overflow in token parsing
- Resolves: #871296

* Tue Oct 30 2012 Jan Synáek <jsynacek@redhat.com> - 0.17-62
- Fix linelen patch
- Resolves: #871290

* Wed Oct 03 2012 Jan Synáek <jsynacek@redhat.com> - 0.17-61
-
Fix: FTP client does not expand home directory correctly after sudo or su
- Resolves: #861113

* Tue Sep 25 2012 Jan Synáek <jsynacek@redhat.com> - 0.17-60
- Plug leaks in "put", "send", "append"

- Add listening timeout

* Tue Aug 28 2012 Jan Synáek <jsynacek@redhat.com> - 0.17-59
- Add active mode option

* Fri Aug 03 2012 Jan Synáek <jsynacek@redhat.com> - 0.17-58
- Extend the input line buffer and the argument storage buffer
- Prettify spec some more and remove trailing space

* Fri Jul 20 2012 Jan Synáek <jsynacek@redhat.com> - 0.17-57
- Remove nested include (fix compilation in rawhide)

* Thu Jul 19 2012 Jan Synáek <jsynacek@redhat.com> - 0.17-56
- Fixed Source0 and URL
- Make spec fedora-review-friendly

* Thu Jul 19 2012 Fedora Release Engineering <rel-eng@lists.fedoraproject.org> - 0.17-56
- Rebuilt for https://fedoraproject.org/wiki/Fedora_18_Mass_Rebuild

* Fri Jan 13 2012 Fedora Release Engineering <rel-eng@lists.fedoraproject.org> - 0.17-55
- Rebuilt for https://fedoraproject.org/wiki/Fedora_17_Mass_Rebuild

*
 Fri Sep 09 2011 Jiri Skala <jskala@redhat.com> - 0.17-54
- fixes #737016 - ftp: off-by-one in account command parsing

* Tue Mar 29 2011 Jiri Skala <jskala@redhat.com> - 0.17-53
- fixes #673850 - ftp(1) manpage fixes

* Tue Feb 08 2011 Fedora Release Engineering <rel-eng@lists.fedoraproject.org> - 0.17-52
- Rebuilt for https://fedoraproject.org/wiki/Fedora_15_Mass_Rebuild

* Fri Jul 24 2009 Fedora Release Engineering <rel-eng@lists.fedoraproject.org> - 0.17-51
- Rebuilt for https://fedoraproject.org/wiki/Fedora_12_Mass_Rebuild

* Tue Feb 24 2009 Fedora Release Engineering <rel-eng@lists.fedoraproject.org> - 0.17-50
- Rebuilt for https://fedoraproject.org/wiki/Fedora_11_Mass_Rebuild

* Mon Dec 01 2008 Jiri Skala <jskala@redhat.com> - 0.17-49
- Resolves: #473491  unchecked malloc

* Wed Apr 23 2008 Martin Nagy <mnagy@redhat.com> - 0.17-48
- fix mget when using case
- Resolves: #442712

* Mon Apr 07 2008 Martin Nagy <mnagy@redhat.com> - 0.17-47
-

Use sysconf to get ARG_MAX instead of a macro (#440782)

* Tue Feb 19 2008 Fedora Release Engineering <rel-eng@fedoraproject.org> - 0.17-46
- Autorebuild for GCC 4.3

* Mon Jan 28 2008 Marcela Maslanova <mmaslano@redhat.com> - 0.17-45
- changed bitrate from 1e+03 KBytes/sec to 1000 kBytes/sec
- Resolves: rhbz#430457

* Thu Nov 15 2007 Marcela Maslanova <mmaslano@redhat.com> - 0.17-44
- using fprintf instead of printf

* Mon Oct 22 2007 Marcela Maslanova <mmaslano@redhat.com> - 0.17-43
- feature: for cmd size is switching to TYPE_I automatized
- bug: ftp leaks socket fds when it fails to open a file (#315241)
- rhbz#306191

* Fri Aug 24 2007 Marcela Maslanova <mmaslano@redhat.com> - 0.17-42
- rebuilt (for mass rebuild)
- license tag checked

* Tue Aug 07 2007 Marcela Maslanova <mmaslano@redhat.com> - 0.17-41
- #251074 add patch from Jan Kratochvil

* Thu Feb 15 2007 Marcela Maslanova <mmaslano@redhat.com> - 0.17-40
- review again

* Wed Feb 14 2007 Marcela Maslanova <mmaslano@redhat.com>
- 0.17-39
- review again

* Wed Feb 7 2007 Marcela Maslanova <mmaslano@redhat.com> - 0.17-38
- add gpl
- spec fix
- rhbz#225774

* Tue Jan 30 2007 Marcela Maslanova <mmaslano@redhat.com> - 0.17-35
- nodebug package

* Wed Sep 13 2006 Marcela Maslanova <mmaslano@redhat.com> - 0.17-33
- rebuilt

* Wed Aug 2 2006 Marcela Maslanova <mmaslano@redhat.com> - 0.17-32.1.2.4
- fix (#199145) patch for IPv6 multihome

* Tue Jul 25 2006 Marcela Maslanova <mmaslano@redhat.com> - 0.17-32.1.2.3
- fix (#196103) patch for long filenames

* Wed Jul 12 2006 Jesse Keating <jkeating@redhat.com> - 0.17-32.1.2.1
- rebuild

* Fri Feb 10 2006 Jesse Keating <jkeating@redhat.com> - 0.17-32.1.2
- bump again for double-long bug on ppc(64)

* Tue Feb 07 2006 Jesse Keating <jkeating@redhat.com> - 0.17-32.1.1
- rebuilt for new gcc4.1 snapshot and glibc changes

* Thu Jan 12 2006 Petr Raszyk <praszyk@redhat.com> - 0.17-32
- support for multi-homed clients
 See #171621, netkit-ftp-0.17-multihome.patch

* Fri Dec
 09 2005 Jesse Keating <jkeating@redhat.com>
- rebuilt

* Fri Dec 2 2005 Petr Raszyk <praszyk@redhat.com> - 0.17-31
- ftp does not close socket descriptor (if the remote file
 does not exist).
 See #174599, netkit-ftp-0.17-data.patch

* Wed Oct 26 2005 Petr Raszyk <praszyk@redhat.com> - 0.17-30
- The patch netkit-ftp-0.17-C-Frame121.patch adds some
 comments/hints for C-Frame 121. It can be removed any time.

* Tue Aug 30 2005 Petr Raszyk <praszyk@redhat.com> - 0.17-29
- rebuild

* Tue Aug 30 2005 Petr Raszyk <praszyk@redhat.com> - 0.17-28
- This 'hack' will avoid a bug in ftp-server
 ( < vsftpd-2.0.1-5 ). See #165083 (server prints the
 '150 FILE:...' line twice).
 This patch can be (later ?) removed.

* Mon Aug 22 2005 Petr Raszyk <praszyk@redhat.com> - 0.17-27
- overflow using 'hash mode' (printing '#' but
 not reading data from network - #79367)

* Tue May 24 2005 Miloslav Trmac <mitr@redhat.com> - 0.17-26
- Fix passive mode with SELinux (#158234, patch by Nalin Dahyabhai)
-
 Fix format string mismatch

* Fri Mar 04 2005 Jiri Ryska <jryska@redhat.com>
- rebuilt

* Wed Jan 12 2005 Tim Waugh <twaugh@redhat.com> 0.17-24

- Rebuilt for new readline.

* Wed Dec 15 2004 Tim Waugh <twaugh@redhat.com>
- Call setlocale() so that readline works correctly (bug #142265).

* Tue Dec  7 2004 Thomas Woerner <twoerner@redhat.com> 0.17-23
- fixed mget with runique (#79367)

* Tue Jun 15 2004 Elliot Lee <sopwith@redhat.com>
- rebuilt

* Mon Jun 14 2004 Alan Cox <alan@redhat.com>
- Re-arranged some totally bogus old bezerkly code that could
 segfault ftp on connection loss. (BZ #122295)

* Fri Feb 13 2004 Elliot Lee <sopwith@redhat.com>
- rebuilt

* Wed Jun 04 2003 Elliot Lee <sopwith@redhat.com>
- rebuilt

* Wed Jan 22 2003 Tim Powers <timp@redhat.com>
- rebuilt

* Fri Dec 13 2002 Elliot Lee <sopwith@redhat.com>
- Rebuild

* Fri Jun 21 2002 Tim Powers <timp@redhat.com>
- automated rebuild

* Thu May 23 2002 Tim Powers <timp@redhat.com>
- automated rebuild

* Fri Apr 12
 2002 Bernhard Rosenkraenzer <bero@redhat.com> 0.17-13
- Recompile with support for files > 2 GB

* Mon Jun 25 2001 Bernhard Rosenkraenzer <bero@redhat.com> 0.17-12
- Add some Build dependencies (#45007)

* Fri May 18 2001 Bernhard Rosenkraenzer <bero@redhat.com> 0.17-11
- Actually apply Patch #3

* Fri May 11 2001 Bernhard Rosenkraenzer <bero@redhat.com> 0.17-10
- Rebuild with new readline

* Sun Apr 15 2001 Bernhard Rosenkraenzer <bero@redhat.com>
- Add IPv6 patch (RFE #35642)

* Wed Apr  4 2001 Jakub Jelinek <jakub@redhat.com>
- don't let configure to guess compiler, it can pick up egcs

* Sun Jan 21 2001 Bernhard Rosenkraenzer <bero@redhat.com>
- Update to 0.17 final
- Fix up ACCT support in netrc (Bug #17353)

* Wed Aug 16 2000 Philipp Knirsch <pknirsch@redhat.com>
- Switched the default transfer protocol from PORT to PASV as proposed on
 bugzilla (#16134)
- Fixed a small compiler warning in ftp.c line 886

* Fri Jul 14 2000 Jeff Johnson <jbj@redhat.com>
- add netrc man page (#7443).
-
 fix possible buffer overflows in ftp client.

* Wed Jul 12 2000 Prospector <bugzilla@redhat.com>
- automatic rebuild

* Sun Jun 18 2000 Jeff Johnson <jbj@redhat.com>
- FHS packaging.
- update to 0.17-pre20000412.

* Wed Apr  5 2000 Bernhard Rosenkraenzer <bero@redhat.com>
- rebuild with current libreadline

* Fri Mar 24 2000 Bernhard Rosenkraenzer <bero@redhat.com>
- 0.17

* Fri Feb  4 2000 Bill Nottingham <notting@redhat.com>
- handle compressed man pages

* Tue Jan  4 2000 Bill Nottingham <notting@redhat.com>
- the ftp client does not require inetd

* Wed Dec 22 1999 Jeff Johnson <jbj@redhat.com>
- update to 0.16.

* Mon Aug 30 1999 Jeff Johnson <jbj@redhat.com>
- update to 0.15.
- enable readline support (#3796).

* Sun Mar 21 1999 Cristian Gafton <gafton@redhat.com>
- auto rebuild in the new build environment (release 22)

* Mon Mar 15 1999 Jeff Johnson <jbj@redhat.com>

- compile for 6.0.

* Tue Aug 11 1998 Jeff Johnson <jbj@redhat.com>
- build root

* Mon Apr 27 1998 Prospector
 System <bugs@redhat.com>
- translations modified for de, fr, tr

Found in path(s):
* /ftp-0.17-89.el9.src.rpm-cosi-expand-archive-ozssGgRr/ftp.spec
No license file was found, but licenses were detected in source scan.

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*/

Found in path(s):

* /ftp-0.17-89.el9.src.rpm-cosi-expand-archive-ozssGgRr/netkit-ftp-0.17.tar.gz-cosi-expand-archive-iTvXN2J9/netkit-ftp-0.17/ftp/main.c
*
 /ftp-0.17-89.el9.src.rpm-cosi-expand-archive-ozssGgRr/netkit-ftp-0.17.tar.gz-cosi-expand-archive-iTvXN2J9/netkit-ftp-0.17/ftp/cmds.c
* /ftp-0.17-89.el9.src.rpm-cosi-expand-archive-ozssGgRr/netkit-ftp-0.17.tar.gz-cosi-expand-archive-iTvXN2J9/netkit-ftp-0.17/ftp/cmdtab.c
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* SUCH DAMAGE.
*/
```

Found in path(s):
* /ftp-0.17-89.el9.src.rpm-cosi-expand-archive-ozssGgRr/netkit-ftp-0.17.tar.gz-cosi-expand-archive-iTvXN2J9/netkit-ftp-0.17/ftp/glob.c
*

/ftp-0.17-89.el9.src.rpm-cosi-expand-archive-ozssGgRr/netkit-ftp-0.17.tar.gz-cosi-expand-archive-iTvXN2J9/netkit-ftp-0.17/ftp/glob.h
No license file was found, but licenses were detected in source scan.

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* SUCH DAMAGE.
*
* from: @(#)ftp_var.h 5.9 (Berkeley) 6/1/90
* $Id: ftp_var.h,v 1.12 1999/10/02 18:39:17 dholland Exp $
 */
```

Found in path(s):
* /ftp-0.17-89.el9.src.rpm-cosi-expand-archive-ozssGgRr/netkit-ftp-0.17.tar.gz-cosi-expand-archive-iTvXN2J9/netkit-ftp-0.17/ftp/ftp_var.h
No license file was found, but licenses were detected in source scan.

diff -uNr netkit-ftp-0.17/CVS/Entries netkit-ftp/CVS/Entries
diff -uNr netkit-ftp-0.17/ChangeLog netkit-ftp/ChangeLog

```
--- netkit-ftp-0.17/ChangeLog Sun Jul 23 04:38:08 2000
+++ netkit-ftp/ChangeLog Tue Nov 28 03:50:10 2000
@@ -1,3 +1,6 @@
+28-Nov-2000:
+ IPv6 support. (Hiroyuki YAMAMORI <h-yamamo@db3.so-net.ne.jp>)
+
8-Jul-2000:
 Fix misused printf-function call (not %n-exploitable though).

diff -uNr netkit-ftp-0.17/configure netkit-ftp/configure
--- netkit-ftp-0.17/configure Sat Jul 29 21:00:28 2000
+++ netkit-ftp/configure Sat Jan 27 06:14:54 2001
@@ -24,6 +24,7 @@
   --binmode=mode        Mode for binaries [755]
   --manmode=mode        Mode for manual pages [644]
   --with-c-compiler=cc  Program for compiling C source [guessed]
+   --enable-ipv6         Enable IPv6 support
EOF
 exit 0;;
 --verbose) ;;
@@ -39,6 +40,11 @@
 --manmode=*) MANMODE=`echo $1 | sed 's/^[^=]*=//'` ;;
 --with-c-compiler=*) CC=`echo
 $1 | sed 's/^[^=]*=//'` ;;
 --without-readline|--disable-readline) WITHOUT_READLINE=1;;
+
+ --disable-ipv6) ENABLE_IPV6=no;;
+ --enable-ipv6=*) ENABLE_IPV6=`echo $1 | sed 's/^[^=]*=//'`;;
+ --enable-ipv6) ENABLE_IPV6=yes;;
+
 *) echo "Unrecognized option: $1"; exit 1;;
esac
shift
@@ -142,6 +148,42 @@

LDFLAGS=
LIBS=
+
+rm -f __conftest*
+
+#####################################################
+## Enable IPv6
+echo -n "Whether to enable IPv6 support... "
+if [ x"$ENABLE_IPV6" = x"yes" ]; then
+    echo yes
+    CFLAGS="$CFLAGS -DINET6"
+else
+    echo no
```

```
+fi
+
+rm -f __conftest*
+
+## Search IPv6 Library / Headers
+if [ x"$ENABLE_IPV6" = x"yes" ]; then
+    echo -n "Search for IPv6 library... "
+    inet6libdirs="/usr/local/v6/lib /usr/local/lib /usr /usr/inet6/lib"
+    inet6libs="inet6"
+    inet6found=no
+    for inet6libdir in $inet6libdirs; do
+        for inet6lib in $inet6libs; do
+            if [ -d $inet6libdir ] && [ -f $inet6libdir/lib$inet6lib.a ]; then
+
          inet6found=yes
+                break 2
+            fi
+        done
+    done
+    if [ x"$inet6found" = x"yes" ]; then
+        echo "$inet6libdir/lib$inet6lib.a"
+        LIBS="$LIBS -L$inet6libdir -l$inet6lib"
+    else
+        echo "not found"
+    fi
+fi

rm -f __conftest*

diff -uNr netkit-ftp-0.17/ftp/CVS/Entries netkit-ftp/ftp/CVS/Entries
--- netkit-ftp-0.17/ftp/CVS/Entries Thu Jan  1 02:00:00 1970
+++ netkit-ftp/ftp/CVS/Entries Mon Feb 19 06:50:49 2001
@@ -0,0 +1,16 @@
+/.cvsignore/1.1.1.1/Fri Nov  3 19:18:15 2000//
+/Makefile/1.4/Sat Jan 27 05:57:08 2001//
+/cmds.c/1.3/Fri Jan 12 21:36:27 2001//
+/cmds.h/1.1.1.1/Fri Nov  3 19:18:15 2000//
+/cmdtab.c/1.1.1.1/Fri Nov  3 19:18:15 2000//
+/domacro.c/1.1.1.1/Fri Nov  3 19:18:15 2000//
+/ftp.1/1.1.1.1/Fri Nov  3 19:18:15 2000//
+/ftp.c/1.11/Sun Feb 11 12:26:59 2001//
+/ftp_var.h/1.3/Fri Jan 12 21:36:27 2001//
+/glob.c/1.1.1.1/Fri Nov  3 19:18:15 2000//
+/glob.h/1.1.1.1/Fri Nov  3 19:18:15 2000//
+/main.c/1.1.1.1/Fri
 Nov  3 19:18:15 2000//
+/netrc.5/1.1.1.1/Fri Nov  3 19:18:15 2000//
+/pathnames.h/1.1.1.1/Fri Nov  3 19:18:15 2000//
```

```
+/ruserpass.c/1.1.1.1/Fri Nov  3 19:18:15 2000//
+D
diff -uNr netkit-ftp-0.17/ftp/CVS/Repository netkit-ftp/ftp/CVS/Repository
--- netkit-ftp-0.17/ftp/CVS/Repository Thu Jan  1 02:00:00 1970
+++ netkit-ftp/ftp/CVS/Repository Mon Feb 19 06:50:49 2001
@@ -0,0 +1 @@
+usagi/src/netkit-ftp/ftp
diff -uNr netkit-ftp-0.17/ftp/CVS/Root netkit-ftp/ftp/CVS/Root
--- netkit-ftp-0.17/ftp/CVS/Root Thu Jan  1 02:00:00 1970
+++ netkit-ftp/ftp/CVS/Root Mon Feb 19 06:50:49 2001
@@ -0,0 +1 @@
+:pserver:anoncvs@anoncvs.linux-ipv6.org:/cvsroot/usagi
diff -uNr netkit-ftp-0.17/ftp/Makefile netkit-ftp/ftp/Makefile
--- netkit-ftp-0.17/ftp/Makefile Sun Aug  1 09:00:12 1999
+++ netkit-ftp/ftp/Makefile Sat Jan 27 07:57:08 2001
@@ -16,10 +16,13 @@
cmds.o glob.o: glob.h

install: ftp
+ install -d $(INSTALLROOT)$(BINDIR)
 install -s -m$(BINMODE) ftp $(INSTALLROOT)$(BINDIR)
 ln -sf ftp $(INSTALLROOT)$(BINDIR)/pftp
+ install
 -d $(INSTALLROOT)$(MANDIR)/man1
 install -m$(MANMODE) ftp.1 $(INSTALLROOT)$(MANDIR)/man1
 ln -sf ftp.1 $(INSTALLROOT)$(MANDIR)/man1/pftp.1
+ install -d $(INSTALLROOT)$(MANDIR)/man5
 install -m$(MANMODE) netrc.5 $(INSTALLROOT)$(MANDIR)/man5

clean:
diff -uNr netkit-ftp-0.17/ftp/cmds.c netkit-ftp/ftp/cmds.c
--- netkit-ftp-0.17/ftp/cmds.c Sun Jul 23 04:36:59 2000
+++ netkit-ftp/ftp/cmds.c Fri Jan 12 23:36:27 2001
@@ -1,3 +1,5 @@
+/* $USAGI$ */
+
/*
 * Copyright (c) 1985, 1989 Regents of the University of California.
 * All rights reserved.
@@ -35,7 +37,7 @@
 * from: @(#)cmds.c 5.26 (Berkeley) 3/5/91
 */
char cmds_rcsid[] =
-   "$Id: cmds.c,v 1.33 2000/07/23 01:36:59 dholland Exp $";
+   "$Id: cmds.c,v 1.3 2001/01/12 21:36:27 sekiya Exp $";

/*
 * FTP User Program -- Command Routines.
```

```
@@ -190,7 +192,7 @@
setpeer(int argc, char *argv[])
{
 char *host;
- unsigned short port;
+ char *port;

 if (connected) {
  printf("Already connected to %s, use
 close first.\n",
@@ -205,22 +207,17 @@
  code = -1;
  return;
 }
- port = ftp_port;
+ port = NULL;
 if (argc > 2) {
-  port = atoi(argv[2]);
-  if (port < 1) {
-   printf("%s: bad port number-- %s\n", argv[1], argv[2]);
-   printf ("usage: %s host-name [port]\n", argv[0]);
-   code = -1;
-   return;
-  }
-  port = htons(port);
+  port = argv[2];
 }
 host = hookup(argv[1], port);
 if (host) {
  int overbose;

  connected = 1;
+  try_epsv = 1;
+  try_eprt = 1;
  /*
   * Set up defaults for FTP.
   */
diff -uNr netkit-ftp-0.17/ftp/cmdtab.c netkit-ftp/ftp/cmdtab.c
--- netkit-ftp-0.17/ftp/cmdtab.c Tue Sep 28 18:36:05 1999
+++ netkit-ftp/ftp/cmdtab.c Fri Nov  3 21:18:15 2000
@@ -35,7 +35,7 @@
 * from: @(#)cmdtab.c 5.10 (Berkeley) 6/1/90
 */
char cmdtab_rcsid[] =
-  "$Id: cmdtab.c,v 1.8 1999/09/28 15:36:05 dholland Exp $";
+  "$Id: cmdtab.c,v 1.1.1.1 2000/11/03 19:18:15 mk Exp $";

#include <string.h>   /* for NULL */
```

```
#include "ftp_var.h"
diff -uNr netkit-ftp-0.17/ftp/domacro.c
 netkit-ftp/ftp/domacro.c
--- netkit-ftp-0.17/ftp/domacro.c Thu Aug 15 02:27:28 1996
+++ netkit-ftp/ftp/domacro.c Fri Nov  3 21:18:15 2000
@@ -35,7 +35,7 @@
 * from: @(#)domacro.c 1.8 (Berkeley) 9/28/90
 */
char domacro_rcsid[] =
-  "$Id: domacro.c,v 1.4 1996/08/14 23:27:28 dholland Exp $";
+  "$Id: domacro.c,v 1.1.1.1 2000/11/03 19:18:15 mk Exp $";

#include <errno.h>
#include <ctype.h>
diff -uNr netkit-ftp-0.17/ftp/ftp.1 netkit-ftp/ftp/ftp.1
--- netkit-ftp-0.17/ftp/ftp.1 Mon Jul 31 02:56:59 2000
+++ netkit-ftp/ftp/ftp.1 Fri Nov  3 21:18:15 2000
@@ -30,7 +30,7 @@
.\" SUCH DAMAGE.
.\"
.\" from: @(#)ftp.1 6.18 (Berkeley) 7/30/91
-.\" $Id: ftp.1,v 1.14 2000/07/30 23:56:59 dholland Exp $
+.\" $Id: ftp.1,v 1.1.1.1 2000/11/03 19:18:15 mk Exp $
.\"
.Dd August 15, 1999
.Dt FTP 1
diff -uNr netkit-ftp-0.17/ftp/ftp.c netkit-ftp/ftp/ftp.c
--- netkit-ftp-0.17/ftp/ftp.c Mon Dec 13 22:33:20 1999
+++ netkit-ftp/ftp/ftp.c Sun Feb 11 14:26:59 2001
@@ -1,3 +1,34 @@
+/* $USAGI$ */
+
+/*
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+ * SUCH DAMAGE.
+ */
+
/*
 * Copyright (c) 1985, 1989 Regents of the University of California.
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@@ -35,7 +66,7 @@
 * From: @(#)ftp.c 5.38 (Berkeley) 4/22/91
 */
char ftp_rcsid[] =
-  "$Id: ftp.c,v 1.25 1999/12/13 20:33:20 dholland Exp $";
+  "$Id: ftp.c,v 1.11 2001/02/11 12:26:59 yoshfuji Exp $";

#include <sys/param.h>
#include <sys/stat.h>
@@ -63,14 +94,38 @@
#include "ftp_var.h"
#include
 "cmds.h"

+#ifdef _USAGI
+#include "version.h"
+#else
#include "../version.h"
+#endif
+
+union sockunion {
+ struct sockinet {
+  u_short si_family;
+  u_short si_port;
+ } su_si;
+ struct sockaddr  su_sa;
+ struct sockaddr_in    su_sin;
+#ifdef INET6
+ struct sockaddr_in6   su_sin6;
+#endif
```

```
+};
+#define su_family su_sa.sa_family
+#define su_port  su_si.si_port
+
+#ifdef INET6
+#define ex_af2prot(a) (a == AF_INET ? 1 : (a == AF_INET6 ? 2 : 0))
+#else
+#define ex_af2prot(a) (a == AF_INET ? 1 : 0)
+#endif

int data = -1;
off_t restart_point = 0;

-static struct sockaddr_in hisctladdr;
-static struct sockaddr_in data_addr;
-static struct sockaddr_in myctladdr;
+static union sockunion hisctladdr;
+static union sockunion data_addr;
+static union sockunion myctladdr;
static int ptflag = 0;
static sigjmp_buf recvabort;
static sigjmp_buf sendabort;
@@ -96,79 +151,119 @@
static FILE *dataconn(const char *);

char *
-hookup(char *host, int port)
+hookup(const char *host, const char *port)
 {
- register struct hostent *hp = 0;
- int s, tos;
+ int s, tos, error;
 socklen_t len;
 static char hostnamebuf[256];
-
+ struct addrinfo hints, *res, *res0;
+ char hbuf[MAXHOSTNAMELEN], pbuf[NI_MAXSERV];
+ char *cause = "ftp: unknown";
+
+ if (port) {
+  strncpy(pbuf, port, sizeof(pbuf) - 1);
+  pbuf[sizeof(pbuf) - 1] = '\0';
+ } else {
+  sprintf(pbuf, "%d", ntohs(ftp_port));
+ }
 memset(&hisctladdr, 0, sizeof(hisctladdr));
- if (inet_aton(host, &hisctladdr.sin_addr)) {
-  hisctladdr.sin_family = AF_INET;
```

```
-  strncpy(hostnamebuf, host, sizeof(hostnamebuf));
-  hostnamebuf[sizeof(hostnamebuf)-1]=0;
- }
- else {
-  hp = gethostbyname(host);
-  if (hp == NULL) {
-   fprintf(stderr, "ftp: %s: ", host);
-   herror((char *)NULL);
-   code = -1;
-   return((char *) 0);
+ memset(&hints, 0, sizeof(hints));
+ hints.ai_flags = AI_CANONNAME;
+ hints.ai_socktype = SOCK_STREAM;
+ error = getaddrinfo(host, pbuf, &hints, &res0);
+ if (error) {
+  if (port) {
+   strcpy(hbuf, " ");
+  } else
 {
+   hbuf[0] = '\0';
+   pbuf[0] = '\0';
  }
-  hisctladdr.sin_family = hp->h_addrtype;
-  if (hp->h_length > (int)sizeof(hisctladdr.sin_addr)) {
-   hp->h_length = sizeof(hisctladdr.sin_addr);
-  }
-  memcpy(&hisctladdr.sin_addr, hp->h_addr_list[0], hp->h_length);
-  (void) strncpy(hostnamebuf, hp->h_name, sizeof(hostnamebuf));
-  hostnamebuf[sizeof(hostnamebuf)-1] = 0;
- }
- hostname = hostnamebuf;
- s = socket(hisctladdr.sin_family, SOCK_STREAM, 0);
- if (s < 0) {
-  perror("ftp: socket");
+  fprintf(stderr, "ftp: %s%s%s: %s\n", host, hbuf, pbuf,
+      gai_strerror(error));
  code = -1;
  return (0);
 }
- hisctladdr.sin_port = port;
- while (connect(s, (struct sockaddr *)&hisctladdr, sizeof (hisctladdr)) < 0) {
-  if (hp && hp->h_addr_list[1]) {
-   int oerrno = errno;
-
-   fprintf(stderr, "ftp: connect to address %s: ",
-    inet_ntoa(hisctladdr.sin_addr));
-   errno = oerrno;
-   perror((char *) 0);
```

```
-   hp->h_addr_list++;
-   memcpy(&hisctladdr.sin_addr, hp->h_addr_list[0],

-         hp->h_length);
-   fprintf(stdout, "Trying %s...\n",
-    inet_ntoa(hisctladdr.sin_addr));
-   (void) close(s);
-   s = socket(hisctladdr.sin_family, SOCK_STREAM, 0);
-   if (s < 0) {
-    perror("ftp: socket");
-    code = -1;
-    return (0);
+
+ if (res0->ai_canonname) {
+  struct addrinfo h, *a;
+  memset(&h, 0, sizeof(h));
+  h.ai_family = PF_UNSPEC;
+  h.ai_socktype = SOCK_STREAM;
+  h.ai_flags = AI_NUMERICHOST;
+  if (!getaddrinfo(res0->ai_canonname, NULL, &h, &a)) {
+   strncpy(hostnamebuf, res0->ai_canonname, sizeof(hostnamebuf));
+   freeaddrinfo(a);
+  } else
+   strncpy(hostnamebuf, host, sizeof(hostnamebuf));
+ }
+ else
+  strncpy(hostnamebuf, host, sizeof(hostnamebuf));
+ hostnamebuf[sizeof(hostnamebuf) - 1] = '\0';
+ hostname = hostnamebuf;
+
+ s = -1;
+ for (res = res0; res; res = res->ai_next) {
+  if (!ex_af2prot(res->ai_family)) {
+   cause = "ftp: mismatch address family";
+   errno = EPROTONOSUPPORT;
+   continue;
+  }
+  if ((size_t)res->ai_addrlen
 > sizeof(hisctladdr)) {
+   cause = "ftp: mismatch struct sockaddr size";
+   errno = EPROTO;
+   continue;
+  }
+  if (getnameinfo(res->ai_addr, res->ai_addrlen,
+    hbuf, sizeof(hbuf), NULL, 0,
+    NI_NUMERICHOST))
+   strcpy(hbuf, "???");
+  if (res0->ai_next) /* if we have multiple possibilities */
```

```
+   fprintf(stdout, "Trying %s...\n", hbuf);
+  s = socket(res->ai_family, res->ai_socktype, res->ai_protocol);
+  if (s < 0) {
+   cause = "ftp: socket";
+   continue;
+  }
+  while ((error = connect(s, res->ai_addr, res->ai_addrlen)) < 0
+    && errno == EINTR) {
+   ;
+  }
+  if (error) {
+   /* this "if" clause is to prevent print warning twice */
+   if (res->ai_next) {
+    fprintf(stderr,
+     "ftp: connect to address %s", hbuf);
+    perror("");
   }
+   cause = "ftp: connect";
+   close(s);
+   s = -1;
   continue;
  }
-  perror("ftp: connect");
+  /* finally we got one */
+  break;
+ }
+ if (s < 0) {
+  perror(cause);
  code = -1;
-  goto bad;
+  freeaddrinfo(res0);
+  return
 NULL;
 }
- len = sizeof (myctladdr);
+ len = res->ai_addrlen;
+ memcpy(&hisctladdr, res->ai_addr, len);
+ freeaddrinfo(res0);
 if (getsockname(s, (struct sockaddr *)&myctladdr, &len) < 0) {
  perror("ftp: getsockname");
  code = -1;
  goto bad;
 }
#ifdef IP_TOS
+ if (hisctladdr.su_family == AF_INET)
+ {
 tos = IPTOS_LOWDELAY;
 if (setsockopt(s, IPPROTO_IP, IP_TOS, (char *)&tos, sizeof(int)) < 0)
```

```
  perror("ftp: setsockopt TOS (ignored)");
+ }
#endif
 cin = fdopen(s, "r");
 cout = fdopen(s, "w");
@@ -182,7 +277,7 @@
  goto bad;
 }
 if (verbose)
-  printf("Connected to %s.\n", hostname);
+  printf("Connected to %s (%s).\n", hostname, hbuf);
 if (getreply(0) > 2) {  /* read startup message from server */
  if (cin)
   (void) fclose(cin);
@@ -392,8 +487,10 @@
   }
   if (dig < 4 && isdigit(c))
    code = code * 10 + (c - '0');
-   if (!pflag && code == 227)
+   if (!pflag && (code == 227 || code == 228))
    pflag = 1;
+   else if (!pflag && code == 229)
+    pflag
 = 100;
   if (dig > 4 && pflag == 1 && isdigit(c))
    pflag = 2;
   if (pflag == 2) {
@@ -405,6 +502,8 @@
     pflag = 3;
    }
   }
+   if (pflag == 100 && c == '(')
+    pflag = 2;
   if (dig == 4 && c == '-') {
    if (continuation)
     code = 0;
@@ -1083,15 +1182,25 @@
static int
initconn(void)
{
- register char *p, *a;
+ u_char *p, *a;
 int result, tmpno = 0;
 socklen_t len;
 int on = 1;
- int tos;
- u_long a1,a2,a3,a4,p1,p2;
-
```

```
+ int tos, error = 0;
+ u_int ad[16], po[2], af, alen, plen;
+ char *pasvcmd = NULL;
+ char hbuf[MAXHOSTNAMELEN], pbuf[NI_MAXSERV];
+
+#ifdef INET6
+ if (myctladdr.su_family == AF_INET6
+  && (IN6_IS_ADDR_LINKLOCAL(&myctladdr.su_sin6.sin6_addr)
+   || IN6_IS_ADDR_SITELOCAL(&myctladdr.su_sin6.sin6_addr))) {
+  fprintf(stderr, "use of scoped address can be troublesome\n");
+ }
+#endif
 if (passivemode) {
-  data = socket(AF_INET, SOCK_STREAM, 0);
+  data_addr = hisctladdr;
+  data = socket(data_addr.su_family, SOCK_STREAM, 0);
  if (data
 < 0) {
   perror("ftp: socket");
   return(1);
@@ -1100,52 +1209,203 @@
      setsockopt(data, SOL_SOCKET, SO_DEBUG, (char *)&on,
         sizeof (on)) < 0)
   perror("ftp: setsockopt (ignored)");
-  if (command("PASV") != COMPLETE) {
+  switch (data_addr.su_family) {
+  case AF_INET:
+#if 0
+   if (try_epsv) {
+    result = command(pasvcmd = "EPSV 1");
+    if (code / 10 == 22 && code != 229) {
+     fprintf(stderr,
+      "wrong server: return code must be 229\n");
+     result = COMPLETE + 1;
+    }
+   } else {
+#endif
+   result = COMPLETE + 1;
+
+   if (result != COMPLETE) {
+    try_epsv = 0;
+    result = command(pasvcmd = "PASV");
+   }
+   break;
+#ifdef INET6
+  case AF_INET6:
+   if (try_epsv) {
+    result = command(pasvcmd = "EPSV 2");
```

```
+    if (code / 10 == 22 && code != 229) {
+     fprintf(stderr,
+      "wrong server: return code must be 229\n");
+     result = COMPLETE + 1;
+    }
+   } else {
+    result = COMPLETE + 1;
+   }
+   if (result != COMPLETE) {
+    try_epsv
 = 0;
+    result = command(pasvcmd = "LPSV");
+   }
+   break;
+#endif
+  default:
+   result = COMPLETE + 1;
+   break;
+  }
+  if (result != COMPLETE) {
   printf("Passive mode refused.\n");
-   return(1);
+   goto bad;
  }

+#define pack2(var) \
+ (((var[0] & 0xff) << 8) | ((var[1] & 0xff) << 0))
+#define pack4(var) \
+ ((((var)[0] & 0xff) << 24) | (((var)[1] & 0xff) << 16) | \
+  (((var)[2] & 0xff) << 8) | (((var)[3] & 0xff) << 0))
+
  /*
   * What we've got at this point is a string of comma separated
   * one-byte unsigned integer values, separated by commas.
-   * The first four are the an IP address. The fifth is the MSB
-   * of the port number, the sixth is the LSB. From that we'll
-   * prepare a sockaddr_in.
   */
-
-  if (sscanf(pasv,"%ld,%ld,%ld,%ld,%ld,%ld",
-      &a1,&a2,&a3,&a4,&p1,&p2)
-      != 6)
-  {
-   printf("Passive mode address scan failure. Shouldn't happen!\n");
-   return(1);
+  error = 0;
+  if (strcmp(pasvcmd, "PASV") == 0) {
+   if
```

```
 (data_addr.su_family != AF_INET) {
+    error = 2;
+    goto psv_done;
+   }
+   if (code / 10 == 22 && code != 227) {
+    error = 227;
+    goto psv_done;
+   }
+   if (sscanf(pasv, "%u,%u,%u,%u,%u,%u",
+     &ad[0], &ad[1], &ad[2], &ad[3],
+     &po[0], &po[1]) != 6) {
+    error = 1;
+    goto psv_done;
+   }
+   data_addr.su_sin.sin_addr.s_addr = htonl(pack4(ad));
+   data_addr.su_port = htons(pack2(po));
+  } else
+      if (strcmp(pasvcmd, "LPSV") == 0) {
+   if (code / 10 == 22 && code != 228) {
+    error = 228;
+    goto psv_done;
+   }
+   switch (data_addr.su_family) {
+   case AF_INET:
+    if (sscanf(pasv, "%u,%u,%u,%u,%u,%u,%u,%u,%u",
+      &af, &alen,
+      &ad[0], &ad[1], &ad[2], &ad[3],
+      &plen, &po[0], &po[1]) != 9) {
+     error = 1;
+     goto psv_done;
+    }
+    if (af != 4 || alen != 4 || plen != 2) {
+     error = 2;
+     goto psv_done;
+    }
+    data_addr.su_sin.sin_addr.s_addr =
+       htonl(pack4(ad));
+    data_addr.su_port = htons(pack2(po));
+    break;
+#ifdef
 INET6
+   case AF_INET6:
+    if (sscanf(pasv,
+ "%u,%u,%u,%u,%u,%u,%u,%u,%u,%u,%u,%u,%u,%u,%u,%u,%u,%u,%u,%u,%u",
+      &af, &alen,
+      &ad[0], &ad[1], &ad[2], &ad[3],
+      &ad[4], &ad[5], &ad[6], &ad[7],
+      &ad[8], &ad[9], &ad[10], &ad[11],
```

```
+      &ad[12], &ad[13], &ad[14], &ad[15],
+      &plen, &po[0], &po[1]) != 21) {
+     error = 1;
+     goto psv_done;
+    }
+    if (af != 6 || alen != 16 || plen != 2) {
+     error = 2;
+     goto psv_done;
+    }
+    data_addr.su_sin6.sin6_addr.s6_addr32[0] =
+       htonl(pack4(ad));
+    data_addr.su_sin6.sin6_addr.s6_addr32[1] =
+       htonl(pack4(ad+4));
+    data_addr.su_sin6.sin6_addr.s6_addr32[2] =
+       htonl(pack4(ad+8));
+    data_addr.su_sin6.sin6_addr.s6_addr32[3] =
+       htonl(pack4(ad+12));
+    data_addr.su_port = htons(pack2(po));
+    break;
+#endif
+   default:
+    error = 1;
+   }
+  } else if (strncmp(pasvcmd, "EPSV", 4) == 0) {
+   char delim[4];
+   u_int epsvpo;
+
+   if (code / 10 ==
 22 && code != 229) {
+    error = 229;
+    goto psv_done;
+   }
+   if (sscanf(pasv, "%c%c%c%u%c", &delim[0], &delim[1],
+     &delim[2], &epsvpo, &delim[3]) != 5) {
+    error = 1;
+    goto psv_done;
+   }
+   if (delim[0] != delim[1] || delim[0] != delim[2]
+    || delim[0] != delim[3]) {
+    error = 1;
+    goto psv_done;
+   }
+   data_addr.su_port = htons(epsvpo);
+  } else {
+   error = 1;
+  }
+psv_done:
+  switch (error) {
```

```
+  case 0:
+   break;
+  case 1:
+   fprintf(stderr,
+    "Passive mode address scan failure. Shouldn't happen!\n");
+   goto bad;
+  case 2:
+   fprintf(stderr,
+     "Passive mode AF mismatch. Shouldn't happen!\n");
+   goto bad;
+  case 227:
+  case 228:
+  case 229:
+   fprintf(stderr,
+     "wrong server: return code must be %d\n", error);
+   goto bad;
+  default:
+   fprintf(stderr, "Bug\n");
  }

-  data_addr.sin_family = AF_INET;
-  data_addr.sin_addr.s_addr = htonl((a1 << 24) | (a2 << 16) |
-        (a3 << 8) | a4);
-  data_addr.sin_port = htons((p1
 << 8) | p2);
-
  if (connect(data, (struct sockaddr *) &data_addr,
-      sizeof(data_addr))<0) {
+       (data_addr.su_family == AF_INET ?
+        sizeof(data_addr.su_sin) :
+        sizeof(data_addr.su_sin6)))<0) {
   perror("ftp: connect");
   return(1);
  }
#ifdef IP_TOS
+  if (data_addr.su_family == AF_INET)
+  {
  tos = IPTOS_THROUGHPUT;
  if (setsockopt(data, IPPROTO_IP, IP_TOS, (char *)&tos,
      sizeof(tos)) < 0)
   perror("ftp: setsockopt TOS (ignored)");
+  }
#endif
  return(0);
 }
noport:
 data_addr = myctladdr;
 if (sendport)
```

```
-  data_addr.sin_port = 0; /* let system pick one */
+  data_addr.su_port = 0; /* let system pick one */
 if (data != -1)
  (void) close(data);
- data = socket(AF_INET, SOCK_STREAM, 0);
+ data = socket(data_addr.su_family, SOCK_STREAM, 0);
 if (data < 0) {
  perror("ftp: socket");
  if (tmpno)
@@ -1172,13 +1432,47 @@
 if (listen(data, 1) < 0)
  perror("ftp: listen");
 if (sendport) {
-  a = (char *)&data_addr.sin_addr;
-  p
 = (char *)&data_addr.sin_port;
-#define UC(b) (((int)b)&0xff)
-  result =
-      command("PORT %d,%d,%d,%d,%d,%d",
-        UC(a[0]), UC(a[1]), UC(a[2]), UC(a[3]),
-        UC(p[0]), UC(p[1]));
+  af = ex_af2prot(data_addr.su_family);
+  if (try_eprt && af > 1) {      /* only IPv6 */
+   if (getnameinfo((struct sockaddr *)&data_addr, len,
+     hbuf, sizeof(hbuf), pbuf, sizeof(pbuf),
+     NI_NUMERICHOST | NI_NUMERICSERV) == 0) {
+    result = command("EPRT |%d|%s|%s|",
+      af, hbuf, pbuf);
+    if (result != COMPLETE) {
+     try_eprt = 0;
+    }
+   } else {
+    result = ERROR;
+   }
+  } else {
+   result = COMPLETE + 1;
+  }
+  if (result == COMPLETE)
+   goto prt_done;
+
+  p = (u_char *)&data_addr.su_port;
+  switch (data_addr.su_family) {
+  case AF_INET:
+   a = (u_char *)&data_addr.su_sin.sin_addr;
+   result = command("PORT %u,%u,%u,%u,%u,%u",
+    a[0], a[1], a[2], a[3], p[0], p[1]);
+   break;
+#ifdef INET6
```

```
+  case AF_INET6:
+   a = (u_char *)&data_addr.su_sin6.sin6_addr;
+   result
 = command(
+ "LPRT 6,16,%d,%d,%d,%d,%d,%d,%d,%d,%d,%d,%d,%d,%d,%d,%d,%d,2,%d,%d",
+    a[0], a[1], a[2], a[3], a[4], a[5], a[6], a[7],
+    a[8], a[9],a[10],a[11],a[12],a[13],a[14],a[15],
+    p[0], p[1]);
+   break;
+#endif
+  default:
+   result = COMPLETE + 1; /* xxx */
+  }
+
+ prt_done:
  if (result == ERROR && sendport == -1) {
   sendport = 0;
   tmpno = 1;
@@ -1189,9 +1483,12 @@
 if (tmpno)
  sendport = 1;
#ifdef IP_TOS
+ if (data_addr.su_family == AF_INET)
+ {
 on = IPTOS_THROUGHPUT;
 if (setsockopt(data, IPPROTO_IP, IP_TOS, (char *)&on, sizeof(int)) < 0)
  perror("ftp: setsockopt TOS (ignored)");
+ }
#endif
 return (0);
bad:
@@ -1204,7 +1501,7 @@
static FILE *
dataconn(const char *lmode)
{
- struct sockaddr_in from;
+ union sockunion from;
 int s, tos;
 socklen_t fromlen = sizeof(from);

@@ -1220,9 +1517,12 @@
 (void) close(data);
 data = s;
#ifdef IP_TOS
+ if (from.su_family == AF_INET)
+ {
 tos = IPTOS_THROUGHPUT;
 if (setsockopt(s,
```

```
 IPPROTO_IP, IP_TOS, (char *)&tos, sizeof(int)) < 0)
  perror("ftp: setsockopt TOS (ignored)");
+ }
#endif
 return (fdopen(data, lmode));
}
@@ -1284,8 +1584,8 @@
 static struct comvars {
  int connect;
  char name[MAXHOSTNAMELEN];
-  struct sockaddr_in mctl;
-  struct sockaddr_in hctl;
+  union sockunion mctl;
+  union sockunion hctl;
  FILE *in;
  FILE *out;
  int tpe;
@@ -1323,7 +1623,7 @@
 connected = op->connect;
 if (hostname) {
  (void) strncpy(ip->name, hostname, sizeof(ip->name) - 1);
-  ip->name[strlen(ip->name)] = '\0';
+  ip->name[sizeof(ip->name) - 1] = '\0';
 }
 else {
  ip->name[0] = 0;
@@ -1352,18 +1652,18 @@
 ip->ntflg = ntflag;
 ntflag = op->ntflg;
 (void) strncpy(ip->nti, ntin, 16);
- (ip->nti)[strlen(ip->nti)] = '\0';
+ (ip->nti)[16] = '\0';  /* shouldn't use strlen */
 (void) strcpy(ntin, op->nti);
 (void) strncpy(ip->nto, ntout, 16);
- (ip->nto)[strlen(ip->nto)] = '\0';
+ (ip->nto)[16] = '\0';
 (void) strcpy(ntout, op->nto);
 ip->mapflg
 = mapflag;
 mapflag = op->mapflg;
 (void) strncpy(ip->mi, mapin, MAXPATHLEN - 1);
- (ip->mi)[strlen(ip->mi)] = '\0';
+ (ip->mi)[MAXPATHLEN - 1] = '\0';
 (void) strcpy(mapin, op->mi);
 (void) strncpy(ip->mo, mapout, MAXPATHLEN - 1);
- (ip->mo)[strlen(ip->mo)] = '\0';
+ (ip->mo)[MAXPATHLEN - 1] = '\0';
 (void) strcpy(mapout, op->mo);
```

```
 (void) signal(SIGINT, oldintr);
 if (abrtflag) {
diff -uNr netkit-ftp-0.17/ftp/ftp_var.h netkit-ftp/ftp/ftp_var.h
--- netkit-ftp-0.17/ftp/ftp_var.h Sat Oct  2 21:39:17 1999
+++ netkit-ftp/ftp/ftp_var.h Fri Jan 12 23:36:27 2001
@@ -1,3 +1,5 @@
+/* $USAGI$ */
+
/*
 * Copyright (c) 1985, 1989 Regents of the University of California.
 * All rights reserved.
@@ -31,7 +33,7 @@
 * SUCH DAMAGE.
 *
 * from: @(#)ftp_var.h 5.9 (Berkeley) 6/1/90
- * $Id: ftp_var.h,v 1.12 1999/10/02 18:39:17 dholland Exp $
+ * $Id: ftp_var.h,v 1.3 2001/01/12 21:36:27 sekiya Exp $
 */

/*
@@ -112,6 +114,8 @@
Extern int mflag;  /* flag: if != 0, then active multi command
 */

Extern int options; /* used during socket creation */
+Extern int try_epsv; /* try EPSV for this session */
+Extern int try_eprt; /* try EPRT for this session */

/*
 * Format of command table.
@@ -140,7 +144,7 @@
Extern char macbuf[4096];
#define MACBUF_SIZE 4096

-char *hookup(char *host, int port);
+char *hookup(const char *host, const char *port);
struct cmd *getcmd(const char *);
char **makeargv(int *pargc, char **parg);
int dologin(const char *host);
```

Found in path(s):
* /ftp-0.17-89.el9.src.rpm-cosi-expand-archive-ozssGgRr/netkit-ftp.usagi-ipv6.patch
No license file was found, but licenses were detected in source scan.

```
/*
* Copyright (c) 1985 Regents of the University of California.
* All rights reserved.
*
```

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* /ftp-0.17-89.el9.src.rpm-cosi-expand-archive-ozssGgRr/netkit-ftp-0.17.tar.gz-cosi-expand-archive-iTvXN2J9/netkit-ftp-0.17/ftp/domacro.c
*
 /ftp-0.17-89.el9.src.rpm-cosi-expand-archive-ozssGgRr/netkit-ftp-0.17.tar.gz-cosi-expand-archive-iTvXN2J9/netkit-ftp-0.17/ftp/ruserpass.c
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*
* from: @(#)pathnames.h 5.2 (Berkeley) 6/1/90
* $Id: pathnames.h,v 1.1 1996/07/13 23:46:07 dholland Exp $
 */

Found in path(s):
* /ftp-0.17-89.el9.src.rpm-cosi-expand-archive-ozssGgRr/netkit-ftp-0.17.tar.gz-cosi-expand-archive-iTvXN2J9/netkit-ftp-0.17/ftp/pathnames.h

# 1.1412 ghodss-yaml 1.0.0

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# 1.1413 @octokit/plugin-paginate-rest 11.4.4-cjs.2

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# 1.1414 @floating-ui/core 1.4.1

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# 1.1416 kubernetes-utils 0.0.0-20250321185631-1f6e0b77f77e

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# 1.1417 pbnjay-memory 0.0.0-20210728143218-7b4eea64cf58

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# 1.1427 otel-metric 1.36.0

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# 1.1428 nuid v1.0.1

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# 1.1429 jboss-logging 3.6.1.Final

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# 1.1435 write-file-atomic 3.0.3

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# 1.1441 gnostic-models 0.6.8

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# 1.1446 alpine-baselayout 3.6.8-r1

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```

Found in path(s):

* /com-springsource-javax-activation-sources-1-1-1-jar/com/sun/activation/registries/LogSupport.java
* /com-springsource-javax-activation-sources-1-1-1-jar/javax/activation/DataHandler.java
* /com-springsource-javax-activation-sources-1-1-1-jar/javax/activation/FileDataSource.java
* /com-springsource-javax-activation-sources-1-1-1-jar/com/sun/activation/viewers/ImageViewer.java

* /com-springsource-javax-activation-sources-1-1-1-jar/com/sun/activation/registries/MimeTypeFile.java
* /com-springsource-javax-activation-sources-1-1-1-jar/javax/activation/MimeTypeParameterList.java
* /com-springsource-javax-activation-sources-1-1-1-jar/javax/activation/ActivationDataFlavor.java
* /com-springsource-javax-activation-sources-1-1-1-jar/javax/activation/FileTypeMap.java
* /com-springsource-javax-activation-sources-1-1-1-jar/com/sun/activation/registries/MailcapTokenizer.java
* /com-springsource-javax-activation-sources-1-1-1-jar/com/sun/activation/registries/MimeTypeEntry.java
*
/com-springsource-javax-activation-sources-1-1-1-jar/com/sun/activation/viewers/TextEditor.java
* /com-springsource-javax-activation-sources-1-1-1-jar/com/sun/activation/viewers/TextViewer.java
* /com-springsource-javax-activation-sources-1-1-1-jar/javax/activation/DataSource.java
* /com-springsource-javax-activation-sources-1-1-1-jar/javax/activation/DataContentHandlerFactory.java
* /com-springsource-javax-activation-sources-1-1-1-jar/com/sun/activation/registries/MailcapParseException.java
* /com-springsource-javax-activation-sources-1-1-1-jar/javax/activation/MailcapCommandMap.java
* /com-springsource-javax-activation-sources-1-1-1-jar/javax/activation/MimeType.java
* /com-springsource-javax-activation-sources-1-1-1-jar/javax/activation/DataContentHandler.java
* /com-springsource-javax-activation-sources-1-1-1-jar/com/sun/activation/viewers/ImageViewerCanvas.java
* /com-springsource-javax-activation-sources-1-1-1-jar/javax/activation/CommandInfo.java
* /com-springsource-javax-activation-sources-1-1-1-jar/javax/activation/CommandMap.java
*
/com-springsource-javax-activation-sources-1-1-1-jar/javax/activation/SecuritySupport.java
* /com-springsource-javax-activation-sources-1-1-1-jar/com/sun/activation/registries/MailcapFile.java
* /com-springsource-javax-activation-sources-1-1-1-jar/javax/activation/URLDataSource.java
* /com-springsource-javax-activation-sources-1-1-1-jar/javax/activation/MimetypesFileTypeMap.java
* /com-springsource-javax-activation-sources-1-1-1-jar/javax/activation/UnsupportedDataTypeException.java
* /com-springsource-javax-activation-sources-1-1-1-jar/javax/activation/MimeTypeParseException.java
* /com-springsource-javax-activation-sources-1-1-1-jar/javax/activation/CommandObject.java
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@(#)package.html 1.2 07/05/14

-->

Found
in path(s):
* /com-springsource-javax-activation-sources-1-1-1-jar/javax/activation/package.html

# 1.1449 libutempter 1.2.1-6.el9

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```
  <one line to give the library's name and a brief idea of what it does.>
  Copyright (C) <year>  <name of author>

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 USA
```

Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or
your school, if any, to sign a "copyright disclaimer" for the library,
if necessary.  Here is a sample; alter the names:

```
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 library `Frob' (a library for tweaking knobs) written by James
 Random Hacker.

 <signature of Ty Coon>, 1 April 1990
 Ty Coon, President of Vice
```

That's all there is to it!

# 1.1450 zsh 5.8-9.el9

## 1.1450.1 Available under license :

```
#autoload

# Options:
#
# -0       include jid 0 as a match for the host system
# -o param  jail parameter to complete instead of jid -
#             e.g. name, path, ip4.addr, host.hostname
```

```
local addhost host param desc=1
local -a jails args expl
zparseopts -D -K -E 0=addhost o:=param
param=${param[2]:-name}

jails=( ${${(f)"$(_call_program jails jls $param name)"}/ /:} )
case $param in
 jid) host=0 ;;
 name)
   host=0
   desc=0
 ;;
 path)
   host=/
   args=( -M 'r:|/=* r:|=*' )
 ;;
 ip4.addr) args=( -M 'r:|.=* r:|=*' ) ;;
esac
[[ -n $addhost && -n $host ]] && jails+=( "$host:$HOST" )

if (( desc )); then
 _describe -t jails jail jails "$@" "$args[@]"
else
 _wanted jails expl jail compadd "$@" "$args[@]" - ${jails%:*}
fi
#autoload

local expl

_description architectures expl 'architecture'
compadd "$@" "$expl[@]" alpha amd64 arm64 armv7 hppa i386 landisk longson luna88k macppc octeon sgi
sparc64
#autoload
#
# device types on FreeBSD/DragonFly
# (for commands using devstat_buildmatch(), such as iostat and vmstat)
#
local -a d i types

d=( da sa printer proc worm cd scanner optical changer
   comm array enclosure floppy)
i=( IDE SCSI other )
types=(
 "($d)da[direct access devices]"
 "($d)sa[sequential access devices]"
 "($d)printer[printers]"
 "($d)proc[processor devices]"
 "($d)worm[write once read multiple devices]"
```

```
 "($d)cd[CD devices]"
 "($d)scanner[scanner devices]"
 "($d)optical[optical memory devices]"
 "($d)changer[medium changer devices]"
 "($d)comm[communication devices]"
 "($d)array[storage array devices]"
 "($d)enclosure[enclosure services devices]"
 "($d)floppy[floppy devices]"
 "($i)IDE[Integrated Drive Electronics devices]"
 "($i)SCSI[Small Computer System Interface devices]"
 "($i)other[any other device interface]"
 'pass[passthrough devices]'
)

_values -s , 'device type' $types
#autoload

local expl

_description architectures expl 'architecture'
compadd "$@" "$expl[@]" amd64 evbarm evbmips evbppc hpcarm i386 sparc64 xen \
 acorn32 algor alpha amiga amigappc arc atari bebox cats cesfic cobalt dreamcast \
 emips epoc32 evbsh3 ews4800mips hp300 hppa hpcmips hpcsh ia64 ibmnws iyonix \
 landisk luna68k mac68k macppc mipsco mmeye mvme68k mvmeppc netwinder news68k \
 newsmips next68k ofppc pmax prep rs6000 sandpoint sbmips sgimips shark sparc \
 sun2 sun3 vax x68k zaurus
#autoload

local expl

_description architectures expl 'architecture'
compadd "$@" "$expl[@]" amd64 arm arm64 i386 mips powerpc riscv sparc64
#autoload

# Provides completion for file flags (formerly part of _chflags)

local curcontext=$curcontext su=$(( ! EUID || $+_comp_priv_prefix ))
local -a context line state state_descr copts=( "${@}" ) flags flag_descs
local -A val_args

flag_descs+=(
 nodump nodump
 uappnd 'user append-only'
 uchg 'user immutable'
)

if (( su )); then
 flag_descs+=(
```

```
  arch archived
  sappnd 'system append-only'
  schg 'system immutable'
 )
fi

if [[ $OSTYPE = (darwin|dragonfly|freebsd|netbsd)* ]]; then
 flag_descs+=(opaque opaque)

 if [[ $OSTYPE = darwin* ]]; then
  flag_descs+=(hidden hidden)
 fi

 if [[ $OSTYPE = (dragonfly|freebsd)* ]]; then
  flag_descs+=(uunlnk 'user undeletable')

  (( su )) &&
  flag_descs+=(sunlnk 'system undeletable')
 fi

 if [[ $OSTYPE = dragonfly* ]]; then
  flag_descs+=(
   cache cache
   nouhistory 'user nohistory'
  )

  (( su )) && flag_descs+=(
   noscache noscache
   noshistory 'system nohistory'
  )
 fi

 [[ $OSTYPE =
 freebsd* ]] && flag_descs+=(
  uarch archive
  uhidden hidden
  uoffline offline
  urdonly 'DOS, Windows and CIFS readonly'
  ureparse 'Windows reparse point'
  usparse 'sparse file'
  usystem 'DOS, Windows and CIFS system'
 )
fi

for 1 2 in $flag_descs; do
 if [[ $1 = no* ]]; then
  flags+=("(${1#no})$1[set the $2 flag]"
          "($1)${1#no}[unset the $2 flag]")
```

```
 else
   flags+=("(no$1)$1[set the $2 flag]"
           "($1)no$1[unset the $2 flag]")
 fi
done

_values -O copts -s , 'file flags' $flags
#autoload
# disk device names on BSDs
local -a disks

case $OSTYPE in
 freebsd*)
   disks=( ${${(M)${(f)"$(geom disk list)"}\:#Geom name\:*}#*\: } )
 ;;
 dragonfly*)
   disks=( $(sysctl -n kern.disks) )
 ;;
 openbsd*)
   disks=( ${${(s.,.)"$(sysctl -n hw.disknames)"}%\:*} )
 ;;
 netbsd*)
   disks=( $(sysctl -n hw.disknames) )
 ;;
esac

if (( $#disks )); then
 local expl
 _wanted disk-devices expl 'disk device' compadd "$@" $disks
 return
fi

return 1
```

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---
ZSH CONTRIBUTORS
---

Zsh was originally written by Paul Falstad <pf@zsh.org>. Zsh is now maintained by the members of the zsh-workers mailing list <zsh-workers@zsh.org>. The development is currently coordinated by Peter Stephenson <pws@zsh.org>.

This file credits only the major contributors to the current release. See the ChangeLog files for a complete list of people who have submitted patches. Note that email addresses below and in the ChangeLog file are included for disambiguation purposes only, and are not guaranteed to be currently accurate. If you feel that you or someone else have been unfairly omitted from this list please mail the list <zsh-workers@zsh.org>.

Version 4.3
---

Contributors to the main shell include Clint Adams, Rocky Bernstein, Andrey Borzenkov, Dan Bullok, Marc Chantreux, Thorsten Dahlheimer, Wayne Davison, Lionel Flandrin, Michael Hwang, Oliver Kiddle, Greg Klanderman, Matthias Kopferman, Mikael Magnusson, Dan Nelson,

Phil Pennock, Toby Peterson,
R. Ramkumar, Franois Revol, Bart Schaefer, Tom Smetana, Joerg Sonnenberger, Peter Stephenson, Jon Strait, Takimoto Jun, River Tarnell, Frank Terbeck, Philippe Troin, Geoff Wing, Matt Wozniski.

The VCS_Info function system was written by Frank Terbeck with contributions from Julien Langer.

Contributors to documentation and to completion and other shell functions include those above plus Nuno Alexandre, Ralph Amissah, Micah Anderson, arno, Frank Benkstein, Jay Berkenbilt, Frank Blendinger, Zack Cerza, Brendan Cully, Baptiste Daroussin, Danek Duvall, Ryan F, Sean Finney, Daniel Friesel, Alexey I. Froloff, Tobias Gruetzmacher, Pierre Habouzit, Richard Hartmann, Benjamin R. Haskell, Ag. D. Hatzimanikas, Pete Hollobon, Erik Johansson, Kohsuke Kawaguchi, Dough Kearns, Hannu Koivisto, Henryk Konsek, Chris Lamb, Vincent Lefevre, Roger Leigh, Eric Mangold, Max Mikhanosha, Arkadiusz Miskiewicz, Matthieu Moy, Scott Murray, Alexander Myodov, tpn Nmec, Kalle Olavi Niemitalo, Kazuhiro
NISHIYAMA, Omari Norman, Mustafa Oezkan, Tomasz Pala, Peter Palfrader, Carlos Phillips, Daniel Qarras, Jean-Baptiste Quenot, David Riebenbauer, Haakon Riiser, Ingo Rohlfs, Felix Rosencrantz, Simon Ruderich, Stephen Rger, William Scott, Kris Shannon, Jrg Sommer, Travis Spencer, Vincent Steman, Mrten Svantesson, Evgenii Terechkov, Magnus Therning, Bernhard Tittelbach, Ingmar Vanhassel, Markus Waldeck, Motoi Washida, Nikolai Weibull, Jesse Weinstein.

Version 4.2
---

The contributor list is similar to that for 4.1.1.

Version 4.1.1
---

Clint Adams <clint@zsh.org>: termcap/terminfo, completion, configuration, various modules, networking, prompts

Andrey Borzenkov <bor@zsh.org>: configuration, completion functions, cygwin support

Chmouel Boudjnah <chmouel@mandrakesoft.com>: Linux completion support

Wayne Davison <wayned@users.sourceforge.net>: shell history mechanism, arithmetic

Zvi Har'El <rl@math.technion.ac.il>: completion functions

Doug Kearns <djkea2@mugca.its.monash.edu.au>:
completion functions

Oliver Kiddle <opk@zsh.org>: builtins, completion, parameters, prompts, standards support, tests

Andrew Main <zefram@zsh.org>: zle keymaps, games

Akinori Musha: BSD completion support

Felix Rosencrantz <f_rosenkrantz@yahoo.com>: completion, zle

Bart Schaefer <schaefer@zsh.org>: configuration, parameters, prompts, signals, syntax, tests, functions, sanity checking

Adam Spiers <adam@spiers.net>: completion and other functions

Peter Stephenson <pws@zsh.org>: configuration, zle, networking, syntax, completion

Tanaka Akira <akr@zsh.org>: completion functions

Philippe Troin <phil@fifi.org>: signals, process groups.

Geoff Wing <gcw@zsh.org>: archiving and distribution network, line editor display, configuration

Sven Wischnowsky <wischnow@zsh.org>: internal completion mechanism and low-level functions, line editor internals, syntax, wordcode mechanism,

Version 4.0.1
---

Clint Adams <schizo@debian.org>: Completion functions,
general
configuration and module issues.

Andrej Borsenkow <bor@zsh.org>: Cygwin support,
configuration, completion functions.

Chmouel Boudjnah <chmouel@mandrakesoft.com>: configuration support.

Wayne Davison <wayned@users.sourceforge.net>: History code.

Alexandre Duret-Lutz: completion functions and substitution code.

Oliver Kiddle <opk@zsh.org>: Modules and completion functions, AIX support.

Andrew Main <zefram@zsh.org>: Parameters and arithmetic, configuration.

Felix Rosencrantz <f_rosencrantz@yahoo.com>: Test code and shell functions.

Bart Schaefer <schaefer@zsh.org>: bits of everything in all parts of code;
general sanity control.

Adam Spiers <adam@spiers.net>: Completion and other functions, completion
caching.

Peter Stephenson <pws@zsh.org>: configuration and installation, parameters,
completion functions and configuration.

Tanaka Akira <akr@zsh.org>: Completion and test functions.

Geoff Wing <gcw@zsh.org>: FTP and mailing list archive

Sven Wischnowsky <wischnow@zsh.org>:
Most of the completion code, zpty,
signal queueing, parameters, builtins, builtouts, built-here-and-theres;
mend garden shed, rewire electricity, reinstall shutters, fix TV aerial in
howling gale...

Other patches from E. Jay Birkenbilt, Jan Fedak, Ulrik Haugen, Paul
Johnson, Fr. Br. George (George V Kouryachy).

Versions 3.1.7 to 3.1.9
---

* Clint Adams <schizo@debian.org>: configuration, various fixes esp. in
completion

* Andrej Borsenkow <Andrej.Borsenkow@mow.siemens.ru>:design, testing and
patches for completion system, documentation, various other fixes

* Chmouel Boudjnah <chmouel@mandrakesoft.com>: design, testing and patches
for completion system, documentation, various other fixes

* Wayne Davison <wayne@clari.net>: History code

* Alexandre Duret-Lutz <duret_g@epita.fr>: design, testing and patches for
completion system, documentation, various other fixes

* Oliver Kiddle <opk@zsh.org>: AIX dynamic library support, various
completion
functions, web page maintenance, documentation fixes

* Andrew Main <zefram@zsh.org>: configuration and module/DLL code, IPv6 support, various other bits

* Felix Rosencrantz <f_rosencrantz@yahoo.com>: design, testing and patches for completion system, documentation, various other fixes

* Bart Schaefer <schaefer@zsh.org>: documentation and many other bits, archive maintenance

* Adam Spiers <adam@spiers.net>: various completion functions, source code archive maintenance, documentation fixes, prompt themes

* Peter Stephenson <pws@zsh.org>: pattern matching code rewrite and enhancements, typeset and local variables, zftp maintenance, general configuration, floating point support

* Tanaka Akira <akr@zsh.org>: CVS archive, numerous completion functions for common commands, regex shell function state machine

* Geoff Wing <gcw@zsh.org>: mailing list and FTP archive, various other bits

* Sven Wischnowsky <wischnow@zsh.org>: almost all completion code including all comp*
libraries, all core functions in completion function system;
styles; job control code; rewrite of internal shell code structures and parsing and execution code to use word code; parameter code; repair roof, fix guttering, put up shelves in study, recarpet hall, ...

Other patches were submitted by Will Day, Irving Wolfe, John Williams, Vin Shelton, Akim Demaille, Helmut Jarausch, Gene Cohler, Johan Sundstrm.

Version 3.1.6
---

* Sven Wischnowsky <wischnow@informatik.hu-berlin.de>: completion code, major rewrite and enhancements, including matching control, completion widgets and function system, complist module; zle code additions; job control code changes; parameters code changes; parameter module; additional autoloading code; general code changes for extra efficiency; subscripting and ordering of globbing lists.

* Peter Stephenson <pws@zsh.org>: zftp and mapfile modules and zf* functions; local parameters and typeset changes; changes in autoconf system;
case-independent and approximate pattern matching; various options; a few completion modules; some zle changes; FAQ.

* Bart Schaefer <schaefer@zsh.org>: associative array implementation; other parameter changes; keeping track of missing patches; function autoloading changes.

* Wayne Davison <wayne@clari.net>: History code novelties and improvements with new options.

* Geoff Wing <gcw@zsh.org>: Zle display code fixes, mailing list and patch archive.

* Zoltn Hidvgi <hzoli@cs.elte.hu>: AIX dynamic loading code.

* Matt Armstrong: cygwin configuration changes.

Other improvements, bug fixes and design suggestions from all the above plus Andrej Borsenkow, Oliver Kiddle, Tanaka Akira, Naoki Wakamatsu, Tatuso Furukawa, Ville Herva, Will Day, Lehti Rahmi, Larry P. Schrof, Helmut Jarausch, Phil Pennock, Wilfredo Sanchez, Bruce Stephens, Gene Cohler, Ollivier Robert, Felix Rosencrantz.

Previous versions of zsh 3 were maintained by Zoltn Hidvgi and Andrew Main (Zefram).

Version
3.0
---

* Richard Coleman <coleman@math.gatech.edu> maintained the code till the release of zsh-2.6-beta16. Converted zsh to use autoconf thus greatly improving the portability. Rewrote signal handling code. Reorganized internal hash tables and rewrote the related builtins (enable, disable, hash, unhash). Made some cleanups in exec.c.

* Zoltn Hidvgi <hzoli@cs.elte.hu> maintained zsh from version 2.6-beta16. Rewrote most of the lexer and substitution and the related completion code. Improved sh/ksh/POSIX compatibility. Fixed lots of bugs in completion, parameter and history code. Made zsh fully 8-bit clean. Made some reorganizations in exec.c. Fixed signal handling bugs. Fixed lots of bugs in various places.

* Peter W. Stephenson <pws@zsh.org> the maintainer of the zsh FAQ. Reorganizations in exec.c. Rewrote and reorganized the history code. Rewrote the zshcompctl manual page. Fixed several bugs related to programmable completion.
Fixed several signal handling bugs. Rewrote test and read builtins. Lots of other bugfixes.

* Andrew Main (Zefram) <zefram@zsh.org> reorganized builtin.c.

Rewrote large parts of the zle vi mode. Redirection fixes. Reorganized parts of the completion code, added some enhancements and fixed lots of bugs. Made zle fully 8-bit clean. Fixed several zle bugs. Reorganized zsh option handling. Lots of other bugfixes.

* Sven Wischnowsky <wischnow@informatik.hu-berlin.de> wrote most of the programmable completion code in zsh-2.5.0. Several bugfixes in exec.c and jobs.c. Lots of completion bugfixes and enhancements.

* Geoff Wing <gcw@zsh.org> rewrote most of zle_refresh.c. Some other bugfixes.

* Clive Messer <clive@epos.demon.co.uk> brought the texinfo documentation up-to-date.

* Mark Borges <mdb@cdc.noaa.gov> contributed several documentation fixes including further texinfo documentation updates and maintained the zsh web pages during their tenure at www.mal.com.

*
Wayne Davison <wayne@clari.net> improved the zle search functions and made them 8-bit clean. Some other little bugfixes.

* Bart Schaefer <schaefer@zsh.org> submitted several bugfixes, reported lots of bugs and gave many very useful suggestions.

Version 2.5
---

Bas de Bakker maintained zsh till the release of zsh-2.5.0. People who have contributed to zsh-2.5.0 are (in lexical order):

Chris.Moore@src.bae.co.uk (Chris Moore)
Harald.Eikrem@delab.sintef.no
Irving_Wolfe@happy-man.com (Irving Wolfe)
Jarkko.Hietaniemi@hut.fi (Jarkko Hietanimi)
P.Stephenson@swansea.ac.uk (Peter Stephenson)
Richard.Sharman@software.mitel.com (Richard Sharman)
Tero_Kivinen@hut.FI (Tero Kivinen)
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bas@phys.uva.nl (Bas de Bakker)
benson@odi.com (Benson Margulies)
billb@bedford.progress.com (Bill Burton)
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hsw1@papa.attmail.com (Stephen Harris)
irving@happy-man.com (Irving Wolfe)
jch@cs.cmu.edu (Jonathan Hardwick)
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marc@cam.org (Marc Boucher)
mason@werple.apana.org.au (Geoff Wing)
mycroft@gnu.ai.mit.edu (Charles Hannum)
mystic@axposf.pa.dec.com (D. Hall)
norbert@i3.informatik.rwth-aachen.de (Norbert Kiesel)
oberon@cs.tu-berlin.de (Sven Wischnowsky)
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(Rick)
pem@aaii.oz.au (Paul Maisano)
per@efd.lth.se (Per Foreby)
pf@z-code.com (Paul Falstad)
roderick@ibcinc.com (Roderick Schertler)
schaefer@z-code.com (Bart Schaefer)
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sinclair@dcs.gla.ac.uk (Duncan Sinclair)
sterling@oldcolo.com (Bruce Sterling Woodcock)
suzuki@otsl.oki.co.jp (Hisao Suzuki)
tsm@cs.brown.edu (Timothy Miller)
vogelke@c17mis.wpafb.af.mil (Karl E. Vogel)
wacker@physik.uni-dortmund.de (Klaus Wacker)
wacren@cis10.ens-cachan.fr (Laurent Wacrenier)

# 1.1451 mikioh-tcpinfo 0.0.0-20190314235526-30a79bb1804b

## 1.1451.1 Available under license :

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# 1.1453 @octokit/rest 20.1.2

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# 1.1454 chownr 2.0.0

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```
---------------
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---------------
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# 1.1468 locker 1.0.1

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# 1.1471 xdg-desktop-portal-gtk 1.12.0-3.el9

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# 1.1472 jaeger-client-go 2.30.0+incompatible

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# 1.1481 go-criu 7.2.0

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# 1.1485 @babel/helper-function-name 7.22.5

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# 1.1488 lmdb 0.9.29-3.el9

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# 1.1489 datadog-go-sqllexer 0.1.6

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```
{
 "input": "CREATE OR REPLACE FUNCTION log_activity(activity text) RETURNS void AS $func$\nBEGIN\n
RAISE NOTICE 'Activity: %', activity;\nEND;\n$func$ LANGUAGE plpgsql;",
 "outputs": [
   {
     "expected": "CREATE OR REPLACE FUNCTION log_activity ( activity text ) RETURNS void AS
$func$BEGIN RAISE NOTICE ?, activity; END$func$ LANGUAGE plpgsql"
   },
   {
     "obfuscator_config": {
       "dollar_quoted_func": false
     },
     "expected": "CREATE OR REPLACE FUNCTION log_activity ( activity text ) RETURNS void AS ?
LANGUAGE plpgsql"
   }
 ]
```

}
{
 "input": "SELECT log_activity('User logged in');",
 "outputs": [
   {
     "expected": "SELECT log_activity ( ? )"
   }
 ]
}

# 1.1490 p-locate 4.1.0

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# 1.1492 type-is 1.6.18

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# 1.1493 node-releases 2.0.13

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# 1.1495 pwquality 1.4.4

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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

// [START discoveryengine_v1_generated_UserLicenseService_ListUserLicenses_sync]

package main
```

```
import (
 "context"

 discoveryengine "cloud.google.com/go/discoveryengine/apiv1"
 discoveryenginepb "cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb"
 "google.golang.org/api/iterator"
)

func main() {
 ctx := context.Background()
 // This snippet
 has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &discoveryenginepb.ListUserLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb#ListUserLicensesRequest.
 }
 it := c.ListUserLicenses(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove
 this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*discoveryenginepb.ListUserLicensesResponse)
 }
}
```

```
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package procurement

import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
 "math"
 "net/http"
 "net/url"

 procurementpb "cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 gtransport
 "google.golang.org/api/transport/grpc"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var newLicenseManagementClientHook clientHook

// LicenseManagementCallOptions contains the retry settings for each method of LicenseManagementClient.
type LicenseManagementCallOptions struct {
 GetLicensePool        []gax.CallOption
 UpdateLicensePool      []gax.CallOption
```

```
 Assign                []gax.CallOption
 Unassign              []gax.CallOption
 EnumerateLicensedUsers []gax.CallOption
 GetOperation          []gax.CallOption
}

func defaultLicenseManagementGRPCClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("cloudcommerceconsumerprocurement.googleapis.com:443"),
internaloption.WithDefaultEndpointTemplate("cloudcommerceconsumerprocurement.UNIVERSE_DOMAIN:443")
,
  internaloption.WithDefaultMTLSEndpoint("cloudcommerceconsumerprocurement.mtls.googleapis.com:443"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://cloudcommerceconsumerprocurement.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableJwtWithScope(),
  internaloption.EnableNewAuthLibrary(),
  option.WithGRPCDialOption(grpc.WithDefaultCallOptions(
   grpc.MaxCallRecvMsgSize(math.MaxInt32))),
 }
}

func
 defaultLicenseManagementCallOptions() *LicenseManagementCallOptions {
 return &LicenseManagementCallOptions{
  GetLicensePool:        []gax.CallOption{},
  UpdateLicensePool:     []gax.CallOption{},
  Assign:                []gax.CallOption{},
  Unassign:              []gax.CallOption{},
  EnumerateLicensedUsers: []gax.CallOption{},
  GetOperation:          []gax.CallOption{},
 }
}

func defaultLicenseManagementRESTCallOptions() *LicenseManagementCallOptions {
 return
 &LicenseManagementCallOptions{
  GetLicensePool:        []gax.CallOption{},
  UpdateLicensePool:     []gax.CallOption{},
  Assign:                []gax.CallOption{},
  Unassign:              []gax.CallOption{},
  EnumerateLicensedUsers: []gax.CallOption{},
  GetOperation:          []gax.CallOption{},
 }
}

// internalLicenseManagementClient is an interface that defines the methods available from Cloud Commerce
Consumer Procurement API.
```

```
type internalLicenseManagementClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 GetLicensePool(context.Context, *procurementpb.GetLicensePoolRequest, ...gax.CallOption)
(*procurementpb.LicensePool, error)
 UpdateLicensePool(context.Context, *procurementpb.UpdateLicensePoolRequest, ...gax.CallOption)
(*procurementpb.LicensePool, error)
 Assign(context.Context, *procurementpb.AssignRequest, ...gax.CallOption) (*procurementpb.AssignResponse,
error)
 Unassign(context.Context, *procurementpb.UnassignRequest,
 ...gax.CallOption) (*procurementpb.UnassignResponse, error)
 EnumerateLicensedUsers(context.Context, *procurementpb.EnumerateLicensedUsersRequest, ...gax.CallOption)
*LicensedUserIterator
 GetOperation(context.Context, *longrunningpb.GetOperationRequest, ...gax.CallOption)
(*longrunningpb.Operation, error)
}

// LicenseManagementClient is a client for interacting with Cloud Commerce Consumer Procurement API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// Service for managing licenses.
type LicenseManagementClient struct {
 // The internal transport-dependent client.
 internalClient internalLicenseManagementClient

 // The call options for this service.
 CallOptions *LicenseManagementCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicenseManagementClient)
 Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *LicenseManagementClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
```

```
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicenseManagementClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// GetLicensePool gets the license pool.
func (c *LicenseManagementClient) GetLicensePool(ctx context.Context, req
*procurementpb.GetLicensePoolRequest, opts ...gax.CallOption) (*procurementpb.LicensePool, error) {
 return c.internalClient.GetLicensePool(ctx, req, opts...)
}

// UpdateLicensePool updates the license pool if one exists for this Order.
func (c *LicenseManagementClient)
 UpdateLicensePool(ctx context.Context, req *procurementpb.UpdateLicensePoolRequest, opts ...gax.CallOption)
(*procurementpb.LicensePool, error) {
 return c.internalClient.UpdateLicensePool(ctx, req, opts...)
}

// Assign assigns a license to a user.
func (c *LicenseManagementClient) Assign(ctx context.Context, req *procurementpb.AssignRequest, opts
...gax.CallOption) (*procurementpb.AssignResponse, error) {
 return c.internalClient.Assign(ctx, req, opts...)
}

// Unassign unassigns a license from a user.
func (c *LicenseManagementClient) Unassign(ctx context.Context, req *procurementpb.UnassignRequest, opts
...gax.CallOption) (*procurementpb.UnassignResponse, error) {
 return c.internalClient.Unassign(ctx, req, opts...)
}

// EnumerateLicensedUsers enumerates all users assigned a license.
func (c *LicenseManagementClient) EnumerateLicensedUsers(ctx context.Context, req
*procurementpb.EnumerateLicensedUsersRequest, opts ...gax.CallOption) *LicensedUserIterator {
 return c.internalClient.EnumerateLicensedUsers(ctx,
 req, opts...)
}

// GetOperation is a utility method from google.longrunning.Operations.
func (c *LicenseManagementClient) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest,
opts ...gax.CallOption) (*longrunningpb.Operation, error) {
 return c.internalClient.GetOperation(ctx, req, opts...)
}

// licenseManagementGRPCClient is a client for interacting with Cloud Commerce Consumer Procurement API
over gRPC transport.
//
```

```
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type licenseManagementGRPCClient struct {
 // Connection pool of gRPC connections to the service.
 connPool gtransport.ConnPool

 // Points back to the CallOptions field of the containing LicenseManagementClient
 CallOptions **LicenseManagementCallOptions

 // The gRPC API client.
 licenseManagementClient procurementpb.LicenseManagementServiceClient

 operationsClient longrunningpb.OperationsClient

 //
 The x-goog-* metadata to be sent with each request.
 xGoogHeaders []string

 logger *slog.Logger
}

// NewLicenseManagementClient creates a new license management service client based on gRPC.
// The returned client must be Closed when it is done being used to clean up its underlying connections.
//
// Service for managing licenses.
func NewLicenseManagementClient(ctx context.Context, opts ...option.ClientOption) (*LicenseManagementClient,
error) {
 clientOpts := defaultLicenseManagementGRPCClientOptions()
 if newLicenseManagementClientHook != nil {
  hookOpts, err := newLicenseManagementClientHook(ctx, clientHookParams{})
  if err != nil {
   return nil, err
  }
  clientOpts = append(clientOpts, hookOpts...)
 }

 connPool, err := gtransport.DialPool(ctx, append(clientOpts, opts...)...)
 if err != nil {
  return nil, err
 }
 client := LicenseManagementClient{CallOptions: defaultLicenseManagementCallOptions()}

 c := &licenseManagementGRPCClient{
  connPool:
     connPool,
  licenseManagementClient: procurementpb.NewLicenseManagementServiceClient(connPool),
  CallOptions:            &client.CallOptions,
  logger:                 internaloption.GetLogger(opts),
```

```
  operationsClient:       longrunningpb.NewOperationsClient(connPool),
 }
 c.setGoogleClientInfo()

 client.internalClient = c

 return &client, nil
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *licenseManagementGRPCClient) Connection() *grpc.ClientConn {
 return c.connPool.Conn()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licenseManagementGRPCClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "grpc",
 grpc.Version, "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licenseManagementGRPCClient) Close() error {
 return c.connPool.Close()
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type licenseManagementRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicenseManagementClient
```

```
 CallOptions **LicenseManagementCallOptions

 logger *slog.Logger
}

// NewLicenseManagementRESTClient creates a new license management service rest client.
//
// Service for managing licenses.
func NewLicenseManagementRESTClient(ctx context.Context,
 opts ...option.ClientOption) (*LicenseManagementClient, error) {
 clientOpts := append(defaultLicenseManagementRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicenseManagementRESTCallOptions()
 c := &licenseManagementRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 return &LicenseManagementClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicenseManagementRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://cloudcommerceconsumerprocurement.googleapis.com"),
internaloption.WithDefaultEndpointTemplate("https://cloudcommerceconsumerprocurement.UNIVERSE_DOMAI
N"),
  internaloption.WithDefaultMTLSEndpoint("https://cloudcommerceconsumerprocurement.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://cloudcommerceconsumerprocurement.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licenseManagementRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
```

```
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licenseManagementRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient
 = nil
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licenseManagementRESTClient) Connection() *grpc.ClientConn {
 return nil
}
func (c *licenseManagementGRPCClient) GetLicensePool(ctx context.Context, req
*procurementpb.GetLicensePoolRequest, opts ...gax.CallOption) (*procurementpb.LicensePool, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).GetLicensePool[0:len((*c.CallOptions).GetLicensePool):len((*c.CallOptions).GetLicenseP
ool)], opts...)
 var resp *procurementpb.LicensePool
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.licenseManagementClient.GetLicensePool, req, settings.GRPC, c.logger,
"GetLicensePool")
  return err
 },
 opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *licenseManagementGRPCClient) UpdateLicensePool(ctx context.Context, req
*procurementpb.UpdateLicensePoolRequest, opts ...gax.CallOption) (*procurementpb.LicensePool, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "license_pool.name",
url.QueryEscape(req.GetLicensePool().GetName()))}
```

```
 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).UpdateLicensePool[0:len((*c.CallOptions).UpdateLicensePool):len((*c.CallOptions).Upda
teLicensePool)], opts...)
 var resp *procurementpb.LicensePool
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.licenseManagementClient.UpdateLicensePool, req, settings.GRPC, c.logger,
"UpdateLicensePool")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *licenseManagementGRPCClient)
 Assign(ctx context.Context, req *procurementpb.AssignRequest, opts ...gax.CallOption)
(*procurementpb.AssignResponse, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts = append((*c.CallOptions).Assign[0:len((*c.CallOptions).Assign):len((*c.CallOptions).Assign)], opts...)
 var resp *procurementpb.AssignResponse
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.licenseManagementClient.Assign, req, settings.GRPC, c.logger, "Assign")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *licenseManagementGRPCClient) Unassign(ctx context.Context, req *procurementpb.UnassignRequest,
opts ...gax.CallOption) (*procurementpb.UnassignResponse, error) {
 hds := []string{"x-goog-request-params",
 fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts = append((*c.CallOptions).Unassign[0:len((*c.CallOptions).Unassign):len((*c.CallOptions).Unassign)], opts...)
 var resp *procurementpb.UnassignResponse
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
```

```
 var err error
 resp, err = executeRPC(ctx, c.licenseManagementClient.Unassign, req, settings.GRPC, c.logger, "Unassign")
 return err
}, opts...)
if err != nil {
 return nil, err
}
return resp, nil
}

func (c *licenseManagementGRPCClient) EnumerateLicensedUsers(ctx context.Context, req
*procurementpb.EnumerateLicensedUsersRequest, opts ...gax.CallOption) *LicensedUserIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts
 =
append((*c.CallOptions).EnumerateLicensedUsers[0:len((*c.CallOptions).EnumerateLicensedUsers):len((*c.CallOp
tions).EnumerateLicensedUsers)], opts...)
 it := &LicensedUserIterator{}
 req = proto.Clone(req).(*procurementpb.EnumerateLicensedUsersRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*procurementpb.LicensedUser, string, error) {
  resp := &procurementpb.EnumerateLicensedUsersResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx, c.licenseManagementClient.EnumerateLicensedUsers, req, settings.GRPC, c.logger,
"EnumerateLicensedUsers")
   return err
  }, opts...)
  if err != nil {
   return nil, "", err
  }

  it.Response = resp
  return resp.GetLicensedUsers(), resp.GetNextPageToken(),
 nil
 }
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
```

```
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

func (c *licenseManagementGRPCClient) GetOperation(ctx context.Context, req
*longrunningpb.GetOperationRequest, opts ...gax.CallOption) (*longrunningpb.Operation, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).GetOperation[0:len((*c.CallOptions).GetOperation):len((*c.CallOptions).GetOperation)],
opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx,
 func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.operationsClient.GetOperation, req, settings.GRPC, c.logger, "GetOperation")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

// GetLicensePool gets the license pool.
func (c *licenseManagementRESTClient) GetLicensePool(ctx context.Context, req
*procurementpb.GetLicensePoolRequest, opts ...gax.CallOption) (*procurementpb.LicensePool, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")
```

```
 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx,
 hds...)
 opts =
append((*c.CallOptions).GetLicensePool[0:len((*c.CallOptions).GetLicensePool):len((*c.CallOptions).GetLicenseP
ool)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &procurementpb.LicensePool{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetLicensePool")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// UpdateLicensePool updates the license pool if one exists for this Order.
func (c *licenseManagementRESTClient) UpdateLicensePool(ctx
 context.Context, req *procurementpb.UpdateLicensePoolRequest, opts ...gax.CallOption)
(*procurementpb.LicensePool, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 body := req.GetLicensePool()
```

```
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetLicensePool().GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")
 if req.GetUpdateMask() != nil {
  field, err := protojson.Marshal(req.GetUpdateMask())
  if err != nil {
   return nil, err
  }
  params.Add("updateMask", string(field[1:len(field)-1]))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "license_pool.name",
url.QueryEscape(req.GetLicensePool().GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds,
 "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).UpdateLicensePool[0:len((*c.CallOptions).UpdateLicensePool):len((*c.CallOptions).Upda
teLicensePool)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &procurementpb.LicensePool{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("PATCH", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "UpdateLicensePool")
```

```
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
}

// Assign assigns a license to a user.
func
 (c *licenseManagementRESTClient) Assign(ctx context.Context, req *procurementpb.AssignRequest, opts
...gax.CallOption) (*procurementpb.AssignResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 jsonReq, err := m.Marshal(req)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:assign", req.GetParent())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Assign[0:len((*c.CallOptions).Assign):len((*c.CallOptions).Assign)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial:
 true, DiscardUnknown: true}
 resp := &procurementpb.AssignResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
```

```
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Assign")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
}

// Unassign unassigns a license from a user.
func (c *licenseManagementRESTClient) Unassign(ctx context.Context, req *procurementpb.UnassignRequest,
opts ...gax.CallOption) (*procurementpb.UnassignResponse, error) {
m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
jsonReq, err :=
m.Marshal(req)
if err != nil {
 return nil, err
}

baseUrl, err := url.Parse(c.endpoint)
if err != nil {
 return nil, err
}
baseUrl.Path += fmt.Sprintf("/v1/%v:unassign", req.GetParent())

params := url.Values{}
params.Add("$alt", "json;enum-encoding=int")

baseUrl.RawQuery = params.Encode()
```

```
 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Unassign[0:len((*c.CallOptions).Unassign):len((*c.CallOptions).Unassign)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &procurementpb.UnassignResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq,
 err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Unassign")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// EnumerateLicensedUsers enumerates all users assigned a license.
func (c *licenseManagementRESTClient) EnumerateLicensedUsers(ctx context.Context, req
*procurementpb.EnumerateLicensedUsersRequest, opts ...gax.CallOption) *LicensedUserIterator {
 it := &LicensedUserIterator{}
 req = proto.Clone(req).(*procurementpb.EnumerateLicensedUsersRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*procurementpb.LicensedUser, string, error) {
  resp := &procurementpb.EnumerateLicensedUsersResponse{}
  if
```

```
pageToken != "" {
 req.PageToken = pageToken
 }
 if pageSize > math.MaxInt32 {
  req.PageSize = math.MaxInt32
 } else if pageSize != 0 {
  req.PageSize = int32(pageSize)
 }
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, "", err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:enumerateLicensedUsers", req.GetParent())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")
 if req.GetPageSize() != 0 {
  params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
 }
 if req.GetPageToken() != "" {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path
= settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "EnumerateLicensedUsers")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
```

```
  }, opts...)
  if e != nil {
   return nil, "", e
  }
  it.Response = resp
  return resp.GetLicensedUsers(), resp.GetNextPageToken(), nil
 }

 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

// GetOperation is a utility method from
 google.longrunning.Operations.
func (c *licenseManagementRESTClient) GetOperation(ctx context.Context, req
*longrunningpb.GetOperationRequest, opts ...gax.CallOption) (*longrunningpb.Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetOperation[0:len((*c.CallOptions).GetOperation):len((*c.CallOptions).GetOperation)],
opts...)
```

```
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &longrunningpb.Operation{}
 e := gax.Invoke(ctx,
 func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetOperation")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}
// Copyright 2025 Google LLC
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//     https://www.apache.org/licenses/LICENSE-2.0
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute
```

```
import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
 "math"
 "net/http"
 "net/url"
 "time"

 computepb "cloud.google.com/go/compute/apiv1/computepb"
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var
 newLicensesClientHook clientHook

// LicensesCallOptions contains the retry settings for each method of LicensesClient.
type LicensesCallOptions struct {
 Delete            []gax.CallOption
 Get               []gax.CallOption
 GetIamPolicy      []gax.CallOption
 Insert            []gax.CallOption
 List              []gax.CallOption
 SetIamPolicy      []gax.CallOption
 TestIamPermissions []gax.CallOption
 Update            []gax.CallOption
}

func defaultLicensesRESTCallOptions() *LicensesCallOptions {
 return &LicensesCallOptions{
  Delete: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  Get: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier:
```

```
 1.30,
   },
   http.StatusGatewayTimeout,
   http.StatusServiceUnavailable)
  }),
 },
 GetIamPolicy: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    100 * time.Millisecond,
    Max:        60000 * time.Millisecond,
    Multiplier: 1.30,
   },
   http.StatusGatewayTimeout,
   http.StatusServiceUnavailable)
  }),
 },
 Insert: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
 },
 List: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    100 * time.Millisecond,
    Max:        60000 * time.Millisecond,
    Multiplier: 1.30,
   },
   http.StatusGatewayTimeout,
   http.StatusServiceUnavailable)
  }),
 },
 SetIamPolicy: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
 },
 TestIamPermissions: []gax.CallOption{
  gax.WithTimeout(600000
* time.Millisecond),
 },
 Update: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
 },
}
}

// internalLicensesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicensesClient interface {
```

```
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Delete(context.Context, *computepb.DeleteLicenseRequest, ...gax.CallOption) (*Operation, error)
 Get(context.Context, *computepb.GetLicenseRequest, ...gax.CallOption) (*computepb.License, error)
 GetIamPolicy(context.Context, *computepb.GetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 Insert(context.Context, *computepb.InsertLicenseRequest, ...gax.CallOption) (*Operation, error)
 List(context.Context, *computepb.ListLicensesRequest, ...gax.CallOption) *LicenseIterator
 SetIamPolicy(context.Context, *computepb.SetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 TestIamPermissions(context.Context,
 *computepb.TestIamPermissionsLicenseRequest, ...gax.CallOption) (*computepb.TestPermissionsResponse, error)
 Update(context.Context, *computepb.UpdateLicenseRequest, ...gax.CallOption) (*Operation, error)
}

// LicensesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// The Licenses API.
type LicensesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicensesClient

 // The call options for this service.
 CallOptions *LicensesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicensesClient) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed
 on each request. Intended for
// use by Google-written clients.
func (c *LicensesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
```

```
// return the same resource.
func (c *LicensesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// Delete deletes the specified license. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 return c.internalClient.Delete(ctx, req, opts...)
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Get(ctx context.Context, req
 *computepb.GetLicenseRequest, opts ...gax.CallOption) (*computepb.License, error) {
 return c.internalClient.Get(ctx, req, opts...)
}

// GetIamPolicy gets the access control policy for a resource. May be empty if no such policy or resource exists. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest, opts ...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.GetIamPolicy(ctx, req, opts...)
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 return c.internalClient.Insert(ctx, req, opts...)
}

// List retrieves the list of licenses available in the
 specified project. This method does not get any licenses that belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-cloud or windows-cloud. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts ...gax.CallOption) *LicenseIterator {
 return c.internalClient.List(ctx, req, opts...)
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest, opts ...gax.CallOption) (*computepb.Policy, error) {
 return
```

```
 c.internalClient.SetIamPolicy(ctx, req, opts...)
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is
intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse,
error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}

// Update updates a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Update(ctx context.Context, req *computepb.UpdateLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 return c.internalClient.Update(ctx, req, opts...)
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type
 licensesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // operationClient is used to call the operation-specific management service.
 operationClient *GlobalOperationsClient

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicensesClient
 CallOptions **LicensesCallOptions

 logger *slog.Logger
}

// NewLicensesRESTClient creates a new licenses rest client.
//
// The Licenses API.
func NewLicensesRESTClient(ctx context.Context, opts ...option.ClientOption) (*LicensesClient, error) {
 clientOpts := append(defaultLicensesRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
```

```
 }

 callOpts := defaultLicensesRESTCallOptions()
 c := &licensesRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:
   internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 o := []option.ClientOption{
  option.WithHTTPClient(httpClient),
  option.WithEndpoint(endpoint),
 }
 opC, err := NewGlobalOperationsRESTClient(ctx, o...)
 if err != nil {
  return nil, err
 }
 c.operationClient = opC

 return &LicensesClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicensesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

// setGoogleClientInfo sets the name and version of the application in
//
 the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licensesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}
```

```
// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licensesRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 if err := c.operationClient.Close(); err != nil {
  return err
 }
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licensesRESTClient) Connection() *grpc.ClientConn {
 return nil
}

// Delete deletes the specified license. Caution This resource is intended for use
 only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Delete[0:len((*c.CallOptions).Delete):len((*c.CallOptions).Delete)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
```

```
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Delete")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
op := &Operation{
 &globalOperationsHandle{
  c:       c.operationClient,
  proto:   resp,
  project: req.GetProject(),
 },
}
return op, nil
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners
who are creating
 Cloud Marketplace images.
func (c *licensesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption)
(*computepb.License, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}
```

```
 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.License{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error
 {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Get")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// GetIamPolicy gets the access control policy for a resource. May be empty if no such policy or resource exists.
Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/getIamPolicy",
 req.GetProject(), req.GetResource())

 params := url.Values{}
```

```
 if req != nil && req.OptionsRequestedPolicyVersion != nil {
  params.Add("optionsRequestedPolicyVersion", fmt.Sprintf("%v", req.GetOptionsRequestedPolicyVersion()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetIamPolicy[0:len((*c.CallOptions).GetIamPolicy):len((*c.CallOptions).GetIamPolicy)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if
 settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetIamPolicy")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-
```

```
party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetLicenseResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if
 err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "project", url.QueryEscape(req.GetProject()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Insert[0:len((*c.CallOptions).Insert):len((*c.CallOptions).Insert)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err
 := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Insert")
  if err != nil {
   return err
```

```
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
op := &Operation{
 &globalOperationsHandle{
  c:       c.operationClient,
  proto:   resp,
  project: req.GetProject(),
 },
}
return op, nil
}

// List retrieves the list of licenses available in the specified project. This method does not get any licenses that
belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a
list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-
cloud or windows-cloud. Caution This resource is intended for
 use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts
...gax.CallOption) *LicenseIterator {
 it := &LicenseIterator{}
 req = proto.Clone(req).(*computepb.ListLicensesRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*computepb.License, string, error) {
  resp := &computepb.LicensesListResponse{}
  if pageToken != "" {
   req.PageToken = proto.String(pageToken)
  }
  if pageSize > math.MaxInt32 {
   req.MaxResults = proto.Uint32(uint32(math.MaxInt32))
  } else if pageSize != 0 {
   req.MaxResults = proto.Uint32(uint32(pageSize))
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
   return nil, "", err
  }
  baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

  params := url.Values{}
```

```
 if req != nil && req.Filter != nil {
  params.Add("filter",
fmt.Sprintf("%v", req.GetFilter()))
 }
 if req != nil && req.MaxResults != nil {
  params.Add("maxResults", fmt.Sprintf("%v", req.GetMaxResults()))
 }
 if req != nil && req.OrderBy != nil {
  params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
 }
 if req != nil && req.PageToken != nil {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }
 if req != nil && req.ReturnPartialSuccess != nil {
  params.Add("returnPartialSuccess", fmt.Sprintf("%v", req.GetReturnPartialSuccess()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header
= headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "List")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetItems(), resp.GetNextPageToken(), nil
```

```
 }

 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetMaxResults())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This
resource is intended for use only by third-party partners who are creating Cloud Marketplace
 images.
func (c *licensesRESTClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetGlobalSetPolicyRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/setIamPolicy", req.GetProject(),
req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).SetIamPolicy[0:len((*c.CallOptions).SetIamPolicy):len((*c.CallOptions).SetIamPolicy)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
```

```
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "SetIamPolicy")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is
intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) TestIamPermissions(ctx
 context.Context, req *computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption)
(*computepb.TestPermissionsResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetTestPermissionsRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/testIamPermissions", req.GetProject(),
req.GetResource())
```

```
 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "TestIamPermissions")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// Update updates a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Update(ctx context.Context,
 req *computepb.UpdateLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetLicenseResource()
 jsonReq, err := m.Marshal(body)
```

```
if err != nil {
 return nil, err
}

baseUrl, err := url.Parse(c.endpoint)
if err != nil {
 return nil, err
}
baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

params := url.Values{}
if req != nil && req.RequestId != nil {
 params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
}
if req != nil && req.UpdateMask != nil {
 params.Add("updateMask", fmt.Sprintf("%v", req.GetUpdateMask()))
}

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

hds = append(c.xGoogHeaders, hds...)
hds = append(hds,
"Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
opts = append((*c.CallOptions).Update[0:len((*c.CallOptions).Update):len((*c.CallOptions).Update)], opts...)
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
resp := &computepb.Operation{}
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("PATCH", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Update")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
```

```
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
op := &Operation{
 &globalOperationsHandle{
  c:       c.operationClient,
  proto:   resp,
  project: req.GetProject(),
 },
}
return
op, nil
}
```

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```

```
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package compute

import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
 "net/http"
 "net/url"
 "time"

 computepb "cloud.google.com/go/compute/apiv1beta/computepb"
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
)

var
 newLicenseCodesClientHook clientHook

// LicenseCodesCallOptions contains the retry settings for each method of LicenseCodesClient.
type LicenseCodesCallOptions struct {
 Get              []gax.CallOption
 TestIamPermissions []gax.CallOption
}

func defaultLicenseCodesRESTCallOptions() *LicenseCodesCallOptions {
 return &LicenseCodesCallOptions{
  Get: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  TestIamPermissions: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
```

```
  },
 }
}

// internalLicenseCodesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicenseCodesClient interface
 {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Get(context.Context, *computepb.GetLicenseCodeRequest, ...gax.CallOption) (*computepb.LicenseCode, error)
 TestIamPermissions(context.Context, *computepb.TestIamPermissionsLicenseCodeRequest, ...gax.CallOption)
(*computepb.TestPermissionsResponse, error)
}

// LicenseCodesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// The LicenseCodes API.
type LicenseCodesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicenseCodesClient

 // The call options for this service.
 CallOptions *LicenseCodesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicenseCodesClient) Close() error {
 return
 c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *LicenseCodesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
```

```
func (c *LicenseCodesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// Get return a specified license code. License codes are mirrored across all projects that have permissions to read the License Code. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicenseCodesClient) Get(ctx context.Context, req *computepb.GetLicenseCodeRequest, opts ...gax.CallOption) (*computepb.LicenseCode, error) {
 return c.internalClient.Get(ctx,
 req, opts...)
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicenseCodesClient) TestIamPermissions(ctx context.Context, req *computepb.TestIamPermissionsLicenseCodeRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse, error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with method calls.
type licenseCodesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicenseCodesClient
 CallOptions **LicenseCodesCallOptions

 logger *slog.Logger
}

// NewLicenseCodesRESTClient
 creates a new license codes rest client.
//
// The LicenseCodes API.
func NewLicenseCodesRESTClient(ctx context.Context, opts ...option.ClientOption) (*LicenseCodesClient, error) {
 clientOpts := append(defaultLicenseCodesRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
```

```
 }

 callOpts := defaultLicenseCodesRESTCallOptions()
 c := &licenseCodesRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 return &LicenseCodesClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicenseCodesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licenseCodesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licenseCodesRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 return
 nil
}

// Connection returns a connection to the API service.
```

```
//
// Deprecated: This method always returns nil.
func (c *licenseCodesRESTClient) Connection() *grpc.ClientConn {
 return nil
}

// Get return a specified license code. License codes are mirrored across all projects that have permissions to read the
License Code. Caution This resource is intended for use only by third-party partners who are creating Cloud
Marketplace images.
func (c *licenseCodesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseCodeRequest, opts
...gax.CallOption) (*computepb.LicenseCode, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenseCodes/%v", req.GetProject(),
req.GetLicenseCode())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license_code", url.QueryEscape(req.GetLicenseCode()))}

 hds
 = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.LicenseCode{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Get")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }
```

```
  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// TestIamPermissions returns permissions that
 a caller has on the specified resource. Caution This resource is intended for use only by third-party partners who are
creating Cloud Marketplace images.
func (c *licenseCodesRESTClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseCodeRequest, opts ...gax.CallOption)
(*computepb.TestPermissionsResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetTestPermissionsRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenseCodes/%v/testIamPermissions",
req.GetProject(), req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds
 = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
```

```
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "TestIamPermissions")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
}
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package compute

import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
 "net/http"
 "net/url"
 "time"
```

```
 computepb "cloud.google.com/go/compute/apiv1/computepb"
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
)

var
 newLicenseCodesClientHook clientHook

// LicenseCodesCallOptions contains the retry settings for each method of LicenseCodesClient.
type LicenseCodesCallOptions struct {
 Get               []gax.CallOption
 TestIamPermissions []gax.CallOption
}

func defaultLicenseCodesRESTCallOptions() *LicenseCodesCallOptions {
 return &LicenseCodesCallOptions{
  Get: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  TestIamPermissions: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
 }
}

// internalLicenseCodesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicenseCodesClient interface {
 Close()
 error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Get(context.Context, *computepb.GetLicenseCodeRequest, ...gax.CallOption) (*computepb.LicenseCode, error)
 TestIamPermissions(context.Context, *computepb.TestIamPermissionsLicenseCodeRequest, ...gax.CallOption)
(*computepb.TestPermissionsResponse, error)
}
```

```
// LicenseCodesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// The LicenseCodes API.
type LicenseCodesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicenseCodesClient

 // The call options for this service.
 CallOptions *LicenseCodesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicenseCodesClient) Close() error {
 return c.internalClient.Close()
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *LicenseCodesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicenseCodesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// Get return a specified license code. License codes are mirrored across all projects that have permissions to read the
License Code. Caution This resource is intended for use only by third-party partners who are creating Cloud
Marketplace images.
func (c *LicenseCodesClient) Get(ctx context.Context, req *computepb.GetLicenseCodeRequest, opts
...gax.CallOption) (*computepb.LicenseCode, error) {
 return c.internalClient.Get(ctx,
 req, opts...)
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is
```

```
intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicenseCodesClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseCodeRequest, opts ...gax.CallOption)
(*computepb.TestPermissionsResponse, error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type licenseCodesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicenseCodesClient
 CallOptions **LicenseCodesCallOptions

 logger *slog.Logger
}

// NewLicenseCodesRESTClient
 creates a new license codes rest client.
//
// The LicenseCodes API.
func NewLicenseCodesRESTClient(ctx context.Context, opts ...option.ClientOption) (*LicenseCodesClient, error) {
 clientOpts := append(defaultLicenseCodesRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicenseCodesRESTCallOptions()
 c := &licenseCodesRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 return &LicenseCodesClient{internalClient: c, CallOptions: callOpts}, nil
}
```

```
func defaultLicenseCodesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licenseCodesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licenseCodesRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 return
 nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licenseCodesRESTClient) Connection() *grpc.ClientConn {
 return nil
}

// Get return a specified license code. License codes are mirrored across all projects that have permissions to read the
License Code. Caution This resource is intended for use only by third-party partners who are creating Cloud
Marketplace images.
func (c *licenseCodesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseCodeRequest, opts
...gax.CallOption) (*computepb.LicenseCode, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
```

```
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenseCodes/%v", req.GetProject(),
req.GetLicenseCode())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license_code", url.QueryEscape(req.GetLicenseCode()))}

 hds
 = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.LicenseCode{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Get")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// TestIamPermissions returns permissions that a
 caller has on the specified resource. Caution This resource is intended for use only by third-party partners who are
creating Cloud Marketplace images.
func (c *licenseCodesRESTClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseCodeRequest, opts ...gax.CallOption)
```

```
(*computepb.TestPermissionsResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetTestPermissionsRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenseCodes/%v/testIamPermissions",
req.GetProject(), req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds =
 append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "TestIamPermissions")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }
```

```
 return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}
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//     http://www.apache.org/licenses/LICENSE-2.0
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// distributed under the License is distributed on an "AS IS" BASIS,
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// limitations under the License.

// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.35.2
//  protoc        v4.25.7
// source: google/ai/generativelanguage/v1alpha/permission.proto

package generativelanguagepb

import (
 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
 reflect "reflect"
 sync
 "sync"
)

const (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Defines types of the grantee of this permission.
type Permission_GranteeType int32
```

```
const (
 // The default value. This value is unused.
 Permission_GRANTEE_TYPE_UNSPECIFIED Permission_GranteeType = 0
 // Represents a user. When set, you must provide email_address for the user.
 Permission_USER Permission_GranteeType = 1
 // Represents a group. When set, you must provide email_address for the
 // group.
 Permission_GROUP Permission_GranteeType = 2
 // Represents access to everyone. No extra information is required.
 Permission_EVERYONE Permission_GranteeType = 3
)

// Enum value maps for Permission_GranteeType.
var (
 Permission_GranteeType_name = map[int32]string{
  0: "GRANTEE_TYPE_UNSPECIFIED",
  1: "USER",
  2:
 "GROUP",
  3: "EVERYONE",
 }
 Permission_GranteeType_value = map[string]int32{
  "GRANTEE_TYPE_UNSPECIFIED": 0,
  "USER":                     1,
  "GROUP":                    2,
  "EVERYONE":                 3,
 }
)

func (x Permission_GranteeType) Enum() *Permission_GranteeType {
 p := new(Permission_GranteeType)
 *p = x
 return p
}

func (x Permission_GranteeType) String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_GranteeType) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[0].Descriptor()
}

func (Permission_GranteeType) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[0]
}

func (x Permission_GranteeType) Number() protoreflect.EnumNumber {
```

```
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_GranteeType.Descriptor instead.
func (Permission_GranteeType) EnumDescriptor() ([]byte,
 []int) {
 return file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescGZIP(), []int{0, 0}
}

// Defines the role granted by this permission.
type Permission_Role int32

const (
 // The default value. This value is unused.
 Permission_ROLE_UNSPECIFIED Permission_Role = 0
 // Owner can use, update, share and delete the resource.
 Permission_OWNER Permission_Role = 1
 // Writer can use, update and share the resource.
 Permission_WRITER Permission_Role = 2
 // Reader can use the resource.
 Permission_READER Permission_Role = 3
)

// Enum value maps for Permission_Role.
var (
 Permission_Role_name = map[int32]string{
  0: "ROLE_UNSPECIFIED",
  1: "OWNER",
  2: "WRITER",
  3: "READER",
 }
 Permission_Role_value = map[string]int32{
  "ROLE_UNSPECIFIED": 0,
  "OWNER":            1,
  "WRITER":           2,
  "READER":           3,
 }
)

func (x Permission_Role) Enum() *Permission_Role {
 p := new(Permission_Role)
 *p = x
 return p
}

func (x Permission_Role) String() string {
 return
```

```
 protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_Role) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[1].Descriptor()
}

func (Permission_Role) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[1]
}

func (x Permission_Role) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_Role.Descriptor instead.
func (Permission_Role) EnumDescriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescGZIP(), []int{0, 1}
}

// Permission resource grants user, group or the rest of the world access to the
// PaLM API resource (e.g. a tuned model, corpus).
//
// A role is a collection of permitted operations that allows users to perform
// specific actions on PaLM API resources. To make them available to users,
// groups, or service
 accounts, you assign roles. When you assign a role, you
// grant permissions that the role contains.
//
// There are three concentric roles. Each role is a superset of the previous
// role's permitted operations:
//
// - reader can use the resource (e.g. tuned model, corpus) for inference
// - writer has reader's permissions and additionally can edit and share
// - owner has writer's permissions and additionally can delete
type Permission struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Output only. Identifier. The permission name. A unique name will be
 // generated on create. Examples:
 //
 // tunedModels/{tuned_model}/permissions/{permission}
 // corpora/{corpus}/permissions/{permission}
 //
 // Output only.
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
```

```
 // Optional. Immutable. The type of the grantee.
 GranteeType *Permission_GranteeType
`protobuf:"varint,2,opt,name=grantee_type,json=granteeType,proto3,enum=google.ai.generativelanguage.v1alpha.P
ermission_GranteeType,oneof"
 json:"grantee_type,omitempty"`
 // Optional. Immutable. The email address of the user of group which this
 // permission refers. Field is not set when permission's grantee type is
 // EVERYONE.
 EmailAddress *string `protobuf:"bytes,3,opt,name=email_address,json=emailAddress,proto3,oneof"
json:"email_address,omitempty"`
 // Required. The role granted by this permission.
 Role *Permission_Role
`protobuf:"varint,4,opt,name=role,proto3,enum=google.ai.generativelanguage.v1alpha.Permission_Role,oneof"
json:"role,omitempty"`
}

func (x *Permission) Reset() {
 *x = Permission{}
 mi := &file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes[0]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *Permission) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*Permission) ProtoMessage() {}

func (x *Permission) ProtoReflect() protoreflect.Message
 {
 mi := &file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use Permission.ProtoReflect.Descriptor instead.
func (*Permission) Descriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescGZIP(), []int{0}
}

func (x *Permission) GetName() string {
```

```
 if x != nil {
  return x.Name
 }
 return ""
}

func (x *Permission) GetGranteeType() Permission_GranteeType {
 if x != nil && x.GranteeType != nil {
  return *x.GranteeType
 }
 return Permission_GRANTEE_TYPE_UNSPECIFIED
}

func (x *Permission) GetEmailAddress() string {
 if x != nil && x.EmailAddress != nil {
  return *x.EmailAddress
 }
 return ""
}

func (x *Permission) GetRole() Permission_Role {
 if x != nil && x.Role != nil {
  return *x.Role
 }
 return Permission_ROLE_UNSPECIFIED
}

var
 File_google_ai_generativelanguage_v1alpha_permission_proto protoreflect.FileDescriptor

var file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc = []byte{
 0x0a, 0x35, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65,
 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x76,
 0x31, 0x61, 0x6c, 0x70, 0x68, 0x61, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f,
 0x6e, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x12, 0x24, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e,
 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e,
 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x61, 0x6c, 0x70, 0x68, 0x61, 0x1a, 0x1f, 0x67,
 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64, 0x5f,
 0x62, 0x65, 0x68, 0x61, 0x76, 0x69, 0x6f, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x19,
 0x67, 0x6f, 0x6f, 0x67, 0x6c,
 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x72, 0x65, 0x73, 0x6f, 0x75,
 0x72, 0x63, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x22, 0x87, 0x05, 0x0a, 0x0a, 0x50, 0x65,
 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x1a, 0x0a, 0x04, 0x6e, 0x61, 0x6d, 0x65,
 0x18, 0x01, 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x03, 0xe0, 0x41, 0x08, 0x52, 0x04,
 0x6e, 0x61, 0x6d, 0x65, 0x12, 0x6c, 0x0a, 0x0c, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f,
 0x74, 0x79, 0x70, 0x65, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0e, 0x32, 0x3c, 0x2e, 0x67, 0x6f, 0x6f,
 0x67, 0x6c, 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76,
 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x61, 0x6c, 0x70, 0x68,
```

0x61, 0x2e, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x2e, 0x47, 0x72, 0x61,
0x6e, 0x74, 0x65, 0x65, 0x54, 0x79, 0x70, 0x65, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05,
0x48, 0x00, 0x52, 0x0b, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65,
0x65, 0x54, 0x79, 0x70, 0x65, 0x88,
0x01, 0x01, 0x12, 0x30, 0x0a, 0x0d, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x5f, 0x61, 0x64, 0x64, 0x72,
0x65, 0x73, 0x73, 0x18, 0x03, 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41,
0x05, 0x48, 0x01, 0x52, 0x0c, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x41, 0x64, 0x64, 0x72, 0x65, 0x73,
0x73, 0x88, 0x01, 0x01, 0x12, 0x53, 0x0a, 0x04, 0x72, 0x6f, 0x6c, 0x65, 0x18, 0x04, 0x20, 0x01,
0x28, 0x0e, 0x32, 0x35, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67,
0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67,
0x65, 0x2e, 0x76, 0x31, 0x61, 0x6c, 0x70, 0x68, 0x61, 0x2e, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73,
0x73, 0x69, 0x6f, 0x6e, 0x2e, 0x52, 0x6f, 0x6c, 0x65, 0x42, 0x03, 0xe0, 0x41, 0x02, 0x48, 0x02,
0x52, 0x04, 0x72, 0x6f, 0x6c, 0x65, 0x88, 0x01, 0x01, 0x22, 0x4e, 0x0a, 0x0b, 0x47, 0x72, 0x61,
0x6e, 0x74, 0x65, 0x65, 0x54, 0x79, 0x70, 0x65, 0x12, 0x1c, 0x0a, 0x18, 0x47, 0x52, 0x41,
0x4e,
0x54, 0x45, 0x45, 0x5f, 0x54, 0x59, 0x50, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49,
0x46, 0x49, 0x45, 0x44, 0x10, 0x00, 0x12, 0x08, 0x0a, 0x04, 0x55, 0x53, 0x45, 0x52, 0x10, 0x01,
0x12, 0x09, 0x0a, 0x05, 0x47, 0x52, 0x4f, 0x55, 0x50, 0x10, 0x02, 0x12, 0x0c, 0x0a, 0x08, 0x45,
0x56, 0x45, 0x52, 0x59, 0x4f, 0x4e, 0x45, 0x10, 0x03, 0x22, 0x3f, 0x0a, 0x04, 0x52, 0x6f, 0x6c,
0x65, 0x12, 0x14, 0x0a, 0x10, 0x52, 0x4f, 0x4c, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43,
0x49, 0x46, 0x49, 0x45, 0x44, 0x10, 0x00, 0x12, 0x09, 0x0a, 0x05, 0x4f, 0x57, 0x4e, 0x45, 0x52,
0x10, 0x01, 0x12, 0x0a, 0x0a, 0x06, 0x57, 0x52, 0x49, 0x54, 0x45, 0x52, 0x10, 0x02, 0x12, 0x0a,
0x0a, 0x06, 0x52, 0x45, 0x41, 0x44, 0x45, 0x52, 0x10, 0x03, 0x3a, 0xaa, 0x01, 0xea, 0x41, 0xa6,
0x01, 0x0a, 0x2c, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e,
0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73,
0x2e, 0x63, 0x6f, 0x6d,
0x2f, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12,
0x32, 0x74, 0x75, 0x6e, 0x65, 0x64, 0x4d, 0x6f, 0x64, 0x65, 0x6c, 0x73, 0x2f, 0x7b, 0x74, 0x75,
0x6e, 0x65, 0x64, 0x5f, 0x6d, 0x6f, 0x64, 0x65, 0x6c, 0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69,
0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x2f, 0x7b, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69,
0x6f, 0x6e, 0x7d, 0x12, 0x29, 0x63, 0x6f, 0x72, 0x70, 0x6f, 0x72, 0x61, 0x2f, 0x7b, 0x63, 0x6f,
0x72, 0x70, 0x75, 0x73, 0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
0x73, 0x2f, 0x7b, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x7d, 0x2a, 0x0b,
0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x32, 0x0a, 0x70, 0x65, 0x72,
0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x42, 0x0f, 0x0a, 0x0d, 0x5f, 0x67, 0x72, 0x61, 0x6e,
0x74, 0x65, 0x65, 0x5f, 0x74, 0x79, 0x70, 0x65, 0x42, 0x10, 0x0a, 0x0e, 0x5f, 0x65, 0x6d, 0x61,
0x69, 0x6c, 0x5f, 0x61, 0x64, 0x64, 0x72, 0x65, 0x73,
0x73, 0x42, 0x07, 0x0a, 0x05, 0x5f, 0x72,
0x6f, 0x6c, 0x65, 0x42, 0x9d, 0x01, 0x0a, 0x28, 0x63, 0x6f, 0x6d, 0x2e, 0x67, 0x6f, 0x6f, 0x67,
0x6c, 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65,
0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x61, 0x6c, 0x70, 0x68, 0x61,
0x42, 0x0f, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x50, 0x72, 0x6f, 0x74,
0x6f, 0x50, 0x01, 0x5a, 0x5e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c,
0x65, 0x2e, 0x63, 0x6f, 0x6d, 0x2f, 0x67, 0x6f, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65,
0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x61,
0x70, 0x69, 0x76, 0x31, 0x61, 0x6c, 0x70, 0x68, 0x61, 0x2f, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61,
0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x3b, 0x67,
0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75,

```
 0x61, 0x67,
 0x65, 0x70, 0x62, 0x62, 0x06, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x33,
}

var (
 file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescOnce sync.Once
 file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData =
file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc
)

func file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescGZIP() []byte {
 file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescOnce.Do(func() {
  file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData)
 })
 return file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData
}

var file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes = make([]protoimpl.EnumInfo, 2)
var file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes = make([]protoimpl.MessageInfo, 1)
var file_google_ai_generativelanguage_v1alpha_permission_proto_goTypes
 = []any{
 (Permission_GranteeType)(0), // 0: google.ai.generativelanguage.v1alpha.Permission.GranteeType
 (Permission_Role)(0),        // 1: google.ai.generativelanguage.v1alpha.Permission.Role
 (*Permission)(nil),          // 2: google.ai.generativelanguage.v1alpha.Permission
}
var file_google_ai_generativelanguage_v1alpha_permission_proto_depIdxs = []int32{
 0, // 0: google.ai.generativelanguage.v1alpha.Permission.grantee_type:type_name ->
google.ai.generativelanguage.v1alpha.Permission.GranteeType
 1, // 1: google.ai.generativelanguage.v1alpha.Permission.role:type_name ->
google.ai.generativelanguage.v1alpha.Permission.Role
 2, // [2:2] is the sub-list for method output_type
 2, // [2:2] is the sub-list for method input_type
 2, // [2:2] is the sub-list for extension type_name
 2, // [2:2] is the sub-list for extension extendee
 0, // [0:2] is the sub-list for field type_name
}

func init() { file_google_ai_generativelanguage_v1alpha_permission_proto_init()
 }
func file_google_ai_generativelanguage_v1alpha_permission_proto_init() {
 if File_google_ai_generativelanguage_v1alpha_permission_proto != nil {
  return
 }
 file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes[0].OneofWrappers = []any{}
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
```

```
  GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
  RawDescriptor: file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc,
  NumEnums:      2,
  NumMessages:   1,
  NumExtensions: 0,
  NumServices:   0,
 },
 GoTypes:          file_google_ai_generativelanguage_v1alpha_permission_proto_goTypes,
 DependencyIndexes: file_google_ai_generativelanguage_v1alpha_permission_proto_depIdxs,
 EnumInfos:         file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes,
 MessageInfos:      file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes,
}.Build()
File_google_ai_generativelanguage_v1alpha_permission_proto = out.File
file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc
= nil
file_google_ai_generativelanguage_v1alpha_permission_proto_goTypes = nil
file_google_ai_generativelanguage_v1alpha_permission_proto_depIdxs = nil
}
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// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1beta"
 computepb "cloud.google.com/go/compute/apiv1beta/computepb"
)

func ExampleLicensesClient_List_all() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
```

```
 // It will require
 modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.ListLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#ListLicensesRequest.
 }
 for resp, err := range c.List(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}
// Copyright 2025 Google LLC
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// You may obtain a copy of the License at
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// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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// limitations under the License.

// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.35.2
//  protoc        v4.25.7
// source: google/cloud/discoveryengine/v1/user_license_service.proto

package discoveryenginepb

import (
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 context "context"
```

```
 _ "google.golang.org/genproto/googleapis/api/annotations"
 status "google.golang.org/genproto/googleapis/rpc/status"
 grpc
 "google.golang.org/grpc"
 codes "google.golang.org/grpc/codes"
 status1 "google.golang.org/grpc/status"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
 fieldmaskpb "google.golang.org/protobuf/types/known/fieldmaskpb"
 timestamppb "google.golang.org/protobuf/types/known/timestamppb"
 reflect "reflect"
 sync "sync"
)

const (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Request message for
// [UserLicenseService.ListUserLicenses][google.cloud.discoveryengine.v1.UserLicenseService.ListUserLicenses].
type ListUserLicensesRequest struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. The parent [UserStore][] resource name,
 format:
 // `projects/{project}/locations/{location}/userStores/{user_store_id}`.
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Optional. Requested page size. Server may return fewer items than
 // requested. If unspecified, defaults to 10. The maximum value is 50; values
 // above 50 will be coerced to 50.
 //
 // If this field is negative, an INVALID_ARGUMENT error is returned.
 PageSize int32 `protobuf:"varint,2,opt,name=page_size,json=pageSize,proto3" json:"page_size,omitempty"`
 // Optional. A page token, received from a previous `ListUserLicenses` call.
 // Provide this to retrieve the subsequent page.
 //
 // When paginating, all other parameters provided to `ListUserLicenses`
 // must match the call that provided the page token.
 PageToken string `protobuf:"bytes,3,opt,name=page_token,json=pageToken,proto3" json:"page_token,omitempty"`
 // Optional. Filter for the list request.
 //
 // Supported fields:
 //
```

```
 // * `license_assignment_state`
 //
 //
 Examples:
 //
 // * `license_assignment_state = ASSIGNED` to list assigned user licenses.
 // * `license_assignment_state = NO_LICENSE` to list not licensed users.
 // * `license_assignment_state = NO_LICENSE_ATTEMPTED_LOGIN` to list users
 // who attempted login but no license assigned.
 // * `license_assignment_state != NO_LICENSE_ATTEMPTED_LOGIN` to filter
 // out users who attempted login but no license assigned.
 Filter string `protobuf:"bytes,4,opt,name=filter,proto3" json:"filter,omitempty"`
}

func (x *ListUserLicensesRequest) Reset() {
 *x = ListUserLicensesRequest{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[0]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *ListUserLicensesRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*ListUserLicensesRequest) ProtoMessage() {}

func (x *ListUserLicensesRequest) ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[0]
 if
 x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use ListUserLicensesRequest.ProtoReflect.Descriptor instead.
func (*ListUserLicensesRequest) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP(), []int{0}
}

func (x *ListUserLicensesRequest) GetParent() string {
 if x != nil {
  return x.Parent
```

```
 }
 return ""
}

func (x *ListUserLicensesRequest) GetPageSize() int32 {
 if x != nil {
  return x.PageSize
 }
 return 0
}

func (x *ListUserLicensesRequest) GetPageToken() string {
 if x != nil {
  return x.PageToken
 }
 return ""
}

func (x *ListUserLicensesRequest) GetFilter() string {
 if x != nil {
  return x.Filter
 }
 return ""
}

// Response message for
// [UserLicenseService.ListUserLicenses][google.cloud.discoveryengine.v1.UserLicenseService.ListUserLicenses].
type
 ListUserLicensesResponse struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // All the customer's
 // [UserLicense][google.cloud.discoveryengine.v1.UserLicense]s.
 UserLicenses []*UserLicense `protobuf:"bytes,1,rep,name=user_licenses,json=userLicenses,proto3"
json:"user_licenses,omitempty"`
 // A token, which can be sent as `page_token` to retrieve the next page. If
 // this field is omitted, there are no subsequent pages.
 NextPageToken string `protobuf:"bytes,2,opt,name=next_page_token,json=nextPageToken,proto3"
json:"next_page_token,omitempty"`
}

func (x *ListUserLicensesResponse) Reset() {
 *x = ListUserLicensesResponse{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[1]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
```

```
}

func (x *ListUserLicensesResponse) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func
 (*ListUserLicensesResponse) ProtoMessage() {}

func (x *ListUserLicensesResponse) ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[1]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use ListUserLicensesResponse.ProtoReflect.Descriptor instead.
func (*ListUserLicensesResponse) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP(), []int{1}
}

func (x *ListUserLicensesResponse) GetUserLicenses() []*UserLicense {
 if x != nil {
  return x.UserLicenses
 }
 return nil
}

func (x *ListUserLicensesResponse) GetNextPageToken() string {
 if x != nil {
  return x.NextPageToken
 }
 return ""
}

// Request message for
//
[UserLicenseService.BatchUpdateUserLicenses][google.cloud.discoveryengine.v1.UserLicenseService.BatchUpdat
eUserLicenses]
//
 method.
type BatchUpdateUserLicensesRequest struct {
 state         protoimpl.MessageState
```

```
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. The source of the input.
 //
 // Types that are assignable to Source:
 //
 // *BatchUpdateUserLicensesRequest_InlineSource_
 Source isBatchUpdateUserLicensesRequest_Source `protobuf_oneof:"source"`
 // Required. The parent [UserStore][] resource name, format:
 // `projects/{project}/locations/{location}/userStores/{user_store_id}`.
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Optional. If true, if user licenses removed associated license config, the
 // user license will be deleted. By default which is false, the user license
 // will be updated to unassigned state.
 DeleteUnassignedUserLicenses bool
`protobuf:"varint,4,opt,name=delete_unassigned_user_licenses,json=deleteUnassignedUserLicenses,proto3"
json:"delete_unassigned_user_licenses,omitempty"`
}

func
 (x *BatchUpdateUserLicensesRequest) Reset() {
 *x = BatchUpdateUserLicensesRequest{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[2]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *BatchUpdateUserLicensesRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*BatchUpdateUserLicensesRequest) ProtoMessage() {}

func (x *BatchUpdateUserLicensesRequest) ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[2]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use BatchUpdateUserLicensesRequest.ProtoReflect.Descriptor instead.
func (*BatchUpdateUserLicensesRequest) Descriptor() ([]byte, []int) {
```

```
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP(),
 []int{2}
}

func (m *BatchUpdateUserLicensesRequest) GetSource() isBatchUpdateUserLicensesRequest_Source {
 if m != nil {
  return m.Source
 }
 return nil
}

func (x *BatchUpdateUserLicensesRequest) GetInlineSource() *BatchUpdateUserLicensesRequest_InlineSource {
 if x, ok := x.GetSource().(*BatchUpdateUserLicensesRequest_InlineSource_); ok {
  return x.InlineSource
 }
 return nil
}

func (x *BatchUpdateUserLicensesRequest) GetParent() string {
 if x != nil {
  return x.Parent
 }
 return ""
}

func (x *BatchUpdateUserLicensesRequest) GetDeleteUnassignedUserLicenses() bool {
 if x != nil {
  return x.DeleteUnassignedUserLicenses
 }
 return false
}

type isBatchUpdateUserLicensesRequest_Source interface {
 isBatchUpdateUserLicensesRequest_Source()
}

type BatchUpdateUserLicensesRequest_InlineSource_ struct {
 // The inline source for the input content for document embeddings.
 InlineSource *BatchUpdateUserLicensesRequest_InlineSource
`protobuf:"bytes,2,opt,name=inline_source,json=inlineSource,proto3,oneof"`
}

func
 (*BatchUpdateUserLicensesRequest_InlineSource_) isBatchUpdateUserLicensesRequest_Source() {}

// Metadata related to the progress of the
//
[UserLicenseService.BatchUpdateUserLicenses][google.cloud.discoveryengine.v1.UserLicenseService.BatchUpdat
```

```
eUserLicenses]
// operation. This will be returned by the google.longrunning.Operation.metadata
// field.
type BatchUpdateUserLicensesMetadata struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Operation create time.
 CreateTime *timestamppb.Timestamp `protobuf:"bytes,1,opt,name=create_time,json=createTime,proto3"
json:"create_time,omitempty"`
 // Operation last update time. If the operation is done, this is also the
 // finish time.
 UpdateTime *timestamppb.Timestamp `protobuf:"bytes,2,opt,name=update_time,json=updateTime,proto3"
json:"update_time,omitempty"`
 // Count of user licenses successfully updated.
 SuccessCount
 int64 `protobuf:"varint,3,opt,name=success_count,json=successCount,proto3" json:"success_count,omitempty"`
 // Count of user licenses that failed to be updated.
 FailureCount int64 `protobuf:"varint,4,opt,name=failure_count,json=failureCount,proto3"
json:"failure_count,omitempty"`
}

func (x *BatchUpdateUserLicensesMetadata) Reset() {
 *x = BatchUpdateUserLicensesMetadata{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[3]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *BatchUpdateUserLicensesMetadata) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*BatchUpdateUserLicensesMetadata) ProtoMessage() {}

func (x *BatchUpdateUserLicensesMetadata) ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[3]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return
 ms
 }
 return mi.MessageOf(x)
}
```

```
// Deprecated: Use BatchUpdateUserLicensesMetadata.ProtoReflect.Descriptor instead.
func (*BatchUpdateUserLicensesMetadata) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP(), []int{3}
}

func (x *BatchUpdateUserLicensesMetadata) GetCreateTime() *timestamppb.Timestamp {
 if x != nil {
  return x.CreateTime
 }
 return nil
}

func (x *BatchUpdateUserLicensesMetadata) GetUpdateTime() *timestamppb.Timestamp {
 if x != nil {
  return x.UpdateTime
 }
 return nil
}

func (x *BatchUpdateUserLicensesMetadata) GetSuccessCount() int64 {
 if x != nil {
  return x.SuccessCount
 }
 return 0
}

func (x *BatchUpdateUserLicensesMetadata) GetFailureCount() int64 {
 if x != nil {
  return x.FailureCount
 }
 return 0
}

// Response message for
//
[UserLicenseService.BatchUpdateUserLicenses][google.cloud.discoveryengine.v1.UserLicenseService.BatchUpdat
eUserLicenses]
// method.
type
 BatchUpdateUserLicensesResponse struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // UserLicenses successfully updated.
 UserLicenses []*UserLicense `protobuf:"bytes,1,rep,name=user_licenses,json=userLicenses,proto3"
json:"user_licenses,omitempty"`
```

```
 // A sample of errors encountered while processing the request.
 ErrorSamples []*status.Status `protobuf:"bytes,2,rep,name=error_samples,json=errorSamples,proto3"
json:"error_samples,omitempty"`
}

func (x *BatchUpdateUserLicensesResponse) Reset() {
 *x = BatchUpdateUserLicensesResponse{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[4]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *BatchUpdateUserLicensesResponse) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*BatchUpdateUserLicensesResponse) ProtoMessage() {}

func (x *BatchUpdateUserLicensesResponse) ProtoReflect()
 protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[4]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use BatchUpdateUserLicensesResponse.ProtoReflect.Descriptor instead.
func (*BatchUpdateUserLicensesResponse) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP(), []int{4}
}

func (x *BatchUpdateUserLicensesResponse) GetUserLicenses() []*UserLicense {
 if x != nil {
  return x.UserLicenses
 }
 return nil
}

func (x *BatchUpdateUserLicensesResponse) GetErrorSamples() []*status.Status {
 if x != nil {
  return x.ErrorSamples
 }
 return nil
```

```
}

// The inline source for the input config for BatchUpdateUserLicenses
// method.
type BatchUpdateUserLicensesRequest_InlineSource struct {
 state         protoimpl.MessageState
 sizeCache
     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. A list of user licenses to update. Each user license
 // must have a valid
 // [UserLicense.user_principal][google.cloud.discoveryengine.v1.UserLicense.user_principal].
 UserLicenses []*UserLicense `protobuf:"bytes,1,rep,name=user_licenses,json=userLicenses,proto3"
json:"user_licenses,omitempty"`
 // Optional. The list of fields to update.
 UpdateMask *fieldmaskpb.FieldMask `protobuf:"bytes,2,opt,name=update_mask,json=updateMask,proto3"
json:"update_mask,omitempty"`
}

func (x *BatchUpdateUserLicensesRequest_InlineSource) Reset() {
 *x = BatchUpdateUserLicensesRequest_InlineSource{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[5]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *BatchUpdateUserLicensesRequest_InlineSource) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*BatchUpdateUserLicensesRequest_InlineSource)
 ProtoMessage() {}

func (x *BatchUpdateUserLicensesRequest_InlineSource) ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[5]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use BatchUpdateUserLicensesRequest_InlineSource.ProtoReflect.Descriptor instead.
func (*BatchUpdateUserLicensesRequest_InlineSource) Descriptor() ([]byte, []int) {
```

```
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP(), []int{2, 0}
}

func (x *BatchUpdateUserLicensesRequest_InlineSource) GetUserLicenses() []*UserLicense {
 if x != nil {
  return x.UserLicenses
 }
 return nil
}

func (x *BatchUpdateUserLicensesRequest_InlineSource) GetUpdateMask() *fieldmaskpb.FieldMask {
 if x != nil {
  return x.UpdateMask
 }
 return nil
}

var File_google_cloud_discoveryengine_v1_user_license_service_proto
 protoreflect.FileDescriptor

var file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDesc = []byte{
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0x74, 0x69, 0x6f, 0x6e, 0x73, 0x2f, 0x2a, 0x2f, 0x75, 0x73, 0x65, 0x72, 0x53, 0x74, 0x6f, 0x72,
0x65, 0x73, 0x2f, 0x2a, 0x7d, 0x2f, 0x75, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73,
0x65, 0x73, 0x12, 0xd5, 0x02, 0x0a, 0x17, 0x42, 0x61, 0x74, 0x63, 0x68, 0x55, 0x70, 0x64, 0x61,
0x74, 0x65, 0x55, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x73, 0x12, 0x3f,
0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x64, 0x69,
0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2e, 0x76, 0x31,
0x2e, 0x42, 0x61, 0x74, 0x63, 0x68, 0x55, 0x70, 0x64, 0x61, 0x74, 0x65, 0x55, 0x73, 0x65, 0x72,
0x4c, 0x69, 0x63, 0x65,
0x6e, 0x73, 0x65, 0x73, 0x52, 0x65, 0x71, 0x75, 0x65, 0x73, 0x74, 0x1a,
0x1d, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x6c, 0x6f, 0x6e, 0x67, 0x72, 0x75, 0x6e,
0x6e, 0x69, 0x6e, 0x67, 0x2e, 0x4f, 0x70, 0x65, 0x72, 0x61, 0x74, 0x69, 0x6f, 0x6e, 0x22, 0xd9,
0x01, 0xca, 0x41, 0x82, 0x01, 0x0a, 0x3f, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c,
0x6f, 0x75, 0x64, 0x2e, 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67,
0x69, 0x6e, 0x65, 0x2e, 0x76, 0x31, 0x2e, 0x42, 0x61, 0x74, 0x63, 0x68, 0x55, 0x70, 0x64, 0x61,
0x74, 0x65, 0x55, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x73, 0x52, 0x65,
0x73, 0x70, 0x6f, 0x6e, 0x73, 0x65, 0x12, 0x3f, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63,
0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e,
0x67, 0x69, 0x6e, 0x65, 0x2e, 0x76, 0x31, 0x2e, 0x42, 0x61, 0x74, 0x63, 0x68, 0x55, 0x70, 0x64,
0x61, 0x74, 0x65, 0x55, 0x73, 0x65, 0x72, 0x4c, 0x69,
0x63, 0x65, 0x6e, 0x73, 0x65, 0x73, 0x4d,
0x65, 0x74, 0x61, 0x64, 0x61, 0x74, 0x61, 0x82, 0xd3, 0xe4, 0x93, 0x02, 0x4d, 0x3a, 0x01, 0x2a,
0x22, 0x48, 0x2f, 0x76, 0x31, 0x2f, 0x7b, 0x70, 0x61, 0x72, 0x65, 0x6e, 0x74, 0x3d, 0x70, 0x72,
0x6f, 0x6a, 0x65, 0x63, 0x74, 0x73, 0x2f, 0x2a, 0x2f, 0x6c, 0x6f, 0x63, 0x61, 0x74, 0x69, 0x6f,
0x6e, 0x73, 0x2f, 0x2a, 0x2f, 0x75, 0x73, 0x65, 0x72, 0x53, 0x74, 0x6f, 0x72, 0x65, 0x73, 0x2f,
0x2a, 0x7d, 0x3a, 0x62, 0x61, 0x74, 0x63, 0x68, 0x55, 0x70, 0x64, 0x61, 0x74, 0x65, 0x55, 0x73,
0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x73, 0x1a, 0x52, 0xca, 0x41, 0x1e, 0x64,
0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2e, 0x67,
0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73, 0x2e, 0x63, 0x6f, 0x6d, 0xd2, 0x41, 0x2e,
0x68, 0x74, 0x74, 0x70, 0x73, 0x3a, 0x2f, 0x2f, 0x77, 0x77, 0x77, 0x2e, 0x67, 0x6f, 0x6f, 0x67,
0x6c, 0x65, 0x61, 0x70, 0x69, 0x73, 0x2e, 0x63, 0x6f, 0x6d, 0x2f, 0x61, 0x75, 0x74,
0x68, 0x2f,
0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2d, 0x70, 0x6c, 0x61, 0x74, 0x66, 0x6f, 0x72, 0x6d, 0x42, 0x8a,
0x02, 0x0a, 0x23, 0x63, 0x6f, 0x6d, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c,
0x6f, 0x75, 0x64, 0x2e, 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67,
0x69, 0x6e, 0x65, 0x2e, 0x76, 0x31, 0x42, 0x17, 0x55, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65,
0x6e, 0x73, 0x65, 0x53, 0x65, 0x72, 0x76, 0x69, 0x63, 0x65, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x50,
0x01, 0x5a, 0x4d, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e,
0x63, 0x6f, 0x6d, 0x2f, 0x67, 0x6f, 0x2f, 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79,
0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x76, 0x31, 0x2f, 0x64, 0x69, 0x73,
0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x70, 0x62, 0x3b, 0x64,
0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x70, 0x62,
0xa2, 0x02, 0x0f,
0x44, 0x49, 0x53, 0x43, 0x4f, 0x56, 0x45, 0x52, 0x59, 0x45, 0x4e, 0x47, 0x49,
0x4e, 0x45, 0xaa, 0x02, 0x1f, 0x47, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x43, 0x6c, 0x6f, 0x75,
0x64, 0x2e, 0x44, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x45, 0x6e, 0x67, 0x69, 0x6e,

```
 0x65, 0x2e, 0x56, 0x31, 0xca, 0x02, 0x1f, 0x47, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x5c, 0x43, 0x6c,
 0x6f, 0x75, 0x64, 0x5c, 0x44, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x45, 0x6e, 0x67,
 0x69, 0x6e, 0x65, 0x5c, 0x56, 0x31, 0xea, 0x02, 0x22, 0x47, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x3a,
 0x3a, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x3a, 0x3a, 0x44, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72,
 0x79, 0x45, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x3a, 0x3a, 0x56, 0x31, 0x62, 0x06, 0x70, 0x72, 0x6f,
 0x74, 0x6f, 0x33,
}

var (
 file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescOnce sync.Once
 file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescData =
file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDesc
)

func
 file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP() []byte {
 file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescOnce.Do(func() {
  file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescData)
 })
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescData
}

var file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes =
make([]protoimpl.MessageInfo, 6)
var file_google_cloud_discoveryengine_v1_user_license_service_proto_goTypes = []any{
 (*ListUserLicensesRequest)(nil),                    // 0: google.cloud.discoveryengine.v1.ListUserLicensesRequest
 (*ListUserLicensesResponse)(nil),                    // 1: google.cloud.discoveryengine.v1.ListUserLicensesResponse
 (*BatchUpdateUserLicensesRequest)(nil),              // 2:
google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest
 (*BatchUpdateUserLicensesMetadata)(nil),
            // 3: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesMetadata
 (*BatchUpdateUserLicensesResponse)(nil),             // 4:
google.cloud.discoveryengine.v1.BatchUpdateUserLicensesResponse
 (*BatchUpdateUserLicensesRequest_InlineSource)(nil), // 5:
google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest.InlineSource
 (*UserLicense)(nil),                                 // 6: google.cloud.discoveryengine.v1.UserLicense
 (*timestamppb.Timestamp)(nil),                       // 7: google.protobuf.Timestamp
 (*status.Status)(nil),                               // 8: google.rpc.Status
 (*fieldmaskpb.FieldMask)(nil),                       // 9: google.protobuf.FieldMask
 (*longrunningpb.Operation)(nil),                     // 10: google.longrunning.Operation
}
var file_google_cloud_discoveryengine_v1_user_license_service_proto_depIdxs = []int32{
 6,  // 0: google.cloud.discoveryengine.v1.ListUserLicensesResponse.user_licenses:type_name
 -> google.cloud.discoveryengine.v1.UserLicense
 5,  // 1: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest.inline_source:type_name ->
google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest.InlineSource
 7,  // 2: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesMetadata.create_time:type_name ->
```

```
google.protobuf.Timestamp
 7,  // 3: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesMetadata.update_time:type_name ->
google.protobuf.Timestamp
 6,  // 4: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesResponse.user_licenses:type_name ->
google.cloud.discoveryengine.v1.UserLicense
 8,  // 5: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesResponse.error_samples:type_name ->
google.rpc.Status
 6,  // 6: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest.InlineSource.user_licenses:type_name -
> google.cloud.discoveryengine.v1.UserLicense
 9,  // 7: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest.InlineSource.update_mask:type_name
 -> google.protobuf.FieldMask
 0,  // 8: google.cloud.discoveryengine.v1.UserLicenseService.ListUserLicenses:input_type ->
google.cloud.discoveryengine.v1.ListUserLicensesRequest
 2,  // 9: google.cloud.discoveryengine.v1.UserLicenseService.BatchUpdateUserLicenses:input_type ->
google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest
 1,  // 10: google.cloud.discoveryengine.v1.UserLicenseService.ListUserLicenses:output_type ->
google.cloud.discoveryengine.v1.ListUserLicensesResponse
 10, // 11: google.cloud.discoveryengine.v1.UserLicenseService.BatchUpdateUserLicenses:output_type ->
google.longrunning.Operation
 10, // [10:12] is the sub-list for method output_type
 8,  // [8:10] is the sub-list for method input_type
 8,  // [8:8] is the sub-list for extension type_name
 8,  // [8:8] is the sub-list for extension extendee
 0,  // [0:8] is the sub-list for field type_name
}

func init() { file_google_cloud_discoveryengine_v1_user_license_service_proto_init()
 }
func file_google_cloud_discoveryengine_v1_user_license_service_proto_init() {
 if File_google_cloud_discoveryengine_v1_user_license_service_proto != nil {
  return
 }
 file_google_cloud_discoveryengine_v1_user_license_proto_init()
 file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[2].OneofWrappers = []any{
  (*BatchUpdateUserLicensesRequest_InlineSource_)(nil),
 }
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor: file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDesc,
   NumEnums:      0,
   NumMessages:   6,
   NumExtensions: 0,
   NumServices:   1,
  },
  GoTypes:           file_google_cloud_discoveryengine_v1_user_license_service_proto_goTypes,
  DependencyIndexes: file_google_cloud_discoveryengine_v1_user_license_service_proto_depIdxs,
```

```
 MessageInfos:      file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes,
 }.Build()
 File_google_cloud_discoveryengine_v1_user_license_service_proto
 = out.File
 file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDesc = nil
 file_google_cloud_discoveryengine_v1_user_license_service_proto_goTypes = nil
 file_google_cloud_discoveryengine_v1_user_license_service_proto_depIdxs = nil
}

// Reference imports to suppress errors if they are not otherwise used.
var _ context.Context
var _ grpc.ClientConnInterface

// This is a compile-time assertion to ensure that this generated file
// is compatible with the grpc package it is being compiled against.
const _ = grpc.SupportPackageIsVersion6

// UserLicenseServiceClient is the client API for UserLicenseService service.
//
// For semantics around ctx use and closing/ending streaming RPCs, please refer to
https://godoc.org/google.golang.org/grpc#ClientConn.NewStream.
type UserLicenseServiceClient interface {
 // Lists the User Licenses.
 ListUserLicenses(ctx context.Context, in *ListUserLicensesRequest,
 opts ...grpc.CallOption) (*ListUserLicensesResponse, error)
 // Updates the User License.
 // This method is used for batch assign/unassign licenses to users.
 BatchUpdateUserLicenses(ctx context.Context, in *BatchUpdateUserLicensesRequest, opts ...grpc.CallOption)
(*longrunningpb.Operation, error)
}

type userLicenseServiceClient struct {
 cc grpc.ClientConnInterface
}

func NewUserLicenseServiceClient(cc grpc.ClientConnInterface) UserLicenseServiceClient {
 return &userLicenseServiceClient{cc}
}

func (c *userLicenseServiceClient) ListUserLicenses(ctx context.Context, in *ListUserLicensesRequest, opts
...grpc.CallOption) (*ListUserLicensesResponse, error) {
 out := new(ListUserLicensesResponse)
 err := c.cc.Invoke(ctx, "/google.cloud.discoveryengine.v1.UserLicenseService/ListUserLicenses", in, out, opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}
```

```
func (c *userLicenseServiceClient) BatchUpdateUserLicenses(ctx context.Context, in
*BatchUpdateUserLicensesRequest,
 opts ...grpc.CallOption) (*longrunningpb.Operation, error) {
 out := new(longrunningpb.Operation)
 err := c.cc.Invoke(ctx, "/google.cloud.discoveryengine.v1.UserLicenseService/BatchUpdateUserLicenses", in, out,
opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

// UserLicenseServiceServer is the server API for UserLicenseService service.
type UserLicenseServiceServer interface {
 // Lists the User Licenses.
 ListUserLicenses(context.Context, *ListUserLicensesRequest) (*ListUserLicensesResponse, error)
 // Updates the User License.
 // This method is used for batch assign/unassign licenses to users.
 BatchUpdateUserLicenses(context.Context, *BatchUpdateUserLicensesRequest) (*longrunningpb.Operation, error)
}

// UnimplementedUserLicenseServiceServer can be embedded to have forward compatible implementations.
type UnimplementedUserLicenseServiceServer struct {
}

func (*UnimplementedUserLicenseServiceServer) ListUserLicenses(context.Context, *ListUserLicensesRequest)
 (*ListUserLicensesResponse, error) {
 return nil, status1.Errorf(codes.Unimplemented, "method ListUserLicenses not implemented")
}
func (*UnimplementedUserLicenseServiceServer) BatchUpdateUserLicenses(context.Context,
*BatchUpdateUserLicensesRequest) (*longrunningpb.Operation, error) {
 return nil, status1.Errorf(codes.Unimplemented, "method BatchUpdateUserLicenses not implemented")
}

func RegisterUserLicenseServiceServer(s *grpc.Server, srv UserLicenseServiceServer) {
 s.RegisterService(&_UserLicenseService_serviceDesc, srv)
}

func _UserLicenseService_ListUserLicenses_Handler(srv interface{}, ctx context.Context, dec func(interface{})
error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(ListUserLicensesRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(UserLicenseServiceServer).ListUserLicenses(ctx, in)
 }
```

```
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: "/google.cloud.discoveryengine.v1.UserLicenseService/ListUserLicenses",
 }
 handler
 := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(UserLicenseServiceServer).ListUserLicenses(ctx, req.(*ListUserLicensesRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _UserLicenseService_BatchUpdateUserLicenses_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(BatchUpdateUserLicensesRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(UserLicenseServiceServer).BatchUpdateUserLicenses(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: "/google.cloud.discoveryengine.v1.UserLicenseService/BatchUpdateUserLicenses",
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(UserLicenseServiceServer).BatchUpdateUserLicenses(ctx, req.(*BatchUpdateUserLicensesRequest))
 }
 return interceptor(ctx,
 in, info, handler)
}

var _UserLicenseService_serviceDesc = grpc.ServiceDesc{
 ServiceName: "google.cloud.discoveryengine.v1.UserLicenseService",
 HandlerType: (*UserLicenseServiceServer)(nil),
 Methods: []grpc.MethodDesc{
  {
   MethodName: "ListUserLicenses",
   Handler:    _UserLicenseService_ListUserLicenses_Handler,
  },
  {
   MethodName: "BatchUpdateUserLicenses",
   Handler:    _UserLicenseService_BatchUpdateUserLicenses_Handler,
  },
 },
 Streams:  []grpc.StreamDesc{},
 Metadata: "google/cloud/discoveryengine/v1/user_license_service.proto",
}
```

```
// Copyright 2025 Google LLC
//
// Licensed under the Apache License, Version 2.0 (the "License");
// you may not use this file except in compliance with the License.
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// Unless required by applicable law or agreed to in writing, software
// distributed under the License is distributed on an "AS IS" BASIS,
// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
// See the License for the specific language governing permissions and
// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package discoveryengine_test

import (
 "context"

 discoveryengine "cloud.google.com/go/discoveryengine/apiv1"
 discoveryenginepb "cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 "google.golang.org/api/iterator"
)

func ExampleNewUserLicenseClient() {
 ctx := context.Background()
 //
 This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleNewUserLicenseRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
```

```
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseRESTClient(ctx)
 if
 err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleUserLicenseClient_BatchUpdateUserLicenses() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &discoveryenginepb.BatchUpdateUserLicensesRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb#BatchUpdateUserLicensesReque
st.
 }
 op, err := c.BatchUpdateUserLicenses(ctx, req)
 if err != nil {
  //
 TODO: Handle error.
 }

 resp, err := op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
```

```
func ExampleUserLicenseClient_ListUserLicenses() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &discoveryenginepb.ListUserLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb#ListUserLicensesRequest.
 }
 it := c.ListUserLicenses(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done
  {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*discoveryenginepb.ListUserLicensesResponse)
 }
}

func ExampleUserLicenseClient_CancelOperation() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
```

```
 }
 defer c.Close()

 req := &longrunningpb.CancelOperationRequest{
  //
 TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#CancelOperationRequest.
 }
 err = c.CancelOperation(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleUserLicenseClient_GetOperation() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &longrunningpb.GetOperationRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#GetOperationRequest.
 }
 resp,
 err := c.GetOperation(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleUserLicenseClient_ListOperations() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
```

```
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &longrunningpb.ListOperationsRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#ListOperationsRequest.
 }
 it := c.ListOperations(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   //
 TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*longrunningpb.ListOperationsResponse)
 }
}

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```

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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package licensemanager_test

import (
 "context"

 licensemanager "cloud.google.com/go/licensemanager/apiv1"
 licensemanagerpb "cloud.google.com/go/licensemanager/apiv1/licensemanagerpb"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 "google.golang.org/api/iterator"
 locationpb "google.golang.org/genproto/googleapis/cloud/location"
)

func
 ExampleNewClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleNewRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
```

```
 c,
 err := licensemanager.NewRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleClient_AggregateUsage() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.AggregateUsageRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#AggregateUsageRequest.
 }
 it := c.AggregateUsage(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if
 err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*licensemanagerpb.AggregateUsageResponse)
 }
}
```

```
func ExampleClient_CreateConfiguration() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.CreateConfigurationRequest{
  // TODO: Fill request
 struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#CreateConfigurationRequest.
 }
 op, err := c.CreateConfiguration(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 resp, err := op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_DeactivateConfiguration() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.DeactivateConfigurationRequest{
  // TODO: Fill request struct fields.
```

```
 // See
https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#DeactivateConfigurationRequest.
 }
 op,
 err := c.DeactivateConfiguration(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 resp, err := op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_DeleteConfiguration() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.DeleteConfigurationRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#DeleteConfigurationRequest.
 }
 op,
 err := c.DeleteConfiguration(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleClient_GetConfiguration() {
```

```
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.GetConfigurationRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#GetConfigurationRequest.
 }
 resp, err := c.GetConfiguration(ctx,
 req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_GetInstance() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.GetInstanceRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#GetInstanceRequest.
 }
 resp, err := c.GetInstance(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
```

```
}

func ExampleClient_GetProduct() {
 ctx := context.Background()
 //
 This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.GetProductRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#GetProductRequest.
 }
 resp, err := c.GetProduct(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_ListConfigurations() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to
 work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.ListConfigurationsRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#ListConfigurationsRequest.
 }
 it := c.ListConfigurations(ctx, req)
 for {
```

```
 resp, err := it.Next()
 if err == iterator.Done {
  break
 }
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp

 // If you need to access the underlying RPC response,
 // you can do so by casting the `Response` as below.
 // Otherwise, remove this line. Only populated after
 // first call to Next(). Not safe for concurrent access.
 _ = it.Response.(*licensemanagerpb.ListConfigurationsResponse)
}
}

func
 ExampleClient_ListInstances() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.ListInstancesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#ListInstancesRequest.
 }
 it := c.ListInstances(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp
```

```
 // If you need to access the
underlying RPC response,
 // you can do so by casting the `Response` as below.
 // Otherwise, remove this line. Only populated after
 // first call to Next(). Not safe for concurrent access.
 _ = it.Response.(*licensemanagerpb.ListInstancesResponse)
}
}

func ExampleClient_ListProducts() {
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := licensemanager.NewClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &licensemanagerpb.ListProductsRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#ListProductsRequest.
}
it
:= c.ListProducts(ctx, req)
for {
 resp, err := it.Next()
 if err == iterator.Done {
  break
 }
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp

 // If you need to access the underlying RPC response,
 // you can do so by casting the `Response` as below.
 // Otherwise, remove this line. Only populated after
 // first call to Next(). Not safe for concurrent access.
 _ = it.Response.(*licensemanagerpb.ListProductsResponse)
}
}

func ExampleClient_QueryConfigurationLicenseUsage() {
```

```
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO:
 Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.QueryConfigurationLicenseUsageRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#QueryConfigurationLicenseUsage
Request.
 }
 resp, err := c.QueryConfigurationLicenseUsage(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_ReactivateConfiguration() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.ReactivateConfigurationRequest{
  //
 TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#ReactivateConfigurationRequest.
 }
 op, err := c.ReactivateConfiguration(ctx, req)
 if err != nil {
```

```
 // TODO: Handle error.
 }

 resp, err := op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_UpdateConfiguration() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.UpdateConfigurationRequest{
  // TODO: Fill request
 struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#UpdateConfigurationRequest.
 }
 op, err := c.UpdateConfiguration(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 resp, err := op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_GetLocation() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
```

```
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := licensemanager.NewClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &locationpb.GetLocationRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/google.golang.org/genproto/googleapis/cloud/location#GetLocationRequest.
}
resp,
err := c.GetLocation(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleClient_ListLocations() {
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := licensemanager.NewClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &locationpb.ListLocationsRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/google.golang.org/genproto/googleapis/cloud/location#ListLocationsRequest.
}
it := c.ListLocations(ctx, req)
for {
 resp, err := it.Next()
 if err == iterator.Done {
  break
 }
 if
err != nil {
  // TODO: Handle error.
 }
```

```
 // TODO: Use resp.
 _ = resp

 // If you need to access the underlying RPC response,
 // you can do so by casting the `Response` as below.
 // Otherwise, remove this line. Only populated after
 // first call to Next(). Not safe for concurrent access.
 _ = it.Response.(*locationpb.ListLocationsResponse)
}
}

func ExampleClient_CancelOperation() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &longrunningpb.CancelOperationRequest{
  // TODO: Fill request struct
 fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#CancelOperationRequest.
 }
 err = c.CancelOperation(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleClient_DeleteOperation() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()
```

```
 req := &longrunningpb.DeleteOperationRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#DeleteOperationRequest.
 }
 err = c.DeleteOperation(ctx, req)
 if err != nil {
  //
 TODO: Handle error.
 }
}

func ExampleClient_GetOperation() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &longrunningpb.GetOperationRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#GetOperationRequest.
 }
 resp, err := c.GetOperation(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_ListOperations() {
 ctx := context.Background()
 // This snippet has been automatically generated and
 should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
```

```
 defer c.Close()

 req := &longrunningpb.ListOperationsRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#ListOperationsRequest.
 }
 it := c.ListOperations(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next().
 Not safe for concurrent access.
  _ = it.Response.(*longrunningpb.ListOperationsResponse)
 }
}
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// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1beta"
```

```
 computepb "cloud.google.com/go/compute/apiv1beta/computepb"
)

func ExampleNewLicenseCodesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications
 to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicenseCodesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetLicenseCodeRequest{
  // TODO:
 Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#GetLicenseCodeRequest.
 }
 resp, err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicenseCodesClient_TestIamPermissions() {
```

```
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.TestIamPermissionsLicenseCodeRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#TestIamPermissionsLicenseCodeRequest.
 }
 resp,
 err := c.TestIamPermissions(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
// Copyright 2025 Google LLC
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// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package licensemanager

import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
```

```
 "math"
 "net/http"
 "net/url"
 "time"

 licensemanagerpb "cloud.google.com/go/licensemanager/apiv1/licensemanagerpb"
 "cloud.google.com/go/longrunning"
 lroauto "cloud.google.com/go/longrunning/autogen"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 gtransport
 "google.golang.org/api/transport/grpc"
 httptransport "google.golang.org/api/transport/http"
 locationpb "google.golang.org/genproto/googleapis/cloud/location"
 "google.golang.org/grpc"
 "google.golang.org/grpc/codes"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var newClientHook clientHook

// CallOptions contains the retry settings for each method of Client.
type CallOptions struct {
 ListConfigurations            []gax.CallOption
 GetConfiguration              []gax.CallOption
 CreateConfiguration           []gax.CallOption
 UpdateConfiguration           []gax.CallOption
 DeleteConfiguration           []gax.CallOption
 ListInstances                 []gax.CallOption
 GetInstance                   []gax.CallOption
 DeactivateConfiguration       []gax.CallOption
 ReactivateConfiguration
       []gax.CallOption
 QueryConfigurationLicenseUsage []gax.CallOption
 AggregateUsage                []gax.CallOption
 ListProducts                  []gax.CallOption
 GetProduct                    []gax.CallOption
 GetLocation                   []gax.CallOption
 ListLocations                 []gax.CallOption
 CancelOperation               []gax.CallOption
 DeleteOperation               []gax.CallOption
 GetOperation                  []gax.CallOption
 ListOperations                []gax.CallOption
}
```

```
func defaultGRPCClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("licensemanager.googleapis.com:443"),
  internaloption.WithDefaultEndpointTemplate("licensemanager.UNIVERSE_DOMAIN:443"),
  internaloption.WithDefaultMTLSEndpoint("licensemanager.mtls.googleapis.com:443"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://licensemanager.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableJwtWithScope(),
  internaloption.EnableNewAuthLibrary(),
  option.WithGRPCDialOption(grpc.WithDefaultCallOptions(
   grpc.MaxCallRecvMsgSize(math.MaxInt32))),
 }
}

func
 defaultCallOptions() *CallOptions {
 return &CallOptions{
  ListConfigurations: []gax.CallOption{
   gax.WithTimeout(60000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnCodes([]codes.Code{
     codes.Unavailable,
    }, gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        10000 * time.Millisecond,
     Multiplier: 1.30,
    })
   }),
  },
  GetConfiguration: []gax.CallOption{
   gax.WithTimeout(60000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnCodes([]codes.Code{
     codes.Unavailable,
    }, gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        10000 * time.Millisecond,
     Multiplier: 1.30,
    })
   }),
  },
  CreateConfiguration: []gax.CallOption{
   gax.WithTimeout(60000
 * time.Millisecond),
  },
  UpdateConfiguration: []gax.CallOption{
```

```
 gax.WithTimeout(60000 * time.Millisecond),
},
DeleteConfiguration: []gax.CallOption{
 gax.WithTimeout(60000 * time.Millisecond),
},
ListInstances: []gax.CallOption{
 gax.WithTimeout(60000 * time.Millisecond),
 gax.WithRetry(func() gax.Retryer {
  return gax.OnCodes([]codes.Code{
   codes.Unavailable,
  }, gax.Backoff{
   Initial:    1000 * time.Millisecond,
   Max:        10000 * time.Millisecond,
   Multiplier: 1.30,
  })
 }),
},
GetInstance: []gax.CallOption{
 gax.WithTimeout(60000 * time.Millisecond),
 gax.WithRetry(func() gax.Retryer {
  return gax.OnCodes([]codes.Code{
   codes.Unavailable,
  }, gax.Backoff{
   Initial:    1000 * time.Millisecond,
   Max:        10000 * time.Millisecond,
   Multiplier: 1.30,
  })
 }),
},
DeactivateConfiguration: []gax.CallOption{},
ReactivateConfiguration: []gax.CallOption{},
QueryConfigurationLicenseUsage:
[]gax.CallOption{
 gax.WithTimeout(60000 * time.Millisecond),
 gax.WithRetry(func() gax.Retryer {
  return gax.OnCodes([]codes.Code{
   codes.Unavailable,
  }, gax.Backoff{
   Initial:    1000 * time.Millisecond,
   Max:        10000 * time.Millisecond,
   Multiplier: 1.30,
  })
 }),
},
AggregateUsage: []gax.CallOption{
 gax.WithTimeout(60000 * time.Millisecond),
},
ListProducts: []gax.CallOption{
```

```
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnCodes([]codes.Code{
    codes.Unavailable,
   }, gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   })
  }),
 },
 GetProduct: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnCodes([]codes.Code{
    codes.Unavailable,
   }, gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:
 10000 * time.Millisecond,
    Multiplier: 1.30,
   })
  }),
 },
 GetLocation:     []gax.CallOption{},
 ListLocations:   []gax.CallOption{},
 CancelOperation: []gax.CallOption{},
 DeleteOperation: []gax.CallOption{},
 GetOperation:    []gax.CallOption{},
 ListOperations:  []gax.CallOption{},
}
}

func defaultRESTCallOptions() *CallOptions {
 return &CallOptions{
  ListConfigurations: []gax.CallOption{
   gax.WithTimeout(60000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        10000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusServiceUnavailable)
   }),
  },
  GetConfiguration: []gax.CallOption{
   gax.WithTimeout(60000 * time.Millisecond),
```

```
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusServiceUnavailable)
  }),
 },
 CreateConfiguration:
[]gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
 },
 UpdateConfiguration: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
 },
 DeleteConfiguration: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
 },
 ListInstances: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusServiceUnavailable)
  }),
 },
 GetInstance: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusServiceUnavailable)
  }),
 },
 DeactivateConfiguration: []gax.CallOption{},
 ReactivateConfiguration:
[]gax.CallOption{},
 QueryConfigurationLicenseUsage: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
```

```
    Initial:    1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusServiceUnavailable)
  }),
 },
 AggregateUsage: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
 },
 ListProducts: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusServiceUnavailable)
  }),
 },
 GetProduct: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:
  10000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusServiceUnavailable)
  }),
 },
 GetLocation:     []gax.CallOption{},
 ListLocations:   []gax.CallOption{},
 CancelOperation: []gax.CallOption{},
 DeleteOperation: []gax.CallOption{},
 GetOperation:    []gax.CallOption{},
 ListOperations:  []gax.CallOption{},
}
}

// internalClient is an interface that defines the methods available from License Manager API.
type internalClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 ListConfigurations(context.Context, *licensemanagerpb.ListConfigurationsRequest, ...gax.CallOption)
```

```
*ConfigurationIterator
 GetConfiguration(context.Context, *licensemanagerpb.GetConfigurationRequest, ...gax.CallOption)
(*licensemanagerpb.Configuration, error)
 CreateConfiguration(context.Context, *licensemanagerpb.CreateConfigurationRequest, ...gax.CallOption)
(*CreateConfigurationOperation, error)
 CreateConfigurationOperation(name string) *CreateConfigurationOperation
 UpdateConfiguration(context.Context,
 *licensemanagerpb.UpdateConfigurationRequest, ...gax.CallOption) (*UpdateConfigurationOperation, error)
 UpdateConfigurationOperation(name string) *UpdateConfigurationOperation
 DeleteConfiguration(context.Context, *licensemanagerpb.DeleteConfigurationRequest, ...gax.CallOption)
(*DeleteConfigurationOperation, error)
 DeleteConfigurationOperation(name string) *DeleteConfigurationOperation
 ListInstances(context.Context, *licensemanagerpb.ListInstancesRequest, ...gax.CallOption) *InstanceIterator
 GetInstance(context.Context, *licensemanagerpb.GetInstanceRequest, ...gax.CallOption)
(*licensemanagerpb.Instance, error)
 DeactivateConfiguration(context.Context, *licensemanagerpb.DeactivateConfigurationRequest, ...gax.CallOption)
(*DeactivateConfigurationOperation, error)
 DeactivateConfigurationOperation(name string) *DeactivateConfigurationOperation
 ReactivateConfiguration(context.Context, *licensemanagerpb.ReactivateConfigurationRequest,
 ...gax.CallOption) (*ReactivateConfigurationOperation, error)
 ReactivateConfigurationOperation(name string) *ReactivateConfigurationOperation
 QueryConfigurationLicenseUsage(context.Context, *licensemanagerpb.QueryConfigurationLicenseUsageRequest,
...gax.CallOption) (*licensemanagerpb.QueryConfigurationLicenseUsageResponse, error)
 AggregateUsage(context.Context, *licensemanagerpb.AggregateUsageRequest, ...gax.CallOption) *UsageIterator
 ListProducts(context.Context, *licensemanagerpb.ListProductsRequest, ...gax.CallOption) *ProductIterator
 GetProduct(context.Context, *licensemanagerpb.GetProductRequest, ...gax.CallOption)
(*licensemanagerpb.Product, error)
 GetLocation(context.Context, *locationpb.GetLocationRequest, ...gax.CallOption) (*locationpb.Location, error)
 ListLocations(context.Context, *locationpb.ListLocationsRequest, ...gax.CallOption) *LocationIterator
 CancelOperation(context.Context, *longrunningpb.CancelOperationRequest, ...gax.CallOption) error
 DeleteOperation(context.Context,
 *longrunningpb.DeleteOperationRequest, ...gax.CallOption) error
 GetOperation(context.Context, *longrunningpb.GetOperationRequest, ...gax.CallOption)
(*longrunningpb.Operation, error)
 ListOperations(context.Context, *longrunningpb.ListOperationsRequest, ...gax.CallOption) *OperationIterator
}

// Client is a client for interacting with License Manager API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// Service describing handlers for resources
type Client struct {
 // The internal transport-dependent client.
 internalClient internalClient

 // The call options for this service.
 CallOptions *CallOptions
```

```
 // LROClient is used internally to handle long-running operations.
 // It is exposed so that its CallOptions can be modified if required.
 // Users should not Close this client.
 LROClient *lroauto.OperationsClient
}

// Wrapper methods routed to the internal client.

// Close
 closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *Client) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *Client) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *Client) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// ListConfigurations lists Configurations in a given project and location.
func (c *Client) ListConfigurations(ctx context.Context, req *licensemanagerpb.ListConfigurationsRequest, opts
...gax.CallOption) *ConfigurationIterator {
 return c.internalClient.ListConfigurations(ctx,
 req, opts...)
}

// GetConfiguration gets details of a single Configuration.
func (c *Client) GetConfiguration(ctx context.Context, req *licensemanagerpb.GetConfigurationRequest, opts
...gax.CallOption) (*licensemanagerpb.Configuration, error) {
 return c.internalClient.GetConfiguration(ctx, req, opts...)
}

// CreateConfiguration creates a new Configuration in a given project and location.
func (c *Client) CreateConfiguration(ctx context.Context, req *licensemanagerpb.CreateConfigurationRequest, opts
...gax.CallOption) (*CreateConfigurationOperation, error) {
 return c.internalClient.CreateConfiguration(ctx, req, opts...)
```

```
}

// CreateConfigurationOperation returns a new CreateConfigurationOperation from a given name.
// The name must be that of a previously created CreateConfigurationOperation, possibly from a different process.
func (c *Client) CreateConfigurationOperation(name string) *CreateConfigurationOperation {
 return c.internalClient.CreateConfigurationOperation(name)
}

//
 UpdateConfiguration updates the parameters of a single Configuration.
func (c *Client) UpdateConfiguration(ctx context.Context, req *licensemanagerpb.UpdateConfigurationRequest,
opts ...gax.CallOption) (*UpdateConfigurationOperation, error) {
 return c.internalClient.UpdateConfiguration(ctx, req, opts...)
}

// UpdateConfigurationOperation returns a new UpdateConfigurationOperation from a given name.
// The name must be that of a previously created UpdateConfigurationOperation, possibly from a different process.
func (c *Client) UpdateConfigurationOperation(name string) *UpdateConfigurationOperation {
 return c.internalClient.UpdateConfigurationOperation(name)
}

// DeleteConfiguration deletes a single Configuration.
func (c *Client) DeleteConfiguration(ctx context.Context, req *licensemanagerpb.DeleteConfigurationRequest, opts
...gax.CallOption) (*DeleteConfigurationOperation, error) {
 return c.internalClient.DeleteConfiguration(ctx, req, opts...)
}

// DeleteConfigurationOperation returns
 a new DeleteConfigurationOperation from a given name.
// The name must be that of a previously created DeleteConfigurationOperation, possibly from a different process.
func (c *Client) DeleteConfigurationOperation(name string) *DeleteConfigurationOperation {
 return c.internalClient.DeleteConfigurationOperation(name)
}

// ListInstances lists Instances in a given project and location.
func (c *Client) ListInstances(ctx context.Context, req *licensemanagerpb.ListInstancesRequest, opts
...gax.CallOption) *InstanceIterator {
 return c.internalClient.ListInstances(ctx, req, opts...)
}

// GetInstance gets details of a single Instance.
func (c *Client) GetInstance(ctx context.Context, req *licensemanagerpb.GetInstanceRequest, opts
...gax.CallOption) (*licensemanagerpb.Instance, error) {
 return c.internalClient.GetInstance(ctx, req, opts...)
}

// DeactivateConfiguration deactivates the given configuration.
func (c *Client) DeactivateConfiguration(ctx context.Context, req
```

```
*licensemanagerpb.DeactivateConfigurationRequest,
 opts ...gax.CallOption) (*DeactivateConfigurationOperation, error) {
 return c.internalClient.DeactivateConfiguration(ctx, req, opts...)
}

// DeactivateConfigurationOperation returns a new DeactivateConfigurationOperation from a given name.
// The name must be that of a previously created DeactivateConfigurationOperation, possibly from a different
process.
func (c *Client) DeactivateConfigurationOperation(name string) *DeactivateConfigurationOperation {
 return c.internalClient.DeactivateConfigurationOperation(name)
}

// ReactivateConfiguration reactivates the given configuration.
func (c *Client) ReactivateConfiguration(ctx context.Context, req
*licensemanagerpb.ReactivateConfigurationRequest, opts ...gax.CallOption) (*ReactivateConfigurationOperation,
error) {
 return c.internalClient.ReactivateConfiguration(ctx, req, opts...)
}

// ReactivateConfigurationOperation returns a new ReactivateConfigurationOperation from a given name.
// The name must
 be that of a previously created ReactivateConfigurationOperation, possibly from a different process.
func (c *Client) ReactivateConfigurationOperation(name string) *ReactivateConfigurationOperation {
 return c.internalClient.ReactivateConfigurationOperation(name)
}

// QueryConfigurationLicenseUsage license Usage information for a Configuration.
func (c *Client) QueryConfigurationLicenseUsage(ctx context.Context, req
*licensemanagerpb.QueryConfigurationLicenseUsageRequest, opts ...gax.CallOption)
(*licensemanagerpb.QueryConfigurationLicenseUsageResponse, error) {
 return c.internalClient.QueryConfigurationLicenseUsage(ctx, req, opts...)
}

// AggregateUsage aggregates Usage per Instance for a Configuration.
func (c *Client) AggregateUsage(ctx context.Context, req *licensemanagerpb.AggregateUsageRequest, opts
...gax.CallOption) *UsageIterator {
 return c.internalClient.AggregateUsage(ctx, req, opts...)
}

// ListProducts lists Products in a given project and location.
func (c *Client)
 ListProducts(ctx context.Context, req *licensemanagerpb.ListProductsRequest, opts ...gax.CallOption)
*ProductIterator {
 return c.internalClient.ListProducts(ctx, req, opts...)
}

// GetProduct gets details of a single Product.
func (c *Client) GetProduct(ctx context.Context, req *licensemanagerpb.GetProductRequest, opts ...gax.CallOption)
```

```
(*licensemanagerpb.Product, error) {
 return c.internalClient.GetProduct(ctx, req, opts...)
}

// GetLocation gets information about a location.
func (c *Client) GetLocation(ctx context.Context, req *locationpb.GetLocationRequest, opts ...gax.CallOption)
(*locationpb.Location, error) {
 return c.internalClient.GetLocation(ctx, req, opts...)
}

// ListLocations lists information about the supported locations for this service.
func (c *Client) ListLocations(ctx context.Context, req *locationpb.ListLocationsRequest, opts ...gax.CallOption)
*LocationIterator {
 return c.internalClient.ListLocations(ctx, req, opts...)
}

// CancelOperation is a utility
 method from google.longrunning.Operations.
func (c *Client) CancelOperation(ctx context.Context, req *longrunningpb.CancelOperationRequest, opts
...gax.CallOption) error {
 return c.internalClient.CancelOperation(ctx, req, opts...)
}

// DeleteOperation is a utility method from google.longrunning.Operations.
func (c *Client) DeleteOperation(ctx context.Context, req *longrunningpb.DeleteOperationRequest, opts
...gax.CallOption) error {
 return c.internalClient.DeleteOperation(ctx, req, opts...)
}

// GetOperation is a utility method from google.longrunning.Operations.
func (c *Client) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest, opts
...gax.CallOption) (*longrunningpb.Operation, error) {
 return c.internalClient.GetOperation(ctx, req, opts...)
}

// ListOperations is a utility method from google.longrunning.Operations.
func (c *Client) ListOperations(ctx context.Context, req *longrunningpb.ListOperationsRequest, opts
...gax.CallOption) *OperationIterator {
 return
 c.internalClient.ListOperations(ctx, req, opts...)
}

// gRPCClient is a client for interacting with License Manager API over gRPC transport.
//
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type gRPCClient struct {
 // Connection pool of gRPC connections to the service.
```

```
 connPool gtransport.ConnPool

 // Points back to the CallOptions field of the containing Client
 CallOptions **CallOptions

 // The gRPC API client.
 client licensemanagerpb.LicenseManagerClient

 // LROClient is used internally to handle long-running operations.
 // It is exposed so that its CallOptions can be modified if required.
 // Users should not Close this client.
 LROClient **lroauto.OperationsClient

 operationsClient longrunningpb.OperationsClient

 locationsClient locationpb.LocationsClient

 // The x-goog-* metadata to be sent with each request.
 xGoogHeaders []string

 logger *slog.Logger
}

// NewClient creates a new license
 manager client based on gRPC.
// The returned client must be Closed when it is done being used to clean up its underlying connections.
//
// Service describing handlers for resources
func NewClient(ctx context.Context, opts ...option.ClientOption) (*Client, error) {
 clientOpts := defaultGRPCClientOptions()
 if newClientHook != nil {
  hookOpts, err := newClientHook(ctx, clientHookParams{})
  if err != nil {
   return nil, err
  }
  clientOpts = append(clientOpts, hookOpts...)
 }

 connPool, err := gtransport.DialPool(ctx, append(clientOpts, opts...)...)
 if err != nil {
  return nil, err
 }
 client := Client{CallOptions: defaultCallOptions()}

 c := &gRPCClient{
  connPool:        connPool,
  client:          licensemanagerpb.NewLicenseManagerClient(connPool),
  CallOptions:     &client.CallOptions,
```

```
 logger:          internaloption.GetLogger(opts),
 operationsClient: longrunningpb.NewOperationsClient(connPool),
 locationsClient:  locationpb.NewLocationsClient(connPool),
}
c.setGoogleClientInfo()

client.internalClient
= c

client.LROClient, err = lroauto.NewOperationsClient(ctx, gtransport.WithConnPool(connPool))
if err != nil {
 // This error "should not happen", since we are just reusing old connection pool
 // and never actually need to dial.
 // If this does happen, we could leak connp. However, we cannot close conn:
 // If the user invoked the constructor with option.WithGRPCConn,
 // we would close a connection that's still in use.
 // TODO: investigate error conditions.
 return nil, err
}
c.LROClient = &client.LROClient
return &client, nil
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *gRPCClient) Connection() *grpc.ClientConn {
 return c.connPool.Conn()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written
 clients.
func (c *gRPCClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "grpc", grpc.Version, "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *gRPCClient) Close() error {
 return c.connPool.Close()
}
```

```
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type restClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // LROClient is used internally to handle long-running operations.
 // It is exposed so that its CallOptions can be modified if required.
 // Users should not Close this client.
 LROClient **lroauto.OperationsClient

 // The x-goog-*
 headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing Client
 CallOptions **CallOptions

 logger *slog.Logger
}

// NewRESTClient creates a new license manager rest client.
//
// Service describing handlers for resources
func NewRESTClient(ctx context.Context, opts ...option.ClientOption) (*Client, error) {
 clientOpts := append(defaultRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultRESTCallOptions()
 c := &restClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 lroOpts := []option.ClientOption{
  option.WithHTTPClient(httpClient),
  option.WithEndpoint(endpoint),
 }
```

```
 opClient, err := lroauto.NewOperationsRESTClient(ctx, lroOpts...)
 if err != nil {
  return nil, err
 }
 c.LROClient = &opClient

 return
 &Client{internalClient: c, CallOptions: callOpts}, nil
}

func defaultRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://licensemanager.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://licensemanager.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://licensemanager.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://licensemanager.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *restClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(),
 "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *restClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *restClient) Connection() *grpc.ClientConn {
 return nil
}
```

```
func (c *gRPCClient) ListConfigurations(ctx context.Context, req *licensemanagerpb.ListConfigurationsRequest,
opts ...gax.CallOption) *ConfigurationIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).ListConfigurations[0:len((*c.CallOptions).ListConfigurations):len((*c.CallOptions).ListCo
nfigurations)],
 opts...)
 it := &ConfigurationIterator{}
 req = proto.Clone(req).(*licensemanagerpb.ListConfigurationsRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*licensemanagerpb.Configuration, string, error) {
  resp := &licensemanagerpb.ListConfigurationsResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx, c.client.ListConfigurations, req, settings.GRPC, c.logger, "ListConfigurations")
   return err
  }, opts...)
  if err != nil {
   return nil, "", err
  }

  it.Response = resp
  return resp.GetConfigurations(), resp.GetNextPageToken(), nil
 }
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize,
 pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()
```

```
 return it
}

func (c *gRPCClient) GetConfiguration(ctx context.Context, req *licensemanagerpb.GetConfigurationRequest, opts
...gax.CallOption) (*licensemanagerpb.Configuration, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).GetConfiguration[0:len((*c.CallOptions).GetConfiguration):len((*c.CallOptions).GetConfi
guration)], opts...)
 var resp *licensemanagerpb.Configuration
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx,
 c.client.GetConfiguration, req, settings.GRPC, c.logger, "GetConfiguration")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *gRPCClient) CreateConfiguration(ctx context.Context, req
*licensemanagerpb.CreateConfigurationRequest, opts ...gax.CallOption) (*CreateConfigurationOperation, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).CreateConfiguration[0:len((*c.CallOptions).CreateConfiguration):len((*c.CallOptions).Cre
ateConfiguration)], opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.CreateConfiguration, req, settings.GRPC, c.logger, "CreateConfiguration")
  return err
 }, opts...)
 if err != nil {
  return
 nil, err
 }
 return &CreateConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, resp),
 }, nil
}
```

```
func (c *gRPCClient) UpdateConfiguration(ctx context.Context, req
*licensemanagerpb.UpdateConfigurationRequest, opts ...gax.CallOption) (*UpdateConfigurationOperation, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "configuration.name",
url.QueryEscape(req.GetConfiguration().GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).UpdateConfiguration[0:len((*c.CallOptions).UpdateConfiguration):len((*c.CallOptions).U
pdateConfiguration)], opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.UpdateConfiguration, req, settings.GRPC, c.logger, "UpdateConfiguration")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return
 &UpdateConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, resp),
 }, nil
}

func (c *gRPCClient) DeleteConfiguration(ctx context.Context, req
*licensemanagerpb.DeleteConfigurationRequest, opts ...gax.CallOption) (*DeleteConfigurationOperation, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).DeleteConfiguration[0:len((*c.CallOptions).DeleteConfiguration):len((*c.CallOptions).Del
eteConfiguration)], opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.DeleteConfiguration, req, settings.GRPC, c.logger, "DeleteConfiguration")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return &DeleteConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient,
 resp),
 }, nil
```

```
}

func (c *gRPCClient) ListInstances(ctx context.Context, req *licensemanagerpb.ListInstancesRequest, opts
...gax.CallOption) *InstanceIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).ListInstances[0:len((*c.CallOptions).ListInstances):len((*c.CallOptions).ListInstances)],
opts...)
 it := &InstanceIterator{}
 req = proto.Clone(req).(*licensemanagerpb.ListInstancesRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*licensemanagerpb.Instance, string, error) {
  resp := &licensemanagerpb.ListInstancesResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx,
 func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx, c.client.ListInstances, req, settings.GRPC, c.logger, "ListInstances")
   return err
  }, opts...)
  if err != nil {
   return nil, "", err
  }

  it.Response = resp
  return resp.GetInstances(), resp.GetNextPageToken(), nil
 }
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()
```

```
 return it
}

func (c *gRPCClient) GetInstance(ctx context.Context, req *licensemanagerpb.GetInstanceRequest, opts
...gax.CallOption) (*licensemanagerpb.Instance, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds
 = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).GetInstance[0:len((*c.CallOptions).GetInstance):len((*c.CallOptions).GetInstance)],
opts...)
 var resp *licensemanagerpb.Instance
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.GetInstance, req, settings.GRPC, c.logger, "GetInstance")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *gRPCClient) DeactivateConfiguration(ctx context.Context, req
*licensemanagerpb.DeactivateConfigurationRequest, opts ...gax.CallOption) (*DeactivateConfigurationOperation,
error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).DeactivateConfiguration[0:len((*c.CallOptions).DeactivateConfiguration):len((*c.CallOpti
ons).DeactivateConfiguration)],
 opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.DeactivateConfiguration, req, settings.GRPC, c.logger,
"DeactivateConfiguration")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return &DeactivateConfigurationOperation{
```

```
  lro: longrunning.InternalNewOperation(*c.LROClient, resp),
 }, nil
}

func (c *gRPCClient) ReactivateConfiguration(ctx context.Context, req
*licensemanagerpb.ReactivateConfigurationRequest, opts ...gax.CallOption) (*ReactivateConfigurationOperation,
error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).ReactivateConfiguration[0:len((*c.CallOptions).ReactivateConfiguration):len((*c.CallOpti
ons).ReactivateConfiguration)],
 opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.ReactivateConfiguration, req, settings.GRPC, c.logger,
"ReactivateConfiguration")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return &ReactivateConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, resp),
 }, nil
}

func (c *gRPCClient) QueryConfigurationLicenseUsage(ctx context.Context, req
*licensemanagerpb.QueryConfigurationLicenseUsageRequest, opts ...gax.CallOption)
(*licensemanagerpb.QueryConfigurationLicenseUsageResponse, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).QueryConfigurationLicenseUsage[0:len((*c.CallOptions).QueryConfigurationLicenseUsag
e):len((*c.CallOptions).QueryConfigurationLicenseUsage)],
 opts...)
 var resp *licensemanagerpb.QueryConfigurationLicenseUsageResponse
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.QueryConfigurationLicenseUsage, req, settings.GRPC, c.logger,
"QueryConfigurationLicenseUsage")
  return err
 }, opts...)
```

```
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *gRPCClient) AggregateUsage(ctx context.Context, req *licensemanagerpb.AggregateUsageRequest, opts
...gax.CallOption) *UsageIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).AggregateUsage[0:len((*c.CallOptions).AggregateUsage):len((*c.CallOptions).Aggregate
Usage)],
 opts...)
 it := &UsageIterator{}
 req = proto.Clone(req).(*licensemanagerpb.AggregateUsageRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*licensemanagerpb.Usage, string, error) {
  resp := &licensemanagerpb.AggregateUsageResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx, c.client.AggregateUsage, req, settings.GRPC, c.logger, "AggregateUsage")
   return err
  }, opts...)
  if err != nil {
   return nil, "", err
  }

  it.Response = resp
  return resp.GetUsages(), resp.GetNextPageToken(), nil
 }
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items,
 items...)
  return nextPageToken, nil
```

```
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

func (c *gRPCClient) ListProducts(ctx context.Context, req *licensemanagerpb.ListProductsRequest, opts
...gax.CallOption) *ProductIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).ListProducts[0:len((*c.CallOptions).ListProducts):len((*c.CallOptions).ListProducts)],
opts...)
 it := &ProductIterator{}
 req = proto.Clone(req).(*licensemanagerpb.ListProductsRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*licensemanagerpb.Product, string, error) {
  resp := &licensemanagerpb.ListProductsResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if
 pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx, c.client.ListProducts, req, settings.GRPC, c.logger, "ListProducts")
   return err
  }, opts...)
  if err != nil {
   return nil, "", err
  }

  it.Response = resp
  return resp.GetProducts(), resp.GetNextPageToken(), nil
 }
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
```

```
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

func (c *gRPCClient) GetProduct(ctx context.Context, req *licensemanagerpb.GetProductRequest,
 opts ...gax.CallOption) (*licensemanagerpb.Product, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts = append((*c.CallOptions).GetProduct[0:len((*c.CallOptions).GetProduct):len((*c.CallOptions).GetProduct)],
opts...)
 var resp *licensemanagerpb.Product
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.GetProduct, req, settings.GRPC, c.logger, "GetProduct")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *gRPCClient) GetLocation(ctx context.Context, req *locationpb.GetLocationRequest, opts
...gax.CallOption) (*locationpb.Location, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders,
 hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).GetLocation[0:len((*c.CallOptions).GetLocation):len((*c.CallOptions).GetLocation)],
opts...)
 var resp *locationpb.Location
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.locationsClient.GetLocation, req, settings.GRPC, c.logger, "GetLocation")
  return err
 }, opts...)
 if err != nil {
```

```
 return nil, err
 }
 return resp, nil
}

func (c *gRPCClient) ListLocations(ctx context.Context, req *locationpb.ListLocationsRequest, opts
...gax.CallOption) *LocationIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).ListLocations[0:len((*c.CallOptions).ListLocations):len((*c.CallOptions).ListLocations)],
opts...)
 it := &LocationIterator{}
 req
 = proto.Clone(req).(*locationpb.ListLocationsRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*locationpb.Location, string, error) {
  resp := &locationpb.ListLocationsResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx, c.locationsClient.ListLocations, req, settings.GRPC, c.logger, "ListLocations")
   return err
  }, opts...)
  if err != nil {
   return nil, "", err
  }

  it.Response = resp
  return resp.GetLocations(), resp.GetNextPageToken(), nil
 }
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken,
 nil
 }
```

```
 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

func (c *gRPCClient) CancelOperation(ctx context.Context, req *longrunningpb.CancelOperationRequest, opts
...gax.CallOption) error {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).CancelOperation[0:len((*c.CallOptions).CancelOperation):len((*c.CallOptions).CancelOp
eration)], opts...)
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  _, err = executeRPC(ctx, c.operationsClient.CancelOperation, req, settings.GRPC, c.logger, "CancelOperation")
  return err
 }, opts...)
 return err
}

func (c *gRPCClient) DeleteOperation(ctx context.Context, req *longrunningpb.DeleteOperationRequest,
 opts ...gax.CallOption) error {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).DeleteOperation[0:len((*c.CallOptions).DeleteOperation):len((*c.CallOptions).DeleteOper
ation)], opts...)
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  _, err = executeRPC(ctx, c.operationsClient.DeleteOperation, req, settings.GRPC, c.logger, "DeleteOperation")
  return err
 }, opts...)
 return err
}

func (c *gRPCClient) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest, opts
...gax.CallOption) (*longrunningpb.Operation, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx,
```

```
 hds...)
 opts =
append((*c.CallOptions).GetOperation[0:len((*c.CallOptions).GetOperation):len((*c.CallOptions).GetOperation)],
opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.operationsClient.GetOperation, req, settings.GRPC, c.logger, "GetOperation")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *gRPCClient) ListOperations(ctx context.Context, req *longrunningpb.ListOperationsRequest, opts
...gax.CallOption) *OperationIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).ListOperations[0:len((*c.CallOptions).ListOperations):len((*c.CallOptions).ListOperations
)], opts...)
 it := &OperationIterator{}
 req = proto.Clone(req).(*longrunningpb.ListOperationsRequest)
 it.InternalFetch
 = func(pageSize int, pageToken string) ([]*longrunningpb.Operation, string, error) {
  resp := &longrunningpb.ListOperationsResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx, c.operationsClient.ListOperations, req, settings.GRPC, c.logger, "ListOperations")
   return err
  }, opts...)
  if err != nil {
   return nil, "", err
  }

  it.Response = resp
```

```
 return resp.GetOperations(), resp.GetNextPageToken(), nil
 }
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo,
 it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

// ListConfigurations lists Configurations in a given project and location.
func (c *restClient) ListConfigurations(ctx context.Context, req *licensemanagerpb.ListConfigurationsRequest, opts
...gax.CallOption) *ConfigurationIterator {
 it := &ConfigurationIterator{}
 req = proto.Clone(req).(*licensemanagerpb.ListConfigurationsRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*licensemanagerpb.Configuration, string, error) {
  resp := &licensemanagerpb.ListConfigurationsResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
   return
 nil, "", err
  }
  baseUrl.Path += fmt.Sprintf("/v1/%v/configurations", req.GetParent())

  params := url.Values{}
  params.Add("$alt", "json;enum-encoding=int")
  if req.GetFilter() != "" {
   params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
  }
  if req.GetOrderBy() != "" {
```

```
 params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
 }
 if req.GetPageSize() != 0 {
  params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
 }
 if req.GetPageToken() != "" {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil
 {
   return err
  }
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "ListConfigurations")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetConfigurations(), resp.GetNextPageToken(), nil
 }

 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
```

```
 return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

// GetConfiguration gets details of a single Configuration.
func (c *restClient) GetConfiguration(ctx context.Context, req *licensemanagerpb.GetConfigurationRequest,
 opts ...gax.CallOption) (*licensemanagerpb.Configuration, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetConfiguration[0:len((*c.CallOptions).GetConfiguration):len((*c.CallOptions).GetConfi
guration)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &licensemanagerpb.Configuration{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path
 = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetConfiguration")
```

```
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
}

// CreateConfiguration creates a new Configuration in a given project and location.
func (c *restClient) CreateConfiguration(ctx context.Context, req *licensemanagerpb.CreateConfigurationRequest,
opts ...gax.CallOption) (*CreateConfigurationOperation, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 body := req.GetConfiguration()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path
 += fmt.Sprintf("/v1/%v/configurations", req.GetParent())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")
 params.Add("configurationId", fmt.Sprintf("%v", req.GetConfigurationId()))
 if req.GetRequestId() != "" {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
```

```
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &longrunningpb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err !=
 nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "CreateConfiguration")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }

 override := fmt.Sprintf("/v1/%s", resp.GetName())
 return &CreateConfigurationOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, resp),
  pollPath: override,
 }, nil
}

// UpdateConfiguration updates the parameters of a single Configuration.
func (c *restClient) UpdateConfiguration(ctx context.Context, req *licensemanagerpb.UpdateConfigurationRequest,
opts ...gax.CallOption) (*UpdateConfigurationOperation, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 body := req.GetConfiguration()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if
```

```
err != nil {
 return nil, err
}
baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetConfiguration().GetName())

params := url.Values{}
params.Add("$alt", "json;enum-encoding=int")
if req.GetRequestId() != "" {
 params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
}
if req.GetUpdateMask() != nil {
 field, err := protojson.Marshal(req.GetUpdateMask())
 if err != nil {
  return nil, err
 }
 params.Add("updateMask", string(field[1:len(field)-1]))
}

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "configuration.name",
url.QueryEscape(req.GetConfiguration().GetName()))}

hds = append(c.xGoogHeaders, hds...)
hds = append(hds, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
resp := &longrunningpb.Operation{}
e := gax.Invoke(ctx, func(ctx context.Context,
settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("PATCH", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "UpdateConfiguration")
 if err != nil {
  return err
 }
 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }
```

```
 return nil
 }, opts...)
 if e != nil {
  return nil, e
 }

 override := fmt.Sprintf("/v1/%s", resp.GetName())
 return &UpdateConfigurationOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, resp),
  pollPath: override,
 }, nil
}

// DeleteConfiguration deletes a single Configuration.
func (c *restClient) DeleteConfiguration(ctx context.Context, req *licensemanagerpb.DeleteConfigurationRequest,
opts ...gax.CallOption) (*DeleteConfigurationOperation, error) {
 baseUrl,
 err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")
 if req.GetRequestId() != "" {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &longrunningpb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
  if err != nil {
   return err
  }
```

```
 httpReq
= httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "DeleteConfiguration")
 if err != nil {
  return err
 }
 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}

override := fmt.Sprintf("/v1/%s", resp.GetName())
return &DeleteConfigurationOperation{
 lro:      longrunning.InternalNewOperation(*c.LROClient, resp),
 pollPath: override,
}, nil
}

// ListInstances lists Instances in a given project and location.
func (c *restClient) ListInstances(ctx context.Context, req *licensemanagerpb.ListInstancesRequest, opts
...gax.CallOption) *InstanceIterator {
 it := &InstanceIterator{}
 req = proto.Clone(req).(*licensemanagerpb.ListInstancesRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*licensemanagerpb.Instance, string, error) {
  resp
 := &licensemanagerpb.ListInstancesResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
   return nil, "", err
  }
  baseUrl.Path += fmt.Sprintf("/v1/%v/instances", req.GetParent())
```

```
params := url.Values{}
params.Add("$alt", "json;enum-encoding=int")
if req.GetFilter() != "" {
 params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
}
if req.GetOrderBy() != "" {
 params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
}
if req.GetPageSize() != 0 {
 params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
}
if req.GetPageToken() != "" {
 params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
}

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := append(c.xGoogHeaders, "Content-Type", "application/json")
headers
:= gax.BuildHeaders(ctx, hds...)
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
 if err != nil {
  return err
 }
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "ListInstances")
 if err != nil {
  return err
 }
 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, "", e
}
it.Response = resp
return resp.GetInstances(), resp.GetNextPageToken(), nil
}
```

```
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen,
 it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

// GetInstance gets details of a single Instance.
func (c *restClient) GetInstance(ctx context.Context, req *licensemanagerpb.GetInstanceRequest, opts
...gax.CallOption) (*licensemanagerpb.Instance, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetInstance[0:len((*c.CallOptions).GetInstance):len((*c.CallOptions).GetInstance)],
opts...)
 unm :=
 protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &licensemanagerpb.Instance{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
```

```
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetInstance")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
}

// DeactivateConfiguration deactivates the given configuration.
func (c *restClient) DeactivateConfiguration(ctx context.Context, req
*licensemanagerpb.DeactivateConfigurationRequest, opts ...gax.CallOption) (*DeactivateConfigurationOperation,
error) {
 m := protojson.MarshalOptions{AllowPartial: true,
 UseEnumNumbers: true}
 jsonReq, err := m.Marshal(req)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:deactivate", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}
```

```
 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &longrunningpb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil
 {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "DeactivateConfiguration")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }

 override := fmt.Sprintf("/v1/%s", resp.GetName())
 return &DeactivateConfigurationOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, resp),
  pollPath: override,
 }, nil
}

// ReactivateConfiguration reactivates the given configuration.
func (c *restClient) ReactivateConfiguration(ctx context.Context, req
*licensemanagerpb.ReactivateConfigurationRequest, opts ...gax.CallOption) (*ReactivateConfigurationOperation,
error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 jsonReq, err := m.Marshal(req)
 if err != nil {
  return nil, err
 }
```

```
baseUrl, err := url.Parse(c.endpoint)
if err !=
nil {
 return nil, err
}
baseUrl.Path += fmt.Sprintf("/v1/%v:reactivate", req.GetName())

params := url.Values{}
params.Add("$alt", "json;enum-encoding=int")

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

hds = append(c.xGoogHeaders, hds...)
hds = append(hds, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
resp := &longrunningpb.Operation{}
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq,
c.logger, jsonReq, "ReactivateConfiguration")
 if err != nil {
  return err
 }
 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}

override := fmt.Sprintf("/v1/%s", resp.GetName())
return &ReactivateConfigurationOperation{
```

```
  lro:      longrunning.InternalNewOperation(*c.LROClient, resp),
  pollPath: override,
 }, nil
}

// QueryConfigurationLicenseUsage license Usage information for a Configuration.
func (c *restClient) QueryConfigurationLicenseUsage(ctx context.Context, req
*licensemanagerpb.QueryConfigurationLicenseUsageRequest, opts ...gax.CallOption)
(*licensemanagerpb.QueryConfigurationLicenseUsageResponse, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:queryLicenseUsage", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")
 if req.GetEndTime() != nil {
  field, err := protojson.Marshal(req.GetEndTime())
  if
 err != nil {
   return nil, err
  }
  params.Add("endTime", string(field[1:len(field)-1]))
 }
 if req.GetStartTime() != nil {
  field, err := protojson.Marshal(req.GetStartTime())
  if err != nil {
   return nil, err
  }
  params.Add("startTime", string(field[1:len(field)-1]))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).QueryConfigurationLicenseUsage[0:len((*c.CallOptions).QueryConfigurationLicenseUsag
e):len((*c.CallOptions).QueryConfigurationLicenseUsage)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &licensemanagerpb.QueryConfigurationLicenseUsageResponse{}
 e := gax.Invoke(ctx, func(ctx
```

```
 context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "QueryConfigurationLicenseUsage")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// AggregateUsage aggregates Usage per Instance for a Configuration.
func (c *restClient) AggregateUsage(ctx context.Context, req *licensemanagerpb.AggregateUsageRequest, opts
...gax.CallOption) *UsageIterator {
 it := &UsageIterator{}
 req = proto.Clone(req).(*licensemanagerpb.AggregateUsageRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken
 string) ([]*licensemanagerpb.Usage, string, error) {
  resp := &licensemanagerpb.AggregateUsageResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
   return nil, "", err
```

```
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:aggregateUsage", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")
 if req.GetEndTime() != nil {
  field, err := protojson.Marshal(req.GetEndTime())
  if err != nil {
   return nil, "", err
  }
  params.Add("endTime", string(field[1:len(field)-1]))
 }
 if req.GetFilter() != "" {
  params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
 }
 if req.GetOrderBy() != "" {
  params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
 }
 if req.GetPageSize() != 0 {
  params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
 }
 if
req.GetPageToken() != "" {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }
 if req.GetStartTime() != nil {
  field, err := protojson.Marshal(req.GetStartTime())
  if err != nil {
   return nil, "", err
  }
  params.Add("startTime", string(field[1:len(field)-1]))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header = headers
```

```
  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "AggregateUsage")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return
 nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetUsages(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// ListProducts lists Products in a given project and location.
func (c *restClient) ListProducts(ctx context.Context, req *licensemanagerpb.ListProductsRequest, opts
...gax.CallOption) *ProductIterator {
 it := &ProductIterator{}
 req = proto.Clone(req).(*licensemanagerpb.ListProductsRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken
 string) ([]*licensemanagerpb.Product, string, error) {
  resp := &licensemanagerpb.ListProductsResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
```

```
} else if pageSize != 0 {
 req.PageSize = int32(pageSize)
}
baseUrl, err := url.Parse(c.endpoint)
if err != nil {
 return nil, "", err
}
baseUrl.Path += fmt.Sprintf("/v1/%v/products", req.GetParent())

params := url.Values{}
params.Add("$alt", "json;enum-encoding=int")
if req.GetFilter() != "" {
 params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
}
if req.GetOrderBy() != "" {
 params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
}
if req.GetPageSize() != 0 {
 params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
}
if req.GetPageToken() != "" {
 params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
}

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds
:= append(c.xGoogHeaders, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
 if err != nil {
  return err
 }
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "ListProducts")
 if err != nil {
  return err
 }
 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }
```

```
  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetProducts(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo,
it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// GetProduct gets details of a single Product.
func (c *restClient) GetProduct(ctx context.Context, req *licensemanagerpb.GetProductRequest, opts
...gax.CallOption) (*licensemanagerpb.Product, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).GetProduct[0:len((*c.CallOptions).GetProduct):len((*c.CallOptions).GetProduct)],
```

```
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &licensemanagerpb.Product{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetProduct")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// GetLocation gets information about a location.
func (c *restClient) GetLocation(ctx context.Context, req *locationpb.GetLocationRequest, opts ...gax.CallOption)
(*locationpb.Location, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return
 nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}
```

```
 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetLocation[0:len((*c.CallOptions).GetLocation):len((*c.CallOptions).GetLocation)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &locationpb.Location{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header
 = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetLocation")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// ListLocations lists information about the supported locations for this service.
func (c *restClient) ListLocations(ctx context.Context, req *locationpb.ListLocationsRequest, opts
...gax.CallOption) *LocationIterator {
 it := &LocationIterator{}
 req = proto.Clone(req).(*locationpb.ListLocationsRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*locationpb.Location, string, error) {
  resp := &locationpb.ListLocationsResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
```

```
 }
 if pageSize > math.MaxInt32 {
  req.PageSize = math.MaxInt32
 } else if pageSize != 0 {
  req.PageSize = int32(pageSize)
 }
 baseUrl,
err := url.Parse(c.endpoint)
 if err != nil {
  return nil, "", err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v/locations", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")
 if req.GetFilter() != "" {
  params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
 }
 if req.GetPageSize() != 0 {
  params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
 }
 if req.GetPageToken() != "" {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header
= headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "ListLocations")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }
```

```
  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetLocations(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// CancelOperation is a utility method from google.longrunning.Operations.
func (c *restClient) CancelOperation(ctx context.Context, req *longrunningpb.CancelOperationRequest, opts
...gax.CallOption)
 error {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 jsonReq, err := m.Marshal(req)
 if err != nil {
  return err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:cancel", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
```

```
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 return gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header
 = headers

  _, err = executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "CancelOperation")
  return err
 }, opts...)
}

// DeleteOperation is a utility method from google.longrunning.Operations.
func (c *restClient) DeleteOperation(ctx context.Context, req *longrunningpb.DeleteOperationRequest, opts
...gax.CallOption) error {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 return gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path !=
 "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
```

```
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  _, err = executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "DeleteOperation")
  return err
 }, opts...)
}

// GetOperation is a utility method from google.longrunning.Operations.
func (c *restClient) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest, opts
...gax.CallOption) (*longrunningpb.Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds
 = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetOperation[0:len((*c.CallOptions).GetOperation):len((*c.CallOptions).GetOperation)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &longrunningpb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers
```

```
  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetOperation")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// ListOperations is a utility method from google.longrunning.Operations.
func
 (c *restClient) ListOperations(ctx context.Context, req *longrunningpb.ListOperationsRequest, opts
...gax.CallOption) *OperationIterator {
 it := &OperationIterator{}
 req = proto.Clone(req).(*longrunningpb.ListOperationsRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*longrunningpb.Operation, string, error) {
  resp := &longrunningpb.ListOperationsResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
   return nil, "", err
  }
  baseUrl.Path += fmt.Sprintf("/v1/%v/operations", req.GetName())

  params := url.Values{}
  params.Add("$alt", "json;enum-encoding=int")
  if req.GetFilter() != "" {
   params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
  }
  if req.GetPageSize() != 0 {
   params.Add("pageSize",
```

```
fmt.Sprintf("%v", req.GetPageSize()))
 }
 if req.GetPageToken() != "" {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "ListOperations")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetOperations(), resp.GetNextPageToken(),
nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}
```

```
 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

// CreateConfigurationOperation returns a new CreateConfigurationOperation from a given name.
// The name must be that of a previously created CreateConfigurationOperation, possibly from a different process.
func (c *gRPCClient) CreateConfigurationOperation(name string) *CreateConfigurationOperation {
 return &CreateConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
 }
}

// CreateConfigurationOperation returns a new CreateConfigurationOperation from a given name.
// The name must
 be that of a previously created CreateConfigurationOperation, possibly from a different process.
func (c *restClient) CreateConfigurationOperation(name string) *CreateConfigurationOperation {
 override := fmt.Sprintf("/v1/%s", name)
 return &CreateConfigurationOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
  pollPath: override,
 }
}

// DeactivateConfigurationOperation returns a new DeactivateConfigurationOperation from a given name.
// The name must be that of a previously created DeactivateConfigurationOperation, possibly from a different
process.
func (c *gRPCClient) DeactivateConfigurationOperation(name string) *DeactivateConfigurationOperation {
 return &DeactivateConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
 }
}

// DeactivateConfigurationOperation returns a new DeactivateConfigurationOperation from a given name.
// The name must be that of a previously
 created DeactivateConfigurationOperation, possibly from a different process.
func (c *restClient) DeactivateConfigurationOperation(name string) *DeactivateConfigurationOperation {
 override := fmt.Sprintf("/v1/%s", name)
 return &DeactivateConfigurationOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
  pollPath: override,
 }
}

// DeleteConfigurationOperation returns a new DeleteConfigurationOperation from a given name.
// The name must be that of a previously created DeleteConfigurationOperation, possibly from a different process.
```

```
func (c *gRPCClient) DeleteConfigurationOperation(name string) *DeleteConfigurationOperation {
 return &DeleteConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
 }
}

// DeleteConfigurationOperation returns a new DeleteConfigurationOperation from a given name.
// The name must be that of a previously created DeleteConfigurationOperation,
 possibly from a different process.
func (c *restClient) DeleteConfigurationOperation(name string) *DeleteConfigurationOperation {
 override := fmt.Sprintf("/v1/%s", name)
 return &DeleteConfigurationOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
  pollPath: override,
 }
}

// ReactivateConfigurationOperation returns a new ReactivateConfigurationOperation from a given name.
// The name must be that of a previously created ReactivateConfigurationOperation, possibly from a different
process.
func (c *gRPCClient) ReactivateConfigurationOperation(name string) *ReactivateConfigurationOperation {
 return &ReactivateConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
 }
}

// ReactivateConfigurationOperation returns a new ReactivateConfigurationOperation from a given name.
// The name must be that of a previously created ReactivateConfigurationOperation, possibly
 from a different process.
func (c *restClient) ReactivateConfigurationOperation(name string) *ReactivateConfigurationOperation {
 override := fmt.Sprintf("/v1/%s", name)
 return &ReactivateConfigurationOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
  pollPath: override,
 }
}

// UpdateConfigurationOperation returns a new UpdateConfigurationOperation from a given name.
// The name must be that of a previously created UpdateConfigurationOperation, possibly from a different process.
func (c *gRPCClient) UpdateConfigurationOperation(name string) *UpdateConfigurationOperation {
 return &UpdateConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
 }
}

// UpdateConfigurationOperation returns a new UpdateConfigurationOperation from a given name.
// The name must be that of a previously created UpdateConfigurationOperation, possibly from a different process.
func (c
```

```
 *restClient) UpdateConfigurationOperation(name string) *UpdateConfigurationOperation {
 override := fmt.Sprintf("/v1/%s", name)
 return &UpdateConfigurationOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
  pollPath: override,
 }
}
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// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
)

func ExampleLicensesClient_List_all() {
```

```
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications
 to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.ListLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#ListLicensesRequest.
 }
 for resp, err := range c.List(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}
// Copyright 2025 Google LLC
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// you may not use this file except in compliance with the License.
// You may obtain a copy of the License at
//
//     https://www.apache.org/licenses/LICENSE-2.0
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// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package licensemanager_test

import (
 "context"
```

```
 licensemanager "cloud.google.com/go/licensemanager/apiv1"
 licensemanagerpb "cloud.google.com/go/licensemanager/apiv1/licensemanagerpb"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 locationpb "google.golang.org/genproto/googleapis/cloud/location"
)

func ExampleClient_AggregateUsage_all()
 {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.AggregateUsageRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#AggregateUsageRequest.
 }
 for resp, err := range c.AggregateUsage(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}

func ExampleClient_ListConfigurations_all() {
 ctx
 := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.ListConfigurationsRequest{
```

```
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#ListConfigurationsRequest.
 }
 for resp, err := range c.ListConfigurations(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}

func ExampleClient_ListInstances_all() {
 ctx := context.Background()
 // This
 snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.ListInstancesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#ListInstancesRequest.
 }
 for resp, err := range c.ListInstances(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}

func ExampleClient_ListProducts_all() {
 ctx := context.Background()
 // This snippet has been automatically generated and
 should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
```

```
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.ListProductsRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#ListProductsRequest.
 }
 for resp, err := range c.ListProducts(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}

func ExampleClient_ListLocations_all() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It
 will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &locationpb.ListLocationsRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/google.golang.org/genproto/googleapis/cloud/location#ListLocationsRequest.
 }
 for resp, err := range c.ListLocations(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}

func ExampleClient_ListOperations_all() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
```

```
 // It will require modifications to work:
 // - It may require
 correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &longrunningpb.ListOperationsRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#ListOperationsRequest.
 }
 for resp, err := range c.ListOperations(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}
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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.35.2
//  protoc        v4.25.7
// source: google/cloud/discoveryengine/v1/user_license.proto

package discoveryenginepb

import (
 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
```

```
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
 timestamppb "google.golang.org/protobuf/types/known/timestamppb"
 reflect
 "reflect"
 sync "sync"
)

const (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// License assignment state enumeration.
type UserLicense_LicenseAssignmentState int32

const (
 // Default value.
 UserLicense_LICENSE_ASSIGNMENT_STATE_UNSPECIFIED UserLicense_LicenseAssignmentState = 0
 // License assigned to the user.
 UserLicense_ASSIGNED UserLicense_LicenseAssignmentState = 1
 // No license assigned to the user.
 // Deprecated, translated to NO_LICENSE.
 UserLicense_UNASSIGNED UserLicense_LicenseAssignmentState = 2
 // No license assigned to the user.
 UserLicense_NO_LICENSE UserLicense_LicenseAssignmentState = 3
 // User attempted to login but no license assigned to the user.
 // This state is only used for no user first time login attempt
 but cannot
 // get license assigned.
 // Users already logged in but cannot get license assigned will be assigned
 // NO_LICENSE state(License could be unassigned by admin).
 UserLicense_NO_LICENSE_ATTEMPTED_LOGIN UserLicense_LicenseAssignmentState = 4
)

// Enum value maps for UserLicense_LicenseAssignmentState.
var (
 UserLicense_LicenseAssignmentState_name = map[int32]string{
  0: "LICENSE_ASSIGNMENT_STATE_UNSPECIFIED",
  1: "ASSIGNED",
  2: "UNASSIGNED",
  3: "NO_LICENSE",
  4: "NO_LICENSE_ATTEMPTED_LOGIN",
 }
 UserLicense_LicenseAssignmentState_value = map[string]int32{
  "LICENSE_ASSIGNMENT_STATE_UNSPECIFIED": 0,
  "ASSIGNED":                             1,
```

```
  "UNASSIGNED":                    2,
  "NO_LICENSE":                    3,
  "NO_LICENSE_ATTEMPTED_LOGIN":        4,
 }
)

func (x UserLicense_LicenseAssignmentState) Enum() *UserLicense_LicenseAssignmentState {
 p := new(UserLicense_LicenseAssignmentState)
 *p = x
 return p
}

func (x UserLicense_LicenseAssignmentState)
 String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (UserLicense_LicenseAssignmentState) Descriptor() protoreflect.EnumDescriptor {
 return file_google_cloud_discoveryengine_v1_user_license_proto_enumTypes[0].Descriptor()
}

func (UserLicense_LicenseAssignmentState) Type() protoreflect.EnumType {
 return &file_google_cloud_discoveryengine_v1_user_license_proto_enumTypes[0]
}

func (x UserLicense_LicenseAssignmentState) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use UserLicense_LicenseAssignmentState.Descriptor instead.
func (UserLicense_LicenseAssignmentState) EnumDescriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_proto_rawDescGZIP(), []int{0, 0}
}

// User License information assigned by the admin.
type UserLicense struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 //
 Required. Immutable. The user principal of the User, could be email address
 // or other prinical identifier. This field is immutable. Admin assign
 // licenses based on the user principal.
 UserPrincipal string `protobuf:"bytes,1,opt,name=user_principal,json=userPrincipal,proto3"
json:"user_principal,omitempty"`
 // Optional. The user profile.
 // We user user full name(First name + Last name) as user profile.
```

```
 UserProfile string `protobuf:"bytes,3,opt,name=user_profile,json=userProfile,proto3"
json:"user_profile,omitempty"`
 // Output only. License assignment state of the user.
 // If the user is assigned with a license config, the user loggin will be
 // assigned with the license;
 // If the user's license assignment state is unassigned or unspecified, no
 // license config will be associated to the user;
 LicenseAssignmentState UserLicense_LicenseAssignmentState
`protobuf:"varint,4,opt,name=license_assignment_state,json=licenseAssignmentState,proto3,enum=google.cloud.dis
coveryengine.v1.UserLicense_LicenseAssignmentState"
 json:"license_assignment_state,omitempty"`
 // Optional. The full resource name of the Subscription(LicenseConfig)
 // assigned to the user.
 LicenseConfig string `protobuf:"bytes,5,opt,name=license_config,json=licenseConfig,proto3"
json:"license_config,omitempty"`
 // Output only. User created timestamp.
 CreateTime *timestamppb.Timestamp `protobuf:"bytes,6,opt,name=create_time,json=createTime,proto3"
json:"create_time,omitempty"`
 // Output only. User update timestamp.
 UpdateTime *timestamppb.Timestamp `protobuf:"bytes,7,opt,name=update_time,json=updateTime,proto3"
json:"update_time,omitempty"`
 // Output only. User last logged in time.
 // If the user has not logged in yet, this field will be empty.
 LastLoginTime *timestamppb.Timestamp
`protobuf:"bytes,8,opt,name=last_login_time,json=lastLoginTime,proto3" json:"last_login_time,omitempty"`
}

func (x *UserLicense) Reset() {
 *x = UserLicense{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_proto_msgTypes[0]
 ms
 := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *UserLicense) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UserLicense) ProtoMessage() {}

func (x *UserLicense) ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
```

```
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use UserLicense.ProtoReflect.Descriptor instead.
func (*UserLicense) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_proto_rawDescGZIP(), []int{0}
}

func (x *UserLicense) GetUserPrincipal() string {
 if x != nil {
  return x.UserPrincipal
 }
 return ""
}

func (x *UserLicense) GetUserProfile() string {
 if x != nil {
  return x.UserProfile
 }
 return ""
}

func (x *UserLicense) GetLicenseAssignmentState()
 UserLicense_LicenseAssignmentState {
 if x != nil {
  return x.LicenseAssignmentState
 }
 return UserLicense_LICENSE_ASSIGNMENT_STATE_UNSPECIFIED
}

func (x *UserLicense) GetLicenseConfig() string {
 if x != nil {
  return x.LicenseConfig
 }
 return ""
}

func (x *UserLicense) GetCreateTime() *timestamppb.Timestamp {
 if x != nil {
  return x.CreateTime
 }
 return nil
}

func (x *UserLicense) GetUpdateTime() *timestamppb.Timestamp {
 if x != nil {
```

```
  return x.UpdateTime
 }
 return nil
}

func (x *UserLicense) GetLastLoginTime() *timestamppb.Timestamp {
 if x != nil {
  return x.LastLoginTime
 }
 return nil
}

var File_google_cloud_discoveryengine_v1_user_license_proto protoreflect.FileDescriptor

var file_google_cloud_discoveryengine_v1_user_license_proto_rawDesc = []byte{
 0x0a, 0x32, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2f, 0x64,
 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2f, 0x76,
 0x31,
 0x2f, 0x75, 0x73, 0x65, 0x72, 0x5f, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x2e, 0x70,
 0x72, 0x6f, 0x74, 0x6f, 0x12, 0x1f, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f,
 0x75, 0x64, 0x2e, 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69,
 0x6e, 0x65, 0x2e, 0x76, 0x31, 0x1a, 0x1f, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70,
 0x69, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64, 0x5f, 0x62, 0x65, 0x68, 0x61, 0x76, 0x69, 0x6f, 0x72,
 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x19, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61,
 0x70, 0x69, 0x2f, 0x72, 0x65, 0x73, 0x6f, 0x75, 0x72, 0x63, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74,
 0x6f, 0x1a, 0x1f, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x62,
 0x75, 0x66, 0x2f, 0x74, 0x69, 0x6d, 0x65, 0x73, 0x74, 0x61, 0x6d, 0x70, 0x2e, 0x70, 0x72, 0x6f,
 0x74, 0x6f, 0x22, 0xa6, 0x05, 0x0a, 0x0b, 0x55, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e,
 0x73, 0x65, 0x12, 0x2d, 0x0a, 0x0e,
 0x75, 0x73, 0x65, 0x72, 0x5f, 0x70, 0x72, 0x69, 0x6e, 0x63,
 0x69, 0x70, 0x61, 0x6c, 0x18, 0x01, 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x05, 0xe0,
 0x41, 0x02, 0x52, 0x0d, 0x75, 0x73, 0x65, 0x72, 0x50, 0x72, 0x69, 0x6e, 0x63, 0x69, 0x70, 0x61,
 0x6c, 0x12, 0x26, 0x0a, 0x0c, 0x75, 0x73, 0x65, 0x72, 0x5f, 0x70, 0x72, 0x6f, 0x66, 0x69, 0x6c,
 0x65, 0x18, 0x03, 0x20, 0x01, 0x28, 0x09, 0x42, 0x03, 0xe0, 0x41, 0x01, 0x52, 0x0b, 0x75, 0x73,
 0x65, 0x72, 0x50, 0x72, 0x6f, 0x66, 0x69, 0x6c, 0x65, 0x12, 0x82, 0x01, 0x0a, 0x18, 0x6c, 0x69,
 0x63, 0x65, 0x6e, 0x73, 0x65, 0x5f, 0x61, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65, 0x6e, 0x74,
 0x5f, 0x73, 0x74, 0x61, 0x74, 0x65, 0x18, 0x04, 0x20, 0x01, 0x28, 0x0e, 0x32, 0x43, 0x2e, 0x67,
 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x64, 0x69, 0x73, 0x63,
 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2e, 0x76, 0x31, 0x2e, 0x55,
 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x2e,
 0x4c, 0x69, 0x63, 0x65, 0x6e,
 0x73, 0x65, 0x41, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65, 0x6e, 0x74, 0x53, 0x74, 0x61, 0x74,
 0x65, 0x42, 0x03, 0xe0, 0x41, 0x03, 0x52, 0x16, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x41,
 0x73, 0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65, 0x6e, 0x74, 0x53, 0x74, 0x61, 0x74, 0x65, 0x12, 0x5b,
 0x0a, 0x0e, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x5f, 0x63, 0x6f, 0x6e, 0x66, 0x69, 0x67,
 0x18, 0x05, 0x20, 0x01, 0x28, 0x09, 0x42, 0x34, 0xe0, 0x41, 0x01, 0xfa, 0x41, 0x2e, 0x0a, 0x2c,
 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2e,
 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73, 0x2e, 0x63, 0x6f, 0x6d, 0x2f, 0x4c,
```

```
0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x43, 0x6f, 0x6e, 0x66, 0x69, 0x67, 0x52, 0x0d, 0x6c, 0x69,
0x63, 0x65, 0x6e, 0x73, 0x65, 0x43, 0x6f, 0x6e, 0x66, 0x69, 0x67, 0x12, 0x40, 0x0a, 0x0b, 0x63,
0x72, 0x65, 0x61, 0x74, 0x65, 0x5f, 0x74, 0x69, 0x6d, 0x65, 0x18, 0x06, 0x20, 0x01, 0x28, 0x0b,
0x32,
0x1a, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x62,
0x75, 0x66, 0x2e, 0x54, 0x69, 0x6d, 0x65, 0x73, 0x74, 0x61, 0x6d, 0x70, 0x42, 0x03, 0xe0, 0x41,
0x03, 0x52, 0x0a, 0x63, 0x72, 0x65, 0x61, 0x74, 0x65, 0x54, 0x69, 0x6d, 0x65, 0x12, 0x40, 0x0a,
0x0b, 0x75, 0x70, 0x64, 0x61, 0x74, 0x65, 0x5f, 0x74, 0x69, 0x6d, 0x65, 0x18, 0x07, 0x20, 0x01,
0x28, 0x0b, 0x32, 0x1a, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74,
0x6f, 0x62, 0x75, 0x66, 0x2e, 0x54, 0x69, 0x6d, 0x65, 0x73, 0x74, 0x61, 0x6d, 0x70, 0x42, 0x03,
0xe0, 0x41, 0x03, 0x52, 0x0a, 0x75, 0x70, 0x64, 0x61, 0x74, 0x65, 0x54, 0x69, 0x6d, 0x65, 0x12,
0x47, 0x0a, 0x0f, 0x6c, 0x61, 0x73, 0x74, 0x5f, 0x6c, 0x6f, 0x67, 0x69, 0x6e, 0x5f, 0x74, 0x69,
0x6d, 0x65, 0x18, 0x08, 0x20, 0x01, 0x28, 0x0b, 0x32, 0x1a, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c,
0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x62, 0x75, 0x66, 0x2e, 0x54, 0x69, 0x6d, 0x65, 0x73,
0x74, 0x61, 0x6d, 0x70, 0x42,
0x03, 0xe0, 0x41, 0x03, 0x52, 0x0d, 0x6c, 0x61, 0x73, 0x74, 0x4c,
0x6f, 0x67, 0x69, 0x6e, 0x54, 0x69, 0x6d, 0x65, 0x22, 0x90, 0x01, 0x0a, 0x16, 0x4c, 0x69, 0x63,
0x65, 0x6e, 0x73, 0x65, 0x41, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65, 0x6e, 0x74, 0x53, 0x74,
0x61, 0x74, 0x65, 0x12, 0x28, 0x0a, 0x24, 0x4c, 0x49, 0x43, 0x45, 0x4e, 0x53, 0x45, 0x5f, 0x41,
0x53, 0x53, 0x49, 0x47, 0x4e, 0x4d, 0x45, 0x4e, 0x54, 0x5f, 0x53, 0x54, 0x41, 0x54, 0x45, 0x5f,
0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49, 0x46, 0x49, 0x45, 0x44, 0x10, 0x00, 0x12, 0x0c, 0x0a,
0x08, 0x41, 0x53, 0x53, 0x49, 0x47, 0x4e, 0x45, 0x44, 0x10, 0x01, 0x12, 0x0e, 0x0a, 0x0a, 0x55,
0x4e, 0x41, 0x53, 0x53, 0x49, 0x47, 0x4e, 0x45, 0x44, 0x10, 0x02, 0x12, 0x0e, 0x0a, 0x0a, 0x4e,
0x4f, 0x5f, 0x4c, 0x49, 0x43, 0x45, 0x4e, 0x53, 0x45, 0x10, 0x03, 0x12, 0x1e, 0x0a, 0x1a, 0x4e,
0x4f, 0x5f, 0x4c, 0x49, 0x43, 0x45, 0x4e, 0x53, 0x45, 0x5f, 0x41, 0x54, 0x54, 0x45, 0x4d, 0x50,
0x54, 0x45, 0x44, 0x5f, 0x4c, 0x4f, 0x47, 0x49, 0x4e, 0x10,
0x04, 0x42, 0x83, 0x02, 0x0a, 0x23,
0x63, 0x6f, 0x6d, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64,
0x2e, 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65,
0x2e, 0x76, 0x31, 0x42, 0x10, 0x55, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65,
0x50, 0x72, 0x6f, 0x74, 0x6f, 0x50, 0x01, 0x5a, 0x4d, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x67,
0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6f, 0x6d, 0x2f, 0x67, 0x6f, 0x2f, 0x64, 0x69, 0x73,
0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2f, 0x61, 0x70, 0x69,
0x76, 0x31, 0x2f, 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69,
0x6e, 0x65, 0x70, 0x62, 0x3b, 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e,
0x67, 0x69, 0x6e, 0x65, 0x70, 0x62, 0xa2, 0x02, 0x0f, 0x44, 0x49, 0x53, 0x43, 0x4f, 0x56, 0x45,
0x52, 0x59, 0x45, 0x4e, 0x47, 0x49, 0x4e, 0x45, 0xaa, 0x02, 0x1f, 0x47, 0x6f, 0x6f, 0x67,
0x6c,
0x65, 0x2e, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x44, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72,
0x79, 0x45, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2e, 0x56, 0x31, 0xca, 0x02, 0x1f, 0x47, 0x6f, 0x6f,
0x67, 0x6c, 0x65, 0x5c, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x5c, 0x44, 0x69, 0x73, 0x63, 0x6f, 0x76,
0x65, 0x72, 0x79, 0x45, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x5c, 0x56, 0x31, 0xea, 0x02, 0x22, 0x47,
0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x3a, 0x3a, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x3a, 0x3a, 0x44, 0x69,
0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x45, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x3a, 0x3a, 0x56,
0x31, 0x62, 0x06, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x33,
}

var (
```

```
 file_google_cloud_discoveryengine_v1_user_license_proto_rawDescOnce sync.Once
 file_google_cloud_discoveryengine_v1_user_license_proto_rawDescData =
file_google_cloud_discoveryengine_v1_user_license_proto_rawDesc
)

func file_google_cloud_discoveryengine_v1_user_license_proto_rawDescGZIP() []byte {
 file_google_cloud_discoveryengine_v1_user_license_proto_rawDescOnce.Do(func()
 {
  file_google_cloud_discoveryengine_v1_user_license_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_cloud_discoveryengine_v1_user_license_proto_rawDescData)
 })
 return file_google_cloud_discoveryengine_v1_user_license_proto_rawDescData
}

var file_google_cloud_discoveryengine_v1_user_license_proto_enumTypes = make([]protoimpl.EnumInfo, 1)
var file_google_cloud_discoveryengine_v1_user_license_proto_msgTypes = make([]protoimpl.MessageInfo, 1)
var file_google_cloud_discoveryengine_v1_user_license_proto_goTypes = []any{
 (UserLicense_LicenseAssignmentState)(0), // 0:
google.cloud.discoveryengine.v1.UserLicense.LicenseAssignmentState
 (*UserLicense)(nil),                    // 1: google.cloud.discoveryengine.v1.UserLicense
 (*timestamppb.Timestamp)(nil),          // 2: google.protobuf.Timestamp
}
var file_google_cloud_discoveryengine_v1_user_license_proto_depIdxs = []int32{
 0, // 0: google.cloud.discoveryengine.v1.UserLicense.license_assignment_state:type_name
 -> google.cloud.discoveryengine.v1.UserLicense.LicenseAssignmentState
 2, // 1: google.cloud.discoveryengine.v1.UserLicense.create_time:type_name -> google.protobuf.Timestamp
 2, // 2: google.cloud.discoveryengine.v1.UserLicense.update_time:type_name -> google.protobuf.Timestamp
 2, // 3: google.cloud.discoveryengine.v1.UserLicense.last_login_time:type_name -> google.protobuf.Timestamp
 4, // [4:4] is the sub-list for method output_type
 4, // [4:4] is the sub-list for method input_type
 4, // [4:4] is the sub-list for extension type_name
 4, // [4:4] is the sub-list for extension extendee
 0, // [0:4] is the sub-list for field type_name
}

func init() { file_google_cloud_discoveryengine_v1_user_license_proto_init() }
func file_google_cloud_discoveryengine_v1_user_license_proto_init() {
 if File_google_cloud_discoveryengine_v1_user_license_proto != nil {
  return
 }
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor:
 file_google_cloud_discoveryengine_v1_user_license_proto_rawDesc,
   NumEnums:      1,
   NumMessages:   1,
```

```
  NumExtensions: 0,
  NumServices:   0,
 },
 GoTypes:          file_google_cloud_discoveryengine_v1_user_license_proto_goTypes,
 DependencyIndexes: file_google_cloud_discoveryengine_v1_user_license_proto_depIdxs,
 EnumInfos:         file_google_cloud_discoveryengine_v1_user_license_proto_enumTypes,
 MessageInfos:      file_google_cloud_discoveryengine_v1_user_license_proto_msgTypes,
}.Build()
File_google_cloud_discoveryengine_v1_user_license_proto = out.File
file_google_cloud_discoveryengine_v1_user_license_proto_rawDesc = nil
file_google_cloud_discoveryengine_v1_user_license_proto_goTypes = nil
file_google_cloud_discoveryengine_v1_user_license_proto_depIdxs = nil
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package procurement_test

import (
 "context"

 procurement "cloud.google.com/go/commerce/consumer/procurement/apiv1"
 procurementpb "cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 "google.golang.org/api/iterator"
)

func ExampleNewLicenseManagementClient() {
 ctx
 := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
```

```
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleNewLicenseManagementRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c,
 err := procurement.NewLicenseManagementRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicenseManagementClient_Assign() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.AssignRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#AssignRequest.
 }
 resp, err := c.Assign(ctx, req)
 if err != nil {
```

```
  // TODO: Handle error.
 }
 //
 TODO: Use resp.
 _ = resp
}

func ExampleLicenseManagementClient_EnumerateLicensedUsers() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.EnumerateLicensedUsersRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#EnumerateLicense
dUsersRequest.
 }
 it := c.EnumerateLicensedUsers(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  //
 TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*procurementpb.EnumerateLicensedUsersResponse)
 }
}

func ExampleLicenseManagementClient_GetLicensePool() {
```

```
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.GetLicensePoolRequest{
  // TODO: Fill request struct fields.
  //
 See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#GetLicensePoolRe
quest.
 }
 resp, err := c.GetLicensePool(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicenseManagementClient_Unassign() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.UnassignRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#UnassignRequest.
 }
 resp,
 err := c.Unassign(ctx, req)
 if err != nil {
```

```
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicenseManagementClient_UpdateLicensePool() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.UpdateLicensePoolRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#UpdateLicensePoo
lRequest.
 }
 resp, err := c.UpdateLicensePool(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 //
 TODO: Use resp.
 _ = resp
}

func ExampleLicenseManagementClient_GetOperation() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &longrunningpb.GetOperationRequest{
```

```
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#GetOperationRequest.
 }
 resp, err := c.GetOperation(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
```

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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package compute_test
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1beta"
 computepb "cloud.google.com/go/compute/apiv1beta/computepb"
 "google.golang.org/api/iterator"
)

func ExampleNewLicensesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 //
 It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()
```

```
 // TODO: Use client.
 _ = c
}

func ExampleLicensesClient_Delete() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.DeleteLicenseRequest{
  //
 TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#DeleteLicenseRequest.
 }
 op, err := c.Delete(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleLicensesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetLicenseRequest{
```

```
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#GetLicenseRequest.
 }
 resp,
 err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_GetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetIamPolicyLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#GetIamPolicyLicenseRequest.
 }
 resp, err := c.GetIamPolicy(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_Insert()
 {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
```

```
 }
 defer c.Close()

 req := &computepb.InsertLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#InsertLicenseRequest.
 }
 op, err := c.Insert(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleLicensesClient_List() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded
 as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.ListLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#ListLicensesRequest.
 }
 it := c.List(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp
```

```
 // If you need to access the underlying RPC response,
 // you can do so by casting the `Response` as below.
 // Otherwise, remove this line. Only populated after
 // first call to Next(). Not safe for concurrent access.
 _
= it.Response.(*computepb.LicensesListResponse)
 }
}

func ExampleLicensesClient_SetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.SetIamPolicyLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#SetIamPolicyLicenseRequest.
 }
 resp, err := c.SetIamPolicy(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_TestIamPermissions() {
 ctx := context.Background()
 //
 This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()
```

```
 req := &computepb.TestIamPermissionsLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#TestIamPermissionsLicenseRequest.
 }
 resp, err := c.TestIamPermissions(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_Update() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require
 modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.UpdateLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#UpdateLicenseRequest.
 }
 op, err := c.Update(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}
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package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
)

func ExampleNewLicenseCodesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 //
 - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicenseCodesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()
```

```
 req := &computepb.GetLicenseCodeRequest{
  // TODO: Fill request
 struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseCodeRequest.
 }
 resp, err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicenseCodesClient_TestIamPermissions() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.TestIamPermissionsLicenseCodeRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseCodeRequest.
 }
 resp,
 err := c.TestIamPermissions(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
// Copyright 2025 Google LLC
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package discoveryengine

import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
 "math"
 "net/http"
 "net/url"
 "time"

 discoveryenginepb "cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb"
 "cloud.google.com/go/longrunning"
 lroauto "cloud.google.com/go/longrunning/autogen"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 gax
 "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 gtransport "google.golang.org/api/transport/grpc"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/grpc/codes"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var newUserLicenseClientHook clientHook

// UserLicenseCallOptions contains the retry settings for each method of UserLicenseClient.
type UserLicenseCallOptions struct {
 ListUserLicenses        []gax.CallOption
 BatchUpdateUserLicenses []gax.CallOption
 CancelOperation         []gax.CallOption
 GetOperation            []gax.CallOption
 ListOperations          []gax.CallOption
}

func defaultUserLicenseGRPCClientOptions() []option.ClientOption {
 return []option.ClientOption{
```

```
 internaloption.WithDefaultEndpoint("discoveryengine.googleapis.com:443"),
 internaloption.WithDefaultEndpointTemplate("discoveryengine.UNIVERSE_DOMAIN:443"),
 internaloption.WithDefaultMTLSEndpoint("discoveryengine.mtls.googleapis.com:443"),
 internaloption.WithDefaultUniverseDomain("googleapis.com"),
 internaloption.WithDefaultAudience("https://discoveryengine.googleapis.com/"),
 internaloption.WithDefaultScopes(DefaultAuthScopes()...),
 internaloption.EnableJwtWithScope(),
 internaloption.EnableNewAuthLibrary(),
 option.WithGRPCDialOption(grpc.WithDefaultCallOptions(
  grpc.MaxCallRecvMsgSize(math.MaxInt32))),
 }
}

func
 defaultUserLicenseCallOptions() *UserLicenseCallOptions {
 return &UserLicenseCallOptions{
  ListUserLicenses:        []gax.CallOption{},
  BatchUpdateUserLicenses: []gax.CallOption{},
  CancelOperation: []gax.CallOption{
   gax.WithTimeout(30000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnCodes([]codes.Code{
     codes.Unavailable,
    }, gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        10000 * time.Millisecond,
     Multiplier:
 1.30,
    })
   }),
  },
  GetOperation: []gax.CallOption{
   gax.WithTimeout(30000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnCodes([]codes.Code{
     codes.Unavailable,
    }, gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        10000 * time.Millisecond,
     Multiplier: 1.30,
    })
   }),
  },
  ListOperations: []gax.CallOption{
   gax.WithTimeout(300000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnCodes([]codes.Code{
     codes.Unavailable,
```

```
    }, gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        30000 * time.Millisecond,
     Multiplier: 1.30,
    })
   }),
  },
 }
}

func defaultUserLicenseRESTCallOptions() *UserLicenseCallOptions {
 return &UserLicenseCallOptions{
  ListUserLicenses:        []gax.CallOption{},
  BatchUpdateUserLicenses: []gax.CallOption{},
  CancelOperation: []gax.CallOption{
   gax.WithTimeout(30000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer
  {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        10000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusServiceUnavailable)
   }),
  },
  GetOperation: []gax.CallOption{
   gax.WithTimeout(30000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        10000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusServiceUnavailable)
   }),
  },
  ListOperations: []gax.CallOption{
   gax.WithTimeout(300000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        30000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusServiceUnavailable)
   }),
  },
```

```
 }
}

// internalUserLicenseClient is an interface that defines the methods available from Discovery Engine API.
type internalUserLicenseClient
 interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 ListUserLicenses(context.Context, *discoveryenginepb.ListUserLicensesRequest, ...gax.CallOption)
*UserLicenseIterator
 BatchUpdateUserLicenses(context.Context, *discoveryenginepb.BatchUpdateUserLicensesRequest,
...gax.CallOption) (*BatchUpdateUserLicensesOperation, error)
 BatchUpdateUserLicensesOperation(name string) *BatchUpdateUserLicensesOperation
 CancelOperation(context.Context, *longrunningpb.CancelOperationRequest, ...gax.CallOption) error
 GetOperation(context.Context, *longrunningpb.GetOperationRequest, ...gax.CallOption)
(*longrunningpb.Operation, error)
 ListOperations(context.Context, *longrunningpb.ListOperationsRequest, ...gax.CallOption) *OperationIterator
}

// UserLicenseClient is a client for interacting with Discovery Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// Service for managing
 User Licenses.
type UserLicenseClient struct {
 // The internal transport-dependent client.
 internalClient internalUserLicenseClient

 // The call options for this service.
 CallOptions *UserLicenseCallOptions

 // LROClient is used internally to handle long-running operations.
 // It is exposed so that its CallOptions can be modified if required.
 // Users should not Close this client.
 LROClient *lroauto.OperationsClient
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *UserLicenseClient) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
```

```
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *UserLicenseClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns
 a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *UserLicenseClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// ListUserLicenses lists the User Licenses.
func (c *UserLicenseClient) ListUserLicenses(ctx context.Context, req
*discoveryenginepb.ListUserLicensesRequest, opts ...gax.CallOption) *UserLicenseIterator {
 return c.internalClient.ListUserLicenses(ctx, req, opts...)
}

// BatchUpdateUserLicenses updates the User License.
// This method is used for batch assign/unassign licenses to users.
func (c *UserLicenseClient) BatchUpdateUserLicenses(ctx context.Context, req
*discoveryenginepb.BatchUpdateUserLicensesRequest, opts ...gax.CallOption)
(*BatchUpdateUserLicensesOperation, error) {
 return c.internalClient.BatchUpdateUserLicenses(ctx, req, opts...)
}

// BatchUpdateUserLicensesOperation returns a new BatchUpdateUserLicensesOperation from a given name.
//
 The name must be that of a previously created BatchUpdateUserLicensesOperation, possibly from a different
process.
func (c *UserLicenseClient) BatchUpdateUserLicensesOperation(name string)
*BatchUpdateUserLicensesOperation {
 return c.internalClient.BatchUpdateUserLicensesOperation(name)
}

// CancelOperation is a utility method from google.longrunning.Operations.
func (c *UserLicenseClient) CancelOperation(ctx context.Context, req *longrunningpb.CancelOperationRequest,
opts ...gax.CallOption) error {
 return c.internalClient.CancelOperation(ctx, req, opts...)
}

// GetOperation is a utility method from google.longrunning.Operations.
func (c *UserLicenseClient) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest, opts
...gax.CallOption) (*longrunningpb.Operation, error) {
 return c.internalClient.GetOperation(ctx, req, opts...)
```

```
}

// ListOperations is a utility method from google.longrunning.Operations.
func (c *UserLicenseClient) ListOperations(ctx context.Context,
 req *longrunningpb.ListOperationsRequest, opts ...gax.CallOption) *OperationIterator {
 return c.internalClient.ListOperations(ctx, req, opts...)
}

// userLicenseGRPCClient is a client for interacting with Discovery Engine API over gRPC transport.
//
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type userLicenseGRPCClient struct {
 // Connection pool of gRPC connections to the service.
 connPool gtransport.ConnPool

 // Points back to the CallOptions field of the containing UserLicenseClient
 CallOptions **UserLicenseCallOptions

 // The gRPC API client.
 userLicenseClient discoveryenginepb.UserLicenseServiceClient

 // LROClient is used internally to handle long-running operations.
 // It is exposed so that its CallOptions can be modified if required.
 // Users should not Close this client.
 LROClient **lroauto.OperationsClient

 operationsClient longrunningpb.OperationsClient

 // The x-goog-* metadata
 to be sent with each request.
 xGoogHeaders []string

 logger *slog.Logger
}

// NewUserLicenseClient creates a new user license service client based on gRPC.
// The returned client must be Closed when it is done being used to clean up its underlying connections.
//
// Service for managing User Licenses.
func NewUserLicenseClient(ctx context.Context, opts ...option.ClientOption) (*UserLicenseClient, error) {
 clientOpts := defaultUserLicenseGRPCClientOptions()
 if newUserLicenseClientHook != nil {
  hookOpts, err := newUserLicenseClientHook(ctx, clientHookParams{})
  if err != nil {
   return nil, err
  }
  clientOpts = append(clientOpts, hookOpts...)
```

```
 }

 connPool, err := gtransport.DialPool(ctx, append(clientOpts, opts...)...)
 if err != nil {
  return nil, err
 }
 client := UserLicenseClient{CallOptions: defaultUserLicenseCallOptions()}

 c := &userLicenseGRPCClient{
  connPool:          connPool,
  userLicenseClient: discoveryenginepb.NewUserLicenseServiceClient(connPool),
  CallOptions:
      &client.CallOptions,
  logger:            internaloption.GetLogger(opts),
  operationsClient:  longrunningpb.NewOperationsClient(connPool),
 }
 c.setGoogleClientInfo()

 client.internalClient = c

 client.LROClient, err = lroauto.NewOperationsClient(ctx, gtransport.WithConnPool(connPool))
 if err != nil {
  // This error "should not happen", since we are just reusing old connection pool
  // and never actually need to dial.
  // If this does happen, we could leak connp. However, we cannot close conn:
  // If the user invoked the constructor with option.WithGRPCConn,
  // we would close a connection that's still in use.
  // TODO: investigate error conditions.
  return nil, err
 }
 c.LROClient = &client.LROClient
 return &client, nil
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *userLicenseGRPCClient) Connection() *grpc.ClientConn {
 return c.connPool.Conn()
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *userLicenseGRPCClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
```

```
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "grpc", grpc.Version, "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *userLicenseGRPCClient) Close() error {
 return c.connPool.Close()
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type userLicenseRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // LROClient is used internally
 to handle long-running operations.
 // It is exposed so that its CallOptions can be modified if required.
 // Users should not Close this client.
 LROClient **lroauto.OperationsClient

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing UserLicenseClient
 CallOptions **UserLicenseCallOptions

 logger *slog.Logger
}

// NewUserLicenseRESTClient creates a new user license service rest client.
//
// Service for managing User Licenses.
func NewUserLicenseRESTClient(ctx context.Context, opts ...option.ClientOption) (*UserLicenseClient, error) {
 clientOpts := append(defaultUserLicenseRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultUserLicenseRESTCallOptions()
 c := &userLicenseRESTClient{
```

```
 endpoint:    endpoint,
 httpClient:  httpClient,
 CallOptions: &callOpts,
 logger:      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 lroOpts
 := []option.ClientOption{
  option.WithHTTPClient(httpClient),
  option.WithEndpoint(endpoint),
 }
 opClient, err := lroauto.NewOperationsRESTClient(ctx, lroOpts...)
 if err != nil {
  return nil, err
 }
 c.LROClient = &opClient

 return &UserLicenseClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultUserLicenseRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://discoveryengine.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://discoveryengine.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://discoveryengine.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://discoveryengine.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

// setGoogleClientInfo
 sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *userLicenseRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *userLicenseRESTClient) Close() error {
```

```
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *userLicenseRESTClient) Connection() *grpc.ClientConn {
 return nil
}
func (c *userLicenseGRPCClient) ListUserLicenses(ctx context.Context, req
*discoveryenginepb.ListUserLicensesRequest,
 opts ...gax.CallOption) *UserLicenseIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).ListUserLicenses[0:len((*c.CallOptions).ListUserLicenses):len((*c.CallOptions).ListUser
Licenses)], opts...)
 it := &UserLicenseIterator{}
 req = proto.Clone(req).(*discoveryenginepb.ListUserLicensesRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*discoveryenginepb.UserLicense, string, error) {
  resp := &discoveryenginepb.ListUserLicensesResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx,
 c.userLicenseClient.ListUserLicenses, req, settings.GRPC, c.logger, "ListUserLicenses")
   return err
  }, opts...)
  if err != nil {
   return nil, "", err
  }

  it.Response = resp
  return resp.GetUserLicenses(), resp.GetNextPageToken(), nil
 }
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
```

```
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

func (c *userLicenseGRPCClient) BatchUpdateUserLicenses(ctx context.Context, req
*discoveryenginepb.BatchUpdateUserLicensesRequest, opts ...gax.CallOption)
(*BatchUpdateUserLicensesOperation, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders,
 hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).BatchUpdateUserLicenses[0:len((*c.CallOptions).BatchUpdateUserLicenses):len((*c.Call
Options).BatchUpdateUserLicenses)], opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.userLicenseClient.BatchUpdateUserLicenses, req, settings.GRPC, c.logger,
"BatchUpdateUserLicenses")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return &BatchUpdateUserLicensesOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, resp),
 }, nil
}

func (c *userLicenseGRPCClient) CancelOperation(ctx context.Context, req
*longrunningpb.CancelOperationRequest, opts ...gax.CallOption) error {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx,
 hds...)
 opts =
```

```
append((*c.CallOptions).CancelOperation[0:len((*c.CallOptions).CancelOperation):len((*c.CallOptions).CancelOp
eration)], opts...)
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  _, err = executeRPC(ctx, c.operationsClient.CancelOperation, req, settings.GRPC, c.logger, "CancelOperation")
  return err
 }, opts...)
 return err
}

func (c *userLicenseGRPCClient) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest,
opts ...gax.CallOption) (*longrunningpb.Operation, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).GetOperation[0:len((*c.CallOptions).GetOperation):len((*c.CallOptions).GetOperation)],
opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context,
 settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.operationsClient.GetOperation, req, settings.GRPC, c.logger, "GetOperation")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *userLicenseGRPCClient) ListOperations(ctx context.Context, req *longrunningpb.ListOperationsRequest,
opts ...gax.CallOption) *OperationIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).ListOperations[0:len((*c.CallOptions).ListOperations):len((*c.CallOptions).ListOperations
)], opts...)
 it := &OperationIterator{}
 req = proto.Clone(req).(*longrunningpb.ListOperationsRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*longrunningpb.Operation, string, error) {
  resp := &longrunningpb.ListOperationsResponse{}
  if pageToken !=
 "" {
   req.PageToken = pageToken
```

```
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx, c.operationsClient.ListOperations, req, settings.GRPC, c.logger, "ListOperations")
   return err
  }, opts...)
  if err != nil {
   return nil, "", err
  }

  it.Response = resp
  return resp.GetOperations(), resp.GetNextPageToken(), nil
 }
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

// ListUserLicenses lists the
 User Licenses.
func (c *userLicenseRESTClient) ListUserLicenses(ctx context.Context, req
*discoveryenginepb.ListUserLicensesRequest, opts ...gax.CallOption) *UserLicenseIterator {
 it := &UserLicenseIterator{}
 req = proto.Clone(req).(*discoveryenginepb.ListUserLicensesRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*discoveryenginepb.UserLicense, string, error) {
  resp := &discoveryenginepb.ListUserLicensesResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
```

```
 } else if pageSize != 0 {
  req.PageSize = int32(pageSize)
 }
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, "", err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v/userLicenses", req.GetParent())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")
 if req.GetFilter() != "" {
  params.Add("filter", fmt.Sprintf("%v",
req.GetFilter()))
 }
 if req.GetPageSize() != 0 {
  params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
 }
 if req.GetPageToken() != "" {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "ListUserLicenses")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
```

```
  return nil, "", e
 }
 it.Response
= resp
 return resp.GetUserLicenses(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// BatchUpdateUserLicenses updates the User License.
// This method is used for batch assign/unassign licenses to users.
func (c *userLicenseRESTClient) BatchUpdateUserLicenses(ctx context.Context, req
*discoveryenginepb.BatchUpdateUserLicensesRequest, opts ...gax.CallOption)
(*BatchUpdateUserLicensesOperation, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 jsonReq, err := m.Marshal(req)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if
 err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:batchUpdateUserLicenses", req.GetParent())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}
```

```
 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &longrunningpb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err
 := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "BatchUpdateUserLicenses")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }

 override := fmt.Sprintf("/v1/%s", resp.GetName())
 return &BatchUpdateUserLicensesOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, resp),
  pollPath: override,
 }, nil
}

// CancelOperation is a utility method from google.longrunning.Operations.
func (c *userLicenseRESTClient) CancelOperation(ctx context.Context, req
*longrunningpb.CancelOperationRequest, opts ...gax.CallOption) error {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 jsonReq, err := m.Marshal(req)
 if err != nil {
  return err
 }
```

```
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:cancel", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery
 = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 return gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  _, err = executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "CancelOperation")
  return err
 }, opts...)
}

// GetOperation is a utility method from google.longrunning.Operations.
func (c *userLicenseRESTClient) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest,
opts ...gax.CallOption)
 (*longrunningpb.Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()
```

```
 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetOperation[0:len((*c.CallOptions).GetOperation):len((*c.CallOptions).GetOperation)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &longrunningpb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET",
 baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetOperation")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// ListOperations is a utility method from google.longrunning.Operations.
func (c *userLicenseRESTClient) ListOperations(ctx context.Context, req *longrunningpb.ListOperationsRequest,
opts ...gax.CallOption) *OperationIterator {
 it := &OperationIterator{}
 req = proto.Clone(req).(*longrunningpb.ListOperationsRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*longrunningpb.Operation, string, error) {
```

```
 resp := &longrunningpb.ListOperationsResponse{}
 if pageToken != "" {
  req.PageToken
= pageToken
 }
 if pageSize > math.MaxInt32 {
  req.PageSize = math.MaxInt32
 } else if pageSize != 0 {
  req.PageSize = int32(pageSize)
 }
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, "", err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v/operations", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")
 if req.GetFilter() != "" {
  params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
 }
 if req.GetPageSize() != 0 {
  params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
 }
 if req.GetPageToken() != "" {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path
= settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "ListOperations")
  if err != nil {
   return err
  }
```

```
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetOperations(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// BatchUpdateUserLicensesOperation returns a new
 BatchUpdateUserLicensesOperation from a given name.
// The name must be that of a previously created BatchUpdateUserLicensesOperation, possibly from a different
process.
func (c *userLicenseGRPCClient) BatchUpdateUserLicensesOperation(name string)
*BatchUpdateUserLicensesOperation {
 return &BatchUpdateUserLicensesOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
 }
}

// BatchUpdateUserLicensesOperation returns a new BatchUpdateUserLicensesOperation from a given name.
// The name must be that of a previously created BatchUpdateUserLicensesOperation, possibly from a different
process.
func (c *userLicenseRESTClient) BatchUpdateUserLicensesOperation(name string)
*BatchUpdateUserLicensesOperation {
 override := fmt.Sprintf("/v1/%s", name)
 return &BatchUpdateUserLicensesOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
```

```
  pollPath: override,
 }
}
// Copyright 2025 Google LLC
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//     https://www.apache.org/licenses/LICENSE-2.0
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// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package procurement_test

import (
 "context"

 procurement "cloud.google.com/go/commerce/consumer/procurement/apiv1"
 procurementpb "cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb"
)

func ExampleLicenseManagementClient_EnumerateLicensedUsers_all() {
 ctx := context.Background()
 // This snippet has been automatically
 generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.EnumerateLicensedUsersRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#EnumerateLicense
```

```
dUsersRequest.
 }
 for resp, err := range c.EnumerateLicensedUsers(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}
// Copyright 2025 Google LLC
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//     https://www.apache.org/licenses/LICENSE-2.0
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// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
// See the License for the specific language governing permissions and
// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute

import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
 "math"
 "net/http"
 "net/url"
 "time"

 computepb "cloud.google.com/go/compute/apiv1beta/computepb"
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)
```

```
var
 newLicensesClientHook clientHook

// LicensesCallOptions contains the retry settings for each method of LicensesClient.
type LicensesCallOptions struct {
 Delete             []gax.CallOption
 Get                []gax.CallOption
 GetIamPolicy       []gax.CallOption
 Insert             []gax.CallOption
 List               []gax.CallOption
 SetIamPolicy       []gax.CallOption
 TestIamPermissions []gax.CallOption
 Update             []gax.CallOption
}

func defaultLicensesRESTCallOptions() *LicensesCallOptions {
 return &LicensesCallOptions{
  Delete: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  Get: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier:
 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  GetIamPolicy: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  Insert: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
```

```
  },
  List: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  SetIamPolicy: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  TestIamPermissions: []gax.CallOption{
   gax.WithTimeout(600000
 * time.Millisecond),
  },
  Update: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
 }
}

// internalLicensesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicensesClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Delete(context.Context, *computepb.DeleteLicenseRequest, ...gax.CallOption) (*Operation, error)
 Get(context.Context, *computepb.GetLicenseRequest, ...gax.CallOption) (*computepb.License, error)
 GetIamPolicy(context.Context, *computepb.GetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 Insert(context.Context, *computepb.InsertLicenseRequest, ...gax.CallOption) (*Operation, error)
 List(context.Context, *computepb.ListLicensesRequest, ...gax.CallOption) *LicenseIterator
 SetIamPolicy(context.Context, *computepb.SetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 TestIamPermissions(context.Context,
 *computepb.TestIamPermissionsLicenseRequest, ...gax.CallOption) (*computepb.TestPermissionsResponse, error)
 Update(context.Context, *computepb.UpdateLicenseRequest, ...gax.CallOption) (*Operation, error)
}

// LicensesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
```

```
// The Licenses API.
type LicensesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicensesClient

 // The call options for this service.
 CallOptions *LicensesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicensesClient) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header
 passed on each request. Intended for
// use by Google-written clients.
func (c *LicensesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicensesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// Delete deletes the specified license. Caution This resource is intended for use only by third-party partners who are
creating Cloud Marketplace images.
func (c *LicensesClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts ...gax.CallOption)
(*Operation, error) {
 return c.internalClient.Delete(ctx, req, opts...)
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners
who are creating Cloud Marketplace images.
func (c *LicensesClient) Get(ctx context.Context,
 req *computepb.GetLicenseRequest, opts ...gax.CallOption) (*computepb.License, error) {
 return c.internalClient.Get(ctx, req, opts...)
}

// GetIamPolicy gets the access control policy for a resource. May be empty if no such policy or resource exists.
```

Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest, opts ...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.GetIamPolicy(ctx, req, opts...)
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 return c.internalClient.Insert(ctx, req, opts...)
}

// List retrieves the list of licenses available
 in the specified project. This method does not get any licenses that belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-cloud or windows-cloud. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts ...gax.CallOption) *LicenseIterator {
 return c.internalClient.List(ctx, req, opts...)
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest, opts ...gax.CallOption) (*computepb.Policy, error) {
 return
 c.internalClient.SetIamPolicy(ctx, req, opts...)
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) TestIamPermissions(ctx context.Context, req *computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse, error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}

// Update updates a License resource in the specified project. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Update(ctx context.Context, req *computepb.UpdateLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 return c.internalClient.Update(ctx, req, opts...)
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with method calls.

```
type
 licensesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // operationClient is used to call the operation-specific management service.
 operationClient *GlobalOperationsClient

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicensesClient
 CallOptions **LicensesCallOptions

 logger *slog.Logger
}

// NewLicensesRESTClient creates a new licenses rest client.
//
// The Licenses API.
func NewLicensesRESTClient(ctx context.Context, opts ...option.ClientOption) (*LicensesClient, error) {
 clientOpts := append(defaultLicensesRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicensesRESTCallOptions()
 c := &licensesRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:
     internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 o := []option.ClientOption{
  option.WithHTTPClient(httpClient),
  option.WithEndpoint(endpoint),
 }
 opC, err := NewGlobalOperationsRESTClient(ctx, o...)
 if err != nil {
  return nil, err
 }
```

```
 c.operationClient = opC

 return &LicensesClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicensesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

// setGoogleClientInfo sets the name and version of the application
 in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licensesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licensesRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 if err := c.operationClient.Close(); err != nil {
  return err
 }
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licensesRESTClient) Connection() *grpc.ClientConn {
 return nil
}

// Delete deletes the specified license. Caution This resource is intended for
```

```
 use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Delete[0:len((*c.CallOptions).Delete):len((*c.CallOptions).Delete)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Delete")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
```

```
 }, opts...)
 if e != nil {
  return nil, e
 }
 op := &Operation{
  &globalOperationsHandle{
   c:       c.operationClient,
   proto:   resp,
   project: req.GetProject(),
  },
 }
 return op, nil
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners
who are creating
 Cloud Marketplace images.
func (c *licensesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption)
(*computepb.License, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.License{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings)
 error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Get")
```

```
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// GetIamPolicy gets the access control policy for a resource. May be empty if no such policy or resource exists.
Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses/%v/getIamPolicy",
 req.GetProject(), req.GetResource())

 params := url.Values{}
 if req != nil && req.OptionsRequestedPolicyVersion != nil {
  params.Add("optionsRequestedPolicyVersion", fmt.Sprintf("%v", req.GetOptionsRequestedPolicyVersion()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetIamPolicy[0:len((*c.CallOptions).GetIamPolicy):len((*c.CallOptions).GetIamPolicy)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error
```

```
 {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetIamPolicy")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetLicenseResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err
 := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
```

```
 params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
}

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "project", url.QueryEscape(req.GetProject()))}

hds = append(c.xGoogHeaders, hds...)
hds = append(hds, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
opts = append((*c.CallOptions).Insert[0:len((*c.CallOptions).Insert):len((*c.CallOptions).Insert)], opts...)
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
resp := &computepb.Operation{}
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq,
err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Insert")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
op := &Operation{
 &globalOperationsHandle{
  c:       c.operationClient,
  proto:   resp,
  project: req.GetProject(),
 },
}
return op, nil
```

```
}

// List retrieves the list of licenses available in the specified project. This method does not get any licenses that
belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a
list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-
cloud or windows-cloud. Caution This resource is intended
 for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts
...gax.CallOption) *LicenseIterator {
 it := &LicenseIterator{}
 req = proto.Clone(req).(*computepb.ListLicensesRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*computepb.License, string, error) {
  resp := &computepb.LicensesListResponse{}
  if pageToken != "" {
   req.PageToken = proto.String(pageToken)
  }
  if pageSize > math.MaxInt32 {
   req.MaxResults = proto.Uint32(uint32(math.MaxInt32))
  } else if pageSize != 0 {
   req.MaxResults = proto.Uint32(uint32(pageSize))
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
   return nil, "", err
  }
  baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses", req.GetProject())

  params := url.Values{}
  if req != nil && req.Filter !=
 nil {
   params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
  }
  if req != nil && req.MaxResults != nil {
   params.Add("maxResults", fmt.Sprintf("%v", req.GetMaxResults()))
  }
  if req != nil && req.OrderBy != nil {
   params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
  }
  if req != nil && req.PageToken != nil {
   params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
  }
  if req != nil && req.ReturnPartialSuccess != nil {
   params.Add("returnPartialSuccess", fmt.Sprintf("%v", req.GetReturnPartialSuccess()))
  }

  baseUrl.RawQuery = params.Encode()
```

```
 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return
err
  }
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "List")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetItems(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetMaxResults())
it.pageInfo.Token = req.GetPageToken()

return it
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This
```

```
resource is intended for use only by third-party partners who are creating
 Cloud Marketplace images.
func (c *licensesRESTClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetGlobalSetPolicyRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses/%v/setIamPolicy", req.GetProject(),
req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).SetIamPolicy[0:len((*c.CallOptions).SetIamPolicy):len((*c.CallOptions).SetIamPolicy)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "SetIamPolicy")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
```

```
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is
intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient)
 TestIamPermissions(ctx context.Context, req *computepb.TestIamPermissionsLicenseRequest, opts
...gax.CallOption) (*computepb.TestPermissionsResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetTestPermissionsRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses/%v/testIamPermissions", req.GetProject(),
req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
```

```
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "TestIamPermissions")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
}

// Update updates a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient)
 Update(ctx context.Context, req *computepb.UpdateLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetLicenseResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }
 if req != nil && req.UpdateMask != nil {
  params.Add("updateMask", fmt.Sprintf("%v", req.GetUpdateMask()))
 }

 baseUrl.RawQuery = params.Encode()
```

```
 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds
 = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Update[0:len((*c.CallOptions).Update):len((*c.CallOptions).Update)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("PATCH", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Update")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 op := &Operation{
  &globalOperationsHandle{
   c:       c.operationClient,
   proto:   resp,
   project:
 req.GetProject(),
  },
 }
 return op, nil
}
```

```
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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.35.2
//  protoc        v4.25.7
// source: google/ai/generativelanguage/v1beta/permission.proto

package generativelanguagepb

import (
 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
 reflect "reflect"
 sync
 "sync"
)

const (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Defines types of the grantee of this permission.
type Permission_GranteeType int32

const (
 // The default value. This value is unused.
 Permission_GRANTEE_TYPE_UNSPECIFIED Permission_GranteeType = 0
 // Represents a user. When set, you must provide email_address for the user.
 Permission_USER Permission_GranteeType = 1
 // Represents a group. When set, you must provide email_address for the
 // group.
```

```
 Permission_GROUP Permission_GranteeType = 2
 // Represents access to everyone. No extra information is required.
 Permission_EVERYONE Permission_GranteeType = 3
)

// Enum value maps for Permission_GranteeType.
var (
 Permission_GranteeType_name = map[int32]string{
  0: "GRANTEE_TYPE_UNSPECIFIED",
  1: "USER",
  2:
 "GROUP",
  3: "EVERYONE",
 }
 Permission_GranteeType_value = map[string]int32{
  "GRANTEE_TYPE_UNSPECIFIED": 0,
  "USER":                     1,
  "GROUP":                    2,
  "EVERYONE":                 3,
 }
)

func (x Permission_GranteeType) Enum() *Permission_GranteeType {
 p := new(Permission_GranteeType)
 *p = x
 return p
}

func (x Permission_GranteeType) String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_GranteeType) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0].Descriptor()
}

func (Permission_GranteeType) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0]
}

func (x Permission_GranteeType) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_GranteeType.Descriptor instead.
func (Permission_GranteeType) EnumDescriptor() ([]byte,
 []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 0}
```

```
}

// Defines the role granted by this permission.
type Permission_Role int32

const (
 // The default value. This value is unused.
 Permission_ROLE_UNSPECIFIED Permission_Role = 0
 // Owner can use, update, share and delete the resource.
 Permission_OWNER Permission_Role = 1
 // Writer can use, update and share the resource.
 Permission_WRITER Permission_Role = 2
 // Reader can use the resource.
 Permission_READER Permission_Role = 3
)

// Enum value maps for Permission_Role.
var (
 Permission_Role_name = map[int32]string{
  0: "ROLE_UNSPECIFIED",
  1: "OWNER",
  2: "WRITER",
  3: "READER",
 }
 Permission_Role_value = map[string]int32{
  "ROLE_UNSPECIFIED": 0,
  "OWNER":            1,
  "WRITER":           2,
  "READER":           3,
 }
)

func (x Permission_Role) Enum() *Permission_Role {
 p := new(Permission_Role)
 *p = x
 return p
}

func (x Permission_Role) String() string {
 return
 protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_Role) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1].Descriptor()
}

func (Permission_Role) Type() protoreflect.EnumType {
```

```
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1]
}

func (x Permission_Role) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_Role.Descriptor instead.
func (Permission_Role) EnumDescriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 1}
}

// Permission resource grants user, group or the rest of the world access to the
// PaLM API resource (e.g. a tuned model, corpus).
//
// A role is a collection of permitted operations that allows users to perform
// specific actions on PaLM API resources. To make them available to users,
// groups, or service accounts,
 you assign roles. When you assign a role, you
// grant permissions that the role contains.
//
// There are three concentric roles. Each role is a superset of the previous
// role's permitted operations:
//
// - reader can use the resource (e.g. tuned model, corpus) for inference
// - writer has reader's permissions and additionally can edit and share
// - owner has writer's permissions and additionally can delete
type Permission struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Output only. Identifier. The permission name. A unique name will be
 // generated on create. Examples:
 //
 // tunedModels/{tuned_model}/permissions/{permission}
 // corpora/{corpus}/permissions/{permission}
 //
 // Output only.
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Optional. Immutable. The type of the grantee.
 GranteeType *Permission_GranteeType
`protobuf:"varint,2,opt,name=grantee_type,json=granteeType,proto3,enum=google.ai.generativelanguage.v1beta.Pe
rmission_GranteeType,oneof"
 json:"grantee_type,omitempty"`
 // Optional. Immutable. The email address of the user of group which this
 // permission refers. Field is not set when permission's grantee type is
 // EVERYONE.
```

```
 EmailAddress *string `protobuf:"bytes,3,opt,name=email_address,json=emailAddress,proto3,oneof"
json:"email_address,omitempty"`
 // Required. The role granted by this permission.
 Role *Permission_Role
`protobuf:"varint,4,opt,name=role,proto3,enum=google.ai.generativelanguage.v1beta.Permission_Role,oneof"
json:"role,omitempty"`
}

func (x *Permission) Reset() {
 *x = Permission{}
 mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *Permission) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*Permission) ProtoMessage() {}

func (x *Permission) ProtoReflect() protoreflect.Message
 {
 mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use Permission.ProtoReflect.Descriptor instead.
func (*Permission) Descriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0}
}

func (x *Permission) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
}

func (x *Permission) GetGranteeType() Permission_GranteeType {
 if x != nil && x.GranteeType != nil {
```

```
  return *x.GranteeType
 }
 return Permission_GRANTEE_TYPE_UNSPECIFIED
}

func (x *Permission) GetEmailAddress() string {
 if x != nil && x.EmailAddress != nil {
  return *x.EmailAddress
 }
 return ""
}

func (x *Permission) GetRole() Permission_Role {
 if x != nil && x.Role != nil {
  return *x.Role
 }
 return Permission_ROLE_UNSPECIFIED
}

var
 File_google_ai_generativelanguage_v1beta_permission_proto protoreflect.FileDescriptor

var file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = []byte{
 0x0a, 0x34, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65,
 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x76,
 0x31, 0x62, 0x65, 0x74, 0x61, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x12, 0x23, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61,
 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67,
 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x1a, 0x1f, 0x67, 0x6f, 0x6f,
 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64, 0x5f, 0x62, 0x65,
 0x68, 0x61, 0x76, 0x69, 0x6f, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x19, 0x67, 0x6f,
 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69,
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0x72,
0x6f, 0x74, 0x6f, 0x33,
}

var (
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce sync.Once
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc
```

```
)

func file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP() []byte {
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce.Do(func() {
  file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData)
 })
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData
}

var file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes = make([]protoimpl.EnumInfo, 2)
var file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes = make([]protoimpl.MessageInfo, 1)
var file_google_ai_generativelanguage_v1beta_permission_proto_goTypes = []any{
 (Permission_GranteeType)(0),
 // 0: google.ai.generativelanguage.v1beta.Permission.GranteeType
 (Permission_Role)(0),        // 1: google.ai.generativelanguage.v1beta.Permission.Role
 (*Permission)(nil),          // 2: google.ai.generativelanguage.v1beta.Permission
}
var file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = []int32{
 0, // 0: google.ai.generativelanguage.v1beta.Permission.grantee_type:type_name ->
google.ai.generativelanguage.v1beta.Permission.GranteeType
 1, // 1: google.ai.generativelanguage.v1beta.Permission.role:type_name ->
google.ai.generativelanguage.v1beta.Permission.Role
 2, // [2:2] is the sub-list for method output_type
 2, // [2:2] is the sub-list for method input_type
 2, // [2:2] is the sub-list for extension type_name
 2, // [2:2] is the sub-list for extension extendee
 0, // [0:2] is the sub-list for field type_name
}

func init() { file_google_ai_generativelanguage_v1beta_permission_proto_init() }
func file_google_ai_generativelanguage_v1beta_permission_proto_init()
 {
 if File_google_ai_generativelanguage_v1beta_permission_proto != nil {
  return
 }
 file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0].OneofWrappers = []any{}
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor: file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc,
   NumEnums:      2,
   NumMessages:   1,
   NumExtensions: 0,
   NumServices:   0,
  },
  GoTypes:          file_google_ai_generativelanguage_v1beta_permission_proto_goTypes,
```

```
  DependencyIndexes: file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs,
  EnumInfos:         file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes,
  MessageInfos:      file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes,
 }.Build()
 File_google_ai_generativelanguage_v1beta_permission_proto = out.File
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = nil
 file_google_ai_generativelanguage_v1beta_permission_proto_goTypes
 = nil
 file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = nil
}
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//go:build go1.23

package discoveryengine_test

import (
 "context"

 discoveryengine "cloud.google.com/go/discoveryengine/apiv1"
 discoveryenginepb "cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
)

func ExampleUserLicenseClient_ListUserLicenses_all() {
 ctx := context.Background()
 //
 This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
```

```
 // TODO: Handle error.
 }
 defer c.Close()

 req := &discoveryenginepb.ListUserLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb#ListUserLicensesRequest.
 }
 for resp, err := range c.ListUserLicenses(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}

func ExampleUserLicenseClient_ListOperations_all() {
 ctx := context.Background()
 //
 This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &longrunningpb.ListOperationsRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#ListOperationsRequest.
 }
 for resp, err := range c.ListOperations(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}
```

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//  protoc        v4.25.7
// source: google/cloud/commerce/consumer/procurement/v1/license_management_service.proto

package procurementpb

import (
 context "context"
 _ "google.golang.org/genproto/googleapis/api/annotations"
 grpc "google.golang.org/grpc"
 codes "google.golang.org/grpc/codes"
 status "google.golang.org/grpc/status"
 protoreflect
 "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
 durationpb "google.golang.org/protobuf/types/known/durationpb"
 fieldmaskpb "google.golang.org/protobuf/types/known/fieldmaskpb"
 timestamppb "google.golang.org/protobuf/types/known/timestamppb"
```

```
 reflect "reflect"
 sync "sync"
)

const (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Assignment protocol for a license pool.
type AssignmentProtocol struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // The type of assignment protocol.
 //
 // Types that are assignable to AssignmentType:
 //
 // *AssignmentProtocol_ManualAssignmentType_
 // *AssignmentProtocol_AutoAssignmentType_
 AssignmentType
 isAssignmentProtocol_AssignmentType `protobuf_oneof:"assignment_type"`
}

func (x *AssignmentProtocol) Reset() {
 *x = AssignmentProtocol{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[0]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *AssignmentProtocol) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*AssignmentProtocol) ProtoMessage() {}

func (x *AssignmentProtocol) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
```

```
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use AssignmentProtocol.ProtoReflect.Descriptor instead.
func (*AssignmentProtocol) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
 []int{0}
}

func (m *AssignmentProtocol) GetAssignmentType() isAssignmentProtocol_AssignmentType {
 if m != nil {
  return m.AssignmentType
 }
 return nil
}

func (x *AssignmentProtocol) GetManualAssignmentType() *AssignmentProtocol_ManualAssignmentType {
 if x, ok := x.GetAssignmentType().(*AssignmentProtocol_ManualAssignmentType_); ok {
  return x.ManualAssignmentType
 }
 return nil
}

func (x *AssignmentProtocol) GetAutoAssignmentType() *AssignmentProtocol_AutoAssignmentType {
 if x, ok := x.GetAssignmentType().(*AssignmentProtocol_AutoAssignmentType_); ok {
  return x.AutoAssignmentType
 }
 return nil
}

type isAssignmentProtocol_AssignmentType interface {
 isAssignmentProtocol_AssignmentType()
}

type AssignmentProtocol_ManualAssignmentType_ struct {
 // Allow manual assignments triggered by administrative operations only.
 ManualAssignmentType *AssignmentProtocol_ManualAssignmentType
`protobuf:"bytes,2,opt,name=manual_assignment_type,json=manualAssignmentType,proto3,oneof"`
}

type
 AssignmentProtocol_AutoAssignmentType_ struct {
 // Allow automatic assignments triggered by data plane operations.
 AutoAssignmentType *AssignmentProtocol_AutoAssignmentType
```

```
`protobuf:"bytes,3,opt,name=auto_assignment_type,json=autoAssignmentType,proto3,oneof"`
}

func (*AssignmentProtocol_ManualAssignmentType_) isAssignmentProtocol_AssignmentType() {}

func (*AssignmentProtocol_AutoAssignmentType_) isAssignmentProtocol_AssignmentType() {}

// A license pool represents a pool of licenses that can be assigned to users.
type LicensePool struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Identifier. Format:
 // `billingAccounts/{billing_account}/orders/{order}/licensePool`
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Required. Assignment protocol for the license pool.
 LicenseAssignmentProtocol *AssignmentProtocol
`protobuf:"bytes,2,opt,name=license_assignment_protocol,json=licenseAssignmentProtocol,proto3"
 json:"license_assignment_protocol,omitempty"`
 // Output only. Licenses count that are available to be assigned.
 AvailableLicenseCount int32
`protobuf:"varint,3,opt,name=available_license_count,json=availableLicenseCount,proto3"
json:"available_license_count,omitempty"`
 // Output only. Total number of licenses in the pool.
 TotalLicenseCount int32 `protobuf:"varint,4,opt,name=total_license_count,json=totalLicenseCount,proto3"
json:"total_license_count,omitempty"`
}

func (x *LicensePool) Reset() {
 *x = LicensePool{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[1]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *LicensePool) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*LicensePool) ProtoMessage() {}

func (x *LicensePool) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[1]
 if
```

```
 x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use LicensePool.ProtoReflect.Descriptor instead.
func (*LicensePool) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{1}
}

func (x *LicensePool) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
}

func (x *LicensePool) GetLicenseAssignmentProtocol() *AssignmentProtocol {
 if x != nil {
  return x.LicenseAssignmentProtocol
 }
 return nil
}

func (x *LicensePool) GetAvailableLicenseCount() int32 {
 if x != nil {
  return x.AvailableLicenseCount
 }
 return 0
}

func (x *LicensePool) GetTotalLicenseCount() int32 {
 if x != nil {
  return x.TotalLicenseCount
 }
 return 0
}

// Request message for getting a
 license pool.
type GetLicensePoolRequest struct {
```

```
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. The name of the license pool to get.
 // Format: `billingAccounts/{billing_account}/orders/{order}/licensePool`
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
}

func (x *GetLicensePoolRequest) Reset() {
 *x = GetLicensePoolRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[2]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *GetLicensePoolRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*GetLicensePoolRequest) ProtoMessage() {}

func (x *GetLicensePoolRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[2]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if
 ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use GetLicensePoolRequest.ProtoReflect.Descriptor instead.
func (*GetLicensePoolRequest) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{2}
}

func (x *GetLicensePoolRequest) GetName() string {
 if x != nil {
  return x.Name
 }
```

```
 return ""
}

// Request message for updating a license pool.
type UpdateLicensePoolRequest struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. The license pool to update.
 //
 // The license pool's name field is used to identify the license pool to
 // update. Format:
 // `billingAccounts/{billing_account}/orders/{order}/licensePool`.
 LicensePool *LicensePool `protobuf:"bytes,1,opt,name=license_pool,json=licensePool,proto3"
json:"license_pool,omitempty"`
 //
 Required. The list of fields to update.
 UpdateMask *fieldmaskpb.FieldMask `protobuf:"bytes,2,opt,name=update_mask,json=updateMask,proto3"
json:"update_mask,omitempty"`
}

func (x *UpdateLicensePoolRequest) Reset() {
 *x = UpdateLicensePoolRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[3]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *UpdateLicensePoolRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UpdateLicensePoolRequest) ProtoMessage() {}

func (x *UpdateLicensePoolRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[3]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}
```

```
// Deprecated: Use UpdateLicensePoolRequest.ProtoReflect.Descriptor
 instead.
func (*UpdateLicensePoolRequest) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{3}
}

func (x *UpdateLicensePoolRequest) GetLicensePool() *LicensePool {
 if x != nil {
  return x.LicensePool
 }
 return nil
}

func (x *UpdateLicensePoolRequest) GetUpdateMask() *fieldmaskpb.FieldMask {
 if x != nil {
  return x.UpdateMask
 }
 return nil
}

// Request message for
//
[LicenseManagementService.Assign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementServic
e.Assign].
type AssignRequest struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. License pool name.
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Required. Username.
 // Format: `name@domain.com`.
 Usernames []string `protobuf:"bytes,2,rep,name=usernames,proto3" json:"usernames,omitempty"`
}

func
 (x *AssignRequest) Reset() {
 *x = AssignRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[4]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}
```

```
func (x *AssignRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*AssignRequest) ProtoMessage() {}

func (x *AssignRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[4]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use AssignRequest.ProtoReflect.Descriptor instead.
func (*AssignRequest) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{4}
}

func (x *AssignRequest) GetParent()
 string {
 if x != nil {
  return x.Parent
 }
 return ""
}

func (x *AssignRequest) GetUsernames() []string {
 if x != nil {
  return x.Usernames
 }
 return nil
}

// Response message for
//
[LicenseManagementService.Assign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementServic
e.Assign].
type AssignResponse struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
```

```
 unknownFields protoimpl.UnknownFields
}

func (x *AssignResponse) Reset() {
 *x = AssignResponse{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[5]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *AssignResponse) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*AssignResponse) ProtoMessage() {}

func (x *AssignResponse) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[5]
 if x
 != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use AssignResponse.ProtoReflect.Descriptor instead.
func (*AssignResponse) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{5}
}

// Request message for
//
[LicenseManagementService.Unassign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementSer
vice.Unassign].
type UnassignRequest struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. License pool name.
```

```
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Required. Username.
 // Format: `name@domain.com`.
 Usernames []string `protobuf:"bytes,2,rep,name=usernames,proto3" json:"usernames,omitempty"`
}

func (x *UnassignRequest) Reset()
 {
 *x = UnassignRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[6]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *UnassignRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UnassignRequest) ProtoMessage() {}

func (x *UnassignRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[6]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use UnassignRequest.ProtoReflect.Descriptor instead.
func (*UnassignRequest) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{6}
}

func (x *UnassignRequest) GetParent() string {
 if x != nil {
  return
 x.Parent
 }
 return ""
}
```

```
func (x *UnassignRequest) GetUsernames() []string {
 if x != nil {
  return x.Usernames
 }
 return nil
}

// Response message for
//
[LicenseManagementService.Unassign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementSer
vice.Unassign].
type UnassignResponse struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields
}

func (x *UnassignResponse) Reset() {
 *x = UnassignResponse{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[7]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *UnassignResponse) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UnassignResponse) ProtoMessage() {}

func (x *UnassignResponse) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[7]
 if x != nil {
  ms
 := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use UnassignResponse.ProtoReflect.Descriptor instead.
func (*UnassignResponse) Descriptor() ([]byte, []int) {
```

```
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{7}
}

// Request message for
//
[LicenseManagementService.EnumerateLicensedUsers][google.cloud.commerce.consumer.procurement.v1.License
ManagementService.EnumerateLicensedUsers].
type EnumerateLicensedUsersRequest struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. License pool name.
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Optional. The maximum number of users to return. The service may return
 // fewer than this value.
 PageSize int32 `protobuf:"varint,2,opt,name=page_size,json=pageSize,proto3"
 json:"page_size,omitempty"`
 // Optional. A page token, received from a previous `EnumerateLicensedUsers`
 // call. Provide this to retrieve the subsequent page.
 PageToken string `protobuf:"bytes,3,opt,name=page_token,json=pageToken,proto3" json:"page_token,omitempty"`
}

func (x *EnumerateLicensedUsersRequest) Reset() {
 *x = EnumerateLicensedUsersRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[8]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *EnumerateLicensedUsersRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*EnumerateLicensedUsersRequest) ProtoMessage() {}

func (x *EnumerateLicensedUsersRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[8]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo()
 == nil {
   ms.StoreMessageInfo(mi)
  }
```

```
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use EnumerateLicensedUsersRequest.ProtoReflect.Descriptor instead.
func (*EnumerateLicensedUsersRequest) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{8}
}

func (x *EnumerateLicensedUsersRequest) GetParent() string {
 if x != nil {
  return x.Parent
 }
 return ""
}

func (x *EnumerateLicensedUsersRequest) GetPageSize() int32 {
 if x != nil {
  return x.PageSize
 }
 return 0
}

func (x *EnumerateLicensedUsersRequest) GetPageToken() string {
 if x != nil {
  return x.PageToken
 }
 return ""
}

// A licensed user.
type LicensedUser struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Username.
 // Format: `name@domain.com`.
 Username string `protobuf:"bytes,1,opt,name=username,proto3" json:"username,omitempty"`
 //
 Output only. Timestamp when the license was assigned.
 AssignTime *timestamppb.Timestamp `protobuf:"bytes,2,opt,name=assign_time,json=assignTime,proto3"
json:"assign_time,omitempty"`
 // Output only. Timestamp when the license was recently used. This may not be
 // the most recent usage time, and will be updated regularly (within 24
```

```
 // hours).
 RecentUsageTime *timestamppb.Timestamp
`protobuf:"bytes,3,opt,name=recent_usage_time,json=recentUsageTime,proto3"
json:"recent_usage_time,omitempty"`
}

func (x *LicensedUser) Reset() {
 *x = LicensedUser{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[9]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *LicensedUser) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*LicensedUser) ProtoMessage() {}

func (x *LicensedUser) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[9]
 if
 x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use LicensedUser.ProtoReflect.Descriptor instead.
func (*LicensedUser) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{9}
}

func (x *LicensedUser) GetUsername() string {
 if x != nil {
  return x.Username
 }
 return ""
}
```

```
func (x *LicensedUser) GetAssignTime() *timestamppb.Timestamp {
 if x != nil {
  return x.AssignTime
 }
 return nil
}

func (x *LicensedUser) GetRecentUsageTime() *timestamppb.Timestamp {
 if x != nil {
  return x.RecentUsageTime
 }
 return nil
}

// Response message for
//
[LicenseManagementService.EnumerateLicensedUsers][google.cloud.commerce.consumer.procurement.v1.License
ManagementService.EnumerateLicensedUsers].
type EnumerateLicensedUsersResponse
 struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // The list of licensed users.
 LicensedUsers []*LicensedUser `protobuf:"bytes,1,rep,name=licensed_users,json=licensedUsers,proto3"
json:"licensed_users,omitempty"`
 // A token that can be sent as `page_token` to retrieve the next page.
 // If this field is omitted, there are no subsequent pages.
 NextPageToken string `protobuf:"bytes,2,opt,name=next_page_token,json=nextPageToken,proto3"
json:"next_page_token,omitempty"`
}

func (x *EnumerateLicensedUsersResponse) Reset() {
 *x = EnumerateLicensedUsersResponse{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[10]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *EnumerateLicensedUsersResponse) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*EnumerateLicensedUsersResponse) ProtoMessage() {}

func
```

```
 (x *EnumerateLicensedUsersResponse) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[10]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use EnumerateLicensedUsersResponse.ProtoReflect.Descriptor instead.
func (*EnumerateLicensedUsersResponse) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{10}
}

func (x *EnumerateLicensedUsersResponse) GetLicensedUsers() []*LicensedUser {
 if x != nil {
  return x.LicensedUsers
 }
 return nil
}

func (x *EnumerateLicensedUsersResponse) GetNextPageToken() string {
 if x != nil {
  return x.NextPageToken
 }
 return ""
}

// Allow manual assignments triggered by administrative operations only.
type AssignmentProtocol_ManualAssignmentType
 struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields
}

func (x *AssignmentProtocol_ManualAssignmentType) Reset() {
 *x = AssignmentProtocol_ManualAssignmentType{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[11]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
```

```
}

func (x *AssignmentProtocol_ManualAssignmentType) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*AssignmentProtocol_ManualAssignmentType) ProtoMessage() {}

func (x *AssignmentProtocol_ManualAssignmentType) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[11]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated:
 Use AssignmentProtocol_ManualAssignmentType.ProtoReflect.Descriptor instead.
func (*AssignmentProtocol_ManualAssignmentType) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{0, 0}
}

// Configuration for automatic assignments handled by data plane operations.
type AssignmentProtocol_AutoAssignmentType struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Optional. The time to live for an inactive license. After this time has
 // passed, the license will be automatically unassigned from the user. Must
 // be at least 7 days, if set. If unset, the license will never expire.
 InactiveLicenseTtl *durationpb.Duration
`protobuf:"bytes,1,opt,name=inactive_license_ttl,json=inactiveLicenseTtl,proto3"
json:"inactive_license_ttl,omitempty"`
}

func (x *AssignmentProtocol_AutoAssignmentType) Reset() {
 *x = AssignmentProtocol_AutoAssignmentType{}
 mi
 := &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[12]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
```

```
 ms.StoreMessageInfo(mi)
}

func (x *AssignmentProtocol_AutoAssignmentType) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*AssignmentProtocol_AutoAssignmentType) ProtoMessage() {}

func (x *AssignmentProtocol_AutoAssignmentType) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[12]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use AssignmentProtocol_AutoAssignmentType.ProtoReflect.Descriptor instead.
func (*AssignmentProtocol_AutoAssignmentType) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
 []int{0, 1}
}

func (x *AssignmentProtocol_AutoAssignmentType) GetInactiveLicenseTtl() *durationpb.Duration {
 if x != nil {
  return x.InactiveLicenseTtl
 }
 return nil
}

var File_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto
protoreflect.FileDescriptor

var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc =
[]byte{
 0x0a, 0x4e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2f, 0x63,
 0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2f, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72,
 0x2f, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2f, 0x76, 0x31, 0x2f,
 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x5f, 0x6d, 0x61, 0x6e, 0x61, 0x67, 0x65, 0x6d, 0x65,
 0x6e, 0x74, 0x5f, 0x73, 0x65, 0x72, 0x76, 0x69, 0x63, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f,
 0x12, 0x2d, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x63,
 0x6f,
```

0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2e, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72,
0x2e, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x76, 0x31, 0x1a,
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0x74, 0x61, 0x74, 0x69, 0x6f, 0x6e, 0x73, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x17, 0x67,
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0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x1f, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61,
0x70, 0x69, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64, 0x5f, 0x62, 0x65, 0x68, 0x61, 0x76, 0x69, 0x6f,
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0x6e, 0x74, 0x5f, 0x74, 0x79, 0x70, 0x65, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0b, 0x32, 0x56, 0x2e,
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0x6d, 0x65, 0x72, 0x63, 0x65, 0x2e, 0x63, 0x6f, 0x6e, 0x73,
0x75, 0x6d, 0x65, 0x72, 0x2e, 0x70,
0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x76, 0x31, 0x2e, 0x41, 0x73,
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0x41, 0x02, 0x52, 0x0b, 0x6c, 0x69, 0x63, 0x65,
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0x42, 0x03, 0xe0, 0x41, 0x02, 0x52, 0x0a, 0x75, 0x70, 0x64, 0x61, 0x74, 0x65, 0x4d, 0x61, 0x73,
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0x28, 0x09, 0x42, 0x03, 0xe0, 0x41, 0x02, 0x52, 0x09, 0x75, 0x73, 0x65, 0x72, 0x6e, 0x61, 0x6d,
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0x74, 0x18, 0x01, 0x20, 0x01, 0x28, 0x09, 0x42, 0x03, 0xe0, 0x41, 0x02, 0x52, 0x06, 0x70, 0x61,
0x72, 0x65, 0x6e, 0x74, 0x12, 0x21, 0x0a, 0x09, 0x75, 0x73, 0x65, 0x72, 0x6e, 0x61, 0x6d, 0x65,
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0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e,
0x74, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73, 0x2e, 0x63, 0x6f, 0x6d,
0xd2, 0x41, 0x2e, 0x68, 0x74, 0x74, 0x70, 0x73, 0x3a, 0x2f, 0x2f, 0x77, 0x77, 0x77, 0x2e, 0x67,
0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73, 0x2e, 0x63, 0x6f, 0x6d, 0x2f, 0x61, 0x75,
0x74, 0x68, 0x2f, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2d, 0x70, 0x6c, 0x61, 0x74, 0x66, 0x6f, 0x72,
0x6d, 0x42, 0xbe, 0x02, 0x0a, 0x31, 0x63, 0x6f, 0x6d, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65,
0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x63,
0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2e,
0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65,
0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x76, 0x31, 0x42, 0x1d, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65,

```
 0x4d, 0x61, 0x6e, 0x61, 0x67, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x53, 0x65, 0x72, 0x76, 0x69, 0x63,
 0x65, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x50, 0x01, 0x5a, 0x53, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e,
 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6f, 0x6d, 0x2f, 0x67, 0x6f, 0x2f, 0x63, 0x6f,
 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2f, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x2f,
 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2f, 0x61, 0x70, 0x69, 0x76,
 0x31, 0x2f, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x70, 0x62, 0x3b,
 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x70, 0x62, 0xaa, 0x02, 0x2d,
 0x47, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x2e,
 0x43, 0x6f, 0x6d,
 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2e, 0x43, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x2e, 0x50,
 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x56, 0x31, 0xca, 0x02, 0x2d,
 0x47, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x5c, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x5c, 0x43, 0x6f, 0x6d,
 0x6d, 0x65, 0x72, 0x63, 0x65, 0x5c, 0x43, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x5c, 0x50,
 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x5c, 0x56, 0x31, 0xea, 0x02, 0x32,
 0x47, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x3a, 0x3a, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x3a, 0x3a, 0x43,
 0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x3a, 0x3a, 0x43, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65,
 0x72, 0x3a, 0x3a, 0x50, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x3a, 0x3a,
 0x56, 0x31, 0x62, 0x06, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x33,
}

var (
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescOnce
sync.Once
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescData
 = file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc
)

func
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP()
[]byte {
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescOnce.Do(f
unc() {
  file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_cloud_commerce_consumer_procurement_v1_license_management_servi
ce_proto_rawDescData)
 })
 return file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescData
}

var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes =
make([]protoimpl.MessageInfo, 13)
var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_goTypes =
[]any{
 (*AssignmentProtocol)(nil),
        // 0: google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol
 (*LicensePool)(nil),                        // 1: google.cloud.commerce.consumer.procurement.v1.LicensePool
 (*GetLicensePoolRequest)(nil),                // 2:
google.cloud.commerce.consumer.procurement.v1.GetLicensePoolRequest
```

```
 (*UpdateLicensePoolRequest)(nil),              // 3:
google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest
 (*AssignRequest)(nil),                         // 4: google.cloud.commerce.consumer.procurement.v1.AssignRequest
 (*AssignResponse)(nil),                        // 5: google.cloud.commerce.consumer.procurement.v1.AssignResponse
 (*UnassignRequest)(nil),                       // 6: google.cloud.commerce.consumer.procurement.v1.UnassignRequest
 (*UnassignResponse)(nil),                      // 7: google.cloud.commerce.consumer.procurement.v1.UnassignResponse
 (*EnumerateLicensedUsersRequest)(nil),         // 8:
google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersRequest
 (*LicensedUser)(nil),
                                // 9: google.cloud.commerce.consumer.procurement.v1.LicensedUser
 (*EnumerateLicensedUsersResponse)(nil),        // 10:
google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersResponse
 (*AssignmentProtocol_ManualAssignmentType)(nil), // 11:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.ManualAssignmentType
 (*AssignmentProtocol_AutoAssignmentType)(nil),   // 12:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.AutoAssignmentType
 (*fieldmaskpb.FieldMask)(nil),                 // 13: google.protobuf.FieldMask
 (*timestamppb.Timestamp)(nil),                 // 14: google.protobuf.Timestamp
 (*durationpb.Duration)(nil),                   // 15: google.protobuf.Duration
}
var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_depIdxs =
[]int32{
 11, // 0:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.manual_assignment_type:type_name
 -> google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.ManualAssignmentType
 12, // 1: google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.auto_assignment_type:type_name -
> google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.AutoAssignmentType
 0,  // 2: google.cloud.commerce.consumer.procurement.v1.LicensePool.license_assignment_protocol:type_name ->
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol
 1,  // 3: google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest.license_pool:type_name ->
google.cloud.commerce.consumer.procurement.v1.LicensePool
 13, // 4: google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest.update_mask:type_name ->
google.protobuf.FieldMask
 14, // 5: google.cloud.commerce.consumer.procurement.v1.LicensedUser.assign_time:type_name ->
google.protobuf.Timestamp
 14, // 6: google.cloud.commerce.consumer.procurement.v1.LicensedUser.recent_usage_time:type_name
 -> google.protobuf.Timestamp
 9,  // 7:
google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersResponse.licensed_users:type_name ->
google.cloud.commerce.consumer.procurement.v1.LicensedUser
 15, // 8:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.AutoAssignmentType.inactive_license_ttl:t
ype_name -> google.protobuf.Duration
 2,  // 9: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.GetLicensePool:input_type -
> google.cloud.commerce.consumer.procurement.v1.GetLicensePoolRequest
 3,  // 10:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.UpdateLicensePool:input_type ->
google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest
```

```
 4,  // 11: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Assign:input_type ->
google.cloud.commerce.consumer.procurement.v1.AssignRequest
 6,  // 12: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Unassign:input_type
 -> google.cloud.commerce.consumer.procurement.v1.UnassignRequest
 8,  // 13:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.EnumerateLicensedUsers:input_typ
e -> google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersRequest
 1,  // 14:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.GetLicensePool:output_type ->
google.cloud.commerce.consumer.procurement.v1.LicensePool
 1,  // 15:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.UpdateLicensePool:output_type ->
google.cloud.commerce.consumer.procurement.v1.LicensePool
 5,  // 16: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Assign:output_type ->
google.cloud.commerce.consumer.procurement.v1.AssignResponse
 7,  // 17: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Unassign:output_type ->
google.cloud.commerce.consumer.procurement.v1.UnassignResponse
 10, // 18:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.EnumerateLicensedUsers:output_ty
pe
 -> google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersResponse
 14, // [14:19] is the sub-list for method output_type
 9,  // [9:14] is the sub-list for method input_type
 9,  // [9:9] is the sub-list for extension type_name
 9,  // [9:9] is the sub-list for extension extendee
 0,  // [0:9] is the sub-list for field type_name
}

func init() {
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_init()
}
func file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_init() {
 if File_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto != nil {
  return
 }
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[0].Oneof
Wrappers = []any{
  (*AssignmentProtocol_ManualAssignmentType_)(nil),
  (*AssignmentProtocol_AutoAssignmentType_)(nil),
 }
 type x struct{}
 out := protoimpl.TypeBuilder{
  File:
 protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor:
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc,
   NumEnums:      0,
```

```
  NumMessages:   13,
  NumExtensions: 0,
  NumServices:   1,
 },
 GoTypes:
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_goTypes,
 DependencyIndexes:
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_depIdxs,
 MessageInfos:
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes,
 }.Build()
 File_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto = out.File
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc = nil
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_goTypes = nil
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_depIdxs
 = nil
}

// Reference imports to suppress errors if they are not otherwise used.
var _ context.Context
var _ grpc.ClientConnInterface

// This is a compile-time assertion to ensure that this generated file
// is compatible with the grpc package it is being compiled against.
const _ = grpc.SupportPackageIsVersion6

// LicenseManagementServiceClient is the client API for LicenseManagementService service.
//
// For semantics around ctx use and closing/ending streaming RPCs, please refer to
https://godoc.org/google.golang.org/grpc#ClientConn.NewStream.
type LicenseManagementServiceClient interface {
 // Gets the license pool.
 GetLicensePool(ctx context.Context, in *GetLicensePoolRequest, opts ...grpc.CallOption) (*LicensePool, error)
 // Updates the license pool if one exists for this Order.
 UpdateLicensePool(ctx context.Context, in *UpdateLicensePoolRequest, opts ...grpc.CallOption) (*LicensePool,
error)
 // Assigns a license to a user.
 Assign(ctx context.Context,
 in *AssignRequest, opts ...grpc.CallOption) (*AssignResponse, error)
 // Unassigns a license from a user.
 Unassign(ctx context.Context, in *UnassignRequest, opts ...grpc.CallOption) (*UnassignResponse, error)
 // Enumerates all users assigned a license.
 EnumerateLicensedUsers(ctx context.Context, in *EnumerateLicensedUsersRequest, opts ...grpc.CallOption)
(*EnumerateLicensedUsersResponse, error)
}

type licenseManagementServiceClient struct {
 cc grpc.ClientConnInterface
```

```
}

func NewLicenseManagementServiceClient(cc grpc.ClientConnInterface) LicenseManagementServiceClient {
 return &licenseManagementServiceClient{cc}
}

func (c *licenseManagementServiceClient) GetLicensePool(ctx context.Context, in *GetLicensePoolRequest, opts
...grpc.CallOption) (*LicensePool, error) {
 out := new(LicensePool)
 err := c.cc.Invoke(ctx,
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/GetLicensePool", in, out, opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

func
 (c *licenseManagementServiceClient) UpdateLicensePool(ctx context.Context, in *UpdateLicensePoolRequest,
opts ...grpc.CallOption) (*LicensePool, error) {
 out := new(LicensePool)
 err := c.cc.Invoke(ctx,
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/UpdateLicensePool", in, out,
opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

func (c *licenseManagementServiceClient) Assign(ctx context.Context, in *AssignRequest, opts ...grpc.CallOption)
(*AssignResponse, error) {
 out := new(AssignResponse)
 err := c.cc.Invoke(ctx, "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Assign", in,
out, opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

func (c *licenseManagementServiceClient) Unassign(ctx context.Context, in *UnassignRequest, opts
...grpc.CallOption) (*UnassignResponse, error) {
 out := new(UnassignResponse)
 err := c.cc.Invoke(ctx, "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Unassign",
 in, out, opts...)
 if err != nil {
  return nil, err
```

```
 }
 return out, nil
}

func (c *licenseManagementServiceClient) EnumerateLicensedUsers(ctx context.Context, in
*EnumerateLicensedUsersRequest, opts ...grpc.CallOption) (*EnumerateLicensedUsersResponse, error) {
 out := new(EnumerateLicensedUsersResponse)
 err := c.cc.Invoke(ctx,
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/EnumerateLicensedUsers", in, out,
opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

// LicenseManagementServiceServer is the server API for LicenseManagementService service.
type LicenseManagementServiceServer interface {
 // Gets the license pool.
 GetLicensePool(context.Context, *GetLicensePoolRequest) (*LicensePool, error)
 // Updates the license pool if one exists for this Order.
 UpdateLicensePool(context.Context, *UpdateLicensePoolRequest) (*LicensePool, error)
 // Assigns a license to a user.
 Assign(context.Context, *AssignRequest) (*AssignResponse,
 error)
 // Unassigns a license from a user.
 Unassign(context.Context, *UnassignRequest) (*UnassignResponse, error)
 // Enumerates all users assigned a license.
 EnumerateLicensedUsers(context.Context, *EnumerateLicensedUsersRequest)
(*EnumerateLicensedUsersResponse, error)
}

// UnimplementedLicenseManagementServiceServer can be embedded to have forward compatible
implementations.
type UnimplementedLicenseManagementServiceServer struct {
}

func (*UnimplementedLicenseManagementServiceServer) GetLicensePool(context.Context,
*GetLicensePoolRequest) (*LicensePool, error) {
 return nil, status.Errorf(codes.Unimplemented, "method GetLicensePool not implemented")
}
func (*UnimplementedLicenseManagementServiceServer) UpdateLicensePool(context.Context,
*UpdateLicensePoolRequest) (*LicensePool, error) {
 return nil, status.Errorf(codes.Unimplemented, "method UpdateLicensePool not implemented")
}
func (*UnimplementedLicenseManagementServiceServer) Assign(context.Context, *AssignRequest)
 (*AssignResponse, error) {
 return nil, status.Errorf(codes.Unimplemented, "method Assign not implemented")
```

```
}
func (*UnimplementedLicenseManagementServiceServer) Unassign(context.Context, *UnassignRequest)
(*UnassignResponse, error) {
 return nil, status.Errorf(codes.Unimplemented, "method Unassign not implemented")
}
func (*UnimplementedLicenseManagementServiceServer) EnumerateLicensedUsers(context.Context,
*EnumerateLicensedUsersRequest) (*EnumerateLicensedUsersResponse, error) {
 return nil, status.Errorf(codes.Unimplemented, "method EnumerateLicensedUsers not implemented")
}

func RegisterLicenseManagementServiceServer(s *grpc.Server, srv LicenseManagementServiceServer) {
 s.RegisterService(&_LicenseManagementService_serviceDesc, srv)
}

func _LicenseManagementService_GetLicensePool_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(GetLicensePoolRequest)
 if err := dec(in); err != nil
 {
  return nil, err
 }
 if interceptor == nil {
  return srv.(LicenseManagementServiceServer).GetLicensePool(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/GetLicensePool",
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(LicenseManagementServiceServer).GetLicensePool(ctx, req.(*GetLicensePoolRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_UpdateLicensePool_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(UpdateLicensePoolRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(LicenseManagementServiceServer).UpdateLicensePool(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/UpdateLicensePool",
 }
 handler
```

```
 := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(LicenseManagementServiceServer).UpdateLicensePool(ctx, req.(*UpdateLicensePoolRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_Assign_Handler(srv interface{}, ctx context.Context, dec func(interface{})
error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(AssignRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(LicenseManagementServiceServer).Assign(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Assign",
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(LicenseManagementServiceServer).Assign(ctx, req.(*AssignRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_Unassign_Handler(srv
 interface{}, ctx context.Context, dec func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{},
error) {
 in := new(UnassignRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(LicenseManagementServiceServer).Unassign(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Unassign",
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(LicenseManagementServiceServer).Unassign(ctx, req.(*UnassignRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_EnumerateLicensedUsers_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(EnumerateLicensedUsersRequest)
```

```
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor
 == nil {
  return srv.(LicenseManagementServiceServer).EnumerateLicensedUsers(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod:
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/EnumerateLicensedUsers",
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(LicenseManagementServiceServer).EnumerateLicensedUsers(ctx,
req.(*EnumerateLicensedUsersRequest))
 }
 return interceptor(ctx, in, info, handler)
}

var _LicenseManagementService_serviceDesc = grpc.ServiceDesc{
 ServiceName: "google.cloud.commerce.consumer.procurement.v1.LicenseManagementService",
 HandlerType: (*LicenseManagementServiceServer)(nil),
 Methods: []grpc.MethodDesc{
  {
   MethodName: "GetLicensePool",
   Handler:    _LicenseManagementService_GetLicensePool_Handler,
  },
  {
   MethodName: "UpdateLicensePool",
   Handler:    _LicenseManagementService_UpdateLicensePool_Handler,
  },
  {
   MethodName: "Assign",
   Handler:    _LicenseManagementService_Assign_Handler,
  },
  {
   MethodName:
 "Unassign",
   Handler:    _LicenseManagementService_Unassign_Handler,
  },
  {
   MethodName: "EnumerateLicensedUsers",
   Handler:    _LicenseManagementService_EnumerateLicensedUsers_Handler,
  },
 },
 Streams:  []grpc.StreamDesc{},
 Metadata: "google/cloud/commerce/consumer/procurement/v1/license_management_service.proto",
}
```

```
// Copyright 2025 Google LLC
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// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

// [START discoveryengine_v1_generated_UserLicenseService_BatchUpdateUserLicenses_sync]

package main

import (
 "context"

 discoveryengine "cloud.google.com/go/discoveryengine/apiv1"
 discoveryenginepb "cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb"
)

func main() {
 ctx := context.Background()
 // This snippet has been automatically generated
 and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &discoveryenginepb.BatchUpdateUserLicensesRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb#BatchUpdateUserLicensesReque
st.
 }
 op, err := c.BatchUpdateUserLicenses(ctx, req)
```

```
 if err != nil {
  // TODO: Handle error.
 }

 resp, err := op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

// [END discoveryengine_v1_generated_UserLicenseService_BatchUpdateUserLicenses_sync]
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
 "google.golang.org/api/iterator"
)

func ExampleNewLicensesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will
 require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
```

```
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicensesClient_Delete() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.DeleteLicenseRequest{
  //
 TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#DeleteLicenseRequest.
 }
 op, err := c.Delete(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleLicensesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
```

```
 }
 defer c.Close()

 req := &computepb.GetLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseRequest.
 }
 resp,
 err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_GetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetIamPolicyLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetIamPolicyLicenseRequest.
 }
 resp, err := c.GetIamPolicy(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_Insert()
 {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
```

```
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.InsertLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#InsertLicenseRequest.
}
op, err := c.Insert(ctx, req)
if err != nil {
 // TODO: Handle error.
}

err = op.Wait(ctx)
if err != nil {
 // TODO: Handle error.
}
}

func ExampleLicensesClient_List() {
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template
only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.ListLicensesRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#ListLicensesRequest.
}
it := c.List(ctx, req)
for {
 resp, err := it.Next()
 if err == iterator.Done {
  break
 }
 if err != nil {
  // TODO: Handle error.
```

```
 }
 // TODO: Use resp.
 _ = resp

 // If you need to access the underlying RPC response,
 // you can do so by casting the `Response` as below.
 // Otherwise, remove this line. Only populated after
 // first call to Next(). Not safe for concurrent access.
 _ = it.Response.(*computepb.LicensesListResponse)
}
}

func
 ExampleLicensesClient_SetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.SetIamPolicyLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#SetIamPolicyLicenseRequest.
 }
 resp, err := c.SetIamPolicy(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_TestIamPermissions() {
 ctx := context.Background()
 // This snippet has been automatically
 generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
```

```
 // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.TestIamPermissionsLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseRequest.
 }
 resp, err := c.TestIamPermissions(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_Update() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may
 require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.UpdateLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#UpdateLicenseRequest.
 }
 op, err := c.Update(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}
```

# 1.1497 pep517 0.12.0

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# 1.1498 viper 1.19.0

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# 1.1499 go-spiffe 2.4.0

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# 1.1500 lyft-gostats 0.4.1

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# 1.1501 perl 5.38.2-3.2ubuntu0.1

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No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: startsh.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: startsh.U,v $
?RCS: Revision 3.0.1.1  1997/02/28  16:25:31  ram
?RCS: patch61: avoid needless chatter since this is now done very early
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:51  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:startsh: sh sharpbang eunicefix
?MAKE: -pick add $@ %<
?S:startsh:
?S: This variable contains the string to put on the front of a shell
?S: script to make sure (hopefully) that it runs with sh and not some
?S: other
 shell.
?S:.
?F:!sharp
: figure out how to guarantee sh startup
?X: Avoid needless chatter since this is now done very early.
?X: echo " "
?X: echo "Checking out how to guarantee sh startup..." >&2
case "$startsh" in
") startsh=${sharpbang}${sh} ;;
*)
?X: echo "Let's see if '$startsh' works..." ;;
esac
cat >sharp <<EOSS
$startsh
set abc
test "$?abc" != 1
EOSS
```

```
chmod +x sharp
$eunicefix sharp
if ./sharp; then
 : echo "Yup, it does."
else
 echo "Hmm... '$startsh' does not guarantee sh startup..."
 echo "You may have to fix up the shell scripts to make sure $sh runs them."
fi
rm -f sharp
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/startsh.U
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Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/i_neterrno.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/sig_name.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_getpent.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_strftime.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/compline/d_fd_set.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/typedefs/uidsize.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_sethent.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_int64_t.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/compline/charsize.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_getpgrp.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_endsent.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_time.U
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* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/models.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_endhent.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_flexfnam.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_setsent.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_scannl.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_safebcpy.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/typedefs/fpostype.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/cppstdin.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_csh.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/randbits.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_usleepproto.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/vendorscript.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_fd_set.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/protos/selecttype.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/sockopt.U

* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_dosuid.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_mmap.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/models.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/fpossize.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_htonl.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_pthread_attr_ss.U
*
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* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_access.U
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* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_strerror.U
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* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/compline/d_wifstat.U
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* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/archlib.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_access.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/prototype.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_mbrtowc.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_wcsxfrm.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/issymlink.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_nanosleep.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/gccvers.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/startperl.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/compline/orderlib.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_volatile.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/scriptdir.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_madvise.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/sig_name.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_gnulibc.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/fpostype.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_setpgrp.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_gethent.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_vprintf.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/compline/bitpbyte.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/bin.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_gethname.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_gethname.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/compline/d_static_inline.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/sh.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/need_va_copy.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/i_varhdr.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_builtin.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_attribut.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/sunscanf.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_varhdr.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_const.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/protos/d_getprotoprotos.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_statblks.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/compline/d_open3.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/compline/errnolist.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/usesocks.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/compline/d_lchown.U

*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/compline/sbrksmart.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/libpth.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_gai_strerror.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/errnolist.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/mallocsrc.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/protos/d_lseekproto.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Signal.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_dlopen.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_wcscmp.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/alignbytes.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_keepsig.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_csh.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_malloc.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/sizetype.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/i_ndbm.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/bitpbyte.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/typedefs/uidsign.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/typedefs/sizesize.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_eofpipe.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/scriptdir.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/compline/randfunc.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/Findhdr.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_htonl.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/compline/ssizetype.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_setpgrp.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_endpent.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/typedefs/uidtype.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/typedefs/lseektype.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/i_pthread.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/floatsize.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/gccvers.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/i_grp.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/i_mallocmalloc.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/compline/charorder.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_isblank.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_getespwnam.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/a_dvisory/intsize.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/vendorlib.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_flexfnam.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_snprintf.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/Cppsym.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/sbrksmart.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/Signal.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/stdchar.U

* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_endnent.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/compline/d_gnulibc.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/Guess.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_strctcpy.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/compline/ptrsize.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/typedefs/gidsign.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/archname.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_syscallproto.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_c99_variadic.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/bin.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Config_sh.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_attribut.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_sigprocmask.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/protos/d_getservprotos.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/compline/floatsize.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/compline/d_safebcpy.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_shm.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_socket.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_msg.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_dladdr.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_gethbynm.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/i_malloc.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/vendorbin.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/compline/d_vprintf.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/Tr.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_casti32.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_strerror.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_termio.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_gconvert.U
No license file was found, but licenses were detected in source scan.

?RCS: $Id: AAAAA.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: AAAAA.U,v $
?RCS: Revision 3.0.1.4  1994/06/20  06:50:26  ram
?RCS: patch30: changes from Jarkko Hietaniemi are tagged with JHI
?RCS:

```
?RCS: Revision 3.0.1.3  1994/05/06  14:01:39  ram
?RCS: patch23: initials for Wayne Davison are now WED
?RCS: patch23: added initials for new unit contributor Andy Dougherty
?RCS:
?RCS: Revision 3.0.1.2  1994/01/24  14:01:09  ram
?RCS: patch16: make metalint shut up on special unit definition for All target
?RCS:
?RCS: Revision
 3.0.1.1  1993/09/13  15:43:57  ram
?RCS: patch10: documents initials used for Wayne Davison's contributions
?RCS:
?RCS: Revision 3.0  1993/08/18  12:04:44  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: The purpose of this file is to supply the head of the Makefile created
?X: by metaconfig.  For this reason it must be first in alphabetical order.
?X: The leading '+' in front of the unit name is a hint for metalint, since
?X: the use of that special unit name as a "made" unit is legitimate here.
?X:
?MAKE:+All: Finish
?X:
?X: Throughout the units, the following initials are used to identify comments:
?X:
?X:  HMS: Harlan Stenn
?X:  RAM: Raphael Manfredi
?X:  WED: Wayne Davison (was WAD by mistake--RAM)
?X:  ADO: Andy Dougherty
?X:  JHI: Jarkko Hietaniemi
?X:
?X: Agreed, this is a weird place to document it, but I couldn't find a better
?X: place to do so. I've bet on the curiosity of users, who would probably
?X: want to know what's in this strangely-named file--RAM.

Found
 in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/AAAAA.U
No license file was found, but licenses were detected in source scan.

?RCS: $Id: d_passwd.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
```

```
?RCS:
?RCS: Original Author: Andy Dougherty <doughera@lafcol.lafayette.edu>
?RCS:
?RCS: $Log: d_passwd.U,v $
?RCS: Revision 3.0.1.2  1997/02/28  15:37:21  ram
?RCS: patch61: useless unit dropped.
?RCS:
?RCS: Revision 3.0.1.1  1994/08/29  16:09:51  ram
?RCS: patch32: created by ADO
?RCS:
?X:
?X: Useless unit dropped.
?X:
?LINT:empty
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_passwd.U
No license file was found, but licenses were detected in source scan.

```
/*
* This file was produced by running the config_h.SH script, which
* gets its values from $CONFIG_SH, which is generally produced by
* running Configure.
*
* Feel free to modify any of this as the need arises.  Note, however,
* that running config_h.SH again will wipe out any changes you've made.
* For a more permanent change edit $CONFIG_SH and rerun config_h.SH.
*
* \$Id: Config_h.U 1 2006-08-24 12:32:52Z rmanfredi $
*/
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Config_h.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1999 Jarkko Hietaniemi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?MAKE:sitehtml3dir sitehtml3direxp installsitehtml3dir: Getfile \
 Setprefixvar prefix siteprefix html3dir sed
?MAKE: -pick add $@ %<
```

```
?Y:TOP
?D:sitehtml3dir=''
?S:sitehtml3dir:
?S: This variable contains the name of the directory in which site-specific
?S: library html source pages are to be put.  It is the responsibility of the
?S: Makefile.SH to get the value of this into the proper command.
?S: You must be prepared to do the ~name expansion yourself.
?S: The standard distribution will put nothing in this directory.
?S: After
 perl has been installed, users may install their own local
?S: library html pages in this directory with
?S:  MakeMaker Makefile.PL
?S: or equivalent.  See INSTALL for details.
?S:.
?D:sitehtml3direxp=''
?S:sitehtml3direxp:
?S: This variable is the same as the sitehtml3dir variable, but is filename
?S: expanded at configuration time, for convenient use in makefiles.
?S:.
?D:installsitehtml3dir=''
?S:installsitehtml3dir:
?S: This variable is really the same as sitehtml3direxp, unless you are using
?S: AFS in which case it points to the read/write location whereas
?S: html3direxp only points to the read-only access location. For extra
?S: portability, you should only use this variable within your makefiles.
?S:.
?LINT:change prefixvar
?LINT:set installsitehtml3dir
?LINT:set sitehtml3dir
?LINT:set sitehtml3direxp
: determine where add-on library html pages go
: There is no standard location, so try to copy the previously-selected
: directory structure for the core html pages.
case
 "$sitehtml3dir" in
")    dflt=`echo "$html3dir" | $sed "s#^$prefix#$siteprefix#"` ;;
*)     dflt=$sitehtml3dir ;;
esac
case "$dflt" in
"|' ') dflt=none ;;
esac
fn=dn+~
rp='Pathname where the site-specific library html pages should be installed?'
. ./getfile
prefixvar=sitehtml3dir
. ./setprefixvar

Found in path(s):
```

* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/sitehtml3dir.U
No license file was found, but licenses were detected in source scan.

```
/* This file was produced by running the config_h.SH script, which
* gets its values from $CONFIG_SH, which is generally produced by
* running Configure.
*
* Feel free to modify any of this as the need arises.  Note, however,
* that running config_h.SH again will wipe out any changes you've made.
* For a more permanent change edit $CONFIG_SH and rerun config_h.SH.
*/
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/Config_h.U
No license file was found, but licenses were detected in source scan.

```
/*|?:[\\/]*)
if test -f "$xxx"; then
: ok
else
echo "WARNING: no $xxx -- ignoring your setting for $file." >&4
xxx=`./loc $file $file $pth`
fi
;;
") xxx=`./loc $file $file $pth`;;
*) xxx=`./loc $xxx $xxx $pth`;;
esac
eval $file=$xxx$_exe
eval _$file=$xxx
case "$xxx" in
/*)
echo $file is in $xxx.
;;
?X: Under OS/2, we have PC-like paths
?:[\\/]*)
echo $file is in $xxx.
;;
*)
echo "I don't know where '$file' is, and my life depends on it." >&4
echo "Go find a public domain implementation or fix your PATH setting!" >&4
exit 1
;;
esac
done
echo " "
echo "Don't worry if any of the following aren't found..."
say=offhand
for file in $trylist; do
```

```
?X: Allow them to -Dmake=pmake on the command line for instance (see above)
eval xxx=\$$file
case "$xxx" in
/*|?:[\/]*)
if test -f "$xxx"; then
: ok
else
echo "WARNING: no $xxx -- ignoring your setting for $file." >&4
xxx=`./loc $file $file $pth`
fi
;;
") xxx=`./loc $file $file $pth`;;
*)
 xxx=`./loc $xxx $xxx $pth`;;
esac
eval $file=$xxx$_exe
eval _$file=$xxx
case "$xxx" in
/*)
echo $file is in $xxx.
;;
?X: Under OS/2, we have PC-like paths
?:[\/]*)
echo $file is in $xxx.
;;
*)
echo "I don't see $file out there, $say."
say=either
;;
esac
done
case "$egrep" in
egrep)
echo "Substituting grep for egrep."
egrep=$grep
_egrep=$grep
;;
esac
@if less
case "$less" in
") ;;
*) if $less -R </dev/null >/dev/null 2>&1; then
echo "Substituting less -R for less."
less="$less -R"
_less=$less
fi
;;
esac
```

```
@end
@if ln
case "$ln" in
ln)
echo "Substituting cp for ln."
ln=$cp
_ln=$cp
;;
esac
@end
@if make || gmake
case "$make" in
make)
case "$gmake" in
gmake)
echo "I can't find make or gmake, and my life depends on it." >&4
echo "Go find a public domain implementation or fix your PATH setting!" >&4
exit 1
;;
esac
;;
esac
case "$gmake" in
gmake) ;;
*) # We can't have osname yet.
if test -f "/system/gnu_library/bin/ar.pm"; then # Stratus VOS
# Assume that gmake, if found, is definitely
 GNU make
# and prefer it over the system make.
echo "Substituting gmake for make."
make=$gmake
_make=$gmake
fi
;;
esac
@end
case "$test" in
test)
echo "Hopefully test is built into your sh."
;;
*)
if `sh -c "PATH= test true" >/dev/null 2>&1`; then
echo "Using the test built into your sh."
?X:
?X: We need to set both test and _test, since Oldconfig.U will use the _test
?X: value to systematically restore computed paths, which may be wrong if
?X: we choose to load an old config.sh generated on another platform.
?X:
```

```
test=test
_test=test
fi
;;
esac
?LINT:change n c
case "$echo" in
echo)
echo "Hopefully echo is built into your sh."
;;
?X: For those rare cases where we don't need $echo...
") ;;
*)
echo " "
echo "Checking compatibility between $echo and builtin echo (if any)..." >&4
$echo $n "hi there$c" >foo1
echo $n "hi there$c" >foo2
if cmp foo1 foo2 >/dev/null 2>&1; then
echo "They are compatible.  In fact, they may be identical."
else
case "$n" in
'-n') n=" c='\c';;
*) n='-n' c=";;
esac
cat
 <<FOO
They are not compatible!  You are probably running ksh on a non-USG system.
I'll have to use $echo instead of the builtin, since Bourne shell doesn't
have echo built in and we may have to run some Bourne shell scripts.  That
means I'll have to use '$n$c' to suppress newlines now.  Life is ridiculous.

FOO
$echo $n "The star should be here-->$c"
$echo "*"
fi
$rm -f foo1 foo2
;;
esac

?X: The next part is irrelevant to the real process
# This question was auctioned at YAPC::Europe-2007 in Vienna
# I never promised you could answer it. I only auctioned the question.
cat <<FOO
The following message is sponsored by

Dresden.pm<--The stars should be here.

Dear Perl user, system administrator or package
```

maintainer, the Perl community sends greetings to
you. Do you (emblematical) greet back [Y/n]? n

FOO

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/Loc.U
No license file was found, but licenses were detected in source scan.

?RCS: $Id: libc.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: libc.U,v $
?RCS: Revision 3.0.1.10  1997/02/28  15:56:48  ram
?RCS: patch61: replaced .a with $_a all over the place
?RCS: patch61: added support for HPUX-10 nm output
?RCS:
?RCS: Revision 3.0.1.9  1995/07/25  14:11:56  ram
?RCS: patch56: now knows about OS/2 platforms
?RCS:
?RCS: Revision 3.0.1.8  1995/05/12  12:20:47  ram
?RCS: patch54: made sure only most recent version of shared lib is picked
?RCS: patch54: final "nm -p" check now uses xscan and xrun
 like everybody
?RCS: patch54: can now grok Linux nm output with lead __IO (ADO)
?RCS: patch54: added support for Linux ELF output, using 'W' for alias (ADO)
?RCS:
?RCS: Revision 3.0.1.7  1994/10/29  16:23:40  ram
?RCS: patch36: now looks for shared libraries before anything else (ADO)
?RCS: patch36: added new nm output format (ADO)
?RCS:
?RCS: Revision 3.0.1.6  1994/08/29  16:28:10  ram
?RCS: patch32: added I-type symbols for nm output parsing on Linux
?RCS:
?RCS: Revision 3.0.1.5  1994/06/20  07:03:24  ram
?RCS: patch30: checks are now presented by succession of if/elif
?RCS: patch30: uniformized checks for shared objects with new so symbol
?RCS:
?RCS: Revision 3.0.1.4  1994/05/06  15:06:33  ram
?RCS: patch23: added shared library knowledge (ADO and WED)
?RCS:

```
?RCS: Revision 3.0.1.3  1994/01/24  14:12:17  ram
?RCS: patch16: can now export nm_extract as an internal-use only variable
?RCS:
?RCS: Revision 3.0.1.2  1993/09/13  16:09:03  ram
?RCS: patch10: added special handling for Apollo
 systems (WAD)
?RCS:
?RCS: Revision 3.0.1.1  1993/08/27  14:40:03  ram
?RCS: patch7: added entry for /usr/shlib/libc.so (OSF/1 machines)
?RCS:
?RCS: Revision 3.0  1993/08/18  12:08:57  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:libc +nm_extract: echo n c rm test grep Getfile Myread Oldconfig Loc \
 sed libs incpath libpth ar runnm nm nm_opt nm_so_opt contains xlibpth \
 so _a _o osname trnl tr sort uniq sysroot
?MAKE: -pick add $@ %<
?S:libc:
?S: This variable contains the location of the C library.
?S:.
?S:nm_extract:
?S: This variable holds the name of the extraction command used to process
?S: the output of nm and yield the list of defined symbols. It is used
?S: internally by Configure.
?S:.
?T:thislib try libnames xxx xscan xrun thisname com tans file
?F:!libnames !libc.tmp !tmp.imp
?LINT:extern PASE
?LINT:extern libnames
?LINT:change nm_opt
?INIT:libnames="
: Figure out where the libc is located
case "$runnm" in
true)
?X: indentation is wrong on purpose--RAM
:
 get list of predefined functions in a handy place
echo " "
case "$libc" in
") libc=unknown
 case "$libs" in
 *-lc_s*) libc=`./loc libc_s$_a $libc $libpth`
 esac
 ;;
esac
case "$libs" in
") ;;
*)  for thislib in $libs; do
```

```
 case "$thislib" in
 -lc|-lc_s)
  : Handle C library specially below.
  ;;
 -l*)
  thislib=`echo $thislib | $sed -e 's/^-l//'`
  if try=`./loc lib$thislib.$so.'*' X $libpth`; $test -f "$try"; then
   :
  elif try=`./loc lib$thislib.$so X $libpth`; $test -f "$try"; then
   :
  elif try=`./loc lib$thislib$_a X $libpth`; $test -f "$try"; then
   :
  elif try=`./loc $thislib$_a X $libpth`; $test -f "$try"; then
   :
  elif try=`./loc lib$thislib X $libpth`; $test -f "$try"; then
   :
  elif try=`./loc $thislib X $libpth`; $test -f "$try"; then
   :
  elif try=`./loc Slib$thislib$_a X $xlibpth`; $test -f "$try"; then
   :
  else
   try=''
  fi
  libnames="$libnames $try"
  ;;
 *) libnames="$libnames $thislib" ;;
 esac
 done
 ;;
esac
?X:
?X: Some systems (e.g. DG/UX) use
 "environmental" links, which make the test
?X: -f fail. Ditto for symbolic links. So in order to reliably check the
?X: existence of a file, we use test -r. It will still fail with DG/UX links
?X: though, but at least it will detect symbolic links. At some strategic
?X: points, we make use of (test -h), using a sub-shell in case builtin test
?X: does not implement the -h check for symbolic links. This makes it
?X: possible to preset libc in a hint file for instance and have it show up
?X: as-is in the question.
?X:
xxx=normal
case "$libc" in
unknown)
?X:
?X: The sed below transforms .so.9 .so.12 into something like .so.0009 .so.0012,
?X: then sorts on it to allow keeping .so.12 instead of .so.9 as the latest
?X: up-to-date library. The initial filename (before sed munging, saved in hold
```

```
?X: space via 'h') is appended via 'G' before sorting, then the leading munged
?X: part is removed after sorting. Nice efficient work from Tye McQueen.
?X: The initial blurfl is here to prevent the trailing
 pipe from producing an
?X: empty string, causing Configure to output all its set variables!
?X:
 set /lib/libc.$so
 for xxx in $libpth; do
  $test -r $1 || set $xxx/libc.$so
  : The messy sed command sorts on library version numbers.
  $test -r $1 || \
   set `echo blurfl; echo $xxx/libc.$so.[0-9]* | \
   tr ' ' $trnl | egrep -v '\.[A-Za-z]*$' | $sed -e '
    h
    s/[0-9][0-9]*/0000&/g
    s/0*\([0-9][0-9][0-9][0-9][0-9]\)/\1/g
    G
    s/\n/ /' | \
    $sort | $sed -e 's/^.* //'`
  eval set \$$#
 done
 $test -r $1 || set $sysroot/usr/ccs/lib/libc.$so
 $test -r $1 || set $sysroot/lib/libsys_s$_a
 ;;
*)
?X: ensure the test below for the (shared) C library will fail
 set blurfl
 ;;
esac
if $test -r "$1"; then
 echo "Your (shared) C library seems to be in $1."
 libc="$1"
elif $test -r /lib/libc && $test -r /lib/clib; then
?X:
?X: Apollo has its C library in /lib/clib AND /lib/libc
?X: not to mention its math library in /lib/syslib...
?X:
 echo "Your C library seems to be in both /lib/clib
 and /lib/libc."
 xxx=apollo
 libc='/lib/clib /lib/libc'
 if $test -r /lib/syslib; then
  echo "(Your math library is in /lib/syslib.)"
?X: Put syslib in libc -- not quite right, but won't hurt
  libc="$libc /lib/syslib"
 fi
elif $test -r "$libc" || (test -h "$libc") >/dev/null 2>&1; then
 echo "Your C library seems to be in $libc, as you said before."
```

```
?X: For mips, and...
elif $test -r $incpath/usr/lib/libc$_a; then
 libc=$incpath/usr/lib/libc$_a;
 echo "Your C library seems to be in $libc.  That's fine."
elif $test -r /lib/libc$_a; then
 libc=/lib/libc$_a;
 echo "Your C library seems to be in $libc.  You're normal."
else
 if tans=`./loc libc$_a blurfl/dyick $libpth`; $test -r "$tans"; then
  :
 elif tans=`./loc libc blurfl/dyick $libpth`; $test -r "$tans"; then
  libnames="$libnames "`./loc clib blurfl/dyick $libpth`
 elif tans=`./loc clib blurfl/dyick $libpth`; $test -r "$tans"; then
  :
 elif tans=`./loc Slibc$_a blurfl/dyick $xlibpth`; $test -r "$tans"; then
  :
 elif tans=`./loc
 Mlibc$_a blurfl/dyick $xlibpth`; $test -r "$tans"; then
  :
 else
  tans=`./loc Llibc$_a blurfl/dyick $xlibpth`
 fi
 if $test -r "$tans"; then
  echo "Your C library seems to be in $tans, of all places."
  libc=$tans
 else
  libc='blurfl'
 fi
fi
if $test $xxx = apollo -o -r "$libc" || (test -h "$libc") >/dev/null 2>&1; then
 dflt="$libc"
 cat <<EOM

If the guess above is wrong (which it might be if you're using a strange
compiler, or your machine supports multiple models), you can override it here.

EOM
else
 dflt=''
 echo $libpth | $tr ' ' $trnl | $sort | $uniq > libpath
 cat >&4 <<EOM
I can't seem to find your C library.  I've looked in the following places:

EOM
 $sed 's/^/ /' libpath
 cat <<EOM

None of these seems to contain your C library. I need to get its name...
```

```
EOM
fi
fn=f
rp='Where is your C library?'
. ./getfile
libc="$ans"

echo " "
echo $libc $libnames | $tr ' ' $trnl | $sort | $uniq > libnames
set X `cat libnames`
shift
xxx=files
case $# in 1) xxx=file; esac
echo
 "Extracting names from the following $xxx for later perusal:" >&4
echo " "
$sed 's/^/ /' libnames >&4
echo " "
$echo $n "This may take a while...$c" >&4

?X:
?X: Linux may need the special Dynamic option to nm for shared libraries.
?X: In general, this is stored in the nm_so_opt variable.
?X: Unfortunately, that option may be fatal on non-shared libraries.
?X:
for file in $*; do
 case $file in
 *$so*) $nm $nm_so_opt $nm_opt $file 2>/dev/null;;
 *) $nm $nm_opt $file 2>/dev/null;;
 esac
done >libc.tmp

$echo $n ".$c"
?X:
?X: To accelerate processing, we look at the correct 'sed' command
?X: by using a small subset of libc.tmp, i.e. fprintf function.
?X: When we know which sed command to use, do the name extraction
?X:
$grep fprintf libc.tmp > libc.ptf
?X:
?X: In order to enhance readability and save some space, we define
?X: some variables that will be "eval"ed.
?X:
xscan='eval "<libc.ptf $com >libc.list"; $echo $n ".$c" >&4'
xrun='eval "<libc.tmp $com >libc.list"; echo "done." >&4'
?X:
```

```
 BSD-like output, I and W types added for Linux
?X: Some versions of Linux include a leading __IO in the symbol name.
?X: HP-UX 10 reportedly has trailing spaces, though I'm surprised it has
?X: BSD-like output.  (AD).
?X: GNU extension: i is "indirect function"
xxx='[ADTSIWi]'
if com="$sed -n -e 's/__IO//' -e 's/^.* $xxx  *//p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
?X: SYSV-like output
elif com="$sed -n -e 's/^__*//' -e 's/^\([a-zA-Z_0-9$]*\).*xtern.*/\1/p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
elif com="$sed -n -e '/|UNDEF/d' -e '/FUNC..GL/s/^.*|__*//p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
elif com="$sed -n -e 's/^.* D __*//p' -e 's/^.* D //p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
elif com="$sed -n -e 's/^_//' -e 's/^\([a-zA-Z_0-9]*\).*xtern.*text.*/\1/p'";\
 eval $xscan;\
 $contains '^fprintf$'
 libc.list >/dev/null 2>&1; then
  eval $xrun
elif com="$sed -n -e 's/^.*|FUNC |GLOB .*|//p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
elif com="$grep '|' | $sed -n -e '/|COMMON/d' -e '/|DATA/d' \
    -e '/ file/d' -e 's/^\([^  ]*\).*/\1/p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
elif com="$sed -n -e 's/^.*|FUNC |GLOB .*|//p' -e 's/^.*|FUNC |WEAK .*|//p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
?X: mips nm output (sysV)
elif com="$sed -n -e 's/^__//' -e '/|Undef/d' -e '/|Proc/s/ .*//p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
elif com="$sed -n -e 's/^.*|Proc .*|Text *| *//p'";\
 eval $xscan;\
```

```
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
elif com="$sed -n -e '/Def. Text/s/.* \([^ ]*\)\$/\1/p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
?X: OS/2
 nm output
elif com="$sed -n -e 's/^[-0-9a-f ]*_\(.*\)=.*/\1/p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
elif com="$sed -n -e 's/.*\.text n\ \ \ \.//p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
?X: AIX nm output
elif com="sed -n -e 's/^__.*//' -e 's/[       ]*D[    ]*[0-9]*.*//p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
else
 $nm -p $* 2>/dev/null >libc.tmp
 $grep fprintf libc.tmp > libc.ptf
 if com="$sed -n -e 's/^.* [ADTSIW]  *_[_.]*//p' -e 's/^.* [ADTSIW] //p'";\
  eval $xscan; $contains '^fprintf$' libc.list >/dev/null 2>&1
 then
  nm_opt='-p'
  eval $xrun
 else
  echo " "
  echo "$nm didn't seem to work right. Trying $ar instead..." >&4
  com=''
  if $ar t $libc > libc.tmp && \
   $contains '^fprintf$' libc.tmp >/dev/null 2>&1
  then
   for thisname in $libnames $libc; do
    $ar t $thisname >>libc.tmp
   done
   $sed -e "s/\\$_o\$//" < libc.tmp > libc.list
   echo
 "Ok." >&4
  elif test "X$osname" = "Xos2" && $ar tv $libc > libc.tmp; then
?X: Repeat libc to extract forwarders to DLL entries too
   for thisname in $libnames $libc; do
    $ar tv $thisname >>libc.tmp
?X: Revision 50 of EMX has bug in ar: it will not extract forwarders
?X: to DLL entries.  Use emximp which will extract exactly them.
```

```
    emximp -o tmp.imp $thisname \
        2>/dev/null && \
        $sed -e 's/^\([_a-zA-Z0-9]*\) .*$/\1/p' \
        < tmp.imp >>libc.tmp
    $rm -f tmp.imp
   done
   $sed -e "s/\\$_o\$//" -e 's/^ \+//' < libc.tmp > libc.list
   echo "Ok." >&4
  else
   echo "$ar didn't seem to work right." >&4
   echo "Maybe this is a Cray...trying bld instead..." >&4
   if  bld t $libc | \
    $sed -e 's/.*\///' -e "s/\\$_o:.*\$//" > libc.list &&
    $test -s libc.list
   then
    for thisname in $libnames; do
     bld t $libnames | \
     $sed -e 's/.*\///' -e "s/\\$_o:.*\$//" >>libc.list
     $ar t $thisname >>libc.tmp
    done
    echo "Ok." >&4
   else
    echo
 "That didn't work either.  Giving up." >&4
    exit 1
   fi
  fi
 fi
fi
nm_extract="$com"
case "$PASE" in
define)
   echo " "
   echo "Since you are compiling for PASE, extracting more symbols from libc.a ...">&4
   dump -Tv /lib/libc.a | awk '$7 == "/unix" {print $5 " " $8}' | grep "^SV" | awk '{print $2}' >> libc.list
   ;;
*)  if $test -f /lib/syscalls.exp; then
 echo " "
 echo "Also extracting names from /lib/syscalls.exp for good ole AIX..." >&4
 $sed -n 's/^\([^  ]*\)[  ]*syscall[0-9]*[  ]*$/\1/p' \
  /lib/syscalls.exp >>libc.list
   fi
   ;;
esac
;;
esac
$rm -f libnames libpath
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/libc.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: etc.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: etc.U,v $
?RCS: Revision 3.0  1993/08/18  12:08:07  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:etc etcexp: Getfile Loc Oldconfig
?MAKE: -pick add $@ %<
?S:etc:
?S: This variable holds the name of the directory in which the user wants
?S: to put "administrative" executable images for the package in question.
?S: It is most often a local directory such as /usr/local/etc. Programs
?S: relying on this variable must be prepared to deal with
 ~name
?S: substitutions.
?S:.
?S:etcexp:
?S: This is the same as the etc variable, but is filename expanded at
?S: configuration time, for convenient use in makefiles.
?S:.
: determine where administrative executables go
case "$etc" in
")
 dflt=`./loc . /local/etc /usr/local/etc /local/etc /usr/etc /etc`
 ;;
*)
 dflt="$etc"
 ;;
esac
fn=d~
rp='Where should the administrative executables go?'
. ./getfile
etc="$ans"
etcexp="$ansexp"
```

Found in path(s):

* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/etc.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Oldsym.U,v $
?RCS: Revision 3.0.1.1  1997/02/28  15:06:58  ram
?RCS: patch61: added support for src.U
?RCS:
?RCS: Revision 3.0  1993/08/18  12:05:13  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This unit follows the creation of the config.sh file. It adds some
?X: special symbols: defines from patchlevel.h file if any and CONFIG,
?X: which is set to true. Then, we try to keep all the new symbols that
?X: may come from a hint file or a previous config.sh file.
?X:
?MAKE:Oldsym:
 Config_sh Options test hint src sed sort uniq
?MAKE: -pick add $@ %<
?T:CONFIG sym tmp
?F:!UU
: add special variables
$test -f $src/patchlevel.h && \
awk '/^#define/ {printf "%s=%s\n",$2,$3}' $src/patchlevel.h >>config.sh
echo "CONFIG=true" >>config.sh

: propagate old symbols
if $test -f UU/config.sh; then
?X: Make sure each symbol is unique in oldconfig.sh
 <UU/config.sh $sort | $uniq >UU/oldconfig.sh
?X:
?X: All the symbols that appear twice come only from config.sh (hence the
?X: two config.sh in the command line). These symbols will be removed by
?X: the uniq -u command. The oldsyms file thus contains all the symbols
?X: that did not appear in the produced config.sh (Larry Wall).
?X:
?X: Do not touch the -u flag of uniq.  This means you too, Jarkko.
?X:
```

```
 $sed -n 's/^\([a-zA-Z_0-9]*\)=.*/\1/p' \
  config.sh config.sh UU/oldconfig.sh |\
  $sort | $uniq -u >UU/oldsyms
 set X `cat UU/oldsyms`
 shift
 case $# in
 0) ;;
 *)
  cat <<EOM
Hmm...You had some extra variables I don't know about...I'll
 try to keep 'em...
EOM
  echo ": Variables propagated from previous config.sh file." >>config.sh
  for sym in `cat UU/oldsyms`; do
   echo "    Propagating $hint variable '"$'"$sym..."
   eval 'tmp="$'"${sym}"'"'
   echo "$tmp" | \
    sed -e "s/'/'\'"\'"/g" -e "s/^/$sym='/" -e "s/$/'/" >>config.sh
  done
  ;;
 esac
fi
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Oldsym.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Warn.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Extract.U,v $
?X:
?X: This unit produces a shell script which can be run in order to emit
?X: an important warning to the user, which will be remembered and shown
?X: at the end of the Configure run as well.
?X:
?X: A typical use would be:
?X:
?X:  ./warn <<EOM
?X:  Problem with your C compiler: can't turn debugging on.
?X:  EOM
```

```
?X:
?X: or:
?X:
?X:  ./warn "Problem with your C compiler: can't turn debugging on."
?X:
?X: Which will both display to the user:
?X:
?X:  ***
 WARNING:
?X:  *** Problem with your C compiler: can't turn debugging on.
?X:  ***
?X:
?MAKE:Warn: startsh eunicefix
?MAKE: -pick add $@ %<
?F:./warn
: script used to emit important warnings
cat >warn <<EOS
$startsh
?X: Read the whole warning message from stdin into a temporary file
?X: when no argument was supplied.
if test \$# -gt 0; then
 echo "\$@" >msg
else
 cat >msg
fi
?X: Emit the warning, prefixing all lines with '*** '
echo "*** WARNING:" >&4
sed -e 's/^/*** /' <msg >&4
echo "*** " >&4
?X: Save the warning in the logs, which will be shown again at the end
cat msg >>config.msg
echo " " >>config.msg
rm -f msg
EOS
chmod +x warn
$eunicefix warn
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Warn.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: maildir.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
```

```
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: maildir.U,v $
?RCS: Revision 3.0.1.1  1993/12/15  08:21:56  ram
?RCS: patch15: now also looks under /var/mail for BSD/386
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:09  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:maildir maildirexp: Getfile Loc Oldconfig
?MAKE: -pick add $@ %<
?S:maildir:
?S: This variable contains the name of the directory in which mail is
?S: spooled. Programs using this variable must be prepared to deal with
?S: ~name
 substitutions.
?S:.
?S:maildirexp:
?S: This is the same as the maildir variable, but is filename expanded
?S: at configuration time, for programs not willing to deal with it at
?S: run-time.
?S:.
: determine where mail is spooled
case "$maildir" in
") dflt=`./loc . /usr/spool/mail /usr/spool/mail /usr/mail /var/mail`;;
*) dflt="$maildir";;
esac
echo " "
fn=d~
rp='Where is yet-to-be-read mail spooled?'
. ./getfile
maildir="$ans"
maildirexp="$ansexp"
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/maildir.U
No license file was found, but licenses were detected in source scan.

```
?RCS: Copyright (c) 2016 Dagfinn Ilmari Mannsker & H.Merijn Brand
?RCS:
?RCS: You may distribute under the terms of either the GNU General Public
?RCS: License or the Artistic License, as specified in the README file.
?RCS:
?X:
?X: This unit produces a variable that is intended to be eval'ed in
?X: order to define/undefine a symbol. A consistency check is made
?X: regarding any previous value and a warning is issued if there
```

```
?X: is any discrepancy.
?X:
?X: To use it, say:
?X: set d_siginfo_si_errno siginfo_t int si_errno $d_sigaction signal.h
?X: eval $hasfield_t;
?X:
?MAKE:Hasfield_t: test Compile rm_try Setvar
?MAKE: -pick add $@ %<
?LINT:define hasfield_t
?S:hasfield_t:
?S: Internal macro for Configure
?S:.
?V:hasfield_t:
?T:varname struct type field
: Define hasfield_t macro for Configure internal use
hasfield_t='varname=$1; struct=$2; type=$3; field=$4; shift; shift; shift; shift;
while $test $# -ge 2; do
   case
 "$1" in
 $define) echo "#include <$2>";;
   esac ;
   shift 2;
done > try.c;
echo "int main () { $struct foo; $type bar = foo.$field; }" >> try.c;
set try;
if eval $compile; then
 val="$define";
else
 val="$undef";
fi;
set $varname;
eval $setvar;
$rm_try'
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/Hasfield_t.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Chk_MANI.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
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?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
```

```
?RCS: $Log: Chk_MANI.U,v $
?RCS: Revision 3.0.1.2  1997/02/28  14:57:25  ram
?RCS: patch61: added support for src.U
?RCS:
?RCS: Revision 3.0.1.1  1994/10/31  09:33:14  ram
?RCS: patch44: now lists Begin instead of Myinit in its dependencies
?RCS: patch44: leading comment now explains how this unit is included
?RCS:
?RCS: Revision 3.0  1993/08/18  12:04:45  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This unit checks the package by making sure
 every file listed in MANIFEST
?X: is present. It is systematically "included" via the Finish unit (which
?X: is always present in every Configure script), although it may result in
?X: an empty inclusion when no MANIFEST is present.
?X:
?MAKE:Chk_MANI: Begin c n rsrc
?MAKE: -pick wipe $@ %<
?T:filelist ans tmppwd
?X: This check happens at metaconfig-time, so it's ok to hard-code the path.
@if {test -f ../MANIFEST}
: Now test for existence of everything in MANIFEST
echo " "
if test -f "$rsrc/MANIFEST"; then
 echo "First let's make sure your kit is complete.  Checking..." >&4
?X:
?X: Files spelled uppercased and beginning with PACK are produced by the
?X: shell archive builder and may be removed by the user. Usually, they are
?X: not listed in the MANIFEST file, but you never know...
?X:
?X: "split -l" is the new way of running a split, but we also try the older way
?X:
 awk '$1 !~ /PACK[A-Z]+/ {print $1}' "$rsrc/MANIFEST" | \
  (split -l 50 2>/dev/null || split -50)
 rm -f missing
 tmppwd=`pwd`
 for
 filelist in x??; do
  (cd "$rsrc"; ls `cat "$tmppwd/$filelist"` \
   >/dev/null 2>>"$tmppwd/missing")
 done
 if test -s missing; then
  cat missing >&4
  cat >&4 <<'EOM'

THIS PACKAGE SEEMS TO BE INCOMPLETE.
```

```
You have the option of continuing the configuration process, despite the
distinct possibility that your kit is damaged, by typing 'y'es.  If you
do, don't blame me if something goes wrong.  I advise you to type 'n'o
and contact the author (<MAINTLOC>).

EOM
?X: Can't use $echo at this early stage
  echo $n "Continue? [n] $c" >&4
  read ans
  case "$ans" in
  y*)
   echo "Continuing..." >&4
   rm -f missing
   ;;
  *)
?X:
?X: Use kill and not exit, so that the trap gets executed to clean up
?X:
   echo "ABORTING..." >&4
   kill $$
   ;;
  esac
 else
  echo "Looks good..."
 fi
else
 echo "There is no MANIFEST file.  I hope your kit is complete !"
fi
rm -f missing x??

@end
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Chk_MANI.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Compile.U,v $
?RCS:
?RCS: Copyright (c) 1998 Andy Dougherty
?RCS:
?RCS: You may distribute under the terms of either the GNU General Public
?RCS: License or the Artistic License, as specified in the README file.
?RCS:
?RCS:
?X:
?X: This unit is just a quick shorthand for the compile command
?X: to be used in all the other metaconfig units.
```

```
?X:
?MAKE:Compile: +cc +optimize +ccflags +ldflags +libs test
?MAKE: -pick wipe $@ %<
?LINT:extern usedevel maintloc
?LINT:define compile compile_ok
?V:compile compile_ok mc_file
?S:compile:
?S: This shell variable is used internally by Configure to provide
?S: a convenient shorthand for the typical compile command, namely
?S: $cc $optimize $ccflags $ldflags -o $1 $1.c $libs > /dev/null 2>&1
?S: Note that the output filename does _not_ include the _exe
?S: extension.  Instead we assume that the linker will be
?S: "helpful" and automatically appending the correct suffix.
?S: OS/2
 users will apparently need to supply the -Zexe flag to
?S: get this behavior.
?S:
?S: To use this variable, say something like:
?S:  echo 'int main() { exit(0); }' > try.c
?S:  set try
?S:  if eval $compile; then
?S:   echo "success"   # and do whatever . . .
?S:  else
?S:   echo "failure"   # and do whatever . . .
?S:  fi
?S: To add extra flags cc flags (e.g. -DWHATEVER) just put them
?S: in $*, e.g.
?S:  set try -DTRY_THIS_FLAG
?S:.
?S:compile_ok:
?S: This shell variable is used internally by Configure to provide
?S: a convenient shorthand for the typical compile command that you
?S: expect to work ok.  It is the same as $compile, except we
?S: deliberately let the user see any error messages.
?S:.
: define a shorthand compile call
compile='
mc_file=$1;
shift;
case "$usedevel" in $define|true|[yY]*) if $test ! -f "${mc_file}.c"; then
echo "Internal Configure script bug - compiler test file ${mc_file}.c is missing. Please report this to <$maintloc>"
>&4;
exit 1;
fi;
esac;
$cc
 -o ${mc_file} $optimize $ccflags $ldflags $* ${mc_file}.c $libs > /dev/null 2>&1;'
: define a shorthand compile call for compilations that should be ok.
```

```
compile_ok='
mc_file=$1;
shift;
$cc -o ${mc_file} $optimize $ccflags $ldflags $* ${mc_file}.c $libs > /dev/null 2>&1;'
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/compline/Compile.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Extract.U,v 3.0.1.2 1997/02/28 14:58:52 ram Exp $
?RCS:
?RCS: Copyright (c) 1991-1993, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: Extract.U,v $
?RCS: Revision 3.0.1.2  1997/02/28  14:58:52  ram
?RCS: patch61: added support for src.U
?RCS:
?RCS: Revision 3.0.1.1  1994/10/29  15:51:46  ram
?RCS: patch36: added ?F: line for metalint file checking
?RCS:
?RCS: Revision 3.0  1993/08/18  12:04:52  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This unit produces a shell script which can be doted in order to extract
?X: .SH files with variable substitutions.
?X:
?X: When running
 Configure from a remote directory ($src is not '.'),
?X: then the files will be created in that directory, so beware!
?X:
?MAKE:Extract: src
?MAKE: -pick add $@ %<
?F:./extract
?T:PERL_CONFIG_SH dir file name create mkdir_p
: script used to extract .SH files with variable substitutions
cat >extract <<'EOS'
PERL_CONFIG_SH=true
echo "Doing variable substitutions on .SH files..."
if test -f MANIFEST; then
 set x `awk '{print $1}' < MANIFEST | grep '\.SH$'`
else
```

```
 echo "(Looking for .SH files under the source directory.)"
 set x `(cd "$src"; find . -name "*.SH" -print)`
fi
shift
case $# in
0) set x `(cd "$src"; echo *.SH)`; shift;;
esac
if test ! -f "$src/$1"; then
 shift
fi
?X: script to emulate mkdir -p
mkdir_p='
name=$1;
create="";
while test $name; do
 if test ! -d "$name"; then
  create="$name $create";
  name=`echo $name | sed -e "s|^[^/]*$||"`;
  name=`echo $name | sed -e "s|\(.*\)/.*|\1|"`;
 else
  name="";
 fi;
done;
for file in $create; do
 mkdir $file;
done
'
for file in $*;
 do
 case "$src" in
 ".")
  case "$file" in
  */*)
   dir=`expr X$file : 'X\(.*\)/'`
   file=`expr X$file : 'X.*/\(.*\)'`
   (cd "$dir" && . ./$file)
   ;;
  *)
   . ./$file
   ;;
  esac
  ;;
 *)
?X:
?X: When running Configure remotely ($src is not '.'), we cannot source
?X: the files directly, since that would wrongly cause the extraction
?X: where the source lie instead of withing the current directory. Therefore,
?X: we need to 'sh <file' then, which is okay since they will source the
```

```
?X: existing config.sh file. It's not possible to use:
?X:  ../src/Configure -S -O -Dsomething
?X: unfortunately since no new config.sh with the -Dsomething override
?X: will be created before running the .SH files. A minor buglet.
?X:
?X: Note that we must create the directory hierarchy ourselves if it does
?X: not exist already, and that is done through a shell emulation of the
?X: 'mkdir -p' command. We don't want to use the $installdir metaconfig
?X: symbol here since that would require too much to
 be configured for
?X: this simple extraction task that may happen quickly with 'Configure -S'.
?X:  -- RAM, 18/03/96
?X:
  case "$file" in
  */*)
   dir=`expr X$file : 'X\(.*\)/'`
   file=`expr X$file : 'X.*/\(.*\)'`
   (set x $dir; shift; eval $mkdir_p)
   sh <"$src/$dir/$file"
   ;;
  *)
   sh <"$src/$file"
   ;;
  esac
  ;;
 esac
done
if test -f "$src/config_h.SH"; then
 if test ! -f config.h; then
 : oops, they left it out of MANIFEST, probably, so do it anyway.
 . "$src/config_h.SH"
 fi
fi
EOS
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/Extract.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: package.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
```

```
?RCS:
?RCS: $Log: package.U,v $
?RCS: Revision 3.0.1.3  1994/10/29  16:27:21  ram
?RCS: patch36: beware of non-ascii character sets when translating case
?RCS:
?RCS: Revision 3.0.1.2  1993/11/10  17:37:02  ram
?RCS: patch14: skip definition of spackage if not otherwise used
?RCS:
?RCS: Revision 3.0.1.1  1993/09/13  16:11:10  ram
?RCS: patch10: added spackage, suitable for starting sentences
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:28  ram
?RCS: Baseline for dist 3.0
 netwide release.
?RCS:
?MAKE:package spackage: Nothing
?MAKE: -pick wipe $@ %<
?S:package:
?S: This variable contains the name of the package being constructed.
?S: It is primarily intended for the use of later Configure units.
?S:.
?S:spackage:
?S: This variable contains the name of the package being constructed,
?S: with the first letter uppercased, i.e. suitable for starting
?S: sentences.
?S:.
?X: dist-4 has defined PACKAGE: here, which clashes with perly.h
?X:  as package is a reserved keyword in perl
?T:first last
: set package name
package='<PACKAGENAME>'
@if spackage
first=`echo $package | sed -e 's/^\(.\).*/\1/'`
last=`echo $package | sed -e 's/^.\(.*\)/\1/'`
?X:
?X: So early in the Configure script, we don't have ./tr set up and can't
?X: include Tr in our dependency or that would create a cycle. Therefore,
?X: we have to somehow duplicate the work done in Tr. That's life.
?X:
case "`echo AbyZ | tr '[:lower:]' '[:upper:]' 2>/dev/null`"-"`echo AbyZ | tr '[:upper:]' '[:lower:]'
 2>/dev/null`" in
ABYZ-abyz) spackage=`echo $first | tr '[:lower:]' '[:upper:]'`$last;;
*) spackage=`echo $first | tr '[a-z]' '[A-Z]'`$last;;
esac
@end
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/package.U

No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: rcs_branch.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: rcs_branch.U,v $
?RCS: Revision 3.0  1993/08/18  12:09:40  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:rcs_branch: Myread contains Loc
?MAKE: -pick add $@ %<
?S:rcs_branch:
?S: This variable will hold "true" if rcs can take the -b<revision>
?S: option, which can make Life Easier on those folks who like to run
?S: rcsdiff manually.
?S:.
?T:xxx
: Tra la la la la
echo " "
echo "Checking to see if RCS understands the -b switch..." >&4
xxx=`./loc
 rcs " $pth`
case "$xxx" in
")
 rcs_branch=false
 echo "Oh.  You don't seem to have RCS here."
 ;;
*)
 rcs > rcsbranch.out 2>&1
 if $contains 'b\[rev\]' rcsbranch.out  >/dev/null 2>&1 ; then
  rcs_branch=true
  echo "Nice!  Your RCS is spiffy!"
 else
  rcs_branch=false
 echo "Well, at least you have RCS.  You know, a newer version is available."
 fi
 ;;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/rcs_branch.U

No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: vendorman1dir.U,v 1.1 1999/07/08 18:32:57 doughera Exp doughera $
?RCS:
?RCS: Copyright (c) 1999, Andy Dougherty
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: vendorman1dir.U,v $
?RCS: Revision 1.1  1999/07/08 18:32:57  doughera
?RCS: Initial revision
?RCS:
?MAKE:vendorman1dir vendorman1direxp installvendorman1dir: man1dir Getfile \
 Oldconfig Setprefixvar Prefixit test vendorprefix prefix sed
?MAKE: -pick add $@ %<
?Y:TOP
?S:vendorman1dir:
?S: This variable contains the name of the directory for man1
?S: pages.  It may have a ~ on the front.
?S: The standard distribution will put nothing in this directory.
?S: Vendors
 who distribute perl may wish to place their own
?S: man1 pages in this directory with
?S:  MakeMaker Makefile.PL INSTALLDIRS=vendor
?S: or equivalent.  See INSTALL for details.
?S:.
?S:vendorman1direxp:
?S: This variable is the ~name expanded version of vendorman1dir, so that you
?S: may use it directly in Makefiles or shell scripts.
?S:.
?D:installvendorman1dir="
?S:installvendorman1dir:
?S: This variable is really the same as vendorman1direxp but may differ on
?S: those systems using AFS. For extra portability, only this variable
?S: should be used in makefiles.
?S:.
?LINT:change prefixvar
?LINT:set installvendorman1dir
: Set the vendorman1dir variables
case "$vendorprefix" in
") vendorman1dir="
 vendorman1direxp="
 ;;
*) : determine where vendor-supplied manual pages go.
```

```
 case "$vendorman1dir" in
 ") dflt=`echo "$man1dir" | $sed "s#^$prefix#$vendorprefix#"` ;;
 *) dflt=$vendorman1dir ;;
 esac
 case "$dflt" in
 "|' ') dflt=none ;;
 esac
 fn=nd~+
 rp='Pathname for
 the vendor-supplied manual section 1 pages?'
 . ./getfile
 vendorman1dir="$ans"
 vendorman1direxp="$ansexp"
 ;;
esac
: Use ' ' for none so value is preserved next time through Configure
$test X"$vendorman1dir" = "X" && vendorman1dir=' '
prefixvar=vendorman1dir
. ./installprefix
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/vendorman1dir.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Myinit.U,v 3.0 1993/08/18 12:05:07 ram Exp $
?RCS:
?RCS: Copyright (c) 1991-1993, Raphael Manfredi
?RCS:
?RCS: This file is included with or a derivative work of a file included
?RCS: with the metaconfig program of Raphael Manfredi's "dist" distribution.
?RCS: In accordance with clause 7 of dist's modified Artistic License:
?RCS:
?RCS:     You may distribute under the terms of either the GNU General Public
?RCS:     License or the Artistic License, as specified in the README file.
?RCS:
?RCS: $Log: Myinit.U,v $
?RCS: Revision 3.0  1993/08/18  12:05:07  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: If you want to initialize any default values, copy this unit to your
?X: personal U directory and add the assignments to the end.  This file
?X: is included after variables are initialized but before any old
?X: config.sh file is read in and before any Configure switch processing.
?X:
?MAKE:Myinit
 libswanted: Init
?MAKE: -pick add $@ %<
```

```
?S:libswanted:
?S: This variable holds a list of all the libraries we want to
?S: search.  The order is chosen to pick up the c library
?S: ahead of ucb or bsd libraries for SVR4.
?S:.
?LINT:extern usevfork glibpth
?LINT:change usevfork glibpth
: List of libraries we want.
?X: Put crypt here, even though I should really fix d_crypt.U to look
?X: for it correctly, including possible shared library versions.
: If anyone needs extra -lxxx, put those in a hint file.
libswanted="cl pthread socket bind inet ndbm gdbm dbm db malloc dl ld"
libswanted="$libswanted sun m crypt sec util c cposix posix ucb bsd BSD"
: We probably want to search /usr/shlib before most other libraries.
: This is only used by the lib/ExtUtils/MakeMaker.pm routine extliblist.
glibpth=`echo " $glibpth " | sed -e 's! /usr/shlib ! !'`
glibpth="/usr/shlib $glibpth"
: Do not use vfork unless overridden by a hint file.
usevfork=false
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/Myinit.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Finish.U,v $
?RCS: Revision 3.0.1.6  1995/02/15  14:09:30  ram
?RCS: patch51: now clearer about how to edit config.sh at the prompt (WED)
?RCS:
?RCS: Revision 3.0.1.5  1994/10/29  15:53:14  ram
?RCS: patch36: added ?F: line for metalint file checking
?RCS:
?RCS: Revision 3.0.1.4  1994/05/06  14:19:37  ram
?RCS: patch23: added blank lines around 'End of Configure'
?RCS:
?RCS: Revision 3.0.1.3  1993/10/16  13:46:09  ram
?RCS: patch12: replaced Config_h by Magic_h in the dependency line
?RCS:
?RCS:
```

```
 Revision 3.0.1.2  1993/09/13  15:45:26  ram
?RCS: patch10: fixed shell evaluation w/o shell escape while in silent mode
?RCS:
?RCS: Revision 3.0.1.1  1993/08/30  08:55:59  ram
?RCS: patch8: prevents myread from blocking on empty answers, exceptionally
?RCS:
?RCS: Revision 3.0  1993/08/18  12:04:55  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This unit is the very last one in the Configure script.  It runs all the
?X: SH files, which among other things produce config.h and (usually) Makefile.
?X: It offers to do a make depend if the Makefile contains that target.
?X:
?MAKE:Finish: Chk_MANI Extract Myread Oldsym Magic_h cat rm contains \
 test package make
?MAKE: -pick add $@ %<
?F:!config.sh
?T:pwd
: Finish up by extracting the .SH files
case "$alldone" in
exit)
?X: They supplied the -E switch
 echo "Stopping at your request, leaving temporary files around."
 exit 0
 ;;
cont)
 ;;
")
 dflt=''
 nostick=true
 $cat <<EOM

If you'd like to make any changes to the config.sh
 file before I begin
to configure things, do it as a shell escape now (e.g. !vi config.sh).

EOM
 rp="Press return or use a shell escape to edit config.sh:"
 . UU/myread
 nostick=''
 case "$ans" in
 '') ;;
 *) : in case they cannot read
  sh 1>&4 -c "$ans";;
 esac
 ;;
esac
```

```
: if this fails, just run all the .SH files by hand
. ./config.sh

?X:
?X: Turn silent mode off from now on (we want a verbose file extraction).
?X: This means we have to explicitly test for '$silent' from now on to
?X: strip off any verbose messages.
?X:
echo " "
exec 1>&4
pwd=`pwd`
. ./UU/extract
cd "$pwd"

if $contains '^depend:' [Mm]akefile >/dev/null 2>&1; then
 dflt=y
 case "$silent" in
 true) ;;
 *)
  $cat <<EOM

Now you need to generate make dependencies by running "$make depend".
You might prefer to run it in background: "$make depend > makedepend.out &"
It can take a while, so you might not want to run it right now.

EOM
  ;;
 esac
 rp="Run $make depend now?"
 . UU/myread
 case "$ans" in
 y*)
  $make depend
 && echo "Now you must run '$make'."
  ;;
 *)
  echo "You must run '$make depend' then '$make'."
  ;;
 esac
elif test -f [Mm]akefile; then
 echo " "
 echo "Now you must run a $make."
else
 echo "Configure done."
fi

if $test -f Policy.sh; then
```

```
  $cat <<EOM

If you compile $package on a different machine or from a different object
directory, copy the Policy.sh file from this object directory to the
new one before you run Configure -- this will help you with most of
the policy defaults.

EOM
fi
if $test -f UU/config.msg; then
  echo "Hmm.  I also noted the following information while running:"
  echo " "
  $cat UU/config.msg >&4
fi
?X:
?X: kit*isdone files are left over by shell archives built using the makedist
?X: script which comes from dist, while ark*isdone files are left over by
?X: the cshar archive maker.
?X:
$rm -f kit*isdone ark*isdone
$rm -rf UU

: End of Configure
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Finish.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: End.U,v $
?RCS: Revision 3.0  1993/08/18  12:04:51  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This unit serves as the goal which forces make to choose all the units that
?X: ask questions.  The $W on the ?MAKE: line is the list of all symbols wanted.
?X: To force any unit to be included, copy this unit to your private U directory
?X: and add the name of the unit desired to the ?MAKE: dependency line.
?X:
```

```
?MAKE:End: $W
?MAKE: -pick add $@ %<
?LINT:use $W
: end of configuration
 questions
echo " "
echo "End of configuration questions."
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/End.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: libdbm.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: libdbm.U,v $
?RCS: Revision 3.0.1.1  1997/02/28  15:56:57  ram
?RCS: patch61: replaced .a with $_a all over the place
?RCS:
?RCS: Revision 3.0  1993/08/18  12:08:58  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:libdbm: test Loc libpth _a
?MAKE: -pick add $@ %<
?S:libdbm:
?S: This variable contains the argument to pass to the loader in order
?S: to get the dbm library routines.  If there is no dbm or ndbm
?S: library, it is null.
?S:.
?T:xxx
:
 see if we should include -ldbm
echo " "
if $test -r /usr/lib/libndbm$_a || $test -r /usr/local/lib/libndbm$_a ; then
 echo "-lndbm found." >&4
 libdbm='-lndbm'
elif $test -r /usr/lib/libdbm$_a || $test -r /usr/local/lib/libdbm$_a ; then
 echo "-ldbm found." >&4
 libdbm='-ldbm'
else
 xxx=`./loc libdbm$_a x $libpth`
```

```
 case "$xxx" in
 x)
  echo "No dbm library found." >&4
  libdbm=''
  ;;
 *)
  echo "DBM library found in $xxx." >&4
  libdbm="$xxx"
  ;;
 esac
fi
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/libdbm.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Whoa.U,v 3.0.1.2 1997/02/28 15:21:21 ram Exp $
?RCS:
?RCS: Copyright (c) 1991-1993, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: Whoa.U,v $
?RCS: Revision 3.0.1.2  1997/02/28  15:21:21  ram
?RCS: patch61: whoa script now starts with leading "startsh"
?RCS:
?RCS: Revision 3.0.1.1  1994/10/29  16:02:01  ram
?RCS: patch36: added ?F: line for metalint file checking
?RCS:
?RCS: Revision 3.0  1993/08/18  12:05:19  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This unit produces a bit of shell code that must be dotted in in order
?X: to warn the user in case a change into a variable
 is noticed.
?X:
?X: To use this unit, $was must hold the old value that has changed. Upon
?X: exit, the two variables $td and $tu are set to the correct value for
?X: respectively defining or undefining a variable. For instance, if $vas was
?X: $undef, but now $var is $define, after calling . whoa, you should use
?X: eval "$var=\$tu" to finally set $var to the correct value. See unit Inlibc.
?X:
?MAKE:Whoa: Myread startsh hint
```

```
?MAKE: -pick add $@ %<
?F:./whoa
?T:var was td tu hintfile
: set up the script used to warn in case of inconsistency
cat <<EOS >whoa
$startsh
EOS
cat <<'EOSC' >>whoa
dflt=y
case "$hint" in
   recommended)
 case "$hintfile" in
 ") echo "The $hint value for \$$var on this machine was \"$was\"!" >&4
  ;;
 *) echo "Hmm.  Based on the hints in hints/$hintfile.sh, " >&4
  echo "the $hint value for \$$var on this machine was \"$was\"!" >&4
  ;;
 esac
 ;;
   *) echo " "
 echo "*** WHOA THERE!!! ***" >&4
 echo "    The $hint value for \$$var on this machine was
 \"$was\"!" >&4
 ;;
esac
rp="    Keep the $hint value?"
. ./myread
case "$ans" in
y) td=$was; tu=$was;;
esac
EOSC
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/Whoa.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Prefixup.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Prefixup.U,v $
?RCS: Revision 3.0.1.1  1995/01/30  14:30:40  ram
```

```
?RCS: patch49: created
?RCS:
?X:
?X: Used as: "set dflt; eval $prefixup" to set $dflt to be $prefix/dir
?X: instead of $prefixexp/dir, in case portability was involved somehow
?X: and $prefix uses ~name expansion.
?X:
?MAKE:Prefixup: prefix prefixexp
?MAKE: -pick add $@ %<
?LINT:define prefixup
?S:prefixup:
?S: This shell variable is used internally by Configure to reset
?S: the leading
 installation prefix correctly when $prefix uses
?S: ~name expansion.
?S:  set dflt
?S:  eval $prefixup
?S: That will set $dflt to $prefix/dir if it was $prefixexp/dir and
?S: $prefix differs from $prefixexp.
?S:.
?V:prefixup
: set the prefixup variable, to restore leading tilda escape
prefixup='case "$prefixexp" in
"$prefix") ;;
*) eval "$1=\`echo \$$1 | sed \"s,^$prefixexp,$prefix,\"\`";;
esac'
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Prefixup.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Inhdr.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Inhdr.U,v $
?RCS: Revision 3.0.1.2  1995/05/12  12:01:31  ram
?RCS: patch54: deleted tabs that caused some /bin/sh to core dump (ADO)
?RCS:
?RCS: Revision 3.0.1.1  1994/10/29  15:55:01  ram
?RCS: patch36: call ./whoa explicitly instead of relying on PATH
?RCS:
```

```
?RCS: Revision 3.0  1993/08/18  12:05:01  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This unit checks wether a set of header files exists or not.
?X: If the first header is not
 found, the function tries to locate
?X: the next header, and so on, until one is found or there is no
?X: more header in the list.
?X:
?X: To use it, say:
?X: set header i_header [ header2 i_header2 ... ]
?X: eval $inhdr
?X:
?MAKE:Inhdr: test Findhdr Whoa
?MAKE: -pick add $@ %<
?LINT:define inhdr
?V:inhdr
?S:inhdr:
?S: This shell variable is used internally by Configure to check
?S: wether a set of headers exist or not. A typical use is:
?S:  set header i_header [ header2 i_header2 ... ]
?S:  eval $inhdr
?S: That will print a message, saying wether header was found or not
?S: and set i_header* accordingly. If the first header is not found,
?S: we try the next one, until the list is empty or one is found.
?S:.
?T:xxx xxf var td xxnf tu yyy instead was cont
: define an alternate in-header-list? function
inhdr='echo " "; td=$define; tu=$undef; yyy=$@;
cont=true; xxf="echo \"<\$1> found.\" >&4";
case $# in 2) xxnf="echo \"<\$1> NOT found.\" >&4";;
*) xxnf="echo \"<\$1> NOT found, ...\" >&4";;
esac;
case
 $# in 4) instead=instead;; *) instead="at last";; esac;
while $test "$cont"; do
 xxx=`./findhdr $1`
 var=$2; eval "was=\$$2";
 if $test "$xxx" && $test -r "$xxx";
 then eval $xxf;
?X: Next line shifted left 1 tabstop to avoid sh core dump on MachTen 2.1.1.
 eval "case \"\$$var\" in $undef) . ./whoa; esac"; eval "$var=\$td";
  cont="";
 else eval $xxnf;
?X: Likewise, the next line has been shifted left 1 tabstop -- ADO, 08/03/95
 eval "case \"\$$var\" in $define) . ./whoa; esac"; eval "$var=\$tu"; fi;
 set $yyy; shift; shift; yyy=$@;
```

```
 case $# in 0) cont="";;
 2) xxf="echo \"but I found <\$1> $instead.\" >&4";
  xxnf="echo \"and I did not find <\$1> either.\" >&4";;
 *) xxf="echo \"but I found <\$1\> instead.\" >&4";
  xxnf="echo \"there is no <\$1>, ...\" >&4";;
 esac;
done;
?X: Remaining values are set to 'undef'
while $test "$yyy";
do set $yyy; var=$2; eval "was=\$$2";
 eval "case \"\$$var\" in $define) . ./whoa; esac"; eval "$var=\$tu";
 set $yyy; shift; shift; yyy=$@;
done'
```

Found
 in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Inhdr.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1998, Jarkko Hietaniemi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?X:
?X: Useless unit dropped.  Use randfunc instead.
?X:
?LINT:empty
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/compline/randbits.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: mansrc.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: mansrc.U,v $
```

```
?RCS: Revision 3.0.1.9  1997/02/28  16:12:03  ram
?RCS: patch61: don't ask for AFS when they choose to not install pages
?RCS:
?RCS: Revision 3.0.1.8  1995/09/25  09:16:58  ram
?RCS: patch59: unit is now forced to the top of Configure, if possible
?RCS:
?RCS: Revision 3.0.1.7  1995/02/15  14:15:31  ram
?RCS: patch51: was mistakenly duplicating /usr/local/man/man1 (ADO)
?RCS: patch51: added /opt/man/man1 to the lookpath (ADO)
?RCS:
?RCS: Revision
 3.0.1.6  1995/01/30  14:39:34  ram
?RCS: patch49: can now handle installation prefix changes (from WED)
?RCS:
?RCS: Revision 3.0.1.5  1995/01/11  15:32:25  ram
?RCS: patch45: can now use Loc variables since path stripping is deferred
?RCS:
?RCS: Revision 3.0.1.4  1994/08/29  16:30:38  ram
?RCS: patch32: now uses installation prefix for default setting
?RCS:
?RCS: Revision 3.0.1.3  1994/05/06  15:11:10  ram
?RCS: patch23: added lint hint, assuring that nroff is used
?RCS:
?RCS: Revision 3.0.1.2  1994/01/24  14:14:39  ram
?RCS: patch16: now uses _nroff in case user asked for portability
?RCS:
?RCS: Revision 3.0.1.1  1993/09/13  16:09:31  ram
?RCS: patch10: allows for L1 man page extension (WAD)
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:14  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:mansrc mansrcexp manext installmansrc: afs cat nroff Loc Oldconfig \
 sysman spackage test Getfile Prefixit prefixexp Prefixup
?MAKE: -pick add $@ %<
?Y:TOP
?S:mansrc:
?S: This variable
 contains the name of the directory in which manual
?S: source pages are to be put.  It is the responsibility of the
?S: Makefile.SH to get the value of this into the proper command.
?S: You must be prepared to do the ~name expansion yourself.
?S:.
?S:mansrcexp:
?S: This variable is the same as the mansrc variable, but is filename
?S: expanded at configuration time, for convenient use in makefiles.
?S:.
?S:installmansrc:
```

```
?S: This variable is really the same as mansrcexp, unless you are using
?S: AFS in which case it points to the read/write location whereas
?S: mansrcexp only points to the read-only access location. For extra
?S: portability, you should only use this variable within your makefiles.
?S:.
?S:manext:
?S: This variable contains the extension that the manual page should
?S: have: one of 'n', 'l', or '1'.  The Makefile must supply the '.'.
?S: See mansrc.
?S:.
?T:lookpath
: determine where manual pages go
set mansrc mansrc none
eval $prefixit
$cat <<EOM

$spackage has manual
 pages available in source form.
EOM
case "$nroff" in
nroff)
 echo "However, you don't have nroff, so they're probably useless to you."
 case "$mansrc" in
 ") mansrc="none";;
 esac;;
esac
echo "If you don't want the manual sources installed, answer 'none'."
case "$mansrc" in
")
 lookpath="$prefixexp/share/man/man1 $prefixexp/man/man1"
 lookpath="$lookpath $prefixexp/man/u_man/man1 $prefixexp/man/l_man/man1"
 lookpath="$lookpath /usr/local/man/man1 /opt/man/man1 /usr/man/manl"
 lookpath="$lookpath /usr/share/man/man1 /usr/local/share/man/man1"
 lookpath="$lookpath /usr/man/local/man1 /usr/man/l_man/man1"
 lookpath="$lookpath /usr/local/man/u_man/man1 /usr/local/man/l_man/man1"
 lookpath="$lookpath /usr/man/man.L"
 mansrc=`./loc . $prefixexp/man/man1 $lookpath`
 if $test -d "$mansrc"; then
  dflt="$mansrc"
 else
  dflt="$sysman"
 fi
 set dflt
 eval $prefixup
 ;;
' ') dflt=none;;
*)  dflt="$mansrc"
 ;;
```

```
esac
echo " "
fn=dn~
rp='Where do the manual pages (source) go?'
. ./getfile
if test
 "X$mansrcexp" != "X$ansexp"; then
 installmansrc="
fi
mansrc="$ans"
mansrcexp="$ansexp"
case "$mansrc" in
") mansrc=' '
 installmansrc=";;
esac
if $afs && $test "$mansrc"; then
 $cat <<EOM

Since you are running AFS, I need to distinguish the directory in which
manual pages reside from the directory in which they are installed (and from
which they are presumably copied to the former directory by occult means).

EOM
 case "$installmansrc" in
 ") dflt=`echo $mansrcexp | sed 's#^/afs/#/afs/.#'`;;
 *) dflt="$installmansrc";;
 esac
 fn=de~
 rp='Where will man pages be installed?'
 . ./getfile
 installmansrc="$ans"
else
 installmansrc="$mansrcexp"
fi

case "$mansrc" in
' ') manext='0';;
*l) manext=l;;
*n) manext=n;;
*o) manext=l;;
*p) manext=n;;
*C) manext=C;;
*L) manext=L;;
*L1) manext=L1;;
*) manext=1;;
esac

Found in path(s):
```

* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/mansrc.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: patchlevel.U,v $
?RCS: Revision 3.0.1.1  1997/02/28  16:18:41  ram
?RCS: patch61: added support for src.U
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:31  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:patchlevel: package baserev test rsrc
?MAKE: -pick add $@ %<
?T:Revision
?S:patchlevel:
?S: The patchlevel level of this package.
?S: The value of patchlevel comes from the patchlevel.h file.
?S:.
: get the patchlevel
echo " "
echo "Getting the current patchlevel..." >&4
if $test -r
 $rsrc/patchlevel.h;then
 patchlevel=`awk \
  '/^#[  ]*define[  ][  ]*PATCHLEVEL/ {print $3}' \
  < $rsrc/patchlevel.h`
else
 patchlevel=0
fi
echo "(You have $package $baserev PL$patchlevel.)"
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/patchlevel.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Oldsym.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
```

```
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Oldsym.U,v $
?RCS: Revision 3.0.1.1  1997/02/28  15:06:58  ram
?RCS: patch61: added support for src.U
?RCS:
?RCS: Revision 3.0  1993/08/18  12:05:13  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This unit follows the creation of the config.sh file. It adds some
?X: special symbols: defines from patchlevel.h file if any and PERL_CONFIG_SH,
?X: which is set to true. Then, we try to keep all the new symbols that
?X: may come from a hint
 file or a previous config.sh file.
?X:
?MAKE:Oldsym: Config_sh cat test hint src sed sort uniq perl_patchlevel
?MAKE: -pick add $@ %<
?T:PERL_CONFIG_SH PERL_PATCHLEVEL sym tmp
?F:!UU
: add special variables
$test -f $src/patchlevel.h && \
awk '/^#define[  ]+PERL_/ {printf "%s=%s\n",$2,$3}' $src/patchlevel.h >>config.sh
echo "PERL_PATCHLEVEL='$perl_patchlevel'" >>config.sh
echo "PERL_CONFIG_SH=true" >>config.sh

: propagate old symbols
if $test -f UU/config.sh; then
?X: Make sure each symbol is unique in oldconfig.sh
 <UU/config.sh $sort | $uniq >UU/oldconfig.sh
?X:
?X: All the symbols that appear twice come only from config.sh (hence the
?X: two config.sh in the command line). These symbols will be removed by
?X: the uniq -u command. The oldsyms file thus contains all the symbols
?X: that did not appear in the produced config.sh (Larry Wall).
?X:
?X: Do not touch the -u flag of uniq.  This means you too, Jarkko.
?X:
 $sed -n 's/^\([a-zA-Z_0-9]*\)=.*/\1/p' \
  config.sh config.sh UU/oldconfig.sh
 |\
  $sort | $uniq -u >UU/oldsyms
 set X `$cat UU/oldsyms`
 shift
```

```
 case $# in
 0) ;;
 *)
  $cat <<EOM
Hmm...You had some extra variables I don't know about...I'll try to keep 'em...
EOM
  echo ": Variables propagated from previous config.sh file." >>config.sh
  for sym in `$cat UU/oldsyms`; do
   echo "    Propagating $hint variable "'$'"$sym..."
   eval 'tmp="$'"${sym}"'"'
   echo "$tmp" | \
    sed -e "s/'/'\''\''/g" -e "s/^/$sym='/" -e "s/$/'/" >>config.sh
  done
  ;;
 esac
fi
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/Oldsym.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1999, Jarkko Hietaniemi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?MAKE:full_ar: ar
?MAKE: -pick add $@ %<
?S:full_ar:
?S: This variable contains the full pathname to 'ar', whether or
?S: not the user has specified 'portability'.  This is only used
?S: in the Makefile.SH.
?S:.
: Store the full pathname to the ar program for use in the C program
: Respect a hint or command line value for full_ar.
case "$full_ar" in
") full_ar=$ar ;;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/Loc_ar.U
No license file was found, but licenses were detected in source scan.

```
# $Id: makedir.sh,v 3.0.1.1 1994/01/24 14:00:08 ram Exp ram $
#
#  Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
#
#  You may redistribute only under the terms of the Artistic Licence,
#  as specified in the README file that comes with the distribution.
#  You may reuse parts of this distribution only within the terms of
#  that same Artistic Licence; a copy of which may be found at the root
#  of the source tree for dist 4.0.
#
# Original Author: Larry Wall <lwall@netlabs.com>
#
# $Log: makedir.sh,v $
# Revision 3.0.1.1  1994/01/24  14:00:08  ram
# patch16: changed top ln-style config.sh lookup into test-style one
#
# Revision 3.0  1993/08/18  12:04:38  ram
# Baseline for dist 3.0 netwide release.
#
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/lib/makedir.SH
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: cf_name.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: Original Author: Graham Stoney <greyham@research.canon.oz.au>
?RCS:
?RCS: $Log: cf_name.U,v $
?RCS: Revision 3.0.1.2  1994/05/06  14:29:36  ram
?RCS: patch23: fixed user name computation from /etc/passwd in bsd systems
?RCS:
?RCS: Revision 3.0.1.1  1994/01/24  14:05:11  ram
?RCS: patch16: created
?RCS:
?RCS:
?MAKE:+cf_name: cf_by passcat Filexp nametype cat test
?MAKE: -pick add $@ %<
?S:cf_name:
?S: Full name of the person who ran the Configure script and
```

```
 answered the
?S: questions. This can be used by units that require the user's full name.
?S: This variable is for internal use only.
?S:.
?T:xxx fn NAME
: figure out their full name
case "$NAME" in
") case "$nametype" in
 other)
  fn=`./filexp ~/.fullname`
  xxx=usg
  $test -f $fn && xxx=other
  ;;
 *)
  xxx="$nametype"
  ;;
 esac

 case "$xxx" in
 bsd)
  cf_name=`$passcat | grep "^$cf_by:" | \
   sed -e 's/^[^:]*:[^:]*:[^:]*:[^:]*:\([^:]*\):.*/\1/' \
   -e 's/,.*//'`
  ;;
   usg)
  cf_name=`$passcat | grep "^$cf_by:" | \
   sed -e 's/^[^:]*:[^:]*:[^:]*:[^:]*:\([^:]*\):.*/\1/' \
   -e 's/[^-]*-\(.*\)(.*)/\1/'`
  ;;
 *)
  cf_name=`$cat $fn`
  ;;
 esac
 ;;
*)
 cf_name="$NAME"
 ;;
esac
?X:
?X: In the original unit, Graham asked for the user name, in case the above
?X: code was unable to figure it out correctly. Since now cf_name has been
?X: made an internal variable only (i.e. it is not saved in config.sh), letting
?X: the user override the computed default each time would be a pain.
?X:
 Therefore, I have decided to trust the above code to get it right, and for
?X: those rare cases where it will fail, too bad :-) --RAM.
?X:
echo " "
```

```
echo "Pleased to meet you, $cf_name."
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/cf_name.U
No license file was found, but licenses were detected in source scan.

```
/*
* $Id: rename.C,v 3.0.1.1 1994/01/24 13:58:42 ram Exp ram $
*
*  Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
*
*  You may redistribute only under the terms of the Artistic Licence,
*  as specified in the README file that comes with the distribution.
*  You may reuse parts of this distribution only within the terms of
*  that same Artistic Licence; a copy of which may be found at the root
*  of the source tree for dist 4.0.
*
* $Log: rename.C,v $
* Revision 3.0.1.1  1994/01/24  13:58:42  ram
* patch16: created
*
*/
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/lib/C/fake/rename.C
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Myread.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Myread.U,v $
?RCS: Revision 3.0.1.6  1997/02/28  15:05:39  ram
?RCS: patch61: myread script now starts with a "startsh"
?RCS: patch61: miscellaneous fixes
?RCS:
?RCS: Revision 3.0.1.5  1995/01/11  15:14:22  ram
?RCS: patch45: added & escape allowing user to turn on -d from the prompt
?RCS:
?RCS: Revision 3.0.1.4  1994/10/31  09:48:04  ram
?RCS: patch44: added Options to the MAKE line since it's no longer in Init.U
?RCS:
```

```
?RCS: Revision 3.0.1.3  1994/10/29
  15:56:20  ram
?RCS: patch36: added ?F: line for metalint file checking
?RCS:
?RCS: Revision 3.0.1.2  1993/08/30  08:57:59  ram
?RCS: patch8: added new visible 'nostick' symbol, mainly for Finish.U
?RCS:
?RCS: Revision 3.0.1.1  1993/08/27  14:39:20  ram
?RCS: patch7: now sticks to the question when no default and empty answer
?RCS:
?RCS: Revision 3.0  1993/08/18  12:05:08  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This unit produces a bit of shell code that must be dotted in in order
?X: to do a read.  It allows for shell escapes, default assignment and
?X: parameter evaluation.
?X:
?X: To use this unit, $rp and $dflt must hold the question and the
?X: default answer. The question will be printed by the script itself.
?X: Neither $rp nor $dflt is altered by the script.
?X:
?X: The myread script will stick to the question if no default is proposed
?X: and the user answer is empty, which prevents mistakes. However, at the
?X: end of Configure, there is an exception
 to this rule (Finish.U) where we
?X: set nostick to a non-empty value to allow the Return key to play its role!
?X:
?MAKE:Myread: Options startsh n c trnl
?MAKE: -pick add $@ %<
?V:ans:dflt rp nostick
?F:./myread
?T:COLUMNS xxxm rp dflt answ aok myecho
?LINT:change fastread
?X: Some shells (Ultrix) do not understand ${COLUMNS:-80}, sigh!
: compute the number of columns on the terminal for proper question formatting
case "$COLUMNS" in
") COLUMNS='80';;
esac

: set up the echo used in my read
?X:
?X: This variable is intended to be eval'ed. It will echo the two
?X: variables $rp and $dflt (provided this latter has a non null value).
?X: It is mainly used by the myread script to echo the questions.
?X:
?X: The $n and $c below are substituted before Loc does its silly echo check
?X: so don't put a $ on the echo below so we get builtin, even if $echo is
```

```
?X: pointing to /bin/echo.
?X:
myecho="case \"\$xxxm\" in
") echo $n \"\$rp $c\" >&4;;
*) case \"\$rp\" in
 ") echo $n \"[\$xxxm] $c\";;
 *)
  if
 test \`echo \"\$rp [\$xxxm]  \" | wc -c\` -ge $COLUMNS; then
   echo \"\$rp\" >&4
   echo $n \"[\$xxxm] $c\" >&4
  else
   echo $n \"\$rp [\$xxxm] $c\" >&4
  fi
  ;;
 esac;;
esac"

: now set up to do reads with possible shell escape and default assignment
cat <<EOSC >myread
$startsh
?X:
?X: Save value of default -- do not alter original in case of eval
?X:
xxxm=\$dflt
$myecho
?X:
?X: If there is no default, then stop, regardless of the value in fastread.
?X: In silent mode, no new-line is to be echoed if the question is empty,
?X: since this is used to wait for the "return" key.
?X:
ans='!'
case "\$fastread" in
yes) case "\$dflt" in
 ") ;;
 *) ans=";
  case "\$silent-\$rp" in
  true-) ;;
  *) echo " " >&4;;
  esac;;
 esac;;
*) case "\$silent" in
 true) case "\$rp" in
  ") ans=";;
  esac;;
 esac;;
esac
while expr "X\$ans" : "X!" >/dev/null; do
```

```
 read answ
?X:
?X: Run 'eval' on the answer, in order to do variable substitution, in case
?X: the user types $HOME or $WHATEVER.
 Variables must be evaluated now.
?X: Typing '\$HOME' won't currently prevent from substitution -- use '\\$HOME'
?X: The $1 .. $9 and $*, as well as $@, are available to refer to the
?X: default value.
?X:
 set x \$xxxm
 shift
 aok=''; eval "ans=\\"\$answ\\"" && aok=y
 case  "\$answ" in
?X:
?X: Use "!" and not a plain ! because of a bug in BSD 4.4 shell
?X: (reported by Wayne Davison)
?X: We must handle the shell escapes before dealing with possible variable
?X: substitution, since the shell we're launching in that case will be able
?X: to do it as well as we can -- RAM, 15/03/96
?X
 "!")
  sh 1>&4
  echo " "
  $myecho
  ;;
 !*)
  set x \`expr "X\$ans" : "X!\(.*\)\$"\`
  shift
  sh 1>&4 -c "\$*"
  echo " "
  $myecho
  ;;
 "\$ans")
  case "\$ans" in
?X:
?X: Answers starting with & are hooks allowing to dynamically turn on/off
?X: some Configure options. That's for the future. -- RAM, 09/01/95
?X: Today, we only recognize '& -d' to mean 'go on as if Configure -d, which
?X: is a hardwired
 behaviour compatible with our general scheme.
?X:
  \\&*)
   set x \`expr "X\$ans" : "X&\(.*\)\$"\`
   shift
   case "\$1" in
   -d)
    fastread=yes
    echo "(OK, I'll run with -d after this question.)" >&4
```

```
    ;;
   -*)
    echo "*** Sorry, \$1 not supported yet." >&4
    ;;
   esac
   $myecho
   ans=!
   ;;
  esac;;
 *)
  case "\$aok" in
  y)
   echo "*** Substitution done -- please confirm."
   xxxm="\$ans"
   ans=\`echo $n "\$ans$c" | tr '$trnl' ' '\`
   xxxm="\$ans"
   ans=!
   ;;
  *)
   echo "*** Error -- try again."
   ans=!
   ;;
  esac
  $myecho
  ;;
 esac
?X: Stick in myread if no default answer and nothing was answered
 case "\$ans\$xxxm\$nostick" in
 ")
  ans=!
  $myecho
  ;;
 esac
done
case "\$ans" in
") ans="\$xxxm";;
esac
EOSC
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Myread.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1999 Jarkko Hietaniemi
?RCS:
?RCS: You may distribute under the terms of either the GNU General Public
```

```
?RCS: License or the Artistic License, as specified in the README file.
?RCS:
?X: This unit generates a $hasstruct string that is used internally
?X: by Configure to check if this system has a field for a
?X: particular struct (of if this system has a particular struct!)
?X:
?X: To use it, say something like:
?X:  set d_statblocks stat i_sysstat sys/stat.h
?X:  eval $hasstruct
?X: Or, for more complicated sets of headers, do something like
?X: hdrs="$define sys/foo.h
?X:  $i_sysbar sys/bar.h
?X:  $i_syszot sys/zot.h
?X:  $i_zappa zappa.h"
?X: set d_statblocks stat $hdrs
?X: eval $hasstruct
?X:
?MAKE:Hasstruct: Setvar rm_try test Compile
?MAKE: -pick add $@ %<
?T:varname struct
?V:hasstruct
: Define hasstruct macro for Configure internal use
hasstruct='varname=$1; struct=$2; shift;
 shift;
while $test $# -ge 2; do
 case "$1" in
 $define) echo "#include <$2>";;
 esac ;
   shift 2;
done > try.c;
echo "int main () { struct $struct foo; }" >> try.c;
set try;
if eval $compile; then
 val="$define";
else
 val="$undef";
fi;
set $varname;
eval $setvar;
$rm_try'
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/protos/Hasstruct.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
```

```
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: lib.U,v $
?RCS: Revision 3.0.1.3  1995/09/25  09:16:47  ram
?RCS: patch59: unit is now forced to the top of Configure, if possible
?RCS:
?RCS: Revision 3.0.1.2  1995/01/30  14:38:08  ram
?RCS: patch49: can now handle installation prefix changes (from WED)
?RCS:
?RCS: Revision 3.0.1.1  1994/08/29  16:27:40  ram
?RCS: patch32: now uses installation prefix to set the default
?RCS:
?RCS: Revision 3.0  1993/08/18  12:08:56  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:lib libexp: Getfile
 Loc Oldconfig Prefixit Prefixup prefixexp
?MAKE: -pick add $@ %<
?Y:TOP
?S:lib:
?S: This variable holds the name of the directory in which the user wants
?S: to put public library files for the package in question.  It is most
?S: often a local directory such as /usr/local/lib. Programs using this
?S: variable must be prepared to deal with filename expansion.
?S:.
?S:libexp:
?S: This variable is the same as the lib variable, but is filename expanded
?S: at configuration time, for convenient use in your makefiles.
?S:.
: determine where public libraries go
set lib lib
eval $prefixit
case "$lib" in
")
 dflt=`./loc . "." $prefixexp/lib /usr/local/lib /usr/lib /lib`
 set dflt
 eval $prefixup
 ;;
*)  dflt="$lib";;
esac
echo " "
fn=d~
rp='Where do you want to put the public libraries?'
```

```
. ./getfile
lib="$ans"
libexp="$ansexp"
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/lib.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Myread.U,v $
?RCS: Revision 3.0.1.6  1997/02/28  15:05:39  ram
?RCS: patch61: myread script now starts with a "startsh"
?RCS: patch61: miscellaneous fixes
?RCS:
?RCS: Revision 3.0.1.5  1995/01/11  15:14:22  ram
?RCS: patch45: added & escape allowing user to turn on -d from the prompt
?RCS:
?RCS: Revision 3.0.1.4  1994/10/31  09:48:04  ram
?RCS: patch44: added Options to the MAKE line since it's no longer in Init.U
?RCS:
?RCS: Revision 3.0.1.3  1994/10/29  15:56:20  ram
?RCS: patch36: added ?F:
 line for metalint file checking
?RCS:
?RCS: Revision 3.0.1.2  1993/08/30  08:57:59  ram
?RCS: patch8: added new visible 'nostick' symbol, mainly for Finish.U
?RCS:
?RCS: Revision 3.0.1.1  1993/08/27  14:39:20  ram
?RCS: patch7: now sticks to the question when no default and empty answer
?RCS:
?RCS: Revision 3.0  1993/08/18  12:05:08  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This unit produces a bit of shell code that must be dotted in in order
?X: to do a read.  It allows for shell escapes, default assignment and
?X: parameter evaluation.
?X:
?X: To use this unit, $rp and $dflt must hold the question and the
```

```
?X: default answer. The question will be printed by the script itself.
?X: Neither $rp nor $dflt is altered by the script.
?X:
?X: The myread script will stick to the question if no default is proposed
?X: and the user answer is empty, which prevents mistakes. However, at the
?X: end of Configure, there is an exception to this rule (Finish.U) where we
?X: set
 nostick to a non-empty value to allow the Return key to play its role!
?X:
?MAKE:Myread: Options startsh n c trnl
?MAKE: -pick add $@ %<
?V:ans:dflt rp nostick
?F:./myread
?T:COLUMNS xxxm rp dflt answ aok myecho counter
?LINT:change fastread
?X: Some shells (Ultrix) do not understand ${COLUMNS:-80}, sigh!
: compute the number of columns on the terminal for proper question formatting
case "$COLUMNS" in
") COLUMNS='80';;
esac

: set up the echo used in my read
?X:
?X: This variable is intended to be eval'ed. It will echo the two
?X: variables $rp and $dflt (provided this latter has a non null value).
?X: It is mainly used by the myread script to echo the questions.
?X:
?X: The $n and $c below are substituted before Loc does its silly echo check
?X: so don't put a $ on the echo below so we get builtin, even if $echo is
?X: pointing to /bin/echo.
?X:
myecho="case \"\$xxxm\" in
") echo $n \"\$rp $c\" >&4;;
*) case \"\$rp\" in
 ") echo $n \"[\$xxxm] $c\";;
 *)
  if test \`echo \"\$rp [\$xxxm]
  \" | wc -c\` -ge $COLUMNS; then
   echo \"\$rp\" >&4
   echo $n \"[\$xxxm] $c\" >&4
  else
   echo $n \"\$rp [\$xxxm] $c\" >&4
  fi
  ;;
 esac;;
esac"

: now set up to do reads with possible shell escape and default assignment
```

```
cat <<EOSC >myread
$startsh
?X:
?X: Save value of default -- do not alter original in case of eval
?X:
xxxm=\$dflt
$myecho
?X:
?X: If there is no default, then stop, regardless of the value in fastread.
?X: In silent mode, no new-line is to be echoed if the question is empty,
?X: since this is used to wait for the "return" key.
?X:
ans='!'
counter=42
case "\$fastread" in
yes) case "\$dflt" in
 ") ;;
 *) ans=";
  case "\$silent-\$rp" in
  true-) ;;
  *) echo " " >&4;;
  esac;;
 esac;;
*) case "\$silent" in
 true) case "\$rp" in
  ") ans=";;
  esac;;
 esac;;
esac
while expr "X\$ans" : "X!" >/dev/null; do
 read answ
?X:
?X: Run 'eval' on the answer, in order to do variable substitution, in case
?X: the user types $HOME or $WHATEVER. Variables must be evaluated
 now.
?X: Typing '\$HOME' won't currently prevent from substitution -- use '\\$HOME'
?X: The $1 .. $9 and $*, as well as $@, are available to refer to the
?X: default value.
?X:
 set x \$xxxm
 shift
 aok="; eval "ans=\\"\$answ\\"" && aok=y
 case  "\$answ" in
?X:
?X: Use "!" and not a plain ! because of a bug in BSD 4.4 shell
?X: (reported by Wayne Davison)
?X: We must handle the shell escapes before dealing with possible variable
?X: substitution, since the shell we're launching in that case will be able
```

```
?X: to do it as well as we can -- RAM, 15/03/96
?X
 "!")
  sh 1>&4
  echo " "
  $myecho
  ;;
 !*)
  set x \`expr "X\$ans" : "X!\(.*\)\$"\`
  shift
  sh 1>&4 -c "\$*"
  echo " "
  $myecho
  ;;
 "\$ans")
  case "\$ans" in
?X:
?X: Answers starting with & are hooks allowing to dynamically turn on/off
?X: some Configure options. That's for the future. -- RAM, 09/01/95
?X: Today, we only recognize '& -d' to mean 'go on as if Configure -d, which
?X: is a hardwired behaviour compatible with
 our general scheme.
?X:
  \\&*)
   set x \`expr "X\$ans" : "X&\(.*\)\$"\`
   shift
   case "\$1" in
   -d)
    fastread=yes
    echo "(OK, I'll run with -d after this question.)" >&4
    ;;
   -*)
    echo "*** Sorry, \$1 not supported yet." >&4
    ;;
   esac
   $myecho
   ans=!
   ;;
  esac;;
 *)
  case "\$aok" in
  y)
   echo "*** Substitution done -- please confirm."
   xxxm="\$ans"
   ans=\`echo $n "\$ans$c" | tr '$trnl' ' '\`
   xxxm="\$ans"
   ans=!
   ;;
```

```
  *)
   echo "*** Error -- try again."
   ans=!
   ;;
  esac
  $myecho
  ;;
 esac
?X: Stick in myread if no default answer and nothing was answered
 case "\$ans\$xxxm\$nostick" in
 ")
  ans=!
  $myecho
  ;;
 esac
 counter=\`echo \$counter | awk '{ print --\$0 }'\`
 if [ \$counter = 0 ]; then
  echo >&4
  echo >&4 Too many attempts asking the same question.  Giving up.
  exit 1
 fi
done
case "\$ans" in
") ans="\$xxxm";;
esac
EOSC
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/Myread.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: usenm.U,v 3.0.1.1 1997/02/28 16:26:40 ram Exp $
?RCS:
?RCS: Copyright (c) 1991-1993, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: usenm.U,v $
?RCS: Revision 3.0.1.1  1997/02/28  16:26:40  ram
?RCS: patch61: don't use nm with the GNU C library
?RCS: patch61: added support for Linux shared libs
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:57  ram
?RCS: Baseline for dist 3.0 netwide release.
```

```
?RCS:
?MAKE:usenm runnm nm_opt nm_so_opt: cat test Myread Oldconfig myuname grep \
 nm d_gnulibc osname egrep rsrc
?MAKE: -pick add $@ %<
?S:usenm:
?S: This variable contains 'true' or 'false' depending
 whether the
?S: nm extraction is wanted or not.
?S:.
?S:runnm:
?S: This variable contains 'true' or 'false' depending whether the
?S: nm extraction should be performed or not, according to the value
?S: of usenm and the flags on the Configure command line.
?S:.
?S:nm_opt:
?S: This variable holds the options that may be necessary for nm.
?S:.
?S:nm_so_opt:
?S: This variable holds the options that may be necessary for nm
?S: to work on a shared library but that can not be used on an
?S: archive library.  Currently, this is only used by Linux, where
?S: nm --dynamic is *required* to get symbols from an ELF library which
?S: has been stripped, but nm --dynamic is *fatal* on an archive library.
?S: Maybe Linux should just always set usenm=false.
?S:.
: see if nm is to be used to determine whether a symbol is defined or not
?X: If there is enough inquiries, it might be worth to wait for the nm
?X: extraction. Otherwise, the C compilations might be a better deal.
?X:
?X: Don't bother if we're
 using GNU libc -- skimo
?LINT:extern PASE
case "$usenm" in
")
 dflt="
 case "$d_gnulibc" in
 "$define")
  echo " "
  echo "nm probably won't work on the GNU C Library." >&4
  dflt=n
  ;;
 esac
 case "$dflt" in
 ")
  if $test "$osname" = aix -a "X$PASE" != "Xdefine" -a ! -f /lib/syscalls.exp; then
   echo " "
   echo "Whoops!  This is an AIX system without /lib/syscalls.exp!" >&4
   echo "'nm' won't be sufficient on this system." >&4
```

```
  dflt=n
 fi
 ;;
esac
case "$dflt" in
") dflt=`$egrep 'inlibc|csym' $rsrc/Configure | wc -l 2>/dev/null`
 if $test $dflt -gt 20; then
  dflt=y
 else
  dflt=n
 fi
 ;;
esac
;;
*)
case "$usenm" in
true|$define) dflt=y;;
*) dflt=n;;
esac
;;
esac
$cat <<EOM

I can use $nm to extract the symbols from your C libraries. This
is a time consuming task which may generate huge output on the disk (up
to 3 megabytes) but that should make the symbols extraction faster. The
alternative is to skip the 'nm' extraction part and to compile a small
test
 program instead to determine whether each symbol is present. If
you have a fast C compiler and/or if your 'nm' output cannot be parsed,
this may be the best solution.

You probably shouldn't let me use 'nm' if you are using the GNU C Library.

EOM
rp="Shall I use $nm to extract C symbols from the libraries?"
. ./myread
case "$ans" in
[Nn]*) usenm=false;;
*) usenm=true;;
esac

?X: Name extraction is to be run if 'nm' usage is wanted and if no -r flag
?X: was provided to configure (in which case we simply re-use the previous
?X: values).
runnm=$usenm
case "$reuseval" in
true) runnm=false;;
```

```
esac

: nm options which may be necessary
case "$nm_opt" in
") if $test -f /mach_boot; then
  nm_opt=" # Mach
 elif $test -d /usr/ccs/lib; then
  nm_opt='-p' # Solaris (and SunOS?)
 elif $test -f /dgux; then
  nm_opt='-p' # DG-UX
 elif $test -f /lib64/rld; then
  nm_opt='-p' # 64-bit Irix
 else
  nm_opt="
 fi;;
esac

: nm options which may be necessary for shared libraries but illegal
: for archive
 libraries.  Thank you, Linux.
case "$nm_so_opt" in
") case "$myuname" in
 *linux*|gnu*)
  if $nm --help | $grep 'dynamic' > /dev/null 2>&1; then
   nm_so_opt='--dynamic'
  fi
  ;;
 esac
 ;;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/usenm.U
No license file was found, but licenses were detected in source scan.

```
?RCS:     c) the GNU General Public License as published by the Free
?RCS:     Software Foundation; either version 1, or (at your option) any
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_builtin_overflow.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: libflex.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
```

```
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: libflex.U,v $
?RCS: Revision 3.0.1.3  1997/02/28  15:57:48  ram
?RCS: patch61: replaced .a with $_a all over the place
?RCS:
?RCS: Revision 3.0.1.2  1994/05/06  15:07:02  ram
?RCS: patch23: now uses full library path instead of -l notation
?RCS:
?RCS: Revision 3.0.1.1  1994/01/24  14:13:25  ram
?RCS: patch16: un-obsoleted this unit to allow smooth lex/flex compilations
?RCS:
?RCS: Revision 3.0  1993/08/18  12:08:59  ram
?RCS: Baseline for dist 3.0 netwide
 release.
?RCS:
?MAKE:libflex: Loc lex libpth _a
?MAKE: -pick add $@ %<
?S:libflex:
?S: This variable contains the argument to pass to the loader in order
?S: to get the flex/lex library routines.  If there is no flex or flex
?S: library, it is null.
?S:.
?T:xxx
: see if we should include -lfl
echo " "
case "$lex" in
*flex)
 xxx=`./loc libfl$_a x $libpth`
 case "$xxx" in
 x)
  echo "No flex library found." >&4
  libflex=''
  ;;
 *)
  echo "flex library found in $xxx." >&4
  libflex="$xxx"
  ;;
 esac
 ;;
*lex)
 xxx=`./loc libl$_a x $libpth`
 case "$xxx" in
 x)
  echo "No lex library found." >&4
  libflex=''
```

```
  ;;
 *)
  echo "lex library found in $xxx." >&4
  libflex="$xxx"
  ;;
 esac
 ;;
*)
echo "You don't seem to have lex or flex, so I won't look for libraries." >&4
 ;;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/libflex.U
No license file was found, but licenses were detected in source scan.

```
# $Id: errnolist.sh,v 3.0.1.1 1994/01/24 14:00:00 ram Exp ram $
#
#  Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
#
#  You may redistribute only under the terms of the Artistic Licence,
#  as specified in the README file that comes with the distribution.
#  You may reuse parts of this distribution only within the terms of
#  that same Artistic Licence; a copy of which may be found at the root
#  of the source tree for dist 4.0.
#
# Original Author: Harlan Stenn <harlan@mumps.pfcs.com>
#
# $Log: errnolist.sh,v $
# Revision 3.0.1.1  1994/01/24  14:00:00  ram
# patch16: changed top ln-style config.sh lookup into test-style one
#
# Revision 3.0  1993/08/18  12:04:36  ram
# Baseline for dist 3.0 netwide release.
#
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/lib/errnolist.SH
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
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```

```
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Options.U,v $
?RCS: Revision 3.0.1.7  1997/02/28  15:08:15  ram
?RCS: patch61: optdef.sh now starts with a "startsh"
?RCS: patch61: moved some code from Head.U
?RCS:
?RCS: Revision 3.0.1.6  1995/09/25  09:14:46  ram
?RCS: patch59: protected option parsing code against 'echo -*' option failure
?RCS:
?RCS: Revision 3.0.1.5  1995/05/12  12:04:52  ram
?RCS: patch54: added -K option for experts
?RCS:
?RCS: Revision 3.0.1.4  1995/01/30  14:27:52  ram
?RCS: patch49: this unit now exports file optdef.sh,
 not a variable
?RCS:
?RCS: Revision 3.0.1.3  1995/01/11  15:19:00  ram
?RCS: patch45: new -O option allowing -D and -U to override config.sh settings
?RCS: patch45: file optdef.sh is no longer removed after sourcing
?RCS:
?RCS: Revision 3.0.1.2  1994/10/29  15:58:06  ram
?RCS: patch36: ensure option definition file is removed before appending
?RCS: patch36: protect variable definitions with spaces in them
?RCS:
?RCS: Revision 3.0.1.1  1994/06/20  06:55:44  ram
?RCS: patch30: now uses new me symbol to tag error messages
?RCS: patch30: new -D and -U options to define/undef symbols (JHI)
?RCS:
?RCS: Revision 3.0  1993/08/18  12:05:14  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: Command line parsing. It is really important that the variables used here
?X: be not listed in the MAKE line, or they will be saved in config.sh and
?X: loading this file to fetch default answers would clobber the values set
?X: herein.
?X:
?MAKE:Options: startsh
?MAKE: -pick wipe $@ %<
?V:reuseval
 alldone error realsilent silent extractsh fastread \
 override knowitall: config_sh
?T:arg argn symbol config_arg0 config_args config_argc xxx yyy zzz uuu
?T:args_exp args_sep arg_exp
?F:!Configure
?F:./optdef.sh ./cmdline.opt ./posthint.sh ./cmdl.opt
: Save command line options in file UU/cmdline.opt for later use in
```

```
: generating config.sh.
?X: This temporary file will be read by Oldsym.U.  I used a temporary
?X: file to preserve all sorts of potential command line quotes and
?X: also because we don't know in advance how many variables we'll
?X: need, so I can't actually declare them on the MAKE line.
?X: The config_args variable won't be quite correct if Configure is
?X: fed something like    ./Configure -Dcc="gcc -B/usr/ccs/bin/"
?X: since the quotes are gone by the time we see them.  You'd have to
?X: reconstruct the command line from the config_arg? lines, but since
?X: I don't imagine anyone actually having to do that, I'm not going
?X: to worry too much.
cat > cmdline.opt
 <<EOSH
: Configure command line arguments.
config_arg0='$0'
config_args='$*'
config_argc=$#
EOSH
argn=1
args_exp=''
args_sep=''
for arg in "$@"; do
 cat >>cmdline.opt <<EOSH
config_arg$argn='$arg'
EOSH
?X: Extreme backslashitis: replace each ' by '''''
 cat <<EOC | sed -e "s/'/'''''''''''''''/g" > cmdl.opt
$arg
EOC
 arg_exp=`cat cmdl.opt`
 args_exp="$args_exp$args_sep'$arg_exp'"
 argn=`expr $argn + 1`
 args_sep=' '
done
?X: args_exp is good for restarting self: eval "set X $args_exp"; shift; $0 "$@"
?X: used by hints/os2.sh in Perl, for instance
rm -f cmdl.opt

: produce awk script to parse command line options
cat >options.awk <<'EOF'
BEGIN {
 optstr = "A:dD:eEf:hKOrsSU:V"; # getopt-style specification

 len = length(optstr);
 for (i = 1; i <= len; i++) {
  c = substr(optstr, i, 1);
?X: some older awk's do not have the C ?: construct
  if (i < len) a = substr(optstr, i + 1, 1); else a = "";
```

```
  if (a == ":") {
   arg[c] = 1;
   i++;
  }
  opt[c] = 1;
 }
}
{
 expect = 0;
 str = $0;
 if (substr(str,
 1, 1) != "-") {
  printf("'%s'\n", str);
  next;
 }
 len = length($0);
 for (i = 2; i <= len; i++) {
  c = substr(str, i, 1);
  if (!opt[c]) {
   printf("-%s\n", substr(str, i));
   next;
  }
  printf("-%s\n", c);
  if (arg[c]) {
   if (i < len)
    printf("'%s'\n", substr(str, i + 1));
   else
    expect = 1;
   next;
  }
 }
}
END {
 if (expect)
  print "?";
}
EOF

: process the command line options
?X: Use "$@" to keep arguments with spaces in them from being split apart.
?X: For the same reason, awk will output quoted arguments and the final eval
?X: removes them and sets a proper $* array. An 'X' is prependend to each
?X: argument before being fed to echo to guard against 'echo -x', where -x
?X: would be understood as an echo option! It is removed before feeding awk.
set X `for arg in "$@"; do echo "X$arg"; done |
 sed -e s/X// | awk -f options.awk`
eval "set $*"
shift
```

```
rm -f options.awk

: set up default values
fastread=''
reuseval=false
config_sh=''
alldone=''
error=''
silent=''
extractsh=''
override=''
knowitall=''
rm
 -f optdef.sh posthint.sh
cat >optdef.sh <<EOS
$startsh
EOS

?X:
?X: Given that we now have the possibility to execute Configure remotely
?X: thanks to the new src.U support, we have to face the possibility
?X: of having to ask where the source lie, which means we need the Myread.U
?X: stuff and possibly other things that might echo something on the
?X: screen...
?X:
?X: That's not pretty, and might be confusing in 99% of the time. So...
?X: We introduce a new realsilent variable which is set when -s is given,
?X: and we force silent=true if -S is supplied. The Extractall.U unit
?X: will then undo the >&4 redirection based on the value of the
?X: realsilent variable... -- RAM, 18/93/96
?X:

: option parsing
while test $# -gt 0; do
 case "$1" in
 -d) shift; fastread=yes;;
 -e) shift; alldone=cont;;
 -f)
  shift
  cd ..
  if test -r "$1"; then
   config_sh="$1"
  else
   echo "$me: cannot read config file $1." >&2
   error=true
  fi
  cd UU
  shift;;
```

```
-h)
shift; error=true;;
-r) shift; reuseval=true;;
-s) shift; silent=true; realsilent=true;;
-E) shift; alldone=exit;;
-K) shift; knowitall=true;;
-O) shift; override=true;;
-S) shift; silent=true; extractsh=true;;
-D)
 shift
 case "$1" in
 *=)
  echo "$me: use '-U symbol=', not '-D symbol='." >&2
  echo "$me: ignoring -D $1" >&2
  ;;
 *=*) echo "$1" | \
   sed -e "s/'/'\"'\"'/g" -e "s/=\(.*\)/='\1'/" >> optdef.sh;;
 *) echo "$1='define'" >> optdef.sh;;
 esac
 shift
 ;;
-U)
 shift
 case "$1" in
 *=) echo "$1" >> optdef.sh;;
 *=*)
  echo "$me: use '-D symbol=val', not '-U symbol=val'." >&2
  echo "$me: ignoring -U $1" >&2
  ;;
 *) echo "$1='undef'" >> optdef.sh;;
 esac
 shift
 ;;
-A)
   shift
   xxx=''
   yyy="$1"
   zzz=''
   uuu=undef
   case "$yyy" in
        *=*) zzz=`echo "$yyy"|sed 's!=.*!!'`
             case "$zzz" in
             *:*) zzz='' ;;
             *)   xxx=append
                  zzz=" "`echo
"$yyy"|sed 's!^[^=]*=!!'`
                  yyy=`echo "$yyy"|sed 's!=.*!!'` ;;
             esac
```

```
            ;;
        esac
        case "$xxx" in
        ")  case "$yyy" in
            *:*) xxx=`echo "$yyy"|sed 's!:.*!!'`
                yyy=`echo "$yyy"|sed 's!^[^:]*:!!'`
                zzz=`echo "$yyy"|sed 's!^[^=]*=!!'`
                yyy=`echo "$yyy"|sed 's!=.*!!'` ;;
            *)   xxx=`echo "$yyy"|sed 's!:.*!!'`
                yyy=`echo "$yyy"|sed 's!^[^:]*:!!'` ;;
            esac
            ;;
        esac
    case "$xxx" in
    append)
  echo "$yyy=\"\${$yyy}$zzz\"" >> posthint.sh ;;
    clear)
  echo "$yyy=""   >> posthint.sh ;;
    define)
        case "$zzz" in
  ") zzz=define ;;
  esac
  echo "$yyy='$zzz'"  >> posthint.sh ;;
    eval)
  echo "eval \"$yyy=$zzz\"" >> posthint.sh ;;
    prepend)
  echo "$yyy=\"$zzz\${$yyy}\"" >> posthint.sh ;;
    undef)
        case "$zzz" in
  ")
 zzz="$uuu" ;;
  esac
  echo "$yyy=$zzz"  >> posthint.sh ;;
         *)  echo "$me: unknown -A command '$xxx', ignoring -A $1" >&2 ;;
    esac
    shift
    ;;
 -V) echo "$me generated by metaconfig <VERSION> PL<PATCHLEVEL>." >&2
    exit 0;;
 --) break;;
 -*) echo "$me: unknown option $1" >&2; shift; error=true;;
 *) break;;
 esac
done

case "$error" in
true)
 cat >&2 <<EOM
```

```
Usage: $me [-dehrsEKOSV] [-f config.sh] [-D symbol] [-D symbol=value]
            [-U symbol] [-U symbol=] [-A command:symbol...]
 -d : use defaults for all answers.
 -e : go on without questioning past the production of config.sh.
 -f : specify an alternate default configuration file.
 -h : print this help message and exit (with an error status).
 -r : reuse C symbols value if possible (skips costly nm extraction).
 -s : silent mode, only echoes questions and essential information.
 -D : define symbol to have some value:
      -D symbol         symbol gets the value 'define'
      -D symbol=value
   symbol gets the value 'value'
 -E : stop at the end of questions, after having produced config.sh.
 -K : do not use unless you know what you are doing.
 -O : let -D and -U override definitions from loaded configuration file.
 -S : perform variable substitutions on all .SH files (can mix with -f)
 -U : undefine symbol:
      -U symbol    symbol gets the value 'undef'
      -U symbol=   symbol gets completely empty
 -A : manipulate symbol after the platform specific hints have been applied:
  -A symbol=value  append " "value to symbol
  -A append:symbol=value  append value to symbol
  -A define:symbol=value  define symbol to have value
      -A clear:symbol  define symbol to be "
  -A define:symbol  define symbol to be 'define'
  -A eval:symbol=value  define symbol to be eval of value
  -A prepend:symbol=value prepend value to symbol
  -A undef:symbol  define symbol to be 'undef'
  -A undef:symbol=  define symbol to be "
 -V : print version number and exit (with
 a zero status).
EOM
 exit 1
 ;;
esac

?X:
?X: Unless they specified either -S or both -d and -e/E, make sure we're
?X: running interactively, i.e. attached to a terminal. Moved from Head.U to
?X: be able to handle batch configurations...
?X:
?X: We have to hardwire the Configure name and cannot use $me, since if they
?X: said 'sh <Configure', then $me is 'sh'...
?X:
: Sanity checks
case "$fastread$alldone" in
yescont|yesexit) ;;
*)
```

```
 case "$extractsh" in
 true) ;;
 *)
  if test ! -t 0; then
   echo "Say 'sh Configure', not 'sh <Configure'"
   exit 1
  fi
  ;;
 esac
 ;;
esac

?X: In silent mode, the standard output is closed. Questions are asked by
?X: outputing on file descriptor #4, which is the original stdout descriptor.
?X: This filters out all the "junk", since all the needed information is written
?X: on #4. Note that ksh will not let us redirect output if the file descriptor
?X: has not be defined yet, unlike sh, hence the following line...--RAM.
exec 4>&1
case "$silent" in
true)
 exec 1>/dev/null;;
esac

: run the defines and the undefines, if any, but leave the file out there...
touch optdef.sh
. ./optdef.sh
: create the posthint manipulation script and leave the file out there...
?X: this file will be perused by Oldconfig.U
touch posthint.sh
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Options.U
No license file was found, but licenses were detected in source scan.

```
/*
* $Id: getopt.C,v 3.0.1.1 1994/01/24 13:58:40 ram Exp ram $
*
*  Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
*
*  You may redistribute only under the terms of the Artistic Licence,
*  as specified in the README file that comes with the distribution.
*  You may reuse parts of this distribution only within the terms of
*  that same Artistic Licence; a copy of which may be found at the root
*  of the source tree for dist 4.0.
*
* Original Author: unknown, got this off net.sources
*
* $Log: getopt.C,v $
```

```
* Revision 3.0.1.1  1994/01/24  13:58:40  ram
* patch16: created
*
*/
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/lib/C/fake/getopt.C
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: cc.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: cc.U,v $
?RCS: Revision 3.0.1.4  1995/05/12  12:06:47  ram
?RCS: patch54: may now abort Configure when cc does not work
?RCS:
?RCS: Revision 3.0.1.3  1995/01/11  15:20:11  ram
?RCS: patch45: changed gcc checking message to a more explicit one (WED)
?RCS:
?RCS: Revision 3.0.1.2  1994/10/29  16:04:29  ram
?RCS: patch36: detect gcc even when not called as 'gcc' (ADO)
?RCS: patch36: simplified gcc version checking (ADO)
?RCS: patch36: added ?F: line for metalint
 file checking
?RCS:
?RCS: Revision 3.0.1.1  1994/05/06  14:26:06  ram
?RCS: patch23: added support for gcc version (ADO)
?RCS:
?RCS: Revision 3.0  1993/08/18  12:05:30  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:cc: Myread Oldconfig Checkcc test
?MAKE: -pick add $@ %<
?S:cc:
?S: This variable holds the name of a command to execute a C compiler which
?S: can resolve multiple global references that happen to have the same
?S: name.  Usual values are 'cc' and 'gcc'.
?S: Fervent ANSI compilers may be called 'c89'.  AIX has xlc.
?S:.
?F:!cc.cbu
?D:cc='cc'
```

```
: Determine the C compiler to be used
echo " "
case "$cc" in
") dflt=cc;;
*) dflt="$cc";;
esac
rp="Use which C compiler?"
. ./myread
cc="$ans"

: See whether they have no cc but they do have gcc
. ./trygcc
?X: Look for a hint-file generated 'call-back-unit'.  Now that the
?X: user has specified the compiler, we may need to set or change some
?X: other defaults.
if $test -f cc.cbu; then
   . ./cc.cbu
fi
. ./checkcc

Found
 in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/cc.U
No license file was found, but licenses were detected in source scan.

?RCS: $Id: Csym.U,v 3.0.1.4 1995/07/25 13:36:29 ram Exp $
?RCS:
?RCS: Copyright (c) 1991-1993, Raphael Manfredi
?RCS:
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?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: Csym.U,v $
?RCS: Revision 3.0.1.4  1995/07/25  13:36:29  ram
?RCS: patch56: re-arranged compile line to include ldflags before objects
?RCS: patch56: added quotes for OS/2 support
?RCS:
?RCS: Revision 3.0.1.3  1995/05/12  12:00:33  ram
?RCS: patch54: fixed C test program to bypass gcc builtin type checks (ADO)
?RCS:
?RCS: Revision 3.0.1.2  1994/10/31  09:34:13  ram
?RCS: patch44: added Options to the MAKE line since it's no longer in Init.U
?RCS:
?RCS: Revision
```

```
 3.0.1.1  1993/08/25  14:00:05  ram
?RCS: patch6: added ldflags as a conditional dependency and to compile line
?RCS: patch6: a final double quote was missing in csym variable after eval
?RCS:
?RCS: Revision 3.0  1993/08/18  12:04:50  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:Csym mistrustnm extern_C: Options contains libc libs runnm test \
 +cc +optimize +ccflags +ldflags run rm_try _exe d_cplusplus
?MAKE: -pick add $@ %<
?LINT:define csym
?LINT:use libc
?LINT:extern mistrustnm
?LINT:set mistrustnm
?S:csym:
?S: This shell variable is used internally by Configure to check
?S: whether a given C symbol is defined or not. A typical use is:
?S:  set symbol result [-fva] [previous]
?S:  eval $csym
?S: That will set result to 'true' if the function [-f], variable [-v]
?S: or array [-a] is defined, 'false' otherwise. If a previous value is
?S: given and the -r flag was provided on the command line, that value
?S: is reused without questioning.
?S:.
?S:extern_C:
?S: ANSI C
 requires 'extern' where C++ requires 'extern "C"'. This
?S: variable can be used in Configure to do the right thing.
?S:.
?S:mistrustnm:
?S: This variable can be used to establish a fallthrough for the cases
?S: where nm fails to find a symbol.  If usenm is false or usenm is true
?S: and mistrustnm is false, this variable has no effect.  If usenm is true
?S: and mistrustnm is "compile", a test program will be compiled to try to
?S: find any symbol that can't be located via nm lookup.  If mistrustnm is
?S: "run", the test program will be run as well as being compiled.
?S:.
?V:csym
?T:tval tx tlook tf tdc
?F:!try
: is a C symbol defined?
csym='tlook=$1;
case "$3" in
-v) tf=libc.tmp; tdc="";;
-a) tf=libc.tmp; tdc="[]";;
*) tlook="^$1\$"; tf=libc.list; tdc="()";;
esac;
case "$d_cplusplus" in
```

```
  $define) extern_C="extern \"C\"" ;;
  *)  extern_C="extern" ;;
esac;
tx=yes;
case "$reuseval-$4" in
true-) ;;
true-*) tx=no; eval "tval=\$$4"; case "$tval" in "") tx=yes;; esac;;
esac;
case "$tx"
 in
yes)
?X:
?X: Put symbol inside a printf to fool optimizing compilers...
?X:
?X: We use 'short' instead of 'int' to try to circumvent overzealous
?X: optimizing compilers using built-in prototypes for commonly used
?X: routines to complain when seeing a different external declaration. For
?X: instance, gcc 2.6.3 fails if we use 'int' and we attempt a test against
?X: memcpy() on machines where sizeof(int) == sizeof(char *) (the usual return
?X: type), the compiler assuming it's a built-in declaration given that the
?X: returned size matches. At least with 'short' we are safe! -- RAM, for ADO
?X:
?X: Let's thank GNU cc for making our lives so easy! :-)
?X: (An alternative for the future would be to use our knowledge about gcc
?X: to force a -fno-builtin option in the compile test, in case the 'short'
?X: trick is obsoleted by future gcc releases). -- RAM
?X:
 tval=false;
 if $test "$runnm" = true; then
  if $contains $tlook $tf >/dev/null 2>&1; then
   tval=true;
  elif $test "$mistrustnm"
 = compile -o "$mistrustnm" = run; then
   echo "$extern_C void *$1$tdc; void *(*(p()))$tdc { return &$1; } int main(int argc, char **argv) { if(p() && p() !=
(void *)argv[0]) return(0); else return(1); }"> try.c;
   $cc -o try $optimize $ccflags $ldflags try.c >/dev/null 2>&1 $libs && tval=true;
   $test "$mistrustnm" = run -a -x try && { $run ./try$_exe >/dev/null 2>&1 || tval=false; };
   $rm_try;
  fi;
 else
  echo "$extern_C void *$1$tdc; void *(*(p()))$tdc { return &$1; } int main(int argc, char **argv) { if(p() && p() !=
(void *)argv[0]) return(0); else return(1); }"> try.c;
  $cc -o try $optimize $ccflags $ldflags try.c $libs >/dev/null 2>&1 && tval=true;
  $rm_try;
 fi;
 ;;
*)
 case "$tval" in
```

```
 $define) tval=true;;
 *) tval=false;;
 esac;
 ;;
esac;
eval "$2=$tval"'
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/compline/Csym.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: mailer.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
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?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: mailer.U,v $
?RCS: Revision 3.0.1.3  1995/01/11  15:32:11  ram
?RCS: patch45: can now use Loc variables since path stripping is deferred
?RCS:
?RCS: Revision 3.0.1.2  1994/05/06  15:10:04  ram
?RCS: patch23: ensure full path value is used for rmail also
?RCS:
?RCS: Revision 3.0.1.1  1994/01/24  14:14:18  ram
?RCS: patch16: now use _sendmail vars and friends for portability issues
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:10  ram
?RCS: Baseline for dist
 3.0 netwide release.
?RCS:
?MAKE:mailer: test cat rmail mail smail sendmail Getfile Oldconfig
?MAKE: -pick add $@ %<
?S:mailer:
?S: This variable contains the full pathname of a reasonable mailer.
?S: By reasonable, we mean some program which can understand internet
?S: addresses or at least forward them to some internet router. This
?S: mailer should be invoked as "mailer [options] recipients <mail".
?S:.
: determine the name of a reasonable mailer
case "$mailer" in
")
 if $test -f "$sendmail"; then
  dflt="$sendmail"
```

```
 elif $test -f "$smail"; then
  dflt="$smail"
 elif $test -f "$rmail"; then
  dflt="$rmail"
 elif $test -f /bin/mail; then
  dflt=/bin/mail
 else
  dflt=$mail
 fi
 ;;
*)  dflt="$mailer";;
esac
$cat <<EOM

I need the full pathname of the program used to deliver mail on your system.
A typical answer would be /usr/lib/sendmail or /bin/rmail, but you may choose
any other program, as long as it can be fed from standard input and will
honour any user-supplied headers.

EOM
fn=f
rp='Mail
 transport agent to be used?'
. ./getfile
mailer="$ans"
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/mailer.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: baserev.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
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?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: baserev.U,v $
?RCS: Revision 3.0  1993/08/18  12:05:24  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:baserev: Null
?MAKE: -pick wipe $@ %<
?S:baserev:
?S: The base revision level of this package, from the .package file.
```

```
?S:.
: set the base revision
baserev=<BASEREV>

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/baserev.U
No license file was found, but licenses were detected in source scan.

?RCS: $Id: libnm.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
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?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: libnm.U,v $
?RCS: Revision 3.0.1.1  1997/02/28  16:08:26  ram
?RCS: patch61: replaced .a with $_a all over the place
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:01  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:libnm: test Loc libpth _a
?MAKE: -pick add $@ %<
?S:libnm:
?S: This variable contains the argument to pass to the loader in order
?S: to get the new math library routines.  If there is no new math
?S: library, it is null.
?S:.
?T:ans
?O:
 use libswanted='-lnm' instead (see libs.U).
: see if we should include -lnm
echo " "
if $test -r /usr/lib/libnm$_a || $test -r /usr/local/lib/libnm$_a ; then
 echo "New math library found." >&4
 libnm='-lnm'
else
 ans=`./loc libnm$_a x $libpth`
 case "$ans" in
 x)
  echo "No nm library found--the normal math library will have to do." >&4
  libnm=''
  ;;
 *)
```

```
  echo "New math library found in $ans." >&4
  libnm="$ans"
  ;;
 esac
fi
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/libnm.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: Copyright (c) 2000, Jarkko Hietaniemi
?RCS:
?X:
?X: This unit allows the duplication of the source tree to the current
?X: directory via symbolic links.  This must be requested explicitly
?X: by them issuing a -Dmksymlinks on the command line.
?X:
?MAKE:Mksymlinks: Mkdirp lns issymlink src rsrc pkgsrc
?MAKE: -pick add $@ %<
?F:!UU
?T: dir filename tmppwd filelist
?LINT:extern mksymlinks
@if {test -f ../MANIFEST}
: Duplicate the tree with symbolic links if -Dmksymlinks was supplied
case "$mksymlinks"
 in
$define|true|[yY]*)
 echo " "
 case "$src" in
 "|'.') echo "Cannot create symlinks in the original directory." >&4
  exit 1
  ;;
 *) case "$lns:$issymlink" in
  *"ln"*" -s:"*"test -"?)
   echo "Creating the symbolic links..." >&4
   echo "(First creating the subdirectories...)" >&4
   cd ..
   awk '{print $1}' $src/MANIFEST | grep / | sed 's:/[^/]*$::' | \
```

```
 sort -u | while true
do
 read dir
 test -z "$dir" && break
 ./UU/mkdirp $dir 2>/dev/null
 if test -d $dir; then
  : ok
 else
  echo "Failed to create '$dir'.  Aborting." >&4
  exit 1
 fi
done
echo "(Now creating the symlinks...)" >&4
awk '{print $1}' $src/MANIFEST | while true; do
 read filename
 test -z "$filename" && break
 if test -f $filename; then
  if $issymlink $filename; then
   rm -f $filename
  fi
 fi
 if test -f $filename; then
  echo "$filename already exists, not symlinking."
 else
?X: Note that the following works because "$pkgsrc" is absolute
   ln
 -s $pkgsrc/$filename $filename
 fi
done
?X: Check that everything was correctly copied
echo "(Checking current directory...)" >&4
cd UU
awk '$1 !~ /PACK[A-Z]+/ {print $1}' "$rsrc/MANIFEST" | \
 (split -l 50 2>/dev/null || split -50)
rm -f missing
tmppwd=`pwd`
for filelist in x??; do
 (cd ..; ls `cat "$tmppwd/$filelist"` \
  >/dev/null 2>>"$tmppwd/missing")
done
if test -s missing; then
 echo "Failed duplication of source tree.  Aborting." >&4
 exit 1
fi
;;
*) echo "(I cannot figure out how to do symbolic links, ignoring!)" >&4
;;
esac
```

```
  ;;
 esac
 ;;
esac

@end
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Mksymlinks.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: so.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
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?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: so.U,v $
?RCS: Revision 3.0.1.2  1994/10/29  16:30:04  ram
?RCS: patch36: now tells user how he can suppress shared lib lookup (ADO)
?RCS: patch36: removed echo at the top, since it's now in the here-doc (ADO)
?RCS:
?RCS: Revision 3.0.1.1  1994/06/20  07:07:02  ram
?RCS: patch30: created
?RCS:
?X:
?X: This unit computes the shared-object / shared-lib extension
?X:
?MAKE:so d_libname_unique: test libpth Loc Myread Oldconfig cat Setvar
?MAKE: -pick add $@ %<
?S:so:
?S: This
 variable holds the extension used to identify shared libraries
?S: (also known as shared objects) on the system. Usually set to 'so'.
?S:.
?S:d_libname_unique:
?S: This variable is defined if the target system insists on unique
?S: basenames for shared library files. This is currently true on Android,
?S: false everywhere else we know of.
?S: Defaults to 'undef'.
?S:.
?LINT:set d_libname_unique
?T: xxx
: compute shared library extension
```

```
case "$so" in
")
 if xxx=`./loc libc.sl X $libpth`; $test -f "$xxx"; then
  dflt='sl'
 else
  dflt='so'
 fi
 ;;
*) dflt="$so";;
esac
$cat <<EOM

On some systems, shared libraries may be available.  Answer 'none' if
you want to suppress searching of shared libraries for the remainder
of this configuration.

EOM
rp='What is the file extension used for shared libraries?'
. ./myread
so="$ans"

: Does target system insist that shared library basenames are unique
$cat << EOM

Some dynamic loaders assume that the *basename* of shared library
 filenames
are globally unique.  We'll default this to undef as we assume your system
is not this weird. Set to defined if you're on one of them.

EOM

dflt='n'
rp='Make shared library basenames unique?'
. ./myread
case "$ans" in
y|Y) val="$define" ;;
*)   val="$undef"  ;;
esac
set d_libname_unique
eval $setvar

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/so.U
No license file was found, but licenses were detected in source scan.

?RCS: $Id: dlsrc.U,v$
?RCS:
?RCS: Copyright (c) 1996-1998, Andy Dougherty
```

```
?RCS:
?RCS: You may distribute under the terms of either the GNU General Public
?RCS: License or the Artistic License, as specified in the README file.
?RCS:
?RCS: $Log: dlext.U,v $
?RCS:
?X:  hpux support thanks to Jeff Okamoto <okamoto@hpcc101.corp.hp.com>
?X:
?X:  To create a shared library, you must compile ALL source files in the
?X:  library with +z (or possibly +Z if the library is whopping huge),
?X:  then link the library with -b.  Example:
?X:   cc -c +z module_a.c
?X:   cc -c +z module_b.c
?X:   ld -b module_a.o module_b.o -o module.sl
?X:
?MAKE:dlext: \
 Getfile Myread cat usedl so
?MAKE: -pick add $@ %<
?Y:BOTTOM
?S:dlext:
?S: This variable contains the extension that is to be used for the
?S: dynamically loaded modules that perl generates.
?S:.
: Check what extension to use for shared libs
case "$usedl" in
$define|y|true)
 $cat <<
 EOM

On a few systems, the dynamically loaded modules that perl generates and uses
will need a different extension than shared libs. The default will probably
be appropriate.

EOM
 case "$dlext" in
 ") dflt="$so" ;;
 *) dflt="$dlext" ;;
 esac
 rp='What is the extension of dynamically loaded modules'
 . ./myread
 dlext="$ans"
 ;;
*)
 dlext="none"
 ;;
esac

Found in path(s):
```

```
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/dlext.U
No license file was found, but licenses were detected in source scan.

?RCS: $Id: vendorman3dir.U,v 1.1 1999/07/08 18:32:57 doughera Exp doughera $
?RCS:
?RCS: Copyright (c) 1999-2000, Andy Dougherty
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: vendorman3dir.U,v $
?RCS: Revision 1.1  1999/07/08 18:32:57  doughera
?RCS: Initial revision
?RCS:
?MAKE:vendorman3dir vendorman3direxp installvendorman3dir: man3dir Getfile \
 Oldconfig Setprefixvar Prefixit test vendorprefix prefix sed
?MAKE: -pick add $@ %<
?Y:TOP
?S:vendorman3dir:
?S: This variable contains the name of the directory for man3
?S: pages.  It may have a ~ on the front.
?S: The standard distribution will put nothing in this directory.
?S: Vendors
 who distribute perl may wish to place their own
?S: man3 pages in this directory with
?S:  MakeMaker Makefile.PL INSTALLDIRS=vendor
?S: or equivalent.  See INSTALL for details.
?S:.
?S:vendorman3direxp:
?S: This variable is the ~name expanded version of vendorman3dir, so that you
?S: may use it directly in Makefiles or shell scripts.
?S:.
?D:installvendorman3dir=''
?S:installvendorman3dir:
?S: This variable is really the same as vendorman3direxp but may differ on
?S: those systems using AFS. For extra portability, only this variable
?S: should be used in makefiles.
?S:.
?LINT:change prefixvar
?LINT:set installvendorman3dir
: Set the vendorman3dir variables
case "$vendorprefix" in
'') vendorman3dir=''
 vendorman3direxp=''
 ;;
```

```
*) : determine where vendor-supplied module manual pages go.
 case "$vendorman3dir" in
 ") dflt=`echo "$man3dir" | $sed "s#^$prefix#$vendorprefix#"` ;;
 *) dflt=$vendorman3dir ;;
 esac
 case "$dflt" in
 "|' ') dflt=none ;;
 esac
 fn=nd~+
 rp='Pathname
 for the vendor-supplied manual section 3 pages?'
 . ./getfile
 vendorman3dir="$ans"
 vendorman3direxp="$ansexp"
 ;;
esac
: Use ' ' for none so value is preserved next time through Configure
$test X"$vendorman3dir" = "X" && vendorman3dir=' '
prefixvar=vendorman3dir
. ./installprefix
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/vendorman3dir.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: d_byacc.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1996, Andy Dougherty
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: d_byacc.U,v $
?RCS: Revision 3.0.1.1  1997/02/28  15:31:14  ram
?RCS: patch61: created
?RCS:
?MAKE:d_byacc: byacc Setvar
?MAKE: -pick add $@ %<
?S:d_byacc:
?S: This variable indicates whether byacc is available.
?S: If the user has specified 'portability', then Makefile.SH
?S: sees $byacc='byacc' whether or not the user actually has
?S: byacc.  This variable allows us to determine in a makefile
?S: if we really
```

```
 have byacc.
?S:.
?LINT:set d_byacc
: Check if we really have byacc
case "$byacc" in
"|'byacc') val="$undef" ;;
*) val="$define" ;;
esac
set d_byacc
eval $setvar
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_byacc.U
No license file was found, but licenses were detected in source scan.

?RCS: You may redistribute only under the terms of the Artistic Licence,

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_nolnbuf.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_truncate.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_setrgid.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_inetd.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/filexp_path.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_systwgcf.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/cppfilecom.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_sysparam.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_syssock.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_fgetpos.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_poll.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_setpgrp2.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_newsadm.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_values.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_systable.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_system.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_perror.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/vaproto.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_tzname.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_whoami.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_sysresrc.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_fcntl.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_killpg.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_sysfile.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_sysndir.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_syscall.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_flock.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/nametype.U

* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_cuserid.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_lockf.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_systypes.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_setegid.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_fmod.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_memccpy.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_popen.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_systimes.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_sigvec.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_chroot.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_gdbm.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_SHM_MAC.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_select.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_mktime.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_msem_lck.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Loc_sed.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_hidnet.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_sfio.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/cpp_trad.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_seteuid.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_wait4.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_munmap.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_shmget.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_fsetpos.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_getwd.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Obsol_h.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_dbl_dig.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_accept4.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_dlerror.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_getopt.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_strdup.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_charsprf.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_tcgtpgrp.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_dld.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_niin.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_getppid.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_msgctl.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/sbrktype.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_drem.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_link.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_setgrps.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_raster.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_memalign.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_ffs.U
*

/perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/ipc.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/locdist.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_limits.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_pause.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_bcopy.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_setlocale.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_waitpid.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_ulimit.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_chown.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_string.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_sigblock.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_arpainet.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_scandir.U
*
/perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_tzmin.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_usendir.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_bsdjmp.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_memmove.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_difftime.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_scorfl.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/basicshell.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_syspoll.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Getfile.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/pkgsrc.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_sysioctl.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_getpgrp2.U
*
/perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_memory.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_table.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_dup3.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_usleep.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Magic_h.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_stdlib.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_sysdir.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_setlnbuf.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/mkdep.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_locconv.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_mbstowcs.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_mblen.U
*
/perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_sjis2jis.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_float.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_syswait.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_msgrcv.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_dup2.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_xdrs.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_ftime.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_setreuid.U

* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/defeditor.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_unistd.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_setregid.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_strtod.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_systimeb.U
*
/perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_siglist.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_euc2jis.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_strtok.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/i_stdlib.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_dbm.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_havetlib.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_ffs.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/ilp.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_uwait.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_linuxstd.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_stat.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_crypt.U
*
/perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_pathconf.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_cbrt.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_preadv.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_sigsetmk.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_sysselct.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_setlocale.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_umask.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Obsol_sh.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_fork.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_pread.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_strstr.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/i_termio.U
*
/perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_pwrite.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_rmdir.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_setruid.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_getpgid.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_symlink.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_vfork.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_wctomb.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_gethid.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_fchmod.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_setprior.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_memset.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_shmdt.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_dlfcn.U
*
/perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_stddef.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_rdchk.U

* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_dbl_dig.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_readdir.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_mkostemp.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/prefshell.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_memcpy.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_internet.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_msync.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/mboxchar.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/registers.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/rootid.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_strtol.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_pidcheck.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_wcstombs.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_rename.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_pipe2.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/i_fenv.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Assert.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_mkfifo.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_msgget.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_strxfrm.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_semctl.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_strchr.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_NeWS.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_strcspn.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_regex.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_shmctl.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_sysun.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_semget.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_locale.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_utime.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_bcmp.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_math.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/mailfile.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_fcntl.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_syslog.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_inetaton.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_nice.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_PORTAR.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_readlink.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_tcstpgrp.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_strccmp.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/newslib.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_bzero.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_memcmp.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_regcmp.U

* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_mbtowc.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_strcoll.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_itimer.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_sbrk.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_su_chown.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_sysconf.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/i_sysstat.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/vaproto.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/i_stdint.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_chsize.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_mkdir.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_ckeypad.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_ctermid.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_psignal.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_rusage.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/compiler_warning.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_semop.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_speedopt.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/newsspool.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_getlogin.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_setsid.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_wait3.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/orgname.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_fchown.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_getprior.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_alarm.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_getgrps.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_setpgid.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/nlist_pfx.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_normsig.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_brokstat.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_pipe.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_lstat.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_sighold.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_tminsys.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_ftrncate.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Prefixit.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_strxfrm_l.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_msgsnd.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_pwritev.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/groupstype.U
No license file was found, but licenses were detected in source scan.

?RCS: $Id: sysman.U,v 3.0.1.2 1994/06/20 07:08:43 ram Exp $

```
?RCS:
?RCS: Copyright (c) 1991-1993, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: sysman.U,v $
?RCS: Revision 3.0.1.2  1994/06/20  07:08:43  ram
?RCS: patch30: now explicitly states that /usr/man/man1 is the default
?RCS: patch30: added /usr/local/man/man1 to the search list
?RCS:
?RCS: Revision 3.0.1.1  1993/09/13  16:13:50  ram
?RCS: patch10: added support for /local/man/man1 (WAD)
?RCS: patch10: added temporary syspath variable to cut down on line length
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:55  ram
?RCS: Baseline for dist 3.0 netwide
 release.
?RCS:
?MAKE:sysman: test Loc Oldconfig
?MAKE: -pick add $@ %<
?S:sysman:
?S: This variable holds the place where the manual is located on this
?S: system. It is not the place where the user wants to put his manual
?S: pages. Rather it is the place where Configure may look to find manual
?S: for unix commands (section 1 of the manual usually). See mansrc.
?S:.
?T:syspath
: determine where manual pages are on this system
echo " "
case "$sysman" in
")
 syspath='/usr/share/man/man1 /usr/man/man1'
 syspath="$syspath /usr/man/mann /usr/man/manl /usr/man/local/man1"
 syspath="$syspath /usr/man/u_man/man1"
 syspath="$syspath /usr/catman/u_man/man1 /usr/man/l_man/man1"
 syspath="$syspath /usr/local/man/u_man/man1 /usr/local/man/l_man/man1"
 syspath="$syspath /usr/man/man.L /local/man/man1 /usr/local/man/man1"
 sysman=`./loc . /usr/man/man1 $syspath`
 ;;
esac
if $test -d "$sysman"; then
 echo "System manual is in $sysman." >&4
else
 echo "Could not find manual pages in source form."
```

```
 >&4
fi

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/sysman.U
No license file was found, but licenses were detected in source scan.

?RCS: $Id: siteprefix.U,v 1.1 1999/07/08 18:32:57 doughera Exp doughera $
?RCS:
?RCS: Copyright (c) 1999 Andy Dougherty
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: siteprefix.U,v $
?RCS: Revision 1.1  1999/07/08 18:32:57  doughera
?RCS: Initial revision
?RCS:
?MAKE:siteprefix siteprefixexp +oldsiteprefix: Getfile Loc Oldconfig cat package prefix
?MAKE: -pick add $@ %<
?S:siteprefix:
?S: This variable holds the full absolute path of the directory below
?S: which the user will install add-on packages.
?S: See INSTALL for usage and examples.
?S:.
?S:siteprefixexp:
?S: This variable holds the full absolute path of the
 directory below
?S: which the user will install add-on packages.  Derived from siteprefix.
?S:.
?S:oldsiteprefix:
?S: This variable is set non-null if the siteprefix was previously defined
?S: and gets set to a new value. Used internally by Configure only.
?S:.
: Set the siteprefix variables
$cat <<EOM

After $package is installed, you may wish to install various
add-on modules and utilities.  Typically, these add-ons will
be installed under $prefix with the rest
of this package.  However, you may wish to install such add-ons
elsewhere under a different prefix.

If you do not wish to put everything under a single prefix, that's
ok.  You will be prompted for the individual locations; this siteprefix
```

```
is only used to suggest the defaults.

The default should be fine for most people.

EOM
fn=d~+
rp='Installation prefix to use for add-on modules and utilities?'
: XXX Here might be another good place for an installstyle setting.
case "$siteprefix" in
") dflt=$prefix ;;
*)  dflt=$siteprefix
 ;;
esac
. ./getfile
: XXX Prefixit unit does not yet support siteprefix and vendorprefix
oldsiteprefix="
case "$siteprefix" in
") ;;
*) case "$ans" in
 "$prefix") ;;
 *) oldsiteprefix="$prefix";;
 esac
 ;;
esac
siteprefix="$ans"
siteprefixexp="$ansexp"

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/siteprefix.U
No license file was found, but licenses were detected in source scan.

?RCS: $Id: nis.U,v 3.0.1.3 1997/02/28 16:17:38 ram Exp $
?RCS:
?RCS: Copyright (c) 1991-1993, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: nis.U,v $
?RCS: Revision 3.0.1.3  1997/02/28  16:17:38  ram
?RCS: patch61: ensure suitable defaults for hostcat and friends
?RCS:
?RCS: Revision 3.0.1.2  1995/03/21  08:48:34  ram
?RCS: patch52: continued fix for NeXT NIS/NetInfo handling
?RCS:
```

```
?RCS: Revision 3.0.1.1  1995/02/15  14:16:23  ram
?RCS: patch51: now correctly handles NeXT using NIS rather than NetInfo
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:24  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:passcat
 groupcat hostcat: Myread Oldconfig test contains
?MAKE: -pick add $@ %<
?S:passcat:
?S: This variable contains a command that produces the text of the
?S: /etc/passwd file.  This is normally "cat /etc/passwd", but can be
?S: "ypcat passwd" when NIS is used.
?S: On some systems, such as os390, there may be no equivalent
?S: command, in which case this variable is unset.
?S:.
?S:groupcat:
?S: This variable contains a command that produces the text of the
?S: /etc/group file.  This is normally "cat /etc/group", but can be
?S: "ypcat group" when NIS is used.
?S: On some systems, such as os390, there may be no equivalent
?S: command, in which case this variable is unset.
?S:.
?S:hostcat:
?S: This variable contains a command that produces the text of the
?S: /etc/hosts file.  This is normally "cat /etc/hosts", but can be
?S: "ypcat hosts" when NIS is used.
?S: On some systems, such as os390, there may be no equivalent
?S: command, in which case this variable is unset.
?S:.
:
 see if we have to deal with yellow pages, now NIS.
?X: NeXT gives us some fun here, as always, by having both NIS (former YP)
?X: and NetInfo. But since it has both, it's ok to put the test inside the if.
?X: Contributed by Thomas Neumann <tom@smart.bo.open.de>.
if $test -d /usr/etc/yp || $test -d /etc/yp || $test -d /usr/lib/yp; then
@if passcat || groupcat
 case "$passcat" in
 nidump*) ;;
 *)
  case "$passcat" in
  *ypcat*) dflt=y;;
  ") if $contains '^\+' /etc/passwd >/dev/null 2>&1; then
    dflt=y
   else
    dflt=n
   fi;;
  *) dflt=n;;
```

```
  esac
  echo " "
  rp='Are you getting the passwd file via yellow pages?'
  . ./myread
  case "$ans" in
  y*) passcat='ypcat passwd'
@if groupcat
   echo "(Assuming /etc/group is also distributed.)"
   groupcat='ypcat group'
@end
   ;;
  *) passcat='cat /etc/passwd'
@if groupcat
   echo "(Assuming /etc/group is also local.)"
   groupcat='cat /etc/group'
@end
   ;;
  esac
  ;;
 esac
@end
@if hostcat
 case "$hostcat" in
 nidump*) ;;
 *)
  case
 "$hostcat" in
  *ypcat*) dflt=y;;
  ") if $contains '^\+' /etc/passwd >/dev/null 2>&1; then
    dflt=y
   else
    dflt=n
   fi;;
  *) dflt=n;;
  esac
  echo " "
  rp='Are you getting the hosts file via yellow pages?'
  . ./myread
  case "$ans" in
  y*) hostcat='ypcat hosts';;
  *) hostcat='cat /etc/hosts';;
  esac
  ;;
 esac
@end
fi
?X: Ensure suitable default -- Manoj Srivastava
case "$hostcat" in
```

```
") test -f /etc/hosts && hostcat='cat /etc/hosts';;
esac
case "$groupcat" in
") test -f /etc/group && groupcat='cat /etc/group';;
esac
case "$passcat" in
") test -f /etc/passwd && passcat='cat /etc/passwd';;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/nis.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: sitescript.U,v $
?RCS:
?RCS: Copyright (c) 1999 Andy Dougherty
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: sitescript.U,v $
?RCS:
?MAKE:sitescript sitescriptexp installsitescript : Getfile Oldconfig test \
 Setprefixvar sitebin siteprefix
?MAKE: -pick add $@ %<
?Y:TOP
?D:sitescript="
?S:sitescript:
?S: This variable holds the name of the directory in which the user wants
?S: to put add-on publicly executable files for the package in question.  It
?S: is most often a local directory such as /usr/local/bin. Programs using
?S: this variable must be prepared to deal with ~name substitution.
?S: The standard
 distribution will put nothing in this directory.
?S: After perl has been installed, users may install their own local
?S: scripts in this directory with
?S:  MakeMaker Makefile.PL
?S: or equivalent.  See INSTALL for details.
?S:.
?D:sitescriptexp="
?S:sitescriptexp:
?S: This is the same as the sitescript variable, but is filename expanded at
?S: configuration time, for use in your makefiles.
?S:.
?D:installsitescript="
```

```
?S:installsitescript:
?S: This variable is usually the same as sitescriptexp, unless you are on
?S: a system running AFS, in which case they may differ slightly. You
?S: should always use this variable within your makefiles for portability.
?S:.
?LINT:change prefixvar
?LINT:set installsitescript
?LINT:set sitescript
?LINT:set sitescriptexp
: determine where add-on public executable scripts go
case "$sitescript" in
") dflt=$siteprefix/script
 $test -d $dflt || dflt=$sitebin ;;
*)  dflt="$sitescript" ;;
esac
fn=d~+
rp='Pathname where add-on public executable scripts
 should be installed?'
. ./getfile
prefixvar=sitescript
. ./setprefixvar
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/sitescript.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Init.U,v $
?RCS: Revision 3.0.1.1  1994/10/31  09:45:59  ram
?RCS: patch44: removed Options from MAKE to prevent Init overrides
?RCS: patch44: option processing now done after Myinit thanks to new Begin.U
?RCS: patch44: moved "Beginning of configuration questions" to Begin.U
?RCS: patch44: moved signal trapping instruction to Begin.U as well
?RCS:
?RCS: Revision 3.0  1993/08/18  12:05:02  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This file initializes certain default variables
```

```
 used by Configure.  They
?X: may be overridden or added to by definitions in Myinit.U.
?X:
?MAKE:Init eunicefix _exe: Null
?MAKE: -pick add $@ %<
?MAKE: -pick weed $@ ./Init
?S:eunicefix:
?S: When running under Eunice this variable contains a command which will
?S: convert a shell script to the proper form of text file for it to be
?S: executable by the shell.  On other systems it is a no-op.
?S:.
?S:_exe (exe_ext):
?S: This variable defines the extension used for executable files.
?S: For unix it is empty.  Other possible values include '.exe'.
?S: DJGPP, Cygwin and OS/2 use '.exe'.  Stratus VOS uses '.pm'.
?S: On operating systems which do not require a specific extension
?S: for executable files, this variable is empty.
?S:.
?V:define undef smallmach:rmlist
?X:
?X: Throughout the units, one may make use of $define and $undef to reference
?X: a defined symbol or an undefined one. There is no need to add them in
?X: the dependency line since this unit makes them visible via ?V:, and
?X:
 everyone inherits from those symbols since by convention Init.U is the
?X: root dependency.
?X:
?T: DJGPP
: Initialize wide constants
define='define'
undef='undef'
smallmach='pdp11 i8086 z8000 i80286 iAPX286'
rmlist=''

: We must find out about Eunice early
eunicefix=':'
if test -f /etc/unixtovms; then
 eunicefix=/etc/unixtovms
fi
if test -f /etc/unixtovms.exe; then
 eunicefix=/etc/unixtovms.exe
fi

: Set executable suffix now -- needed before hints available
if test -f "/libs/version.library"; then
 : Amiga OS
  _exe=""
elif test -f "/system/gnu_library/bin/ar.pm"; then
```

```
 : Stratus VOS
 _exe=".pm"
elif test -n "$DJGPP"; then
 : DOS DJGPP
  _exe=".exe"
elif test -d c:/. ; then
 : OS/2 or cygwin
 _exe=".exe"
else
 : All other UNIX systems
 _exe=""
fi
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Init.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1999 Jarkko Hietaniemi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?MAKE:siteman3dir siteman3direxp installsiteman3dir: Getfile \
 Setprefixvar prefix siteprefix man3dir sed
?MAKE: -pick add $@ %<
?Y:TOP
?D:siteman3dir="
?S:siteman3dir:
?S: This variable contains the name of the directory in which site-specific
?S: library man source pages are to be put.  It is the responsibility of the
?S: Makefile.SH to get the value of this into the proper command.
?S: You must be prepared to do the ~name expansion yourself.
?S: The standard distribution will put nothing in this directory.
?S: After
 perl has been installed, users may install their own local
?S: man3 pages in this directory with
?S:  MakeMaker Makefile.PL
?S: or equivalent.  See INSTALL for details.
?S:.
?D:siteman3direxp="
?S:siteman3direxp:
?S: This variable is the same as the siteman3dir variable, but is filename
?S: expanded at configuration time, for convenient use in makefiles.
```

```
?S:.
?D:installsiteman3dir="
?S:installsiteman3dir:
?S: This variable is really the same as siteman3direxp, unless you are using
?S: AFS in which case it points to the read/write location whereas
?S: man3direxp only points to the read-only access location. For extra
?S: portability, you should only use this variable within your makefiles.
?S:.
?LINT:change prefixvar
?LINT:set installsiteman3dir
?LINT:set siteman3dir
?LINT:set siteman3direxp
: determine where add-on library man pages go
case "$siteman3dir" in
") dflt=`echo $man3dir | $sed "s#^$prefix#$siteprefix#"` ;;
*) dflt=$siteman3dir ;;
esac
case "$dflt" in
"|' ') dflt=none ;;
esac
fn=dn+~
rp='Pathname
 where the site-specific library manual pages should be installed?'
. ./getfile
prefixvar=siteman3dir
. ./setprefixvar
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/siteman3dir.U
No license file was found, but licenses were detected in source scan.

Perl5 Metaconfig Units

Copyright (c) 1996-1998, Andy Dougherty
Copyright (c) 1999-2011, H.Merijn Brand
All rights reserved.

These units are the ones used to build Configure and config_h.SH
in the Perl5 distribution.

metaconfig will first look in its standard locations (specified when you
installed dist). It will then recurse through the 'U' subdirectory
and find any additional "private" units. Private units override
standard ones supplied with metaconfig.

Files in this directory:

README

This file.

Glossary.patch
The standard dist units contain some strings that make pod2man complain. This patch silences those warnings. As new units are added and Configure is regenerated, this patch may need more and more 'fuzz' to be applied. It should be freshly regenerated every once in a while. See also mkgloss.pl

ln-all.pl
Re-generate the all/ folder

mkglossary
A script
to regenerate Porting/Glossary. You have to manually edit the top of the script to point the location of your metaconfig units. It is called automatically by 'mksample'. See also mkgloss.pl

mkgloss.pl
A perl script that calls U/mkglossary from the perl source tree, sorts the list of symbols, and applies the patch mentioned in Glossary.patch. When called on its own, redirect the output to a temporary file, and compare that file to Porting/Glossary before applying.

mksample
A script to regenerate Porting/config.sh and Porting/config.H. It also calls mkglossary, if necessary.

Subdirectories:

The units and other related files have been broken up into the following directories.

a_dvisory/
These are units that have to go first in the generated config_h.SH. A word of explanation: Configure and config_h.SH are generated from 'Units' (the *.U files). Files indicate dependencies (using make(1)), and Configure is built to follow those dependencies.
However, config_h.SH is simply built by putting all the units in alphabetical order and extracting the relevant lines. (This could be fixed, I suppose, but it wasn't trivial the one time I looked.)
The a_dvisory/ directory, then, is a place to put units that need to be early in config_h.SH. (Most units are self-contained and ought to be able to go anywhere. However, some things, like byteorder, need to have the #defines from multiarch available.)

acl/

This is an old patch to begin to detect and use ACL (access control list) file protection schemes.

all/
A folder that conveniently holds symbolic links to all the modules that are used to build the current Configure and config_h.SH.

compline/
These are similar to the standard units, but I have modified them to have a more uniform compile command line, usually using the new Compile.U unit. (The ccflags.U unit is perl-specific since it mentions -DDEBUGGING and
-DPOSIX_SOURCE, but that's the only place
it is perl-specific.)

dist_patches/
These are patches to dist that must be applied before it is built and installed. I have submitted these for inclusion in the regular dist distribution. They have already been applied to the ../dist-3.0at70b directory.

ebcdic/
These are units that had to be specially modified to work under either EBCDIC or ASCII.

installdirs/
These are units to handle perl's installation directories and related issues.

modified/
These are modified versions of the standard units. Also included in this directory are new units that are clearly derived from existing units. I have submitted these for inclusion in the regular dist distribution.

nullified/
These are null units that replace units in the standard distribution. Typically they are there because some part of the perl source accidentally uses a symbol that metaconfig thinks means we want the corresponding
unit.

perl/
These are specific to perl. Some are heavily derived from original dist units, and are marked as such. Others are original.

perl_patches/
These are patches to the perl source. This directory

should ordinarily be empty, but there may have been drift between the standard version of perl and the one associated with these units.

protos/
These are units modified to use the new Hasproto.U or Protochk.U units to check for prototypes.

threads/
These are specific to threading perl.

typedefs/
These are standard units modified to use the modified Typedef.U unit to check for typedefs. (The modified Typdef.U includes a function to avoid unnecessary prompts if the typdef being searched for exists.)

Where appropriate, I submitted these units for inclusion into the regular dist distribution. However, since dist is no longer actively maintained, and the alternative is for *me* to actively maintain it, the units just
sit here.

Copyright Information:

Unless otherwise indicated, the files contained in this distribution are:

Copyright (c) 1996-1998, Andy Dougherty

The following licensing terms apply to all files contained in this distribution:

You may distribute the files contained in this distribution under the terms of either

a) the "Artistic License" which comes with Perl, or

b) the "Artistic License" which comes with dist, or

c) the GNU General Public License as published by the Free Software Foundation; either version 1, or (at your option) any later version (see the file "Copying" that comes with the Perl distribution).

Which one to use is your choice.

The units in the "modified" directory have been derived from units
associated with the metaconfig program of Raphael Manfredi's "dist"
distribution. These units list Raphael Manfredi as the Copyright holder.
dist is distributed under a modified version of the Perl Artistic License.
Clause 7 of this modified
license as contained in dist-3.0-pl60 provides:

7. You may reuse parts of this Package in your own programs, provided
that you explicitly state where you got them from, in the source code
(and, left to your courtesy, in the documentation), duplicating
all the associated copyright notices and disclaimers. Besides
your changes, if any, must be clearly marked as such. Parts reused
that way will no longer fall under this license if, and only if,
the name of your program(s) have no immediate connection with the
name of the Package itself or its associated programs. You may then
apply whatever restrictions you wish on the reused parts or choose
to place them in the Public Domain--this will apply only within the
context of your package.

In accordance with this clause, the versions of these units
contained here are made available under the same terms as the
rest of the units.

If you have any questions about the use of these units or about
the differences
between these units and the standard versions, please
feel free to ask.

Andy Dougherty doughera@lafayette.edu
Dept. of Physics
Lafayette College
Easton, PA 18042-1782

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/README
No license file was found, but licenses were detected in source scan.

?RCS: $Id: afs.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: afs.U,v $

```
?RCS: Revision 3.0.1.2  1997/02/28  15:23:06  ram
?RCS: patch61: can now explicitly tell Configure whether AFS is running
?RCS:
?RCS: Revision 3.0.1.1  1993/08/24  12:24:43  ram
?RCS: patch3: created
?RCS:
?MAKE:afs afsroot: test
?MAKE: -pick add $@ %<
?S:afs:
?S: This variable is set to 'true' if AFS (Andrew File System) is used
?S: on the system, 'false' otherwise.  It is possible to override this
?S: with a hint value or command line option,
 but you'd better know
?S: what you are doing.
?S:.
?S:afsroot:
?S: This variable is by default set to '/afs'. In the unlikely case
?S: this is not the correct root, it is possible to override this with
?S: a hint value or command line option.  This will be used in subsequent
?S: tests for AFSness in the configure and test process.
?S:.
: allow them to override the AFS root
case "$afsroot" in
") afsroot=/afs ;;
*) afsroot=$afsroot ;;
esac

: is AFS running?
echo " "
case "$afs" in
$define|true) afs=true ;;
$undef|false) afs=false ;;
*) if $test -d $afsroot; then
  afs=true
 else
  afs=false
 fi
 ;;
esac
if $afs; then
 echo "AFS may be running... I'll be extra cautious then..." >&4
else
 echo "AFS does not seem to be running..." >&4
fi

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/afs.U
```

No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: usenm.U,v $
?RCS: Revision 3.0.1.1  1997/02/28  16:26:40  ram
?RCS: patch61: don't use nm with the GNU C library
?RCS: patch61: added support for Linux shared libs
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:57  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:usenm runnm nm_opt nm_so_opt: cat test Myread Oldconfig grep \
 d_gnulibc nm egrep rsrc osname Guess
?MAKE: -pick add $@ %<
?S:usenm:
?S: This variable contains 'true' or 'false' depending whether the
?S: nm extraction is wanted
 or not.
?S:.
?S:runnm:
?S: This variable contains 'true' or 'false' depending whether the
?S: nm extraction should be performed or not, according to the value
?S: of usenm and the flags on the Configure command line.
?S:.
?S:nm_opt:
?S: This variable holds the options that may be necessary for nm.
?S:.
?S:nm_so_opt:
?S: This variable holds the options that may be necessary for nm
?S: to work on a shared library but that can not be used on an
?S: archive library.  Currently, this is only used by Linux, where
?S: nm --dynamic is *required* to get symbols from an ELF library which
?S: has been stripped, but nm --dynamic is *fatal* on an archive library.
?S: Maybe Linux should just always set usenm=false.
?S:.
: see if nm is to be used to determine whether a symbol is defined or not
?X: If there is enough inquiries, it might be worth to wait for the nm
?X: extraction. Otherwise, the C compilations might be a better deal.
?X:
```

```
?X: Don't bother if we're using GNU libc -- skimo
case "$usenm"
 in
")
 dflt="
 case "$d_gnulibc" in
 "$define")
  echo " "
  echo "$nm probably won't work on the GNU C Library." >&4
  dflt=n
  ;;
 esac
 case "$dflt" in
 ")
  if $test "$osname" = aix -a ! -f /lib/syscalls.exp; then
   echo " "
   echo "Whoops!  This is an AIX system without /lib/syscalls.exp!" >&4
   echo "'nm' won't be sufficient on this system." >&4
   dflt=n
  fi
  ;;
 esac
 case "$dflt" in
 ")
  if ./gnu; then
   echo " "
   echo "Hmm...  A GNU system without a GNU C Library?  Weird..." >&4
   dflt=n
  else
   dflt=`$egrep 'inlibc|csym' $rsrc/Configure | wc -l 2>/dev/null`
   if $test $dflt -gt 20; then
    dflt=y
   else
    dflt=n
   fi
  fi
  ;;
 esac
 ;;
*)
 case "$usenm" in
 true|$define) dflt=y;;
 *) dflt=n;;
 esac
 ;;
esac
$cat <<EOM
```

```
I can use $nm to extract the symbols from your C libraries. This
is a time consuming task which may generate huge output on the disk (up
to 3 megabytes) but that should make the symbols extraction faster. The
alternative is to skip the
 'nm' extraction part and to compile a small
test program instead to determine whether each symbol is present. If
you have a fast C compiler and/or if your 'nm' output cannot be parsed,
this may be the best solution.

EOM
rp='Shall I use nm to extract C symbols from the libraries?'
. ./myread
case "$ans" in
[Nn]*) usenm=false;;
*) usenm=true;;
esac

?X: Name extraction is to be run if 'nm' usage is wanted and if no -r flag
?X: was provided to configure (in which case we simply re-use the previous
?X: values).
runnm=$usenm
case "$reuseval" in
true) runnm=false;;
esac

: nm options which may be necessary
case "$nm_opt" in
") if $test -f /mach_boot; then
  nm_opt="  # Mach
 elif $test -d /usr/ccs/lib; then
  nm_opt='-p'  # Solaris (and SunOS?)
 elif $test -f /dgux; then
  nm_opt='-p'  # DG-UX
 elif $test -f /lib64/rld; then
  nm_opt='-p'  # 64-bit Irix
 else
  nm_opt="
 fi;;
esac

?X: nm options which may be necessary for shared libraries but illegal
?X: for archive libraries.  Thank you,
 Linux.
case "$nm_so_opt" in
") case "$osname" in
 *linux*)
  if $nm --help | $grep 'dynamic' > /dev/null 2>&1; then
   nm_so_opt='--dynamic'
```

```
  fi
  ;;
 esac
 ;;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/usenm.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Null.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Null.U,v $
?RCS: Revision 3.0  1993/08/18  12:05:10  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This unit ends up producing shell code to set all variables to ".  This
?X: probably isn't necessary, but I'm paranoid.  About certain things.
?X:
?MAKE:Null: Head
?MAKE: -pick add.Null $@ %<
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Null.U
No license file was found, but licenses were detected in source scan.

* Feel free to modify any of this as the need arises.  Note, however,

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/metaconfig.html
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: patchlevel.U,v 3.0.1.1 1997/02/28 16:18:41 ram Exp $
?RCS:
?RCS: Copyright (c) 1991-1993, Raphael Manfredi
?RCS:
?RCS: This file is included with or a derivative work of a file included
?RCS: with the metaconfig program of Raphael Manfredi's "dist" distribution.
?RCS: In accordance with clause 7 of dist's modified Artistic License:
```

```
?RCS:
?RCS:     You may distribute under the terms of either the GNU General Public
?RCS:     License or the Artistic License, as specified in the README file.
?RCS:
?RCS: $Log: patchlevel.U,v $
?RCS: Revision 3.0.1.1  1997/02/28  16:18:41  ram
?RCS: patch61: added support for src.U
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:31  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:patchlevel revision version subversion \
 perl_patchlevel version_patchlevel_string \
 api_revision api_version api_subversion api_versionstring: \
 package test rsrc echo awk osname
?MAKE: -pick
 add $@ %<
?S:revision:
?S: The value of revision comes from the patchlevel.h file.
?S: In a version number such as 5.6.1, this is the "5".
?S: In patchlevel.h, this is referred to as "PERL_REVISION".
?S:.
?S:patchlevel:
?S: The patchlevel level of this package.
?S: The value of patchlevel comes from the patchlevel.h file.
?S: In a version number such as 5.6.1, this is the "6".
?S: In patchlevel.h, this is referred to as "PERL_VERSION".
?S:.
?S:subversion:
?S: The subversion level of this package.
?S: The value of subversion comes from the patchlevel.h file.
?S: In a version number such as 5.6.1, this is the "1".
?S: In patchlevel.h, this is referred to as "PERL_SUBVERSION".
?S: This is unique to perl.
?S:.
?S:version:
?S: The full version number of this package, such as 5.6.1 (or 5_6_1).
?S: This combines revision, patchlevel, and subversion to get the
?S: full version number, including any possible subversions.
?S: This is suitable for use as a directory name, and hence is
?S: filesystem
 dependent.
?S:.
?S:api_revision:
?S: The three variables, api_revision, api_version, and
?S: api_subversion, specify the version of the oldest perl binary
?S: compatible with the present perl.  In a full version string
?S: such as '5.6.1', api_revision is the '5'.
```

```
?S: Prior to 5.5.640, the format was a floating point number,
?S: like 5.00563.
?S:
?S: perl.c:incpush() and lib/lib.pm will automatically search in
?S: $sitelib/.. for older directories back to the limit specified
?S: by these api_ variables.  This is only useful if you have a
?S: perl library directory tree structured like the default one.
?S: See INSTALL for how this works.  The versioned site_perl
?S: directory was introduced in 5.005, so that is the lowest
?S: possible value.  The version list appropriate for the current
?S: system is determined in inc_version_list.U.
?S:
?S: XXX To do:  Since compatibility can depend on compile time
?S: options (such as bincompat, longlong, etc.) it should
?S: (perhaps) be set by
 Configure, but currently it isn't.
?S: Currently, we read a hard-wired value from patchlevel.h.
?S: Perhaps what we ought to do is take the hard-wired value from
?S: patchlevel.h but then modify it if the current Configure
?S: options warrant.  patchlevel.h then would use an #ifdef guard.
?S:.
?S:api_version:
?S: The three variables, api_revision, api_version, and
?S: api_subversion, specify the version of the oldest perl binary
?S: compatible with the present perl.  In a full version string
?S: such as '5.6.1', api_version is the '6'.  See api_revision for
?S: full details.  As a special case, 5.5.0 is rendered in the
?S: old-style as 5.005.  (In the 5.005_0x maintenance series,
?S: this was the only versioned directory in $sitelib.)
?S:.
?S:api_subversion:
?S: The three variables, api_revision, api_version, and
?S: api_subversion, specify the version of the oldest perl binary
?S: compatible with the present perl.  In a full version string
?S: such as '5.6.1', api_subversion is the
 '1'.  See api_revision for
?S: full details.
?S:.
?S:api_versionstring:
?S: This variable combines api_revision, api_version, and
?S: api_subversion in a format such as 5.6.1 (or 5_6_1) suitable
?S: for use as a directory name.  This is filesystem dependent.
?S:.
?S:perl_patchlevel:
?S: This is the Perl patch level, a numeric change identifier,
?S: as defined by whichever source code maintenance system
?S: is used to maintain the patches; currently Perforce.
?S: It does not correlate with the Perl version numbers or
```

```
?S: the maintenance versus development dichotomy except
?S: by also being increasing.
?S:.
?S:version_patchlevel_string:
?S: This is a string combining version, subversion and
?S: perl_patchlevel (if perl_patchlevel is non-zero).
?S: It is typically something like
?S: 'version 7 subversion 1'  or
?S: 'version 7 subversion 1 patchlevel 11224'
?S: It is computed here to avoid duplication of code in myconfig.SH
?S: and lib/Config.pm.
?S:.
?LINT:extern LC_ALL
?LINT:extern LANGUAGE
:
 get the patchlevel
echo " "
echo "Getting the current patchlevel..." >&4
if $test -r $rsrc/patchlevel.h;then
 revision=`awk '/define[  ]+PERL_REVISION/ {print $3}' $rsrc/patchlevel.h`
 patchlevel=`awk '/define[  ]+PERL_VERSION/ {print $3}' $rsrc/patchlevel.h`
 subversion=`awk '/define[  ]+PERL_SUBVERSION/ {print $3}' $rsrc/patchlevel.h`
 api_revision=`awk '/define[  ]+PERL_API_REVISION/ {print $3}' $rsrc/patchlevel.h`
 api_version=`awk '/define[  ]+PERL_API_VERSION/ {print $3}' $rsrc/patchlevel.h`
 api_subversion=`awk '/define[  ]+PERL_API_SUBVERSION/ {print $3}' $rsrc/patchlevel.h`
 perl_patchlevel=`egrep ',"(MAINT|SMOKE)[0-9][0-9]*"' $rsrc/patchlevel.h|tail -1|sed 's/[^0-9]//g'`
else
 revision=0
 patchlevel=0
 subversion=0
 api_revision=0
 api_version=0
 api_subversion=0
 perl_patchlevel=0
 $echo "(You do not have patchlevel.h.  Eek.)"
fi
: Define a handy string here to avoid duplication in myconfig.SH and configpm.
version_patchlevel_string="version $patchlevel subversion $subversion"
case
 "$perl_patchlevel" in
0|'') ;;
*)  perl_patchlevel=`echo $perl_patchlevel | sed 's/.* //'`
   version_patchlevel_string="$version_patchlevel_string patch $perl_patchlevel"
   ;;
esac

$echo "(You have $package $version_patchlevel_string.)"
```

```
case "$osname" in
dos|vms)
 : XXX Should be a Configure test for double-dots in filenames.
 version=`echo $revision $patchlevel $subversion | \
   $awk '{ printf "%d_%d_%d", $1, $2, $3 }'`
 api_versionstring=`echo $api_revision $api_version $api_subversion | \
   $awk '{ printf "%d_%d_%d", $1, $2, $3 }'`
 ;;
*)
 version=`echo $revision $patchlevel $subversion | \
   $awk '{ printf "%d.%d.%d", $1, $2, $3 }'`
 api_versionstring=`echo $api_revision $api_version $api_subversion | \
   $awk '{ printf "%d.%d.%d", $1, $2, $3 }'`
 ;;
esac
: Special case the 5.005_xx maintenance series, which used 5.005
: without any subversion label as a subdirectory in $sitelib
if test "${api_revision}${api_version}${api_subversion}" = "550"; then
 api_versionstring='5.005'
fi
```

Found
 in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/patchlevel.U
No license file was found, but licenses were detected in source scan.

Perl5 Metaconfig Units

Copyright (c) 1996-1998, Andy Dougherty
Copyright (c) 1999-2011, H.Merijn Brand
All rights reserved.

These units are the ones I used to build Configure and config_h.SH
in the Perl5 distribution.

The Configure script and config_h.SH file in the Perl distribution are
generated by a program called metaconfig.  To run metaconfig, you will
need the full dist 3.0 distribution, maintained by Raphael Manfredi.
As of this writing, the current version is dist3.0, patchlevel 70.
Dist version dist-3.0@70.tar.gz is available on CPAN (the Comprehensive
Perl Archive Network) as
<http://www.perl.com/perl/CPAN/authors/id/RAM/dist-3.0@70.tar.gz>.

Instructions:

1.  Unpack the full perl5 sources.  Execute the following command

```
 chmod +w Configure config_h.SH Porting/Glossary Porting/config*
```

2. Unpack the archive containing this file in the perl5 source
directory. This will create a directory
'U' under the perl5
sources. That directory will contain the metaconfig units for perl5.
This will also create two files in the perl5 source tree:
MANIFEST.new and .package.

3. Apply any patches to perl in the perl_patches/ directory.
(This may well be empty.)

4. Obtain and install dist-3.0pl70.

4. Apply any patches to dist under the dist_patches subdirectory.

5. From your main perl5 source directory, run packinit to
regenerate the .package file. IMPORTANT: Change the name and
address of the maintainer to your own name and address. I don't
want bug reports intended for you coming to me.

6. From your main perl5 source directory, run

metalint (or mlint)

and repair every failure it reports.

7. From your main perl5 source directory, run

metaconfig -m (or mconfig -m)

8. Edit U/mkglossary and/or U/mkgloss.pl to point to your dist-3.0pl70
location. (See comments at the top.)

9. Run the Porting/mksample script to update the contents
of the Porting/
subdirectory, or run all parts by hand. (see README)

NB: this script used to be U/mksample replaced by Porting/mksample;
see Porting/pumpkin.pod instead for current documentation on its
use.

10. Let me know about any changes, corrections, or enhancements.

Things to watch out for:

1. Future support of better random number generators should probably
start with the randfunc.U unit included here. It's currently
broken, but well commented and probably a good place to start.

Descriptions:

The units and other related files have been broken up into the following directories:

acl/
This is an old patch to begin to detect and use ACL (access control list) file protection schemes.

compline/
These are similar to the standard units, but I have modified them to have a more uniform compile command line, usually using the new Compile.U unit. I have submitted these for inclusion into the regular dist distribution. (The ccflags.U unit is actually perl-specific since it mentions -DDEBUGGING and -DPOSIX_SOURCE, but that's the only place it is perl-specific.)

dist_patches/
These are patches to dist that must be applied before it is built and installed. I have submitted these for inclusion in the regular dist distribution.

modified/
These are modified versions of the standard units. Also included in this directory are new units that are clearly derived from existing units. I have submitted these for inclusion in the regular dist distribution.

perl/
These are specific to perl. Some are heavily derived from original dist units, and are marked as such. Others are original.

perl_patches/
These are patches to the perl source. This directory should ordinarily be empty, but there may have been drift between the standard version of perl and the one associated with these units.

protos/
These are units modified to use the new Hasproto.U or Protochk.U units to check for prototypes. I have submitted these for inclusion into the regular dist distribution.

target/
This is the very, very beginning of cross-compiler support. It doesn't work yet, and many standard units will need

modification.

typedefs/
These are standard units modified to use the modified Typedef.U unit to check for typedefs. (The modified Typdef.U includes a function to avoid unnecessary prompts if the typdef being searched for exists.) I have submitted these for inclusion into the regular dist distribution.

threads/
These are specific to threading perl.

Copyright Information:

Unless otherwise indicated, the files contained in this distribution are:

Copyright (c) 1996-1998, Andy Dougherty

The following licensing terms apply to all files contained in this distribution:

You may distribute the files contained in this distribution under the terms of either

a) the "Artistic License" which comes with Perl,
or

b) the "Artistic License" which comes with dist, or

c) the GNU General Public License as published by the Free Software Foundation; either version 1, or (at your option) any later version (see the file "Copying" that comes with the Perl distribution).

Which one to use is your choice.

The units in the "modified" directory have been derived from units associated with the metaconfig program of Raphael Manfredi's "dist" distribution. These units list Raphael Manfredi as the Copyright holder. dist is distributed under a modified version of the Perl Artistic License. Clause 7 of this modified license as contained in dist-3.0-pl60 provides:

7. You may reuse parts of this Package in your own programs, provided that you explicitly state where you got them from, in the source code (and, left to your courtesy, in the documentation), duplicating all the associated copyright notices and disclaimers. Besides your changes, if any, must be clearly marked

as such. Parts reused
that way will no longer fall under this license if, and only if,
the name of your program(s) have no immediate connection with the
name of the Package itself or its associated programs.  You may then
apply whatever restrictions you wish on the reused parts or choose
to place them in the Public Domain--this will apply only within the
context of your package.

In accordance with this clause, the versions of these units
contained here are made available under the same terms as the
rest of the units.

If you have any questions about the use of these units or about
the differences between these units and the standard versions, please
feel free to ask.

Andy Dougherty  doughera@lafayette.edu
Dept. of Physics
Lafayette College
Easton, PA  18042-1782

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/README.dist
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Extras.U,v$
?RCS:
?RCS: Copyright (c) 2001, Jarkko Hietaniemi
?RCS:
?RCS: You may distribute under the terms of either the GNU General Public
?RCS: License or the Artistic License, as specified in the README file.
?RCS:
?MAKE:extras: Myread Oldconfig Setvar rm
?MAKE: -pick add $@ %<
?Y:TOP
?S:extras:
?S: This variable holds a list of extra modules to install.
?S:.
: See if we want extra modules installed
echo " "
case "$extras" in
") dflt='n';;
*) dflt='y';;
esac
cat <<EOM
Perl can be built with extra modules or bundles of modules which
will be fetched from the CPAN and installed alongside Perl.
```

```
Notice that you will need access to the CPAN; either via the Internet,
or a local copy, for example a CD-ROM or a local CPAN mirror.  (You will
be asked later to configure the CPAN.pm module which will in turn do
the installation of the rest of the extra modules or bundles.)

Notice also that if the modules require
 any external software such as
libraries and headers (the libz library and the zlib.h header for the
Compress::Zlib module, for example) you MUST have any such software
already installed, this configuration process will NOT install such
things for you.

If this doesn't make any sense to you, just accept the default '$dflt'.
EOM
rp='Install any extra modules (y or n)?'
. ./myread
case "$ans" in
y|Y)
 cat <<EOM

Please list any extra modules or bundles to be installed from CPAN,
with spaces between the names.  The names can be in any format the
'install' command of CPAN.pm will understand.  (Answer 'none',
without the quotes, to install no extra modules or bundles.)
EOM
 rp='Extras?'
 dflt="$extras"
 . ./myread
 extras="$ans"
esac
case "$extras" in
"|'none')
 val=''
 $rm -f ../extras.lst
 ;;
*) echo "(Saving the list of extras for later...)"
 echo "$extras" > ../extras.lst
 val='"$extras"'
 ;;
esac
set extras
eval $setvar
echo " "
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/Extras.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1996, Andy Dougherty
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: man1dir.U,v $
?RCS: Revision 3.0.1.1  1997/02/28  16:10:29  ram
?RCS: patch61: created
?RCS:
?X:
?X: This was originally specific to perl5.  Since perl5 has man pages that
?X: go in both man1/ and man3/ directories, we need both man1dir
?X: and man3dir.  This unit is basically dist's mansrc.U with
?X: man1 used instead of man everywhere.
?X:
?MAKE:man1dir man1direxp man1ext installman1dir: afs cat nroff Loc Oldconfig \
 spackage test Getfile Prefixit prefixexp
 Prefixup sysman Myread
?MAKE: -pick add $@ %<
?Y:TOP
?S:man1dir:
?S: This variable contains the name of the directory in which manual
?S: source pages are to be put.  It is the responsibility of the
?S: Makefile.SH to get the value of this into the proper command.
?S: You must be prepared to do the ~name expansion yourself.
?S:.
?S:man1direxp:
?S: This variable is the same as the man1dir variable, but is filename
?S: expanded at configuration time, for convenient use in makefiles.
?S:.
?S:installman1dir:
?S: This variable is really the same as man1direxp, unless you are using
?S: AFS in which case it points to the read/write location whereas
?S: man1direxp only points to the read-only access location. For extra
?S: portability, you should only use this variable within your makefiles.
?S:.
?S:man1ext:
?S: This variable contains the extension that the manual page should
?S: have: one of 'n', 'l', or '1'.  The Makefile must supply the '.'.
?S: See man1dir.
?S:.
?T:lookpath
```

```
: determine
 where manual pages go
set man1dir man1dir none
eval $prefixit
$cat <<EOM

$spackage has manual pages available in source form.
EOM
case "$nroff" in
nroff)
 echo "However, you don't have nroff, so they're probably useless to you."
 case "$man1dir" in
 ") man1dir="none";;
 esac;;
esac
echo "If you don't want the manual sources installed, answer 'none'."
case "$man1dir" in
' ') dflt=none
 ;;
")
 lookpath="$prefixexp/man/man1 $prefixexp/man/l_man/man1"
 lookpath="$lookpath $prefixexp/man/p_man/man1"
 lookpath="$lookpath $prefixexp/man/u_man/man1"
 lookpath="$lookpath $prefixexp/man/man.1"
?X: Experience has shown people expect man1dir to be under prefix,
?X: so we now always put it there.  Users who want other behavior
?X: can answer interactively or use a command line option.
?X: Does user have System V-style man paths.
 case "$sysman" in
 */?_man*) dflt=`./loc . $prefixexp/l_man/man1 $lookpath` ;;
 *) dflt=`./loc . $prefixexp/man/man1 $lookpath` ;;
 esac
 set dflt
 eval $prefixup
 ;;
*)
  dflt="$man1dir"
 ;;
esac
echo " "
fn=dn+~
rp="Where do the main $spackage manual pages (source) go?"
. ./getfile
if $test "X$man1direxp" != "X$ansexp"; then
 installman1dir="
fi
man1dir="$ans"
man1direxp="$ansexp"
```

```
case "$man1dir" in
") man1dir=' '
 installman1dir="";;
esac
if $afs; then
 $cat <<EOM

Since you are running AFS, I need to distinguish the directory in which
manual pages reside from the directory in which they are installed (and from
which they are presumably copied to the former directory by occult means).

EOM
 case "$installman1dir" in
 ") dflt=`echo $man1direxp | sed 's#^/afs/#/afs/.#'`;;
 *) dflt="$installman1dir";;
 esac
 fn=de~
 rp='Where will man pages be installed?'
 . ./getfile
 installman1dir="$ans"
else
 installman1dir="$man1direxp"
fi

: What suffix to use on installed man pages

case "$man1dir" in
' ')
 man1ext='0'
 ;;
*)
 rp="What suffix should be used for the main $spackage man pages?"
 case "$man1ext" in
 ") case "$man1dir" in
  *1)  dflt=1 ;;
  *1p)
 dflt=1p ;;
  *1pm) dflt=1pm ;;
  *l) dflt=l;;
  *n) dflt=n;;
  *o) dflt=o;;
  *p) dflt=p;;
  *C) dflt=C;;
  *L) dflt=L;;
  *L1) dflt=L1;;
  *) dflt=1;;
  esac
  ;;
```

```
 *) dflt="$man1ext";;
 esac
 . ./myread
 man1ext="$ans"
 ;;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/man1dir.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: yacc.U,v $
?RCS: Revision 3.0.1.1  1994/05/13  15:28:48  ram
?RCS: patch27: added byacc as another alternative (ADO)
?RCS:
?RCS: Revision 3.0  1993/08/18  12:10:03  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:yacc yaccflags: Guess Myread Loc Oldconfig byacc bison cat test
?MAKE: -pick add $@ %<
?S:yacc:
?S: This variable holds the name of the compiler compiler we
?S: want to use in the Makefile. It can be yacc, byacc, or bison -y.
?S:.
?S:yaccflags:
?S: This variable contains any
 additional yacc flags desired by the
?S: user.  It is up to the Makefile to use this.
?S:.
?T:comp
: determine compiler compiler
echo " "
comp='yacc'
if $test -f "$byacc$_exe"; then
 comp="byacc or $comp"
fi
if $test -f "$bison$_exe"; then
 comp="$comp or bison -y"
```

```
fi
case "$yacc" in
")
 yacc=`./loc yacc yacc $pth`
 if $test -f "$yacc$_exe"; then
  dflt='yacc'
 elif $test -f "$byacc$_exe"; then
  dflt='byacc'
 elif $test -f "$bison$_exe"; then
  dflt='bison'
 else
  dflt=''
 fi
 ;;
*) dflt="$yacc";;
esac
rp="Which compiler compiler ($comp) shall I use?"
. ./myread
yacc="$ans"
case "$yacc" in
*bis*)
 case "$yacc" in
 *-y*) ;;
 *)
  yacc="$yacc -y"
  echo "(Adding -y option to bison to get yacc-compatible behaviour.)"
  ;;
 esac
 ;;
esac

@if yaccflags
: see if we need extra yacc flags
dflt="$yaccflags"
case "$dflt" in
") dflt=none;;
esac
$cat <<EOH

Your yacc program may need extra flags to normally process the parser sources.
Do NOT specify any -d or -v flags here, since those are
 explicitly known
by the various Makefiles. However, if your machine has strange/undocumented
options (like -Sr# on SCO to specify the maximum number of grammar rules), then
please add them here.  To use no flags, specify the word "none".

EOH
rp="Any additional yacc flags?"
```

```
. ./myread
case "$ans" in
none) yaccflags=";;
*) yaccflags="$ans";;
esac

@end

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/yacc.U
No license file was found, but licenses were detected in source scan.

?RCS: $Id: warnflags.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: Orginal Author: Graham Stoney <greyham@research.canon.oz.au>
?RCS:
?RCS: $Log: warnflags.U,v $
?RCS: Revision 3.0  1993/08/18  12:10:02  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:warnflags: cat cc contains Myread Guess Oldconfig Findhdr
?MAKE: -pick add $@ %<
?S:warnflags:
?S: This variable contains any additional C compiler flags to generate
?S: warnings from the compiler. It is up to the Makefile to use this.
?S:.
: offer additional
 warning flags for compilation
$cat <<EOH

You may wish to compile with extra compiler warnings enabled.
Note that doing so enhances your chance of receiving your free set of steak
knives, particularly if you find any bugs and report them.
If you don't want extra warnings, answer "none".

EOH
case "$warnflags" in
") case "$cc" in
 *gcc*)
  dflt="-Wall -Wno-comment"
```

```
  if $contains 'fprintf' `./findhdr stdio.h` >/dev/null 2>&1; then
   :
  else
   dflt="$dflt -Wno-implicit"
  fi
  ;;
 *) dflt="none";;
 esac
 ;;
' ') dflt="none";;
*) dflt="$warnflags";;
esac

rp="Any $cc flags to enable warnings?"
. ./myread
case "$ans" in
none) warnflags=' ';;
*) warnflags="$ans";;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/warnflags.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Warn_v7EXT.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Warn_v7EXT.U,v $
?RCS: Revision 3.0.1.1  1994/10/29  16:01:42  ram
?RCS: patch36: call ./v7 explicitly instead of relying on PATH
?RCS:
?RCS: Revision 3.0  1993/08/18  12:05:17  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This unit issues warnings to V7 sites that they are living dangerously.
?X: This unit needs to get mentioned in End.U to get included.
?X:
?MAKE:Warn_v7EXT: package Guess
?MAKE: -pick add $@ %<
: Warnings
```

```
if ./v7;
 then
 cat <<EOM

NOTE: the V7 compiler may ignore some #undefs that $package uses.  If so,
you may get messages about redefining EXT.  Some V7 compilers also have
difficulties with #defines near buffer boundaries, so beware.  You may have
to play with the spacing in some .h files, believe it or not.
EOM
fi
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Warn_v7EXT.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Mkdirp.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Extract.U,v $
?RCS: Revision 3.0.1.2  1997/02/28  14:58:52  ram
?RCS: patch61: added support for src.U
?RCS:
?RCS: Revision 3.0.1.1  1994/10/29  15:51:46  ram
?RCS: patch36: added ?F: line for metalint file checking
?RCS:
?RCS: Revision 3.0  1993/08/18  12:04:52  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This unit produces a shell script which can launched to create a
?X: directory path like "mkdir -p" would do.
?X:
?MAKE:Mkdirp:
 eunicefix startsh
?MAKE: -pick add $@ %<
?F:./mkdirp
?T:name create file
: script used to emulate mkdir -p
cat >mkdirp <<EOS
$startsh
EOS
```

```
cat >>mkdirp <<'EOS'
name=$1;
create="";
while test $name; do
 if test ! -d "$name"; then
  create="$name $create"
  name=`echo $name | sed -e "s|^[^/]*$||"`
  name=`echo $name | sed -e "s|\(.*\)/.*|\1|"`
 else
  name=""
 fi
done
for file in $create; do
 mkdir $file
done
EOS
chmod +x mkdirp
$eunicefix mkdirp
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Mkdirp.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: packadmin.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1996, Andy Dougherty
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?MAKE:packadmin: cf_email Oldconfig Myread cat spackage package
?MAKE: -pick add $@ %<
?Y:TOP
?S:packadmin:
?S: Electronic mail address of the package administrator.
?S:.
: check wehther they will act as local admin for the package
$cat <<EOM

If you or somebody else will be maintaining $package at your site, please
fill in the correct e-mail address here so that they may be contacted
if necessary.  You may enter "none"
 for no administrator.
```

```
EOM
case "$packadmin" in
") dflt="$cf_email";;
*) dflt="$packadmin";;
esac
rp="$spackage administrator e-mail address"
. ./myread
packadmin="$ans"
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/packadmin.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: libs.U,v 3.0.1.6 1997/02/28 16:09:11 ram Exp $
?RCS:
?RCS: Copyright (c) 1991-1993, Raphael Manfredi
?RCS:
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?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: libs.U,v $
?RCS: Revision 3.0.1.6  1997/02/28  16:09:11  ram
?RCS: patch61: replaced .a with $_a all over the place
?RCS:
?RCS: Revision 3.0.1.5  1995/07/25  14:12:05  ram
?RCS: patch56: now knows about OS/2 platforms
?RCS:
?RCS: Revision 3.0.1.4  1994/10/29  16:24:22  ram
?RCS: patch36: removed old broken thislib/thatlib processing (ADO)
?RCS:
?RCS: Revision 3.0.1.3  1994/06/20  07:05:44  ram
?RCS: patch30: code cleanup with if/elif by ADO and RAM
?RCS: patch30:
 undone patch23 for libswanted default setting
?RCS:
?RCS: Revision 3.0.1.2  1994/05/06  15:08:45  ram
?RCS: patch23: now includes ordered default libswanted variable (ADO)
?RCS: patch23: major cleanup for library lookups (ADO)
?RCS:
?RCS: Revision 3.0.1.1  1993/08/25  14:02:31  ram
?RCS: patch6: added default for libs
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:03  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
```

```
?MAKE:libs ignore_versioned_solibs libsfound libsfiles libsdirs libspath: \
 test cat Myread Oldconfig Loc libpth package xlibpth so _a \
 usesocks sed uselongdouble
?MAKE: -pick add $@ %<
?S:libs:
?S: This variable holds the additional libraries we want to use.
?S: It is up to the Makefile to deal with it.  The list can be empty.
?S:.
?S:libsfound:
?S: This variable holds the full pathnames of the libraries
?S: we found and accepted.
?S:.
?S:libsfiles:
?S: This variable holds the filenames aka basenames of the libraries
?S: we found and accepted.
?S:.
?S:libsdirs:
?S: This
 variable holds the directory names aka dirnames of the libraries
?S: we found and accepted, duplicates are removed.
?S:.
?S:libspath:
?S: This variable holds the directory names probed for libraries.
?S:.
?S:ignore_versioned_solibs:
?S: This variable should be non-empty if non-versioned shared
?S: libraries (libfoo.so.x.y) are to be ignored (because they
?S: cannot be linked against).
?S:.
?T:xxx yyy thislib thisdir libswanted libstyle
?D:libs="
?X:
?X: This order is chosen so that libraries  -lndir, -ldir, -lucb, -lbsd,
?X: -lBSD, -lPW, and -lx only get used if there are unresolved
?X: routines at link time.  Usually, these are backwards compatibility
?X: libraries, and may not be as reliable as the standard c library.
?X:
?X: The -lsocket -linet -lnsl order has been reported to be necessary
?X: for at least one SVR4 implementation.
?X: -lc must proceed -lucb or -lbsd for most Solaris applications.
?X: -lc_s proceeds -lc so we pick up the shared library version, if
?X: it is
 available.
?X:
?X: The ordering of c, posix, and cposix is a guess and almost
?X: certainly wrong on about half of all systems.
?X:
?X: Set proper libswanted in your private Myinit.U if needed.
```

```
?X:
?X:: default ordered library list
?X:libswanted='net socket inet bind nsl nm sdbm gdbm ndbm dbm malloc dl'
?X:libswanted="$libswanted dld sun m c_s c posix cposix ndir dir ucb"
?X:libswanted="$libswanted bsd BSD PW x"
?X:
?INIT:: default library list
?INIT:libswanted="
?INIT:: some systems want to use only the non-versioned libso:s
?INIT:ignore_versioned_solibs="
?LINT:extern usecbacktrace
?LINT:extern libscheck
?LINT:extern p
?LINT:use uselongdouble
: Looking for optional libraries
echo " "
echo "Checking for optional libraries..." >&4
case "$libs" in
' '|'') dflt='';;
*) dflt="$libs";;
esac
case "$libswanted" in
'') libswanted='c_s';;
esac
?X: libsocks has nasty naming scheme.
?X: This does not work if somebody wants SOCKS 4.
case "$usesocks" in
"$define") libswanted="$libswanted socks5
 socks5_sh" ;;
esac
case "$usecbacktrace" in
"$define") libswanted="$libswanted bfd" ;;
esac
libsfound="
libsfiles="
libsdirs="
libspath="
for thisdir in $libpth $xlibpth; do
 test -d $thisdir && libspath="$libspath $thisdir"
done
for thislib in $libswanted; do
 for thisdir in $libspath; do
    xxx="
    if $test ! -f "$xxx" -a "X$ignore_versioned_solibs" = "X"; then
  xxx=`ls $thisdir/lib$thislib.$so.[0-9] 2>/dev/null|sed -n '$p'`
        $test -f "$xxx" && eval $libscheck
  $test -f "$xxx" && libstyle=shared
  xxx=`ls $thisdir/lib$thislib.[0-9].$so 2>/dev/null|sed -n '$p'`
```

```
        $test -f "$xxx" && eval $libscheck
 $test -f "$xxx" && libstyle=shared
    fi
    if test ! -f "$xxx"; then
 xxx=$thisdir/lib$thislib.$so$_a
 $test -f "$xxx" && eval $libscheck
 $test -f "$xxx" && libstyle="import"
    fi
    if test ! -f "$xxx"; then
 xxx=$thisdir/$thislib.$so$_a
 $test -f "$xxx" && eval $libscheck
 $test -f "$xxx" && libstyle="import"
    fi
    if test ! -f "$xxx";
then
 xxx=$thisdir/lib$thislib.$so
        $test -f "$xxx" && eval $libscheck
 $test -f "$xxx" && libstyle=shared
    fi
    if test ! -f "$xxx"; then
 xxx=$thisdir/lib$thislib$_a
        $test -f "$xxx" && eval $libscheck
 $test -f "$xxx" && libstyle=static
    fi
    if test ! -f "$xxx"; then
 xxx=$thisdir/$thislib$_a
        $test -f "$xxx" && eval $libscheck
 $test -f "$xxx" && libstyle=static
    fi
    if test ! -f "$xxx"; then
 xxx=$thisdir/lib${thislib}_s$_a
        $test -f "$xxx" && eval $libscheck
 $test -f "$xxx" && libstyle=static
 $test -f "$xxx" && thislib=${thislib}_s
    fi
    if test ! -f "$xxx"; then
 xxx=$thisdir/Slib$thislib$_a
        $test -f "$xxx" && eval $libscheck
 $test -f "$xxx" && libstyle=static
    fi
    if $test -f "$xxx"; then
 case "$libstyle" in
 shared) echo "Found -l$thislib (shared)." ;;
 static) echo "Found -l$thislib." ;;
 *)      echo "Found -l$thislib ($libstyle)." ;;
 esac
 case " $dflt " in
 *"-l$thislib "*);;
```

```
  *)
 dflt="$dflt -l$thislib"
     libsfound="$libsfound $xxx"
     yyy=`basename $xxx`
     libsfiles="$libsfiles $yyy"
     yyy=`echo $xxx|$sed -e "s%/$yyy\\$%%"`
     case " $libsdirs " in
     *" $yyy "*) ;;
     *) libsdirs="$libsdirs $yyy" ;;
     esac
     ;;
  esac
  break
     fi
 done
 if $test ! -f "$xxx"; then
     echo "No -l$thislib."
 fi
done
set X $dflt
shift
dflt="$*"
case "$libs" in
") dflt="$dflt";;
*) dflt="$libs";;
esac
case "$dflt" in
' '|") dflt='none';;
esac

$cat <<EOM

In order to compile $package on your machine, a number of libraries
are usually needed.  Include any other special libraries here as well.
Say "none" for none.  The default list is almost always right.
EOM

echo " "
rp="What libraries to use?"
. ./myread
case "$ans" in
none) libs=' ';;
*) libs="$ans";;
esac

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/libs.U
```

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```
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?RCS:
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?RCS:
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?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: Copyright (c) 1998 Andy Dougherty
?RCS:
?RCS: You may distribute under the terms of either the GNU General Public
?RCS: License or the Artistic License, as specified in the README file.
?RCS:
?RCS:
?X:
?X: This unit is just a quick shorthand for the compile command
?X: to be used in all the other metaconfig units.
?X:
?MAKE:Compile: +cc +optimize +ccflags +ldflags +libs
?MAKE: -pick add $@ %<
?LINT:define compile compile_ok
?V:compile compile_ok mc_file
?S:compile:
?S: This shell variable is used internally
 by Configure to provide
?S: a convenient shorthand for the typical compile command, namely
?S: $cc $optimize $ccflags $ldflags -o $1 $1.c $libs > /dev/null 2>&1
?S: Note that the output filename does _not_ include the _exe
?S: extension.  Instead we assume that the linker will be
?S: "helpful" and automatically appending the correct suffix.
?S: OS/2 users will apparently need to supply the -Zexe flag to
?S: get this behavior.
?S:
?S: To use this variable, say something like:
?S:  echo 'int main() { exit(0); }' > try.c
?S:  set try
?S:  if eval $compile; then
?S:   echo "success"   # and do whatever . . .
?S:  else
?S:   echo "failure"   # and do whatever . . .
?S:  fi
?S: To add extra flags cc flags (e.g. -DWHATEVER) just put them
?S: in $*, e.g.
?S:  set try -DTRY_THIS_FLAG
```

```
?S:.
?S:compile_ok:
?S: This shell variable is used internally by Configure to provide
?S: a convenient shorthand for the typical compile command that you
?S: expect to work ok.  It is the same as $compile,
 except we
?S: deliberately let the user see any error messages.
?S:.
: define a shorthand compile call
compile='
mc_file=$1;
shift;
$cc -o ${mc_file} $optimize $ccflags $ldflags $* ${mc_file}.c $libs > /dev/null 2>&1;'
: define a shorthand compile call for compilations that should be ok.
compile_ok='
mc_file=$1;
shift;
$cc -o ${mc_file} $optimize $ccflags $ldflags $* ${mc_file}.c $libs;'
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Compile.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
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?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: Copyright (c) 2000, Jarkko Hietaniemi
?RCS:
?X:
?X: This unit produces a bit of shell code that must be dotted in order
?X: to make quick check on whether the current C compiler is working.
?X:
?MAKE:Checkcc ccname ccversion: Myread Warn startsh cat contains test
?MAKE: -pick add $@ %<
?S:ccname:
?S: This can set either by hints files or by Configure.  If using
?S: gcc, this is gcc, and if not, usually equal to cc, unimpressive, no?
?S: Some platforms, however, make good use of this by storing the
?S: flavor
 of the C compiler being used here.  For example if using
?S: the Sun WorkShop suite, ccname will be 'workshop'.
```

```
?S:.
?S:ccversion:
?S: This can set either by hints files or by Configure.  If using
?S: a (non-gcc) vendor cc, this variable may contain a version for
?S: the compiler.
?S:.
?F:./checkcc ./trygcc !checktmp
?V:despair
?T:trygcc
?LINT:extern cc rm ccflags ldflags
?LINT:change cc ccflags
?LINT:usefile checktmp
?INIT:ccname=''
?INIT:ccversion=''
: generate the trygcc script for later perusal
cat <<EOS >trygcc
$startsh
EOS
cat <<'EOSC' >>trygcc
case "$cc" in
'') ;;
*)  $rm -f try try.*
   $cat >try.c <<EOM
int main(int argc, char *argv[]) {
 (void) argc;
 (void) argv;
 return 0;
}
EOM
   if $cc -o try $ccflags $ldflags try.c; then
      :
   else
       echo "Uh-oh, the C compiler '$cc' doesn't seem to be working." >&4
       despair=yes
       trygcc=yes
       case "$cc" in
       *gcc*) trygcc=no ;;
       esac
       case "`$cc -v -c try.c 2>&1`" in

      *gcc*) trygcc=no ;;
       esac
       if $test X"$trygcc" = Xyes; then
           if gcc -o try -c try.c; then
               echo " "
               echo "You seem to have a working gcc, though." >&4
               rp="Would you like to use it?"
               dflt=y
```

```
            if $test -f myread; then
               . ./myread
            else
               if $test -f UU/myread; then
                  . ./UU/myread
               else
                  echo "Cannot find myread, sorry.  Aborting." >&2
                  exit 1
               fi
            fi
            case "$ans" in
            [yY]*) cc=gcc; ccname=gcc; ccflags=''; despair=no;
?X: Look whether we have 'call-back units' generated by hints that would
?X: seemingly affect the compiling environment.
                  $cat *.cbu >checktmp 2>/dev/null
                  if $contains ccflags checktmp >/dev/null; then

      ./warn <<EOM
Any previous setting of the C compiler flags has been lost.
It may be necessary to pass -Dcc=gcc to Configure right away.
EOM
                  fi;;
            esac
         fi
      fi
   fi
   $rm -f try try.*
   ;;
esac
EOSC

: generate the checkcc script for later perusal
cat <<EOS >checkcc
$startsh
EOS
cat <<'EOSC' >>checkcc
case "$cc" in
") ;;
*)  $rm -f try try.*
   $cat >try.c <<EOM
int main(int argc, char *argv[]) {
 (void) argc;
 (void) argv;
 return 0;
}
EOM
   if $cc -o try $ccflags $ldflags try.c; then
      :
```

```
  else
    if $test X"$despair" = Xyes; then
      echo "Uh-oh, the C compiler '$cc' doesn't seem to be working." >&4
    fi
    $cat >&4 <<EOM
You need to find a working C compiler.
Either (purchase and) install the C compiler supplied by your OS vendor,
or for a free C compiler try http://gcc.gnu.org/
I cannot continue any further, aborting.
EOM
    exit 1
  fi

 $rm -f try try.*
  ;;
esac
EOSC
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Checkcc.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
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?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: libs.U,v $
?RCS: Revision 3.0.1.6  1997/02/28  16:09:11  ram
?RCS: patch61: replaced .a with $_a all over the place
?RCS:
?RCS: Revision 3.0.1.5  1995/07/25  14:12:05  ram
?RCS: patch56: now knows about OS/2 platforms
?RCS:
?RCS: Revision 3.0.1.4  1994/10/29  16:24:22  ram
?RCS: patch36: removed old broken thislib/thatlib processing (ADO)
?RCS:
?RCS: Revision 3.0.1.3  1994/06/20  07:05:44  ram
?RCS: patch30: code cleanup with if/elif by ADO and RAM
?RCS: patch30: undone patch23 for libswanted default
 setting
?RCS:
?RCS: Revision 3.0.1.2  1994/05/06  15:08:45  ram
```

```
?RCS: patch23: now includes ordered default libswanted variable (ADO)
?RCS: patch23: major cleanup for library lookups (ADO)
?RCS:
?RCS: Revision 3.0.1.1  1993/08/25  14:02:31  ram
?RCS: patch6: added default for libs
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:03  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:libs libsfound libsfiles libsdirs libspath libscheck: \
 test cat Myread Oldconfig Loc libpth package xlibpth so _a \
 +usesocks sed +cc +ccflags +ldflags rm
?MAKE: -pick add $@ %<
?S:libs:
?S: This variable holds the additional libraries we want to use.
?S: It is up to the Makefile to deal with it.  The list can be empty.
?S:.
?S:libsfound:
?S: This variable holds the full pathnames of the libraries
?S: we found and accepted.
?S:.
?S:libsfiles:
?S: This variable holds the filenames aka basenames of the libraries
?S: we found and accepted.
?S:.
?S:libsdirs:
?S: This variable holds the directory
 names aka dirnames of the libraries
?S: we found and accepted, duplicates are removed.
?S:.
?S:libspath:
?S: This variable holds the directory names probed for libraries.
?S:.
?S:libscheck:
?S: This variable is intended to be set by hint files, if needed.
?S: It should contain shell code that will be eval'ed with $xxx holding
?S: some library file.  It may change $xxx if needed.
?S: For instance, on an Irix platform, you may make sure the right
?S: library file is used depending on the cc command line, so that the
?S: correct library is used depending on the selected ABI (for 32 and
?S: 64-bit compilations).
?S:
?S: Here is an example of code that could be found in a hint file on Irix
?S: when the selected compiler was for 32-bit -- that code is put in the
?S: cc.cbu call-back unit to be invoked AFTER the C compiler and its
?S: flags have been chosen:
?S:
?S:  libscheck='case "$xxx" in
```

```
?S:  *.a) /bin/ar p $xxx `/bin/ar t $xxx | sed q` >$$.o;
?S:   case "`/usr/bin/file $$.o`" in
?S:   *N32*)
 rm -f $$.o ;;
?S:   *) rm -f $$.o; xxx=/no/n32$xxx ;;
?S:   esac ;;
?S:  *) case "`/usr/bin/file $xxx`" in
?S:   *N32*) ;;
?S:   *) xxx=/no/n32$xxx ;;
?S:   esac ;;
?S:  esac'
?S:.
?D:libs="
?LINT:extern libswanted
?LINT:change libswanted
?INIT:: default library list
?INIT:libswanted="
?X: This order is chosen so that libraries  -lndir, -ldir, -lucb, -lbsd,
?X: -lBSD, -lPW, and -lx only get used if there are unresolved
?X: routines at link time.  Usually, these are backwards compatability
?X: libraries, and may not be as reliable as the standard c library.
?X:
?X: The -lsocket -linet -lnsl order has been reported to be necessary
?X: for at least one SVR4 implementation.
?X: -lc must proceed -lucb or -lbsd for most Solaris applications.
?X: -lc_s proceeds -lc so we pick up the shared library version, if
?X: it is available.
?X:
?X: The ordering of c, posix, and cposix is a guess and almost
?X: certainly wrong on about half of all systems.
?X:
?X: Set proper libswanted in your private
 Myinit.U if needed.
?X:
?X:: default ordered library list
?X:libswanted='net socket inet bind nsl nm sdbm gdbm ndbm dbm malloc dl'
?X:libswanted="$libswanted dld sun m c_s c posix cposix ndir dir ucb"
?X:libswanted="$libswanted bsd BSD PW x"
?X:
?INIT:: should be set by hint files if needed
?INIT:libscheck="
?T:xxx yyy thislib thisdir libstyle linkmsg
?F:lt.c lt
: Looking for optional libraries
echo " "
echo "Checking for optional libraries..." >&4
case "$libs" in
' '|'') dflt='';;
```

```
*) dflt="$libs";;
esac
case "$libswanted" in
") libswanted='c_s';;
esac
?X: libsocks has nasty naming scheme.
?X: This does not work if somebody wants SOCKS 4.
case "$usesocks" in
"$define") libswanted="$libswanted socks5 socks5_sh" ;;
esac
?X: Used later for link checks
echo "extern char printf(); int main() { printf(); return 0; }" > lt.c
libsfound="
libsfiles="
libsdirs="
libspath="
for thisdir in $libpth $xlibpth; do
 test -d $thisdir && libspath="$libspath $thisdir"
done
for thislib in $libswanted;
 do
 for thisdir in $libspath; do
    xxx="
    if $test ! -f "$xxx" ; then
   xxx=`ls $thisdir/lib$thislib.$so.[0-9]* 2>/dev/null | $sed -n '1p'`
   $test -f "$xxx" && eval $libscheck
   $test -f "$xxx" && libstyle=shared
    fi
    if test ! -f "$xxx"; then
   xxx=$thisdir/lib$thislib.$so
   $test -f "$xxx" && eval $libscheck
   $test -f "$xxx" && libstyle=shared
    fi
    if test ! -f "$xxx"; then
   xxx=$thisdir/lib$thislib$_a
        $test -f "$xxx" && eval $libscheck
   $test -f "$xxx" && libstyle=static
    fi
    if test ! -f "$xxx"; then
   xxx=$thisdir/$thislib$_a
        $test -f "$xxx" && eval $libscheck
   $test -f "$xxx" && libstyle=static
    fi
    if test ! -f "$xxx"; then
   xxx=$thisdir/lib${thislib}_s$_a
        $test -f "$xxx" && eval $libscheck
   $test -f "$xxx" && libstyle=static
   $test -f "$xxx" && thislib=${thislib}_s
```

```
    fi
    if test ! -f "$xxx"; then
  xxx=$thisdir/Slib$thislib$_a
        $test -f "$xxx" && eval $libscheck
  $test
 -f "$xxx" && libstyle=static
    fi
    if $test -f "$xxx"; then
?X:
?X: It is not sufficient to find a .so on the disk.  We must make sure
?X: that we can indeed supply the -lfoo line on the cc line to link against
?X: that library.  On Linux for instance, a versionned .so will not be
?X: implicitly linked against, whereas it will work fine on Solaris 2.6.
?X:  --RAM, 10/10/2003
?X:
  if $cc -o lt $ccflags $ldflags lt.c -l$thislib >/dev/null 2>&1;
  then
   linkmsg=""
  else
   linkmsg=" but I can't link against it"
  fi
  case "$libstyle" in
  shared) echo "Found -l$thislib (shared)$linkmsg." ;;
  static) echo "Found -l$thislib$linkmsg." ;;
  *)      echo "Found -l$thislib ($libstyle)$linkmsg." ;;
  esac
  case " $dflt " in
  *"-l$thislib "*) ;;
  *)
   case "$linkmsg" in
   ")
    dflt="$dflt -l$thislib"
    libsfound="$libsfound $xxx"
    yyy=`basename $xxx`
    libsfiles="$libsfiles $yyy"
    yyy=`echo $xxx|$sed -e "s%/$yyy\\$%%"`
    case " $libsdirs
 " in
    *" $yyy "*) ;;
    *) libsdirs="$libsdirs $yyy" ;;
    esac
      ;;
   esac
   ;;
  esac
  break
    fi
 done
```

```
 if $test ! -f "$xxx"; then
     echo "No -l$thislib."
 fi
done
set X $dflt
shift
dflt="$*"
case "$libs" in
") dflt="$dflt";;
*) dflt="$libs";;
esac
case "$dflt" in
' '|") dflt='none';;
esac
$rm -f lt.c lt

$cat <<EOM

In order to compile $package on your machine, a number of libraries
are usually needed.  Include any other special libraries here as well.
Say "none" for none.  The default list is almost always right.
EOM

echo " "
rp="Which libraries to use?"
. ./myread
case "$ans" in
none) libs=' ';;
*) libs="$ans";;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/libs.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: so.U,v $
?RCS: Revision 3.0.1.2  1994/10/29  16:30:04  ram
?RCS: patch36: now tells user how he can suppress shared lib lookup (ADO)
```

```
?RCS: patch36: removed echo at the top, since it's now in the here-doc (ADO)
?RCS:
?RCS: Revision 3.0.1.1  1994/06/20  07:07:02  ram
?RCS: patch30: created
?RCS:
?X:
?X: This unit computes the shared-object / shared-lib extension
?X:
?MAKE:so: test libpth Loc Myread Oldconfig cat
?MAKE: -pick add $@ %<
?S:so:
?S: This variable holds the extension used to identify
 shared libraries
?S: (also known as shared objects) on the system. Usually set to 'so'.
?S:.
?T: xxx
: compute shared library extension
case "$so" in
")
 if xxx=`./loc libc.sl X $libpth`; $test -f "$xxx"; then
  dflt='sl'
 else
  dflt='so'
 fi
 ;;
*) dflt="$so";;
esac
$cat <<EOM

On some systems, shared libraries may be available.  Answer 'none' if
you want to suppress searching of shared libraries for the remainder
of this configuration.

EOM
rp='What is the file extension used for shared libraries?'
. ./myread
so="$ans"

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/so.U
No license file was found, but licenses were detected in source scan.

?RCS: $Id: n.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
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```

```
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?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: n.U,v $
?RCS: Revision 3.0  1993/08/18  12:09:19  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:n c: contains
?MAKE: -pick add $@ %<
?S:n:
?S: This variable contains the -n flag if that is what causes the echo
?S: command to suppress newline.  Otherwise it is null.  Correct usage is
?S:     $echo $n "prompt for a question: $c".
?S:.
?S:c:
?S: This variable contains the \c string if that is what causes the echo
?S: command to suppress newline.
  Otherwise it is null.  Correct usage is
?S:     $echo $n "prompt for a question: $c".
?S:.
: first determine how to suppress newline on echo command
echo " "
echo "Checking echo to see how to suppress newlines..."
(echo "hi there\c" ; echo " ") >.echotmp
if $contains c .echotmp >/dev/null 2>&1 ; then
 echo "...using -n."
 n='-n'
 c=''
else
 cat <<'EOM'
...using \c
EOM
 n=''
 c='\c'
fi
echo $n "The star should be here-->$c"
echo '*'
rm -f .echotmp
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/n.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: lns.U,v 3.0.1.1 1994/06/20 07:05:52 ram Exp $
?RCS:
?RCS: Copyright (c) 1991-1993, Raphael Manfredi
?RCS:
```

```
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?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: Original Author: Andy Dougherty <doughera@lafcol.lafayette.edu>
?RCS:
?RCS: $Log: lns.U,v $
?RCS: Revision 3.0.1.1  1994/06/20  07:05:52  ram
?RCS: patch30: created by ADO
?RCS:
?X:
?X: This unit checks whether symbolic links are really supported.
?X: We can't rely on d_symlink because that may be listed in the
?X: C library but unimplemented.
?X:
?MAKE:lns: ln rm touch
?MAKE: -pick add $@ %<
?S:lns:
?S: This variable holds the name of the command to make
?S: symbolic
 links (if they are supported).  It can be used
?S: in the Makefile. It is either 'ln -s' or 'ln'
?S:.
: determine whether symbolic links are supported
echo " "
$touch blurfl
if $ln -s blurfl sym > /dev/null 2>&1 ; then
 echo "Symbolic links are supported." >&4
 lns="$ln -s"
else
 echo "Symbolic links are NOT supported." >&4
 lns="$ln"
fi
$rm -f blurfl sym
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/lns.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
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```

```
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Instruct.U,v $
?RCS: Revision 3.0.1.3  1997/02/28  15:02:55  ram
?RCS: patch61: logname / whoami sequence rewritten to use case
?RCS:
?RCS: Revision 3.0.1.2  1995/02/15  14:11:34  ram
?RCS: patch51: author name now appears at the end of the paragraph (WED)
?RCS:
?RCS: Revision 3.0.1.1  1995/01/11  15:12:05  ram
?RCS: patch45: now documents the & escape to turn -d on at the read prompt
?RCS:
?RCS: Revision 3.0  1993/08/18  12:05:04  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X:
 This unit spew out the directions that we want everyone to read.  I try to
?X: keep the first "pagefull" much less than a page since they don't know it
?X: isn't going to go shooting off the top of the screen, and we don't want
?X: to panic them yet.
?X:
?MAKE:Instruct: Begin Myread Configdir contains
?MAKE: -pick wipe $@ %<
?T:user needman firsttime
: general instructions
needman=true
firsttime=true
user=`(logname) 2>/dev/null`
case "$user" in
") user=`whoami 2>&1`;;
esac
if $contains "^$user\$" ../.config/instruct >/dev/null 2>&1; then
 firsttime=false
 echo " "
 rp='Would you like to see the instructions?'
 dflt=n
 . ./myread
 case "$ans" in
 [yY]*) ;;
 *) needman=false;;
 esac
fi
if $needman; then
 cat <<EOH

This installation shell script will examine your system and ask you questions
```

```
to determine how the <PACKAGENAME> package should be installed. If you get
stuck on a question, you may use a ! shell escape to start a subshell or
execute a command.  Many of the questions will have
 default answers in square
brackets; typing carriage return will give you the default.

On some of the questions which ask for file or directory names you are allowed
to use the ~name construct to specify the login directory belonging to "name",
even if you don't have a shell which knows about that.  Questions where this is
allowed will be marked "(~name ok)".

EOH
 rp="
 dflt='Type carriage return to continue'
 . ./myread
 cat <<'EOH'

The prompter used in this script allows you to use shell variables and
backticks in your answers.  You may use $1, $2, etc...  to refer to the words
in the default answer, as if the default line was a set of arguments given to a
script shell.  This means you may also use $* to repeat the whole default line,
so you do not have to re-type everything to add something to the default.

Everytime there is a substitution, you will have to confirm.  If there is an
error (e.g. an unmatched backtick), the default answer will remain unchanged
and you will be prompted
 again.

If you are in a hurry, you may run 'Configure -d'.  This will bypass nearly all
the questions and use the computed defaults (or the previous answers if there
was already a config.sh file). Type 'Configure -h' for a list of options.
You may also start interactively and then answer '& -d' at any prompt to turn
on the non-interactive behaviour for the remainder of the execution.

EOH
 . ./myread
 cat <<EOH

Much effort has been expended to ensure that this shell script will run on any
Unix system.  If despite that it blows up on yours, your best bet is to edit
Configure and run it again.  If you can't run Configure for some reason,
you'll have to generate a config.sh file by hand.  Whatever problems you
have, let me (<MAINTLOC>) know how I blew it.

This installation script affects things in two ways:

1) it may do direct variable substitutions on some of the files included
  in this kit.
```

```
2) it builds a config.h file for inclusion in C programs.  You may edit
  any of these
 files as the need arises after running this script.

If you make a mistake on a question, there is no easy way to back up to it
currently.  The easiest thing to do is to edit config.sh and rerun all the SH
files.  Configure will offer to let you do this before it runs the SH files.

EOH
?X: In case they played with the prompter...
 dflt='Type carriage return to continue'
 . ./myread
 case "$firsttime" in
 true) echo $user >>../.config/instruct;;
 esac
fi
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Instruct.U
No license file was found, but licenses were detected in source scan.

```
*  You may redistribute only under the terms of the Artistic Licence,
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/files/Jmake.tmpl
No license file was found, but licenses were detected in source scan.

```
# $Id: errnolist.a,v 3.0 1993/08/18 12:04:35 ram Exp ram $
#
#  Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
#
#  You may redistribute only under the terms of the Artistic Licence,
#  as specified in the README file that comes with the distribution.
#  You may reuse parts of this distribution only within the terms of
#  that same Artistic Licence; a copy of which may be found at the root
#  of the source tree for dist 4.0.
#
# Original Author: Harlan Stenn <harlan@mumps.pfcs.com>
#
# $Log: errnolist.a,v $
# Revision 3.0  1993/08/18 12:04:35  ram
# Baseline for dist 3.0 netwide release.
#
#
# This is a simple-minded awk script to generate an initialization for
# sys_errnolist on systems that don't have it.
# This file now depends only on sys/errno.h error numbers under maxerr being
# in order.  It will complain and die if not.  NOTE: It will still produce
```

```
# a compilable output file, even with errors, so you must
 check the output.

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/lib/errnolist.a
No license file was found, but licenses were detected in source scan.

?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
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?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Extract.U,v $
?RCS: Revision 3.0.1.2  1997/02/28  14:58:52  ram
?RCS: patch61: added support for src.U
?RCS:
?RCS: Revision 3.0.1.1  1994/10/29  15:51:46  ram
?RCS: patch36: added ?F: line for metalint file checking
?RCS:
?RCS: Revision 3.0  1993/08/18  12:04:52  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This unit produces a shell script which can be doted in order to extract
?X: .SH files with variable substitutions.
?X:
?X: When running Configure from a remote directory ($src
 is not '.'),
?X: then the files will be created in that directory, so beware!
?X:
?MAKE:Extract: Mkdirp src
?MAKE: -pick add $@ %<
?F:./extract
?T:CONFIG SRC dir file
: script used to extract .SH files with variable substitutions
cat >extract <<EOS
CONFIG=true
SRC="$src"
EOS
cat >>extract <<'EOS'
echo "Doing variable substitutions on .SH files..."
if test -f "$SRC/MANIFEST"; then
 set x `awk '{print $1}' <$SRC/MANIFEST | grep '\.SH'`
```

```
else
 echo "(Looking for .SH files under the source directory.)"
 set x `(cd "$SRC"; find . -name "*.SH" -print)`
fi
shift
case $# in
0) set x `(cd "$SRC"; echo *.SH)`; shift;;
esac
if test ! -f "$SRC/$1"; then
 shift
fi
for file in $*; do
 case "$SRC" in
 ".")
  case "$file" in
  */*)
   dir=`expr X$file : 'X\(.*\)/'`
   file=`expr X$file : 'X.*/\(.*\)'`
   (cd $dir && . ./$file)
   ;;
  *)
   . ./$file
   ;;
  esac
  ;;
 *)
?X:
?X: When running Configure remotely ($src is not '.'), we cannot source
?X: the files directly, since that would wrongly cause
 the extraction
?X: where the source lie instead of withing the current directory. Therefore,
?X: we need to 'sh <file' then, which is okay since they will source the
?X: existing config.sh file. It's not possible to use:
?X:  ../src/Configure -S -O -Dsomething
?X: unfortunately since no new config.sh with the -Dsomething override
?X: will be created before running the .SH files. A minor buglet.
?X:
?X: Note that we must create the directory hierarchy ourselves if it does
?X: not exist already, and that is done through a shell emulation of the
?X: 'mkdir -p' command. We don't want to use the $installdir metaconfig
?X: symbol here since that would require too much to be configured for
?X: this simple extraction task that may happen quickly with 'Configure -S'.
?X:  -- RAM, 18/03/96
?X:
  case "$file" in
  */*)
   dir=`expr X$file : 'X\(.*\)/'`
   file=`expr X$file : 'X.*/\(.*\)'`
```

```
   ./mkdirp $dir
   sh <"$SRC/$dir/$file"
   ;;
  *)
   sh <"$SRC/$file"
   ;;
  esac
  ;;
 esac
done
if
 test -f "$SRC/config_h.SH"; then
 if test ! -f config.h; then
?X: oops, they left it out of MANIFEST, probably, so do it anyway.
  sh <"$SRC/config_h.SH"
 fi
fi
EOS
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Extract.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: contains.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
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?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: contains.U,v $
?RCS: Revision 3.0  1993/08/18  12:05:35  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:contains: Nothing
?MAKE: -pick add $@ %<
?S:contains:
?S: This variable holds the command to do a grep with a proper return
?S: status.  On most sane systems it is simply "grep".  On insane systems
?S: it is a grep followed by a cat followed by a test.  This variable
?S: is primarily for the use of other Configure units.
?S:.
: Some
 greps do not return status, grrr.
echo "grimblepritz" >grimble
```

```
if grep blurfldyick grimble >/dev/null 2>&1 ; then
 contains=contains
elif grep grimblepritz grimble >/dev/null 2>&1 ; then
 contains=grep
else
 contains=contains
fi
rm -f grimble
: the following should work in any shell
case "$contains" in
contains*)
 echo " "
 echo "AGH!  Grep doesn't return a status.  Attempting remedial action."
 cat >contains <<'EOSS'
grep "$1" "$2" >.greptmp && cat .greptmp && test -s .greptmp
EOSS
chmod +x contains
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/contains.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: lex.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
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?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: Orginal Author: Graham Stoney <greyham@research.canon.oz.au>
?RCS:
?RCS: $Log: lex.U,v $
?RCS: Revision 3.0.1.3  1994/10/29  16:22:50  ram
?RCS: patch36: spurious single quote could cause Configure to crash
?RCS: patch36: (reported by Xavier Le Vourch <xavierl@eiffel.com>.)
?RCS:
?RCS: Revision 3.0.1.2  1994/08/29  16:27:09  ram
?RCS: patch32: added lexflags variable for lex flags setting
?RCS:
?RCS: Revision 3.0.1.1  1994/05/06  15:06:01  ram
?RCS: patch23: added
 trailing blank line for metalint
?RCS:
?RCS: Revision 3.0  1993/08/18  12:08:55  ram
```

```
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:lex lexflags: Guess Myread Oldconfig flex test
?MAKE: -pick add $@ %<
?S:lex:
?S: This variable holds the name of the lexical analyser generator we
?S: want to use in the Makefile. It can be lex or flex.
?S:.
?S:lexflags:
?S: This variable holds any flags that should be passed to the lexical
?S: analyzer.  It is up to the Makefile to use it.
?S:.
: determine lexical analyser generator
case "$lex" in
")
 dflt=lex;;
*)
 dflt="$lex";;
esac
echo " "
if $test -f "$flex"; then
 rp='Which lexical analyser generator (lex or flex) shall I use?'
else
 rp='Which lexical analyser generator shall I use?'
fi
. ./myread
lex="$ans"

@if lexflags
: if using lex this will normally be useless, but flex frequently takes args
echo " "
case "$lexflags" in
") dflt='none';;
*) dflt="$lexflags";;
esac
rp="What flags should be given to $lex?"
. ./myread
case "$ans"
 in
none) lexflags=";;
*) lexflags="$ans";;
esac

@end
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/lex.U

No license file was found, but licenses were detected in source scan.

```
/*|?:[\/]*)
if test -f "$xxx"; then
: ok
else
./warn "no $xxx -- ignoring your setting for $file."
xxx=`./loc $file $file $pth`
fi
;;
") xxx=`./loc $file $file $pth`;;
*) xxx=`./loc $xxx $xxx $pth`;;
esac
eval $file=$xxx$_exe
eval _$file=$xxx
case "$xxx" in
/*)
echo $file is in $xxx.
;;
?X: Under OS/2, we have PC-like paths
?:[\/]*)
echo $file is in $xxx.
;;
*)
echo "I don't know where '$file' is, and my life depends on it." >&4
echo "Go find a public domain implementation or fix your PATH setting!" >&4
exit 1
;;
esac
done
echo " "
echo "Don't worry if any of the following aren't found..."
say=offhand
for file in $trylist; do
?X: Allow them to -Dmake=pmake on the command line for instance (see above)
eval xxx=\$$file
case "$xxx" in
/*|?:[\/]*)
if test -f "$xxx"; then
: ok
else
./warn "no $xxx -- ignoring your setting for $file."
xxx=`./loc $file $file $pth`
fi
;;
") xxx=`./loc $file $file $pth`;;
*) xxx=`./loc $xxx
```

```
 $xxx $pth`;;
esac
eval $file=$xxx$_exe
eval _$file=$xxx
case "$xxx" in
/*)
echo $file is in $xxx.
;;
?X: Under OS/2, we have PC-like paths
?:[\\/]*)
echo $file is in $xxx.
;;
*)
echo "I don't see $file out there, $say."
say=either
;;
esac
done
case "$egrep" in
egrep)
echo "Substituting grep for egrep."
egrep=$grep
_egrep=$_grep
;;
esac
@if ln
case "$ln" in
ln)
echo "Substituting cp for ln."
ln=$cp
_ln=$_cp
;;
esac
@end
@if make || gmake
case "$make" in
make)
case "$gmake" in
gmake)
echo "I can't find make or gmake, and my life depends on it." >&4
echo "Go find a public domain implementation or fix your PATH setting!" >&4
exit 1
;;
esac
;;
esac
case "$gmake" in
gmake) ;;
```

```
*) # We can't have osname yet.
if test -f "/system/gnu_library/bin/ar.pm"; then # Stratus VOS
# Assume that gmake, if found, is definitely GNU make
# and prefer it over the system make.
echo "Substituting gmake for make."
make=$gmake
_make=$_gmake
fi
;;
esac
@end
case "$test" in
test)
echo "Hopefully test is built into
 your sh."
;;
*)
if `sh -c "PATH= test true" >/dev/null 2>&1`; then
echo "Using the test built into your sh."
?X:
?X: We need to set both test and _test, since Oldconfig.U will use the _test
?X: value to systematically restore computed paths, which may be wrong if
?X: we choose to load an old config.sh generated on another platform.
?X:
test=test
_test=test
fi
;;
esac
?LINT:change n c
case "$echo" in
echo)
echo "Hopefully echo is built into your sh."
;;
?X: For those rare cases where we don't need $echo...
") ;;
*)
echo " "
echo "Checking compatibility between $echo and builtin echo (if any)..." >&4
$echo $n "hi there$c" >foo1
echo $n "hi there$c" >foo2
if cmp foo1 foo2 >/dev/null 2>&1; then
echo "They are compatible.  In fact, they may be identical."
else
case "$n" in
'-n') n=" c='\c';;
*) n='-n' c=";;
esac
```

```
cat <<FOO
They are not compatible!  You are probably running ksh on a non-USG system.
I'll have to use $echo instead of the builtin, since Bourne shell doesn't
have echo built
 in and we may have to run some Bourne shell scripts.  That
means I'll have to use '$n$c' to suppress newlines now.  Life is ridiculous.

FOO
$echo $n "The star should be here-->$c"
$echo "*"
fi
$rm -f foo1 foo2
;;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Loc.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: End.U,v 3.0 1993/08/18 12:04:51 ram Exp $
?RCS:
?RCS: Copyright (c) 1991-1993, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: End.U,v $
?RCS: Revision 3.0  1993/08/18  12:04:51  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This unit serves as the goal which forces make to choose all the units that
?X: ask questions.  The $W on the ?MAKE: line is the list of all symbols wanted.
?X: To force any unit to be included, copy this unit to your private U directory
?X: and add the name of the unit desired to the ?MAKE: dependency line.
?X:
?MAKE:End perllibs: $W cppstdin gzip zip
 libs usedl osname osvers
?MAKE: -pick add $@ %<
?S:perllibs:
?S: The list of libraries needed by Perl only (any libraries needed
?S: by extensions only will by dropped, if using dynamic loading).
?S:.
?INIT:perllibs="
?LINT:use $W
```

```
?LINT:use gzip zip
?LINT:change cppstdin
: Remove libraries needed only for extensions
: The appropriate ext/Foo/Makefile.PL will add them back in, if necessary.
: The exception is SunOS 4.x, which needs them.
case "${osname}X${osvers}" in
sunos*X4*)
   perllibs="$libs"
   ;;
*) case "$usedl" in
   $define|true|[yY]*)
     set X `echo " $libs " | sed -e 's@ -lndbm @ @' -e 's@ -lgdbm @ @' -e 's@ -lgdbm_compat @ @' -e 's@ -ldbm @
@' -e 's@ -ldb @ @'`
     shift
     perllibs="$*"
     ;;
   *) perllibs="$libs"
     ;;
   esac
   ;;
esac

?X: If the user has the cppstdin wrapper, perl.c will try to call
?X: CPPSTDIN, but that will point to a location in the build
?X: directory, not the installed version!.  Here, we'll just strip the
?X: name down to 'cppstdin',
 and rely on the fact that perl.c will
?X: then call SCRIPTDIR/cppstdin, but local things like 'make depend'
?X: will continue to work.
: Remove build directory name from cppstdin so it can be used from
: either the present location or the final installed location.
echo " "
: Get out of the UU directory to get correct path name.
cd ..
case "$cppstdin" in
`pwd`/cppstdin)
 echo "Stripping down cppstdin path name"
 cppstdin=cppstdin
 ;;
esac
cd UU

: end of configuration questions
echo " "
echo "End of configuration questions."
echo " "
```

Found in path(s):

* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/End.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: shm_for.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: shm_for.U,v $
?RCS: Revision 3.0.1.1  1994/10/29  16:28:37  ram
?RCS: patch36: call ./Cppsym explicitly instead of relying on PATH
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:46  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:shm_for shm_att shm_lim: Cppsym Myread ipc uname
?MAKE: -pick add $@ %<
?S:shm_for:
?S: This variable tells us the type of machine we're expecting the
?S: shared memory code to run on.  The value is available to C
 programs
?S: in the C_SHM_FOR manifest.
?S:.
?S:shm_att:
?S: This variable tells us where a shared memory segment should be
?S: attached.  Good values are HIGH, LOW, and ZERO.
?S:.
?S:shm_lim:
?S: This variable tells us if shared memory attached HIGH should
?S: have an upper limit.
?S:.
?X: ----------------------------------------------------------
?X: It's a potential lose to define anything beginning with SHM...
?X: At least we can think that S_ stands for "String version of ..." -- HMS
?X: ----------------------------------------------------------
?C:S_SHM_FOR ~ %<:
?C: This symbol identifies what we chose for the target system's
?C: default shared memory configuration parameters.
?C:.
?C:S_SHM_ATT ~ %<:
?C: This symbol holds the default "place" to attach shared memory.
?C: Values are "HIGH", "ZERO", and "LOW".
?C:.
```

```
?C:S_SHM_LIM ~ %<:
?C: This symbol holds the default upper bound address limit if shared
?C: memory is attached HIGH.  If zero, there is no upper limit.
?C:.
?H:?%<:#ifdef
 SERVE_SHM
?H:?%<:#define S_SHM_FOR "$shm_for"
?H:?%<:#define S_SHM_ATT "$shm_att"
?H:?%<:#define S_SHM_LIM "$shm_lim"
?H:?%<:#endif
?H:.
?W:%<:S_SHM_FOR S_SHM_ATT S_SHM_LIM
: see how to attach shared memory
echo " "
echo "Deciding how to attach shared memory..." >&4

case "$ipc" in
shm)
 shm_for='Default case'
 shm_att='HIGH'
 shm_lim='0x0'
 if ./Cppsym tower32 tower32_600; then
  echo "NCR Towers are usually normal..."
  : echo "Oh, an NCR Tower."
  : This works for the 600
  shm_for='NCR Tower 32'
  shm_att='LOW'
 else
  case "$uname" in
  */uname)
   case "`uname -m`" in
   ACS??68*)
    echo "Oh, an Altos 3068."
    shm_for='Altos 3068:'
    shm_lim='0x800000'
    ;;
    esac
    ;;
  *)
   echo "Looks normal to me..."
   ;;
  esac
 fi

 dflt="$shm_for"
 rp='Description of shared memory configuration?'
 . ./myread
 shm_for="$ans"
```

```
 dflt="$shm_att"
 rp='Where should shared memory be attached?'
 . ./myread
 shm_att="$ans"

 case "$shm_att" in
 HIGH)
  dflt="$shm_lim"
  rp='What is
 the upper address limit for shared memory?'
  . ./myread
  shm_lim="$ans"
  ;;
 *)
  shm_lim=''
  ;;
 esac
 ;;

*)
 echo "but you aren't using shared memory so I won't bother." >&4
 shm_for='NOT CONFIGURED'
 shm_att='NONE'
 shm_lim='-1'
 ;;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/shm_for.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Typedef.U,v 3.0.1.3 1995/07/25 13:42:07 ram Exp $
?RCS:
?RCS: Copyright (c) 1991-1993, Raphael Manfredi
?RCS:
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?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: Typedef.U,v $
?RCS: Revision 3.0.1.3  1995/07/25  13:42:07  ram
?RCS: patch56: added backslash escapes within evals to prevent space problems
?RCS:
?RCS: Revision 3.0.1.2  1994/10/29  16:01:16  ram
?RCS: patch36: don't clobber visible 'val' variable, use 'varval' instead
```

```
?RCS:
?RCS: Revision 3.0.1.1  1994/08/29  16:05:14  ram
?RCS: patch32: created
?RCS:
?X:
?X: This unit checks for the definition of a given typedef.
?X:
?X: To use it, say:
?X: set typedef
 val_t default [includes]
?X: eval $typedef
?X:
?MAKE:Typedef: cppstdin cppminus cppflags rm sed contains Oldconfig Myread
?MAKE: -pick add $@ %<
?LINT:define typedef
?LINT:define typedef_ask
?V:typedef typedef_ask
?S:typedef:
?S: This shell variable is used internally by Configure to check
?S: whether a given typedef is defined or not. A typical use is:
?S:  set typedef val_t default [includes]
?S:  eval $typedef
?S: That will return val_t set to default if the typedef was not found,
?S: to typedef otherwise. If no includes are specified, look in sys/types.h.
?S:.
?S:typedef_ask:
?S: This shell variable is used internally by Configure to check
?S: whether a given typedef is defined or not.  If it is not defined,
?S: this will call the ./myread script to prompt for an answer.
?S: It is intended to be used to avoid unnecessary prompts.
?S: A typical use is
?S:  rp="What is the type for file position used by fsetpos()?"
?S:  set fpos_t fpostype long stdio.h sys/types.h
?S:  eval $typedef_ask
?S: This
 will set fpostype=fpos_t, if fpos_t is available.  Otherwise
?S: it will call myread with a default of 'long', and a prompt of $rp.
?S:.
?T:type var def inclist varval inc
?F:!temp.c
: define an is-a-typedef? function
typedef='type=$1; var=$2; def=$3; shift; shift; shift; inclist=$@;
case "$inclist" in
"") inclist="sys/types.h";;
esac;
eval "varval=\$$var";
case "$varval" in
"")
```

```
 $rm -f temp.c;
 for inc in $inclist; do
  echo "#include <$inc>" >>temp.c;
 done;
?X: Maybe it's a #define instead of a typedef.
 echo "#ifdef $type" >> temp.c;
 echo "printf(\"We have $type\");" >> temp.c;
 echo "#endif" >> temp.c;
 $cppstdin $cppflags $cppminus < temp.c >temp.E 2>/dev/null;
 if $contains $type temp.E >/dev/null 2>&1; then
  eval "$var=\$type";
 else
  eval "$var=\$def";
 fi;
 $rm -f temp.?;;
*) eval "$var=\$varval";;
esac'

?X: Originally, I eval'd $typedef and then checked the results against
?X: $type.  Unfortunately, it then became complicated to check
?X: whether you are re-using
 an old config.sh value, and the logic got
?X: so convoluted it became easier to just copy the function above
?X: and alter it slightly.  A.D.  3/1998
: define an is-a-typedef? function that prompts if the type is not available.
typedef_ask='type=$1; var=$2; def=$3; shift; shift; shift; inclist=$@;
case "$inclist" in
"") inclist="sys/types.h";;
esac;
eval "varval=\$$var";
case "$varval" in
"")
 $rm -f temp.c;
 for inc in $inclist; do
  echo "#include <$inc>" >>temp.c;
 done;
?X: Maybe it's a #define instead of a typedef.
 echo "#ifdef $type" >> temp.c;
 echo "printf(\"We have $type\");" >> temp.c;
 echo "#endif" >> temp.c;
 $cppstdin $cppflags $cppminus < temp.c >temp.E 2>/dev/null;
 echo " " ;
 echo "$rp" | $sed -e "s/What is/Looking for/" -e "s/?/./";
 if $contains $type temp.E >/dev/null 2>&1; then
  echo "$type found." >&4;
  eval "$var=\$type";
 else
  echo "$type NOT found." >&4;
```

```
  dflt="$def";
  . ./myread ;
  eval "$var=\$ans";
 fi;
 $rm -f temp.?;;
*) eval "$var=\$varval";;
esac'

Found
 in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/typedefs/Typedef.U
No license file was found, but licenses were detected in source scan.

?RCS: $Id: yacc.U,v 3.0.1.1 1994/05/13 15:28:48 ram Exp $
?RCS:
?RCS: Copyright (c) 1991-1993, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: yacc.U,v $
?RCS: Revision 3.0.1.1  1994/05/13  15:28:48  ram
?RCS: patch27: added byacc as another alternative (ADO)
?RCS:
?RCS: Revision 3.0  1993/08/18  12:10:03  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:yacc yaccflags: Guess Myread Oldconfig byacc bison cat test _exe
?MAKE: -pick add $@ %<
?S:yacc:
?S: This variable holds the name of the compiler compiler we
?S: want to use in the Makefile. It can be yacc, byacc, or bison -y.
?S:.
?S:yaccflags:
?S: This
 variable contains any additional yacc flags desired by the
?S: user.  It is up to the Makefile to use this.
?S:.
?T:comp
: determine compiler compiler
case "$yacc" in
")
 dflt=yacc;;
*)
 dflt="$yacc";;
```

```
esac
echo " "
comp='yacc'
if $test -f "$byacc$_exe"; then
 dflt="$byacc"
 comp="byacc or $comp"
fi
if $test -f "$bison$_exe"; then
 comp="$comp or bison -y"
fi
rp="Which compiler compiler ($comp) shall I use?"
. ./myread
yacc="$ans"
case "$yacc" in
*bis*)
 case "$yacc" in
 *-y*) ;;
 *)
  yacc="$yacc -y"
  echo "(Adding -y option to bison to get yacc-compatible behavior.)"
  ;;
 esac
 ;;
esac

@if yaccflags
: see if we need extra yacc flags
dflt="$yaccflags"
case "$dflt" in
") dflt=none;;
esac
$cat <<EOH

Your yacc program may need extra flags to normally process the parser sources.
Do NOT specify any -d or -v flags here, since those are explicitly known
by the various Makefiles. However, if your machine has strange/undocumented
options (like -Sr# on SCO to specify the
 maximum number of grammar rules), then
please add them here.  To use no flags, specify the word "none".

EOH
rp="Any additional yacc flags?"
. ./myread
case "$ans" in
none) yaccflags=";;
*) yaccflags="$ans";;
esac
```

```
@end
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/yacc.U
No license file was found, but licenses were detected in source scan.

```
?RCS: Copyright (c) 1996, Andy Dougherty
?RCS:
?RCS: You may distribute under the terms of either the GNU General Public
?RCS: License or the Artistic License, as specified in the README file.
?RCS:
?MAKE:perladmin: cf_email Oldconfig Myread cat
?MAKE: -pick add $@ %<
?Y:TOP
?S:perladmin:
?S: Electronic mail address of the perl5 administrator.
?S:.
: Ask e-mail of administrator
$cat <<EOM

If you or somebody else will be maintaining perl at your site, please
fill in the correct e-mail address here so that they may be contacted
if necessary. You may enter "none" for no administrator.

EOM
case "$perladmin" in
") dflt="$cf_email";;
*) dflt="$perladmin";;
esac
rp='Perl administrator e-mail address'
. ./myread
perladmin="$ans"
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/perladmin.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: inc.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
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?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: inc.U,v $
```

```
?RCS: Revision 3.0  1993/08/18  12:08:51  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:inc incexp: Loc Oldconfig Getfile usrinc
?MAKE: -pick add $@ %<
?S:inc:
?S: This variable holds the name of the directory in which the user wants
?S: to put public header files for the package in question.  It is most
?S: often a local directory such as /usr/local/include.
?S:.
?S:incexp:
?S: This is the same as the inc variable, but is filename
 expaned
?S: at configuration time for convenient use in your makefiles.
?S:.
: determine where public header files go
case "$inc" in
")
 dflt=`./loc . "." /usr/local/include /usr/include/local $usrinc`
 ;;
*)  dflt="$inc"
 ;;
esac
fn=d~
rp='Where do you want to put the public header files?'
. ./getfile
inc="$ans"
incexp="$ansexp"
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/inc.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: install.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: install.U,v $
?RCS: Revision 3.0.1.2  1995/09/25  09:16:37  ram
?RCS: patch59: all possible install programs are now looked for
?RCS:
?RCS: Revision 3.0.1.1  1995/01/11  15:30:41  ram
```

```
?RCS: patch45: created
?RCS:
?MAKE:install installdir: Loc Oldconfig Getfile cat test startsh rm +cc \
 eunicefix package contains mkdir echo n c
?MAKE: -pick add $@ %<
?S:install:
?S: This variable contains the name of an install program that can accept
?S: BSD-style arguments.
 It must correctly support -c, -s, and -m at least.
?S: It is a fully qualified pathname when found. If you have a local
?S: install.SH file at the root directory of your package, it is assumed to
?S: be the default script emulating a BSD install and the variable will be
?S: set to ./install. Otherwise, it is set to plain 'install', relying on
?S: the user's PATH to perform miracles.
?S:.
?S:installdir:
?S: This variable contains the name of a program that can install nested
?S: directories. Often set to 'mkdir -p', it can also be 'install -d' if
?S: you have such a beast and lack the former. If you have an install.SH
?S: file at the root directory of your package, it will be used in last
?S: resort, setting the variable to './install -d'. Otherwise, it is set to
?S: plain 'mkdir', and cross your fingers!
?S:.
?T:dir file tryit prog creatdir either
?F:!tryinst
: locate a BSD compatible install program
echo " "
echo "Looking for a BSD-compatible install program..." >&4
@if installdir
creatdir="
@end
case
 "$install" in
")
 tryit="
 for dir in $pth; do
  for file in ginstall installbsd scoinst install; do
   if $test -f $dir/$file; then
    tryit="$tryit $dir/$file"
   fi
  done
 done
 $cat >try.c <<EOC
int main()
{
 printf("OK\n");
 exit(0);
}
```

```
EOC
 if $cc -o try try.c >/dev/null 2>&1; then
  cp try try.ns
  strip try >/dev/null 2>&1
 else
  echo "(I can't seem to compile a trivial C program -- bypassing.)"
  echo "try" >try
  cp try try.ns
 fi
 $cat >tryinst <<EOS
$startsh
$rm -rf foo d
@if installdir
\$1 -d foo/bar
@end
$mkdir d
\$1 -c -m 764 try.ns d
\$1 -c -s -m 642 try.ns d/try
EOS
 chmod +x tryinst
 $eunicefix tryinst
 dflt=''
 either=''
 for prog in $tryit; do
  $echo $n "Checking $prog... $c"
  ./tryinst $prog >/dev/null 2>&1
@if installdir
  if $test -d foo/bar; then
   creatdir="$prog -d"
  fi
@end
  (ls -l d/try >try.ls; ls -l d/try.ns >tryno.ls) 2>/dev/null
  if (cmp -s d/try try && cmp -s d/try.ns try.ns && \
   $contains 'rwxrw-r--' tryno.ls &&
 \
   $contains 'rw-r---w-' try.ls) >/dev/null 2>&1
  then
   dflt="$prog"
   echo "ok, that will do."
   break
  fi
  echo "not good$either."
  either=' either'
  $rm -f try*.ls
 done
 $rm -rf foo d tryinst try try*.ls try.*
 case "$dflt" in
 '')
```

```
@if {test -f ../install.SH}
  echo "Hopefully, $package comes with its own install script!"
  dflt='./install'
@else
  dflt='install'
@end
  ;;
 esac
 ;;
*) dflt="$install";;
esac
$cat <<EOM

I will be requiring a BSD-compatible install program (one that allows
options like -s to strip executables or -m to specify a file mode) to
install $package.

If the question below contains a fully qualified default path, then it
is probably ok. If it is an unqualified name such as 'install', then it
means I was unable to find out a good install program I could use. If
@if {test -f ../install.SH}
you know of one, please tell me about it. If the default is './install',
then I shall be using the install script supplied with $package.
@else
you know of one,
 please tell me about it.
@end

EOM
@if {test -f ../install.SH}
fn='/fe~(install,./install)'
@else
fn='/fe~(install)'
@end
rp='Which install program shall I use?'
. ./getfile
install="$ans"

@if installdir
: how can we create nested directories?
echo " "
echo "Ok, let's see how we can create nested directories..." >&4
case "$installdir" in
")
?X: First time, maybe we already found out a working one in $creatdir above...
?X: Prefer "mkdir -p" because of bugs in GNU install when not running as root
 $mkdir -p foo/bar >/dev/null 2>&1
 if $test -d foo/bar; then
```

```
  echo "Great, we can build them using 'mkdir -p'."
  creatdir='mkdir -p'
 else
  case "$creatdir" in
  ")
   if eval "$install -d foo/bar"; $test -d foo/bar; then
    creatdir="install -d"
    echo "It looks like '$creatdir' will do it for us."
   fi
   ;;
  *)
   eval "$creatdir foo/bar" >/dev/null 2>&1
   if $test -d foo/bar; then
    echo "Ah! We can use '$creatdir' to do just that."
   else
    creatdir="
   fi
   ;;
  esac
 fi
 $rm
 -rf foo
 case "$creatdir" in
 ")
  echo "Heck! Another ancient system lacking the comfort of modern ones!"
@if {test -f ../install.SH}
  echo "You can thank $package for bringing you its own install script!"
  installdir='./install -d'
@else
  echo "We have no choice but to use plain old 'mkdir' -- wish me luck!"
  installdir=mkdir
@end
  ;;
 *) installdir="$creatdir";;
 esac
 ;;
*) echo "As you already told me, '$installdir' should work.";;
esac

@end
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/install.U
No license file was found, but licenses were detected in source scan.

?RCS: $Id$
?RCS:
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```
?RCS:
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?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: Original Author: Andy Dougherty <doughera@lafcol.lafayette.edu>
?RCS:
?RCS: $Log: lns.U,v $
?RCS: Revision 3.0.1.1  1994/06/20  07:05:52  ram
?RCS: patch30: created by ADO
?RCS:
?X:
?X: This unit checks whether symbolic links are really supported.
?X: We can't rely on d_symlink because that may be listed in the
?X: C library but unimplemented.
?X:
?MAKE:lns: ln rm touch test
?MAKE: -pick add $@ %<
?S:lns:
?S: This variable holds the name of the command to make
?S: symbolic links (if they are supported).
  It can be used
?S: in the Makefile. It is either 'ln -s' or 'ln'
?S:.
: determine whether symbolic links are supported
echo " "
$rm -f blurfl sym
$touch blurfl
if $ln -s blurfl sym > /dev/null 2>&1 && $test -f sym; then
 echo "Symbolic links are supported." >&4
 lns="$ln -s"
else
 echo "Symbolic links are NOT supported." >&4
 lns="$ln"
fi
$rm -f blurfl sym
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/lns.U
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```
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```
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?RCS:
?RCS: $Log: Filexp.U,v $
?RCS: Revision 3.0.1.2  1994/10/29  15:52:53  ram
?RCS: patch36: added ?F: line for metalint file checking
?RCS: patch36: added HOME to the ?T: line since metalint now checks ${HOME}
?RCS:
?RCS: Revision 3.0.1.1  1994/05/06  14:03:00  ram
?RCS: patch23: made sure error status from csh is propagated (WED)
?RCS:
?RCS: Revision 3.0  1993/08/18  12:04:53  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This unit produces a shell script which will expand filenames beginning
?X:
 with tildes.  The script is deleted at the end of Configure.
?X:
?MAKE:Filexp: startsh sed test expr eunicefix
?MAKE: -pick add $@ %<
?F:./filexp
?T:HOME LOGDIR dir me name failed
: set up shell script to do ~ expansion
cat >filexp <<EOSS
$startsh
: expand filename
?X:
?X: The case entries below escape the ~ as some shells have shown expansion
?X: of the ~ during here-doc processing.
?X:
case "\$1" in
\~/*|\~)
 echo \$1 | $sed "s|~|\${HOME-\$LOGDIR}|"
 ;;
\~*)
 if $test -f /bin/csh; then
  /bin/csh -f -c "glob \$1"
  failed=\$?
  echo ""
  exit \$failed
 else
  name=\`$expr x\$1 : '..\([^/]*\)'\`
  dir=\`$sed -n -e "/^\${name}:/{s/^[^:]*:[^:]*:[^:]*:[^:]*:[^:]*:\([^:]*\).*'"\$'"/\1/" -e p -e q -e '}' </etc/passwd\`
  if $test ! -d "\$dir"; then
   me=\`basename \$0\`
```

```
   echo "\$me: can't locate home directory for: \$name" >&2
   exit 1
  fi
  case "\$1" in
  */*)
   echo \$dir/\`$expr x\$1 : '..[^/]*/\(.*\)'\`
   ;;
  *)
   echo \$dir
   ;;
  esac
 fi
 ;;
*)
 echo \$1
 ;;
esac
EOSS
chmod
 +x filexp
$eunicefix filexp
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Filexp.U
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```
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?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: cf_who.U,v $
?RCS: Revision 3.0.1.2  1997/02/28  15:28:50  ram
?RCS: patch61: new computation method avoiding use of temporary file
?RCS:
?RCS: Revision 3.0.1.1  1994/05/06  14:42:34  ram
?RCS: patch23: login name now computed the hard way
?RCS:
?RCS: Revision 3.0  1993/08/18  12:05:32  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: Oldconfig dependency is there to ensure computation occurs after old values
```

```
?X: from config.sh have been loaded, so that we can supersede them.
?X:
?MAKE:cf_time
 cf_by: date Oldconfig
?MAKE: -pick add $@ %<
?S:cf_time:
?S: Holds the output of the "date" command when the configuration file was
?S: produced. This is used to tag both config.sh and config_h.SH.
?S:.
?S:cf_by:
?S: Login name of the person who ran the Configure script and answered the
?S: questions. This is used to tag both config.sh and config_h.SH.
?S:.
?LINT:change LC_ALL LANGUAGE
: who configured the system
?X: Ensure English date -- Jarkko Hietaniemi
cf_time=`LC_ALL=C; LANGUAGE=C; export LC_ALL; export LANGUAGE; $date 2>&1`
?X:
?X: Leave a white space between first two '(' for ksh. The sub-shell is needed
?X: on some machines to avoid the error message when logname is not found; e.g.
?X: on SUN-OS 3.2, (logname || whoami) would not execute whoami if logname was
?X: not found. Sigh!
?X:
?X: Convex had a broken logname executable which returned a non-zero status,
?X: and that broke the previous:
?X:   cf_by=`( (logname) 2>/dev/null || whoami) 2>&1`
?X: Switch to emergency
 mode... -- RAM, 19/04/94
?X:
?X: Parentheses needed to avoid error message if the program does not exist.
?X: Uses case instead of $test so it can be put before $test is defined.
?X: Don't redirect to a file because on Ultrix (under script?) logname
?X: outputs a blank line first.  This method will apparently work.
case "$cf_by" in
"")
 cf_by=`(logname) 2>/dev/null`
 case "$cf_by" in
 "")
  cf_by=`(whoami) 2>/dev/null`
  case "$cf_by" in
  "") cf_by=unknown ;;
  esac ;;
 esac ;;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/cf_who.U

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```
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?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Whoa.U,v $
?RCS: Revision 3.0.1.2  1997/02/28  15:21:21  ram
?RCS: patch61: whoa script now starts with leading "startsh"
?RCS:
?RCS: Revision 3.0.1.1  1994/10/29  16:02:01  ram
?RCS: patch36: added ?F: line for metalint file checking
?RCS:
?RCS: Revision 3.0  1993/08/18  12:05:19  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This unit produces a bit of shell code that must be dotted in in order
?X: to warn the user in case a change into a variable is noticed.
?X:
?X: To use this
 unit, $was must hold the old value that has changed. Upon
?X: exit, the two variables $td and $tu are set to the correct value for
?X: respectively defining or undefining a variable. For instance, if $vas was
?X: $undef, but now $var is $define, after calling . whoa, you should use
?X: eval "$var=\$tu" to finally set $var to the correct value. See unit Inlibc.
?X:
?MAKE:Whoa: Myread startsh hint
?MAKE: -pick add $@ %<
?F:./whoa
?T:var was
?LINT:change td tu
: set up the script used to warn in case of inconsistency
cat <<EOS >whoa
$startsh
EOS
cat <<'EOSC' >>whoa
dflt=y
echo " "
echo "*** WHOA THERE!!! ***" >&4
echo "    The $hint value for \$$var on this machine was \"$was\"!" >&4
rp="    Keep the $hint value?"
```

```
. ./myread
case "$ans" in
y) td=$was; tu=$was;;
esac
EOSC
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Whoa.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1999 Jarkko Hietaniemi
?RCS:
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?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?MAKE:sitehtml1dir sitehtml1direxp installsitehtml1dir: Getfile \
 Setprefixvar prefix siteprefix html1dir sed
?MAKE: -pick add $@ %<
?Y:TOP
?D:sitehtml1dir="
?S:sitehtml1dir:
?S: This variable contains the name of the directory in which site-specific
?S: html source pages are to be put.  It is the responsibility of the
?S: Makefile.SH to get the value of this into the proper command.
?S: You must be prepared to do the ~name expansion yourself.
?S: The standard distribution will put nothing in this directory.
?S: After perl
 has been installed, users may install their own local
?S: html pages in this directory with
?S:  MakeMaker Makefile.PL
?S: or equivalent.  See INSTALL for details.
?S:.
?D:sitehtml1direxp="
?S:sitehtml1direxp:
?S: This variable is the same as the sitehtml1dir variable, but is filename
?S: expanded at configuration time, for convenient use in makefiles.
?S:.
?D:installsitehtml1dir="
?S:installsitehtml1dir:
?S: This variable is really the same as sitehtml1direxp, unless you are using
?S: AFS in which case it points to the read/write location whereas
?S: html1direxp only points to the read-only access location. For extra
?S: portability, you should only use this variable within your makefiles.
```

```
?S:.
?LINT:change prefixvar
?LINT:set installsitehtml1dir
?LINT:set sitehtml1dir
?LINT:set sitehtml1direxp
: determine where add-on html pages go
: There is no standard location, so try to copy the previously-selected
: directory structure for the core html pages.
case "$sitehtml1dir" in
")
   dflt=`echo "$html1dir" | $sed "s#^$prefix#$siteprefix#"` ;;
*)     dflt=$sitehtml1dir ;;
esac
case "$dflt" in
"|' ') dflt=none ;;
esac
fn=dn+~
rp='Pathname where the site-specific html pages should be installed?'
. ./getfile
prefixvar=sitehtml1dir
. ./setprefixvar
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/sitehtml1dir.U
No license file was found, but licenses were detected in source scan.

```
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?RCS:
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?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: sysman.U,v $
?RCS: Revision 3.0.1.2  1994/06/20  07:08:43  ram
?RCS: patch30: now explicitly states that /usr/man/man1 is the default
?RCS: patch30: added /usr/local/man/man1 to the search list
?RCS:
?RCS: Revision 3.0.1.1  1993/09/13  16:13:50  ram
?RCS: patch10: added support for /local/man/man1 (WAD)
?RCS: patch10: added temporary syspath variable to cut down on line length
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:55  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
```

```
?MAKE:sysman: test
 Loc Oldconfig
?MAKE: -pick add $@ %<
?S:sysman:
?S: This variable holds the place where the manual is located on this
?S: system. It is not the place where the user wants to put his manual
?S: pages. Rather it is the place where Configure may look to find manual
?S: for unix commands (section 1 of the manual usually). See mansrc.
?S:.
?T:syspath
: determine where manual pages are on this system
echo " "
case "$sysman" in
")
 syspath='/usr/share/man/man1 /usr/man/man1'
 syspath="$syspath /usr/man/mann /usr/man/manl /usr/man/local/man1"
 syspath="$syspath /usr/man/u_man/man1 /usr/share/man/man1"
 syspath="$syspath /usr/catman/u_man/man1 /usr/man/l_man/man1"
 syspath="$syspath /usr/local/man/u_man/man1 /usr/local/man/l_man/man1"
 syspath="$syspath /usr/man/man.L /local/man/man1 /usr/local/man/man1"
 sysman=`./loc . /usr/man/man1 $syspath`
 ;;
esac
if $test -d "$sysman"; then
 echo "System manual is in $sysman." >&4
else
 echo "Could not find manual pages in source form." >&4
fi

Found
 in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/sysman.U
No license file was found, but licenses were detected in source scan.

?RCS: $Id: vendorprefix.U,v 1.1 1999/07/08 18:32:57 doughera Exp doughera $
?RCS:
?RCS: Copyright (c) 1999 Andy Dougherty
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
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?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: vendorprefix.U,v $
?RCS: Revision 1.1  1999/07/08 18:32:57  doughera
?RCS: Initial revision
?RCS:
```

```
?MAKE:usevendorprefix vendorprefix vendorprefixexp +oldvendorprefix: \
 Getfile Loc Oldconfig cat prefix Myread
?MAKE: -pick add $@ %<
?S:usevendorprefix:
?S: This variable tells whether the vendorprefix
?S: and consequently other vendor* paths are in use.
?S:.
?S:vendorprefix:
?S: This variable holds the full absolute path of the directory below
?S: which
 the vendor will install add-on packages.
?S: See INSTALL for usage and examples.
?S:.
?S:vendorprefixexp:
?S: This variable holds the full absolute path of the directory below
?S: which the vendor will install add-on packages.  Derived from vendorprefix.
?S:.
?S:oldvendorprefix:
?S: This variable is set non-null if the vendorprefix was previously defined
?S: and gets set to a new value. Used internally by Configure only.
?S:.
: Set the vendorprefix variables
$cat <<EOM

The installation process will also create a directory for
vendor-supplied add-ons.  Vendors who supply perl with their system
may find it convenient to place all vendor-supplied files in this
directory rather than in the main distribution directory.  This will
ease upgrades between binary-compatible maintenance versions of perl.

Of course you may also use these directories in whatever way you see
fit.  For example, you might use them to access modules shared over a
company-wide network.

The default answer should be
 fine for most people.
This causes further questions about vendor add-ons to be skipped
and no vendor-specific directories will be configured for perl.

EOM
rp='Do you want to configure vendor-specific add-on directories?'
case "$usevendorprefix" in
define|true|[yY]*) dflt=y ;;
*) : User may have set vendorprefix directly on Configure command line.
 case "$vendorprefix" in
 ''|' ') dflt=n ;;
 *) dflt=y ;;
 esac
```

```
 ;;
esac
. ./myread
case "$ans" in
[yY]*) fn=d~+
 rp='Installation prefix to use for vendor-supplied add-ons?'
 case "$vendorprefix" in
 ") dflt="$prefix" ;;
 *)  dflt=$vendorprefix ;;
 esac
 . ./getfile
 : XXX Prefixit unit does not yet support siteprefix and vendorprefix
 oldvendorprefix="
 case "$vendorprefix" in
 ") ;;
 *) case "$ans" in
  "$prefix") ;;
  *) oldvendorprefix="$prefix";;
  esac
  ;;
 esac
 usevendorprefix="$define"
 vendorprefix="$ans"
 vendorprefixexp="$ansexp"
 ;;
*) usevendorprefix="$undef"
 vendorprefix="
 vendorprefixexp="
 ;;
esac
```

Found in path(s):
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/vendorprefix.U
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```
?RCS: $Id$
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?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Extractall.U,v $
?RCS: Revision 3.0.1.1  1997/02/28  15:00:43  ram
```

```
?RCS: patch61: created
?RCS:
?X:
?X: If extraction has been requested, load the configuration file, perform
?X: the extraction and exit.
?X:
?X: This unit was originally a part of Options.U. It had to be removed from
?X: it to prevent a dependency cycle: Extract -> src -> Options -> Extract
?X: The Begin.U unit now requires us before beginning to do anything
?X: interesting, to ensure proper semantics. -- RAM, 15/03/96
?X:
?MAKE:Extractall:
 Extract Options
?MAKE: -pick wipe $@ %<
: extract files and exit if asked to do so
case "$extractsh" in
true)
?X: Undo the forced silent=true when -S was supplied, by probing realsilent
?X: which was set iff -s was also given. See Options.U for details.
 case "$realsilent" in
 true) ;;
 *) exec 1>&4;;
 esac
 case "$config_sh" in
 '') config_sh='config.sh';;
 esac
 echo " "
 echo "Fetching answers from $config_sh..."
 cd ..
 . $config_sh
 test "$override" && . ./optdef.sh
 echo " "
?X: extract has to be run from the top directory, not within UU.
 . UU/extract
 rm -rf UU
 echo "Extraction done."
 exit 0
 ;;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Extractall.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
```

```
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: libpth.U,v $
?RCS: Revision 3.0.1.6  1997/02/28  16:08:49  ram
?RCS: patch61: new loclibpth variable
?RCS:
?RCS: Revision 3.0.1.5  1995/01/11  15:31:30  ram
?RCS: patch45: call ./mips instead of just mips (WED)
?RCS:
?RCS: Revision 3.0.1.4  1994/08/29  16:29:15  ram
?RCS: patch32: added /lib/pa1.1 for HP-UX specially tuned PA-RISC libs (ADO)
?RCS: patch32: fixed information message, making it clearer (ADO)
?RCS:
?RCS: Revision 3.0.1.3  1994/06/20  07:03:54  ram
?RCS: patch30: added /usr/shlib to
 glibpth for shared-only libraries
?RCS:
?RCS: Revision 3.0.1.2  1994/05/13  15:26:57  ram
?RCS: patch27: fixed a typo (libpth -> glibpth)
?RCS:
?RCS: Revision 3.0.1.1  1994/05/06  15:07:53  ram
?RCS: patch23: now asks for library directories to be searched (ADO)
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:02  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This unit initializes the path for C library lookup.
?X:
?MAKE:libpth glibpth xlibpth plibpth loclibpth: \
 usrinc incpath test cat Myread Oldconfig
?MAKE: -pick add $@ %<
?S:libpth:
?S: This variable holds the general path (space-separated) used to find
?S: libraries. It is intended to be used by other units.
?S:.
?S:glibpth:
?S: This variable holds the general path (space-separated) used to
?S: find libraries.  It may contain directories that do not exist on
?S: this platform, libpth is the cleaned-up version.
?S:.
?S:xlibpth:
?S: This variable holds extra path (space-separated) used to find
?S: libraries on this platform,
```

```
 for example CPU-specific libraries
?S: (on multi-CPU platforms) may be listed here.
?S:.
?S:loclibpth:
?S: This variable holds the paths (space-separated) used to find local
?S: libraries.  It is prepended to libpth, and is intended to be easily
?S: set from the command line.
?S:.
?S:plibpth:
?S: Holds the private path used by Configure to find out the libraries.
?S: Its value is prepend to libpth. This variable takes care of special
?S: machines, like the mips.  Usually, it should be empty.
?S:.
?T: xxx dlist
?LINT:use usrinc
?INIT:: change the next line if compiling for Xenix/286 on Xenix/386
?INIT:xlibpth='/usr/lib/386 /lib/386'
?INIT:: Possible local library directories to search.
?INIT:loclibpth="/usr/local/lib /opt/local/lib /usr/gnu/lib"
?INIT:loclibpth="$loclibpth /opt/gnu/lib /usr/GNU/lib /opt/GNU/lib"
?INIT:
?INIT:: general looking path for locating libraries
?INIT:glibpth="/lib /usr/lib $xlibpth"
?INIT:glibpth="$glibpth /usr/ccs/lib /usr/ucblib /usr/local/lib"
?X: /shlib
 is for Digital Unix 4.0
?X: /usr/shlib is for OSF/1 systems.
?INIT:test -f /usr/shlib/libc.so && glibpth="/usr/shlib $glibpth"
?INIT:test -f /shlib/libc.so     && glibpth="/shlib $glibpth"
?INIT:
?INIT:: Private path used by Configure to find libraries.  Its value
?INIT:: is prepended to libpth. This variable takes care of special
?INIT:: machines, like the mips.  Usually, it should be empty.
?INIT:plibpth="
?INIT:
: Set private lib path
case "$plibpth" in
") if ./mips; then
?X: on mips, we DO NOT want /lib, and we want $incpath/usr/lib
  plibpth="$incpath/usr/lib /usr/local/lib /usr/ccs/lib"
 fi;;
esac
case "$libpth" in
' ') dlist=";;
") dlist="$loclibpth $plibpth $glibpth";;
*) dlist="$libpth";;
esac
```

```
: Now check and see which directories actually exist, avoiding duplicates
libpth="
for xxx in $dlist
do
   if $test -d $xxx; then
  case " $libpth " in
  *" $xxx "*) ;;
  *) libpth="$libpth $xxx";;
  esac
   fi
done
$cat <<'EOM'

Some systems have incompatible or broken versions
 of libraries.  Among
the directories listed in the question below, please remove any you
know not to be holding relevant libraries, and add any that are needed.
Say "none" for none.

EOM
case "$libpth" in
") dflt='none';;
*)
?X: strip leading space
 set X $libpth
 shift
 dflt=${1+"$@"}
 ;;
esac
rp="Directories to use for library searches?"
. ./myread
case "$ans" in
none) libpth=' ';;
*) libpth="$ans";;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/libpth.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: html1dir.U,v $
?RCS:
?RCS: Copyright (c) 1999 Andy Dougherty
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
```

```
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: html1dir.U,v $
?RCS:
?MAKE:html1dir html1direxp installhtml1dir: cat Loc Myread \
 spackage test Getfile Setprefixvar Prefixit Prefixup
?MAKE: -pick add $@ %<
?Y:TOP
?D:html1dir="
?S:html1dir:
?S: This variable contains the name of the directory in which html
?S: source pages are to be put.  This directory is for pages
?S: that describe whole programs, not libraries or modules.  It
?S: is intended to correspond roughly to section 1 of the Unix
?S: manuals.
?S:.
?D:html1direxp="
?S:html1direxp:
?S: This
 variable is the same as the html1dir variable, but is filename
?S: expanded at configuration time, for convenient use in makefiles.
?S:.
?D:installhtml1dir="
?S:installhtml1dir:
?S: This variable is really the same as html1direxp, unless you are
?S: using a different installprefix.  For extra portability, you
?S: should only use this variable within your makefiles.
?S:.
?LINT:change prefixvar
?LINT:set html1direxp
?LINT:set installhtml1dir
: determine where html pages for programs go
set html1dir html1dir none
eval $prefixit
$cat <<EOM

If you wish to install html files for programs in $spackage, indicate
the appropriate directory here.  To skip installing html files,
answer "none".
EOM
case "$html1dir" in
"|none|$undef|' ') dflt=none ;;
*) dflt=$html1dir ;;
esac
fn=dn+~
rp="Directory for the main $spackage html pages?"
. ./getfile
prefixvar=html1dir
```

```
. ./setprefixvar
: Use ' ' for none so value is preserved next time through Configure
$test X"$html1dir" = "X" && html1dir=' '
```

Found
 in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/html1dir.U
No license file was found, but licenses were detected in source scan.

```
/*
* $Id: setsid.C,v 3.0.1.1 1994/01/24 13:58:47 ram Exp ram $
*
*  Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
*
*  You may redistribute only under the terms of the Artistic Licence,
*  as specified in the README file that comes with the distribution.
*  You may reuse parts of this distribution only within the terms of
*  that same Artistic Licence; a copy of which may be found at the root
*  of the source tree for dist 4.0.
*
* $Log: setsid.C,v $
* Revision 3.0.1.1  1994/01/24  13:58:47  ram
* patch16: created
*
*/
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/lib/C/fake/setsid.C
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: libc.U,v $
?RCS: Revision 3.0.1.10  1997/02/28  15:56:48  ram
?RCS: patch61: replaced .a with $_a all over the place
?RCS: patch61: added support for HPUX-10 nm output
?RCS:
?RCS: Revision 3.0.1.9  1995/07/25  14:11:56  ram
?RCS: patch56: now knows about OS/2 platforms
?RCS:
```

```
?RCS: Revision 3.0.1.8  1995/05/12  12:20:47  ram
?RCS: patch54: made sure only most recent version of shared lib is picked
?RCS: patch54: final "nm -p" check now uses xscan and xrun like everybody
?RCS: patch54: can now grok
 linux nm output with lead __IO (ADO)
?RCS: patch54: added support for linux ELF output, using 'W' for alias (ADO)
?RCS:
?RCS: Revision 3.0.1.7  1994/10/29  16:23:40  ram
?RCS: patch36: now looks for shared libraries before anything else (ADO)
?RCS: patch36: added new nm output format (ADO)
?RCS:
?RCS: Revision 3.0.1.6  1994/08/29  16:28:10  ram
?RCS: patch32: added I-type symbols for nm output parsing on Linux
?RCS:
?RCS: Revision 3.0.1.5  1994/06/20  07:03:24  ram
?RCS: patch30: checks are now presented by succession of if/elif
?RCS: patch30: uniformized checks for shared objects with new so symbol
?RCS:
?RCS: Revision 3.0.1.4  1994/05/06  15:06:33  ram
?RCS: patch23: added shared library knowledge (ADO and WED)
?RCS:
?RCS: Revision 3.0.1.3  1994/01/24  14:12:17  ram
?RCS: patch16: can now export nm_extract as an internal-use only variable
?RCS:
?RCS: Revision 3.0.1.2  1993/09/13  16:09:03  ram
?RCS: patch10: added special handling for Apollo systems (WAD)
?RCS:
?RCS: Revision 3.0.1.1
  1993/08/27  14:40:03  ram
?RCS: patch7: added entry for /usr/shlib/libc.so (OSF/1 machines)
?RCS:
?RCS: Revision 3.0  1993/08/18  12:08:57  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:libc libnames +nm_extract: echo n c rm test grep Getfile Myread \
 Oldconfig Loc sed libs incpath libpth ar runnm nm nm_opt nm_so_opt \
 contains xlibpth so osname trnl tr sort uniq _o _a
?MAKE: -pick add $@ %<
?S:libc:
?S: This variable contains the location of the C library.
?S:.
?S:libnames:
?S: The constructed list of library names.  Normally empty, but hint files
?S: may set this for later perusal by Configure.
?S:.
?S:nm_extract:
?S: This variable holds the name of the extraction command used to process
?S: the output of nm and yield the list of defined symbols. It is used
```

```
?S: internally by Configure.
?S:.
?T:thislib try libnames xxx xscan xrun thisname com tans file
?F:!libnames !libc.tmp !tmp.imp
?LINT:change nm_opt runnm
?INIT:libnames=''
: Figure out where the libc is located
case
 "$runnm" in
true)
?X: indentation is wrong on purpose--RAM
: get list of predefined functions in a handy place
echo " "
case "$libc" in
'') libc=unknown
 case "$libs" in
 *-lc_s*) libc=`./loc libc_s$_a $libc $libpth`
 esac
 ;;
esac
case "$libs" in
'') ;;
*)  for thislib in $libs; do
 case "$thislib" in
 -lc|-lc_s)
  : Handle C library specially below.
  ;;
 -l*)
  thislib=`echo $thislib | $sed -e 's/^-l//'`
  if try=`./loc lib$thislib.$so.'*' X $libpth`; $test -f "$try"; then
   :
  elif try=`./loc lib$thislib.$so X $libpth`; $test -f "$try"; then
   :
  elif try=`./loc lib$thislib$_a X $libpth`; $test -f "$try"; then
   :
  elif try=`./loc $thislib$_a X $libpth`; $test -f "$try"; then
   :
  elif try=`./loc lib$thislib X $libpth`; $test -f "$try"; then
   :
  elif try=`./loc $thislib X $libpth`; $test -f "$try"; then
   :
  elif try=`./loc Slib$thislib$_a X $xlibpth`; $test -f "$try"; then
   :
  else
   try=''
  fi
  libnames="$libnames $try"
  ;;
```

```
 *) libnames="$libnames $thislib"
 ;;
 esac
 done
 ;;
esac
?X:
?X: Some systems (e.g. DG/UX) use "environmental" links, which make the test
?X: -f fail. Ditto for symbolic links. So in order to reliably check the
?X: existence of a file, we use test -r. It will still fail with DG/UX links
?X: though, but at least it will detect symbolic links. At some strategic
?X: points, we make use of (test -h), using a sub-shell in case builtin test
?X: does not implement the -h check for symbolic links. This makes it
?X: possible to preset libc in a hint file for instance and have it show up
?X: as-is in the question.
?X:
xxx=normal
case "$libc" in
unknown)
?X:
?X: The sed below transforms .so.9 .so.12 into something like .so.0009 .so.0012,
?X: then sorts on it to allow keeping .so.12 instead of .so.9 as the latest
?X: up-to-date library. The initial filename (before sed munging, saved in hold
?X: space via 'h') is appended via 'G' before sorting, then the leading munged
?X: part is removed after sorting. Nice efficient work
 from Tye McQueen.
?X: The initial blurfl is here to prevent the trailing pipe from producing an
?X: empty string, causing Configure to output all its set variables!
?X:
 set /lib/libc.$so
 for xxx in $libpth; do
  $test -r $1 || set $xxx/libc.$so
  : The messy sed command sorts on library version numbers.
  $test -r $1 || \
   set `echo blurfl; echo $xxx/libc.$so.[0-9]* | \
   tr ' ' $trnl | egrep -v '\.[A-Za-z]*$' | $sed -e '
    h
    s/[0-9][0-9]*/0000&/g
    s/0*\([0-9][0-9][0-9][0-9][0-9]\)/\1/g
    G
    s/\n/ /' | \
    $sort | $sed -e 's/^.* //'`
  eval set \$$#
 done
 $test -r $1 || set /usr/ccs/lib/libc.$so
 $test -r $1 || set /lib/libsys_s$_a
 ;;
*)
```

```
?X: ensure the test below for the (shared) C library will fail
 set blurfl
 ;;
esac
if $test -r "$1"; then
 echo "Your (shared) C library seems to be in $1."
 libc="$1"
elif $test -r /lib/libc && $test -r /lib/clib; then
?X:
?X: Apollo has its C library in /lib/clib AND /lib/libc
?X: not to mention its math library in /lib/syslib...
?X:
 echo
 "Your C library seems to be in both /lib/clib and /lib/libc."
 xxx=apollo
 libc='/lib/clib /lib/libc'
 if $test -r /lib/syslib; then
  echo "(Your math library is in /lib/syslib.)"
?X: Put syslib in libc -- not quite right, but won't hurt
  libc="$libc /lib/syslib"
 fi
elif $test -r "$libc" || (test -h "$libc") >/dev/null 2>&1; then
 echo "Your C library seems to be in $libc, as you said before."
?X: For mips, and...
elif $test -r $incpath/usr/lib/libc$_a; then
 libc=$incpath/usr/lib/libc$_a;
 echo "Your C library seems to be in $libc.  That's fine."
elif $test -r /lib/libc$_a; then
 libc=/lib/libc$_a;
 echo "Your C library seems to be in $libc.  You're normal."
else
 if tans=`./loc libc$_a blurfl/dyick $libpth`; $test -r "$tans"; then
  :
 elif tans=`./loc libc blurfl/dyick $libpth`; $test -r "$tans"; then
  libnames="$libnames "`./loc clib blurfl/dyick $libpth`
 elif tans=`./loc clib blurfl/dyick $libpth`; $test -r "$tans"; then
  :
 elif tans=`./loc Slibc$_a blurfl/dyick
 $xlibpth`; $test -r "$tans"; then
  :
 elif tans=`./loc Mlibc$_a blurfl/dyick $xlibpth`; $test -r "$tans"; then
  :
 else
  tans=`./loc Llibc$_a blurfl/dyick $xlibpth`
 fi
 if $test -r "$tans"; then
  echo "Your C library seems to be in $tans, of all places."
  libc=$tans
```

```
 else
  libc='blurfl'
 fi
fi
if $test $xxx = apollo -o -r "$libc" || (test -h "$libc") >/dev/null 2>&1; then
 dflt="$libc"
 cat <<EOM

If the guess above is wrong (which it might be if you're using a strange
compiler, or your machine supports multiple models), you can override it here.

EOM
else
 dflt="
 echo $libpth | $tr ' ' $trnl | $sort | $uniq > libpath
 cat >&4 <<EOM
I can't seem to find your C library.  I've looked in the following places:

EOM
 $sed 's/^/ /' libpath
 cat <<EOM

None of these seems to contain your C library. I need to get its name...

EOM
fi
fn=f
rp='Where is your C library?'
. ./getfile
libc="$ans"

echo " "
echo $libc $libnames | $tr ' ' $trnl | $sort | $uniq > libnames
set X `cat libnames`
shift
xxx=files
case
 $# in 1) xxx=file; esac
echo "Extracting names from the following $xxx for later perusal:" >&4
echo " "
$sed 's/^/ /' libnames >&4
echo " "
$echo $n "This may take a while...$c" >&4

?X:
?X: Linux may need the special Dynamic option to nm for shared libraries.
?X: In general, this is stored in the nm_so_opt variable.
?X: Unfortunately, that option may be fatal on non-shared libraries.
```

```
?X:
for file in $*; do
 case $file in
 *$so*) $nm $nm_so_opt $nm_opt $file 2>/dev/null;;
 *) $nm $nm_opt $file 2>/dev/null;;
 esac
done >libc.tmp

$echo $n ".$c"
?X:
?X: To accelerate processing, we look at the correct 'sed' command
?X: by using a small subset of libc.tmp, i.e. fprintf function.
?X: When we know which sed command to use, do the name extraction
?X:
$grep fprintf libc.tmp > libc.ptf
?X:
?X: In order to enhance readability and save some space, we define
?X: some variables that will be "eval"ed.
?X:
xscan='eval "<libc.ptf $com >libc.list"; $echo $n ".$c" >&4'
xrun='eval
 "<libc.tmp $com >libc.list"; echo "done." >&4'
?X: BSD-like output, I and W types added for Linux
?X: Some versions of Linux include a leading __IO in the symbol name.
?X: HPUX10 reportedly has trailing spaces, though I'm surprised it has
?X: BSD-like output.  (AD).
xxx='[ADTSIW]'
if com="$sed -n -e 's/__IO//' -e 's/^.* $xxx  *_[_.]*//p' -e 's/^.* $xxx  *//p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
?X: SYSV-like output
elif com="$sed -n -e 's/^__*//' -e 's/^\([a-zA-Z_0-9$]*\).*xtern.*/\1/p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
elif com="$sed -n -e '/|UNDEF/d' -e '/FUNC..GL/s/^.*|__*//p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
elif com="$sed -n -e 's/^.* D __*//p' -e 's/^.* D //p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
elif com="$sed -n -e 's/^_//' -e 's/^\([a-zA-Z_0-9]*\).*xtern.*text.*/\1/p'";\
 eval
 $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
```

```
  eval $xrun
elif com="$sed -n -e 's/^.*|FUNC |GLOB .*|//p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
elif com="$grep '|' | $sed -n -e '/|COMMON/d' -e '/|DATA/d' \
    -e '/ file/d' -e 's/^\([^  ]*\).*/\1/p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
elif com="$sed -n -e 's/^.*|FUNC |GLOB .*|//p' -e 's/^.*|FUNC |WEAK .*|//p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
?X: mips nm output (sysV)
elif com="$sed -n -e 's/^__//' -e '/|Undef/d' -e '/|Proc/s/ .*//p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
elif com="$sed -n -e 's/^.*|Proc .*|Text *| *//p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
elif com="$sed -n -e '/Def. Text/s/.* \([^ ]*\)\$/\1/p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null
 2>&1; then
  eval $xrun
?X: OS/2 nm output
elif com="$sed -n -e 's/^[-0-9a-f ]*_\(.*\)=.*/\1/p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
elif com="$sed -n -e 's/.*\.text n\ \ \ \.//p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
?X: AIX nm output
elif com="sed -n -e 's/^__.*//' -e 's/[       ]*D[    ]*[0-9]*.*//p'";\
 eval $xscan;\
 $contains '^fprintf$' libc.list >/dev/null 2>&1; then
  eval $xrun
else
 $nm -p $* 2>/dev/null >libc.tmp
 $grep fprintf libc.tmp > libc.ptf
 if com="$sed -n -e 's/^.* [ADTSIW]  *_[_.]*//p' -e 's/^.* [ADTSIW] //p'";\
  eval $xscan; $contains '^fprintf$' libc.list >/dev/null 2>&1
 then
```

```
 nm_opt='-p'
 eval $xrun
else
 echo " "
 echo "$nm didn't seem to work right. Trying $ar instead..." >&4
 com=''
 if $ar t $libc > libc.tmp && \
  $contains '^fprintf$' libc.tmp >/dev/null 2>&1
 then
  for thisname in $libnames $libc; do
   $ar t $thisname >>libc.tmp
  done
  $sed
-e "s/\\$_o\$//" < libc.tmp > libc.list
  echo "Ok." >&4
 elif test "X$osname" = "Xos2" && $ar tv $libc > libc.tmp; then
?X: Repeat libc to extract forwarders to DLL entries too
  for thisname in $libnames $libc; do
   $ar tv $thisname >>libc.tmp
?X: Revision 50 of EMX has bug in ar: it will not extract forwarders
?X: to DLL entries.  Use emximp which will extract exactly them.
   emximp -o tmp.imp $thisname \
       2>/dev/null && \
       $sed -e 's/^\([_a-zA-Z0-9]*\) .*$/\1/p' \
       < tmp.imp >>libc.tmp
   $rm -f tmp.imp
  done
  $sed -e "s/\\$_o\$//" -e 's/^ \+//' < libc.tmp > libc.list
  echo "Ok." >&4
 else
  echo "$ar didn't seem to work right." >&4
  echo "Maybe this is a Cray...trying bld instead..." >&4
  if
   bld t $libc | \
    $sed -e 's/.*\///' -e "s/\\$_o:.*\$//" > libc.list &&
   $test -s libc.list
  then
   for thisname in $libnames; do
    bld t $libnames | \
    $sed -e 's/.*\///' -e "s/\\$_o:.*\$//" >>libc.list
    $ar t $thisname >>libc.tmp
   done
   echo
"Ok." >&4
  else
   echo "That didn't work either." >&4
   echo "No problem, I'll be compiling test programs then..." >&4
   runnm=false
```

```
   fi
  fi
 fi
fi
nm_extract="$com"
if $test -f /lib/syscalls.exp; then
 echo " "
 echo "Also extracting names from /lib/syscalls.exp for good ole AIX..." >&4
 $sed -n 's/^\([^  ]*\)[  ]*syscall[0-9]*[  ]*$/\1/p' \
  /lib/syscalls.exp >>libc.list
fi
?X: remember, indentation is wrong on purpose--RAM
;;
esac
$rm -f libnames libpath
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/libc.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: h_fcntl.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: h_fcntl.U,v $
?RCS: Revision 3.0  1993/08/18  12:08:12  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:h_fcntl: Nothing
?MAKE: -pick add $@ %<
?S:h_fcntl:
?S: This is variable gets set in various places to tell i_fcntl that
?S: <fcntl.h> should be included.
?S:.
: Initialize h_fcntl
h_fcntl=false
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/h_fcntl.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
```

```
?RCS:
?RCS: Copyright (c) 1999 Jarkko Hietaniemi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?MAKE:siteman1dir siteman1direxp installsiteman1dir: Getfile \
 Setprefixvar prefix siteprefix man1dir sed
?MAKE: -pick add $@ %<
?Y:TOP
?D:siteman1dir=''
?S:siteman1dir:
?S: This variable contains the name of the directory in which site-specific
?S: manual source pages are to be put.  It is the responsibility of the
?S: Makefile.SH to get the value of this into the proper command.
?S: You must be prepared to do the ~name expansion yourself.
?S: The standard distribution will put nothing in this directory.
?S: After perl
 has been installed, users may install their own local
?S: man1 pages in this directory with
?S:  MakeMaker Makefile.PL
?S: or equivalent.  See INSTALL for details.
?S:.
?D:siteman1direxp=''
?S:siteman1direxp:
?S: This variable is the same as the siteman1dir variable, but is filename
?S: expanded at configuration time, for convenient use in makefiles.
?S:.
?D:installsiteman1dir=''
?S:installsiteman1dir:
?S: This variable is really the same as siteman1direxp, unless you are using
?S: AFS in which case it points to the read/write location whereas
?S: man1direxp only points to the read-only access location. For extra
?S: portability, you should only use this variable within your makefiles.
?S:.
?LINT:change prefixvar
?LINT:set installsiteman1dir
?LINT:set siteman1dir
?LINT:set siteman1direxp
: determine where add-on manual pages go
case "$siteman1dir" in
'') dflt=`echo $man1dir | $sed "s#^$prefix#$siteprefix#"` ;;
*) dflt=$siteman1dir ;;
esac
case "$dflt" in
```

```
"|' ') dflt=none ;;
esac
fn=dn+~
rp='Pathname
 where the site-specific manual pages should be installed?'
. ./getfile
prefixvar=siteman1dir
. ./setprefixvar

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/siteman1dir.U
No license file was found, but licenses were detected in source scan.

?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: Original Author: Thomas Neumann <tom@smart.bo.open.de>
?RCS:
?RCS: $Log: Findhdr.U,v $
?RCS: Revision 3.0.1.2  1994/10/29  15:53:08  ram
?RCS: patch36: added ?F: line for metalint file checking
?RCS:
?RCS: Revision 3.0.1.1  1994/05/06  14:03:56  ram
?RCS: patch23: cppminus must be after other cppflags, not before
?RCS:
?RCS: Revision 3.0  1993/08/18  12:04:54  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This unit produces a findhdr script which is used to locate the header
?X: files
 in $usrinc or other stranger places using cpp capabilities. The
?X: script is given an include file base name, like 'stdio.h' or 'sys/file.h'
?X: and it returns the full path of the include file and a zero status or an
?X: empty string with an error status if the file could not be located.
?X:
?MAKE:Findhdr: grep test tr rm +usrinc awk cat startsh \
 cppstdin cppminus +cppflags eunicefix osname
?MAKE: -pick add $@ %<
?LINT:define fieldn
?S:fieldn:
```

```
?S: This variable is used internally by Configure. It contains the position
?S: of the included file name in cpp output. That is to say, when cpp
?S: pre-processes a #include <file> line, it replaces it by a # line which
?S: contains the original position in the input file and the full name of
?S: included file, between "quotes".
?S:.
?V:fieldn
?F:./findhdr !fieldn
?T:cline pos wanted name awkprg cppfilter testaccess status usrincdir
: determine filename position in cpp output
echo " "
echo "Computing filename position in cpp output for #include
 directives..." >&4
echo '#include <stdio.h>' > foo.c
case "$osname" in
vos)
 testaccess=-e
?X: VOS: path component separator is >
 cppfilter="tr '\\\\>' '/' |"
 ;;
*)
 testaccess=-r
 cppfilter="
 ;;
esac
$cat >fieldn <<EOF
$startsh
$cppstdin $cppflags $cppminus <foo.c 2>/dev/null | \
$grep '^[  ]*#.*stdio\.h' | \
while read cline; do
 pos=1
 set \$cline
 while $test \$# -gt 0; do
  if $test $testaccess \`echo \$1 | $tr -d '"'\`; then
   echo "\$pos"
   exit 0
  fi
  shift
  pos=\`expr \$pos + 1\`
 done
done
EOF
chmod +x fieldn
fieldn=`./fieldn`
$rm -f foo.c fieldn
case $fieldn in
") pos='???';;
1) pos=first;;
```

```
2) pos=second;;
3) pos=third;;
*) pos="${fieldn}th";;
esac
echo "Your cpp writes the filename in the $pos field of the line."

?X: To locate a header file, we cannot simply check for $usrinc/file.h, since
?X: some machine have the headers in weird places and our only hope is that
?X: the C pre-processor will know how to find those headers. Thank you NexT!
: locate header file
$cat
 >findhdr <<EOF
$startsh
wanted=\$1
name=''
for usrincdir in $usrinc; do
 if test -f \$usrincdir/\$wanted; then
  echo "\$usrincdir/\$wanted"
  exit 0
 fi
done
awkprg='{ print \$$fieldn }'
echo "#include <\$wanted>" > foo\$\$.c
$cppstdin $cppminus $cppflags < foo\$\$.c 2>/dev/null | \
$cppfilter $grep "^[  ]*#.*\$wanted" | \
while read cline; do
 name=\`echo \$cline | $awk "\$awkprg" | $tr -d '"'\`
 case "\$name" in
 *[/\\\\]\$wanted) echo "\$name"; exit 1;;
 *[\\\\/]\$wanted) echo "\$name"; exit 1;;
 *) exit 2;;
 esac
done
?X: status = 0: grep returned 0 lines, case statement not executed
?X: status = 1: headerfile found
?X: status = 2: while loop executed, no headerfile found
status=\$?
$rm -f foo\$\$.c
if test \$status -eq 1; then
 exit 0
fi
exit 1
EOF
chmod +x findhdr
$eunicefix findhdr
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Findhdr.U

No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: contains.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
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?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: contains.U,v $
?RCS: Revision 3.0  1993/08/18  12:05:35  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:contains: Nothing
?MAKE: -pick add $@ %<
?S:contains:
?S: This variable holds the command to do a grep with a proper return
?S: status.  On most sane systems it is simply "grep".  On insane systems
?S: it is a grep followed by a cat followed by a test.  This variable
?S: is primarily for the use of other Configure units.
?S:.
: Some
 greps do not return status, grrr.
echo "grimblepritz" >grimble
if grep blurfldyick grimble >/dev/null 2>&1 ; then
 contains=contains
elif grep grimblepritz grimble >/dev/null 2>&1 ; then
 contains=grep
else
 contains=contains
fi
rm -f grimble
: the following should work in any shell
case "$contains" in
contains*)
 echo " " >&4
 echo "AGH!  Grep doesn't return a status.  Attempting remedial action." >&4
 cat >contains <<'EOSS'
grep "$1" "$2" >.greptmp && cat .greptmp && test -s .greptmp
EOSS
contains=./contains
chmod +x $contains
esac
```

Found in path(s):

* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/contains.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1996, Andy Dougherty
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: man3dir.U,v $
?RCS: Revision 3.0.1.1  1997/02/28  16:10:34  ram
?RCS: patch61: created
?RCS:
?X:
?X: This was originally specific to perl5.  Since perl5 has man pages that
?X: go in both man1/ and man3/ directories, we need both man1dir
?X: and man3dir.  This unit is basically dist's mansrc.U with
?X: man3 used instead of man everywhere.
?X: I then added various tests because perl5 has *lots* of man3
?X: pages with long file names. -- ADO
?X:
?MAKE:man3dir
 man3direxp man3ext installman3dir: afs cat nroff Loc Oldconfig \
 sed man1dir spackage package Getfile prefix Prefixit Prefixup \
 d_flexfnam privlib Myread
?MAKE: -pick add $@ %<
?Y:TOP
?S:man3dir:
?S: This variable contains the name of the directory in which manual
?S: source pages are to be put.  It is the responsibility of the
?S: Makefile.SH to get the value of this into the proper command.
?S: You must be prepared to do the ~name expansion yourself.
?S:.
?S:man3direxp:
?S: This variable is the same as the man3dir variable, but is filename
?S: expanded at configuration time, for convenient use in makefiles.
?S:.
?S:installman3dir:
?S: This variable is really the same as man3direxp, unless you are using
?S: AFS in which case it points to the read/write location whereas
?S: man3direxp only points to the read-only access location. For extra
?S: portability, you should only use this variable within your makefiles.
?S:.
```

```
?S:man3ext:
?S: This variable contains the extension that the manual
 page should
?S: have: one of 'n', 'l', or '3'.  The Makefile must supply the '.'.
?S: See man3dir.
?S:.
: determine where library module manual pages go
set man3dir man3dir none
eval $prefixit
$cat <<EOM

$spackage has manual pages for many of the library modules.
EOM

case "$nroff" in
nroff)
 $cat <<'EOM'
However, you don't have nroff, so they're probably useless to you.
EOM
 case "$man3dir" in
 ") man3dir="none";;
 esac;;
esac

case "$d_flexfnam" in
undef)
 $cat <<'EOM'
However, your system can't handle the long file names like File::Basename.3.
EOM
 case "$man3dir" in
 ") man3dir="none";;
 esac;;
esac

echo "If you don't want the manual sources installed, answer 'none'."
?X: We dont use /usr/local/man/man3 because some man programs will
?X: only show the /usr/local/man/man3 contents, and not the system ones,
?X: thus man less will show the perl module less.pm, but not the system
?X: less command.  We might also conflict with TCL man pages.
?X: However, something like /opt/perl/man/man3
 is fine.
case "$man3dir" in
") case "$prefix" in
 *$package*) dflt=`echo $man1dir |
   $sed -e 's/man1/man3/g' -e 's/man\.1/man\.3/g'` ;;
 *) dflt="$privlib/man/man3" ;;
 esac
 ;;
```

```
' ') dflt=none;;
*) dflt="$man3dir" ;;
esac
echo " "

fn=dn+~
rp="Where do the $package library man pages (source) go?"
. ./getfile
if test "X$man3direxp" != "X$ansexp"; then
 installman3dir=''
fi

man3dir="$ans"
man3direxp="$ansexp"
case "$man3dir" in
'') man3dir=' '
 installman3dir='';;
esac
if $afs; then
 $cat <<EOM

Since you are running AFS, I need to distinguish the directory in which
manual pages reside from the directory in which they are installed (and from
which they are presumably copied to the former directory by occult means).

EOM
 case "$installman3dir" in
 '') dflt=`echo $man3direxp | sed 's#^/afs/#/afs/.#'`;;
 *) dflt="$installman3dir";;
 esac
 fn=de~
 rp='Where will man pages be installed?'
 . ./getfile
 installman3dir="$ans"
else
 installman3dir="$man3direxp"
fi

: What suffix
 to use on installed man pages

case "$man3dir" in
' ')
 man3ext='0'
 ;;
*)
 rp="What suffix should be used for the $package library man pages?"
 case "$man3ext" in
```

```
 ") case "$man3dir" in
  *3)  dflt=3 ;;
  *3p) dflt=3p ;;
  *3pm) dflt=3pm ;;
  *l) dflt=l;;
  *n) dflt=n;;
  *o) dflt=o;;
  *p) dflt=p;;
  *C) dflt=C;;
  *L) dflt=L;;
  *L3) dflt=L3;;
  *) dflt=3;;
  esac
  ;;
 *) dflt="$man3ext";;
 esac
 . ./myread
 man3ext="$ans"
 ;;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/man3dir.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
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?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Typedef.U,v $
?RCS: Revision 3.0.1.3  1995/07/25  13:42:07  ram
?RCS: patch56: added backslash escapes within evals to prevent space problems
?RCS:
?RCS: Revision 3.0.1.2  1994/10/29  16:01:16  ram
?RCS: patch36: don't clobber visible 'val' variable, use 'varval' instead
?RCS:
?RCS: Revision 3.0.1.1  1994/08/29  16:05:14  ram
?RCS: patch32: created
?RCS:
?X:
?X: This unit checks for the definition of a given typedef.
?X:
```

```
?X: To use it, say:
?X: set typedef val_t default [includes]
?X: eval $typedef
?X:
?MAKE:Typedef:
 cppstdin cppminus cppflags rm contains Oldconfig
?MAKE: -pick add $@ %<
?F:!temp.c
?LINT:define typedef
?V:typedef
?S:typedef:
?S: This shell variable is used internally by Configure to check
?S: wether a given typedef is defined or not. A typical use is:
?S:  set typedef val_t default [includes]
?S:  eval $typedef
?S: That will return val_t set to default if the typedef was not found,
?S: to typedef otherwise. If no includes are specified, look in sys/types.h.
?S:.
?T:type var def inclist varval inc
: define an is-a-typedef? function
typedef='type=$1; var=$2; def=$3; shift; shift; shift; inclist=$@;
case "$inclist" in
"") inclist="sys/types.h";;
esac;
eval "varval=\$$var";
case "$varval" in
"")
 $rm -f temp.c;
 for inc in $inclist; do
  echo "#include <$inc>" >>temp.c;
 done;
 $cppstdin $cppflags $cppminus < temp.c >temp.E 2>/dev/null;
 if $contains $type temp.E >/dev/null 2>&1; then
  eval "$var=\$type";
 else
  eval "$var=\$def";
 fi;
 $rm -f temp.?;;
*) eval
 "$var=\$varval";;
esac'
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Typedef.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Setvar.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
```

```
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Setvar.U,v $
?RCS: Revision 3.0.1.1  1994/10/29  15:58:28  ram
?RCS: patch36: call ./whoa explicitly instead of relying on PATH
?RCS:
?RCS: Revision 3.0  1993/08/18  12:05:16  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This unit produces a variable that is intended to be eval'ed in
?X: order to define/undefine a symbol. A consistency check is made
?X: regarding any previous value and a warning is issued if there
?X: is any discrepancy.
?X:
?X:
 To use it, say:
?X: val=<value>
?X: set d_variable
?X: eval $setvar
?X:
?MAKE:Setvar: Whoa
?MAKE: -pick add $@ %<
?LINT:define setvar
?S:setvar:
?S: This shell variable is used internally by Configure to set a value
?S: to a given symbol that is defined or not. A typical use is:
?S: val=<value computed>
?S:  set d_variable
?S:  eval $setvar
?S: That will print a message in case the $val value is not the same
?S: as the previous value of $d_variable.
?S:.
?V:setvar:val
?T:var was td tu
: function used to set '$1' to '$val'
setvar='var=$1; eval "was=\$$1"; td=$define; tu=$undef;
case "$val$was" in
$define$undef) . ./whoa; eval "$var=\$td";;
$undef$define) . ./whoa; eval "$var=\$tu";;
*) eval "$var=$val";;
esac'
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Setvar.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Inlibc.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
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?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Inlibc.U,v $
?RCS: Revision 3.0.1.1  1994/10/29  15:55:08  ram
?RCS: patch36: call ./whoa explicitly instead of relying on PATH
?RCS:
?RCS: Revision 3.0  1993/08/18  12:05:03  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This unit checks for the definition of a given function.
?X:
?X: To use it, say:
?X: set function d_func
?X: eval $inlibc
?X:
?MAKE:Inlibc: Csym Whoa Oldconfig
?MAKE: -pick add $@ %<
?LINT:define inlibc
?V:inlibc
?S:inlibc:
?S: This
 shell variable is used internally by Configure to check
?S: wether a given function is defined or not. A typical use is:
?S:  set function d_func
?S:  eval $inlibc
?S: That will print a message, saying wether function was found or
?S: not and set d_func accordingly.
?S:.
?T:was tx sym tres td tu var
: define an is-in-libc? function
inlibc='echo " "; td=$define; tu=$undef;
sym=$1; var=$2; eval "was=\$$2";
tx=yes;
case "$reuseval$was" in
```

```
true) ;;
true*) tx=no;;
esac;
case "$tx" in
yes)
 set $sym tres -f;
 eval $csym;
 case "$tres" in
 true)
  echo "$sym() found." >&4;
  case "$was" in $undef) . ./whoa; esac; eval "$var=\$td";;
 *)
  echo "$sym() NOT found." >&4;
  case "$was" in $define) . ./whoa; esac; eval "$var=\$tu";;
 esac;;
*)
 case "$was" in
 $define) echo "$sym() found." >&4;;
 *) echo "$sym() NOT found." >&4;;
 esac;;
esac'
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Inlibc.U
No license file was found, but licenses were detected in source scan.

?RCS: You may distribute under the terms of either the GNU General Public

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_fsat.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_fpclass.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_truncl.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_towlower.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_sockatmark.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_statfs_s.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_signbit.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_strtold.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/i_shadow.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/i_stdbool.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_endpwent.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_lgamma_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_fpclassify.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_fstatfs.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_fcntl_can_lock.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/i_sysstatvfs.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/i_ustat.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_isless.U

* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_drand48_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_endservent_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_getpwent_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_expm1.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/mantbits.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/dlsrc.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/i_netdb.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_sethostent_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_getprotobyname_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_readv.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/useperlio.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/Cross.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_isinfl.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_strerror_l.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_tgamma.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_isnanl.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_gmtime_r.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_nl_langinfo.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_copysign.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/ebcdic/ebcdic.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_fseeko.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/acl/d_eaccess.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_inetpton.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/i_syssyscall.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_endpwent_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_getpwuid_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_endgrent.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/atolf.U
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 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_fma.U
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* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/i_quadmath.U
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* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_erfc.U
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* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/uselongdbl.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_erf.U
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* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_cplusplus.U
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* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_j0.U
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* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_isfinitel.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_logb.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/usedtrace.U
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* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_ilogbl.U
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* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_strnlen.U

* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/i_prot.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_llrint.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_nexttoward.U
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 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/i_fp_class.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_getnetent_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_getprotobynumber_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_scalbn.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/i_poll.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_getservbyport_r.U
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* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_memrchr.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_getgrent.U
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* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/libperl.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_fmax.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/i_crypt.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_fdclose.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_strtod_l.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_getservbyname_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_setnetent_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_endhostent_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_srand48_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_qgcvt.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_getgrgid_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_setlocale_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_trunc.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_exp2.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_setgrent_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_getpwnam_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/i_fp.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_faststdio.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_getprotoent_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_getpwent.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_getnameinfo.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_nl_langinfo_l.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_gethbyad.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_statvfs.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_setpwent.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/i_bfd.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_setprotoent_r.U

* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_lroundl.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_srandom_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_round.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_socks5_init.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/acl/d_accessx.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_strtoq.U
*
/perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_towupper.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_futimes.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/i_sysuio.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_setenv.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_mkdtemp.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_setproctitle.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_unordered.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_strftime.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/uselfs.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_strlcpy.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_unsetenv.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/i_mntent.U
*
/perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_libm_lib_version.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_getenv_thread.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_msghdr_s.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/i_socks.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_getcwd.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/a_dvisory/quadtype.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_strlcat.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/i_sysvfs.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/infnan.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_hasmntopt.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_getspnam_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_log2.U
*
/perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_log1p.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_nextafter.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/perlx32f.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/usemultiplicity.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_setgrent.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_setitimer.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/quadfio.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_nan.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_getgrnam_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_getnetbyaddr_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_fp_classl.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_ptrdiff_t.U
*
/perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_localtime_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/i_ieeefp.U

* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_remainder.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_newlocale.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/typedefs/gidf.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_gethostbyaddr_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/compline/d_siginfo_si.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/usefaststdio.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_isnan.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_isfinite.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_sendmsg.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_nearbyint.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_endgrent_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_ilogb.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/typedefs/uidf.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/usebacktrace.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_rint.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/protos/Protochk.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_getsrvby.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_fpclassl.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/time_size.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_llroundl.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_getaddrinfo.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/usesocks.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_asctime_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_pthread_atfork.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_lrint.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_off64_t.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/i_sysutsname.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_endnetent_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_hypot.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_crypt_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/usequadmath.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_longlong.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/threads/d_readdir64_r.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/d_getnbynm.U
*
 /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_strtouq.U
No license file was found, but licenses were detected in source scan.

?RCS: $Id: html3dir.U,v $
?RCS:
?RCS: Copyright (c) 1999 Andy Dougherty
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root

```
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: html3dir.U,v $
?RCS:
?MAKE:html3dir html3direxp installhtml3dir: cat sed Loc Myread \
 spackage test Getfile Setprefixvar Prefixit Prefixup html1dir
?MAKE: -pick add $@ %<
?Y:TOP
?D:html3dir="
?S:html3dir:
?S: This variable contains the name of the directory in which html
?S: source pages are to be put.  This directory is for pages
?S: that describe libraries or modules.  It is intended to
?S: correspond roughly to section 3 of the Unix manuals.
?S:.
?D:html3direxp="
?S:html3direxp:
?S: This variable
 is the same as the html3dir variable, but is filename
?S: expanded at configuration time, for convenient use in makefiles.
?S:.
?D:installhtml3dir="
?S:installhtml3dir:
?S: This variable is really the same as html3direxp, unless you are
?S: using a different installprefix.  For extra portability, you
?S: should only use this variable within your makefiles.
?S:.
?LINT:change prefixvar
?LINT:set html3direxp
?LINT:set installhtml3dir
: determine where html pages for libraries and modules go
set html3dir html3dir none
eval $prefixit
$cat <<EOM

If you wish to install html files for modules associated with $spackage,
indicate the appropriate directory here.  To skip installing html files,
answer "none".
EOM
: There is no obvious default.  If they have specified html1dir, then
: try to key off that, possibly changing .../html1 into .../html3.
case "$html3dir" in
") html3dir=`echo "$html1dir" | $sed 's/1$/3$/'` ;;
*) dflt=$html3dir ;;
esac
fn=dn+~
rp="Directory for the $spackage module
```

```
 html pages?"
. ./getfile
prefixvar=html3dir
. ./setprefixvar
: Use ' ' for none so value is preserved next time through Configure
$test X"$html3dir" = "X" && html3dir=' '
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/html3dir.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Myinit.U,v $
?RCS: Revision 3.0.1.1  1994/10/31  09:47:29  ram
?RCS: patch44: leading comment states this unit comes before option processing
?RCS:
?RCS: Revision 3.0  1993/08/18  12:05:07  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: If you want to initialize any default values, copy this unit to your
?X: personal U directory and add the assignments to the end.  This file
?X: is included after variables are initialized but before any old
?X: config.sh file is read in and before
 any Configure switch processing.
?X:
?MAKE:Myinit: Init
?MAKE: -pick add $@ %<
?LINT: nocomment
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Myinit.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Hasproto.U $
?RCS:
?RCS: Copyright (c) 1998 Andy Dougherty
?RCS:
?RCS: You may distribute under the terms of either the GNU General Public
```

```
?RCS: License or the Artistic License, as specified in the README file.
?RCS:
?X: This unit generates a $hasproto string that is used internally
?X: by Configure to check if this system has a prototype for a
?X: particular function
?X:
?X: To use it, say something like:
?X:  set d_getnetent_proto getnetent $i_netdb netdb.h
?X:  eval $hasproto
?X: Or, for more complicated sets of headers, do something like
?X: hdrs="$define sys/types.h
?X:  $i_systime sys/time.h
?X:  $i_sysselct sys/select.h
?X:  $i_netdb netdb.h"
?X: set d_getnetent_proto getnetent $hdrs
?X: eval $hasproto
?X:
?X: There is also an 'escape' hatch built in.  If you have a pair
?X: of args   'literal 'stuff' then 'stuff' gets included literally
?X: into the test program.  See Protochk.U for more details.
?X:
?MAKE:Hasproto:
 Setvar cppstdin cppflags cppminus contains rm_try test
?MAKE: -pick add $@ %<
?T:func varname
?F:!try.c
?V:hasproto
: Define hasproto macro for Configure internal use
hasproto='varname=$1; func=$2; shift; shift;
while $test $# -ge 2; do
 case "$1" in
 $define) echo "#include <$2>";;
 literal) echo "$2" ;;
 esac ;
   shift 2;
done > try.c;
$cppstdin $cppflags $cppminus < try.c > tryout.c 2>/dev/null;
if $contains "$func.*(" tryout.c >/dev/null 2>&1; then
 echo "$func() prototype found.";
 val="$define";
else
 echo "$func() prototype NOT found.";
 val="$undef";
fi;
set $varname;
eval $setvar;
$rm_try tryout.c'
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/protos/Hasproto.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: Copyright (c) 1998 Andy Dougherty
?RCS:
?RCS: Original author Jarkko Hietaniemi <jhi@iki.fi>
?RCS: Merged into dist by Andy Dougherty  July 13, 1998
?RCS:
?MAKE:trnl: Nothing
?MAKE: -pick add $@ %<
?S:trnl:
?S: This variable contains the value to be passed to the tr(1)
?S: command to transliterate a newline.  Typical values are
?S: '\012' and '\n'.  This is needed for EBCDIC systems where
?S: newline is not necessarily '\012'.
?S:.
?T: DJGPP
: Find the appropriate value for a newline for tr
?X: We can't
 use $tr since that would cause a circular dependency via Myread
?X: dos djgpp uses '\015\012', but reportedly is happy with '\012' in the
?X: tr command.  I don't know why it passes the '\n' test but later
?X: refuses to work correctly with it.  --AD  6/14/98
if test -n "$DJGPP"; then
    trnl='\012'
fi
if test X"$trnl" = X; then
 case "`echo foo | tr '\n' x 2>/dev/null`" in
 foox) trnl='\n' ;;
 esac
fi
if test X"$trnl" = X; then
 case "`echo foo | tr '\012' x 2>/dev/null`" in
 foox) trnl='\012' ;;
 esac
fi
if test X"$trnl" = X; then
```

```
    case "`echo foo | tr '\r\n' xy 2>/dev/null`" in
    fooxy) trnl='\n\r' ;;
    esac
fi
if test X"$trnl" = X; then
 cat <<EOM >&2

$me: Fatal Error: cannot figure out how to translate newlines with 'tr'.

EOM
 exit 1
fi
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/trnl.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Rcs.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Rcs.U,v $
?RCS: Revision 3.0  1993/08/18  12:05:15  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This is a unit that helps people who write SH scripts and keep them under
?X: RCS, but don't think to protect the $Log and other $Id keywords from
?X: variable substitution (or people like me who do not like to).
?X:
?MAKE:Author Date Header Id Locker Log RCSfile Revision Source State: Oldconfig
?MAKE: -pick weed $@ %<
?LINT:describe Author
 Date Header Id Locker Log RCSfile Revision Source State
: preserve RCS keywords in files with variable substitution, grrr
?Author:Author='$Author'
?Date:Date='$Date'
?Header:Header='$Header'
?Id:Id='$Id'
?$Locker'
?Log:Log='$Log'
?RCSfile:RCSfile='$RCSfile'
```

```
?Revision:Revision='$Revision'
?Source:Source='$Source'
?State:State='$State'
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Rcs.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: lib.U,v 3.0.1.3 1995/09/25 09:16:47 ram Exp $
?RCS:
?RCS: Copyright (c) 1991-1993, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: lib.U,v $
?RCS: Revision 3.0.1.3  1995/09/25  09:16:47  ram
?RCS: patch59: unit is now forced to the top of Configure, if possible
?RCS:
?RCS: Revision 3.0.1.2  1995/01/30  14:38:08  ram
?RCS: patch49: can now handle installation prefix changes (from WED)
?RCS:
?RCS: Revision 3.0.1.1  1994/08/29  16:27:40  ram
?RCS: patch32: now uses installation prefix to set the default
?RCS:
?RCS: Revision 3.0  1993/08/18  12:08:56  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?LINT:
 empty
?X:?MAKE:lib libexp: Getfile Loc Oldconfig Prefixit Prefixup prefixexp
?X:?MAKE: -pick add $@ %<
?X:?Y:TOP
?X:?S:lib:
?X:?S: This variable holds the name of the directory in which the user wants
?X:?S: to put public library files for the package in question.  It is most
?X:?S: often a local directory such as /usr/local/lib. Programs using this
?X:?S: variable must be prepared to deal with filename expansion.
?X:?S:.
?X:?S:libexp:
?X:?S: This variable is the same as the lib variable, but is filename expanded
?X:?S: at configuration time, for convenient use in your makefiles.
?X:?S:.
?X:: determine where public libraries go
?X:set lib lib
```

```
?X:eval $prefixit
?X:case "$lib" in
?X:")
?X: dflt=`./loc . "." $prefixexp/lib /usr/local/lib /usr/lib /lib`
?X: set dflt
?X: eval $prefixup
?X: ;;
?X:*)  dflt="$lib";;
?X:esac
?X:echo " "
?X:fn=d~
?X:rp='Where do you want to put the public libraries?'
?X:. ./getfile
?X:lib="$ans"
?X:libexp="$ansexp"
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/nullified/lib.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Begin.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Begin.U,v $
?RCS: Revision 3.0.1.3  1997/02/28  14:56:35  ram
?RCS: patch61: added Extractall dependency
?RCS:
?RCS: Revision 3.0.1.2  1995/01/30  14:25:08  ram
?RCS: patch49: avoid an empty rmlist: systems might choke on it (WED)
?RCS:
?RCS: Revision 3.0.1.1  1994/10/31  09:32:20  ram
?RCS: patch44: created
?RCS:
?X:
?X: This file comes after option processing had been done and after all
?X: the default values have been set up. It marks the beginning
 of questions.
?X: It is important that Options be listed *after* Myinit to ensure that the
?X: default initializations performed by Init and Myinit will not clobber
?X: any setting done on the command line via -D or -U.
?X:
```

```
?MAKE:Begin: Myinit Options package Extractall
?MAKE: -pick add $@ %<
: Eunice requires " " instead of "", can you believe it
echo " "
: Here we go...
echo "Beginning of configuration questions for $package."

?X: Make sure the rm below is given a non-empty list for some systems.
?X: This is run only when within the UU directory, hence we can safely
?X: attempt to rm a non-existent 'X' file...
trap 'echo " "; test -d ../UU && rm -rf X $rmlist; exit 1' 1 2 3 15
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Begin.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: man3dir.U,v 3.1 1999/07/08 20:52:19 doughera Exp doughera $
?RCS:
?RCS: Copyright (c) 1996-1999, Andy Dougherty
?RCS: Copyright (c) 1991-1993, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: man3dir.U,v $
?RCS: Revision 3.1  1999/07/08 20:52:19  doughera
?RCS: Updated for perl5.005_5x
?RCS:
?RCS: Revision 3.0.1.1  1997/02/28  16:10:34  ram
?RCS: patch61: created
?RCS:
?X: This was originally specific to perl5.  Since perl5 has man pages that
?X: go in both man1/ and man3/ directories, we need both man1dir
?X: and man3dir.  This unit is basically dist's mansrc.U with
?X: man3 used instead
 of man everywhere.
?X: I then added various tests because perl5 has *lots* of man3
?X: pages with long file names. -- ADO
?X:
?MAKE:man3dir man3direxp man3ext installman3dir: cat nroff Loc Oldconfig \
 sed man1dir spackage package Getfile Setprefixvar Prefixit Prefixup \
 d_flexfnam privlib Myread test
?MAKE: -pick add $@ %<
?Y:TOP
?D:man3dir="
```

```
?S:man3dir:
?S: This variable contains the name of the directory in which manual
?S: source pages are to be put.  It is the responsibility of the
?S: Makefile.SH to get the value of this into the proper command.
?S: You must be prepared to do the ~name expansion yourself.
?S:.
?D:man3direxp=''
?S:man3direxp:
?S: This variable is the same as the man3dir variable, but is filename
?S: expanded at configuration time, for convenient use in makefiles.
?S:.
?D:installman3dir=''
?S:installman3dir:
?S: This variable is really the same as man3direxp, unless you are using
?S: AFS in which case it points to the read/write location whereas
?S: man3direxp only
 points to the read-only access location. For extra
?S: portability, you should only use this variable within your makefiles.
?S:.
?S:man3ext:
?S: This variable contains the extension that the manual page should
?S: have: one of 'n', 'l', or '3'.  The Makefile must supply the '.'.
?S: See man3dir.
?S:.
?T:prog tdflt
?LINT:change prefixvar
?LINT:set man3direxp
: determine where library module manual pages go
set man3dir man3dir none
eval $prefixit
$cat <<EOM

$spackage has manual pages for many of the library modules.
EOM

case "$nroff" in
nroff)
 $cat <<'EOM'
However, you don't have nroff, so they're probably useless to you.
EOM
 case "$man3dir" in
 '') man3dir="none";;
 esac;;
esac

case "$d_flexfnam" in
undef)
 $cat <<'EOM'
```

```
However, your system can't handle the long file names like File::Basename.3.
EOM
 case "$man3dir" in
 ") man3dir="none";;
 esac;;
esac

echo "If you don't want the manual sources installed, answer 'none'."
?X: In 5.005_57 and earlier, I had the following notes:
?X:
 We do not use /usr/local/man/man3 because some man programs will
?X: only show the /usr/local/man/man3 contents, and not the system ones,
?X: thus man less will show the perl module less.pm, but not the system
?X: less command.  We might also conflict with Tcl man pages.
?X: However, something like /opt/perl/man/man3 is fine.
?X:
?X: However, opinion seems to be shifting such that 'man POSIX' ought
?X: to just work.  -- Andy Dougherty  July 8, 1999
?X:
?X: remove any trailing -3.0 or other version indication from $package
prog=`echo $package | $sed 's/-*[0-9.]*$//'`
case "$man3dir" in
") dflt=`echo "$man1dir" | $sed -e 's/man1/man3/g' -e 's/man\.1/man\.3/g'`
 if $test -d "$privlib/man/man3"; then
  cat <<EOM >&4

WARNING:  Previous versions of perl installed man3 pages into
$privlib/man/man3.  This version will suggest a
new default of $dflt.
EOM
  tdflt=$dflt
  dflt='n'
  rp='Do you wish to preserve the old behavior?(y/n)'
  . ./myread
  case "$ans" in
  y*) dflt="$privlib/man/man3"
 ;;
  *)  dflt=$tdflt ;;
  esac
   fi
 ;;
*) dflt="$man3dir" ;;
esac
case "$dflt" in
' ') dflt=none ;;
esac
echo " "
fn=dn+~
```

```
rp="Where do the $package library man pages (source) go?"
. ./getfile
prefixvar=man3dir
. ./setprefixvar

case "$man3dir" in
") man3dir=' '
 installman3dir=";;
esac

: What suffix to use on installed man pages
case "$man3dir" in
' ')
 man3ext='0'
 ;;
*)
 rp="What suffix should be used for the $package library man pages?"
 case "$man3ext" in
 ") case "$man3dir" in
  *3)  dflt=3 ;;
  *3p) dflt=3p ;;
  *3pm) dflt=3pm ;;
  *l) dflt=l;;
  *n) dflt=n;;
  *o) dflt=o;;
  *p) dflt=p;;
  *C) dflt=C;;
  *L) dflt=L;;
  *L3) dflt=L3;;
  *) dflt=3;;
  esac
  ;;
 *) dflt="$man3ext";;
 esac
 . ./myread
 man3ext="$ans"
 ;;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/man3dir.U
No license file was found, but licenses were detected in source scan.

```
/* $Id: Jmake.rules 18 2006-12-27 10:35:09Z rmanfredi $
*
*  Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
*
*  You may redistribute only under the terms of the Artistic Licence,
```

```
*  as specified in the README file that comes with the distribution.
*  You may reuse parts of this distribution only within the terms of
*  that same Artistic Licence; a copy of which may be found at the root
*  of the source tree for dist 4.0.
*
* $Log: Jmake.rules,v $
* Revision 3.0.1.7  2004/08/22 08:28:58  ram
* patch71: random cleanup
*
* Revision 3.0.1.6  1997/02/28  14:56:01  ram
* patch61: now handles USRINC for dependencies
* patch61: smarter about dependencies computation
*
* Revision 3.0.1.5  1995/09/25  09:07:19  ram
* patch59: smarter sed command to strip /usr/include dependencies
*
* Revision 3.0.1.4  1995/07/25  13:33:59  ram
* patch56: install of script man pages can now cope with missing files
* patch56: the clobber
 target now removes the .config directory as well
*
* Revision 3.0.1.3  1995/03/21  08:35:28  ram
* patch52: suppressed extra argument to NormalProgramTarget call
*
* Revision 3.0.1.2  1995/01/11  14:49:55  ram
* patch45: new macros ShellScriptTargetExt and SimpleShellScriptTargetExt
* patch45: directory installation is now made via INSTALLDIR (Configure)
*
* Revision 3.0.1.1  1994/10/29  15:46:30  ram
* patch36: added RemoteDependency rule
*
* Revision 3.0  1993/08/18  12:04:14  ram
* Baseline for dist 3.0 netwide release.
*
*/
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/files/Jmake.rules
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: sitebin.U,v $
?RCS:
?RCS: Copyright (c) 1999 Andy Dougherty
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
```

```
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: sitebin.U,v $
?RCS:
?MAKE:sitebin sitebinexp installsitebin : Getfile Oldconfig \
 Setprefixvar siteprefix
?MAKE: -pick add $@ %<
?Y:TOP
?D:sitebin=''
?S:sitebin:
?S: This variable holds the name of the directory in which the user wants
?S: to put add-on publicly executable files for the package in question.  It
?S: is most often a local directory such as /usr/local/bin. Programs using
?S: this variable must be prepared to deal with ~name substitution.
?S: The standard distribution will put nothing
 in this directory.
?S: After perl has been installed, users may install their own local
?S: executables in this directory with
?S:  MakeMaker Makefile.PL
?S: or equivalent.  See INSTALL for details.
?S:.
?D:sitebinexp=''
?S:sitebinexp:
?S: This is the same as the sitebin variable, but is filename expanded at
?S: configuration time, for use in your makefiles.
?S:.
?D:installsitebin=''
?S:installsitebin:
?S: This variable is usually the same as sitebinexp, unless you are on
?S: a system running AFS, in which case they may differ slightly. You
?S: should always use this variable within your makefiles for portability.
?S:.
?LINT:change prefixvar
?LINT:set installsitebin
?LINT:set sitebin
?LINT:set sitebinexp
: determine where add-on public executables go
case "$sitebin" in
'') dflt=$siteprefix/bin ;;
*) dflt=$sitebin ;;
esac
fn=d~
rp='Pathname where the add-on public executables should be installed?'
. ./getfile
prefixvar=sitebin
. ./setprefixvar

Found in path(s):
```

```
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/sitebin.U
No license file was found, but licenses were detected in source scan.

?RCS: $Id$
?RCS:
?RCS: Copyright (c) 2000, Andy Dougherty
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?MAKE:versionony: cat Myread Setvar Devel
?MAKE: -pick add $@ %<
?LINT:set versionony
?Y:TOP
?S:versionony:
?S: If set, this symbol indicates that only the version-specific
?S: components of a perl installation should be installed.
?S: This may be useful for making a test installation of a new
?S: version without disturbing the existing installation.
?S: Setting versionony is equivalent to setting installperl's -v option.
?S: In particular, the non-versioned scripts and programs such as
?S: a2p, c2ph, h2xs, pod2*, and perldoc
 are not installed
?S: (see INSTALL for a more complete list).  Nor are the man
?S: pages installed.
?S: Usually, this is undef.
?S:.
?LINT:extern inc_version_list
?LINT:change inc_version_list
?LINT:extern inc_version_list_init
?LINT:change inc_version_list_init
?LINT:extern version
: determine whether to use a version number suffix for installed binaries
echo " "
$cat <<EOM
Do you want to use a version number suffix for installed binaries? This
will install 'perl$version' instead of 'perl', and likewise for other
binaries like 'perldoc' and 'cpan'. This allows many versions of perl
to be installed side-by-side. Unless you are a developer, you probably
do *not* want to do this.
EOM
case "$versionony" in
"$define"|[Yy]*|true) dflt='y' ;;
*) dflt='n';
esac
```

```
rp="Do you want to use a version number suffix for installed binaries?"
. ./myread
case "$ans" in
[yY]*) val="$define";;
*) val="$undef" ;;
esac
set versionononly
eval $setvar

case "$versionononly" in
"$define") inc_version_list="
        inc_version_list_init=0
       ;;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/versionononly.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: prototype.U,v 3.0.1.3 1994/05/06 15:11:49 ram Exp $
?RCS:
?RCS: Copyright (c) 1991-1993, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: prototype.U,v $
?RCS: Revision 3.0.1.3  1994/05/06  15:11:49  ram
?RCS: patch23: ensure cc flags used when looking for prototype support
?RCS:
?RCS: Revision 3.0.1.2  1994/01/24  14:15:36  ram
?RCS: patch16: prototype handling macros now appear only when needed
?RCS:
?RCS: Revision 3.0.1.1  1993/08/25  14:03:12  ram
?RCS: patch6: defines were referring to non-existent VOID symbol
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:36  ram
?RCS: Baseline for dist
 3.0 netwide release.
?RCS:
?MAKE:prototype: Nothing
?S:prototype:
?S: This variable holds the eventual value of CAN_PROTOTYPE, which
?S: indicates the C compiler can handle function prototypes.
?S:.
```

: stub, never used
prototype=nothing

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/prototype.U
No license file was found, but licenses were detected in source scan.

```
/*
* $Id: dup2.C,v 3.0.1.1 1994/01/24 13:58:37 ram Exp ram $
*
*  Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
*
*  You may redistribute only under the terms of the Artistic Licence,
*  as specified in the README file that comes with the distribution.
*  You may reuse parts of this distribution only within the terms of
*  that same Artistic Licence; a copy of which may be found at the root
*  of the source tree for dist 4.0.
*
* Original Author: Larry Wall <lwall@netlabs.com>
*
* $Log: dup2.C,v $
* Revision 3.0.1.1  1994/01/24  13:58:37  ram
* patch16: created
*
*/
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/lib/C/fake/dup2.C
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: spitshell.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: spitshell.U,v $
?RCS: Revision 3.0.1.4  1997/02/28  16:22:12  ram
?RCS: patch61: removed useless chatter as this is now done very early
?RCS:
?RCS: Revision 3.0.1.3  1995/01/11  15:37:01  ram
?RCS: patch45: use 'test -f' instead of 'test -r' for exec-only cat progs (WED)
?RCS: patch45: protected "sh -c" within backquotes for Linux and SGI
?RCS:
```

```
?RCS: Revision 3.0.1.2  1994/08/29  16:33:00  ram
?RCS: patch32: don't create spitshell under the UU directory
?RCS:
 patch32: allow for cat in /bin or /usr/bin
?RCS:
?RCS: Revision 3.0.1.1  1993/09/13  16:12:58  ram
?RCS: patch10: made #!-failure message more friendly (WAD)
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:49  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:spitshell shsharp sharpbang: eunicefix sh Head
?MAKE: -pick add $@ %<
?S:spitshell:
?S: This variable contains the command necessary to spit out a runnable
?S: shell on this system.  It is either cat or a grep -v for # comments.
?S:.
?S:shsharp:
?S: This variable tells further Configure units whether your sh can
?S: handle # comments.
?S:.
?S:sharpbang:
?S: This variable contains the string #! if this system supports that
?S: construct.
?S:.
?F:!sharp
?T:xcat p
?X: "paths" comes from Head
?LINT:extern paths _exe
: see if sh knows # comments
?X: This is loaded up early, so avoid being chatty.
?X: echo " "
?X: echo "Checking your $sh to see if it knows about # comments..." >&2
if `$sh -c '#' >/dev/null 2>&1`; then
?X: echo
 "Your $sh handles # comments correctly."
 shsharp=true
 spitshell=cat
?X: echo " "
?X: echo "Okay, let's see if #! works on this system..."
 xcat=/bin/cat
 test -f $xcat$_exe || xcat=/usr/bin/cat
 if test ! -f $xcat$_exe; then
  for p in `echo $PATH | sed -e "s/$p_/ /g"` $paths; do
   if test -f $p/cat$_exe; then
    xcat=$p/cat
    break
   fi
```

```
  done
  if test ! -f $xcat$_exe; then
   echo "Can't find cat anywhere!"
   exit 1
  fi
 fi
 echo "#!$xcat" >sharp
 $eunicefix sharp
 chmod +x sharp
 ./sharp > today 2>/dev/null
 if test -s today; then
?X:  echo "It does."
  sharpbang='#!'
 else
  echo "#! $xcat" > sharp
  $eunicefix sharp
  chmod +x sharp
  ./sharp > today 2>/dev/null
  if test -s today; then
?X:   echo "It does."
   sharpbang='#! '
  else
?X:   echo "Okay, let's see if #! works on this system..."
?X:   echo "It's just a comment."
   sharpbang=': use '
  fi
 fi
else
 echo " "
 echo "Your $sh doesn't grok # comments--I will strip them later on."
 shsharp=false
?X: The
 spitshell script will be perused, so leave it out the UU directory
 cd ..
 echo "exec grep -v '^[  ]*#'" >spitshell
 chmod +x spitshell
 $eunicefix spitshell
 spitshell=`pwd`/spitshell
 cd UU
 echo "I presume that if # doesn't work, #! won't work either!"
 sharpbang=': use '
fi
rm -f sharp today
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/spitshell.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: make.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1996, Andy Dougherty
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: make.U,v $
?RCS: Revision 3.0.1.1  1997/02/28  16:09:40  ram
?RCS: patch61: created
?RCS:
?MAKE:make_set_make : Loc rm sed make
?MAKE: -pick add $@ %<
?S:make_set_make:
?S: Some versions of 'make' set the variable MAKE.  Others do not.
?S: This variable contains the string to be included in Makefile.SH
?S: so that MAKE is set if needed, and not if not needed.
?S: Possible values are:
?S:
?S: make_set_make='#'  #
 If your make program handles this for you,
?S:
?S: make_set_make="MAKE=$make" # if it doesn't.
?S:
?S: This uses a comment character so that we can distinguish a
?S: 'set' value (from a previous config.sh or Configure -D option)
?S: from an uncomputed value.
?S:.
?LINT: extern MAKE
?LINT: change MAKE
?X: This test is based on one from an autoconf-generated configure
?X: script. Autoconf stole a lot from Configure, but now it's our
?X: turn to do so... ;-) -- RAM, 21/02/97
: check whether make sets MAKE
echo " "
echo "Checking if your $make program sets \$(MAKE)..." >&4
case "$make_set_make" in
")
?X: Use sed so we don't have a line begining with @echo.  Metaconfig
?X: will think that's a command like @if or @end.
 $sed 's/^X //' > testmake.mak << 'EOF'
Xall:
X  @echo 'maketemp="$(MAKE)"'
EOF
```

```
?X: GNU make sometimes prints "make[1]: Entering...", which would confuse us
 case "`$make -f testmake.mak 2>/dev/null`" in
 *maketemp=*) make_set_make='#' ;;
 *) make_set_make="MAKE=$make" ;;
 esac
 $rm
 -f testmake.mak
 ;;
esac
case "$make_set_make" in
'#') echo "Yup, it does.";;
*) echo "Nope, it doesn't.";;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/make.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Instruct.U,v 3.0.1.3 1997/02/28 15:02:55 ram Exp $
?RCS:
?RCS: Copyright (c) 1991-1993, Raphael Manfredi
?RCS:
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?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: Instruct.U,v $
?RCS: Revision 3.0.1.3  1997/02/28  15:02:55  ram
?RCS: patch61: logname / whoami sequence rewritten to use case
?RCS:
?RCS: Revision 3.0.1.2  1995/02/15  14:11:34  ram
?RCS: patch51: author name now appears at the end of the paragraph (WED)
?RCS:
?RCS: Revision 3.0.1.1  1995/01/11  15:12:05  ram
?RCS: patch45: now documents the & escape to turn -d on at the read prompt
?RCS:
?RCS: Revision 3.0  1993/08/18  12:05:04  ram
?RCS: Baseline for
 dist 3.0 netwide release.
?RCS:
?X:
?X: This unit spew out the directions that we want everyone to read.  I try to
?X: keep the first "pagefull" much less than a page since they don't know it
?X: isn't going to go shooting off the top of the screen, and we don't want
?X: to panic them yet.
?X:
```

```
?MAKE:Instruct: Myread Configdir Devel contains
?MAKE: -pick wipe $@ %<
?T:user needman firsttime
: general instructions
needman=true
firsttime=true
user=`(logname) 2>/dev/null`
case "$user" in
") user=`whoami 2>&1`;;
esac
if $contains "^$user\$" ../.config/instruct >/dev/null 2>&1; then
 firsttime=false
 echo " "
 rp='Would you like to see the instructions?'
 dflt=n
 . ./myread
 case "$ans" in
 [yY]*) ;;
 *) needman=false;;
 esac
fi
if $needman; then
 cat <<EOH

This installation shell script will examine your system and ask you questions
to determine how the <PACKAGENAME> package should be installed. If you get
stuck on a question, you may use a ! shell escape to start a subshell or
execute a
 command.  Many of the questions will have default answers in square
brackets; typing carriage return will give you the default.

On some of the questions which ask for file or directory names you are allowed
to use the ~name construct to specify the login directory belonging to "name",
even if you don't have a shell which knows about that.  Questions where this is
allowed will be marked "(~name ok)".

EOH
 rp="
 dflt='Type carriage return to continue'
 . ./myread
 cat <<'EOH'

The prompter used in this script allows you to use shell variables and
backticks in your answers.  You may use $1, $2, etc...  to refer to the words
in the default answer, as if the default line was a set of arguments given to a
script shell.  This means you may also use $* to repeat the whole default line,
so you do not have to re-type everything to add something to the default.
```

```
Every time there is a substitution, you will have to confirm.  If there is an
error (e.g. an unmatched backtick), the default answer
 will remain unchanged
and you will be prompted again.

If you are in a hurry, you may run 'Configure -d'.  This will bypass nearly all
the questions and use the computed defaults (or the previous answers if there
was already a config.sh file). Type 'Configure -h' for a list of options.
You may also start interactively and then answer '& -d' at any prompt to turn
on the non-interactive behaviour for the remainder of the execution.

EOH
 . ./myread
 cat <<EOH

Much effort has been expended to ensure that this shell script will run on any
Unix system.  If despite that it blows up on yours, your best bet is to edit
Configure and run it again.  If you can't run Configure for some reason,
you'll have to generate a config.sh file by hand.  Whatever problems you
have, let me (<MAINTLOC>) know how I blew it.

This installation script affects things in two ways:

1) it may do direct variable substitutions on some of the files included
  in this kit.
2) it builds a config.h file for inclusion in
 C programs.  You may edit
  any of these files as the need arises after running this script.

If you make a mistake on a question, there is no easy way to back up to it
currently.  The easiest thing to do is to edit config.sh and rerun all the SH
files.  Configure will offer to let you do this before it runs the SH files.

EOH
?X: In case they played with the prompter...
 dflt='Type carriage return to continue'
 . ./myread
 case "$firsttime" in
 true) echo $user >>../.config/instruct;;
 esac
fi

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/Instruct.U
No license file was found, but licenses were detected in source scan.

?RCS: $Id: kernel.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
```

```
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: kernel.U,v $
?RCS: Revision 3.0  1993/08/18  12:08:54  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:kernel: Getfile test
?MAKE: -pick add $@ %<
?S:kernel:
?S: This variable becomes the (fully rooted) path name of the kernel.
?S:.
: find the name of the kernel.
echo " "
case "$kernel" in
")
 if $test -r /unix; then
  dflt=/unix
 elif $test -r /vmunix; then
  dflt=/vmunix
 elif $test -r /xenix; then
  dflt=/xenix
 elif $test -r /mach; then
  dflt=/mach
 elif
 $test -r /dgux; then
  dflt=/dgux
 elif $test -r /hp-ux; then
  dflt=/hp-ux
 elif $test -r /syst; then
  dflt=/syst
 elif $test -r /arix; then
  dflt=/arix
 elif $test -r /irix; then
  dflt=/arix
 else
  dflt='unknown'
  set X /*x
  shift
  case $# in
  1)
   if $test -r "$1"; then
    dflt="$1"
```

```
   fi
   ;;
  esac
 fi
 ;;
*)
 dflt="$kernel"
 ;;
esac
fn=f
rp='What is the name of your kernel?'
. ./getfile
kernel="$ans"
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/kernel.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: nis.U,v $
?RCS: Revision 3.0.1.3  1997/02/28  16:17:38  ram
?RCS: patch61: ensure suitable defaults for hostcat and friends
?RCS:
?RCS: Revision 3.0.1.2  1995/03/21  08:48:34  ram
?RCS: patch52: continued fix for NeXT NIS/NetInfo handling
?RCS:
?RCS: Revision 3.0.1.1  1995/02/15  14:16:23  ram
?RCS: patch51: now correctly handles NeXT using NIS rather than NetInfo
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:24  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:passcat groupcat hostcat:
 Myread Oldconfig test contains
?MAKE: -pick add $@ %<
?S:passcat:
?S: This variable contains a command that produces the text of the
?S: /etc/passwd file.  This is normally "cat /etc/passwd", but can be
?S: "ypcat passwd" when NIS is used.
```

```
?S:.
?S:groupcat:
?S: This variable contains a command that produces the text of the
?S: /etc/group file.  This is normally "cat /etc/group", but can be
?S: "ypcat group" when NIS is used.
?S:.
?S:hostcat:
?S: This variable contains a command that produces the text of the
?S: /etc/hosts file.  This is normally "cat /etc/hosts", but can be
?S: "ypcat hosts" when NIS is used.
?S:.
: see if we have to deal with yellow pages, now NIS.
?X: NeXT gives us some fun here, as always, by having both NIS (former YP)
?X: and NetInfo. But since it has both, it's ok to put the test inside the if.
?X: Contributed by Thomas Neumann <tom@smart.bo.open.de>.
if $test -d /usr/etc/yp || $test -d /etc/yp || $test -d /usr/lib/yp; then
 if $test -f /usr/etc/nibindd; then
  echo
 " "
  echo "I'm fairly confident you're on a NeXT."
@if passcat || groupcat
  echo " "
  rp='Do you get the passwd file via NetInfo?'
  dflt=y
  case "$passcat" in
  nidump*) ;;
  ") ;;
  *) dflt=n;;
  esac
  . ./myread
  case "$ans" in
  y*) passcat='nidump passwd .'
@if groupcat
   echo "(Assuming /etc/group is also distributed.)"
   groupcat='nidump group .'
@end
   ;;
  *) echo "You told me, so don't blame me."
   case "$passcat" in
   nidump*) passcat="
@if groupcat
     groupcat=";;
@end
   esac
@if groupcat
   echo "(Assuming /etc/group is handled the same way.)"
@end
   ;;
```

```
  esac
@end
@if hostcat
  echo " "
  rp='Do you get the hosts file via NetInfo?'
  dflt=y
  case "$hostcat" in
  nidump*) ;;
  ") ;;
  *) dflt=n;;
  esac
  . ./myread
  case "$ans" in
  y*) hostcat='nidump hosts .';;
  *) case "$hostcat" in
   nidump*) hostcat=";;
   esac
   ;;
  esac
@end
 fi
@if passcat || groupcat
 case "$passcat" in
 nidump*) ;;
 *)
  case "$passcat" in
  *ypcat*) dflt=y;;
  ")
 if $contains '^\+' /etc/passwd >/dev/null 2>&1; then
    dflt=y
   else
    dflt=n
   fi;;
  *) dflt=n;;
  esac
  echo " "
  rp='Are you getting the passwd file via yellow pages?'
  . ./myread
  case "$ans" in
  y*) passcat='ypcat passwd'
@if groupcat
   echo "(Assuming /etc/group is also distributed.)"
   groupcat='ypcat group'
@end
   ;;
  *) passcat='cat /etc/passwd'
@if groupcat
   echo "(Assuming /etc/group is also local.)"
```

```
   groupcat='cat /etc/group'
@end
   ;;
  esac
  ;;
 esac
@end
@if hostcat
 case "$hostcat" in
 nidump*) ;;
 *)
  case "$hostcat" in
  *ypcat*) dflt=y;;
  ") if $contains '^\+' /etc/passwd >/dev/null 2>&1; then
    dflt=y
   else
    dflt=n
   fi;;
  *) dflt=n;;
  esac
  echo " "
  rp='Are you getting the hosts file via yellow pages?'
  . ./myread
  case "$ans" in
  y*) hostcat='ypcat hosts';;
  *) hostcat='cat /etc/hosts';;
  esac
  ;;
 esac
@end
fi
?X: Ensure suitable default -- Manoj Srivastava
case "$hostcat" in
") hostcat=':'
 $test -f /etc/hosts && hostcat='cat
 /etc/hosts';;
esac
case "$groupcat" in
") groupcat=':'
 $test -f /etc/group && groupcat='cat /etc/group';;
esac
case "$passcat" in
") passcat=':'
 $test -f /etc/passwd && passcat='cat /etc/passwd';;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/nis.U

No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Extractall.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Extractall.U,v $
?RCS: Revision 3.0.1.1  1997/02/28  15:00:43  ram
?RCS: patch61: created
?RCS:
?X:
?X: If extraction has been requested, load the configuration file, perform
?X: the extraction and exit.
?X:
?X: This unit was originally a part of Options.U. It had to be removed from
?X: it to prevent a dependency cycle: Extract -> src -> Options -> Extract
?X: The Begin.U unit now requires us before beginning to do anything
?X: interesting, to ensure
 proper semantics. -- RAM, 15/03/96
?X:
?MAKE:Extractall: Extract Options
?MAKE: -pick wipe $@ %<
: extract files and exit if asked to do so
case "$extractsh" in
true)
?X: Undo the forced silent=true when -S was supplied, by probing realsilent
?X: which was set iff -s was also given. See Options.U for details.
 case "$realsilent" in
 true) ;;
 *) exec 1>&4;;
 esac
 case "$config_sh" in
 '') config_sh='config.sh';;
 esac
 echo " "
 echo "Fetching answers from $config_sh..."
 cd ..
 . $config_sh
?X: extract has to be run from the top directory, not within UU.
 . UU/optdef.sh
 echo " "
?X: extract has to be run from the top directory, not within UU.
```

```
 . UU/extract
 rm -rf UU
 echo "Extraction done."
 exit 0
 ;;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/Extractall.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: perl5.U,v $
?RCS:
?RCS: Copyright (c) 2000 Andrew Dougherty
?RCS:
?RCS:     You may distribute under the terms of either the GNU General Public
?RCS:     License or the Artistic License, as specified in the README file.
?RCS:
?RCS: $Log: perl5.U,v $
?RCS:
?X:
?X: The purpose of this unit is to locate a previously installed
?X: version of perl5 suitable for running inc_version_list.U.
?X: We check for 5.005 and later because inc_version_list is
?X: irrelevant for earlier versions.
?X:
?MAKE:perl5: path_sep binexp test sed exe_ext
?MAKE: -pick add $@ %<
?Y:TOP
?S:perl5:
?S: This variable contains the full path (if any) to a previously
?S: installed perl5.005 or later suitable for running the script
?S: to determine inc_version_list.
?S:.
?T: tdir
: Find perl5.005 or later.
echo "Looking for a previously installed perl5.005 or later... "
case "$perl5" in
") for tdir in `echo "$binexp$path_sep$PATH" | $sed "s/$path_sep/
 /g"`; do
  : Check if this perl is recent and can load a simple module
  if $test -x $tdir/perl$exe_ext && $tdir/perl -Mless -e 'use 5.005;' >/dev/null 2>&1; then
   perl5=$tdir/perl
   break;
  elif $test -x $tdir/perl5$exe_ext && $tdir/perl5 -Mless -e 'use 5.005;' >/dev/null 2>&1; then
   perl5=$tdir/perl5
   break;
  fi
```

```
 done
 ;;
*) perl5="$perl5"
 ;;
esac
case "$perl5" in
") echo "None found.  That's ok.";;
*) echo "Using $perl5." ;;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/perl5.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
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?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: package.U,v $
?RCS: Revision 3.0.1.3  1994/10/29  16:27:21  ram
?RCS: patch36: beware of non-ascii character sets when translating case
?RCS:
?RCS: Revision 3.0.1.2  1993/11/10  17:37:02  ram
?RCS: patch14: skip definition of spackage if not otherwise used
?RCS:
?RCS: Revision 3.0.1.1  1993/09/13  16:11:10  ram
?RCS: patch10: added spackage, suitable for starting sentences
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:28  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:package spackage:
 Nothing
?MAKE: -pick wipe $@ %<
?S:package:
?S: This variable contains the name of the package being constructed.
?S: It is primarily intended for the use of later Configure units.
?S:.
?S:spackage:
?S: This variable contains the name of the package being constructed,
?S: with the first letter uppercased, i.e. suitable for starting
?S: sentences.
```

```
?S:.
?C:PACKAGE:
?C: This variable contains the name of the package being built.
?C:.
?H:#define PACKAGE "$package"
?H:.
?T:first last
: set package name
package='<PACKAGENAME>'
@if spackage
first=`echo $package | sed -e 's/^\(.\).*/\1/'`
last=`echo $package | sed -e 's/^.\(.*\)/\1/'`
?X:
?X: So early in the Configure script, we don't have ./tr set up and can't
?X: include Tr in our dependency or that would create a cycle. Therefore,
?X: we have to somehow duplicate the work done in Tr. That's life.
?X:
case "`echo AbyZ | tr '[:lower:]' '[:upper:]' 2>/dev/null`" in
ABYZ) spackage=`echo $first | tr '[:lower:]' '[:upper:]'`$last;;
*) spackage=`echo
 $first | tr '[a-z]' '[A-Z]'`$last;;
esac
@end
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/package.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Configdir.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Configdir.U,v $
?RCS: Revision 3.0.1.1  1997/02/28  14:58:36  ram
?RCS: patch61: have README explicitly mention the package name
?RCS:
?RCS: Revision 3.0  1993/08/18  12:04:49  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:Configdir: package
?MAKE: -pick add $@ %<
: create .config dir to save info across Configure sessions
```

```
test -d ../.config || mkdir ../.config
cat >../.config/README <<EOF
This directory created by Configure to save
 information that should
persist across sessions for $package.

You may safely delete it if you wish.
EOF
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Configdir.U
No license file was found, but licenses were detected in source scan.

```
# $Id: makedepend.sh,v 3.0.1.1 1994/01/24 14:00:05 ram Exp ram $
#
#  Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
#
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#  as specified in the README file that comes with the distribution.
#  You may reuse parts of this distribution only within the terms of
#  that same Artistic Licence; a copy of which may be found at the root
#  of the source tree for dist 4.0.
#
# Original Author: Larry Wall <lwall@netlabs.com>
#
# $Log: makedepend.sh,v $
# Revision 3.0.1.1  1994/01/24  14:00:05  ram
# patch16: changed top ln-style config.sh lookup into test-style one
#
# Revision 3.0  1993/08/18  12:04:37  ram
# Baseline for dist 3.0 netwide release.
#
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/lib/makedepend.SH
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Setprefixvar.U,v 3.0 2006/04/01 17:25:29 hmbrand $
?RCS:
?RCS: Copyright (c) 2006-2006, H.Merijn Brand & Nicholas Clark
?RCS:
?RCS: This file is included with or a derivative work of a file included
?RCS: with the metaconfig program of Raphael Manfredi's "dist" distribution.
?RCS: In accordance with clause 7 of dist's modified Artistic License:
?RCS:
?RCS:   You may distribute under the terms of either the GNU General Public
?RCS:   License or the Artistic License, as specified in the README file.
?RCS:
```

```
?X:
?X: This unit sets up the scripts installprefix and setprefixvar, so code
?X: in other parts can be more simple and maintainable
?X:
?MAKE:Setprefixvar: Myread Getfile startsh eunicefix test \
 prefix prefixexp installprefix installprefixexp
?MAKE: -pick add $@ %<
?LINT:extern prefixvar
?X: metalint still sees "`\$${prefixvar}exp`" as variable :(
?T:prefixvarexp
?F:./setprefixvar
?F:./installprefix
: Perform
 the prefixexp/installprefixexp correction if necessary
cat <<EOS >installprefix
$startsh
EOS
cat <<'EOSC' >>installprefix
: Change installation prefix, if necessary.
if $test X"$prefix" != X"$installprefix"; then
   eval "install${prefixvar}=\`echo \$${prefixvar}exp | sed \"s#^\$prefixexp#\$installprefixexp#\"\`"
else
   eval "install${prefixvar}=\"\$${prefixvar}exp\""
fi
EOSC
chmod +x installprefix
$eunicefix installprefix

: Set variables such as privlib and privlibexp from the output of ./getfile
: performing the prefixexp/installprefixexp correction if necessary.
cat <<EOS >setprefixvar
$startsh
EOS
cat <<'EOSC' >>setprefixvar
eval "${prefixvar}=\"\$ans\""
eval "${prefixvar}exp=\"\$ansexp\""
. ./installprefix
EOSC
chmod +x setprefixvar
$eunicefix setprefixvar
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/Setprefixvar.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: man1dir.U,v 3.2 1999/07/08 20:57:21 doughera Exp doughera $
?RCS:
?RCS: Copyright (c) 1996, 1999 Andy Dougherty
```

```
?RCS: Copyright (c) 1991-1993, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: man1dir.U,v $
?RCS: Revision 3.2  1999/07/08 20:57:21  doughera
?RCS: Used installprefix.
?RCS:
?RCS: Revision 3.1  1999/07/08 20:52:19  doughera
?RCS: Updated for perl5.005_5x
?RCS:
?RCS: Revision 3.0.1.1  1997/02/28  16:10:29  ram
?RCS: patch61: created
?RCS:
?X: This was originally specific to perl5.  Since perl5 has man pages that
?X: go in both man1/ and man3/ directories, we need both man1dir
?X: and
 man3dir.  This unit is basically dist's mansrc.U with
?X: man1 used instead of man everywhere.
?X:
?MAKE:man1dir man1direxp man1ext installman1dir: cat nroff Loc Oldconfig \
 spackage test Getfile Setprefixvar Prefixit Prefixup sysman Myread \
 prefixexp
?MAKE: -pick add $@ %<
?Y:TOP
?D:man1dir=''
?S:man1dir:
?S: This variable contains the name of the directory in which manual
?S: source pages are to be put.  It is the responsibility of the
?S: Makefile.SH to get the value of this into the proper command.
?S: You must be prepared to do the ~name expansion yourself.
?S:.
?D:man1direxp=''
?S:man1direxp:
?S: This variable is the same as the man1dir variable, but is filename
?S: expanded at configuration time, for convenient use in makefiles.
?S:.
?D:installman1dir=''
?S:installman1dir:
?S: This variable is really the same as man1direxp, unless you are using
?S: AFS in which case it points to the read/write location whereas
?S: man1direxp only points to the read-only access location.
 For extra
?S: portability, you should only use this variable within your makefiles.
```

```
?S:.
?S:man1ext:
?S: This variable contains the extension that the manual page should
?S: have: one of 'n', 'l', or '1'.  The Makefile must supply the '.'.
?S: See man1dir.
?S:.
?T:lookpath
?LINT:change prefixvar
?LINT:set man1direxp
: determine where manual pages go
set man1dir man1dir none
eval $prefixit
$cat <<EOM

$spackage has manual pages available in source form.
EOM
case "$nroff" in
nroff)
 echo "However, you don't have nroff, so they're probably useless to you."
 case "$man1dir" in
 ") man1dir="none";;
 esac;;
esac
echo "If you don't want the manual sources installed, answer 'none'."
case "$man1dir" in
' ') dflt=none
 ;;
")
 lookpath="$prefixexp/share/man/man1"
 lookpath="$lookpath $prefixexp/man/man1 $prefixexp/man/l_man/man1"
 lookpath="$lookpath $prefixexp/man/p_man/man1"
 lookpath="$lookpath $prefixexp/man/u_man/man1"
 lookpath="$lookpath $prefixexp/man/man.1"
?X: Experience has shown people
 expect man1dir to be under prefix,
?X: so we now always put it there.  Users who want other behavior
?X: can answer interactively or use a command line option.
?X: Does user have System V-style man paths.
 case "$sysman" in
 */?_man*) dflt=`./loc . $prefixexp/l_man/man1 $lookpath` ;;
 *) dflt=`./loc . $prefixexp/man/man1 $lookpath` ;;
 esac
 set dflt
 eval $prefixup
 ;;
*)  dflt="$man1dir"
 ;;
esac
```

```
echo " "
fn=dn+~
rp="Where do the main $spackage manual pages (source) go?"
. ./getfile
if $test "X$man1direxp" != "X$ansexp"; then
 installman1dir=''
fi
prefixvar=man1dir
. ./setprefixvar

case "$man1dir" in
'') man1dir=' '
 installman1dir='';;
esac

: What suffix to use on installed man pages

case "$man1dir" in
' ')
 man1ext='0'
 ;;
*)
 rp="What suffix should be used for the main $spackage man pages?"
 case "$man1ext" in
 '') case "$man1dir" in
  *1)  dflt=1 ;;
  *1p) dflt=1p ;;
  *1pm) dflt=1pm ;;
  *l) dflt=l;;
  *n) dflt=n;;
  *o) dflt=o;;
  *p) dflt=p;;
  *C) dflt=C;;
  *L) dflt=L;;
  *L1)
 dflt=L1;;
  *) dflt=1;;
  esac
  ;;
 *) dflt="$man1ext";;
 esac
 . ./myread
 man1ext="$ans"
 ;;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/man1dir.U

No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: installstyle.U,v 1.2 1999/07/13 14:56:06 doughera Exp $
?RCS:
?RCS: Copyright (c) 1999 Andy Dougherty
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: installstyle.U,v $
?RCS: Revision 1.2  1999/07/13 14:56:06  doughera
?RCS: Fix dependencies.  Add more comments.
?RCS:
?RCS: Revision 1.1  1999/07/12 17:30:41  doughera
?RCS: Initial revision
?RCS:
?RCS:
?MAKE:installstyle: prefix Myread
?MAKE: -pick add $@ %<
?X: Myread dependence is for dflt.
?S:installstyle:
?S: This variable describes the "style" of the perl installation.
?S: This is intended to be useful for tools that need to
?S: manipulate entire perl
 distributions.  Perl itself doesn't use
?S: this to find its libraries -- the library directories are
?S: stored directly in Config.pm.  Currently, there are only two
?S: styles:  "lib" and "lib/perl5".  The default library locations
?S: (e.g. privlib, sitelib) are either $prefix/lib or
?S: $prefix/lib/perl5.  The former is useful if $prefix is a
?S: directory dedicated to perl (e.g. /opt/perl), while the latter
?S: is useful if $prefix is shared by many packages, e.g. if
?S: $prefix=/usr/local.
?S:
?S: Unfortunately, while this "style" variable is used to set
?S: defaults for all three directory hierarchies (core, vendor, and
?S: site), there is no guarantee that the same style is actually
?S: appropriate for all those directories.  For example, $prefix
?S: might be /opt/perl, but $siteprefix might be /usr/local.
?S: (Perhaps, in retrospect, the "lib" style should never have been
?S: supported, but it did seem like a nice idea at the time.)
?S:
?S: The situation is even less clear for
 tools such as MakeMaker
?S: that can be used to install additional modules into
```

```
?S: non-standard places.  For example, if a user intends to install
?S: a module into a private directory (perhaps by setting PREFIX on
?S: the Makefile.PL command line), then there is no reason to
?S: assume that the Configure-time $installstyle setting will be
?S: relevant for that PREFIX.
?S:
?S: This may later be extended to include other information, so
?S: be careful with pattern-matching on the results.
?S:
?S: For compatibility with perl5.005 and earlier, the default
?S: setting is based on whether or not $prefix contains the string
?S: "perl".
?S:.
: determine installation style
: For now, try to deduce it from prefix unless it is already set.
: Reproduce behavior of 5.005 and earlier, maybe drop that in 5.7.
case "$installstyle" in
") case "$prefix" in
  *perl*) dflt='lib';;
  *) dflt='lib/perl5' ;;
 esac
 ;;
*) dflt="$installstyle" ;;
esac
: Probably not worth prompting for this since we prompt
 for all
: the directories individually, and the prompt would be too long and
: confusing anyway.
installstyle=$dflt
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/installstyle.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Init.U,v 3.0.1.1 1994/10/31 09:45:59 ram Exp $
?RCS:
?RCS: Copyright (c) 1991-1993, Raphael Manfredi
?RCS:
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?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: Init.U,v $
?RCS: Revision 3.0.1.1  1994/10/31  09:45:59  ram
?RCS: patch44: removed Options from MAKE to prevent Init overrides
?RCS: patch44: option processing now done after Myinit thanks to new Begin.U
```

```
?RCS: patch44: moved "Beginning of configuration questions" to Begin.U
?RCS: patch44: moved signal trapping instruction to Begin.U as well
?RCS:
?RCS: Revision 3.0  1993/08/18  12:05:02  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This file
 initializes certain default variables used by Configure.  They
?X: may be overridden or added to by definitions in Myinit.U.
?X:
?MAKE:Init eunicefix: Null
?MAKE: -pick add $@ %<
?MAKE: -pick weed $@ ./Init
?S:eunicefix:
?S: When running under Eunice this variable contains a command which will
?S: convert a shell script to the proper form of text file for it to be
?S: executable by the shell.  On other systems it is a no-op.
?S:.
?V:define undef smallmach:rmlist
?X:
?X: Throughout the units, one may make use of $define and $undef to reference
?X: a defined symbol or an undefined one. There is no need to add them in
?X: the dependency line since this unit makes them visible via ?V:, and
?X: everyone inherits from those symbols since by convention Init.U is the
?X: root dependency.
?X:
?LINT:extern DJGPP
?LINT:extern _exe
?LINT:change _exe
?LINT:extern is_os2
: Detect odd OSs
define='define'
undef='undef'
smallmach='pdp11 i8086 z8000 i80286 iAPX286'
rmlist=''

: We must find out about
 Eunice early
eunicefix=':'
if test -f /etc/unixtovms; then
 eunicefix=/etc/unixtovms
fi
if test -f /etc/unixtovms.exe; then
 eunicefix=/etc/unixtovms.exe
fi

: Set executable suffix now -- needed before hints available
```

```
if test -f "/libs/version.library"; then
: Amiga OS
   _exe=""
elif test -f "/system/gnu_library/bin/ar.pm"; then
: Stratus VOS
   _exe=".pm"
elif test -n "$DJGPP"; then
: DOS DJGPP
   _exe=".exe"
elif test -f /kern/cookiejar; then
: MiNT
   _exe=""
elif test -d c:/. -o -n "$is_os2" ; then
: OS/2 or cygwin
   _exe=".exe"
fi
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/Init.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Options.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
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?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Options.U,v $
?RCS: Revision 3.0.1.7  1997/02/28  15:08:15  ram
?RCS: patch61: optdef.sh now starts with a "startsh"
?RCS: patch61: moved some code from Head.U
?RCS:
?RCS: Revision 3.0.1.6  1995/09/25  09:14:46  ram
?RCS: patch59: protected option parsing code against 'echo -*' option failure
?RCS:
?RCS: Revision 3.0.1.5  1995/05/12  12:04:52  ram
?RCS: patch54: added -K option for experts
?RCS:
?RCS: Revision 3.0.1.4  1995/01/30  14:27:52  ram
?RCS:
 patch49: this unit now exports file optdef.sh, not a variable
?RCS:
?RCS: Revision 3.0.1.3  1995/01/11  15:19:00  ram
?RCS: patch45: new -O option allowing -D and -U to override config.sh settings
```

```
?RCS: patch45: file optdef.sh is no longer removed after sourcing
?RCS:
?RCS: Revision 3.0.1.2  1994/10/29  15:58:06  ram
?RCS: patch36: ensure option definition file is removed before appending
?RCS: patch36: protect variable definitions with spaces in them
?RCS:
?RCS: Revision 3.0.1.1  1994/06/20  06:55:44  ram
?RCS: patch30: now uses new me symbol to tag error messages
?RCS: patch30: new -D and -U options to define/undef symbols (JHI)
?RCS:
?RCS: Revision 3.0  1993/08/18  12:05:14  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: Command line parsing. It is really important that the variables used here
?X: be not listed in the MAKE line, or they will be saved in config.sh and
?X: loading this file to fetch default answers would clobber the values set
?X: herein.
?X:
?MAKE:Options:
 startsh
?MAKE: -pick wipe $@ %<
?V:reuseval alldone error realsilent silent extractsh fastread \
 knowitall: config_sh
?T:arg argn symbol config_arg0 config_args config_argc xxx yyy zzz uuu
?T:args_exp args_sep arg_exp ccflags
?F:!Configure
?F:./optdef.sh ./cmdline.opt ./posthint.sh ./cmdl.opt
: Save command line options in file UU/cmdline.opt for later use in
: generating config.sh.
?X: This temporary file will be read by Oldsym.U.  I used a temporary
?X: file to preserve all sorts of potential command line quotes and
?X: also because we don't know in advance how many variables we'll
?X: need, so I can't actually declare them on the MAKE line.
?X: The config_args variable won't be quite correct if Configure is
?X: fed something like    ./Configure -Dcc="gcc -B/usr/ccs/bin/"
?X: since the quotes are gone by the time we see them.  You'd have to
?X: reconstruct the command line from the config_arg? lines, but since
?X: I don't imagine anyone actually having to do that, I'm not going
?X:
 to worry too much.
cat > cmdline.opt <<EOSH
: Configure command line arguments.
config_arg0='$0'
config_args='$*'
config_argc=$#
EOSH
argn=1
```

```
args_exp=''
args_sep=''
for arg in "$@"; do
 cat >>cmdline.opt <<EOSH
config_arg$argn='$arg'
EOSH
?X: Extreme backslashitis: replace each ' by '''''
 cat <<EOC | sed -e "s/'/'''''''''''''/g" > cmdl.opt
$arg
EOC
 arg_exp=`cat cmdl.opt`
 args_exp="$args_exp$args_sep'$arg_exp'"
 argn=`expr $argn + 1`
 args_sep=' '
done
?X: args_exp is good for restarting self: eval "set X $args_exp"; shift; $0 "$@"
?X: used by hints/os2.sh in Perl, for instance
rm -f cmdl.opt

: produce awk script to parse command line options
cat >options.awk <<'EOF'
BEGIN {
 optstr = "A:dD:eEf:hKOrsSU:V"; # getopt-style specification

 len = length(optstr);
 for (i = 1; i <= len; i++) {
  c = substr(optstr, i, 1);
?X: some older awk's do not have the C ?: construct
  if (i < len) a = substr(optstr, i + 1, 1); else a = "";
  if (a == ":") {
   arg[c] = 1;
   i++;
  }
  opt[c]
 = 1;
 }
}
{
 expect = 0;
 str = $0;
 if (substr(str, 1, 1) != "-") {
  printf("'%s'\n", str);
  next;
 }
 len = length($0);
 for (i = 2; i <= len; i++) {
  c = substr(str, i, 1);
  if (!opt[c]) {
```

```
   printf("-%s\n", substr(str, i));
   next;
  }
  printf("-%s\n", c);
  if (arg[c]) {
   if (i < len)
    printf("'%s'\n", substr(str, i + 1));
   else
    expect = 1;
   next;
  }
 }
}
END {
 if (expect)
  print "?";
}
EOF

: process the command line options
?X: Use "$@" to keep arguments with spaces in them from being split apart.
?X: For the same reason, awk will output quoted arguments and the final eval
?X: removes them and sets a proper $* array. An 'X' is prepended to each
?X: argument before being fed to echo to guard against 'echo -x', where -x
?X: would be understood as an echo option! It is removed before feeding awk.
set X `for arg in "$@"; do echo "X$arg"; done |
 sed -e s/X// | awk -f options.awk`
eval "set $*"
shift
rm -f options.awk

: set up default values
fastread=''
reuseval=false
config_sh=''
alldone=''
error=''
silent=''
extractsh=''
knowitall=''
rm
 -f optdef.sh posthint.sh
cat >optdef.sh <<EOS
$startsh
EOS

?X:
?X: Given that we now have the possibility to execute Configure remotely
```

```
?X: thanks to the new src.U support, we have to face the possibility
?X: of having to ask where the source lie, which means we need the Myread.U
?X: stuff and possibly other things that might echo something on the
?X: screen...
?X:
?X: That's not pretty, and might be confusing in 99% of the time. So...
?X: We introduce a new realsilent variable which is set when -s is given,
?X: and we force silent=true if -S is supplied. The Extractall.U unit
?X: will then undo the >&4 redirection based on the value of the
?X: realsilent variable... -- RAM, 18/93/96
?X:

: option parsing
while test $# -gt 0; do
 case "$1" in
 -d) shift; fastread=yes;;
 -e) shift; alldone=cont;;
 -f)
  shift
  cd ..
  if test -r "$1"; then
   config_sh="$1"
  else
   echo "$me: cannot read config file $1."
 >&2
   error=true
  fi
  cd UU
  shift;;
 --help|\
 -h) shift; error=true;;
 -r) shift; reuseval=true;;
 -s) shift; silent=true; realsilent=true;;
 -E) shift; alldone=exit;;
 -K) shift; knowitall=true;;
 -O) shift;;
 -S) shift; silent=true; extractsh=true;;
 -D)
  shift
  case "$1" in
  *=)
   echo "$me: use '-U symbol=', not '-D symbol='." >&2
   echo "$me: ignoring -D $1" >&2
   ;;
  *=*) echo "$1" | \
    sed -e "s/'/\'"\'"/g" -e "s/=\(.*\)/='\1'/" >> optdef.sh;;
  *) echo "$1='define'" >> optdef.sh;;
  esac
```

```
 shift
 ;;
-U)
 shift
 case "$1" in
 *=) echo "$1" >> optdef.sh;;
 *=*)
  echo "$me: use '-D symbol=val', not '-U symbol=val'." >&2
  echo "$me: ignoring -U $1" >&2
  ;;
 *) echo "$1='undef'" >> optdef.sh;;
 esac
 shift
 ;;
-A)
   shift
   xxx=''
   yyy="$1"
   zzz=''
   uuu=undef
   case "$yyy" in
        *=*) zzz=`echo "$yyy"|sed 's!=.*!!'`
             case "$zzz" in
             *:*) zzz='' ;;
             *)   xxx=append

             zzz=' '`echo "$yyy"|sed 's!^[^=]*=!!'`
                  yyy=`echo "$yyy"|sed 's!=.*!!'` ;;
             esac
             ;;
        esac
        case "$xxx" in
        '')  case "$yyy" in
             *:*) xxx=`echo "$yyy"|sed 's!:.*!!'`
                  yyy=`echo "$yyy"|sed 's!^[^:]*:!!'`
                  zzz=`echo "$yyy"|sed 's!^[^=]*=!!'`
                  yyy=`echo "$yyy"|sed 's!=.*!!'` ;;
             *)   xxx=`echo "$yyy"|sed 's!:.*!!'`
                  yyy=`echo "$yyy"|sed 's!^[^:]*:!!'` ;;
             esac
             ;;
        esac
   case "$xxx" in
   append)
 echo "$yyy=\"\${$yyy}$zzz\"" >> posthint.sh ;;
   clear)
 echo "$yyy=''"   >> posthint.sh ;;
   define)
```

```
        case "$zzz" in
  ") zzz=define ;;
  esac
  echo "$yyy='$zzz'"  >> posthint.sh ;;
    eval)
  echo "eval \"$yyy=$zzz\"" >> posthint.sh ;;
    prepend)
  echo "$yyy=\"$zzz\${$yyy}\"" >> posthint.sh ;;
    undef)

      case "$zzz" in
  ") zzz="$uuu" ;;
  esac
  echo "$yyy=$zzz"  >> posthint.sh ;;
          *)  echo "$me: unknown -A command '$xxx', ignoring -A $1" >&2 ;;
    esac
    shift
    ;;
 -V) echo "$me generated by metaconfig <VERSION> PL<PATCHLEVEL>." >&2
    exit 0;;
 --) break;;
 -*) echo "$me: unknown option $1" >&2; shift; error=true;;
 *) break;;
 esac
done

case "$error" in
true)
 cat >&2 <<EOM
Usage: $me [-dehrsEKOSV] [-f config.sh] [-D symbol] [-D symbol=value]
               [-U symbol] [-U symbol=] [-A command:symbol...]
 -d : use defaults for all answers.
 -e : go on without questioning past the production of config.sh.
 -f : specify an alternate default configuration file.
 -h : print this help message and exit (with an error status).
 -r : reuse C symbols value if possible (skips costly nm extraction).
 -s : silent mode, only echoes questions and essential information.
 -D : define symbol to have some value:
        -D symbol               symbol gets the
 value 'define'
        -D symbol='some value'   symbol is set to 'some value'
      common used examples (see INSTALL for more info):
        -Duse64bitint           use 64bit integers
        -Duse64bitall           use 64bit integers and pointers
        -Dusethreads            use thread support
        -Dinc_version_list=none  do not include older perl trees in @INC
        -DEBUGGING=none         DEBUGGING options
        -Dcc=gcc                choose your compiler
```

```
        -Dprefix=/opt/perl5       choose your destination
 -E : stop at the end of questions, after having produced config.sh.
 -K : do not use unless you know what you are doing.
 -O : ignored for backward compatibility
 -S : perform variable substitutions on all .SH files (can mix with -f)
 -U : undefine symbol:
        -U symbol    symbol gets the value 'undef'
        -U symbol=   symbol gets completely empty
      e.g.:  -Uversiononly
 -A : manipulate symbol after the platform specific hints
 have been applied:
        -A append:symbol=value   append value to symbol
        -A symbol=value          like append:, but with a separating space
        -A define:symbol=value   define symbol to have value
        -A clear:symbol          define symbol to be ''
        -A define:symbol         define symbol to be 'define'
        -A eval:symbol=value     define symbol to be eval of value
        -A prepend:symbol=value  prepend value to symbol
        -A undef:symbol          define symbol to be 'undef'
        -A undef:symbol=         define symbol to be ''
      e.g.:  -A prepend:libswanted='cl pthread '
             -A ccflags=-DSOME_MACRO
 -V : print version number and exit (with a zero status).
EOM
 exit 1
 ;;
esac

?X:
?X: Unless they specified either -S or both -d and -e/E, make sure we're
?X: running interactively, i.e. attached to a terminal. Moved from Head.U to
?X: be able to handle batch configurations...
?X:
?X: We have to hardwire the Configure name and
 cannot use $me, since if they
?X: said 'sh <Configure', then $me is 'sh'...
?X:
: Sanity checks
case "$fastread$alldone" in
yescont|yesexit) ;;
*)
 case "$extractsh" in
 true) ;;
 *)
  if test ! -t 0; then
   echo "Say 'sh Configure', not 'sh <Configure'"
   exit 1
  fi
```

```
  ;;
 esac
 ;;
esac

?X: In silent mode, the standard output is closed. Questions are asked by
?X: outputing on file descriptor #4, which is the original stdout descriptor.
?X: This filters out all the "junk", since all the needed information is written
?X: on #4. Note that ksh will not let us redirect output if the file descriptor
?X: has not be defined yet, unlike sh, hence the following line...--RAM.
exec 4>&1
case "$silent" in
true) exec 1>/dev/null;;
esac

: run the defines and the undefines, if any, but leave the file out there...
touch optdef.sh
?X: -q is POSIX
?X: It does not work in SysV (solaris) or old BSD greps.
grep '\\' optdef.sh >/dev/null 2>&1
if test $? = 0; then
   echo "Configure does not support \\
 in -D arguments"
   exit 1
fi
. ./optdef.sh
: create the posthint manipulation script and leave the file out there...
?X: this file will be perused by Oldconfig.U
touch posthint.sh
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/Options.U
No license file was found, but licenses were detected in source scan.

```
?RCS: In accordance with clause 7 of dist's modified Artistic License:
?RCS:     You may distribute under the terms of either the GNU General Public
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/perlpath.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/archlib.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/a_dvisory/multiarch.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/d_portable.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/perl/startperl.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/privlib.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Chk_whoami.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
```

```
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Chk_whoami.U,v $
?RCS: Revision 3.0  1993/08/18  12:04:46  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This unit makes sure we don't try to include whoami.h if uname() exists.
?X:
?MAKE:Chk_whoami: d_uname i_whoami
?MAKE: -pick add $@ %<
?LINT:change i_whoami
: weed out incompatibilities
case "$d_uname" in
 "$define") i_whoami="$undef" ;;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Chk_whoami.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: MailList.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: Original Author: Graham Stoney <greyham@research.canon.oz.au>
?RCS:
?RCS: $Log: MailList.U,v $
?RCS: Revision 3.0.1.1  1994/01/24  14:01:49  ram
?RCS: patch16: created
?RCS:
?RCS:
?X:
?X: This unit offers the user the option of subscribing to the mailing
?X: list. To force inclusion of this unit, you must add it's name to the
?X: dependancies on the MAKE line in your private copy of End.U.
```

```
?X: The address of the mailing list server must be set via a "list_request=..."
?X:
 entry in the .package file. This is usually done by running packinit and
?X: answering the proper questions.
?X:
?MAKE:MailList: cat mailer package Myread cf_name cf_email
?MAKE: -pick wipe $@ %<
?T:list_request list_sub list_unsub list_name
?X:
?X: The cf_name dependency is used through list_sub when the mailing list
?X: manager happens to be listserv, whereas cf_email is used whith majordomo
?X: or when the mailing list request address is scanned by a human. Since
?X: they do not appear within the unit itself, we need a lint hint.
?X:
?LINT:use cf_name cf_email
: offer to join the mailing list
list_request='<$list_request>'
list_sub="<$list_sub>"
list_unsub="<$list_unsub>"
list_name="<$list_name>"
$cat <<EOM

There is a mailing list for discussion about $package and related issues.
This is the preferred place to ask questions about the program and discuss
modifications and additions with the author and other users.  If you are able
to send mail to the Internet, you
 are encouraged to subscribe.  You need only
ever subscribe once, and you can unsubscribe automatically at any time in the
future.  If you have already subscribed and you wish to unsubscribe now, you
may do so by answering "unsubscribe".  Answer "subscribe" to subscribe to the
list.

EOM
rp="Subscribe to or unsubscribe from the $list_name mailing list?"
dflt=neither
. ./myread
case "$ans" in
[sS]*) $cat <<EOM

You will be sent a message from the list server to let you know when your
subscription has been successful and telling you how to submit articles and
how to unsubscribe again when necessary. You may also unsubscribe by running
this script again and asking it to do so for you.

EOM
 echo "Sending mail to subscribe you to the $list_name list..." >&4
 $mailer $list_request <<EOM >/dev/null 2>&1
Precedence: junk
```

```
To: $list_request

$list_sub
EOM
 ;;
[uU]*) echo "Sending mail to unsubscribe you from the $list_name list..." >&4
 $mailer $list_request <<EOM >/dev/null 2>&1
Precedence: junk
To:
 $list_request

$list_unsub
EOM
 ;;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/MailList.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Csym.U,v $
?RCS: Revision 3.0.1.4  1995/07/25  13:36:29  ram
?RCS: patch56: re-arranged compile line to include ldflags before objects
?RCS: patch56: added quotes for OS/2 support
?RCS:
?RCS: Revision 3.0.1.3  1995/05/12  12:00:33  ram
?RCS: patch54: fixed C test program to bypass gcc builtin type checks (ADO)
?RCS:
?RCS: Revision 3.0.1.2  1994/10/31  09:34:13  ram
?RCS: patch44: added Options to the MAKE line since it's no longer in Init.U
?RCS:
?RCS: Revision 3.0.1.1  1993/08/25  14:00:05  ram
?RCS:
 patch6: added ldflags as a conditional dependency and to compile line
?RCS: patch6: a final double quote was missing in csym variable after eval
?RCS:
?RCS: Revision 3.0  1993/08/18  12:04:50  ram
?RCS: Baseline for dist 3.0 netwide release.
```

```
?RCS:
?MAKE:Csym: Options contains libc libs runnm +cc +ccflags +ldflags rm
?MAKE: -pick add $@ %<
?LINT:define csym
?LINT:use libc
?S:csym:
?S: This shell variable is used internally by Configure to check
?S: wether a given C symbol is defined or not. A typical use is:
?S:  set symbol result [-fva] [previous]
?S:  eval $csym
?S: That will set result to 'true' if the function [-f], variable [-v]
?S: or array [-a] is defined, 'false' otherwise. If a previous value is
?S: given and the -r flag was provided on the command line, that value
?S: is reused without questioning.
?S:.
?V:csym
?T:tval tx tlook tf tdc tc
: is a C symbol defined?
csym='tlook=$1;
case "$3" in
-v) tf=libc.tmp; tc=""; tdc="";;
-a) tf=libc.tmp; tc="[0]"; tdc="[]";;
*) tlook="^$1\$";
 tf=libc.list; tc=""; tdc="()";;
esac;
tx=yes;
case "$reuseval-$4" in
true-) ;;
true-*) tx=no; eval "tval=\$$4"; case "$tval" in "") tx=yes;; esac;;
esac;
case "$tx" in
yes)
 case "$runnm" in
 true)
  if $contains $tlook $tf >/dev/null 2>&1;
  then tval=true;
  else tval=false;
  fi;;
 *)
?X:
?X: We use 'char' instead of 'int' to try to circumvent overzealous
?X: optimizing compilers using built-in prototypes for commonly used
?X: routines to complain when seeing a different external declaration. For
?X: instance, gcc 2.6.3 fails if we use 'int' and we attempt a test against
?X: memcpy() on machines where sizeof(int) == sizeof(char *) (the usual return
?X: type), the compiler assuming it's a built-in declaration given that the
?X: returned size matches. At least with 'char' we are safe! -- RAM, for ADO
?X:
```

```
?X: Let's thank GNU cc for making our lifes so easy! :-)
?X: (An alternative for the future would be to use our knowledge about gcc
?X: to force a -fno-builtin option in the
 compile test, in case the 'char'
?X: trick is obsoleted by future gcc releases). -- RAM
?X:
?X: Lastly, gcc 3.4 otimizes &missing == 0 away, so we use + 2 instead now.
?X: The GNU folks like to do weird things, don't they? -- RAM, 2004-06-05
?X:
  echo "extern char $1$tdc; int main() { return &$1$tc + 2; }" > t.c;
  if $cc $ccflags $ldflags -o t t.c $libs >/dev/null 2>&1;
  then tval=true;
  else tval=false;
  fi;
  $rm -f t t.c;;
 esac;;
*)
 case "$tval" in
 $define) tval=true;;
 *) tval=false;;
 esac;;
esac;
eval "$2=$tval"'
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Csym.U
No license file was found, but licenses were detected in source scan.

```
# Yes, you may rip this off to use in other distribution packages. This
# script belongs to the public domain and cannot be copyrighted.
#
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/Head.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Head.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: manfmt.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: manfmt.U,v $
```

```
?RCS: Revision 3.0.1.5  1997/02/28  16:11:57  ram
?RCS: patch61: don't ask for AFS when they choose to not install pages
?RCS:
?RCS: Revision 3.0.1.4  1995/09/25  09:16:52  ram
?RCS: patch59: unit is now forced to the top of Configure, if possible
?RCS:
?RCS: Revision 3.0.1.3  1995/01/30  14:39:20  ram
?RCS: patch49: new installmanfmt and AFS-lookup for formatted man pages
?RCS: patch49: can now handle installation prefix changes (from WED)
?RCS:
?RCS:
 Revision 3.0.1.2  1994/08/29  16:30:31  ram
?RCS: patch32: now uses installation prefix for default setting
?RCS:
?RCS: Revision 3.0.1.1  1993/09/13  16:09:22  ram
?RCS: patch10: allows for L1 man page extension (WAD)
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:13  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:manfmt manfmtexp installmanfmt: Getfile Loc Oldconfig cat manext \
 spackage Prefixit prefixexp Prefixup afs test
?MAKE: -pick add $@ %<
?Y:TOP
?S:manfmt:
?S: This variable contains the name of the directory in which formatted
?S: manual pages are to be put.  It is the responsibility of the
?S: Makefile.SH to get the value of this into the proper command. Note
?S: that you may have to do ~name substitution. Use manfmtexp otherwise.
?S:.
?S:manfmtexp:
?S: This is the same as the manfmt variable, but is filename expanded
?S: at configuration time, for programs not willing to deal with it at
?S: run-time.
?S:.
?S:installmanfmt:
?S: This variable is really
 the same as manfmtexp, unless you are using
?S: AFS in which case it points to the read/write location whereas
?S: mansrcexp only points to the read-only access location. For extra
?S: portability, you should only use this variable within your makefiles.
?S:.
?LINT:change manext
?T:lookpath
: determine where manual pages go
set manfmt manfmt
eval $prefixit
$cat <<EOM
```

```
$spackage has pre-formatted manual pages.  If you don't want these installed,
answer 'none' to the next question.

EOM
case "$manfmt" in
")
 lookpath="$prefixexp/catman/man1 $prefixexp/man/cat1"
 lookpath="$lookpath $prefixexp/catman/u_man/man1"
 lookpath="$lookpath $prefixexp/catman/l_man/man1"
 lookpath="$lookpath $prefixexp/catman/cat1 /usr/catman/local/man1"
 lookpath="$lookpath /usr/catman/manl /usr/man/cat1"
 lookpath="$lookpath /usr/catman/mann /usr/catman/l_man/man1"
 lookpath="$lookpath /usr/catman/u_man/man1 /usr/catman/man1"
 dflt=`./loc . none $lookpath`
 set dflt
 eval $prefixup
 ;;
*)  dflt="$manfmt"
 ;;
esac
fn=dn~
rp='Where
 do pre-formatted manual pages go?'
. ./getfile
if test "X$manfmtexp" != "X$ansexp"; then
 installmanfmt=''
fi
manfmt="$ans"
manfmtexp="$ansexp"
if $afs && $test "$manfmt"; then
 $cat <<EOM

Since you are running AFS, I need to distinguish the directory in which
manual pages reside from the directory in which they are installed (and from
which they are presumably copied to the former directory by occult means).

EOM
 case "$installmanfmt" in
 '') dflt=`echo $manfmtexp | sed 's#^/afs/#/afs/.#'`;;
 *) dflt="$installmanfmt";;
 esac
 fn=de~
 rp='Where will pre-formatted man pages be installed?'
 . ./getfile
 installmanfmt="$ans"
else
 installmanfmt="$manfmtexp"
```

```
fi

case "$manfmt" in
") manext='0';;
*l) manext=l;;
*n) manext=n;;
*o) manext=l;;
*p) manext=n;;
*C) manext=C;;
*L) manext=L;;
*L1) manext=L1;;
*) manext=1;;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/manfmt.U
No license file was found, but licenses were detected in source scan.

```
#  You may redistribute only under the terms of the Artistic Licence,
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/files/fixcpp
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/bindex
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/makegloss
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/lib/errnolist.mk
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: vendorhtml1dir.U,v 1.1 1999/07/08 18:32:57 doughera Exp doughera $
?RCS:
?RCS: Copyright (c) 1999, Andy Dougherty
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: vendorhtml1dir.U,v $
?RCS: Revision 1.1  1999/07/08 18:32:57  doughera
?RCS: Initial revision
?RCS:
?MAKE:vendorhtml1dir vendorhtml1direxp installvendorhtml1dir: html1dir Getfile \
 Setprefixvar Oldconfig Prefixit test vendorprefix prefix sed
?MAKE: -pick add $@ %<
?Y:TOP
?S:vendorhtml1dir:
?S: This variable contains the name of the directory for html
?S: pages.  It may have a ~ on the front.
```

```
?S: The standard distribution will put nothing in this
 directory.
?S: Vendors who distribute perl may wish to place their own
?S: html pages in this directory with
?S:  MakeMaker Makefile.PL INSTALLDIRS=vendor
?S: or equivalent.  See INSTALL for details.
?S:.
?S:vendorhtml1direxp:
?S: This variable is the ~name expanded version of vendorhtml1dir, so that you
?S: may use it directly in Makefiles or shell scripts.
?S:.
?D:installvendorhtml1dir=''
?S:installvendorhtml1dir:
?S: This variable is really the same as vendorhtml1direxp but may differ on
?S: those systems using AFS. For extra portability, only this variable
?S: should be used in makefiles.
?S:.
?LINT:change prefixvar
?LINT:set installvendorhtml1dir
: Set the vendorhtml1dir variables
case "$vendorprefix" in
'') vendorhtml1dir=''
 vendorhtml1direxp=''
 ;;
*) : determine where vendor-supplied html pages go.
 : There is no standard location, so try to copy the previously-selected
 : directory structure for the core html pages.
 : XXX Better default suggestions would be welcome.
 case "$vendorhtml1dir"
 in
 '') dflt=`echo "$html1dir" | $sed "s#^$prefix#$vendorprefix#"` ;;
 *) dflt=$vendorhtml1dir ;;
 esac
 case "$dflt" in
 '|' ') dflt=none ;;
 esac
 fn=dn+~
 rp='Pathname for the vendor-supplied html pages?'
 . ./getfile
 vendorhtml1dir="$ans"
 vendorhtml1direxp="$ansexp"
 ;;
esac
: Use ' ' for none so value is preserved next time through Configure
$test X"$vendorhtml1dir" = "X" && vendorhtml1dir=' '
prefixvar=vendorhtml1dir
. ./installprefix
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/vendorhtml1dir.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: libnlist.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: libnlist.U,v $
?RCS: Revision 3.0.1.1  1997/02/28  16:08:02  ram
?RCS: patch61: added usrinc and mips on the dependency line
?RCS: patch61: make sure we call ./mips
?RCS: patch61: added a ?LINT: hint
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:00  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:libnlist: Loc libpth Guess usrinc _a
?MAKE: -pick add $@ %<
?S:libnlist (libmld):
?S: This variable contains the name of the library required to
 get the
?S: definition of the nlist() function.  On a MIPS RISC/OS box, it is -lmld.
?S: Under Sys Vr4, it is -lelf.  Otherwise, its value is empty.
?S:.
?T:xxx
?LINT:use usrinc
: see if we need a special library for 'nlist()'
echo " "
: How about doing this if nlist is not in libc...
if ./mips ; then
 libnlist='-lmld'
else
 xxx=`./loc libelf$_a x $libpth`
 case "$xxx" in
 x)  ;;
 *)
  libnlist="$xxx"
  ;;
 esac
fi
case "$libnlist" in
```

```
") echo "No special library for nlist() seems necessary." >&4
 ;;
*)  echo "nlist() can be found in $libnlist." >&4
 ;;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/libnlist.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: h_sysfile.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: h_sysfile.U,v $
?RCS: Revision 3.0  1993/08/18  12:08:13  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:h_sysfile: Nothing
?MAKE: -pick add $@ %<
?S:h_sysfile:
?S: This is variable gets set in various places to tell i_sys_file that
?S: <sys/file.h> should be included.
?S:.
: Initialize h_sysfile
h_sysfile=false
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/h_sysfile.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1998 Jarkko Hietaniemi
?RCS:
?RCS: You may distribute under the terms of either the GNU General Public
?RCS: License or the Artistic License, as specified in the README file.
?RCS:
?X: This unit generates a $hasfield string that is used internally
?X: by Configure to check if this system has a field for a
?X: particular struct (of if this system has a particular struct!)
?X:
```

```
?X: To use it, say something like:
?X:  set d_statblocks stat st_blocks i_sysstat sys/stat.h
?X:  eval $hasfield
?X: Or, for more complicated sets of headers, do something like
?X: hdrs="$define sys/foo.h
?X:  $i_sysbar sys/bar.h
?X:  $i_syszot sys/zot.h
?X:  $i_zappa zappa.h"
?X: set d_statblocks stat st_blocks $hdrs
?X: eval $hasfield
?X:
?MAKE:Hasfield: Setvar rm_try test Compile
?MAKE: -pick add $@ %<
?T:varname struct field
?V:hasfield
: Define hasfield macro for Configure internal use
hasfield='varname=$1;
 struct=$2; field=$3; shift; shift; shift;
while $test $# -ge 2; do
 case "$1" in
 $define) echo "#include <$2>";;
 esac ;
   shift 2;
done > try.c;
echo "int main () { struct $struct foo; char* bar; bar = (char*)foo.$field; }" >> try.c;
set try;
if eval $compile; then
 val="$define";
else
 val="$undef";
fi;
set $varname;
eval $setvar;
$rm_try'
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/protos/Hasfield.U
No license file was found, but licenses were detected in source scan.

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?RCS: You may distribute under the terms of either the GNU General Public

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_sigsetjmp.U
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/compline/d_sigsetjmp.U
No license file was found, but licenses were detected in source scan.

?RCS: $Id: installprefix.U,v 1.1 1999/07/08 18:32:57 doughera Exp doughera $

```
?RCS:
?RCS: Copyright (c) 1999 Andy Dougherty
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: Original Author: Andy Dougherty <doughera@lafcol.lafayette.edu>
?RCS:
?RCS: $Log: installprefix.U,v $
?RCS: Revision 1.1  1999/07/08 18:32:57  doughera
?RCS: Initial revision
?RCS:
?RCS:
?MAKE:installprefix installprefixexp: Getfile Loc \
 Oldconfig afs cat package prefix
?MAKE: -pick add $@ %<
?S:installprefix:
?S: This variable holds the name of the directory below which
?S: "make install" will install the package.  For most users, this
?S: is the same
 as prefix.  However, it is useful for
?S: installing the software into a different (usually temporary)
?S: location after which it can be bundled up and moved somehow
?S: to the final location specified by prefix.
?S:.
?S:installprefixexp:
?S: This variable holds the full absolute path of installprefix
?S: with all ~-expansion done.
?S:.
: determine installation prefix for where package is to be installed.
if $afs; then
$cat <<EOM

Since you are running AFS, I need to distinguish the directory in which
files will reside from the directory in which they are installed (and from
which they are presumably copied to the former directory by occult means).

EOM
 case "$installprefix" in
 ") dflt=`echo $prefix | sed 's#^/afs/#/afs/.#'`;;
 *) dflt="$installprefix";;
 esac
else
$cat <<EOM
```

```
In some special cases, particularly when building $package for distribution,
it is convenient to distinguish the directory in which files should be
installed from the directory ($prefix) in which they will
eventually
 reside.  For most users, these two directories are the same.

EOM
 case "$installprefix" in
 ") dflt=$prefix ;;
 *) dflt=$installprefix;;
 esac
fi
fn=d~
rp='What installation prefix should I use for installing files?'
. ./getfile
installprefix="$ans"
installprefixexp="$ansexp"
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/installprefix.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: MailAuthor.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: Original Author: Graham Stoney <greyham@research.canon.oz.au>
?RCS:
?RCS: $Log: MailAuthor.U,v $
?RCS: Revision 3.0.1.5  1997/02/28  15:04:41  ram
?RCS: patch61: added support for src.U
?RCS:
?RCS: Revision 3.0.1.4  1994/08/29  16:05:09  ram
?RCS: patch32: avoid message sending if they said no previously
?RCS:
?RCS: Revision 3.0.1.3  1993/10/16  13:47:30  ram
?RCS: patch12: now makes sure user-specified address is in Internet format
?RCS:
?RCS: Revision
 3.0.1.2  1993/09/13  15:48:49  ram
?RCS: patch10: reverted to original intent by the Author himself
?RCS:
```

```
?RCS: Revision 3.0.1.1  1993/08/27  14:38:38  ram
?RCS: patch7: now prompts user for its e-mail address
?RCS: patch7: no longer silent when mail has been sent
?RCS:
?RCS: Revision 3.0  1993/08/18  12:05:06  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?RCS:
?X:
?X: This unit asks the user to please send a message to the author.
?X: To force inclusion of this unit, you must add it's name to the
?X: dependancies on the MAKE line in your private copy of End.U.
?X: This allows a smart mailagent program to automatically let users know
?X: when their package is out of date, and to allow users to be notified of
?X: any future patches.
?X:
?MAKE:MailAuthor mailpatches notifypatches usermail: test cat mailer \
 package Myread patchlevel baserev rm rsrc Oldconfig Configdir
?MAKE: -pick wipe $@ %<
?S:mailpatches:
?S: Indicates whether the user would like future patches to be mailed
?S: directly
 to them.
?S:.
?S:notifypatches:
?S: Indicates whether the user would like notification of future patches
?S: mailed to them.
?S:.
?S:usermail:
?S: This variable is used internally by Configure to keep track of the
?S: user e-mail address, where notifications or patches should be sent.
?S: A '-' value means the return address will be extracted by parsing
?S: the mail headers.
?S:.
?T:opt mailpatches notifypatches atsh status
: notify author that his package is used
if $test -f ../.config/mailauthor &&
 cmp $rsrc/patchlevel.h ../.config/mailauthor >/dev/null 2>&1
then
 status="say that you're using $package";
 case "$mailpatches" in
 true) status='have patches mailed to you as they are issued';;
 esac
 case "$notifypatches" in
 true) status='be notified when new patches are issued';;
 esac
 $cat <<EOM
```

```
You have already sent the author of $package (<MAINTLOC>) mail to
$status. If you wish, you may modify
your previous request by sending a new mail with different options.

EOM
 rp='Should
 I send a status update to <MAINTLOC>?'
 dflt=n
else
 $cat <<EOM

If you are able to send mail to the Internet, the author of $package would
really appreciate you letting me send off a quick note, just to say that you've
tried it. The author is more likely to spend time maintaining $package if it's
known that many people are using it, and you can even ask to get sent new
patches automagically this way if you wish. To protect your privacy, all I'll
say in the mail is the version of $package that you're using.

EOM
 rp='Should I send mail to <MAINTLOC>?'
 dflt=y
?X: Ensure default is 'n' if question has been asked already, in case they
?X: run Configure -d next time and answered 'n' the first time. Therefore,
?X: an empty nomail will be created later on even if no mail is sent.
 $test -f ../.config/nomail && dflt=n
fi
. ./myread
case "$ans" in
[yY]*)
 echo " "
 echo "Great! Your cooperation is really appreciated."
 $cat <<EOM

Some braindead sites do not set a proper return
 address in the From: header of
their outgoing mail, making it impossible to reply to mail they generate.
If your site is broken in this way, write to your system administrator and get
it fixed!!! In the mean time, you can manually specify the Internet e-mail
address by which the author can get back to you, should there be a need to do
so. If manually specified, it should be something like "user@domain.top".
If your mail system generates addresses correctly, specify "none".

EOM
 case "$usermail" in
 '-'|'') dflt=none;;
 *) dflt="$usermail";;
 esac
 rp='Manually specify a return address to use:'
```

```
. ./myread
case "$ans" in
none|*@*.*)
 case "$ans" in
 none) usermail='-';;
 *) usermail="$ans";;
 esac
 ;;
*)
 echo "(Address does not look like an Internet one -- ignoring it.)"
?X:
?X: If we can't trust their mailer or their return address, it's highly
?X: suggested that they only register and don't ask to get anything from
?X: the author, since it's likely to bounce in null-land --
 RAM.
?X:
 usermail='-'
 mailpatches=false
 notifypatches=false
 ;;
esac
echo " "
opt=''
rp='Would you like to have new patches automatically mailed to you?'
case "$mailpatches" in
true) dflt=y;;
*) dflt=n;;
esac
. ./myread
case "$ans" in
[yY]*) opt=' mailpatches'; mailpatches=true;;
*)
 mailpatches=false
 echo " "
 rp='Ok, would you like to simply be notified of new patches?'
 case "$notifypatches" in
 false) dflt=n;;
 *) dflt=y;;
 esac
 . ./myread
 echo " "
 case "$ans" in
 [yY]*) opt=' notifypatches'; notifypatches=true;;
 *)
  echo "Fine, I'll simply say that you've tried it then."
  notifypatches=false
  ;;
 esac
```

```
  ;;
 esac
 echo "Sending mail to <MAINTLOC>..." >&4
?X: Bizarre hack here. We can't just put @SH in the hereis lines below, because
?X: metaconfig will interpret it as a command, and there's no quoting mechanism.
?X: Do it via a variable instead.
 atsh='@SH'
 $mailer <MAINTLOC> <<EOM >/dev/null 2>&1
Subject: Command
Precedence: junk
To: <MAINTLOC>

$atsh
 package $usermail $package $baserev $patchlevel$opt
EOM
 $rm -f ../.config/mailauthor ../.config/nomail
 cp $rsrc/patchlevel.h ../.config/mailauthor
 ;;
*)
 case "$dflt" in
 "y")
  echo "Oh well, maybe next time."
  cp /dev/null ../.config/nomail
  ;;
 esac
 ;;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/MailAuthor.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic Licence,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic Licence; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: cf_email.U,v $
?RCS: Revision 3.0.1.1  1994/01/24  14:05:06  ram
?RCS: patch16: created
?RCS:
?RCS:
?MAKE:cf_email: cat cf_by test myhostname mydomain Oldconfig Myread
```

```
?MAKE: -pick add $@ %<
?S:cf_email:
?S: Electronic mail address of the person who ran Configure. This can be
?S: used by units that require the user's e-mail, like MailList.U.
?S:.
?T:cont maildomain
?LINT:extern MAILDOMAIN
: determine the e-mail address of the user who is running us
$cat <<EOM

I need to get your e-mail address
 in Internet format if possible, i.e.
something like user@host.domain. Please answer accurately since I have
no easy means to double check it. The default value provided below
is most probably close to reality but may not be valid from outside
your organization...

EOM
cont=x
while test "$cont"; do
 case "$MAILDOMAIN" in
 ")
  if $test -s /etc/mailname; then
   maildomain=`$cat /etc/mailname`
  else
   maildomain="$myhostname$mydomain"
  fi
  ;;
 *)  maildomain="$MAILDOMAIN";;
 esac
 case "$cf_email" in
 ") dflt="$cf_by@$maildomain";;
 *)  dflt="$cf_email";;
 esac
 rp='What is your e-mail address?'
 . ./myread
 cf_email="$ans"
 case "$cf_email" in
 *@*.*) cont=" ;;
 *)
  rp='Address does not look like an Internet one.  Use it anyway?'
  case "$fastread" in
  yes) dflt=y ;;
  *) dflt=n ;;
  esac
  . ./myread
  case "$ans" in
  y*) cont=" ;;
```

```
  *) echo " " ;;
  esac
  ;;
 esac
done
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/cf_email.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1996, Andy Dougherty
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Unix.U,v $
?RCS: Revision 3.0.1.1  1997/02/28  15:20:06  ram
?RCS: patch61: created
?RCS:
?X:
?X: The purpose of this unit is to define things that are common across all
?X: known UNIX platforms. If Configure is ported/used on a non-UNIX
?X: environment, then some of the following variables can be redefined in hint
?X: files.
?X:
?MAKE:Unix _a _o firstmakefile archobjs: Oldconfig
?MAKE: -pick add $@ %<
?S:_a (lib_ext):
?S: This variable defines the extension
 used for ordinary libraries.
?S: For unix, it is '.a'.  The '.' is included.  Other possible
?S: values include '.lib'.
?S:.
?S:_o (obj_ext):
?S: This variable defines the extension used for object files.
?S: For unix, it is '.o'.  The '.' is included.  Other possible
?S: values include '.obj'.
?S:.
?S:firstmakefile:
?S: This variable defines the first file searched by make.  On unix,
?S: it is makefile (then Makefile).  On case-insensitive systems,
?S: it might be something else.  This is only used to deal with
```

```
?S: convoluted make depend tricks.
?S:.
?S:archobjs:
?S: This variable defines any additional objects that must be linked
?S: in with the program on this architecture.  On unix, it is usually
?S: empty.  It is typically used to include emulations of unix calls
?S: or other facilities.  For perl on OS/2, for example, this would
?S: include os2/os2.obj.
?S:.
?INIT:: Extra object files, if any, needed on this platform.
?INIT:archobjs="
: Define several unixisms.
: Hints files
 or command line option can be used to override them.
case "$_a" in
") _a='.a';;
esac
case "$_o" in
") _o='.o';;
esac

@if firstmakefile
: Which makefile gets called first.  This is used by make depend.
case "$firstmakefile" in
") firstmakefile='makefile';;
esac

@end
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Unix.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Unix.U,v 3.0.1.1 1997/02/28 15:20:06 ram Exp $
?RCS:
?RCS: Copyright (c) 1991-1993, Raphael Manfredi
?RCS:
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 3.0.
?RCS:
?RCS: $Log: Unix.U,v $
?RCS: Revision 3.0.1.1  1997/02/28  15:20:06  ram
?RCS: patch61: created
?RCS:
?X:
```

```
?X: The purpose of this unit is to define things that are common across all
?X: known UNIX platforms. If Configure is ported/used on a non-UNIX
?X: environment, then some of the following variables can be redefined in hint
?X: files.
?X:
?MAKE:Unix _exe _a _o exe_ext lib_ext obj_ext path_sep \
 firstmakefile archobjs rm_try: Oldconfig rm
?MAKE: -pick add $@ %<
?S:_exe:
?S: This
 variable defines the extension used for executable files.
?S: DJGPP, Cygwin and OS/2 use '.exe'.  Stratus VOS uses '.pm'.
?S: On operating systems which do not require a specific extension
?S: for executable files, this variable is empty.
?S:.
?S:_a:
?S: This variable defines the extension used for ordinary library files.
?S: For unix, it is '.a'.  The '.' is included.  Other possible
?S: values include '.lib'.
?S:.
?S:_o:
?S: This variable defines the extension used for object files.
?S: For unix, it is '.o'.  The '.' is included.  Other possible
?S: values include '.obj'.
?S:.
?S:firstmakefile:
?S: This variable defines the first file searched by make.  On unix,
?S: it is makefile (then Makefile).  On case-insensitive systems,
?S: it might be something else.  This is only used to deal with
?S: convoluted make depend tricks.
?S:.
?S:archobjs:
?S: This variable defines any additional objects that must be linked
?S: in with the program on this architecture.  On unix, it is usually
?S: empty.
  It is typically used to include emulations of unix calls
?S: or other facilities.  For perl on OS/2, for example, this would
?S: include os2/os2.obj.
?S:.
?X: Metaconfig's Obsolete symbol stuff is too over-eager.  In the
?X: perl sources, it picks up things like "P" and "FLOCK" that are
?X: not used in the way Metaconfig thinks they are.  Thus I can't
?X: just declare these obsolete and then run metaconfig -o.
?X: Instead, I'll just handle them here.
?X: Sadly, history has conspired to give us a web of definitions;
?X: this could have been much simpler.
?S:lib_ext:
?S: This is an old synonym for _a.
```

```
?S:.
?S:exe_ext:
?S: This is an old synonym for _exe.
?S:.
?S:obj_ext:
?S: This is an old synonym for _o.
?S:.
?S:path_sep:
?S: This is an old synonym for p_ in Head.U, the character
?S: used to separate elements in the command shell search PATH.
?S:.
?S:rm_try:
?S: This is a cleanup variable for try test programs.
?S: Internal Configure use only.
?S:.
?LINT: change p_
?INIT::
 Trailing extension.  Override this in a hint file, if needed.
?INIT:: Extra object files, if any, needed on this platform.
?INIT:archobjs="
: Define several unixisms.
: Hints files or command line option can be used to override them.
: The convoluted testing is in case hints files set either the old
: or the new name.
case "$_exe" in
") case "$exe_ext" in
 ") ;;
 *) _exe="$exe_ext" ;;
 esac
 ;;
esac
case "$_a" in
") case "$lib_ext" in
   ") _a='.a';;
 *) _a="$lib_ext" ;;
 esac
 ;;
esac
case "$_o" in
") case "$obj_ext" in
 ") _o='.o';;
 *) _o="$obj_ext";;
 esac
 ;;
esac
case "$p_" in
") case "$path_sep" in
 ") p_=':';;
```

```
 *) p_="$path_sep";;
 esac
 ;;
esac
exe_ext=$_exe
lib_ext=$_a
obj_ext=$_o
path_sep=$p_

rm_try="$rm -f try try$_exe a.out .out try.[cho] try.$_o core core.try* try.core*"

@if firstmakefile
: Which makefile gets called first.  This is used by make depend.
case "$firstmakefile" in
") firstmakefile='makefile';;
esac

@end
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/modified/Unix.U
No license file was found, but licenses were detected in source scan.

```
/*
* $Id: scandir.C,v 3.0.1.1 1994/01/24 13:58:45 ram Exp ram $
*
*  Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
*
*  You may redistribute only under the terms of the Artistic Licence,
*  as specified in the README file that comes with the distribution.
*  You may reuse parts of this distribution only within the terms of
*  that same Artistic Licence; a copy of which may be found at the root
*  of the source tree for dist 4.0.
*
* $Log: scandir.C,v $
* Revision 3.0.1.1  1994/01/24  13:58:45  ram
* patch16: created
*
*/
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/lib/C/fake/scandir.C
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id$
?RCS:
?RCS: Copyright (c) 1991-1997, 2004-2006, Raphael Manfredi
?RCS:
```

```
?RCS: You may redistribute only under the terms of the Artistic License,
?RCS: as specified in the README file that comes with the distribution.
?RCS: You may reuse parts of this distribution only within the terms of
?RCS: that same Artistic License; a copy of which may be found at the root
?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: orderlib.U,v $
?RCS: Revision 3.0.1.4  1997/02/28  16:18:18  ram
?RCS: patch61: replaced .a with $_a all over the place
?RCS: patch61: likewise for .o replaced by $_o
?RCS: patch61: now uses the ar located by Loc.U
?RCS:
?RCS: Revision 3.0.1.3  1995/01/11  15:33:04  ram
?RCS: patch45: allows hint files to specify their own value for 'ranlib'
?RCS:
?RCS: Revision 3.0.1.2  1994/10/29  16:26:48  ram
?RCS: patch36: now performs a real small compile for accurate checks (ADO)
?RCS:
?RCS: Revision 3.0.1.1
  1994/08/29  16:31:17  ram
?RCS: patch32: use cc variable instead of hardwired 'cc' in 1st compile
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:26  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:orderlib ranlib: Loc ar cat test rm +cc +ccflags +ldflags +libs _a _o
?MAKE: -pick add $@ %<
?S:orderlib:
?S: This variable is "true" if the components of libraries must be ordered
?S: (with `lorder $* | tsort`) before placing them in an archive.  Set to
?S: "false" if ranlib or ar can generate random libraries.
?S:.
?S:ranlib:
?S: This variable is set to the pathname of the ranlib program, if it is
?S: needed to generate random libraries.  Set to ":" if ar can generate
?S: random libraries or if random libraries are not supported
?S:.
?F:!foobar
: see if ar generates random libraries by itself
echo " "
echo "Checking how to generate random libraries on your machine..." >&4
?X: Some systems (like MIPS) complain when running ar... Others like Ultrix
?X: need an explicit 'ar ts'
 to add the table of contents.
?X: Still others like Linux run ar ts successfully, but still need ranlib.
?X: This set of tests seems the minimum necessary to check out Linux.
?X: We need to explicitly put the entries in out-of-order so that Sun's ld
?X: will fail.  (Otherwise it complains, but gives an exit status of 0.)
```

```
echo 'int bar1() { return bar2(); }' > bar1.c
echo 'int bar2() { return 2; }' > bar2.c
$cat > foo.c <<'EOP'
int main() { printf("%d\n", bar1()); exit(0); }
EOP
$cc $ccflags -c bar1.c >/dev/null 2>&1
$cc $ccflags -c bar2.c >/dev/null 2>&1
$cc $ccflags -c foo.c >/dev/null 2>&1
$ar rc bar$_a bar2$_o bar1$_o >/dev/null 2>&1
if $cc $ccflags $ldflags -o foobar foo$_o bar$_a $libs > /dev/null 2>&1 &&
 ./foobar >/dev/null 2>&1; then
 echo "ar appears to generate random libraries itself."
 orderlib=false
 ranlib=":"
elif $ar ts bar$_a >/dev/null 2>&1 &&
 $cc $ccflags $ldflags -o foobar foo$_o bar$_a $libs > /dev/null 2>&1 &&
 ./foobar >/dev/null 2>&1; then
  echo "a table of contents
 needs to be added with 'ar ts'."
  orderlib=false
  ranlib="$ar ts"
else
?X: Allow hints to specify their own ranlib "script". For instance, on
?X: some NeXT machines, the timestamp put by ranlib is not correct, and this
?X: may raise tedious recompiles for nothing. Therefore, NeXT may add the
?X: ranlib='sleep 5; /bin/ranlib' line in their hints to "fix" that.
?X: (reported by Andreas Koenig <k@franz.ww.tu-berlin.de>)
 case "$ranlib" in
 :) ranlib=";;
 ")
  ranlib=`./loc ranlib X /usr/bin /bin /usr/local/bin`
  $test -f $ranlib || ranlib="
  ;;
 esac
 if $test -n "$ranlib"; then
  echo "your system has '$ranlib'; we'll use that."
  orderlib=false
 else
  echo "your system doesn't seem to support random libraries"
  echo "so we'll use lorder and tsort to order the libraries."
  orderlib=true
  ranlib=":"
 fi
fi
$rm -f foo* bar*
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/orderlib.U

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```
?RCS: $Id: lintlib.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
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?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: lintlib.U,v $
?RCS: Revision 3.0  1993/08/18  12:09:05  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?MAKE:lintlib lintlibexp: Getfile Loc Oldconfig
?MAKE: -pick add $@ %<
?S:lintlib:
?S: This variable holds the name of the directory in which the user wants
?S: to put public lint-library files for the package in question.  It is
?S: most often a local directory such as /usr/local/lib/lint. Programs using
?S: this variable must be prepared to
 deal with ~name expansion.
?S:.
?S:lintlibexp:
?S: This variable is the same as the lintlib variable, but is filename
?S: expanded at configuration time, for convenient use in your makefiles.
?S:.
: determine where public lint libraries go
case "$lintlib" in
") dflt=`./loc . "." /usr/local/lib/lint /usr/lib/lint /usr/lib`;;
*) dflt="$lintlib" ;;
esac
echo " "
fn=d~
rp='Where do you want to put the public lint libraries?'
. ./getfile
lintlib="$ans"
lintlibexp="$ansexp"
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/lintlib.U
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```
?RCS: $Id: vendorhtml3dir.U,v 1.1 1999/07/08 18:32:57 doughera Exp doughera $
?RCS:
?RCS: Copyright (c) 1999, Andy Dougherty
```

```
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?RCS:
?RCS: $Log: vendorhtml3dir.U,v $
?RCS: Revision 1.1  1999/07/08 18:32:57  doughera
?RCS: Initial revision
?RCS:
?MAKE:vendorhtml3dir vendorhtml3direxp installvendorhtml3dir: html3dir Getfile \
 Oldconfig Setprefixvar Prefixit test vendorprefix prefix sed
?MAKE: -pick add $@ %<
?Y:TOP
?S:vendorhtml3dir:
?S: This variable contains the name of the directory for html
?S: library pages.  It may have a ~ on the front.
?S: The standard distribution will put nothing
 in this directory.
?S: Vendors who distribute perl may wish to place their own
?S: html pages for modules and extensions in this directory with
?S:  MakeMaker Makefile.PL INSTALLDIRS=vendor
?S: or equivalent.  See INSTALL for details.
?S:.
?S:vendorhtml3direxp:
?S: This variable is the ~name expanded version of vendorhtml3dir, so that you
?S: may use it directly in Makefiles or shell scripts.
?S:.
?D:installvendorhtml3dir="
?S:installvendorhtml3dir:
?S: This variable is really the same as vendorhtml3direxp but may differ on
?S: those systems using AFS. For extra portability, only this variable
?S: should be used in makefiles.
?S:.
?LINT:change prefixvar
?LINT:set installvendorhtml3dir
: Set the vendorhtml3dir variables
case "$vendorprefix" in
") vendorhtml3dir="
 vendorhtml3direxp="
 ;;
*) : determine where vendor-supplied module html pages go.
 : There is no standard location, so try to copy the previously-selected
 : directory structure for the core html pages.
 : XXX Better default
 suggestions would be welcome.
 case "$vendorhtml3dir" in
```

```
 ") dflt=`echo "$html3dir" | $sed "s#^$prefix#$vendorprefix#"` ;;
 *) dflt=$vendorhtml3dir ;;
 esac
 case "$dflt" in
 "|' ') dflt=none ;;
 esac
 fn=dn+~
 rp='Pathname for the vendor-supplied html pages?'
 . ./getfile
 vendorhtml3dir="$ans"
 vendorhtml3direxp="$ansexp"
 ;;
esac
: Use ' ' for none so value is preserved next time through Configure
$test X"$vendorhtml3dir" = "X" && vendorhtml3dir=' '
prefixvar=vendorhtml3dir
. ./installprefix
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/U/installdirs/vendorhtml3dir.U
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```
?RCS: $Id: libyacc.U 1 2006-08-24 12:32:52Z rmanfredi $
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?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: libyacc.U,v $
?RCS: Revision 3.0.1.4  1997/02/28  16:09:19  ram
?RCS: patch61: replaced .a with $_a all over the place
?RCS:
?RCS: Revision 3.0.1.3  1994/05/13  15:27:12  ram
?RCS: patch27: added byacc case (ADO)
?RCS:
?RCS: Revision 3.0.1.2  1994/05/06  15:09:01  ram
?RCS: patch23: now uses full library path instead of -l notation
?RCS:
?RCS: Revision 3.0.1.1  1994/01/24  14:13:49  ram
?RCS: patch16: un-obsoleted this unit for smooth yacc compilations
?RCS:
?RCS:
 Revision 3.0  1993/08/18  12:09:04  ram
?RCS: Baseline for dist 3.0 netwide release.
```

```
?RCS:
?MAKE:libyacc: Loc yacc libpth _a
?MAKE: -pick add $@ %<
?S:libyacc:
?S: This variable contains the argument to pass to the loader in order
?S: to get the yacc library routines.  If there is no yacc or yacc
?S: library, it is null.
?S:.
?T:xxx
: see if we should include -ly
echo " "
case "$yacc" in
*byacc*)
 echo "You are using byacc, so I won't look for a yacc library." >&4
 libyacc=''
 ;;
*yacc)
 xxx=`./loc liby$_a x $libpth`
 case "$xxx" in
 x)
  echo "No yacc library found." >&4
  libyacc=''
  ;;
 *)
  echo "yacc library found in $xxx." >&4
  libyacc="$xxx"
  ;;
 esac
 ;;
*bison*)
 echo "You are using bison, so I won't look for a yacc library." >&4
 libyacc=''
 ;;
*)
echo "You don't seem to have yacc, so I won't look for the yacc library." >&4
 libyacc=''
 ;;
esac
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/libyacc.U
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```
?RCS: $Id: longsize.U 1 2006-08-24 12:32:52Z rmanfredi $
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```

```
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?RCS:
?RCS: $Log: longsize.U,v $
?RCS: Revision 3.0.1.2  1997/02/28  16:09:35  ram
?RCS: patch61: code moved to intsize.U
?RCS:
?RCS: Revision 3.0.1.1  1994/10/29  16:24:31  ram
?RCS: patch36: added ?F: line for metalint file checking
?RCS:
?RCS: Revision 3.0  1993/08/18  12:09:07  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: 'longsize' is now defined within intsize.U
?X:
?LINT: empty
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/longsize.U
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```
?RCS: $Id: d_group.U 1 2006-08-24 12:32:52Z rmanfredi $
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?RCS:
?RCS: Original Author: Andy Dougherty <doughera@lafcol.lafayette.edu>
?RCS:
?RCS: $Log: d_group.U,v $
?RCS: Revision 3.0.1.2  1997/02/28  15:34:52  ram
?RCS: patch61: useless unit dropped.
?RCS:
?RCS: Revision 3.0.1.1  1994/08/29  16:07:48  ram
?RCS: patch32: created by ADO
?RCS:
?X:
?X: Useless unit dropped.
?X:
?LINT:empty
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/d_group.U
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```
?RCS: $Id: Nothing.U 1 2006-08-24 12:32:52Z rmanfredi $
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?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Nothing.U,v $
?RCS: Revision 3.0  1993/08/18  12:05:09  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: The purpose of this file is to supply an empty target for the private
?X: Makefile built by metaconfig to order the units.
?X:
?MAKE:Nothing: Head
```

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Nothing.U
No license file was found, but licenses were detected in source scan.

```
?RCS: $Id: Warn_v7ND.U 1 2006-08-24 12:32:52Z rmanfredi $
?RCS:
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?RCS: of the source tree for dist 4.0.
?RCS:
?RCS: $Log: Warn_v7ND.U,v $
?RCS: Revision 3.0.1.1  1994/10/29  16:01:46  ram
?RCS: patch36: call ./v7 explicitly instead of relying on PATH
?RCS:
?RCS: Revision 3.0  1993/08/18  12:05:18  ram
?RCS: Baseline for dist 3.0 netwide release.
?RCS:
?X:
?X: This unit warns V7 sites that they may not have a non-blocking read.
?X: This unit needs to be mentioned in End.U to get included.
```

```
?X:
?MAKE:Warn_v7ND: package Guess
?MAKE: -pick add $@ %<
: Warnings
if ./v7; then
 cat
 <<EOM

NOTE: many V7 systems do not have a way to do a non-blocking read.  If you
don't have any of FIONREAD, O_NDELAY, or rdchk(), the $package package
may not work as well as it might.  It might not work at all.
EOM
fi

Found in path(s):
* /perl-5-38-2-orig-regen-configure-1-tar-xz/metaconfig-5.38.0/dist/U/Warn_v7ND.U
```

# 1.1502 kimmachinegun-automemlimit 0.7.4

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# 1.1503 go-runc 1.1.0

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# 1.1504 gofrs-uuid 4.4.0+incompatible

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# 1.1505 destroy 1.2.0

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# 1.1506 go.mongodb.org-mongo-driver 1.17.4

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```
package migration

import "fmt"

// Notice is a migration warning
type Notice struct {
 Plugin     string
 Option     string
 Severity   string // 'deprecated', 'removed', or 'unsupported'
 ReplacedBy string
 Additional string
 Version    string
}

func (n *Notice) ToString() string {
 s := ""
 if n.Option == "" {
  s += fmt.Sprintf(`Plugin "%v" `, n.Plugin)
 } else {
  s += fmt.Sprintf(`Option "%v" in plugin "%v" `, n.Option, n.Plugin)
 }
```

```
 if n.Severity == SevUnsupported {
  s += "is unsupported by this migration tool in " + n.Version + "."
 } else if n.Severity == SevNewDefault {
  s += "is added as a default in " + n.Version + "."
 } else {
  s += "is " + n.Severity + " in " + n.Version + "."
 }
 if n.ReplacedBy != "" {
  s += fmt.Sprintf(` It is replaced by "%v".`, n.ReplacedBy)
 }
 if n.Additional != "" {
  s += " " + n.Additional
 }
 return s
}

const (
 // The following statuses are used to indicate the state of support/deprecation in a given release.
 SevDeprecated  = "deprecated"
  // deprecated, but still completely functional
 SevIgnored     = "ignored"     // if included in the corefile, it will be ignored by CoreDNS
 SevRemoved     = "removed"     // completely removed from CoreDNS, and would cause CoreDNS to exit if present
in the Corefile
 SevNewDefault  = "newdefault"  // added to the default corefile.  CoreDNS may not function properly if it is not
present in the corefile.
 SevUnsupported = "unsupported" // the plugin/option is not supported by the migration tool

 // The following statuses are used for selecting/filtering notifications
 SevAll = "all" // show all statuses
)
```

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==========
The common/types/pb/equal.go modification of proto.Equal logic
==========
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package spec

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```
//
// For more information: http://goo.gl/8us55a#licenseObject
type License struct {
 Name string `json:"name,omitempty"`
 URL  string `json:"url,omitempty"`
}
```

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procfs provides functions to retrieve system, kernel and process
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==========
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A. HISTORY OF THE SOFTWARE
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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of
the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |

| | | | | |
|---|---|---|---|---|
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.2 | 2.1.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | | | | |
| 2.1.2 | 2002 | PSF | yes | |
| 2.2.1 | 2.2 | 2002 | PSF | yes |
| 2.2.2 | 2.2.1 | 2002 | PSF | yes |
| 2.2.3 | 2.2.2 | 2003 | PSF | yes |
| 2.3 | 2.2.2 | 2002-2003 | PSF | yes |
| 2.3.1 | 2.3 | 2002-2003 | PSF | yes |
| 2.3.2 | 2.3.1 | 2002-2003 | PSF | yes |
| 2.3.3 | 2.3.2 | 2002-2003 | PSF | yes |
| 2.3.4 | 2.3.3 | 2004 | PSF | yes |
| 2.3.5 | 2.3.4 | 2005 | PSF | yes |
| 2.4 | 2.3 | 2004 | PSF | yes |
| 2.4.1 | 2.4 | 2005 | PSF | yes |
| 2.4.2 | 2.4.1 | 2005 | PSF | yes |
| 2.4.3 | 2.4.2 | 2006 | PSF | yes |
| 2.4.4 | 2.4.3 | 2006 | PSF | yes |
| 2.5 | 2.4 | 2006 | PSF | yes |
| 2.5.1 | 2.5 | 2007 | PSF | yes |
| 2.5.2 | 2.5.1 | 2008 | PSF | yes |
| 2.5.3 | 2.5.2 | 2008 | PSF | yes |
| 2.6 | 2.5 | 2008 | PSF | yes |
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| 2.6.2 | 2.6.1 | 2009 | PSF | yes |
| 2.6.3 | 2.6.2 | 2009 | PSF | yes |
| 2.6.4 | 2.6.3 | 2009 | PSF | yes |
| 2.6.5 | 2.6.4 | 2010 | PSF | yes |
| 3.0 | 2.6 | 2008 | PSF | yes |
| 3.0.1 | 3.0 | 2009 | PSF | yes |
| 3.1 | 3.0.1 | 2009 | PSF | yes |
| 3.1.1 | 3.1 | 2009 | PSF | yes |
| 3.1.2 | 3.1 | 2010 | PSF | yes |
| 3.2 | 3.1 | 2010 | PSF | yes |

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- Francisco Martn Brugu
- Nicolas Cadou
- Godefroid Chapelle
- Julien Courteau
- Christophe Combelles
- Jason R. Coombs
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---

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Email local part: Philip.Hazel
Email domain: gmail.com

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# 1.1538 shared-mime-info 2.1-5.el9

## 1.1538.1 Available under license :

```
#!/usr/bin/env bash
# MIT licenses will each have a unique MD5 sum since they contain a unique copyright.
# This script will read the license file into memory, strip out the copyright, and then
# generate an MD5 that is not unique and can be matched against a known MIT MD5 sum.
set -e

calculate_md5_sum() {
 local FILE="$1"

 # Read the contents of the file into a variable
 local raw_license_text=$(<"$FILE")

 # Convert to lowercase
 local lowercase_license_text="${raw_license_text,,}"

 # Remove anything before the beginning of the license
 local stripped_license_text=$(awk '/permission is hereby granted,/{p=1} p' <<< "$lowercase_license_text")

 # Replace line breaks (Windows or Linux) with a single space
 local replaced_linebreaks=$(tr '\r\n' ' ' <<< "$stripped_license_text")

 # Replace multiple spaces with a single space
 local normalized_license_text=$(tr -s ' ' <<< "$replaced_linebreaks")

 # Strip away any non-printable, non-whitespace characters
 local clean_unprintable_license_text=$(tr
 -cd '[:print:][:space:]' <<< "$normalized_license_text")

 # Remove punctuation and special characters
 local clean_license_text=$(echo "$clean_unprintable_license_text" | sed 's/[^a-zA-Z ]//g')

 # Calculate the MD5 sum of the cleaned license text
 local MD5SUM=$(echo -n "$clean_license_text" | md5sum | awk '{print $1}')

 # Output the MD5 sum
 echo "$MD5SUM"
```

```
}

# Check if the FILE argument is provided
if [ -z "$1" ]; then
 echo "Please provide a FILE as an argument."
 exit 1
fi

# Invoke the function with the provided FILE argument
calculate_md5_sum "$1"
```

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# 1.1540 grep 3.6-5.el9

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# 1.1544 libxcrypt 4.4.18-3.el9

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# 1.1551 p-limit 2.3.0

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# 1.1554 graphene 1.10.6-2.el9

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# 1.1555 tomli 2.0.1

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# 1.1567 findutils 1:4.8.0-7.el9

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```
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#ifndef _BASENAME_LGPL_H
#define _BASENAME_LGPL_H

#include <stddef.h>

#ifndef DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif


/*
 Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
```

```
          FILENAME      RESULT
          "foo.c"       "foo.c"
          "foo/bar.c"   "bar.c"
          "/foo/bar.c"  "bar.c"
          "foo/bar/"    "bar/"
          "foo/bar//"   "bar//"
          "/"           ""
          "//"          ""
          ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(), defined in <string.h>, does
      not consider trailing slashes to be part of the component:
          FILENAME
      RESULT
          "foo/bar/"    ""
          "foo/bar//"   ""
    * The 'basename' command eliminates trailing slashes and for a root
      produces a non-empty result:
          FILENAME      RESULT
          "foo/bar/"    "bar"
          "foo/bar//"   "bar"
          "/"           "/"
          "//"          "/"
*/
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;


#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
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# 1.1588 libxcrypt 4.4.18-3.el9

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Aymeric Augustin
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Ned Batchelder
Wouter Bolsterlee
Brett Cannon
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Ben Darnell
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# 1.1629 flock 0.8.1

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---

- Chris McDonough, 2011/02/16
- Wichert Akkerman, 2012/02/02
This package contains a modified version of ca-bundle.crt:

ca-bundle.crt -- Bundle of CA Root Certificates

Certificate data from Mozilla as of: Thu Nov 3 19:04:19 2011#
This is a bundle of X.509 certificates of public Certificate Authorities
(CA). These were automatically extracted from Mozilla's root certificates
file (certdata.txt). This file can be found in the mozilla source tree:
http://mxr.mozilla.org/mozilla/source/security/nss/lib/ckfw/builtins/certdata.txt?raw=1#
It contains the certificates in PEM format and therefore
can be directly used with curl / libcurl / php_curl, or with
an Apache+mod_ssl webserver for SSL client authentication.

Just configure this file as the SSLCACertificateFile.#

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@(#) $RCSfile: certdata.txt,v $
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A. HISTORY OF THE SOFTWARE
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Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python's

principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.2 | 2.1.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
| 2.2.1 | 2.2 | 2002 | PSF | yes |
| 2.2.2 | 2.2.1 | 2002 | PSF | yes |
| 2.2.3 | 2.2.2 | 2003 | PSF | yes |
| 2.3 | 2.2.2 | 2002-2003 | PSF | yes |
| 2.3.1 | 2.3 | 2002-2003 | PSF | yes |
| 2.3.2 | 2.3.1 | 2002-2003 | PSF | yes |
| 2.3.3 | 2.3.2 | 2002-2003 | PSF | yes |
| 2.3.4 | 2.3.3 | 2004 | PSF | yes |
| 2.3.5 | 2.3.4 | 2005 | PSF | yes |
| 2.4 | 2.3 | 2004 | PSF | yes |
| 2.4.1 | 2.4 | 2005 | PSF | yes |

| | | | | |
|---|---|---|---|---|
| 2.4.2 | 2.4.1 | 2005 | PSF | yes |
| 2.4.3 | 2.4.2 | 2006 | PSF | yes |
| 2.4.4 | 2.4.3 | 2006 | PSF | yes |
| 2.5 | 2.4 | 2006 | PSF | yes |
| 2.5.1 | 2.5 | 2007 | PSF | yes |
| 2.5.2 | 2.5.1 | 2008 | PSF | yes |
| 2.5.3 | 2.5.2 | 2008 | PSF | yes |
| 2.6 | 2.5 | 2008 | PSF | yes |
| 2.6.1 | 2.6 | 2008 | PSF | yes |
| 2.6.2 | 2.6.1 | 2009 | PSF | yes |
| 2.6.3 | 2.6.2 | 2009 | PSF | yes |
| 2.6.4 | 2.6.3 | 2009 | PSF | yes |
| 2.6.5 | 2.6.4 | 2010 | PSF | yes |
| 2.7 | 2.6 | 2010 | PSF | yes |

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A. HISTORY OF THE SOFTWARE
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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.2 | 2.1.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
| 2.2.1 | 2.2 | 2002 | PSF | yes |
| 2.2.2 | 2.2.1 | 2002 | PSF | yes |
| 2.2.3 | 2.2.2 | 2003 | PSF | yes |
| 2.3 | 2.2.2 | 2002-2003 | PSF | yes |
| 2.3.1 | 2.3 | 2002-2003 | PSF | yes |
| 2.3.2 | 2.3.1 | 2002-2003 | PSF | yes |
| 2.3.3 | 2.3.2 | 2002-2003 | PSF | yes |

| | | | | |
|---|---|---|---|---|
| 2.3.4 | 2.3.3 | 2004 | PSF | yes |
| 2.3.5 | 2.3.4 | 2005 | PSF | yes |
| 2.4 | 2.3 | 2004 | PSF | yes |
| 2.4.1 | 2.4 | 2005 | PSF | yes |
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| 2.4.4 | 2.4.3 | 2006 | PSF | yes |
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| 2.6.5 | 2.6.4 | 2010 | PSF | yes |
| 3.0 | 2.6 | 2008 | PSF | yes |
| 3.0.1 | 3.0 | 2009 | PSF | yes |
| 3.1 | 3.0.1 | 2009 | PSF | yes |
| 3.1.1 | 3.1 | 2009 | PSF | yes |
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| 3.2 | 3.1 | 2010 | PSF | yes |

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# 1.1641 jaxb-runtime 2.3.1

# 1.1642 source-map-support 0.5.21

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# 1.1643 javax-activation 2.1.4

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```
---
name: Handle External Contributor PRs

on:
 # run in the context of the base branch, so that it still works in PR from forks
 pull_request_target:
   types: [opened, reopened]

permissions: {}

jobs:
 external-contributor-prs:
   name: Handle Fork PRs
   runs-on: ubuntu-latest
   permissions:
     pull-requests: write
   if: github.event.pull_request.head.repo.full_name != github.repository
   steps:
     - name: Checkout repository
       uses: actions/checkout@11bd71901bbe5b1630ceea73d27597364c9af683 # v4.2.2
       with:
         ref: main
         fetch-depth: 0
         persist-credentials: false
     - name: Install dda
       uses: ./.github/actions/install-dda
       with:
```

```
        features: legacy-tasks
    - name: Set label on external contributor PRs
      run: |
        dda inv -- -e github.handle-community-pr --repo="$GH_REPO" --pr-id="$NUMBER" --labels="$LABELS"
      env:
        GH_TOKEN: ${{ secrets.GITHUB_TOKEN }}
        GITHUB_TOKEN:
 ${{ secrets.GITHUB_TOKEN }}
        SLACK_DATADOG_AGENT_BOT_TOKEN: ${{ secrets.SLACK_DATADOG_AGENT_BOT_TOKEN }}
        GH_REPO: ${{ github.repository }}
        NUMBER: ${{ github.event.number }}
        # labels is a comma-separated list of tags
        LABELS: community
Component,Origin,License
devenv,github.com/StefanScherer/packer-windows,MIT
devenv,github.com/luciusbono/Packer-Windows10,MIT
```

# 1.1645 colorama 0.4.6

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# 1.1646 golang-protobuf-extensions 1.0.4

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# 1.1650 ipld-go-ipld-prime 0.21.0

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# 1.1652 open-golang 0.0.0-20200116055534-eef842397966

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/opt/cola/permits/2711855064_1764239348.3584223/0/mksh-59c-5.el9-1.src.rpm-cosi-expand-archive-d76xprb0/mksh.specSummary: MirBSD enhanced version of the Korn Shell

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*
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/* $OpenBSD: expr.c,v 1.24 2014/12/08 14:26:31 otto Exp $ */

Found in path(s):
* /mksh-59c-5.el9-1.src.rpm-cosi-expand-archive-d76xprb0/mksh-R59c.tgz-cosi-expand-archive-DuTNIFSJ/mksh/expr.c

# 1.1654 berkeley-db 5.3.28

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/db5-3-5-3-28-orig-tar/db5-3-5-3-28-orig-tar-1-xz/db5.3_5.3.28.orig.tar (1): binary file matches

Found in path(s):
* /bin/grep

# 1.1655 adwaita-icon-theme 40.1.1-3.el9

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# 1.1656 kubernetes-client 0.32.0

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# 1.1664 packet 1.1.2

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# 1.1677 vault-api 1.22.0

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#### _Beep Boop, 6/8/18_

#### By _**Brian Palowski**_

## Description

_A website that takes a users inputed numbers and converts them to output eaither Beep or Boop depending on the number_

## Setup/Installation Requirements

* _Clone or download the repository._
*_https://github.com/bpalowski/Beep-Boop
* _ When downloaded, unzip the files into a single directory._
* _Open the  HTML file "index.html", then open it using a web browser._

## Specs

* _Program checks if number is either a 1 and 0 or divisible by 3._
* _Function checks whether the numbers 1 or 0 are to be replaced with the string Beep or Boop_
* _If there are numbers divisible by 3 then the number is replaced with a string "I'm sorry, Dave. I'm afraid I can't do that."._
* _There is no limit to what number you can put in the input box._

## Known Bugs

_No known bugs_

## Support and contact details

_If you would like to contact me for any further information
 or update requests, email me at b.scott9592@gmail.com_

## Technologies Used

_HTML/CSS, Bootstrap, Javascript, jQuery_

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# Contributor Ladder

Within the Kubernetes community, the concept of a contributor ladder has been developed to define how individuals can earn formal roles within the project. The Gateway API contributor ladder largely follows the [roles defined by the broader Kubernetes community](https://github.com/kubernetes/community/blob/master/community-membership.md), though there are some aspects that are unique to this community.

## Goals

We hope that this doc will provide an initial step towards the following goals:

* Ensure the long term health of the Gateway API community
* Encourage new contributors to work towards formal roles and responsibilities in the project
* Clearly define the path towards leadership roles
* Develop a strong leadership pipeline so we have great candidates to fill project leadership roles

## Scope

The following repositories are covered by this doc:

* [kubernetes-sigs/gateway-api](https://github.com/kubernetes-sigs/gateway-api)
* [kubernetes-sigs/ingress2gateway](https://github.com/kubernetes-sigs/ingress2gateway)
* kubernetes-sigs/blixt (once migration is complete)

Within each of these projects, there are opportunities to become an approver or reviewer for either the entire project, or a subset of that project. For example, you could become a reviewer or approver focused on just docs, GEPs, API changes, or conformance tests.

## General Guidelines

### 1. Everyone is welcome

We appreciate all contributions. You dont need to have a formal role in the project to make or review pull requests,

and help with issues or discussions. Accepting a formal role within the project is entirely optional.

### 2. These roles require continued contributions

Applying for one of the roles defined above should only be done if you intend to continue to contribute at a level that would merit that role. If for any reason you are unable to continue in one of the roles above, please resign. Members with an extended period away from the project with no activity will be removed from the Kubernetes GitHub Organizations and will be required to go through the org membership process again after re-familiarizing themselves with the current state.

### 3. Dont merge without consensus

If you have reason to believe that a change may be contentious, please wait for additional perspectives from others before merging any PRs. Even if you have access to merge a PR, it doesnt mean you should. Although we cant have PRs blocked indefinitely, we need to make sure everyone has had a chance to present their perspective.

### 4. Start a discussion

If youre interested in working towards one of these roles, please reach out to a Gateway API maintainer on Slack.

## Contributor Ladder

The Gateway API contributor ladder has the following steps:

1. Member
2. Reviewer
3. Approver
4. Maintainer

This is also a GAMMA-specific leadership role that does not fit as cleanly on this ladder. All of these roles will be defined in more detail below.

## Member, Reviewer, and Approver

The first steps on the contributor ladder are already [clearly defined in the upstream Kubernetes Community](https://github.com/kubernetes/community/blob/master/community-membership.md#community-membership).
Gateway API follows those guidelines along with the rest of the Kubernetes community. Within Gateway API, there are a variety of areas one can become a reviewer or approver, this includes:

* Conformance
* Documentation
* GEPs

## Maintainers and GAMMA Leads

The final steps on the contributor ladder represent large overall leadership roles within the project as a whole. The spaces available for these roles are limited (generally 3-4 people in each role is ideal). Wherever possible, we try to ensure that different companies are represented in these roles.

### Maintainers

Gateway API Maintainers are known as [Subproject Owners](https://github.com/kubernetes/community/blob/master/community-membership.md#subproject-owner) within the Kubernetes community. To become a Gateway API Maintainer, the most important things we expect are:

* Long term, sustained contributions to Gateway API for at least 6 months
* Deep understanding of technical goals and direction of the project
* Successfully authored and led significant enhancement proposals
* Approver for at least 3 months
* Ability to lead community meetings

In addition to all of the expectations described above, we expect maintainers to set the technical direction and goals for the project. This role is critical to the health of the project, maintainers should mentor new approvers and reviewers, and ensure that there are healthy processes in place for discussion and decision making. Finally, maintainers are ultimately responsible for releasing new versions of the API.

## GAMMA Leads

The concept of GAMMA Leads does not have a perfect parallel on the upstream Kubernetes community ladder. They are essentially Subproject Owners, but for the GAMMA initiative, which is a major initiative within Gateway API.

To become a GAMMA lead, the most important thing we expect are:

* Significant experience with Service Mesh implementation(s)
* Deep understanding of technical goals and direction of the project
* Long term, sustained contributions to the GAMMA initiative for at least 6 months
* Ability to lead community meetings

In addition to all of the expectations described above, we expect GAMMA Leads to

set the technical direction and goals for the GAMMA initiative. They should ensure that there are healthy processes in place for discussion and decision making and that the release goals and milestones are clearly defined.

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# 1.1692 go.etcd.io-raft 3.6.0

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package spec

// License information for the exposed API.
//
// For more information: http://goo.gl/8us55a#licenseObject
type License struct {
 Name string `json:"name,omitempty"`
 URL  string `json:"url,omitempty"`
}
# This source code was written by the Go contributors.
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package spec

import "testing"

func TestIntegrationLicense(t *testing.T) {
 license := License{Name: "the name", URL: "the url"}
 const licenseJSON = `{"name":"the name","url":"the url"}`
```

```
const licenseYAML = "name: the name\nurl: the url\n"

assertSerializeJSON(t, license, licenseJSON)
assertParsesJSON(t, licenseJSON, license)
}
```

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# 1.1701 python-certifi 2021.05.30

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ca-bundle.crt -- Bundle of CA Root Certificates

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This is a bundle of X.509 certificates of public Certificate Authorities
(CA). These were automatically extracted from Mozilla's root certificates
file (certdata.txt).  This file can be found in the mozilla source tree:
http://mxr.mozilla.org/mozilla/source/security/nss/lib/ckfw/builtins/certdata.txt?raw=1#
It contains the certificates in PEM format and therefore
can be directly used with curl / libcurl / php_curl, or with
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@(#) $RCSfile: certdata.txt,v $
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# 1.1702 ipfs-go-ds-leveldb 0.5.0

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localtime.go, localtime_test.go:

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Changes:
* Renamed files from civil* to localtime*.
* Package changed from civil to toml.
* 'Local' prefix added to all structs.
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#!/usr/bin/env bash
# MIT licenses will each have a unique MD5 sum since they contain a unique copyright.
# This script will read the license file into memory, strip out the copyright, and then
# generate an MD5 that is not unique and can be matched against a known MIT MD5 sum.
set -e

calculate_md5_sum() {
 local FILE="$1"

 # Read the contents of the file into a variable

```
 local raw_license_text=$(<"$FILE")

 # Convert to lowercase
 local lowercase_license_text="${raw_license_text,,}"

 # Remove anything before the beginning of the license
 local stripped_license_text=$(awk '/permission is hereby granted,/{p=1} p' <<< "$lowercase_license_text")

 # Replace line breaks (Windows or Linux) with a single space
 local replaced_linebreaks=$(tr '\r\n' ' ' <<< "$stripped_license_text")

 # Replace multiple spaces with a single space
 local normalized_license_text=$(tr -s ' ' <<< "$replaced_linebreaks")

 # Strip away any non-printable, non-whitespace characters
 local clean_unprintable_license_text=$(tr
 -cd '[:print:][:space:]' <<< "$normalized_license_text")

 # Remove punctuation and special characters
 local clean_license_text=$(echo "$clean_unprintable_license_text" | sed 's/[^a-zA-Z ]//g')

 # Calculate the MD5 sum of the cleaned license text
 local MD5SUM=$(echo -n "$clean_license_text" | md5sum | awk '{print $1}')

 # Output the MD5 sum
 echo "$MD5SUM"
}

# Check if the FILE argument is provided
if [ -z "$1" ]; then
 echo "Please provide a FILE as an argument."
 exit 1
fi

# Invoke the function with the provided FILE argument
calculate_md5_sum "$1"
```

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# 1.1716 @emotion/use-insertion-effect-with-fallbacks 1.0.1

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# 1.1717 dylibso-observe-sdk-go 0.0.0-20240819160327-2d926c5d788a

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[This is the first released version of the Lesser GPL. It also counts

as the successor of the GNU Library Public License, version 2, hence the
version number 2.1.]
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@subheading Preamble

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it too, but we suggest you first think carefully about whether this
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use in any particular case, based on the explanations below.

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rights. These restrictions translate to certain responsibilities for
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or if you modify it.

For example, if you distribute copies of the library, whether gratis
or for a fee, you must give the recipients all the rights that we gave
you. You must make sure that they, too, receive or can get the source
code. If you link other code with the library, you must provide
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with the library after making changes to the library and recompiling
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We protect your rights with a two-step method: (1) we copyright the
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modified by someone else and passed on, the recipients should know

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When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the @dfn{Lesser} General Public License because it does @emph{Less} to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

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non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a ``work based on the library'' and a ``work that uses the library''. The former
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A ``library'' means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The ``Library'', below, refers to any such software library or work which has been distributed under these terms. A ``work based on the Library'' means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it,
either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term ``modification''.)

``Source code'' for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

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and what the program that uses the Library does.

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You must cause the files modified to carry prominent notices
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If a facility in the modified Library refers to a function or a
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in the event an application does not supply such function or
table, the facility still operates, and performs whatever part of
its purpose remains meaningful.

(For example, a function in a library to compute square roots has

a purpose that is entirely well-defined independent of the
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application-supplied function or table used by this function must
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root function must still compute square roots.)
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entire whole, and thus to each and every part regardless of who wrote
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Thus, it is not the intent of this section to claim rights or contest
your rights to work written entirely by you; rather, the intent is to
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collective works based on the Library.

In addition, mere aggregation of another work not based on the Library
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this, you must alter all the notices that refer to this License, so
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instead of to this License.  (If a newer version than version 2 of the
ordinary GNU General Public License has appeared, then you can specify
that version instead if you wish.)  Do not make any other change in
these notices.

 Once this change is made in a given copy, it is irreversible for
that copy, so the ordinary GNU General Public License applies to all
subsequent copies and derivative works made from that copy.

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the Library into a program that is not a library.

@item

You may copy and distribute the Library (or a portion or
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under the terms of Sections 1 and
2 above provided that you accompany
it with the complete corresponding machine-readable source code, which
must be distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

If distribution of object code is made by offering access to copy
from a designated place, then offering equivalent access to copy the
source code from the same place satisfies the requirement to
distribute the source code, even though third parties are not
compelled to copy the source along with the object code.

@item
A program that contains no derivative of any portion of the
Library, but is designed to work with the Library by being compiled or
linked with it, is called a ``work that uses the Library''. Such a
work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

However, linking a ``work that uses the Library'' with the Library
creates an executable that is a derivative of the Library (because
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contains portions of the Library), rather than a ``work that uses the
library''. The executable is therefore covered by this License.
Section 6 states terms for distribution of such executables.

When a ``work that uses the Library'' uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library. The
threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small inline
functions (ten lines or less in length), then the use of the object
file is unrestricted, regardless of whether it is legally a derivative
work. (Executables containing this object code plus portions of the
Library will still fall under Section 6.)

Otherwise,
if the work is a derivative of the Library, you may
distribute the object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.

@item
As an exception to the Sections above, you may also combine or link a ``work that uses the Library'' with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

@enumerate a
@item
Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable ``work that uses the Library'', as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

@item
Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

@item
Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

@item

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@item
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the Library and of the other library facilities is otherwise
permitted, and provided that you do these two things:

@enumerate a
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based on the Library,
uncombined with any other library
facilities. This must be distributed under the terms of the
Sections above.

@item
Give prominent notice with the combined library of the fact
that part of it is a work based on the Library, and explaining
where to find the accompanying uncombined form of the same work.
@end enumerate

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@subheading END OF TERMS AND CONDITIONS

@page
@subheading How to Apply These Terms to Your New Libraries

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part thereof, to be licensed as a whole at no charge to all third
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when run, you must cause it, when started running for such
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does not normally print such an announcement, your work based on
the Program is not required to print an announcement.)
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These requirements apply to the modified work as
a whole. If
identifiable sections of that work are not derived from the Program,
and can be reasonably considered independent and separate works in
themselves, then this License, and its terms, do not apply to those
sections when you distribute them as separate works. But when you
distribute the same sections as part of a whole which is a work based
on the Program, the distribution of the whole must be on the terms of
this License, whose permissions for other licensees extend to the
entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest
your rights to work written entirely by you; rather, the intent is to
exercise the right to control the distribution of derivative or
collective works based on the Program.

In addition, mere aggregation of another work not based on the Program
with the Program (or with a work based on the Program) on a volume of
a storage or distribution medium does not bring
the other work under
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You may copy and distribute the Program (or a work based on it,
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Sections 1 and 2 above provided that you also do one of the following:

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source code, which must be distributed under the terms of Sections
1 and 2 above on a medium customarily used for software interchange; or,

@item
Accompany it with a written offer, valid for at least three
years, to give any third party, for a charge no more than your
cost of physically performing source distribution, a complete
machine-readable copy of the corresponding source code, to be
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customarily used for software interchange; or,

@item
Accompany it with the information you received as to the offer
to distribute corresponding source code. (This alternative is
allowed only for noncommercial
distribution and only if you
received the program in object code or executable form with such
an offer, in accord with Subsection b above.)
@end enumerate

The source code for a work means the preferred form of the work for
making modifications to it. For an executable work, complete source
code means all the source code for all modules it contains, plus any
associated interface definition files, plus the scripts used to
control compilation and installation of the executable. However, as a
special exception, the source code distributed need not include
anything that is normally distributed (in either source or binary
form) with the major components (compiler, kernel, and so on) of the
operating system on which the executable runs, unless that component
itself accompanies the executable.

If distribution of executable or object code is made by offering
access to copy from a designated place, then offering equivalent
access to copy the source code from the same place counts
as
distribution of the source code, even though third parties are not
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@page
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 and a brief idea of what it does.}
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Version 3, 29 June 2007

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# 1.1719 jaxb-api 2.3.1

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# 1.1735 cors 1.11.1

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# 1.1737 javax activation api 1.2.0

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```
---
name: Handle External Contributor PRs

on:
 # run in the context of the base branch, so that it still works in PR from forks
 pull_request_target:
   types: [opened, reopened]

permissions: {}

jobs:
 external-contributor-prs:
   name: Handle Fork PRs
   runs-on: ubuntu-latest
   permissions:
     pull-requests: write
   if: github.event.pull_request.head.repo.full_name != github.repository
   steps:
     - name: Checkout repository
       uses: actions/checkout@11bd71901bbe5b1630ceea73d27597364c9af683 # v4.2.2
       with:
         ref: main
         fetch-depth: 0
         persist-credentials: false
     - name: Install dda
       uses: ./.github/actions/install-dda
       with:
         features: legacy-tasks
     - name: Set label on external contributor PRs
       run: |
         dda inv -- -e github.handle-community-pr --repo="$GH_REPO" --pr-id="$NUMBER" --labels="$LABELS"
       env:
         GH_TOKEN: ${{ secrets.GITHUB_TOKEN }}
         GITHUB_TOKEN:
 ${{ secrets.GITHUB_TOKEN }}
         SLACK_DATADOG_AGENT_BOT_TOKEN: ${{ secrets.SLACK_DATADOG_AGENT_BOT_TOKEN }}
         GH_REPO: ${{ github.repository }}
         NUMBER: ${{ github.event.number }}
         # labels is a comma-separated list of tags
         LABELS: community
```

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# 1.1739 go-restful 3.12.0

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# 1.1743 mdast-util-gfm-footnote 2.1.0

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# 1.1749 protobuf-specs 0.4.1

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# 1.1764 minipass 3.0.0

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# 1.1770 docker 28.3.2+incompatible

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// OtherLicense is an Other License Information section of an
// SPDX Document for version 2.2 of the spec.
type OtherLicense struct {
 // 10.1: License Identifier: "LicenseRef-[idstring]"
 // Cardinality: conditional (mandatory, one) if license is not
 //              on SPDX License List
 LicenseIdentifier string `json:"licenseId"`

 // 10.2: Extracted Text
 // Cardinality: conditional (mandatory, one) if there is a
 //              License Identifier assigned
 ExtractedText string `json:"extractedText"`

 // 10.3: License Name: single line of text or "NOASSERTION"
 // Cardinality: conditional (mandatory, one) if license is not
 //              on SPDX License List
 LicenseName string `json:"name,omitempty"`

 // 10.4: License Cross Reference
 // Cardinality: conditional (optional, one or many) if license
 //              is not on SPDX License List
 LicenseCrossReferences []string `json:"seeAlsos,omitempty"`

 //
 10.5: License Comment
 // Cardinality: optional, one
 LicenseComment string `json:"comment,omitempty"`
}
```

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package v2_1

// OtherLicense is an Other License Information section of an
// SPDX Document for version 2.1 of the spec.
type OtherLicense struct {
 // 6.1: License Identifier: "LicenseRef-[idstring]"
 // Cardinality: conditional (mandatory, one) if license is not
 //              on SPDX License List
 LicenseIdentifier string `json:"licenseId"`

 // 6.2: Extracted Text
 // Cardinality: conditional (mandatory, one) if there is a
```

```
//          License Identifier assigned
ExtractedText string `json:"extractedText"`

// 6.3: License Name: single line of text or "NOASSERTION"
// Cardinality: conditional (mandatory, one) if license is not
//          on SPDX License List
LicenseName string `json:"name,omitempty"`

// 6.4: License Cross Reference
// Cardinality: conditional (optional, one or many) if license
//          is not on SPDX License List
LicenseCrossReferences []string `json:"seeAlsos,omitempty"`

// 6.5:
License Comment
// Cardinality: optional, one
LicenseComment string `json:"comment,omitempty"`
}
```

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```
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type OtherLicense struct {
 // 10.1: License Identifier: "LicenseRef-[idstring]"
 // Cardinality: conditional (mandatory, one) if license is not
 //              on SPDX License List
 LicenseIdentifier string `json:"licenseId"`

 // 10.2: Extracted Text
 // Cardinality: conditional (mandatory, one) if there is a
 //              License Identifier assigned
 ExtractedText string `json:"extractedText"`

 // 10.3: License Name: single line of text or "NOASSERTION"
 // Cardinality: conditional (mandatory, one) if license is not
 //              on SPDX License List
 LicenseName string `json:"name,omitempty"`

 // 10.4: License Cross Reference
 // Cardinality: conditional (optional, one or many) if license
 //              is not on SPDX License List
 LicenseCrossReferences []string `json:"seeAlsos,omitempty"`
```

```
 // 10.5: License Comment
 // Cardinality:
 optional, one
 LicenseComment string `json:"comment,omitempty"`
}
```

procfs provides functions to retrieve system, kernel and process
metrics from the pseudo-filesystem proc.

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localtime.go, localtime_test.go:

Originals:
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Changes:
* Renamed files from civil* to localtime*.
* Package changed from civil to toml.
* 'Local' prefix added to all structs.
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# 1.1775 noise 1.1.0

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# 1.1799 hoist-non-react-statics 3.3.2

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# 1.1801 contrib-instrumentation-net-http-otelhttp 0.60.0

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# 1.1810 reference 0.6.0

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# 1.1811 httpcomponents-client 4.5.13

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# 1.1814 strfmt 0.23.0

## 1.1814.1 Available under license :

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# 1.1815 gpgme 1.15.1-6.el9

## 1.1815.1 Available under license :

(21:protected-private-key(3:elg(1:p129:|B36I(s7}+ZJ/pvE;"tg7N ca"Gxvnyu&bB#h'7=89&oG
R<hO)(1:g1:)(1:y128:Ji]WU_UP}AQ\YMhAl|2e{_tcMNDg]{QnWsK 4pY{$bDCs)(9:protected25:openpgp-s2k3-
sha1-aes-cbc((4:sha18:JcE7:6452224)16: i[Q*vK)192:FJA!O!ZAF
biJ&Tsb!t
&9@R\~V+x>?sedDz-W(yqf?u^e?s1saV8<T0:tC5%ZMh?$|,y_e[1D)(12:protected-at15:20130812T105135)))
(21:protected-private-key(3:elg(1:p129:W#}}l;;m>
;4YV$Qg
LoLy~*Tru*+ID8"-9,:17^g*({ #7)(1:g1:)(1:y128:2o62,Tj/
rRi3sSS iCAYNYbVtAHKi7(UPp)?Od{'R^f)(9:protected25:openpgp-s2k3-sha1-aes-
cbc((4:sha18:fw`E7:5242880)16:aqR)192:5f1a-`{^EV699WoB\,:Rs1*W6Lu iZ
:=ZqURM47;pA3#DL
so8O)Th^P@lP0&.DR;"rkN7)(12:protected-at15:20101008T070216)))

```
#+TITLE: GPGME Python Bindings HOWTO Examples
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltxtra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}


* Examples
 :PROPERTIES:
 :CUSTOM_ID: gpgme-python3-examples
 :END:

 The contents of this directory are the examples included in the /GNU
 Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO/ file.  Each
 script is explicitly for Python 3 and specifically for Python 3.4 or
 later.

 Some of these scripts may work with Python 2.7, but there are no
 guarantees.  They will include the relevant imports from the
 =__future__= module to facilitate that if possible.


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```

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cython

```
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```

```
;;; Conventions:
;;;
;;; gpg-error is used for error handling.
;;;
;;; Standard I/O streams are used for input and output.

(defpackage #:gpgme
 (:use #:common-lisp #:cffi #:gpg-error)
  (:import-from #:trivial-garbage
              #:finalize)
 (:export #:check-version
   #:*version*
   #:context
   #:protocol
   #:armorp
   #:textmodep
   #:+include-certs-default+
   #:include-certs
   #:keylist-mode
   #:signers
   #:sig-notations
   #:with-context
   #:key-data
   #:get-key
   #:op-encrypt
   #:op-decrypt
   #:op-sign
   #:op-verify
   #:op-import
   #:op-export))
```

2011-12-02  Werner Koch  <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained.  Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist".  See doc/HACKING for details.

2011-05-12  Marcus Brinkmann  <marcus@g10code.com>

* gpgme.texi (I/O Callback Example): Fix example code.

* gpgme.texi (Generating Keys): Fix OpenPGP parameters and reference GPG and GPGSM manual.

2010-01-05  Werner Koch  <wk@g10code.com>

* gpgme.texi (Changing Passphrases): New.

2009-07-21  Werner Koch  <wk@g10code.com>

* uiserver.texi (UI Server Encrypt): Add --expect-sign option to
PREP_ENCRYPT.

2009-06-16  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Result Management): New section.

2009-06-16  Werner Koch  <wk@g10code.com>

* gpgme.texi (Exporting Keys): Document gpgme_op_export_keys.
(Importing Keys): Document gpgme_op_import_keys.
(Data Buffer Meta-Data): Document URL encodings.

2009-05-28
Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Library Version Check): Document selftest error.
(Creating Contexts): Likewise.

2009-05-18  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document
GPGME_ENCRYPT_NO_ENCRYPT_TO.

2009-05-05  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Engine Information): Replace path by file_name.

2008-11-28  Werner Koch  <wk@g10code.com>

* gpgme.texi (Listing Keys): Change description of the return
value to match the code.  Spotted by Colin Leroy.

2008-10-15  Werner Koch  <wk@g10code.com>

* uiserver.texi (Miscellaneous UI Server Commands): Add option
--protocol to the SENDER command.

2008-07-17  Werner Koch  <wk@g10code.com>

* module-overview.sk: New.

2008-07-04  Werner Koch  <wk@g10code.com>

* gpgme.texi (Algorithms): Add a hint on symmetric only encryption.

2008-06-27  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Cancellation): Document gpgme_cancel_async.

2008-06-25
Werner Koch  <wk@g10code.com>

* gpgme.texi (Listing Keys): Updated example to the current API.
Noted by Nico Schottelius.

2008-06-05  Werner Koch  <wk@g10code.com>

* uiserver.texi (Miscellaneous UI Server Commands): Describe
START_CONFDIALOG.

2008-06-04  Werner Koch  <wk@g10code.com>

* gpgme.texi: Use @copying command. Change license to
GPLv3. Include protocol specis from GpgOL and GPGEx.  Minor
cleanups.

2008-03-11  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (File Based Data Buffers): Document the need for
blocking operations.
(Callback Based Data Buffers): Likewise.

2008-03-05  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Library Version Check): Rename snippet function to
init_gpgme.
(I/O Callback Example): Call it here.

2008-01-28  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi: Document that data encoding affects some output data
objects now.

2007-09-27  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Protocols and Engines):
Document GPGME_PROTOCOL_UNKNOWN.

2007-09-11  Werner Koch  <wk@g10code.com>

* gpgme.texi (I/O Callback Example): Typo fix.

2007-08-07  Werner Koch  <wk@g10code.com>

* gpgme.texi (Verify): Describe chain_model.

2007-07-12  Werner Koch  <wk@g10code.com>

* gpgme.texi (Library Version Check): Add remark that the socket
layer will get initialized.

2007-06-05  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Advanced Key Editing): New section.

2007-05-21  Werner Koch  <wk@g10code.com>

* Makefile.am (online): New target.

2007-05-18  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Error Strings): Fix documentation of
gpgme_strerror_r.

2006-11-01  Moritz Schulte  <moritz@g10code.com>

* gpgme.texi (Data Buffer I/O Operations): Fixed entry for
gpgme_data_seek: OFFSET is not a pointer; some s/whence/offset/.

2006-09-25  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Destroying Data Buffers): Clarify that
gpgme_data_release_and_get_mem destroys DH unconditionally.

2005-03-24
Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Library Version Check): Make example code compatible
to W32 systems.

2006-06-21  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Fix inverted condition in
description.

2005-12-20  Werner Koch  <wk@g10code.com>

* gpgme.texi (Verify): Document pka_trust.

2005-12-06  Werner Koch  <wk@g10code.com>

* gpgme.texi (Key Management): Updated to match the fixes for
subkey fingerprints and theg secret flag.

2005-10-06  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Destroying Data Buffers): Document gpgme_free.

2005-10-02  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Key Management): Add the new member notations of
gpgme_sig_key_t.
(Key Listing Mode): Document GPGME_KEYLIST_MODE_SIG_NOTATIONS.

2005-10-01  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi: Enclose all return parameters of deftypefuns in
curly brackets.

* gpgme.texi (Signature Notation Data): New
section.
(Verify): Added more about the notation data structure.

2005-09-30  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Data Buffer I/O Operations, Data Buffer Meta-Data):
New subsections.

* gpgme.texi: Replace plaintext_filename with file_name.

* gpgme.texi (Key Management): Document is_qualified.

2005-07-27  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Decrypt): Add plaintext_filename to
gpgme_decrypt_result_t.
(Verify): Likewise for gpgme_verify_result_t.

2005-06-03  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Verify): Add information about new fields in
gpgme_signature_t.

* gpgme.texi (Decrypt): Add gpgme_recipient_t.

2005-05-28  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Key Listing Mode): Fix return type of
gpgme_set_keylist_mode.

Reported by "Sergio" <ml_sergico@virgilio.it>.

2005-04-28 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Included Certificates): Document
GPGME_INCLUDE_CERTS_DEFAULT.

2005-01-12 Marcus
Brinkmann <marcus@g10code.de>

* gpgme.texi (Engine Configuration): New section.
(Crypto Engine): New subsection.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

* lesser.texi (Library Copying): Change from @appendixsec to
@appendix.
* gpgme.texi (Features): Change reference to GPL to one to LGPL.

* Makefile.am: Change license to LGPL.
(gpgme_TEXINFOS): Replace gpl.texi with lesser.texi.

* gpgme.texi: Change license to LGPL (also for documentation of
GPGME's license).
* lesser.texi: New file.
* gpl.texi: File removed.

* gpgme.texi (Creating Contexts): Fix cut&paste error. Reported
by Noel Torres <envite@rolamasao.org>.

2004-09-30 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (gpgme_TEXINFOS): Remove fdl.texi.
* gpgme.texi: Do not include fdl.texi. Change license to GPL.
* fdl.texi: File removed.

2004-09-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Change type of keylist_mode in
gpgme_key_t to gpgme_keylist_mode_t.

2004-09-28
Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Fix last change.

2004-09-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Document
GPG_ERR_NOT_IMPLEMENTED.

* gpgme.texi: Update copyright year for tex version.

2004-07-29  Moritz Schulte  <moritz@g10code.com>

* gpgme.texi (Verify): Fix gpgme_get_key example (ancient
force_update argument was still there).

2004-06-08  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Listing Keys): Elaborate on the length restrictions
on search patterns.

* gpgme.texi (Decrypt and Verify): Document the NO_DATA error
code.
(Verify): Document the relationship between gpgme_op_verify_result
and the decrypt and verify operations.

2004-05-21  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.text (Verify): Document GPG_ERR_CERT_REVOKED status.

* gpgme.texi (Decrypt): Add note about new field wrong_key_usage
of gpgme_decrypt_result_t.

* gpgme.texi (Key Management): Add
note about new field
keylist_mode of gpgme_key_t.

2004-04-29  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Verify): Correct type of member wrong_key_usage.

2004-03-29  Moritz Schulte  <moritz@duesseldorf.ccc.de>

* gpgme.texi (Verify): Fix type of gpgme_op_verify_result.
* gpgme.texi (Key Listing Mode): Typo fix.

2004-03-23  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Library Version Check): Fix the instruction when to
set the locale.

2004-03-03  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (I/O Callback Example Qt): New section by Marc Mutz.

2004-02-24  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (cancellation): New section.

2004-02-17  Werner Koch  <wk@gnupg.org>

* gpgme.texi (Key Listing Mode): Doc KEYLIST_MODE_VALIDATE.

2004-02-06  Moritz Schulte  <mo@g10code.com>

* gpgme.texi: A couple of small fixes regarding the Largfile
Support section.

2004-02-01  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Largefile Support): New
section.

2004-01-13  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Key Management): Fix exportable field.

2003-12-25  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Key Management): Rename member class in
gpgme_key_sig_t to sig_class.
(Creating a Signature): Likewise for gpgme_signature_t.

2003-12-23  Moritz Schulte  <mo@g10code.com>

* gpgme.texi (Listing Keys): Minor clarification for
gpgme_get_key.

2003-10-06  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Signal Handling): New section.

2003-09-14  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Multi Threading): Correct documentation on memory
synchronization requirement.

* gpgme.texi (Locale): New section.
(Multi Threading): Set locale in example.

2003-09-13  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Error Strings): Add gpgme_strerror_r.

2003-09-13 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Update documentation.

2003-09-03 Marcus Brinkmann <marcus@g10code.de>

*
gpgme.texi (Header): We don't use the assuan namespace anymore.
Document new thread options.

2003-08-14 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Creating a Signature): Change type of member class
to unsigned int.

2003-08-04 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Get error code from SIG->status in the code
for gpgme_get_sig_status.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Add can_authenticate flag.

* gpgme.texi (Listing Keys): Document GPG_ERR_AMBIGUOUS_NAME for
gpgme_get_key.

2003-07-29 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (EXTRA_DIST): Remove variable.

* gpgme.texi (Encrypting a Plaintext): Bad passphrase is only
possible with symmetric encryption, change the wording to reflect
that.

* gpgme.texi (Creating a Signature): Document
GPG_ERR_UNUSABLE_SECKEY.

* gpgme.texi (Encrypting a Plaintext): Mention encrypt and sign
operations in result function.
(Creating
a Signature): Likewise.

2003-07-23 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Listing Mode): Remove word duplication.

(Listing Keys): Remove mentioning of force argument.
(Verify): Don't mention r_stat.  Fix some typos.
(Decrypt and Verify): Correct info how to get the result.  Don't
mention r_stat.
(Manipulating Data Buffers): Fix documentation of return value.
(Listing Keys): Update examples.
(Decrypt): Result might also be available when operation failed.
(Verify): Result might also be available when operation failed.
All spotted by Stphane Corthsy.

2003-07-22  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Error Sources): Fix cut and paste error.

2003-07-09  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Key Management): Clarify difference between can_sign
and can_certify.
(Information About Keys): Likewise for GPGME_ATTR_CAN_SIGN and
GPGME_ATTR_CAN_CERTIFY.

2003-07-08  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Progress
Meter Callback): Change return type of
gpgme_progress_cb_t to void.

2003-06-22  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi: Add 2003 to copyright notice.

* gpgme.texi (Header): Fix name space documentation on
libgpg-error.

2003-06-22  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Multi Threading): Remove reference to
gpgme_recipients_t.

2003-06-06  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Crypto Operations): Rename gpgme_invalid_user_id_t
to gpgme_invalid_key_t.

2003-06-06  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi: Change error codes to GPG_ERR_* variants.
(Error Handling): Rewritten.

2003-05-29  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Exporting Keys): Change and document prototypes.
Add new gpgme_op_export_ext and gpgme_op_export_ext_start
variants.
(Selecting Recipients): Section removed.
(Encrypting a Plaintext): Change prototypes and document the
changes.

2003-05-28  Marcus Brinkmann  <marcus@g10code.de>

*
gpgme.texi (Exporting Keys): Change argument type from
gpgme_recipient_t to gpgme_user_id_t.
(Encrypting a Plaintext): Likewise.
(Selecting Recipients): Rewritten.

2003-05-27  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Protocol Selection): Do not use @acronym in @node
because that breaks texi2dvi.

* gpgme.texi (Passphrase Callback): Document new prototype.

2003-05-18  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Header): Remove Gpgme as namespace prefix.  Add
_GPGME to namespace prefix.
* gpgme.texi (Multi Threading): Add note about link order.

2003-05-04  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Listing Keys): Document what happens if key is not
found.

* gpgme.texi (Importing Keys): Fix cut and paste error.

2003-04-30  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Remove reference to
gpgme_get_op_info.
(Detailed Results): Subsection removed.

* gpgme.texi (Key Listing Mode): Add GPGME_KEYLIST_MODE_SIGS.
(Manipulating
Keys): Add obsoleteness note.
(Key Signatures): Likewise.

(Information About Keys): Likewise.
(Key Management): Add new data types GpgmeSubkey, GpgmeKeySig,
GpgmeUserID, and all the information about GpgmeKey.

2003-04-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Listing Keys): Remove force_update argument from
gpgme_get_key.

* gpgme.texi (Trust Item Management): Add data members of
GpgmeTrustItem type.
(Information About Trust Items): Add note about obsoleteness.
(Manipulating Trust Items): Add gpgme_trust_item_ref and
gpgme_trust_item_unref.

2003-04-28 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Rewritten to take into account new and
deprecated functions and data types.

* gpgme.texi (Decrypt): Descript gpgme_op_decrypt_result and
GpgmeDecryptResult.

2003-04-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Add info about
GpgmeEncryptResult and gpgme_op_encrypt_result.

* gpgme.texi
(Creating a Signature): Add info about
GpgmeNewSignature, GpgmeSignResult and gpgme_op_sign_result.
(Crypto Operations): Add GpgmeInvalidUserID.
(Algorithms): New chapter.

* gpgme.texi (Deleting Keys): Document
GPGME_Ambiguous_Specification.
(Error Values): Remove GPGME_Invalid_Type and GPGME_Invalid_Mode.
Add GPGME_Unknown_Reason, GPGME_Not_Found,
GPGME_Ambiguous_Specification, GPGME_Wrong_Key_Usage,
GPGME_Key_Revoked, GPGME_Key_Expired, GPGME_No_CRL_Known,
GPGME_CRL_Too_Old, GPGME_Policy_Mismatch, GPGME_No_Secret_Key,
GPGME_Key_Not_Trusted, GPGME_Issuer_Missing, GPGME_Chain_Too_Long,
GPGME_Unsupported_Algorithm, GPGME_Sig_Expired,
GPGME_Bad_Signature, GPGME_No_Public_Key.

2003-04-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Importing Keys): Change GPGME_IMPORT_PRIVATE to

GPGME_IMPORT_SECRET.

* gpgme.texi (Importing Keys): Remove note about gpgme_get_op_info.
(Detailed Results): Remove note about import.

* gpgme.texi (Importing Keys): Add documentation
for
GpgmeImportStatus, GpgmeImportResult and gpgme_op_import_result.

* gpgme.texi (Generating Keys): Fix documentation of public and
secret arguments.

2003-04-24 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Generating Keys): Document changed gpgme_op_genkey
and new gpgme_op_genkey_result function. Document
GpgmeGenKeyResult data type.

* gpgme.texi (Error Values): Rename GPGME_No_Passphrase to
GPGME_Bad_Passphrase.
* gpgme.texi (Decrypt): Likewise.
(Decrypt and Verify): Likewise.
(Creating a Signature): Likewise.
(Encrypting a Plaintext): Likewise.

* gpgme.texi (Error Values): Rename GPGME_No_Recipients to
GPGME_No_UserID and GPGME_Invalid_Recipient to
GPGME_Invalid_UserID.
(Encrypting a Plaintext): Likewise.

* gpgme.texi (Error Values): Remove GPGME_Busy and GPGME_No_Request.
(Listing Keys): Likewise.
(Listing Trust Items): Likewise.

2003-02-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Cancelling an Operation): Removed.
(Passphrase
Callback): Document new type for GpgmePassphraseCb.

2003-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Engine Information): Rename member part to
file_name.

* gpgme.texi (Protocols and Engines): Document
gpgme_get_protocol_name.

* gpgme.texi (Engine Information): Rewritten.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (I/O Callback Interface): Document new even
GPGME_EVENT_START.
(Waiting For Completion): Document new possible return values.
(I/O Callback Interface): Document return type of GpgmeIOCb.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Hooking Up Into Idle Time): Section removed.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Drop R_STAT argument in gpgme_op_verify.
* gpgme.texi (Decrypt and Verify): Likewise for
gpgme_op_decrypt_verify.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Information About Keys): Document that
GPGME_ATTR_IS_SECRET is not representable
as a string anymore.

2002-12-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Signatures): New section.
(Listing Keys): Add gpgme_get_key.

2002-12-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Memory Based Data Buffers): New subsection.
(File Based Data Buffers): Likewise.
(Callback Based Data Buffers): Likewise.
(Manipulating Data Buffers): Update interfaces. Add
gpgme_data_seek.
* gpgme.texi (Engine Version Check): Remove gpgme_check_engine.

2002-11-21 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Document the new interface.

2002-11-19 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Generating Keys): Document new argument to
gpgme_op_genkey.

2002-11-05  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Verify): Fix prototype of gpgme_get_sig_key.
Reported by Miguel Coca <e970095@zipi.fi.upm.es>.

2002-08-30  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Selecting Signers): Fix reference count.

2002-08-21
Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Header): Document name space.

2002-08-20  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Importing Keys): Document gpgme_op_import_ext.

* gpgme.texi (Importing Keys): Undocument EOF.

2002-08-14  Werner Koch  <wk@gnupg.org>

* gpgme.texi (Information About Keys): Changed GPGME_ATTR_TYPE.

2002-07-25  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Deleting Keys): Say that secret keys might not be
deleted.

2002-07-25  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Information About Keys): Document (badly) the new
key attributes.

* gpgme.texi (Manipulating Data Buffers): Mention that backend
tries to detect encoding automatically.

2002-07-03  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Run Control): Update this section.
(Waiting For Completion): Likewise for this subsection.
(Cancelling an Operation): Likewise for this subsection.
(Using External Event Loops): New subsection with several
subsubsections.

2002-06-28
Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Multi Threading): Remove item about the need to
synchronize anything against gpgme_wait (except gpgme_wait
itself).

2002-06-27  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Information About Keys): Fix documentation for IDX.
(Information About Trust Items): Likewise.

2002-06-26  Werner Koch  <wk@gnupg.org>

* gpgme.texi (Importing Keys): Document the return value -1 of
gpgme_op_import.

2002-06-20  Werner Koch  <wk@gnupg.org>

* gpgme.texi (Verify): Explain the new whatidx variable.

2002-06-10  Werner Koch  <wk@gnupg.org>

* gpgme.texi (Verify): Document attribute GPGME_ATTR_ERRTOK.

2002-06-04  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Multi Threading): Document new autodetection.

2002-06-04  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (DISTCLEANFILES): New variable.

2002-05-26  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi: Some typographical corrections
throughout.

2002-05-09  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Using Automake): New section.

2002-05-09  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Multi Threading): Escape { and }.

2002-05-09  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Overview): Replace note about thread-safeness.
(Multi Threading): New section.

2002-05-03  Werner Koch  <wk@gnupg.org>

* gpgme.texi (Manipulating Data Buffers): Changed some data types
to void*.
(Protocol Selection): Added gpgme_get_protocol.
(Verify): Updated to include the new attribute functions and
status codes.

2002-04-27  Werner Koch  <wk@gnupg.org>

* gpgme.texi (Manipulating Data Buffers): New type GpgmeDataEncoding.

2002-04-23  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Document that either return
argument can be NULL.
(Progress Meter Callback): Likewise.

2002-04-22  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Fix small
typo.  Document the
new function gpgme_get_passphrase_cb.
(Progress Meter Callback): Document the new function
gpgme_get_progress_cb.

2002-04-16  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Creating a Signature): Fix function name.  Reported
by Wichert Ackerman <wichert@debian.org>.

2002-03-29  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (direntry): End index entry with a full stop.
Patch submitted by Jose Carlos Garcia Sogo <jsogo@debian.org>.

2002-03-17  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Detailed Results): Fix syntax error in last change.

2002-03-08  Werner Koch  <wk@gnupg.org>

* gpgme.texi (Detailed Results): Import does also return info.

2002-03-06  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document symmetric
encryption.

2002-03-06  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Error Strings): Add example.
* gpgme.texi (Listing Keys): Likewise.

2002-03-03  Marcus Brinkmann  <marcus@g10code.de>

*
gpgme.texi (Information About Keys): Document GPGME_ATTR_EXPIRE.

2002-03-03  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Verify): Document verification of normal and
cleartext signatures.

2002-02-27  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Listing Keys): Document gpgme_op_keylist_ext_start.

2002-02-27  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document
GPGME_Invalid_Recipients.
(Error Values): Likewise.

2002-02-26  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document
gpgme_op_encrypt_sign and gpgme_op_encrypt_sign_start.

2002-02-25  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Creating a Signature): Add a note about
certificates to include.
(Included Certificates): New section.

2002-02-09  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Detailed Results): Remove literal tags.
(Generating Keys): Update documentation.

* gpgme.texi (Generating Keys):
Fix syntax error.

2002-02-06  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Waiting For Completion): Adjust doc to changes in

the code.

2002-02-06  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Key Listing Mode): Update documentation.

2002-01-31  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Generating Keys): Document error at creation
failure.

2002-01-30  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Deleting Keys): Document new error values.

2002-01-30  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Importing Keys): Add reference to gpgme_get_op_info.

2002-01-30  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi: Some spell checking.

2002-01-30  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi: Add all the gpgme_op_*_start functions.
Fill the concept index with many, many entries.

2002-01-29  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Run Control): New section.
(Verify): Document gpgme_get_notation.
(More Information):
New section describing gpgme_get_op_info.

2002-01-22  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Passphrase callback): Change GpgmePassphraseCb's
R_HD type from void* to void**.

2002-01-22  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Creating data buffers): Change
gpgme_data_new_from_filepart's LENGTH type from off_t to size_t.

2002-01-22  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi (Generating keys): New subsection.

(Exporting keys): Likewise.
(Importing keys): Likewise.
(Deleting keys): Likewise.

2002-01-16  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.texi: g10Code -> g10 Code

* gpgme.texi (Top): Complete detailmenu.

* gpgme.texi: Convert embarrassing cruft to the real thing.

2002-01-16  Marcus Brinkmann  <marcus@g10code.de>

* ChangeLog: New file.
* gpgme.texi: Likewise.
* gpl.texi: Likewise.
* fdl.texi: Likewise.
* Makefile.am (info_TEXINFOS): New variable.
(gpgme_TEXINFOS): Likewise.

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This is gpgme.info, produced by makeinfo version 6.5 from gpgme.texi.

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INFO-DIR-SECTION GNU Libraries
START-INFO-DIR-ENTRY
* GPGME: (gpgme). Adding support for cryptography to your program.
END-INFO-DIR-ENTRY

This file documents the GPGME library.

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The GnuPG Made Easy Reference Manual, for Version 1.14.1-beta35.

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Main Menu
*********

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The GnuPG Made Easy Reference Manual, for Version 1.14.1-beta35 of the GPGME library.

* Menu:

* Introduction:: How to use this manual.
* Preparation:: What you should do before using the library.
* Protocols and Engines:: Supported crypto protocols.
* Algorithms:: Supported algorithms.
* Error Handling:: Error numbers and their meanings.
* Exchanging Data:: Passing data to and from GPGME.
* Contexts:: Handling GPGME contexts.

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* UI Server Protocol:: The GnuPG UI Server Protocol.
* Debugging:: How to solve problems.
* Deprecated Functions:: Documentation of deprecated functions.

* Library Copying:: The GNU Lesser General Public License says how you can copy and share GnuPG Made Easy.
* Copying:: The GNU General Public License says how you can copy and share this manual.

Indices

* Concept Index:: Index of concepts and programs.
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The Detailed Node Listing

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* Getting Started:: Purpose of the manual, and how to use it.
* Features:: Reasons to install and use GPGME.
* Overview:: Basic architecture of the GPGME library.

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* Building the Source:: Compiler options to be used.
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* Using Libtool:: Avoiding compiler options entirely.
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* I/O Callback Example GDK:: How to integrate GPGME in GDK.
* I/O Callback Example Qt:: How to integrate GPGME in Qt.

File:
gpgme.info, Node: Introduction, Next: Preparation, Prev: Top, Up: Top

# 1 Introduction
**********

GnuPG Made Easy (GPGME) is a C language library that allows to add support for cryptography to a program. It is designed to make access to public key crypto engines like GnuPG or GpgSM easier for applications. GPGME provides a high-level crypto API for encryption, decryption, signing, signature verification and key management.

GPGME uses GnuPG and GpgSM as its backends to support OpenPGP and the Cryptographic Message Syntax (CMS).

* Menu:

* Getting Started:: Purpose of the manual, and how to use it.
* Features:: Reasons to install and use GPGME.
* Overview:: Basic architecture of the GPGME library.

File: gpgme.info, Node: Getting Started, Next: Features, Up: Introduction

## 1.1 Getting Started

This manual documents the GPGME library programming interface. All functions and data types provided by the library are explained.

The reader is assumed to possess basic knowledge about cryptography in general, and public key cryptography in particular. The underlying cryptographic engines that are used by the library are not explained, but where necessary, special features or requirements by an engine are mentioned as far as they are relevant to GPGME or its users.

This manual can be used in several ways. If read from the beginning to the end, it gives a good introduction into the library and how it can be used in an application. Forward references are included where necessary. Later on, the manual can be used as a reference manual to get just the information needed about any particular interface of the library. Experienced programmers might want to start looking at the examples at the end of the manual, and then only read up those parts of the interface which are unclear.

The documentation for the language bindings is currently not included in this manual. Those languages bindings follow the general programming model of GPGME but may provide some extra high level abstraction on top of the GPGME style API. For now please see the README files in the lang/ directory of the source distribution.

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## 1.2 Features

GPGME has a couple of advantages over other libraries doing a similar job, and over implementing support for GnuPG or other crypto engines into your application directly.

its free software

Anybody can use, modify, and redistribute it under the terms of the GNU Lesser General Public License (*note Library Copying::).

its flexible

GPGME provides transparent support for several cryptographic protocols by different engines. Currently, GPGME supports the OpenPGP protocol using GnuPG as the backend, and the Cryptographic Message Syntax using GpgSM as the backend.

its easy

GPGME hides the differences between the protocols and engines from the programmer behind an easy-to-use interface. This way the programmer can focus on the other parts of the program, and still integrate strong cryptography in his application. Once support for GPGME has been added to a program, it is easy to add support for other crypto protocols once GPGME backends provide them.

its language friendly

GPGME comes with languages bindings for several common programming languages: Common Lisp, C++, Python 2, and Python 3.

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## 1.3 Overview

GPGME provides a data abstraction that is used to pass data to the crypto engine, and receive returned data from it. Data can be read from memory or from files, but it can also be provided by a callback function.

The actual cryptographic operations are always set within a context. A context provides configuration parameters that define the behaviour of all operations performed within it. Only one operation per context is allowed at any time, but when one operation is finished, you can run the next operation in the same context. There can be more than one context, and all can run different operations at the same time.

Furthermore, GPGME has rich key management facilities including listing keys, querying their attributes, generating, importing, exporting and deleting keys, and acquiring information about the trust path.

With some precautions, GPGME can be used in a multi-threaded environment, although it is not completely thread safe and thus needs the support of the application.

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## 2 Preparation

**********

To use GPGME, you have to perform some changes to your sources and the build system. The necessary changes are small and explained in the following sections. At the end of this chapter, it is described how the library is initialized, and how the requirements of the library are verified.

* Menu:


* Header:: What header file you need to include.
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* Largefile Support (LFS):: How to use GPGME with LFS.
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File: gpgme.info, Node: Header, Next: Building the Source, Up: Preparation

### 2.1 Header

==========

All interfaces (data types and functions) of the library are defined in the header file gpgme.h. You must include this in all programs using the library, either directly or through some other header file, like this:

```
#include <gpgme.h>
```

The name space of GPGME is gpgme_* for function names and data types and GPGME_* for other symbols. Symbols internal to GPGME take the form _gpgme_* and _GPGME_*.

Because GPGME makes use of the GPG Error library, using GPGME will also use the GPG_ERR_* name space directly, and the gpg_err*,

gpg_str*, and gpgrt_* name space indirectly.

File: gpgme.info, Node: Building the Source, Next: Largefile Support (LFS), Prev: Header, Up: Preparation

## 2.2 Building the Source

If you want to compile a source file including the gpgme.h header file, you must make sure that the compiler can find it in the directory hierarchy. This is accomplished by adding the path to the directory in which the header file is located to the compilers include file search path (via the -I option).

However, the path to the include file is determined at the time the source is configured. To solve this problem, gpgme ships with a small helper program gpgme-config that knows about the path to the include file and other configuration options. The options that need to be added to the compiler invocation at compile time are output by the --cflags option to gpgme-config. The following example shows how it can be used at the command line:

```
gcc -c foo.c `gpgme-config --cflags`
```

Adding the output of gpgme-config --cflags to the compiler command line will ensure that the compiler can find the GPGME header file.

A similar problem occurs when linking the program with the library. Again, the compiler has to find the library files. For this to work, the path to the library files has to be added to the library search path (via the -L option). For this, the option --libs to gpgme-config can be used. For convenience, this option also outputs all other options that are required to link the program with GPGME (in particular, the -lgpgme option). The example shows how to link foo.o with the GPGME library to a program foo.

```
gcc -o foo foo.o `gpgme-config --libs`
```

Of course you can also combine both examples to a single command by specifying both options to gpgme-config:

```
gcc -o foo foo.c `gpgme-config --cflags --libs`
```

If you need to detect the installed language bindings you can use list them using:

```
gpgme-config --print-lang
```

or test for the availability using

```
gpgme-config --have-lang=python && echo 'Bindings for Pythons available'
```

File: gpgme.info, Node: Largefile Support (LFS), Next: Using Automake, Prev: Building the Source, Up: Preparation

## 2.3 Largefile Support (LFS)

GPGME is compiled with largefile support by default, if it is available on the system. This means that GPGME supports files larger than two gigabyte in size, if the underlying operating system can. On some systems, largefile support is already the default. On such systems, nothing special is required. However, some systems provide only support for files up to two gigabyte in size by default. Support for larger file sizes has to be specifically enabled.

To make a difficult situation even more complex, such systems provide two different types of largefile support. You can either get all relevant functions replaced with alternatives that are largefile capable, or you can get new functions and data types for largefile support added. Those new functions have the same name as their smallfile counterparts, but with a suffix of 64.

An example: The data type off_t is 32 bit wide on GNU/Linux PC systems. To address offsets in large files, you can either enable largefile support add-on. Then a new data type off64_t is provided, which is 64 bit wide. Or you can replace the existing off_t data type with its 64 bit wide counterpart. All occurrences of off_t are then automagically replaced.

As if matters were not complex enough, there are also two different types of file descriptors in such systems. This is important because if file descriptors are exchanged between programs that use a different maximum file size, certain errors must be produced on some file descriptors to prevent subtle overflow bugs from occurring.

As you can see, supporting two different maximum file sizes at the same time is not at all an easy task. However, the maximum file size does matter for GPGME, because some data types it uses in its interfaces are affected by that. For example, the off_t data type is used in the gpgme_data_seek function, to match its POSIX counterpart. This

affects the call-frame of the function, and thus the ABI of the library. Furthermore, file descriptors can be exchanged between GPGME and the application.

For you as the user of the library, this means that your program must be compiled in the same file size mode as the library. Luckily, there is absolutely no valid reason for new programs to not enable largefile support by default and just use that. The compatibility modes (small file sizes or dual mode) can be considered an historic artefact, only useful to allow
for a transitional period.

On POSIX platforms GPGME is compiled using largefile support by default. This means that your application must do the same, at least as far as it is relevant for using the gpgme.h header file. All types in this header files refer to their largefile counterparts, if they are different from any default types on the system.

On 32 and 64 bit Windows platforms off_t is declared as 32 bit signed integer. There is no specific support for LFS in the C library. The recommendation from Microsoft is to use the native interface (CreateFile et al.) for large files. Released binary versions of GPGME (libgpgme-11.dll) have always been build with a 32 bit off_t. To avoid an ABI break we stick to this convention for 32 bit Windows by using long there. GPGME versions for 64 bit Windows have never been released and thus we are able to use int64_t instead of off_t there. For easier migration the typedef gpgme_off_t has been defined. The reason we cannot use off_t
directly is that some toolchains (e.g.
mingw64) introduce a POSIX compatible hack for off_t. Some widely used toolkits make use of this hack and in turn GPGME would need to use it also. However, this would introduce an ABI break and existing software making use of libgpgme might suffer from a severe break. Thus with version 1.4.2 we redefined all functions using off_t to use gpgme_off_t which is defined as explained above. This way we keep the ABI well defined and independent of any toolchain hacks. The bottom line is that LFS support in GPGME is only available on 64 bit versions of Windows.

On POSIX platforms you can enable largefile support, if it is different from the default on the system the application is compiled on, by using the Autoconf macro AC_SYS_LARGEFILE. If you do this, then you dont need to worry about anything else: It will just work. In this case you might also want to use AC_FUNC_FSEEKO to take advantage of some new interfaces, and AC_TYPE_OFF_T (just in
case).

If you do not use Autoconf, you can define the preprocessor symbol

_FILE_OFFSET_BITS to 64 _before_ including any header files, for example by specifying the option -D_FILE_OFFSET_BITS=64 on the compiler command line. You will also want to define the preprocessor symbol LARGEFILE_SOURCE to 1 in this case, to take advantage of some new interfaces.

If you do not want to do either of the above, you probably know enough about the issue to invent your own solution. Just keep in mind that the GPGME header file expects that largefile support is enabled, if it is available. In particular, we do not support dual mode (_LARGEFILE64_SOURCE).

File: gpgme.info, Node: Using Automake, Next: Using Libtool, Prev: Largefile Support (LFS), Up: Preparation

## 2.4 Using Automake

It is much easier if you use GNU Automake instead of writing your own Makefiles. If you do that you do not have to worry about finding and invoking the gpgme-config script at all. GPGME provides an extension to Automake that does all the work for you.

-- Macro: AM_PATH_GPGME ([MINIMUM-VERSION], [ACTION-IF-FOUND], [ACTION-IF-NOT-FOUND])
-- Macro: AM_PATH_GPGME_PTH ([MINIMUM-VERSION], [ACTION-IF-FOUND], [ACTION-IF-NOT-FOUND])
-- Macro: AM_PATH_GPGME_PTHREAD ([MINIMUM-VERSION], [ACTION-IF-FOUND], [ACTION-IF-NOT-FOUND])

Check whether GPGME (at least version MINIMUM-VERSION, if given) exists on the host system. If it is found, execute ACTION-IF-FOUND, otherwise do ACTION-IF-NOT-FOUND, if given.

Additionally, the function defines GPGME_CFLAGS to the flags needed for compilation of the program to find the gpgme.h header file, and GPGME_LIBS to the linker flags needed to link the program to the GPGME library. If the used helper script does not match the target type you are building for a warning is printed and the string libgcrypt is appended to the variable gpg_config_script_warn.

AM_PATH_GPGME_PTH checks for the version of GPGME that can be used with GNU Pth, and defines GPGME_PTH_CFLAGS and GPGME_PTH_LIBS.

AM_PATH_GPGME_PTHREAD checks for the version of GPGME that can be

used with the native pthread implementation, and defines GPGME_PTHREAD_CFLAGS and GPGME_PTHREAD_LIBS. Since version 1.8.0 this is no longer required to GPGME_PTHREAD as GPGME itself is thread safe.

This macro searches for gpgme-config along the PATH. If you are cross-compiling, it is useful to set the environment variable SYSROOT to the top directory of your target. The macro will then first look for the helper program in the bin directory below that top directory. An absolute directory name must be used for SYSROOT. Finally, if the configure command line option --with-gpgme-prefix is used, only its value is used for the top directory below which the helper script is expected.

You can use the defined Autoconf variables like this in your Makefile.am:

```
AM_CPPFLAGS = $(GPGME_CFLAGS)
LDADD = $(GPGME_LIBS)
```

File: gpgme.info, Node: Using Libtool, Next: Library Version Check, Prev: Using Automake, Up: Preparation

## 2.5 Using Libtool

The easiest way is to just use GNU Libtool. If you use libtool, and link to libgpgme.la, libgpgme-pth.la or libgpgme-pthread.la respectively, everything will be done automatically by Libtool.

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## 2.6 Library Version Check

-- Function: const char * gpgme_check_version (const char *REQUIRED_VERSION)

The function gpgme_check_version has four purposes. It can be used to retrieve the version number of the library. In addition it can verify that the version number is higher than a certain required version number. In either case, the function initializes some sub-systems, and for this reason alone it must be invoked early in your program, before you make use of the other functions in GPGME. The last purpose is to run selftests.

As a side effect for W32 based systems, the socket layer will get initialized.

If REQUIRED_VERSION is NULL, the function returns a pointer to a statically allocated string containing the version number of the library.

If REQUIRED_VERSION is not NULL, it should point to a string containing a version number, and the function checks that the version of the library is at least as high as the version number provided. In this case, the function returns a pointer to a statically allocated string containing the version number of the library. If REQUIRED_VERSION is not a valid version number, or if the version requirement is not met, the function returns NULL.

If you use a version of a library that is backwards compatible with older releases, but contains additional interfaces which your program uses, this function provides a run-time check if the necessary features are provided by the installed version of the library.

If a selftest fails, the function may still succeed. Selftest errors are returned later when invoking gpgme_new or gpgme-data_new, so that a detailed error code can be returned (historically, gpgme_check_version does not return a detailed error code).

-- Function: int gpgme_set_global_flag (const char *NAME, const char *VALUE)

SINCE: 1.4.0

On some systems it is not easy to set environment variables and thus hard to use GPGMEs internal trace facility for debugging. This function has been introduced as an alternative way to enable debugging and for a couple of other rarely used tweaks. It is important to assure that only one thread accesses GPGME functions between a call to this function and after the return from the call to gpgme_check_version.

All currently supported features require that this function is called as early as possible even before gpgme_check_version. The features are identified by the following values for NAME:

debug
To enable debugging use the string debug for NAME and VALUE

identical to the value used with the environment variable
GPGME_DEBUG.

disable-gpgconf
Using this feature with any VALUE disables the detection of
the gpgconf program and thus forces GPGME to fallback into the
simple OpenPGP only mode. It may be used to force the use of
GnuPG-1 on systems which have both GPG versions installed.
Note that in general the use of gpgme_set_engine_info is a
better way to select a specific engine version.

gpgconf-name
gpg-name
Set the name of the gpgconf respective gpg binary. The
defaults are GNU/GnuPG/gpgconf and GNU/GnuPG/gpg. Under

Unix the leading directory part is ignored. Under Windows the
leading directory part is used as the default installation
directory; the .exe suffix is added by GPGME. Use forward
slashed even under Windows.

require-gnupg
Set the minimum version of the required GnuPG engine. If that
version is not met, GPGME fails early instead of trying to use
the existent version. The given version must be a string with
major, minor, and micro number. Example: "2.1.0".

w32-inst-dir
On Windows GPGME needs to know its installation directory to
find its spawn helper. This is in general no problem because
a DLL has this information. Some applications however link
statically to GPGME and thus GPGME can only figure out the
installation directory of this application which may be wrong
in certain cases. By supplying an installation directory as

value to this flag, GPGME will assume that that directory is
the installation directory. This flag has no effect on
non-Windows platforms.

This function returns 0 on success. In contrast to other
functions the non-zero return value on failure does not convey any
error code. For setting debug the only possible error cause is
an out of memory condition; which would exhibit itself later
anyway. Thus the return value may be ignored.

After initializing GPGME, you should set the locale information to
the locale required for your output terminal. This locale information
is needed for example for the curses and Gtk pinentry. Here is an

example of a complete initialization:

```
#include <locale.h>
#include <gpgme.h>

void
init_gpgme (void)
{
  /* Initialize the locale environment.  */
  setlocale (LC_ALL, "");
  gpgme_check_version (NULL);
  gpgme_set_locale (NULL, LC_CTYPE, setlocale (LC_CTYPE, NULL));
 #ifdef LC_MESSAGES
  gpgme_set_locale (NULL, LC_MESSAGES, setlocale (LC_MESSAGES, NULL));
#endif
}
```

Note that you are highly recommended to initialize the locale settings like this. GPGME can not do this for you because it would not be thread safe. The conditional on LC_MESSAGES is only necessary for portability to W32 systems.

File: gpgme.info, Node: Signal Handling, Next: Multi-Threading, Prev: Library Version Check, Up: Preparation

## 2.7 Signal Handling

The GPGME library communicates with child processes (the crypto engines). If a child process dies unexpectedly, for example due to a bug, or system problem, a SIGPIPE signal will be delivered to the application. The default action is to abort the program. To protect against this, gpgme_check_version sets the SIGPIPE signal action to SIG_IGN, which means that the signal will be ignored.

GPGME will only do that if the signal action for SIGPIPE is SIG_DEF at the time gpgme_check_version is called. If it is something different, GPGME will take no action.

This means that if your application does not install any signal handler for SIGPIPE, you dont need to take any precautions. If you do install a signal handler for SIGPIPE, you must be prepared to handle any SIGPIPE events that occur due to GPGME writing to a defunct pipe. Furthermore, if your application is multi-threaded, and you install a signal action for SIGPIPE, you must make sure you do this either before gpgme_check_version is called or afterwards.

File: gpgme.info, Node: Multi-Threading, Prev: Signal Handling, Up: Preparation

## 2.8 Multi-Threading

The GPGME library is mostly thread-safe, and can be used in a multi-threaded environment but there are some requirements for multi-threaded use:

The function gpgme_check_version must be called before any other function in the library, because it initializes the thread support subsystem in GPGME. To achieve this in multi-threaded programs, you must synchronize the memory with respect to other threads that also want to use GPGME. For this, it is sufficient to call gpgme_check_version before creating the other threads using GPGME(1).

Any gpgme_data_t and gpgme_ctx_t object must only be accessed by one thread at a time. If multiple threads want to deal with the same object, the caller has to make sure that operations on that object are fully synchronized.

Only one thread at any time is allowed to call gpgme_wait. If multiple threads call this function, the caller must make sure that all invocations are fully synchronized. It is safe to start asynchronous operations while a thread is running in gpgme_wait.

The function gpgme_strerror is not thread safe. You have to use gpgme_strerror_r instead.

---------- Footnotes ----------

(1) At least this is true for POSIX threads, as pthread_create is a function that synchronizes memory with respects to other threads. There are many functions which have this property, a complete list can be found in POSIX, IEEE Std 1003.1-2003, Base Definitions, Issue 6, in the definition of the term Memory Synchronization. For other thread packages other, more relaxed or more strict rules may apply.

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# 3 Protocols and Engines

GPGME supports several cryptographic protocols, however, it does not implement them. Rather it uses backends (also called engines) which implement the protocol. GPGME uses inter-process communication to pass data back and forth between the application and the backend, but the details of the communication protocol and invocation of the backend is completely hidden by the interface. All complexity is handled by GPGME. Where an exchange of information between the application and the backend is necessary, GPGME provides the necessary
callback function hooks and
further interfaces.

-- Data type: enum gpgme_protocol_t

The gpgme_protocol_t type specifies the set of possible protocol values that are supported by GPGME. The following protocols are supported:

GPGME_PROTOCOL_OpenPGP
GPGME_PROTOCOL_OPENPGP

This specifies the OpenPGP protocol.

GPGME_PROTOCOL_CMS

This specifies the Cryptographic Message Syntax.

GPGME_PROTOCOL_GPGCONF

Under development. Please ask on <gnupg-devel@gnupg.org> for help.

GPGME_PROTOCOL_ASSUAN

SINCE: 1.2.0

This specifies the raw Assuan protocol.

GPGME_PROTOCOL_G13

SINCE: 1.3.0

Under development. Please ask on <gnupg-devel@gnupg.org> for help.

GPGME_PROTOCOL_UISERVER

Under development. Please ask on <gnupg-devel@gnupg.org> for help.

GPGME_PROTOCOL_SPAWN

SINCE: 1.5.0

Special protocol for use with
gpgme_op_spawn.

GPGME_PROTOCOL_UNKNOWN
Reserved for future extension. You may use this to indicate that the used protocol is not known to the application. Currently, GPGME does not accept this value in any operation, though, except for gpgme_get_protocol_name.

-- Function: const char * gpgme_get_protocol_name (gpgme_protocol_t PROTOCOL)
The function gpgme_get_protocol_name returns a statically allocated string describing the protocol PROTOCOL, or NULL if the protocol number is not valid.

* Menu:

* Engine Version Check:: Verifying the engine version.
* Engine Information:: Obtaining more information about the engines.
* Engine Configuration:: Changing the engine configuration.
* OpenPGP:: Support for the OpenPGP protocol.
* Cryptographic Message Syntax:: Support for the CMS.
* Assuan:: Support for the raw Assuan protocol.

File: gpgme.info,
Node: Engine Version Check, Next: Engine Information, Up: Protocols and Engines

## 3.1 Engine Version Check

-- Function: const char * gpgme_get_dirinfo (cons char *WHAT)
SINCE: 1.5.0

The function gpgme_get_dirinfo returns a statically allocated string with the value associated to WHAT. The returned values are the defaults and wont change even after gpgme_set_engine_info has been used to configure a different engine. NULL is returned if no value is available. Commonly supported values for WHAT are:

homedir
Return the default home directory.

sysconfdir
Return the name of the system configuration directory

bindir
Return the name of the directory with GnuPG program files.

libdir
Return the name of the directory with GnuPG related library

files.

libexecdir
Return the name of the directory with GnuPG helper program files.

datadir
Return the name of the directory with GnuPG shared data.

localedir
Return the name of the directory with GnuPG locale data.

agent-socket
Return the name of the socket to connect to the gpg-agent.

agent-ssh-socket
Return the name of the socket to connect to the ssh-agent component of gpg-agent.

dirmngr-socket
Return the name of the socket to connect to the dirmngr.

uiserver-socket
Return the name of the socket to connect to the user interface server.

gpgconf-name
Return the file name of the engine configuration tool.

gpg-name
Return the file name of the OpenPGP engine.

gpgsm-name
Return the file name of the CMS engine.

g13-name
Return the name of the file container encryption engine.

gpg-wks-client-name
Return the name of the Web Key Service tool.

-- Function: gpgme_error_t gpgme_engine_check_version (gpgme_protocol_t PROTOCOL)
The function gpgme_engine_check_version verifies that the engine implementing the protocol PROTOCOL is installed in the expected path and meets the version requirement of GPGME.

This function returns the error code GPG_ERR_NO_ERROR if the engine is available and GPG_ERR_INV_ENGINE if it is not.

File: gpgme.info, Node: Engine Information, Next: Engine Configuration, Prev: Engine Version Check, Up: Protocols and Engines

## 3.2 Engine Information

-- Data type: gpgme_engine_info_t

The gpgme_engine_info_t type specifies a pointer to a structure describing a crypto engine. The structure contains the following elements:

gpgme_engine_info_t next

This is a pointer to the next engine info structure in the linked list, or NULL if this is the last element.

gpgme_protocol_t protocol

This is the protocol for which the crypto engine is used. You can convert this to a string with gpgme_get_protocol_name for printing.

const char *file_name

This is a string holding the file name of the executable of the crypto engine. Currently, it is never NULL, but using NULL is reserved for future use, so always check before you use it.

const char *home_dir

This is a string holding the directory name of the crypto engines configuration directory. If it is NULL, then the default directory is used. See gpgme_get_dirinfo on how to get the default directory.

const char *version

This is a string containing the version number of the crypto engine. It might be NULL if the version number can not be determined, for example because the executable doesnt exist or is invalid.

const char *req_version

This is a string containing the minimum required version number of the crypto engine for GPGME to work correctly. This is the version number that gpgme_engine_check_version

verifies against. Currently, it is never NULL, but using NULL is reserved for future use, so always check before you use it.

-- Function: gpgme_error_t gpgme_get_engine_info (gpgme_engine_info_t *INFO)

The function gpgme_get_engine_info returns a linked list of engine info structures in INFO. Each info structure describes the defaults of one configured backend.

The memory for the info structures is allocated the first time this function is invoked, and must not be freed by the caller.

This function returns the error code GPG_ERR_NO_ERROR if successful, and a system error if the memory could not be allocated.

Here is an example how you can provide more diagnostics if you receive an error message which indicates that the crypto engine is invalid.

```
gpgme_ctx_t ctx;
gpgme_error_t
err;

[...]

if (gpgme_err_code (err) == GPG_ERR_INV_ENGINE)
  {
    gpgme_engine_info_t info;
    err = gpgme_get_engine_info (&info);
    if (!err)
      {
        while (info && info->protocol != gpgme_get_protocol (ctx))
          info = info->next;
        if (!info)
          fprintf (stderr, "GPGME compiled without support for protocol %s",
                   gpgme_get_protocol_name (info->protocol));
        else if (info->file_name && !info->version)
          fprintf (stderr, "Engine %s not installed properly",
                   info->file_name);
        else if (info->file_name && info->version && info->req_version)
          fprintf (stderr, "Engine %s version %s installed, "
                   "but at least version %s required", info->file_name,
                   info->version, info->req_version);
        else
          fprintf (stderr, "Unknown problem with engine
```

```
 for protocol %s",
                    gpgme_get_protocol_name (info->protocol));
        }
    }
```

File: gpgme.info, Node: Engine Configuration, Next: OpenPGP, Prev: Engine Information, Up: Protocols and Engines

## 3.3 Engine Configuration

You can change the configuration of a backend engine, and thus change the executable program and configuration directory to be used. You can make these changes the default or set them for some contexts individually.

-- Function: gpgme_error_t gpgme_set_engine_info
(gpgme_protocol_t PROTO, const char *FILE_NAME,
const char *HOME_DIR)
SINCE: 1.1.0

The function gpgme_set_engine_info changes the default configuration of the crypto engine implementing the protocol PROTO.

FILE_NAME is the file name of the executable program implementing this protocol, and HOME_DIR is the directory name of the configuration directory for this crypto engine. If HOME_DIR is

NULL, the engines default will be used.

The new defaults are not applied to already created GPGME contexts.

This function returns the error code GPG_ERR_NO_ERROR if successful, or an error code on failure.

The functions gpgme_ctx_get_engine_info and gpgme_ctx_set_engine_info can be used to change the engine configuration per context. *Note Crypto Engine::.

File: gpgme.info, Node: OpenPGP, Next: Cryptographic Message Syntax, Prev: Engine Configuration, Up: Protocols and Engines

## 3.4 OpenPGP

OpenPGP is implemented by GnuPG, the GNU Privacy Guard. This is the

first protocol that was supported by GPGME.

The OpenPGP protocol is specified by GPGME_PROTOCOL_OpenPGP.

File: gpgme.info, Node: Cryptographic Message Syntax, Next: Assuan, Prev: OpenPGP, Up: Protocols and Engines

## 3.5 Cryptographic Message Syntax

CMS is implemented by GpgSM, the S/MIME implementation for GnuPG.

The CMS protocol is specified by
GPGME_PROTOCOL_CMS.

File: gpgme.info, Node: Assuan, Prev: Cryptographic Message Syntax, Up: Protocols and Engines

## 3.6 Assuan

Assuan is the RPC library used by the various GnuPG components. The Assuan protocol allows one to talk to arbitrary Assuan servers using GPGME. *Note Using the Assuan protocol::.

The ASSUAN protocol is specified by GPGME_PROTOCOL_ASSUAN.

File: gpgme.info, Node: Algorithms, Next: Error Handling, Prev: Protocols and Engines, Up: Top

# 4 Algorithms

The crypto backends support a variety of algorithms used in public key cryptography.(1) The following sections list the identifiers used to denote such an algorithm.

* Menu:

* Public Key Algorithms:: A list of all public key algorithms.
* Hash Algorithms:: A list of all hash algorithms.

---------- Footnotes ----------

(1) Some engines also provide symmetric only encryption; see the description of the encryption function on how to use this.

File:
gpgme.info, Node: Public Key Algorithms, Next: Hash Algorithms, Up: Algorithms

## 4.1 Public Key Algorithms

Public key algorithms are used for encryption, decryption, signing and verification of signatures.

-- Data type: enum gpgme_pubkey_algo_t

The gpgme_pubkey_algo_t type specifies the set of all public key algorithms that are supported by GPGME. Possible values are:

GPGME_PK_RSA

This value indicates the RSA (Rivest, Shamir, Adleman) algorithm.

GPGME_PK_RSA_E

Deprecated. This value indicates the RSA (Rivest, Shamir, Adleman) algorithm for encryption and decryption only.

GPGME_PK_RSA_S

Deprecated. This value indicates the RSA (Rivest, Shamir, Adleman) algorithm for signing and verification only.

GPGME_PK_DSA

This value indicates DSA, the Digital Signature Algorithm.

GPGME_PK_ELG

This value indicates ElGamal.

GPGME_PK_ELG_E

This value also indicates ElGamal and is used specifically in GnuPG.

GPGME_PK_ECC

SINCE: 1.5.0

This value is a generic indicator for ellipic curve algorithms.

GPGME_PK_ECDSA

SINCE: 1.3.0

This value indicates ECDSA, the Elliptic Curve Digital Signature Algorithm as defined by FIPS 186-2 and RFC-6637.

GPGME_PK_ECDH
SINCE: 1.3.0

This value indicates ECDH, the Eliptic Curve Diffie-Hellmann encryption algorithm as defined by RFC-6637.

GPGME_PK_EDDSA
SINCE: 1.7.0

This value indicates the EdDSA algorithm.

-- Function: const char * gpgme_pubkey_algo_name (gpgme_pubkey_algo_t ALGO)

The function gpgme_pubkey_algo_name returns a pointer to a statically allocated string containing a description of the public key algorithm ALGO. This string can be used to output the name of the public key algorithm to the user.

If ALGO is not a valid public key algorithm, NULL is returned.

-- Function: char * gpgme_pubkey_algo_string (gpgme_subkey_t KEY)

SINCE: 1.7.0

The function gpgme_pubkey_algo_string is a convenience function to build and return an algorithm string in the same way GnuPG does (e.g. rsa2048 or ed25519). The caller must free the result using gpgme_free. On error (e.g. invalid argument or memory exhausted), the function returns NULL and sets ERRNO.

File: gpgme.info, Node: Hash Algorithms, Prev: Public Key Algorithms, Up: Algorithms

## 4.2 Hash Algorithms

Hash (message digest) algorithms are used to compress a long message to make it suitable for public key cryptography.

-- Data type: enum gpgme_hash_algo_t

The gpgme_hash_algo_t type specifies the set of all hash algorithms that are supported by GPGME. Possible values are:

GPGME_MD_MD5
GPGME_MD_SHA1
GPGME_MD_RMD160
GPGME_MD_MD2
GPGME_MD_TIGER

GPGME_MD_HAVAL
GPGME_MD_SHA256
GPGME_MD_SHA384
GPGME_MD_SHA512
GPGME_MD_SHA224
SINCE: 1.5.0

GPGME_MD_MD4
GPGME_MD_CRC32
GPGME_MD_CRC32_RFC1510
GPGME_MD_CRC24_RFC2440

-- Function: const char * gpgme_hash_algo_name (gpgme_hash_algo_t ALGO)
The function gpgme_hash_algo_name returns a pointer to a statically allocated string containing a description of the hash algorithm ALGO. This string can be used to output the name of the hash algorithm to the user.

If ALGO is not a valid hash algorithm, NULL is returned.

File: gpgme.info, Node: Error Handling, Next: Exchanging Data, Prev: Algorithms, Up: Top

# 5 Error Handling

Many functions in GPGME can return an error if they fail. For this reason, the application should always catch the error condition and take appropriate measures, for example by releasing the resources and passing the error up to the caller, or by displaying a descriptive message to the user and cancelling the operation.

Some error values do not indicate a system error or an error in the operation, but the result of an operation that failed properly. For example, if you try to decrypt a tempered message, the decryption will fail. Another error value actually means that the end of a data buffer or list has been reached. The following descriptions explain for many error codes what they mean usually. Some error values have specific meanings if returned by a certain functions. Such cases are described in the documentation of those functions.

GPGME uses the libgpg-error library. This allows to share the error codes with other components of the GnuPG system, and thus pass error values transparently from the crypto engine, or some helper application of the crypto engine, to the user. This way no information is lost. As a consequence, GPGME does not use its own identifiers for error codes, but uses those provided by libgpg-error. They usually

start
with GPG_ERR_.

However, GPGME does provide aliases for the functions defined in libgpg-error, which might be preferred for name space consistency.

* Menu:

* Error Values:: The error value and what it means.
* Error Sources:: A list of important error sources.
* Error Codes:: A list of important error codes.
* Error Strings:: How to get a descriptive string from a value.

File: gpgme.info, Node: Error Values, Next: Error Sources, Up: Error Handling

## 5.1 Error Values

-- Data type: gpgme_err_code_t
The gpgme_err_code_t type is an alias for the libgpg-error type gpg_err_code_t. The error code indicates the type of an error, or the reason why an operation failed.

A list of important error codes can be found in the next section.

-- Data type: gpgme_err_source_t
The gpgme_err_source_t type is an alias for the libgpg-error type gpg_err_source_t. The error source has not a precisely defined meaning. Sometimes it is the place where the error happened, sometimes it is the place where an error was encoded into an error value. Usually the error source will give an indication to where to look for the problem. This is not always true, but it is attempted to achieve this goal.

A list of important error sources can be found in the next section.

-- Data type: gpgme_error_t
The gpgme_error_t type is an alias for the libgpg-error type gpg_error_t. An error value like this has always two components, an error code and an error source. Both together form the error value.

Thus, the error value can not be directly compared against an error code, but the accessor functions described below must be used. However, it is guaranteed that only 0 is used to indicate success (GPG_ERR_NO_ERROR), and that in this case all other parts of the

error value are set to 0, too.

Note
that in GPGME, the error source is used purely for
diagnostical purposes. Only the error code should be checked to
test for a certain outcome of a function. The manual only
documents the error code part of an error value. The error source
is left unspecified and might be anything.

-- Function: static inline gpgme_err_code_t gpgme_err_code
(gpgme_error_t ERR)
The static inline function gpgme_err_code returns the
gpgme_err_code_t component of the error value ERR. This function
must be used to extract the error code from an error value in order
to compare it with the GPG_ERR_* error code macros.

-- Function: static inline gpgme_err_source_t gpgme_err_source
(gpgme_error_t ERR)
The static inline function gpgme_err_source returns the
gpgme_err_source_t component of the error value ERR. This
function must be used to extract the error source from an error
value in order to compare it with the GPG_ERR_SOURCE_*
error
source macros.

-- Function: static inline gpgme_error_t gpgme_err_make
(gpgme_err_source_t SOURCE, gpgme_err_code_t CODE)
The static inline function gpgme_err_make returns the error value
consisting of the error source SOURCE and the error code CODE.

This function can be used in callback functions to construct an
error value to return it to the library.

-- Function: static inline gpgme_error_t gpgme_error
(gpgme_err_code_t CODE)
The static inline function gpgme_error returns the error value
consisting of the default error source and the error code CODE.

For GPGME applications, the default error source is
GPG_ERR_SOURCE_USER_1. You can define GPGME_ERR_SOURCE_DEFAULT
before including gpgme.h to change this default.

This function can be used in callback functions to construct an
error value to return it to the library.

The libgpg-error library provides error codes for all system error
numbers

it knows about. If ERR is an unknown error number, the error code GPG_ERR_UNKNOWN_ERRNO is used. The following functions can be used to construct error values from system errnor numbers.

-- Function: gpgme_error_t gpgme_err_make_from_errno
(gpgme_err_source_t SOURCE, int ERR)
The function gpgme_err_make_from_errno is like gpgme_err_make, but it takes a system error like errno instead of a gpgme_err_code_t error code.

-- Function: gpgme_error_t gpgme_error_from_errno (int ERR)
The function gpgme_error_from_errno is like gpgme_error, but it takes a system error like errno instead of a gpgme_err_code_t error code.

Sometimes you might want to map system error numbers to error codes directly, or map an error code representing a system error back to the system error number. The following functions can be used to do that.

-- Function: gpgme_err_code_t gpgme_err_code_from_errno (int ERR)
The function gpgme_err_code_from_errno returns the error code for the system error ERR. If ERR is not a known system error, the function returns GPG_ERR_UNKNOWN_ERRNO.

-- Function: int gpgme_err_code_to_errno (gpgme_err_code_t ERR)
The function gpgme_err_code_to_errno returns the system error for the error code ERR. If ERR is not an error code representing a system error, or if this system error is not defined on this system, the function returns 0.

File: gpgme.info, Node: Error Sources, Next: Error Codes, Prev: Error Values, Up: Error Handling

## 5.2 Error Sources

The library libgpg-error defines an error source for every component of the GnuPG system. The error source part of an error value is not well defined. As such it is mainly useful to improve the diagnostic error message for the user.

If the error code part of an error value is 0, the whole error value will be 0. In this case the error source part is of course GPG_ERR_SOURCE_UNKNOWN.

The list of error

sources that might occur in applications using
GPGME is:

GPG_ERR_SOURCE_UNKNOWN
The error source is not known. The value of this error source is 0.

GPG_ERR_SOURCE_GPGME
The error source is GPGME itself. This is the default for errors that occur in the GPGME library.

GPG_ERR_SOURCE_GPG
The error source is GnuPG, which is the crypto engine used for the OpenPGP protocol.

GPG_ERR_SOURCE_GPGSM
The error source is GPGSM, which is the crypto engine used for the CMS protocol.

GPG_ERR_SOURCE_GCRYPT
The error source is libgcrypt, which is used by crypto engines to perform cryptographic operations.

GPG_ERR_SOURCE_GPGAGENT
The error source is gpg-agent, which is used by crypto engines to perform operations with the secret key.

GPG_ERR_SOURCE_PINENTRY
The error source is pinentry, which is used by gpg-agent to query the passphrase to unlock a secret key.

GPG_ERR_SOURCE_SCD
The error source is the SmartCard Daemon,
which is used by
gpg-agent to delegate operations with the secret key to a SmartCard.

GPG_ERR_SOURCE_KEYBOX
The error source is libkbx, a library used by the crypto engines to manage local keyrings.

GPG_ERR_SOURCE_USER_1
GPG_ERR_SOURCE_USER_2
GPG_ERR_SOURCE_USER_3
GPG_ERR_SOURCE_USER_4
These error sources are not used by any GnuPG component and can be used by other software. For example, applications using GPGME can use them to mark error values coming from callback handlers. Thus

GPG_ERR_SOURCE_USER_1 is the default for errors created with gpgme_error and gpgme_error_from_errno, unless you define GPGME_ERR_SOURCE_DEFAULT before including gpgme.h.

File: gpgme.info, Node: Error Codes, Next: Error Strings, Prev: Error Sources, Up: Error Handling

## 5.3 Error Codes

The library libgpg-error defines many error values. Most of them are not used by GPGME directly, but might be returned by GPGME because it received them from the crypto engine. The below list only includes such error codes that have a specific meaning in GPGME, or which are so common that you should know about them.

GPG_ERR_EOF
This value indicates the end of a list, buffer or file.

GPG_ERR_NO_ERROR
This value indicates success. The value of this error code is 0. Also, it is guaranteed that an error value made from the error code 0 will be 0 itself (as a whole). This means that the error source information is lost for this error code, however, as this error code indicates that no error occurred, this is generally not a problem.

GPG_ERR_GENERAL
This value means that something went wrong, but either there is not enough information about the problem to return a more useful error value, or there is no separate error value for this type of problem.

GPG_ERR_ENOMEM
This value means that an out-of-memory condition occurred.

GPG_ERR_E...
System errors are mapped to GPG_ERR_FOO where FOO is the symbol for the system error.

GPG_ERR_INV_VALUE
This value means that some user provided data was out of range. This can also refer to objects. For example, if an empty gpgme_data_t object was expected, but one containing data was provided, this error value is returned.

GPG_ERR_UNUSABLE_PUBKEY
This value means that some recipients for a message were invalid.

GPG_ERR_UNUSABLE_SECKEY
This value means that some signers were invalid.

GPG_ERR_NO_DATA
This value means that a gpgme_data_t object which was expected to have content was found empty.

GPG_ERR_CONFLICT
This value means that a conflict of some sort occurred.

GPG_ERR_NOT_IMPLEMENTED
This value indicates that the specific function (or operation) is not implemented. This error should never happen. It can only occur if you use certain values or configuration options which do not work, but for which we think that they should work at some later time.

GPG_ERR_DECRYPT_FAILED
This value indicates that a decryption operation was unsuccessful.

GPG_ERR_BAD_PASSPHRASE
This value means that the user did not provide a correct passphrase when requested.

GPG_ERR_CANCELED
This value means that the operation was canceled.

GPG_ERR_INV_ENGINE
This value means that the engine that implements the desired protocol is currently not available. This can either be because the sources were configured to exclude support for this engine, or because the engine is not installed properly.

GPG_ERR_AMBIGUOUS_NAME
This value indicates that a user ID or other specifier did not specify a unique key.

GPG_ERR_WRONG_KEY_USAGE
This value indicates that a key is not used appropriately.

GPG_ERR_CERT_REVOKED
This value indicates that a key signature was revoced.

GPG_ERR_CERT_EXPIRED
This value indicates that a key signature expired.

GPG_ERR_NO_CRL_KNOWN
This value indicates
that no certificate revocation list is known
for the certificate.

GPG_ERR_NO_POLICY_MATCH
This value indicates that a policy issue occurred.

GPG_ERR_NO_SECKEY
This value indicates that no secret key for the user ID is
available.

GPG_ERR_MISSING_CERT
This value indicates that a key could not be imported because the
issuer certificate is missing.

GPG_ERR_BAD_CERT_CHAIN
This value indicates that a key could not be imported because its
certificate chain is not good, for example it could be too long.

GPG_ERR_UNSUPPORTED_ALGORITHM
This value means a verification failed because the cryptographic
algorithm is not supported by the crypto backend.

GPG_ERR_BAD_SIGNATURE
This value means a verification failed because the signature is
bad.

GPG_ERR_NO_PUBKEY
This value means a verification failed because the public key is
not available.

GPG_ERR_USER_1
GPG_ERR_USER_2
...
GPG_ERR_USER_16
These error codes are not used
by any GnuPG component and can be
freely used by other software. Applications using GPGME might use
them to mark specific errors returned by callback handlers if no
suitable error codes (including the system errors) for these errors
exist already.

File: gpgme.info, Node: Error Strings, Prev: Error Codes, Up: Error Handling

5.4 Error Strings

==========

-- Function: const char * gpgme_strerror (gpgme_error_t ERR)
The function gpgme_strerror returns a pointer to a statically allocated string containing a description of the error code contained in the error value ERR. This string can be used to output a diagnostic message to the user.

This function is not thread safe. Use gpgme_strerror_r in multi-threaded programs.

-- Function: int gpgme_strerror_r (gpgme_error_t ERR, char *BUF, size_t BUFLEN)
The function gpgme_strerror_r returns the error string for ERR in the user-supplied buffer BUF of size BUFLEN.
This function is, in contrast to gpgme_strerror, thread-safe if a thread-safe strerror_r function is provided by the system. If the function succeeds, 0 is returned and BUF contains the string describing the error. If the buffer was not large enough, ERANGE is returned and BUF contains as much of the beginning of the error string as fits into the buffer.

-- Function: const char * gpgme_strsource (gpgme_error_t ERR)
The function gpgme_strerror returns a pointer to a statically allocated string containing a description of the error source contained in the error value ERR. This string can be used to output a diagnostic message to the user.

The following example illustrates the use of gpgme_strerror:

```
gpgme_ctx_t ctx;
gpgme_error_t err = gpgme_new (&ctx);
if (err)
  {
    fprintf (stderr, "%s: creating GpgME context failed: %s: %s\n",
             argv[0], gpgme_strsource (err), gpgme_strerror (err));
    exit (1);
  }
```

File: gpgme.info, Node: Exchanging Data, Next: Contexts, Prev: Error Handling, Up: Top

# 6 Exchanging Data

**********

A lot of data has to be exchanged between the user and the crypto engine, like plaintext messages, ciphertext, signatures and information

about the keys. The technical details about exchanging the data information are completely abstracted by GPGME. The user provides and receives the data via gpgme_data_t objects, regardless of the communication protocol between GPGME and the crypto engine in use.

-- Data type: gpgme_data_t
The gpgme_data_t type is a handle for a container for generic data, which is used by GPGME to exchange data with the user.

gpgme_data_t objects do not provide notifications on events. It is assumed that read and write operations are blocking until data is available. If this is undesirable, the application must ensure that all GPGME data operations always have data available, for example by using
memory buffers or files rather than pipes or sockets. This might be relevant, for example, if the external event loop mechanism is used.

-- Data type: gpgme_off_t
SINCE: 1.4.1

On POSIX platforms the gpgme_off_t type is an alias for off_t; it may be used interchangeable. On Windows platforms gpgme_off_t is defined as a long (i.e. 32 bit) for 32 bit Windows and as a 64 bit signed integer for 64 bit Windows.

-- Data type: gpgme_ssize_t
The gpgme_ssize_t type is an alias for ssize_t. It has only been introduced to overcome portability problems pertaining to the declaration of ssize_t by different toolchains.

* Menu:

* Creating Data Buffers:: Creating new data buffers.
* Destroying Data Buffers:: Releasing data buffers.
* Manipulating Data Buffers:: Operations on data buffers.

File: gpgme.info, Node: Creating Data Buffers, Next: Destroying Data Buffers, Up: Exchanging Data

## 6.1 Creating Data Buffers

Data
objects can be based on memory, files, or callback functions provided by the user. Not all operations are supported by all objects.

* Menu:

* Memory Based Data Buffers:: Creating memory based data buffers.
* File Based Data Buffers:: Creating file based data buffers.
* Callback Based Data Buffers:: Creating callback based data buffers.

File: gpgme.info, Node: Memory Based Data Buffers, Next: File Based Data Buffers, Up: Creating Data Buffers

### 6.1.1 Memory Based Data Buffers

Memory based data objects store all data in allocated memory. This is convenient, but only practical for an amount of data that is a fraction of the available physical memory. The data has to be copied from its source and to its destination, which can often be avoided by using one of the other data object

-- Function: gpgme_error_t gpgme_data_new (gpgme_data_t *DH)
The function gpgme_data_new creates a new gpgme_data_t object

and returns a handle for it in DH. The data object is memory based and initially empty.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, GPG_ERR_INV_VALUE if DH is not a valid pointer, and GPG_ERR_ENOMEM if not enough memory is available.

-- Function: gpgme_error_t gpgme_data_new_from_mem (gpgme_data_t *DH, const char *BUFFER, size_t SIZE, int COPY)
The function gpgme_data_new_from_mem creates a new gpgme_data_t object and fills it with SIZE bytes starting from BUFFER.

If COPY is not zero, a private copy of the data is made. If COPY is zero, the data is taken from the specified buffer as needed, and the user has to ensure that the buffer remains valid for the whole life span of the data object.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, GPG_ERR_INV_VALUE if DH or BUFFER is not a valid pointer, and
GPG_ERR_ENOMEM if not enough
memory is available.

-- Function: gpgme_error_t gpgme_data_new_from_file (gpgme_data_t *DH, const char *FILENAME, int COPY)
The function gpgme_data_new_from_file creates a new gpgme_data_t object and fills it with the content of the file FILENAME.

If COPY is not zero, the whole file is read in at initialization time and the file is not used anymore after that. This is the only mode supported currently. Later, a value of zero for COPY might cause all reads to be delayed until the data is needed, but this is not yet implemented.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, GPG_ERR_INV_VALUE if DH or FILENAME is not a valid pointer, GPG_ERR_NOT_IMPLEMENTED if CODE is zero, and GPG_ERR_ENOMEM if not enough memory is available.

-- Function: gpgme_error_t gpgme_data_new_from_filepart
(gpgme_data_t *DH, const char *FILENAME,
FILE *FP,
off_t OFFSET, size_t LENGTH)

The function gpgme_data_new_from_filepart creates a new gpgme_data_t object and fills it with a part of the file specified by FILENAME or FP.

Exactly one of FILENAME and FP must be non-zero, the other must be zero. The argument that is not zero specifies the file from which LENGTH bytes are read into the data object, starting from OFFSET.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, GPG_ERR_INV_VALUE if DH and exactly one of FILENAME and FP is not a valid pointer, and GPG_ERR_ENOMEM if not enough memory is available.

File: gpgme.info, Node: File Based Data Buffers, Next: Callback Based Data Buffers, Prev: Memory Based Data Buffers, Up: Creating Data Buffers

### 6.1.2 File Based Data Buffers

File based data objects operate directly on file descriptors or streams. Only a small amount of data is stored in core at any time, so the size of the data objects is not limited by GPGME.

-- Function: gpgme_error_t gpgme_data_new_from_fd (gpgme_data_t *DH,
int FD)

The function gpgme_data_new_from_fd creates a new gpgme_data_t object and uses the file descriptor FD to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might

read a bit more from the file descriptor than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the file descriptor is set to blocking mode. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, and GPG_ERR_ENOMEM if not enough memory is available.

-- Function: gpgme_error_t gpgme_data_new_from_stream
(gpgme_data_t *DH, FILE *STREAM)

The function gpgme_data_new_from_stream creates a new gpgme_data_t object and uses the I/O stream STREAM to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the stream than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the stream is in blocking mode. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, and GPG_ERR_ENOMEM if not enough memory is available.

-- Function: gpgme_error_t gpgme_data_new_from_estream
(gpgme_data_t *DH, gpgrt_stream_t STREAM)

The function gpgme_data_new_from_estream creates a new gpgme_data_t object and uses the gpgrt stream STREAM to read from (if used as an input data object) and write to (if used as an output data object).

When using the data object as an input buffer, the function might read a bit more from the stream than is actually needed by the crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the stream is in blocking mode. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function returns the error code GPG_ERR_NO_ERROR if the data object was successfully created, and GPG_ERR_ENOMEM if not enough memory is available.

File: gpgme.info, Node: Callback Based Data Buffers, Prev: File Based Data Buffers, Up: Creating Data Buffers

### 6.1.3 Callback Based Data Buffers

If neither memory nor file based data objects are a good fit for your application, you can implement the functions a data object provides yourself and create a data object from these callback functions.

-- Data type: ssize_t (*gpgme_data_read_cb_t) (void *HANDLE, void *BUFFER, size_t SIZE)

The gpgme_data_read_cb_t type is the type of functions which GPGME calls if it wants to read data from a user-implemented data object. The function should read up to SIZE bytes from the current read position into the space starting at BUFFER. The HANDLE is provided by the user at data object creation time.

Note that GPGME assumes that the read blocks until data is available. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function should return the number of bytes read, 0 on EOF, and -1 on error. If an error occurs, ERRNO should be set to describe the type of the error.

-- Data type: ssize_t (*gpgme_data_write_cb_t) (void *HANDLE, const void *BUFFER, size_t SIZE)

The gpgme_data_write_cb_t type is the type of functions which GPGME calls if it wants to write data to a user-implemented data object. The function should write up to SIZE bytes to the current write position from the space starting at BUFFER. The HANDLE is provided by the user at data object creation time.

Note that GPGME assumes that the write blocks until data is available. Errors during I/O operations, except for EINTR, are usually fatal for crypto operations.

The function should return the number of bytes written, and -1 on error. If an error occurs, ERRNO should be set to describe the type of the error.

-- Data type: off_t (*gpgme_data_seek_cb_t) (void *HANDLE,
off_t OFFSET, int WHENCE)

The gpgme_data_seek_cb_t type is the type of functions which GPGME calls if it wants to change the current read/write position in a user-implemented data object, just like the lseek function.

The function should return the new read/write position, and -1 on error. If an error occurs, ERRNO should be set to describe the type of the error.

-- Data type: void (*gpgme_data_release_cb_t) (void *HANDLE)

The gpgme_data_release_cb_t type is the type of functions which GPGME calls if it wants to destroy a user-implemented data object. The HANDLE is provided by the user at data object creation time.

-- Data type: struct gpgme_data_cbs

This structure is used to store the data callback interface functions described above. It has the following members:

gpgme_data_read_cb_t read

This is the function called by GPGME to read data from the data object. It is only required for input data object.

gpgme_data_write_cb_t write

This is the function called by GPGME to write data to the data object. It is only required for output data object.

gpgme_data_seek_cb_t seek

This is the function called by GPGME to change the current read/write pointer in the data object (if available). It is optional.

gpgme_data_release_cb_t release

This is the function called by GPGME to release a data object. It is optional.

-- Function: gpgme_error_t gpgme_data_new_from_cbs (gpgme_data_t *DH,
gpgme_data_cbs_t CBS, void *HANDLE)

The function gpgme_data_new_from_cbs creates a new gpgme_data_t object and uses the user-provided callback functions to operate on the data object.

The handle HANDLE is passed as first argument to the callback functions. This can be used to identify this data object.

The function returns the error code GPG_ERR_NO_ERROR if the data

object was successfully created, and GPG_ERR_ENOMEM if not enough memory is available.

File: gpgme.info, Node: Destroying Data Buffers, Next: Manipulating Data Buffers, Prev: Creating Data Buffers, Up: Exchanging Data

## 6.2 Destroying Data Buffers

-- Function: void gpgme_data_release (gpgme_data_t DH)
The function gpgme_data_release destroys the data object with the handle DH. It releases all associated resources that were not provided by the user in the first place.

-- Function: char * gpgme_data_release_and_get_mem (gpgme_data_t DH, size_t *LENGTH)
The function gpgme_data_release_and_get_mem is like gpgme_data_release, except that it returns the data buffer and its length that was provided by the object.

The user has to release the buffer with gpgme_free. In case the user provided the data buffer in non-copy mode, a copy will be made for this purpose.

In case an error returns, or there is no suitable data buffer that can be returned to the user, the function will return NULL. In any case, the data object DH is destroyed.

-- Function: void gpgme_free (void *BUFFER)
SINCE: 1.1.1

The function gpgme_free releases the memory returned by gpgme_data_release_and_get_mem and gpgme_pubkey_algo_string. It should be used instead of the system libraries free function in case different allocators are used by a program. This is often the case if gpgme is used under Windows as a DLL.

File: gpgme.info, Node: Manipulating Data Buffers, Prev: Destroying Data Buffers, Up: Exchanging Data

## 6.3 Manipulating Data Buffers

Data buffers contain data and meta-data. The following operations can be used to manipulate both.

* Menu:

* Data Buffer I/O Operations:: I/O operations on data buffers.
* Data Buffer Meta-Data:: Meta-data manipulation of data buffers.
* Data Buffer Convenience:: Convenience function for data buffers.

File: gpgme.info, Node: Data Buffer I/O Operations, Next: Data Buffer Meta-Data, Up: Manipulating Data Buffers

6.3.1 Data Buffer I/O Operations
---

-- Function: ssize_t gpgme_data_read
(gpgme_data_t DH, void *BUFFER,
size_t LENGTH)
The function gpgme_data_read reads up to LENGTH bytes from the data object with the handle DH into the space starting at BUFFER.

If no error occurs, the actual amount read is returned. If the end of the data object is reached, the function returns 0.

In all other cases, the function returns -1 and sets ERRNO.

-- Function: ssize_t gpgme_data_write (gpgme_data_t DH,
const void *BUFFER, size_t SIZE)
The function gpgme_data_write writes up to SIZE bytes starting from BUFFER into the data object with the handle DH at the current write position.

The function returns the number of bytes actually written, or -1 if an error occurs. If an error occurs, ERRNO is set.

-- Function: off_t gpgme_data_seek (gpgme_data_t DH, off_t OFFSET,
int WHENCE)
The function gpgme_data_seek changes the current read/write position.

The WHENCE argument specifies how the OFFSET should be interpreted.
It must be one of the following symbolic constants:

SEEK_SET
Specifies that OFFSET is a count of characters from the beginning of the data object.

SEEK_CUR
Specifies that OFFSET is a count of characters from the

current file position. This count may be positive or negative.

SEEK_END
Specifies that OFFSET is a count of characters from the end of the data object. A negative count specifies a position within the current extent of the data object; a positive count specifies a position past the current end. If you set the position past the current end, and actually write data, you will extend the data object with zeros up to that position.

If successful, the function returns the resulting file position, measured in bytes from the beginning of the data object. You can use this feature together with SEEK_CUR
to read the current
read/write position.

If the function fails, -1 is returned and ERRNO is set.

File: gpgme.info, Node: Data Buffer Meta-Data, Next: Data Buffer Convenience, Prev: Data Buffer I/O Operations, Up: Manipulating Data Buffers

6.3.2 Data Buffer Meta-Data
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-- Function: char * gpgme_data_get_file_name (gpgme_data_t DH)
SINCE: 1.1.0

The function gpgme_data_get_file_name returns a pointer to a string containing the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting or verifying the output data.

If no error occurs, the string containing the file name is returned. Otherwise, NULL will be returned.

-- Function: gpgme_error_t gpgme_data_set_file_name (gpgme_data_t DH,
const char *FILE_NAME)
SINCE: 1.1.0

The function gpgme_data_set_file_name sets the file
name
associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting or verifying the output data.

The function returns the error code GPG_ERR_INV_VALUE if DH is not a valid pointer and GPG_ERR_ENOMEM if not enough memory is available.

-- Data type: enum gpgme_data_encoding_t

The gpgme_data_encoding_t type specifies the encoding of a gpgme_data_t object. For input data objects, the encoding is useful to give the backend a hint on the type of data. For output data objects, the encoding can specify the output data format on certain operations. Please note that not all backends support all encodings on all operations. The following data types are available:

GPGME_DATA_ENCODING_NONE

This specifies that the encoding is not known. This is the default for a new data object. The backend will try its best to detect the encoding automatically.

GPGME_DATA_ENCODING_BINARY

This specifies that the data is encoding in binary form; i.e. there is no special encoding.

GPGME_DATA_ENCODING_BASE64

This specifies that the data is encoded using the Base-64 encoding scheme as used by MIME and other protocols.

GPGME_DATA_ENCODING_ARMOR

This specifies that the data is encoded in an armored form as used by OpenPGP and PEM.

GPGME_DATA_ENCODING_MIME

SINCE: 1.7.0

This specifies that the data is encoded as a MIME part.

GPGME_DATA_ENCODING_URL

SINCE: 1.2.0

The data is a list of linefeed delimited URLs. This is only useful with gpgme_op_import.

GPGME_DATA_ENCODING_URL0

SINCE: 1.2.0

The data is a list of binary zero delimited URLs. This is only useful with gpgme_op_import.

GPGME_DATA_ENCODING_URLESC

SINCE: 1.2.0

The data is a list of linefeed delimited URLs with all control and space characters percent escaped. This mode is is not yet implemented.

-- Function: gpgme_data_encoding_t gpgme_data_get_encoding (gpgme_data_t DH)

The function gpgme_data_get_encoding returns the encoding of the data object with the handle DH. If DH is not a valid pointer (e.g. NULL) GPGME_DATA_ENCODING_NONE is returned.

-- Function: gpgme_error_t gpgme_data_set_encoding (gpgme_data_t DH, gpgme_data_encoding_t ENC)

The function gpgme_data_set_encoding changes the encoding of the data object with the handle DH to ENC.

-- Function: gpgme_error_t gpgme_data_set_flag (gpgme_data_t DH, const char *NAME, const char *VALUE)

SINCE: 1.7.0

Some minor properties of the data object can be controlled with flags set by this function. The properties are identified by the following values for NAME:

size-hint

The value is a decimal number with the length gpgme shall assume for this data object. This is useful if the data is provided by callbacks or via file descriptors but the applications knows the total size of the data. If this is set the OpenPGP engine may use this to decide on buffer allocation strategies and to provide a total value for its progress information.

This function returns 0 on success.

File: gpgme.info, Node: Data Buffer Convenience, Prev: Data Buffer Meta-Data, Up: Manipulating Data Buffers

6.3.3 Data Buffer Convenience Functions
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-- Data type: enum gpgme_data_type_t

SINCE: 1.4.3

The gpgme_data_type_t type is used to return the detected type of
the content of a data buffer.

GPGME_DATA_TYPE_INVALID
This is returned by gpgme_data_identify if it was not possible to
identify the data. Reasons for this might be a non-seekable
stream
or a memory problem. The value is 0.
GPGME_DATA_TYPE_UNKNOWN
The type of the data is not known.
GPGME_DATA_TYPE_PGP_SIGNED
The data is an OpenPGP signed message. This may be a binary
signature, a detached one or a cleartext signature.
GPGME_DATA_TYPE_PGP_ENCRYPTED
SINCE: 1.7.0

The data is an OpenPGP encrypted message.
GPGME_DATA_TYPE_PGP_SIGNATURE
SINCE: 1.7.0

The data is an OpenPGP detached signature.
GPGME_DATA_TYPE_PGP_OTHER
This is a generic OpenPGP message. In most cases this will be
encrypted data.
GPGME_DATA_TYPE_PGP_KEY
This is an OpenPGP key (private or public).
GPGME_DATA_TYPE_CMS_SIGNED
This is a CMS signed message.
GPGME_DATA_TYPE_CMS_ENCRYPTED
This is a CMS encrypted (enveloped data) message.
GPGME_DATA_TYPE_CMS_OTHER
This is used for other CMS message types.
GPGME_DATA_TYPE_X509_CERT
The data is a X.509 certificate
GPGME_DATA_TYPE_PKCS12
The data is a PKCS#12 message. This
is commonly used to exchange
private keys for X.509.

-- Function: gpgme_data_type_t gpgme_data_identify (gpgme_data_t DH)
SINCE: 1.4.3

The function gpgme_data_identify returns the type of the data
with the handle DH. If it is not possible to perform the
identification, the function returns zero
(GPGME_DATA_TYPE_INVALID). Note that depending on how the data
object has been created the identification may not be possible or
the data object may change its internal state (file pointer moved).

For file or memory based data object, the state should not change.

File: gpgme.info, Node: Contexts, Next: UI Server Protocol, Prev: Exchanging Data, Up: Top

# 7 Contexts

All cryptographic operations in GPGME are performed within a context, which contains the internal state of the operation as well as configuration parameters. By using several contexts you can run several cryptographic operations in parallel, with different configuration.

-- Data type: gpgme_ctx_t
The gpgme_ctx_t type is a handle for a GPGME context, which is used to hold the configuration, status and result of cryptographic operations.

* Menu:


* Creating Contexts:: Creating new GPGME contexts.
* Destroying Contexts:: Releasing GPGME contexts.
* Result Management:: Managing the result of crypto operations.
* Context Attributes:: Setting properties of a context.
* Key Management:: Managing keys with GPGME.
* Crypto Operations:: Using a context for cryptography.
* Miscellaneous:: Miscellaneous operations
* Run Control:: Controlling how operations are run.


File: gpgme.info, Node: Creating Contexts, Next: Destroying Contexts, Up: Contexts

## 7.1 Creating Contexts

-- Function: gpgme_error_t gpgme_new (gpgme_ctx_t *CTX)
The function gpgme_new creates a new gpgme_ctx_t object and returns a handle
for it in CTX.

The function returns the error code GPG_ERR_NO_ERROR if the context was successfully created, GPG_ERR_INV_VALUE if CTX is not a valid pointer, and GPG_ERR_ENOMEM if not enough memory is available. Also, it returns GPG_ERR_NOT_OPERATIONAL if gpgme_check_version was not called to initialize GPGME, and GPG_ERR_SELFTEST_FAILED if a selftest failed. Currently, the only selftest is for Windows MingW32 targets to see if -mms-bitfields was used (as required).

File: gpgme.info, Node: Destroying Contexts, Next: Result Management, Prev: Creating Contexts, Up: Contexts

## 7.2 Destroying Contexts

-- Function: void gpgme_release (gpgme_ctx_t CTX)
The function gpgme_release destroys the context with the handle CTX and releases all associated resources.

File: gpgme.info, Node: Result Management, Next: Context Attributes, Prev: Destroying Contexts, Up: Contexts

## 7.3 Result Management

The detailed result of an operation is returned in operation-specific structures such as gpgme_decrypt_result_t. The corresponding retrieval functions such as gpgme_op_decrypt_result provide static access to the results after an operation completes. Those structures shall be considered read-only and an application must not allocate such a structure on its own. The following interfaces make it possible to detach a result structure from its associated context and give it a lifetime beyond that of the current operation or context.

-- Function: void gpgme_result_ref (void *RESULT)
SINCE: 1.2.0

The function gpgme_result_ref acquires an additional reference for the result RESULT, which may be of any type gpgme_*_result_t. As long as the user holds a reference, the result structure is guaranteed to be valid and unmodified.

-- Function: void gpgme_result_unref (void *RESULT)
SINCE: 1.2.0

The function gpgme_result_unref releases a reference for the result RESULT. If this was the last reference, the result structure will be destroyed and all resources associated to it will be released.

Note that a context may hold its own references to result structures, typically until the context is destroyed or the next operation is started. In fact, these references are accessed through the gpgme_op_*_result functions.

File: gpgme.info, Node: Context Attributes, Next: Key Management, Prev: Result Management, Up: Contexts

## 7.4 Context Attributes

* Menu:

* Protocol Selection:: Selecting the protocol used by a context.
* Crypto Engine:: Configuring the crypto engine.
* Setting the Sender:: How to tell the engine the sender.
* ASCII Armor:: Requesting ASCII armored output.
* Text Mode:: Choosing canonical text mode.
* Offline Mode:: Choosing offline mode.
* Pinentry Mode:: Choosing
the pinentry mode.
* Included Certificates:: Including a number of certificates.
* Key Listing Mode:: Selecting key listing mode.
* Passphrase Callback:: Getting the passphrase from the user.
* Progress Meter Callback:: Being informed about the progress.
* Status Message Callback:: Status messages received from gpg.
* Context Flags:: Additional flags for a context.
* Locale:: Setting the locale of a context.
* Additional Logs:: Additional logs of a context.

File: gpgme.info, Node: Protocol Selection, Next: Crypto Engine, Up: Context Attributes

### 7.4.1 Protocol Selection

-- Function: gpgme_error_t gpgme_set_protocol (gpgme_ctx_t CTX,
gpgme_protocol_t PROTO)

The function gpgme_set_protocol sets the protocol used within the context CTX to PROTO. All crypto operations will be performed by the crypto engine configured for that protocol. *Note Protocols and Engines::.

Setting the protocol with gpgme_set_protocol does intentionally not check if the crypto engine for that protocol is available and installed correctly. *Note Engine Version Check::.

The function returns the error code GPG_ERR_NO_ERROR if the protocol could be set successfully, and GPG_ERR_INV_VALUE if PROTOCOL is not a valid protocol.

-- Function: gpgme_protocol_t gpgme_get_protocol (gpgme_ctx_t CTX)
The function gpgme_get_protocol retrieves the protocol currently
use with the context CTX.

File: gpgme.info, Node: Crypto Engine, Next: Setting the Sender, Prev: Protocol Selection, Up: Context Attributes

7.4.2 Crypto Engine
---

The following functions can be used to set and retrieve the
configuration of the crypto engines of a specific context. The default
can also be retrieved without any particular context. *Note Engine
Information::. The default can also be changed globally. *Note
Engine
Configuration::.

-- Function: gpgme_engine_info_t gpgme_ctx_get_engine_info
(gpgme_ctx_t CTX)
SINCE: 1.1.0

The function gpgme_ctx_get_engine_info returns a linked list of
engine info structures. Each info structure describes the
configuration of one configured backend, as used by the context
CTX.

The result is valid until the next invocation of
gpgme_ctx_set_engine_info for this particular context.

This function can not fail.

-- Function: gpgme_error_t gpgme_ctx_set_engine_info (gpgme_ctx_t CTX,
gpgme_protocol_t PROTO, const char *FILE_NAME,
const char *HOME_DIR)
SINCE: 1.1.0

The function gpgme_ctx_set_engine_info changes the configuration
of the crypto engine implementing the protocol PROTO for the
context CTX.

FILE_NAME is the file name of the executable program implementing
this protocol, and HOME_DIR is the directory name of the
configuration directory for this
crypto engine. If HOME_DIR is
NULL, the engines default will be used.

Currently this function must be used before starting the first

crypto operation. It is unspecified if and when the changes will take effect if the function is called after starting the first operation on the context CTX.

This function returns the error code GPG_ERR_NO_ERROR if successful, or an error code on failure.

File: gpgme.info, Node: Setting the Sender, Next: ASCII Armor, Prev: Crypto Engine, Up: Context Attributes

7.4.3 How to tell the engine the sender.
---

Some engines can make use of the senders address, for example to figure out the best user id in certain trust models. For verification and signing of mails, it is thus suggested to let the engine know the sender ("From:") address. GPGME provides two functions to accomplish that. Note that the esoteric use of multiple "From:" addresses is not supported.

-- Function: gpgme_error_t
 gpgme_set_sender (gpgme_ctx_t CTX,
 int ADDRESS)

SINCE: 1.8.0

The function gpgme_set_sender specifies the sender address for use in sign and verify operations. ADDRESS is expected to be the addr-spec part of an address but my also be a complete mailbox address, in which case this function extracts the addr-spec from it. Using NULL for ADDRESS clears the sender address.

The function returns 0 on success or an error code on failure. The most likely failure is that no valid addr-spec was found in ADDRESS.

-- Function: const char * gpgme_get_sender (gpgme_ctx_t CTX)

SINCE: 1.8.0

The function gpgme_get_sender returns the current sender address from the context, or NULL if none was set. The returned value is valid as long as the CTX is valid and gpgme_set_sender has not been called again.

File: gpgme.info, Node: ASCII Armor, Next: Text Mode, Prev: Setting the Sender, Up: Context Attributes

7.4.4
ASCII Armor
---

-- Function: void gpgme_set_armor (gpgme_ctx_t CTX, int YES)
The function gpgme_set_armor specifies if the output should be ASCII armored. By default, output is not ASCII armored.

ASCII armored output is disabled if YES is zero, and enabled otherwise.

-- Function: int gpgme_get_armor (gpgme_ctx_t CTX)
The function gpgme_get_armor returns 1 if the output is ASCII armored, and 0 if it is not, or if CTX is not a valid pointer.

File: gpgme.info, Node: Text Mode, Next: Offline Mode, Prev: ASCII Armor, Up: Context Attributes

7.4.5 Text Mode
---

-- Function: void gpgme_set_textmode (gpgme_ctx_t CTX, int YES)
The function gpgme_set_textmode specifies if canonical text mode should be used. By default, text mode is not used.

Text mode is for example used for the RFC2015 signatures; note that the updated RFC 3156 mandates that the mail user agent does some preparations so that
text mode is not needed anymore.

This option is only relevant to the OpenPGP crypto engine, and ignored by all other engines.

Canonical text mode is disabled if YES is zero, and enabled otherwise.

-- Function: int gpgme_get_textmode (gpgme_ctx_t CTX)
The function gpgme_get_textmode returns 1 if canonical text mode is enabled, and 0 if it is not, or if CTX is not a valid pointer.

File: gpgme.info, Node: Offline Mode, Next: Pinentry Mode, Prev: Text Mode, Up: Context Attributes

7.4.6 Offline Mode
---

-- Function: void gpgme_set_offline (gpgme_ctx_t CTX, int YES)
SINCE: 1.6.0

The function gpgme_set_offline specifies if offline mode should be used. Offline mode is disabled if YES is zero, and enabled otherwise. By default, offline mode is disabled.

The details of the offline mode depend on the used protocol and its backend engine. It may eventually be extended to be more stricter and for example
completely disable the use of Dirmngr for any engine.

For the CMS protocol the offline mode specifies whether Dirmngr shall be used to do additional validation that might require connecting external services (e.g. CRL / OCSP checks). Here the offline mode only affects the keylist mode GPGME_KEYLIST_MODE_VALIDATE.

For the OpenPGP protocol offline mode entirely disables the use of the Dirmngr and will thus guarantee that no network connections are done as part of an operation on this context. It has only an effect with GnuPG versions 2.1.23 or later.

For all other protocols the offline mode is currently ignored.

-- Function: int gpgme_get_offline (gpgme_ctx_t CTX)
SINCE: 1.6.0

The function gpgme_get_offline returns 1 if offline mode is enabled, and 0 if it is not, or if CTX is not a valid pointer.

File: gpgme.info, Node: Pinentry Mode, Next: Included Certificates, Prev: Offline Mode, Up: Context Attributes

7.4.7
Pinentry Mode
---

-- Function: gpgme_error_t gpgme_set_pinentry_mode (gpgme_ctx_t CTX, gpgme_pinentry_mode_t MODE)

SINCE: 1.4.0

The function gpgme_set_pinentry_mode specifies the pinentry mode to be used.

For GnuPG >= 2.1 this option is required to be set to GPGME_PINENTRY_MODE_LOOPBACK to enable the passphrase callback mechanism in GPGME through gpgme_set_passphrase_cb.

-- Function: gpgme_pinentry_mode_t gpgme_get_pinentry_mode
(gpgme_ctx_t CTX)
SINCE: 1.4.0

The function gpgme_get_pinenty_mode returns the mode set for the context.

-- Data type: enum gpgme_pinentry_mode_t
SINCE: 1.4.0

The gpgme_minentry_mode_t type specifies the set of possible pinentry modes that are supported by GPGME if GnuPG >= 2.1 is used. The following modes are supported:

GPGME_PINENTRY_MODE_DEFAULT
SINCE: 1.4.0

Use the default of the agent, which is ask.

GPGME_PINENTRY_MODE_ASK
SINCE: 1.4.0

Force the use of the Pinentry.

GPGME_PINENTRY_MODE_CANCEL
SINCE: 1.4.0

Emulate use of Pinentrys cancel button.

GPGME_PINENTRY_MODE_ERROR
SINCE: 1.4.0

Return a Pinentry error No Pinentry.

GPGME_PINENTRY_MODE_LOOPBACK
SINCE: 1.4.0

Redirect Pinentry queries to the caller. This enables the use of gpgme_set_passphrase_cb because pinentry queries are redirected to gpgme.

Note: For 2.1.0 - 2.1.12 this mode requires allow-loopback-pinentry to be enabled in the gpg-agent.conf or an agent started with that option.

File: gpgme.info, Node: Included Certificates, Next: Key Listing Mode, Prev: Pinentry Mode, Up: Context

Attributes

7.4.8 Included Certificates
---

-- Function: void gpgme_set_include_certs (gpgme_ctx_t CTX,
int NR_OF_CERTS)
The function gpgme_set_include_certs
specifies how many
certificates should be included in an S/MIME signed message. By
default, only the senders certificate is included. The possible
values of NR_OF_CERTS are:

GPGME_INCLUDE_CERTS_DEFAULT
SINCE: 1.0.3

Fall back to the default of the crypto backend. This is the
default for GPGME.

-2
Include all certificates except the root certificate.

-1
Include all certificates.

0
Include no certificates.

1
Include the senders certificate only.

n
Include the first n certificates of the certificates path,
starting from the senders certificate. The number n must
be positive.

Values of NR_OF_CERTS smaller than -2 are undefined.

This option is only relevant to the CMS crypto engine, and ignored
by all other engines.

-- Function: int gpgme_get_include_certs (gpgme_ctx_t CTX)
The function gpgme_get_include_certs returns
the number of
certificates to include into an S/MIME signed message.

File: gpgme.info, Node: Key Listing Mode, Next: Passphrase Callback, Prev: Included Certificates, Up: Context Attributes

7.4.9 Key Listing Mode
---

-- Function: gpgme_error_t gpgme_set_keylist_mode (gpgme_ctx_t CTX,
gpgme_keylist_mode_t MODE)

The function gpgme_set_keylist_mode changes the default behaviour of the key listing functions. The value in MODE is a bitwise-or combination of one or multiple of the following bit values:

GPGME_KEYLIST_MODE_LOCAL

The GPGME_KEYLIST_MODE_LOCAL symbol specifies that the local keyring should be searched for keys in the keylisting operation. This is the default.

Using only this option results in a --list-keys.

GPGME_KEYLIST_MODE_EXTERN

The GPGME_KEYLIST_MODE_EXTERN symbol specifies that an external source should be searched for keys in the keylisting operation. The type of external source is dependent on the crypto engine used and whether it is combined with GPGME_KEYLIST_MODE_LOCAL. For example, it can be a remote keyserver or LDAP certificate server.

Using only this option results in a --search-keys for GPGME_PROTOCOL_OpenPGP and something similar to --list-external-keys for GPGME_PROTOCOL_CMS.

GPGME_KEYLIST_MODE_LOCATE

This is a shortcut for the combination of GPGME_KEYLIST_MODE_LOCAL and GPGME_KEYLIST_MODE_EXTERN, which results in a --locate-keys for GPGME_PROTOCOL_OpenPGP.

GPGME_KEYLIST_MODE_SIGS

The GPGME_KEYLIST_MODE_SIGS symbol specifies that the key signatures should be included in the listed keys.

GPGME_KEYLIST_MODE_SIG_NOTATIONS

SINCE: 1.1.1

The GPGME_KEYLIST_MODE_SIG_NOTATIONS symbol specifies that the signature notations on key signatures should be included in the listed keys. This only works if GPGME_KEYLIST_MODE_SIGS is also enabled.

GPGME_KEYLIST_MODE_WITH_TOFU

SINCE: 1.7.0

The GPGME_KEYLIST_MODE_WITH_TOFU symbol specifies that

information pertaining to the TOFU trust model should be
included in the listed keys.

GPGME_KEYLIST_MODE_WITH_KEYGRIP
SINCE: 1.14.0

The GPGME_KEYLIST_MODE_WITH_KEYRIP symbol specifies that the
keygrip is always included in the listing. The default
depends on the version of the backend and the used protocol.

GPGME_KEYLIST_MODE_WITH_SECRET
SINCE: 1.5.1

The GPGME_KEYLIST_MODE_WITH_SECRET returns information about
the presence of a corresponding secret key in a public key
listing. A public key listing with this mode is slower than a
standard listing but can be used instead of a second run to
list the secret keys.
This is only supported for GnuPG
versions >= 2.1. Note that using this option also makes sure
that the keygrip is available in the output.

GPGME_KEYLIST_MODE_EPHEMERAL
SINCE: 1.2.0

The GPGME_KEYLIST_MODE_EPHEMERAL symbol specifies that keys
flagged as ephemeral are included in the listing.

GPGME_KEYLIST_MODE_VALIDATE
SINCE: 0.4.5

The GPGME_KEYLIST_MODE_VALIDATE symbol specifies that the
backend should do key or certificate validation and not just
get the validity information from an internal cache. This
might be an expensive operation and is in general not useful.
Currently only implemented for the S/MIME backend and ignored
for other backends.

At least one of GPGME_KEYLIST_MODE_LOCAL and
GPGME_KEYLIST_MODE_EXTERN must be specified. For future binary
compatibility, you should get the current mode with
gpgme_get_keylist_mode and
modify it by setting or clearing the
appropriate bits, and then using that calculated value in the
gpgme_set_keylisting_mode operation. This will leave all other
bits in the mode value intact (in particular those that are not
used in the current version of the library).

The function returns the error code GPG_ERR_NO_ERROR if the mode could be set correctly, and GPG_ERR_INV_VALUE if CTX is not a valid pointer or MODE is not a valid mode.

-- Function: gpgme_keylist_mode_t gpgme_get_keylist_mode (gpgme_ctx_t CTX)

The function gpgme_get_keylist_mode returns the current key listing mode of the context CTX. This value can then be modified and used in a subsequent gpgme_set_keylist_mode operation to only affect the desired bits (and leave all others intact).

The function returns 0 if CTX is not a valid pointer, and the current mode otherwise. Note that 0 is not a valid mode value.

File: gpgme.info, Node: Passphrase Callback, Next: Progress Meter Callback, Prev: Key Listing Mode, Up: Context Attributes

7.4.10 Passphrase Callback
---

-- Data type: gpgme_error_t (*gpgme_passphrase_cb_t)(void *HOOK, const char *UID_HINT, const char *PASSPHRASE_INFO, int PREV_WAS_BAD, int FD)

The gpgme_passphrase_cb_t type is the type of functions usable as passphrase callback function.

The argument UID_HINT might contain a string that gives an indication for which user ID the passphrase is required. If this is not available, or not applicable (in the case of symmetric encryption, for example), UID_HINT will be NULL.

The argument PASSPHRASE_INFO, if not NULL, will give further information about the context in which the passphrase is required. This information is engine and operation specific.

If this is the repeated attempt to get the passphrase, because previous attempts failed, then PREV_WAS_BAD is 1, otherwise it will be 0.

The user must write the passphrase, followed by a newline character, to the file descriptor FD. The function gpgme_io_writen should be used for the write operation. Note that if the user returns 0 to indicate success, the user must at least write a newline character before returning from the callback.

If an error occurs, return the corresponding gpgme_error_t value.

You can use the error code GPG_ERR_CANCELED to abort the operation. Otherwise, return 0.

Note: The passphrase_cb only works with GnuPG 1.x and 2.1.x and not with the 2.0.x series. See gpgme_set_pinentry_mode for more details on 2.1.x usage.

-- Function: void gpgme_set_passphrase_cb (gpgme_ctx_t CTX, gpgme_passphrase_cb_t PASSFUNC, void *HOOK_VALUE)

The function gpgme_set_passphrase_cb sets the function that is used when a passphrase needs to be provided by the user to PASSFUNC. The function PASSFUNC needs to implemented by the user, and whenever it is called, it is called with its first argument being HOOK_VALUE. By default, no passphrase callback function is set.

Not all crypto engines require this callback to retrieve the passphrase. It is better if the engine retrieves the passphrase from a trusted agent (a daemon process), rather than having each user to implement their own passphrase query. Some engines do not even support an external passphrase callback at all, in this case the error code GPG_ERR_NOT_SUPPORTED is returned.

For GnuPG >= 2.1 the pinentry mode has to be set to GPGME_PINENTRY_MODE_LOOPBACK to enable the passphrase callback. See gpgme_set_pinentry_mode.

The user can disable the use of a passphrase callback function by calling gpgme_set_passphrase_cb with PASSFUNC being NULL.

-- Function: void gpgme_get_passphrase_cb (gpgme_ctx_t CTX, gpgme_passphrase_cb_t *PASSFUNC, void **HOOK_VALUE)

The function gpgme_get_passphrase_cb returns the function that is used when a passphrase needs to be provided by the user in *PASSFUNC, and the first argument for this function in *HOOK_VALUE. If no passphrase callback is set, or CTX is not a valid pointer, NULL is returned in both variables.

PASSFUNC or HOOK_VALUE can be NULL. In this case, the corresponding value will not be returned.

File: gpgme.info, Node: Progress Meter Callback, Next: Status Message Callback, Prev: Passphrase Callback, Up: Context Attributes

7.4.11 Progress Meter Callback
---

-- Data type: void (*gpgme_progress_cb_t)(void *HOOK, const char *WHAT,
int TYPE, int CURRENT, int TOTAL)
The gpgme_progress_cb_t type is the type of functions usable as
progress callback function.

The arguments are specific to the crypto engine. More information
about the progress information returned from the GnuPG engine can
be
found in the GnuPG source code in the file doc/DETAILS in the
section PROGRESS.

-- Function: void gpgme_set_progress_cb (gpgme_ctx_t CTX,
gpgme_progress_cb_t PROGFUNC, void *HOOK_VALUE)
The function gpgme_set_progress_cb sets the function that is used
when progress information about a cryptographic operation is
available. The function PROGFUNC needs to implemented by the user,
and whenever it is called, it is called with its first argument
being HOOK_VALUE. By default, no progress callback function is
set.

Setting a callback function allows an interactive program to
display progress information about a long operation to the user.

The user can disable the use of a progress callback function by
calling gpgme_set_progress_cb with PROGFUNC being NULL.

-- Function: void gpgme_get_progress_cb (gpgme_ctx_t CTX,
gpgme_progress_cb_t *PROGFUNC, void **HOOK_VALUE)
The function gpgme_get_progress_cb returns the
function that is
used to inform the user about the progress made in *PROGFUNC, and
the first argument for this function in *HOOK_VALUE. If no
progress callback is set, or CTX is not a valid pointer, NULL is
returned in both variables.

PROGFUNC or HOOK_VALUE can be NULL. In this case, the
corresponding value will not be returned.

File: gpgme.info, Node: Status Message Callback, Next: Context Flags, Prev: Progress Meter Callback, Up: Context Attributes

7.4.12 Status Message Callback
---

-- Data type: gpgme_error_t (*gpgme_status_cb_t)(void *HOOK, const char
*KEYWORD, const char *ARGS)

The gpgme_status_cb_t type is the type of function usable as a status message callback function.

The argument KEYWORD is the name of the status message while the ARGS argument contains any arguments for the status message.

If an error occurs, return the corresponding gpgme_error_t value. Otherwise, return 0.

-- Function: void gpgme_set_status_cb (gpgme_ctx_t CTX, gpgme_status_cb_t STATUSFUNC, void *HOOK_VALUE)

SINCE: 1.6.0

The function gpgme_set_status_cb sets the function that is used when a status message is received from gpg to STATUSFUNC. The function STATUSFUNC needs to be implemented by the user, and whenever it is called, it is called with its first argument being HOOK_VALUE. By default, no status message callback function is set.

The user can disable the use of a status message callback function by calling gpgme_set_status_cb with STATUSFUNC being NULL.

-- Function: void gpgme_get_status_cb (gpgme_ctx_t CTX, gpgme_status_cb_t *STATUSFUNC, void **HOOK_VALUE)

SINCE: 1.6.0

The function gpgme_get_status_cb returns the function that is used to process status messages from gpg in *STATUSFUNC, and the first argument for this function in *HOOK_VALUE. If no status message callback is set, or CTX is not a valid pointer, NULL is returned in both variables.

File: gpgme.info, Node: Context Flags, Next: Locale, Prev: Status Message Callback, Up: Context Attributes

### 7.4.13 Context Flags

-- Function: gpgme_error_t gpgme_set_ctx_flag (gpgme_ctx_t CTX, const char *NAME, const char *VALUE)

SINCE: 1.7.0

Some minor properties of the context can be controlled with flags set by this function. The properties are identified by the

following values for NAME:

"redraw"

This flag is normally not changed by the caller because GPGME sets and clears it automatically: The flag is cleared before an operation and set if an operation noticed that the engine has launched a Pinentry. A Curses based application may use this information to redraw the screen; for example:

```
err = gpgme_op_keylist_start (ctx, "foo@example.org", 0);
while
(!err)
  {
    err = gpgme_op_keylist_next (ctx, &key);
    if (err)
      break;
    show_key (key);
    gpgme_key_release (key);
  }
if ((s = gpgme_get_ctx_flag (ctx, "redraw")) && *s)
  redraw_screen ();
gpgme_release (ctx);
```

"full-status"

Using a VALUE of "1" the status callback set by gpgme_set_status_cb returns all status lines with the exception of PROGRESS lines. With the default of "0" the status callback is only called in certain situations.

"raw-description"

Setting the VALUE to "1" returns human readable strings in a raw format. For example the non breaking space characters ("~") will not be removed from the description field of the gpgme_tofu_info_t object.

"export-session-key"

Using a VALUE of "1" specifies that the context should try to export the symmetric session key when decrypting data. By default, or when using an empty string or "0" for VALUE, session keys are not exported.

"override-session-key"

The string given in VALUE is passed to the GnuPG engine to override the session key for decryption. The format of that session key is specific to GnuPG and can be retrieved during a decrypt operation when the context flag "export-session-key" is enabled. Please be aware that using this feature with

GnuPG < 2.1.16 will leak the session key on many platforms via ps(1).

"auto-key-retrieve"

Setting the VALUE to "1" asks the backend to automatically retrieve a key for signature verification if possible. Note that this option makes a "web bug" like behavior possible. Keyserver or Web Key Directory operators can see which keys you request, so by sending you a message signed by a brand new key (which you naturally will not have on your local keyring), the operator can tell both your IP address and the time when you verified the signature.

"auto-key-import"

Setting the VALUE to "1" forces the GPG backend to automatically import a missing key for signature verification from the signature.

"include-key-block"

Setting the VALUE to "1" forces the GPG backend to embed the signing key as well as an encryption subkey into the the signature.

"request-origin"

The string given in VALUE is passed to the GnuPG engines to request restrictions based on the origin of the request. Valid values are documented in the GnuPG manual and the gpg man page under the option --request-origin. Requires at least GnuPG 2.2.6 to have an effect.

"no-symkey-cache"

For OpenPGP disable the passphrase cache used for symmetrical en- and decryption. This cache is based on the message specific salt value. Requires at least GnuPG 2.2.7 to have an effect.

"ignore-mdc-error"

This flag passes the option --ignore-mdc-error to gpg. This can be used to force decryption of a message which failed due to a missing integrity check. This flag must be used with great caution and only if it is a known non-corrupted old message and the decryption result of the former try had the decryption result flag legacy_cipher_nomdc set. For failsafe reasons this flag is reset after each operation.

"auto-key-locate"

The string given in VALUE is passed to gpg. This can be used

to change the behavior of a GPGME_KEYLIST_MODE_LOCATE keylisting. Valid values are documented in the GnuPG manual and the gpg man page under the option --auto-key-locate. Requires at least GnuPG 2.1.18.

Note: Keys retrieved through auto-key-locate are automatically imported in the keyring.

trust-model
SINCE: 1.11.2

Change the trust-model for all GnuPG engine operations. An empty string sets the trust-model back to the users default. If the trust-model is not supported by GnuPG the behavior is undefined and will likely cause all operations to fail. Example: "tofu+pgp".

This options should be used carefully with a strict version requirement. In some versions of GnuPG setting the trust-model changes the default trust-model for future operations. A change in the trust-model also can have unintended side effects, like rebuilding the trust-db.

"extended-edit"
This flag passes the option --expert to gpg key edit. This can be used to get additional callbacks in gpgme_op_edit.

This function returns 0 on success.

-- Function: const char * gpgme_get_ctx_flag (gpgme_ctx_t CTX, const char *NAME)

SINCE: 1.8.0

The value of flags settable by gpgme_set_ctx_flag can be retrieved by this function. If NAME is unknown the function returns NULL. For boolean flags an empty string is returned for False and the string "1" is returned for True; either atoi(3) or a test for an empty string can be used to get the boolean value.

File: gpgme.info, Node: Locale, Next: Additional Logs, Prev: Context Flags, Up: Context Attributes

7.4.14 Locale
---

A locale setting can be associated with a context. This locale is passed to the crypto engine, and used for applications like the PIN entry, which is displayed to the user when entering a passphrase is required.

The default locale is used to initialize the locale setting of all contexts created afterwards.

-- Function: gpgme_error_t
gpgme_set_locale (gpgme_ctx_t CTX,
int CATEGORY, const char *VALUE)
SINCE: 0.4.3

The function gpgme_set_locale sets the locale of the context CTX, or the default locale if CTX is a null pointer.

The locale settings that should be changed are specified by CATEGORY. Supported categories are LC_CTYPE, LC_MESSAGES, and LC_ALL, which is a wildcard you can use if you want to change all the categories at once.

The value to be used for the locale setting is VALUE, which will be copied to GPGMEs internal data structures. VALUE can be a null pointer, which disables setting the locale, and will make PIN entry and other applications use their default setting, which is usually not what you want.

Note that the settings are only used if the application runs on a text terminal, and that the settings should fit the configuration of the output terminal. Normally, it is sufficient to initialize the default
value at startup.

The function returns an error if not enough memory is available.

File: gpgme.info, Node: Additional Logs, Prev: Locale, Up: Context Attributes

7.4.15 Additional Logs
---

Additional logs can be associated with a context. These logs are engine specific and can be be obtained with gpgme_op_getauditlog.

-- Function: gpgme_error_t gpgme_op_getauditlog (gpgme_ctx_t CTX,
gpgme_data_t OUTPUT, unsigned int FLAGS)
SINCE: 1.1.1

The function gpgme_op_getauditlog is used to obtain additional logs as specified by FLAGS into the OUTPUT data. If

The function returns the error code GPG_ERR_NO_ERROR if a log could be queried from the engine, and GPG_ERR_NOT_IMPLEMENTED if the log specified in FLAGS is not available for this engine. If no log is available GPG_ERR_NO_DATA is returned.

The value in FLAGS is a bitwise-or combination of one or multiple of the following bit values:

GPGME_AUDITLOG_DIAG
SINCE: 1.11.2

Obtain diagnostic output which would be written to stderr in interactive use of the engine. This can be used to provide additional diagnostic information in case of errors in other operations.

Note: If log-file has been set in the configuration the log will be empty and GPG_ERR_NO_DATA will be returned.

Implemented for: GPGME_PROTOCOL_OpenPGP

GPGME_AUDITLOG_DEFAULT
SINCE: 1.11.2

This flag has the value 0 for compatibility reasons. Obtains additional information from the engine by issuing the GETAUDITLOG command. For GPGME_PROTOCOL_CMS this provides additional information about the X509 certificate chain.

Implemented for: GPGME_PROTOCOL_CMS

GPGME_AUDITLOG_HTML
SINCE: 1.1.1

Same as GPGME_AUDITLOG_DEFAULT but in HTML.

Implemented for: GPGME_PROTOCOL_CMS

-- Function: gpgme_error_t
gpgme_op_getauditlog_start (gpgme_ctx_t CTX,
gpgme_data_t OUTPUT, unsigned int FLAGS)
SINCE: 1.1.1

This is the asynchronous variant of gpgme_op_getauditlog.

File: gpgme.info, Node: Key Management, Next: Crypto Operations, Prev: Context Attributes, Up: Contexts

## 7.5 Key Management

Some of the cryptographic operations require that recipients or signers are specified. This is always done by specifying the respective keys that should be used for the operation. The following section describes how such keys can be selected and manipulated.

* Menu:


* Key objects:: Description of the key structures.
* Listing Keys:: Browsing the list of available keys.
* Information About Keys:: Requesting detailed information about keys.
* Manipulating Keys:: Operations on keys.
* Generating Keys:: Creating new key pairs.
* Signing Keys:: Adding key signatures to public keys.
* Exporting Keys:: Retrieving key data from the key ring.
* Importing Keys:: Adding keys to the key ring.
* Deleting Keys:: Removing keys from the key ring.
* Changing Passphrases:: Change the passphrase of a key.
* Changing TOFU Data:: Changing data pertaining to TOFU.
* Advanced Key Editing:: Advanced key edit operation.


File: gpgme.info, Node: Key objects, Next: Listing Keys, Up: Key Management

### 7.5.1 Key objects

The keys are represented in GPGME by structures which may only be read by the application but never be allocated or changed. They are valid as long as the key object itself is valid.

-- Data type: gpgme_key_t

The gpgme_key_t type is a pointer to a key object. It has the following members:

gpgme_keylist_mode_t keylist_mode
SINCE: 0.9.0

The keylist mode that was active when the key was retrieved.

unsigned int revoked : 1

This is true if the key is revoked.

unsigned int expired : 1
This is true if the key is expired.

unsigned int disabled : 1
This is true if the key is disabled.

unsigned int invalid : 1
This is true if the key is invalid. This might have several reasons, for a example for the S/MIME backend, it will be set during key listings if the key could not be validated due to missing certificates or unmatched policies.

unsigned int can_encrypt : 1
This is true if the key (ie one of its subkeys) can be used for encryption.

unsigned int can_sign : 1
This is true if the key (ie one of its subkeys) can be used to create data signatures.

unsigned int can_certify : 1
This is true if the key (ie one of its subkeys) can be used to create key certificates.

unsigned int can_authenticate : 1
SINCE: 0.4.5

This is true
if the key (ie one of its subkeys) can be used
for authentication.

unsigned int is_qualified : 1
SINCE: 1.1.0

This is true if the key can be used for qualified signatures according to local government regulations.

unsigned int secret : 1
This is true if the key is a secret key. Note, that this will always be true even if the corresponding subkey flag may be false (offline/stub keys). This is only set if a listing of secret keys has been requested or if GPGME_KEYLIST_MODE_WITH_SECRET is active.

unsigned int origin : 5
SINCE: 1.8.0

Reserved for the origin of this key.

gpgme_protocol_t protocol
This is the protocol supported by this key.

char *issuer_serial
If protocol is GPGME_PROTOCOL_CMS, then this is the issuer serial.

char *issuer_name
If protocol is GPGME_PROTOCOL_CMS, then this is the issuer name.

char *chain_id
If protocol is GPGME_PROTOCOL_CMS, then this is the chain ID, which can be used to built the certificate chain.

gpgme_validity_t owner_trust
If protocol is GPGME_PROTOCOL_OpenPGP, then this is the owner trust.

gpgme_subkey_t subkeys
This is a linked list with the subkeys of the key. The first subkey in the list is the primary key and usually available.

gpgme_user_id_t uids
This is a linked list with the user IDs of the key. The first user ID in the list is the main (or primary) user ID.

char *fpr
SINCE: 1.7.0

This field gives the fingerprint of the primary key. Note that this is a copy of the fingerprint of the first subkey. For an incomplete key (for example from a verification result) a subkey may be missing but this field may be set nevertheless.

unsigned long last_update

SINCE: 1.8.0

Reserved for the time of the last update of this key.

-- Data type: gpgme_subkey_t
SINCE: 1.5.0

The gpgme_subkey_t type is a pointer to a subkey structure. Subkeys are one component of a gpgme_key_t object. In fact, subkeys are those parts that contains the real information about the individual cryptographic keys that belong to the same key object. One gpgme_key_t can contain several subkeys. The first subkey in the linked list is also called the primary key.

The subkey structure has the following members:

gpgme_subkey_t next
: This is a pointer to the next subkey structure in the linked list, or NULL if this is the last element.

unsigned int revoked : 1
: This is true if the subkey is revoked.

unsigned int expired : 1
: This is true if the subkey is expired.

unsigned int disabled : 1
: This is true if the subkey is disabled.

unsigned int invalid : 1
: This is true if the subkey is invalid.

unsigned int can_encrypt : 1
: This is true if the subkey can be used for encryption.

unsigned int can_sign : 1
: This is true if the subkey can be used to create data signatures.

unsigned int can_certify : 1
: This is true if the subkey can be used to create key certificates.

unsigned int can_authenticate : 1
: SINCE: 0.4.5

This is true if the subkey can be used for authentication.

unsigned int is_qualified : 1
: SINCE: 1.1.0

This is true if the subkey can be used for qualified signatures according to local government regulations.

unsigned int is_de_vs : 1
SINCE: 1.8.0

This is true if the subkey complies with the rules for classified information in Germany at the restricted level (VS-NfD). This are currently RSA keys of at least 2048 bits or ECDH/ECDSA
keys using a Brainpool curve.

unsigned int secret : 1
This is true if the subkey is a secret key. Note that it will be false if the key is actually a stub key; i.e. a secret key operation is currently not possible (offline-key). This is only set if a listing of secret keys has been requested or if GPGME_KEYLIST_MODE_WITH_SECRET is active.

gpgme_pubkey_algo_t pubkey_algo
This is the public key algorithm supported by this subkey.

unsigned int length
This is the length of the subkey (in bits).

char *keyid
This is the key ID of the subkey in hexadecimal digits.

char *fpr
This is the fingerprint of the subkey in hexadecimal digits, if available.

char *keygrip
SINCE: 1.7.0

The keygrip of the subkey in hex digit form or NULL if not available.

long int timestamp
This is the creation timestamp of the subkey.
This is -1 if
the timestamp is invalid, and 0 if it is not available.

long int expires
This is the expiration timestamp of the subkey, or 0 if the subkey does not expire.

unsigned int is_cardkey : 1
SINCE: 1.2.0

True if the secret key is stored on a smart card.

char *card_number
SINCE: 1.2.0

The serial number of a smart card holding this key or NULL.

char *curve
For ECC algorithms the name of the curve.

-- Data type: gpgme_user_id_t

A user ID is a component of a gpgme_key_t object. One key can have many user IDs. The first one in the list is the main (or primary) user ID.

The user ID structure has the following members.

gpgme_user_id_t next
This is a pointer to the next user ID structure in the linked list, or NULL if this is the last element.

unsigned int revoked : 1
This is true if the user ID is revoked.

unsigned int invalid : 1
This is true if the user ID is invalid.

gpgme_validity_t validity
This specifies the validity of the user ID.

char *uid
This is the user ID string.

char *name
This is the name component of uid, if available.

char *comment
This is the comment component of uid, if available.

char *email
This is the email component of uid, if available.

char *address;
The mail address (addr-spec from RFC-5322) of the user ID string. This is general the same as the email part of this structure but might be slightly different. If no mail address is available NULL is stored.

gpgme_tofu_info_t tofu
SINCE: 1.7.0

If not NULL information from the TOFU database pertaining to this user id.

gpgme_key_sig_t signatures
This is a linked list with the signatures on this user ID.

unsigned int origin :
5
SINCE: 1.8.0

Reserved for the origin of this user ID.

unsigned long last_update
SINCE: 1.8.0

Reserved for the time of the last update of this user ID.

char *uidhash;
A string used by gpg to identify a user ID. This string can be used at certain prompts of gpgme_op_edit to select a user ID. Users must be prepared to see a NULL value here. The format of the value is not specified and may depend on the GPGME or GnuPG version.

-- Data type: gpgme_tofu_info_t

SINCE: 1.7.0

The gpgme_tofu_info_t type is a pointer to a tofu info structure. Tofu info structures are one component of a gpgme_user_id_t object, and provide information from the TOFU database pertaining to the user ID.

The tofu info structure has the following members:

gpgme_key_sig_t next
This is a pointer to the next tofu info structure in the linked list, or NULL if
this is the last element.

unsigned int validity : 3
This is the TOFU validity. It can have the following values:

0

The value 0 indicates a conflict.

1
The value 1 indicates a key without history.

2
The value 2 indicates a key with too little history.

3
The value 3 indicates a key with enough history for basic trust.

4
The value 4 indicates a key with a lot of history.

unsigned int policy : 4
This is the TOFU policy, see gpgme_tofu_policy_t.

unsigned short signcount
This is the number of signatures seen for this binding (or USHRT_MAX if there are more than that).

unsigned short encrcount
This is the number of encryptions done with this binding (or USHRT_MAX if there are more than that).

unsigned long signfirst
Number of seconds since Epoch when the first signature was seen with this binding.

unsigned long signlast
Number of seconds since Epoch when the last signature was seen with this binding.

unsigned long encrfirst
Number of seconds since Epoch when the first encryption was done with this binding.

unsigned long encrlast
Number of seconds since Epoch when the last encryption was done with this binding.

char *description
A human-readable string summarizing the TOFU data (or NULL).

-- Data type: gpgme_key_sig_t

The gpgme_key_sig_t type is a pointer to a key signature structure. Key signatures are one component of a gpgme_key_t object, and validate user IDs on the key in the OpenPGP protocol.

The signatures on a key are only available if the key was retrieved via a listing operation with the GPGME_KEYLIST_MODE_SIGS mode enabled, because it can be expensive to retrieve all signatures of

a key.

The signature notations on a key signature are only available if the key was retrieved via a listing operation with the GPGME_KEYLIST_MODE_SIG_NOTATIONS mode enabled, because it can be expensive to retrieve all signature notations.

The key signature structure has the following members:

gpgme_key_sig_t next
This is a pointer to the next key signature structure in the linked list, or NULL if this is the last element.

unsigned int revoked : 1
This is true if the key signature is a revocation signature.

unsigned int expired : 1
This is true if the key signature is expired.

unsigned int invalid : 1
This is true if the key signature is invalid.

unsigned int exportable : 1
This is true if the key signature is exportable.

gpgme_pubkey_algo_t pubkey_algo
This is the public key algorithm used to create the signature.

char *keyid
This is the key ID of the key (in hexadecimal digits) used to create the signature.

long int timestamp
This is the creation timestamp of the key signature. This is -1 if the timestamp is invalid, and 0 if it is not available.

long int expires
This is the expiration timestamp of the key signature, or 0 if the key signature does not expire.

gpgme_error_t status
This is the status of the signature and has the same meaning as the member of the same name in a gpgme_signature_t object.

unsigned int sig_class
This specifies the signature class of the key signature. The meaning is specific to the crypto engine.

char *uid
This is the main user ID of the key used to create the signature.

char *name
This is the name component of uid, if available.

char *comment
This is the comment component of uid, if available.

char *email
This is the email component of uid, if available.

gpgme_sig_notation_t notations
This is a linked list with the notation data and policy URLs.

File: gpgme.info, Node: Listing Keys, Next: Information About Keys, Prev: Key objects, Up: Key Management

7.5.2 Listing Keys
---

-- Function: gpgme_error_t gpgme_op_keylist_start (gpgme_ctx_t CTX, const char *PATTERN, int SECRET_ONLY)

The function gpgme_op_keylist_start initiates a key listing operation inside the context CTX. It sets everything up so that subsequent invocations of gpgme_op_keylist_next return the keys in the list.

If PATTERN is NULL, all available keys are returned. Otherwise, PATTERN contains an engine specific expression that is used to limit the list to all keys matching the pattern. Note that the total length of the pattern is restricted to an engine-specific maximum (a couple of hundred characters are usually accepted). The pattern should be used to restrict the search to a certain common name or user, not to list many specific keys at once by listing

their fingerprints or key IDs.

If SECRET_ONLY is not 0, the list is restricted to secret keys only.

The context will be busy until either all keys are received (and gpgme_op_keylist_next returns GPG_ERR_EOF), or gpgme_op_keylist_end is called to finish the operation.

The function returns the error code GPG_ERR_INV_VALUE if CTX is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_keylist_ext_start (gpgme_ctx_t CTX, const char *PATTERN[], int SECRET_ONLY, int RESERVED)

The function gpgme_op_keylist_ext_start initiates an extended key listing operation inside the context CTX. It sets everything up so that subsequent invocations of gpgme_op_keylist_next return the

keys in the list.

If PATTERN or *PATTERN is NULL, all available keys are returned. Otherwise, PATTERN is a NULL terminated array of strings that are used to limit the list to all keys matching at least one of the patterns verbatim. Note that the total length of all patterns is restricted to an engine-specific maximum (the exact limit also depends on the number of patterns and amount of quoting required, but a couple of hundred characters are usually accepted). Patterns should be used to restrict the search to a certain common name or user, not to list many specific keys at once by listing their fingerprints or key IDs.

If SECRET_ONLY is not 0, the list is restricted to secret keys only.

The value of RESERVED must be 0.

The context will be busy until either all keys are received (and gpgme_op_keylist_next returns GPG_ERR_EOF), or gpgme_op_keylist_end is called to finish the operation.

The function
returns the error code GPG_ERR_INV_VALUE if CTX is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_keylist_from_data_start

(gpgme_ctx_t CTX, gpgme_data_t DATA, int RESERVED)

SINCE: 1.8.0

The function gpgme_op_keylist_from_data_start initiates a key listing operation inside the context CTX. In contrast to the other key listing operation the keys are read from the supplied DATA and not from the local key database. The keys are also not imported into the local key database. The function sets everything up so that subsequent invocations of gpgme_op_keylist_next return the keys from DATA.

The value of RESERVED must be 0.

This function requires at least GnuPG version 2.1.14 and currently works only with OpenPGP keys.

The context will be busy until either all keys are received (and gpgme_op_keylist_next
returns GPG_ERR_EOF), or
gpgme_op_keylist_end is called to finish the operation. While the context is busy DATA may not be released.

The function returns the error code GPG_ERR_INV_VALUE if CTX is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_keylist_next (gpgme_ctx_t CTX, gpgme_key_t *R_KEY)

The function gpgme_op_keylist_next returns the next key in the list created by a previous gpgme_op_keylist_start operation in the context CTX. The key will have one reference for the user. *Note Manipulating Keys::.

This is the only way to get at gpgme_key_t objects in GPGME.

If the last key in the list has already been returned, gpgme_op_keylist_next returns GPG_ERR_EOF.

The function returns the error code GPG_ERR_INV_VALUE if CTX or R_KEY is not a valid pointer, and GPG_ERR_ENOMEM if there is not enough memory
for the operation.

-- Function: gpgme_error_t gpgme_op_keylist_end (gpgme_ctx_t CTX)

The function gpgme_op_keylist_end ends a pending key list

operation in the context CTX.

After the operation completed successfully, the result of the key listing operation can be retrieved with gpgme_op_keylist_result.

The function returns the error code GPG_ERR_INV_VALUE if CTX is not a valid pointer, and GPG_ERR_ENOMEM if at some time during the operation there was not enough memory available.

The following example illustrates how all keys containing a certain string (g10code) can be listed with their key ID and the name and email address of the main user ID:

```
gpgme_ctx_t ctx;
gpgme_key_t key;
gpgme_error_t err = gpgme_new (&ctx);

if (!err)
  {
    err = gpgme_op_keylist_start (ctx, "g10code", 0);
    while (!err)
      {
        err = gpgme_op_keylist_next (ctx, &key);
        if (err)

 break;
        printf ("%s:", key->subkeys->keyid);
        if (key->uids && key->uids->name)
          printf (" %s", key->uids->name);
        if (key->uids && key->uids->email)
          printf (" <%s>", key->uids->email);
        putchar ('\n');
        gpgme_key_release (key);
      }
    gpgme_release (ctx);
  }
if (gpg_err_code (err) != GPG_ERR_EOF)
  {
    fprintf (stderr, "can not list keys: %s\n", gpgme_strerror (err));
    exit (1);
  }
```

-- Data type: gpgme_keylist_result_t

This is a pointer to a structure used to store the result of a gpgme_op_keylist_* operation. After successfully ending a key listing operation, you can retrieve the pointer to the result with gpgme_op_keylist_result. The structure contains the following member:

unsigned int truncated : 1
This is true if the crypto backend had to truncate the result, and less than the desired keys could be listed.

-- Function: gpgme_keylist_result_t gpgme_op_keylist_result (gpgme_ctx_t CTX)
The function gpgme_op_keylist_result returns a gpgme_keylist_result_t pointer to a structure holding the result of a gpgme_op_keylist_* operation. The pointer is only valid if the last operation on the context was a key listing operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

In a simple program, for which a blocking operation is acceptable, the following function can be used to retrieve a single key.

-- Function: gpgme_error_t gpgme_get_key (gpgme_ctx_t CTX, const char *FPR, gpgme_key_t *R_KEY, int SECRET)
The function gpgme_get_key gets the key with the fingerprint (or key ID) FPR from the crypto backend and return it in R_KEY. If SECRET is true, get the secret key. The currently active keylist mode is used to retrieve the key. The key will have one reference for the user.

If the key is not found in the keyring, gpgme_get_key returns the error code GPG_ERR_EOF and *R_KEY will be set to NULL.

The function returns the error code GPG_ERR_INV_VALUE if CTX or R_KEY is not a valid pointer or FPR is not a fingerprint or key ID, GPG_ERR_AMBIGUOUS_NAME if the key ID was not a unique specifier for a key, and GPG_ERR_ENOMEM if at some time during the operation there was not enough memory available.

File: gpgme.info, Node: Information About Keys, Next: Manipulating Keys, Prev: Listing Keys, Up: Key Management

7.5.3 Information About Keys
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Please see the beginning of this section for more information about gpgme_key_t objects.

-- Data type: gpgme_validity_t
The gpgme_validity_t type is used to specify the validity of a

user ID in a key. The following validities are defined:

GPGME_VALIDITY_UNKNOWN
The user
ID is of unknown validity. The string representation
of this validity is ?.

GPGME_VALIDITY_UNDEFINED
The validity of the user ID is undefined. The string
representation of this validity is q.

GPGME_VALIDITY_NEVER
The user ID is never valid. The string representation of this
validity is n.

GPGME_VALIDITY_MARGINAL
The user ID is marginally valid. The string representation of
this validity is m.

GPGME_VALIDITY_FULL
The user ID is fully valid. The string representation of this
validity is f.

GPGME_VALIDITY_ULTIMATE
The user ID is ultimately valid. The string representation of
this validity is u.

File: gpgme.info, Node: Manipulating Keys, Next: Generating Keys, Prev: Information About Keys, Up: Key Management

7.5.4 Manipulating Keys
---

-- Function: void gpgme_key_ref (gpgme_key_t KEY)
The function gpgme_key_ref
acquires an additional reference for
the key KEY.

-- Function: void gpgme_key_unref (gpgme_key_t KEY)
The function gpgme_key_unref releases a reference for the key
KEY. If this was the last reference, the key will be destroyed and
all resources associated to it will be released.

-- Function: gpgme_error_t gpgme_op_setexpire (gpgme_ctx_t CTX,
gpgme_key_t KEY, unsigned long EXPIRES, const char *SUBFPRS,
unsigned int RESERVED);

SINCE: 1.14.1

The function gpgme_op_setexpire sets the expiration time of the key KEY or of the specified subkeys. This function requires at least version 2.1.22 of GnuPG.

KEY specifies the key to operate on.

EXPIRES specifies the expiration time in seconds from now. To be similar to other usages where expiration times are provided in unsigned long this is similar to the key creation date and so it is in seconds from NOW.

The common case is to use 0 to not set an expiration time. Note that this parameter takes an unsigned long value and not a time_t to avoid problems on systems which use a signed 32 bit time_t. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

SUBFPRS selects the subkey(s) for which the expiration time should be set. If SUBFPRS is set to NULL, then the expiration time of the primary key is set. If SUBFPRS is an asterisk (*), then the expiration times of all non-revoked and not yet expired subkeys are set. To select more than one subkey put all subkey fingerprints into one string separated by linefeeds characters (\n).

RESERVED is reserved for later use and must be 0.

-- Function: gpgme_error_t gpgme_op_setexpire_start (gpgme_ctx_t CTX, gpgme_key_t KEY, unsigned long EXPIRES, const char *SUBFPRS, unsigned int FLAGS);

SINCE: 1.14.1

The function gpgme_op_setexpire_start initiates a gpgme_op_setexpire operation; see there for details. It must be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

-- Function: gpgme_error_t gpgme_op_revuid_start (gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);

SINCE: 1.14.1

The function gpgme_op_setexpire_start initiates a gpgme_op_setexpire operation; see there for details. It must be

completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

File: gpgme.info, Node: Generating Keys, Next: Signing Keys, Prev: Manipulating Keys, Up: Key Management

### 7.5.5 Generating Keys

GPGME provides a set of functions to create public key pairs. Most of these functions require the use of GnuPG 2.1 and later; for older GnuPG versions the gpgme_op_genkey function can be used. Existing code which wants to update to the new functions or new code which shall supports older GnuPG versions may try the new functions first and provide a fallback to the old function if the error code GPG_ERR_NOT_SUPPORTED is received.

-- Function: gpgme_error_t gpgme_op_createkey (gpgme_ctx_t CTX,
const char *USERID, const char *ALGO, unsigned long RESERVED,
unsigned long EXPIRES, gpgme_key_t EXTRAKEY,
unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_createkey generates a new key for the procotol active in the context CTX. As of now this function does only work for OpenPGP and requires at least version 2.1.13 of GnuPG.

USERID is commonly the mail address associated with the key. GPGME does not require a specific syntax but if more than a mail address is given, RFC-822 style format is suggested. The value is expected to be in UTF-8 encoding (i.e. no IDN encoding for mail addresses). This is a required parameter.

ALGO specifies the algorithm for the new key (actually a keypair of public and private key). For a list of supported algorithms, see the GnuPG manual. If ALGO is NULL or the string "default", the key is generated using the default algorithm of the engine. If the string "future-default" is used the engine may use an algorithm which is planned to be the default in a future release of the engine; however existing implementation of the protocol may not be able to already handle such future algorithms. For the OpenPGP protocol, the specification of a default algorithm, without requesting a non-default usage via FLAGS, triggers the creation of a primary key plus a secondary key (subkey).

RESERVED must be set to zero.

EXPIRES specifies the expiration time in seconds. If you supply 0, a reasonable expiration time is chosen. Use the flag GPGME_CREATE_NOEXPIRE to create keys that do not expire. Note that this parameter takes an unsigned long value and not a time_t to
avoid problems on systems which use a signed 32 bit time_t. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

EXTRAKEY is currently not used and must be set to NULL. A future version of GPGME may use this parameter to create X.509 keys.

FLAGS can be set to the bit-wise OR of the following flags:

GPGME_CREATE_SIGN
GPGME_CREATE_ENCR
GPGME_CREATE_CERT
GPGME_CREATE_AUTH
SINCE: 1.7.0

Do not create the key with the default capabilities (key usage) of the requested algorithm but use those explicitly given by these flags: signing, encryption, certification, or authentication. The allowed combinations depend on the algorithm.

If any of these flags are set and a default algorithm has been selected only one key is created in the case of the OpenPGP protocol.

GPGME_CREATE_NOPASSWD
SINCE: 1.7.0

Request generation of the key without password protection.

GPGME_CREATE_SELFSIGNED
SINCE: 1.7.0

For an X.509 key do not create a CSR but a self-signed certificate. This has not yet been implemented.

GPGME_CREATE_NOSTORE
SINCE: 1.7.0

Do not store the created key in the local key database. This

has not yet been implemented.

GPGME_CREATE_WANTPUB
GPGME_CREATE_WANTSEC
SINCE: 1.7.0

Return the public or secret key as part of the result structure. This has not yet been implemented.

GPGME_CREATE_FORCE
SINCE: 1.7.0

The engine does not allow the creation of a key with a user ID already existing in the local key database. This flag can be used to override this check.

GPGME_CREATE_NOEXPIRE
SINCE: 1.9.0

Request generation of keys that do not expire.

After the operation completed successfully, information about the created key can be retrieved with gpgme_op_genkey_result.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

-- Function: gpgme_error_t gpgme_op_createkey_start (gpgme_ctx_t CTX, const char *USERID, const char *ALGO, unsigned long RESERVED, unsigned long EXPIRES, gpgme_key_t EXTRAKEY, unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_createkey_start initiates a gpgme_op_createkey operation; see there for details. It must be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

-- Function: gpgme_error_t gpgme_op_createsubkey (gpgme_ctx_t CTX, gpgme_key_t KEY, const char *ALGO, unsigned long RESERVED, unsigned long EXPIRES, unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_createsubkey creates and adds

a new subkey
to the primary OpenPGP key given by KEY. The only allowed protocol in CTX is GPGME_PROTOCOL_OPENPGP. Subkeys (aka secondary keys) are a concept in the OpenPGP protocol to bind several keys to a primary key. As of now this function requires at least version 2.1.13 of GnuPG.

KEY specifies the key to operate on.

ALGO specifies the algorithm for the new subkey. For a list of supported algorithms, see the GnuPG manual. If ALGO is NULL or the string "default", the subkey is generated using the default algorithm for an encryption subkey of the engine. If the string "future-default" is used the engine may use an encryption algorithm which is planned to be the default in a future release of the engine; however existing implementation of the protocol may not be able to already handle such future algorithms.

RESERVED must be set to zero.

EXPIRES specifies the expiration time in seconds. If you supply 0,
a reasonable expiration time is chosen. Use the flag GPGME_CREATE_NOEXPIRE to create keys that do not expire. Note that this parameter takes an unsigned long value and not a time_t to avoid problems on systems which use a signed 32 bit time_t. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

FLAGS takes the same values as described above for gpgme_op_createkey.

After the operation completed successfully, information about the created key can be retrieved with gpgme_op_genkey_result.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

-- Function: gpgme_error_t gpgme_op_createsubkey_start
(gpgme_ctx_t CTX, gpgme_key_t KEY, const char *ALGO,
unsigned long RESERVED, unsigned long EXPIRES,
unsigned int FLAGS);

SINCE:
1.7.0

The function gpgme_op_createsubkey_start initiates a

gpgme_op_createsubkey operation; see there for details. It must be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

-- Function: gpgme_error_t gpgme_op_adduid (gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_adduid adds a new user ID to the OpenPGP key given by KEY. Adding additional user IDs after key creation is a feature of the OpenPGP protocol and thus the protocol for the context CTX must be set to OpenPGP. As of now this function requires at least version 2.1.13 of GnuPG.

KEY specifies the key to operate on.

USERID is the user ID to add to the key. A user ID is commonly the mail address to be associated with the key. GPGME does not require a specific syntax but if more than a mail address is given, RFC-822 style format is suggested.
The value is expected to be in UTF-8 encoding (i.e. no IDN encoding for mail addresses). This is a required parameter.

FLAGS are currently not used and must be set to zero.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

-- Function: gpgme_error_t gpgme_op_adduid_start (gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_adduid_start initiates a gpgme_op_adduid operation; see there for details. It must be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

-- Function: gpgme_error_t gpgme_op_revuid (gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID, unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_revuid revokes a user ID from the OpenPGP key given by KEY. Revoking user IDs after key creation is a feature

of the OpenPGP protocol and thus the protocol for the
context CTX must be set to OpenPGP. As of now this function
requires at least version 2.1.13 of GnuPG.

KEY specifies the key to operate on.

USERID is the user ID to be revoked from the key. The user ID must
be given verbatim because the engine does an exact and case
sensitive match. Thus the uid field from the user ID object
(gpgme_user_id_t) is to be used. This is a required parameter.

FLAGS are currently not used and must be set to zero.

Note that the engine wont allow to revoke the last valid user ID.
To change a user ID is better to first add the new user ID, then
revoke the old one, and finally publish the key.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if
the engine does not support the command, or a bunch of other error
codes.

-- Function: gpgme_error_t gpgme_op_revuid_start (gpgme_ctx_t CTX,
gpgme_key_t KEY, const
char *USERID, unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_revuid_start initiates a gpgme_op_revuid
operation; see there for details. It must be completed by calling
gpgme_wait on the context. *Note Waiting For Completion::.

-- Function: gpgme_error_t gpgme_op_set_ui_flag (gpgme_ctx_t CTX,
gpgme_key_t KEY, const char *USERID, cons char * NAME,
cons char * VALUE);

SINCE: 1.8.0

The function gpgme_op_set_uid_flag is used to set flags on a user
ID from the OpenPGP key given by KEY. Setting flags on user IDs
after key creation is a feature of the OpenPGP protocol and thus
the protocol for the context CTX must be set to OpenPGP.

KEY specifies the key to operate on. This parameters is required.

USERID is the user ID of the key to be manipulated. This user ID
must be given verbatim because the engine does an exact and case
sensitive match. Thus the uid field from the user ID object

(gpgme_user_id_t) is to be used. This is a required parameter.

NAME names the flag which is to be changed. The only currently supported flag is:

primary
This sets the primary key flag on the given user ID. All other primary key flag on other user IDs are removed. VALUE must be given as NULL. For technical reasons this functions bumps the creation timestamp of all affected self-signatures up by one second. At least GnuPG version 2.1.20 is required.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

-- Function: gpgme_error_t gpgme_op_set_uid_flag_start
(gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID, cons char * NAME, cons char * VALUE);

SINCE: 1.8.0

The function gpgme_op_set_uid_flag_start initiates a gpgme_op_set_uid_flag operation; see there for details. It must

be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

-- Function: gpgme_error_t gpgme_op_genkey (gpgme_ctx_t CTX,
const char *PARMS, gpgme_data_t PUBLIC, gpgme_data_t SECRET)

The function gpgme_op_genkey generates a new key pair in the context CTX. The meaning of PUBLIC and SECRET depends on the crypto backend.

GPG does not support PUBLIC and SECRET, they should be NULL. GnuPG will generate a key pair and add it to the standard key ring. The fingerprint of the generated key is available with gpgme_op_genkey_result.

GpgSM requires PUBLIC to be a writable data object. GpgSM will generate a secret key (which will be stored by gpg-agent, and return a certificate request in PUBLIC, which then needs to be signed by the certification authority and imported before it can be used. GpgSM does not make the fingerprint available.

The argument PARMS specifies parameters for the

key in an string
that looks something like XML. The details about the format of PARMS are specific to the crypto engine used by CTX. The first line of the parameters must be <GnupgKeyParams format="internal">
and the last line must be </GnupgKeyParams>. Every line in between the first and last lines is treated as a Header: Value pair. In particular, no XML escaping is necessary if you need to include the characters <, >, or &.

Here is an example for GnuPG as the crypto engine (all parameters of OpenPGP key generation are documented in the GPG manual):

```
<GnupgKeyParms format="internal">
Key-Type: default
Subkey-Type: default
Name-Real: Joe Tester
Name-Comment: with stupid passphrase
Name-Email: joe@foo.bar
Expire-Date: 0
Passphrase: abc
</GnupgKeyParms>
```

Here is an example for GpgSM as the crypto engine (all parameters of OpenPGP key generation
are documented in the GPGSM manual):

```
<GnupgKeyParms format="internal">
Key-Type: RSA
Key-Length: 1024
Name-DN: C=de,O=g10 code,OU=Testlab,CN=Joe 2 Tester
Name-Email: joe@foo.bar
</GnupgKeyParms>
```

Strings should be given in UTF-8 encoding. The only format supported for now is internal. The content of the GnupgKeyParms container is passed verbatim to the crypto backend. Control statements are not allowed.

After the operation completed successfully, the result can be retrieved with gpgme_op_genkey_result.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, GPG_ERR_INV_VALUE if PARMS is not a well-formed string (e.g. does not have the expected tag-like headers and footers), GPG_ERR_NOT_SUPPORTED if PUBLIC or SECRET is not valid, and GPG_ERR_GENERAL if no key was created by the backend.

-- Function: gpgme_error_t
gpgme_op_genkey_start (gpgme_ctx_t CTX,
const char *PARMS, gpgme_data_t PUBLIC, gpgme_data_t SECRET)

The function gpgme_op_genkey_start initiates a gpgme_op_genkey operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, GPG_ERR_INV_VALUE if PARMS is not a valid XML string, and GPG_ERR_NOT_SUPPORTED if PUBLIC or SECRET is not NULL.

-- Data type: gpgme_genkey_result_t

This is a pointer to a structure used to store the result of a gpgme_op_genkey operation. After successfully generating a key, you can retrieve the pointer to the result with gpgme_op_genkey_result. The structure contains the following members:

unsigned int primary : 1
This flag is set to 1 if a primary key was created and to 0 if not.

unsigned int sub : 1
This
flag is set to 1 if a subkey was created and to 0 if not.

unsigned int uid : 1
This flag is set to 1 if a user ID was created and to 0 if not.

char *fpr
This is the fingerprint of the key that was created. If both a primary and a subkey were generated, the fingerprint of the primary key will be returned. If the crypto engine does not provide the fingerprint, fpr will be a null pointer.

gpgme_data_t pubkey
SINCE: 1.7.0

This will eventually be used to return the public key. It is currently not used.

gpgme_data_t seckey
SINCE: 1.7.0

This will eventually be used to return the secret key. It is currently not used.

-- Function: gpgme_genkey_result_t gpgme_op_genkey_result (gpgme_ctx_t CTX)

The function gpgme_op_genkey_result returns a gpgme_genkey_result_t pointer to a structure holding the result of a gpgme_op_genkey operation. The pointer is only valid if the last operation on the context was a gpgme_op_genkey or gpgme_op_genkey_start operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

File: gpgme.info, Node: Signing Keys, Next: Exporting Keys, Prev: Generating Keys, Up: Key Management

### 7.5.6 Signing Keys

Key signatures are a unique concept of the OpenPGP protocol. They can be used to certify the validity of a key and are used to create the Web-of-Trust (WoT). Instead of using the gpgme_op_interact function along with a finite state machine, GPGME provides a convenient function to create key signatures when using modern GnuPG versions.

-- Function: gpgme_error_t gpgme_op_keysign (gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID, unsigned long EXPIRES, unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_keysign adds a new key signature to the public key KEY. This function requires at least version 2.1.12 of GnuPG.

CTX is the usual context which describes the protocol to use (which must be OpenPGP) and has also the list of signer keys to be used for the signature. The common case is to use the default key for signing other keys. If another key or more than one key shall be used for a key signature, gpgme_signers_add can be used. *Note Selecting Signers::.

KEY specifies the key to operate on.

USERID selects the user ID or user IDs to be signed. If USERID is

set to NULL all valid user IDs are signed. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the uid field from the user ID object (gpgme_user_id_t) is to be used. To select more than one user ID put them all into one string separated by linefeeds characters (\n) and set the flag GPGME_KEYSIGN_LFSEP.

EXPIRES
specifies the expiration time of the new signature in seconds. The common case is to use 0 to not set an expiration date. However, if the configuration of the engine defines a default expiration for key signatures, that is still used unless the flag GPGME_KEYSIGN_NOEXPIRE is used. Note that this parameter takes an unsigned long value and not a time_t to avoid problems on systems which use a signed 32 bit time_t. Note further that the OpenPGP protocol uses 32 bit values for timestamps and thus can only encode dates up to the year 2106.

FLAGS can be set to the bit-wise OR of the following flags:

GPGME_KEYSIGN_LOCAL
SINCE: 1.7.0

Instead of creating an exportable key signature, create a key signature which is is marked as non-exportable.

GPGME_KEYSIGN_LFSEP
SINCE: 1.7.0

Although linefeeds are uncommon in user IDs this flag is required to explicitly declare that
USERID may contain several
linefeed separated user IDs.

GPGME_KEYSIGN_NOEXPIRE
Force the creation of a key signature without an expiration date. This overrides EXPIRE and any local configuration of the engine.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

-- Function: gpgme_error_t gpgme_op_keysign_start (gpgme_ctx_t CTX, gpgme_key_t KEY, const char *USERID, unsigned long EXPIRES, unsigned int FLAGS);

SINCE: 1.7.0

The function gpgme_op_keysign_start initiates a gpgme_op_keysign operation; see there for details. It must be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

-- Function: gpgme_error_t gpgme_op_revsig (gpgme_ctx_t CTX, gpgme_key_t KEY, gpgme_key_t SIGNING_KEY, const char *USERID, unsigned int FLAGS);

SINCE: 1.14.1

The function gpgme_op_revsig revokes key signatures of the public key KEY made with the key SIGNING_KEY. This function requires at least version 2.2.24 of GnuPG.

KEY specifies the key to operate on.

SIGNING_KEY specifies the key whose signatures shall be revoked.

USERID selects the user ID or user IDs whose signatures shall be revoked. If USERID is set to NULL the signatures on all user IDs are revoked. The user ID must be given verbatim because the engine does an exact and case sensitive match. Thus the uid field from the user ID object (gpgme_user_id_t) is to be used. To select more than one user ID put them all into one string separated by linefeeds characters (\n) and set the flag GPGME_REVSIG_LFSEP.

FLAGS can be set to the bit-wise OR of the following flags:

GPGME_REVSIG_LFSEP
SINCE: 1.14.1

Although linefeeds are uncommon in user IDs this flag is required to explicitly declare that USERID may contain several linefeed separated user IDs.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if the engine does not support the command, or a bunch of other error codes.

-- Function: gpgme_error_t gpgme_op_revsig_start (gpgme_ctx_t CTX, gpgme_key_t KEY, gpgme_key_t SIGNING_KEY, const char *USERID, unsigned int FLAGS);

SINCE: 1.14.1

The function gpgme_op_revsig_start initiates a gpgme_op_revsig operation; see there for details. It must be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

File: gpgme.info, Node: Exporting Keys, Next: Importing Keys, Prev: Signing Keys, Up: Key Management

### 7.5.7 Exporting Keys

Exporting keys means the same as running gpg with the command --export. However, a mode flag can be used to change the way the export works. The available mode flags are described below, they may be or-ed together.

GPGME_EXPORT_MODE_EXTERN

If this bit is set, the output is send directly to the default keyserver. This is currently only allowed for OpenPGP keys. It is good practise to not send more than a few dozens key to a keyserver at one time. Using this flag requires that the KEYDATA argument of the export function is set to NULL.

GPGME_EXPORT_MODE_MINIMAL

SINCE: 1.3.1

If this bit is set, the smallest possible key is exported. For OpenPGP keys it removes all signatures except for the latest self-signatures. For X.509 keys it has no effect.

GPGME_EXPORT_MODE_SSH

SINCE: 1.4.0

If this bit is set, the latest authentication key of the requested OpenPGP key is exported in the OpenSSH public key format. This accepts just a single key; to force the export of a specific subkey a fingerprint pattern with an appended exclamation mark may be used.

GPGME_EXPORT_MODE_SECRET

SINCE: 1.6.0

Instead of exporting the public key, the secret key is exported.

This may not be combined with GPGME_EXPORT_MODE_EXTERN. For X.509 the export format is PKCS#8.

GPGME_EXPORT_MODE_RAW

SINCE: 1.6.0

If this flag is used with GPGME_EXPORT_MODE_SECRET for an X.509 key the export format will be changed to PKCS#1. This flag may not be used with OpenPGP.

GPGME_EXPORT_MODE_PKCS12
SINCE: 1.6.0

If this flag is used with GPGME_EXPORT_MODE_SECRET for an X.509 key the export format will be changed to PKCS#12 which also includes the certificate. This flag may not be used with OpenPGP.

GPGME_EXPORT_MODE_NOUID
SINCE: 1.12.0 - experimental Do not export user ids. Works only with certain gpg version.

-- Function: gpgme_error_t gpgme_op_export (gpgme_ctx_t CTX,
const char *PATTERN, gpgme_export_mode_t MODE,
gpgme_data_t KEYDATA)
The function gpgme_op_export extracts public keys and returns them in the data buffer KEYDATA. The output
format of the key data
returned is determined by the ASCII armor attribute set for the context CTX, or, if that is not set, by the encoding specified for KEYDATA.

If PATTERN is NULL, all available keys are returned. Otherwise, PATTERN contains an engine specific expression that is used to limit the list to all keys matching the pattern.

MODE is usually 0; other values are described above.

The function returns the error code GPG_ERR_NO_ERROR if the operation completed successfully, GPG_ERR_INV_VALUE if KEYDATA is not a valid empty data buffer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_export_start (gpgme_ctx_t CTX,
const char *PATTERN, gpgme_export_mode_t MODE,
gpgme_data_t KEYDATA)
The function gpgme_op_export_start initiates a gpgme_op_export operation. It can be completed by calling gpgme_wait on the context.
*Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, and GPG_ERR_INV_VALUE if KEYDATA is not a valid empty data buffer.

-- Function: gpgme_error_t gpgme_op_export_ext (gpgme_ctx_t CTX,
const char *PATTERN[], gpgme_export_mode_t MODE,
gpgme_data_t KEYDATA)

The function gpgme_op_export extracts public keys and returns them in the data buffer KEYDATA. The output format of the key data returned is determined by the ASCII armor attribute set for the context CTX, or, if that is not set, by the encoding specified for KEYDATA.

If PATTERN or *PATTERN is NULL, all available keys are returned. Otherwise, PATTERN is a NULL terminated array of strings that are used to limit the list to all keys matching at least one of the patterns verbatim.

MODE is usually 0; other values are described above.

The function returns the error code GPG_ERR_NO_ERROR if the operation completed successfully, GPG_ERR_INV_VALUE if KEYDATA is not a valid empty data buffer, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_export_ext_start (gpgme_ctx_t CTX,
const char *PATTERN[], gpgme_export_mode_t MODE,
gpgme_data_t KEYDATA)

The function gpgme_op_export_ext_start initiates a gpgme_op_export_ext operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, and GPG_ERR_INV_VALUE if KEYDATA is not a valid empty data buffer.

-- Function: gpgme_error_t gpgme_op_export_keys (gpgme_ctx_t CTX,
gpgme_key_t keys[], gpgme_export_mode_t MODE,
gpgme_data_t KEYDATA)

SINCE: 1.2.0

The function gpgme_op_export_keys extracts public keys and returns them in the data buffer KEYDATA. The output format of the key data returned is determined by the ASCII armor attribute set for the context CTX, or, if that is not set, by the encoding specified for KEYDATA.

The keys to export are taken form the NULL terminated array KEYS. Only keys of the currently selected protocol of CTX which do have a

fingerprint set are considered for export. Other keys specified by the KEYS are ignored. In particular OpenPGP keys retrieved via an external key listing are not included.

MODE is usually 0; other values are described above.

The function returns the error code GPG_ERR_NO_ERROR if the operation completed successfully, GPG_ERR_INV_VALUE if KEYDATA is not a valid empty data buffer, GPG_ERR_NO_DATA if no useful keys are in KEYS and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_export_keys_start (gpgme_ctx_t CTX,
gpgme_key_t KEYS[], gpgme_export_mode_t MODE,
gpgme_data_t KEYDATA)

SINCE: 1.2.0

The function gpgme_op_export_keys_start initiates a gpgme_op_export_ext operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, and GPG_ERR_INV_VALUE if KEYDATA is not a valid empty data buffer, GPG_ERR_NO_DATA if no useful keys are in KEYS and passes through any errors that are reported by the crypto engine support routines.

File: gpgme.info, Node: Importing Keys, Next: Deleting Keys, Prev: Exporting Keys, Up: Key Management

### 7.5.8 Importing Keys

Importing keys means the same as running gpg with the command --import.

-- Function: gpgme_error_t gpgme_op_import (gpgme_ctx_t CTX,
gpgme_data_t KEYDATA)

The function gpgme_op_import adds the keys in the data buffer KEYDATA to the key ring of the crypto engine used by CTX. The format of KEYDATA can be ASCII armored, for example, but the details are specific to the crypto engine.

After the operation completed successfully, the result can be retrieved with gpgme_op_import_result.

The function returns the error code GPG_ERR_NO_ERROR if the import was completed successfully, GPG_ERR_INV_VALUE if KEYDATA if CTX or KEYDATA is not a valid pointer, and GPG_ERR_NO_DATA if KEYDATA is an empty data buffer.

-- Function: gpgme_error_t gpgme_op_import_start (gpgme_ctx_t CTX, gpgme_data_t KEYDATA)

The function gpgme_op_import_start initiates a gpgme_op_import operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the import could be started successfully, GPG_ERR_INV_VALUE if CTX or KEYDATA is not a valid pointer, and GPG_ERR_NO_DATA if KEYDATA is an empty data buffer.

-- Function: gpgme_error_t gpgme_op_import_keys (gpgme_ctx_t CTX, gpgme_key_t *KEYS)

SINCE: 1.2.0

The function gpgme_op_import_keys adds the keys described by the NULL terminated array KEYS to the key ring of the crypto engine used by CTX. It is used to actually import and make keys permanent which have been retrieved from an external source (i.e. using GPGME_KEYLIST_MODE_EXTERN) earlier. The external keylisting must have been made with the same context configuration (in particular the same home directory). (1) Note that for OpenPGP this may require another access to the keyserver over the network.

Only keys of the currently selected protocol of CTX are considered for import. Other keys specified by the KEYS are ignored. As of now all considered keys must have been retrieved using the same method, i.e. the used key listing mode must be identical.

After the operation completed successfully, the result can be retrieved with gpgme_op_import_result.

To move keys from one home directory to another, export and import the keydata using gpgme_op_export and gpgme_op_import.

The function returns the error code GPG_ERR_NO_ERROR if the import was completed successfully, GPG_ERR_INV_VALUE if CTX is not a valid pointer, GPG_ERR_CONFLICT if the key listing mode does not match, and GPG_ERR_NO_DATA if no keys are considered for export.

-- Function: gpgme_error_t gpgme_op_import_keys_start (gpgme_ctx_t CTX, gpgme_key_t *KEYS)

SINCE: 1.2.0

The function gpgme_op_import_keys_start initiates a gpgme_op_import_keys operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the import was completed successfully, GPG_ERR_INV_VALUE if KEYDATA if CTX or KEYDATA is not a valid pointer, GPG_ERR_CONFLICT if the key listing mode does not match, and GPG_ERR_NO_DATA if no keys are considered for export.

-- Data type: gpgme_import_status_t

This is a pointer to a structure used to store a part of the result of a gpgme_op_import operation. For each considered key one status is added that contains information about the result of the import. The structure contains the following members:

gpgme_import_status_t next

This is a pointer to the next status structure in the linked list, or NULL if this is the last element.

char *fpr

This is the fingerprint of the key that was considered.

gpgme_error_t result

If the import was not successful, this is the error value that caused the import to fail. Otherwise the error code is GPG_ERR_NO_ERROR.

unsigned int status

This is a bit-wise OR of the following flags that give more information about what part of the key was imported. If the key was already known, this might be 0.

GPGME_IMPORT_NEW

The key was new.

GPGME_IMPORT_UID

The key contained new user IDs.

GPGME_IMPORT_SIG

The key contained new signatures.

GPGME_IMPORT_SUBKEY
The key contained new sub keys.

GPGME_IMPORT_SECRET
The key contained a secret key.

-- Data type: gpgme_import_result_t
This is a pointer to a structure used to store the result of a gpgme_op_import operation. After a successful import operation, you can retrieve the pointer to the result with gpgme_op_import_result. The structure contains the following members:

int considered
The total number of considered keys.

int no_user_id
The number of keys without user ID.

int imported
The total number
of imported keys.

int imported_rsa
The number of imported RSA keys.

int unchanged
The number of unchanged keys.

int new_user_ids
The number of new user IDs.

int new_sub_keys
The number of new sub keys.

int new_signatures
The number of new signatures.

int new_revocations
The number of new revocations.

int secret_read
The total number of secret keys read.

int secret_imported
The number of imported secret keys.

int secret_unchanged

The number of unchanged secret keys.

int not_imported
The number of keys not imported.

gpgme_import_status_t imports
A list of gpgme_import_status_t objects which contain more information about the keys for which an import was attempted.

int skipped_v3_keys
For security reasons modern versions of GnuPG do not anymore support v3 keys (created with PGP
2.x) and ignores them on
import. This counter provides the number of such skipped v3 keys.

-- Function: gpgme_import_result_t gpgme_op_import_result
(gpgme_ctx_t CTX)
The function gpgme_op_import_result returns a gpgme_import_result_t pointer to a structure holding the result of a gpgme_op_import operation. The pointer is only valid if the last operation on the context was a gpgme_op_import or gpgme_op_import_start operation, and if this operation finished successfully. The returned pointer is only valid until the next operation is started on the context.

---------- Footnotes ----------

(1) Thus it is a replacement for the usual workaround of exporting and then importing a key to make an X.509 key permanent.

File: gpgme.info, Node: Deleting Keys, Next: Changing Passphrases, Prev: Importing Keys, Up: Key Management

7.5.9 Deleting Keys
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-- Function: gpgme_error_t gpgme_op_delete_ext
(gpgme_ctx_t CTX,
const gpgme_key_t KEY, unsigned int FLAGS)
SINCE: 1.9.1

The function gpgme_op_delete_ext deletes the key KEY from the key ring of the crypto engine used by CTX.

FLAGS can be set to the bit-wise OR of the following flags:

GPGME_DELETE_ALLOW_SECRET
SINCE: 1.9.1

If not set, only public keys are deleted. If set, secret keys are deleted as well, if that is supported.

GPGME_DELETE_FORCE
SINCE: 1.9.1

If set, the user is not asked to confirm the deletion.

The function returns the error code GPG_ERR_NO_ERROR if the key was deleted successfully, GPG_ERR_INV_VALUE if CTX or KEY is not a valid pointer, GPG_ERR_NO_PUBKEY if KEY could not be found in the keyring, GPG_ERR_AMBIGUOUS_NAME if the key was not specified unambiguously, and GPG_ERR_CONFLICT if the secret key for KEY is available, but ALLOW_SECRET is zero.

-- Function: gpgme_error_t gpgme_op_delete_ext_start (gpgme_ctx_t CTX,
const gpgme_key_t KEY, unsigned int FLAGS)
SINCE: 1.9.1

The function gpgme_op_delete_ext_start initiates a gpgme_op_delete operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation was started successfully, and GPG_ERR_INV_VALUE if CTX or KEY is not a valid pointer.

The following functions allow only to use one particular flag.

-- Function: gpgme_error_t gpgme_op_delete (gpgme_ctx_t CTX,
const gpgme_key_t KEY, int ALLOW_SECRET)
Similar to gpgme_op_delete_ext, but only the flag GPGME_DELETE_ALLOW_SECRET can be provided.

-- Function: gpgme_error_t gpgme_op_delete_start (gpgme_ctx_t CTX,
const gpgme_key_t KEY, int ALLOW_SECRET)
Similar to gpgme_op_delete_ext_start, but only the flag GPGME_DELETE_ALLOW_SECRET can be provided.

File: gpgme.info, Node:
Changing Passphrases, Next: Changing TOFU Data, Prev: Deleting Keys, Up: Key Management

7.5.10 Changing Passphrases

---

-- Function: gpgme_error_t gpgme_op_passwd (gpgme_ctx_t CTX,
const gpgme_key_t KEY, unsigned int FLAGS)

SINCE: 1.3.0

The function gpgme_op_passwd changes the passphrase of the private key associated with KEY. The only allowed value for FLAGS is 0. The backend engine will usually popup a window to ask for the old and the new passphrase. Thus this function is not useful in a server application (where passphrases are not required anyway).

Note that old gpg engines (before version 2.0.15) do not support this command and will silently ignore it.

-- Function: gpgme_error_t gpgme_op_passwd_start (gpgme_ctx_t CTX,
const gpgme_key_t KEY, unsigned int FLAGS)

SINCE: 1.3.0

The function gpgme_op_passwd_start initiates a gpgme_op_passwd operation. It can be completed
by calling gpgme_wait on the
context. *Note Waiting For Completion::.

The function returns 0 if the operation was started successfully, and an error code if one of the arguments is not valid or the oepration could not be started.

File: gpgme.info, Node: Changing TOFU Data, Next: Advanced Key Editing, Prev: Changing Passphrases, Up: Key Management

7.5.11 Changing TOFU Data
---

The OpenPGP engine features a Trust-On-First-Use (TOFU) key validation model. For resolving conflicts it is necessary to declare the policy for a key. See the GnuPG manual for details on the TOFU implementation.

-- Data type: enum gpgme_tofu_policy_t
SINCE: 1.7.0

The gpgme_tofu_policy_t type specifies the set of possible policy values that are supported by GPGME:

GPGME_TOFU_POLICY_AUTO
Set the policy to auto.
GPGME_TOFU_POLICY_GOOD
Set the policy to good.
GPGME_TOFU_POLICY_BAD
Set the policy to
bad.
GPGME_TOFU_POLICY_ASK
Set the policy to ask.
GPGME_TOFU_POLICY_UNKNOWN
Set the policy to unknown.

To change the policy for a key the following functions can be used:

-- Function: gpgme_error_t gpgme_op_tofu_policy (gpgme_ctx_t CTX,
const gpgme_key_t KEY, gpgme_tofu_policy_t POLICY)

SINCE: 1.7.0

The function gpgme_op_tofu_policy changes the TOFU policy of KEY.
The valid values for POLICY are listed above. As of now this
function does only work for OpenPGP and requires at least version
2.1.10 of GnuPG.

The function returns zero on success, GPG_ERR_NOT_SUPPORTED if
the engine does not support the command, or a bunch of other error
codes.

-- Function: gpgme_error_t gpgme_op_tofu_policy_start (gpgme_ctx_t CTX,
const gpgme_key_t KEY, gpgme_tofu_policy_t POLICY)

SINCE: 1.7.0

The function gpgme_op_tofu_policy_start initiates a
gpgme_op_tofu_policy operation. It can be
completed by calling
gpgme_wait on the context. *Note Waiting For Completion::.

The function returns 0 if the operation was started successfully,
and an error code if one of the arguments is not valid or the
oepration could not be started.

File: gpgme.info, Node: Advanced Key Editing, Prev: Changing TOFU Data, Up: Key Management

7.5.12 Advanced Key Editing
---

-- Data type: gpgme_error_t (*gpgme_interact_cb_t) (void *HANDLE, const char *STATUS, const char *ARGS, int FD)

SINCE: 1.7.0

The gpgme_interact_cb_t type is the type of functions which GPGME calls if it a key interact operation is on-going. The status keyword STATUS and the argument line ARGS are passed through by GPGME from the crypto engine. An empty string represents EOF. The file descriptor FD is -1 for normal status messages. If STATUS indicates a command rather than a status message, the response to the command should be written to FD. The HANDLE is provided by the user at start of operation.

The function should return GPG_ERR_FALSE if it did not handle the status code, 0 for success, or any other error value.

-- Function: gpgme_error_t gpgme_op_interact (gpgme_ctx_t CTX, gpgme_key_t KEY, unsigned int FLAGS, gpgme_interact_cb_t FNC, void *HANDLE, gpgme_data_t OUT)

SINCE: 1.7.0

The function gpgme_op_interact processes the key KEY interactively, using the interact callback function FNC with the handle HANDLE. The callback is invoked for every status and command request from the crypto engine. The output of the crypto engine is written to the data object OUT.

Note that the protocol between the callback function and the crypto engine is specific to the crypto engine and no further support in implementing this protocol correctly is provided by GPGME.

FLAGS modifies the behaviour of the function; the only defined bit value is:

GPGME_INTERACT_CARD

SINCE: 1.7.0

This is used for smartcard based keys and uses gpgs --card-edit command.

The function returns 0 if the edit operation completes successfully, GPG_ERR_INV_VALUE if CTX or KEY is not a valid pointer, and any error returned by the crypto engine or the edit callback handler.

-- Function: gpgme_error_t gpgme_op_interact_start (gpgme_ctx_t CTX,
gpgme_key_t KEY, unsigned int FLAGS, gpgme_interact_cb_t FNC,
void *HANDLE, gpgme_data_t OUT)

SINCE: 1.7.0

The function gpgme_op_interact_start initiates a
gpgme_op_interact operation. It can be completed by calling
gpgme_wait on the context. *Note Waiting For Completion::.

The function returns 0 if the operation was started successfully,
and GPG_ERR_INV_VALUE if CTX or KEY is not a valid pointer.

File: gpgme.info, Node: Crypto Operations, Next: Miscellaneous, Prev: Key Management,
Up: Contexts

7.6 Crypto Operations
==========

Sometimes, the result of a crypto operation returns a list of invalid
keys encountered in processing the request. The following structure is
used to hold information about such a key.

-- Data type: gpgme_invalid_key_t
This is a pointer to a structure used to store a part of the result
of a crypto operation which takes user IDs as one input parameter.
The structure contains the following members:

gpgme_invalid_key_t next
This is a pointer to the next invalid key structure in the
linked list, or NULL if this is the last element.

char *fpr
The fingerprint or key ID of the invalid key encountered.

gpgme_error_t reason
An error code describing the reason why the key was found
invalid.

* Menu:

* Decrypt:: Decrypting a ciphertext.
* Verify:: Verifying a signature.
* Decrypt and Verify:: Decrypting
a signed ciphertext.
* Sign:: Creating a signature.

* Encrypt:: Encrypting a plaintext.

File: gpgme.info, Node: Decrypt, Next: Verify, Up: Crypto Operations

7.6.1 Decrypt
---

-- Function: gpgme_error_t gpgme_op_decrypt (gpgme_ctx_t CTX,
gpgme_data_t CIPHER, gpgme_data_t PLAIN)
The function gpgme_op_decrypt decrypts the ciphertext in the data object CIPHER and stores it into the data object PLAIN.

The function returns the error code GPG_ERR_NO_ERROR if the ciphertext could be decrypted successfully, GPG_ERR_INV_VALUE if CTX, CIPHER or PLAIN is not a valid pointer, GPG_ERR_NO_DATA if CIPHER does not contain any data to decrypt, GPG_ERR_DECRYPT_FAILED if CIPHER is not a valid cipher text, GPG_ERR_BAD_PASSPHRASE if the passphrase for the secret key could not be retrieved, and passes through some errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_decrypt_start (gpgme_ctx_t CTX,
gpgme_data_t CIPHER, gpgme_data_t PLAIN)
The function gpgme_op_decrypt_start initiates a gpgme_op_decrypt operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, and GPG_ERR_INV_VALUE if CIPHER or PLAIN is not a valid pointer.

-- Function: gpgme_error_t gpgme_op_decrypt_ext ( gpgme_ctx_t CTX,
gpgme_decrypt_flags_t FLAGS, gpgme_data_t CIPHER,
gpgme_data_t PLAIN)

SINCE: 1.8.0

The function gpgme_op_decrypt_ext is the same as gpgme_op_decrypt but has an additional argument FLAGS. If FLAGS is 0 both function behave identically.

The value in FLAGS is a bitwise-or combination of one or multiple of the following bit values:

GPGME_DECRYPT_VERIFY
SINCE: 1.8.0

The GPGME_DECRYPT_VERIFY symbol specifies that this function shall exactly act as gpgme_op_decrypt_verify.

GPGME_DECRYPT_UNWRAP
SINCE: 1.8.0

The GPGME_DECRYPT_UNWRAP symbol specifies that the output shall be an OpenPGP message with only the encryption layer removed. This requires GnuPG 2.1.12 and works only for OpenPGP. This is the counterpart to GPGME_ENCRYPT_WRAP.

The function returns the error codes as described for gpgme_op_decrypt.

-- Function: gpgme_error_t gpgme_op_decrypt_ext_start (
gpgme_ctx_t CTX, gpgme_decrypt_flags_t FLAGS,
gpgme_data_t CIPHER, gpgme_data_t PLAIN)

SINCE: 1.8.0

The function gpgme_op_decrypt_ext_start initiates a gpgme_op_decrypt_ext operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully,
and GPG_ERR_INV_VALUE if
CIPHER or PLAIN is not a valid pointer.

-- Data type: gpgme_recipient_t
SINCE: 1.1.0

This is a pointer to a structure used to store information about the recipient of an encrypted text which is decrypted in a gpgme_op_decrypt operation. This information (except for the status field) is even available before the operation finished successfully, for example in a passphrase callback. The structure contains the following members:

gpgme_recipient_t next
This is a pointer to the next recipient structure in the linked list, or NULL if this is the last element.

gpgme_pubkey_algo_t
The public key algorithm used in the encryption.

char *keyid

This is the key ID of the key (in hexadecimal digits) used as recipient.

gpgme_error_t status

This is an error number with the error code GPG_ERR_NO_SECKEY if the secret key for this recipient
is not available, and 0
otherwise.

-- Data type: gpgme_decrypt_result_t

This is a pointer to a structure used to store the result of a gpgme_op_decrypt operation. After successfully decrypting data, you can retrieve the pointer to the result with gpgme_op_decrypt_result. As with all result structures, it this structure shall be considered read-only and an application must not allocate such a strucure on its own. The structure contains the following members:

char *unsupported_algorithm

If an unsupported algorithm was encountered, this string describes the algorithm that is not supported.

unsigned int wrong_key_usage : 1

SINCE: 0.9.0 This is true if the key was not used according to its policy.

unsigned int legacy_cipher_nomdc : 1

SINCE: 1.11.2 The message was made by a legacy algorithm without any integrity protection. This might be an old but

legitimate message.

unsigned int is_mime : 1;

SINCE: 1.11.0 The message claims that the content is a MIME object.

unsigned int is_de_vs : 1;

SINCE: 1.10.0 The message was encrypted in a VS-NfD compliant way. This is a specification in Germany for a restricted communication level.

gpgme_recipient_t recipients

SINCE: 1.1.0

This is a linked list of recipients to which this message was encrypted.

char *file_name

This is the filename of the original plaintext message file if it is known, otherwise this is a null pointer.

char *session_key
SINCE: 1.8.0

A textual representation (nul-terminated string) of the session key used in symmetric encryption of the message, if the context has been set to export session keys (see gpgme_set_ctx_flag, "export-session-key"), and a session key was available for the
most recent decryption operation.
Otherwise, this is a null pointer.

You must not try to access this member of the struct unless gpgme_set_ctx_flag (ctx, "export-session-key") returns success or gpgme_get_ctx_flag (ctx, "export-session-key") returns true (non-empty string).

char *symkey_algo
SINCE: 1.11.0

A string with the symmetric encryption algorithm and mode using the format "<algo>.<mode>". Note that the deprecated non-MDC encryption mode of OpenPGP is given as "PGPCFB".

-- Function: gpgme_decrypt_result_t gpgme_op_decrypt_result (gpgme_ctx_t CTX)
The function gpgme_op_decrypt_result returns a gpgme_decrypt_result_t pointer to a structure holding the result of a gpgme_op_decrypt operation. The pointer is only valid if the last operation on the context was a gpgme_op_decrypt or gpgme_op_decrypt_start operation. If the operation failed this

might be a NULL pointer. The returned pointer is only valid until the next operation is started on the context.

File: gpgme.info, Node: Verify, Next: Decrypt and Verify, Prev: Decrypt, Up: Crypto Operations

7.6.2 Verify
---

-- Function: gpgme_error_t gpgme_op_verify (gpgme_ctx_t CTX, gpgme_data_t SIG, gpgme_data_t SIGNED_TEXT, gpgme_data_t PLAIN)
The function gpgme_op_verify verifies that the signature in the data object SIG is a valid signature. If SIG is a detached

signature, then the signed text should be provided in SIGNED_TEXT and PLAIN should be a null pointer. Otherwise, if SIG is a normal (or cleartext) signature, SIGNED_TEXT should be a null pointer and PLAIN should be a writable data object that will contain the plaintext after successful verification.

The results of the individual signature verifications can be retrieved with gpgme_op_verify_result.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be completed successfully, GPG_ERR_INV_VALUE if CTX, SIG or PLAIN is not a valid pointer, GPG_ERR_NO_DATA if SIG does not contain any data to verify, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_verify_start (gpgme_ctx_t CTX, gpgme_data_t SIG, gpgme_data_t SIGNED_TEXT, gpgme_data_t PLAIN)

The function gpgme_op_verify_start initiates a gpgme_op_verify operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, GPG_ERR_INV_VALUE if CTX, SIG or PLAIN is not a valid pointer, and GPG_ERR_NO_DATA if SIG or PLAIN does not contain any data to verify.

-- Data type: gpgme_sig_notation_t

This is a pointer to a structure used to store a part of the result of a gpgme_op_verify operation. The structure contains the following members:

gpgme_sig_notation_t next

This is a pointer to the next new signature notation structure in the linked list, or NULL if this is the last element.

char *name

The name of the notation field. If this is NULL, then the member value will contain a policy URL.

int name_len

The length of the name field. For strings the length is counted without the trailing binary zero.

char *value

The value of the notation field. If name is NULL, then this is a policy URL.

int value_len
The length of the value field. For strings the length is
counted without the trailing binary zero.

gpgme_sig_notation_flags_t flags
The accumulated flags field. This field contains the flags
associated with the notation data in an accumulated form which
can be used
as an argument to the function
gpgme_sig_notation_add. The value flags is a bitwise-or
combination of one or multiple of the following bit values:

GPGME_SIG_NOTATION_HUMAN_READABLE
SINCE: 1.1.0

The GPGME_SIG_NOTATION_HUMAN_READABLE symbol specifies
that the notation data is in human readable form

GPGME_SIG_NOTATION_CRITICAL
SINCE: 1.1.0

The GPGME_SIG_NOTATION_CRITICAL symbol specifies that
the notation data is critical.

unsigned int human_readable : 1
This is true if the GPGME_SIG_NOTATION_HUMAN_READABLE flag
is set and false otherwise. This flag is only valid for
notation data, not for policy URLs.

unsigned int critical : 1
This is true if the GPGME_SIG_NOTATION_CRITICAL flag is set
and false otherwise. This flag is valid for notation data and
policy URLs.

-- Data type: gpgme_signature_t
This is a pointer to a structure used to store a part of the result
of a gpgme_op_verify operation. The structure contains the
following members:

gpgme_signature_t next
This is a pointer to the next new signature structure in the
linked list, or NULL if this is the last element.

gpgme_sigsum_t summary
This is a bit vector giving a summary of the signature status.
It provides an easy interface to a defined semantic of the
signature status. Checking just one bit is sufficient to see

whether a signature is valid without any restrictions. This means that you can check for GPGME_SIGSUM_VALID like this:

```
if ((sig.summary & GPGME_SIGSUM_VALID))
{
  ..do stuff if valid..
}
else
{
  ..do stuff if not fully valid..
}
```

The defined bits are:

GPGME_SIGSUM_VALID
The signature is fully valid.

GPGME_SIGSUM_GREEN
The signature is good but one might want to display some extra information. Check the other bits.

GPGME_SIGSUM_RED
The signature is bad. It might be useful to check other bits and display more information, i.e. a revoked certificate might not render a signature invalid when the message was received prior to the cause for the revocation.

GPGME_SIGSUM_KEY_REVOKED
The key or at least one certificate has been revoked.

GPGME_SIGSUM_KEY_EXPIRED
The key or one of the certificates has expired. It is probably a good idea to display the date of the expiration.

GPGME_SIGSUM_SIG_EXPIRED
The signature has expired.

GPGME_SIGSUM_KEY_MISSING
Cant verify due to a missing key or certificate.

GPGME_SIGSUM_CRL_MISSING
The CRL (or an equivalent mechanism) is not available.

GPGME_SIGSUM_CRL_TOO_OLD
Available CRL is too old.

GPGME_SIGSUM_BAD_POLICY
A policy requirement was not met.

GPGME_SIGSUM_SYS_ERROR
A system error occurred.

GPGME_SIGSUM_TOFU_CONFLICT
A TOFU conflict was detected.

char *fpr
This is the fingerprint or key ID of the signature.

gpgme_error_t status
This is the status of the signature. In particular, the following status codes are of interest:

GPG_ERR_NO_ERROR
This status indicates that the signature could be verified or that there is no signature. For the combined result this status means that all signatures could be verified.

Note: This does not mean that a valid signature could be found. Check the summary field for that.

For example a gpgme_op_decrypt_verify returns a verification result with GPG_ERR_NO_ERROR for encrypted but unsigned data.

GPG_ERR_SIG_EXPIRED
This status indicates that the signature is valid but expired. For the combined result this status means that all signatures are valid and expired.

GPG_ERR_KEY_EXPIRED
This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.

GPG_ERR_CERT_REVOKED
This status indicates that the signature is valid but the key used to verify the signature has been revoked. For the combined result this status means that all signatures are valid and all keys are revoked.

GPG_ERR_BAD_SIGNATURE
This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

GPG_ERR_NO_PUBKEY
This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

GPG_ERR_GENERAL
This status indicates that there was some other error which prevented the signature verification.

gpgme_sig_notation_t notations
This is a linked list with the notation data and policy URLs.

unsigned long timestamp
The creation timestamp of this signature.

unsigned long exp_timestamp
The expiration timestamp of this signature, or 0 if the signature
does not expire.

unsigned int wrong_key_usage : 1
This is true if the key was not used according to its policy.

unsigned int pka_trust : 2
This is set to the trust information gained by means of the PKA system. Values are:
0
No PKA information available or verification not possible.
1
PKA verification failed.
2
PKA verification succeeded.
3
Reserved for future use.
Depending on the configuration of the engine, this metric may also be reflected by the validity of the signature.

unsigned int chain_model : 1
SINCE: 1.1.6

This is true if the validity of the signature has been checked

using the chain model. In the chain model the time the signature has been created must be within the validity period of the certificate and the time the certificate itself has been created must be within the validity period of the issuing certificate. In contrast the default validation model checks the validity of signature as well at the entire certificate chain at the current time.

gpgme_validity_t validity
The validity of the signature.

gpgme_error_t validity_reason
If a signature is not valid, this provides a reason why.

gpgme_pubkey_algo_t
The public key algorithm used to create this signature.

gpgme_hash_algo_t
The hash algorithm used to create this signature.

char *pka_address
The mailbox from the PKA information or NULL.

gpgme_key_t key
SINCE: 1.7.0

An object describing the key used to create the signature. This key object may be incomplete in that it only conveys information availabale directly with a signature. It may also be NULL if such information is not readily available.

-- Data type: gpgme_verify_result_t
This is a pointer to a structure used to store the result of a gpgme_op_verify operation. After verifying a signature, you can retrieve the pointer to the result with gpgme_op_verify_result. If the operation failed this might be a NULL pointer. The structure contains the following member:

gpgme_signature_t signatures
A linked list with information about all signatures for which a verification was attempted.

char *file_name
This is the filename of the original plaintext message file if it is known, otherwise this is a null pointer. Warning: The filename is not covered by the signature.

unsigned int is_mime : 1;

SINCE: 1.11.0

The message claims that the content is a MIME object.
Warning: This flag is not covered by the signature.

-- Function: gpgme_verify_result_t gpgme_op_verify_result
(gpgme_ctx_t CTX)

The function gpgme_op_verify_result returns a gpgme_verify_result_t pointer to a structure holding the result of a gpgme_op_verify operation. The pointer is only valid if the last operation on the context was a gpgme_op_verify, gpgme_op_verify_start, gpgme_op_decrypt_verify or gpgme_op_decrypt_verify_start operation, and if this operation finished successfully (for gpgme_op_decrypt_verify and gpgme_op_decrypt_verify_start, the error code GPG_ERR_NO_DATA counts as successful in this context). The returned pointer is only valid until the next operation is started on the context.

File: gpgme.info, Node: Decrypt and Verify, Next: Sign, Prev: Verify, Up: Crypto Operations

7.6.3 Decrypt and Verify
---

-- Function: gpgme_error_t gpgme_op_decrypt_verify (gpgme_ctx_t CTX,
gpgme_data_t CIPHER, gpgme_data_t PLAIN)

The function gpgme_op_decrypt_verify decrypts the ciphertext in the data object CIPHER and stores it into the data object PLAIN.
If CIPHER contains signatures, they will be verified.

After the operation completed, gpgme_op_decrypt_result and gpgme_op_verify_result can be used to retrieve more information about the signatures.

If the error code GPG_ERR_NO_DATA is returned, CIPHER does not contain any data to decrypt. However, it might still be signed. The information about detected signatures is available with gpgme_op_verify_result in this case.

The function returns the error code GPG_ERR_NO_ERROR if the ciphertext could be decrypted successfully, GPG_ERR_INV_VALUE if CTX, CIPHER or PLAIN is not a valid pointer, GPG_ERR_NO_DATA if CIPHER does not contain any data to decrypt, GPG_ERR_DECRYPT_FAILED if CIPHER is not a valid cipher text, GPG_ERR_BAD_PASSPHRASE if the passphrase for the secret key could not be retrieved, and passes through any errors that are reported

by the crypto engine support
routines.

-- Function: gpgme_error_t gpgme_op_decrypt_verify_start
(gpgme_ctx_t CTX, gpgme_data_t CIPHER, gpgme_data_t PLAIN)
The function gpgme_op_decrypt_verify_start initiates a gpgme_op_decrypt_verify operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, GPG_ERR_INV_VALUE if CTX, CIPHER, PLAIN or R_STAT is not a valid pointer, and GPG_ERR_NO_DATA if CIPHER does not contain any data to decrypt.

When processing mails it is sometimes useful to extract the actual mail address (the addr-spec) from a string. GPGME provides this helper function which uses the same semantics as the internal functions in GPGME and GnuPG:

-- Function: char * gpgme_addrspec_from_uid (const char *UID)

SINCE: 1.7.1

Return the mail address (called addr-spec in RFC-5322) from the string
UID which is assumed to be a user id (called address in RFC-5322). All plain ASCII characters (i.e. those with bit 7 cleared) in the result are converted to lowercase. Caller must free the result using gpgme_free. Returns NULL if no valid address was found (in which case ERRNO is set to EINVAL) or for other errors.

File: gpgme.info, Node: Sign, Next: Encrypt, Prev: Decrypt and Verify, Up: Crypto Operations

7.6.4 Sign
---

A signature can contain signatures by one or more keys. The set of keys used to create a signatures is contained in a context, and is applied to all following signing operations in this context (until the set is changed).

* Menu:

* Selecting Signers:: How to choose the keys to sign with.
* Creating a Signature:: How to create a signature.

* Signature Notation Data:: How to add notation data to a signature.

File: gpgme.info, Node: Selecting Signers, Next: Creating a Signature, Up: Sign

7.6.4.1
Selecting Signers
.....

The key or the keys used to create a signature are stored in the context. The following functions can be used to manipulate this list. If no signer has been set into the context a default key is used for signing.

-- Function: void gpgme_signers_clear (gpgme_ctx_t CTX)
The function gpgme_signers_clear releases a reference for each key on the signers list and removes the list of signers from the context CTX.

Every context starts with an empty list.

-- Function: gpgme_error_t gpgme_signers_add (gpgme_ctx_t CTX, const gpgme_key_t KEY)
The function gpgme_signers_add adds the key KEY to the list of signers in the context CTX.

Calling this function acquires an additional reference for the key.

-- Function: unsigned int gpgme_signers_count (const gpgme_ctx_t CTX)
SINCE: 1.4.3

The function gpgme_signers_count returns the number of signer keys in the context CTX.

-- Function:
gpgme_key_t gpgme_signers_enum (const gpgme_ctx_t CTX, int SEQ)
The function gpgme_signers_enum returns the SEQth key in the list of signers in the context CTX. An additional reference is acquired for the user.

If SEQ is out of range, NULL is returned.

File: gpgme.info, Node: Creating a Signature, Next: Signature Notation Data, Prev: Selecting Signers, Up: Sign

7.6.4.2 Creating a Signature
.....

-- Data type: enum gpgme_sig_mode_t
The gpgme_sig_mode_t type is used to specify the desired type of a signature. The following modes are available:

GPGME_SIG_MODE_NORMAL
A normal signature is made, the output includes the plaintext and the signature.

GPGME_SIG_MODE_DETACH
A detached signature is made.

GPGME_SIG_MODE_CLEAR
A clear text signature is made. The ASCII armor and text mode settings of the context are ignored.

-- Function: gpgme_error_t gpgme_op_sign
(gpgme_ctx_t CTX,
gpgme_data_t PLAIN, gpgme_data_t SIG, gpgme_sig_mode_t MODE)
The function gpgme_op_sign creates a signature for the text in the data object PLAIN and returns it in the data object SIG. The type of the signature created is determined by the ASCII armor (or, if that is not set, by the encoding specified for SIG), the text mode attributes set for the context CTX and the requested signature mode MODE.

After the operation completed successfully, the result can be retrieved with gpgme_op_sign_result.

If an S/MIME signed message is created using the CMS crypto engine, the number of certificates to include in the message can be specified with gpgme_set_include_certs. *Note Included Certificates::.

The function returns the error code GPG_ERR_NO_ERROR if the signature could be created successfully, GPG_ERR_INV_VALUE if CTX, PLAIN or SIG is not a valid pointer, GPG_ERR_NO_DATA if the
signature could not be created, GPG_ERR_BAD_PASSPHRASE if the passphrase for the secret key could not be retrieved, GPG_ERR_UNUSABLE_SECKEY if there are invalid signers, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_sign_start (gpgme_ctx_t CTX,
gpgme_data_t PLAIN, gpgme_data_t SIG, gpgme_sig_mode_t MODE)
The function gpgme_op_sign_start initiates a gpgme_op_sign operation. It can be completed by calling gpgme_wait on the

context.  *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, and GPG_ERR_INV_VALUE if CTX, PLAIN or SIG is not a valid pointer.

-- Data type: gpgme_new_signature_t
This is a pointer to a structure used to store a part of the result of a gpgme_op_sign operation.  The structure contains the following members:

gpgme_new_signature_t next
This is a pointer to the next new signature structure in the linked list, or NULL if this is the last element.

gpgme_sig_mode_t type
The type of this signature.

gpgme_pubkey_algo_t pubkey_algo
The public key algorithm used to create this signature.

gpgme_hash_algo_t hash_algo
The hash algorithm used to create this signature.

unsigned int sig_class
The signature class of this signature.

long int timestamp
The creation timestamp of this signature.

char *fpr
The fingerprint of the key which was used to create this signature.

-- Data type: gpgme_sign_result_t
This is a pointer to a structure used to store the result of a gpgme_op_sign operation.  After successfully generating a signature, you can retrieve the pointer to the result with gpgme_op_sign_result.  The structure contains the following members:

gpgme_invalid_key_t invalid_signers
A linked list with information about all invalid keys for which a signature could not be created.

gpgme_new_signature_t signatures

A linked list with information about all signatures created.

-- Function: gpgme_sign_result_t gpgme_op_sign_result (gpgme_ctx_t CTX)
The function gpgme_op_sign_result returns a gpgme_sign_result_t pointer to a structure holding the result of a gpgme_op_sign operation. The pointer is only valid if the last operation on the context was a gpgme_op_sign, gpgme_op_sign_start, gpgme_op_encrypt_sign or gpgme_op_encrypt_sign_start operation. If that operation failed, the function might return a NULL pointer. The returned pointer is only valid until the next operation is started on the context.

File: gpgme.info, Node: Signature Notation Data, Prev: Creating a Signature, Up: Sign

7.6.4.3 Signature Notation Data
.....

Using the following functions, you can attach arbitrary notation data to a signature. This information is then available to the user when the signature is verified.

-- Function: void gpgme_sig_notation_clear (gpgme_ctx_t CTX)
SINCE: 1.1.0

The function gpgme_sig_notation_clear removes the notation data from the context CTX. Subsequent signing operations from this context will not include any notation data.

Every context starts with an empty notation data list.

-- Function: gpgme_error_t gpgme_sig_notation_add (gpgme_ctx_t CTX,
const char *NAME, const char *VALUE,
gpgme_sig_notation_flags_t FLAGS)
SINCE: 1.1.0

The function gpgme_sig_notation_add adds the notation data with the name NAME and the value VALUE to the context CTX.

Subsequent signing operations will include this notation data, as well as any other notation data that was added since the creation of the context or the last gpgme_sig_notation_clear operation.

The arguments NAME and VALUE must be NUL-terminated strings in human-readable form. The flag GPGME_SIG_NOTATION_HUMAN_READABLE is implied (non-human-readable notation data is currently not

supported). The strings must be in UTF-8 encoding.

If NAME is NULL, then VALUE should be a policy URL.

The function gpgme_sig_notation_add returns the error code GPG_ERR_NO_ERROR if the notation data could be added successfully, GPG_ERR_INV_VALUE if CTX is not a valid pointer, or if NAME, VALUE and FLAGS are an invalid combination. The function also passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_sig_notation_t gpgme_sig_notation_get
(const gpgme_ctx_t CTX)
SINCE: 1.1.0

The function gpgme_sig_notation_get returns the linked list of notation data structures that are contained in the context CTX.

If CTX is not a valid pointer, or there is no notation data added for this context, NULL is returned.

File: gpgme.info, Node: Encrypt, Prev: Sign, Up: Crypto Operations

7.6.5 Encrypt
---

One plaintext can be encrypted for several recipients at the same time. The list of recipients is created independently of any context, and then passed to the encryption operation.

* Menu:

* Encrypting a Plaintext:: How to encrypt a plaintext.

File: gpgme.info, Node: Encrypting a Plaintext, Up: Encrypt

7.6.5.1 Encrypting a Plaintext
.....

-- Function: gpgme_error_t gpgme_op_encrypt (gpgme_ctx_t CTX,
gpgme_key_t RECP[], gpgme_encrypt_flags_t FLAGS,
gpgme_data_t PLAIN, gpgme_data_t CIPHER)
The function gpgme_op_encrypt encrypts the plaintext in the data object PLAIN for the recipients RECP and stores the ciphertext in the data object CIPHER. The type of the ciphertext created is determined by the ASCII armor (or, if that is not set, by the

encoding specified
for CIPHER) and the text mode attributes set for
the context CTX.

RECP must be a NULL-terminated array of keys. The user must keep
references for all keys during the whole duration of the call (but
see gpgme_op_encrypt_start for the requirements with the
asynchronous variant).

The value in FLAGS is a bitwise-or combination of one or multiple
of the following bit values:

GPGME_ENCRYPT_ALWAYS_TRUST
The GPGME_ENCRYPT_ALWAYS_TRUST symbol specifies that all the
recipients in RECP should be trusted, even if the keys do not
have a high enough validity in the keyring. This flag should
be used with care; in general it is not a good idea to use any
untrusted keys.

GPGME_ENCRYPT_NO_ENCRYPT_TO
SINCE: 1.2.0

The GPGME_ENCRYPT_NO_ENCRYPT_TO symbol specifies that no
default or hidden default recipients as configured in the
crypto backend should be included. This
can be useful for
managing different user profiles.

GPGME_ENCRYPT_NO_COMPRESS
SINCE: 1.5.0

The GPGME_ENCRYPT_NO_COMPRESS symbol specifies that the
plaintext shall not be compressed before it is encrypted.
This is in some cases useful if the length of the encrypted
message may reveal information about the plaintext.

GPGME_ENCRYPT_PREPARE
GPGME_ENCRYPT_EXPECT_SIGN
The GPGME_ENCRYPT_PREPARE symbol is used with the UI Server
protocol to prepare an encryption (i.e. sending the
PREP_ENCRYPT command). With the GPGME_ENCRYPT_EXPECT_SIGN
symbol the UI Server is advised to also expect a sign command.

GPGME_ENCRYPT_SYMMETRIC
SINCE: 1.7.0

The GPGME_ENCRYPT_SYMMETRIC symbol specifies that the output
should be additionally encrypted symmetrically even if

recipients are provided. This feature is only supported for the OpenPGP crypto engine.

GPGME_ENCRYPT_THROW_KEYIDS
SINCE: 1.8.0

The GPGME_ENCRYPT_THROW_KEYIDS symbols requests that the identifiers for the decrption keys are not included in the ciphertext. On the receiving side, the use of this flag may slow down the decryption process because all available secret keys must be tried. This flag is only honored for OpenPGP encryption.

GPGME_ENCRYPT_WRAP
SINCE: 1.8.0

The GPGME_ENCRYPT_WRAP symbol specifies that the input is an OpenPGP message and not a plain data. This is the counterpart to GPGME_DECRYPT_UNWRAP.

GPGME_ENCRYPT_WANT_ADDRESS
SINCE: 1.11.0

The GPGME_ENCRYPT_WANT_ADDRESS symbol requests that all supplied keys or key specifications include a syntactically valid mail address. If this is not the case the operation is not even tried and the error code GPG_ERR_INV_USER_ID is returned. Only the address part of the key specification is conveyed to the backend. As of now the key must be specified using the RECPSTRING argument of the extended encrypt functions. This feature is currently only supported for the OpenPGP crypto engine.

If GPG_ERR_UNUSABLE_PUBKEY is returned, some recipients in RECP are invalid, but not all. In this case the plaintext might be encrypted for all valid recipients and returned in CIPHER (if this happens depends on the crypto engine). More information about the invalid recipients is available with gpgme_op_encrypt_result.

If RECP is NULL, symmetric rather than public key encryption is performed. Symmetrically encrypted cipher text can be deciphered with gpgme_op_decrypt. Note that in this case the crypto backend needs to retrieve a passphrase from the user. Symmetric encryption is currently only supported for the OpenPGP crypto backend.

The function returns the error code GPG_ERR_NO_ERROR if the ciphertext could be created successfully, GPG_ERR_INV_VALUE if CTX, RECP, PLAIN or CIPHER is not a valid pointer, GPG_ERR_UNUSABLE_PUBKEY if RECP contains some invalid recipients, GPG_ERR_BAD_PASSPHRASE if the passphrase for the symmetric key could not be retrieved, and passes through any errors that are reported by the crypto engine support routines.

-- Function: gpgme_error_t gpgme_op_encrypt_start (gpgme_ctx_t CTX, gpgme_key_t RECP[], gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN, gpgme_data_t CIPHER)

The function gpgme_op_encrypt_start initiates a gpgme_op_encrypt operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

References to the keys only need to be held for the duration of this call. The user can release its references to the keys after this function returns, even if the operation is not yet finished.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, GPG_ERR_INV_VALUE if CTX, RSET, PLAIN or CIPHER is not a valid pointer, and GPG_ERR_UNUSABLE_PUBKEY if RSET does not contain any valid recipients.

-- Function: gpgme_error_t gpgme_op_encrypt_ext (gpgme_ctx_t CTX, gpgme_key_t RECP[], const char *RECPSTRING, gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN, gpgme_data_t CIPHER)

SINCE: 1.11.0

This is an extended version of gpgme_op_encrypt with RECPSTRING as additional parameter. If RECP is NULL and RECPSTRING is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to RECP the keys are given directly as strings and there is no need to first create key objects. Leading and trailing white space is remove from each line in RECPSTRING. The keys are then passed verbatim to the backend engine.

For the OpenPGP backend several special keywords are supported to modify the operation. These keywords are given instead of a key specification. The currently supported keywords are:

--hidden

--no-hidden

These keywords toggle between normal and hidden recipients for all following key specifications. When a hidden recipient is requested the gpg option -R (or -F in file mode) is used instead of -r (-f in file mode).

--file

--no-file

These keywords toggle between regular and file mode for all following key specification. In file mode the option -f or -F is passed to gpg. At least GnuPG version 2.1.14 is required to handle these options. The GPGME_ENCRYPT_WANT_ADDRESS flag is ignored in file mode.

--

This keyword disables all keyword detection up to the end of the string. All keywords are treated as verbatim arguments.

To create a RECPSTRING it is often useful to employ a strconcat style function. For example this function creates a string to encrypt to two keys:

```
char *
xbuild_recpstring (const char *key1, const char *key2)
{
  char *result = gpgrt_strconcat ("--\n", key1, "\n", key2, NULL);
  if (!result)
    { perror ("strconcat failed"); exit (2); }
  return result;
}
```

Note the use of the double dash here; unless you want to specify a keyword, it is a good idea to avoid any possible trouble with key specifications starting with a double dash. The used strconcat function is available in Libgpg-error 1.28 and later; Libgpg-error (aka Gpgrt) is a dependency of GPGME. The number of arguments to gpgrt_strconcat is limited to 47 but that should always be sufficient. In case a larger and non-fixed number of keys are to be supplied the following code can be used:

```
char *
xbuild_long_recpstring (void)
{
  gpgrt_stream_t memfp;
  const char *s;
  void *result;
```

```
memfp = gpgrt_fopenmem (0, "w+b");
if (!memfp)
  { perror ("fopenmem failed"); exit (2); }
gpgrt_fputs ("--", memfp);
while ((s = get_next_keyspec ()))
  {
    gpgrt_fputc ('\n', memfp);
    gpgrt_fputs (s, memfp);
  }
gpgrt_fputc (0, memfp);
if (gpgrt_ferror (memfp))
  { perror ("writing to memstream failed"); exit (2); }
if (gpgrt_fclose_snatch (memfp, &result, NULL))
  { perror ("fclose_snatch failed"); exit (2); }
return result;
}
```

In this example get_next_keyspec is expected to return the next key to be added to the string. Please take care: Encrypting to a large number of recipients is often questionable due to security reasons and also for the technicality that all keys are currently passed on the command line to gpg which has as a platform specific length limitation.

-- Function: gpgme_error_t gpgme_op_encrypt_ext_start (gpgme_ctx_t CTX, gpgme_key_t RECP[], const char *RECPSTRING, gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN, gpgme_data_t CIPHER)

SINCE: 1.11.0

This is an extended version of gpgme_op_encrypt_start with RECPSTRING as additional parameter. If RECP is NULL and RECPSTRING is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to RECP the keys are given directly as strings and there is no need to first create key objects. The keys are passed verbatim to the backend engine.

-- Data type: gpgme_encrypt_result_t

This is a pointer to a structure used to store the result of a gpgme_op_encrypt operation. After successfully encrypting data, you can retrieve the pointer to the result with gpgme_op_encrypt_result. The structure contains the following members:

gpgme_invalid_key_t invalid_recipients
A linked list with information about all invalid keys for which the data could not be encrypted.

-- Function: gpgme_encrypt_result_t gpgme_op_encrypt_result (gpgme_ctx_t CTX)
The function gpgme_op_encrypt_result returns a gpgme_encrypt_result_t pointer to a structure holding the result of a gpgme_op_encrypt operation. The pointer is only valid if the last operation on the context was a gpgme_op_encrypt, gpgme_op_encrypt_start, gpgme_op_sign or gpgme_op_sign_start operation. If this operation failed, this might be a NULL pointer. The returned pointer is only valid until the next operation is started on the context.

-- Function: gpgme_error_t gpgme_op_encrypt_sign (gpgme_ctx_t CTX, gpgme_key_t RECP[], gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN, gpgme_data_t CIPHER)
The function gpgme_op_encrypt_sign does a combined encrypt and sign operation. It is used like gpgme_op_encrypt, but the ciphertext also contains signatures for the signers listed in CTX.

The combined encrypt and sign operation is currently only available for the OpenPGP crypto engine.

-- Function: gpgme_error_t gpgme_op_encrypt_sign_start (gpgme_ctx_t CTX, gpgme_key_t RECP[], gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN, gpgme_data_t CIPHER)
The function gpgme_op_encrypt_sign_start initiates a gpgme_op_encrypt_sign operation. It can be completed by calling gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation could be started successfully, and GPG_ERR_INV_VALUE if CTX, RSET, PLAIN or CIPHER is not a valid pointer.

-- Function: gpgme_error_t gpgme_op_encrypt_sign_ext (gpgme_ctx_t CTX, gpgme_key_t RECP[], const char *RECPSTRING, gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN, gpgme_data_t CIPHER)

SINCE: 1.11.0

This is an extended version of gpgme_op_encrypt_sign with RECPSTRING as additional parameter. If RECP is NULL and RECPSTRING is not NULL, the latter is expected to be a linefeed delimited

string with the set of key specifications. In contrast to RECP the keys are given directly as strings and there is no need to first create the key objects. The keys are passed verbatim to the backend engine.

-- Function: gpgme_error_t gpgme_op_encrypt_sign_ext_start
(gpgme_ctx_t CTX, gpgme_key_t RECP[], const char *RECPSTRING, gpgme_encrypt_flags_t FLAGS, gpgme_data_t PLAIN, gpgme_data_t CIPHER)

SINCE: 1.11.0

This is an extended version of gpgme_op_encrypt_sign_start with RECPSTRING
as additional parameter. If RECP is NULL and RECPSTRING is not NULL, the latter is expected to be a linefeed delimited string with the set of key specifications. In contrast to RECP the keys are given directly as strings and there is no need to first create the key objects. The keys are passed verbatim to the backend engine.

File: gpgme.info, Node: Miscellaneous, Next: Run Control, Prev: Crypto Operations, Up: Contexts

## 7.7 Miscellaneous operations

Here are some support functions which are sometimes useful.

* Menu:

* Running other Programs:: Running other Programs
* Using the Assuan protocol:: Using the Assuan protocol
* Checking for updates:: How to check for software updates

File: gpgme.info, Node: Running other Programs, Next: Using the Assuan protocol, Up: Miscellaneous

### 7.7.1 Running other Programs

GPGME features an internal subsystem to run the actual backend engines. Along
with data abstraction object this subsystem can be used to run arbitrary simple programs which even need not be related to cryptographic features. It may for example be used to run tools which are part of the GnuPG system but are not directly accessible with the GPGME API.

-- Function: gpgme_error_t gpgme_op_spawn (gpgme_ctx_t CTX,
const char *FILE, const char *ARGV[], gpgme_data_t DATAIN,
gpgme_data_t DATAOUT, gpgme_data_t DATAERR,
unsigned int FLAGS)

SINCE: 1.5.0

The function gpgme_op_spawn runs the program FILE with the arguments taken from the NULL terminated array ARGV. If no arguments are required ARGV may be given as NULL. In the latter case or if argv[0] is the empty string, GPGME uses the basename of FILE for argv[0]. The file descriptors stdin, stdout, and stderr are connected to the data objects DATAIN, DATAOUT, and DATAERR. If NULL is passed for one of these data objects the corresponding
file descriptor is connected to /dev/null.

The value in FLAGS is a bitwise-or combination of one or multiple of the following bit values:

GPGME_SPAWN_DETACHED
SINCE: 1.5.0

Under Windows this flag inhibits the allocation of a new console for the program. This is useful for a GUI application which needs to call a command line helper tool.

GPGME_SPAWN_ALLOW_SET_FG
SINCE: 1.5.0

Under Windows this flag allows the called program to put itself into the foreground.

-- Function: gpgme_error_t gpgme_op_spawn_start (gpgme_ctx_t CTX,
const char *FILE, const char *ARGV[], gpgme_data_t DATAIN,
gpgme_data_t DATAOUT, gpgme_data_t DATAERR,
unsigned int FLAGS)

SINCE: 1.5.0

This is the asynchronous variant of gpgme_op_spawn.

File: gpgme.info, Node: Using the Assuan protocol, Next: Checking for updates, Prev: Running other Programs, Up: Miscellaneous

7.7.2

## Using the Assuan protocol

The Assuan protocol can be used to talk to arbitrary Assuan servers. By default it is connected to the GnuPG agent, but it may be connected to arbitrary servers by using gpgme_ctx_set_engine_info, passing the location of the servers socket as FILE_NAME argument, and an empty string as HOME_DIR argument.

The Assuan protocol functions use three kinds of callbacks to transfer data:

-- Data type: gpgme_error_t (*gpgme_assuan_data_cb_t) (void *OPAQUE, const void *DATA, size_t DATALEN)

SINCE: 1.2.0

This callback receives any data sent by the server. OPAQUE is the pointer passed to gpgme_op_assuan_transact_start, DATA of length DATALEN refers to the data sent.

-- Data type: gpgme_error_t (*gpgme_assuan_inquire_cb_t) (void *OPAQUE, const char *NAME, const char *ARGS, gpgme_data_t *R_DATA)

SINCE: 1.2.0

This callback is used to provide additional data to the Assuan

server. OPAQUE is the pointer passed to gpgme_op_assuan_transact_start, NAME and ARGS specify what kind of data the server requested, and R_DATA is used to return the actual data.

Note: Returning data is currently not implemented in GPGME.

-- Data type: gpgme_error_t (*gpgme_assuan_status_cb_t) (void *OPAQUE, const char *STATUS, const char *ARGS)

SINCE: 1.2.0

This callback receives any status lines sent by the server. OPAQUE is the pointer passed to gpgme_op_assuan_transact_start, STATUS and ARGS denote the status update sent.

-- Function: gpgme_error_t gpgme_op_assuan_transact_start (gpgme_ctx_t CTX, const char *COMMAND, gpgme_assuan_data_cb_t DATA_CB, void * DATA_CB_VALUE, gpgme_assuan_inquire_cb_t INQUIRE_CB, void * INQUIRE_CB_VALUE,

gpgme_assuan_status_cb_t STATUS_CB, void * STATUS_CB_VALUE)

SINCE: 1.2.0

Send the Assuan COMMAND and return results via the callbacks. Any callback may be NULL. The result of the operation may be retrieved using gpgme_wait_ext.

Asynchronous variant.

-- Function: gpgme_error_t gpgme_op_assuan_transact_ext
(gpgme_ctx_t CTX, const char *COMMAND,
gpgme_assuan_data_cb_t DATA_CB, void * DATA_CB_VALUE,
gpgme_assuan_inquire_cb_t INQUIRE_CB, void * INQUIRE_CB_VALUE,
gpgme_assuan_status_cb_t STATUS_CB, void * STATUS_CB_VALUE,
gpgme_error_t *OP_ERR)

Send the Assuan COMMAND and return results via the callbacks. The result of the operation is returned in OP_ERR.

Synchronous variant.

File: gpgme.info, Node: Checking for updates, Prev: Using the Assuan protocol, Up: Miscellaneous

7.7.3 How to check for software updates
---

The GnuPG Project operates a server to query the current versions of software packages related to GnuPG. GPGME can be used to access this online database and check whether a new version of a software package is available.

-- Data type: gpgme_query_swdb_result_t
SINCE: 1.8.0

This is a pointer to a structure used to store the result of a gpgme_op_query_swdb operation. After success full call to that function, you can retrieve the pointer to the result with gpgme_op_query_swdb_result. The structure contains the following member:

name
This is the name of the package.

iversion
The currently installed version or an empty string. This

value is either a copy of the argument given to gpgme_op_query_swdb or the version of the installed software as figured out by GPGME or GnuPG.

created
This gives the date the file with the list of version numbers has originally be created by the GnuPG project.

retrieved
This gives the date the file was downloaded.

warning
If this flag is set either an error has occurred or some of the information in this structure are not properly set. For example if the version number of the installed software could not be figured out, the update flag may not reflect a required update status.

update
If this flag is set an update of the software is available.

urgent
If this flag is set an available update is important.

noinfo
If this flag is set, no valid information could be retrieved.

unknown
If this flag is set the given name is not known.

toold
If this flag is set the available information is not fresh enough.

error
If this flag is set some other error has occurred.

version
The version string of the latest released version.

reldate
The release date of the latest released version.

-- Function: gpgme_error_t gpgme_op_query_swdb (gpgme_ctx_t CTX, const char *NAME, const char *IVERSION, gpgme_data_t RESERVED)

SINCE: 1.8.0

Query the software version database for software package NAME and check against the installed version given by IVERSION. If IVERSION is given as NULL a check is only done if GPGME can figure out the version by itself (for example when using "gpgme" or "gnupg"). If NULL is used for NAME the current gpgme version is checked. RESERVED must be set to 0.

-- Function: gpgme_query_swdb_result_t gpgme_op_query_swdb_result (gpgme_ctx_t CTX)

SINCE: 1.8.0

The function gpgme_op_query_swdb_result returns a gpgme_query_swdb_result_t pointer to a structure holding the result of a gpgme_op_query_swdb operation. The pointer is only valid if the last operation on the context was a successful call to gpgme_op_query_swdb. If that call failed, the result might be a NULL pointer. The returned pointer is only valid until the next operation is started on the context CTX.

Here is an example on
how to check whether GnuPG is current:

```
#include <gpgme.h>

int
main (void)
{
  gpg_error_t err;
  gpgme_ctx_t ctx;
  gpgme_query_swdb_result_t result;

  gpgme_check_version (NULL);
  err = gpgme_new (&ctx);
  if (err)
    fprintf (stderr, "error creating context: %s\n", gpg_strerror (err));
  else
    {
      gpgme_set_protocol (ctx, GPGME_PROTOCOL_GPGCONF);

      err = gpgme_op_query_swdb (ctx, "gnupg", NULL, 0);
      if (err)
        fprintf (stderr, "error querying swdb: %s\n", gpg_strerror (err));
      else
        {
          result = gpgme_op_query_swdb_result (ctx);
```

```
          if (!result)
            fprintf (stderr, "error querying swdb\n");
          if (!result->warning && !result->update)
            printf ("GnuPG version %s is current\n",
                    result->iversion);
          else if (!result->warning && result->update)

      printf ("GnuPG version %s can be updated to %s\n",
                    result->iversion, result->version);
          else
            fprintf (stderr, "error finding the update status\n");
        }
      gpgme_release (ctx);
    }
  return 0;
}
```

File: gpgme.info,  Node: Run Control,  Prev: Miscellaneous,  Up: Contexts

## 7.8 Run Control

GPGME supports running operations synchronously and asynchronously.  You can use asynchronous operation to set up a context up to initiating the desired operation, but delay performing it to a later point.

Furthermore, you can use an external event loop to control exactly when GPGME runs.  This ensures that GPGME only runs when necessary and also prevents it from blocking for a long time.

* Menu:

* Waiting For Completion::  Waiting until an operation is completed.
* Using External Event Loops::  Advanced control over what happens when.
* Cancellation::  How to
end pending operations prematurely.

File: gpgme.info,  Node: Waiting For Completion,  Next: Using External Event Loops,  Up: Run Control

### 7.8.1 Waiting For Completion

-- Function: gpgme_ctx_t gpgme_wait (gpgme_ctx_t CTX,
    gpgme_error_t *STATUS, int HANG)

The function gpgme_wait continues the pending operation within the context CTX.  In particular, it ensures the data exchange

between GPGME and the crypto backend and watches over the run time status of the backend process.

If HANG is true, the function does not return until the operation is completed or cancelled. Otherwise the function will not block for a long time.

The error status of the finished operation is returned in STATUS if gpgme_wait does not return NULL.

The CTX argument can be NULL. In that case, gpgme_wait waits for any context to complete its operation.

gpgme_wait can be used only in conjunction with any context that has a pending operation initiated with one of the gpgme_op_*_start functions except gpgme_op_keylist_start and gpgme_op_trustlist_start (for which you should use the corresponding gpgme_op_*_next functions). If CTX is NULL, all of such contexts are waited upon and possibly returned. Synchronous operations running in parallel, as well as key and trust item list operations, do not affect gpgme_wait.

In a multi-threaded environment, only one thread should ever call gpgme_wait at any time, regardless of whether CTX is specified or not. This means that all calls to this function should be fully synchronized by locking primitives. It is safe to start asynchronous operations while a thread is running in gpgme_wait.

The function returns the CTX of the context which has finished the operation. If HANG is false, and the timeout expires, NULL is returned and *status will be set to 0. If an error occurs, NULL is returned and the error is returned in *status.

File: gpgme.info, Node: Using External Event Loops, Next: Cancellation, Prev: Waiting For Completion, Up: Run Control

### 7.8.2 Using External Event Loops

GPGME hides the complexity of the communication between the library and the crypto engine. The price of this convenience is that the calling thread can block arbitrary long waiting for the data returned by the crypto engine. In single-threaded programs, in particular if they are interactive, this is an unwanted side-effect. OTOH, if gpgme_wait is used without the HANG option being enabled, it might be called

unnecessarily often, wasting CPU time that could be used otherwise.

The I/O callback interface described in this section lets the user take control over what happens when. GPGME will provide the user with the file descriptors that should be monitored, and the callback functions that should be invoked when a file descriptor is ready for reading
or writing. It is then the users responsibility to decide when to check the file descriptors and when to invoke the callback functions. Usually this is done in an event loop, that also checks for events in other parts of the program. If the callback functions are only called when the file descriptors are ready, GPGME will never block. This gives the user more control over the program flow, and allows to perform other tasks when GPGME would block otherwise.

By using this advanced mechanism, GPGME can be integrated smoothly into GUI toolkits like GTK+ even for single-threaded programs.

* Menu:

* I/O Callback Interface:: How I/O callbacks are registered.
* Registering I/O Callbacks:: How to use I/O callbacks for a context.
* I/O Callback Example:: An example how to use I/O callbacks.
* I/O Callback Example GTK+:: How to use GPGME with GTK+.
* I/O Callback Example GDK:: How to use GPGME with GDK.
* I/O Callback Example Qt:: How to use
GPGME with Qt.

File: gpgme.info, Node: I/O Callback Interface, Next: Registering I/O Callbacks, Up: Using External Event Loops

7.8.2.1 I/O Callback Interface
.....

-- Data type: gpgme_error_t (*gpgme_io_cb_t) (void *DATA, int FD)
The gpgme_io_cb_t type is the type of functions which GPGME wants to register as I/O callback handlers using the gpgme_register_io_cb_t functions provided by the user.

DATA and FD are provided by GPGME when the I/O callback handler is registered, and should be passed through to the handler when it is invoked by the user because it noticed activity on the file descriptor FD.

The callback handler always returns 0, but you should consider the return value to be reserved for later use.

-- Data type: gpgme_error_t (*gpgme_register_io_cb_t) (void *DATA,

int FD, int DIR, gpgme_io_cb_t FNC, void *FNC_DATA,
void **TAG)

The gpgme_register_io_cb_t type is the type of functions which can be called by GPGME to register an I/O callback function FNC for the file descriptor FD with the user. FNC_DATA should be passed as the first argument to FNC when the handler is invoked (the second argument should be FD). If DIR is 0, FNC should be called by the user when FD is ready for writing. If DIR is 1, FNC should be called when FD is ready for reading.

DATA was provided by the user when registering the gpgme_register_io_cb_t function with GPGME and will always be passed as the first argument when registering a callback function. For example, the user can use this to determine the event loop to which the file descriptor should be added.

GPGME will call this function when a crypto operation is initiated in a context for which the user has registered I/O callback handler functions with gpgme_set_io_cbs. It can also call this function when it is in an I/O callback handler for a file descriptor associated to this context.

The user should return a unique handle in TAG identifying this I/O callback registration, which will be passed to the gpgme_register_io_cb_t function without interpretation when the file descriptor should not be monitored anymore.

-- Data type: void (*gpgme_remove_io_cb_t) (void *TAG)

The gpgme_remove_io_cb_t type is the type of functions which can be called by GPGME to remove an I/O callback handler that was registered before. TAG is the handle that was returned by the gpgme_register_io_cb_t for this I/O callback.

GPGME can call this function when a crypto operation is in an I/O callback. It will also call this function when the context is destroyed while an operation is pending.

-- Data type: enum gpgme_event_io_t

The gpgme_event_io_t type specifies the type of an event that is reported to the user by GPGME as a consequence of an I/O operation. The following events are defined:

GPGME_EVENT_START

The operation is fully initialized now, and you can start to run the registered I/O callback handlers now. Note that

registered I/O callback handlers must not be run before this event is signalled. TYPE_DATA is NULL and reserved for later use.

GPGME_EVENT_DONE
The operation is finished, the last I/O callback for this operation was removed. The accompanying TYPE_DATA points to a struct gpgme_io_event_done_data variable that contains the status of the operation that finished. This event is signalled after the last I/O callback has been removed.

GPGME_EVENT_NEXT_KEY
In a gpgme_op_keylist_start operation, the next key was received from the crypto engine. The accompanying TYPE_DATA is a gpgme_key_t variable that contains the key with one reference for the user.

-- Data type: void (*gpgme_event_io_cb_t)
(void *DATA,
gpgme_event_io_t TYPE, void *TYPE_DATA)
The gpgme_event_io_cb_t type is the type of functions which can be called by GPGME to signal an event for an operation running in a context which has I/O callback functions registered by the user.

DATA was provided by the user when registering the gpgme_event_io_cb_t function with GPGME and will always be passed as the first argument when registering a callback function. For example, the user can use this to determine the context in which this event has occurred.

TYPE will specify the type of event that has occurred. TYPE_DATA specifies the event further, as described in the above list of possible gpgme_event_io_t types.

GPGME can call this function in an I/O callback handler.

File: gpgme.info, Node: Registering I/O Callbacks, Next: I/O Callback Example, Prev: I/O Callback Interface, Up: Using External Event Loops

7.8.2.2 Registering I/O Callbacks
.....

-- Data type: struct gpgme_io_cbs
This structure is used to store the I/O callback interface functions described in the previous section. It has the following members:

gpgme_register_io_cb_t add
This is the function called by GPGME to register an I/O callback handler. It must be specified.

void *add_priv
This is passed as the first argument to the add function when it is called by GPGME. For example, it can be used to determine the event loop to which the file descriptor should be added.

gpgme_remove_io_cb_t remove
This is the function called by GPGME to remove an I/O callback handler. It must be specified.

gpgme_event_io_cb_t event
This is the function called by GPGME to signal an event for an operation. It must be specified, because at least the start event must be processed.

void *event_priv
This is passed as the first argument to the event function when it is called by GPGME. For example, it can be used to determine the context in which the event has occurred.

-- Function: void gpgme_set_io_cbs (gpgme_ctx_t CTX, struct gpgme_io_cbs *IO_CBS)
The function gpgme_set_io_cbs enables the I/O callback interface for the context CTX. The I/O callback functions are specified by IO_CBS.

If IO_CBS->add is NULL, the I/O callback interface is disabled for the context, and normal operation is restored.

-- Function: void gpgme_get_io_cbs (gpgme_ctx_t CTX, struct gpgme_io_cbs *IO_CBS)
The function gpgme_get_io_cbs returns the I/O callback functions set with gpgme_set_io_cbs in IO_CBS.

File: gpgme.info, Node: I/O Callback Example, Next: I/O Callback Example GTK+, Prev: Registering I/O Callbacks, Up: Using External Event Loops

7.8.2.3 I/O Callback Example
.....

To actually use an external event loop, you have to implement the I/O callback functions that are used by GPGME to register and unregister

file descriptors. Furthermore, you have to actually monitor these file descriptors for activity and call the appropriate I/O callbacks.

The following example illustrates how to do that. The example uses locking to show in which way the callbacks and the event loop can run concurrently. For the event loop, we use a fixed array. For a real-world implementation, you should use a dynamically sized structure because the number of file descriptors needed for a crypto operation in GPGME is not predictable.

```
#include <assert.h>
#include <errno.h>
#include <stdlib.h>
#include <pthread.h>
#include <sys/types.h>
#include <gpgme.h>

/* The following structure holds the result of a crypto operation.  */
struct op_result
{
  int done;
  gpgme_error_t err;
};

/* The following structure holds the
data associated with one I/O
callback.  */
struct one_fd
{
  int fd;
  int dir;
  gpgme_io_cb_t fnc;
  void *fnc_data;
  void *loop;
};

struct event_loop
{
  pthread_mutex_t lock;
#define MAX_FDS 32
  /* Unused slots are marked with FD being -1.  */
  struct one_fd fds[MAX_FDS];
};
```

The following functions implement the I/O callback interface.

```
gpgme_error_t
add_io_cb (void *data, int fd, int dir, gpgme_io_cb_t fnc, void *fnc_data,
```

```
    void **r_tag)
{
  struct event_loop *loop = data;
  struct one_fd *fds = loop->fds;
  int i;

  pthread_mutex_lock (&loop->lock);
  for (i = 0; i < MAX_FDS; i++)
    {
      if (fds[i].fd == -1)
 {
   fds[i].fd = fd;
   fds[i].dir = dir;
   fds[i].fnc = fnc;
   fds[i].fnc_data = fnc_data;
   fds[i].loop = loop;
   break;
 }
    }
  pthread_mutex_unlock (&loop->lock);
   if (i == MAX_FDS)
    return gpg_error (GPG_ERR_GENERAL);
  *r_tag = &fds[i];
  return 0;
}

void
remove_io_cb (void *tag)
{
  struct one_fd *fd = tag;
  struct event_loop *loop = fd->loop;

  pthread_mutex_lock (&loop->lock);
  fd->fd = -1;
  pthread_mutex_unlock (&loop->lock);
}

void
event_io_cb (void *data, gpgme_event_io_t type, void *type_data)
{
  struct op_result *result = data;

  /* We don't support list operations here.  */
  if (type == GPGME_EVENT_DONE)
    {
      result->done = 1;
      result->err = *type_data;
    }
```

```
}
```

The final missing piece is the event loop, which will be presented next. We only support waiting for the success of a single operation.

```
int
do_select (struct event_loop *loop)
{
  fd_set rfds;
  fd_set wfds;
  int i, n;
  int any = 0;
  struct timeval tv;
  struct one_fd *fdlist
= loop->fds;

  pthread_mutex_lock (&loop->lock);
  FD_ZERO (&rfds);
  FD_ZERO (&wfds);
  for (i = 0; i < MAX_FDS; i++)
    if (fdlist[i].fd != -1)
      FD_SET (fdlist[i].fd, fdlist[i].dir ? &rfds : &wfds);
  pthread_mutex_unlock (&loop->lock);

  tv.tv_sec = 0;
  tv.tv_usec = 1000;

  do
    {
      n = select (FD_SETSIZE, &rfds, &wfds, NULL, &tv);
    }
  while (n < 0 && errno == EINTR);

  if (n < 0)
    return n; /* Error or timeout.  */

  pthread_mutex_lock (&loop->lock);
  for (i = 0; i < MAX_FDS && n; i++)
    {
      if (fdlist[i].fd != -1)
 {
   if (FD_ISSET (fdlist[i].fd, fdlist[i].dir ? &rfds : &wfds))
     {
       assert (n);
       n--;
       any = 1;
            /* The I/O callback handler can register/remove callbacks,
               so we have to unlock the file descriptor list.  */
```

```
            pthread_mutex_unlock (&loop->lock);
        (*fdlist[i].fnc) (fdlist[i].fnc_data, fdlist[i].fd);
            pthread_mutex_lock (&loop->lock);
      }
  }
    }
  pthread_mutex_unlock (&loop->lock);
  return any;
}

void
wait_for_op (struct event_loop *loop, struct op_result *result)
{
  int ret;

  do
    {
      ret = do_select (loop);
    }
  while (ret >= 0 && !result->done);
}
```

The main function shows how to put it all together.

```
int
main (int argc, char *argv[])
{
  struct event_loop loop;
  struct op_result result;
  gpgme_ctx_t ctx;
  gpgme_error_t err;
  gpgme_data_t sig, text;
  int i;
  pthread_mutexattr_t attr;
  struct gpgme_io_cbs io_cbs =
  {
    add_io_cb,
    &loop,
    remove_io_cb,
    event_io_cb,
    &result
  };

  init_gpgme ();

  /* Initialize the loop structure.  */

  /* The mutex must be
```

```
recursive, since remove_io_cb (which acquires a
        lock) can be called while holding a lock acquired in do_select.  */
    pthread_mutexattr_init (&attr);
    pthread_mutexattr_settype (&attr, PTHREAD_MUTEX_RECURSIVE);
    pthread_mutex_init (&loop.lock, &attr);
    pthread_mutexattr_destroy (&attr);

    for (i = 0; i < MAX_FDS; i++)
      loop.fds[i].fd = -1;

    /* Initialize the result structure.  */
    result.done = 0;

    err = gpgme_data_new_from_file (&sig, "signature", 1);
    if (!err)
      err = gpgme_data_new_from_file (&text, "text", 1);
    if (!err)
      err = gpgme_new (&ctx);
    if (!err)
      {
        gpgme_set_io_cbs (ctx, &io_cbs);
        err = gpgme_op_verify_start (ctx, sig, text, NULL);
      }
    if (err)
      {
        fprintf (stderr, "gpgme error: %s: %s\n",
                 gpgme_strsource (err), gpgme_strerror (err));
        exit (1);
      }

    wait_for_op (&loop,
&result);
    if (!result.done)
      {
        fprintf (stderr, "select error\n");
        exit (1);
      }
    if (!result.err)
      {
        fprintf (stderr, "verification failed: %s: %s\n",
                 gpgme_strsource (result.err), gpgme_strerror (result.err));
        exit (1);
      }
    /* Evaluate verify result.  */
    ...
    return 0;
  }
```

File: gpgme.info, Node: I/O Callback Example GTK+, Next: I/O Callback Example GDK, Prev: I/O Callback Example, Up: Using External Event Loops

7.8.2.4 I/O Callback Example GTK+
.....

The I/O callback interface can be used to integrate GPGME with the GTK+ event loop. The following code snippets shows how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any GTK+ specific
setup.

```
#include <gtk/gtk.h>

struct my_gpgme_io_cb
{
  gpgme_io_cb_t fnc;
  void *fnc_data;
  guint input_handler_id
};

void
my_gpgme_io_cb (gpointer data, gint source, GdkInputCondition condition)
{
  struct my_gpgme_io_cb *iocb = data;
  (*(iocb->fnc)) (iocb->data, source);
}

void
my_gpgme_remove_io_cb (void *data)
{
  struct my_gpgme_io_cb *iocb = data;
  gtk_input_remove (data->input_handler_id);
}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
                               void *fnc_data, void **tag)
{
  struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
  iocb->fnc = fnc;
  iocb->data = fnc_data;
  iocb->input_handler_id = gtk_input_add_full (fd, dir
                                               ? GDK_INPUT_READ
                                               : GDK_INPUT_WRITE,
```

```
                                        my_gpgme_io_callback,
                                       0, iocb, NULL);
  *tag = iocb;
  return 0;
}
```

File: gpgme.info, Node: I/O Callback Example GDK, Next: I/O Callback Example Qt, Prev: I/O Callback Example GTK+, Up: Using External Event Loops

7.8.2.5 I/O Callback Example GDK
.....

The I/O callback interface can also be used to integrate GPGME with the GDK event loop. The following code snippets shows how this can be done using the appropriate register and remove I/O callback functions. In this example, the private data of the register I/O callback function is unused. The event notifications is missing because it does not require any GDK specific setup.

It is very similar to the GTK+ example in the previous section.

```
#include <gdk/gdk.h>

struct my_gpgme_io_cb
{
  gpgme_io_cb_t fnc;
  void *fnc_data;
  gint tag;

};

void
my_gpgme_io_cb (gpointer data, gint source, GdkInputCondition condition)
{
  struct my_gpgme_io_cb *iocb = data;
  (*(iocb->fnc)) (iocb->data, source);
}

void
my_gpgme_remove_io_cb (void *data)
{
  struct my_gpgme_io_cb *iocb = data;
  gdk_input_remove (data->tag);
}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
```

```
                                void *fnc_data, void **tag)
  {
    struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
    iocb->fnc = fnc;
    iocb->data = fnc_data;
    iocb->tag = gtk_input_add_full (fd, dir ? GDK_INPUT_READ : GDK_INPUT_WRITE,
                                    my_gpgme_io_callback, iocb, NULL);
    *tag = iocb;
    return 0;
  }
```

File: gpgme.info, Node: I/O Callback Example Qt, Prev: I/O Callback Example GDK, Up: Using External Event Loops

7.8.2.6 I/O Callback Example Qt
.....

The
I/O callback interface can also be used to integrate GPGME with the
Qt event loop. The following code snippets show how this can be done
using the appropriate register and remove I/O callback functions. In
this example, the private data of the register I/O callback function is
unused. The event notifications is missing because it does not require
any Qt specific setup.

```
  #include <qsocketnotifier.h>
  #include <qapplication.h>

  struct IOCB {
    IOCB( GpgmeIOCb f, void * d, QSocketNotifier * n )
      : func( f ), data( d ), notifier( n ) {}
    GpgmeIOCb func;
    void * data;
    QSocketNotifier * notifier;
  }

  class MyApp : public QApplication {

    // ...

    static void registerGpgmeIOCallback( void * data, int fd, int dir,
                                         GpgmeIOCb func, void * func_data,
                                         void ** tag ) {
      QSocketNotifier * n =
        new QSocketNotifier(
fd, dir ? QSocketNotifier::Read
                                       : QSocketNotifier::Write );
```

```
      connect( n, SIGNAL(activated(int)),
               qApp, SLOT(slotGpgmeIOCallback(int)) );
      qApp->mIOCBs.push_back( IOCB( func, func_data, n ) );
      *tag = (void*)n;
    }

    static void removeGpgmeIOCallback( void * tag ) {
      if ( !tag ) return;
      QSocketNotifier * n = static_cast<QSocketNotifier*>( tag );
      for ( QValueList<IOCB>::iterator it = qApp->mIOCBs.begin() ;
            it != qApp->mIOCBs.end() ; ++it )
        if ( it->notifier == n ) {
          delete it->notifier;
          qApp->mIOCBs.erase( it );
          return;
        }
    }

  public slots:
    void slotGpgmeIOCallback( int fd ) {
      for ( QValueList<IOCB>::const_iterator it = mIOCBs.begin() ;
            it != mIOCBs.end() ; ++it )
        if ( it->notifier && it->notifier->socket() == fd )
          (*(it->func))
( it->func_data, fd );
    }

    // ...

  private:
    QValueList<IOCB> mIOCBs;
    // ...
  };
```

File: gpgme.info, Node: Cancellation, Prev: Using External Event Loops, Up: Run Control

7.8.3 Cancellation
---

Sometimes you do not want to wait for an operation to finish. GPGME provides two different functions to achieve that. The function gpgme_cancel takes effect immediately. When it returns, the operation is effectively canceled. However, it has some limitations and can not be used with synchronous operations. In contrast, the function gpgme_cancel_async can be used with any context and from any thread, but it is not guaranteed to take effect immediately. Instead, cancellation occurs at the next possible time (typically the next time

I/O occurs in the target context).

-- Function: gpgme_ctx_t gpgme_cancel (gpgme_ctx_t CTX)
SINCE: 0.4.5

The function gpgme_cancel attempts to cancel a pending operation in the context
CTX. This only works if you use the global event loop or your own event loop.

If you use the global event loop, you must not call gpgme_wait during cancellation. After successful cancellation, you can call gpgme_wait (optionally waiting on CTX), and the context CTX will appear as if it had finished with the error code GPG_ERR_CANCEL.

If you use an external event loop, you must ensure that no I/O callbacks are invoked for this context (for example by halting the event loop). On successful cancellation, all registered I/O callbacks for this context will be unregistered, and a GPGME_EVENT_DONE event with the error code GPG_ERR_CANCEL will be signalled.

The function returns an error code if the cancellation failed (in this case the state of CTX is not modified).

-- Function: gpgme_ctx_t gpgme_cancel_async (gpgme_ctx_t CTX)
SINCE: 1.1.7

The function gpgme_cancel_async attempts to cancel a pending operation
in the context CTX. This can be called by any thread at any time after starting an operation on the context, but will not take effect immediately. The actual cancellation happens at the next time GPGME processes I/O in that context.

The function returns an error code if the cancellation failed (in this case the state of CTX is not modified).

File: gpgme.info, Node: UI Server Protocol, Next: Debugging, Prev: Contexts, Up: Top

# Appendix A The GnuPG UI Server Protocol

This section specifies the protocol used between clients and a User Interface Server (UI server). This protocol helps to build a system where all cryptographic operations are done by a server and the server is responsible for all dialogs. Although GPGME has no direct support

for this protocol it is believed that servers will utilize the GPGME library; thus having the specification included in this manual is an appropriate choice. This protocol should be referenced as The GnuPG UI Server Protocol.

A server needs to implement these commands:(1)

* Menu:

* UI Server Encrypt:: Encrypt a message.
* UI Server Sign:: Sign a message.
* UI Server Decrypt:: Decrypt a message.
* UI Server Verify:: Verify a message.
* UI Server Set Input Files:: Specifying the input files to operate on.
* UI Server Sign/Encrypt Files:: Encrypting and signing files.
* UI Server Verify/Decrypt Files:: Decrypting and verifying files.
* UI Server Import/Export Keys:: Managing certificates.
* UI Server Checksum Files:: Create and verify checksums for files.
* Miscellaneous UI Server Commands:: Commands not related to a specific operation.

---------- Footnotes ----------

(1) In all examples we assume that the connection has already been established; see the Assuan manual for details.

File: gpgme.info, Node: UI Server Encrypt, Next: UI Server Sign, Up: UI Server Protocol

## A.1 UI Server: Encrypt a Message

Before encryption can be done the recipients must be set using the command:

-- Command: RECIPIENT STRING

Set the recipient for the encryption. STRING is an RFC-2822 recipient name ("mailbox" as per section 3.4). This command may or may not check the recipient for validity right away; if it does not all recipients are expected to be checked at the time of the ENCRYPT command. All RECIPIENT commands are cumulative until a successful ENCRYPT command or until a RESET command. Linefeeds are obviously not allowed in STRING and should be folded into spaces (which are equivalent).

To tell the server the source and destination of the data, the next two

commands are to be used:

-- Command: INPUT FD=N
Set the file descriptor for the message to be encrypted to N. The message send to the server is binary encoded.

GpgOL is a Windows only program,
thus N is not a libc file
descriptor but a regular system handle. Given that the Assuan connection works over a socket, it is not possible to use regular inheritance to make the file descriptor available to the server. Thus DuplicateHandle needs to be used to duplicate a handle to the server process. This is the reason that the server needs to implement the GETINFO pid command. Sending this command a second time replaces the file descriptor set by the last one.

-- Command: OUTPUT FD=N [--binary]
Set the file descriptor to be used for the output (i.e. the encrypted message) to N. If the option --binary is given the output shall be in binary format; if not given, the output for OpenPGP needs to be ASCII armored and for CMS Base-64 encoded. For details on the file descriptor, see the INPUT command.

The setting of the recipients, the data source and destination may happen in any order, even intermixed. If this has been done the actual
encryption operation is called using:

-- Command: ENCRYPT --protocol=NAME

This command reads the plaintext from the file descriptor set by the INPUT command, encrypts it and writes the ciphertext to the file descriptor set by the OUTPUT command. The server may (and should) overlap reading and writing. The recipients used for the encryption are all the recipients set so far. If any recipient is not usable the server should take appropriate measures to notify the user about the problem and may cancel the operation by returning an error code. The used file descriptors are void after this command; the recipient list is only cleared if the server returns success.

Because GpgOL uses a streaming mode of operation the server is not allowed to auto select the protocol and must obey to the mandatory PROTOCOL parameter:

OpenPGP
Use the OpenPGP protocol (RFC-2440).
CMS

Use the CMS
(PKCS#7) protocol (RFC-3852).

To support automagically selection of the protocol depending on the selected keys, the server MAY implement the command:

-- Command: PREP_ENCRYPT [--protocol=NAME] [--expect-sign]

This commands considers all recipients set so far and decides whether it is able to take input and start the actual encryption. This is kind of a dry-run ENCRYPT without requiring or using the input and output file descriptors. The server shall cache the result of any user selection to avoid asking this again when the actual ENCRYPT command is send. The --protocol option is optional; if it is not given, the server should allow the user to select the protocol to be used based on the recipients given or by any other means.

If --expect-sign is given the server should expect that the message will also be signed and use this hint to present a unified recipient and signer selection dialog if possible and desired.
A
selected signer should then be cached for the expected SIGN command (which is expected in the same session but possible on another connection).

If this command is given again before a successful ENCRYPT command, the second one takes effect.

Before sending the OK response the server shall tell the client the protocol to be used (either the one given by the argument or the one selected by the user) by means of a status line:

-- Status line: PROTOCOL NAME
Advise the client to use the protocol NAME for the ENCRYPT command. The valid protocol names are listed under the description of the ENCRYPT command. The server shall emit exactly one PROTOCOL status line.

Here is an example of a complete encryption sequence; client lines are indicated by a C:, server responses by C::

```
C: RESET
S: OK
C: RECIPIENT foo@example.net
S: OK
C: RECIPIENT bar@example.com
S: OK
```

C: PREP_ENCRYPT
S: S PROTOCOL OpenPGP
S: OK
C: INPUT FD=17
S: OK
C: OUTPUT FD=18
S: OK
C: ENCRYPT
S: OK

File: gpgme.info, Node: UI Server Sign, Next: UI Server Decrypt, Prev: UI Server Encrypt, Up: UI Server Protocol

A.2 UI Server: Sign a Message
==========

The server needs to implement opaque signing as well as detached signing. Due to the nature of OpenPGP messages it is always required to send the entire message to the server; sending just the hash is not possible. The following two commands are required to set the input and output file descriptors:

-- Command: INPUT FD=N
Set the file descriptor for the message to be signed to N. The message send to the server is binary encoded. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: OUTPUT FD=N [--binary]
Set the file descriptor to be used for the output. The output is either the complete signed message or in case of a detached signature just that detached signature. If the option --binary is given the output shall be in binary format; if not given, the output for OpenPGP needs to be ASCII armored and for CMS Base-64 encoded. For details on the file descriptor, see the INPUT command.

To allow the server the selection of a non-default signing key the client may optionally use the SENDER command, see *note command SENDER::.

The signing operation is then initiated by:

-- Command: SIGN --protocol=NAME [--detached]
Sign the data set with the INPUT command and write it to the sink set by OUTPUT. NAME is the signing protocol used for the message.

For a description of the allowed protocols see the ENCRYPT
command. With option --detached given, a detached signature is
created; this is actually the usual way the command is used.

The client expects the server to send at least this status information
before
the final OK response:

-- Status line: MICALG STRING
The STRING represents the hash algorithm used to create the
signature. It is used with RFC-1847 style signature messages and
defined by PGP/MIME (RFC-3156) and S/MIME (RFC-3851). The GPGME
library has a supporting function gpgme_hash_algo_name to return
the algorithm name as a string. This string needs to be lowercased
and for OpenPGP prefixed with "pgp-".
-----BEGIN PGP PRIVATE KEY BLOCK-----

lQOYBFrsKEkBCADKw4Wt8J6M/88qD8PO6lSMCxH1cpwH8iK0uPaFFYsJkkXo7kWf
PTAtrV+REqF/o80dvYcdLvRsV21pvncZz/HXLu1yQ18mC3XObrKokbdgrTTKA5XE
BZkNsqyaMMJauT18H4hYkSg62/tTdO1cu/zWv/LFf7Xyn6+uA74ovXCJlO1s0N2c
PShtr98QRzPMf2owgVk37JnDNp4gGVDGHxSZOuUwxgYAZYnA8SFc+c+3ZrQfY870
+O4j3Mz4p7yD13AwP4buQLBsb/icxekeQCqpRJhLH9f7MdEcGXa1x36RcEkHdu+M
yJ392eMgD+dKNfRCtyTPhjZTxvbNELIBYICfABEBAAEAB/wLJ0gyMjs2fFfT83wM
5Lzz2yQIwV4t3bblBAujdHTqeN5Zmsm/oakFyjSokULK96Kv0R4ej9eoIgMFvxFk
HRkrggxTrbsNJ7I6QcKYHTPeIIj318ykNL6fj0WJUcdPIENukXl5jbqNyk3/4D2y
TTDySyq6jHTgvMH4K4KJUSpglvSJPntTk9RhuFGHAF+sNR9atygDYctAaERMRtSg
LCoSt/AoX5GRMlQjXT9oqQjwSQoZyF4s8HMC8wdTFIE/E0L4IVdHVp8sz2UszNtT
W/evmCA+KVruKjRH/Fhrq4hHkEamW28+j4L6uAyagONP7BONs+S5Oo2zTT9+tV2R
ILTZBADdgLuAgF6C5Lu9jCF6DfFgaT/uafMyQNkEGNlxOHMWHTgLHe475V2eG9gA
amd4yXKyEFKU1PWnvlGuicQSGdzVcwmq61msvXgYD0FK3LP3yWzKnE4X1tzrC9Vp
/uHJxKjewCuyt1f5in919v+T8TbUxBYKC0zX/qWtX+10cTx77QQA6leqhToJ95Yc
u4UBrKMEO+y2v8Svb3LG7yI5oY8tkw0EkJ/kpZ8xTAfZYCe6fXdvVE3PHg2lrxyc
Wv/EU3QY/qA3G82mbXYeJ2jNZaTNYo4MylMrt4Mx25x4ke7JlsE8SVrQ+4CrHkqp
OjSIa7fppLrQ78uW980AtN8NNQGrlTsD/A9aoA60Igxy1Q3K2uSyDCyjLknv57ym
ZSBD3/t7m0l6Q6gbdfhNGosT+Hd4y3actqEqzXZHW2VG4dKZ/wRNkxtSm9adU9vs
EHyzxjb6mKIH32zAG5TaFT20hC+NK6lsyHr9UE2ZrS6ma2sLxGW2O40hqNsdD+5m
NrqeBc2I/js1PMK0EHRlc3RAZXhhbXBsZS5vcmeJAVQEEwEIAD4WIQTUFzW5Ejb9
uIIEjFojAWNe7/DLBQUCWuwoSQIbAwUJA8JnAAULCQgHAgYVCgkICwIEFgIDAQIe
AQIXgAAKCRAjAWNe7/DLBf9kB/wOQ/S60HGwFq07W9N01HWULyhHKoMmcHL6rfZ6
4oDqLxolPSasz7WAMW1jN4qtWJ0mFzwO83V6kaBe+wF6Kqir6udFSBW9rPcFg6/V
ZXPltT0a6uacIHq6DyQ5iMW4YQWbVy9OR2rNGkYo1JCBR0XdRJYCSX3yB4TWv/eX
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95uSmC6UY4hzyP84ORYMYn9n1QAR0goxDN6UunOf9Rlp1oMzdxMool/d1MlCxg2h
3jheuhv7lgUF4KpvHOuEPXQ7UO417E0TYcDZ1J8Nsv87SZeEnQOYBFrsKEkBCADj
oEBhG/QPqZHg8VyoD1xYRAWGxyDJkX/GrSs6yE+x2hk5FoQCajxKa/d4AVxOnJpd
whAfeXeSNaql5Ejgzax+Tdj9BV6vtGVJVv0pO7bgAiZxkA6RHxtNqhpPnPQoXvUz
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MyMONfOGBQx6jk8tvAphS/LAqrrNepnagIyLUGKU+L8cB2g1PGGp2biBFWqZbudZ
oyRBet/0yH/zirBdQJw1ABEBAAEAB/4lN3gXOI4OuoOcsvHak4pebx61Mt0YP9cT
qZASIBqxok5x8E28pFh/tYfkYdqRCtdNYZOnxcEoUWh5j6nfwZkEnJ9P/T8GPNk7
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X3lnXRNMhnB3Uewx4i00LQmjsxhJfQiGLpMv0j58tn64s7GqQzGVV1JKcQm992RV
jFOydyjZ+K4LGWEOITG/bZrMEVNGCM+OnQQA/Haz8xN0NFSlq7tyfFc0pkx/TiCX
xGfBqbO0wU2b5GMnZbY/06HENpidIzpa231VQaw5/nPTvfhlLKW1iGAkc148cX1q
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l5/1h3C5S0TuxHkEAL/3BGihkhNfv1Xx0rWu0/732usX/nE/A9C26hGu41FUf3fp
0ilonKpKZUEwWt5hWSEFCSrznNVekiO0rxvuu3RVegvzThPNU4Pf4JZtJpRVhvUQ
d9ulxJw7V9rs75uNBatTNC0kXuGoXhehw4Bn93xa67gYGd3LfrH+oT0GCDpTSHCJ
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CRAjAWNe7/DLBf0pCACPp5hBuUWngu2Hqvg+tNiujfsiYzId3MffFxEk3CbXeHcJ
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Jq3e/4Iy0N5ip7PNYMCyakcAsxvsNCJKrSaDuYe/OAoTXRBtgRWE2uyT315em02L
kr+2Cc/Qk6H+vlNOHGRgnpI/OZZjnUuUfBUvMGHr1phW+y7aeymC9PnUGdViRdJe
23nntMSDA+0/I7ESO9JsWvJbyBmuiZpu9JjScOjYH9xpQLqRNyw4WHpZriN69F0t
9Mmd7bM1+UyPgbPEr0iWMeyctYsuOLeUyQKMscDT
=hkUm
-----END
 PGP PRIVATE KEY BLOCK-----

```
from __future__ import absolute_import

import cython
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

if cython.compiled is True:
   cc = "Powered by Cython compiled C code."
else:
   cc = "Powered by Python."

print("""
   Number of secret keys:  {0}
   Number of public keys:  {1}
```

{2}
""".format(secnum, pubnum, cc))
This is gpgme.info, produced by makeinfo version 6.5 from gpgme.texi.

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INFO-DIR-SECTION GNU Libraries
START-INFO-DIR-ENTRY
* GPGME: (gpgme). Adding support for cryptography to your program.
END-INFO-DIR-ENTRY

This file documents the GPGME library.

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The
GnuPG Made Easy Reference Manual, for Version
1.14.1-beta35.

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Indirect:
gpgme.info-1: 1688
gpgme.info-2: 301751

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End Tag Table

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coding: utf-8
End:
000
 *H
010 UDE1!0U
Deutsches Forschungsnetz10UDFN-PCA1.0,U%DFN Top Level Certification Authority1!0 *H
 certify@pca.dfn.de0
001102164724Z
011230180000Z010 UDE1!0U
Deutsches Forschungsnetz10UDFN-PCA1+0)U"DFN Server Certification Authority1!0 *H
 certify@pca.dfn.de0"0
 *H
0
W`r;wXu)QYHm1t]4?|-.B(iw6G01N>[mQSwC'muw~E'l-M
+<[A|F)F%
ZiRaW=OC,,meKW@J-*<,L}:Bnm-kv

EYBmu tt[-%,R+n0j0U00U0U{upz*D\
v0Ux0v09753http://www.pca.dfn.de/dfnpca/certify/ssl/dfnpca.crx09753http://www.pca.dfn.de/dfnpca/certify/ssl/dfnpca.crl0 `HB0) `HBhttps://mystic.pca.dfn.de/0A `HB42http://www.pca.dfn.de/dfnpca/policy/wwwpolicy.html0 `HB
This certificate was issued by the DFN-PCA, the Top
Level Certification Authority of the German Research
Network (Deutsches Forschungsnetz, DFN).
The key owner's identity was authenticated in
accordance with the DFN World Wide Web Policy, v1.00! `HBcgi/check-rev.cgi?0
*H
\C)2
+ZYG| UCA|PzYFnTj@SA)/<HU+4t?@g?pb5w'Z;dqLi9\(d=
,}h?c(MeM44=Qe/_^^JyYN/61&jPFXifP&#;/KZ
1 xOK?ps
\input texinfo @c -*- mode: texinfo; coding: utf-8; -*-
@documentencoding UTF-8
@setfilename gpgme.info
@include defs.inc
@settitle The `GnuPG Made Easy' Reference Manual

@dircategory GNU Libraries
@direntry
* @acronym{GPGME}: (gpgme). Adding support for cryptography to your program.
@end direntry

@c Unify some of the indices.
@syncodeindex tp fn
@syncodeindex pg fn

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@end copying

@c Macros used by the description of the UI server protocol
@macro clnt{string}

```
 @sc{c:} \string\
@end macro
@macro srvr{string}
 @sc{s:} \string\
@end macro

@c API version.
@macro since{string}
 @sc{Since:} \string\
@end macro


@c
@c  T I T L E  P A G E
@c
@ifinfo
This file documents the @acronym{GPGME} library.

This is Edition @value{EDITION}, last updated @value{UPDATED}, of
@cite{The `GnuPG Made Easy' Reference Manual}, for Version
@value{VERSION}.

@c NOTE: Don't forget to update the year for the TeX version, too.
@insertcopying

@end ifinfo

@c We do not want that bastard short titlepage.
@c @iftex
@c @shorttitlepage The `GnuPG Made Easy' Reference Manual
@c @end iftex
@titlepage
@center @titlefont{The `GnuPG Made Easy'}
@sp 1
@center @titlefont{Reference Manual}
@sp 6
@center Edition @value{EDITION}
@sp 1
@center last updated @value{UPDATED}
@sp 1
@center for version @value{VERSION}
@page
@vskip 0pt plus 1filll
Published
 by The GnuPG Project@* c/o g10 Code GmbH@* Httenstr. 61@* 40699 Erkrath, Germany

@insertcopying
@end titlepage
```

@page

@summarycontents
@contents

@ifnottex
@node Top
@top Main Menu
This is Edition @value{EDITION}, last updated @value{UPDATED}, of
@cite{The `GnuPG Made Easy' Reference Manual}, for Version
@value{VERSION} of the @acronym{GPGME} library.
@end ifnottex

@menu
* Introduction:: How to use this manual.
* Preparation:: What you should do before using the library.
* Protocols and Engines:: Supported crypto protocols.
* Algorithms:: Supported algorithms.
* Error Handling:: Error numbers and their meanings.
* Exchanging Data:: Passing data to and from @acronym{GPGME}.
* Contexts:: Handling @acronym{GPGME} contexts.

Appendices

* UI Server Protocol:: The GnuPG UI Server Protocol.
* Debugging:: How to solve problems.
* Deprecated
Functions:: Documentation of deprecated functions.

* Library Copying:: The GNU Lesser General Public License says
how you can copy and share `GnuPG Made Easy'.
* Copying:: The GNU General Public License says how you
can copy and share this manual.

Indices

* Concept Index:: Index of concepts and programs.
* Function and Data Index:: Index of functions, variables and data types.

@detailmenu
--- The Detailed Node Listing ---

Introduction

* Getting Started:: Purpose of the manual, and how to use it.
* Features:: Reasons to install and use @acronym{GPGME}.
* Overview:: Basic architecture of the @acronym{GPGME} library.

Preparation

* Header:: What header file you need to include.
* Building the Source:: Compiler options to be used.
* Largefile Support (LFS)::
  How to use @acronym{GPGME} with LFS.
* Using Automake:: Compiler options to be used the easy way.
* Using Libtool:: Avoiding compiler options entirely.
* Library Version Check:: Getting and verifying the library version.
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* Multi-Threading:: How @acronym{GPGME} can be used in an MT environment.

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* Text Mode:: Choosing canonical text mode.
* Offline Mode:: Choosing offline mode.
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* Key Listing Mode::
Selecting key listing mode.
* Passphrase Callback:: Getting the passphrase from the user.
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* Exporting Keys:: Retrieving key data from the key ring.
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a key.
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* Decrypt:: Decrypting a ciphertext.
* Verify:: Verifying a signature.
* Decrypt and Verify:: Decrypting a signed ciphertext.
* Sign:: Creating a signature.
* Encrypt:: Encrypting a plaintext.

Sign

* Selecting Signers:: How to choose the keys to sign with.
* Creating a Signature:: How to create a signature.
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Encrypt

* Encrypting a Plaintext:: How to encrypt a plaintext.

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until an operation is completed.
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Using External Event Loops

* I/O Callback Interface:: How I/O callbacks are registered.
* Registering I/O Callbacks:: How to use I/O callbacks for a context.
* I/O Callback Example:: An example how to use I/O callbacks.
* I/O Callback Example GTK+:: How to integrate @acronym{GPGME} in GTK+.
* I/O Callback Example GDK:: How to integrate @acronym{GPGME} in GDK.
* I/O Callback Example Qt:: How to integrate @acronym{GPGME} in Qt.

@end detailmenu
@end menu

@node Introduction
@chapter Introduction

`GnuPG Made Easy' (@acronym{GPGME}) is a C language library that
allows to add support for cryptography to a program. It is designed
to make access to public key crypto engines like GnuPG or GpgSM easier

for applications.  @acronym{GPGME} provides a high-level crypto API
for
 encryption, decryption, signing, signature verification and key
management.

@acronym{GPGME} uses GnuPG and GpgSM as its backends to support
OpenPGP and the Cryptographic Message Syntax (CMS).

@menu
* Getting Started::  Purpose of the manual, and how to use it.
* Features::  Reasons to install and use @acronym{GPGME}.
* Overview::  Basic architecture of the @acronym{GPGME} library.
@end menu

@node Getting Started
@section Getting Started

This manual documents the @acronym{GPGME} library programming
interface.  All functions and data types provided by the library are
explained.

The reader is assumed to possess basic knowledge about cryptography in
general, and public key cryptography in particular.  The underlying
cryptographic engines that are used by the library are not explained,
but where necessary, special features or requirements by an engine are
mentioned as far as they are relevant to @acronym{GPGME} or its users.

This manual
 can be used in several ways.  If read from the beginning
to the end, it gives a good introduction into the library and how it
can be used in an application.  Forward references are included where
necessary.  Later on, the manual can be used as a reference manual to
get just the information needed about any particular interface of the
library.  Experienced programmers might want to start looking at the
examples at the end of the manual, and then only read up those parts
of the interface which are unclear.

The documentation for the language bindings is currently not included
in this manual.  Those languages bindings follow the general
programming model of @acronym{GPGME} but may provide some extra high
level abstraction on top of the @acronym{GPGME} style API.  For now
please see the README files in the @file{lang/} directory of the
source distribution.

@node Features
@section Features

@acronym{GPGME} has a couple of advantages over other libraries doing
a similar job, and over
implementing support for GnuPG or other crypto
engines into your application directly.

@table @asis
@item it's free software
Anybody can use, modify, and redistribute it under the terms of the GNU
Lesser General Public License (@pxref{Library Copying}).

@item it's flexible
@acronym{GPGME} provides transparent support for several cryptographic
protocols by different engines. Currently, @acronym{GPGME} supports
the OpenPGP protocol using GnuPG as the backend, and the Cryptographic
Message Syntax using GpgSM as the backend.

@item it's easy
@acronym{GPGME} hides the differences between the protocols and
engines from the programmer behind an easy-to-use interface. This way
the programmer can focus on the other parts of the program, and still
integrate strong cryptography in his application. Once support for
@acronym{GPGME} has been added to a program, it is easy to add support
for other crypto protocols once @acronym{GPGME} backends provide them.

@item it's language friendly
@acronym{GPGME}
comes with languages bindings for several common
programming languages: Common Lisp, C++, Python 2, and Python 3.
@end table

@node Overview
@section Overview

@acronym{GPGME} provides a data abstraction that is used to pass data
to the crypto engine, and receive returned data from it. Data can be
read from memory or from files, but it can also be provided by a
callback function.

The actual cryptographic operations are always set within a context.
A context provides configuration parameters that define the behaviour
of all operations performed within it. Only one operation per context
is allowed at any time, but when one operation is finished, you can
run the next operation in the same context. There can be more than
one context, and all can run different operations at the same time.

Furthermore, @acronym{GPGME} has rich key management facilities
including listing keys, querying their attributes, generating,

importing, exporting and deleting keys, and acquiring information
about
 the trust path.

With some precautions, @acronym{GPGME} can be used in a multi-threaded
environment, although it is not completely thread safe and thus needs
the support of the application.

@node Preparation
@chapter Preparation

To use @acronym{GPGME}, you have to perform some changes to your
sources and the build system.  The necessary changes are small and
explained in the following sections.  At the end of this chapter, it
is described how the library is initialized, and how the requirements
of the library are verified.

@menu
* Header::  What header file you need to include.
* Building the Source::  Compiler options to be used.
* Largefile Support (LFS)::  How to use @acronym{GPGME} with LFS.
* Using Automake::  Compiler options to be used the easy way.
* Using Libtool::  Avoiding compiler options entirely.
* Library Version Check::  Getting and verifying the library version.
* Signal Handling::
  How @acronym{GPGME} affects signal handling.
* Multi-Threading::  How @acronym{GPGME} can be used in an MT environment.
@end menu

@node Header
@section Header
@cindex header file
@cindex include file

All interfaces (data types and functions) of the library are defined
in the header file `gpgme.h'.  You must include this in all programs
using the library, either directly or through some other header file,
like this:

@example
#include <gpgme.h>
@end example

The name space of @acronym{GPGME} is @code{gpgme_*} for function names
and data types and @code{GPGME_*} for other symbols.  Symbols internal
to @acronym{GPGME} take the form @code{_gpgme_*} and @code{_GPGME_*}.

Because @acronym{GPGME} makes use of the GPG Error library, using
@acronym{GPGME} will also use the @code{GPG_ERR_*} name space
directly, and the @code{gpg_err*}, @code{gpg_str*}, and @code{gpgrt_*}
name space indirectly.

@node Building the Source
@section Building the Source
@cindex compiler options
@cindex
compiler flags

If you want to compile a source file including the `gpgme.h' header
file, you must make sure that the compiler can find it in the
directory hierarchy. This is accomplished by adding the path to the
directory in which the header file is located to the compilers include
file search path (via the @option{-I} option).

However, the path to the include file is determined at the time the
source is configured. To solve this problem, gpgme ships with a small
helper program @command{gpgme-config} that knows about the path to the
include file and other configuration options. The options that need
to be added to the compiler invocation at compile time are output by
the @option{--cflags} option to @command{gpgme-config}. The following
example shows how it can be used at the command line:

@example
gcc -c foo.c `gpgme-config --cflags`
@end example

Adding the output of @samp{gpgme-config --cflags} to the compiler
command line will ensure that the compiler can find the
@acronym{GPGME}
header file.

A similar problem occurs when linking the program with the library.
Again, the compiler has to find the library files. For this to work,
the path to the library files has to be added to the library search
path (via the @option{-L} option). For this, the option
@option{--libs} to @command{gpgme-config} can be used. For
convenience, this option also outputs all other options that are
required to link the program with @acronym{GPGME} (in particular, the
@samp{-lgpgme} option). The example shows how to link @file{foo.o}
with the @acronym{GPGME} library to a program @command{foo}.

@example
gcc -o foo foo.o `gpgme-config --libs`

@end example

Of course you can also combine both examples to a single command by
specifying both options to @command{gpgme-config}:

@example
gcc -o foo foo.c `gpgme-config --cflags --libs`
@end example

If you need to detect the installed language bindings you can use list
them using:

@example
gpgme-config --print-lang
@end example

or
 test for the availability using

@example
gpgme-config --have-lang=python && echo 'Bindings for Pythons available'
@end example

@node Largefile Support (LFS)
@section Largefile Support (LFS)
@cindex largefile support
@cindex LFS

@acronym{GPGME} is compiled with largefile support by default, if it
is available on the system.  This means that GPGME supports files
larger than two gigabyte in size, if the underlying operating system
can.  On some systems, largefile support is already the default.  On
such systems, nothing special is required.  However, some systems
provide only support for files up to two gigabyte in size by default.
Support for larger file sizes has to be specifically enabled.

To make a difficult situation even more complex, such systems provide
two different types of largefile support.  You can either get all
relevant functions replaced with alternatives that are largefile
capable, or you can get new functions and data types for largefile
support added.  Those
 new functions have the same name as their
smallfile counterparts, but with a suffix of 64.

An example: The data type @code{off_t} is 32 bit wide on GNU/Linux PC
systems.  To address offsets in large files, you can either enable
largefile support add-on.  Then a new data type @code{off64_t} is

provided, which is 64 bit wide. Or you can replace the existing @code{off_t} data type with its 64 bit wide counterpart. All occurrences of @code{off_t} are then automagically replaced.

As if matters were not complex enough, there are also two different types of file descriptors in such systems. This is important because if file descriptors are exchanged between programs that use a different maximum file size, certain errors must be produced on some file descriptors to prevent subtle overflow bugs from occurring.

As you can see, supporting two different maximum file sizes at the same time is not at all an easy task. However, the maximum file size does matter for @acronym{GPGME}, because some data types it uses in its interfaces are affected by that. For example, the @code{off_t} data type is used in the @code{gpgme_data_seek} function, to match its @acronym{POSIX} counterpart. This affects the call-frame of the function, and thus the ABI of the library. Furthermore, file descriptors can be exchanged between GPGME and the application.

For you as the user of the library, this means that your program must be compiled in the same file size mode as the library. Luckily, there is absolutely no valid reason for new programs to not enable largefile support by default and just use that. The compatibility modes (small file sizes or dual mode) can be considered an historic artefact, only useful to allow for a transitional period.

On POSIX platforms @acronym{GPGME} is compiled using largefile support by default. This means that your application must do the same, at least as far as it is relevant for using the @file{gpgme.h} header file. All types in this header files refer to their largefile counterparts, if they are different from any default types on the system.

On 32 and 64 bit Windows platforms @code{off_t} is declared as 32 bit signed integer. There is no specific support for LFS in the C library. The recommendation from Microsoft is to use the native interface (@code{CreateFile} et al.) for large files. Released binary versions of @acronym{GPGME} (libgpgme-11.dll) have always been build with a 32 bit @code{off_t}. To avoid an ABI break we stick to this convention for 32 bit Windows by using @code{long} there. @acronym{GPGME} versions for 64 bit Windows have never been released and thus we are able to use @code{int64_t} instead of @code{off_t} there. For easier migration the typedef @code{gpgme_off_t} has been defined. The reason we cannot use @code{off_t} directly is that some toolchains (e.g. mingw64) introduce a POSIX compatible hack for @code{off_t}. Some widely used toolkits make use of this hack and in

turn @acronym{GPGME} would need
to use it also. However, this would
introduce an ABI break and existing software making use of libgpgme
might suffer from a severe break. Thus with version 1.4.2 we
redefined all functions using @code{off_t} to use @code{gpgme_off_t}
which is defined as explained above. This way we keep the ABI well
defined and independent of any toolchain hacks. The bottom line is
that LFS support in @acronym{GPGME} is only available on 64 bit
versions of Windows.

On POSIX platforms you can enable largefile support, if it is
different from the default on the system the application is compiled
on, by using the Autoconf macro @code{AC_SYS_LARGEFILE}. If you do
this, then you don't need to worry about anything else: It will just
work. In this case you might also want to use @code{AC_FUNC_FSEEKO}
to take advantage of some new interfaces, and @code{AC_TYPE_OFF_T}
(just in case).

If you do not use Autoconf, you can define the preprocessor symbol
@code{_FILE_OFFSET_BITS} to 64 @emph{before} including
any header
files, for example by specifying the option
@code{-D_FILE_OFFSET_BITS=64} on the compiler command line. You will
also want to define the preprocessor symbol @code{LARGEFILE_SOURCE} to
1 in this case, to take advantage of some new interfaces.

If you do not want to do either of the above, you probably know enough
about the issue to invent your own solution. Just keep in mind that
the @acronym{GPGME} header file expects that largefile support is
enabled, if it is available. In particular, we do not support dual
mode (@code{_LARGEFILE64_SOURCE}).

@node Using Automake
@section Using Automake
@cindex automake
@cindex autoconf

It is much easier if you use GNU Automake instead of writing your own
Makefiles. If you do that you do not have to worry about finding and
invoking the @command{gpgme-config} script at all. @acronym{GPGME}
provides an extension to Automake that does all the work for you.

@c A simple macro for optional variables.
@macro ovar{varname}
@r{[}@var{\varname\}@r{]}
@end

macro
@defmac AM_PATH_GPGME (@ovar{minimum-version}, @ovar{action-if-found}, @ovar{action-if-not-found})
@defmacx AM_PATH_GPGME_PTH (@ovar{minimum-version}, @ovar{action-if-found}, @ovar{action-if-not-found})
@defmacx AM_PATH_GPGME_PTHREAD (@ovar{minimum-version}, @ovar{action-if-found}, @ovar{action-if-not-found})
Check whether @acronym{GPGME} (at least version @var{minimum-version},
if given) exists on the host system. If it is found, execute
@var{action-if-found}, otherwise do @var{action-if-not-found}, if
given.

Additionally, the function defines @code{GPGME_CFLAGS} to the flags
needed for compilation of the program to find the @file{gpgme.h}
header file, and @code{GPGME_LIBS} to the linker flags needed to link
the program to the @acronym{GPGME} library. If the used helper script
does not match the target type you are building for a warning is
printed and the string @code{libgcrypt} is appended to the variable
@code{gpg_config_script_warn}.

@code{AM_PATH_GPGME_PTH}
checks for the version of @acronym{GPGME}
that can be used with GNU Pth, and defines @code{GPGME_PTH_CFLAGS} and
@code{GPGME_PTH_LIBS}.

@code{AM_PATH_GPGME_PTHREAD} checks for the version of @acronym{GPGME}
that can be used with the native pthread implementation, and defines
@code{GPGME_PTHREAD_CFLAGS} and @code{GPGME_PTHREAD_LIBS}. Since
version 1.8.0 this is no longer required to GPGME_PTHREAD as
@acronym{GPGME} itself is thread safe.

This macro searches for @command{gpgme-config} along the PATH. If
you are cross-compiling, it is useful to set the environment variable
@code{SYSROOT} to the top directory of your target. The macro will
then first look for the helper program in the @file{bin} directory
below that top directory. An absolute directory name must be used for
@code{SYSROOT}. Finally, if the configure command line option
@code{--with-gpgme-prefix} is used, only its value is used for the top
directory below which the helper script is expected.

@end defmac

You can
use the defined Autoconf variables like this in your
@file{Makefile.am}:

@example
AM_CPPFLAGS = $(GPGME_CFLAGS)
LDADD = $(GPGME_LIBS)

@end example

@node Using Libtool
@section Using Libtool
@cindex libtool

The easiest way is to just use GNU Libtool.  If you use libtool, and
link to @code{libgpgme.la}, @code{libgpgme-pth.la} or
@code{libgpgme-pthread.la} respectively, everything will be done
automatically by Libtool.

@node Library Version Check
@section Library Version Check
@cindex version check, of the library

@deftypefun {const char *} gpgme_check_version (@w{const char *@var{required_version}})
The function @code{gpgme_check_version} has four purposes.  It can be
used to retrieve the version number of the library.  In addition it
can verify that the version number is higher than a certain required
version number.  In either case, the function initializes some
sub-systems, and for this reason alone it must be invoked early in
your program, before you make use of the other functions
 in
@acronym{GPGME}.  The last purpose is to run selftests.

As a side effect for W32 based systems, the socket layer will get
initialized.

If @var{required_version} is @code{NULL}, the function returns a
pointer to a statically allocated string containing the version number
of the library.

If @var{required_version} is not @code{NULL}, it should point to a
string containing a version number, and the function checks that the
version of the library is at least as high as the version number
provided.  In this case, the function returns a pointer to a
statically allocated string containing the version number of the
library.  If @var{REQUIRED_VERSION} is not a valid version number, or
if the version requirement is not met, the function returns
@code{NULL}.

If you use a version of a library that is backwards compatible with
older releases, but contains additional interfaces which your program
uses, this function provides a run-time check if the necessary
features are provided by the

installed version of the library.

If a selftest fails, the function may still succeed. Selftest errors
are returned later when invoking @code{gpgme_new} or
@code{gpgme-data_new}, so that a detailed error code can be returned
(historically, @code{gpgme_check_version} does not return a detailed
error code).
@end deftypefun

@deftypefun {int} gpgme_set_global_flag @
(@w{const char *@var{name}}, @
@w{const char *@var{value}})

@since{1.4.0}

On some systems it is not easy to set environment variables and thus
hard to use @acronym{GPGME}'s internal trace facility for debugging.
This function has been introduced as an alternative way to enable
debugging and for a couple of other rarely used tweaks. It is
important to assure that only one thread accesses @acronym{GPGME}
functions between a call to this function and after the return from
the call to @code{gpgme_check_version}.

All currently supported features require that this function is called
as early as possible
--- even before @code{gpgme_check_version}. The
features are identified by the following values for @var{name}:

@table @code
@item debug
To enable debugging use the string ``debug'' for @var{name} and
@var{value} identical to the value used with the environment variable
@code{GPGME_DEBUG}.

@item disable-gpgconf
Using this feature with any @var{value} disables the detection of the
gpgconf program and thus forces GPGME to fallback into the simple
OpenPGP only mode. It may be used to force the use of GnuPG-1 on
systems which have both GPG versions installed. Note that in general
the use of @code{gpgme_set_engine_info} is a better way to select a
specific engine version.

@item gpgconf-name
@itemx gpg-name
Set the name of the gpgconf respective gpg binary. The defaults are
@code{GNU/GnuPG/gpgconf} and @code{GNU/GnuPG/gpg}. Under Unix the
leading directory part is ignored. Under Windows the leading

directory part is used as the default installation directory; the
@code{.exe} suffix
is added by GPGME. Use forward slashed even under
Windows.

@item require-gnupg
Set the minimum version of the required GnuPG engine. If that version
is not met, GPGME fails early instead of trying to use the existent
version. The given version must be a string with major, minor, and
micro number. Example: "2.1.0".

@item w32-inst-dir
On Windows GPGME needs to know its installation directory to find its
spawn helper. This is in general no problem because a DLL has this
information. Some applications however link statically to GPGME and
thus GPGME can only figure out the installation directory of this
application which may be wrong in certain cases. By supplying an
installation directory as value to this flag, GPGME will assume that
that directory is the installation directory. This flag has no effect
on non-Windows platforms.

@end table

This function returns @code{0} on success. In contrast to other
functions the non-zero return value on failure does not convey any
error
code. For setting ``debug'' the only possible error cause is an
out of memory condition; which would exhibit itself later anyway.
Thus the return value may be ignored.
@end deftypefun

After initializing @acronym{GPGME}, you should set the locale
information to the locale required for your output terminal. This
locale information is needed for example for the curses and Gtk
pinentry. Here is an example of a complete initialization:

```
@example
#include <locale.h>
#include <gpgme.h>

void
init_gpgme (void)
@{
 /* Initialize the locale environment.  */
 setlocale (LC_ALL, "");
 gpgme_check_version (NULL);
 gpgme_set_locale (NULL, LC_CTYPE, setlocale (LC_CTYPE, NULL));
```

```
#ifdef LC_MESSAGES
 gpgme_set_locale (NULL, LC_MESSAGES, setlocale (LC_MESSAGES, NULL));
#endif
@}
@end example
```

Note that you are highly recommended to initialize the locale settings like this. @acronym{GPGME} can not do this for you because it would not be thread safe. The conditional on LC_MESSAGES is only necessary for
portability to W32 systems.

@node Signal Handling
@section Signal Handling
@cindex signals
@cindex signal handling

The @acronym{GPGME} library communicates with child processes (the crypto engines). If a child process dies unexpectedly, for example due to a bug, or system problem, a @code{SIGPIPE} signal will be delivered to the application. The default action is to abort the program. To protect against this, @code{gpgme_check_version} sets the @code{SIGPIPE} signal action to @code{SIG_IGN}, which means that the signal will be ignored.

@acronym{GPGME} will only do that if the signal action for @code{SIGPIPE} is @code{SIG_DEF} at the time @code{gpgme_check_version} is called. If it is something different, @code{GPGME} will take no action.

This means that if your application does not install any signal handler for @code{SIGPIPE}, you don't need to take any precautions. If you do install a signal handler for @code{SIGPIPE}, you must be prepared to handle any @code{SIGPIPE}
events that occur due to
@acronym{GPGME} writing to a defunct pipe. Furthermore, if your application is multi-threaded, and you install a signal action for @code{SIGPIPE}, you must make sure you do this either before @code{gpgme_check_version} is called or afterwards.

@node Multi-Threading
@section Multi-Threading
@cindex thread-safeness
@cindex multi-threading

The @acronym{GPGME} library is mostly thread-safe, and can be used

in a multi-threaded environment but there are some requirements
for multi-threaded use:

@itemize @bullet
@item
The function @code{gpgme_check_version} must be called before any
other function in the library, because it initializes the thread
support subsystem in @acronym{GPGME}. To achieve this in
multi-threaded programs, you must synchronize the memory with respect
to other threads that also want to use @acronym{GPGME}. For this, it
is sufficient to call @code{gpgme_check_version} before creating the
other threads using @acronym{GPGME}@footnote{At least
this is true for
POSIX threads, as @code{pthread_create} is a function that
synchronizes memory with respects to other threads. There are many
functions which have this property, a complete list can be found in
POSIX, IEEE Std 1003.1-2003, Base Definitions, Issue 6, in the
definition of the term ``Memory Synchronization''. For other thread
packages other, more relaxed or more strict rules may apply.}.

@item
Any @code{gpgme_data_t} and @code{gpgme_ctx_t} object must only be
accessed by one thread at a time. If multiple threads want to deal
with the same object, the caller has to make sure that operations on
that object are fully synchronized.

@item
Only one thread at any time is allowed to call @code{gpgme_wait}. If
multiple threads call this function, the caller must make sure that
all invocations are fully synchronized. It is safe to start
asynchronous operations while a thread is running in gpgme_wait.

@item
The function @code{gpgme_strerror} is not thread safe. You have
to
use @code{gpgme_strerror_r} instead.
@end itemize

@node Protocols and Engines
@chapter Protocols and Engines
@cindex protocol
@cindex engine
@cindex crypto engine
@cindex backend
@cindex crypto backend

@acronym{GPGME} supports several cryptographic protocols, however, it

does not implement them.  Rather it uses backends (also called
engines) which implement the protocol.  @acronym{GPGME} uses
inter-process communication to pass data back and forth between the
application and the backend, but the details of the communication
protocol and invocation of the backend is completely hidden by the
interface.  All complexity is handled by @acronym{GPGME}.  Where an
exchange of information between the application and the backend is
necessary, @acronym{GPGME} provides the necessary callback function
hooks and further interfaces.

@deftp {Data type} {enum gpgme_protocol_t}
@tindex gpgme_protocol_t
The @code{gpgme_protocol_t} type specifies the set of possible protocol
values that are supported
 by @acronym{GPGME}.  The following protocols
are supported:

@table @code
@item GPGME_PROTOCOL_OpenPGP
@itemx GPGME_PROTOCOL_OPENPGP
This specifies the OpenPGP protocol.

@item GPGME_PROTOCOL_CMS
This specifies the Cryptographic Message Syntax.

@item GPGME_PROTOCOL_GPGCONF
Under development.  Please ask on @email{gnupg-devel@@gnupg.org} for help.

@item GPGME_PROTOCOL_ASSUAN
@since{1.2.0}

This specifies the raw Assuan protocol.

@item GPGME_PROTOCOL_G13
@since{1.3.0}

Under development.  Please ask on @email{gnupg-devel@@gnupg.org} for help.

@item GPGME_PROTOCOL_UISERVER
Under development.  Please ask on @email{gnupg-devel@@gnupg.org} for help.

@item GPGME_PROTOCOL_SPAWN
@since{1.5.0}

Special protocol for use with @code{gpgme_op_spawn}.

@item GPGME_PROTOCOL_UNKNOWN
Reserved for future extension.  You may use this to indicate that the

used protocol is not known to the application.  Currently,
@acronym{GPGME} does not accept this value in any operation, though,
except for @code{gpgme_get_protocol_name}.
@end
 table
@end deftp

@deftypefun {const char *} gpgme_get_protocol_name (@w{gpgme_protocol_t @var{protocol}})
The function @code{gpgme_get_protocol_name} returns a statically
allocated string describing the protocol @var{protocol}, or
@code{NULL} if the protocol number is not valid.
@end deftypefun

@menu
* Engine Version Check::  Verifying the engine version.
* Engine Information::  Obtaining more information about the engines.
* Engine Configuration::  Changing the engine configuration.
* OpenPGP::  Support for the OpenPGP protocol.
* Cryptographic Message Syntax::  Support for the CMS.
* Assuan::  Support for the raw Assuan protocol.
@end menu

@node Engine Version Check
@section Engine Version Check
@cindex version check, of the engines

@deftypefun @w{const char *} gpgme_get_dirinfo (@w{cons char *@var{what}})
@since{1.5.0}

The function @code{gpgme_get_dirinfo} returns a statically
 allocated
string with the value associated to @var{what}.  The returned values
are the defaults and won't change even after
@code{gpgme_set_engine_info} has been used to configure a different
engine.  @code{NULL} is returned if no value is available.  Commonly
supported values for @var{what} are:

@table @code
@item homedir
Return the default home directory.

@item sysconfdir
Return the name of the system configuration directory

@item bindir
Return the name of the directory with GnuPG program files.

@item libdir
Return the name of the directory with GnuPG related library files.

@item libexecdir
Return the name of the directory with GnuPG helper program files.

@item datadir
Return the name of the directory with GnuPG shared data.

@item localedir
Return the name of the directory with GnuPG locale data.

@item agent-socket
Return the name of the socket to connect to the gpg-agent.

@item agent-ssh-socket
Return the name of the socket to connect to the ssh-agent component of
gpg-agent.

@item
dirmngr-socket
Return the name of the socket to connect to the dirmngr.

@item uiserver-socket
Return the name of the socket to connect to the user interface server.

@item gpgconf-name
Return the file name of the engine configuration tool.

@item gpg-name
Return the file name of the OpenPGP engine.

@item gpgsm-name
Return the file name of the CMS engine.

@item g13-name
Return the name of the file container encryption engine.

@item gpg-wks-client-name
Return the name of the Web Key Service tool.

@end table

@end deftypefun

@deftypefun gpgme_error_t gpgme_engine_check_version (@w{gpgme_protocol_t @var{protocol}})

The function @code{gpgme_engine_check_version} verifies that the engine implementing the protocol @var{PROTOCOL} is installed in the expected path and meets the version requirement of @acronym{GPGME}.

This function returns the error code @code{GPG_ERR_NO_ERROR} if the engine is available and @code{GPG_ERR_INV_ENGINE} if it is not.
@end deftypefun

@node Engine
 Information
@section Engine Information
@cindex engine, information about

@deftp {Data type} {gpgme_engine_info_t}
@tindex gpgme_protocol_t
The @code{gpgme_engine_info_t} type specifies a pointer to a structure describing a crypto engine.  The structure contains the following elements:

@table @code
@item gpgme_engine_info_t next
This is a pointer to the next engine info structure in the linked list, or @code{NULL} if this is the last element.

@item gpgme_protocol_t protocol
This is the protocol for which the crypto engine is used.  You can convert this to a string with @code{gpgme_get_protocol_name} for printing.

@item const char *file_name
This is a string holding the file name of the executable of the crypto engine.  Currently, it is never @code{NULL}, but using @code{NULL} is reserved for future use, so always check before you use it.

@item const char *home_dir
This is a string holding the directory name of the crypto engine's configuration directory.  If it is @code{NULL}, then
 the default
directory is used.  See @code{gpgme_get_dirinfo} on how to get the default directory.

@item const char *version
This is a string containing the version number of the crypto engine.
It might be @code{NULL} if the version number can not be determined, for example because the executable doesn't exist or is invalid.

@item const char *req_version

This is a string containing the minimum required version number of the
crypto engine for @acronym{GPGME} to work correctly.  This is the
version number that @code{gpgme_engine_check_version} verifies
against.  Currently, it is never @code{NULL}, but using @code{NULL} is
reserved for future use, so always check before you use it.
@end table
@end deftp

@deftypefun gpgme_error_t gpgme_get_engine_info (@w{gpgme_engine_info_t *@var{info}})
The function @code{gpgme_get_engine_info} returns a linked list of
engine info structures in @var{info}.  Each info structure describes
the defaults of one configured backend.

The memory for the info
 structures is allocated the first time this
function is invoked, and must not be freed by the caller.

This function returns the error code @code{GPG_ERR_NO_ERROR} if
successful, and a system error if the memory could not be allocated.
@end deftypefun

Here is an example how you can provide more diagnostics if you receive
an error message which indicates that the crypto engine is invalid.

@example
gpgme_ctx_t ctx;
gpgme_error_t err;

[...]

```
if (gpgme_err_code (err) == GPG_ERR_INV_ENGINE)
 @{
   gpgme_engine_info_t info;
   err = gpgme_get_engine_info (&info);
   if (!err)
     @{
       while (info && info->protocol != gpgme_get_protocol (ctx))
         info = info->next;
       if (!info)
         fprintf (stderr, "GPGME compiled without support for protocol %s",
                  gpgme_get_protocol_name (info->protocol));
       else if (info->file_name && !info->version)
         fprintf (stderr, "Engine %s not installed properly",
                  info->file_name);
        else if (info->file_name && info->version && info->req_version)
         fprintf (stderr, "Engine %s version %s installed, "
                  "but at least version %s required", info->file_name,
                  info->version, info->req_version);
```

```
      else
        fprintf (stderr, "Unknown problem with engine for protocol %s",
                 gpgme_get_protocol_name (info->protocol));
    @}
 @}
@end example
```

@node Engine Configuration
@section Engine Configuration
@cindex engine, configuration of
@cindex configuration of crypto backend

You can change the configuration of a backend engine, and thus change the executable program and configuration directory to be used. You can make these changes the default or set them for some contexts individually.

@deftypefun gpgme_error_t gpgme_set_engine_info (@w{gpgme_protocol_t @var{proto}}, @w{const char *@var{file_name}}, @w{const char *@var{home_dir}})
@since{1.1.0}

The function @code{gpgme_set_engine_info} changes
 the default
configuration of the crypto engine implementing the protocol
@var{proto}.

@var{file_name} is the file name of the executable program
implementing this protocol, and @var{home_dir} is the directory name
of the configuration directory for this crypto engine. If
@var{home_dir} is @code{NULL}, the engine's default will be used.

The new defaults are not applied to already created GPGME contexts.

This function returns the error code @code{GPG_ERR_NO_ERROR} if
successful, or an error code on failure.
@end deftypefun

The functions @code{gpgme_ctx_get_engine_info} and
@code{gpgme_ctx_set_engine_info} can be used to change the engine
configuration per context. @xref{Crypto Engine}.

@node OpenPGP
@section OpenPGP
@cindex OpenPGP
@cindex GnuPG
@cindex protocol, GnuPG

@cindex engine, GnuPG

OpenPGP is implemented by GnuPG, the @acronym{GNU} Privacy Guard.
This is the first protocol that was supported by @acronym{GPGME}.

The OpenPGP protocol is specified by @code{GPGME_PROTOCOL_OpenPGP}.

@node
 Cryptographic Message Syntax
@section Cryptographic Message Syntax
@cindex CMS
@cindex cryptographic message syntax
@cindex GpgSM
@cindex protocol, CMS
@cindex engine, GpgSM
@cindex S/MIME
@cindex protocol, S/MIME

@acronym{CMS} is implemented by GpgSM, the S/MIME implementation for
GnuPG.

The @acronym{CMS} protocol is specified by @code{GPGME_PROTOCOL_CMS}.

@node Assuan
@section Assuan
@cindex ASSUAN
@cindex protocol, ASSUAN
@cindex engine, ASSUAN

Assuan is the RPC library used by the various @acronym{GnuPG}
components.  The Assuan protocol allows one to talk to arbitrary
Assuan servers using @acronym{GPGME}.  @xref{Using the Assuan
protocol}.

The ASSUAN protocol is specified by @code{GPGME_PROTOCOL_ASSUAN}.

@node Algorithms
@chapter Algorithms
@cindex algorithms

The crypto backends support a variety of algorithms used in public key
cryptography.@footnote{Some engines also provide symmetric only
encryption; see the description of the encryption function on
 how to use
this.}  The following sections list the identifiers used to denote such

an algorithm.

@menu
* Public Key Algorithms:: A list of all public key algorithms.
* Hash Algorithms:: A list of all hash algorithms.
@end menu

@node Public Key Algorithms
@section Public Key Algorithms
@cindex algorithms, public key
@cindex public key algorithms

Public key algorithms are used for encryption, decryption, signing and verification of signatures.

@deftp {Data type} {enum gpgme_pubkey_algo_t}
@tindex gpgme_pubkey_algo_t
The @code{gpgme_pubkey_algo_t} type specifies the set of all public key algorithms that are supported by @acronym{GPGME}. Possible values are:

@table @code
@item GPGME_PK_RSA
This value indicates the RSA (Rivest, Shamir, Adleman) algorithm.

@item GPGME_PK_RSA_E
Deprecated. This value indicates the RSA (Rivest, Shamir, Adleman) algorithm for encryption and decryption only.

@item GPGME_PK_RSA_S
Deprecated. This value indicates the RSA (Rivest, Shamir,
Adleman)
algorithm for signing and verification only.

@item GPGME_PK_DSA
This value indicates DSA, the Digital Signature Algorithm.

@item GPGME_PK_ELG
This value indicates ElGamal.

@item GPGME_PK_ELG_E
This value also indicates ElGamal and is used specifically in GnuPG.

@item GPGME_PK_ECC
@since{1.5.0}

This value is a generic indicator for ellipic curve algorithms.

@item GPGME_PK_ECDSA
@since{1.3.0}

This value indicates ECDSA, the Elliptic Curve Digital Signature
Algorithm as defined by FIPS 186-2 and RFC-6637.

@item GPGME_PK_ECDH
@since{1.3.0}

This value indicates ECDH, the Eliptic Curve Diffie-Hellmann
encryption algorithm as defined by RFC-6637.

@item GPGME_PK_EDDSA
@since{1.7.0}

This value indicates the EdDSA algorithm.

@end table
@end deftp

@deftypefun {const char *} gpgme_pubkey_algo_name (@w{gpgme_pubkey_algo_t @var{algo}})
The function @code{gpgme_pubkey_algo_name} returns a pointer to a
statically allocated string containing a description of the public key
algorithm
 @var{algo}.  This string can be used to output the name of
the public key algorithm to the user.

If @var{algo} is not a valid public key algorithm, @code{NULL} is
returned.
@end deftypefun

@deftypefun {char *} gpgme_pubkey_algo_string (@w{gpgme_subkey_t @var{key}})
@since{1.7.0}

The function @code{gpgme_pubkey_algo_string} is a convenience function
to build and return an algorithm string in the same way GnuPG does
(e.g. ``rsa2048'' or ``ed25519'').  The caller must free the result
using @code{gpgme_free}.  On error (e.g. invalid argument or memory
exhausted), the function returns NULL and sets @code{ERRNO}.
@end deftypefun

@node Hash Algorithms
@section Hash Algorithms
@cindex algorithms, hash
@cindex algorithms, message digest
@cindex hash algorithms

@cindex message digest algorithms

Hash (message digest) algorithms are used to compress a long message
to make it suitable for public key cryptography.

@deftp {Data type} {enum gpgme_hash_algo_t}
@tindex gpgme_hash_algo_t
The
@code{gpgme_hash_algo_t} type specifies the set of all hash algorithms
that are supported by @acronym{GPGME}. Possible values are:

@table @code
@item GPGME_MD_MD5
@item GPGME_MD_SHA1
@item GPGME_MD_RMD160
@item GPGME_MD_MD2
@item GPGME_MD_TIGER
@item GPGME_MD_HAVAL
@item GPGME_MD_SHA256
@item GPGME_MD_SHA384
@item GPGME_MD_SHA512
@item GPGME_MD_SHA224
@since{1.5.0}

@item GPGME_MD_MD4
@item GPGME_MD_CRC32
@item GPGME_MD_CRC32_RFC1510
@item GPGME_MD_CRC24_RFC2440
@end table
@end deftp

@deftypefun {const char *} gpgme_hash_algo_name (@w{gpgme_hash_algo_t @var{algo}})
The function @code{gpgme_hash_algo_name} returns a pointer to a
statically allocated string containing a description of the hash
algorithm @var{algo}. This string can be used to output the name of
the hash algorithm to the user.

If @var{algo} is not a valid hash algorithm, @code{NULL} is returned.
@end deftypefun

@node Error Handling
@chapter Error Handling
@cindex error handling

Many functions in @acronym{GPGME}
can return an error if they fail.
For this reason, the application should always catch the error

condition and take appropriate measures, for example by releasing the resources and passing the error up to the caller, or by displaying a descriptive message to the user and cancelling the operation.

Some error values do not indicate a system error or an error in the operation, but the result of an operation that failed properly. For example, if you try to decrypt a tempered message, the decryption will fail. Another error value actually means that the end of a data buffer or list has been reached. The following descriptions explain for many error codes what they mean usually. Some error values have specific meanings if returned by a certain functions. Such cases are described in the documentation of those functions.

@acronym{GPGME} uses the @code{libgpg-error} library. This allows to share the error codes with other components of the GnuPG system, and thus pass error values transparently
from the crypto engine, or some
helper application of the crypto engine, to the user. This way no information is lost. As a consequence, @acronym{GPGME} does not use its own identifiers for error codes, but uses those provided by @code{libgpg-error}. They usually start with @code{GPG_ERR_}.

However, @acronym{GPGME} does provide aliases for the functions defined in libgpg-error, which might be preferred for name space consistency.

@menu
* Error Values:: The error value and what it means.
* Error Sources:: A list of important error sources.
* Error Codes:: A list of important error codes.
* Error Strings:: How to get a descriptive string from a value.
@end menu

@node Error Values
@section Error Values
@cindex error values
@cindex error codes
@cindex error sources

@deftp {Data type} {gpgme_err_code_t}
The @code{gpgme_err_code_t} type is an alias for the @code{libgpg-error} type @code{gpg_err_code_t}. The
error code indicates the type of an
error, or the reason why an operation failed.

A list of important error codes can be found in the next section.
@end deftp

@deftp {Data type} {gpgme_err_source_t}
The @code{gpgme_err_source_t} type is an alias for the
@code{libgpg-error} type @code{gpg_err_source_t}. The error source
has not a precisely defined meaning. Sometimes it is the place where
the error happened, sometimes it is the place where an error was
encoded into an error value. Usually the error source will give an
indication to where to look for the problem. This is not always true,
but it is attempted to achieve this goal.

A list of important error sources can be found in the next section.
@end deftp

@deftp {Data type} {gpgme_error_t}
The @code{gpgme_error_t} type is an alias for the @code{libgpg-error}
type @code{gpg_error_t}. An error value like this has always two
components, an error code and an error source. Both together form the
error value.

Thus, the error value
can not be directly compared against an error
code, but the accessor functions described below must be used.
However, it is guaranteed that only 0 is used to indicate success
(@code{GPG_ERR_NO_ERROR}), and that in this case all other parts of
the error value are set to 0, too.

Note that in @acronym{GPGME}, the error source is used purely for
diagnostical purposes. Only the error code should be checked to test
for a certain outcome of a function. The manual only documents the
error code part of an error value. The error source is left
unspecified and might be anything.
@end deftp

@deftypefun {static inline gpgme_err_code_t} gpgme_err_code (@w{gpgme_error_t @var{err}})
The static inline function @code{gpgme_err_code} returns the
@code{gpgme_err_code_t} component of the error value @var{err}. This
function must be used to extract the error code from an error value in
order to compare it with the @code{GPG_ERR_*} error code macros.
@end deftypefun

@deftypefun {static inline gpgme_err_source_t}
gpgme_err_source (@w{gpgme_error_t @var{err}})
The static inline function @code{gpgme_err_source} returns the
@code{gpgme_err_source_t} component of the error value @var{err}. This
function must be used to extract the error source from an error value in
order to compare it with the @code{GPG_ERR_SOURCE_*} error source macros.
@end deftypefun

@deftypefun {static inline gpgme_error_t} gpgme_err_make (@w{gpgme_err_source_t @var{source}}, @w{gpgme_err_code_t @var{code}})
The static inline function @code{gpgme_err_make} returns the error value consisting of the error source @var{source} and the error code @var{code}.

This function can be used in callback functions to construct an error value to return it to the library.
@end deftypefun

@deftypefun {static inline gpgme_error_t} gpgme_error (@w{gpgme_err_code_t @var{code}})
The static inline function @code{gpgme_error} returns the error value consisting of the default error source and the error code @var{code}.

For @acronym{GPGME} applications, the default error source is @code{GPG_ERR_SOURCE_USER_1}. You can define @code{GPGME_ERR_SOURCE_DEFAULT} before including @file{gpgme.h} to change this default.

This function can be used in callback functions to construct an error value to return it to the library.
@end deftypefun

The @code{libgpg-error} library provides error codes for all system error numbers it knows about. If @var{err} is an unknown error number, the error code @code{GPG_ERR_UNKNOWN_ERRNO} is used. The following functions can be used to construct error values from system errnor numbers.

@deftypefun {gpgme_error_t} gpgme_err_make_from_errno (@w{gpgme_err_source_t @var{source}}, @w{int @var{err}})
The function @code{gpgme_err_make_from_errno} is like @code{gpgme_err_make}, but it takes a system error like @code{errno} instead of a @code{gpgme_err_code_t} error code.
@end deftypefun

@deftypefun {gpgme_error_t} gpgme_error_from_errno (@w{int @var{err}})
The function @code{gpgme_error_from_errno} is like @code{gpgme_error}, but it takes a system error like @code{errno} instead of a @code{gpgme_err_code_t} error code.
@end deftypefun

Sometimes you might want to map system error numbers to error codes directly, or map an error code representing a system error back to the system error number. The following functions can be used to do that.

@deftypefun {gpgme_err_code_t} gpgme_err_code_from_errno (@w{int @var{err}})
The function @code{gpgme_err_code_from_errno} returns the error code
for the system error @var{err}.  If @var{err} is not a known system
error, the function returns @code{GPG_ERR_UNKNOWN_ERRNO}.
@end deftypefun

@deftypefun {int} gpgme_err_code_to_errno (@w{gpgme_err_code_t @var{err}})
The function @code{gpgme_err_code_to_errno} returns the system error
for the error code @var{err}.  If @var{err} is not an error code
representing a system error, or if this system error is not defined on
this system, the function returns @code{0}.
@end deftypefun

@node Error Sources
@section
 Error Sources
@cindex error codes, list of

The library @code{libgpg-error} defines an error source for every
component of the GnuPG system.  The error source part of an error
value is not well defined.  As such it is mainly useful to improve the
diagnostic error message for the user.

If the error code part of an error value is @code{0}, the whole error
value will be @code{0}.  In this case the error source part is of
course @code{GPG_ERR_SOURCE_UNKNOWN}.

The list of error sources that might occur in applications using
@acronym{GPGME} is:

@table @code
@item GPG_ERR_SOURCE_UNKNOWN
The error source is not known.  The value of this error source is
@code{0}.

@item GPG_ERR_SOURCE_GPGME
The error source is @acronym{GPGME} itself.  This is the default for
errors that occur in the @acronym{GPGME} library.

@item GPG_ERR_SOURCE_GPG
The error source is GnuPG, which is the crypto engine used for the
OpenPGP protocol.

@item GPG_ERR_SOURCE_GPGSM
The error source is GPGSM, which is
 the crypto engine used for the
CMS protocol.

@item GPG_ERR_SOURCE_GCRYPT
The error source is @code{libgcrypt}, which is used by crypto engines
to perform cryptographic operations.

@item GPG_ERR_SOURCE_GPGAGENT
The error source is @command{gpg-agent}, which is used by crypto
engines to perform operations with the secret key.

@item GPG_ERR_SOURCE_PINENTRY
The error source is @command{pinentry}, which is used by
@command{gpg-agent} to query the passphrase to unlock a secret key.

@item GPG_ERR_SOURCE_SCD
The error source is the SmartCard Daemon, which is used by
@command{gpg-agent} to delegate operations with the secret key to a
SmartCard.

@item GPG_ERR_SOURCE_KEYBOX
The error source is @code{libkbx}, a library used by the crypto
engines to manage local keyrings.

@item GPG_ERR_SOURCE_USER_1
@item GPG_ERR_SOURCE_USER_2
@item GPG_ERR_SOURCE_USER_3
@item GPG_ERR_SOURCE_USER_4
These error sources are not used by any GnuPG component and can be
used by other software. For example, applications
using
@acronym{GPGME} can use them to mark error values coming from callback
handlers. Thus @code{GPG_ERR_SOURCE_USER_1} is the default for errors
created with @code{gpgme_error} and @code{gpgme_error_from_errno},
unless you define @code{GPGME_ERR_SOURCE_DEFAULT} before including
@file{gpgme.h}.
@end table

@node Error Codes
@section Error Codes
@cindex error codes, list of

The library @code{libgpg-error} defines many error values. Most of
them are not used by @code{GPGME} directly, but might be returned by
@acronym{GPGME} because it received them from the crypto engine. The
below list only includes such error codes that have a specific meaning
in @code{GPGME}, or which are so common that you should know about
them.

@table @code
@item GPG_ERR_EOF
This value indicates the end of a list, buffer or file.

@item GPG_ERR_NO_ERROR
This value indicates success. The value of this error code is
@code{0}. Also, it is guaranteed that an error value made from the
error code @code{0}
will be @code{0} itself (as a whole). This means
that the error source information is lost for this error code,
however, as this error code indicates that no error occurred, this is
generally not a problem.

@item GPG_ERR_GENERAL
This value means that something went wrong, but either there is not
enough information about the problem to return a more useful error
value, or there is no separate error value for this type of problem.

@item GPG_ERR_ENOMEM
This value means that an out-of-memory condition occurred.

@item GPG_ERR_E...
System errors are mapped to GPG_ERR_FOO where FOO is the symbol for
the system error.

@item GPG_ERR_INV_VALUE
This value means that some user provided data was out of range. This
can also refer to objects. For example, if an empty
@code{gpgme_data_t} object was expected, but one containing data was
provided, this error value is returned.

@item GPG_ERR_UNUSABLE_PUBKEY
This value means that some recipients for a message were invalid.

@item GPG_ERR_UNUSABLE_SECKEY
This
value means that some signers were invalid.

@item GPG_ERR_NO_DATA
This value means that a @code{gpgme_data_t} object which was expected
to have content was found empty.

@item GPG_ERR_CONFLICT
This value means that a conflict of some sort occurred.

@item GPG_ERR_NOT_IMPLEMENTED
This value indicates that the specific function (or operation) is not
implemented. This error should never happen. It can only occur if

you use certain values or configuration options which do not work,
but for which we think that they should work at some later time.

@item GPG_ERR_DECRYPT_FAILED
This value indicates that a decryption operation was unsuccessful.

@item GPG_ERR_BAD_PASSPHRASE
This value means that the user did not provide a correct passphrase
when requested.

@item GPG_ERR_CANCELED
This value means that the operation was canceled.

@item GPG_ERR_INV_ENGINE
This value means that the engine that implements the desired protocol
is currently not available. This can either be because
the sources
were configured to exclude support for this engine, or because the
engine is not installed properly.

@item GPG_ERR_AMBIGUOUS_NAME
This value indicates that a user ID or other specifier did not specify
a unique key.

@item GPG_ERR_WRONG_KEY_USAGE
This value indicates that a key is not used appropriately.

@item GPG_ERR_CERT_REVOKED
This value indicates that a key signature was revoced.

@item GPG_ERR_CERT_EXPIRED
This value indicates that a key signature expired.

@item GPG_ERR_NO_CRL_KNOWN
This value indicates that no certificate revocation list is known for
the certificate.

@item GPG_ERR_NO_POLICY_MATCH
This value indicates that a policy issue occurred.

@item GPG_ERR_NO_SECKEY
This value indicates that no secret key for the user ID is available.

@item GPG_ERR_MISSING_CERT
This value indicates that a key could not be imported because the
issuer certificate is missing.

@item GPG_ERR_BAD_CERT_CHAIN

This value indicates that a key could not be imported because its
certificate
 chain is not good, for example it could be too long.

@item GPG_ERR_UNSUPPORTED_ALGORITHM
This value means a verification failed because the cryptographic
algorithm is not supported by the crypto backend.

@item GPG_ERR_BAD_SIGNATURE
This value means a verification failed because the signature is bad.

@item GPG_ERR_NO_PUBKEY
This value means a verification failed because the public key is not
available.

@item GPG_ERR_USER_1
@item GPG_ERR_USER_2
@item ...
@item GPG_ERR_USER_16
These error codes are not used by any GnuPG component and can be
freely used by other software.  Applications using @acronym{GPGME}
might use them to mark specific errors returned by callback handlers
if no suitable error codes (including the system errors) for
these errors exist already.
@end table

@node Error Strings
@section Error Strings
@cindex error values, printing of
@cindex error codes, printing of
@cindex error sources, printing of
@cindex error strings

@deftypefun {const char *} gpgme_strerror
 (@w{gpgme_error_t @var{err}})
The function @code{gpgme_strerror} returns a pointer to a statically
allocated string containing a description of the error code contained
in the error value @var{err}.  This string can be used to output a
diagnostic message to the user.

This function is not thread safe.  Use @code{gpgme_strerror_r} in
multi-threaded programs.
@end deftypefun

@deftypefun {int} gpgme_strerror_r (@w{gpgme_error_t @var{err}}, @w{char *@var{buf}}, @w{size_t
@var{buflen}})

```
The function @code{gpgme_strerror_r} returns the error string for
@var{err} in the user-supplied buffer @var{buf} of size @var{buflen}.
This function is, in contrast to @code{gpgme_strerror}, thread-safe if
a thread-safe @code{strerror_r} function is provided by the system.
If the function succeeds, 0 is returned and @var{buf} contains the
string describing the error.  If the buffer was not large enough,
ERANGE is returned and @var{buf} contains as much of the beginning of
the error string as fits into
 the buffer.
@end deftypefun


@deftypefun {const char *} gpgme_strsource (@w{gpgme_error_t @var{err}})
The function @code{gpgme_strerror} returns a pointer to a statically
allocated string containing a description of the error source
contained in the error value @var{err}.  This string can be used to
output a diagnostic message to the user.
@end deftypefun

The following example illustrates the use of @code{gpgme_strerror}:

@example
gpgme_ctx_t ctx;
gpgme_error_t err = gpgme_new (&ctx);
if (err)
 @{
   fprintf (stderr, "%s: creating GpgME context failed: %s: %s\n",
            argv[0], gpgme_strsource (err), gpgme_strerror (err));
   exit (1);
 @}
@end example


@node Exchanging Data
@chapter Exchanging Data
@cindex data, exchanging

A lot of data has to be exchanged between the user and the crypto
engine, like plaintext messages, ciphertext, signatures and
information about the keys.  The technical details about exchanging
the data information are completely abstracted by @acronym{GPGME}.
The
 user provides and receives the data via @code{gpgme_data_t} objects,
regardless of the communication protocol between @acronym{GPGME} and
the crypto engine in use.

@deftp {Data type} {gpgme_data_t}
The @code{gpgme_data_t} type is a handle for a container for generic
```

data, which is used by @acronym{GPGME} to exchange data with the user.
@end deftp

@code{gpgme_data_t} objects do not provide notifications on events.
It is assumed that read and write operations are blocking until data
is available.  If this is undesirable, the application must ensure
that all GPGME data operations always have data available, for example
by using memory buffers or files rather than pipes or sockets.  This
might be relevant, for example, if the external event loop mechanism
is used.

@deftp {Data type} {gpgme_off_t}
@since{1.4.1}

On POSIX platforms the @code{gpgme_off_t} type is an alias for
@code{off_t}; it may be used interchangeable.  On Windows platforms
@code{gpgme_off_t} is defined as
 a long (i.e. 32 bit) for 32 bit
Windows and as a 64 bit signed integer for 64 bit Windows.
@end deftp

@deftp {Data type} {gpgme_ssize_t}
The @code{gpgme_ssize_t} type is an alias for @code{ssize_t}.  It has
only been introduced to overcome portability problems pertaining to
the declaration of @code{ssize_t} by different toolchains.
@end deftp

@menu
* Creating Data Buffers::  Creating new data buffers.
* Destroying Data Buffers::  Releasing data buffers.
* Manipulating Data Buffers::  Operations on data buffers.
@end menu

@node Creating Data Buffers
@section Creating Data Buffers
@cindex data buffer, creation

Data objects can be based on memory, files, or callback functions
provided by the user.  Not all operations are supported by all
objects.

@menu
* Memory Based Data Buffers::  Creating memory based data buffers.
* File Based Data Buffers::  Creating file based data buffers.
* Callback Based Data Buffers::  Creating callback based data buffers.

@end menu

@node
Memory Based Data Buffers
@subsection Memory Based Data Buffers

Memory based data objects store all data in allocated memory. This is
convenient, but only practical for an amount of data that is a
fraction of the available physical memory. The data has to be copied
from its source and to its destination, which can often be avoided by
using one of the other data object

@deftypefun gpgme_error_t gpgme_data_new (@w{gpgme_data_t *@var{dh}})
The function @code{gpgme_data_new} creates a new @code{gpgme_data_t}
object and returns a handle for it in @var{dh}. The data object is
memory based and initially empty.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, @code{GPG_ERR_INV_VALUE} if
@var{dh} is not a valid pointer, and @code{GPG_ERR_ENOMEM} if not
enough memory is available.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_new_from_mem (@w{gpgme_data_t *@var{dh}}, @w{const char
*@var{buffer}}, @w{size_t @var{size}},
@w{int @var{copy}})
The function @code{gpgme_data_new_from_mem} creates a new
@code{gpgme_data_t} object and fills it with @var{size} bytes starting
from @var{buffer}.

If @var{copy} is not zero, a private copy of the data is made. If
@var{copy} is zero, the data is taken from the specified buffer as
needed, and the user has to ensure that the buffer remains valid for
the whole life span of the data object.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, @code{GPG_ERR_INV_VALUE} if
@var{dh} or @var{buffer} is not a valid pointer, and
@code{GPG_ERR_ENOMEM} if not enough memory is available.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_new_from_file (@w{gpgme_data_t *@var{dh}}, @w{const char
*@var{filename}}, @w{int @var{copy}})
The function @code{gpgme_data_new_from_file} creates a new
@code{gpgme_data_t} object and fills it with the content of the file
@var{filename}.

If @var{copy} is not zero, the whole file is
read in at initialization
time and the file is not used anymore after that. This is the only
mode supported currently. Later, a value of zero for @var{copy} might
cause all reads to be delayed until the data is needed, but this is
not yet implemented.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, @code{GPG_ERR_INV_VALUE} if
@var{dh} or @var{filename} is not a valid pointer,
@code{GPG_ERR_NOT_IMPLEMENTED} if @var{code} is zero, and
@code{GPG_ERR_ENOMEM} if not enough memory is available.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_new_from_filepart (@w{gpgme_data_t *@var{dh}}, @w{const char
*@var{filename}}, @w{FILE *@var{fp}}, @w{off_t @var{offset}}, @w{size_t @var{length}})
The function @code{gpgme_data_new_from_filepart} creates a new
@code{gpgme_data_t} object and fills it with a part of the file specified
by @var{filename} or @var{fp}.

Exactly one of @var{filename} and @var{fp} must be non-zero, the other
must
be zero. The argument that is not zero specifies the file from
which @var{length} bytes are read into the data object, starting from
@var{offset}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, @code{GPG_ERR_INV_VALUE} if
@var{dh} and exactly one of @var{filename} and @var{fp} is not a valid
pointer, and @code{GPG_ERR_ENOMEM} if not enough memory is available.
@end deftypefun

@node File Based Data Buffers
@subsection File Based Data Buffers

File based data objects operate directly on file descriptors or
streams. Only a small amount of data is stored in core at any time,
so the size of the data objects is not limited by @acronym{GPGME}.

@deftypefun gpgme_error_t gpgme_data_new_from_fd (@w{gpgme_data_t *@var{dh}}, @w{int @var{fd}})
The function @code{gpgme_data_new_from_fd} creates a new
@code{gpgme_data_t} object and uses the file descriptor @var{fd} to read
from (if used as an input data object) and write to (if used as
an
output data object).

When using the data object as an input buffer, the function might read

a bit more from the file descriptor than is actually needed by the
crypto engine in the desired operation because of internal buffering.

Note that GPGME assumes that the file descriptor is set to blocking
mode.  Errors during I/O operations, except for EINTR, are usually
fatal for crypto operations.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, and @code{GPG_ERR_ENOMEM} if not
enough memory is available.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_new_from_stream (@w{gpgme_data_t *@var{dh}}, @w{FILE
*@var{stream}})
The function @code{gpgme_data_new_from_stream} creates a new
@code{gpgme_data_t} object and uses the I/O stream @var{stream} to read
from (if used as an input data object) and write to (if used as an
output data object).

When using the data object as an input buffer, the function might read
a bit more from the
 stream than is actually needed by the crypto
engine in the desired operation because of internal buffering.

Note that GPGME assumes that the stream is in blocking mode.  Errors
during I/O operations, except for EINTR, are usually fatal for crypto
operations.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, and @code{GPG_ERR_ENOMEM} if not
enough memory is available.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_new_from_estream (@w{gpgme_data_t *@var{dh}},
@w{gpgrt_stream_t @var{stream}})
The function @code{gpgme_data_new_from_estream} creates a new
@code{gpgme_data_t} object and uses the gpgrt stream @var{stream} to read
from (if used as an input data object) and write to (if used as an
output data object).

When using the data object as an input buffer, the function might read
a bit more from the stream than is actually needed by the crypto
engine in the desired operation because of internal buffering.

Note that GPGME
 assumes that the stream is in blocking mode.  Errors
during I/O operations, except for EINTR, are usually fatal for crypto
operations.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, and @code{GPG_ERR_ENOMEM} if not
enough memory is available.
@end deftypefun

@node Callback Based Data Buffers
@subsection Callback Based Data Buffers

If neither memory nor file based data objects are a good fit for your
application, you can implement the functions a data object provides
yourself and create a data object from these callback functions.

@deftp {Data type} {ssize_t (*gpgme_data_read_cb_t) (@w{void *@var{handle}}, @w{void @var{*buffer}},
@w{size_t @var{size}})}
@tindex gpgme_data_read_cb_t
The @code{gpgme_data_read_cb_t} type is the type of functions which
@acronym{GPGME} calls if it wants to read data from a user-implemented
data object. The function should read up to @var{size} bytes from the
current read position into the space
starting at @var{buffer}. The
@var{handle} is provided by the user at data object creation time.

Note that GPGME assumes that the read blocks until data is available.
Errors during I/O operations, except for EINTR, are usually fatal for
crypto operations.

The function should return the number of bytes read, 0 on EOF, and -1
on error. If an error occurs, @var{errno} should be set to describe
the type of the error.
@end deftp

@deftp {Data type} {ssize_t (*gpgme_data_write_cb_t) (@w{void *@var{handle}}, @w{const void
@var{*buffer}}, @w{size_t @var{size}})}
@tindex gpgme_data_write_cb_t
The @code{gpgme_data_write_cb_t} type is the type of functions which
@acronym{GPGME} calls if it wants to write data to a user-implemented
data object. The function should write up to @var{size} bytes to the
current write position from the space starting at @var{buffer}. The
@var{handle} is provided by the user at data object creation time.

Note that GPGME assumes that the write blocks until data
is available.
Errors during I/O operations, except for EINTR, are usually fatal for
crypto operations.

The function should return the number of bytes written, and -1 on

error.  If an error occurs, @var{errno} should be set to describe the
type of the error.
@end deftp

@deftp {Data type} {off_t (*gpgme_data_seek_cb_t) (@w{void *@var{handle}}, @w{off_t @var{offset}},
@w{int @var{whence}})}
@tindex gpgme_data_seek_cb_t
The @code{gpgme_data_seek_cb_t} type is the type of functions which
@acronym{GPGME} calls if it wants to change the current read/write
position in a user-implemented data object, just like the @code{lseek}
function.

The function should return the new read/write position, and -1 on
error.  If an error occurs, @var{errno} should be set to describe the
type of the error.
@end deftp

@deftp {Data type} {void (*gpgme_data_release_cb_t) (@w{void *@var{handle}})}
@tindex gpgme_data_release_cb_t
The @code{gpgme_data_release_cb_t} type is the type of functions which
@acronym{GPGME}
 calls if it wants to destroy a user-implemented data
object.  The @var{handle} is provided by the user at data object
creation time.
@end deftp

@deftp {Data type} {struct gpgme_data_cbs}
This structure is used to store the data callback interface functions
described above.  It has the following members:

@table @code
@item gpgme_data_read_cb_t read
This is the function called by @acronym{GPGME} to read data from the
data object.  It is only required for input data object.

@item gpgme_data_write_cb_t write
This is the function called by @acronym{GPGME} to write data to the
data object.  It is only required for output data object.

@item gpgme_data_seek_cb_t seek
This is the function called by @acronym{GPGME} to change the current
read/write pointer in the data object (if available).  It is optional.

@item gpgme_data_release_cb_t release
This is the function called by @acronym{GPGME} to release a data
object.  It is optional.
@end table
@end deftp

@deftypefun gpgme_error_t gpgme_data_new_from_cbs
(@w{gpgme_data_t *@var{dh}}, @w{gpgme_data_cbs_t @var{cbs}}, @w{void *@var{handle}})
The function @code{gpgme_data_new_from_cbs} creates a new
@code{gpgme_data_t} object and uses the user-provided callback functions
to operate on the data object.

The handle @var{handle} is passed as first argument to the callback
functions.  This can be used to identify this data object.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, and @code{GPG_ERR_ENOMEM} if not
enough memory is available.
@end deftypefun

@node Destroying Data Buffers
@section Destroying Data Buffers
@cindex data buffer, destruction

@deftypefun void gpgme_data_release (@w{gpgme_data_t @var{dh}})
The function @code{gpgme_data_release} destroys the data object with
the handle @var{dh}.  It releases all associated resources that were
not provided by the user in the first place.
@end deftypefun

@deftypefun {char *} gpgme_data_release_and_get_mem (@w{gpgme_data_t
@var{dh}}, @w{size_t *@var{length}})
The function @code{gpgme_data_release_and_get_mem} is like
@code{gpgme_data_release}, except that it returns the data buffer and
its length that was provided by the object.

The user has to release the buffer with @code{gpgme_free}.  In case
the user provided the data buffer in non-copy mode, a copy will be
made for this purpose.

In case an error returns, or there is no suitable data buffer that can
be returned to the user, the function will return @code{NULL}.  In any
case, the data object @var{dh} is destroyed.
@end deftypefun

@deftypefun void gpgme_free (@w{void *@var{buffer}})
@since{1.1.1}

The function @code{gpgme_free} releases the memory returned by
@code{gpgme_data_release_and_get_mem} and
@code{gpgme_pubkey_algo_string}.  It should be used instead of the

system libraries @code{free} function in case different allocators are
used by a program.  This is often the case if gpgme is used under
Windows as a DLL.
@end deftypefun

@node
 Manipulating Data Buffers
@section Manipulating Data Buffers
@cindex data buffer, manipulation

Data buffers contain data and meta-data.  The following operations can
be used to manipulate both.

@menu
* Data Buffer I/O Operations::  I/O operations on data buffers.
* Data Buffer Meta-Data::  Meta-data manipulation of data buffers.
* Data Buffer Convenience::  Convenience function for data buffers.
@end menu

@node Data Buffer I/O Operations
@subsection Data Buffer I/O Operations
@cindex data buffer, I/O operations
@cindex data buffer, read
@cindex data buffer, write
@cindex data buffer, seek

@deftypefun ssize_t gpgme_data_read (@w{gpgme_data_t @var{dh}}, @w{void *@var{buffer}}, @w{size_t @var{length}})
The function @code{gpgme_data_read} reads up to @var{length} bytes
from the data object with the handle @var{dh} into the space starting
at @var{buffer}.

If no error occurs, the actual amount read is returned.  If the end of
the data object is reached, the function returns
 0.

In all other cases, the function returns -1 and sets @var{errno}.
@end deftypefun

@deftypefun ssize_t gpgme_data_write (@w{gpgme_data_t @var{dh}}, @w{const void *@var{buffer}}, @w{size_t @var{size}})
The function @code{gpgme_data_write} writes up to @var{size} bytes
starting from @var{buffer} into the data object with the handle
@var{dh} at the current write position.

The function returns the number of bytes actually written, or -1 if an
error occurs.  If an error occurs, @var{errno} is set.
@end deftypefun

@deftypefun off_t gpgme_data_seek (@w{gpgme_data_t @var{dh}}, @w{off_t @var{offset}}, @w{int @var{whence}})
The function @code{gpgme_data_seek} changes the current read/write
position.

The @var{whence} argument specifies how the @var{offset} should be
interpreted.  It must be one of the following symbolic constants:

@table @code
@item SEEK_SET
Specifies that @var{offset} is a count of characters from the
beginning of the data object.

@item SEEK_CUR
Specifies that @var{offset}
 is a count of characters from the current
file position.  This count may be positive or negative.

@item SEEK_END
Specifies that @var{offset} is a count of characters from the end of
the data object.  A negative count specifies a position within the
current extent of the data object; a positive count specifies a
position past the current end.  If you set the position past the
current end, and actually write data, you will extend the data object
with zeros up to that position.
@end table

If successful, the function returns the resulting file position,
measured in bytes from the beginning of the data object.  You can use
this feature together with @code{SEEK_CUR} to read the current
read/write position.

If the function fails, -1 is returned and @var{errno} is set.
@end deftypefun

@node Data Buffer Meta-Data
@subsection Data Buffer Meta-Data
@cindex data buffer, meta-data
@cindex data buffer, file name
@cindex data buffer, encoding

@deftypefun {char *} gpgme_data_get_file_name

(@w{gpgme_data_t @var{dh}})
@since{1.1.0}

The function @code{gpgme_data_get_file_name} returns a pointer to a string containing the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting or verifying the output data.

If no error occurs, the string containing the file name is returned. Otherwise, @code{NULL} will be returned.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_set_file_name (@w{gpgme_data_t @var{dh}}, @w{const char *@var{file_name}})
@since{1.1.0}

The function @code{gpgme_data_set_file_name} sets the file name associated with the data object. The file name will be stored in the output when encrypting or signing the data and will be returned to the user when decrypting or verifying the output data.

The function returns the error code @code{GPG_ERR_INV_VALUE} if @var{dh} is not a valid pointer and @code{GPG_ERR_ENOMEM} if not enough memory is available.
@end
deftypefun

@deftp {Data type} {enum gpgme_data_encoding_t}
@tindex gpgme_data_encoding_t
The @code{gpgme_data_encoding_t} type specifies the encoding of a @code{gpgme_data_t} object. For input data objects, the encoding is useful to give the backend a hint on the type of data. For output data objects, the encoding can specify the output data format on certain operations. Please note that not all backends support all encodings on all operations. The following data types are available:

@table @code
@item GPGME_DATA_ENCODING_NONE
This specifies that the encoding is not known. This is the default for a new data object. The backend will try its best to detect the encoding automatically.

@item GPGME_DATA_ENCODING_BINARY
This specifies that the data is encoding in binary form; i.e. there is no special encoding.

@item GPGME_DATA_ENCODING_BASE64
This specifies that the data is encoded using the Base-64 encoding
scheme as used by @acronym{MIME} and other protocols.

@item
GPGME_DATA_ENCODING_ARMOR
This specifies that the data is encoded in an armored form as used by
OpenPGP and PEM.

@item GPGME_DATA_ENCODING_MIME
@since{1.7.0}

This specifies that the data is encoded as a MIME part.

@item GPGME_DATA_ENCODING_URL
@since{1.2.0}

The data is a list of linefeed delimited URLs. This is only useful with
@code{gpgme_op_import}.

@item GPGME_DATA_ENCODING_URL0
@since{1.2.0}

The data is a list of binary zero delimited URLs. This is only useful
with @code{gpgme_op_import}.

@item GPGME_DATA_ENCODING_URLESC
@since{1.2.0}

The data is a list of linefeed delimited URLs with all control and space
characters percent escaped. This mode is is not yet implemented.

@end table
@end deftp

@deftypefun gpgme_data_encoding_t gpgme_data_get_encoding (@w{gpgme_data_t @var{dh}})
The function @code{gpgme_data_get_encoding} returns the encoding of
the data object with the handle @var{dh}. If @var{dh} is not a valid
pointer (e.g. @code{NULL}) @code{GPGME_DATA_ENCODING_NONE}
is
returned.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_set_encoding (@w{gpgme_data_t @var{dh}, gpgme_data_encoding_t
@var{enc}})
The function @code{gpgme_data_set_encoding} changes the encoding of
the data object with the handle @var{dh} to @var{enc}.

@end deftypefun

@deftypefun {gpgme_error_t} gpgme_data_set_flag @
(@w{gpgme_data_t @var{dh}}, @
@w{const char *@var{name}}, @
@w{const char *@var{value}})

@since{1.7.0}

Some minor properties of the data object can be controlled with flags
set by this function. The properties are identified by the following
values for @var{name}:

@table @code
@item size-hint
The value is a decimal number with the length gpgme shall assume for
this data object. This is useful if the data is provided by callbacks
or via file descriptors but the applications knows the total size of
the data. If this is set the OpenPGP engine may use this to decide on
buffer allocation strategies and to provide a total
value for its
progress information.

@end table

This function returns @code{0} on success.
@end deftypefun

@node Data Buffer Convenience
@subsection Data Buffer Convenience Functions
@cindex data buffer, convenience
@cindex type of data
@cindex identify

@deftp {Data type} {enum gpgme_data_type_t}
@tindex gpgme_data_type_t
@since{1.4.3}

The @code{gpgme_data_type_t} type is used to return the detected type
of the content of a data buffer.
@end deftp

@table @code
@item GPGME_DATA_TYPE_INVALID
This is returned by @code{gpgme_data_identify} if it was not possible
to identify the data. Reasons for this might be a non-seekable stream
or a memory problem. The value is 0.

@item GPGME_DATA_TYPE_UNKNOWN
The type of the data is not known.
@item GPGME_DATA_TYPE_PGP_SIGNED
The data is an OpenPGP signed message.  This may be a binary
signature, a detached one or a cleartext signature.
@item GPGME_DATA_TYPE_PGP_ENCRYPTED
@since{1.7.0}

The data is an OpenPGP encrypted message.
@item GPGME_DATA_TYPE_PGP_SIGNATURE
@since{1.7.0}

The
 data is an OpenPGP detached signature.
@item GPGME_DATA_TYPE_PGP_OTHER
This is a generic OpenPGP message.  In most cases this will be
encrypted data.
@item GPGME_DATA_TYPE_PGP_KEY
This is an OpenPGP key (private or public).
@item GPGME_DATA_TYPE_CMS_SIGNED
This is a CMS signed message.
@item GPGME_DATA_TYPE_CMS_ENCRYPTED
This is a CMS encrypted (enveloped data) message.
@item GPGME_DATA_TYPE_CMS_OTHER
This is used for other CMS message types.
@item GPGME_DATA_TYPE_X509_CERT
The data is a X.509 certificate
@item GPGME_DATA_TYPE_PKCS12
The data is a PKCS#12 message.  This is commonly used to exchange
private keys for X.509.
@end table

@deftypefun gpgme_data_type_t gpgme_data_identify (@w{gpgme_data_t @var{dh}})
@since{1.4.3}

The function @code{gpgme_data_identify} returns the type of the data
with the handle @var{dh}.  If it is not possible to perform the
identification, the function returns zero
(@code{GPGME_DATA_TYPE_INVALID}).  Note that depending
 on how the data
object has been created the identification may not be possible or the
data object may change its internal state (file pointer moved).  For
file or memory based data object, the state should not change.
@end deftypefun

@c
@c  Chapter Contexts

```
@c
@node Contexts
@chapter Contexts
@cindex context

All cryptographic operations in @acronym{GPGME} are performed within a
context, which contains the internal state of the operation as well as
configuration parameters.  By using several contexts you can run
several cryptographic operations in parallel, with different
configuration.

@deftp {Data type} {gpgme_ctx_t}
The @code{gpgme_ctx_t} type is a handle for a @acronym{GPGME} context,
which is used to hold the configuration, status and result of
cryptographic operations.
@end deftp

@menu
* Creating Contexts::           Creating new @acronym{GPGME} contexts.
* Destroying Contexts::         Releasing @acronym{GPGME} contexts.
* Result Management::           Managing the
 result of crypto operations.
* Context Attributes::          Setting properties of a context.
* Key Management::              Managing keys with @acronym{GPGME}.
* Crypto Operations::           Using a context for cryptography.
* Miscellaneous::               Miscellaneous operations
* Run Control::                 Controlling how operations are run.
@end menu


@node Creating Contexts
@section Creating Contexts
@cindex context, creation

@deftypefun gpgme_error_t gpgme_new (@w{gpgme_ctx_t *@var{ctx}})
The function @code{gpgme_new} creates a new @code{gpgme_ctx_t} object
and returns a handle for it in @var{ctx}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
context was successfully created, @code{GPG_ERR_INV_VALUE} if
@var{ctx} is not a valid pointer, and @code{GPG_ERR_ENOMEM} if not
enough memory is available.  Also, it returns
@code{GPG_ERR_NOT_OPERATIONAL} if @code{gpgme_check_version} was not
called to initialize GPGME, and @code{GPG_ERR_SELFTEST_FAILED}
 if a
selftest failed.  Currently, the only selftest is for Windows MingW32
targets to see if @code{-mms-bitfields} was used (as required).
@end deftypefun
```

@node Destroying Contexts
@section Destroying Contexts
@cindex context, destruction

@deftypefun void gpgme_release (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_release} destroys the context with the handle
@var{ctx} and releases all associated resources.
@end deftypefun

@node Result Management
@section Result Management
@cindex context, result of operation

The detailed result of an operation is returned in operation-specific
structures such as @code{gpgme_decrypt_result_t}.  The corresponding
retrieval functions such as @code{gpgme_op_decrypt_result} provide
static access to the results after an operation completes.  Those
structures shall be considered read-only and an application must not
allocate such a structure on its own.  The following interfaces make
it possible to detach a result structure from its associated
context
and give it a lifetime beyond that of the current operation or
context.

@deftypefun void gpgme_result_ref (@w{void *@var{result}})
@since{1.2.0}

The function @code{gpgme_result_ref} acquires an additional reference
for the result @var{result}, which may be of any type
@code{gpgme_*_result_t}.  As long as the user holds a reference, the
result structure is guaranteed to be valid and unmodified.
@end deftypefun

@deftypefun void gpgme_result_unref (@w{void *@var{result}})
@since{1.2.0}

The function @code{gpgme_result_unref} releases a reference for the
result @var{result}.  If this was the last reference, the result
structure will be destroyed and all resources associated to it will be
released.
@end deftypefun

Note that a context may hold its own references to result structures,
typically until the context is destroyed or the next operation is
started.  In fact, these references are accessed through the

@code{gpgme_op_*_result} functions.

@node Context Attributes
@section
Context Attributes
@cindex context, attributes

@menu
* Protocol Selection:: Selecting the protocol used by a context.
* Crypto Engine:: Configuring the crypto engine.
* Setting the Sender:: How to tell the engine the sender.
* ASCII Armor:: Requesting @acronym{ASCII} armored output.
* Text Mode:: Choosing canonical text mode.
* Offline Mode:: Choosing offline mode.
* Pinentry Mode:: Choosing the pinentry mode.
* Included Certificates:: Including a number of certificates.
* Key Listing Mode:: Selecting key listing mode.
* Passphrase Callback:: Getting the passphrase from the user.
* Progress Meter Callback:: Being informed about the progress.
* Status Message Callback:: Status messages received from gpg.
* Context Flags:: Additional flags for a context.
* Locale:: Setting the locale of a context.
*
Additional Logs:: Additional logs of a context.
@end menu

@node Protocol Selection
@subsection Protocol Selection
@cindex context, selecting protocol
@cindex protocol, selecting

@deftypefun gpgme_error_t gpgme_set_protocol (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_protocol_t @var{proto}})
The function @code{gpgme_set_protocol} sets the protocol used within
the context @var{ctx} to @var{proto}. All crypto operations will be
performed by the crypto engine configured for that protocol.
@xref{Protocols and Engines}.

Setting the protocol with @code{gpgme_set_protocol} does intentionally
not check if the crypto engine for that protocol is available and
installed correctly. @xref{Engine Version Check}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
protocol could be set successfully, and @code{GPG_ERR_INV_VALUE} if
@var{protocol} is not a valid protocol.
@end deftypefun

@deftypefun gpgme_protocol_t gpgme_get_protocol (@w{gpgme_ctx_t @var{ctx}})
The
 function @code{gpgme_get_protocol} retrieves the protocol currently
use with the context @var{ctx}.
@end deftypefun

@node Crypto Engine
@subsection Crypto Engine
@cindex context, configuring engine
@cindex engine, configuration per context

The following functions can be used to set and retrieve the
configuration of the crypto engines of a specific context.  The
default can also be retrieved without any particular context.
@xref{Engine Information}.  The default can also be changed globally.
@xref{Engine Configuration}.

@deftypefun gpgme_engine_info_t gpgme_ctx_get_engine_info (@w{gpgme_ctx_t @var{ctx}})
@since{1.1.0}

The function @code{gpgme_ctx_get_engine_info} returns a linked list of
engine info structures.  Each info structure describes the
configuration of one configured backend, as used by the context
@var{ctx}.

The result is valid until the next invocation of
@code{gpgme_ctx_set_engine_info} for this particular context.

This function can not fail.
@end deftypefun

@deftypefun
 gpgme_error_t gpgme_ctx_set_engine_info (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_protocol_t
@var{proto}}, @w{const char *@var{file_name}}, @w{const char *@var{home_dir}})
@since{1.1.0}

The function @code{gpgme_ctx_set_engine_info} changes the
configuration of the crypto engine implementing the protocol
@var{proto} for the context @var{ctx}.

@var{file_name} is the file name of the executable program
implementing this protocol, and @var{home_dir} is the directory name
of the configuration directory for this crypto engine.  If
@var{home_dir} is @code{NULL}, the engine's default will be used.

Currently this function must be used before starting the first crypto

operation.  It is unspecified if and when the changes will take effect
if the function is called after starting the first operation on the
context @var{ctx}.

This function returns the error code @code{GPG_ERR_NO_ERROR} if
successful, or an error code on failure.
@end deftypefun

@node Setting the Sender
@subsection How to tell
 the engine the sender.
@cindex context, sender
@cindex sender
@cindex From:

Some engines can make use of the senders address, for example to
figure out the best user id in certain trust models.  For verification
and signing of mails, it is thus suggested to let the engine know the
sender ("From:") address.  @acronym{GPGME} provides two functions to
accomplish that.  Note that the esoteric use of multiple "From:"
addresses is not supported.

@deftypefun gpgme_error_t gpgme_set_sender @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{int @var{address}})

@since{1.8.0}

The function @code{gpgme_set_sender} specifies the sender address for
use in sign and verify operations.  @var{address} is expected to be
the ``addr-spec'' part of an address but my also be a complete mailbox
address, in which case this function extracts the ``addr-spec'' from
it.  Using @code{NULL} for @var{address} clears the sender address.

The function returns 0 on success or an error code on failure.  The
most likely
 failure is that no valid ``addr-spec'' was found in
@var{address}.

@end deftypefun

@deftypefun @w{const char *} gpgme_get_sender @
    (@w{gpgme_ctx_t @var{ctx}})

@since{1.8.0}

The function @code{gpgme_get_sender} returns the current sender

address from the context, or NULL if none was set.  The returned
value is valid as long as the @var{ctx} is valid and
@code{gpgme_set_sender} has not been called again.

@end deftypefun

@c FIXME: Unfortunately, using @acronym here breaks texi2dvi.
@node ASCII Armor
@subsection @acronym{ASCII} Armor
@cindex context, armor mode
@cindex @acronym{ASCII} armor
@cindex armor mode

@deftypefun void gpgme_set_armor (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{yes}})
The function @code{gpgme_set_armor} specifies if the output should be
@acronym{ASCII} armored.  By default, output is not @acronym{ASCII}
armored.

@acronym{ASCII} armored output is disabled if @var{yes} is zero, and
enabled otherwise.
@end deftypefun

@deftypefun int gpgme_get_armor (@w{gpgme_ctx_t
 @var{ctx}})
The function @code{gpgme_get_armor} returns 1 if the output is
@acronym{ASCII} armored, and @code{0} if it is not, or if @var{ctx} is
not a valid pointer.
@end deftypefun

@node Text Mode
@subsection Text Mode
@cindex context, text mode
@cindex text mode
@cindex canonical text mode

@deftypefun void gpgme_set_textmode (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{yes}})
The function @code{gpgme_set_textmode} specifies if canonical text mode
should be used.  By default, text mode is not used.

Text mode is for example used for the RFC2015 signatures; note that
the updated RFC 3156 mandates that the mail user agent does some
preparations so that text mode is not needed anymore.

This option is only relevant to the OpenPGP crypto engine, and ignored
by all other engines.

Canonical text mode is disabled if @var{yes} is zero, and enabled
otherwise.
@end deftypefun

@deftypefun int gpgme_get_textmode (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_get_textmode} returns
1 if canonical text
mode is enabled, and @code{0} if it is not, or if @var{ctx} is not a
valid pointer.
@end deftypefun

@node Offline Mode
@subsection Offline Mode
@cindex context, offline mode
@cindex offline mode

@deftypefun void gpgme_set_offline (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{yes}})
@since{1.6.0}

The function @code{gpgme_set_offline} specifies if offline mode should
be used. Offline mode is disabled if @var{yes} is zero, and enabled
otherwise. By default, offline mode is disabled.

The details of the offline mode depend on the used protocol and its
backend engine. It may eventually be extended to be more stricter and
for example completely disable the use of Dirmngr for any engine.

For the CMS protocol the offline mode specifies whether Dirmngr shall
be used to do additional validation that might require connecting
external services (e.g. CRL / OCSP checks). Here the offline mode
only affects the keylist mode @code{GPGME_KEYLIST_MODE_VALIDATE}.

For the OpenPGP
protocol offline mode entirely disables the use of the
Dirmngr and will thus guarantee that no network connections are done
as part of an operation on this context. It has only an effect with
GnuPG versions 2.1.23 or later.

For all other protocols the offline mode is currently ignored.

@end deftypefun

@deftypefun int gpgme_get_offline (@w{gpgme_ctx_t @var{ctx}})
@since{1.6.0}

The function @code{gpgme_get_offline} returns 1 if offline

mode is enabled, and @code{0} if it is not, or if @var{ctx} is not a
valid pointer.
@end deftypefun

@node Pinentry Mode
@subsection Pinentry Mode
@cindex context, pinentry mode
@cindex pinentry mode

@deftypefun gpgme_error_t gpgme_set_pinentry_mode (@w{gpgme_ctx_t @var{ctx}},
@w{gpgme_pinentry_mode_t @var{mode}})

@since{1.4.0}

The function @code{gpgme_set_pinentry_mode} specifies the pinentry mode
to be used.

For GnuPG >= 2.1 this option is required to be set to
@code{GPGME_PINENTRY_MODE_LOOPBACK} to enable the passphrase callback
mechanism in GPGME
 through @code{gpgme_set_passphrase_cb}.
@end deftypefun

@deftypefun gpgme_pinentry_mode_t gpgme_get_pinentry_mode (@w{gpgme_ctx_t @var{ctx}})
@since{1.4.0}

The function @code{gpgme_get_pinenty_mode} returns the
mode set for the context.
@end deftypefun

@deftp {Data type} {enum gpgme_pinentry_mode_t}
@tindex gpgme_pinentry_mode_t
@since{1.4.0}

The @code{gpgme_minentry_mode_t} type specifies the set of possible pinentry
modes that are supported by @acronym{GPGME} if GnuPG >= 2.1 is used.
The following modes are supported:

@table @code
@item GPGME_PINENTRY_MODE_DEFAULT
@since{1.4.0}

Use the default of the agent, which is ask.

@item GPGME_PINENTRY_MODE_ASK
@since{1.4.0}

Force the use of the Pinentry.

@item GPGME_PINENTRY_MODE_CANCEL
@since{1.4.0}

Emulate use of Pinentry's cancel button.

@item GPGME_PINENTRY_MODE_ERROR
@since{1.4.0}

Return a Pinentry error @code{No Pinentry}.

@item GPGME_PINENTRY_MODE_LOOPBACK
@since{1.4.0}

Redirect Pinentry queries to the caller.
This enables
 the use of @code{gpgme_set_passphrase_cb} because pinentry
queries are redirected to gpgme.

Note: For 2.1.0 - 2.1.12 this mode requires @code{allow-loopback-pinentry}
to be enabled in the @file{gpg-agent.conf} or an agent started with that option.

@end table
@end deftp

@node Included Certificates
@subsection Included Certificates
@cindex certificates, included

@deftypefun void gpgme_set_include_certs (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{nr_of_certs}})
The function @code{gpgme_set_include_certs} specifies how many
certificates should be included in an S/MIME signed message.  By
default, only the sender's certificate is included.  The possible
values of @var{nr_of_certs} are:

@table @code
@item GPGME_INCLUDE_CERTS_DEFAULT
@since{1.0.3}

Fall back to the default of the crypto backend.  This is the default
for GPGME.
@item -2
Include all certificates except the root certificate.
@item -1
Include all certificates.
@item 0

Include no certificates.
@item 1
Include the sender's
certificate only.
@item n
Include the first n certificates of the certificates path, starting
from the sender's certificate. The number @code{n} must be positive.
@end table

Values of @var{nr_of_certs} smaller than -2 are undefined.

This option is only relevant to the CMS crypto engine, and ignored by
all other engines.
@end deftypefun

@deftypefun int gpgme_get_include_certs (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_get_include_certs} returns the number of
certificates to include into an S/MIME signed message.
@end deftypefun

@node Key Listing Mode
@subsection Key Listing Mode
@cindex key listing mode
@cindex key listing, mode of

@deftypefun gpgme_error_t gpgme_set_keylist_mode (@w{gpgme_ctx_t @var{ctx}},
@w{gpgme_keylist_mode_t @var{mode}})
The function @code{gpgme_set_keylist_mode} changes the default
behaviour of the key listing functions. The value in @var{mode} is a
bitwise-or combination of one or multiple of the following bit values:

@table @code
@item GPGME_KEYLIST_MODE_LOCAL
The
@code{GPGME_KEYLIST_MODE_LOCAL} symbol specifies that the local
keyring should be searched for keys in the keylisting operation. This
is the default.

Using only this option results in a @code{--list-keys}.

@item GPGME_KEYLIST_MODE_EXTERN
The @code{GPGME_KEYLIST_MODE_EXTERN} symbol specifies that an external
source should be searched for keys in the keylisting operation. The
type of external source is dependent on the crypto engine used and
whether it is combined with @code{GPGME_KEYLIST_MODE_LOCAL}. For
example, it can be a remote keyserver or LDAP certificate server.

Using only this option results in a @code{--search-keys} for
@code{GPGME_PROTOCOL_OpenPGP} and something similar to
@code{--list-external-keys} for @code{GPGME_PROTOCOL_CMS}.

@item GPGME_KEYLIST_MODE_LOCATE
This is a shortcut for the combination of
@code{GPGME_KEYLIST_MODE_LOCAL} and @code{GPGME_KEYLIST_MODE_EXTERN}, which
results in a @code{--locate-keys} for @code{GPGME_PROTOCOL_OpenPGP}.

@item
GPGME_KEYLIST_MODE_SIGS
The @code{GPGME_KEYLIST_MODE_SIGS} symbol specifies that the key
signatures should be included in the listed keys.

@item GPGME_KEYLIST_MODE_SIG_NOTATIONS
@since{1.1.1}

The @code{GPGME_KEYLIST_MODE_SIG_NOTATIONS} symbol specifies that the
signature notations on key signatures should be included in the listed
keys. This only works if @code{GPGME_KEYLIST_MODE_SIGS} is also
enabled.

@item GPGME_KEYLIST_MODE_WITH_TOFU
@since{1.7.0}

The @code{GPGME_KEYLIST_MODE_WITH_TOFU} symbol specifies that
information pertaining to the TOFU trust model should be included in
the listed keys.

@item GPGME_KEYLIST_MODE_WITH_KEYGRIP
@since{1.14.0}

The @code{GPGME_KEYLIST_MODE_WITH_KEYRIP} symbol specifies that the
keygrip is always included in the listing. The default depends on the
version of the backend and the used protocol.

@item GPGME_KEYLIST_MODE_WITH_SECRET
@since{1.5.1}

The @code{GPGME_KEYLIST_MODE_WITH_SECRET} returns information about
the presence of a corresponding
secret key in a public key listing. A
public key listing with this mode is slower than a standard listing
but can be used instead of a second run to list the secret keys. This
is only supported for GnuPG versions >= 2.1. Note that using this
option also makes sure that the keygrip is available in the output.

@item GPGME_KEYLIST_MODE_EPHEMERAL

@since{1.2.0}

The @code{GPGME_KEYLIST_MODE_EPHEMERAL} symbol specifies that keys
flagged as ephemeral are included in the listing.

@item GPGME_KEYLIST_MODE_VALIDATE
@since{0.4.5}

The @code{GPGME_KEYLIST_MODE_VALIDATE} symbol specifies that the
backend should do key or certificate validation and not just get the
validity information from an internal cache.  This might be an
expensive operation and is in general not useful.  Currently only
implemented for the S/MIME backend and ignored for other backends.

@end table

At least one of @code{GPGME_KEYLIST_MODE_LOCAL} and
@code{GPGME_KEYLIST_MODE_EXTERN} must be specified.  For future binary
compatibility,
you should get the current mode with
@code{gpgme_get_keylist_mode} and modify it by setting or clearing the
appropriate bits, and then using that calculated value in the
@code{gpgme_set_keylisting_mode} operation.  This will leave all other
bits in the mode value intact (in particular those that are not used
in the current version of the library).

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
mode could be set correctly, and @code{GPG_ERR_INV_VALUE} if @var{ctx}
is not a valid pointer or @var{mode} is not a valid mode.
@end deftypefun

@deftypefun gpgme_keylist_mode_t gpgme_get_keylist_mode (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_get_keylist_mode} returns the current key
listing mode of the context @var{ctx}.  This value can then be
modified and used in a subsequent @code{gpgme_set_keylist_mode}
operation to only affect the desired bits (and leave all others
intact).

The function returns 0 if @var{ctx} is not a valid pointer, and
the
current mode otherwise.  Note that 0 is not a valid mode value.
@end deftypefun

@node Passphrase Callback
@subsection Passphrase Callback
@cindex callback, passphrase

@cindex passphrase callback

@deftp {Data type} {gpgme_error_t (*gpgme_passphrase_cb_t)(void *@var{hook}, const char *@var{uid_hint}, const char *@var{passphrase_info}, @w{int @var{prev_was_bad}}, @w{int @var{fd}})}
@tindex gpgme_passphrase_cb_t
The @code{gpgme_passphrase_cb_t} type is the type of functions usable as
passphrase callback function.

The argument @var{uid_hint} might contain a string that gives an
indication for which user ID the passphrase is required. If this is
not available, or not applicable (in the case of symmetric encryption,
for example), @var{uid_hint} will be @code{NULL}.

The argument @var{passphrase_info}, if not @code{NULL}, will give
further information about the context in which the passphrase is
required. This information is engine and operation specific.

If this is the repeated attempt
to get the passphrase, because
previous attempts failed, then @var{prev_was_bad} is 1, otherwise it
will be 0.

The user must write the passphrase, followed by a newline character,
to the file descriptor @var{fd}. The function @code{gpgme_io_writen}
should be used for the write operation. Note that if the user returns
0 to indicate success, the user must at least write a newline
character before returning from the callback.

If an error occurs, return the corresponding @code{gpgme_error_t}
value. You can use the error code @code{GPG_ERR_CANCELED} to abort
the operation. Otherwise, return @code{0}.

Note: The passphrase_cb only works with GnuPG 1.x and 2.1.x and not
with the 2.0.x series. See @code{gpgme_set_pinentry_mode} for more
details on 2.1.x usage.
@end deftp

@deftypefun void gpgme_set_passphrase_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_passphrase_cb_t @var{passfunc}}, @w{void *@var{hook_value}})
The function @code{gpgme_set_passphrase_cb} sets the function that is
used
when a passphrase needs to be provided by the user to
@var{passfunc}. The function @var{passfunc} needs to implemented by
the user, and whenever it is called, it is called with its first
argument being @var{hook_value}. By default, no passphrase callback
function is set.

Not all crypto engines require this callback to retrieve the

passphrase.  It is better if the engine retrieves the passphrase from
a trusted agent (a daemon process), rather than having each user to
implement their own passphrase query.  Some engines do not even
support an external passphrase callback at all, in this case the error
code @code{GPG_ERR_NOT_SUPPORTED} is returned.

For GnuPG >= 2.1 the pinentry mode has to be set to
@code{GPGME_PINENTRY_MODE_LOOPBACK} to enable the passphrase callback.
See @code{gpgme_set_pinentry_mode}.

The user can disable the use of a passphrase callback function by
calling @code{gpgme_set_passphrase_cb} with @var{passfunc} being
@code{NULL}.
@end deftypefun

@deftypefun void gpgme_get_passphrase_cb
 (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_passphrase_cb_t *@var{passfunc}}, @w{void
**@var{hook_value}})
The function @code{gpgme_get_passphrase_cb} returns the function that
is used when a passphrase needs to be provided by the user in
@var{*passfunc}, and the first argument for this function in
@var{*hook_value}.  If no passphrase callback is set, or @var{ctx} is
not a valid pointer, @code{NULL} is returned in both variables.

@var{passfunc} or @var{hook_value} can be @code{NULL}.  In this case,
the corresponding value will not be returned.
@end deftypefun

@node Progress Meter Callback
@subsection Progress Meter Callback
@cindex callback, progress meter
@cindex progress meter callback

@deftp {Data type} {void (*gpgme_progress_cb_t)(void *@var{hook}, const char *@var{what}, int @var{type},
int @var{current}, int @var{total})}
@tindex gpgme_progress_cb_t
The @code{gpgme_progress_cb_t} type is the type of functions usable as
progress callback function.

The arguments are
 specific to the crypto engine.  More information
about the progress information returned from the GnuPG engine can be
found in the GnuPG source code in the file @file{doc/DETAILS} in the
section PROGRESS.
@end deftp

@deftypefun void gpgme_set_progress_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_progress_cb_t

@var{progfunc}}, @w{void *@var{hook_value}})
The function @code{gpgme_set_progress_cb} sets the function that is
used when progress information about a cryptographic operation is
available.  The function @var{progfunc} needs to implemented by the
user, and whenever it is called, it is called with its first argument
being @var{hook_value}.  By default, no progress callback function
is set.

Setting a callback function allows an interactive program to display
progress information about a long operation to the user.

The user can disable the use of a progress callback function by
calling @code{gpgme_set_progress_cb} with @var{progfunc} being
@code{NULL}.
@end deftypefun

@deftypefun void
 gpgme_get_progress_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_progress_cb_t *@var{progfunc}},
@w{void **@var{hook_value}})
The function @code{gpgme_get_progress_cb} returns the function that is
used to inform the user about the progress made in @var{*progfunc},
and the first argument for this function in @var{*hook_value}.  If no
progress callback is set, or @var{ctx} is not a valid pointer,
@code{NULL} is returned in both variables.

@var{progfunc} or @var{hook_value} can be @code{NULL}.  In this case,
the corresponding value will not be returned.
@end deftypefun

@node Status Message Callback
@subsection Status Message Callback
@cindex callback, status message
@cindex status message callback

@deftp {Data type} {gpgme_error_t (*gpgme_status_cb_t)(void *@var{hook}, const char *@var{keyword}, const
char *@var{args})}
@tindex gpgme_status_cb_t
The @code{gpgme_status_cb_t} type is the type of function usable as
a status message callback function.

The argument @var{keyword} is the name
 of the status message while the
@var{args} argument contains any arguments for the status message.

If an error occurs, return the corresponding @code{gpgme_error_t}
value. Otherwise, return @code{0}.
@end deftp

@deftypefun void gpgme_set_status_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_status_cb_t @var{statusfunc}}, @w{void *@var{hook_value}})
@since{1.6.0}

The function @code{gpgme_set_status_cb} sets the function that is used when a status message is received from gpg to @var{statusfunc}. The function @var{statusfunc} needs to be implemented by the user, and whenever it is called, it is called with its first argument being @var{hook_value}. By default, no status message callback function is set.

The user can disable the use of a status message callback function by calling @code{gpgme_set_status_cb} with @var{statusfunc} being @code{NULL}.
@end deftypefun

@deftypefun void gpgme_get_status_cb (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_status_cb_t *@var{statusfunc}}, @w{void **@var{hook_value}})
@since{1.6.0}

The function @code{gpgme_get_status_cb} returns the function that is used to process status messages from gpg in @var{*statusfunc}, and the first argument for this function in @var{*hook_value}. If no status message callback is set, or @var{ctx} is not a valid pointer, @code{NULL} is returned in both variables.
@end deftypefun

@node Context Flags
@subsection Context Flags
@cindex flags, of a context

@deftypefun {gpgme_error_t} gpgme_set_ctx_flag @
    (@w{gpgme_ctx_t @var{ctx}}, @
    @w{const char *@var{name}}, @
    @w{const char *@var{value}})

@since{1.7.0}

Some minor properties of the context can be controlled with flags set by this function. The properties are identified by the following values for @var{name}:

@table @code
@item "redraw"
This flag is normally not changed by the caller because GPGME sets and clears it automatically: The flag is cleared before an operation and set if an operation noticed that the engine has launched

a Pinentry.
A Curses based application may use this information to redraw the
screen; for example:

```
@example
  err = gpgme_op_keylist_start (ctx, "foo@@example.org", 0);
  while (!err)
    @{
      err = gpgme_op_keylist_next (ctx, &key);
      if (err)
        break;
      show_key (key);
      gpgme_key_release (key);
    @}
  if ((s = gpgme_get_ctx_flag (ctx, "redraw")) && *s)
    redraw_screen ();
  gpgme_release (ctx);
@end example
```

@item "full-status"
Using a @var{value} of "1" the status callback set by
gpgme_set_status_cb returns all status lines with the exception of
PROGRESS lines.  With the default of "0" the status callback is only
called in certain situations.

@item "raw-description"
Setting the @var{value} to "1" returns human readable strings in a raw
format.  For example the non breaking space characters ("~") will not
be removed from the @code{description} field of the
@code{gpgme_tofu_info_t} object.

@item "export-session-key"
Using a @var{value}
of "1" specifies that the context should try to
export the symmetric session key when decrypting data.  By default, or
when using an empty string or "0" for @var{value}, session keys are
not exported.

@item "override-session-key"
The string given in @var{value} is passed to the GnuPG engine to override
the session key for decryption.  The format of that session key is
specific to GnuPG and can be retrieved during a decrypt operation when
the context flag "export-session-key" is enabled.  Please be aware that
using this feature with GnuPG < 2.1.16 will leak the session key on
many platforms via ps(1).

@item "auto-key-retrieve"

Setting the @var{value} to "1" asks the backend to automatically
retrieve a key for signature verification if possible.  Note that this
option makes a "web bug" like behavior possible.  Keyserver or Web Key
Directory operators can see which keys you request, so by sending you
a message signed by a brand new key (which you naturally will not have
on your
 local keyring), the operator can tell both your IP address and
the time when you verified the signature.

@item "auto-key-import"
Setting the @var{value} to "1" forces the GPG backend to automatically
import a missing key for signature verification from the signature.

@item "include-key-block"
Setting the @var{value} to "1" forces the GPG backend to embed the
signing key as well as an encryption subkey into the the signature.

@item "request-origin"
The string given in @var{value} is passed to the GnuPG engines to
request restrictions based on the origin of the request.  Valid values
are documented in the GnuPG manual and the gpg man page under the
option @option{--request-origin}.  Requires at least GnuPG 2.2.6 to have an
effect.

@item "no-symkey-cache"
For OpenPGP disable the passphrase cache used for symmetrical en- and
decryption.  This cache is based on the message specific salt value.
Requires at least GnuPG 2.2.7 to have an effect.

@item "ignore-mdc-error"
This flag passes
 the option @option{--ignore-mdc-error} to gpg.  This
can be used to force decryption of a message which failed due to a
missing integrity check.  This flag must be used with great caution
and only if it is a known non-corrupted old message and the decryption
result of the former try had the decryption result flag
@code{legacy_cipher_nomdc} set.  For failsafe reasons this flag is
reset after each operation.

@item "auto-key-locate"
The string given in @var{value} is passed to gpg.  This can be used
to change the behavior of a @code{GPGME_KEYLIST_MODE_LOCATE} keylisting.
Valid values are documented in the GnuPG manual and the gpg man page under
the option @option{--auto-key-locate}.
Requires at least GnuPG 2.1.18.

Note: Keys retrieved through @code{auto-key-locate} are automatically
imported in the keyring.

@item trust-model
@since{1.11.2}

Change the trust-model for all GnuPG engine operations.  An empty string sets the trust-model back to the users default.  If the trust-model is not
supported by GnuPG the behavior is undefined
and will likely cause all operations to fail.  Example: "tofu+pgp".

This options should be used carefully with a strict version requirement.  In some versions of GnuPG setting the trust-model changes the default trust-model for future operations.
A change in the trust-model also can have unintended side effects, like rebuilding the trust-db.

@item "extended-edit"
This flag passes the option @option{--expert} to gpg key edit.  This can be used to get additional callbacks in @code{gpgme_op_edit}.

@end table

This function returns @code{0} on success.
@end deftypefun

@deftypefun {const char *} gpgme_get_ctx_flag  @
        (@w{gpgme_ctx_t @var{ctx}}, @
        @w{const char *@var{name}})

@since{1.8.0}

The value of flags settable by @code{gpgme_set_ctx_flag} can be retrieved by this function.  If @var{name} is unknown the function returns @code{NULL}.  For boolean flags an empty string is returned for False and the string "1" is
returned for True; either atoi(3) or a
test for an empty string can be used to get the boolean value.

@end deftypefun

@node Locale
@subsection Locale
@cindex locale, default
@cindex locale, of a context

A locale setting can be associated with a context.  This locale is

passed to the crypto engine, and used for applications like the PIN
entry, which is displayed to the user when entering a passphrase is
required.

The default locale is used to initialize the locale setting of all
contexts created afterwards.

@deftypefun gpgme_error_t gpgme_set_locale (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{category}},
@w{const char *@var{value}})
@since{0.4.3}

The function @code{gpgme_set_locale} sets the locale of the context
@var{ctx}, or the default locale if @var{ctx} is a null pointer.

The locale settings that should be changed are specified by
@var{category}.  Supported categories are @code{LC_CTYPE},
@code{LC_MESSAGES}, and @code{LC_ALL}, which is a wildcard you can use
if you want to change
 all the categories at once.

The value to be used for the locale setting is @var{value}, which will
be copied to @acronym{GPGME}'s internal data structures.  @var{value}
can be a null pointer, which disables setting the locale, and will
make PIN entry and other applications use their default setting, which
is usually not what you want.

Note that the settings are only used if the application runs on a text
terminal, and that the settings should fit the configuration of the
output terminal.  Normally, it is sufficient to initialize the default
value at startup.

The function returns an error if not enough memory is available.
@end deftypefun

@node Additional Logs
@subsection Additional Logs
@cindex auditlog, of the engine
@cindex auditlog

Additional logs can be associated with a context.  These logs are
engine specific and can be be obtained with @code{gpgme_op_getauditlog}.

@deftypefun gpgme_error_t gpgme_op_getauditlog @
	(@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{output}},
 @
	@w{unsigned int @var{flags}})
@since{1.1.1}

The function @code{gpgme_op_getauditlog} is used to obtain additional
logs as specified by @var{flags} into the @var{output} data.  If

The function returns the error code @code{GPG_ERR_NO_ERROR} if a
log could be queried from the engine, and @code{GPG_ERR_NOT_IMPLEMENTED}
if the log specified in @var{flags} is not available for this engine.
If no log is available @code{GPG_ERR_NO_DATA} is returned.

The value in @var{flags} is a bitwise-or combination of one or
multiple of the following bit values:

@table @code
@item GPGME_AUDITLOG_DIAG
@since{1.11.2}

Obtain diagnostic output which would be written to @code{stderr} in
interactive use of the engine.  This can be used to provide additional
diagnostic information in case of errors in other operations.

Note: If log-file has been set in the configuration the log will
be empty and @code{GPG_ERR_NO_DATA} will be returned.

Implemented for: @code{GPGME_PROTOCOL_OpenPGP}

@item
 GPGME_AUDITLOG_DEFAULT
@since{1.11.2}

This flag has the value 0 for compatibility reasons.  Obtains additional
information from the engine by issuing the @code{GETAUDITLOG} command.
For @code{GPGME_PROTOCOL_CMS} this provides additional information about
the X509 certificate chain.

Implemented for: @code{GPGME_PROTOCOL_CMS}

@item GPGME_AUDITLOG_HTML
@since{1.1.1}

Same as @code{GPGME_AUDITLOG_DEFAULT} but in HTML.

Implemented for: @code{GPGME_PROTOCOL_CMS}
@end table
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_getauditlog_start @
    (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{output}}, @
    @w{unsigned int @var{flags}})

```
@since{1.1.1}

This is the asynchronous variant of @code{gpgme_op_getauditlog}.
@end deftypefun

@node Key Management
@section Key Management
@cindex key management

Some of the cryptographic operations require that recipients or
signers are specified.  This is always done by specifying the
respective keys that should be used
 for the operation.  The following
section describes how such keys can be selected and manipulated.


@menu
* Key objects::                 Description of the key structures.
* Listing Keys::                Browsing the list of available keys.
* Information About Keys::      Requesting detailed information about keys.
* Manipulating Keys::           Operations on keys.
* Generating Keys::             Creating new key pairs.
* Signing Keys::                Adding key signatures to public keys.
* Exporting Keys::              Retrieving key data from the key ring.
* Importing Keys::              Adding keys to the key ring.
* Deleting Keys::               Removing keys from the key ring.
* Changing Passphrases::        Change the passphrase of a key.
* Changing TOFU Data::          Changing data pertaining to TOFU.
* Advanced Key Editing::        Advanced key edit operation.
@end menu

@node Key objects
@subsection Key objects

The keys are represented in GPGME by
 structures which may only be read
by the application but never be allocated or changed.  They are valid
as long as the key object itself is valid.

@deftp {Data type} gpgme_key_t

The @code{gpgme_key_t} type is a pointer to a key object.  It has the
following members:

@table @code
@item gpgme_keylist_mode_t keylist_mode
@since{0.9.0}
```

The keylist mode that was active when the key was retrieved.

@item unsigned int revoked : 1
This is true if the key is revoked.

@item unsigned int expired : 1
This is true if the key is expired.

@item unsigned int disabled : 1
This is true if the key is disabled.

@item unsigned int invalid : 1
This is true if the key is invalid. This might have several reasons,
for a example for the S/MIME backend, it will be set during key
listings if the key could not be validated due to missing
certificates or unmatched policies.

@item unsigned int can_encrypt : 1
This is true if the key (ie one of its subkeys) can be used for
encryption.

@item unsigned int can_sign
: 1
This is true if the key (ie one of its subkeys) can be used to create
data signatures.

@item unsigned int can_certify : 1
This is true if the key (ie one of its subkeys) can be used to create
key certificates.

@item unsigned int can_authenticate : 1
@since{0.4.5}

This is true if the key (ie one of its subkeys) can be used for
authentication.

@item unsigned int is_qualified : 1
@since{1.1.0}

This is true if the key can be used for qualified signatures according
to local government regulations.

@item unsigned int secret : 1
This is true if the key is a secret key. Note, that this will always
be true even if the corresponding subkey flag may be false
(offline/stub keys). This is only set if a listing of secret keys has
been requested or if @code{GPGME_KEYLIST_MODE_WITH_SECRET} is active.

@item unsigned int origin : 5
@since{1.8.0}

Reserved for the origin of this key.

@item gpgme_protocol_t protocol
This is the protocol supported by this key.

@item char *issuer_serial
If
 @code{protocol} is @code{GPGME_PROTOCOL_CMS}, then this is the
issuer serial.

@item char *issuer_name
If @code{protocol} is @code{GPGME_PROTOCOL_CMS}, then this is the
issuer name.

@item char *chain_id
If @code{protocol} is @code{GPGME_PROTOCOL_CMS}, then this is the
chain ID, which can be used to built the certificate chain.

@item gpgme_validity_t owner_trust
If @code{protocol} is @code{GPGME_PROTOCOL_OpenPGP}, then this is the
owner trust.

@item gpgme_subkey_t subkeys
This is a linked list with the subkeys of the key.  The first subkey
in the list is the primary key and usually available.

@item gpgme_user_id_t uids
This is a linked list with the user IDs of the key.  The first user ID
in the list is the main (or primary) user ID.

@item char *fpr
@since{1.7.0}

This field gives the fingerprint of the primary key.  Note that
this is a copy of the fingerprint of the first subkey.  For an
incomplete key (for example from a verification result) a subkey may
be missing but this field
 may be set nevertheless.

@item unsigned long last_update
@since{1.8.0}

Reserved for the time of the last update of this key.

@end table

@end deftp

@deftp {Data type} gpgme_subkey_t
@since{1.5.0}

The @code{gpgme_subkey_t} type is a pointer to a subkey structure. Subkeys are one component of a @code{gpgme_key_t} object. In fact, subkeys are those parts that contains the real information about the individual cryptographic keys that belong to the same key object. One @code{gpgme_key_t} can contain several subkeys. The first subkey in the linked list is also called the primary key.

The subkey structure has the following members:

@table @code
@item gpgme_subkey_t next
This is a pointer to the next subkey structure in the linked list, or @code{NULL} if this is the last element.

@item unsigned int revoked : 1
This is true if the subkey is revoked.

@item unsigned int expired : 1
This is true if the subkey is expired.

@item unsigned int disabled : 1
This is true if the subkey
is disabled.

@item unsigned int invalid : 1
This is true if the subkey is invalid.

@item unsigned int can_encrypt : 1
This is true if the subkey can be used for encryption.

@item unsigned int can_sign : 1
This is true if the subkey can be used to create data signatures.

@item unsigned int can_certify : 1
This is true if the subkey can be used to create key certificates.

@item unsigned int can_authenticate : 1
@since{0.4.5}

This is true if the subkey can be used for authentication.

@item unsigned int is_qualified : 1

@since{1.1.0}

This is true if the subkey can be used for qualified signatures
according to local government regulations.

@item unsigned int is_de_vs : 1
@since{1.8.0}

This is true if the subkey complies with the rules for classified
information in Germany at the restricted level (VS-NfD). This are
currently RSA keys of at least 2048 bits or ECDH/ECDSA keys using a
Brainpool curve.

@item unsigned int secret : 1
This is true if the subkey is a secret key. Note that
it will be
false if the key is actually a stub key; i.e. a secret key operation
is currently not possible (offline-key). This is only set if a
listing of secret keys has been requested or if
@code{GPGME_KEYLIST_MODE_WITH_SECRET} is active.

@item gpgme_pubkey_algo_t pubkey_algo
This is the public key algorithm supported by this subkey.

@item unsigned int length
This is the length of the subkey (in bits).

@item char *keyid
This is the key ID of the subkey in hexadecimal digits.

@item char *fpr
This is the fingerprint of the subkey in hexadecimal digits, if
available.

@item char *keygrip
@since{1.7.0}

The keygrip of the subkey in hex digit form or @code{NULL} if not
available.

@item long int timestamp
This is the creation timestamp of the subkey. This is -1 if the
timestamp is invalid, and 0 if it is not available.

@item long int expires
This is the expiration timestamp of the subkey, or 0 if the subkey
does not expire.

@item unsigned int is_cardkey : 1
@since{1.2.0}

True if
 the secret key is stored on a smart card.

@item char *card_number
@since{1.2.0}

The serial number of a smart card holding this key or @code{NULL}.

@item char *curve
For ECC algorithms the name of the curve.

@end table
@end deftp

@deftp {Data type} gpgme_user_id_t

A user ID is a component of a @code{gpgme_key_t} object.  One key can
have many user IDs.  The first one in the list is the main (or
primary) user ID.

The user ID structure has the following members.

@table @code
@item gpgme_user_id_t next
This is a pointer to the next user ID structure in the linked list, or
@code{NULL} if this is the last element.

@item unsigned int revoked : 1
This is true if the user ID is revoked.

@item unsigned int invalid : 1
This is true if the user ID is invalid.

@item gpgme_validity_t validity
This specifies the validity of the user ID.

@item char *uid
This is the user ID string.

@item char *name
This is the name component of @code{uid}, if available.

@item char *comment
This is the comment

component of @code{uid}, if available.

@item char *email
This is the email component of @code{uid}, if available.

@item char *address;
The mail address (addr-spec from RFC-5322) of the user ID string.
This is general the same as the @code{email} part of this structure
but might be slightly different. If no mail address is available
@code{NULL} is stored.

@item gpgme_tofu_info_t tofu
@since{1.7.0}

If not @code{NULL} information from the TOFU database pertaining to
this user id.

@item gpgme_key_sig_t signatures
This is a linked list with the signatures on this user ID.

@item unsigned int origin : 5
@since{1.8.0}

Reserved for the origin of this user ID.

@item unsigned long last_update
@since{1.8.0}

Reserved for the time of the last update of this user ID.

@item char *uidhash;
A string used by gpg to identify a user ID. This string can be used
at certain prompts of @code{gpgme_op_edit} to select a user ID. Users
must be prepared to see a @code{NULL} value here. The format
of the
value is not specified and may depend on the GPGME or GnuPG version.

@end table
@end deftp

@deftp {Data type} gpgme_tofu_info_t

@since{1.7.0}

The @code{gpgme_tofu_info_t} type is a pointer to a tofu info
structure. Tofu info structures are one component of a
@code{gpgme_user_id_t} object, and provide information from the TOFU

database pertaining to the user ID.

The tofu info structure has the following members:

@table @code
@item gpgme_key_sig_t next
This is a pointer to the next tofu info structure in the linked
list, or @code{NULL} if this is the last element.

@item unsigned int validity : 3
This is the TOFU validity.  It can have the following values:

@table @code
@item 0
The value @code{0} indicates a conflict.

@item 1
The value @code{1} indicates a key without history.

@item 2
The value @code{2} indicates a key with too little history.

@item 3
The value @code{3} indicates a key with enough history for basic trust.

@item 4
The value @code{4} indicates a key
 with a lot of history.

@end table

@item unsigned int policy : 4
This is the TOFU policy, see @code{gpgme_tofu_policy_t}.

@item unsigned short signcount
This is the number of signatures seen for this binding (or
@code{USHRT_MAX} if there are more than that).

@item unsigned short encrcount
This is the number of encryptions done with this binding (or
@code{USHRT_MAX} if there are more than that).

@item unsigned long signfirst
Number of seconds since Epoch when the first signature was seen with
this binding.

@item unsigned long signlast
Number of seconds since Epoch when the last signature was seen with

this binding.

@item unsigned long encrfirst
Number of seconds since Epoch when the first encryption was done with
this binding.

@item unsigned long encrlast
Number of seconds since Epoch when the last encryption was done with
this binding.

@item char *description
A human-readable string summarizing the TOFU data (or NULL).

@end table
@end deftp

@deftp {Data type} gpgme_key_sig_t

The
@code{gpgme_key_sig_t} type is a pointer to a key signature structure.
Key signatures are one component of a @code{gpgme_key_t} object, and
validate user IDs on the key in the OpenPGP protocol.

The signatures on a key are only available if the key was retrieved
via a listing operation with the @code{GPGME_KEYLIST_MODE_SIGS} mode
enabled, because it can be expensive to retrieve all signatures of a
key.

The signature notations on a key signature are only available if the
key was retrieved via a listing operation with the
@code{GPGME_KEYLIST_MODE_SIG_NOTATIONS} mode enabled, because it can
be expensive to retrieve all signature notations.

The key signature structure has the following members:

@table @code
@item gpgme_key_sig_t next
This is a pointer to the next key signature structure in the linked
list, or @code{NULL} if this is the last element.

@item unsigned int revoked : 1
This is true if the key signature is a revocation signature.

@item unsigned int expired : 1
This is
true if the key signature is expired.

@item unsigned int invalid : 1
This is true if the key signature is invalid.

@item unsigned int exportable : 1
This is true if the key signature is exportable.

@item gpgme_pubkey_algo_t pubkey_algo
This is the public key algorithm used to create the signature.

@item char *keyid
This is the key ID of the key (in hexadecimal digits) used to create the signature.

@item long int timestamp
This is the creation timestamp of the key signature. This is -1 if the timestamp is invalid, and 0 if it is not available.

@item long int expires
This is the expiration timestamp of the key signature, or 0 if the key signature does not expire.

@item gpgme_error_t status
This is the status of the signature and has the same meaning as the member of the same name in a @code{gpgme_signature_t} object.

@item unsigned int sig_class
This specifies the signature class of the key signature. The meaning is specific to the crypto engine.

@item char *uid
This is the main
user ID of the key used to create the signature.

@item char *name
This is the name component of @code{uid}, if available.

@item char *comment
This is the comment component of @code{uid}, if available.

@item char *email
This is the email component of @code{uid}, if available.

@item gpgme_sig_notation_t notations
This is a linked list with the notation data and policy URLs.
@end table
@end deftp

@node Listing Keys
@subsection Listing Keys
@cindex listing keys
@cindex key listing
@cindex key listing, start
@cindex key ring, list
@cindex key ring, search

@deftypefun gpgme_error_t gpgme_op_keylist_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{pattern}}, @w{int @var{secret_only}})

The function @code{gpgme_op_keylist_start} initiates a key listing operation inside the context @var{ctx}. It sets everything up so that subsequent invocations of @code{gpgme_op_keylist_next} return the keys in the list.

If @var{pattern} is @code{NULL}, all available keys are returned. Otherwise,
@var{pattern} contains an engine specific expression that is used to limit the list to all keys matching the pattern. Note that the total length of the pattern is restricted to an engine-specific maximum (a couple of hundred characters are usually accepted). The pattern should be used to restrict the search to a certain common name or user, not to list many specific keys at once by listing their fingerprints or key IDs.

If @var{secret_only} is not @code{0}, the list is restricted to secret keys only.

The context will be busy until either all keys are received (and @code{gpgme_op_keylist_next} returns @code{GPG_ERR_EOF}), or @code{gpgme_op_keylist_end} is called to finish the operation.

The function returns the error code @code{GPG_ERR_INV_VALUE} if @var{ctx} is not a valid pointer, and passes through any errors that are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_keylist_ext_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{pattern}[]}, @w{int @var{secret_only}}, @w{int @var{reserved}})

The function @code{gpgme_op_keylist_ext_start} initiates an extended key listing operation inside the context @var{ctx}. It sets everything up so that subsequent invocations of @code{gpgme_op_keylist_next} return the keys in the list.

If @var{pattern} or @var{*pattern} is @code{NULL}, all available keys

are returned.  Otherwise, @var{pattern} is a @code{NULL} terminated
array of strings that are used to limit the list to all keys matching
at least one of the patterns verbatim.  Note that the total length of
all patterns is restricted to an engine-specific maximum (the exact
limit also depends on the number of patterns and amount of quoting
required, but a couple of hundred characters are usually accepted).
Patterns should be used to restrict the search to a certain common
name or user, not to list many specific keys at once by listing their
fingerprints or key IDs.

If @var{secret_only} is not @code{0}, the list
 is restricted to secret
keys only.

The value of @var{reserved} must be @code{0}.

The context will be busy until either all keys are received (and
@code{gpgme_op_keylist_next} returns @code{GPG_ERR_EOF}), or
@code{gpgme_op_keylist_end} is called to finish the operation.

The function returns the error code @code{GPG_ERR_INV_VALUE} if
@var{ctx} is not a valid pointer, and passes through any errors that
are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_keylist_from_data_start @
        (@w{gpgme_ctx_t @var{ctx}}, @
         @w{gpgme_data_t @var{data}}, @
         @w{int @var{reserved}})

@since{1.8.0}

The function @code{gpgme_op_keylist_from_data_start} initiates a key
listing operation inside the context @var{ctx}.  In contrast to the
other key listing operation the keys are read from the supplied
@var{data} and not from the local key database.  The keys are also not
imported into the local key database.  The function
 sets everything up
so that subsequent invocations of @code{gpgme_op_keylist_next} return
the keys from @var{data}.

The value of @var{reserved} must be @code{0}.

This function requires at least GnuPG version 2.1.14 and currently
works only with OpenPGP keys.

The context will be busy until either all keys are received (and
@code{gpgme_op_keylist_next} returns @code{GPG_ERR_EOF}), or

@code{gpgme_op_keylist_end} is called to finish the operation.
While the context is busy @var{data} may not be released.

The function returns the error code @code{GPG_ERR_INV_VALUE} if
@var{ctx} is not a valid pointer, and passes through any errors that
are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_keylist_next (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t *@var{r_key}})

The function @code{gpgme_op_keylist_next} returns the next key in the
list created by a previous @code{gpgme_op_keylist_start} operation in
the context @var{ctx}.  The key will have
 one reference for the user.
@xref{Manipulating Keys}.

This is the only way to get at @code{gpgme_key_t} objects in
@acronym{GPGME}.

If the last key in the list has already been returned,
@code{gpgme_op_keylist_next} returns @code{GPG_ERR_EOF}.

The function returns the error code @code{GPG_ERR_INV_VALUE} if
@var{ctx} or @var{r_key} is not a valid pointer, and
@code{GPG_ERR_ENOMEM} if there is not enough memory for the operation.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_keylist_end (@w{gpgme_ctx_t @var{ctx}})

The function @code{gpgme_op_keylist_end} ends a pending key list
operation in the context @var{ctx}.

After the operation completed successfully, the result of the key
listing operation can be retrieved with
@code{gpgme_op_keylist_result}.

The function returns the error code @code{GPG_ERR_INV_VALUE} if
@var{ctx} is not a valid pointer, and @code{GPG_ERR_ENOMEM} if at some
time during the operation there was not enough memory available.
@end deftypefun

The following
 example illustrates how all keys containing a certain
string (@code{g10code}) can be listed with their key ID and the name
and email address of the main user ID:

@example

```
gpgme_ctx_t ctx;
gpgme_key_t key;
gpgme_error_t err = gpgme_new (&ctx);

if (!err)
 @{
   err = gpgme_op_keylist_start (ctx, "g10code", 0);
   while (!err)
     @{
       err = gpgme_op_keylist_next (ctx, &key);
       if (err)
         break;
       printf ("%s:", key->subkeys->keyid);
       if (key->uids && key->uids->name)
         printf (" %s", key->uids->name);
       if (key->uids && key->uids->email)
         printf (" <%s>", key->uids->email);
       putchar ('\n');
       gpgme_key_release (key);
     @}
   gpgme_release (ctx);
 @}
if (gpg_err_code (err) != GPG_ERR_EOF)
 @{
   fprintf (stderr, "can not list keys: %s\n", gpgme_strerror (err));
   exit (1);
 @}
@end example

@deftp {Data type} {gpgme_keylist_result_t}
This is a pointer to a structure used to store the result of a
@code{gpgme_op_keylist_*}
 operation.  After successfully ending a key
listing operation, you can retrieve the pointer to the result with
@code{gpgme_op_keylist_result}.  The structure contains the following
member:

@table @code
@item unsigned int truncated : 1
This is true if the crypto backend had to truncate the result, and
less than the desired keys could be listed.
@end table
@end deftp

@deftypefun gpgme_keylist_result_t gpgme_op_keylist_result (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_op_keylist_result} returns a
@code{gpgme_keylist_result_t} pointer to a structure holding the
result of a @code{gpgme_op_keylist_*} operation.  The pointer is only
```

valid if the last operation on the context was a key listing
operation, and if this operation finished successfully. The returned
pointer is only valid until the next operation is started on the
context.
@end deftypefun

In a simple program, for which a blocking operation is acceptable, the
following function can be used to retrieve
a single key.

@deftypefun gpgme_error_t gpgme_get_key (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{fpr}},
@w{gpgme_key_t *@var{r_key}}, @w{int @var{secret}})
The function @code{gpgme_get_key} gets the key with the fingerprint
(or key ID) @var{fpr} from the crypto backend and return it in
@var{r_key}. If @var{secret} is true, get the secret key. The
currently active keylist mode is used to retrieve the key. The key
will have one reference for the user.

If the key is not found in the keyring, @code{gpgme_get_key} returns
the error code @code{GPG_ERR_EOF} and *@var{r_key} will be set to
@code{NULL}.

The function returns the error code @code{GPG_ERR_INV_VALUE} if
@var{ctx} or @var{r_key} is not a valid pointer or @var{fpr} is not a
fingerprint or key ID, @code{GPG_ERR_AMBIGUOUS_NAME} if the key ID was
not a unique specifier for a key, and @code{GPG_ERR_ENOMEM} if at some
time during the operation there was not enough memory available.
@end deftypefun

@node Information About Keys
@subsection
Information About Keys
@cindex key, information about
@cindex key, attributes
@cindex attributes, of a key

Please see the beginning of this section for more information about
@code{gpgme_key_t} objects.

@deftp {Data type} gpgme_validity_t
The @code{gpgme_validity_t} type is used to specify the validity of a user ID
in a key. The following validities are defined:

@table @code
@item GPGME_VALIDITY_UNKNOWN
The user ID is of unknown validity. The string representation of this
validity is ``?''.

```
@item GPGME_VALIDITY_UNDEFINED
The validity of the user ID is undefined.  The string representation of this
validity is ``q''.

@item GPGME_VALIDITY_NEVER
The user ID is never valid.  The string representation of this
validity is ``n''.

@item GPGME_VALIDITY_MARGINAL
The user ID is marginally valid.  The string representation of this
validity is ``m''.

@item GPGME_VALIDITY_FULL
The user ID is fully valid.  The string representation of this
validity is ``f''.

@item GPGME_VALIDITY_ULTIMATE
The
 user ID is ultimately valid.  The string representation of this
validity is ``u''.
@end table
@end deftp




@node Manipulating Keys
@subsection Manipulating Keys
@cindex key, manipulation

@deftypefun void gpgme_key_ref (@w{gpgme_key_t @var{key}})
The function @code{gpgme_key_ref} acquires an additional reference for
the key @var{key}.
@end deftypefun

@deftypefun void gpgme_key_unref (@w{gpgme_key_t @var{key}})
The function @code{gpgme_key_unref} releases a reference for the key
@var{key}.  If this was the last reference, the key will be destroyed
and all resources associated to it will be released.
@end deftypefun

@c
@c  gpgme_op_setexpire
@c
@deftypefun gpgme_error_t gpgme_op_setexpire @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
```

```
    @w{unsigned long @var{expires}}, @
    @w{const char *@var{subfprs}}, @
    @w{unsigned int @var{reserved}});

@since{1.14.1}

The function @code{gpgme_op_setexpire} sets the expiration time of
the
 key @var{key} or of the specified subkeys.
This function requires at least version 2.1.22 of GnuPG.

@var{key} specifies the key to operate on.

@var{expires} specifies the expiration time in seconds from now.
To be similar to other usages where expiration times are provided
in unsigned long this is similar to the key creation date
and so it is in seconds from NOW.

The common case is to use 0 to not set an expiration time.
Note that this parameter takes an unsigned long value and not
a @code{time_t} to avoid problems on systems which use a signed
32 bit @code{time_t}.  Note further that the OpenPGP protocol
uses 32 bit values for timestamps and thus can
only encode dates up to the year 2106.

@var{subfprs} selects the subkey(s) for which the expiration time
should be set.  If @var{subfprs} is set to @code{NULL}, then the
expiration time of the primary key is set.  If @var{subfprs} is
an asterisk (@code{*}), then the expiration times of all non-revoked
and not yet expired subkeys are set.
  To select more than one subkey
put all subkey fingerprints into one string separated by linefeeds
characters (@code{\n}).

@var{reserved} is reserved for later use and must be @code{0}.

@end deftypefun


@deftypefun gpgme_error_t gpgme_op_setexpire_start @
   (@w{gpgme_ctx_t @var{ctx}}, @
    @w{gpgme_key_t @var{key}}, @
    @w{unsigned long @var{expires}}, @
    @w{const char *@var{subfprs}}, @
    @w{unsigned int @var{flags}});

@since{1.14.1}
```

The function @code{gpgme_op_setexpire_start} initiates a
@code{gpgme_op_setexpire} operation; see there for details.  It must
be completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun

@deftypefun gpgme_error_t gpgme_op_revuid_start @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}}, @
     @w{unsigned int @var{flags}});

@since{1.14.1}

The function @code{gpgme_op_setexpire_start} initiates a
@code{gpgme_op_setexpire}
 operation; see there for details.  It must
be completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun

@node Generating Keys
@subsection Generating Keys
@cindex key, creation
@cindex key ring, add

GPGME provides a set of functions to create public key pairs.  Most of
these functions require the use of GnuPG 2.1 and later; for older
GnuPG versions the @code{gpgme_op_genkey} function can be used.
Existing code which wants to update to the new functions or new code
which shall supports older GnuPG versions may try the new functions
first and provide a fallback to the old function if the error code
@code{GPG_ERR_NOT_SUPPORTED} is received.

@c
@c  gpgme_op_createkey
@c
@deftypefun gpgme_error_t gpgme_op_createkey @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{const char *@var{userid}}, @
     @w{const char *@var{algo}}, @
     @w{unsigned long @var{reserved}}, @
     @w{unsigned long @var{expires}}, @
     @w{gpgme_key_t @var{extrakey}},

@
@w{unsigned int @var{flags}});

@since{1.7.0}

The function @code{gpgme_op_createkey} generates a new key for the
procotol active in the context @var{ctx}. As of now this function
does only work for OpenPGP and requires at least version 2.1.13 of
GnuPG.

@var{userid} is commonly the mail address associated with the key.
GPGME does not require a specific syntax but if more than a mail
address is given, RFC-822 style format is suggested. The value is
expected to be in UTF-8 encoding (i.e. no IDN encoding for mail
addresses). This is a required parameter.

@var{algo} specifies the algorithm for the new key (actually a keypair
of public and private key). For a list of supported algorithms, see
the GnuPG manual. If @var{algo} is @code{NULL} or the string
"default", the key is generated using the default algorithm of the
engine. If the string "future-default" is used the engine may use an
algorithm which is planned to be the default in a future release of
the engine;
however existing implementation of the protocol may not be
able to already handle such future algorithms. For the OpenPGP
protocol, the specification of a default algorithm, without requesting
a non-default usage via @var{flags}, triggers the creation of a
primary key plus a secondary key (subkey).

@var{reserved} must be set to zero.

@var{expires} specifies the expiration time in seconds. If you supply
0, a reasonable expiration time is chosen. Use the flag
@code{GPGME_CREATE_NOEXPIRE} to create keys that do not expire. Note
that this parameter takes an unsigned long value and not a
@code{time_t} to avoid problems on systems which use a signed 32 bit
@code{time_t}. Note further that the OpenPGP protocol uses 32 bit
values for timestamps and thus can only encode dates up to the year
2106.

@var{extrakey} is currently not used and must be set to @code{NULL}.
A future version of GPGME may use this parameter to create X.509 keys.

@var{flags} can be set to the bit-wise OR of the following
flags:

@table @code
@item GPGME_CREATE_SIGN

@itemx GPGME_CREATE_ENCR
@itemx GPGME_CREATE_CERT
@itemx GPGME_CREATE_AUTH
@since{1.7.0}

Do not create the key with the default capabilities (key usage) of the requested algorithm but use those explicitly given by these flags: ``signing'', ``encryption'', ``certification'', or ``authentication''. The allowed combinations depend on the algorithm.

If any of these flags are set and a default algorithm has been selected only one key is created in the case of the OpenPGP protocol.

@item GPGME_CREATE_NOPASSWD
@since{1.7.0}

Request generation of the key without password protection.

@item GPGME_CREATE_SELFSIGNED
@since{1.7.0}

For an X.509 key do not create a CSR but a self-signed certificate. This has not yet been implemented.

@item GPGME_CREATE_NOSTORE
@since{1.7.0}

Do not store the created key in the local key database. This has not yet been implemented.

@item GPGME_CREATE_WANTPUB
@itemx GPGME_CREATE_WANTSEC
@since{1.7.0}

Return
 the public or secret key as part of the result structure. This has not yet been implemented.

@item GPGME_CREATE_FORCE
@since{1.7.0}

The engine does not allow the creation of a key with a user ID already existing in the local key database.  This flag can be used to override this check.

@item GPGME_CREATE_NOEXPIRE
@since{1.9.0}

Request generation of keys that do not expire.

@end table

After the operation completed successfully, information about the
created key can be retrieved with @code{gpgme_op_genkey_result}.

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if
the engine does not support the command, or a bunch of other error
codes.

@end deftypefun

```
@deftypefun gpgme_error_t gpgme_op_createkey_start @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{const char *@var{userid}}, @
     @w{const char *@var{algo}}, @
     @w{unsigned long @var{reserved}}, @
     @w{unsigned long @var{expires}}, @
     @w{gpgme_key_t @var{extrakey}}, @
     @w{unsigned int
 @var{flags}});
```

@since{1.7.0}

The function @code{gpgme_op_createkey_start} initiates a
@code{gpgme_op_createkey} operation; see there for details.  It must
be completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun

```
@c
@c  gpgme_op_createsubkey
@c
@deftypefun gpgme_error_t gpgme_op_createsubkey @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{algo}}, @
     @w{unsigned long @var{reserved}}, @
     @w{unsigned long @var{expires}}, @
     @w{unsigned int @var{flags}});
```

@since{1.7.0}

The function @code{gpgme_op_createsubkey} creates and adds a new

subkey to the primary OpenPGP key given by @var{KEY}.  The only
allowed protocol in @var{ctx} is @code{GPGME_PROTOCOL_OPENPGP}.
Subkeys (aka secondary keys) are a concept in the OpenPGP protocol to
bind several keys to a primary key.  As of now this function requires
at least version 2.1.13 of GnuPG.

@var{key} specifies the key to operate
 on.

@var{algo} specifies the algorithm for the new subkey.  For a list of
supported algorithms, see the GnuPG manual.  If @var{algo} is
@code{NULL} or the string "default", the subkey is generated using the
default algorithm for an encryption subkey of the engine.  If the
string "future-default" is used the engine may use an encryption
algorithm which is planned to be the default in a future release of
the engine; however existing implementation of the protocol may not be
able to already handle such future algorithms.

@var{reserved} must be set to zero.

@var{expires} specifies the expiration time in seconds.  If you supply
0, a reasonable expiration time is chosen.  Use the flag
@code{GPGME_CREATE_NOEXPIRE} to create keys that do not expire.  Note
that this parameter takes an unsigned long value and not a
@code{time_t} to avoid problems on systems which use a signed 32 bit
@code{time_t}.  Note further that the OpenPGP protocol uses 32 bit
values for timestamps and thus can only encode
 dates up to the year
2106.

@var{flags} takes the same values as described above for
@code{gpgme_op_createkey}.

After the operation completed successfully, information about the
created key can be retrieved with @code{gpgme_op_genkey_result}.

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if
the engine does not support the command, or a bunch of other error
codes.


@end deftypefun

@deftypefun gpgme_error_t gpgme_op_createsubkey_start @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{algo}}, @
     @w{unsigned long @var{reserved}}, @

```
    @w{unsigned long @var{expires}}, @
    @w{unsigned int @var{flags}});

@since{1.7.0}

The function @code{gpgme_op_createsubkey_start} initiates a
@code{gpgme_op_createsubkey} operation; see there for details.  It must
be completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun


@c
@c  gpgme_op_adduid
@c
@deftypefun gpgme_error_t
 gpgme_op_adduid @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}}, @
     @w{unsigned int @var{flags}});

@since{1.7.0}

The function @code{gpgme_op_adduid} adds a new user ID to the OpenPGP
key given by @var{KEY}.  Adding additional user IDs after key creation
is a feature of the OpenPGP protocol and thus the protocol for the
context @var{ctx} must be set to OpenPGP.  As of now this function
requires at least version 2.1.13 of GnuPG.

@var{key} specifies the key to operate on.

@var{userid} is the user ID to add to the key.  A user ID is commonly
the mail address to be associated with the key.  GPGME does not
require a specific syntax but if more than a mail address is given,
RFC-822 style format is suggested.  The value is expected to be in
UTF-8 encoding (i.e. no IDN encoding for mail addresses).  This is a
required parameter.

@var{flags} are currently not used and must be set to zero.

The function returns zero
 on success, @code{GPG_ERR_NOT_SUPPORTED} if
the engine does not support the command, or a bunch of other error
codes.

@end deftypefun
```

```
@deftypefun gpgme_error_t gpgme_op_adduid_start @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}}, @
     @w{unsigned int @var{flags}});

@since{1.7.0}

The function @code{gpgme_op_adduid_start} initiates a
@code{gpgme_op_adduid} operation; see there for details.  It must
be completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun


@c
@c  gpgme_op_revuid
@c
@deftypefun gpgme_error_t gpgme_op_revuid @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}}, @
     @w{unsigned int @var{flags}});

@since{1.7.0}

The function @code{gpgme_op_revuid} revokes a user ID from the OpenPGP
key given by @var{KEY}.  Revoking user IDs after key creation is a
feature of the OpenPGP protocol and thus the protocol
 for the context
@var{ctx} must be set to OpenPGP.  As of now this function requires at
least version 2.1.13 of GnuPG.

@var{key} specifies the key to operate on.

@var{userid} is the user ID to be revoked from the key.  The user ID
must be given verbatim because the engine does an exact and case
sensitive match.  Thus the @code{uid} field from the user ID object
(@code{gpgme_user_id_t}) is to be used.  This is a required parameter.

@var{flags} are currently not used and must be set to zero.

Note that the engine won't allow to revoke the last valid user ID.  To
change a user ID is better to first add the new user ID, then revoke
the old one, and finally publish the key.
```

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if
the engine does not support the command, or a bunch of other error
codes.

@end deftypefun

@deftypefun gpgme_error_t gpgme_op_revuid_start @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}},
 @
     @w{unsigned int @var{flags}});

@since{1.7.0}

The function @code{gpgme_op_revuid_start} initiates a
@code{gpgme_op_revuid} operation; see there for details.  It must
be completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun

@c
@c  gpgme_op_set_uid_flag
@c
@deftypefun gpgme_error_t gpgme_op_set_ui_flag @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}}, @
     @w{cons char * @var{name}}, @
     @w{cons char * @var{value}});

@since{1.8.0}

The function @code{gpgme_op_set_uid_flag} is used to set flags on a
user ID from the OpenPGP key given by @var{KEY}.  Setting flags on
user IDs after key creation is a feature of the OpenPGP protocol and
thus the protocol for the context @var{ctx} must be set to OpenPGP.

@var{key} specifies the key to operate on.  This parameters is required.

@var{userid} is the user ID of the key to be manipulated.  This user ID
must
 be given verbatim because the engine does an exact and case
sensitive match.  Thus the @code{uid} field from the user ID object
(@code{gpgme_user_id_t}) is to be used.  This is a required parameter.

@var{name} names the flag which is to be changed.  The only currently
supported flag is:

@table @code
@item primary
This sets the primary key flag on the given user ID.  All other
primary key flag on other user IDs are removed.  @var{value} must be
given as NULL.  For technical reasons this functions bumps the
creation timestamp of all affected self-signatures up by one second.
At least GnuPG version 2.1.20 is required.

@end table

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if
the engine does not support the command, or a bunch of other error
codes.

@end deftypefun

@deftypefun gpgme_error_t gpgme_op_set_uid_flag_start @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}}, @
     @w{cons char * @var{name}},
 @
     @w{cons char * @var{value}});

@since{1.8.0}

The function @code{gpgme_op_set_uid_flag_start} initiates a
@code{gpgme_op_set_uid_flag} operation; see there for details.  It must
be completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun

@c
@c  gpgme_op_genkey
@c
@deftypefun gpgme_error_t gpgme_op_genkey @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{const char *@var{parms}}, @
     @w{gpgme_data_t @var{public}}, @
     @w{gpgme_data_t @var{secret}})

The function @code{gpgme_op_genkey} generates a new key pair in the
context @var{ctx}.  The meaning of @var{public} and @var{secret}
depends on the crypto backend.

GPG does not support @var{public} and @var{secret}, they should be @code{NULL}. GnuPG will generate a key pair and add it to the standard key ring. The fingerprint of the generated key is available with @code{gpgme_op_genkey_result}.

GpgSM requires @var{public} to be a writable data object. GpgSM will generate
a secret key (which will be stored by @command{gpg-agent}, and return a certificate request in @var{public}, which then needs to be signed by the certification authority and imported before it can be used. GpgSM does not make the fingerprint available.

The argument @var{parms} specifies parameters for the key in an string that looks something like XML. The details about the format of @var{parms} are specific to the crypto engine used by @var{ctx}. The first line of the parameters must be @code{<GnupgKeyParams format="internal">} and the last line must be @code{</GnupgKeyParams>}. Every line in between the first and last lines is treated as a Header: Value pair. In particular, no XML escaping is necessary if you need to include the characters @code{<}, @code{>}, or @code{&}.

Here is an example for GnuPG as the crypto engine (all parameters of OpenPGP key generation are documented in the GPG manual):

```
@example
<GnupgKeyParms format="internal">
Key-Type: default
Subkey-Type: default
Name-Real:
 Joe Tester
Name-Comment: with stupid passphrase
Name-Email: joe@@foo.bar
Expire-Date: 0
Passphrase: abc
</GnupgKeyParms>
@end example
```

Here is an example for GpgSM as the crypto engine (all parameters of OpenPGP key generation are documented in the GPGSM manual):

```
@example
<GnupgKeyParms format="internal">
Key-Type: RSA
Key-Length: 1024
Name-DN: C=de,O=g10 code,OU=Testlab,CN=Joe 2 Tester
Name-Email: joe@@foo.bar
```

</GnupgKeyParms>
@end example

Strings should be given in UTF-8 encoding.  The only format supported
for now is ``internal''.  The content of the @code{GnupgKeyParms}
container is passed verbatim to the crypto backend.  Control
statements are not allowed.

After the operation completed successfully, the result can be
retrieved with @code{gpgme_op_genkey_result}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, @code{GPG_ERR_INV_VALUE} if
@var{parms} is not a well-formed string (e.g. does not have the
expected
 tag-like headers and footers), @code{GPG_ERR_NOT_SUPPORTED}
if @var{public} or @var{secret} is not valid, and
@code{GPG_ERR_GENERAL} if no key was created by the backend.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_genkey_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char
*@var{parms}}, @w{gpgme_data_t @var{public}}, @w{gpgme_data_t @var{secret}})

The function @code{gpgme_op_genkey_start} initiates a
@code{gpgme_op_genkey} operation.  It can be completed by calling
@code{gpgme_wait} on the context.  @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, @code{GPG_ERR_INV_VALUE} if
@var{parms} is not a valid XML string, and
@code{GPG_ERR_NOT_SUPPORTED} if @var{public} or @var{secret} is not
@code{NULL}.
@end deftypefun

@c
@c  gpgme_op_genkey_result
@c
@deftp {Data type} {gpgme_genkey_result_t}

This is a pointer to a structure used to store the result of a
@code{gpgme_op_genkey} operation.
 After successfully generating a
key, you can retrieve the pointer to the result with
@code{gpgme_op_genkey_result}.  The structure contains the following
members:

@table @code

@item unsigned int primary : 1
This flag is set to 1 if a primary key was created and to 0
if not.

@item unsigned int sub : 1
This flag is set to 1 if a subkey was created and to 0 if not.

@item unsigned int uid : 1
This flag is set to 1 if a user ID was created and to 0 if not.

@item char *fpr
This is the fingerprint of the key that was created. If both a
primary and a subkey were generated, the fingerprint of the primary
key will be returned. If the crypto engine does not provide the
fingerprint, @code{fpr} will be a null pointer.

@item gpgme_data_t pubkey
@since{1.7.0}

This will eventually be used to return the public key. It is
currently not used.

@item gpgme_data_t seckey
@since{1.7.0}

This will eventually be used to return the secret key. It is
currently not used.

@end table
@end deftp

@deftypefun
gpgme_genkey_result_t gpgme_op_genkey_result (@w{gpgme_ctx_t @var{ctx}})

The function @code{gpgme_op_genkey_result} returns a
@code{gpgme_genkey_result_t} pointer to a structure holding the result of
a @code{gpgme_op_genkey} operation. The pointer is only valid if the
last operation on the context was a @code{gpgme_op_genkey} or
@code{gpgme_op_genkey_start} operation, and if this operation finished
successfully. The returned pointer is only valid until the next
operation is started on the context.

@end deftypefun

@c
@c SIGNING KEYS
@c

@node Signing Keys
@subsection Signing Keys
@cindex key, signing

Key signatures are a unique concept of the OpenPGP protocol. They can be used to certify the validity of a key and are used to create the Web-of-Trust (WoT). Instead of using the @code{gpgme_op_interact} function along with a finite state machine, GPGME provides a convenient function to create key signatures when using modern GnuPG versions.

```
@c
@c  gpgme_op_keysign
@c
@deftypefun
 gpgme_error_t gpgme_op_keysign @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}}, @
     @w{unsigned long @var{expires}}, @
     @w{unsigned int @var{flags}});
```

@since{1.7.0}

The function @code{gpgme_op_keysign} adds a new key signature to the public key @var{KEY}. This function requires at least version 2.1.12 of GnuPG.

@var{CTX} is the usual context which describes the protocol to use (which must be OpenPGP) and has also the list of signer keys to be used for the signature. The common case is to use the default key for signing other keys. If another key or more than one key shall be used for a key signature, @code{gpgme_signers_add} can be used. @xref{Selecting Signers}.

@var{key} specifies the key to operate on.

@var{userid} selects the user ID or user IDs to be signed. If @var{userid} is set to @code{NULL} all valid user IDs are signed. The user ID must be given verbatim because the engine does an exact
 and
case sensitive match. Thus the @code{uid} field from the user ID object (@code{gpgme_user_id_t}) is to be used. To select more than one user ID put them all into one string separated by linefeeds characters (@code{\n}) and set the flag @code{GPGME_KEYSIGN_LFSEP}.

@var{expires} specifies the expiration time of the new signature in

seconds.  The common case is to use 0 to not set an expiration date.
However, if the configuration of the engine defines a default
expiration for key signatures, that is still used unless the flag
@code{GPGME_KEYSIGN_NOEXPIRE} is used.  Note that this parameter takes
an unsigned long value and not a @code{time_t} to avoid problems on
systems which use a signed 32 bit @code{time_t}.  Note further that
the OpenPGP protocol uses 32 bit values for timestamps and thus can
only encode dates up to the year 2106.

@var{flags} can be set to the bit-wise OR of the following flags:

@table @code
@item GPGME_KEYSIGN_LOCAL
@since{1.7.0}

Instead of creating an exportable
 key signature, create a key
signature which is is marked as non-exportable.

@item GPGME_KEYSIGN_LFSEP
@since{1.7.0}

Although linefeeds are uncommon in user IDs this flag is required to
explicitly declare that @var{userid} may contain several linefeed
separated user IDs.

@item GPGME_KEYSIGN_NOEXPIRE
Force the creation of a key signature without an expiration date.  This
overrides @var{expire} and any local configuration of the engine.

@end table

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if
the engine does not support the command, or a bunch of other error
codes.

@end deftypefun

@deftypefun gpgme_error_t gpgme_op_keysign_start @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{const char *@var{userid}}, @
     @w{unsigned long @var{expires}}, @
     @w{unsigned int @var{flags}});

@since{1.7.0}

The function @code{gpgme_op_keysign_start} initiates a
@code{gpgme_op_keysign} operation; see there for details. It must
be
completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun

@c
@c gpgme_op_revsig
@c
@deftypefun gpgme_error_t gpgme_op_revsig @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{gpgme_key_t @var{key}}, @
@w{gpgme_key_t @var{signing_key}}, @
@w{const char *@var{userid}}, @
@w{unsigned int @var{flags}});

@since{1.14.1}

The function @code{gpgme_op_revsig} revokes key signatures of the
public key @var{key} made with the key @var{signing_key}. This
function requires at least version 2.2.24 of GnuPG.

@var{key} specifies the key to operate on.

@var{signing_key} specifies the key whose signatures shall be revoked.

@var{userid} selects the user ID or user IDs whose signatures shall
be revoked. If @var{userid} is set to @code{NULL} the signatures
on all user IDs are revoked. The user ID must be given verbatim
because the engine does an exact and case sensitive match. Thus the
@code{uid} field from the user ID object
(@code{gpgme_user_id_t}) is to
be used. To select more than one user ID put them all into one string
separated by linefeeds characters (@code{\n}) and set the flag
@code{GPGME_REVSIG_LFSEP}.

@var{flags} can be set to the bit-wise OR of the following flags:

@table @code
@item GPGME_REVSIG_LFSEP
@since{1.14.1}

Although linefeeds are uncommon in user IDs this flag is required to
explicitly declare that @var{userid} may contain several linefeed
separated user IDs.

@end table

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if
the engine does not support the command, or a bunch of other error
codes.

@end deftypefun

@deftypefun gpgme_error_t gpgme_op_revsig_start @
    (@w{gpgme_ctx_t @var{ctx}}, @
     @w{gpgme_key_t @var{key}}, @
     @w{gpgme_key_t @var{signing_key}}, @
     @w{const char *@var{userid}}, @
     @w{unsigned int @var{flags}});

@since{1.14.1}

The function @code{gpgme_op_revsig_start} initiates a
@code{gpgme_op_revsig} operation; see there
 for details.  It must
be completed by calling @code{gpgme_wait} on the context.
@xref{Waiting For Completion}.

@end deftypefun

@c
@c  EXPORTING KEYS
@c
@node Exporting Keys
@subsection Exporting Keys
@cindex key, export
@cindex key ring, export from

Exporting keys means the same as running @command{gpg} with the command
@option{--export}.  However, a mode flag can be used to change the way
the export works.  The available mode flags are described below, they
may be or-ed together.

@table @code

@item GPGME_EXPORT_MODE_EXTERN
If this bit is set, the output is send directly to the default
keyserver. This is currently only allowed for OpenPGP keys.  It is good
practise to not send more than a few dozens key to a keyserver at one
time.  Using this flag requires that the @var{keydata} argument of the

export function is set to @code{NULL}.

@item GPGME_EXPORT_MODE_MINIMAL
@since{1.3.1}

If this bit is set, the smallest possible key is exported. For OpenPGP
keys it removes all signatures
except for the latest self-signatures.
For X.509 keys it has no effect.

@item GPGME_EXPORT_MODE_SSH
@since{1.4.0}

If this bit is set, the latest authentication key of the requested
OpenPGP key is exported in the OpenSSH public key format. This
accepts just a single key; to force the export of a specific subkey
a fingerprint pattern with an appended exclamation mark may be used.

@item GPGME_EXPORT_MODE_SECRET
@since{1.6.0}

Instead of exporting the public key, the secret key is exported. This
may not be combined with @code{GPGME_EXPORT_MODE_EXTERN}. For X.509
the export format is PKCS#8.

@item GPGME_EXPORT_MODE_RAW
@since{1.6.0}

If this flag is used with @code{GPGME_EXPORT_MODE_SECRET} for an X.509
key the export format will be changed to PKCS#1. This flag may not be
used with OpenPGP.

@item GPGME_EXPORT_MODE_PKCS12
@since{1.6.0}

If this flag is used with @code{GPGME_EXPORT_MODE_SECRET} for an X.509
key the export format will be changed to PKCS#12 which also includes
the
certificate. This flag may not be used with OpenPGP.

@item GPGME_EXPORT_MODE_NOUID
@since{1.12.0 - experimental}
Do not export user ids. Works only with certain gpg version.

@end table

@deftypefun gpgme_error_t gpgme_op_export (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{pattern}}, @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
The function @code{gpgme_op_export} extracts public keys and returns
them in the data buffer @var{keydata}.  The output format of the key
data returned is determined by the @acronym{ASCII} armor attribute set
for the context @var{ctx}, or, if that is not set, by the encoding
specified for @var{keydata}.

If @var{pattern} is @code{NULL}, all available keys are returned.
Otherwise, @var{pattern} contains an engine specific expression that
is used to limit the list to all keys matching the pattern.

@var{mode} is usually 0; other values are described above.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation
 completed successfully, @code{GPG_ERR_INV_VALUE} if
@var{keydata} is not a valid empty data buffer, and passes through any
errors that are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_export_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{pattern}}, @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
The function @code{gpgme_op_export_start} initiates a
@code{gpgme_op_export} operation.  It can be completed by calling
@code{gpgme_wait} on the context.  @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, and @code{GPG_ERR_INV_VALUE}
if @var{keydata} is not a valid empty data buffer.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_export_ext (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{pattern}[]}, @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
The function @code{gpgme_op_export} extracts public
 keys and returns
them in the data buffer @var{keydata}.  The output format of the key
data returned is determined by the @acronym{ASCII} armor attribute set
for the context @var{ctx}, or, if that is not set, by the encoding
specified for @var{keydata}.

If @var{pattern} or @var{*pattern} is @code{NULL}, all available keys
are returned.  Otherwise, @var{pattern} is a @code{NULL} terminated
array of strings that are used to limit the list to all keys matching
at least one of the patterns verbatim.

@var{mode} is usually 0; other values are described above.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation completed successfully, @code{GPG_ERR_INV_VALUE} if
@var{keydata} is not a valid empty data buffer, and passes through any
errors that are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_export_ext_start (@w{gpgme_ctx_t @var{ctx}}, @w{const char
*@var{pattern}[]}, @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t
@var{keydata}})
The function @code{gpgme_op_export_ext_start} initiates a
@code{gpgme_op_export_ext} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, and @code{GPG_ERR_INV_VALUE}
if @var{keydata} is not a valid empty data buffer.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_export_keys (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t keys[]},
@w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})
@since{1.2.0}

The function @code{gpgme_op_export_keys} extracts public keys and returns
them in the data buffer @var{keydata}. The output format of the key
data returned is determined by the @acronym{ASCII} armor attribute set
for the context @var{ctx}, or, if that is not set, by the encoding
specified for @var{keydata}.

The keys to export are taken form the @code{NULL} terminated array
@var{keys}. Only
keys of the currently selected protocol of
@var{ctx} which do have a fingerprint set are considered for export.
Other keys specified by the @var{keys} are ignored. In particular
OpenPGP keys retrieved via an external key listing are not included.

@var{mode} is usually 0; other values are described above.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation completed successfully, @code{GPG_ERR_INV_VALUE} if
@var{keydata} is not a valid empty data buffer, @code{GPG_ERR_NO_DATA}
if no useful keys are in @var{keys} and passes through any errors that
are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_export_keys_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
@var{keys}[]}, @w{gpgme_export_mode_t @var{mode}}, @w{gpgme_data_t @var{keydata}})

@since{1.2.0}

The function @code{gpgme_op_export_keys_start} initiates a
@code{gpgme_op_export_ext} operation.  It can be completed by calling
@code{gpgme_wait} on the
 context.  @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, and @code{GPG_ERR_INV_VALUE}
if @var{keydata} is not a valid empty data buffer, @code{GPG_ERR_NO_DATA}
if no useful keys are in @var{keys} and passes through any errors that
are reported by the crypto engine support routines.
@end deftypefun

@node Importing Keys
@subsection Importing Keys
@cindex key, import
@cindex key ring, import to

Importing keys means the same as running @command{gpg} with the command
@option{--import}.

@deftypefun gpgme_error_t gpgme_op_import (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t
@var{keydata}})
The function @code{gpgme_op_import} adds the keys in the data buffer
@var{keydata} to the key ring of the crypto engine used by @var{ctx}.
The format of @var{keydata} can be @acronym{ASCII} armored, for example,
but the details are specific to the crypto engine.

After the operation completed successfully, the result
 can be
retrieved with @code{gpgme_op_import_result}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
import was completed successfully, @code{GPG_ERR_INV_VALUE} if
@var{keydata} if @var{ctx} or @var{keydata} is not a valid pointer,
and @code{GPG_ERR_NO_DATA} if @var{keydata} is an empty data buffer.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_import_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t
@var{keydata}})
The function @code{gpgme_op_import_start} initiates a
@code{gpgme_op_import} operation.  It can be completed by calling
@code{gpgme_wait} on the context.  @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the

import could be started successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx} or @var{keydata} is not a valid pointer, and
@code{GPG_ERR_NO_DATA} if @var{keydata} is an empty data buffer.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_import_keys (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t *@var{keys}})
@since{1.2.0}

The
function @code{gpgme_op_import_keys} adds the keys described by
the @code{NULL} terminated array @var{keys} to the key ring of the
crypto engine used by @var{ctx}. It is used to actually import and
make keys permanent which have been retrieved from an external source
(i.e. using @code{GPGME_KEYLIST_MODE_EXTERN}) earlier. The external
keylisting must have been made with the same context configuration (in
particular the same home directory). @footnote{Thus it is a
replacement for the usual workaround of exporting and then importing a
key to make an X.509 key permanent.} Note that for OpenPGP this may
require another access to the keyserver over the network.

Only keys of the currently selected protocol of @var{ctx} are
considered for import. Other keys specified by the @var{keys} are
ignored. As of now all considered keys must have been retrieved using
the same method, i.e. the used key listing mode must be identical.

After the operation completed successfully,
the result can be
retrieved with @code{gpgme_op_import_result}.

To move keys from one home directory to another, export and import the
keydata using @code{gpgme_op_export} and @code{gpgme_op_import}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
import was completed successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx} is not a valid pointer, @code{GPG_ERR_CONFLICT} if the key
listing mode does not match, and @code{GPG_ERR_NO_DATA} if no keys are
considered for export.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_import_keys_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t *@var{keys}})
@since{1.2.0}

The function @code{gpgme_op_import_keys_start} initiates a
@code{gpgme_op_import_keys} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
import was completed successfully, @code{GPG_ERR_INV_VALUE} if
@var{keydata} if @var{ctx}
 or @var{keydata} is not a valid pointer,
@code{GPG_ERR_CONFLICT} if the key listing mode does not match, and
@code{GPG_ERR_NO_DATA} if no keys are considered for export.
@end deftypefun

@deftp {Data type} {gpgme_import_status_t}
This is a pointer to a structure used to store a part of the result of
a @code{gpgme_op_import} operation.  For each considered key one
status is added that contains information about the result of the
import.  The structure contains the following members:

@table @code
@item gpgme_import_status_t next
This is a pointer to the next status structure in the linked list, or
@code{NULL} if this is the last element.

@item char *fpr
This is the fingerprint of the key that was considered.

@item gpgme_error_t result
If the import was not successful, this is the error value that caused
the import to fail.  Otherwise the error code is
@code{GPG_ERR_NO_ERROR}.

@item unsigned int status
This is a bit-wise OR of the following flags that give more
information about what
 part of the key was imported.  If the key was
already known, this might be 0.

@table @code
@item GPGME_IMPORT_NEW
The key was new.

@item GPGME_IMPORT_UID
The key contained new user IDs.

@item GPGME_IMPORT_SIG
The key contained new signatures.

@item GPGME_IMPORT_SUBKEY
The key contained new sub keys.

@item GPGME_IMPORT_SECRET
The key contained a secret key.

@end table
@end table
@end deftp

@deftp {Data type} {gpgme_import_result_t}
This is a pointer to a structure used to store the result of a @code{gpgme_op_import} operation. After a successful import operation, you can retrieve the pointer to the result with @code{gpgme_op_import_result}. The structure contains the following members:

@table @code
@item int considered
The total number of considered keys.

@item int no_user_id
The number of keys without user ID.

@item int imported
The total number of imported keys.

@item int imported_rsa
The number of imported RSA keys.

@item int unchanged
The number of unchanged keys.

@item
int new_user_ids
The number of new user IDs.

@item int new_sub_keys
The number of new sub keys.

@item int new_signatures
The number of new signatures.

@item int new_revocations
The number of new revocations.

@item int secret_read
The total number of secret keys read.

@item int secret_imported
The number of imported secret keys.

@item int secret_unchanged
The number of unchanged secret keys.

@item int not_imported
The number of keys not imported.

@item gpgme_import_status_t imports
A list of gpgme_import_status_t objects which contain more information
about the keys for which an import was attempted.

@item int skipped_v3_keys
For security reasons modern versions of GnuPG do not anymore support
v3 keys (created with PGP 2.x) and ignores them on import.  This
counter provides the number of such skipped v3 keys.

@end table
@end deftp

@deftypefun gpgme_import_result_t gpgme_op_import_result (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_op_import_result} returns a
@code{gpgme_import_result_t}
 pointer to a structure holding the result
of a @code{gpgme_op_import} operation.  The pointer is only valid if
the last operation on the context was a @code{gpgme_op_import} or
@code{gpgme_op_import_start} operation, and if this operation finished
successfully.  The returned pointer is only valid until the next
operation is started on the context.
@end deftypefun

@node Deleting Keys
@subsection Deleting Keys
@cindex key, delete
@cindex key ring, delete from

@deftypefun gpgme_error_t gpgme_op_delete_ext (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t
@var{key}}, @w{unsigned int @var{flags}})
@since{1.9.1}

The function @code{gpgme_op_delete_ext} deletes the key @var{key} from
the key ring of the crypto engine used by @var{ctx}.

@var{flags} can be set to the bit-wise OR of the following flags:

@table @code
@item GPGME_DELETE_ALLOW_SECRET
@since{1.9.1}

If not set, only public keys are deleted. If set, secret keys are
deleted as well, if that is supported.

@item
GPGME_DELETE_FORCE
@since{1.9.1}

If set, the user is not asked to confirm the deletion.
@end table

The function returns the error code @code{GPG_ERR_NO_ERROR} if the key
was deleted successfully, @code{GPG_ERR_INV_VALUE} if @var{ctx} or
@var{key} is not a valid pointer, @code{GPG_ERR_NO_PUBKEY} if
@var{key} could not be found in the keyring,
@code{GPG_ERR_AMBIGUOUS_NAME} if the key was not specified
unambiguously, and @code{GPG_ERR_CONFLICT} if the secret key for
@var{key} is available, but @var{allow_secret} is zero.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_delete_ext_start (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t
@var{key}}, @w{unsigned int @var{flags}})
@since{1.9.1}

The function @code{gpgme_op_delete_ext_start} initiates a
@code{gpgme_op_delete} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation was started successfully,
and @code{GPG_ERR_INV_VALUE} if
@var{ctx} or @var{key} is not a valid pointer.
@end deftypefun

The following functions allow only to use one particular flag.

@deftypefun gpgme_error_t gpgme_op_delete (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t
@var{key}}, @w{int @var{allow_secret}})
Similar to @code{gpgme_op_delete_ext}, but only the flag
@code{GPGME_DELETE_ALLOW_SECRET} can be provided.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_delete_start (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t
@var{key}}, @w{int @var{allow_secret}})
Similar to @code{gpgme_op_delete_ext_start}, but only the flag
@code{GPGME_DELETE_ALLOW_SECRET} can be provided.
@end deftypefun

@node Changing Passphrases
@subsection Changing Passphrases
@cindex passphrase, change

@deftypefun gpgme_error_t gpgme_op_passwd @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{const gpgme_key_t @var{key}}, @
@w{unsigned int @var{flags}})

@since{1.3.0}

The function @code{gpgme_op_passwd}
changes the passphrase of the
private key associated with @var{key}. The only allowed value for
@var{flags} is @code{0}. The backend engine will usually popup a window
to ask for the old and the new passphrase. Thus this function is not
useful in a server application (where passphrases are not required
anyway).

Note that old @code{gpg} engines (before version 2.0.15) do not support
this command and will silently ignore it.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_passwd_start @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{const gpgme_key_t @var{key}}, @
@w{unsigned int @var{flags}})

@since{1.3.0}

The function @code{gpgme_op_passwd_start} initiates a
@code{gpgme_op_passwd} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns @code{0} if the operation was started successfully,
and an error code if one of the arguments is not valid or the
oepration
could not be started.
@end deftypefun

@c
@c CHANGING TOFU DATA
@c
@node Changing TOFU Data
@subsection Changing TOFU Data
@cindex validity, TOFU

The OpenPGP engine features a Trust-On-First-Use (TOFU) key validation
model. For resolving conflicts it is necessary to declare the policy
for a key. See the GnuPG manual for details on the TOFU

implementation.

@deftp {Data type} {enum gpgme_tofu_policy_t}
@since{1.7.0}

@tindex gpgme_tofu_policy_t
The @code{gpgme_tofu_policy_t} type specifies the set of possible
policy values that are supported by @acronym{GPGME}:

@table @code
@item GPGME_TOFU_POLICY_AUTO
Set the policy to ``auto''.
@item GPGME_TOFU_POLICY_GOOD
Set the policy to ``good''.
@item GPGME_TOFU_POLICY_BAD
Set the policy to ``bad''.
@item GPGME_TOFU_POLICY_ASK
Set the policy to ``ask''.
@item GPGME_TOFU_POLICY_UNKNOWN
Set the policy to ``unknown''.
@end table

@end deftp

To change the policy for a key the following functions can be used:

@deftypefun gpgme_error_t
 gpgme_op_tofu_policy @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{const gpgme_key_t @var{key}}, @
 @w{gpgme_tofu_policy_t @var{policy}})

@since{1.7.0}

The function @code{gpgme_op_tofu_policy} changes the TOFU policy of
@var{key}. The valid values for @var{policy} are listed above. As of
now this function does only work for OpenPGP and requires at least
version 2.1.10 of GnuPG.

The function returns zero on success, @code{GPG_ERR_NOT_SUPPORTED} if
the engine does not support the command, or a bunch of other error
codes.

@end deftypefun

@deftypefun gpgme_error_t gpgme_op_tofu_policy_start @
 (@w{gpgme_ctx_t @var{ctx}}, @
 @w{const gpgme_key_t @var{key}}, @

```
        @w{gpgme_tofu_policy_t @var{policy}})

@since{1.7.0}

The function @code{gpgme_op_tofu_policy_start} initiates a
@code{gpgme_op_tofu_policy} operation.    It can be completed by calling
@code{gpgme_wait} on the context.  @xref{Waiting For Completion}.

The
 function returns @code{0} if the operation was started successfully,
and an error code if one of the arguments is not valid or the oepration
could not be started.

@end deftypefun


@node Advanced Key Editing
@subsection Advanced Key Editing
@cindex key, edit

@deftp {Data type} {gpgme_error_t (*gpgme_interact_cb_t) @
  (@w{void *@var{handle}}, @
   @w{const char *@var{status}}, @
   @w{const char *@var{args}}, @
   @w{int @var{fd}})}

@since{1.7.0}

@tindex gpgme_interact_cb_t
The @code{gpgme_interact_cb_t} type is the type of functions which
@acronym{GPGME} calls if it a key interact operation is on-going.  The
status keyword @var{status} and the argument line @var{args} are
passed through by @acronym{GPGME} from the crypto engine.  An empty
string represents EOF.  The file descriptor @var{fd} is -1 for normal
status messages.  If @var{status} indicates a command rather than a
status message, the response to the command should be written to
@var{fd}.  The @var{handle} is
 provided by the user at start of
operation.

The function should return @code{GPG_ERR_FALSE} if it did not handle
the status code, @code{0} for success, or any other error value.
@end deftp

@deftypefun gpgme_error_t gpgme_op_interact (@w{gpgme_ctx_t @var{ctx}}, @
  @w{gpgme_key_t @var{key}}, @
  @w{unsigned int @var{flags}}, @
  @w{gpgme_interact_cb_t @var{fnc}}, @
```

```
  @w{void *@var{handle}}, @
  @w{gpgme_data_t @var{out}})

@since{1.7.0}

The function @code{gpgme_op_interact} processes the key @var{KEY}
interactively, using the interact callback function @var{FNC} with the
handle @var{HANDLE}.  The callback is invoked for every status and
command request from the crypto engine.  The output of the crypto
engine is written to the data object @var{out}.

Note that the protocol between the callback function and the crypto
engine is specific to the crypto engine and no further support in
implementing this protocol correctly is provided by @acronym{GPGME}.

@var{flags} modifies the behaviour
 of the function; the only defined
bit value is:

@table @code
@item GPGME_INTERACT_CARD
@since{1.7.0}

This is used for smartcard based keys and uses gpgs
@code{--card-edit} command.

@end table

The function returns @code{0} if the edit operation completes
successfully, @code{GPG_ERR_INV_VALUE} if @var{ctx} or @var{key} is
not a valid pointer, and any error returned by the crypto engine or
the edit callback handler.
@end deftypefun


@deftypefun gpgme_error_t gpgme_op_interact_start (@w{gpgme_ctx_t @var{ctx}}, @
  @w{gpgme_key_t @var{key}}, @
  @w{unsigned int @var{flags}}, @
  @w{gpgme_interact_cb_t @var{fnc}}, @
  @w{void *@var{handle}}, @
  @w{gpgme_data_t @var{out}})

@since{1.7.0}

The function @code{gpgme_op_interact_start} initiates a
@code{gpgme_op_interact} operation.  It can be completed by calling
@code{gpgme_wait} on the context.  @xref{Waiting For Completion}.
```

The function returns @code{0} if the operation was started
successfully, and @code{GPG_ERR_INV_VALUE}
 if @var{ctx} or @var{key}
is not a valid pointer.
@end deftypefun

@node Crypto Operations
@section Crypto Operations
@cindex cryptographic operation

Sometimes, the result of a crypto operation returns a list of invalid
keys encountered in processing the request.  The following structure
is used to hold information about such a key.

@deftp {Data type} {gpgme_invalid_key_t}
This is a pointer to a structure used to store a part of the result of
a crypto operation which takes user IDs as one input parameter.  The
structure contains the following members:

@table @code
@item gpgme_invalid_key_t next
This is a pointer to the next invalid key structure in the linked
list, or @code{NULL} if this is the last element.

@item char *fpr
The fingerprint or key ID of the invalid key encountered.

@item gpgme_error_t reason
An error code describing the reason why the key was found invalid.
@end table
@end deftp

@menu
* Decrypt::  Decrypting a ciphertext.
* Verify::
  Verifying a signature.
* Decrypt and Verify::  Decrypting a signed ciphertext.
* Sign::  Creating a signature.
* Encrypt::  Encrypting a plaintext.
@end menu

@node Decrypt
@subsection Decrypt
@cindex decryption
@cindex cryptographic operation, decryption

@deftypefun gpgme_error_t gpgme_op_decrypt (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{cipher}}, @w{gpgme_data_t @var{plain}})
The function @code{gpgme_op_decrypt} decrypts the ciphertext in the
data object @var{cipher} and stores it into the data object
@var{plain}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
ciphertext could be decrypted successfully, @code{GPG_ERR_INV_VALUE}
if @var{ctx}, @var{cipher} or @var{plain} is not a valid pointer,
@code{GPG_ERR_NO_DATA} if @var{cipher} does not contain any data to
decrypt, @code{GPG_ERR_DECRYPT_FAILED} if @var{cipher} is not a valid
cipher text, @code{GPG_ERR_BAD_PASSPHRASE} if the passphrase
for the
secret key could not be retrieved, and passes through some errors that
are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_decrypt_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{cipher}}, @w{gpgme_data_t @var{plain}})
The function @code{gpgme_op_decrypt_start} initiates a
@code{gpgme_op_decrypt} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, and @code{GPG_ERR_INV_VALUE}
if @var{cipher} or @var{plain} is not a valid pointer.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_decrypt_ext ( @
    @w{gpgme_ctx_t @var{ctx}}, @
    @w{gpgme_decrypt_flags_t @var{flags}}, @
    @w{gpgme_data_t @var{cipher}}, @
    @w{gpgme_data_t @var{plain}})

@since{1.8.0}

The function @code{gpgme_op_decrypt_ext} is the same as
@code{gpgme_op_decrypt}
but has an additional argument
@var{flags}. If @var{flags} is 0 both function behave identically.

The value in @var{flags} is a bitwise-or combination of one or
multiple of the following bit values:

@table @code
@item GPGME_DECRYPT_VERIFY

@since{1.8.0}

The @code{GPGME_DECRYPT_VERIFY} symbol specifies that this function
shall exactly act as @code{gpgme_op_decrypt_verify}.

@item GPGME_DECRYPT_UNWRAP
@since{1.8.0}

The @code{GPGME_DECRYPT_UNWRAP} symbol specifies that the output shall
be an OpenPGP message with only the encryption layer removed. This
requires GnuPG 2.1.12 and works only for OpenPGP. This is the
counterpart to @code{GPGME_ENCRYPT_WRAP}.

@end table

The function returns the error codes as described for
@code{gpgme_op_decrypt}.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_decrypt_ext_start ( @
    @w{gpgme_ctx_t @var{ctx}}, @
    @w{gpgme_decrypt_flags_t @var{flags}}, @
    @w{gpgme_data_t @var{cipher}}, @

@w{gpgme_data_t @var{plain}})

@since{1.8.0}

The function @code{gpgme_op_decrypt_ext_start} initiates a
@code{gpgme_op_decrypt_ext} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, and @code{GPG_ERR_INV_VALUE}
if @var{cipher} or @var{plain} is not a valid pointer.
@end deftypefun

@deftp {Data type} {gpgme_recipient_t}
@since{1.1.0}

This is a pointer to a structure used to store information about the
recipient of an encrypted text which is decrypted in a
@code{gpgme_op_decrypt} operation. This information (except for the
status field) is even available before the operation finished
successfully, for example in a passphrase callback. The structure
contains the following members:

@table @code
@item gpgme_recipient_t next
This is a pointer to the next recipient structure in the linked list,
or @code{NULL} if this is
 the last element.

@item gpgme_pubkey_algo_t
The public key algorithm used in the encryption.

@item char *keyid
This is the key ID of the key (in hexadecimal digits) used as
recipient.

@item gpgme_error_t status
This is an error number with the error code GPG_ERR_NO_SECKEY if the
secret key for this recipient is not available, and 0 otherwise.
@end table
@end deftp

@deftp {Data type} {gpgme_decrypt_result_t}
This is a pointer to a structure used to store the result of a
@code{gpgme_op_decrypt} operation.  After successfully decrypting
data, you can retrieve the pointer to the result with
@code{gpgme_op_decrypt_result}.  As with all result structures, it
this structure shall be considered read-only and an application must
not allocate such a strucure on its own.  The structure contains the
following members:

@table @code
@item char *unsupported_algorithm
If an unsupported algorithm was encountered, this string describes the
algorithm that is not supported.

@item unsigned int wrong_key_usage
 : 1
@since{0.9.0}
This is true if the key was not used according to its policy.

@item unsigned int legacy_cipher_nomdc : 1
@since{1.11.2}
The message was made by a legacy algorithm without any integrity
protection.  This might be an old but legitimate message.

@item unsigned int is_mime : 1;
@since{1.11.0}
The message claims that the content is a MIME object.

@item unsigned int is_de_vs : 1;

@since{1.10.0}
The message was encrypted in a VS-NfD compliant way.  This is a
specification in Germany for a restricted communication level.

@item gpgme_recipient_t recipients
@since{1.1.0}

This is a linked list of recipients to which this message was encrypted.

@item char *file_name
This is the filename of the original plaintext message file if it is
known, otherwise this is a null pointer.

@item char *session_key
@since{1.8.0}

A textual representation (nul-terminated string) of the session key
used in symmetric encryption of the message, if the context has been
set to export session
 keys (see @code{gpgme_set_ctx_flag,
"export-session-key"}), and a session key was available for the most
recent decryption operation.  Otherwise, this is a null pointer.

You must not try to access this member of the struct unless
@code{gpgme_set_ctx_flag (ctx, "export-session-key")} returns success
or @code{gpgme_get_ctx_flag (ctx, "export-session-key")} returns true
(non-empty string).

@item char *symkey_algo
@since{1.11.0}

A string with the symmetric encryption algorithm and mode using the
format "<algo>.<mode>".  Note that the deprecated non-MDC encryption mode of
OpenPGP is given as "PGPCFB".

@end table
@end deftp

@deftypefun gpgme_decrypt_result_t gpgme_op_decrypt_result (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_op_decrypt_result} returns a
@code{gpgme_decrypt_result_t} pointer to a structure holding the
result of a @code{gpgme_op_decrypt} operation.  The pointer is only
valid if the last operation on the context was a
@code{gpgme_op_decrypt} or @code{gpgme_op_decrypt_start}
 operation.
If the operation failed this might be a @code{NULL} pointer.  The
returned pointer is only valid until the next operation is started on
the context.

@end deftypefun

@node Verify
@subsection Verify
@cindex verification
@cindex signature, verification
@cindex cryptographic operation, verification
@cindex cryptographic operation, signature check
@cindex signature notation data
@cindex notation data

@deftypefun gpgme_error_t gpgme_op_verify (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{sig}}, @w{gpgme_data_t @var{signed_text}}, @w{gpgme_data_t @var{plain}})
The function @code{gpgme_op_verify} verifies that the signature in the
data object @var{sig} is a valid signature. If @var{sig} is a
detached signature, then the signed text should be provided in
@var{signed_text} and @var{plain} should be a null pointer.
Otherwise, if @var{sig} is a normal (or cleartext) signature,
@var{signed_text} should be a null pointer and @var{plain} should be a
writable data object
that will contain the plaintext after successful
verification.

The results of the individual signature verifications can be retrieved
with @code{gpgme_op_verify_result}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be completed successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx}, @var{sig} or @var{plain} is not a valid pointer,
@code{GPG_ERR_NO_DATA} if @var{sig} does not contain any data to
verify, and passes through any errors that are reported by the crypto
engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_verify_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{sig}}, @w{gpgme_data_t @var{signed_text}}, @w{gpgme_data_t @var{plain}})
The function @code{gpgme_op_verify_start} initiates a
@code{gpgme_op_verify} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started
successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx}, @var{sig} or @var{plain} is not a valid pointer, and
@code{GPG_ERR_NO_DATA} if @var{sig} or @var{plain} does not contain
any data to verify.
@end deftypefun

@deftp {Data type} {gpgme_sig_notation_t}
This is a pointer to a structure used to store a part of the result of
a @code{gpgme_op_verify} operation.  The structure contains the
following members:

@table @code
@item gpgme_sig_notation_t next
This is a pointer to the next new signature notation structure in the
linked list, or @code{NULL} if this is the last element.

@item char *name
The name of the notation field.  If this is @code{NULL}, then the
member @code{value} will contain a policy URL.

@item int name_len
The length of the @code{name} field.  For strings the length is
counted without the trailing binary zero.

@item char *value
The value of the notation field.  If @code{name} is @code{NULL}, then
this is a policy URL.

@item int value_len
The length of the @code{value}
 field.  For strings the length is
counted without the trailing binary zero.

@item gpgme_sig_notation_flags_t flags
The accumulated flags field.  This field contains the flags associated
with the notation data in an accumulated form which can be used as an
argument to the function @code{gpgme_sig_notation_add}.  The value
@code{flags} is a bitwise-or combination of one or multiple of the
following bit values:

@table @code
@item GPGME_SIG_NOTATION_HUMAN_READABLE
@since{1.1.0}

The @code{GPGME_SIG_NOTATION_HUMAN_READABLE} symbol specifies that the
notation data is in human readable form

@item GPGME_SIG_NOTATION_CRITICAL
@since{1.1.0}

The @code{GPGME_SIG_NOTATION_CRITICAL} symbol specifies that the
notation data is critical.

```
@end table

@item unsigned int human_readable : 1
This is true if the @code{GPGME_SIG_NOTATION_HUMAN_READABLE} flag is
set and false otherwise.  This flag is only valid for notation data,
not for policy URLs.

@item unsigned int critical : 1
This is true if the
 @code{GPGME_SIG_NOTATION_CRITICAL} flag is set and
false otherwise.  This flag is valid for notation data and policy URLs.

@end table
@end deftp

@deftp {Data type} {gpgme_signature_t}
This is a pointer to a structure used to store a part of the result of
a @code{gpgme_op_verify} operation.  The structure contains the
following members:

@table @code
@item gpgme_signature_t next
This is a pointer to the next new signature structure in the linked
list, or @code{NULL} if this is the last element.

@item gpgme_sigsum_t summary
This is a bit vector giving a summary of the signature status.  It
provides an easy interface to a defined semantic of the signature
status.  Checking just one bit is sufficient to see whether a
signature is valid without any restrictions. This means that
you can check for GPGME_SIGSUM_VALID like this:

@example
if ((sig.summary & GPGME_SIGSUM_VALID))
@{
  ..do stuff if valid..
@}
else
@{
  ..do stuff if not fully valid..
@}
@end example

The defined bits are:
  @table @code
 @item GPGME_SIGSUM_VALID
 The signature is fully valid.
```

@item GPGME_SIGSUM_GREEN
The signature is good but one might want to display some extra information.  Check the other bits.

@item GPGME_SIGSUM_RED
The signature is bad. It might be useful to check other bits and display more information, i.e. a revoked certificate might not render a signature invalid when the message was received prior to the cause for the revocation.

@item GPGME_SIGSUM_KEY_REVOKED
The key or at least one certificate has been revoked.

@item GPGME_SIGSUM_KEY_EXPIRED
The key or one of the certificates has expired. It is probably a good idea to display the date of the expiration.

@item GPGME_SIGSUM_SIG_EXPIRED
The signature has expired.

@item GPGME_SIGSUM_KEY_MISSING
Can't verify due to a missing key or certificate.

@item GPGME_SIGSUM_CRL_MISSING
The CRL (or an equivalent mechanism) is not available.

@item GPGME_SIGSUM_CRL_TOO_OLD
Available CRL is too
old.

@item GPGME_SIGSUM_BAD_POLICY
A policy requirement was not met.

@item GPGME_SIGSUM_SYS_ERROR
A system error occurred.

@item GPGME_SIGSUM_TOFU_CONFLICT
A TOFU conflict was detected.
@end table

@item char *fpr
This is the fingerprint or key ID of the signature.

@item gpgme_error_t status
This is the status of the signature.  In particular, the following status codes are of interest:

@table @code

@item GPG_ERR_NO_ERROR
This status indicates that the signature could be verified or that
there is no signature.  For the combined result this status
means that all signatures could be verified.

Note: This does not mean that a valid signature could be found.  Check
the @code{summary} field for that.

For example a @code{gpgme_op_decrypt_verify} returns a verification
result with GPG_ERR_NO_ERROR for encrypted but unsigned data.

@item GPG_ERR_SIG_EXPIRED
This status indicates that the signature is valid but expired.  For
the combined result this
status means that all signatures are valid
and expired.

@item GPG_ERR_KEY_EXPIRED
This status indicates that the signature is valid but the key used to
verify the signature has expired.  For the combined result this status
means that all signatures are valid and all keys are expired.

@item GPG_ERR_CERT_REVOKED
This status indicates that the signature is valid but the key used
to verify the signature has been revoked.  For the combined result
this status means that all signatures are valid and all keys are
revoked.

@item GPG_ERR_BAD_SIGNATURE
This status indicates that the signature is invalid.  For the combined
result this status means that all signatures are invalid.

@item GPG_ERR_NO_PUBKEY
This status indicates that the signature could not be verified due to
a missing key.  For the combined result this status means that all
signatures could not be checked due to missing keys.

@item GPG_ERR_GENERAL
This status indicates that there was some other
error which prevented
the signature verification.
@end table

@item gpgme_sig_notation_t notations
This is a linked list with the notation data and policy URLs.

@item unsigned long timestamp
The creation timestamp of this signature.

@item unsigned long exp_timestamp
The expiration timestamp of this signature, or 0 if the signature does
not expire.

@item unsigned int wrong_key_usage : 1
This is true if the key was not used according to its policy.

@item unsigned int pka_trust : 2
This is set to the trust information gained by means of the PKA system.
Values are:
@table @code
@item 0
No PKA information available or verification not possible.
@item 1
PKA verification failed.
@item 2
PKA verification succeeded.
@item 3
Reserved for future use.
@end table
Depending on the configuration of the engine, this metric may also be
reflected by the validity of the signature.

@item unsigned int chain_model : 1
@since{1.1.6}

This is true if the
validity of the signature has been checked using the
chain model. In the chain model the time the signature has been created
must be within the validity period of the certificate and the time the
certificate itself has been created must be within the validity period
of the issuing certificate. In contrast the default validation model
checks the validity of signature as well at the entire certificate chain
at the current time.

@item gpgme_validity_t validity
The validity of the signature.

@item gpgme_error_t validity_reason
If a signature is not valid, this provides a reason why.

@item gpgme_pubkey_algo_t
The public key algorithm used to create this signature.

@item gpgme_hash_algo_t
The hash algorithm used to create this signature.

@item char *pka_address
The mailbox from the PKA information or @code{NULL}.

@item gpgme_key_t key
@since{1.7.0}

An object describing the key used to create the signature. This key
object may be incomplete in that it only conveys information
availabale
directly with a signature. It may also be @code{NULL} if
such information is not readily available.

@end table
@end deftp

@deftp {Data type} {gpgme_verify_result_t}
This is a pointer to a structure used to store the result of a
@code{gpgme_op_verify} operation. After verifying a signature, you
can retrieve the pointer to the result with
@code{gpgme_op_verify_result}. If the operation failed this might be
a @code{NULL} pointer. The structure contains the following member:

@table @code
@item gpgme_signature_t signatures
A linked list with information about all signatures for which a
verification was attempted.

@item char *file_name
This is the filename of the original plaintext message file if it is
known, otherwise this is a null pointer. Warning: The filename is
not covered by the signature.

@item unsigned int is_mime : 1;
@since{1.11.0}

The message claims that the content is a MIME object. Warning: This
flag is not covered by the signature.

@end table
@end deftp

@deftypefun
gpgme_verify_result_t gpgme_op_verify_result (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_op_verify_result} returns a
@code{gpgme_verify_result_t} pointer to a structure holding the result
of a @code{gpgme_op_verify} operation. The pointer is only valid if
the last operation on the context was a @code{gpgme_op_verify},

@code{gpgme_op_verify_start}, @code{gpgme_op_decrypt_verify} or
@code{gpgme_op_decrypt_verify_start} operation, and if this operation
finished successfully (for @code{gpgme_op_decrypt_verify} and
@code{gpgme_op_decrypt_verify_start}, the error code
@code{GPG_ERR_NO_DATA} counts as successful in this context). The
returned pointer is only valid until the next operation is started on
the context.
@end deftypefun

@node Decrypt and Verify
@subsection Decrypt and Verify
@cindex decryption and verification
@cindex verification and decryption
@cindex signature check
@cindex cryptographic operation, decryption and verification

@deftypefun gpgme_error_t gpgme_op_decrypt_verify
(@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{cipher}}, @w{gpgme_data_t @var{plain}})
The function @code{gpgme_op_decrypt_verify} decrypts the ciphertext in
the data object @var{cipher} and stores it into the data object
@var{plain}. If @var{cipher} contains signatures, they will be
verified.

After the operation completed, @code{gpgme_op_decrypt_result} and
@code{gpgme_op_verify_result} can be used to retrieve more information
about the signatures.

If the error code @code{GPG_ERR_NO_DATA} is returned, @var{cipher}
does not contain any data to decrypt. However, it might still be
signed. The information about detected signatures is available with
@code{gpgme_op_verify_result} in this case.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
ciphertext could be decrypted successfully, @code{GPG_ERR_INV_VALUE}
if @var{ctx}, @var{cipher} or @var{plain} is not a valid pointer,
@code{GPG_ERR_NO_DATA} if @var{cipher} does not contain any data to
decrypt,
@code{GPG_ERR_DECRYPT_FAILED} if @var{cipher} is not a valid
cipher text, @code{GPG_ERR_BAD_PASSPHRASE} if the passphrase for the
secret key could not be retrieved, and passes through any errors that
are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_decrypt_verify_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{cipher}}, @w{gpgme_data_t @var{plain}})
The function @code{gpgme_op_decrypt_verify_start} initiates a
@code{gpgme_op_decrypt_verify} operation. It can be completed by

calling @code{gpgme_wait} on the context.  @xref{Waiting For
Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx}, @var{cipher}, @var{plain} or @var{r_stat} is not a valid
pointer, and @code{GPG_ERR_NO_DATA} if @var{cipher} does not contain
any data to decrypt.
@end deftypefun

When processing mails it is sometimes useful to extract the actual
mail
 address (the ``addr-spec'') from a string.  GPGME provides this
helper function which uses the same semantics as the internal
functions in GPGME and GnuPG:

@deftypefun @w{char *} gpgme_addrspec_from_uid (@w{const char *@var{uid}})

@since{1.7.1}

Return the mail address (called ``addr-spec'' in RFC-5322) from the
string @var{uid} which is assumed to be a user id (called ``address''
in RFC-5322).  All plain ASCII characters (i.e. those with bit 7
cleared) in the result are converted to lowercase.  Caller must free
the result using @code{gpgme_free}.  Returns @code{NULL} if no valid
address was found (in which case @code{ERRNO} is set to @code{EINVAL})
or for other errors.

@end deftypefun

@node Sign
@subsection Sign
@cindex signature, creation
@cindex sign
@cindex cryptographic operation, signing

A signature can contain signatures by one or more keys.  The set of
keys used to create a signatures is contained in a context, and is
applied to all following signing operations in
 this context (until the
set is changed).

@menu
* Selecting Signers::  How to choose the keys to sign with.
* Creating a Signature::  How to create a signature.
* Signature Notation Data::  How to add notation data to a signature.
@end menu

@node Selecting Signers
@subsubsection Selecting Signers
@cindex signature, selecting signers
@cindex signers, selecting

The key or the keys used to create a signature are stored in the
context.  The following functions can be used to manipulate this list.
If no signer has been set into the context a default key is used for
signing.

@deftypefun void gpgme_signers_clear (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_signers_clear} releases a reference for each
key on the signers list and removes the list of signers from the
context @var{ctx}.

Every context starts with an empty list.
@end deftypefun

@deftypefun gpgme_error_t gpgme_signers_add (@w{gpgme_ctx_t @var{ctx}}, @w{const gpgme_key_t
@var{key}})
The function
 @code{gpgme_signers_add} adds the key @var{key} to the
list of signers in the context @var{ctx}.

Calling this function acquires an additional reference for the key.
@end deftypefun

@deftypefun @w{unsigned int} gpgme_signers_count (@w{const gpgme_ctx_t @var{ctx}})
@since{1.4.3}

The function @code{gpgme_signers_count} returns the number of signer keys in
the context @var{ctx}.
@end deftypefun

@deftypefun gpgme_key_t gpgme_signers_enum (@w{const gpgme_ctx_t @var{ctx}}, @w{int @var{seq}})
The function @code{gpgme_signers_enum} returns the @var{seq}th key in
the list of signers in the context @var{ctx}.  An additional reference
is acquired for the user.

If @var{seq} is out of range, @code{NULL} is returned.
@end deftypefun

@node Creating a Signature
@subsubsection Creating a Signature

@deftp {Data type} {enum gpgme_sig_mode_t}
@tindex gpgme_sig_mode_t
The @code{gpgme_sig_mode_t} type is used to specify the desired type of a
signature.  The following modes are available:

@table @code
@item
 GPGME_SIG_MODE_NORMAL
A normal signature is made, the output includes the plaintext and the
signature.

@item GPGME_SIG_MODE_DETACH
A detached signature is made.

@item GPGME_SIG_MODE_CLEAR
A clear text signature is made.  The @acronym{ASCII} armor and text
mode settings of the context are ignored.
@end table
@end deftp

@deftypefun gpgme_error_t gpgme_op_sign (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t @var{plain}},
@w{gpgme_data_t @var{sig}}, @w{gpgme_sig_mode_t @var{mode}})
The function @code{gpgme_op_sign} creates a signature for the text in
the data object @var{plain} and returns it in the data object
@var{sig}.  The type of the signature created is determined by the
@acronym{ASCII} armor (or, if that is not set, by the encoding
specified for @var{sig}), the text mode attributes set for the context
@var{ctx} and the requested signature mode @var{mode}.

After the operation completed successfully, the result can be
retrieved with @code{gpgme_op_sign_result}.

If an S/MIME
 signed message is created using the CMS crypto engine,
the number of certificates to include in the message can be specified
with @code{gpgme_set_include_certs}.  @xref{Included Certificates}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
signature could be created successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx}, @var{plain} or @var{sig} is not a valid pointer,
@code{GPG_ERR_NO_DATA} if the signature could not be created,
@code{GPG_ERR_BAD_PASSPHRASE} if the passphrase for the secret key
could not be retrieved, @code{GPG_ERR_UNUSABLE_SECKEY} if there are
invalid signers, and passes through any errors that are reported by the
crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_sign_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t

@var{plain}}, @w{gpgme_data_t @var{sig}}, @w{gpgme_sig_mode_t @var{mode}})
The function @code{gpgme_op_sign_start} initiates a
@code{gpgme_op_sign} operation.  It can be completed by calling
@code{gpgme_wait}
 on the context.  @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the operation could be
started successfully, and @code{GPG_ERR_INV_VALUE} if @var{ctx},
@var{plain} or @var{sig} is not a valid pointer.
@end deftypefun

@deftp {Data type} {gpgme_new_signature_t}
This is a pointer to a structure used to store a part of the result of
a @code{gpgme_op_sign} operation.  The structure contains the
following members:

@table @code
@item gpgme_new_signature_t next
This is a pointer to the next new signature structure in the linked
list, or @code{NULL} if this is the last element.

@item gpgme_sig_mode_t type
The type of this signature.

@item gpgme_pubkey_algo_t pubkey_algo
The public key algorithm used to create this signature.

@item gpgme_hash_algo_t hash_algo
The hash algorithm used to create this signature.

@item unsigned int sig_class
The signature class of this signature.

@item long int timestamp
The creation timestamp of this signature.

@item
 char *fpr
The fingerprint of the key which was used to create this signature.
@end table
@end deftp

@deftp {Data type} {gpgme_sign_result_t}
This is a pointer to a structure used to store the result of a
@code{gpgme_op_sign} operation.  After successfully generating a
signature, you can retrieve the pointer to the result with
@code{gpgme_op_sign_result}.  The structure contains the following
members:

@table @code
@item gpgme_invalid_key_t invalid_signers
A linked list with information about all invalid keys for which a
signature could not be created.

@item gpgme_new_signature_t signatures
A linked list with information about all signatures created.
@end table
@end deftp

@deftypefun gpgme_sign_result_t gpgme_op_sign_result (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_op_sign_result} returns a
@code{gpgme_sign_result_t} pointer to a structure holding the result
of a @code{gpgme_op_sign} operation. The pointer is only valid if the
last operation on the context was
a @code{gpgme_op_sign},
@code{gpgme_op_sign_start}, @code{gpgme_op_encrypt_sign} or
@code{gpgme_op_encrypt_sign_start} operation. If that operation
failed, the function might return a @code{NULL} pointer. The returned
pointer is only valid until the next operation is started on the
context.
@end deftypefun

@node Signature Notation Data
@subsubsection Signature Notation Data
@cindex notation data
@cindex signature notation data
@cindex policy URL

Using the following functions, you can attach arbitrary notation data
to a signature. This information is then available to the user when
the signature is verified.

@deftypefun void gpgme_sig_notation_clear (@w{gpgme_ctx_t @var{ctx}})
@since{1.1.0}

The function @code{gpgme_sig_notation_clear} removes the notation data
from the context @var{ctx}. Subsequent signing operations from this
context will not include any notation data.

Every context starts with an empty notation data list.
@end deftypefun

@deftypefun gpgme_error_t gpgme_sig_notation_add
(@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{name}}, @w{const char *@var{value}},
@w{gpgme_sig_notation_flags_t @var{flags}})

@since{1.1.0}

The function @code{gpgme_sig_notation_add} adds the notation data with
the name @var{name} and the value @var{value} to the context
@var{ctx}.

Subsequent signing operations will include this notation data, as well
as any other notation data that was added since the creation of the
context or the last @code{gpgme_sig_notation_clear} operation.

The arguments @var{name} and @var{value} must be @code{NUL}-terminated
strings in human-readable form. The flag
@code{GPGME_SIG_NOTATION_HUMAN_READABLE} is implied
(non-human-readable notation data is currently not supported). The
strings must be in UTF-8 encoding.

If @var{name} is @code{NULL}, then @var{value} should be a policy URL.

The function @code{gpgme_sig_notation_add} returns the error code
@code{GPG_ERR_NO_ERROR} if the notation data could be added
successfully, @code{GPG_ERR_INV_VALUE}
if @var{ctx} is not a valid
pointer, or if @var{name}, @var{value} and @var{flags} are an invalid
combination. The function also passes through any errors that are
reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_sig_notation_t gpgme_sig_notation_get (@w{const gpgme_ctx_t @var{ctx}})
@since{1.1.0}

The function @code{gpgme_sig_notation_get} returns the linked list of
notation data structures that are contained in the context @var{ctx}.

If @var{ctx} is not a valid pointer, or there is no notation data
added for this context, @code{NULL} is returned.
@end deftypefun

@node Encrypt
@subsection Encrypt
@cindex encryption
@cindex cryptographic operation, encryption

One plaintext can be encrypted for several recipients at the same
time. The list of recipients is created independently of any context,
and then passed to the encryption operation.

@menu

* Encrypting a Plaintext::  How to encrypt a plaintext.
@end menu

@node Encrypting a
Plaintext
@subsubsection Encrypting a Plaintext

@deftypefun gpgme_error_t gpgme_op_encrypt (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{recp}[]}, @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
The function @code{gpgme_op_encrypt} encrypts the plaintext in the
data object @var{plain} for the recipients @var{recp} and stores the
ciphertext in the data object @var{cipher}.  The type of the
ciphertext created is determined by the @acronym{ASCII} armor (or, if
that is not set, by the encoding specified for @var{cipher}) and the
text mode attributes set for the context @var{ctx}.

@var{recp} must be a @code{NULL}-terminated array of keys.  The user
must keep references for all keys during the whole duration of the
call (but see @code{gpgme_op_encrypt_start} for the requirements with
the asynchronous variant).

The value in @var{flags} is a bitwise-or combination of one or
multiple of the following bit values:

@table @code
@item GPGME_ENCRYPT_ALWAYS_TRUST
The
@code{GPGME_ENCRYPT_ALWAYS_TRUST} symbol specifies that all the
recipients in @var{recp} should be trusted, even if the keys do not
have a high enough validity in the keyring.  This flag should be used
with care; in general it is not a good idea to use any untrusted keys.

@item GPGME_ENCRYPT_NO_ENCRYPT_TO
@since{1.2.0}

The @code{GPGME_ENCRYPT_NO_ENCRYPT_TO} symbol specifies that no
default or hidden default recipients as configured in the crypto
backend should be included.  This can be useful for managing different
user profiles.

@item GPGME_ENCRYPT_NO_COMPRESS
@since{1.5.0}

The @code{GPGME_ENCRYPT_NO_COMPRESS} symbol specifies that the
plaintext shall not be compressed before it is encrypted.  This is
in some cases useful if the length of the encrypted message

may reveal information about the plaintext.

@item GPGME_ENCRYPT_PREPARE
@itemx GPGME_ENCRYPT_EXPECT_SIGN
The @code{GPGME_ENCRYPT_PREPARE} symbol is used with the UI Server protocol to prepare an encryption
(i.e. sending the
@code{PREP_ENCRYPT} command). With the
@code{GPGME_ENCRYPT_EXPECT_SIGN} symbol the UI Server is advised to also expect a sign command.

@item GPGME_ENCRYPT_SYMMETRIC
@since{1.7.0}

The @code{GPGME_ENCRYPT_SYMMETRIC} symbol specifies that the output should be additionally encrypted symmetrically even if recipients are provided. This feature is only supported for the OpenPGP crypto engine.

@item GPGME_ENCRYPT_THROW_KEYIDS
@since{1.8.0}

The @code{GPGME_ENCRYPT_THROW_KEYIDS} symbols requests that the identifiers for the decrption keys are not included in the ciphertext. On the receiving side, the use of this flag may slow down the decryption process because all available secret keys must be tried. This flag is only honored for OpenPGP encryption.

@item GPGME_ENCRYPT_WRAP
@since{1.8.0}

The @code{GPGME_ENCRYPT_WRAP} symbol specifies that the input is an OpenPGP message and not a plain data. This is the counterpart to @code{GPGME_DECRYPT_UNWRAP}.

@item GPGME_ENCRYPT_WANT_ADDRESS
@since{1.11.0}

The
@code{GPGME_ENCRYPT_WANT_ADDRESS} symbol requests that all supplied keys or key specifications include a syntactically valid mail address. If this is not the case the operation is not even tried and the error code @code{GPG_ERR_INV_USER_ID} is returned. Only the address part of the key specification is conveyed to the backend. As of now the key must be specified using the @var{recpstring} argument of the extended encrypt functions. This feature is currently only supported for the OpenPGP crypto engine.

@end table

If @code{GPG_ERR_UNUSABLE_PUBKEY} is returned, some recipients in
@var{recp} are invalid, but not all.  In this case the plaintext might
be encrypted for all valid recipients and returned in @var{cipher} (if
this happens depends on the crypto engine).  More information about
the invalid recipients is available with
@code{gpgme_op_encrypt_result}.

If @var{recp} is @code{NULL}, symmetric rather than public key
encryption is performed.
  Symmetrically encrypted cipher text can be
deciphered with @code{gpgme_op_decrypt}.  Note that in this case the
crypto backend needs to retrieve a passphrase from the user.
Symmetric encryption is currently only supported for the OpenPGP
crypto backend.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
ciphertext could be created successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx}, @var{recp}, @var{plain} or @var{cipher} is not a valid
pointer, @code{GPG_ERR_UNUSABLE_PUBKEY} if @var{recp} contains some
invalid recipients, @code{GPG_ERR_BAD_PASSPHRASE} if the passphrase
for the symmetric key could not be retrieved, and passes through any
errors that are reported by the crypto engine support routines.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_encrypt_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
@var{recp}[]}, @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t
@var{cipher}})
The function @code{gpgme_op_encrypt_start} initiates
 a
@code{gpgme_op_encrypt} operation.  It can be completed by calling
@code{gpgme_wait} on the context.  @xref{Waiting For Completion}.

References to the keys only need to be held for the duration of this
call.  The user can release its references to the keys after this
function returns, even if the operation is not yet finished.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx}, @var{rset}, @var{plain} or @var{cipher} is not a valid
pointer, and @code{GPG_ERR_UNUSABLE_PUBKEY} if @var{rset} does not
contain any valid recipients.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_encrypt_ext @
        (@w{gpgme_ctx_t @var{ctx}}, @
         @w{gpgme_key_t @var{recp}[]}, @

@w{const char *@var{recpstring}}, @
@w{gpgme_encrypt_flags_t @var{flags}}, @
@w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})

@since{1.11.0}

This is an extended
version of @code{gpgme_op_encrypt} with
@var{recpstring} as additional parameter. If @var{recp} is NULL and
@var{recpstring} is not NULL, the latter is expected to be a linefeed
delimited string with the set of key specifications. In contrast to
@var{recp} the keys are given directly as strings and there is no need
to first create key objects. Leading and trailing white space is
remove from each line in @var{recpstring}. The keys are then passed
verbatim to the backend engine.

For the OpenPGP backend several special keywords are supported to
modify the operation. These keywords are given instead of a key
specification. The currently supported keywords are:

@table @code
@item --hidden
@itemx --no-hidden
These keywords toggle between normal and hidden recipients for all
following key specifications. When a hidden recipient is requested
the gpg option @option{-R} (or @option{-F} in file mode) is used
instead of @option{-r} (@option{-f} in file mode).

@item --file
@itemx
--no-file
These keywords toggle between regular and file mode for all following
key specification. In file mode the option @option{-f} or @option{-F}
is passed to gpg. At least GnuPG version 2.1.14 is required to handle
these options. The @code{GPGME_ENCRYPT_WANT_ADDRESS} flag is ignored
in file mode.

@item --
This keyword disables all keyword detection up to the end of the
string. All keywords are treated as verbatim arguments.

@end table

To create a @var{recpstring} it is often useful to employ a strconcat
style function. For example this function creates a string to encrypt
to two keys:

@example

```
char *
xbuild_recpstring (const char *key1, const char *key2)
@{
 char *result = gpgrt_strconcat ("--\n", key1, "\n", key2, NULL);
 if (!result)
   @{ perror ("strconcat failed"); exit (2); @}
 return result;
@}
@end example
```

Note the use of the double dash here; unless you want to specify a keyword, it is a good idea to avoid any possible trouble with key specifications starting
with a double dash. The used strconcat
function is available in Libgpg-error 1.28 and later; Libgpg-error (aka Gpgrt) is a dependency of GPGME. The number of arguments to @code{gpgrt_strconcat} is limited to 47 but that should always be sufficient. In case a larger and non-fixed number of keys are to be supplied the following code can be used:

```
@example
char *
xbuild_long_recpstring (void)
@{
 gpgrt_stream_t memfp;
 const char *s;
 void *result;

 memfp = gpgrt_fopenmem (0, "w+b");
 if (!memfp)
   @{ perror ("fopenmem failed"); exit (2); @}
 gpgrt_fputs ("--", memfp);
 while ((s = get_next_keyspec ()))
   @{
     gpgrt_fputc ('\n', memfp);
     gpgrt_fputs (s, memfp);
   @}
 gpgrt_fputc (0, memfp);
 if (gpgrt_ferror (memfp))
   @{ perror ("writing to memstream failed"); exit (2); @}
 if (gpgrt_fclose_snatch (memfp, &result, NULL))
   @{ perror ("fclose_snatch failed"); exit (2); @}
 return result;
@}
@end example
```

In this example @code{get_next_keyspec} is expected

to return the next
key to be added to the string.  Please take care: Encrypting to a
large number of recipients is often questionable due to security
reasons and also for the technicality that all keys are currently
passed on the command line to @command{gpg} which has as a platform
specific length limitation.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_encrypt_ext_start @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{gpgme_key_t @var{recp}[]}, @
@w{const char *@var{recpstring}}, @
@w{gpgme_encrypt_flags_t @var{flags}}, @
@w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})

@since{1.11.0}

This is an extended version of @code{gpgme_op_encrypt_start} with
@var{recpstring} as additional parameter.  If @var{recp} is NULL and
@var{recpstring} is not NULL, the latter is expected to be a linefeed
delimited string with the set of key specifications.  In contrast to
@var{recp} the keys are given directly as strings and there
is no need
to first create key objects.  The keys are passed verbatim to the
backend engine.

@end deftypefun

@deftp {Data type} {gpgme_encrypt_result_t}
This is a pointer to a structure used to store the result of a
@code{gpgme_op_encrypt} operation.  After successfully encrypting
data, you can retrieve the pointer to the result with
@code{gpgme_op_encrypt_result}.  The structure contains the following
members:

@table @code
@item gpgme_invalid_key_t invalid_recipients
A linked list with information about all invalid keys for which
the data could not be encrypted.
@end table
@end deftp

@deftypefun gpgme_encrypt_result_t gpgme_op_encrypt_result (@w{gpgme_ctx_t @var{ctx}})
The function @code{gpgme_op_encrypt_result} returns a
@code{gpgme_encrypt_result_t} pointer to a structure holding the
result of a @code{gpgme_op_encrypt} operation.  The pointer is only
valid if the last operation on the context was a

@code{gpgme_op_encrypt}, @code{gpgme_op_encrypt_start},
@code{gpgme_op_sign} or
@code{gpgme_op_sign_start} operation. If this
operation failed, this might be a @code{NULL} pointer. The returned
pointer is only valid until the next operation is started on the
context.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_encrypt_sign (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{recp}[]}, @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
The function @code{gpgme_op_encrypt_sign} does a combined encrypt and
sign operation. It is used like @code{gpgme_op_encrypt}, but the
ciphertext also contains signatures for the signers listed in
@var{ctx}.

The combined encrypt and sign operation is currently only available
for the OpenPGP crypto engine.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_encrypt_sign_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{recp}[]}, @w{gpgme_encrypt_flags_t @var{flags}}, @w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})
The function @code{gpgme_op_encrypt_sign_start}
initiates a
@code{gpgme_op_encrypt_sign} operation. It can be completed by
calling @code{gpgme_wait} on the context. @xref{Waiting For
Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation could be started successfully, and @code{GPG_ERR_INV_VALUE}
if @var{ctx}, @var{rset}, @var{plain} or @var{cipher} is not a valid
pointer.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_encrypt_sign_ext @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{gpgme_key_t @var{recp}[]}, @
@w{const char *@var{recpstring}}, @
@w{gpgme_encrypt_flags_t @var{flags}}, @
@w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})

@since{1.11.0}

This is an extended version of @code{gpgme_op_encrypt_sign} with
@var{recpstring} as additional parameter. If @var{recp} is NULL and
@var{recpstring} is not NULL, the latter is expected to be a linefeed

delimited string with the set of key specifications.  In contrast to
@var{recp}
 the keys are given directly as strings and there is no need
to first create the key objects.  The keys are passed verbatim to the
backend engine.

@end deftypefun

@deftypefun gpgme_error_t gpgme_op_encrypt_sign_ext_start @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{gpgme_key_t @var{recp}[]}, @
@w{const char *@var{recpstring}}, @
@w{gpgme_encrypt_flags_t @var{flags}}, @
@w{gpgme_data_t @var{plain}}, @w{gpgme_data_t @var{cipher}})

@since{1.11.0}

This is an extended version of @code{gpgme_op_encrypt_sign_start} with
@var{recpstring} as additional parameter.  If @var{recp} is NULL and
@var{recpstring} is not NULL, the latter is expected to be a linefeed
delimited string with the set of key specifications.  In contrast to
@var{recp} the keys are given directly as strings and there is no need
to first create the key objects.  The keys are passed verbatim to the
backend engine.

@end deftypefun

@node Miscellaneous
@section Miscellaneous
 operations

Here are some support functions which are sometimes useful.

@menu
* Running other Programs::  Running other Programs
* Using the Assuan protocol::  Using the Assuan protocol
* Checking for updates::  How to check for software updates
@end menu

@node Running other Programs
@subsection Running other Programs

GPGME features an internal subsystem to run the actual backend
engines.  Along with data abstraction object this subsystem can be
used to run arbitrary simple programs which even need not be related
to cryptographic features.  It may for example be used to run tools

which are part of the GnuPG system but are not directly accessible
with the GPGME API.

@deftypefun gpgme_error_t gpgme_op_spawn @
(@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{file}}, @
@w{const char *@var{argv}[]}, @w{gpgme_data_t @var{datain}}, @
@w{gpgme_data_t @var{dataout}}, @w{gpgme_data_t @var{dataerr}}, @
@w{unsigned int @var{flags}})

@since{1.5.0}

The
function @code{gpgme_op_spawn} runs the program @var{file} with
the arguments taken from the NULL terminated array @var{argv}. If no
arguments are required @var{argv} may be given as @code{NULL}. In the
latter case or if @code{argv[0]} is the empty string, GPGME uses the
basename of @var{file} for @code{argv[0]}. The file descriptors
@code{stdin}, @code{stdout}, and @code{stderr} are connected to the
data objects @var{datain}, @var{dataout}, and @var{dataerr}. If NULL
is passed for one of these data objects the corresponding file
descriptor is connected to @file{/dev/null}.

The value in @var{flags} is a bitwise-or combination of one or
multiple of the following bit values:

@table @code
@item GPGME_SPAWN_DETACHED
@since{1.5.0}

Under Windows this flag inhibits the allocation of a new console for
the program. This is useful for a GUI application which needs to call
a command line helper tool.

@item GPGME_SPAWN_ALLOW_SET_FG
@since{1.5.0}

Under Windows
this flag allows the called program to put itself into
the foreground.
@end table
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_spawn_start @
(@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{file}}, @
@w{const char *@var{argv}[]}, @w{gpgme_data_t @var{datain}}, @
@w{gpgme_data_t @var{dataout}}, @w{gpgme_data_t @var{dataerr}}, @
@w{unsigned int @var{flags}})

@since{1.5.0}

This is the asynchronous variant of @code{gpgme_op_spawn}.
@end deftypefun

@node Using the Assuan protocol
@subsection Using the Assuan protocol

The Assuan protocol can be used to talk to arbitrary Assuan servers.
By default it is connected to the GnuPG agent, but it may be connected
to arbitrary servers by using @code{gpgme_ctx_set_engine_info},
passing the location of the servers socket as @var{file_name}
argument, and an empty string as @var{home_dir} argument.

The Assuan protocol functions use three kinds of callbacks to transfer
data:

@deftp {Data type}
{gpgme_error_t (*gpgme_assuan_data_cb_t) @
(@w{void *@var{opaque}}, @w{const void *@var{data}}, @
@w{size_t @var{datalen}})}

@since{1.2.0}

This callback receives any data sent by the server. @var{opaque} is
the pointer passed to @code{gpgme_op_assuan_transact_start},
@var{data} of length @var{datalen} refers to the data sent.
@end deftp

@deftp {Data type} {gpgme_error_t (*gpgme_assuan_inquire_cb_t) @
(@w{void *@var{opaque}}, @w{const char *@var{name}}, @
@w{const char *@var{args}}, @w{gpgme_data_t *@var{r_data}})}

@since{1.2.0}

This callback is used to provide additional data to the Assuan server.
@var{opaque} is the pointer passed to
@code{gpgme_op_assuan_transact_start}, @var{name} and @var{args}
specify what kind of data the server requested, and @var{r_data} is
used to return the actual data.

Note: Returning data is currently not implemented in @acronym{GPGME}.
@end deftp

@deftp {Data type} {gpgme_error_t (*gpgme_assuan_status_cb_t) @

```
 (@w{void *@var{opaque}}, @w{const char *@var{status}}, @
     @w{const char *@var{args}})}

@since{1.2.0}

This callback receives any status lines sent by the server.
@var{opaque} is the pointer passed to
@code{gpgme_op_assuan_transact_start}, @var{status} and @var{args}
denote the status update sent.
@end deftp

@deftypefun gpgme_error_t gpgme_op_assuan_transact_start @
        (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{command}}, @
         @w{gpgme_assuan_data_cb_t @var{data_cb}}, @
         @w{void * @var{data_cb_value}}, @
         @w{gpgme_assuan_inquire_cb_t @var{inquire_cb}}, @
         @w{void * @var{inquire_cb_value}}, @
         @w{gpgme_assuan_status_cb_t @var{status_cb}}, @
         @w{void * @var{status_cb_value}})

@since{1.2.0}

Send the Assuan @var{command} and return results via the callbacks.
Any callback may be @code{NULL}.  The result of the operation may be
retrieved using @code{gpgme_wait_ext}.

Asynchronous variant.
@end deftypefun

@deftypefun
 gpgme_error_t gpgme_op_assuan_transact_ext @
        (@w{gpgme_ctx_t @var{ctx}}, @w{const char *@var{command}}, @
         @w{gpgme_assuan_data_cb_t @var{data_cb}}, @
         @w{void * @var{data_cb_value}}, @
         @w{gpgme_assuan_inquire_cb_t @var{inquire_cb}}, @
         @w{void * @var{inquire_cb_value}}, @
         @w{gpgme_assuan_status_cb_t @var{status_cb}}, @
         @w{void * @var{status_cb_value}}, @
         @w{gpgme_error_t *@var{op_err}})

Send the Assuan @var{command} and return results via the callbacks.
The result of the operation is returned in @var{op_err}.

Synchronous variant.
@end deftypefun


@node Checking for updates
```

@subsection How to check for software updates

The GnuPG Project operates a server to query the current versions of software packages related to GnuPG.  GPGME can be used to access this online database and check whether a new version of a software package is available.

@deftp {Data type} {gpgme_query_swdb_result_t}
@since{1.8.0}

This
 is a pointer to a structure used to store the result of a @code{gpgme_op_query_swdb} operation.  After success full call to that function, you can retrieve the pointer to the result with @code{gpgme_op_query_swdb_result}.  The structure contains the following member:

@table @code
@item name
This is the name of the package.

@item iversion
The currently installed version or an empty string.  This value is either a copy of the argument given to @code{gpgme_op_query_swdb} or the version of the installed software as figured out by GPGME or GnuPG.

@item created
This gives the date the file with the list of version numbers has originally be created by the GnuPG project.

@item retrieved
This gives the date the file was downloaded.

@item warning
If this flag is set either an error has occurred or some of the information in this structure are not properly set.  For example if the version number of the installed software could not be figured out, the
 @code{update} flag may not reflect a required update status.

@item update
If this flag is set an update of the software is available.

@item urgent
If this flag is set an available update is important.

@item noinfo
If this flag is set, no valid information could be retrieved.

@item unknown
If this flag is set the given @code{name} is not known.

@item toold
If this flag is set the available information is not fresh enough.

@item error
If this flag is set some other error has occurred.

@item version
The version string of the latest released version.

@item reldate
The release date of the latest released version.

@end table
@end deftp

@deftypefun gpgme_error_t gpgme_op_query_swdb @
(@w{gpgme_ctx_t @var{ctx}}, @
@w{const char *@var{name}}, @
@w{const char *@var{iversion}}, @
@w{gpgme_data_t @var{reserved}})

@since{1.8.0}

Query the software version database for software package @var{name}
and check against the installed
version given by @var{iversion}. If
@var{iversion} is given as @code{NULL} a check is only done if GPGME
can figure out the version by itself (for example when using
"gpgme" or "gnupg"). If @code{NULL} is used for @var{name} the
current gpgme version is checked. @var{reserved} must be set to 0.

@end deftypefun

@deftypefun gpgme_query_swdb_result_t gpgme_op_query_swdb_result @
(@w{gpgme_ctx_t @var{ctx}})

@since{1.8.0}

The function @code{gpgme_op_query_swdb_result} returns a
@code{gpgme_query_swdb_result_t} pointer to a structure holding the
result of a @code{gpgme_op_query_swdb} operation. The pointer is only
valid if the last operation on the context was a successful call to
@code{gpgme_op_query_swdb}. If that call failed, the result might
be a @code{NULL} pointer. The returned pointer is only valid until

the next operation is started on the context @var{ctx}.
@end deftypefun

@noindent
Here is an example on how to check whether GnuPG is current:

```
@example
#include
 <gpgme.h>

int
main (void)
@{
 gpg_error_t err;
 gpgme_ctx_t ctx;
 gpgme_query_swdb_result_t result;

 gpgme_check_version (NULL);
 err = gpgme_new (&ctx);
 if (err)
   fprintf (stderr, "error creating context: %s\n", gpg_strerror (err));
 else
   @{
     gpgme_set_protocol (ctx, GPGME_PROTOCOL_GPGCONF);

     err = gpgme_op_query_swdb (ctx, "gnupg", NULL, 0);
     if (err)
       fprintf (stderr, "error querying swdb: %s\n", gpg_strerror (err));
     else
       @{
         result = gpgme_op_query_swdb_result (ctx);
         if (!result)
           fprintf (stderr, "error querying swdb\n");
         if (!result->warning && !result->update)
           printf ("GnuPG version %s is current\n",
                   result->iversion);
         else if (!result->warning && result->update)
           printf ("GnuPG version %s can be updated to %s\n",
                   result->iversion, result->version);
         else
           fprintf (stderr, "error finding the
 update status\n");
       @}
     gpgme_release (ctx);
   @}
 return 0;
@}
@end example
```

@node Run Control
@section Run Control
@cindex run control
@cindex cryptographic operation, running

@acronym{GPGME} supports running operations synchronously and asynchronously. You can use asynchronous operation to set up a context up to initiating the desired operation, but delay performing it to a later point.

Furthermore, you can use an external event loop to control exactly when @acronym{GPGME} runs. This ensures that @acronym{GPGME} only runs when necessary and also prevents it from blocking for a long time.

@menu
* Waiting For Completion:: Waiting until an operation is completed.
* Using External Event Loops:: Advanced control over what happens when.
* Cancellation:: How to end pending operations prematurely.
@end menu

@node Waiting For Completion
@subsection Waiting For Completion
@cindex cryptographic operation, wait for
@cindex wait for completion

@deftypefun
gpgme_ctx_t gpgme_wait (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_error_t *@var{status}}, @w{int @var{hang}})
The function @code{gpgme_wait} continues the pending operation within the context @var{ctx}. In particular, it ensures the data exchange between @acronym{GPGME} and the crypto backend and watches over the run time status of the backend process.

If @var{hang} is true, the function does not return until the operation is completed or cancelled. Otherwise the function will not block for a long time.

The error status of the finished operation is returned in @var{status} if @code{gpgme_wait} does not return @code{NULL}.

The @var{ctx} argument can be @code{NULL}. In that case, @code{gpgme_wait} waits for any context to complete its operation.

@code{gpgme_wait} can be used only in conjunction with any context

that has a pending operation initiated with one of the
@code{gpgme_op_*_start} functions except @code{gpgme_op_keylist_start}
and @code{gpgme_op_trustlist_start} (for
which you should use the
corresponding @code{gpgme_op_*_next} functions). If @var{ctx} is
@code{NULL}, all of such contexts are waited upon and possibly
returned. Synchronous operations running in parallel, as well as key
and trust item list operations, do not affect @code{gpgme_wait}.

In a multi-threaded environment, only one thread should ever call
@code{gpgme_wait} at any time, regardless of whether @var{ctx} is specified
or not. This means that all calls to this function should be fully
synchronized by locking primitives. It is safe to start asynchronous
operations while a thread is running in @code{gpgme_wait}.

The function returns the @var{ctx} of the context which has finished
the operation. If @var{hang} is false, and the timeout expires,
@code{NULL} is returned and @code{*status} will be set to 0. If an
error occurs, @code{NULL} is returned and the error is returned in
@code{*status}.
@end deftypefun

@node Using External Event Loops
@subsection Using External Event
Loops
@cindex event loop, external

@acronym{GPGME} hides the complexity of the communication between the
library and the crypto engine. The price of this convenience is that
the calling thread can block arbitrary long waiting for the data
returned by the crypto engine. In single-threaded programs, in
particular if they are interactive, this is an unwanted side-effect.
OTOH, if @code{gpgme_wait} is used without the @var{hang} option being
enabled, it might be called unnecessarily often, wasting CPU time that
could be used otherwise.

The I/O callback interface described in this section lets the user
take control over what happens when. @acronym{GPGME} will provide the
user with the file descriptors that should be monitored, and the
callback functions that should be invoked when a file descriptor is
ready for reading or writing. It is then the user's responsibility to
decide when to check the file descriptors and when to invoke the
callback functions. Usually this is done in an event
loop, that also
checks for events in other parts of the program. If the callback
functions are only called when the file descriptors are ready,
@acronym{GPGME} will never block. This gives the user more control

over the program flow, and allows to perform other tasks when
@acronym{GPGME} would block otherwise.

By using this advanced mechanism, @acronym{GPGME} can be integrated
smoothly into GUI toolkits like GTK+ even for single-threaded
programs.

@menu
* I/O Callback Interface:: How I/O callbacks are registered.
* Registering I/O Callbacks:: How to use I/O callbacks for a context.
* I/O Callback Example:: An example how to use I/O callbacks.
* I/O Callback Example GTK+:: How to use @acronym{GPGME} with GTK+.
* I/O Callback Example GDK:: How to use @acronym{GPGME} with GDK.
* I/O Callback Example Qt:: How to use @acronym{GPGME} with Qt.
@end menu

@node I/O Callback Interface
@subsubsection I/O Callback Interface

@deftp {Data type} {gpgme_error_t
(*gpgme_io_cb_t) (@w{void *@var{data}}, @w{int @var{fd}})}
@tindex gpgme_io_cb_t
The @code{gpgme_io_cb_t} type is the type of functions which
@acronym{GPGME} wants to register as I/O callback handlers using the
@code{gpgme_register_io_cb_t} functions provided by the user.

@var{data} and @var{fd} are provided by @acronym{GPGME} when the I/O
callback handler is registered, and should be passed through to the
handler when it is invoked by the user because it noticed activity on
the file descriptor @var{fd}.

The callback handler always returns @code{0}, but you should consider
the return value to be reserved for later use.
@end deftp

@deftp {Data type} {gpgme_error_t (*gpgme_register_io_cb_t) (@w{void *@var{data}}, @w{int @var{fd}},
@w{int @var{dir}}, @w{gpgme_io_cb_t @var{fnc}}, @w{void *@var{fnc_data}}, @w{void **@var{tag}})}
@tindex gpgme_register_io_cb_t
The @code{gpgme_register_io_cb_t} type is the type of functions which can
be called by @acronym{GPGME} to register an I/O callback
function
@var{fnc} for the file descriptor @var{fd} with the user.
@var{fnc_data} should be passed as the first argument to @var{fnc}
when the handler is invoked (the second argument should be @var{fd}).
If @var{dir} is 0, @var{fnc} should be called by the user when
@var{fd} is ready for writing. If @var{dir} is 1, @var{fnc} should be
called when @var{fd} is ready for reading.

@var{data} was provided by the user when registering the
@code{gpgme_register_io_cb_t} function with @acronym{GPGME} and will always
be passed as the first argument when registering a callback function.
For example, the user can use this to determine the event loop to
which the file descriptor should be added.

@acronym{GPGME} will call this function when a crypto operation is
initiated in a context for which the user has registered I/O callback
handler functions with @code{gpgme_set_io_cbs}.  It can also call this
function when it is in an I/O callback handler for a file descriptor
associated to this context.

The
 user should return a unique handle in @var{tag} identifying this
I/O callback registration, which will be passed to the
@code{gpgme_register_io_cb_t} function without interpretation when the file
descriptor should not be monitored anymore.
@end deftp

@deftp {Data type} {void (*gpgme_remove_io_cb_t) (@w{void *@var{tag}})}
The @code{gpgme_remove_io_cb_t} type is the type of functions which can be
called by @acronym{GPGME} to remove an I/O callback handler that was
registered before.  @var{tag} is the handle that was returned by the
@code{gpgme_register_io_cb_t} for this I/O callback.

@acronym{GPGME} can call this function when a crypto operation is in
an I/O callback.  It will also call this function when the context is
destroyed while an operation is pending.
@end deftp

@deftp {Data type} {enum gpgme_event_io_t}
@tindex gpgme_event_io_t
The @code{gpgme_event_io_t} type specifies the type of an event that is
reported to the user by @acronym{GPGME} as a consequence of an I/O
operation.
  The following events are defined:

@table @code
@item GPGME_EVENT_START
The operation is fully initialized now, and you can start to run the
registered I/O callback handlers now.  Note that registered I/O
callback handlers must not be run before this event is signalled.
@var{type_data} is @code{NULL} and reserved for later use.

@item GPGME_EVENT_DONE
The operation is finished, the last I/O callback for this operation
was removed.  The accompanying @var{type_data} points to a

@code{struct gpgme_io_event_done_data} variable that contains the
status of the operation that finished.  This event is signalled after
the last I/O callback has been removed.

@item GPGME_EVENT_NEXT_KEY
In a @code{gpgme_op_keylist_start} operation, the next key was
received from the crypto engine.  The accompanying @var{type_data} is
a @code{gpgme_key_t} variable that contains the key with one reference
for the user.

@end table
@end deftp

@deftp {Data type} {void (*gpgme_event_io_cb_t) (@w{void *@var{data}},
 @w{gpgme_event_io_t @var{type}}, @w{void *@var{type_data}})}
The @code{gpgme_event_io_cb_t} type is the type of functions which can be
called by @acronym{GPGME} to signal an event for an operation running
in a context which has I/O callback functions registered by the user.

@var{data} was provided by the user when registering the
@code{gpgme_event_io_cb_t} function with @acronym{GPGME} and will always be
passed as the first argument when registering a callback function.
For example, the user can use this to determine the context in which
this event has occurred.

@var{type} will specify the type of event that has occurred.
@var{type_data} specifies the event further, as described in the above
list of possible @code{gpgme_event_io_t} types.

@acronym{GPGME} can call this function in an I/O callback handler.
@end deftp

@node Registering I/O Callbacks
@subsubsection Registering I/O Callbacks

@deftp {Data type} {struct gpgme_io_cbs}
@tindex gpgme_event_io_t
This structure
 is used to store the I/O callback interface functions
described in the previous section.  It has the following members:

@table @code
@item gpgme_register_io_cb_t add
This is the function called by @acronym{GPGME} to register an I/O
callback handler.  It must be specified.

@item void *add_priv

This is passed as the first argument to the @code{add} function when
it is called by @acronym{GPGME}.  For example, it can be used to
determine the event loop to which the file descriptor should be added.

@item gpgme_remove_io_cb_t remove
This is the function called by @acronym{GPGME} to remove an I/O
callback handler.  It must be specified.

@item gpgme_event_io_cb_t event
This is the function called by @acronym{GPGME} to signal an event for
an operation.  It must be specified, because at least the start event
must be processed.

@item void *event_priv
This is passed as the first argument to the @code{event} function when
it is called by @acronym{GPGME}.  For example, it can be used to
determine
 the context in which the event has occurred.
@end table
@end deftp

@deftypefun void gpgme_set_io_cbs (@w{gpgme_ctx_t @var{ctx}}, @w{struct gpgme_io_cbs *@var{io_cbs}})
The function @code{gpgme_set_io_cbs} enables the I/O callback
interface for the context @var{ctx}.  The I/O callback functions are
specified by @var{io_cbs}.

If @var{io_cbs}->@code{add} is @code{NULL}, the I/O callback interface
is disabled for the context, and normal operation is restored.
@end deftypefun

@deftypefun void gpgme_get_io_cbs (@w{gpgme_ctx_t @var{ctx}}, @w{struct gpgme_io_cbs *@var{io_cbs}})
The function @code{gpgme_get_io_cbs} returns the I/O callback
functions set with @code{gpgme_set_io_cbs} in @var{io_cbs}.
@end deftypefun


@node I/O Callback Example
@subsubsection I/O Callback Example

To actually use an external event loop, you have to implement the I/O
callback functions that are used by @acronym{GPGME} to register and
unregister file descriptors.  Furthermore, you have to actually
monitor these
 file descriptors for activity and call the appropriate
I/O callbacks.

The following example illustrates how to do that.  The example uses
locking to show in which way the callbacks and the event loop can

run concurrently.  For the event loop, we use a fixed array.  For a real-world implementation, you should use a dynamically sized structure because the number of file descriptors needed for a crypto operation in @acronym{GPGME} is not predictable.

```
@example
#include <assert.h>
#include <errno.h>
#include <stdlib.h>
#include <pthread.h>
#include <sys/types.h>
#include <gpgme.h>

/* The following structure holds the result of a crypto operation.  */
struct op_result
@{
 int done;
 gpgme_error_t err;
@};

/* The following structure holds the data associated with one I/O
callback.  */
struct one_fd
@{
 int fd;
 int dir;
 gpgme_io_cb_t fnc;
 void *fnc_data;
 void *loop;
@};

struct event_loop
@{
 pthread_mutex_t lock;
#define MAX_FDS 32
 /* Unused slots are marked with FD being
 -1.  */
 struct one_fd fds[MAX_FDS];
@};
@end example
```

The following functions implement the I/O callback interface.

```
@example
gpgme_error_t
add_io_cb (void *data, int fd, int dir, gpgme_io_cb_t fnc, void *fnc_data,
    void **r_tag)
@{
```

```
 struct event_loop *loop = data;
 struct one_fd *fds = loop->fds;
 int i;

 pthread_mutex_lock (&loop->lock);
 for (i = 0; i < MAX_FDS; i++)
   @{
     if (fds[i].fd == -1)
 @{
   fds[i].fd = fd;
   fds[i].dir = dir;
   fds[i].fnc = fnc;
   fds[i].fnc_data = fnc_data;
   fds[i].loop = loop;
   break;
 @}
   @}
 pthread_mutex_unlock (&loop->lock);
 if (i == MAX_FDS)
   return gpg_error (GPG_ERR_GENERAL);
 *r_tag = &fds[i];
 return 0;
@}

void
remove_io_cb (void *tag)
@{
 struct one_fd *fd = tag;
 struct event_loop *loop = fd->loop;

 pthread_mutex_lock (&loop->lock);
 fd->fd = -1;
 pthread_mutex_unlock (&loop->lock);
@}

void
event_io_cb (void *data, gpgme_event_io_t type, void *type_data)
@{
 struct op_result *result = data;

 /* We
 don't support list operations here.  */
 if (type == GPGME_EVENT_DONE)
   @{
     result->done = 1;
     result->err = *type_data;
   @}
@}
```

@end example

The final missing piece is the event loop, which will be presented next. We only support waiting for the success of a single operation.

```
@example
int
do_select (struct event_loop *loop)
@{
 fd_set rfds;
 fd_set wfds;
 int i, n;
 int any = 0;
 struct timeval tv;
 struct one_fd *fdlist = loop->fds;

 pthread_mutex_lock (&loop->lock);
 FD_ZERO (&rfds);
 FD_ZERO (&wfds);
 for (i = 0; i < MAX_FDS; i++)
   if (fdlist[i].fd != -1)
     FD_SET (fdlist[i].fd, fdlist[i].dir ? &rfds : &wfds);
 pthread_mutex_unlock (&loop->lock);

 tv.tv_sec = 0;
 tv.tv_usec = 1000;

 do
   @{
     n = select (FD_SETSIZE, &rfds, &wfds, NULL, &tv);
   @}
 while (n < 0 && errno == EINTR);

 if (n < 0)
   return n; /* Error or timeout.  */

 pthread_mutex_lock (&loop->lock);
 for (i = 0; i < MAX_FDS && n; i++)
   @{
     if (fdlist[i].fd
 != -1)
 @{
   if (FD_ISSET (fdlist[i].fd, fdlist[i].dir ? &rfds : &wfds))
     @{
       assert (n);
       n--;
       any = 1;
            /* The I/O callback handler can register/remove callbacks,
```

```
            so we have to unlock the file descriptor list.  */
          pthread_mutex_unlock (&loop->lock);
      (*fdlist[i].fnc) (fdlist[i].fnc_data, fdlist[i].fd);
          pthread_mutex_lock (&loop->lock);
    @}
 @}
  @}
 pthread_mutex_unlock (&loop->lock);
 return any;
@}

void
wait_for_op (struct event_loop *loop, struct op_result *result)
@{
 int ret;

 do
   @{
     ret = do_select (loop);
   @}
 while (ret >= 0 && !result->done);
@}
@end example
```

The main function shows how to put it all together.

```
@example
int
main (int argc, char *argv[])
@{
 struct event_loop loop;
 struct op_result result;
 gpgme_ctx_t ctx;
 gpgme_error_t err;
 gpgme_data_t sig, text;
 int i;
 pthread_mutexattr_t attr;
 struct gpgme_io_cbs io_cbs =
 @{
   add_io_cb,
    &loop,
   remove_io_cb,
   event_io_cb,
   &result
 @};

 init_gpgme ();
```

```
/* Initialize the loop structure.  */

/* The mutex must be recursive, since remove_io_cb (which acquires a
   lock) can be called while holding a lock acquired in do_select.  */
pthread_mutexattr_init (&attr);
pthread_mutexattr_settype (&attr, PTHREAD_MUTEX_RECURSIVE);
pthread_mutex_init (&loop.lock, &attr);
pthread_mutexattr_destroy (&attr);

for (i = 0; i < MAX_FDS; i++)
  loop.fds[i].fd = -1;

/* Initialize the result structure.  */
result.done = 0;

err = gpgme_data_new_from_file (&sig, "signature", 1);
if (!err)
  err = gpgme_data_new_from_file (&text, "text", 1);
if (!err)
  err = gpgme_new (&ctx);
if (!err)
  @{
     gpgme_set_io_cbs (ctx, &io_cbs);
     err = gpgme_op_verify_start (ctx, sig, text, NULL);
  @}
if (err)
  @{
    fprintf (stderr, "gpgme error: %s: %s\n",
             gpgme_strsource (err), gpgme_strerror (err));
    exit (1);

  @}

wait_for_op (&loop, &result);
if (!result.done)
  @{
    fprintf (stderr, "select error\n");
    exit (1);
  @}
if (!result.err)
  @{
    fprintf (stderr, "verification failed: %s: %s\n",
             gpgme_strsource (result.err), gpgme_strerror (result.err));
    exit (1);
  @}
/* Evaluate verify result.  */
@dots{}
return 0;
```

```
@}
@end example


@node I/O Callback Example GTK+
@subsubsection I/O Callback Example GTK+
@cindex GTK+, using @acronym{GPGME} with

The I/O callback interface can be used to integrate @acronym{GPGME}
with the GTK+ event loop.  The following code snippets shows how this
can be done using the appropriate register and remove I/O callback
functions.  In this example, the private data of the register I/O
callback function is unused.  The event notifications is missing
because it does not require any GTK+ specific setup.

@example
#include <gtk/gtk.h>

struct my_gpgme_io_cb
@{
 gpgme_io_cb_t fnc;
 void *fnc_data;
 guint input_handler_id
@};

void
my_gpgme_io_cb
 (gpointer data, gint source, GdkInputCondition condition)
@{
 struct my_gpgme_io_cb *iocb = data;
 (*(iocb->fnc)) (iocb->data, source);
@}

void
my_gpgme_remove_io_cb (void *data)
@{
 struct my_gpgme_io_cb *iocb = data;
 gtk_input_remove (data->input_handler_id);
@}

void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,
                               void *fnc_data, void **tag)
@{
 struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
 iocb->fnc = fnc;
 iocb->data = fnc_data;
 iocb->input_handler_id = gtk_input_add_full (fd, dir
```

```
                                    ? GDK_INPUT_READ
                                    : GDK_INPUT_WRITE,
                                my_gpgme_io_callback,
                                0, iocb, NULL);
 *tag = iocb;
 return 0;
@}
@end example
```

```
@node I/O Callback Example GDK
@subsubsection I/O Callback Example
 GDK
@cindex GDK, using @acronym{GPGME} with

The I/O callback interface can also be used to integrate
@acronym{GPGME} with the GDK event loop.  The following code snippets
shows how this can be done using the appropriate register and remove
I/O callback functions.  In this example, the private data of the
register I/O callback function is unused.  The event notifications is
missing because it does not require any GDK specific setup.

It is very similar to the GTK+ example in the previous section.

@example
#include <gdk/gdk.h>

struct my_gpgme_io_cb
@{
 gpgme_io_cb_t fnc;
 void *fnc_data;
 gint tag;
@};

void
my_gpgme_io_cb (gpointer data, gint source, GdkInputCondition condition)
@{
 struct my_gpgme_io_cb *iocb = data;
 (*(iocb->fnc)) (iocb->data, source);
@}

void
my_gpgme_remove_io_cb (void *data)
@{
 struct my_gpgme_io_cb *iocb = data;
 gdk_input_remove (data->tag);
@}
```

```
void
my_gpgme_register_io_callback (void *data, int fd, int dir, gpgme_io_cb_t fnc,

                void *fnc_data, void **tag)
@{
 struct my_gpgme_io_cb *iocb = g_malloc (sizeof (struct my_gpgme_io_cb));
 iocb->fnc = fnc;
 iocb->data = fnc_data;
 iocb->tag = gtk_input_add_full (fd, dir ? GDK_INPUT_READ : GDK_INPUT_WRITE,
                              my_gpgme_io_callback, iocb, NULL);
 *tag = iocb;
 return 0;
@}
@end example
```

```
@node I/O Callback Example Qt
@subsubsection I/O Callback Example Qt
@cindex Qt, using @acronym{GPGME} with

The I/O callback interface can also be used to integrate
@acronym{GPGME} with the Qt event loop.  The following code snippets
show how this can be done using the appropriate register and remove
I/O callback functions.  In this example, the private data of the
register I/O callback function is unused.  The event notifications is
missing because it does not require any Qt specific setup.

@example
#include <qsocketnotifier.h>
#include <qapplication.h>

struct IOCB @{
 IOCB( GpgmeIOCb f, void * d, QSocketNotifier * n )
   : func(
 f ), data( d ), notifier( n ) @{@}
 GpgmeIOCb func;
 void * data;
 QSocketNotifier * notifier;
@}

class MyApp : public QApplication @{

 // ...

 static void registerGpgmeIOCallback( void * data, int fd, int dir,
                                 GpgmeIOCb func, void * func_data,
                                 void ** tag ) @{
   QSocketNotifier * n =
```

```
    new QSocketNotifier( fd, dir ? QSocketNotifier::Read
                                 : QSocketNotifier::Write );
  connect( n, SIGNAL(activated(int)),
           qApp, SLOT(slotGpgmeIOCallback(int)) );
  qApp->mIOCBs.push_back( IOCB( func, func_data, n ) );
  *tag = (void*)n;
@}

static void removeGpgmeIOCallback( void * tag ) @{
  if ( !tag ) return;
  QSocketNotifier * n = static_cast<QSocketNotifier*>( tag );
  for ( QValueList<IOCB>::iterator it = qApp->mIOCBs.begin() ;
        it != qApp->mIOCBs.end() ; ++it )
    if ( it->notifier == n ) @{
      delete it->notifier;
      qApp->mIOCBs.erase(
it );
      return;
    @}
@}

public slots:
 void slotGpgmeIOCallback( int fd ) @{
  for ( QValueList<IOCB>::const_iterator it = mIOCBs.begin() ;
        it != mIOCBs.end() ; ++it )
    if ( it->notifier && it->notifier->socket() == fd )
      (*(it->func)) ( it->func_data, fd );
@}

// ...

private:
 QValueList<IOCB> mIOCBs;
 // ...
@};
@end example
```

@node Cancellation
@subsection Cancellation
@cindex cryptographic operation, aborting
@cindex cryptographic operation, cancelling
@cindex aborting operations
@cindex cancelling operations

Sometimes you do not want to wait for an operation to finish. @acronym{GPGME} provides two different functions to achieve that. The function @code{gpgme_cancel} takes effect immediately. When it

returns, the operation is effectively canceled. However, it has some
limitations and can not be used with synchronous operations. In
contrast, the function @code{gpgme_cancel_async} can be used with any
context and from
any thread, but it is not guaranteed to take effect
immediately. Instead, cancellation occurs at the next possible time
(typically the next time I/O occurs in the target context).

@deftypefun gpgme_ctx_t gpgme_cancel (@w{gpgme_ctx_t @var{ctx}})
@since{0.4.5}

The function @code{gpgme_cancel} attempts to cancel a pending
operation in the context @var{ctx}. This only works if you use the
global event loop or your own event loop.

If you use the global event loop, you must not call @code{gpgme_wait}
during cancellation. After successful
cancellation, you can call @code{gpgme_wait} (optionally waiting on
@var{ctx}), and the context @var{ctx} will appear as if it had
finished with the error code @code{GPG_ERR_CANCEL}.

If you use an external event loop, you must ensure that no I/O
callbacks are invoked for this context (for example by halting the
event loop). On successful cancellation, all registered I/O callbacks
for this context will be unregistered, and a @code{GPGME_EVENT_DONE}
event
with the error code @code{GPG_ERR_CANCEL} will be signalled.

The function returns an error code if the cancellation failed (in this
case the state of @var{ctx} is not modified).
@end deftypefun

@deftypefun gpgme_ctx_t gpgme_cancel_async (@w{gpgme_ctx_t @var{ctx}})
@since{1.1.7}

The function @code{gpgme_cancel_async} attempts to cancel a pending
operation in the context @var{ctx}. This can be called by any thread
at any time after starting an operation on the context, but will not
take effect immediately. The actual cancellation happens at the next
time GPGME processes I/O in that context.

The function returns an error code if the cancellation failed (in this
case the state of @var{ctx} is not modified).
@end deftypefun

@c **********
@c ********** Appendices **********

@c ******************************************************

@include uiserver.texi

@node Debugging
@appendix How to solve problems
@cindex
 debug
@cindex GPGME_DEBUG

Everyone knows that software often does not do what it should do and thus there is a need to track down problems. This is in particular true for applications using a complex library like @acronym{GPGME} and of course also for the library itself. Here we give a few hints on how to solve such problems.

First of all you should make sure that the keys you want to use are installed in the GnuPG engine and are usable. Thus the first test is to run the desired operation using @command{gpg} or @command{gpgsm} on the command line. If you can't figure out why things don't work, you may use @acronym{GPGME}'s built in trace feature. This feature is either enabled using the environment variable @code{GPGME_DEBUG} or, if this is not possible, by calling the function @code{gpgme_set_global_flag}. The value is the trace level and an optional file name. If no file name is given the trace output is printed to @code{stderr}.

@noindent
For example
@smallexample
GPGME_DEBUG=9:/home/user/mygpgme.log
@end
 smallexample
@noindent
(Note that under Windows you use a semicolon in place of the colon to separate the fields.)

A trace level of 9 is pretty verbose and thus you may want to start off with a lower level. The exact definition of the trace levels and the output format may change with any release; you need to check the source code for details. In any case the trace log should be helpful to understand what is going going on. Warning: The trace log may reveal sensitive details like passphrases or other data you use in your application. If you are asked to send a log file, make sure that you run your tests only with play data.

@node Deprecated Functions

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@appendix Deprecated Functions
@cindex deprecated

For backward compatibility @acronym{GPGME} has a number of functions,
data types and constants which are deprecated and should not be used
anymore.  We document here those which are really old to help
understanding old code and to allow migration
 to their modern
counterparts.

@strong{Warning:} These interfaces will be removed in a future version
of @acronym{GPGME}.

@deftypefun void gpgme_key_release (@w{gpgme_key_t @var{key}})
The function @code{gpgme_key_release} is equivalent to
@code{gpgme_key_unref}.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_import_ext (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_data_t
@var{keydata}}, @w{int *@var{nr}})
@since{0.3.9}

The function @code{gpgme_op_import_ext} is equivalent to:

@example
 gpgme_error_t err = gpgme_op_import (ctx, keydata);
 if (!err)
   @{
     gpgme_import_result_t result = gpgme_op_import_result (ctx);
     *nr = result->considered;
   @}
@end example
@end deftypefun


@deftp {Data type} {gpgme_error_t (*gpgme_edit_cb_t) @
  (@w{void *@var{handle}}, @
   @w{gpgme_status_code_t @var{status}}, @
   @w{const char *@var{args}}, @
   @w{int @var{fd}})}
@tindex gpgme_edit_cb_t
The @code{gpgme_edit_cb_t} type is the type of functions which
@acronym{GPGME} calls
 if it a key edit operation is on-going.  The
status code @var{status} and the argument line @var{args} are passed
through by @acronym{GPGME} from the crypto engine.  The file
descriptor @var{fd} is -1 for normal status messages.  If @var{status}
indicates a command rather than a status message, the response to the
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command should be written to @var{fd}.  The @var{handle} is provided
by the user at start of operation.

The function should return @code{GPG_ERR_FALSE} if it did not handle
the status code, @code{0} for success, or any other error value.
@end deftp

@deftypefun gpgme_error_t gpgme_op_edit (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{key}},
@w{gpgme_edit_cb_t @var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})
@since{0.3.9}

Note: This function is deprecated, please use
@code{gpgme_op_interact} instead.

The function @code{gpgme_op_edit} processes the key @var{KEY}
interactively, using the edit callback function @var{FNC} with the
handle @var{HANDLE}.  The callback
 is invoked for every status and
command request from the crypto engine.  The output of the crypto
engine is written to the data object @var{out}.

Note that the protocol between the callback function and the crypto
engine is specific to the crypto engine and no further support in
implementing this protocol correctly is provided by @acronym{GPGME}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
edit operation completes successfully, @code{GPG_ERR_INV_VALUE} if
@var{ctx} or @var{key} is not a valid pointer, and any error returned
by the crypto engine or the edit callback handler.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_edit_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t
@var{key}}, @w{gpgme_edit_cb_t @var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})

@since{0.3.9}

Note: This function is deprecated, please use
@code{gpgme_op_interact_start} instead.

The function @code{gpgme_op_edit_start} initiates a
@code{gpgme_op_edit} operation.
  It can be completed by calling
@code{gpgme_wait} on the context.  @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation was started successfully, and @code{GPG_ERR_INV_VALUE} if
@var{ctx} or @var{key} is not a valid pointer.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_card_edit (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{key}}, @w{gpgme_edit_cb_t @var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})
Note: This function is deprecated, please use @code{gpgme_op_interact}
with the flag @code{GPGME_INTERACT_CARD} instead.

The function @code{gpgme_op_card_edit} is analogous to
@code{gpgme_op_edit}, but should be used to process the smart card corresponding to the key @var{key}.
@end deftypefun

@deftypefun gpgme_error_t gpgme_op_card_edit_start (@w{gpgme_ctx_t @var{ctx}}, @w{gpgme_key_t @var{key}}, @w{gpgme_edit_cb_t @var{fnc}}, @w{void *@var{handle}}, @w{gpgme_data_t @var{out}})
Note: This function is deprecated,
please use @code{gpgme_op_interact_start}
with the flag @code{GPGME_INTERACT_CARD} instead.

The function @code{gpgme_op_card_edit_start} initiates a
@code{gpgme_op_card_edit} operation. It can be completed by calling
@code{gpgme_wait} on the context. @xref{Waiting For Completion}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
operation was started successfully, and @code{GPG_ERR_INV_VALUE} if
@var{ctx} or @var{key} is not a valid pointer.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_new_with_read_cb (@w{gpgme_data_t *@var{dh}}, @w{int (*@var{readfunc})} (@w{void *@var{hook}}, @w{char *@var{buffer}}, @w{size_t @var{count}}, @w{size_t *@var{nread}}), @w{void *@var{hook_value}})
The function @code{gpgme_data_new_with_read_cb} creates a new
@code{gpgme_data_t} object and uses the callback function @var{readfunc}
to retrieve the data on demand. As the callback function can supply
the data in any way it wants, this is the most flexible data type
@acronym{GPGME}
provides. However, it can not be used to write data.

The callback function receives @var{hook_value} as its first argument
whenever it is invoked. It should return up to @var{count} bytes in
@var{buffer}, and return the number of bytes actually read in
@var{nread}. It may return @code{0} in @var{nread} if no data is
currently available. To indicate @code{EOF} the function should
return with an error code of @code{-1} and set @var{nread} to
@code{0}. The callback function may support to reset its internal
read pointer if it is invoked with @var{buffer} and @var{nread} being
@code{NULL} and @var{count} being @code{0}.

The function returns the error code @code{GPG_ERR_NO_ERROR} if the
data object was successfully created, @code{GPG_ERR_INV_VALUE} if
@var{dh} or @var{readfunc} is not a valid pointer, and
@code{GPG_ERR_ENOMEM} if not enough memory is available.
@end deftypefun

@deftypefun gpgme_error_t gpgme_data_rewind (@w{gpgme_data_t @var{dh}})
The function @code{gpgme_data_rewind}
 is equivalent to:

@example
 return (gpgme_data_seek (dh, 0, SEEK_SET) == -1)
   ? gpgme_error_from_errno (errno) : 0;
@end example
@end deftypefun

@deftp {Data type} gpgme_attr_t
The @code{gpgme_attr_t} type is used to specify a key or trust item
attribute.  The following attributes are defined:

@table @code
@item GPGME_ATTR_KEYID
This is the key ID of a sub key.  It is representable as a string.

@item GPGME_ATTR_FPR
This is the fingerprint of a sub key.  It is representable as a
string.

@item GPGME_ATTR_ALGO
This is the crypto algorithm for which the sub key can be used.  It
is representable as a string and as a number.  The numbers correspond
to the @code{enum gcry_pk_algos} values in the gcrypt library.

@item GPGME_ATTR_LEN
This is the key length of a sub key.  It is representable as a
number.

@item GPGME_ATTR_CREATED
This is the timestamp at creation time of a sub key.  It is
representable as a number.

@item GPGME_ATTR_EXPIRE
This is the expiration time of
 a sub key.  It is representable as a
number.

@item GPGME_ATTR_USERID

This is a user ID.  There can be more than one user IDs in a @var{gpgme_key_t} object.  The first one (with index 0) is the primary user ID.  The user ID is representable as a number.

@item GPGME_ATTR_NAME
This is the name belonging to a user ID.  It is representable as a string.

@item GPGME_ATTR_EMAIL
This is the email address belonging to a user ID.  It is representable as a string.

@item GPGME_ATTR_COMMENT
This is the comment belonging to a user ID.  It is representable as a string.

@item GPGME_ATTR_VALIDITY
This is the validity belonging to a user ID.  It is representable as a string and as a number.  See below for a list of available validities.

@item GPGME_ATTR_UID_REVOKED
This specifies if a user ID is revoked.  It is representable as a number, and is @code{1} if the user ID is revoked, and @code{0} otherwise.

@item GPGME_ATTR_UID_INVALID
This specifies if a user ID is invalid.  It is representable as a number,
 and is @code{1} if the user ID is invalid, and @code{0} otherwise.

@item GPGME_ATTR_TYPE
This returns information about the type of key.  For the string function this will eother be "PGP" or "X.509".  The integer function returns 0 for PGP and 1 for X.509.

@item GPGME_ATTR_IS_SECRET
This specifies if the key is a secret key.  It is representable as a number, and is @code{1} if the key is revoked, and @code{0} otherwise.

@item GPGME_ATTR_KEY_REVOKED
This specifies if a sub key is revoked.  It is representable as a number, and is @code{1} if the key is revoked, and @code{0} otherwise.

@item GPGME_ATTR_KEY_INVALID
This specifies if a sub key is invalid.  It is representable as a number, and is @code{1} if the key is invalid, and @code{0} otherwise.

@item GPGME_ATTR_KEY_EXPIRED

This specifies if a sub key is expired.  It is representable as a
number, and is @code{1} if the key is expired, and @code{0} otherwise.

@item GPGME_ATTR_KEY_DISABLED
This specifies if a sub key is disabled.
  It is representable as a
number, and is @code{1} if the key is disabled, and @code{0} otherwise.

@item GPGME_ATTR_KEY_CAPS
This is a description of the capabilities of a sub key.  It is
representable as a string.  The string contains the letter ``e'' if
the key can be used for encryption, ``s'' if the key can be used for
signatures, and ``c'' if the key can be used for certifications.

@item GPGME_ATTR_CAN_ENCRYPT
This specifies if a sub key can be used for encryption.  It is
representable as a number, and is @code{1} if the sub key can be used
for encryption, and @code{0} otherwise.

@item GPGME_ATTR_CAN_SIGN
This specifies if a sub key can be used to create data signatures.  It
is representable as a number, and is @code{1} if the sub key can be
used for signatures, and @code{0} otherwise.

@item GPGME_ATTR_CAN_CERTIFY
This specifies if a sub key can be used to create key certificates.
It is representable as a number, and is @code{1} if the sub key can be
used for certifications,
 and @code{0} otherwise.

@item GPGME_ATTR_SERIAL
The X.509 issuer serial attribute of the key.  It is representable as
a string.

@item GPGME_ATTR_ISSUE
The X.509 issuer name attribute of the key.  It is representable as a
string.

@item GPGME_ATTR_CHAINID
The X.509 chain ID can be used to build the certification chain.  It
is representable as a string.
@end table
@end deftp

@deftypefun {const char *} gpgme_key_get_string_attr (@w{gpgme_key_t @var{key}}, @w{gpgme_attr_t @var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
The function @code{gpgme_key_get_string_attr} returns the value of the
string-representable attribute @var{what} of key @var{key}.  If the

attribute is an attribute of a sub key or an user ID, @var{idx}
specifies the sub key or user ID of which the attribute value is
returned.  The argument @var{reserved} is reserved for later use and
should be @code{NULL}.

The string returned is only valid as long as the key is valid.

The function returns @code{0}
 if an attribute can't be returned as a
string, @var{key} is not a valid pointer, @var{idx} out of range,
or @var{reserved} not @code{NULL}.
@end deftypefun

@deftypefun {unsigned long} gpgme_key_get_ulong_attr (@w{gpgme_key_t @var{key}}, @w{gpgme_attr_t @var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
The function @code{gpgme_key_get_ulong_attr} returns the value of the
number-representable attribute @var{what} of key @var{key}.  If the
attribute is an attribute of a sub key or an user ID, @var{idx}
specifies the sub key or user ID of which the attribute value is
returned.  The argument @var{reserved} is reserved for later use and
should be @code{NULL}.

The function returns @code{0} if the attribute can't be returned as a
number, @var{key} is not a valid pointer, @var{idx} out of range, or
@var{reserved} not @code{NULL}.
@end deftypefun

@c
@c Key Signatures
@c
The signatures on a key are only available if the key was retrieved
via a listing operation with the @code{GPGME_KEYLIST_MODE_SIGS}
 mode
enabled, because it is expensive to retrieve all signatures of a key.

So, before using the below interfaces to retrieve the signatures on a
key, you have to make sure that the key was listed with signatures
enabled.  One convenient, but blocking, way to do this is to use the
function @code{gpgme_get_key}.

@deftp {Data type} gpgme_attr_t
The @code{gpgme_attr_t} type is used to specify a key signature
attribute.  The following attributes are defined:

@table @code
@item GPGME_ATTR_KEYID
This is the key ID of the key which was used for the signature.  It is

representable as a string.

@item GPGME_ATTR_ALGO
This is the crypto algorithm used to create the signature.  It is
representable as a string and as a number.  The numbers correspond to
the @code{enum gcry_pk_algos} values in the gcrypt library.

@item GPGME_ATTR_CREATED
This is the timestamp at creation time of the signature.  It is
representable as a number.

@item GPGME_ATTR_EXPIRE
This is the expiration
 time of the signature.  It is representable as
a number.

@item GPGME_ATTR_USERID
This is the user ID associated with the signing key.  The user ID is
representable as a number.

@item GPGME_ATTR_NAME
This is the name belonging to a user ID.  It is representable as a string.

@item GPGME_ATTR_EMAIL
This is the email address belonging to a user ID.  It is representable
as a string.

@item GPGME_ATTR_COMMENT
This is the comment belonging to a user ID.  It is representable as a
string.

@item GPGME_ATTR_KEY_REVOKED
This specifies if a key signature is a revocation signature.  It is
representable as a number, and is @code{1} if the key is revoked, and
@code{0} otherwise.

@c @item GPGME_ATTR_KEY_EXPIRED
@c This specifies if a key signature is expired.  It is representable as
@c a number, and is @code{1} if the key is revoked, and @code{0}
@c otherwise.
@c
@item GPGME_ATTR_SIG_CLASS
This specifies the signature class of a key signature.  It is
representable as a number.  The meaning is specific
 to the crypto
engine.

@item GPGME_ATTR_SIG_CLASS

This specifies the signature class of a key signature. It is
representable as a number. The meaning is specific to the crypto
engine.

@item GPGME_ATTR_SIG_STATUS
This is the same value as returned by @code{gpgme_get_sig_status}.
@end table
@end deftp

@deftypefun {const char *} gpgme_key_sig_get_string_attr (@w{gpgme_key_t @var{key}}, @w{int @var{uid_idx}}, @w{gpgme_attr_t @var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
The function @code{gpgme_key_sig_get_string_attr} returns the value of
the string-representable attribute @var{what} of the signature
@var{idx} on the user ID @var{uid_idx} in the key @var{key}. The
argument @var{reserved} is reserved for later use and should be
@code{NULL}.

The string returned is only valid as long as the key is valid.

The function returns @code{0} if an attribute can't be returned as a
string, @var{key} is not a valid pointer, @var{uid_idx} or @var{idx}
out of range, or @var{reserved}
not @code{NULL}.
@end deftypefun

@deftypefun {unsigned long} gpgme_key_sig_get_ulong_attr (@w{gpgme_key_t @var{key}}, @w{int @var{uid_idx}}, @w{gpgme_attr_t @var{what}}, @w{const void *@var{reserved}}, @w{int @var{idx}})
The function @code{gpgme_key_sig_get_ulong_attr} returns the value of
the number-representable attribute @var{what} of the signature
@var{idx} on the user ID @var{uid_idx} in the key @var{key}. The
argument @var{reserved} is reserved for later use and should be
@code{NULL}.

The function returns @code{0} if an attribute can't be returned as a
string, @var{key} is not a valid pointer, @var{uid_idx} or @var{idx}
out of range, or @var{reserved} not @code{NULL}.
@end deftypefun

@deftp {Data type} {enum gpgme_sig_stat_t}
@tindex gpgme_sig_stat_t
The @code{gpgme_sig_stat_t} type holds the result of a signature check, or
the combined result of all signatures. The following results are
possible:

@table @code
@item GPGME_SIG_STAT_NONE
This status should not occur

in normal operation.

@item GPGME_SIG_STAT_GOOD
This status indicates that the signature is valid. For the combined result this status means that all signatures are valid.

@item GPGME_SIG_STAT_GOOD_EXP
This status indicates that the signature is valid but expired. For the combined result this status means that all signatures are valid and expired.

@item GPGME_SIG_STAT_GOOD_EXPKEY
This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.

@item GPGME_SIG_STAT_BAD
This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

@item GPGME_SIG_STAT_NOKEY
This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

@item GPGME_SIG_STAT_NOSIG
This
status indicates that the signature data provided was not a real signature.

@item GPGME_SIG_STAT_ERROR
This status indicates that there was some other error which prevented the signature verification.

@item GPGME_SIG_STAT_DIFF
For the combined result this status means that at least two signatures have a different status. You can get each key's status with @code{gpgme_get_sig_status}.
@end table
@end deftp

@deftypefun {const char *} gpgme_get_sig_status (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}}, @w{gpgme_sig_stat_t *@var{r_stat}}, @w{time_t *@var{r_created}})
The function @code{gpgme_get_sig_status} is equivalent to:

@example
gpgme_verify_result_t result;
gpgme_signature_t sig;

```
result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
  @{
    sig = sig->next;
    idx--;
  @}
if (!sig || idx)
  return NULL;

if (r_stat)
  @{
    switch (gpg_err_code (sig->status))
@{
case GPG_ERR_NO_ERROR:
  *r_stat = GPGME_SIG_STAT_GOOD;

 break;

case GPG_ERR_BAD_SIGNATURE:
  *r_stat = GPGME_SIG_STAT_BAD;
  break;

case GPG_ERR_NO_PUBKEY:
  *r_stat = GPGME_SIG_STAT_NOKEY;
  break;

case GPG_ERR_NO_DATA:
  *r_stat = GPGME_SIG_STAT_NOSIG;
  break;

case GPG_ERR_SIG_EXPIRED:
  *r_stat = GPGME_SIG_STAT_GOOD_EXP;
  break;

case GPG_ERR_KEY_EXPIRED:
  *r_stat = GPGME_SIG_STAT_GOOD_EXPKEY;
  break;

default:
  *r_stat = GPGME_SIG_STAT_ERROR;
  break;
@}
  @}
if (r_created)
  *r_created = sig->timestamp;
```

```
 return sig->fpr;
@end example
@end deftypefun

@deftypefun {const char *} gpgme_get_sig_string_attr (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}},
@w{gpgme_attr_t @var{what}}, @w{int @var{whatidx}})
The function @code{gpgme_get_sig_string_attr} is equivalent to:

@example
 gpgme_verify_result_t result;
 gpgme_signature_t sig;

 result = gpgme_op_verify_result (ctx);
 sig = result->signatures;

 while (sig && idx)
   @{
     sig = sig->next;
     idx--;
   @}
 if (!sig || idx)
   return
 NULL;

 switch (what)
   @{
   case GPGME_ATTR_FPR:
     return sig->fpr;

   case GPGME_ATTR_ERRTOK:
     if (whatidx == 1)
       return sig->wrong_key_usage ? "Wrong_Key_Usage" : "";
     else
 return "";
   default:
     break;
   @}

 return NULL;
@end example
@end deftypefun

@deftypefun {const char *} gpgme_get_sig_ulong_attr (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}},
@w{gpgme_attr_t @var{what}}, @w{int @var{whatidx}})
The function @code{gpgme_get_sig_ulong_attr} is equivalent to:

@example
 gpgme_verify_result_t result;
```

```
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
  @{
    sig = sig->next;
    idx--;
  @}
if (!sig || idx)
  return 0;

switch (what)
  @{
  case GPGME_ATTR_CREATED:
    return sig->timestamp;

  case GPGME_ATTR_EXPIRE:
    return sig->exp_timestamp;

  case GPGME_ATTR_VALIDITY:
    return (unsigned long) sig->validity;

  case GPGME_ATTR_SIG_STATUS:
     switch (sig->status)
@{
case GPG_ERR_NO_ERROR:
  return GPGME_SIG_STAT_GOOD;

case GPG_ERR_BAD_SIGNATURE:
  return GPGME_SIG_STAT_BAD;

case GPG_ERR_NO_PUBKEY:
  return GPGME_SIG_STAT_NOKEY;

case GPG_ERR_NO_DATA:
  return GPGME_SIG_STAT_NOSIG;

case GPG_ERR_SIG_EXPIRED:
  return GPGME_SIG_STAT_GOOD_EXP;

case GPG_ERR_KEY_EXPIRED:
  return GPGME_SIG_STAT_GOOD_EXPKEY;

default:
  return GPGME_SIG_STAT_ERROR;
@}
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  case GPGME_ATTR_SIG_SUMMARY:
    return sig->summary;

  default:
    break;
  @}
 return 0;
@end example
@end deftypefun

@deftypefun {const char *} gpgme_get_sig_key (@w{gpgme_ctx_t @var{ctx}}, @w{int @var{idx}},
@w{gpgme_key_t *@var{r_key}})
The function @code{gpgme_get_sig_key} is equivalent to:

@example
 gpgme_verify_result_t result;
 gpgme_signature_t sig;

 result = gpgme_op_verify_result (ctx);
 sig = result->signatures;

 while (sig && idx)
   @{
     sig = sig->next;
     idx--;
   @}
 if (!sig || idx)
   return gpg_error
 (GPG_ERR_EOF);

 return gpgme_get_key (ctx, sig->fpr, r_key, 0);
@end example
@end deftypefun
```

```
@include lesser.texi

@include gpl.texi

@node Concept Index
@unnumbered Concept Index

@printindex cp
```

@node Function and Data Index
@unnumbered Function and Data Index

@printindex fn

@bye
(21:protected-private-key(3:elg(1:p193:5*n^f"Q'R0_6<ymec \=c7S8u[5
ZF'xf5yi9F@T=KhZdU0(k5nZEI/ R]njVITPU$W<xs-Yx)(1:g1:)(1:y192:O9GNR{?]Y_W[FD*zuRmk%'R\'>>e9pe
eU)uS%VJ!5F)yH*O
]l'7{@wJmQP^jurx'V2H2j[G{q_"8()(9:protected25:openpgp-s2k3-sha1-aes-cbc((4:sha18:o"%7:5242880)16:Hs*}u
)256:Gzk3%\Kb2=oOO@,}eBBI3F|OQP3eD%n,;~L-6UH^=64i);l
e+sG"(mlH_2sn_BBO7hRcZUt(p6,{5|37C3m8EY9=gQ )(12:protected-at15:20101008T070148)))
-----BEGIN PGP PUBLIC KEY BLOCK-----

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8zdYNKSbLjkWN4ujV5aiyA7MtEofszzYLEoKUt1wiDScHMpW8qmEFDvl9g26MeAV
rTno9D5KodHvEIs8wnrqBs8ix0WLbh6J1Dtt8HQgIbN+v3gaRQrgBFe6z2ZYpHHx
ZfOu3iFKlm2WE/NekRkvvFIo3ApGvRhGIYw6JMmugBlo7s5xosJK0I9dkPGlEEtt
aF1RkcMj8sWG9vHAXcjlGgFfXSN9YLppydXpkuZGm4+gjLB2a3rbQCZVFnxCyG4O
ybjkP8Jw6Udm89bK2ucYFfjdrmYn/nJqRxeNABEBAAG0I1Rlc3QgTm9Qcml2S2V5
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U9F+qwf/SHj4uRnTWgyJ71FBxQDYCBq3jbi6e7hMkRPbJyJdnPIMAb2p0PJjBgjW
0pp4+kDPZans3UDHbma1u/SFI4/y6isJiK94Bk5xp5YliLGnUceTjgDFe6lBhfQ1
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FcWAY5n5t1nNZtMxxse3LqEon3rKiLkBDQRbDB3nAQgAqfAjSjcngERtM+ZYOwN0
QF2v2FuEuMe8mhju7Met7SN2zGv1LnjhTNshEa9IABEfjZirE2Tqx4xCWDwDedK4
u1ToFvcnuAMnq2O47Sh+eTypsf6WPFtPBWf6ctKY31hFXjgoyDBULBvl43XU/D9C
Mt7nsKDPYHVrrnge/qWPYVcb+cO0sSwNImMcwQSdTQ3VBq7MeNS9ZeBcXi+XCjhN
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+QARAQABiQE2BBgBCAAgFiEE4Fmh4IZtMa4TEXCITZouEzBBU9EFAlsMHecCGwwA
CgkQTZouEzBBU9H5TQgAolWvIsez/WW8N2tmZEnX0LOFNB+1S4L4X983njwNdoVI
w19pbj+8RIHF/H9kcPGi7jK96gvlykQn3uez/95D2AiRFW5KYdOouFisKgHpv8Ay
BrhclHv11yK+X/0iTD0scYaG7np5162xLkaxSO9hsz2fGv20RKaXCWkI69fWw0BR
XlI5pZh2YFei2ZhH/tIMIW65h3w0gtgaZBBdpZTOOW4zvghyN+0MSObqkI1BvUJu
caDFI4d6ZTmp5SY+pZyktZ4bg/vMH5VFxdIKgbLx9uVeTvOupvbAW0TNulYGUBQE
nm+S0zr3W18t64e4sS3oHse8zCqo1iiImpba6F1Oaw==
=y6DD
-----END
 PGP PUBLIC KEY BLOCK-----
;;;; gpgme.lisp

;;; Copyright (C) 2006 g10 Code GmbH
;;;

```
;;; This file is part of GPGME-CL.
;;;
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;;;
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;;; MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the GNU
;;; Lesser General Public License for more details.
;;;
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;;; along with GPGME; if not, write to the Free Software Foundation,
;;; Inc., 59 Temple Place - Suite 330, Boston, MA 02111-1307, USA.

;;; TODO

;;; Set up the library.

(in-package :gpgme)

(deftype byte-array ()
 '(simple-array (unsigned-byte 8) (*)))

(deftype character-array ()
 '(simple-array character (*)))

;;;
 Debugging.

(defvar *debug* nil "If debugging output should be given or not.")

;;; Load the foreign library.

(define-foreign-library libgpgme
 (:unix "libgpgme.so")
 (t (:default "libgpgme")))

(use-foreign-library libgpgme)

;;; System dependencies.

; Access to ERRNO.
(defcfun ("strerror" c-strerror) :string
 (err :int))

(defun get-errno ()
```

```
 *errno*)

(defun set-errno (errno)
 (setf *errno* errno))

(define-condition system-error (error)
 ((errno :initarg :errno :reader system-error-errno))
 (:report (lambda (c stream)
     (format stream "System error: ~A: ~A"
      (system-error-errno c)
      (c-strerror (system-error-errno c)))))
 (:documentation "Signalled when an errno is encountered."))

; Needed to write passphrases.
(defcfun ("write" c-write) ssize-t
 (fd :int)
 (buffer :string) ; Actually :pointer, but we only need string.
 (size size-t))

(defun system-write (fd buffer size)
 (let ((res (c-write fd buffer size)))
   (when (< res 0) (error 'system-error
 :errno (get-errno)))
   res))

;;;
;;; C Interface Definitions
;;;

;;; Data Type Interface

;;; Some new data types used for easier translation.

;;; The number of include certs.  Translates to NIL for default.
(defctype cert-int-t
   (:wrapper :int
    :from-c translate-cert-int-t-from-foreign
    :to-c translate-cert-int-t-to-foreign))

;;; A string that may be NIL to indicate a null pointer.
(defctype string-or-nil-t
   (:wrapper :string
    :to-c translate-string-or-nil-t-to-foreign))

;;; Some opaque data types used by GPGME.

(defctype gpgme-ctx-t
   (:wrapper :pointer
```

```
    :to-c translate-gpgme-ctx-t-to-foreign)
 "The GPGME context type.")

(defctype gpgme-data-t
   (:wrapper :pointer
    :to-c translate-gpgme-data-t-to-foreign)
 "The GPGME data object type.")

;;; Wrappers for the libgpg-error library.

(defctype gpgme-error-t
   (:wrapper gpg-error::gpg-error-t
    :from-c translate-gpgme-error-t-from-foreign
    :to-c translate-gpgme-error-t-to-foreign)
 "The
 GPGME error type.")

(defctype gpgme-error-no-signal-t
   (:wrapper gpg-error::gpg-error-t
    :from-c translate-gpgme-error-no-signal-t-from-foreign)
 "The GPGME error type (this version does not signal conditions in translation.")

(defctype gpgme-err-code-t gpg-error::gpg-err-code-t
 "The GPGME error code type.")

(defctype gpgme-err-source-t gpg-error::gpg-err-source-t
 "The GPGME error source type.")

(defun gpgme-err-make (source code)
 "Construct an error value from an error code and source."
 (gpg-err-make source code))

(defun gpgme-error (code)
 "Construct an error value from an error code."
 (gpgme-err-make :gpg-err-source-gpgme code))

(defun gpgme-err-code (err)
 "Retrieve an error code from the error value ERR."
 (gpg-err-code err))

(defun gpgme-err-source (err)
 "Retrieve an error source from the error value ERR."
 (gpg-err-source err))

(defun gpgme-strerror (err)
 "Return a string containing a description of the error code."
 (gpg-strerror err))
```

```
(defun
 gpgme-strsource (err)
 "Return a string containing a description of the error source."
 (gpg-strsource err))

(defun gpgme-err-code-from-errno (err)
 "Retrieve the error code for the system error.  If the system error
  is not mapped, :gpg-err-unknown-errno is returned."
 (gpg-err-code-from-errno err))

(defun gpgme-err-code-to-errno (code)
 "Retrieve the system error for the error code.  If this is not a
  system error, 0 is returned."
 (gpg-err-code-to-errno code))

(defun gpgme-err-make-from-errno (source err)
 (gpg-err-make-from-errno source err))

(defun gpgme-error-from-errno (err)
 (gpg-error-from-errno err))

;;;

(defcenum gpgme-data-encoding-t
 "The possible encoding mode of gpgme-data-t objects."
 (:none 0)
 (:binary 1)
 (:base64 2)
 (:armor 3)
 (:url 4)
 (:urlesc 5)
 (:url0 6)
 (:mime 7))

;;;

(defcenum gpgme-pubkey-algo-t
 "Public key algorithms from libgcrypt."
 (:rsa 1)
 (:rsa-e 2)
 (:rsa-s 3)
 (:elg-e 16)
 (:dsa 17)
 (:ecc 18)
 (:elg 20)
  (:ecdsa 301)
 (:ecdh 302)
 (:eddsa 303))
```

```
(defcenum gpgme-hash-algo-t
 "Hash algorithms from libgcrypt."
 (:none 0)
 (:md5 1)
 (:sha1 2)
 (:rmd160 3)
 (:md2 5)
 (:tiger 6)
 (:haval 7)
 (:sha256 8)
 (:sha384 9)
 (:sha512 10)
 (:sha224 11)
 (:md4 301)
 (:crc32 302)
 (:crc32-rfc1510 303)
 (:crc24-rfc2440 304))

;;;

(defcenum gpgme-sig-mode-t
 "The available signature modes."
 (:none 0)
 (:detach 1)
 (:clear 2))

;;;

(defcenum gpgme-validity-t
 "The available validities for a trust item or key."
 (:unknown 0)
 (:undefined 1)
 (:never 2)
 (:marginal 3)
 (:full 4)
 (:ultimate 5))

;;;

(defcenum gpgme-protocol-t
 "The available protocols."
 (:openpgp 0)
 (:cms 1)
 (:gpgconf 2)
 (:assuan 3)
 (:g13 4)
 (:uiserver 5)
```

```
 (:spawn 6)
 (:default 254)
 (:unknown 255))

;;;

(defbitfield (gpgme-keylist-mode-t :unsigned-int)
 "The available keylist mode flags."
 (:local 1)
 (:extern 2)
 (:sigs 4)
 (:sig-notations)
 (:with-secret 16)
 (:with-tofu 32)
 (:ephemeral
 128)
 (:validate 256))

;;;

(defbitfield (gpgme-sig-notation-flags-t :unsigned-int)
 "The available signature notation flags."
 (:human-readable 1)
 (:critical 2))

(defctype gpgme-sig-notation-t
   (:wrapper :pointer
    :from-c translate-gpgme-sig-notation-t-from-foreign)
 "Signature notation pointer type.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-sig-notation-bitfield :unsigned-int)
 (:human-readable 1)
 (:critical 2))

(defcstruct gpgme-sig-notation
 "Signature notations."
 (next gpgme-sig-notation-t)
 (name :pointer)
 (value :pointer)
 (name-len :int)
 (value-len :int)
 (flags gpgme-sig-notation-flags-t)
 (bitfield gpgme-sig-notation-bitfield))

;;;

(defcenum gpgme-status-code-t
```

"The possible status codes for the edit operation."
(:eof 0)
(:enter 1)
(:leave 2)
(:abort 3)
(:goodsig 4)
(:badsig 5)
(:errsig 6)
(:badarmor 7)
(:rsa-or-idea 8)
(:keyexpired 9)
(:keyrevoked 10)
(:trust-undefined 11)
(:trust-never
12)
(:trust-marginal 13)
(:trust-fully 14)
(:trust-ultimate 15)
(:shm-info 16)
(:shm-get 17)
(:shm-get-bool 18)
(:shm-get-hidden 19)
(:need-passphrase 20)
(:validsig 21)
(:sig-id 22)
(:enc-to 23)
(:nodata 24)
(:bad-passphrase 25)
(:no-pubkey 26)
(:no-seckey 27)
(:need-passphrase-sym 28)
(:decryption-failed 29)
(:decryption-okay 30)
(:missing-passphrase 31)
(:good-passphrase 32)
(:goodmdc 33)
(:badmdc 34)
(:errmdc 35)
(:imported 36)
(:import-ok 37)
(:import-problem 38)
(:import-res 39)
(:file-start 40)
(:file-done 41)
(:file-error 42)
(:begin-decryption 43)
(:end-decryption 44)
(:begin-encryption 45)

(:end-encryption 46)
(:delete-problem 47)
(:get-bool 48)
(:get-line 49)
(:get-hidden 50)
(:got-it 51)
(:progress 52)
(:sig-created 53)
(:session-key 54)
(:notation-name 55)
(:notation-data 56)
(:policy-url 57)
(:begin-stream 58)
(:end-stream 59)
(:key-created 60)
(:userid-hint 61)
(:unexpected
62)
(:inv-recp 63)
(:no-recp 64)
(:already-signed 65)
(:sigexpired 66)
(:expsig 67)
(:expkeysig 68)
(:truncated 69)
(:error 70)
(:newsig 71)
(:revkeysig 72)
(:sig-subpacket 73)
(:need-passphrase-pin 74)
(:sc-op-failure 75)
(:sc-op-success 76)
(:cardctrl 77)
(:backup-key-created 78)
(:pka-trust-bad 79)
(:pka-trust-good 80)
(:plaintext 81)
(:inv-sgnr 82)
(:no-sgnr 83)
(:success 84)
(:decryption-info 85)
(:plaintext-length 86)
(:mountpoint 87)
(:pinentry-launched 88)
(:attribute 89)
(:begin-signing 90)
(:key-not-created 91)
(:inquire-maxlen 92)

```
 (:failure 93)
 (:key-considered 94)
 (:tofu-user 95)
 (:tofu-stats 96)
 (:tofu-stats-long 97)
 (:notation-flags 98)
 (:decryption-compliance-mode 99)
 (:verification-compliance-mode 100))

;;;

(defctype gpgme-engine-info-t
   (:wrapper :pointer
    :from-c translate-gpgme-engine-info-t-to-foreign)
 "The engine information structure pointer type.")

(defcstruct gpgme-engine-info
  "Engine information."
 (next gpgme-engine-info-t)
 (protocol gpgme-protocol-t)
 (file-name :string)
 (version :string)
 (req-version :string)
 (home-dir :string))

;;;

(defctype gpgme-subkey-t
   (:wrapper :pointer
    :from-c translate-gpgme-subkey-t-from-foreign)
 "A subkey from a key.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-subkey-bitfield :unsigned-int)
 "The subkey bitfield."
 (:revoked 1)
 (:expired 2)
 (:disabled 4)
 (:invalid 8)
 (:can-encrypt 16)
 (:can-sign 32)
 (:can-certify 64)
 (:secret 128)
 (:can-authenticate 256)
 (:is-qualified 512)
 (:is-cardkey 1024)
 (:is-de-vs 2048))
```

```
(defcstruct gpgme-subkey
 "Subkey from a key."
 (next gpgme-subkey-t)
 (bitfield gpgme-subkey-bitfield)
 (pubkey-algo gpgme-pubkey-algo-t)
 (length :unsigned-int)
 (keyid :string)
 (-keyid :char :count 17)
 (fpr :string)
 (timestamp :long)
 (expires :long))


(defctype gpgme-key-sig-t
   (:wrapper :pointer
    :from-c translate-gpgme-key-sig-t-from-foreign)
  "A signature on a user ID.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-key-sig-bitfield :unsigned-int)
 "The key signature bitfield."
 (:revoked 1)
 (:expired 2)
 (:invalid 4)
 (:exportable 16))

(defcstruct gpgme-key-sig
 "A signature on a user ID."
 (next gpgme-key-sig-t)
 (bitfield gpgme-key-sig-bitfield)
 (pubkey-algo gpgme-pubkey-algo-t)
 (keyid :string)
 (-keyid :char :count 17)
 (timestamp :long)
 (expires :long)
 (status gpgme-error-no-signal-t)
 (-class :unsigned-int)
 (uid :string)
 (name :string)
 (email :string)
 (comment :string)
 (sig-class :unsigned-int))


(defctype gpgme-user-id-t
   (:wrapper :pointer
    :from-c translate-gpgme-user-id-t-from-foreign)
 "A user ID from a key.")
```

```
;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-user-id-bitfield :unsigned-int)
 "The user ID bitfield."
 (:revoked 1)
 (:invalid 2))

(defcstruct gpgme-user-id
 "A user ID from a key."
 (next
 gpgme-user-id-t)
 (bitfield gpgme-user-id-bitfield)
 (validity gpgme-validity-t)
 (uid :string)
 (name :string)
 (email :string)
 (comment :string)
 (signatures gpgme-key-sig-t)
 (-last-keysig gpgme-key-sig-t))


(defctype gpgme-key-t
   (:wrapper :pointer
    :from-c translate-gpgme-key-t-from-foreign
    :to-c translate-gpgme-key-t-to-foreign)
 "A key from the keyring.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-key-bitfield :unsigned-int)
 "The key bitfield."
 (:revoked 1)
 (:expired 2)
 (:disabled 4)
 (:invalid 8)
 (:can-encrypt 16)
 (:can-sign 32)
 (:can-certify 64)
 (:secret 128)
 (:can-authenticate 256)
 (:is-qualified 512))

(defcstruct gpgme-key
 "A signature on a user ID."
 (-refs :unsigned-int)
 (bitfield gpgme-key-bitfield)
 (protocol gpgme-protocol-t)
 (issuer-serial :string)
 (issuer-name :string)
```

```
 (chain-id :string)
 (owner-trust gpgme-validity-t)
 (subkeys gpgme-subkey-t)
 (uids gpgme-user-id-t)
 (-last-subkey gpgme-subkey-t)
  (-last-uid gpgme-user-id-t)
 (keylist-mode gpgme-keylist-mode-t))

;;;

;;; There is no support in CFFI to define callback C types and have
;;; automatic type checking with the callback definition.

(defctype gpgme-passphrase-cb-t :pointer)

(defctype gpgme-progress-cb-t :pointer)

(defctype gpgme-edit-cb-t :pointer)


;;;
;;; Function Interface
;;;

;;; Context management functions.

(defcfun ("gpgme_new" c-gpgme-new) gpgme-error-t
 (ctx :pointer))

(defcfun ("gpgme_release" c-gpgme-release) :void
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_protocol" c-gpgme-set-protocol) gpgme-error-t
 (ctx gpgme-ctx-t)
 (proto gpgme-protocol-t))

(defcfun ("gpgme_get_protocol" c-gpgme-get-protocol) gpgme-protocol-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_get_protocol_name" c-gpgme-get-protocol-name) :string
 (proto gpgme-protocol-t))

(defcfun ("gpgme_set_armor" c-gpgme-set-armor) :void
 (ctx gpgme-ctx-t)
 (yes :boolean))

(defcfun ("gpgme_get_armor" c-gpgme-get-armor) :boolean
```

```
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_textmode" c-gpgme-set-textmode) :void
 (ctx gpgme-ctx-t)
 (yes :boolean))

(defcfun ("gpgme_get_textmode" c-gpgme-get-textmode) :boolean
 (ctx gpgme-ctx-t))

(defconstant +include-certs-default+ -256)

(defcfun ("gpgme_set_include_certs" c-gpgme-set-include-certs) :void
 (ctx gpgme-ctx-t)
 (nr-of-certs cert-int-t))

(defcfun ("gpgme_get_include_certs" c-gpgme-get-include-certs) cert-int-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_keylist_mode" c-gpgme-set-keylist-mode) gpgme-error-t
 (ctx gpgme-ctx-t)
 (mode gpgme-keylist-mode-t))

(defcfun ("gpgme_get_keylist_mode" c-gpgme-get-keylist-mode)
   gpgme-keylist-mode-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_passphrase_cb" c-gpgme-set-passphrase-cb) :void
 (ctx gpgme-ctx-t)
 (cb gpgme-passphrase-cb-t)
 (hook-value :pointer))

(defcfun ("gpgme_get_passphrase_cb" c-gpgme-get-passphrase-cb) :void
 (ctx gpgme-ctx-t)
 (cb-p :pointer)
 (hook-value-p :pointer))

(defcfun ("gpgme_set_progress_cb"
 c-gpgme-set-progress-cb) :void
 (ctx gpgme-ctx-t)
 (cb gpgme-progress-cb-t)
 (hook-value :pointer))

(defcfun ("gpgme_get_progress_cb" c-gpgme-get-progress-cb) :void
 (ctx gpgme-ctx-t)
 (cb-p :pointer)
 (hook-value-p :pointer))

(defcfun ("gpgme_set_locale" c-gpgme-set-locale) gpgme-error-t
```

```
 (ctx gpgme-ctx-t)
 (category :int)
 (value string-or-nil-t))

(defcfun ("gpgme_ctx_get_engine_info" c-gpgme-ctx-get-engine-info)
   gpgme-engine-info-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_ctx_set_engine_info" c-gpgme-ctx-set-engine-info)
   gpgme-error-t
 (ctx gpgme-ctx-t)
 (proto gpgme-protocol-t)
 (file-name string-or-nil-t)
 (home-dir string-or-nil-t))

;;;

(defcfun ("gpgme_pubkey_algo_name" c-gpgme-pubkey-algo-name) :string
 (algo gpgme-pubkey-algo-t))

(defcfun ("gpgme_hash_algo_name" c-gpgme-hash-algo-name) :string
 (algo gpgme-hash-algo-t))

;;;

(defcfun ("gpgme_signers_clear" c-gpgme-signers-clear) :void
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_signers_add" c-gpgme-signers-add)
 gpgme-error-t
 (ctx gpgme-ctx-t)
 (key gpgme-key-t))

(defcfun ("gpgme_signers_enum" c-gpgme-signers-enum) gpgme-key-t
 (ctx gpgme-ctx-t)
 (seq :int))

;;;

(defcfun ("gpgme_sig_notation_clear" c-gpgme-sig-notation-clear) :void
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_sig_notation_add" c-gpgme-sig-notation-add) gpgme-error-t
 (ctx gpgme-ctx-t)
 (name :string)
 (value string-or-nil-t)
 (flags gpgme-sig-notation-flags-t))
```

```
(defcfun ("gpgme_sig_notation_get" c-gpgme-sig-notation-get)
   gpgme-sig-notation-t
 (ctx gpgme-ctx-t))

;;; Run Control.

;;; There is no support in CFFI to define callback C types and have
;;; automatic type checking with the callback definition.

(defctype gpgme-io-cb-t :pointer)

(defctype gpgme-register-io-cb-t :pointer)

(defctype gpgme-remove-io-cb-t :pointer)

(defcenum gpgme-event-io-t
 "The possible events on I/O event callbacks."
 (:start 0)
 (:done 1)
 (:next-key 2)
 (:next-trustitem 3))

(defctype gpgme-event-io-cb-t :pointer)

(defcstruct
 gpgme-io-cbs
 "I/O callbacks."
 (add gpgme-register-io-cb-t)
 (add-priv :pointer)
 (remove gpgme-remove-io-cb-t)
 (event gpgme-event-io-cb-t)
 (event-priv :pointer))

(defctype gpgme-io-cbs-t :pointer)

(defcfun ("gpgme_set_io_cbs" c-gpgme-set-io-cbs) :void
 (ctx gpgme-ctx-t)
 (io-cbs gpgme-io-cbs-t))

(defcfun ("gpgme_get_io_cbs" c-gpgme-get-io-cbs) :void
 (ctx gpgme-ctx-t)
 (io-cbs gpgme-io-cbs-t))

(defcfun ("gpgme_wait" c-gpgme-wait) gpgme-ctx-t
 (ctx gpgme-ctx-t)
 (status-p :pointer)
 (hang :int))
```

```
;;; Functions to handle data objects.

;;; There is no support in CFFI to define callback C types and have
;;; automatic type checking with the callback definition.

(defctype gpgme-data-read-cb-t :pointer)
(defctype gpgme-data-write-cb-t :pointer)
(defctype gpgme-data-seek-cb-t :pointer)
(defctype gpgme-data-release-cb-t :pointer)

(defcstruct gpgme-data-cbs
 "Data callbacks."
 (read gpgme-data-read-cb-t)
 (write gpgme-data-write-cb-t)
 (seek gpgme-data-seek-cb-t)
  (release gpgme-data-release-cb-t))

(defctype gpgme-data-cbs-t :pointer
 "Data callbacks pointer.")

(defcfun ("gpgme_data_read" c-gpgme-data-read) ssize-t
 (dh gpgme-data-t)
 (buffer :pointer)
 (size size-t))

(defcfun ("gpgme_data_write" c-gpgme-data-write) ssize-t
 (dh gpgme-data-t)
 (buffer :pointer)
 (size size-t))

(defcfun ("gpgme_data_seek" c-gpgme-data-seek) off-t
 (dh gpgme-data-t)
 (offset off-t)
 (whence :int))

(defcfun ("gpgme_data_new" c-gpgme-data-new) gpgme-error-t
 (dh-p :pointer))

(defcfun ("gpgme_data_release" c-gpgme-data-release) :void
 (dh gpgme-data-t))

(defcfun ("gpgme_data_new_from_mem" c-gpgme-data-new-from-mem) gpgme-error-t
 (dh-p :pointer)
 (buffer :pointer)
 (size size-t)
 (copy :int))

(defcfun ("gpgme_data_release_and_get_mem" c-gpgme-data-release-and-get-mem)
```

```
  :pointer
 (dh gpgme-data-t)
 (len-p :pointer))

(defcfun ("gpgme_data_new_from_cbs" c-gpgme-data-new-from-cbs) gpgme-error-t
 (dh-p :pointer)
 (cbs gpgme-data-cbs-t)
  (handle :pointer))

(defcfun ("gpgme_data_new_from_fd" c-gpgme-data-new-from-fd) gpgme-error-t
 (dh-p :pointer)
 (fd :int))

(defcfun ("gpgme_data_new_from_stream" c-gpgme-data-new-from-stream)
  gpgme-error-t
 (dh-p :pointer)
 (stream :pointer))

(defcfun ("gpgme_data_get_encoding" c-gpgme-data-get-encoding)
  gpgme-data-encoding-t
 (dh gpgme-data-t))

(defcfun ("gpgme_data_set_encoding" c-gpgme-data-set-encoding)
  gpgme-error-t
 (dh gpgme-data-t)
 (enc gpgme-data-encoding-t))

(defcfun ("gpgme_data_get_file_name" c-gpgme-data-get-file-name) :string
 (dh gpgme-data-t))

(defcfun ("gpgme_data_set_file_name" c-gpgme-data-set-file-name) gpgme-error-t
 (dh gpgme-data-t)
 (file-name string-or-nil-t))

(defcfun ("gpgme_data_new_from_file" c-gpgme-data-new-from-file) gpgme-error-t
 (dh-p :pointer)
 (fname :string)
 (copy :int))

(defcfun ("gpgme_data_new_from_filepart" c-gpgme-data-new-from-filepart)
  gpgme-error-t
 (dh-p :pointer)
 (fname :string)
 (fp
 :pointer)
 (offset off-t)
 (length size-t))
```

```
;;; Key and trust functions.

(defcfun ("gpgme_get_key" c-gpgme-get-key) gpgme-error-t
 (ctx gpgme-ctx-t)
 (fpr :string)
 (key-p :pointer)
 (secret :boolean))

(defcfun ("gpgme_key_ref" c-gpgme-key-ref) :void
 (key gpgme-key-t))

(defcfun ("gpgme_key_unref" c-gpgme-key-unref) :void
 (key gpgme-key-t))

;;; Crypto operations.

(defcfun ("gpgme_cancel" c-gpgme-cancel) gpgme-error-t
 (ctx gpgme-ctx-t))

;;;

(defctype gpgme-invalid-key-t
   (:wrapper :pointer
    :from-c translate-gpgme-invalid-key-t-from-foreign)
 "An invalid key structure.")

(defcstruct gpgme-invalid-key
 "An invalid key structure."
 (next gpgme-invalid-key-t)
 (fpr :string)
 (reason gpgme-error-no-signal-t))

;;; Encryption.

(defcstruct gpgme-op-encrypt-result
 "Encryption result structure."
 (invalid-recipients gpgme-invalid-key-t))

(defctype gpgme-op-encrypt-result-t
   (:wrapper :pointer
    :from-c translate-gpgme-op-encrypt-result-t-from-foreign)
  "An encryption result structure.")

(defcfun ("gpgme_op_encrypt_result" c-gpgme-op-encrypt-result)
   gpgme-op-encrypt-result-t
 (ctx gpgme-ctx-t))

(defbitfield gpgme-encrypt-flags-t
```

```
 (:always-trust 1)
 (:no-encrypt-to 2)
 (:prepare 4)
 (:expect-sign 8)
 (:no-compress 16)
 (:symmetric 32)
 (:throw-keyids 64)
 (:wrap 128)
 (:want-address 256))

(defcfun ("gpgme_op_encrypt_start" c-gpgme-op-encrypt-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (recp :pointer) ; Key array.
 (flags gpgme-encrypt-flags-t)
 (plain gpgme-data-t)
 (cipher gpgme-data-t))

(defcfun ("gpgme_op_encrypt" c-gpgme-op-encrypt) gpgme-error-t
 (ctx gpgme-ctx-t)
 (recp :pointer) ; Key array.
 (flags gpgme-encrypt-flags-t)
 (plain gpgme-data-t)
 (cipher gpgme-data-t))

(defcfun ("gpgme_op_encrypt_sign_start" c-gpgme-op-encrypt-sign-start)
   gpgme-error-t
 (ctx gpgme-ctx-t)
 (recp :pointer) ; Key array.
 (flags gpgme-encrypt-flags-t)
 (plain gpgme-data-t)
 (cipher gpgme-data-t))

(defcfun ("gpgme_op_encrypt_sign"
 c-gpgme-op-encrypt-sign) gpgme-error-t
 (ctx gpgme-ctx-t)
 (recp :pointer) ; Key array.
 (flags gpgme-encrypt-flags-t)
 (plain gpgme-data-t)
 (cipher gpgme-data-t))

;;; Decryption.

(defctype gpgme-recipient-t
   (:wrapper :pointer
    :from-c translate-gpgme-recipient-t-from-foreign)
 "A recipient structure.")

(defcstruct gpgme-recipient
```

```
 "Recipient structure."
 (next gpgme-recipient-t)
 (keyid :string)
 (-keyid :char :count 17)
 (pubkey-algo gpgme-pubkey-algo-t)
 (status gpgme-error-no-signal-t))

(defbitfield gpgme-op-decrypt-result-bitfield
 "Decryption result structure bitfield."
 (:wrong-key-usage 1)
 (:is-de-vs 2)
 (:is-mine 4))

(defcstruct gpgme-op-decrypt-result
 "Decryption result structure."
 (unsupported-algorithm :string)
 (bitfield gpgme-op-decrypt-result-bitfield)
 (recipients gpgme-recipient-t)
 (file-name :string))

(defctype gpgme-op-decrypt-result-t
   (:wrapper :pointer
    :from-c translate-gpgme-op-decrypt-result-t-from-foreign)
  "A decryption result structure.")

(defcfun ("gpgme_op_decrypt_result" c-gpgme-op-decrypt-result)
   gpgme-op-decrypt-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_decrypt_start" c-gpgme-op-decrypt-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (cipher gpgme-data-t)
 (plain gpgme-data-t))

(defcfun ("gpgme_op_decrypt" c-gpgme-op-decrypt) gpgme-error-t
 (ctx gpgme-ctx-t)
 (cipher gpgme-data-t)
 (plain gpgme-data-t))

(defcfun ("gpgme_op_decrypt_verify_start" c-gpgme-op-decrypt-verify-start)
   gpgme-error-t
 (ctx gpgme-ctx-t)
 (cipher gpgme-data-t)
 (plain gpgme-data-t))

(defcfun ("gpgme_op_decrypt_verify" c-gpgme-op-decrypt-verify) gpgme-error-t
 (ctx gpgme-ctx-t)
 (cipher gpgme-data-t)
```

```
 (plain gpgme-data-t))

;;; Signing.

(defctype gpgme-new-signature-t
   (:wrapper :pointer
    :from-c translate-gpgme-new-signature-t-from-foreign)
 "A new signature structure.")

(defcstruct gpgme-new-signature
 "New signature structure."
 (next gpgme-new-signature-t)
  (type gpgme-sig-mode-t)
 (pubkey-algo gpgme-pubkey-algo-t)
 (hash-algo gpgme-hash-algo-t)
 (-obsolete-class :unsigned-long)
 (timestamp :long)
 (fpr :string)
 (-obsolete-class-2 :unsigned-int)
 (sig-class :unsigned-int))

(defcstruct gpgme-op-sign-result
 "Signing result structure."
 (invalid-signers gpgme-invalid-key-t)
 (signatures gpgme-new-signature-t))

(defctype gpgme-op-sign-result-t
   (:wrapper :pointer
    :from-c translate-gpgme-op-sign-result-t-from-foreign)
 "A signing result structure.")

(defcfun ("gpgme_op_sign_result" c-gpgme-op-sign-result)
   gpgme-op-sign-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_sign_start" c-gpgme-op-sign-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (plain gpgme-data-t)
 (sig gpgme-data-t)
 (mode gpgme-sig-mode-t))

(defcfun ("gpgme_op_sign" c-gpgme-op-sign) gpgme-error-t
 (ctx gpgme-ctx-t)
 (plain gpgme-data-t)
 (sig gpgme-data-t)
 (mode gpgme-sig-mode-t))

;;; Verify.
```

```
(defbitfield (gpgme-sigsum-t :unsigned-int)
 "Flags
 used for the summary field in a gpgme-signature-t."
 (:valid #x0001)
 (:green #x0002)
 (:red #x0004)
 (:key-revoked #x0010)
 (:key-expired #x0020)
 (:sig-expired #x0040)
 (:key-missing #x0080)
 (:crl-missing #x0100)
 (:crl-too-old #x0200)
 (:bad-policy #x0400)
 (:sys-error #x0800)
 (:tofu-conflict #x1000))

(defctype gpgme-signature-t
   (:wrapper :pointer
    :from-c translate-gpgme-signature-t-from-foreign)
 "A signature structure.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-signature-bitfield :unsigned-int)
 "The signature bitfield."
 (:wrong-key-usage 1)
 (:pka-trust 2)
 (:chain-model 4)
 (:is-de-vs 8))

(defcstruct gpgme-signature
 "Signature structure."
 (next gpgme-signature-t)
 (summary gpgme-sigsum-t)
 (fpr :string)
 (status gpgme-error-no-signal-t)
 (notations gpgme-sig-notation-t)
 (timestamp :unsigned-long)
 (exp-timestamp :unsigned-long)
 (bitfield gpgme-signature-bitfield)
 (validity gpgme-validity-t)
 (validity-reason
 gpgme-error-no-signal-t)
 (pubkey-algo gpgme-pubkey-algo-t)
 (hash-algo gpgme-hash-algo-t))

(defcstruct gpgme-op-verify-result
 "Verify result structure."
```

```
 (signatures gpgme-signature-t)
 (file-name :string))

(defctype gpgme-op-verify-result-t
   (:wrapper :pointer
    :from-c translate-gpgme-op-verify-result-t-from-foreign)
 "A verify result structure.")

(defcfun ("gpgme_op_verify_result" c-gpgme-op-verify-result)
   gpgme-op-verify-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_verify_start" c-gpgme-op-verify-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (sig gpgme-data-t)
 (signed-text gpgme-data-t)
 (plaintext gpgme-data-t))

(defcfun ("gpgme_op_verify" c-gpgme-op-verify) gpgme-error-t
 (ctx gpgme-ctx-t)
 (sig gpgme-data-t)
 (signed-text gpgme-data-t)
 (plaintext gpgme-data-t))

;;; Import.

(defbitfield (gpgme-import-flags-t :unsigned-int)
 "Flags used for the import status field."
 (:new #x0001)
 (:uid #x0002)
 (:sig #x0004)
 (:subkey #x0008)
 (:secret
 #x0010))

(defctype gpgme-import-status-t
   (:wrapper :pointer
    :from-c translate-gpgme-import-status-t-from-foreign)
 "An import status structure.")

(defcstruct gpgme-import-status
 "New import status structure."
 (next gpgme-import-status-t)
 (fpr :string)
 (result gpgme-error-no-signal-t)
 (status :unsigned-int))

(defcstruct gpgme-op-import-result
```

```
 "Import result structure."
 (considered :int)
 (no-user-id :int)
 (imported :int)
 (imported-rsa :int)
 (unchanged :int)
 (new-user-ids :int)
 (new-sub-keys :int)
 (new-signatures :int)
 (new-revocations :int)
 (secret-read :int)
 (secret-imported :int)
 (secret-unchanged :int)
 (skipped-new-keys :int)
 (not-imported :int)
 (imports gpgme-import-status-t))

(defctype gpgme-op-import-result-t
   (:wrapper :pointer
    :from-c translate-gpgme-op-import-result-t-from-foreign)
 "An import status result structure.")

(defcfun ("gpgme_op_import_result" c-gpgme-op-import-result)
   gpgme-op-import-result-t
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_import_start" c-gpgme-op-import-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (keydata gpgme-data-t))

(defcfun ("gpgme_op_import" c-gpgme-op-import) gpgme-error-t
 (ctx gpgme-ctx-t)
 (keydata gpgme-data-t))

;;; Export.

(defcfun ("gpgme_op_export_start" c-gpgme-op-export-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (pattern :string)
 (reserved :unsigned-int)
 (keydata gpgme-data-t))

(defcfun ("gpgme_op_export" c-gpgme-op-export) gpgme-error-t
 (ctx gpgme-ctx-t)
 (pattern :string)
 (reserved :unsigned-int)
 (keydata gpgme-data-t))
```

```
;;; FIXME: Extended export interfaces require array handling.

;;; Key generation.

(defbitfield (gpgme-genkey-flags-t :unsigned-int)
 "Flags used for the key generation result bitfield."
 (:primary #x0001)
 (:sub #x0002)
 (:uid #x0004))

(defcstruct gpgme-op-genkey-result
 "Key generation result structure."
 (bitfield gpgme-genkey-flags-t)
 (fpr :string))

(defctype gpgme-op-genkey-result-t :pointer
 "A
 key generation result structure.")

(defcfun ("gpgme_op_genkey_result" c-gpgme-op-genkey-result)
   gpgme-op-genkey-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_genkey_start" c-gpgme-op-genkey-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (parms :string)
 (pubkey gpgme-data-t)
 (seckey gpgme-data-t))

(defcfun ("gpgme_op_genkey" c-gpgme-op-genkey) gpgme-error-t
 (ctx gpgme-ctx-t)
 (parms :string)
 (pubkey gpgme-data-t)
 (seckey gpgme-data-t))

;;; Key deletion.

(defcfun ("gpgme_op_delete_start" c-gpgme-op-delete-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (key gpgme-key-t)
 (allow-secret :int))

(defcfun ("gpgme_op_delete" c-gpgme-op-delete) gpgme-error-t
 (ctx gpgme-ctx-t)
 (key gpgme-key-t)
 (allow-secret :int))

;;; FIXME: Add edit interfaces.
```

```
;;; Keylist interface.

(defbitfield (gpgme-keylist-flags-t :unsigned-int)
 "Flags used for the key listing result bitfield."
 (:truncated #x0001))

(defcstruct gpgme-op-keylist-result
 "Key listing result structure."
 (bitfield
 gpgme-keylist-flags-t))

(defctype gpgme-op-keylist-result-t :pointer
 "A key listing result structure.")

(defcfun ("gpgme_op_keylist_result" c-gpgme-op-keylist-result)
   gpgme-op-keylist-result-t
 (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_keylist_start" c-gpgme-op-keylist-start) gpgme-error-t
 (ctx gpgme-ctx-t)
 (pattern :string)
 (secret_only :boolean))

;;; FIXME: Extended keylisting requires array handling.

(defcfun ("gpgme_op_keylist_next" c-gpgme-op-keylist-next) gpgme-error-t
 (ctx gpgme-ctx-t)
 (r-key :pointer))

(defcfun ("gpgme_op_keylist_end" c-gpgme-op-keylist-end) gpgme-error-t
 (ctx gpgme-ctx-t))

;;; Various functions.

(defcfun ("gpgme_check_version" c-gpgme-check-version) :string
 (req-version string-or-nil-t))

(defcfun ("gpgme_get_engine_info" c-gpgme-get-engine-info) gpgme-error-t
 (engine-info-p :pointer))

(defcfun ("gpgme_set_engine_info" c-gpgme-set-engine-info) gpgme-error-t
 (proto gpgme-protocol-t)
 (file-name string-or-nil-t)
 (home-dir
 string-or-nil-t))

(defcfun ("gpgme_engine_check_version" c-gpgme-engine-check-verson)
```

```
   gpgme-error-t
 (proto gpgme-protocol-t))

;;;
;;;  L I S P   I N T E R F A C E
;;;

;;;
;;; Lisp type translators.
;;;

;;; Both directions.

;;; cert-int-t is a helper type that takes care of representing the
;;; default number of certs as NIL.

(defun translate-cert-int-t-from-foreign (value)
 (cond
   ((eql value +include-certs-default+) nil)
   (t value)))

(defun translate-cert-int-t-to-foreign (value)
 (cond
   (value value)
   (t +include-certs-default+)))

;;; string-or-nil-t translates a null pointer to NIL and vice versa.
;;; Translation from foreign null pointer already works as expected.

(defun translate-string-or-nil-t-to-foreign (value)
 (cond
   (value value)
   (t (null-pointer))))

;;; Output only.

;;; These type translators only convert from foreign type, because we
;;; never use these types in the other direction.

;;; Convert gpgme-engine-info-t linked lists into a
 list of property
;;; lists.  Note that this converter will automatically be invoked
;;; recursively.
;;;
;;; FIXME: Should we use a hash table (or struct, or clos) instead of
;;; property list, as recommended by the Lisp FAQ?

(defun translate-gpgme-engine-info-t-from-foreign (value)
```

```
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next protocol file-name version req-version home-dir)
     value (:struct gpgme-engine-info))
  (append (list protocol (list
        :file-name file-name
        :version version
        :req-version req-version
        :home-dir home-dir))
   next)))))

(defun translate-gpgme-invalid-key-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next fpr reason)
     value (:struct gpgme-invalid-key))
  (append (list (list :fpr fpr
        :reason reason))
   next)))))

(defun translate-gpgme-op-encrypt-result-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots

   ((invalid-recipients)
     value (:struct gpgme-op-encrypt-result))
  (list :encrypt
        (list :invalid-recipients invalid-recipients))))))

(defun translate-gpgme-recipient-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next keyid pubkey-algo status)
     value (:struct gpgme-recipient))
  (append (list (list :keyid keyid
        :pubkey-algo pubkey-algo
        :status status))
   next)))))

(defun translate-gpgme-op-decrypt-result-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((unsupported-algorithm bitfield recipients file-name)
```

```
    value (:struct gpgme-op-decrypt-result))
  (list :decrypt (list :unsupported-algorithm unsupported-algorithm
        :bitfield bitfield
        :recipients recipients
        :file-name file-name))))))

(defun translate-gpgme-new-signature-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next
 type pubkey-algo hash-algo timestamp fpr sig-class)
    value (:struct gpgme-new-signature))
  (append (list (list :type type
       :pubkey-algo pubkey-algo
       :hash-algo hash-algo
       :timestamp timestamp
       :fpr fpr
       :sig-class sig-class))
   next)))))

(defun translate-gpgme-op-sign-result-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((invalid-signers signatures)
    value (:struct gpgme-op-sign-result))
  (list :sign (list :invalid-signers invalid-signers
     :signatures signatures))))))

(defun translate-gpgme-signature-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next summary fpr status notations timestamp
    exp-timestamp bitfield validity validity-reason
    pubkey-algo hash-algo)
    value (:struct gpgme-signature))
  (append (list (list :summary summary
       :fpr fpr
       :status status
       :notations notations
       :timestamp timestamp

    :exp-timestamp exp-timestamp
       :bitfield bitfield
       :validity validity
       :validity-reason validity-reason
```

```
      :pubkey-algo pubkey-algo))
  next)))))

(defun translate-gpgme-op-verify-result-t-from-foreign (value)
 (cond
  ((null-pointer-p value) nil)
  (t (with-foreign-slots
   ((signatures file-name)
    value (:struct gpgme-op-verify-result))
  (list :verify (list :signatures signatures
      :file-name file-name))))))

(defun translate-gpgme-import-status-t-from-foreign (value)
 (cond
  ((null-pointer-p value) nil)
  (t (with-foreign-slots
   ((next fpr result status)
    value (:struct gpgme-import-status))
  (append (list (list :fpr fpr
      :result result
      :status status))
  next)))))

(defun translate-gpgme-op-import-result-t-from-foreign (value)
 (cond
  ((null-pointer-p value) nil)
  (t (with-foreign-slots
   ((considered no-user-id imported imported-rsa unchanged
  new-user-ids new-sub-keys new-signatures
  new-revocations
 secret-read secret-imported
  secret-unchanged skipped-new-keys not-imported
  imports)
    value (:struct gpgme-op-import-result))
  (list :verify (list :considered considered
      :no-user-id no-user-id
      :imported imported
      :imported-rsa imported-rsa
      :unchanged unchanged
      :new-user-ids new-user-ids
      :new-sub-keys new-sub-keys
      :new-signatures new-signatures
      :new-revocations new-revocations
      :secret-read secret-read
      :secret-imported secret-imported
      :secret-unchanged secret-unchanged
      :skipped-new-keys skipped-new-keys
      :not-imported not-imported
```

```
        :imports imports))))))

;;; Error handling.

;;; Use gpgme-error-no-signal-t to suppress automatic error handling
;;; at translation time.
;;;
;;; FIXME: Part of this probably should be in gpg-error!

(define-condition gpgme-error (error)
 ((value :initarg :gpgme-error :reader gpgme-error-value))
 (:report (lambda (c stream)

    (format stream "GPGME returned error: ~A (~A)"
      (gpgme-strerror (gpgme-error-value c))
      (gpgme-strsource (gpgme-error-value c)))))
 (:documentation "Signalled when a GPGME function returns an error."))

(defun translate-gpgme-error-t-from-foreign (value)
 "Raise a GPGME-ERROR if VALUE is non-zero."
 (when (not (eql (gpgme-err-code value) :gpg-err-no-error))
   (error 'gpgme-error :gpgme-error value))
 (gpg-err-canonicalize value))

(defun translate-gpgme-error-t-to-foreign (value)
 "Canonicalize the error value."
 (if (eql (gpgme-err-code value) :gpg-err-no-error)
    0
    (gpg-err-as-value value)))

(defun translate-gpgme-error-no-signal-t-from-foreign (value)
 "Canonicalize the error value."
 (gpg-err-canonicalize value))


;;; *INTERNAL* Lispy Function Interface that is still close to the C
;;; interface.

;;; Passphrase callback management.

;;; Maybe: Instead, use subclassing, and provide a customizable
;;; default implementation for ease-of-use.

(defvar
 *passphrase-handles* (make-hash-table)
 "Hash table with GPGME context address as key and the corresponding
  passphrase callback object as value.")
```

```
(defcallback passphrase-cb gpgme-error-t ((handle :pointer)
       (uid-hint :string)
       (passphrase-info :string)
       (prev-was-bad :boolean)
       (fd :int))
 (handler-case
     (let* ((passphrase-cb
       (gethash (pointer-address handle) *passphrase-handles*))
      (passphrase
       (cond
  ((functionp passphrase-cb)
   (concatenate 'string
         (funcall passphrase-cb uid-hint passphrase-info
           prev-was-bad)
         '(#\Newline)))
  (t (concatenate 'string passphrase-cb '(#\Newline)))))
      (passphrase-len (length passphrase))
      ;; FIXME: Could be more robust.
      (res (system-write fd passphrase passphrase-len)))
 (cond
   ((< res passphrase-len) ; FIXME: Blech.  A weak attempt to be robust.
    (gpgme-error :gpg-err-inval))
   (t (gpgme-error :gpg-err-no-error))))
   (gpgme-error (err)
 (gpgme-error-value err))
   (system-error (err) (gpgme-error-from-errno (system-error-errno err)))
   ;; FIXME: The original error gets lost here.
   (condition (err) (progn
         (when *debug*
    (format t "DEBUG: passphrase-cb: Unexpressable: ~A~%"
     err))
         (gpgme-error :gpg-err-general)))))

;;; CTX is a C-pointer to the context.
(defun gpgme-set-passphrase-cb (ctx cb)
 "Set the passphrase callback for CTX."
 (let ((handle (pointer-address ctx)))
   (cond
     (cb (setf (gethash handle *passphrase-handles*) cb)
   (c-gpgme-set-passphrase-cb ctx (callback passphrase-cb) ctx))
     (t (c-gpgme-set-passphrase-cb ctx (null-pointer) (null-pointer))
  (remhash handle *passphrase-handles*)))))

;;; Progress callback management.

;;; Maybe: Instead, use subclassing, and provide a customizable
;;; default implementation for ease-of-use.
```

```
(defvar *progress-handles* (make-hash-table)
 "Hash table with GPGME context address as key and the corresponding
  progress callback
 object as value.")

(defcallback progress-cb :void ((handle :pointer)
    (what :string)
    (type :int)
    (current :int)
    (total :int))
 (handler-case
     (let* ((progress-cb
       (gethash (pointer-address handle) *progress-handles*)))
 (funcall progress-cb what type current total))
   ;; FIXME: The original error gets lost here.
   (condition (err) (when *debug*
         (format t "DEBUG: progress-cb: Unexpressable: ~A~%"
          err)))))

;;; CTX is a C-pointer to the context.
(defun gpgme-set-progress-cb (ctx cb)
 "Set the progress callback for CTX."
 (let ((handle (pointer-address ctx)))
   (cond
     (cb (setf (gethash handle *progress-handles*) cb)
   (c-gpgme-set-progress-cb ctx (callback progress-cb) ctx))
     (t (c-gpgme-set-progress-cb ctx (null-pointer) (null-pointer))
  (remhash handle *progress-handles*)))))

;;; Context management.

(defun gpgme-new (&key (protocol :openpgp) armor textmode include-certs
    keylist-mode passphrase progress file-name
 home-dir)
 "Allocate a new GPGME context."
 (with-foreign-object (ctx-p 'gpgme-ctx-t)
   (c-gpgme-new ctx-p)
   (let ((ctx (mem-ref ctx-p 'gpgme-ctx-t)))
     ;;; Set locale?
     (gpgme-set-protocol ctx protocol)
     (gpgme-set-armor ctx armor)
     (gpgme-set-textmode ctx textmode)
     (when include-certs (gpgme-set-include-certs ctx include-certs))
     (when keylist-mode (gpgme-set-keylist-mode ctx keylist-mode))
     (gpgme-set-passphrase-cb ctx passphrase)
     (gpgme-set-progress-cb ctx progress)
     (gpgme-set-engine-info ctx protocol
        :file-name file-name :home-dir home-dir)
```

```
    (when *debug* (format t "DEBUG: gpgme-new: ~A~%" ctx))
    ctx)))

(defun gpgme-release (ctx)
 "Release a GPGME context."
 (when *debug* (format t "DEBUG: gpgme-release: ~A~%" ctx))
 (c-gpgme-release ctx))

(defun gpgme-set-protocol (ctx proto)
 "Set the protocol to be used by CTX to PROTO."
 (c-gpgme-set-protocol ctx proto))

(defun gpgme-get-protocol (ctx)
 "Get
 the protocol used with CTX."
 (c-gpgme-get-protocol ctx))

;;; FIXME: How to do pretty printing?
;;;
;;; gpgme-get-protocol-name

(defun gpgme-set-armor (ctx armor)
 "If ARMOR is true, enable armor mode in CTX, disable it otherwise."
(c-gpgme-set-armor ctx armor))

(defun gpgme-armor-p (ctx)
 "Return true if armor mode is set for CTX."
 (c-gpgme-get-armor ctx))

(defun gpgme-set-textmode (ctx textmode)
 "If TEXTMODE is true, enable text mode mode in CTX, disable it otherwise."
(c-gpgme-set-textmode ctx textmode))

(defun gpgme-textmode-p (ctx)
 "Return true if text mode mode is set for CTX."
 (c-gpgme-get-textmode ctx))

(defun gpgme-set-include-certs (ctx &optional certs)
 "Include up to CERTS certificates in an S/MIME message."
 (c-gpgme-set-include-certs ctx certs))

(defun gpgme-get-include-certs (ctx)
 "Return the number of certs to include in an S/MIME message,
  or NIL if the default is used."
 (c-gpgme-get-include-certs ctx))

(defun gpgme-get-keylist-mode (ctx)
```

```
  "Get the keylist mode in CTX."
 (c-gpgme-get-keylist-mode ctx))

(defun gpgme-set-keylist-mode (ctx mode)
 "Set the keylist mode in CTX."
 (c-gpgme-set-keylist-mode ctx mode))


;;; FIXME: How to handle locale?  cffi-grovel?

(defun gpgme-get-engine-info (&optional ctx)
 "Retrieve the engine info for CTX, or the default if CTX is omitted."
 (cond
   (ctx (c-gpgme-ctx-get-engine-info ctx))
   (t (with-foreign-object (info-p 'gpgme-engine-info-t)
  (c-gpgme-get-engine-info info-p)
  (mem-ref info-p 'gpgme-engine-info-t)))))

(defun gpgme-set-engine-info (ctx proto &key file-name home-dir)
 "Set the engine info for CTX, or the default if CTX is NIL."
 (cond
   (ctx (c-gpgme-ctx-set-engine-info ctx proto file-name home-dir))
   (t (c-gpgme-set-engine-info proto file-name home-dir))))

;;; FIXME: How to do pretty printing?
;;;
;;; gpgme_pubkey_algo_name, gpgme_hash_algo_name

(defun gpgme-set-signers (ctx keys)
 "Set the signers for the context CTX."
 (c-gpgme-signers-clear ctx)
  (dolist (key keys) (c-gpgme-signers-add ctx key)))

;;;

(defun gpgme-set-sig-notation (ctx notations)
 "Set the sig notation for the context CTX."
 (c-gpgme-sig-notation-clear ctx)
 (dolist (notation notations)
   (c-gpgme-sig-notation-add
    ctx (first notation) (second notation) (third notation))))

(defun gpgme-get-sig-notation (ctx)
 "Get the signature notation data for the context CTX."
 (c-gpgme-sig-notation-get ctx))

;;; FIXME: Add I/O callback interface, for integration with clg.
```

```
;;; FIXME: Add gpgme_wait?

;;; Streams
;;; -------
;;;
;;; GPGME uses standard streams.  You can define your own streams, or
;;; use the existing file or string streams.
;;;
;;; A stream-spec is either a stream, or a list with a stream as its
;;; first argument followed by keyword parameters: encoding,
;;; file-name.
;;;
;;; FIXME: Eventually, we should provide a class that can be mixed
;;; into stream classes and which provides accessors for encoding and
;;; file-names.  This interface
 should be provided in addition to the
;;; above sleazy interface, because the sleazy interface is easier to
;;; use (less typing), and is quite sufficient in a number of cases.
;;;
;;; For best results, streams with element type (unsigned-byte 8)
;;; should be used.  Character streams may work if armor mode is used.

;;; Do we need to provide access to GPGME data objects through streams
;;; as well?  It seems to me that specific optimizations, like
;;; directly writing to file descriptors, is better done by extending
;;; the sleazy syntax (stream-spec) instead of customized streams.
;;; Customized streams do buffering, and this may mess up things.  Mmh.

(defvar *data-handles* (make-hash-table)
 "Hash table with GPGME data user callback handle address as key
  and the corresponding stream as value.")

;;; The release callback removes the stream from the *data-handles*
;;; hash and releases the CBS structure that is used as the key in
;;; that hash.  It is implicitly invoked (through
 GPGME) by
;;; gpgme-data-release.
(defcallback data-release-cb :void ((handle :pointer))
 (unwind-protect (remhash (pointer-address handle) *data-handles*)
   (when (not (null-pointer-p handle)) (foreign-free handle))))

(defcallback data-read-cb ssize-t ((handle :pointer) (buffer :pointer)
                                   (size size-t))
 (when *debug* (format t "DEBUG: gpgme-data-read-cb: want ~A~%" size))
 (let ((stream (gethash (pointer-address handle) *data-handles*)))
   (cond
     (stream
      (let* ((stream-type (stream-element-type stream))
```

```
          (seq (make-array size :element-type stream-type))
          (read (read-sequence seq stream)))
      (cond
        ((equal stream-type '(unsigned-byte 8))
         (dotimes (i read)
           (setf (mem-aref buffer :unsigned-char i)
                 (aref (the byte-array seq) i))))
        ((eql stream-type 'character)
         (dotimes (i read)
           (setf (mem-aref buffer :unsigned-char
i)
                 (char-code (aref (the character-array seq) i)))))
        (t
         (dotimes (i read)
           (setf (mem-aref buffer :unsigned-char i)
                 (coerce (aref seq i) '(unsigned-byte 8))))))
      (when *debug* (format t "DEBUG: gpgme-data-read-cb: read ~A~%" read))
      read))
    (t
     (set-errno +ebadf+)
     -1))))

(defcallback data-write-cb ssize-t ((handle :pointer) (buffer :pointer)
                                    (size size-t))
 (when *debug* (format t "DEBUG: gpgme-data-write-cb: want ~A~%" size))
 (let ((stream (gethash (pointer-address handle) *data-handles*)))
   (cond
     (stream
      (let* ((stream-type (stream-element-type stream))
             (seq (make-array size :element-type stream-type)))
        (cond
          ((equal stream-type '(unsigned-byte 8))
           (dotimes (i size)
             (setf (aref (the byte-array seq) i)
                   (mem-aref buffer :unsigned-char i))))
          ((eql stream-type 'character)
           (dotimes (i size)
             (setf (aref (the character-array seq) i)
                   (code-char (mem-aref buffer :unsigned-char i)))))
          (t
           (dotimes (i size)
             (setf (aref seq i)
                   (coerce (mem-aref buffer :unsigned-char i) stream-type)))))
        (write-sequence seq stream)
        size))
     (t
      (set-errno +ebadf+)
      -1))))
```

```
;;; This little helper macro allows us to swallow the cbs structure by
;;; simply setting it to a null pointer, but still protect against
;;; conditions.
(defmacro with-cbs-swallowed ((cbs) &body body)
 `(let ((,cbs (foreign-alloc '(:struct gpgme-data-cbs))))
   (unwind-protect (progn ,@body)
     (when (not (null-pointer-p ,cbs)) (foreign-free ,cbs)))))

(defun gpgme-data-new (stream &key encoding file-name)
 "Allocate a new GPGME data object for STREAM."
 (with-foreign-object (dh-p 'gpgme-data-t)
   ;;; We allocate one CBS structure
 for each stream we wrap in a
   ;;; data object.  Although we could also share all these
   ;;; structures, as they contain the very same callbacks, we need a
   ;;; unique C pointer as handle anyway to look up the stream in the
   ;;; callback.  This is a convenient one to use.
   (with-cbs-swallowed (cbs)
     (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'read)
           (callback data-read-cb))
     (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'write)
           (callback data-write-cb))
     (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'seek)
           (null-pointer))
     (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'release)
           (callback data-release-cb))
     (c-gpgme-data-new-from-cbs dh-p cbs cbs)
     (let ((dh (mem-ref dh-p 'gpgme-data-t)))
 (when encoding (gpgme-data-set-encoding dh encoding))
 (when file-name (gpgme-data-set-file-name dh file-name))
 ;;; Install the stream into the hash table and
 swallow the cbs
       ;;; structure while protecting against any errors.
 (unwind-protect
      (progn
        (setf (gethash (pointer-address cbs) *data-handles*) stream)
        (setf cbs (null-pointer)))
   (when (not (null-pointer-p cbs)) (c-gpgme-data-release dh)))
 (when *debug* (format t "DEBUG: gpgme-data-new: ~A~%" dh))
 dh))))

;;; This function releases a GPGME data object.  It implicitly
;;; invokes the data-release-cb function to clean up associated junk.
(defun gpgme-data-release (dh)
 "Release a GPGME data object."
 (when *debug* (format t "DEBUG: gpgme-data-release: ~A~%" dh))
 (c-gpgme-data-release dh))
```

```
(defclass data ()
 (c-data)  ; The C data object pointer
 (:documentation "The GPGME data type."))

(defmethod initialize-instance :after ((data data) &key streamspec
                                       &allow-other-keys)
 (let ((c-data (if (listp streamspec)
                   (apply #'gpgme-data-new streamspec)
                   (gpgme-data-new streamspec)))
       (cleanup t))
   (unwind-protect
       (progn
         (setf (slot-value data 'c-data) c-data)
         (finalize data (lambda () (gpgme-data-release c-data)))
         (setf cleanup nil))
     (if cleanup (gpgme-data-release c-data)))))

(defun translate-gpgme-data-t-to-foreign (value)
 ;; Allow a pointer to be passed directly for the finalizer to work.
 (cond
   ((null value) (null-pointer))
   ((pointerp value) value)
   (t (slot-value value 'c-data))))

(defmacro with-gpgme-data ((dh streamspec) &body body)
 `(let ((,dh (make-instance 'data :streamspec ,streamspec)))
    ,@body))

(defun gpgme-data-get-encoding (dh)
 "Get the encoding associated with the data object DH."
 (c-gpgme-data-get-encoding dh))

(defun gpgme-data-set-encoding (dh encoding)
 "Set the encoding associated with the data object DH to ENCODING."
 (c-gpgme-data-set-encoding dh encoding))

(defun gpgme-data-get-file-name (dh)
 "Get the file name associated with the data object
 DH."
 (c-gpgme-data-get-file-name dh))

(defun gpgme-data-set-file-name (dh file-name)
 "Set the file name associated with the data object DH to FILE-NAME."
 (c-gpgme-data-set-file-name dh file-name))

;;; FIXME: Add key accessor interfaces.
```

```
(defun gpgme-get-key (ctx fpr &optional secret)
 "Get the key with the fingerprint FPR from the context CTX."
 (with-foreign-object (key-p 'gpgme-key-t)
   (c-gpgme-get-key ctx fpr key-p secret)
   (mem-ref key-p 'gpgme-key-t)))

(defun gpgme-key-ref (key)
 "Acquire an additional reference to the key KEY."
 (when *debug* (format t "DEBUG: gpgme-key-ref: ~A~%" key))
 (c-gpgme-key-ref key))

(defun gpgme-key-unref (key)
 "Release a reference to the key KEY."
 (when *debug* (format t "DEBUG: gpgme-key-unref: ~A~%" key))
 (c-gpgme-key-unref key))

;;; FIXME: We REALLY need pretty printing for keys and all the other
;;; big structs.

;;; Various interfaces.

(defun gpgme-check-version (&optional req-version)
 (c-gpgme-check-version req-version))

;;;
;;;
 The *EXPORTED* CLOS interface.
;;;

;;; The context type.

;;; We wrap the C context pointer into a class object to be able to
;;; stick a finalizer on it.

(defclass context ()
 (c-ctx  ; The C context object pointer.
  signers ; The list of signers.
  sig-notation) ; The list of signers.
 (:documentation "The GPGME context type."))

(defmethod initialize-instance :after ((ctx context) &rest rest
          &key &allow-other-keys)
 (let ((c-ctx (apply #'gpgme-new rest))
 (cleanup t))
   (unwind-protect
  (progn (setf (slot-value ctx 'c-ctx) c-ctx)
  (finalize ctx (lambda () (gpgme-release c-ctx)))
  (setf cleanup nil))
```

```
    (if cleanup (gpgme-release c-ctx)))))

(defun translate-gpgme-ctx-t-to-foreign (value)
 ;; Allow a pointer to be passed directly for the finalizer to work.
 (if (pointerp value) value (slot-value value 'c-ctx)))

(defmacro context (&rest rest)
 "Create a new GPGME context."
 `(make-instance 'context ,@rest))

;;; The context type: Accessor
 functions.

;;; The context type: Accessor functions: Protocol.

(defgeneric protocol (ctx)
 (:documentation "Get the protocol of CONTEXT."))

(defmethod protocol ((ctx context))
 (gpgme-get-protocol ctx))

(defgeneric (setf protocol) (protocol ctx)
 (:documentation "Set the protocol of CONTEXT to PROTOCOL."))

;;; FIXME: Adjust translator to reject invalid protocols.  Currently,
;;; specifying an invalid protocol throws a "NIL is not 32 signed int"
;;; error.  This is suboptimal.
(defmethod (setf protocol) (protocol (ctx context))
 (gpgme-set-protocol ctx protocol))

;;; The context type: Accessor functions: Armor.
;;; FIXME: Is it good style to make foop setf-able?  Or should it be
;;; foo/foop for set/get?

(defgeneric armorp (ctx)
 (:documentation "Get the armor flag of CONTEXT."))

(defmethod armorp ((ctx context))
 (gpgme-armor-p ctx))

(defgeneric (setf armorp) (armor ctx)
 (:documentation "Set the armor flag of CONTEXT to ARMOR."))

(defmethod (setf armorp) (armor (ctx
 context))
 (gpgme-set-armor ctx armor))

;;; The context type: Accessor functions: Textmode.
```

```
;;; FIXME: Is it good style to make foop setf-able?  Or should it be
;;; foo/foop for set/get?

(defgeneric textmodep (ctx)
 (:documentation "Get the text mode flag of CONTEXT."))

(defmethod textmodep ((ctx context))
 (gpgme-textmode-p ctx))

(defgeneric (setf textmodep) (textmode ctx)
 (:documentation "Set the text mode flag of CONTEXT to TEXTMODE."))

(defmethod (setf textmodep) (textmode (ctx context))
 (gpgme-set-textmode ctx textmode))

;;; The context type: Accessor functions: Include Certs.

(defgeneric include-certs (ctx)
 (:documentation "Get the number of included certificates in an
                S/MIME message, or NIL if the default is used."))

(defmethod include-certs ((ctx context))
 (gpgme-get-include-certs ctx))

(defgeneric (setf include-certs) (certs ctx)
 (:documentation "Return the number of certificates to include in an
                S/MIME message, or
 NIL if the default is used."))

(defmethod (setf include-certs) (certs (ctx context))
 (gpgme-set-include-certs ctx certs))

;;; The context type: Accessor functions: Engine info.

(defgeneric engine-info (ctx)
 (:documentation "Retrieve the engine info for CTX."))

(defmethod engine-info ((ctx context))
 (gpgme-get-engine-info ctx))

(defgeneric (setf engine-info) (info ctx)
 (:documentation "Set the engine info for CTX."))

(defmethod (setf engine-info) (info (ctx context))
 (dolist (proto '(:openpgp :cms))
   (let ((pinfo (getf info proto)))
     (when pinfo
 (gpgme-set-engine-info ctx proto :file-name (getf pinfo :file-name)
```

```
        :home-dir (getf pinfo :home-dir))))))

;;; The context type: Accessor functions: Keylist mode.

(defgeneric keylist-mode (ctx)
 (:documentation "Get the keylist mode of CTX."))

(defmethod keylist-mode ((ctx context))
 (gpgme-get-keylist-mode ctx))

(defgeneric (setf keylist-mode) (mode ctx)
 (:documentation "Set the keylist mode of CTX to MODE."))

(defmethod
 (setf keylist-mode) (mode (ctx context))
 (gpgme-set-keylist-mode ctx mode))

;;; The context type: Accessor functions: Signers.

(defgeneric signers (ctx)
 (:documentation "Get the signers of CTX."))

(defmethod signers ((ctx context))
 (slot-value ctx 'signers))

(defgeneric (setf signers) (signers ctx)
 (:documentation "Set the signers of CTX to SIGNERS."))

(defmethod (setf keylist-mode) (signers (ctx context))
 (gpgme-set-signers ctx signers)
 (setf (slot-value ctx 'signers) signers))

;;; The context type: Accessor functions: Sig notations.

(defgeneric sig-notations (ctx)
 (:documentation "Get the signature notations of CTX."))

(defmethod sig-notations ((ctx context))
 (slot-value ctx 'signers))

(defgeneric (setf sig-notations) (notations ctx)
 (:documentation "Set the signatire notations of CTX to NOTATIONS."))

(defmethod (setf sig-notations) (notations (ctx context))
 (gpgme-set-signers ctx notations)
 (setf (slot-value ctx 'notations) notations))

;;;
```

The context type: Support macros.

```
(defmacro with-context ((ctx &rest rest) &body body)
 `(let ((,ctx (make-instance 'context ,@rest)))
   ,@body))

;;; The key type.

(defclass key ()
 (c-key)  ; The C key object pointer.
 (:documentation "The GPGME key type."))

;;; In the initializer, we swallow the c-key argument.
(defmethod initialize-instance :after ((key key) &key c-key
          &allow-other-keys)
 (setf (slot-value key 'c-key) c-key)
 (finalize key (lambda () (gpgme-key-unref c-key))))

(defun translate-gpgme-key-t-from-foreign (value)
 (when *debug* (format t "DEBUG: import key: ~A~%" value))
 (make-instance 'key :c-key value))

(defun translate-gpgme-key-t-to-foreign (value)
 ;; Allow a pointer to be passed directly for the finalizer to work.
 (if (pointerp value) value (slot-value value 'c-key)))

(defmethod print-object ((key key) stream)
 (print-unreadable-object (key stream :type t :identity t)
   (format stream "~s" (fpr key))))

;;; The key type:
 Accessor functions.

;;; FIXME: The bitfield and flags contain redundant information at
;;; this point.  FIXME: Deal nicer with zero-length name (policy url)
;;; and zero length value (omit?) and human-readable (convert to string).
;;; FIXME: Turn binary data into sequence or vector or what it should be.
;;; FIXME: Turn the whole thing into a hash?
(defun translate-gpgme-sig-notation-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next name value name-len value-len flags bitfield)
     value (:struct gpgme-sig-notation))
  (append (list (list
   :name name
   :value value
   :name-len name-len
```

```
   :value-len value-len
   :flags flags
   :bitfield bitfield))
   next)))))

;;; FIXME: Deal nicer with timestamps.  bitfield field name?
(defun translate-gpgme-subkey-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next bitfield pubkey-algo length keyid fpr timestamp expires)
     value (:struct gpgme-subkey))

 (append (list (list
   :bitfield bitfield
   :pubkey-algo pubkey-algo
   :length length
   :keyid keyid
   :fpr fpr
   :timestamp timestamp
   :expires expires))
   next)))))

(defun translate-gpgme-key-sig-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
    ((next bitfield pubkey-algo keyid timestamp expires status
    uid name email comment sig-class)
     value (:struct gpgme-key-sig))
  (append (list (list
   :bitfield bitfield
   :pubkey-algo pubkey-algo
   :keyid keyid
   :timestamp timestamp
   :expires expires
   :status status
   :uid uid
   :name name
   :email email
   :comment comment
   :sig-class sig-class))
   next)))))

(defun translate-gpgme-user-id-t-from-foreign (value)
 (cond
   ((null-pointer-p value) nil)
   (t (with-foreign-slots
```

```
    ((next bitfield validity uid name email comment signatures)
     value (:struct gpgme-user-id))
  (append (list (list
   :bitfield bitfield
   :validity validity
   :uid uid
   :name
 name
   :email email
   :comment comment
   :signatures signatures))
   next)))))

(defun key-data (key)
 (with-slots (c-key) key
   (with-foreign-slots
 ((bitfield protocol issuer-serial issuer-name chain-id
     owner-trust subkeys uids keylist-mode)
  c-key (:struct gpgme-key))
     (list
      :bitfield bitfield
      :protocol protocol
      :issuer-serial issuer-serial
      :issuer-name issuer-name
      :chain-id chain-id
      :owner-trust owner-trust
      :subkeys subkeys
      :uids uids
      :keylist-mode keylist-mode))
   ))


(defgeneric fpr (key)
 (:documentation "Get the primary fingerprint of the key."))

(defmethod fpr ((key key))
 (getf (car (getf (key-data key) :subkeys)) :fpr))


;;; The context type: Crypto-Operations.

(defgeneric get-key (ctx fpr &optional secret)
 (:documentation "Get the (secret) key FPR from CTX."))

(defmethod get-key ((ctx context) fpr &optional secret)
 (gpgme-get-key ctx fpr secret))

;;; Encrypt.
```

```
(defgeneric
 op-encrypt (ctx recp plain cipher &key always-trust sign)
 (:documentation "Encrypt."))

(defmethod op-encrypt ((ctx context) recp plain cipher
        &key always-trust sign)
 (with-foreign-object (c-recp :pointer (+ 1 (length recp)))
   (dotimes (i (length recp))
     (setf (mem-aref c-recp 'gpgme-key-t i) (elt recp i)))
   (setf (mem-aref c-recp :pointer (length recp)) (null-pointer))
   (with-gpgme-data (in plain)
     (with-gpgme-data (out cipher)
 (let ((flags))
   (if always-trust (push :always-trust flags))
   (cond
     (sign
      (c-gpgme-op-encrypt-sign ctx c-recp flags in out)
      (append (c-gpgme-op-encrypt-result ctx)
       (c-gpgme-op-sign-result ctx)))
     (t
      (c-gpgme-op-encrypt ctx c-recp flags in out)
      (c-gpgme-op-encrypt-result ctx))))))))

;;; Decrypt.

(defgeneric op-decrypt (ctx cipher plain &key verify)
 (:documentation "Decrypt."))

(defmethod op-decrypt ((ctx context) cipher plain &key verify)
 (with-gpgme-data (in cipher)
   (with-gpgme-data
 (out plain)
     (cond
 (verify
  (c-gpgme-op-decrypt-verify ctx in out)
  (append (c-gpgme-op-decrypt-result ctx)
   (c-gpgme-op-verify-result ctx)))
 (t
  (c-gpgme-op-decrypt ctx in out)
  (c-gpgme-op-decrypt-result ctx))))))

;;; Signing.

(defgeneric op-sign (ctx plain sig &optional mode)
 (:documentation "Sign."))

(defmethod op-sign ((ctx context) plain sig &optional (mode :none))
```

```
 (with-gpgme-data (in plain)
   (with-gpgme-data (out sig)
     (c-gpgme-op-sign ctx in out mode)
     (c-gpgme-op-sign-result ctx))))

;;; Verify.

(defgeneric op-verify (ctx sig text &key detached)
 (:documentation "Verify."))

(defmethod op-verify ((ctx context) sig text &key detached)
 (with-gpgme-data (in sig)
   (with-gpgme-data (on text)
     (c-gpgme-op-verify ctx in (if detached on nil)
    (if detached nil on))
     (c-gpgme-op-verify-result ctx))))

;;; Import.

(defgeneric op-import (ctx keydata)
 (:documentation "Import."))

(defmethod op-import ((ctx context) keydata)
  (with-gpgme-data (in keydata)
   (c-gpgme-op-import ctx in)
   (c-gpgme-op-import-result ctx)))

;;; Export.

(defgeneric op-export (ctx pattern keydata)
 (:documentation "Export public key data matching PATTERN to the
                  stream KEYDATA."))

(defmethod op-export ((ctx context) pattern keydata)
 (with-gpgme-data (dh keydata)
   (c-gpgme-op-export ctx pattern 0 dh)))

;;; Key generation.


;;;
;;; Initialization
;;;

(defun check-version (&optional req-version)
 "Check that the GPGME version requirement is satisfied."
 (gpgme-check-version req-version))
```

```
(defparameter *version* (check-version)
 "The version number of GPGME used.")
# -*- mode: org -*-
#+TITLE: A Short History of the GPGME bindings for Python
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltxtra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}

* Overview
 :PROPERTIES:
 :CUSTOM_ID: overview
 :END:

| Version:       | 0.0.1                                |
| GPGME Version:  | 1.13.0                              |
| Author:        | Ben McGinnes <ben@gnupg.org>            |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language:      | Australian English, British English      |
| xml:lang:      | en-AU, en-GB, en                         |

The GPGME Python bindings passed through many hands and numerous
phases before, after a fifteen year journey, coming full circle to
return to the source.  This is a short explanation of that journey.

** In the beginning
  :PROPERTIES:
  :CUSTOM_ID: in-the-begining
   :END:

  In 2002 John Goerzen released PyME; Python bindings for the GPGME
  module which utilised the current release of Python of the time and
  SWIG.[fn:1]  Shortly after creating it and ensuring it worked he stopped
  supporting it, though he left his work available on his Gopher
  site.


** Keeping the flame alive
  :PROPERTIES:
  :CUSTOM_ID: keeping-the-flame-alive
  :END:

  A couple of years later the project was picked up by Igor Belyi and
  actively developed and maintained by him from 2004 to 2008.  Igor's
  whereabouts at the time of this document's creation are unknown,
  but the current authors do hope he is well.  We're assuming (or
```

hoping) that life did what life does and made continuing untenable.

** Passing the torch
:PROPERTIES:
:CUSTOM_ID: passing-the-torch
:END:

In 2014 Martin Albrecht wanted to patch a bug in the PyME code and discovered the absence of Igor. Following a discussion on the PyME mailing list he
became the new maintainer for PyME, releasing
version 0.9.0 in May of that year. He remains the maintainer of the original PyME release in Python 2.6 and 2.7 (available via PyPI).

** Coming full circle
:PROPERTIES:
:CUSTOM_ID: ouroboros
:END:

In 2015 Ben McGinnes approached Martin about a Python 3 version, while investigating how complex a task this would be the task ended up being completed. A subsequent discussion with Werner Koch led to the decision to fold the Python 3 port back into the original GPGME release in the languages subdirectory for non-C bindings under the module name of =pyme3=.

In 2016 this PyME module was integrated back into the GPGME project by Justus Winter. During the course of this work Justus adjusted the port to restore limited support for Python 2, but not as many minor point releases as the original PyME package supports. During the course of this integration the package was renamed to more accurately
reflect its status as a component of GPGME. The =pyme3= module was renamed to =gpg= and adopted by the upstream GnuPG team.

In 2017 Justus departed G10code and the GnuPG team. Following this Ben returned to maintain of gpgme Python bindings and continue building them from that point.

* Relics of the past
:PROPERTIES:
:CUSTOM_ID: relics-past
:END:

There are a few things, in addition to code specific factors, such as
SWIG itself, which are worth noting here.

** The Annoyances of Git
:PROPERTIES:
:CUSTOM_ID: the-annoyances-of-git
:END:

As anyone who has ever worked with git knows, submodules are
horrible way to deal with pretty much anything. In the interests
of avoiding migraines, that was skipped with addition of the PyME
code to GPGME.

Instead the files were added to a subdirectory of the =lang/=
directory, along with a copy of the entire git log up to that point
as a separate file within the =lang/python/docs/= directory.[fn:2]
As the log for PyME is nearly 100KB and the log for GPGME is
approximately 1MB, this would cause considerable bloat, as well as
some confusion, should the two be merged.

Hence the unfortunate, but necessary, step to simply move the
files. A regular repository version has been maintained should it
be possible to implement this better in the future.

** The Perils of PyPI
:PROPERTIES:
:CUSTOM_ID: the-perils-of-pypi
:END:

The early port of the Python 2 =pyme= module as =pyme3= was never
added to PyPI while the focus remained on development and testing
during 2015 and early 2016. Later in 2016, however, when Justus
completed his major integration work and subsequently renamed the
module from =pyme3= to =gpg=, some prior releases were also
provided through PyPI.

Since these bindings require a matching release of the GPGME
libraries in order to function, it was determined that there was
little benefit in also providing a copy
through PyPI since anyone
obtaining the GPGME source code would obtain the Python bindings
source code at the same time. Whereas there was the potential to
sew confusion amongst Python users installing the module from PyPI,
only to discover that without the relevant C files, header files or
SWIG compiled binaries, the Python module did them little good.

There are only two files on PyPI which might turn up in a search

for this module or a sample of its content:

1. gpg (1.8.0) - Python bindings for GPGME GnuPG cryptography library
2. pyme (0.9.0) - Python support for GPGME GnuPG cryptography library

*** GPG 180 - Python bindings for GPGME GnuPG cryptography library
:PROPERTIES:
:CUSTOM_ID: pypi-gpgme-180
:END:

This is the most recent version to reach PyPI and is the version of the official Pyhon bindings which shipped with GPGME 1.8.0. If you have GPGME 1.8.0 installed and /only/ 1.8.0 installed, then it is probably safe to use
this copy from PyPI.

As there have been a lot of changes since the release of GPGME 1.8.0, the GnuPG Project recommends not using this version of the module and instead installing the current version of GPGME along with the Python bindings included with that package.

*** PyME 090 - Python support for GPGME GnuPG cryptography library
:PROPERTIES:
:CUSTOM_ID: pypi-gpgme-90
:END:

This is the last release of the PyME bindings maintained by Martin Albrecht and is only compatible with Python 2, it will not work with Python 3. This is the version of the software from which the port from Python 2 to Python 3 code was made in 2015.

Users of the more recent Python bindings will recognise numerous points of similarity, but also significant differences. It is likely that the more recent official bindings will feel "more pythonic."

For those using Python 2, there is essentially no harm in using this module, but it may lack
a number of more recent features
added to GPGME.

* Footnotes

[fn:1] In all likelihood this would have been Python 2.2 or possibly Python 2.3.

[fn:2] The entire PyME git log and other preceding VCS logs are
located in the =gpgme/lang/python/docs/old-commits.log= file.
# HACKING -*- org -*-
#+TITLE: Hacking notes for GPGME
#+STARTUP: showall

* How to contribute
** No more ChangeLog files

Do not modify any of the ChangeLog files in GPGME. Starting
on December 1st, 2011 we put change information only in the GIT
commit log, and generate a top-level ChangeLog file from logs at
"make dist" time. As such, there are strict requirements on the
form of the commit log messages. The old ChangeLog files have all
be renamed to ChangeLog-2011

** Commit log requirements

Your commit log should always start with a one-line summary, the
second line should be blank, and the remaining lines are usually
ChangeLog-style entries for all affected files. However, it's fine
-- even recommended -- to write a few lines of prose describing the
change, when the summary and ChangeLog entries don't give enough of
the big picture. Omit the leading TABs that you're used to seeing
in a "real" ChangeLog
file, but keep the maximum line length at 72
or smaller, so that the generated ChangeLog lines, each with its
leading TAB, will not exceed 80 columns. If you want to add text
which shall not be copied to the ChangeLog, separate it by a line
consisting of two dashes at the begin of a line.

Note that ./autogen.sh installs a git hook to do some basic syntax
checking on the commit log message.

Typo fixes and documentation updates don't need a ChangeLog entry;
thus you would use a commit message like

#+begin_example
Fix typo in a comment

--
#+end_example

The marker line here is important; without it the first line would
appear in the ChangeLog.

If you exceptionally need to have longer lines in a commit log you may

do this after this scissor line:
#+begin_example
# ------------------------ >8 ------------------------
#+end_example
(hash, blank, 24 dashes, blank, scissor, blank, 24 dashes).
Note that such a comment will be removed if the
git commit option
=--cleanup-scissor= is used.

** License policy

GPGME is currently licensed under the LGPLv2.1+ with tools and the
manual being under the GPLv3+. We may eventually update to a newer
version of the licenses or a combination of them. It is thus
important, that all contributed code allows for an update of the
license; for example we can't accept code under the LGPLv2(only).

If you want to contribute code or documentation to GPGME you are
asked to assert that the contribution is in accordance to the "GPGME
Developer's Certificate of Origin" as found in the file "DCO".
Except for a slight wording change, this DCO is identical to the one
used by the Linux kernel. Please take these simple steps:

- Decide which mail address you want to use. Please have your real
  name in the address and not a pseudonym. Anonymous contributions
  can only be done if you find a proxy who certifies for you.

- If your employer or school might claim ownership
of code written
  by you; you need to talk to them to make sure that you have the
  right to contribute under the DCO.

- Send an OpenPGP signed mail to the gnupg-devel@gnupg.org public
  mailing list from your mail address. Include a copy of the DCO as
  found in the official master branch. Insert your name and email
  address into the DCO in the same way you want to use it later.
  Example:

    Signed-off-by: Joe R. Hacker <joe@example.org>

  If you need it, you may perform simple transformations on the mail
  address: Replacing "@" by " at " or "." by " dot ".)

- That's it. From now on you only need to add a "Signed-off-by:"
  line with your name and mail address to the GIT commit message.
  It is recommended to send the patches using a PGP/MIME signed
  mail.

** Coding standards

Please follow the GNU coding standards. If you are in doubt consult
the existing code as an example. Do no re-indent code without a
need. If you really need to
do it, use a separate commit for such a
change.

- C99 syntax should not be used; stick to C90.
- Please do not use C++ =//= style comments.
- Try to fit lines into 80 columns.
- Ignore signed/unsigned pointer mismatches
- No arithmetic on void pointers; cast to char* first.

** Commit log keywords

- GnuPG-bug-id :: Values are comma or space delimited bug numbers
  from bug.gnupg.org pertaining to this commit.
- Debian-bug-id :: Same as above but from the Debian bug tracker.
- CVE-id :: CVE id number pertaining to this commit.
- Regression-due-to :: Commit id of the regression fixed by this commit.
- Fixes-commit :: Commit id this commit fixes.
- Reported-by :: Value is a name or mail address of a bug reporte.
- Suggested-by :: Value is a name or mail address of someone how
  suggested this change.
- Co-authored-by :: Name or mail address of a co-author
- Some-comments-by :: Name or mail address of the author of

  additional comments (commit log or code).
- Proofread-by :: Sometimes used by translation commits.
- Signed-off-by :: Name or mail address of the developer

* Debug hints

- Use gpgme-tool for manual tests.
- The envvar GPGME_DEBUG enables debugging; see debug.[ch] for
  details.

Configuration files may go here. Note that config.h.in is
auto-generated so that this file is not in git.

2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting
on December 1st, 2011 we put change information only in the GIT
commit log, and generate a top-level ChangeLog file from logs at
"make dist". See doc/HACKING for details.

2011-04-06 Werner Koch <wk@g10code.com>

* gpg-error.m4: Update from current libgpg-error repo.

2010-05-07  Werner Koch  <wk@g10code.com>

* libassuan.m4: Update from libassuan svn.

2009-11-10  Marcus Brinkmann  <marcus@g10code.de>

* libassuan.m4: Fix LIBASSUAN_VERSION.

2006-06-08  Marcus Brinkmann  <marcus@g10code.de>

* pth.m4: Add --all to pth-config invocation.

2006-02-22  Marcus Brinkmann  <marcus@g10code.de>

* pth.m4: Fix code generation (required for Max OS X).
Submitted by Emanuele Giaquinta <exg@gentoo.org>.

2005-11-17  Marcus Brinkmann  <marcus@g10code.de>

* glib-2.0.m4: New file.

2004-12-28  Werner Koch  <wk@g10code.com>

* pth.m4: Changed quoting for use with automake 1.9.

2004-09-14
Marcus Brinkmann  <marcus@g10code.de>

* pth.m4: Disable _ac_pth_line, and don't fail if Pth is not
found.

* glibc21.m4: New file.
* gpg-error.m4: New file.
* pth.m4: New file.

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WITHOUT ANY WARRANTY, to the extent permitted by law; without even the
implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

GPGME Developer's Certificate of Origin.  Version 1.0
==========

By making a contribution to the GPGME project, I certify that:

(a) The contribution was created in whole or in part by me and I
have the right to submit it under the free software license
indicated in the file; or

(b) The contribution is based upon previous work that, to the
best of my knowledge, is covered under an appropriate free
software license and I have the right under that license to
submit that work with modifications, whether created in whole
or in part by me, under the same free software license
(unless I am permitted to submit under a different license),
as indicated in the file; or

(c) The contribution was provided directly to me by some other
person who certified (a), (b) or (c) and I have not modified
it.

(d) I understand and agree that this project and the contribution
are public and that a record of the contribution
(including
all personal information I submit with it, including my
sign-off) is maintained indefinitely and may be redistributed
consistent with this project or the free software license(s)
involved.

Signed-off-by: [Your name and mail address]
1.15.1
2011-12-02  Werner Koch  <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained.  Starting
on December 1st, 2011 we put change information only in the GIT
commit log, and generate a top-level ChangeLog file from logs at
"make dist".  See doc/HACKING for details.

2008-11-08  Moritz  <moritz@gnu.org>

* gpgme.lisp (size-t): Wrong call to defctype: function accepts
optional, not keyword argument.
(ssize-t): Likewise.
(off-t): Likewise.
(gpgme-data-t, gpgme-ctx-t): Likewise.
(gpgme-error-t): Likewise.
(gpgme-error-no-signal-t): Likewise.
(gpgme-err-code-t): Likewise.

(gpgme-err-source-t): Likewise.
(gpgme-sig-notation-t, gpgme-engine-info-t): Likewise.
(gpgme-subkey-t): Likewise.
(gpgme-key-sig-t): Likewise.
(gpgme-user-id-t): Likewise.
(gpgme-key-t): Likewise.
(gpgme-data-cbs-t): Likewise.
(gpgme-invalid-key-t): Likewise.
(gpgme-op-encrypt-result-t): Likewise.
(gpgme-recipient-t): Likewise.
(gpgme-op-decrypt-result-t): Likewise.
(gpgme-new-signature-t):
Likewise.
(gpgme-op-sign-result-t): Likewise.
(gpgme-signature-t): Likewise.
(gpgme-op-verify-result-t): Likewise.
(gpgme-import-status-t): Likewise.
(gpgme-op-import-result-t): Likewise.
(gpgme-op-genkey-result-t): Likewise.
(gpgme-op-keylist-result-t): Likewise.

2006-07-06 Marcus Brinkmann <marcus@g10code.de>

* Initial release.

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WITHOUT ANY WARRANTY, to the extent permitted by law; without even the
implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
000
*H
010 UDE1!0U
Deutsches Forschungsnetz10UDFN-PCA1.0,U%DFN Top Level Certification Authority1!0 *H
certify@pca.dfn.de0
981029180310Z
011231180310Z010 UDE1!0U
Deutsches Forschungsnetz10UDFN-PCA1.0,U%DFN Top Level Certification Authority1!0 *H
certify@pca.dfn.de0"0
*H
0
nskvS2r#iA4H|*/
:Sd;v
tD}L+~IWWD|eP&qH)

!1\p%,1.tIsmnQ,g-W)@\(t<kvm5j(d)9M_KGQJ0:qTE 00 `HB0) `HBhttps://mystic.pca.dfn.de/0A
`HB42http://www.pca.dfn.de/dfnpca/policy/wwwpolicy.html08 `HB
+)The DFN Top Level Certification Authority0! `HBcgi/check-rev.cgi?0 `HB
dfnpca.crl0U00U0
 *H
`^[:8\e7*%QC?:/JVgwPUB
OgGqjGVxl50%<`Pb18 z;t~r0U<A%3#l'8b"<iX"V!k"*Q8&hAPI"3 00KUb&Qq'46_{D[JZ!i<=T
/OF

```
# -*- mode: org -*-
#+TITLE: What Was New in the GPGME Python Bindings and Documentation
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltxtra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}


* What Was New
 :PROPERTIES:
 :CUSTOM_ID: new-stuff
 :END:

| Version:       | 0.0.1                                |
| GPGME Version:  | 1.13.0                              |
| Author:        | Ben McGinnes <ben@gnupg.org>            |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language:      | Australian English, British English      |
| xml:lang:      | en-AU, en-GB, en                         |

The following are all the past /What's New/ sections for the Python
Bindings HOWTO and other documentation.


** What Was New in GPGME 1120
  :PROPERTIES:

 :CUSTOM_ID: gpgme-1-12-0
  :END:

The most obviously new point for those reading this guide is this
section on other new things, but thats hardly important. Not given
all the other things which spurred the need for adding this section
and its subsections.
```

*** New in GPGME 1120
:PROPERTIES:
:CUSTOM_ID: new-stuff-1-12-0
:END:

There have been quite a number of additions to GPGME and the Python bindings to it since the last release of GPGME with versions 1.11.0 and 1.11.1 in April, 2018.

The bullet points of new additiions are:

- an expanded section on [[file:gpgme-python-howto#installation][installing]] and [[file:gpgme-python-howto#snafu][troubleshooting]] the Python bindings.
- The release of Python 3.7.0; which appears to be working just fine with our bindings, in spite of intermittent reports of problems for many other Python projects with that new release.
- Python 3.7 has been moved to the head of the specified python versions list in the build process.
- In order to fix some other issues, there are certain underlying functions which are more exposed through the [[file:gpgme-python-howto#howto-get-context][gpg.Context()]], but ongoing documentation ought to clarify that or otherwise provide the best means of using the bindings. Some additions to =gpg.core= and the =Context()=, however, were intended (see below).
- Continuing work in identifying and confirming the cause of oft-reported [[file:gpgme-python-howto#snafu-runtime-not-funtime][problems installing the Python bindings on Windows]].
- GSOC: Google's Surreptitiously Ordered Conscription ... erm ... oh, right; Google's Summer of Code. Though there were two hopeful candidates this year; only one ended up involved with the GnuPG Project directly, the other concentrated on an unrelated third party project with closer ties to one of the GNU/Linux distributions than to the GnuPG Project. Thus the Python bindings benefited from GSOC participant Jacob Adams, who added the key_import function; building on prior work by Tobias Mueller.
- Several new methods functions were added to the gpg.Context(), including: [[file:gpgme-python-howto#howto-import-key][key_import]], [[file:gpgme-python-howto#howto-export-key][key_export]], [[file:gpgme-python-howto#howto-export-public-key][key_export_minimal]] and [[file:gpgme-python-howto#howto-export-secret-key][key_export_secret]].
- Importing and exporting examples include versions integrated with Marcel Fest's recently released [[https://github.com/Selfnet/hkp4py][HKP for Python]] module. Some [[file:gpgme-python-howto#hkp4py][additional notes on this module]] are included at the end of the HOWTO.
- Instructions for dealing with semi-walled garden implementations like ProtonMail are also included. This is intended to make things a little easier when communicating with users of ProtonMail's services and should not be construed as an endorsement of said

service. The GnuPG Project neither favours,
nor disfavours
ProtonMail and the majority of this deals with interacting with the
ProtonMail keyserver.
- Semi-formalised the location where [[file:gpgme-python-howto#draft-editions][draft versions]] of this HOWTO may
periodically be accessible. This is both for the reference of
others and testing the publishing of the document itself. Renamed
this file at around the same time.
- The Texinfo documentation build configuration has been replicated
from the parent project in order to make to maintain consistency
with that project (and actually ship with each release).
- a reStructuredText (=.rst=) version is also generated for Python
developers more used to and comfortable with that format as it is
the standard Python documentation format and Python developers may
wish to use it with Sphinx. Please note that there has been no
testing of the reStructuredText version with Sphinx at all. The
reST file was generated by the simple expedient of using [[https://pandoc.org/][Pandoc]].
-
Added a new section for [[file:gpgme-python-howto#advanced-use][advanced or experimental use]].
- Began the advanced use cases with [[file:gpgme-python-howto#cython][a section]] on using the module with
[[https://cython.org/][Cython]].
- Added a number of new scripts to the =example/howto/= directory;
some of which may be in advance of their planned sections of the
HOWTO (and some are just there because it seemed like a good idea at
the time).
- Cleaned up a lot of things under the hood.
This is gpgme.info, produced by makeinfo version 6.5 from gpgme.texi.

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INFO-DIR-SECTION GNU Libraries
START-INFO-DIR-ENTRY
* GPGME: (gpgme). Adding support for cryptography to your program.
END-INFO-DIR-ENTRY

This file documents the GPGME library.

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The GnuPG Made Easy Reference Manual, for Version 1.14.1-beta35.

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## A.3 UI Server: Decrypt a Message

Decryption may include the verification of OpenPGP messages. This is due to the often used combined signing/encryption modus of OpenPGP. The client may pass an option to the server to inhibit the signature verification. The following two commands are required to set the input and output file descriptors:

-- Command: INPUT FD=N
Set the file descriptor for the message to be decrypted to N. The message send to the server is either binary encoded or in the case of OpenPGP ASCII armored. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: OUTPUT FD=N
Set the file descriptor to be used for the output. The output is binary encoded. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

The decryption is started with the command:

-- Command: DECRYPT --protocol=NAME [--no-verify]
[--export-session-key]
NAME is the encryption protocol used for the message. For a description of the allowed protocols see the ENCRYPT command.

This argument is mandatory. If the option --no-verify is given, the server
should not try to verify a signature, in case the input
data is an OpenPGP combined message. If the option
--export-session-key is given and the underlying engine knows how
to export the session key, it will appear on a status line

File: gpgme.info, Node: UI Server Verify, Next: UI Server Set Input Files, Prev: UI Server Decrypt, Up: UI Server Protocol

## A.4 UI Server: Verify a Message

The server needs to support the verification of opaque signatures as well as detached signatures. The kind of input sources controls what kind message is to be verified.

-- Command: MESSAGE FD=N
This command is used with detached signatures to set the file descriptor for the signed data to N. The data is binary encoded (used verbatim). For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: INPUT FD=N
Set the file descriptor for the opaque message or the signature part
of a detached signature to N. The message send to the server
is either binary encoded or in the case of OpenPGP ASCII
armored. For details on the file descriptor, see the description
of INPUT in the ENCRYPT section.

-- Command: OUTPUT FD=N
Set the file descriptor to be used for the output. The output is binary encoded and only used for opaque signatures. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

The verification is then started using:

-- Command: VERIFY --protocol=NAME [--silent]
NAME is the signing protocol used for the message. For a description of the allowed protocols see the ENCRYPT command. This argument is mandatory. Depending on the combination of MESSAGE INPUT and OUTPUT commands, the server needs to select the appropriate verification mode:

MESSAGE and INPUT

This indicates a detached signature. Output data is not applicable.

INPUT

This indicates an opaque signature. As no output command has been given, the server is only required to check the signature.

INPUT and OUTPUT

This indicates an opaque signature. The server shall write the signed data to the file descriptor set by the output command. This data shall even be written if the signatures cant be verified.

With --silent the server shall not display any dialog; this is for example used by the client to get the content of opaque signed messages. The client expects the server to send at least this status information before the final OK response:

-- Status line: SIGSTATUS FLAG DISPLAYSTRING

Returns the status for the signature and a short string explaining the status. Valid values for FLAG are:

none

The message has a signature but it could not not be verified due to a missing key.

green

The signature is fully valid.

yellow

The signature is valid but additional information was shown regarding the validity of the key.

red

The signature is not valid.

DISPLAYSTRING is a percent-and-plus-encoded string with a short human readable description of the status. For example

S SIGSTATUS green Good+signature+from+Keith+Moon+<keith@example.net>

Note that this string needs to fit into an Assuan line and should be short enough to be displayed as short one-liner on the clients window. As usual the encoding of this string is UTF-8 and it should be send in its translated form.

The server shall send one status line for every signature found on the message.

File: gpgme.info, Node: UI Server Set Input Files, Next: UI Server Sign/Encrypt Files, Prev: UI Server Verify, Up: UI Server Protocol

A.5 UI Server: Specifying the input files to operate on.
==========

All file related UI
server commands operate on a number of input files
or directories, specified by one or more FILE commands:

-- Command: FILE [--clear] NAME
Add the file or directory NAME to the list of pathnames to be processed by the server. The parameter NAME must be an absolute path name (including the drive letter) and is percent espaced (in particular, the characters %, = and white space characters are always escaped). If the option --clear is given, the list of files is cleared before adding NAME.

Historical note: The original spec did not define --clear but the keyword --continued after the file name to indicate that more files are to be expected. However, this has never been used and thus removed from the specs.

File: gpgme.info, Node: UI Server Sign/Encrypt Files, Next: UI Server Verify/Decrypt Files, Prev: UI Server Set Input Files, Up: UI Server Protocol

A.6 UI Server: Encrypting and signing files.
==========

First,
the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

-- Command: ENCRYPT_FILES --nohup
-- Command: SIGN_FILES --nohup
-- Command: ENCRYPT_SIGN_FILES --nohup
Request that the files specified by FILE are encrypted and/or signed. The command selects the default action. The UI server may allow the user to change this default afterwards interactively, and even abort the operation or complete it only on some of the selected files and directories.

What it means to encrypt or sign a file or directory is specific to the preferences of the user, the functionality the UI server provides, and the selected protocol. Typically, for each input file a new file is created under the original filename plus a protocol specific extension (like .gpg or .sig), which contain

the encrypted/signed file or a detached signature. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The ENCRYPT_SIGN_FILES command requests a combined sign and encrypt operation. It may not be available for all protocols (for example, it is available for OpenPGP but not for CMS).

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

File: gpgme.info, Node: UI Server Verify/Decrypt Files, Next: UI Server Import/Export Keys, Prev: UI Server Sign/Encrypt Files, Up: UI Server Protocol

A.7 UI Server: Decrypting and verifying files.
==========

First, the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

-- Command: DECRYPT_FILES --nohup
-- Command: VERIFY_FILES --nohup
-- Command: DECRYPT_VERIFY_FILES --nohup

Request that the files specified by FILE are decrypted and/or verified. The command selects the default action. The UI server may allow the user to change this default afterwards interactively, and even abort the operation or complete it only on some of the selected files and directories.

What it means to decrypt or verify a file or directory is specific to the preferences of the user, the functionality the UI server provides, and the selected protocol. Typically, for decryption, a new file is created for each input file under the original filename minus a protocol specific extension (like .gpg) which contains the original plaintext. For verification a status is displayed for each signed input file, indicating if it is signed, and if yes, if the signature is valid. For files that are signed and encrypted, the VERIFY command transiently decrypts the file to verify the enclosed signature. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The option --nohup is mandatory. It is currently unspecified

what should happen if --nohup is not present. Because --nohup
is present, the server always returns OK promptly, and completes
the operation asynchronously.

File: gpgme.info, Node: UI Server Import/Export Keys, Next: UI Server Checksum Files, Prev: UI Server Verify/Decrypt Files, Up: UI Server Protocol

A.8 UI Server: Managing certificates.
==========

First, the input files need to be specified by one or more FILE
commands. Afterwards, the actual operation is requested:

-- Command: IMPORT_FILES --nohup
Request that the certificates contained in the files specified by
FILE are imported into the local certificate databases.

For directories, the server may offer multiple options to the user
(for example ignore or process recursively).

The
option --nohup is mandatory. It is currently unspecified
what should happen if --nohup is not present. Because --nohup
is present, the server always returns OK promptly, and completes
the operation asynchronously.

FIXME: It may be nice to support an EXPORT command as well, which
is enabled by the context menu of the background of a directory.

File: gpgme.info, Node: UI Server Checksum Files, Next: Miscellaneous UI Server Commands, Prev: UI Server Import/Export Keys, Up: UI Server Protocol

A.9 UI Server: Create and verify checksums for files.
==========

First, the input files need to be specified by one or more FILE
commands. Afterwards, the actual operation is requested:

-- Command: CHECKSUM_CREATE_FILES --nohup
Request that checksums are created for the files specified by
FILE. The choice of checksum algorithm and the destination
storage and format for the created checksums depend on the

preferences of the user and the functionality provided by the UI
server. For directories, the server may offer multiple options to
the user (for example ignore or process recursively).

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

-- Command: CHECKSUM_VERIFY_FILES --nohup

Request that checksums are created for the files specified by FILE and verified against previously created and stored checksums. The choice of checksum algorithm and the source storage and format for previously created checksums depend on the preferences of the user and the functionality provided by the UI server. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

If the source storage of previously created checksums is available to the user through the Windows shell, this command may also accept such checksum files as FILE arguments. In this case, the UI server should instead verify the checksum of the referenced files as if they were given as INPUT files.

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

File: gpgme.info, Node: Miscellaneous UI Server Commands, Prev: UI Server Checksum Files, Up: UI Server Protocol

## A.10 Miscellaneous UI Server Commands

The server needs to implement the following commands which are not related to a specific command:

-- Command: GETINFO WHAT

This is a multi purpose command, commonly used to return a variety of information. The required subcommands as described by the WHAT parameter are:

pid

Return the process id of the server in decimal notation using an Assuan data line.

To allow the server to pop up the windows in the correct relation to the client, the client is advised to tell the server by sending the option:

-- Command option: window-id NUMBER
The NUMBER represents the native window ID of the clients current window. On Windows systems this is a windows handle (HWND) and on X11 systems it is the X Window ID. The number needs to be given as a hexadecimal value so that it is easier to convey pointer values (e.g. HWND).

A client may want to fire up the certificate manager of the server. To do this it uses the Assuan command:

-- Command: START_KEYMANAGER
The server shall pop up the main window of the key manager (aka certificate manager). The client expects that the key manager is brought into the foregound and that this command immediately returns (does not wait until the key manager has been fully brought up).

A client may want to fire up the configuration dialog of the server. To do this it uses the Assuan command:

-- Command: START_CONFDIALOG
The server shall pop up its configuration dialog. The client expects that this dialog is brought into the foregound and that this command immediately returns (i.e. it does not wait until the dialog has been fully brought up).

When doing an operation on a mail, it is useful to let the server know the address of the sender:

-- Command: SENDER [--info] [--protocol=NAME] EMAIL
EMAIL is the plain ASCII encoded address ("addr-spec" as per RFC-2822) enclosed in angle brackets. The address set with this command is valid until a successful completion of the operation or until a RESET command. A second command overrides the effect of the first one; if EMAIL is not given and --info is not used, the server shall use the default signing key.

If option --info is not given, the server shall also suggest a protocol to use for signing. The client may use this suggested protocol on its own discretion. The same status line as with PREP_ENCRYPT is used for this.

The option --protocol may be used to give the server a hint on which signing protocol should be preferred.

To allow the UI-server to visually identify a running operation or to associate operations the server MAY support the command:

-- Command: SESSION NUMBER [STRING]
The NUMBER is an arbitrary value, a server may use to associate simultaneous running sessions. It is a 32 bit unsigned integer with 0 as a special value indicating that no session association shall be done.

If STRING is given, the server may use this as the title of a window or, in the case of an email operation, to extract the senders address. The string may contain spaces; thus no plus-escaping is used.

This command may be used at any time and overrides the effect of the last command. A RESET undoes the effect of this command.

File: gpgme.info, Node: Debugging, Next: Deprecated Functions, Prev: UI Server Protocol, Up: Top

## Appendix B How to solve problems

Everyone knows that software often does not do what it should do and thus there is a need to track down problems. This is in particular true for applications using a complex library like GPGME and of course also for the library itself. Here we give a few hints on how to solve such problems.

First of all you should make sure that the keys you want to use are installed in the GnuPG engine and are usable. Thus the first test is to run the desired operation using gpg or gpgsm on the command line. If you cant figure out why things dont work, you may use GPGMEs built in trace feature. This feature is either enabled using the environment variable GPGME_DEBUG or, if this is not possible, by calling the function gpgme_set_global_flag. The value is the trace level and an optional file name. If no file name is given the trace output is printed to stderr.

For example
GPGME_DEBUG=9:/home/user/mygpgme.log
(Note that under Windows you use a semicolon in place of the colon to separate the fields.)

A trace level of 9 is pretty verbose and thus you may want to start off with a lower level. The exact definition of the trace levels and

the output format may change with any release; you need to check the source code for details. In any case the trace log should be helpful to understand what is going going on. Warning: The trace log may reveal sensitive details like passphrases or other data you use in your application. If you are asked to send a log file, make sure that you run your tests only with play data.

File: gpgme.info, Node: Deprecated Functions, Next: Library Copying, Prev: Debugging, Up: Top

## Appendix C Deprecated Functions

For backward compatibility GPGME has a number of functions, data types and constants which are deprecated and should not be used anymore. We document here those which are really old to help understanding old code and to allow migration to their modern counterparts.

*Warning:* These interfaces will be removed in a future version of GPGME.

-- Function: void gpgme_key_release (gpgme_key_t KEY)
The function gpgme_key_release is equivalent to gpgme_key_unref.

-- Function: gpgme_error_t gpgme_op_import_ext (gpgme_ctx_t CTX, gpgme_data_t KEYDATA, int *NR)
SINCE: 0.3.9

The function gpgme_op_import_ext is equivalent to:

```
gpgme_error_t err = gpgme_op_import (ctx, keydata);
if (!err)
  {
    gpgme_import_result_t result = gpgme_op_import_result (ctx);
    *nr = result->considered;
  }
```

-- Data type: gpgme_error_t (*gpgme_edit_cb_t) (void *HANDLE, gpgme_status_code_t STATUS, const char *ARGS, int FD)
The gpgme_edit_cb_t type is the type of functions which GPGME calls if it a key edit operation is on-going. The status code STATUS and the argument line ARGS are passed through by GPGME from the crypto engine. The file descriptor FD is -1 for normal status messages. If STATUS indicates a command rather than a status message, the response to the command should be written to FD. The

HANDLE is provided by the user at start of operation.

The function should return GPG_ERR_FALSE if it did not handle the status code, 0 for success, or any other error value.

-- Function: gpgme_error_t gpgme_op_edit (gpgme_ctx_t CTX, gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE, gpgme_data_t OUT)

SINCE: 0.3.9

Note: This function is deprecated, please use gpgme_op_interact instead.

The function gpgme_op_edit processes the key KEY interactively, using the edit callback function FNC with the handle HANDLE. The callback is
invoked for every status and command request from the crypto engine. The output of the crypto engine is written to the data object OUT.

Note that the protocol between the callback function and the crypto engine is specific to the crypto engine and no further support in implementing this protocol correctly is provided by GPGME.

The function returns the error code GPG_ERR_NO_ERROR if the edit operation completes successfully, GPG_ERR_INV_VALUE if CTX or KEY is not a valid pointer, and any error returned by the crypto engine or the edit callback handler.

-- Function: gpgme_error_t gpgme_op_edit_start (gpgme_ctx_t CTX, gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE, gpgme_data_t OUT)

SINCE: 0.3.9

Note: This function is deprecated, please use gpgme_op_interact_start instead.

The function gpgme_op_edit_start initiates a gpgme_op_edit operation. It can be completed by calling gpgme_wait on
the
context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the operation was started successfully, and GPG_ERR_INV_VALUE if CTX or KEY is not a valid pointer.

-- Function: gpgme_error_t gpgme_op_card_edit (gpgme_ctx_t CTX,

gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE,
gpgme_data_t OUT)
Note: This function is deprecated, please use gpgme_op_interact
with the flag GPGME_INTERACT_CARD instead.

The function gpgme_op_card_edit is analogous to gpgme_op_edit,
but should be used to process the smart card corresponding to the
key KEY.

-- Function: gpgme_error_t gpgme_op_card_edit_start (gpgme_ctx_t CTX,
gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE,
gpgme_data_t OUT)
Note: This function is deprecated, please use
gpgme_op_interact_start with the flag GPGME_INTERACT_CARD
instead.

The function gpgme_op_card_edit_start initiates a

gpgme_op_card_edit operation. It can be completed by calling
gpgme_wait on the context. *Note Waiting For Completion::.

The function returns the error code GPG_ERR_NO_ERROR if the
operation was started successfully, and GPG_ERR_INV_VALUE if CTX
or KEY is not a valid pointer.

-- Function: gpgme_error_t gpgme_data_new_with_read_cb
(gpgme_data_t *DH, int (*READFUNC) (void *HOOK, char *BUFFER,
size_t COUNT, size_t *NREAD), void *HOOK_VALUE)
The function gpgme_data_new_with_read_cb creates a new
gpgme_data_t object and uses the callback function READFUNC to
retrieve the data on demand. As the callback function can supply
the data in any way it wants, this is the most flexible data type
GPGME provides. However, it can not be used to write data.

The callback function receives HOOK_VALUE as its first argument
whenever it is invoked. It should return up to COUNT bytes in
BUFFER, and return the number of bytes
actually read in NREAD. It
may return 0 in NREAD if no data is currently available. To
indicate EOF the function should return with an error code of
-1 and set NREAD to 0. The callback function may support to
reset its internal read pointer if it is invoked with BUFFER and
NREAD being NULL and COUNT being 0.

The function returns the error code GPG_ERR_NO_ERROR if the data
object was successfully created, GPG_ERR_INV_VALUE if DH or
READFUNC is not a valid pointer, and GPG_ERR_ENOMEM if not enough
memory is available.

-- Function: gpgme_error_t gpgme_data_rewind (gpgme_data_t DH)

The function gpgme_data_rewind is equivalent to:

```
return (gpgme_data_seek (dh, 0, SEEK_SET) == -1)
  ? gpgme_error_from_errno (errno) : 0;
```

-- Data type: gpgme_attr_t

The gpgme_attr_t type is used to specify a key or trust item attribute. The following attributes are defined:

GPGME_ATTR_KEYID

This is the key ID of a sub key. It is representable as a string.

GPGME_ATTR_FPR

This is the fingerprint of a sub key. It is representable as a string.

GPGME_ATTR_ALGO

This is the crypto algorithm for which the sub key can be used. It is representable as a string and as a number. The numbers correspond to the enum gcry_pk_algos values in the gcrypt library.

GPGME_ATTR_LEN

This is the key length of a sub key. It is representable as a number.

GPGME_ATTR_CREATED

This is the timestamp at creation time of a sub key. It is representable as a number.

GPGME_ATTR_EXPIRE

This is the expiration time of a sub key. It is representable as a number.

GPGME_ATTR_USERID

This is a user ID. There can be more than one user IDs in a GPGME_KEY_T object. The first one (with index 0) is the primary user ID. The user ID is representable as a number.

GPGME_ATTR_NAME

This is the name belonging to a user ID. It is representable as a string.

GPGME_ATTR_EMAIL
This is the email address belonging to a user ID. It is representable as a string.

GPGME_ATTR_COMMENT
This is the comment belonging to a user ID. It is representable as a string.

GPGME_ATTR_VALIDITY
This is the validity belonging to a user ID. It is representable as a string and as a number. See below for a list of available validities.

GPGME_ATTR_UID_REVOKED
This specifies if a user ID is revoked. It is representable as a number, and is 1 if the user ID is revoked, and 0 otherwise.

GPGME_ATTR_UID_INVALID
This specifies if a user ID is invalid. It is representable as a number, and is 1 if the user ID is invalid, and 0 otherwise.

GPGME_ATTR_TYPE
This returns information about the type of key. For the string function this will eother be "PGP" or "X.509". The integer function returns 0 for PGP and 1 for X.509.

GPGME_ATTR_IS_SECRET
This specifies if the key is a secret key. It is representable as a number, and is 1 if the key is revoked, and 0 otherwise.

GPGME_ATTR_KEY_REVOKED
This specifies if a sub key is revoked. It is representable as a number, and is 1 if the key is revoked, and 0 otherwise.

GPGME_ATTR_KEY_INVALID
This specifies if a sub key is invalid. It is representable as a number, and is 1 if the key is invalid, and 0 otherwise.

GPGME_ATTR_KEY_EXPIRED
This specifies if a sub key is expired. It is representable as a number, and is 1 if the key is expired, and 0 otherwise.

GPGME_ATTR_KEY_DISABLED
This specifies if a sub key is disabled. It is
representable
as a number, and is 1 if the key is disabled, and 0
otherwise.

GPGME_ATTR_KEY_CAPS
This is a description of the capabilities of a sub key. It is
representable as a string. The string contains the letter e
if the key can be used for encryption, s if the key can be
used for signatures, and c if the key can be used for
certifications.

GPGME_ATTR_CAN_ENCRYPT
This specifies if a sub key can be used for encryption. It is
representable as a number, and is 1 if the sub key can be
used for encryption, and 0 otherwise.

GPGME_ATTR_CAN_SIGN
This specifies if a sub key can be used to create data
signatures. It is representable as a number, and is 1 if
the sub key can be used for signatures, and 0 otherwise.

GPGME_ATTR_CAN_CERTIFY
This specifies if a sub key can be used to create key
certificates. It is representable
as a number, and is 1 if
the sub key can be used for certifications, and 0 otherwise.

GPGME_ATTR_SERIAL
The X.509 issuer serial attribute of the key. It is
representable as a string.

GPGME_ATTR_ISSUE
The X.509 issuer name attribute of the key. It is
representable as a string.

GPGME_ATTR_CHAINID
The X.509 chain ID can be used to build the certification
chain. It is representable as a string.

-- Function: const char * gpgme_key_get_string_attr (gpgme_key_t KEY,
gpgme_attr_t WHAT, const void *RESERVED, int IDX)
The function gpgme_key_get_string_attr returns the value of the
string-representable attribute WHAT of key KEY. If the attribute
is an attribute of a sub key or an user ID, IDX specifies the sub
key or user ID of which the attribute value is returned. The

argument RESERVED is reserved for later use and should be NULL.

The string returned is
only valid as long as the key is valid.

The function returns 0 if an attribute cant be returned as a
string, KEY is not a valid pointer, IDX out of range, or RESERVED
not NULL.

-- Function: unsigned long gpgme_key_get_ulong_attr (gpgme_key_t KEY,
gpgme_attr_t WHAT, const void *RESERVED, int IDX)
The function gpgme_key_get_ulong_attr returns the value of the
number-representable attribute WHAT of key KEY. If the attribute
is an attribute of a sub key or an user ID, IDX specifies the sub
key or user ID of which the attribute value is returned. The
argument RESERVED is reserved for later use and should be NULL.

The function returns 0 if the attribute cant be returned as a
number, KEY is not a valid pointer, IDX out of range, or RESERVED
not NULL.

The signatures on a key are only available if the key was retrieved
via a listing operation with the GPGME_KEYLIST_MODE_SIGS mode enabled,
because it is expensive to retrieve
all signatures of a key.

So, before using the below interfaces to retrieve the signatures on a
key, you have to make sure that the key was listed with signatures
enabled. One convenient, but blocking, way to do this is to use the
function gpgme_get_key.

-- Data type: gpgme_attr_t
The gpgme_attr_t type is used to specify a key signature
attribute. The following attributes are defined:

GPGME_ATTR_KEYID
This is the key ID of the key which was used for the
signature. It is representable as a string.

GPGME_ATTR_ALGO
This is the crypto algorithm used to create the signature. It
is representable as a string and as a number. The numbers
correspond to the enum gcry_pk_algos values in the gcrypt
library.

GPGME_ATTR_CREATED
This is the timestamp at creation time of the signature. It
is representable as a number.

GPGME_ATTR_EXPIRE
This is the expiration time
of the signature. It is
representable as a number.

GPGME_ATTR_USERID
This is the user ID associated with the signing key. The user
ID is representable as a number.

GPGME_ATTR_NAME
This is the name belonging to a user ID. It is representable
as a string.

GPGME_ATTR_EMAIL
This is the email address belonging to a user ID. It is
representable as a string.

GPGME_ATTR_COMMENT
This is the comment belonging to a user ID. It is
representable as a string.

GPGME_ATTR_KEY_REVOKED
This specifies if a key signature is a revocation signature.
It is representable as a number, and is 1 if the key is
revoked, and 0 otherwise.

GPGME_ATTR_SIG_CLASS
This specifies the signature class of a key signature. It is
representable as a number. The meaning is specific to the
crypto engine.

GPGME_ATTR_SIG_CLASS
This
specifies the signature class of a key signature. It is
representable as a number. The meaning is specific to the
crypto engine.

GPGME_ATTR_SIG_STATUS
This is the same value as returned by gpgme_get_sig_status.

-- Function: const char * gpgme_key_sig_get_string_attr
(gpgme_key_t KEY, int UID_IDX, gpgme_attr_t WHAT,
const void *RESERVED, int IDX)
The function gpgme_key_sig_get_string_attr returns the value of
the string-representable attribute WHAT of the signature IDX on the
user ID UID_IDX in the key KEY. The argument RESERVED is reserved
for later use and should be NULL.

The string returned is only valid as long as the key is valid.

The function returns 0 if an attribute cant be returned as a string, KEY is not a valid pointer, UID_IDX or IDX out of range, or RESERVED not NULL.

-- Function: unsigned long gpgme_key_sig_get_ulong_attr (gpgme_key_t KEY, int UID_IDX, gpgme_attr_t WHAT, const void *RESERVED, int IDX)

The function gpgme_key_sig_get_ulong_attr returns the value of the number-representable attribute WHAT of the signature IDX on the user ID UID_IDX in the key KEY. The argument RESERVED is reserved for later use and should be NULL.

The function returns 0 if an attribute cant be returned as a string, KEY is not a valid pointer, UID_IDX or IDX out of range, or RESERVED not NULL.

-- Data type: enum gpgme_sig_stat_t

The gpgme_sig_stat_t type holds the result of a signature check, or the combined result of all signatures. The following results are possible:

GPGME_SIG_STAT_NONE
This status should not occur in normal operation.

GPGME_SIG_STAT_GOOD
This status indicates that the signature is valid. For the combined result this status means that all signatures are valid.

GPGME_SIG_STAT_GOOD_EXP
This status indicates that the signature is valid but expired. For the combined result this status means that all signatures are valid and expired.

GPGME_SIG_STAT_GOOD_EXPKEY
This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.

GPGME_SIG_STAT_BAD
This status indicates that the signature is invalid. For the combined result this status means that all signatures are

invalid.

GPGME_SIG_STAT_NOKEY
This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

GPGME_SIG_STAT_NOSIG
This status indicates that the signature data provided was not a real signature.

GPGME_SIG_STAT_ERROR
This status indicates that there was some other error which prevented the signature verification.

GPGME_SIG_STAT_DIFF
For the combined result this status means that at least two signatures have a different status. You can get each keys status with gpgme_get_sig_status.

-- Function: const char * gpgme_get_sig_status (gpgme_ctx_t CTX, int IDX, gpgme_sig_stat_t *R_STAT, time_t *R_CREATED)
The function gpgme_get_sig_status is equivalent to:

```
gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
  {
    sig = sig->next;
    idx--;
  }
if (!sig || idx)
  return NULL;

if (r_stat)
  {
    switch (gpg_err_code (sig->status))
{
case GPG_ERR_NO_ERROR:
  *r_stat = GPGME_SIG_STAT_GOOD;
 break;

case GPG_ERR_BAD_SIGNATURE:
```

```
      *r_stat = GPGME_SIG_STAT_BAD;
      break;

    case GPG_ERR_NO_PUBKEY:
      *r_stat = GPGME_SIG_STAT_NOKEY;
      break;

    case GPG_ERR_NO_DATA:
      *r_stat = GPGME_SIG_STAT_NOSIG;
      break;

    case GPG_ERR_SIG_EXPIRED:
      *r_stat = GPGME_SIG_STAT_GOOD_EXP;
      break;

    case GPG_ERR_KEY_EXPIRED:
      *r_stat = GPGME_SIG_STAT_GOOD_EXPKEY;
      break;

    default:
      *r_stat = GPGME_SIG_STAT_ERROR;
      break;
    }
  }
  if (r_created)
    *r_created = sig->timestamp;
  return sig->fpr;
```

-- Function: const char * gpgme_get_sig_string_attr (gpgme_ctx_t CTX, int IDX, gpgme_attr_t WHAT, int WHATIDX)

The function gpgme_get_sig_string_attr is equivalent to:

```
  gpgme_verify_result_t result;
  gpgme_signature_t sig;

  result = gpgme_op_verify_result (ctx);
  sig = result->signatures;

  while (sig && idx)
    {
      sig = sig->next;
      idx--;
    }
  if (!sig || idx)
    return NULL;

  switch (what)
```

```
          {
          case GPGME_ATTR_FPR:
            return sig->fpr;

          case GPGME_ATTR_ERRTOK:
            if (whatidx == 1)
              return sig->wrong_key_usage ? "Wrong_Key_Usage" : "";
            else
        return "";
          default:
            break;
          }

        return NULL;
```

-- Function: const char * gpgme_get_sig_ulong_attr (gpgme_ctx_t CTX, int IDX, gpgme_attr_t WHAT, int WHATIDX)

The function gpgme_get_sig_ulong_attr is equivalent to:

```
        gpgme_verify_result_t result;
        gpgme_signature_t sig;


  result = gpgme_op_verify_result (ctx);
        sig = result->signatures;

        while (sig && idx)
          {
            sig = sig->next;
            idx--;
          }
        if (!sig || idx)
          return 0;

        switch (what)
          {
          case GPGME_ATTR_CREATED:
            return sig->timestamp;

          case GPGME_ATTR_EXPIRE:
            return sig->exp_timestamp;

          case GPGME_ATTR_VALIDITY:
            return (unsigned long) sig->validity;

          case GPGME_ATTR_SIG_STATUS:
            switch (sig->status)
        {
```

```
        case GPG_ERR_NO_ERROR:
          return GPGME_SIG_STAT_GOOD;

        case GPG_ERR_BAD_SIGNATURE:
          return GPGME_SIG_STAT_BAD;

        case GPG_ERR_NO_PUBKEY:
          return GPGME_SIG_STAT_NOKEY;

        case GPG_ERR_NO_DATA:
          return GPGME_SIG_STAT_NOSIG;

        case GPG_ERR_SIG_EXPIRED:

    return GPGME_SIG_STAT_GOOD_EXP;

        case GPG_ERR_KEY_EXPIRED:
          return GPGME_SIG_STAT_GOOD_EXPKEY;

        default:
          return GPGME_SIG_STAT_ERROR;
        }

          case GPGME_ATTR_SIG_SUMMARY:
            return sig->summary;

          default:
            break;
          }
        return 0;
```

-- Function: const char * gpgme_get_sig_key (gpgme_ctx_t CTX, int IDX, gpgme_key_t *R_KEY)

The function gpgme_get_sig_key is equivalent to:

```
        gpgme_verify_result_t result;
        gpgme_signature_t sig;

        result = gpgme_op_verify_result (ctx);
        sig = result->signatures;

        while (sig && idx)
          {
            sig = sig->next;
            idx--;
          }
        if (!sig || idx)
          return gpg_error (GPG_ERR_EOF);
```

```
return gpgme_get_key (ctx, sig->fpr, r_key, 0);
```

File: gpgme.info, Node: Library Copying, Next: Copying,
Prev: Deprecated Functions, Up: Top

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Version 2.1, February 1999

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========

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* gpgme_pinentry_mode_t: Pinentry Mode. (line 26)
* gpgme_progress_cb_t: Progress Meter Callback.
(line 8)
* gpgme_protocol_t: Protocols and Engines.
(line 17)
* gpgme_protocol_t <1>: Engine Information. (line 7)
* gpgme_pubkey_algo_name: Public Key Algorithms.
(line 58)
* gpgme_pubkey_algo_string: Public Key Algorithms.
(line 68)
* gpgme_pubkey_algo_t: Public Key Algorithms.

(line 10)
* gpgme_query_swdb_result_t: Checking for updates.
(line 11)
* gpgme_recipient_t: Decrypt. (line 75)
* gpgme_register_io_cb_t: I/O Callback Interface.
(line 23)
* gpgme_release: Destroying Contexts. (line 6)
* gpgme_result_ref: Result Management. (line 15)
* gpgme_result_unref: Result Management. (line 23)
* gpgme_set_armor: ASCII Armor. (line 6)
* gpgme_set_ctx_flag: Context Flags. (line 6)
* gpgme_set_engine_info: Engine Configuration.
(line 11)
* gpgme_set_global_flag: Library Version Check.

(line 44)
* gpgme_set_include_certs: Included Certificates.
(line 6)
* gpgme_set_io_cbs: Registering I/O Callbacks.
(line 35)
* gpgme_set_keylist_mode: Key Listing Mode. (line 6)
* gpgme_set_locale: Locale. (line 14)
* gpgme_set_offline: Offline Mode. (line 6)
* gpgme_set_passphrase_cb: Passphrase Callback. (line 40)
* gpgme_set_pinentry_mode: Pinentry Mode. (line 6)

* gpgme_set_progress_cb: Progress Meter Callback.
(line 16)
* gpgme_set_protocol: Protocol Selection. (line 6)
* gpgme_set_sender: Setting the Sender. (line 13)
* gpgme_set_status_cb:
Status Message Callback.
(line 17)
* gpgme_set_textmode: Text Mode. (line 6)
* gpgme_signature_t: Verify. (line 92)
* gpgme_signers_add: Selecting Signers. (line 18)
* gpgme_signers_clear: Selecting Signers. (line 11)
* gpgme_signers_count: Selecting Signers. (line 25)
* gpgme_signers_enum: Selecting Signers. (line 31)
* gpgme_sign_result_t: Creating a Signature.
(line 85)
* gpgme_sig_mode_t: Creating a Signature.
(line 7)
* gpgme_sig_notation_add: Signature Notation Data.
(line 19)
* gpgme_sig_notation_clear:
Signature Notation Data.
(line 10)
* gpgme_sig_notation_get: Signature Notation Data.
(line 45)
* gpgme_sig_notation_t: Verify. (line 38)
* gpgme_sig_stat_t: Deprecated Functions.
(line 388)
* gpgme_ssize_t: Exchanging Data. (line 32)
* gpgme_status_cb_t: Status Message Callback.
(line 8)
* gpgme_strerror: Error Strings. (line 6)
* gpgme_strerror_r: Error Strings. (line 15)
* gpgme_strsource: Error Strings. (line 26)
* gpgme_subkey_t: Key objects. (line 112)
* gpgme_tofu_info_t: Key objects.
(line 282)
* gpgme_tofu_policy_t: Changing TOFU Data. (line 13)
* gpgme_user_id_t: Key objects. (line 217)
* gpgme_validity_t: Information About Keys.
(line 9)
* gpgme_verify_result_t: Verify. (line 276)
* gpgme_wait: Waiting For Completion.
(line 6)
* IMPORT_FILES: UI Server Import/Export Keys.
(line 9)
* INPUT: UI Server Encrypt. (line 23)
* INPUT <1>: UI Server Sign. (line 12)
* INPUT <2>: UI Server Decrypt. (line 12)

* INPUT <3>: UI Server Verify. (line 16)
* MESSAGE: UI
Server Verify. (line 10)
* MICALG: UI Server Sign. (line 43)
* off_t (*gpgme_data_seek_cb_t) (void *HANDLE, off_t OFFSET, int WHENCE): Callback Based Data Buffers.
(line 43)
* OUTPUT: UI Server Encrypt. (line 36)
* OUTPUT <1>: UI Server Sign. (line 18)
* OUTPUT <2>: UI Server Decrypt. (line 19)
* OUTPUT <3>: UI Server Verify. (line 23)
* PREP_ENCRYPT: UI Server Encrypt. (line 72)
* PROTOCOL: UI Server Encrypt. (line 98)
* RECIPIENT: UI Server Encrypt. (line 9)
* SENDER: Miscellaneous UI Server Commands.
(line 50)
* SESSION: Miscellaneous UI Server
Commands.
(line 69)
* SIGN: UI Server Sign. (line 33)
* SIGN_FILES: UI Server Sign/Encrypt Files.
(line 10)
* SIGSTATUS: UI Server Verify. (line 56)
* ssize_t (*gpgme_data_read_cb_t) (void *HANDLE, void *BUFFER, size_t SIZE): Callback Based Data Buffers.
(line 10)
* ssize_t (*gpgme_data_write_cb_t) (void *HANDLE, const void *BUFFER, size_t SIZE): Callback Based Data Buffers.
(line 27)
* START_CONFDIALOG: Miscellaneous UI Server Commands.
(line 41)
* START_KEYMANAGER: Miscellaneous UI Server Commands.

(line 31)
* struct gpgme_data_cbs: Callback Based Data Buffers.
(line 59)
* struct gpgme_io_cbs: Registering I/O Callbacks.
(line 6)
* VERIFY: UI Server Verify. (line 31)
* VERIFY_FILES: UI Server Verify/Decrypt Files.
(line 10)
* void (*gpgme_data_release_cb_t) (void *HANDLE): Callback Based Data Buffers.
(line 54)
* void (*gpgme_event_io_cb_t) (void *DATA, gpgme_event_io_t TYPE, void *TYPE_DATA): I/O Callback Interface.
(line 83)
* void (*gpgme_progress_cb_t)(void *HOOK, const char *WHAT, int TYPE, int CURRENT, int TOTAL): Progress Meter Callback.

(line 6)
* void (*gpgme_remove_io_cb_t) (void *TAG): I/O Callback Interface.
(line 48)
* window-id: Miscellaneous UI Server Commands.
(line 21)
Wenn Sie dies lesen knnen, ist es wohl nicht
geheim genug.
hkp4py
requests
Additional license notices for GPGME. -*- org -*-

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with any binary distributions derived from the GNU C Library.

* MIT License

For files:
- cJSON.c, cJSON.h

#+begin_quote
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#+end_quote

```
# -*- mode: org -*-
#+TITLE: Maintenance Mode
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltxtra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}


* Maintenance Mode from 2019
 :PROPERTIES:
 :CUSTOM_ID: maintenance-mode
 :END:

| Version:       | 0.0.1                                |
| GPGME Version:  | 1.13.0                              |
| Author:        | Ben McGinnes <ben@gnupg.org>            |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language:      | Australian English, British English      |
| xml:lang:      | en-AU, en-GB, en                         |

From the beginning of 2019 the Python bindings to GPGME will enter
maintenance mode, meaning that new features will not be added and only
bug fixes and security fixes will be made.
  This also means that
documentation beyond that existing at the end of 2018 will not be
developed further except to correct errors.

Though use of these bindings appears to have been quite well received,
there has been no indication of what demand there is, if any for
either financial backing of the current Python bindings development or
support contracts with g10code GmbH citing the necessity of including
the bindings.


** Maintainer from 2019 onward
  :PROPERTIES:
  :CUSTOM_ID: maintenance-mode-bm
  :END:

How does this affect the position of GnuPG Python Bindings Maintainer?

Well, I will remain as maintainer of the bindings; but without funding
for that position, the amount of time I will be able to dedicate
solely to this task will be limited and reduced to volunteered time.
```

As with all volunteered time and effort in free software projects,
this will be subject to numerous external imperatives.

** Using the Python Bindings from 2019 and beyond
:PROPERTIES:
:CUSTOM_ID:
maintenance-mode-blade-runner
:END:

For most, if not all, Python developers using these bindings; they
will continue to just work the same as they always have. Expansions
of GPGME itself are usually handled by SWIG with the existing code and
thus bindings are generated properly when the bindings are installed
alongside GPGME and when the latter is built from source.

In the rare circumstances where that is not enough to address some new
addition to GPGME, then that is a bug and thus subject to the
maintenance mode provisions (i.e. it will be fixed following a bug
report being raised and your humble author will need to remember where
the timesheet template was filed, depending on how many years off such
an event is).

All the GPGME functionality will continue to be accessible via the
lower level, dynamically generated methods which match the GPGME C
documentation. While the more intuitively Pythonic higher level layer
already covers the vast majority of functionality people require
with
key generation, signatures, certifications (key signing), encryption,
decryption, verification, validation, trust levels and so on.

Any wanted features lacking in the Python bindings are usually lacking
because they are missing from GPGME itself (e.g. revoking keys via the
API) and in such cases they are usually deliberately excluded. More
discussion of these issues can be found in the archives of the
[[https://lists.gnupg.org/mailman/listinfo/gnupg-devel][gnupg-devel mailing list]].

Any features existing in the dynamically generated layer for which
people want a specific, higher level function included to make it more
Pythonic (e.g. to avoid needing to learn or memorise cryptographic
mode values or GnuPG status code numbers), would be a feature request
and /not/ a bug.

It is still worthwhile requesting it, but the addition of such a
feature would not be guaranteed and provided on a purely volunteer
basis. Expediting such a request would require funding that request.

Those

with a commercial interest in expediting such a feature request
already know how to [[https://gnupg.org/cgi-bin/procdonate.cgi?mode=preset][expedite it]] (use the message field to state what
feature is being requested).

** Documentation formats
:PROPERTIES:
:CUSTOM_ID: docs
:END:

The documentation has been written in Org mode for GNU Emacs, with
both Texinfo and reStructuredText formats generated from that. The
Texinfo files are intended for use with the rest of the GnuPG
documentation; while the reStructuredText files are intended for use
with Docutils and Sphinx, as with other Python projects.

*** Cautionary Notes regarding Sphinx and EPUB
:PROPERTIES:
:CUSTOM_ID: sphinx-made-epubs-suck
:END:

Though Python's Docutils in conjunction with Sphinx is capable of
generating some very useful HTML sites, as proven by [[https://readthedocs.org/][Read the Docs]] and
the [[https://docs.python.org/][Python documentation]], there are a number of output formats it does not
handle well. At the top of the list of things it manages to break
so atrociously as to be embarassing is the [[http://idpf.org/epub][EPUB 3]] format.

The automatically generated EPUB of the CPython documentation always
contains hundreds of validation errors and even the modest amount of
documentation here [[https://files.au.adversary.org.s3.amazonaws.com/crypto/gpgme-python/rst/epub/GPGMEPythonBindings.epub][produced a file]] with approximately thirty
validation errors. As the volume of documentation content increases,
so does the induced errors. Whereas Texinfo doesn't produce EPUB
output at all, nor does Org-mode.

Should there ever be genuine demand for this format, lodge a
[[https://dev.gnupg.org/maniphest/task/edit/form/4/][feature
request]] case marked for [[https://dev.gnupg.org/p/BenM/][my]] attention. The means of generating such
files flawlessly is already available, but is not yet part of the
GnuPG build system. Nor is it integrated with a means of converting Org
mode input files to the relevant base format automatically, as can
already be done when converting Org to reStructuredText or Org to
Texinfo. As a certain amount of work would be required to get it
done, there would need to be clear demand for that work to be done.

Just GNU it!
2011-12-02  Werner Koch  <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained.  Starting
on December 1st, 2011 we put change information only in the GIT
commit log, and generate a top-level ChangeLog file from logs at
"make dist".  See doc/HACKING for details.

2011-10-25  Marcus Brinkmann  <marcus@g10code.com>

* m4/pth.m4: Removed.
* configure.ac: Remove check for pth and automake conditional
HAVE_PTH.

2011-06-16  Marcus Brinkmann  <marcus@g10code.com>

Release 1.3.1

* configure.ac: Set LT version to C19/A8/R0.

2011-05-06  Marcus Brinkmann  <marcus@g10code.com>

* Makefile.am (SUBDIRS): Remove complus.

* configure.ac (AC_CONFIG_FILES): Remove complus/Makefile.
(BUILD_COMPLUS): Remove AM_CONDITIONAL.
* complus/: Remove very old and stale component.

* acinclude.m4 (GNUPG_FIX_HDR_VERSION): Remove.

2011-04-14  Werner Koch  <wk@g10code.com>

* configure.ac: Require automake 1.11.

2011-04-06  Werner Koch  <wk@g10code.com>

* autogen.sh (--build-w32):
Support option --build-w64.
* configure.ac (HAVE_W64_SYSTEM): Define.
(INSERT__TYPEDEFS_FOR_GPGME_H): New.
(GPGME_CONFIG_HOST): New.

2011-02-02  Marcus Brinkmann  <mb@g10code.com>

* configure.ac (NEED_LIBASSUAN_VERSION): Bump to 2.0.2 for system hooks.

2010-12-30  Werner Koch  <wk@g10code.com>

* configure.ac: Support a git revision.

2010-11-03  Werner Koch  <wk@g10code.com>

* configure.ac (AC_CHECK_HEADERS): Check for sys/types.h and
sys.stat.h.

2010-11-02  Werner Koch  <wk@g10code.com>

* configure.ac (AC_CHECK_HEADERS): Check for sys.time.h.

2010-08-19  Werner Koch  <wk@g10code.com>

* configure.ac (AH_BOTTOM): Define GPG_ERR_ENABLE_ERRNO_MACROS.

2010-05-12  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Check for setlocale.

2010-05-07  Werner Koch  <wk@g10code.com>

* configure.ac: Change checks to always require libassuan.

2010-05-07  Marcus Brinkmann  <marcus@g10code.de>

* autogen.sh: Update the thing.

* configure.ac: Check for locale.h.

2010-05-06
Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Detect Windows CE.
(HAVE_W32CE_SYSTEM): New symbol and automake conditional.
* ltmain.sh, m4/libtool.m4: Patch so that it works for Windows CE.

* configure.ac: Require libgpg-error 1.8.

2010-03-15  Werner Koch  <wk@g10code.com>

* configure.ac (emacs_local_vars_begin)
(emacs_local_vars_read_only, emacs_local_vars_end): New.

2010-01-22  Werner Koch  <wk@g10code.com>

* autogen.sh (--build-w32): Add --with-libassuan-prefix.

2010-01-11  Marcus Brinkmann  <marcus@g10code.de>

Release 1.3.0.

2009-12-22  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Do not use echo -n.  Test for __thread.

2009-12-17  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Make largefile check more robust.

2009-12-10  Werner Koch  <wk@g10code.com>

* configure.ac: Check for getgid and getegid.

2009-12-08  Marcus Brinkmann  <marcus@g10code.de>

Update to libtool 2.2.6a.
* configure.ac: Invoke AC_CONFIG_MACRO_DIR.
(AC_LIBTOOL_WIN32_DLL,
AC_LIBTOOL_RC): Replace by ...
(LT_PREREQ, LT_INIT, LT_LANG): ... these.
* config.guess, config.sub, install-sh, ltmain.sh, m4/libtool.m4:
Updated to libtool 2.2.6a.
* m4/ltoptions.m4, m4/ltsugar.m4, m4/ltversion.m4,
m4/lt~obsolete.m4: New files from libtool 2.2.6a.

2009-11-10  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Activate UIServer if FD passing is enabled and
Assuan is available.

2009-10-30  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Check for argp.h and error_t.

2009-10-26  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (NEED_GPG_VERSION_DEFAULT): Bump to 1.4.0 as 1.3.0
was development versions only.

2009-10-22  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Add support for G13.

2009-10-20  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (AC_CONFIG_FILES): Remove assuan/Makefile.

2009-10-20  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Replace internal libassuan by external libassuan.
* m4/libassuan.m4:
New file.
* Makefile.am (assuan): Remove variable.
(SUBDIRS): Remove ${assuan}.
* assuan/: Removed.

2009-06-22  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Add AC_TYPE_UINTPTR_T.

* assuan/assuan.h [_ASSUAN_IN_GPGME_BUILD_ASSUAN]: Declare
_gpgme_io_connect.

2009-06-18  Marcus Brinkmann  <marcus@g10code.de>

Released GPGME 1.2.0.

* configure.ac (my_version): Set to 1.2.0.
(LIBGPGME_LT_CURRENT, LIBGPGME_LT_AGE): Bump.
(LIBGPGME_LT_REVISION): Reset.

2009-05-05  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Add infrastructure for compile time check of
_FILE_OFFSET_BITS.

2009-04-19  Moritz  <moritz@gnu.org>

* Makefile.am (DISTCHECK_CONFIGURE_FLAGS): Specify --with-gpg.

2009-03-06  Marcus Brinkmann  <marcus@g10code.de>

* assuan/: Update to libassuan SVN 2009-03-06.

2009-01-26  Werner Koch  <wk@g10code.com>

* configure.ac (AC_CONFIG_FILES): Add tests/opassuan/Makefile.

2008-12-08  Marcus Brinkmann  <marcus@g10code.de>

Release GPGME
1.1.8.

* configure.ac: Bump API revision.

2008-11-03  Marcus Brinkmann  <marcus@g10code.com>

* configure.ac: Replace gpgme paths with src.
* gpgme: Move to ...
* src: ... this new directory.

2008-10-20  Werner Koch  <wk@g10code.com>

* configure.ac (AC_CONFIG_FILES): Add gpgme.h.
(GNUPG_FIX_HDR_VERSION): Remove.

2008-10-17  Marcus Brinkmann  <marcus@g10code.com>

Release GPGME 1.1.7.

* configure.ac (LIBGPGME_LT_REVISION): Bump for release.

2008-09-19  Moritz  <moritz@gnu.org>

* configure.ac: Remove bogus "esac".

2008-09-16  Marcus Brinkmann  <marcus@g10code.com>

* configure.ac (_XOPEN_SOURCE) [apple-darwin]: Define it.

2008-07-04  Werner Koch  <wk@g10code.com>

* config.guess, config.sub: Update to 2007-11-19.  Also update
missing et al scripts.

2008-04-01  Werner Koch  <wk@g10code.com>

* configure.ac (AC_INIT): Fix quoting.

2008-01-30  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Bump required version of automake up to 1.10.
* autogen.sh: Fix
aclocal check.

2008-01-04  Marcus Brinkmann  <marcus@g10code.de>

Release GPGME 1.1.6.

* configure.ac: Support gpgconf.

2007-09-27  Marcus Brinkmann  <marcus@g10code.de>

* assuan-pipe-connect.c (pipe_connect_gpgme): Do not close process handle here.  Use this function also on Unix systems.

* assuan-pipe-connect.c (pipe_connect_gpgme): Fix last change.

* assuan-pipe-connect.c (pipe_connect_gpgme): New function, use it if _ASSUAN_IN_GPGME_BUILD_ASSUAN.

2007-09-17  Werner Koch  <wk@g10code.com>

* configure.ac: Use the svn version magic.

2007-09-07  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Check for C++, Qt and support --enable-w32-qt.
* m4/pkg.m4: New file.

2007-08-21  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (--enable-w32-glib): Use --enableval, not --withval.

2007-07-16  Marcus Brinkmann  <marcus@g10code.de>

* assuan/assuan-socket.c (_assuan_close): Always use close().
* assuan/assuan.h (_gpgme_io_close): New prototype.
(close): New
macro, define as _gpgme_io_close.

2007-07-13  Marcus Brinkmann  <marcus@g10code.de>

* assuan/assuan-io.c (_assuan_simple_read, _assuan_simple_write): Always use read/write (which means _gpgme_io_read and _gpgme_io_write).

2007-07-09  Marcus Brinkmann  <marcus@g10code.de>

Released 1.1.5.

* configure.ac (LIBGPGME_LT_REVISION): Bump for release.

2007-07-08  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (GPGSM_DEFAULT) [*-mingw32*]: Initialize it.
(HAVE_ASSUAN_H): Set to 1 if we have it.
(funopen): Use AC_REPLACE_FUNCS.
(USE_DESCRIPTOR_PASSING): Define to 1 if we have it.  Do not

define it at all if we don't.
(NETLIBS) [have_w32_system]: Add -lws2_32.
(DIRSEP_C, DIRSEP_S, EXPSEP_C, EXPSEP_S, PATHSEP_S)
[HAVE_DOSISH_SYSTEM]: Remove definitions.

* assuan/assuan.h (_assuan_funopen): Define to _gpgme_funopen.
* assuan/funopen.c: Move to ../gpgme/funopen.c.
* assuan/Makefile.am (libassuan_la_SOURCES): Remove funopen.c.

2007-07-04 Marcus Brinkmann <marcus@g10code.de>

*
assuan/Makefile.am (INCLUDES): Include $(top_srcdir)/gpgme.
* assuan/assuan.h: Include <ath.h> instead of trying to duplicate
the definitions.

* assuan/: Update files to 2007-07-04 version of assuan.

* autogen.sh: Use = not == in test.

2007-03-05 Werner Koch <wk@g10code.com>

Released 1.1.4.

* configure.ac (LIBGPGME_LT_REVISION): Bump for release.

* autogen.sh: New option --force.

2007-01-29 Marcus Brinkmann <marcus@g10code.de>

Released 1.1.3.

* configure.ac (LIBGPGME_LT_REVISION): Bump for release.

2007-01-26 Werner Koch <wk@g10code.com>

* configure.ac: Changed gpg and gpgsm version checks to work with
arbitrary names of the gpg binary. New option --disable-gpg-test
and --disable-gpgsm-test.

2007-01-09 Werner Koch <wk@g10code.com>

* configure.ac (NEED_GPG_VERSION, NEED_GPGSM_VERSION): Must define
after it may have been changed by an option.

2007-01-08 Werner Koch <wk@g10code.com>

* configure.ac: Require gpg-error 1.4 due to the use of

gpg_error_from_syserror.
(HAVE_ASSUAN_H):
New.

2007-01-05 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Add options --with-gpg-version and
--with-gpgsm-version to allow overriding the minimum version
requirements.

2006-12-17 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Fix two typos in last change.

2006-12-03 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Use descriptor passing only if --enable-fd-passing
is provided.

* configure.ac: Add check for use of descriptor passing.

2006-11-29 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (NEED_GPG_VERSION): Bump to 1.3.0.

2006-09-19 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Turn stpcpy into a replacement function.
Check for unistd.h and add setenv as replacement function.

2006-07-29 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Check for network libraries and set NETLIBS.

2006-07-06 Marcus Brinkmann <marcus@g10code.de>

* lang, lang/cl: New subdirectories.
*
lang/Makefile.am, lang/README: New files.
* configure.ac (AC_CONFIG_FILES): Add lang/Makefile,
lang/cl/Makefile and lang/cl/gpgme.asd.
* Makefile.am (SUBDIRS): Add lang.

2006-03-02 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (LIBGPGME_LT_REVISION): Bump for release.

2006-02-22 Marcus Brinkmann <marcus@g10code.de>

Released 1.1.1.

* configure.ac (LIBGPGME_LT_CURRENT, LIBGPGME_LT_AGE): Bump for release.
(LIBGPGME_LT_REVISION): Reset to 0 for release.

2006-01-05  Werner Koch  <wk@g10code.com>

* configure.ac: Test for inline feature.
(AH_BOTTOM): New to define the pure attribute.

2006-01-03  Werner Koch  <wk@g10code.com>

* configure.ac: Append SVN revision to the version.

2005-11-18  Werner Koch  <wk@g10code.com>

* configure.ac (BUILD_REVISION): New.

2005-11-17  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Add support for --enable-w32-glib (disabled by default).  Invoke AM_PATH_GLIB_2_0.

2005-11-16  Werner Koch  <wk@g10code.com>

* configure.ac
(CFLAGS) [W32]: Make sure that -mms-bitfields are used.

2005-11-15  Werner Koch  <wk@g10code.com>

* configure.ac: Create BUILD_FILEVERSION from SVN Revision.

* autogen.sh [W32]: Build shared and static versions of the library.

2005-10-20  Marcus Brinkmann  <marcus@g10code.de>

* w32-dll/ChangeLog, w32-dll/build-dll, w32-dll/gpgme.def: Remove files.

* configure.ac: Instead checking for windres and dlltool, invoke AC_LIBTOOL_WIN32_DLL and AC_LIBTOOL_RC.
* src/Makefile.am [HAVE_W32_SYSTEM]: Use libtool, which simplifies the rules.

2005-10-01  Marcus Brinkmann  <marcus@g10code.de>

Released 1.1.0.

* configure.ac (LIBGPGME_LT_CURRENT, LIBGPGME_LT_AGE): Bump for release.
(LIBGPGME_LT_REVISION): Reset to 0 for release.

2005-09-12 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (HAVE_PTH): Don't add $PTH_CFLAGS to $CFLAGS here.

2005-08-26 Werner Koch <wk@g10code.com>

* configure.ac (SEPCONSTANTS): New to define DIRSEP_C et al.

2005-08-19 Werner Koch <wk@g10code.com>

* configure.ac [W32]: Create values for versioninfo.rc and list substuture versioninfo.rc.
* configure.ac: Define ENABLE_GPGSM.

2005-08-08 Werner Koch <wk@g10code.com>

* configure.ac (stpcpy): Changed from replace to test.

2005-03-24 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (AH_BOTTOM): Removed.

2005-03-09 Werner Koch <wk@g10code.com>

* acinclude.m4 (GNUPG_CHECK_VA_COPY): Assume no when cross-compiling.

* Makefile.am (EXTRA_DIST): Include autogen.sh

* autogen.sh: Added the usual code to build for W32 (--build-w32).

* configure.ac: Fixed the mingw32 host string, removed OS/2 stuff.
(HAVE_DRIVE_LETTERS): Removed.
(HAVE_W32_SYSTEM): Added.
(AC_GNU_SOURCE): New to replace the identical AH_VERBATIM.
(AH_BOTTOM): Added.

2004-12-28 Werner Koch <wk@g10code.com>

Released 1.0.2.

* Makefile.am (AUTOMAKE_OPTIONS): Build bzip 2 version.

(ACLOCAL_AMFLAGS): Add -I m4.
* configure.ac: Require automake 1.9.3 and autoconf 2.59.
* acinclude.m4:
Changed quoting for automake 1.9.
* README: Use SHA1 instead of MD5.

2004-12-11 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Replace ttyname_r if it doesn't exist (and warn in
that case).

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

* README: Refer to COPYING.LESSER and "each file" instead of
COPYING.
* COPYING.LESSER: New file.
* gpgme.spec.in (%doc): Add COPYING.LESSER.
* acinclude.m4, configure.ac, Makefile.am: Change license to LGPL
2.1 or later.
* TODO: Add copyright notice.
* README.CVS: Likewise.

* configure.ac (GPGSM_VERSION): Fix filter to get it.

2004-10-22 Marcus Brinkmann <marcus@g10code.de>

Released 1.0.1.

* configure.ac (LIBGPGME_LT_REVISION): Bump up to 2.
(AC_INIT): Set version to 1.0.1.

* configure.ac: Set HAVE_GPGSM to true only if $GPGSM is not "no".

2004-09-30 Marcus Brinkmann <marcus@g10code.de>

Released 1.0.0.

* configure.ac (LIBGPGME_LT_REVISION): Bump up to 1.
(AC_INIT): Set version to 1.0.0.

* Makefile.am
(EXTRA_DIST): Remove README-alpha.
* README-alpha: Remove file.

2004-09-17 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Disable AC_CONFIG_MACRO_DIR for now.

2004-09-14  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Improve diagnostics with version check.

* configure.ac: Print diagnostics about found thread libraries at
the end.  Check for the versions of GPG and GPGSM and print the
found versions at the end.
(HAVE_GPGSM): Do not require GPGSM to exist and be readable.
(AC_CONFIG_MACRO_DIR): Invoke with argument m4.

* acinclude.m4: Add copyright notice.
(jm_GLIBC21, AM_PATH_GPG_ERROR, _AC_PTH_ERROR, _AC_PTH_VERBOSE,
AC_CHECK_PTH): Removed.

2004-06-23  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Check for <sys/uio.h>.

2004-06-08  Marcus Brinkmann  <marcus@g10code.de>

Released 0.9.0.

* configure.ac (AC_INIT): Set version number to 0.9.0.
(LIBGPGME_LT_CURRENT, LIBGPGME_LT_AGE): Bump up by one.
(LIBGPGME_LT_REVISION): Reset to zero.

2004-05-21
Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (GPGME_CONFIG_API_VERSION): New variable,
substitute it.

2004-04-29  Marcus Brinkmann  <marcus@g10code.de>

Released 0.4.7.

* configure.ac (LIBGPGME_LT_REVISION): Bump it up.

2004-04-02  Thomas Schwinge  <schwinge@nic-nac-project.de>

* autogen.sh: Added ACLOCAL_FLAGS.

2004-04-06  Werner Koch  <wk@gnupg.org>

Released 0.4.6.

* config.guess, config.sub, ltmain.sh: Updated to those from
libtools 1.5.4.

2004-03-07  Marcus Brinkmann  <marcus@g10code.de>

Released 0.4.5.

* configure.ac (NEED_GPGSM_VERSION): Bump up to 1.9.6.

* Makefile.am (EXTRA_DIST): Remove autogen.sh and README.CVS.

2004-02-18  Werner Koch  <wk@gnupg.org>

* configure.ac: Make the check for funopen fail with just a
warning.

2004-02-11  Werner Koch  <wk@gnupg.org>

* autogen.sh (check_version): Removed bashism and simplified.

2004-02-10  Werner Koch  <wk@gnupg.org>

* configure.ac: Fixed funopen test change.

2004-02-06  Moritz Schulte
<mo@g10code.com>

* configure.ac: Fix funopen replacement mechanism.

2004-01-31  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Add invocation of AC_SYS_LARGEFILE, AC_TYPE_OFF_T
and AC_FUNC_FSEEKO.

2004-01-12  Werner Koch  <wk@gnupg.org>

Released 0.4.4.

* configure.ac: Bumbed LT_Revision; now at C12/A1/R1.
(NEED_GPGSM_VERSION): Set to 1.9.3.
(min_automake_version): Added.
* README.CVS: New.
* Makefile.am (EXTRA_DIST): Added README.CVS.
* autogen.sh: Updated.

2003-11-19  Werner Koch  <wk@gnupg.org>

* acinclude.m4: Add AM_PATH_GPG_ERROR.
* configure.ac: Check for timegm.  Made warning messages more
prominent.

2003-10-06  Marcus Brinkmann  <marcus@g10code.de>

Released 0.4.3.

* configure.ac (LIBGPGME_LT_CURRENT, LIBGPGME_LT_AGE): Bump up by 1.
(LIBGPGME_LT_REVISION): Set to 0.

2003-09-13  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Require libgpg-error 0.5.

* acinclude.m4: Remove libtool cruft, add jm_GLIBC21.
* configure.ac: Add check for
getenv_r, and call jm_GLIBC21.
Define HAVE_THREAD_SAFE_GETENV if appropriate.

2003-09-03  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Remove GPGME_CONFIG_LIBS and GPGME_CONFIG_CFLAGS.

2003-09-02  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Move invocation of AC_CANONICAL_HOST up to
suppress warning by autoconf.

2003-08-30  Robert Schiele <rschiele@uni-mannheim.de>

* gpgme.spec.in: %{_infodir}/dir is not packaged,
remove to prevent checking failure.

2003-08-18  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: If building Assuan, check for funopen and
fopencookie, and make isascii, putc_unlocked and memrchr
replacement functions.
(AM_PATH_GPG_ERROR): Require 0.3.

2003-07-31  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (AC_INIT): Bump version to 0.4.3.

2003-07-30  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (LIBGPGME_LT_REVISION): Bump up to 1.

Released 0.4.2.

2003-07-08  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac:
Complain if libgpg-error is not found.

2003-06-22  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (AC_INIT): Bump version to 0.4.2.

2003-06-06  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (LIBGPGME_LT_CURRENT): Bump up to 11.

* configure.ac: Use AM_PATH_GPG_ERROR.

* configure.ac: Check for libgpg-error.  Define
GPG_ERR_SOURCE_DEFAULT.

2003-05-26  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (NEED_GPG_VERSION): Bump up to 1.2.2.

2003-05-18  Marcus Brinkmann  <marcus@g10code.de>

In all files, replace the Gpgme* type names with the new gpgme_*
type names.

2003-02-01  Marcus Brinkmann  <marcus@g10code.de>

* assuan/: Update files to 2002-11-10 version of assuan.

2003-01-29  Marcus Brinkmann  <marcus@g10code.de>

* bonobo/gpgme.c, bonobo/main.c, bonobo/main.h, bonobo/Makefile,
bonobo/Makefile.am, bonobo/Makefile.in: Dead files removed.
* configure.ac: Remove automake conditional BUILD_BONOBO
(AC_CONFIG_FILES): Remove bonobo/Makefile.
*
Makefile.am (bonobo): Remove variable.
(SUBDIRS): Remove ${bonobo}.

* configure.ac: Remove all uses of GNUPG_CHECK_TYPEDEF, for byte,
ushort, ulong, u16 and u32.
* acinclude.m4 (GNUPG_CHECK_TYPEDEF): Remove macro.

2002-12-24  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: New conditional HAVE_LD_VERSION_SCRIPT.

Call AC_CANONICAL_HOST, use host instead target.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Bump up to 0.4.1.

Released 0.4.0.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

* autogen.sh (automake_vers): Require 1.7 (really 1.7.1) for the
conditional source distribution bug fix.

2002-12-08 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (LIBGPGME_LT_CURRENT): Increase by one.
(LIBGPGME_LT_AGE, LIBGPGME_LT_REVISION): Set to 0.

2002-11-28 Marcus Brinkmann <marcus@g10code.de>

* NEWS: Add note about moving "gpgmeplug" to the "cryptplug"
package.
* README: Remove instructions related to "gpgmeplug".
* configure.ac:
Remove enable option "gpgmeplug" and automake
conditional BUILD_GPGMEPLUG, as well as the status info about it.
(GPGMEPLUG): Remove variable.
* Makefile.am (gpgmeplug): Remove variable.
(SUBDIRS): Remove ${gpgmeplug}.
* cryptplug.h, gpgme-openpgp.c, gpgmeplug.dox, gpgme-smime.c,
Makefile.am, gpgmeplug.c, ChangeLog: Files removed.

2002-11-22 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Disable GPGSM for all dosish systems.

2002-10-12 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Add automake conditional HAVE_GPGSM.

2002-10-08 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (AC_INIT): Bump version up to 0.4.0.
(NEED_GPG_VERSION): Bump up to 1.2.0.
(NEED_GPGSM_VERSION): Bump up to 0.9.0.
* README: Update version numbers.
* NEWS: Start entry for 0.4.0.

2002-09-20  Werner Koch  <wk@gnupg.org>

Released 0.3.11.

* configure.ac: Bump up LIBGPGME_LT_REVISION.

* configure.ac (AC_CHECK_HEADERS): Check for sys/select.h.

2002-09-04  Marcus Brinkmann
<marcus@g10code.de>

* autogen.sh (autoconf_vers): Bump up to 2.53 to get the @&t@
quadrigraph.  Always cutting the edge!

2002-09-02  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Create and substitute LTLIBOBJS.

2002-09-02  Marcus Brinkmann  <marcus@g10code.de>

Released 0.3.10.

* NEWS: Update for 0.3.9 release.
* configure.ac: Bump up LIBGPGME_LT_REVISION.

2002-08-29  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.spec.in: Changed user name in Wojciech Polak's email
address from ghostface to polak per request by himself.

2002-08-28  Werner Koch  <wk@gnupg.org>

* acinclude.m4 (GNUPG_CHECK_VA_COPY): New.
* configure.ac: Use it.

2002-08-23  Werner Koch  <wk@gnupg.org>

* configure.ac (GPGME_CONFIG_CFLAGS): Renamed from GPGME_CFLAGS
and removed the libpath because it is set by the config script.

2002-08-21  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Bump version number to 0.3.10.

* NEWS: Add template for development version.

2002-08-21

Marcus Brinkmann <marcus@g10code.de>

Released 0.3.9.

* NEWS: Update for 0.3.9 release.
* Makefile.am (EXTRA_DIST): Add gpgme.spec.in.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

* jnlib/argparse.c, jnlib/argparse.h, jnlib/ChangeLog,
jnlib/dotlock.c, jnlib/dotlock.h, jnlib/libjnlib-config.h,
jnlib/logging.c, jnlib/logging.h,jnlib/Makefile.am,
jnlib/mischelp.h, jnlib/README, jnlib/stringhelp.c,
jnlib/stringhelp.h, jnlib/strlist.c, jnlib/strlist.h,
jnlib/types.h, jnlib/xmalloc.c, jnlib/xmalloc.h: Remove files.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (SUBDIRS): Remove jnlib.
* configure.ac: Don't check for unsigned short or unsigned long.
Don't check for memicmp, strlwr, strtoul, memmove, stricmp.
Make stpcpy a replaced function.
Don't define HAVE_JNLIB_LOGGING.
Don't generate jnlib/Makefile.

2002-07-02 Werner Koch <wk@gnupg.org>

* configure.ac: Bumbed version number to 0.3.9; add a comment on
when to change it.

* gpgme.spec.in:
New. Contributed by Wojciech Polak.
* Makefile.am (dist-hook): New.

* AUTHORS: Added Wojciech and bug reporting addresses.

2002-06-25 Werner Koch <wk@gnupg.org>

Released 0.3.8.

* configure.ac: Bumbed LT version to 9/3/0.
(NEED_GPGSM_VERSION): Need 0.3.8 due to fixed export command.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

Released 0.3.7.

* configure.ac (AC_INIT): Set version to 0.3.7.

(LIBGPGME_LT_REVISION): Add one.

* README: Document version requirement correctly.

2002-06-02  Marcus Brinkmann  <marcus@g10code.de>

* acinclude.m4: Fix Pth check so that it doesn't error out if pth
is not found.

2002-06-02  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Add checks for Pth and pthreads.
* acinclude.m4: Add slightly hacked check for pth (seems to be an
autoconf version problem).

2002-05-21  Werner Koch  <wk@gnupg.org>

* configure.ac (NEED_GPGSM_VERSION): We need gpgsm 0.3.7.

2002-05-03  Werner Koch  <wk@gnupg.org>

Released 0.3.6.

2002-04-05
Marcus Brinkmann  <marcus@g10code.de>

* acconfig.h: File removed.
* configure.ac (NEED_GPG_VERSION): Add description.
(NEED_GPGSM_VERSION): Likewise.
(HAVE_DOSISH_SYSTEM): Likewise.
(HAVE_DRIVE_LETTERS): Likewise.
(GPG_PATH): Likewise.
(GPGSM_PATH): Likewise.
* acinclude.m4 (GNUPG_CHECK_TYPEDEF): Likewise.

2002-04-01  Werner Koch  <wk@gnupg.org>

Released 0.3.5.

2002-03-17  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac: Add automake conditional HAVE_DOSISH_SYSTEM.

2002-03-04  Werner Koch  <wk@gnupg.org>

* configure.ac: Bumbed version to 0.3.4-cvs to continue development.

Released 0.3.4.

* configure.ac: Bumbed LT version numbers to (7,1,0), requires
gpgsm 0.3.1.

2002-03-03  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (AC_INIT): Change version number to snapshot CVS
version.

2002-02-13  Werner Koch  <wk@gnupg.org>

* configure.ac (vasprintf,fopencookie): Add checks.

2002-02-12  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (AC_INIT):
Bump version to 0.3.3.
* jnlib/Makefile.am: Rever to older version that includes xmalloc
but not dotlock and some other files.  Reported by Stphane
Corthsy.

2002-02-10  Marcus Brinkmann  <marcus@g10code.de>

* Released 0.3.2.

* configure.ac (AC_INIT): Bump version to 0.3.2.
* jnlib/libjnlibconfig.h: Revert to older version that doesn't
expect libgcrypt.  Reported by Jose Carlos Garcia Sogo
<jsogo@debian.org>.

2002-02-09  Marcus Brinkmann  <marcus@g10code.de>

* Released 0.3.1.

* configure.ac (LIBGPGME_LT_CURRENT): Bump it up to 6!
(NEED_GPGSM_VERSION): Bump it up to 0.3.0!
(AC_INIT): Bump version to 0.3.1

2002-01-22  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (HAVE_JNLIB_LOGGING): Define always for assuan.

2001-12-19  Werner Koch  <wk@gnupg.org>

* configure.ac (VERSION,PACKAGE): Defined and subst.  Used for
AM_INIT_AUTOMAKE and moved all version number more to the top.

2001-12-18  Marcus Brinkmann  <marcus@g10code.de>

* autogen.sh (libtool_vers):
Bump to 1.4.

* configure.ac (LIBGPGME_LT_CURRENT): Increment.
(LIBGPGME_LT_AGE): Reset.
Improve comment.
Fix wrong comment character.

2001-12-18  Werner Koch  <wk@gnupg.org>

* acinclude.m4 (GNUPG_FIX_HDR_VERSION): Fixed for new automake.

2001-12-14  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (GPG): Substitute this variable.
(GPGSM): Likewise.

2001-11-22  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (AC_CONFIG_FILES): Add tests/gpg/Makefile and
tests/gpgsm/Makefile.

2001-11-21  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (gpgmeplug): New variable, set to gpgmeplug if
[BUILD_GPGMEPLUG].
* configure.ac (AC_CONFIG_FILES): Add gpgmeplug/Makefile.
Support --enable-gpgmeplug.

2001-11-21  Marcus Brinkmann  <marcus@g10code.de>

* autogen.sh: Tighten version dependencies.

2001-11-20  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (SUBDIRS): Support building the assuan library
(currently if GPGSM_PATH is set)..
* configure.ac: Support building
the assuan library.
* assuan: New directory, populated with the Assuan library
(copied from the newpg repository).

2001-11-20  Marcus Brinkmann  <marcus@g10code.de>

* configure.ac (NEED_GPGSM_VERSION): New variable.  Treat it
similarly to NEED_GPG_VERSION.
* acconfig.h: Likewise.

2001-11-18  Marcus Brinkmann  <marcus@g10code.de>

* configure.in: Renamed to ...
* configure.ac: ... this.  Update to autoconf 2.52.  Lots of small
changes in the transition.  Support --with-gpg=PATH and
--with-gpgsm=PATH options.  Check if test suites can be run.
* acconfig.h: Add GPGSM_PATH.
* Makefile.am: New variable `tests', set to `tests' if
RUN_GPG_TESTS.
(SUBDIRS): Replace string `tests' with variable `tests'.

2001-10-22  Marcus Brinkmann  <marcus@g10code.de>

* autogen.sh: Invoke automake with `-a' (add missing files).
Do not invoke configure.

2001-09-17  Werner Koch  <wk@gnupg.org>

Released 0.2.3.

* configure.in (NEED_GPG_VERSION): Set to 1.0.6. Incremented LT
current
and age.

* Makefile.am (SUBDIRS): Add doc

2001-06-12  Werner Koch  <wk@gnupg.org>

Released 0.2.2.

2001-04-05  Werner Koch  <wk@gnupg.org>

* configure.in (NEED_GPG_VERSION): Set to 1.0.4g

2001-04-02  Werner Koch  <wk@gnupg.org>

Released 0.2.1.

Changed the copyright notices all over the place.

2001-02-28  Werner Koch  <wk@gnupg.org>

Released 0.2.0.

2001-01-18  Werner Koch  <wk@gnupg.org>

* autogen.sh: Added option --build-w32.

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implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
2011-12-02  Werner Koch  <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained.  Starting
on December 1st, 2011 we put change information only in the GIT
commit log, and generate a top-level ChangeLog file from logs at
"make dist".  See doc/HACKING for details.

2011-05-11  Marcus Brinkmann  <marcus@g10code.com>

* gpgsm/Makefile.am (DISTCLEANFILES): Move to ...
(CLEANFILES): ... here.
(clean-local): New rule.
* gpg/Makefile.am (DISTCLEANFILES): Move to ...
(CLEANFILES): ... here.

2011-05-05  Marcus Brinkmann  <marcus@g10code.com>

* gpg/Makefile.am: Unset GPG_AGENT_INFO when setting up local
configuration.
(clean-local): Shut down local gpg-agent.

2011-05-04  Marcus Brinkmann  <marcus@g10code.com>

* gpg/t-import.c (check_result): Complete secret key pair counting
and disable status check, as GPG 2.1 currently emits two IMPORT_OK
lines and we only look at the first.

2011-04-27  Marcus Brinkmann  <marcus@g10code.com>

* gpg/Makefile.am (DISTCLEANFILES):
Add S.gpg-agent.
(mkdemodirs, ./Alpha/Secret.gpg): Remove targets.
(GNUPGHOME): Export as absolute build directory (for gpg-agent).
(./pubring.gpg): Remove --homedir option, import secdemo.asc.
(clean-local): Rewrite.
* gpg/secdemo.asc: New file.

* gpg/pubkey-1.asc, gpg/seckey-1.asc: Change passphrase to
"abc" (now needed as GnuPG 2.1 asks for secret key passphrase on
import).
* gpg/t-keylist.c (keys): Update key info for Joe Random Hacker.
(main): Disable check for can_encrypt, as this is now in a
different subkey.
* gpg/t-encrypt-sign.c (check_result): Allow RMD160 hash
algorithm.
* gpg/t-import.c (check_result): One secret key pair now counts as
two secret keys, allow that.

2009-11-03 Werner Koch <wk@g10code.com>

* run-support.h (fail_if_err): Include program name.

* run-sign.c (main): Add option --uiserver.

2009-10-26 Marcus Brinkmann <marcus@g10code.de>

* opassuan/t-command.c: Update to new interface.

2009-10-15 Werner Koch <wk@g10code.com>

* run-verify.c:
New.

2009-08-06 Werner Koch <wk@g10code.com>

* run-sign.c: New.

2009-07-07 Werner Koch <wk@g10code.com>

* run-keylist.c (main): Add options --cms and --openpgp.

* gpg/pgp-keylist.c: Rename to ...
* run-keylist.c: ... this.
* gpg/pgp-import.c: Rename to ...
* run-import.c: ... this.
* gpg/pgp-export.c: Rename to ...
* run-export.c: ... this.
* run-support.h: New. Copied from gpg/t-support.h.
* gpg/Makefile.am (noinst_PROGRAMS): Remove them.
* Makefile.am (noinst_PROGRAMS): Add them.
(noinst_HEADERS): New.

2009-06-22 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-support.h (passphrase_cb): Implement write() according to

the book to silence compiler warning.
* gpgsm/t-support.h (passphrase_cb): Likewise.

2009-06-16  Werner Koch  <wk@g10code.com>

* gpg/pgp-import.c: New.
* gpg/t-support.h (print_import_result, nonnull): Factored out
from other tools.

* gpg/pgp-export.c, gpg/pgp-keylist.c: New.

2009-06-09  Werner Koch  <wk@g10code.com>

* gpg/Makefile.am
(./pubring.gpg): Ignore errors in case of
already imported keys.  Add --no-permission-warning and remove
obsolete --allow-secret-key-import.
* gpg/mkdemodirs.in (GPG): Add --no-permission-warning.

* gpg/t-edit.c (edit_fnc): Use gpgme_io_write.

2009-04-19  Moritz  <moritz@gnu.org>

* gpg/Makefile.am (EXTRA_DIST): Replaced mkdemodirs with mkdemodirs.in.
(mkdemodirs): New target.
(clean-local): Added command for removing mkdemodirs script.
(./Alpha/Secret.gpg): Added dependency on mkdemodirs.

* gpg/mkdemodirs: Renamed to ...
* gpg/mkdemodirs.in: ... here.
* gpg/mkdemodirs.in (GPG): Derive value from @GPG@ instead of
hard-coding "gpg".

2009-02-24  Werner Koch  <wk@g10code.com>

* opassuan/t-command.c: Adjust for changed new op_assuan interface.

2009-02-03  Werner Koch  <wk@g10code.com>

* gpg/t-keylist.c (main): Check that new fields is_cardkey and
card_number are not set.

2009-01-26  Werner Koch  <wk@g10code.com>

* opassuan/: New.
* opassuan/Makefile.am:
New.
* opassuan/t-command.c: New.

2008-12-03  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (INCLUDES): Fix path to include file.
* gpg/Makefile.am (INCLUDES), gpgsm/Makefile.am (INCLUDES): Likewise.

2008-11-18  Werner Koch  <wk@g10code.com>

* gpgsm/cms-decrypt.c: New.

2008-11-03  Marcus Brinkmann  <marcus@g10code.com>

* gpgsm/Makefile.am (INCLUDES, LDADD): Replace gpgme path with src.
* gpg/Makefile.am (INCLUDES, LDADD, t_thread1_LDADD): Likewise.
* Makefile.am (LDADD): Likewise.

2008-10-30  Werner Koch  <wk@g10code.com>

* gpgsm/cms-keylist.c: New.

2008-06-19  Werner Koch  <wk@g10code.com>

* gpg/t-gpgconf.c (dump_arg): Add new types.  Print strings in
quotes.

2008-01-28  Marcus Brinkmann  <marcus@g10code.de>

* gpg/Makefile.am (DISTCLEANFILES): Add pubring.kbx~.

2008-01-10  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-gpgconf.c (main): Allow for dirmngr not to be available.

* gpg/Makefile.am (./gpg-agent.conf): Correct pinentry path.

* gpg/pinentry:
New file.
* gpg/Makefile.am (DISTCLEANFILES, all-local): Add gpg-agent.conf
(./gpg-agent.conf): New target.
(EXTRA_DIST): Add pinentry.

* gpg/t-gpgconf.c (main): Exit early if compiled without gpgconf.

2008-01-04  Marcus Brinkmann  <marcus@g10code.de>

* gpg/Makefile.am (CLEANFILES): Add pubring.kbx and dirmngr.conf.

* Makefile.am (TESTS_ENVIRONMENT): Use absolute path for

GNUPGHOME.
* gpg/Makefile.am (TESTS_ENVIRONMENT): Use absolute path for
GNUPGHOME.
* gpgsm/Makefile.am (TESTS_ENVIRONMENT): Use absolute path for
GNUPGHOME.
* gpg/Makefile.am (TESTS): Add t-gpgconf.
t-gpgconf.c: New file.

2007-11-23 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-verify.c (show_auditlog): Check for GPG_ERR_ASS_UNKNOWN_CMD.

2007-11-23 Werner Koch <wk@g10code.com>

* gpgsm/t-verify.c (check_result): Don't exit on error but set a flag.
(main): Cosnult flag for return value.
(show_auditlog): New.
(main): Use it.

2007-09-27 Marcus Brinkmann <marcus@g10code.de>

* t-engine-info.c
(check_engine_info): Fix debug output.
* gpg/Makefile.am (tests_unix): New variable.
(TESTS): Use it.
* gpg/t-support.h (passphrase_cb) [HAVE_W32_SYSTEM]: Use WriteFile instead of write.
* gpg/t-wait.c [HAVE_W32_SYSTEM]: Define sleep as _sleep.

2007-09-14 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-verify.c (main): Release TEXT and SIG.

2007-07-12 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/Makefile.am (key_id): Change := into =.

2007-07-12 Werner Koch <wk@g10code.com>

* gpgsm/t-support.h (init_gpgme) [W32]: Do not init the locales as
the constants are not available.

2007-02-26 Werner Koch <wk@g10code.com>

* gpg/t-verify.c (double_plaintext_sig): New.
(main): Check it.

2006-12-02 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-keylist.c (main): Skip unknown keys.  Newer versions of GPGSM import more keys than older ones.

2005-12-06  Werner Koch  <wk@g10code.com>

* gpg/t-keylist.c (main): Changed for that secondary keys now have a fingerprint.
*
gpg/t-keylist-sig.c (main): Ditto.
* gpgsm/t-keylist.c (main): Ditto.  The test used to be wrong.

2005-10-18  Werner Koch  <wk@g10code.com>

* gpg/pubdemo.asc, gpg/secdemo.asc: Add 2 expired subkeys to Whisky.
* gpg/t-keylist.c: Reordered list to match new demo keyring.  Add arg for number of subkeys and for extra checking function.
(main): Enhanced a few error outputs.  Changed subkey counting. Call extra checking function.
(check_whisky): New.

2005-10-07  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/t-keylist.c (main): Allow for an email address as a second uid.

* gpg/t-sig-notation.c: Change critical notation to something GnuPG understands.

2005-10-01  Marcus Brinkmann  <marcus@g10code.de>

* gpg/Makefile.am (EXTRA_DIST): Remove gpg.conf.
(DISTCLEANFILES): Add gpg.conf.
(all-local): Add gpg.conf.
(./gpg.conf): New target.
* gpg/gpg.conf: Remove file.

* gpg/Makefile.am (EXTRA_DIST): Add gpg.conf.

* gpg/Makefile.am (TESTS): Add t-sig-notation.
* gpg/t-sig-notation.c
(check_result): New file.
* gpg/t-verify.c (check_result): Also check the length of the notation data.
* gpg/gpg.conf: New file.

2005-09-30  Marcus Brinkmann  <marcus@g10code.de>

* gpg/Makefile.am (TESTS): Add t-filename.
* gpg/t-filename.c: New file.

2005-09-23 Werner Koch <wk@g10code.com>

* gpg/t-support.h (init_gpgme) [W32]: Don't use LC_MESSAGES.

* gpg/t-encrypt-large.c: New test.
* gpg/Makefile.am (TESTS): Add t-encrypt-large.

2005-06-03 Marcus Brinkmann <marcus@g10code.de>

* gpg/Makefile.am (TESTS): Add t-wait.
* gpg/t-wait.c (main): New test.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

* gpg/mkdemodirs: Add copyright notice.

* gpgsm/Makefile.am, gpgsm/t-support.h, gpgsm/t-decrypt.c,
gpgsm/t-encrypt.c, gpgsm/t-export.c, gpgsm/t-genkey.c,
gpgsm/t-import.c, gpgsm/t-keylist.c, gpgsm/t-sign.c,
gpgsm/t-verify.c, gpg/Makefile.am, gpg/t-decrypt.c,
gpg/t-decrypt-verify.c, gpg/t-edit.c, gpg/t-encrypt.c,
gpg/t-encrypt-sign.c, gpg/t-encrypt-sym.c,
gpg/t-eventloop.c,
gpg/t-export.c, gpg/t-genkey.c, gpg/t-import.c, gpg/t-keylist.c,
gpg/t-keylist-sig.c, gpg/t-sign.c, gpg/t-signers.c,
gpg/t-support.h, gpg/t-thread1.c, gpg/t-trustlist.c,
gpg/t-verify.c, Makefile.am, t-data.c, t-engine-info.c,
t-version.c: Change license to LGPL.

2004-08-17 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-keylist.c (struct): Add new fields VALIDITY and
KEY_LENGTH.
(main): Use them.
* gpgsm/t-import.c (check_result): New argument total_stat.
(main): Pass this argument. Reduce number of total considered
keys to 1 for the second test.

2004-04-05 Werner Koch <wk@gnupg.org>

* gpgsm/Makefile.am: Changed the faked system time to 20011213T12000.

2004-03-07 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-keylist.c: Add chain IDs.

2004-03-03  Werner Koch  <wk@gnupg.org>

* gpgsm/t-export.c (main): Also check exporting 2 certificates.

2004-02-17  Werner Koch  <wk@gnupg.org>

* gpgsm/t-import.c (check_result): gpgsm does now
return info in
the result->imports; adjust for that.

* gpgsm/Makefile.am (TESTS_ENVIRONMENT): Reset the GPG_AGENT_INFO.

Include config.h at the top of each C source.  This is required
due to LFS support.

* gpg/t-keylist-sig.c (main): s/class/sig_class/.
* gpg/t-signers.c (check_result): Ditto.
* gpg/t-sign.c (check_result): Ditto.
* gpg/t-encrypt-sign.c (check_result): Ditto.
* gpgsm/t-sign.c (check_result): Ditto.

2004-01-12  Werner Koch  <wk@gnupg.org>

* gpg/t-keylist-sig.c (main): Temporary disabled one test due top
gpg 1.3.4 problems.
* gpg/t-import.c (check_result): Likewise.

2003-11-19  Werner Koch  <wk@gnupg.org>

* gpg/t-support.h (DIM): Added.

* gpg/t-verify.c (check_result): Rewrote test for notations
because the order of notaions is not guaranteed.

* gpgsm/t-support.h (fail_if_err): Also print the numeric values.

2003-10-06  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-eventloop.c: Include <sys/types.h> for old systems.

* gpgsm/Makefile.am
(DISTCLEANFILES): Add random_seed.

* gpg/t-thread1.c (thread_one): Do not call initialize_gpgme.
Likewise.

2003-09-14  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-thread1.c (main): Call init_gpgme here.
(initialize_gpgme): Function removed.

* gpg/t-thread1.c: New file.
* gpg/Makefile.am (TESTS): Add t-thread1.c.
(t_thread1_LDADD): New variable.
(LDADD): Remove GPG Error lib.
* gpgsm/Makefile.am (LDADD): Likewise.

* gpg/t-import.c (main): Likewise.
* gpg/t-keylist-sig.c (main): Likewise.
* gpg/t-keylist.c (main): Likewise.
* gpg/t-sign.c (main): Likewise.
* gpg/t-signers.c (main): Likewise.
* gpg/t-trustlist.c (main): Likewise.
* gpgsm/t-support.h: Include <stdlib.h> and <locale.h>.
(init_gpgme): New function.
* gpg/t-support.h: Likewise.
* gpgsm/t-verify.c (main): Call init_gpgme.
* gpgsm/t-decrypt.c (main): Likewise.
* gpgsm/t-encrypt.c (main): Likewise.
* gpgsm/t-export.c (main): Likewise.
* gpgsm/t-genkey.c (main): Likewise.
* gpgsm/t-import.c (main):
Likewise.
* gpgsm/t-keylist.c (main): Likewise.
* gpgsm/t-sign.c (main): Likewise.
* gpg/t-verify.c (main): Call init_gpgme.
* gpg/t-decrypt-verify.c (main): Likewise.
* gpg/t-decrypt.c (main): Likewise.
* gpg/t-edit.c (main): Likewise.
* gpg/t-encrypt-sign.c (main): Likewise.
* gpg/t-encrypt-sym.c (main): Likewise.
* gpg/t-encrypt.c (main): Likewise.
* gpg/t-eventloop.c (main): Likewise.
* gpg/t-export.c (main): Likewise.
* gpg/t-genkey.c (main): Likewise.

2003-08-14 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-sign.c (check_result): Change output format for signature
class to unsigned int.
* gpg/t-signers.c (check_result): Likewise.
* gpg/t-encrypt-sign.c (check_result): Likewise.
* gpgsm/t-sign.c (check_result): Likewise.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-verify.c (check_result): Change type of SUMMARY to
unsigned int.
* gpg/t-decrypt-verify.c (check_verify_result): Likewise.
* gpg/t-keylist-sig.c (keys): Change type of member CLASS
to
unsigned int.
* t-data.c (read_cb): Change type of AMOUNT to unsigned int.
* t-version.c (version): Remove unused variable.

2003-07-22 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (AM_CPPFLAGS): New variable.
(LDADD): Add @GPG_ERROR_LIBS@.
* gpg/Makefile.am (AM_CPPFLAGS): New variable.
(LDADD): Add @GPG_ERROR_LIBS@.
* gpgsm/Makefile.am (AM_CPPFLAGS): New variable.
(LDADD): Add @GPG_ERROR_LIBS@.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

Everywhere: Use libgpg-error error codes.

* gpg/Makefile.am (noinst_HEADERS): New variable.
* gpg/t-support.h: New file.
* gpgsm/Makefile.am (noinst_HEADERS): New variable.
* gpgsm/t-support.h: New file.

2003-05-29 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-encrypt-sym.c (main): Adapt to new syntax.
* gpg/t-encrypt.c (main): Likewise.
* gpg/t-eventloop.c (main): Likewise.
* gpg/t-encrypt-sign.c (main): Likewise.
* gpgsm/t-export.c (main): Likewise.
* gpgsm/t-encrypt.c (main): Likewise.

2003-05-28 Marcus
Brinkmann <marcus@g10code.de>

* gpg/t-eventloop.c (main): Rewrite recipient management.
* gpg/t-encrypt-sign.c (main): Likewise.
* gpg/t-encrypt.c (main): Likewise.
* gpg/t-export.c (main): Likewise.
* gpgsm/t-encrypt.c (main): Likewise.
* gpgsm/t-export.c (main): Likewise.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

* gpg/Makefile.am (TESTS): Order t-keylist and t-keylist-sig after
t-import.
* gpg/t-edit.c (edit_fnc): Fix primary UID for keylisting tests.
* gpg/t-keylist.c: Change order of user IDs.
* gpg/t-keylist-sig.c: Likewise.
* gpg/t-import.c: Add support for gpg in CVS.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

* t-data.c: Remove TEST_OUT_CB.
(main): Likewise.
* gpg/t-trustlist.c (main): Access ITEM directly.

* (t-decrypt-verify.c, t-decrypt.c, t-edit.c, t-encrypt-sign.c,
t-encrypt-sym.c, t-sign.c, t-signers.c): Include <unistd.h>.
(passphrase_cb): Rewritten.
* t-edit.c (edit_fnc): Rewritten.

2003-05-04 Marcus Brinkmann <marcus@g10code.de>

*
gpg/t-keylist-sig.c (main): Remove timestamp check.

* gpgsm/t-keylist.c: Add check for timestamp.

* gpg/Makefile.am (TESTS): Add t-keylist-sig.
* gpg/t-keylist-sig.c: New file.

2003-04-30 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-eventloop.c (main): Do not call print_op_info.
(print_op_info): Function removed.

* gpg/t-keylist.c: Rewritten.
* gpgsm/t-keylist.c (main): Rewritten.
* gpg/t-edit.c (main): Do not use gpgme_key_get_as_xml. Use
gpgme_key_unref instead gpgme_key_release.
* gpg/t-signers.c (main): Use gpgme_key_unref instead
gpgme_key_release.

2003-04-29 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-trustlist.c: Rewritten.

* gpg/t-verify.c (main): Rewritten.
* gpg/t-decrypt-verify.c: Rewritten.
* gpgsm/t-verify.c (main): Rewritten.

2003-04-28  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/t-decrypt.c (main): Rewritten.

* gpg/t-decrypt.c: Rewritten.

* gpg/t-signers.c: Rewritten.

2003-04-27  Marcus Brinkmann  <marcus@g10code.de>

*
gpg/t-encrypt-sign.c (check_result): Rewritten.

* gpg/t-sign.c: Rewritten.
* gpgsm/t-sign.c: Rewritten.
* gpg/t-encrypt.c: Check for invalid recipients.
* gpgsm/t-encrypt.c: Likewise.

* gpg/t-import.c (check_result): Really use FPR.
* gpgsm/t-import.c (check_result): Rewritten.

2003-04-25  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-import.c: Rewritten.

* gpgsm/t-genkey.c: Rewritten.
* gpgsm/Makefile.am (noinst_PROGRAMS): Add t-genkey.
* gpg/t-genkey.c: Include <stdlib.h>.
(main): Check result->fpr before checking its length.

2003-04-24  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-genkey.c: Rewritten to match new semantics.

2003-02-06  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-decrypt.c (passphrase_cb): Fix to new prototype.
* gpg/t-decrypt-verify.c (passphrase_cb): Likewise.
* gpg/t-edit.c (passphrase_cb): Likewise.
* gpg/t-encrypt-sign.c (passphrase_cb): Likewise.
* gpg/t-encrypt-sym.c (passphrase_cb): Likewise.
* gpg/t-sign.c (passphrase_cb): Likewise.
*
gpg/t-signers.c (passphrase_cb): Likewise.

2003-01-30  Marcus Brinkmann  <marcus@g10code.de>

* t-engine-info.c: Use file_name instead path throughout.

* Makefile.am (TESTS): Add t-engine-info.
* t-engine-info.c: New file.
* gpg/t-encrypt.c (main): Don't print engine info.
* gpg/t-eventloop.c (main): Likewise.
* gpg/t-encrypt-sign.c (main): Likewise.
* gpgsm/t-encrypt.c (main): Likewise.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-verify.c (main): Adjust caller of gpgme_op_verify.
* gpg/t-verify.c (main): Likewise.
* gpg/t-decrypt-verify.c (main): Likewise for
gpgme_op_decrypt_verify.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/Makefile.am (./gpgsm.conf): Add a faked system time to
avoid certification's expiry.
* gpgsm/t-encrypt.c (main): Use the short certification name.

2002-11-19 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-genkey.c (main): Add missing argument to gpgme_op_genkey
invocation.

2002-10-09 Marcus Brinkmann
<marcus@g10code.de>

* gpg/t-decrypt.c (print_data): Update to new gpgme_data_read
interface, and use gpgme_engine_check_version instead
gpgme_check_version.
* gpg/t-decrypt-verify.c (print_data): Likewise.
* gpg/t-edit.c (main): Likewise.
* gpg/t-encrypt.c (print_data): Likewise.
* gpg/t-encrypt-sign.c (print_data): Likewise.
* gpg/t-encrypt-sym.c (print_data): Likewise.
* gpg/t-eventloop.c (print_data): Likewise.
* gpg/t-export.c (print_data): Likewise.
* gpg/t-sign.c (print_data): Likewise.
* gpg/t-signers.c (print_data): Likewise.
* gpgsm/t-decrypt.c (print_data): Likewise.
* gpgsm/t-encrypt.c (print_data): Likewise.
* gpgsm/t-export.c (print_data): Likewise.
* gpgsm/t-sign.c (print_data): Likewise.
* gpg/t-verify.c (main): Likewise for gpgme_op_verify.
* gpgsm/t-verify.c (main): Likewise for gpgme_op_verify.

* t-data.c (read_once_test): Likewise.
(write_test): Update for new behaviour of data objects.
(main): Remove type test.

2002-09-30 Werner Koch <wk@gnupg.org>

*
gpgsm/t-keylist.c (doit): Add arg SECRET.
(main): Add option --secret.

2002-09-28 Marcus Brinkmann <marcus@g10code.de>

* t-version.c: Include <string.h>. Reported by Stphane Corthsy.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-keylist.c (main): Test PATTERN for NULL before printing.
Reported by Dr. Stefan Dalibor <Dr.Stefan.Dalibor@bfa.de>.

2002-08-01 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-edit.c: Also add a test for the expire command (testing
the passphrase callback).

2002-07-28 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-edit.c: New file.
* gpg/Makefile (TESTS): Add t-edit.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-encrypt-sym.c (main): Change type of I to size_t and
rename to LEN.
* gpg/t-verify.c (main): Likewise. Submitted by Stphane
Corthsy.

2002-07-03 Marcus Brinkmann <marcus@g10code.de>

* gpg/t-eventloop.c: New file.
* gpg/Makefile (TESTS): Add t-eventloop.

2002-06-26 Werner Koch <wk@gnupg.org>

*
gpgsm/t-import.c (print_op_info): New.
(main): Print operation info.

2002-06-25 Werner Koch <wk@gnupg.org>

* gpgsm/Makefile.am (DISTCLEANFILES): new.

2002-06-25 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/Makefile.am (TESTS): Add t-export.
gpgsm/t-export.c: New file.

2002-06-20 Werner Koch <wk@gnupg.org>

* gpgsm/t-sign.c (main): Also test a normal signature.

* gpg/Makefile (TESTS_ENVIRONMENT): Set GPG_AGENT_INFO empty.
* gpg/t-signers.c, gpg/t-sign.c, gpg/t-encrypt-sym.c
* gpg/t-encrypt-sign.c, gpg/t-decrypt.c
* gpg/t-decrypt-verify.c (main): Changed the GPG_AGENT_INFO check to
match the one in ../../gpgme/rungpg.c.

2002-06-12 Werner Koch <wk@gnupg.org>

* gpgsm/t-keylist.c (doit): Print operation info if available.

2002-06-10 Werner Koch <wk@gnupg.org>

* gpgsm/t-verify.c (print_sig_stat): Print the error token.

2002-06-04 Werner Koch <wk@gnupg.org>

* gpgsm/t-encrypt.c (main): Add a simple option parser and allow
to specify an encryption
key.

2002-05-26 Marcus Brinkmann <marcus@g10code.de>

* gpg/Makefile.am (all-local): Remove dependency on ./secring.gpg.
(./secring.gpg): Remove target, and move all rules for this target
to ...
(./pubring.gpg): ... here. This was necessary because GnuPG 1.0.7
does create an empty secring.gpg file when importing public keys.

2002-05-08 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/t-verify.c (validity_string): New.
(print_sig_stat): Print expire time and validity.
(status_string): Add new exipred stati.

2002-05-03 Werner Koch <wk@gnupg.org>

* gpg/t-verify.c (validity_string): New.
(print_sig_stat): Print expire time and validity.
(status_string): Add new exipred stati.

2002-04-05  Marcus Brinkmann  <marcus@g10code,de>

* gpgsm/Makefile.am (./trustlist.txt): Put more into this file to
prevent use of gpg-agent.
(./gpg-agent.conf): Remove target.
(all-local): Remove ./gpg-agent.conf.

2002-04-05  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/t-keylist.c
(main): Use gpgme_engine_check_version instead
gpgme_check_engine.
* gpgsm/t-encrypt.c (main): Likewise.

2002-03-06  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-encrypt-sym.c: New file.
* gpg/Makefile.am (TESTS): Add t-encrypt-sym.

2002-03-05  Marcus Brinkmann  <marcus@g10code.de>

* gpg/Makefile.am (CLEANFILES): Remove random_seed, which is now
in DISTCLEANFILES.

2002-03-04  Werner Koch  <wk@gnupg.org>

* gpg/Makefile.am (DISTCLEANFILES): Added.

2002-03-03  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-verify.c (main): Add a few more sanity checks, and a check
for normal signatures.

2002-02-26  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-encrypt-sign.c: New file.
* gpg/Makefile.am (TESTS): Add t-encrypt-sign.

2002-02-13  Werner Koch  <wk@gnupg.org>

* gpgsm/Makefile.am (private-keys-v1.d): Don't
fail when the directory already exists.

2002-02-12  Marcus Brinkmann  <marcus@g10code.de>

* gpg/Makefile.am (CLEANFILES): New target.
(distclean-local): Rename to
...
(clean-local): ... this.

2002-02-09  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/Makefile.am (./private-keys-v1.d/$(key_id).key): Fix rule.

2002-02-09  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/t-genkey.c: New file (not added to Makefile.am because of
gpg-agent bug).

2002-02-08  Marcus Brinkmann  <marcus@g10code.de>

* gpgsm/Makefile.am (key_id): Update value.
(all-local): Add .key to keyid filename.
(./private-keys-v1.d/$(key_id)): Renamed to ...
(./private-keys-v1.d/$(key_id).key): ... this.
(all-local): Add ./gpgsm.conf, ./trustlist.txt.
(./gpgsm.conf, ./trustlist.txt): New target.
* gpgsm/567064FE6D14A17B2D811ABB407728BC558AA455: Renamed to ...
* gpgsm/32100C27173EF6E9C4E9A25D3D69F86D37A4F939: ... this.

2002-01-30  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-import.c (print_op_info): New function.
(main): Use it.

2002-01-22  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-signers.c (passphrase_cb): Change type of r_hd to void**.
* gpg/t-sign.c (passphrase_cb):
Likewise.
* gpg/t-decrypt-verify.c (passphrase_cb): Likewise.
* gpg/t-decrypt.c (passphrase_cb): Likewise.

2001-12-19  Marcus Brinkmann  <marcus@g10code.de>

* gpg/t-decrypt-verify.c: Don't include `mcheck.h'.  Reported by
Stphane Corthsy.

2001-12-19  Marcus Brinkmann  <marcus@g10code.de>

* gpg/Makefile.am (EXTRA_DIST): Add missing line continuation.

2001-12-19  Marcus Brinkmann  <marcus@g10code.de>

 * gpgsm/Makefile.am (EXTRA_DIST): Add $(key_id).

2001-12-16  Marcus Brinkmann  <marcus@g10code.de>

 * gpgsm/Makefile: Rename `pubcerts.kbx' to `pubring.kbx'.

2001-12-15  Marcus Brinkmann  <marcus@g10code.de>

 * gpgsm/t-keylist.c (check_two_contexts): Set protocols.

2001-12-14  Marcus Brinkmann  <marcus@g10code.de>

 * gpgsm/t-sign.c: New file.
 * gpgsm/Makefile.am (TESTS): Add t-sign.

2001-12-14  Marcus Brinkmann  <marcus@g10code.de>

 * gpgsm/t-decrypt.c: New file.
 * gpgsm/567064FE6D14A17B2D811ABB407728BC558AA455: Likewise.
 * gpgsm/Makefile.am (TESTS): Add
 t-decrypt.
 (key_id): New variable.
 (all-local): New target ./private-keys-v1.d/$(key_id) added.
 (./private-keys-v1.d/$(key_id)): New target.

2001-12-14  Marcus Brinkmann  <marcus@g10code.de>

 * gpgsm/t-verify.c: New file.
 * gpgsm/Makefile.am (TESTS): Add t-verify.

2001-12-14  Marcus Brinkmann  <marcus@g10code.de>

 * gpg/Makefile.am (GPG): Set to @GPG_PATH@.
 (./pubring.gpg): Use $(GPG) instead gpg.
 (./secring.gpg): Likewise.

 * gpgsm/t-import.c (main): Remove third test case.
 * gpgsm/Makefile.am (GPGSM): Set to @GPGSM@.
 (all-local): New target.
 (./pubcerts.kbx): Likewise.
 * gpgsm/t-encrypt.c: New file.
 * gpgsm/Makefile.am (TESTS): Add t-encrypt.

2001-12-14  Marcus Brinkmann  <marcus@g10code.de>

 * gpgsm/t-keylist.c: New file.

* gpgsm/Makefile.am (TESTS): Add t-keylist.

2001-12-13 Marcus Brinkmann <marcus@g10code.de>

* gpgsm/cert_dfn_pca01.der: New file.
* gpgsm/cert_dfn_pca15.der: Likewise.
* gpgsm/cert_g10code_test1.der: Likewise.
* gpgsm/t-import.c: Likewise.
*
gpgsm/Makefile.am (EXTRADIST): Add new files.
(TESTS): Add t-import.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

* gpg/: New directory.
* Makefile.am, t-verify.c, t-encrypt.c, t-signers.c, t-trustlist.c,
t-sign.c, t-keylist.c, t-import.c, t-genkey.c, t-export.c,
t-decrypt-verify.c, t-decrypt.c, t-version.c, t-data.c, mkdemodirs.
cipher-1.asc, cipher-2.asc, geheim.txt, pubdemo.asc, pubkey-1.asc,
secdemo.asc, seckey-1.asc): Move to sub directory gpg/.

* gpg/Makefile.am (INCLUDES): Include gpgme/, not include/ and
intl/.
(LDD): Correct relative path to gpgme library.
(TESTS): Remove t-version and t-data.
* gpg/t-verify.c, gpg/t-encrypt.c, gpg/t-signers.c, gpg/t-trustlist.c,
gpg/t-sign.c, gpg/t-keylist.c, gpg/t-import.c, gpg/t-genkey.c,
gpg/t-export.c, gpg/t-decrypt-verify.c, gpg/t-decrypt.c,
t-version.c, t-data.c): Include gpgme.h, not "../gpgme/gpgme.h".

* Makefile.am: New file.
* gpgsm/: New directory.
* gpgsm/Makefile.am: New file.

2001-11-16 Marcus
Brinkmann <marcus@g10code.de>

* Makefile.am (TESTS): Add t-decrypt-verify.
* t-decrypt-verify.c: New file.
* cipher-2.asc: Likewise.

2001-11-02 Marcus Brinkmann <marcus@g10code.de>

* t-data.c: Include stddef.h.
(read_once_test): Change type of READ to size_t.
(read_test): Likewise.
(write_test): Likewise.

2001-10-29  Marcus Brinkmann  <marcus@g10code.de>

* t-signers.c: New file.
* Makefile.am (TESTS): Add t-signers.

2001-10-22  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (TEST_ENVIRONMENT): Revert last change.

2001-10-22  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (TEST_ENVIRONMENT): Set environment to $(srcdir),
not current directory.

2001-10-22  Marcus Brinkmann  <marcus@g10code.de>

* t-data.c (write_test): New function.
(main): Invoke write_test for all rounds except TEST_OUT_CB.

2001-10-22  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (INCLUDES): Remove spurious duplicate to silence
automake.

2001-10-16  Marcus Brinkmann  <marcus@g10code.de>

*
t-version.c: New file.
* t-data.c: Likewise.
* t-data-1.txt: Likewise.
* t-data-2.txt: Likewise.
* Makefile.am (TESTS): Add t-version, t-data.

2001-09-17  Werner Koch  <wk@gnupg.org>

* t-keylist.c (check_two_contexts): New.

2001-09-03  Werner Koch  <wk@gnupg.org>

* t-encrypt.c (print_op_info): New and use it after each operation.

2001-08-28  Werner Koch  <wk@gnupg.org>

* t-sign.c (print_op_info): New and use it after each operation.

2001-03-15  Werner Koch  <wk@gnupg.org>

* t-keylist.c (doit): List subkeys too, show caps.

2001-02-13  Werner Koch  <wk@gnupg.org>

 * t-verify.c (print_sig_stat): Repaled ulong by unsigned long
 because we don't use the config stuff here.

2001-02-12  Werner Koch  <wk@gnupg.org>

 * tests/t-verify.c (print_sig_stat): Print info about the keys.

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(11:private-key(3:dsa(1:p129:eC_L&$2,6tx.gh1VirlqI9
,^g3.$DveUvX1'oIj)(1:q21: #UFK2z(tuVG)(1:g128:zu^Rab;qeQQA B?/6/aspfE/
gx!Mr0YY*oMrJc2xWG:.r6)(1:y128:Uf]j^@oEn4j#QrRq" RcEa E/}4C[3A
5+~~.#!+
)W&5d)ij)(1:x21:` )))
# libgpgme.vers - List of symbols to export.
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#
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#-----------------------------------------------------
# Please remember to add new functions also to gpgme.def
#-----------------------------------------------------

```
GPGME_1.1 {
 global:
   gpgme_set_engine_info;

    gpgme_ctx_get_engine_info;
   gpgme_ctx_set_engine_info;

   gpgme_data_set_file_name;
   gpgme_data_get_file_name;
   gpgme_data_identify;

   gpgme_sig_notation_clear;
   gpgme_sig_notation_add;
   gpgme_sig_notation_get;

   gpgme_free;

   gpgme_op_getauditlog_start;
   gpgme_op_getauditlog;

   gpgme_conf_release;
   gpgme_conf_arg_new;
   gpgme_conf_arg_release;
   gpgme_conf_opt_change;
   gpgme_op_conf_load;
   gpgme_op_conf_save;
   gpgme_op_conf_dir;

   gpgme_cancel_async;

   gpgme_op_assuan_result;
   gpgme_op_assuan_transact;
   gpgme_op_assuan_transact_start;

   gpgme_check_version_internal;

   gpgme_io_read;
   gpgme_io_write;

   gpgme_result_ref;
   gpgme_result_unref;

   gpgme_op_import_keys;
   gpgme_op_import_keys_start;
   gpgme_op_export_keys;
   gpgme_op_export_keys_start;
```

gpgme_op_assuan_transact_ext;

gpgme_wait_ext;

gpgme_op_vfs_mount_result;
gpgme_op_vfs_mount;
gpgme_op_vfs_create;

gpgme_key_from_uid;
gpgme_set_sub_protocol;
gpgme_get_sub_protocol;

gpgme_op_passwd_start;
gpgme_op_passwd;

gpgme_set_global_flag;

gpgme_io_writen;

gpgme_set_pinentry_mode;
gpgme_get_pinentry_mode;

gpgme_get_dirinfo;

gpgme_op_spawn_start;
gpgme_op_spawn;

gpgme_set_offline;
gpgme_get_offline;

gpgme_set_status_cb;
gpgme_get_status_cb;

gpgme_pubkey_algo_string;
gpgme_set_ctx_flag;
gpgme_get_ctx_flag;
gpgme_data_set_flag;

gpgme_op_createkey_start;
gpgme_op_createkey;
gpgme_op_createsubkey_start;
gpgme_op_createsubkey;
gpgme_op_adduid_start;
gpgme_op_adduid;
gpgme_op_revuid_start;
gpgme_op_revuid;
gpgme_op_keysign_start;
gpgme_op_keysign;

```
  gpgme_op_tofu_policy_start;
  gpgme_op_tofu_policy;
  gpgme_op_interact_start;
  gpgme_op_interact;

  gpgme_addrspec_from_uid;

  gpgme_set_sender;
  gpgme_get_sender;

  gpgme_op_query_swdb;
  gpgme_op_query_swdb_result;

   gpgme_op_set_uid_flag_start;
  gpgme_op_set_uid_flag;

  gpgme_op_decrypt_ext;
  gpgme_op_decrypt_ext_start;

  gpgme_data_new_from_estream;

};


GPGME_1.0 {
 global:
  gpgme_check_version;
  gpgme_get_engine_info;
  gpgme_engine_check_version;

  gpgme_err_code_from_errno;
  gpgme_err_code_to_errno;
  gpgme_err_make_from_errno;
  gpgme_error_from_errno;
  gpgme_strerror;
  gpgme_strerror_r;
  gpgme_strsource;

  gpgme_data_get_encoding;
  gpgme_data_new;
  gpgme_data_new_from_cbs;
  gpgme_data_new_from_fd;
  gpgme_data_new_from_file;
  gpgme_data_new_from_filepart;
  gpgme_data_new_from_mem;
  gpgme_data_new_from_stream;
  gpgme_data_read;
  gpgme_data_release;
```

gpgme_data_release_and_get_mem;
gpgme_data_seek;
gpgme_data_set_encoding;
gpgme_data_write;

gpgme_get_protocol_name;
gpgme_hash_algo_name;
gpgme_pubkey_algo_name;

gpgme_new;
gpgme_get_armor;
gpgme_get_include_certs;
gpgme_get_io_cbs;
gpgme_get_keylist_mode;
gpgme_get_passphrase_cb;
gpgme_get_progress_cb;
gpgme_get_protocol;
gpgme_get_textmode;
gpgme_release;
gpgme_set_armor;
gpgme_set_include_certs;
gpgme_set_io_cbs;
gpgme_set_keylist_mode;
gpgme_set_locale;
gpgme_set_passphrase_cb;
gpgme_set_progress_cb;
gpgme_set_protocol;
gpgme_set_textmode;
gpgme_signers_add;
gpgme_signers_clear;
gpgme_signers_count;
gpgme_signers_enum;

gpgme_key_ref;
gpgme_key_unref;
gpgme_key_release;

gpgme_trust_item_ref;
gpgme_trust_item_unref;

gpgme_cancel;
gpgme_op_card_edit;
gpgme_op_card_edit_start;
gpgme_op_decrypt;
gpgme_op_decrypt_result;
gpgme_op_decrypt_start;
gpgme_op_decrypt_verify;
gpgme_op_decrypt_verify_start;

gpgme_op_delete;
gpgme_op_delete_start;
gpgme_op_delete_ext;
gpgme_op_delete_ext_start;
gpgme_op_edit;
gpgme_op_edit_start;
gpgme_op_encrypt;
gpgme_op_encrypt_start;
gpgme_op_encrypt_ext;
gpgme_op_encrypt_ext_start;
gpgme_op_encrypt_sign;
gpgme_op_encrypt_sign_ext;
gpgme_op_encrypt_sign_start;
gpgme_op_encrypt_sign_ext_start;
gpgme_op_encrypt_result;

gpgme_op_export;
gpgme_op_export_ext;
gpgme_op_export_ext_start;
gpgme_op_export_start;
gpgme_op_genkey;
gpgme_op_genkey_result;
gpgme_op_genkey_start;
gpgme_get_key;
gpgme_op_import;
gpgme_op_import_result;
gpgme_op_import_start;
gpgme_op_keylist_end;
gpgme_op_keylist_ext_start;
gpgme_op_keylist_from_data_start;
gpgme_op_keylist_next;
gpgme_op_keylist_result;
gpgme_op_keylist_start;
gpgme_op_sign;
gpgme_op_sign_result;
gpgme_op_sign_start;
gpgme_op_trustlist_end;
gpgme_op_trustlist_next;
gpgme_op_trustlist_start;
gpgme_op_verify;
gpgme_op_verify_result;
gpgme_op_verify_start;
gpgme_wait;

gpgme_data_new_with_read_cb;
gpgme_data_rewind;
gpgme_get_sig_status;

```
    gpgme_get_sig_string_attr;
    gpgme_get_sig_ulong_attr;
    gpgme_get_sig_key;
    gpgme_key_get_string_attr;
    gpgme_key_get_ulong_attr;
    gpgme_key_sig_get_string_attr;
    gpgme_key_sig_get_ulong_attr;
    gpgme_op_import_ext;
    gpgme_trust_item_get_int_attr;
    gpgme_trust_item_get_string_attr;
    gpgme_trust_item_release;

    gpgme_err_code_from_syserror;
    gpgme_err_set_errno;

    gpgme_op_setexpire;
    gpgme_op_setexpire_start;

    gpgme_op_revsig;
    gpgme_op_revsig_start;

  local:
    *;

};
# -*- mode: org -*-
#+TITLE: What's New in the GPGME Python Bindings and Documentation
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltxtra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}


* What's New
  :PROPERTIES:
  :CUSTOM_ID: new-stuff
  :END:

| Version:        | 0.0.1                                |
| GPGME Version:  | 1.13.0                               |
| Author:         | Ben McGinnes <ben@gnupg.org>         |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language:       | Australian English, British English  |
| xml:lang:       | en-AU, en-GB, en                     |
```

Last time the most obviously new thing was adding the /What's New/
section to the HOWTO.  Now it's moving it out of the HOWTO.

** New in GPGME 1130
  :PROPERTIES:
   :CUSTOM_ID: new-stuff-1-13-0
  :END:

Additions since GPGME 1.12.0 include:

- Moving the /What's New/ section out of the basic [[file:gpgme-python-howto.org][HOWTO]] document and
 into its own file so as to more readily include other documents
 beyond that HOWTO.
- Moving the preceding, archival, segments into [[file:what-was-new.org][another file]].
- Added =gpg.version.versionintlist= to make it easier for Python
 developers to check for a specific version number, even with beta
 versions (it will drop the "-betaN" part).
- Added expanded detail on issues pertaining to installing for Windows
 users.
- Bindings enter [[file:maintenance-mode][maintenance mode]] from January, 2019.
- Added documentation on maintenance mode and what changes can be made
 to the code when in that status.  Essentially that boils down to bug
 fixes only and no feature requests.
- The import-keys-hkp.py example script, which uses the =hkp4py=
 module to search the SKS servers for a key, has been
 tightened up to
 search for both hexadecimal key IDs and user ID strings with reduced
 chance of unnecessary repitition.  There may still be some
 repetition if a key includes a user ID matching the hexadecimal
 value of a key ID.

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^L
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former contains code derived from the library, whereas the latter must
be combined with the library in order
to run.
^L

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in the event an application does not supply such function or
table, the facility still operates, and performs whatever part of
its purpose remains meaningful.

(For example, a function in a library to compute square roots has
a purpose that is entirely well-defined independent of the
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When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.
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a)

Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

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d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

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Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or
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library `Frob' (a library for tweaking knobs) written by James
Random Hacker.

<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

That's all there is to it!
1603972630
##Sketch 1 2
document()
layout('A4',1)
fp((0,0,0))
ft(1)
Fn('Helvetica-Bold')
Fs(18)

```
dstyle('Text')
fp((0,1,0.498))
ft(1)
lp((0,0,0))
lw(0.283465)
lc(1)
lj(0)
ld(())
la1()
la2()
dstyle('Application Box')
layer('Layer 1',1,1,0,0,(0,0,0))
lw(1)
r(0,0,0,0,688.145,44.1554)
lw(1)
r(0,0,0,0,682.363,85.0359)
lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(605.383,329.758,0)
bs(605.383,230.546,0)
lw(1)
r(0,0,0,0,807.414,53.6148)
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(480.134,240.945,0)
bs(480.358,325.277,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(474.803,432.284,0)
bs(475.334,360.243,0)
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(354.331,432.284,0)
bs(352.806,361.417,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(212.598,432.284,0)
bs(212.598,361.417,0)
```

```
fp((0.999,1,0.4))
lw(0.283465)
r(70.5968,0,0,-56.6929,191.608,488.976,0.0603744,0.151107)
lw(1)
r(0,0,0,0,88.5492,390.805)
lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(226.772,524.409,0)
bs(226.772,488.976,0)
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(403.937,528.718,0)
bs(403.937,488.976,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1,
 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(240.945,432.284,0)
bs(240.574,394.994,0)
bs(595.276,396.85,0)
bs(595.276,361.417,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(333.071,432.284,0)
bs(333.07,425.196,0)
bs(333.07,382.677,0)
bs(240.945,382.677,0)
bs(240.945,361.417,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.347,318.897,354.331,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica-Bold')
Fs(10)
txt('GPG',(1,0,0,0.905764,344.004,335.686))
G_()
G()
fp((0.999,1,0.4))
```

```
lw(0.283465)
r(70.5589,0,0,-28.3464,446.763,354.33,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('GpgConf',(0.552654,0,0,0.500564,481.802,340.184),1,1)
G_()
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.347,191.338,354.331,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('GpgSM',(0.552654,0,0,0.500574,226.376,340.185),1,1)
G_()
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(347.244,325.984,0)
bs(347.244,325.984,0)
bs(347.244,255.118,0)
bs(304.724,255.118,0)
bs(304.724,226.771,0)
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(233.858,325.984,0)
bs(233.858,255.118,0)
bs(276.378,255.118,0)
bs(276.378,226.771,0)
fp((0,0,0))
le()
lw(1)
Fn('Palatino-Roman')
txt('2008-07-17',(0.608301,0,0,0.608301,708.661,65.8308))
lw(1)
r(0,0,0,0,750.427,153.265)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1,
```

```
 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(219.685,325.984,0)
bs(219.685,198.425,0)
bs(219.685,162.992,0)
G()
fp((1,1,1))
lw(0.283465)
r(113.386,0,0,-42.5196,35.4333,162.992,0.0670228,0.151107)
fp((0,0,0))
lw(0.283465)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('LDAP
 Server',(0.552654,0,0,0.552654,92.1261,148.819),1,1)
fp((0,0,0))
lw(0.283465)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('(CRLs, Certificates)',(0.552654,0,0,0.552654,92.1261,134.646),1,1)
G_()
G()
fp((1,1,1))
lw(0.283465)
r(113.386,0,0,-42.5196,35.4331,99.2125,0.0670228,0.151107)
fp((0,0,0))
lw(0.283465)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('HTTP Server',(0.552654,0,0,0.552654,92.1259,85.0394),1,1)
fp((0,0,0))
lw(0.283465)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('(CRLs)',(0.552654,0,0,0.552654,92.1259,70.8662),1,1)
```

```
G_()
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.866,0,0,-31.2962,191.338,158.855,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('DirMngr',(0.552654,0,0,0.552654,224.02,142.978),1,1)
G_()
lw(2)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(219.15,126.18,0)
bs(219.685,77.9528,0)
bs(155.906,77.9528,0)
lp((0.392,0.584,0.929))
lw(3)
b()
bs(233.858,127.559,0)
bs(233.858,99.2125,0)
bs(276.378,99.2125,0)
bs(276.378,85.0393,0)
lp((0.392,0.584,0.929))
lw(3)
b()
bs(248.031,127.559,0)
bs(248.031,113.386,0)
bs(375.59,113.386,0)
bs(375.59,85.0393,0)
G()
fp((1,0.647,0.31))
lw(0.283465)
r(99.2124,0,0,-28.3464,333.07,85.0393,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Certificate
```

```
 Cache',(0.552654,0,0,0.552654,382.606,69.8548),1,1)
fp((1,0.647,0.31))
lw(0.283465)
r(70.5589,0,0,-28.3464,248.031,85.0393,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('CRL Cache',(0.552654,0,0,0.552654,284.147,70.6936),1,1)
G_()
lw(1)
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(503.149,240.945,0)
bs(503.149,283.464,0)
bs(588.189,283.465,0)
bs(588.189,325.984,0)
lw(1)
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(503.149,283.464,0)
bs(503.149,283.464,0)
bs(361.417,283.464,0)
bs(361.417,325.984,0)
lw(1)
la2(([(-4.0,
 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(361.417,283.464,0)
bs(205.512,283.465,0)
bs(205.512,325.984,0)
lw(1)
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(574.015,85.0393,0)
bs(574.015,141.732,0)
bs(262.204,141.732,0)
lw(1)
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(602.361,85.0393,0)
bs(602.361,170.079,0)
bs(439.37,170.079,0)
bs(439.37,311.811,0)
bs(460.629,311.811,0)
bs(460.629,325.984,0)
```

```
lw(1)
ld((5, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(389.763,240.945,0)
bs(389.763,269.291,0)
bs(290.551,269.291,0)
bs(290.551,340.157,0)
bs(262.204,340.157,0)
lw(1)
ld((5, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(389.763,269.291,0)
bs(559.843,269.291,0)
bs(559.843,333.071,0)
bs(574.016,333.071,0)
lw(1)
ld((5, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(488.976,85.0393,0)
bs(488.976,127.559,0)
bs(389.763,127.559,0)
bs(389.763,212.598,0)
lw(2)
ld((1,
 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(205.512,127.559,0)
bs(205.512,113.386,0)
bs(170.079,113.386,0)
bs(170.079,141.732,0)
bs(155.906,141.732,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(622.961,356.76,0)
bs(622.961,518.503,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.3459,573.199,354.33,0.0670228,0.151107)
fp((0,0,0))
le()
```

```
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('GpgAgent',(0.552654,0,0,0.500554,608.238,340.185),1,1)
G_()
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(721.712,467.717,0)
bs(721.712,297.838,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.3464,686.278,297.637,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('SCdaemon',(0.552654,0,0,0.500564,721.316,283.492),1,1)
G_()
fp((1,0.647,0.31))
lw(0.283465)
lj(1)
r(86.162,0,0,-117.493,679.192,566.929,0.181818,0.333333)
G()
fp((0,0,0))
le()
lw(1)
Fn('Helvetica-Bold')
Fs(18)
txt('Smartcard',(0.552654,0,0,0.552654,698.127,491.036))
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-31.2962,686.279,557.593,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('Card
 Reader',(0.552654,0,0,0.552654,721.318,541.975),1,1)
G_()
G()
fp((0.999,1,0.4))
```

```
lw(0.283465)
r(73.6353,0,0,-41.2944,587.066,565.703,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('PIN Entry',(0.57675,0,0,0.729211,623.632,545.097),1,1)
G_()
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(643.758,340.157,0)
bs(643.758,340.157,0)
bs(707.539,340.158,0)
bs(707.539,304.724,0)
lw(1)
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(574.016,283.465,0)
bs(587.066,283.464,0)
bs(686.278,283.464,0)
G()
lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(98.9053,325.985,0)
bs(98.9053,240.945,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.3464,63.7795,354.331,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('WatchGnuPG',(0.552654,0,0,0.552654,98.8185,338.713),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(70.5589,0,0,-28.1194,63.7795,240.718,0.0670228,0.168178)
fp((0,0,0))
```

```
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('Log
 Socket',(0.552654,0,0,0.552654,98.8175,225.1),1,1)
G_()
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(85.0392,0,0,-28.3464,446.457,240.945,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Config Files',(0.552654,0,0,0.552654,485.621,226.772),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(85.0392,0,0,-28.3464,545.669,85.0394,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Config Files',(0.552654,0,0,0.552654,584.834,70.8662),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(84.6546,0,0,-27.3609,347.245,239.959,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
```

```
Fs(18)
txt('Help
 Files',(0.552654,0,0,0.552654,388.252,224.705),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(84.6546,0,0,-27.3609,446.457,85.0394,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Help Files',(0.552654,0,0,0.552654,487.464,69.7854),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(85.0392,0,0,-28.3464,248.032,240.945,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Keybox Files',(0.552654,0,0,0.552654,289.59,226.322),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(70.866,0,0,-28.3464,574.016,240.945,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Private Keys',(0.552654,0,0,0.552654,609.449,226.772),1,1)
G_()
G()
fp((0,0,0))
```

```
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(24)
txt('Scute',(0.552654,0,0,0.599958,224.978,465.775),1,1)
fp((0,0,0))
le()
lw(1)
Fn('Times-Roman')
Fs(10)
txt('(pkcs#11)',(1,0,0,1.08559,206.081,445.011))
G_()
G()
fp((0.999,1,0.4))
lw(0.283465)
r(198.827,0,0,-56.6929,304.322,488.976,0.0603744,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(36)
txt('GPGME
 Library',(0.552654,0,0,0.552654,404.952,457.853),1,1)
G_()
G()
lw(1)
style('Application Box')
r(197.598,0,0,-42.5187,304.724,566.928,0.0152672,0.0677968)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
txt('GPGME aware Application',(0.98062,0,0,0.937018,334.892,540.985))
G_()
G()
lw(1)
style('Application Box')
r(127.829,0,0,-41.7496,162.992,566.159,0.0152672,0.0677968)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
```

```
txt('Legacy Application',(174.688,540.01))
G_()
G()
G()
lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(749.296,162.296,0)
bs(705.89,162.296,0)
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0,
 -3.0), (-4.0, 3.0)], 1))
b()
bs(705.89,100.083,0)
bs(744.472,100.083,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(705.89,131.189,0)
bs(744.472,131.189,0)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('execute/access',(0.31891,0,0,0.280771,726.951,87.3768),1,1)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('closely linked',(0.31891,0,0,0.280771,724.715,149.589),1,1)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('Assuan protocol',(0.31891,0,0,0.280771,728.535,118.483),1,1)
G_()
lw(1)
r(56.6929,0,0,-92.126,701.575,170.079)
G_()
```

lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(248.031,325.984,0)
bs(248.031,297.638,0)
bs(538.583,297.638,0)
bs(538.583,340.157,0)
bs(566.929,340.157,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2(([(-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(375.591,325.984,0)
bs(375.591,304.724,0)
bs(531.496,304.724,0)
bs(531.496,347.244,0)
bs(566.929,347.244,0)
guidelayer('Guide
 Lines',1,0,0,1,(0,0,1))
grid((0,0,7.08661,7.08661),1,(0,0,1),'Grid')
00~0
 *H
0k10 UDE10U
Dsseldorf10U

g10 Code GmbH10UAegypten Project10Utest cert 10
011203093638Z
021203093638Z0k10 UDE10U
Dsseldorf10U

g10 Code GmbH10UAegypten Project10Utest cert 100
 *H
0l+Pu.\-ZT$e'nE&h4<}BePm[%j-/7PcHKi@FKy~npcd${]K~Q00U37Tq8_eK40U#037Tq8_eK4om0k10 UDE10U
Dsseldorf10U

g10 Code GmbH10UAegypten Project10Utest cert 10U00
 *H
l8gD Z
wYL,M'j
pk2pf|L ;Rl}#h$~O!9;3e\A'v&P^$'Oc.-TS~A>:fQY<
# -*- mode: org -*-
#+TITLE: GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article

#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltxtra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

* Introduction
 :PROPERTIES:
 :CUSTOM_ID: intro
 :END:

| Version: | 0.1.5 |
| GPGME Version: | 1.13.0 |
| Author: | Ben McGinnes <ben@gnupg.org> |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language: | Australian English, British English |
| Language codes: | en-AU, en-GB, en |

This document provides basic instruction in how to use the GPGME
Python bindings to programmatically leverage the GPGME library.

** Python 2 versus Python
 3
  :PROPERTIES:
  :CUSTOM_ID: py2-vs-py3
  :END:

Though the GPGME Python bindings themselves provide support for both
Python 2 and 3, the focus is unequivocally on Python 3 and
specifically from Python 3.4 and above.  As a consequence all the
examples and instructions in this guide use Python 3 code.

Much of it will work with Python 2, but much of it also deals with
Python 3 byte literals, particularly when reading and writing data.
Developers concentrating on Python 2.7, and possibly even 2.6, will
need to make the appropriate modifications to support the older string
and unicode types as opposed to bytes.

There are multiple reasons for concentrating on Python 3; some of
which relate to the immediate integration of these bindings, some of
which relate to longer term plans for both GPGME and the python
bindings and some of which relate to the impending EOL period for
Python 2.7.  Essentially, though, there is little value in tying the
bindings to a version of the language which
 is a dead end and the
advantages offered by Python 3 over Python 2 make handling the data

types with which GPGME deals considerably easier.

** Examples
:PROPERTIES:
:CUSTOM_ID: howto-python3-examples
:END:

All of the examples found in this document can be found as Python 3
scripts in the =lang/python/examples/howto= directory.

** Unofficial Drafts
:PROPERTIES:
:CUSTOM_ID: unofficial-drafts
:END:

In addition to shipping with each release of GPGME, there is a section
on locations to read or download [[#draft-editions][draft editions]] of this document from
at the end of it. These are unofficial versions produced in between
major releases.

** What's New
:PROPERTIES:
:CUSTOM_ID: new-stuff
:END:

Full details of what is new are now available in the [[file:what-is-new.org][What's New]] file
and archives of the preceding /What's New/ sections are available in
the [[file:what-was-new][What Was New]] file.

*** New in GPGME 1130
:PROPERTIES:
:CUSTOM_ID:
new-stuff-1-13-0
:END:

See the [[file:what-is-new#new-stuff-1-13-0][What's New]] document for what is new in version 1.13.0.

*** New in GPGME 1120
:PROPERTIES:
:CUSTOM_ID: new-stuff-1-12-0
:END:

See the [[file:what-was-new#new-stuff-1-12-0][What Was New]] document for what was new in version 1.12.0.

* GPGME Concepts
 :PROPERTIES:
 :CUSTOM_ID: gpgme-concepts
 :END:

** A C API
  :PROPERTIES:
  :CUSTOM_ID: gpgme-c-api
  :END:

Unlike many modern APIs with which programmers will be more familiar
with these days, the GPGME API is a C API.  The API is intended for
use by C coders who would be able to access its features by including
the =gpgme.h= header file with their own C source code and then access
its functions just as they would any other C headers.

This is a very effective method of gaining complete access to the API
and in the most efficient manner possible.  It does, however, have the
drawback that it cannot be directly used by other languages without
some
 means of providing an interface to those languages.  This is
where the need for bindings in various languages stems.

** Python bindings
  :PROPERTIES:
  :CUSTOM_ID: gpgme-python-bindings
  :END:

The Python bindings for GPGME provide a higher level means of
accessing the complete feature set of GPGME itself.  It also provides
a more pythonic means of calling these API functions.

The bindings are generated dynamically with SWIG and the copy of
=gpgme.h= generated when GPGME is compiled.

This means that a version of the Python bindings is fundamentally tied
to the exact same version of GPGME used to generate that copy of
=gpgme.h=.

** Difference between the Python bindings and other GnuPG Python packages
  :PROPERTIES:
  :CUSTOM_ID: gpgme-python-bindings-diffs
  :END:

There have been numerous attempts to add GnuPG support to Python over the years. Some of the most well known are listed here, along with what differentiates them.

*** The python-gnupg package maintained
by Vinay Sajip
:PROPERTIES:
:CUSTOM_ID: diffs-python-gnupg
:END:

This is arguably the most popular means of integrating GPG with Python. The package utilises the =subprocess= module to implement wrappers for the =gpg= and =gpg2= executables normally invoked on the command line (=gpg.exe= and =gpg2.exe= on Windows).

The popularity of this package stemmed from its ease of use and capability in providing the most commonly required features.

Unfortunately it has been beset by a number of security issues in the past; most of which stemmed from using unsafe methods of accessing the command line via the =subprocess= calls. While some effort has been made over the last two to three years (as of 2018) to mitigate this, particularly by no longer providing shell access through those subprocess calls, the wrapper is still somewhat limited in the scope of its GnuPG features coverage.

The python-gnupg package is available under the MIT license.

*** The gnupg package created
and maintained by Isis Lovecruft
:PROPERTIES:
:CUSTOM_ID: diffs-isis-gnupg
:END:

In 2015 Isis Lovecruft from the Tor Project forked and then re-implemented the python-gnupg package as just gnupg. This new package also relied on subprocess to call the =gpg= or =gpg2= binaries, but did so somewhat more securely.

The naming and version numbering selected for this package, however, resulted in conflicts with the original python-gnupg and since its functions were called in a different manner to python-gnupg, the release of this package also resulted in a great deal of consternation when people installed what they thought was an upgrade that subsequently broke the code relying on it.

The gnupg package is available under the GNU General Public License
version 3.0 (or any later version).

*** The PyME package maintained by Martin Albrecht
:PROPERTIES:
:CUSTOM_ID: diffs-pyme
:END:

This package is the origin of these bindings, though they are somewhat
different now.
For details of when and how the PyME package was
folded back into GPGME itself see the [[file:short-history.org][Short History]] document.[fn:1]

The PyME package was first released in 2002 and was also the first
attempt to implement a low level binding to GPGME. In doing so it
provided access to considerably more functionality than either the
=python-gnupg= or =gnupg= packages.

The PyME package is only available for Python 2.6 and 2.7.

Porting the PyME package to Python 3.4 in 2015 is what resulted in it
being folded into the GPGME project and the current bindings are the
end result of that effort.

The PyME package is available under the same dual licensing as GPGME
itself: the GNU General Public License version 2.0 (or any later
version) and the GNU Lesser General Public License version 2.1 (or any
later version).

* GPGME Python bindings installation
:PROPERTIES:
:CUSTOM_ID: gpgme-python-install
:END:

** No PyPI
:PROPERTIES:
:CUSTOM_ID: do-not-use-pypi
:END:

Most
third-party Python packages and modules are available and
distributed through the Python Package Installer, known as PyPI.

Due to the nature of what these bindings are and how they work, it is

infeasible to install the GPGME Python bindings in the same way.

This is because the bindings use SWIG to dynamically generate C
bindings against =gpgme.h= and =gpgme.h= is generated from
=gpgme.h.in= at compile time when GPGME is built from source. Thus to
include a package in PyPI which actually built correctly would require
either statically built libraries for every architecture bundled with
it or a full implementation of C for each architecture.

See the additional notes regarding [[#snafu-cffi][CFFI and SWIG]] at the end of this
section for further details.

** Requirements
:PROPERTIES:
:CUSTOM_ID: gpgme-python-requirements
:END:

The GPGME Python bindings only have three requirements:

1. A suitable version of Python 2 or Python 3. With Python 2 that
means CPython
2.7 and with Python 3 that means CPython 3.4 or
higher.
2. [[https://www.swig.org][SWIG]].
3. GPGME itself. Which also means that all of GPGME's dependencies
must be installed too.

*** Recommended Additions
:PROPERTIES:
:CUSTOM_ID: gpgme-python-recommendations
:END:

Though none of the following are absolute requirements, they are all
recommended for use with the Python bindings. In some cases these
recommendations refer to which version(s) of CPython to use the
bindings with, while others refer to third party modules which provide
a significant advantage in some way.

1. If possible, use Python 3 instead of 2.
2. Favour a more recent version of Python since even 3.4 is due to
reach EOL soon. In production systems and services, Python 3.6
should be robust enough to be relied on.
3. If possible add the following Python modules which are not part of
the standard library: [[http://docs.python-requests.org/en/latest/index.html][Requests]],
[[https://cython.org/][Cython]],

[[https://pendulum.eustace.io/][Pendulum]] and [[https://github.com/Selfnet/hkp4py][hkp4py]].

Chances are quite high that at least the first one and maybe two of those will already be installed.

Note that, as with Cython, some of advanced use case scenarios will bring with them additional requirements. Most of these will be fairly well known and commonly installed ones, however, which are in many cases likely to have already been installed on many systems or be familiar to Python programmers.

** Installation
:PROPERTIES:
:CUSTOM_ID: installation
:END:

Installing the Python bindings is effectively achieved by compiling and installing GPGME itself.

Once SWIG is installed with Python and all the dependencies for GPGME are installed you only need to confirm that the version(s) of Python you want the bindings installed for are in your =$PATH=.

By default GPGME will attempt to install the bindings for the most recent or highest version number of Python 2 and Python 3 it detects in =$PATH=. It specifically checks for the =python= and =python3= executables first and then checks for specific version numbers.

For Python 2 it checks for these executables in this order: =python=, =python2= and =python2.7=.

For Python 3 it checks for these executables in this order: =python3=, =python3.7=, =python3.6=, =python3.5= and =python3.4=.[fn:2]

On systems where =python= is actually =python3= and not =python2= it may be possible that =python2= may be overlooked, but there have been no reports of that actually occurring as yet.

In the three months or so since the release of Python 3.7.0 there has been extensive testing and work with these bindings with no issues specifically relating to the new version of Python or any of the new features of either the language or the bindings. This has also been the case with Python 3.7.1rc1. With that in mind and given the release of Python 3.7.1 is scheduled for around the same time as GPGME 1.12.0, the order of preferred

Python versions has been changed to
move Python 3.7 ahead of Python 3.6.

*** Installing GPGME
:PROPERTIES:
:CUSTOM_ID: install-gpgme
:END:

See the GPGME =README= file for details of how to install GPGME from
source.

** Known Issues
:PROPERTIES:
:CUSTOM_ID: snafu
:END:

There are a few known issues with the current build process and the
Python bindings. For the most part these are easily addressed should
they be encountered.

*** Breaking Builds
:PROPERTIES:
:CUSTOM_ID: snafu-a-swig-of-this-builds-character
:END:

Occasionally when installing GPGME with the Python bindings included
it may be observed that the =make= portion of that process induces a
large very number of warnings and, eventually errors which end that
part of the build process. Yet following that with =make check= and
=make install= appears to work seamlessly.

The cause of this is related to the way SWIG needs to be called to
dynamically generate the C bindings for GPGME in
the first place. So
the entire process will always produce =lang/python/python2-gpg/= and
=lang/python/python3-gpg/= directories. These should contain the
build output generated during compilation, including the complete
bindings and module installed into =site-packages=.

Occasionally the errors in the early part or some other conflict
(e.g. not installing as */root/* or */su/*) may result in nothing
being installed to the relevant =site-packages= directory and the
build directory missing a lot of expected files. Even when this
occurs, the solution is actually quite simple and will always work.

That solution is simply to run the following commands as either the
*root* user or prepended with =sudo -H=[fn:3] in the =lang/python/=
directory:

#+BEGIN_SRC shell
 /path/to/pythonX.Y setup.py build
 /path/to/pythonX.Y setup.py build
 /path/to/pythonX.Y setup.py install
#+END_SRC

Yes, the build command does need to be run twice.  Yes, you still need
to run the potentially failing or
 incomplete steps during the
=configure=, =make= and =make install= steps with installing GPGME.
This is because those steps generate a lot of essential files needed,
both by and in order to create, the bindings (including both the
=setup.py= and =gpgme.h= files).

**** IMPORTANT Note
   :PROPERTIES:
   :CUSTOM_ID: snafu-swig-build-note
   :END:

If specifying a selected number of languages to create bindings for,
try to leave Python last.  Currently the majority of the other
language bindings are also preceding Python of either version when
listed alphabetically (not counting the Qt bindings).

If Python is set to precede one of the other languages then it is
possible that the errors described here may interrupt the build
process before generating bindings for those other languages.  In
these cases it may be preferable to configure all preferred language
bindings separately with alternative =configure= steps for GPGME using
the =--enable-languages=$LANGUAGE= option.

Alternatively
 =make= (or =gmake=, depending on your platform) may be
run with the the =-k= option, which tells make to keep going even if
errors are encountered.  In that case the failure of one language's
set of bindings to build should not hamper another language's bindings
to build.

*** Reinstalling Responsibly
  :PROPERTIES:
  :CUSTOM_ID: snafu-lessons-for-the-lazy
  :END:

Regardless of whether you're installing for one version of Python or several, there will come a point where reinstallation is required. With most Python module installations, the installed files go into the relevant site-packages directory and are then forgotten about. Then the module is upgraded, the new files are copied over the old and that's the end of the matter.

While the same is true of these bindings, there have been intermittent issues observed on some platforms which have benefited significantly from removing all the previous installations of the bindings before installing the updated versions.

Removing
the previous version(s) is simply a matter of changing to the relevant =site-packages= directory for the version of Python in question and removing the =gpg/= directory and any accompanying egg-info files for that module.

In most cases this will require root or administration privileges on the system, but the same is true of installing the module in the first place.

*** Multiple installations
:PROPERTIES:
:CUSTOM_ID: snafu-the-full-monty
:END:

For a variety of reasons it may be either necessary or just preferable to install the bindings to alternative installed Python versions which meet the requirements of these bindings.

On POSIX systems this will generally be most simply achieved by running the manual installation commands (build, build, install) as described in the previous section for each Python installation the bindings need to be installed to.

As per the SWIG documentation: the compilers, libraries and runtime used to build GPGME and the Python Bindings *must*
match those used to
compile Python itself, including the version number(s) (at least going by major version numbers and probably minor numbers too).

On most POSIX systems, including OS X, this will very likely be the case in most, if not all, cases.

Note that from GPGME [[https://dev.gnupg.org/rMff6ff616aea6f59b7f2ce1176492850ecdf3851e][1.12.1]] the

default installation installs to each
version of Python it can find first.  That is that it will currently
install for the first copies of Python versions 2.7, 3.4, 3.5, and so on
up until the current dev branch that it finds.  Usually this will be in the
same prefix as GPGME itself, but is dictated by the =$PATH= when the
installation is performed.  The above instructions can still be
performed on other python installations which the installer does not
find, including alternative prefixes.

*** Won't Work With Windows
:PROPERTIES:
:CUSTOM_ID: snafu-runtime-not-funtime
:END:

There are semi-regular reports of Windows users
having considerable
difficulty in installing and using the Python bindings at all.  Very
often, possibly even always, these reports come from Cygwin users
and/or MinGW users and/or Msys2 users.  Though not all of them have
been confirmed, it appears that these reports have also come from
people who installed Python using the Windows installer files from the
[[https://python.org][Python website]] (i.e. mostly MSI installers, sometimes self-extracting
=.exe= files).

The Windows versions of Python are not built using Cygwin, MinGW or
Msys2; they're built using Microsoft Visual Studio.  Furthermore the
version used is /considerably/ more advanced than the version which
MinGW obtained a small number of files from many years ago in order to
be able to compile anything at all.  Not only that, but there are
changes to the version of Visual Studio between some micro releases,
though that is is particularly the case with Python 2.7, since it has
been kept around far longer than it should have
been.

There are two theoretical solutions to this issue:

1. Compile and install the GnuPG stack, including GPGME and the
   Python bindings using the same version of Microsoft Visual Studio
   used by the Python Foundation to compile the version of Python
   installed.

   If there are multiple versions of Python then this will need to be
   done with each different version of Visual Studio used for those
   versions of Python.

2. Compile and install Python using the same tools used by choice,

such as MinGW or Msys2.

Do *not* use the official Windows installer for Python unless following the first method.

In this type of situation it may even be for the best to accept that there are less limitations on permissive software than free software and simply opt to use a recent version of the Community Edition of Microsoft Visual Studio to compile and build all of it, no matter what.

Investigations into the extent or the limitations of this issue are ongoing.

The following table lists the version of Microsoft Visual Studio which needs to be used when compiling GPGME and the Python bindings with each version of the CPython binary released [[https://www.python.org/downloads/windows/][for Windows]]:

| CPython | Microsoft product name | runtime filename |
|---|---|---|
| 2.7.6 | Visual Studio 2008 | MSVCR90.DLL |
| 3.4.0 | Visual Studio 2010 | MSVCR100.DLL |
| 3.5.0 | Visual Studio 2015 | *see below* |
| 3.6.0 | Visual Studio 2015 | *see below* |
| 3.7.0 | Visual Studio 2017* | *see below* |

It is important to note that MingW and Msys2 ship with the Visual C runtime from Microsoft Visual Studio 2005 and are thus *incompatible* with all the versions of CPython which can be used with the GPGME Python bindings.

It is also important to note that from CPython 3.5 onwards, the Python Foundation has adopted the reworking of the Visual C runtime which was performed for Visual Studio 2015 and aimed at resolving many of these kinds of issues. Much greater detail on these issues and the correct file(s) to link to are available from Matthew Brett's invaluable page, [[https://matthew-brett.github.io/pydagogue/python_msvc.html][Using Microsoft Visual C with Python]]. It is also worth reading the Microsoft Developer Network blog post on [[http://blogs.msdn.com/b/vcblog/archive/2015/03/03/introducing-the-universal-crt.aspx][the universal CRT]] and Steve Dower's blog posts on Python extensions ([[http://stevedower.id.au/blog/building-for-python-3-5][part 1]] and [[http://stevedower.id.au/blog/building-for-python-3-5-part-two][part 2]]).

The second of those two posts by Steve Dower contains the details of specific configuration options required for compiling anything to be used with official CPython releases. In addition to those configuration and compiler settings to use, the versions of Visual

Studio prior to Visual Studio 2015 did not support 64-bit systems by
default. So compiling a 64-bit version of these
bindings for a 64-bit
version of CPython 2.7 or 3.4 requires additional work.

In addition to the blog posts, the [[https://wiki.python.org/moin/WindowsCompilers][Windows compilers]] wiki page on the
CPython wiki is another essential reference on the relevant versions
of Visual Studio to use and the degree of compatibility with CPython
releases.

Eventually someone will ask why there isn't an installable binary for
Windows, which the GPGME of the licenses do not preclude as long as
the source code is available in conjunction with such a release.

The sheer number of versions of Visual Studio in conjunction with
differing configuration options depending on the target Windows
version and whether the architecture is 64-bit or 32-bit makes it
difficult to provide a correct binary installer for Windows users. At
the bare minimum doing so would require the GnuPG project compile ten
different versions of the bindings with each release; both 32-bit and
64-bit versions for CPython 2.7 and 3.4,
with 64-bit versions for both
x86-64 (i.e. Intel and AMD) and ARM architectures for CPython 3.5,
3.6, 3.7 and later releases. That's the bare *minimum*, it'd probably
be higher.

Additionally, with only a binary installation used in conjunction with
the CPython installer from =python.org= the advanced options available
which utilise [[#cython][Cython]] will not be able to be used at all. Cython
depends on being able to compile the C code it generates and that too
would need to utilise a matching runtime to both the installed version
of CPython and these bindings in order to work with the bindings.

Considering all of that, what do we recommend?

1. Use a recent version of CPython; at least 3.5, but ideally 3.6 or
   later.

2. Use Visual Studio 2015 or the standalone build tools for Visual
   Studio 2017 (or later).

3. Compile both CPython and GPGME with these bindings using the tools
   selected in step 2.

4. Ignore MingW, Msys2 and the official CPython binary installers.

5. Be thankful the answer to this question wasn't simply to say something like, install Linux or install FreeBSD (or even Apple's OS X).

*** CFFI is the Best and GPGME should use it instead of SWIG
:PROPERTIES:
:CUSTOM_ID: snafu-cffi
:END:

There are many reasons for favouring [[https://cffi.readthedocs.io/en/latest/overview.html][CFFI]] and proponents of it are
quite happy to repeat these things as if all it would take to switch
from SWIG to CFFI is repeating that list as if it were a new concept.

The fact is that there are things which Python's CFFI implementation
cannot handle in the GPGME C code. Beyond that there are features of
SWIG which are simply not available with CFFI at all. SWIG generates
the bindings to Python using the =gpgme.h= file, but that file is not
a single version shipped with each release, it too is generated when
GPGME is compiled.

CFFI is currently unable to adapt to such a potentially mutable
codebase. If there were some means of
applying SWIG's dynamic code
generation to produce the Python/CFFI API modes of accessing the GPGME
libraries (or the source source code directly), but such a thing does
not exist yet either and it currently appears that work is needed in
at least one of CFFI's dependencies before any of this can be
addressed.

So if you're a massive fan of CFFI; that's great, but if you want this
project to switch to CFFI then rather than just insisting that it
should, I'd suggest you volunteer to bring CFFI up to the level this
project needs.

If you're actually seriously considering doing so, then I'd suggest
taking the =gpgme-tool.c= file in the GPGME =src/= directory and
getting that to work with any of the CFFI API methods (not the ABI
methods, they'll work with pretty much anything). When you start
running into trouble with "ifdefs" then you'll know what sort of
things are lacking. That doesn't even take into account the amount of
work saved via SWIG's code generation techniques either.

***
Virtualised Environments
:PROPERTIES:

:CUSTOM_ID: snafu-venv
:END:

It is fairly common practice amongst Python developers to, as much as possible, use packages like virtualenv to keep various things that are to be installed from interfering with each other. Given how much of the GPGME bindings is often at odds with the usual pythonic way of doing things, it stands to reason that this would be called into question too.

As it happens the answer as to whether or not the bindings can be used with virtualenv, the answer is both yes and no.

In general we recommend installing to the relevant path and matching prefix of GPGME itself. Which means that when GPGME, and ideally the rest of the GnuPG stack, is installed to a prefix like =/usr/local= or =/opt/local= then the bindings would need to be installed to the main Python installation and not a virtualised abstraction. Attempts to separate the two in the past have been known to cause weird and intermittent errors ranging from
minor annoyances to complete failures
in the build process.

As a consequence we only recommend building with and installing to the main Python installations within the same prefix as GPGME is installed to or which are found by GPGME's configuration stage immediately prior to running the make commands. Which is exactly what the compiling and installing process of GPGME does by default.

Once that is done, however, it appears that a copy of the compiled module may be installed into a virtualenv of the same major and minor version matching the build. Alternatively it is possible to utilise a =sites.pth= file in the =site-packages/= directory of a virtualenv installation, which links back to the system installations corresponding directory in order to import anything installed system wide. This may or may not be appropriate on a case by case basis.

Though extensive testing of either of these options is not yet complete, preliminary testing of them indicates that both are viable
as
long as the main installation is complete. Which means that certain other options normally restricted to virtual environments are also available, including integration with pythonic test suites (e.g. [[https://docs.pytest.org/en/latest/index.html][pytest]]) and other large projects.

That said, it is worth reiterating the warning regarding non-standard installations. If one were to attempt to install the bindings only to a virtual environment without somehow also including the full GnuPG

stack (or enough of it as to include GPGME) then it is highly likely
that errors would be encountered at some point and more than a little
likely that the build process itself would break.

If a degree of separation from the main operating system is still
required in spite of these warnings, then consider other forms of
virtualisation. Either a virtual machine (e.g. [[https://www.virtualbox.org/][VirtualBox]]), a
hardware emulation layer (e.g. [[https://www.qemu.org/][QEMU]]) or an application container
(e.g.
[[https://www.docker.com/why-docker][Docker]]).

Finally it should be noted that the limited tests conducted thus far
have been using the =virtualenv= command in a new directory to create
the virtual python environment. As opposed to the standard =python3
-m venv= and it is possible that this will make a difference depending
on the system and version of Python in use. Another option is to run
the command =python3 -m virtualenv /path/to/install/virtual/thingy=
instead.

*** Post installation
:PROPERTIES:
:CUSTOM_ID: snafu-docs
:END:

Following installation it is recommended to move the
=post_installer.py= script from the =lang/python/examples/howto/=
directory to the =lang/python/= directory and run it. This will fix
or restore files needed by Sphinx which may be removed during a
distribution build for release. It will also generate reST files from
Org mode files with Pandoc and generate Texinfo files from Org mode
files with GNU Emacs and Org mode (in batch
mode). Additionally it
will fix the UTF-8 declaration line in the Texinfo files (Emacs
expects "UTF-8" to be "utf-8").

* Fundamentals
:PROPERTIES:
:CUSTOM_ID: howto-fund-a-mental
:END:

Before we can get to the fun stuff, there are a few matters regarding
GPGME's design which hold true whether you're dealing with the C code
directly or these Python bindings.

** No REST

:PROPERTIES:
:CUSTOM_ID: no-rest-for-the-wicked
:END:

The first part of which is or will be fairly blatantly obvious upon viewing the first example, but it's worth reiterating anyway. That being that this API is /*not*/ a REST API. Nor indeed could it ever be one.

Most, if not all, Python programmers (and not just Python programmers) know how easy it is to work with a RESTful API. In fact they've become so popular that many other APIs attempt to emulate REST-like behaviour as much as they are able. Right down to the use of JSON formatted output to facilitate the use of their API without having to retrain developers.

This API does not do that. It would not be able to do that and also provide access to the entire C API on which it's built. It does, however, provide a very pythonic interface on top of the direct bindings and it's this pythonic layer that this HOWTO deals with.

** Context
:PROPERTIES:
:CUSTOM_ID: howto-get-context
:END:

One of the reasons which prevents this API from being RESTful is that most operations require more than one instruction to the API to perform the task. Sure, there are certain functions which can be performed simultaneously, particularly if the result known or strongly anticipated (e.g. selecting and encrypting to a key known to be in the public keybox).

There are many more, however, which cannot be manipulated so readily: they must be performed in a specific sequence and the result of one operation has a direct bearing on the outcome of subsequent operations. Not merely by generating an error either.

When dealing with this type of persistent state on the web, full of both the RESTful and REST-like, it's most commonly referred to as a session. In GPGME, however, it is called a context and every operation type has one.

* Working with keys

:PROPERTIES:
:CUSTOM_ID: howto-keys
:END:

** Key selection
:PROPERTIES:
:CUSTOM_ID: howto-keys-selection
:END:

Selecting keys to encrypt to or to sign with will be a common occurrence when working with GPGMe and the means available for doing so are quite simple.

They do depend on utilising a Context; however once the data is recorded in another variable, that Context does not need to be the same one which subsequent operations are performed.

The easiest way to select a specific key is by searching for that key's key ID or fingerprint, preferably the full fingerprint without any spaces in it. A long key ID will probably be okay, but is not advised and short key IDs are already a problem with some being generated to match specific patterns. It does not matter whether the pattern is upper or lower case.

So this is the best method:

```
#+BEGIN_SRC python -i
import gpg

k = gpg.Context().keylist(pattern="258E88DCBD3CD44D8E7AB43F6ECB6AF0DEADBEEF")
keys = list(k)
#+END_SRC
```

This is passable and very likely to be common:

```
#+BEGIN_SRC python -i
import gpg

k = gpg.Context().keylist(pattern="0x6ECB6AF0DEADBEEF")
keys = list(k)
#+END_SRC
```

And this is a really bad idea:

```
#+BEGIN_SRC python -i
import gpg
```

```
k = gpg.Context().keylist(pattern="0xDEADBEEF")
keys = list(k)
#+END_SRC
```

Alternatively it may be that the intention is to create a list of keys
which all match a particular search string.  For instance all the
addresses at a particular domain, like this:

```
#+BEGIN_SRC python -i
import gpg

ncsc = gpg.Context().keylist(pattern="ncsc.mil")
nsa = list(ncsc)
#+END_SRC
```

*** Counting keys
:PROPERTIES:
:CUSTOM_ID: howto-keys-counting
:END:

Counting the number of keys in your public keybox (=pubring.kbx=), the
format which has superseded
the old keyring format (=pubring.gpg= and
=secring.gpg=), or the number of secret keys is a very simple task.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

print("""
 Number of secret keys:  {0}
 Number of public keys:  {1}
""".format(secnum, pubnum))
#+END_SRC
```

NOTE: The [[#cython][Cython]] introduction in the [[#advanced-use][Advanced and Experimental]]
section uses this same key counting code with Cython to demonstrate

some areas where Cython can improve performance even with the bindings.  Users with large public keyrings or keyboxes, for instance, should consider these options if they are comfortable with using Cython.

** Get key
  :PROPERTIES:
  :CUSTOM_ID: howto-get-key
  :END:

An alternative method of getting a single key via its fingerprint is available directly within a Context
 with =Context().get_key=.  This is
the preferred method of selecting a key in order to modify it, sign or certify it and for obtaining relevant data about a single key as a part of other functions; when verifying a signature made by that key, for instance.

By default this method will select public keys, but it can select secret keys as well.

This first example demonstrates selecting the current key of Werner Koch, which is due to expire at the end of 2018:

#+BEGIN_SRC python -i
import gpg

fingerprint = "80615870F5BAD690333686D0F2AD85AC1E42B367"
key = gpg.Context().get_key(fingerprint)
#+END_SRC

Whereas this example demonstrates selecting the author's current key with the =secret= key word argument set to =True=:

#+BEGIN_SRC python -i
import gpg

fingerprint = "DB4724E6FA4286C92B4E55C4321E4E2373590E5D"
key = gpg.Context().get_key(fingerprint, secret=True)
#+END_SRC

It is, of course, quite possible to select expired, disabled and revoked keys with this function, but only to effectively
 display
information about those keys.

It is also possible to use both unicode or string literals and byte

literals with the fingerprint when getting a key in this way.

** Importing keys
:PROPERTIES:
:CUSTOM_ID: howto-import-key
:END:

Importing keys is possible with the =key_import()= method and takes one argument which is a bytes literal object containing either the binary or ASCII armoured key data for one or more keys.

The following example retrieves one or more keys from the SKS keyservers via the web using the requests module. Since requests returns the content as a bytes literal object, we can then use that directly to import the resulting data into our keybox.

```
#+BEGIN_SRC python -i
import gpg
import os.path
import requests

c = gpg.Context()
url = "https://sks-keyservers.net/pks/lookup"
pattern = input("Enter the pattern to search for key or user IDs: ")
payload = {"op": "get", "search": pattern}

r = requests.get(url, verify=True, params=payload)
result
 = c.key_import(r.content)

if result is not None and hasattr(result, "considered") is False:
   print(result)
elif result is not None and hasattr(result, "considered") is True:
   num_keys = len(result.imports)
   new_revs = result.new_revocations
   new_sigs = result.new_signatures
   new_subs = result.new_sub_keys
   new_uids = result.new_user_ids
   new_scrt = result.secret_imported
   nochange = result.unchanged
   print("""
 The total number of keys considered for import was:  {0}

    Number of keys revoked:  {1}
  Number of new signatures:  {2}
     Number of new subkeys:  {3}
    Number of new user IDs:  {4}
```

```
 Number of new secret keys:  {5}
  Number of unchanged keys:  {6}

 The key IDs for all considered keys were:
""".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scrt,
         nochange))
   for i in range(num_keys):
       print("{0}\n".format(result.imports[i].fpr))
else:
   pass
#+END_SRC
```

NOTE: When searching for a key ID of any length
 or a fingerprint
(without spaces), the SKS servers require the the leading =0x=
indicative of hexadecimal be included.  Also note that the old short
key IDs (e.g. =0xDEADBEEF=) should no longer be used due to the
relative ease by which such key IDs can be reproduced, as demonstrated
by the Evil32 Project in 2014 (which was subsequently exploited in
2016).

Testing for whether a string in any given search is or may be a
hexadecimal value which may be missing the leading =0x= is a simple
matter of using a try/except statement which attempts to convert the
string as hex to an integer and then back to hex; then using that to
search with.  Raising a ValueError simply results in treating the
string as a string.  This is the method and logic utilised in the
=import-keys-hkp.py= script (see below).

*** Working with ProtonMail
   :PROPERTIES:
   :CUSTOM_ID: import-protonmail
   :END:

Here is a variation on the example above which checks the constrained
ProtonMail keyserver for ProtonMail
 public keys.

```
#+BEGIN_SRC python -i
import gpg
import requests
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it.
""")
```

```
c = gpg.Context(armor=True)
url = "https://api.protonmail.ch/pks/lookup"
ksearch = []

if len(sys.argv) >= 2:
   keyterm = sys.argv[1]
else:
   keyterm = input("Enter the key ID, UID or search string: ")

if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
   ksearch.append(keyterm[1:])
   ksearch.append(keyterm[1:])
   ksearch.append(keyterm[1:])
elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
   ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
   ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
   ksearch.append("{0}@pm.me".format(keyterm[1:]))
elif keyterm.count("@") == 0:
   ksearch.append("{0}@protonmail.com".format(keyterm))
   ksearch.append("{0}@protonmail.ch".format(keyterm))
   ksearch.append("{0}@pm.me".format(keyterm))
elif keyterm.count("@") ==
 2 and keyterm.startswith("@") is False:
   uidlist = keyterm.split("@")
   for uid in uidlist:
      ksearch.append("{0}@protonmail.com".format(uid))
      ksearch.append("{0}@protonmail.ch".format(uid))
      ksearch.append("{0}@pm.me".format(uid))
elif keyterm.count("@") > 2:
   uidlist = keyterm.split("@")
   for uid in uidlist:
      ksearch.append("{0}@protonmail.com".format(uid))
      ksearch.append("{0}@protonmail.ch".format(uid))
      ksearch.append("{0}@pm.me".format(uid))
else:
   ksearch.append(keyterm)

for k in ksearch:
   payload = {"op": "get", "search": k}
   try:
      r = requests.get(url, verify=True, params=payload)
      if r.ok is True:
         result = c.key_import(r.content)
      elif r.ok is False:
         result = r.content
   except Exception as e:
      result = None
```

```
  if result is not None and hasattr(result, "considered") is False:
      print("{0} for {1}".format(result.decode(), k))
  elif result is not None
 and hasattr(result, "considered") is True:
      num_keys = len(result.imports)
      new_revs = result.new_revocations
      new_sigs = result.new_signatures
      new_subs = result.new_sub_keys
      new_uids = result.new_user_ids
      new_scrt = result.secret_imported
      nochange = result.unchanged
      print("""
The total number of keys considered for import was:  {0}

With UIDs wholely or partially matching the following string:

      {1}

  Number of keys revoked:  {2}
Number of new signatures:  {3}
   Number of new subkeys:  {4}
  Number of new user IDs:  {5}
Number of new secret keys:  {6}
Number of unchanged keys:  {7}

The key IDs for all considered keys were:
""".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scrt,
         nochange))
      for i in range(num_keys):
          print(result.imports[i].fpr)
      print("")
  elif result is None:
      print(e)
#+END_SRC
```

Both the above example, [[../examples/howto/pmkey-import.py][pmkey-import.py]],
 and a version which prompts
for an alternative GnuPG home directory, [[../examples/howto/pmkey-import-alt.py][pmkey-import-alt.py]], are
available with the other examples and are executable scripts.

Note that while the ProtonMail servers are based on the SKS servers,
their server is related more to their API and is not feature complete
by comparison to the servers in the SKS pool.  One notable difference
being that the ProtonMail server does not permit non ProtonMail users
to update their own keys, which could be a vector for attacking
ProtonMail users who may not receive a key's revocation if it had been
compromised.

*** Importing with HKP for Python
:PROPERTIES:
:CUSTOM_ID: import-hkp4py
:END:

Performing the same tasks with the [[https://github.com/Selfnet/hkp4py][hkp4py module]] (available via PyPI) is not too much different, but does provide a number of options of benefit to end users. Not least of which being the ability to perform some
checks on a key before importing it or not. For instance it may be the policy of a site or project to only import keys which have not been revoked. The hkp4py module permits such checks prior to the importing of the keys found.

```
#+BEGIN_SRC python -i
import gpg
import hkp4py
import sys

c = gpg.Context()
server = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")
results = []
keys = []

if len(sys.argv) > 2:
  pattern = " ".join(sys.argv[1:])
elif len(sys.argv) == 2:
  pattern = sys.argv[1]
else:
  pattern = input("Enter the pattern to search for keys or user IDs: ")


if pattern is not None:
  try:
    key = server.search(hex(int(pattern, 16)))
    keyed = True
  except ValueError as ve:
    key = server.search(pattern)
    keyed = False

  if key is not None:
    keys.append(key[0])
    if keyed is True:
      try:
        fob = server.search(pattern)
      except:
```

```
            fob = None
        if fob is not
None:
            keys.append(fob[0])
    else:
        pass
  else:
    pass

  for logrus in pattern.split():
    try:
        key = server.search(hex(int(logrus, 16)))
        hexed = True
    except ValueError as ve:
        key = server.search(logrus)
        hexed = False

    if key is not None:
        keys.append(key[0])
        if hexed is True:
            try:
                fob = server.search(logrus)
            except:
                fob = None
            if fob is not None:
                keys.append(fob[0])
        else:
            pass
    else:
        pass


if len(keys) > 0:
  for key in keys:
    import_result = c.key_import(key.key_blob)
    results.append(import_result)

for result in results:
  if result is not None and hasattr(result, "considered") is False:
    print(result)
  elif result is not None and hasattr(result, "considered") is True:
     num_keys = len(result.imports)
    new_revs = result.new_revocations
    new_sigs = result.new_signatures
    new_subs = result.new_sub_keys
    new_uids = result.new_user_ids
    new_scrt = result.secret_imported
    nochange = result.unchanged
```

```
        print("""
The total number of keys considered for import was:  {0}

  Number of keys revoked:  {1}
Number of new signatures:  {2}
   Number of new subkeys:  {3}
  Number of new user IDs:  {4}
Number of new secret keys:  {5}
Number of unchanged keys:  {6}

The key IDs for all considered keys were:
""".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scrt,
           nochange))
        for i in range(num_keys):
            print(result.imports[i].fpr)
        print("")
    else:
        pass
#+END_SRC
```

Since the hkp4py module handles multiple keys just as effectively as one (=keys= is a list of responses per matching key), the example above is able to do a little bit more with the returned data before anything is actually imported.

*** Importing from ProtonMail with HKP for Python

```
   :PROPERTIES:
   :CUSTOM_ID: import-protonmail-hkp4py
   :END:
```

Though this can provide certain benefits even when working with ProtonMail, the scope is somewhat constrained there due to the limitations of the ProtonMail keyserver.

For instance, searching the SKS keyserver pool for the term "gnupg" produces hundreds of results from any time the word appears in any part of a user ID.  Performing the same search on the ProtonMail keyserver returns zero results, even though there are at least two test accounts which include it as part of the username.

The cause of this discrepancy is the deliberate configuration of that server by ProtonMail to require an exact match of the full email address of the ProtonMail user whose key is being requested. Presumably this is intended to reduce breaches of privacy of their users as an email address must already be known before a key for that address

can be obtained.

**** Import from ProtonMail via HKP for Python Example no. 1
:PROPERTIES:
:CUSTOM_ID: import-hkp4py-pm1
:END:

The following script is available with the rest of the examples under
the somewhat less than original name, =pmkey-import-hkp.py=.

```
#+BEGIN_SRC python -i
import gpg
import hkp4py
import os.path
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it.

Usage:  pmkey-import-hkp.py [search strings]
""")

c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None

if len(sys.argv) > 2:
  keyterms = sys.argv[1:]
elif len(sys.argv) == 2:
  keyterm = sys.argv[1]
  keyterms.append(keyterm)
else:
  key_term = input("Enter the key ID, UID or search string: ")
  keyterms = key_term.split()

for keyterm in keyterms:
  if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
     ksearch.append(keyterm[1:])
      ksearch.append(keyterm[1:])
     ksearch.append(keyterm[1:])
  elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
```

```
        ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
        ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
        ksearch.append("{0}@pm.me".format(keyterm[1:]))
    elif keyterm.count("@") == 0:
        ksearch.append("{0}@protonmail.com".format(keyterm))
        ksearch.append("{0}@protonmail.ch".format(keyterm))
        ksearch.append("{0}@pm.me".format(keyterm))
    elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
        uidlist = keyterm.split("@")
        for uid in uidlist:
            ksearch.append("{0}@protonmail.com".format(uid))
            ksearch.append("{0}@protonmail.ch".format(uid))
            ksearch.append("{0}@pm.me".format(uid))
    elif keyterm.count("@") > 2:
        uidlist = keyterm.split("@")
        for uid in uidlist:
            ksearch.append("{0}@protonmail.com".format(uid))
             ksearch.append("{0}@protonmail.ch".format(uid))
            ksearch.append("{0}@pm.me".format(uid))
    else:
        ksearch.append(keyterm)

for k in ksearch:
    print("Checking for key for: {0}".format(k))
    try:
        keys = server.search(k)
        if isinstance(keys, list) is True:
            for key in keys:
                allkeys.append(key)
                try:
                    import_result = c.key_import(key.key_blob)
                except Exception as e:
                    import_result = c.key_import(key.key)
        else:
            paradox.append(keys)
            import_result = None
    except Exception as e:
        import_result = None
    results.append(import_result)

for result in results:
    if result is not None and hasattr(result, "considered") is False:
        print("{0} for {1}".format(result.decode(), k))
    elif result is not None and hasattr(result, "considered") is True:
        num_keys = len(result.imports)
         new_revs = result.new_revocations
        new_sigs = result.new_signatures
        new_subs = result.new_sub_keys
```

```
        new_uids = result.new_user_ids
        new_scrt = result.secret_imported
        nochange = result.unchanged
        print("""
The total number of keys considered for import was:  {0}

With UIDs wholely or partially matching the following string:

        {1}

  Number of keys revoked:  {2}
Number of new signatures:  {3}
   Number of new subkeys:  {4}
  Number of new user IDs:  {5}
Number of new secret keys:  {6}
Number of unchanged keys:  {7}

The key IDs for all considered keys were:
""".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scrt,
           nochange))
        for i in range(num_keys):
            print(result.imports[i].fpr)
        print("")
    elif result is None:
        pass
#+END_SRC
```

**** Import from ProtonMail via HKP for Python Example no. 2
:PROPERTIES:
:CUSTOM_ID: import-hkp4py-pm2
:END:

Like
its counterpart above, this script can also be found with the
rest of the examples, by the name pmkey-import-hkp-alt.py.

With this script a modicum of effort has been made to treat anything
passed as a =homedir= which either does not exist or which is not a
directory, as also being a pssible user ID to check for.  It's not
guaranteed to pick up on all such cases, but it should cover most of
them.

```
#+BEGIN_SRC python -i
import gpg
import hkp4py
import os.path
import sys
```

```
print("""
This script searches the ProtonMail key server for the specified key and
imports it.  Optionally enables specifying a different GnuPG home directory.

Usage:  pmkey-import-hkp.py [homedir] [search string]
  or:  pmkey-import-hkp.py [search string]
""")

c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None

if len(sys.argv) > 3:
   homedir = sys.argv[1]
   keyterms = sys.argv[2:]
elif len(sys.argv)
 == 3:
   homedir = sys.argv[1]
   keyterm = sys.argv[2]
   keyterms.append(keyterm)
elif len(sys.argv) == 2:
   homedir = ""
   keyterm = sys.argv[1]
   keyterms.append(keyterm)
else:
   keyterm = input("Enter the key ID, UID or search string: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")
   keyterms.append(keyterm)

if len(homedir) == 0:
   homedir = None
   homeless = False

if homedir is not None:
   if homedir.startswith("~"):
      if os.path.exists(os.path.expanduser(homedir)) is True:
         if os.path.isdir(os.path.expanduser(homedir)) is True:
            c.home_dir = os.path.realpath(os.path.expanduser(homedir))
         else:
            homeless = True
      else:
         homeless = True
```

```
    elif os.path.exists(os.path.realpath(homedir)) is True:
        if os.path.isdir(os.path.realpath(homedir)) is True:
            c.home_dir = os.path.realpath(homedir)
        else:
            homeless = True
     else:
        homeless = True

# First check to see if the homedir really is a homedir and if not, treat it as
# a search string.
if homeless is True:
    keyterms.append(homedir)
    c.home_dir = None
else:
    pass

for keyterm in keyterms:
    if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
        ksearch.append(keyterm[1:])
        ksearch.append(keyterm[1:])
        ksearch.append(keyterm[1:])
    elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
        ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
        ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
        ksearch.append("{0}@pm.me".format(keyterm[1:]))
    elif keyterm.count("@") == 0:
        ksearch.append("{0}@protonmail.com".format(keyterm))
        ksearch.append("{0}@protonmail.ch".format(keyterm))
        ksearch.append("{0}@pm.me".format(keyterm))
    elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
        uidlist = keyterm.split("@")

    for uid in uidlist:
            ksearch.append("{0}@protonmail.com".format(uid))
            ksearch.append("{0}@protonmail.ch".format(uid))
            ksearch.append("{0}@pm.me".format(uid))
    elif keyterm.count("@") > 2:
        uidlist = keyterm.split("@")
        for uid in uidlist:
            ksearch.append("{0}@protonmail.com".format(uid))
            ksearch.append("{0}@protonmail.ch".format(uid))
            ksearch.append("{0}@pm.me".format(uid))
    else:
        ksearch.append(keyterm)

for k in ksearch:
    print("Checking for key for: {0}".format(k))
    try:
```

```
        keys = server.search(k)
        if isinstance(keys, list) is True:
            for key in keys:
                allkeys.append(key)
                try:
                    import_result = c.key_import(key.key_blob)
                except Exception as e:
                    import_result = c.key_import(key.key)
        else:
            paradox.append(keys)
            import_result = None
    except Exception
 as e:
        import_result = None
    results.append(import_result)

for result in results:
    if result is not None and hasattr(result, "considered") is False:
        print("{0} for {1}".format(result.decode(), k))
    elif result is not None and hasattr(result, "considered") is True:
        num_keys = len(result.imports)
        new_revs = result.new_revocations
        new_sigs = result.new_signatures
        new_subs = result.new_sub_keys
        new_uids = result.new_user_ids
        new_scrt = result.secret_imported
        nochange = result.unchanged
        print("""
The total number of keys considered for import was:  {0}

With UIDs wholely or partially matching the following string:

        {1}

  Number of keys revoked:  {2}
Number of new signatures:  {3}
   Number of new subkeys:  {4}
  Number of new user IDs:  {5}
Number of new secret keys:  {6}
Number of unchanged keys:  {7}

The key IDs for all considered keys were:
""".format(num_keys, k, new_revs, new_sigs,
 new_subs, new_uids, new_scrt,
            nochange))
        for i in range(num_keys):
            print(result.imports[i].fpr)
        print("")
```

```
   elif result is None:
       pass
#+END_SRC
```

** Exporting keys
  :PROPERTIES:
  :CUSTOM_ID: howto-export-key
  :END:

Exporting keys remains a reasonably simple task, but has been separated into three different functions for the OpenPGP cryptographic engine.  Two of those functions are for exporting public keys and the third is for exporting secret keys.

*** Exporting public keys
   :PROPERTIES:
   :CUSTOM_ID: howto-export-public-key
   :END:

There are two methods of exporting public keys, both of which are very similar to the other.  The default method, =key_export()=, will export a public key or keys matching a specified pattern as normal.  The alternative, the =key_export_minimal()= method, will do the same thing except producing a minimised output with extra signatures and third party signatures or certifications removed.

```
#+BEGIN_SRC
 python -i
import gpg
import os.path
import sys

print("""
This script exports one or more public keys.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = sys.argv[3]
elif len(sys.argv) == 3:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = input("Enter the GPG configuration directory path (optional): ")
```

```
elif len(sys.argv) == 2:
   keyfile = sys.argv[1]
   logrus = input("Enter the UID matching the key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")
else:
   keyfile = input("Enter the path and filename to save the secret key to: ")
   logrus = input("Enter the UID matching the key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
   if os.path.exists(os.path.expanduser(homedir)) is True:
       c.home_dir = os.path.expanduser(homedir)
   else:
       pass
elif
 os.path.exists(homedir) is True:
   c.home_dir = homedir
else:
   pass

try:
   result = c.key_export(pattern=logrus)
except:
   result = c.key_export(pattern=None)

if result is not None:
   with open(keyfile, "wb") as f:
       f.write(result)
else:
   pass
#+END_SRC
```

It should be noted that the result will only return =None= when a search pattern has been entered, but has not matched any keys.  When the search pattern itself is set to =None= this triggers the exporting of the entire public keybox.

```
#+BEGIN_SRC python -i
import gpg
import os.path
import sys

print("""
This script exports one or more public keys in minimised form.
""")

c = gpg.Context(armor=True)
```

```
if len(sys.argv) >= 4:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = sys.argv[3]
elif len(sys.argv) == 3:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
   keyfile = sys.argv[1]
   logrus
 = input("Enter the UID matching the key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")
else:
   keyfile = input("Enter the path and filename to save the secret key to: ")
   logrus = input("Enter the UID matching the key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
   if os.path.exists(os.path.expanduser(homedir)) is True:
       c.home_dir = os.path.expanduser(homedir)
   else:
       pass
elif os.path.exists(homedir) is True:
   c.home_dir = homedir
else:
   pass

try:
   result = c.key_export_minimal(pattern=logrus)
except:
   result = c.key_export_minimal(pattern=None)

if result is not None:
   with open(keyfile, "wb") as f:
       f.write(result)
else:
   pass
#+END_SRC
```

*** Exporting secret keys
   :PROPERTIES:
   :CUSTOM_ID: howto-export-secret-key
   :END:

Exporting secret keys is, functionally, very similar to exporting
public

keys; save for the invocation of =pinentry= via =gpg-agent= in order to securely enter the key's passphrase and authorise the export.

The following example exports the secret key to a file which is then set with the same permissions as the output files created by the command line secret key export options.

```
#+BEGIN_SRC python -i
import gpg
import os
import os.path
import sys

print("""
This script exports one or more secret keys.

The gpg-agent and pinentry are invoked to authorise the export.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
  keyfile = sys.argv[1]
  logrus = sys.argv[2]
  homedir = sys.argv[3]
elif len(sys.argv) == 3:
  keyfile = sys.argv[1]
  logrus = sys.argv[2]
  homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
  keyfile = sys.argv[1]
  logrus = input("Enter the UID matching the secret key(s) to export: ")
  homedir = input("Enter the GPG configuration directory path (optional): ")
else:
   keyfile = input("Enter the path and filename to save the secret key to: ")
  logrus = input("Enter the UID matching the secret key(s) to export: ")
  homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
  homedir = None
elif homedir.startswith("~"):
  userdir = os.path.expanduser(homedir)
  if os.path.exists(userdir) is True:
     homedir = os.path.realpath(userdir)
  else:
     homedir = None
else:
  homedir = os.path.realpath(homedir)
```

```
if os.path.exists(homedir) is False:
  homedir = None
else:
  if os.path.isdir(homedir) is False:
    homedir = None
  else:
    pass

if homedir is not None:
  c.home_dir = homedir
else:
  pass

try:
  result = c.key_export_secret(pattern=logrus)
except:
  result = c.key_export_secret(pattern=None)

if result is not None:
  with open(keyfile, "wb") as f:
    f.write(result)
  os.chmod(keyfile, 0o600)
else:
  pass
#+END_SRC
```

Alternatively the approach
 of the following script can be used.  This
longer example saves the exported secret key(s) in files in the GnuPG
home directory, in addition to setting the file permissions as only
readable and writable by the user.  It also exports the secret key(s)
twice in order to output both GPG binary (=.gpg=) and ASCII armoured
(=.asc=) files.

```
#+BEGIN_SRC python -i
import gpg
import os
import os.path
import subprocess
import sys

print("""
This script exports one or more secret keys as both ASCII armored and binary
file formats, saved in files within the user's GPG home directory.

The gpg-agent and pinentry are invoked to authorise the export.
""")
```

```
if sys.platform == "win32":
   gpgconfcmd = "gpgconf.exe --list-dirs homedir"
else:
   gpgconfcmd = "gpgconf --list-dirs homedir"

a = gpg.Context(armor=True)
b = gpg.Context()
c = gpg.Context()

if len(sys.argv) >= 4:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = sys.argv[3]
elif len(sys.argv) == 3:
   keyfile = sys.argv[1]
    logrus = sys.argv[2]
   homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
   keyfile = sys.argv[1]
   logrus = input("Enter the UID matching the secret key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")
else:
   keyfile = input("Enter the filename to save the secret key to: ")
   logrus = input("Enter the UID matching the secret key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
   homedir = None
elif homedir.startswith("~"):
   userdir = os.path.expanduser(homedir)
   if os.path.exists(userdir) is True:
       homedir = os.path.realpath(userdir)
   else:
       homedir = None
else:
   homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
   homedir = None
else:
   if os.path.isdir(homedir) is False:
       homedir = None
   else:
       pass

if homedir is not None:
   c.home_dir
```

```
 = homedir
else:
   pass

if c.home_dir is not None:
   if c.home_dir.endswith("/"):
      gpgfile = "{0}{1}.gpg".format(c.home_dir, keyfile)
      ascfile = "{0}{1}.asc".format(c.home_dir, keyfile)
   else:
      gpgfile = "{0}/{1}.gpg".format(c.home_dir, keyfile)
      ascfile = "{0}/{1}.asc".format(c.home_dir, keyfile)
else:
   if os.path.exists(os.environ["GNUPGHOME"]) is True:
      hd = os.environ["GNUPGHOME"]
   else:
      try:
         hd = subprocess.getoutput(gpgconfcmd)
      except:
         process = subprocess.Popen(gpgconfcmd.split(),
                                    stdout=subprocess.PIPE)
         procom = process.communicate()
         if sys.version_info[0] == 2:
            hd = procom[0].strip()
         else:
            hd = procom[0].decode().strip()
   gpgfile = "{0}/{1}.gpg".format(hd, keyfile)
   ascfile = "{0}/{1}.asc".format(hd, keyfile)

try:
   a_result = a.key_export_secret(pattern=logrus)
   b_result
 = b.key_export_secret(pattern=logrus)
except:
   a_result = a.key_export_secret(pattern=None)
   b_result = b.key_export_secret(pattern=None)

if a_result is not None:
   with open(ascfile, "wb") as f:
      f.write(a_result)
   os.chmod(ascfile, 0o600)
else:
   pass

if b_result is not None:
   with open(gpgfile, "wb") as f:
      f.write(b_result)
   os.chmod(gpgfile, 0o600)
else:
```

```
   pass
#+END_SRC
```

*** Sending public keys to the SKS Keyservers

```
   :PROPERTIES:
   :CUSTOM_ID: howto-send-public-key
   :END:
```

As with the previous section on importing keys, the =hkp4py= module adds another option with exporting keys in order to send them to the public keyservers.

The following example demonstrates how this may be done.

```
#+BEGIN_SRC python -i
import gpg
import hkp4py
import os.path
import sys

print("""
This script sends one or more public keys to the SKS keyservers and is
essentially a slight variation on the export-key.py script.
""")

c = gpg.Context(armor=True)
server
 = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")

if len(sys.argv) > 2:
   logrus = " ".join(sys.argv[1:])
elif len(sys.argv) == 2:
   logrus = sys.argv[1]
else:
   logrus = input("Enter the UID matching the key(s) to send: ")

if len(logrus) > 0:
   try:
      export_result = c.key_export(pattern=logrus)
   except Exception as e:
      print(e)
      export_result = None
else:
   export_result = c.key_export(pattern=None)

if export_result is not None:
   try:
```

```
        try:
            send_result = server.add(export_result)
        except:
            send_result = server.add(export_result.decode())
        if send_result is not None:
            print(send_result)
        else:
            pass
    except Exception as e:
        print(e)
else:
    pass
#+END_SRC
```

An expanded version of this script with additional functions for specifying an alternative homedir location is in the examples directory as =send-key-to-keyserver.py=.

The =hkp4py= module appears to
 handle both string and byte literal text
data equally well, but the GPGME bindings deal primarily with byte literal data only and so this script sends in that format first, then tries the string literal form.

```
* Basic Functions
 :PROPERTIES:
 :CUSTOM_ID: howto-the-basics
 :END:
```

The most frequently called features of any cryptographic library will be the most fundamental tasks for encryption software.  In this section we will look at how to programmatically encrypt data, decrypt it, sign it and verify signatures.

```
** Encryption
  :PROPERTIES:
  :CUSTOM_ID: howto-basic-encryption
  :END:
```

Encrypting is very straight forward.  In the first example below the message, =text=, is encrypted to a single recipient's key.  In the second example the message will be encrypted to multiple recipients.

```
*** Encrypting to one key
   :PROPERTIES:
```

:CUSTOM_ID: howto-basic-encryption-single
:END:

Once the the Context is set the main issues with encrypting data is
essentially reduced
to key selection and the keyword arguments
specified in the =gpg.Context().encrypt()= method.

Those keyword arguments are: =recipients=, a list of keys encrypted to
(covered in greater detail in the following section); =sign=, whether
or not to sign the plaintext data, see subsequent sections on signing
and verifying signatures below (defaults to =True=); =sink=, to write
results or partial results to a secure sink instead of returning it
(defaults to =None=); =passphrase=, only used when utilising symmetric
encryption (defaults to =None=); =always_trust=, used to override the
trust model settings for recipient keys (defaults to =False=);
=add_encrypt_to=, utilises any preconfigured =encrypt-to= or
=default-key= settings in the user's =gpg.conf= file (defaults to
=False=); =prepare=, prepare for encryption (defaults to =False=);
=expect_sign=, prepare for signing (defaults to =False=); =compress=,
compresses the plaintext prior to encryption (defaults to =True=).

```
#+BEGIN_SRC python -i
import
 gpg

a_key = "0x12345678DEADBEEF"
text = b"""Some text to test with.

Since the text in this case must be bytes, it is most likely that
the input form will be a separate file which is opened with "rb"
as this is the simplest method of obtaining the correct data format.
"""

c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext, result, sign_result = c.encrypt(text, recipients=rkey, sign=False)

with open("secret_plans.txt.asc", "wb") as afile:
   afile.write(ciphertext)
#+END_SRC
```

Though this is even more likely to be used like this; with the
plaintext input read from a file, the recipient keys used for
encryption regardless of key trust status and the encrypted output
also encrypted to any preconfigured keys set in the =gpg.conf= file:

```
#+BEGIN_SRC python -i
```

```
import gpg

a_key = "0x12345678DEADBEEF"

with open("secret_plans.txt", "rb") as afile:
   text = afile.read()

c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext,
 result, sign_result = c.encrypt(text, recipients=rkey, sign=True,
                                 always_trust=True,
                                 add_encrypt_to=True)

with open("secret_plans.txt.asc", "wb") as afile:
   afile.write(ciphertext)
#+END_SRC
```

If the =recipients= parameter is empty then the plaintext is encrypted symmetrically. If no =passphrase= is supplied as a parameter or via a callback registered with the =Context()= then an out-of-band prompt for the passphrase via pinentry will be invoked.

*** Encrypting to multiple keys
   :PROPERTIES:
   :CUSTOM_ID: howto-basic-encryption-multiple
   :END:

Encrypting to multiple keys essentially just expands upon the key selection process and the recipients from the previous examples.

The following example encrypts a message (=text=) to everyone with an email address on the =gnupg.org= domain,[fn:4] but does /not/ encrypt to a default key or other key which is configured to
 normally encrypt
to.

```
#+BEGIN_SRC python -i
import gpg

text = b"""Oh look, another test message.
```

The same rules apply as with the previous example and more likely than not, the message will actually be drawn from reading the contents of a file or, maybe, from entering data at an input() prompt.

Since the text in this case must be bytes, it is most likely that
the input form will be a separate file which is opened with "rb"
as this is the simplest method of obtaining the correct data
format.
"""

```
c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org", secret=False))
logrus = []

for i in range(len(rpattern)):
   if rpattern[i].can_encrypt == 1:
      logrus.append(rpattern[i])

ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
                                            sign=False, always_trust=True)

with open("secret_plans.txt.asc", "wb") as afile:
   afile.write(ciphertext)
```
#+END_SRC

All it would take to change the above example to sign
 the message
and also encrypt the message to any configured default keys would
be to change the =c.encrypt= line to this:

#+BEGIN_SRC python -i
```
ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
                                            always_trust=True,
                                            add_encrypt_to=True)
```
#+END_SRC

The only keyword arguments requiring modification are those for which
the default values are changing.  The default value of =sign= is
=True=, the default of =always_trust= is =False=, the default of
=add_encrypt_to= is =False=.

If =always_trust= is not set to =True= and any of the recipient keys
are not trusted (e.g. not signed or locally signed) then the
encryption will raise an error.  It is possible to mitigate this
somewhat with something more like this:

#+BEGIN_SRC python -i
```
import gpg

with open("secret_plans.txt.asc", "rb") as afile:
   text = afile.read()
```

```
c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org",
 secret=False))
logrus = []

for i in range(len(rpattern)):
   if rpattern[i].can_encrypt == 1:
      logrus.append(rpattern[i])

   try:
      ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
                                          add_encrypt_to=True)
   except gpg.errors.InvalidRecipients as e:
      for i in range(len(e.recipients)):
         for n in range(len(logrus)):
            if logrus[n].fpr == e.recipients[i].fpr:
               logrus.remove(logrus[n])
            else:
               pass
      try:
         ciphertext, result, sign_result = c.encrypt(text,
                                             recipients=logrus,
                                             add_encrypt_to=True)
         with open("secret_plans.txt.asc", "wb") as afile:
            afile.write(ciphertext)
      except:
         pass
#+END_SRC
```

This will attempt to encrypt to all the keys searched
 for, then remove
invalid recipients if it fails and try again.

** Decryption
  :PROPERTIES:
  :CUSTOM_ID: howto-basic-decryption
  :END:

Decrypting something encrypted to a key in one's secret keyring is
fairly straight forward.

In this example code, however, preconfiguring either =gpg.Context()=
or =gpg.core.Context()= as =c= is unnecessary because there is no need
to modify the Context prior to conducting the decryption and since the
Context is only used once, setting it to =c= simply adds lines for no
gain.

```
#+BEGIN_SRC python -i
import gpg

ciphertext = input("Enter path and filename of encrypted file: ")
newfile = input("Enter path and filename of file to save decrypted data to: ")

with open(ciphertext, "rb") as cfile:
  try:
      plaintext, result, verify_result = gpg.Context().decrypt(cfile)
  except gpg.errors.GPGMEError as e:
      plaintext = None
      print(e)

if plaintext is not None:
  with open(newfile, "wb") as nfile:
    nfile.write(plaintext)

  else:
      pass
#+END_SRC
```

The data available in =plaintext= in this example is the decrypted content as a byte object, the recipient key IDs and algorithms in =result= and the results of verifying any signatures of the data in =verify_result=.

If =gpg.Context().decrypt(cfile, verify=False)= is called instead, then =verify_result= will be returned as =None= and the rest remains as described here.

** Signing text and files
:PROPERTIES:
:CUSTOM_ID: howto-basic-signing
:END:

The following sections demonstrate how to specify keys to sign with.

*** Signing key selection
:PROPERTIES:
:CUSTOM_ID: howto-basic-signing-signers
:END:

By default GPGME and the Python bindings will use the default key configured for the user invoking the GPGME API. If there is no default key specified and there is more than one secret key available it may be necessary to specify the key or keys with which to sign

messages and files.

```
#+BEGIN_SRC python -i
import gpg

logrus = input("Enter
 the email address or string to match signing keys to: ")
hancock = gpg.Context().keylist(pattern=logrus, secret=True)
sig_src = list(hancock)
#+END_SRC
```

The signing examples in the following sections include the explicitly designated =signers= parameter in two of the five examples; once where the resulting signature would be ASCII armoured and once where it would not be armoured.

While it would be possible to enter a key ID or fingerprint here to match a specific key, it is not possible to enter two fingerprints and match two keys since the patten expects a string, bytes or None and not a list.  A string with two fingerprints won't match any single key.

```
*** Normal or default signing messages or files
   :PROPERTIES:
   :CUSTOM_ID: howto-basic-signing-normal
   :END:
```

The normal or default signing process is essentially the same as is most often invoked when also encrypting a message or file.  So when the encryption component is not utilised, the result is to produce an encoded
 and signed output which may or may not be ASCII armoured and which may or may not also be compressed.

By default compression will be used unless GnuPG detects that the plaintext is already compressed.  ASCII armouring will be determined according to the value of =gpg.Context().armor=.

The compression algorithm is selected in much the same way as the symmetric encryption algorithm or the hash digest algorithm is when multiple keys are involved; from the preferences saved into the key itself or by comparison with the preferences with all other keys involved.

```
#+BEGIN_SRC python -i
import gpg
```

```
text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context(armor=True, signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.asc", "w") as afile:
   afile.write(signed_data.decode())
#+END_SRC
```

Though everything in this example is accurate, it is more likely that reading the input data from another file and writing the result to a new file will be performed more like the way it is done in the next example.  Even if the output format is ASCII armoured.

```
#+BEGIN_SRC python -i
import gpg

with open("/path/to/statement.txt", "rb") as tfile:
   text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.sig", "wb") as afile:
   afile.write(signed_data)
#+END_SRC
```

*** Detached signing messages and files

```
   :PROPERTIES:
   :CUSTOM_ID: howto-basic-signing-detached
   :END:
```

Detached signatures will often be needed in programmatic uses of GPGME, either for signing files (e.g. tarballs of code releases) or as a component of message signing (e.g. PGP/MIME encoded email).

```
#+BEGIN_SRC python -i
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()
```

```
c = gpg.Context(armor=True)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.asc",
 "w") as afile:
   afile.write(signed_data.decode())
#+END_SRC
```

As with normal signatures, detached signatures are best handled as
byte literals, even when the output is ASCII armoured.

```
#+BEGIN_SRC python -i
import gpg

with open("/path/to/statement.txt", "rb") as tfile:
   text = tfile.read()

c = gpg.Context(signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.sig", "wb") as afile:
   afile.write(signed_data)
#+END_SRC
```

*** Clearsigning messages or text
   :PROPERTIES:
   :CUSTOM_ID: howto-basic-signing-clear
   :END:

Though PGP/in-line messages are no longer encouraged in favour of
PGP/MIME, there is still sometimes value in utilising in-line
signatures.  This is where clear-signed messages or text is of value.

```
#+BEGIN_SRC python -i
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)

with
```

```
 open("/path/to/statement.txt.asc", "w") as afile:
   afile.write(signed_data.decode())
#+END_SRC
```

In spite of the appearance of a clear-signed message, the data handled by GPGME in signing it must still be byte literals.

```
#+BEGIN_SRC python -i
import gpg

with open("/path/to/statement.txt", "rb") as tfile:
   text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)

with open("/path/to/statement.txt.asc", "wb") as afile:
   afile.write(signed_data)
#+END_SRC
```

** Signature verification
  :PROPERTIES:
  :CUSTOM_ID: howto-basic-verification
  :END:

Essentially there are two principal methods of verification of a signature.  The first of these is for use with the normal or default signing method and for clear-signed messages.  The second is for use with files and data with detached signatures.

The following example is intended for use with the default signing method where the file was not ASCII armoured:

```
#+BEGIN_SRC python
 -i
import gpg
import time

filename = "statement.txt"
gpg_file = "statement.txt.gpg"

c = gpg.Context()

try:
   data, result = c.verify(open(gpg_file))
   verified = True
except gpg.errors.BadSignatures as e:
```

```
  verified = False
  print(e)

if verified is True:
  for i in range(len(result.signatures)):
     sign = result.signatures[i]
     print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
        time.ctime(sign.timestamp)))
else:
  pass
#+END_SRC
```

Whereas this next example, which is almost identical would work with normal ASCII armoured files and with clear-signed files:

```
#+BEGIN_SRC python -i
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
  data, result = c.verify(open(asc_file))
  verified = True
except gpg.errors.BadSignatures as e:
  verified = False
  print(e)

if verified is True:
  for i in range(len(result.signatures)):
      sign = result.signatures[i]
     print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
        time.ctime(sign.timestamp)))
else:
  pass
#+END_SRC
```

In both of the previous examples it is also possible to compare the original data that was signed against the signed data in =data= to see if it matches with something like this:

```
#+BEGIN_SRC python -i
with open(filename, "rb") as afile:
   text = afile.read()

if text == data:
   print("Good signature.")
else:
   pass
#+END_SRC
```

The following two examples, however, deal with detached signatures. With his method of verification the data that was signed does not get returned since it is already being explicitly referenced in the first argument of =c.verify=.  So =data= is =None= and only the information in =result= is available.

```
#+BEGIN_SRC python -i
import gpg
import time

filename = "statement.txt"
sig_file = "statement.txt.sig"

c = gpg.Context()

try:
   data,
 result = c.verify(open(filename), open(sig_file))
   verified = True
except gpg.errors.BadSignatures as e:
   verified = False
   print(e)

if verified is True:
   for i in range(len(result.signatures)):
       sign = result.signatures[i]
       print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
          time.ctime(sign.timestamp)))
else:
   pass
```

```
#+END_SRC

#+BEGIN_SRC python -i
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
   data, result = c.verify(open(filename), open(asc_file))
   verified = True
except gpg.errors.BadSignatures as e:
   verified = False
   print(e)

if verified is True:
   for i in range(len(result.signatures)):
       sign = result.signatures[i]
       print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
          time.ctime(sign.timestamp)))
else:
   pass
#+END_SRC
```

*
 Creating keys and subkeys
 :PROPERTIES:
 :CUSTOM_ID: key-generation
 :END:

The one thing, aside from GnuPG itself, that GPGME depends on, of course, is the keys themselves.  So it is necessary to be able to generate them and modify them by adding subkeys, revoking or disabling them, sometimes deleting them and doing the same for user IDs.

In the following examples a key will be created for the world's greatest secret agent, Danger Mouse.  Since Danger Mouse is a secret agent he needs to be able to protect information to =SECRET= level clearance, so his keys will be 3072-bit keys.

The pre-configured =gpg.conf= file which sets cipher, digest and other
preferences contains the following configuration parameters:

```
#+BEGIN_SRC conf
 expert
 allow-freeform-uid
 allow-secret-key-import
 trust-model tofu+pgp
 tofu-default-policy unknown
 enable-large-rsa
 enable-dsa2
 cert-digest-algo SHA512
 default-preference-list TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128
 AES BLOWFISH IDEA CAST5 3DES SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1 ZLIB BZIP2 ZIP
Uncompressed
 personal-cipher-preferences TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128 AES
BLOWFISH IDEA CAST5 3DES
 personal-digest-preferences SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1
 personal-compress-preferences ZLIB BZIP2 ZIP Uncompressed
#+END_SRC
```

** Primary key
  :PROPERTIES:
  :CUSTOM_ID: keygen-primary
  :END:

Generating a primary key uses the =create_key= method in a Context.
It contains multiple arguments and keyword arguments, including:
=userid=, =algorithm=, =expires_in=, =expires=, =sign=, =encrypt=,
=certify=, =authenticate=, =passphrase= and =force=.  The defaults for
all of those except =userid=, =algorithm=, =expires_in=, =expires= and
=passphrase= is =False=.  The defaults for =algorithm= and
=passphrase= is =None=.  The default for =expires_in= is =0=.  The
default for =expires= is =True=.  There is no default for =userid=.

If =passphrase= is left as =None=
 then the key will not be generated
with a passphrase, if =passphrase= is set to a string then that will
be the passphrase and if =passphrase= is set to =True= then gpg-agent
will launch pinentry to prompt for a passphrase.  For the sake of
convenience, these examples will keep =passphrase= set to =None=.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
```

```
c.home_dir = "~/.gnupg-dm"
userid = "Danger Mouse <dm@secret.example.net>"

dmkey = c.create_key(userid, algorithm="rsa3072", expires_in=31536000,
                 sign=True, certify=True)
#+END_SRC
```

One thing to note here is the use of setting the =c.home_dir= parameter. This enables generating the key or keys in a different location. In this case to keep the new key data created for this example in a separate location rather than adding it to existing and active key store data. As with the default directory, =~/.gnupg=, any temporary or separate directory needs the permissions set to only permit access by the directory owner. On posix systems this means setting the directory permissions to 700.

The =temp-homedir-config.py= script in the HOWTO examples directory will create an alternative homedir with these configuration options already set and the correct directory and file permissions.

The successful generation of the key can be confirmed via the returned =GenkeyResult= object, which includes the following data:

```
#+BEGIN_SRC python -i
print("""
Fingerprint: {0}
Primary Key: {1}
 Public Key: {2}
 Secret Key: {3}
Sub Key: {4}
User IDs: {5}
""".format(dmkey.fpr, dmkey.primary, dmkey.pubkey, dmkey.seckey, dmkey.sub,
        dmkey.uid))
#+END_SRC
```

Alternatively the information can be confirmed using the command line program:

```
#+BEGIN_SRC shell
 bash-4.4$ gpg --homedir ~/.gnupg-dm -K
 ~/.gnupg-dm/pubring.kbx
 ----------------------
 sec   rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
 177B7C25DB99745EE2EE13ED026D2F19E99E63AA
 uid          [ultimate] Danger Mouse <dm@secret.example.net>
```

```
  bash-4.4$
#+END_SRC
```

As with generating keys manually, to preconfigure expanded preferences for the cipher, digest and compression algorithms, the =gpg.conf= file must contain those details in the home directory in which the new key is being generated.  I used a cut down version of my own =gpg.conf= file in order to be able to generate this:

```
#+BEGIN_SRC shell
 bash-4.4$ gpg --homedir ~/.gnupg-dm --edit-key 177B7C25DB99745EE2EE13ED026D2F19E99E63AA showpref
quit
 Secret key is available.

 sec  rsa3072/026D2F19E99E63AA
      created: 2018-03-15  expires: 2019-03-15  usage: SC
      trust: ultimate      validity: ultimate
 [ultimate] (1). Danger Mouse <dm@secret.example.net>

 [ultimate] (1). Danger Mouse <dm@secret.example.net>
      Cipher: TWOFISH, CAMELLIA256, AES256, CAMELLIA192, AES192, CAMELLIA128, AES, BLOWFISH,
IDEA, CAST5, 3DES
      Digest: SHA512, SHA384, SHA256, SHA224, RIPEMD160, SHA1
      Compression: ZLIB, BZIP2, ZIP, Uncompressed
      Features: MDC, Keyserver
 no-modify

 bash-4.4$
#+END_SRC
```

** Subkeys
  :PROPERTIES:
  :CUSTOM_ID: keygen-subkeys
  :END:

Adding subkeys to a primary key is fairly similar to creating the primary key with the =create_subkey= method.  Most of the arguments are the same, but not quite all.  Instead of the =userid= argument there is now a =key= argument for selecting which primary key to add the subkey to.

In the following example an encryption subkey will be added to the primary key.  Since Danger Mouse is a security conscious secret agent, this subkey will only be valid for about six months, half the length of the primary key.

```
#+BEGIN_SRC python -i
```

```
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

key = c.get_key(dmkey.fpr, secret=True)
dmsub = c.create_subkey(key, algorithm="rsa3072", expires_in=15768000,
                        encrypt=True)
#+END_SRC
```

As with the primary key, the results here can be checked with:

```
#+BEGIN_SRC python -i
print("""
Fingerprint:  {0}
Primary Key:  {1}
  Public Key:  {2}
 Secret Key:  {3}
Sub Key:  {4}
User IDs:  {5}
""".format(dmsub.fpr, dmsub.primary, dmsub.pubkey, dmsub.seckey, dmsub.sub,
          dmsub.uid))
#+END_SRC
```

As well as on the command line with:

```
#+BEGIN_SRC shell
 bash-4.4$ gpg --homedir ~/.gnupg-dm -K
 ~/.gnupg-dm/pubring.kbx
 ----------------------
 sec   rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
 177B7C25DB99745EE2EE13ED026D2F19E99E63AA
 uid           [ultimate] Danger Mouse <dm@secret.example.net>
 ssb   rsa3072 2018-03-15 [E] [expires: 2018-09-13]

 bash-4.4$
#+END_SRC
```

```
** User IDs
  :PROPERTIES:
  :CUSTOM_ID: keygen-uids
  :END:


*** Adding User IDs
   :PROPERTIES:
   :CUSTOM_ID: keygen-uids-add
```

:END:

By comparison to creating primary keys and subkeys, adding a new user ID to an existing key is much simpler. The method used to do this is =key_add_uid= and the only arguments it takes are for the =key= and the new =uid=.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

dmfpr
 = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid = "Danger Mouse <danger.mouse@secret.example.net>"

c.key_add_uid(key, uid)
#+END_SRC
```

Unsurprisingly the result of this is:

```
#+BEGIN_SRC shell
 bash-4.4$ gpg --homedir ~/.gnupg-dm -K
 ~/.gnupg-dm/pubring.kbx
 ----------------------
 sec   rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
 177B7C25DB99745EE2EE13ED026D2F19E99E63AA
 uid           [ultimate] Danger Mouse <danger.mouse@secret.example.net>
 uid           [ultimate] Danger Mouse <dm@secret.example.net>
 ssb   rsa3072 2018-03-15 [E] [expires: 2018-09-13]

 bash-4.4$
#+END_SRC
```

*** Revoking User IDs

:PROPERTIES:
:CUSTOM_ID: keygen-uids-revoke
:END:

Revoking a user ID is a fairly similar process, except that it uses the =key_revoke_uid= method.

```
#+BEGIN_SRC python -i
import gpg
```

```
c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid
 = "Danger Mouse <danger.mouse@secret.example.net>"

c.key_revoke_uid(key, uid)
#+END_SRC
```

** Key certification
  :PROPERTIES:
  :CUSTOM_ID: key-sign
  :END:

Since key certification is more frequently referred to as key signing, the method used to perform this function is =key_sign=.

The =key_sign= method takes four arguments: =key=, =uids=, =expires_in= and =local=. The default value of =uids= is =None= and which results in all user IDs being selected. The default value of both =expires_in= and =local= is =False=; which results in the signature never expiring and being able to be exported.

The =key= is the key being signed rather than the key doing the signing. To change the key doing the signing refer to the signing key selection above for signing messages and files.

If the =uids= value is not =None= then it must either be a string to match a single user ID or a list of strings to match multiple user IDs. In this case the matching of those strings must be precise and it
 is case sensitive.

To sign Danger Mouse's key for just the initial user ID with a signature which will last a little over a month, do this:

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
uid = "Danger Mouse <dm@secret.example.net>"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
c.key_sign(key, uids=uid, expires_in=2764800)
```

```
#+END_SRC


*** Verifying key certifications
   :PROPERTIES:
   :CUSTOM_ID: key-sign-verify
   :END:

#+BEGIN_SRC python -i
import gpg
import time

c = gpg.Context()
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
keys = list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
   for sig in user.signatures:
       print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
             sig.uid)
#+END_SRC
```

Which for Danger Mouse displays the following:

```
#+BEGIN_EXAMPLE
 0x92E3F6115435C65A  Thu Mar 15 13:17:44 2018  Danger Mouse <dm@secret.example.net>
  0x321E4E2373590E5D  Mon Nov 26 12:46:05 2018  Ben McGinnes <ben@adversary.org>
#+END_EXAMPLE
```

The two key signatures listed are for the self-certification of Danger Mouse's key made when the key was created in March, 2018; and the second is a signature made by the author and set to expire at the end of the year.  Note that the second signature was made with the following code (including the preceding code to display the output of the certifications or key signatures):

```
#+BEGIN_SRC python -i
import gpg
import math
import pendulum
import time

hd = "/home/dm/.gnupg"
c = gpg.Context()
d = gpg.Context(home_dir=hd)
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
dmuid = "Danger Mouse <dm@secret.example.net>"
```

```
dkeys = list(c.keylist(pattern=dmuid))
dmkey = dkeys[0]

c.key_import(d.key_export(pattern=None))

tp = pendulum.period(pendulum.now(tz="local"), pendulum.datetime(2019, 1, 1))
ts = tp.total_seconds()
total_secs = math.ceil(ts)
c.key_sign(dmkey, uids=dmuid, expires_in=total_secs)

d.key_import(c.key_export(pattern=dmuid))
keys
 = list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
   for sig in user.signatures:
       print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
            sig.uid)
#+END_SRC
```

Note that this final code block includes the use of a module which is
/not/ part of Python's standard library, the [[https://pendulum.eustace.io/][pendulum module]]. Unlike
the standard datetime module, pendulum makes working with dates and
times significantly easier in Python; just as the requests module
makes working with HTTP and HTTPS easier than the builtin modules do.

Though neither requests nor pendulum are required modules for using
the GPGME Python bindings, they are both highly recommended more
generally.

* Advanced or Experimental Use Cases
 :PROPERTIES:
 :CUSTOM_ID: advanced-use
 :END:

** C plus Python plus SWIG plus Cython
  :PROPERTIES:
  :CUSTOM_ID: cython
  :END:

In
 spite of the apparent incongruence of using Python bindings to a C
interface only to generate more C from the Python; it is in fact quite
possible to use the GPGME bindings with [[http://docs.cython.org/en/latest/index.html][Cython]]. Though in many
cases

the benefits may not be obvious since the most computationally
intensive work never leaves the level of the C code with which GPGME
itself is interacting with.

Nevertheless, there are some situations where the benefits are
demonstrable.  One of the better and easier examples being the one of
the early examples in this HOWTO, the [[#howto-keys-counting][key counting]] code.  Running that
example as an executable Python script, =keycount.py= (available in
the =examples/howto/= directory), will take a noticeable amount of time
to run on most systems where the public keybox or keyring contains a
few thousand public keys.

Earlier in the evening, prior to starting this section, I ran that
script on my laptop; as I tend to do periodically
 and timed it using
=time= utility, with the following results:

```
#+BEGIN_SRC shell
 bash-4.4$ time keycount.py

 Number of secret keys:  23
 Number of public keys:  12112


 real 11m52.945s
 user 0m0.913s
 sys 0m0.752s

 bash-4.4$
#+END_SRC
```

Sometime after that I imported another key and followed it with a
little test of Cython.  This test was kept fairly basic, essentially
lifting the material from the [[http://docs.cython.org/en/latest/src/tutorial/cython_tutorial.html][Cython Basic Tutorial]] to demonstrate
compiling Python code to C.  The first step was to take the example
key counting code quoted previously, essentially from the importing of
the =gpg= module to the end of the script:

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)
```

```
publist = list(pubkeys)
pubnum = len(publist)

print("""
   Number of secret keys:  {0}
   Number
 of public keys:  {1}

""".format(secnum, pubnum))
#+END_SRC
```

Save that into a file called =keycount.pyx= and then create a
=setup.py= file which contains this:

```
#+BEGIN_SRC python -i
from distutils.core import setup
from Cython.Build import cythonize

setup(
   ext_modules = cythonize("keycount.pyx")
)
#+END_SRC
```

Compile it:

```
#+BEGIN_SRC shell
 bash-4.4$ python setup.py build_ext --inplace
 bash-4.4$
#+END_SRC
```

Then run it in a similar manner to =keycount.py=:

```
#+BEGIN_SRC shell
 bash-4.4$ time python3.7 -c "import keycount"

 Number of secret keys:  23
 Number of public keys:  12113


 real 6m47.905s
 user 0m0.785s
 sys 0m0.331s

 bash-4.4$
#+END_SRC
```

Cython turned =keycount.pyx= into an 81KB =keycount.o= file in the

=build/= directory, a 24KB =keycount.cpython-37m-darwin.so= file to be
imported into Python 3.7 and a 113KB =keycount.c= generated C source
code file of nearly three thousand lines.  Quite a bit bigger than the
314 bytes of the =keycount.pyx= file or the full
 1,452 bytes of the
full executable =keycount.py= example script.

On the other hand it ran in nearly half the time; taking 6 minutes and
47.905 seconds to run.  As opposed to the 11 minutes and 52.945 seconds
which the CPython script alone took.

The =keycount.pyx= and =setup.py= files used to generate this example
have been added to the =examples/howto/advanced/cython/= directory
The example versions include some additional options to annotate the
existing code and to detect Cython's use.  The latter comes from the
[[http://docs.cython.org/en/latest/src/tutorial/pure.html#magic-attributes-within-the-pxd][Magic Attributes]] section
of the Cython documentation.

* Miscellaneous extras and work-arounds
 :PROPERTIES:
 :CUSTOM_ID: cheats-and-hacks
 :END:

Most of the things in the following sections are here simply because
there was no better place to put them, even though some are only
peripherally related to the GPGME Python bindings.  Some are also
workarounds for functions not integrated
 with GPGME as yet.  This is
especially true of the first of these, dealing with [[#group-lines][group lines]].

** Group lines
  :PROPERTIES:
  :CUSTOM_ID: group-lines
  :END:

There is not yet an easy way to access groups configured in the
gpg.conf file from within GPGME.  As a consequence these central
groupings of keys cannot be shared amongst multiple programs, such as
MUAs readily.

The following code, however, provides a work-around for obtaining this
information in Python.

#+BEGIN_SRC python -i
import subprocess
import sys

```
if sys.platform == "win32":
   gpgconfcmd = "gpgconf.exe --list-options gpg"
else:
   gpgconfcmd = "gpgconf --list-options gpg"

process = subprocess.Popen(gpgconfcmd.split(), stdout=subprocess.PIPE)
procom = process.communicate()

if sys.version_info[0] == 2:
   lines = procom[0].splitlines()
else:
   lines = procom[0].decode().splitlines()

for line in lines:
   if line.startswith("group") is True:
       break

groups = line.split(":")[-1].replace("",
 ").split(',')

group_lines = []
group_lists = []

for group in groups:
   group_lines.append(group.split("="))
   group_lists.append(group.split("="))

for glist in group_lists:
   glist[1] = glist[1].split()
#+END_SRC
```

The result of that code is that =group_lines= is a list of lists where =group_lines[i][0]= is the name of the group and =group_lines[i][1]= is the key IDs of the group as a string.

The =group_lists= result is very similar in that it is a list of lists.  The first part, =group_lists[i][0]= matches =group_lines[i][0]= as the name of the group, but =group_lists[i][1]= is the key IDs of the group as a list.

A demonstration of using the =groups.py= module is also available in the form of the executable =mutt-groups.py= script.  This second script reads all the group entries in a user's =gpg.conf= file and converts them into crypt-hooks suitable for use with the Mutt and Neomutt mail clients.

** Keyserver access for Python
  :PROPERTIES:
  :CUSTOM_ID:
 hkp4py
  :END:

The [[https://github.com/Selfnet/hkp4py][hkp4py]] module by Marcel Fest was originally a port of the old [[https://github.com/dgladkov/python-hkp][python-hkp]] module from Python 2 to Python 3 and updated to use the [[http://docs.python-requests.org/en/latest/index.html][requests]] module instead.  It has since been modified to provide
support for Python 2.7 as well and is available via PyPI.

Since it rewrites the =hkp= protocol prefix as =http= and =hkps= as
=https=, the module is able to be used even with servers which do not
support the full scope of keyserver functions.[fn:5]  It also works quite
readily when incorporated into a [[#cython][Cython]] generated and compiled version
of any code.

*** Key import format
   :PROPERTIES:
   :CUSTOM_ID: hkp4py-strings
   :END:

The hkp4py module returns key data via requests as string literals
(=r.text=) instead of byte literals (=r.content=).  This means that
the retrurned key data must be encoded to UTF-8 when importing
 that
key material using a =gpg.Context().key_import()= method.

For this reason an alternative method has been added to the =search=
function of =hkp4py.KeyServer()= which returns the key in the correct
format as expected by =key_import=.  When importing using this module,
it is now possible to import with this:

#+BEGIN_SRC python -i
for key in keys:
   if key.revoked is False:
       gpg.Context().key_import(key.key_blob)
   else:
       pass
#+END_SRC

Without that recent addition it would have been necessary to encode
the contents of each =hkp4py.KeyServer().search()[i].key= in
=hkp4py.KeyServer().search()= before trying to import it.

An example of this is included in the [[#howto-import-key][Importing Keys]] section of this

HOWTO and the corresponding executable version of that example is available in the =lang/python/examples/howto= directory as normal; the executable version is the =import-keys-hkp.py= file.

** GPGME version checking
:PROPERTIES:
:CUSTOM_ID: gpgme-version-check
:END:

For various reasons it may be necessary to check which version of GPGME the bindings have been built against; including whether a minimum required version of GPGME is in use.

For the most part the =gpg.version.versionstr= and =gpg.version.versionlist= methods have been quite sufficient. The former returns the same string as =gpgme-config --version=, while the latter returns the major, minor and patch values in a list.

To check if the installed bindings have actually been built against the current installed libgpgme version, this check can be performed:

```
#+BEGIN_SRC python -i
import gpg
import subprocess
import sys

gpgme_version_call = subprocess.Popen(["gpgme-config", "--version"],
                                      stdout=subprocess.PIPE,
                                      stderr=subprocess.PIPE)
gpgme_version_str = gpgme_version_call.communicate()

if sys.version_info[0] == 2:
   gpgme_version = gpgme_version_str[0].strip()
elif sys.version_info[0]
 >= 3:
   gpgme_version = gpgme_version_str[0].decode().strip()
else:
   gpgme_version = None

if gpgme_version is not None:
   if gpgme_version == gpg.version.versionstr:
      print("The GPGME Python bindings match libgpgme.")
   else:
      print("The GPGME Python bindings do NOT match libgpgme.")
else:
   print("Upgrade Python and reinstall the GPGME Python bindings.")
#+END_SRC
```

For many developers, however, the preferred checking means checking for a minimum version or point release. This is now readily available via the =gpg.version.versionintlist= method (added in version =1.12.1-beta79=). It is also now possible to easily check whether the installed GPGME Python bindings were built from a development or beta branch of the GPGME source code.

The following code demonstrates how both of those methods may be used:

```
#+BEGIN_SRC python -i
import gpg

try:
  if gpg.version.is_beta is True:
     print("The installed GPGME Python bindings were built from beta code.")
   else:
     print("The installed GPGME Python bindings are a released version.")
except Exception as e:
  print(e)

try:
  if gpg.version.versionintlist[0] == 1:
     if gpg.version.versionintlist[1] == 12:
        if gpg.version.versionintlist[2] == 1:
           print("This is the minimum version for using versionintlist.")
        elif gpg.version.versionintlist[2] > 1:
           print("The versionintlist method is available.")
        else:
           pass
     elif gpg.version.versionintlist[1] > 12:
        print("The versionintlist method is available.")
     else:
        pass
  elif gpg.version.versionintlist[0] > 1:
     print("The versionintlist method is available.")
  else:
     pass
except Exception as e:
  print(e)
#+END_SRC
```

The points where =pass= is used in the above example will most likely also produce an =Exception= error since those results should only occur in versions which do not have the =gpgme.version.is_beta= and =gpgme.version.versionintlist= methods available.

* Copyright and Licensing
 :PROPERTIES:
 :CUSTOM_ID: copyright-and-license
 :END:

** Copyright
  :PROPERTIES:
  :CUSTOM_ID: copyright
  :END:

Copyright  The GnuPG Project, 2018.

** Draft Editions of this HOWTO
  :PROPERTIES:
  :CUSTOM_ID: draft-editions
  :END:

Draft editions of this HOWTO may be periodically available directly
from the author at any of the following URLs:

- [[https://files.au.adversary.org/crypto/gpgme-python-howto.html][GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 SSL)]]
- [[http://files.au.adversary.org/crypto/gpgme-python-howto.html][GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 no SSL)]]
- [[https://files.au.adversary.org/crypto/gpgme-python-howto-split/index.html][GPGME Python Bindings HOWTO draft (HTML multiple files, AWS S3 SSL)]]
- [[http://files.au.adversary.org/crypto/gpgme-python-howto/index.html][GPGME Python Bindings HOWTO draft (HTML
 multiple files, AWS S3 no SSL)]]

These draft versions have been generated from this document via GNU
Emacs [[https://orgmode.org/][Org mode]] to =.texi= and [[https://www.gnu.org/software/texinfo/][GNU Texinfo]] to HTML.  Though it is
likely that the specific [[https://files.au.adversary.org/crypto/gpgme-python-howto][file]]
[[http://files.au.adversary.org/crypto/gpgme-python-howto.org][version]] used will be on the same server
with the generated output formats.  Occasionally I may include the Org
mode generated XHTML versions:

- [[https://files.au.adversary.org/crypto/gpgme-python-howto.xhtml][GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 SSL)]]
- [[http://files.au.adversary.org/crypto/gpgme-python-howto.xhtml][GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 no SSL)]]

That XHTML version, however, is exported in a way which inherits a
colour scheme from [[https://github.com/holomorph/emacs-zenburn][the author's Emacs theme]] (which is a higher

contrast
version
 of [[http://kippura.org/zenburnpage/][Zenburn]] ported by [[https://github.com/holomorph][Holomorph]]).  So it's fine for people who
prefer dark themed web pages, but not so great for everyone else.

The GNU Texinfo and reStructured Text versions ship with the software,
while the GNU Emacs Info version is generated from the Texinfo
version using GNU Texinfo or GNU Makeinfo.  The Texinfo format is
generated from the original Org mode source file in Org mode itself
either within GNU Emacs or via the command line by invoking Emacs in
batch mode:

```
#+BEGIN_SRC shell
 emacs gpgme-python-howto.org --batch -f org-texinfo-export-to-texinfo --kill
 emacs gpgme-python-howto --batch -f org-texinfo-export-to-texinfo --kill
#+END_SRC
```

The reStructuredText format is also generated from the Org mode source
file, except it is generated using [[https://pandoc.org][Pandoc]] with either of the following
commands (depending on the filename):

```
#+BEGIN_SRC shell
 pandoc -f org -t rst+smart -o gpgme-python-howto.rst
 gpgme-python-howto.org
 pandoc -f org -t rst+smart -o gpgme-python-howto.rst gpgme-python-howto
#+END_SRC
```

Note that the Org mode source files are identified as such via a mode
line at the top of each file and have had their =.org= file extensions
dropped in order to make scripted generation of output formats easier
and not require renaming files post-conversion.

Due to a bug in Org mode's texinfo conversion method, the recommended
steps for generating the Texinfo files for all the files in the
=lang/python/doc/src/= directory are as follows:

```
#+BEGIN_SRC shell
 for x in * ; do
     emacs $x --batch -f org-texinfo-export-to-texinfo --kill
     cat $x.texi | sed -e 's/@documentencoding UTF-8/@documentencoding utf-8/g' > ../texinfo/$x.texi
     pandoc -f org -t rst+smart -o ../rst/$x.rst $x
 done ;
 rm -fv *.texi
 cd ../texinfo
 mkdir info
 mkdir html
 for x in *.texi ; do
```

```
    makeinfo -v $x
    makeinfo --html --no-split $x
 done ;
 mv *.info info/
 mv
 *.html html/
#+END_SRC
```

This code snippet includes the generation of the reStructuredText
files and would be expected to be run from the =doc/src/= directory
containing the Org mode source files. It also assumes that the
commands are being run on POSIX compliant systems with basic tools
like sed, the Bourne shell and GNU Emacs[fn:6] available. The code
snippet also includes the steps for generating the Emacs Info files
and HTML files from the Texinfo files. Using reStructuredText files
with Sphinx is best left for the documentation of that project.

In addition to these there is a significantly less frequently updated
version as a HTML [[https://files.au.adversary.org/crypto/gpgme-python/dita/webhelp/index.html][WebHelp site]]
(AWS S3 SSL); generated from DITA XML
source files, which can be found in [[https://dev.gnupg.org/source/gpgme/browse/ben%252Fhowto-dita/][an
alternative branch]] of the GPGME
git repository.

Various generated output formats may occasionally be found in
subdirectories
 of the [[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python][gpgme-python]] directory. In
particular within
the [[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/dita][DITA]],
[[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/rst][reStructuredText]] and
[[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/texinfo][Texinfo]] subdirectories. The
=rst=
directory contains output files generated with Sphinx and may include a
considerable number of its possible output formats, but there are no
guarantees as to how recent these are or even if they are present.

These draft editions are not official documents and the version of
documentation in the master branch or which ships with released
versions is the only official documentation. Nevertheless, these
draft editions may occasionally be of use by providing more accessible
web versions which are updated between releases. They are provided on
the understanding
 that they may contain errors or may contain content
subject to change prior to an official release.

** License GPL compatible
  :PROPERTIES:

:CUSTOM_ID: license
:END:

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* Footnotes

[fn:1] =short-history= and/or =short-history.html=.

[fn:2] With no issues reported specific to Python 3.7, the release of Python 3.7.1 at around the same time as GPGME 1.12.0 and the testing with Python 3.7.1rc1, there is no reason to delay moving 3.7 ahead of 3.6 now. Production environments with more conservative requirements will always enforce their own policies anyway and installation to each supported
minor release is quite possible too.

[fn:3] Yes, even if you use virtualenv with everything you do in Python. If you want to install this module as just your user account then you will need to manually configure, compile and install the /entire/ GnuPG stack as that user as well. This includes libraries which are not often installed that way. It can be done and there are circumstances under which it is worthwhile, but generally only on POSIX systems which utilise single user mode (some even require it).

[fn:4] You probably don't really want to do this. Searching the keyservers for "gnupg.org" produces over 400 results, the majority of which aren't actually at the gnupg.org domain, but just included a comment regarding the project in their key somewhere.

[fn:5] Such as with ProtonMail servers. This also means that restricted servers which only advertise either HTTP or HTTPS end points and not HKP or HKPS end points must still be identified as as HKP or HKPS within the Python
Code. The =hkp4py= module will rewrite
these appropriately when the connection is made to the server.

[fn:6] Okay, Emacs might not necessarily qualify as a basic tool, but it is common enough that having it installed on a system isn't too great an expectation, nor is it difficult to add to most POSIX

systems, even if the users of those systems do not personally use it.
2011-12-02  Werner Koch  <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained.  Starting
on December 1st, 2011 we put change information only in the GIT
commit log, and generate a top-level ChangeLog file from logs at
"make dist".  See doc/HACKING for details.

2011-10-25  Marcus Brinkmann  <marcus@g10code.com>

* Makefile.am: Remove build rules for libgpgme-pth.
* gpgme.m4: Remove support for libgpgme-pth.

2011-05-26  Marcus Brinkmann  <marcus@g10code.com>

* decrypt.c (gpgme_op_decrypt_start, gpgme_op_decrypt): Check CTX.
* decrypt-verify.c (gpgme_op_decrypt_verify_start)
(gpgme_op_decrypt_verify): Likewise.
* delete.c (gpgme_op_delete_start, gpgme_op_delete): Likewise.
* edit.c (gpgme_op_edit_start, gpgme_op_edit)
(gpgme_op_card_edit_start, gpgme_op_card_edit): Likewise.
* encrypt.c (gpgme_op_encrypt_start, gpgme_op_encrypt): Likewise.
* encrypt-sign.c (gpgme_op_encrypt_sign_start)
(gpgme_op_encrypt_sign): Likewise.
* export.c (gpgme_op_export_start,
gpgme_op_export)
(gpgme_op_export_ext_start, gpgme_op_export_ext)
(gpgme_op_export_keys_start, gpgme_op_export_keys): Likewise.
* genkey.c (gpgme_op_genkey_start, gpgme_op_genkey): Likewise.
* getauditlog.c (gpgme_op_getauditlog_start)
(gpgme_op_getauditlog): Likewise.
* gpgconf.c (gpgme_op_conf_load, gpgme_op_conf_save): Likewise.
* import.c (gpgme_op_import_start, gpgme_op_import_keys_start)
(gpgme_op_import_keys, gpgme_op_import): Likewise.
* keylist.c (gpgme_op_keylist_start, gpgme_op_keylist_ext_start):
Likewise.
* opassuan.c (gpgme_op_assuan_transact_start)
(gpgme_op_assuan_transact_ext): Likewise.
* passwd.c (gpgme_op_passwd_start, gpgme_op_passwd): Likewise.
* sign.c (gpgme_op_sign_start, gpgme_op_sign): Likewise.
* trustlist.c (gpgme_op_trustlist_start)
(gpgme_op_trustlist_next): Likewise.
* verify.c (gpgme_op_verify_start, gpgme_get_sig_key): Likewise.
* op-support.c (_gpgme_op_data_lookup): Likewise.
* vfs-create.c (gpgme_op_vfs_transact, gpgme_op_vfs_create):
Likewise.
* vfs-mount.c (gpgme_op_vfs_mount, gpgme_op_vfs_transact): Likewise.
* gpgme.c (gpgme_set_protocol)

(gpgme_set_sub_protocol)
(gpgme_set_armor, gpgme_set_include_certs)
(gpgme_set_keylist_mode, gpgme_set_passphrase_cb)
(gpgme_set_progress_cb, gpgme_set_io_cbs, gpgme_set_locale)
(gpgme_ctx_set_engine_info, gpgme_sig_notation_clear): Likewise.
* gpgme.c (gpgme_new): Check for valid R_CTX.
(gpgme_cancel, gpgme_cancel_async, gpgme_release): Likewise.

2011-04-06 Werner Koch <wk@g10code.com>

* gpgme-config.in: Add option --host. Change options --cflags and
--libs to collapse duplicate include and lib dirs. Try to put
extra libs at the end.

* gpgme.h.in: Use INSERT__TYPEDEFS_FOR_GPGME_H to include platform
specific typedefs.

2011-02-03 Werner Koch <wk@g10code.com>

* extra-stati.h: New.
* mkstatus: Extend to also process extra-stati.h
* Makefile.am (main_sources): Add extra-stati.h
(status-table.h): Depend on extra-stati.h and adjust rule.

2011-02-03
Marcus Brinkmann <marcus@g10code.com>

* w32-io.c (_gpgme_io_socket): Return fd, not res.

2011-02-02 Marcus Brinkmann <mb@g10code.com>

* assuan-support.c (my_socket, my_connect): New functions.
(_gpgme_assuan_system_hooks): Add my_Socket, my_connect.
* priv-io.h (_gpgme_io_socket): New prototype.
* w32-io.c (pid_to_handle, handle_to_oid, fd_to_handle): Remove macros.
(is_socket): Remove function.
(_gpgme_io_spawn) [HAVE_W32CE_SYSTEM]: Remove some dead code.
(_gpgme_io_spawn): Translate handles before DuplicateHandle them.

2011-02-02 Marcus Brinkmann <mb@g10code.com>

* w32-util.c (mkstemp): Don't use CreateFile instead of open (the
function is not used on Windows CE, and the callers were not
adjusted).

2011-01-21 Marcus Brinkmann <mb@g10code.com>

* engine-gpgconf.c (_gpgme_conf_opt_change): Fix the case that is

not self-assignment.

2010-12-08  Werner Koch  <wk@g10code.com>

* gpgme-tool.c (strcpy_escaped_plus): New.
(DIM, xtoi_1, xtoi_2): New.
(cmd_keylist):
Allow for multiple patterns.

2010-11-23  Marcus Brinkmann  <mb@g10code.com>

* w32-io.c (create_reader, create_writer): Use small stack size on
Windows CE.

2010-11-23  Marcus Brinkmann  <mb@g10code.com>

* gpgme.h.in (gpgme_conf_arg_new): Make VALUE arg const void *.
* gpgconf.c (_gpgme_conf_arg_new): Likewise.
(gpgme_conf_arg_new): Likewise.
* engine-gpgconf.c (_gpgme_conf_arg_new): Likewise.
(gpgconf_write): Remove debug hack.

2010-11-19  Marcus Brinkmann  <mb@g10code.com>

* engine-gpgconf.c (_gpgme_conf_opt_change): Support
self-assignment.  Requested by Marc Mutz.

2010-11-17  Marcus Brinkmann  <mb@g10code.com>

* vasprintf.c (int_vasprintf) [HAVE_W32CE_SYSTEM]: Just use a
fixed size buffer, as va_copy is not easy to fake.

2010-11-15  Marcus Brinkmann  <mb@g10code.com>

* w32-ce.h (strcasecmp, strdup) [_MSC_VER]: Define.
* genkey.c, passphrase.c: Include util.h.

* w32-util.c (_gpgme_w32ce_get_debug_envvar): Fix return value.

2010-11-15  Werner Koch  <wk@g10code.com>

*
data-compat.c (gpgme_data_new_from_filepart)
(gpgme_data_new_from_file) [W32CE && _MSC_VER]: Return not
GPG_ERR_NOT_IMPLEMENTED.

* w32-ce.h (HKEY_PERFORMANCE_DATA, HKEY_CURRENT_CONFIG, _IOLBF)
(abort) [_MSC_VER]: Provide these macros.

* ath.h [W32CE && _MSC_VER]: Include winsock2.h.

* ath.c (ath_read, ath_write) [W32CE && _MSC_VER]: Do not call
non-available functions.

2010-11-04  Werner Koch  <wk@g10code.com>

* w32-ce.h [_MSC_VER && W32CE]: Undef leave.
* export.c: Include util.h so that we get the above undef.

* memrchr.c: Remove.  Used to be a replacement function required
by the formerly included assuan code.

2010-11-03  Werner Koch  <wk@g10code.com>

* debug.c (_gpgme_debug) [W32CE]: Replace locatime by GetLocalTime.

* signers.c (gpgme_signers_clear): Remove useless return.
Reported by Patrick Spendrin.

* w32-util.c: s/__inline__/GPG_ERR_INLINE/

* setenv.c: Include string.h due to our strerror replacement.

* w32-ce.h (access, bsearch):
New macros.
* w32-ce.c (_gpgme_wince_access): New.
(RegQueryValueExA): Change DATA to a void*.
(_gpgme_wince_bsearch): New.  Taken from glibc 2.6.

Guard include of sys/stat.h and sys/types.h.

2010-11-02  Werner Koch  <wk@g10code.com>

* data-fd.c (read, write, lseek) [W32CE && ! __MINGW32CE__]: New.
Taken from Pedro Alves Public Domain code.

* w32-ce.h (SHGetSpecialFolderPath): Remove our defines and
prototypes.  We use the system provided prototypes now.
* w32-ce.c: Include shlobj.h
(_WIN32_IE): Define to 0x0400
(CreateFileA): New.
* w32-util.c: Explicitly include windows headers before util.h.
(_gpgme_w32ce_get_debug_envvar): Do not use wchar_t strings for
read_w32_registry_string.
(mkstemp): Use CreateFile instead of open.

* w32-io.c (handle_to_fd, fd_tohandle): Add.  We need them for W32.
* w32-util.c (_WIN32_IE): Define to 0x0400.

* util.h [W32]: Include windows.h.
* w32-sema.c: Do not include windows.h directly.
* ath.c (ssize_t, pid_t)[_MSC_VER]: Add new
types.
* gpgme.c (gpgme_result_ref, gpgme_result_unref): Do not use a
void pointer in pointer arithmetic.
* w32-util.c: Include util.h prior to ath.h.  Don't include
windows.h directly.
(F_OK): Define if not defined.
* w32-ce.c: Include string.h.
(RegQueryValueExA): Use WINAPI modifier to match the declaration.
* vfs-create.c: Include string.h because under W32CE with MSC we
get a warning related to our strerror replacement.
* encrypt-sign.c: Include stdlib.h, string.h and errno.h.
* priv-io.h [W32CE]: Include w32-ce.h
* w32-ce.h: Include winsock2.h and ws2tcpip.h.
(_MSV_VER): Remove useless macro.
(pid_t): Add typedef.

Guard all includes of unistd.h and sys/time.h.

2010-10-28  Marcus Brinkmann  <marcus@g10code.com>

* opassuan.c (gpgme_op_assuan_transact_ext): Fix uninitialized
value use.  Reported by Marc Mutz.

2010-10-07  Werner Koch  <wk@g10code.com>

* gpgme-tool.c (ARGP_ERR_UNKNOWN): Use EDEADLK if available.

* w32-util.c (_gpgme_w32ce_get_debug_envvar) [W32CE]:
New.
* debug.c (debug_init) [W32CE]: Use new function.

2010-09-16  Werner Koch  <wk@g10code.com>

* import.c: Include "util.h".
(parse_import): Return GPG_ERR_MISSING_ISSUER_CERT.

* util.h: Add fallback define for GPG_ERR_MISSING_ISSUER_CERT.
* op-support.c: Include "util.h".
(_gpgme_parse_inv_recp): Handle new code 12.

2010-09-02  Marcus Brinkmann  <marcus@g10code.de>

* error.c (gpgme_err_code_to_errno): Fix cut and paste bug (thanks
to Marc Mutz).

2010-09-01  Marcus Brinkmann  <marcus@g10code.de>

* w32-io.c: Revert change from 2009-06-18, as it created a race
condition.

2010-08-18  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.def: Add gpgme_err_code_from_syserror and gpgme_err_set_errno.
* libgpgme.vers: Likewise.
* gpgme.h.in (gpgme_error_from_errno): Fix return type to
gpgme_error_t.
(gpgme_err_code_from_syserror, gpgme_err_set_errno): New prototype.
(gpgme_error_from_syserror): New inline function (why are
gpgme_err_make_from_errno and gpgme_error_from_errno
not inline
functions?).
* error.c (gpgme_error_from_errno): Fix return type to gpgme_error_t.
(gpgme_err_set_errno, gpgme_err_code_from_syserror): New functions.

2010-08-03  Marcus Brinkmann  <marcus@g10code.de>

* gpgme-tool.c (result_encrypt_to_xml, result_sign_to_xml)
(result_verify_to_xml, result_import_to_xml)
(result_genkey_to_xml): Check vigorously for null pointers.

* w32-io.c (GPGCEDEV_IOCTL_ASSIGN_RVID): New macro.
(_gpgme_io_spawn): Use ASSIGN_RVID.

2010-06-11  Marcus Brinkmann  <marcus@g10code.de>

* w32-io.c (_gpgme_io_spawn): Remove debug printf.

2010-06-10  Marcus Brinkmann  <marcus@g10code.de>

* gpgme-tool.c (gpgme_server): Use special hack for Windows CE to
get at stdin and stdout.

* engine-gpgsm.c (gpgsm_new): Translate returned achild_fds back
to child_fds.

* debug.h (TRACE_SUC6): New macro.
* w32-io.c (MAX_SLAFD): New macro.
(fd_table): New static variable.
(new_fd, release_fd): New functions.
(fd_to_handle, handle_to_fd, handle_to_socket):

Remove macros.
(MAX_READERS, MAX_WRITERS): Increase to 64.
(notify_table): Increase to MAX_SLAFD.
(struct reader_context_s, struct writer_context_s): Add member
file_sock.
(reader, writer): Use file_hd vs file_sock to decide if socket
operations to use.  Remove auto-detect mode.
(create_reader, create_writer): Set file_sock.  Unblock pending
thread only if this is a pipe fd.
(_gpgme_io_pipe): Allocate fds from table and return slot indices
instead of windows handles.  This allows to properly handle RVIDs.
(_gpgme_io_close): Handle dup'ed file descriptors.
(build_commandline) [HAVE_W32_SYSTEM]: Use RVID from fd table now.
(_gpgme_io_spawn): Use fd table now.
(_gpgme_io_fd2str): Use RVID from fd table now.
(_gpgme_io_dup): Implement using fd table.
(_gpgme_io_socket): Allocate fds from table.
(_gpgme_io_connect): Use fd from table.

* w32-glib-io.c (find_channel): Check that the slot is used.

2010-06-09  Marcus Brinkmann  <marcus@g10code.de>

* w32-io.c [HAVE_W32CE_SYSTEM]:
Include assuan.h and winioctl.h.
(GPGCEDEV_IOCTL_UNBLOCK) [HAVE_W32CE_SYSTEM]: Define.
(set_synchronize) [HAVE_W32CE_SYSTEM]: Stub it out.
(is_socket): Allow to return -1 for auto-detect (old behaviour).
(is_socket) [HAVE_W32CE_SYSTEM]: Return -1.
(reader): Handle auto-detect case.  Handle ctx->stop_me before
checking for EOF.
(destroy_reader) [HAVE_W32CE_SYSTEM]: Unblock a pending reader.
(writer): Handle auto-detect case.  Handle ctx->stop_me with
ERROR_BUSY.
(destroy_writer) [HAVE_W32CE_SYSTEM]: Unblock a pending writer.
(_gpgme_io_pipe) [HAVE_W32CE_SYSTEM]: Implement in terms of a
half-pipe.
(build_commandline) [HAVE_W32CE_SYSTEM]: New function.
(_gpgme_io_spawn) [HAVE_W32CE_SYSTEM]: Implement it differently
for this platform.
(_gpgme_io_fd2str) [HAVE_W32CE_SYSTEM]: Implement it for RVIDs.
(_gpgme_io_dup) [HAVE_W32CE_SYSTEM]: Stub it out.

* gpgme-tool.c (result_add_timestamp): Add missing NULL argument.
(result_sign_to_xml): Protect against NULL
fingerprint.
(struct server): New members input_fd, input_filename,
input_stream output_fd, output_filename, output_stream,

message_filename, message_stream.
(server_reset_fds): Deallocate those.
(server_parse_fd): New function.
(server_data_obj): Take optional filename argument and direction
argument.  Also take new argument to return a filestream that
needs to be closed after destroying the data object.
Change all callers, too.
(input_notify, output_notify): Removed.
(cmd_input, cmd_output): New functions.
(gpgme_server): Do not register input and output notifier.
(register_commands): Use cmd_input and cmd_output.
(cmd_message): Rewritten to use server_parse_fd.
(cmd_delete, cmd_keylist): Fix inverted option check.
(main) [HAVE_W32CE_SYSTEM]: Sleep a bit to work around bug in ssh.

* genkey.c (gpgme_op_genkey): Return err with TRACE_ERR.

2010-05-12  Marcus Brinkmann  <marcus@g10code.de>

* conversion.c (_gpgme_timegm) [HAVE_W32_SYSTEM]: New static
function.
(_gpgme_parse_timestamp)
[HAVE_W32_SYSTEM]: Use it.

* gpgme-tool.c (main): Protect call to setlocale with
HAVE_SETLOCALE.

* Makefile.am (system_components): Remove custom cppflags from
RCCOMPILE (because gpg-error adds -idirafter that makes RC bail.
[HAVE_W32CE_SYSTEM]: Add w32-ce.h and w32-ce.c, clear
libexec_PROGRAMS.
* w32-ce.h, w32-ce.c: New files.

* priv-io.h: Include <sys/types.h>
* util.h: Likewise.

2010-05-11  Marcus Brinkmann  <marcus@g10code.de>

* w32-util.c: Include ath.h
(HAVE_ALLOW_SET_FOREGROUND_WINDOW) [!HAVE_W32CE_SYSTEM]: Define
it.
(RTLD_LAZY, dlopen, dlsym,
dlclose) [!HAVE_ALLOW_SET_FORGROUND_WINDOW]: Don't define anymore.
(_gpgme_allow_set_foreground_window) [!HAVE_ALLOW_SET_FOREGROUND_WINDOW]:
Make it a stub.
(read_w32_registry_string): Use FooA variants of Windows functions
instead of Foo (which dispatches depending on UNICODE).
[!HAVE_W32CE_SYSTEM]: Don't check environment.

(w32_shgetfolderpath): Remove.
(find_program_at_standard_place): Call
SHGetSpecialFolderPath
(which is available on all Windows systems
and also Windows CE).
(mkstemp): Use ath_self instead of getpid.
(_gpgme_mkstemp): Use GetTempPathA instead of GetTempPath.

* gpgme.h.in: Use _WIN32 instead of _MSC_VER. Include time.h for
time_t.

2010-05-07 Marcus Brinkmann <marcus@g10code.de>

* engine-g13.c, gpgme.c, engine-gpgsm.c, engine-gpg.c,
op-support.c, engine-assuan.c, gpgme-tool.c: Include <locale.h>
only if available with HAVE_LOCALE_H and conditionalize use of
LC_CTYPE on its definition.
* engine-gpgconf.c: Do not include <locale.h>.

* engine-gpgsm.c (gpgsm_new, start): Cast between int and
assuan_fd_t.
* assuan-support.c (my_pipe, my_close, my_read, my_write): Likewise.
* gpgme-tool.c (server_data_obj, server_reset_fds, gpgme_server),
(my_recvmsg, my_sendmsg, my_spawn): Likewise.
* engine-assuan.c (start): Likewise.
* engine-g13.c (start): Likewise.

2010-05-06 Marcus Brinkmann <marcus@g10code.de>

* w32-glib-io.c, w32-io.c, w32-qt-io.cpp,
w32-sema.c, w32-util.c:
Do not include <signal.h>.

* sign.c, data-user.c, conversion.c, debug.c, verify.c, data.c,
decrypt.c, delete.c, assuan-support.c, import.c, engine-gpgsm.c,
data-mem.c, op-support.c, w32-io.c, w32-util.c, data-compat.c: Use
gpg_error_from_syserror instead gpg_error_from_errno, and use
gpg_err_set_errno to set error number.
* setenv.c: Include <gpg-error.h> and define __set_errno to use
gpg_err_set_errno.
* gpgme-tool.c (ARGP_ERR_UNKNOWN): Define to EDEADLOCK (which is
mapped in Windows CE) instead of E2BIG (which is not).
(gt_import_keys): Initialize err.

2010-04-19 Marcus Brinkmann <marcus@g10code.de>

* assuan-support.c (my_spawn): Cast to avoid warning.
* engine-g13.c (g13_new): Make ARGV array of pointer to const

char.
(g13_assuan_simple_command) [!USE_DESCRIPTOR_FUNCTION]: Don't define.
* ops.h (_gpgme_key_append_name): Same in prototype.
* key.c (_gpgme_key_append_name): Make SRC argument pointer to
const char.
* posix-util.c
(_gpgme_get_uiserver_socket_path): Make HOMEDIR
const.
* vfs-mount.c (gpgme_op_vfs_transact_start): Never define this
potentially useful but currently unused function.
* vfs-create.c (gpgme_op_vfs_transact_start): Likewise.

2010-04-16 Werner Koch <wk@g10code.com>

* w32-io.c (is_socket): New.
(reader, writer): Use it to figure out the API to use.

2010-03-15 Werner Koch <wk@g10code.com>

* gpgme.h.in: Add autoconf template to set generated file to
read-only in an emacs buffer.

2010-03-12 Werner Koch <wk@g10code.com>

* gpgme.h.in (GPGME_STATUS_SUCCESS): Use the right file for the
change; see below.

* passwd.c (op_data_t): New.
(passwd_start): Setup OPD.
(passwd_status_handler): Return GPG_ERR_NOT_SUPPORTED if needed.
* context.h (OPDATA_PASSWD): New.
* gpgme.h (GPGME_STATUS_SUCCESS): New.

2010-03-09 Werner Koch <wk@g10code.com>

* engine-gpgsm.c (gpgsm_keylist): Try to start the agent.

2010-02-17 Werner Koch <wk@g10code.com>

* posix-io.c (notify_table):
Change implementation.
(notify_table_item_t, notify_table_size, notify_table_lock): New.
(_gpgme_io_close, _gpgme_io_set_close_notify): Adjust for new
implementation.

2010-02-16 Werner Koch <wk@g10code.com>

* gpgme-tool.c (spacep, has_option, skip_options): New.

(cmd_export): Implement option --minimal.

* gpgme.h.in (GPGME_EXPORT_MODE_MINIMAL): New.
* export.c (export_start, export_ext_start): Implement it.
* engine-gpg.c (export_common): Ditto.

2010-01-25 Werner Koch <wk@g10code.com>

* w32-io.c (_gpgme_io_connect): Fix return code check to make it work.

* version.c (do_subsystem_inits): Remove superfluous second
WSAStartup.

2010-01-22 Werner Koch <wk@g10code.com>

* w32-io.c (writer): Try to use send first.
(reader): Try to use recv first.

2010-01-08 Werner Koch <wk@g10code.com>

* engine-gpg.c (gpg_passwd): New.
(_gpgme_engine_ops_gpg): Register.
* passwd.c (parse_error): New.
(passwd_status_handler): Use it.

2010-01-07 Marcus Brinkmann <marcus@g10code.de>

*
gpgme-tool.c (result_xml_write_cb_t, struct result_xml_state):
New types.
(MAX_TAGS): New macro.
(result_init, result_xml_indent, result_xml_tag_start)
(result_xml_tag_data, result_xml_tag_end, result_add_error)
(result_add_pubkey_algo, result_add_hash_algo, result_add_keyid)
(result_add_fpr, result_add_timestamp, result_add_sig_mode)
(result_add_value, result_add_string, result_encrypt_to_xml)
(result_decrypt_to_xml, result_sign_to_xml)
(result_verify_to_xml, result_import_to_xml)
(result_genkey_to_xml, result_keylist_to_xml)
(result_vfs_mount_to_xml): New functions.
(gt_result): Rewritten.

2010-01-05 Werner Koch <wk@g10code.com>

* gpgme-tool.c (gt_passwd, cmd_passwd): New.
(register_commands): Register.

* gpgme.h.in (gpgme_op_passwd_start, gpgme_op_passwd): New.

```
* libgpgme.vers, gpgme.def: Add new functions.
* passwd.c: New.
* Makefile.am (main_sources): Add passwd.c
* engine.c, engine.h (_gpgme_engine_op_passwd): New.
* engine-backend.h (struct
engine_ops): Add PASSWD.
* engine-gpgsm.c (gpgsm_passwd): New.
(_gpgme_engine_ops_gpgsm): Register.
(gpgsm_reset): Reset only if we have a connection.

* gpgme.h.in (GPGME_PK_ECDSA, GPGME_PK_ECDH): New.
* gpgme.c (gpgme_pubkey_algo_name): Add them.

2009-12-22  Marcus Brinkmann  <marcus@g10code.de>

* debug.c: Test for TLS, not __GNUC__

2009-12-15  Marcus Brinkmann  <marcus@g10code.de>

* assuan-support.c (my_spawn): Calloc, not malloc, the fd_items.

2009-12-10  Werner Koch  <wk@g10code.com>

* debug.c (debug_init): Test on sgid process.

2009-12-08  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (LTRCCOMPILE): Refactor with ...
(RCCOMPILE): ... this new macro.
(SUFFIXES): Add .lo.
(gpgme_res_ldflag): Removed.
(gpgme_res): Use libtool object file name here.
(libgpgme_la_LDFLAGS): Remove gpgme_res_ldflag usage.
(libgpgme_la_LIBADD): Add gpgme_res.

* ath.c (ath_self) [HAVE_W32_SYSTEM]: Fix typo.

2009-12-02  Werner Koch  <wk@g10code.com>

* gpgconf.c (gpgme_conf_arg_release):
No return in a function
returning void.  Reported by Wyllys Ingersoll.

2009-12-01  Werner Koch  <wk@g10code.com>

* gpgme-tool.c (cmd_getauditlog): Add flag --html.
(hlp_getauditlog): New.
```

* gpgme-tool.c (GT_GCC_A_SENTINEL, GT_GCC_A_PRINTF): New.
(gt_write_status): Use sentinel.
(argp_error, log_error): Use printf attribute.
(argp_parse): Remove extra argument to argp_error.
(_gt_progress_cb, gt_get_engine_info, gt_get_keylist_mode)
(gt_result): Add NULL arg.

2009-11-26 Marcus Brinkmann <marcus@g10code.de>

* opassuan.c (opassuan_start): Allocate result structure before
beginning operation.

2009-11-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme-tool.c (gpgme_server): Use assuan_fd_t and assuan_fdopen
on fds.

2009-11-13 <wk@g10code.com>

* sign.c (_gpgme_sign_status_handler): Handle SIG_CREATED_SEEN.
* engine-uiserver.c (uiserver_sign): Make sending SENDER optional.

2009-11-10 Marcus Brinkmann <marcus@g10code.de>

* op-support.c (_gpgme_op_reset):
Instead of last change, only set
sub protocol if it is not the default.

2009-11-10 Werner Koch <wk@g10code.com>

* op-support.c (_gpgme_op_reset): Ignore GPG_ERR_NOT_IMPLEMENTED
while setting the sub protocol.

* engine-uiserver.c (uiserver_new): Pass fdpassing flag to
assuan_socket_connect.
(set_recipients): Replace fingerprint by user id.

* engine-gpgsm.c (set_recipients): Fix non-terminating loop in
case of a missing key.

2009-11-10 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (gpgme_new): Set default sub protocol.
* gpgme-tool.c: Implement get sub protocol.

* gpgme.h.in (gpgme_get_sub_protocol): Add prototype.
* gpgme.def, libgpgme.vers: Add gpgme_get_sub_protocol.
* context.h (struct gpgme_context): New member sub_protocol.

* gpgme.c (gpgme_set_sub_protocol): Set CTX->sub_protocol.
(gpgme_get_sub_protocol): New function.
* op-support.c (_gpgme_op_reset): Set sub protocol.

* Makefile.am (uiserver_components): New variable.
(main_sources):
Add it.
* ops.h, key.c (_gpgme_key_append_name): Take CONVERT argument,
implement it.  Adjust callers.
(gpgme_key_from_uid): New function.
* gpgme.h.in (gpgme_protocol_t): Add GPGME_PROTOCOL_DEFAULT.
(gpgme_encrypt_flags_t): Add GPGME_ENCRYPT_PREPARE,
GPGME_ENCRYPT_EXPECT_SIGN.
(gpgme_set_sub_protocol, gpgme_key_from_uid): New functions.
* libgpgme.vers, gpgme.def: Add new functions.
* gpgme.c (gpgme_set_protocol): Add UIServer protocol.
(gpgme_set_sub_protocol): New function.
(gpgme_get_protocol_name): Add UIServer and default protocol.
* assuan-support.c: Return correct error values, implement
socketpair for POSIX.
* priv-io.h, posix-io.c, w32-io.c, w32-glib-io.c,
w32-qt-io.cpp (_gpgme_io_spawn): Add ATFORK and ATFORKVALUE
arguments.  Implement it for POSIX.  Adjust all callers.
* engine.h, engine-backend.h (_gpgme_engine_set_protocol)
(_gpgme_engine_op_decrypt_verify): New prototypes.  Adjust all
users.
* engine.c (engine_ops, gpgme_get_engine_info): Add UIServer
engine.
(_gpgme_engine_set_protocol,
_gpgme_engine_op_decrypt_verify): New
function.
* decrypt-verify.c (decrypt_verify_start): Call
_gpgme_engine_op_decrypt_verify.
* util.h, posix-util.c,
w32-util.c (_gpgme_get_uiserver_socket_path): New function.
* engine-gpgsm.c (gpgsm_set_fd): Fix _gpgme_io_pipe invocation.
* gpgme-tool.c: Some support for UIServer protocol.
* engine-uiserver.c: New file.

2009-11-09  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_new): Close server side FDs.

2009-11-06  Marcus Brinkmann  <marcus@g10code.de>

* gpgme-tool.c (struct gpgme_tool): New members write_data and
write_data_hook.
(gt_write_data): New function.

(gt_result): Output vfs_mount result.
(server_write_data): New function.
(gpgme_server): Initialize write_data members.

2009-11-05 Marcus Brinkmann <marcus@g10code.de>

* engine-g13.c (struct engine_g13): Remove members RESULT_CB and
RESULT_CB_VALUE.
(g13_assuan_simple_command, status_handler): Don't use those
anymore.
(g13_transact): Remove them from argument list, too.
* vfs-mount.c (_gpgme_vfs_mount_status_handler): New function.
(_gpgme_op_vfs_mount): Pass it to transact.

* engine-assuan.c (llass_new): Update use of assuan_socket_connect.
* engine-gpgsm.c (gpgsm_new): Update use of assuan_pipe_connect.
* engine-g13.c (g13_new): Likewise.

* priv-io.h (IOSPAWN_FLAG_NOCLOSE): New flag.
* w32-io.c (_gpgme_io_spawn): Implement this flag.
* posix-io.c (_gpgme_io_spawn): Likewise.
* w32-glib-io.c (_gpgme_io_spawn): Likewise.
* assuan-support.c (my_spawn): Set this flag.

* decrypt.c (gpgme_op_decrypt_start): Fix use of debug macro.
* decrypt-verify.c (gpgme_op_decrypt_verify_start): Likewise.
* delete.c (gpgme_op_delete_start): Likewise.
* edit.c (gpgme_op_edit_start, gpgme_op_card_edit_start):
Likewise.
* encrypt.c (gpgme_op_encrypt_start): Likewise.
* encrypt-sign.c (gpgme_op_encrypt_sign_start): Likewise.
* export.c (gpgme_op_export_start, gpgme_op_export_ext_start)
(gpgme_op_export_keys_start,
gpgme_op_export_keys): Likewise.
* genkey.c (gpgme_op_genkey_start): Likewise.
* getauditlog.c (gpgme_op_getauditlog_start): Likewise.
* import.c (gpgme_op_import_start, gpgme_op_import_keys_start):
Likewise.
* opassuan.c (gpgme_op_assuan_transact_start): Likewise.
* sign.c (gpgme_op_sign_start): Likewise.
* verify.c (gpgme_op_verify_start): Likewise.
* vfs-create.c (gpgme_op_vfs_create): Likewise.
* vfs-mount.c (gpgme_op_vfs_mount): Likewise.

2009-11-04 Marcus Brinkmann <marcus@g10code.de>

* ath.h (ath_self): New prototype. Include <stdint.h>
* ath.c, ath-pth.c, ath-pthread.c (ath_self): New function.

* debug.h: Rewrite most macros to beautify debug output.
(_gpgme_debug_buffer): Remove tagname and tag argument.
(_gpgme_debug_frame_begin, _gpgme_debug_frame_end): New prototypes.
* debug.c: Include <time.h>.  Don't include assuan.h.
(frame_nr, FRAME_NR): New thread-specific variable and macro.
(debug_init): Do not initialize assuan.
Call _gpgme_debug after
initialization instead using printf directly.
(_gpgme_debug): Do not call debug_init (we now ensure proper
initialization by user).  Add timestamp and thread/process ID.
(_gpgme_debug_buffer): Do not take tagname and tag argument.
(_gpgme_debug_frame_begin, _gpgme_debug_frame_end): New functions.
* version.c (gpgme_check_version_internal, gpgme_check_version):
Fix debug string.  Do not initialize assuan.
* posix-io.c (get_max_fds): Use 0 not NULL (nicer debug output).

2009-11-04  Werner Koch  <wk@g10code.com>

* gpgme-tool.c (register_commands): Add HELP feature.

2009-11-03  Werner Koch  <wk@g10code.com>

* gpgme.h.in (GPGME_PROTOCOL_UISERVER): New.

2009-11-03  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (main_sources): Change g13.c to vfs-mount.c.  Add
vfs-create.c
* vfs-create.c: New file.
* g13.c: Renamed to ...
* vfs-mount.c: ... this new file.
* gpgme.h.in (gpgme_op_vfs_create): New prototype.
* gpgme.def, libgpgme.vers: Add gpgme_op_vfs_create.
*
gpgme-tool.c (gt_vfs_create, cmd_vfs_create): New functions.
(register_commands): Add VFS_CREATE and CREAET.

2009-11-02  Marcus Brinkmann  <marcus@g10code.de>

* debug.h (_gpgme_debug_buffer): Make TAG argument const const.
* debug.c (_gpgme_debug_buffer): Likewise.
* gpgme-tool.c (input_notify, output_notify): Adjust type to new
assuan interface.
* decrypt.c (gpgme_op_decrypt_result): Remove unused variable.
* opassuan.c (gpgme_op_assuan_transact): Fix return value.

2009-10-30  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (noinst_PROGRAMS): New target gpgme-tool.
(gpgme_tool_LDADD): New variable.
* gpgme-tool.c: New file.
* ops.h (_gpgme_sig_notation_clearm _gpgme_signers_clear): New
prototypes.
* gpgme.c (gpgme_set_protocol): Allow GPGME_PROTOCOL_GPGCONF (when
had that gone missing?).
(_gpgme_sig_notation_clear): New function without debug output.
(gpgme_release): Call it and _gpgme_signers_clear.
* signers.c (_gpgme_signers_clear): New
function without debug output.
* g13.c (gpgme_op_vfs_mount): Add debug output.
* assuan-support.c (my_spawn): Allow fd_child_list to be NULL.
* conversion.c (_gpgme_encode_percent_string): Fix infinite loop.
* debug.h: Put tag in front of debug lines, should make for nicer
output.
* engine-assuan.c (llass_new): Use our new system hooks for libassuan.
* engine-g13.c (g13_new): Remove redundant assuan context allocation.
* version.c (gpgme_check_version_internal): Delay debug output
until after gpgme_check_version was called.

2009-10-28 Marcus Brinkmann <marcus@g10code.de>

* signers.c, encrypt-sign.c, encrypt.c, delete.c, keylist.c,
edit.c, import.c, export.c: Fix last change in debug output.

2009-10-27 Marcus Brinkmann <marcus@g10code.de>

* edit.c (gpgme_op_edit_start, gpgme_op_edit)
(gpgme_op_card_edit_start, gpgme_op_card_edit): Add debug output.
* encrypt-sign.c (gpgme_op_encrypt_sign_start)
(gpgme_op_encrypt_sign): Likewise.
* encrypt.c (gpgme_op_encrypt_start,
gpgme_op_encrypt)
(gpgme_op_encrypt_result): Likewise.
* export.c (gpgme_op_export_start, gpgme_op_export)
(gpgme_op_export_ext_start, gpgme_op_export_ext)
(gpgme_op_export_keys_start, gpgme_op_export_keys): Likewise.
* genkey.c (gpgme_op_genkey_start, gpgme_op_genkey)
(gpgme_op_genkey_result): Likewise.
* getauditlog.c (gpgme_op_getauditlog_start)
(gpgme_op_getauditlog): Likewise.
* import.c (gpgme_op_import_result, gpgme_op_import_start)
(gpgme_op_import): Likewise.
* keylist.c (gpgme_op_keylist_result, keylist_colon_handler)
(gpgme_op_keylist_start, gpgme_op_keylist_ext_start)
(gpgme_op_keylist_next, gpgme_op_keylist_end, gpgme_get_key): Likewise.
* opassuan.c (gpgme_op_assuan_transact_start)

(gpgme_op_assuan_transact_ext, gpgme_op_assuan_result)
(gpgme_op_assuan_transact): Likewise.
* signers.c (gpgme_signers_add, gpgme_signers_clear): Likewise.
* trustlist.c (gpgme_op_trustlist_start)
(gpgme_op_trustlist_next, gpgme_op_trustlist_end): Likewise.
* verify.c (gpgme_op_verify_start,
gpgme_op_verify)
(gpgme_op_verify_result): Likewise.

2009-10-26 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h.in (struct gpgme_io_event_done_data)
(gpgme_io_event_done_data_t): New types.
(struct _gpgme_op_assuan_result): Deprecate the err member.
(gpgme_op_assuan_result): Deprecate (for now).
(gpgme_op_assuan_transact_ext): New prototype.
(gpgme_op_assuan_transact): Deprecate.
(struct _gpgme_op_g13_result): Replace with ...
(struct _gpgme_op_vfs_mount_result): ... this.
(gpgme_op_g13_mount): Replace with ...
(gpgme_op_vfs_mount): ... this.
* gpgme.def (gpgme_op_assuan_transact_ext, gpgme_wait_ext)
(gpgme_op_vfs_mount_result, gpgme_op_vfs_mount): New.
(gpgme_op_g13_mount): Remove.
* libgpgme.vers: Likewise.
* engine-backend.h (struct engine_ops): Remove RESULT_CB and
RESULT_CB_VALUE args in opassuan_transact member. Add CANCEL_OP
member.
* ops.h (_gpgme_cancel_with_err, _gpgme_wait_on_condition): Add
OP_ERR argument.
(_gpgme_wait_one_ext):
New prototype.
* context.h (ctx_op_data_id_t): Add OPDATA_VFS_MOUNT.
* engine-g13.c (g13_cancel_op): New function.
(parse_status): Remove declaration.
(g13_assuan_simple_command): Do nothing with status lines for now.
(status_handler): Update opaque value access.
(_gpgme_engine_ops_g13): Add new cancel_op member.
* gpgme.c (_gpgme_cancel_with_err): Add new parameter OP_ERR.
Handle operational errors.
(gpgme_cancel, gpgme_io_read, gpgme_io_write): Add debug output.
* data.c (_gpgme_data_inbound_handler)
(_gpgme_data_outbound_handler): Adjust opaque value access.
* engine-gpg.c (command_handler, status_handler)
(colon_line_handler): Likewise.
* engine-gpgsm.c (status_handler): Likewise.
* engine-gpg.c (_gpgme_engine_ops_gpg): Add cancel_op member.
* engine-gpgsm.c (_gpgme_engine_ops_gpgsm): Likewise.

* g13.c: Rewritten (and will be rewritten again).
* engine.h (_gpgme_engine_op_assuan_transact): Remove result_cb
and result_cb_value parameters from prototype.
(_gpgme_engine_cancel_op):
New prototype.
* engine.c (engine_ops) [! ENABLE_ASSUAN]: Add missing comma.
(_gpgme_engine_op_assuan_transact): Remove result_cb and
result_cb_value parameter.
(_gpgme_engine_cancel_op): New function.
* wait.h (_gpgme_run_io_cb): Add new argument OP_ERR.
(struct io_cb_data): New struct to pass opaque data and get a
op_err return value.  Needed because we can't modify I/O callback
handler signature because it is exposed to the user.
* wait.c (_gpgme_run_io_cb): Add OP_ERR parameter.  Handle
operational errors.
* wait-user.c (_gpgme_user_io_cb_handler): Handle operational
errors.
* wait-private.c (_gpgme_wait_on_condition): New argument to
retrieve the operational result.  Handle operational errors in
session based protocols.
(_gpgme_wait_one_ext): New function.
(_gpgme_wait_one): Pass argument in invocation of
_gpgme_wait_on_condition.
* wait-global.c (struct ctx_list_item): Add member OP_ERR.
(ctx_done): New argument OP_ERR.
(ctx_wait): New argument
OP_ERR.
(gpgme_wait_ext): New function based on gpgme_wait but handling
operational errors.
(gpgme_wait): Implement in term of gpgme_wait_ext.
* keylist.c (gpgme_op_keylist_next): Pass argument in invocation
of _gpgme_wait_on_condition.
* trustlist.c (gpgme_op_trustlist_next): Pass argument in
invocation of _gpgme_wait_on_condition.
* engine-assuan.c (struct engine_llass): Replace members RESULT_CB
and RESULT_CB_VALUE by LAST_OP_ERR.
(_gpgme_engine_assuan_last_op_err): Add this hack function.
(llass_cancel_op): New function.
(_gpgme_engine_llass_ops): Add cancel_op member.
(llass_status_handler): Update opaque value access.
(llass_transact): Remove RESULT_CB and RESULT_CB_VALUE arguments.
* opassuan.c: Move compat hacks to the end of file.
(opassuan_start): Do not set OPD->result.err.
Do not pass RESULT_Cb and CTX to _gpgme_engine_op_assuan_transact.
(gpgme_op_assuan_transact_ext): New function.

* debug.h (DEBUG_GLOBAL): New debug level.
* conversion.c (gnupg_errors,

_gpgme_map_gnupg_error): Removed.
* data-user.c (gpgme_data_new_from_cbs): Add debug output.
* data-fd.c (gpgme_data_new_from_fd): Likewise.
* data-stream.c (gpgme_data_new_from_stream): Likewise.
* decrypt.c (gpgme_op_decrypt_result, gpgme_op_decrypt_start)
(gpgme_op_decrypt): Likewise.
* delete.c (gpgme_op_delete_start, gpgme_op_delete): Likewise.
* decrypt-verify.c (gpgme_op_decrypt_verify_start)
(gpgme_op_decrypt_verify): Likewise.
* sign.c (gpgme_op_sign_result): Fix debug message.
* data-mem.c (gpgme_data_new): Improve debug output.
* verify.c (parse_trust): Use atoi instead of
_gpgme_map_gnupg_error.
* decrypt.c (_gpgme_decrypt_status_handler): Likewise.

2009-10-22 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am: Remove @NETLIBS@ from LIBADDs.
(g13_components): New variable.
(main_sources): Add $(g13_components).
* g13.c, engine-g13.c: New files.
* engine.c (engine_ops): Check for assuan for assuan engine, add
g13 engine.
* util.h (_gpgme_get_g13_path,
_gpgme_encode_percent_string): New
prototypes.
* conversion.c (_gpgme_encode_percent_string): New function.
* gpgme.h.in (gpgme_protocol_t): Add GPGME_PROTOCOL_G13.
(struct _gpgme_op_g13_result, gpgme_g13_result_t): New types.
(gpgme_op_g13_mount): New function.
* gpgme.def, libgpgme.vers: Add gpgme_op_g13_mount.
* gpgme.c (gpgme_set_protocol): Allow GPGME_PROTOCOL_G13.
(gpgme_get_protocol_name): Add GPGME_PROTOCOL_G13.
* posix-util.c (_gpgme_get_g13_path): New function.
* w32-util.c (_gpgme_get_g13_path): New function.
* engine-backend.h (_gpgme_engine_ops_g13): New declaration.

2009-10-20 Marcus Brinkmann <marcus@g10code.de>

* gpgme-config.in (netlibs): Remove.
(assuan_cflags, assuan_libs): Add.

* Makefile.am (assuan_cppflags, assuan_libobjs): Removed.
(gpgsm_components): Move engine-assuan.c to ...
(assuan_components): ... this new variable.
(main_sources): Add this new variable.
(AM_CPPFLAGS): Remove $(assuan_cppflags).
(AM_CFLAGS): Add @LIBASSUAN_CFLAGS@.

(libgpgme_la_DEPENDENCIES,
libgpgme_pth_la_DEPENDENCIES)
(libgpgme_glib_la_DEPENDENCIES, libgpgme_qt_la_DEPENDENCIES)
(libgpgme_pthread_la_DEPENDENCIES): Remove $(assuan_libobjs).
(libgpgme_la_LIBADD, libgpgme_pth_la_LIBADD)
(libgpgme_glib_la_LIBADD, libgpgme_qt_la_LIBADD))
(libgpgme_pthread_la_LIBADD): Replace $(assuan_libobjs) by
@LIBASSUAN_LIBS@.
* priv-io.h [!HAVE_W32_SYSTEM]: Declare _gpgme_io_recvmsg,
_gpgme_io_sendmsg, _gpgme_io_waitpid.
* engine-backend.h: Define with [ENABLE_ASSUAN] instead
of [ENABLE_GPGSM].
* posix-io.c (_gpgme_io_waitpid): Make non-static.
* util.h (ENABLE_ASSUAN): Declare _gpgme_assuan_system_hooks,
_gpgme_assuan_malloc_hooks, _gpgme_assuan_log_cb.
* engine-gpgsm.c: Don't map assuan error codes. Use
assuan_release instead of assuan_disconnect.
(map_assuan_error): Remove function.
(gpgsm_new): Use new assuan context interface.
* engine-assuan.c: Use assuan_release instead of
assuan_disconnect.
(llass_new): Use new assuan context
interface.

2009-10-07 <wk@g10code.com>

* priv-io.h [W32]: Include windows.h instead of sys/socket.h.

2009-08-06 Werner Koch <wk@g10code.com>

* op-support.c (_gpgme_parse_inv_recp): Allow for no fingerprint.

* engine-gpgsm.c (gpgsm_sign): Hook up the status func for the
SIGNER command.
* gpgme.h.in (GPGME_STATUS_INV_SGNR, GPGME_STATUS_NO_SGNR): New.
* sign.c (op_data_t): Add fields IGNORE_INV_RECP and INV_SGNR_SEEN.
(_gpgme_op_sign_init_result): Factor code out to ...
(sign_init_result): .. new. Init new fields.
(sign_start): Use sign_init_result.
(_gpgme_sign_status_handler): Take care of the new INV_SGNR.
Return an error if no signature has been created.

2009-07-07 Werner Koch <wk@g10code.com>

* engine-gpgsm.c (struct engine_gpgsm): Add fields
input_helper_data and input_helper_memory.
(close_notify_handler): Release these new fields.
(gpgsm_import): Implement the keyarray feature.

* engine-gpg.c (gpg_import): Actually return GPG_ERR_INV_VALUE.

*
engine-gpgsm.c (gpgsm_import): Return an error for unknown data
encodings.

2009-06-22  Marcus Brinkmann  <marcus@g10code.de>

* debug.h: Everywhere, use %p instead of 0x%x to print pointer.
[HAVE_STDINT_H]: Include <stdint.h>.
(_TRACE, TRACE, TRACE0, TRACE1, TRACE2, TRACE3, TRACE6): Cast tag
to (uintptr_t) before casting it to (void*) to silence GCC
warning.

* gpgme.h.in (_GPGME_DEPRECATED_OUTSIDE_GPGME): New macro.
* sign.c (_GPGME_IN_GPGME): Define it.
* keylist.c (_GPGME_IN_GPGME): Define it.

* debug.c (_gpgme_debug_begin, _gpgme_debug_add): Handle error in
vasprintf and asprintf.

* priv-io.h: Include <sys/socket.h>.  Declare _gpgme_io_connect.

2009-06-18  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h.in (GPGME_CONF_PATHNAME): Revert last change, it's
back! (GPA still uses it...).

* gpgme.def: Fix stupid typo.
* w32-io.c (_gpgme_io_pipe): Add missing declaration.

* gpgme.h.in (GPGME_CONF_PATHNAME): Remove obsolete macro.

* w32-io.c (_gpgme_io_pipe): Allocate
reader/writer thread right
away.
(_gpgme_io_read, _gpgme_io_write, _gpgme_io_select)
(_gpgme_io_dup): Never allocate threads here.
(find_writer, find_reader): Check return value of thread creation
function.

* context.h (CTX_OP_DATA_MAGIC): New macro.
(struct ctx_op_data): New member MAGIC.
* op-support.c (_gpgme_op_data_lookup): Initialize magic.
* gpgme.c (gpgme_result_unref, gpgme_result_ref): Check magic.

2009-06-16  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c (gpgme_result_unref): Hot fix to release a lock.

* gpgme.c (result_ref_lock): New global variable.
(gpgme_result_ref, gpgme_result_unref): use it.

2009-06-16  Werner Koch  <wk@g10code.com>

* version.c: Include stdlib.h.

* gpgme.h.in (gpgme_data_encoding_t): Add GPGME_DATA_ENCODING_URL,
GPGME_DATA_ENCODING_URLESC, GPGME_DATA_ENCODING_URL0.
* data.c (gpgme_data_set_encoding): Adjust for new values.
* engine-gpg.c (string_from_data): New.
(gpg_import): Implement --fetch-key feature.

* gpgme.h.in
(gpgme_op_export_keys_start, gpgme_op_export_keys): New.
* gpgme.def, libgpgme.vers: Add them.
* export.c (gpgme_op_export_keys_start, gpgme_op_export_keys): New.
(export_keys_start): New.

* gpgme.h.in (gpgme_export_mode_t, GPGME_EXPORT_MODE_EXTERN): New.
(gpgme_op_export_start, gpgme_op_export, gpgme_op_export_ext_start)
(gpgme_op_export_ext): Change arg RESERVED to MODE of new
compatible type.
* export.c (gpgme_export_ext_start, gpgme_op_export)
(gpgme_op_export_ext_start, gpgme_op_export_ext): Ditto.
(export_start): Ditto.
* engine.c (_gpgme_engine_op_export): Ditto.
* engine-backend.h (struct engine_ops): Ditto.
* engine-gpgsm.c (gpgsm_export, gpgsm_export_ext): Ditto.
* engine-gpg.c (gpg_export, gpg_export_ext): Ditto.  Implement
mode EXTERN.
(gpg_export, gpg_export_ext): Factor common code out to ..
(export_common): .. this.

* gpgme.h.in (gpgme_op_import_keys_start, gpgme_op_import_keys): New.
* gpgme.def, libgpgme.vers: Add them.
* import.c (gpgme_op_import_keys_start,
gpgme_op_import_keys): New.
(_gpgme_op_import_keys_start): New.
* engine.c (_gpgme_engine_op_import): Add arg KEYARRAY.
* engine-backend.h (struct engine_ops): Ditto.
* engine-gpgsm.c (gpgsm_import): Ditto.  Not functional.
* engine-gpg.c (gpg_import): Ditto.  Implement it.

2009-06-15  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h.in (gpgme_result_ref, gpgme_result_unref): Add
prototypes.
* gpgme.def, libgpgme.vers (gpgme_result_ref, gpgme_result_unref):
Add these.
* context.h (struct ctx_op_data): Add member "references".
* gpgme.c (gpgme_result_ref, gpgme_result_unref): New functions.
(_gpgme_release_result): Use gpgme_result_unref.
* op-support.c (_gpgme_op_data_lookup): Initialize references.

2009-06-12 Werner Koch <wk@g10code.com>

* gpgme-w32spawn.c (translate_get_from_file): Parse optional spawn
flags. Add new arg R_FLAGS. Fix segv on file w/o LF.
(translate_handles): Add new arg R_FLAGS. Avoid possible segv.
(main): Pass flags for my_spawn.
(my_spawn):
Add arg FLAGS and implement AllowSetForegroundWindow.

* priv-io.h (IOSPAWN_FLAG_ALLOW_SET_FG): New.
* w32-io.c (_gpgme_io_spawn): Add arg FLAGS and implement it.
* w32-glib-io.c (_gpgme_io_spawn): Ditto.
* w32-qt-io.cpp (_gpgme_io_spawn): Ditto.
* posix-io.c (_gpgme_io_spawn): Add dummy arg FLAGS.
* engine-gpg.c (start): Call spawn with new flag.

* w32-util.c (_gpgme_allow_set_foregound_window): Rename to
_gpgme_allow_set_foreground_window. Change all callers.
* posix-util.c (_gpgme_allow_set_foreground_window): Ditto.

2009-06-10 Werner Koch <wk@g10code.com>

* w32-util.c (_gpgme_allow_set_foregound_window): Add trace support.

2009-06-09 Werner Koch <wk@g10code.com>

* engine-gpg.c (gpg_io_event): Test for cmd.fd.

* version.c (gpgme_check_version_internal): Make result const.

* gpgme.c: Include priv-io.h.
(gpgme_io_read, gpgme_io_write): New.
* libgpgme.vers (GPGME_1.1): Add them.
* gpgme.def: Ditto.

* Makefile.am (main_sources): Remove gpgme.h.
(include_HEADERS):

Rename to nodist_include_HEADERS so that a
VPATH build won't use the distributed one.

* util.h (GPG_ERR_NOT_OPERATIONAL): Define.

2009-05-28  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h.in (gpgme_check_version_internal): New prototype.
(gpgme_check_version): New macro, overriding function of the same
name.
* libgpgme.vers, gpgme.def: Add gpgme_check_version_internal.o
* context.h (_gpgme_selftest): New variable declaration.
* version.c: Include "context.h".
(gpgme_check_version): Set _gpgme_selftest on success.
(gpgme_check_version_internal): New function.
* gpgme.c (_gpgme_selftest): Define it.
(gpgme_new): Check the selftest result.

2009-05-18  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h.in (gpgme_encrypt_flags_t): Add
GPGME_ENCRYPT_NO_ENCRYPT_TO.
* engine-gpg.c (gpg_encrypt): Pass --no-encrypt-to to gpg if
GPGME_ENCRYPT_NO_ENCRYPT_TO flag is set.

2009-05-14  Werner Koch  <wk@g10code.com>

* gpgme.h.in (gpgme_status_code_t):
Explicitly initialize for
better maintainability and to help debugging.

2009-05-05  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h.in: Add compile time check for _FILE_OFFSET_BITS.

2009-04-15  Marcus Brinkmann  <marcus@g10code.de>

* posix-io.c (_gpgme_io_socket, _gpgme_io_connect): New functions.
* w32-io.c (_gpgme_io_connect): Fix stupid error.

2009-04-08  Marcus Brinkmann  <marcus@g10code.de>

* w32-glib-io.c (giochannel_table): New members used, fd, socket.
(find_channel): Drop CREATE argument.
(new_dummy_channel_from_fd, new_channel_from_fd)
(new_channel_from_socket): New functions.
(_gpgm_io_fd2str): Implement for sockets.
(_gpgme_io_write, _gpgme_io_read): Translate EAGAIN errors

correctly.
(_gpgme_io_pipe): Fix for new channel bookkeeping.
(_gpgme_io_close, _gpgme_io_dup): Likewise.
(wsa2errno, _gpgme_io_socket, _gpgme_io_connect): New.
* w32-io.c (MAX_READERS, MAX_WRITERS): Bump up to 40.
(wsa2errno, _gpgme_io_socket, _gpgme_io_connect): New.
* w32-qt-io.cpp
(_gpgme_io_socket, _gpgme_io_connect): New stubs.
* version.c [HAVE_W32_SYSTEM]: Include "windows.h.
(do_subsystem_inits) [HAVE_W32_SYSTEM]: Call WSAStartup.
* engine-assuan.c (llass_status_handler): Ignore EAGAIN errors.

2009-03-18 Werner Koch <wk@g10code.com>

* gpgme.h.in (GPGME_KEYLIST_MODE_EPHEMERAL): New.
* engine-gpgsm.c (gpgsm_keylist): Send new option.

2009-03-13 Werner Koch <wk@g10code.com>

* gpgme-config.in: Make sure locale is set to C.

2009-02-24 Werner Koch <wk@g10code.com>

* gpgme.h.in (struct _gpgme_op_assuan_result): New.
(gpgme_assuan_result_t): New.
(gpgme_op_assuan_result): Change return type.
(struct _gpgme_assuan_sendfnc_ctx)
(gpgme_assuan_sendfnc_ctx_t, gpgme_assuan_sendfnc_t):Remove.
(gpgme_assuan_inquire_cb_t): Changed.
* opassuan.c (op_data_t): Make use of a result structure.
(gpgme_op_assuan_result): Change return type.
(opassuan_start): Use result structure.
(result_cb): Ditto.
* engine-assuan.c (struct _gpgme_assuan_sendfnc_ctx):
Remove.
(inquire_cb_sendfnc): Remove.
(inquire_cb): Change for new callback scheme. Not yet finished.
(llass_status_handler): Allow sending a CANCEL from the inquire CB.

2009-02-04 Werner Koch <wk@g10code.com>

* w32-glib-io.c (_gpgme_io_spawn): Make ARGV argument const to
match prototype.
* w32-qt-io.cpp (_gpgme_io_spawn): Ditto.

2009-02-03 Werner Koch <wk@g10code.com>

* gpgme.h.in (struct _gpgme_subkey): Add fields IS_CARDKEY and

CARD_NUMBER..
* key.c (gpgme_key_unref): Release field CARD_NUMBER.
* keylist.c (keylist_colon_handler): Factor common code out to ...
(parse_sec_field15): New. Set card number.

2009-01-26 Werner Koch <wk@g10code.com>

* opassuan.c, dirinfo.c, engine-assuan.c: New.
* Makefile.am: Add them.
* engine-backend.h: Add _gpgme_engine_ops_assuan.
(struct engine_ops): Add field OPASSUAN_TRANSACT. Update all
engine intializers.
* Makefile.am (gpgsm_components): Add engine-assuan.c.
* gpgme.h.in (gpgme_protocol_t): Add GPGME_PROTOCOL_ASSUAN.
(gpgme_assuan_data_cb_t,
gpgme_assuan_sendfnc_ctx_t)
(gpgme_assuan_inquire_cb_t, gpgme_assuan_status_cb_t): New.
(gpgme_op_assuan_transact_start, gpgme_op_assuan_transact): New.
* gpgme.c (gpgme_get_protocol_name): Ditto.
(gpgme_set_protocol): Support it.
* engine.c (gpgme_get_engine_info): Ditto.
(engine_ops): Register it.
(_gpgme_engine_op_assuan_transact): New.
* libgpgme.vers (gpgme_op_assuan_transact_start)
(gpgme_op_assuan_transact): New.
* gpgme.def (gpgme_op_assuan_transact_start)
(gpgme_op_assuan_transact): New.
* engine-backend.h (struct engine_ops): Add GET_HOME_DIR and
initialize to NULL for all engines.
* engine.c (engine_get_home_dir): New.
(gpgme_get_engine_info): Use it.
(_gpgme_set_engine_info): Use it.
* engine.h (engine_assuan_result_cb_t): New.
* context.h (ctx_op_data_id_t): Add OPDATA_ASSUAN.

* util.h (GPG_ERR_UNFINISHED): Define if not yet defined.

* version.c (gpgme_check_version): Protect trace arg against NULL.

2009-01-19 Werner
Koch <wk@g10code.com>

* rungpg.c: Rename to engine-gpg.c
* Makefile.am (main_sources): Ditto.

2008-12-03 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (status-table.h): Use $(builddir) to find gpgme.h.

2008-11-18  Werner Koch  <wk@g10code.com>

* version.c (do_subsystem_inits): Always initialize I/O
subsystem.  Fixes regression from 2007-08-02.

* decrypt.c (_gpgme_decrypt_status_handler): Use
_gpgme_map_gnupg_error to parse the error code for decrypt.algorithm.

2008-10-30  Marcus Brinkmann  <marcus@g10code.de>

* wait-private.c (_gpgme_wait_on_condition): Remove unused
variable IDX.
* wait-global.c: Include ops.h to silence gcc warning.
(_gpgme_wait_global_event_cb): Pass error value directly.
* wait-user.c: Include ops.h to silence gcc warning.

* posix-io.c (_gpgme_io_spawn): Make ARGV argument const to
silence gcc warning.  Cast argument to execv to silence warning.
* w32-io.c (_gpgme_io_spawn): Likewise.
* priv-io.h (_gpgme_io_spawn): Likewise for
prototype.

2008-10-24  Werner Koch  <wk@g10code.com>

* rungpg.c (gpg_keylist_preprocess): Escape backslashes too.

2008-10-23  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (gpg_keylist_preprocess): Convert percent escaped
string to C coded string.

2008-10-20  Werner Koch  <wk@g10code.com>

* Makefile.am (EXTRA_DIST): Add gpgme.h.in.

* gpgme.h: Rename to gpgme.h.in.
* gpgme.h.in (GPGME_VERSION): Use autoconf substitution.

* posix-io.c: Include sys/uio.h.  Fixes bug #818.

2008-10-18  Marcus Brinkmann  <marcus@g10code.com>

* w32-util.c (find_program_in_registry): Don't define.
(_gpgme_get_gpg_path, _gpgme_get_gpgsm_path)
(_gpgme_get_gpgconf_path): Do not check for fooProgram in the
registry anymore.  It is now no longer possible to overwrite the
default location in that way.

2008-10-17  Werner Koch  <wk@g10code.com>

* w32-glib-io.c (_gpgme_io_fd2str): Use "%d" and not "%ld" to work
around a bug in mingw32.

2008-09-23  Marcus Brinkmann  <marcus@g10code.com>

*
gpgme.c (gpgme_sig_notation_clear): Clear CTX->sig_notations.
Submitted by "Daniel Mueller" <daniel@danm.de>

2008-09-16  Marcus Brinkmann  <marcus@g10code.com>

* rungpg.c (gpg_new): Don't use errno with ttyname_r.

2008-08-11  Marcus Brinkmann  <marcus@g10code.com>

* rungpg.c (gpg_cancel): Remove cmd fd before status fd.
* gpgme.c (_gpgme_cancel_with_err): New function.
(gpgme_cancel): Reimplement in terms of _gpgme_cancel_with_err.
* wait-private.c (_gpgme_wait_on_condition): Use
_gpgme_cancel_with_err.
* wait-user.c (_gpgme_user_io_cb_handler): Likewise.
* wait-global.c (_gpgme_wait_global_event_cb, gpgme_wait): Likewise.

2008-08-08  Marcus Brinkmann  <marcus@g10code.com>

* rungpg.c (command_handler): Remove I/O callback on error, too.

2008-06-29  Marcus Brinkmann  <marcus@g10code.com>

* gpgme.c (gpgme_cancel_async): Remove unused variable.

2008-06-27  Marcus Brinkmann  <marcus@g10code.de>

* libgpgme.vers: Add gpgme_cancel_async.
* gpgme.def: Likewise.

* context.h:
Include "sema.h".
(struct gpgme_context): New members lock and canceled.
* gpgme.c (gpgme_new): Initialize lock.
(gpgme_release): Destroy lock.
(gpgme_cancel_async): New function.
* op-support.c (_gpgme_op_reset): Reset the canceled flag.
* wait-global.c (gpgme_wait): Check cancel flag before processing
any I/O callbacks.

* wait-private.c (_gpgme_wait_on_condition): Likewise.
* wait-user.c (_gpgme_user_io_cb_handler): Likewise.

2008-06-26 Werner Koch <wk@g10code.com>

* w32-util.c (_gpgme_mkstemp): Replace sprint by stpcpy.
(mkstemp): Need to use GetSystemTimeAsFileTime for better
compatibility.

2008-06-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme-w32spawn.c: New file.
* Makefile.am (libexec_PROGRAMS) [HAVE_W32_SYSTEM]: New variable
with gpgme-w32spawn.
* engine-gpgsm.c (gpgsm_new): Use server translated handles.
(gpgsm_set_locale): Return early if locale value is NULL.
* util.h (_gpgme_mkstemp)
(_gpgme_get_w32spawn_path) [HAVE_W32_SYSTEM]: New function
prototypes.
*
w32-util.c: Include <stdint.h>, <sys/stat.h> and <unistd.h>.
(letters, mkstemp, _gpgme_mkstemp, _gpgme_get_w32spawn_path): New
functions.
* rungpg.c (gpg_decrypt, gpg_encrypt, gpg_encrypt_sign)
(gpg_genkey, gpg_import, gpg_verify, gpg_sign): Pass data over
special filename FD rather than stdin.
(struct arg_and_data_s): Add member ARG_LOCP.
(struct fd_data_map_s): Add member ARG_LOC.
(struct engine_gpg): Add member ARG_LOC to status and colon.
(_add_arg, add_arg_with_locp): New function.
(add_arg_ext): Reimplement in terms of _add_arg.
(gpg_new): Remember argument location for status FD.
(build_argv): Set argument location if requested. Also set
argument location of fd_data_map for data items.
(start): Adjust caller of _gpgme_io_spawn.
* priv-io.h (struct spawn_fd_item_s): Add members peer_name and
arg_loc.
(_gpgme_io_spawn): Remove parent fd list argument.
* posix-io.c (get_max_fds): New function.
(_gpgme_io_dup): Add tracing.
(_gpgme_io_spawn):
Remove parent fd list. Change meaning of child
fd list to contain all child fds that should be inherited. Close
all other file descriptors after fork.
* w32-io.c, w32-glib-io.c, w32-qt-io.c(_gpgme_io_spawn): Remove
parent fd list. Change meaning of child fd list to contain all
child fds that should be inherited. Do not inherit any file
descriptors, but DuplicateHandle them. Spawn process through

wrapper process. Provide wrapper process with a temporary file
containing handle translation data. Return translated handle
names.
* w32-io.c (reader): Add more tracing output.
(_gpgme_io_read): Likewise.
* engine-gpgconf.c (gpgconf_read): Adjust caller of
_gpgme_io_spawn.
* version.c (_gpgme_get_program_version): Likewise.

2008-06-20 Werner Koch <wk@g10code.com>

* engine-gpgconf.c (gpgconf_read): Change ARGV initialization for
compatibility with old compilers. Fix amount of memmove. Fix
CR removal.

2008-06-19 Werner Koch <wk@g10code.com>

* gpgme.h (GPGME_CONF_PATHNAME):
Replace by GPGME_CONF_FILENAME,
change all callers and provide compatibility macro.
(gpgme_conf_type_t): Add complex types 34..37.
* engine-gpgconf.c (gpgconf_parse_option, arg_to_data)
(_gpgme_conf_arg_new, _gpgme_conf_arg_release): Add new types.

2008-06-19 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgconf.c (gpgconf_parse_option): Fix comma detection.

2008-05-09 Werner Koch <wk@g10code.com>

* engine-gpgconf.c (gpgconf_read): Do not pass empty lines to the
callback.

2008-05-07 Werner Koch <wk@g10code.com>

* engine-gpgconf.c (gpgconf_write): Change argv[0] to a
self-explaining string. Needs a proper fix, though.

* rungpg.c (gpg_keylist, gpg_keylist_ext): Factor common code out
to ..
(gpg_build_keylist_options): .. new. Allow combination of extern
and intern mode.
(gpg_new): DFT_TTYNAME is an array, thus check the first character.

2008-05-06 Werner Koch <wk@g10code.com>

* version.c (extract_version_string): New.
(_gpgme_get_program_version):

Use it to allow for suffixes in the
version line.

2008-04-28  Werner Koch  <wk@g10code.com>

* engine-gpgconf.c (gpgconf_read): Fixed segv.  Avoid memmove for
each line.

2008-04-22  Marcus Brinkmann  <marcus@g10code.de>

* w32-qt-io.cpp, kdpipeiodevice.cpp: New versions from Frank
Osterfeld, implement blocking select.

2008-03-11  Marcus Brinkmann  <marcus@g10code.de>

* data.c (gpgme_data_read, gpgme_data_write): Retry on EINTR.

2008-03-06  Marcus Brinkmann  <marcus@g10code.de>

* key.c (_gpgme_key_add_sig): Terminate UID in case SRC is NULL.
Reported by Marc Mutz.

2008-03-05  Marcus Brinkmann  <marcus@g10code.de>

* decrypt.c (release_op_data): Release OPD->result.recipients.
* encrypt.c (release_op_data): Release invalid_recipient.

2008-02-15  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgconf.c (gpgconf_read): Fix end-of-line handline.

2008-02-14  Werner Koch  <wk@g10code.com>

* w32-io.c (_gpgme_io_spawn): Add arg R_PID to return the pid.
* posix-io.c
(_gpgme_io_spawn): Ditto.
* w32-glib-io.c (_gpgme_io_spawn): Ditto.
* w32-qt-io.cpp (_gpgme_io_spawn): Ditto.
* priv-io.h (_gpgme_io_spawn): Adjust prototyp and change all callers.
* rungpg.c (start): Call _gpgme_allow_set_foregound_window.

* w32-util.c (_gpgme_allow_set_foregound_window): New.
* posix-util.c (_gpgme_allow_set_foregound_window): New.
* engine-gpgsm.c (default_inq_cb): New.
(gpgsm_new) [W32]: Enable pinentry notifications.
(status_handler): Handle inquiries.

2008-01-30  Marcus Brinkmann  <marcus@g10code.de>

* kdpipeiodevice.cpp: New version by Frank Osterfeld, fixes race
condition.

2008-01-28  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (map_input_enc): Rename to ...
(map_data_enc): ... this.  Also change all callers.
(gpgsm_encrypt, gpgsm_export, gpgsm_export_ext, gpgsm_genkey)
(gpgsm_sign): Set encoding for output.

2008-01-28  Werner Koch  <wk@g10code.com>

* keylist.c (gpgme_get_key): Skip duplicated keys.  Fixes bug 876.

2008-01-14
Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgconf.c (gpgconf_config_load_cb): Fix program_name
field.

2008-01-10  Marcus Brinkmann  <marcus@g10code.de>

* kdpipeiodevice.cpp: New version from Frank Osterfeld.

* engine-gpgconf.c (gpgconf_config_load_cb2): Handle the flag
NO_ARG_DESC.

2008-01-04  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (gpgconf_components): New variable.
(main_sources): Add gpgconf.c.
* gpgme.h (gpgme_protocol_t): New protocol GPGME_PROTOCOL_GPGCONF.
(gpgme_conf_level_t, gpgme_conf_type_t, gpgme_conf_arg_t)
(gpgme_conf_opt_t, gpgme_conf_comp_t, gpgme_conf_arg_new)
(gpgme_conf_arg_release, gpgme_conf_opt_change)
(gpgme_conf_release, gpgme_op_conf_load, gpgme_op_conf_save): New
types.
* gpgconf.c, engine-gpgconf.c: New files.
* engine.h: (_gpgme_engine_op_conf_load,
(_gpgme_engine_op_conf_save): New prototypes.
* op-support.c (_gpgme_op_reset): Ignore not implemented locale
function.
* posix-util.c (_gpgme_get_gpgconf_path): New
function.
* w32-util.c (_gpgme_get_gpgconf_path): New function.
* engine-gpgsm.c:
(_gpgme_engine_ops_gpgsm): Add stubs for conf_load and conf_save.

* rungpg.c:
(_gpgme_engine_ops_gpg): Add stubs for conf_load and conf_save.
* gpgme.def: Add new gpgconf related interfaces.
* libgpgme.vers: Likewise.
* util.h (_gpgme_get_gpgconf_path): New prototype.
* gpgme.h (gpgme_protocol_t): Add GPGME_PROTOCOL_GPGCONF.
* engine-backend.h (_gpgme_engine_ops_gpgconf): New prototype.
(struct engine_ops): Add members for conf_load and conf_save.
* engine.c (engine_ops): Add _gpgme_engine_ops_gpgconf.
(_gpgme_engine_op_conf_load,
(_gpgme_engine_op_conf_save): New functions.
(gpgme_get_engine_info): Allow protocol GPGME_PROTOCOL_GPGCONF.

2007-11-28 Marcus Brinkmann <marcus@g10code.de>

* w32-util.c (_gpgme_get_gpg_path, _gpgme_get_gpgsm_path): Search
for installation directory. Remove old fallback default.
(find_program_in_inst_dir): New function.

2007-11-26 Werner Koch <wk@g10code.com>

*
engine-gpgsm.c (struct engine_gpgsm): Add field INLINE_DATA and
always reset it before calling start.
(gpgsm_new): Clear it.
(status_handler): Implement it.
(gpgsm_getauditlog) [USE_DESCRIPTOR_PASSING]: Use INLINE_DATA.

2007-11-23 Werner Koch <wk@g10code.com>

* op-support.c (_gpgme_op_reset): Implement a no-reset flag.
* getauditlog.c (getauditlog_start): Use that flag.

2007-11-20 Werner Koch <wk@g10code.com>

* op-support.c (_gpgme_parse_inv_recp): Add new reason code 11.

2007-11-22 Werner Koch <wk@g10code.com>

* gpgme.h (gpgme_op_getauditlog_start, gpgme_op_getauditlog): New.
* libgpgme.vers: Ditto.
* gpgme.def: Ditto.
* getauditlog.c: New.
* engine-backend.h (struct engine_ops): Add member GETAUDITLOG.
* engine-gpgsm.c (gpgsm_getauditlog): New.
(_gpgme_engine_ops_gpgsm): Insert new function.
(gpgsm_new): Try to enable audit log support.
* rungpg.c (_gpgme_engine_ops_gpg): Insert dummy entry.

2007-11-12  Marcus Brinkmann  <marcus@g10code.de>

*
kdpipeiodevice.cpp: New version from Frank Osterfeld.

2007-10-11  Marcus Brinkmann  <marcus@g10code.de>

* kdpipeiodevice.cpp: New version from Frank Osterfeld.

2007-10-09  Marcus Brinkmann  <marcus@g10code.de>

* kdpipeiodevice.cpp: New version from Frank Osterfeld and Marc
Mutz.

2007-10-05  Marcus Brinkmann  <marcus@g10code.de>

* kdpipeiodevice.cpp, w32-qt-io.cpp: New versions from Frank
Osterfeld.

2007-10-04  Marcus Brinkmann  <marcus@g10code.de>

* kdpipeiodevice.h, kdpipeiodevice.cpp, kdpipeiodevice.moc,
w32-qt-io.cpp: New versions from Frank Osterfeld.

2007-10-02  Marcus Brinkmann  <marcus@g10code.de>

* kdpipeiodevice.cpp, kdpipeiodevice.moc: New versions.
* w32-qt-io.cpp (_gpgme_io_fd2str): Print actual_fd if available.
(_gpgme_io_dup): Only acquire a reference, do not actually dup.
Submitted by Frank Osterfeld.

* priv-io.h, engine-gpgsm.c: Add comments.
* w32-qt-io.cpp (_gpgme_io_select): Remove code handling frozen FDs.
* w32-glib-io.c (_gpgme_io_close):
Always dereference the channel,
even if not primary.
(_gpgme_io_dup): Acquire a reference.  Replace unused
implementation by assertion.

2007-09-28  Werner Koch  <wk@g10code.com>

* engine-gpgsm.c (iocb_data_t): Add SERVER_FD_STR.
(gpgsm_new): Set it.
(gpgsm_set_fd): Use it.

* w32-glib-io.c (find_channel): Add a new primary flag.
(_gpgme_io_close): Close channel only if primary.

(_gpgme_io_dup): Put newfd into the table as shallow copy.

* priv-io.h (struct io_select_fd_s): Remove member FROZEN.
* w32-io.c (_gpgme_io_select): Ditto.
* w32-glib-io.c (_gpgme_io_select): Ditto.

* posix-io.c (_gpgme_io_select): Ditto.
* rungpg.c (read_status): Ditto.
* wait.c (fd_table_put): Ditto.

* rungpg.c (gpg_io_event): Add tracing.
(start): Use gpg_io_event for sending the start event.
* engine-gpgsm.c (gpgsm_io_event): Add tracing.
(start): Use gpgsm_io_event for sending the start event.
* wait.c (_gpgme_add_io_cb, _gpgme_run_io_cb): Add tracing.

2007-09-28 Marcus Brinkmann
<marcus@g10code.de>

* kdpipeiodevice.moc, w32-qt-io.cpp, kdpipeiodevice.cpp: New
versions from Frank Osterfeld.

2007-09-27 Marcus Brinkmann <marcus@g10code.de>

* w32-glib-io.c (_gpgme_io_spawn),
w32-qt-io.cpp (_gpgme_io_spawn), w32-io.c (_gpgme_io_spawn): Close
the process handle, return 0.

* gpgme.h (gpgme_protocol_t): Add GPGME_PROTOCOL_UNKNOWN.
* gpgme.c (gpgme_get_protocol_name): Implement support for
GPGME_PROTOCOL_UNKNOWN.

* kdpipeiodevice.h: Fix last change.

* w32-glib-io.c (_gpgme_io_pipe), w32-qt-io.c (_gpgme_io_pipe),
w32-io.c (_gpgme_io_pipe), posix-io.c (_gpgme_io_pipe): Fix debug
output.

2007-09-25 Marcus Brinkmann <marcus@g10code.de>

* conversion.c, keylist.c: Include <sys/types.h>.

* kdpipeiodevice.h: Use namespace _gpgme_.
* kdpipeiodevice.cpp: Use namespace _gpgme_.
[Q_OS_WIN32 && NOMINMAX]: Do not define NOMINMAX again.
* w32-qt-io.cpp: Change namespace of KDPipeIODevice to
_gpgme_::KDPipeIODevice.

2007-09-17  Werner Koch  <wk@g10code.com>

*
rungpg.c (gpg_new): Make robust against undefined ttyname or
ttytype.

2007-09-14  Werner Koch  <wk@g10code.com>

* data-mem.c (gpgme_data_release_and_get_mem): Fix tracing bug.

2007-09-14  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c (gpgme_release): Call gpgme_sig_notation_clear.

2007-09-13  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (gpg_new): Handle return value of _gpgme_getenv (fixes
small memory leak).

2007-09-07  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (libgpgme_qt_la_SOURCES): Move
moc_kdpipeiodevice.cpp to EXTRA_DIST, as this is only included by
another file (it's more like a header file than a cpp file, but
automake doesn't know that).

* w32-qt-io.cpp (_gpgme_io_spawn): Fix several cast errors and typos.
* w32-io.c (_gpgme_io_write): Use TRACE_SYSRES instead of TRACE_SYS.
(libgpgme_qt_la_LIBADD): Add QT4_CORE_LIBS, not QT4_CORE_LIB.

* kdpipeiodevice.h, kdpipeiodevice.cpp, moc_kdpipeiodevice.cpp,
kdpipeiodevice.moc, w32-qt-io.c:
New files.
* Makefile.am (ltlib_gpgme_extra): Rename to ltlib_gpgme_glib.
(ltlib_gpgme_qt): New variable.
(lib_LTLIBRARIES): Add $(ltlib_gpgme_qt).
(libgpgme_qt_la_SOURCES): New variable.
(AM_CPPFLAGS): Add @QT4_CORE_INCLUDES@
(AM_CFLAGS): Add @QT4_CORE_CFLAGS@.
(libgpgme_qt_la_LDFLAGS, libgpgme_qt_la_DEPENDENCIES)
(libgpgme_qt_la_LIBADD): New variables.

* sema.h (struct critsect_s): Rename "private" to "priv" to make
C++ users happy.  Change users.
* posix-sema.c (_gpgme_sema_cs_enter, _gpgme_sema_cs_leave)
(_gpgme_sema_cs_destroy): Likewise.
* w32-sema.c (critsect_init, _gpgme_sema_cs_enter)
(_gpgme_sema_cs_leave, _gpgme_sema_cs_destroy): Likewise.

* w32-glib-io.c (gpgme_get_giochannel): Change return type to
void*.
(gpgme_get_fdptr): New function.
* w32-io.c (gpgme_get_fdptr): New function
* gpgme.def: Add gpgme_get_fdptr.

2007-08-22  Marcus Brinkmann  <marcus@g10code.de>

* w32-io.c (_gpgme_io_write): Return early if COUNT is zero.
(writer): Remove superfluous
check.

2007-08-20  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h: Move include of gpg-error.h out of extern "C".

2007-08-07  Werner Koch  <wk@g10code.com>

* gpgme.h (struct _gpgme_signature): Add member CHAIN_MODEL.
* verify.c (parse_trust): Set Chain_MODEL.

2007-08-02  Werner Koch  <wk@g10code.com>

* w32-glib-io.c (_gpgme_io_spawn): Use DETACHED_PROCESS flag.
* w32-io.c (_gpgme_io_spawn): Ditto.
(_gpgme_io_write): Map ERROR_NO_DATA to EPIPE.
* debug.c (_gpgme_debug): Enable assuan logging.
(_gpgme_debug_subsystem_init): New.
* version.c (do_subsystem_inits): Disable assuan logging and
initialize the debug system.
(gpgme_check_version): Do not trace before the subsystems are
initialized.

2007-07-17  Marcus Brinkmann  <marcus@g10code.de>

* debug.c: Include <errno.h> and "debug.h".
(_gpgme_debug): Save and restore ERRNO.
(TOHEX): New macro.
(_gpgme_debug_buffer): New function.
* conversion.c, data-compat.c, data-mem.c, data.c, engine-gpgsm.c,
gpgme.c,
keylist.c, posix-io.c, rungpg.c, sign.c, version.c,
w32-io.c, wait.c: Replace DEBUG macros by TRACE_* variants.  In
most of these files, add many more tracepoints.

2007-07-16  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (status_handler): Do not send BYE here.

* w32-io.c (struct reader_context_s, struct writer_context_s): New
members REFCOUNT.
(create_reader, create_writer): Initialize C->refcount to 1.
(destroy_reader, destroy_writer): Only destroy if C->refcount
drops to 0.
(find_reader, find_writer, kill_reader, kill_writer): Beautify.
* priv-io.h (_gpgme_io_dup): New prototype.
* posix-io.c (_gpgme_io_dup): New function.
* w32-io.c (_gpgme_io_dup): Likewise.
* w32-glib-io.c (_gpgme_io_dup): Likewise.
* engine-gpgsm.c (start): Reverting to version 2007-07-10.

2007-07-13 Marcus Brinkmann <marcus@g10code.de>

* data-user.c (user_read, user_write, user_seek): Set errno and
return -1 instead returning the error code directly.
* data-compat.c (old_user_seek):
Likewise.
* gpgme.c (gpgme_sig_notation_add): Return error properly.

* Revert the "close_notify_handler" returns int stuff. Always
close in the _gpgme_io_close implementations.
* engine-gpgsm.c (status_handler): Try to terminate the connection
in case of error.
* w32-io.c (_gpgme_io_read): Return C->error_code in ERRNO.
(_gpgme_io_write): Likewise.

* priv-io.h (_gpgme_io_set_close_notify): Change type of HANDLER
to _gpgme_close_notify_handler.
(_gpgme_close_notify_handler): New type.
(_gpgme_io_dup): Remove prototype.
* posix-io.c (notify_table, _gpgme_io_set_close_notify): Change
type of HANDLER to _gpgme_close_notify_handler_t.
(_gpgme_io_close): Do not close the FD if handler returns 0.
(_gpgme_io_dup): Remove function.
* w32-io.c (notify_table, _gpgme_io_set_close_notify,
_gpgme_io_close): Change type of HANDLER to
_gpgme_close_notify_handler_t.
(_gpgme_io_close): Do not close the FD if handler returns 0.
(_gpgme_io_dup): Remove function.
* w32-glib-io.c
(_gpgme_io_dup): Remove function.
(_gpgme_io_set_close_notify, notify_table): Change type of HANDLER
to _gpgme_close_notify_handler_t.
(_gpgme_io_close): Do not close the FD if handler returns 0.
* rungpg.c (close_notify_handler): Change return type to int,
return 1.

* engine-gpgsm.c (close_notify_handler): Change return type to
int, return 0 for status FD and 1 for all other FDs.
(start): Do not duplicate the status FD.

2007-07-12  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am: Replace implicit rule by suffix rule.  Add
SUFFIXES for that.

2007-07-12  Werner Koch  <wk@g10code.com>

* version.c (do_subsystem_inits) [W32]: Make sure that the socket
system has been started.

2007-07-10  Marcus Brinkmann  <marcus@g10code.de>

* priv-io.h (_gpgme_io_dup): New prototype.
* posix-io.c (_gpgme_io_dup): New function.
* w32-io.c (_gpgme_io_dup): Likewise.
* w32-glib-io.c (_gpgme_io_dup): Likewise.
* engine-gpgsm.c (start): Use _gpgme_dup() instead of dup().

2007-07-08
Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c [HAVE_W32_SYSTEM]: Enable the bunch of the file.
* funopen.c (funopen): Rename to _gpgme_funopen.

2007-04-30  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_new): Fix error handling for ttyname_r.
* rungpg.c (gpg_new): Likewise.
Submitted by Stephen Tether.

2007-02-26  Werner Koch  <wk@g10code.com>

* verify.c (op_data_t): New element PLAINTEXT_SEEN.
(_gpgme_verify_status_handler): Return an error if more than one
plaintext has been seen.
(parse_error): New arg SET_STATUS. Also detect it based on an
ERROR status (gpg > 1.4.6).

2007-01-26  Werner Koch  <wk@g10code.com>

* w32-io.c (build_commandline): Fixed stupid quoting bug.
* w32-glib-io.c (build_commandline): Ditto.

* rungpg.c (gpg_set_locale): Avoid dangling pointer after free.

* gpgme-config.in: New options --get-gpg and --get-gpgsm.

2007-01-18  Marcus Brinkmann  <marcus@g10code.de>

* data.h (_gpgme_data_get_fd): Add prototype.
(gpgme_data_get_fd_cb):
New type.
(struct _gpgme_data_cbs): New member get_fd.
* data.c (_gpgme_data_get_fd): New function.
* data-fd.c (fd_get_fd): New function.
(fd_cbs): Add fd_get_fd.
* data-stream.c (stream_get_fd): New function.
(stream_cbs): Add stream_get_fd.
* data-mem.c (mem_cbs): Add NULL for get_fd callback.
* data-user.c (user_cbs): Likewise.
* engine-gpgsm.c (gpgsm_set_fd) [USE_DESCRIPTOR_PASSING]: Try to
short-cut by passing the data descriptor directly.

2007-01-17  Marcus Brinkmann  <marcus@g10code.de>

* w32-io.c (build_commandline): Quote all command line arguments.
* w32-glib-io.c (build_commandline): Likewise.

2007-01-10  Werner Koch  <wk@g10code.com>

* ttyname_r.c (ttyname_r) [W32]: Return a dummy name.

2007-01-08  Werner Koch  <wk@g10code.com>

* version.c (do_subsystem_inits): Do assuan init only if building
with Assuan.
* setenv.c: Include assuan-def.h only if building with Assuan
support.

* op-support.c (_gpgme_op_reset): Set LC_MESSAGES only if
if
defined.
* engine-gpgsm.c (gpgsm_set_locale): Ditto.
* rungpg.c (gpg_set_locale): Ditto.

2006-12-17  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c (gpgme_set_protocol): Shut down the engine when
switching protocols.
(gpgme_ctx_set_engine_info): Likewise for engine info.
* engine.h (_gpgme_engine_reset): New function prototype.
* engine.c (_gpgme_engine_reset): New function.

* engine-backend.h (struct engine_ops): New member RESET.
* rungpg.c (_gpgme_engine_ops_gpg): Add NULL for reset function.
* engine-gpgsm.c (_gpgme_engine_ops_gpgsm)
[USE_DESCRIPTOR_PASSING]: Add gpgsm_reset for reset.
(_gpgme_engine_ops_gpgsm) [!USE_DESCRIPTOR_PASSING]: Add NULL for
reset function.
(gpgsm_reset) [USE_DESCRIPTOR_PASSING]: New function.
* op-support.c (_gpgme_op_reset): Try to use the engine's reset
function if available.
* engine-gpgsm.c (gpgsm_new): Move code to dup status_fd to ...
(start): ... here.
* posix-io.c (_gpgme_io_recvmsg, _gpgme_io_sendmsg): New functions.

*
engine.h (_gpgme_engine_new): Remove arguments lc_ctype and
lc_messages from prototype.
(_gpgme_engine_set_locale): New prototype.
* engine.c (_gpgme_engine_set_locale): New function.
* op-support.c (_gpgme_op_reset): Call _gpgme_engine_set_locale.
* engine-backend.h (struct engine_ops): Add new member SET_LOCALE.
Remove arguments lc_messages and lc_ctype from member NEW.
* engine-gpgsm.c (struct engine_gpgsm): New members lc_ctype_set
and lc_messages_set.
(gpgsm_new): Remove lc_messages and lc_ctype
arguments.
(gpgsm_set_locale): New function.
(_gpgme_engine_ops_gpgsm): Add gpgsm_set_locale.
* rungpg.c (struct engine_gpg): Add new members lc_messages and
lc_ctype.
(gpg_release): Release lc_messages and lc_ctype if set.
(gpg_new): Remove lc_messages and lc_ctype arguments.
(gpg_set_locale): New function.
(_gpgme_engine_ops_gpg): Add gpg_set_locale.
(add_arg): Implement in terms of:
(add_arg_ext): New function.
(start): Set lc-messages and lc-ctype arguments here.

2006-12-03
Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (struct engine_gpgsm): Move members
input_fd_server, output_fd_server, message_fd_server to ...
(iocb_data): ... here (as server_fd).
(close_notify_handler): Reset tags as well.
(gpgsm_new): Implement support for descriptor
passing.
(fd_type_t): New type.
(gpgsm_clear_fd): New function. Use it instead of _gpgsm_io_close

for unused communication channels.
(gpgsm_set_fd): Rewritten to support descriptor passing. All
relevant callers adjusted as well (previously of _gpgme_io_close).

2006-12-02 Marcus Brinkmann <marcus@g10code.de>

* version.c: Include "assuan.h".
(do_subsystem_inits): Call assuan_set_assuan_err_source.

2006-12-01 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (libgpgme_real_la_SOURCES): Rename to main_sources.
(libgpgme_la_SOURCES, libgpgme_pthread_la_SOURCES,
libgpgme_glib_la_SOURCES, libgpgme_pth_la_SOURCES): Add
$(main_sources).
(libgpgme_la_DEPENDENCIES, libgpgme_la_LIBADD,
libgpgme_pthread_la_DEPENDENCIES,
libgpgme_pthread_la_LIBADD,
libgpgme_pth_la_DEPENDENCIES, libgpgme_pth_la_LIBADD,
libgpgme_glib_la_DEPENDENCIES, libgpgme_glib_la_LIBADD): Remove
libgpgme-real.la.
(noinst_LTLIBRARIES): Removed.
(libgpgme_glib_la_CFLAGS, libgpgme_pth_la_CFLAGS): Removed.
(AM_CFLAGS): New variable.

2006-11-30 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c: Replace AssuanError with gpg_error_t and
ASSUAN_CONTEXT with assuan_context_t.

2006-11-29 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_new): Check return value of
assuan_pipe_connect.

* rungpg.c: Include <unistd.h>.
(gpg_new): Support --display, --ttyname, --ttytype, --lc-ctype and
--lc-messages. Fixes issue 734.

2006-10-24 Marcus Brinkmann <marcus@g10code.de>

* trustlist.c (gpgme_op_trustlist_next): Return error if OPD is
NULL.

2006-10-23 Marcus Brinkmann <marcus@g10code.de>

* wait-global.c (gpgme_wait): Unlock CTX_LIST_LOCK while calling
_gpgme_engine_io_event().

*
keylist.c (gpgme_op_keylist_next): Return error if OPD is NULL.

2006-09-25  Marcus Brinkmann  <marcus@g10code.de>

* data-mem.c (gpgme_data_release_and_get_mem): Release the data
object properly.

2006-09-22  Marcus Brinkmann  <marcus@g10code.de>

* keylist.c (keylist_colon_handler): Move debug output after
initialising KEY.

2006-07-29  Marcus Brinkmann  <marcus@g10code.de>

* gpgme-config.in (Options): Add NETLIBS.
* Makefile.am (libgpgme_la_LIBADD, libgpgme_pthread_la_LIBADD,
libgpgme_pth_la_LIBADD, libgpgme_glib_la_LIBADD): Add NETLIBS.

* rungpg.c (read_status): Fix comparison disguising as an
assignment.

2005-03-24  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c (gpgme_set_locale): Remove conditional on
HAVE_W32_SYSTEM, and just check for LC_MESSAGES.

2006-07-16  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (read_status): Strip potential carriage return.
* genkey.c (get_key_parameter): Skip potential carriage return.
* version.c (_gpgme_get_program_version):
Strip potential carriage
return.

* data.c (gpgme_data_set_file_name): Allow to clear the file name
by passing NULL.

2006-06-22  Marcus Brinkmann  <marcus@g10code.de>

* keylist.c (gpgme_get_key): Also clone the engine info.

2006-03-06  Marcus Brinkmann  <marcus@g10code.de>

* gpgme-config.in (cflags_pth): Revert accidental removal of
pthread support with last change.

2006-02-28  Marcus Brinkmann  <marcus@g10code.de>

* w32-glib-io.c (O_BINARY) [!O_BINARY]: New macro.
(_gpgme_io_pipe): Open pipes in binary mode.

2006-02-22  Marcus Brinkmann  <marcus@g10code.de>

* engine.c (gpgme_engine_check_version): Reimplemented to allow
checking the version correctly even after changing the engine
information.  Bug reported by Stphane Corthsy.

* rungpg.c (read_colon_line): Invoke colon preprocess handler if
it is set.
(colon_preprocessor_t): New type.
(struct engine_gpg): New member colon.preprocess_fnc.
(gpg_keylist_preprocess): New function.
* keylist.c
(keylist_colon_handler): Allow short key IDs.

2006-02-15  Marcus Brinkmann  <marcus@g10code.de>

* w32-io.c (create_writer): Make C->have_data a manually reset
event.
(writer): Move code from end of if block to beginning, so it
is also run the first time.
(_gpgme_io_write): Move assert check after error check.  Reset
the is_empty event, and also do it eagerly.
(_gpgme_io_select): Unconditionally wait for the is_empty event.

2006-01-26  Werner Koch  <wk@g10code.com>

* w32-util.c (_gpgme_get_conf_int): New.
* posix-util.c (_gpgme_get_conf_int): New.
* w32-io.c (get_desired_thread_priority): New.
(create_reader, create_writer): Use it here.

2006-01-04  Werner Koch  <wk@g10code.com>

* debug.h (_gpgme_debug_srcname): New. Use it with the debug macros.

* w32-glib-io.c (_gpgme_io_set_nonblocking): Add debug
statements. Disable error return for failed nonblocking call.

2006-01-03  Marcus Brinkmann  <marcus@g10code.de>

* w32-glib-io.c (_gpgme_io_close): Only close fd if there
is no
channel for it.

2005-12-31  Marcus Brinkmann  <marcus@g10code.de>

* w32-glib-io.c (find_channel): Set channel to unbuffered.
(_gpgme_io_select): Fix debug output.

2005-12-23  Werner Koch  <wk@g10code.com>

* gpgme.h (struct _gpgme_signature): Append field PKA_ADDRESS.
* verify.c (release_op_data, _gpgme_verify_status_handler): Set
this field.

2005-12-20  Werner Koch  <wk@g10code.com>

* gpgme.h (gpgme_status_code_t): Added GPGME_STATUS_PKA_TRUST_BAD
and GPGME_STATUS_PKA_TRUST_GOOD.
(struct _gpgme_signature): New field pka_trust.
* verify.c (_gpgme_verify_status_handler): Set pka_trust.

2005-12-06  Werner Koch  <wk@g10code.com>

* keylist.c (keylist_colon_handler): Store fingerprints of the
subkeys.  Reset the secret flag of subkeys for stub secret keys.
(NR_FIELDS): Bumped up to 16

2005-11-27  Marcus Brinkmann  <marcus@g10code.de>

* engine.c (_gpgme_set_engine_info): Use new_file_name in
engine_get_version invocation.  Reported by Stphane Corthsy.

2005-11-24
Marcus Brinkmann  <marcus@g10code.de>

* w32-glib-io.c (_gpgme_io_fd2str): Remove debug printf.

2005-11-18  Werner Koch  <wk@g10code.com>

* w32-glib-io.c: Include glib.h before windows to avoid a symbol
shadowing warning.
(find_channel): Better use g_io_channel_win32_new_fd instead of
the autodetection function g_io_channel_unix_new.
(_gpgme_io_select): Rewritten.  It is now a fully working select
implementation.

2005-11-18  Marcus Brinkmann  <marcus@g10code.de>

* priv-io.h (_gpgme_io_fd2str): New prototype.
* posix-io.c (_gpgme_io_fd2str): New function.

* w32-io.c (_gpgme_io_fd2str): New function.
* rungpg.c: Use this new function.
* w32-glib-io.c (_gpgme_io_fd2str): Rewrote the file handle code
again.  Two's company, three's the musketeers.

* w32-glib-io.c: Rewrote the file handle code.  We don't create
system fds for every handle (doesn't work for inherited handles),
but we create pseudo fds in a private namespace that designate a
handle and potentially
a giochannel.

2005-11-18  Werner Koch  <wk@g10code.com>

* versioninfo.rc.in: Set file version to LT-version + Svn-revision.

2005-11-17  Marcus Brinkmann  <marcus@g10code.de>

* w32-glib-io.c: New file.
* gpgme.def (gpgme_get_giochannel): Add symbol.
* Makefile.am (system_components) [HAVE_DOSISH_SYSTEM]: Remove
w32-io.c.
(ltlib_gpgme_extra): New variable.
(lib_LTLIBRARIES): Add $(ltlib_gpgme_extra).
(system_components_not_extra): New variable.
(libgpgme_la_SOURCES, libgpgme_pthread_la_SOURCES,
(libgpgme_pth_la_SOURCES): Add $(system_components_not_extra).
(libgpgme_glib_la_LDFLAGS, libgpgme_glib_la_DEPENDENCIES,
(libgpgme_glib_la_LIBADD, libgpgme_glib_la_CFLAGS)
[BUILD_W32_GLIB]: New variables.
* gpgme-config.in (glib): New option.
* gpgme.m4 (AM_PATH_GPGME_GLIB): New macro.

2005-11-17  Marcus Brinkmann  <marcus@g10code.de>

* priv-io.h (_gpgme_io_waitpid, _gpgme_io_kill): Removed.
* w32-io.c (_gpgme_io_waitpid, _gpgme_io_kill): Removed.
* posix-io.c (_gpgme_io_kill):
Removed.
(_gpgme_io_waitpid): Declare static.

2005-10-24  Marcus Brinkmann  <marcus@g10code.de>

* w32-io.c (_gpgme_io_spawn): Don't minimize window, hide it.

2005-10-21  Werner Koch  <wk@g10code.com>

* Makefile.am: Fixed cut+paste problem

2005-10-20  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am: Build versioninfo.lo, not versioninfo.o.  Also, fix
the whole mess.

2005-10-16  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (gpg_edit): Don't add a key argument if in card edit
mode.

2005-10-06  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (gpgme.dll gpgme.dll.a): Use $(srcdir) for
gpgme.def.

* gpgme.h (gpgme_free): New prototype.
* data-mem.c (gpgme_free): New function.
* libgpgme.vers (GPGME_1.1): Add gpgme_free.
* gpgme.def: Add gpgme_free.

2005-10-02  Marcus Brinkmann  <marcus@g10code.de>

* util.h (_gpgme_decode_percent_string): Add new argument BINARY
to prototype.
* verify.c (parse_notation): Likewise for invocation.
* conversion.c (_gpgme_decode_percent_string):
Likewise to
declaration.  If set, do not replace '\0' characters with a
printable string.
* gpgme.h (struct _gpgme_key_sig): New field notations.
* ops.h (_gpgme_parse_notation): New prototype.
* sig-notation.c (_gpgme_parse_notation): New function.
* key.c (gpgme_key_unref): Free all signature notations.
* keylist.c (op_data_t): New member tmp_keysig.
(finish_key): Clear OPD->tmp_keysig.
* gpgme.c (gpgme_set_keylist_mode): Remove check.
* rungpg.c (gpg_keylist): Support listing signature notations.
(gpg_keylist_ext): Likewise.

2005-10-01  Marcus Brinkmann  <marcus@g10code.de>

* engine.h (_gpgme_set_engine_info): Add prototype.
* engine-backend.h (struct engine_ops): Change return type of
get_file_name() to const char * to silence gcc warning.
* engine.c (engine_get_file_name): Change return type to const
char * to silence gcc warning.
(gpgme_get_engine_info): Use transitional variable to go from
const char * to char * to silence gcc warning.

(_gpgme_set_engine_info):
Likewise.
* engine-gpgsm.c (struct engine_gpgsm): Change type of LINE to
char * to silence gcc warning.
(gpgsm_new): Make ARGV a pointer to const char.
(status_handler): Change type of SRC, END, DST, ALINE and NEWLINE
to char * to silence gcc warning.

* gpgme.def: Add gpgme_data_set_file_name,
gpgme_data_get_file_name, gpgme_sig_notation_clear,
gpgme_sig_notation_add and gpgme_sig_notation_get.
* libgpgme.vers: Add gpgme_sig_notation_clear,
gpgme_sig_notation_add and gpgme_sig_notation_get.
* Makefile.am (libgpgme_real_la_SOURCES): Add sig-notation.c.
* context.h (struct gpgme_context): New field sig_notations.
* gpgme.h (struct _gpgme_sig_notation): New member value_len and
critical.
(GPGME_SIG_NOTATION_CRITICAL): New symbol.
(gpgme_sig_notation_flags_t): New type.
(gpgme_sig_notation_add, gpgme_sig_notation_clear,
gpgme_sig_notation_get): New prototypes.
* ops.h (_gpgme_sig_notation_create, _gpgme_sig_notation_free):
New prototypes.
*
sig-notation.c (_gpgme_sig_notation_free): New file.
* verify.c (parse_notation): Use support functions.
(release_op_data): Likewise.
* rungpg.c (append_args_from_sig_notations): New function.
(gpg_encrypt_sign, gpg_sign): Call it.

2005-09-30 Marcus Brinkmann <marcus@g10code.de>

* data.h (struct gpgme_data): New member file_name.
* data.c (gpgme_data_set_filename): New function.
(_gpgme_data_release): Free DH->filename if necessary.
(gpgme_data_get_filename): New function.
* rungpg.c (gpg_encrypt): Set filename option.
(gpg_encrypt_sign): Likewise.
(gpg_sign): Likewise.
* libgpgme.vers (GPGME_1.1): Add gpgme_data_set_file_name and
gpgme_data_get_file_name.

* decrpyt.c, verify.c, gpgme.h: Replace plaintext_filename with
file_name.

2005-09-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (struct _gpgme_key): Add field is_qualified.

(struct _gpgme_subkey): Likewise.
* keylist.c (set_subkey_capability, set_mainkey_capability): Set
field is_qualified.

2005-09-23
Werner Koch <wk@g10code.com>

* w32-io.c (_gpgme_io_pipe): Removed use of environment variable
again.
(create_reader, create_writer): Set thread priority higher.

2005-09-19 Werner Koch <wk@g10code.com>

* w32-io.c (_gpgme_io_pipe): New environment variable to change
the size of the pipe buffer.

2005-09-13 Werner Koch <wk@g10code.com>

* ath.c: Changes to make it work under W32.

2005-09-12 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (libgpgme_la_SOURCES): Set to ath.h and ath.c.
(ath_pth_src, ath_pthread_src): Removed.
(w32_o_files): Replace ath-compat.o with ath.o.
(libgpgme_pth_la_CFLAGS): New variable.
* ath-compat.c, ath-pthread-compat.c, ath-pth-compat.c: Removed.
* ath.h (ath_pthread_available, ath_pth_available): Removed.
(ath_init) [!_ATH_EXT_SYM_PREFIX]: Do not define macro.
(struct ath_ops, ath_init) [_ATH_COMPAT]: Removed.
(_ATH_COMPAT): Macro removed.
* posix-sema.c (_gpgme_sema_subsystem_init): Do not call
_gpgme_ath_init.

2005-09-12
Marcus Brinkmann <marcus@g10code.de>

* keylist.c (release_op_data): Do not free opd->tmp_uid.

2005-09-07 Werner Koch <wk@g10code.com>

* w32-io.c (build_commandline): Quote argv[0].

2005-08-26 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (command_handler): Use _gpgme_io_write instead of write.

* edit.c (command_handler): Do not depend on PROCESSED being

available.

* engine.h (engine_command_handler_t): Add new argument processed.
* ops.h (_gpgme_passphrase_command_handler_internal): Rename
prototype to ...
(_gpgme_passphrase_command_handler): ... this one.
* passphrase.c (_gpgme_passphrase_command_handler_internal):
Rename to ...
(_gpgme_passphrase_command_handler): ... this one.
* edit.c (command_handler): Add new argument processed. Remove
local variable with the same name. Always return processed as
true.
* rungpg.c (command_handler): Send a newline character if the
handler did not.

2005-08-26 Werner Koch <wk@g10code.com>

* w32-util.c (read_w32_registry_string):
Updated from code used by
GnuPG. This allows for expanding strings and features the
implicit fallback key.
(w32_shgetfolderpath, find_program_at_standard_place): New.
(_gpgme_get_gpg_path, _gpgme_get_gpgsm_path): With no registry
entry, locate the programs at the standard place.
(dlopen, dlsym, dlclose): New, so that we can keep on using what
we are accustomed to.

* debug.c (debug_init): Use PATHSEP_C so that under W32 a
semicolon is used which allows us to create files with drive
letters.

* w32-io.c (_gpgme_io_read, _gpgme_io_write): Print content in
debug mode too.

2005-07-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (gpgme_status_code_t): Add GPGME_STATUS_PLAINTEXT.
(struct _gpgme_op_decrypt_result): New member plaintext_filename.
(struct _gpgme_op_verify_result): Likewise.
* ops.h (_gpgme_parse_plaintext): Add prototype.
* op-support.c (_gpgme_parse_plaintext): New function.
* decrypt.c (release_op_data): Release
OPD->result.plaintext_filename.
(_gpgme_decrypt_status_handler):
Handle GPGME_STATUS_PLAINTEXT.
* verify.c (release_op_data): Release
OPD->result.plaintext_filename.
(_gpgme_verify_status_handler): Handle GPGME_STATUS_PLAINTEXT.

2005-08-08  Werner Koch  <wk@g10code.com>

* util.h (stpcpy): Renamed to ..
(_gpgme_stpcpy): .. this and made inline.  This avoids duplicate
definitions when linking statically.
* stpcpy.c: Removed.

2005-08-19  Werner Koch  <wk@g10code.com>

* gpgme.def: New.
* versioninfo.rc.in: New.
* Makefile.am: Adds support for building a W32 DLL.

* ttyname_r.c (ttyname_r) [W32]: Return error.
* ath-compat.c [W32]: select and co are not yet supported; return
error.
* data-stream.c (stream_seek): Use ftell if ftello is not available.

2005-07-26  Marcus Brinkmann  <marcus@g10code.de>

* keylist.c (gpgme_get_key): Allow key IDs.

2005-06-20  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.m4: Only call GPGME_CONFIG if found.

2005-06-03  Marcus Brinkmann  <marcus@g10code.de>

*
gpgme.h (struct _gpgme_signature): New members pubkey_algo and
hash_algo.
* verify.c (parse_valid_sig): Parse pubkey and hash algo numbers.
(parse_new_sig): Parse pubkey, hash algo and timestamp for ERRSIG.

(_gpgme_decrypt_status_handler): Fix last change.

* gpgme.h (struct _gpgme_recipient): New structure.
(gpgme_recipient_t): New type.
(struct _gpgme_op_decrypt_result): Add member recipients.
* decrypt.c (op_data_t): New member last_recipient_p.
(_gpgme_op_decrypt_init_result): Initialize last_recipient_p.
(parse_enc_to): New function.
(_gpgme_decrypt_status_handler): Handle status ENC_TO and
NO_SECKEY.

* wait-global.c (gpgme_wait): Break out of the fd processing loop
after an error.

Reported by Igor Belyi <gpgme@katehok.ac93.org>.

2005-06-02 Marcus Brinkmann <marcus@g10code.de>

* wait.h (_gpgme_run_io_cb): New prototype.
* wait.c (_gpgme_run_io_cb): New function.
* wait-global.c (gpgme_wait): Call it.
* wait-user.c (_gpgme_user_io_cb_handler): Likewise.
*
wait-private.c (_gpgme_wait_on_condition): Likewise.

2005-06-02 Werner Koch <wk@g10code.com>

* passphrase.c (_gpgme_passphrase_status_handler): Take care of
GPGME_STATUS_NEED_PASSPHRASE_PIN.
(_gpgme_passphrase_command_handler_internal): Also act on the key
"passphrase.pin.ask".

* gpgme.h: Added status codes GPGME_STATUS_SIG_SUBPACKET,
GPGME_STATUS_NEED_PASSPHRASE_PIN, GPGME_STATUS_SC_OP_FAILURE,
GPGME_STATUS_SC_OP_SUCCESS, GPGME_STATUS_CARDCTRL,
GPGME_STATUS_BACKUP_KEY_CREATED.

2005-05-28 Marcus Brinkmann <marcus@g10code.de>

* data-user.c: Include <errno.h>.

2005-05-17 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (gpgme_new): Set the CTX->include_certs default to the
default.

2005-05-11 Marcus Brinkmann <marcus@g10code.de>

* w32-io.c (_gpgme_io_select): Fix loop increment.

2005-05-05 Marcus Brinkmann <marcus@g10code.de>

* data-user.c (user_release): Only call user hook if provided.
(user_seek): Return EBADF if no user hook is provided.
(user_read):
Likewise.
(user_write): Likewise.

2005-04-28 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (GPGME_INCLUDE_CERTS_DEFAULT): New macro.
* engine-gpgsm.c (gpgsm_sign): Send the include-certs option after

the reset, just for cleanliness, and do not sent it at all if the
default is requested.
* gpgme.c (gpgme_set_include_certs): Allow to use
GPGME_INCLUDE_CERTS_DEFAULT.

2005-04-21  Werner Koch  <wk@g10code.com>

* verify.c (calc_sig_summary): Set the key revoked bit.

2005-04-14  Marcus Brinkmann  <marcus@g10code.de>

* wait-global.c (gpgme_wait): Use LI->ctx when checking a context
in the list, not the user-provided CTX.
Reported by Igor Belyi <gpgme@katehok.ac93.org>.

* wait-global.c (gpgme_wait): If no context is found, and we
should not hang, set *status to 0 and return NULL.
Reported by Igor Belyi <gpgme@katehok.ac93.org>.

2005-03-24  Marcus Brinkmann  <marcus@g10code.de>

* data.h (EOPNOTSUPP) [_WIN32]: Remove definition.
* data.c (EOPNOTSUPP) [HAVE_W32_SYSTEM]:
Remove definition.
(gpgme_data_read, gpgme_data_write, gpgme_data_seek): Return
ENOSYS instead EOPNOTSUPP.
* data-compat.c (EOPNOTSUPP) [HAVE_W32_SYSTEM]: Remove definition.
(gpgme_error_to_errno): Map GPG_ERR_NOT_SUPPORTED
to ENOSYS.

2005-03-24  Marcus Brinkmann  <marcus@g10code.de>

* io.h: Rename to ...
* priv-io.h: ... this.
* Makefile.am (libgpgme_real_la_SOURCES): Change io.h to priv-io.h.
* data.c, engine-gpgsm.c, posix-io.c, rungpg.c, version.c,
w32-io.c, wait-private.c, wait-global.c, wait-user.c, wait.c:
Change all includes of "io.h" to "priv-io.h"

2005-03-09  Werner Koch  <wk@g10code.com>

* w32-util.c (_gpgme_get_gpg_path, _gpgme_get_gpgsm_path): Do not
cast away type checks.

* io.h [W32]: Do not include stdio.h.  If it is needed do it at
the right place.

* data.h [W32]: Removed kludge for EOPNOTSUP.

* data.c, data-compat.c [W32]: Explicitly test for it here.

Replaced use of _WIN32 by HAVE_W32_SYSTEM except for public header files.

2005-03-07
Timo Schulz <twoaday@g10code.de>

* gpgme.h: [_WIN32] Removed ssize_t typedef.
* ath.h: [_WIN32] Added some (dummy) types.
* io.h: [_WIN32] include stdio.h.
* data.h: [_WIN32] Define EOPNOTSUPP.
* w32-io.c [_WIN32] (_gpgme_io_subsystem_init): New.
* gpgme.c [_WIN32] (gpgme_set_locale): Disabled.

2004-12-12 Marcus Brinkmann <marcus@g10code.de>

* engine.c (_gpgme_set_engine_info): Fix assertion.

2004-12-11 Marcus Brinkmann <marcus@g10code.de>

* util.h [HAVE_CONFIG_H && HAVE_TTYNAME_R] (ttyname_r): Define prototype.
* ttyname_r.c: New file.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

* putc_unlocked.c, funopen.c: I just claim copyright on these files and change their license to LGPL, because they are totally trivial wrapper functions.
* isascii.c: Change copyright notice to the one from ctype/ctype.h in the GNU C Library (CVS Head 2004-10-10), where isascii is defined as a macro doing exactly the same as the function in this file.
* memrchr.c: Update from the GNU C Library (CVS Head 2001-07-06).
* stpcpy.c: Update from the GNU C Library (CVS Head 2004-10-10).
* ath.c, ath-compat.c, ath.h, ath-pth.c, ath-pth-compat.c, ath-pthread.c, ath-pthread-compat.c, context.h, conversion.c, data.c, data-compat.c, data-fd.c, data.h, data-mem.c, data-stream.c, data-user.c, debug.c, debug.h, decrypt.c, decrypt-verify.c, delete.c, edit.c, encrypt.c, encrypt-sign.c, engine-backend.h, engine.c, engine-gpgsm.c, engine.h, error.c, export.c, genkey.c, get-env.c, gpgme.c, gpgme.h, import.c, io.h, key.c, keylist.c, mkstatus, Makefile.am, ops.h, op-support.c, passphrase.c, posix-io.c, posix-sema.c, posix-util.c, progress.c, rungpg.c, sema.h, sign.c, signers.c, trust-item.c, trustlist.c, util.h, verify.c, version.c, w32-io.c, w32-sema.c, w32-util.c,

wait.c, wait-global.c, wait.h, wait-private.c, wait-user.c: Change
license to LGPL.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

* libgpgme.vers
(GPGME_1.1): New version.
* engine-backend.h (struct engine_ops): Add argument FILE_NAME to
member get_version(). Add arguments FILE_NAME and HOME_DIR to
member new(). Change return type of get_file_name and get_version
to char *.
* engine-gpgsm.c (gpgsm_get_version): Change return type to char
pointer. Do not cache result.
(gpgsm_new): Add file_name and home_dir argument, and use them
instead of the defaults, if set.
* rungpg.c (struct engine_gpg): New member file_name.
(gpg_get_version): Change return type to char pointer, and do not
cache result.
(gpg_release): Free gpg->file_name.
(gpg_new): Take new arguments file_name and home_dir. Set the
--homedir argument if HOME_DIR is not NULL. Set gpg->file_name.
(start): Use gpg->file_name instead _gpgme_get_gpg_path, if set.
* engine.h (_gpgme_engine_info_copy, _gpgme_engine_info_release):
New prototypes.
(_gpgme_engine_new): Change first argument to gpgme_engine_info_t
info.
* engine.c: Include <assert.h>.
(gpgme_get_engine_info):
Set *INFO within the lock. Move
ENGINE_INFO and ENGINE_INFO_LOCK to ....
(engine_info, engine_info_lock): ... here. New static variables.
(engine_get_version): Add file_name argument to
get_version invocation. Change return type to char pointer.
(gpgme_engine_check_version): Rewritten to free() the return value
of engine_get_version after using it.
(_gpgme_engine_info_release): New function.
(gpgme_get_engine_info): Rewritten.
(_gpgme_engine_info_copy): New function.
(_gpgme_set_engine_info): New function.
(gpgme_set_engine_info): New function.
(_gpgme_engine_new): Change first argument to gpgme_engine_info_t
info, and use that.
* gpgme.h (struct _gpgme_engine_info): Change type of file_name
and version to char * (remove the const). New member home_dir.
(gpgme_set_engine_info, gpgme_ctx_get_engine_info,
gpgme_ctx_set_engine_info): New prototypes.
* context.h (struct gpgme_context): New member engine_info.
* gpgme.c (gpgme_new): Allocate CTX->engine_info.

(gpgme_release):
Deallocate CTX->engine_info.
(gpgme_ctx_get_engine_info, gpgme_ctx_set_engine_info): New
functions.
* op-support.c (_gpgme_op_reset): Look for correct engine info and
pass it to _gpgme_engine_new.
* version.c (gpgme_check_version): Adjust to
_gpgme_compare_versions returning an int.
(_gpgme_compare_versions): Return an int value, not a const char
pointer.
* ops.h (_gpgme_compare_versions): Same for prototype.

2004-10-03 Marcus Brinkmann <marcus@g10code.de>

* verify.c (parse_trust): If no reason is provided, set
SIG->validity_reason to 0.
(calc_sig_summary): Set GPGME_SIGSUM_CRL_TOO_OLD if appropriate.

2004-10-22 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (map_assuan_error): Return 0 if ERR is 0.
(start): Call map_assuan_error on return value of
assuan_write_line.

2004-10-05 Marcus Brinkmann <marcus@g10code.de>

* op-support.c (_gpgme_op_data_lookup): Use char pointer for
pointer arithmetic.

2004-09-30 Marcus Brinkmann
<marcus@g10code.de>

* gpgme.m4: Implement the --api-version check.

* rungpg.c (read_status): Move the polling of the output data pipe
to just before removing the command fd, from just before adding
it. This avoids buffering problems.

* data.c (_gpgme_data_inbound_handler): Use _gpgme_io_read, not
read, to improve debug output.

2004-09-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (GPGME_IMPORT_NEW, GPGME_IMPORT_UID, GPGME_IMPORT_SIG,
GPGME_IMPORT_SUBKEY, GPGME_IMPORT_SECRET,
(GPGME_KEYLIST_MODE_LOCAL, GPGME_KEYLIST_MODERN_EXTERN,
GPGME_KEYLIST_MODE_SIGS, GPGME_KEYLIST_MODE_VALIDATE): Change from
enum to macros.

(gpgme_keylist_mode_t): Define as unsigned int.
(gpgme_key_t): Change type of keylist_mode to
gpgme_keylist_mode_t.

2004-09-23 Marcus Brinkmann <marcus@g10code.de>

* data.c (_gpgme_data_outbound_handler): Close the file descriptor
if we get an EPIPE.

* data-stream.c (stream_seek): Call ftello and return the current
offset.
* data.h (struct
gpgme_data): Change type of data.mem.offset to
off_t.
* data.c (gpgme_data_seek): Check dh->cbs->seek callback, not read
callback. If SEEK_CUR, adjust the offset by the pending buffer
size. Clear pending buffer on success.

2004-09-14 Marcus Brinkmann <marcus@g10code.de>

* gpgme.m4: Add copyright notice.

2004-08-18 Marcus Brinkmann <marcus@g10code.de>

* passphrase.c (_gpgme_passphrase_status_handler): Always run the
status handler.

2004-08-17 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (build_argv): Use --no-sk-comment, not --no-comment.

2004-06-23 Marcus Brinkmann <marcus@g10code.de>

* key.c (_gpgme_key_append_name): Make sure tail points to the
byte following the uid.
(_gpgme_key_add_sig): Likewise. Don't use calloc, but malloc and
memset.

2004-06-02 Marcus Brinkmann <marcus@g10code.de>

* libgpgme.vers: Remove C-style comment, which is not supported by
older binutils.

2004-05-21 Marcus Brinkmann <marcus@g10code.de>

* gpgme-config.in (Options):

Support --api-version.

* libgpgme.vers: List all gpgme symbols under version GPGME_1.0.

* decrypt.c (_gpgme_decrypt_status_handler): Fix last change.
* verify.c (parse_error): Likewise.

* verify.c (parse_error): Do not skip location of where token.

* gpgme.h (gpgme_status_code_t): Add GPGME_STATUS_REVKEYSIG.
* verify.c (_gpgme_verify_status_handler): Add handling of
GPGME_STATUS_REVKEYSIG.
(parse_trust): Likewise.

2004-05-21 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (struct _gpgme_decrypt_result): New fields
wrong_key_usage and _unused.
* decrypt.c (_gpgme_decrypt_status_handler): Don't skip over
character after a matched string, as in a protocol error this
could skip over the trailing binary zero.
Handle decrypt.keyusage error notifications.

* gpgme.h (struct _gpgme_key): New member keylist_mode.
* keylist.c (keylist_colon_handler): Set the keylist_mode of KEY.

2004-04-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (struct _gpgme_signature):
Change member WRONG_KEY_USAGE
to unsigned int. Same for member _unused.

* keylist.c (set_mainkey_trust_info): Rewritten.
(set_subkey_capability): Handle 'd' (disabled).
(set_mainkey_capability): Rewritten.

2004-04-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.m4: Quote first argument to AC_DEFUN.

2004-04-21 Werner Koch <wk@gnupg.org>

* key.c (gpgme_key_unref): Allow passing NULL like free does.
The rule of least surprise.

2004-04-15 Werner Koch <wk@gnupg.org>

* verify.c (prepare_new_sig, _gpgme_verify_status_handler): Remove

unused result.signatures items.

* keylist.c (gpgme_get_key): Return an error if FPR is NULL.

2004-04-08 Werner Koch <wk@gnupg.org>

* verify.c (_gpgme_verify_status_handler): Ignore the error status
if we can't process it.
* decrypt-verify.c (decrypt_verify_status_handler): Backed out
yesterday's hack. It is not any longer required.

2004-04-07 Werner Koch <wk@gnupg.org>

* decrypt-verify.c (decrypt_verify_status_handler):
Hack to cope
with meaningless error codes from the verify status function.

2004-04-05 Werner Koch <wk@gnupg.org>

* gpgme.h: Add GPGME_STATUS_NEWSIG.

* verify.c (parse_error): Compare only the last part of the where
token.
(prepare_new_sig): New.
(parse_new_sig): Use prepare_new_sig when required.
(_gpgme_verify_status_handler): Handle STATUS_NEWSIG.

* engine-gpgsm.c (gpgsm_keylist_ext): Send with-validation
option. Fixed pattern construction.
(status_handler): Add debugging output.

2004-03-23 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_new): Protect _only_ tty related code with
isatty(). Submitted by Bernhard Herzog.

2004-03-11 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_new): Protect all tty related code with
isatty().

* rungpg.c (gpg_cancel): Set GPG->fd_data_map to NULL after
releasing it.
* engine-gpgsm.c (gpgsm_cancel): Only call assuan_disconnect if
GPGSM->assuan_ctx is not NULL. Set it to NULL afterwards.

2004-03-07

Marcus Brinkmann <marcus@g10code.de>

* gpgme-config.in: Do not emit include and lib directory for
prefix "/usr" or "".

2004-03-03 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (gpgsm_export_ext): Properly insert a space
between patterns.

2004-02-18 Werner Koch <wk@gnupg.org>

* gpgme-config.in: Ignore setting of --prefix.

2004-02-25 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (gpg_cancel): New function.
(gpg_release): Call it here.
(_gpgme_engine_ops_gpg): Add it here.
* engine-gpgsm.c (gpgsm_cancel): Fix last change.

2004-02-24 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (gpgme_cancel): New function.
* engine-backend.h (struct engine_ops): New member cancel.
* engine.h (_gpgme_engine_cancel): New prototype.
* engine.c (_gpgme_engine_cancel): New function.
* engine-gpgsm.c (_gpgme_engine_ops_gpgsm): Add new member cancel.
(gpgsm_cancel): New function.
(gpgsm_release): Use it.
* rungpg.c (_gpgme_engine_ops_gpg): Add new member cancel.

2004-02-17
Werner Koch <wk@gnupg.org>

* gpgme.h: Add GPGME_KEYLIST_MODE_VALIDATE.
* engine-gpgsm.c (gpgsm_keylist): Send this to gpgsm.

2004-02-15 Werner Koch <wk@gnupg.org>

* memrchr.c (memrchr): Fixed implementation. Problem pointed out
by Adriaan de Groot.

2004-02-01 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (build_argv): Use --no-comment, not --comment "".

* data-compat.c (gpgme_data_new_from_filepart): Call fseeko if

available.
* data-stream.c (stream_seek): Likewise.

2004-01-16  Werner Koch  <wk@gnupg.org>

* conversion.c (_gpgme_map_gnupg_error): Handle numerical codes as
used by GnuPG 1.9.x

2004-01-13  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (struct _gpgme_key_sig): Fix comment on REVOKED.

2004-01-12  Werner Koch  <wk@gnupg.org>

* sign.c: Include util.h for prototype of _gpgme_parse_timestamp.

2003-12-25  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (_GPGME_D_CLASS): Revert this change.
(struct _gpgme_key_sig): For C++ compilers,
rename class
member to _obsolete_class.  Add new member sig_class.
(struct _gpgme_new_signature): Same here.
* key.c (gpgme_key_sig_get_ulong_attr): Use CERTSIG->sig_class,
not CERTSIG->class.
* keylist.c (keylist_colon_handler): Likewise for KEYSIG, but keep
setting KEYSIG->class, too.  Rename variable CLASS to SIG_CLASS.
* sign.c (parse_sig_created): Set SIG->sig_class.

2003-12-22  Werner Koch  <wk@gnupg.org>

* gpgme.h (_GPGME_D_CLASS): Kludge for C++ compatibility without
changing the C API.

2003-11-19  Werner Koch  <wk@gnupg.org>

* conversion.c (_gpgme_parse_timestamp): New.
(atoi_1, atoi_2, atoi_4): New.
* keylist.c (parse_timestamp): Removed. Changed all callers to use
the new function.
* verify.c (parse_valid_sig): Ditto.  Repalced the errno check.
* sign.c (parse_sig_created): Ditto.

2003-10-31  Werner Koch  <wk@gnupg.org>

* keylist.c (parse_timestamp): Detect ISO 8601 timestamps and try
to convert them.

2003-10-10  Marcus Brinkmann  <marcus@g10code.de>

*
genkey.c (get_key_parameter): Make a copy of the key parameters.
Submitted by Miguel Coca <e970095@zipi.fi.upm.es>.

2003-10-06  Marcus Brinkmann  <marcus@g10code.de>

* data-compat.c: Include <sys/time.h> before <sys/stat.h> for
broken systems.

* engine-gpgsm.c (map_assuan_error): If ERR is -1, return sensible
error.

* io.h (_gpgme_io_subsystem_init): New prototype.
* posix-io.c (_gpgme_io_subsystem_init): Add function.
(_gpgme_io_spawn): Do not fixup signal handler here.
* version.c (do_subsystem_inits): Call _gpgme_io_subsystem_init.

* debug.c (debug_init): Drop const qualifier from E.

* ath.h (struct ath_ops): Make ADDR argument of CONNECT prototype
const.
(ath_connect): Make ADDR argument const.
* ath-pthread.c (ath_connect): Likewise.
* ath-pth.c (ath_connect): Likewise.
* ath-compat.c (ath_connect): Likewise.
* ath.c (ath_connect): Likewise.

* ath.h [HAVE_SYS_SELECT_H]: Include <sys/select.h> for fd_set.
[!HAVE_SYS_SELECT_H]: Include <sys/time.h>.

*
conversion.c (_gpgme_hextobyte): Drop "unsigned" from type of
SRC argument.
* util.h (_gpgme_hextobyte): Likewise for prototype.

* gpgme.h: Remove trailing comma in enum.

* rungpg.c: Do not include <time.h>, <sys/time.h>, <sys/types.h>,
<signal.h>, <fcntl.h>, or "unistd.h".

2003-10-02  Marcus Brinkmann  <marcus@g10code.de>

* engine-backend.h (struct engine_ops): Add argument TYPE.
* engine.c (_gpgme_engine_op_edit): Likewise.
* engine.h: Likewise.
* rungpg.c (gpg_edit): Likewise.  Use it.

* edit.c (edit_start): Likewise.  Pass it on.
(gpgme_op_edit_start, gpgme_op_edit): Likewise.
(gpgme_op_card_edit_start, gpgme_op_card_edit): New functions.

2003-09-30  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (gpg_strerror_r): Change prototype to match
gpg_strerror_r change.
* error.c (gpg_strerror_r): Likewise, also update implementation.

* gpgme.c (gpgme_hash_algo_name): Change name of RMD160 to
RIPEMD160, name of TIGER to TIGER192, name of CRC32-RFC1510 to
CRC32RFC1510,
and name of CRC24-RFC2440 to CRC24RFC2440.

2003-09-14  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h: Add prototype for gpgme_set_locale.

* gpgme.h: Define macro _GPGME_INLINE depending on the compiler
characteristics and use that instead __inline__.

* context.h (struct gpgme_context): New members lc_ctype and
lc_messages.
* gpgme.c: Include <locale.h>.
(def_lc_lock, def_lc_ctype, def_lc_messages): New static
variables.
(gpgme_set_locale): New function.
* engine.c (_gpgme_engine_new): Add arguments lc_ctype and
lc_messages.
* engine.h (_gpgme_engine_new): Likewise.
* engine-gpgsm.c (gpgsm_new): Likewise.
* rungpg.c (gpg_new): Likewise.
* engine-backend.h (struct engine_ops): Likewise to NEW.
* op-support.c (_gpgme_op_reset): Likewise to invocation of
_gpgme_engine_new.

2003-09-13  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (gpgme_strerror_r): New prototype.
* error.c (gpgme_strerror_r): New function.

* get-env.c: New file.
* util.h (_gpgme_getenv):
Add prototype.
* Makefile.am (libgpgme_real_la_SOURCES): Add get-env.c.
* rungpg.c (build_argv): Use _gpgme_getenv.
* debug.c (debug_init): Likewise.

* engine-gpgsm.c (gpgsm_new): Likewise.
(gpgsm_new): Use ttyname_r.
* w32-io.c (_gpgme_io_spawn): Disable debugging for now.

2003-09-03 Marcus Brinkmann <marcus@g10code.de>

* gpgme-config.in: Use $libdir, not @libdir@, for the echo
command.

* gpgme-config.in: Rewritten.
* gpgme.m4: Rewritten.

2003-08-19 Marcus Brinkmann <marcus@g10code.de>

The ath files (ath.h, ath.c, ath-pth.c, ath-pthread.c,
ath-compat.c, ath-pth-compat.c and ath-pthread-compat.c) have been
updated to have better thread support, and the Makefile.am was
changed to reflect that.

* util.h [!HAVE_FOPENCOOKIE]: Remove fopencookie declaration.
* engine-gpgsm.c (gpgsm_assuan_simple_command): Set ERR to return
value of status_fnc.
* rungpg.c (start): Return SAVED_ERRNO, not errno.

2003-08-18 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (start):
Use saved_errno instead errno.

2003-08-18 Marcus Brinkmann <marcus@g10code.de>

* funopen.c, putc_unlocked.c, isascii.c, memrchr.c: New files.
* fopencookie.c: File removed.

2003-08-15 Marcus Brinkmann <marcus@g10code.de>

* gpgme-config.in: Put gpg-error related flags after gpgme's.

2003-08-14 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (struct _gpgme_new_signature): Rename member CLASS to
_OBSOLETE_CLASS, add member CLASS with type unsigned int.
* sign.c (parse_sig_created): Also set SIG->_unused_class for
backward compatibility.

2003-08-04 Marcus Brinkmann <marcus@g10code.de>

* verify.c (parse_new_sig): Fix status parsing case.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (struct _gpgme_subkey): Add flag CAN_AUTHENTICATE.
Lower _UNUSED to 23 bits.
(struct _gpgme_key): Likewise.
* keylist.c (set_mainkey_capability): Support 'a' and 'A'.
(set_subkey_capability): Support 'a'.

* keylist.c (gpgme_get_key): Check if there is more than
one key
listed, and return GPG_ERR_AMBIGUOUS_NAME in that case.

* util.h (_gpgme_decode_c_string): Change type of LEN argument to
size_t.
(_gpgme_decode_percent_string): Likewise.
* conversion.c (_gpgme_decode_c_string): Likewise.
(_gpgme_decode_percent_string): Likewise.
(_gpgme_map_gnupg_error): Change type of I to unsigned int.
* signers.c (gpgme_signers_clear): Likewise.
(gpgme_signers_enum): New unsigned variable SEQNO, set to SEQ.
Use SEQNO instead SEQ.
* wait.c (fd_table_put): Change type of I and J to unsigned int.
* wait-global.c (_gpgme_wait_global_event_cb): Change type of IDX
to unsigned int.
(gpgme_wait): Change type of I and IDX to unsigned int.
* wait-private.c (_gpgme_wait_on_condition): Change type of IDX
and I to unsigned int.
* posix-io.c (_gpgme_io_close): Cast return value of macro DIM to
int to suppress gcc warning.
(_gpgme_io_set_close_notify): Likewise.
(_gpgme_io_select): Change type of I to unsigned int.
* engine.c (gpgme_get_engine_info):
Change type of PROTO to
unsigned int.
* wait-user.c (_gpgme_user_io_cb_handler): Change type of IDX and
I to unsigned int.

2003-07-29 Marcus Brinkmann <marcus@g10code.de>

* decrypt-verify.c (decrypt_verify_status_handler): Expand silly
and wrong expression.
* encrypt-sign.c (encrypt_sign_status_handler): Likewise.
* encrypt.c (encrypt_sym_status_handler): Likewise.
* sign.c (sign_status_handler): Likewise.
* verify.c (verify_status_handler): Likewise.
* decrypt.c (decrypt_status_handler): Likewise.

* engine.c (gpgme_get_engine_info): Initialize NULL.

2003-07-23  Marcus Brinkmann  <marcus@g10code.de>

* gpgme-config.in (gpg_error_libs): Quote GPG_ERROR_CFLAGS and
GPG_ERROR_LIBS when setting the corresponding variables.
Reported by Stphane Corthsy.

2003-07-22  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (set_recipients): Move declaration of NEWLEN to
the beginning of the block.

2003-06-22  Marcus Brinkmann  <marcus@g10code.de>

* data-mem.c (mem_write):
Copy original buffer content.

2003-06-22  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (gpgme_user_ids_release, gpgme_user_ids_append): Remove
prototypes.

2003-06-06  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (AM_CPPFLAGS): Add @GPG_ERROR_CFLAGS@.
* gpgme-config.in (gpg_error_libs, gpg_error_cflags): New variables.
Print them.

* op-support.c (_gpgme_parse_inv_userid): Rename to
_gpgme_parse_inv_recp and change to new datatype.
* ops.h (_gpgme_parse_inv_key): Fix prototype.
* gpgme.h (struct _gpgme_invalid_user_id): Rename to
__gpgme_invalid_key.  Rename field ID to KEY.
(gpgme_invalid_user_id_t): Rename to gpgme_invalid_key_t.
(struct _gpgme_op_encrypt_result): Here, too.
(struct _gpgme_op_sign_result): Likewise.
* encrypt.c (struct op_data): Likewise.
(release_op_data): Likewise.
* sign.c (struct op_data): Likewise.
(release_op_data): Likewise.

* posix-io.c (_gpgme_io_read): Save errno across debug calls.
(_gpgme_io_write): Likewise.
(_gpgme_io_pipe):
Likewise.
(_gpgme_io_select): Likewise.

* rungpg.c (struct engine_gpg): Remove arg_error.
(add_arg): Don't set arg_error.
(add_data): Likewise.
(start): Don't check arg_error.
(gpg_new): Check return value of add_arg.
* verify.c (parse_notation): Free allocated memory at error.

2003-06-05 Marcus Brinkmann <marcus@g10code.de>

Everywhere: Use libgpg-error error codes.

* Makefile.am (EXTRA_DIST): Remove mkerrors.
(BUILT_SOURCES): Remove errors.c.
(MOSTLYCLEANFILES): Likewise.
(libgpgme_la_SOURCES): Likewise. Add error.c.
(errors.c): Remove target.
* mkerrors: File removed.
* error.c: New file.

* gpgme.h (gpgme_error_t): Change to type gpg_error_t.
(gpgme_err_code_t, gpgme_err_source_t): New types.
(gpgme_err_code, gpgme_err_source, gpgme_error, gpgme_err_make):
New static inline functions.
(gpgme_strsource, gpgme_err_code_from_errno,
gpgme_err_code_to_errno, gpgme_err_make_from_errno,
gpgme_error_from_errno): New prototypes.

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* gpgme.h (gpgme_op_export_start): Change second arg to const char *.
(gpgme_op_export): Likewise.
(gpgme_op_export_ext_start): New prototype.
(gpgme_op_export_ext): Likewise.
* engine.h: Likewise for _gpgme_engine_op_export and
_gpgme_engine_op_export_ext.
* engine-backend.h (struct engine_ops): Change second argument of
prototype of export to const char *, and add reserved int as
third argument. Add prototype for export_ext.
* engine.c (_gpgme_engine_op_export_ext): New function.
(_gpgme_engine_op_export): Change second argument of prototype of
export to const char *, and add reserved int as third argument.
* rungpg.c (gpg_export): Change second argument of prototype of
export to const char *, and add reserved int as third argument.
(gpg_export_ext): New function.
(gpg_keylist_ext): Break loop at error.
(_gpgme_engine_ops_gpg): Add gpg_export_ext.
* engine-gpgsm.c (gpgsm_export): Change second argument of

prototype of export to const
char *, and add reserved int as
third argument.
(gpgsm_export_ext): New function.
(_gpgme_engine_ops_gpgsm): Add gpgsm_export_ext.
* export.c (export_start): Change second argument of prototype of
export to const char *, and add reserved int as third argument.
(gpgme_op_export_start): Likewise.
(export_ext_start): New function.
(gpgme_op_export_ext_start): Likewise.
(gpgme_op_export_ext): Likewise.

* gpgme.h (gpgme_keylist_mode_t): New type for anonymous enum.
(gpgme_sigsum_t): New type for anonymous enum.

* encrypt-sign.c (encrypt_sign_start): Check for errors earlier,
and return an error if RECP is not set.

* Makefile.am (libgpgme_la_SOURCES): Remove user-id.c.
* user-id.c: Remove file.
* ops.h: Remove prototype for _gpgme_user_ids_all_valid.
* gpgme.h (gpgme_encrypt_flags_t): New type.
(gpgme_op_encrypt_start): Change second parameter to type
gpgme_key_t[], and add third parameter.
(gpgme_op_encrypt): Likewise.
(gpgme_op_encrypt_sign_start): Likewise.
(gpgme_op_encrypt_sign):
Likewise.
* encrypt.c (encrypt_start): Likewise.
(gpgme_op_encrypt_start): Likewise.
(gpgme_op_encrypt): Likewise.  Pass flags to engine.
* encrypt-sign.c (encrypt_sign_start): Likewise.
(gpgme_op_encrypt_sign_start): Likewise.
(gpgme_op_encrypt_sign): Likewise.
* engine-backend.h (struct engine_ops): Likewise for prototypes of
encrypt and encrypt_sign.
* engine.h: Likewise for prototypes of _gpgme_engine_op_encrypt
and _gpgme_engine_op_encrypt_sign.
* engine.c (_gpgme_engine_op_encrypt): Likewise.
(_gpgme_engine_op_encrypt_sign): Likewise.
* rungpg.c (gpg_encrypt): Likewise.
(gpg_encrypt_sign): Likewise.
* rungpg.c (gpg_encrypt): Check flags for always trust option.
* engine-gpgsm.c (gpgsm_encrypt): Likewise.
(set_recipients): Rewritten to use keys instead user IDs.
* rungpg.c (append_args_from_recipients): Rewritten to use keys
instead user IDs.
* encrypt.c (_gpgme_encrypt_status_handler): Change errors

returned to GPGME_Invalid_Key and GPGME_General_Error.

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* engine-gpgsm.c: Rename GpgsmObject to engine_gpgsm_t.
(struct gpgsm_object_s): Rename to struct engine_gpgsm.
* rungpg.c: Rename GpgObject to engine_gpg_t.
(struct gpg_object_s): Rename to struct engine_gpg.

* context.h (struct gpgme_context): Change EngineObject to
engine_object_t.
(enum ctx_op_data_type): Rename to ctx_op_data_id_t.
(ctx_op_data_t): New type.
(struct gpgme_context): Use it.
* ops.h (_gpgme_op_data_lookup): Use new type name.
* op-support.c (_gpgme_op_data_lookup): Likewise.
* engine.c: Rename EngineObject to engine_t in the file. Also
EngineStatusHandler to engine_status_handler_t,
EngineCommandHandler to engine_command_handler_t and
EngineColonLineHandler to engine_colon_line_handler.
* rungpg.c (start): Likewise.
* engine-gpgsm.c: Likewise.
* engine-backend.h (struct engine_ops): Likewise
* engine.h (struct engine_object_s): Rename to struct engine.
(EngineObject): Rename to
engine_t. Also everywhere else in the
file.
(EngineStatusHandler): Rename to engine_status_handler_t.
(EngineColonLineHandler): Rename to engine_colon_line_handler_t.
(EngineCommandHandler): Rename to engine_command_handler_t.

* engine-gpgsm.c (gpgsm_export): Fix bug in last change.

* Makefile.am (libgpgme_la_SOURCES): Remove recipient.c, add
user-id.c.
* gpgme.h (gpgme_recipients_t): Removed.
(gpgme_recipients_new, gpgme_recipients_release,
gpgme_recipients_add_name,
gpgme_recipients_add_name_with_validity, gpgme_recipients_count,
gpgme_recipients_enum_open, gpgme_recipients_enum_read,
gpgme_recipients_enum_close): Removed.
(gpgme_op_encrypt, gpgme_op_encrypt_start, gpgme_op_encrypt_sign,
gpgme_op_encrypt_sign_start, gpgme_op_export_start,
gpgme_op_export): Change second argument to gpgme_user_id_t.
(gpgme_user_ids_release): New prototype.
(gpgme_user_ids_append): Likewise.
* ops.h (_gpgme_recipients_all_valid): Remove.

(_gpgme_user_ids_all_valid): Add.
* context.h
(struct gpgme_recipients): Removed.
* user-id.c: New file.
* recipient.c: Removed file.
* rungpg.c (append_args_from_recipients): Change last arg to
gpgme_user_id_t. Reimplement.
(gpg_encrypt): Change second arg to gpgme_user_id_t.
(gpg_encrypt_sign): Likewise.
(gpg_export): Likewise. Rewrite user ID list code.
* engine.c (_gpgme_engine_op_encrypt): Change second arg to
gpgme_user_id_t.
(_gpgme_engine_op_encrypt_sign): Likewise.
(_gpgme_engine_op_export): Likewise.
* engine.h (_gpgme_engine_op_encrypt, _gpgme_engine_op_encrypt_sign,
_gpgme_engine_op_export): Likewise.
* engine-gpgsm.c (set_recipients): Likewise. Rewrite loop code.
(gpgsm_encrypt): Likewise.
(gpgsm_export): Likewise.
* engine-backend.h (struct engine_ops): Likewise for members
ENCRYPT, ENCRYPT_SIGN and EXPORT.
* export.c (export_start, gpgme_op_export_start, gpgme_op_export):
Likewise.
* encrypt.c (encrypt_start): Likewise. Don't check for count of
recipients.
(gpgme_op_encrypt_start): Likewise.
(gpgme_op_encrypt):
Likewise.
* encrypt-sign.c (encrypt_sign_start): Likewise.
(gpgme_op_encrypt_sign): Likewise.
(gpgme_op_encrypt_sign_start): Likewise.

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* gpgme.h (struct _gpgme_op_import_result): Add skipped_new_keys.
* import.c (parse_import_res): Add skipped_new_keys parser.

* op-support.c (_gpgme_parse_inv_userid): Add missing break
statements.
* encrypt.c (gpgme_op_encrypt): Use gpgme_error_t instead of int.

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* encrypt.c (gpgme_op_encrypt_result): Use intermediate variable
HOOK to avoid compiler warning. Don't ask, you don't want to know.
(_gpgme_encrypt_status_handler): Likewise.
(_gpgme_op_encrypt_init_result): Likewise.
* decrypt.c (gpgme_op_decrypt_result): Likewise.

(_gpgme_decrypt_status_handler): Likewise.
(_gpgme_op_decrypt_init_result): Likewise.
* verify.c (gpgme_op_verify_result): Likewise.
(_gpgme_verify_status_handler): Likewise.
(_gpgme_op_verify_init_result):
Likewise.
* edit.c (edit_status_handler): Likewise.
(command_handler): Likewise.
(edit_start): Likewise.
* genkey.c (gpgme_op_genkey_result): Likewise.
(genkey_status_handler): Likewise.
(genkey_start): Likewise.
* import.c (gpgme_op_import_result): Likewise.
(import_status_handler): Likewise.
(_gpgme_op_import_start): Likewise.
* trustlist.c (gpgme_op_trustlist_next): Likewise.
(_gpgme_op_trustlist_event_cb): Likewise.
(gpgme_op_trustlist_start): Likewise.
* keylist.c (gpgme_op_keylist_result): Likewise.
(keylist_colon_handler): Likewise.
(keylist_status_handler): Likewise.
(_gpgme_op_keylist_event_cb): Likewise.
(gpgme_op_keylist_start): Likewise.
(gpgme_op_keylist_ext_start): Likewise.
(gpgme_op_keylist_next): Likewise.
* passphrase.c (_gpgme_passphrase_status_handler): Likewise.
(_gpgme_passphrase_command_handler_internal): Likewise.
* sign.c (gpgme_op_sign_result): Likewise.
(_gpgme_sign_status_handler): Likewise.
(_gpgme_op_sign_init_result):
Likewise.

* passphrase.c (_gpgme_passphrase_command_handler_internal): Fix
access to pointer type.

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* engine.h (EngineCommandHandler): Change last argument to int fd.
* gpgme.h (gpgme_passphrase_cb_t): Rewritten to take parts of the
description and fd.
(gpgme_edit_cb_t): Change last argument to int fd.
* ops.h (_gpgme_passphrase_command_handler_internal): New prototype.
* passphrase.c: Include <assert.h>.
(op_data_t): Rename userid_hint to uid_hint, remove last_pw_handle.
(release_op_data): Check values before calling free.
(_gpgme_passphrase_status_handler): Likewise.
(_gpgme_passphrase_command_handler_internal): New function.
(_gpgme_passphrase_command_handler): Rewritten.

* edit.c (edit_status_handler): Pass -1 as fd argument.
(command_handler): Update prototype. New variable processed. Use
it to store return value of
_gpgme_passphrase_command_handler_internal which is now used
instead _gpgme_passphrase_command_handler.
Use it also to check
if we should call the user's edit function. Pass fd to user's
edit function.
* rungpg.c (struct gpg_object_s): Change type of cmd.cb_data to
void *.
(gpg_release): Check value before calling free. Do not release
cmd.cb_data.
(command_cb): Function removed.
(command_handler): New function. Thus we don't use a data object
for command handler stuff anymore, but handle it directly. This
allows proper error reporting (cancel of passphrase requests, for
example). Also all callbacks work via direct writes to the file
descriptor (so that passphrases are not kept in insecure memory).
(gpg_set_command_handler): Rewritten to use even more ugly hacks.
(read_status): Check cmd.keyword before calling free. Install
command_handler as the I/O callback handler with GPG as private
data.

* rungpg.c (gpg_new): Add --enable-progress-filter to gpg
invocation.
* decrypt-verify.c (_gpgme_op_decrypt_verify_start): Rename to
decrypt_verify_start.
(gpgme_op_decrypt_verify_start):
Call decrypt_verify_start.
(gpgme_op_decrypt_verify): Likewise.
* verify.c (verify_status_handler): New function that also calls
progress status handler.
(_gpgme_op_verify_start): Set status handler to verify_status_handler.
Rename to (verify_start).
(gpgme_op_verify_start): Call verify_start.
(gpgme_op_verify): Likewise.
* encrypt.c (encrypt_status_handler): New function.
(_gpgme_encrypt_sym_status_handler): Call progress status handler.
Make static. Rename to encrypt_sym_status_handler.
(encrypt_start): Set status handler to encrypt_sym_status_handler
or encrypt_status_handler.
* sign.c (sign_status_handler): New function.
(sign_start): Set status handler to sign_status_handler.
* decrypt.c (decrypt_status_handler): New function that also calls
progress status handler.
(decrypt_start): Set status handler to decrypt_status_handler.
* encrypt-sign.c (encrypt_sign_status_handler): Likewise.
* decrypt-verify.c (decrypt_verify_status_handler):

Call
_gpgme_progress_status_handler.

* conversion.c (_gpgme_decode_c_string): Add missing break
statement.

* recipient.c (gpgme_recipients_add_name_with_validity): Add one
to buffer to allocate.

2003-05-19  Marcus Brinkmann  <marcus@g10code.de>

* verify.c (parse_new_sig): Fix ERRSIG case.
Submitted by Benjamin Lee <benjaminlee@users.sf.net>.

2003-05-18  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h: The following types are renamed.  The old name is kept
as a deprecated typedef.
(GpgmeCtx): Rename to gpgme_ctx_t.
(GpgmeData): Rename to gpgme_data_t.
(GpgmeRecipients): Rename to gpgme_recipients_t.
(GpgmeError): Rename to gpgme_error_t.
(GpgmeDataEncoding): Rename to gpgme_data_encoding_t.
(GpgmePubKeyAlgo): Rename to gpgme_pubkey_algo_t.
(GpgmeHashAlgo): Rename to gpgme_hash_algo_t.
(GpgmeSigStat): Rename to gpgme_sig_stat_t.
(GpgmeSigMode): Rename to gpgme_sig_mode_t.
(GpgmeAttr): Rename to gpgme_attr_t.
(GpgmeValidity): Rename to gpgme_validity_t.
(GpgmeProtocol):
Rename to gpgme_protocol_t.
(GpgmeStatusCode): Rename to gpgme_status_code_t.
(GpgmeEngineInfo): Rename to gpgme_engine_info_t.
(GpgmeSubkey): Rename to gpgme_subkey_t.
(GpgmeKeySig): Rename to gpgme_keysig_t.
(GpgmeUserID): Rename to gpgme_user_id_t.
(GpgmePassphraseCb): Rename to gpgme_passphrase_cb_t.
(GpgmeProgressCb): Rename to gpgme_progress_cb_t.
(GpgmeEditCb): Rename to gpgme_edit_cb_t.
(GpgmeIOCb): Rename to gpgme_io_cb_t.
(GpgmeRegisterIOCb): Rename to gpgme_register_io_cb_t.
(GpgmeRemoveIOCb): Rename to gpgme_remove_io_cb_t.
(GpgmeEventIO): Rename to gpgme_event_io_t.
(GpgmeEventIOCb): Rename to gpgme_event_io_cb_t.
(GpgmeIOCbs): Rename to gpgme_io_cbs.
(gpgme_io_cbs_t): New type.
(GpgmeDataReadCb): Rename to gpgme_data_read_cb_t.
(GpgmeDataWriteCb): Rename to gpgme_data_write_cb_t.

(GpgmeDataSeekCb): Rename to gpgme_data_seek_cb_t.
(GpgmeDataReleaseCb): Rename to gpgme_data_release_cb_t.
(GpgmeDataCbs): Rename to gpgme_data_cbs.
(gpgme_data_cbs_t):
New type.
(GpgmeInvalidUserID): Rename to gpgme_invalid_user_id_t.
(GpgmeEncryptResult): Rename to gpgme_encrypt_result_t.
(GpgmeDecryptResult): Rename to gpgme_decrypt_result_t.
(GpgmeNewSignature): Rename to gpgme_new_signature_t.
(GpgmeSignResult): Rename to gpgme_sign_result_t.
(GpgmeSigNotation): Rename to gpgme_sig_notation_t.
(GpgmeSignature): Rename to gpgme_signature_t.
(GpgmeVerifyResult): Rename to gpgme_verify_result_t.
(GpgmeImportStatus): Rename to gpgme_import_status_t.
(GpgmeImportResult): Rename to gpgme_import_result_t.
(GpgmeGenKeyResult): Rename to gpgme_genkey_result_t.
(GpgmeKeyListResult): Rename to gpgme_keylist_result_t.
(GpgmeTrustItem): Rename to gpgme_trust_item_t.
* gpgme.h (gpgme_deprecated_error_t): New type, swallowing macros
GPGME_No_Recipients, GPGME_Invalid_Recipient and
GPGME_No_Passphrase.
* data.h (struct gpgme_data_s): Rename to struct gpgme_data.
* context.h (struct gpgme_context_s): Rename to struct
gpgme_context.
(struct
gpgme_recipients_s): Rename to gpgme_recipients.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

* keylist.c (finish_key): Clear OPD->tmp_uid.

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* verify.c (_gpgme_verify_status_handler): Return GPGME_No_Data
for NODATA status without signatures.

2003-05-05 Marcus Brinkmann <marcus@g10code.de>

* key.c (_gpgme_key_append_name): Use decoded string to parse user id.
(_gpgme_key_add_sig): Likewise.

2003-05-04 Marcus Brinkmann <marcus@g10code.de>

* context.h (struct gpgme_context_s): Remove member op_info.

* key.c (_gpgme_key_add_sig): Initialize SIG->uid.

* gpgme.h (GpgmeError): Add deprecated values for

GPGME_Invalid_Type and GPGME_Invalid_Mode.

2003-04-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (gpgme_get_op_info): Remove prototype.
* ops.h (_gpgme_set_op_info,
_gpgme_data_release_and_return_string, _gpgme_data_get_as_string,
_gpgme_data_append, _gpgme_data_append_string,
_gpgme_data_append_string_for_xml,
_gpgme_data_append_for_xml,
_gpgme_data_append_percentstring_for_xml): Likewise.
(_gpgme_progress_status_handler): Change first arg to void *.
* progress.c (_gpgme_progress_status_handler): Likewise.
* conversion.c: Do not include <string.h>, <errno.h>, <ctype.h>,
and <sys/types.h>, but <string.h>.
(_gpgme_data_append): Remove function.
(_gpgme_data_append_string): Likewise.
(_gpgme_data_append_for_xml): Likewise.
(_gpgme_data_append_string_for_xml): Likewise.
(_gpgme_data_append_percentstring_for_xml): Likewise.
* data-mem.c (_gpgme_data_get_as_string): Likewise.
(_gpgme_data_release_and_return_string): Likewise.
* gpgme.c (gpgme_get_op_info): Likewise.
(_gpgme_set_op_info): Likewise.

* gpgme.h (struct _gpgme_key): New structure.
(GpgmeKey): Define using _gpgme_key.
(struct _gpgme_subkey): New structure.
(GpgmeSubKey): New type.
(struct _gpgme_key_sig): New structure.
(GpgmeKeySig): New type.
(struct _gpgme_user_id): New structure.
(GpgmeUserID):
New type.
(struct _gpgme_op_keylist_result): New structure.
(GpgmeKeyListResult): New type.
(gpgme_op_keylist_result): New function.
(gpgme_key_get_as_xml): Remove prototype.
* context.h (struct gpgme_context_s): Remove members tmp_key,
tmp_uid, key_cond and key_queue.
(struct key_queue_item_s): Remove structure.
(struct user_id_s): Remove structure.
(struct gpgme_recipients_s): Replace with simple
GpgmeUserID list.
* gpgme.c (gpgme_release): Do not release CTX->tmp_key.
* ops.h (_gpgme_key_add_subkey, _gpgme_key_append_name,
_gpgme_key_add_sig, _gpgme_trust_item_new): New prototypes.
* rungpg.c (command_cb): Return GpgmeError instead int.

New variable ERR.  Use it to hold return value of cmd handler.
(gpg_delete): Access fingerprint of key directly.
(append_args_from_signers): Likewise.
(gpg_edit): Likewise.
(append_args_from_recipients): Use GpgmeUserID for recipient list.
* engine-gpgsm.c: Do not include "key.h".
(gpgsm_delete): Access fingerprint of key
directly.
(gpgsm_sign): Likewise.
(set_recipients): Use GpgmeUserID for recipients.  Invert invalid
user ID flag.
* key.h: File removed.
* key.c: Completely reworked to use exposed GpgmeKey data types.
* keylist.c: Likewise.
* recipient.c: Completely reworked to use GpgmeUserID.

2003-04-29  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (gpgme_get_key): Remove force_update argument.
* key-cache.c: File removed.
* Makefile.am (libgpgme_la_SOURCES): Remove key-cache.c.
* ops.h (_gpgme_key_cache_add, _gpgme_key_cache_get): Remove
prototypes.
* keylist.c (_gpgme_op_keylist_event_cb): Don't call
_gpgme_key_cache_add.
(gpgme_get_key): New function.
* verify.c (gpgme_get_sig_key): Remove last argument to
gpgme_get_key invocation.

* gpgme.h (struct _gpgme_trust_item): New structure.
(GpgmeTrustItem): New type.
(gpgme_trust_item_ref, gpgme_trust_item_unref): New prototypes.
* context.h (struct trust_queue_item_s): Remove structure.
(struct gpgme_context_s): Remove trust_queue
member.
* Makefile.am (libgpgme_la_SOURCES): Add trust-item.c.
* trust-item.c: New file.
* trustlist.c: Do not include <stdio.h> or <time.h>, but
"gpgme.h".
(struct trust_queue_item_s): Change to new type op_data_t.
(trust_status_handler): Change first argument to void *.
(trust_colon_handler): Likewise.
(_gpgme_op_trustlist_event_cb): Use op_data_t type.
(gpgme_op_trustlist_start): Use op_data_t and rework error
handling.
(gpgme_op_trustlist_next): Use op_data_t.
(gpgme_trust_item_release): Remove function.
(gpgme_trust_item_get_string_attr): Likewise.

(gpgme_trust_item_get_int_attr): Likewise.

* verify.c (calc_sig_summary): Do not set GPGME_SIGSUM_SYS_ERROR
for bad signatures.

2003-04-28 Marcus Brinkmann <marcus@g10code.de>

* context.h: Remove OPDATA_VERIFY_COLLECTING.
(struct gpgme_context_s): Remove member notation.
* gpgme.h: Make enum for GPGME_KEYLIST_MODE_* values.

* gpgme.h (struct _gpgme_sig_notation): New structure.
(GpgmeSigNotation): New
type.
(struct _gpgme_signature): New structure.
(GpgmeSignature): New type.
(struct _gpgme_op_verify_result): New structure.
(GpgmeVerifyResult): New type.
(gpgme_op_verify_result): New prototype.
(gpgme_get_notation): Remove prototype.
* ops.h (_gpgme_op_verify_init_result): New prototype.
(_gpgme_verify_status_handler): Change first argument to void *.
* util.h (_gpgme_decode_percent_string, _gpgme_map_gnupg_error):
New prototypes.
* conversion.c (_gpgme_decode_percent_string): New function.
(gnupg_errors): New static global.
(_gpgme_map_gnupg_error): New function.
* gpgme.c (gpgme_release): Don't release CTX->notation.
(gpgme_get_notation): Remove function.
* decrypt-verify.c (_gpgme_op_decrypt_verify_start): Call
_gpgme_op_verify_init_result.
* verify.c: Do not include <stdio.h>, <assert.h> and "key.h", but
do include "gpgme.h".
(struct verify_result): Replace with ...
(op_data_t): ... this type.
(release_verify_result): Remove function.
(release_op_data):
New function.
(is_token): Remove function.
(skip_token): Remove function.
(copy_token): Remove function.
(gpgme_op_verify_result): New function.
(calc_sig_summary): Rewritten.
(finish_sig): Remove function.
(parse_new_sig): New function.
(parse_valid_sig): New function.
(parse_notation): New function.
(parse_trust): New function.

(parse_error): New function.
(_gpgme_verify_status_handler): Rewritten. Change first argument
to void *.
(_gpgme_op_verify_start): Rework error handling. Call
_gpgme_op_verify_init_result.
(gpgme_op_verify): Do not release or clear CTX->notation.
(gpgme_get_sig_status): Rewritten.
(gpgme_get_sig_string_attr): Likewise.
(gpgme_get_sig_ulong_attr): Likewise.
(gpgme_get_sig_key): Likewise.

* gpgme.h (struct _gpgme_op_decrypt_result): New structure.
(GpgmeDecryptResult): New type.
(gpgme_op_decrypt_result): New prototype.
* ops.h (_gpgme_op_decrypt_init_result): New prototype.
(_gpgme_decrypt_status_handler): Fix prototype.
(_gpgme_decrypt_start):
Remove prototype.
* decrypt-verify.c: Do not include <stdio.h>, <stdlib.h>,
<string.h> and <assert.h>, "util.h" and "context.h", but
"gpgme.h".
(decrypt_verify_status_handler): Change first argument to void *,
and rework error handling.
(_gpgme_op_decrypt_verify_start): New function.
(gpgme_op_decrypt_verify_start): Rewrite using
_gpgme_op_decrypt_verify_start.
(gpgme_op_decrypt_verify): Likewise.
* decrypt.c: Include <string.h>, "gpgme.h" and "util.h".
(struct decrypt_result): Change to typedef op_data_t, rewritten.
(is_token): Remove function.
(release_op_data): New function.
(skip_token): Remove function.
(gpgme_op_decrypt_result): New function.
(_gpgme_decrypt_status_handler): Change first argument to void *.
Rework error handling.
(_gpgme_decrypt_start): Rename to ...
(decrypt_start): ... this. Call _gpgme_op_decrypt_init_result.
(_gpgme_op_decrypt_init_result): New function.
(gpgme_op_decrypt_start): Use decrypt_start.
(gpgme_op_decrypt): Likewise.

2003-04-27
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* encrypt-sign.c: Do not include <stddef.h>, <stdio.h>,
<stdlib.h>, <string.h>, <assert.h> and "util.h", but "gpgme.h".
(_gpgme_op_encrypt_sign_start): Rename to ...
(encrypt_sign_start): ... this.

(gpgme_op_encrypt_sign_start): Use encrypt_sign_start, not
_gpgme_op_encrypt_sign_start.
(gpgme_op_encrypt_sign): Likewise.

* gpgme.h (GpgmeEncryptResult): New data type.
(gpgme_op_encrypt_result): New prototype.
* ops.h (_gpgme_op_encrypt_init_result): New prototype.
(_gpgme_op_encrypt_status_handler): Fix prototype.
* encrypt-sign.c (_gpgme_op_encrypt_sign_start): Call
_gpgme_op_encrypt_init_result.
* encrypt.c: Do not include <stdio.h>, <assert.h>, "util.h" and
"wait.h". Include <errno.h> and "gpgme.h".
(SKIP_TOKEN_OR_RETURN): Remove macro.
(struct encrypt_result): Rename to ...
(op_data_t): ... new data type. Rewrite for user result data.
(append_xml_encinfo): Remove function.
(release_op_data): New function.
(gpgme_op_encrypt_result):
New function.
(_gpgme_op_encrypt_status_handler): Change first argument to void *.
Rewrite result parsing.
(_gpgme_op_encrypt_sym_status_handler): Change first argument to
void *.
(_gpgme_op_encrypt_init_result): New function.
(_gpgme_op_encrypt_start): Rename to ...
(encrypt_start): ... this.
(gpgme_op_encrypt_start): Use encrypt_start, not
gpgme_op_encrypt_start.
(gpgme_op_encrypt): Likewise.

* gpgme.h (GpgmePubKeyAlgo, GpgmeHashAlgo, GpgmeInvalidUserID,
GpgmeNewSignature, GpgmeSignResult): New data types.
(gpgme_op_sign_result, gpgme_pubkey_algo_name,
gpgme_hash_algo_name): New prototypes.
* gpgme.c (gpgme_pubkey_algo_name): New function.
(gpgme_hash_algo_name): Likewise.
* ops.h (_gpgme_parse_inv_userid, _gpgme_op_sign_init_result): New
prototype.
(_gpgme_op_sign_status_handler): Fix prototype.
* op-support.c: Include <errno.h> and <string.h>.
(_gpgme_parse_inv_userid): New function.
* sign.c: Include <errno.h> and "gpgme.h", but
not <stdio.h>,
<assert.h> and "util.h".
(SKIP_TOKEN_OR_RETURN): Remove macro.
(struct sign_result): Change to op_data_t type and rework it.
(release_sign_result): Rename to ...
(release_op_data): ... this and rewrite it.

(append_xml_info): Remove function.
(gpgme_op_sign_result): New function.
(parse_sig_created): New function.
(_gpgme_sign_status_handler): Change first argument to void *.
Rewrite the function to use the new result structure and functions.
(_gpgme_op_sign_init_result): New function.
(_gpgme_op_sign_start): Rename to ...
(sign_start): ... this. Call _gpgme_op_sign_init_result.
(gpgme_op_sign_start): Use sign_start instead _gpgme_op_sign_start.
(gpgme_op_sign): Likewise.
* encrypt-sign.c (_gpgme_op_encrypt_sign_start): Call
_gpgme_op_sign_init_result.

* delete.c: Include <errno.h> and "gpgme.h", but not "util.h" or
"key.h".
(enum delete_problem): Move into function delete_status_handler.
(delete_status_handler): Change first argument to void *. Parse
delete
problem with strtol instead atoi. Return better error
values.
(_gpgme_op_delete_start): Rename to ...
(delete_start): ... this. Rework error handling.
(gpgme_op_delete_start): Use delete_start instead
_gpgme_op_delete_start.
(gpgme_op_delete): Likewise.
* gpgme.h (GpgmeDataType): Removed.

2003-04-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h: Change GPGME_IMPORT_PRIVATE to GPGME_IMPORT_SECRET.
* import.c (parse_import_res): Parse unchanged field.

* gpgme.h: New enum for GPGME_IMPORT_NEW, GPGME_IMPORT_UID,
GPGME_IMPORT_SIG, GPGME_IMPORT_SUBKEY, GPGME_IMPORT_PRIVATE.
(GpgmeError): GPGME_Unknown_Reason, GPGME_Not_Found,
GPGME_Ambiguous_Specification, GPGME_Wrong_Key_Usage,
GPGME_Key_Revoked, GPGME_Key_Expired, GPGME_No_CRL_Known,
GPGME_CRL_Too_Old, GPGME_Policy_Mismatch, GPGME_No_Secret_Key,
GPGME_Key_Not_Trusted, GPGME_Issuer_Missing, GPGME_Chain_Too_Long,
GPGME_Unsupported_Algorithm, GPGME_Sig_Expired,
GPGME_Bad_Signature, GPGME_No_Public_Key added
as new error codes.
(struct _gpgme_import_status): New structure.
(GpgmeImportStatus): New type.
(struct _gpgme_op_import_result): New structure.
(GpgmeImportResult): New type.
(gpgme_op_import_result): New function.
* import.c: Include <errno.h> and "gpgme.h", but not "util.h".

(struct import_result): Change to type op_data_t.
(release_import_result): Rename to ...
(release_op_data): ... this.
(append_xml_impinfo): Function removed.
(gpgme_op_import_result): New function.
(parse_import): New function.
(parse_import_res): Likewise.
(import_status_handler): Change first argument to void *.  Rewrite
to use new functions.
(_gpgme_op_import_start): Rework error handling.

* edit.c: Do not include <assert.h>, "util.h", but "gpgme.h".
(edit_resut): Change to typedef for op_data_t.
(edit_status_handler): Change first argument to void *.
Rework error handling.
(command_handler): Rework error handling.
(_gpgme_op_edit_start): Rename to ...
(edit_start): ... this.  Rework
error handling.
(gpgme_op_edit_start): Rewrite using edit_start.
(gpgme_op_edit): Likewise.

* ops.h (_gpgme_passphrase_start): Remove prototype.
* passphrase.c: Do not include <assert.h>, "util.h" or
"debug.h", but "gpgme.h".
(struct passphrase_result): Change to typedef for op_data_t.
(release_passphrase_result): Rename to release_op_data.
(_gpgme_passphrase_status_handler): Change first argument to void *.
Use new op_data_t type.
(_gpgme_passphrase_command_handler): Use new op_data_t type.
(_gpgme_passphrase_start): Remove function.
* decrypt.c (_gpgme_decrypt_start): Rewrite error handling.  Do
not call _gpgme_passphrase_start, but install command handler.
* encrypt.c (_gpgme_op_encrypt_start): Likewise.
* encrypt-sign.c (_gpgme_op_encrypt_sign_start): Likewise.
* sign.c (_gpgme_op_sign_start): Likewise.

* context.h (struct gpgme_context_s): Remove member initialized,
use_cms and help_data_1.  Add member protocol.  Make use_armor and
use_textmode bit flags.
 Make keylist_mode, include_certs,
signers_len and signers_size unsigned.
* gpgme.c (gpgme_new): Initialize CTX->protocol.
(gpgme_set_protocol): Do not check CTX.  Use CTX->protocol.
(gpgme_get_protocol): Likewise.
(gpgme_release): Do not release CTX->help_data_1.
* op-support.c (_gpgme_op_reset): Use CTX->protocol.

* wait-private.c (_gpgme_wait_private_event_cb): Remove variable CTX.

* data.c: Do not include <assert.h>, but "gpgme.h".
(_gpgme_data_inbound_handler): Expand _gpgme_data_append, because
it will go.  Do not assert DH.
(_gpgme_data_outbound_handler): Do not assert DH.

* export.c: Do not include <stdlib.h>, "debug.h" and "util.h", but
"gpgme.h".
(export_status_handler): Change type of first argument to void *.
(_gpgme_op_export_start): Rename to ...
(export_start): ... this.  Rework error handling.
(gpgme_op_export_start): Rewritten to use export_start instead
_gpgme_op_export_start.
(gpgme_op_export): Likewise.

* gpgme.h (GpgmeError): Add GPGME_Busy,
GPGME_No_Request.
(GPGME_No_Recipients, GPGME_Invalid_Recipient,
GPGME_No_Passphrase): New macros.

* key.c (gpgme_key_get_string_attr): Fix validity attribute.

2003-04-24  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (struct _gpgme_op_genkey_result): New structure.
(GpgmeGenKeyResult): New type.
(gpgme_op_genkey): Drop last argument.
(gpgme_op_genkey_result): New function.
* genkey.c: Do not include "util.h", but "gpgme.h".
(struct genkey_result): Replace with ...
(op_data_t): ... this new type.
(release_genkey_result): Replace with ...
(release_op_data): ... this new function.
(gpgme_op_genkey_result): New function.
(genkey_status_handler): Rewritten using new op_data_t type.
(get_key_parameter): New function.
(_gpgme_op_genkey_start): Renamed to
(genkey_start): ... this and rewritten.
(gpgme_op_genkey_start): Use genkey_start instead
_gpgme_op_genkey_start.
(gpgme_op_genkey): Rewritten.  Remove FPR argument.

* context.h (struct gpgme_context_s): Remove member
verbosity.
* gpgme.c (gpgme_new): Do not set member verbosity.
* engine.h (_gpgme_engine_set_verbosity): Remove prototype.
* engine.c (_gpgme_engine_set_verbosity): Remove function.

* engine-backend.h (struct engine_ops): Remove set_verbosity.
* engine-gpgsm.c (_gpgme_engine_ops_gpgsm): Remove set_verbosity member.
* rungpg.c (_gpgme_engine_ops_gpg): Likewise.
(gpg_set_verbosity): Remove function.
* decrypt.c (_gpgme_decrypt_start): Don't call
_gpgme_engine_set_verbosity.
* delete.c (_gpgme_op_delete_start): Likewise.
* edit.c (_gpgme_op_edit_start): Likewise.
* encrypt.c (_gpgme_op_encrypt_start): Likewise.
* encrypt-sign.c (_gpgme_op_encrypt_sign_start): Likewise.
* export.c (_gpgme_op_export_start): Likewise.
* genkey.c (_gpgme_op_genkey_start): Likewise.
* import.c (_gpgme_op_import_start): Likewise.
* keylist.c (gpgme_op_keylist_start): Likewise.
(gpgme_op_keylist_ext_start): Likewise.
* sign.c (_gpgme_op_sign_start): Likewise.
* verify.c (_gpgme_op_verify_start):
Likewise.

* Makefile.am (libgpgme_la_SOURCES): Add key-cache.c.
* key.c (key_cache_initialized, key_cache_size,
key_cache_max_chain_length, ): Removed.
(struct key_cache_item_s, key_cache_lock, key_cache,
key_cache_unused_items, hash_key, _gpgme_key_cache_add,
_gpgme_key_cache_get, gpgme_get_key): Moved to ...
* key-cache.c: ... here.  New file.
* key.h (_gpgme_key_cache_init): Remove prototypes.
(_gpgme_key_cache_add,_gpgme_key_cache_get): Move to ...
* ops.h: ... here.
* version.c: Do not include "key.h".
(do_subsystem_inits): Do not call _gpgme_key_cache_init.

* mkstatus: Strip trailing comma.
* gpgme.h (GpgmeStatus): Pretty print.

* gpgme.h (GpgmeError): Rename GPGME_No_Passphrase to
GPGME_Bad_Passphrase.
* passphrase.c (_gpgme_passphrase_status_handler): Use
GPGME_Bad_Passphrase instead GPGME_No_Passphrase.

* gpgme.h (GpgmeError): Rename GPGME_No_Recipients to
GPGME_No_UserID and GPGME_Invalid_Recipient to
GPGME_Invalid_UserID.
* encrypt.c (_gpgme_encrypt_status_handler):
Use GPGME_No_UserID
instead GPGME_No_Recipients and GPGME_Invalid_UserID instead
GPGME_Invalid_Recipient.
(_gpgme_op_encrypt_start): Likewise.

* gpgme.h (GpgmeError): Remove GPGME_Busy and GPGME_No_Request.
* wait-user.c (_gpgme_wait_user_event_cb): Don't clear CTX->pending.
* wait-private.c (_gpgme_wait_private_event_cb): Likewise.
* wait-global.c (gpgme_wait): Likewise.
* verify.c (_gpgme_op_verify_start): Likewise.
(gpgme_get_sig_status): Don't check pending flag.
(gpgme_get_sig_string_attr): Likewise.
(gpgme_get_sig_ulong_attr): Likewise.
(gpgme_get_sig_key): Likewise.
* op-support.c (_gpgme_op_reset): Likewise.
* trustlist.c (gpgme_op_trustlist_start): Don't clear pending flag.
(gpgme_op_trustlist_next): Don't check or clear pending flag.
(gpgme_op_trustlist_end): Likewise.
* sign.c (_gpgme_op_sign_start): Likewise.
* context.h (struct gpgme_context_s): Remove member PENDING.
* decrypt.c (_gpgme_decrypt_start): Likewise.
* delete.c (_gpgme_op_delete_start):
Likewise.
* edit.c (_gpgme_op_edit_start): Likewise.
* encrypt.c (_gpgme_op_encrypt_start): Likewise.
* encrypt-sign.c (_gpgme_op_encrypt_sign_start): Likewise.
* export.c (_gpgme_op_export_start): Likewise.
* genkey.c (_gpgme_op_genkey_start): Likewise.
* import.c (_gpgme_op_import_start): Likewise.
* key.c (gpgme_get_key): Likewise.
* keylist.c (gpgme_op_keylist_start): Likewise.
(gpgme_op_keylist_ext_start): Likewise.
(gpgme_op_keylist_next): Likewise.
(gpgme_op_keylist_end): Likewise.
* data-compat.c (gpgme_error_to_errno): Don't convert EBUSY.

2003-02-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h (GpgmePassphraseCb): Change type to return GpgmeError,
and add argument for returning the result string.
(gpgme_cancel): Remove prototype.
* gpgme.c (gpgme_cancel): Remove function.
* context.h (struct gpgme_context_s): Remove member cancel.
* passphrase.c (_gpgme_passphrase_command_handler): Call the
passphrase callback in the new way.

2003-01-30
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* edit.c (_gpgme_edit_status_handler): Call the progress status
handler.

2003-02-05 Marcus Brinkmann <marcus@g10code.de>

* wait-user.c (_gpgme_wait_user_remove_io_cb): Move check for no
I/O handlers left to ...
(_gpgme_user_io_cb_handler): ... here.

2003-02-04 Marcus Brinkmann <marcus@g10code.de>

* trustlist.c (trustlist_colon_handler): Release ITEM if name
could not be allocated.
(gpgme_trust_item_release): Only release name if it is allocated.
Reported by Marc Mutz <Marc.Mutz@uni-bielefeld.de>.

2003-02-04 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (read_status): If he status handler returns an error,
return it.
(status_handler): If read_status fails, just return the error.

2003-02-01 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (start): Handle all errors, not only most of
them.
(xtoi_1, xtoi_2): Remove macro.
(status_handler): Replace use of xtoi_2 with _gpgme_hextobyte.

2003-02-01 Marcus
Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (map_assuan_error): Replace
ASSUAN_Bad_Certificate_Path with ASSUAN_Bad_Certificate_Chain.
(gpgsm_new): Use assuan_pipe_connect instead assuan_pipe_connect2.

* util.h (DIMof): Remove macro.

* ops.h (_gpgme_op_event_cb, _gpgme_op_event_cb_user,
_gpgme_data_unread): Prototypes removed.

2003-01-30 Marcus Brinkmann <marcus@g10code.de>

* types.h: File removed.
* Makefile.am (libgpgme_la_SOURCES): Remove types.h.
* io.h (struct spawn_fd_item_s): Do not include "types.h".
* key.h: Likewise.
* context.h: Likewise.
* cengine-gpgsm.h: Likewise.
* engine.h: Include "gpgme.h" instead "types.h". Add prototypes
for EngineStatusHandler, EngineColonLineHandler and

EngineCommandHandler.
(_gpgme_engine_set_status_handler): Change parameter type from
GpgmeStatusHandler to EngineStatusHandler.
(_gpgme_engine_set_command_handler): Change parameter type from
GpgmeCommandHandler to EngineCommandHandler.
(_gpgme_engine_set_colon_line_handler):
Change parameter type from
GpgmeColonLineHandler to EngineColonLineHandler.
* engine-backend.h: Include "engine.h" instead "types.h".
(struct engine_ops): Change Gpgme*Handler parameters in members
set_command_handler, set_colon_line_handler and set_status_handler
to Engine*Handler.
* engine.c (_gpgme_engine_set_status_handler): Change parameter
type from GpgmeStatusHandler to EngineStatusHandler.
(_gpgme_engine_set_command_handler): Change parameter type from
GpgmeCommandHandler to EngineCommandHandler.
(_gpgme_engine_set_colon_line_handler): Change parameter type from
GpgmeColonLineHandler to EngineColonLineHandler.
* rungpg.c (struct gpg_object_s): Change type of member status.fnc
from GpgmeStatusHandler to EngineStatusHandler.  Change type of
member colon.fnc from GpgmeColonLineHandler to
EngineColonLineHandler.  Change type of member cmd.fnc from
GpgmeCommandHandler to EngineCommandHandler.
* engine-gpgsm.c (struct gpgsm_object_s): Likewise.
* rungpg.c
(gpg_set_status_handler): Change parameter type from
GpgmeStatusHandler to EngineStatusHandler.
* engine-gpgsm.c (gpgsm_set_status_handler): Likewise.
(assuan_simple_command): Likewise.
* rungpg.c (gpg_set_colon_line_handler): Change parameter type
from GpgmeColonLineHandler to EngineColonLineHandler.
* engine-gpgsm.c (gpgsm_set_colon_line_handler): Likewise.
* rungpg.c (gpg_set_command_handler): Change parameter type from
GpgmeCommandHandler to EngineCommandHandler.

* engine-gpgsm.c (status_handler): Do not close status fd at end
of function.

* ops.h (_gpgme_op_data_lookup): Add prototype.
* op-support.c: Include <stdlib.h>.
(_gpgme_op_data_lookup): New function.
* decrypt.c (_gpgme_release_decrypt_result): Function removed.
(struct decrypt_result_s): Rename to ...
(struct decrypt_resul): ... this.
(DecryptResult): New type.
(_gpgme_decrypt_status_handler): Don't use
test_and_allocate_result, but use _gpgme_op_data_lookup to
retrieve result data object.

* sign.c
(_gpgme_release_sign_result): Function removed.
(release_sign_result): New function.
(struct sign_result_s): Rename to ...
(struct sign_result): ... this.
(SignResult): New type.
(_gpgme_sign_status_handler): Don't use
test_and_allocate_result, but use _gpgme_op_data_lookup to
retrieve result data object.
* encrypt.c (struct encrypt_result_s): Rename to ...
(struct encrypt_result): ... this.
(_gpgme_release_encrypt_result): Function removed.
(release_encrypt_result): New function.
(_gpgme_encrypt_status_handler): Don't use
test_and_allocate_result, but use _gpgme_op_data_lookup to
retrieve result data object.
* verify.c (struct verify_result_s): Rename to ...
(struct verify_result): ... this.  Remove member next.
(VerifyResult): New type.
(_gpgme_release_verify_result): Function removed.
(release_verify_result): New function.
(finish_sig): Change first argument to type VerifyResult.  Diddle
the type of the op_data structure.
(add_notation): Change first argument
to type VerifyResult.
(_gpgme_verify_status_handler): Don't use
test_and_allocate_result, but use _gpgme_op_data_lookup to
retrieve result data object.
* passphrase.c (struct passphrase_result_s): Rename to ...
(struct passphrase_result): ... this.  Remove member next.
(PassphraseResult): New type.
(_gpgme_release_passphrase_result): Function removed.
(release_passphrase_result): New function.
(_gpgme_passphrase_status_handler): Don't use
test_and_allocate_result, but use _gpgme_op_data_lookup to
retrieve result data object.
(_gpgme_passphrase_command_handler): Likewise.
* keylist.c (struct keylist_result_s): Rename to ...
(struct keylist_result): ... this.  Remove member next.
(KeylistResult): New type.
(_gpgme_release_keylist_result): Function removed.
(release_keylist_result): New function.
(keylist_status_handler): Don't use
test_and_allocate_result, but use _gpgme_op_data_lookup to
retrieve result data object.
* edit.c (struct edit_result_s): Rename to ...
(struct

edit_result): ... this.  Remove member next.
(EditResult): New type.
(_gpgme_release_edit_result): Function removed.
(release_edit_result): New function.
(edit_status_handler): Don't use
test_and_allocate_result, but use _gpgme_op_data_lookup to
retrieve result data object.
(command_handler): Likewise.
* types.h (DecryptResult, SignResult, EncryptResult,
PassphraseResult, ImportResult, DeleteResult, GenKeyResult,
KeylistResult, EditResult): Types removed.
* ops.h: Don't include "types.h", but "gpgme.h" and "context.h".
(test_and_allocate_result): Remove macro.
(_gpgme_release_decrypt_result): Remove prototype.
(_gpgme_decrypt_result): Remove prototype.
(_gpgme_release_sign_result): Remove prototype.
(_gpgme_release_encrypt_result): Remove prototype.
(_gpgme_release_passphrase_result): Remove prototype.
(_gpgme_release_import_result): Remove prototype.
(_gpgme_release_delete_result): Remove prototype.
(_gpgme_release_genkey_result): Remove prototype.
(_gpgme_release_keylist_result):
Remove prototype.
(_gpgme_release_edit_result): Remove prototype.
(_gpgme_release_verify_result): Remove prototype.
* gpgme.c (_gpgme_release_result): Rewritten.
* context.h (enum ctx_op_data_type): New enum.
(struct ctx_op_data): New structure.
(struct gpgme_context_s): Replace the member result with a member
op_data.
(fail_on_pending_request): Remove macro.
* op-support.c (_gpgme_op_reset): Expand macro
fail_on_pending_request.
* util.h: Don't include "types.h" or "debug.h", but include "gpgme.h".

2003-01-19  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (_gpgme_engine_ops_gpg): Remove gpg_start.
(gpg_start): Rename to ...
(start): ... this function.  Change arguments to GpgObject.
(gpg_decrypt): Call start.
(gpg_edit): Likewise.
(gpg_encrypt): Likewise.
(gpg_encrypt_sign): Likewise.
(gpg_export): Likewise.
(gpg_import): Likewise.
(gpg_keylist): Likewise.
(gpg_keylist_ext): Likewise.

(gpg_trustlist): Likewise.
(gpg_verify): Likewise.

*
engine-gpgsm.c (_gpgme_engine_ops_encrypt): Remove gpgsm_start.
(gpgsm_start): Rename to ...
(struct gpgsm_object_s): Remove member command.
(gpgsm_release): Don't free command.
(start): ... this function.  Change arguments to GpgsmObject and
const char *.
(gpgsm_decrypt): Call start.
(gpgsm_delete): Likewise.
(gpgsm_encrypt): Likewise.
(gpgsm_export): Likewise.
(gpgsm_genkey): Likewise.
(gpgsm_import): Likewise.
(gpgsm_keylist): Likewise.
(gpgsm_keylist_ext): Likewise.
(gpgsm_verify): Likewise.

* decrypt.c (_gpgme_decrypt_start): Don't call
_gpgme_engine_start.
* delete.c (_gpgme_op_delete_start): Likewise.
* edit.c (_gpgme_op_edit_start): Likewise.
* encrypt.c (_gpgme_op_encrypt_start):
* encrypt-sign.c (_gpgme_op_encrypt_sign_start):
* export.c (_gpgme_op_export_start): Likewise.
* genkey.c (_gpgme_op_genkey_start): Likewise.
* import.c (_gpgme_op_import_start): Likewise.
* keylist.c (gpgme_op_keylist_ext_start): Likewise.
(gpgme_op_keylist_start):
Likewise.
* sign.c (_gpgme_op_sign_start): Likewise.
* trustlist.c (gpgme_op_trustlist_start): Likewise.
* verify.c (_gpgme_op_verify_start): Likewise.

* engine-backend.h (struct engine_ops): Remove member start.

* engine.h (_gpgme_engine_start): Remove prototype.
* engine.c (_gpgme_engine_start): Remove function.

2003-01-19  Miguel Coca  <mcoca@gnu.org>

* w32-io.c (_gpgme_io_select): Add missing argument in calls to
DEBUG_BEGIN.
* w32-util.c: Include "sema.h".
(find_program_in_registry): Change DEBUG1 to DEBUG2, fixes compilation
error.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

* types.h: Remove byte and ulong types.
* util.h (_gpgme_hextobyte): Change prototype to unsigned char
instead byte.
* conversion.c (_gpgme_hextobyte): Change argument to unsigned
char instead byte.
(_gpgme_decode_c_string): Likewise, and beautify. Also support a
few more escaped characters. Be more strict about buffer size.
(_gpgme_data_append_percentstring_for_xml): Change
type of SRC,
BUF and DST to unsigned char instead byte.
* progress.c (_gpgme_progress_status_handler): Use unsigned char
instead byte.
* debug.c (trim_spaces): Likewise.

* util.h (mk_error): Remove macro.
* conversion.c, data.c, data-compat.c, decrypt.c, delete.c,
edit.c, encrypt.c, encrypt-sign.c, engine.c, engine-gpgsm.c,
export.c, genkey.c, gpgme.c, import.c, key.c, keylist.c,
passphrase.c, progress.c, recipient.c, rungpg.c, sign.c,
signers.c, trustlist.c, verify.c, wait.c, wait-global.c,
wait-private (literally everywhere): Expand the mk_error macro.

* context.h (wait_on_request_or_fail): Remove macro.

* context.h (gpgme_context_s): Remove member ERROR.
* types.h (GpgmeStatusHandler): Change return type to GpgmeError.
(GpgmeCommandHandler): Change return type to GpgmeError and add
new argument RESULT.
* gpgme.h (GpgmeIOCb): Change return type to GpgmeError.
(GpgmeEventIO): New event GPGME_EVENT_START.
(GpgmeIdleFunc): Remove type.
(gpgme_register_idle): Remove
prototype.
* data.c: Include <assert.h>.
(_gpgme_data_inbound_handler): Change return type to GpgmeError.
Return any error instead ignoring it, don't close file descriptor
on error.
(_gpgme_data_outbound_handler): Likewise.
* decrypt.c: Do not include <stdio.h>, <string.h> and <assert.h>.
(_gpgme_decrypt_status_handler): Change return type to GpgmeError.
Return error instead setting ctx->error. Return success at end of
function.
(gpgme_op_decrypt): Don't work around the old kludge anymore.
* decrypt-verify.c (decrypt_verify_status_handler): Change return
type to GpgmeError. Return possible errors.

* delete.c: Do not include <stdio.h>, <string.h>, <time.h> and
<assert.h>.
(delete_status_handler): Change return type to GpgmeError. Return
error instead setting ctx->error. Return success at end of
function.
* edit.c: Do not include <stdio.h> and <string.h>.
(_gpgme_edit_status_handler): Change type to GpgmeError,
make static and rename to ...
(edit_status_handler):
... this. Return error directly.
(command_handler): Change return type to GpgmeError, add result
argument. Return error directly.
* encrypt.c (status_handler_finish): Remove function.
(_gpgme_encrypt_status_handler): Change return type to GpgmeError.
Return error directly.
(_gpgme_encrypt_sym_status_handler): Likewise.
* encrypt-sign.c (encrypt_sign_status_handler): Likewise.
* engine-gpgsm.c (close_notify_handler): Do not signal done event
anymore.
(status_handler): Change return type to GpgmeError. Diddle things
around a bit to return errors directly.
(start): Send start event.
* export.c: Do not include <stdio.h>, <string.h> and <assert.h>.
(export_status_handler): Change return type to GpgmeError. Don't
check ctx->error.
* genkey.c: Do not include <stdio.h> and <assert.h>.
(genkey_status_handler): Change return type to GpgmeError. Don't
check ctx->error. Return errors directly.
* gpgme.c (_gpgme_release_result): Do not initialize ctx->error.
(_gpgme_op_event_cb):
Function removed.
(_gpgme_op_event_cb_user): Likewise.
* import.c: Do not include <stdio.h>, <string.h> and <assert.h>.
(import_status_handler): Change return type to GpgmeError. Don't
check ctx->error.
* keylist.c (keylist_colon_handler, keylist_status_handler, finish_key):
Change return type to GpgmeError, return error directly.
* Makefile (libgpgme_la_SOURCES): Add wait-global.c,
wait-private.c and wait-user.c
* ops.h (test_and_allocate_result): Return error instead setting
ctx->error.
(_gpgme_data_inbound_handler, _gpgme_data_outbound_handler,
_gpgme_verify_status_handler, _gpgme_decrypt_status_handler,
_gpgme_sign_status_handler, _gpgme_encrypt_staus_handler,
_gpgme_passphrase_status_handler, _gpgme_progress_status_handler):
Change return type to GpgmeError.
(_gpgme_passphease_command_handler): Change return type to
GpgmeError and add new argument RESULT.

* op-support.c: Use new callback functions, and change private
data to ctx everywhere.
* passphrase.c
(_gpgme_passphrase_status_handler): Change return
type to GpgmeError, return error directly.
(_gpgme_passphrase_command_handler): Change return type to
GpgmeError, add result argument.  Return results accordingly.
* progress.c (_gpgme_progress_status_handler): Change return type
to GpgmeError, return errors directly.
* rungpg.c (status_handler): Change return type to GpgmeError.
Return error directly.
(close_notify_handler): Don't send done event.
(colon_line_handler): Change return type to GpgmeError, return
errors directly.
* rungpg.c (start): Send start event.
* sign.c (_gpgme_sign_status_handler): Change return type to
GpgmeError, return errors directly.
* trustlist.c (trustlist_status_handler): Change return type to
GpgmeError.  Return 0.
(trustlist_colon_handler): Change return type GpgmeError.  Return
errors directly.
* verify.c (add_notation): Change return type to GpgmeError,
return errors directly.
(_gpgme_verify_status_handler): Likewise.
* wait.h
(struct fd_table): Remove lock member.
(struct wait_item_s): Moved here from wait.c.
(struct tag): New structure.
(_gpgme_wait_event_cb): Remove prototype.
(_gpgme_wait_private_event_cb, _gpgme_wait_global_event_cb,
_gpgme_wait_user_add_io_cb, _gpgme_wait_user_remove_io_cb,
_gpgme_wait_user_event_io_cb): New prototypes.
* wait.c: Don't include <stdio.h>.
(ftd_global, ctx_done_list, ctx_done_list_size,
ctx_done_list_length, ctx_done_list_lock, idle_function): Remove
global variable.
(gpgme_register_idle, do_select, _gpgme_wait_event_cb): Remove
function.
(gpgme_wait): Move to file wait-global.c.
(_gpgme_add_io_cb): Take ctx as private argument, initialize ctx
member in wait item and tag.
(_gpgme_remove_io_cb): Take ctx from tag.  Don't use FDT lock.
(_gpgme_wait_one, _gpgme_wait_on_condition): Move to
wait-private.c.
(gpgme_fd_table_init): Don't initialize FDT->lock.
(gpgme_fd_table_deinit): Don't destroy FDT->lock.
(_gpgme_fd_table_put): Make static and rename to

...
(fd_table_put): ... this function.  Don't use FDT->lock.
(struct wait_item_s): Move to wait.h.
* wait-global.c: New file.
* wait-private.c: New file.
* wait-user.c: New file.

* key.c (gpgme_key_sig_get_string_attr): Use validity_to_string
instead otrust_to_string to calculate validity.

2003-01-30  Marcus Brinkmann  <marcus@g10code.de>

* types.h (EngineObject): Move typedef to ...
* engine.h: ... here.
* types.h (GpgObject): Move typedef to ...
* rungpg.c: ... here.
* types.h (GpgsmObject): Move typedef to ...
* engine-gpgsm.c: ... here.

* util.h (return_if_fail, return_null_if_fail,
return_val_if_fail): Remove macro.
* gpgme.c (gpgme_cancel): Don't use return_if_fail.
* key.c (gpgme_key_ref): Likewise.
* signers.c (gpgme_signers_enum): Likewise.
(gpgme_signers_clear): Likewise.

* engine-backend.h (struct engine_ops): Rename get_path to
get_file_name.
* gpgme.h (struct _gpgme_engine_info): Rename member path to
file_name.
* version.c: Do not include <stdio.h>,
<stdlib.h>, context.h and
util.h.  Other clean ups.
(parse_version_number): Protect more seriously against
overflow.
(gpgme_get_engine_info): Move to ...
* engine.c (gpgme_get_engine_info): ... here.
(_gpgme_engine_get_info): Function removed.
(_gpgme_engine_get_path): Make static and rename to ...
(engine_get_file_name): .. this.
(_gpgme_engine_get_version): Make static and rename to ...
(engine_get_version): ... this.
(_gpgme_engine_get_req_version): Make static and rename to ...
(engine_get_req_version): ... this.
* engine.h (_gpgme_engine_get_path, _gpgme_engine_get_version,
_gpgme_engine_req_version, _gpgme_engine_get_info.): Remove
prototypes.

* gpgme.h (enum GpgmeProtocol): Remove GPGME_PROTOCOL_AUTO.
* gpgme.c (gpgme_set_protocol): Don't handle GPGME_PROTOCOL_AUTO.
(gpgme_get_protocol_name): New function.

* engine-backend.h (struct engine_ops): New member
get_req_version, remove member check_version.
* engine.h (_gpgme_Engine_get_version): New prototype.
*
rungpg.c (gpg_get_req_version): New function.
(gpg_check_version): Function removed.
(_gpgme_engine_ops_gpg): Add gpg_get_req_version, remove
gpg_check_version.
* engine-gpgsm.c (gpgsm_get_req_version): New function.
(gpgsm_check_version): Function removed.
(_gpgme_engine_ops_gpgsm): Add gpgsm_get_req_version, remove
gpgsm_check_version.
* engine.c: Include ops.h.
(_gpgme_engine_get_req_version): New function.
(gpgme_engine_check_version): Rewritten.
* version.c (gpgme_get_engine_info): Rewritten.
* gpgme.h (gpgme_engine_info): New structure.
(GpgmeEngineInfo): New type.

2003-01-06 Werner Koch <wk@gnupg.org>

* keylist.c (set_mainkey_capability): Handle 'd' and 'D' used
since gpg 1.3 to denote disabled keys.

2003-01-06 Marcus Brinkmann <marcus@g10code.de>

* data-mem.c: Include <string.h>.
* engine.c: Likewise.

2003-01-06 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (libgpgme_la_DEPENDENCIES): Correct bug in last change.

2002-12-24 Marcus
Brinkmann <marcus@g10code.de>

* gpgme.h (gpgme_op_verify, gpgme_op_decrypt_verify): Drop R_STAT
argument.
* decrypt-verify.c (gpgme_op_decrypt_verify): Drop R_STAT
argument.
* verify.c (gpgme_op_verify): Drop R_STAT argument.
(_gpgme_intersect_stati): Function removed.
* ops.h (_gpgme_intersect_stati): Remove prototype.

2002-12-24  Marcus Brinkmann  <marcus@g10code.de>

* libgpgme.vers: New file.
* Makefile.am (EXTRA_DIST): Add libgpgme.vers.
(libgpgme_version_script_cmd): New variable.
(libgpgme_la_LDFLAGS): Add libgpgme_version_script_cmd here.
(libgpgme_la_DEPENDENCIES): New variable.

2002-12-23  Marcus Brinkmann  <marcus@g10code.de>

* key.c (gpgme_key_get_string_attr): Don't accept GPGME_ATTR_IS_SECRET.
(otrust_to_string): New function.
(gpgme_key_get_as_xml): Use it.
(validity_to_string): New function.
(gpgme_key_get_string_attr): Beautify using above functions.
(gpgme_key_get_ulong_attr): Likewise.

2002-12-23  Marcus Brinkmann  <marcus@g10code.de>

* data-mem.c
(mem_release): Fix gcc warning.
* data-user.c (user_release): Likewise.

2002-12-06  Marcus Brinkmann  <marcus@g10code.de>

* data.h (gpgme_data_release_cb): Change return type to void.
(gpgme_data_read_cb): Change return type to ssize_t.
* data.c (gpgme_data_read): Likewise.
* data-stream.c (stream_read): Likewise.
* data-fd.c (fd_read): Likewise.
* data-mem.c (mem_read): Likewise.
(mem_release): Change return type to void.
* data-user.c (user_read): Change return type to ssize_t.
(user_release): Change return type to void.
* data-compat.c (old_user_read): Change return type to ssize_t.
* gpgme.h (GpgmeDataReadCb): Likewise.
(gpgme_data_read): Likewise.
(GpgmeDataSeekCb): Change return type to off_t.

2002-12-04  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h: Add prototype for gpgme_get_key.
* key.c (gpgme_get_key): New function.
* verify.c (gpgme_get_sig_key): Rewrite using gpgme_get_key.

* gpgme.h: Add prototypes for new interfaces
gpgme_key_sig_get_string_attr

and gpgme_key_get_ulong_attr.
(enum GpgmeAttr): New attribute GPGME_ATTR_SIG_CLASS.
* gpgme.c (gpgme_set_keylist_mode): Allow GPGME_KEYLIST_MODE_SIGS.
* key.h (struct certsig_s): New members ALGO, NAME_PART,
EMAIL_PART, COMMENT_PART, NAME, SIG_STAT and SIG_CLASS.

* conversion.c (_gpgme_decode_c_string): Add new parameter LEN.
Use that to determine if allocation is desired or not.
* util.h: Adjust prototype of _gpgme_decode_c_string.
* keylist.c (keylist_colon_handler): Adjust caller of
_gpgme_decode_c_string.

* key.h (struct gpgme_key_s): New member last_uid.
* key.c (_gpgme_key_append_name): Rewritten using
_gpgme_decode_c_string and the last_uid pointer.
(my_isdigit): Macro removed.
(ALLOC_CHUNK): Likewise.
* keylist.c (set_userid_flags): Use last_uid member of KEY.

* context.h (struct user_id_s): New member last_certsig.
* key.h: Add prototype for _gpgme_key_add_certsig.
* key.c (_gpgme_key_add_certsig): New function.
(set_user_id_part): Move function
before _gpgme_key_add_certsig.
(parse_user_id): Change first argument to SRC, add new arguments
NAME, EMAIL and COMMENT.  Change code to use these arguments
instead going through UID.  Move function before
_gpgme_add_certsig.
(parse_x509_user_id): Likewise.
(_gpgme_key_append_name): Adjust arguments to parse_x509_user_id
and parse_user_id invocation.
(one_certsig_as_xml): New function.
(one_uid_as_xml): Print signatures.
* context.h (struct gpgme_context_s): New member TMP_UID.
* keylist.c (keylist_colon_handler): Rewritten, implement "sig"
record entries.

* key.c (get_certsig): New function.
(gpgme_key_sig_get_string_attr): Likewise.
(gpgme_key_sig_get_ulong_attr): Likewise.

* keylist.c: Include <ctype.h>.
(my_isdigit): Macro removed.
(set_mainkey_trust_info): Use isdigit, not my_isdigit.
(set_userid_flags): Likewise.
(set_subkey_trust_info): Likewise.
(set_ownertrust): Likewise.
(finish_key): Move function up a bit and remove prototype.

* rungpg.c (gpg_keylist_ext):
Correct precedence of signature
listing mode.
(gpg_keylist_ext): Implement signature listing mode.

2002-11-25  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (_gpgme_gpg_spawn): Do not set parent fds to -1.
* posix-io.c (_gpgme_io_spawn): Call _gpgme_io_close instead close
for parent fds.
* w32-io.c (_gpgme_io_spawn): Call _gpgme_io_close instead
CloseHandle for parent fds.

2002-11-22  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h [_MSC_VER]: Define ssize_t as long.

2002-11-22  Werner Koch  <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_new): Save the result of a first
setlocale before doing another setlocale.

2002-11-21  Marcus Brinkmann  <marcus@g10code.de>

* decrypt.c: Some beautyfication.

* verify.c (_gpgme_verify_status_handler): Treat
GPGME_STATUS_UNEXPECTED like GPGME_STATUS_NODATA.
Reported by Miguel Coca <e970095@zipi.fi.upm.es>.

2002-11-19  Marcus Brinkmann  <marcus@g10code.de>

* genkey.c: Only include <config.h> if [HAVE_CONFIG_H].
(struct
genkey_result_s): Add new member FPR.
(_gpgme_release_genkey_result): Free RESULT->fpr if set.
(genkey_status_handler): Extract the fingerprint from the status
line.
(gpgme_op_genkey): Add new argument FPR and return the fingerprint
in it.
* gpgme.h: Adjust prototype of gpgme_op_genkey.

2002-11-19  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (gpg_keylist): Add --with-fingerprint to gpg invocation
twice, to get fingerprints on subkeys.  Suggested by Timo Schulz
<twoaday@freakmail.de>.

(gpg_keylist_ext): Likewise.

2002-11-05 Marcus Brinkmann <marcus@g10code.de>

* import.c (append_xml_impinfo): Use
_gpgme_data_append_string_for_xml rather than
_gpgme_data_append_string for the field content.
Submitted by Miguel Coca <e970095@zipi.fi.upm.es>.

2002-10-10 Marcus Brinkmann <marcus@g10code.de>

* rungpg.h, engine-gpgsm.h: File removed.
* engine-backend.h: New file.
* Makefile.am (gpgsm_components): New variable, set depending on
automake conditional HAVE_GPGSM.
(libgpgme_la_SOURCES):
Add engine-backend.h, remove rungpg.h and
engine-gpgsm.h. Replace engine-gpgsm.c with ${gpgsm_components}.
(status-table.h): Depend on gpgme.h, not rungpg.h.
* conversion.c: Include <stdlib.h>.
* engine-gpgsm.c: Do not set ENABLE_GPGSM here. Include
"engine-backend.h" instead "engine-gpgsm.h". Reorder some
functions and remove all function prototypes.
(_gpgme_gpgsm_get_version): Make static and rename to ...
(gpgsm_get_version): ... this.
(_gpgme_gpgsm_check_version): Make static and rename to ...
(gpgsm_check_version): ... this.
(_gpgme_gpgsm_new): Make static. Change argument type from
GpgsmObject * to void **. Call gpgsm_release instead
_gpgme_gpgsm_release.
(_gpgme_gpgsm_op_decrypt): Make static and rename to ...
(gpgsm_check_decrypt): ... this.
(_gpgme_gpgsm_op_delete): Make static and rename to ...
(gpgsm_check_delete): ... this.
(_gpgme_gpgsm_set_recipients): Make static and rename to ...
(gpgsm_check_set_recipients): ... this.
(_gpgme_gpgsm_op_encrypt):
Make static and rename to ...
(gpgsm_encrypt): ... this.
(_gpgme_gpgsm_op_export): Make static and rename to ...
(gpgsm_export): ... this.
(_gpgme_gpgsm_op_genkey): Make static and rename to ...
(gpgsm_genkey): ... this.
(_gpgme_gpgsm_op_import): Make static and rename to ...
(gpgsm_import): ... this.
(_gpgme_gpgsm_op_keylist): Make static and rename to ...
(gpgsm_keylist): ... this.
(_gpgme_gpgsm_op_keylist_ext): Make static and rename to ...

(gpgsm_keylist_ext): ... this.
(_gpgme_gpgsm_op_sign): Make static and rename to ...
(gpgsm_sign): ... this.
(_gpgme_gpgsm_op_trustlist): Make static and rename to ...
(gpgsm_trustlist): ... this.
(_gpgme_gpgsm_op_verify): Make static and rename to ...
(gpgsm_verify): ... this.
(gpgsm_status_handler): Rename to ...
(status_handler): ... this.
(_gpgme_gpgsm_set_status_handler): Make static and rename to ...
(gpgsm_set_status_handler): ... this.
(_gpgme_gpgsm_set_colon_line_handler): Make static
and rename to ...
(gpgsm_set_colon_line_handler): ... this.
(_gpgme_gpgsm_add_io_cb): Rename to ...
(add_io_cb): ... this.
(_gpgme_gpgsm_start): Make static and rename to ...
(gpgsm_start): ... this.
(_gpgme_gpgsm_set_io_cb): Make static and rename to ...
(gpgsm_set_io_cb): ... this.
(_gpgme_gpgsm_io_event): Make static and rename to ...
(gpgsm_io_event): ... this.
(struct _gpgme_engine_ops_gpgsm): New variable.
[!ENABLE_GPGSM]: Removed.
* engine.c: Do not include <time.h>, <sys/types.h>, <string.h>,
<assert.h>, "io.h", "rungpg.h" and "engine-gpgsm.h". Include
<stdlib.h> and "engine-backend.h".
(struct engine_object_s): Rewritten.
(engine_ops): New variable.
* engine.c (_gpgme_engine_get_path, _gpgme_engine_get_version,
_gpgme_engine_check_version, _gpgme_engine_new,
_gpgme_engine_release, _gpgme_engine_set_verbosity,
_gpgme_engine_set_status_handler,
_gpgme_engine_set_command_handler,
_gpgme_engine_set_colon_line_handler, _gpgme_engine_op_decrypt,
_gpgme_engine_op_delete,
_gpgme_engine_op_edit,
_gpgme_engine_op_encrypt, _gpgme_engine_op_encrypt_sign,
_gpgme_engine_op_export, _gpgme_engine_op_genkey,
_gpgme_engine_op_import, _gpgme_engine_op_keylist,
_gpgme_engine_op_keylist_ext, _gpgme_engine_op_sign,
_gpgme_engine_op_trustlist, _gpgme_engine_op_verify,
_gpgme_engine_start, _gpgme_engine_set_io_cbs,
_gpgme_engine_io_event): Reimplement.
* engine.h: Fix a few comments and a variable name in a prototype.
* ops.h: Do not include "rungpg.h".
* passphrase.c: Include config.h only if [HAVE_CONFIG_H]. Do not
include "rungpg.h".

* recipient.c: Likewise.
* signers.c: Likewise.
* version.c: Likewise.
* rungpg.c: Likewise.  Include "engine-backend.h".  Reorder
functions and remove prototypes.
(_gpgme_gpg_get_version): Make static and rename to ...
(gpg_get_version): ... this.
(_gpgme_gpg_check_version): Make static and rename to ...
(gpg_check_version): ... this.
(_gpgme_gpg_new): Make static.  Change argument type from
GpgObject
* to void **.  Call gpg_release instead
_gpgme_gpg_release.
(_gpgme_gpg_op_decrypt): Make static and rename to ...
(gpg_check_decrypt): ... this.
(_gpgme_gpg_op_delete): Make static and rename to ...
(gpg_check_delete): ... this.
(_gpgme_gpg_set_recipients): Make static and rename to ...
(gpg_check_set_recipients): ... this.
(_gpgme_gpg_op_encrypt): Make static and rename to ...
(gpg_encrypt): ... this.
(_gpgme_gpg_op_export): Make static and rename to ...
(gpg_export): ... this.
(_gpgme_gpg_op_genkey): Make static and rename to ...
(gpg_genkey): ... this.
(_gpgme_gpg_op_import): Make static and rename to ...
(gpg_import): ... this.
(_gpgme_gpg_op_keylist): Make static and rename to ...
(gpg_keylist): ... this.
(_gpgme_gpg_op_keylist_ext): Make static and rename to ...
(gpg_keylist_ext): ... this.
(_gpgme_gpg_op_sign): Make static and rename to ...
(gpg_sign): ... this.
(_gpgme_gpg_op_trustlist): Make static and rename to ...
(gpg_trustlist): ... this.
(_gpgme_gpg_op_verify):
Make static and rename to ...
(gpg_verify): ... this.
(gpg_status_handler): Rename to ...
(status_handler): ... this.
(_gpgme_gpg_set_status_handler): Make static and rename to ...
(gpg_set_status_handler): ... this.
(_gpgme_gpg_set_colon_line_handler): Make static and rename to ...
(gpg_set_colon_line_handler): ... this.
(gpgme_gpg_add_io_cb): Rename to ...
(add_io_cb): ... this.
(_gpgme_gpg_start): Make static and rename to ...
(gpg_start): ... this.

(_gpgme_gpg_set_io_cb): Make static and rename to ...
(gpg_set_io_cb): ... this.
(_gpgme_gpg_io_event): Make static and rename to ...
(gpg_io_event): ... this.
(struct _gpgme_engine_ops_gpg): New variable.

2002-10-10 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_verify) [!ENABLE_GPGSM]: Add
missing argument.

2002-10-09 Marcus Brinkmann <marcus@g10code.de>

* data.h, data-user.c, data-stream.c, data-mem.c, data-fd.c,
data-compat.c: New file. Really check them in this time,
completes
2002-10-08 change.

* rungpg.h (GpgStatusHandler): Rename type to GpgmeStatusHandler
and move to ...
* types.h (GpgmeStatusHandler): ... here.
* rungpg.h (GpgColonLineHandler): Rename type to GpgmeColonLineHandler.
and move to ...
* types.h (GpgmeColonLineHandler): ... here.
* rungpg.h (GpgCommandHandler): Rename type to GpgmeCommandHandler.
and move to ...
* types.h (GpgmeCommandHandler): ... here.
* engine.h: Don't include "rungpg.h".
(_gpgme_engine_set_status_handler): Change type of
argument from GpgStatusHandler to GpgmeStatusHandler.
(_gpgme_engine_set_colon_line_handler): Change type of
argument from GpgColonLineHandler to GpgmeColonLineHandler.
(_gpgme_engine_set_command_handler): Change type of
argument from GpgCommandHandler to GpgmeCommandHandler.
* engine-gpgsm.h: Don't include "rungpg.h".
(_gpgme_gpgsm_set_status_handler): Change type of
argument from GpgStatusHandler to GpgmeStatusHandler.
(_gpgme_gpgsm_set_colon_line_handler): Change type
of
argument from GpgColonLineHandler to GpgmeColonLineHandler.
* engine-gpgsm.c: Do not include "rungpg.h".
(struct gpgsm_object_s): Change type of
status.fnc to GpgmeStatusHandler. Change type of colon.fnc to
GpgmeColonLineHandler.
(gpgsm_assuan_simple_command): Change type of argument from
GpgStatusHandler to GpgmeStatusHandler.
(_gpgme_gpgsm_set_status_handler): Likewise.
(_gpgme_gpgsm_set_colon_line_handler): Change type of argument from

GpgColonLineHandler to GpgmeColonLineHandler.
* rungpg.h (_gpgme_gpg_set_status_handler): Change type of
argument from GpgStatusHandler to GpgmeStatusHandler.
(_gpgme_gpg_set_colon_line_handler): Change type of
argument from GpgColonLineHandler to GpgmeColonLineHandler.
(_gpgme_gpg_set_command_handler): Change type of
argument from GpgCommandHandler to GpgmeCommandHandler.
* rungpg.c (struct gpg_object_s): Change type of status.fnc to
GpgmeStatusHandler.  Change type of colon.fnc to
GpgmeColonLineHandler.  Change type of cmd.fnc
to
GpgmeCommandLineHandler.
(_gpgme_gpg_set_status_handler): Change type of argument FNC to
GpgmeStatusHandler.
(_gpgme_gpg_set_colon_line_handler): Change type of argument FNC
to GpgmeColonLineHandler.
(_gpgme_gpg_set_command_handler): Change type of argument FNC to
GpgmeCommandHandler.
* engine.c (_gpgme_engine_set_status_handler): Change type of
argument FNC to GpgmeStatusHandler.
(_gpgme_engine_set_colon_line_handler): Change type of argument FNC
to GpgmeColonLineHandler.
(_gpgme_engine_set_command_handler): Change type of argument FNC to
GpgmeCommandHandler.

* rungpg.h (_gpgme_gpg_enable_pipemode): Remove prototype.
* rungpg.c (struct gpg_object_s): Remove PM.
(pipemode_cb): Prototype removed.
(add_pm_data): Function removed.
(_gpgme_gpg_enable_pipemode): Likewise.
(pipemode_copy): Likewise.
(pipemode_cb): Likewise.
(add_arg): Don't check for pipemode.
(add_data): Likewise.
(_gpgme_gpg_set_status_handler): Likewise.
(_gpgme_gpg_set_colon_line_handler):
Likewise.
(_gpgme_gpg_set_command_handler): Likewise.
(_gpgme_gpg_spawn): Likewise.
(_gpgme_gpg_spawn): Don't set PM.active.
(_gpgme_gpg_op_verify): Remove pipemode case.
* verify.c (_gpgme_op_verify_start): Remove pipemode case.

* rungpg.h (_gpgme_gpg_add_arg, _gpgme_gpg_add_data,
_gpgme_gpg_add_pm_data, _gpgme_gpg_housecleaning,
_gpgme_gpg_set_simple_line_handler): Prototype removed.
(_gpgme_gpg_set_verbosity): New prototype.
* rungpg.c (_gpgme_gpg_add_data): Make static and rename to ...

(add_data): ... this.
(_gpgme_gpg_add_pm_data): Call add_data, not _gpgme_gpg_add_data.
(_gpgme_gpg_set_command_handler): Likewise.
(_gpgme_gpg_op_decrypt, _gpgme_gpg_op_edit, _gpgme_gpg_op_encrypt,
_gpgme_gpg_op_encrypt_sign, _gpgme_gpg_op_export,
_gpgme_gpg_op_genkey, _gpgme_gpg_op_import, _gpgme_gpg_op_sign,
_gpgme_gpg_op_verify): Likewise.
(_gpgme_gpg_add_pm_data): Rename to ...
(add_pm_data): ... this.
(_gpgme_gpg_op_verify): Call add_pm_data, not
_gpgme_gpg_add_pm_data.
(_gpgme_gpg_add_arg):
Make static and rename to ...
(add_arg): ... this.
(_gpgme_gpg_set_command_handler, _gpgme_gpg_new,
_gpgme_gpg_op_decrypt, _gpgme_gpg_op_delete,
_gpgme_append_gpg_args_from_signers, _gpgme_gpg_op_edit,
_gpgme_append_gpg_args_from_recipients, _gpgme_gpg_op_encrypt,
_gpgme_gpg_op_encrypt_sign, _gpgme_gpg_op_export,
_gpgme_gpg_op_genkey, _gpgme_gpg_op_import, _gpgme_gpg_op_keylist,
_gpgme_gpg_op_keylist_ext, _gpgme_gpg_op_trustlist,
_gpgme_gpg_op_sign, _gpgme_gpg_op_verify): Use add_arg, not
_gpgme_gpg_add_arg.
(_gpgme_gpg_set_verbosity): New function.
(struct gpg_object_s): Remove member simple from colon.
(_gpgme_gpg_set_colon_line_handler): Don't initialize simple.
(_gpgme_gpg_set_simple_line_handler): Removed function.
(read_colon_line): Don't check the GPG->colon.simple.
* engine.c (_gpgme_engine_set_verbosity): Call
_gpgme_gpg_set_verbosity instead _gpgme_gpg_add_arg.

2002-10-08 Marcus Brinkmann <marcus@g10code.de>

* util.h (_gpgme_malloc,
_gpgme_realloc, _gpgme_calloc,
_gpgme_strdup, _gpgme_free): Remove prototypes.
(xtrymalloc, xtrycalloc, xtryrealloc, xtrystrdup, xfree): Remove
macros.
* util.c: File removed.
* Makefile.am (libgpgme_la_SOURCES): Remove util.h.
* conversion.c (_gpgme_decode_c_string): Use malloc instead of
xtrymalloc, realloc instead of xtryrealloc, calloc instead of
xtrycalloc, free instead of xfree.
(_gpgme_data_append_percentstring_for_xml): Likewise.
* data.c (_gpgme_data_new, _gpgme_data_release): Likewise.
* data-compat.c (gpgme_data_new_from_filepart): Likewise.
* data-mem.c (mem_write, mem_release, gpgme_data_new_from_mem,
_gpgme_data_get_as_string): Likewise.

* debug.c (debug_init): Likewise.
* decrypt.c (_gpgme_release_decrypt_result): Likewise.
* delete.c (_gpgme_release_delete_result): Likewise.
* edit.c (_gpgme_release_edit_result, _gpgme_op_edit_start):
Likewise.
* encrypt.c (_gpgme_release_encrypt_result): Likewise.
* engine.c (_gpgme_engine_get_info, _gpgme_engine_new,
_gpgme_engine_release):
Likewise.
* engine-gpgsm.c (_gpgme_gpgsm_new, _gpgme_gpgsm_release,
_gpgme_gpgsm_op_decrypt, _gpgme_gpgsm_op_delete,
gpgsm_set_recipients, _gpgme_gpgsm_op_encrypt,
_gpgme_gpgsm_op_export, _gpgme_gpgsm_op_genkey,
_gpgme_gpgsm_op_import, _gpgme_gpgsm_op_keylist,
_gpgme_gpgsm_op_keylist_ext, _gpgme_gpgsm_op_sign,
_gpgme_gpgsm_op_verify, gpgsm_status_handler): Likewise.
* genkey.c (_gpgme_release_genkey_result): Likewise.
* gpgme.c (gpgme_new, gpgme_release): Likewise.
* import.c (_gpgme_release_import_result): Likewise.
* key.c (_gpgme_key_cache_init, _gpgme_key_cache_add, key_new,
add_subkey, gpgme_key_release, _gpgme_key_append_name): Likewise.
* keylist.c (_gpgme_release_keylist_result, keylist_colon_handler,
_gpgme_op_keylist_event_cb, gpgme_op_keylist_next): Likewise.
* ops.h (test_and_allocate_result): Likewise.
* passphrase.c (_gpgme_release_passphrase_result,
_gpgme_passphrase_status_handler,
_gpgme_passphrase_command_handler): Likewise.
*
progress.c (_gpgme_progress_status_handler): Likewise.
* recipient.c (gpgme_recipients_new, gpgme_recipients_release,
gpgme_recipients_add_name_with_validity): Likewise.
* rungpg.c (_gpgme_gpg_new, _gpgme_gpg_release,
_gpgme_gpg_add_arg, _gpgme_gpg_add_data,
_gpgme_gpg_set_colon_line_handler, free_argv, free_fd_data_map,
build_argv, _gpgme_gpg_spawn, read_status, read_colon_line):
Likewise.
* sign.c (_gpgme_release_sign_result): Likewise.
* signers.c (_gpgme_signers_add): Likewise.
* trustlist.c (trust_item_new, trustlist_colon_handler,
_gpgme_op_trustlist_event_cb, gpgme_op_trustlist_next,
gpgme_trustitem_release): Likewise.
* verify.c (_gpgme_release_verify_result, finish_sig): Likewise.
* version.c (gpgme_get_engine_info, _gpgme_get_program_version):
Likewise.
* w32-io.c (create_reader, create_writer, destroy_reader,
destroy_writer, build_commandline, _gpgme_io_spawn): Likewise.
* w32-sema.c (critsect_init, _gpgme_sema_cs_destroy): Likewise.
* w32-util.c (read_w32_registry_string):

Likewise.
* wait.c (_gpgme_fd_table_deinit, _gpgme_fd_table_put,
_gpgme_wait_event_cb, _gpgme_add_io_cb, _gpgme_remove_io_cb)
* data-compat.c: Include <stdlib.h>.

2002-10-08 Marcus Brinkmann <marcus@g10code.de>

New data object component:

* gpgme.h (GpgmeDataReadCb, GpgmeDataWriteCb, GpgmeDataSeekCb,
GpgmeDataReleaseCb): New types.
(struct GpgmeDataCbs): New structure.
(gpgme_data_read): Changed prototype to match that of read() closely.
(gpgme_data_write): Similar for write().
(gpgme_data_seek, gpgme_data_new_from_cbs, gpgme_data_new_from_fd,
gpgme_data_new_from_stream): New prototypes.
(gpgme_data_get_type, gpgme_check_engine): Prototype removed.

* Makefile.am (libgpgme_la_SOURCES): Add data.h, data-fd.c,
data-stream.c, data-mem.c, data-user.c and data-compat.c.
* data.c: Reimplemented from scratch.
* (data-compat.c, data-fd.c, data.h, data-mem.c, data-stream.c,
data-user.c): New file.
* context.h (struct gpgme_data_s): Removed.
* conversion.c:
Include <errno.h> and <sys/types.h>.
(_gpgme_data_append): New function.
* data.c (_gpgme_data_append_string): Move to ...
* conversion.c (_gpgme_data_append_string): ... here.
* data.c (_gpgme_data_append_for_xml): Move to ...
* conversion.c (_gpgme_data_append_for_xml): ... here.
* data.c (_gpgme_data_append_string_for_xml): Move to ...
* conversion.c (_gpgme_data_append_string_for_xml): ... here.
* data.c (_gpgme_data_append_percentstring_for_xml): Move to ...
* conversion.c (_gpgme_data_append_percentstring_for_xml): ... here.

* ops.h (_gpgme_data_get_mode, _gpgme_data_set_mode): Prototype
removed.
* types.h (GpgmeDataMode): Type removed.

* decrypt.c (_gpgme_decrypt_start): Don't check data type or mode.
* edit.c (_gpgme_op_edit_start): Likewise.
* encrypt.c (_gpgme_op_encrypt_start): Likewise.
* encrypt-sign.c (_gpgme_op_encrypt_sign_start): Likewise.
* encrypt-sign.c (_gpgme_op_encrypt_sign_start): Likewise.
* export.c (_gpgme_op_export_start): Likewise.
*

genkey.c (_gpgme_op_genkey_start): Likewise.
* import.c (_gpgme_op_import_start): Likewise.
* sign.c (_gpgme_op_sign_start): Likewise.
* verify.c (_gpgme_op_verify_start): Likewise.

* encrypt.c (gpgme_op_encrypt): Remove hack that returns invalid
no recipient if no data was returned.
* encrypt-sign.c (gpgme_op_encrypt_sign): Remove hack that returns
no recipient if no data was returned.
* encrypt-sign.c (gpgme_op_encrypt_sign): Remove hack that returns
no recipient if no data was returned.

* engine.c (_gpgme_engine_op_verify): Add new argument to
differentiate detached from normal signatures.
* engine.h (_gpgme_engine_op_verify): Likewise for prototype.
* engine-gpgsm.c (_gpgme_gpgsm_op_verify): Likewise. Don't check
mode of data argument.
* engine-gpgsm.h (_gpgme_gpgsm_op_verify): Likewise for prototype.
* gpgme.h (gpgme_op_verify_start): Likewise for prototype.
(gpgme_op_verify): Likewise for prototype.
* rungpg.c (_gpgme_gpg_op_verify): Likewise.
* rungpg.h
(_gpgme_gpg_op_verify): Likewise for prototype.
* verify.c (_gpgme_op_verify_start): Likewise.
(gpgme_op_verify_start): Likewise.
(gpgme_op_verify): Likewise.

* rungpg.c (struct arg_and_data_s): New member INBOUND to hold
direction of data object.
(_gpgme_gpg_add_data): Add new argument INBOUND. Use it to
determine direction of data object.
(_gpgme_gpg_add_pm_data, _gpgme_gpg_set_command_handler,
_gpgme_gpg_op_decrypt, _gpgme_gpg_op_edit, _gpgme_gpg_op_encrypt,
_gpgme_gpg_op_encrypt_sign, _gpgme_gpg_op_export,
_gpgme_gpg_op_genkey, _gpgme_gpg_op_import, _gpgme_gpg_op_sign,
_gpgme_gpg_op_verify): Add new argument to _gpgme_gpg_add_data
invocation.
(build_argv): Use new member INBOUND to determine direction of
file descriptor. Don't check the data type.
* rungpg.h (_gpgme_gpg_add_data): Add new argument to prototype.

* gpgme.c (gpgme_get_op_info): Don't call
_gpgme_data_get_as_string if CTX->op_info is NULL.

* version.c (gpgme_check_engine): Function removed.

2002-09-30

Werner Koch <wk@gnupg.org>

* keylist.c (keylist_colon_handler): Take care when printing a
NULL with the DEBUG.

* engine-gpgsm.c (struct gpgsm_object_s): New member ANY.
(gpgsm_status_handler): Run the colon function to indicate EOF.
(_gpgme_gpgsm_set_colon_line_handler): Better reset ANY here.

2002-09-28 Marcus Brinkmann <marcus@g10code.de>

* conversion.c (_gpgme_hextobyte): Prevent superfluous
multiplication with base. Reported by Stphane Corthsy.

* keylist.c (gpgme_op_keylist_ext_start): Use private asynchronous
operation type in invocation of _gpgme_op_reset.

2002-09-20 Werner Koch <wk@gnupg.org>

* ath.c: Include sys/time.h if sys/select.h is not available.

2002-09-13 Marcus Brinkmann <marcus@g10code.de>

* keylist.c (keylist_status_handler): Do not call finish_key() here.
(gpgme_op_keylist_ext_start): Set CTX->tmp_key to NULL.

2002-09-03 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (assuan_libobjs): Remove @LTLIBOBJS@ as we link
them
into gpgme unconditionally.
(libgpgme_la_LIBADD): Change @LIBOBJS@ into @LTLIBOBJS@.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (assuan_libobjs): Use @LTLIBOBJS@ instead @LIBOBJS@.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

* debug.c (_gpgme_debug_add): Test *LINE, not LINE.
(_gpgme_debug_end): Likewise.
Reported by Dr. Stefan Dalibor <Dr.Stefan.Dalibor@bfa.de>.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

* posix-io.c (_gpgme_io_select): Don't use a non-constant struct
initializer.
* version.c (_gpgme_get_program_version): Likewise.

Reported by Dr. Stefan Dalibor <Dr.Stefan.Dalibor@bfa.de>.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

* conversion.c (_gpgme_decode_c_string): Set DESTP before
modifying DEST.

* conversion.c (_gpgme_decode_c_string): Fix off by one error in
last change.
* rungpg.c (_gpgme_append_gpg_args_from_signers): Move before
_gpgme_op_edit so its prototype is known early on.

* conversion.c: New
file.
* util.h: Add prototypes for _gpgme_decode_c_string and
_gpgme_hextobyte.
* keylist.c (keylist_colon_handler): Call _gpgme_decode_c_string
on issuer name.
* Makefile.am (libgpgme_la_SOURCES): Add conversion.c
* key.c (_gpgme_key_append_name): Replace calls to hextobyte by
calls to _gpgme_hextobyte.
(hash_key): Likewise.

2002-09-01 Marcus Brinkmann <marcus@g10code.de>

* op-support.c (_gpgme_op_reset): Set CTX->pending after calling
_gpgme_engine_release, as this will reset pending to zero in the
event done callback on cancelled operations.

2002-08-30 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (_gpgme_gpg_op_edit): Add args from signers.
Suggested by Miguel Coca <e970095@zipi.fi.upm.es>.

* rungpg.c (_gpgme_gpg_op_edit): Add bogus ctx argument.
* rungpg.h: Also to prototype.
* engine.c (_gpgme_engine_op_edit): Likewise.
* engine.h: Likewise.
* edit.c (_gpgme_op_edit_start): Likewise.

2002-08-29 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_op_sign):
Implement signer
selection.
* vasprintf.c (va_copy): Define macro if not yet defined.

2002-08-29 Marcus Brinkmann <marcus@g10code.de>

* passphrase.c (_gpgme_passphrase_status_handler): Reset
CTX->result.passphrase->no_passphrase if passphrase is given (good
or bad). Submitted by Jean DIRAISON <jean.diraison@free.fr>.

2002-08-28 Marcus Brinkmann <marcus@g10code.de>

* posix-io.c (_gpgme_io_spawn): Use a double-fork approach.
Return 0 on success, -1 on error.
* version.c (_gpgme_get_program_version): Don't wait for the child.
* engine.c (_gpgme_engine_housecleaning): Function removed.
(do_reaping): Likewise.
(_gpgme_engine_add_child_to_reap_list): Likewise.
(struct reap_s): Removed.
(reap_list): Likewise.
(reap_list_lock): Likewise.
* engine.h (_gpgme_engine_io_event): Remove prototypes for
_gpgme_engine_housecleaning and
_gpgme_engine_add_child_to_reap_list.
* rungpg.c (_gpgme_gpg_release): Don't add child to reap list.
(struct gpg_object_s): Remove
PID member.
(_gpgme_gpg_new): Don't initialize GPG->pid.
(_gpgme_gpg_spawn): Don't set GPG->pid.
* wait.c (run_idle): Removed.
(gpgme_wait): Run idle_function directly.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

* encrypt-sign.c (encrypt_sign_status_handler): Remove dead
variables encrypt_info and encrypt_info_len.
* trustlist.c (gpgme_op_trustlist_start): Set colon line handler.
* posix-sema.c (sema_fatal): Remove function.
All these reported by Stphane Corthsy.

2002-08-23 Werner Koch <wk@gnupg.org>

* gpgme-config.in: Made --prefix work for --libs.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

* ath.h: Update list of symbols that get a prefix: Rename the
ath_mutex_*_available symbols to ath_*_available.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

* stpcpy.c: New file from gnulib.
* Makefile.am (assuan_libobjs): Remove jnlib.

2002-08-20  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h: Add prototype for gpgme_op_import_ext.
* import.c
(struct import_result_s): New member `nr_considered'.
Rename `any_imported' to `nr_imported'.
(import_status_handler): Increment nr_imported.  Set nr_considered
if appropriate.
(gpgme_op_import_ext): New function.
(gpgme_op_import): Implement in terms of gpgme_op_import_ext.

2002-08-20  Werner Koch  <wk@gnupg.org>

* gpgme.m4: Replaced with a new and faster version.  This does not
anymore try to build test programs.  If we really need test
programs, we should add an option to gpgme-config to do so.

* vasprintf.c (int_vasprintf): Hack to handle NULL passed for %s.

2002-08-20  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c (_gpgme_set_op_info): Append data on subsequent calls.
* encrypt-sign.c (encrypt_sign_status_handler): Remove op_info
handling.

2002-08-19  Werner Koch  <wk@gnupg.org>

* decrypt.c (is_token,skip_token): Duplicated from verify.c
(gpgme_op_decrypt): Hack to properly return Decryption_Failed..
(_gpgme_decrypt_status_handler): Create an operation info.

2002-08-14
Werner Koch  <wk@gnupg.org>

* key.h (struct certsig_s): New.  Use it in gpgme_key_s.
* key.c (gpgme_key_release): Release it. We need to add more code
of course.
(_gpgme_key_append_name): Use memset to initialize the struct.
* gpgme.h (GPGME_KEYLIST_MODE_SIGS): New.
* rungpg.c (_gpgme_gpg_op_keylist): Include sigs in listing depending
non the list mode.

* key.c (gpgme_key_get_string_attr): Use GPGME_ATTR_TYPE to return
information about the key type (PGP or X.509).
(gpgme_key_get_ulong_attr): Likewise.

* keylist.c (keylist_colon_handler): Include 1 in the check for

valid algorithms so that RSA is usable. Store the issuer name and
serial number also for "crs" records. Parse the expire date for
subkeys.
(set_userid_flags): Put them onto the last appended key.

2002-07-29 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (_gpgme_gpg_op_edit): Use --with-colons.

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* data.c (gpgme_data_read): For GPGME_DATA_TYPE_NONE,
return EOF
instead an error.

The following changes make it possible to flush an inbound data
pipe before invoking a command handler:

* posix-io.c (_gpgme_io_select): Accept new argument NONBLOCK to
_gpgme_io_select. Set timeout of 0 if this is set.
* w32-io.c (_gpgme_io_select): Likewise.
* io.h: Add new argument NONBLOCK to _gpgme_io_select prototype.
* wait.c (do_select): Add new argument to _gpgme_io_select
invocation.
* rungpg.h (_gpgme_gpg_set_command_handler): Add new argument
linked_data to prototype.
* engine.h (_gpgme_engine_set_command_handler): Likewise.
* engine.c (_gpgme_engine_set_command_handler): Likewise.
* passphrase.c (_gpgme_passphrase_start): Pass NULL as linked_data
argument to _gpgme_engine_set_command_handler.
* rungpg.c (struct gpg_object_s): New members linked_data and
linked_idx in CMD.
(_gpgme_gpg_new): Initialize those new members.
(_gpgme_gpg_set_command_handler): Accept new argument linked_data.
(build_argv): Handle linked_data
in the same hack as cb_data.
(read_status): If linked_data is in use, flush the pipe before
activating the command handler.
* gpgme.h: Add prototypes for gpgme_op_edit_start and
gpgme_op_edit.

The next changes export the status codes to the user:

* decrypt.c (_gpgme_decrypt_status_handler): Likewise, also prefix
all STATUS_ with GPGME_.
* delete.c (delete_status_handler): Likewise.
* decrypt-verify.c (decrypt_verify_status_handler): Likewise.
* encrypt.c (_gpgme_encrypt_status_handler): Likewise.

(_gpgme_encrypt_sym_status_handler): Likewise.
* encrypt-sign.c (encrypt_sign_status_handler): Likewise.
* engine-gpgsm.c (parse_status): Likewise.
(gpgsm_status_handler): Likewise.
(gpgsm_set_recipients): Likewise.
* export.c (export_status_handler): Likewise.
* genkey.c (genkey_status_handler): Likewise.
* import.c (append_xml_impinfo): Likewise.
(import_status_handler): Likewise.
* keylist.c (keylist_status_handler): Likewise.
* passphrase.c (_gpgme_passphrase_status_handler):
Likewise.
(command_handler): Likewise.
* progress.c (_gpgme_progress_status_handler): Likewise.
* sign.c (_gpgme_sign_status_handler): Likewise.
* trustlist.c (trustlist_status_handler): Likewise.
* verify.c (_gpgme_verify_status_handler): Likewise.
* gpgme.h (GpgmeEditCb): New type.
* rungpg.h (GpgStatusCode): Rename and move to ...
* gpgme.h (GpgmeStatusCode): ... this and here.
* Makefile.am (status-table.h): Run mkstatus on gpgme.h, not rungpg.h.
* mkstatus: Prefix STATUS with GPGME_.
* rungpg.h (GpgStatusHandler, GpgCommandHandler): Change type
accordingly.
* ops.h (_gpgme_verify_status_handler,
_gpgme_decrypt_status_handler, _gpgme_sign_status_handler,
_gpgme_encrypt_status_handler, _gpgme_passphrase_status_handler,
_gpgme_progress_status_handler): Likewise.
* rungpg.c (struct gpg_object_s): Likewise for CMD.code.

These changes add an edit operation to GPGME:

* context.h (struct gpgme_context_s): New member RESULT.edit. *
ops.h: Add prototype
for _gpgme_release_edit_result and
_gpgme_passphrase_command_handler.
* passphrase.c (command_handler): Make non-static and rename to ...
(_gpgme_passphrase_command_handler): ... this.
(_gpgme_passphrase_start): Use new name for command handler.
* types.h: Add EditResult type.
* gpgme.c (_gpgme_release_result): Release EDIT result.
* edit.c: New file.
* Makefile.am (libgpgme_la_SOURCES): Add edit.c.
(libgpgme_la_LDADD): Rename to libgpgme_la_LIBADD, and include
assuan_libobjs.
(assuan_libobjs): New variable, set this instead
libgpgme_la_LIBADD.
* engine.h (_gpgme_engine_op_edit): New prototype.

* engine.c (_gpgme_engine_op_edit): New function.
* rungpg.h (_gpgme_gpg_op_edit): New prototype.
* rungpg.c (_gpgme_gpg_op_edit): New function.

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* delete.c (delete_problem): New case ambiguous specification.
(delete_status_handler): Handle new case (poorly).

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* engine-gpgsm.c
(_gpgme_gpgsm_op_delete): Implement this.

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* Makefile.am (libgpgme_la_LDADD): Add @LIBOBJS@ for vasprintf and
fopencookie.
* vasprintf.c: Update to more recent libiberty version.
* debug.h: Replace #elsif with #elif.

Submitted by Stphane Corthsy:
* util.h (vasprintf): Correct prototype.
* encrypt-sign.c: Include <stddef.h>.
(encrypt_sign_status_handler): Change type of ENCRYPT_INFO_LEN to
size_t.
* ath-pthread.c: Include <stdlib.h>, not <malloc.h>.
* ath-pth.c: Likewise.

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* wait.c (fdt_global): Make static. Reported by Stphane
Corthsy.

* rungpg.c (_gpgme_gpg_op_keylist_ext): Skip empty string
patterns. Reported by Stphane Corthsy.

* key.c (gpgme_key_get_as_xml): Add OTRUST attribute. Requested
by Stphane Corthsy.
(gpgme_key_get_string_attr): Add GPGME_ATTR_SIG_SUMMARY case to
silence gcc warning.

* rungpg.c (_gpgme_gpg_new): Always set utf8 as charset.

2002-07-03
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* gpgme.c (gpgme_set_io_cbs): Deal with CTX being NULL.

* gpgme.c (_gpgme_op_event_cb_user): New function.
* op-support.c (_gpgme_op_reset): Support a new mode of operation
for private or user event loop.  Use new user event callback
wrapper.
* trustlist.c (gpgme_op_trustlist_start): Use this new mode.
* keylist.c (gpgme_op_keylist_start): Likewise.

* rungpg.c (_gpgme_gpg_io_event): New function.
* rungpg.h (_gpgme_gpg_io_event): New prototype.
* engine-gpgsm.c (_gpgme_gpg_io_event): New function.
* engine-gpgsm.h (_gpgme_gpgsm_io_event): New prototype.
* engine.c (_gpgme_engine_io_event): New function.
* engine.h (_gpgme_engine_io_event): New prototype.
* keylist.c (finish_key): Call _gpgme_engine_io_event, and move
the real work for the default IO callback routines to ...
(_gpgme_op_keylist_event_cb): ... here.  New function.
* trustlist.c (trustlist_colon_handler): Signal
GPGME_EVENT_NEXT_TRUSTITEM.  Move queue
manipulation to ...
(_gpgme_op_trustlist_event_cb): ... here.  New function.
* gpgme.c (_gpgme_op_event_cb): Call _gpgme_op_keylist_event_cb
and _gpgme_op_trustlist_event_cb when appropriate.
* ops.h (_gpgme_op_keylist_event_cb): New prototype.
(_gpgme_op_trustlist_event_cb): Likewise.
* op-support.c (_gpgme_op_reset): Add comment why we don't use the
user provided event handler directly.
* gpgme.h (GpgmeRegisterIOCb): Return GpgmeError value, and TAG in
a pointer argument.
* wait.c (_gpgme_add_io_cb): Likewise.
* wait.h (_gpgme_add_io_cb): Likewise for prototype.
* rungpg.c (_gpgme_gpg_add_io_cb): Call IO_CBS->add with new
argument.  Fix up error handling.
* engine-gpgsm.c (_gpgme_gpgsm_add_io_cb): Call IO_CBS->add with
new argument, fix up error handling.

2002-07-03  Werner Koch  <wk@gnupg.org>

* encrypt.c (status_handler_finish): New.
(_gpgme_encrypt_status_handler): Moved some code out to the new
function and call this function also in case we get into the
status
handler with an error which might happen due to a kludge in
engine-gpgsm.c

2002-06-28  Marcus Brinkmann  <marcus@g10code.de>

* keylist.c (gpgme_op_keylist_ext_start): Always use our own FD

table (eg use synchronous mode).

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* gpgme.h: Fix documentation of key attribute retrieval functions.

2002-06-28 Marcus Brinkmann <marcus@g10code.de>

* ops.h (_gpgme_wait_on_condition): Remove HANG argument from
prototype and change return type to GpgmeError.
(_gpgme_wait_one): New prototype.
* wait.c (gpgme_wait): Replace with the meat from
_gpgme_wait_on_condition here, and remove the support for
conditions.
(_gpgme_wait_on_condition): Remove HANG argument from prototype
and change return type to GpgmeError. Replace with meat from
_gpgme_wait_one and add support for conditions.
(_gpgme_wait_one): Just call _gpgme_wait_on_condition without
condition.
* keylist.c (gpgme_op_keylist_ext_start): Always use our own FD
table (eg
use synchronous mode).
(gpgme_op_keylist_next): Remove HANG argument from
_gpgme_wait_on_condition. Check its return value.
* trustlist.c (gpgme_op_trustlist_start): Always use our own FD
table (eg use synchronous mode).
(gpgme_op_trustlist_next): Remove HANG argument from
_gpgme_wait_on_condition. Check its return value.

2002-06-26 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (map_assuan_error): Map No_Data_Available to EOF.

* import.c (append_xml_impinfo): Kludge to print fingerprint
instead of keyid for use with gpgsm.
(import_status_handler): Set a flag to know whether any import
occurred.
(gpgme_op_import): Return -1 if no certificate ewas imported.

2002-06-25 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_set_io_cbs) [ENABLE_GPGSM]: Fixed
function arguments.

2002-06-25 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_export): Only export the keys
listed in RECP.

* export.c (gpgme_op_export): If no data was returned,
return
GPGME_No_Recipients.

2002-06-25  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_export): Implement.

2002-06-21  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_assuan_simple_command): Return ERR.
(parse_status): New function.
(gpgsm_status_handler): Use parse_status.
(gpgsm_assuan_simple_command): Accept new arguments STATUS_FNC and
STATUS_FNC_VALUE and process status messages.
(gpgsm_set_recipients): Pass new arguments to gpgsm_assuan_simple_command.
(gpgsm_set_fd): Likewise.
(_gpgme_gpgsm_op_keylist): Likewise.
(_gpgme_gpgsm_op_keylist_ext): Likewise.
(_gpgme_gpgsm_op_sign): Likewise.

2002-06-21  Marcus Brinkmann  <marcus@g10code.de>

* wait.c (_gpgme_remove_io_cb): Unlock FDT->lock.

2002-06-20  Werner Koch  <wk@gnupg.org>

* rungpg.c (build_argv): Ignore GPG_AGENT_INFO if set but empty.

* verify.c (calc_sig_summary): Set bad policy for wrong key usage.
(skip_token): New.
(_gpgme_verify_status_handler): Watch out
for wrong key usage.
(gpgme_get_sig_string_attr): Hack to return info on the key
usage.  Does now make use of the former RESERVED argument which
has been renamed to WHATIDX.
(gpgme_get_sig_ulong_attr): Renamed RESERVED to WHATIDX.

2002-06-14  Marcus Brinkmann  <marcus@g10code.de>

* wait.c (do_select): Return -1 on error, and 0 if nothing to run.
(_gpgme_wait_one): Only set HANG to zero if do_select returned an
error, or there are no more file descriptors to wait on.
(_gpgme_wait_on_condition): Ignore return value from do_select for
now.

2002-06-13  Werner Koch  <wk@gnupg.org>

* verify.c (gpgme_op_verify): Make sure that we never access an
uninitialized result structure.

2002-06-12  Werner Koch  <wk@gnupg.org>

* keylist.c (struct keylist_result_s): New.
(_gpgme_release_keylist_result): Release it here
(keylist_status_handler): Handle truncated.
(append_xml_keylistinfo): New.
* gpgme.c (_gpgme_release_result): and use it here.
* types.h: Declare the new type here.
*
context.h (struct gpgme_context_s): Use it here.

2002-06-11  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_release): Close status_cb.fd.
(_gpgme_gpgsm_new): Duplicate status file descriptor, so we can
use our own close notification mechanism without interfering with
assuan.

2002-06-11  Werner Koch  <wk@gnupg.org>

* gpgme.h: Add GPGME_ATTR_SIG_SUMMARY and the GPGME_SIGSUM_
constants.
* verify.c (calc_sig_summary): New.
(gpgme_get_sig_ulong_attr): And use it here.

2002-06-10  Werner Koch  <wk@gnupg.org>

* rungpg.h: Add new status codes TRUNCATED and ERROR.
* verify.c (is_token, copy_token): New.
(_gpgme_verify_status_handler): Use copy_token, handle the new
ERROR status and store the errorcode used withgpgsm and trust
status codes.
* gpgme.h: New attribute ERRTOK.
* key.c (gpgme_key_get_string_attr): Add dummy case for it.
(gpgme_get_sig_string_attr): Use it here to return the last error.

2002-06-10  Marcus Brinkmann  <marcus@g10code.de>

*
engine-gpgsm.c (_gpgme_gpgsm_start): Move the code that sets the
close notification for the status fd to ...
(_gpgme_gpgsm_new): ... here.
* wait.h: Include "sema.h".  Remove prototypes of
_gpgme_remove_proc_from_wait_queue and
_gpgme_register_pipe_handler.  Add prototypes of

_gpgme_fd_table_init, _gpgme_fd_table_deinit, _gpgme_fd_table_put,
_gpgme_add_io_cb, _gpgme_remove_io_cb, _gpgme_wait_event_cb and
_gpgme_wait_one..
* wait.c: Remove global variables PROC_QUEUE, PROC_QUEUE_LOCK,
FD_TABLE_SIZE, FD_TABLE, FD_TABLE_LOCK. New global variables
FDT_GLOBAL, CTX_DONE_LIST, CTX_DONE_LIST_SIZE,
CTX_DONE_LIST_LENGTH and CTX_DONE_LIST_LOCK. Remove struct
proc_s. Replace struct wait_item_s.
(_gpgme_fd_table_init): New function.
(_gpgme_fd_table_deinit): Likewise.
(_gpgme_fd_table_put): Likewise.
(set_process_done): Remove function.
(do_select): Take argument FDT. Use that to decide which fds to
select on.
(_gpgme_remove_proc_from_wait_queue): Remove function.
(_gpgme_wait_event_cb):
New function.
(_gpgme_wait_one): Likewise.
(_gpgme_register_pipe_hanldler): Remove function.
(_gpgme_add_io_cb): New function.
(_gpgme_remove_io_cb): Likewise.
(_gpgme_freeze_fd): Remove function.
(_gpgme_thaw_fd): Remove function.
* rungpg.c (struct fd_data_map_s): Add new member TAG.
(struct gpg_object_s): Likewise for STATUS and COLON. Add member
IDX to CMD. Add new member IO_CBS.
(close_notify_handler): New variables POSSIBLY_DONE and NOT_DONE.
For each I/O callback, check if it should be unregistered. If all
callbacks have been unregistered, trigger GPGME_EVENT_DONE.
Remove member RUNNING.
(_gpgme_gpg_new): Initialize new members.
(_gpgme_gpg_release): Check PID not RUNNING. Don't call
_gpgme_remove_proc_from_wait_queue. Close GPG->CMD.FD if set.
(build_argv): Store away the index instead the file descriptor for
CMD.
(_gpgme_gpg_add_io_cb): New function.
(_gpgme_gpg_spawn): Use _gpgme_gpg_add_io_cb to register IO
callbacks.
(gpg_status_handler):
Change return type to void, remove PID
argument, close filedescriptor if EOF or error occurs.
(read_status): Use _gpgme_gpg_add_io_cb instead _gpgme_thaw_fd.
Use IO_CBS->remove instead _gpgme_freeze_fd.
(gpg_colon_line_handler): Change return type to void, remove PID
argument, close filedescriptor if EOF or error occurs.
(command_cb): Use IO_CBS->remove instead _gpgme_freeze_fd.
(_gpgme_gpg_set_io_cbs): New function.
* rungpg.h (_gpgme_gpg_set_io_cbs): Prototype for

_gpgme_gpg_set_io_cbs.
* gpgme.h (GpgmeIOCb): New type.
(GpgmeRegisterIOCb): Likewise.
(GpgmeRemoveIOCb): Likewise.
(GpgmeEventIO): Likewise.
(GpgmeEventIOCb): Likewise.
(struct GpgmeIOCbs): New structure to hold I/O callbacks.
(gpgme_set_op_io_cbs): New prototype.
(gpgme_get_op_io_cbs): Likewise.
* ops.h: New prototype for _gpgme_op_event_cb. Remove prototypes
for _gpgme_freeze_fd and _gpgme_thaw_fd. Remove PID argument from
_gpgme_data_inbound_handler and _gpgme_data_outbound_handler
prototype.
Add prototype for _gpgme_op_reset.
Add synchronous argument to _gpgme_decrypt_start prototype.
* io.h: Beautification.
* gpgme.c: Include "wait.h".
(gpgme_new): Initialize FDT.
(gpgme_set_io_cbs): New function.
(gpgme_get_io_cbs): Likewise.
(_gpgme_op_event_cb): Likewise.
* data.c (_gpgme_data_inbound_handler): Change return type to
void. Drop PID argument. Close FD on error and EOF.
(write_mem_data): Don't close FD here ...
(write_cb_data): ... or here ...
(_gpgme_data_outbound_handler): ... but here. Change return type
to void. Drop PID argument.
* context.h: Include "wait.h".
(struct gpgme_context_s): New members FDT and IO_CBS.
* op-support.c: New file.
* Makefile.am (libgpgme_la_SOURCES): Add op-support.c.
* ops.h: Add prototype for _gpgme_op_reset().
* decrypt.c (_gpgme_decrypt_start): New argument SYNCHRONOUS. Use
_gpgme_op_reset.
(gpgme_op_decrypt_start): Add synchronous argument.
(gpgme_op_decrypt): Likewise. Use _gpgme_wait_one instead
gpgme_wait.
*
delete.c (gpgme_op_delete_start): Rename to ...
(_gpgme_op_delete_start): ... this. New argument SYNCHRONOUS.
Use _gpgme_op_reset. Make function static.
(gpgme_op_delete_start): Just a wrapper around
_gpgme_op_delete_start now.
(gpgme_op_delete): Add synchronous argument. Use _gpgme_wait_one
instead gpgme_wait.
* encrypt.c: Include "wait.h".
(ggpgme_op_encrypt_start): Rename to ...
(_gpgme_op_encrypt_start): ... this. New argument SYNCHRONOUS.

Use _gpgme_op_reset.  Make function static.
(gpgme_op_encrypt_start): Just a wrapper around
_gpgme_op_encrypt_start now.
(gpgme_op_encrypt): Add synchronous argument.  Use _gpgme_wait_one
instead gpgme_wait.
* encrypt_sign.c (gpgme_op_encrypt_sign_start): Rename to ...
(_gpgme_op_encrypt_sign_start): ... this.  New argument
SYNCHRONOUS.  Use _gpgme_op_reset.  Make function static.
(gpgme_op_encrypt_sign_start): Just a wrapper around
_gpgme_op_encrypt_sign_start now.
(gpgme_op_encrypt_sign): Add synchronous argument.
 Use
_gpgme_wait_one instead gpgme_wait.
* export.c (gpgme_op_export_start): Rename to ...
(_gpgme_op_export_start): ... this.  New argument SYNCHRONOUS.
Use _gpgme_op_reset.  Make function static.
(gpgme_op_export_start): Just a wrapper around
_gpgme_op_export_start now.
(gpgme_op_export): Add synchronous argument.  Use _gpgme_wait_one
instead gpgme_wait.
* genkey.c (gpgme_op_genkey_start): Rename to ...
(_gpgme_op_genkey_start): ... this.  New argument SYNCHRONOUS.
Use _gpgme_op_reset.  Make function static.
(gpgme_op_genkey_start): Just a wrapper around
_gpgme_op_genkey_start now.
(gpgme_op_genkey): Add synchronous argument.  Use _gpgme_wait_one
instead gpgme_wait.
* import.c (gpgme_op_import_start): Rename to ...
(_gpgme_op_import_start): ... this.  New argument SYNCHRONOUS.
Use _gpgme_op_reset.  Make function static.
(gpgme_op_import_start): Just a wrapper around
_gpgme_op_import_start now.
(gpgme_op_import): Add synchronous argument.  Use _gpgme_wait_one
instead
gpgme_wait.
* keylist.c (gpgme_op_keylist_start): Use _gpgme_op_reset.
(gpgme_op_keylist_ext_start): Likewise.
* sign.c (gpgme_op_sign_start): Rename to ...
(_gpgme_op_sign_start): ... this.  New argument SYNCHRONOUS.  Use
_gpgme_op_reset.  Make function static.
(gpgme_op_sign_start): Just a wrapper around _gpgme_op_sign_start
now.
(gpgme_op_sign): Add synchronous argument.  Use _gpgme_wait_one
instead gpgme_wait.
* trustlist.c (gpgme_op_trustlist_start): Use _gpgme_op_reset.
* verify.c (gpgme_op_verify_start): Rename to ...
(_gpgme_op_verify_start): ... this.  New argument SYNCHRONOUS.
Use _gpgme_op_reset.  Make function static.

(gpgme_op_verify_start): Just a wrapper around
_gpgme_op_verify_start now.
(gpgme_op_verify): Add synchronous argument. Use _gpgme_wait_one
instead gpgme_wait.
* engine-gpgsm.c (iocb_data_t): New type.
(struct gpgsm_object_s): New member status_cb. Replace input_fd
and input_data with input_cb. Replace output_fd and output_data
with
output_cb. Replace message_fd and message_data with
message_cb. New member io_cbs.
(_gpgme_gpgsm_new): Initialize all new members (and drop the old
ones).
(close_notify_handler): New variable POSSIBLY_DONE. For each I/O
callback, check if it should be unregistered. If all callbacks
have been unregistered, trigger GPGME_EVENT_DONE.
(_gpgme_gpgsm_release): Remove variable PID. Use new variable
names to close the file descriptors.
(_gpgme_gpgsm_op_decrypt): Use new variable names,
(_gpgme_gpgsm_op_encrypt): Likewise.
(_gpgme_gpgsm_op_genkey): Likewise.
(_gpgme_gpgsm_op_import): Likewise.
(_gpgme_gpgsm_op_keylist): Likewise.
(_gpgme_gpgsm_op_keylist_ext): Likewise.
(_gpgme_gpgsm_op_sign): Likewise.
(_gpgme_gpgsm_op_verify): Likewise.
(gpgsm_status_handler): Drop argument PID. Change return type to
void. Close status pipe before returning because of EOF or error.
(_gpgme_gpgsm_add_io_cb): New function.
(_gpgme_gpgsm_start): Use _gpgme_gpgsm_add_io_cb to register
callback
function.
(_gpgme_gpgsm_set_io_cbs): New function.
* engine-gpgsm.h: New prototype for _gpgme_gpgsm_set_io_cbs.
* engine.c (_gpgme_engine_set_io_cbs): New function.
* engine.h: New prototype for _gpgme_engine_set_io_cbs.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (libgpgme_la_SOURCES): Remove mutex.h.

2002-06-03 Marcus Brinkmann <marcus@g10code.de>

* key.c: Include <ctype.h>.
(_gpgme_key_append_name): Skip one more char when
processing escaped char. Submitted by Marc Mutz <mutz@kde.org>.
Handle hexadecimal encodings. Also reported by Marc. Thanks!

2002-06-02 Marcus Brinkmann <marcus@g10code.de>

* ath.h: Enable the _gpgme_ prefix.  Fix all those prefix macros.
* posix-sema.c: Use that prefix here.
* posix-io.c: Include "ath.h".
(_gpgme_io_read): Use _gpgme_ath_read instead read.
(_gpgme_io_write): Use _gpgme_ath_write instead write.
(_gpgme_io_waitpid): Use _gpgme_ath_waitpid instead waitpid.
(_gpgme_io_select): Use _gpgme_ath_select
instead select.

2002-06-02  Marcus Brinkmann  <marcus@g10code.de>

* Makefile.am (ath_components): New variable.
(ath_components_pthread): Likewise.
(ath_components_pth): Likewise.
(system_components): Add ath_componentes.

* ath.h: New file.
* ath.c: Likewise.
* ath-pthread.c: Likewise.
* ath-pth.c: Likewise.
* posix-sema.c (_gpgme_sema_cs_enter): Rework to use the ATH
interface.
* mutex.h: Remove file.

2002-05-30  Werner Koch  <wk@gnupg.org>

* key.c (gpgme_key_get_string_attr): Return NULL when asking for
an issuer with IDX > 0.  We don't support altIssuerNames for now.

2002-05-22  Werner Koch  <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_op_keylist_ext): Aehmm, added
missing variable definition.  Oohh - Marcus was faster.

2002-05-22  Marcus Brinkmann  <marcus@gnu.org>

* engine-gpgsm.c (_gpgme_gpgsm_op_keylist_ext): Fix last change.

2002-05-21  Werner Koch  <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_op_keylist)
(_gpgme_gpgsm_op_keylist_ext):
Pass the keylist mode to gpgsm.

2002-05-10  Werner Koch  <wk@gnupg.org>

* key.h (gpgme_key_s): Add OTRUST.

* keylist.c (set_ownertrust): New.
(keylist_colon_handler): Get the ownertrust value
* key.c (gpgme_key_get_string_attr,gpgme_key_get_ulong_attr):
Return that value.

2002-05-08 Marcus Brinkmann <marcus@g10code.de>

* w32-util.c: New static variable GET_PATH_LOCK.
(_gpgme_get_gpg_path): Remove superfluous NULL initializer.
Take lock while determining path.
(_gpgme_get_gpgsm_path): Likewise.
* version.c (do_subsystem_inits): Set DONE to 1 after
initialization.
(gpgme_get_engine_info): New variable ENGINE_INFO_LOCK. Take lock
while determining engine info.
* rungpg.c (_gpgme_gpg_get_version): New variable
GPG_VERSION_LOCK. Take the lock while determining the program
version.
* posix-io.c: Include "sema.h".
(_gpgme_io_spawn): New variable FIXED_SIGNALS_LOCK. Take the lock
while fixing the signals.
(_gpgme_io_select): Make READFDS and WRITEFDS non-static.
*
key.c: Include "sema.h". New globals KEY_CACHE_LOCK and
KEY_REF_LOCK.
(capabilities_to_string): Make STRINGS very const.
(_gpgme_key_cache_add): Lock the key cache.
(_gpgme_key_cache_get): Likewise.
(gpgme_key_ref, gpgme_key_release): Lock the key_ref_lock.
* import.c (append_xml_impinfo): Make IMPORTED_FIELDS and
IMPORT_RES_FIELDS very const. Make FIELD and FIELD_NAME a little
const.
* engine.c (_gpgme_engine_get_info): New variable
ENGINE_INFO_LOCK. Take lock while determining engine info.
* engine-gpgsm.c: Include "sema.h".
(_gpgme_gpgsm_get_version): New variable GPGSM_VERSION_LOCK. Take
lock while getting program version.

2002-05-08 Marcus Brinkmann <marcus@g10code.de>

* debug.h: New file.
* Makefile.am (libgpgme_la_SOURCES): Add debug.h.
* util.h: Removed all prototypes and declarations related to
debugging. Include "debug.h".

* debug.c (debug_level): Comment variable and remove superfluous
zero initializer.
(errfp): Likewise.

(_gpgme_debug_enabled):
Function removed.
(struct debug_control_s): Definition removed.
(_gpgme_debug_level): Function removed.
(_gpgme_debug_begin): Rewritten to use vasprintf. Accept a
pritnf-style format specification and a variable number of
arguments.
(_gpgme_debug_add): Rewritten using vasprintf. Expect that format
starts out with "%s" for simplicity.
(_gpgme_debug_end): Rewritten using vasprintf. Do not accept a
TEXT argument anymore.

* posix-io.c (_gpgme_io_select): Use new level argument for
DEBUG_BEGIN instead explicit if construct.

* debug.c (debug_init): Remove superfluous zero initializer,
remove volatile flag of INITIALIZED. Do not use the
double-checked locking algorithm, it is fundamentally flawed and
will empty your fridge (on a more serious note, despite the
volatile flag it doesn't give you the guarantee you would expect,
for example on a DEC Alpha or an SMP machine. The volatile only
serializes accesses to the volatile variable, but not to the other
variables).

2002-05-03
Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_new): Redirect any gpgsm error
output to /dev/null.

* verify.c (gpgme_get_sig_key): Set the protocol of the listctx.
* gpgme.c (gpgme_get_protocol): New.

* data.c (gpgme_data_write): Changed type of BUFFER to void*.
(gpgme_data_read): Ditto.

* verify.c (_gpgme_verify_status_handler): Handle TRUST_* status
lines so that a claim can be made without looking up the key.
(gpgme_get_sig_string_attr): New.
(gpgme_get_sig_ulong_attr): New.

* gpgme.h (GpgmeAttr): Added GPGME_ATTR_SIG_STATUS.

* rungpg.h: Add new status codes from gpg 1.0.7 and formatted the
list to align with the status.h file from gnupg.

* gpgme.h (GpgmeSigStat): Add _GOOD_EXP and _GOOD_EXPKEY.
* verify.c (_gpgme_verify_status_handler, finish_sig): Handle

these new status codes.  Store the expiration time

2002-04-27  Werner Koch  <wk@gnupg.org>

* gpgme.h (GpgmeData_Encoding): New.
* data.c (gpgme_data_get_encoding,gpgme_data_set_encoding):
New.
* engine-gpgsm.c (map_input_enc): New. Use it in all local
functions where the INPUT command gets send.

2002-04-27  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_verify): Close the output
descriptor only when we don't need it anymore.  Close the message
descriptor if we don't need it.

2002-04-26  Werner Koch  <wk@gnupg.org>

* Makefile.am (libgpgme_la_LIBADD): Use libtool libraries.

2002-04-25  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (_gpgme_gpg_release): Call gpgme_data_release on
GPG->cmd.cb_data, not xfree.

2002-04-25  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_new): Set the display, ttyname,
ttytype, lc_ctype and lc_messages options in the server.

2002-04-24  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (map_assuan_error): Add new error codes.

2002-04-23  Werner Koch  <wk@gnupg.org>

* key.c (gpgme_key_get_ulong_attr): Swapped use of can_encrypt and
can_certify to return
the requested values.

2002-04-23  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c (gpgme_get_progress_cb): Allow either return parameter
to be NULL.
(gpgme_get_passphrase_cb): Likewise.

2002-04-22  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c (gpgme_get_passphrase_cb): New function.
(gpgme_get_progress_cb): New function.
* gpgme.h: Add new prototypes for gpgme_get_passphrase_cb and
gpgme_get_progress_cb.

2002-03-28 Werner Koch <wk@gnupg.org>

* gpgme.h (GpgmeAttr): Add values for issuer and chaining.
* key.h (gpgme_key_s): Add issuer and chaining elements for X509.
* keylist.c (keylist_colon_handler): Store them.
* key.c (gpgme_key_release): Free them.
(gpgme_key_get_as_xml,gpgme_key_get_string_attr): Print them.

2002-03-26 Werner Koch <wk@gnupg.org>

* Makefile.am (libgpgme_la_SOURCES): Add mutex.h

2002-03-21 Werner Koch <wk@gnupg.org>

* util.h [!HAVE_FOPENCOOKIE]: Make sure off_t and ssize_t are
defined.

2002-03-18 Marcus Brinkmann <marcus@g10code.de>

*
Makefile.am (system_components): New variable, set depending on
HAVE_DOSISH_SYSTEM.
(libgpgme_la_SOURCES): Use system_components. Remove `syshdr.h'.
* syshdr.h: File removed.

* posix-io.c: Remove !HAVE_DOSISH_SYSTEM safeguard. Clean up source.
* posix-sema.c: Likewise.
* posix-util.c: Likewise.

* w32-io.c: Remove HAVE_DOSISH_SYSTEM safeguard.
* w32-sema.c: Likewise.
* w32-util.c: Likewise.

* posix-io.c: Include `unistd.h', do not include `syshdr.h'.
* posix-sema.c: Likewise.
* w32-io.c: Include `io.h', do not include `syshdr.h'
* w32-sema.c: Likewise.
* w32-util.c: Likewise.
* data.c: Do not include `syshdr.h'.
* wait.c: Likewise.
* wait.h: Code cleanup.

* mutex.h: New file.

* posix-sema.c: Implement.

2002-03-08  Werner Koch  <wk@gnupg.org>

* util.h [!HAVE_FOPENCOOKIE]: Fixed type.  Thanks to Frank Heckenbach.

2002-03-07  Werner Koch  <wk@gnupg.org>

* gpgme.h (gpgme_op_keylist_ext_start): Add prototype.

2002-03-06  Marcus Brinkmann  <marcus@g10code.de>

*
encrypt.c (_gpgme_encrypt_sym_status_handler): New function.
(gpgme_op_encrypt_start): New variable SYMMETRIC, set it if RECP
is null, and if it is set, use _gpgme_encrypt_sym_status_handler
as status handler and run _gpgme_passphrase_start.
* rungpg.c (_gpgme_gpg_op_encrypt): If RECP is zero, do symmetric
encryption.
* engine-gpgsm.c (_gpgme_gpgsm_op_encrypt): If RECP is zero,
return error value.

* rungpg.c (_gpgme_gpg_op_verify): Add "--" argument.

2002-03-03  Marcus Brinkmann  <marcus@g10code.de>

* passphrase.c (_gpgme_passphrase_status_handler): Also set the
error No_Passphrase if only a bad passphrase was provided.

2002-03-03  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (_gpgme_gpg_op_verify): If TEXT is of mode
GPGME_DATA_MODE_IN, construct a command line that stores the
plaintext in TEXT.
* verify.c (gpgme_op_verify_start): Accept TEXT being
uninitialized, and in this case interpret SIG as a normal or
cleartext signature and TEXT as a return
data object.
* engine-gpgsm.c (_gpgme_gpgsm_op_verify): Likewise.

2002-03-03  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_keylist_ext) [!ENABLE_GPGSM]:
Add stub function.

2002-02-28  Werner Koch  <wk@gnupg.org>

* key.h (subkey_s): New member expires_at.

* keylist.c (keylist_colon_handler): Set it here
* key.c (gpgme_key_get_as_xml,gpgme_key_get_ulong_attr): Return it.

2002-02-27  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.h (_gpgme_gpg_op_keylist_ext): New prototype.
* rungpg.c (_gpgme_gpg_op_keylist_ext): New function.
* engine-gpgsm.h (_gpgme_gpgsm_op_keylist_ext): New prototype.
* engine-gpgsm.c (_gpgme_gpgsm_op_keylist_ext): New function.
* engine.h (_gpgme_engine_op_keylist_ext): New prototype.
* engine.c (_gpgme_engine_op_keylist_ext): New function.
* keylist.c (gpgme_op_keylist_ext_start): New function.

2002-02-27  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h: Add new error code GPGME_Invalid_Recipient.
* encrypt.c (struct
encrypt_result_s): New member invalid_recipients,
rename no_recipients to no_valid_recipients.
(_gpgme_encrypt_status_handler): Include error for invalid
recipients.
* engine-gpgsm.c (gpgsm_set_recipients): Change type of first
argument to GpgsmObject.  Use that to report back the status about
the recipients.

2002-02-26  Marcus Brinkmann  <marcus@g10code.de>

* verify.c (_gpgme_verify_status_handler): Fix the last change.

2002-02-25  Marcus Brinkmann  <marcus@g10code.de>

* verify.c (_gpgme_verify_status_handler): Parse the args line to
see if the problem is due to a missing key, and report that back
to the user.

2002-02-25  Marcus Brinkmann  <marcus@g10code.de>

* engine.c (_gpgme_engine_op_encrypt_sign): New function.
* engine.h (_gpgme_engine_op_encrypt_sign): New prototype.
* rungpg.c (_gpgme_append_gpg_args_from_signers): New function.
(_gpgme_gpg_op_sign): Use that new function.
(_gpgme_gpg_op_encrypt_sign): New function.
* rungpg.h (_gpgme_gpg_op_encrypt_sign):
New prototype.
* gpgme.h (gpgme_op_encrypt_sign_start): New prototype.
(gpgme_op_encrypt_sign): Likewise.
* Makefile.am (libgpgme_la_SOURCES): Add encrypt-sign.c.
* ops.h (_gpgme_encrypt_status_handler): Add prototype.

(_gpgme_sign_status_handler): Add prototype.
* sign.c (sign_status_handler): Rename to ...
(_gpgme_sign_status_handler): ... this and make non-static.
* encrypt.c (encrypt_status_handler): Rename to ...
(_gpgme_encrypt_status_handler): ... this and make non-static.
* encrypt.c (gpgme_op_encrypt_start): Use new status handler name.
* sign.c (gpgme_op_sign_start): Likewise.

2002-02-25 Marcus Brinkmann <marcus@g10code.de>

* context.h (struct gpgme_context_s): New member include_certs.
* gpgme.h (gpgme_set_include_certs): Add prototype.
(gpgme_get_include_certs): Likewise.
* gpgme.c (gpgme_set_include_certs): New function.
(gpgme_get_include_certs): Likewise.
(gpgme_new): Set include_certs to 1 (the default).
* engine.c (_gpgme_engine_op_sign): Accept
new argument include_certs,
and pass it to _gpgme_gpgsm_op_sign.
* engine.h (_gpgme_engine_op_sign): Likewise for prototype.
* engine-gpgsm.c (_gpgme_gpgsm_op_sign): Accept new argument
include_certs and handle it.
* engine-gpgsm.h (_gpgme_gpgsm_start): Add new argument include_certs.
* sign.c (gpgme_op_sign_start): Add new argument to
_gpgme_engine_op_sign call.

2002-02-14 Werner Koch <wk@gnupg.org>

* keylist.c (gpgme_op_keylist_start): Do not use a verbose listing.

2002-02-13 Werner Koch <wk@gnupg.org>

* vasprintf.c, fopencookie.c: Add replacement functions.
* util.h: Add prototypes for them.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_assuan_simple_command): Return 0 if we
reach the end of the function.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

* genkey.c (gpgme_op_genkey_start): Fix logic in validity check.
(gpgme_op_genkey_start): Skip newlines after opening tag.

* engine-gpgsm.c (_gpgme_gpgsm_start): Remove cruft.

2002-02-08

Marcus Brinkmann <marcus@g10code.de>

* genkey.c (gpgme_op_genkey_start): Allow PUBKEY and SECKEY to be
set, and pass them down to the crypto engine.
* engine-gpgsm.h (_gpgme_gpgsm_start): New arguments PUBKEY and SECKEY.
* engine.h: Likewise.
* rungpg.h (_gpgme_gpg_spawn): Likewise.
* engine.c (_gpgme_engine_op_genkey): Likewise. Use those
arguments.
* rungpg.c (_gpgme_gpg_op_genkey): Likewise. Complain if those
arguments are set.
* engine-gpgsm.c (_gpgme_gpgsm_op_genkey): Likewise. Implement
function.

* engine-gpgsm.c (_gpgme_gpgsm_op_keylist): Beautify comment.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (_gpgme_gpg_op_keylist): Remove handling of keylist
mode (for now).

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

* wait.c (gpgme_wait): Add new argument STATUS, in which the
status of the returned context is returned.
(_gpgme_wait_on_condition): Rework the function a bit, to make it
aware of cancelled processes, and to
allow to use gpgme_wait with
CTX being NULL (as documented in the source).
(struct proc_s): New member REPORTED.
* gpgme.h: Fix prototype.
* verify.c (gpgme_op_verify): Fix use of gpgme_wait.
* sign.c (gpgme_op_sign): Likewise.
* import.c (gpgme_op_import): Likewise.
* genkey.c (gpgme_op_genkey): Likewise.
* export.c (gpgme_op_export): Likewise.
* encrypt.c (gpgme_op_encrypt): Likewise.
* delete.c (gpgme_op_delete): Likewise.
* decrypt-verify.c (gpgme_op_decrypt_verify): Likewise.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (gpgme_set_keylist_mode): Possibly return an error
value.
(gpgme_get_keylist_mode): New function.
(gpgme_new): Set the default for keylist_mode member of CTX.

* gpgme.h (gpgme_set_keylist_mode): Fix prototype.

(gpgme_get_keylist_mode): New prototype.
(GPGME_KEYLIST_MODE_LOCAL): New macro.
(GPGME_KEYLIST_MODE_EXTERN): Likewise..

2002-02-02 Marcus Brinkmann <marcus@g10code.de>

This patch has gotten a bit large... mmh. The
main thing that
happens here is that error values are now not determined in the
operation function after gpgme_wait completed, but in the status
handler when EOF is received. It should always be the case that
either an error is flagged or EOF is received, so that after a
gpgme_wait you should never have the situation that no error is
flagged and EOF is not received. One problem is that the engine
status handlers don't have access to the context, a horrible
kludge works around this for now. All errors that happen during a
pending operation should be caught and reported in ctx->error,
including out-of-core and cancellation. This rounds up neatly a
couple of loose ends, and makes it possible to pass up any errors
in the communication with the backend as well. As a bonus, there
will be a function to access gpgme->wait, so that the operations
can truly be implemented with their _start function.

* engine-gpgsm.c (gpgsm_status_handler): Horrible kludge to report
error back
to the context.
* rungpg.c (gpg_status_handler): Same horrible kludge applied here.

* engine-gpgsm.c (gpgsm_assuan_simple_command): Add error checking.

* wait.c (_gpgme_wait_on_condition): If canceled, set CTX->error
to a value indication that.

* verify.c (add_notation): Set error, not out_of_core.
(finish_sig): Likewise.
(gpgme_op_verify_start): Don't clear out_of_core.
(_gpgme_verify_status_handler): At EOF, clean up the notation data.
(gpgme_op_verify): And don't do it here.

* trustlist.c (trustlist_status_handler): Check error, not out_of_core.
(gpgme_op_trustlist_start): Don't clear out_of_core.
(gpgme_op_trustlist_next): Check error, not out_of_core.
(gpgme_op_trustlist_end): Likewise.

* ops.h (test_and_allocate_result): New macro.
(_gpgme_passphrase_result): Remove prototype.
* delete.c (gpgme_op_delete): Return error from context.
(delete_status_handler): Use macro test_and_allocate_result.

Perform error checking at EOF.
(gpgme_op_delete_start): Release
result.
* passphrase.c (_gpgme_passphrase_status_handler): Use macro
test_and_allocate_result, and perform error checking here.
(_gpgme_passphrase_result): Function removed.
* sign.c (gpgme_op_sign_start): Do not set out_of_core to zero.
(gpgme_op_sign): Just return the error value from the context.
(sign_status_handler): Only progress if no error is set yet.  If
we process an EOF, set the resulting error value (if any).
* decrypt.c (_gpgme_decrypt_result): Function removed.
(create_result_struct): Function removed.
(_gpgme_decrypt_status_handler): Use macro test_and_allocate_result,
caclulate error on EOF, do not progress with errors.
(_gpgme_decrypt_start): Do not set out_of_core to zero.
(gpgme_op_decrypt): Just return the error value from the context.
* encrypt.c (encrypt_status_handler): Perform the error checking
here.
(gpgme_op_encrypt_start): Do not clear out_of_core.
* export.c (export_status_handler): Return if error is set in context.
(gpgme_op_export_start):
Release result.
(gpgme_op_export): Return error from context.
* decrypt-verify.c (gpgme_op_decrypt_verify): Return the error in
the context.
* genkey.c (genkey_status_handler): Use macro
test_and_allocate_result.  Perform error checking at EOF.
(gpgme_op_genkey): Just return the error from context.
* import.c (gpgme_op_import): Return the error from context.
(import_status_handler): Use macro test_and_allocate_result.
* keylist.c (gpgme_op_keylist_start): Do not clear out_of_core.
(gpgme_op_keylist_next): Return error of context.
(keylist_colon_handler): Set error instead out_of_code.
(finish_key): Likewise.

* context.h: Remove member out_of_core, add member error.
* gpgme.c (_gpgme_release_result): Clear error flag.

* engine.h (_gpgme_engine_get_error): New prototype.
* engine.c (_gpgme_engine_get_error): New function.
* engine-gpgsm.c (_gpgme_gpgsm_get_error): New function.

* engine-gpgsm.c (map_assuan_error): New function.
(gpgsm_assuan_simple_command): Change
return type to GpgmeError,
use the new function to map error values.
(gpgsm_set_fd): Change return type tp GpgmeError.
(_gpgme_gpgsm_op_decrypt): Change type of ERR to GpgmeError.

(gpgsm_set_recipients): Likewise. Change type of return value
equivalently. Adjust error values.
(_gpgme_gpgsm_op_import): Likewise.
(_gpgme_gpgsm_op_sign): Likewise.
(struct gpgsm_object_s): New member error.
(gpgsm_status_handler): Set error if error occurs. Determine
error number from ERR line received. If assuan_read_line fails,
terminate the connection.

2002-02-01 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (MOSTLYCLEANFILES): New variable.

2002-02-01 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_status_handler): At error, terminate the
connection to the server.

2002-01-31 Marcus Brinkmann <marcus@g10code.de>

* rungpg.h: Add STATUS_KEY_CREATED.

* progress.c: New file.
* Makefile.am (libgpgme_la_SOURCES): Add progress.c.

* genkey.c (genkey_status_handler):
Use
_gpgme_progress_status_handler. Add check for status.
(struct genkey_result_s): New structure.
(_gpgme_release_genkey_result): New function.
(gpgme_op_genkey): Check for error.
* gpgme.c (_gpgme_release_result): Call
_gpgme_release_genkey_result.
* ops.h (_gpgme_release_genkey_result): Add prototype.
* types.h (GenKeyResult): New type.
* context.h (gpgme_context_s): Add GenKeyResult to member result.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.c (_gpgme_release_result): Call
_gpgme_release_delete_result.
* ops.h (_gpgme_release_delete_result): Add prototype.
* types.h (DeleteResult): New type.
* context.h (gpgme_context_s): Add DeleteResult to member result.

* delete.c (enum delete_problem): New type.
(struct delete_result_s): New structure.
(_gpgme_release_delete_result): New function.

(delete_status_handler): Implement more status codes.
(gpgme_op_delete): Return error on failure.

* import.c (MAX_IMPORTED_FIELDS): Bump up to 14.

2002-01-30
Marcus Brinkmann <marcus@g10code.de>

* import.c (struct import_result_s): New structure.
(_gpgme_release_import_result): New function.
(append_xml_impinfo): Likewise.
(import_status_handler): Implement.
* gpgme.c (_gpgme_release_result): Add call to
_gpgme_release_import_result.
* ops.h (_gpgme_release_import_result): Add prototype.
* types.h (ImportResult): New type.
* context.h (gpgme_context_s): Add ImportResult to member result.

* encrypt.c (gpgme_op_encrypt): Code clean up.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h: Add lots of comment and fix the formatting. Add
gpgme_trustlist_end prototype.

2002-01-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h: Add new type GpgmeIdleFunc. Change type of
gpgme_register_idle to return and accept this type.
* wait.c (gpgme_register_idle): Fix type.
Save and return old value of idle_function.

2002-01-29 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_op_keylist): Implement
secret only mode.

* keylist.c (keylist_colon_handler): Add support for the new "crs"
record type.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_release): Call assuan_disconnect,
not assuan_pipe_disconnect.

* Makefile.am (libgpgme_la_LIBADD): Change to link assuan and
jnlib (needed by assuan) statically into libgpgme. Linking a
static library into a shared library this way is not portable.

2002-01-22  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.h (GpgmePassphraseCb): Change type of R_HD from void* to
void**.

2002-01-22  Marcus Brinkmann  <marcus@g10code.de>

* data.c (gpgme_data_new_from_filepart): Change type of LENGTH
from off_t to size_t.
* gpgme.h: Likewise.

2002-01-22  Marcus Brinkmann  <marcus@g10code.de>

* wait.c (_gpgme_wait_on_condition): If the process finished,
reset the pending flag.  Also if the operation was cancelled.

(struct proc_s): Rename READY to DONE.
(wait_item_s): Likewise.
(set_process_ready): Rename
to ...
(set_process_done): ... this.
(_gpgme_remove_proc_from_wait_queue): Call set_process_done
instead set_process_ready.
(_gpgme_wait_on_condition): Likewise.
(do_select): Rename READY to DONE.

* verify.c (gpgme_op_verify): Do not set pending to zero here.
* sign.c (gpgme_op_sign): Likewise.
* import.c (gpgme_op_import): Likewise.
* genkey.c (gpgme_op_genkey): Likewise.
* export.c (gpgme_op_export): Likewise.
* encrypt.c (gpgme_op_encrypt): Likewise.
* delete.c (gpgme_op_delete): Likewise.
* decrypt-verify.c (gpgme_op_decrypt_verify): Likewise.
* decrypt.c (gpgme_op_decrypt): Likewise.

2002-01-22  Marcus Brinkmann  <marcus@g10code.de>

* export.c: Cleanup.

2002-01-15  Marcus Brinkmann  <marcus@g10code.de>

* trustlist.c: Various source clean ups.
(my_isdigit): Removed.
(gpgme_op_trustlist_end): New function.

2002-01-13  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c: Various source clean ups, like renaming C to CTX where appropriate.
(gpgme_new): Clear
R_CTX before starting the work.
(my_isdigit): Removed.
(my_isxdigit): Likewise.

* data.c: Various source clean ups.
(gpgme_data_new_from_mem): Check BUFFER after clearing R_DH.
(gpgme_data_new_with_read_cb): Similar for READ_CB.
(gpgme_data_new_from_file): Loop over fread while EINTR.
(gpgme_data_new_from_filepart): Rediddled a bit. Allow LENGTH to be zero. Loop over fread while EINTR.

(my_isdigit): Removed.
(my_isxdigit): Likewise.

2001-12-21 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_new): Replace General_Error with Pipe_Error where appropriate.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

* engine.c: Include `string.h'. Reported by Stphane Corthsy.

* version.c (get_engine_info): Remove prototype.

2001-12-19 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_new): New variable CHILD_FDS.
Fill it with the servers fds, and pass it to assuan_pipe_connect.

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

*
keylist.c (gpgme_op_keylist_end): New function.
* gpgme.h (gpgme_op_keylist_end): New prototype.

* engine.h (gpgme_engine_check_version): Move prototype to ...
* gpgme.h (gpgme_engine_check_version): ... here.

* genkey.c (gpgme_op_genkey_start): Remove unused variable.

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

* version.c (gpgme_get_engine_info): Reimplemented.

(gpgme_check_engine): Reimplemented.
(_gpgme_compare_versions): Return NULL if MY_VERSION is NULL.

* engine.c: Include `io.h'.
(gpgme_engine_get_info): New function.
* engine.h (gpgme_engine_check_version, _gpgme_engine_get_info):
Add prototype.

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (struct reap_s, reap_list, reap_list_lock): Moved to ...
* engine.c (struct reap_s, reap_list, reap_list_lock): ... here.
Include `time.h', `sys/types.h', `assert.h', and `sema.h'.

* rungpg.c (_gpgme_engine_add_child_to_reap_list): New function.
(do_reaping, _gpgme_gpg_housecleaning): Moved to
...
* engine.c (do_reaping, _gpgme_engine_housecleaning): ... here.
* rungpg.c (_gpgme_gpg_release): Replace code that is now in its
own function by call to _gpgme_engine_add_child_to_reap_list().

* wait.c: Include `engine.h'.
(run_idle): Call _gpgme_engine_housecleaning(), not
_gpgme_gpg_housecleaning().

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

* key.c (_gpgme_key_append_name): Append, not prepend, the uid.
Initialize the next field of the uid structure.
(gpgme_key_get_as_xml): Do not list last uid first.

2001-12-17 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_set_colon_line_handler): New
function [!ENABLE_GPGSM].

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_verify): Put TEXT into
message_data, not SIG.
(_gpgme_gpgsm_op_sign): Use `--detached', not `--detach'.

* sign.c (sign_status_handler): Call
_gpgme_passphrase_status_handler early.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

*

engine-gpgsm.c: Revert last change.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_status_handler): Freeze the output file
handler when ending this operation, otherwise the wait function
will sit on it.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (struct gpgsm_object_s): New member colon.attic.
(_gpgme_gpgsm_new): Initialize some more members.
(_gpgme_gpgsm_release): Free the colon line handler's attic line.
(gpgsm_status_handler): Rework the inline-data processing.

2001-12-13 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (_gpgme_gpg_spawn): Do not add the fds to the child
list that are not dup'ed, for those the close-on-exec flag is set
now.
* version.c (_gpgme_get_program_version): Remove first entry in
CFD, as the close-on-exec flag is now set for this fd.

2001-12-13 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_encrypt): Do not add `armor'
option to `ENCRYPT'.
* engine-gpgsm.c
(gpgsm_set_recipients): Free LINE when returning
successfully.

2001-12-13 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (close_notify_handler): New function.
(_gpgme_gpgsm_new): Manage the file descriptors a
bit differently. Do not set close-on-exec flags.
(_gpgme_gpgsm_op_decrypt): Do not set message_fd
to -1, this is done by the close handler.
(_gpgme_gpgsm_op_encrypt): Likewise.
(_gpgme_gpgsm_op_import): Likewise (also for output_fd).
(_gpgme_gpgsm_op_keylist): Likewise (also for input_fd and output_fd).
(_gpgme_gpgsm_op_sign): Likewise.
(_gpgme_gpgsm_op_verify): Likewise, but for output_fd.

* posix-io.c (_gpgme_io_pipe): Set the close-on-exec flag for the
non-inherited file descriptor index of the pipe.

2001-12-13 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c (_gpgme_gpgsm_set_colon_line_handler): New.
(gpgsm_status_handler): Pass datalines to a colon handler
* engine.c (_gpgme_engine_set_colon_line_handler): Set the colon
handler for gpgsm.

* engine-gpgsm.c
(_gpgme_gpgsm_op_keylist): Allow NULL for
pattern.
(gpgsm_assuan_simple_command): Removed underscore from
assuan_write_line.
(_gpgme_gpgsm_start): Ditto.
(gpgsm_assuan_simple_command): Replaced internal Assuan read
function by the new assuan_read_line.  Removed the use of the
internal header.
(gpgsm_status_handler): Ditto. Use the new assuan_pending_line.
(_gpgme_gpgsm_start): Use the documented way to get an fd from
assuan.

* keylist.c (keylist_colon_handler): Handle "crt" records
* key.h (gpgme_key_s): Add an x509 flag.
* key.c (parse_x509_user_id): New.
(_gpgme_key_append_name): Handle x.509 names.

2001-12-05  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_status_handler): Make it work with current
version of assuan.

2001-12-05  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_set_fd): Accept one more argument OPT.
(_gpgme_gpgsm_op_encrypt): Pass armor argument to gpgsm_set_fd for
output descriptor.
(_gpgme_gpgsm_op_sign):
Likewise.

2001-12-05  Marcus Brinkmann  <marcus@g10code.de>

* keylist.c (gpgme_op_keylist_next): Set pending to 0 if EOF
occurs.

2001-11-26  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_sign): Fix stupid typo.

2001-11-24  Marcus Brinkmann  <marcus@g10code.de>

* engine-gpgsm.c (gpgsm_status_handler): Don't break if bsearch fails.
Deal with assuan read line returning more than one line (for now).

2001-11-23 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_sign): Implement it according to
the current protocol definition.

2001-11-23 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_new): Set CLOEXEC flag for parent
ends of the pipe.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c: Include stdlib.h and string.h. Also include,
for now, rungpg.h and status-table.h.
(gpgsm_status_handler): Implement more of the status handler.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

*
engine.c (_gpgme_engine_op_decrypt): Implement CMS case.
(_gpgme_engine_op_delete): Likewise.
(_gpgme_engine_op_encrypt): Likewise.
(_gpgme_engine_op_export): Likewise.
(_gpgme_engine_op_genkey): Likewise.
(_gpgme_engine_op_keylist): Likewise.
(_gpgme_engine_op_sign): Likewise.
(_gpgme_engine_op_trustlist): Likewise.

* engine-gpgsm.c (_gpgme_gpgsm_op_encrypt): New function.
(gpgsm_assuan_simple_command): Likewise.
(gpgsm_set_recipients): Likewise.
(gpgsm_set_fd): Reimplement using gpgsm_assuan_simple_command.
(_gpgme_gpgsm_op_delete): New function.
(_gpgme_gpgsm_op_export): Likewise.
(_gpgme_gpgsm_op_genkey): Likewise.
(_gpgme_gpgsm_op_sign): Likewise.
(_gpgme_gpgsm_op_keylist): Likewise.
(_gpgme_gpgsm_op_trustlist): Likewise.
(_gpgme_gpgsm_release): Release command.
(_gpgme_gpgsm_op_decrypt): Allocate command.
(_gpgme_gpgsm_op_import): Likewise.
(gpgsm_status_handler): Also treat `ERR' strings as EOF.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.h
(gpgme_set_protocol): New prototype.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c (_gpgme_gpgsm_op_decrypt): New function.
(_gpgme_gpgsm_op_import): Likewise.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

* engine-gpgsm.c: Shuffle around header inclusion a bit, to still
keep them separate.
(_gpgme_set_status_handler) [!ENABLE_GPGSM]: New function.

2001-11-22 Werner Koch <wk@gnupg.org>

* engine-gpgsm.c: Include more headers so that NULL and mk_error
is defined even with an undefined GPGSM_PATH.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

* rungpg.c (gpg_inbound_handler, write_mem_data, write_cb_data,
gpg_outbound_handler): Moved to ...
* data.c (_gpgme_data_inbound_handler, write_mem_data,
write_cb_data, _gpgme_data_outbound_handler): ... here. Make the
_gpgme_* ones non-static.
* data.c: Include io.h.

* ops.h (_gpgme_data_inbound_handler): New prototype.
(_gpgme_data_outbound_handler): Likewise.
(_gpgme_gpg_spawn): Use
these new functions.

* engine-gpgsm.h (_gpgme_gpgsm_op_decrypt, _gpgme_gpgsm_op_delete,
_gpgme_gpgsm_op_encrypt, _gpgme_gpgsm_op_export,
_gpgme_gpgsm_op_genkey, _gpgme_gpgsm_op_import,
_gpgme_gpgsm_op_keylist, _gpgme_gpgsm_op_sign,
_gpgme_gpgsm_op_trustlist, _gpgme_gpgsm_op_verify,
_gpgme_gpgsm_start, _gpgme_gpgsm_set_status_handler): New prototype.
Include <rungpg.h> for status handler function.

* engine-gpgsm.c (struct gpgsm_object_s): New members input_fd,
input_data, output_fd, output_data, message_fd, message_data, command
and status.
(_gpgme_gpgsm_new): Open input, output and message pipes before
connecting to the client. Close server's ends afterwards.
(_gpgme_gpgsm_release): Close open file descriptors. Remove
server process from wait queue.

(_gpgme_gpgsm_op_verify, _gpgme_gpgsm_start,
_gpgme_gpgsm_set_status_handler, gpgms_status_handler): New function.

* engine.c (_gpgme_engine_start): Implement for GPGME_PROTOCOL_CMS.
(_gpgme_engine_set_status_handler):
Likewise.
(_gpgme_engine_op_verify): Likewise.

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* context.h: Do not include rungpg.h, but engine.h.
(struct gpgme_context_s): Replace member gpg with engine.
* gpgme.c (gpgme_release): Release engine, not gpg.

* recipient.c (_gpgme_append_gpg_args_from_recifgpients): Function
moved ...
* rungpg.c (_gpgme_append_gpg_args_from_recipients): ... here.
Make static, change order of arguments, and return an error value.
* ops.h (_gpgme_append_gpg_args_from_recipients): Removed prototype.

* rungpg.h (_gpgme_gpg_op_verify): Add prototype.
(_gpgme_gpg_op_encrypt): Likewise.
(_gpgme_gpg_op_decrypt): Likewise.
(_gpgme_gpg_op_delete): Likewise.
(_gpgme_gpg_op_export): Likewise.
(_gpgme_gpg_op_genkey): Likewise.
(_gpgme_gpg_op_import): Likewise.
(_gpgme_gpg_op_keylist): Likewise.
(_gpgme_gpg_op_sign): Likewise.
(_gpgme_gpg_op_trustlist): Likewise.
* rungpg.c (_gpgme_gpg_op_verify): New function.
(_gpgme_gpg_op_encrypt): Likewise.
(_gpgme_gpg_op_decrypt):
Likewise.
(_gpgme_gpg_op_delete): Likewise.
(_gpgme_gpg_op_export): Likewise.
(_gpgme_gpg_op_genkey): Likewise.
(_gpgme_gpg_op_import): Likewise.
(_gpgme_gpg_op_keylist): Likewise.
(_gpgme_gpg_op_sign): Likewise.
(_gpgme_gpg_op_trustlist): Likewise.

* engine.h (_gpgme_engine_set_status_handler): Add prototype.
(_gpgme_engine_set_command_handler): Likewise.
(_gpgme_engine_set_colon_line_handler): Likewise.
(_gpgme_engine_op_decrypt): Likewise.
(_gpgme_engine_op_delete): Likewise.
(_gpgme_engine_op_encrypt): Likewise.

(_gpgme_engine_op_export): Likewise.
(_gpgme_engine_op_genkey): Likewise.
(_gpgme_engine_op_import): Likewise.
(_gpgme_engine_op_keylist): Likewise.
(_gpgme_engine_op_sign): Likewise.
(_gpgme_engine_op_trustlist): Likewise.
(_gpgme_engine_op_verify): Likewise.
(_gpgme_engine_start): Likewise.
* engine.c (_gpgme_engine_set_status_handler): New function.
(_gpgme_engine_set_command_handler): Likewise.
(_gpgme_engine_set_colon_line_handler):
Likewise.
(_gpgme_engine_op_decrypt): Likewise.
(_gpgme_engine_op_delete): Likewise.
(_gpgme_engine_op_encrypt): Likewise.
(_gpgme_engine_op_export): Likewise.
(_gpgme_engine_op_genkey): Likewise.
(_gpgme_engine_op_import): Likewise.
(_gpgme_engine_op_keylist): Likewise.
(_gpgme_engine_op_sign): Likewise.
(_gpgme_engine_op_trustlist): Likewise.
(_gpgme_engine_op_verify): Likewise.
(_gpgme_engine_start): Likewise.

* verify.c (gpgme_op_verify_start): Reimplement in terms of above
functions.
* encrypt.c (gpgme_op_encrypt_start): Likewise.
* decrypt.c (_gpgme_decrypt_start): Likewise.
* passphrase.c (_gpgme_passphrase_start): Likewise.
* keylist.c (gpgme_op_keylist_start): Likewise.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

* types.h: Add types EngineObject and GpgsmObject.

* Makefile.am (libgpgme_la_SOURCES): Add engine-gpgsm.h,
engine-gpgsm.c, engine.h and engine.c.
* engine.h: New file.
* engine.c: Likewise.
* engine-gpgsm.h: Likewise.
*
engine-gpgsm.c: Likewise.

* rungpg.c (_gpgme_gpg_get_version): New function.
(_gpgme_gpg_check_version): Likewise.
* rungpg.h: Add prototypes for _gpgme_gpg_get_version and
_gpgme_gpg_check_version.

* version.c (compare_versions): Rename to ...
(_gpgme_compare_versions): ... this. Make non-static.
(gpgme_check_version): Use _gpgme_compare_versions rather than
compare_versions.
(gpgme_check_engine): Likewise.
* ops.h (_gpgme_get_program_version): Add prototype.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (libgpgme_la_INCLUDES): Remove obsolete directive.
(AM_CPPFLAGS): New directive [BUILD_ASSUAN].
(libgpgme_la_LIBADD): Likewise.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

* version.c: Remove global variables lineno and
tmp_engine_version.
(version_handler): Removed.
(_gpgme_get_program_version): New function.
(get_engine_info): Don't use context and version_handler,
but _gpgme_get_program_version.
* ops.h (_gpgme_get_program_version):
Add prototype for
_gpgme_get_program_version (we expect to use it elsewhere soon).

2001-11-18 Marcus Brinkmann <marcus@g10code.de>

* version.c (get_engine_info): If GnuPG is not available, return
an error message.
* posix-util.c (_gpgme_get_gpg_path): Allow GPG_PATH to be
undefined.
(_gpgme_get_gpgsm_path): New function.
* w32-util.c (find_program_in_registry): New static function.
(_gpgme_get_gpg_path): Allow GPG_PATH to be undefined. Rework
to use find_program_in_registry.
(_gpgme_get_gpgsm_path): New function.
(util.h): Prototype _gpgme_get_gpgsm_path).
* rungpg.c (_gpgme_gpg_spawn): Verify that _gpgme_get_gpg_path()
returns non-null.

2001-11-16 Marcus Brinkmann <marcus@g10code.de>

* decrypt-verify.c: New file.
* Makefile.am (libgpgme_la_SOURCES): Add decrypt-verify.c.
* types.h: Add decrypt-verify types.
* ops.h: Likewise.
* context.h: Add result type for decrypt-verify.
* gpgme.h: Add decrypt-verify prototypes.

* decrypt.c (decrypt_status_handler):
Renamed to ...
(_gpgme_decrypt_status_handler): ... this.  Make non-static.
(_gpgme_decrypt_start): New function, derived from
gpgme_op_decrypt_start.
(gpgme_op_decrypt_start): Reimplement in terms of
_gpgme_decrypt_start.
(_gpgme_decrypt_result): New function to retrieve error value.
(gpgme_op_decrypt): Use _gpgme_decrypt_result.
* ops.h: Add prototypes for new functions.

* verify.c (verify_status_handler): Renamed to ...
(_gpgme_verify_status_handler): ... this.  Make non-static.
(gpgme_op_verify_start): Use new function name.
(intersect_stati): Renamed to ...
(_gpgme_intersect_stati): ... this.  Make non-static.
(gpgme_op_verify): Use new name.
* ops.h: Add prototypes for new functions.

2001-11-16  Marcus Brinkmann  <marcus@g10code.de>

* passphrase.c: New file.
* Makefile.am (libgpgme_la_SOURCES): Add passphrase.c.
* ops.h (_gpgme_passphrase_result): Add prototypes from
passphrase.c.
* types.h: Likewise.
* context.h: Add member passphrase to result.
*
gpgme.c (_gpgme_release_result): Release passphrase member.

* decrypt.c: Some formatting and variable name changes (like
CTX instead C).
(struct decrypt_result_s): Remove members now found in
passphrase result.
(_gpgme_release_decrypt_result): Don't release removed members.
(decrypt_status_handler): Call _gpgme_passphrase_status_handler,
and don't handle the cases caught there.
(command_handler): Removed.
(gpgme_op_decrypt_start): Don't set command handler, but invoke
_gpgme_passphrase_start which does it.
(gpgme_op_decrypt): Invoke _gpgme_passphrase_result and drop the
cases covered by it.

* sign.c Some formatting and variable name changes (like
CTX instead C).
(struct sign_result_s): Remove members now found in
passphrase result.

(_gpgme_release_sign_result): Don't release removed members.
(sign_status_handler): Call _gpgme_passphrase_status_handler,
and don't handle the cases caught there.
(command_handler): Removed.
(gpgme_op_sign_start): Don't set command
handler, but invoke
_gpgme_passphrase_start which does it.
(gpgme_op_sign): Invoke _gpgme_passphrase_result and drop the
cases covered by it.

2001-11-15 Marcus Brinkmann <marcus@g10code.de>

* decrypt.c (command_handler): Fix last change.

2001-11-15 Marcus Brinkmann <marcus@g10code.de>

* verify.c (_gpgme_release_verify_result): Rename RES to RESULT.
Rename R2 to NEXT_RESULT.
(intersect_stati): Rename RES to RESULT.
(gpgme_get_sig_status): Likewise. Do not check return_type, but
the member verify of result.
(gpgme_get_sig_key): Likewise.

* sign.c (_gpgme_release_sign_result): Rename RES to RESULT. If
RESULT is zero, return.
(sign_status_handler, command_handler): Do not check return_type,
but the member sign of result.
(gpgme_op_sign): Likewise. Drop assertion.

* encrypt.c (_gpgme_release_encrypt_result): Rename RES to RESULT.
If RESULT is zero, return.
(encrypt_status_handler): Do not check return_type, but the member
encrypt of result.
(gpgme_op_encrypt):
Likewise. Drop assertion.

* decrypt.c (_gpgme_release_decrypt_result): Rename RES to RESULT.
(create_result_struct): Do not set result_type.
(command_handler, decrypt_status_handler): Do not check
return_type, but the member decrypt of result.
(gpgme_op_decrypt): Likewise. Drop assertion.

* context.h (enum ResultType): Removed.
(struct gpgme_context_s): Remove member result_type.
(struct result): Replaces union result.
* gpgme.c: Include string.h.
(_gpgme_release_result): Release all members of c->result, which
is now a struct. Zero out all members of the struct afterwards.

2001-11-11  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (_gpgme_gpg_release): Release GPG->cmd.cb_data.
Release all members of the list GPG->arglist.
Reported by Michael Schmidt <mschmidt@cs.uni-sb.de>.

2001-11-02  Marcus Brinkmann  <marcus@g10code.de>

* rungpg.c (pipemode_copy): Change type of NBYTES to size_t.

* key.c: Include string.h.
* data.c: Likewise.
* recipient.c: Likewise.

2001-10-29
Marcus Brinkmann  <marcus@g10code.de>

* context.h: New member signers_len.
* signers.c (gpgme_signers_clear): Require that signers are
non-NULL with assertion.  Use signers_len to determine how much
keys to release.  Add documentation.
(gpgme_signers_add): Use signers_len to determine if the buffer is
large enough.  Use xtryrealloc rather than xtrymalloc and copying.
Add documentation.
(gpgme_signers_enum): Use signers_len to determine if key is
available.  Add documentation.

2001-10-22  Marcus Brinkmann  <marcus@g10code.de>

* data.c (_gpgme_data_append): Check if LENGTH is smaller than
ALLOC_CHUNK, not DH->length.

2001-10-17  Marcus Brinkmann  <marcus@g10code.de>

* gpgme.c (gpgme_set_protocol): Fix last change.

2001-10-15  Werner Koch  <wk@gnupg.org>

* gpgme.h (GpgmeProtocol): New.
* gpgme.c (gpgme_set_protocol): New.

2001-09-26  Werner Koch  <wk@gnupg.org>

* gpgme.c (gpgme_set_passphrase_cb): Ignore a NULL context.
(gpgme_set_progress_cb): Ditto.
Suggested by Mark Mutz.

2001-09-17  Werner Koch  <wk@gnupg.org>

* keylist.c (finish_key): Shortcut for no tmp_key.  Changed all
callers to use this function without a check for tmp_key.

* keylist.c (gpgme_op_keylist_next): Reset the key_cond after
emptying the queue.  Bug reported by Stphane Corthsy.

2001-09-12  Werner Koch  <wk@gnupg.org>

* data.c (gpgme_data_rewind): Allow rewind for callbacks.

2001-09-07  Werner Koch  <wk@gnupg.org>

* rungpg.h: Add NO_RECP.
* encrypt.c (encrypt_status_handler): Take on No_RECP.
(gpgme_op_encrypt): Better error return.

* verify.c (verify_status_handler): Take on NODATA.

2001-09-03  Werner Koch  <wk@gnupg.org>

* rungpg.h: Added STATUS_INV_RECP.
* gpgme.c (_gpgme_release_result): Add support for new
EncryptResult object.
* encrypt.c (append_xml_encinfo): New.
(encrypt_status_handler): Add some status parsing.
(_gpgme_release_encrypt_result): New.

2001-08-29  Werner Koch  <wk@gnupg.org>

* recipient.c (gpgme_recipients_release):
Free the list.  By Timo.

* keylist.c (keylist_colon_handler): Do a finish key if we receive
an EOF here.  This is probably the reason for a lot of bugs
related to keylisting.  It is so obvious.  Kudos to Enno Cramer
for pointing that out.

2001-08-28  Werner Koch  <wk@gnupg.org>

* gpgme.c, gpgme.h (gpgme_get_op_info): New.
(_gpgme_set_op_info): New.
(_gpgme_release_result): Reset the op_info here.
* sign.c (append_xml_siginfo): New.
(sign_status_handler): Store the sig create information.

2001-07-31  Werner Koch  <wk@gnupg.org>

* encrypt.c (gpgme_op_encrypt): Hack to detect no valid recipients.

2001-07-30  Werner Koch  <wk@gnupg.org>

* gpgme.c (gpgme_get_armor,gpgme_get_textmode): New.

* rungpg.c (build_argv): Disable armor comments
* w32-io.c (build_commandline): Need to add quotes here

2001-07-24  Werner Koch  <wk@gnupg.org>

* data.c (gpgme_data_read): Add a a way to return the available bytes.

2001-07-23  Werner Koch  <wk@gnupg.org>

* util.c: Removed
stpcpy() because we use the version from jnlib.

2001-07-19  Werner Koch  <wk@gnupg.org>

* mkstatus: Define the collating sequence for sort.

2001-06-26  Werner Koch  <wk@gnupg.org>

* rungpg.h: Add STATUS_UNEXPECTED as suggested by Timo.

2001-06-15  Werner Koch  <wk@gnupg.org>

* keylist.c (set_userid_flags): Fixed the assigned values. Kudos
to Timo for pointing this out.

2001-06-01  Werner Koch  <wk@gnupg.org>

* debug.c (_gpgme_debug_begin): Fixed a /tmp race.  Noted by
Johannes Poehlmann.

2001-05-28  Werner Koch  <wk@gnupg.org>

* version.c (gpgme_check_engine): Stop version number parsing at
the opening angle and not the closing one.  By Tommy Reynolds.

2001-05-01  Jos Carlos Garca Sogo <jose@jaimedelamo.eu.org>

* encrypt.c (gpgme_op_encrypt_start): Deleted the assert ( !c->gpg )
line, because it gave an error if another operation had been made
before using the same context.

* decrypt.c (gpgme_op_decrypt_start): The same as above. Also added
one line to release
the gpg object in the context (if any).

2001-04-26  Werner Koch  <wk@gnupg.org>

* key.c, key.h (_gpgme_key_cache_init): New.
(_gpgme_key_cache_add): New.
(_gpgme_key_cache_get): New.
* version.c (do_subsystem_inits): Init the cache.
* keylist.c (finish_key): Put key into the cache
* verify.c (gpgme_get_sig_key): First look into the cache.

2001-04-19  Werner Koch  <wk@gnupg.org>

* keylist.c (parse_timestamp): Adjusted for the changed
--fixed-list-mode of gpg 1.0.4h.

2001-04-05  Werner Koch  <wk@gnupg.org>

* verify.c (gpgme_op_verify_start): Enabled pipemode for detached sigs.

2001-04-04  Werner Koch  <wk@gnupg.org>

* w32-io.c (_gpgme_io_select): Don't select on the writer if there
are still bytes pending.  Timo found this not easy to track down
race condition.

2001-04-02  Werner Koch  <wk@gnupg.org>

* gpgme.h: Add GPGME_ATTR_KEY_{EXPIRED,DISABLED}.
* key.c (gpgme_key_get_ulong_attr): And return those attribs.

* verify.c (gpgme_get_sig_key): Set keyliosting mode
depending on
the mode set in the current context.  Suggested by Timo.

* key.c (gpgme_key_get_ulong_attr): Return can_certify and not
can_encrypt. By Timo.

2001-03-30  Werner Koch  <wk@gnupg.org>

* debug.c (debug_init): Allow to specify a debug file.
(_gpgme_debug_level): New.

* posix-io.c (_gpgme_io_read, _gpgme_io_write): Print output.
(_gpgme_io_select): Debug only with level > 2.

2001-03-15  Werner Koch  <wk@gnupg.org>

* rungpg.c: Included time.h.

* key.h: New keyflags for capabilities.
* keylist.c (set_mainkey_capability, set_subkey_capability): New.
(keylist_colon_handler): Parse them.
* gpgme.h: New attribute values for capabilities.
* key.c (gpgme_key_get_string_attr): Return them.
(capabilities_to_string): New.
(gpgme_key_get_ulong_attr): Return the global caps.

2001-03-14  Werner Koch  <wk@gnupg.org>

* w32-io.c (destroy_reader,destroy_writer): Fixed syntax error.
Thanks to Jan Oliver Wagner.

2001-03-13  Werner Koch  <wk@gnupg.org>

* context.h: Add
invalid and revoke flags to user_id structure.
* keylist.c (gpgme_op_keylist_start): Use --fixed-list-mode.
(keylist_colon_handler): Adjust for that.
(set_userid_flags): New.
(set_mainkey_trust_info): Handle new key invalid flag
(set_subkey_trust_info): Ditto.
* gpgme.h: Add new attributes for key and user ID flags.
* key.c (_gpgme_key_append_name): Init these flags
(gpgme_key_get_as_xml): Print them.
(one_uid_as_xml): New helper for above.
(gpgme_key_get_string_attr, gpgme_key_get_ulong_attr):
Return the new attributes.  Enhanced, so that subkey information
can be returned now.

2001-02-28  Werner Koch  <wk@gnupg.org>

* w32-io.c (destroy_reader): Set stop_me flag.
(writer,create_writer,destroy_writer,find_writer,kill_writer): New.
(_gpgme_io_write): Use a writer thread to avoid blocking.
(_gpgme_io_close): Cleanup a writer thread
(_gpgme_io_select): Repalce the faked wait on writing by a real
waiting which is now possible due to the use of a writer thread.

2001-02-20
Werner Koch  <wk@gnupg.org>

* w32-io.c (destroy_reader,kill_reader): New.
(create_reader, reader): Add a new event to stop the thread.

(_gpgme_io_close): Kill the reader thread.

* posix-io.c (_gpgme_io_select): Handle frozen fds here.
* 32-io.c (_gpgme_io_select): Ditto. Removed a bunch of unused code.

* wait.c: Reworked the whole thing.
* rungpg.c (_gpgme_gpg_new): Init pid to -1.
(_gpgme_gpg_release): Remove the process from the wait queue.

2001-02-19 Werner Koch <wk@gnupg.org>

* w32-io.c (_gpgme_io_set_close_notify): New.
(_gpgme_io_close): Do the notification.

* posix-io.c (_gpgme_io_select): Use a 1 sec timeout and not 200
microseconds.

* wait.c (remove_process): Don't close the fd here.
(do_select): Set the fd to -1 and remove the is_closed flag everywhere.
(_gpgme_wait_on_condition): Remove the assert on the queue and
break out if we could not find the queue. The whole thing should
be reworked.

* posix-io.c (_gpgme_io_set_close_notify): New.
(_gpgme_io_close):
Do the notification.

* rungpg.c (close_notify_handler): New.
(_gpgme_gpg_new): Register a callback for the fd.
(_gpgme_gpg_set_colon_line_handler): Ditto.
(build_argv): Ditto

2001-02-13 Werner Koch <wk@gnupg.org>

* rungpg.c (struct reap_s): Replaced pid_t by int.

* types.h: Add ulong typedef.

* rungpg.c (do_reaping,_gpgme_gpg_housecleaning): New.
(_gpgme_gpg_release): Reap children.
* io.h, posix-io.c (_gpgme_io_kill): New.
* w32-io.c (_gpgme_io_kill): New (dummy).

* keylist.c (gpgme_op_keylist_start): Cancel a pending request.

* posix-io.c (_gpgme_io_read): Add some debug output.
(_gpgme_io_write): Ditto.
(_gpgme_io_select): Increased the timeout.

2001-02-12  Werner Koch  <wk@gnupg.org>

Enhanced the signature verification, so that it can how handle
more than one signature and is able to return more information on
the signatures.
* verify.c (gpgme_get_sig_key): New.
(gpgme_get_sig_status): New.

* gpgme.h: Add stdio.h.
(GpgmeSigStat):
New status DIFF.

2001-02-01  Werner Koch  <wk@gnupg.org>

* w32-io.c (set_synchronize): Add EVENT_MODIFY_STATE.  Add Debug
code to all Set/ResetEvent().

* rungpg.c (read_status): Check for end of stream only if we have
an r.  By Timo.

2001-01-31  Werner Koch  <wk@gnupg.org>

* wait.c (_gpgme_wait_on_condition): Removed all exit code processing.
(propagate_term_results,clear_active_fds): Removed.
(count_active_fds): Renamed to ..
(count_active_and_thawed_fds): .. this and count only thawed fds.

* rungpg.c (gpg_colon_line_handler): Return colon.eof and not
status.eof ;-)

2001-01-30  Werner Koch  <wk@gnupg.org>

* w32-io.c (_gpgme_io_spawn): Use the supplied path arg.

* version.c (get_engine_info): Return better error information.

* posix-util.c, w32-util.c: New.
(_gpgme_get_gpg_path): New, suggested by Jan-Oliver.
* rungpg.c (_gpgme_gpg_spawn): Use new function to get GPG's path.

* signers.c (gpgme_signers_add): Ooops, one should test code and
not just write it;
the newarr was not assigned.  Thanks to Jos
for pointing this out.  Hmmm, still not tested, why should a coder
test his fix :-)

* w32-io.c: Does now use reader threads, so that we can use

WaitForMultipleObjects.
* sema.h, posix-sema.c, w32-sema.c: Support for Critical sections.
Does currently only work for W32.

* debug.c, util.h : New. Changed all fprintfs to use this new
set of debugging functions.

2001-01-23  Werner Koch  <wk@gnupg.org>

* data.c (_gpgme_data_release_and_return_string): Fixed string
termination.

2001-01-22  Werner Koch  <wk@gnupg.org>

* delete.c: New.

* signers.c: New.
* key.c (gpgme_key_ref, gpgme_key_unref): New.
* sign.c (gpgme_op_sign_start): Allow the use of other keys.

* version.c (gpgme_get_engine_info,gpgme_check_engine): New.
* rungpg.c (_gpgme_gpg_set_simple_line_handler): New.

2001-01-05  Werner Koch  <wk@gnupg.org>

* data.c (gpgme_data_rewind): Allow to rewind data_type_none.

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;;; 02111-1307, USA.

(defpackage #:gpgme-system
 (:use #:common-lisp #:asdf))

(in-package #:gpgme-system)

(defsystem gpgme
 :description "GnuPG Made Easy."
 :author "g10 Code GmbH"
  :version "1.15.1"
 :licence "GPL"
 :defsystem-depends-on ("cffi-grovel")
 :depends-on ("cffi" "gpg-error" "trivial-garbage")
 :components ((:file "gpgme-package")
              (:cffi-grovel-file "gpgme-grovel"
               :depends-on ("gpgme-package"))
       (:file "gpgme"
  :depends-on ("gpgme-package" "gpgme-grovel"))))
# -*- mode: org -*-
#+TITLE: GNU Privacy Guard (GnuPG) Made Easy Python Bindings
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltxtra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}


* GPGME Python Bindings
 :PROPERTIES:
 :CUSTOM_ID: top
 :END:
```

** Contents
:PROPERTIES:
:CUSTOM_ID: contents
:END:

- [[file:short-history][A short history of the project]]
- [[file:what-is-new][What's New]]
- [[file:maintenance-mode][Maintenance Mode]] (from January, 2019)
- [[file:what-was-new][What Was New]]
- [[file:gpgme-python-howto][GPGME Python Bindings HOWTO]]

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```
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This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

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`show c' should show the appropriate
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Yoyodyne, Inc., hereby disclaims all copyright interest in the program
`Gnomovision' (which makes passes at compilers) written by James Hacker.

<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice

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consider it more useful to permit linking proprietary applications with the
library.  If this is what you want to do, use the GNU Library General
Public License instead of this License.
-----BEGIN PGP PUBLIC KEY BLOCK-----

mQENBFrsKEkBCADKw4Wt8J6M/88qD8PO6lSMCxH1cpwH8iK0uPaFFYsJkkXo7kWf
PTAtrV+REqF/o80dvYcdLvRsV21pvncZz/HXLu1yQ18mC3XObrKokbdgrTTKA5XE
BZkNsqyaMMJauT18H4hYkSg62/tTdO1cu/zWv/LFf7Xyn6+uA74ovXCJlO1s0N2c
PShtr98QRzPMf2owgVk37JnDNp4gGVDGHxSZOuUwxgYAZYnA8SFc+c+3ZrQfY870
+O4j3Mz4p7yD13AwP4buQLBsb/icxekeQCqpRJhLH9f7MdEcGXa1x36RcEkHdu+M
yJ392eMgD+dKNfRCtyTPhjZTxvbNELIBYICfABEBAAG0EHRlc3RAZXhhbXBsZS5v
cmeJAVQEEwEIAD4WIQTUFzW5Ejb9uIIEjFojAWNe7/DLBQUCWuwoSQIbAwUJA8Jn
AAULCQgHAgYVCgkICwIEFgIDAQIeAQIXgAAKCRAjAWNe7/DLBf9kB/wOQ/S60HGw
Fq07W9N01HWULyhHKoMmcHL6rfZ64oDqLxolPSasz7WAMW1jN4qtWJ0mFzwO83V6
kaBe+wF6Kqir6udFSBW9rPcFg6/VZXPltT0a6uacIHq6DyQ5iMW4YQWbVy9OR2rN
GkYo1JCBR0XdRJYCSX3yB4TWv/eXnZ37/WjmiTOIZh35rjs+NuU/S5JPDfAp2/k7
0DevQeBsv+UjVXjWpNTZmPbvDnd995uSmC6UY4hzyP84ORYMYn9n1QAR0goxDN6U
unOf9Rlp1oMzdxMool/d1MlCxg2h3jheuhv7lgUF4KpvHOuEPXQ7UO417E0TYcDZ

1J8Nsv87SZeEuQENBFrsKEkBCADjoEBhG/QPqZHg8VyoD1xYRAWGxyDJkX/GrSs6
yE+x2hk5FoQCajxKa/d4AVxOnJpdwhAfeXeSNaql5Ejgzax+Tdj9BV6vtGVJVv0p
O7bgAiZxkA6RHxtNqhpPnPQoXvUzkzpRgpuL+Nj4yIg7z1ITH6KQH4u5SI9vd+j/
8i9Taz67pdZwuJjac8qBuJHjzAo1bjYctFYUSG5pbmMQyNLySzgiNkFa4DajODlt
3RuqVGP316Fk+Sy2+60tC/HlX8jgMyMONfOGBQx6jk8tvAphS/LAqrrNepnagIyL
UGKU+L8cB2g1PGGp2biBFWqZbudZoyRBet/0yH/zirBdQJw1ABEBAAGJATwEGAEI
ACYWIQTUFzW5Ejb9uIIEjFojAWNe7/DLBQUCWuwoSQIbDAUJA8JnAAAKCRAjAWNe
7/DLBf0pCACPp5hBuUWngu2Hqvg+tNiujfsiYzId3MffFxEk3CbXeHcJ5F32NDJ9
PYCnra4L8wSv+NZt9gIa8lFwoFSFQCjzH7KE86XcV3MhfdJTNb/+9CR7Jq3e/4Iy
0N5ip7PNYMCyakcAsxvsNCJKrSaDuYe/OAoTXRBtgRWE2uyT315em02Lkr+2Cc/Q
k6H+vlNOHGRgnpI/OZZjnUuUfBUvMGHr1phW+y7aeymC9PnUGdViRdJe23nntMSD
A+0/I7ESO9JsWvJbyBmuiZpu9JjScOjYH9xpQLqRNyw4WHpZriN69F0t9Mmd7bM1
+UyPgbPEr0iWMeyctYsuOLeUyQKMscDT
=QyY6
-----END
PGP PUBLIC KEY BLOCK-----

Using gpgme.js

---

At first, make sure that the environment you want to use gpgme.js in has access
and permissions for nativeMessaging, and gpgme-json installed. For details,
see the README.

The library itself is started via the {@link init} method. This will test the
nativeMessaging connection, and then resolve into an Object offering
the top level API:

* [encrypt]{@link GpgME#encrypt}
* [decrypt]{@link GpgME#decrypt}
* [sign]{@link GpgME#sign}
* [verify]{@link GpgME#verify}
* [Keyring]{@link GPGME_Keyring}

```
gpgmejs.init()
  .then(function(GPGME) {
      // using GPGME
  }, function(error){
      // error handling;
  })
```

All methods that require communication with nativeMessaging are asynchronous,
using Promises. Rejections will be instances of {@link GPGME_Error}.

An exaeption are Keys, which can be initialized in a 'sync' mode, allowing them
to be cached and used synchronously until manually refreshed.

Keyring and Keys

---
The gnupg keys
can be accessed via the [Keyring]{@link GPGME_Keyring}.

The Keyring offers the methods for accessing information on all Keys known to
gnupg.

**Due to security constraints, the javascript-binding currently only offers
limited support for secret-Key interaction.**

The existence of secret Keys is not secret, and those secret Keys can be used
for signing, but Operations that may expose, modify or delete secret Keys are
not supported.

* [getKeysArmored]{@link GPGME_Keyring#getKeysArmored}
* [getKeys]{@link GPGME_Keyring#getKeys}
* [getDefaultKey]{@link GPGME_Keyring#getDefaultKey}
* [generateKey]{@link GPGME_Keyring#generateKey}
* [deleteKey]{@link GPGME_Keyring#deleteKey}

```
#!/usr/bin/env bash
# MIT licenses will each have a unique MD5 sum since they contain a unique copyright.
# This script will read the license file into memory, strip out the copyright, and then
# generate an MD5 that is not unique and can be matched against a known MIT MD5 sum.
set -e

calculate_md5_sum() {
 local FILE="$1"

 # Read the contents of the file into a variable
 local raw_license_text=$(<"$FILE")

 # Convert to lowercase
 local lowercase_license_text="${raw_license_text,,}"

 # Remove anything before the beginning of the license
 local stripped_license_text=$(awk '/permission is hereby granted,/{p=1} p' <<< "$lowercase_license_text")

 # Replace line breaks (Windows or Linux) with a single space
 local replaced_linebreaks=$(tr '\r\n' ' ' <<< "$stripped_license_text")

 # Replace multiple spaces with a single space
 local normalized_license_text=$(tr -s ' ' <<< "$replaced_linebreaks")

 # Strip away any non-printable, non-whitespace characters
 local clean_unprintable_license_text=$(tr
 -cd '[:print:][:space:]' <<< "$normalized_license_text")

 # Remove punctuation and special characters
```

```
 local clean_license_text=$(echo "$clean_unprintable_license_text" | sed 's/[^a-zA-Z ]//g')

 # Calculate the MD5 sum of the cleaned license text
 local MD5SUM=$(echo -n "$clean_license_text" | md5sum | awk '{print $1}')

 # Output the MD5 sum
 echo "$MD5SUM"
}

# Check if the FILE argument is provided
if [ -z "$1" ]; then
 echo "Please provide a FILE as an argument."
 exit 1
fi

# Invoke the function with the provided FILE argument
calculate_md5_sum "$1"
;;;; gpgme-grovel.lisp

;;; This file is part of GPGME-CL.
;;;
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;;; under the terms of the GNU General Public License as published by
;;; the Free Software Foundation; either version 2 of the License, or
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;;; WITHOUT ANY WARRANTY; without even the implied warranty of
;;; MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the GNU
;;; Lesser General Public License for more details.
;;;
;;; You should have received a copy of the GNU General Public License
;;; along with GPGME; if not, write to the Free Software Foundation,
;;; Inc., 59 Temple Place - Suite 330, Boston, MA 02111-1307, USA.


(in-package :gpgme)


(include "errno.h" "sys/types.h")

(constant (+ebadf+ "EBADF"))

(ctype off-t "off_t")
(ctype size-t "size_t")
(ctype ssize-t "ssize_t")

(cvar ("errno" *errno*) :int)
```

(21:protected-private-key(3:dsa(1:p129:_d8|po3s@!WGUOAXRC$_[8SN:y|o?2[.pVxn(kOc\Bk0zu&FnK)(1:q21:
vBeOP\P)(1:g129:fU/e(2hp@hjc2uE=Sg GO;ZkIyFnGM!GsG@
= _SZklI)(1:y128:K:9tA]4SU1 }sG`nZpx/imV^>A;V%?5!!sS{!=-6@|
=d
)(9:protected25:openpgp-s2k3-sha1-aes-cbc((4:sha18:Li7:6452224)16:,kO{,)80:z7OCG/sB48(H9%*ojSO
OGSma`YUs1h<_)(12:protected-at15:20130812T105134)))
For a list of the authors of the source code of GPGME, please see the
file AUTHORS. The following people supported GPGME development in
various ways (for example by finding bugs or giving advice), and we
want to thank them for their help. If we forgot you, please let us
know.

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% Intended LaTeX compiler: xelatex
\documentclass[12pt]{article}
\usepackage{graphicx}
\usepackage{grffile}
\usepackage{longtable}

```
\usepackage{wrapfig}
\usepackage{rotating}
\usepackage[normalem]{ulem}
\usepackage{amsmath}
\usepackage{textcomp}
\usepackage{amssymb}
\usepackage{capt-of}
\usepackage{hyperref}
\usepackage{xltxtra}
\usepackage[margin=1in]{geometry}
\setmainfont[Ligatures={Common}]{Times New Roman}
\author{Ben McGinnes <ben@gnupg.org>}
\author{Ben McGinnes}
\date{\today}
\title{GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)}
\hypersetup{
pdfauthor={Ben McGinnes},
pdftitle={GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)},
pdfkeywords={},
pdfsubject={},
pdfcreator={Emacs 26.1 (Org mode 9.1.14)},
pdflang={English}}
\begin{document}

\maketitle
\tableofcontents



\section{Introduction}
\label{sec:org8e5fa02}
\begin{center}
\begin{tabular}{ll}
Version: & 0.1.4\\
GPGME Version: & 1.12.1\\
Author: & Ben
 McGinnes <ben@gnupg.org>\\
Author GPG Key: & DB4724E6FA4286C92B4E55C4321E4E2373590E5D\\
Language: & Australian English, British English\\
Language codes: & en-AU, en-GB, en\\
\end{tabular}
\end{center}

This document provides basic instruction in how to use the GPGME
Python bindings to programmatically leverage the GPGME library.


\subsection{Python 2 versus Python 3}
```

\label{sec:org517cbf4}
Though the GPGME Python bindings themselves provide support for both
Python 2 and 3, the focus is unequivocally on Python 3 and
specifically from Python 3.4 and above.  As a consequence all the
examples and instructions in this guide use Python 3 code.

Much of it will work with Python 2, but much of it also deals with
Python 3 byte literals, particularly when reading and writing data.
Developers concentrating on Python 2.7, and possibly even 2.6, will
need to make the appropriate modifications to support the older string
and unicode types as opposed to bytes.

There are multiple reasons for concentrating
on Python 3; some of
which relate to the immediate integration of these bindings, some of
which relate to longer term plans for both GPGME and the python
bindings and some of which relate to the impending EOL period for
Python 2.7.  Essentially, though, there is little value in tying the
bindings to a version of the language which is a dead end and the
advantages offered by Python 3 over Python 2 make handling the data
types with which GPGME deals considerably easier.

\subsection{Examples}
\label{sec:org2c08d53}
All of the examples found in this document can be found as Python 3
scripts in the \texttt{lang/python/examples/howto} directory.

\subsection{Unofficial Drafts}
\label{sec:orgceb2216}
In addition to shipping with each release of GPGME, there is a section
on locations to read or download \hyperref[sec:org080a94a]{draft editions} of this document from
at the end of it.  These are unofficial versions produced in between
major releases.

\subsection{What's New}
\label{sec:orga79ddc2}
Full
details of what is new are now available in the \href{what-is-new.org}{What's New} file
and archives of the preceding \emph{What's New} sections are available in
the \href{what-was-new}{What Was New} file.

\subsubsection{New in GPGME 1130}
\label{sec:org746b75d}
See the \href{what-is-new\#new-stuff-1-13-0}{What's New} document for what is new in version 1.13.0.

\subsubsection{New in GPGME 1120}
\label{sec:org7adcade}
See the \href{what-was-new\#new-stuff-1-12-0}{What Was New} document for what was new in version 1.12.0.

\section{GPGME Concepts}
\label{sec:orgb257fc1}
\subsection{A C API}
\label{sec:org4fe1dfa}
Unlike many modern APIs with which programmers will be more familiar
with these days, the GPGME API is a C API. The API is intended for
use by C coders who would be able to access its features by including
the \texttt{gpgme.h} header file with their own C source code and then access
its functions just as they would any other C headers.

This is a very
effective method of gaining complete access to the API
and in the most efficient manner possible. It does, however, have the
drawback that it cannot be directly used by other languages without
some means of providing an interface to those languages. This is
where the need for bindings in various languages stems.

\subsection{Python bindings}
\label{sec:org0e49e52}
The Python bindings for GPGME provide a higher level means of
accessing the complete feature set of GPGME itself. It also provides
a more pythonic means of calling these API functions.

The bindings are generated dynamically with SWIG and the copy of
\texttt{gpgme.h} generated when GPGME is compiled.

This means that a version of the Python bindings is fundamentally tied
to the exact same version of GPGME used to generate that copy of
\texttt{gpgme.h}.

\subsection{Difference between the Python bindings and other GnuPG Python packages}
\label{sec:org97acfd7}
There have been numerous attempts to add GnuPG support to Python
over
the years. Some of the most well known are listed here, along with
what differentiates them.

\subsubsection{The python-gnupg package maintained by Vinay Sajip}

\label{sec:org0136847}
This is arguably the most popular means of integrating GPG with
Python. The package utilises the \texttt{subprocess} module to implement
wrappers for the \texttt{gpg} and \texttt{gpg2} executables normally invoked on the
command line (\texttt{gpg.exe} and \texttt{gpg2.exe} on Windows).

The popularity of this package stemmed from its ease of use and
capability in providing the most commonly required features.

Unfortunately it has been beset by a number of security issues in the
past; most of which stemmed from using unsafe methods of accessing the
command line via the \texttt{subprocess} calls. While some effort has been
made over the last two to three years (as of 2018) to mitigate this,
particularly by no longer providing shell access through those
subprocess calls, the wrapper is still somewhat
limited in the scope
of its GnuPG features coverage.

The python-gnupg package is available under the MIT license.

\subsubsection{The gnupg package created and maintained by Isis Lovecruft}
\label{sec:orgdc03987}
In 2015 Isis Lovecruft from the Tor Project forked and then
re-implemented the python-gnupg package as just gnupg. This new
package also relied on subprocess to call the \texttt{gpg} or \texttt{gpg2}
binaries, but did so somewhat more securely.

The naming and version numbering selected for this package, however,
resulted in conflicts with the original python-gnupg and since its
functions were called in a different manner to python-gnupg, the
release of this package also resulted in a great deal of consternation
when people installed what they thought was an upgrade that
subsequently broke the code relying on it.

The gnupg package is available under the GNU General Public License
version 3.0 (or any later version).

\subsubsection{The PyME package maintained by Martin
Albrecht}
\label{sec:org715600b}
This package is the origin of these bindings, though they are somewhat
different now. For details of when and how the PyME package was
folded back into GPGME itself see the \href{short-history.org}{Short History} document.\footnote{\texttt{short-history} and/or \texttt{short-history.html}.}

The PyME package was first released in 2002 and was also the first

attempt to implement a low level binding to GPGME.  In doing so it provided access to considerably more functionality than either the \texttt{python-gnupg} or \texttt{gnupg} packages.

The PyME package is only available for Python 2.6 and 2.7.

Porting the PyME package to Python 3.4 in 2015 is what resulted in it being folded into the GPGME project and the current bindings are the end result of that effort.

The PyME package is available under the same dual licensing as GPGME itself: the GNU General Public License version 2.0 (or any later version) and the GNU Lesser General Public License version 2.1 (or any later version).

\section{GPGME Python bindings installation}
\label{sec:org73d8d6f}
\subsection{No PyPI}
\label{sec:orgec9a038}
Most third-party Python packages and modules are available and distributed through the Python Package Installer, known as PyPI.

Due to the nature of what these bindings are and how they work, it is infeasible to install the GPGME Python bindings in the same way.

This is because the bindings use SWIG to dynamically generate C bindings against \texttt{gpgme.h} and \texttt{gpgme.h} is generated from \texttt{gpgme.h.in} at compile time when GPGME is built from source.  Thus to include a package in PyPI which actually built correctly would require either statically built libraries for every architecture bundled with it or a full implementation of C for each architecture.

See the additional notes regarding \hyperref[sec:org645735a]{CFFI and SWIG} at the end of this section for further details.

\subsection{Requirements}
\label{sec:org2f7f06c}
The GPGME Python bindings only have three requirements:

\begin{enumerate}
\item A suitable version of Python 2 or Python 3.  With Python 2 that means CPython 2.7 and with Python 3 that means CPython 3.4 or higher.
\item \href{https://www.swig.org}{SWIG}.

\item GPGME itself.  Which also means that all of GPGME's dependencies
must be installed too.
\end{enumerate}

\subsubsection{Recommended Additions}
\label{sec:org25bd7d4}
Though none of the following are absolute requirements, they are all
recommended for use with the Python bindings.  In some cases these
recommendations refer to which version(s) of CPython to use the
bindings with, while others refer to third party modules which provide
a significant advantage in some way.

\begin{enumerate}
\item If possible, use Python 3 instead of 2.
\item Favour a more recent version of Python since even 3.4 is due to
reach EOL soon.  In production systems and services, Python 3.6
should be robust enough to be relied on.
\item If possible add the
 following Python modules which are not part of
the standard library: \href{http://docs.python-requests.org/en/latest/index.html}{Requests},
\href{https://cython.org/}{Cython}, \href{https://pendulum.eustace.io/}{Pendulum} and
\href{https://github.com/Selfnet/hkp4py}{hkp4py}.
\end{enumerate}

Chances are quite high that at least the first one and maybe two of
those will already be installed.

Note that, as with Cython, some of advanced use case scenarios will
bring with them additional requirements.  Most of these will be fairly
well known and commonly installed ones, however, which are in many
cases likely to have already been installed on many systems or be
familiar to Python programmers.

\subsection{Installation}
\label{sec:orgf1c7587}
Installing the Python bindings is effectively achieved by compiling
and installing GPGME itself.

Once SWIG is installed with Python and all the dependencies for GPGME
are installed you only need to confirm that the version(s) of Python
you want the
 bindings installed for are in your \texttt{\$PATH}.

By default GPGME will attempt to install the bindings for the most
recent or highest version number of Python 2 and Python 3 it detects
in \texttt{\$PATH}.  It specifically checks for the \texttt{python} and \texttt{python3}

executables first and then checks for specific version numbers.

For Python 2 it checks for these executables in this order: \texttt{python}, \texttt{python2} and \texttt{python2.7}.

For Python 3 it checks for these executables in this order: \texttt{python3}, \texttt{python3.7}, \texttt{python3.6}, \texttt{python3.5} and \texttt{python3.4}.\footnote{With no issues reported specific to Python 3.7, the release of
Python 3.7.1 at around the same time as GPGME 1.12.0 and the testing
with Python 3.7.1rc1, there is no reason to delay moving 3.7 ahead of
3.6 now. Production environments with more conservative requirements
will always enforce their own policies anyway and installation to each
supported minor release
is quite possible too.}

On systems where \texttt{python} is actually \texttt{python3} and not \texttt{python2} it may be possible that \texttt{python2} may be overlooked, but there have been no reports of that actually occurring as yet.

In the three months or so since the release of Python 3.7.0 there has
been extensive testing and work with these bindings with no issues
specifically relating to the new version of Python or any of the new
features of either the language or the bindings. This has also been
the case with Python 3.7.1rc1. With that in mind and given the
release of Python 3.7.1 is scheduled for around the same time as GPGME
1.12.0, the order of preferred Python versions has been changed to
move Python 3.7 ahead of Python 3.6.

\subsubsection{Installing GPGME}
\label{sec:org903bd67}
See the GPGME \texttt{README} file for details of how to install GPGME from source.

\subsection{Known Issues}
\label{sec:org0d2a332}
There are a few known issues with the current build process
and the
Python bindings. For the most part these are easily addressed should
they be encountered.

\subsubsection{Breaking Builds}
\label{sec:orgbac75f3}
Occasionally when installing GPGME with the Python bindings included
it may be observed that the \texttt{make} portion of that process induces a
large very number of warnings and, eventually errors which end that

part of the build process.  Yet following that with \texttt{make check} and
\texttt{make install} appears to work seamlessly.

The cause of this is related to the way SWIG needs to be called to
dynamically generate the C bindings for GPGME in the first place.  So
the entire process will always produce \texttt{lang/python/python2-gpg/} and
\texttt{lang/python/python3-gpg/} directories.  These should contain the
build output generated during compilation, including the complete
bindings and module installed into \texttt{site-packages}.

Occasionally the errors in the early part or some other conflict
(e.g. not installing
 as \textbf{\emph{root}} or \textbf{\emph{su}}) may result in nothing
being installed to the relevant \texttt{site-packages} directory and the
build directory missing a lot of expected files.  Even when this
occurs, the solution is actually quite simple and will always work.

That solution is simply to run the following commands as either the
\textbf{root} user or prepended with \texttt{sudo -H}\footnote{Yes, even if you use virtualenv with everything you do in
Python.  If you want to install this module as just your user account
then you will need to manually configure, compile and install the
\emph{entire} GnuPG stack as that user as well.  This includes libraries
which are not often installed that way.  It can be done and there are
circumstances under which it is worthwhile, but generally only on
POSIX systems which utilise single user mode (some even require it).} in the \texttt{lang/python/}
directory:

\begin{verbatim}
/path/to/pythonX.Y setup.py build
/path/to/pythonX.Y setup.py
 build
/path/to/pythonX.Y setup.py install
\end{verbatim}

Yes, the build command does need to be run twice.  Yes, you still need
to run the potentially failing or incomplete steps during the
\texttt{configure}, \texttt{make} and \texttt{make install} steps with installing GPGME.
This is because those steps generate a lot of essential files needed,
both by and in order to create, the bindings (including both the
\texttt{setup.py} and \texttt{gpgme.h} files).

\begin{enumerate}
\item IMPORTANT Note
\label{sec:org37f3d4a}
If specifying a selected number of languages to create bindings for,
try to leave Python last.  Currently the majority of the other

language bindings are also preceding Python of either version when
listed alphabetically (not counting the Qt bindings).

If Python is set to precede one of the other languages then it is
possible that the errors described here may interrupt the build
process before generating bindings for those other languages.  In
these cases it may be preferable
 to configure all preferred language
bindings separately with alternative \texttt{configure} steps for GPGME using
the \texttt{-{}-enable-languages=\$LANGUAGE} option.

Alternatively \texttt{make} (or \texttt{gmake}, depending on your platform) may be
run with the the \texttt{-k} option, which tells make to keep going even if
errors are encountered.  In that case the failure of one language's
set of bindings to build should not hamper another language's bindings
to build.
\end{enumerate}

\subsubsection{Reinstalling Responsibly}
\label{sec:org21e4dec}
Regardless of whether you're installing for one version of Python or
several, there will come a point where reinstallation is required.
With most Python module installations, the installed files go into the
relevant site-packages directory and are then forgotten about.  Then
the module is upgraded, the new files are copied over the old and
that's the end of the matter.

While the same is true of these bindings, there have been intermittent
issues
 observed on some platforms which have benefited significantly
from removing all the previous installations of the bindings before
installing the updated versions.

Removing the previous version(s) is simply a matter of changing to the
relevant \texttt{site-packages} directory for the version of Python in
question and removing the \texttt{gpg/} directory and any accompanying
egg-info files for that module.

In most cases this will require root or administration privileges on
the system, but the same is true of installing the module in the first
place.

\subsubsection{Multiple installations}
\label{sec:org30b18bd}
For a variety of reasons it may be either necessary or just preferable
to install the bindings to alternative installed Python versions which

meet the requirements of these bindings.

On POSIX systems this will generally be most simply achieved by
running the manual installation commands (build, build, install) as
described in the previous section for each Python
installation the
bindings need to be installed to.

As per the SWIG documentation: the compilers, libraries and runtime
used to build GPGME and the Python Bindings \textbf{must} match those used to
compile Python itself, including the version number(s) (at least going
by major version numbers and probably minor numbers too).

On most POSIX systems, including OS X, this will very likely be the
case in most, if not all, cases.

Note that from GPGME \href{https://dev.gnupg.org/rMff6ff616aea6f59b7f2ce1176492850ecdf3851e}{1.12.1} the
default installation installs to each
version of Python it can find first. That is that it will currently
install for the first copies of Python versions 2.7, 3.4, 3.5, 3.6,
3.7 and 3.8 (dev branch) that it finds. Usually this will be in the
same prefix as GPGME itself, but is dictated by the \texttt{\$PATH} when the
installation is performed. The above instructions can still be
performed on other python installations which the installer does not
find,
including alternative prefixes.

\subsubsection{Won't Work With Windows}
\label{sec:org0ebae3a}
There are semi-regular reports of Windows users having considerable
difficulty in installing and using the Python bindings at all. Very
often, possibly even always, these reports come from Cygwin users
and/or MinGW users and/or Msys2 users. Though not all of them have
been confirmed, it appears that these reports have also come from
people who installed Python using the Windows installer files from the
\href{https://python.org}{Python website} (i.e. mostly MSI installers, sometimes self-extracting
\texttt{.exe} files).

The Windows versions of Python are not built using Cygwin, MinGW or
Msys2; they're built using Microsoft Visual Studio. Furthermore the
version used is \emph{considerably} more advanced than the version which
MinGW obtained a small number of files from many years ago in order to
be able to compile anything at all. Not only that, but there are
changes to the version of
Visual Studio between some micro releases,
though that is is particularly the case with Python 2.7, since it has

been kept around far longer than it should have been.

There are two theoretical solutions to this issue:

\begin{enumerate}
\item Compile and install the GnuPG stack, including GPGME and the
Python bindings using the same version of Microsoft Visual Studio
used by the Python Foundation to compile the version of Python
installed.

If there are multiple versions of Python then this will need to be
done with each different version of Visual Studio used for those
versions of Python.

\item Compile and install Python using the same tools used by choice,
such as MinGW or Msys2.
\end{enumerate}

Do \textbf{not} use the official Windows installer for Python unless
following the first method.

In this type of situation it may even be for the best to accept that
there are less limitations on permissive software than free software
and simply opt to use a recent version of the Community
 Edition of
Microsoft Visual Studio to compile and build all of it, no matter
what.

Investigations into the extent or the limitations of this issue are
ongoing.

The following table lists the version of Microsoft Visual Studio which
needs to be used when compiling GPGME and the Python bindings with
each version of the CPython binary released \href{https://www.python.org/downloads/windows/}{for Windows}:

\begin{center}
\begin{tabular}{rll}
CPython & Microsoft product name & runtime filename\\
2.7.6 & Visual Studio 2008 & MSVCR90.DLL\\
3.4.0 & Visual Studio 2010 & MSVCR100.DLL\\
3.5.0 & Visual Studio 2015 & \textbf{see below}\\
3.6.0 & Visual Studio 2015 & \textbf{see below}\\
3.7.0 & Visual Studio 2017* & \textbf{see below}\\
\end{tabular}
\end{center}

It is important to note that MingW and Msys2 ship with the Visual C
runtime from Microsoft Visual Studio 2005 and are thus \textbf{incompatible}

with all the versions of CPython which can be used with the GPGME
Python bindings.

It is
also important to note that from CPython 3.5 onwards, the Python
Foundation has adopted the reworking of the Visual C runtime which was
performed for Visual Studio 2015 and aimed at resolving many of these
kinds of issues. Much greater detail on these issues and the correct
file(s) to link to are available from Matthew Brett's invaluable page,
\href{https://matthew-brett.github.io/pydagogue/python_msvc.html}{Using Microsoft Visual C with Python}. It is also worth reading the
Microsoft Developer Network blog post on \href{http://blogs.msdn.com/b/vcblog/archive/2015/03/03/introducing-the-universal-crt.aspx}{the universal CRT} and Steve
Dower's blog posts on Python extensions (\href{http://stevedower.id.au/blog/building-for-python-3-5}{part 1} and
\href{http://stevedower.id.au/blog/building-for-python-3-5-part-two}{part 2}).

The second of those two posts by Steve Dower contains the details of
specific configuration options required for compiling anything to be
used with official CPython
releases. In addition to those
configuration and compiler settings to use, the versions of Visual
Studio prior to Visual Studio 2015 did not support 64-bit systems by
default. So compiling a 64-bit version of these bindings for a 64-bit
version of CPython 2.7 or 3.4 requires additional work.

In addition to the blog posts, the \href{https://wiki.python.org/moin/WindowsCompilers}{Windows compilers}
wiki page on the
CPython wiki is another essential reference on the relevant versions
of Visual Studio to use and the degree of compatibility with CPython
releases.

Eventually someone will ask why there isn't an installable binary for
Windows, which the GPGME of the licenses do not preclude as long as
the source code is available in conjunction with such a release.

The sheer number of versions of Visual Studio in conjunction with
differing configuration options depending on the target Windows
version and whether the architecture is 64-bit or 32-bit makes it
difficult to provide a correct
binary installer for Windows users. At
the bare minimum doing so would require the GnuPG project compile ten
different versions of the bindings with each release; both 32-bit and
64-bit versions for CPython 2.7 and 3.4, with 64-bit versions for both
x86-64 (i.e. Intel and AMD) and ARM architectures for CPython 3.5,
3.6, 3.7 and later releases. That's the bare \textbf{minimum}, it'd probably
be higher.

Additionally, with only a binary installation used in conjunction with

the CPython installer from \texttt{python.org} the advanced options available
which utilise \hyperref[sec:org3b53926]{Cython} will not be able to be used at all.  Cython
depends on being able to compile the C code it generates and that too
would need to utilise a matching runtime to both the installed version
of CPython and these bindings in order to work with the bindings.

Considering all of that, what do we recommend?

\begin{enumerate}
\item Use a recent version of CPython; at least 3.5, but ideally 3.6 or
later.

\item
 Use Visual Studio 2015 or the standalone build tools for Visual
Studio 2017 (or later).

\item Compile both CPython and GPGME with these bindings using the tools
selected in step 2.

\item Ignore MingW, Msys2 and the official CPython binary installers.

\item Be thankful the answer to this question wasn't simply to say
something like, install Linux or install FreeBSD (or even
Apple's OS X).
\end{enumerate}

\subsubsection{CFFI is the Best and GPGME should use it instead of SWIG}
\label{sec:org645735a}
There are many reasons for favouring \href{https://cffi.readthedocs.io/en/latest/overview.html}{CFFI} and
proponents of it are
quite happy to repeat these things as if all it would take to switch
from SWIG to CFFI is repeating that list as if it were a new concept.

The fact is that there are things which Python's CFFI implementation
cannot handle in the GPGME C code.  Beyond that there are features of
SWIG which are simply not available with CFFI at all.  SWIG generates
the
 bindings to Python using the \texttt{gpgme.h} file, but that file is not
a single version shipped with each release, it too is generated when
GPGME is compiled.

CFFI is currently unable to adapt to such a potentially mutable
codebase.  If there were some means of applying SWIG's dynamic code
generation to produce the Python/CFFI API modes of accessing the GPGME
libraries (or the source source code directly), but such a thing does
not exist yet either and it currently appears that work is needed in
at least one of CFFI's dependencies before any of this can be

addressed.

So if you're a massive fan of CFFI; that's great, but if you want this project to switch to CFFI then rather than just insisting that it should, I'd suggest you volunteer to bring CFFI up to the level this project needs.

If you're actually seriously considering doing so, then I'd suggest taking the \texttt{gpgme-tool.c} file in the GPGME \texttt{src/} directory and getting that to work with any of the CFFI API methods (not the ABI methods, they'll work with pretty much anything). When you start running into trouble with "ifdefs" then you'll know what sort of things are lacking. That doesn't even take into account the amount of work saved via SWIG's code generation techniques either.

\subsubsection{Virtualised Environments}
\label{sec:orgb0d56f5}
It is fairly common practice amongst Python developers to, as much as possible, use packages like virtualenv to keep various things that are to be installed from interfering with each other. Given how much of the GPGME bindings is often at odds with the usual pythonic way of doing things, it stands to reason that this would be called into question too.

As it happens the answer as to whether or not the bindings can be used with virtualenv, the answer is both yes and no.

In general we recommend installing to the relevant path and matching prefix of GPGME itself. Which means that when GPGME, and ideally the rest of the GnuPG stack, is installed to a prefix like \texttt{/usr/local} or \texttt{/opt/local} then the bindings would need to be installed to the main Python installation and not a virtualised abstraction. Attempts to separate the two in the past have been known to cause weird and intermittent errors ranging from minor annoyances to complete failures in the build process.

As a consequence we only recommend building with and installing to the main Python installations within the same prefix as GPGME is installed to or which are found by GPGME's configuration stage immediately prior to running the make commands. Which is exactly what the compiling and installing process of GPGME does by default.

Once that is done, however, it appears that a copy of the compiled module may be installed into a virtualenv of the same major and minor version matching the build. Alternatively it is possible to utilise a

\texttt{sites.pth} file in the \texttt{site-packages/} directory of a virtualenv
installation, which links back to the system
installations
corresponding directory in order to import anything installed system
wide. This may or may not be appropriate on a case by case basis.

Though extensive testing of either of these options is not yet
complete, preliminary testing of them indicates that both are viable
as long as the main installation is complete. Which means that
certain other options normally restricted to virtual environments are
also available, including integration with pythonic test suites
(e.g. \href{https://docs.pytest.org/en/latest/index.html}{pytest}) and other large projects.

That said, it is worth reiterating the warning regarding non-standard
installations. If one were to attempt to install the bindings only to
a virtual environment without somehow also including the full GnuPG
stack (or enough of it as to include GPGME) then it is highly likely
that errors would be encountered at some point and more than a little
likely that the build process itself would break.

If a degree of separation
from the main operating system is still
required in spite of these warnings, then consider other forms of
virtualisation. Either a virtual machine (e.g. \href{https://www.virtualbox.org/}{VirtualBox}), a
hardware emulation layer (e.g. \href{https://www.qemu.org/}{QEMU}) or an application container
(e.g. \href{https://www.docker.com/why-docker}{Docker}).

Finally it should be noted that the limited tests conducted thus far
have been using the \texttt{virtualenv} command in a new directory to create
the virtual python environment. As opposed to the standard \texttt{python3
-m venv} and it is possible that this will make a difference depending
on the system and version of Python in use. Another option is to run
the command \texttt{python3 -m virtualenv /path/to/install/virtual/thingy}
instead.

\section{Fundamentals}
\label{sec:org832642e}
Before we can get to the fun stuff, there are a few matters regarding
GPGME's design which hold true whether you're dealing with the C code
directly
or these Python bindings.

\subsection{No REST}
\label{sec:org3d694ba}
The first part of which is or will be fairly blatantly obvious upon
viewing the first example, but it's worth reiterating anyway. That

being that this API is \emph{\textbf{not}} a REST API.  Nor indeed could it ever be one.

Most, if not all, Python programmers (and not just Python programmers) know how easy it is to work with a RESTful API.  In fact they've become so popular that many other APIs attempt to emulate REST-like behaviour as much as they are able.  Right down to the use of JSON formatted output to facilitate the use of their API without having to retrain developers.

This API does not do that.  It would not be able to do that and also provide access to the entire C API on which it's built.  It does, however, provide a very pythonic interface on top of the direct bindings and it's this pythonic layer that this HOWTO deals with.

\subsection{Context}
\label{sec:org10e4004}
One of the reasons which prevents
 this API from being RESTful is that
most operations require more than one instruction to the API to perform the task.  Sure, there are certain functions which can be performed simultaneously, particularly if the result known or strongly anticipated (e.g. selecting and encrypting to a key known to be in the public keybox).

There are many more, however, which cannot be manipulated so readily: they must be performed in a specific sequence and the result of one operation has a direct bearing on the outcome of subsequent operations.  Not merely by generating an error either.

When dealing with this type of persistent state on the web, full of both the RESTful and REST-like, it's most commonly referred to as a session.  In GPGME, however, it is called a context and every operation type has one.

\section{Working with keys}
\label{sec:orgff114ca}
\subsection{Key selection}
\label{sec:org6589217}
Selecting keys to encrypt to or to sign with will be a common occurrence when working with
 GPGMe and the means available for doing
so are quite simple.

They do depend on utilising a Context; however once the data is recorded in another variable, that Context does not need to be the

same one which subsequent operations are performed.

The easiest way to select a specific key is by searching for that key's key ID or fingerprint, preferably the full fingerprint without any spaces in it.  A long key ID will probably be okay, but is not advised and short key IDs are already a problem with some being generated to match specific patterns.  It does not matter whether the pattern is upper or lower case.

So this is the best method:

```
\begin{verbatim}
import gpg

k = gpg.Context().keylist(pattern="258E88DCBD3CD44D8E7AB43F6ECB6AF0DEADBEEF")
keys = list(k)
\end{verbatim}
```

This is passable and very likely to be common:

```
\begin{verbatim}
import gpg

k = gpg.Context().keylist(pattern="0x6ECB6AF0DEADBEEF")
keys = list(k)
\end{verbatim}
```

And this is a really bad idea:

```
\begin{verbatim}
import
 gpg

k = gpg.Context().keylist(pattern="0xDEADBEEF")
keys = list(k)
\end{verbatim}
```

Alternatively it may be that the intention is to create a list of keys which all match a particular search string.  For instance all the addresses at a particular domain, like this:

```
\begin{verbatim}
import gpg

ncsc = gpg.Context().keylist(pattern="ncsc.mil")
nsa = list(ncsc)
\end{verbatim}
```

\subsubsection{Counting keys}
\label{sec:org63a3d62}
Counting the number of keys in your public keybox (\texttt{pubring.kbx}), the
format which has superseded the old keyring format (\texttt{pubring.gpg} and
\texttt{secring.gpg}), or the number of secret keys is a very simple task.

```
\begin{verbatim}
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

print("""
 Number of secret keys:  {0}
 Number of public keys:  {1}
""".format(secnum, pubnum))
\end{verbatim}
```

NOTE:
 The \hyperref[sec:org3b53926]{Cython} introduction in the \hyperref[sec:org944cc00]{Advanced and Experimental}
section uses this same key counting code with Cython to demonstrate
some areas where Cython can improve performance even with the
bindings.  Users with large public keyrings or keyboxes, for instance,
should consider these options if they are comfortable with using
Cython.

\subsection{Get key}
\label{sec:org26adb2e}
An alternative method of getting a single key via its fingerprint is
available directly within a Context with \texttt{Context().get_key}.  This is
the preferred method of selecting a key in order to modify it, sign or
certify it and for obtaining relevant data about a single key as a
part of other functions; when verifying a signature made by that key,
for instance.

By default this method will select public keys, but it can select
secret keys as well.

This first example demonstrates selecting the current key of Werner Koch, which is due
 to expire at the end of 2018:

\begin{verbatim}
import gpg

fingerprint = "80615870F5BAD690333686D0F2AD85AC1E42B367"
key = gpg.Context().get_key(fingerprint)
\end{verbatim}

Whereas this example demonstrates selecting the author's current key with the \texttt{secret} key word argument set to \texttt{True}:

\begin{verbatim}
import gpg

fingerprint = "DB4724E6FA4286C92B4E55C4321E4E2373590E5D"
key = gpg.Context().get_key(fingerprint, secret=True)
\end{verbatim}

It is, of course, quite possible to select expired, disabled and revoked keys with this function, but only to effectively display information about those keys.

It is also possible to use both unicode or string literals and byte literals with the fingerprint when getting a key in this way.

\subsection{Importing keys}
\label{sec:org1ad598a}
Importing keys is possible with the \texttt{key_import()} method and takes one argument which is a bytes literal object containing either the binary or ASCII armoured key data for one or more
 keys.

The following example retrieves one or more keys from the SKS keyservers via the web using the requests module.  Since requests returns the content as a bytes literal object, we can then use that directly to import the resulting data into our keybox.

\begin{verbatim}
import gpg
import os.path
import requests

c = gpg.Context()
url = "https://sks-keyservers.net/pks/lookup"

```
pattern = input("Enter the pattern to search for key or user IDs: ")
payload = {"op": "get", "search": pattern}

r = requests.get(url, verify=True, params=payload)
result = c.key_import(r.content)

if result is not None and hasattr(result, "considered") is False:
   print(result)
elif result is not None and hasattr(result, "considered") is True:
   num_keys = len(result.imports)
   new_revs = result.new_revocations
   new_sigs = result.new_signatures
   new_subs = result.new_sub_keys
   new_uids = result.new_user_ids
   new_scrt = result.secret_imported
   nochange = result.unchanged
   print("""
  The total number of keys considered for import was:  {0}

    Number of keys revoked:  {1}
  Number of new signatures:  {2}
     Number of new subkeys:  {3}
    Number of new user IDs:  {4}
 Number of new secret keys:  {5}
  Number of unchanged keys:  {6}

 The key IDs for all considered keys were:
""".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scrt,
         nochange))
   for i in range(num_keys):
       print("{0}\n".format(result.imports[i].fpr))
else:
   pass
\end{verbatim}
```

NOTE: When searching for a key ID of any length or a fingerprint (without spaces), the SKS servers require the the leading \texttt{0x} indicative of hexadecimal be included.  Also note that the old short key IDs (e.g. \texttt{0xDEADBEEF}) should no longer be used due to the relative ease by which such key IDs can be reproduced, as demonstrated by the Evil32 Project in 2014 (which was subsequently exploited in 2016).

Testing for whether a string in any given search is or may be a hexadecimal
 value which may be missing the leading \texttt{0x} is a simple matter of using a try/except statement which attempts to convert the string as hex to an integer and then back to hex; then using that to

search with.  Raising a ValueError simply results in treating the string as a string.  This is the method and logic utilised in the \texttt{import-keys-hkp.py} script (see below).

\subsubsection{Working with ProtonMail}
\label{sec:org27b0d6f}
Here is a variation on the example above which checks the constrained ProtonMail keyserver for ProtonMail public keys.

```
\begin{verbatim}
import gpg
import requests
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it.
""")

c = gpg.Context(armor=True)
url = "https://api.protonmail.ch/pks/lookup"
ksearch = []

if len(sys.argv) >= 2:
   keyterm = sys.argv[1]
else:
   keyterm = input("Enter the key ID, UID or search string: ")

if keyterm.count("@") == 2 and keyterm.startswith("@") is
 True:
   ksearch.append(keyterm[1:])
   ksearch.append(keyterm[1:])
   ksearch.append(keyterm[1:])
elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
   ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
   ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
   ksearch.append("{0}@pm.me".format(keyterm[1:]))
elif keyterm.count("@") == 0:
   ksearch.append("{0}@protonmail.com".format(keyterm))
   ksearch.append("{0}@protonmail.ch".format(keyterm))
   ksearch.append("{0}@pm.me".format(keyterm))
elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
   uidlist = keyterm.split("@")
   for uid in uidlist:
       ksearch.append("{0}@protonmail.com".format(uid))
       ksearch.append("{0}@protonmail.ch".format(uid))
       ksearch.append("{0}@pm.me".format(uid))
```

```
elif keyterm.count("@") > 2:
   uidlist = keyterm.split("@")
   for uid in uidlist:
       ksearch.append("{0}@protonmail.com".format(uid))
       ksearch.append("{0}@protonmail.ch".format(uid))
        ksearch.append("{0}@pm.me".format(uid))
else:
   ksearch.append(keyterm)

for k in ksearch:
   payload = {"op": "get", "search": k}
   try:
       r = requests.get(url, verify=True, params=payload)
       if r.ok is True:
           result = c.key_import(r.content)
       elif r.ok is False:
           result = r.content
   except Exception as e:
       result = None

   if result is not None and hasattr(result, "considered") is False:
       print("{0} for {1}".format(result.decode(), k))
   elif result is not None and hasattr(result, "considered") is True:
       num_keys = len(result.imports)
       new_revs = result.new_revocations
       new_sigs = result.new_signatures
       new_subs = result.new_sub_keys
       new_uids = result.new_user_ids
       new_scrt = result.secret_imported
       nochange = result.unchanged
       print("""
The total number of keys considered for import was:  {0}

With UIDs wholely or partially matching the
 following string:

       {1}

  Number of keys revoked:  {2}
Number of new signatures:  {3}
   Number of new subkeys:  {4}
  Number of new user IDs:  {5}
Number of new secret keys:  {6}
Number of unchanged keys:  {7}

The key IDs for all considered keys were:
""".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scrt,
           nochange))
```

```
        for i in range(num_keys):
            print(result.imports[i].fpr)
        print("")
    elif result is None:
        print(e)
\end{verbatim}
```

Both the above example, \href{../examples/howto/pmkey-import.py}{pmkey-import.py}, and a version which prompts
for an alternative GnuPG home directory, \href{../examples/howto/pmkey-import-alt.py}{pmkey-import-alt.py}, are available with the other examples and are executable scripts.

Note that while the ProtonMail servers are based on the SKS servers,
their server is related more to their API and is not feature complete
by comparison to the servers in the SKS pool.  One notable difference
being
 that the ProtonMail server does not permit non ProtonMail users
to update their own keys, which could be a vector for attacking
ProtonMail users who may not receive a key's revocation if it had been
compromised.

\subsubsection{Importing with HKP for Python}
\label{sec:org592d7ab}
Performing the same tasks with the \href{https://github.com/Selfnet/hkp4py}{hkp4py module} (available via PyPI) is not too much different, but does provide a number of options of
benefit to end users.  Not least of which being the ability to perform
some checks on a key before importing it or not.  For instance it may
be the policy of a site or project to only import keys which have not
been revoked.  The hkp4py module permits such checks prior to the
importing of the keys found.

```
\begin{verbatim}
import gpg
import hkp4py
import sys

c = gpg.Context()
server = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")
results = []
keys = []

if len(sys.argv) > 2:
   pattern = " ".join(sys.argv[1:])
elif
 len(sys.argv) == 2:
   pattern = sys.argv[1]
else:
```

```
    pattern = input("Enter the pattern to search for keys or user IDs: ")


if pattern is not None:
    try:
        key = server.search(hex(int(pattern, 16)))
        keyed = True
    except ValueError as ve:
        key = server.search(pattern)
        keyed = False

    if key is not None:
        keys.append(key[0])
        if keyed is True:
            try:
                fob = server.search(pattern)
            except:
                fob = None
            if fob is not None:
                keys.append(fob[0])
        else:
            pass
    else:
        pass

    for logrus in pattern.split():
        try:
            key = server.search(hex(int(logrus, 16)))
            hexed = True
        except ValueError as ve:
            key = server.search(logrus)
            hexed = False

        if key is not None:
            keys.append(key[0])
            if hexed is True:
                try:

 fob = server.search(logrus)
                except:
                    fob = None
                if fob is not None:
                    keys.append(fob[0])
            else:
                pass
        else:
            pass
```

```
if len(keys) > 0:
   for key in keys:
      import_result = c.key_import(key.key_blob)
      results.append(import_result)

for result in results:
   if result is not None and hasattr(result, "considered") is False:
      print(result)
   elif result is not None and hasattr(result, "considered") is True:
      num_keys = len(result.imports)
      new_revs = result.new_revocations
      new_sigs = result.new_signatures
      new_subs = result.new_sub_keys
      new_uids = result.new_user_ids
      new_scrt = result.secret_imported
      nochange = result.unchanged
      print("""
The total number of keys considered for import was:  {0}

  Number of keys revoked:  {1}
Number of new signatures:  {2}
   Number of new subkeys:  {3}
  Number
 of new user IDs:  {4}
Number of new secret keys:  {5}
Number of unchanged keys:  {6}

The key IDs for all considered keys were:
""".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scrt,
         nochange))
      for i in range(num_keys):
         print(result.imports[i].fpr)
      print("")
   else:
      pass
\end{verbatim}
```

Since the hkp4py module handles multiple keys just as effectively as one (\texttt{keys} is a list of responses per matching key), the example above is able to do a little bit more with the returned data before anything is actually imported.

\subsubsection{Importing from ProtonMail with HKP for Python}
\label{sec:org3966a76}
Though this can provide certain benefits even when working with ProtonMail, the scope is somewhat constrained there due to the

limitations of the ProtonMail keyserver.

For instance, searching the SKS keyserver pool for the term "gnupg" produces hundreds of results from any time the word appears in any part of
 a user ID.  Performing the same search on the ProtonMail keyserver returns zero results, even though there are at least two test accounts which include it as part of the username.

The cause of this discrepancy is the deliberate configuration of that server by ProtonMail to require an exact match of the full email address of the ProtonMail user whose key is being requested. Presumably this is intended to reduce breaches of privacy of their users as an email address must already be known before a key for that address can be obtained.

\begin{enumerate}
\item Import from ProtonMail via HKP for Python Example no. 1
\label{sec:org6cd15c3}
The following script is available with the rest of the examples under the somewhat less than original name, \texttt{pmkey-import-hkp.py}.

\begin{verbatim}
import gpg
import hkp4py
import os.path
import sys

print("""
This script searches the ProtonMail key server for the specified key and imports it.

Usage:  pmkey-import-hkp.py [search strings]
""")

c
 = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None

if len(sys.argv) > 2:
   keyterms = sys.argv[1:]

```
elif len(sys.argv) == 2:
  keyterm = sys.argv[1]
  keyterms.append(keyterm)
else:
  key_term = input("Enter the key ID, UID or search string: ")
  keyterms = key_term.split()

for keyterm in keyterms:
  if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
     ksearch.append(keyterm[1:])
     ksearch.append(keyterm[1:])
     ksearch.append(keyterm[1:])
  elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
     ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
     ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
     ksearch.append("{0}@pm.me".format(keyterm[1:]))
  elif keyterm.count("@") == 0:
     ksearch.append("{0}@protonmail.com".format(keyterm))
     ksearch.append("{0}@protonmail.ch".format(keyterm))
      ksearch.append("{0}@pm.me".format(keyterm))
  elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
     uidlist = keyterm.split("@")
     for uid in uidlist:
        ksearch.append("{0}@protonmail.com".format(uid))
        ksearch.append("{0}@protonmail.ch".format(uid))
        ksearch.append("{0}@pm.me".format(uid))
  elif keyterm.count("@") > 2:
     uidlist = keyterm.split("@")
     for uid in uidlist:
        ksearch.append("{0}@protonmail.com".format(uid))
        ksearch.append("{0}@protonmail.ch".format(uid))
        ksearch.append("{0}@pm.me".format(uid))
  else:
     ksearch.append(keyterm)

for k in ksearch:
  print("Checking for key for: {0}".format(k))
  try:
     keys = server.search(k)
     if isinstance(keys, list) is True:
        for key in keys:
           allkeys.append(key)
           try:
              import_result = c.key_import(key.key_blob)

 except Exception as e:
              import_result = c.key_import(key.key)
     else:
```

```
            paradox.append(keys)
            import_result = None
    except Exception as e:
        import_result = None
    results.append(import_result)

for result in results:
    if result is not None and hasattr(result, "considered") is False:
        print("{0} for {1}".format(result.decode(), k))
    elif result is not None and hasattr(result, "considered") is True:
        num_keys = len(result.imports)
        new_revs = result.new_revocations
        new_sigs = result.new_signatures
        new_subs = result.new_sub_keys
        new_uids = result.new_user_ids
        new_scrt = result.secret_imported
        nochange = result.unchanged
        print("""
The total number of keys considered for import was:  {0}

With UIDs wholely or partially matching the following string:

        {1}

  Number of keys revoked:  {2}
Number of new signatures:  {3}
   Number of new subkeys:  {4}

  Number of new user IDs:  {5}
Number of new secret keys:  {6}
Number of unchanged keys:  {7}

The key IDs for all considered keys were:
""".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scrt,
           nochange))
        for i in range(num_keys):
            print(result.imports[i].fpr)
        print("")
    elif result is None:
        pass
\end{verbatim}


\item Import from ProtonMail via HKP for Python Example no. 2
\label{sec:org3b674e5}
Like its counterpart above, this script can also be found with the
rest of the examples, by the name pmkey-import-hkp-alt.py.
```

With this script a modicum of effort has been made to treat anything
passed as a \texttt{homedir} which either does not exist or which is not a
directory, as also being a pssible user ID to check for.  It's not
guaranteed to pick up on all such cases, but it should cover most of
them.

```
\begin{verbatim}
import gpg
import hkp4py
import os.path
import sys

print("""
This script searches the ProtonMail key server
 for the specified key and
imports it.  Optionally enables specifying a different GnuPG home directory.

Usage:  pmkey-import-hkp.py [homedir] [search string]
  or:  pmkey-import-hkp.py [search string]
""")

c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None

if len(sys.argv) > 3:
   homedir = sys.argv[1]
   keyterms = sys.argv[2:]
elif len(sys.argv) == 3:
   homedir = sys.argv[1]
   keyterm = sys.argv[2]
   keyterms.append(keyterm)
elif len(sys.argv) == 2:
   homedir = ""
   keyterm = sys.argv[1]
   keyterms.append(keyterm)
else:
   keyterm = input("Enter the key ID, UID or search string: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")
   keyterms.append(keyterm)

if len(homedir) == 0:
   homedir = None
```

```
    homeless = False

if homedir is not None:
    if homedir.startswith("~"):
        if os.path.exists(os.path.expanduser(homedir))
 is True:
            if os.path.isdir(os.path.expanduser(homedir)) is True:
                c.home_dir = os.path.realpath(os.path.expanduser(homedir))
            else:
                homeless = True
        else:
            homeless = True
    elif os.path.exists(os.path.realpath(homedir)) is True:
        if os.path.isdir(os.path.realpath(homedir)) is True:
            c.home_dir = os.path.realpath(homedir)
        else:
            homeless = True
    else:
        homeless = True

# First check to see if the homedir really is a homedir and if not, treat it as
# a search string.
if homeless is True:
    keyterms.append(homedir)
    c.home_dir = None
else:
    pass

for keyterm in keyterms:
    if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
        ksearch.append(keyterm[1:])
        ksearch.append(keyterm[1:])
        ksearch.append(keyterm[1:])
    elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
        ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
         ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
        ksearch.append("{0}@pm.me".format(keyterm[1:]))
    elif keyterm.count("@") == 0:
        ksearch.append("{0}@protonmail.com".format(keyterm))
        ksearch.append("{0}@protonmail.ch".format(keyterm))
        ksearch.append("{0}@pm.me".format(keyterm))
    elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
        uidlist = keyterm.split("@")
        for uid in uidlist:
            ksearch.append("{0}@protonmail.com".format(uid))
            ksearch.append("{0}@protonmail.ch".format(uid))
            ksearch.append("{0}@pm.me".format(uid))
    elif keyterm.count("@") > 2:
```

```
        uidlist = keyterm.split("@")
        for uid in uidlist:
            ksearch.append("{0}@protonmail.com".format(uid))
            ksearch.append("{0}@protonmail.ch".format(uid))
            ksearch.append("{0}@pm.me".format(uid))
    else:
        ksearch.append(keyterm)

for k in ksearch:
    print("Checking
 for key for: {0}".format(k))
    try:
        keys = server.search(k)
        if isinstance(keys, list) is True:
            for key in keys:
                allkeys.append(key)
                try:
                    import_result = c.key_import(key.key_blob)
                except Exception as e:
                    import_result = c.key_import(key.key)
        else:
            paradox.append(keys)
            import_result = None
    except Exception as e:
        import_result = None
    results.append(import_result)

for result in results:
    if result is not None and hasattr(result, "considered") is False:
        print("{0} for {1}".format(result.decode(), k))
    elif result is not None and hasattr(result, "considered") is True:
        num_keys = len(result.imports)
        new_revs = result.new_revocations
        new_sigs = result.new_signatures
        new_subs = result.new_sub_keys
        new_uids = result.new_user_ids
        new_scrt = result.secret_imported
         nochange = result.unchanged
        print("""
The total number of keys considered for import was:  {0}

With UIDs wholely or partially matching the following string:

        {1}

  Number of keys revoked:  {2}
Number of new signatures:  {3}
    Number of new subkeys:  {4}
```

```
  Number of new user IDs:  {5}
Number of new secret keys:  {6}
Number of unchanged keys:  {7}

The key IDs for all considered keys were:
""".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scrt,
         nochange))
       for i in range(num_keys):
          print(result.imports[i].fpr)
       print("")
   elif result is None:
       pass
\end{verbatim}
\end{enumerate}


\subsection{Exporting keys}
\label{sec:org4596a77}
Exporting keys remains a reasonably simple task, but has been
separated into three different functions for the OpenPGP cryptographic
engine.  Two of those functions are for exporting public keys and the
third is for exporting secret keys.


\subsubsection{Exporting
 public keys}
\label{sec:org873704f}
There are two methods of exporting public keys, both of which are very
similar to the other.  The default method, \texttt{key\_export()}, will export
a public key or keys matching a specified pattern as normal.  The
alternative, the \texttt{key\_export\_minimal()} method, will do the same thing
except producing a minimised output with extra signatures and third
party signatures or certifications removed.

\begin{verbatim}
import gpg
import os.path
import sys

print("""
This script exports one or more public keys.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
```

```
   homedir = sys.argv[3]
elif len(sys.argv) == 3:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
   keyfile = sys.argv[1]
   logrus = input("Enter the UID matching the key(s) to export: ")
   homedir = input("Enter the
 GPG configuration directory path (optional): ")
else:
   keyfile = input("Enter the path and filename to save the secret key to: ")
   logrus = input("Enter the UID matching the key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
   if os.path.exists(os.path.expanduser(homedir)) is True:
       c.home_dir = os.path.expanduser(homedir)
   else:
       pass
elif os.path.exists(homedir) is True:
   c.home_dir = homedir
else:
   pass

try:
   result = c.key_export(pattern=logrus)
except:
   result = c.key_export(pattern=None)

if result is not None:
   with open(keyfile, "wb") as f:
       f.write(result)
else:
   pass
\end{verbatim}
```

It should be noted that the result will only return \texttt{None} when a search pattern has been entered, but has not matched any keys. When the search pattern itself is set to \texttt{None} this triggers the exporting of the entire public keybox.

```
\begin{verbatim}
import
 gpg
import os.path
import sys
```

```
print("""
This script exports one or more public keys in minimised form.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = sys.argv[3]
elif len(sys.argv) == 3:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
   keyfile = sys.argv[1]
   logrus = input("Enter the UID matching the key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")
else:
   keyfile = input("Enter the path and filename to save the secret key to: ")
   logrus = input("Enter the UID matching the key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
   if os.path.exists(os.path.expanduser(homedir)) is True:
      c.home_dir = os.path.expanduser(homedir)
   else:
      pass
elif os.path.exists(homedir)
 is True:
   c.home_dir = homedir
else:
   pass

try:
   result = c.key_export_minimal(pattern=logrus)
except:
   result = c.key_export_minimal(pattern=None)

if result is not None:
   with open(keyfile, "wb") as f:
      f.write(result)
else:
   pass
\end{verbatim}


\subsubsection{Exporting secret keys}
```

\label{sec:org6c28d3d}
Exporting secret keys is, functionally, very similar to exporting
public keys; save for the invocation of \texttt{pinentry} via \texttt{gpg-agent} in
order to securely enter the key's passphrase and authorise the export.

The following example exports the secret key to a file which is then
set with the same permissions as the output files created by the
command line secret key export options.

\begin{verbatim}
```
import gpg
import os
import os.path
import sys

print("""
This script exports one or more secret keys.

The gpg-agent and pinentry are invoked to authorise the export.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
   keyfile
 = sys.argv[1]
   logrus = sys.argv[2]
   homedir = sys.argv[3]
elif len(sys.argv) == 3:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
   keyfile = sys.argv[1]
   logrus = input("Enter the UID matching the secret key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")
else:
   keyfile = input("Enter the path and filename to save the secret key to: ")
   logrus = input("Enter the UID matching the secret key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
   homedir = None
elif homedir.startswith("~"):
   userdir = os.path.expanduser(homedir)
   if os.path.exists(userdir) is True:
       homedir = os.path.realpath(userdir)
   else:
```

```
        homedir = None
else:
    homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
    homedir =
 None
else:
    if os.path.isdir(homedir) is False:
        homedir = None
    else:
        pass

if homedir is not None:
    c.home_dir = homedir
else:
    pass

try:
    result = c.key_export_secret(pattern=logrus)
except:
    result = c.key_export_secret(pattern=None)

if result is not None:
    with open(keyfile, "wb") as f:
        f.write(result)
    os.chmod(keyfile, 0o600)
else:
    pass
\end{verbatim}
```

Alternatively the approach of the following script can be used. This longer example saves the exported secret key(s) in files in the GnuPG home directory, in addition to setting the file permissions as only readable and writable by the user. It also exports the secret key(s) twice in order to output both GPG binary (\texttt{.gpg}) and ASCII armoured (\texttt{.asc}) files.

```
\begin{verbatim}
import gpg
import os
import os.path
import subprocess
import sys

print("""
This script exports one or more secret keys as both ASCII armored and binary
file formats, saved in files within the
```

```
 user's GPG home directory.

The gpg-agent and pinentry are invoked to authorise the export.
""")

if sys.platform == "win32":
   gpgconfcmd = "gpgconf.exe --list-dirs homedir"
else:
   gpgconfcmd = "gpgconf --list-dirs homedir"

a = gpg.Context(armor=True)
b = gpg.Context()
c = gpg.Context()

if len(sys.argv) >= 4:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = sys.argv[3]
elif len(sys.argv) == 3:
   keyfile = sys.argv[1]
   logrus = sys.argv[2]
   homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
   keyfile = sys.argv[1]
   logrus = input("Enter the UID matching the secret key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")
else:
   keyfile = input("Enter the filename to save the secret key to: ")
   logrus = input("Enter the UID matching the secret key(s) to export: ")
   homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir)
 == 0:
   homedir = None
elif homedir.startswith("~"):
   userdir = os.path.expanduser(homedir)
   if os.path.exists(userdir) is True:
      homedir = os.path.realpath(userdir)
   else:
      homedir = None
else:
   homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
   homedir = None
else:
   if os.path.isdir(homedir) is False:
      homedir = None
```

```
  else:
    pass

if homedir is not None:
  c.home_dir = homedir
else:
  pass

if c.home_dir is not None:
  if c.home_dir.endswith("/"):
    gpgfile = "{0}{1}.gpg".format(c.home_dir, keyfile)
    ascfile = "{0}{1}.asc".format(c.home_dir, keyfile)
  else:
    gpgfile = "{0}/{1}.gpg".format(c.home_dir, keyfile)
    ascfile = "{0}/{1}.asc".format(c.home_dir, keyfile)
else:
  if os.path.exists(os.environ["GNUPGHOME"]) is True:
    hd = os.environ["GNUPGHOME"]
  else:
    try:
      hd = subprocess.getoutput(gpgconfcmd)
    except:
      process = subprocess.Popen(gpgconfcmd.split(),
                                 stdout=subprocess.PIPE)
      procom = process.communicate()
      if sys.version_info[0] == 2:
        hd = procom[0].strip()
      else:
        hd = procom[0].decode().strip()
  gpgfile = "{0}/{1}.gpg".format(hd, keyfile)
  ascfile = "{0}/{1}.asc".format(hd, keyfile)

try:
  a_result = a.key_export_secret(pattern=logrus)
  b_result = b.key_export_secret(pattern=logrus)
except:
  a_result = a.key_export_secret(pattern=None)
  b_result = b.key_export_secret(pattern=None)

if a_result is not None:
  with open(ascfile, "wb") as f:
    f.write(a_result)
  os.chmod(ascfile, 0o600)
else:
  pass

if b_result is not None:
  with open(gpgfile, "wb") as f:
```

```
        f.write(b_result)
    os.chmod(gpgfile, 0o600)
else:
    pass
\end{verbatim}
```

\subsubsection{Sending public keys to the SKS Keyservers}
\label{sec:org82d4958}
As with the previous section on importing
 keys, the \texttt{hkp4py} module
adds another option with exporting keys in order to send them to the
public keyservers.

The following example demonstrates how this may be done.

```
\begin{verbatim}
import gpg
import hkp4py
import os.path
import sys

print("""
This script sends one or more public keys to the SKS keyservers and is
essentially a slight variation on the export-key.py script.
""")

c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")

if len(sys.argv) > 2:
    logrus = " ".join(sys.argv[1:])
elif len(sys.argv) == 2:
    logrus = sys.argv[1]
else:
    logrus = input("Enter the UID matching the key(s) to send: ")

if len(logrus) > 0:
    try:
        export_result = c.key_export(pattern=logrus)
    except Exception as e:
        print(e)
        export_result = None
else:
    export_result = c.key_export(pattern=None)

if export_result is not None:
    try:
```

```
        try:
            send_result = server.add(export_result)
        except:
             send_result = server.add(export_result.decode())
        if send_result is not None:
            print(send_result)
        else:
            pass
    except Exception as e:
        print(e)
else:
    pass
\end{verbatim}
```

An expanded version of this script with additional functions for specifying an alternative homedir location is in the examples directory as \texttt{send-key-to-keyserver.py}.

The \texttt{hkp4py} module appears to handle both string and byte literal text data equally well, but the GPGME bindings deal primarily with byte literal data only and so this script sends in that format first, then tries the string literal form.

\section{Basic Functions}
\label{sec:orgb40b488}
The most frequently called features of any cryptographic library will be the most fundamental tasks for encryption software.  In this section we will look at how to programmatically encrypt data, decrypt it, sign it and verify signatures.

\subsection{Encryption}
\label{sec:org3170365}
Encrypting
 is very straight forward.  In the first example below the message, \texttt{text}, is encrypted to a single recipient's key.  In the second example the message will be encrypted to multiple recipients.

\subsubsection{Encrypting to one key}
\label{sec:org8098c64}
Once the the Context is set the main issues with encrypting data is essentially reduced to key selection and the keyword arguments specified in the \texttt{gpg.Context().encrypt()} method.

Those keyword arguments are: \texttt{recipients}, a list of keys encrypted to (covered in greater detail in the following section); \texttt{sign}, whether

or not to sign the plaintext data, see subsequent sections on signing
and verifying signatures below (defaults to \texttt{True}); \texttt{sink}, to write
results or partial results to a secure sink instead of returning it
(defaults to \texttt{None}); \texttt{passphrase}, only used when utilising symmetric
encryption (defaults to \texttt{None}); \texttt{always_trust}, used to override
 the
trust model settings for recipient keys (defaults to \texttt{False});
\texttt{add_encrypt_to}, utilises any preconfigured \texttt{encrypt-to} or
\texttt{default-key} settings in the user's \texttt{gpg.conf} file (defaults to
\texttt{False}); \texttt{prepare}, prepare for encryption (defaults to \texttt{False});
\texttt{expect_sign}, prepare for signing (defaults to \texttt{False}); \texttt{compress},
compresses the plaintext prior to encryption (defaults to \texttt{True}).

```
\begin{verbatim}
import gpg

a_key = "0x12345678DEADBEEF"
text = b"""Some text to test with.

Since the text in this case must be bytes, it is most likely that
the input form will be a separate file which is opened with "rb"
as this is the simplest method of obtaining the correct data format.
"""

c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext, result, sign_result = c.encrypt(text, recipients=rkey, sign=False)

with open("secret_plans.txt.asc", "wb") as afile:
    afile.write(ciphertext)
\end{verbatim}
```

Though this is even more likely to be used like this; with the
plaintext input read from a file, the recipient keys used for
encryption regardless of key trust status and the encrypted output
also encrypted to any preconfigured keys set in the \texttt{gpg.conf} file:

```
\begin{verbatim}
import gpg

a_key = "0x12345678DEADBEEF"

with open("secret_plans.txt", "rb") as afile:
   text = afile.read()

c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext, result, sign_result = c.encrypt(text, recipients=rkey, sign=True,
```

```
                                always_trust=True,
                                add_encrypt_to=True)

with open("secret_plans.txt.asc", "wb") as afile:
   afile.write(ciphertext)
\end{verbatim}

If the \texttt{recipients} parameter is empty then the plaintext is encrypted
symmetrically.  If no \texttt{passphrase} is supplied as a parameter or via a
callback registered with
 the \texttt{Context()} then an out-of-band prompt
for the passphrase via pinentry will be invoked.


\subsubsection{Encrypting to multiple keys}
\label{sec:orgdcf6e47}
Encrypting to multiple keys essentially just expands upon the key
selection process and the recipients from the previous examples.

The following example encrypts a message (\texttt{text}) to everyone with an
email address on the \texttt{gnupg.org} domain,\footnote{You probably don't really want to do this.  Searching the
keyservers for "gnupg.org" produces over 400 results, the majority of
which aren't actually at the gnupg.org domain, but just included a
comment regarding the project in their key somewhere.} but does \emph{not} encrypt
to a default key or other key which is configured to normally encrypt
to.

\begin{verbatim}
import gpg

text = b"""Oh look, another test message.

The same rules apply as with the previous example and more likely
than not, the message will actually be drawn from reading the
contents
 of a file or, maybe, from entering data at an input()
prompt.

Since the text in this case must be bytes, it is most likely that
the input form will be a separate file which is opened with "rb"
as this is the simplest method of obtaining the correct data
format.
"""

c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org", secret=False))
logrus = []
```

```
for i in range(len(rpattern)):
   if rpattern[i].can_encrypt == 1:
      logrus.append(rpattern[i])

ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
                                 sign=False, always_trust=True)

with open("secret_plans.txt.asc", "wb") as afile:
   afile.write(ciphertext)
\end{verbatim}
```

All it would take to change the above example to sign the message
and also encrypt the message to any configured default keys would
be to change the \texttt{c.encrypt} line to this:

```
\begin{verbatim}
ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,

                        always_trust=True,
                                 add_encrypt_to=True)
\end{verbatim}
```

The only keyword arguments requiring modification are those for which
the default values are changing.  The default value of \texttt{sign} is
\texttt{True}, the default of \texttt{always_trust} is \texttt{False}, the default of
\texttt{add_encrypt_to} is \texttt{False}.

If \texttt{always_trust} is not set to \texttt{True} and any of the recipient keys
are not trusted (e.g. not signed or locally signed) then the
encryption will raise an error.  It is possible to mitigate this
somewhat with something more like this:

```
\begin{verbatim}
import gpg

with open("secret_plans.txt.asc", "rb") as afile:
   text = afile.read()

c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org", secret=False))
logrus = []

for i in range(len(rpattern)):
   if rpattern[i].can_encrypt == 1:
      logrus.append(rpattern[i])

   try:
      ciphertext, result,
```

```
 sign_result = c.encrypt(text, recipients=logrus,
                                    add_encrypt_to=True)
  except gpg.errors.InvalidRecipients as e:
     for i in range(len(e.recipients)):
        for n in range(len(logrus)):
           if logrus[n].fpr == e.recipients[i].fpr:
              logrus.remove(logrus[n])
           else:
              pass
     try:
        ciphertext, result, sign_result = c.encrypt(text,
                                    recipients=logrus,
                                    add_encrypt_to=True)
        with open("secret_plans.txt.asc", "wb") as afile:
           afile.write(ciphertext)
     except:
        pass
\end{verbatim}
```

This will attempt to encrypt to all the keys searched for, then remove
invalid recipients if it fails and try again.

\subsection{Decryption}
\label{sec:org1282b3d}
Decrypting something encrypted to a key in one's secret
 keyring is
fairly straight forward.

In this example code, however, preconfiguring either \texttt{gpg.Context()}
or \texttt{gpg.core.Context()} as \texttt{c} is unnecessary because there is no need
to modify the Context prior to conducting the decryption and since the
Context is only used once, setting it to \texttt{c} simply adds lines for no
gain.

\begin{verbatim}

```
import gpg

ciphertext = input("Enter path and filename of encrypted file: ")
newfile = input("Enter path and filename of file to save decrypted data to: ")

with open(ciphertext, "rb") as cfile:
  try:
     plaintext, result, verify_result = gpg.Context().decrypt(cfile)
  except gpg.errors.GPGMEError as e:
     plaintext = None
     print(e)
```

```
if plaintext is not None:
   with open(newfile, "wb") as nfile:
     nfile.write(plaintext)
   else:
       pass
\end{verbatim}
```

The data available in \texttt{plaintext} in this example is the decrypted
content as a byte object, the recipient key IDs and algorithms
 in
\texttt{result} and the results of verifying any signatures of the data in
\texttt{verify_result}.

If \texttt{gpg.Context().decrypt(cfile, verify=False)} is called instead,
then \texttt{verify_result} will be returned as \texttt{None} and the rest remains
as described here.

\subsection{Signing text and files}
\label{sec:org59f1262}
The following sections demonstrate how to specify keys to sign with.

\subsubsection{Signing key selection}
\label{sec:org909cb3c}
By default GPGME and the Python bindings will use the default key
configured for the user invoking the GPGME API.  If there is no
default key specified and there is more than one secret key available
it may be necessary to specify the key or keys with which to sign
messages and files.

```
\begin{verbatim}
import gpg

logrus = input("Enter the email address or string to match signing keys to: ")
hancock = gpg.Context().keylist(pattern=logrus, secret=True)
sig_src = list(hancock)
\end{verbatim}
```

The signing examples in the
 following sections include the explicitly
designated \texttt{signers} parameter in two of the five examples; once where
the resulting signature would be ASCII armoured and once where it
would not be armoured.

While it would be possible to enter a key ID or fingerprint here to
match a specific key, it is not possible to enter two fingerprints and
match two keys since the patten expects a string, bytes or None and

not a list.  A string with two fingerprints won't match any single
key.

\subsubsection{Normal or default signing messages or files}
\label{sec:org6ee259d}
The normal or default signing process is essentially the same as is
most often invoked when also encrypting a message or file.  So when
the encryption component is not utilised, the result is to produce an
encoded and signed output which may or may not be ASCII armoured and
which may or may not also be compressed.

By default compression will be used unless GnuPG detects that the
plaintext is already compressed.  ASCII armouring
 will be determined
according to the value of \texttt{gpg.Context().armor}.

The compression algorithm is selected in much the same way as the
symmetric encryption algorithm or the hash digest algorithm is when
multiple keys are involved; from the preferences saved into the key
itself or by comparison with the preferences with all other keys
involved.

```
\begin{verbatim}
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context(armor=True, signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.asc", "w") as afile:
   afile.write(signed_data.decode())
\end{verbatim}
```

Though everything in this example is accurate, it is more likely that
reading the input data from another file and writing the result to a
new file will be performed more like the way it is done in the next
example.  Even if the output format is ASCII armoured.

```
\begin{verbatim}
import gpg

with open("/path/to/statement.txt",
```

```
 "rb") as tfile:
   text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.sig", "wb") as afile:
   afile.write(signed_data)
\end{verbatim}
```

\subsubsection{Detached signing messages and files}
\label{sec:org51049d4}
Detached signatures will often be needed in programmatic uses of
GPGME, either for signing files (e.g. tarballs of code releases) or as
a component of message signing (e.g. PGP/MIME encoded email).

```
\begin{verbatim}
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context(armor=True)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.asc", "w") as afile:
   afile.write(signed_data.decode())
\end{verbatim}
```

As with normal signatures, detached signatures are best handled as
byte literals, even when the output is ASCII armoured.

```
\begin{verbatim}
import gpg

with open("/path/to/statement.txt",
 "rb") as tfile:
   text = tfile.read()

c = gpg.Context(signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.sig", "wb") as afile:
   afile.write(signed_data)
\end{verbatim}
```

\subsubsection{Clearsigning messages or text}
\label{sec:orgf528a20}
Though PGP/in-line messages are no longer encouraged in favour of
PGP/MIME, there is still sometimes value in utilising in-line
signatures.  This is where clear-signed messages or text is of value.

```
\begin{verbatim}
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)

with open("/path/to/statement.txt.asc", "w") as afile:
   afile.write(signed_data.decode())
\end{verbatim}
```

In spite of the appearance of a clear-signed message, the data handled
by GPGME in signing it must still be byte literals.

```
\begin{verbatim}
import gpg

with open("/path/to/statement.txt",
 "rb") as tfile:
   text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)

with open("/path/to/statement.txt.asc", "wb") as afile:
   afile.write(signed_data)
\end{verbatim}
```

\subsection{Signature verification}
\label{sec:org6cd81af}
Essentially there are two principal methods of verification of a
signature.  The first of these is for use with the normal or default
signing method and for clear-signed messages.  The second is for use
with files and data with detached signatures.

The following example is intended for use with the default signing method where the file was not ASCII armoured:

```
\begin{verbatim}
import gpg
import time

filename = "statement.txt"
gpg_file = "statement.txt.gpg"

c = gpg.Context()

try:
   data, result = c.verify(open(gpg_file))
   verified = True
except gpg.errors.BadSignatures as e:
   verified = False
   print(e)

if verified is True:
   for i in range(len(result.signatures)):

      sign = result.signatures[i]
       print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
          time.ctime(sign.timestamp)))
else:
   pass
\end{verbatim}
```

Whereas this next example, which is almost identical would work with normal ASCII armoured files and with clear-signed files:

```
\begin{verbatim}
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
   data, result = c.verify(open(asc_file))
   verified = True
```

```
except gpg.errors.BadSignatures as e:
   verified = False
   print(e)

if verified is True:
   for i in range(len(result.signatures)):
       sign = result.signatures[i]
       print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
          time.ctime(sign.timestamp)))
else:
   pass
\end{verbatim}
```

In both of the previous examples it is also possible to compare the
original data that was signed
 against the signed data in \texttt{data} to see
if it matches with something like this:

```
\begin{verbatim}
with open(filename, "rb") as afile:
   text = afile.read()

if text == data:
   print("Good signature.")
else:
   pass
\end{verbatim}
```

The following two examples, however, deal with detached signatures.
With his method of verification the data that was signed does not get
returned since it is already being explicitly referenced in the first
argument of \texttt{c.verify}.  So \texttt{data} is \texttt{None} and only the information
in \texttt{result} is available.

```
\begin{verbatim}
import gpg
import time

filename = "statement.txt"
sig_file = "statement.txt.sig"

c = gpg.Context()

try:
```

```
   data, result = c.verify(open(filename), open(sig_file))
   verified = True
except gpg.errors.BadSignatures as e:
   verified = False
   print(e)

if verified is True:
   for i in range(len(result.signatures)):
       sign = result.signatures[i]
       print("""Good signature from:
{0}
with
 key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
          time.ctime(sign.timestamp)))
else:
   pass
\end{verbatim}

\begin{verbatim}
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
   data, result = c.verify(open(filename), open(asc_file))
   verified = True
except gpg.errors.BadSignatures as e:
   verified = False
   print(e)

if verified is True:
   for i in range(len(result.signatures)):
       sign = result.signatures[i]
       print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
          time.ctime(sign.timestamp)))
else:
   pass
\end{verbatim}
```

\section{Creating keys and subkeys}
\label{sec:org754c6df}
The one thing, aside from GnuPG itself, that GPGME depends on, of course, is the keys themselves. So it is necessary to be able to generate them and modify them by adding subkeys, revoking or disabling them, sometimes
deleting them and doing the same for user IDs.

In the following examples a key will be created for the world's greatest secret agent, Danger Mouse. Since Danger Mouse is a secret agent he needs to be able to protect information to \texttt{SECRET} level clearance, so his keys will be 3072-bit keys.

The pre-configured \texttt{gpg.conf} file which sets cipher, digest and other preferences contains the following configuration parameters:

\begin{verbatim}
expert
allow-freeform-uid
allow-secret-key-import
trust-model tofu+pgp
tofu-default-policy unknown
enable-large-rsa
enable-dsa2
cert-digest-algo SHA512
default-preference-list TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128 AES BLOWFISH IDEA CAST5 3DES SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1 ZLIB BZIP2 ZIP Uncompressed
personal-cipher-preferences TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128 AES BLOWFISH IDEA CAST5 3DES
personal-digest-preferences SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1
personal-compress-preferences
ZLIB BZIP2 ZIP Uncompressed
\end{verbatim}

\subsection{Primary key}
\label{sec:org0185c23}
Generating a primary key uses the \texttt{create_key} method in a Context.
It contains multiple arguments and keyword arguments, including:
\texttt{userid}, \texttt{algorithm}, \texttt{expires_in}, \texttt{expires}, \texttt{sign}, \texttt{encrypt}, \texttt{certify}, \texttt{authenticate}, \texttt{passphrase} and \texttt{force}. The defaults for all of those except \texttt{userid}, \texttt{algorithm}, \texttt{expires_in}, \texttt{expires} and \texttt{passphrase} is \texttt{False}. The defaults for \texttt{algorithm} and \texttt{passphrase} is \texttt{None}. The default for \texttt{expires_in} is \texttt{0}. The default for \texttt{expires} is \texttt{True}. There is no default for \texttt{userid}.

If \texttt{passphrase} is left as \texttt{None} then the key will not be generated
with a passphrase, if \texttt{passphrase} is set to a string then that will
be the passphrase and if
 \texttt{passphrase} is set to \texttt{True} then gpg-agent
will launch pinentry to prompt for a passphrase.  For the sake of
convenience, these examples will keep \texttt{passphrase} set to \texttt{None}.

```
\begin{verbatim}
import gpg

c = gpg.Context()

c.home_dir = "~/.gnupg-dm"
userid = "Danger Mouse <dm@secret.example.net>"

dmkey = c.create_key(userid, algorithm="rsa3072", expires_in=31536000,
                 sign=True, certify=True)
\end{verbatim}
```

One thing to note here is the use of setting the \texttt{c.home_dir}
parameter.  This enables generating the key or keys in a different
location.  In this case to keep the new key data created for this
example in a separate location rather than adding it to existing and
active key store data.  As with the default directory, \texttt{\textasciitilde{}/.gnupg}, any
temporary or separate directory needs the permissions set to only
permit access by the directory owner.  On posix systems this means
setting the directory permissions to
 700.

The \texttt{temp-homedir-config.py} script in the HOWTO examples directory
will create an alternative homedir with these configuration options
already set and the correct directory and file permissions.

The successful generation of the key can be confirmed via the returned
\texttt{GenkeyResult} object, which includes the following data:

```
\begin{verbatim}
print("""
Fingerprint:  {0}
Primary Key:  {1}
 Public Key:  {2}
 Secret Key:  {3}
Sub Key:  {4}
User IDs:  {5}
""".format(dmkey.fpr, dmkey.primary, dmkey.pubkey, dmkey.seckey, dmkey.sub,
        dmkey.uid))
\end{verbatim}
```

Alternatively the information can be confirmed using the command line
program:

\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx
----------
sec   rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
    177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid          [ultimate] Danger Mouse <dm@secret.example.net>

bash-4.4$
\end{verbatim}

As with generating keys manually,
 to preconfigure expanded preferences
for the cipher, digest and compression algorithms, the \texttt{gpg.conf} file
must contain those details in the home directory in which the new key
is being generated.  I used a cut down version of my own \texttt{gpg.conf}
file in order to be able to generate this:

\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm --edit-key 177B7C25DB99745EE2EE13ED026D2F19E99E63AA showpref
quit
Secret key is available.

sec  rsa3072/026D2F19E99E63AA
   created: 2018-03-15  expires: 2019-03-15  usage: SC
   trust: ultimate      validity: ultimate
[ultimate] (1). Danger Mouse <dm@secret.example.net>

[ultimate] (1). Danger Mouse <dm@secret.example.net>
   Cipher: TWOFISH, CAMELLIA256, AES256, CAMELLIA192, AES192, CAMELLIA128, AES, BLOWFISH,
IDEA, CAST5, 3DES
   Digest: SHA512, SHA384, SHA256, SHA224, RIPEMD160, SHA1
   Compression: ZLIB, BZIP2, ZIP, Uncompressed
   Features: MDC, Keyserver no-modify

bash-4.4$
\end{verbatim}

\subsection{Subkeys}
\label{sec:org5e2acbc}
Adding
 subkeys to a primary key is fairly similar to creating the
primary key with the \texttt{create_subkey} method.  Most of the arguments

are the same, but not quite all.  Instead of the \texttt{userid} argument
there is now a \texttt{key} argument for selecting which primary key to add
the subkey to.

In the following example an encryption subkey will be added to the
primary key.  Since Danger Mouse is a security conscious secret agent,
this subkey will only be valid for about six months, half the length
of the primary key.

```
\begin{verbatim}
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

key = c.get_key(dmkey.fpr, secret=True)
dmsub = c.create_subkey(key, algorithm="rsa3072", expires_in=15768000,
                    encrypt=True)
\end{verbatim}
```

As with the primary key, the results here can be checked with:

```
\begin{verbatim}
print("""
Fingerprint:  {0}
Primary Key:  {1}
 Public Key:  {2}
 Secret Key:  {3}
Sub Key:  {4}
User IDs:  {5}
""".format(dmsub.fpr,
 dmsub.primary, dmsub.pubkey, dmsub.seckey, dmsub.sub,
         dmsub.uid))
\end{verbatim}
```

As well as on the command line with:

```
\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx
----------------------
sec   rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
     177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid           [ultimate] Danger Mouse <dm@secret.example.net>
ssb   rsa3072 2018-03-15 [E] [expires: 2018-09-13]

bash-4.4$
\end{verbatim}
```

\subsection{User IDs}
\label{sec:org4869c58}
\subsubsection{Adding User IDs}
\label{sec:orgebb13ca}
By comparison to creating primary keys and subkeys, adding a new user
ID to an existing key is much simpler.  The method used to do this is
\texttt{key_add_uid} and the only arguments it takes are for the \texttt{key} and
the new \texttt{uid}.

\begin{verbatim}
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid
 = "Danger Mouse <danger.mouse@secret.example.net>"

c.key_add_uid(key, uid)
\end{verbatim}

Unsurprisingly the result of this is:

\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx
----------------------
sec   rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
     177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid           [ultimate] Danger Mouse <danger.mouse@secret.example.net>
uid           [ultimate] Danger Mouse <dm@secret.example.net>
ssb   rsa3072 2018-03-15 [E] [expires: 2018-09-13]

bash-4.4$
\end{verbatim}

\subsubsection{Revoking User IDs}
\label{sec:org1683695}
Revoking a user ID is a fairly similar process, except that it uses
the \texttt{key_revoke_uid} method.

\begin{verbatim}
import gpg

```
c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid = "Danger Mouse <danger.mouse@secret.example.net>"

c.key_revoke_uid(key, uid)
\end{verbatim}
```

\subsection{Key certification}
\label{sec:orgf431bf8}
Since
 key certification is more frequently referred to as key signing,
the method used to perform this function is \texttt{key_sign}.

The \texttt{key_sign} method takes four arguments: \texttt{key}, \texttt{uids},
\texttt{expires_in} and \texttt{local}.  The default value of \texttt{uids} is \texttt{None} and
which results in all user IDs being selected.  The default value of
both \texttt{expires_in} and \texttt{local} is \texttt{False}; which results in the
signature never expiring and being able to be exported.

The \texttt{key} is the key being signed rather than the key doing the
signing.  To change the key doing the signing refer to the signing key
selection above for signing messages and files.

If the \texttt{uids} value is not \texttt{None} then it must either be a string to
match a single user ID or a list of strings to match multiple user
IDs.  In this case the matching of those strings must be precise and
it is case sensitive.

To sign Danger
 Mouse's key for just the initial user ID with a
signature which will last a little over a month, do this:

```
\begin{verbatim}
import gpg

c = gpg.Context()
uid = "Danger Mouse <dm@secret.example.net>"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
c.key_sign(key, uids=uid, expires_in=2764800)
\end{verbatim}
```

```
\subsubsection{Verifying key certifications}
\label{sec:org87abdd3}
\begin{verbatim}
import gpg
import time

c = gpg.Context()
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
keys = list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
   for sig in user.signatures:
       print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
            sig.uid)
\end{verbatim}
```

Which for Danger Mouse displays the following:

```
\begin{verbatim}
0x92E3F6115435C65A  Thu Mar 15 13:17:44 2018  Danger Mouse <dm@secret.example.net>
0x321E4E2373590E5D  Mon Nov 26 12:46:05 2018  Ben McGinnes <ben@adversary.org>
\end{verbatim}
```

The
 two key signatures listed are for the self-certification of Danger
Mouse's key made when the key was created in March, 2018; and the
second is a signature made by the author and set to expire at the end
of the year.  Note that the second signature was made with the
following code (including the preceding code to display the output of
the certifications or key signatures):

```
\begin{verbatim}
import gpg
import math
import pendulum
import time

hd = "/home/dm/.gnupg"
c = gpg.Context()
d = gpg.Context(home_dir=hd)
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
dmuid = "Danger Mouse <dm@secret.example.net>"
dkeys = list(c.keylist(pattern=dmuid))
dmkey = dkeys[0]

c.key_import(d.key_export(pattern=None))
```

```
tp = pendulum.period(pendulum.now(tz="local"), pendulum.datetime(2019, 1, 1))
ts = tp.total_seconds()
total_secs = math.ceil(ts)
c.key_sign(dmkey, uids=dmuid, expires_in=total_secs)

d.key_import(c.key_export(pattern=dmuid))
keys = list(c.keylist(pattern=dmuid,
 mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
   for sig in user.signatures:
      print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
           sig.uid)
\end{verbatim}
```

Note that this final code block includes the use of a module which is
\emph{not} part of Python's standard library, the \href{https://pendulum.eustace.io/}{pendulum module}. Unlike
the standard datetime module, pendulum makes working with dates and
times significantly easier in Python; just as the requests module
makes working with HTTP and HTTPS easier than the builtin modules do.

Though neither requests nor pendulum are required modules for using
the GPGME Python bindings, they are both highly recommended more
generally.

\section{Advanced or Experimental Use Cases}
\label{sec:org944cc00}
\subsection{C plus Python plus SWIG plus Cython}
\label{sec:org3b53926}
In spite of the apparent incongruence of using Python bindings to a C
interface only to generate
 more C from the Python; it is in fact quite
possible to use the GPGME bindings with \href{http://docs.cython.org/en/latest/index.html}{Cython}. Though in
many cases
the benefits may not be obvious since the most computationally
intensive work never leaves the level of the C code with which GPGME
itself is interacting with.

Nevertheless, there are some situations where the benefits are
demonstrable. One of the better and easier examples being the one of
the early examples in this HOWTO, the \hyperref[sec:org63a3d62]{key counting} code. Running that
example as an executable Python script, \texttt{keycount.py} (available in
the \texttt{examples/howto/} directory), will take a noticeable amount of time
to run on most systems where the public keybox or keyring contains a
few thousand public keys.

Earlier in the evening, prior to starting this section, I ran that
script on my laptop; as I tend to do periodically and timed it using
\texttt{time} utility, with the following results:

```
\begin{verbatim}
bash-4.4$
 time keycount.py

Number of secret keys:  23
Number of public keys:  12112


real 11m52.945s
user 0m0.913s
sys 0m0.752s

bash-4.4$
\end{verbatim}
```

Sometime after that I imported another key and followed it with a
little test of Cython.  This test was kept fairly basic, essentially
lifting the material from the \href{http://docs.cython.org/en/latest/src/tutorial/cython_tutorial.html}{Cython Basic Tutorial} to demonstrate
compiling Python code to C.  The first step was to take the example
key counting code quoted previously, essentially from the importing of
the \texttt{gpg} module to the end of the script:

```
\begin{verbatim}
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

print("""
   Number of secret keys:  {0}
   Number of public keys:  {1}

""".format(secnum, pubnum))
\end{verbatim}
```

Save
that into a file called \texttt{keycount.pyx} and then create a
\texttt{setup.py} file which contains this:

\begin{verbatim}
from distutils.core import setup
from Cython.Build import cythonize

setup(
  ext_modules = cythonize("keycount.pyx")
)
\end{verbatim}

Compile it:

\begin{verbatim}
bash-4.4$ python setup.py build_ext --inplace
bash-4.4$
\end{verbatim}

Then run it in a similar manner to \texttt{keycount.py}:

\begin{verbatim}
bash-4.4$ time python3.7 -c "import keycount"

Number of secret keys:  23
Number of public keys:  12113


real 6m47.905s
user 0m0.785s
sys 0m0.331s

bash-4.4$
\end{verbatim}

Cython turned \texttt{keycount.pyx} into an 81KB \texttt{keycount.o} file in the
\texttt{build/} directory, a 24KB \texttt{keycount.cpython-37m-darwin.so} file to be
imported into Python 3.7 and a 113KB \texttt{keycount.c} generated C source
code file of nearly three thousand lines.  Quite a bit bigger than the
314 bytes of the \texttt{keycount.pyx} file or the full 1,452 bytes
of the
full executable \texttt{keycount.py} example script.

On the other hand it ran in nearly half the time; taking 6 minutes and
47.905 seconds to run.  As opposed to the 11 minutes and 52.945 seconds
which the CPython script alone took.

The \texttt{keycount.pyx} and \texttt{setup.py} files used to generate this example
have been added to the \texttt{examples/howto/advanced/cython/} directory
The example versions include some additional options to annotate the
existing code and to detect Cython's use.  The latter comes from the
\href{http://docs.cython.org/en/latest/src/tutorial/pure.html\#magic-attributes-within-the-pxd}{Magic Attributes}
section of the Cython documentation.

\section{Miscellaneous extras and work-arounds}
\label{sec:orgd72f7de}
Most of the things in the following sections are here simply because
there was no better place to put them, even though some are only
peripherally related to the GPGME Python bindings.  Some are also
workarounds for functions not integrated
 with GPGME as yet.  This is
especially true of the first of these, dealing with \hyperref[sec:org83f4d00]{group lines}.

\subsection{Group lines}
\label{sec:org83f4d00}
There is not yet an easy way to access groups configured in the
gpg.conf file from within GPGME.  As a consequence these central
groupings of keys cannot be shared amongst multiple programs, such as
MUAs readily.

The following code, however, provides a work-around for obtaining this
information in Python.

\begin{verbatim}
import subprocess
import sys

if sys.platform == "win32":
   gpgconfcmd = "gpgconf.exe --list-options gpg"
else:
   gpgconfcmd = "gpgconf --list-options gpg"

process = subprocess.Popen(gpgconfcmd.split(), stdout=subprocess.PIPE)
procom = process.communicate()

if sys.version_info[0] == 2:
   lines = procom[0].splitlines()
else:
   lines = procom[0].decode().splitlines()

for line in lines:
   if line.startswith("group") is True:
       break

```
groups = line.split(":")[-1].replace("", ").split(',')

group_lines
 = []
group_lists = []

for i in range(len(groups)):
   group_lines.append(groups[i].split("="))
   group_lists.append(groups[i].split("="))

for i in range(len(group_lists)):
   group_lists[i][1] = group_lists[i][1].split()
\end{verbatim}
```

The result of that code is that \texttt{group_lines} is a list of lists where
\texttt{group_lines[i][0]} is the name of the group and \texttt{group_lines[i][1]}
is the key IDs of the group as a string.

The \texttt{group_lists} result is very similar in that it is a list of
lists.  The first part, \texttt{group_lists[i][0]} matches
\texttt{group_lines[i][0]} as the name of the group, but \texttt{group_lists[i][1]}
is the key IDs of the group as a list.

A demonstration of using the \texttt{groups.py} module is also available in
the form of the executable \texttt{mutt-groups.py} script.  This second
script reads all the group entries in a user's \texttt{gpg.conf} file and
converts them into crypt-hooks suitable for use
 with the Mutt and
Neomutt mail clients.

\subsection{Keyserver access for Python}
\label{sec:org5ad99aa}
The \href{https://github.com/Selfnet/hkp4py}{hkp4py} module by Marcel Fest was originally a port of the old
\href{https://github.com/dgladkov/python-hkp}{python-hkp} module from Python 2 to Python 3 and updated to use the
\href{http://docs.python-requests.org/en/latest/index.html}{requests} module instead.  It has since been modified to provide
support for Python 2.7 as well and is available via PyPI.

Since it rewrites the \texttt{hkp} protocol prefix as \texttt{http} and \texttt{hkps} as
\texttt{https}, the module is able to be used even with servers which do not
support the full scope of keyserver functions.\footnote{Such as with ProtonMail servers.  This also means that
restricted servers which only advertise either HTTP or HTTPS end
points and not HKP or HKPS end points must still be identified as as
HKP or HKPS within the Python Code.  The \texttt{hkp4py} module will rewrite
these

appropriately when the connection is made to the server.} It also works quite
readily when incorporated into a \hyperref[sec:org3b53926]{Cython} generated and compiled version
of any code.

\subsubsection{Key import format}
\label{sec:org1e47c97}
The hkp4py module returns key data via requests as string literals
(\texttt{r.text}) instead of byte literals (\texttt{r.content}). This means that
the retrurned key data must be encoded to UTF-8 when importing that
key material using a \texttt{gpg.Context().key_import()} method.

For this reason an alternative method has been added to the \texttt{search}
function of \texttt{hkp4py.KeyServer()} which returns the key in the correct
format as expected by \texttt{key_import}. When importing using this module,
it is now possible to import with this:

\begin{verbatim}
for key in keys:
  if key.revoked is False:
    gpg.Context().key_import(key.key_blob)
  else:
    pass
\end{verbatim}

Without that recent addition it would
have been necessary to encode
the contents of each \texttt{hkp4py.KeyServer().search()[i].key} in
\texttt{hkp4py.KeyServer().search()} before trying to import it.

An example of this is included in the \hyperref[sec:org1ad598a]{Importing Keys} section of this
HOWTO and the corresponding executable version of that example is
available in the \texttt{lang/python/examples/howto} directory as normal; the
executable version is the \texttt{import-keys-hkp.py} file.

\subsection{GPGME version checking}
\label{sec:org18b8ef8}
For various reasons it may be necessary to check which version of
GPGME the bindings have been built against; including whether a
minimum required version of GPGME is in use.

For the most part the \texttt{gpg.version.versionstr} and
\texttt{gpg.version.versionlist} methods have been quite sufficient. The
former returns the same string as \texttt{gpgme-config -{}-version}, while the
latter returns the major, minor and patch values in a list.

To check if the installed bindings

have actually been built against
the current installed libgpgme version, this check can be performed:

```
\begin{verbatim}
import gpg
import subprocess
import sys

gpgme_version_call = subprocess.Popen(["gpgme-config", "--version"],
                                      stdout=subprocess.PIPE,
                                      stderr=subprocess.PIPE)
gpgme_version_str = gpgme_version_call.communicate()

if sys.version_info[0] == 2:
   gpgme_version = gpgme_version_str[0].strip()
elif sys.version_info[0] >= 3:
   gpgme_version = gpgme_version_str[0].decode().strip()
else:
   gpgme_version = None

if gpgme_version is not None:
   if gpgme_version == gpg.version.versionstr:
      print("The GPGME Python bindings match libgpgme.")
   else:
      print("The GPGME Python bindings do NOT match libgpgme.")
else:
   print("Upgrade Python and reinstall the GPGME Python bindings.")
\end{verbatim}
```

For many developers, however, the preferred checking means checking
for a minimum
version or point release. This is now readily available
via the \texttt{gpg.version.versionintlist} method (added in version
\texttt{1.12.1-beta79}). It is also now possible to easily check whether the
installed GPGME Python bindings were built from a development or beta
branch of the GPGME source code.

The following code demonstrates how both of those methods may be used:

```
\begin{verbatim}
import gpg

try:
   if gpg.version.is_beta is True:
      print("The installed GPGME Python bindings were built from beta code.")
   else:
      print("The installed GPGME Python bindings are a released version.")
except Exception as e:
```

```
  print(e)

try:
  if gpg.version.versionintlist[0] == 1:
     if gpg.version.versionintlist[1] == 12:
        if gpg.version.versionintlist[2] == 1:
           print("This is the minimum version for using versionintlist.")
        elif gpg.version.versionintlist[2] > 1:
           print("The versionintlist method is available.")

        else:
           pass
     elif gpg.version.versionintlist[1] > 12:
        print("The versionintlist method is available.")
     else:
        pass
  elif gpg.version.versionintlist[0] > 1:
     print("The versionintlist method is available.")
  else:
     pass
except Exception as e:
  print(e)
\end{verbatim}
```

The points where \texttt{pass} is used in the above example will most likely
also produce an \texttt{Exception} error since those results should only
occur in versions which do not have the \texttt{gpgme.version.is_beta} and
\texttt{gpgme.version.versionintlist} methods available.

\section{Copyright and Licensing}
\label{sec:org9d52a23}
\subsection{Copyright}
\label{sec:org26ed04d}
Copyright  The GnuPG Project, 2018.

Copyright (C) The GnuPG Project, 2018.

\subsection{Draft Editions of this HOWTO}
\label{sec:org080a94a}
Draft editions of this HOWTO may be periodically available directly
from the author at any of the following URLs:

\begin{itemize}
\item
 \href{https://files.au.adversary.org/crypto/gpgme-python-howto.html}{GPGME Python Bindings HOWTO draft
(XHTML single file, AWS S3 SSL)}

\item \href{http://files.au.adversary.org/crypto/gpgme-python-howto.html}{GPGME Python Bindings HOWTO draft (XHTML single file, AWS S3 no SSL)}
\item \href{https://files.au.adversary.org/crypto/gpgme-python-howto-split/index.html}{GPGME Python Bindings HOWTO draft (XHTML multiple files, AWS S3 SSL)}
\item \href{http://files.au.adversary.org/crypto/gpgme-python-howto/index.html}{GPGME Python Bindings HOWTO draft (XHTML multiple files, AWS S3 no SSL)}
\end{itemize}

All of these draft versions except for one have been generated from
this document via GNU Emacs \href{https://orgmode.org/}{Org mode} and
\href{https://www.gnu.org/software/texinfo/}{GNU Texinfo}.  Though it is
likely that the specific \href{https://files.au.adversary.org/crypto/gpgme-python-howto}{file}
\href{http://files.au.adversary.org/crypto/gpgme-python-howto.org}{version}
 used will be on the same server
with the generated output formats.

The GNU Texinfo and reStructured Text versions ship with the software,
while the GNU Emacs Info verseion is generated from the Texinfo
version using GNU Texinfo or GNU Makeinfo.  The Texinfo format is
generated from the original Org mode source file in Org mode itself
either within GNU Emacs or via the command line by invoking Emacs in
batch mode:

\begin{verbatim}
emacs gpgme-python-howto.org --batch -f org-texinfo-export-to-texinfo --kill
emacs gpgme-python-howto --batch -f org-texinfo-export-to-texinfo --kill
\end{verbatim}

The reStructuredText format is also generated from the Org-mode source
file, except it is generated using \href{https://pandoc.org}{Pandoc} with either of the following
commands:

\begin{verbatim}
pandoc -f org -t rst+smart -o gpgme-python-howto.rst gpgme-python-howto.org
pandoc -f org -t rst+smart -o gpgme-python-howto.rst gpgme-python-howto
\end{verbatim}

In addition to these there is
 a significantly less frequently updated
version as a HTML \href{https://files.au.adversary.org/crypto/gpgme-python/dita/webhelp/index.html}{WebHelp site} (AWS S3 SSL); generated from DITA XML
source files, which can be found in \href{https://dev.gnupg.org/source/gpgme/browse/ben\%252Fhowto-dita/}{an alternative branch} of the GPGME
git repository.

Various generated output formats may occasionally be found in
subdirectories of the \href{https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python}{gpgme-python} directory.  In particular within

the \href{https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/dita}{DITA},
\href{https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/rst}{reStructuredText} and
\href{https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/texinfo}{Texinfo} subdirectories. The
\texttt{rst}
directory contains output files generated with Sphix and may include a
considerable number of its possible output formats.

These
draft editions are not official documents and the version of
documentation in the master branch or which ships with released
versions is the only official documentation. Nevertheless, these
draft editions may occasionally be of use by providing more accessible
web versions which are updated between releases. They are provided on
the understanding that they may contain errors or may contain content
subject to change prior to an official release.

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PURPOSE.
\end{document}
# This is a template. The dist target uses it to create the real file.
Summary: GPGME - GnuPG Made Easy
Name: gpgme
Version: 1.15.1
Release: 1
URL: https://gnupg.org/gpgme.html
Source: https://www.gnupg.org/ftp/gcrypt/gpgme/%{name}-%{version}.tar.gz
Group: Development/Libraries
Copyright: GPL
BuildRoot: %{_tmppath}/%{name}-%{version}
BuildRequires: make
Prereq: /sbin/ldconfig /sbin/install-info
Requires: gnupg

%description
GnuPG Made Easy (GPGME) is a library designed to make access to GnuPG easier
for applications. It provides a High-Level Crypto API for encryption,
decryption, signing, signature verification and key management.

%prep

```
%setup -q

%build
CFLAGS="$RPM_OPT_FLAGS"; export CFLAGS
./configure --prefix=/usr
make

%install
rm -fr $RPM_BUILD_ROOT
mkdir -p $RPM_BUILD_ROOT
make install prefix=$RPM_BUILD_ROOT/usr infodir=$RPM_BUILD_ROOT%{_infodir}
rm -f $RPM_BUILD_ROOT%{_infodir}/dir

%clean
rm -fr $RPM_BUILD_ROOT
make distclean

%post
/sbin/ldconfig
/sbin/install-info %{_infodir}/gpgme.info.gz
 %{_infodir}/dir
/sbin/install-info %{_infodir}/gpgme-python-howto.info.gz %{_infodir}/dir

%preun
if [ "$1" = 0 ]; then
/sbin/install-info --delete %{_infodir}/gpgme.info.gz %{_infodir}/dir
/sbin/install-info --delete %{_infodir}/gpgme-python-howto.info.gz %{_infodir}/dir
fi

%postun
/sbin/ldconfig

%files
%defattr(-,root,root)
%doc COPYING COPYING.LESSER AUTHORS README INSTALL NEWS ChangeLog TODO THANKS
%attr(0755,root,root) %{_bindir}/gpgme-config
%attr(0755,root,root) %{_libdir}/*gpgme.so*
%attr(0755,root,root) %{_libdir}/*gpgme.la
%attr(0644,root,root) %{_libdir}/*gpgme.a
%{_includedir}/gpgme.h
%{_datadir}/aclocal/gpgme.m4
%{_infodir}/gpgme.info*
%{_infodir}/gpgme-python-howto.info*

%changelog
* Sat Aug 30 2003 Robert Schiele <rschiele@uni-mannheim.de>
- %{_infodir}/dir is not packaged, remove to prevent checking failure
* Mon Jul 01 2002 Wojciech Polak <polak@lodz.pdi.net>
```

- initial specfile release for GPGME.

# EOF

# 1.1816 esutils 2.0.3

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# 1.1817 go-grpc-middleware 2.2.0

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cloud.google.com/go v0.26.0/go.mod h1:aQUYkXzVsufM+DwF1aE+0xfcU+56JwCaLick0ClmMTw=
github.com/BurntSushi/toml v0.3.1/go.mod h1:xHWCNGjB5oqiDr8zfno3MHue2Ht5sIBksp03qcyfWMU=
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github.com/census-instrumentation/opencensus-proto v0.2.1/go.mod
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github.com/chzyer/logex v1.1.10/go.mod h1:+Ywpsq7O8HXn0nuIou7OrIPyXbp3wmkHB+jjWRnGsAI=
github.com/chzyer/readline v0.0.0-20180603132655-2972be24d48e/go.mod
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github.com/chzyer/test v0.0.0-20180213035817-a1ea475d72b1/go.mod
h1:Q3SI9o4m/ZMnBNeIyt5eFwwo7qiLfzFZmjNmxjkiQlU=
github.com/client9/misspell v0.3.4/go.mod h1:qj6jICC3Q7zFZvVWo7KLAzC3yx5G7kyvSDkc90ppPyw=
github.com/davecgh/go-spew v1.1.0/go.mod h1:J7Y8YcW2NihsgmVo/mv3lAwl/skON4iLHjSsI+c5H38=
github.com/davecgh/go-spew v1.1.1/go.mod h1:J7Y8YcW2NihsgmVo/mv3lAwl/skON4iLHjSsI+c5H38=
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github.com/envoyproxy/go-control-plane v0.9.1-0.20191026205805-5f8ba28d4473/go.mod
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github.com/envoyproxy/protoc-gen-validate v0.1.0/go.mod
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github.com/felixge/fgprof v0.9.1/go.mod h1:7/HK6JFtFaARhIljgP2IV8rJLIoHDoOYoUphsnGvqxE=
github.com/golang/glog v0.0.0-20160126235308-23def4e6c14b/go.mod
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github.com/pkg/errors v0.9.1 h1:FEBLx1zS214owpjy7qsBeixbURkuhQAwrK5UwLGTwt4=
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github.com/prometheus/client_model v0.0.0-20190812154241-14fe0d1b01d4/go.mod
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github.com/protoconfig/protoconfig/go v0.0.0-20210106192113-733758adefac
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github.com/stretchr/objx v0.1.0/go.mod h1:HFkY916IF+rwdDfMAkV7OtwuqBVzrE8GR6GFx+wExME=
github.com/stretchr/testify v1.4.0/go.mod h1:j7eGeouHqKxXV5pUuKE4zz7dFj8WfuZ+81PSLYec5m4=
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golang.org/x/crypto v0.0.0-20190308221718-c2843e01d9a2/go.mod
h1:djNgcEr1/C05ACkg1iLfiJU5Ep61QUkGW8qpdssI0+w=
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golang.org/x/exp v0.0.0-20190121172915-509febef88a4/go.mod
h1:CJ0aWSM057203Lf6IL+f9T1iT9GByDxfZKAQTCR3kQA=
golang.org/x/lint
v0.0.0-20181026193005-c67002cb31c3/go.mod h1:UVdnD1Gm6xHRNCYTkRU2/jEulfH38KcIWyp/GAMgvoE=
golang.org/x/lint v0.0.0-20190227174305-5b3e6a55c961/go.mod

h1:wehouNa3lNwaWXcvxsM5YxQ5yQlVC4a0KAMCusXpPoU=
golang.org/x/lint v0.0.0-20190313153728-d0100b6bd8b3/go.mod
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golang.org/x/mod v0.1.1-0.20191105210325-c90efee705ee/go.mod
h1:QqPTAvyqsEbceGzBzNggFXnrqF1CaUcvgkdR5Ot7KZg=
golang.org/x/mod v0.3.0/go.mod h1:s0Qsj1ACt9ePp/hMypM3fl4fZqREWJwdYDEqhRiZZUA=
golang.org/x/net v0.0.0-20180724234803-3673e40ba225/go.mod
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golang.org/x/net v0.0.0-20180826012351-8a410e7b638d/go.mod
h1:mL1N/T3taQHkDXs73rZJwtUhF3w3ftmwwsq0BUmARs4=
golang.org/x/net
v0.0.0-20190213061140-3a22650c66bd/go.mod h1:mL1N/T3taQHkDXs73rZJwtUhF3w3ftmwwsq0BUmARs4=
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golang.org/x/net v0.0.0-20190404232315-eb5bcb51f2a3/go.mod
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golang.org/x/net v0.0.0-20190620200207-3b0461eec859/go.mod
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go 1.16

require github.com/efficientgo/tools/copyright v0.0.0-20210326193628-425a09c04e05

# 1.1818 camelcase-keys 6.2.2

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# 1.1819 at-spi2-core 2.40.3-1.el9

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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machine-readable source code, which
must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses
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When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The

threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object
code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the
work with the complete corresponding
machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

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d) If distribution of the work is made by offering access to copy
from a designated place, offer equivalent access to copy the above
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e) Verify that the user has already received a copy of these
materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the
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It may happen that this requirement contradicts the license
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# 1.1831 difflib 0.0.0-20210328193216-ff5ff6dc229b

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# 1.1832 libiptcdata 1.0.5-10.el9

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derivative of the original library, and the ordinary General Public License
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Because of this blurred distinction, using the ordinary General
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concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the
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permit developers of non-free programs to use free libraries, while

preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

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c) You must cause the whole of the work to be licensed at no
charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a
table of data to be supplied by an application program that uses
the facility, other than as an argument passed when the facility
is invoked, then you must make a good faith effort to ensure that,
in the event an application does not supply such function or
table, the facility still operates, and performs whatever part of
its purpose remains meaningful.

(For example, a function in a library to compute square roots has
a purpose that is entirely well-defined independent of the
application. Therefore, Subsection 2d requires that any
application-supplied function or table used by
this function must
be optional: if the application does not supply it, the square
root function must still compute square roots.)

These requirements apply to the modified work as a whole. If

identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to

distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

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When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

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6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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# 1.1837 etcd-client 3.6.2

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# Features

This document provides an overview of etcd features and general development guidelines for adding and deprecating them. The project maintainers can override these guidelines per the need of the project following the project governance.

## Overview

The etcd features fall into three stages, experimental, stable, and unsafe.

### Experimental

Any new feature is usually added as an experimental feature. An experimental feature is characterized as below:
- Might be buggy due to a lack of user testing. Enabling the feature may not work as expected.
- Disabled by default when added initially.
- Support for such a feature may be dropped at any time without notice
  - Feature-related issues may be given lower priorities.
  - It can be removed in the next minor or major release without following the feature deprecation policy unless it graduates to a stable future.

### Stable

A stable feature is characterized as below:
- Supported as part of the supported releases of etcd.
-
 May be enabled by default.
- Discontinuation of support must follow the feature deprecation policy.

### Unsafe

Unsafe features are rare and listed under the `Unsafe feature:` section in the etcd usage documentation. By default, they are disabled. They should be used with caution following documentation. An unsafe feature can be removed in the next minor or major release without following the feature deprecation policy.

## Development Guidelines

### Adding a new feature

Any new enhancements to the etcd are typically added as an experimental feature. The general development requirements are listed below. They can be somewhat flexible depending on the scope of the feature and review discussions and will evolve over time.
- Open an issue
  - It must provide a clear need for the proposed feature.
  - It should list development work items as checkboxes. There must be one work item towards future graduation to a stable future.
  - Label the issue with `type/feature` and `experimental`.
  - Keep the issue open for tracking purposes until a decision is made on graduation.
- Open a Pull Request (PR)
  - Provide unit tests. Integration tests are also recommended as possible.
  - Provide robust e2e test coverage. If the feature being added is complicated or quickly needed, maintainers can decide to go with e2e tests for basic coverage initially and have robust coverage added at a later time before the feature graduation to the stable feature.
  - Provide logs for proper debugging.
  - Provide metrics and benchmarks as needed.
  - The Feature should be disabled by default.
  - Any configuration flags related to the implementation of the feature must be prefixed with `experimental` e.g. `--experimental-feature-name`.
  - Add a CHANGELOG entry.
- At least two maintainers must approve feature requirements and related code changes.

### Graduating an Experimental feature to Stable

It is important that experimental features don't get stuck in that stage.
They should be revisited and moved to the stable stage following the graduation steps as described here.

#### Locate graduation candidate
Decide if an experimental feature is ready for graduation to the stable stage.
- Find the issue that was used to enable the experimental feature initially. One way to find such issues is to search for issues with `type/feature` and `experimental` labels.
- Fix any known open issues against the feature.
- Make sure the feature was enabled for at least one previous release. Check the PR(s) reference from the issue to see when the feature-related code changes were merged.

#### Provide implementation
If an experimental feature is found ready for graduation to the stable stage, open a Pull Request (PR) with the following changes.
- Add robust e2e tests if not already provided.
- Add a new stable feature flag identical to the experimental feature flag but without the `--experimental` prefix.
- Deprecate the experimental feature following the [feature deprecation policy](#Deprecating-a-feature).
- Implementation must ensure that both the graduated and deprecated experimental feature flags work as expected. Note that both these flags will co-exist for the timeframe described in the feature deprecation policy.
- Enable the graduated feature by default if needed.

At least two maintainers must approve the work. Patch releases should not be considered for graduation.

### Deprecating a feature

#### Experimental
An experimental feature deprecates when it graduates to the stable stage.
- Add a deprecation message in the documentation of the experimental feature with a recommendation to use a related stable feature. e.g. `DEPRECATED. Use <feature-name> instead.`
- Add a `deprecated` label in the issue that was initially used to enable the experimental feature.

#### Stable
As the project evolves, a stable feature may sometimes need to be deprecated and removed. Such a situation should be handled using the steps below:
- Create an issue for tracking
 purposes.
- Add a deprecation message in the feature usage documentation before a planned release for feature deprecation. e.g. `To be deprecated in <release>.`. If a new feature replaces the `To be deprecated` feature, then also provide a message saying so. e.g. `Use <feature-name> instead.`.
- Deprecate the feature in the planned release with a message as part of the feature usage documentation. e.g. `DEPRECATED`. If a new feature replaces the deprecated feature, then also provide a message saying so. e.g. `DEPRECATED. Use <feature-name> instead.`.
- Add a `deprecated` label in the related issue.

Remove the deprecated feature in the following release. Close any related issue(s). At least two maintainers must approve the work. Patch releases should not be considered for deprecation.
# Set up the local cluster

For testing and development deployments, the quickest and easiest way is to configure a local cluster. For a production deployment, refer to the [clustering][clustering] section.

## Local standalone cluster

### Starting a cluster

Run the following to deploy an etcd cluster as a standalone cluster:

```
$ ./etcd
...
```

If the `etcd` binary is not present in the current working directory, it might be located either at `$GOPATH/bin/etcd` or at `/usr/local/bin/etcd`. Run the command appropriately.

The running etcd member listens on `localhost:2379` for client requests.

### Interacting with the cluster

Use `etcdctl` to interact with the running cluster:

1. Store an example key-value pair in the cluster:

```
$ ./etcdctl put foo bar
OK
```

If OK is printed, storing the key-value pair is successful.

2. Retrieve the value of `foo`:

```
$ ./etcdctl get foo
bar
```

If `bar` is returned, interaction with the etcd cluster is working as expected.

## Local multi-member cluster

### Starting a cluster

A `Procfile` at the base of the etcd git repository is provided to easily configure a local multi-member cluster. To start a multi-member cluster, navigate to the root of the etcd source tree and perform the following:

1. Install `goreman` to control Procfile-based applications:

```
$ go install github.com/mattn/goreman@latest
```

The installation will place executables in the $GOPATH/bin. If $GOPATH environment variable is not set, the tool will be installed into the $HOME/go/bin. Make sure that $PATH is set accordingly in your environment.

2. Start a cluster with `goreman` using etcd's stock Procfile:

```
$ goreman -f Procfile start
```

The members start running. They listen on `localhost:2379`, `localhost:22379`, and `localhost:32379` respectively for client requests.

### Interacting with the cluster

Use `etcdctl` to interact with the running cluster:

1. Print

the list of members:

```
$ etcdctl --write-out=table --endpoints=localhost:2379 member list
```

The list of etcd members is displayed as follows:

```
+------------------+---------+--------+------------------------+------------------------+
|       ID         | STATUS  |  NAME  |       PEER ADDRS       |      CLIENT ADDRS      |
+------------------+---------+--------+------------------------+------------------------+
| 8211f1d0f64f3269 | started | infra1 | http://127.0.0.1:2380  | http://127.0.0.1:2379  |
| 91bc3c398fb3c146 | started | infra2 | http://127.0.0.1:22380 | http://127.0.0.1:22379 |
| fd422379fda50e48 | started | infra3 | http://127.0.0.1:32380 | http://127.0.0.1:32379 |
+------------------+---------+--------+------------------------+------------------------+
```

2. Store an example key-value pair in the cluster:

```
$ etcdctl put foo bar
OK
```

If OK is printed, storing the key-value pair is successful.

### Testing fault tolerance

To exercise etcd's fault tolerance, kill a member and attempt to retrieve the key.

1. Identify the process name of the member to be stopped.

The `Procfile` lists the properties of the multi-member cluster. For example, consider the member with the process name, `etcd2`.

2. Stop the member:

```
# kill etcd2
$ goreman run stop etcd2
```

3. Store a key:

```
$ etcdctl put key hello
OK
```

```

4.  Retrieve the key that is stored in the previous step:

```
$ etcdctl get key
hello
```

5. Retrieve a key from the stopped member:

```
$ etcdctl --endpoints=localhost:22379 get key
```

The command should display an error caused by connection failure:

```
2017/06/18 23:07:35 grpc: Conn.resetTransport failed to create client transport: connection error: desc =
"transport: dial tcp 127.0.0.1:22379: getsockopt: connection refused"; Reconnecting to "localhost:22379"
Error:  grpc:
timed out trying to connect
```

6. Restart the stopped member:

```
$ goreman run restart etcd2
```

7. Get the key from the restarted member:

```
$ etcdctl --endpoints=localhost:22379 get key
hello
```

Restarting the member re-establishs the connection. `etcdctl` will now be able to retrieve the key successfully. To learn more about interacting with etcd, read [interacting with etcd section][interacting].

[clustering]: https://etcd.io/docs/latest/op-guide/clustering/
[interacting]: https://etcd.io/docs/latest/dev-guide/interacting_v3/
# Issue triage guidelines

## Purpose

Speed up issue management.

The `etcd` issues are listed at <https://github.com/etcd-io/etcd/issues> and are identified with labels. For example,
```

an issue that is identified as a bug will be set to the label `type/bug`.

The etcd project uses labels to indicate common attributes such as `area`, `type`, and `priority` of incoming issues.

New issues will often start without any labels, but typically `etcd` maintainers, reviewers, and members will add labels by following these triage guidelines. The detailed list of labels can be found at <https://github.com/etcd-io/etcd/labels>.

## Scope

This document serves as the primary guidelines for triaging incoming issues in `etcd`.

All contributors are encouraged and welcome to help manage issues which will help reduce the burden on project maintainers, though the work and responsibilities discussed in this document are created with `etcd` project reviewers and members in mind as these individuals will have
 triage access to the etcd project which is a requirement for actions like applying labels or closing issues.

Refer to [etcd community membership](https://github.com/etcd-io/etcd/blob/main/Documentation/contributor-guide/community-membership.md) for guidance on becoming an etcd project member or reviewer.

## Step 1 - Find an issue to triage

To get started you can use the following recommended issue searches to identify issues that are in need of triage:

* [Issues that have no labels](https://github.com/etcd-io/etcd/issues?q=is%3Aissue+is%3Aopen+sort%3Aupdated+no%3Alabel)
* [Issues created recently](https://github.com/etcd-io/etcd/issues?q=is%3Aissue+is%3Aopen+)
* [Issues not assigned but linked pr](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+no%3Aassignee+linked%3Apr)
* [Issues with no comments](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+comments%3A0+)
* [Issues with help wanted](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+label%3A%22help+wanted%22+)

## Step 2 - Check the issue is valid

Before we start adding labels or trying to work out a priority, our first triage step needs to be working out if the issue actually belongs to the etcd project and is not a duplicate.

### Issues that don't belong to etcd

Sometimes issues are reported that belong to other projects that `etcd` use. For example, `grpc` or `golang` issues. Such issues should be addressed by asking the reporter to open issues in the appropriate other projects.

These issues can generally be closed unless a maintainer and issue reporter see a need to keep it open for tracking purposes. If you have triage permissions please close it, alternatively mention the @etcd-io/members group to request a member with triage access to close the issue.

### Duplicate issues

If an issue is a duplicate, add a comment stating so along with a reference for the original issue and if you have triage permissions please close it, alternatively mention the @etcd-io/members
group to request a member with triage access close the issue.

## Step 3 - Apply the appropriate type of label

Adding a `type` label to an issue helps create visibility on the health of the project and helps contributors identify potential priorities, i.e. addressing existing bugs or test flakes before implementing new features.

### Support requests

As a general rule, the focus for etcd support is to address common themes in a broad way that helps all users, i.e. through channels like known issues, frequently asked questions, and high-quality documentation. To make the best use of project members time we should avoid providing 1:1 support if a broad approach is available.

Some people mistakenly use our GitHub bug report or feature request templates to file support requests. Usually, they are asking for help operating or configuring some aspect of etcd. Support requests for etcd should instead be raised as [discussions](https://github.com/etcd-io/etcd/discussions).

Common
types of support requests are:

1. Questions about configuring or operating existing well-documented etcd features, for example, <https://github.com/etcd-io/etcd/issues/15945>. Note - If an existing feature is not well documented please apply the `area/documentation` label and propose documentation improvements that would prevent future users from stumbling on the problem again.

2. Bug reports or questions about unsupported versions of etcd, for example <https://github.com/etcd-io/etcd/issues/15796>. When responding to these issues please refer to our [supported versions documentation](https://etcd.io/docs/latest/op-guide/versioning) and encourage the reporter to upgrade to a recent patch release of a supported version as soon as possible. We should limit the effort supporting users that do not make the effort to run a supported version of etcd or ensure their version is patched.

3. Bug reports that do not provide a complete list of steps to reproduce the issue and/or contributors
are not able to reproduce the issue, for example, <https://github.com/etcd-io/etcd/issues/15740>. We should limit the effort we put into reproducing issues ourselves and motivate users to provide the necessary information to accept the bug report.

4. General questions that are filed using feature request or bug report issue templates, for example, <https://github.com/etcd-io/etcd/issues/15914>. Note - These types of requests may surface good additions to our [frequently asked questions](https://etcd.io/docs/v3.5/faq).

If you identify that an issue is a support request please:

1. Add the `type/support` or `type/question` label.

2. Add the following comment to inform the issue creator that discussions should be used instead and that this issue will be converted to a discussion.

> Thank you for your question, this support issue will be moved to our [Discussion Forums](https://github.com/etcd-io/etcd/discussions).
>
> We are trying to consolidate the channels to which questions for help/support are posted so that we can improve our efficiency in responding to your requests, and make it easier for you to find answers to frequently asked questions and how to address common use cases.
>
> We regularly see messages posted in multiple forums, with the full response thread only in one place or, worse, spread across multiple forums. Also, the large volume of support issues on GitHub is making it difficult for us to use issues to identify real bugs.
>
> Members of the etcd community use Discussion Forums to field support requests. Before posting a new question, please search these for answers to similar questions, and also familiarize yourself with:
>
> 1. [user documentation](https://etcd.io/docs/latest)
> 2. [frequently asked questions](https://etcd.io/docs/v3.5/faq)
>
> Again, thanks for using etcd and raising this question.
>
> The etcd team

3. Finally, click `Convert to discussion` on the right-hand panel, selecting the appropriate discussion category.

### Bug reports

If an issue has been raised as a bug it should already have the `type/bug` label, however, if this is missing for an issue you determine to be a bug please add the label manually.

The next step is to validate if the issue is indeed a bug. If not, add a comment with the findings and close the trivial issue. For non-trivial issues, wait to hear back from the issue reporter and see if there is any objection. If the issue reporter does not reply in 30 days, close the issue.

If the problem can not be reproduced or requires more information, leave a comment for the issue reporter as soon as possible while the issue is fresh for the issue reporter.

### Feature requests

New feature requests should be created via the etcd feature request template and in theory already have the `type/feature` label, however, if this is missing for an issue you determine to be a feature please add the label manually.

### Test flakes

Test flakes

are a specific type of bug that the etcd project tracks separately as these are a priority to address. These should be created via the test flake template and in theory already have the `type/flake` label, however, if this is missing for an issue you determine to be related to a flaking test please add the label manually.

## Step 4 - Define the areas impacted

Adding an `area` label to an issue helps create visibility on which areas of the etcd project require attention and helps contributors find issues to work on relating to their particular skills or knowledge of the etcd codebase.

If an issue crosses multiple domains please add additional `area` labels to reflect that.

Below is a brief summary of the area labels in active use by the etcd project along with any notes on their use:

| Label | Notes |
| --- | --- |
| area/external | Tracking label for issues raised that are external to etcd. |
| area/community | |
| area/raft | |
| area/clientv3 | |
| area/performance | |
| area/security | |
| area/tls | |
| area/auth | |
| area/etcdctl | |
| area/etcdutl | |
| area/contrib | Not to be confused with `area/community` this label is specifically used for issues relating to community-maintained scripts or files in the `contrib/` directory which aren't part of the core etcd project. |
| area/documentation | |
| area/tooling | Generally used in relation to the third party / external utilities or tools that are used in various stages of the etcd build, test, or release process, for example, tooling to create sboms. |
| area/testing | |
| area/robustness-testing | |

## Step 5 - Prioritise the issue

If an issue lacks a priority label it has not been formally prioritized yet.

Adding a `priority` label helps the etcd project understand what is important and should be worked on now, and conversely, what is not as important and is on the project backlog.

|Priority label|What it means|Examples|
|---|---|---|
| `priority/critical-urgent` | Maintainers are responsible for making sure that these issues (in their area) are being actively worked oni.e., drop what you're doing. The stuff is burning. These should be fixed before the next release. | user-visible critical bugs in core features <br> broken builds on tier1 supported platforms <br> tests and critical security issues |

| `priority/important-soon` | Must be staffed and worked on either currently or very soonideally in time for the next release. | |
| `priority/important-longterm` | Important over the long term, but may not be currently staffed and/or may require multiple releases to complete. | |
| `priority/backlog`  | General agreement that this is a nice-to-have, but no one's available to work on it anytime soon. Community contributions would be most welcome in the meantime, though it might take a while to get them reviewed if reviewers are fully occupied with higher-priority issuesfor example, immediately before a release.| |
| `priority/awaiting-more-evidence`
 | Possibly useful, but not yet enough support to actually get it done. | Mostly placeholders for potentially good ideas, so that they don't get completely forgotten, and can be referenced or deduped every time they come up |

## Step 6 - Support new contributors

As part of the `etcd` triage process once the `kind` and `area` have been determined, please consider if the issue would be suitable for a less experienced contributor. The `good first issue` label is a subset of the `help wanted` label, indicating that members have committed to providing extra assistance for new contributors. All `good first issue` items also have the `help wanted` label.

### Help wanted

Items marked with the `help wanted` label need to ensure that they meet these criteria:

* **Low Barrier to Entry** - It should be easy for new contributors.

* **Clear** - The task is agreed upon and does not require further discussions in the community.

* **Goldilocks priority** - The priority
 should not be so high that a core contributor should do it, but not too low that it isnt useful enough for a core contributor to spend time reviewing it, answering questions, helping get it into a release, etc.

### Good first issue

Items marked with `good first issue` are intended for first-time contributors. It indicates that members will keep an eye out for these pull requests and shepherd it through our processes.

New contributors should not be left to find an approver, ping for reviews, decipher test commands, or identify that their build failed due to a flake. It is important to make new contributors feel welcome and valued. We should assure them that they will have an extra level of help with their first contribution.

After a contributor has successfully completed one or two `good first issue` items, they should be ready to move on to `help wanted` items.

* **No Barrier to Entry** - The task is something that a new contributor can tackle without advanced setup or domain knowledge.

*
 **Solution Explained** - The recommended solution is clearly described in the issue.

* **Gives Examples** - Link to examples of similar implementations so new contributors have a reference guide for their changes.

* **Identifies Relevant Code** - The relevant code and tests to be changed should be linked in the issue.

* **Ready to Test** - There should be existing tests that can be modified, or existing test cases fit to be copied. If the area of code doesnt have tests, before labeling the issue, add a test fixture. This prep often makes a great help wanted task!

## Step 7 - Follow up

Once initial triage has been completed, issues need to be re-evaluated over time to ensure they don't become stale incorrectly.

### Track important issues

If an issue is at risk of being closed by the stale bot in the future, but is an important issue for the etcd project, then please apply the `stage/tracked` label and remove any `stale` labels that exist. This will ensure the project does not lose sight of the issue.

### Close incomplete issues

Issues that lack enough information from the issue reporter should be closed if the issue reporter does not provide information in 30 days. Issues can always be re-opened at a later date if new information is provided.

### Check for incomplete work

If an issue owned by a developer has no pull request created in 30 days, contact the issue owner and kindly ask about the status of their work, or to release ownership on the issue if needed.
# Branch management

## Guide

* New development occurs on the [main branch][main].
* The main branch should always have a green build!
* Backwards-compatible bug fixes should target the main branch and subsequently be ported to stable branches.
* Once the main branch is ready for release, it will be tagged and become the new stable branch.

The etcd team has adopted a *rolling release model* and supports two stable versions of etcd.

### Main branch

The `main` branch is our development branch. All new features land here first.

To try new and experimental features, pull `main` and play with it. Note that `main` may not be stable because new features may introduce bugs.

Before the release of the next stable version, feature PRs will be frozen. A [release manager](./release.md#release-

management) will be assigned to the major/minor version and will lead the etcd community in testing, bug-fix, and documentation of the release for one to two weeks.

### Stable branches

All branches with
 the prefix `release-` are considered _stable_ branches.

After every minor release ([semver.org](https://semver.org/)), we will have a new stable branch for that release, managed by a [patch release manager](./release.md#release-management). We will keep fixing the backward-compatible bugs for the latest two stable releases. A _patch_ release to each supported release branch, incorporating any bug fixes, will be once every two weeks, given any patches.

[main]: https://github.com/etcd-io/etcd/tree/main
# PR management

## Purpose

Speed up PR management.

The `etcd` PRs are listed at https://github.com/etcd-io/etcd/pulls
A PR can have various labels, milestones, reviewers, etc. The detailed list of labels can be found at https://github.com/kubernetes/kubernetes/labels

Following are a few example searches on PR for convenience:
* [Open PRS for milestone etcd-v3.6](https://github.com/etcd-io/etcd/pulls?utf8=%E2%9C%93&q=is%3Apr+is%3Aopen+milestone%3Aetcd-v3.6)
* [PRs under investigation](https://github.com/etcd-io/etcd/labels/Investigating)

## Scope

These guidelines serve as a primary document for managing PRs in `etcd`. Everyone is welcome to help manage PRs but the work and responsibilities discussed in this document are created with `etcd` maintainers and active contributors in mind.

## Ensure tests are run

The etcd project use Kubernetes Prow and GitHub Actions to run tests. To ensure all required tests run if a pull request is ready for testing and still has the `needs-ok-to-test`
 label then please comment on the pull request `/ok-to-test`.

## Handle inactive PRs
Poke PR owner if review comments are not addressed in 15 days. If the PR owner does not reply in 90 days, update the PR with a new commit if possible. If not, inactive PR should be closed after 180 days.

## Poke reviewer if needed

Reviewers are responsive in a timely fashion, but considering everyone is busy, give them some time after

requesting a review if a quick response is not provided. If the response is not provided in 10 days, feel free to contact them via adding a comment in the PR or sending an email or message on Slack.

## Verify important labels are in place

Make sure that appropriate reviewers are added to the PR. Also, make sure that a milestone is identified. If any of these or other important labels are missing, add them. If a correct label cannot be decided, leave a comment for the maintainers to do so as needed.
# Roadmap

etcd uses GitHub milestones to track all tasks in each major or minor release. The `roadmap.md` file only records the
most important tasks for each release. The list is based on the current maintainer capacity that may shift over time. Proposed milestones are what we think we can deliver with the people we have. If we have more support on the important
stuff, we could pick up more items from the backlog. Note that etcd will continue to mainly focus on technical debt over
the next few major or minor releases.

Each item has an assigned priority. Refer to [priority definitions](https://github.com/etcd-io/etcd/blob/main/Documentation/contributor-guide/triage_issues.md#step-5---prioritise-the-issue).

## v3.6.0

For a full list of tasks in `v3.6.0`, please see [milestone etcd-v3.6](https://github.com/etcd-io/etcd/milestone/38).

| Title | Priority | Status | Note |
|---|---|---|---|
| [Support downgrade](https://github.com/etcd-io/etcd/issues/11716) | priority/important-soon | In progress | etcd will support downgrade starting from 3.6.0. But it will also support offline downgrade from 3.5 to 3.4. |
| [StoreV2 deprecation](https://github.com/etcd-io/etcd/issues/12913) | priority/important-soon | In progress | This task will be covered in both 3.6 and 3.7. |
| [Release raft 3.6.0](https://github.com/etcd-io/raft/issues/89) | priority/important-soon | Not started | etcd 3.6.0 will depends on raft 3.6.0 |
| [Release bbolt 1.4.0](https://github.com/etcd-io/bbolt/issues/553) | priority/important-soon | Not started | etcd 3.6.0 will depends on bbolt 1.4.0 |
| [Support /livez and /readyz endpoints](https://github.com/etcd-io/etcd/issues/16007) | priority/important-longterm | In progress | It provides clearer APIs, and can also work around the stalled writes issue |
| [Bump gRPC](https://github.com/etcd-io/etcd/issues/16290) | priority/important-longterm | Completed | It isn't guaranteed to be resolved in 3.6, and might be postponed to 3.7 depending on the effort and risk. |
| [Deprecate grpc-gateway

or bump it](https://github.com/etcd-io/etcd/issues/14499) | priority/important-longterm | Completed | It isn't guaranteed to be resolved in 3.6, and might be postponed to 3.7 depending on the effort and risk. |
| [bbolt: Add logger into bbolt](https://github.com/etcd-io/bbolt/issues/509) | priority/important-longterm | Completed | It's important to diagnose bbolt issues |
| [bbolt: Add surgery commands](https://github.com/etcd-io/bbolt/issues/370) | priority/important-longterm | Completed | Surgery commands are important for fixing corrupted db files |
| [Evaluate and (Gradulate or deprecate/remove) experimental features](https://github.com/etcd-io/etcd/issues/16292) | priority/backlog | Not started | This task will be covered in both 3.6 and 3.7. |

## v3.7.0

For a full list of tasks in `v3.7.0`, please see [milestone etcd-v3.7](https://github.com/etcd-io/etcd/milestone/39).

| Title | Priority | Note |
|---|---|---|
| [StoreV2 deprecation](https://github.com/etcd-io/etcd/issues/12913) | P0 | Finish the remaining tasks 3.7. |
| [Refactor lease: Lease might be revoked by mistake by old leader](https://github.com/etcd-io/etcd/issues/15247) | P1 | to be investigated & discussed |
| [Integrate raft's new feature (async write) into etcd](https://github.com/etcd-io/etcd/issues/16291) | P1 | It should improve the performance |
| [bbolt: Support customizing the bbolt rebalance threshold](https://github.com/etcd-io/bbolt/issues/422) | P2 | It may get rid of etcd's defragmentation. Both bbolt and etcd need to be changed. |
| [Evaluate and (graduate or deprecate/remove) experimental features](https://github.com/etcd-io/etcd/issues/16292) | P2 | Finish the remaining tasks 3.7. |

## Backlog (future releases)

| Title | Priority | Note |
|---|---|---|
| [Remove the dependency on grpc-go's experimental API](https://github.com/etcd-io/etcd/issues/15145) | | |
| [Protobuf: cleanup both golang/protobuf and gogo/protobuf](https://github.com/etcd-io/etcd/issues/14533) | | |
| [Proposals should include a merkle root](https://github.com/etcd-io/etcd/issues/13839) | | |
| [Add Distributed Tracing using OpenTelemetry](https://github.com/etcd-io/etcd/issues/12460) | | |
| [Support CA rotation](https://github.com/etcd-io/etcd/issues/11555) | | |
| [bbolt: Migrate all commands to cobra style commands](https://github.com/etcd-io/bbolt/issues/472) | | |
| [raft: enhance the configuration change validation](https://github.com/etcd-io/raft/issues/80) | | |

# Release

The guide talks about how to release a new version of etcd.

The procedure includes some manual steps for sanity checking, but it can probably be further scripted. Please keep this document up-to-date if making changes to the release process.

## Release management

The following pool of release candidates manages the release of each etcd major/minor version as well as manages patches
to each stable release branch. They are responsible for communicating the timelines and status of each release and for ensuring the stability of the release branch.

- Benjamin Wang [@ahrtr](https://github.com/ahrtr)
- James Blair [@jmhbnz](https://github.com/jmhbnz)
- Marek Siarkowicz [@serathius](https://github.com/serathius)
- Sahdev Zala [@spzala](https://github.com/spzala)
- Wenjia Zhang [@wenjiaswe](https://github.com/wenjiaswe)

All release version numbers follow the format of [semantic versioning 2.0.0](http://semver.org/).

### Major, minor version release, or its pre-release

- Ensure
 the relevant [milestone](https://github.com/etcd-io/etcd/milestones) on GitHub is complete. All referenced issues should be closed or moved elsewhere.
- Ensure the latest [upgrade documentation](https://etcd.io/docs/next/upgrades) is available.
- Bump [hardcoded MinClusterVerion in the repository](https://github.com/etcd-io/etcd/blob/v3.4.15/version/version.go#L29), if necessary.
- Add feature capability maps for the new version, if necessary.

### Patch version release

- To request a backport, developers submit cherry-pick PRs targeting the release branch. The commits should not include merge commits. The commits should be restricted to bug fixes and security patches.
- The cherrypick PRs should target the appropriate release branch (`base:release-<major>-<minor>`). The k8s infra cherry pick robot `/cherrypick <branch>` PR chatops command may be used to automatically generate cherrypick PRs.
- The release patch manager reviews the cherrypick PRs. Please discuss carefully what is backported
 to the patch release. Each patch release should be strictly better than its predecessor.
- The release patch manager will cherry-pick these commits starting from the oldest one into stable branch.

## Write a release note

- Write an introduction for the new release. For example, what major bug we fix, what new features we introduce, or what performance improvement we make.
- Put `[GH XXXX]` at the head of the change line to reference the Pull Request that introduces the change.

Moreover, add a link on it to jump to the Pull Request.
- Find PRs with the `release-note` label and explain them in the `NEWS` file, as a straightforward summary of changes for end-users.

## Patch release criteria

The etcd project aims to release a new patch version if any of the following conditions are met:

- Fixed one or more major CVEs (>=7.5).
- Fixed one or more critical bugs.
- Fixed three or more major bugs.
- Fixed five or more minor bugs.

## Release guide

### Prerequisites

There are some
 prerequisites, which should be done before the release process. These are one-time operations,
which don't need to be executed before releasing each version.
1. Generate a GPG key and add it to your GitHub account. Refer to the links on
[settings](https://github.com/settings/keys).
2. Ensure you have a Linux machine, on which the git, Golang, and docker have been installed.
   - Ensure the Golang version matches the version defined in `.go-version` file.
   - Ensure non-privileged users can run docker commands, refer to the [Linux
postinstall](https://docs.docker.com/engine/install/linux-postinstall/).
   - Ensure there is at least 5GB of free space on your Linux machine.
3. Install gsutil, refer to [gsutil_install](https://cloud.google.com/storage/docs/gsutil_install). When asked about cloud project to use, pick `etcd-development`.
4. Authenticate the image registry, refer to [Authentication methods](https://cloud.google.com/container-registry/docs/advanced-authentication).
  - `gcloud
 auth login`
  - `gcloud auth configure-docker`
5. Install gh, refer to [GitHub's documentation](https://github.com/cli/cli#installation). Ensure that running
  `gh auth login` succeeds for the GitHub account you use to contribute to etcd,
  and that `gh auth status` has a clean exit and doesn't show any issues.

### Release steps

1. Raise an issue to publish the release plan, e.g. [issues/17350](https://github.com/etcd-io/etcd/issues/17350).
2. Raise a `kubernetes/org` pull request to temporarily elevate permissions for the GitHub release team.
3. Once permissions are elevated, temporarily relax [branch protections](https://github.com/etcd-io/etcd/settings/branches) to allow pushing changes directly to `release-*` branches in GitHub.
4. Verify you can pass the authentication to the image registries,
  - `docker login gcr.io`
  - `docker login quay.io`
    - If the release person doesn't have access to 1password, one of the owners (@ahrtr, @ivanvc, @jmhbnz,

@serathius) needs
 to share the password with them per [this guide](https://support.1password.com/share-items/). See rough steps below,
    - [Sign in](https://team-etcd.1password.com/home) to your account on 1password.com.
    - Click `Your Vault Items` on the right side.
    - Select `Password of quay.io`.
    - Click `Share` on the top right, and set expiration as `1 hour` and only available to the release person using his/her email.
    - Click `Copy Link` then send the link to the release person via slack or email.
5. Clone the etcd repository and checkout the target branch,
  - `git clone --branch release-3.X git@github.com:etcd-io/etcd.git`
6. Run the release script under the repository's root directory, replacing `${VERSION}` with a value without the `v` prefix, i.e. `3.5.13`.
  - `DRY_RUN=false ./scripts/release.sh ${VERSION}`
  - **NOTE:** When doing a pre-release (i.e., a version from the main branch, 3.6.0-alpha.2), you will need to explicitly set the branch to main:

  ```
    DRY_RUN=false BRANCH=main ./scripts/release.sh ${VERSION}
    ```

  It generates all release binaries under the directory `/tmp/etcd-release-${VERSION}/etcd/release/` and images. Binaries are pushed to the Google Cloud bucket
  under project `etcd-development`, and images are pushed to `quay.io` and `gcr.io`.
7. Publish the release page on GitHub
  - Open the **draft** release URL shown by the release script
  - Click the pen button at the top right to edit the release
  - Review that it looks correct, reviewing that the bottom checkboxes are checked depending on the
    release version (v3.4 no checkboxes, v3.5 has the set as latest release checkbox checked,
    v3.6 has the set as pre-release checkbox checked)
  - Then, publish the release
8. Announce to the etcd-dev googlegroup

  Follow the format of previous release emails sent to etcd-dev@googlegroups.com, see an example below. After sending out the email, ask one of the mailing list maintainers to approve the
 email from the pending list. Additionally, label the release email as `Release`.

```text
Hello,

etcd v3.4.30 is now public!

https://github.com/etcd-io/etcd/releases/tag/v3.4.30

Thanks to everyone who contributed to the release!

etcd team
```

9. Update the changelog to reflect the correct release date.
10. Paste the release link to the issue raised in Step 1 and close the issue.
11. Restore standard branch protection settings and raise a follow-up `kubernetes/org` pull request to return to least privilege permissions.
12. Crease a new stable branch through `git push origin release-${VERSION_MAJOR}.${VERSION_MINOR}` if this is a new major or minor stable release.
13. Re-generate a new password for quay.io if needed (e.g. shared to a contributor who isn't in the release team, and we should rotate the password at least once every 3 months).

#### Release known issues

1. Timeouts pushing binaries - If binaries fail to fully upload to Google Cloud storage, the script must be re-run using the same command. Any artifacts that are already pushed will be overwritten to ensure they are correct. The storage bucket does not use object versioning so incorrect files cannot remain.

2. Timeouts pushing images - It is rare, although possible for connection timeouts to occur when publishing etcd release images to `quay.io` or `gcr.io`. If this occurs, it is known to be safe to rerun the release script command appending the `--no-upload` flag, and image uploads will gracefully resume.

3. GPG vs SSH signing - The release scripts assume that git tags will be signed with a GPG key. Since 2022 GitHub has supported [signing commits and tags using ssh](https://github.blog/changelog/2022-08-23-ssh-commit-verification-now-supported). Until further release script updates are completed you will need to disable this feature in your `~/.gitconfig` and revert to signing via GPG to perform etcd releases.
# Golang modules

The etcd project (since version 3.5) is organized into multiple
[golang modules](https://golang.org/ref/mod) hosted in a [single repository](https://golang.org/ref/mod#vcs-dir).

![modules graph](modules.svg)

There are the following modules:

- **go.etcd.io/etcd/api/v3** - contains API definitions
(like protos & proto-generated libraries) that defines communication protocol
between etcd clients and servers.

- **go.etcd.io/etcd/pkg/v3** - a collection of utility packages used by etcd
without being specific to etcd itself. A package belongs here
only if it could possibly be moved out into its own repository in the future.
Please avoid adding here code that has a lot of dependencies on its own, as
they automatically become dependencies of the client library
(that we want to keep lightweight).

- **go.etcd.io/etcd/client/v3** - client library used to contact etcd over
the network (grpc). Recommended for all new usage of etcd.

- **go.etcd.io/raft/v3**

- implementation of distributed consensus
protocol. Should have no etcd specific code. Hosted in a separate repository:
https://github.com/etcd-io/raft.

- **go.etcd.io/etcd/server/v3** - etcd implementation.
The code in this package is internal to etcd and should not be consumed
by external projects. The package layout and API can change within the minor versions.

- **go.etcd.io/etcd/etcdctl/v3** - a command line tool to access and manage etcd.

- **go.etcd.io/etcd/tests/v3** - a module that contains all integration tests of etcd.
  Notice: All unit tests (fast and not requiring cross-module dependencies)
  should be kept in the local modules of the code under the test.

- **go.etcd.io/bbolt** - implementation of persistent b-tree.
  Hosted in a separate repository: https://github.com/etcd-io/bbolt.

### Operations

1. All etcd modules should be released in the same versions, e.g.
  `go.etcd.io/etcd/client/v3@v3.5.10` must depend on `go.etcd.io/etcd/api/v3@v3.5.10`.

  The consistent updating of versions can be performed using:
  ```shell script
  % DRY_RUN=false TARGET_VERSION="v3.5.10" ./scripts/release_mod.sh update_versions
  ```
2. The released modules should be tagged according to https://golang.org/ref/mod#vcs-version rules,
  i.e. each module should get its own tag.
  The tagging can be performed using:
  ```shell script
  % DRY_RUN=false REMOTE_REPO="origin" ./scripts/release_mod.sh push_mod_tags
  ```

3. All etcd modules should depend on the same versions of underlying dependencies.
  This can be verified using:
  ```shell script
  % PASSES="dep" ./test.sh
  ```

4. The go.mod files must not contain dependencies not being used and must
  conform to `go mod tidy` format.
  This is being verified by:
  ```
  % PASSES="mod_tidy" ./test.sh
  ```

5. To trigger actions across all modules (e.g. auto-format all files), please

use/expand the following script:
```shell script
% ./scripts/fix.sh
```

###
Future

As a North Star, we would like to evaluate etcd modules towards the following model:

![modules graph](modules-future.svg)

This assumes:
- Splitting etcdmigrate/etcdadm out of etcdctl binary.
  Thanks to this etcdctl would become clearly a command-line wrapper
  around network client API,
  while etcdmigrate/etcdadm would support direct physical operations on the
  etcd storage files.
- Splitting etcd-proxy out of ./etcd binary, as it contains more experimental code
  so carries additional risk & dependencies.
- Deprecation of support for v2 protocol.

# Reporting bugs

If any part of the etcd project has bugs or documentation mistakes, please let us know by [opening an issue][etcd-issue]. We treat bugs and mistakes very seriously and believe no issue is too small. Before creating a bug report, please check that an issue reporting the same problem does not already exist.

To make the bug report accurate and easy to understand, please try to create bug reports that are:

- Specific. Include as many details as possible: which version, what environment, what configuration, etc. If the bug is related to running the etcd server, please attach the etcd log (the starting log with the etcd configuration is especially important).

- Reproducible. Include the steps to reproduce the problem. We understand some issues might be hard to reproduce, please include the steps that might lead to the problem. If possible, please attach the affected etcd data dir and stack trace to the bug report.

- Isolated. Please try to isolate and reproduce the bug with
  minimum dependencies. It would significantly slow down the speed to fix a bug if too many dependencies are involved in a bug report. Debugging external systems that rely on etcd is out of scope, but we are happy to provide guidance in the right direction or help with using etcd itself.

- Unique. Do not duplicate existing bug reports.

- Scoped. One bug per report. Do not follow up with another bug inside one report.

It may be worthwhile to read [Elika Etemads article on filing good bug reports][filing-good-bugs] before creating a bug report.

We might ask for further information to locate a bug. A duplicated bug report will be closed.

## Frequently asked questions

### How to get a stack trace

```bash
$ kill -QUIT $PID
```

### How to get the etcd version

```bash
$ etcd --version
```

### How to get etcd configuration and log when it runs as systemd service etcd2.service

```bash
$ sudo systemctl cat etcd2
$ sudo journalctl -u etcd2
```

Due to an upstream systemd bug, journald
may miss the last few log lines when its processes exit. If journalctl says etcd stopped without a fatal or panic message, try `sudo journalctl -f -t etcd2` to get the full log.

[etcd-issue]: https://github.com/etcd-io/etcd/issues/new
[filing-good-bugs]: http://fantasai.inkedblade.net/style/talks/filing-good-bugs/
# Community membership

This doc outlines the various responsibilities of contributor roles in etcd.

| Role | Responsibilities | Requirements | Defined by |
|---|---|---|---|
| Member | Active contributor in the community | Sponsored by 2 reviewers and multiple contributions | etcd GitHub org member |
| Reviewer | Review contributions from other members | History of review and authorship | [OWNERS] file reviewer entry |
| Maintainer | Set direction and priorities for the project | Demonstrated responsibility and excellent technical judgement | [OWNERS] file approver entry |

## New contributors

New contributors should be welcomed to the community by existing members,

helped with
PR workflow, and directed to relevant documentation and
communication channels.

## Established community members

Established community members are expected to demonstrate their adherence to the
principles in this document, familiarity with project organization, roles,
policies, procedures, conventions, etc., and technical and/or writing ability.
Role-specific expectations, responsibilities, and requirements are enumerated
below.

## Member

Members are continuously active contributors to the community. They can have
issues and PRs assigned to them. Members are expected to remain active
contributors to the community.

**Defined by:** Member of the etcd GitHub organization.

### Requirements

- Enabled [two-factor authentication] on their GitHub account
- Have made multiple contributions to the project or community. Contribution may include, but is not limited to:
  - Authoring or reviewing PRs on GitHub. At least one PR must be **merged**.
  - Filing or commenting on issues on
GitHub
  - Contributing to community discussions (e.g. meetings, Slack, email discussion
    forums, Stack Overflow)
- Subscribed to [etcd-dev@googlegroups.com](https://groups.google.com/g/etcd-dev)
- Have read the [contributor guide]
- Sponsored by two active maintainers or reviewers.
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
  - With no objections from other maintainers
- Open a [membership nomination] issue against the `kubernetes/org` repo
  - Ensure your sponsors are @mentioned on the issue
  - Make sure that the list of contributions included is representative of your work on the project.
- Members can be removed by a supermajority of the maintainers or can resign by notifying
the maintainers.

### Responsibilities and privileges

- Responsive to issues and PRs assigned to them
- Granted "triage access" to etcd project
- Active owner of code they have contributed (unless ownership is explicitly transferred)
  - Code is well-tested
  - Tests consistently pass
  - Addresses bugs or issues discovered after code is accepted

**Note:** Members who frequently contribute code are expected to proactively perform code reviews and work towards becoming a *reviewer*.

## Reviewers

Reviewers are contributors who have demonstrated greater skill in reviewing the code from other contributors. They are knowledgeable about both the codebase and software engineering principles. Their LGTM counts towards merging a code change into the project. A reviewer is generally on the ladder towards maintainership.

**Defined by:** *reviewers* entry in the [OWNERS] file.

### Requirements

- member for at least 3 months.
- Primary reviewer for at least 5 PRs to the codebase.
- Reviewed or contributed at least 20 substantial PRs to the codebase.
- Knowledgeable about the codebase.
- Sponsored by two active maintainers.
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
  - With no objections from other maintainers
- Reviewers can be removed by a supermajority of the maintainers or can resign by notifying the maintainers.

### Responsibilities and privileges

- Code reviewer status may be a precondition to accepting large code contributions
- Responsible for project quality control via code reviews
  - Focus on code quality and correctness, including testing and factoring
  - May also review for more holistic issues, but not a requirement
- Expected to be responsive to review requests
- Assigned PRs to review related to area of expertise
- Assigned test bugs related to area of expertise
- Granted "triage access" to etcd project

## Maintainers

Maintainers are first and foremost contributors who have shown they are committed to the long-term success of a project. Maintainership is about building trust with the current maintainers and being a person that they can depend on to make decisions in the best interest of the project in a consistent manner.

**Defined by:** *approvers* entry in the [OWNERS] file.

### Requirements

- Deep understanding of the technical goals and direction of the project
- Deep understanding of the technical domain of the project
- Sustained contributions to design and direction by doing all of:
  - Authoring and reviewing proposals
  - Initiating, contributing, and resolving discussions (emails, GitHub issues, meetings)
  - Identifying subtle or complex issues in the designs and implementation of PRs
- Directly contributed to the project through implementation and/or review
- Sponsored by two active maintainers and elected by supermajority
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
- To become a maintainer send an email with your candidacy to etcd-maintainers-private@googlegroups.com
  - Ensure your sponsors are @mentioned in the email
  - Include a list of contributions representative of your work on the project.
  -

Existing maintainers vote will privately and respond to the email with either acceptance or feedback for suggested improvement.

- With your membership approved you are expected to:
- Open a PR and add an entry to the [OWNERS] file
- Subscribe to etcd-maintainers@googlegroups.com and etcd-maintainers-private@googlegroups.com
- Request to join [etcd-maintainer teams of etcd organization of GitHub](https://github.com/orgs/etcd-io/teams/maintainers-etcd)
- Request to join the private slack channel for etcd maintainers on [kubernetes slack](http://slack.kubernetes.io/)
- Request access to etcd-development GCP project where we publish releases
- Request access to passwords shared between maintainers

### Responsibilities and privileges

- Make and approve technical design decisions
- Set technical direction and priorities
- Define milestones and releases
- Mentor and guide reviewers, and contributors to the project.
- Participate when called upon in the [security disclosure and release process]
- Ensure the continued health of the project
  - Adequate test coverage to confidently release
  - Tests are passing reliably (i.e. not flaky) and are fixed when they fail
- Ensure a healthy process for discussion and decision-making is in place.
- Work with other maintainers to maintain the project's overall health and success holistically

### Retiring

Life priorities, interests, and passions can change. Maintainers can retire and move to [emeritus maintainers]. If a maintainer needs to step down, they should inform other maintainers and, if possible, help find someone to pick up the related work. At the very least, ensure the related work can be continued. Afterward, they can remove themselves from the list of existing maintainers.

If a maintainer has not been performing their duties for 12 months,
they can be removed by other maintainers. In that case, the inactive maintainer will
be first notified via an email. If the situation doesn't improve, they will be
removed.
If an emeritus maintainer wants to regain an active role, they can do
so by renewing their contributions. Active maintainers should welcome such a move.
Retiring other maintainers or regaining the status should require the approval
of at least two active maintainers.

## Acknowledgements

Contributor roles and responsibilities were written based on [Kubernetes community membership]

[OWNERS]: /OWNERS
[contributor guide]: /CONTRIBUTING.md
[membership nomination]: https://github.com/kubernetes/org/issues/new?assignees=&labels=area%2Fgithub-membership&projects=&template=membership.yml&title=REQUEST%3A+New+membership+for+%3Cyour-GH-handle%3E
[Kubernetes community membership]: https://github.com/kubernetes/community/blob/master/community-membership.md
[emeritus maintainers]: /README.md#etcd-emeritus-maintainers
[security disclosure and release process]: /security/README.md
[two-factor authentication]: https://docs.github.com/en/authentication/securing-your-account-with-two-factor-authentication-2fa/about-two-factor-authentication

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# Logging Conventions

etcd uses the [zap][zap] library for logging application output categorized into *levels*. A log message's level is determined according to these conventions:

* Debug: Everything is still fine, but even common operations may be logged, and less helpful but more quantity of

notices. Usually not used in production.
 * Examples:
   * Send a normal message to a remote peer
   * Write a log entry to disk

* Info: Normal, working log information, everything is fine, but helpful notices for auditing or common operations. Should rather not be logged more frequently than once per a few seconds in a normal server's operation.
 * Examples:
   * Startup configuration
   * Start to do a snapshot

* Warning: (Hopefully) Temporary conditions that may cause errors, but may work fine. A replica disappearing (that may reconnect) is a warning.
 * Examples:
   * Failure to send a raft message to a remote peer
   * Failure to receive heartbeat message within the configured election
 timeout

* Error: Data has been lost, a request has failed for a bad reason, or a required resource has been lost.
 * Examples:
   * Failure to allocate disk space for WAL

* Panic: Unrecoverable or unexpected error situation that requires stopping execution.
 * Examples:
   * Failure to create the database

* Fatal: Unrecoverable or unexpected error situation that requires immediate exit. Mostly used in the test.
 * Examples:
   * Failure to find the data directory
   * Failure to run a test function

[zap]: https://github.com/uber-go/zap
# Dependency management

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## Main branch

The dependabot is enabled & [configured](https://github.com/etcd-io/etcd/blob/main/.github/dependabot.yml) to manage dependencies for etcd `main` branch. But dependabot doesn't work well for multi-module repository like `etcd`,
see [dependabot-core/issues/6678](https://github.com/dependabot/dependabot-core/issues/6678).
Usually, human intervention is required
each time when dependabot automatically opens some PRs to bump dependencies.
Please see the guidance below.

### Dependencies used in workflows

The PRs that automatically bump dependencies (see examples below) used in workflows are fine and can be approved & merged directly as long as all checks are successful.

- [build(deps): bump github/codeql-action from 2.2.11 to 2.2.12](https://github.com/etcd-io/etcd/pull/15736)
- [build(deps): bump actions/checkout from 3.5.0 to 3.5.2](https://github.com/etcd-io/etcd/pull/15735)
- [build(deps): bump ossf/scorecard-action from 2.1.2 to 2.1.3](https://github.com/etcd-io/etcd/pull/15607)

### Bumping order

When multiple etcd modules depend on the same package, please bump the package version for all the modules in the correct order. The rule is simple:
if module A depends on module B, then bump the dependency for module B before module A. If the two modules do not depend on each other, then
it doesn't matter to bump which module first. For
example, multiple modules depend on `github.com/spf13/cobra`, so we need to bump the dependency
in the following order,

- go.etcd.io/etcd/pkg/v3
- go.etcd.io/etcd/server/v3
- go.etcd.io/etcd/etcdctl/v3
- go.etcd.io/etcd/etcdutl/v3
- go.etcd.io/etcd/tests/v3
- go.etcd.io/etcd/v3
- go.etcd.io/etcd/tools/v3

For more details about etcd Golang modules, please check <https://etcd.io/docs/next/dev-internal/modules>

Note the module `go.etcd.io/etcd/tools/v3` doesn't depend on any other modules, nor by any other modules, so it doesn't matter when to bump dependencies for it.

### Steps to bump a dependency

Use the `github.com/spf13/cobra` as an example, follow the steps below to bump it from 1.6.1 to 1.7.0 for module `go.etcd.io/etcd/etcdctl/v3`,

```bash
cd ${ETCD_ROOT_DIR}/etcdctl
```

```
go get github.com/spf13/cobra@v1.7.0
go mod tidy
cd ..
./scripts/fix.sh
```

Execute the same steps for all other modules. When you finish bumping the dependency for all modules, then commit the change,

```bash
git
 add .
git commit --signoff -m "dependency: bump github.com/spf13/cobra from 1.6.1 to 1.7.0"
```

Please close the related PRs which were automatically opened by dependabot.

When you bump multiple dependencies in one PR, it's recommended to create a separate commit for each dependency. But it isn't a must; for example,
you can get all dependencies bumping for the module `go.etcd.io/etcd/tools/v3` included in one commit.

#### Troubleshooting

In an event of bumping the version of protoc, protoc plugins or grpc-gateway, it might change `*.proto` file which can result in the following error:

```bash
[0;31mFAIL: 'genproto' FAILED at Wed Jul 31 07:09:08 UTC 2024
make: *** [Makefile:134: verify-genproto] Error 255
```

To fix the above error, run the following script from the root of etcd repository:

```bash
./scripts/genproto.sh
```

### Indirect dependencies

Usually, we don't bump a dependency if all modules just indirectly depend on it, such as `github.com/go-logr/logr`.

If
 an indirect dependency (e.g. `D1`) causes any CVE or bugs that affect etcd, usually the module (e.g. `M1`, not part of etcd, but used by etcd)
which depends on it should bump the dependency (`D1`), and then etcd just needs to bump `M1`. However, if the module (`M1`) somehow doesn't
bump the problematic dependency, then etcd can still bump it (`D1`) directly following the same steps above. But as a long-term solution, etcd should

try to remove the dependency on such module (`M1`) that lack maintenance.

For mixed cases, in which some modules directly while others indirectly depend on a dependency, we have multiple options,

- Bump the dependency for all modules, no matter it's direct or indirect dependency.
- Bump the dependency only for modules that directly depend on it.

We should try to follow the first way, and temporarily fall back to the second one if we run into any issue on the first way. Eventually we
should fix the issue and ensure all modules depend on the same version of the
dependency.

### Known incompatible dependency updates

#### arduino/setup-protoc

Please refer to [build(deps): bump arduino/setup-protoc from 1.3.0 to 2.0.0](https://github.com/etcd-io/etcd/pull/16016)

### Rotation worksheet

The dependabot scheduling interval is weekly; it means dependabot will automatically raise a bunch of PRs per week.
Usually, human intervention is required each time. We have a [rotation worksheet](https://docs.google.com/spreadsheets/d/1jodHIO7Dk2VWTs1IRnfMFaRktS9IH8XRyifOnPdSY8I/edit#gid=1394774387),
and everyone is welcome to participate; you just need to register your name in the worksheet.

## Stable branches

Usually, we don't proactively bump dependencies for stable releases unless there are any CVEs or bugs that affect etcd.

If we have to do it, then follow the same guidance above. Note that there is no `./scripts/fix.sh` in release-3.4, so no need to
execute it for 3.4.

## Golang versions

The etcd project aims to maintain a development branch that
is on the latest [Go version](https://go.dev/dl), ideally, this will align with the Go version in use for Kubernetes project development. For an example of how to update etcd to a new minor release of Go refer to issue <https://github.com/etcd-io/etcd/issues/16393> and the linked pull requests.

Suggested steps for performing a minor version upgrade for the etcd development branch:

1. Carefully review new Go version release notes and potentially related blog posts for any deprecations,

performance impacts, or other considerations.
2. Create a GitHub issue to signal intent to upgrade and invite discussion, for example, <https://github.com/etcd-io/etcd/issues/16393>.
3. Complete the upgrade locally in your development environment by editing `.go-version` and running `make fix`.
4. Run performance benchmarks locally to compare before and after.
5. Raise a pull request for the changes, for example, <https://github.com/etcd-io/etcd/pull/16394>.

Stable etcd release branches will be maintained
 to stay on the latest patch release of a supported Go version. Upgrading minor versions will be completed before the minor version in use currently is no longer supported. Refer to the [Go release
policy](https://go.dev/doc/devel/release).

For an example of how to update etcd to a new patch release of Go refer to issue <https://github.com/etcd-io/etcd/issues/16343> and the linked pull requests.

References:

- <https://github.com/kubernetes/sig-release/blob/master/release-engineering/handbooks/go.md>

## Core dependencies mappings

[bbolt](https://github.com/etcd-io/bbolt) and [raft](https://github.com/etcd-io/raft) are two core dependencies of etcd.

Both etcd 3.4.x and 3.5.x depend on bbolt 1.3.x, and etcd 3.6.x (`main` branch) depends on bbolt 1.4.x.

raft is included in the etcd repository for release-3.4 and release-3.5 branches, so etcd 3.4.x and 3.5.x do not depend on any
external raft module. We moved raft into [a separate repository](https://github.com/etcd-io/raft) starting
 from 3.6 (`main` branch), and the first raft
release will be v3.6.0, so etcd 3.6.x will depend on raft 3.6.x.

Please see the table below:

| etcd versions | bbolt versions | raft versions |
|---|---|---|
| 3.4.x | v1.3.x | N/A |
| 3.5.x | v1.3.x | N/A |
| 3.6.x | v1.4.x | v3.6.x |

# 1.1838 reflectwalk 1.0.2

## 1.1838.1 Available under license :

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# 1.1839 libpng 2:1.6.37-12.el9

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pnm2png / png2pnm --- conversion from PBM/PGM/PPM-file to PNG-file

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```
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/* Extract the last component (base name) of a file name.

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#ifndef _BASENAME_LGPL_H
#define _BASENAME_LGPL_H

#include <stddef.h>

#ifndef DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif


/*
```

```
 Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
          FILENAME      RESULT
          "foo.c"       "foo.c"
          "foo/bar.c"   "bar.c"
          "/foo/bar.c"  "bar.c"
          "foo/bar/"    "bar/"
          "foo/bar//"   "bar//"
          "/"           ""
          "//"          ""
          ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(), defined in <string.h>, does
      not consider trailing slashes to be part of the component:

 FILENAME      RESULT
          "foo/bar/"    ""
          "foo/bar//"   ""
    * The 'basename' command eliminates trailing slashes and for a root
      produces a non-empty result:
          FILENAME      RESULT
          "foo/bar/"    "bar"
          "foo/bar//"   "bar"
          "/"           "/"
          "//"          "/"
*/
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;



#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
```

# 1.1841 image-spec 1.1.1

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# 1.1842 mapstructure 2.4.0

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package spec

// License information for the exposed API.
//
// For more information: http://goo.gl/8us55a#licenseObject
type License struct {
 Name string `json:"name,omitempty"`
 URL  string `json:"url,omitempty"`
}
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package spec

import "testing"

```
func TestIntegrationLicense(t *testing.T) {
 license := License{Name: "the name", URL: "the url"}
 const licenseJSON = `{"name":"the name","url":"the url"}`
 const licenseYAML = "name: the name\nurl: the url\n"

 assertSerializeJSON(t, license, licenseJSON)
 assertParsesJSON(t, licenseJSON, license)
}
```

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# 1.1845 libassuan 2.5.5-3.el9

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When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object

file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object
code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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a) Accompany the
work with the complete corresponding
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with a modified version of the library, if
the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least

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d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

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# 1.1850 smithy-go 1.22.4

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# 1.1857 gonvenience-bunt 1.4.2

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d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License.

Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object
code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the
work with the complete corresponding
machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application

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# 1.1868 chardet 5.1.0

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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based

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Tom Callaway, Fedora Legal, Red Hat
Thu Sep 17, 2009

# 1.1876 zlib 1.3.1-r2

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program and simply using it. Linking a program with a library, without
changing the library, is in some sense simply using the library, and is
analogous to running a utility program or application program. However, in
a textual and legal sense, the linked executable is a combined work, a
derivative of the original library, and the ordinary
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treats it as such.

Because of this blurred distinction, using the ordinary General
Public License for libraries did not effectively promote software
sharing, because most developers did not use the libraries. We
concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the
users of those programs of all benefit from the free status of the

libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification
follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution
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collective works based on the Library.

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

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If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the

source code from the same place satisfies the requirement to
distribute the source code, even though third parties are not
compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the
Library, but is designed to work with the Library by being compiled or
linked with it, is called a "work that
uses the Library". Such a
work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library
creates an executable that is a derivative of the Library (because it
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library". The executable is therefore covered by this License.
Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library. The
threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small
inline
functions (ten lines or less in length), then the use of the object
file is unrestricted, regardless of whether it is legally a derivative
work. (Executables containing this object code plus portions of the
Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may
distribute the object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or
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c) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

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# 1.1884 binutils 2.40-2

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If you've contributed to gas and your name isn't listed here, it is
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++++++++++++++++

Dean Elsner wrote the original gas for vax. [more details?]

Jay Fenlason maintained gas for a while, adding support for
gdb-specific debug information and the 68k series machines, most of
the preprocessing pass, and extensive changes in messages.c,
input-file.c, write.c.

K. Richard Pixley maintained gas for a while, adding various
enhancements and many bug fixes, including merging support for several
processors, breaking gas up to handle multiple object file format
backends (including heavy rewrite, testing, an integration of the coff
and b.out backends), adding configuration
including heavy testing and
verification of cross assemblers and file splits and renaming,
converted gas to strictly ansi C including full prototypes, added
support for m680[34]0 & cpu32, considerable work on i960 including a
coff port (including considerable amounts of reverse engineering), a
sparc opcode file rewrite, decstation, rs6000, and hp300hpux host
ports, updated "know" assertions and made them work, much other
reorganization, cleanup, and lint.

Ken Raeburn wrote the high-level BFD interface code to replace most of
the code in format-specific I/O modules.

The original Vax-VMS support was contributed by David L. Kashtan.

Eric Youngdale and Pat Rankin have done much work with it since.

The Intel 80386 machine description was written by Eliot Dresselhaus.

Minh Tran-Le at IntelliCorp contributed some AIX 386 support.

The Motorola 88k machine description was contributed by Devon Bowen of Buffalo University and Torbjorn Granlund of the Swedish Institute of Computer Science.

Keith
Knowles at the Open Software Foundation wrote the original MIPS back end (tc-mips.c, tc-mips.h), and contributed Rose format support that hasn't been merged in yet. Ralph Campbell worked with the MIPS code to support a.out format.

Support for the Zilog Z8k and Hitachi H8/300, H8/500 and SH processors (tc-z8k, tc-h8300, tc-h8500, tc-sh), and IEEE 695 object file format (obj-ieee), was written by Steve Chamberlain of Cygnus Solutions. Steve also modified the COFF back end (obj-coffbfd) to use BFD for some low-level operations, for use with the Hitachi, 29k and Zilog targets.

John Gilmore built the AMD 29000 support, added .include support, and simplified the configuration of which versions accept which pseudo-ops. He updated the 68k machine description so that Motorola's opcodes always produced fixed-size instructions (e.g. jsr), while synthetic instructions remained shrinkable (jbsr). John fixed many bugs, including true tested cross-compilation support, and one bug in relaxation
that took a week and required the proverbial one-bit fix.

Ian Lance Taylor of Cygnus Solutions merged the Motorola and MIT syntaxes for the 68k, completed support for some COFF targets (68k, i386 SVR3, and SCO Unix), wrote the ECOFF support based on Michael Meissner's mips-tfile program, wrote the PowerPC and RS/6000 support, and made a few other minor patches. He handled the binutils releases for versions 2.7 through 2.9.

David Edelsohn contributed fixes for the PowerPC and AIX support.

Steve Chamberlain made gas able to generate listings.

Support for the HP9000/300 was contributed by Glenn Engel of HP.

Support for ELF format files has been worked on by Mark Eichin of Cygnus Solutions (original, incomplete implementation), Pete Hoogenboom at the University of Utah (HPPA mainly), Michael Meissner

of the Open Software Foundation (i386 mainly), and Ken Raeburn of
Cygnus Solutions (sparc, initial 64-bit support).

Several engineers at Cygnus Solutions have also provided many
small
bug fixes and configuration enhancements.

The initial Alpha support was contributed by Carnegie-Mellon
University. Additional work was done by Ken Raeburn of Cygnus
Solutions. Richard Henderson then rewrote much of the Alpha support.

Ian Dall updated the support code for the National Semiconductor 32000
series, and added support for Mach 3 and NetBSD running on the PC532.

Klaus Kaempf ported the assembler and the binutils to openVMS/Alpha.

Steve Haworth contributed the support for the Texas Instruction c30
(tms320c30).

H.J. Lu has contributed many patches and much testing.

Alan Modra reworked much of the i386 backend, improving the error
checking, updating the code, and improving the 16 bit support, using
patches from the work of Martynas Kunigelis and H.J. Lu.

Many others have contributed large or small bugfixes and enhancements. If
you've contributed significant work and are not mentioned on this list, and
want to be, let us know. Some of the history has been lost;
we aren't
intentionally leaving anyone out.

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"work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

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0. This License Agreement applies to any software library which contains a notice placed by the copyright holder or other authorized party saying it may be distributed under the terms of this Library General Public License (also called "this License"). Each licensee is addressed as "you".

A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion

of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of

a storage or distribution medium does not bring the other work under
the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public
License instead of this License to a given copy of the Library. To do
this, you must alter all the notices that refer to this License, so
that they refer to the ordinary GNU General Public License, version 2,
instead of to this License. (If a newer version than version 2 of the
ordinary GNU General Public License has appeared, then you can specify
that version instead if you wish.) Do not make any other change in
these notices.

Once this change is made in a given copy, it is irreversible for
that copy, so the ordinary GNU General Public License applies to all
subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of
the
Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or
derivative of it, under Section 2) in object code or executable form
under the terms of Sections 1 and 2 above provided that you accompany
it with the complete corresponding machine-readable source code, which
must be distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

If distribution of object code is made by offering access to copy
from a designated place, then offering equivalent access to copy the
source code from the same place satisfies the requirement to
distribute the source code, even though third parties are not
compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the
Library, but is designed to work with the Library by being compiled or
linked with it, is called a "work that uses the Library". Such a
work, in isolation, is not a derivative
work of the Library, and
therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library
creates an executable that is a derivative of the Library (because it
contains portions of the Library), rather than a "work that uses the
library". The executable is therefore covered by this License.
Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file
that is part of the Library, the object code for the work may be a

derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Accompany the

work with a written offer, valid for at
least three years, to give the same user the materials
specified in Subsection 6a, above, for a charge no more
than the cost of performing this distribution.

c) If distribution of the work is made by offering access to copy
from a designated place, offer equivalent access to copy the above
specified materials from the same place.

d) Verify that the user has already received a copy of these
materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the
Library" must include any data and utility programs needed for
reproducing the executable from it. However, as a special exception,
the source code distributed need not include anything that is normally
distributed (in either source or binary form) with the major
components (compiler, kernel, and so on) of the operating system on
which the executable runs, unless that component itself accompanies
the executable.

It may happen that this requirement contradicts the license
restrictions of other proprietary libraries that do not normally
accompany the operating system. Such a contradiction means you cannot
use both them and the Library together in an executable that you
distribute.

7. You may place library facilities that are a work based on the
Library side-by-side in a single library together with other library
facilities not covered by this License, and distribute such a combined
library, provided that the separate distribution of the work based on
the Library and of the other library facilities is otherwise
permitted, and provided that you do these two things:

a) Accompany the combined library with a copy of the same work
based on the Library, uncombined with any other library
facilities. This must be distributed under the terms of the
Sections above.

b) Give prominent notice with the combined library of the fact
that part of it is a work based on the
Library, and explaining
where to find the accompanying uncombined form of the same work.

8. You may not copy, modify, sublicense, link with, or distribute
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11. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute
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license would not permit royalty-free redistribution of the Library by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Library.

If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply, and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system;

it is up to the author/donor to decide if he or she is willing
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This section is intended to make thoroughly clear what is believed to
be a consequence of the rest of this License.

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an explicit geographical distribution limitation excluding those countries,
so that distribution is permitted only in or among countries not thus
excluded. In such case, this License incorporates the limitation as if
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END OF TERMS AND CONDITIONS

Appendix: How to Apply These Terms to Your New Libraries

If you develop a new library, and you want it to be of the greatest possible use to the public, we recommend making it free software that everyone can redistribute and change. You can do so by permitting redistribution under these terms (or, alternatively, under the terms of the ordinary General Public License).

To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

<one line to give the library's name and a brief idea of what it does.>
Copyright (C) <year>
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Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the library, if necessary.
Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the library `Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

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[This is the first released version of the Lesser GPL. It also counts as the successor of the GNU Library Public License, version 2, hence the version number 2.1.]

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public Licenses are intended to guarantee your freedom to share and change free software--to make sure the software is free for all its users.

This license, the Lesser General Public License, applies to some specially designated software packages--typically libraries--of the Free Software Foundation and other authors who decide to use it. You can use it too, but we
suggest you first think carefully about whether
this license or the ordinary General Public License is the better strategy to use in any particular case, based on the explanations below.

When we speak of free software, we are referring to freedom of use, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish); that you receive source code or can get it if you want it; that you can change the software and use pieces of it in new free programs; and that you are informed that you can do

these things.

To protect your rights, we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights. These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it.

For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link other code with the library, you must provide complete object files to the recipients, so that they can relink them with the library after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

We protect your rights with a two-step method: (1) we copyright the library, and (2) we offer you this license, which gives you legal permission to copy, distribute and/or modify the library.

To protect each distributor, we want to make it very clear that there is no warranty for the free library. Also, if the library is modified by someone else and passed on, the recipients should know that what they have is not the original version, so that the original author's reputation will not be affected by problems that might be introduced by others.

Finally, software patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder. Therefore, we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination

fits its criteria of freedom. The Lesser General
Public License permits more lax criteria for linking other code with
the library.

We call this license the "Lesser" General Public License because it
does Less to protect the user's freedom than the ordinary General
Public License. It also provides other free software developers Less
of an advantage over competing non-free programs. These disadvantages
are the reason we use the ordinary General Public License for many
libraries. However, the Lesser license provides advantages in certain
special circumstances.

For example, on rare occasions, there may be a special need to
encourage the widest possible use of a certain library, so that it becomes
a de-facto standard. To achieve this, non-free programs must be
allowed to use the library. A more frequent case is that a free
library does the same job as widely used non-free libraries. In this
case, there is little to gain by limiting the free library to free
software only, so we
use the Lesser General Public License.

In other cases, permission to use a particular library in non-free
programs enables a greater number of people to use a large body of
free software. For example, permission to use the GNU C Library in
non-free programs enables many more people to use the whole GNU
operating system, as well as its variant, the GNU/Linux operating
system.

Although the Lesser General Public License is Less protective of the
users' freedom, it does ensure that the user of a program that is
linked with the Library has the freedom and the wherewithal to run
that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and
modification follow. Pay close attention to the difference between a
"work based on the library" and a "work that uses the library". The
former contains code derived from the library, whereas the latter must
be combined with the library in order to run.

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this Lesser General Public License (also called "this License").
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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

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1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices

stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2,

instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be
distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered
by this License.
Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline

functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

a) Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above.

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# 1.1892 @babel/helper-split-export-declaration 7.22.6

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# 1.1894 chardet 4.0.0

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# 1.1906 rancher-wharfie 0.7.0

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# 1.1908 datadog-go-runtime-metrics-internal 0.0.4-0.20250603194815-7edb7c2ad56a

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# 1.1916 sed 4.9-2build1

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Version 3, 29 June 2007

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# 1.1918 go-redis-redis 8.11.5

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# 1.1921 zaf-g711 1.4.0

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# 1.1922 asynckit 0.4.0

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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

// [START discoveryengine_v1_generated_UserLicenseService_ListUserLicenses_sync]

package main

import (
 "context"

 discoveryengine "cloud.google.com/go/discoveryengine/apiv1"
 discoveryenginepb "cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb"
 "google.golang.org/api/iterator"
)

func main() {
 ctx := context.Background()
 // This snippet
 has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &discoveryenginepb.ListUserLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb#ListUserLicensesRequest.
 }
 it := c.ListUserLicenses(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
```

```
 // you can do so by casting the `Response` as below.
 // Otherwise, remove
this line. Only populated after
 // first call to Next(). Not safe for concurrent access.
 _ = it.Response.(*discoveryenginepb.ListUserLicensesResponse)
 }
}

// [END discoveryengine_v1_generated_UserLicenseService_ListUserLicenses_sync]
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package procurement

import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
 "math"
 "net/http"
 "net/url"

 procurementpb "cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 gtransport
 "google.golang.org/api/transport/grpc"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
```

```
)

var newLicenseManagementClientHook clientHook

// LicenseManagementCallOptions contains the retry settings for each method of LicenseManagementClient.
type LicenseManagementCallOptions struct {
 GetLicensePool         []gax.CallOption
 UpdateLicensePool      []gax.CallOption
 Assign                 []gax.CallOption
 Unassign               []gax.CallOption
 EnumerateLicensedUsers []gax.CallOption
 GetOperation           []gax.CallOption
}

func defaultLicenseManagementGRPCClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("cloudcommerceconsumerprocurement.googleapis.com:443"),
internaloption.WithDefaultEndpointTemplate("cloudcommerceconsumerprocurement.UNIVERSE_DOMAIN:443")
,
  internaloption.WithDefaultMTLSEndpoint("cloudcommerceconsumerprocurement.mtls.googleapis.com:443"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://cloudcommerceconsumerprocurement.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableJwtWithScope(),
  internaloption.EnableNewAuthLibrary(),
  option.WithGRPCDialOption(grpc.WithDefaultCallOptions(
   grpc.MaxCallRecvMsgSize(math.MaxInt32))),
 }
}

func
 defaultLicenseManagementCallOptions() *LicenseManagementCallOptions {
 return &LicenseManagementCallOptions{
  GetLicensePool:         []gax.CallOption{},
  UpdateLicensePool:      []gax.CallOption{},
  Assign:                 []gax.CallOption{},
  Unassign:               []gax.CallOption{},
  EnumerateLicensedUsers: []gax.CallOption{},
  GetOperation:           []gax.CallOption{},
 }
}

func defaultLicenseManagementRESTCallOptions() *LicenseManagementCallOptions {
 return
 &LicenseManagementCallOptions{
  GetLicensePool:         []gax.CallOption{},
  UpdateLicensePool:      []gax.CallOption{},
  Assign:                 []gax.CallOption{},
```

```
  Unassign:              []gax.CallOption{},
  EnumerateLicensedUsers: []gax.CallOption{},
  GetOperation:          []gax.CallOption{},
 }
}

// internalLicenseManagementClient is an interface that defines the methods available from Cloud Commerce
Consumer Procurement API.
type internalLicenseManagementClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 GetLicensePool(context.Context, *procurementpb.GetLicensePoolRequest, ...gax.CallOption)
(*procurementpb.LicensePool, error)
 UpdateLicensePool(context.Context, *procurementpb.UpdateLicensePoolRequest, ...gax.CallOption)
(*procurementpb.LicensePool, error)
 Assign(context.Context, *procurementpb.AssignRequest, ...gax.CallOption) (*procurementpb.AssignResponse,
error)
 Unassign(context.Context, *procurementpb.UnassignRequest,
 ...gax.CallOption) (*procurementpb.UnassignResponse, error)
 EnumerateLicensedUsers(context.Context, *procurementpb.EnumerateLicensedUsersRequest, ...gax.CallOption)
*LicensedUserIterator
 GetOperation(context.Context, *longrunningpb.GetOperationRequest, ...gax.CallOption)
(*longrunningpb.Operation, error)
}

// LicenseManagementClient is a client for interacting with Cloud Commerce Consumer Procurement API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// Service for managing licenses.
type LicenseManagementClient struct {
 // The internal transport-dependent client.
 internalClient internalLicenseManagementClient

 // The call options for this service.
 CallOptions *LicenseManagementCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicenseManagementClient)
 Close() error {
 return c.internalClient.Close()
}
```

```
// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *LicenseManagementClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicenseManagementClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// GetLicensePool gets the license pool.
func (c *LicenseManagementClient) GetLicensePool(ctx context.Context, req
*procurementpb.GetLicensePoolRequest, opts ...gax.CallOption) (*procurementpb.LicensePool, error) {
 return c.internalClient.GetLicensePool(ctx, req, opts...)
}

// UpdateLicensePool updates the license pool if one exists for this Order.
func (c *LicenseManagementClient)
 UpdateLicensePool(ctx context.Context, req *procurementpb.UpdateLicensePoolRequest, opts ...gax.CallOption)
(*procurementpb.LicensePool, error) {
 return c.internalClient.UpdateLicensePool(ctx, req, opts...)
}

// Assign assigns a license to a user.
func (c *LicenseManagementClient) Assign(ctx context.Context, req *procurementpb.AssignRequest, opts
...gax.CallOption) (*procurementpb.AssignResponse, error) {
 return c.internalClient.Assign(ctx, req, opts...)
}

// Unassign unassigns a license from a user.
func (c *LicenseManagementClient) Unassign(ctx context.Context, req *procurementpb.UnassignRequest, opts
...gax.CallOption) (*procurementpb.UnassignResponse, error) {
 return c.internalClient.Unassign(ctx, req, opts...)
}

// EnumerateLicensedUsers enumerates all users assigned a license.
func (c *LicenseManagementClient) EnumerateLicensedUsers(ctx context.Context, req
*procurementpb.EnumerateLicensedUsersRequest, opts ...gax.CallOption) *LicensedUserIterator {
 return c.internalClient.EnumerateLicensedUsers(ctx,
 req, opts...)
}

// GetOperation is a utility method from google.longrunning.Operations.
```

```
func (c *LicenseManagementClient) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest,
opts ...gax.CallOption) (*longrunningpb.Operation, error) {
 return c.internalClient.GetOperation(ctx, req, opts...)
}

// licenseManagementGRPCClient is a client for interacting with Cloud Commerce Consumer Procurement API
over gRPC transport.
//
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type licenseManagementGRPCClient struct {
 // Connection pool of gRPC connections to the service.
 connPool gtransport.ConnPool

 // Points back to the CallOptions field of the containing LicenseManagementClient
 CallOptions **LicenseManagementCallOptions

 // The gRPC API client.
 licenseManagementClient procurementpb.LicenseManagementServiceClient

 operationsClient longrunningpb.OperationsClient

 //
 The x-goog-* metadata to be sent with each request.
 xGoogHeaders []string

 logger *slog.Logger
}

// NewLicenseManagementClient creates a new license management service client based on gRPC.
// The returned client must be Closed when it is done being used to clean up its underlying connections.
//
// Service for managing licenses.
func NewLicenseManagementClient(ctx context.Context, opts ...option.ClientOption) (*LicenseManagementClient,
error) {
 clientOpts := defaultLicenseManagementGRPCClientOptions()
 if newLicenseManagementClientHook != nil {
  hookOpts, err := newLicenseManagementClientHook(ctx, clientHookParams{})
  if err != nil {
   return nil, err
  }
  clientOpts = append(clientOpts, hookOpts...)
 }

 connPool, err := gtransport.DialPool(ctx, append(clientOpts, opts...)...)
 if err != nil {
  return nil, err
 }
```

```
 client := LicenseManagementClient{CallOptions: defaultLicenseManagementCallOptions()}

 c := &licenseManagementGRPCClient{
  connPool:
      connPool,
  licenseManagementClient: procurementpb.NewLicenseManagementServiceClient(connPool),
  CallOptions:             &client.CallOptions,
  logger:                  internaloption.GetLogger(opts),
  operationsClient:        longrunningpb.NewOperationsClient(connPool),
 }
 c.setGoogleClientInfo()

 client.internalClient = c

 return &client, nil
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *licenseManagementGRPCClient) Connection() *grpc.ClientConn {
 return c.connPool.Conn()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licenseManagementGRPCClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "grpc",
 grpc.Version, "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licenseManagementGRPCClient) Close() error {
 return c.connPool.Close()
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type licenseManagementRESTClient struct {
 // The http endpoint to connect to.
 endpoint string
```

```
 // The http client.
 httpClient *http.Client

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicenseManagementClient
 CallOptions **LicenseManagementCallOptions

 logger *slog.Logger
}

// NewLicenseManagementRESTClient creates a new license management service rest client.
//
// Service for managing licenses.
func NewLicenseManagementRESTClient(ctx context.Context,
 opts ...option.ClientOption) (*LicenseManagementClient, error) {
 clientOpts := append(defaultLicenseManagementRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicenseManagementRESTCallOptions()
 c := &licenseManagementRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 return &LicenseManagementClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicenseManagementRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://cloudcommerceconsumerprocurement.googleapis.com"),
internaloption.WithDefaultEndpointTemplate("https://cloudcommerceconsumerprocurement.UNIVERSE_DOMAI
N"),
  internaloption.WithDefaultMTLSEndpoint("https://cloudcommerceconsumerprocurement.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://cloudcommerceconsumerprocurement.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}
```

```
//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licenseManagementRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licenseManagementRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient
 = nil
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licenseManagementRESTClient) Connection() *grpc.ClientConn {
 return nil
}
func (c *licenseManagementGRPCClient) GetLicensePool(ctx context.Context, req
*procurementpb.GetLicensePoolRequest, opts ...gax.CallOption) (*procurementpb.LicensePool, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).GetLicensePool[0:len((*c.CallOptions).GetLicensePool):len((*c.CallOptions).GetLicenseP
ool)], opts...)
 var resp *procurementpb.LicensePool
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.licenseManagementClient.GetLicensePool, req, settings.GRPC, c.logger,
"GetLicensePool")
  return err
 },
 opts...)
 if err != nil {
  return nil, err
 }
```

```
 return resp, nil
}

func (c *licenseManagementGRPCClient) UpdateLicensePool(ctx context.Context, req
*procurementpb.UpdateLicensePoolRequest, opts ...gax.CallOption) (*procurementpb.LicensePool, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "license_pool.name",
url.QueryEscape(req.GetLicensePool().GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).UpdateLicensePool[0:len((*c.CallOptions).UpdateLicensePool):len((*c.CallOptions).Upda
teLicensePool)], opts...)
 var resp *procurementpb.LicensePool
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.licenseManagementClient.UpdateLicensePool, req, settings.GRPC, c.logger,
"UpdateLicensePool")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *licenseManagementGRPCClient)
 Assign(ctx context.Context, req *procurementpb.AssignRequest, opts ...gax.CallOption)
(*procurementpb.AssignResponse, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts = append((*c.CallOptions).Assign[0:len((*c.CallOptions).Assign):len((*c.CallOptions).Assign)], opts...)
 var resp *procurementpb.AssignResponse
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.licenseManagementClient.Assign, req, settings.GRPC, c.logger, "Assign")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *licenseManagementGRPCClient) Unassign(ctx context.Context, req *procurementpb.UnassignRequest,
opts ...gax.CallOption) (*procurementpb.UnassignResponse, error) {
```

```
 hds := []string{"x-goog-request-params",
 fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts = append((*c.CallOptions).Unassign[0:len((*c.CallOptions).Unassign):len((*c.CallOptions).Unassign)], opts...)
 var resp *procurementpb.UnassignResponse
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.licenseManagementClient.Unassign, req, settings.GRPC, c.logger, "Unassign")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *licenseManagementGRPCClient) EnumerateLicensedUsers(ctx context.Context, req
*procurementpb.EnumerateLicensedUsersRequest, opts ...gax.CallOption) *LicensedUserIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts
 =
append((*c.CallOptions).EnumerateLicensedUsers[0:len((*c.CallOptions).EnumerateLicensedUsers):len((*c.CallOp
tions).EnumerateLicensedUsers)], opts...)
 it := &LicensedUserIterator{}
 req = proto.Clone(req).(*procurementpb.EnumerateLicensedUsersRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*procurementpb.LicensedUser, string, error) {
  resp := &procurementpb.EnumerateLicensedUsersResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx, c.licenseManagementClient.EnumerateLicensedUsers, req, settings.GRPC, c.logger,
"EnumerateLicensedUsers")
   return err
  }, opts...)
  if err != nil {
   return nil, "", err
```

```
  }

  it.Response = resp
  return resp.GetLicensedUsers(), resp.GetNextPageToken(),
 nil
 }
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

func (c *licenseManagementGRPCClient) GetOperation(ctx context.Context, req
*longrunningpb.GetOperationRequest, opts ...gax.CallOption) (*longrunningpb.Operation, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).GetOperation[0:len((*c.CallOptions).GetOperation):len((*c.CallOptions).GetOperation)],
opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx,
 func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.operationsClient.GetOperation, req, settings.GRPC, c.logger, "GetOperation")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

// GetLicensePool gets the license pool.
func (c *licenseManagementRESTClient) GetLicensePool(ctx context.Context, req
*procurementpb.GetLicensePoolRequest, opts ...gax.CallOption) (*procurementpb.LicensePool, error) {
 baseUrl, err := url.Parse(c.endpoint)
```

```
if err != nil {
 return nil, err
}
baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

params := url.Values{}
params.Add("$alt", "json;enum-encoding=int")

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

hds = append(c.xGoogHeaders, hds...)
hds = append(hds, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx,
hds...)
opts =
append((*c.CallOptions).GetLicensePool[0:len((*c.CallOptions).GetLicensePool):len((*c.CallOptions).GetLicenseP
ool)], opts...)
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
resp := &procurementpb.LicensePool{}
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetLicensePool")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
```

```
}

// UpdateLicensePool updates the license pool if one exists for this Order.
func (c *licenseManagementRESTClient) UpdateLicensePool(ctx
 context.Context, req *procurementpb.UpdateLicensePoolRequest, opts ...gax.CallOption)
(*procurementpb.LicensePool, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 body := req.GetLicensePool()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetLicensePool().GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")
 if req.GetUpdateMask() != nil {
  field, err := protojson.Marshal(req.GetUpdateMask())
  if err != nil {
   return nil, err
  }
  params.Add("updateMask", string(field[1:len(field)-1]))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "license_pool.name",
url.QueryEscape(req.GetLicensePool().GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds,
 "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).UpdateLicensePool[0:len((*c.CallOptions).UpdateLicensePool):len((*c.CallOptions).Upda
teLicensePool)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &procurementpb.LicensePool{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
```

```
 httpReq, err := http.NewRequest("PATCH", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "UpdateLicensePool")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
}

// Assign assigns a license to a user.
func
 (c *licenseManagementRESTClient) Assign(ctx context.Context, req *procurementpb.AssignRequest, opts
...gax.CallOption) (*procurementpb.AssignResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 jsonReq, err := m.Marshal(req)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:assign", req.GetParent())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}
```

```
 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Assign[0:len((*c.CallOptions).Assign):len((*c.CallOptions).Assign)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial:
 true, DiscardUnknown: true}
 resp := &procurementpb.AssignResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Assign")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// Unassign unassigns a license from a user.
func (c *licenseManagementRESTClient) Unassign(ctx context.Context, req *procurementpb.UnassignRequest,
opts ...gax.CallOption) (*procurementpb.UnassignResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 jsonReq, err :=
 m.Marshal(req)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
```

```
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:unassign", req.GetParent())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Unassign[0:len((*c.CallOptions).Unassign):len((*c.CallOptions).Unassign)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &procurementpb.UnassignResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq,
 err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Unassign")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// EnumerateLicensedUsers enumerates all users assigned a license.
func (c *licenseManagementRESTClient) EnumerateLicensedUsers(ctx context.Context, req
```

```
*procurementpb.EnumerateLicensedUsersRequest, opts ...gax.CallOption) *LicensedUserIterator {
 it := &LicensedUserIterator{}
 req = proto.Clone(req).(*procurementpb.EnumerateLicensedUsersRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*procurementpb.LicensedUser, string, error) {
  resp := &procurementpb.EnumerateLicensedUsersResponse{}
  if
 pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
   return nil, "", err
  }
  baseUrl.Path += fmt.Sprintf("/v1/%v:enumerateLicensedUsers", req.GetParent())

  params := url.Values{}
  params.Add("$alt", "json;enum-encoding=int")
  if req.GetPageSize() != 0 {
   params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
  }
  if req.GetPageToken() != "" {
   params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
  }

  baseUrl.RawQuery = params.Encode()

  // Build HTTP headers from client and context metadata.
  hds := append(c.xGoogHeaders, "Content-Type", "application/json")
  headers := gax.BuildHeaders(ctx, hds...)
  e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   if settings.Path != "" {
    baseUrl.Path
= settings.Path
   }
   httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
   if err != nil {
    return err
   }
   httpReq.Header = headers

   buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "EnumerateLicensedUsers")
   if err != nil {
```

```
    return err
   }
   if err := unm.Unmarshal(buf, resp); err != nil {
    return err
   }

   return nil
  }, opts...)
  if e != nil {
   return nil, "", e
  }
  it.Response = resp
  return resp.GetLicensedUsers(), resp.GetNextPageToken(), nil
 }

 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

// GetOperation is a utility method from
 google.longrunning.Operations.
func (c *licenseManagementRESTClient) GetOperation(ctx context.Context, req
*longrunningpb.GetOperationRequest, opts ...gax.CallOption) (*longrunningpb.Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}
```

```
 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetOperation[0:len((*c.CallOptions).GetOperation):len((*c.CallOptions).GetOperation)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &longrunningpb.Operation{}
 e := gax.Invoke(ctx,
 func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetOperation")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}
// Copyright 2025 Google LLC
//
// Licensed under the Apache License, Version 2.0 (the "License");
// you may not use this file except in compliance with the License.
// You may obtain a copy of the License at
//
//     https://www.apache.org/licenses/LICENSE-2.0
//
// Unless required by applicable law or agreed to in writing, software
// distributed under the License is distributed on an "AS IS" BASIS,
// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
```

```
// See the License for the specific language governing permissions and
// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute

import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
 "math"
 "net/http"
 "net/url"
 "time"

 computepb "cloud.google.com/go/compute/apiv1/computepb"
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var
 newLicensesClientHook clientHook

// LicensesCallOptions contains the retry settings for each method of LicensesClient.
type LicensesCallOptions struct {
 Delete            []gax.CallOption
 Get               []gax.CallOption
 GetIamPolicy      []gax.CallOption
 Insert            []gax.CallOption
 List              []gax.CallOption
 SetIamPolicy      []gax.CallOption
 TestIamPermissions []gax.CallOption
 Update            []gax.CallOption
}

func defaultLicensesRESTCallOptions() *LicensesCallOptions {
 return &LicensesCallOptions{
  Delete: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
```

```
 Get: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    100 * time.Millisecond,
    Max:        60000 * time.Millisecond,
    Multiplier:
1.30,
   },
    http.StatusGatewayTimeout,
    http.StatusServiceUnavailable)
  }),
 },
 GetIamPolicy: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    100 * time.Millisecond,
    Max:        60000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusGatewayTimeout,
    http.StatusServiceUnavailable)
  }),
 },
 Insert: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
 },
 List: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    100 * time.Millisecond,
    Max:        60000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusGatewayTimeout,
    http.StatusServiceUnavailable)
  }),
 },
 SetIamPolicy: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
 },
 TestIamPermissions: []gax.CallOption{
  gax.WithTimeout(600000
* time.Millisecond),
 },
 Update: []gax.CallOption{
```

```
   gax.WithTimeout(600000 * time.Millisecond),
  },
 }
}

// internalLicensesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicensesClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Delete(context.Context, *computepb.DeleteLicenseRequest, ...gax.CallOption) (*Operation, error)
 Get(context.Context, *computepb.GetLicenseRequest, ...gax.CallOption) (*computepb.License, error)
 GetIamPolicy(context.Context, *computepb.GetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 Insert(context.Context, *computepb.InsertLicenseRequest, ...gax.CallOption) (*Operation, error)
 List(context.Context, *computepb.ListLicensesRequest, ...gax.CallOption) *LicenseIterator
 SetIamPolicy(context.Context, *computepb.SetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 TestIamPermissions(context.Context,
 *computepb.TestIamPermissionsLicenseRequest, ...gax.CallOption) (*computepb.TestPermissionsResponse, error)
 Update(context.Context, *computepb.UpdateLicenseRequest, ...gax.CallOption) (*Operation, error)
}

// LicensesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// The Licenses API.
type LicensesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicensesClient

 // The call options for this service.
 CallOptions *LicensesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicensesClient) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed
 on each request. Intended for
// use by Google-written clients.
```

```
func (c *LicensesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicensesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// Delete deletes the specified license. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 return c.internalClient.Delete(ctx, req, opts...)
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Get(ctx context.Context, req
 *computepb.GetLicenseRequest, opts ...gax.CallOption) (*computepb.License, error) {
 return c.internalClient.Get(ctx, req, opts...)
}

// GetIamPolicy gets the access control policy for a resource. May be empty if no such policy or resource exists. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest, opts ...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.GetIamPolicy(ctx, req, opts...)
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 return c.internalClient.Insert(ctx, req, opts...)
}

// List retrieves the list of licenses available in the
 specified project. This method does not get any licenses that belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-cloud or windows-cloud. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts ...gax.CallOption) *LicenseIterator {
 return c.internalClient.List(ctx, req, opts...)
```

```
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This
resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest, opts
...gax.CallOption) (*computepb.Policy, error) {
 return
 c.internalClient.SetIamPolicy(ctx, req, opts...)
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is
intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse,
error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}

// Update updates a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Update(ctx context.Context, req *computepb.UpdateLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 return c.internalClient.Update(ctx, req, opts...)
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type
 licensesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // operationClient is used to call the operation-specific management service.
 operationClient *GlobalOperationsClient

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicensesClient
 CallOptions **LicensesCallOptions

 logger *slog.Logger
}

// NewLicensesRESTClient creates a new licenses rest client.
```

```
//
// The Licenses API.
func NewLicensesRESTClient(ctx context.Context, opts ...option.ClientOption) (*LicensesClient, error) {
 clientOpts := append(defaultLicensesRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicensesRESTCallOptions()
 c := &licensesRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:
   internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 o := []option.ClientOption{
  option.WithHTTPClient(httpClient),
  option.WithEndpoint(endpoint),
 }
 opC, err := NewGlobalOperationsRESTClient(ctx, o...)
 if err != nil {
  return nil, err
 }
 c.operationClient = opC

 return &LicensesClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicensesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

// setGoogleClientInfo sets the name and version of the application in
//
 the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
```

```
func (c *licensesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licensesRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 if err := c.operationClient.Close(); err != nil {
  return err
 }
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licensesRESTClient) Connection() *grpc.ClientConn {
 return nil
}

// Delete deletes the specified license. Caution This resource is intended for use
 only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
```

```
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Delete[0:len((*c.CallOptions).Delete):len((*c.CallOptions).Delete)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Delete")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 op := &Operation{
  &globalOperationsHandle{
   c:       c.operationClient,
   proto:   resp,
   project: req.GetProject(),
  },
 }
 return op, nil
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners
who are creating
 Cloud Marketplace images.
func (c *licensesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption)
(*computepb.License, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
```

```
 return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.License{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error
 {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Get")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// GetIamPolicy gets the access control policy for a resource. May be empty if no such policy or resource exists.
Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 baseUrl, err := url.Parse(c.endpoint)
```

```
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/getIamPolicy",
 req.GetProject(), req.GetResource())

 params := url.Values{}
 if req != nil && req.OptionsRequestedPolicyVersion != nil {
  params.Add("optionsRequestedPolicyVersion", fmt.Sprintf("%v", req.GetOptionsRequestedPolicyVersion()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetIamPolicy[0:len((*c.CallOptions).GetIamPolicy):len((*c.CallOptions).GetIamPolicy)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if
 settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetIamPolicy")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
```

```
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetLicenseResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if
 err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "project", url.QueryEscape(req.GetProject()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Insert[0:len((*c.CallOptions).Insert):len((*c.CallOptions).Insert)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err
 := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
```

```
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Insert")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
op := &Operation{
 &globalOperationsHandle{
  c:       c.operationClient,
  proto:   resp,
  project: req.GetProject(),
 },
}
return op, nil
}

// List retrieves the list of licenses available in the specified project. This method does not get any licenses that
belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a
list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-
cloud or windows-cloud. Caution This resource is intended for
 use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts
...gax.CallOption) *LicenseIterator {
 it := &LicenseIterator{}
 req = proto.Clone(req).(*computepb.ListLicensesRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*computepb.License, string, error) {
  resp := &computepb.LicensesListResponse{}
  if pageToken != "" {
   req.PageToken = proto.String(pageToken)
  }
  if pageSize > math.MaxInt32 {
   req.MaxResults = proto.Uint32(uint32(math.MaxInt32))
  } else if pageSize != 0 {
   req.MaxResults = proto.Uint32(uint32(pageSize))
  }
```

```
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, "", err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if req != nil && req.Filter != nil {
  params.Add("filter",
fmt.Sprintf("%v", req.GetFilter()))
 }
 if req != nil && req.MaxResults != nil {
  params.Add("maxResults", fmt.Sprintf("%v", req.GetMaxResults()))
 }
 if req != nil && req.OrderBy != nil {
  params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
 }
 if req != nil && req.PageToken != nil {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }
 if req != nil && req.ReturnPartialSuccess != nil {
  params.Add("returnPartialSuccess", fmt.Sprintf("%v", req.GetReturnPartialSuccess()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header
= headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "List")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }
```

```
  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetItems(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetMaxResults())
it.pageInfo.Token = req.GetPageToken()

return it
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This
resource is intended for use only by third-party partners who are creating Cloud Marketplace
 images.
func (c *licensesRESTClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetGlobalSetPolicyRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/setIamPolicy", req.GetProject(),
req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}
```

```
 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).SetIamPolicy[0:len((*c.CallOptions).SetIamPolicy):len((*c.CallOptions).SetIamPolicy)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "SetIamPolicy")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is
intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) TestIamPermissions(ctx
 context.Context, req *computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption)
(*computepb.TestPermissionsResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetTestPermissionsRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }
```

```
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/testIamPermissions", req.GetProject(),
req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "TestIamPermissions")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}
```

```
// Update updates a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Update(ctx context.Context,
 req *computepb.UpdateLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetLicenseResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }
 if req != nil && req.UpdateMask != nil {
  params.Add("updateMask", fmt.Sprintf("%v", req.GetUpdateMask()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds,
 "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Update[0:len((*c.CallOptions).Update):len((*c.CallOptions).Update)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("PATCH", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers
```

```
  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Update")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 op := &Operation{
  &globalOperationsHandle{
   c:       c.operationClient,
   proto:   resp,
   project: req.GetProject(),
  },
 }
 return
 op, nil
}
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// Code generated by protoc-gen-go-grpc. DO NOT EDIT.
// versions:
// - protoc-gen-go-grpc v1.3.0
// - protoc             v4.25.7
// source: google/cloud/discoveryengine/v1/user_license_service.proto

package discoveryenginepb

import (
```

```
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 context "context"
 grpc "google.golang.org/grpc"
 codes "google.golang.org/grpc/codes"
 status "google.golang.org/grpc/status"
)

//
 This is a compile-time assertion to ensure that this generated file
// is compatible with the grpc package it is being compiled against.
// Requires gRPC-Go v1.32.0 or later.
const _ = grpc.SupportPackageIsVersion7

const (
 UserLicenseService_ListUserLicenses_FullMethodName        =
"/google.cloud.discoveryengine.v1.UserLicenseService/ListUserLicenses"
 UserLicenseService_BatchUpdateUserLicenses_FullMethodName =
"/google.cloud.discoveryengine.v1.UserLicenseService/BatchUpdateUserLicenses"
)

// UserLicenseServiceClient is the client API for UserLicenseService service.
//
// For semantics around ctx use and closing/ending streaming RPCs, please refer to
https://pkg.go.dev/google.golang.org/grpc/?tab=doc#ClientConn.NewStream.
type UserLicenseServiceClient interface {
 // Lists the User Licenses.
 ListUserLicenses(ctx context.Context, in *ListUserLicensesRequest, opts ...grpc.CallOption)
(*ListUserLicensesResponse, error)
 // Updates the User License.
 // This
 method is used for batch assign/unassign licenses to users.
 BatchUpdateUserLicenses(ctx context.Context, in *BatchUpdateUserLicensesRequest, opts ...grpc.CallOption)
(*longrunningpb.Operation, error)
}

type userLicenseServiceClient struct {
 cc grpc.ClientConnInterface
}

func NewUserLicenseServiceClient(cc grpc.ClientConnInterface) UserLicenseServiceClient {
 return &userLicenseServiceClient{cc}
}

func (c *userLicenseServiceClient) ListUserLicenses(ctx context.Context, in *ListUserLicensesRequest, opts
...grpc.CallOption) (*ListUserLicensesResponse, error) {
 out := new(ListUserLicensesResponse)
 err := c.cc.Invoke(ctx, UserLicenseService_ListUserLicenses_FullMethodName, in, out, opts...)
 if err != nil {
```

```
 return nil, err
 }
 return out, nil
}

func (c *userLicenseServiceClient) BatchUpdateUserLicenses(ctx context.Context, in
*BatchUpdateUserLicensesRequest, opts ...grpc.CallOption) (*longrunningpb.Operation, error) {
 out := new(longrunningpb.Operation)
 err := c.cc.Invoke(ctx,
 UserLicenseService_BatchUpdateUserLicenses_FullMethodName, in, out, opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

// UserLicenseServiceServer is the server API for UserLicenseService service.
// All implementations should embed UnimplementedUserLicenseServiceServer
// for forward compatibility
type UserLicenseServiceServer interface {
 // Lists the User Licenses.
 ListUserLicenses(context.Context, *ListUserLicensesRequest) (*ListUserLicensesResponse, error)
 // Updates the User License.
 // This method is used for batch assign/unassign licenses to users.
 BatchUpdateUserLicenses(context.Context, *BatchUpdateUserLicensesRequest) (*longrunningpb.Operation, error)
}

// UnimplementedUserLicenseServiceServer should be embedded to have forward compatible implementations.
type UnimplementedUserLicenseServiceServer struct {
}

func (UnimplementedUserLicenseServiceServer) ListUserLicenses(context.Context, *ListUserLicensesRequest)
(*ListUserLicensesResponse, error) {
 return
 nil, status.Errorf(codes.Unimplemented, "method ListUserLicenses not implemented")
}
func (UnimplementedUserLicenseServiceServer) BatchUpdateUserLicenses(context.Context,
*BatchUpdateUserLicensesRequest) (*longrunningpb.Operation, error) {
 return nil, status.Errorf(codes.Unimplemented, "method BatchUpdateUserLicenses not implemented")
}

// UnsafeUserLicenseServiceServer may be embedded to opt out of forward compatibility for this service.
// Use of this interface is not recommended, as added methods to UserLicenseServiceServer will
// result in compilation errors.
type UnsafeUserLicenseServiceServer interface {
 mustEmbedUnimplementedUserLicenseServiceServer()
}
```

```
func RegisterUserLicenseServiceServer(s grpc.ServiceRegistrar, srv UserLicenseServiceServer) {
 s.RegisterService(&UserLicenseService_ServiceDesc, srv)
}

func _UserLicenseService_ListUserLicenses_Handler(srv interface{}, ctx context.Context, dec func(interface{})
error, interceptor grpc.UnaryServerInterceptor) (interface{},
 error) {
 in := new(ListUserLicensesRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(UserLicenseServiceServer).ListUserLicenses(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: UserLicenseService_ListUserLicenses_FullMethodName,
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(UserLicenseServiceServer).ListUserLicenses(ctx, req.(*ListUserLicensesRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _UserLicenseService_BatchUpdateUserLicenses_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(BatchUpdateUserLicensesRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(UserLicenseServiceServer).BatchUpdateUserLicenses(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: UserLicenseService_BatchUpdateUserLicenses_FullMethodName,
 }
 handler
 := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(UserLicenseServiceServer).BatchUpdateUserLicenses(ctx, req.(*BatchUpdateUserLicensesRequest))
 }
 return interceptor(ctx, in, info, handler)
}

// UserLicenseService_ServiceDesc is the grpc.ServiceDesc for UserLicenseService service.
// It's only intended for direct use with grpc.RegisterService,
// and not to be introspected or modified (even as a copy)
var UserLicenseService_ServiceDesc = grpc.ServiceDesc{
```

```
ServiceName: "google.cloud.discoveryengine.v1.UserLicenseService",
HandlerType: (*UserLicenseServiceServer)(nil),
Methods: []grpc.MethodDesc{
 {
  MethodName: "ListUserLicenses",
  Handler:    _UserLicenseService_ListUserLicenses_Handler,
 },
 {
  MethodName: "BatchUpdateUserLicenses",
  Handler:    _UserLicenseService_BatchUpdateUserLicenses_Handler,
 },
},
Streams:  []grpc.StreamDesc{},
Metadata: "google/cloud/discoveryengine/v1/user_license_service.proto",
}
```

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```

```
package compute

import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
 "net/http"
 "net/url"
 "time"

 computepb "cloud.google.com/go/compute/apiv1/computepb"
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
)

var
 newLicenseCodesClientHook clientHook

// LicenseCodesCallOptions contains the retry settings for each method of LicenseCodesClient.
type LicenseCodesCallOptions struct {
 Get              []gax.CallOption
 TestIamPermissions []gax.CallOption
}

func defaultLicenseCodesRESTCallOptions() *LicenseCodesCallOptions {
 return &LicenseCodesCallOptions{
  Get: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  TestIamPermissions: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
 }
}
```

```
// internalLicenseCodesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicenseCodesClient interface {
 Close()
 error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Get(context.Context, *computepb.GetLicenseCodeRequest, ...gax.CallOption) (*computepb.LicenseCode, error)
 TestIamPermissions(context.Context, *computepb.TestIamPermissionsLicenseCodeRequest, ...gax.CallOption)
(*computepb.TestPermissionsResponse, error)
}

// LicenseCodesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// The LicenseCodes API.
type LicenseCodesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicenseCodesClient

 // The call options for this service.
 CallOptions *LicenseCodesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicenseCodesClient) Close() error {
 return c.internalClient.Close()
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *LicenseCodesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicenseCodesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}
```

```
// Get return a specified license code. License codes are mirrored across all projects that have permissions to read the License Code. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicenseCodesClient) Get(ctx context.Context, req *computepb.GetLicenseCodeRequest, opts ...gax.CallOption) (*computepb.LicenseCode, error) {
 return c.internalClient.Get(ctx,
 req, opts...)
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicenseCodesClient) TestIamPermissions(ctx context.Context, req *computepb.TestIamPermissionsLicenseCodeRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse, error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with method calls.
type licenseCodesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicenseCodesClient
 CallOptions **LicenseCodesCallOptions

 logger *slog.Logger
}

// NewLicenseCodesRESTClient
 creates a new license codes rest client.
//
// The LicenseCodes API.
func NewLicenseCodesRESTClient(ctx context.Context, opts ...option.ClientOption) (*LicenseCodesClient, error) {
 clientOpts := append(defaultLicenseCodesRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicenseCodesRESTCallOptions()
```

```
 c := &licenseCodesRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 return &LicenseCodesClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicenseCodesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licenseCodesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licenseCodesRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 return
 nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licenseCodesRESTClient) Connection() *grpc.ClientConn {
```

```
 return nil
}

// Get return a specified license code. License codes are mirrored across all projects that have permissions to read the License Code. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licenseCodesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseCodeRequest, opts ...gax.CallOption) (*computepb.LicenseCode, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenseCodes/%v", req.GetProject(), req.GetLicenseCode())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project", url.QueryEscape(req.GetProject()), "license_code", url.QueryEscape(req.GetLicenseCode()))}

 hds
 = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.LicenseCode{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Get")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
```

```
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// TestIamPermissions returns permissions that a
 caller has on the specified resource. Caution This resource is intended for use only by third-party partners who are
creating Cloud Marketplace images.
func (c *licenseCodesRESTClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseCodeRequest, opts ...gax.CallOption)
(*computepb.TestPermissionsResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetTestPermissionsRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenseCodes/%v/testIamPermissions",
req.GetProject(), req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds =
 append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
```

```
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "TestIamPermissions")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}
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 "bytes"
 "context"
 "fmt"
 "log/slog"
 "net/http"
 "net/url"
 "time"

 computepb "cloud.google.com/go/compute/apiv1beta/computepb"
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/option"
```

```
 "google.golang.org/api/option/internaloption"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
)

var
 newLicenseCodesClientHook clientHook

// LicenseCodesCallOptions contains the retry settings for each method of LicenseCodesClient.
type LicenseCodesCallOptions struct {
 Get              []gax.CallOption
 TestIamPermissions []gax.CallOption
}

func defaultLicenseCodesRESTCallOptions() *LicenseCodesCallOptions {
 return &LicenseCodesCallOptions{
  Get: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  TestIamPermissions: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
 }
}

// internalLicenseCodesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicenseCodesClient interface
 {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Get(context.Context, *computepb.GetLicenseCodeRequest, ...gax.CallOption) (*computepb.LicenseCode, error)
 TestIamPermissions(context.Context, *computepb.TestIamPermissionsLicenseCodeRequest, ...gax.CallOption)
(*computepb.TestPermissionsResponse, error)
}

// LicenseCodesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
```

```
method calls.
//
// The LicenseCodes API.
type LicenseCodesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicenseCodesClient

 // The call options for this service.
 CallOptions *LicenseCodesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicenseCodesClient) Close() error {
 return
 c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *LicenseCodesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicenseCodesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// Get return a specified license code. License codes are mirrored across all projects that have permissions to read the
License Code. Caution This resource is intended for use only by third-party partners who are creating Cloud
Marketplace images.
func (c *LicenseCodesClient) Get(ctx context.Context, req *computepb.GetLicenseCodeRequest, opts
...gax.CallOption) (*computepb.LicenseCode, error) {
 return c.internalClient.Get(ctx,
 req, opts...)
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is
intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicenseCodesClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseCodeRequest, opts ...gax.CallOption)
```

```
(*computepb.TestPermissionsResponse, error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type licenseCodesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicenseCodesClient
 CallOptions **LicenseCodesCallOptions

 logger *slog.Logger
}

// NewLicenseCodesRESTClient
 creates a new license codes rest client.
//
// The LicenseCodes API.
func NewLicenseCodesRESTClient(ctx context.Context, opts ...option.ClientOption) (*LicenseCodesClient, error) {
 clientOpts := append(defaultLicenseCodesRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicenseCodesRESTCallOptions()
 c := &licenseCodesRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 return &LicenseCodesClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicenseCodesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
```

```
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licenseCodesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licenseCodesRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 return
 nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licenseCodesRESTClient) Connection() *grpc.ClientConn {
 return nil
}

// Get return a specified license code. License codes are mirrored across all projects that have permissions to read the
License Code. Caution This resource is intended for use only by third-party partners who are creating Cloud
Marketplace images.
func (c *licenseCodesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseCodeRequest, opts
...gax.CallOption) (*computepb.LicenseCode, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenseCodes/%v", req.GetProject(),
req.GetLicenseCode())
```

```
 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license_code", url.QueryEscape(req.GetLicenseCode()))}

 hds
 = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.LicenseCode{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Get")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// TestIamPermissions returns permissions that
 a caller has on the specified resource. Caution This resource is intended for use only by third-party partners who are
creating Cloud Marketplace images.
func (c *licenseCodesRESTClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseCodeRequest, opts ...gax.CallOption)
(*computepb.TestPermissionsResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetTestPermissionsRequestResource()
```

```
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenseCodes/%v/testIamPermissions",
req.GetProject(), req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds
 = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "TestIamPermissions")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
```

```
  return nil, e
 }
 return resp, nil
}
// Copyright 2025 Google LLC
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//     http://www.apache.org/licenses/LICENSE-2.0
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// distributed under the License is distributed on an "AS IS" BASIS,
// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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// limitations under the License.

// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.35.2
//  protoc        v4.25.7
// source: google/ai/generativelanguage/v1alpha/permission.proto

package generativelanguagepb

import (
 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
 reflect "reflect"
 sync
 "sync"
)

const (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Defines types of the grantee of this permission.
type Permission_GranteeType int32

const (
 // The default value. This value is unused.
 Permission_GRANTEE_TYPE_UNSPECIFIED Permission_GranteeType = 0
```

```
 // Represents a user. When set, you must provide email_address for the user.
 Permission_USER Permission_GranteeType = 1
 // Represents a group. When set, you must provide email_address for the
 // group.
 Permission_GROUP Permission_GranteeType = 2
 // Represents access to everyone. No extra information is required.
 Permission_EVERYONE Permission_GranteeType = 3
)

// Enum value maps for Permission_GranteeType.
var (
 Permission_GranteeType_name = map[int32]string{
  0: "GRANTEE_TYPE_UNSPECIFIED",
  1: "USER",
  2:
 "GROUP",
  3: "EVERYONE",
 }
 Permission_GranteeType_value = map[string]int32{
  "GRANTEE_TYPE_UNSPECIFIED": 0,
  "USER":                     1,
  "GROUP":                    2,
  "EVERYONE":                 3,
 }
)

func (x Permission_GranteeType) Enum() *Permission_GranteeType {
 p := new(Permission_GranteeType)
 *p = x
 return p
}

func (x Permission_GranteeType) String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_GranteeType) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[0].Descriptor()
}

func (Permission_GranteeType) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[0]
}

func (x Permission_GranteeType) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}
```

```
// Deprecated: Use Permission_GranteeType.Descriptor instead.
func (Permission_GranteeType) EnumDescriptor() ([]byte,
 []int) {
 return file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescGZIP(), []int{0, 0}
}

// Defines the role granted by this permission.
type Permission_Role int32

const (
 // The default value. This value is unused.
 Permission_ROLE_UNSPECIFIED Permission_Role = 0
 // Owner can use, update, share and delete the resource.
 Permission_OWNER Permission_Role = 1
 // Writer can use, update and share the resource.
 Permission_WRITER Permission_Role = 2
 // Reader can use the resource.
 Permission_READER Permission_Role = 3
)

// Enum value maps for Permission_Role.
var (
 Permission_Role_name = map[int32]string{
  0: "ROLE_UNSPECIFIED",
  1: "OWNER",
  2: "WRITER",
  3: "READER",
 }
 Permission_Role_value = map[string]int32{
  "ROLE_UNSPECIFIED": 0,
  "OWNER":            1,
  "WRITER":           2,
  "READER":           3,
 }
)

func (x Permission_Role) Enum() *Permission_Role {
 p := new(Permission_Role)
 *p = x
 return p
}

func (x Permission_Role) String() string {
 return
 protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_Role) Descriptor() protoreflect.EnumDescriptor {
```

```
 return file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[1].Descriptor()
}

func (Permission_Role) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[1]
}

func (x Permission_Role) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_Role.Descriptor instead.
func (Permission_Role) EnumDescriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescGZIP(), []int{0, 1}
}

// Permission resource grants user, group or the rest of the world access to the
// PaLM API resource (e.g. a tuned model, corpus).
//
// A role is a collection of permitted operations that allows users to perform
// specific actions on PaLM API resources. To make them available to users,
// groups, or service
 accounts, you assign roles. When you assign a role, you
// grant permissions that the role contains.
//
// There are three concentric roles. Each role is a superset of the previous
// role's permitted operations:
//
// - reader can use the resource (e.g. tuned model, corpus) for inference
// - writer has reader's permissions and additionally can edit and share
// - owner has writer's permissions and additionally can delete
type Permission struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Output only. Identifier. The permission name. A unique name will be
 // generated on create. Examples:
 //
 // tunedModels/{tuned_model}/permissions/{permission}
 // corpora/{corpus}/permissions/{permission}
 //
 // Output only.
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Optional. Immutable. The type of the grantee.
 GranteeType *Permission_GranteeType
`protobuf:"varint,2,opt,name=grantee_type,json=granteeType,proto3,enum=google.ai.generativelanguage.v1alpha.P
ermission_GranteeType,oneof"
```

```
 json:"grantee_type,omitempty"`
 // Optional. Immutable. The email address of the user of group which this
 // permission refers. Field is not set when permission's grantee type is
 // EVERYONE.
 EmailAddress *string `protobuf:"bytes,3,opt,name=email_address,json=emailAddress,proto3,oneof"
json:"email_address,omitempty"`
 // Required. The role granted by this permission.
 Role *Permission_Role
`protobuf:"varint,4,opt,name=role,proto3,enum=google.ai.generativelanguage.v1alpha.Permission_Role,oneof"
json:"role,omitempty"`
}

func (x *Permission) Reset() {
 *x = Permission{}
 mi := &file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes[0]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *Permission) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*Permission) ProtoMessage() {}

func (x *Permission) ProtoReflect() protoreflect.Message
 {
 mi := &file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use Permission.ProtoReflect.Descriptor instead.
func (*Permission) Descriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescGZIP(), []int{0}
}

func (x *Permission) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
```

```
}

func (x *Permission) GetGranteeType() Permission_GranteeType {
 if x != nil && x.GranteeType != nil {
  return *x.GranteeType
 }
 return Permission_GRANTEE_TYPE_UNSPECIFIED
}

func (x *Permission) GetEmailAddress() string {
 if x != nil && x.EmailAddress != nil {
  return *x.EmailAddress
 }
 return ""
}

func (x *Permission) GetRole() Permission_Role {
 if x != nil && x.Role != nil {
  return *x.Role
 }
 return Permission_ROLE_UNSPECIFIED
}

var
 File_google_ai_generativelanguage_v1alpha_permission_proto protoreflect.FileDescriptor

var file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc = []byte{
 0x0a, 0x35, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65,
 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x76,
 0x31, 0x61, 0x6c, 0x70, 0x68, 0x61, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f,
 0x6e, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x12, 0x24, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e,
 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e,
 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x61, 0x6c, 0x70, 0x68, 0x61, 0x1a, 0x1f, 0x67,
 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64, 0x5f,
 0x62, 0x65, 0x68, 0x61, 0x76, 0x69, 0x6f, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x19,
 0x67, 0x6f, 0x6f, 0x67, 0x6c,
 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x72, 0x65, 0x73, 0x6f, 0x75,
 0x72, 0x63, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x22, 0x87, 0x05, 0x0a, 0x0a, 0x50, 0x65,
 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x1a, 0x0a, 0x04, 0x6e, 0x61, 0x6d, 0x65,
 0x18, 0x01, 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x03, 0xe0, 0x41, 0x08, 0x52, 0x04,
 0x6e, 0x61, 0x6d, 0x65, 0x12, 0x6c, 0x0a, 0x0c, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f,
 0x74, 0x79, 0x70, 0x65, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0e, 0x32, 0x3c, 0x2e, 0x67, 0x6f, 0x6f,
 0x67, 0x6c, 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76,
 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x61, 0x6c, 0x70, 0x68,
 0x61, 0x2e, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x2e, 0x47, 0x72, 0x61,
 0x6e, 0x74, 0x65, 0x65, 0x54, 0x79, 0x70, 0x65, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05,
 0x48, 0x00, 0x52, 0x0b, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65,
```

```
0x65, 0x54, 0x79, 0x70, 0x65, 0x88,
0x01, 0x01, 0x12, 0x30, 0x0a, 0x0d, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x5f, 0x61, 0x64, 0x64, 0x72,
0x65, 0x73, 0x73, 0x18, 0x03, 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41,
0x05, 0x48, 0x01, 0x52, 0x0c, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x41, 0x64, 0x64, 0x72, 0x65, 0x73,
0x73, 0x88, 0x01, 0x01, 0x12, 0x53, 0x0a, 0x04, 0x72, 0x6f, 0x6c, 0x65, 0x18, 0x04, 0x20, 0x01,
0x28, 0x0e, 0x32, 0x35, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67,
0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67,
0x65, 0x2e, 0x76, 0x31, 0x61, 0x6c, 0x70, 0x68, 0x61, 0x2e, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73,
0x73, 0x69, 0x6f, 0x6e, 0x2e, 0x52, 0x6f, 0x6c, 0x65, 0x42, 0x03, 0xe0, 0x41, 0x02, 0x48, 0x02,
0x52, 0x04, 0x72, 0x6f, 0x6c, 0x65, 0x88, 0x01, 0x01, 0x22, 0x4e, 0x0a, 0x0b, 0x47, 0x72, 0x61,
0x6e, 0x74, 0x65, 0x65, 0x54, 0x79, 0x70, 0x65, 0x12, 0x1c, 0x0a, 0x18, 0x47, 0x52, 0x41,
0x4e,
0x54, 0x45, 0x45, 0x5f, 0x54, 0x59, 0x50, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49,
0x46, 0x49, 0x45, 0x44, 0x10, 0x00, 0x12, 0x08, 0x0a, 0x04, 0x55, 0x53, 0x45, 0x52, 0x10, 0x01,
0x12, 0x09, 0x0a, 0x05, 0x47, 0x52, 0x4f, 0x55, 0x50, 0x10, 0x02, 0x12, 0x0c, 0x0a, 0x08, 0x45,
0x56, 0x45, 0x52, 0x59, 0x4f, 0x4e, 0x45, 0x10, 0x03, 0x22, 0x3f, 0x0a, 0x04, 0x52, 0x6f, 0x6c,
0x65, 0x12, 0x14, 0x0a, 0x10, 0x52, 0x4f, 0x4c, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43,
0x49, 0x46, 0x49, 0x45, 0x44, 0x10, 0x00, 0x12, 0x09, 0x0a, 0x05, 0x4f, 0x57, 0x4e, 0x45, 0x52,
0x10, 0x01, 0x12, 0x0a, 0x0a, 0x06, 0x57, 0x52, 0x49, 0x54, 0x45, 0x52, 0x10, 0x02, 0x12, 0x0a,
0x0a, 0x06, 0x52, 0x45, 0x41, 0x44, 0x45, 0x52, 0x10, 0x03, 0x3a, 0xaa, 0x01, 0xea, 0x41, 0xa6,
0x01, 0x0a, 0x2c, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e,
0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73,
0x2e, 0x63, 0x6f, 0x6d,
0x2f, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12,
0x32, 0x74, 0x75, 0x6e, 0x65, 0x64, 0x4d, 0x6f, 0x64, 0x65, 0x6c, 0x73, 0x2f, 0x7b, 0x74, 0x75,
0x6e, 0x65, 0x64, 0x5f, 0x6d, 0x6f, 0x64, 0x65, 0x6c, 0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69,
0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x2f, 0x7b, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69,
0x6f, 0x6e, 0x7d, 0x12, 0x29, 0x63, 0x6f, 0x72, 0x70, 0x6f, 0x72, 0x61, 0x2f, 0x7b, 0x63, 0x6f,
0x72, 0x70, 0x75, 0x73, 0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
0x73, 0x2f, 0x7b, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x7d, 0x2a, 0x0b,
0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x32, 0x0a, 0x70, 0x65, 0x72,
0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x42, 0x0f, 0x0a, 0x0d, 0x5f, 0x67, 0x72, 0x61, 0x6e,
0x74, 0x65, 0x65, 0x5f, 0x74, 0x79, 0x70, 0x65, 0x42, 0x10, 0x0a, 0x0e, 0x5f, 0x65, 0x6d, 0x61,
0x69, 0x6c, 0x5f, 0x61, 0x64, 0x64, 0x72, 0x65, 0x73,
0x73, 0x42, 0x07, 0x0a, 0x05, 0x5f, 0x72,
0x6f, 0x6c, 0x65, 0x42, 0x9d, 0x01, 0x0a, 0x28, 0x63, 0x6f, 0x6d, 0x2e, 0x67, 0x6f, 0x6f, 0x67,
0x6c, 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65,
0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x61, 0x6c, 0x70, 0x68, 0x61,
0x42, 0x0f, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x50, 0x72, 0x6f, 0x74,
0x6f, 0x50, 0x01, 0x5a, 0x5e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c,
0x65, 0x2e, 0x63, 0x6f, 0x6d, 0x2f, 0x67, 0x6f, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65,
0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x61,
0x70, 0x69, 0x76, 0x31, 0x61, 0x6c, 0x70, 0x68, 0x61, 0x2f, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61,
0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x3b, 0x67,
0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75,
0x61, 0x67,
0x65, 0x70, 0x62, 0x62, 0x06, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x33,
}
```

```
var (
 file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescOnce sync.Once
 file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData =
file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc
)

func file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescGZIP() []byte {
 file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescOnce.Do(func() {
  file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData)
 })
 return file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData
}

var file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes = make([]protoimpl.EnumInfo, 2)
var file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes = make([]protoimpl.MessageInfo, 1)
var file_google_ai_generativelanguage_v1alpha_permission_proto_goTypes
 = []any{
 (Permission_GranteeType)(0), // 0: google.ai.generativelanguage.v1alpha.Permission.GranteeType
 (Permission_Role)(0),        // 1: google.ai.generativelanguage.v1alpha.Permission.Role
 (*Permission)(nil),          // 2: google.ai.generativelanguage.v1alpha.Permission
}
var file_google_ai_generativelanguage_v1alpha_permission_proto_depIdxs = []int32{
 0, // 0: google.ai.generativelanguage.v1alpha.Permission.grantee_type:type_name ->
google.ai.generativelanguage.v1alpha.Permission.GranteeType
 1, // 1: google.ai.generativelanguage.v1alpha.Permission.role:type_name ->
google.ai.generativelanguage.v1alpha.Permission.Role
 2, // [2:2] is the sub-list for method output_type
 2, // [2:2] is the sub-list for method input_type
 2, // [2:2] is the sub-list for extension type_name
 2, // [2:2] is the sub-list for extension extendee
 0, // [0:2] is the sub-list for field type_name
}

func init() { file_google_ai_generativelanguage_v1alpha_permission_proto_init()
 }
func file_google_ai_generativelanguage_v1alpha_permission_proto_init() {
 if File_google_ai_generativelanguage_v1alpha_permission_proto != nil {
  return
 }
 file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes[0].OneofWrappers = []any{}
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor: file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc,
   NumEnums:      2,
```

```
  NumMessages:   1,
  NumExtensions: 0,
  NumServices:   0,
 },
 GoTypes:          file_google_ai_generativelanguage_v1alpha_permission_proto_goTypes,
 DependencyIndexes: file_google_ai_generativelanguage_v1alpha_permission_proto_depIdxs,
 EnumInfos:         file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes,
 MessageInfos:      file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes,
}.Build()
File_google_ai_generativelanguage_v1alpha_permission_proto = out.File
file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc
= nil
file_google_ai_generativelanguage_v1alpha_permission_proto_goTypes = nil
file_google_ai_generativelanguage_v1alpha_permission_proto_depIdxs = nil
}
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// Code generated by protoc-gen-go-grpc. DO NOT EDIT.
// versions:
// - protoc-gen-go-grpc v1.3.0
// - protoc             v4.25.7
// source: google/cloud/commerce/consumer/procurement/v1/license_management_service.proto

package procurementpb

import (
 context "context"
 grpc "google.golang.org/grpc"
 codes "google.golang.org/grpc/codes"
 status "google.golang.org/grpc/status"
)

// This is a compile-time assertion
 to ensure that this generated file
// is compatible with the grpc package it is being compiled against.
// Requires gRPC-Go v1.32.0 or later.
```

```
const _ = grpc.SupportPackageIsVersion7

const (
 LicenseManagementService_GetLicensePool_FullMethodName        =
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/GetLicensePool"
 LicenseManagementService_UpdateLicensePool_FullMethodName      =
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/UpdateLicensePool"
 LicenseManagementService_Assign_FullMethodName                 =
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Assign"
 LicenseManagementService_Unassign_FullMethodName               =
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Unassign"
 LicenseManagementService_EnumerateLicensedUsers_FullMethodName =
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/EnumerateLicensedUsers"
)

// LicenseManagementServiceClient
 is the client API for LicenseManagementService service.
//
// For semantics around ctx use and closing/ending streaming RPCs, please refer to
https://pkg.go.dev/google.golang.org/grpc/?tab=doc#ClientConn.NewStream.
type LicenseManagementServiceClient interface {
 // Gets the license pool.
 GetLicensePool(ctx context.Context, in *GetLicensePoolRequest, opts ...grpc.CallOption) (*LicensePool, error)
 // Updates the license pool if one exists for this Order.
 UpdateLicensePool(ctx context.Context, in *UpdateLicensePoolRequest, opts ...grpc.CallOption) (*LicensePool,
error)
 // Assigns a license to a user.
 Assign(ctx context.Context, in *AssignRequest, opts ...grpc.CallOption) (*AssignResponse, error)
 // Unassigns a license from a user.
 Unassign(ctx context.Context, in *UnassignRequest, opts ...grpc.CallOption) (*UnassignResponse, error)
 // Enumerates all users assigned a license.
 EnumerateLicensedUsers(ctx context.Context, in *EnumerateLicensedUsersRequest, opts ...grpc.CallOption)
 (*EnumerateLicensedUsersResponse, error)
}

type licenseManagementServiceClient struct {
 cc grpc.ClientConnInterface
}

func NewLicenseManagementServiceClient(cc grpc.ClientConnInterface) LicenseManagementServiceClient {
 return &licenseManagementServiceClient{cc}
}

func (c *licenseManagementServiceClient) GetLicensePool(ctx context.Context, in *GetLicensePoolRequest, opts
...grpc.CallOption) (*LicensePool, error) {
 out := new(LicensePool)
 err := c.cc.Invoke(ctx, LicenseManagementService_GetLicensePool_FullMethodName, in, out, opts...)
 if err != nil {
```

```
 return nil, err
 }
 return out, nil
}

func (c *licenseManagementServiceClient) UpdateLicensePool(ctx context.Context, in
*UpdateLicensePoolRequest, opts ...grpc.CallOption) (*LicensePool, error) {
 out := new(LicensePool)
 err := c.cc.Invoke(ctx, LicenseManagementService_UpdateLicensePool_FullMethodName, in, out, opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

func (c *licenseManagementServiceClient) Assign(ctx
 context.Context, in *AssignRequest, opts ...grpc.CallOption) (*AssignResponse, error) {
 out := new(AssignResponse)
 err := c.cc.Invoke(ctx, LicenseManagementService_Assign_FullMethodName, in, out, opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

func (c *licenseManagementServiceClient) Unassign(ctx context.Context, in *UnassignRequest, opts
...grpc.CallOption) (*UnassignResponse, error) {
 out := new(UnassignResponse)
 err := c.cc.Invoke(ctx, LicenseManagementService_Unassign_FullMethodName, in, out, opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

func (c *licenseManagementServiceClient) EnumerateLicensedUsers(ctx context.Context, in
*EnumerateLicensedUsersRequest, opts ...grpc.CallOption) (*EnumerateLicensedUsersResponse, error) {
 out := new(EnumerateLicensedUsersResponse)
 err := c.cc.Invoke(ctx, LicenseManagementService_EnumerateLicensedUsers_FullMethodName, in, out, opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

// LicenseManagementServiceServer
 is the server API for LicenseManagementService service.
// All implementations should embed UnimplementedLicenseManagementServiceServer
```

```
// for forward compatibility
type LicenseManagementServiceServer interface {
 // Gets the license pool.
 GetLicensePool(context.Context, *GetLicensePoolRequest) (*LicensePool, error)
 // Updates the license pool if one exists for this Order.
 UpdateLicensePool(context.Context, *UpdateLicensePoolRequest) (*LicensePool, error)
 // Assigns a license to a user.
 Assign(context.Context, *AssignRequest) (*AssignResponse, error)
 // Unassigns a license from a user.
 Unassign(context.Context, *UnassignRequest) (*UnassignResponse, error)
 // Enumerates all users assigned a license.
 EnumerateLicensedUsers(context.Context, *EnumerateLicensedUsersRequest)
(*EnumerateLicensedUsersResponse, error)
}

// UnimplementedLicenseManagementServiceServer should be embedded to have forward compatible
implementations.
type UnimplementedLicenseManagementServiceServer
 struct {
}

func (UnimplementedLicenseManagementServiceServer) GetLicensePool(context.Context,
*GetLicensePoolRequest) (*LicensePool, error) {
 return nil, status.Errorf(codes.Unimplemented, "method GetLicensePool not implemented")
}
func (UnimplementedLicenseManagementServiceServer) UpdateLicensePool(context.Context,
*UpdateLicensePoolRequest) (*LicensePool, error) {
 return nil, status.Errorf(codes.Unimplemented, "method UpdateLicensePool not implemented")
}
func (UnimplementedLicenseManagementServiceServer) Assign(context.Context, *AssignRequest)
(*AssignResponse, error) {
 return nil, status.Errorf(codes.Unimplemented, "method Assign not implemented")
}
func (UnimplementedLicenseManagementServiceServer) Unassign(context.Context, *UnassignRequest)
(*UnassignResponse, error) {
 return nil, status.Errorf(codes.Unimplemented, "method Unassign not implemented")
}
func (UnimplementedLicenseManagementServiceServer) EnumerateLicensedUsers(context.Context,
*EnumerateLicensedUsersRequest)
 (*EnumerateLicensedUsersResponse, error) {
 return nil, status.Errorf(codes.Unimplemented, "method EnumerateLicensedUsers not implemented")
}

// UnsafeLicenseManagementServiceServer may be embedded to opt out of forward compatibility for this service.
// Use of this interface is not recommended, as added methods to LicenseManagementServiceServer will
// result in compilation errors.
type UnsafeLicenseManagementServiceServer interface {
 mustEmbedUnimplementedLicenseManagementServiceServer()
```

```
}

func RegisterLicenseManagementServiceServer(s grpc.ServiceRegistrar, srv LicenseManagementServiceServer) {
 s.RegisterService(&LicenseManagementService_ServiceDesc, srv)
}

func _LicenseManagementService_GetLicensePool_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(GetLicensePoolRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(LicenseManagementServiceServer).GetLicensePool(ctx,
 in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: LicenseManagementService_GetLicensePool_FullMethodName,
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(LicenseManagementServiceServer).GetLicensePool(ctx, req.(*GetLicensePoolRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_UpdateLicensePool_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(UpdateLicensePoolRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(LicenseManagementServiceServer).UpdateLicensePool(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: LicenseManagementService_UpdateLicensePool_FullMethodName,
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return
 srv.(LicenseManagementServiceServer).UpdateLicensePool(ctx, req.(*UpdateLicensePoolRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_Assign_Handler(srv interface{}, ctx context.Context, dec func(interface{})
error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
```

```
 in := new(AssignRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(LicenseManagementServiceServer).Assign(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: LicenseManagementService_Assign_FullMethodName,
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(LicenseManagementServiceServer).Assign(ctx, req.(*AssignRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_Unassign_Handler(srv interface{}, ctx context.Context, dec func(interface{})
error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in
 := new(UnassignRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(LicenseManagementServiceServer).Unassign(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: LicenseManagementService_Unassign_FullMethodName,
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(LicenseManagementServiceServer).Unassign(ctx, req.(*UnassignRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_EnumerateLicensedUsers_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(EnumerateLicensedUsersRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(LicenseManagementServiceServer).EnumerateLicensedUsers(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
```

```
  FullMethod: LicenseManagementService_EnumerateLicensedUsers_FullMethodName,
 }
 handler
 := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(LicenseManagementServiceServer).EnumerateLicensedUsers(ctx,
req.(*EnumerateLicensedUsersRequest))
 }
 return interceptor(ctx, in, info, handler)
}

// LicenseManagementService_ServiceDesc is the grpc.ServiceDesc for LicenseManagementService service.
// It's only intended for direct use with grpc.RegisterService,
// and not to be introspected or modified (even as a copy)
var LicenseManagementService_ServiceDesc = grpc.ServiceDesc{
 ServiceName: "google.cloud.commerce.consumer.procurement.v1.LicenseManagementService",
 HandlerType: (*LicenseManagementServiceServer)(nil),
 Methods: []grpc.MethodDesc{
  {
   MethodName: "GetLicensePool",
   Handler:    _LicenseManagementService_GetLicensePool_Handler,
  },
  {
   MethodName: "UpdateLicensePool",
   Handler:    _LicenseManagementService_UpdateLicensePool_Handler,
  },
  {
   MethodName: "Assign",
   Handler:    _LicenseManagementService_Assign_Handler,
  },
  {
   MethodName:
 "Unassign",
   Handler:    _LicenseManagementService_Unassign_Handler,
  },
  {
   MethodName: "EnumerateLicensedUsers",
   Handler:    _LicenseManagementService_EnumerateLicensedUsers_Handler,
  },
 },
 Streams:  []grpc.StreamDesc{},
 Metadata: "google/cloud/commerce/consumer/procurement/v1/license_management_service.proto",
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1beta"
 computepb "cloud.google.com/go/compute/apiv1beta/computepb"
)

func ExampleLicensesClient_List_all() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require
 modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.ListLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#ListLicensesRequest.
 }
 for resp, err := range c.List(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}
```

```
// +build ignore

package ignore
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// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
// See the License for the specific language governing permissions and
// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package discoveryengine_test

import (
 "context"

 discoveryengine "cloud.google.com/go/discoveryengine/apiv1"
 discoveryenginepb "cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 "google.golang.org/api/iterator"
)

func ExampleNewUserLicenseClient() {
 ctx := context.Background()
 //
 This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}
```

```
func ExampleNewUserLicenseRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseRESTClient(ctx)
 if
 err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleUserLicenseClient_BatchUpdateUserLicenses() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &discoveryenginepb.BatchUpdateUserLicensesRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb#BatchUpdateUserLicensesReque
st.
 }
 op, err := c.BatchUpdateUserLicenses(ctx, req)
 if err != nil {
  //
 TODO: Handle error.
 }

 resp, err := op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
```

```
 _ = resp
}

func ExampleUserLicenseClient_ListUserLicenses() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &discoveryenginepb.ListUserLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb#ListUserLicensesRequest.
 }
 it := c.ListUserLicenses(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done
  {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*discoveryenginepb.ListUserLicensesResponse)
 }
}

func ExampleUserLicenseClient_CancelOperation() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
```

```
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &longrunningpb.CancelOperationRequest{
  //
 TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#CancelOperationRequest.
 }
 err = c.CancelOperation(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleUserLicenseClient_GetOperation() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &longrunningpb.GetOperationRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#GetOperationRequest.
 }
 resp,
 err := c.GetOperation(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleUserLicenseClient_ListOperations() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
```

```
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := discoveryengine.NewUserLicenseClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &longrunningpb.ListOperationsRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#ListOperationsRequest.
}
it := c.ListOperations(ctx, req)
for {
 resp, err := it.Next()
 if err == iterator.Done {
  break
 }
 if err != nil {
  //
TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp

 // If you need to access the underlying RPC response,
 // you can do so by casting the `Response` as below.
 // Otherwise, remove this line. Only populated after
 // first call to Next(). Not safe for concurrent access.
 _ = it.Response.(*longrunningpb.ListOperationsResponse)
}
}
// Copyright 2025 Google LLC
//
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// you may not use this file except in compliance with the License.
// You may obtain a copy of the License at
//
//     http://www.apache.org/licenses/LICENSE-2.0
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// Unless required by applicable law or agreed to in writing, software
// distributed under the License is distributed on an "AS IS" BASIS,
// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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// limitations under the License.

// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
```

```
//  protoc-gen-go v1.35.2
//  protoc        v4.25.7
// source: google/cloud/commerce/consumer/procurement/v1/license_management_service.proto

package procurementpb

import (
 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
 durationpb
 "google.golang.org/protobuf/types/known/durationpb"
 fieldmaskpb "google.golang.org/protobuf/types/known/fieldmaskpb"
 timestamppb "google.golang.org/protobuf/types/known/timestamppb"
 reflect "reflect"
 sync "sync"
)

const (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Assignment protocol for a license pool.
type AssignmentProtocol struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // The type of assignment protocol.
 //
 // Types that are assignable to AssignmentType:
 //
 // *AssignmentProtocol_ManualAssignmentType_
 // *AssignmentProtocol_AutoAssignmentType_
 AssignmentType isAssignmentProtocol_AssignmentType `protobuf_oneof:"assignment_type"`
}

func (x *AssignmentProtocol) Reset() {
 *x = AssignmentProtocol{}
 mi
 := &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[0]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}
```

```
func (x *AssignmentProtocol) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*AssignmentProtocol) ProtoMessage() {}

func (x *AssignmentProtocol) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use AssignmentProtocol.ProtoReflect.Descriptor instead.
func (*AssignmentProtocol) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{0}
}

func (m *AssignmentProtocol) GetAssignmentType() isAssignmentProtocol_AssignmentType
 {
 if m != nil {
  return m.AssignmentType
 }
 return nil
}

func (x *AssignmentProtocol) GetManualAssignmentType() *AssignmentProtocol_ManualAssignmentType {
 if x, ok := x.GetAssignmentType().(*AssignmentProtocol_ManualAssignmentType_); ok {
  return x.ManualAssignmentType
 }
 return nil
}

func (x *AssignmentProtocol) GetAutoAssignmentType() *AssignmentProtocol_AutoAssignmentType {
 if x, ok := x.GetAssignmentType().(*AssignmentProtocol_AutoAssignmentType_); ok {
  return x.AutoAssignmentType
 }
 return nil
}
```

```
type isAssignmentProtocol_AssignmentType interface {
 isAssignmentProtocol_AssignmentType()
}

type AssignmentProtocol_ManualAssignmentType_ struct {
 // Allow manual assignments triggered by administrative operations only.
 ManualAssignmentType *AssignmentProtocol_ManualAssignmentType
`protobuf:"bytes,2,opt,name=manual_assignment_type,json=manualAssignmentType,proto3,oneof"`
}

type AssignmentProtocol_AutoAssignmentType_ struct {
 // Allow automatic assignments
 triggered by data plane operations.
 AutoAssignmentType *AssignmentProtocol_AutoAssignmentType
`protobuf:"bytes,3,opt,name=auto_assignment_type,json=autoAssignmentType,proto3,oneof"`
}

func (*AssignmentProtocol_ManualAssignmentType_) isAssignmentProtocol_AssignmentType() {}

func (*AssignmentProtocol_AutoAssignmentType_) isAssignmentProtocol_AssignmentType() {}

// A license pool represents a pool of licenses that can be assigned to users.
type LicensePool struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Identifier. Format:
 // `billingAccounts/{billing_account}/orders/{order}/licensePool`
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Required. Assignment protocol for the license pool.
 LicenseAssignmentProtocol *AssignmentProtocol
`protobuf:"bytes,2,opt,name=license_assignment_protocol,json=licenseAssignmentProtocol,proto3"
json:"license_assignment_protocol,omitempty"`
 //
 Output only. Licenses count that are available to be assigned.
 AvailableLicenseCount int32
`protobuf:"varint,3,opt,name=available_license_count,json=availableLicenseCount,proto3"
json:"available_license_count,omitempty"`
 // Output only. Total number of licenses in the pool.
 TotalLicenseCount int32 `protobuf:"varint,4,opt,name=total_license_count,json=totalLicenseCount,proto3"
json:"total_license_count,omitempty"`
}

func (x *LicensePool) Reset() {
 *x = LicensePool{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[1]
```

```
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *LicensePool) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*LicensePool) ProtoMessage() {}

func (x *LicensePool) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[1]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if
 ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use LicensePool.ProtoReflect.Descriptor instead.
func (*LicensePool) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{1}
}

func (x *LicensePool) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
}

func (x *LicensePool) GetLicenseAssignmentProtocol() *AssignmentProtocol {
 if x != nil {
  return x.LicenseAssignmentProtocol
 }
 return nil
}

func (x *LicensePool) GetAvailableLicenseCount() int32 {
 if x != nil {
  return x.AvailableLicenseCount
```

```
 }
 return 0
}

func (x *LicensePool) GetTotalLicenseCount() int32 {
 if x != nil {
  return x.TotalLicenseCount
 }
 return 0
}

// Request message for getting a license pool.
type GetLicensePoolRequest struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields
 protoimpl.UnknownFields

 // Required. The name of the license pool to get.
 // Format: `billingAccounts/{billing_account}/orders/{order}/licensePool`
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
}

func (x *GetLicensePoolRequest) Reset() {
 *x = GetLicensePoolRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[2]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *GetLicensePoolRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*GetLicensePoolRequest) ProtoMessage() {}

func (x *GetLicensePoolRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[2]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
```

```
}

// Deprecated:
 Use GetLicensePoolRequest.ProtoReflect.Descriptor instead.
func (*GetLicensePoolRequest) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{2}
}

func (x *GetLicensePoolRequest) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
}

// Request message for updating a license pool.
type UpdateLicensePoolRequest struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. The license pool to update.
 //
 // The license pool's name field is used to identify the license pool to
 // update. Format:
 // `billingAccounts/{billing_account}/orders/{order}/licensePool`.
 LicensePool *LicensePool `protobuf:"bytes,1,opt,name=license_pool,json=licensePool,proto3"
json:"license_pool,omitempty"`
 // Required. The list of fields to update.
 UpdateMask *fieldmaskpb.FieldMask `protobuf:"bytes,2,opt,name=update_mask,json=updateMask,proto3"
 json:"update_mask,omitempty"`
}

func (x *UpdateLicensePoolRequest) Reset() {
 *x = UpdateLicensePoolRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[3]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *UpdateLicensePoolRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UpdateLicensePoolRequest) ProtoMessage() {}
```

```
func (x *UpdateLicensePoolRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[3]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use UpdateLicensePoolRequest.ProtoReflect.Descriptor instead.
func (*UpdateLicensePoolRequest) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
 []int{3}
}

func (x *UpdateLicensePoolRequest) GetLicensePool() *LicensePool {
 if x != nil {
  return x.LicensePool
 }
 return nil
}

func (x *UpdateLicensePoolRequest) GetUpdateMask() *fieldmaskpb.FieldMask {
 if x != nil {
  return x.UpdateMask
 }
 return nil
}

// Request message for
//
[LicenseManagementService.Assign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementServic
e.Assign].
type AssignRequest struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. License pool name.
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Required. Username.
 // Format: `name@domain.com`.
```

```
 Usernames []string `protobuf:"bytes,2,rep,name=usernames,proto3" json:"usernames,omitempty"`
}

func (x *AssignRequest) Reset() {
 *x = AssignRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[4]
 ms
 := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *AssignRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*AssignRequest) ProtoMessage() {}

func (x *AssignRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[4]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use AssignRequest.ProtoReflect.Descriptor instead.
func (*AssignRequest) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{4}
}

func (x *AssignRequest) GetParent() string {
 if x != nil {
  return x.Parent
 }
 return ""
}

func (x *AssignRequest) GetUsernames() []string {
 if x != nil
```

```
 {
  return x.Usernames
 }
 return nil
}

// Response message for
//
[LicenseManagementService.Assign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementServic
e.Assign].
type AssignResponse struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields
}

func (x *AssignResponse) Reset() {
 *x = AssignResponse{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[5]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *AssignResponse) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*AssignResponse) ProtoMessage() {}

func (x *AssignResponse) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[5]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return
 ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use AssignResponse.ProtoReflect.Descriptor instead.
func (*AssignResponse) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
```

```
[]int{5}
}

// Request message for
//
[LicenseManagementService.Unassign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementSer
vice.Unassign].
type UnassignRequest struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. License pool name.
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Required. Username.
 // Format: `name@domain.com`.
 Usernames []string `protobuf:"bytes,2,rep,name=usernames,proto3" json:"usernames,omitempty"`
}

func (x *UnassignRequest) Reset() {
 *x = UnassignRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[6]
 ms
 := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *UnassignRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UnassignRequest) ProtoMessage() {}

func (x *UnassignRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[6]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use UnassignRequest.ProtoReflect.Descriptor instead.
```

```
func (*UnassignRequest) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{6}
}

func (x *UnassignRequest) GetParent() string {
 if x != nil {
  return x.Parent
 }
 return ""
}

func (x *UnassignRequest) GetUsernames() []string {
 if x != nil {
  return x.Usernames
 }
 return
 nil
}

// Response message for
//
[LicenseManagementService.Unassign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementSer
vice.Unassign].
type UnassignResponse struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields
}

func (x *UnassignResponse) Reset() {
 *x = UnassignResponse{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[7]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *UnassignResponse) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UnassignResponse) ProtoMessage() {}

func (x *UnassignResponse) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[7]
```

```
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return
 mi.MessageOf(x)
}

// Deprecated: Use UnassignResponse.ProtoReflect.Descriptor instead.
func (*UnassignResponse) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{7}
}

// Request message for
//
[LicenseManagementService.EnumerateLicensedUsers][google.cloud.commerce.consumer.procurement.v1.License
ManagementService.EnumerateLicensedUsers].
type EnumerateLicensedUsersRequest struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. License pool name.
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Optional. The maximum number of users to return. The service may return
 // fewer than this value.
 PageSize int32 `protobuf:"varint,2,opt,name=page_size,json=pageSize,proto3" json:"page_size,omitempty"`
 // Optional. A page token, received from a previous `EnumerateLicensedUsers`
 //
 call. Provide this to retrieve the subsequent page.
 PageToken string `protobuf:"bytes,3,opt,name=page_token,json=pageToken,proto3" json:"page_token,omitempty"`
}

func (x *EnumerateLicensedUsersRequest) Reset() {
 *x = EnumerateLicensedUsersRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[8]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *EnumerateLicensedUsersRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
```

```
}

func (*EnumerateLicensedUsersRequest) ProtoMessage() {}

func (x *EnumerateLicensedUsersRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[8]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use EnumerateLicensedUsersRequest.ProtoReflect.Descriptor
 instead.
func (*EnumerateLicensedUsersRequest) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{8}
}

func (x *EnumerateLicensedUsersRequest) GetParent() string {
 if x != nil {
  return x.Parent
 }
 return ""
}

func (x *EnumerateLicensedUsersRequest) GetPageSize() int32 {
 if x != nil {
  return x.PageSize
 }
 return 0
}

func (x *EnumerateLicensedUsersRequest) GetPageToken() string {
 if x != nil {
  return x.PageToken
 }
 return ""
}

// A licensed user.
type LicensedUser struct {
```

```
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Username.
 // Format: `name@domain.com`.
 Username string `protobuf:"bytes,1,opt,name=username,proto3" json:"username,omitempty"`
 // Output only. Timestamp when the license was assigned.
 AssignTime *timestamppb.Timestamp `protobuf:"bytes,2,opt,name=assign_time,json=assignTime,proto3"
 json:"assign_time,omitempty"`
 // Output only. Timestamp when the license was recently used. This may not be
 // the most recent usage time, and will be updated regularly (within 24
 // hours).
 RecentUsageTime *timestamppb.Timestamp
`protobuf:"bytes,3,opt,name=recent_usage_time,json=recentUsageTime,proto3"
json:"recent_usage_time,omitempty"`
}

func (x *LicensedUser) Reset() {
 *x = LicensedUser{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[9]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *LicensedUser) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*LicensedUser) ProtoMessage() {}

func (x *LicensedUser) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[9]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo()
 == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use LicensedUser.ProtoReflect.Descriptor instead.
func (*LicensedUser) Descriptor() ([]byte, []int) {
```

```
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{9}
}

func (x *LicensedUser) GetUsername() string {
 if x != nil {
  return x.Username
 }
 return ""
}

func (x *LicensedUser) GetAssignTime() *timestamppb.Timestamp {
 if x != nil {
  return x.AssignTime
 }
 return nil
}

func (x *LicensedUser) GetRecentUsageTime() *timestamppb.Timestamp {
 if x != nil {
  return x.RecentUsageTime
 }
 return nil
}

// Response message for
//
[LicenseManagementService.EnumerateLicensedUsers][google.cloud.commerce.consumer.procurement.v1.License
ManagementService.EnumerateLicensedUsers].
type EnumerateLicensedUsersResponse struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 //
 The list of licensed users.
 LicensedUsers []*LicensedUser `protobuf:"bytes,1,rep,name=licensed_users,json=licensedUsers,proto3"
json:"licensed_users,omitempty"`
 // A token that can be sent as `page_token` to retrieve the next page.
 // If this field is omitted, there are no subsequent pages.
 NextPageToken string `protobuf:"bytes,2,opt,name=next_page_token,json=nextPageToken,proto3"
json:"next_page_token,omitempty"`
}

func (x *EnumerateLicensedUsersResponse) Reset() {
 *x = EnumerateLicensedUsersResponse{}
 mi :=
```

```
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[10]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *EnumerateLicensedUsersResponse) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*EnumerateLicensedUsersResponse) ProtoMessage() {}

func (x *EnumerateLicensedUsersResponse) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[10]
 if
 x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use EnumerateLicensedUsersResponse.ProtoReflect.Descriptor instead.
func (*EnumerateLicensedUsersResponse) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{10}
}

func (x *EnumerateLicensedUsersResponse) GetLicensedUsers() []*LicensedUser {
 if x != nil {
  return x.LicensedUsers
 }
 return nil
}

func (x *EnumerateLicensedUsersResponse) GetNextPageToken() string {
 if x != nil {
  return x.NextPageToken
 }
 return ""
}

// Allow manual assignments triggered by administrative operations only.
type AssignmentProtocol_ManualAssignmentType struct {
```

```
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields
}

func
 (x *AssignmentProtocol_ManualAssignmentType) Reset() {
 *x = AssignmentProtocol_ManualAssignmentType{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[11]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *AssignmentProtocol_ManualAssignmentType) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*AssignmentProtocol_ManualAssignmentType) ProtoMessage() {}

func (x *AssignmentProtocol_ManualAssignmentType) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[11]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use AssignmentProtocol_ManualAssignmentType.ProtoReflect.Descriptor instead.
func (*AssignmentProtocol_ManualAssignmentType) Descriptor()
 ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{0, 0}
}

// Configuration for automatic assignments handled by data plane operations.
type AssignmentProtocol_AutoAssignmentType struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Optional. The time to live for an inactive license. After this time has
```

```
 // passed, the license will be automatically unassigned from the user. Must
 // be at least 7 days, if set. If unset, the license will never expire.
 InactiveLicenseTtl *durationpb.Duration
`protobuf:"bytes,1,opt,name=inactive_license_ttl,json=inactiveLicenseTtl,proto3"
json:"inactive_license_ttl,omitempty"`
}

func (x *AssignmentProtocol_AutoAssignmentType) Reset() {
 *x = AssignmentProtocol_AutoAssignmentType{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[12]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func
 (x *AssignmentProtocol_AutoAssignmentType) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*AssignmentProtocol_AutoAssignmentType) ProtoMessage() {}

func (x *AssignmentProtocol_AutoAssignmentType) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[12]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use AssignmentProtocol_AutoAssignmentType.ProtoReflect.Descriptor instead.
func (*AssignmentProtocol_AutoAssignmentType) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{0, 1}
}

func (x *AssignmentProtocol_AutoAssignmentType) GetInactiveLicenseTtl() *durationpb.Duration
 {
 if x != nil {
  return x.InactiveLicenseTtl
 }
 return nil
```

```
}

var File_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto
protoreflect.FileDescriptor

var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc =
[]byte{
 0x0a, 0x4e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2f, 0x63,
 0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2f, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72,
 0x2f, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2f, 0x76, 0x31, 0x2f,
 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x5f, 0x6d, 0x61, 0x6e, 0x61, 0x67, 0x65, 0x6d, 0x65,
 0x6e, 0x74, 0x5f, 0x73, 0x65, 0x72, 0x76, 0x69, 0x63, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f,
 0x12, 0x2d, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x63,
 0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2e, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72,
 0x2e, 0x70, 0x72, 0x6f, 0x63,
 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x76, 0x31, 0x1a,
 0x1c, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x61, 0x6e, 0x6e, 0x6f,
 0x74, 0x61, 0x74, 0x69, 0x6f, 0x6e, 0x73, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x17, 0x67,
 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x63, 0x6c, 0x69, 0x65, 0x6e, 0x74,
 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x1f, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61,
 0x70, 0x69, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64, 0x5f, 0x62, 0x65, 0x68, 0x61, 0x76, 0x69, 0x6f,
 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x19, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f,
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 0x74, 0x6f, 0x1a, 0x20, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65,
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 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x1f, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x70, 0x72, 0x6f,
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 0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65, 0x6e, 0x74, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x63, 0x6f, 0x6c,
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 0x73, 0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65, 0x6e, 0x74, 0x54, 0x79, 0x70, 0x65, 0x12, 0x88, 0x01,
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 0x65, 0x72, 0x63, 0x65, 0x2e, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x2e, 0x70, 0x72,
 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x76, 0x31, 0x2e, 0x41, 0x73, 0x73,
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```

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0x41, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65, 0x6e, 0x74, 0x54, 0x79,
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0x6e, 0x74, 0x54, 0x79, 0x70, 0x65, 0x12, 0x50, 0x0a, 0x14, 0x69, 0x6e, 0x61, 0x63, 0x74, 0x69,
0x76, 0x65, 0x5f, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x5f, 0x74, 0x74, 0x6c, 0x18, 0x01,
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0x6f, 0x74, 0x6f, 0x62, 0x75, 0x66, 0x2e, 0x44, 0x75, 0x72, 0x61, 0x74, 0x69, 0x6f, 0x6e, 0x42,
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0x11, 0x0a, 0x0f, 0x61, 0x73, 0x73, 0x69,
0x67, 0x6e, 0x6d, 0x65, 0x6e, 0x74, 0x5f, 0x74, 0x79, 0x70, 0x65, 0x22, 0xbe, 0x03, 0x0a, 0x0b,
0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x50, 0x6f, 0x6f, 0x6c, 0x12, 0x17, 0x0a, 0x04, 0x6e,
0x61, 0x6d, 0x65, 0x18, 0x01, 0x20, 0x01, 0x28, 0x09, 0x42, 0x03, 0xe0, 0x41, 0x08, 0x52, 0x04,
0x6e, 0x61, 0x6d, 0x65, 0x12, 0x86, 0x01, 0x0a, 0x1b, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65,
0x5f, 0x61, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65, 0x6e, 0x74, 0x5f, 0x70, 0x72, 0x6f, 0x74,
0x6f, 0x63, 0x6f, 0x6c, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0b, 0x32, 0x41, 0x2e, 0x67, 0x6f, 0x6f,
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0x63, 0x65, 0x2e, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x63,
0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x76, 0x31, 0x2e, 0x41, 0x73, 0x73, 0x69, 0x67,
0x6e, 0x6d, 0x65, 0x6e, 0x74, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x63, 0x6f, 0x6c, 0x42,
0x03, 0xe0,
0x41, 0x02, 0x52, 0x19, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x41, 0x73, 0x73, 0x69, 0x67,
0x6e, 0x6d, 0x65, 0x6e, 0x74, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x63, 0x6f, 0x6c, 0x12, 0x3b, 0x0a,
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0x73, 0x65, 0x5f, 0x63, 0x6f, 0x75, 0x6e, 0x74, 0x18, 0x03, 0x20, 0x01, 0x28, 0x05, 0x42, 0x03,
0xe0, 0x41, 0x03, 0x52, 0x15, 0x61, 0x76, 0x61, 0x69, 0x6c, 0x61, 0x62, 0x6c, 0x65, 0x4c, 0x69,
0x63, 0x65, 0x6e, 0x73, 0x65, 0x43, 0x6f, 0x75, 0x6e, 0x74, 0x12, 0x33, 0x0a, 0x13, 0x74, 0x6f,
0x74, 0x61, 0x6c, 0x5f, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x5f, 0x63, 0x6f, 0x75, 0x6e,
0x74, 0x18, 0x04, 0x20, 0x01, 0x28, 0x05, 0x42, 0x03, 0xe0, 0x41, 0x03, 0x52, 0x11, 0x74, 0x6f,
0x74, 0x61, 0x6c, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x43, 0x6f, 0x75, 0x6e, 0x74, 0x3a,
0x9a, 0x01, 0xea, 0x41, 0x96, 0x01, 0x0a, 0x3b, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x63, 0x6f, 0x6d,
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0x0b, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x50, 0x6f, 0x6f, 0x6c, 0x22, 0x30, 0x0a, 0x15,
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0x75, 0x65, 0x73, 0x74, 0x1a, 0x3d, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x63, 0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2e, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x76, 0x31, 0x2e, 0x41, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x52, 0x65, 0x73, 0x70, 0x6f, 0x6e, 0x73, 0x65, 0x22, 0x58, 0xda, 0x41, 0x10, 0x70, 0x61, 0x72, 0x65, 0x6e, 0x74, 0x2c, 0x75, 0x73, 0x65, 0x72, 0x6e, 0x61, 0x6d, 0x65, 0x73, 0x82, 0xd3, 0xe4, 0x93, 0x02, 0x3f, 0x3a, 0x01, 0x2a, 0x22, 0x3a, 0x2f, 0x76, 0x31, 0x2f, 0x7b, 0x70, 0x61, 0x72, 0x65, 0x6e, 0x74, 0x3d, 0x62, 0x69, 0x6c, 0x6c, 0x69, 0x6e, 0x67, 0x41, 0x63, 0x63, 0x6f, 0x75, 0x6e, 0x74, 0x73, 0x2f, 0x2a, 0x2f, 0x6f, 0x72, 0x64, 0x65, 0x72, 0x73, 0x2f, 0x2a, 0x2f, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x50, 0x6f, 0x6f, 0x6c, 0x7d, 0x3a, 0x61, 0x73, 0x73,
0x69, 0x67, 0x6e, 0x12, 0xe7, 0x01,
0x0a, 0x08, 0x55, 0x6e, 0x61, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x12, 0x3e, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x63, 0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2e, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x76, 0x31, 0x2e, 0x55, 0x6e, 0x61, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x52, 0x65, 0x71, 0x75, 0x65, 0x73, 0x74, 0x1a, 0x3f, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x63, 0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2e, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x76, 0x31, 0x2e, 0x55, 0x6e, 0x61, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x52, 0x65, 0x73, 0x70, 0x6f, 0x6e, 0x73, 0x65, 0x22, 0x5a, 0xda, 0x41, 0x10, 0x70, 0x61, 0x72, 0x65, 0x6e, 0x74, 0x2c, 0x75, 0x73, 0x65, 0x72, 0x6e, 0x61, 0x6d, 0x65,
0x73,
0x82, 0xd3, 0xe4, 0x93, 0x02, 0x41, 0x3a, 0x01, 0x2a, 0x22, 0x3c, 0x2f, 0x76, 0x31, 0x2f, 0x7b, 0x70, 0x61, 0x72, 0x65, 0x6e, 0x74, 0x3d, 0x62, 0x69, 0x6c, 0x6c, 0x69, 0x6e, 0x67, 0x41, 0x63, 0x63, 0x6f, 0x75, 0x6e, 0x74, 0x73, 0x2f, 0x2a, 0x2f, 0x6f, 0x72, 0x64, 0x65, 0x72, 0x73, 0x2f, 0x2a, 0x2f, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x50, 0x6f, 0x6f, 0x6c, 0x7d, 0x3a, 0x75, 0x6e, 0x61, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x12, 0x92, 0x02, 0x0a, 0x16, 0x45, 0x6e, 0x75, 0x6d, 0x65, 0x72, 0x61, 0x74, 0x65, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x64, 0x55, 0x73, 0x65, 0x72, 0x73, 0x12, 0x4c, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x63, 0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2e, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x76, 0x31, 0x2e, 0x45, 0x6e, 0x75, 0x6d, 0x65, 0x72, 0x61, 0x74, 0x65, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65,
0x64, 0x55, 0x73, 0x65, 0x72, 0x73, 0x52, 0x65, 0x71, 0x75, 0x65, 0x73, 0x74,
0x1a, 0x4d, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x63, 0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2e, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x76, 0x31, 0x2e, 0x45, 0x6e, 0x75, 0x6d, 0x65, 0x72, 0x61, 0x74, 0x65, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x64, 0x55, 0x73, 0x65, 0x72, 0x73, 0x52, 0x65, 0x73, 0x70, 0x6f, 0x6e, 0x73, 0x65, 0x22, 0x5b, 0xda, 0x41, 0x06, 0x70, 0x61, 0x72, 0x65, 0x6e, 0x74, 0x82, 0xd3, 0xe4, 0x93, 0x02, 0x4c, 0x12, 0x4a, 0x2f, 0x76, 0x31, 0x2f, 0x7b, 0x70, 0x61, 0x72, 0x65, 0x6e, 0x74, 0x3d, 0x62, 0x69, 0x6c, 0x6c, 0x69, 0x6e, 0x67, 0x41, 0x63, 0x63, 0x6f, 0x75, 0x6e, 0x74, 0x73, 0x2f, 0x2a, 0x2f, 0x6f, 0x72, 0x64, 0x65, 0x72, 0x73, 0x2f, 0x2a, 0x2f, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65,

```
 0x50, 0x6f, 0x6f, 0x6c, 0x7d, 0x3a, 0x65, 0x6e,
 0x75, 0x6d, 0x65, 0x72, 0x61, 0x74, 0x65, 0x4c,
 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x64, 0x55, 0x73, 0x65, 0x72, 0x73, 0x1a, 0x63, 0xca, 0x41,
 0x2f, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x63, 0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x63, 0x6f,
 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e,
 0x74, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73, 0x2e, 0x63, 0x6f, 0x6d,
 0xd2, 0x41, 0x2e, 0x68, 0x74, 0x74, 0x70, 0x73, 0x3a, 0x2f, 0x2f, 0x77, 0x77, 0x77, 0x2e, 0x67,
 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73, 0x2e, 0x63, 0x6f, 0x6d, 0x2f, 0x61, 0x75,
 0x74, 0x68, 0x2f, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2d, 0x70, 0x6c, 0x61, 0x74, 0x66, 0x6f, 0x72,
 0x6d, 0x42, 0xbe, 0x02, 0x0a, 0x31, 0x63, 0x6f, 0x6d, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65,
 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x63, 0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2e,
 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x63,
 0x75, 0x72, 0x65,
 0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x76, 0x31, 0x42, 0x1d, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65,
 0x4d, 0x61, 0x6e, 0x61, 0x67, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x53, 0x65, 0x72, 0x76, 0x69, 0x63,
 0x65, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x50, 0x01, 0x5a, 0x53, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e,
 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6f, 0x6d, 0x2f, 0x67, 0x6f, 0x2f, 0x63, 0x6f,
 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2f, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x2f,
 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2f, 0x61, 0x70, 0x69, 0x76,
 0x31, 0x2f, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x70, 0x62, 0x3b,
 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x70, 0x62, 0xaa, 0x02, 0x2d,
 0x47, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x43, 0x6f, 0x6d,
 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2e, 0x43, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x2e, 0x50,
 0x72, 0x6f,
 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x56, 0x31, 0xca, 0x02, 0x2d,
 0x47, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x5c, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x5c, 0x43, 0x6f, 0x6d,
 0x6d, 0x65, 0x72, 0x63, 0x65, 0x5c, 0x43, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x5c, 0x50,
 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x5c, 0x56, 0x31, 0xea, 0x02, 0x32,
 0x47, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x3a, 0x3a, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x3a, 0x3a, 0x43,
 0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x3a, 0x3a, 0x43, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65,
 0x72, 0x3a, 0x3a, 0x50, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x3a, 0x3a,
 0x56, 0x31, 0x62, 0x06, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x33,
}

var (
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescOnce
sync.Once
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescData =
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc
)

func
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP()
[]byte {
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescOnce.Do(f
unc() {
  file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_cloud_commerce_consumer_procurement_v1_license_management_servi
```

```
ce_proto_rawDescData)
 })
 return file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescData
}

var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes =
make([]protoimpl.MessageInfo, 13)
var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_goTypes =
[]any{
 (*AssignmentProtocol)(nil),                    // 0:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol
 (*LicensePool)(nil),
  // 1: google.cloud.commerce.consumer.procurement.v1.LicensePool
 (*GetLicensePoolRequest)(nil),                 // 2:
google.cloud.commerce.consumer.procurement.v1.GetLicensePoolRequest
 (*UpdateLicensePoolRequest)(nil),              // 3:
google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest
 (*AssignRequest)(nil),                         // 4: google.cloud.commerce.consumer.procurement.v1.AssignRequest
 (*AssignResponse)(nil),                        // 5: google.cloud.commerce.consumer.procurement.v1.AssignResponse
 (*UnassignRequest)(nil),                       // 6: google.cloud.commerce.consumer.procurement.v1.UnassignRequest
 (*UnassignResponse)(nil),                      // 7: google.cloud.commerce.consumer.procurement.v1.UnassignResponse
 (*EnumerateLicensedUsersRequest)(nil),         // 8:
google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersRequest
 (*LicensedUser)(nil),                          // 9: google.cloud.commerce.consumer.procurement.v1.LicensedUser
 (*EnumerateLicensedUsersResponse)(nil),
        // 10: google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersResponse
 (*AssignmentProtocol_ManualAssignmentType)(nil), // 11:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.ManualAssignmentType
 (*AssignmentProtocol_AutoAssignmentType)(nil),   // 12:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.AutoAssignmentType
 (*fieldmaskpb.FieldMask)(nil),                 // 13: google.protobuf.FieldMask
 (*timestamppb.Timestamp)(nil),                 // 14: google.protobuf.Timestamp
 (*durationpb.Duration)(nil),                   // 15: google.protobuf.Duration
}
var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_depIdxs =
[]int32{
 11, // 0:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.manual_assignment_type:type_name ->
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.ManualAssignmentType
 12,
 // 1: google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.auto_assignment_type:type_name ->
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.AutoAssignmentType
 0,  // 2: google.cloud.commerce.consumer.procurement.v1.LicensePool.license_assignment_protocol:type_name ->
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol
 1,  // 3: google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest.license_pool:type_name ->
google.cloud.commerce.consumer.procurement.v1.LicensePool
 13, // 4: google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest.update_mask:type_name ->
google.protobuf.FieldMask
```

```
 14, // 5: google.cloud.commerce.consumer.procurement.v1.LicensedUser.assign_time:type_name ->
google.protobuf.Timestamp
 14, // 6: google.cloud.commerce.consumer.procurement.v1.LicensedUser.recent_usage_time:type_name ->
google.protobuf.Timestamp
 9,  // 7:
google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersResponse.licensed_users:type_name
 -> google.cloud.commerce.consumer.procurement.v1.LicensedUser
 15, // 8:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.AutoAssignmentType.inactive_license_ttl:t
ype_name -> google.protobuf.Duration
 2,  // 9: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.GetLicensePool:input_type -
> google.cloud.commerce.consumer.procurement.v1.GetLicensePoolRequest
 3,  // 10:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.UpdateLicensePool:input_type ->
google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest
 4,  // 11: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Assign:input_type ->
google.cloud.commerce.consumer.procurement.v1.AssignRequest
 6,  // 12: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Unassign:input_type ->
google.cloud.commerce.consumer.procurement.v1.UnassignRequest
 8,  // 13:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.EnumerateLicensedUsers:input_typ
e
 -> google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersRequest
 1,  // 14:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.GetLicensePool:output_type ->
google.cloud.commerce.consumer.procurement.v1.LicensePool
 1,  // 15:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.UpdateLicensePool:output_type ->
google.cloud.commerce.consumer.procurement.v1.LicensePool
 5,  // 16: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Assign:output_type ->
google.cloud.commerce.consumer.procurement.v1.AssignResponse
 7,  // 17: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Unassign:output_type ->
google.cloud.commerce.consumer.procurement.v1.UnassignResponse
 10, // 18:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.EnumerateLicensedUsers:output_ty
pe -> google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersResponse
 14,
 // [14:19] is the sub-list for method output_type
 9,  // [9:14] is the sub-list for method input_type
 9,  // [9:9] is the sub-list for extension type_name
 9,  // [9:9] is the sub-list for extension extendee
 0,  // [0:9] is the sub-list for field type_name
}

func init() {
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_init()
}
func file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_init() {
```

```
 if File_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto != nil {
  return
 }
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[0].OneofWrappers = []any{
  (*AssignmentProtocol_ManualAssignmentType_)(nil),
  (*AssignmentProtocol_AutoAssignmentType_)(nil),
 }
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor:
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc,
   NumEnums:
     0,
   NumMessages:   13,
   NumExtensions: 0,
   NumServices:   1,
  },
  GoTypes:
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_goTypes,
  DependencyIndexes:
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_depIdxs,
  MessageInfos:
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes,
 }.Build()
 File_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto = out.File
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc = nil
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_goTypes = nil
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_depIdxs = nil
}

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```

```
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// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package licensemanager_test

import (
 "context"

 licensemanager "cloud.google.com/go/licensemanager/apiv1"
 licensemanagerpb "cloud.google.com/go/licensemanager/apiv1/licensemanagerpb"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 "google.golang.org/api/iterator"
 locationpb "google.golang.org/genproto/googleapis/cloud/location"
)

func
 ExampleNewClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleNewRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
```

```
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c,
err := licensemanager.NewRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

// TODO: Use client.
_ = c
}

func ExampleClient_AggregateUsage() {
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := licensemanager.NewClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &licensemanagerpb.AggregateUsageRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#AggregateUsageRequest.
}
it := c.AggregateUsage(ctx, req)
for {
 resp, err := it.Next()
 if err == iterator.Done {
  break
 }
 if
err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp

 // If you need to access the underlying RPC response,
 // you can do so by casting the `Response` as below.
 // Otherwise, remove this line. Only populated after
 // first call to Next(). Not safe for concurrent access.
```

```
  _ = it.Response.(*licensemanagerpb.AggregateUsageResponse)
 }
}

func ExampleClient_CreateConfiguration() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.CreateConfigurationRequest{
  // TODO: Fill request
 struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#CreateConfigurationRequest.
 }
 op, err := c.CreateConfiguration(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 resp, err := op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_DeactivateConfiguration() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()
```

```
 req := &licensemanagerpb.DeactivateConfigurationRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#DeactivateConfigurationRequest.
 }
 op,
 err := c.DeactivateConfiguration(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 resp, err := op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_DeleteConfiguration() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.DeleteConfigurationRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#DeleteConfigurationRequest.
 }
 op,
 err := c.DeleteConfiguration(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
```

```
}

func ExampleClient_GetConfiguration() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.GetConfigurationRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#GetConfigurationRequest.
 }
 resp, err := c.GetConfiguration(ctx,
 req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_GetInstance() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.GetInstanceRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#GetInstanceRequest.
 }
 resp, err := c.GetInstance(ctx, req)
 if err != nil {
  // TODO: Handle error.
```

```
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_GetProduct() {
 ctx := context.Background()
 //
 This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.GetProductRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#GetProductRequest.
 }
 resp, err := c.GetProduct(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_ListConfigurations() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to
 work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.ListConfigurationsRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#ListConfigurationsRequest.
```

```
 }
 it := c.ListConfigurations(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*licensemanagerpb.ListConfigurationsResponse)
 }
}

func
 ExampleClient_ListInstances() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.ListInstancesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#ListInstancesRequest.
 }
 it := c.ListInstances(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
```

```
 // TODO: Use resp.
 _ = resp

 // If you need to access the
underlying RPC response,
 // you can do so by casting the `Response` as below.
 // Otherwise, remove this line. Only populated after
 // first call to Next(). Not safe for concurrent access.
 _ = it.Response.(*licensemanagerpb.ListInstancesResponse)
 }
}

func ExampleClient_ListProducts() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.ListProductsRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#ListProductsRequest.
 }
 it
 := c.ListProducts(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*licensemanagerpb.ListProductsResponse)
 }
```

```
}

func ExampleClient_QueryConfigurationLicenseUsage() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO:
 Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.QueryConfigurationLicenseUsageRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#QueryConfigurationLicenseUsage
Request.
 }
 resp, err := c.QueryConfigurationLicenseUsage(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_ReactivateConfiguration() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.ReactivateConfigurationRequest{
  //
 TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#ReactivateConfigurationRequest.
```

```
 }
 op, err := c.ReactivateConfiguration(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 resp, err := op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_UpdateConfiguration() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.UpdateConfigurationRequest{
  // TODO: Fill request
 struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#UpdateConfigurationRequest.
 }
 op, err := c.UpdateConfiguration(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 resp, err := op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_GetLocation() {
 ctx := context.Background()
```

```
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := licensemanager.NewClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &locationpb.GetLocationRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/google.golang.org/genproto/googleapis/cloud/location#GetLocationRequest.
}
resp,
err := c.GetLocation(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleClient_ListLocations() {
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := licensemanager.NewClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &locationpb.ListLocationsRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/google.golang.org/genproto/googleapis/cloud/location#ListLocationsRequest.
}
it := c.ListLocations(ctx, req)
for {
 resp, err := it.Next()
 if err == iterator.Done {
  break
 }
 if
```

```
 err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*locationpb.ListLocationsResponse)
 }
}

func ExampleClient_CancelOperation() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &longrunningpb.CancelOperationRequest{
  // TODO: Fill request struct
 fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#CancelOperationRequest.
 }
 err = c.CancelOperation(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleClient_DeleteOperation() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
```

```
 }
 defer c.Close()

 req := &longrunningpb.DeleteOperationRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#DeleteOperationRequest.
 }
 err = c.DeleteOperation(ctx, req)
 if err != nil {
  //
 TODO: Handle error.
 }
}

func ExampleClient_GetOperation() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &longrunningpb.GetOperationRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#GetOperationRequest.
 }
 resp, err := c.GetOperation(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_ListOperations() {
 ctx := context.Background()
 // This snippet has been automatically generated and
 should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
```

```
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &longrunningpb.ListOperationsRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#ListOperationsRequest.
 }
 it := c.ListOperations(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next().
 Not safe for concurrent access.
  _ = it.Response.(*longrunningpb.ListOperationsResponse)
 }
}
// Copyright 2025 Google LLC
//
// Licensed under the Apache License, Version 2.0 (the "License");
// you may not use this file except in compliance with the License.
// You may obtain a copy of the License at
//
//     https://www.apache.org/licenses/LICENSE-2.0
//
// Unless required by applicable law or agreed to in writing, software
// distributed under the License is distributed on an "AS IS" BASIS,
// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
// See the License for the specific language governing permissions and
// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute_test

import (
```

```
 "context"

 compute "cloud.google.com/go/compute/apiv1beta"
 computepb "cloud.google.com/go/compute/apiv1beta/computepb"
)

func ExampleNewLicenseCodesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications
 to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicenseCodesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetLicenseCodeRequest{
  // TODO:
 Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#GetLicenseCodeRequest.
 }
 resp, err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
```

```
}

func ExampleLicenseCodesClient_TestIamPermissions() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.TestIamPermissionsLicenseCodeRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#TestIamPermissionsLicenseCodeRequest.
 }
 resp,
 err := c.TestIamPermissions(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
// Copyright 2025 Google LLC
//
// Licensed under the Apache License, Version 2.0 (the "License");
// you may not use this file except in compliance with the License.
// You may obtain a copy of the License at
//
//     https://www.apache.org/licenses/LICENSE-2.0
//
// Unless required by applicable law or agreed to in writing, software
// distributed under the License is distributed on an "AS IS" BASIS,
// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
// See the License for the specific language governing permissions and
// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package licensemanager

import (
 "bytes"
```

```
 "context"
 "fmt"
 "log/slog"
 "math"
 "net/http"
 "net/url"
 "time"

 licensemanagerpb "cloud.google.com/go/licensemanager/apiv1/licensemanagerpb"
 "cloud.google.com/go/longrunning"
 lroauto "cloud.google.com/go/longrunning/autogen"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 gtransport
 "google.golang.org/api/transport/grpc"
 httptransport "google.golang.org/api/transport/http"
 locationpb "google.golang.org/genproto/googleapis/cloud/location"
 "google.golang.org/grpc"
 "google.golang.org/grpc/codes"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var newClientHook clientHook

// CallOptions contains the retry settings for each method of Client.
type CallOptions struct {
 ListConfigurations            []gax.CallOption
 GetConfiguration              []gax.CallOption
 CreateConfiguration           []gax.CallOption
 UpdateConfiguration           []gax.CallOption
 DeleteConfiguration           []gax.CallOption
 ListInstances                 []gax.CallOption
 GetInstance                   []gax.CallOption
 DeactivateConfiguration       []gax.CallOption
 ReactivateConfiguration
       []gax.CallOption
 QueryConfigurationLicenseUsage []gax.CallOption
 AggregateUsage                []gax.CallOption
 ListProducts                  []gax.CallOption
 GetProduct                    []gax.CallOption
 GetLocation                   []gax.CallOption
 ListLocations                 []gax.CallOption
 CancelOperation               []gax.CallOption
 DeleteOperation               []gax.CallOption
```

```
 GetOperation                []gax.CallOption
 ListOperations              []gax.CallOption
}

func defaultGRPCClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("licensemanager.googleapis.com:443"),
  internaloption.WithDefaultEndpointTemplate("licensemanager.UNIVERSE_DOMAIN:443"),
  internaloption.WithDefaultMTLSEndpoint("licensemanager.mtls.googleapis.com:443"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://licensemanager.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableJwtWithScope(),
  internaloption.EnableNewAuthLibrary(),
  option.WithGRPCDialOption(grpc.WithDefaultCallOptions(
   grpc.MaxCallRecvMsgSize(math.MaxInt32))),
 }
}

func
 defaultCallOptions() *CallOptions {
 return &CallOptions{
  ListConfigurations: []gax.CallOption{
   gax.WithTimeout(60000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnCodes([]codes.Code{
     codes.Unavailable,
    }, gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        10000 * time.Millisecond,
     Multiplier: 1.30,
    })
   }),
  },
  GetConfiguration: []gax.CallOption{
   gax.WithTimeout(60000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnCodes([]codes.Code{
     codes.Unavailable,
    }, gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        10000 * time.Millisecond,
     Multiplier: 1.30,
    })
   }),
  },
  CreateConfiguration: []gax.CallOption{
   gax.WithTimeout(60000
```

```
* time.Millisecond),
 },
 UpdateConfiguration: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
 },
 DeleteConfiguration: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
 },
 ListInstances: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnCodes([]codes.Code{
    codes.Unavailable,
   }, gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   })
  }),
 },
 GetInstance: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnCodes([]codes.Code{
    codes.Unavailable,
   }, gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   })
  }),
 },
 DeactivateConfiguration: []gax.CallOption{},
 ReactivateConfiguration: []gax.CallOption{},
 QueryConfigurationLicenseUsage:
[]gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnCodes([]codes.Code{
    codes.Unavailable,
   }, gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   })
  }),
 },
 AggregateUsage: []gax.CallOption{
```

```
  gax.WithTimeout(60000 * time.Millisecond),
 },
 ListProducts: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnCodes([]codes.Code{
    codes.Unavailable,
   }, gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   })
  }),
 },
 GetProduct: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnCodes([]codes.Code{
    codes.Unavailable,
   }, gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:
 10000 * time.Millisecond,
    Multiplier: 1.30,
   })
  }),
 },
 GetLocation:     []gax.CallOption{},
 ListLocations:   []gax.CallOption{},
 CancelOperation: []gax.CallOption{},
 DeleteOperation: []gax.CallOption{},
 GetOperation:    []gax.CallOption{},
 ListOperations:  []gax.CallOption{},
}
}

func defaultRESTCallOptions() *CallOptions {
 return &CallOptions{
  ListConfigurations: []gax.CallOption{
   gax.WithTimeout(60000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        10000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusServiceUnavailable)
   }),
```

```
 },
 GetConfiguration: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusServiceUnavailable)
  }),
 },
 CreateConfiguration:
[]gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
 },
 UpdateConfiguration: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
 },
 DeleteConfiguration: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
 },
 ListInstances: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusServiceUnavailable)
  }),
 },
 GetInstance: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusServiceUnavailable)
  }),
 },
 DeactivateConfiguration: []gax.CallOption{},
 ReactivateConfiguration:
[]gax.CallOption{},
 QueryConfigurationLicenseUsage: []gax.CallOption{
```

```
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusServiceUnavailable)
  }),
 },
 AggregateUsage: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
 },
 ListProducts: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusServiceUnavailable)
  }),
 },
 GetProduct: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:
  10000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusServiceUnavailable)
  }),
 },
 GetLocation:     []gax.CallOption{},
 ListLocations:   []gax.CallOption{},
 CancelOperation: []gax.CallOption{},
 DeleteOperation: []gax.CallOption{},
 GetOperation:    []gax.CallOption{},
 ListOperations:  []gax.CallOption{},
}
}

// internalClient is an interface that defines the methods available from License Manager API.
type internalClient interface {
 Close() error
```

```
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 ListConfigurations(context.Context, *licensemanagerpb.ListConfigurationsRequest, ...gax.CallOption)
*ConfigurationIterator
 GetConfiguration(context.Context, *licensemanagerpb.GetConfigurationRequest, ...gax.CallOption)
(*licensemanagerpb.Configuration, error)
 CreateConfiguration(context.Context, *licensemanagerpb.CreateConfigurationRequest, ...gax.CallOption)
(*CreateConfigurationOperation, error)
 CreateConfigurationOperation(name string) *CreateConfigurationOperation
 UpdateConfiguration(context.Context,
 *licensemanagerpb.UpdateConfigurationRequest, ...gax.CallOption) (*UpdateConfigurationOperation, error)
 UpdateConfigurationOperation(name string) *UpdateConfigurationOperation
 DeleteConfiguration(context.Context, *licensemanagerpb.DeleteConfigurationRequest, ...gax.CallOption)
(*DeleteConfigurationOperation, error)
 DeleteConfigurationOperation(name string) *DeleteConfigurationOperation
 ListInstances(context.Context, *licensemanagerpb.ListInstancesRequest, ...gax.CallOption) *InstanceIterator
 GetInstance(context.Context, *licensemanagerpb.GetInstanceRequest, ...gax.CallOption)
(*licensemanagerpb.Instance, error)
 DeactivateConfiguration(context.Context, *licensemanagerpb.DeactivateConfigurationRequest, ...gax.CallOption)
(*DeactivateConfigurationOperation, error)
 DeactivateConfigurationOperation(name string) *DeactivateConfigurationOperation
 ReactivateConfiguration(context.Context, *licensemanagerpb.ReactivateConfigurationRequest,
 ...gax.CallOption) (*ReactivateConfigurationOperation, error)
 ReactivateConfigurationOperation(name string) *ReactivateConfigurationOperation
 QueryConfigurationLicenseUsage(context.Context, *licensemanagerpb.QueryConfigurationLicenseUsageRequest,
...gax.CallOption) (*licensemanagerpb.QueryConfigurationLicenseUsageResponse, error)
 AggregateUsage(context.Context, *licensemanagerpb.AggregateUsageRequest, ...gax.CallOption) *UsageIterator
 ListProducts(context.Context, *licensemanagerpb.ListProductsRequest, ...gax.CallOption) *ProductIterator
 GetProduct(context.Context, *licensemanagerpb.GetProductRequest, ...gax.CallOption)
(*licensemanagerpb.Product, error)
 GetLocation(context.Context, *locationpb.GetLocationRequest, ...gax.CallOption) (*locationpb.Location, error)
 ListLocations(context.Context, *locationpb.ListLocationsRequest, ...gax.CallOption) *LocationIterator
 CancelOperation(context.Context, *longrunningpb.CancelOperationRequest, ...gax.CallOption) error
 DeleteOperation(context.Context,
 *longrunningpb.DeleteOperationRequest, ...gax.CallOption) error
 GetOperation(context.Context, *longrunningpb.GetOperationRequest, ...gax.CallOption)
(*longrunningpb.Operation, error)
 ListOperations(context.Context, *longrunningpb.ListOperationsRequest, ...gax.CallOption) *OperationIterator
}

// Client is a client for interacting with License Manager API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// Service describing handlers for resources
type Client struct {
 // The internal transport-dependent client.
 internalClient internalClient
```

```
 // The call options for this service.
 CallOptions *CallOptions

 // LROClient is used internally to handle long-running operations.
 // It is exposed so that its CallOptions can be modified if required.
 // Users should not Close this client.
 LROClient *lroauto.OperationsClient
}

// Wrapper methods routed to the internal client.

// Close
 closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *Client) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *Client) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *Client) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// ListConfigurations lists Configurations in a given project and location.
func (c *Client) ListConfigurations(ctx context.Context, req *licensemanagerpb.ListConfigurationsRequest, opts
...gax.CallOption) *ConfigurationIterator {
 return c.internalClient.ListConfigurations(ctx,
 req, opts...)
}

// GetConfiguration gets details of a single Configuration.
func (c *Client) GetConfiguration(ctx context.Context, req *licensemanagerpb.GetConfigurationRequest, opts
...gax.CallOption) (*licensemanagerpb.Configuration, error) {
 return c.internalClient.GetConfiguration(ctx, req, opts...)
}

// CreateConfiguration creates a new Configuration in a given project and location.
```

```
func (c *Client) CreateConfiguration(ctx context.Context, req *licensemanagerpb.CreateConfigurationRequest, opts
...gax.CallOption) (*CreateConfigurationOperation, error) {
 return c.internalClient.CreateConfiguration(ctx, req, opts...)
}

// CreateConfigurationOperation returns a new CreateConfigurationOperation from a given name.
// The name must be that of a previously created CreateConfigurationOperation, possibly from a different process.
func (c *Client) CreateConfigurationOperation(name string) *CreateConfigurationOperation {
 return c.internalClient.CreateConfigurationOperation(name)
}

//
 UpdateConfiguration updates the parameters of a single Configuration.
func (c *Client) UpdateConfiguration(ctx context.Context, req *licensemanagerpb.UpdateConfigurationRequest,
opts ...gax.CallOption) (*UpdateConfigurationOperation, error) {
 return c.internalClient.UpdateConfiguration(ctx, req, opts...)
}

// UpdateConfigurationOperation returns a new UpdateConfigurationOperation from a given name.
// The name must be that of a previously created UpdateConfigurationOperation, possibly from a different process.
func (c *Client) UpdateConfigurationOperation(name string) *UpdateConfigurationOperation {
 return c.internalClient.UpdateConfigurationOperation(name)
}

// DeleteConfiguration deletes a single Configuration.
func (c *Client) DeleteConfiguration(ctx context.Context, req *licensemanagerpb.DeleteConfigurationRequest, opts
...gax.CallOption) (*DeleteConfigurationOperation, error) {
 return c.internalClient.DeleteConfiguration(ctx, req, opts...)
}

// DeleteConfigurationOperation returns
 a new DeleteConfigurationOperation from a given name.
// The name must be that of a previously created DeleteConfigurationOperation, possibly from a different process.
func (c *Client) DeleteConfigurationOperation(name string) *DeleteConfigurationOperation {
 return c.internalClient.DeleteConfigurationOperation(name)
}

// ListInstances lists Instances in a given project and location.
func (c *Client) ListInstances(ctx context.Context, req *licensemanagerpb.ListInstancesRequest, opts
...gax.CallOption) *InstanceIterator {
 return c.internalClient.ListInstances(ctx, req, opts...)
}

// GetInstance gets details of a single Instance.
func (c *Client) GetInstance(ctx context.Context, req *licensemanagerpb.GetInstanceRequest, opts
...gax.CallOption) (*licensemanagerpb.Instance, error) {
 return c.internalClient.GetInstance(ctx, req, opts...)
}
```

```
// DeactivateConfiguration deactivates the given configuration.
func (c *Client) DeactivateConfiguration(ctx context.Context, req
*licensemanagerpb.DeactivateConfigurationRequest,
 opts ...gax.CallOption) (*DeactivateConfigurationOperation, error) {
 return c.internalClient.DeactivateConfiguration(ctx, req, opts...)
}

// DeactivateConfigurationOperation returns a new DeactivateConfigurationOperation from a given name.
// The name must be that of a previously created DeactivateConfigurationOperation, possibly from a different
process.
func (c *Client) DeactivateConfigurationOperation(name string) *DeactivateConfigurationOperation {
 return c.internalClient.DeactivateConfigurationOperation(name)
}

// ReactivateConfiguration reactivates the given configuration.
func (c *Client) ReactivateConfiguration(ctx context.Context, req
*licensemanagerpb.ReactivateConfigurationRequest, opts ...gax.CallOption) (*ReactivateConfigurationOperation,
error) {
 return c.internalClient.ReactivateConfiguration(ctx, req, opts...)
}

// ReactivateConfigurationOperation returns a new ReactivateConfigurationOperation from a given name.
// The name must
 be that of a previously created ReactivateConfigurationOperation, possibly from a different process.
func (c *Client) ReactivateConfigurationOperation(name string) *ReactivateConfigurationOperation {
 return c.internalClient.ReactivateConfigurationOperation(name)
}

// QueryConfigurationLicenseUsage license Usage information for a Configuration.
func (c *Client) QueryConfigurationLicenseUsage(ctx context.Context, req
*licensemanagerpb.QueryConfigurationLicenseUsageRequest, opts ...gax.CallOption)
(*licensemanagerpb.QueryConfigurationLicenseUsageResponse, error) {
 return c.internalClient.QueryConfigurationLicenseUsage(ctx, req, opts...)
}

// AggregateUsage aggregates Usage per Instance for a Configuration.
func (c *Client) AggregateUsage(ctx context.Context, req *licensemanagerpb.AggregateUsageRequest, opts
...gax.CallOption) *UsageIterator {
 return c.internalClient.AggregateUsage(ctx, req, opts...)
}

// ListProducts lists Products in a given project and location.
func (c *Client)
 ListProducts(ctx context.Context, req *licensemanagerpb.ListProductsRequest, opts ...gax.CallOption)
*ProductIterator {
 return c.internalClient.ListProducts(ctx, req, opts...)
}
```

```
// GetProduct gets details of a single Product.
func (c *Client) GetProduct(ctx context.Context, req *licensemanagerpb.GetProductRequest, opts ...gax.CallOption)
(*licensemanagerpb.Product, error) {
 return c.internalClient.GetProduct(ctx, req, opts...)
}

// GetLocation gets information about a location.
func (c *Client) GetLocation(ctx context.Context, req *locationpb.GetLocationRequest, opts ...gax.CallOption)
(*locationpb.Location, error) {
 return c.internalClient.GetLocation(ctx, req, opts...)
}

// ListLocations lists information about the supported locations for this service.
func (c *Client) ListLocations(ctx context.Context, req *locationpb.ListLocationsRequest, opts ...gax.CallOption)
*LocationIterator {
 return c.internalClient.ListLocations(ctx, req, opts...)
}

// CancelOperation is a utility
 method from google.longrunning.Operations.
func (c *Client) CancelOperation(ctx context.Context, req *longrunningpb.CancelOperationRequest, opts
...gax.CallOption) error {
 return c.internalClient.CancelOperation(ctx, req, opts...)
}

// DeleteOperation is a utility method from google.longrunning.Operations.
func (c *Client) DeleteOperation(ctx context.Context, req *longrunningpb.DeleteOperationRequest, opts
...gax.CallOption) error {
 return c.internalClient.DeleteOperation(ctx, req, opts...)
}

// GetOperation is a utility method from google.longrunning.Operations.
func (c *Client) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest, opts
...gax.CallOption) (*longrunningpb.Operation, error) {
 return c.internalClient.GetOperation(ctx, req, opts...)
}

// ListOperations is a utility method from google.longrunning.Operations.
func (c *Client) ListOperations(ctx context.Context, req *longrunningpb.ListOperationsRequest, opts
...gax.CallOption) *OperationIterator {
 return
 c.internalClient.ListOperations(ctx, req, opts...)
}

// gRPCClient is a client for interacting with License Manager API over gRPC transport.
//
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
```

```
method calls.
type gRPCClient struct {
 // Connection pool of gRPC connections to the service.
 connPool gtransport.ConnPool

 // Points back to the CallOptions field of the containing Client
 CallOptions **CallOptions

 // The gRPC API client.
 client licensemanagerpb.LicenseManagerClient

 // LROClient is used internally to handle long-running operations.
 // It is exposed so that its CallOptions can be modified if required.
 // Users should not Close this client.
 LROClient **lroauto.OperationsClient

 operationsClient longrunningpb.OperationsClient

 locationsClient locationpb.LocationsClient

 // The x-goog-* metadata to be sent with each request.
 xGoogHeaders []string

 logger *slog.Logger
}

// NewClient creates a new license
 manager client based on gRPC.
// The returned client must be Closed when it is done being used to clean up its underlying connections.
//
// Service describing handlers for resources
func NewClient(ctx context.Context, opts ...option.ClientOption) (*Client, error) {
 clientOpts := defaultGRPCClientOptions()
 if newClientHook != nil {
  hookOpts, err := newClientHook(ctx, clientHookParams{})
  if err != nil {
   return nil, err
  }
  clientOpts = append(clientOpts, hookOpts...)
 }

 connPool, err := gtransport.DialPool(ctx, append(clientOpts, opts...)...)
 if err != nil {
  return nil, err
 }
 client := Client{CallOptions: defaultCallOptions()}

 c := &gRPCClient{
```

```
 connPool:         connPool,
 client:           licensemanagerpb.NewLicenseManagerClient(connPool),
 CallOptions:      &client.CallOptions,
 logger:           internaloption.GetLogger(opts),
 operationsClient: longrunningpb.NewOperationsClient(connPool),
 locationsClient:  locationpb.NewLocationsClient(connPool),
}
c.setGoogleClientInfo()

client.internalClient
= c

client.LROClient, err = lroauto.NewOperationsClient(ctx, gtransport.WithConnPool(connPool))
if err != nil {
 // This error "should not happen", since we are just reusing old connection pool
 // and never actually need to dial.
 // If this does happen, we could leak connp. However, we cannot close conn:
 // If the user invoked the constructor with option.WithGRPCConn,
 // we would close a connection that's still in use.
 // TODO: investigate error conditions.
 return nil, err
}
c.LROClient = &client.LROClient
return &client, nil
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *gRPCClient) Connection() *grpc.ClientConn {
 return c.connPool.Conn()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written
 clients.
func (c *gRPCClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "grpc", grpc.Version, "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
```

```
func (c *gRPCClient) Close() error {
 return c.connPool.Close()
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type restClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // LROClient is used internally to handle long-running operations.
 // It is exposed so that its CallOptions can be modified if required.
 // Users should not Close this client.
 LROClient **lroauto.OperationsClient

 // The x-goog-*
 headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing Client
 CallOptions **CallOptions

 logger *slog.Logger
}

// NewRESTClient creates a new license manager rest client.
//
// Service describing handlers for resources
func NewRESTClient(ctx context.Context, opts ...option.ClientOption) (*Client, error) {
 clientOpts := append(defaultRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultRESTCallOptions()
 c := &restClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 lroOpts := []option.ClientOption{
```

```
  option.WithHTTPClient(httpClient),
  option.WithEndpoint(endpoint),
 }
 opClient, err := lroauto.NewOperationsRESTClient(ctx, lroOpts...)
 if err != nil {
  return nil, err
 }
 c.LROClient = &opClient

 return
 &Client{internalClient: c, CallOptions: callOpts}, nil
}

func defaultRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://licensemanager.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://licensemanager.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://licensemanager.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://licensemanager.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *restClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(),
 "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *restClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
```

```
func (c *restClient) Connection() *grpc.ClientConn {
 return nil
}
func (c *gRPCClient) ListConfigurations(ctx context.Context, req *licensemanagerpb.ListConfigurationsRequest,
opts ...gax.CallOption) *ConfigurationIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).ListConfigurations[0:len((*c.CallOptions).ListConfigurations):len((*c.CallOptions).ListCo
nfigurations)],
 opts...)
 it := &ConfigurationIterator{}
 req = proto.Clone(req).(*licensemanagerpb.ListConfigurationsRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*licensemanagerpb.Configuration, string, error) {
  resp := &licensemanagerpb.ListConfigurationsResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx, c.client.ListConfigurations, req, settings.GRPC, c.logger, "ListConfigurations")
   return err
  }, opts...)
  if err != nil {
   return nil, "", err
  }

  it.Response = resp
  return resp.GetConfigurations(), resp.GetNextPageToken(), nil
 }
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize,
 pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
```

```
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

func (c *gRPCClient) GetConfiguration(ctx context.Context, req *licensemanagerpb.GetConfigurationRequest, opts
...gax.CallOption) (*licensemanagerpb.Configuration, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).GetConfiguration[0:len((*c.CallOptions).GetConfiguration):len((*c.CallOptions).GetConfi
guration)], opts...)
 var resp *licensemanagerpb.Configuration
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx,
 c.client.GetConfiguration, req, settings.GRPC, c.logger, "GetConfiguration")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *gRPCClient) CreateConfiguration(ctx context.Context, req
*licensemanagerpb.CreateConfigurationRequest, opts ...gax.CallOption) (*CreateConfigurationOperation, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).CreateConfiguration[0:len((*c.CallOptions).CreateConfiguration):len((*c.CallOptions).Cre
ateConfiguration)], opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.CreateConfiguration, req, settings.GRPC, c.logger, "CreateConfiguration")
  return err
 }, opts...)
 if err != nil {
  return
 nil, err
 }
 return &CreateConfigurationOperation{
```

```
  lro: longrunning.InternalNewOperation(*c.LROClient, resp),
 }, nil
}

func (c *gRPCClient) UpdateConfiguration(ctx context.Context, req
*licensemanagerpb.UpdateConfigurationRequest, opts ...gax.CallOption) (*UpdateConfigurationOperation, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "configuration.name",
url.QueryEscape(req.GetConfiguration().GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).UpdateConfiguration[0:len((*c.CallOptions).UpdateConfiguration):len((*c.CallOptions).U
pdateConfiguration)], opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.UpdateConfiguration, req, settings.GRPC, c.logger, "UpdateConfiguration")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return
 &UpdateConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, resp),
 }, nil
}

func (c *gRPCClient) DeleteConfiguration(ctx context.Context, req
*licensemanagerpb.DeleteConfigurationRequest, opts ...gax.CallOption) (*DeleteConfigurationOperation, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).DeleteConfiguration[0:len((*c.CallOptions).DeleteConfiguration):len((*c.CallOptions).Del
eteConfiguration)], opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.DeleteConfiguration, req, settings.GRPC, c.logger, "DeleteConfiguration")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return &DeleteConfigurationOperation{
```

```
  lro: longrunning.InternalNewOperation(*c.LROClient,
 resp),
 }, nil
}

func (c *gRPCClient) ListInstances(ctx context.Context, req *licensemanagerpb.ListInstancesRequest, opts
...gax.CallOption) *InstanceIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).ListInstances[0:len((*c.CallOptions).ListInstances):len((*c.CallOptions).ListInstances)],
opts...)
 it := &InstanceIterator{}
 req = proto.Clone(req).(*licensemanagerpb.ListInstancesRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*licensemanagerpb.Instance, string, error) {
  resp := &licensemanagerpb.ListInstancesResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx,
 func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx, c.client.ListInstances, req, settings.GRPC, c.logger, "ListInstances")
   return err
  }, opts...)
  if err != nil {
   return nil, "", err
  }

  it.Response = resp
  return resp.GetInstances(), resp.GetNextPageToken(), nil
 }
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }
```

```
 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

func (c *gRPCClient) GetInstance(ctx context.Context, req *licensemanagerpb.GetInstanceRequest, opts
...gax.CallOption) (*licensemanagerpb.Instance, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds
 = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).GetInstance[0:len((*c.CallOptions).GetInstance):len((*c.CallOptions).GetInstance)],
opts...)
 var resp *licensemanagerpb.Instance
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.GetInstance, req, settings.GRPC, c.logger, "GetInstance")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *gRPCClient) DeactivateConfiguration(ctx context.Context, req
*licensemanagerpb.DeactivateConfigurationRequest, opts ...gax.CallOption) (*DeactivateConfigurationOperation,
error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).DeactivateConfiguration[0:len((*c.CallOptions).DeactivateConfiguration):len((*c.CallOpti
ons).DeactivateConfiguration)],
 opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.DeactivateConfiguration, req, settings.GRPC, c.logger,
"DeactivateConfiguration")
  return err
 }, opts...)
 if err != nil {
```

```
  return nil, err
 }
 return &DeactivateConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, resp),
 }, nil
}

func (c *gRPCClient) ReactivateConfiguration(ctx context.Context, req
*licensemanagerpb.ReactivateConfigurationRequest, opts ...gax.CallOption) (*ReactivateConfigurationOperation,
error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).ReactivateConfiguration[0:len((*c.CallOptions).ReactivateConfiguration):len((*c.CallOpti
ons).ReactivateConfiguration)],
 opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.ReactivateConfiguration, req, settings.GRPC, c.logger,
"ReactivateConfiguration")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return &ReactivateConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, resp),
 }, nil
}

func (c *gRPCClient) QueryConfigurationLicenseUsage(ctx context.Context, req
*licensemanagerpb.QueryConfigurationLicenseUsageRequest, opts ...gax.CallOption)
(*licensemanagerpb.QueryConfigurationLicenseUsageResponse, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).QueryConfigurationLicenseUsage[0:len((*c.CallOptions).QueryConfigurationLicenseUsag
e):len((*c.CallOptions).QueryConfigurationLicenseUsage)],
 opts...)
 var resp *licensemanagerpb.QueryConfigurationLicenseUsageResponse
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.QueryConfigurationLicenseUsage, req, settings.GRPC, c.logger,
```

```
"QueryConfigurationLicenseUsage")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *gRPCClient) AggregateUsage(ctx context.Context, req *licensemanagerpb.AggregateUsageRequest, opts
...gax.CallOption) *UsageIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).AggregateUsage[0:len((*c.CallOptions).AggregateUsage):len((*c.CallOptions).Aggregate
Usage)],
 opts...)
 it := &UsageIterator{}
 req = proto.Clone(req).(*licensemanagerpb.AggregateUsageRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*licensemanagerpb.Usage, string, error) {
  resp := &licensemanagerpb.AggregateUsageResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx, c.client.AggregateUsage, req, settings.GRPC, c.logger, "AggregateUsage")
   return err
  }, opts...)
  if err != nil {
   return nil, "", err
  }

  it.Response = resp
  return resp.GetUsages(), resp.GetNextPageToken(), nil
 }
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
```

```
 it.items = append(it.items,
items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

func (c *gRPCClient) ListProducts(ctx context.Context, req *licensemanagerpb.ListProductsRequest, opts
...gax.CallOption) *ProductIterator {
hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

hds = append(c.xGoogHeaders, hds...)
ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
opts =
append((*c.CallOptions).ListProducts[0:len((*c.CallOptions).ListProducts):len((*c.CallOptions).ListProducts)],
opts...)
it := &ProductIterator{}
req = proto.Clone(req).(*licensemanagerpb.ListProductsRequest)
it.InternalFetch = func(pageSize int, pageToken string) ([]*licensemanagerpb.Product, string, error) {
 resp := &licensemanagerpb.ListProductsResponse{}
 if pageToken != "" {
  req.PageToken = pageToken
 }
 if
pageSize > math.MaxInt32 {
  req.PageSize = math.MaxInt32
 } else if pageSize != 0 {
  req.PageSize = int32(pageSize)
 }
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.ListProducts, req, settings.GRPC, c.logger, "ListProducts")
  return err
 }, opts...)
 if err != nil {
  return nil, "", err
 }

 it.Response = resp
 return resp.GetProducts(), resp.GetNextPageToken(), nil
}
fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
```

```
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

func (c *gRPCClient) GetProduct(ctx context.Context, req *licensemanagerpb.GetProductRequest,
 opts ...gax.CallOption) (*licensemanagerpb.Product, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts = append((*c.CallOptions).GetProduct[0:len((*c.CallOptions).GetProduct):len((*c.CallOptions).GetProduct)],
opts...)
 var resp *licensemanagerpb.Product
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.GetProduct, req, settings.GRPC, c.logger, "GetProduct")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *gRPCClient) GetLocation(ctx context.Context, req *locationpb.GetLocationRequest, opts
...gax.CallOption) (*locationpb.Location, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders,
 hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).GetLocation[0:len((*c.CallOptions).GetLocation):len((*c.CallOptions).GetLocation)],
opts...)
 var resp *locationpb.Location
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.locationsClient.GetLocation, req, settings.GRPC, c.logger, "GetLocation")
```

```
 return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *gRPCClient) ListLocations(ctx context.Context, req *locationpb.ListLocationsRequest, opts
...gax.CallOption) *LocationIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).ListLocations[0:len((*c.CallOptions).ListLocations):len((*c.CallOptions).ListLocations)],
opts...)
 it := &LocationIterator{}
 req
 = proto.Clone(req).(*locationpb.ListLocationsRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*locationpb.Location, string, error) {
  resp := &locationpb.ListLocationsResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx, c.locationsClient.ListLocations, req, settings.GRPC, c.logger, "ListLocations")
   return err
  }, opts...)
  if err != nil {
   return nil, "", err
  }

  it.Response = resp
  return resp.GetLocations(), resp.GetNextPageToken(), nil
 }
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
```

```
  return nextPageToken,
 nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

func (c *gRPCClient) CancelOperation(ctx context.Context, req *longrunningpb.CancelOperationRequest, opts
...gax.CallOption) error {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).CancelOperation[0:len((*c.CallOptions).CancelOperation):len((*c.CallOptions).CancelOp
eration)], opts...)
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  _, err = executeRPC(ctx, c.operationsClient.CancelOperation, req, settings.GRPC, c.logger, "CancelOperation")
  return err
 }, opts...)
 return err
}

func (c *gRPCClient) DeleteOperation(ctx context.Context, req *longrunningpb.DeleteOperationRequest,
 opts ...gax.CallOption) error {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).DeleteOperation[0:len((*c.CallOptions).DeleteOperation):len((*c.CallOptions).DeleteOper
ation)], opts...)
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  _, err = executeRPC(ctx, c.operationsClient.DeleteOperation, req, settings.GRPC, c.logger, "DeleteOperation")
  return err
 }, opts...)
 return err
}

func (c *gRPCClient) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest, opts
...gax.CallOption) (*longrunningpb.Operation, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}
```

```
 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx,
 hds...)
 opts =
append((*c.CallOptions).GetOperation[0:len((*c.CallOptions).GetOperation):len((*c.CallOptions).GetOperation)],
opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.operationsClient.GetOperation, req, settings.GRPC, c.logger, "GetOperation")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *gRPCClient) ListOperations(ctx context.Context, req *longrunningpb.ListOperationsRequest, opts
...gax.CallOption) *OperationIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).ListOperations[0:len((*c.CallOptions).ListOperations):len((*c.CallOptions).ListOperations
)], opts...)
 it := &OperationIterator{}
 req = proto.Clone(req).(*longrunningpb.ListOperationsRequest)
 it.InternalFetch
 = func(pageSize int, pageToken string) ([]*longrunningpb.Operation, string, error) {
  resp := &longrunningpb.ListOperationsResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx, c.operationsClient.ListOperations, req, settings.GRPC, c.logger, "ListOperations")
   return err
  }, opts...)
  if err != nil {
   return nil, "", err
```

```
 }

 it.Response = resp
 return resp.GetOperations(), resp.GetNextPageToken(), nil
}
fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo,
it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// ListConfigurations lists Configurations in a given project and location.
func (c *restClient) ListConfigurations(ctx context.Context, req *licensemanagerpb.ListConfigurationsRequest, opts
...gax.CallOption) *ConfigurationIterator {
 it := &ConfigurationIterator{}
 req = proto.Clone(req).(*licensemanagerpb.ListConfigurationsRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*licensemanagerpb.Configuration, string, error) {
  resp := &licensemanagerpb.ListConfigurationsResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
   return
 nil, "", err
  }
  baseUrl.Path += fmt.Sprintf("/v1/%v/configurations", req.GetParent())

  params := url.Values{}
  params.Add("$alt", "json;enum-encoding=int")
  if req.GetFilter() != "" {
```

```
 params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
}
if req.GetOrderBy() != "" {
 params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
}
if req.GetPageSize() != 0 {
 params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
}
if req.GetPageToken() != "" {
 params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
}

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := append(c.xGoogHeaders, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
 if err != nil
{
  return err
 }
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "ListConfigurations")
 if err != nil {
  return err
 }
 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, "", e
}
it.Response = resp
return resp.GetConfigurations(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
```

```
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// GetConfiguration gets details of a single Configuration.
func (c *restClient) GetConfiguration(ctx context.Context, req *licensemanagerpb.GetConfigurationRequest,
 opts ...gax.CallOption) (*licensemanagerpb.Configuration, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetConfiguration[0:len((*c.CallOptions).GetConfiguration):len((*c.CallOptions).GetConfi
guration)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &licensemanagerpb.Configuration{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path
 = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
```

```
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetConfiguration")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
}

// CreateConfiguration creates a new Configuration in a given project and location.
func (c *restClient) CreateConfiguration(ctx context.Context, req *licensemanagerpb.CreateConfigurationRequest,
opts ...gax.CallOption) (*CreateConfigurationOperation, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 body := req.GetConfiguration()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path
 += fmt.Sprintf("/v1/%v/configurations", req.GetParent())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")
 params.Add("configurationId", fmt.Sprintf("%v", req.GetConfigurationId()))
 if req.GetRequestId() != "" {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}
```

```
 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &longrunningpb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err !=
 nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "CreateConfiguration")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }

 override := fmt.Sprintf("/v1/%s", resp.GetName())
 return &CreateConfigurationOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, resp),
  pollPath: override,
 }, nil
}

// UpdateConfiguration updates the parameters of a single Configuration.
func (c *restClient) UpdateConfiguration(ctx context.Context, req *licensemanagerpb.UpdateConfigurationRequest,
opts ...gax.CallOption) (*UpdateConfigurationOperation, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 body := req.GetConfiguration()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }
```

```
baseUrl, err := url.Parse(c.endpoint)
if
err != nil {
 return nil, err
}
baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetConfiguration().GetName())

params := url.Values{}
params.Add("$alt", "json;enum-encoding=int")
if req.GetRequestId() != "" {
 params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
}
if req.GetUpdateMask() != nil {
 field, err := protojson.Marshal(req.GetUpdateMask())
 if err != nil {
  return nil, err
 }
 params.Add("updateMask", string(field[1:len(field)-1]))
}

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "configuration.name",
url.QueryEscape(req.GetConfiguration().GetName()))}

hds = append(c.xGoogHeaders, hds...)
hds = append(hds, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
resp := &longrunningpb.Operation{}
e := gax.Invoke(ctx, func(ctx context.Context,
settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("PATCH", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "UpdateConfiguration")
 if err != nil {
  return err
 }
 if err := unm.Unmarshal(buf, resp); err != nil {
```

```
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}

override := fmt.Sprintf("/v1/%s", resp.GetName())
return &UpdateConfigurationOperation{
 lro:      longrunning.InternalNewOperation(*c.LROClient, resp),
 pollPath: override,
}, nil
}

// DeleteConfiguration deletes a single Configuration.
func (c *restClient) DeleteConfiguration(ctx context.Context, req *licensemanagerpb.DeleteConfigurationRequest,
opts ...gax.CallOption) (*DeleteConfigurationOperation, error) {
 baseUrl,
 err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")
 if req.GetRequestId() != "" {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &longrunningpb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
  if err != nil {
```

```
  return err
 }
 httpReq
= httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "DeleteConfiguration")
 if err != nil {
  return err
 }
 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}

override := fmt.Sprintf("/v1/%s", resp.GetName())
return &DeleteConfigurationOperation{
 lro:      longrunning.InternalNewOperation(*c.LROClient, resp),
 pollPath: override,
}, nil
}

// ListInstances lists Instances in a given project and location.
func (c *restClient) ListInstances(ctx context.Context, req *licensemanagerpb.ListInstancesRequest, opts
...gax.CallOption) *InstanceIterator {
 it := &InstanceIterator{}
 req = proto.Clone(req).(*licensemanagerpb.ListInstancesRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*licensemanagerpb.Instance, string, error) {
  resp
 := &licensemanagerpb.ListInstancesResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
   return nil, "", err
  }
```

```
baseUrl.Path += fmt.Sprintf("/v1/%v/instances", req.GetParent())

params := url.Values{}
params.Add("$alt", "json;enum-encoding=int")
if req.GetFilter() != "" {
 params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
}
if req.GetOrderBy() != "" {
 params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
}
if req.GetPageSize() != 0 {
 params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
}
if req.GetPageToken() != "" {
 params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
}

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := append(c.xGoogHeaders, "Content-Type", "application/json")
headers
:= gax.BuildHeaders(ctx, hds...)
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
 if err != nil {
  return err
 }
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "ListInstances")
 if err != nil {
  return err
 }
 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, "", e
}
it.Response = resp
return resp.GetInstances(), resp.GetNextPageToken(), nil
```

```
 }

 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen,
 it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

// GetInstance gets details of a single Instance.
func (c *restClient) GetInstance(ctx context.Context, req *licensemanagerpb.GetInstanceRequest, opts
...gax.CallOption) (*licensemanagerpb.Instance, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetInstance[0:len((*c.CallOptions).GetInstance):len((*c.CallOptions).GetInstance)],
opts...)
 unm :=
 protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &licensemanagerpb.Instance{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
```

```
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetInstance")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// DeactivateConfiguration deactivates the given configuration.
func (c *restClient) DeactivateConfiguration(ctx context.Context, req
*licensemanagerpb.DeactivateConfigurationRequest, opts ...gax.CallOption) (*DeactivateConfigurationOperation,
error) {
 m := protojson.MarshalOptions{AllowPartial: true,
 UseEnumNumbers: true}
 jsonReq, err := m.Marshal(req)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:deactivate", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
```

```
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &longrunningpb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil
 {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "DeactivateConfiguration")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }

 override := fmt.Sprintf("/v1/%s", resp.GetName())
 return &DeactivateConfigurationOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, resp),
  pollPath: override,
 }, nil
}

// ReactivateConfiguration reactivates the given configuration.
func (c *restClient) ReactivateConfiguration(ctx context.Context, req
*licensemanagerpb.ReactivateConfigurationRequest, opts ...gax.CallOption) (*ReactivateConfigurationOperation,
error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 jsonReq, err := m.Marshal(req)
 if err != nil {
  return nil, err
```

```
}

baseUrl, err := url.Parse(c.endpoint)
if err !=
nil {
 return nil, err
}
baseUrl.Path += fmt.Sprintf("/v1/%v:reactivate", req.GetName())

params := url.Values{}
params.Add("$alt", "json;enum-encoding=int")

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

hds = append(c.xGoogHeaders, hds...)
hds = append(hds, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
resp := &longrunningpb.Operation{}
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq,
c.logger, jsonReq, "ReactivateConfiguration")
 if err != nil {
  return err
 }
 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
```

```
 override := fmt.Sprintf("/v1/%s", resp.GetName())
 return &ReactivateConfigurationOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, resp),
  pollPath: override,
 }, nil
}

// QueryConfigurationLicenseUsage license Usage information for a Configuration.
func (c *restClient) QueryConfigurationLicenseUsage(ctx context.Context, req
*licensemanagerpb.QueryConfigurationLicenseUsageRequest, opts ...gax.CallOption)
(*licensemanagerpb.QueryConfigurationLicenseUsageResponse, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:queryLicenseUsage", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")
 if req.GetEndTime() != nil {
  field, err := protojson.Marshal(req.GetEndTime())
  if
 err != nil {
   return nil, err
  }
  params.Add("endTime", string(field[1:len(field)-1]))
 }
 if req.GetStartTime() != nil {
  field, err := protojson.Marshal(req.GetStartTime())
  if err != nil {
   return nil, err
  }
  params.Add("startTime", string(field[1:len(field)-1]))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).QueryConfigurationLicenseUsage[0:len((*c.CallOptions).QueryConfigurationLicenseUsag
e):len((*c.CallOptions).QueryConfigurationLicenseUsage)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &licensemanagerpb.QueryConfigurationLicenseUsageResponse{}
```

```
 e := gax.Invoke(ctx, func(ctx
 context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "QueryConfigurationLicenseUsage")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// AggregateUsage aggregates Usage per Instance for a Configuration.
func (c *restClient) AggregateUsage(ctx context.Context, req *licensemanagerpb.AggregateUsageRequest, opts
...gax.CallOption) *UsageIterator {
 it := &UsageIterator{}
 req = proto.Clone(req).(*licensemanagerpb.AggregateUsageRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken
 string) ([]*licensemanagerpb.Usage, string, error) {
  resp := &licensemanagerpb.AggregateUsageResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
```

```
 return nil, "", err
}
baseUrl.Path += fmt.Sprintf("/v1/%v:aggregateUsage", req.GetName())

params := url.Values{}
params.Add("$alt", "json;enum-encoding=int")
if req.GetEndTime() != nil {
 field, err := protojson.Marshal(req.GetEndTime())
 if err != nil {
  return nil, "", err
 }
 params.Add("endTime", string(field[1:len(field)-1]))
}
if req.GetFilter() != "" {
 params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
}
if req.GetOrderBy() != "" {
 params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
}
if req.GetPageSize() != 0 {
 params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
}
if
req.GetPageToken() != "" {
 params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
}
if req.GetStartTime() != nil {
 field, err := protojson.Marshal(req.GetStartTime())
 if err != nil {
  return nil, "", err
 }
 params.Add("startTime", string(field[1:len(field)-1]))
}

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := append(c.xGoogHeaders, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
 if err != nil {
  return err
 }
 httpReq.Header = headers
```

```
  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "AggregateUsage")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return
 nil
  }, opts...)
  if e != nil {
   return nil, "", e
  }
  it.Response = resp
  return resp.GetUsages(), resp.GetNextPageToken(), nil
 }

 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

// ListProducts lists Products in a given project and location.
func (c *restClient) ListProducts(ctx context.Context, req *licensemanagerpb.ListProductsRequest, opts
...gax.CallOption) *ProductIterator {
 it := &ProductIterator{}
 req = proto.Clone(req).(*licensemanagerpb.ListProductsRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken
 string) ([]*licensemanagerpb.Product, string, error) {
  resp := &licensemanagerpb.ListProductsResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
```

```
 req.PageSize = math.MaxInt32
} else if pageSize != 0 {
 req.PageSize = int32(pageSize)
}
baseUrl, err := url.Parse(c.endpoint)
if err != nil {
 return nil, "", err
}
baseUrl.Path += fmt.Sprintf("/v1/%v/products", req.GetParent())

params := url.Values{}
params.Add("$alt", "json;enum-encoding=int")
if req.GetFilter() != "" {
 params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
}
if req.GetOrderBy() != "" {
 params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
}
if req.GetPageSize() != 0 {
 params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
}
if req.GetPageToken() != "" {
 params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
}

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds
:= append(c.xGoogHeaders, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
 if err != nil {
  return err
 }
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "ListProducts")
 if err != nil {
  return err
 }
 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }
```

```
  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetProducts(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo,
it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// GetProduct gets details of a single Product.
func (c *restClient) GetProduct(ctx context.Context, req *licensemanagerpb.GetProductRequest, opts
...gax.CallOption) (*licensemanagerpb.Product, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).GetProduct[0:len((*c.CallOptions).GetProduct):len((*c.CallOptions).GetProduct)],
```

```
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &licensemanagerpb.Product{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetProduct")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// GetLocation gets information about a location.
func (c *restClient) GetLocation(ctx context.Context, req *locationpb.GetLocationRequest, opts ...gax.CallOption)
(*locationpb.Location, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return
 nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}
```

```
 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetLocation[0:len((*c.CallOptions).GetLocation):len((*c.CallOptions).GetLocation)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &locationpb.Location{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header
 = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetLocation")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// ListLocations lists information about the supported locations for this service.
func (c *restClient) ListLocations(ctx context.Context, req *locationpb.ListLocationsRequest, opts
...gax.CallOption) *LocationIterator {
 it := &LocationIterator{}
 req = proto.Clone(req).(*locationpb.ListLocationsRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*locationpb.Location, string, error) {
  resp := &locationpb.ListLocationsResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
```

```
 }
 if pageSize > math.MaxInt32 {
  req.PageSize = math.MaxInt32
 } else if pageSize != 0 {
  req.PageSize = int32(pageSize)
 }
 baseUrl,
err := url.Parse(c.endpoint)
 if err != nil {
  return nil, "", err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v/locations", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")
 if req.GetFilter() != "" {
  params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
 }
 if req.GetPageSize() != 0 {
  params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
 }
 if req.GetPageToken() != "" {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header
= headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "ListLocations")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }
```

```
  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetLocations(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// CancelOperation is a utility method from google.longrunning.Operations.
func (c *restClient) CancelOperation(ctx context.Context, req *longrunningpb.CancelOperationRequest, opts
...gax.CallOption)
 error {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 jsonReq, err := m.Marshal(req)
 if err != nil {
  return err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:cancel", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
```

```
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 return gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header
 = headers

  _, err = executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "CancelOperation")
  return err
 }, opts...)
}

// DeleteOperation is a utility method from google.longrunning.Operations.
func (c *restClient) DeleteOperation(ctx context.Context, req *longrunningpb.DeleteOperationRequest, opts
...gax.CallOption) error {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 return gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path !=
 "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
```

```
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  _, err = executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "DeleteOperation")
  return err
 }, opts...)
}

// GetOperation is a utility method from google.longrunning.Operations.
func (c *restClient) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest, opts
...gax.CallOption) (*longrunningpb.Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds
 = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetOperation[0:len((*c.CallOptions).GetOperation):len((*c.CallOptions).GetOperation)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &longrunningpb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers
```

```
  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetOperation")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// ListOperations is a utility method from google.longrunning.Operations.
func
 (c *restClient) ListOperations(ctx context.Context, req *longrunningpb.ListOperationsRequest, opts
...gax.CallOption) *OperationIterator {
 it := &OperationIterator{}
 req = proto.Clone(req).(*longrunningpb.ListOperationsRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*longrunningpb.Operation, string, error) {
  resp := &longrunningpb.ListOperationsResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
   return nil, "", err
  }
  baseUrl.Path += fmt.Sprintf("/v1/%v/operations", req.GetName())

  params := url.Values{}
  params.Add("$alt", "json;enum-encoding=int")
  if req.GetFilter() != "" {
   params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
  }
  if req.GetPageSize() != 0 {
   params.Add("pageSize",
```

```
fmt.Sprintf("%v", req.GetPageSize()))
 }
 if req.GetPageToken() != "" {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "ListOperations")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetOperations(), resp.GetNextPageToken(),
nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}
```

```
 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

// CreateConfigurationOperation returns a new CreateConfigurationOperation from a given name.
// The name must be that of a previously created CreateConfigurationOperation, possibly from a different process.
func (c *gRPCClient) CreateConfigurationOperation(name string) *CreateConfigurationOperation {
 return &CreateConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
 }
}

// CreateConfigurationOperation returns a new CreateConfigurationOperation from a given name.
// The name must
 be that of a previously created CreateConfigurationOperation, possibly from a different process.
func (c *restClient) CreateConfigurationOperation(name string) *CreateConfigurationOperation {
 override := fmt.Sprintf("/v1/%s", name)
 return &CreateConfigurationOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
  pollPath: override,
 }
}

// DeactivateConfigurationOperation returns a new DeactivateConfigurationOperation from a given name.
// The name must be that of a previously created DeactivateConfigurationOperation, possibly from a different
process.
func (c *gRPCClient) DeactivateConfigurationOperation(name string) *DeactivateConfigurationOperation {
 return &DeactivateConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
 }
}

// DeactivateConfigurationOperation returns a new DeactivateConfigurationOperation from a given name.
// The name must be that of a previously
 created DeactivateConfigurationOperation, possibly from a different process.
func (c *restClient) DeactivateConfigurationOperation(name string) *DeactivateConfigurationOperation {
 override := fmt.Sprintf("/v1/%s", name)
 return &DeactivateConfigurationOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
  pollPath: override,
 }
}

// DeleteConfigurationOperation returns a new DeleteConfigurationOperation from a given name.
// The name must be that of a previously created DeleteConfigurationOperation, possibly from a different process.
```

```
func (c *gRPCClient) DeleteConfigurationOperation(name string) *DeleteConfigurationOperation {
 return &DeleteConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
 }
}

// DeleteConfigurationOperation returns a new DeleteConfigurationOperation from a given name.
// The name must be that of a previously created DeleteConfigurationOperation,
 possibly from a different process.
func (c *restClient) DeleteConfigurationOperation(name string) *DeleteConfigurationOperation {
 override := fmt.Sprintf("/v1/%s", name)
 return &DeleteConfigurationOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
  pollPath: override,
 }
}

// ReactivateConfigurationOperation returns a new ReactivateConfigurationOperation from a given name.
// The name must be that of a previously created ReactivateConfigurationOperation, possibly from a different
process.
func (c *gRPCClient) ReactivateConfigurationOperation(name string) *ReactivateConfigurationOperation {
 return &ReactivateConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
 }
}

// ReactivateConfigurationOperation returns a new ReactivateConfigurationOperation from a given name.
// The name must be that of a previously created ReactivateConfigurationOperation, possibly
 from a different process.
func (c *restClient) ReactivateConfigurationOperation(name string) *ReactivateConfigurationOperation {
 override := fmt.Sprintf("/v1/%s", name)
 return &ReactivateConfigurationOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
  pollPath: override,
 }
}

// UpdateConfigurationOperation returns a new UpdateConfigurationOperation from a given name.
// The name must be that of a previously created UpdateConfigurationOperation, possibly from a different process.
func (c *gRPCClient) UpdateConfigurationOperation(name string) *UpdateConfigurationOperation {
 return &UpdateConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
 }
}

// UpdateConfigurationOperation returns a new UpdateConfigurationOperation from a given name.
// The name must be that of a previously created UpdateConfigurationOperation, possibly from a different process.
func (c
```

```
 *restClient) UpdateConfigurationOperation(name string) *UpdateConfigurationOperation {
 override := fmt.Sprintf("/v1/%s", name)
 return &UpdateConfigurationOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
  pollPath: override,
 }
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
)

func ExampleLicensesClient_List_all() {
```

```
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications
 to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.ListLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#ListLicensesRequest.
 }
 for resp, err := range c.List(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}
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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.35.2
//  protoc        v4.25.7
// source: google/cloud/discoveryengine/v1/user_license_service.proto

package discoveryenginepb

import (
```

```
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 _ "google.golang.org/genproto/googleapis/api/annotations"
 status "google.golang.org/genproto/googleapis/rpc/status"
 protoreflect
 "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
 fieldmaskpb "google.golang.org/protobuf/types/known/fieldmaskpb"
 timestamppb "google.golang.org/protobuf/types/known/timestamppb"
 reflect "reflect"
 sync "sync"
)

const (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Request message for
// [UserLicenseService.ListUserLicenses][google.cloud.discoveryengine.v1.UserLicenseService.ListUserLicenses].
type ListUserLicensesRequest struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. The parent [UserStore][] resource name, format:
 // `projects/{project}/locations/{location}/userStores/{user_store_id}`.
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3"
 json:"parent,omitempty"`
 // Optional. Requested page size. Server may return fewer items than
 // requested. If unspecified, defaults to 10. The maximum value is 50; values
 // above 50 will be coerced to 50.
 //
 // If this field is negative, an INVALID_ARGUMENT error is returned.
 PageSize int32 `protobuf:"varint,2,opt,name=page_size,json=pageSize,proto3" json:"page_size,omitempty"`
 // Optional. A page token, received from a previous `ListUserLicenses` call.
 // Provide this to retrieve the subsequent page.
 //
 // When paginating, all other parameters provided to `ListUserLicenses`
 // must match the call that provided the page token.
 PageToken string `protobuf:"bytes,3,opt,name=page_token,json=pageToken,proto3" json:"page_token,omitempty"`
 // Optional. Filter for the list request.
 //
 // Supported fields:
 //
 // * `license_assignment_state`
 //
```

```
 // Examples:
 //
 // * `license_assignment_state = ASSIGNED` to list assigned user licenses.
 // * `license_assignment_state
 = NO_LICENSE` to list not licensed users.
 // * `license_assignment_state = NO_LICENSE_ATTEMPTED_LOGIN` to list users
 // who attempted login but no license assigned.
 // * `license_assignment_state != NO_LICENSE_ATTEMPTED_LOGIN` to filter
 // out users who attempted login but no license assigned.
 Filter string `protobuf:"bytes,4,opt,name=filter,proto3" json:"filter,omitempty"`
}

func (x *ListUserLicensesRequest) Reset() {
 *x = ListUserLicensesRequest{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[0]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *ListUserLicensesRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*ListUserLicensesRequest) ProtoMessage() {}

func (x *ListUserLicensesRequest) ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if
 ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use ListUserLicensesRequest.ProtoReflect.Descriptor instead.
func (*ListUserLicensesRequest) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP(), []int{0}
}

func (x *ListUserLicensesRequest) GetParent() string {
 if x != nil {
  return x.Parent
 }
 return ""
```

```
}

func (x *ListUserLicensesRequest) GetPageSize() int32 {
 if x != nil {
  return x.PageSize
 }
 return 0
}

func (x *ListUserLicensesRequest) GetPageToken() string {
 if x != nil {
  return x.PageToken
 }
 return ""
}

func (x *ListUserLicensesRequest) GetFilter() string {
 if x != nil {
  return x.Filter
 }
 return ""
}

// Response message for
// [UserLicenseService.ListUserLicenses][google.cloud.discoveryengine.v1.UserLicenseService.ListUserLicenses].
type ListUserLicensesResponse struct {
 state         protoimpl.MessageState
 sizeCache
     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // All the customer's
 // [UserLicense][google.cloud.discoveryengine.v1.UserLicense]s.
 UserLicenses []*UserLicense `protobuf:"bytes,1,rep,name=user_licenses,json=userLicenses,proto3"
json:"user_licenses,omitempty"`
 // A token, which can be sent as `page_token` to retrieve the next page. If
 // this field is omitted, there are no subsequent pages.
 NextPageToken string `protobuf:"bytes,2,opt,name=next_page_token,json=nextPageToken,proto3"
json:"next_page_token,omitempty"`
}

func (x *ListUserLicensesResponse) Reset() {
 *x = ListUserLicensesResponse{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[1]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}
```

```
func (x *ListUserLicensesResponse) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*ListUserLicensesResponse) ProtoMessage() {}

func (x *ListUserLicensesResponse) ProtoReflect() protoreflect.Message
 {
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[1]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use ListUserLicensesResponse.ProtoReflect.Descriptor instead.
func (*ListUserLicensesResponse) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP(), []int{1}
}

func (x *ListUserLicensesResponse) GetUserLicenses() []*UserLicense {
 if x != nil {
  return x.UserLicenses
 }
 return nil
}

func (x *ListUserLicensesResponse) GetNextPageToken() string {
 if x != nil {
  return x.NextPageToken
 }
 return ""
}

// Request message for
//
[UserLicenseService.BatchUpdateUserLicenses][google.cloud.discoveryengine.v1.UserLicenseService.BatchUpdat
eUserLicenses]
// method.
type BatchUpdateUserLicensesRequest struct {
 state         protoimpl.MessageState
 sizeCache
     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields
```

```
 // Required. The source of the input.
 //
 // Types that are assignable to Source:
 //
 // *BatchUpdateUserLicensesRequest_InlineSource_
 Source isBatchUpdateUserLicensesRequest_Source `protobuf_oneof:"source"`
 // Required. The parent [UserStore][] resource name, format:
 // `projects/{project}/locations/{location}/userStores/{user_store_id}`.
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Optional. If true, if user licenses removed associated license config, the
 // user license will be deleted. By default which is false, the user license
 // will be updated to unassigned state.
 DeleteUnassignedUserLicenses bool
`protobuf:"varint,4,opt,name=delete_unassigned_user_licenses,json=deleteUnassignedUserLicenses,proto3"
json:"delete_unassigned_user_licenses,omitempty"`
}

func (x *BatchUpdateUserLicensesRequest) Reset() {
 *x = BatchUpdateUserLicensesRequest{}
 mi
 := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[2]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *BatchUpdateUserLicensesRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*BatchUpdateUserLicensesRequest) ProtoMessage() {}

func (x *BatchUpdateUserLicensesRequest) ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[2]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use BatchUpdateUserLicensesRequest.ProtoReflect.Descriptor instead.
func (*BatchUpdateUserLicensesRequest) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP(), []int{2}
}
```

```
func (m *BatchUpdateUserLicensesRequest) GetSource() isBatchUpdateUserLicensesRequest_Source
 {
 if m != nil {
  return m.Source
 }
 return nil
}

func (x *BatchUpdateUserLicensesRequest) GetInlineSource() *BatchUpdateUserLicensesRequest_InlineSource {
 if x, ok := x.GetSource().(*BatchUpdateUserLicensesRequest_InlineSource_); ok {
  return x.InlineSource
 }
 return nil
}

func (x *BatchUpdateUserLicensesRequest) GetParent() string {
 if x != nil {
  return x.Parent
 }
 return ""
}

func (x *BatchUpdateUserLicensesRequest) GetDeleteUnassignedUserLicenses() bool {
 if x != nil {
  return x.DeleteUnassignedUserLicenses
 }
 return false
}

type isBatchUpdateUserLicensesRequest_Source interface {
 isBatchUpdateUserLicensesRequest_Source()
}

type BatchUpdateUserLicensesRequest_InlineSource_ struct {
 // The inline source for the input content for document embeddings.
 InlineSource *BatchUpdateUserLicensesRequest_InlineSource
`protobuf:"bytes,2,opt,name=inline_source,json=inlineSource,proto3,oneof"`
}

func (*BatchUpdateUserLicensesRequest_InlineSource_) isBatchUpdateUserLicensesRequest_Source()
 {}

// Metadata related to the progress of the
//
[UserLicenseService.BatchUpdateUserLicenses][google.cloud.discoveryengine.v1.UserLicenseService.BatchUpdat
eUserLicenses]
// operation. This will be returned by the google.longrunning.Operation.metadata
```

```
// field.
type BatchUpdateUserLicensesMetadata struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Operation create time.
 CreateTime *timestamppb.Timestamp `protobuf:"bytes,1,opt,name=create_time,json=createTime,proto3"
json:"create_time,omitempty"`
 // Operation last update time. If the operation is done, this is also the
 // finish time.
 UpdateTime *timestamppb.Timestamp `protobuf:"bytes,2,opt,name=update_time,json=updateTime,proto3"
json:"update_time,omitempty"`
 // Count of user licenses successfully updated.
 SuccessCount int64 `protobuf:"varint,3,opt,name=success_count,json=successCount,proto3"
json:"success_count,omitempty"`
 // Count
 of user licenses that failed to be updated.
 FailureCount int64 `protobuf:"varint,4,opt,name=failure_count,json=failureCount,proto3"
json:"failure_count,omitempty"`
}

func (x *BatchUpdateUserLicensesMetadata) Reset() {
 *x = BatchUpdateUserLicensesMetadata{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[3]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *BatchUpdateUserLicensesMetadata) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*BatchUpdateUserLicensesMetadata) ProtoMessage() {}

func (x *BatchUpdateUserLicensesMetadata) ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[3]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use BatchUpdateUserLicensesMetadata.ProtoReflect.Descriptor
```

```
 instead.
func (*BatchUpdateUserLicensesMetadata) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP(), []int{3}
}

func (x *BatchUpdateUserLicensesMetadata) GetCreateTime() *timestamppb.Timestamp {
 if x != nil {
  return x.CreateTime
 }
 return nil
}

func (x *BatchUpdateUserLicensesMetadata) GetUpdateTime() *timestamppb.Timestamp {
 if x != nil {
  return x.UpdateTime
 }
 return nil
}

func (x *BatchUpdateUserLicensesMetadata) GetSuccessCount() int64 {
 if x != nil {
  return x.SuccessCount
 }
 return 0
}

func (x *BatchUpdateUserLicensesMetadata) GetFailureCount() int64 {
 if x != nil {
  return x.FailureCount
 }
 return 0
}

// Response message for
//
[UserLicenseService.BatchUpdateUserLicenses][google.cloud.discoveryengine.v1.UserLicenseService.BatchUpdat
eUserLicenses]
// method.
type BatchUpdateUserLicensesResponse struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields
 protoimpl.UnknownFields

 // UserLicenses successfully updated.
 UserLicenses []*UserLicense `protobuf:"bytes,1,rep,name=user_licenses,json=userLicenses,proto3"
json:"user_licenses,omitempty"`
 // A sample of errors encountered while processing the request.
```

```
 ErrorSamples []*status.Status `protobuf:"bytes,2,rep,name=error_samples,json=errorSamples,proto3"
json:"error_samples,omitempty"`
}

func (x *BatchUpdateUserLicensesResponse) Reset() {
 *x = BatchUpdateUserLicensesResponse{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[4]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *BatchUpdateUserLicensesResponse) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*BatchUpdateUserLicensesResponse) ProtoMessage() {}

func (x *BatchUpdateUserLicensesResponse) ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[4]
 if x != nil {
  ms
 := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use BatchUpdateUserLicensesResponse.ProtoReflect.Descriptor instead.
func (*BatchUpdateUserLicensesResponse) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP(), []int{4}
}

func (x *BatchUpdateUserLicensesResponse) GetUserLicenses() []*UserLicense {
 if x != nil {
  return x.UserLicenses
 }
 return nil
}

func (x *BatchUpdateUserLicensesResponse) GetErrorSamples() []*status.Status {
 if x != nil {
  return x.ErrorSamples
 }
 return nil
}
```

```
// The inline source for the input config for BatchUpdateUserLicenses
// method.
type BatchUpdateUserLicensesRequest_InlineSource struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. A list of user licenses to update. Each user license
 //
 must have a valid
 // [UserLicense.user_principal][google.cloud.discoveryengine.v1.UserLicense.user_principal].
 UserLicenses []*UserLicense `protobuf:"bytes,1,rep,name=user_licenses,json=userLicenses,proto3"
json:"user_licenses,omitempty"`
 // Optional. The list of fields to update.
 UpdateMask *fieldmaskpb.FieldMask `protobuf:"bytes,2,opt,name=update_mask,json=updateMask,proto3"
json:"update_mask,omitempty"`
}

func (x *BatchUpdateUserLicensesRequest_InlineSource) Reset() {
 *x = BatchUpdateUserLicensesRequest_InlineSource{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[5]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *BatchUpdateUserLicensesRequest_InlineSource) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*BatchUpdateUserLicensesRequest_InlineSource) ProtoMessage() {}

func (x *BatchUpdateUserLicensesRequest_InlineSource) ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[5]
 if
 x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use BatchUpdateUserLicensesRequest_InlineSource.ProtoReflect.Descriptor instead.
func (*BatchUpdateUserLicensesRequest_InlineSource) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP(), []int{2, 0}
```

```
}

func (x *BatchUpdateUserLicensesRequest_InlineSource) GetUserLicenses() []*UserLicense {
 if x != nil {
  return x.UserLicenses
 }
 return nil
}

func (x *BatchUpdateUserLicensesRequest_InlineSource) GetUpdateMask() *fieldmaskpb.FieldMask {
 if x != nil {
  return x.UpdateMask
 }
 return nil
}

var File_google_cloud_discoveryengine_v1_user_license_service_proto protoreflect.FileDescriptor

var file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDesc
 = []byte{
 0x0a, 0x3a, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2f, 0x64,
 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2f, 0x76,
 0x31, 0x2f, 0x75, 0x73, 0x65, 0x72, 0x5f, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x5f, 0x73,
 0x65, 0x72, 0x76, 0x69, 0x63, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x12, 0x1f, 0x67, 0x6f,
 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x64, 0x69, 0x73, 0x63, 0x6f,
 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2e, 0x76, 0x31, 0x1a, 0x1c, 0x67,
 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x61, 0x6e, 0x6e, 0x6f, 0x74, 0x61,
 0x74, 0x69, 0x6f, 0x6e, 0x73, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x17, 0x67, 0x6f, 0x6f,
 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x63, 0x6c, 0x69, 0x65, 0x6e, 0x74, 0x2e, 0x70,
 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x1f, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69,
 0x2f, 0x66, 0x69,
 0x65, 0x6c, 0x64, 0x5f, 0x62, 0x65, 0x68, 0x61, 0x76, 0x69, 0x6f, 0x72, 0x2e,
 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x19, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70,
 0x69, 0x2f, 0x72, 0x65, 0x73, 0x6f, 0x75, 0x72, 0x63, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f,
 0x1a, 0x32, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2f, 0x64,
 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2f, 0x76,
 0x31, 0x2f, 0x75, 0x73, 0x65, 0x72, 0x5f, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x2e, 0x70,
 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x23, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x6c, 0x6f, 0x6e,
 0x67, 0x72, 0x75, 0x6e, 0x6e, 0x69, 0x6e, 0x67, 0x2f, 0x6f, 0x70, 0x65, 0x72, 0x61, 0x74, 0x69,
 0x6f, 0x6e, 0x73, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x20, 0x67, 0x6f, 0x6f, 0x67, 0x6c,
 0x65, 0x2f, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x62, 0x75, 0x66, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64,
 0x5f, 0x6d, 0x61, 0x73, 0x6b, 0x2e, 0x70, 0x72,
 0x6f, 0x74, 0x6f, 0x1a, 0x1f, 0x67, 0x6f, 0x6f,
 0x67, 0x6c, 0x65, 0x2f, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x62, 0x75, 0x66, 0x2f, 0x74, 0x69, 0x6d,
 0x65, 0x73, 0x74, 0x61, 0x6d, 0x70, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x17, 0x67, 0x6f,
 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x72, 0x70, 0x63, 0x2f, 0x73, 0x74, 0x61, 0x74, 0x75, 0x73, 0x2e,
 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x22, 0xc6, 0x01, 0x0a, 0x17, 0x4c, 0x69, 0x73, 0x74, 0x55, 0x73,
 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x73, 0x52, 0x65, 0x71, 0x75, 0x65, 0x73,
```

0x74, 0x12, 0x48, 0x0a, 0x06, 0x70, 0x61, 0x72, 0x65, 0x6e, 0x74, 0x18, 0x01, 0x20, 0x01, 0x28,
0x09, 0x42, 0x30, 0xe0, 0x41, 0x02, 0xfa, 0x41, 0x2a, 0x0a, 0x28, 0x64, 0x69, 0x73, 0x63, 0x6f,
0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c,
0x65, 0x61, 0x70, 0x69, 0x73, 0x2e, 0x63, 0x6f, 0x6d, 0x2f, 0x55, 0x73, 0x65, 0x72, 0x53, 0x74,
0x6f, 0x72, 0x65, 0x52, 0x06, 0x70, 0x61, 0x72, 0x65, 0x6e, 0x74, 0x12, 0x20,
0x0a, 0x09, 0x70,
0x61, 0x67, 0x65, 0x5f, 0x73, 0x69, 0x7a, 0x65, 0x18, 0x02, 0x20, 0x01, 0x28, 0x05, 0x42, 0x03,
0xe0, 0x41, 0x01, 0x52, 0x08, 0x70, 0x61, 0x67, 0x65, 0x53, 0x69, 0x7a, 0x65, 0x12, 0x22, 0x0a,
0x0a, 0x70, 0x61, 0x67, 0x65, 0x5f, 0x74, 0x6f, 0x6b, 0x65, 0x6e, 0x18, 0x03, 0x20, 0x01, 0x28,
0x09, 0x42, 0x03, 0xe0, 0x41, 0x01, 0x52, 0x09, 0x70, 0x61, 0x67, 0x65, 0x54, 0x6f, 0x6b, 0x65,
0x6e, 0x12, 0x1b, 0x0a, 0x06, 0x66, 0x69, 0x6c, 0x74, 0x65, 0x72, 0x18, 0x04, 0x20, 0x01, 0x28,
0x09, 0x42, 0x03, 0xe0, 0x41, 0x01, 0x52, 0x06, 0x66, 0x69, 0x6c, 0x74, 0x65, 0x72, 0x22, 0x95,
0x01, 0x0a, 0x18, 0x4c, 0x69, 0x73, 0x74, 0x55, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e,
0x73, 0x65, 0x73, 0x52, 0x65, 0x73, 0x70, 0x6f, 0x6e, 0x73, 0x65, 0x12, 0x51, 0x0a, 0x0d, 0x75,
0x73, 0x65, 0x72, 0x5f, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x73, 0x18, 0x01, 0x20, 0x03,
0x28, 0x0b, 0x32, 0x2c, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75,
0x64, 0x2e,
0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e,
0x65, 0x2e, 0x76, 0x31, 0x2e, 0x55, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65,
0x52, 0x0c, 0x75, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x73, 0x12, 0x26,
0x0a, 0x0f, 0x6e, 0x65, 0x78, 0x74, 0x5f, 0x70, 0x61, 0x67, 0x65, 0x5f, 0x74, 0x6f, 0x6b, 0x65,
0x6e, 0x18, 0x02, 0x20, 0x01, 0x28, 0x09, 0x52, 0x0d, 0x6e, 0x65, 0x78, 0x74, 0x50, 0x61, 0x67,
0x65, 0x54, 0x6f, 0x6b, 0x65, 0x6e, 0x22, 0xe0, 0x03, 0x0a, 0x1e, 0x42, 0x61, 0x74, 0x63, 0x68,
0x55, 0x70, 0x64, 0x61, 0x74, 0x65, 0x55, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73,
0x65, 0x73, 0x52, 0x65, 0x71, 0x75, 0x65, 0x73, 0x74, 0x12, 0x73, 0x0a, 0x0d, 0x69, 0x6e, 0x6c,
0x69, 0x6e, 0x65, 0x5f, 0x73, 0x6f, 0x75, 0x72, 0x63, 0x65, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0b,
0x32, 0x4c, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e,
0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65,
0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2e,
0x76, 0x31, 0x2e, 0x42, 0x61, 0x74, 0x63, 0x68, 0x55, 0x70, 0x64, 0x61, 0x74, 0x65, 0x55, 0x73,
0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x73, 0x52, 0x65, 0x71, 0x75, 0x65, 0x73,
0x74, 0x2e, 0x49, 0x6e, 0x6c, 0x69, 0x6e, 0x65, 0x53, 0x6f, 0x75, 0x72, 0x63, 0x65, 0x48, 0x00,
0x52, 0x0c, 0x69, 0x6e, 0x6c, 0x69, 0x6e, 0x65, 0x53, 0x6f, 0x75, 0x72, 0x63, 0x65, 0x12, 0x48,
0x0a, 0x06, 0x70, 0x61, 0x72, 0x65, 0x6e, 0x74, 0x18, 0x01, 0x20, 0x01, 0x28, 0x09, 0x42, 0x30,
0xe0, 0x41, 0x02, 0xfa, 0x41, 0x2a, 0x0a, 0x28, 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72,
0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70,
0x69, 0x73, 0x2e, 0x63, 0x6f, 0x6d, 0x2f, 0x55, 0x73, 0x65, 0x72, 0x53, 0x74, 0x6f, 0x72, 0x65,
0x52, 0x06, 0x70, 0x61, 0x72, 0x65, 0x6e, 0x74, 0x12, 0x4a, 0x0a, 0x1f, 0x64, 0x65, 0x6c, 0x65,
0x74, 0x65, 0x5f, 0x75, 0x6e, 0x61, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x65,
0x64, 0x5f, 0x75, 0x73,
0x65, 0x72, 0x5f, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x73, 0x18, 0x04, 0x20, 0x01, 0x28,
0x08, 0x42, 0x03, 0xe0, 0x41, 0x01, 0x52, 0x1c, 0x64, 0x65, 0x6c, 0x65, 0x74, 0x65, 0x55, 0x6e,
0x61, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x65, 0x64, 0x55, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65,
0x6e, 0x73, 0x65, 0x73, 0x1a, 0xa8, 0x01, 0x0a, 0x0c, 0x49, 0x6e, 0x6c, 0x69, 0x6e, 0x65, 0x53,
0x6f, 0x75, 0x72, 0x63, 0x65, 0x12, 0x56, 0x0a, 0x0d, 0x75, 0x73, 0x65, 0x72, 0x5f, 0x6c, 0x69,
0x63, 0x65, 0x6e, 0x73, 0x65, 0x73, 0x18, 0x01, 0x20, 0x03, 0x28, 0x0b, 0x32, 0x2c, 0x2e, 0x67,
0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x64, 0x69, 0x73, 0x63,
0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2e, 0x76, 0x31, 0x2e, 0x55,

0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x42, 0x03, 0xe0, 0x41, 0x02, 0x52, 0x0c, 0x75, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x73, 0x12, 0x40, 0x0a, 0x0b,
0x75, 0x70, 0x64, 0x61, 0x74, 0x65, 0x5f, 0x6d, 0x61, 0x73, 0x6b, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0b, 0x32, 0x1a, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x62, 0x75, 0x66, 0x2e, 0x46, 0x69, 0x65, 0x6c, 0x64, 0x4d, 0x61, 0x73, 0x6b, 0x42, 0x03, 0xe0, 0x41, 0x01, 0x52, 0x0a, 0x75, 0x70, 0x64, 0x61, 0x74, 0x65, 0x4d, 0x61, 0x73, 0x6b, 0x42, 0x08, 0x0a, 0x06, 0x73, 0x6f, 0x75, 0x72, 0x63, 0x65, 0x22, 0xe5, 0x01, 0x0a, 0x1f, 0x42, 0x61, 0x74, 0x63, 0x68, 0x55, 0x70, 0x64, 0x61, 0x74, 0x65, 0x55, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x73, 0x4d, 0x65, 0x74, 0x61, 0x64, 0x61, 0x74, 0x61, 0x12, 0x3b, 0x0a, 0x0b, 0x63, 0x72, 0x65, 0x61, 0x74, 0x65, 0x5f, 0x74, 0x69, 0x6d, 0x65, 0x18, 0x01, 0x20, 0x01, 0x28, 0x0b, 0x32, 0x1a, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x62, 0x75, 0x66, 0x2e, 0x54, 0x69, 0x6d, 0x65, 0x73, 0x74, 0x61, 0x6d, 0x70, 0x52, 0x0a, 0x63, 0x72, 0x65, 0x61, 0x74, 0x65,
0x54, 0x69, 0x6d, 0x65, 0x12, 0x3b, 0x0a, 0x0b, 0x75, 0x70,
0x64, 0x61, 0x74, 0x65, 0x5f, 0x74, 0x69, 0x6d, 0x65, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0b, 0x32, 0x1a, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x62, 0x75, 0x66, 0x2e, 0x54, 0x69, 0x6d, 0x65, 0x73, 0x74, 0x61, 0x6d, 0x70, 0x52, 0x0a, 0x75, 0x70, 0x64, 0x61, 0x74, 0x65, 0x54, 0x69, 0x6d, 0x65, 0x12, 0x23, 0x0a, 0x0d, 0x73, 0x75, 0x63, 0x63, 0x65, 0x73, 0x73, 0x5f, 0x63, 0x6f, 0x75, 0x6e, 0x74, 0x18, 0x03, 0x20, 0x01, 0x28, 0x03, 0x52, 0x0c, 0x73, 0x75, 0x63, 0x63, 0x65, 0x73, 0x73, 0x43, 0x6f, 0x75, 0x6e, 0x74, 0x12, 0x23, 0x0a, 0x0d, 0x66, 0x61, 0x69, 0x6c, 0x75, 0x72, 0x65, 0x5f, 0x63, 0x6f, 0x75, 0x6e, 0x74, 0x18, 0x04, 0x20, 0x01, 0x28, 0x03, 0x52, 0x0c, 0x66, 0x61, 0x69, 0x6c, 0x75, 0x72, 0x65, 0x43, 0x6f, 0x75, 0x6e, 0x74, 0x22, 0xad, 0x01, 0x0a, 0x1f, 0x42, 0x61, 0x74, 0x63, 0x68, 0x55, 0x70, 0x64, 0x61, 0x74, 0x65, 0x55, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73,
0x65, 0x73, 0x52, 0x65, 0x73,
0x70, 0x6f, 0x6e, 0x73, 0x65, 0x12, 0x51, 0x0a, 0x0d, 0x75, 0x73, 0x65, 0x72, 0x5f, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x73, 0x18, 0x01, 0x20, 0x03, 0x28, 0x0b, 0x32, 0x2c, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2e, 0x76, 0x31, 0x2e, 0x55, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x52, 0x0c, 0x75, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x73, 0x12, 0x37, 0x0a, 0x0d, 0x65, 0x72, 0x72, 0x6f, 0x72, 0x5f, 0x73, 0x61, 0x6d, 0x70, 0x6c, 0x65, 0x73, 0x18, 0x02, 0x20, 0x03, 0x28, 0x0b, 0x32, 0x12, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x72, 0x70, 0x63, 0x2e, 0x53, 0x74, 0x61, 0x74, 0x75, 0x73, 0x52, 0x0c, 0x65, 0x72, 0x72, 0x6f, 0x72, 0x53, 0x61, 0x6d, 0x70, 0x6c, 0x65, 0x73, 0x32, 0x9a, 0x05, 0x0a, 0x12, 0x55, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65,
0x53, 0x65, 0x72, 0x76, 0x69, 0x63, 0x65, 0x12, 0xd7, 0x01, 0x0a, 0x10, 0x4c, 0x69, 0x73, 0x74, 0x55, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x73, 0x12, 0x38, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2e, 0x76, 0x31, 0x2e, 0x4c, 0x69, 0x73, 0x74, 0x55, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x73, 0x52, 0x65, 0x71, 0x75, 0x65, 0x73, 0x74, 0x1a, 0x39, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2e, 0x76, 0x31, 0x2e, 0x4c, 0x69, 0x73, 0x74, 0x55, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x73, 0x52, 0x65, 0x73, 0x70, 0x6f, 0x6e, 0x73, 0x65, 0x22, 0x4e, 0xda, 0x41, 0x06, 0x70, 0x61, 0x72, 0x65, 0x6e, 0x74, 0x82, 0xd3, 0xe4, 0x93, 0x02, 0x3f, 0x12, 0x3d,

0x2f, 0x76, 0x31, 0x2f, 0x7b, 0x70, 0x61, 0x72, 0x65, 0x6e, 0x74,
0x3d, 0x70, 0x72, 0x6f, 0x6a, 0x65, 0x63, 0x74, 0x73, 0x2f, 0x2a, 0x2f, 0x6c, 0x6f, 0x63, 0x61,
0x74, 0x69, 0x6f, 0x6e, 0x73, 0x2f, 0x2a, 0x2f, 0x75, 0x73, 0x65, 0x72, 0x53, 0x74, 0x6f, 0x72,
0x65, 0x73, 0x2f, 0x2a, 0x7d, 0x2f, 0x75, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73,
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0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2e, 0x76, 0x31,
0x2e, 0x42, 0x61, 0x74, 0x63, 0x68, 0x55, 0x70, 0x64, 0x61, 0x74, 0x65, 0x55, 0x73, 0x65, 0x72,
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0x1d, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x6c,
0x6f, 0x6e, 0x67, 0x72, 0x75, 0x6e,
0x6e, 0x69, 0x6e, 0x67, 0x2e, 0x4f, 0x70, 0x65, 0x72, 0x61, 0x74, 0x69, 0x6f, 0x6e, 0x22, 0xd9,
0x01, 0xca, 0x41, 0x82, 0x01, 0x0a, 0x3f, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c,
0x6f, 0x75, 0x64, 0x2e, 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67,
0x69, 0x6e, 0x65, 0x2e, 0x76, 0x31, 0x2e, 0x42, 0x61, 0x74, 0x63, 0x68, 0x55, 0x70, 0x64, 0x61,
0x74, 0x65, 0x55, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x73, 0x52, 0x65,
0x73, 0x70, 0x6f, 0x6e, 0x73, 0x65, 0x12, 0x3f, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63,
0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e,
0x67, 0x69, 0x6e, 0x65, 0x2e, 0x76, 0x31, 0x2e, 0x42, 0x61, 0x74, 0x63, 0x68, 0x55, 0x70, 0x64,
0x61, 0x74, 0x65, 0x55, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x73, 0x4d,
0x65, 0x74, 0x61, 0x64, 0x61, 0x74, 0x61, 0x82, 0xd3, 0xe4, 0x93, 0x02, 0x4d, 0x3a, 0x01,
0x2a,
0x22, 0x48, 0x2f, 0x76, 0x31, 0x2f, 0x7b, 0x70, 0x61, 0x72, 0x65, 0x6e, 0x74, 0x3d, 0x70, 0x72,
0x6f, 0x6a, 0x65, 0x63, 0x74, 0x73, 0x2f, 0x2a, 0x2f, 0x6c, 0x6f, 0x63, 0x61, 0x74, 0x69, 0x6f,
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0x2a, 0x7d, 0x3a, 0x62, 0x61, 0x74, 0x63, 0x68, 0x55, 0x70, 0x64, 0x61, 0x74, 0x65, 0x55, 0x73,
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0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2e, 0x67,
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0x68, 0x74, 0x74, 0x70, 0x73, 0x3a, 0x2f, 0x2f, 0x77, 0x77, 0x77, 0x2e, 0x67, 0x6f, 0x6f, 0x67,
0x6c, 0x65, 0x61, 0x70, 0x69, 0x73, 0x2e, 0x63, 0x6f, 0x6d, 0x2f, 0x61, 0x75, 0x74, 0x68, 0x2f,
0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2d, 0x70, 0x6c, 0x61, 0x74, 0x66, 0x6f, 0x72, 0x6d, 0x42, 0x8a,
0x02, 0x0a, 0x23, 0x63,
0x6f, 0x6d, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c,
0x6f, 0x75, 0x64, 0x2e, 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67,
0x69, 0x6e, 0x65, 0x2e, 0x76, 0x31, 0x42, 0x17, 0x55, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65,
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0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x76, 0x31, 0x2f, 0x64, 0x69, 0x73,
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0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x70, 0x62,
0xa2, 0x02, 0x0f, 0x44, 0x49, 0x53, 0x43, 0x4f, 0x56, 0x45, 0x52, 0x59, 0x45, 0x4e, 0x47, 0x49,
0x4e, 0x45, 0xaa, 0x02, 0x1f, 0x47, 0x6f, 0x6f, 0x67,
0x6c, 0x65, 0x2e, 0x43, 0x6c, 0x6f, 0x75,
0x64, 0x2e, 0x44, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x45, 0x6e, 0x67, 0x69, 0x6e,
0x65, 0x2e, 0x56, 0x31, 0xca, 0x02, 0x1f, 0x47, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x5c, 0x43, 0x6c,

```
 0x6f, 0x75, 0x64, 0x5c, 0x44, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x45, 0x6e, 0x67,
 0x69, 0x6e, 0x65, 0x5c, 0x56, 0x31, 0xea, 0x02, 0x22, 0x47, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x3a,
 0x3a, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x3a, 0x3a, 0x44, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72,
 0x79, 0x45, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x3a, 0x3a, 0x56, 0x31, 0x62, 0x06, 0x70, 0x72, 0x6f,
 0x74, 0x6f, 0x33,
}

var (
 file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescOnce sync.Once
 file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescData =
file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDesc
)

func file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP() []byte {
 file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescOnce.Do(func()
 {
  file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescData)
 })
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescData
}

var file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes =
make([]protoimpl.MessageInfo, 6)
var file_google_cloud_discoveryengine_v1_user_license_service_proto_goTypes = []any{
 (*ListUserLicensesRequest)(nil),                    // 0: google.cloud.discoveryengine.v1.ListUserLicensesRequest
 (*ListUserLicensesResponse)(nil),                   // 1: google.cloud.discoveryengine.v1.ListUserLicensesResponse
 (*BatchUpdateUserLicensesRequest)(nil),             // 2:
google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest
 (*BatchUpdateUserLicensesMetadata)(nil),            // 3:
google.cloud.discoveryengine.v1.BatchUpdateUserLicensesMetadata
 (*BatchUpdateUserLicensesResponse)(nil),
            // 4: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesResponse
 (*BatchUpdateUserLicensesRequest_InlineSource)(nil), // 5:
google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest.InlineSource
 (*UserLicense)(nil),                                // 6: google.cloud.discoveryengine.v1.UserLicense
 (*timestamppb.Timestamp)(nil),                      // 7: google.protobuf.Timestamp
 (*status.Status)(nil),                              // 8: google.rpc.Status
 (*fieldmaskpb.FieldMask)(nil),                      // 9: google.protobuf.FieldMask
 (*longrunningpb.Operation)(nil),                    // 10: google.longrunning.Operation
}
var file_google_cloud_discoveryengine_v1_user_license_service_proto_depIdxs = []int32{
 6,  // 0: google.cloud.discoveryengine.v1.ListUserLicensesResponse.user_licenses:type_name ->
google.cloud.discoveryengine.v1.UserLicense
 5,  // 1: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest.inline_source:type_name
 -> google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest.InlineSource
 7,  // 2: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesMetadata.create_time:type_name ->
google.protobuf.Timestamp
```

```
 7,  // 3: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesMetadata.update_time:type_name ->
google.protobuf.Timestamp
 6,  // 4: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesResponse.user_licenses:type_name ->
google.cloud.discoveryengine.v1.UserLicense
 8,  // 5: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesResponse.error_samples:type_name ->
google.rpc.Status
 6,  // 6: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest.InlineSource.user_licenses:type_name -
> google.cloud.discoveryengine.v1.UserLicense
 9,  // 7: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest.InlineSource.update_mask:type_name -
> google.protobuf.FieldMask
 0,  // 8: google.cloud.discoveryengine.v1.UserLicenseService.ListUserLicenses:input_type
 -> google.cloud.discoveryengine.v1.ListUserLicensesRequest
 2,  // 9: google.cloud.discoveryengine.v1.UserLicenseService.BatchUpdateUserLicenses:input_type ->
google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest
 1,  // 10: google.cloud.discoveryengine.v1.UserLicenseService.ListUserLicenses:output_type ->
google.cloud.discoveryengine.v1.ListUserLicensesResponse
 10, // 11: google.cloud.discoveryengine.v1.UserLicenseService.BatchUpdateUserLicenses:output_type ->
google.longrunning.Operation
 10, // [10:12] is the sub-list for method output_type
 8,  // [8:10] is the sub-list for method input_type
 8,  // [8:8] is the sub-list for extension type_name
 8,  // [8:8] is the sub-list for extension extendee
 0,  // [0:8] is the sub-list for field type_name
}

func init() { file_google_cloud_discoveryengine_v1_user_license_service_proto_init() }
func file_google_cloud_discoveryengine_v1_user_license_service_proto_init() {
 if File_google_cloud_discoveryengine_v1_user_license_service_proto
 != nil {
  return
 }
 file_google_cloud_discoveryengine_v1_user_license_proto_init()
 file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[2].OneofWrappers = []any{
  (*BatchUpdateUserLicensesRequest_InlineSource_)(nil),
 }
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor: file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDesc,
   NumEnums:      0,
   NumMessages:   6,
   NumExtensions: 0,
   NumServices:   1,
  },
  GoTypes:           file_google_cloud_discoveryengine_v1_user_license_service_proto_goTypes,
  DependencyIndexes: file_google_cloud_discoveryengine_v1_user_license_service_proto_depIdxs,
  MessageInfos:      file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes,
```

```
 }.Build()
 File_google_cloud_discoveryengine_v1_user_license_service_proto = out.File
 file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDesc
 = nil
 file_google_cloud_discoveryengine_v1_user_license_service_proto_goTypes = nil
 file_google_cloud_discoveryengine_v1_user_license_service_proto_depIdxs = nil
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package licensemanager_test

import (
 "context"

 licensemanager "cloud.google.com/go/licensemanager/apiv1"
 licensemanagerpb "cloud.google.com/go/licensemanager/apiv1/licensemanagerpb"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 locationpb "google.golang.org/genproto/googleapis/cloud/location"
)

func ExampleClient_AggregateUsage_all()
 {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
```

```
 defer c.Close()

 req := &licensemanagerpb.AggregateUsageRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#AggregateUsageRequest.
 }
 for resp, err := range c.AggregateUsage(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}

func ExampleClient_ListConfigurations_all() {
 ctx
 := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.ListConfigurationsRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#ListConfigurationsRequest.
 }
 for resp, err := range c.ListConfigurations(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}

func ExampleClient_ListInstances_all() {
 ctx := context.Background()
 // This
 snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
```

```
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := licensemanager.NewClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &licensemanagerpb.ListInstancesRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#ListInstancesRequest.
}
for resp, err := range c.ListInstances(ctx, req).All() {
 if err != nil {
  // TODO: Handle error and break/return/continue. Iteration will stop after any error.
 }
 // TODO: Use resp.
 _ = resp
}
}

func ExampleClient_ListProducts_all() {
ctx := context.Background()
// This snippet has been automatically generated and
should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := licensemanager.NewClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &licensemanagerpb.ListProductsRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#ListProductsRequest.
}
for resp, err := range c.ListProducts(ctx, req).All() {
 if err != nil {
  // TODO: Handle error and break/return/continue. Iteration will stop after any error.
 }
 // TODO: Use resp.
 _ = resp
}
}
```

```
func ExampleClient_ListLocations_all() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It
 will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &locationpb.ListLocationsRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/google.golang.org/genproto/googleapis/cloud/location#ListLocationsRequest.
 }
 for resp, err := range c.ListLocations(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}

func ExampleClient_ListOperations_all() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require
 correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &longrunningpb.ListOperationsRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#ListOperationsRequest.
 }
 for resp, err := range c.ListOperations(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
```

```
  }
  // TODO: Use resp.
  _ = resp
 }
}
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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.35.2
//  protoc        v4.25.7
// source: google/cloud/discoveryengine/v1/user_license.proto

package discoveryenginepb

import (
 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
 timestamppb "google.golang.org/protobuf/types/known/timestamppb"
 reflect
 "reflect"
 sync "sync"
)

const (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// License assignment state enumeration.
type UserLicense_LicenseAssignmentState int32

const (
```

```
 // Default value.
 UserLicense_LICENSE_ASSIGNMENT_STATE_UNSPECIFIED UserLicense_LicenseAssignmentState = 0
 // License assigned to the user.
 UserLicense_ASSIGNED UserLicense_LicenseAssignmentState = 1
 // No license assigned to the user.
 // Deprecated, translated to NO_LICENSE.
 UserLicense_UNASSIGNED UserLicense_LicenseAssignmentState = 2
 // No license assigned to the user.
 UserLicense_NO_LICENSE UserLicense_LicenseAssignmentState = 3
 // User attempted to login but no license assigned to the user.
 // This state is only used for no user first time login attempt
 but cannot
 // get license assigned.
 // Users already logged in but cannot get license assigned will be assigned
 // NO_LICENSE state(License could be unassigned by admin).
 UserLicense_NO_LICENSE_ATTEMPTED_LOGIN UserLicense_LicenseAssignmentState = 4
)

// Enum value maps for UserLicense_LicenseAssignmentState.
var (
 UserLicense_LicenseAssignmentState_name = map[int32]string{
  0: "LICENSE_ASSIGNMENT_STATE_UNSPECIFIED",
  1: "ASSIGNED",
  2: "UNASSIGNED",
  3: "NO_LICENSE",
  4: "NO_LICENSE_ATTEMPTED_LOGIN",
 }
 UserLicense_LicenseAssignmentState_value = map[string]int32{
  "LICENSE_ASSIGNMENT_STATE_UNSPECIFIED": 0,
  "ASSIGNED":                             1,
  "UNASSIGNED":                           2,
  "NO_LICENSE":                           3,
  "NO_LICENSE_ATTEMPTED_LOGIN":           4,
 }
)

func (x UserLicense_LicenseAssignmentState) Enum() *UserLicense_LicenseAssignmentState {
 p := new(UserLicense_LicenseAssignmentState)
 *p = x
 return p
}

func (x UserLicense_LicenseAssignmentState)
 String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
 }

func (UserLicense_LicenseAssignmentState) Descriptor() protoreflect.EnumDescriptor {
```

```
 return file_google_cloud_discoveryengine_v1_user_license_proto_enumTypes[0].Descriptor()
}

func (UserLicense_LicenseAssignmentState) Type() protoreflect.EnumType {
 return &file_google_cloud_discoveryengine_v1_user_license_proto_enumTypes[0]
}

func (x UserLicense_LicenseAssignmentState) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use UserLicense_LicenseAssignmentState.Descriptor instead.
func (UserLicense_LicenseAssignmentState) EnumDescriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_proto_rawDescGZIP(), []int{0, 0}
}

// User License information assigned by the admin.
type UserLicense struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 //
 Required. Immutable. The user principal of the User, could be email address
 // or other prinical identifier. This field is immutable. Admin assign
 // licenses based on the user principal.
 UserPrincipal string `protobuf:"bytes,1,opt,name=user_principal,json=userPrincipal,proto3"
json:"user_principal,omitempty"`
 // Optional. The user profile.
 // We user user full name(First name + Last name) as user profile.
 UserProfile string `protobuf:"bytes,3,opt,name=user_profile,json=userProfile,proto3"
json:"user_profile,omitempty"`
 // Output only. License assignment state of the user.
 // If the user is assigned with a license config, the user loggin will be
 // assigned with the license;
 // If the user's license assignment state is unassigned or unspecified, no
 // license config will be associated to the user;
 LicenseAssignmentState UserLicense_LicenseAssignmentState
`protobuf:"varint,4,opt,name=license_assignment_state,json=licenseAssignmentState,proto3,enum=google.cloud.dis
coveryengine.v1.UserLicense_LicenseAssignmentState"
 json:"license_assignment_state,omitempty"`
 // Optional. The full resource name of the Subscription(LicenseConfig)
 // assigned to the user.
 LicenseConfig string `protobuf:"bytes,5,opt,name=license_config,json=licenseConfig,proto3"
json:"license_config,omitempty"`
 // Output only. User created timestamp.
 CreateTime *timestamppb.Timestamp `protobuf:"bytes,6,opt,name=create_time,json=createTime,proto3"
json:"create_time,omitempty"`
```

```
 // Output only. User update timestamp.
 UpdateTime *timestamppb.Timestamp `protobuf:"bytes,7,opt,name=update_time,json=updateTime,proto3"
json:"update_time,omitempty"`
 // Output only. User last logged in time.
 // If the user has not logged in yet, this field will be empty.
 LastLoginTime *timestamppb.Timestamp
`protobuf:"bytes,8,opt,name=last_login_time,json=lastLoginTime,proto3" json:"last_login_time,omitempty"`
}

func (x *UserLicense) Reset() {
 *x = UserLicense{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_proto_msgTypes[0]
 ms
 := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *UserLicense) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UserLicense) ProtoMessage() {}

func (x *UserLicense) ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use UserLicense.ProtoReflect.Descriptor instead.
func (*UserLicense) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_proto_rawDescGZIP(), []int{0}
}

func (x *UserLicense) GetUserPrincipal() string {
 if x != nil {
  return x.UserPrincipal
 }
 return ""
}

func (x *UserLicense) GetUserProfile() string {
```

```
 if x != nil {
  return x.UserProfile
 }
 return ""
}

func (x *UserLicense) GetLicenseAssignmentState()
 UserLicense_LicenseAssignmentState {
 if x != nil {
  return x.LicenseAssignmentState
 }
 return UserLicense_LICENSE_ASSIGNMENT_STATE_UNSPECIFIED
}

func (x *UserLicense) GetLicenseConfig() string {
 if x != nil {
  return x.LicenseConfig
 }
 return ""
}

func (x *UserLicense) GetCreateTime() *timestamppb.Timestamp {
 if x != nil {
  return x.CreateTime
 }
 return nil
}

func (x *UserLicense) GetUpdateTime() *timestamppb.Timestamp {
 if x != nil {
  return x.UpdateTime
 }
 return nil
}

func (x *UserLicense) GetLastLoginTime() *timestamppb.Timestamp {
 if x != nil {
  return x.LastLoginTime
 }
 return nil
}

var File_google_cloud_discoveryengine_v1_user_license_proto protoreflect.FileDescriptor

var file_google_cloud_discoveryengine_v1_user_license_proto_rawDesc = []byte{
 0x0a, 0x32, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2f, 0x64,
 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2f, 0x76,
 0x31,
```

0x2f, 0x75, 0x73, 0x65, 0x72, 0x5f, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x2e, 0x70,
0x72, 0x6f, 0x74, 0x6f, 0x12, 0x1f, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f,
0x75, 0x64, 0x2e, 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69,
0x6e, 0x65, 0x2e, 0x76, 0x31, 0x1a, 0x1f, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70,
0x69, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64, 0x5f, 0x62, 0x65, 0x68, 0x61, 0x76, 0x69, 0x6f, 0x72,
0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x19, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61,
0x70, 0x69, 0x2f, 0x72, 0x65, 0x73, 0x6f, 0x75, 0x72, 0x63, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74,
0x6f, 0x1a, 0x1f, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x62,
0x75, 0x66, 0x2f, 0x74, 0x69, 0x6d, 0x65, 0x73, 0x74, 0x61, 0x6d, 0x70, 0x2e, 0x70, 0x72, 0x6f,
0x74, 0x6f, 0x22, 0xa6, 0x05, 0x0a, 0x0b, 0x55, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e,
0x73, 0x65, 0x12, 0x2d, 0x0a, 0x0e,
0x75, 0x73, 0x65, 0x72, 0x5f, 0x70, 0x72, 0x69, 0x6e, 0x63,
0x69, 0x70, 0x61, 0x6c, 0x18, 0x01, 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x05, 0xe0,
0x41, 0x02, 0x52, 0x0d, 0x75, 0x73, 0x65, 0x72, 0x50, 0x72, 0x69, 0x6e, 0x63, 0x69, 0x70, 0x61,
0x6c, 0x12, 0x26, 0x0a, 0x0c, 0x75, 0x73, 0x65, 0x72, 0x5f, 0x70, 0x72, 0x6f, 0x66, 0x69, 0x6c,
0x65, 0x18, 0x03, 0x20, 0x01, 0x28, 0x09, 0x42, 0x03, 0xe0, 0x41, 0x01, 0x52, 0x0b, 0x75, 0x73,
0x65, 0x72, 0x50, 0x72, 0x6f, 0x66, 0x69, 0x6c, 0x65, 0x12, 0x82, 0x01, 0x0a, 0x18, 0x6c, 0x69,
0x63, 0x65, 0x6e, 0x73, 0x65, 0x5f, 0x61, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65, 0x6e, 0x74,
0x5f, 0x73, 0x74, 0x61, 0x74, 0x65, 0x18, 0x04, 0x20, 0x01, 0x28, 0x0e, 0x32, 0x43, 0x2e, 0x67,
0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x64, 0x69, 0x73, 0x63,
0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2e, 0x76, 0x31, 0x2e, 0x55,
0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x2e,
0x4c, 0x69, 0x63, 0x65, 0x6e,
0x73, 0x65, 0x41, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65, 0x6e, 0x74, 0x53, 0x74, 0x61, 0x74,
0x65, 0x42, 0x03, 0xe0, 0x41, 0x03, 0x52, 0x16, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x41,
0x73, 0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65, 0x6e, 0x74, 0x53, 0x74, 0x61, 0x74, 0x65, 0x12, 0x5b,
0x0a, 0x0e, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x5f, 0x63, 0x6f, 0x6e, 0x66, 0x69, 0x67,
0x18, 0x05, 0x20, 0x01, 0x28, 0x09, 0x42, 0x34, 0xe0, 0x41, 0x01, 0xfa, 0x41, 0x2e, 0x0a, 0x2c,
0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2e,
0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73, 0x2e, 0x63, 0x6f, 0x6d, 0x2f, 0x4c,
0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x43, 0x6f, 0x6e, 0x66, 0x69, 0x67, 0x52, 0x0d, 0x6c, 0x69,
0x63, 0x65, 0x6e, 0x73, 0x65, 0x43, 0x6f, 0x6e, 0x66, 0x69, 0x67, 0x12, 0x40, 0x0a, 0x0b, 0x63,
0x72, 0x65, 0x61, 0x74, 0x65, 0x5f, 0x74, 0x69, 0x6d, 0x65, 0x18, 0x06, 0x20, 0x01, 0x28, 0x0b,
0x32,
0x1a, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x62,
0x75, 0x66, 0x2e, 0x54, 0x69, 0x6d, 0x65, 0x73, 0x74, 0x61, 0x6d, 0x70, 0x42, 0x03, 0xe0, 0x41,
0x03, 0x52, 0x0a, 0x63, 0x72, 0x65, 0x61, 0x74, 0x65, 0x54, 0x69, 0x6d, 0x65, 0x12, 0x40, 0x0a,
0x0b, 0x75, 0x70, 0x64, 0x61, 0x74, 0x65, 0x5f, 0x74, 0x69, 0x6d, 0x65, 0x18, 0x07, 0x20, 0x01,
0x28, 0x0b, 0x32, 0x1a, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74,
0x6f, 0x62, 0x75, 0x66, 0x2e, 0x54, 0x69, 0x6d, 0x65, 0x73, 0x74, 0x61, 0x6d, 0x70, 0x42, 0x03,
0xe0, 0x41, 0x03, 0x52, 0x0a, 0x75, 0x70, 0x64, 0x61, 0x74, 0x65, 0x54, 0x69, 0x6d, 0x65, 0x12,
0x47, 0x0a, 0x0f, 0x6c, 0x61, 0x73, 0x74, 0x5f, 0x6c, 0x6f, 0x67, 0x69, 0x6e, 0x5f, 0x74, 0x69,
0x6d, 0x65, 0x18, 0x08, 0x20, 0x01, 0x28, 0x0b, 0x32, 0x1a, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c,
0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x62, 0x75, 0x66, 0x2e, 0x54, 0x69, 0x6d, 0x65, 0x73,
0x74, 0x61, 0x6d, 0x70, 0x42,
0x03, 0xe0, 0x41, 0x03, 0x52, 0x0d, 0x6c, 0x61, 0x73, 0x74, 0x4c,
0x6f, 0x67, 0x69, 0x6e, 0x54, 0x69, 0x6d, 0x65, 0x22, 0x90, 0x01, 0x0a, 0x16, 0x4c, 0x69, 0x63,
0x65, 0x6e, 0x73, 0x65, 0x41, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65, 0x6e, 0x74, 0x53, 0x74,

```
 0x61, 0x74, 0x65, 0x12, 0x28, 0x0a, 0x24, 0x4c, 0x49, 0x43, 0x45, 0x4e, 0x53, 0x45, 0x5f, 0x41,
 0x53, 0x53, 0x49, 0x47, 0x4e, 0x4d, 0x45, 0x4e, 0x54, 0x5f, 0x53, 0x54, 0x41, 0x54, 0x45, 0x5f,
 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49, 0x46, 0x49, 0x45, 0x44, 0x10, 0x00, 0x12, 0x0c, 0x0a,
 0x08, 0x41, 0x53, 0x53, 0x49, 0x47, 0x4e, 0x45, 0x44, 0x10, 0x01, 0x12, 0x0e, 0x0a, 0x0a, 0x55,
 0x4e, 0x41, 0x53, 0x53, 0x49, 0x47, 0x4e, 0x45, 0x44, 0x10, 0x02, 0x12, 0x0e, 0x0a, 0x0a, 0x4e,
 0x4f, 0x5f, 0x4c, 0x49, 0x43, 0x45, 0x4e, 0x53, 0x45, 0x10, 0x03, 0x12, 0x1e, 0x0a, 0x1a, 0x4e,
 0x4f, 0x5f, 0x4c, 0x49, 0x43, 0x45, 0x4e, 0x53, 0x45, 0x5f, 0x41, 0x54, 0x54, 0x45, 0x4d, 0x50,
 0x54, 0x45, 0x44, 0x5f, 0x4c, 0x4f, 0x47, 0x49, 0x4e, 0x10,
 0x04, 0x42, 0x83, 0x02, 0x0a, 0x23,
 0x63, 0x6f, 0x6d, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64,
 0x2e, 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65,
 0x2e, 0x76, 0x31, 0x42, 0x10, 0x55, 0x73, 0x65, 0x72, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65,
 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x50, 0x01, 0x5a, 0x4d, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x67,
 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6f, 0x6d, 0x2f, 0x67, 0x6f, 0x2f, 0x64, 0x69, 0x73,
 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2f, 0x61, 0x70, 0x69,
 0x76, 0x31, 0x2f, 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e, 0x67, 0x69,
 0x6e, 0x65, 0x70, 0x62, 0x3b, 0x64, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x65, 0x6e,
 0x67, 0x69, 0x6e, 0x65, 0x70, 0x62, 0xa2, 0x02, 0x0f, 0x44, 0x49, 0x53, 0x43, 0x4f, 0x56, 0x45,
 0x52, 0x59, 0x45, 0x4e, 0x47, 0x49, 0x4e, 0x45, 0xaa, 0x02, 0x1f, 0x47, 0x6f, 0x6f, 0x67,
 0x6c,
 0x65, 0x2e, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x44, 0x69, 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72,
 0x79, 0x45, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x2e, 0x56, 0x31, 0xca, 0x02, 0x1f, 0x47, 0x6f, 0x6f,
 0x67, 0x6c, 0x65, 0x5c, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x5c, 0x44, 0x69, 0x73, 0x63, 0x6f, 0x76,
 0x65, 0x72, 0x79, 0x45, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x5c, 0x56, 0x31, 0xea, 0x02, 0x22, 0x47,
 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x3a, 0x3a, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x3a, 0x3a, 0x44, 0x69,
 0x73, 0x63, 0x6f, 0x76, 0x65, 0x72, 0x79, 0x45, 0x6e, 0x67, 0x69, 0x6e, 0x65, 0x3a, 0x3a, 0x56,
 0x31, 0x62, 0x06, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x33,
}

var (
 file_google_cloud_discoveryengine_v1_user_license_proto_rawDescOnce sync.Once
 file_google_cloud_discoveryengine_v1_user_license_proto_rawDescData =
file_google_cloud_discoveryengine_v1_user_license_proto_rawDesc
)

func file_google_cloud_discoveryengine_v1_user_license_proto_rawDescGZIP() []byte {
 file_google_cloud_discoveryengine_v1_user_license_proto_rawDescOnce.Do(func()
 {
  file_google_cloud_discoveryengine_v1_user_license_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_cloud_discoveryengine_v1_user_license_proto_rawDescData)
 })
 return file_google_cloud_discoveryengine_v1_user_license_proto_rawDescData
}

var file_google_cloud_discoveryengine_v1_user_license_proto_enumTypes = make([]protoimpl.EnumInfo, 1)
var file_google_cloud_discoveryengine_v1_user_license_proto_msgTypes = make([]protoimpl.MessageInfo, 1)
var file_google_cloud_discoveryengine_v1_user_license_proto_goTypes = []any{
 (UserLicense_LicenseAssignmentState)(0), // 0:
```

```
google.cloud.discoveryengine.v1.UserLicense.LicenseAssignmentState
 (*UserLicense)(nil),                    // 1: google.cloud.discoveryengine.v1.UserLicense
 (*timestamppb.Timestamp)(nil),          // 2: google.protobuf.Timestamp
}
var file_google_cloud_discoveryengine_v1_user_license_proto_depIdxs = []int32{
 0, // 0: google.cloud.discoveryengine.v1.UserLicense.license_assignment_state:type_name
 -> google.cloud.discoveryengine.v1.UserLicense.LicenseAssignmentState
 2, // 1: google.cloud.discoveryengine.v1.UserLicense.create_time:type_name -> google.protobuf.Timestamp
 2, // 2: google.cloud.discoveryengine.v1.UserLicense.update_time:type_name -> google.protobuf.Timestamp
 2, // 3: google.cloud.discoveryengine.v1.UserLicense.last_login_time:type_name -> google.protobuf.Timestamp
 4, // [4:4] is the sub-list for method output_type
 4, // [4:4] is the sub-list for method input_type
 4, // [4:4] is the sub-list for extension type_name
 4, // [4:4] is the sub-list for extension extendee
 0, // [0:4] is the sub-list for field type_name
}

func init() { file_google_cloud_discoveryengine_v1_user_license_proto_init() }
func file_google_cloud_discoveryengine_v1_user_license_proto_init() {
 if File_google_cloud_discoveryengine_v1_user_license_proto != nil {
  return
 }
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor:
 file_google_cloud_discoveryengine_v1_user_license_proto_rawDesc,
   NumEnums:      1,
   NumMessages:   1,
   NumExtensions: 0,
   NumServices:   0,
  },
  GoTypes:           file_google_cloud_discoveryengine_v1_user_license_proto_goTypes,
  DependencyIndexes: file_google_cloud_discoveryengine_v1_user_license_proto_depIdxs,
  EnumInfos:         file_google_cloud_discoveryengine_v1_user_license_proto_enumTypes,
  MessageInfos:      file_google_cloud_discoveryengine_v1_user_license_proto_msgTypes,
 }.Build()
 File_google_cloud_discoveryengine_v1_user_license_proto = out.File
 file_google_cloud_discoveryengine_v1_user_license_proto_rawDesc = nil
 file_google_cloud_discoveryengine_v1_user_license_proto_goTypes = nil
 file_google_cloud_discoveryengine_v1_user_license_proto_depIdxs = nil
}
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```

```
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package procurement_test

import (
 "context"

 procurement "cloud.google.com/go/commerce/consumer/procurement/apiv1"
 procurementpb "cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 "google.golang.org/api/iterator"
)

func ExampleNewLicenseManagementClient() {
 ctx
 := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleNewLicenseManagementRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c,
```

```
 err := procurement.NewLicenseManagementRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicenseManagementClient_Assign() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.AssignRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#AssignRequest.
 }
 resp, err := c.Assign(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 //
 TODO: Use resp.
 _ = resp
}

func ExampleLicenseManagementClient_EnumerateLicensedUsers() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
```

```
 defer c.Close()

 req := &procurementpb.EnumerateLicensedUsersRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#EnumerateLicense
dUsersRequest.
 }
 it := c.EnumerateLicensedUsers(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  //
 TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*procurementpb.EnumerateLicensedUsersResponse)
 }
}

func ExampleLicenseManagementClient_GetLicensePool() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.GetLicensePoolRequest{
  // TODO: Fill request struct fields.
  //
 See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#GetLicensePoolRe
quest.
```

```
 }
 resp, err := c.GetLicensePool(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicenseManagementClient_Unassign() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.UnassignRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#UnassignRequest.
 }
 resp,
 err := c.Unassign(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicenseManagementClient_UpdateLicensePool() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()
```

```
 req := &procurementpb.UpdateLicensePoolRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#UpdateLicensePoo
lRequest.
 }
 resp, err := c.UpdateLicensePool(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 //
 TODO: Use resp.
 _ = resp
}

func ExampleLicenseManagementClient_GetOperation() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &longrunningpb.GetOperationRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#GetOperationRequest.
 }
 resp, err := c.GetOperation(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
```

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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package compute_test
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1beta"
 computepb "cloud.google.com/go/compute/apiv1beta/computepb"
 "google.golang.org/api/iterator"
)

func ExampleNewLicensesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 //
 It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicensesClient_Delete() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()
```

```
 req := &computepb.DeleteLicenseRequest{
  //
 TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#DeleteLicenseRequest.
 }
 op, err := c.Delete(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleLicensesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#GetLicenseRequest.
 }
 resp,
 err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_GetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
```

```
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.GetIamPolicyLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#GetIamPolicyLicenseRequest.
}
resp, err := c.GetIamPolicy(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleLicensesClient_Insert()
{
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.InsertLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#InsertLicenseRequest.
}
op, err := c.Insert(ctx, req)
if err != nil {
 // TODO: Handle error.
}

err = op.Wait(ctx)
if err != nil {
 // TODO: Handle error.
}
}
```

```
func ExampleLicensesClient_List() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded
 as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.ListLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#ListLicensesRequest.
 }
 it := c.List(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _
 = it.Response.(*computepb.LicensesListResponse)
 }
}

func ExampleLicensesClient_SetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
```

```
 // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.SetIamPolicyLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#SetIamPolicyLicenseRequest.
 }
 resp, err := c.SetIamPolicy(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_TestIamPermissions() {
 ctx := context.Background()
 //
 This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.TestIamPermissionsLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#TestIamPermissionsLicenseRequest.
 }
 resp, err := c.TestIamPermissions(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_Update() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require
 modifications to work:
 // - It may require correct/in-range values for request initialization.
```

```
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.UpdateLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#UpdateLicenseRequest.
 }
 op, err := c.Update(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
)

func ExampleNewLicenseCodesRESTClient() {
```

```
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 //
 - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicenseCodesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetLicenseCodeRequest{
  // TODO: Fill request
 struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseCodeRequest.
 }
 resp, err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicenseCodesClient_TestIamPermissions() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
```

```
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.TestIamPermissionsLicenseCodeRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseCodeRequest.
 }
 resp,
 err := c.TestIamPermissions(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package procurement_test

import (
 "context"

 procurement "cloud.google.com/go/commerce/consumer/procurement/apiv1"
 procurementpb "cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb"
)

func ExampleLicenseManagementClient_EnumerateLicensedUsers_all() {
```

```
 ctx := context.Background()
 // This snippet has been automatically
 generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.EnumerateLicensedUsersRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#EnumerateLicense
dUsersRequest.
 }
 for resp, err := range c.EnumerateLicensedUsers(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package discoveryengine

import (
 "bytes"
 "context"
```

```
 "fmt"
 "log/slog"
 "math"
 "net/http"
 "net/url"
 "time"

 discoveryenginepb "cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb"
 "cloud.google.com/go/longrunning"
 lroauto "cloud.google.com/go/longrunning/autogen"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 gax
 "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 gtransport "google.golang.org/api/transport/grpc"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/grpc/codes"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var newUserLicenseClientHook clientHook

// UserLicenseCallOptions contains the retry settings for each method of UserLicenseClient.
type UserLicenseCallOptions struct {
 ListUserLicenses        []gax.CallOption
 BatchUpdateUserLicenses []gax.CallOption
 CancelOperation         []gax.CallOption
 GetOperation            []gax.CallOption
 ListOperations          []gax.CallOption
}

func defaultUserLicenseGRPCClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("discoveryengine.googleapis.com:443"),
  internaloption.WithDefaultEndpointTemplate("discoveryengine.UNIVERSE_DOMAIN:443"),
  internaloption.WithDefaultMTLSEndpoint("discoveryengine.mtls.googleapis.com:443"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://discoveryengine.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableJwtWithScope(),
  internaloption.EnableNewAuthLibrary(),
  option.WithGRPCDialOption(grpc.WithDefaultCallOptions(
   grpc.MaxCallRecvMsgSize(math.MaxInt32))),
 }
```

```
}

func
 defaultUserLicenseCallOptions() *UserLicenseCallOptions {
 return &UserLicenseCallOptions{
  ListUserLicenses:       []gax.CallOption{},
  BatchUpdateUserLicenses: []gax.CallOption{},
  CancelOperation: []gax.CallOption{
   gax.WithTimeout(30000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnCodes([]codes.Code{
     codes.Unavailable,
    }, gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        10000 * time.Millisecond,
     Multiplier:
 1.30,
    })
   }),
  },
  GetOperation: []gax.CallOption{
   gax.WithTimeout(30000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnCodes([]codes.Code{
     codes.Unavailable,
    }, gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        10000 * time.Millisecond,
     Multiplier: 1.30,
    })
   }),
  },
  ListOperations: []gax.CallOption{
   gax.WithTimeout(300000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnCodes([]codes.Code{
     codes.Unavailable,
    }, gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        30000 * time.Millisecond,
     Multiplier: 1.30,
    })
   }),
  },
 }
}

func defaultUserLicenseRESTCallOptions() *UserLicenseCallOptions {
```

```
 return &UserLicenseCallOptions{
  ListUserLicenses:        []gax.CallOption{},
  BatchUpdateUserLicenses: []gax.CallOption{},
  CancelOperation: []gax.CallOption{
   gax.WithTimeout(30000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer
  {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        10000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusServiceUnavailable)
   }),
  },
  GetOperation: []gax.CallOption{
   gax.WithTimeout(30000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        10000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusServiceUnavailable)
   }),
  },
  ListOperations: []gax.CallOption{
   gax.WithTimeout(300000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        30000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusServiceUnavailable)
   }),
  },
 }
}

// internalUserLicenseClient is an interface that defines the methods available from Discovery Engine API.
type internalUserLicenseClient
 interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 ListUserLicenses(context.Context, *discoveryenginepb.ListUserLicensesRequest, ...gax.CallOption)
*UserLicenseIterator
```

```
 BatchUpdateUserLicenses(context.Context, *discoveryenginepb.BatchUpdateUserLicensesRequest,
...gax.CallOption) (*BatchUpdateUserLicensesOperation, error)
 BatchUpdateUserLicensesOperation(name string) *BatchUpdateUserLicensesOperation
 CancelOperation(context.Context, *longrunningpb.CancelOperationRequest, ...gax.CallOption) error
 GetOperation(context.Context, *longrunningpb.GetOperationRequest, ...gax.CallOption)
(*longrunningpb.Operation, error)
 ListOperations(context.Context, *longrunningpb.ListOperationsRequest, ...gax.CallOption) *OperationIterator
}

// UserLicenseClient is a client for interacting with Discovery Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// Service for managing
 User Licenses.
type UserLicenseClient struct {
 // The internal transport-dependent client.
 internalClient internalUserLicenseClient

 // The call options for this service.
 CallOptions *UserLicenseCallOptions

 // LROClient is used internally to handle long-running operations.
 // It is exposed so that its CallOptions can be modified if required.
 // Users should not Close this client.
 LROClient *lroauto.OperationsClient
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *UserLicenseClient) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *UserLicenseClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns
 a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
```

```
func (c *UserLicenseClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// ListUserLicenses lists the User Licenses.
func (c *UserLicenseClient) ListUserLicenses(ctx context.Context, req
*discoveryenginepb.ListUserLicensesRequest, opts ...gax.CallOption) *UserLicenseIterator {
 return c.internalClient.ListUserLicenses(ctx, req, opts...)
}

// BatchUpdateUserLicenses updates the User License.
// This method is used for batch assign/unassign licenses to users.
func (c *UserLicenseClient) BatchUpdateUserLicenses(ctx context.Context, req
*discoveryenginepb.BatchUpdateUserLicensesRequest, opts ...gax.CallOption)
(*BatchUpdateUserLicensesOperation, error) {
 return c.internalClient.BatchUpdateUserLicenses(ctx, req, opts...)
}

// BatchUpdateUserLicensesOperation returns a new BatchUpdateUserLicensesOperation from a given name.
//
 The name must be that of a previously created BatchUpdateUserLicensesOperation, possibly from a different
process.
func (c *UserLicenseClient) BatchUpdateUserLicensesOperation(name string)
*BatchUpdateUserLicensesOperation {
 return c.internalClient.BatchUpdateUserLicensesOperation(name)
}

// CancelOperation is a utility method from google.longrunning.Operations.
func (c *UserLicenseClient) CancelOperation(ctx context.Context, req *longrunningpb.CancelOperationRequest,
opts ...gax.CallOption) error {
 return c.internalClient.CancelOperation(ctx, req, opts...)
}

// GetOperation is a utility method from google.longrunning.Operations.
func (c *UserLicenseClient) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest, opts
...gax.CallOption) (*longrunningpb.Operation, error) {
 return c.internalClient.GetOperation(ctx, req, opts...)
}

// ListOperations is a utility method from google.longrunning.Operations.
func (c *UserLicenseClient) ListOperations(ctx context.Context,
 req *longrunningpb.ListOperationsRequest, opts ...gax.CallOption) *OperationIterator {
 return c.internalClient.ListOperations(ctx, req, opts...)
}

// userLicenseGRPCClient is a client for interacting with Discovery Engine API over gRPC transport.
//
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
```

```
method calls.
type userLicenseGRPCClient struct {
 // Connection pool of gRPC connections to the service.
 connPool gtransport.ConnPool

 // Points back to the CallOptions field of the containing UserLicenseClient
 CallOptions **UserLicenseCallOptions

 // The gRPC API client.
 userLicenseClient discoveryenginepb.UserLicenseServiceClient

 // LROClient is used internally to handle long-running operations.
 // It is exposed so that its CallOptions can be modified if required.
 // Users should not Close this client.
 LROClient **lroauto.OperationsClient

 operationsClient longrunningpb.OperationsClient

 // The x-goog-* metadata
 to be sent with each request.
 xGoogHeaders []string

 logger *slog.Logger
}

// NewUserLicenseClient creates a new user license service client based on gRPC.
// The returned client must be Closed when it is done being used to clean up its underlying connections.
//
// Service for managing User Licenses.
func NewUserLicenseClient(ctx context.Context, opts ...option.ClientOption) (*UserLicenseClient, error) {
 clientOpts := defaultUserLicenseGRPCClientOptions()
 if newUserLicenseClientHook != nil {
  hookOpts, err := newUserLicenseClientHook(ctx, clientHookParams{})
  if err != nil {
   return nil, err
  }
  clientOpts = append(clientOpts, hookOpts...)
 }

 connPool, err := gtransport.DialPool(ctx, append(clientOpts, opts...)...)
 if err != nil {
  return nil, err
 }
 client := UserLicenseClient{CallOptions: defaultUserLicenseCallOptions()}

 c := &userLicenseGRPCClient{
  connPool:         connPool,
  userLicenseClient: discoveryenginepb.NewUserLicenseServiceClient(connPool),
```

```
 CallOptions:
     &client.CallOptions,
 logger:           internaloption.GetLogger(opts),
 operationsClient:  longrunningpb.NewOperationsClient(connPool),
}
c.setGoogleClientInfo()

client.internalClient = c

client.LROClient, err = lroauto.NewOperationsClient(ctx, gtransport.WithConnPool(connPool))
if err != nil {
 // This error "should not happen", since we are just reusing old connection pool
 // and never actually need to dial.
 // If this does happen, we could leak connp. However, we cannot close conn:
 // If the user invoked the constructor with option.WithGRPCConn,
 // we would close a connection that's still in use.
 // TODO: investigate error conditions.
 return nil, err
}
c.LROClient = &client.LROClient
return &client, nil
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *userLicenseGRPCClient) Connection() *grpc.ClientConn {
 return c.connPool.Conn()
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *userLicenseGRPCClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "grpc", grpc.Version, "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *userLicenseGRPCClient) Close() error {
 return c.connPool.Close()
}
```

```
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type userLicenseRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // LROClient is used internally
 to handle long-running operations.
 // It is exposed so that its CallOptions can be modified if required.
 // Users should not Close this client.
 LROClient **lroauto.OperationsClient

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing UserLicenseClient
 CallOptions **UserLicenseCallOptions

 logger *slog.Logger
}

// NewUserLicenseRESTClient creates a new user license service rest client.
//
// Service for managing User Licenses.
func NewUserLicenseRESTClient(ctx context.Context, opts ...option.ClientOption) (*UserLicenseClient, error) {
 clientOpts := append(defaultUserLicenseRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultUserLicenseRESTCallOptions()
 c := &userLicenseRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 lroOpts
 := []option.ClientOption{
  option.WithHTTPClient(httpClient),
  option.WithEndpoint(endpoint),
```

```
 }
 opClient, err := lroauto.NewOperationsRESTClient(ctx, lroOpts...)
 if err != nil {
  return nil, err
 }
 c.LROClient = &opClient

 return &UserLicenseClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultUserLicenseRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://discoveryengine.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://discoveryengine.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://discoveryengine.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://discoveryengine.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

// setGoogleClientInfo
 sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *userLicenseRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *userLicenseRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *userLicenseRESTClient) Connection() *grpc.ClientConn {
 return nil
}
```

```
func (c *userLicenseGRPCClient) ListUserLicenses(ctx context.Context, req
*discoveryenginepb.ListUserLicensesRequest,
 opts ...gax.CallOption) *UserLicenseIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).ListUserLicenses[0:len((*c.CallOptions).ListUserLicenses):len((*c.CallOptions).ListUser
Licenses)], opts...)
 it := &UserLicenseIterator{}
 req = proto.Clone(req).(*discoveryenginepb.ListUserLicensesRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*discoveryenginepb.UserLicense, string, error) {
  resp := &discoveryenginepb.ListUserLicensesResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx,
 c.userLicenseClient.ListUserLicenses, req, settings.GRPC, c.logger, "ListUserLicenses")
   return err
  }, opts...)
  if err != nil {
   return nil, "", err
  }

  it.Response = resp
  return resp.GetUserLicenses(), resp.GetNextPageToken(), nil
 }
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()
```

```
 return it
}

func (c *userLicenseGRPCClient) BatchUpdateUserLicenses(ctx context.Context, req
*discoveryenginepb.BatchUpdateUserLicensesRequest, opts ...gax.CallOption)
(*BatchUpdateUserLicensesOperation, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders,
 hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).BatchUpdateUserLicenses[0:len((*c.CallOptions).BatchUpdateUserLicenses):len((*c.Call
Options).BatchUpdateUserLicenses)], opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.userLicenseClient.BatchUpdateUserLicenses, req, settings.GRPC, c.logger,
"BatchUpdateUserLicenses")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return &BatchUpdateUserLicensesOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, resp),
 }, nil
}

func (c *userLicenseGRPCClient) CancelOperation(ctx context.Context, req
*longrunningpb.CancelOperationRequest, opts ...gax.CallOption) error {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx,
 hds...)
 opts =
append((*c.CallOptions).CancelOperation[0:len((*c.CallOptions).CancelOperation):len((*c.CallOptions).CancelOp
eration)], opts...)
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  _, err = executeRPC(ctx, c.operationsClient.CancelOperation, req, settings.GRPC, c.logger, "CancelOperation")
  return err
 }, opts...)
 return err
}

func (c *userLicenseGRPCClient) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest,
```

```
opts ...gax.CallOption) (*longrunningpb.Operation, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).GetOperation[0:len((*c.CallOptions).GetOperation):len((*c.CallOptions).GetOperation)],
opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context,
 settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.operationsClient.GetOperation, req, settings.GRPC, c.logger, "GetOperation")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *userLicenseGRPCClient) ListOperations(ctx context.Context, req *longrunningpb.ListOperationsRequest,
opts ...gax.CallOption) *OperationIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 opts =
append((*c.CallOptions).ListOperations[0:len((*c.CallOptions).ListOperations):len((*c.CallOptions).ListOperations
)], opts...)
 it := &OperationIterator{}
 req = proto.Clone(req).(*longrunningpb.ListOperationsRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*longrunningpb.Operation, string, error) {
  resp := &longrunningpb.ListOperationsResponse{}
  if pageToken !=
 "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx, c.operationsClient.ListOperations, req, settings.GRPC, c.logger, "ListOperations")
   return err
  }, opts...)
```

```
 if err != nil {
  return nil, "", err
 }

 it.Response = resp
 return resp.GetOperations(), resp.GetNextPageToken(), nil
}
fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// ListUserLicenses lists the
 User Licenses.
func (c *userLicenseRESTClient) ListUserLicenses(ctx context.Context, req
*discoveryenginepb.ListUserLicensesRequest, opts ...gax.CallOption) *UserLicenseIterator {
 it := &UserLicenseIterator{}
 req = proto.Clone(req).(*discoveryenginepb.ListUserLicensesRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*discoveryenginepb.UserLicense, string, error) {
  resp := &discoveryenginepb.ListUserLicensesResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
   return nil, "", err
  }
  baseUrl.Path += fmt.Sprintf("/v1/%v/userLicenses", req.GetParent())

  params := url.Values{}
  params.Add("$alt", "json;enum-encoding=int")
```

```
 if req.GetFilter() != "" {
  params.Add("filter", fmt.Sprintf("%v",
req.GetFilter()))
 }
 if req.GetPageSize() != 0 {
  params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
 }
 if req.GetPageToken() != "" {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "ListUserLicenses")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response
= resp
 return resp.GetUserLicenses(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
```

```
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// BatchUpdateUserLicenses updates the User License.
// This method is used for batch assign/unassign licenses to users.
func (c *userLicenseRESTClient) BatchUpdateUserLicenses(ctx context.Context, req
*discoveryenginepb.BatchUpdateUserLicensesRequest, opts ...gax.CallOption)
(*BatchUpdateUserLicensesOperation, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 jsonReq, err := m.Marshal(req)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if
 err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:batchUpdateUserLicenses", req.GetParent())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &longrunningpb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
```

```
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err
:= executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "BatchUpdateUserLicenses")
 if err != nil {
  return err
 }
 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}

override := fmt.Sprintf("/v1/%s", resp.GetName())
return &BatchUpdateUserLicensesOperation{
 lro:      longrunning.InternalNewOperation(*c.LROClient, resp),
 pollPath: override,
}, nil
}

// CancelOperation is a utility method from google.longrunning.Operations.
func (c *userLicenseRESTClient) CancelOperation(ctx context.Context, req
*longrunningpb.CancelOperationRequest, opts ...gax.CallOption) error {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 jsonReq, err := m.Marshal(req)
 if err != nil {
  return err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:cancel", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery
```

```
 = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 return gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  _, err = executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "CancelOperation")
  return err
 }, opts...)
}

// GetOperation is a utility method from google.longrunning.Operations.
func (c *userLicenseRESTClient) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest,
opts ...gax.CallOption)
 (*longrunningpb.Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetOperation[0:len((*c.CallOptions).GetOperation):len((*c.CallOptions).GetOperation)],
opts...)
```

```
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &longrunningpb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET",
 baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetOperation")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// ListOperations is a utility method from google.longrunning.Operations.
func (c *userLicenseRESTClient) ListOperations(ctx context.Context, req *longrunningpb.ListOperationsRequest,
opts ...gax.CallOption) *OperationIterator {
 it := &OperationIterator{}
 req = proto.Clone(req).(*longrunningpb.ListOperationsRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*longrunningpb.Operation, string, error) {
  resp := &longrunningpb.ListOperationsResponse{}
  if pageToken != "" {
   req.PageToken
 = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
```

```
baseUrl, err := url.Parse(c.endpoint)
if err != nil {
 return nil, "", err
}
baseUrl.Path += fmt.Sprintf("/v1/%v/operations", req.GetName())

params := url.Values{}
params.Add("$alt", "json;enum-encoding=int")
if req.GetFilter() != "" {
 params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
}
if req.GetPageSize() != 0 {
 params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
}
if req.GetPageToken() != "" {
 params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
}

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := append(c.xGoogHeaders, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path
= settings.Path
 }
 httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
 if err != nil {
  return err
 }
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "ListOperations")
 if err != nil {
  return err
 }
 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, "", e
}
it.Response = resp
```

```
 return resp.GetOperations(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// BatchUpdateUserLicensesOperation returns a new
 BatchUpdateUserLicensesOperation from a given name.
// The name must be that of a previously created BatchUpdateUserLicensesOperation, possibly from a different
process.
func (c *userLicenseGRPCClient) BatchUpdateUserLicensesOperation(name string)
*BatchUpdateUserLicensesOperation {
 return &BatchUpdateUserLicensesOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
 }
}

// BatchUpdateUserLicensesOperation returns a new BatchUpdateUserLicensesOperation from a given name.
// The name must be that of a previously created BatchUpdateUserLicensesOperation, possibly from a different
process.
func (c *userLicenseRESTClient) BatchUpdateUserLicensesOperation(name string)
*BatchUpdateUserLicensesOperation {
 override := fmt.Sprintf("/v1/%s", name)
 return &BatchUpdateUserLicensesOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
  pollPath: override,
 }
}
// Copyright 2025 Google LLC
//
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// you may not use this file except in compliance with the License.
// You may obtain a copy of the License at
//
//     https://www.apache.org/licenses/LICENSE-2.0
```

```
//
// Unless required by applicable law or agreed to in writing, software
// distributed under the License is distributed on an "AS IS" BASIS,
// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
// See the License for the specific language governing permissions and
// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute

import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
 "math"
 "net/http"
 "net/url"
 "time"

 computepb "cloud.google.com/go/compute/apiv1beta/computepb"
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var
 newLicensesClientHook clientHook

// LicensesCallOptions contains the retry settings for each method of LicensesClient.
type LicensesCallOptions struct {
 Delete            []gax.CallOption
 Get               []gax.CallOption
 GetIamPolicy      []gax.CallOption
 Insert            []gax.CallOption
 List              []gax.CallOption
 SetIamPolicy      []gax.CallOption
 TestIamPermissions []gax.CallOption
 Update            []gax.CallOption
}

func defaultLicensesRESTCallOptions() *LicensesCallOptions {
```

```
return &LicensesCallOptions{
 Delete: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
 },
 Get: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    100 * time.Millisecond,
    Max:        60000 * time.Millisecond,
    Multiplier:
1.30,
   },
    http.StatusGatewayTimeout,
    http.StatusServiceUnavailable)
  }),
 },
 GetIamPolicy: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    100 * time.Millisecond,
    Max:        60000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusGatewayTimeout,
    http.StatusServiceUnavailable)
  }),
 },
 Insert: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
 },
 List: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    100 * time.Millisecond,
    Max:        60000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusGatewayTimeout,
    http.StatusServiceUnavailable)
  }),
 },
 SetIamPolicy: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
 },
 TestIamPermissions: []gax.CallOption{
```

```
  gax.WithTimeout(600000
 * time.Millisecond),
  },
  Update: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
  },
 }
}

// internalLicensesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicensesClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Delete(context.Context, *computepb.DeleteLicenseRequest, ...gax.CallOption) (*Operation, error)
 Get(context.Context, *computepb.GetLicenseRequest, ...gax.CallOption) (*computepb.License, error)
 GetIamPolicy(context.Context, *computepb.GetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 Insert(context.Context, *computepb.InsertLicenseRequest, ...gax.CallOption) (*Operation, error)
 List(context.Context, *computepb.ListLicensesRequest, ...gax.CallOption) *LicenseIterator
 SetIamPolicy(context.Context, *computepb.SetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 TestIamPermissions(context.Context,
 *computepb.TestIamPermissionsLicenseRequest, ...gax.CallOption) (*computepb.TestPermissionsResponse, error)
 Update(context.Context, *computepb.UpdateLicenseRequest, ...gax.CallOption) (*Operation, error)
}

// LicensesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// The Licenses API.
type LicensesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicensesClient

 // The call options for this service.
 CallOptions *LicensesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicensesClient) Close() error {
 return c.internalClient.Close()
}
```

```
// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header
 passed on each request. Intended for
// use by Google-written clients.
func (c *LicensesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicensesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// Delete deletes the specified license. Caution This resource is intended for use only by third-party partners who are
creating Cloud Marketplace images.
func (c *LicensesClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts ...gax.CallOption)
(*Operation, error) {
 return c.internalClient.Delete(ctx, req, opts...)
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners
who are creating Cloud Marketplace images.
func (c *LicensesClient) Get(ctx context.Context,
 req *computepb.GetLicenseRequest, opts ...gax.CallOption) (*computepb.License, error) {
 return c.internalClient.Get(ctx, req, opts...)
}

// GetIamPolicy gets the access control policy for a resource. May be empty if no such policy or resource exists.
Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest, opts
...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.GetIamPolicy(ctx, req, opts...)
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts ...gax.CallOption)
(*Operation, error) {
 return c.internalClient.Insert(ctx, req, opts...)
}

// List retrieves the list of licenses available
 in the specified project. This method does not get any licenses that belong to other projects, including licenses
attached to publicly-available images, like Debian 9. If you want to get a list of publicly-available licenses, use this
method to make a request to the respective image project, such as debian-cloud or windows-cloud. Caution This
```

resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts ...gax.CallOption) *LicenseIterator {
 return c.internalClient.List(ctx, req, opts...)
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest, opts ...gax.CallOption) (*computepb.Policy, error) {
 return
 c.internalClient.SetIamPolicy(ctx, req, opts...)
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) TestIamPermissions(ctx context.Context, req *computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse, error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}

// Update updates a License resource in the specified project. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Update(ctx context.Context, req *computepb.UpdateLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 return c.internalClient.Update(ctx, req, opts...)
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with method calls.
type
 licensesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // operationClient is used to call the operation-specific management service.
 operationClient *GlobalOperationsClient

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicensesClient
 CallOptions **LicensesCallOptions

```
 logger *slog.Logger
}

// NewLicensesRESTClient creates a new licenses rest client.
//
// The Licenses API.
func NewLicensesRESTClient(ctx context.Context, opts ...option.ClientOption) (*LicensesClient, error) {
 clientOpts := append(defaultLicensesRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicensesRESTCallOptions()
 c := &licensesRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:
     internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 o := []option.ClientOption{
  option.WithHTTPClient(httpClient),
  option.WithEndpoint(endpoint),
 }
 opC, err := NewGlobalOperationsRESTClient(ctx, o...)
 if err != nil {
  return nil, err
 }
 c.operationClient = opC

 return &LicensesClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicensesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}
```

```
// setGoogleClientInfo sets the name and version of the application
 in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licensesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licensesRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 if err := c.operationClient.Close(); err != nil {
  return err
 }
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licensesRESTClient) Connection() *grpc.ClientConn {
 return nil
}

// Delete deletes the specified license. Caution This resource is intended for
 use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
```

```
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Delete[0:len((*c.CallOptions).Delete):len((*c.CallOptions).Delete)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Delete")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 op := &Operation{
  &globalOperationsHandle{
   c:       c.operationClient,
   proto:   resp,
   project: req.GetProject(),
  },
 }
 return op, nil
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners
who are creating
```

```
 Cloud Marketplace images.
func (c *licensesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption)
(*computepb.License, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.License{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings)
 error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Get")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}
```

```
// GetIamPolicy gets the access control policy for a resource. May be empty if no such policy or resource exists.
Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses/%v/getIamPolicy",
 req.GetProject(), req.GetResource())

 params := url.Values{}
 if req != nil && req.OptionsRequestedPolicyVersion != nil {
  params.Add("optionsRequestedPolicyVersion", fmt.Sprintf("%v", req.GetOptionsRequestedPolicyVersion()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetIamPolicy[0:len((*c.CallOptions).GetIamPolicy):len((*c.CallOptions).GetIamPolicy)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error
 {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetIamPolicy")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
```

```
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetLicenseResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err
 := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "project", url.QueryEscape(req.GetProject()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Insert[0:len((*c.CallOptions).Insert):len((*c.CallOptions).Insert)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
```

```
 }
 httpReq,
err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Insert")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
op := &Operation{
 &globalOperationsHandle{
  c:       c.operationClient,
  proto:   resp,
  project: req.GetProject(),
 },
}
return op, nil
}

// List retrieves the list of licenses available in the specified project. This method does not get any licenses that
belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a
list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-
cloud or windows-cloud. Caution This resource is intended
 for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts
...gax.CallOption) *LicenseIterator {
 it := &LicenseIterator{}
 req = proto.Clone(req).(*computepb.ListLicensesRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*computepb.License, string, error) {
  resp := &computepb.LicensesListResponse{}
  if pageToken != "" {
   req.PageToken = proto.String(pageToken)
  }
```

```
 if pageSize > math.MaxInt32 {
  req.MaxResults = proto.Uint32(uint32(math.MaxInt32))
 } else if pageSize != 0 {
  req.MaxResults = proto.Uint32(uint32(pageSize))
 }
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, "", err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if req != nil && req.Filter !=
nil {
  params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
 }
 if req != nil && req.MaxResults != nil {
  params.Add("maxResults", fmt.Sprintf("%v", req.GetMaxResults()))
 }
 if req != nil && req.OrderBy != nil {
  params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
 }
 if req != nil && req.PageToken != nil {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }
 if req != nil && req.ReturnPartialSuccess != nil {
  params.Add("returnPartialSuccess", fmt.Sprintf("%v", req.GetReturnPartialSuccess()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return
err
  }
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "List")
  if err != nil {
   return err
```

```
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetItems(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetMaxResults())
it.pageInfo.Token = req.GetPageToken()

return it
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This
resource is intended for use only by third-party partners who are creating
 Cloud Marketplace images.
func (c *licensesRESTClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetGlobalSetPolicyRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses/%v/setIamPolicy", req.GetProject(),
req.GetResource())
```

```
 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).SetIamPolicy[0:len((*c.CallOptions).SetIamPolicy):len((*c.CallOptions).SetIamPolicy)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "SetIamPolicy")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is
intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient)
 TestIamPermissions(ctx context.Context, req *computepb.TestIamPermissionsLicenseRequest, opts
...gax.CallOption) (*computepb.TestPermissionsResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetTestPermissionsRequestResource()
```

```
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses/%v/testIamPermissions", req.GetProject(),
req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "TestIamPermissions")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
```

```
  return nil, e
 }
 return resp, nil
}

// Update updates a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient)
 Update(ctx context.Context, req *computepb.UpdateLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetLicenseResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }
 if req != nil && req.UpdateMask != nil {
  params.Add("updateMask", fmt.Sprintf("%v", req.GetUpdateMask()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds
 = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Update[0:len((*c.CallOptions).Update):len((*c.CallOptions).Update)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("PATCH", baseUrl.String(), bytes.NewReader(jsonReq))
```

```
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Update")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 op := &Operation{
  &globalOperationsHandle{
   c:       c.operationClient,
   proto:   resp,
   project:
 req.GetProject(),
  },
 }
 return op, nil
}
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// limitations under the License.

// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.35.2
//  protoc        v4.25.7
```

```
// source: google/ai/generativelanguage/v1beta/permission.proto

package generativelanguagepb

import (
 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
 reflect "reflect"
 sync
 "sync"
)

const (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Defines types of the grantee of this permission.
type Permission_GranteeType int32

const (
 // The default value. This value is unused.
 Permission_GRANTEE_TYPE_UNSPECIFIED Permission_GranteeType = 0
 // Represents a user. When set, you must provide email_address for the user.
 Permission_USER Permission_GranteeType = 1
 // Represents a group. When set, you must provide email_address for the
 // group.
 Permission_GROUP Permission_GranteeType = 2
 // Represents access to everyone. No extra information is required.
 Permission_EVERYONE Permission_GranteeType = 3
)

// Enum value maps for Permission_GranteeType.
var (
 Permission_GranteeType_name = map[int32]string{
  0: "GRANTEE_TYPE_UNSPECIFIED",
  1: "USER",
  2:
 "GROUP",
  3: "EVERYONE",
 }
 Permission_GranteeType_value = map[string]int32{
  "GRANTEE_TYPE_UNSPECIFIED": 0,
  "USER":                     1,
  "GROUP":                    2,
```

```
  "EVERYONE":                 3,
 }
)

func (x Permission_GranteeType) Enum() *Permission_GranteeType {
 p := new(Permission_GranteeType)
 *p = x
 return p
}

func (x Permission_GranteeType) String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_GranteeType) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0].Descriptor()
}

func (Permission_GranteeType) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0]
}

func (x Permission_GranteeType) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_GranteeType.Descriptor instead.
func (Permission_GranteeType) EnumDescriptor() ([]byte,
 []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 0}
}

// Defines the role granted by this permission.
type Permission_Role int32

const (
 // The default value. This value is unused.
 Permission_ROLE_UNSPECIFIED Permission_Role = 0
 // Owner can use, update, share and delete the resource.
 Permission_OWNER Permission_Role = 1
 // Writer can use, update and share the resource.
 Permission_WRITER Permission_Role = 2
 // Reader can use the resource.
 Permission_READER Permission_Role = 3
)

// Enum value maps for Permission_Role.
var (
```

```
 Permission_Role_name = map[int32]string{
  0: "ROLE_UNSPECIFIED",
  1: "OWNER",
  2: "WRITER",
  3: "READER",
 }
 Permission_Role_value = map[string]int32{
  "ROLE_UNSPECIFIED": 0,
  "OWNER":            1,
  "WRITER":           2,
  "READER":           3,
 }
)

func (x Permission_Role) Enum() *Permission_Role {
 p := new(Permission_Role)
 *p = x
 return p
}

func (x Permission_Role) String() string {
 return
 protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_Role) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1].Descriptor()
}

func (Permission_Role) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1]
}

func (x Permission_Role) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_Role.Descriptor instead.
func (Permission_Role) EnumDescriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 1}
}

// Permission resource grants user, group or the rest of the world access to the
// PaLM API resource (e.g. a tuned model, corpus).
//
// A role is a collection of permitted operations that allows users to perform
// specific actions on PaLM API resources. To make them available to users,
// groups, or service accounts,
```

```
 you assign roles. When you assign a role, you
// grant permissions that the role contains.
//
// There are three concentric roles. Each role is a superset of the previous
// role's permitted operations:
//
// - reader can use the resource (e.g. tuned model, corpus) for inference
// - writer has reader's permissions and additionally can edit and share
// - owner has writer's permissions and additionally can delete
type Permission struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Output only. Identifier. The permission name. A unique name will be
 // generated on create. Examples:
 //
 // tunedModels/{tuned_model}/permissions/{permission}
 // corpora/{corpus}/permissions/{permission}
 //
 // Output only.
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Optional. Immutable. The type of the grantee.
 GranteeType *Permission_GranteeType
`protobuf:"varint,2,opt,name=grantee_type,json=granteeType,proto3,enum=google.ai.generativelanguage.v1beta.Pe
rmission_GranteeType,oneof"
 json:"grantee_type,omitempty"`
 // Optional. Immutable. The email address of the user of group which this
 // permission refers. Field is not set when permission's grantee type is
 // EVERYONE.
 EmailAddress *string `protobuf:"bytes,3,opt,name=email_address,json=emailAddress,proto3,oneof"
json:"email_address,omitempty"`
 // Required. The role granted by this permission.
 Role *Permission_Role
`protobuf:"varint,4,opt,name=role,proto3,enum=google.ai.generativelanguage.v1beta.Permission_Role,oneof"
json:"role,omitempty"`
}

func (x *Permission) Reset() {
 *x = Permission{}
 mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *Permission) String() string {
 return protoimpl.X.MessageStringOf(x)
}
```

```
func (*Permission) ProtoMessage() {}

func (x *Permission) ProtoReflect() protoreflect.Message
 {
 mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use Permission.ProtoReflect.Descriptor instead.
func (*Permission) Descriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0}
}

func (x *Permission) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
}

func (x *Permission) GetGranteeType() Permission_GranteeType {
 if x != nil && x.GranteeType != nil {
  return *x.GranteeType
 }
 return Permission_GRANTEE_TYPE_UNSPECIFIED
}

func (x *Permission) GetEmailAddress() string {
 if x != nil && x.EmailAddress != nil {
  return *x.EmailAddress
 }
 return ""
}

func (x *Permission) GetRole() Permission_Role {
 if x != nil && x.Role != nil {
  return *x.Role
 }
 return Permission_ROLE_UNSPECIFIED
}
```

```
var
 File_google_ai_generativelanguage_v1beta_permission_proto protoreflect.FileDescriptor

var file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = []byte{
 0x0a, 0x34, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65,
 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x76,
 0x31, 0x62, 0x65, 0x74, 0x61, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x12, 0x23, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61,
 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67,
 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x1a, 0x1f, 0x67, 0x6f, 0x6f,
 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64, 0x5f, 0x62, 0x65,
 0x68, 0x61, 0x76, 0x69, 0x6f, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x19, 0x67, 0x6f,
 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69,
 0x2f, 0x72, 0x65, 0x73, 0x6f, 0x75, 0x72, 0x63,
 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x22, 0x85, 0x05, 0x0a, 0x0a, 0x50, 0x65, 0x72, 0x6d,
 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x1a, 0x0a, 0x04, 0x6e, 0x61, 0x6d, 0x65, 0x18, 0x01,
 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x03, 0xe0, 0x41, 0x08, 0x52, 0x04, 0x6e, 0x61,
 0x6d, 0x65, 0x12, 0x6b, 0x0a, 0x0c, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f, 0x74, 0x79,
 0x70, 0x65, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0e, 0x32, 0x3b, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c,
 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c,
 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x2e, 0x50,
 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x2e, 0x47, 0x72, 0x61, 0x6e, 0x74, 0x65,
 0x65, 0x54, 0x79, 0x70, 0x65, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05, 0x48, 0x00, 0x52,
 0x0b, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x54, 0x79, 0x70, 0x65, 0x88,
 0x01, 0x01, 0x12,
 0x30, 0x0a, 0x0d, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x5f, 0x61, 0x64, 0x64, 0x72, 0x65, 0x73, 0x73,
 0x18, 0x03, 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05, 0x48, 0x01,
 0x52, 0x0c, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x41, 0x64, 0x64, 0x72, 0x65, 0x73, 0x73, 0x88, 0x01,
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 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76,
 0x31, 0x62, 0x65, 0x74, 0x61, 0x2e, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
 0x2e, 0x52, 0x6f, 0x6c, 0x65, 0x42, 0x03, 0xe0, 0x41, 0x02, 0x48, 0x02, 0x52, 0x04, 0x72, 0x6f,
 0x6c, 0x65, 0x88, 0x01, 0x01, 0x22, 0x4e, 0x0a, 0x0b, 0x47, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65,
 0x54, 0x79, 0x70, 0x65, 0x12, 0x1c, 0x0a, 0x18, 0x47, 0x52, 0x41, 0x4e, 0x54, 0x45, 0x45, 0x5f,
 0x54, 0x59,
 0x50, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49, 0x46, 0x49, 0x45, 0x44,
 0x10, 0x00, 0x12, 0x08, 0x0a, 0x04, 0x55, 0x53, 0x45, 0x52, 0x10, 0x01, 0x12, 0x09, 0x0a, 0x05,
 0x47, 0x52, 0x4f, 0x55, 0x50, 0x10, 0x02, 0x12, 0x0c, 0x0a, 0x08, 0x45, 0x56, 0x45, 0x52, 0x59,
 0x4f, 0x4e, 0x45, 0x10, 0x03, 0x22, 0x3f, 0x0a, 0x04, 0x52, 0x6f, 0x6c, 0x65, 0x12, 0x14, 0x0a,
 0x10, 0x52, 0x4f, 0x4c, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49, 0x46, 0x49, 0x45,
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 0x0a, 0x06, 0x57, 0x52, 0x49, 0x54, 0x45, 0x52, 0x10, 0x02, 0x12, 0x0a, 0x0a, 0x06, 0x52, 0x45,
 0x41, 0x44, 0x45, 0x52, 0x10, 0x03, 0x3a, 0xaa, 0x01, 0xea, 0x41, 0xa6, 0x01, 0x0a, 0x2c, 0x67,
 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67,
 0x65, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73, 0x2e, 0x63, 0x6f, 0x6d,
 0x2f, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73,
```

```
 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x32, 0x74, 0x75, 0x6e,
 0x65, 0x64, 0x4d, 0x6f, 0x64, 0x65, 0x6c, 0x73, 0x2f, 0x7b, 0x74, 0x75, 0x6e, 0x65, 0x64, 0x5f,
 0x6d, 0x6f, 0x64, 0x65, 0x6c, 0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f,
 0x6e, 0x73, 0x2f, 0x7b, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x7d, 0x12,
 0x29, 0x63, 0x6f, 0x72, 0x70, 0x6f, 0x72, 0x61, 0x2f, 0x7b, 0x63, 0x6f, 0x72, 0x70, 0x75, 0x73,
 0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x2f, 0x7b, 0x70,
 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x7d, 0x2a, 0x0b, 0x70, 0x65, 0x72, 0x6d,
 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x32, 0x0a, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73,
 0x69, 0x6f, 0x6e, 0x42, 0x0f, 0x0a, 0x0d, 0x5f, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f,
 0x74, 0x79, 0x70, 0x65, 0x42, 0x10, 0x0a, 0x0e, 0x5f, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x5f, 0x61,
 0x64, 0x64, 0x72, 0x65, 0x73, 0x73, 0x42, 0x07, 0x0a, 0x05, 0x5f, 0x72,
 0x6f, 0x6c, 0x65, 0x42,
 0x9b, 0x01, 0x0a, 0x27, 0x63, 0x6f, 0x6d, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61,
 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67,
 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x42, 0x0f, 0x50, 0x65, 0x72,
 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x50, 0x01, 0x5a, 0x5d,
 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6f, 0x6d,
 0x2f, 0x67, 0x6f, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76,
 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x76, 0x31, 0x62,
 0x65, 0x74, 0x61, 0x2f, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61,
 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x3b, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74,
 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x62, 0x06, 0x70,
 0x72,
 0x6f, 0x74, 0x6f, 0x33,
}

var (
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce sync.Once
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc
)

func file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP() []byte {
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce.Do(func() {
  file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData)
 })
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData
}

var file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes = make([]protoimpl.EnumInfo, 2)
var file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes = make([]protoimpl.MessageInfo, 1)
var file_google_ai_generativelanguage_v1beta_permission_proto_goTypes = []any{
 (Permission_GranteeType)(0),
 // 0: google.ai.generativelanguage.v1beta.Permission.GranteeType
 (Permission_Role)(0),        // 1: google.ai.generativelanguage.v1beta.Permission.Role
 (*Permission)(nil),          // 2: google.ai.generativelanguage.v1beta.Permission
}
```

```
var file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = []int32{
 0, // 0: google.ai.generativelanguage.v1beta.Permission.grantee_type:type_name ->
google.ai.generativelanguage.v1beta.Permission.GranteeType
 1, // 1: google.ai.generativelanguage.v1beta.Permission.role:type_name ->
google.ai.generativelanguage.v1beta.Permission.Role
 2, // [2:2] is the sub-list for method output_type
 2, // [2:2] is the sub-list for method input_type
 2, // [2:2] is the sub-list for extension type_name
 2, // [2:2] is the sub-list for extension extendee
 0, // [0:2] is the sub-list for field type_name
}

func init() { file_google_ai_generativelanguage_v1beta_permission_proto_init() }
func file_google_ai_generativelanguage_v1beta_permission_proto_init()
 {
 if File_google_ai_generativelanguage_v1beta_permission_proto != nil {
  return
 }
 file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0].OneofWrappers = []any{}
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor: file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc,
   NumEnums:      2,
   NumMessages:   1,
   NumExtensions: 0,
   NumServices:   0,
  },
  GoTypes:           file_google_ai_generativelanguage_v1beta_permission_proto_goTypes,
  DependencyIndexes: file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs,
  EnumInfos:         file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes,
  MessageInfos:      file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes,
 }.Build()
 File_google_ai_generativelanguage_v1beta_permission_proto = out.File
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = nil
 file_google_ai_generativelanguage_v1beta_permission_proto_goTypes
 = nil
 file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = nil
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package discoveryengine_test

import (
 "context"

 discoveryengine "cloud.google.com/go/discoveryengine/apiv1"
 discoveryenginepb "cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
)

func ExampleUserLicenseClient_ListUserLicenses_all() {
 ctx := context.Background()
 //
 This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &discoveryenginepb.ListUserLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb#ListUserLicensesRequest.
 }
 for resp, err := range c.ListUserLicenses(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}

func ExampleUserLicenseClient_ListOperations_all() {
```

```
ctx := context.Background()
//
This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := discoveryengine.NewUserLicenseClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &longrunningpb.ListOperationsRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#ListOperationsRequest.
}
for resp, err := range c.ListOperations(ctx, req).All() {
 if err != nil {
  // TODO: Handle error and break/return/continue. Iteration will stop after any error.
 }
 // TODO: Use resp.
 _ = resp
}
}
```

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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

// [START discoveryengine_v1_generated_UserLicenseService_BatchUpdateUserLicenses_sync]

package main

import (
 "context"

 discoveryengine "cloud.google.com/go/discoveryengine/apiv1"
 discoveryenginepb "cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb"
)

func main() {
 ctx := context.Background()
 // This snippet has been automatically generated
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 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &discoveryenginepb.BatchUpdateUserLicensesRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb#BatchUpdateUserLicensesReque
st.
 }
 op, err := c.BatchUpdateUserLicenses(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
```

```
 resp, err := op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

// [END discoveryengine_v1_generated_UserLicenseService_BatchUpdateUserLicenses_sync]
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
 "google.golang.org/api/iterator"
)

func ExampleNewLicensesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will
 require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
```

```
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicensesClient_Delete() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.DeleteLicenseRequest{
  //
 TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#DeleteLicenseRequest.
 }
 op, err := c.Delete(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleLicensesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()
```

```
 req := &computepb.GetLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseRequest.
 }
 resp,
 err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_GetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetIamPolicyLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetIamPolicyLicenseRequest.
 }
 resp, err := c.GetIamPolicy(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_Insert()
 {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
```

```
 // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.InsertLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#InsertLicenseRequest.
 }
 op, err := c.Insert(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleLicensesClient_List() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template
 only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.ListLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#ListLicensesRequest.
 }
 it := c.List(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp
```

```
 // If you need to access the underlying RPC response,
 // you can do so by casting the `Response` as below.
 // Otherwise, remove this line. Only populated after
 // first call to Next(). Not safe for concurrent access.
 _ = it.Response.(*computepb.LicensesListResponse)
 }
}

func
 ExampleLicensesClient_SetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.SetIamPolicyLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#SetIamPolicyLicenseRequest.
 }
 resp, err := c.SetIamPolicy(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_TestIamPermissions() {
 ctx := context.Background()
 // This snippet has been automatically
 generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()
```

```
 req := &computepb.TestIamPermissionsLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseRequest.
 }
 resp, err := c.TestIamPermissions(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_Update() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may
 require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.UpdateLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#UpdateLicenseRequest.
 }
 op, err := c.Update(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}
```

# 1.1925 append-field 1.0.0

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# 1.1926 gonvenience-neat 1.3.16

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# 1.1927 on-finished 2.4.1

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# 1.1929 agent-base 7.1.4

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# 1.1930 dd-trace-go 2.1.0

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# 1.1937 protobuf 1.5.4

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# 1.1938 go-secure-stdlib-parseutil 0.2.0

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# 1.1947 tar-stream 2.2.0

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Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent

of the use of the Library in a tool for
writing it). Whether that is true depends on what the Library does
and what the program that uses the Library does.

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itself be a software library.

b) You must cause the files modified to carry prominent notices
stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no
charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a
table of data to be supplied by an application program that uses
the facility, other than as an argument passed when the facility
is invoked, then you must make a good faith effort to ensure that,
in the event an application does not supply such function or
table, the facility still operates, and performs whatever part of
its purpose remains meaningful.

(For example, a function in a library to compute square roots has
a purpose that is entirely well-defined independent of the
application. Therefore, Subsection 2d requires that any
application-supplied function or table used by this
function must
be optional: if the application does not supply it, the square
root function must still compute square roots.)

These requirements apply to the modified work as a whole. If
identifiable sections of that work are not derived from the Library,

and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition,
mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

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Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the
Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not

compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference

directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

c) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

d) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise

permitted, and provided that you do these two things:

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END OF TERMS AND CONDITIONS

Appendix: How to Apply These Terms to Your New Libraries

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To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

<one line to give the library's name and a brief idea of what it does.>
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library `Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

That's all there is to it!

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Version 3, 29 June 2007

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Some devices are designed to deny users access to install or run modified versions of the software inside them, although the manufacturer can do so. This is fundamentally incompatible with the aim of protecting users' freedom to change the software. The systematic pattern of such abuse occurs in the area of products for individuals to use, which is precisely where it is most unacceptable. Therefore, we have designed this version of the GPL to prohibit the practice for those products. If such problems arise substantially in other domains, we stand ready to extend this provision to those domains in future versions of the GPL, as needed to protect the freedom of users.

Finally, every program is threatened constantly by software patents. States should not allow patents to restrict development and use of

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The precise terms and conditions for copying, distribution and modification follow.

TERMS AND CONDITIONS

0. Definitions.

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A "covered work" means either the unmodified Program or a work based on the Program.

To "propagate" a work means to do anything with it that, without permission, would make you directly or secondarily liable for infringement under applicable copyright law, except executing it on a computer or modifying a private copy. Propagation includes copying, distribution (with or without modification), making available to the public, and in some countries other activities as well.

To "convey" a work means any kind of propagation that enables other parties to make or receive copies. Mere interaction with a user through a computer network, with no transfer of a copy, is not conveying.

An interactive user interface displays "Appropriate Legal Notices" to the extent that it includes a convenient and prominently visible feature that (1) displays an appropriate copyright notice, and (2) tells the user that there is no warranty for the work (except to the extent that warranties are provided), that licensees may convey the work under this License, and how to view a copy of this License. If

the interface presents a list of user commands or options, such as a menu, a prominent item in the list meets this criterion.

1. Source Code.

The "source code" for a work means the preferred form of the work for making modifications to it. "Object code" means any non-source form of a work.

A "Standard Interface" means an interface that either is an official standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.

The "System Libraries" of an executable work include anything, other than the work as a whole, that (a) is included in the normal form of packaging a Major Component, but which is not part of that Major Component, and (b) serves only to enable use of the work with that Major Component, or to implement a Standard Interface for which an implementation is available to the public in source code form. A "Major Component", in this context, means a major essential component (kernel, window system, and so on) of the specific operating system (if any) on which the executable work runs, or a compiler used to produce the work, or an object code interpreter used to run it.

The "Corresponding Source" for a work in object code form means all the source code needed to generate, install, and (for an executable work) run the object code and to modify the work, including scripts to control those activities. However, it does not include the work's System Libraries, or general-purpose tools or generally available free programs which are used unmodified in performing those activities but which are not part of the work. For example, Corresponding Source includes interface definition files associated with source files for the work, and the source code for shared libraries and dynamically linked subprograms that the work is specifically designed to require, such as by intimate data communication or control flow between those subprograms and other parts of the work.

The Corresponding Source need not include anything that users can regenerate automatically from other parts of the Corresponding Source.

The Corresponding Source for a work in source code form is that same work.

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5. Conveying Modified Source Versions.

You may convey a work based on the Program, or the modifications to
produce it from the Program, in the form of source code under the
terms of section 4, provided that you also meet all of these conditions:

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it, and giving a relevant date.

b) The work must carry prominent notices stating that it is
released under this License and any conditions added under section
7. This requirement modifies the requirement in section
4 to
"keep intact all notices".

c) You must license the entire work, as a whole, under this
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additional terms, to the whole of the work, and all its parts,
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A compilation of a covered work with other separate and independent
works, which are not by their nature extensions of the covered work,
and which are not combined with it such as to form a larger program,
in or on a volume of a storage or distribution
medium, is called an
"aggregate" if the compilation and its resulting copyright are not
used to limit the access or legal rights of the compilation's users
beyond what the individual works permit. Inclusion of a covered work
in an aggregate does not cause this License to apply to the other
parts of the aggregate.

6. Conveying Non-Source Forms.

You may convey a covered work in object code form under the terms of sections 4 and 5, provided that you also convey the machine-readable Corresponding Source under the terms of this License, in one of these ways:

a) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by the Corresponding Source fixed on a durable physical medium customarily used for software interchange.

b) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years and valid for as long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a copy of the Corresponding Source for all the software in the product that is covered by this License, on a durable physical medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the Corresponding Source from a network server at no charge.

c) Convey individual copies of the object code with a copy of the written offer to provide the Corresponding Source. This alternative is allowed only occasionally and noncommercially, and only if you received the object code with such an offer, in accord with subsection 6b.

d) Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements.

e) Convey the object code using peer-to-peer transmission, provided you inform other peers where the object code and Corresponding Source of the work are being offered to the general public at no

charge under subsection 6d.

A separable portion of the object code, whose source code is excluded from the Corresponding Source as a System Library, need not be included in conveying the object code work.

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The requirement to provide Installation Information does not include a requirement to continue to provide support service, warranty, or updates for a work that has been modified or installed by the recipient, or for the User Product in which it has been modified or installed. Access to a network may be denied when the modification itself materially and adversely affects the operation of the network or violates the rules and protocols for communication across the network.

Corresponding Source conveyed, and Installation Information provided, in accord with this section must be in a format that is publicly documented (and with an implementation available to the public in source code form), and must require no special password or key for unpacking, reading or copying.

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# 1.1952 hosted-git-info 2.8.9

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---
name: Handle External Contributor PRs

on:
# run in the context of the base branch, so that it still works in PR from forks
pull_request_target:
types: [opened, reopened]

permissions: {}

jobs:

```
external-contributor-prs:
  name: Handle Fork PRs
  runs-on: ubuntu-latest
  permissions:
    pull-requests: write
  if: github.event.pull_request.head.repo.full_name != github.repository
  steps:
    - name: Checkout repository
      uses: actions/checkout@11bd71901bbe5b1630ceea73d27597364c9af683 # v4.2.2
      with:
        ref: main
        fetch-depth: 0
        persist-credentials: false
    - name: Install dda
      uses: ./.github/actions/install-dda
      with:
        features: legacy-tasks
    - name: Set label on external contributor PRs
      run: |
        dda inv -- -e github.handle-community-pr --repo="$GH_REPO" --pr-id="$NUMBER" --labels="$LABELS"
      env:
        GH_TOKEN: ${{ secrets.GITHUB_TOKEN }}
        GITHUB_TOKEN:
${{ secrets.GITHUB_TOKEN }}
        SLACK_DATADOG_AGENT_BOT_TOKEN: ${{ secrets.SLACK_DATADOG_AGENT_BOT_TOKEN }}
        GH_REPO: ${{ github.repository }}
        NUMBER: ${{ github.event.number }}
        # labels is a comma-separated list of tags
        LABELS: community
```

Component,Origin,License
devenv,github.com/StefanScherer/packer-windows,MIT
devenv,github.com/luciusbono/Packer-Windows10,MIT

# 1.1954 otel-metric 1.34.0

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# 1.1955 tar 2:1.34-7.el9

## 1.1955.1 Available under license :

```
/*  Extract the last component (base name) of a file name.

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#ifndef _BASENAME_LGPL_H
#define _BASENAME_LGPL_H

#include <stddef.h>

#ifndef DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif


/*
 Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
```

```
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
          FILENAME      RESULT
          "foo.c"       "foo.c"
          "foo/bar.c"   "bar.c"
          "/foo/bar.c"  "bar.c"
          "foo/bar/"    "bar/"
          "foo/bar//"   "bar//"
          "/"           ""
          "//"          ""
          ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
   * Various platforms have different functions in their libc.
     In particular, the glibc basename(), defined in <string.h>, does
     not consider trailing slashes to be part of the component:
          FILENAME
     RESULT
          "foo/bar/"    ""
          "foo/bar//"   ""
   * The 'basename' command eliminates trailing slashes and for a root
     produces a non-empty result:
          FILENAME      RESULT
          "foo/bar/"    "bar"
          "foo/bar//"   "bar"
          "/"           "/"
          "//"          "/"
*/
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;


#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
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                  Version 3, 29 June 2007

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```

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# 1.1957 pcre 8.44-4.el9

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# 1.1979 glib-networking 2.68.3-3.el9

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Most GNU software, including some libraries, is covered by the ordinary GNU General Public License, which was designed for utility programs. This license, the GNU Library General Public License, applies to certain designated libraries. This license is quite different from the ordinary one; be sure to read it in full, and don't assume that anything in it is the same as in the ordinary license.

The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

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0. This License Agreement applies to any software library which contains a notice placed by the copyright holder or other authorized

party saying it may be distributed under the terms of this Library General Public License (also called "this License"). Each licensee is addressed as "you".

A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

a) The modified work must
itself be a software library.

b) You must cause the files modified to carry prominent notices
stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no
charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a
table of data to be supplied by an application program that uses
the facility, other than as an argument passed when the facility
is invoked, then you must make a good faith effort to ensure that,
in the event an application does not supply such function or
table, the facility still operates, and performs whatever part of
its purpose remains meaningful.

(For example, a function in a library to compute square roots has
a purpose that is entirely well-defined independent of the
application. Therefore, Subsection 2d requires that any
application-supplied function or table used by this
function must
be optional: if the application does not supply it, the square
root function must still compute square roots.)

These requirements apply to the modified work as a whole. If
identifiable sections of that work are not derived from the Library,
and can be reasonably considered independent and separate works in
themselves, then this License, and its terms, do not apply to those
sections when you distribute them as separate works. But when you
distribute the same sections as part of a whole which is a work based
on the Library, the distribution of the whole must be on the terms of
this License, whose permissions for other licensees extend to the
entire whole, and thus to each and every part regardless of who wrote
it.

Thus, it is not the intent of this section to claim rights or contest
your rights to work written entirely by you; rather, the intent is to
exercise the right to control the distribution of derivative or
collective works based on the Library.

In addition,
mere aggregation of another work not based on the Library
with the Library (or with a work based on the Library) on a volume of
a storage or distribution medium does not bring the other work under
the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the
Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative
work of the Library, and
therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The

threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

c) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

d) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

a) Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above.

b) Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

8. You may not copy, modify, sublicense, link with, or distribute the Library except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense, link with, or distribute the Library is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

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If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply, and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

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FAILURE OF THE LIBRARY TO OPERATE WITH ANY OTHER SOFTWARE), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

END OF TERMS AND CONDITIONS

Appendix: How to Apply These Terms to Your New Libraries

If you develop a new library, and you want it to be of the greatest possible use to the public, we recommend making it free software that everyone can redistribute and change. You can do so by permitting redistribution under these terms (or, alternatively, under the terms of the ordinary General Public License).

To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

<one line to give the library's name and a brief idea of what it does.>
Copyright (C) <year>
<name of author>

This library is free software; you can redistribute it and/or modify it under the terms of the GNU Library General Public License as published by the Free Software Foundation; either version 2 of the License, or (at your option) any later version.

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You should have received a copy of the GNU Library General Public License along with this library; if not, write to the Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301, USA

Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your

school, if any, to sign a "copyright disclaimer" for the library, if necessary.
Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the library `Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

That's all there is to it!

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Version 3, 29 June 2007

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When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for them if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs, and that you know you can do these things.

To protect your rights, we need to prevent others from denying you these rights or asking you to surrender the rights. Therefore, you have certain responsibilities if you distribute copies of the software, or if you modify it: responsibilities to respect the freedom of others.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must pass on to the recipients the same freedoms that you received. You must make sure that they, too, receive

or can get the source code. And you must show them these terms so they know their rights.

Developers that use the GNU GPL protect your rights with two steps: (1) assert copyright on the software, and (2) offer you this License giving you legal permission to copy, distribute and/or modify it.

For the developers' and authors' protection, the GPL clearly explains that there is no warranty for this free software. For both users' and authors' sake, the GPL requires that modified versions be marked as changed, so that their problems will not be attributed erroneously to authors of previous versions.

Some devices are designed to deny users access to install or run modified versions of the software inside them, although the manufacturer can do so. This is fundamentally incompatible with the aim of protecting users' freedom to change the software. The systematic pattern of such abuse occurs in the area of products for individuals to use, which is precisely where it is most unacceptable. Therefore, we have designed this version of the GPL to prohibit the practice for those products. If such problems arise substantially in other domains, we stand ready to extend this provision to those domains in future versions of the GPL, as needed to protect the freedom of users.

Finally, every program is threatened constantly by software patents. States should not allow patents to restrict development and use of software on general-purpose computers, but in those that do, we wish to avoid the special danger that patents applied to a free program could make it effectively proprietary. To prevent this, the GPL assures that patents cannot be used to render the program non-free.

The precise terms and conditions for copying, distribution and modification follow.

TERMS AND CONDITIONS

0. Definitions.

"This License" refers to version 3 of the GNU General Public License.

"Copyright" also means copyright-like laws that apply to other kinds of works, such as semiconductor masks.

"The Program" refers to any copyrightable work licensed under this License. Each licensee is addressed as "you". "Licensees"

and
"recipients" may be individuals or organizations.

To "modify" a work means to copy from or adapt all or part of the work in a fashion requiring copyright permission, other than the making of an exact copy. The resulting work is called a "modified version" of the earlier work or a work "based on" the earlier work.

A "covered work" means either the unmodified Program or a work based on the Program.

To "propagate" a work means to do anything with it that, without permission, would make you directly or secondarily liable for infringement under applicable copyright law, except executing it on a computer or modifying a private copy. Propagation includes copying, distribution (with or without modification), making available to the public, and in some countries other activities as well.

To "convey" a work means any kind of propagation that enables other parties to make or receive copies. Mere interaction with a user through a computer network, with no transfer of a copy, is
not conveying.

An interactive user interface displays "Appropriate Legal Notices" to the extent that it includes a convenient and prominently visible feature that (1) displays an appropriate copyright notice, and (2) tells the user that there is no warranty for the work (except to the extent that warranties are provided), that licensees may convey the work under this License, and how to view a copy of this License. If the interface presents a list of user commands or options, such as a menu, a prominent item in the list meets this criterion.

1. Source Code.

The "source code" for a work means the preferred form of the work for making modifications to it. "Object code" means any non-source form of a work.

A "Standard Interface" means an interface that either is an official standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.

The
"System Libraries" of an executable work include anything, other than the work as a whole, that (a) is included in the normal form of packaging a Major Component, but which is not part of that Major Component, and (b) serves only to enable use of the work with that

Major Component, or to implement a Standard Interface for which an implementation is available to the public in source code form. A "Major Component", in this context, means a major essential component (kernel, window system, and so on) of the specific operating system (if any) on which the executable work runs, or a compiler used to produce the work, or an object code interpreter used to run it.

The "Corresponding Source" for a work in object code form means all the source code needed to generate, install, and (for an executable work) run the object code and to modify the work, including scripts to control those activities. However, it does not include the work's System Libraries, or general-purpose tools or generally available free programs which are used unmodified in performing those activities but which are not part of the work. For example, Corresponding Source includes interface definition files associated with source files for the work, and the source code for shared libraries and dynamically linked subprograms that the work is specifically designed to require, such as by intimate data communication or control flow between those subprograms and other parts of the work.

The Corresponding Source need not include anything that users can regenerate automatically from other parts of the Corresponding Source.

The Corresponding Source for a work in source code form is that same work.

2. Basic Permissions.

All rights granted under this License are granted for the term of copyright on the Program, and are irrevocable provided the stated conditions are met. This License explicitly affirms your unlimited permission to run the unmodified Program. The output from running a covered work is covered by this License only if the output, given its content, constitutes a covered work. This License acknowledges your rights of fair use or other equivalent, as provided by copyright law.

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your copyrighted material outside their relationship with you.

Conveying under any other circumstances is permitted solely under the conditions stated below. Sublicensing is not allowed; section 10 makes it unnecessary.

3. Protecting Users' Legal Rights From Anti-Circumvention Law.

No covered work shall be deemed part of an effective technological measure under any applicable law fulfilling obligations under article 11 of the WIPO copyright treaty adopted on 20 December 1996, or similar laws prohibiting or restricting circumvention of such measures.

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4. Conveying Verbatim Copies.

You may convey verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice; keep intact all notices stating that this License and any non-permissive terms added in accord with section 7 apply to the code; keep intact all notices of the absence of any warranty; and give all recipients a copy of this License along with the Program.

You may charge any price or no price for each copy that you convey, and you may offer support or warranty protection for a fee.

5. Conveying Modified Source Versions.

You may convey a work based on the Program, or the modifications to produce it from the Program, in the form of source code under the terms of section 4, provided that you also meet all of these conditions:

a) The work must carry prominent notices stating that you modified it, and giving a relevant date.

b) The work must carry prominent notices stating that it is released under this License and any conditions added under section

7. This requirement modifies the requirement in section
4 to
"keep intact all notices".

c) You must license the entire work, as a whole, under this
License to anyone who comes into possession of a copy. This
License will therefore apply, along with any applicable section 7
additional terms, to the whole of the work, and all its parts,
regardless of how they are packaged. This License gives no
permission to license the work in any other way, but it does not
invalidate such permission if you have separately received it.

d) If the work has interactive user interfaces, each must display
Appropriate Legal Notices; however, if the Program has interactive
interfaces that do not display Appropriate Legal Notices, your
work need not make them do so.

A compilation of a covered work with other separate and independent
works, which are not by their nature extensions of the covered work,
and which are not combined with it such as to form a larger program,
in or on a volume of a storage or distribution
medium, is called an
"aggregate" if the compilation and its resulting copyright are not
used to limit the access or legal rights of the compilation's users
beyond what the individual works permit. Inclusion of a covered work
in an aggregate does not cause this License to apply to the other
parts of the aggregate.

6. Conveying Non-Source Forms.

You may convey a covered work in object code form under the terms
of sections 4 and 5, provided that you also convey the
machine-readable Corresponding Source under the terms of this License,
in one of these ways:

a) Convey the object code in, or embodied in, a physical product
(including a physical distribution medium), accompanied by the
Corresponding Source fixed on a durable physical medium
customarily used for software interchange.

b) Convey the object code in, or embodied in, a physical product
(including a physical distribution medium), accompanied by a
written offer, valid for at least three years
and valid for as
long as you offer spare parts or customer support for that product
model, to give anyone who possesses the object code either (1) a
copy of the Corresponding Source for all the software in the
product that is covered by this License, on a durable physical

medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the Corresponding Source from a network server at no charge.

c) Convey individual copies of the object code with a copy of the written offer to provide the Corresponding Source. This alternative is allowed only occasionally and noncommercially, and only if you received the object code with such an offer, in accord with subsection 6b.

d) Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements.

e) Convey the object code using peer-to-peer transmission, provided you inform other peers where the object code and Corresponding Source of the work are being offered to the general public at no charge under subsection 6d.

A separable portion of the object code, whose source code is excluded from the Corresponding Source as a System Library, need not be included in conveying the object code work.

A "User Product" is either (1) a "consumer product", which means any tangible personal property which is normally used for personal, family, or household purposes, or (2) anything designed or sold for incorporation into a dwelling. In determining whether a product is a consumer product, doubtful cases shall be resolved in favor of coverage. For a particular product received by a particular user, "normally used" refers to a typical or common use of that class of product, regardless of the status of the particular user or of the way in which the particular user actually uses, or expects or is expected to use, the product. A product is a consumer product regardless of whether the product has substantial commercial, industrial or non-consumer uses, unless such uses represent the only significant mode of use of the product.

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# 1.1987 path-parse 1.0.7

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the same source package, or built from a separate same source package.
Packaging is done by the Debian GCC Maintainers
<debian-gcc@lists.debian.org>, with sources obtained from:

```
ftp://gcc.gnu.org/pub/gcc/releases/  (for full releases)
svn://gcc.gnu.org/svn/gcc/           (for prereleases)
ftp://sourceware.org/pub/newlib/     (for newlib)
git://git.savannah.gnu.org/gm2.git   (for Modula-2)
```

The current gcc-14 source package is taken from the git gcc-14-branch.

Changes: See changelog.Debian.gz

Debian splits the GNU Compiler Collection into packages for each language,
library, and documentation as follows:

```
Language       Compiler package  Library package    Documentation
-----------------------------------------------------------------------------
Ada
               gnat-14           libgnat-14          gnat-14-doc
C              gcc-14                                gcc-14-doc
C++            g++-14            libstdc++6          libstdc++6-14-doc
D              gdc-14
Fortran 95     gfortran-14       libgfortran5        gfortran-14-doc
Go             gccgo-14          libgo0
Objective C    gobjc-14          libobjc4
Objective C++  gobjc++-14
Modula-2       gm2-14            libgm2
Rust           gccrs-14
```

For some language run-time libraries, Debian provides source files, development files, debugging symbols and libraries containing position-independent code in separate packages:

| Language | Sources | Development | Debugging | Position-Independent |
|---|---|---|---|---|
| C++ | | libstdc++6-14-dbg | libstdc++6-14-pic | |
| D | libphobos-14-dev | | | |

Additional packages include:

All languages:
libgcc1, libgcc2, libgcc4
GCC intrinsics (platform-dependent)
gcc-14-base Base files common to all compilers
gcc-14-soft-float Software floating point (ARM only)
gcc-14-source The sources with patches

Ada:
libgnat-util14-dev, libgnat-util14 GNAT version library

C:
cpp-14, cpp-14-doc GNU C Preprocessor
libssp0-dev, libssp0 GCC stack smashing protection library
libquadmath0 Math routines for the __float128 type
fixincludes Fix non-ANSI header files

C, C++ and Fortran 95:
libgomp1-dev, libgomp1 GCC OpenMP (GOMP) support library
libitm1-dev, libitm1 GNU Transactional Memory Library

Biarch support: On some 64-bit platforms which can also run 32-bit code, Debian provides additional packages containing 32-bit versions of some libraries. These packages have names beginning with 'lib32' instead of 'lib', for example lib32stdc++6. Similarly, on some 32-bit platforms which can also run 64-bit code,
Debian provides additional packages with names beginning with 'lib64' instead of 'lib'. These packages contain 64-bit versions of the libraries. (At this time, not all platforms and not all libraries support biarch.) The license terms for these lib32 or lib64 packages are identical to the ones for the lib packages.

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- libatomic
- libdecnumber
- libgm2
- libgomp
- libgrust
- libitm
- libssp
- libstdc++-v3
- libobjc
- libgfortran
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- Various config files in gcc/config/ used in runtime libraries.
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D:

| | |
|---|---|
| gdc-14 | GNU D Compiler |
| libphobos-14-dev | D standard runtime library |

The D source package is made up of the following components.

The D front-end for GCC:
- d/*

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The DMD Compiler implementation of the D programming language:
- d/dmd/*

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The Zlib data compression library:
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The Phobos standard runtime library:

- libphobos/*

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# Copy of __expand_tilde_by_ref from bash-completion
__python_argcomplete_expand_tilde_by_ref () {
  if [ "${!1:0:1}" = "~" ]; then
    if [ "${!1}" != "${!1//\/}" ]; then
      eval $1="${!1/%\/*}"'/'${!1#*/}';
    else
      eval $1="${!1}";
    fi;
  fi
}

# Run something, muting output or redirecting it to the debug stream
# depending on the value of _ARC_DEBUG.
# If ARGCOMPLETE_USE_TEMPFILES is set, use tempfiles for IPC.
__python_argcomplete_run() {
  if [[ -z "$ARGCOMPLETE_USE_TEMPFILES" ]]; then
    __python_argcomplete_run_inner "$@"
    return
  fi
  local tmpfile="$(mktemp)"
  _ARGCOMPLETE_STDOUT_FILENAME="$tmpfile" __python_argcomplete_run_inner "$@"
  local code=$?
  cat "$tmpfile"
  rm "$tmpfile"
   return $code
}

__python_argcomplete_run_inner() {
  if [[ -z "$_ARC_DEBUG" ]]; then
    "$@" 8>&1 9>&2 1>/dev/null 2>&1
  else
    "$@" 8>&1 9>&2 1>&9 2>&1
  fi
```

```
}

# Scan the beginning of an executable file ($1) for a regexp ($2). By default,
# scan for the magic string indicating that the executable supports the
# argcomplete completion protocol. By default, scan the first kilobyte;
# if $3 is set to -n, scan until the first line break up to a kilobyte.
__python_argcomplete_scan_head() {
  read -s -r ${3:--N} 1024 < "$1"
  [[ "$REPLY" =~ ${2:-PYTHON_ARGCOMPLETE_OK} ]]
}

__python_argcomplete_scan_head_noerr() {
  __python_argcomplete_scan_head "$@" 2>/dev/null
}

_python_argcomplete_global() {
  local executable=$1
  __python_argcomplete_expand_tilde_by_ref executable

  local ARGCOMPLETE=0
  if [[ "$executable" == python* ]] || [[ "$executable" == pypy* ]]; then
    if [[ "${COMP_WORDS[1]}" == -m ]]; then
      if __python_argcomplete_run
 "$executable" -m argcomplete._check_module "${COMP_WORDS[2]}"; then
        ARGCOMPLETE=3
      else
        return
      fi
    elif [[ -f "${COMP_WORDS[1]}" ]] && __python_argcomplete_scan_head_noerr "${COMP_WORDS[1]}";
then
      local ARGCOMPLETE=2
    else
      return
    fi
  elif type -P "$executable" >/dev/null 2>&1; then
    local SCRIPT_NAME=$(type -P "$executable")
    if (type -t pyenv && [[ "$SCRIPT_NAME" = $(pyenv root)/shims/* ]]) >/dev/null 2>&1; then
      local SCRIPT_NAME=$(pyenv which "$executable")
    fi
    if __python_argcomplete_scan_head_noerr "$SCRIPT_NAME"; then
      local ARGCOMPLETE=1
    elif __python_argcomplete_scan_head_noerr "$SCRIPT_NAME" '^#!(.*)$' -n && [[
"${BASH_REMATCH[1]}" =~ ^.*(python|pypy)[0-9\.]*$ ]]; then
      local interpreter="$BASH_REMATCH"
      if (__python_argcomplete_scan_head_noerr "$SCRIPT_NAME" "(PBR Generated)|(EASY-INSTALL-
(SCRIPT|ENTRY-SCRIPT|DEV-SCRIPT))"
 \
        && "$interpreter" "$(type -P python-argcomplete-check-easy-install-script)" "$SCRIPT_NAME")
```

```
>/dev/null 2>&1; then
            local ARGCOMPLETE=1
        elif __python_argcomplete_run "$interpreter" -m argcomplete._check_console_script "$SCRIPT_NAME";
then
            local ARGCOMPLETE=1
        fi
    fi
  fi

  if [[ $ARGCOMPLETE != 0 ]]; then
    local IFS=$(echo -e '\v')
    COMPREPLY=( $(_ARGCOMPLETE_IFS="$IFS" \
        COMP_LINE="$COMP_LINE" \
        COMP_POINT="$COMP_POINT" \
        COMP_TYPE="$COMP_TYPE" \
        _ARGCOMPLETE_COMP_WORDBREAKS="$COMP_WORDBREAKS" \
        _ARGCOMPLETE=$ARGCOMPLETE \
        _ARGCOMPLETE_SUPPRESS_SPACE=1 \
        __python_argcomplete_run "$executable" "${COMP_WORDS[@]:1:ARGCOMPLETE-1}") )
    if [[ $? != 0 ]]; then
        unset COMPREPLY
    elif [[ "$COMPREPLY" =~ [=/:]$ ]]; then
        compopt -o nospace
    fi
  else
    type -t _completion_loader | grep -q 'function' && _completion_loader "$@"
  fi
}
complete -o default -o bashdefault -D -F _python_argcomplete_global
```

Found in path(s):
* /argcomplete-1-12-0-tar-gz/argcomplete-1.12.0/argcomplete/bash_completion.d/python-argcomplete
No license file was found, but licenses were detected in source scan.

Metadata-Version: 2.1
Name: argcomplete
Version: 1.12.0
Summary: Bash tab completion for argparse
Home-page: https://github.com/kislyuk/argcomplete
Author: Andrey Kislyuk
Author-email: kislyuk@gmail.com
License: Apache Software License
Project-URL: Documentation, https://kislyuk.github.io/argcomplete
Project-URL: Source Code, https://github.com/kislyuk/argcomplete
Project-URL: Issue Tracker, https://github.com/kislyuk/argcomplete/issues
Description: argcomplete - Bash tab completion for argparse
    ==========
    *Tab complete all the things!*

Argcomplete provides easy, extensible command line tab completion of arguments for your Python script.

It makes two assumptions:

* You're using bash as your shell (limited support for zsh, fish, and tcsh is available)
* You're using `argparse <http://docs.python.org/3/library/argparse.html>`_
to manage your command line arguments/options

Argcomplete is particularly useful if your program has lots of options or subparsers, and if your program can dynamically suggest completions for your argument/option values (for example, if the user is browsing resources over
the network).

Installation
---
::

```
pip install argcomplete
activate-global-python-argcomplete
```

See `Activating global completion`_ below for details about the second step (or if it reports an error).

Refresh your bash environment (start a new shell or ``source /etc/profile``).

Synopsis
---
Python code (e.g. ``my-awesome-script``):

.. code-block:: python

```
#!/usr/bin/env python
# PYTHON_ARGCOMPLETE_OK
import argcomplete, argparse
parser = argparse.ArgumentParser()
 ...
argcomplete.autocomplete(parser)
args = parser.parse_args()
...
```

Shellcode (only necessary if global completion is not activated - see `Global completion`_ below), to be put in e.g. ``.bashrc``::

```
eval "$(register-python-argcomplete my-awesome-script)"
```

argcomplete.autocomplete(*parser*)
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
This method is the entry point to the module. It must be called **after** ArgumentParser construction is
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

complete, but
**before** the ``ArgumentParser.parse_args()`` method is called. The method looks for an environment variable that the
completion hook shellcode sets, and if it's there, collects completions, prints them to the output stream (fd 8 by default), and exits. Otherwise, it returns to the caller immediately.

.. admonition:: Side effects

Argcomplete gets completions by running
your program. It intercepts the execution flow at the moment
``argcomplete.autocomplete()`` is called. After sending completions, it exits using ``exit_method`` (``os._exit`` by default). This means if your program has any side effects that happen before ``argcomplete`` is called, those side effects will happen every time the user presses ``<TAB>`` (although anything your program prints to stdout or
stderr will be suppressed). For this reason it's best to construct the argument parser and call
``argcomplete.autocomplete()`` as early as possible in your execution flow.

.. admonition:: Performance

If the program takes a long time to get to the point where ``argcomplete.autocomplete()`` is called, the tab completion
process will feel sluggish, and the user may lose confidence in it. So it's also important to minimize the startup time
of the program up to that point (for example, by deferring
initialization or importing of large modules until after
parsing options).

Specifying completers
---
You can specify custom completion functions for your options and arguments. Two styles are supported: callable and
readline-style. Callable completers are simpler. They are called with the following keyword arguments:

* ``prefix``: The prefix text of the last word before the cursor on the command line.
For dynamic completers, this can be used to reduce the work required to generate possible completions.
* ``action``: The ``argparse.Action`` instance that this completer was called for.
* ``parser``: The ``argparse.ArgumentParser`` instance that the action was taken by.
* ``parsed_args``: The result of argument parsing so far (the ``argparse.Namespace`` args object normally returned by
``ArgumentParser.parse_args()``).

Completers should return
their completions as a list of strings. An example completer for names of environment
variables might look like this:

.. code-block:: python

def EnvironCompleter(**kwargs):

```
        return os.environ
```

To specify a completer for an argument or option, set the ``completer`` attribute of its associated action. An easy way to do this at definition time is:

.. code-block:: python

```
    from argcomplete.completers import EnvironCompleter

    parser = argparse.ArgumentParser()
    parser.add_argument("--env-var1").completer = EnvironCompleter
    parser.add_argument("--env-var2").completer = EnvironCompleter
    argcomplete.autocomplete(parser)
```

If you specify the ``choices`` keyword for an argparse option or argument (and don't specify a completer), it will be
used for completions.

A completer that is
initialized with a set of all possible choices of values for its action might look like this:

.. code-block:: python

```
    class ChoicesCompleter(object):
        def __init__(self, choices):
            self.choices = choices

        def __call__(self, **kwargs):
            return self.choices
```

The following two ways to specify a static set of choices are equivalent for completion purposes:

.. code-block:: python

```
    from argcomplete.completers import ChoicesCompleter

    parser.add_argument("--protocol", choices=('http', 'https', 'ssh', 'rsync', 'wss'))
    parser.add_argument("--proto").completer=ChoicesCompleter(('http', 'https', 'ssh', 'rsync', 'wss'))
```

Note that if you use the ``choices=<completions>`` option, argparse will show
all these choices in the ``--help`` output by default. To prevent this, set

``metavar`` (like ``parser.add_argument("--protocol", metavar="PROTOCOL",
choices=('http', 'https', 'ssh', 'rsync', 'wss'))``).

The following `script
<https://raw.github.com/kislyuk/argcomplete/master/docs/examples/describe_github_user.py>`_ uses
``parsed_args`` and `Requests <http://python-requests.org/>`_ to query GitHub for publicly known members of

an
organization and complete their names, then prints the member description:

.. code-block:: python

```
#!/usr/bin/env python
# PYTHON_ARGCOMPLETE_OK
import argcomplete, argparse, requests, pprint

def github_org_members(prefix, parsed_args, **kwargs):
    resource = "https://api.github.com/orgs/{org}/members".format(org=parsed_args.organization)
    return (member['login'] for member in requests.get(resource).json() if member['login'].startswith(prefix))

parser = argparse.ArgumentParser()
 parser.add_argument("--organization", help="GitHub organization")
parser.add_argument("--member", help="GitHub member").completer = github_org_members

argcomplete.autocomplete(parser)
args = parser.parse_args()

pprint.pprint(requests.get("https://api.github.com/users/{m}".format(m=args.member)).json())
```

`Try it <https://raw.github.com/kislyuk/argcomplete/master/docs/examples/describe_github_user.py>`_ like this::

```
./describe_github_user.py --organization heroku --member <TAB>
```

If you have a useful completer to add to the `completer library <https://github.com/kislyuk/argcomplete/blob/master/argcomplete/completers.py>`_, send a pull request!

Readline-style completers
~~~~~~~~~~~~~~~~~~~~~~~~~
The readline_ module defines a completer protocol in rlcompleter_. Readline-style completers are also supported
by
argcomplete, so you can use the same completer object both in an interactive readline-powered shell and on the bash
command line. For example, you can use the readline-style completer provided by IPython_ to get introspective completions like you would get in the IPython shell:

.. _readline: http://docs.python.org/3/library/readline.html
.. _rlcompleter: http://docs.python.org/3/library/rlcompleter.html#completer-objects
.. _IPython: http://ipython.org/

.. code-block:: python

```
import IPython
parser.add_argument("--python-name").completer = IPython.core.completer.Completer()
```
~~~~~~~~~~~~~~~~~~~~~~~~~

``argcomplete.CompletionFinder.rl_complete`` can also be used to plug in an argparse parser as a readline completer.

Printing warnings in completers
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Normal stdout/stderr output is suspended when argcomplete runs. Sometimes, though, when the user presses ``<TAB>``, it's
appropriate to print information about why completions generation failed. To do this, use ``warn``:

.. code-block:: python

```
from argcomplete import warn

def AwesomeWebServiceCompleter(prefix, **kwargs):
    if login_failed:
        warn("Please log in to Awesome Web Service to use autocompletion")
    return completions
```

Using a custom completion validator
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
By default, argcomplete validates your completions by checking if they start with the prefix given to the completer. You
can override this validation check by supplying the ``validator`` keyword to ``argcomplete.autocomplete()``:

.. code-block:: python

```
def my_validator(current_input, keyword_to_check_against):
    # Pass through ALL options even if they don't all start with 'current_input'
    return True

argcomplete.autocomplete(parser, validator=my_validator)
```

Global completion
-----------------
In global completion mode, you don't have to register each argcomplete-capable executable separately. Instead, bash
will look for the string **PYTHON_ARGCOMPLETE_OK** in the first 1024 bytes of any executable that it's running
completion for, and if it's found, follow the rest of the argcomplete protocol as described above.

Additionally, completion is activated for scripts run as ``python <script>`` and ``python -m <module>``.
This also works for alternate Python versions (e.g. ``python3`` and ``pypy``), as long as that version of Python has
argcomplete installed.

.. admonition:: Bash version compatibility

Global completion requires bash support for ``complete -D``, which was introduced in bash 4.2. On OS X or older Linux
systems, you will need to update bash to use this feature. Check the version of the running copy of bash with
``echo $BASH_VERSION``. On OS X, install bash via `Homebrew <http://brew.sh/>`_ (``brew install bash``), add
``/usr/local/bin/bash`` to ``/etc/shells``, and run ``chsh`` to change your shell.

Global completion is not currently compatible with zsh.

.. note:: If you use setuptools/distribute ``scripts`` or ``entry_points`` directives to package your module,
argcomplete will follow the wrapper scripts to their destination and look for ``PYTHON_ARGCOMPLETE_OK`` in the
destination code.

If you choose not to use global completion, or ship a bash completion module that depends on argcomplete, you must
register your script explicitly using ``eval "$(register-python-argcomplete my-awesome-script)"``. Standard bash
completion registration roules apply: namely, the
script name is passed directly to ``complete``, meaning it is only tab
completed when invoked exactly as it was registered. In the above example, ``my-awesome-script`` must be on the path,
and the user must be attempting to complete it by that name. The above line alone would **not** allow you to complete
``./my-awesome-script``, or ``/path/to/my-awesome-script``.

Activating global completion
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
The script ``activate-global-python-argcomplete`` will try to install the file
``bash_completion.d/python-argcomplete`` (`see on GitHub`_) into an appropriate location on your system
(``/etc/bash_completion.d/`` or ``~/.bash_completion.d/``). If it
fails, but you know the correct location of your bash completion scripts directory, you can specify it with ``--dest``::

```
activate-global-python-argcomplete --dest=/path/to/bash_completion.d
```

Otherwise,
you can redirect its shellcode output into a file::

```
activate-global-python-argcomplete --dest=- > file
```

The file's contents should then be sourced in e.g. ``~/.bashrc``.

.. _`see on GitHub`: https://github.com/kislyuk/argcomplete/blob/master/argcomplete/bash_completion.d/python-argcomplete
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Zsh Support
---
To activate completions for zsh you need to have ``bashcompinit`` enabled in zsh::

```
autoload -U bashcompinit
bashcompinit
```

Afterwards you can enable completion for your scripts with ``register-python-argcomplete``::

```
eval "$(register-python-argcomplete my-awesome-script)"
```

Tcsh Support
---
To activate completions for tcsh use::

```
eval `register-python-argcomplete --shell tcsh my-awesome-script`
```

The ``python-argcomplete-tcsh`` script provides
completions for tcsh.
The following is an example of the tcsh completion syntax for
``my-awesome-script`` emitted by ``register-python-argcomplete``::

```
complete my-awesome-script 'p@*@`python-argcomplete-tcsh my-awesome-script`@'
```

Fish Support
---
To activate completions for fish use::

```
register-python-argcomplete --shell fish my-awesome-script | source
```

or create new completion file, e.g::

```
register-python-argcomplete --shell fish ~/.config/fish/completions/my-awesome-script.fish
```

Completion Description For Fish
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
By default help string is added as completion description.

.. image:: docs/fish_help_string.png

You can disable this feature by removing ``_ARGCOMPLETE_DFS`` variable, e.g::

```
register-python-argcomplete --shell fish my-awesome-script
| grep -v _ARGCOMPLETE_DFS | .
```

Git Bash Support
---
Due to limitations of file descriptor inheritance on Windows,
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Git Bash not supported out of the box. You can opt in to using
temporary files instead of file descriptors for for IPC
by setting the environment variable ``ARGCOMPLETE_USE_TEMPFILES``,
e.g. by adding ``export ARGCOMPLETE_USE_TEMPFILES=1`` to ``~/.bashrc``.

For full support, consider using Bash with the
Windows Subsystem for Linux (WSL).

External argcomplete script
---
To register an argcomplete script for an arbitrary name, the ``--external-argcomplete-script`` argument of the ``register-python-argcomplete`` script can be used::

```
eval "$(register-python-argcomplete --external-argcomplete-script /path/to/script arbitrary-name)"
```

This allows, for example, to use the auto completion
functionality of argcomplete for an application not written in Python.
The command line interface of this program must be additionally implemented in a Python script with argparse and argcomplete and whenever the application is called the registered external argcomplete script is used for auto completion.

This option can also be used in combination with the other supported shells.

Python Support
---
Argcomplete requires Python 2.7 or 3.5+.

Common Problems
---
If global completion is not completing your script, bash may have registered a
default completion function::

```
$ complete | grep my-awesome-script
complete -F _minimal my-awesome-script
```

You can fix this by restarting your shell, or by running
``complete -r my-awesome-script``.

Debugging
---
Set the ``_ARC_DEBUG``
variable in your shell to enable verbose debug output every time argcomplete runs. This will
disrupt the command line composition state of your terminal, but make it possible to see the internal state of the completer if it encounters problems.

Acknowledgments
---
Inspired and informed by the optcomplete_ module by Martin Blais.

.. _optcomplete: http://pypi.python.org/pypi/optcomplete

Links
-----
* `Project home page (GitHub) <https://github.com/kislyuk/argcomplete>`_
* `Documentation <https://kislyuk.github.io/argcomplete/>`_
* `Package distribution (PyPI) <https://pypi.python.org/pypi/argcomplete>`_
* `Change log <https://github.com/kislyuk/argcomplete/blob/master/Changes.rst>`_

Bugs
~~~~
Please report bugs, issues, feature requests, etc. on `GitHub <https://github.com/kislyuk/argcomplete/issues>`_.

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 -------
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.. image:: https://travis-ci.org/kislyuk/argcomplete.png
:target: https://travis-ci.org/kislyuk/argcomplete
.. image:: https://codecov.io/github/kislyuk/argcomplete/coverage.svg?branch=master
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:target: https://pypi.python.org/pypi/argcomplete

Platform: MacOS X
Platform: Posix
Classifier: Environment :: Console
Classifier: Intended Audience :: Developers
Classifier: License :: OSI Approved :: Apache Software License
Classifier: Operating System :: MacOS :: MacOS X
Classifier: Operating System :: POSIX
Classifier:
Programming Language :: Python
Classifier: Programming Language :: Python :: 2
Classifier: Programming Language :: Python :: 2.7
Classifier: Programming Language :: Python :: 3
Classifier: Programming Language :: Python :: 3.5
Classifier: Programming Language :: Python :: 3.6
Classifier: Programming Language :: Python :: 3.7
Classifier: Programming Language :: Python :: 3.8
Classifier: Programming Language :: Python :: Implementation :: CPython
Classifier: Programming Language :: Python :: Implementation :: PyPy
Classifier: Development Status :: 5 - Production/Stable
Classifier: Topic :: Software Development
~~~~

Classifier: Topic :: Software Development :: Libraries :: Python Modules
Classifier: Topic :: System :: Shells
Classifier: Topic :: Terminals
Provides-Extra: test

Found in path(s):
* /argcomplete-1-12-0-tar-gz/argcomplete-1.12.0/PKG-INFO
* /argcomplete-1-12-0-tar-gz/argcomplete-1.12.0/argcomplete.egg-info/PKG-INFO
No license file was found, but licenses were detected in source scan.

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Version 2.0, January 2004
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# 1.2008 pid 2.2.3

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```
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software is freely granted, provided that this notice
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A C-program for MT19937, with initialization improved 2002/1/26.
Coded by Takuji Nishimura and Makoto Matsumoto.

Before using, initialize the state by using init_genrand(seed)
or init_by_array(init_key, key_length).

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This software package is based on the paper
I. Bogaert, "Iteration-Free Computation of Gauss-Legendre Quadrature Nodes and Weights",
to be published in the SIAM Journal of Scientific Computing.

The main features of this software are:
- Speed: due to the simple formulas and the O(1) complexity computation of individual Gauss-Legendre quadrature nodes and weights. This makes it compatible with parallel computing paradigms.
- Accuracy: the error on the nodes and weights is within a few ulps (see the paper for details).

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OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
A C-program for MT19937-64 (2004/9/29 version).
Coded by Takuji Nishimura and Makoto Matsumoto.

This is a 64-bit version of Mersenne Twister pseudorandom number
generator.

Before using, initialize the state by using init_genrand64(seed)
or init_by_array64(init_key, key_length).

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This package contains a modified version of ca-bundle.crt:

ca-bundle.crt -- Bundle of CA Root Certificates

Certificate data from Mozilla as of: Thu Nov  3 19:04:19 2011#
This is a bundle of X.509 certificates of public Certificate Authorities
(CA). These were automatically extracted from Mozilla's root certificates
file (certdata.txt).  This file can be found in the mozilla source tree:
http://mxr.mozilla.org/mozilla/source/security/nss/lib/ckfw/builtins/certdata.txt?raw=1#
It contains the certificates in PEM format and therefore
can be directly used with curl / libcurl / php_curl, or with
an Apache+mod_ssl webserver for SSL client authentication.
Just configure this file as the SSLCACertificateFile.#

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@(#) $RCSfile: certdata.txt,v $
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A. HISTORY OF THE SOFTWARE
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Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations (now Zope
Corporation, see http://www.zope.com). In 2001, the Python Software
Foundation (PSF, see http://www.python.org/psf/) was formed, a
non-profit organization created specifically to own Python-related
Intellectual Property. Zope Corporation is a sponsoring member
of
the PSF.

All Python releases are Open Source (see http://www.opensource.org for
the Open Source Definition). Historically, most, but not all, Python
releases have also been GPL-compatible; the table below summarizes
the various releases.

| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |

| | | | | |
|---|---|---|---|---|
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.2 | 2.1.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | | | | |
| 2.1.2 | 2002 | PSF | yes | |
| 2.2.1 | 2.2 | 2002 | PSF | yes |
| 2.2.2 | 2.2.1 | 2002 | PSF | yes |
| 2.2.3 | 2.2.2 | 2003 | PSF | yes |
| 2.3 | 2.2.2 | 2002-2003 | PSF | yes |
| 2.3.1 | 2.3 | 2002-2003 | PSF | yes |
| 2.3.2 | 2.3.1 | 2002-2003 | PSF | yes |
| 2.3.3 | 2.3.2 | 2002-2003 | PSF | yes |
| 2.3.4 | 2.3.3 | 2004 | PSF | yes |
| 2.3.5 | 2.3.4 | 2005 | PSF | yes |
| 2.4 | 2.3 | 2004 | PSF | yes |
| 2.4.1 | 2.4 | 2005 | PSF | yes |
| 2.4.2 | 2.4.1 | 2005 | PSF | yes |
| 2.4.3 | 2.4.2 | 2006 | PSF | yes |
| 2.4.4 | 2.4.3 | 2006 | PSF | yes |
| 2.5 | 2.4 | 2006 | PSF | yes |
| 2.5.1 | 2.5 | 2007 | PSF | yes |
| 2.5.2 | 2.5.1 | 2008 | PSF | yes |
| 2.5.3 | 2.5.2 | 2008 | PSF | yes |
| 2.6 | 2.5 | 2008 | PSF | yes |
| 2.6.1 | 2.6 | 2008 | PSF | yes |
| 2.6.2 | 2.6.1 | 2009 | PSF | yes |
| 2.6.3 | 2.6.2 | 2009 | PSF | yes |
| 2.6.4 | 2.6.3 | 2009 | PSF | yes |
| 2.6.5 | 2.6.4 | 2010 | PSF | yes |
| 3.0 | 2.6 | 2008 | PSF | yes |
| 3.0.1 | 3.0 | 2009 | PSF | yes |
| 3.1 | 3.0.1 | 2009 | PSF | yes |
| 3.1.1 | 3.1 | 2009 | PSF | yes |
| 3.1.2 | 3.1 | 2010 | PSF | yes |
| 3.2 | 3.1 | 2010 | PSF | yes |

Footnotes:

(1) GPL-compatible doesn't mean that we're distributing Python under the GPL. All Python licenses, unlike the GPL, let you distribute a

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(2) According to Richard Stallman, 1.6.1 is not GPL-compatible,
because its license has a choice of law clause. According to
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Thanks to the many outside volunteers who have worked under Guido's
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# 1.2046 pkcs11 1.1.1

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a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting
the free library to free
software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library
in order to run.
^L

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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

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copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly
into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation
and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it,
in any medium, provided that
you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under
the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and
can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms
of the ordinary GNU General Public
License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.
^L
Once this change is made in a given copy, it is irreversible for

that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the
complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a
"work that uses the
library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may

distribute
the object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.
^L
6. As an exception to the Sections above, you may also combine or
link a "work that uses the Library" with the Library to produce a
work containing portions of the Library, and distribute that work
under terms of your choice, provided that the terms permit
modification of the work for the customer's own use and reverse
engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the
Library is used in it and that the Library and its use are covered by
this License. You must supply a copy of this License. If the work
during execution displays copyright notices, you must include the
copyright notice for the Library among them, as well as a reference
directing the user to the copy of this License. Also, you must do one
of these things:

a) Accompany the work with the complete corresponding
machine-readable source code for the Library including whatever
changes were used in the work (which must be distributed under
Sections 1 and 2 above); and, if the work is an executable linked
with the Library, with the complete machine-readable "work that
uses the Library", as object code and/or source code, so that the
user can modify the Library and then relink to produce a modified
executable containing the modified Library. (It is understood
that the user who changes the contents of definitions files in the
Library will not necessarily be able to recompile the application
to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the
Library. A suitable mechanism is one that (1) uses at run time a
copy of the library already present on the user's computer system,
rather than copying library functions into the executable, and (2)

will operate properly with a modified version of the library, if
the user installs one, as long as the modified version is
interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at
least three years, to give the same user the materials
specified in Subsection 6a, above, for a charge no more
than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy

from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.
^L
7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

a) Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above.

b) Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

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distribution system which is
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END OF TERMS AND CONDITIONS

^L

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To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source
file to most
effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

<one line to give the library's name and a brief idea of what it does.>
Copyright (C) <year> <name of author>

This library is free software; you can redistribute it and/or modify it under the terms of the GNU Lesser General Public License as published by the Free Software Foundation; either version 2 of the License, or (at your option) any later version.

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You should have received a copy of the GNU Lesser General Public License along with this library; if not, write to the Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor,
Boston, MA 02110-1301 USA

Also add information on how to contact you by electronic and paper
mail.

You should also get your employer (if you work as a programmer) or
your
school, if any, to sign a "copyright disclaimer" for the library, if
necessary.  Here is a sample; alter the names:

 Yoyodyne, Inc., hereby disclaims all copyright interest in the
 library `Frob' (a library for tweaking knobs) written by James
Random Hacker.

 <signature of Ty Coon>, 1 April 1990
 Ty Coon, President of Vice

That's all there is to it!
---
EFFECTIVE OCT 2008, LICENSE IS BEING CHANGED TO LGPL-2.1 (though not reflected
in released code until Nov 2009 - slow release cycle...)
---

Discussion thread from mailing list archive, with approval from everyone actively
involved or holding original licensing rights included.

[Cracklib-devel] cracklib license
From: Mike Frysinger <vapier@ge...> - 2007-10-02 01:16

Attachments: Message as HTML
looks like 2.8.11 is out and marked as "GPL-2" ... releasing libraries unde=
r=20
GPL-2 is not desirable at all ... this is why the LGPL-2.1 exists
=2Dmike

Re: [Cracklib-devel] cracklib license
From: Neulinger, Nathan <nneul@um...> - 2007-10-02 01:18
I understand that, and you're welcome to bring it up with Alec directly
and see if he wants to relicense his code as LGPL... but at this point,
it was enough to just get it consistent and documented as to what it was
released under. This wasn't actually a license change, just a
 clarification of the licensing that was already in place.=20

-- Nathan
=20
---
Nathan Neulinger EMail: nneul@um...

University of Missouri - Rolla Phone: (573) 341-6679
UMR Information Technology Fax: (573) 341-4216

> -----Original Message-----
> From: cracklib-devel-bounces@li...
> [mailto:cracklib-devel-bounces@li...] On Behalf Of
> Mike Frysinger
> Sent: Monday, October 01, 2007 8:15 PM
> To: cracklib-devel@li...
> Subject: [Cracklib-devel] cracklib license
>=20
> looks like 2.8.11 is out and marked as "GPL-2" ... releasing
> libraries under
> GPL-2 is not desirable at all ... this is why the LGPL-2.1 exists
> -mike

Re: [Cracklib-devel] cracklib license
From: Mike Frysinger <vapier@ge...> - 2007-10-02 01:33

Attachments: Message as HTML
On Monday 01 October 2007, Neulinger, Nathan
wrote:
> I understand that, and you're welcome to bring it up with Alec directly
> and see if he wants to relicense his code as LGPL... but at this point,
> it was enough to just get it consistent and documented as to what it was
> released under. This wasn't actually a license change, just a
> clarification of the licensing that was already in place.

the original license (before moving to sourceforge -- aka, 2.7) was not=20
GPL-2 ... it was a modified artistic license ... i didnt notice the license=
=20
change until it was mentioned in the latest notes.

unlike the old license, GPL-2 prevents people from using cracklib unless th=
eir=20
applications are also GPL-2 which imo is just wrong. it isnt the place of =
a=20
library to dictact to application writes what license they should be using.=
=20
thus LGPL-2.1 enters to fill this void.
=2Dmike

Re: [Cracklib-devel]
cracklib license
From: Neulinger, Nathan <nneul@um...> - 2007-10-02 01:46
Seems like the ideal thing here would be for you and the other distro

maintainers to get together with Alec in a conversation and come to a
decision as to what licensing scheme y'all want. I haven't really done
much other than cleaning up the packaging and patches and a small bit of
additional code, so whatever licensing y'all come up with is fine by me.

-- Nathan
=20
---
Nathan Neulinger EMail: nneul@um...
University of Missouri - Rolla Phone: (573) 341-6679
UMR Information Technology Fax: (573) 341-4216

> -----Original Message-----
> From: cracklib-devel-bounces@li...
> [mailto:cracklib-devel-bounces@li...] On Behalf Of
> Mike Frysinger
> Sent: Monday, October 01, 2007 8:33 PM
> To: Neulinger, Nathan
> Cc: cracklib-devel@li...; Alec Muffett
> Subject: Re: [Cracklib-devel] cracklib license
>=20
> On Monday 01 October 2007, Neulinger, Nathan wrote:
> > I understand that, and you're welcome to bring it up with Alec
> directly
> > and see if he wants to relicense his code as LGPL... but at this
> point,
> > it was enough to just get it consistent and documented as to what
> it was
> > released under. This wasn't actually a license change, just a
> > clarification of the licensing that was already in place.
>=20
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> not
> GPL-2 ... it was a modified artistic license ... i didnt notice the
> license
> change until it was mentioned in the latest notes.
>=20
> unlike the old license, GPL-2 prevents people from using cracklib
> unless their
> applications are also GPL-2 which imo is just wrong. it isnt the
> place of a
> library
to dictact to application writes what license they should
> be using.
> thus LGPL-2.1 enters to fill this void.
> -mike

Re: [Cracklib-devel] cracklib license
From: Alec Muffett <alecm@cr...> - 2007-10-02 08:57
> Seems like the ideal thing here would be for you and the other distro
> maintainers to get together with Alec in a conversation and come to a
> decision as to what licensing scheme y'all want. I haven't really done
> much other than cleaning up the packaging and patches and a small
> bit of
> additional code, so whatever licensing y'all come up with is fine
> by me.

I am sympathetic. Guys, what do you reckon?

What I am hearing so far is that LGPL makes sense, since it can be
linked with any code, not just GPL...

-a

Re: [Cracklib-devel] cracklib license
From: Devin Reade <gdr@gn...> - 2007-10-02 15:04
I would like to see it under LGPL as well. I
think it is in everyone's
best interests to have as secure systems as possible, and I think tainting
it via GPL will just make it less likely that the library gets used, and
will not usually cause companies/developers to GPL the dependent code
(where it is not already GPL).

I like GPL, I use it when I can, but I don't think that it's the correct
license in this situation.

Devin
--
If it's sinful, it's more fun.

Re: [Cracklib-devel] cracklib license
From: Nalin Dahyabhai <nalin@re...> - 2008-01-28 16:32
On Tue, Oct 02, 2007 at 09:57:31AM +0100, Alec Muffett wrote:
> > Seems like the ideal thing here would be for you and the other distro
> > maintainers to get together with Alec in a conversation and come to a
> > decision as to what licensing scheme y'all want. I haven't really done
> > much other than cleaning up the packaging and patches and a small
> > bit of
> > additional
code, so whatever licensing y'all come up with is fine
> > by me.
>
> I am sympathetic. Guys, what do you reckon?

>
> What I am hearing so far is that LGPL makes sense, since it can be
> linked with any code, not just GPL...

My apologies for not chiming in in anything resembling a reasonable
timeframe.

I'd also suggest the LGPL, for the reason you noted above. Alternately,
GPLv2 with the option of using the library under a later version of the
GPL would permit applications which were released under version 3 of the
GPL to use the library, too, which would be sufficient for the packages
which are included in Fedora. FWIW, I'd personally lean toward LGPL.

In any case, I thank you both for working on sorting this out.

Cheers,

Nalin

Re: [Cracklib-devel] cracklib license
From: Mike Frysinger <vapier@ge...> - 2008-10-05 21:27

Attachments: Message as HTML

On Monday 28 January 2008, Nalin Dahyabhai wrote:
> On Tue, Oct 02, 2007 at 09:57:31AM +0100, Alec Muffett wrote:
> > > Seems like the ideal thing here would be for you and the other distro
> > > maintainers to get together with Alec in a conversation and come to a
> > > decision as to what licensing scheme y'all want. I haven't really done
> > > much other than cleaning up the packaging and patches and a small
> > > bit of
> > > additional code, so whatever licensing y'all come up with is fine
> > > by me.
> >
> > I am sympathetic. Guys, what do you reckon?
> >
> > What I am hearing so far is that LGPL makes sense, since it can be
> > linked with any code, not just GPL...
>
> My apologies for not chiming in in anything resembling a reasonable
> timeframe.
>
> I'd also suggest the LGPL, for the reason you noted above. Alternately,
> GPLv2 with the option of using
the library under a later version of the
> GPL would permit applications which were released under version 3 of the
> GPL to use the library, too, which would be sufficient for the packages

> which are included in Fedora. FWIW, I'd personally lean toward LGPL.
>
> In any case, I thank you both for working on sorting this out.

looks like everyone is OK with LGPL-2.1 (GNU Lesser license), so can we make
the change now ?
-mike

Re: [Cracklib-devel] cracklib license
From: Alec Muffett <alecm@cr...> - 2008-10-05 23:18
>> In any case, I thank you both for working on sorting this out.
>
> looks like everyone is OK with LGPL-2.1 (GNU Lesser license), so can we make
> the change now ?

yes. go for it. thanks++

-a

Re: [Cracklib-devel] cracklib license
From: Mike Frysinger <vapier@ge...> - 2008-10-25 22:34

Attachments: Message as HTML
On Sunday 05 October
2008, Alec Muffett wrote:
> >> In any case, I thank you both for working on sorting this out.
> >
> > looks like everyone is OK with LGPL-2.1 (GNU Lesser license), so can we
> > make the change now ?
>
> yes. go for it. thanks++

Nathan Neulinger is the only one who can actually make said change ...
-mike

---
BELOW IS ORIGINAL LICENSING DISCUSSION RE CHANGING TO GPL from Artistic.
---

CrackLib was originally licensed with a variant of the Artistic license. In the
interests of wider acceptance and more modern licensing, it was switched with
the original author's blessing to GPL v2.

This approval was carried out in email discussions in 2005, and has been reconfirmed

as of 2007-10-01 with the following email from Alec Muffett.

The below email references nneul@umr.edu address, as that is the address
that was used at the time. For any future emails regarding this, please
use nneul@neulinger.org.

---

From
 alecm@crypticide.com Mon Oct  1 12:26:03 2007
Received: from umr-exproto2.cc.umr.edu ([131.151.0.192]) by UMR-CMAIL1.umr.edu with Microsoft SMTPSVC(6.0.3790.3959);
  Mon, 1 Oct 2007 12:26:03 -0500
Received: from scansrv2.srv.mst.edu ([131.151.1.114]) by umr-exproto2.cc.umr.edu with Microsoft SMTPSVC(6.0.3790.3959);
  Mon, 1 Oct 2007 12:26:02 -0500
Received: (qmail 8022 invoked from network); 1 Oct 2007 16:59:55 -0000
Received: from smtp1.srv.mst.edu (131.151.1.43)
 by scanin-ipvs.cc.umr.edu with SMTP; 1 Oct 2007 16:59:55 -0000
Received: from spunkymail-mx8.g.dreamhost.com (mx1.spunky.mail.dreamhost.com [208.97.132.47])
 by smtp1.srv.mst.edu (8.13.1/8.13.1) with ESMTP id l91Gxtpr020623
 for <nneul@umr.edu>; Mon, 1 Oct 2007 11:59:55 -0500
Received: from rutherford.zen.co.uk (rutherford.zen.co.uk [212.23.3.142])
 by spunkymail-mx8.g.dreamhost.com (Postfix) with ESMTP id 2C7734D311
 for <nneul@neulinger.org>; Mon,  1 Oct 2007 09:59:50 -0700 (PDT)
Received: from
 [82.68.43.14] (helo=[192.168.1.3])
 by rutherford.zen.co.uk with esmtp (Exim 4.50)
 id 1IcOcX-0004Qt-6L
 for nneul@neulinger.org; Mon, 01 Oct 2007 16:59:49 +0000
Mime-Version: 1.0 (Apple Message framework v752.2)
In-Reply-To: <1b1b3fd80710010908k11dac0afp1f2dd471059ff9a4@mail.gmail.com>
References: <1190922867.3457.147.camel@localhost.localdomain>
<EC90713277D2BE41B7110CCD74E235CEF44F38@UMR-CMAIL1.umr.edu>
<1b1b3fd80710010908k11dac0afp1f2dd471059ff9a4@mail.gmail.com>
Content-Type: text/plain; charset=US-ASCII; delsp=yes; format=flowed
Message-Id: <117A1264-F6DC-4E25-B0DD-56FBFEBE6E9F@crypticide.com>
Content-Transfer-Encoding: 7bit
From: Alec Muffett <alecm@crypticide.com>
Subject: Re: cracklib license
Date: Mon, 1 Oct 2007 17:59:46 +0100
To: Nathan Neulinger <nneul@neulinger.org>
X-Mailer: Apple Mail (2.752.2)
X-Originating-Rutherford-IP: [82.68.43.14]
Return-Path: alecm@crypticide.com
X-OriginalArrivalTime: 01 Oct 2007 17:26:03.0008 (UTC) FILETIME=[2420C000:01C80450]

Status: RO
Content-Length:
585
Lines: 21

>
> ---------- Forwarded message ----------
> From: Neulinger, Nathan <nneul@umr.edu>
> Date: Sep 27, 2007 2:58 PM
> Subject: RE: cracklib license
> To: alecm@crypto.dircon.co.uk
>
> Any chance you could write me a self-contained email stating clearly
> that the license is being changed to GPL, so I could include that
> email
> in the repository and clean up the repository/tarballs? I have all the
> original discussion, but something succinct and self contained
> would be
> ideal.

The license for my code in the Cracklib distribution is henceforth GPL.

Happy now? :-)

-a

# 1.2053 x-tools 0.28.0

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```
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// Package copyright checks that files have the correct copyright notices.
package copyright

import (
 "go/ast"
 "go/parser"
 "go/token"
 "io/fs"
 "os"
 "path/filepath"
 "regexp"
 "strings"
)

func checkCopyright(dir string) ([]string, error) {
 var files []string
 err := filepath.WalkDir(dir, func(path string, d fs.DirEntry, err error) error {
  if err != nil {
   return err
  }
  if d.IsDir() {
   // Skip directories like ".git".
   if strings.HasPrefix(d.Name(), ".") && d.Name() != "." && d.Name() != ".." {
    return filepath.SkipDir
   }
   // Skip any directory that starts with an underscore, as the go
   // command would.
   if strings.HasPrefix(d.Name(), "_") {
    return filepath.SkipDir
   }
   return nil
  }
  needsCopyright, err := checkFile(dir, path)
  if err != nil {
```

```
  return err
 }
 if needsCopyright {
  files
= append(files, path)
 }
 return nil
})
return files, err
}

var copyrightRe = regexp.MustCompile(`Copyright \d{4} The Go Authors. All rights reserved.
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license that can be found in the LICENSE file.`)

func checkFile(toolsDir, filename string) (bool, error) {
 // Only check Go files.
 if !strings.HasSuffix(filename, ".go") {
  return false, nil
 }
 // Don't check testdata files.
 normalized := strings.TrimPrefix(filepath.ToSlash(filename), filepath.ToSlash(toolsDir))
 if strings.Contains(normalized, "/testdata/") {
  return false, nil
 }
 // goyacc is the only file with a different copyright header.
 if strings.HasSuffix(normalized, "cmd/goyacc/yacc.go") {
  return false, nil
 }
 content, err := os.ReadFile(filename)
 if err != nil {
  return false, err
 }
 fset := token.NewFileSet()
 parsed, err := parser.ParseFile(fset, filename, content, parser.ParseComments)
 if err != nil {
  return false, err
 }
 // Don't require headers on
 generated files.
 if isGenerated(fset, parsed) {
  return false, nil
 }
 shouldAddCopyright := true
 for _, c := range parsed.Comments {
  // The copyright should appear before the package declaration.
  if c.Pos() > parsed.Package {
   break
```

```
  }
  if copyrightRe.MatchString(c.Text()) {
   shouldAddCopyright = false
   break
  }
 }
 return shouldAddCopyright, nil
}

// Copied from golang.org/x/tools/gopls/internal/golang/util.go.
// Matches cgo generated comment as well as the proposed standard:
//
// https://golang.org/s/generatedcode
var generatedRx = regexp.MustCompile(`// .*DO NOT EDIT\.?`)

func isGenerated(fset *token.FileSet, file *ast.File) bool {
 for _, commentGroup := range file.Comments {
  for _, comment := range commentGroup.List {
   if matched := generatedRx.MatchString(comment.Text); !matched {
    continue
   }
   // Check if comment is at the beginning of the line in source.
   if pos := fset.Position(comment.Slash); pos.Column == 1 {
    return true
   }
  }
 }
 return
 false
}
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//go:generate ./gen-licenses.sh licenses.go
package licenses

const Text = `
-- github.com/BurntSushi/toml COPYING --

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`

```
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package copyright

import (
 "strings"
 "testing"
```

```
)

func TestToolsCopyright(t *testing.T) {
 files, err := checkCopyright("..")
 if err != nil {
  t.Fatal(err)
 }
 if len(files) > 0 {
  t.Errorf("The following files are missing copyright notices:\n%s", strings.Join(files, "\n"))
 }
}
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package licenses_test

import (
 "bytes"
 "os"
 "os/exec"
 "runtime"
 "testing"
)

func TestLicenses(t *testing.T) {
 if runtime.GOOS != "linux" && runtime.GOOS != "darwin" {
  t.Skip("generating licenses only works on Unixes")
 }
 tmp, err := os.CreateTemp("", "")
 if err != nil {
  t.Fatal(err)
 }
 tmp.Close()

 if out, err := exec.Command("./gen-licenses.sh", tmp.Name()).CombinedOutput(); err != nil {
  t.Fatalf("generating licenses failed: %q, %v", out, err)
 }

 got, err := os.ReadFile(tmp.Name())
 if err != nil {
  t.Fatal(err)
 }
 want, err := os.ReadFile("licenses.go")
 if err != nil {
  t.Fatal(err)
 }
 if !bytes.Equal(got, want) {
```

```
  t.Error("combined license text needs updating. Run: `go generate ./internal/licenses` from the gopls module.")
 }
}
```

# 1.2054 http-cache-semantics 4.2.0

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# 1.2055 opentelemetry-collector-component 1.28.1

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Version 2, June 1991

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[This is the first released version of the library GPL. It is
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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

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If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may

distribute the
object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or
link a "work that uses the Library" with the Library to produce a
work containing portions of the Library, and distribute that work
under terms of your choice, provided that the terms permit
modification of the work for the customer's own use and reverse
engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the
Library is used in it and that the Library and its use are covered by
this License. You must supply a copy of this License. If the work
during execution displays copyright notices, you must include the
copyright notice for the Library among them, as well as a reference
directing the user to the copy of this License. Also, you must do one
of these things:

a) Accompany
the work with the complete corresponding
machine-readable source code for the Library including whatever
changes were used in the work (which must be distributed under
Sections 1 and 2 above); and, if the work is an executable linked
with the Library, with the complete machine-readable "work that
uses the Library", as object code and/or source code, so that the
user can modify the Library and then relink to produce a modified
executable containing the modified Library. (It is understood
that the user who changes the contents of definitions files in the
Library will not necessarily be able to recompile the application
to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the
Library. A suitable mechanism is one that (1) uses at run time a
copy of the library already present on the user's computer system,
rather than copying library functions into the executable, and (2)
will operate
properly with a modified version of the library, if
the user installs one, as long as the modified version is
interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at
least three years, to give the same user the materials
specified in Subsection 6a, above, for a charge no more
than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy

from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

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work) run the object code and to modify the work, including scripts to
control those activities. However, it does not include the work's
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the work, and the source code for shared libraries and dynamically
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subprograms and other parts of the work.

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b) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years and valid for as long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a copy of the Corresponding Source for all the software in the product that is covered by this License, on a durable physical medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the

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c) Convey individual copies of the object code with a copy of the written offer to provide the Corresponding Source. This alternative is allowed only occasionally and noncommercially, and only if you received the object code with such an offer, in accord with subsection 6b.

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# 1.2061 smithy-go 1.23.0

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---
name: Handle External Contributor PRs

on:
# run in the context of the base branch, so that it still works in PR from forks
pull_request_target:
types: [opened, reopened]

permissions: {}

jobs:

```
external-contributor-prs:
  name: Handle Fork PRs
  runs-on: ubuntu-latest
  permissions:
    pull-requests: write
  if: github.event.pull_request.head.repo.full_name != github.repository
  steps:
    - name: Checkout repository
      uses: actions/checkout@11bd71901bbe5b1630ceea73d27597364c9af683 # v4.2.2
      with:
        ref: main
        fetch-depth: 0
        persist-credentials: false
    - name: Install dda
      uses: ./.github/actions/install-dda
      with:
        features: legacy-tasks
    - name: Set label on external contributor PRs
      run: |
        dda inv -- -e github.handle-community-pr --repo="$GH_REPO" --pr-id="$NUMBER" --labels="$LABELS"
      env:
        GH_TOKEN: ${{ secrets.GITHUB_TOKEN }}
        GITHUB_TOKEN:
${{ secrets.GITHUB_TOKEN }}
        SLACK_DATADOG_AGENT_BOT_TOKEN: ${{ secrets.SLACK_DATADOG_AGENT_BOT_TOKEN }}
        GH_REPO: ${{ github.repository }}
        NUMBER: ${{ github.event.number }}
        # labels is a comma-separated list of tags
        LABELS: community
```

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- x x
{
 "x": [
   "x x"
 ]
}
```

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x:
- x
x

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ISC

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# 1.2126 pretty-format/node_modules/ansi-styles 5.2.0

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# 1.2129 datadog-opentelemetry-mapping-go-pkg-otlp-attributes 0.26.0

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package main

import (

```
 "fmt"
 "os"
 "path/filepath"

 "gopkg.in/yaml.v3"
)

type CopyrightOverride struct {
 dependencies map[string]string
}

const (
 overrideFilePath = ".copyright-overrides.yml"
)

var globalOverrides *CopyrightOverride

func init() {
 var err error
 if globalOverrides, err = NewOverrideFromFile(overrideFilePath); err != nil {
  panic(fmt.Sprintf("Failed to load overrides: %s", err))
 }
}

func (c *CopyrightOverride) CopyrightNotice(dependency string) ([]string, bool) {
 for pattern, notice := range c.dependencies {
  if ok, err := filepath.Match(pattern, dependency); err != nil {
   // Bad pattern, should never happen
   panic(err)
  } else if ok {
   return []string{notice}, true
  }
 }
 return nil, false
}

func NewOverrideFromFile(path
 string) (*CopyrightOverride, error) {
 //nolint:gosec // (G304) Path is fixed.
 data, err := os.ReadFile(path)
 if err != nil {
  return nil, fmt.Errorf("failed to read %q: %w", path, err)
 }

 overrides := &CopyrightOverride{
  dependencies: map[string]string{},
 }
```

```
 if err = yaml.Unmarshal(data, &overrides.dependencies); err != nil {
  return nil, fmt.Errorf("failed to unmarshal %q: %w", path, err)
 }

 return overrides, nil
}
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     direction or management of such entity, whether by contract or
     otherwise, or (ii) ownership of fifty percent (50%) or more of the
     outstanding shares, or (iii) beneficial ownership
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module github.com/DataDog/opentelemetry-mapping-go/internal/tools/generate-license-file

go 1.23

require gopkg.in/yaml.v3 v3.0.1
gopkg.in/check.v1 v0.0.0-20161208181325-20d25e280405
h1:yhCVgyC4o1eVCa2tZl7eS0r+SDo693bJlVdllGtEeKM=
gopkg.in/check.v1 v0.0.0-20161208181325-20d25e280405/go.mod
h1:Co6ibVJAznAaIkqp8huTwlJQCZ016jof/cbN4VW5Yz0=
gopkg.in/yaml.v3 v3.0.1 h1:fxVm/GzAzEWqLHuvctI91KS9hhNmmWOoWu0XTYJS7CA=
gopkg.in/yaml.v3 v3.0.1/go.mod h1:K4uyk7z7BCEPqu6E+C64Yfv1cQ7kz7rIZviUmN+EgEM=
package main

```
import (
 "bufio"
 "errors"
 "fmt"
 "os"
 "path"
 "regexp"
 "strings"
)

var (
 copyrightLocations = []string{
  "LICENSE",
  "license.md",
  "LICENSE.md",
  "LICENSE.txt",
```

```
 "License.txt",
 "COPYING",
 "NOTICE",
 "README",
 "README.md",
 "README.mdown",
 "README.markdown",
 "COPYRIGHT",
 "COPYRIGHT.txt",
 }
 authorLocations = []string{
 "AUTHORS",
 "AUTHORS.md",
 "CONTRIBUTORS",
 }
)

// findCopyrightNotices on a given dependency.
// The dependency is passed by its full path, e.g. github.com/DataDog/sketches-go.
func findCopyrightNotices(origin string) (copyrightHeaders []string, err error) {
 if headers, ok := globalOverrides.CopyrightNotice(origin); ok {
 return headers, nil
 }

 if strings.Contains(origin, "/") {
 var parentHeaders []string
 parentHeaders, err = findCopyrightNotices(origin[:strings.LastIndex(origin, "/")])
 if err != nil {
  return nil, err
 }
 copyrightHeaders = append(copyrightHeaders, parentHeaders...)
 }

 pkgDir := path.Join("vendor",
 origin)

 for _, filename := range copyrightLocations {
 var lines []string
 lines, err = mapLines(path.Join(pkgDir, filename), getCopyrightNotice)
 if err != nil {
  return
 }
 copyrightHeaders = append(copyrightHeaders, lines...)

 }

 for _, filename := range authorLocations {
 var lines []string
```

```
  lines, err = mapLines(path.Join(pkgDir, filename), getAuthors)
  if err != nil {
   return
  }
  copyrightHeaders = append(copyrightHeaders, lines...)
 }

 return
}

// mapLines maps lines of a file given by its full path.
// The mapping function fn may return ok=false to indicate that a line should be skipped
func mapLines(fullPath string, fn func(line string) (string, bool)) ([]string, error) {
 if _, err := os.Stat(fullPath); err != nil {
  if errors.Is(err, os.ErrNotExist) {
   // file does not exist, nothing to do.
   return nil, nil
  } else {
   // true error. bubble up.
   return nil, fmt.Errorf("failed to stat %q: %w", fullPath, err)
  }
 }

 //nolint:gosec // (G304)
 Path comes from fixed list
 file, err := os.Open(fullPath)
 if err != nil {
  return nil, fmt.Errorf("failed to open %q: %w", fullPath, err)
 }
 defer func() { err = errors.Join(err, file.Close()) }()

 var notices []string

 scanner := bufio.NewScanner(file)
 for scanner.Scan() {
  if notice, ok := fn(scanner.Text()); ok {
   notices = append(notices, notice)
  }
 }

 if err := scanner.Err(); err != nil {
  return nil, fmt.Errorf("failed to scan %q: %w", fullPath, err)
 }

 return notices, nil
}

var (
```

```
 copyrightHeaderRegexp = regexp.MustCompile(`(?i)copyright\s+(?:|\(c\)\s+)?(?:(?:[0-9 ,-
]|present)+\s+)?(?:by\s+)?(.*)`)

 copyrightIgnoreRegexp = []*regexp.Regexp{
  regexp.MustCompile(`(?i)copyright(:? and license)?$`),
  regexp.MustCompile(`(?i)copyright (:?holder|owner|notice|license|statement)`),
  regexp.MustCompile(`Copyright & License -`),
  regexp.MustCompile(`(?i)copyright .yyyy. .name of copyright owner.`),
  regexp.MustCompile(`(?i)copyright .yyyy. .name of copyright owner.`),
 }
)

//
 getCopyrightNotice from a given line on LICENSE-like file.
func getCopyrightNotice(line string) (notice string, ok bool) {
 matches := copyrightHeaderRegexp.FindStringSubmatch(line)
 if len(matches) == 0 {
  return
 }

 notice = matches[0]
 var shouldIgnore bool
 for _, reg := range copyrightIgnoreRegexp {
  if reg.MatchString(notice) {
   shouldIgnore = true
   break
  }
 }
 if shouldIgnore {
  return
 }

 return strings.TrimSuffix(strings.TrimSpace(notice), "."), true
}

// getAuthors from a given line on an AUTHORS-like file.
func getAuthors(line string) (author string, ok bool) {
 line = strings.TrimSpace(line)
 if len(line) == 0 || line[0] == '#' {
  return
 }
 return line, true
}
```

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# 1.2130 python-pexpect 4.8.0-7.el9

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# 1.2131 component-helpers 0.33.5

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# 1.2132 brotli 1.0.9-7.el9_5

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.gitignore
#
builds/unix/pkg.m4
#
docs/FTL.TXT
docs/GPLv2.TXT
#
include/freetype/internal/fthash.h
#
src/base/fthash.c
src/base/md5.c
src/base/md5.h
#
src/bdf/bdf.c
src/bdf/bdf.h
src/bdf/bdfdrivr.c
src/bdf/bdfdrivr.h
src/bdf/bdferror.h
src/bdf/bdflib.c
src/bdf/module.mk
src/bdf/README
```

```
src/bdf/rules.mk
#
src/pcf/module.mk
src/pcf/pcf.c
src/pcf/pcf.h
src/pcf/pcfdrivr.c
src/pcf/pcfdrivr.h
src/pcf/pcferror.h
src/pcf/pcfread.c
src/pcf/pcfread.h
src/pcf/pcfutil.c
src/pcf/pcfutil.h
src/pcf/README
src/pcf/rules.mk
#
src/gzip/adler32.c
src/gzip/infblock.c
src/gzip/infblock.h
src/gzip/infcodes.c
src/gzip/infcodes.h
src/gzip/inffixed.h
src/gzip/inflate.c
src/gzip/inftrees.c
src/gzip/inftrees.h
src/gzip/infutil.c
src/gzip/infutil.h
src/gzip/zconf.h
src/gzip/zlib.h
src/gzip/zutil.c
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#
src/tools/apinames.c
src/tools/ftrandom/ftrandom.c
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# 1.2145 delayed-stream 1.0.0

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# delayed-stream

Buffers events from a stream until you are ready to handle them.

## Installation

```bash
npm install delayed-stream
```

## Usage

The following example shows how to write a http echo server that delays its
response by 1000 ms.

```` javascript
var DelayedStream = require('delayed-stream');
var http = require('http');

http.createServer(function(req, res) {
 var delayed = DelayedStream.create(req);

 setTimeout(function() {
   res.writeHead(200);
   delayed.pipe(res);
 }, 1000);
});
```

If you are not using `Stream#pipe`, you can also manually release the buffered events by calling `delayedStream.resume()`:

```` javascript
var delayed = DelayedStream.create(req);

setTimeout(function() {
 // Emit all buffered events and resume underlaying source
 delayed.resume();
}, 1000);
```

## Implementation

In order to use this meta stream properly, here are a few things you should know about the implementation.

### Event Buffering / Proxying

All events of the `source` stream are hijacked by overwriting the `source.emit` method. Until node implements a catch-all event listener, this is the only way.

However, delayed-stream still continues to emit all events it captures on the `source`, regardless of whether you have released the delayed stream yet or not.

Upon creation, delayed-stream captures all `source` events and stores them in an internal event buffer. Once `delayedStream.release()` is called, all buffered events are emitted on the `delayedStream`, and the event buffer is cleared. After that, delayed-stream merely acts as a proxy for the underlaying source.

### Error handling

Error events on `source` are buffered / proxied just like any other events. However, `delayedStream.create` attaches a no-op `'error'` listener to the `source`. This way you only have to handle errors on the `delayedStream` object, rather than in two places.

### Buffer limits

delayed-stream provides
 a `maxDataSize` property that can be used to limit
the amount of data being buffered. In order to protect you from bad `source` streams that don't react to `source.pause()`, this feature is enabled by default.

## API

### DelayedStream.create(source, [options])

Returns a new `delayedStream`. Available options are:

* `pauseStream`
* `maxDataSize`

The description for those properties can be found below.

### delayedStream.source

The `source` stream managed by this object. This is useful if you are passing your `delayedStream` around, and you still want to access properties on the `source` object.

### delayedStream.pauseStream = true

Whether to pause the underlaying `source` when calling `DelayedStream.create()`. Modifying this property afterwards has no effect.

### delayedStream.maxDataSize = 1024 * 1024

The amount of data to buffer before emitting an `error`.

If the underlaying source is emitting `Buffer` objects, the `maxDataSize` refers to bytes.

If the underlaying source
 is emitting JavaScript strings, the size refers to
characters.

If you know what you are doing, you can set this property to `Infinity` to

disable this feature. You can also modify this property during runtime.

### delayedStream.dataSize = 0

The amount of data buffered so far.

### delayedStream.readable

An ECMA5 getter that returns the value of `source.readable`.

### delayedStream.resume()

If the `delayedStream` has not been released so far, `delayedStream.release()`
is called.

In either case, `source.resume()` is called.

### delayedStream.pause()

Calls `source.pause()`.

### delayedStream.pipe(dest)

Calls `delayedStream.resume()` and then proxies the arguments to `source.pipe`.

### delayedStream.release()

Emits and clears all events that have been buffered up so far. This does not
resume the underlaying source, use `delayedStream.resume()` instead.

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# 1.2150 commander 2.20.3

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freedom to share and change it. By contrast, the GNU General Public

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The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

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# 1.2156 getsops-sops 3.11.0

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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
)

func ExampleLicensesClient_List_all() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications
 to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()
```

```
 req := &computepb.ListLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#ListLicensesRequest.
 }
 for resp, err := range c.List(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}
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package procurement_test

import (
 "context"

 procurement "cloud.google.com/go/commerce/consumer/procurement/apiv1"
 procurementpb "cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 "google.golang.org/api/iterator"
)

func ExampleNewLicenseManagementClient() {
 ctx
 := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
```

```
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleNewLicenseManagementRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c,
 err := procurement.NewLicenseManagementRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicenseManagementClient_Assign() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.AssignRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#AssignRequest.
 }
 resp, err := c.Assign(ctx, req)
 if err != nil {
```

```
 // TODO: Handle error.
 }
 //
 TODO: Use resp.
 _ = resp
}

func ExampleLicenseManagementClient_EnumerateLicensedUsers() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.EnumerateLicensedUsersRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#EnumerateLicense
dUsersRequest.
 }
 it := c.EnumerateLicensedUsers(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  //
 TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*procurementpb.EnumerateLicensedUsersResponse)
 }
}

func ExampleLicenseManagementClient_GetLicensePool() {
```

```
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.GetLicensePoolRequest{
  // TODO: Fill request struct fields.
  //
 See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#GetLicensePoolRe
quest.
 }
 resp, err := c.GetLicensePool(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicenseManagementClient_Unassign() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.UnassignRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#UnassignRequest.
 }
 resp,
 err := c.Unassign(ctx, req)
 if err != nil {
```

```
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicenseManagementClient_UpdateLicensePool() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.UpdateLicensePoolRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#UpdateLicensePoo
lRequest.
 }
 resp, err := c.UpdateLicensePool(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 //
 TODO: Use resp.
 _ = resp
}

func ExampleLicenseManagementClient_GetOperation() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &longrunningpb.GetOperationRequest{
```

```
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#GetOperationRequest.
 }
 resp, err := c.GetOperation(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
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package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
 "google.golang.org/api/iterator"
)

func ExampleNewLicensesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will
 require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
```

```
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicensesClient_Delete() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.DeleteLicenseRequest{
  //
 TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#DeleteLicenseRequest.
 }
 op, err := c.Delete(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleLicensesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()
```

```
 req := &computepb.GetLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseRequest.
 }
 resp,
 err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_GetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetIamPolicyLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetIamPolicyLicenseRequest.
 }
 resp, err := c.GetIamPolicy(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_Insert()
 {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
```

```
 // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.InsertLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#InsertLicenseRequest.
 }
 op, err := c.Insert(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleLicensesClient_List() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template
 only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.ListLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#ListLicensesRequest.
 }
 it := c.List(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp
```

```
 // If you need to access the underlying RPC response,
 // you can do so by casting the `Response` as below.
 // Otherwise, remove this line. Only populated after
 // first call to Next(). Not safe for concurrent access.
 _ = it.Response.(*computepb.LicensesListResponse)
 }
}

func
 ExampleLicensesClient_SetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.SetIamPolicyLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#SetIamPolicyLicenseRequest.
 }
 resp, err := c.SetIamPolicy(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_TestIamPermissions() {
 ctx := context.Background()
 // This snippet has been automatically
 generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()
```

```
 req := &computepb.TestIamPermissionsLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseRequest.
 }
 resp, err := c.TestIamPermissions(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
```

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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute

import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
 "math"
 "net/http"
 "net/url"
 "time"

 computepb "cloud.google.com/go/compute/apiv1/computepb"
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)
```

```
var
 newLicensesClientHook clientHook

// LicensesCallOptions contains the retry settings for each method of LicensesClient.
type LicensesCallOptions struct {
 Delete            []gax.CallOption
 Get               []gax.CallOption
 GetIamPolicy      []gax.CallOption
 Insert            []gax.CallOption
 List              []gax.CallOption
 SetIamPolicy      []gax.CallOption
 TestIamPermissions []gax.CallOption
}

func defaultLicensesRESTCallOptions() *LicensesCallOptions {
 return &LicensesCallOptions{
  Delete: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  Get: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  GetIamPolicy:
 []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  Insert: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  List: []gax.CallOption{
```

```
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  SetIamPolicy: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  TestIamPermissions: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
 }
}

//
 internalLicensesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicensesClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Delete(context.Context, *computepb.DeleteLicenseRequest, ...gax.CallOption) (*Operation, error)
 Get(context.Context, *computepb.GetLicenseRequest, ...gax.CallOption) (*computepb.License, error)
 GetIamPolicy(context.Context, *computepb.GetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 Insert(context.Context, *computepb.InsertLicenseRequest, ...gax.CallOption) (*Operation, error)
 List(context.Context, *computepb.ListLicensesRequest, ...gax.CallOption) *LicenseIterator
 SetIamPolicy(context.Context, *computepb.SetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 TestIamPermissions(context.Context, *computepb.TestIamPermissionsLicenseRequest, ...gax.CallOption)
(*computepb.TestPermissionsResponse,
 error)
}

// LicensesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// The Licenses API.
type LicensesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicensesClient
```

```
 // The call options for this service.
 CallOptions *LicensesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicensesClient) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *LicensesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection
 to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicensesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// Delete deletes the specified license. Caution This resource is intended for use only by third-party partners who are
creating Cloud Marketplace images.
func (c *LicensesClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts ...gax.CallOption)
(*Operation, error) {
 return c.internalClient.Delete(ctx, req, opts...)
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners
who are creating Cloud Marketplace images.
func (c *LicensesClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption)
(*computepb.License, error) {
 return c.internalClient.Get(ctx, req, opts...)
}

// GetIamPolicy gets the access control policy for a resource. May be empty
 if no such policy or resource exists. Caution This resource is intended for use only by third-party partners who are
creating Cloud Marketplace images.
func (c *LicensesClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest, opts
...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.GetIamPolicy(ctx, req, opts...)
```

```
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts ...gax.CallOption)
(*Operation, error) {
 return c.internalClient.Insert(ctx, req, opts...)
}

// List retrieves the list of licenses available in the specified project. This method does not get any licenses that
belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a
list of publicly-available licenses,
 use this method to make a request to the respective image project, such as debian-cloud or windows-cloud. Caution
This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts ...gax.CallOption)
*LicenseIterator {
 return c.internalClient.List(ctx, req, opts...)
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This
resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest, opts
...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.SetIamPolicy(ctx, req, opts...)
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is
intended for use only by third-party partners
 who are creating Cloud Marketplace images.
func (c *LicensesClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse,
error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type licensesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // operationClient is used to call the operation-specific management service.
 operationClient *GlobalOperationsClient

 // The x-goog-* headers to be sent with each request.
```

```
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicensesClient
 CallOptions **LicensesCallOptions

 logger *slog.Logger
}

// NewLicensesRESTClient creates a new licenses rest client.
//
// The Licenses API.
func NewLicensesRESTClient(ctx
 context.Context, opts ...option.ClientOption) (*LicensesClient, error) {
 clientOpts := append(defaultLicensesRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicensesRESTCallOptions()
 c := &licensesRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 o := []option.ClientOption{
  option.WithHTTPClient(httpClient),
  option.WithEndpoint(endpoint),
 }
 opC, err := NewGlobalOperationsRESTClient(ctx, o...)
 if err != nil {
  return nil, err
 }
 c.operationClient = opC

 return &LicensesClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicensesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
```

```
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licensesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN")
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licensesRESTClient) Close() error {
 // Replace httpClient
 with nil to force cleanup.
 c.httpClient = nil
 if err := c.operationClient.Close(); err != nil {
  return err
 }
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licensesRESTClient) Connection() *grpc.ClientConn {
 return nil
}

// Delete deletes the specified license. Caution This resource is intended for use only by third-party partners who are
creating Cloud Marketplace images.
func (c *licensesRESTClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
```

```
 params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client
 and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Delete[0:len((*c.CallOptions).Delete):len((*c.CallOptions).Delete)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Delete")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf,
 resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 op := &Operation{
  &globalOperationsHandle{
   c:       c.operationClient,
   proto:   resp,
   project: req.GetProject(),
  },
```

```
 }
 return op, nil
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners
who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption)
(*computepb.License, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders,
 hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.License{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Get")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
```

```
  return nil, e
 }
 return resp, nil
}

// GetIamPolicy gets the access control policy for a resource. May be empty if no such policy or resource
 exists. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace
images.
func (c *licensesRESTClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/getIamPolicy", req.GetProject(),
req.GetResource())

 params := url.Values{}
 if req != nil && req.OptionsRequestedPolicyVersion != nil {
  params.Add("optionsRequestedPolicyVersion", fmt.Sprintf("%v", req.GetOptionsRequestedPolicyVersion()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds,
 "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetIamPolicy[0:len((*c.CallOptions).GetIamPolicy):len((*c.CallOptions).GetIamPolicy)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers
```

```
 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetIamPolicy")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
}

// Insert create a License resource in the specified project. Caution This resource is intended
 for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetLicenseResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "project", url.QueryEscape(req.GetProject()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx,
```

```
 hds...)
 opts = append((*c.CallOptions).Insert[0:len((*c.CallOptions).Insert):len((*c.CallOptions).Insert)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Insert")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 op := &Operation{
  &globalOperationsHandle{
   c:       c.operationClient,
   proto:   resp,
   project: req.GetProject(),
  },
 }
 return op, nil
}

// List retrieves the
 list of licenses available in the specified project. This method does not get any licenses that belong to other projects,
including licenses attached to publicly-available images, like Debian 9. If you want to get a list of publicly-available
licenses, use this method to make a request to the respective image project, such as debian-cloud or windows-cloud.
Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts
...gax.CallOption) *LicenseIterator {
 it := &LicenseIterator{}
 req = proto.Clone(req).(*computepb.ListLicensesRequest)
```

```
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
it.InternalFetch = func(pageSize int, pageToken string) ([]*computepb.License, string, error) {
 resp := &computepb.LicensesListResponse{}
 if pageToken != "" {
  req.PageToken = proto.String(pageToken)
 }
 if pageSize > math.MaxInt32
{
  req.MaxResults = proto.Uint32(uint32(math.MaxInt32))
 } else if pageSize != 0 {
  req.MaxResults = proto.Uint32(uint32(pageSize))
 }
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, "", err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if req != nil && req.Filter != nil {
  params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
 }
 if req != nil && req.MaxResults != nil {
  params.Add("maxResults", fmt.Sprintf("%v", req.GetMaxResults()))
 }
 if req != nil && req.OrderBy != nil {
  params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
 }
 if req != nil && req.PageToken != nil {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }
 if req != nil && req.ReturnPartialSuccess != nil {
  params.Add("returnPartialSuccess", fmt.Sprintf("%v", req.GetReturnPartialSuccess()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from
client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
```

```
  }
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "List")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetItems(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken,
nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetMaxResults())
it.pageInfo.Token = req.GetPageToken()

return it
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This
resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetGlobalSetPolicyRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }
```

```
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/setIamPolicy", req.GetProject(),
req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds
 := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project", url.QueryEscape(req.GetProject()),
"resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).SetIamPolicy[0:len((*c.CallOptions).SetIamPolicy):len((*c.CallOptions).SetIamPolicy)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "SetIamPolicy")
  if err != nil {
   return err
  }

  if
 err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}
```

```
// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is
intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse,
error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetTestPermissionsRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/testIamPermissions", req.GetProject(),
req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params",
 fmt.Sprintf("%s=%v&%s=%v", "project", url.QueryEscape(req.GetProject()), "resource",
url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "TestIamPermissions")
  if err !=
 nil {
   return err
```

```
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package compute_test
// Copyright 2025 Google LLC
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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
```

```
//  protoc-gen-go v1.35.2
//  protoc        v4.25.3
// source: google/ai/generativelanguage/v1beta/permission.proto

package generativelanguagepb

import (
 reflect "reflect"
 sync "sync"

 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
)

const
 (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Defines types of the grantee of this permission.
type Permission_GranteeType int32

const (
 // The default value. This value is unused.
 Permission_GRANTEE_TYPE_UNSPECIFIED Permission_GranteeType = 0
 // Represents a user. When set, you must provide email_address for the user.
 Permission_USER Permission_GranteeType = 1
 // Represents a group. When set, you must provide email_address for the
 // group.
 Permission_GROUP Permission_GranteeType = 2
 // Represents access to everyone. No extra information is required.
 Permission_EVERYONE Permission_GranteeType = 3
)

// Enum value maps for Permission_GranteeType.
var (
 Permission_GranteeType_name = map[int32]string{
  0: "GRANTEE_TYPE_UNSPECIFIED",
  1: "USER",
  2:
 "GROUP",
  3: "EVERYONE",
 }
 Permission_GranteeType_value = map[string]int32{
```

```
  "GRANTEE_TYPE_UNSPECIFIED": 0,
  "USER":                    1,
  "GROUP":                   2,
  "EVERYONE":                3,
 }
)

func (x Permission_GranteeType) Enum() *Permission_GranteeType {
 p := new(Permission_GranteeType)
 *p = x
 return p
}

func (x Permission_GranteeType) String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_GranteeType) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0].Descriptor()
}

func (Permission_GranteeType) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0]
}

func (x Permission_GranteeType) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_GranteeType.Descriptor instead.
func (Permission_GranteeType) EnumDescriptor() ([]byte,
 []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 0}
}

// Defines the role granted by this permission.
type Permission_Role int32

const (
 // The default value. This value is unused.
 Permission_ROLE_UNSPECIFIED Permission_Role = 0
 // Owner can use, update, share and delete the resource.
 Permission_OWNER Permission_Role = 1
 // Writer can use, update and share the resource.
 Permission_WRITER Permission_Role = 2
 // Reader can use the resource.
 Permission_READER Permission_Role = 3
)
```

```
// Enum value maps for Permission_Role.
var (
 Permission_Role_name = map[int32]string{
  0: "ROLE_UNSPECIFIED",
  1: "OWNER",
  2: "WRITER",
  3: "READER",
 }
 Permission_Role_value = map[string]int32{
  "ROLE_UNSPECIFIED": 0,
  "OWNER":            1,
  "WRITER":           2,
  "READER":           3,
 }
)

func (x Permission_Role) Enum() *Permission_Role {
 p := new(Permission_Role)
 *p = x
 return p
}

func (x Permission_Role) String() string {
 return
 protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_Role) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1].Descriptor()
}

func (Permission_Role) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1]
}

func (x Permission_Role) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_Role.Descriptor instead.
func (Permission_Role) EnumDescriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 1}
}

// Permission resource grants user, group or the rest of the world access to the
// PaLM API resource (e.g. a tuned model, corpus).
//
```

```
// A role is a collection of permitted operations that allows users to perform
// specific actions on PaLM API resources. To make them available to users,
// groups, or service accounts,
 you assign roles. When you assign a role, you
// grant permissions that the role contains.
//
// There are three concentric roles. Each role is a superset of the previous
// role's permitted operations:
//
// - reader can use the resource (e.g. tuned model, corpus) for inference
// - writer has reader's permissions and additionally can edit and share
// - owner has writer's permissions and additionally can delete
type Permission struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Output only. Identifier. The permission name. A unique name will be
 // generated on create. Examples:
 //
 // tunedModels/{tuned_model}/permissions/{permission}
 // corpora/{corpus}/permissions/{permission}
 //
 // Output only.
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Optional. Immutable. The type of the grantee.
 GranteeType *Permission_GranteeType
`protobuf:"varint,2,opt,name=grantee_type,json=granteeType,proto3,enum=google.ai.generativelanguage.v1beta.Pe
rmission_GranteeType,oneof"
 json:"grantee_type,omitempty"`
 // Optional. Immutable. The email address of the user of group which this
 // permission refers. Field is not set when permission's grantee type is
 // EVERYONE.
 EmailAddress *string `protobuf:"bytes,3,opt,name=email_address,json=emailAddress,proto3,oneof"
json:"email_address,omitempty"`
 // Required. The role granted by this permission.
 Role *Permission_Role
`protobuf:"varint,4,opt,name=role,proto3,enum=google.ai.generativelanguage.v1beta.Permission_Role,oneof"
json:"role,omitempty"`
}

func (x *Permission) Reset() {
 *x = Permission{}
 mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}
```

```
func (x *Permission) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*Permission) ProtoMessage() {}

func (x *Permission) ProtoReflect() protoreflect.Message
 {
 mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use Permission.ProtoReflect.Descriptor instead.
func (*Permission) Descriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0}
}

func (x *Permission) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
}

func (x *Permission) GetGranteeType() Permission_GranteeType {
 if x != nil && x.GranteeType != nil {
  return *x.GranteeType
 }
 return Permission_GRANTEE_TYPE_UNSPECIFIED
}

func (x *Permission) GetEmailAddress() string {
 if x != nil && x.EmailAddress != nil {
  return *x.EmailAddress
 }
 return ""
}

func (x *Permission) GetRole() Permission_Role {
 if x != nil && x.Role != nil {
  return *x.Role
```

```
 }
 return Permission_ROLE_UNSPECIFIED
}

var
 File_google_ai_generativelanguage_v1beta_permission_proto protoreflect.FileDescriptor

var file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = []byte{
 0x0a, 0x34, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65,
 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x76,
 0x31, 0x62, 0x65, 0x74, 0x61, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x12, 0x23, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61,
 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67,
 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x1a, 0x1f, 0x67, 0x6f, 0x6f,
 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64, 0x5f, 0x62, 0x65,
 0x68, 0x61, 0x76, 0x69, 0x6f, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x19, 0x67, 0x6f,
 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69,
 0x2f, 0x72, 0x65, 0x73, 0x6f, 0x75, 0x72, 0x63,
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 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x1a, 0x0a, 0x04, 0x6e, 0x61, 0x6d, 0x65, 0x18, 0x01,
 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x03, 0xe0, 0x41, 0x08, 0x52, 0x04, 0x6e, 0x61,
 0x6d, 0x65, 0x12, 0x6b, 0x0a, 0x0c, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f, 0x74, 0x79,
 0x70, 0x65, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0e, 0x32, 0x3b, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c,
 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c,
 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x2e, 0x50,
 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x2e, 0x47, 0x72, 0x61, 0x6e, 0x74, 0x65,
 0x65, 0x54, 0x79, 0x70, 0x65, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05, 0x48, 0x00, 0x52,
 0x0b, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x54, 0x79, 0x70, 0x65, 0x88,
 0x01, 0x01, 0x12,
 0x30, 0x0a, 0x0d, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x5f, 0x61, 0x64, 0x64, 0x72, 0x65, 0x73, 0x73,
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 0x52, 0x0c, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x41, 0x64, 0x64, 0x72, 0x65, 0x73, 0x73, 0x88, 0x01,
 0x01, 0x12, 0x52, 0x0a, 0x04, 0x72, 0x6f, 0x6c, 0x65, 0x18, 0x04, 0x20, 0x01, 0x28, 0x0e, 0x32,
 0x34, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65,
 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76,
 0x31, 0x62, 0x65, 0x74, 0x61, 0x2e, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
 0x2e, 0x52, 0x6f, 0x6c, 0x65, 0x42, 0x03, 0xe0, 0x41, 0x02, 0x48, 0x02, 0x52, 0x04, 0x72, 0x6f,
 0x6c, 0x65, 0x88, 0x01, 0x01, 0x22, 0x4e, 0x0a, 0x0b, 0x47, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65,
 0x54, 0x79, 0x70, 0x65, 0x12, 0x1c, 0x0a, 0x18, 0x47, 0x52, 0x41, 0x4e, 0x54, 0x45, 0x45, 0x5f,
 0x54,
 0x59, 0x50, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49, 0x46, 0x49, 0x45, 0x44,
 0x10, 0x00, 0x12, 0x08, 0x0a, 0x04, 0x55, 0x53, 0x45, 0x52, 0x10, 0x01, 0x12, 0x09, 0x0a, 0x05,
 0x47, 0x52, 0x4f, 0x55, 0x50, 0x10, 0x02, 0x12, 0x0c, 0x0a, 0x08, 0x45, 0x56, 0x45, 0x52, 0x59,
 0x4f, 0x4e, 0x45, 0x10, 0x03, 0x22, 0x3f, 0x0a, 0x04, 0x52, 0x6f, 0x6c, 0x65, 0x12, 0x14, 0x0a,
 0x10, 0x52, 0x4f, 0x4c, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49, 0x46, 0x49, 0x45,
 0x44, 0x10, 0x00, 0x12, 0x09, 0x0a, 0x05, 0x4f, 0x57, 0x4e, 0x45, 0x52, 0x10, 0x01, 0x12, 0x0a,
 0x0a, 0x06, 0x57, 0x52, 0x49, 0x54, 0x45, 0x52, 0x10, 0x02, 0x12, 0x0a, 0x0a, 0x06, 0x52, 0x45,
 0x41, 0x44, 0x45, 0x52, 0x10, 0x03, 0x3a, 0xaa, 0x01, 0xea, 0x41, 0xa6, 0x01, 0x0a, 0x2c, 0x67,
```

```
 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67,
 0x65, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73, 0x2e, 0x63, 0x6f, 0x6d,
 0x2f, 0x50, 0x65, 0x72, 0x6d, 0x69,
 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x32, 0x74, 0x75, 0x6e,
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 0x65, 0x74, 0x61, 0x2f, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61,
 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x3b, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74,
 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x62, 0x06, 0x70,
 0x72,
 0x6f, 0x74, 0x6f, 0x33,
}

var (
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce sync.Once
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc
)

func file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP() []byte {
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce.Do(func() {
  file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData)
 })
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData
}

var file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes = make([]protoimpl.EnumInfo, 2)
var file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes = make([]protoimpl.MessageInfo, 1)
var file_google_ai_generativelanguage_v1beta_permission_proto_goTypes = []any{
 (Permission_GranteeType)(0),
```

```
 // 0: google.ai.generativelanguage.v1beta.Permission.GranteeType
 (Permission_Role)(0),        // 1: google.ai.generativelanguage.v1beta.Permission.Role
 (*Permission)(nil),          // 2: google.ai.generativelanguage.v1beta.Permission
}
var file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = []int32{
 0, // 0: google.ai.generativelanguage.v1beta.Permission.grantee_type:type_name ->
google.ai.generativelanguage.v1beta.Permission.GranteeType
 1, // 1: google.ai.generativelanguage.v1beta.Permission.role:type_name ->
google.ai.generativelanguage.v1beta.Permission.Role
 2, // [2:2] is the sub-list for method output_type
 2, // [2:2] is the sub-list for method input_type
 2, // [2:2] is the sub-list for extension type_name
 2, // [2:2] is the sub-list for extension extendee
 0, // [0:2] is the sub-list for field type_name
}

func init() { file_google_ai_generativelanguage_v1beta_permission_proto_init() }
func file_google_ai_generativelanguage_v1beta_permission_proto_init()
 {
 if File_google_ai_generativelanguage_v1beta_permission_proto != nil {
  return
 }
 file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0].OneofWrappers = []any{}
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor: file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc,
   NumEnums:      2,
   NumMessages:   1,
   NumExtensions: 0,
   NumServices:   0,
  },
  GoTypes:           file_google_ai_generativelanguage_v1beta_permission_proto_goTypes,
  DependencyIndexes: file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs,
  EnumInfos:         file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes,
  MessageInfos:      file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes,
 }.Build()
 File_google_ai_generativelanguage_v1beta_permission_proto = out.File
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = nil
 file_google_ai_generativelanguage_v1beta_permission_proto_goTypes
 = nil
 file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = nil
}
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```

```
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
)

func ExampleNewLicenseCodesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 //
 - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicenseCodesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
```

```
 // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetLicenseCodeRequest{
  // TODO: Fill request
 struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseCodeRequest.
 }
 resp, err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicenseCodesClient_TestIamPermissions() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.TestIamPermissionsLicenseCodeRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseCodeRequest.
 }
 resp,
 err := c.TestIamPermissions(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
// Copyright 2025 Google LLC
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//
```

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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.35.2
//  protoc        v4.25.3
// source: google/ai/generativelanguage/v1alpha/permission.proto

package generativelanguagepb

import (
 reflect "reflect"
 sync "sync"

 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
)

const
 (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Defines types of the grantee of this permission.
type Permission_GranteeType int32

const (
 // The default value. This value is unused.
 Permission_GRANTEE_TYPE_UNSPECIFIED Permission_GranteeType = 0
 // Represents a user. When set, you must provide email_address for the user.
 Permission_USER Permission_GranteeType = 1
 // Represents a group. When set, you must provide email_address for the
 // group.
 Permission_GROUP Permission_GranteeType = 2
 // Represents access to everyone. No extra information is required.
 Permission_EVERYONE Permission_GranteeType = 3
)
```

```
// Enum value maps for Permission_GranteeType.
var (
 Permission_GranteeType_name = map[int32]string{
  0: "GRANTEE_TYPE_UNSPECIFIED",
  1: "USER",
  2:
 "GROUP",
  3: "EVERYONE",
 }
 Permission_GranteeType_value = map[string]int32{
  "GRANTEE_TYPE_UNSPECIFIED": 0,
  "USER":                     1,
  "GROUP":                    2,
  "EVERYONE":                 3,
 }
)

func (x Permission_GranteeType) Enum() *Permission_GranteeType {
 p := new(Permission_GranteeType)
 *p = x
 return p
}

func (x Permission_GranteeType) String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_GranteeType) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[0].Descriptor()
}

func (Permission_GranteeType) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[0]
}

func (x Permission_GranteeType) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_GranteeType.Descriptor instead.
func (Permission_GranteeType) EnumDescriptor() ([]byte,
 []int) {
 return file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescGZIP(), []int{0, 0}
}

// Defines the role granted by this permission.
type Permission_Role int32
```

```
const (
 // The default value. This value is unused.
 Permission_ROLE_UNSPECIFIED Permission_Role = 0
 // Owner can use, update, share and delete the resource.
 Permission_OWNER Permission_Role = 1
 // Writer can use, update and share the resource.
 Permission_WRITER Permission_Role = 2
 // Reader can use the resource.
 Permission_READER Permission_Role = 3
)

// Enum value maps for Permission_Role.
var (
 Permission_Role_name = map[int32]string{
  0: "ROLE_UNSPECIFIED",
  1: "OWNER",
  2: "WRITER",
  3: "READER",
 }
 Permission_Role_value = map[string]int32{
  "ROLE_UNSPECIFIED": 0,
  "OWNER":            1,
  "WRITER":           2,
  "READER":           3,
 }
)

func (x Permission_Role) Enum() *Permission_Role {
 p := new(Permission_Role)
 *p = x
 return p
}

func (x Permission_Role) String() string
 {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_Role) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[1].Descriptor()
}

func (Permission_Role) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[1]
}

func (x Permission_Role) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
```

```
}

// Deprecated: Use Permission_Role.Descriptor instead.
func (Permission_Role) EnumDescriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescGZIP(), []int{0, 1}
}

// Permission resource grants user, group or the rest of the world access to the
// PaLM API resource (e.g. a tuned model, corpus).
//
// A role is a collection of permitted operations that allows users to perform
// specific actions on PaLM API resources. To make them available to users,
// groups, or service
 accounts, you assign roles. When you assign a role, you
// grant permissions that the role contains.
//
// There are three concentric roles. Each role is a superset of the previous
// role's permitted operations:
//
// - reader can use the resource (e.g. tuned model, corpus) for inference
// - writer has reader's permissions and additionally can edit and share
// - owner has writer's permissions and additionally can delete
type Permission struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Output only. Identifier. The permission name. A unique name will be
 // generated on create. Examples:
 //
 // tunedModels/{tuned_model}/permissions/{permission}
 // corpora/{corpus}/permissions/{permission}
 //
 // Output only.
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Optional. Immutable. The type of the grantee.
 GranteeType *Permission_GranteeType
`protobuf:"varint,2,opt,name=grantee_type,json=granteeType,proto3,enum=google.ai.generativelanguage.v1alpha.P
ermission_GranteeType,oneof"
 json:"grantee_type,omitempty"`
 // Optional. Immutable. The email address of the user of group which this
 // permission refers. Field is not set when permission's grantee type is
 // EVERYONE.
 EmailAddress *string `protobuf:"bytes,3,opt,name=email_address,json=emailAddress,proto3,oneof"
json:"email_address,omitempty"`
 // Required. The role granted by this permission.
 Role *Permission_Role
`protobuf:"varint,4,opt,name=role,proto3,enum=google.ai.generativelanguage.v1alpha.Permission_Role,oneof"
```

```
json:"role,omitempty"`
}

func (x *Permission) Reset() {
 *x = Permission{}
 mi := &file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes[0]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *Permission) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*Permission) ProtoMessage() {}

func (x *Permission) ProtoReflect() protoreflect.Message
 {
 mi := &file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use Permission.ProtoReflect.Descriptor instead.
func (*Permission) Descriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescGZIP(), []int{0}
}

func (x *Permission) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
}

func (x *Permission) GetGranteeType() Permission_GranteeType {
 if x != nil && x.GranteeType != nil {
  return *x.GranteeType
 }
 return Permission_GRANTEE_TYPE_UNSPECIFIED
}
```

```
func (x *Permission) GetEmailAddress() string {
 if x != nil && x.EmailAddress != nil {
  return *x.EmailAddress
 }
 return ""
}

func (x *Permission) GetRole() Permission_Role {
 if x != nil && x.Role != nil {
  return *x.Role
 }
 return Permission_ROLE_UNSPECIFIED
}

var
 File_google_ai_generativelanguage_v1alpha_permission_proto protoreflect.FileDescriptor

var file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc = []byte{
 0x0a, 0x35, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65,
 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x76,
 0x31, 0x61, 0x6c, 0x70, 0x68, 0x61, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f,
 0x6e, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x12, 0x24, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e,
 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e,
 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x61, 0x6c, 0x70, 0x68, 0x61, 0x1a, 0x1f, 0x67,
 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64, 0x5f,
 0x62, 0x65, 0x68, 0x61, 0x76, 0x69, 0x6f, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x19,
 0x67, 0x6f, 0x6f, 0x67, 0x6c,
 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x72, 0x65, 0x73, 0x6f, 0x75,
 0x72, 0x63, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x22, 0x87, 0x05, 0x0a, 0x0a, 0x50, 0x65,
 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x1a, 0x0a, 0x04, 0x6e, 0x61, 0x6d, 0x65,
 0x18, 0x01, 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x03, 0xe0, 0x41, 0x08, 0x52, 0x04,
 0x6e, 0x61, 0x6d, 0x65, 0x12, 0x6c, 0x0a, 0x0c, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f,
 0x74, 0x79, 0x70, 0x65, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0e, 0x32, 0x3c, 0x2e, 0x67, 0x6f, 0x6f,
 0x67, 0x6c, 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76,
 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x61, 0x6c, 0x70, 0x68,
 0x61, 0x2e, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x2e, 0x47, 0x72, 0x61,
 0x6e, 0x74, 0x65, 0x65, 0x54, 0x79, 0x70, 0x65, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05,
 0x48, 0x00, 0x52, 0x0b, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65,
 0x65, 0x54, 0x79, 0x70, 0x65, 0x88,
 0x01, 0x01, 0x12, 0x30, 0x0a, 0x0d, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x5f, 0x61, 0x64, 0x64, 0x72,
 0x65, 0x73, 0x73, 0x18, 0x03, 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41,
 0x05, 0x48, 0x01, 0x52, 0x0c, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x41, 0x64, 0x64, 0x72, 0x65, 0x73,
 0x73, 0x88, 0x01, 0x01, 0x12, 0x53, 0x0a, 0x04, 0x72, 0x6f, 0x6c, 0x65, 0x18, 0x04, 0x20, 0x01,
 0x28, 0x0e, 0x32, 0x35, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67,
 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67,
 0x65, 0x2e, 0x76, 0x31, 0x61, 0x6c, 0x70, 0x68, 0x61, 0x2e, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73,
 0x73, 0x69, 0x6f, 0x6e, 0x2e, 0x52, 0x6f, 0x6c, 0x65, 0x42, 0x03, 0xe0, 0x41, 0x02, 0x48, 0x02,
 0x52, 0x04, 0x72, 0x6f, 0x6c, 0x65, 0x88, 0x01, 0x01, 0x22, 0x4e, 0x0a, 0x0b, 0x47, 0x72, 0x61,
```

```
 0x6e, 0x74, 0x65, 0x65, 0x54, 0x79, 0x70, 0x65, 0x12, 0x1c, 0x0a, 0x18, 0x47, 0x52, 0x41,
 0x4e,
 0x54, 0x45, 0x45, 0x5f, 0x54, 0x59, 0x50, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49,
 0x46, 0x49, 0x45, 0x44, 0x10, 0x00, 0x12, 0x08, 0x0a, 0x04, 0x55, 0x53, 0x45, 0x52, 0x10, 0x01,
 0x12, 0x09, 0x0a, 0x05, 0x47, 0x52, 0x4f, 0x55, 0x50, 0x10, 0x02, 0x12, 0x0c, 0x0a, 0x08, 0x45,
 0x56, 0x45, 0x52, 0x59, 0x4f, 0x4e, 0x45, 0x10, 0x03, 0x22, 0x3f, 0x0a, 0x04, 0x52, 0x6f, 0x6c,
 0x65, 0x12, 0x14, 0x0a, 0x10, 0x52, 0x4f, 0x4c, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43,
 0x49, 0x46, 0x49, 0x45, 0x44, 0x10, 0x00, 0x12, 0x09, 0x0a, 0x05, 0x4f, 0x57, 0x4e, 0x45, 0x52,
 0x10, 0x01, 0x12, 0x0a, 0x0a, 0x06, 0x57, 0x52, 0x49, 0x54, 0x45, 0x52, 0x10, 0x02, 0x12, 0x0a,
 0x0a, 0x06, 0x52, 0x45, 0x41, 0x44, 0x45, 0x52, 0x10, 0x03, 0x3a, 0xaa, 0x01, 0xea, 0x41, 0xa6,
 0x01, 0x0a, 0x2c, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e,
 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73,
 0x2e, 0x63, 0x6f, 0x6d,
 0x2f, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12,
 0x32, 0x74, 0x75, 0x6e, 0x65, 0x64, 0x4d, 0x6f, 0x64, 0x65, 0x6c, 0x73, 0x2f, 0x7b, 0x74, 0x75,
 0x6e, 0x65, 0x64, 0x5f, 0x6d, 0x6f, 0x64, 0x65, 0x6c, 0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69,
 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x2f, 0x7b, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69,
 0x6f, 0x6e, 0x7d, 0x12, 0x29, 0x63, 0x6f, 0x72, 0x70, 0x6f, 0x72, 0x61, 0x2f, 0x7b, 0x63, 0x6f,
 0x72, 0x70, 0x75, 0x73, 0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
 0x73, 0x2f, 0x7b, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x7d, 0x2a, 0x0b,
 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x32, 0x0a, 0x70, 0x65, 0x72,
 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x42, 0x0f, 0x0a, 0x0d, 0x5f, 0x67, 0x72, 0x61, 0x6e,
 0x74, 0x65, 0x65, 0x5f, 0x74, 0x79, 0x70, 0x65, 0x42, 0x10, 0x0a, 0x0e, 0x5f, 0x65, 0x6d, 0x61,
 0x69, 0x6c, 0x5f, 0x61, 0x64, 0x64, 0x72, 0x65, 0x73,
 0x73, 0x42, 0x07, 0x0a, 0x05, 0x5f, 0x72,
 0x6f, 0x6c, 0x65, 0x42, 0x9d, 0x01, 0x0a, 0x28, 0x63, 0x6f, 0x6d, 0x2e, 0x67, 0x6f, 0x6f, 0x67,
 0x6c, 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65,
 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x61, 0x6c, 0x70, 0x68, 0x61,
 0x42, 0x0f, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x50, 0x72, 0x6f, 0x74,
 0x6f, 0x50, 0x01, 0x5a, 0x5e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c,
 0x65, 0x2e, 0x63, 0x6f, 0x6d, 0x2f, 0x67, 0x6f, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65,
 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x61,
 0x70, 0x69, 0x76, 0x31, 0x61, 0x6c, 0x70, 0x68, 0x61, 0x2f, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61,
 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x3b, 0x67,
 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75,
 0x61, 0x67,
 0x65, 0x70, 0x62, 0x62, 0x06, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x33,
}

var (
 file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescOnce sync.Once
 file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData =
file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc
)

func file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescGZIP() []byte {
 file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescOnce.Do(func() {
  file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData =
```

```
protoimpl.X.CompressGZIP(file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData)
 })
 return file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData
}

var file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes = make([]protoimpl.EnumInfo, 2)
var file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes = make([]protoimpl.MessageInfo, 1)
var file_google_ai_generativelanguage_v1alpha_permission_proto_goTypes
 = []any{
 (Permission_GranteeType)(0), // 0: google.ai.generativelanguage.v1alpha.Permission.GranteeType
 (Permission_Role)(0),        // 1: google.ai.generativelanguage.v1alpha.Permission.Role
 (*Permission)(nil),          // 2: google.ai.generativelanguage.v1alpha.Permission
}
var file_google_ai_generativelanguage_v1alpha_permission_proto_depIdxs = []int32{
 0, // 0: google.ai.generativelanguage.v1alpha.Permission.grantee_type:type_name ->
google.ai.generativelanguage.v1alpha.Permission.GranteeType
 1, // 1: google.ai.generativelanguage.v1alpha.Permission.role:type_name ->
google.ai.generativelanguage.v1alpha.Permission.Role
 2, // [2:2] is the sub-list for method output_type
 2, // [2:2] is the sub-list for method input_type
 2, // [2:2] is the sub-list for extension type_name
 2, // [2:2] is the sub-list for extension extendee
 0, // [0:2] is the sub-list for field type_name
}

func init() { file_google_ai_generativelanguage_v1alpha_permission_proto_init()
 }
func file_google_ai_generativelanguage_v1alpha_permission_proto_init() {
 if File_google_ai_generativelanguage_v1alpha_permission_proto != nil {
  return
 }
 file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes[0].OneofWrappers = []any{}
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor: file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc,
   NumEnums:      2,
   NumMessages:   1,
   NumExtensions: 0,
   NumServices:   0,
  },
  GoTypes:           file_google_ai_generativelanguage_v1alpha_permission_proto_goTypes,
  DependencyIndexes: file_google_ai_generativelanguage_v1alpha_permission_proto_depIdxs,
  EnumInfos:         file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes,
  MessageInfos:      file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes,
 }.Build()
 File_google_ai_generativelanguage_v1alpha_permission_proto = out.File
```

```
 file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc
 = nil
 file_google_ai_generativelanguage_v1alpha_permission_proto_goTypes = nil
 file_google_ai_generativelanguage_v1alpha_permission_proto_depIdxs = nil
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package procurement_test

import (
 "context"

 procurement "cloud.google.com/go/commerce/consumer/procurement/apiv1"
 procurementpb "cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb"
)

func ExampleLicenseManagementClient_EnumerateLicensedUsers_all() {
 ctx := context.Background()
 // This snippet has been automatically
 generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.EnumerateLicensedUsersRequest{
  // TODO: Fill request struct fields.
```

```
  // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#EnumerateLicense
dUsersRequest.
 }
 for resp, err := range c.EnumerateLicensedUsers(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}

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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.35.2
//  protoc        v4.25.3
// source: google/cloud/commerce/consumer/procurement/v1/license_management_service.proto

package procurementpb
```

```
import (
 context "context"
 reflect "reflect"
 sync "sync"

 _ "google.golang.org/genproto/googleapis/api/annotations"
 grpc "google.golang.org/grpc"
 codes "google.golang.org/grpc/codes"
 status
 "google.golang.org/grpc/status"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
 durationpb "google.golang.org/protobuf/types/known/durationpb"
 fieldmaskpb "google.golang.org/protobuf/types/known/fieldmaskpb"
 timestamppb "google.golang.org/protobuf/types/known/timestamppb"
)

const (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Assignment protocol for a license pool.
type AssignmentProtocol struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // The type of assignment protocol.
 //
 // Types that are assignable to AssignmentType:
 //
 // *AssignmentProtocol_ManualAssignmentType_
 // *AssignmentProtocol_AutoAssignmentType_
 AssignmentType
 isAssignmentProtocol_AssignmentType `protobuf_oneof:"assignment_type"`
}

func (x *AssignmentProtocol) Reset() {
 *x = AssignmentProtocol{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[0]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}
```

```
func (x *AssignmentProtocol) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*AssignmentProtocol) ProtoMessage() {}

func (x *AssignmentProtocol) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use AssignmentProtocol.ProtoReflect.Descriptor instead.
func (*AssignmentProtocol) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
 []int{0}
}

func (m *AssignmentProtocol) GetAssignmentType() isAssignmentProtocol_AssignmentType {
 if m != nil {
  return m.AssignmentType
 }
 return nil
}

func (x *AssignmentProtocol) GetManualAssignmentType() *AssignmentProtocol_ManualAssignmentType {
 if x, ok := x.GetAssignmentType().(*AssignmentProtocol_ManualAssignmentType_); ok {
  return x.ManualAssignmentType
 }
 return nil
}

func (x *AssignmentProtocol) GetAutoAssignmentType() *AssignmentProtocol_AutoAssignmentType {
 if x, ok := x.GetAssignmentType().(*AssignmentProtocol_AutoAssignmentType_); ok {
  return x.AutoAssignmentType
 }
 return nil
}

type isAssignmentProtocol_AssignmentType interface {
```

```
 isAssignmentProtocol_AssignmentType()
}

type AssignmentProtocol_ManualAssignmentType_ struct {
 // Allow manual assignments triggered by administrative operations only.
 ManualAssignmentType *AssignmentProtocol_ManualAssignmentType
`protobuf:"bytes,2,opt,name=manual_assignment_type,json=manualAssignmentType,proto3,oneof"`
}

type
 AssignmentProtocol_AutoAssignmentType_ struct {
 // Allow automatic assignments triggered by data plane operations.
 AutoAssignmentType *AssignmentProtocol_AutoAssignmentType
`protobuf:"bytes,3,opt,name=auto_assignment_type,json=autoAssignmentType,proto3,oneof"`
}

func (*AssignmentProtocol_ManualAssignmentType_) isAssignmentProtocol_AssignmentType() {}

func (*AssignmentProtocol_AutoAssignmentType_) isAssignmentProtocol_AssignmentType() {}

// A license pool represents a pool of licenses that can be assigned to users.
type LicensePool struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Identifier. Format:
 // `billingAccounts/{billing_account}/orders/{order}/licensePool`
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Required. Assignment protocol for the license pool.
 LicenseAssignmentProtocol *AssignmentProtocol
`protobuf:"bytes,2,opt,name=license_assignment_protocol,json=licenseAssignmentProtocol,proto3"
 json:"license_assignment_protocol,omitempty"`
 // Output only. Licenses count that are available to be assigned.
 AvailableLicenseCount int32
`protobuf:"varint,3,opt,name=available_license_count,json=availableLicenseCount,proto3"
json:"available_license_count,omitempty"`
 // Output only. Total number of licenses in the pool.
 TotalLicenseCount int32 `protobuf:"varint,4,opt,name=total_license_count,json=totalLicenseCount,proto3"
json:"total_license_count,omitempty"`
}

func (x *LicensePool) Reset() {
 *x = LicensePool{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[1]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
```

```
}

func (x *LicensePool) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*LicensePool) ProtoMessage() {}

func (x *LicensePool) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[1]
 if
 x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use LicensePool.ProtoReflect.Descriptor instead.
func (*LicensePool) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{1}
}

func (x *LicensePool) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
}

func (x *LicensePool) GetLicenseAssignmentProtocol() *AssignmentProtocol {
 if x != nil {
  return x.LicenseAssignmentProtocol
 }
 return nil
}

func (x *LicensePool) GetAvailableLicenseCount() int32 {
 if x != nil {
  return x.AvailableLicenseCount
 }
 return 0
```

```
}

func (x *LicensePool) GetTotalLicenseCount() int32 {
 if x != nil {
  return x.TotalLicenseCount
 }
 return 0
}

// Request message for getting a
 license pool.
type GetLicensePoolRequest struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. The name of the license pool to get.
 // Format: `billingAccounts/{billing_account}/orders/{order}/licensePool`
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
}

func (x *GetLicensePoolRequest) Reset() {
 *x = GetLicensePoolRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[2]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *GetLicensePoolRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*GetLicensePoolRequest) ProtoMessage() {}

func (x *GetLicensePoolRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[2]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if
 ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}
```

```
// Deprecated: Use GetLicensePoolRequest.ProtoReflect.Descriptor instead.
func (*GetLicensePoolRequest) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{2}
}

func (x *GetLicensePoolRequest) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
}

// Request message for updating a license pool.
type UpdateLicensePoolRequest struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. The license pool to update.
 //
 // The license pool's name field is used to identify the license pool to
 // update. Format:
 // `billingAccounts/{billing_account}/orders/{order}/licensePool`.
 LicensePool *LicensePool `protobuf:"bytes,1,opt,name=license_pool,json=licensePool,proto3"
json:"license_pool,omitempty"`
 //
 Required. The list of fields to update.
 UpdateMask *fieldmaskpb.FieldMask `protobuf:"bytes,2,opt,name=update_mask,json=updateMask,proto3"
json:"update_mask,omitempty"`
}

func (x *UpdateLicensePoolRequest) Reset() {
 *x = UpdateLicensePoolRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[3]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *UpdateLicensePoolRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UpdateLicensePoolRequest) ProtoMessage() {}
```

```
func (x *UpdateLicensePoolRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[3]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use UpdateLicensePoolRequest.ProtoReflect.Descriptor
 instead.
func (*UpdateLicensePoolRequest) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{3}
}

func (x *UpdateLicensePoolRequest) GetLicensePool() *LicensePool {
 if x != nil {
  return x.LicensePool
 }
 return nil
}

func (x *UpdateLicensePoolRequest) GetUpdateMask() *fieldmaskpb.FieldMask {
 if x != nil {
  return x.UpdateMask
 }
 return nil
}

// Request message for
//
[LicenseManagementService.Assign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementServic
e.Assign].
type AssignRequest struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. License pool name.
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Required. Username.
 // Format: `name@domain.com`.
```

```
 Usernames []string `protobuf:"bytes,2,rep,name=usernames,proto3" json:"usernames,omitempty"`
}

func
 (x *AssignRequest) Reset() {
 *x = AssignRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[4]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *AssignRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*AssignRequest) ProtoMessage() {}

func (x *AssignRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[4]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use AssignRequest.ProtoReflect.Descriptor instead.
func (*AssignRequest) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{4}
}

func (x *AssignRequest) GetParent()
 string {
 if x != nil {
  return x.Parent
 }
 return ""
}

func (x *AssignRequest) GetUsernames() []string {
 if x != nil {
```

```
  return x.Username s
 }
 return nil
}

// Response message for
//
[LicenseManagementService.Assign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementServic
e.Assign].
type AssignResponse struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields
}

func (x *AssignResponse) Reset() {
 *x = AssignResponse{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[5]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *AssignResponse) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*AssignResponse) ProtoMessage() {}

func (x *AssignResponse) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[5]
 if x
 != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use AssignResponse.ProtoReflect.Descriptor instead.
func (*AssignResponse) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{5}
```

```
}

// Request message for
//
[LicenseManagementService.Unassign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementSer
vice.Unassign].
type UnassignRequest struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. License pool name.
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Required. Username.
 // Format: `name@domain.com`.
 Usernames []string `protobuf:"bytes,2,rep,name=usernames,proto3" json:"usernames,omitempty"`
}

func (x *UnassignRequest) Reset()
 {
 *x = UnassignRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[6]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *UnassignRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UnassignRequest) ProtoMessage() {}

func (x *UnassignRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[6]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use UnassignRequest.ProtoReflect.Descriptor instead.
func (*UnassignRequest) Descriptor() ([]byte, []int) {
```

```
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{6}
}

func (x *UnassignRequest) GetParent() string {
 if x != nil {
  return
 x.Parent
 }
 return ""
}

func (x *UnassignRequest) GetUsernames() []string {
 if x != nil {
  return x.Usernames
 }
 return nil
}

// Response message for
//
[LicenseManagementService.Unassign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementSer
vice.Unassign].
type UnassignResponse struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields
}

func (x *UnassignResponse) Reset() {
 *x = UnassignResponse{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[7]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *UnassignResponse) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UnassignResponse) ProtoMessage() {}

func (x *UnassignResponse) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[7]
 if x != nil {
```

```
  ms
 := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use UnassignResponse.ProtoReflect.Descriptor instead.
func (*UnassignResponse) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{7}
}

// Request message for
//
[LicenseManagementService.EnumerateLicensedUsers][google.cloud.commerce.consumer.procurement.v1.License
ManagementService.EnumerateLicensedUsers].
type EnumerateLicensedUsersRequest struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Required. License pool name.
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Optional. The maximum number of users to return. The service may return
 // fewer than this value.
 PageSize int32 `protobuf:"varint,2,opt,name=page_size,json=pageSize,proto3"
 json:"page_size,omitempty"`
 // Optional. A page token, received from a previous `EnumerateLicensedUsers`
 // call. Provide this to retrieve the subsequent page.
 PageToken string `protobuf:"bytes,3,opt,name=page_token,json=pageToken,proto3" json:"page_token,omitempty"`
}

func (x *EnumerateLicensedUsersRequest) Reset() {
 *x = EnumerateLicensedUsersRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[8]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *EnumerateLicensedUsersRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}
```

```
func (*EnumerateLicensedUsersRequest) ProtoMessage() {}

func (x *EnumerateLicensedUsersRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[8]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo()
 == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use EnumerateLicensedUsersRequest.ProtoReflect.Descriptor instead.
func (*EnumerateLicensedUsersRequest) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{8}
}

func (x *EnumerateLicensedUsersRequest) GetParent() string {
 if x != nil {
  return x.Parent
 }
 return ""
}

func (x *EnumerateLicensedUsersRequest) GetPageSize() int32 {
 if x != nil {
  return x.PageSize
 }
 return 0
}

func (x *EnumerateLicensedUsersRequest) GetPageToken() string {
 if x != nil {
  return x.PageToken
 }
 return ""
}

// A licensed user.
type LicensedUser struct {
 state        protoimpl.MessageState
```

```
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Username.
 // Format: `name@domain.com`.
 Username string `protobuf:"bytes,1,opt,name=username,proto3" json:"username,omitempty"`
 //
 Output only. Timestamp when the license was assigned.
 AssignTime *timestamppb.Timestamp `protobuf:"bytes,2,opt,name=assign_time,json=assignTime,proto3"
json:"assign_time,omitempty"`
 // Output only. Timestamp when the license was recently used. This may not be
 // the most recent usage time, and will be updated regularly (within 24
 // hours).
 RecentUsageTime *timestamppb.Timestamp
`protobuf:"bytes,3,opt,name=recent_usage_time,json=recentUsageTime,proto3"
json:"recent_usage_time,omitempty"`
}

func (x *LicensedUser) Reset() {
 *x = LicensedUser{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[9]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *LicensedUser) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*LicensedUser) ProtoMessage() {}

func (x *LicensedUser) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[9]
 if
 x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use LicensedUser.ProtoReflect.Descriptor instead.
func (*LicensedUser) Descriptor() ([]byte, []int) {
```

```
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{9}
}

func (x *LicensedUser) GetUsername() string {
 if x != nil {
  return x.Username
 }
 return ""
}

func (x *LicensedUser) GetAssignTime() *timestamppb.Timestamp {
 if x != nil {
  return x.AssignTime
 }
 return nil
}

func (x *LicensedUser) GetRecentUsageTime() *timestamppb.Timestamp {
 if x != nil {
  return x.RecentUsageTime
 }
 return nil
}

// Response message for
//
[LicenseManagementService.EnumerateLicensedUsers][google.cloud.commerce.consumer.procurement.v1.License
ManagementService.EnumerateLicensedUsers].
type EnumerateLicensedUsersResponse
 struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // The list of licensed users.
 LicensedUsers []*LicensedUser `protobuf:"bytes,1,rep,name=licensed_users,json=licensedUsers,proto3"
json:"licensed_users,omitempty"`
 // A token that can be sent as `page_token` to retrieve the next page.
 // If this field is omitted, there are no subsequent pages.
 NextPageToken string `protobuf:"bytes,2,opt,name=next_page_token,json=nextPageToken,proto3"
json:"next_page_token,omitempty"`
}

func (x *EnumerateLicensedUsersResponse) Reset() {
 *x = EnumerateLicensedUsersResponse{}
 mi :=
```

```
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[10]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *EnumerateLicensedUsersResponse) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*EnumerateLicensedUsersResponse) ProtoMessage() {}

func
 (x *EnumerateLicensedUsersResponse) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[10]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use EnumerateLicensedUsersResponse.ProtoReflect.Descriptor instead.
func (*EnumerateLicensedUsersResponse) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{10}
}

func (x *EnumerateLicensedUsersResponse) GetLicensedUsers() []*LicensedUser {
 if x != nil {
  return x.LicensedUsers
 }
 return nil
}

func (x *EnumerateLicensedUsersResponse) GetNextPageToken() string {
 if x != nil {
  return x.NextPageToken
 }
 return ""
}

// Allow manual assignments triggered by administrative operations only.
type AssignmentProtocol_ManualAssignmentType
```

```
 struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields
}

func (x *AssignmentProtocol_ManualAssignmentType) Reset() {
 *x = AssignmentProtocol_ManualAssignmentType{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[11]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *AssignmentProtocol_ManualAssignmentType) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*AssignmentProtocol_ManualAssignmentType) ProtoMessage() {}

func (x *AssignmentProtocol_ManualAssignmentType) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[11]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated:
 Use AssignmentProtocol_ManualAssignmentType.ProtoReflect.Descriptor instead.
func (*AssignmentProtocol_ManualAssignmentType) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{0, 0}
}

// Configuration for automatic assignments handled by data plane operations.
type AssignmentProtocol_AutoAssignmentType struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Optional. The time to live for an inactive license. After this time has
```

```
 // passed, the license will be automatically unassigned from the user. Must
 // be at least 7 days, if set. If unset, the license will never expire.
 InactiveLicenseTtl *durationpb.Duration
`protobuf:"bytes,1,opt,name=inactive_license_ttl,json=inactiveLicenseTtl,proto3"
json:"inactive_license_ttl,omitempty"`
}

func (x *AssignmentProtocol_AutoAssignmentType) Reset() {
 *x = AssignmentProtocol_AutoAssignmentType{}
 mi
 := &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[12]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *AssignmentProtocol_AutoAssignmentType) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*AssignmentProtocol_AutoAssignmentType) ProtoMessage() {}

func (x *AssignmentProtocol_AutoAssignmentType) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[12]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use AssignmentProtocol_AutoAssignmentType.ProtoReflect.Descriptor instead.
func (*AssignmentProtocol_AutoAssignmentType) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
 []int{0, 1}
}

func (x *AssignmentProtocol_AutoAssignmentType) GetInactiveLicenseTtl() *durationpb.Duration {
 if x != nil {
  return x.InactiveLicenseTtl
 }
 return nil
}
```

```
var File_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto
protoreflect.FileDescriptor

var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc =
[]byte{
 0x0a, 0x4e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2f, 0x63,
 0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2f, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72,
 0x2f, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2f, 0x76, 0x31, 0x2f,
 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x5f, 0x6d, 0x61, 0x6e, 0x61, 0x67, 0x65, 0x6d, 0x65,
 0x6e, 0x74, 0x5f, 0x73, 0x65, 0x72, 0x76, 0x69, 0x63, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f,
 0x12, 0x2d, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x63,
 0x6f,
 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2e, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72,
 0x2e, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x76, 0x31, 0x1a,
 0x1c, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x61, 0x6e, 0x6e, 0x6f,
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 0x02, 0x2d, 0x47, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x43, 0x6c, 0x6f, 0x75,
 0x64, 0x2e, 0x43,
 0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2e, 0x43, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72,
 0x2e, 0x50, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x56, 0x31, 0xca,
 0x02, 0x2d, 0x47, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x5c, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x5c, 0x43,
 0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x5c, 0x43, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72,
 0x5c, 0x50, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x5c, 0x56, 0x31, 0xea,
 0x02, 0x32, 0x47, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x3a, 0x3a, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x3a,
 0x3a, 0x43, 0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x3a, 0x3a, 0x43, 0x6f, 0x6e, 0x73, 0x75,
 0x6d, 0x65, 0x72, 0x3a, 0x3a, 0x50, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74,
 0x3a, 0x3a, 0x56, 0x31, 0x62, 0x06, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x33,
}

var (
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescOnce
sync.Once
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescData
 = file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc
)

func
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP()
[]byte {
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescOnce.Do(f
unc() {
  file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_cloud_commerce_consumer_procurement_v1_license_management_servi
ce_proto_rawDescData)
 })
```

```
 return file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescData
}

var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes =
make([]protoimpl.MessageInfo, 13)
var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_goTypes =
[]any{
 (*AssignmentProtocol)(nil),
                    // 0: google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol
 (*LicensePool)(nil),                        // 1: google.cloud.commerce.consumer.procurement.v1.LicensePool
 (*GetLicensePoolRequest)(nil),                  // 2:
google.cloud.commerce.consumer.procurement.v1.GetLicensePoolRequest
 (*UpdateLicensePoolRequest)(nil),               // 3:
google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest
 (*AssignRequest)(nil),                      // 4: google.cloud.commerce.consumer.procurement.v1.AssignRequest
 (*AssignResponse)(nil),                      // 5: google.cloud.commerce.consumer.procurement.v1.AssignResponse
 (*UnassignRequest)(nil),                     // 6: google.cloud.commerce.consumer.procurement.v1.UnassignRequest
 (*UnassignResponse)(nil),                     // 7: google.cloud.commerce.consumer.procurement.v1.UnassignResponse
 (*EnumerateLicensedUsersRequest)(nil),          // 8:
google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersRequest
 (*LicensedUser)(nil),
                        // 9: google.cloud.commerce.consumer.procurement.v1.LicensedUser
 (*EnumerateLicensedUsersResponse)(nil),         // 10:
google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersResponse
 (*AssignmentProtocol_ManualAssignmentType)(nil), // 11:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.ManualAssignmentType
 (*AssignmentProtocol_AutoAssignmentType)(nil),   // 12:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.AutoAssignmentType
 (*fieldmaskpb.FieldMask)(nil),                  // 13: google.protobuf.FieldMask
 (*timestamppb.Timestamp)(nil),                   // 14: google.protobuf.Timestamp
 (*durationpb.Duration)(nil),                    // 15: google.protobuf.Duration
}
var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_depIdxs =
[]int32{
 11, // 0:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.manual_assignment_type:type_name
 -> google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.ManualAssignmentType
 12, // 1: google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.auto_assignment_type:type_name -
> google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.AutoAssignmentType
 0,  // 2: google.cloud.commerce.consumer.procurement.v1.LicensePool.license_assignment_protocol:type_name ->
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol
 1,  // 3: google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest.license_pool:type_name ->
google.cloud.commerce.consumer.procurement.v1.LicensePool
 13, // 4: google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest.update_mask:type_name ->
google.protobuf.FieldMask
 14, // 5: google.cloud.commerce.consumer.procurement.v1.LicensedUser.assign_time:type_name ->
google.protobuf.Timestamp
 14, // 6: google.cloud.commerce.consumer.procurement.v1.LicensedUser.recent_usage_time:type_name
```

```
 -> google.protobuf.Timestamp
 9,  // 7:
google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersResponse.licensed_users:type_name ->
google.cloud.commerce.consumer.procurement.v1.LicensedUser
 15, // 8:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.AutoAssignmentType.inactive_license_ttl:t
ype_name -> google.protobuf.Duration
 2,  // 9: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.GetLicensePool:input_type -
> google.cloud.commerce.consumer.procurement.v1.GetLicensePoolRequest
 3,  // 10:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.UpdateLicensePool:input_type ->
google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest
 4,  // 11: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Assign:input_type ->
google.cloud.commerce.consumer.procurement.v1.AssignRequest
 6,  // 12: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Unassign:input_type
 -> google.cloud.commerce.consumer.procurement.v1.UnassignRequest
 8,  // 13:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.EnumerateLicensedUsers:input_typ
e -> google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersRequest
 1,  // 14:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.GetLicensePool:output_type ->
google.cloud.commerce.consumer.procurement.v1.LicensePool
 1,  // 15:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.UpdateLicensePool:output_type ->
google.cloud.commerce.consumer.procurement.v1.LicensePool
 5,  // 16: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Assign:output_type ->
google.cloud.commerce.consumer.procurement.v1.AssignResponse
 7,  // 17: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Unassign:output_type ->
google.cloud.commerce.consumer.procurement.v1.UnassignResponse
 10, // 18:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.EnumerateLicensedUsers:output_ty
pe
 -> google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersResponse
 14, // [14:19] is the sub-list for method output_type
 9,  // [9:14] is the sub-list for method input_type
 9,  // [9:9] is the sub-list for extension type_name
 9,  // [9:9] is the sub-list for extension extendee
 0,  // [0:9] is the sub-list for field type_name
}

func init() {
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_init()
}
func file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_init() {
 if File_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto != nil {
  return
 }
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[0].Oneof
```

```
Wrappers = []any{
  (*AssignmentProtocol_ManualAssignmentType_)(nil),
  (*AssignmentProtocol_AutoAssignmentType_)(nil),
 }
 type x struct{}
 out := protoimpl.TypeBuilder{
  File:
 protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor:
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc,
   NumEnums:      0,
   NumMessages:   13,
   NumExtensions: 0,
   NumServices:   1,
  },
  GoTypes:
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_goTypes,
  DependencyIndexes:
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_depIdxs,
  MessageInfos:
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes,
 }.Build()
 File_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto = out.File
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc = nil
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_goTypes = nil
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_depIdxs
 = nil
}

// Reference imports to suppress errors if they are not otherwise used.
var _ context.Context
var _ grpc.ClientConnInterface

// This is a compile-time assertion to ensure that this generated file
// is compatible with the grpc package it is being compiled against.
const _ = grpc.SupportPackageIsVersion6

// LicenseManagementServiceClient is the client API for LicenseManagementService service.
//
// For semantics around ctx use and closing/ending streaming RPCs, please refer to
https://godoc.org/google.golang.org/grpc#ClientConn.NewStream.
type LicenseManagementServiceClient interface {
 // Gets the license pool.
 GetLicensePool(ctx context.Context, in *GetLicensePoolRequest, opts ...grpc.CallOption) (*LicensePool, error)
 // Updates the license pool if one exists for this Order.
 UpdateLicensePool(ctx context.Context, in *UpdateLicensePoolRequest, opts ...grpc.CallOption) (*LicensePool,
error)
```

```
 // Assigns a license to a user.
 Assign(ctx
 context.Context, in *AssignRequest, opts ...grpc.CallOption) (*AssignResponse, error)
 // Unassigns a license from a user.
 Unassign(ctx context.Context, in *UnassignRequest, opts ...grpc.CallOption) (*UnassignResponse, error)
 // Enumerates all users assigned a license.
 EnumerateLicensedUsers(ctx context.Context, in *EnumerateLicensedUsersRequest, opts ...grpc.CallOption)
(*EnumerateLicensedUsersResponse, error)
}

type licenseManagementServiceClient struct {
 cc grpc.ClientConnInterface
}

func NewLicenseManagementServiceClient(cc grpc.ClientConnInterface) LicenseManagementServiceClient {
 return &licenseManagementServiceClient{cc}
}

func (c *licenseManagementServiceClient) GetLicensePool(ctx context.Context, in *GetLicensePoolRequest, opts
...grpc.CallOption) (*LicensePool, error) {
 out := new(LicensePool)
 err := c.cc.Invoke(ctx,
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/GetLicensePool", in, out, opts...)
 if err != nil {
  return nil, err
 }
 return
 out, nil
}

func (c *licenseManagementServiceClient) UpdateLicensePool(ctx context.Context, in
*UpdateLicensePoolRequest, opts ...grpc.CallOption) (*LicensePool, error) {
 out := new(LicensePool)
 err := c.cc.Invoke(ctx,
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/UpdateLicensePool", in, out,
opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

func (c *licenseManagementServiceClient) Assign(ctx context.Context, in *AssignRequest, opts ...grpc.CallOption)
(*AssignResponse, error) {
 out := new(AssignResponse)
 err := c.cc.Invoke(ctx, "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Assign", in,
out, opts...)
 if err != nil {
```

```
  return nil, err
 }
 return out, nil
}

func (c *licenseManagementServiceClient) Unassign(ctx context.Context, in *UnassignRequest, opts
...grpc.CallOption) (*UnassignResponse, error) {
 out := new(UnassignResponse)
 err := c.cc.Invoke(ctx, "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Unassign",
 in, out, opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

func (c *licenseManagementServiceClient) EnumerateLicensedUsers(ctx context.Context, in
*EnumerateLicensedUsersRequest, opts ...grpc.CallOption) (*EnumerateLicensedUsersResponse, error) {
 out := new(EnumerateLicensedUsersResponse)
 err := c.cc.Invoke(ctx,
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/EnumerateLicensedUsers", in, out,
opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

// LicenseManagementServiceServer is the server API for LicenseManagementService service.
type LicenseManagementServiceServer interface {
 // Gets the license pool.
 GetLicensePool(context.Context, *GetLicensePoolRequest) (*LicensePool, error)
 // Updates the license pool if one exists for this Order.
 UpdateLicensePool(context.Context, *UpdateLicensePoolRequest) (*LicensePool, error)
 // Assigns a license to a user.
 Assign(context.Context, *AssignRequest)
 (*AssignResponse, error)
 // Unassigns a license from a user.
 Unassign(context.Context, *UnassignRequest) (*UnassignResponse, error)
 // Enumerates all users assigned a license.
 EnumerateLicensedUsers(context.Context, *EnumerateLicensedUsersRequest)
(*EnumerateLicensedUsersResponse, error)
}

// UnimplementedLicenseManagementServiceServer can be embedded to have forward compatible
implementations.
type UnimplementedLicenseManagementServiceServer struct {
}
```

```
func (*UnimplementedLicenseManagementServiceServer) GetLicensePool(context.Context,
*GetLicensePoolRequest) (*LicensePool, error) {
 return nil, status.Errorf(codes.Unimplemented, "method GetLicensePool not implemented")
}
func (*UnimplementedLicenseManagementServiceServer) UpdateLicensePool(context.Context,
*UpdateLicensePoolRequest) (*LicensePool, error) {
 return nil, status.Errorf(codes.Unimplemented, "method UpdateLicensePool not implemented")
}
func (*UnimplementedLicenseManagementServiceServer) Assign(context.Context, *AssignRequest)
 (*AssignResponse, error) {
 return nil, status.Errorf(codes.Unimplemented, "method Assign not implemented")
}
func (*UnimplementedLicenseManagementServiceServer) Unassign(context.Context, *UnassignRequest)
(*UnassignResponse, error) {
 return nil, status.Errorf(codes.Unimplemented, "method Unassign not implemented")
}
func (*UnimplementedLicenseManagementServiceServer) EnumerateLicensedUsers(context.Context,
*EnumerateLicensedUsersRequest) (*EnumerateLicensedUsersResponse, error) {
 return nil, status.Errorf(codes.Unimplemented, "method EnumerateLicensedUsers not implemented")
}

func RegisterLicenseManagementServiceServer(s *grpc.Server, srv LicenseManagementServiceServer) {
 s.RegisterService(&_LicenseManagementService_serviceDesc, srv)
}

func _LicenseManagementService_GetLicensePool_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(GetLicensePoolRequest)
 if err := dec(in);
 err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(LicenseManagementServiceServer).GetLicensePool(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/GetLicensePool",
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(LicenseManagementServiceServer).GetLicensePool(ctx, req.(*GetLicensePoolRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_UpdateLicensePool_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
```

```
 in := new(UpdateLicensePoolRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(LicenseManagementServiceServer).UpdateLicensePool(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/UpdateLicensePool",
 }
 handler
 := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(LicenseManagementServiceServer).UpdateLicensePool(ctx, req.(*UpdateLicensePoolRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_Assign_Handler(srv interface{}, ctx context.Context, dec func(interface{})
error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(AssignRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(LicenseManagementServiceServer).Assign(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Assign",
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(LicenseManagementServiceServer).Assign(ctx, req.(*AssignRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_Unassign_Handler(srv
 interface{}, ctx context.Context, dec func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{},
error) {
 in := new(UnassignRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(LicenseManagementServiceServer).Unassign(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
```

```
 Server:     srv,
 FullMethod: "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Unassign",
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(LicenseManagementServiceServer).Unassign(ctx, req.(*UnassignRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_EnumerateLicensedUsers_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(EnumerateLicensedUsersRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if
 interceptor == nil {
  return srv.(LicenseManagementServiceServer).EnumerateLicensedUsers(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod:
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/EnumerateLicensedUsers",
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(LicenseManagementServiceServer).EnumerateLicensedUsers(ctx,
req.(*EnumerateLicensedUsersRequest))
 }
 return interceptor(ctx, in, info, handler)
}

var _LicenseManagementService_serviceDesc = grpc.ServiceDesc{
 ServiceName: "google.cloud.commerce.consumer.procurement.v1.LicenseManagementService",
 HandlerType: (*LicenseManagementServiceServer)(nil),
 Methods: []grpc.MethodDesc{
  {
   MethodName: "GetLicensePool",
   Handler:    _LicenseManagementService_GetLicensePool_Handler,
  },
  {
   MethodName: "UpdateLicensePool",
   Handler:    _LicenseManagementService_UpdateLicensePool_Handler,
  },
  {
   MethodName: "Assign",
   Handler:
    _LicenseManagementService_Assign_Handler,
  },
```

```
 {
  MethodName: "Unassign",
  Handler:    _LicenseManagementService_Unassign_Handler,
 },
 {
  MethodName: "EnumerateLicensedUsers",
  Handler:    _LicenseManagementService_EnumerateLicensedUsers_Handler,
 },
},
Streams:  []grpc.StreamDesc{},
Metadata: "google/cloud/commerce/consumer/procurement/v1/license_management_service.proto",
}
```

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////

ca-legacy(8)
==========
:doctype: manpage

:man source: ca-legacy

NAME
---
ca-legacy - Manage the system configuration for legacy CA certificates

SYNOPSIS
---
*ca-legacy* ['COMMAND']

DESCRIPTION
---
ca-legacy(8) is used to include or exclude a set of legacy Certificate Authority (CA)
certificates in the system's list of trusted CA certificates.

The list of CA certificates and trust flags
included in the ca-certificates package
are based on the decisions made by Mozilla.org according to the Mozilla CA policy.

Occasionally, removal or distrust decisions made by Mozilla.org might be incompatible with the requirements
or limitations of some applications that also use the CA certificates list in the Linux environment.

The ca-certificates package might keep some CA certificates included and trusted by default,
as long as it is seen necessary by the maintainers, despite the fact that they have
been removed by Mozilla. These certificates are called legacy CA certificates.

The general requirements to keep legacy CA certificates included and trusted might change over time,
for example if functional limitations of software packages have been resolved.
Future versions of the ca-certificates package might reduce the set of legacy CA certificates
that are included and trusted by default.

The ca-legacy(8) command can be used to override the default behaviour.

The mechanisms
to individually trust or distrust CA certificates as described in update-ca-trust(8) still apply.

COMMANDS
---
*check*::
The current configuration will be shown.

*default*::
Configure the system to use the default configuration, as recommended
by the package maintainers.

*disable*::
Configure the system to explicitly disable legacy CA certificates.
Using this configuration, the system will use the set of
included and trusted CA certificates as released by Mozilla.

*install*::
The configuration file will be read and the system configuration
will be set accordingly. This command is executed automatically during
upgrades of the ca-certificates package.

FILES
---
/etc/pki/ca-trust/ca-legacy.conf::
A configuration file that will be used and modified by the ca-legacy command.
The contents of the configuration file will be read on package upgrades.

AUTHOR
---
Written by Kai Engert.

Found in path(s):
* /ca-certificates-2024.2.69_v8.0.303-91.4.el9_4.src.rpm-cosi-expand-archive-UkBj2Hnl/ca-legacy.8.txt
No license file was found, but licenses were detected in source scan.

```
#
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# file, You can obtain one at http://mozilla.org/MPL/2.0/.

#
# certdata.txt
#
# This file contains the object definitions for the certs and other
# information "built into" NSS.
#
# Object definitions:
#
#    Certificates
#
#  -- Attribute --              -- type --          -- value --
#  CKA_CLASS                    CK_OBJECT_CLASS     CKO_CERTIFICATE
#  CKA_TOKEN                    CK_BBOOL            CK_TRUE
#  CKA_PRIVATE                  CK_BBOOL            CK_FALSE
#  CKA_MODIFIABLE               CK_BBOOL            CK_FALSE
#  CKA_LABEL                    UTF8                (varies)
#  CKA_CERTIFICATE_TYPE         CK_CERTIFICATE_TYPE CKC_X_509
```

```
#  CKA_SUBJECT                  DER+base64         (varies)
#  CKA_ID                       byte array         (varies)
#
  CKA_ISSUER                   DER+base64         (varies)
#  CKA_SERIAL_NUMBER            DER+base64         (varies)
#  CKA_VALUE                    DER+base64         (varies)
#  CKA_NSS_EMAIL                ASCII7             (unused here)
#  CKA_NSS_SERVER_DISTRUST_AFTER DER+base64        (varies)
#  CKA_NSS_EMAIL_DISTRUST_AFTER  DER+base64        (varies)
#
#    Trust
#
#  -- Attribute --             -- type --         -- value --
#  CKA_CLASS                    CK_OBJECT_CLASS    CKO_TRUST
#  CKA_TOKEN                    CK_BBOOL           CK_TRUE
#  CKA_PRIVATE                  CK_BBOOL           CK_FALSE
#  CKA_MODIFIABLE               CK_BBOOL           CK_FALSE
#  CKA_LABEL                    UTF8               (varies)
#  CKA_ISSUER                   DER+base64         (varies)
#  CKA_SERIAL_NUMBER            DER+base64         (varies)
#  CKA_CERT_HASH                binary+base64      (varies)
#  CKA_EXPIRES                  CK_DATE
  (not used here)
#  CKA_TRUST_DIGITAL_SIGNATURE  CK_TRUST           (varies)
#  CKA_TRUST_NON_REPUDIATION    CK_TRUST           (varies)
#  CKA_TRUST_KEY_ENCIPHERMENT   CK_TRUST           (varies)
#  CKA_TRUST_DATA_ENCIPHERMENT  CK_TRUST           (varies)
#  CKA_TRUST_KEY_AGREEMENT      CK_TRUST           (varies)
#  CKA_TRUST_KEY_CERT_SIGN      CK_TRUST           (varies)
#  CKA_TRUST_CRL_SIGN           CK_TRUST           (varies)
#  CKA_TRUST_SERVER_AUTH        CK_TRUST           (varies)
#  CKA_TRUST_CLIENT_AUTH        CK_TRUST           (varies)
#  CKA_TRUST_CODE_SIGNING       CK_TRUST           (varies)
#  CKA_TRUST_EMAIL_PROTECTION   CK_TRUST           (varies)
#  CKA_TRUST_IPSEC_END_SYSTEM   CK_TRUST           (varies)
#  CKA_TRUST_IPSEC_TUNNEL       CK_TRUST           (varies)
#  CKA_TRUST_IPSEC_USER         CK_TRUST           (varies)
#  CKA_TRUST_TIME_STAMPING      CK_TRUST           (varies)
#  CKA_TRUST_STEP_UP_APPROVED   CK_BBOOL           (varies)
#  (other
 trust attributes can be defined)
#

#
# The object to tell NSS that this is a root list and we don't
# have to go looking for others.
#
BEGINDATA
```

```
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_BUILTIN_ROOT_LIST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Mozilla Builtin Roots"

#
# Certificate "GlobalSign Root CA"
#
# Issuer: CN=GlobalSign Root CA,OU=Root CA,O=GlobalSign nv-sa,C=BE
# Serial Number:04:00:00:00:00:01:15:4b:5a:c3:94
# Subject: CN=GlobalSign Root CA,OU=Root CA,O=GlobalSign nv-sa,C=BE
# Not Valid Before: Tue Sep 01 12:00:00 1998
# Not Valid After : Fri Jan 28 12:00:00 2028
# Fingerprint (SHA-256):
EB:D4:10:40:E4:BB:3E:C7:42:C9:E3:81:D3:1E:F2:A4:1A:48:B6:68:5C:96:E7:CE:F3:C1:DF:6C:D4:33:1C:99
# Fingerprint (SHA1): B1:BC:96:8B:D4:F4:9D:62:2A:A8:9A:81:F2:15:01:52:A4:1D:82:9C
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign
 Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\127\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\020\060\016\006\003
\125\004\013\023\007\122\157\157\164\040\103\101\061\033\060\031
\006\003\125\004\003\023\022\107\154\157\142\141\154\123\151\147
\156\040\122\157\157\164\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\127\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\020\060\016\006\003
\125\004\013\023\007\122\157\157\164\040\103\101\061\033\060\031
\006\003\125\004\003\023\022\107\154\157\142\141\154\123\151\147
\156\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\025\113\132\303\224
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\165\060\202\002\135\240\003\002\001\002\002\013\004
\000\000\000\000\001\025\113\132\303\224\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\060\127\061\013\060\011\006
```

\003\125\004\006\023\002\102\105\061\031\060\027\006\003\125\004
\012\023\020\107\154\157\142\141\154\123\151\147\156\040\156\166
\055\163\141\061\020\060\016\006\003\125\004\013\023\007\122\157
\157\164\040\103\101\061\033\060\031\006\003\125\004\003\023\022
\107\154\157\142\141\154\123\151\147\156\040\122\157\157\164\040
\103\101\060\036\027\015\071\070\060\071\060\061\061\062\060\060
\060\060\132\027\015\062\070\060\061\062\070\061\062\060\060\060
\060\132\060\127\061\013\060\011\006\003\125\004\006\023\002\102
\105\061\031\060\027\006\003\125\004\012\023\020\107\154\157\142
\141\154\123\151\147\156\040\156\166\055\163\141\061\020\060\016
\006\003\125\004\013\023\007\122\157\157\164\040\103\101\061\033
\060\031\006\003\125\004\003\023\022\107\154\157\142\141\154\123
\151\147\156\040\122\157\157\164\040\103\101\060\202\001\042\060
\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202
\001\017\000\060\202\001\012\002\202\001\001\000\332\016\346\231
\215\316\243\343\117\212\176\373\361\213\203\045\153\352\110\037
\361\052\260\271\225\021\004\275\360\143\321\342\147\146\317\034
\335\317\033\110\053\356\215\211\216\232\257\051\200\145\253\351
\307\055\022\313\253\034\114\160\007\241\075\012\060\315\025\215
\117\370\335\324\214\120\025\034\357\120\356\304\056\367\374\351
\122\362\221\175\340\155\325\065\060\216\136\103\163\362\101\351
\325\152\343\262\211\072\126\071\070\157\006\074\210\151\133\052
\115\305\247\124\270\154\211\314\233\371\074\312\345\375\211\365
\022\074\222\170\226\326\334\164\156\223\104\141\321\215\307\106
\262\165\016\206\350\031\212\325\155\154\325\170\026\225\242\351
\310\012\070\353\362\044\023\117\163\124\223\023\205\072\033\274
\036\064\265\213\005\214\271\167\213\261\333\037\040\221\253\011
\123\156\220\316\173\067\164\271\160\107\221\042\121\143\026\171
\256\261\256\101\046\010\310\031\053\321\106\252\110\326\144\052
\327\203\064\377\054\052\301\154\031\103\112\007\205\347\323\174
\366\041\150\357\352\362\122\237\177\223\220\317\002\003\001\000
\001\243\102\060\100\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004
\024\140\173\146\032\105\015\227\312\211\120\057\175\004\315\064
\250\377\374\375\113\060\015\006\011\052\206\110\206\367\015\001
\001\005\005\000\003\202\001\001\000\326\163\347\174\117\166\320
\215\277\354\272\242\276\064\305\050\062\265\174\374\154\234\054
\053\275\011\236\123\277\153\136\252\021\110\266\345\010\243\263
\312\075\141\115\323\106\011\263\076\303\240\343\143\125\033\362
\272\357\255\071\341\103\271\070\243\346\057\212\046\073\357\240
\120\126\371\306\012\375\070\315\304\013\160\121\224\227\230\004
\337\303\137\224\325\025\311\024\101\234\304\135\165\144\025\015
\377\125\060\354\206\217\377\015\357\054\271\143\106\366\252\374
\337\274\151\375\056\022\110\144\232\340\225\360\246\357\051\217
\001\261\025\265\014\035\245\376\151\054\151\044\170\036\263\247
\034\161\142\356\312\310\227\254\027\135\212\302\370\107\206\156
\052\304\126\061\225\320\147\211\205\053\371\154\246\135\106\235

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\014\252\202\344\231\121\335\160\267\333\126\075\141\344\152\341
\134\326\366\376\075\336\101\314\007\256\143\122\277\123\123\364
\053\351\307\375\266\367\202\137\205\322\101\030\333\201\263\004
\034\305\037\244\200\157\025\040\311\336\014\210\012\035\326\146
\125\342\374\110\311\051\046\151\340
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "GlobalSign Root CA"
# Issuer: CN=GlobalSign Root CA,OU=Root CA,O=GlobalSign nv-sa,C=BE
# Serial Number:04:00:00:00:00:01:15:4b:5a:c3:94
# Subject: CN=GlobalSign Root CA,OU=Root CA,O=GlobalSign nv-sa,C=BE
# Not Valid Before: Tue Sep 01 12:00:00 1998
#
 Not Valid After : Fri Jan 28 12:00:00 2028
# Fingerprint (SHA-256):
EB:D4:10:40:E4:BB:3E:C7:42:C9:E3:81:D3:1E:F2:A4:1A:48:B6:68:5C:96:E7:CE:F3:C1:DF:6C:D4:33:1C:99
# Fingerprint (SHA1): B1:BC:96:8B:D4:F4:9D:62:2A:A8:9A:81:F2:15:01:52:A4:1D:82:9C
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\261\274\226\213\324\364\235\142\052\250\232\201\362\025\001\122
\244\035\202\234
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\076\105\122\025\011\121\222\341\267\135\067\237\261\207\051\212
END
CKA_ISSUER MULTILINE_OCTAL
\060\127\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\020\060\016\006\003
\125\004\013\023\007\122\157\157\164\040\103\101\061\033\060\031
\006\003\125\004\003\023\022\107\154\157\142\141\154\123\151\147
\156\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\025\113\132\303\224
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
```

```
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Entrust.net Premium 2048 Secure Server CA"
#
# Issuer: CN=Entrust.net Certification Authority (2048),OU=(c) 1999 Entrust.net
Limited,OU=www.entrust.net/CPS_2048 incorp. by ref. (limits liab.),O=Entrust.net
# Serial Number: 946069240 (0x3863def8)
# Subject: CN=Entrust.net Certification Authority (2048),OU=(c) 1999 Entrust.net
Limited,OU=www.entrust.net/CPS_2048 incorp. by ref. (limits liab.),O=Entrust.net
# Not Valid Before: Fri Dec 24 17:50:51 1999
# Not Valid After : Tue Jul 24 14:15:12 2029
# Fingerprint (SHA-256):
6D:C4:71:72:E0:1C:BC:B0:BF:62:58:0D:89:5F:E2:B8:AC:9A:D4:F8:73:80:1E:0C:10:B9:C8:37:D2:1E:B1:77
# Fingerprint (SHA1):
 50:30:06:09:1D:97:D4:F5:AE:39:F7:CB:E7:92:7D:7D:65:2D:34:31
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust.net Premium 2048 Secure Server CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\264\061\024\060\022\006\003\125\004\012\023\013\105\156
\164\162\165\163\164\056\156\145\164\061\100\060\076\006\003\125
\004\013\024\067\167\167\167\056\145\156\164\162\165\163\164\056
\156\145\164\057\103\120\123\137\062\060\064\070\040\151\156\143
\157\162\160\056\040\142\171\040\162\145\146\056\040\050\154\151
\155\151\164\163\040\154\151\141\142\056\051\061\045\060\043\006
\003\125\004\013\023\034\050\143\051\040\061\071\071\071\040\105
\156\164\162\165\163\164\056\156\145\164\040\114\151\155\151\164
\145\144\061\063\060\061\006\003\125\004\003\023\052\105\156\164
\162\165\163\164\056\156\145\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\040\050\062\060\064\070\051
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\264\061\024\060\022\006\003\125\004\012\023\013\105\156
\164\162\165\163\164\056\156\145\164\061\100\060\076\006\003\125
\004\013\024\067\167\167\167\056\145\156\164\162\165\163\164\056
\156\145\164\057\103\120\123\137\062\060\064\070\040\151\156\143
\157\162\160\056\040\142\171\040\162\145\146\056\040\050\154\151
\155\151\164\163\040\154\151\141\142\056\051\061\045\060\043\006
\003\125\004\013\023\034\050\143\051\040\061\071\071\071\040\105
\156\164\162\165\163\164\056\156\145\164\040\114\151\155\151\164
\145\144\061\063\060\061\006\003\125\004\003\023\052\105\156\164
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\162\165\163\164\056\156\145\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\040\050\062\060\064\070\051
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\070\143\336\370
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\052\060\202\003\022\240\003\002\001\002\002\004\070
\143\336\370\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\201\264\061\024\060\022\006\003\125\004\012\023\013
\105\156\164\162\165\163\164\056\156\145\164\061\100\060\076\006
\003\125\004\013\024\067\167\167\167\056\145\156\164\162\165\163
\164\056\156\145\164\057\103\120\123\137\062\060\064\070\040\151
\156\143\157\162\160\056\040\142\171\040\162\145\146\056\040\050
\154\151\155\151\164\163\040\154\151\141\142\056\051\061\045\060
\043\006\003\125\004\013\023\034\050\143\051\040\061\071\071\071
\040\105\156\164\162\165\163\164\056\156\145\164\040\114\151\155
\151\164\145\144\061\063\060\061\006\003\125\004\003\023\052\105
\156\164\162\165\163\164\056\156\145\164\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\050\062\060\064\070\051\060\036\027\015\071\071\061
\062\062\064\061\067\065\060\065\061\132\027\015\062\071\060\067
\062\064\061\064\061\065\061\062\132\060\201\264\061\024\060\022
\006\003\125\004\012\023\013\105\156\164\162\165\163\164\056\156
\145\164\061\100\060\076\006\003\125\004\013\024\067\167\167\167
\056\145\156\164\162\165\163\164\056\156\145\164\057\103\120\123
\137\062\060\064\070\040\151\156\143\157\162\160\056\040\142\171
\040\162\145\146\056\040\050\154\151\155\151\164\163\040\154\151
\141\142\056\051\061\045\060\043\006\003\125\004\013\023\034\050
\143\051\040\061\071\071\071\040\105\156\164\162\165\163\164\056
\156\145\164\040\114\151\155\151\164\145\144\061\063\060\061\006
\003\125\004\003\023\052\105\156\164\162\165\163\164\056\156\145
\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040
\101\165\164\150\157\162\151\164\171\040\050\062\060\064\070\051
\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001
\000\255\115\113\251\022\206\262\352\243\040\007\025\026\144\052
\053\113\321\277\013\112\115\216\355\200\166\245\147\267\170\100
\300\163\102\310\150\300\333\123\053\335\136\270\166\230\065\223
\213\032\235\174\023\072\016\037\133\267\036\317\345\044\024\036
\261\201\251\215\175\270\314\153\113\003\361\002\014\334\253\245
\100\044\000\177\164\224\241\235\010\051\263\210\013\365\207\167
\235\125\315\344\303\176\327\152\144\253\205\024\206\225\133\227
\062\120\157\075\310\272\146\014\343\374\275\270\111\301\166\211
\111\031\375\300\250\275\211\243\147\057\306\237\274\161\031\140
\270\055\351\054\311\220\166\146\173\224\342\257\170\326\145\123
\135\074\326\234\262\317\051\003\371\057\244\120\262\324\110\316

\005\062\125\212\375\262\144\114\016\344\230\007\165\333\177\337
\271\010\125\140\205\060\051\371\173\110\244\151\206\343\065\077
\036\206\135\172\172\025\275\357\000\216\025\042\124\027\000\220
\046\223\274\016\111\150\221\277\370\107\323\235\225\102\301\016
\115\337\157\046\317\303\030\041\142\146\103\160\326\325\300\007
\341\002\003\001\000\001\243\102\060\100\060\016\006\003\125\035
\017\001\001\377\004\004\003\002\001\006\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125
\035\016\004\026\004\024\125\344\201\321\021\200\276\330\211\271
\010\243\061\371\241\044\011\026\271\160\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\003\202\001\001\000\073\233
\217\126\233\060\347\123\231\174\172\171\247\115\227\327\031\225
\220\373\006\037\312\063\174\106\143\217\226\146\044\372\100\033
\041\047\312\346\162\163\362\117\376\061\231\375\310\014\114\150
\123\306\200\202\023\230\372\266\255\332\135\075\361\316\156\366
\025\021\224\202\014\356\077\225\257\021\253\017\327\057\336\037
\003\217\127\054\036\311\273\232\032\104\225\353\030\117\246\037
\315\175\127\020\057\233\004\011\132\204\265\156\330\035\072\341
\326\236\321\154\171\136\171\034\024\305\343\320\114\223\073\145
\074\355\337\075\276\246\345\225\032\303\265\031\303\275\136\133
\273\377\043\357\150\031\313\022\223\047\134\003\055\157\060\320
\036\266\032\254\336\132\367\321\252\250\047\246\376\171\201\304
\171\231\063\127\272\022\260\251\340\102\154\223\312\126\336\376
\155\204\013\010\213\176\215\352\327\230\041\306\363\347\074\171
\057\136\234\321\114\025\215\341\354\042\067\314\232\103\013\227
\334\200\220\215\263\147\233\157\110\010\025\126\317\277\361\053
\174\136\232\166\351\131\220\305\174\203\065\021\145\121
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Entrust.net Premium 2048 Secure Server CA"
# Issuer: CN=Entrust.net Certification Authority (2048),OU=(c) 1999 Entrust.net
Limited,OU=www.entrust.net/CPS_2048 incorp. by ref. (limits liab.),O=Entrust.net
# Serial Number: 946069240 (0x3863def8)
# Subject: CN=Entrust.net Certification Authority (2048),OU=(c) 1999 Entrust.net
Limited,OU=www.entrust.net/CPS_2048 incorp. by ref. (limits liab.),O=Entrust.net
# Not Valid Before: Fri Dec 24 17:50:51 1999
# Not Valid After : Tue Jul 24 14:15:12 2029
# Fingerprint (SHA-256):
6D:C4:71:72:E0:1C:BC:B0:BF:62:58:0D:89:5F:E2:B8:AC:9A:D4:F8:73:80:1E:0C:10:B9:C8:37:D2:1E:B1:77
#
Fingerprint (SHA1): 50:30:06:09:1D:97:D4:F5:AE:39:F7:CB:E7:92:7D:7D:65:2D:34:31
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE

```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust.net Premium 2048 Secure Server CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\120\060\006\011\035\227\324\365\256\071\367\313\347\222\175\175
\145\055\064\061
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\356\051\061\274\062\176\232\346\350\265\367\121\264\064\161\220
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\264\061\024\060\022\006\003\125\004\012\023\013\105\156
\164\162\165\163\164\056\156\145\164\061\100\060\076\006\003\125
\004\013\024\067\167\167\167\056\145\156\164\162\165\163\164\056
\156\145\164\057\103\120\123\137\062\060\064\070\040\151\156\143
\157\162\160\056\040\142\171\040\162\145\146\056\040\050\154\151
\155\151\164\163\040\154\151\141\142\056\051\061\045\060\043\006
\003\125\004\013\023\034\050\143\051\040\061\071\071\071\040\105
\156\164\162\165\163\164\056\156\145\164\040\114\151\155\151\164
\145\144\061\063\060\061\006\003\125\004\003\023\052\105\156\164
\162\165\163\164\056\156\145\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\040\050\062\060\064\070\051
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\004\070\143\336\370
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Baltimore CyberTrust Root"
#
# Issuer: CN=Baltimore CyberTrust Root,OU=CyberTrust,O=Baltimore,C=IE
# Serial Number: 33554617 (0x20000b9)
# Subject: CN=Baltimore CyberTrust Root,OU=CyberTrust,O=Baltimore,C=IE
# Not Valid Before: Fri May 12 18:46:00 2000
# Not Valid After : Mon May 12 23:59:00 2025
# Fingerprint (SHA-256):
16:AF:57:A9:F6:76:B0:AB:12:60:95:AA:5E:BA:DE:F2:2A:B3:11:19:D6:44:AC:95:CD:4B:93:DB:F3:F2:6A:EB
#
 Fingerprint (SHA1): D4:DE:20:D0:5E:66:FC:53:FE:1A:50:88:2C:78:DB:28:52:CA:E4:74
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
```

```
CKA_LABEL UTF8 "Baltimore CyberTrust Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\111\105\061
\022\060\020\006\003\125\004\012\023\011\102\141\154\164\151\155
\157\162\145\061\023\060\021\006\003\125\004\013\023\012\103\171
\142\145\162\124\162\165\163\164\061\042\060\040\006\003\125\004
\003\023\031\102\141\154\164\151\155\157\162\145\040\103\171\142
\145\162\124\162\165\163\164\040\122\157\157\164
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\111\105\061
\022\060\020\006\003\125\004\012\023\011\102\141\154\164\151\155
\157\162\145\061\023\060\021\006\003\125\004\013\023\012\103\171
\142\145\162\124\162\165\163\164\061\042\060\040\006\003\125\004
\003\023\031\102\141\154\164\151\155\157\162\145\040\103\171\142
\145\162\124\162\165\163\164\040\122\157\157\164
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\004\002\000\000\271
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\167\060\202\002\137\240\003\002\001\002\002\004\002
\000\000\271\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\132\061\013\060\011\006\003\125\004\006\023\002\111
\105\061\022\060\020\006\003\125\004\012\023\011\102\141\154\164
\151\155\157\162\145\061\023\060\021\006\003\125\004\013\023\012
\103\171\142\145\162\124\162\165\163\164\061\042\060\040\006\003
\125\004\003\023\031\102\141\154\164\151\155\157\162\145\040\103
\171\142\145\162\124\162\165\163\164\040\122\157\157\164\060\036
\027\015\060\060\060\065\061\062\061\070\064\066\060\060\132\027
\015\062\065\060\065\061\062\062\063\065\071\060\060\132\060\132
\061\013\060\011\006\003\125\004\006\023\002\111\105\061\022\060
\020\006\003\125\004\012\023\011\102\141\154\164\151\155\157\162
\145\061\023\060\021\006\003\125\004\013\023\012\103\171\142\145
\162\124\162\165\163\164\061\042\060\040\006\003\125\004\003\023
\031\102\141\154\164\151\155\157\162\145\040\103\171\142\145\162
\124\162\165\163\164\040\122\157\157\164\060\202\001\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001
\017\000\060\202\001\012\002\202\001\001\000\243\004\273\042\253
\230\075\127\350\046\162\232\265\171\324\051\342\341\350\225\200
\261\260\343\133\216\053\051\232\144\337\241\135\355\260\011\005
\155\333\050\056\316\142\242\142\376\264\210\332\022\353\070\353
\041\235\300\101\053\001\122\173\210\167\323\034\217\307\272\271
\210\265\152\011\347\163\350\021\100\247\321\314\312\142\215\055
\345\217\013\246\120\322\250\120\303\050\352\365\253\045\207\212
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\232\226\034\251\147\270\077\014\325\367\371\122\023\057\302\033
\325\160\160\360\217\300\022\312\006\313\232\341\331\312\063\172
\167\326\370\354\271\361\150\104\102\110\023\322\300\302\244\256
\136\140\376\266\246\005\374\264\335\007\131\002\324\131\030\230
\143\365\245\143\340\220\014\175\135\262\006\172\363\205\352\353
\324\003\256\136\204\076\137\377\025\355\151\274\371\071\066\162
\165\317\167\122\115\363\311\220\054\271\075\345\311\043\123\077
\037\044\230\041\134\007\231\051\275\306\072\354\347\156\206\072
\153\227\164\143\063\275\150\030\061\360\170\215\166\277\374\236
\216\135\052\206\247\115\220\334\047\032\071\002\003\001\000\001
\243\105\060\103\060\035\006\003\125\035\016\004\026\004\024\345
\235\131\060\202\107\130\314\254\372\010\124\066\206\173\072\265
\004\115\360\060\022\006\003\125\035\023\001\001\377\004\010\060
\006\001\001\377\002\001\003\060\016\006\003\125\035\017\001\001
\377\004\004\003\002\001\006\060\015\006\011\052\206\110\206\367
\015\001\001\005\005\000\003\202\001\001\000\205\014\135\216\344
\157\121\150\102\005\240\335\273\117\047\045\204\003\275\367\144
\375\055\327\060\343\244\020\027\353\332\051\051\266\171\077\166
\366\031\023\043\270\020\012\371\130\244\324\141\160\275\004\141
\152\022\212\027\325\012\275\305\274\060\174\326\351\014\045\215
\206\100\117\354\314\243\176\070\306\067\021\117\355\335\150\061
\216\114\322\263\001\164\356\276\165\136\007\110\032\177\160\377
\026\134\204\300\171\205\270\005\375\177\276\145\021\243\017\300
\002\264\370\122\067\071\004\325\251\061\172\030\277\240\052\364
\022\231\367\243\105\202\343\074\136\365\235\236\265\310\236\174
\056\310\244\236\116\010\024\113\155\375\160\155\153\032\143\275
\144\346\037\267\316\360\362\237\056\273\033\267\362\120\210\163
\222\302\342\343\026\215\232\062\002\253\216\030\335\351\020\021
\356\176\065\253\220\257\076\060\224\172\320\063\075\247\145\017
\365\374\216\236\142\317\107\104\054\001\135\273\035\265\062\322
\107\322\070\056\320\376\201\334\062\152\036\265\356\074\325\374
\347\201\035\031\303\044\102\352\143\071\251
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL
 CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Baltimore CyberTrust Root"
# Issuer: CN=Baltimore CyberTrust Root,OU=CyberTrust,O=Baltimore,C=IE
# Serial Number: 33554617 (0x20000b9)
# Subject: CN=Baltimore CyberTrust Root,OU=CyberTrust,O=Baltimore,C=IE
# Not Valid Before: Fri May 12 18:46:00 2000
# Not Valid After : Mon May 12 23:59:00 2025
# Fingerprint (SHA-256):
16:AF:57:A9:F6:76:B0:AB:12:60:95:AA:5E:BA:DE:F2:2A:B3:11:19:D6:44:AC:95:CD:4B:93:DB:F3:F2:6A:EB
# Fingerprint (SHA1): D4:DE:20:D0:5E:66:FC:53:FE:1A:50:88:2C:78:DB:28:52:CA:E4:74

```
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Baltimore CyberTrust Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\324\336\040\320\136\146\374\123\376\032\120\210\054\170\333\050
\122\312\344\164
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\254\266\224\245\234\027\340\327\221\122\233\261\227\006\246\344
END
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\111\105\061
\022\060\020\006\003\125\004\012\023\011\102\141\154\164\151\155
\157\162\145\061\023\060\021\006\003\125\004\013\023\012\103\171
\142\145\162\124\162\165\163\164\061\042\060\040\006\003\125\004
\003\023\031\102\141\154\164\151\155\157\162\145\040\103\171\142
\145\162\124\162\165\163\164\040\122\157\157\164
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\004\002\000\000\271
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Entrust Root Certification Authority"
#
# Issuer: CN=Entrust Root Certification Authority,OU="(c) 2006 Entrust, Inc.",OU=www.entrust.net/CPS is
incorporated by reference,O="Entrust, Inc.",C=US
# Serial Number: 1164660820 (0x456b5054)
# Subject: CN=Entrust Root Certification Authority,OU="(c) 2006 Entrust, Inc.",OU=www.entrust.net/CPS
 is incorporated by reference,O="Entrust, Inc.",C=US
# Not Valid Before: Mon Nov 27 20:23:42 2006
# Not Valid After : Fri Nov 27 20:53:42 2026
# Fingerprint (SHA-256):
73:C1:76:43:4F:1B:C6:D5:AD:F4:5B:0E:76:E7:27:28:7C:8D:E5:76:16:C1:E6:E6:14:1A:2B:2C:BC:7D:8E:4C
# Fingerprint (SHA1): B3:1E:B1:B7:40:E3:6C:84:02:DA:DC:37:D4:4D:F5:D4:67:49:52:F9
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust Root Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
```

CKA_SUBJECT MULTILINE_OCTAL
\060\201\260\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\071\060\067\006\003\125\004
\013\023\060\167\167\167\056\145\156\164\162\165\163\164\056\156
\145\164\057\103\120\123\040\151\163\040\151\156\143\157\162\160
\157\162\141\164\145\144\040\142\171\040\162\145\146\145\162\145
\156\143\145\061\037\060\035\006\003\125\004\013\023\026\050\143
\051\040\062\060\060\066\040\105\156\164\162\165\163\164\054\040
\111\156\143\056\061\055\060\053\006\003\125\004\003\023\044\105
\156\164\162\165\163\164\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\260\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\071\060\067\006\003\125\004
\013\023\060\167\167\167\056\145\156\164\162\165\163\164\056\156
\145\164\057\103\120\123\040\151\163\040\151\156\143\157\162\160
\157\162\141\164\145\144\040\142\171\040\162\145\146\145\162\145
\156\143\145\061\037\060\035\006\003\125\004\013\023\026\050\143
\051\040\062\060\060\066\040\105\156\164\162\165\163\164\054\040
\111\156\143\056\061\055\060\053\006\003\125\004\003\023\044\105
\156\164\162\165\163\164\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\004\105\153\120\124
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\221\060\202\003\171\240\003\002\001\002\002\004\105
\153\120\124\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\201\260\061\013\060\011\006\003\125\004\006\023\002
\125\123\061\026\060\024\006\003\125\004\012\023\015\105\156\164
\162\165\163\164\054\040\111\156\143\056\061\071\060\067\006\003
\125\004\013\023\060\167\167\167\056\145\156\164\162\165\163\164
\056\156\145\164\057\103\120\123\040\151\163\040\151\156\143\157
\162\160\157\162\141\164\145\144\040\142\171\040\162\145\146\145
\162\145\156\143\145\061\037\060\035\006\003\125\004\013\023\026
\050\143\051\040\062\060\060\066\040\105\156\164\162\165\163\164
\054\040\111\156\143\056\061\055\060\053\006\003\125\004\003\023
\044\105\156\164\162\165\163\164\040\122\157\157\164\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150

\157\162\151\164\171\060\036\027\015\060\066\061\061\062\067\062
\060\062\063\064\062\132\027\015\062\066\061\061\062\067\062\060
\065\063\064\062\132\060\201\260\061\013\060\011\006\003\125\004
\006\023\002\125\123\061\026\060\024\006\003\125\004\012\023\015
\105\156\164\162\165\163\164\054\040\111\156\143\056\061\071\060
\067\006\003\125\004\013\023\060\167\167\167\056\145\156\164\162
\165\163\164\056\156\145\164\057\103\120\123\040\151\163\040\151
\156\143\157\162\160\157\162\141\164\145\144\040\142\171\040\162
\145\146\145\162\145\156\143\145\061\037\060\035\006\003\125\004
\013\023\026\050\143\051\040\062\060\060\066\040\105\156\164\162
\165\163\164\054\040\111\156\143\056\061\055\060\053\006\003\125
\004\003\023\044\105\156\164\162\165\163\164\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\060\202\001\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000
\060\202\001\012\002\202\001\001\000\266\225\266\103\102\372\306
\155\052\157\110\337\224\114\071\127\005\356\303\171\021\101\150
\066\355\354\376\232\001\217\241\070\050\374\367\020\106\146\056
\115\036\032\261\032\116\306\321\300\225\210\260\311\377\061\213
\063\003\333\267\203\173\076\040\204\136\355\262\126\050\247\370
\340\271\100\161\067\305\313\107\016\227\052\150\300\042\225\142
\025\333\107\331\365\320\053\377\202\113\311\255\076\336\114\333
\220\200\120\077\011\212\204\000\354\060\012\075\030\315\373\375
\052\131\232\043\225\027\054\105\236\037\156\103\171\155\014\134
\230\376\110\247\305\043\107\134\136\375\156\347\036\264\366\150
\105\321\206\203\133\242\212\215\261\343\051\200\376\045\161\210
\255\276\274\217\254\122\226\113\252\121\215\344\023\061\031\350
\116\115\237\333\254\263\152\325\274\071\124\161\312\172\172\177
\220\335\175\035\200\331\201\273\131\046\302\021\376\346\223\342
\367\200\344\145\373\064\067\016\051\200\160\115\257\070\206\056
\236\177\127\257\236\027\256\353\034\313\050\041\137\266\034\330
\347\242\004\042\371\323\332\330\313\002\003\001\000\001\243\201
\260\060\201\255\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004\005
\060\003\001\001\377\060\053\006\003\125\035\020\004\044\060\042
\200\017\062\060\060\066\061\061\062\067\062\060\062\063\064\062
\132\201\017\062\060\062\066\061\061\062\067\062\060\065\063\064
\062\132\060\037\006\003\125\035\043\004\030\060\026\200\024\150
\220\344\147\244\246\123\200\307\206\146\244\361\367\113\103\373
\204\275\155\060\035\006\003\125\035\016\004\026\004\024\150\220
\344\147\244\246\123\200\307\206\146\244\361\367\113\103\373\204
\275\155\060\035\006\011\052\206\110\206\366\175\007\101\000\004
\020\060\016\033\010\126\067\056\061\072\064\056\060\003\002\004
\220\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000
\003\202\001\001\000\223\324\060\260\327\003\040\052\320\371\143
\350\221\014\005\040\251\137\031\312\173\162\116\324\261\333\320
\226\373\124\132\031\054\014\010\367\262\274\205\250\235\177\155
\073\122\263\052\333\347\324\204\214\143\366\017\313\046\001\221

\120\154\364\137\024\342\223\164\300\023\236\060\072\120\343\264
\140\305\034\360\042\104\215\161\107\254\310\032\311\351\233\232
\000\140\023\377\160\176\137\021\115\111\033\263\025\122\173\311
\124\332\277\235\225\257\153\232\330\236\351\361\344\103\215\342
\021\104\072\277\257\275\203\102\163\122\213\252\273\247\051\317
\365\144\034\012\115\321\274\252\254\237\052\320\377\177\177\332
\175\352\261\355\060\045\301\204\332\064\322\133\170\203\126\354
\234\066\303\046\342\021\366\147\111\035\222\253\214\373\353\377
\172\356\205\112\247\120\200\360\247\134\112\224\056\137\005\231
\074\122\101\340\315\264\143\317\001\103\272\234\203\334\217\140
\073\363\132\264\264\173\256\332\013\220\070\165\357\201\035\146
\322\367\127\160\066\263\277\374\050\257\161\045\205\133\023\376
\036\177\132\264\074
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Entrust Root Certification Authority"
# Issuer: CN=Entrust Root Certification Authority,OU="(c) 2006 Entrust, Inc.",OU=www.entrust.net/CPS is incorporated by reference,O="Entrust, Inc.",C=US
# Serial Number: 1164660820 (0x456b5054)
# Subject: CN=Entrust Root Certification Authority,OU="(c) 2006 Entrust, Inc.",OU=www.entrust.net/CPS is incorporated by reference,O="Entrust, Inc.",C=US
# Not Valid Before: Mon Nov 27 20:23:42 2006
# Not Valid After : Fri Nov 27 20:53:42 2026
# Fingerprint (SHA-256):
73:C1:76:43:4F:1B:C6:D5:AD:F4:5B:0E:76:E7:27:28:7C:8D:E5:76:16:C1:E6:E6:14:1A:2B:2C:BC:7D:8E:4C
# Fingerprint (SHA1): B3:1E:B1:B7:40:E3:6C:84:02:DA:DC:37:D4:4D:F5:D4:67:49:52:F9
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust Root Certification Authority"
CKA_CERT_SHA1_HASH
 MULTILINE_OCTAL
\263\036\261\267\100\343\154\204\002\332\334\067\324\115\365\324
\147\111\122\371
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\326\245\303\355\135\335\076\000\301\075\207\222\037\035\077\344
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\260\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\071\060\067\006\003\125\004
\013\023\060\167\167\167\056\145\156\164\162\165\163\164\056\156

\145\164\057\103\120\123\040\151\163\040\151\156\143\157\162\160
\157\162\141\164\145\144\040\142\171\040\162\145\146\145\162\145
\156\143\145\061\037\060\035\006\003\125\004\013\023\026\050\143
\051\040\062\060\060\066\040\105\156\164\162\165\163\164\054\040
\111\156\143\056\061\055\060\053\006\003\125\004\003\023\044\105
\156\164\162\165\163\164\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\004\105\153\120\124
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Certum Root CA"
#
# Issuer: CN=Certum CA,O=Unizeto Sp. z o.o.,C=PL
# Serial Number: 65568 (0x10020)
# Subject: CN=Certum CA,O=Unizeto Sp. z o.o.,C=PL
# Not Valid Before: Tue Jun 11 10:46:39 2002
# Not Valid After : Fri Jun 11 10:46:39 2027
# Fingerprint (SHA-256):
D8:E0:FE:BC:1D:B2:E3:8D:00:94:0F:37:D2:7D:41:34:4D:99:3E:73:4B:99:D5:65:6D:97:78:D4:D8:14:36:24
# Fingerprint (SHA1): 62:52:DC:40:F7:11:43:A2:2F:DE:9E:F7:34:8E:06:42:51:B1:81:18
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certum Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\033\060\031\006\003\125\004\012\023\022\125\156\151\172\145\164
\157\040\123\160\056\040\172\040\157\056\157\056\061\022\060\020
\006\003\125\004\003\023\011\103\145\162\164\165\155\040\103\101
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\033\060\031\006\003\125\004\012\023\022\125\156\151\172\145\164
\157\040\123\160\056\040\172\040\157\056\157\056\061\022\060\020
\006\003\125\004\003\023\011\103\145\162\164\165\155\040\103\101

END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\001\000\040
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\014\060\202\001\364\240\003\002\001\002\002\003\001
\000\040\060\015\006\011\052\206\110\206\367\015\001\001\005\005
\000\060\076\061\013\060\011\006\003\125\004\006\023\002\120\114
\061\033\060\031\006\003\125\004\012\023\022\125\156\151\172\145
\164\157\040\123\160\056\040\172\040\157\056\157\056\061\022\060
\020\006\003\125\004\003\023\011\103\145\162\164\165\155\040\103
\101\060\036\027\015\060\062\060\066\061\061\061\060\064\066\063
\071\132\027\015\062\067\060\066\061\061\061\060\064\066\063\071
\132\060\076\061\013\060\011\006\003\125\004\006\023\002\120\114
\061\033\060\031\006\003\125\004\012\023\022\125\156\151\172\145
\164\157\040\123\160\056\040\172\040\157\056\157\056\061\022\060
\020\006\003\125\004\003\023\011\103\145\162\164\165\155\040\103
\101\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001
\001\000\316\261\301\056\323\117\174\315\045\316\030\076\117\304
\214\157\200\152\163\310\133\121\370\233\322\334\273\000\134\261
\240\374\165\003\356\201\360\210\356\043\122\351\346\025\063\215
\254\055\011\305\166\371\053\071\200\211\344\227\113\220\245\250
\170\370\163\103\173\244\141\260\330\130\314\341\154\146\176\234
\363\011\136\125\143\204\325\250\357\363\261\056\060\150\263\304
\074\330\254\156\215\231\132\220\116\064\334\066\232\217\201\210
\120\267\155\226\102\011\363\327\225\203\015\101\113\260\152\153
\370\374\017\176\142\237\147\304\355\046\137\020\046\017\010\117
\360\244\127\050\316\217\270\355\105\366\156\356\045\135\252\156
\071\276\344\223\057\331\107\240\162\353\372\246\133\257\312\123
\077\342\016\306\226\126\021\156\367\351\146\251\046\330\177\225
\123\355\012\205\210\272\117\051\245\102\214\136\266\374\205\040
\000\252\150\013\241\032\205\001\234\304\106\143\202\210\266\042
\261\356\376\252\106\131\176\317\065\054\325\266\332\135\367\110
\063\024\124\266\353\331\157\316\315\210\326\253\033\332\226\073
\035\131\002\003\001\000\001\243\023\060\021\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\015\006\011
\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000
\270\215\316\357\347\024\272\317\356\260\104\222\154\264\071\076
\242\204\156\255\270\041\167\322\324\167\202\207\346\040\101\201
\356\342\370\021\267\143\321\027\067\276\031\166\044\034\004\032
\114\353\075\252\147\157\055\324\315\376\145\061\160\305\033\246
\002\012\272\140\173\155\130\302\232\111\376\143\062\013\153\343
\072\300\254\253\073\260\350\323\011\121\214\020\203\306\064\340
\305\053\340\032\266\140\024\047\154\062\167\214\274\262\162\230
\317\315\314\077\271\310\044\102\024\326\127\374\346\046\103\251
\035\345\200\220\316\003\124\050\076\367\077\323\370\115\355\152
\012\072\223\023\233\073\024\043\023\143\234\077\321\207\047\171

\345\114\121\343\001\255\205\135\032\073\261\325\163\020\244\323
\362\274\156\144\365\132\126\220\250\307\016\114\164\017\056\161
\073\367\310\107\364\151\157\025\362\021\136\203\036\234\174\122
\256\375\002\332\022\250\131\147\030\333\274\160\335\233\261\151
\355\200\316\211\100\110\152\016\065\312\051\146\025\041\224\054
\350\140\052\233\205\112\100\363\153\212\044\354\006\026\054\163
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Certum Root CA"
# Issuer:
CN=Certum CA,O=Unizeto Sp. z o.o.,C=PL
# Serial Number: 65568 (0x10020)
# Subject: CN=Certum CA,O=Unizeto Sp. z o.o.,C=PL
# Not Valid Before: Tue Jun 11 10:46:39 2002
# Not Valid After : Fri Jun 11 10:46:39 2027
# Fingerprint (SHA-256):
D8:E0:FE:BC:1D:B2:E3:8D:00:94:0F:37:D2:7D:41:34:4D:99:3E:73:4B:99:D5:65:6D:97:78:D4:D8:14:36:24
# Fingerprint (SHA1): 62:52:DC:40:F7:11:43:A2:2F:DE:9E:F7:34:8E:06:42:51:B1:81:18
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certum Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\142\122\334\100\367\021\103\242\057\336\236\367\064\216\006\102
\121\261\201\030
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\054\217\237\146\035\030\220\261\107\046\235\216\206\202\214\251
END
CKA_ISSUER MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\033\060\031\006\003\125\004\012\023\022\125\156\151\172\145\164
\157\040\123\160\056\040\172\040\157\056\157\056\061\022\060\020
\006\003\125\004\003\023\011\103\145\162\164\165\155\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\003\001\000\040
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```
#
# Certificate "Comodo AAA Services root"
#
# Issuer: CN=AAA Certificate Services,O=Comodo CA Limited,L=Salford,ST=Greater Manchester,C=GB
# Serial Number: 1 (0x1)
# Subject: CN=AAA Certificate Services,O=Comodo CA Limited,L=Salford,ST=Greater Manchester,C=GB
# Not Valid Before: Thu Jan 01 00:00:00 2004
# Not Valid After : Sun Dec 31 23:59:59 2028
# Fingerprint (SHA-256):
D7:A7:A0:FB:5D:7E:27:31:D7:71:E9:48:4E:BC:DE:F7:1D:5F:0C:3E:0A:29:48:78:2B:C8:3E:E0:EA:69:9E:F4
# Fingerprint (SHA1): D1:EB:23:A4:6D:17:D6:8F:D9:25:64:C2:F1:F1:60:17:64:D8:E3:49
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
 CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Comodo AAA Services root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\173\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\033\060\031\006\003\125\004\010\014\022\107\162\145\141\164\145
\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060\016
\006\003\125\004\007\014\007\123\141\154\146\157\162\144\061\032
\060\030\006\003\125\004\012\014\021\103\157\155\157\144\157\040
\103\101\040\114\151\155\151\164\145\144\061\041\060\037\006\003
\125\004\003\014\030\101\101\101\040\103\145\162\164\151\146\151
\143\141\164\145\040\123\145\162\166\151\143\145\163
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\173\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\033\060\031\006\003\125\004\010\014\022\107\162\145\141\164\145
\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060\016
\006\003\125\004\007\014\007\123\141\154\146\157\162\144\061\032
\060\030\006\003\125\004\012\014\021\103\157\155\157\144\157\040
\103\101\040\114\151\155\151\164\145\144\061\041\060\037\006\003
\125\004\003\014\030\101\101\101\040\103\145\162\164\151\146\151
\143\141\164\145\040\123\145\162\166\151\143\145\163
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\062\060\202\003\032\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\173\061\013\060\011\006\003\125\004\006\023\002\107\102\061\033
```

\060\031\006\003\125\004\010\014\022\107\162\145\141\164\145\162
\040\115\141\156\143\150\145\163\164\145\162\061\020\060\016\006
\003\125\004\007\014\007\123\141\154\146\157\162\144\061\032\060
\030\006\003\125\004\012\014\021\103\157\155\157\144\157\040\103
\101\040\114\151\155\151\164\145\144\061\041\060\037\006\003\125
\004\003\014\030\101\101\101\040\103\145\162\164\151\146\151\143
\141\164\145\040\123\145\162\166\151\143\145\163\060\036\027\015
\060\064\060\061\060\061\060\060\060\060\060\060\132\027\015\062
\070\061\062\063\061\062\063\065\071\065\071\132\060\173\061\013
\060\011\006\003\125\004\006\023\002\107\102\061\033\060\031\006
\003\125\004\010\014\022\107\162\145\141\164\145\162\040\115\141
\156\143\150\145\163\164\145\162\061\020\060\016\006\003\125\004
\007\014\007\123\141\154\146\157\162\144\061\032\060\030\006\003
\125\004\012\014\021\103\157\155\157\144\157\040\103\101\040\114
\151\155\151\164\145\144\061\041\060\037\006\003\125\004\003\014
\030\101\101\101\040\103\145\162\164\151\146\151\143\141\164\145
\040\123\145\162\166\151\143\145\163\060\202\001\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017
\000\060\202\001\012\002\202\001\001\000\276\100\235\364\156\341
\352\166\207\034\115\105\104\216\276\106\310\203\006\235\301\052
\376\030\037\216\344\002\372\363\253\135\120\212\026\061\013\232
\006\320\305\160\042\315\111\055\124\143\314\266\156\150\106\013
\123\352\313\114\044\300\274\162\116\352\361\025\256\364\124\232
\022\012\303\172\262\063\140\342\332\211\125\363\042\130\363\336
\334\317\357\203\206\242\214\224\117\237\150\362\230\220\106\204
\047\307\166\277\343\314\065\054\213\136\007\144\145\202\300\110
\260\250\221\371\141\237\166\040\120\250\221\307\146\265\353\170
\142\003\126\360\212\032\023\352\061\243\036\240\231\375\070\366
\366\047\062\130\157\007\365\153\270\373\024\053\257\267\252\314
\326\143\137\163\214\332\005\231\250\070\250\313\027\170\066\121
\254\351\236\364\170\072\215\317\017\331\102\342\230\014\253\057
\237\016\001\336\357\237\231\111\361\055\337\254\164\115\033\230
\265\107\305\345\051\321\371\220\030\307\142\234\276\203\307\046
\173\076\212\045\307\300\335\235\346\065\150\020\040\235\217\330
\336\322\303\204\234\015\136\350\057\311\002\003\001\000\001\243
\201\300\060\201\275\060\035\006\003\125\035\016\004\026\004\024
\240\021\012\043\076\226\361\007\354\342\257\051\357\202\245\177
\320\060\244\264\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004\005
\060\003\001\001\377\060\173\006\003\125\035\037\004\164\060\162
\060\070\240\066\240\064\206\062\150\164\164\160\072\057\057\143
\162\154\056\143\157\155\157\144\157\143\141\056\143\157\155\057
\101\101\101\103\145\162\164\151\146\151\143\141\164\145\123\145
\162\166\151\143\145\163\056\143\162\154\060\066\240\064\240\062
\206\060\150\164\164\160\072\057\057\143\162\154\056\143\157\155
\157\144\157\056\156\145\164\057\101\101\101\103\145\162\164\151
\146\151\143\141\164\145\123\145\162\166\151\143\145\163\056\143
\162\154\060\015\006\011\052\206\110\206\367\015\001\001\005\005

\000\003\202\001\001\000\010\126\374\002\360\233\350\377\244\372
\326\173\306\104\200\316\117\304\305\366\000\130\314\246\266\274
\024\111\150\004\166\350\346\356\135\354\002\017\140\326\215\120
\030\117\046\116\001\343\346\260\245\356\277\274\164\124\101\277
\375\374\022\270\307\117\132\364\211\140\005\177\140\267\005\112
\363\366\361\302\277\304\271\164\206\266\055\175\153\314\322\363
\106\335\057\306\340\152\303\303\064\003\054\175\226\335\132\302
\016\247\012\231\301\005\213\253\014\057\363\134\072\317\154\067
\125\011\207\336\123\100\154\130\357\374\266\253\145\156\004\366
\033\334\074\340\132\025\306\236\331\361\131\110\060\041\145\003
\154\354\351\041\163\354\233\003\241\340\067\255\240\025\030\217
\372\272\002\316\247\054\251\020\023\054\324\345\010\046\253\042
\227\140\370\220\136\164\324\242\232\123\275\362\251\150\340\242
\156\302\327\154\261\243\017\236\277\353\150\347\126\362\256\362
\343\053\070\072\011\201\265\153\205\327\276\055\355\077\032\267
\262\143\342\365\142\054\202\324\152\000\101\120\361\071\203\237
\225\351\066\226\230\156
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Comodo AAA Services root"
# Issuer: CN=AAA Certificate Services,O=Comodo CA Limited,L=Salford,ST=Greater Manchester,C=GB
# Serial Number:
 1 (0x1)
# Subject: CN=AAA Certificate Services,O=Comodo CA Limited,L=Salford,ST=Greater Manchester,C=GB
# Not Valid Before: Thu Jan 01 00:00:00 2004
# Not Valid After : Sun Dec 31 23:59:59 2028
# Fingerprint (SHA-256):
D7:A7:A0:FB:5D:7E:27:31:D7:71:E9:48:4E:BC:DE:F7:1D:5F:0C:3E:0A:29:48:78:2B:C8:3E:E0:EA:69:9E:F4
# Fingerprint (SHA1): D1:EB:23:A4:6D:17:D6:8F:D9:25:64:C2:F1:F1:60:17:64:D8:E3:49
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Comodo AAA Services root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\321\353\043\244\155\027\326\217\331\045\144\302\361\361\140\027
\144\330\343\111
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\111\171\004\260\353\207\031\254\107\260\274\021\121\233\164\320
END
CKA_ISSUER MULTILINE_OCTAL
\060\173\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\033\060\031\006\003\125\004\010\014\022\107\162\145\141\164\145

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\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060\016
\006\003\125\004\007\014\007\123\141\154\146\157\162\144\061\032
\060\030\006\003\125\004\012\014\021\103\157\155\157\144\157\040
\103\101\040\114\151\155\151\164\145\144\061\041\060\037\006\003
\125\004\003\014\030\101\101\101\040\103\145\162\164\151\146\151
\143\141\164\145\040\123\145\162\166\151\143\145\163
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "QuoVadis Root CA 2"
#
# Issuer: CN=QuoVadis Root CA 2,O=QuoVadis Limited,C=BM
# Serial Number: 1289 (0x509)
# Subject: CN=QuoVadis Root CA 2,O=QuoVadis Limited,C=BM
# Not Valid Before: Fri Nov 24 18:27:00 2006
# Not Valid After : Mon Nov 24 18:23:33 2031
# Fingerprint (SHA-256):
85:A0:DD:7D:D7:20:AD:B7:FF:05:F8:3D:54:2B:20:9D:C7:FF:45:28:F7:D6:77:B1:83:89:FE:A5:E5:C4:9E:86
#
 Fingerprint (SHA1): CA:3A:FB:CF:12:40:36:4B:44:B2:16:20:88:80:48:39:19:93:7C:F7
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root CA 2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\033\060\031\006\003
\125\004\003\023\022\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\033\060\031\006\003
\125\004\003\023\022\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\062
```

END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\002\005\011
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\005\267\060\202\003\237\240\003\002\001\002\002\002\005
\011\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000
\060\105\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\033\060\031\006\003
\125\004\003\023\022\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\062\060\036\027\015\060\066\061\061\062
\064\061\070\062\067\060\060\132\027\015\063\061\061\061\062\064
\061\070\062\063\063\063\132\060\105\061\013\060\011\006\003\125
\004\006\023\002\102\115\061\031\060\027\006\003\125\004\012\023
\020\121\165\157\126\141\144\151\163\040\114\151\155\151\164\145
\144\061\033\060\031\006\003\125\004\003\023\022\121\165\157\126
\141\144\151\163\040\122\157\157\164\040\103\101\040\062\060\202
\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\232
\030\312\113\224\015\000\055\257\003\051\212\360\017\201\310\256
\114\031\205\035\010\237\253\051\104\205\363\057\201\255\062\036
\220\106\277\243\206\046\032\036\376\176\034\030\072\134\234\140
\027\052\072\164\203\063\060\175\141\124\021\313\355\253\340\346
\322\242\176\365\153\157\030\267\012\013\055\375\351\076\357\012
\306\263\020\351\334\302\106\027\370\135\375\244\332\377\236\111
\132\234\346\063\346\044\226\367\077\272\133\053\034\172\065\302
\326\147\376\253\146\120\213\155\050\140\053\357\327\140\303\307
\223\274\215\066\221\363\177\370\333\021\023\304\234\167\166\301
\256\267\002\152\201\172\251\105\203\342\005\346\271\126\301\224
\067\217\110\161\143\042\354\027\145\007\225\212\113\337\217\306
\132\012\345\260\343\137\136\153\021\253\014\371\205\353\104\351
\370\004\163\362\351\376\134\230\214\365\163\257\153\264\176\315
\324\134\002\053\114\071\341\262\225\225\055\102\207\327\325\263
\220\103\267\154\023\361\336\335\366\304\370\211\077\321\165\365
\222\303\221\325\212\210\320\220\354\334\155\336\211\302\145\161
\226\213\015\003\375\234\277\133\026\254\222\333\352\376\171\174
\255\353\257\367\026\313\333\315\045\053\345\037\373\232\237\342
\121\314\072\123\014\110\346\016\275\311\264\166\006\122\346\021
\023\205\162\143\003\004\340\004\066\053\040\031\002\350\164\247
\037\266\311\126\146\360\165\045\334\147\301\016\141\140\210\263
\076\321\250\374\243\332\035\260\321\261\043\124\337\104\166\155
\355\101\330\301\262\042\266\123\034\337\065\035\334\241\167\052
\061\344\055\365\345\345\333\310\340\377\345\200\327\013\143\240
\377\063\241\017\272\054\025\025\352\227\263\322\242\265\276\362
\214\226\036\032\217\035\154\244\141\067\271\206\163\063\327\227
\226\236\043\175\202\244\114\201\342\241\321\272\147\137\225\007

\243\047\021\356\026\020\173\274\105\112\114\262\004\322\253\357
\325\375\014\121\316\120\152\010\061\371\221\332\014\217\144\134
\003\303\072\213\040\077\156\215\147\075\072\326\376\175\133\210
\311\136\373\314\141\334\213\063\167\323\104\062\065\011\142\004
\222\026\020\330\236\047\107\373\073\041\343\370\353\035\133\002
\003\001\000\001\243\201\260\060\201\255\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\013\006\003\125
\035\017\004\004\003\002\001\006\060\035\006\003\125\035\016\004
\026\004\024\032\204\142\274\110\114\063\045\004\324\356\320\366
\003\304\031\106\321\224\153\060\156\006\003\125\035\043\004\147
\060\145\200\024\032\204\142\274\110\114\063\045\004\324\356\320
\366\003\304\031\106\321\224\153\241\111\244\107\060\105\061\013
\060\011\006\003\125\004\006\023\002\102\115\061\031\060\027\006
\003\125\004\012\023\020\121\165\157\126\141\144\151\163\040\114
\151\155\151\164\145\144\061\033\060\031\006\003\125\004\003\023
\022\121\165\157\126\141\144\151\163\040\122\157\157\164\040\103
\101\040\062\202\002\005\011\060\015\006\011\052\206\110\206\367
\015\001\001\005\005\000\003\202\002\001\000\076\012\026\115\237
\006\133\250\256\161\135\057\005\057\147\346\023\105\203\304\066
\366\363\300\046\014\015\265\107\144\135\370\264\162\311\106\245
\003\030\047\125\211\170\175\166\352\226\064\200\027\040\334\347
\203\370\215\374\007\270\332\137\115\056\147\262\204\375\331\104
\374\167\120\201\346\174\264\311\015\013\162\123\370\166\007\007
\101\107\226\014\373\340\202\046\223\125\214\376\042\037\140\145
\174\137\347\046\263\367\062\220\230\120\324\067\161\125\366\222
\041\170\367\225\171\372\370\055\046\207\146\126\060\167\246\067
\170\063\122\020\130\256\077\141\216\362\152\261\357\030\176\112
\131\143\312\215\242\126\325\247\057\274\126\037\317\071\301\342
\373\012\250\025\054\175\115\172\143\306\154\227\104\074\322\157
\303\112\027\012\370\220\322\127\242\031\121\245\055\227\101\332
\007\117\251\120\332\220\215\224\106\341\076\360\224\375\020\000
\070\365\073\350\100\341\264\156\126\032\040\314\157\130\215\355
\056\105\217\326\351\223\077\347\261\054\337\072\326\042\214\334
\204\273\042\157\320\370\344\306\071\351\004\210\074\303\272\353
\125\172\155\200\231\044\365\154\001\373\370\227\260\224\133\353
\375\322\157\361\167\150\015\065\144\043\254\270\125\241\003\321
\115\102\031\334\370\165\131\126\243\371\250\111\171\370\257\016
\271\021\240\174\267\152\355\064\320\266\046\142\070\032\207\014
\370\350\375\056\323\220\177\007\221\052\035\326\176\134\205\203
\231\260\070\010\077\351\136\371\065\007\344\311\142\156\127\177
\247\120\225\367\272\310\233\346\216\242\001\305\326\146\277\171
\141\363\074\034\341\271\202\134\135\240\303\351\330\110\275\031
\242\021\024\031\156\262\206\033\150\076\110\067\032\210\267\135
\226\136\234\307\357\047\142\010\342\221\031\134\322\361\041\335
\272\027\102\202\227\161\201\123\061\251\237\366\175\142\277\162
\341\243\223\035\314\212\046\132\011\070\320\316\327\015\200\026
\264\170\245\072\207\114\215\212\245\325\106\227\362\054\020\271
\274\124\042\300\001\120\151\103\236\364\262\357\155\370\354\332

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\361\343\261\357\337\221\217\124\052\013\045\301\046\031\304\122
\020\005\145\325\202\020\352\302\061\315\056
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "QuoVadis Root CA 2"
# Issuer: CN=QuoVadis Root CA 2,O=QuoVadis Limited,C=BM
# Serial Number: 1289 (0x509)
# Subject: CN=QuoVadis Root CA 2,O=QuoVadis Limited,C=BM
# Not Valid Before: Fri Nov 24 18:27:00 2006
# Not Valid After : Mon Nov 24 18:23:33 2031
# Fingerprint (SHA-256):
85:A0:DD:7D:D7:20:AD:B7:FF:05:F8:3D:54:2B:20:9D:C7:FF:45:28:F7:D6:77:B1:83:89:FE:A5:E5:C4:9E:86
# Fingerprint (SHA1): CA:3A:FB:CF:12:40:36:4B:44:B2:16:20:88:80:48:39:19:93:7C:F7
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root CA 2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\312\072\373\317\022\100\066\113\104\262\026\040\210\200\110\071
\031\223\174\367
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\136\071\173\335\370\272\354\202\351\254\142\272\014\124\000\053
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\033\060\031\006\003
\125\004\003\023\022\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\002\005\011
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "QuoVadis Root CA 3"
#
```

```
# Issuer: CN=QuoVadis Root CA 3,O=QuoVadis Limited,C=BM
# Serial Number: 1478 (0x5c6)
# Subject: CN=QuoVadis Root CA 3,O=QuoVadis Limited,C=BM
# Not Valid Before: Fri Nov 24 19:11:23 2006
# Not Valid After : Mon Nov 24 19:06:44 2031
# Fingerprint (SHA-256):
18:F1:FC:7F:20:5D:F8:AD:DD:EB:7F:E0:07:DD:57:E3:AF:37:5A:9C:4D:8D:73:54:6B:F4:F1:FE:D1:E1:8D:35
# Fingerprint
 (SHA1): 1F:49:14:F7:D8:74:95:1D:DD:AE:02:C0:BE:FD:3A:2D:82:75:51:85
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root CA 3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\033\060\031\006\003
\125\004\003\023\022\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\033\060\031\006\003
\125\004\003\023\022\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\002\005\306
END
CKA_VALUE
 MULTILINE_OCTAL
\060\202\006\235\060\202\004\205\240\003\002\001\002\002\002\005
\306\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000
\060\105\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\033\060\031\006\003
\125\004\003\023\022\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\063\060\036\027\015\060\066\061\061\062
\064\061\071\061\061\062\063\132\027\015\063\061\061\061\062\064
\061\071\060\066\064\064\132\060\105\061\013\060\011\006\003\125
\004\006\023\002\102\115\061\031\060\027\006\003\125\004\012\023
\020\121\165\157\126\141\144\151\163\040\114\151\155\151\164\145
\144\061\033\060\031\006\003\125\004\003\023\022\121\165\157\126
\141\144\151\163\040\122\157\157\164\040\103\101\040\063\060\202
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\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\314
\127\102\026\124\234\346\230\323\323\115\356\376\355\307\237\103
\071\112\145\263\350\026\210\064\333\015\131\221\164\317\222\270
\004\100\255\002\113\061\253\274\215\221\150\330\040\016\032\001
\342\032\173\116\027\135\342\212\267\077\231\032\315\353\141\253
\302\145\246\037\267\267\275\267\217\374\375\160\217\013\240\147
\276\001\242\131\317\161\346\017\051\166\377\261\126\171\105\053
\037\236\172\124\350\243\051\065\150\244\001\117\017\244\056\067
\357\033\277\343\217\020\250\162\253\130\127\347\124\206\310\311
\363\133\332\054\332\135\216\156\074\243\076\332\373\202\345\335
\362\134\262\005\063\157\212\066\316\320\023\116\377\277\112\014
\064\114\246\303\041\275\120\004\125\353\261\273\235\373\105\036
\144\025\336\125\001\214\002\166\265\313\241\077\102\151\274\057
\275\150\103\026\126\211\052\067\141\221\375\246\256\116\300\313
\024\145\224\067\113\222\006\357\004\320\310\234\210\333\013\173
\201\257\261\075\052\304\145\072\170\266\356\334\200\261\322\323
\231\234\072\356\153\132\153\263\215\267\325\316\234\302\276\245
\113\057\026\261\236\150\073\006\157\256\175\237\370\336\354\314
\051\247\230\243\045\103\057\357\361\137\046\341\210\115\370\136
\156\327\331\024\156\031\063\151\247\073\204\211\223\304\123\125
\023\241\121\170\100\370\270\311\242\356\173\272\122\102\203\236
\024\355\005\122\132\131\126\247\227\374\235\077\012\051\330\334
\117\221\016\023\274\336\225\244\337\213\231\276\254\233\063\210
\357\265\201\257\033\306\042\123\310\366\307\356\227\024\260\305
\174\170\122\310\360\316\156\167\140\204\246\351\052\166\040\355
\130\001\027\060\223\351\032\213\340\163\143\331\152\222\224\111
\116\264\255\112\205\304\243\042\060\374\011\355\150\042\163\246
\210\014\125\041\130\305\341\072\237\052\335\312\341\220\340\331
\163\253\154\200\270\350\013\144\223\240\234\214\031\377\263\322
\014\354\221\046\207\212\263\242\341\160\217\054\012\345\315\155
\150\121\353\332\077\005\177\213\062\346\023\134\153\376\137\100
\342\042\310\264\264\144\117\326\272\175\110\076\250\151\014\327
\273\206\161\311\163\270\077\073\235\045\113\332\377\100\353\002
\003\001\000\001\243\202\001\225\060\202\001\221\060\017\006\003
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\201\341
\006\003\125\035\040\004\201\331\060\201\326\060\201\323\006\011
\053\006\001\004\001\276\130\000\003\060\201\305\060\201\223\006
\010\053\006\001\005\005\007\002\002\060\201\206\032\201\203\101
\156\171\040\165\163\145\040\157\146\040\164\150\151\163\040\103
\145\162\164\151\146\151\143\141\164\145\040\143\157\156\163\164
\151\164\165\164\145\163\040\141\143\143\145\160\164\141\156\143
\145\040\157\146\040\164\150\145\040\121\165\157\126\141\144\151
\163\040\122\157\157\164\040\103\101\040\063\040\103\145\162\164
\151\146\151\143\141\164\145\040\120\157\154\151\143\171\040\057
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\120
\162\141\143\164\151\143\145\040\123\164\141\164\145\155\145\156
\164\056\060\055\006\010\053\006\001\005\005\007\002\001\026\041

\150\164\164\160\072\057\057\167\167\167\056\161\165\157\166\141
\144\151\163\147\154\157\142\141\154\056\143\157\155\057\143\160
\163\060\013\006\003\125\035\017\004\004\003\002\001\006\060\035
\006\003\125\035\016\004\026\004\024\362\300\023\340\202\103\076
\373\356\057\147\062\226\065\134\333\270\313\002\320\060\156\006
\003\125\035\043\004\147\060\145\200\024\362\300\023\340\202\103
\076\373\356\057\147\062\226\065\134\333\270\313\002\320\241\111
\244\107\060\105\061\013\060\011\006\003\125\004\006\023\002\102
\115\061\031\060\027\006\003\125\004\012\023\020\121\165\157\126
\141\144\151\163\040\114\151\155\151\164\145\144\061\033\060\031
\006\003\125\004\003\023\022\121\165\157\126\141\144\151\163\040
\122\157\157\164\040\103\101\040\063\202\002\005\306\060\015\006
\011\052\206\110\206\367\015\001\001\005\005\000\003\202\002\001
\000\117\255\240\054\114\372\300\362\157\367\146\125\253\043\064
\356\347\051\332\303\133\266\260\203\331\320\320\342\041\373\363
\140\247\073\135\140\123\047\242\233\366\010\042\052\347\277\240
\162\345\234\044\152\061\261\220\172\047\333\204\021\211\047\246
\167\132\070\327\277\254\206\374\356\135\203\274\006\306\321\167
\153\017\155\044\057\113\172\154\247\007\226\312\343\204\237\255
\210\213\035\253\026\215\133\146\027\331\026\364\213\200\322\335
\370\262\166\303\374\070\023\252\014\336\102\151\053\156\363\074
\353\200\047\333\365\246\104\015\237\132\125\131\013\325\015\122
\110\305\256\237\362\057\200\305\352\062\120\065\022\227\056\301
\341\377\361\043\210\121\070\237\362\146\126\166\347\017\121\227
\245\122\014\115\111\121\225\066\075\277\242\113\014\020\035\206
\231\114\252\363\162\021\223\344\352\366\233\332\250\135\247\115
\267\236\002\256\163\000\310\332\043\003\350\371\352\031\164\142
\000\224\313\042\040\276\224\247\131\265\202\152\276\231\171\172
\251\362\112\044\122\367\164\375\272\116\346\250\035\002\156\261
\015\200\104\301\256\323\043\067\137\273\205\174\053\222\056\350
\176\245\213\335\231\341\277\047\157\055\135\252\173\207\376\012
\335\113\374\216\365\046\344\156\160\102\156\063\354\061\236\173
\223\301\344\311\151\032\075\300\153\116\042\155\356\253\130\115
\306\320\101\301\053\352\117\022\207\136\353\105\330\154\365\230
\002\323\240\330\125\212\006\231\031\242\240\167\321\060\236\254
\314\165\356\203\365\260\142\071\317\154\127\342\114\322\221\013
\016\165\050\033\232\277\375\032\103\361\312\167\373\073\217\141
\270\151\050\026\102\004\136\160\052\034\041\330\217\341\275\043
\133\055\164\100\222\331\143\031\015\163\335\151\274\142\107\274
\340\164\053\262\353\175\276\101\033\265\300\106\305\241\042\313
\137\116\301\050\222\336\030\272\325\052\050\273\021\213\027\223
\230\231\140\224\134\043\317\132\047\227\136\013\005\006\223\067
\036\073\151\066\353\251\236\141\035\217\062\332\216\014\326\164
\076\173\011\044\332\001\167\107\304\073\315\064\214\231\365\312
\341\045\141\063\262\131\033\342\156\327\067\127\266\015\251\022
\332
END
CKA_NSS_MOZILLA_CA_POLICY

```
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER
 CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "QuoVadis Root CA 3"
# Issuer: CN=QuoVadis Root CA 3,O=QuoVadis Limited,C=BM
# Serial Number: 1478 (0x5c6)
# Subject: CN=QuoVadis Root CA 3,O=QuoVadis Limited,C=BM
# Not Valid Before: Fri Nov 24 19:11:23 2006
# Not Valid After : Mon Nov 24 19:06:44 2031
# Fingerprint (SHA-256):
18:F1:FC:7F:20:5D:F8:AD:DD:EB:7F:E0:07:DD:57:E3:AF:37:5A:9C:4D:8D:73:54:6B:F4:F1:FE:D1:E1:8D:35
# Fingerprint (SHA1): 1F:49:14:F7:D8:74:95:1D:DD:AE:02:C0:BE:FD:3A:2D:82:75:51:85
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root CA 3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\037\111\024\367\330\164\225\035\335\256\002\300\276\375\072\055
\202\165\121\205
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\061\205\074\142\224\227\143\271\252\375\211\116\257\157\340\317
END
CKA_ISSUER MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\033\060\031\006\003
\125\004\003\023\022\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\063
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\002\005\306
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "XRamp Global CA Root"
#
# Issuer: CN=XRamp Global Certification Authority,O=XRamp Security Services
Inc,OU=www.xrampsecurity.com,C=US
# Serial Number:50:94:6c:ec:18:ea:d5:9c:4d:d5:97:ef:75:8f:a0:ad
```

```
# Subject: CN=XRamp Global Certification Authority,O=XRamp Security Services
Inc,OU=www.xrampsecurity.com,C=US
# Not Valid Before: Mon Nov 01 17:14:04 2004
# Not Valid After : Mon Jan 01 05:37:19 2035
# Fingerprint (SHA-256):
CE:CD:DC:90:50:99:D8:DA:DF:C5:B1:D2:09:B7:37:CB:E2:C1:8C:FB:2C:10:C0:FF:0B:CF:0D:32:86:FC:1A:A2
#
 Fingerprint (SHA1): B8:01:86:D1:EB:9C:86:A5:41:04:CF:30:54:F3:4C:52:B7:E5:58:C6
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "XRamp Global CA Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\036\060\034\006\003\125\004\013\023\025\167\167\167\056\170
\162\141\155\160\163\145\143\165\162\151\164\171\056\143\157\155
\061\044\060\042\006\003\125\004\012\023\033\130\122\141\155\160
\040\123\145\143\165\162\151\164\171\040\123\145\162\166\151\143
\145\163\040\111\156\143\061\055\060\053\006\003\125\004\003\023
\044\130\122\141\155\160\040\107\154\157\142\141\154\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\036\060\034\006\003\125\004\013\023\025\167\167\167\056\170
\162\141\155\160\163\145\143\165\162\151\164\171\056\143\157\155
\061\044\060\042\006\003\125\004\012\023\033\130\122\141\155\160
\040\123\145\143\165\162\151\164\171\040\123\145\162\166\151\143
\145\163\040\111\156\143\061\055\060\053\006\003\125\004\003\023
\044\130\122\141\155\160\040\107\154\157\142\141\154\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\120\224\154\354\030\352\325\234\115\325\227\357\165\217
\240\255
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\060\060\202\003\030\240\003\002\001\002\002\020\120
\224\154\354\030\352\325\234\115\325\227\357\165\217\240\255\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\201
\202\061\013\060\011\006\003\125\004\006\023\002\125\123\061\036
\060\034\006\003\125\004\013\023\025\167\167\167\056\170\162\141
```

\155\160\163\145\143\165\162\151\164\171\056\143\157\155\061\044
\060\042\006\003\125\004\012\023\033\130\122\141\155\160\040\123
\145\143\165\162\151\164\171\040\123\145\162\166\151\143\145\163
\040\111\156\143\061\055\060\053\006\003\125\004\003\023\044\130
\122\141\155\160\040\107\154\157\142\141\154\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\060\036\027\015\060\064\061\061\060\061\061\067\061
\064\060\064\132\027\015\063\065\060\061\060\061\060\065\063\067
\061\071\132\060\201\202\061\013\060\011\006\003\125\004\006\023
\002\125\123\061\036\060\034\006\003\125\004\013\023\025\167\167
\167\056\170\162\141\155\160\163\145\143\165\162\151\164\171\056
\143\157\155\061\044\060\042\006\003\125\004\012\023\033\130\122
\141\155\160\040\123\145\143\165\162\151\164\171\040\123\145\162
\166\151\143\145\163\040\111\156\143\061\055\060\053\006\003\125
\004\003\023\044\130\122\141\155\160\040\107\154\157\142\141\154
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\060\202\001\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000
\060\202\001\012\002\202\001\001\000\230\044\036\275\025\264\272
\337\307\214\245\047\266\070\013\151\363\266\116\250\054\056\041
\035\134\104\337\041\135\176\043\164\376\136\176\264\112\267\246
\255\037\256\340\006\026\342\233\133\331\147\164\153\135\200\217
\051\235\206\033\331\234\015\230\155\166\020\050\130\344\145\260
\177\112\230\171\237\340\303\061\176\200\053\265\214\300\100\073
\021\206\320\313\242\206\066\140\244\325\060\202\155\331\156\320
\017\022\004\063\227\137\117\141\132\360\344\371\221\253\347\035
\073\274\350\317\364\153\055\064\174\342\110\141\034\216\363\141
\104\314\157\240\112\251\224\260\115\332\347\251\064\172\162\070
\250\101\314\074\224\021\175\353\310\246\214\267\206\313\312\063
\073\331\075\067\213\373\172\076\206\054\347\163\327\012\127\254
\144\233\031\353\364\017\004\010\212\254\003\027\031\144\364\132
\045\042\215\064\054\262\366\150\035\022\155\323\212\036\024\332
\304\217\246\342\043\205\325\172\015\275\152\340\351\354\354\027
\273\102\033\147\252\045\355\105\203\041\374\301\311\174\325\142
\076\372\362\305\055\323\375\324\145\002\003\001\000\001\243\201
\237\060\201\234\060\023\006\011\053\006\001\004\001\202\067\024
\002\004\006\036\004\000\103\000\101\060\013\006\003\125\035\017
\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026
\004\024\306\117\242\075\006\143\204\011\234\316\142\344\004\254
\215\134\265\351\266\033\060\066\006\003\125\035\037\004\057\060
\055\060\053\240\051\240\047\206\045\150\164\164\160\072\057\057
\143\162\154\056\170\162\141\155\160\163\145\143\165\162\151\164
\171\056\143\157\155\057\130\107\103\101\056\143\162\154\060\020
\006\011\053\006\001\004\001\202\067\025\001\004\003\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003
\202\001\001\000\221\025\071\003\001\033\147\373\112\034\371\012
\140\133\241\332\115\227\142\371\044\123\047\327\202\144\116\220

\056\303\111\033\053\232\334\374\250\170\147\065\361\035\360\021
\275\267\110\343\020\366\015\337\077\322\311\266\252\125\244\110
\272\002\333\336\131\056\025\133\073\235\026\175\107\327\067\352
\137\115\166\022\066\273\037\327\241\201\004\106\040\243\054\155
\251\236\001\176\077\051\316\000\223\337\375\311\222\163\211\211
\144\236\347\053\344\034\221\054\322\271\316\175\316\157\061\231
\323\346\276\322\036\220\360\011\024\171\134\043\253\115\322\332
\041\037\115\231\171\235\341\317\047\237\020\233\034\210\015\260
\212\144\101\061\270\016\154\220\044\244\233\134\161\217\272\273
\176\034\033\333\152\200\017\041\274\351\333\246\267\100\364\262
\213\251\261\344\357\232\032\320\075\151\231\356\250\050\243\341
\074\263\360\262\021\234\317\174\100\346\335\347\103\175\242\330
\072\265\251\215\362\064\231\304\324\020\341\006\375\011\204\020
\073\356\304\114\364\354\047\174\102\302\164\174\202\212\011\311
\264\003\045\274
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "XRamp Global CA Root"
# Issuer: CN=XRamp Global Certification Authority,O=XRamp Security Services
Inc,OU=www.xrampsecurity.com,C=US
# Serial Number:50:94:6c:ec:18:ea:d5:9c:4d:d5:97:ef:75:8f:a0:ad
# Subject: CN=XRamp Global Certification Authority,O=XRamp Security Services
Inc,OU=www.xrampsecurity.com,C=US
# Not Valid Before: Mon Nov 01 17:14:04 2004
# Not Valid After : Mon Jan 01 05:37:19 2035
# Fingerprint (SHA-256):
CE:CD:DC:90:50:99:D8:DA:DF:C5:B1:D2:09:B7:37:CB:E2:C1:8C:FB:2C:10:C0:FF:0B:CF:0D:32:86:FC:1A:A2
# Fingerprint (SHA1): B8:01:86:D1:EB:9C:86:A5:41:04:CF:30:54:F3:4C:52:B7:E5:58:C6
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "XRamp Global CA Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\270\001\206\321\353\234\206\245\101\004\317\060\124\363\114\122
\267\345\130\306
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\241\013\104\263\312\020\330\000\156\235\017\330\017\222\012\321
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\036\060\034\006\003\125\004\013\023\025\167\167\167\056\170

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\162\141\155\160\163\145\143\165\162\151\164\171\056\143\157\155
\061\044\060\042\006\003\125\004\012\023\033\130\122\141\155\160
\040\123\145\143\165\162\151\164\171\040\123\145\162\166\151\143
\145\163\040\111\156\143\061\055\060\053\006\003\125\004\003\023
\044\130\122\141\155\160\040\107\154\157\142\141\154\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\120\224\154\354\030\352\325\234\115\325\227\357\165\217
\240\255
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Go Daddy Class 2 CA"
#
# Issuer: OU=Go Daddy Class 2 Certification Authority,O="The Go Daddy Group, Inc.",C=US
# Serial Number: 0 (0x0)
# Subject: OU=Go Daddy Class 2 Certification Authority,O="The Go Daddy Group, Inc.",C=US
# Not Valid Before: Tue Jun 29 17:06:20 2004
# Not Valid After : Thu Jun 29 17:06:20 2034
# Fingerprint (SHA-256):
C3:84:6B:F2:4B:9E:93:CA:64:27:4C:0E:C6:7C:1E:CC:5E:02:4F:FC:AC:D2:D7:40:19:35:0E:81:FE:54:6A:E4
# Fingerprint (SHA1): 27:96:BA:E6:3F:18:01:E2:77:26:1B:A0:D7:77:70:02:8F:20:EE:E4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Go Daddy Class 2 CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\041\060\037\006\003\125\004\012\023\030\124\150\145\040\107\157
\040\104\141\144\144\171\040\107\162\157\165\160\054\040\111\156
\143\056\061\061\060\057\006\003\125\004\013\023\050\107\157\040
\104\141\144\144\171\040\103\154\141\163\163\040\062\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\125\123\061
```

\041\060\037\006\003\125\004\012\023\030\124\150\145\040\107\157
\040\104\141\144\144\171\040\107\162\157\165\160\054\040\111\156
\143\056\061\061\060\057\006\003\125\004\013\023\050\107\157\040
\104\141\144\144\171\040\103\154\141\163\163\040\062\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\000
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\000\060\202\002\350\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\143\061\013\060\011\006\003\125\004\006\023\002\125\123\061\041
\060\037\006\003\125\004\012\023\030\124\150\145\040\107\157\040
\104\141\144\144\171\040\107\162\157\165\160\054\040\111\156\143
\056\061\061\060\057\006\003\125\004\013\023\050\107\157\040\104
\141\144\144\171\040\103\154\141\163\163\040\062\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171\060\036\027\015\060\064\060\066\062\071\061\067
\060\066\062\060\132\027\015\063\064\060\066\062\071\061\067\060
\066\062\060\132\060\143\061\013\060\011\006\003\125\004\006\023
\002\125\123\061\041\060\037\006\003\125\004\012\023\030\124\150
\145\040\107\157\040\104\141\144\144\171\040\107\162\157\165\160
\054\040\111\156\143\056\061\061\060\057\006\003\125\004\013\023
\050\107\157\040\104\141\144\144\171\040\103\154\141\163\163\040
\062\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040
\101\165\164\150\157\162\151\164\171\060\202\001\040\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\015
\000\060\202\001\010\002\202\001\001\000\336\235\327\352\127\030
\111\241\133\353\327\137\110\206\352\276\335\377\344\357\147\034
\364\145\150\263\127\161\240\136\167\273\355\233\111\351\160\200
\075\126\030\143\010\157\332\362\314\320\077\177\002\124\042\124
\020\330\262\201\324\300\165\075\113\177\307\167\303\076\170\253
\032\003\265\040\153\057\152\053\261\305\210\176\304\273\036\260
\301\330\105\047\157\252\067\130\367\207\046\327\330\055\366\251
\027\267\037\162\066\116\246\027\077\145\230\222\333\052\156\135
\242\376\210\340\013\336\177\345\215\025\341\353\313\072\325\342
\022\242\023\055\330\216\257\137\022\075\240\010\005\010\266\134
\245\145\070\004\105\231\036\243\140\140\164\305\101\245\162\142
\033\142\305\037\157\137\032\102\276\002\121\145\250\256\043\030
\152\374\170\003\251\115\177\200\303\372\253\132\374\241\100\244
\312\031\026\376\262\310\357\136\163\015\356\167\275\232\366\171
\230\274\261\007\147\242\025\015\335\240\130\306\104\173\012\076
\142\050\137\272\101\007\123\130\317\021\176\070\164\305\370\377
\265\151\220\217\204\164\352\227\033\257\002\001\003\243\201\300
\060\201\275\060\035\006\003\125\035\016\004\026\004\024\322\304
\260\322\221\324\114\021\161\263\141\313\075\241\376\335\250\152

\324\343\060\201\215\006\003\125\035\043\004\201\205\060\201\202
\200\024\322\304\260\322\221\324\114\021\161\263\141\313\075\241
\376\335\250\152\324\343\241\147\244\145\060\143\061\013\060\011
\006\003\125\004\006\023\002\125\123\061\041\060\037\006\003\125
\004\012\023\030\124\150\145\040\107\157\040\104\141\144\144\171
\040\107\162\157\165\160\054\040\111\156\143\056\061\061\060\057
\006\003\125\004\013\023\050\107\157\040\104\141\144\144\171\040
\103\154\141\163\163\040\062\040\103\145\162\164\151\146\151\143
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171\202
\001\000\060\014\006\003\125\035\023\004\005\060\003\001\001\377
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003
\202\001\001\000\062\113\363\262\312\076\221\374\022\306\241\007
\214\216\167\240\063\006\024\134\220\036\030\367\010\246\075\012
\031\371\207\200\021\156\151\344\226\027\060\377\064\221\143\162
\070\356\314\034\001\243\035\224\050\244\061\366\172\304\124\327
\366\345\061\130\003\242\314\316\142\333\224\105\163\265\277\105
\311\044\265\325\202\002\255\043\171\151\215\270\266\115\316\317
\114\312\063\043\350\034\210\252\235\213\101\156\026\311\040\345
\211\236\315\073\332\160\367\176\231\046\040\024\124\045\253\156
\163\205\346\233\041\235\012\154\202\016\250\370\302\014\372\020
\036\154\226\357\207\015\304\017\141\213\255\356\203\053\225\370
\216\222\204\162\071\353\040\352\203\355\203\315\227\156\010\274
\353\116\046\266\163\053\344\323\366\114\376\046\161\342\141\021
\164\112\377\127\032\207\017\165\110\056\317\121\151\027\240\002
\022\141\225\325\321\100\262\020\114\356\304\254\020\103\246\245
\236\012\325\225\142\232\015\317\210\202\305\062\014\344\053\237
\105\346\015\237\050\234\261\271\052\132\127\255\067\017\257\035
\177\333\275\237
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Go Daddy Class 2 CA"
# Issuer: OU=Go Daddy Class 2 Certification Authority,O="The Go Daddy Group, Inc.",C=US
# Serial Number: 0 (0x0)
# Subject: OU=Go Daddy Class 2 Certification Authority,O="The Go Daddy Group, Inc.",C=US
# Not Valid Before: Tue Jun 29 17:06:20 2004
# Not Valid After : Thu Jun 29 17:06:20 2034
# Fingerprint (SHA-256):
C3:84:6B:F2:4B:9E:93:CA:64:27:4C:0E:C6:7C:1E:CC:5E:02:4F:FC:AC:D2:D7:40:19:35:0E:81:FE:54:6A:E4
# Fingerprint (SHA1): 27:96:BA:E6:3F:18:01:E2:77:26:1B:A0:D7:77:70:02:8F:20:EE:E4
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Go Daddy Class 2 CA"

```
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\047\226\272\346\077\030\001\342\167\046\033\240\327\167\160\002
\217\040\356\344
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\221\336\006\045\253\332\375\062\027\014\273\045\027\052\204\147
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\041\060\037\006\003\125\004\012\023\030\124\150\145\040\107\157
\040\104\141\144\144\171\040\107\162\157\165\160\054\040\111\156
\143\056\061\061\060\057\006\003\125\004\013\023\050\107\157\040
\104\141\144\144\171\040\103\154\141\163\163\040\062\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Starfield Class 2 CA"
#
# Issuer: OU=Starfield Class 2 Certification Authority,O="Starfield Technologies, Inc.",C=US
# Serial Number: 0 (0x0)
# Subject: OU=Starfield Class 2 Certification Authority,O="Starfield
 Technologies, Inc.",C=US
# Not Valid Before: Tue Jun 29 17:39:16 2004
# Not Valid After : Thu Jun 29 17:39:16 2034
# Fingerprint (SHA-256):
14:65:FA:20:53:97:B8:76:FA:A6:F0:A9:95:8E:55:90:E4:0F:CC:7F:AA:4F:B7:C2:C8:67:75:21:FB:5F:B6:58
# Fingerprint (SHA1): AD:7E:1C:28:B0:64:EF:8F:60:03:40:20:14:C3:D0:E3:37:0E:B5:8A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Starfield Class 2 CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\045\060\043\006\003\125\004\012\023\034\123\164\141\162\146\151
\145\154\144\040\124\145\143\150\156\157\154\157\147\151\145\163
\054\040\111\156\143\056\061\062\060\060\006\003\125\004\013\023
```

\051\123\164\141\162\146\151\145\154\144\040\103\154\141\163\163
\040\062\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\045\060\043\006\003\125\004\012\023\034\123\164\141\162\146\151
\145\154\144\040\124\145\143\150\156\157\154\157\147\151\145\163
\054\040\111\156\143\056\061\062\060\060\006\003\125\004\013\023
\051\123\164\141\162\146\151\145\154\144\040\103\154\141\163\163
\040\062\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\000
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\017\060\202\002\367\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\150\061\013\060\011\006\003\125\004\006\023\002\125\123\061\045
\060\043\006\003\125\004\012\023\034\123\164\141\162\146\151\145
\154\144\040\124\145\143\150\156\157\154\157\147\151\145\163\054
\040\111\156\143\056\061\062\060\060\006\003\125\004\013\023\051
\123\164\141\162\146\151\145\154\144\040\103\154\141\163\163\040
\062\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040
\101\165\164\150\157\162\151\164\171\060\036\027\015\060\064\060
\066\062\071\061\067\063\071\061\066\132\027\015\063\064\060\066
\062\071\061\067\063\071\061\066\132\060\150\061\013\060\011\006
\003\125\004\006\023\002\125\123\061\045\060\043\006\003\125\004
\012\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143
\150\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061
\062\060\060\006\003\125\004\013\023\051\123\164\141\162\146\151
\145\154\144\040\103\154\141\163\163\040\062\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\060\202\001\040\060\015\006\011\052\206\110\206\367
\015\001\001\001\005\000\003\202\001\015\000\060\202\001\010\002
\202\001\001\000\267\062\310\376\351\161\246\004\205\255\014\021
\144\337\316\115\357\310\003\030\207\077\241\253\373\074\246\237
\360\303\241\332\324\330\156\053\123\220\373\044\244\076\204\360
\236\350\137\354\345\047\104\365\050\246\077\173\336\340\052\360
\310\257\123\057\236\312\005\001\223\036\217\146\034\071\247\115
\372\132\266\163\004\045\146\353\167\177\347\131\306\112\231\045
\024\124\353\046\307\363\177\031\325\060\160\217\257\260\106\052
\377\255\353\051\355\327\237\252\004\207\243\324\371\211\245\064
\137\333\103\221\202\066\331\146\074\261\270\271\202\375\234\072
\076\020\310\073\357\006\145\146\172\233\031\030\075\377\161\121

\074\060\056\137\276\075\167\163\262\135\006\154\303\043\126\232
\053\205\046\222\034\247\002\263\344\077\015\257\010\171\202\270
\066\075\352\234\323\065\263\274\151\312\365\314\235\350\375\144
\215\027\200\063\156\136\112\135\231\311\036\207\264\235\032\300
\325\156\023\065\043\136\337\233\137\075\357\326\367\166\302\352
\076\273\170\015\034\102\147\153\004\330\370\326\332\157\213\362
\104\240\001\253\002\001\003\243\201\305\060\201\302\060\035\006
\003\125\035\016\004\026\004\024\277\137\267\321\316\335\037\206
\364\133\125\254\334\327\020\302\016\251\210\347\060\201\222\006
\003\125\035\043\004\201\212\060\201\207\200\024\277\137\267\321
\316\335\037\206\364\133\125\254\334\327\020\302\016\251\210\347
\241\154\244\152\060\150\061\013\060\011\006\003\125\004\006\023
\002\125\123\061\045\060\043\006\003\125\004\012\023\034\123\164
\141\162\146\151\145\154\144\040\124\145\143\150\156\157\154\157
\147\151\145\163\054\040\111\156\143\056\061\062\060\060\006\003
\125\004\013\023\051\123\164\141\162\146\151\145\154\144\040\103
\154\141\163\163\040\062\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\202\001
\000\060\014\006\003\125\035\023\004\005\060\003\001\001\377\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003\202
\001\001\000\005\235\077\210\235\321\311\032\125\241\254\151\363
\363\131\332\233\001\207\032\117\127\251\241\171\011\052\333\367
\057\262\036\314\307\136\152\330\203\207\241\227\357\111\065\076
\167\006\101\130\142\277\216\130\270\012\147\077\354\263\335\041
\146\037\311\124\372\162\314\075\114\100\330\201\257\167\236\203
\172\273\242\307\365\064\027\216\331\021\100\364\374\054\052\115
\025\177\247\142\135\056\045\323\000\013\040\032\035\150\371\027
\270\364\275\213\355\050\131\335\115\026\213\027\203\310\262\145
\307\055\172\245\252\274\123\206\155\335\127\244\312\370\040\101
\013\150\360\364\373\164\276\126\135\172\171\365\371\035\205\343
\055\225\276\365\161\220\103\314\215\037\232\000\012\207\051\351
\125\042\130\000\043\352\343\022\103\051\133\107\010\335\214\101
\152\145\006\250\345\041\252\101\264\225\041\225\271\175\321\064
\253\023\326\255\274\334\342\075\071\315\275\076\165\160\241\030
\131\003\311\042\264\217\234\325\136\052\327\245\266\324\012\155
\370\267\100\021\106\232\037\171\016\142\277\017\227\354\340\057
\037\027\224
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Starfield Class 2 CA"
# Issuer: OU=Starfield
Class 2 Certification Authority,O="Starfield Technologies, Inc.",C=US
# Serial Number: 0 (0x0)
# Subject: OU=Starfield Class 2 Certification Authority,O="Starfield Technologies, Inc.",C=US

```
# Not Valid Before: Tue Jun 29 17:39:16 2004
# Not Valid After : Thu Jun 29 17:39:16 2034
# Fingerprint (SHA-256):
14:65:FA:20:53:97:B8:76:FA:A6:F0:A9:95:8E:55:90:E4:0F:CC:7F:AA:4F:B7:C2:C8:67:75:21:FB:5F:B6:58
# Fingerprint (SHA1): AD:7E:1C:28:B0:64:EF:8F:60:03:40:20:14:C3:D0:E3:37:0E:B5:8A
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Starfield Class 2 CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\255\176\034\050\260\144\357\217\140\003\100\040\024\303\320\343
\067\016\265\212
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\062\112\113\273\310\143\151\233\276\164\232\306\335\035\106\044
END
CKA_ISSUER MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\045\060\043\006\003\125\004\012\023\034\123\164\141\162\146\151
\145\154\144\040\124\145\143\150\156\157\154\157\147\151\145\163
\054\040\111\156\143\056\061\062\060\060\006\003\125\004\013\023
\051\123\164\141\162\146\151\145\154\144\040\103\154\141\163\163
\040\062\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DigiCert Assured ID Root CA"
#
# Issuer: CN=DigiCert Assured ID Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US
# Serial Number:0c:e7:e0:e5:17:d8:46:fe:8f:e5:60:fc:1b:f0:30:39
# Subject: CN=DigiCert Assured ID Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US
# Not Valid Before: Fri Nov 10 00:00:00 2006
# Not Valid After : Mon Nov 10 00:00:00 2031
# Fingerprint (SHA-256):
 3E:90:99:B5:01:5E:8F:48:6C:00:BC:EA:9D:11:1E:E7:21:FA:BA:35:5A:89:BC:F1:DF:69:56:1E:3D:C6:32:5C
# Fingerprint (SHA1): 05:63:B8:63:0D:62:D7:5A:BB:C8:AB:1E:4B:DF:B5:A8:99:B2:4D:43
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
```

CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Assured ID Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040
\122\157\157\164\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040
\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\014\347\340\345\027\330\106\376\217\345\140\374\033\360
\060\071
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\267\060\202\002\237\240\003\002\001\002\002\020\014
\347\340\345\027\330\106\376\217\345\140\374\033\360\060\071\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\145
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025\060
\023\006\003\125\004\012\023\014\104\151\147\151\103\145\162\164
\040\111\156\143\061\031\060\027\006\003\125\004\013\023\020\167
\167\167\056\144\151\147\151\143\145\162\164\056\143\157\155\061
\044\060\042\006\003\125\004\003\023\033\104\151\147\151\103\145
\162\164\040\101\163\163\165\162\145\144\040\111\104\040\122\157
\157\164\040\103\101\060\036\027\015\060\066\061\061\061\060\060
\060\060\060\060\060\132\027\015\063\061\061\061\061\060\060\060
\060\060\060\060\132\060\145\061\013\060\011\006\003\125\004\006
\023\002\125\123\061\025\060\023\006\003\125\004\012\023\014\104
\151\147\151\103\145\162\164\040\111\156\143\061\031\060\027\006
\003\125\004\013\023\020\167\167\167\056\144\151\147\151\143\145
\162\164\056\143\157\155\061\044\060\042\006\003\125\004\003\023
\033\104\151\147\151\103\145\162\164\040\101\163\163\165\162\145
\144\040\111\104\040\122\157\157\164\040\103\101\060\202\001\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003

\202\001\017\000\060\202\001\012\002\202\001\001\000\255\016\025
\316\344\103\200\134\261\207\363\267\140\371\161\022\245\256\334
\046\224\210\252\364\316\365\040\071\050\130\140\014\370\200\332
\251\025\225\062\141\074\265\261\050\204\212\212\334\237\012\014
\203\027\172\217\220\254\212\347\171\123\134\061\204\052\366\017
\230\062\066\166\314\336\335\074\250\242\357\152\373\041\362\122
\141\337\237\040\327\037\342\261\331\376\030\144\322\022\133\137
\371\130\030\065\274\107\315\241\066\371\153\177\324\260\070\076
\301\033\303\214\063\331\330\057\030\376\050\017\263\247\203\326
\303\156\104\300\141\065\226\026\376\131\234\213\166\155\327\361
\242\113\015\053\377\013\162\332\236\140\320\216\220\065\306\170
\125\207\040\241\317\345\155\012\310\111\174\061\230\063\154\042
\351\207\320\062\132\242\272\023\202\021\355\071\027\235\231\072
\162\241\346\372\244\331\325\027\061\165\256\205\175\042\256\077
\001\106\206\366\050\171\310\261\332\344\127\027\304\176\034\016
\260\264\222\246\126\263\275\262\227\355\252\247\360\267\305\250
\077\225\026\320\377\241\226\353\010\137\030\167\117\002\003\001
\000\001\243\143\060\141\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026
\004\024\105\353\242\257\364\222\313\202\061\055\121\213\247\247
\041\235\363\155\310\017\060\037\006\003\125\035\043\004\030\060
\026\200\024\105\353\242\257\364\222\313\202\061\055\121\213\247
\247\041\235\363\155\310\017\060\015\006\011\052\206\110\206\367
\015\001\001\005\005\000\003\202\001\001\000\242\016\274\337\342
\355\360\343\162\163\172\144\224\277\367\162\146\330\062\344\102
\165\142\256\207\353\362\325\331\336\126\263\237\314\316\024\050
\271\015\227\140\134\022\114\130\344\323\075\203\111\105\130\227
\065\151\032\250\107\352\126\306\171\253\022\330\147\201\204\337
\177\011\074\224\346\270\046\054\040\275\075\263\050\211\367\137
\377\042\342\227\204\037\351\145\357\207\340\337\301\147\111\263
\135\353\262\011\052\353\046\355\170\276\175\077\053\363\267\046
\065\155\137\211\001\266\111\133\237\001\005\233\253\075\045\301
\314\266\177\302\361\157\206\306\372\144\150\353\201\055\224\353
\102\267\372\214\036\335\142\361\276\120\147\267\154\275\363\361
\037\153\014\066\007\026\177\067\174\251\133\155\172\361\022\106
\140\203\327\047\004\276\113\316\227\276\303\147\052\150\021\337
\200\347\014\063\146\277\023\015\024\156\363\177\037\143\020\036
\372\215\033\045\155\154\217\245\267\141\001\261\322\243\046\241
\020\161\235\255\342\303\371\303\231\121\267\053\007\010\316\056
\346\120\262\247\372\012\105\057\242\360\362
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "DigiCert Assured ID Root CA"

```
# Issuer: CN=DigiCert Assured ID Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US
# Serial Number:0c:e7:e0:e5:17:d8:46:fe:8f:e5:60:fc:1b:f0:30:39
# Subject: CN=DigiCert Assured ID Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US
# Not Valid Before: Fri Nov 10 00:00:00 2006
# Not Valid After : Mon Nov 10 00:00:00 2031
# Fingerprint (SHA-256):
3E:90:99:B5:01:5E:8F:48:6C:00:BC:EA:9D:11:1E:E7:21:FA:BA:35:5A:89:BC:F1:DF:69:56:1E:3D:C6:32:5C
# Fingerprint (SHA1): 05:63:B8:63:0D:62:D7:5A:BB:C8:AB:1E:4B:DF:B5:A8:99:B2:4D:43
CKA_CLASS
 CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Assured ID Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\005\143\270\143\015\142\327\132\273\310\253\036\113\337\265\250
\231\262\115\103
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\207\316\013\173\052\016\111\000\341\130\161\233\067\250\223\162
END
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040
\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\014\347\340\345\027\330\106\376\217\345\140\374\033\360
\060\071
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DigiCert Global Root CA"
#
# Issuer: CN=DigiCert Global Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US
# Serial Number:08:3b:e0:56:90:42:46:b1:a1:75:6a:c9:59:91:c7:4a
# Subject: CN=DigiCert Global Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US
# Not Valid Before: Fri Nov 10 00:00:00 2006
# Not Valid After : Mon Nov 10 00:00:00 2031
```

```
# Fingerprint (SHA-256):
43:48:A0:E9:44:4C:78:CB:26:5E:05:8D:5E:89:44:B4:D8:4F:96:62:BD:26:DB:25:7F:89:34:A4:43:C7:01:61
# Fingerprint (SHA1): A8:98:5D:3A:65:E5:E5:C4:B2:D7:D6:6D:40:C6:DD:2F:B1:9C:54:36
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Global Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE
 CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164
\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164
\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\010\073\340\126\220\102\106\261\241\165\152\311\131\221
\307\112
END
CKA_VALUE
 MULTILINE_OCTAL
\060\202\003\257\060\202\002\227\240\003\002\001\002\002\020\010
\073\340\126\220\102\106\261\241\165\152\311\131\221\307\112\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\141
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025\060
\023\006\003\125\004\012\023\014\104\151\147\151\103\145\162\164
\040\111\156\143\061\031\060\027\006\003\125\004\013\023\020\167
\167\167\056\144\151\147\151\143\145\162\164\056\143\157\155\061
\040\060\036\006\003\125\004\003\023\027\104\151\147\151\103\145
\162\164\040\107\154\157\142\141\154\040\122\157\157\164\040\103
\101\060\036\027\015\060\066\061\061\061\060\060\060\060\060\060
\060\132\027\015\063\061\061\061\061\060\060\060\060\060\060\060
\132\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103
```

\145\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013
\023\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143
\157\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147
\151\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157
\164\040\103\101\060\202\001\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012
\002\202\001\001\000\342\073\341\021\162\336\250\244\323\243\127
\252\120\242\217\013\167\220\311\242\245\356\022\316\226\133\001
\011\040\314\001\223\247\116\060\267\123\367\103\304\151\000\127
\235\342\215\042\335\207\006\100\000\201\011\316\316\033\203\277
\337\315\073\161\106\342\326\146\307\005\263\166\047\026\217\173
\236\036\225\175\356\267\110\243\010\332\326\257\172\014\071\006
\145\177\112\135\037\274\027\370\253\276\356\050\327\164\177\172
\170\231\131\205\150\156\134\043\062\113\277\116\300\350\132\155
\343\160\277\167\020\277\374\001\366\205\331\250\104\020\130\062
\251\165\030\325\321\242\276\107\342\047\152\364\232\063\370\111
\010\140\213\324\137\264\072\204\277\241\252\112\114\175\076\317
\117\137\154\166\136\240\113\067\221\236\334\042\346\155\316\024
\032\216\152\313\376\315\263\024\144\027\307\133\051\236\062\277
\362\356\372\323\013\102\324\253\267\101\062\332\014\324\357\370
\201\325\273\215\130\077\265\033\350\111\050\242\160\332\061\004
\335\367\262\026\362\114\012\116\007\250\355\112\075\136\265\177
\243\220\303\257\047\002\003\001\000\001\243\143\060\141\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\035\006\003\125\035\016\004\026\004\024\003\336\120\065\126\321
\114\273\146\360\243\342\033\033\303\227\262\075\321\125\060\037
\006\003\125\035\043\004\030\060\026\200\024\003\336\120\065\126
\321\114\273\146\360\243\342\033\033\303\227\262\075\321\125\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003\202
\001\001\000\313\234\067\252\110\023\022\012\372\335\104\234\117
\122\260\364\337\256\004\365\171\171\010\243\044\030\374\113\053
\204\300\055\271\325\307\376\364\301\037\130\313\270\155\234\172
\164\347\230\051\253\021\265\343\160\240\241\315\114\210\231\223
\214\221\160\342\253\017\034\276\223\251\377\143\325\344\007\140
\323\243\277\235\133\011\361\325\216\343\123\364\216\143\372\077
\247\333\264\146\337\142\146\326\321\156\101\215\362\055\265\352
\167\112\237\235\130\342\053\131\300\100\043\355\055\050\202\105
\076\171\124\222\046\230\340\200\110\250\067\357\360\326\171\140
\026\336\254\350\016\315\156\254\104\027\070\057\111\332\341\105
\076\052\271\066\123\317\072\120\006\367\056\350\304\127\111\154
\141\041\030\325\004\255\170\074\054\072\200\153\247\353\257\025
\024\351\330\211\301\271\070\154\342\221\154\212\377\144\271\167
\045\127\060\300\033\044\243\341\334\351\337\107\174\265\264\044
\010\005\060\354\055\275\013\277\105\277\120\271\251\363\353\230
\001\022\255\310\210\306\230\064\137\215\012\074\306\351\325\225
\225\155\336
END

```
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER
 CK_BBOOL CK_FALSE

# Trust for "DigiCert Global Root CA"
# Issuer: CN=DigiCert Global Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US
# Serial Number:08:3b:e0:56:90:42:46:b1:a1:75:6a:c9:59:91:c7:4a
# Subject: CN=DigiCert Global Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US
# Not Valid Before: Fri Nov 10 00:00:00 2006
# Not Valid After : Mon Nov 10 00:00:00 2031
# Fingerprint (SHA-256):
43:48:A0:E9:44:4C:78:CB:26:5E:05:8D:5E:89:44:B4:D8:4F:96:62:BD:26:DB:25:7F:89:34:A4:43:C7:01:61
# Fingerprint (SHA1): A8:98:5D:3A:65:E5:E5:C4:B2:D7:D6:6D:40:C6:DD:2F:B1:9C:54:36
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Global Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\250\230\135\072\145\345\345\304\262\327\326\155\100\306\335\057
\261\234\124\066
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\171\344\251\204\015\175\072\226\327\300\117\342\103\114\211\056
END
CKA_ISSUER MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164
\040\103\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\010\073\340\126\220\102\106\261\241\165\152\311\131\221
\307\112
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DigiCert High Assurance EV Root CA"
```

```
#
# Issuer: CN=DigiCert High Assurance EV Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US
# Serial Number:02:ac:5c:26:6a:0b:40:9b:8f:0b:79:f2:ae:46:25:77
# Subject: CN=DigiCert High Assurance EV Root CA,OU=www.digicert.com,O=DigiCert
 Inc,C=US
# Not Valid Before: Fri Nov 10 00:00:00 2006
# Not Valid After : Mon Nov 10 00:00:00 2031
# Fingerprint (SHA-256):
74:31:E5:F4:C3:C1:CE:46:90:77:4F:0B:61:E0:54:40:88:3B:A9:A0:1E:D0:0B:A6:AB:D7:80:6E:D3:B1:18:CF
# Fingerprint (SHA1): 5F:B7:EE:06:33:E2:59:DB:AD:0C:4C:9A:E6:D3:8F:1A:61:C7:DC:25
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert High Assurance EV Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\154\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\053\060\051\006\003\125\004\003\023\042\104\151\147\151
\103\145\162\164\040\110\151\147\150\040\101\163\163\165\162\141
\156\143\145\040\105\126\040\122\157\157\164\040\103\101
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\154\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\053\060\051\006\003\125\004\003\023\042\104\151\147\151
\103\145\162\164\040\110\151\147\150\040\101\163\163\165\162\141
\156\143\145\040\105\126\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\002\254\134\046\152\013\100\233\217\013\171\362\256\106
\045\167
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\305\060\202\002\255\240\003\002\001\002\002\020\002
\254\134\046\152\013\100\233\217\013\171\362\256\106\045\167\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\154
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025\060
\023\006\003\125\004\012\023\014\104\151\147\151\103\145\162\164
\040\111\156\143\061\031\060\027\006\003\125\004\013\023\020\167
\167\167\056\144\151\147\151\143\145\162\164\056\143\157\155\061
```

\053\060\051\006\003\125\004\003\023\042\104\151\147\151\103\145
\162\164\040\110\151\147\150\040\101\163\163\165\162\141\156\143
\145\040\105\126\040\122\157\157\164\040\103\101\060\036\027\015
\060\066\061\061\061\060\060\060\060\060\060\060\132\027\015\063
\061\061\061\061\060\060\060\060\060\060\060\132\060\154\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\025\060\023\006
\003\125\004\012\023\014\104\151\147\151\103\145\162\164\040\111
\156\143\061\031\060\027\006\003\125\004\013\023\020\167\167\167
\056\144\151\147\151\143\145\162\164\056\143\157\155\061\053\060
\051\006\003\125\004\003\023\042\104\151\147\151\103\145\162\164
\040\110\151\147\150\040\101\163\163\165\162\141\156\143\145\040
\105\126\040\122\157\157\164\040\103\101\060\202\001\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001
\017\000\060\202\001\012\002\202\001\001\000\306\314\345\163\346
\373\324\273\345\055\055\062\246\337\345\201\077\311\315\045\111
\266\161\052\303\325\224\064\147\242\012\034\260\137\151\246\100
\261\304\267\262\217\320\230\244\251\101\131\072\323\334\224\326
\074\333\164\070\244\112\314\115\045\202\367\112\245\123\022\070
\356\363\111\155\161\221\176\143\266\253\246\137\303\244\204\370
\117\142\121\276\370\305\354\333\070\222\343\006\345\010\221\014
\304\050\101\125\373\313\132\211\025\176\161\350\065\277\115\162
\011\075\276\072\070\120\133\167\061\033\215\263\307\044\105\232
\247\254\155\000\024\132\004\267\272\023\353\121\012\230\101\101
\042\116\145\141\207\201\101\120\246\171\134\211\336\031\112\127
\325\056\346\135\034\123\054\176\230\315\032\006\026\244\150\163
\320\064\004\023\134\241\161\323\132\174\125\333\136\144\341\067
\207\060\126\004\345\021\264\051\200\022\361\171\071\210\242\002
\021\174\047\146\267\210\267\170\362\312\012\250\070\253\012\144
\302\277\146\135\225\204\301\241\045\036\207\135\032\120\013\040
\022\314\101\273\156\013\121\070\270\113\313\002\003\001\000\001
\243\143\060\141\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\206\060\017\006\003\125\035\023\001\001\377\004\005
\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024
\261\076\303\151\003\370\277\107\001\324\230\046\032\010\002\357
\143\144\053\303\060\037\006\003\125\035\043\004\030\060\026\200
\024\261\076\303\151\003\370\277\107\001\324\230\046\032\010\002
\357\143\144\053\303\060\015\006\011\052\206\110\206\367\015\001
\001\005\005\000\003\202\001\001\000\034\032\006\227\334\327\234
\237\074\210\146\006\010\127\041\333\041\107\370\052\147\252\277
\030\062\166\100\020\127\301\212\363\172\331\021\145\216\065\372
\236\374\105\265\236\331\114\061\113\270\221\350\103\054\216\263
\170\316\333\343\123\171\161\326\345\041\224\001\332\125\207\232
\044\144\366\212\146\314\336\234\067\315\250\064\261\151\233\043
\310\236\170\042\053\160\103\343\125\107\061\141\031\357\130\305
\205\057\116\060\366\240\061\026\043\310\347\342\145\026\063\313
\277\032\033\240\075\370\312\136\213\061\213\140\010\211\055\014
\006\134\122\267\304\371\012\230\321\025\137\237\022\276\174\066
\143\070\275\104\244\177\344\046\053\012\304\227\151\015\351\214

\342\300\020\127\270\310\166\022\221\125\362\110\151\330\274\052
\002\133\017\104\324\040\061\333\364\272\160\046\135\220\140\236
\274\113\027\011\057\264\313\036\103\150\311\007\047\301\322\134
\367\352\041\271\150\022\234\074\234\277\236\374\200\134\233\143
\315\354\107\252\045\047\147\240\067\363\000\202\175\124\327\251
\370\351\056\023\243\167\350\037\112
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "DigiCert High Assurance EV Root CA"
# Issuer: CN=DigiCert High Assurance EV Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US
# Serial Number:02:ac:5c:26:6a:0b:40:9b:8f:0b:79:f2:ae:46:25:77
# Subject: CN=DigiCert High Assurance EV
Root CA,OU=www.digicert.com,O=DigiCert Inc,C=US
# Not Valid Before: Fri Nov 10 00:00:00 2006
# Not Valid After : Mon Nov 10 00:00:00 2031
# Fingerprint (SHA-256):
74:31:E5:F4:C3:C1:CE:46:90:77:4F:0B:61:E0:54:40:88:3B:A9:A0:1E:D0:0B:A6:AB:D7:80:6E:D3:B1:18:CF
# Fingerprint (SHA1): 5F:B7:EE:06:33:E2:59:DB:AD:0C:4C:9A:E6:D3:8F:1A:61:C7:DC:25
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert High Assurance EV Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\137\267\356\006\063\342\131\333\255\014\114\232\346\323\217\032
\141\307\334\045
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\324\164\336\127\134\071\262\323\234\205\203\305\300\145\111\212
END
CKA_ISSUER MULTILINE_OCTAL
\060\154\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\053\060\051\006\003\125\004\003\023\042\104\151\147\151
\103\145\162\164\040\110\151\147\150\040\101\163\163\165\162\141
\156\143\145\040\105\126\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\002\254\134\046\152\013\100\233\217\013\171\362\256\106
\045\167
END

```
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "SwissSign Gold CA - G2"
#
# Issuer: CN=SwissSign Gold CA - G2,O=SwissSign AG,C=CH
# Serial Number:00:bb:40:1c:43:f5:5e:4f:b0
# Subject: CN=SwissSign Gold CA - G2,O=SwissSign AG,C=CH
# Not Valid Before: Wed Oct 25 08:30:35 2006
# Not Valid After : Sat Oct 25 08:30:35 2036
# Fingerprint (SHA-256):
62:DD:0B:E9:B9:F5:0A:16:3E:A0:F8:E7:5C:05:3B:1E:CA:57:EA:55:C8:68:8F:64:7C:68:81:F2:C8:35:7B:95
# Fingerprint (SHA1): D8:C5:38:8A:B7:30:1B:1B:6E:D4:7A:E6:45:25:3A:6F:9F:1A:27:61
CKA_CLASS
 CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SwissSign Gold CA - G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\037\060\035\006\003\125\004\003\023
\026\123\167\151\163\163\123\151\147\156\040\107\157\154\144\040
\103\101\040\055\040\107\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\037\060\035\006\003\125\004\003\023
\026\123\167\151\163\163\123\151\147\156\040\107\157\154\144\040
\103\101\040\055\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\273\100\034\103\365\136\117\260
END
CKA_VALUE
 MULTILINE_OCTAL
\060\202\005\272\060\202\003\242\240\003\002\001\002\002\011\000
\273\100\034\103\365\136\117\260\060\015\006\011\052\206\110\206
\367\015\001\001\005\005\000\060\105\061\013\060\011\006\003\125
\004\006\023\002\103\110\061\025\060\023\006\003\125\004\012\023
\014\123\167\151\163\163\123\151\147\156\040\101\107\061\037\060
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\035\006\003\125\004\003\023\026\123\167\151\163\163\123\151\147
\156\040\107\157\154\144\040\103\101\040\055\040\107\062\060\036
\027\015\060\066\061\060\062\065\060\070\063\060\063\065\132\027
\015\063\066\061\060\062\065\060\070\063\060\063\065\132\060\105
\061\013\060\011\006\003\125\004\006\023\002\103\110\061\025\060
\023\006\003\125\004\012\023\014\123\167\151\163\163\123\151\147
\156\040\101\107\061\037\060\035\006\003\125\004\003\023\026\123
\167\151\163\163\123\151\147\156\040\107\157\154\144\040\103\101
\040\055\040\107\062\060\202\002\042\060\015\006\011\052\206\110
\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002
\012\002\202\002\001\000\257\344\356\176\213\044\016\022\156\251
\120\055\026\104\073\222\222\134\312\270\135\204\222\102\023\052
\274\145\127\202\100\076\127\044\315\120\213\045\052\267\157\374
\357\242\320\300\037\002\044\112\023\226\217\043\023\346\050\130
\000\243\107\307\006\247\204\043\053\273\275\226\053\177\125\314
\213\301\127\037\016\142\145\017\335\075\126\212\163\332\256\176
\155\272\201\034\176\102\214\040\065\331\103\115\204\372\204\333
\122\054\363\016\047\167\013\153\277\021\057\162\170\237\056\330
\076\346\030\067\132\052\162\371\332\142\220\222\225\312\037\234
\351\263\074\053\313\363\001\023\277\132\317\301\265\012\140\275
\335\265\231\144\123\270\240\226\263\157\342\046\167\221\214\340
\142\020\002\237\064\017\244\325\222\063\121\336\276\215\272\204
\172\140\074\152\333\237\053\354\336\336\001\077\156\115\345\120
\206\313\264\257\355\104\100\305\312\132\214\332\322\053\174\250
\356\276\246\345\012\252\016\245\337\005\122\267\125\307\042\135
\062\152\227\227\143\023\333\311\333\171\066\173\205\072\112\305
\122\211\371\044\347\235\167\251\202\377\125\034\245\161\151\053
\321\002\044\362\263\046\324\153\332\004\125\345\301\012\307\155
\060\067\220\052\344\236\024\063\136\026\027\125\305\133\265\313
\064\211\222\361\235\046\217\241\007\324\306\262\170\120\333\014
\014\013\174\013\214\101\327\271\351\335\214\210\367\243\115\262
\062\314\330\027\332\315\267\316\146\235\324\375\136\377\275\227
\076\051\165\347\176\247\142\130\257\045\064\245\101\307\075\274
\015\120\312\003\003\017\010\132\037\225\163\170\142\277\257\162
\024\151\016\245\345\003\016\170\216\046\050\102\360\007\013\142
\040\020\147\071\106\372\251\003\314\004\070\172\146\357\040\203
\265\214\112\126\216\221\000\374\216\134\202\336\210\240\303\342
\150\156\175\215\357\074\335\145\364\135\254\121\357\044\200\256
\252\126\227\157\371\255\175\332\141\077\230\167\074\245\221\266
\034\214\046\332\145\242\011\155\301\342\124\343\271\312\114\114
\200\217\167\173\140\232\036\337\266\362\110\036\016\272\116\124
\155\230\340\341\242\032\242\167\120\317\304\143\222\354\107\031
\235\353\346\153\316\301\002\003\001\000\001\243\201\254\060\201
\251\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\006\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\035\006\003\125\035\016\004\026\004\024\133\045\173
\226\244\145\121\176\270\071\363\300\170\146\136\350\072\347\360
\356\060\037\006\003\125\035\043\004\030\060\026\200\024\133\045

\173\226\244\145\121\176\270\071\363\300\170\146\136\350\072\347
\360\356\060\106\006\003\125\035\040\004\077\060\075\060\073\006
\011\140\205\164\001\131\001\002\001\001\060\056\060\054\006\010
\053\006\001\005\005\007\002\001\026\040\150\164\164\160\072\057
\057\162\145\160\157\163\151\164\157\162\171\056\163\167\151\163
\163\163\151\147\156\056\143\157\155\057\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\003\202\002\001\000\047\272
\343\224\174\361\256\300\336\027\346\345\330\325\365\124\260\203
\364\273\315\136\005\173\117\237\165\146\257\074\350\126\176\374
\162\170\070\003\331\053\142\033\000\271\370\351\140\315\314\316
\121\212\307\120\061\156\341\112\176\030\057\151\131\266\075\144
\201\053\343\203\204\346\042\207\216\175\340\356\002\231\141\270
\036\364\270\053\210\022\026\204\302\061\223\070\226\061\246\271
\073\123\077\303\044\223\126\133\151\222\354\305\301\273\070\000
\343\354\027\251\270\334\307\174\001\203\237\062\107\272\122\042
\064\035\062\172\011\126\247\174\045\066\251\075\113\332\300\202
\157\012\273\022\310\207\113\047\021\371\036\055\307\223\077\236
\333\137\046\153\122\331\056\212\361\024\306\104\215\025\251\267
\277\275\336\246\032\356\256\055\373\110\167\027\376\273\354\257
\030\365\052\121\360\071\204\227\225\154\156\033\303\053\304\164
\140\171\045\260\012\047\337\337\136\322\071\317\105\175\102\113
\337\263\054\036\305\306\135\312\125\072\240\234\151\232\217\332
\357\262\260\074\237\207\154\022\053\145\160\025\122\061\032\044
\317\157\061\043\120\037\214\117\217\043\303\164\101\143\034\125
\250\024\335\076\340\121\120\317\361\033\060\126\016\222\260\202
\205\330\203\313\042\144\274\055\270\045\325\124\242\270\006\352
\255\222\244\044\240\301\206\265\112\023\152\107\317\056\013\126
\225\124\313\316\232\333\152\264\246\262\333\101\010\206\047\167
\367\152\240\102\154\013\070\316\327\165\120\062\222\302\337\053
\060\042\110\320\325\101\070\045\135\244\351\135\237\306\224\165
\320\105\375\060\227\103\217\220\253\012\307\206\163\140\112\151
\055\336\245\170\327\006\332\152\236\113\076\167\072\040\023\042
\001\320\277\150\236\143\140\153\065\115\013\155\272\241\075\300
\223\340\177\043\263\125\255\162\045\116\106\371\322\026\357\260
\144\301\001\236\351\312\240\152\230\016\317\330\140\362\057\111
\270\344\102\341\070\065\026\364\310\156\117\367\201\126\350\272
\243\276\043\257\256\375\157\003\340\002\073\060\166\372\033\155
\101\317\001\261\351\270\311\146\364\333\046\363\072\244\164\362
\111\044\133\311\260\320\127\301\372\076\172\341\227\311
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "SwissSign Gold CA - G2"
# Issuer: CN=SwissSign Gold CA - G2,O=SwissSign AG,C=CH
# Serial Number:00:bb:40:1c:43:f5:5e:4f:b0

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# Subject: CN=SwissSign Gold CA - G2,O=SwissSign AG,C=CH
# Not Valid Before: Wed Oct 25 08:30:35 2006
# Not Valid After : Sat Oct 25 08:30:35 2036
# Fingerprint (SHA-256):
62:DD:0B:E9:B9:F5:0A:16:3E:A0:F8:E7:5C:05:3B:1E:CA:57:EA:55:C8:68:8F:64:7C:68:81:F2:C8:35:7B:95
# Fingerprint (SHA1): D8:C5:38:8A:B7:30:1B:1B:6E:D4:7A:E6:45:25:3A:6F:9F:1A:27:61
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SwissSign Gold CA - G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\330\305\070\212\267\060\033\033\156\324\172\346\105\045\072\157
\237\032\047\141
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\044\167\331\250\221\321\073\372\210\055\302\377\370\315\063\223
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\037\060\035\006\003\125\004\003\023
\026\123\167\151\163\163\123\151\147\156\040\107\157\154\144\040
\103\101\040\055\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\273\100\034\103\365\136\117\260
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "SwissSign Silver CA - G2"
#
# Issuer: CN=SwissSign Silver CA - G2,O=SwissSign AG,C=CH
# Serial Number:4f:1b:d4:2f:54:bb:2f:4b
# Subject: CN=SwissSign Silver CA - G2,O=SwissSign AG,C=CH
# Not Valid Before: Wed Oct 25 08:32:46 2006
# Not Valid After : Sat Oct 25 08:32:46 2036
# Fingerprint (SHA-256):
BE:6C:4D:A2:BB:B9:BA:59:B6:F3:93:97:68:37:42:46:C3:C0:05:99:3F:A9:8F:02:0D:1D:ED:BE:D4:8A:81:D5
#
 Fingerprint (SHA1): 9B:AA:E5:9F:56:EE:21:CB:43:5A:BE:25:93:DF:A7:F0:40:D1:1D:CB
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
```

CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SwissSign Silver CA - G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\041\060\037\006\003\125\004\003\023
\030\123\167\151\163\163\123\151\147\156\040\123\151\154\166\145
\162\040\103\101\040\055\040\107\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\041\060\037\006\003\125\004\003\023
\030\123\167\151\163\163\123\151\147\156\040\123\151\154\166\145
\162\040\103\101\040\055\040\107\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\010\117\033\324\057\124\273\057\113
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\275\060\202\003\245\240\003\002\001\002\002\010\117
\033\324\057\124\273\057\113\060\015\006\011\052\206\110\206\367
\015\001\001\005\005\000\060\107\061\013\060\011\006\003\125\004
\006\023\002\103\110\061\025\060\023\006\003\125\004\012\023\014
\123\167\151\163\163\123\151\147\156\040\101\107\061\041\060\037
\006\003\125\004\003\023\030\123\167\151\163\163\123\151\147\156
\040\123\151\154\166\145\162\040\103\101\040\055\040\107\062\060
\036\027\015\060\066\061\060\062\065\060\070\063\062\064\066\132
\027\015\063\066\061\060\062\065\060\070\063\062\064\066\132\060
\107\061\013\060\011\006\003\125\004\006\023\002\103\110\061\025
\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123\151
\147\156\040\101\107\061\041\060\037\006\003\125\004\003\023\030
\123\167\151\163\163\123\151\147\156\040\123\151\154\166\145\162
\040\103\101\040\055\040\107\062\060\202\002\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000
\060\202\002\012\002\202\002\001\000\304\361\207\177\323\170\061
\367\070\311\370\303\231\103\274\307\367\274\067\347\116\161\272
\113\217\245\163\035\134\156\230\256\003\127\256\070\067\103\057
\027\075\037\310\316\150\020\301\170\256\031\003\053\020\372\054
\171\203\366\350\271\150\271\125\362\004\104\247\071\371\374\004
\213\036\361\242\115\047\371\141\173\272\267\345\242\023\266\353
\141\076\320\154\321\346\373\372\136\355\035\264\236\240\065\133
\241\222\313\360\111\222\376\205\012\005\076\346\331\013\342\117
\273\334\225\067\374\221\351\062\065\042\321\037\072\116\047\205

\235\260\025\224\062\332\141\015\107\115\140\102\256\222\107\350
\203\132\120\130\351\212\213\271\135\241\334\335\231\112\037\066
\147\273\110\344\203\266\067\353\110\072\257\017\147\217\027\007
\350\004\312\357\152\061\207\324\300\266\371\224\161\173\147\144
\270\266\221\112\102\173\145\056\060\152\014\365\220\356\225\346
\362\315\202\354\331\241\112\354\366\262\113\345\105\205\346\155
\170\223\004\056\234\202\155\066\251\304\061\144\037\206\203\013
\052\364\065\012\170\311\125\317\101\260\107\351\060\237\231\276
\141\250\006\204\271\050\172\137\070\331\033\251\070\260\203\177
\163\301\303\073\110\052\202\017\041\233\270\314\250\065\303\204
\033\203\263\076\276\244\225\151\001\072\211\000\170\004\331\311
\364\231\031\253\126\176\133\213\206\071\025\221\244\020\054\011
\062\200\140\263\223\300\052\266\030\013\235\176\215\111\362\020
\112\177\371\325\106\057\031\222\243\231\247\046\254\273\214\074
\346\016\274\107\007\334\163\121\361\160\144\057\010\371\264\107
\035\060\154\104\352\051\067\205\222\150\146\274\203\070\376\173
\071\056\323\120\360\037\373\136\140\266\251\246\372\047\101\361
\233\030\162\362\365\204\164\112\311\147\304\124\256\110\144\337
\214\321\156\260\035\341\007\217\010\036\231\234\161\351\114\330
\245\367\107\022\037\164\321\121\236\206\363\302\242\043\100\013
\163\333\113\246\347\163\006\214\301\240\351\301\131\254\106\372
\346\057\370\317\161\234\106\155\271\304\025\215\070\171\003\105
\110\357\304\135\327\010\356\207\071\042\206\262\015\017\130\103
\367\161\251\110\056\375\352\326\037\002\003\001\000\001\243\201
\254\060\201\251\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004\005
\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024
\027\240\315\301\344\101\266\072\133\073\313\105\235\275\034\302
\230\372\206\130\060\037\006\003\125\035\043\004\030\060\026\200
\024\027\240\315\301\344\101\266\072\133\073\313\105\235\275\034
\302\230\372\206\130\060\106\006\003\125\035\040\004\077\060\075
\060\073\006\011\140\205\164\001\131\001\003\001\001\060\056\060
\054\006\010\053\006\001\005\005\007\002\001\026\040\150\164\164
\160\072\057\057\162\145\160\157\163\151\164\157\162\171\056\163
\167\151\163\163\163\151\147\156\056\143\157\155\057\060\015\006
\011\052\206\110\206\367\015\001\001\005\005\000\003\202\002\001
\000\163\306\201\340\047\322\055\017\340\225\060\342\232\101\177
\120\054\137\137\142\141\251\206\152\151\030\014\164\111\326\135
\204\352\101\122\030\157\130\255\120\126\040\152\306\275\050\151
\130\221\334\221\021\065\251\072\035\274\032\245\140\236\330\037
\177\105\221\151\331\176\273\170\162\301\006\017\052\316\217\205
\160\141\254\240\315\013\270\071\051\126\204\062\116\206\273\075
\304\052\331\327\037\162\356\376\121\241\042\101\261\161\002\143
\032\202\260\142\253\136\127\022\037\337\313\335\165\240\300\135
\171\220\214\033\340\120\346\336\061\376\230\173\160\137\245\220
\330\255\370\002\266\157\323\140\335\100\113\042\305\075\255\072
\172\237\032\032\107\221\171\063\272\202\334\062\151\003\226\156
\037\113\360\161\376\343\147\162\240\261\277\134\213\344\372\231

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\042\307\204\271\033\215\043\227\077\355\045\340\317\145\273\365
\141\004\357\335\036\262\132\101\042\132\241\237\135\054\350\133
\311\155\251\014\014\170\252\140\306\126\217\001\132\014\150\274
\151\031\171\304\037\176\227\005\277\305\351\044\121\136\324\325
\113\123\355\331\043\132\066\003\145\243\301\003\255\101\060\363
\106\033\205\220\257\145\265\325\261\344\026\133\170\165\035\227
\172\155\131\251\052\217\173\336\303\207\211\020\231\111\163\170
\310\075\275\121\065\164\052\325\361\176\151\033\052\273\073\275
\045\270\232\132\075\162\141\220\146\207\356\014\326\115\324\021
\164\013\152\376\013\003\374\243\125\127\211\376\112\313\256\133
\027\005\310\362\215\043\061\123\070\322\055\152\077\202\271\215
\010\152\367\136\101\164\156\303\021\176\007\254\051\140\221\077
\070\312\127\020\015\275\060\057\307\245\346\101\240\332\256\005
\207\232\240\244\145\154\114\011\014\211\272\270\323\271\300\223
\212\060\372\215\345\232\153\025\001\116\147\252\332\142\126\076
\204\010\146\322\304\066\175\247\076\020\374\210\340\324\200\345
\000\275\252\363\116\006\243\172\152\371\142\162\343\011\117\353
\233\016\001\043\361\237\273\174\334\334\154\021\227\045\262\362
\264\143\024\322\006\052\147\214\203\365\316\352\007\330\232\152
\036\354\344\012\273\052\114\353\011\140\071\316\312\142\330\056
\156
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "SwissSign Silver CA - G2"
# Issuer: CN=SwissSign Silver CA - G2,O=SwissSign AG,C=CH
# Serial Number:4f:1b:d4:2f:54:bb:2f:4b
# Subject: CN=SwissSign Silver CA - G2,O=SwissSign AG,C=CH
# Not Valid Before: Wed Oct 25 08:32:46 2006
# Not Valid After : Sat Oct 25 08:32:46 2036
# Fingerprint (SHA-256):
BE:6C:4D:A2:BB:B9:BA:59:B6:F3:93:97:68:37:42:46:C3:C0:05:99:3F:A9:8F:02:0D:1D:ED:BE:D4:8A:81:D5
# Fingerprint (SHA1): 9B:AA:E5:9F:56:EE:21:CB:43:5A:BE:25:93:DF:A7:F0:40:D1:1D:CB
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SwissSign Silver CA - G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\233\252\345\237\126\356\041\313\103\132\276\045\223\337\247\360
\100\321\035\313
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\340\006\241\311\175\317\311\374\015\300\126\165\226\330\142\023
```

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END
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\041\060\037\006\003\125\004\003\023
\030\123\167\151\163\163\123\151\147\156\040\123\151\154\166\145
\162\040\103\101\040\055\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\117\033\324\057\124\273\057\113
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "SecureTrust CA"
#
# Issuer: CN=SecureTrust CA,O=SecureTrust Corporation,C=US
# Serial Number:0c:f0:8e:5c:08:16:a5:ad:42:7f:f0:eb:27:18:59:d0
# Subject: CN=SecureTrust CA,O=SecureTrust
 Corporation,C=US
# Not Valid Before: Tue Nov 07 19:31:18 2006
# Not Valid After : Mon Dec 31 19:40:55 2029
# Fingerprint (SHA-256):
F1:C1:B5:0A:E5:A2:0D:D8:03:0E:C9:F6:BC:24:82:3D:D3:67:B5:25:57:59:B4:E7:1B:61:FC:E9:F7:37:5D:73
# Fingerprint (SHA1): 87:82:C6:C3:04:35:3B:CF:D2:96:92:D2:59:3E:7D:44:D9:34:FF:11
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SecureTrust CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\040\060\036\006\003\125\004\012\023\027\123\145\143\165\162\145
\124\162\165\163\164\040\103\157\162\160\157\162\141\164\151\157
\156\061\027\060\025\006\003\125\004\003\023\016\123\145\143\165
\162\145\124\162\165\163\164\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\040\060\036\006\003\125\004\012\023\027\123\145\143\165\162\145
\124\162\165\163\164\040\103\157\162\160\157\162\141\164\151\157
\156\061\027\060\025\006\003\125\004\003\023\016\123\145\143\165
\162\145\124\162\165\163\164\040\103\101
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END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\014\360\216\134\010\026\245\255\102\177\360\353\047\030
\131\320
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\270\060\202\002\240\240\003\002\001\002\002\020\014
\360\216\134\010\026\245\255\102\177\360\353\047\030\131\320\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\110
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\040\060
\036\006\003\125\004\012\023\027\123\145\143\165\162\145\124\162
\165\163\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\027\060\025\006\003\125\004\003\023\016\123\145\143\165\162\145
\124\162\165\163\164\040\103\101\060\036\027\015\060\066\061\061
\060\067\061\071\063\061\061\070\132\027\015\062\071\061\062\063
\061\061\071\064\060\065\065\132\060\110\061\013\060\011\006\003
\125\004\006\023\002\125\123\061\040\060\036\006\003\125\004\012
\023\027\123\145\143\165\162\145\124\162\165\163\164\040\103\157
\162\160\157\162\141\164\151\157\156\061\027\060\025\006\003\125
\004\003\023\016\123\145\143\165\162\145\124\162\165\163\164\040
\103\101\060\202\001\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202
\001\001\000\253\244\201\345\225\315\365\366\024\216\302\117\312
\324\342\170\225\130\234\101\341\015\231\100\044\027\071\221\063
\146\351\276\341\203\257\142\134\211\321\374\044\133\141\263\340
\021\021\101\034\035\156\360\270\273\370\336\247\201\272\246\110
\306\237\035\275\276\216\251\101\076\270\224\355\051\032\324\216
\322\003\035\003\357\155\015\147\034\127\327\006\255\312\310\365
\376\016\257\146\045\110\004\226\013\135\243\272\026\303\010\117
\321\106\370\024\134\362\310\136\001\231\155\375\210\314\206\250
\301\157\061\102\154\122\076\150\313\363\031\064\337\273\207\030
\126\200\046\304\320\334\300\157\337\336\240\302\221\026\240\144
\021\113\104\274\036\366\347\372\143\336\146\254\166\244\161\243
\354\066\224\150\172\167\244\261\347\016\057\201\172\342\265\162
\206\357\242\153\213\360\017\333\323\131\077\272\162\274\104\044
\234\343\163\263\367\257\127\057\102\046\235\251\164\272\000\122
\362\113\315\123\174\107\013\066\205\016\146\251\010\227\026\064
\127\301\146\367\200\343\355\160\124\307\223\340\056\050\025\131
\207\272\273\002\003\001\000\001\243\201\235\060\201\232\060\023
\006\011\053\006\001\004\001\202\067\024\002\004\006\036\004\000
\103\000\101\060\013\006\003\125\035\017\004\004\003\002\001\206
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\035\006\003\125\035\016\004\026\004\024\102\062\266\026
\372\004\375\376\135\113\172\303\375\367\114\100\035\132\103\257
\060\064\006\003\125\035\037\004\055\060\053\060\051\240\047\240
\045\206\043\150\164\164\160\072\057\057\143\162\154\056\163\145
\143\165\162\145\164\162\165\163\164\056\143\157\155\057\123\124

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\103\101\056\143\162\154\060\020\006\011\053\006\001\004\001\202
\067\025\001\004\003\002\001\000\060\015\006\011\052\206\110\206
\367\015\001\001\005\005\000\003\202\001\001\000\060\355\117\112
\341\130\072\122\162\133\265\246\243\145\030\246\273\121\073\167
\351\235\352\323\237\134\340\105\145\173\015\312\133\342\160\120
\262\224\005\024\256\111\307\215\101\007\022\163\224\176\014\043
\041\375\274\020\177\140\020\132\162\365\230\016\254\354\271\177
\335\172\157\135\323\034\364\377\210\005\151\102\251\005\161\310
\267\254\046\350\056\264\214\152\377\161\334\270\261\337\231\274
\174\041\124\053\344\130\242\273\127\051\256\236\251\243\031\046
\017\231\056\010\260\357\375\151\317\231\032\011\215\343\247\237
\053\311\066\064\173\044\263\170\114\225\027\244\006\046\036\266
\144\122\066\137\140\147\331\234\305\005\164\013\347\147\043\322
\010\374\210\351\256\213\177\341\060\364\067\176\375\306\062\332
\055\236\104\060\060\154\356\007\336\322\064\374\322\377\100\366
\113\364\146\106\006\124\246\362\062\012\143\046\060\153\233\321
\334\213\107\272\341\271\325\142\320\242\240\364\147\005\170\051
\143\032\157\004\326\370\306\114\243\232\261\067\264\215\345\050
\113\035\236\054\302\270\150\274\355\002\356\061
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "SecureTrust CA"
# Issuer: CN=SecureTrust CA,O=SecureTrust Corporation,C=US
# Serial Number:0c:f0:8e:5c:08:16:a5:ad:42:7f:f0:eb:27:18:59:d0
# Subject: CN=SecureTrust CA,O=SecureTrust Corporation,C=US
# Not Valid Before: Tue Nov 07 19:31:18 2006
# Not Valid After : Mon Dec 31 19:40:55 2029
# Fingerprint (SHA-256):
F1:C1:B5:0A:E5:A2:0D:D8:03:0E:C9:F6:BC:24:82:3D:D3:67:B5:25:57:59:B4:E7:1B:61:FC:E9:F7:37:5D:73
# Fingerprint (SHA1): 87:82:C6:C3:04:35:3B:CF:D2:96:92:D2:59:3E:7D:44:D9:34:FF:11
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL
 CK_FALSE
CKA_LABEL UTF8 "SecureTrust CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\207\202\306\303\004\065\073\317\322\226\222\322\131\076\175\104
\331\064\377\021
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\334\062\303\247\155\045\127\307\150\011\235\352\055\251\242\321
END
CKA_ISSUER MULTILINE_OCTAL
```

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\060\110\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\040\060\036\006\003\125\004\012\023\027\123\145\143\165\162\145
\124\162\165\163\164\040\103\157\162\160\157\162\141\164\151\157
\156\061\027\060\025\006\003\125\004\003\023\016\123\145\143\165
\162\145\124\162\165\163\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\014\360\216\134\010\026\245\255\102\177\360\353\047\030
\131\320
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Secure Global CA"
#
# Issuer: CN=Secure Global CA,O=SecureTrust
 Corporation,C=US
# Serial Number:07:56:22:a4:e8:d4:8a:89:4d:f4:13:c8:f0:f8:ea:a5
# Subject: CN=Secure Global CA,O=SecureTrust Corporation,C=US
# Not Valid Before: Tue Nov 07 19:42:28 2006
# Not Valid After : Mon Dec 31 19:52:06 2029
# Fingerprint (SHA-256):
42:00:F5:04:3A:C8:59:0E:BB:52:7D:20:9E:D1:50:30:29:FB:CB:D4:1C:A1:B5:06:EC:27:F1:5A:DE:7D:AC:69
# Fingerprint (SHA1): 3A:44:73:5A:E5:81:90:1F:24:86:61:46:1E:3B:9C:C4:5F:F5:3A:1B
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Secure Global CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\040\060\036\006\003\125\004\012\023\027\123\145\143\165\162\145
\124\162\165\163\164\040\103\157\162\160\157\162\141\164\151\157
\156\061\031\060\027\006\003\125\004\003\023\020\123\145\143\165
\162\145\040\107\154\157\142\141\154\040\103\101
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\040\060\036\006\003\125\004\012\023\027\123\145\143\165\162\145
\124\162\165\163\164\040\103\157\162\160\157\162\141\164\151\157
\156\061\031\060\027\006\003\125\004\003\023\020\123\145\143\165
\162\145\040\107\154\157\142\141\154\040\103\101
```

END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\007\126\042\244\350\324\212\211\115\364\023\310\360\370
\352\245
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\274\060\202\002\244\240\003\002\001\002\002\020\007
\126\042\244\350\324\212\211\115\364\023\310\360\370\352\245\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\112
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\040\060
\036\006\003\125\004\012\023\027\123\145\143\165\162\145\124\162
\165\163\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\031\060\027\006\003\125\004\003\023\020\123\145\143\165\162\145
\040\107\154\157\142\141\154\040\103\101\060\036\027\015\060\066
\061\061\060\067\061\071\064\062\062\070\132\027\015\062\071\061
\062\063\061\061\071\065\062\060\066\132\060\112\061\013\060\011
\006\003\125\004\006\023\002\125\123\061\040\060\036\006\003\125
\004\012\023\027\123\145\143\165\162\145\124\162\165\163\164\040
\103\157\162\160\157\162\141\164\151\157\156\061\031\060\027\006
\003\125\004\003\023\020\123\145\143\165\162\145\040\107\154\157
\142\141\154\040\103\101\060\202\001\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202
\001\012\002\202\001\001\000\257\065\056\330\254\154\125\151\006
\161\345\023\150\044\263\117\330\314\041\107\370\361\140\070\211
\211\003\351\275\352\136\106\123\011\334\134\365\132\350\367\105
\052\002\353\061\141\327\051\063\114\316\307\174\012\067\176\017
\272\062\230\341\035\227\257\217\307\334\311\070\226\363\333\032
\374\121\355\150\306\320\156\244\174\044\321\256\102\310\226\120
\143\056\340\376\165\376\230\247\137\111\056\225\343\071\063\144
\216\036\244\137\220\322\147\074\262\331\376\101\271\125\247\011
\216\162\005\036\213\335\104\205\202\102\320\111\300\035\140\360
\321\027\054\225\353\366\245\301\222\243\305\302\247\010\140\015
\140\004\020\226\171\236\026\064\346\251\266\372\045\105\071\310
\036\145\371\223\365\252\361\122\334\231\230\075\245\206\032\014
\065\063\372\113\245\004\006\025\034\061\200\357\252\030\153\302
\173\327\332\316\371\063\040\325\365\275\152\063\055\201\004\373
\260\134\324\234\243\342\134\035\343\251\102\165\136\173\324\167
\357\071\124\272\311\012\030\033\022\231\111\057\210\113\375\120
\142\321\163\347\217\172\103\002\003\001\000\001\243\201\235\060
\201\232\060\023\006\011\053\006\001\004\001\202\067\024\002\004
\006\036\004\000\103\000\101\060\013\006\003\125\035\017\004\004
\003\002\001\206\060\017\006\003\125\035\023\001\001\377\004\005
\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024
\257\104\004\302\101\176\110\203\333\116\071\002\354\354\204\172
\346\316\311\244\060\064\006\003\125\035\037\004\055\060\053\060
\051\240\047\240\045\206\043\150\164\164\160\072\057\057\143\162
\154\056\163\145\143\165\162\145\164\162\165\163\164\056\143\157
\155\057\123\107\103\101\056\143\162\154\060\020\006\011\053\006

\001\004\001\202\067\025\001\004\003\002\001\000\060\015\006\011
\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000
\143\032\010\100\175\244\136\123\015\167\330\172\256\037\015\013
\121\026\003\357\030\174\310\343\257\152\130\223\024\140\221\262
\204\334\210\116\276\071\212\072\363\346\202\211\135\001\067\263
\253\044\244\025\016\222\065\132\112\104\136\116\127\372\165\316
\037\110\316\146\364\074\100\046\222\230\154\033\356\044\106\014
\027\263\122\245\333\245\221\221\317\067\323\157\347\047\010\072
\116\031\037\072\247\130\134\027\317\171\077\213\344\247\323\046
\043\235\046\017\130\151\374\107\176\262\320\215\213\223\277\051
\117\103\151\164\166\147\113\317\007\214\346\002\367\265\341\264
\103\265\113\055\024\237\371\334\046\015\277\246\107\164\006\330
\210\321\072\051\060\204\316\322\071\200\142\033\250\307\127\111
\274\152\125\121\147\025\112\276\065\007\344\325\165\230\067\171
\060\024\333\051\235\154\305\151\314\107\125\242\060\367\314\134
\177\302\303\230\034\153\116\026\200\353\172\170\145\105\242\000
\032\257\014\015\125\144\064\110\270\222\271\361\264\120\051\362
\117\043\037\332\154\254\037\104\341\335\043\170\121\133\307\026
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Secure Global CA"
# Issuer: CN=Secure Global CA,O=SecureTrust Corporation,C=US
# Serial Number:07:56:22:a4:e8:d4:8a:89:4d:f4:13:c8:f0:f8:ea:a5
# Subject: CN=Secure Global CA,O=SecureTrust Corporation,C=US
# Not Valid Before: Tue Nov 07 19:42:28 2006
# Not Valid After : Mon Dec 31 19:52:06 2029
# Fingerprint (SHA-256):
42:00:F5:04:3A:C8:59:0E:BB:52:7D:20:9E:D1:50:30:29:FB:CB:D4:1C:A1:B5:06:EC:27:F1:5A:DE:7D:AC:69
# Fingerprint (SHA1): 3A:44:73:5A:E5:81:90:1F:24:86:61:46:1E:3B:9C:C4:5F:F5:3A:1B
CKA_CLASS
 CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Secure Global CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\072\104\163\132\345\201\220\037\044\206\141\106\036\073\234\304
\137\365\072\033
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\317\364\047\015\324\355\334\145\026\111\155\075\332\277\156\336
END
CKA_ISSUER MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\125\123\061

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\040\060\036\006\003\125\004\012\023\027\123\145\143\165\162\145
\124\162\165\163\164\040\103\157\162\160\157\162\141\164\151\157
\156\061\031\060\027\006\003\125\004\003\023\020\123\145\143\165
\162\145\040\107\154\157\142\141\154\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\007\126\042\244\350\324\212\211\115\364\023\310\360\370
\352\245
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "COMODO Certification Authority"
#
# Issuer: CN=COMODO Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater
Manchester,C=GB
# Serial Number:4e:81:2d:8a:82:65:e0:0b:02:ee:3e:35:02:46:e5:3d
# Subject: CN=COMODO Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater
Manchester,C=GB
# Not Valid Before: Fri Dec 01 00:00:00 2006
# Not Valid After : Mon Dec 31 23:59:59 2029
# Fingerprint (SHA-256):
0C:2C:D6:3D:F7:80:6F:A3:99:ED:E8:09:11:6B:57:5B:F8:79:89:F0:65:18:F9:80:8C:86:05:03:17:8B:AF:66
# Fingerprint (SHA1): 66:31:BF:9E:F7:4F:9E:B6:C9:D5:A6:0C:BA:6A:BE:D1:F7:BD:EF:7B
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "COMODO Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\201\061\013\060\011\006\003\125\004\006\023\002\107\102
\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164
\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117
\040\103\101\040\114\151\155\151\164\145\144\061\047\060\045\006
\003\125\004\003\023\036\103\117\115\117\104\117\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
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\060\201\201\061\013\060\011\006\003\125\004\006\023\002\107\102
\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164
\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117
\040\103\101\040\114\151\155\151\164\145\144\061\047\060\045\006
\003\125\004\003\023\036\103\117\115\117\104\117\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\116\201\055\212\202\145\340\013\002\356\076\065\002\106
\345\075
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\035\060\202\003\005\240\003\002\001\002\002\020\116
\201\055\212\202\145\340\013\002\356\076\065\002\106\345\075\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\201
\201\061\013\060\011\006\003\125\004\006\023\002\107\102\061\033
\060\031\006\003\125\004\010\023\022\107\162\145\141\164\145\162
\040\115\141\156\143\150\145\163\164\145\162\061\020\060\016\006
\003\125\004\007\023\007\123\141\154\146\157\162\144\061\032\060
\030\006\003\125\004\012\023\021\103\117\115\117\104\117\040\103
\101\040\114\151\155\151\164\145\144\061\047\060\045\006\003\125
\004\003\023\036\103\117\115\117\104\117\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\060\036\027\015\060\066\061\062\060\061\060\060\060\060
\060\060\132\027\015\062\071\061\062\063\061\062\063\065\071\065
\071\132\060\201\201\061\013\060\011\006\003\125\004\006\023\002
\107\102\061\033\060\031\006\003\125\004\010\023\022\107\162\145
\141\164\145\162\040\115\141\156\143\150\145\163\164\145\162\061
\020\060\016\006\003\125\004\007\023\007\123\141\154\146\157\162
\144\061\032\060\030\006\003\125\004\012\023\021\103\117\115\117
\104\117\040\103\101\040\114\151\155\151\164\145\144\061\047\060
\045\006\003\125\004\003\023\036\103\117\115\117\104\117\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\060\202\001\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202
\001\012\002\202\001\001\000\320\100\213\213\162\343\221\033\367
\121\301\033\124\004\230\323\251\277\301\346\212\135\073\207\373
\273\210\316\015\343\057\077\006\226\360\242\051\120\231\256\333
\073\241\127\260\164\121\161\315\355\102\221\115\101\376\251\310
\330\152\206\167\104\273\131\146\227\120\136\264\324\054\160\104
\317\332\067\225\102\151\074\060\304\161\263\122\360\041\115\241
\330\272\071\174\034\236\243\044\235\362\203\026\230\252\026\174
\103\233\025\133\267\256\064\221\376\324\142\046\030\106\232\077
\353\301\371\361\220\127\353\254\172\015\213\333\162\060\152\146

\325\340\106\243\160\334\150\331\377\004\110\211\167\336\265\351
\373\147\155\101\351\274\071\275\062\331\142\002\361\261\250\075
\156\067\234\342\057\342\323\242\046\213\306\270\125\103\210\341
\043\076\245\322\044\071\152\107\253\000\324\241\263\251\045\376
\015\077\247\035\272\323\121\301\013\244\332\254\070\357\125\120
\044\005\145\106\223\064\117\055\215\255\306\324\041\031\322\216
\312\005\141\161\007\163\107\345\212\031\022\275\004\115\316\116
\234\245\110\254\273\046\367\002\003\001\000\001\243\201\216\060
\201\213\060\035\006\003\125\035\016\004\026\004\024\013\130\345
\213\306\114\025\067\244\100\251\060\251\041\276\107\066\132\126
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\006\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\111\006\003\125\035\037\004\102\060\100\060\076\240
\074\240\072\206\070\150\164\164\160\072\057\057\143\162\154\056
\143\157\155\157\144\157\143\141\056\143\157\155\057\103\117\115
\117\104\117\103\145\162\164\151\146\151\143\141\164\151\157\156
\101\165\164\150\157\162\151\164\171\056\143\162\154\060\015\006
\011\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001
\000\076\230\236\233\366\033\351\327\071\267\170\256\035\162\030
\111\323\207\344\103\202\353\077\311\252\365\250\265\357\125\174
\041\122\145\371\325\015\341\154\364\076\214\223\163\221\056\002
\304\116\007\161\157\300\217\070\141\010\250\036\201\012\300\057
\040\057\101\213\221\334\110\105\274\361\306\336\272\166\153\063
\310\000\055\061\106\114\355\347\235\317\210\224\377\063\300\126
\350\044\206\046\270\330\070\070\337\052\153\335\022\314\307\077
\107\027\114\242\302\006\226\011\326\333\376\077\074\106\101\337
\130\342\126\017\074\073\301\034\223\065\331\070\122\254\356\310
\354\056\060\116\224\065\264\044\037\113\170\151\332\362\002\070
\314\225\122\223\360\160\045\131\234\040\147\304\356\371\213\127
\141\364\222\166\175\077\204\215\125\267\350\345\254\325\361\365
\031\126\246\132\373\220\034\257\223\353\345\034\324\147\227\135
\004\016\276\013\203\246\027\203\271\060\022\240\305\063\025\005
\271\015\373\307\005\166\343\330\112\215\374\064\027\243\306\041
\050\276\060\105\061\036\307\170\276\130\141\070\254\073\342\001
\145
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "COMODO Certification Authority"
# Issuer: CN=COMODO Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater Manchester,C=GB
# Serial Number:4e:81:2d:8a:82:65:e0:0b:02:ee:3e:35:02:46:e5:3d
# Subject: CN=COMODO Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater Manchester,C=GB
#

```
 Not Valid Before: Fri Dec 01 00:00:00 2006
# Not Valid After : Mon Dec 31 23:59:59 2029
# Fingerprint (SHA-256):
0C:2C:D6:3D:F7:80:6F:A3:99:ED:E8:09:11:6B:57:5B:F8:79:89:F0:65:18:F9:80:8C:86:05:03:17:8B:AF:66
# Fingerprint (SHA1): 66:31:BF:9E:F7:4F:9E:B6:C9:D5:A6:0C:BA:6A:BE:D1:F7:BD:EF:7B
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "COMODO Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\146\061\277\236\367\117\236\266\311\325\246\014\272\152\276\321
\367\275\357\173
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\134\110\334\367\102\162\354\126\224\155\034\314\161\065\200\165
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\201\061\013\060\011\006\003\125\004\006\023\002\107\102
\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164
\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117
\040\103\101\040\114\151\155\151\164\145\144\061\047\060\045\006
\003\125\004\003\023\036\103\117\115\117\104\117\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\116\201\055\212\202\145\340\013\002\356\076\065\002\106
\345\075
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "COMODO ECC Certification Authority"
#
# Issuer: CN=COMODO ECC Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater
Manchester,C=GB
# Serial Number:1f:47:af:aa:62:00:70:50:54:4c:01:9e:9b:63:99:2a
# Subject: CN=COMODO ECC Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater
Manchester,C=GB
# Not Valid Before: Thu Mar 06 00:00:00 2008
# Not Valid After : Mon Jan
```

18 23:59:59 2038
# Fingerprint (SHA-256):
17:93:92:7A:06:14:54:97:89:AD:CE:2F:8F:34:F7:F0:B6:6D:0F:3A:E3:A3:B8:4D:21:EC:15:DB:BA:4F:AD:C7
# Fingerprint (SHA1): 9F:74:4E:9F:2B:4D:BA:EC:0F:31:2C:50:B6:56:3B:8E:2D:93:C3:11
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "COMODO ECC Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\205\061\013\060\011\006\003\125\004\006\023\002\107\102
\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164
\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117
\040\103\101\040\114\151\155\151\164\145\144\061\053\060\051\006
\003\125\004\003\023\042\103\117\115\117\104\117\040\105\103\103
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\205\061\013\060\011\006\003\125\004\006\023\002\107\102
\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164
\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117
\040\103\101\040\114\151\155\151\164\145\144\061\053\060\051\006
\003\125\004\003\023\042\103\117\115\117\104\117\040\105\103\103
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\037\107\257\252\142\000\160\120\124\114\001\236\233\143
\231\052
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\211\060\202\002\017\240\003\002\001\002\002\020\037
\107\257\252\142\000\160\120\124\114\001\236\233\143\231\052\060
\012\006\010\052\206\110\316\075\004\003\003\060\201\205\061\013
\060\011\006\003\125\004\006\023\002\107\102\061\033\060\031\006
\003\125\004\010\023\022\107\162\145\141\164\145\162\040\115\141
\156\143\150\145\163\164\145\162\061\020\060\016\006\003\125\004
\007\023\007\123\141\154\146\157\162\144\061\032\060\030\006\003
\125\004\012\023\021\103\117\115\117\104\117\040\103\101\040\114
\151\155\151\164\145\144\061\053\060\051\006\003\125\004\003\023

\042\103\117\115\117\104\117\040\105\103\103\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\060\036\027\015\060\070\060\063\060\066\060\060\060
\060\060\060\132\027\015\063\070\060\061\061\070\062\063\065\071
\065\071\132\060\201\205\061\013\060\011\006\003\125\004\006\023
\002\107\102\061\033\060\031\006\003\125\004\010\023\022\107\162
\145\141\164\145\162\040\115\141\156\143\150\145\163\164\145\162
\061\020\060\016\006\003\125\004\007\023\007\123\141\154\146\157
\162\144\061\032\060\030\006\003\125\004\012\023\021\103\117\115
\117\104\117\040\103\101\040\114\151\155\151\164\145\144\061\053
\060\051\006\003\125\004\003\023\042\103\117\115\117\104\117\040
\105\103\103\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\060\166\060\020\006
\007\052\206\110\316\075\002\001\006\005\053\201\004\000\042\003
\142\000\004\003\107\173\057\165\311\202\025\205\373\165\344\221
\026\324\253\142\231\365\076\122\013\006\316\101\000\177\227\341
\012\044\074\035\001\004\356\075\322\215\011\227\014\340\165\344
\372\373\167\212\052\365\003\140\113\066\213\026\043\026\255\011
\161\364\112\364\050\120\264\376\210\034\156\077\154\057\057\011
\131\133\245\133\013\063\231\342\303\075\211\371\152\054\357\262
\323\006\351\243\102\060\100\060\035\006\003\125\035\016\004\026
\004\024\165\161\247\031\110\031\274\235\235\352\101\107\337\224
\304\110\167\231\323\171\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\012\006\010\052\206\110\316\075
\004\003\003\003\150\000\060\145\002\061\000\357\003\133\172\254
\267\170\012\162\267\210\337\377\265\106\024\011\012\372\240\346
\175\010\306\032\207\275\030\250\163\275\046\312\140\014\235\316
\231\237\317\134\017\060\341\276\024\061\352\002\060\024\364\223
\074\111\247\063\172\220\106\107\263\143\175\023\233\116\267\157
\030\067\200\123\376\335\040\340\065\232\066\321\307\001\271\346
\334\335\363\377\035\054\072\026\127\331\222\071\326
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "COMODO ECC Certification Authority"
# Issuer: CN=COMODO ECC Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater Manchester,C=GB
# Serial Number:1f:47:af:aa:62:00:70:50:54:4c:01:9e:9b:63:99:2a
# Subject: CN=COMODO ECC Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater Manchester,C=GB
# Not Valid Before: Thu Mar 06 00:00:00 2008
# Not Valid After : Mon Jan 18 23:59:59 2038
# Fingerprint

```
 (SHA-256):
17:93:92:7A:06:14:54:97:89:AD:CE:2F:8F:34:F7:F0:B6:6D:0F:3A:E3:A3:B8:4D:21:EC:15:DB:BA:4F:AD:C7
# Fingerprint (SHA1): 9F:74:4E:9F:2B:4D:BA:EC:0F:31:2C:50:B6:56:3B:8E:2D:93:C3:11
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "COMODO ECC Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\237\164\116\237\053\115\272\354\017\061\054\120\266\126\073\216
\055\223\303\021
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\174\142\377\164\235\061\123\136\150\112\325\170\252\036\277\043
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\205\061\013\060\011\006\003\125\004\006\023\002\107\102
\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164
\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117
\040\103\101\040\114\151\155\151\164\145\144\061\053\060\051\006
\003\125\004\003\023\042\103\117\115\117\104\117\040\105\103\103
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\037\107\257\252\142\000\160\120\124\114\001\236\233\143
\231\052
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "OISTE WISeKey Global Root GA CA"
#
# Issuer: CN=OISTE WISeKey Global Root GA CA,OU=OISTE Foundation Endorsed,OU=Copyright (c)
2005,O=WISeKey,C=CH
# Serial Number:41:3d:72:c7:f4:6b:1f:81:43:7d:f1:d2:28:54:df:9a
# Subject: CN=OISTE WISeKey Global Root GA CA,OU=OISTE Foundation Endorsed,OU=Copyright (c)
2005,O=WISeKey,C=CH
# Not Valid Before: Sun Dec 11 16:03:44 2005
# Not Valid After : Fri Dec 11 16:09:51 2037
# Fingerprint (SHA-256):
41:C9:23:86:6A:B4:CA:D6:B7:AD:57:80:81:58:2E:02:07:97:A6:CB:DF:4F:FF:78:CE:83:96:B3:89:37:D7:F5
```

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#
 Fingerprint (SHA1): 59:22:A1:E1:5A:EA:16:35:21:F8:98:39:6A:46:46:B0:44:1B:0F:A9
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "OISTE WISeKey Global Root GA CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\212\061\013\060\011\006\003\125\004\006\023\002\103\110
\061\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113
\145\171\061\033\060\031\006\003\125\004\013\023\022\103\157\160
\171\162\151\147\150\164\040\050\143\051\040\062\060\060\065\061
\042\060\040\006\003\125\004\013\023\031\117\111\123\124\105\040
\106\157\165\156\144\141\164\151\157\156\040\105\156\144\157\162
\163\145\144\061\050\060\046\006\003\125\004\003\023\037\117\111
\123\124\105\040\127\111\123\145\113\145\171\040\107\154\157\142
\141\154\040\122\157\157\164\040\107\101\040\103\101
END
CKA_ID UTF8
 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\212\061\013\060\011\006\003\125\004\006\023\002\103\110
\061\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113
\145\171\061\033\060\031\006\003\125\004\013\023\022\103\157\160
\171\162\151\147\150\164\040\050\143\051\040\062\060\060\065\061
\042\060\040\006\003\125\004\013\023\031\117\111\123\124\105\040
\106\157\165\156\144\141\164\151\157\156\040\105\156\144\157\162
\163\145\144\061\050\060\046\006\003\125\004\003\023\037\117\111
\123\124\105\040\127\111\123\145\113\145\171\040\107\154\157\142
\141\154\040\122\157\157\164\040\107\101\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\101\075\162\307\364\153\037\201\103\175\361\322\050\124
\337\232
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\361\060\202\002\331\240\003\002\001\002\002\020\101
\075\162\307\364\153\037\201\103\175\361\322\050\124\337\232\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\201
\212\061\013\060\011\006\003\125\004\006\023\002\103\110\061\020
\060\016\006\003\125\004\012\023\007\127\111\123\145\113\145\171
\061\033\060\031\006\003\125\004\013\023\022\103\157\160\171\162
\151\147\150\164\040\050\143\051\040\062\060\060\065\061\042\060
\040\006\003\125\004\013\023\031\117\111\123\124\105\040\106\157
\165\156\144\141\164\151\157\156\040\105\156\144\157\162\163\145
\144\061\050\060\046\006\003\125\004\003\023\037\117\111\123\124
\105\040\127\111\123\145\113\145\171\040\107\154\157\142\141\154
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\040\122\157\157\164\040\107\101\040\103\101\060\036\027\015\060
\065\061\062\061\061\061\066\060\063\064\064\132\027\015\063\067
\061\062\061\061\061\066\060\071\065\061\132\060\201\212\061\013
\060\011\006\003\125\004\006\023\002\103\110\061\020\060\016\006
\003\125\004\012\023\007\127\111\123\145\113\145\171\061\033\060
\031\006\003\125\004\013\023\022\103\157\160\171\162\151\147\150
\164\040\050\143\051\040\062\060\060\065\061\042\060\040\006\003
\125\004\013\023\031\117\111\123\124\105\040\106\157\165\156\144
\141\164\151\157\156\040\105\156\144\157\162\163\145\144\061\050
\060\046\006\003\125\004\003\023\037\117\111\123\124\105\040\127
\111\123\145\113\145\171\040\107\154\157\142\141\154\040\122\157
\157\164\040\107\101\040\103\101\060\202\001\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000
\060\202\001\012\002\202\001\001\000\313\117\263\000\233\075\066
\335\371\321\111\152\153\020\111\037\354\330\053\262\306\370\062
\201\051\103\225\114\232\031\043\041\025\105\336\343\310\034\121
\125\133\256\223\350\067\377\053\153\351\324\352\276\052\335\250
\121\053\327\146\303\141\134\140\002\310\365\316\162\173\073\270
\362\116\145\010\232\315\244\152\031\301\001\273\163\246\327\366
\303\335\315\274\244\213\265\231\141\270\001\242\243\324\115\324
\005\075\221\255\370\264\010\161\144\257\160\361\034\153\176\366
\303\167\235\044\163\173\344\014\214\341\331\066\341\231\213\005
\231\013\355\105\061\011\312\302\000\333\367\162\240\226\252\225
\207\320\216\307\266\141\163\015\166\146\214\334\033\264\143\242
\237\177\223\023\060\361\241\047\333\331\377\054\125\210\221\240
\340\117\007\260\050\126\214\030\033\227\104\216\211\335\340\027
\156\347\052\357\217\071\012\061\204\202\330\100\024\111\056\172
\101\344\247\376\343\144\314\301\131\161\113\054\041\247\133\175
\340\035\321\056\201\233\303\330\150\367\275\226\033\254\160\261
\026\024\013\333\140\271\046\001\005\002\003\001\000\001\243\121
\060\117\060\013\006\003\125\035\017\004\004\003\002\001\206\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\035\006\003\125\035\016\004\026\004\024\263\003\176\256\066
\274\260\171\321\334\224\046\266\021\276\041\262\151\206\224\060
\020\006\011\053\006\001\004\001\202\067\025\001\004\003\002\001
\000\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000
\003\202\001\001\000\113\241\377\013\207\156\263\371\301\103\261
\110\363\050\300\035\056\311\011\101\372\224\000\034\244\244\253
\111\117\217\075\036\357\115\157\275\274\244\366\362\046\060\311
\020\312\035\210\373\164\031\037\205\105\275\260\154\121\371\066
\176\333\365\114\062\072\101\117\133\107\317\350\013\055\266\304
\031\235\164\305\107\306\073\152\017\254\024\333\074\364\163\234
\251\005\337\000\334\164\170\372\370\065\140\131\002\023\030\174
\274\373\115\260\040\155\103\273\140\060\172\147\063\134\305\231
\321\370\055\071\122\163\373\214\252\227\045\134\162\331\010\036
\253\116\074\343\201\061\237\003\246\373\300\376\051\210\125\332
\204\325\120\003\266\342\204\243\246\066\252\021\072\001\341\030
\113\326\104\150\263\075\371\123\164\204\263\106\221\106\226\000

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\267\200\054\266\341\343\020\342\333\242\347\050\217\001\226\142
\026\076\000\343\034\245\066\201\030\242\114\122\166\300\021\243
\156\346\035\272\343\132\276\066\123\305\076\165\217\206\151\051
\130\123\265\234\273\157\237\134\305\030\354\335\057\341\230\311
\374\276\337\012\015
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

#
 Trust for "OISTE WISeKey Global Root GA CA"
# Issuer: CN=OISTE WISeKey Global Root GA CA,OU=OISTE Foundation Endorsed,OU=Copyright (c)
2005,O=WISeKey,C=CH
# Serial Number:41:3d:72:c7:f4:6b:1f:81:43:7d:f1:d2:28:54:df:9a
# Subject: CN=OISTE WISeKey Global Root GA CA,OU=OISTE Foundation Endorsed,OU=Copyright (c)
2005,O=WISeKey,C=CH
# Not Valid Before: Sun Dec 11 16:03:44 2005
# Not Valid After : Fri Dec 11 16:09:51 2037
# Fingerprint (SHA-256):
41:C9:23:86:6A:B4:CA:D6:B7:AD:57:80:81:58:2E:02:07:97:A6:CB:DF:4F:FF:78:CE:83:96:B3:89:37:D7:F5
# Fingerprint (SHA1): 59:22:A1:E1:5A:EA:16:35:21:F8:98:39:6A:46:46:B0:44:1B:0F:A9
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "OISTE WISeKey Global Root GA CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\131\042\241\341\132\352\026\065\041\370\230\071\152\106\106\260
\104\033\017\251
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\274\154\121\063\247\351\323\146\143\124\025\162\033\041\222\223
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\201\212\061\013\060\011\006\003\125\004\006\023\002\103\110
\061\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113
\145\171\061\033\060\031\006\003\125\004\013\023\022\103\157\160
\171\162\151\147\150\164\040\050\143\051\040\062\060\060\065\061
\042\060\040\006\003\125\004\013\023\031\117\111\123\124\105\040
\106\157\165\156\144\141\164\151\157\156\040\105\156\144\157\162
\163\145\144\061\050\060\046\006\003\125\004\003\023\037\117\111
\123\124\105\040\127\111\123\145\113\145\171\040\107\154\157\142
\141\154\040\122\157\157\164\040\107\101\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
```

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\002\020\101\075\162\307\364\153\037\201\103\175\361\322\050\124
\337\232
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Certigna"
#
#
 Issuer: CN=Certigna,O=Dhimyotis,C=FR
# Serial Number:00:fe:dc:e3:01:0f:c9:48:ff
# Subject: CN=Certigna,O=Dhimyotis,C=FR
# Not Valid Before: Fri Jun 29 15:13:05 2007
# Not Valid After : Tue Jun 29 15:13:05 2027
# Fingerprint (SHA-256):
E3:B6:A2:DB:2E:D7:CE:48:84:2F:7A:C5:32:41:C7:B7:1D:54:14:4B:FB:40:C1:1F:3F:1D:0B:42:F5:EE:A1:2D
# Fingerprint (SHA1): B1:2E:13:63:45:86:A4:6F:1A:B2:60:68:37:58:2D:C4:AC:FD:94:97
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certigna"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\064\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\104\150\151\155\171\157
\164\151\163\061\021\060\017\006\003\125\004\003\014\010\103\145
\162\164\151\147\156\141
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\064\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\104\150\151\155\171\157
\164\151\163\061\021\060\017\006\003\125\004\003\014\010\103\145
\162\164\151\147\156\141
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\011\000\376\334\343\001\017\311\110\377
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\250\060\202\002\220\240\003\002\001\002\002\011\000
\376\334\343\001\017\311\110\377\060\015\006\011\052\206\110\206
\367\015\001\001\005\005\000\060\064\061\013\060\011\006\003\125
\004\006\023\002\106\122\061\022\060\020\006\003\125\004\012\014
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\011\104\150\151\155\171\157\164\151\163\061\021\060\017\006\003
\125\004\003\014\010\103\145\162\164\151\147\156\141\060\036\027
\015\060\067\060\066\062\071\061\065\061\063\060\065\132\027\015
\062\067\060\066\062\071\061\065\061\063\060\065\132\060\064\061
\013\060\011\006\003\125\004\006\023\002\106\122\061\022\060\020
\006\003\125\004\012\014\011\104\150\151\155\171\157\164\151\163
\061\021\060\017\006\003\125\004\003\014\010\103\145\162\164\151
\147\156\141\060\202\001\042\060\015\006\011\052\206\110\206\367
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002
\202\001\001\000\310\150\361\311\326\326\263\064\165\046\202\036
\354\264\276\352\134\341\046\355\021\107\141\341\242\174\026\170
\100\041\344\140\236\132\310\143\341\304\261\226\222\377\030\155
\151\043\341\053\142\367\335\342\066\057\221\007\271\110\317\016
\354\171\266\054\347\064\113\160\010\045\243\074\207\033\031\362
\201\007\017\070\220\031\323\021\376\206\264\362\321\136\036\036
\226\315\200\154\316\073\061\223\266\362\240\320\251\225\022\175
\245\232\314\153\310\204\126\212\063\251\347\042\025\123\026\360
\314\027\354\127\137\351\242\012\230\011\336\343\137\234\157\334
\110\343\205\013\025\132\246\272\237\254\110\343\011\262\367\364
\062\336\136\064\276\034\170\135\102\133\316\016\042\217\115\220
\327\175\062\030\263\013\054\152\277\216\077\024\021\211\040\016
\167\024\265\075\224\010\207\367\045\036\325\262\140\000\354\157
\052\050\045\156\052\076\030\143\027\045\077\076\104\040\026\366
\046\310\045\256\005\112\264\347\143\054\363\214\026\123\176\134
\373\021\032\010\301\106\142\237\042\270\361\302\215\151\334\372
\072\130\006\337\002\003\001\000\001\243\201\274\060\201\271\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\035\006\003\125\035\016\004\026\004\024\032\355\376\101\071
\220\264\044\131\276\001\362\122\325\105\366\132\071\334\021\060
\144\006\003\125\035\043\004\135\060\133\200\024\032\355\376\101
\071\220\264\044\131\276\001\362\122\325\105\366\132\071\334\021
\241\070\244\066\060\064\061\013\060\011\006\003\125\004\006\023
\002\106\122\061\022\060\020\006\003\125\004\012\014\011\104\150
\151\155\171\157\164\151\163\061\021\060\017\006\003\125\004\003
\014\010\103\145\162\164\151\147\156\141\202\011\000\376\334\343
\001\017\311\110\377\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\006\060\021\006\011\140\206\110\001\206\370\102
\001\001\004\004\003\002\000\007\060\015\006\011\052\206\110\206
\367\015\001\001\005\005\000\003\202\001\001\000\205\003\036\222
\161\366\102\257\341\243\141\236\353\363\300\017\362\245\324\332
\225\346\326\276\150\066\075\176\156\037\114\212\357\321\017\041
\155\136\245\122\143\316\022\370\357\052\332\157\353\067\376\023
\002\307\313\073\076\042\153\332\141\056\177\324\162\075\335\060
\341\036\114\100\031\214\017\327\234\321\203\060\173\230\131\334
\175\306\271\014\051\114\241\063\242\353\147\072\145\204\323\226
\342\355\166\105\160\217\265\053\336\371\043\326\111\156\074\024
\265\306\237\065\036\120\320\301\217\152\160\104\002\142\313\256
\035\150\101\247\252\127\350\123\252\007\322\006\366\325\024\006

\013\221\003\165\054\154\162\265\141\225\232\015\213\271\015\347
\365\337\124\315\336\346\330\326\011\010\227\143\345\301\056\260
\267\104\046\300\046\300\257\125\060\236\073\325\066\052\031\004
\364\134\036\377\317\054\267\377\320\375\207\100\021\325\021\043
\273\110\300\041\251\244\050\055\375\025\370\260\116\053\364\060
\133\041\374\021\221\064\276\101\357\173\235\227\165\377\227\225
\300\226\130\057\352\273\106\327\273\344\331\056
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Certigna"
# Issuer: CN=Certigna,O=Dhimyotis,C=FR
# Serial Number:00:fe:dc:e3:01:0f:c9:48:ff
# Subject: CN=Certigna,O=Dhimyotis,C=FR
# Not Valid Before: Fri Jun 29 15:13:05 2007
# Not Valid After : Tue Jun 29 15:13:05 2027
# Fingerprint (SHA-256):
E3:B6:A2:DB:2E:D7:CE:48:84:2F:7A:C5:32:41:C7:B7:1D:54:14:4B:FB:40:C1:1F:3F:1D:0B:42:F5:EE:A1:2D
# Fingerprint (SHA1): B1:2E:13:63:45:86:A4:6F:1A:B2:60:68:37:58:2D:C4:AC:FD:94:97
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certigna"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\261\056\023\143\105\206\244\157\032\262\140\150\067\130\055\304
\254\375\224\227
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\253\127\246\133\175\102\202\031\265\330\130\046\050\136\375\377
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\064\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\104\150\151\155\171\157
\164\151\163\061\021\060\017\006\003\125\004\003\014\010\103\145
\162\164\151\147\156\141
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\376\334\343\001\017\311\110\377
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

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#
# Certificate "ePKI Root Certification Authority"
#
# Issuer: OU=ePKI Root Certification Authority,O="Chunghwa Telecom Co., Ltd.",C=TW
# Serial Number:15:c8:bd:65:47:5c:af:b8:97:00:5e:e4:06:d2:bc:9d
# Subject: OU=ePKI Root Certification Authority,O="Chunghwa Telecom Co., Ltd.",C=TW
# Not Valid Before: Mon Dec 20 02:31:27 2004
# Not Valid After : Wed Dec 20 02:31:27 2034
# Fingerprint (SHA-256):
C0:A6:F4:DC:63:A2:4B:FD:CF:54:EF:2A:6A:08:2A:0A:72:DE:35:80:3E:2F:F5:FF:52:7A:E5:D8:72:06:DF:D5
#
 Fingerprint (SHA1): 67:65:0D:F1:7E:8E:7E:5B:82:40:A4:F4:56:4B:CF:E2:3D:69:C6:F0
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ePKI Root Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\136\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\043\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150
\167\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040
\114\164\144\056\061\052\060\050\006\003\125\004\013\014\041\145
\120\113\111\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\136\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\043\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150
\167\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040
\114\164\144\056\061\052\060\050\006\003\125\004\013\014\041\145
\120\113\111\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\025\310\275\145\107\134\257\270\227\000\136\344\006\322
\274\235
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\260\060\202\003\230\240\003\002\001\002\002\020\025
\310\275\145\107\134\257\270\227\000\136\344\006\322\274\235\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\136
\061\013\060\011\006\003\125\004\006\023\002\124\127\061\043\060
\041\006\003\125\004\012\014\032\103\150\165\156\147\150\167\141
\040\124\145\154\145\143\157\155\040\103\157\056\054\040\114\164
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\144\056\061\052\060\050\006\003\125\004\013\014\041\145\120\113
\111\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\060\036
\027\015\060\064\061\062\062\060\060\062\063\061\062\067\132\027
\015\063\064\061\062\062\060\060\062\063\061\062\067\132\060\136
\061\013\060\011\006\003\125\004\006\023\002\124\127\061\043\060
\041\006\003\125\004\012\014\032\103\150\165\156\147\150\167\141
\040\124\145\154\145\143\157\155\040\103\157\056\054\040\114\164
\144\056\061\052\060\050\006\003\125\004\013\014\041\145\120\113
\111\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\060\202
\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\341
\045\017\356\215\333\210\063\165\147\315\255\037\175\072\116\155
\235\323\057\024\363\143\164\313\001\041\152\067\352\204\120\007
\113\046\133\011\103\154\041\236\152\310\325\003\365\140\151\217
\314\360\042\344\037\347\367\152\042\061\267\054\025\362\340\376
\000\152\103\377\207\145\306\265\032\301\247\114\155\042\160\041
\212\061\362\227\164\211\011\022\046\034\236\312\331\022\242\225
\074\332\351\147\277\010\240\144\343\326\102\267\105\357\227\364
\366\365\327\265\112\025\002\130\175\230\130\113\140\274\315\327
\015\232\023\063\123\321\141\371\172\325\327\170\263\232\063\367
\000\206\316\035\115\224\070\257\250\354\170\121\160\212\134\020
\203\121\041\367\021\075\064\206\136\345\110\315\227\201\202\065
\114\031\354\145\366\153\305\005\241\356\107\023\326\263\041\047
\224\020\012\331\044\073\272\276\104\023\106\060\077\227\074\330
\327\327\152\356\073\070\343\053\324\227\016\271\033\347\007\111
\177\067\052\371\167\170\317\124\355\133\106\235\243\200\016\221
\103\301\326\133\137\024\272\237\246\215\044\107\100\131\277\162
\070\262\066\154\067\377\231\321\135\016\131\012\253\151\367\300
\262\004\105\172\124\000\256\276\123\366\265\347\341\370\074\243
\061\322\251\376\041\122\144\305\246\147\360\165\007\006\224\024
\201\125\306\047\344\001\217\027\301\152\161\327\276\113\373\224
\130\175\176\021\063\261\102\367\142\154\030\326\317\011\150\076
\177\154\366\036\217\142\255\245\143\333\011\247\037\042\102\101
\036\157\231\212\076\327\371\077\100\172\171\260\245\001\222\322
\235\075\010\025\245\020\001\055\263\062\166\250\225\015\263\172
\232\373\007\020\170\021\157\341\217\307\272\017\045\032\164\052
\345\034\230\101\231\337\041\207\350\225\006\152\012\263\152\107
\166\145\366\072\317\217\142\027\031\173\012\050\315\032\322\203
\036\041\307\054\277\276\377\141\150\267\147\033\273\170\115\215
\316\147\345\344\301\216\267\043\146\342\235\220\165\064\230\251
\066\053\212\232\224\271\235\354\314\212\261\370\045\211\134\132
\266\057\214\037\155\171\044\247\122\150\303\204\065\342\146\215
\143\016\045\115\325\031\262\346\171\067\247\042\235\124\061\002
\003\001\000\001\243\152\060\150\060\035\006\003\125\035\016\004
\026\004\024\036\014\367\266\147\362\341\222\046\011\105\300\125
\071\056\167\077\102\112\242\060\014\006\003\125\035\023\004\005

\060\003\001\001\377\060\071\006\004\147\052\007\000\004\061\060
\057\060\055\002\001\000\060\011\006\005\053\016\003\002\032\005
\000\060\007\006\005\147\052\003\000\000\004\024\105\260\302\307
\012\126\174\356\133\170\014\225\371\030\123\301\246\034\330\020
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003
\202\002\001\000\011\263\203\123\131\001\076\225\111\271\361\201
\272\371\166\040\043\265\047\140\164\324\152\231\064\136\154\000
\123\331\237\362\246\261\044\007\104\152\052\306\245\216\170\022
\350\107\331\130\033\023\052\136\171\233\237\012\052\147\246\045
\077\006\151\126\163\303\212\146\110\373\051\201\127\164\006\312
\234\352\050\350\070\147\046\053\361\325\265\077\145\223\370\066
\135\216\215\215\100\040\207\031\352\357\047\300\075\264\071\017
\045\173\150\120\164\125\234\014\131\175\132\075\101\224\045\122
\010\340\107\054\025\061\031\325\277\007\125\306\273\022\265\227
\364\137\203\205\272\161\301\331\154\201\021\166\012\012\260\277
\202\227\367\352\075\372\372\354\055\251\050\224\073\126\335\322
\121\056\256\300\275\010\025\214\167\122\064\226\326\233\254\323
\035\216\141\017\065\173\233\256\071\151\013\142\140\100\040\066
\217\257\373\066\356\055\010\112\035\270\277\233\134\370\352\245
\033\240\163\246\330\370\156\340\063\004\137\150\252\047\207\355
\331\301\220\234\355\275\343\152\065\257\143\337\253\030\331\272
\346\351\112\352\120\212\017\141\223\036\342\055\031\342\060\224
\065\222\135\016\266\007\257\031\200\217\107\220\121\113\056\115
\335\205\342\322\012\122\012\027\232\374\032\260\120\002\345\001
\243\143\067\041\114\104\304\233\121\231\021\016\163\234\006\217
\124\056\247\050\136\104\071\207\126\055\067\275\205\104\224\341
\014\113\054\234\303\222\205\064\141\313\017\270\233\112\103\122
\376\064\072\175\270\351\051\334\166\251\310\060\370\024\161\200
\306\036\066\110\164\042\101\134\207\202\350\030\161\213\101\211
\104\347\176\130\133\250\270\215\023\351\247\154\303\107\355\263
\032\235\142\256\215\202\352\224\236\335\131\020\303\255\335\342
\115\343\061\325\307\354\350\362\260\376\222\036\026\012\032\374
\331\363\370\047\266\311\276\035\264\154\144\220\177\364\344\304
\133\327\067\256\102\016\335\244\032\157\174\210\124\305\026\156
\341\172\150\056\370\072\277\015\244\074\211\073\170\247\116\143
\203\004\041\010\147\215\362\202\111\320\133\375\261\315\017\203
\204\324\076\040\205\367\112\075\053\234\375\052\012\011\115\352
\201\370\021\234
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "ePKI Root Certification Authority"
# Issuer: OU=ePKI Root Certification Authority,O="Chunghwa Telecom Co., Ltd.",C=TW
# Serial Number:15:c8:bd:65:47:5c:af:b8:97:00:5e:e4:06:d2:bc:9d
# Subject: OU=ePKI Root Certification Authority,O="Chunghwa Telecom Co., Ltd.",C=TW

```
# Not Valid Before: Mon Dec 20 02:31:27 2004
# Not Valid After : Wed Dec 20 02:31:27 2034
# Fingerprint (SHA-256):
C0:A6:F4:DC:63:A2:4B:FD:CF:54:EF:2A:6A:08:2A:0A:72:DE:35:80:3E:2F:F5:FF:52:7A:E5:D8:72:06:DF:D5
# Fingerprint (SHA1): 67:65:0D:F1:7E:8E:7E:5B:82:40:A4:F4:56:4B:CF:E2:3D:69:C6:F0
CKA_CLASS
 CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ePKI Root Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\147\145\015\361\176\216\176\133\202\100\244\364\126\113\317\342
\075\151\306\360
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\033\056\000\312\046\006\220\075\255\376\157\025\150\323\153\263
END
CKA_ISSUER MULTILINE_OCTAL
\060\136\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\043\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150
\167\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040
\114\164\144\056\061\052\060\050\006\003\125\004\013\014\041\145
\120\113\111\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\025\310\275\145\107\134\257\270\227\000\136\344\006\322
\274\235
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "certSIGN ROOT CA"
#
# Issuer: OU=certSIGN ROOT CA,O=certSIGN,C=RO
# Serial Number:20:06:05:16:70:02
# Subject: OU=certSIGN ROOT CA,O=certSIGN,C=RO
# Not Valid Before: Tue Jul 04 17:20:04 2006
# Not Valid After : Fri Jul 04 17:20:04 2031
# Fingerprint (SHA-256):
EA:A9:62:C4:FA:4A:6B:AF:EB:E4:15:19:6D:35:1C:CD:88:8D:4F:53:F3:FA:8A:E6:D7:C4:66:A9:4E:60:42:BB
# Fingerprint (SHA1): FA:B7:EE:36:97:26:62:FB:2D:B0:2A:F6:BF:03:FD:E8:7C:4B:2F:9B
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
```

CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "certSIGN ROOT CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\073\061\013\060\011\006\003\125\004\006\023\002\122\117\061
\021\060\017\006\003\125\004\012\023\010\143\145\162\164\123\111
\107\116\061\031\060\027\006\003\125\004\013\023\020\143\145\162
\164\123\111\107\116\040\122\117\117\124\040\103\101
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\073\061\013\060\011\006\003\125\004\006\023\002\122\117\061
\021\060\017\006\003\125\004\012\023\010\143\145\162\164\123\111
\107\116\061\031\060\027\006\003\125\004\013\023\020\143\145\162
\164\123\111\107\116\040\122\117\117\124\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\006\040\006\005\026\160\002
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\070\060\202\002\040\240\003\002\001\002\002\006\040
\006\005\026\160\002\060\015\006\011\052\206\110\206\367\015\001
\001\005\005\000\060\073\061\013\060\011\006\003\125\004\006\023
\002\122\117\061\021\060\017\006\003\125\004\012\023\010\143\145
\162\164\123\111\107\116\061\031\060\027\006\003\125\004\013\023
\020\143\145\162\164\123\111\107\116\040\122\117\117\124\040\103
\101\060\036\027\015\060\066\060\067\060\064\061\067\062\060\060
\064\132\027\015\063\061\060\067\060\064\061\067\062\060\060\064
\132\060\073\061\013\060\011\006\003\125\004\006\023\002\122\117
\061\021\060\017\006\003\125\004\012\023\010\143\145\162\164\123
\111\107\116\061\031\060\027\006\003\125\004\013\023\020\143\145
\162\164\123\111\107\116\040\122\117\117\124\040\103\101\060\202
\001\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\001\017\000\060\202\001\012\002\202\001\001\000\267
\063\271\176\310\045\112\216\265\333\264\050\033\252\127\220\350
\321\042\323\144\272\323\223\350\324\254\206\141\100\152\140\127
\150\124\204\115\274\152\124\002\005\377\337\233\232\052\256\135
\007\217\112\303\050\177\357\373\053\372\171\361\307\255\360\020
\123\044\220\213\146\311\250\210\253\257\132\243\000\351\276\272
\106\356\133\163\173\054\027\202\201\136\142\054\241\002\145\263
\275\305\053\000\176\304\374\003\063\127\015\355\342\372\316\135
\105\326\070\315\065\266\262\301\320\234\201\112\252\344\262\001
\134\035\217\137\231\304\261\255\333\210\041\353\220\010\202\200
\363\060\243\103\346\220\202\256\125\050\111\355\133\327\251\020
\070\016\376\217\114\133\233\106\352\101\365\260\010\164\303\320

\210\063\266\174\327\164\337\334\204\321\103\016\165\071\241\045
\100\050\352\170\313\016\054\056\071\235\214\213\156\026\034\057
\046\202\020\342\343\145\224\012\004\300\136\367\135\133\370\020
\342\320\272\172\113\373\336\067\000\000\032\133\050\343\322\234
\163\076\062\207\230\241\311\121\057\327\336\254\063\263\117\002
\003\001\000\001\243\102\060\100\060\017\006\003\125\035\023\001
\001\377\004\005\060\003\001\001\377\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\306\060\035\006\003\125\035\016
\004\026\004\024\340\214\233\333\045\111\263\361\174\206\326\262
\102\207\013\320\153\240\331\344\060\015\006\011\052\206\110\206
\367\015\001\001\005\005\000\003\202\001\001\000\076\322\034\211
\056\065\374\370\165\335\346\177\145\210\364\162\114\311\054\327
\062\116\363\335\031\171\107\275\216\073\133\223\017\120\111\044
\023\153\024\006\162\357\011\323\241\241\343\100\204\311\347\030
\062\164\074\110\156\017\237\113\324\367\036\323\223\206\144\124
\227\143\162\120\325\125\317\372\040\223\002\242\233\303\043\223
\116\026\125\166\240\160\171\155\315\041\037\317\057\055\274\031
\343\210\061\370\131\032\201\011\310\227\246\164\307\140\304\133
\314\127\216\262\165\375\033\002\011\333\131\157\162\223\151\367
\061\101\326\210\070\277\207\262\275\026\171\371\252\344\276\210
\045\335\141\047\043\034\265\061\007\004\066\264\032\220\275\240
\164\161\120\211\155\274\024\343\017\206\256\361\253\076\307\240
\011\314\243\110\321\340\333\144\347\222\265\317\257\162\103\160
\213\371\303\204\074\023\252\176\222\233\127\123\223\372\160\302
\221\016\061\371\233\147\135\351\226\070\136\137\263\163\116\210
\025\147\336\236\166\020\142\040\276\125\151\225\103\000\071\115
\366\356\260\132\116\111\104\124\130\137\102\203
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL
 CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "certSIGN ROOT CA"
# Issuer: OU=certSIGN ROOT CA,O=certSIGN,C=RO
# Serial Number:20:06:05:16:70:02
# Subject: OU=certSIGN ROOT CA,O=certSIGN,C=RO
# Not Valid Before: Tue Jul 04 17:20:04 2006
# Not Valid After : Fri Jul 04 17:20:04 2031
# Fingerprint (SHA-256):
EA:A9:62:C4:FA:4A:6B:AF:EB:E4:15:19:6D:35:1C:CD:88:8D:4F:53:F3:FA:8A:E6:D7:C4:66:A9:4E:60:42:BB
# Fingerprint (SHA1): FA:B7:EE:36:97:26:62:FB:2D:B0:2A:F6:BF:03:FD:E8:7C:4B:2F:9B
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "certSIGN ROOT CA"

CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\372\267\356\066\227\046\142\373\055\260\052\366\277\003\375\350
\174\113\057\233
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\030\230\300\326\351\072\374\371\260\365\014\367\113\001\104\027
END
CKA_ISSUER MULTILINE_OCTAL
\060\073\061\013\060\011\006\003\125\004\006\023\002\122\117\061
\021\060\017\006\003\125\004\012\023\010\143\145\162\164\123\111
\107\116\061\031\060\027\006\003\125\004\013\023\020\143\145\162
\164\123\111\107\116\040\122\117\117\124\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\006\040\006\005\026\160\002
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "NetLock Arany (Class Gold) Ftanúsítvány"
#
# Issuer: CN=NetLock Arany (Class Gold) F..tan..s..tv..ny,OU=Tan..s..tv..nykiad..k (Certification Services),O=NetLock Kft.,L=Budapest,C=HU
# Serial Number:49:41:2c:e4:00:10
# Subject: CN=NetLock Arany (Class Gold) F..tan..s..tv..ny,OU=Tan..s..tv..nykiad..k (Certification Services),O=NetLock Kft.,L=Budapest,C=HU
# Not Valid Before: Thu Dec 11 15:08:21 2008
# Not Valid After : Wed Dec 06 15:08:21 2028
# Fingerprint (SHA-256):
6C:61:DA:C3:A2:DE:F0:31:50:6B:E0:36:D2:A6:FE:40:19:94:FB:D1:3D:F9:C8:D4:66:59:92:74:C4:46:EC:98
#
Fingerprint (SHA1): 06:08:3F:59:3F:15:A1:04:A0:69:A4:6B:A9:03:D0:06:B7:97:09:91
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "NetLock Arany (Class Gold) Ftanúsítvány"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\247\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160
\145\163\164\061\025\060\023\006\003\125\004\012\014\014\116\145
\164\114\157\143\153\040\113\146\164\056\061\067\060\065\006\003
\125\004\013\014\056\124\141\156\303\272\163\303\255\164\166\303

\241\156\171\153\151\141\144\303\263\153\040\050\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\123\145\162\166\151\143
\145\163\051\061\065\060\063\006\003\125\004\003\014\054\116\145
\164\114\157\143\153\040\101\162\141\156\171\040\050\103\154\141
\163\163\040\107\157\154\144\051\040\106\305\221\164\141\156\303
\272\163\303\255\164\166\303\241\156\171
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\247\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160
\145\163\164\061\025\060\023\006\003\125\004\012\014\014\116\145
\164\114\157\143\153\040\113\146\164\056\061\067\060\065\006\003
\125\004\013\014\056\124\141\156\303\272\163\303\255\164\166\303
\241\156\171\153\151\141\144\303\263\153\040\050\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\123\145\162\166\151\143
\145\163\051\061\065\060\063\006\003\125\004\003\014\054\116\145
\164\114\157\143\153\040\101\162\141\156\171\040\050\103\154\141
\163\163\040\107\157\154\144\051\040\106\305\221\164\141\156\303
\272\163\303\255\164\166\303\241\156\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\006\111\101\054\344\000\020
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\025\060\202\002\375\240\003\002\001\002\002\006\111
\101\054\344\000\020\060\015\006\011\052\206\110\206\367\015\001
\001\013\005\000\060\201\247\061\013\060\011\006\003\125\004\006
\023\002\110\125\061\021\060\017\006\003\125\004\007\014\010\102
\165\144\141\160\145\163\164\061\025\060\023\006\003\125\004\012
\014\014\116\145\164\114\157\143\153\040\113\146\164\056\061\067
\060\065\006\003\125\004\013\014\056\124\141\156\303\272\163\303
\255\164\166\303\241\156\171\153\151\141\144\303\263\153\040\050
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\123\145
\162\166\151\143\145\163\051\061\065\060\063\006\003\125\004\003
\014\054\116\145\164\114\157\143\153\040\101\162\141\156\171\040
\050\103\154\141\163\163\040\107\157\154\144\051\040\106\305\221
\164\141\156\303\272\163\303\255\164\166\303\241\156\171\060\036
\027\015\060\070\061\062\061\061\061\065\060\070\062\061\132\027
\015\062\070\061\062\060\066\061\065\060\070\062\061\132\060\201
\247\061\013\060\011\006\003\125\004\006\023\002\110\125\061\021
\060\017\006\003\125\004\007\014\010\102\165\144\141\160\145\163
\164\061\025\060\023\006\003\125\004\012\014\014\116\145\164\114
\157\143\153\040\113\146\164\056\061\067\060\065\006\003\125\004
\013\014\056\124\141\156\303\272\163\303\255\164\166\303\241\156
\171\153\151\141\144\303\263\153\040\050\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\123\145\162\166\151\143\145\163

\051\061\065\060\063\006\003\125\004\003\014\054\116\145\164\114
\157\143\153\040\101\162\141\156\171\040\050\103\154\141\163\163
\040\107\157\154\144\051\040\106\305\221\164\141\156\303\272\163
\303\255\164\166\303\241\156\171\060\202\001\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000
\060\202\001\012\002\202\001\001\000\304\044\136\163\276\113\155
\024\303\241\364\343\227\220\156\322\060\105\036\074\356\147\331
\144\340\032\212\177\312\060\312\203\343\040\301\343\364\072\323
\224\137\032\174\133\155\277\060\117\204\047\366\237\037\111\274
\306\231\012\220\362\017\365\177\103\204\067\143\121\213\172\245
\160\374\172\130\315\216\233\355\303\106\154\204\160\135\332\363
\001\220\043\374\116\060\251\176\341\047\143\347\355\144\074\240
\270\311\063\143\376\026\220\377\260\270\375\327\250\300\300\224
\103\013\266\325\131\246\236\126\320\044\037\160\171\257\333\071
\124\015\145\165\331\025\101\224\001\257\136\354\366\215\361\377
\255\144\376\040\232\327\134\353\376\246\037\010\144\243\213\166
\125\255\036\073\050\140\056\207\045\350\252\257\037\306\144\106
\040\267\160\177\074\336\110\333\226\123\267\071\167\344\032\342
\307\026\204\166\227\133\057\273\031\025\205\370\151\205\365\231
\247\251\362\064\247\251\266\246\003\374\157\206\075\124\174\166
\004\233\153\371\100\135\000\064\307\056\231\165\235\345\210\003
\252\115\370\003\322\102\166\300\033\002\003\000\250\213\243\105
\060\103\060\022\006\003\125\035\023\001\001\377\004\010\060\006
\001\001\377\002\001\004\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\035\006\003\125\035\016\004\026\004
\024\314\372\147\223\360\266\270\320\245\300\036\363\123\375\214
\123\337\203\327\226\060\015\006\011\052\206\110\206\367\015\001
\001\013\005\000\003\202\001\001\000\253\177\356\034\026\251\234
\074\121\000\240\300\021\010\005\247\231\346\157\001\210\124\141
\156\361\271\030\255\112\255\376\201\100\043\224\057\373\165\174
\057\050\113\142\044\201\202\013\365\141\361\034\156\270\141\070
\353\201\372\142\241\073\132\142\323\224\145\304\341\346\155\202
\370\057\045\160\262\041\046\301\162\121\037\214\054\303\204\220
\303\132\217\272\317\364\247\145\245\353\230\321\373\005\262\106
\165\025\043\152\157\205\143\060\200\360\325\236\037\051\034\302
\154\260\120\131\135\220\133\073\250\015\060\317\277\175\177\316
\361\235\203\275\311\106\156\040\246\371\141\121\272\041\057\173
\276\245\025\143\241\324\225\207\361\236\271\363\211\363\075\205
\270\270\333\276\265\271\051\371\332\067\005\000\111\224\003\204
\104\347\277\103\061\317\165\213\045\321\364\246\144\365\222\366
\253\005\353\075\351\245\013\066\142\332\314\006\137\066\213\266
\136\061\270\052\373\136\366\161\337\104\046\236\304\346\015\221
\264\056\165\225\200\121\152\113\060\246\260\142\241\223\361\233
\330\316\304\143\165\077\131\107\261
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

```
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "NetLock Arany (Class Gold) Ftanúsítvány"
# Issuer: CN=NetLock Arany (Class Gold) F..tan..s..tv..ny,OU=Tan..s..tv..nykiad..k (Certification
Services),O=NetLock Kft.,L=Budapest,C=HU
# Serial Number:49:41:2c:e4:00:10
# Subject: CN=NetLock Arany (Class Gold) F..tan..s..tv..ny,OU=Tan..s..tv..nykiad..k (Certification
Services),O=NetLock Kft.,L=Budapest,C=HU
# Not Valid Before: Thu Dec 11 15:08:21 2008
# Not Valid After : Wed Dec 06 15:08:21 2028
# Fingerprint (SHA-256):
6C:61:DA:C3:A2:DE:F0:31:50:6B:E0:36:D2:A6:FE:40:19:94:FB:D1:3D:F9:C8:D4:66:59:92:74:C4:46:EC:98
# Fingerprint (SHA1): 06:08:3F:59:3F:15:A1:04:A0:69:A4:6B:A9:03:D0:06:B7:97:09:91
CKA_CLASS
 CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "NetLock Arany (Class Gold) Ftanúsítvány"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\006\010\077\131\077\025\241\004\240\151\244\153\251\003\320\006
\267\227\011\221
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\305\241\267\377\163\335\326\327\064\062\030\337\374\074\255\210
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\247\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160
\145\163\164\061\025\060\023\006\003\125\004\012\014\014\116\145
\164\114\157\143\153\040\113\146\164\056\061\067\060\065\006\003
\125\004\013\014\056\124\141\156\303\272\163\303\255\164\166\303
\241\156\171\153\151\141\144\303\263\153\040\050\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\123\145\162\166\151\143
\145\163\051\061\065\060\063\006\003\125\004\003\014\054\116\145
\164\114\157\143\153\040\101\162\141\156\171\040\050\103\154\141
\163\163\040\107\157\154\144\051\040\106\305\221\164\141\156\303
\272\163\303\255\164\166\303\241\156\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\006\111\101\054\344\000\020
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
#
# Certificate "SecureSign RootCA11"
#
# Issuer: CN=SecureSign RootCA11,O="Japan Certification Services, Inc.",C=JP
# Serial Number: 1 (0x1)
# Subject: CN=SecureSign RootCA11,O="Japan Certification Services, Inc.",C=JP
# Not Valid Before: Wed Apr 08 04:56:47 2009
# Not Valid After : Sun Apr 08 04:56:47 2029
# Fingerprint (SHA-256):
BF:0F:EE:FB:9E:3A:58:1A:D5:F9:E9:DB:75:89:98:57:43:D2:61:08:5C:4D:31:4F:6F:5D:72:59:AA:42:16:12
# Fingerprint (SHA1): 3B:C4:9F:48:F8:F3:73:A0:9C:1E:BD:F8:5B:B1:C3:65:C7:D8:11:B3
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL
 CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SecureSign RootCA11"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\130\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\053\060\051\006\003\125\004\012\023\042\112\141\160\141\156\040
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\123\145
\162\166\151\143\145\163\054\040\111\156\143\056\061\034\060\032
\006\003\125\004\003\023\023\123\145\143\165\162\145\123\151\147
\156\040\122\157\157\164\103\101\061\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\130\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\053\060\051\006\003\125\004\012\023\042\112\141\160\141\156\040
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\123\145
\162\166\151\143\145\163\054\040\111\156\143\056\061\034\060\032
\006\003\125\004\003\023\023\123\145\143\165\162\145\123\151\147
\156\040\122\157\157\164\103\101\061\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE
 MULTILINE_OCTAL
\060\202\003\155\060\202\002\125\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\130\061\013\060\011\006\003\125\004\006\023\002\112\120\061\053
\060\051\006\003\125\004\012\023\042\112\141\160\141\156\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\123\145\162
\166\151\143\145\163\054\040\111\156\143\056\061\034\060\032\006
\003\125\004\003\023\023\123\145\143\165\162\145\123\151\147\156
\040\122\157\157\164\103\101\061\061\060\036\027\015\060\071\060
```

\064\060\070\060\064\065\066\064\067\132\027\015\062\071\060\064
\060\070\060\064\065\066\064\067\132\060\130\061\013\060\011\006
\003\125\004\006\023\002\112\120\061\053\060\051\006\003\125\004
\012\023\042\112\141\160\141\156\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\123\145\162\166\151\143\145\163\054
\040\111\156\143\056\061\034\060\032\006\003\125\004\003\023\023
\123\145\143\165\162\145\123\151\147\156\040\122\157\157\164\103
\101\061\061\060\202\001\042\060\015\006\011\052\206\110\206\367
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002
\202\001\001\000\375\167\252\245\034\220\005\073\313\114\233\063
\213\132\024\105\244\347\220\026\321\337\127\322\041\020\244\027
\375\337\254\326\037\247\344\333\174\367\354\337\270\003\332\224
\130\375\135\162\174\214\077\137\001\147\164\025\226\343\002\074
\207\333\256\313\001\216\302\363\146\306\205\105\364\002\306\072
\265\142\262\257\372\234\277\244\346\324\200\060\230\363\015\266
\223\217\251\324\330\066\362\260\374\212\312\054\241\025\063\225
\061\332\300\033\362\356\142\231\206\143\077\277\335\223\052\203
\250\166\271\023\037\267\316\116\102\205\217\042\347\056\032\362
\225\011\262\005\265\104\116\167\241\040\275\251\362\116\012\175
\120\255\365\005\015\105\117\106\161\375\050\076\123\373\004\330
\055\327\145\035\112\033\372\317\073\260\061\232\065\156\310\213
\006\323\000\221\362\224\010\145\114\261\064\006\000\172\211\342
\360\307\003\131\317\325\326\350\247\062\263\346\230\100\206\305
\315\047\022\213\314\173\316\267\021\074\142\140\007\043\076\053
\100\156\224\200\011\155\266\263\157\167\157\065\010\120\373\002
\207\305\076\211\002\003\001\000\001\243\102\060\100\060\035\006
\003\125\035\016\004\026\004\024\133\370\115\117\262\245\206\324
\072\322\361\143\232\240\276\011\366\127\267\336\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\017\006\003
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\015\006
\011\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001
\000\240\241\070\026\146\056\247\126\037\041\234\006\372\035\355
\271\042\305\070\046\330\116\117\354\243\177\171\336\106\041\241
\207\167\217\007\010\232\262\244\305\257\017\062\230\013\174\146
\051\266\233\175\045\122\111\103\253\114\056\053\156\172\160\257
\026\016\343\002\154\373\102\346\030\235\105\330\125\310\350\073
\335\347\341\364\056\013\034\064\134\154\130\112\373\214\210\120
\137\225\034\277\355\253\042\265\145\263\205\272\236\017\270\255
\345\172\033\212\120\072\035\275\015\274\173\124\120\013\271\102
\257\125\240\030\201\255\145\231\357\276\344\234\277\304\205\253
\101\262\124\157\334\045\315\355\170\342\216\014\215\011\111\335
\143\173\132\151\226\002\041\250\275\122\131\351\175\065\313\310
\122\312\177\201\376\331\153\323\367\021\355\045\337\370\347\371
\244\372\162\227\204\123\015\245\320\062\030\121\166\131\024\154
\017\353\354\137\200\214\165\103\203\303\205\230\377\114\236\055
\015\344\167\203\223\116\265\226\007\213\050\023\233\214\031\215
\101\047\111\100\356\336\346\043\104\071\334\241\042\326\272\003
\362

```
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "SecureSign RootCA11"
# Issuer: CN=SecureSign RootCA11,O="Japan Certification Services, Inc.",C=JP
# Serial Number: 1 (0x1)
# Subject: CN=SecureSign RootCA11,O="Japan Certification Services, Inc.",C=JP
# Not Valid
 Before: Wed Apr 08 04:56:47 2009
# Not Valid After : Sun Apr 08 04:56:47 2029
# Fingerprint (SHA-256):
BF:0F:EE:FB:9E:3A:58:1A:D5:F9:E9:DB:75:89:98:57:43:D2:61:08:5C:4D:31:4F:6F:5D:72:59:AA:42:16:12
# Fingerprint (SHA1): 3B:C4:9F:48:F8:F3:73:A0:9C:1E:BD:F8:5B:B1:C3:65:C7:D8:11:B3
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SecureSign RootCA11"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\073\304\237\110\370\363\163\240\234\036\275\370\133\261\303\145
\307\330\021\263
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\267\122\164\342\222\264\200\223\362\165\344\314\327\362\352\046
END
CKA_ISSUER MULTILINE_OCTAL
\060\130\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\053\060\051\006\003\125\004\012\023\042\112\141\160\141\156\040
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\123\145
\162\166\151\143\145\163\054\040\111\156\143\056\061\034\060\032
\006\003\125\004\003\023\023\123\145\143\165\162\145\123\151\147
\156\040\122\157\157\164\103\101\061\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Microsec e-Szigno Root CA 2009"
#
```

```
# Issuer: E=info@e-szigno.hu,CN=Microsec e-Szigno Root CA 2009,O=Microsec Ltd.,L=Budapest,C=HU
# Serial Number:00:c2:7e:43:04:4e:47:3f:19
# Subject: E=info@e-szigno.hu,CN=Microsec e-Szigno Root CA 2009,O=Microsec Ltd.,L=Budapest,C=HU
# Not Valid Before: Tue Jun 16 11:30:18 2009
# Not Valid After : Sun Dec 30 11:30:18 2029
# Fingerprint (SHA-256):
3C:5F:81:FE:A5:FA:B8:2C:64:BF:A2:EA:EC:AF:CD:E8:E0:77:FC:86:20:A7:CA:E5:37:16:3D:F3:6E:DB:F3:78
# Fingerprint (SHA1): 89:DF:74:FE:5C:F4:0F:4A:80:F9:E3:37:7D:54:DA:91:E1:01:31:8E
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
 CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsec e-Szigno Root CA 2009"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160
\145\163\164\061\026\060\024\006\003\125\004\012\014\015\115\151
\143\162\157\163\145\143\040\114\164\144\056\061\047\060\045\006
\003\125\004\003\014\036\115\151\143\162\157\163\145\143\040\145
\055\123\172\151\147\156\157\040\122\157\157\164\040\103\101\040
\062\060\060\071\061\037\060\035\006\011\052\206\110\206\367\015
\001\011\001\026\020\151\156\146\157\100\145\055\163\172\151\147
\156\157\056\150\165
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160
\145\163\164\061\026\060\024\006\003\125\004\012\014\015\115\151
\143\162\157\163\145\143\040\114\164\144\056\061\047\060\045\006
\003\125\004\003\014\036\115\151\143\162\157\163\145\143\040\145
\055\123\172\151\147\156\157\040\122\157\157\164\040\103\101\040
\062\060\060\071\061\037\060\035\006\011\052\206\110\206\367\015
\001\011\001\026\020\151\156\146\157\100\145\055\163\172\151\147
\156\157\056\150\165
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\011\000\302\176\103\004\116\107\077\031
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\012\060\202\002\362\240\003\002\001\002\002\011\000
\302\176\103\004\116\107\077\031\060\015\006\011\052\206\110\206
\367\015\001\001\013\005\000\060\201\202\061\013\060\011\006\003
\125\004\006\023\002\110\125\061\021\060\017\006\003\125\004\007
\014\010\102\165\144\141\160\145\163\164\061\026\060\024\006\003
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\125\004\012\014\015\115\151\143\162\157\163\145\143\040\114\164
\144\056\061\047\060\045\006\003\125\004\003\014\036\115\151\143
\162\157\163\145\143\040\145\055\123\172\151\147\156\157\040\122
\157\157\164\040\103\101\040\062\060\060\071\061\037\060\035\006
\011\052\206\110\206\367\015\001\011\001\026\020\151\156\146\157
\100\145\055\163\172\151\147\156\157\056\150\165\060\036\027\015
\060\071\060\066\061\066\061\061\063\060\061\070\132\027\015\062
\071\061\062\063\060\061\061\063\060\061\070\132\060\201\202\061
\013\060\011\006\003\125\004\006\023\002\110\125\061\021\060\017
\006\003\125\004\007\014\010\102\165\144\141\160\145\163\164\061
\026\060\024\006\003\125\004\012\014\015\115\151\143\162\157\163
\145\143\040\114\164\144\056\061\047\060\045\006\003\125\004\003
\014\036\115\151\143\162\157\163\145\143\040\145\055\123\172\151
\147\156\157\040\122\157\157\164\040\103\101\040\062\060\060\071
\061\037\060\035\006\011\052\206\110\206\367\015\001\011\001\026
\020\151\156\146\157\100\145\055\163\172\151\147\156\157\056\150
\165\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001
\001\000\351\370\217\363\143\255\332\206\330\247\340\102\373\317
\221\336\246\046\370\231\245\143\160\255\233\256\312\063\100\175
\155\226\156\241\016\104\356\341\023\235\224\102\122\232\275\165
\205\164\054\250\016\035\223\266\030\267\214\054\250\317\373\134
\161\271\332\354\376\350\176\217\344\057\035\262\250\165\207\330
\267\241\345\073\317\231\112\106\320\203\031\175\300\241\022\034
\225\155\112\364\330\307\245\115\063\056\205\071\100\165\176\024
\174\200\022\230\120\307\101\147\270\240\200\141\124\246\154\116
\037\340\235\016\007\351\311\272\063\347\376\300\125\050\054\002
\200\247\031\365\236\334\125\123\003\227\173\007\110\377\231\373
\067\212\044\304\131\314\120\020\143\216\252\251\032\260\204\032
\206\371\137\273\261\120\156\244\321\012\314\325\161\176\037\247
\033\174\365\123\156\042\137\313\053\346\324\174\135\256\326\302
\306\114\345\005\001\331\355\127\374\301\043\171\374\372\310\044
\203\225\363\265\152\121\001\320\167\326\351\022\241\371\032\203
\373\202\033\271\260\227\364\166\006\063\103\111\240\377\013\265
\372\265\002\003\001\000\001\243\201\200\060\176\060\017\006\003
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006
\003\125\035\016\004\026\004\024\313\017\306\337\102\103\314\075
\313\265\110\043\241\032\172\246\052\273\064\150\060\037\006\003
\125\035\043\004\030\060\026\200\024\313\017\306\337\102\103\314
\075\313\265\110\043\241\032\172\246\052\273\064\150\060\033\006
\003\125\035\021\004\024\060\022\201\020\151\156\146\157\100\145
\055\163\172\151\147\156\157\056\150\165\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\003\202\001\001\000\311\321
\016\136\056\325\314\263\174\076\313\374\075\377\015\050\225\223
\004\310\277\332\315\171\270\103\220\360\244\276\357\362\357\041
\230\274\324\324\135\006\366\356\102\354\060\154\240\252\251\312
\361\257\212\372\077\013\163\152\076\352\056\100\176\037\256\124

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\141\171\353\056\010\067\327\043\363\214\237\276\035\261\341\244
\165\333\240\342\124\024\261\272\034\051\244\030\366\022\272\242
\024\024\343\061\065\310\100\377\267\340\005\166\127\301\034\131
\362\370\277\344\355\045\142\134\204\360\176\176\037\263\276\371
\267\041\021\314\003\001\126\160\247\020\222\036\033\064\201\036
\255\234\032\303\004\074\355\002\141\326\036\006\363\137\072\207
\362\053\361\105\207\345\075\254\321\307\127\204\275\153\256\334
\330\371\266\033\142\160\013\075\066\311\102\362\062\327\172\141
\346\322\333\075\317\310\251\311\233\334\333\130\104\327\157\070
\257\177\170\323\243\255\032\165\272\034\301\066\174\217\036\155
\034\303\165\106\256\065\005\246\366\134\075\041\356\126\360\311
\202\042\055\172\124\253\160\303\175\042\145\202\160\226
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Microsec e-Szigno Root CA 2009"
# Issuer: E=info@e-szigno.hu,CN=Microsec e-Szigno Root CA 2009,O=Microsec Ltd.,L=Budapest,C=HU
# Serial Number:00:c2:7e:43:04:4e:47:3f:19
# Subject: E=info@e-szigno.hu,CN=Microsec
 e-Szigno Root CA 2009,O=Microsec Ltd.,L=Budapest,C=HU
# Not Valid Before: Tue Jun 16 11:30:18 2009
# Not Valid After : Sun Dec 30 11:30:18 2029
# Fingerprint (SHA-256):
3C:5F:81:FE:A5:FA:B8:2C:64:BF:A2:EA:EC:AF:CD:E8:E0:77:FC:86:20:A7:CA:E5:37:16:3D:F3:6E:DB:F3:78
# Fingerprint (SHA1): 89:DF:74:FE:5C:F4:0F:4A:80:F9:E3:37:7D:54:DA:91:E1:01:31:8E
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsec e-Szigno Root CA 2009"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\211\337\164\376\134\364\017\112\200\371\343\067\175\124\332\221
\341\001\061\216
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\370\111\364\003\274\104\055\203\276\110\151\175\051\144\374\261
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160
\145\163\164\061\026\060\024\006\003\125\004\012\014\015\115\151
\143\162\157\163\145\143\040\114\164\144\056\061\047\060\045\006
\003\125\004\003\014\036\115\151\143\162\157\163\145\143\040\145
\055\123\172\151\147\156\157\040\122\157\157\164\040\103\101\040
\062\060\060\071\061\037\060\035\006\011\052\206\110\206\367\015
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\001\011\001\026\020\151\156\146\157\100\145\055\163\172\151\147
\156\157\056\150\165
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\011\000\302\176\103\004\116\107\077\031
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GlobalSign Root CA - R3"
#
# Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R3
# Serial Number:04:00:00:00:00:01:21:58:53:08:a2
# Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R3
# Not Valid Before: Wed Mar 18 10:00:00 2009
# Not Valid After : Sun Mar 18 10:00:00 2029
# Fingerprint (SHA-256):
CB:B5:22:D7:B7:F1:27:AD:6A:01:13:86:5B:DF:1C:D4:10:2E:7D:07:59:AF:63:5A:7C:F4:72:0D:C9:63:C5:3B
#
 Fingerprint (SHA1): D6:9B:56:11:48:F0:1C:77:C5:45:78:C1:09:26:DF:5B:85:69:76:AD
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Root CA - R3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\114\061\040\060\036\006\003\125\004\013\023\027\107\154\157
\142\141\154\123\151\147\156\040\122\157\157\164\040\103\101\040
\055\040\122\063\061\023\060\021\006\003\125\004\012\023\012\107
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125
\004\003\023\012\107\154\157\142\141\154\123\151\147\156
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\040\060\036\006\003\125\004\013\023\027\107\154\157
\142\141\154\123\151\147\156\040\122\157\157\164\040\103\101\040
\055\040\122\063\061\023\060\021\006\003\125\004\012\023\012\107
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125
\004\003\023\012\107\154\157\142\141\154\123\151\147\156
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\041\130\123\010\242
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END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\137\060\202\002\107\240\003\002\001\002\002\013\004
\000\000\000\000\001\041\130\123\010\242\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\060\114\061\040\060\036\006
\003\125\004\013\023\027\107\154\157\142\141\154\123\151\147\156
\040\122\157\157\164\040\103\101\040\055\040\122\063\061\023\060
\021\006\003\125\004\012\023\012\107\154\157\142\141\154\123\151
\147\156\061\023\060\021\006\003\125\004\003\023\012\107\154\157
\142\141\154\123\151\147\156\060\036\027\015\060\071\060\063\061
\070\061\060\060\060\060\060\132\027\015\062\071\060\063\061\070
\061\060\060\060\060\060\132\060\114\061\040\060\036\006\003\125
\004\013\023\027\107\154\157\142\141\154\123\151\147\156\040\122
\157\157\164\040\103\101\040\055\040\122\063\061\023\060\021\006
\003\125\004\012\023\012\107\154\157\142\141\154\123\151\147\156
\061\023\060\021\006\003\125\004\003\023\012\107\154\157\142\141
\154\123\151\147\156\060\202\001\042\060\015\006\011\052\206\110
\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001
\012\002\202\001\001\000\314\045\166\220\171\006\170\042\026\365
\300\203\266\204\312\050\236\375\005\166\021\305\255\210\162\374
\106\002\103\307\262\212\235\004\137\044\313\056\113\341\140\202
\106\341\122\253\014\201\107\160\154\335\144\321\353\365\054\243
\017\202\075\014\053\256\227\327\266\024\206\020\171\273\073\023
\200\167\214\010\341\111\322\152\142\057\037\136\372\226\150\337
\211\047\225\070\237\006\327\076\311\313\046\131\015\163\336\260
\310\351\046\016\203\025\306\357\133\213\322\004\140\312\111\246
\050\366\151\073\366\313\310\050\221\345\235\212\141\127\067\254
\164\024\334\164\340\072\356\162\057\056\234\373\320\273\277\365
\075\000\341\006\063\350\202\053\256\123\246\072\026\163\214\335
\101\016\040\072\300\264\247\241\351\262\117\220\056\062\140\351
\127\313\271\004\222\150\150\345\070\046\140\165\262\237\167\377
\221\024\357\256\040\111\374\255\100\025\110\321\002\061\141\031
\136\270\227\357\255\167\267\144\232\172\277\137\301\023\357\233
\142\373\015\154\340\124\151\026\251\003\332\156\351\203\223\161
\166\306\151\205\202\027\002\003\001\000\001\243\102\060\100\060
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\035\006\003\125\035\016\004\026\004\024\217\360\113\177\250
\056\105\044\256\115\120\372\143\232\213\336\342\335\033\274\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202
\001\001\000\113\100\333\300\120\252\376\310\014\357\367\226\124
\105\111\273\226\000\011\101\254\263\023\206\206\050\007\063\312
\153\346\164\271\272\000\055\256\244\012\323\365\361\361\017\212
\277\163\147\112\203\307\104\173\170\340\257\156\154\157\003\051
\216\063\071\105\303\216\344\271\127\154\252\374\022\226\354\123
\306\055\344\044\154\271\224\143\373\334\123\150\147\126\076\203
\270\317\065\041\303\311\150\376\316\332\302\123\252\314\220\212
\351\360\135\106\214\225\335\172\130\050\032\057\035\336\315\000

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\067\101\217\355\104\155\327\123\050\227\176\363\147\004\036\025
\327\212\226\264\323\336\114\047\244\114\033\163\163\166\364\027
\231\302\037\172\016\343\055\010\255\012\034\054\377\074\253\125
\016\017\221\176\066\353\303\127\111\276\341\056\055\174\140\213
\303\101\121\023\043\235\316\367\062\153\224\001\250\231\347\054
\063\037\072\073\045\322\206\100\316\073\054\206\170\311\141\057
\024\272\356\333\125\157\337\204\356\005\011\115\275\050\330\162
\316\323\142\120\145\036\353\222\227\203\061\331\263\265\312\107
\130\077\137
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "GlobalSign Root CA - R3"
# Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R3
# Serial Number:04:00:00:00:00:01:21:58:53:08:a2
#
 Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R3
# Not Valid Before: Wed Mar 18 10:00:00 2009
# Not Valid After : Sun Mar 18 10:00:00 2029
# Fingerprint (SHA-256):
CB:B5:22:D7:B7:F1:27:AD:6A:01:13:86:5B:DF:1C:D4:10:2E:7D:07:59:AF:63:5A:7C:F4:72:0D:C9:63:C5:3B
# Fingerprint (SHA1): D6:9B:56:11:48:F0:1C:77:C5:45:78:C1:09:26:DF:5B:85:69:76:AD
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Root CA - R3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\326\233\126\021\110\360\034\167\305\105\170\301\011\046\337\133
\205\151\166\255
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\305\337\270\111\312\005\023\125\356\055\272\032\303\076\260\050
END
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\040\060\036\006\003\125\004\013\023\027\107\154\157
\142\141\154\123\151\147\156\040\122\157\157\164\040\103\101\040
\055\040\122\063\061\023\060\021\006\003\125\004\012\023\012\107
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125
\004\003\023\012\107\154\157\142\141\154\123\151\147\156
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\041\130\123\010\242
END
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CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Izenpe.com"
#
# Issuer: CN=Izenpe.com,O=IZENPE S.A.,C=ES
# Serial Number:00:b0:b7:5a:16:48:5f:bf:e1:cb:f5:8b:d7:19:e6:7d
# Subject: CN=Izenpe.com,O=IZENPE S.A.,C=ES
# Not Valid Before: Thu Dec 13 13:08:28 2007
# Not Valid After : Sun Dec 13 08:27:25 2037
# Fingerprint (SHA-256):
25:30:CC:8E:98:32:15:02:BA:D9:6F:9B:1F:BA:1B:09:9E:2D:29:9E:0F:45:48:BB:91:4F:36:3B:C0:D4:53:1F
# Fingerprint (SHA1): 2F:78:3D:25:52:18:A7:4A:65:39:71:B5:2C:A2:9C:45:15:6F:E9:19
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL
 CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Izenpe.com"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\070\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\024\060\022\006\003\125\004\012\014\013\111\132\105\116\120\105
\040\123\056\101\056\061\023\060\021\006\003\125\004\003\014\012
\111\172\145\156\160\145\056\143\157\155
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\070\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\024\060\022\006\003\125\004\012\014\013\111\132\105\116\120\105
\040\123\056\101\056\061\023\060\021\006\003\125\004\003\014\012
\111\172\145\156\160\145\056\143\157\155
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\000\260\267\132\026\110\137\277\341\313\365\213\327\031
\346\175
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\361\060\202\003\331\240\003\002\001\002\002\020\000
\260\267\132\026\110\137\277\341\313\365\213\327\031\346\175\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\070
\061\013\060\011\006\003\125\004\006\023\002\105\123\061\024\060
\022\006\003\125\004\012\014\013\111\132\105\116\120\105\040\123
\056\101\056\061\023\060\021\006\003\125\004\003\014\012\111\172
\145\156\160\145\056\143\157\155\060\036\027\015\060\067\061\062
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\061\063\061\063\060\070\062\070\132\027\015\063\067\061\062\061
\063\060\070\062\067\062\065\132\060\070\061\013\060\011\006\003
\125\004\006\023\002\105\123\061\024\060\022\006\003\125\004\012
\014\013\111\132\105\116\120\105\040\123\056\101\056\061\023\060
\021\006\003\125\004\003\014\012\111\172\145\156\160\145\056\143
\157\155\060\202\002\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202
\002\001\000\311\323\172\312\017\036\254\247\206\350\026\145\152
\261\302\033\105\062\161\225\331\376\020\133\314\257\347\245\171
\001\217\211\303\312\362\125\161\367\167\276\167\224\363\162\244
\054\104\330\236\222\233\024\072\241\347\044\220\012\012\126\216
\305\330\046\224\341\331\110\341\055\076\332\012\162\335\243\231
\025\332\201\242\207\364\173\156\046\167\211\130\255\326\353\014
\262\101\172\163\156\155\333\172\170\101\351\010\210\022\176\207
\056\146\021\143\154\124\373\074\235\162\300\274\056\377\302\267
\335\015\166\343\072\327\367\264\150\276\242\365\343\201\156\301
\106\157\135\215\340\115\306\124\125\211\032\063\061\012\261\127
\271\243\212\230\303\354\073\064\305\225\101\151\176\165\302\074
\040\305\141\272\121\107\240\040\220\223\241\220\113\363\116\174
\205\105\124\232\321\005\046\101\260\265\115\035\063\276\304\003
\310\045\174\301\160\333\073\364\011\055\124\047\110\254\057\341
\304\254\076\310\313\222\114\123\071\067\043\354\323\001\371\340
\011\104\115\115\144\300\341\015\132\207\042\274\255\033\243\376
\046\265\025\363\247\374\204\031\351\354\241\210\264\104\151\204
\203\363\211\321\164\006\251\314\013\326\302\336\047\205\120\046
\312\027\270\311\172\207\126\054\032\001\036\154\276\023\255\020
\254\265\044\365\070\221\241\326\113\332\361\273\322\336\107\265
\361\274\201\366\131\153\317\031\123\351\215\025\313\112\313\251
\157\104\345\033\101\317\341\206\247\312\320\152\237\274\114\215
\006\063\132\242\205\345\220\065\240\142\134\026\116\360\343\242
\372\003\032\264\054\161\263\130\054\336\173\013\333\032\017\353
\336\041\037\006\167\006\003\260\311\357\231\374\300\271\117\013
\206\050\376\322\271\352\343\332\245\303\107\151\022\340\333\360
\366\031\213\355\173\160\327\002\326\355\207\030\050\054\004\044
\114\167\344\110\212\032\306\073\232\324\017\312\372\165\322\001
\100\132\215\171\277\213\317\113\317\252\026\301\225\344\255\114
\212\076\027\221\324\261\142\345\202\345\200\004\244\003\176\215
\277\332\177\242\017\227\117\014\323\015\373\327\321\345\162\176
\034\310\167\377\133\232\017\267\256\005\106\345\361\250\026\354
\107\244\027\002\003\001\000\001\243\201\366\060\201\363\060\201
\260\006\003\125\035\021\004\201\250\060\201\245\201\017\151\156
\146\157\100\151\172\145\156\160\145\056\143\157\155\244\201\221
\060\201\216\061\107\060\105\006\003\125\004\012\014\076\111\132
\105\116\120\105\040\123\056\101\056\040\055\040\103\111\106\040
\101\060\061\063\063\067\062\066\060\055\122\115\145\162\143\056
\126\151\164\157\162\151\141\055\107\141\163\164\145\151\172\040
\124\061\060\065\065\040\106\066\062\040\123\070\061\103\060\101
\006\003\125\004\011\014\072\101\166\144\141\040\144\145\154\040

\115\145\144\151\164\145\162\162\141\156\145\157\040\105\164\157
\162\142\151\144\145\141\040\061\064\040\055\040\060\061\060\061
\060\040\126\151\164\157\162\151\141\055\107\141\163\164\145\151
\172\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\006\060\035\006\003\125\035\016\004\026\004\024\035\034\145
\016\250\362\045\173\264\221\317\344\261\261\346\275\125\164\154
\005\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000
\003\202\002\001\000\170\246\014\026\112\237\114\210\072\300\313
\016\245\026\175\237\271\110\137\030\217\015\142\066\366\315\031
\153\254\253\325\366\221\175\256\161\363\077\263\016\170\205\233
\225\244\047\041\107\102\112\174\110\072\365\105\174\263\014\216
\121\170\254\225\023\336\306\375\175\270\032\220\114\253\222\003
\307\355\102\001\316\017\330\261\372\242\222\341\140\155\256\172
\153\011\252\306\051\356\150\111\147\060\200\044\172\061\026\071
\133\176\361\034\056\335\154\011\255\362\061\301\202\116\271\273
\371\276\277\052\205\077\300\100\243\072\131\374\131\113\074\050
\044\333\264\025\165\256\015\210\272\056\163\300\275\130\207\345
\102\362\353\136\356\036\060\042\231\313\067\321\304\041\154\201
\354\276\155\046\346\034\344\102\040\236\107\260\254\203\131\160
\054\065\326\257\066\064\264\315\073\370\062\250\357\343\170\211
\373\215\105\054\332\234\270\176\100\034\141\347\076\242\222\054
\113\362\315\372\230\266\051\377\363\362\173\251\037\056\240\223
\127\053\336\205\003\371\151\067\313\236\170\152\005\264\305\061
\170\211\354\172\247\205\341\271\173\074\336\276\036\171\204\316
\237\160\016\131\302\065\056\220\052\061\331\344\105\172\101\244
\056\023\233\064\016\146\173\111\253\144\227\320\106\303\171\235
\162\120\143\246\230\133\006\275\110\155\330\071\203\160\350\065
\360\005\321\252\274\343\333\310\002\352\174\375\202\332\302\133
\122\065\256\230\072\255\272\065\223\043\247\037\110\335\065\106
\230\262\020\150\344\245\061\302\012\130\056\031\201\020\311\120
\165\374\352\132\026\316\021\327\356\357\120\210\055\141\377\077
\102\163\005\224\103\325\216\074\116\001\072\031\245\037\106\116
\167\320\135\345\201\042\041\207\376\224\175\204\330\223\255\326
\150\103\110\262\333\353\163\044\347\221\177\124\244\266\200\076
\235\243\074\114\162\302\127\304\240\324\314\070\047\316\325\006
\236\242\110\331\351\237\316\202\160\066\223\232\073\337\226\041
\343\131\267\014\332\221\067\360\375\131\132\263\231\310\151\154
\103\046\001\065\143\140\125\211\003\072\165\330\272\112\331\124
\377\356\336\200\330\055\321\070\325\136\055\013\230\175\076\154
\333\374\046\210\307
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Izenpe.com"

```
# Issuer: CN=Izenpe.com,O=IZENPE S.A.,C=ES
# Serial Number:00:b0:b7:5a:16:48:5f:bf:e1:cb:f5:8b:d7:19:e6:7d
# Subject: CN=Izenpe.com,O=IZENPE S.A.,C=ES
# Not Valid Before: Thu Dec 13 13:08:28 2007
# Not Valid After : Sun Dec 13 08:27:25 2037
# Fingerprint (SHA-256):
25:30:CC:8E:98:32:15:02:BA:D9:6F:9B:1F:BA:1B:09:9E:2D:29:9E:0F:45:48:BB:91:4F:36:3B:C0:D4:53:1F
# Fingerprint (SHA1): 2F:78:3D:25:52:18:A7:4A:65:39:71:B5:2C:A2:9C:45:15:6F:E9:19
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Izenpe.com"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\057\170\075\045\122\030\247\112\145\071\161\265\054\242\234\105
\025\157\351\031
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\246\260\315\205\200\332\134\120\064\243\071\220\057\125\147\163
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\070\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\024\060\022\006\003\125\004\012\014\013\111\132\105\116\120\105
\040\123\056\101\056\061\023\060\021\006\003\125\004\003\014\012
\111\172\145\156\160\145\056\143\157\155
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\000\260\267\132\026\110\137\277\341\313\365\213\327\031
\346\175
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Go Daddy Root Certificate Authority - G2"
#
# Issuer: CN=Go Daddy Root Certificate Authority - G2,O="GoDaddy.com, Inc.",L=Scottsdale,ST=Arizona,C=US
# Serial Number: 0 (0x0)
# Subject: CN=Go Daddy Root Certificate Authority - G2,O="GoDaddy.com,
Inc.",L=Scottsdale,ST=Arizona,C=US
# Not Valid Before: Tue Sep 01 00:00:00 2009
# Not Valid After : Thu Dec 31 23:59:59 2037
# Fingerprint
 (SHA-256):
45:14:0B:32:47:EB:9C:C8:C5:B4:F0:D7:B5:30:91:F7:32:92:08:9E:6E:5A:63:E2:74:9D:D3:AC:A9:19:8E:DA
```

# Fingerprint (SHA1): 47:BE:AB:C9:22:EA:E8:0E:78:78:34:62:A7:9F:45:C2:54:FD:E6:8B
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Go Daddy Root Certificate Authority - G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\203\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\032\060\030\006\003\125\004\012
\023\021\107\157\104\141\144\144\171\056\143\157\155\054\040\111
\156\143\056\061\061\060\057\006\003\125\004\003\023\050\107\157
\040\104\141\144\144\171\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164
\171\040\055\040\107\062
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\203\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\032\060\030\006\003\125\004\012
\023\021\107\157\104\141\144\144\171\056\143\157\155\054\040\111
\156\143\056\061\061\060\057\006\003\125\004\003\023\050\107\157
\040\104\141\144\144\171\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164
\171\040\055\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\000
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\305\060\202\002\255\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\201\203\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157\156
\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157\164
\164\163\144\141\154\145\061\032\060\030\006\003\125\004\012\023
\021\107\157\104\141\144\144\171\056\143\157\155\054\040\111\156
\143\056\061\061\060\057\006\003\125\004\003\023\050\107\157\040
\104\141\144\144\171\040\122\157\157\164\040\103\145\162\164\151
\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171
\040\055\040\107\062\060\036\027\015\060\071\060\071\060\061\060
\060\060\060\060\060\132\027\015\063\067\061\062\063\061\062\063
\065\071\065\071\132\060\201\203\061\013\060\011\006\003\125\004

\006\023\002\125\123\061\020\060\016\006\003\125\004\010\023\007
\101\162\151\172\157\156\141\061\023\060\021\006\003\125\004\007
\023\012\123\143\157\164\164\163\144\141\154\145\061\032\060\030
\006\003\125\004\012\023\021\107\157\104\141\144\144\171\056\143
\157\155\054\040\111\156\143\056\061\061\060\057\006\003\125\004
\003\023\050\107\157\040\104\141\144\144\171\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164
\150\157\162\151\164\171\040\055\040\107\062\060\202\001\042\060
\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202
\001\017\000\060\202\001\012\002\202\001\001\000\277\161\142\010
\361\372\131\064\367\033\311\030\243\367\200\111\130\351\042\203
\023\246\305\040\103\001\073\204\361\346\205\111\237\047\352\366
\204\033\116\240\264\333\160\230\307\062\001\261\005\076\007\116
\356\364\372\117\057\131\060\042\347\253\031\126\153\342\200\007
\374\363\026\165\200\071\121\173\345\371\065\266\164\116\251\215
\202\023\344\266\077\251\003\203\372\242\276\212\025\152\177\336
\013\303\266\031\024\005\312\352\303\250\004\224\073\106\174\062
\015\363\000\146\042\310\215\151\155\066\214\021\030\267\323\262
\034\140\264\070\372\002\214\316\323\335\106\007\336\012\076\353
\135\174\310\174\373\260\053\123\244\222\142\151\121\045\005\141
\032\104\201\214\054\251\103\226\043\337\254\072\201\232\016\051
\305\034\251\351\135\036\266\236\236\060\012\071\316\361\210\200
\373\113\135\314\062\354\205\142\103\045\064\002\126\047\001\221
\264\073\160\052\077\156\261\350\234\210\001\175\237\324\371\333
\123\155\140\235\277\054\347\130\253\270\137\106\374\316\304\033
\003\074\011\353\111\061\134\151\106\263\340\107\002\003\001\000
\001\243\102\060\100\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\035\006\003\125\035\016\004\026\004
\024\072\232\205\007\020\147\050\266\357\366\275\005\101\156\040
\301\224\332\017\336\060\015\006\011\052\206\110\206\367\015\001
\001\013\005\000\003\202\001\001\000\231\333\135\171\325\371\227
\131\147\003\141\361\176\073\006\061\165\055\241\040\216\117\145
\207\264\367\246\234\274\330\351\057\320\333\132\356\317\164\214
\163\264\070\102\332\005\173\370\002\165\270\375\245\261\327\256
\366\327\336\023\313\123\020\176\212\106\321\227\372\267\056\053
\021\253\220\260\047\200\371\350\237\132\351\067\237\253\344\337
\154\263\205\027\235\075\331\044\117\171\221\065\326\137\004\353
\200\203\253\232\002\055\265\020\364\330\220\307\004\163\100\355
\162\045\240\251\237\354\236\253\150\022\231\127\306\217\022\072
\011\244\275\104\375\006\025\067\301\233\344\062\243\355\070\350
\330\144\363\054\176\024\374\002\352\237\315\377\007\150\027\333
\042\220\070\055\172\215\321\124\361\151\343\137\063\312\172\075
\173\012\343\312\177\137\071\345\342\165\272\305\166\030\063\316
\054\360\057\114\255\367\261\347\316\117\250\304\233\112\124\006
\305\177\175\325\010\017\342\034\376\176\027\270\254\136\366\324
\026\262\103\011\014\115\366\247\153\264\231\204\145\312\172\210
\342\342\104\276\134\367\352\034\365

```
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Go Daddy Root Certificate Authority - G2"
# Issuer: CN=Go Daddy Root Certificate Authority - G2,O="GoDaddy.com, Inc.",L=Scottsdale,ST=Arizona,C=US
# Serial Number: 0 (0x0)
# Subject: CN=Go Daddy Root Certificate Authority - G2,O="GoDaddy.com,
 Inc.",L=Scottsdale,ST=Arizona,C=US
# Not Valid Before: Tue Sep 01 00:00:00 2009
# Not Valid After : Thu Dec 31 23:59:59 2037
# Fingerprint (SHA-256):
45:14:0B:32:47:EB:9C:C8:C5:B4:F0:D7:B5:30:91:F7:32:92:08:9E:6E:5A:63:E2:74:9D:D3:AC:A9:19:8E:DA
# Fingerprint (SHA1): 47:BE:AB:C9:22:EA:E8:0E:78:78:34:62:A7:9F:45:C2:54:FD:E6:8B
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Go Daddy Root Certificate Authority - G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\107\276\253\311\042\352\350\016\170\170\064\142\247\237\105\302
\124\375\346\213
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\200\072\274\042\301\346\373\215\233\073\047\112\062\033\232\001
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\203\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\032\060\030\006\003\125\004\012
\023\021\107\157\104\141\144\144\171\056\143\157\155\054\040\111
\156\143\056\061\061\060\057\006\003\125\004\003\023\050\107\157
\040\104\141\144\144\171\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164
\171\040\055\040\107\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
#
# Certificate "Starfield Root Certificate Authority - G2"
#
# Issuer: CN=Starfield Root Certificate Authority - G2,O="Starfield Technologies,
Inc.",L=Scottsdale,ST=Arizona,C=US
# Serial Number: 0 (0x0)
# Subject: CN=Starfield Root Certificate Authority - G2,O="Starfield Technologies,
Inc.",L=Scottsdale,ST=Arizona,C=US
# Not Valid Before: Tue Sep 01 00:00:00 2009
# Not Valid After : Thu Dec
 31 23:59:59 2037
# Fingerprint (SHA-256):
2C:E1:CB:0B:F9:D2:F9:E1:02:99:3F:BE:21:51:52:C3:B2:DD:0C:AB:DE:1C:68:E5:31:9B:83:91:54:DB:B7:F5
# Fingerprint (SHA1): B5:1C:06:7C:EE:2B:0C:3D:F8:55:AB:2D:92:F4:FE:39:D4:E7:0F:0E
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Starfield Root Certificate Authority - G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\217\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012
\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150
\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061\062
\060\060\006\003\125\004\003\023\051\123\164\141\162\146\151\145
\154\144\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\055\040
\107\062
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\217\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012
\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150
\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061\062
\060\060\006\003\125\004\003\023\051\123\164\141\162\146\151\145
\154\144\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\055\040
\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\000
```

END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\335\060\202\002\305\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\201\217\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157\156
\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157\164
\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012\023
\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150\156
\157\154\157\147\151\145\163\054\040\111\156\143\056\061\062\060
\060\006\003\125\004\003\023\051\123\164\141\162\146\151\145\154
\144\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\145\040\101\165\164\150\157\162\151\164\171\040\055\040\107
\062\060\036\027\015\060\071\060\071\060\061\060\060\060\060\060
\060\132\027\015\063\067\061\062\063\061\062\063\065\071\065\071
\132\060\201\217\061\013\060\011\006\003\125\004\006\023\002\125
\123\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172
\157\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143
\157\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004
\012\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143
\150\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061
\062\060\060\006\003\125\004\003\023\051\123\164\141\162\146\151
\145\154\144\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\145\040\101\165\164\150\157\162\151\164\171\040\055
\040\107\062\060\202\001\042\060\015\006\011\052\206\110\206\367
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002
\202\001\001\000\275\355\301\003\374\366\217\374\002\261\157\133
\237\110\331\235\171\342\242\267\003\141\126\030\303\107\266\327
\312\075\065\056\211\103\367\241\151\233\336\212\032\375\023\040
\234\264\111\167\062\051\126\375\271\354\214\335\042\372\162\334
\047\141\227\356\366\132\204\354\156\031\271\211\054\334\204\133
\325\164\373\153\137\305\211\245\020\122\211\106\125\364\270\165
\034\346\177\344\124\256\113\370\125\162\127\002\031\370\027\161
\131\353\036\050\007\164\305\235\110\276\154\264\364\244\260\363
\144\067\171\222\300\354\106\136\177\341\155\123\114\142\257\315
\037\013\143\273\072\235\373\374\171\000\230\141\164\317\046\202
\100\143\363\262\162\152\031\015\231\312\324\016\165\314\067\373
\213\211\301\131\361\142\177\137\263\137\145\060\370\247\267\115
\166\132\036\166\136\064\300\350\226\126\231\212\263\360\177\244
\315\275\334\062\061\174\221\317\340\137\021\370\153\252\111\134
\321\231\224\321\242\343\143\133\011\166\265\126\142\341\113\164
\035\226\324\046\324\010\004\131\320\230\016\016\346\336\374\303
\354\037\220\361\002\003\001\000\001\243\102\060\100\060\017\006
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035
\006\003\125\035\016\004\026\004\024\174\014\062\037\247\331\060
\177\304\175\150\243\142\250\241\316\253\007\133\047\060\015\006
\011\052\206\110\206\367\015\001\001\013\005\000\003\202\001\001

\000\021\131\372\045\117\003\157\224\231\073\232\037\202\205\071
\324\166\005\224\136\341\050\223\155\142\135\011\302\240\250\324
\260\165\070\361\064\152\235\344\237\212\206\046\121\346\054\321
\306\055\156\225\040\112\222\001\354\270\212\147\173\061\342\147
\056\214\225\003\046\056\103\235\112\061\366\016\265\014\273\267
\342\067\177\042\272\000\243\016\173\122\373\153\273\073\304\323
\171\121\116\315\220\364\147\007\031\310\074\106\172\015\001\175
\305\130\347\155\346\205\060\027\232\044\304\020\340\004\367\340
\362\177\324\252\012\377\102\035\067\355\224\345\144\131\022\040
\167\070\323\062\076\070\201\165\226\163\372\150\217\261\313\316
\037\305\354\372\234\176\317\176\261\361\007\055\266\374\277\312
\244\277\320\227\005\112\274\352\030\050\002\220\275\124\170\011
\041\161\323\321\175\035\331\026\260\251\141\075\320\012\000\042
\374\307\173\313\011\144\105\013\073\100\201\367\175\174\062\365
\230\312\130\216\175\052\356\220\131\163\144\371\066\164\136\045
\241\365\146\005\056\177\071\025\251\052\373\120\213\216\205\151
\364
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Starfield
Root Certificate Authority - G2"
# Issuer: CN=Starfield Root Certificate Authority - G2,O="Starfield Technologies,
Inc.",L=Scottsdale,ST=Arizona,C=US
# Serial Number: 0 (0x0)
# Subject: CN=Starfield Root Certificate Authority - G2,O="Starfield Technologies,
Inc.",L=Scottsdale,ST=Arizona,C=US
# Not Valid Before: Tue Sep 01 00:00:00 2009
# Not Valid After : Thu Dec 31 23:59:59 2037
# Fingerprint (SHA-256):
2C:E1:CB:0B:F9:D2:F9:E1:02:99:3F:BE:21:51:52:C3:B2:DD:0C:AB:DE:1C:68:E5:31:9B:83:91:54:DB:B7:F5
# Fingerprint (SHA1): B5:1C:06:7C:EE:2B:0C:3D:F8:55:AB:2D:92:F4:FE:39:D4:E7:0F:0E
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Starfield Root Certificate Authority - G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\265\034\006\174\356\053\014\075\370\125\253\055\222\364\376\071
\324\347\017\016
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\326\071\201\306\122\176\226\151\374\374\312\146\355\005\362\226
END
CKA_ISSUER

```
 MULTILINE_OCTAL
\060\201\217\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012
\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150
\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061\062
\060\060\006\003\125\004\003\023\051\123\164\141\162\146\151\145
\154\144\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\055\040
\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Starfield Services Root Certificate Authority - G2"
#
# Issuer: CN=Starfield
 Services Root Certificate Authority - G2,O="Starfield Technologies, Inc.",L=Scottsdale,ST=Arizona,C=US
# Serial Number: 0 (0x0)
# Subject: CN=Starfield Services Root Certificate Authority - G2,O="Starfield Technologies,
Inc.",L=Scottsdale,ST=Arizona,C=US
# Not Valid Before: Tue Sep 01 00:00:00 2009
# Not Valid After : Thu Dec 31 23:59:59 2037
# Fingerprint (SHA-256):
56:8D:69:05:A2:C8:87:08:A4:B3:02:51:90:ED:CF:ED:B1:97:4A:60:6A:13:C6:E5:29:0F:CB:2A:E6:3E:DA:B5
# Fingerprint (SHA1): 92:5A:8F:8D:2C:6D:04:E0:66:5F:59:6A:FF:22:D8:63:E8:25:6F:3F
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Starfield Services Root Certificate Authority - G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\230\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012
\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150
\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061\073
\060\071\006\003\125\004\003\023\062\123\164\141\162\146\151\145
\154\144\040\123\145\162\166\151\143\145\163\040\122\157\157\164
```

\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164
\150\157\162\151\164\171\040\055\040\107\062
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\230\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012
\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150
\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061\073
\060\071\006\003\125\004\003\023\062\123\164\141\162\146\151\145
\154\144\040\123\145\162\166\151\143\145\163\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164
\150\157\162\151\164\171\040\055\040\107\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\000
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\357\060\202\002\327\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\201\230\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157\156
\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157\164
\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012\023
\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150\156
\157\154\157\147\151\145\163\054\040\111\156\143\056\061\073\060
\071\006\003\125\004\003\023\062\123\164\141\162\146\151\145\154
\144\040\123\145\162\166\151\143\145\163\040\122\157\157\164\040
\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150
\157\162\151\164\171\040\055\040\107\062\060\036\027\015\060\071
\060\071\060\061\060\060\060\060\060\060\132\027\015\063\067\061
\062\063\061\062\063\065\071\065\071\132\060\201\230\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\020\060\016\006\003
\125\004\010\023\007\101\162\151\172\157\156\141\061\023\060\021
\006\003\125\004\007\023\012\123\143\157\164\164\163\144\141\154
\145\061\045\060\043\006\003\125\004\012\023\034\123\164\141\162
\146\151\145\154\144\040\124\145\143\150\156\157\154\157\147\151
\145\163\054\040\111\156\143\056\061\073\060\071\006\003\125\004
\003\023\062\123\164\141\162\146\151\145\154\144\040\123\145\162
\166\151\143\145\163\040\122\157\157\164\040\103\145\162\164\151
\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171
\040\055\040\107\062\060\202\001\042\060\015\006\011\052\206\110
\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001
\012\002\202\001\001\000\325\014\072\304\052\371\116\342\365\276

\031\227\137\216\210\123\261\037\077\313\317\237\040\023\155\051
\072\310\017\175\074\367\153\166\070\143\331\066\140\250\233\136
\134\000\200\262\057\131\177\366\207\371\045\103\206\347\151\033
\122\232\220\341\161\343\330\055\015\116\157\366\310\111\331\266
\363\032\126\256\053\266\164\024\353\317\373\046\343\032\272\035
\226\056\152\073\130\224\211\107\126\377\045\240\223\160\123\203
\332\204\164\024\303\147\236\004\150\072\337\216\100\132\035\112
\116\317\103\221\073\347\126\326\000\160\313\122\356\173\175\256
\072\347\274\061\371\105\366\302\140\317\023\131\002\053\200\314
\064\107\337\271\336\220\145\155\002\317\054\221\246\246\347\336
\205\030\111\174\146\116\243\072\155\251\265\356\064\056\272\015
\003\270\063\337\107\353\261\153\215\045\331\233\316\201\321\105
\106\062\226\160\207\336\002\016\111\103\205\266\154\163\273\144
\352\141\101\254\311\324\124\337\207\057\307\042\262\046\314\237
\131\124\150\237\374\276\052\057\304\125\034\165\100\140\027\205
\002\125\071\213\177\005\002\003\001\000\001\243\102\060\100\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006
\060\035\006\003\125\035\016\004\026\004\024\234\137\000\337\252
\001\327\060\053\070\210\242\270\155\112\234\362\021\221\203\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202
\001\001\000\113\066\246\204\167\151\335\073\031\237\147\043\010
\157\016\141\311\375\204\334\137\330\066\201\315\330\033\101\055
\237\140\335\307\032\150\331\321\156\206\341\210\043\317\023\336
\103\317\342\064\263\004\235\037\051\325\277\370\136\310\325\301
\275\356\222\157\062\164\362\221\202\057\275\202\102\172\255\052
\267\040\175\115\274\172\125\022\302\025\352\275\367\152\225\056
\154\164\237\317\034\264\362\305\001\243\205\320\162\076\255\163
\253\013\233\165\014\155\105\267\216\224\254\226\067\265\240\320
\217\025\107\016\343\350\203\335\217\375\357\101\001\167\314\047
\251\142\205\063\362\067\010\357\161\317\167\006\336\310\031\035
\210\100\317\175\106\035\377\036\307\341\316\377\043\333\306\372
\215\125\116\251\002\347\107\021\106\076\364\375\275\173\051\046
\273\251\141\142\067\050\266\055\052\366\020\206\144\311\160\247
\322\255\267\051\160\171\352\074\332\143\045\237\375\150\267\060
\354\160\373\165\212\267\155\140\147\262\036\310\271\351\330\250
\157\002\213\147\015\115\046\127\161\332\040\374\301\112\120\215
\261\050\272
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Starfield Services Root Certificate Authority - G2"
# Issuer: CN=Starfield Services Root Certificate Authority - G2,O="Starfield Technologies, Inc.",L=Scottsdale,ST=Arizona,C=US
# Serial Number: 0 (0x0)

```
# Subject: CN=Starfield Services Root Certificate Authority - G2,O="Starfield Technologies,
Inc.",L=Scottsdale,ST=Arizona,C=US
# Not Valid Before: Tue Sep 01 00:00:00 2009
# Not Valid After : Thu Dec 31 23:59:59 2037
# Fingerprint (SHA-256):
56:8D:69:05:A2:C8:87:08:A4:B3:02:51:90:ED:CF:ED:B1:97:4A:60:6A:13:C6:E5:29:0F:CB:2A:E6:3E:DA:B5
#
 Fingerprint (SHA1): 92:5A:8F:8D:2C:6D:04:E0:66:5F:59:6A:FF:22:D8:63:E8:25:6F:3F
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Starfield Services Root Certificate Authority - G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\222\132\217\215\054\155\004\340\146\137\131\152\377\042\330\143
\350\045\157\077
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\027\065\164\257\173\141\034\353\364\371\074\342\356\100\371\242
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\230\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012
\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150
\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061\073
\060\071\006\003\125\004\003\023\062\123\164\141\162\146\151\145
\154\144\040\123\145\162\166\151\143\145\163\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164
\150\157\162\151\164\171\040\055\040\107\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "AffirmTrust Commercial"
#
# Issuer: CN=AffirmTrust Commercial,O=AffirmTrust,C=US
# Serial Number:77:77:06:27:26:a9:b1:7c
# Subject: CN=AffirmTrust Commercial,O=AffirmTrust,C=US
# Not Valid Before: Fri Jan 29 14:06:06 2010
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# Not Valid After : Tue Dec 31 14:06:06 2030
# Fingerprint (SHA-256):
03:76:AB:1D:54:C5:F9:80:3C:E4:B2:E2:01:A0:EE:7E:EF:7B:57:B6:36:E8:A9:3C:9B:8D:48:60:C9:6F:5F:A7
# Fingerprint (SHA1): F9:B5:B6:32:45:5F:9C:BE:EC:57:5F:80:DC:E9:6E:2C:C7:B2:78:B7
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN
 CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AffirmTrust Commercial"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\037\060\035\006\003\125\004\003\014\026
\101\146\146\151\162\155\124\162\165\163\164\040\103\157\155\155
\145\162\143\151\141\154
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\037\060\035\006\003\125\004\003\014\026
\101\146\146\151\162\155\124\162\165\163\164\040\103\157\155\155
\145\162\143\151\141\154
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\167\167\006\047\046\251\261\174
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\114\060\202\002\064\240\003\002\001\002\002\010\167
\167\006\047\046\251\261\174\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\104\061\013\060\011\006\003\125\004
\006\023\002\125\123\061\024\060\022\006\003\125\004\012\014\013
\101\146\146\151\162\155\124\162\165\163\164\061\037\060\035\006
\003\125\004\003\014\026\101\146\146\151\162\155\124\162\165\163
\164\040\103\157\155\155\145\162\143\151\141\154\060\036\027\015
\061\060\060\061\062\071\061\064\060\066\060\066\132\027\015\063
\060\061\062\063\061\061\064\060\066\060\066\132\060\104\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\024\060\022\006
\003\125\004\012\014\013\101\146\146\151\162\155\124\162\165\163
\164\061\037\060\035\006\003\125\004\003\014\026\101\146\146\151
\162\155\124\162\165\163\164\040\103\157\155\155\145\162\143\151
\141\154\060\202\001\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202
\001\001\000\366\033\117\147\007\053\241\025\365\006\042\313\037
\001\262\343\163\105\006\104\111\054\273\111\045\024\326\316\303
\267\253\054\117\306\101\062\224\127\372\022\247\133\016\342\217
```

\037\036\206\031\247\252\265\055\271\137\015\212\302\257\205\065
\171\062\055\273\034\142\067\362\261\133\112\075\312\315\161\137
\351\102\276\224\350\310\336\371\042\110\144\306\345\253\306\053
\155\255\005\360\372\325\013\317\232\345\360\120\244\213\073\107
\245\043\133\172\172\370\063\077\270\357\231\227\343\040\301\326
\050\211\317\224\373\271\105\355\343\100\027\021\324\164\360\013
\061\342\053\046\152\233\114\127\256\254\040\076\272\105\172\005
\363\275\233\151\025\256\175\116\040\143\304\065\166\072\007\002
\311\067\375\307\107\356\350\361\166\035\163\025\362\227\244\265
\310\172\171\331\102\252\053\177\134\376\316\046\117\243\146\201
\065\257\104\272\124\036\034\060\062\145\235\346\074\223\136\120
\116\172\343\072\324\156\314\032\373\371\322\067\256\044\052\253
\127\003\042\050\015\111\165\177\267\050\332\165\277\216\343\334
\016\171\061\002\003\001\000\001\243\102\060\100\060\035\006\003
\125\035\016\004\026\004\024\235\223\306\123\213\136\312\257\077
\237\036\017\345\231\225\274\044\366\224\217\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\015\006\011
\052\206\110\206\367\015\001\001\013\005\000\003\202\001\001\000
\130\254\364\004\016\315\300\015\377\012\375\324\272\026\137\051
\275\173\150\231\130\111\322\264\035\067\115\177\047\175\106\006
\135\103\306\206\056\076\163\262\046\175\117\223\251\266\304\052
\232\253\041\227\024\261\336\214\323\253\211\025\330\153\044\324
\361\026\256\330\244\134\324\177\121\216\355\030\001\261\223\143
\275\274\370\141\200\232\236\261\316\102\160\342\251\175\006\045
\175\047\241\376\157\354\263\036\044\332\343\113\125\032\000\073
\065\264\073\331\327\135\060\375\201\023\211\362\302\006\053\355
\147\304\216\311\103\262\134\153\025\211\002\274\142\374\116\362
\265\063\252\262\157\323\012\242\120\343\366\073\350\056\104\302
\333\146\070\251\063\126\110\361\155\033\063\215\015\214\077\140
\067\235\323\312\155\176\064\176\015\237\162\166\213\033\237\162
\375\122\065\101\105\002\226\057\034\262\232\163\111\041\261\111
\107\105\107\264\357\152\064\021\311\115\232\314\131\267\326\002
\236\132\116\145\265\224\256\033\337\051\260\026\361\277\000\236
\007\072\027\144\265\004\265\043\041\231\012\225\073\227\174\357
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "AffirmTrust Commercial"
# Issuer: CN=AffirmTrust Commercial,O=AffirmTrust,C=US
# Serial Number:77:77:06:27:26:a9:b1:7c
# Subject: CN=AffirmTrust Commercial,O=AffirmTrust,C=US
# Not Valid Before: Fri Jan 29 14:06:06 2010
# Not Valid After : Tue Dec 31 14:06:06 2030
# Fingerprint (SHA-256):

```
03:76:AB:1D:54:C5:F9:80:3C:E4:B2:E2:01:A0:EE:7E:EF:7B:57:B6:36:E8:A9:3C:9B:8D:48:60:C9:6F:5F:A7
# Fingerprint (SHA1): F9:B5:B6:32:45:5F:9C:BE:EC:57:5F:80:DC:E9:6E:2C:C7:B2:78:B7
CKA_CLASS
 CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AffirmTrust Commercial"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\371\265\266\062\105\137\234\276\354\127\137\200\334\351\156\054
\307\262\170\267
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\202\222\272\133\357\315\212\157\246\075\125\371\204\366\326\267
END
CKA_ISSUER MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\037\060\035\006\003\125\004\003\014\026
\101\146\146\151\162\155\124\162\165\163\164\040\103\157\155\155
\145\162\143\151\141\154
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\167\167\006\047\046\251\261\174
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
#
 Certificate "AffirmTrust Networking"
#
# Issuer: CN=AffirmTrust Networking,O=AffirmTrust,C=US
# Serial Number:7c:4f:04:39:1c:d4:99:2d
# Subject: CN=AffirmTrust Networking,O=AffirmTrust,C=US
# Not Valid Before: Fri Jan 29 14:08:24 2010
# Not Valid After : Tue Dec 31 14:08:24 2030
# Fingerprint (SHA-256):
0A:81:EC:5A:92:97:77:F1:45:90:4A:F3:8D:5D:50:9F:66:B5:E2:C5:8F:CD:B5:31:05:8B:0E:17:F3:F0:B4:1B
# Fingerprint (SHA1): 29:36:21:02:8B:20:ED:02:F5:66:C5:32:D1:D6:ED:90:9F:45:00:2F
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AffirmTrust Networking"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
```

CKA_SUBJECT MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\037\060\035\006\003\125\004\003\014\026
\101\146\146\151\162\155\124\162\165\163\164\040\116\145\164\167
\157\162\153\151\156\147
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\037\060\035\006\003\125\004\003\014\026
\101\146\146\151\162\155\124\162\165\163\164\040\116\145\164\167
\157\162\153\151\156\147
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\174\117\004\071\034\324\231\055
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\114\060\202\002\064\240\003\002\001\002\002\010\174
\117\004\071\034\324\231\055\060\015\006\011\052\206\110\206\367
\015\001\001\005\005\000\060\104\061\013\060\011\006\003\125\004
\006\023\002\125\123\061\024\060\022\006\003\125\004\012\014\013
\101\146\146\151\162\155\124\162\165\163\164\061\037\060\035\006
\003\125\004\003\014\026\101\146\146\151\162\155\124\162\165\163
\164\040\116\145\164\167\157\162\153\151\156\147\060\036\027\015
\061\060\060\061\062\071\061\064\060\070\062\064\132\027\015\063
\060\061\062\063\061\061\064\060\070\062\064\132\060\104\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\024\060\022\006
\003\125\004\012\014\013\101\146\146\151\162\155\124\162\165\163
\164\061\037\060\035\006\003\125\004\003\014\026\101\146\146\151
\162\155\124\162\165\163\164\040\116\145\164\167\157\162\153\151
\156\147\060\202\001\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202
\001\001\000\264\204\314\063\027\056\153\224\154\153\141\122\240
\353\243\317\171\224\114\345\224\200\231\313\125\144\104\145\217
\147\144\342\006\343\134\067\111\366\057\233\204\204\036\055\362
\140\235\060\116\314\204\205\342\054\317\036\236\376\066\253\063
\167\065\104\330\065\226\032\075\066\350\172\016\330\325\107\241
\152\151\213\331\374\273\072\256\171\132\325\364\326\161\273\232
\220\043\153\232\267\210\164\207\014\036\137\271\236\055\372\253
\123\053\334\273\166\076\223\114\010\010\214\036\242\043\034\324
\152\255\042\272\231\001\056\155\145\313\276\044\146\125\044\113
\100\104\261\033\327\341\302\205\300\336\020\077\075\355\270\374
\361\361\043\123\334\277\145\227\157\331\371\100\161\215\175\275
\225\324\316\276\240\136\047\043\336\375\246\320\046\016\000\051
\353\074\106\360\075\140\277\077\120\322\334\046\101\121\236\024

\067\102\004\243\160\127\250\033\207\355\055\372\173\356\214\012
\343\251\146\211\031\313\101\371\335\104\066\141\317\342\167\106
\310\175\366\364\222\201\066\375\333\064\361\162\176\363\014\026
\275\264\025\002\003\001\000\001\243\102\060\100\060\035\006\003
\125\035\016\004\026\004\024\007\037\322\347\234\332\302\156\242
\100\264\260\172\120\020\120\164\304\310\275\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\015\006\011
\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000
\211\127\262\026\172\250\302\375\326\331\233\233\064\302\234\264
\062\024\115\247\244\337\354\276\247\276\370\103\333\221\067\316
\264\062\056\120\125\032\065\116\166\103\161\040\357\223\167\116
\025\160\056\207\303\301\035\155\334\313\265\047\324\054\126\321
\122\123\072\104\322\163\310\304\033\005\145\132\142\222\234\356
\101\215\061\333\347\064\352\131\041\325\001\172\327\144\270\144
\071\315\311\355\257\355\113\003\110\247\240\231\001\200\334\145
\243\066\256\145\131\110\117\202\113\310\145\361\127\035\345\131
\056\012\077\154\330\321\365\345\011\264\154\124\000\012\340\025
\115\207\165\155\267\130\226\132\335\155\322\000\240\364\233\110
\276\303\067\244\272\066\340\174\207\205\227\032\025\242\336\056
\242\133\275\257\030\371\220\120\315\160\131\370\047\147\107\313
\307\240\007\072\175\321\054\135\154\031\072\146\265\175\375\221
\157\202\261\276\010\223\333\024\107\361\242\067\307\105\236\074
\307\167\257\144\250\223\337\366\151\203\202\140\362\111\102\064
\355\132\000\124\205\034\026\066\222\014\134\372\246\255\277\333
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL
 CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "AffirmTrust Networking"
# Issuer: CN=AffirmTrust Networking,O=AffirmTrust,C=US
# Serial Number:7c:4f:04:39:1c:d4:99:2d
# Subject: CN=AffirmTrust Networking,O=AffirmTrust,C=US
# Not Valid Before: Fri Jan 29 14:08:24 2010
# Not Valid After : Tue Dec 31 14:08:24 2030
# Fingerprint (SHA-256):
0A:81:EC:5A:92:97:77:F1:45:90:4A:F3:8D:5D:50:9F:66:B5:E2:C5:8F:CD:B5:31:05:8B:0E:17:F3:F0:B4:1B
# Fingerprint (SHA1): 29:36:21:02:8B:20:ED:02:F5:66:C5:32:D1:D6:ED:90:9F:45:00:2F
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AffirmTrust Networking"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\051\066\041\002\213\040\355\002\365\146\305\062\321\326\355\220

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\237\105\000\057
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\102\145\312\276\001\232\232\114\251\214\101\111\315\300\325\177
END
CKA_ISSUER MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\037\060\035\006\003\125\004\003\014\026
\101\146\146\151\162\155\124\162\165\163\164\040\116\145\164\167
\157\162\153\151\156\147
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\010\174\117\004\071\034\324\231\055
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "AffirmTrust Premium"
#
# Issuer: CN=AffirmTrust Premium,O=AffirmTrust,C=US
# Serial Number:6d:8c:14:46:b1:a6:0a:ee
# Subject: CN=AffirmTrust Premium,O=AffirmTrust,C=US
# Not Valid Before: Fri Jan 29 14:10:36 2010
# Not Valid After : Mon Dec 31 14:10:36 2040
# Fingerprint (SHA-256):
70:A7:3F:7F:37:6B:60:07:42:48:90:45:34:B1:14:82:D5:BF:0E:69:8E:CC:49:8D:F5:25:77:EB:F2:E9:3B:9A
# Fingerprint (SHA1): D8:A6:33:2C:E0:03:6F:B1:85:F6:63:4F:7D:6A:06:65:26:32:28:27
CKA_CLASS
 CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AffirmTrust Premium"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\101\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\034\060\032\006\003\125\004\003\014\023
\101\146\146\151\162\155\124\162\165\163\164\040\120\162\145\155
\151\165\155
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
```

\060\101\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\034\060\032\006\003\125\004\003\014\023
\101\146\146\151\162\155\124\162\165\163\164\040\120\162\145\155
\151\165\155
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\155\214\024\106\261\246\012\356
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\106\060\202\003\056\240\003\002\001\002\002\010\155
\214\024\106\261\246\012\356\060\015\006\011\052\206\110\206\367
\015\001\001\014\005\000\060\101\061\013\060\011\006\003\125\004
\006\023\002\125\123\061\024\060\022\006\003\125\004\012\014\013
\101\146\146\151\162\155\124\162\165\163\164\061\034\060\032\006
\003\125\004\003\014\023\101\146\146\151\162\155\124\162\165\163
\164\040\120\162\145\155\151\165\155\060\036\027\015\061\060\060
\061\062\071\061\064\061\060\063\066\132\027\015\064\060\061\062
\063\061\061\064\061\060\063\066\132\060\101\061\013\060\011\006
\003\125\004\006\023\002\125\123\061\024\060\022\006\003\125\004
\012\014\013\101\146\146\151\162\155\124\162\165\163\164\061\034
\060\032\006\003\125\004\003\014\023\101\146\146\151\162\155\124
\162\165\163\164\040\120\162\145\155\151\165\155\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\304\022\337
\251\137\376\101\335\335\365\237\212\343\366\254\341\074\170\232
\274\330\360\177\172\240\063\052\334\215\040\133\256\055\157\347
\223\331\066\160\152\150\317\216\121\243\205\133\147\004\240\020
\044\157\135\050\202\301\227\127\330\110\051\023\266\341\276\221
\115\337\205\014\123\030\232\036\044\242\117\217\360\242\205\013
\313\364\051\177\322\244\130\356\046\115\311\252\250\173\232\331
\372\070\336\104\127\025\345\370\214\310\331\110\342\015\026\047
\035\036\310\203\205\045\267\272\252\125\101\314\003\042\113\055
\221\215\213\346\211\257\146\307\351\377\053\351\074\254\332\322
\263\303\341\150\234\211\370\172\000\126\336\364\125\225\154\373
\272\144\335\142\213\337\013\167\062\353\142\314\046\232\233\273
\252\142\203\114\264\006\172\060\310\051\277\355\006\115\227\271
\034\304\061\053\325\137\274\123\022\027\234\231\127\051\146\167
\141\041\061\007\056\045\111\235\030\362\356\363\053\161\214\265
\272\071\007\111\167\374\357\056\222\220\005\215\055\057\167\173
\357\103\277\065\273\232\330\371\163\247\054\362\320\127\356\050
\116\046\137\217\220\150\011\057\270\370\334\006\351\056\232\076
\121\247\321\042\304\012\247\070\110\154\263\371\377\175\253\206
\127\343\272\326\205\170\167\272\103\352\110\177\366\330\276\043
\155\036\277\321\066\154\130\134\361\356\244\031\124\032\365\003
\322\166\346\341\214\275\074\263\323\110\113\342\310\370\177\222
\250\166\106\234\102\145\076\244\036\301\007\003\132\106\055\270
\227\363\267\325\262\125\041\357\272\334\114\000\227\373\024\225

\047\063\277\350\103\107\106\322\010\231\026\140\073\232\176\322
\346\355\070\352\354\001\036\074\110\126\111\011\307\114\067\000
\236\210\016\300\163\341\157\146\351\162\107\060\076\020\345\013
\003\311\232\102\000\154\305\224\176\141\304\212\337\177\202\032
\013\131\304\131\062\167\263\274\140\151\126\071\375\264\006\173
\054\326\144\066\331\275\110\355\204\037\176\245\042\217\052\270
\102\364\202\267\324\123\220\170\116\055\032\375\201\157\104\327
\073\001\164\226\102\340\000\342\056\153\352\305\356\162\254\273
\277\376\352\252\250\370\334\366\262\171\212\266\147\002\003\001
\000\001\243\102\060\100\060\035\006\003\125\035\016\004\026\004
\024\235\300\147\246\014\042\331\046\365\105\253\246\145\122\021
\047\330\105\254\143\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\015\006\011\052\206\110\206\367\015
\001\001\014\005\000\003\202\002\001\000\263\127\115\020\142\116
\072\344\254\352\270\034\257\062\043\310\263\111\132\121\234\166
\050\215\171\252\127\106\027\325\365\122\366\267\104\350\010\104
\277\030\204\322\013\200\315\305\022\375\000\125\005\141\207\101
\334\265\044\236\074\304\330\310\373\160\236\057\170\226\203\040
\066\336\174\017\151\023\210\245\165\066\230\010\246\306\337\254
\316\343\130\326\267\076\336\272\363\353\064\100\330\242\201\365
\170\077\057\325\245\374\331\242\324\136\004\016\027\255\376\101
\360\345\262\162\372\104\202\063\102\350\055\130\367\126\214\142
\077\272\102\260\234\014\134\176\056\145\046\134\123\117\000\262
\170\176\241\015\231\055\215\270\035\216\242\304\260\375\140\320
\060\244\216\310\004\142\251\304\355\065\336\172\227\355\016\070
\136\222\057\223\160\245\251\234\157\247\175\023\035\176\306\010
\110\261\136\147\353\121\010\045\351\346\045\153\122\051\221\234
\322\071\163\010\127\336\231\006\264\133\235\020\006\341\302\000
\250\270\034\112\002\012\024\320\301\101\312\373\214\065\041\175
\202\070\362\251\124\221\031\065\223\224\155\152\072\305\262\320
\273\211\206\223\350\233\311\017\072\247\172\270\241\360\170\106
\372\374\067\057\345\212\204\363\337\376\004\331\241\150\240\057
\044\342\011\225\006\325\225\312\341\044\226\353\174\366\223\005
\273\355\163\351\055\321\165\071\327\347\044\333\330\116\137\103
\217\236\320\024\071\277\125\160\110\231\127\061\264\234\356\112
\230\003\226\060\037\140\006\356\033\043\376\201\140\043\032\107
\142\205\245\314\031\064\200\157\263\254\032\343\237\360\173\110
\255\325\001\331\147\266\251\162\223\352\055\146\265\262\270\344
\075\074\262\357\114\214\352\353\007\277\253\065\232\125\206\274
\030\246\265\250\136\264\203\154\153\151\100\323\237\334\361\303
\151\153\271\341\155\011\364\361\252\120\166\012\172\175\172\027
\241\125\226\102\231\061\011\335\140\021\215\005\060\176\346\216
\106\321\235\024\332\307\027\344\005\226\214\304\044\265\033\317
\024\007\262\100\370\243\236\101\206\274\004\320\153\226\310\052
\200\064\375\277\357\006\243\335\130\305\205\075\076\217\376\236
\051\340\266\270\011\150\031\034\030\103
END

```
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "AffirmTrust Premium"
# Issuer: CN=AffirmTrust Premium,O=AffirmTrust,C=US
# Serial Number:6d:8c:14:46:b1:a6:0a:ee
# Subject: CN=AffirmTrust Premium,O=AffirmTrust,C=US
# Not Valid Before: Fri Jan 29 14:10:36 2010
# Not Valid After : Mon Dec 31 14:10:36 2040
# Fingerprint (SHA-256):
70:A7:3F:7F:37:6B:60:07:42:48:90:45:34:B1:14:82:D5:BF:0E:69:8E:CC:49:8D:F5:25:77:EB:F2:E9:3B:9A
#
 Fingerprint (SHA1): D8:A6:33:2C:E0:03:6F:B1:85:F6:63:4F:7D:6A:06:65:26:32:28:27
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AffirmTrust Premium"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\330\246\063\054\340\003\157\261\205\366\143\117\175\152\006\145
\046\062\050\047
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\304\135\016\110\266\254\050\060\116\012\274\371\070\026\207\127
END
CKA_ISSUER MULTILINE_OCTAL
\060\101\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\034\060\032\006\003\125\004\003\014\023
\101\146\146\151\162\155\124\162\165\163\164\040\120\162\145\155
\151\165\155
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\155\214\024\106\261\246\012\356
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "AffirmTrust Premium ECC"
#
# Issuer: CN=AffirmTrust Premium ECC,O=AffirmTrust,C=US
# Serial Number:74:97:25:8a:c7:3f:7a:54
```

```
# Subject: CN=AffirmTrust Premium ECC,O=AffirmTrust,C=US
# Not Valid Before: Fri Jan 29 14:20:24 2010
# Not Valid After : Mon Dec 31 14:20:24 2040
# Fingerprint (SHA-256):
BD:71:FD:F6:DA:97:E4:CF:62:D1:64:7A:DD:25:81:B0:7D:79:AD:F8:39:7E:B4:EC:BA:9C:5E:84:88:82:14:23
# Fingerprint (SHA1): B8:23:6B:00:2F:1D:16:86:53:01:55:6C:11:A4:37:CA:EB:FF:C3:BB
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AffirmTrust Premium ECC"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\040\060\036\006\003\125\004\003\014\027
\101\146\146\151\162\155\124\162\165\163\164\040\120\162\145\155
\151\165\155\040\105\103\103
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
\124\162\165\163\164\061\040\060\036\006\003\125\004\003\014\027
\101\146\146\151\162\155\124\162\165\163\164\040\120\162\145\155
\151\165\155\040\105\103\103
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\164\227\045\212\307\077\172\124
END
CKA_VALUE MULTILINE_OCTAL
\060\202\001\376\060\202\001\205\240\003\002\001\002\002\010\164
\227\045\212\307\077\172\124\060\012\006\010\052\206\110\316\075
\004\003\003\060\105\061\013\060\011\006\003\125\004\006\023\002
\125\123\061\024\060\022\006\003\125\004\012\014\013\101\146\146
\151\162\155\124\162\165\163\164\061\040\060\036\006\003\125\004
\003\014\027\101\146\146\151\162\155\124\162\165\163\164\040\120
\162\145\155\151\165\155\040\105\103\103\060\036\027\015\061\060
\060\061\062\071\061\064\062\060\062\064\132\027\015\064\060\061
\062\063\061\061\064\062\060\062\064\132\060\105\061\013\060\011
\006\003\125\004\006\023\002\125\123\061\024\060\022\006\003\125
\004\012\014\013\101\146\146\151\162\155\124\162\165\163\164\061
\040\060\036\006\003\125\004\003\014\027\101\146\146\151\162\155
\124\162\165\163\164\040\120\162\145\155\151\165\155\040\105\103
\103\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005
\053\201\004\000\042\003\142\000\004\015\060\136\033\025\235\003
\320\241\171\065\267\072\074\222\172\312\025\034\315\142\363\234
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\046\134\007\075\345\124\372\243\326\314\022\352\364\024\137\350
\216\031\253\057\056\110\346\254\030\103\170\254\320\067\303\275
\262\315\054\346\107\342\032\346\143\270\075\056\057\170\304\117
\333\364\017\244\150\114\125\162\153\225\035\116\030\102\225\170
\314\067\074\221\342\233\145\053\051\243\102\060\100\060\035\006
\003\125\035\016\004\026\004\024\232\257\051\172\300\021\065\065
\046\121\060\000\303\152\376\100\325\256\326\074\060\017\006\003
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\012\006
\010\052\206\110\316\075\004\003\003\003\147\000\060\144\002\060
\027\011\363\207\210\120\132\257\310\300\102\277\107\137\365\154
\152\206\340\304\047\164\344\070\123\327\005\177\033\064\343\306
\057\263\312\011\074\067\235\327\347\270\106\361\375\241\342\161
\002\060\102\131\207\103\324\121\337\272\323\011\062\132\316\210
\176\127\075\234\137\102\153\365\007\055\265\360\202\223\371\131
\157\256\144\372\130\345\213\036\343\143\276\265\201\315\157\002
\214\171
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "AffirmTrust Premium ECC"
# Issuer: CN=AffirmTrust Premium ECC,O=AffirmTrust,C=US
# Serial Number:74:97:25:8a:c7:3f:7a:54
# Subject: CN=AffirmTrust Premium ECC,O=AffirmTrust,C=US
# Not Valid
 Before: Fri Jan 29 14:20:24 2010
# Not Valid After : Mon Dec 31 14:20:24 2040
# Fingerprint (SHA-256):
BD:71:FD:F6:DA:97:E4:CF:62:D1:64:7A:DD:25:81:B0:7D:79:AD:F8:39:7E:B4:EC:BA:9C:5E:84:88:82:14:23
# Fingerprint (SHA1): B8:23:6B:00:2F:1D:16:86:53:01:55:6C:11:A4:37:CA:EB:FF:C3:BB
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AffirmTrust Premium ECC"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\270\043\153\000\057\035\026\206\123\001\125\154\021\244\067\312
\353\377\303\273
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\144\260\011\125\317\261\325\231\342\276\023\253\246\135\352\115
END
CKA_ISSUER MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\024\060\022\006\003\125\004\012\014\013\101\146\146\151\162\155
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\124\162\165\163\164\061\040\060\036\006\003\125\004\003\014\027
\101\146\146\151\162\155\124\162\165\163\164\040\120\162\145\155
\151\165\155\040\105\103\103
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\010\164\227\045\212\307\077\172\124
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Certum Trusted Network CA"
#
# Issuer: CN=Certum Trusted Network CA,OU=Certum Certification Authority,O=Unizeto Technologies
S.A.,C=PL
# Serial Number: 279744 (0x444c0)
# Subject: CN=Certum Trusted Network CA,OU=Certum Certification Authority,O=Unizeto Technologies
S.A.,C=PL
# Not Valid Before: Wed Oct 22 12:07:37 2008
# Not Valid After : Mon Dec 31 12:07:37 2029
# Fingerprint (SHA-256):
5C:58:46:8D:55:F5:8E:49:7E:74:39:82:D2:B5:00:10:B6:D1:65:37:4A:CF:83:A7:D4:A3:2D:B7:68:C4:40:8E
# Fingerprint (SHA1): 07:E0:32:E0:20:B7:2C:3F:19:2F:06:28:A2:59:3A:19:A7:0F:06:9E
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
 CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certum Trusted Network CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\176\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\042\060\040\006\003\125\004\012\023\031\125\156\151\172\145\164
\157\040\124\145\143\150\156\157\154\157\147\151\145\163\040\123
\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145
\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\061\042\060\040
\006\003\125\004\003\023\031\103\145\162\164\165\155\040\124\162
\165\163\164\145\144\040\116\145\164\167\157\162\153\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\176\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\042\060\040\006\003\125\004\012\023\031\125\156\151\172\145\164
\157\040\124\145\143\150\156\157\154\157\147\151\145\163\040\123
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\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145
\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\061\042\060\040
\006\003\125\004\003\023\031\103\145\162\164\165\155\040\124\162
\165\163\164\145\144\040\116\145\164\167\157\162\153\040\103\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\003\004\104\300
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\273\060\202\002\243\240\003\002\001\002\002\003\004
\104\300\060\015\006\011\052\206\110\206\367\015\001\001\005\005
\000\060\176\061\013\060\011\006\003\125\004\006\023\002\120\114
\061\042\060\040\006\003\125\004\012\023\031\125\156\151\172\145
\164\157\040\124\145\143\150\156\157\154\157\147\151\145\163\040
\123\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103
\145\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\061\042\060
\040\006\003\125\004\003\023\031\103\145\162\164\165\155\040\124
\162\165\163\164\145\144\040\116\145\164\167\157\162\153\040\103
\101\060\036\027\015\060\070\061\060\062\062\061\062\060\067\063
\067\132\027\015\062\071\061\062\063\061\061\062\060\067\063\067
\132\060\176\061\013\060\011\006\003\125\004\006\023\002\120\114
\061\042\060\040\006\003\125\004\012\023\031\125\156\151\172\145
\164\157\040\124\145\143\150\156\157\154\157\147\151\145\163\040
\123\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103
\145\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\061\042\060
\040\006\003\125\004\003\023\031\103\145\162\164\165\155\040\124
\162\165\163\164\145\144\040\116\145\164\167\157\162\153\040\103
\101\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001
\001\000\343\373\175\243\162\272\302\360\311\024\207\365\153\001
\116\341\156\100\007\272\155\047\135\177\367\133\055\263\132\307
\121\137\253\244\062\246\141\207\266\156\017\206\322\060\002\227
\370\327\151\127\241\030\071\135\152\144\171\306\001\131\254\074
\061\112\070\174\322\004\322\113\050\350\040\137\073\007\242\314
\115\163\333\363\256\117\307\126\325\132\247\226\211\372\363\253
\150\324\043\206\131\047\317\011\047\274\254\156\162\203\034\060
\162\337\340\242\351\322\341\164\165\031\275\052\236\173\025\124
\004\033\327\103\071\255\125\050\305\342\032\273\364\300\344\256
\070\111\063\314\166\205\237\071\105\322\244\236\362\022\214\121
\370\174\344\055\177\365\254\137\353\026\237\261\055\321\272\314
\221\102\167\114\045\311\220\070\157\333\360\314\373\216\036\227
\131\076\325\140\116\346\005\050\355\111\171\023\113\272\110\333
\057\371\162\323\071\312\376\037\330\064\162\365\264\100\317\061
\001\303\354\336\021\055\027\135\037\270\120\321\136\031\247\151

\336\007\063\050\312\120\225\371\247\124\313\124\206\120\105\251
\371\111\002\003\001\000\001\243\102\060\100\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003
\125\035\016\004\026\004\024\010\166\315\313\007\377\044\366\305
\315\355\273\220\274\342\204\067\106\165\367\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\006\060\015\006\011\052
\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000\246
\250\255\042\316\001\075\246\243\377\142\320\110\235\213\136\162
\260\170\104\343\334\034\257\011\375\043\110\372\275\052\304\271
\125\004\265\020\243\215\047\336\013\202\143\320\356\336\014\067
\171\101\133\042\262\260\232\101\134\246\160\340\324\320\167\313
\043\323\000\340\154\126\057\341\151\015\015\331\252\277\041\201
\120\331\006\245\250\377\225\067\320\252\376\342\263\365\231\055
\105\204\212\345\102\011\327\164\002\057\367\211\330\231\351\274
\047\324\107\215\272\015\106\034\167\317\024\244\034\271\244\061
\304\234\050\164\003\064\377\063\031\046\245\351\015\164\267\076
\227\306\166\350\047\226\243\146\335\341\256\362\101\133\312\230
\126\203\163\160\344\206\032\322\061\101\272\057\276\055\023\132
\166\157\116\350\116\201\016\077\133\003\042\240\022\276\146\130
\021\112\313\003\304\264\052\052\055\226\027\340\071\124\274\110
\323\166\047\235\232\055\006\246\311\354\071\322\253\333\237\232
\013\047\002\065\051\261\100\225\347\371\350\234\125\210\031\106
\326\267\064\365\176\316\071\232\331\070\361\121\367\117\054
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Certum Trusted Network CA"
# Issuer: CN=Certum Trusted Network CA,OU=Certum Certification Authority,O=Unizeto Technologies S.A.,C=PL
# Serial Number: 279744 (0x444c0)
# Subject: CN=Certum Trusted Network CA,OU=Certum Certification Authority,O=Unizeto Technologies S.A.,C=PL
# Not Valid Before: Wed Oct 22 12:07:37 2008
# Not Valid After : Mon Dec 31 12:07:37 2029
# Fingerprint (SHA-256): 5C:58:46:8D:55:F5:8E:49:7E:74:39:82:D2:B5:00:10:B6:D1:65:37:4A:CF:83:A7:D4:A3:2D:B7:68:C4:40:8E
# Fingerprint (SHA1): 07:E0:32:E0:20:B7:2C:3F:19:2F:06:28:A2:59:3A:19:A7:0F:06:9E
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
 CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certum Trusted Network CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\007\340\062\340\040\267\054\077\031\057\006\050\242\131\072\031

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\247\017\006\236
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\325\351\201\100\305\030\151\374\106\054\211\165\142\017\252\170
END
CKA_ISSUER MULTILINE_OCTAL
\060\176\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\042\060\040\006\003\125\004\012\023\031\125\156\151\172\145\164
\157\040\124\145\143\150\156\157\154\157\147\151\145\163\040\123
\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145
\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\061\042\060\040
\006\003\125\004\003\023\031\103\145\162\164\165\155\040\124\162
\165\163\164\145\144\040\116\145\164\167\157\162\153\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\004\104\300
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "TWCA Root Certification Authority"
#
# Issuer: CN=TWCA Root Certification Authority,OU=Root CA,O=TAIWAN-CA,C=TW
# Serial Number: 1 (0x1)
# Subject: CN=TWCA Root Certification Authority,OU=Root CA,O=TAIWAN-CA,C=TW
# Not Valid Before: Thu Aug 28 07:24:33 2008
# Not Valid After : Tue Dec 31 15:59:59 2030
# Fingerprint (SHA-256):
BF:D8:8F:E1:10:1C:41:AE:3E:80:1B:F8:BE:56:35:0E:E9:BA:D1:A6:B9:BD:51:5E:DC:5C:6D:5B:87:11:AC:44
# Fingerprint (SHA1): CF:9E:87:6D:D3:EB:FC:42:26:97:A3:B5:A3:7A:A0:76:A9:06:23:48
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TWCA Root Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\022\060\020\006\003\125\004\012\014\011\124\101\111\127\101\116
\055\103\101\061\020\060\016\006\003\125\004\013\014\007\122\157
\157\164\040\103\101\061\052\060\050\006\003\125\004\003\014\041
\124\127\103\101\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
```

\171
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\022\060\020\006\003\125\004\012\014\011\124\101\111\127\101\116
\055\103\101\061\020\060\016\006\003\125\004\013\014\007\122\157
\157\164\040\103\101\061\052\060\050\006\003\125\004\003\014\041
\124\127\103\101\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\173\060\202\002\143\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\137\061\013\060\011\006\003\125\004\006\023\002\124\127\061\022
\060\020\006\003\125\004\012\014\011\124\101\111\127\101\116\055
\103\101\061\020\060\016\006\003\125\004\013\014\007\122\157\157
\164\040\103\101\061\052\060\050\006\003\125\004\003\014\041\124
\127\103\101\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\060\036\027\015\060\070\060\070\062\070\060\067\062\064\063\063
\132\027\015\063\060\061\062\063\061\061\065\065\071\065\071\132
\060\137\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\022\060\020\006\003\125\004\012\014\011\124\101\111\127\101\116
\055\103\101\061\020\060\016\006\003\125\004\013\014\007\122\157
\157\164\040\103\101\061\052\060\050\006\003\125\004\003\014\041
\124\127\103\101\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001
\001\000\260\176\162\270\244\003\224\346\247\336\011\070\221\112
\021\100\207\247\174\131\144\024\173\265\021\020\335\376\277\325
\300\273\126\342\205\045\364\065\162\017\370\123\320\101\341\104
\001\302\264\034\303\061\102\026\107\205\063\042\166\262\012\157
\017\345\045\120\117\205\206\276\277\230\056\020\147\036\276\021
\005\206\005\220\304\131\320\174\170\020\260\200\134\267\341\307
\053\165\313\174\237\256\265\321\235\043\067\143\247\334\102\242
\055\222\004\033\120\301\173\270\076\033\311\126\004\213\057\122
\233\255\251\126\351\301\377\255\251\130\207\060\266\201\367\227
\105\374\031\127\073\053\157\344\107\364\231\105\376\035\361\370
\227\243\210\035\067\034\134\217\340\166\045\232\120\370\240\124
\377\104\220\166\043\322\062\306\303\253\006\277\374\373\277\363
\255\175\222\142\002\133\051\323\065\243\223\232\103\144\140\135

\262\372\062\377\073\004\257\115\100\152\371\307\343\357\043\375
\153\313\345\017\213\070\015\356\012\374\376\017\230\237\060\061
\335\154\122\145\371\213\201\276\042\341\034\130\003\272\221\033
\211\007\002\003\001\000\001\243\102\060\100\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\006\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003
\125\035\016\004\026\004\024\152\070\133\046\215\336\213\132\362
\117\172\124\203\031\030\343\010\065\246\272\060\015\006\011\052
\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000\074
\325\167\075\332\337\211\272\207\014\010\124\152\040\120\222\276
\260\101\075\271\046\144\203\012\057\350\100\300\227\050\047\202
\060\112\311\223\377\152\347\246\000\177\211\102\232\326\021\345
\123\316\057\314\362\332\005\304\376\342\120\304\072\206\175\314
\332\176\020\011\073\222\065\052\123\262\376\353\053\005\331\154
\135\346\320\357\323\152\146\236\025\050\205\172\350\202\000\254
\036\247\011\151\126\102\323\150\121\030\276\124\232\277\104\101
\272\111\276\040\272\151\134\356\270\167\315\316\154\037\255\203
\226\030\175\016\265\024\071\204\361\050\351\055\243\236\173\036
\172\162\132\203\263\171\157\357\264\374\320\012\245\130\117\106
\337\373\155\171\131\362\204\042\122\256\017\314\373\174\073\347
\152\312\107\141\303\172\370\323\222\004\037\270\040\204\341\066
\124\026\307\100\336\073\212\163\334\337\306\011\114\337\354\332
\377\324\123\102\241\311\362\142\035\042\203\074\227\305\371\031
\142\047\254\145\042\327\323\074\306\345\216\262\123\314\111\316
\274\060\376\173\016\063\220\373\355\322\024\221\037\007\257
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "TWCA Root Certification Authority"
# Issuer: CN=TWCA Root Certification Authority,OU=Root CA,O=TAIWAN-CA,C=TW
# Serial Number: 1 (0x1)
# Subject: CN=TWCA Root Certification Authority,OU=Root CA,O=TAIWAN-CA,C=TW
# Not Valid Before: Thu Aug 28 07:24:33 2008
# Not Valid After : Tue Dec 31 15:59:59 2030
# Fingerprint (SHA-256):
BF:D8:8F:E1:10:1C:41:AE:3E:80:1B:F8:BE:56:35:0E:E9:BA:D1:A6:B9:BD:51:5E:DC:5C:6D:5B:87:11:AC:44
#
Fingerprint (SHA1): CF:9E:87:6D:D3:EB:FC:42:26:97:A3:B5:A3:7A:A0:76:A9:06:23:48
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TWCA Root Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\317\236\207\155\323\353\374\102\046\227\243\265\243\172\240\166

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\251\006\043\110
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\252\010\217\366\371\173\267\362\261\247\036\233\352\352\275\171
END
CKA_ISSUER MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\022\060\020\006\003\125\004\012\014\011\124\101\111\127\101\116
\055\103\101\061\020\060\016\006\003\125\004\013\014\007\122\157
\157\164\040\103\101\061\052\060\050\006\003\125\004\003\014\041
\124\127\103\101\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Explicitly Distrust DigiNotar Root CA"
#
# Issuer: E=info@diginotar.nl,CN=DigiNotar Root CA,O=DigiNotar,C=NL
# Serial Number:0f:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff
# Subject: E=info@diginotar.nl,CN=DigiNotar Root CA,O=DigiNotar,C=NL
# Not Valid Before: Fri Jul 27 17:19:37 2007
# Not Valid After : Mon Mar 31 18:19:22 2025
# Fingerprint (MD5): 0A:A4:D5:CC:BA:B4:FB:A3:59:E3:E6:01:DD:53:D9:4E
# Fingerprint (SHA1): C1:77:CB:4B:E0:B4:26:8E:F5:C7:CF:45:99:22:B9:B0:CE:BA:21:2F
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Explicitly Distrust DigiNotar Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT
 MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\022\060\020\006\003\125\004\012\023\011\104\151\147\151\116\157
\164\141\162\061\032\060\030\006\003\125\004\003\023\021\104\151
\147\151\116\157\164\141\162\040\122\157\157\164\040\103\101\061
\040\060\036\006\011\052\206\110\206\367\015\001\011\001\026\021
\151\156\146\157\100\144\151\147\151\156\157\164\141\162\056\156
\154
```

END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\022\060\020\006\003\125\004\012\023\011\104\151\147\151\116\157
\164\141\162\061\032\060\030\006\003\125\004\003\023\021\104\151
\147\151\116\157\164\141\162\040\122\157\157\164\040\103\101\061
\040\060\036\006\011\052\206\110\206\367\015\001\011\001\026\021
\151\156\146\157\100\144\151\147\151\156\157\164\141\162\056\156
\154
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\017\377\377\377\377\377\377\377\377\377\377\377\377\377
\377\377
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\212\060\202\003\162\240\003\002\001\002\002\020\017
\377\377\377\377\377\377\377\377\377\377\377\377\377\377\377\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\137
\061\013\060\011\006\003\125\004\006\023\002\116\114\061\022\060
\020\006\003\125\004\012\023\011\104\151\147\151\116\157\164\141
\162\061\032\060\030\006\003\125\004\003\023\021\104\151\147\151
\116\157\164\141\162\040\122\157\157\164\040\103\101\061\040\060
\036\006\011\052\206\110\206\367\015\001\011\001\026\021\151\156
\146\157\100\144\151\147\151\156\157\164\141\162\056\156\154\060
\036\027\015\060\067\060\067\062\067\061\067\061\071\063\067\132
\027\015\062\065\060\063\063\061\061\070\061\071\062\062\132\060
\137\061\013\060\011\006\003\125\004\006\023\002\116\114\061\022
\060\020\006\003\125\004\012\023\011\104\151\147\151\116\157\164
\141\162\061\032\060\030\006\003\125\004\003\023\021\104\151\147
\151\116\157\164\141\162\040\122\157\157\164\040\103\101\061\040
\060\036\006\011\052\206\110\206\367\015\001\011\001\026\021\151
\156\146\157\100\144\151\147\151\156\157\164\141\162\056\156\154
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001
\000\254\260\130\301\000\275\330\041\010\013\053\232\376\156\126
\060\005\237\033\167\220\020\101\134\303\015\207\021\167\216\201
\361\312\174\351\214\152\355\070\164\065\273\332\337\371\273\300
\011\067\264\226\163\201\175\063\032\230\071\367\223\157\225\177
\075\271\261\165\207\272\121\110\350\213\160\076\225\004\305\330
\266\303\026\331\210\260\261\207\035\160\332\206\264\017\024\213
\172\317\020\321\164\066\242\022\173\167\206\112\171\346\173\337
\002\021\150\245\116\206\256\064\130\233\044\023\170\126\042\045
\036\001\213\113\121\161\373\202\314\131\226\151\210\132\150\123
\305\271\015\002\067\313\113\274\146\112\220\176\052\013\005\007
\355\026\137\125\220\165\330\106\311\033\203\342\010\276\361\043
\314\231\035\326\052\017\203\040\025\130\047\202\056\372\342\042
\302\111\261\271\001\201\152\235\155\235\100\167\150\166\116\041

\052\155\204\100\205\116\166\231\174\202\363\363\267\002\131\324
\046\001\033\216\337\255\123\006\321\256\030\335\342\262\072\313
\327\210\070\216\254\133\051\271\031\323\230\371\030\003\317\110
\202\206\146\013\033\151\017\311\353\070\210\172\046\032\005\114
\222\327\044\324\226\362\254\122\055\243\107\325\122\366\077\376
\316\204\006\160\246\252\076\242\362\266\126\064\030\127\242\344
\201\155\347\312\360\152\323\307\221\153\002\203\101\174\025\357
\153\232\144\136\343\320\074\345\261\353\173\135\206\373\313\346
\167\111\315\243\145\334\367\271\234\270\344\013\137\223\317\314
\060\032\062\034\316\034\143\225\245\371\352\341\164\213\236\351
\053\251\060\173\240\030\037\016\030\013\345\133\251\323\321\154
\036\007\147\217\221\113\251\212\274\322\146\252\223\001\210\262
\221\372\061\134\325\246\301\122\010\011\315\012\143\242\323\042
\246\350\241\331\071\006\227\365\156\215\002\220\214\024\173\077
\200\315\033\234\272\304\130\162\043\257\266\126\237\306\172\102
\063\051\007\077\202\311\346\037\005\015\315\114\050\066\213\323
\310\076\034\306\210\357\136\356\211\144\351\035\353\332\211\176
\062\246\151\321\335\314\210\237\321\320\311\146\041\334\006\147
\305\224\172\232\155\142\114\175\314\340\144\200\262\236\107\216
\243\002\003\001\000\001\243\102\060\100\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003\125
\035\016\004\026\004\024\210\150\277\340\216\065\304\073\070\153
\142\367\050\073\204\201\310\014\327\115\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\003\202\002\001\000\073\002
\215\313\074\060\350\156\240\255\362\163\263\137\236\045\023\004
\005\323\366\343\213\273\013\171\316\123\336\344\226\305\321\257
\163\274\325\303\320\100\125\174\100\177\315\033\137\011\325\362
\174\237\150\035\273\135\316\172\071\302\214\326\230\173\305\203
\125\250\325\175\100\312\340\036\367\211\136\143\135\241\023\302
\135\212\266\212\174\000\363\043\303\355\205\137\161\166\360\150
\143\252\105\041\071\110\141\170\066\334\361\103\223\324\045\307
\362\200\145\341\123\002\165\121\374\172\072\357\067\253\204\050
\127\014\330\324\324\231\126\154\343\242\376\131\204\264\061\350
\063\370\144\224\224\121\227\253\071\305\113\355\332\335\200\013
\157\174\051\015\304\216\212\162\015\347\123\024\262\140\101\075
\204\221\061\150\075\047\104\333\345\336\364\372\143\105\310\114
\076\230\365\077\101\272\116\313\067\015\272\146\230\361\335\313
\237\134\367\124\066\202\153\054\274\023\141\227\102\370\170\273
\314\310\242\237\312\360\150\275\153\035\262\337\215\157\007\235
\332\216\147\307\107\036\312\271\277\052\102\221\267\143\123\146
\361\102\243\341\364\132\115\130\153\265\344\244\063\255\134\160
\035\334\340\362\353\163\024\221\232\003\301\352\000\145\274\007
\374\317\022\021\042\054\256\240\275\072\340\242\052\330\131\351
\051\323\030\065\244\254\021\137\031\265\265\033\377\042\112\134
\306\172\344\027\357\040\251\247\364\077\255\212\247\232\004\045
\235\016\312\067\346\120\375\214\102\051\004\232\354\271\317\113
\162\275\342\010\066\257\043\057\142\345\312\001\323\160\333\174

\202\043\054\026\061\014\306\066\007\220\172\261\037\147\130\304
\073\130\131\211\260\214\214\120\263\330\206\313\150\243\304\012
\347\151\113\040\316\301\036\126\113\225\251\043\150\330\060\330
\303\353\260\125\121\315\345\375\053\270\365\273\021\237\123\124
\366\064\031\214\171\011\066\312\141\027\045\027\013\202\230\163
\014\167\164\303\325\015\307\250\022\114\307\247\124\161\107\056
\054\032\175\311\343\053\073\110\336\047\204\247\143\066\263\175
\217\240\144\071\044\015\075\173\207\257\146\134\164\033\113\163
\262\345\214\360\206\231\270\345\305\337\204\301\267\353
END

#
Trust for Certificate "Explicitly Distrust DigiNotar Root CA"
# Issuer: E=info@diginotar.nl,CN=DigiNotar Root CA,O=DigiNotar,C=NL
# Serial Number:0f:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff:ff
# Subject:
E=info@diginotar.nl,CN=DigiNotar Root CA,O=DigiNotar,C=NL
# Not Valid Before: Fri Jul 27 17:19:37 2007
# Not Valid After : Mon Mar 31 18:19:22 2025
# Fingerprint (MD5): 0A:A4:D5:CC:BA:B4:FB:A3:59:E3:E6:01:DD:53:D9:4E
# Fingerprint (SHA1): C1:77:CB:4B:E0:B4:26:8E:F5:C7:CF:45:99:22:B9:B0:CE:BA:21:2F
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Explicitly Distrust DigiNotar Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\301\167\313\113\340\264\046\216\365\307\317\105\231\042\271\260
\316\272\041\057
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\012\244\325\314\272\264\373\243\131\343\346\001\335\123\331\116
END
CKA_ISSUER MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\022\060\020\006\003\125\004\012\023\011\104\151\147\151\116\157
\164\141\162\061\032\060\030\006\003\125\004\003\023\021\104\151
\147\151\116\157\164\141\162\040\122\157\157\164\040\103\101\061
\040\060\036\006\011\052\206\110\206\367\015\001\011\001\026\021
\151\156\146\157\100\144\151\147\151\156\157\164\141\162\056\156
\154
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\017\377\377\377\377\377\377\377\377\377\377\377\377\377
\377\377
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_NOT_TRUSTED

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CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_NOT_TRUSTED
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_NOT_TRUSTED
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Security Communication RootCA2"
#
# Issuer: OU=Security Communication RootCA2,O="SECOM Trust Systems CO.,LTD.",C=JP
# Serial Number: 0 (0x0)
# Subject: OU=Security Communication RootCA2,O="SECOM Trust Systems CO.,LTD.",C=JP
# Not Valid Before: Fri May 29 05:00:39 2009
# Not Valid After : Tue May 29 05:00:39 2029
# Fingerprint (SHA-256):
51:3B:2C:EC:B8:10:D4:CD:E5:DD:85:39:1A:DF:C6:C2:DD:60:D8:7B:B7:36:D2:B5:21:48:4A:A4:7A:0E:BE:F6
# Fingerprint (SHA1): 5F:3B:8C:F2:F8:10:B3:7D:78:B4:CE:EC:19:19:C3:73:34:B9:C7:74
CKA_CLASS CK_OBJECT_CLASS
 CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Security Communication RootCA2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\047\060\045\006\003\125\004\013\023
\036\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\122\157\157\164\103\101\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\047\060\045\006\003\125\004\013\023
\036\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\122\157\157\164\103\101\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\000
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\167\060\202\002\137\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\135\061\013\060\011\006\003\125\004\006\023\002\112\120\061\045
\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040\124
```

\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117\056
\054\114\124\104\056\061\047\060\045\006\003\125\004\013\023\036
\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156\151
\143\141\164\151\157\156\040\122\157\157\164\103\101\062\060\036
\027\015\060\071\060\065\062\071\060\065\060\060\063\071\132\027
\015\062\071\060\065\062\071\060\065\060\060\063\071\132\060\135
\061\013\060\011\006\003\125\004\006\023\002\112\120\061\045\060
\043\006\003\125\004\012\023\034\123\105\103\117\115\040\124\162
\165\163\164\040\123\171\163\164\145\155\163\040\103\117\056\054
\114\124\104\056\061\047\060\045\006\003\125\004\013\023\036\123
\145\143\165\162\151\164\171\040\103\157\155\155\165\156\151\143
\141\164\151\157\156\040\122\157\157\164\103\101\062\060\202\001
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000
\003\202\001\017\000\060\202\001\012\002\202\001\001\000\320\025
\071\122\261\122\263\272\305\131\202\304\135\122\256\072\103\145
\200\113\307\362\226\274\333\066\227\326\246\144\214\250\136\360
\343\012\034\367\337\227\075\113\256\366\135\354\041\265\101\253
\315\271\176\166\237\276\371\076\066\064\240\073\301\366\061\021
\105\164\223\075\127\200\305\371\211\231\312\345\253\152\324\265
\332\101\220\020\301\326\326\102\211\302\277\364\070\022\225\114
\124\005\367\066\344\105\203\173\024\145\326\334\014\115\321\336
\176\014\253\073\304\025\276\072\126\246\132\157\166\151\122\251
\172\271\310\353\152\232\135\122\320\055\012\153\065\026\011\020
\204\320\152\312\072\006\000\067\107\344\176\127\117\077\213\353
\147\270\210\252\305\276\123\125\262\221\304\175\271\260\205\031
\006\170\056\333\141\032\372\205\365\112\221\241\347\026\325\216
\242\071\337\224\270\160\037\050\077\213\374\100\136\143\203\074
\203\052\032\231\153\317\336\131\152\073\374\157\026\327\037\375
\112\020\353\116\202\026\072\254\047\014\123\361\255\325\044\260
\153\003\120\301\055\074\026\335\104\064\047\032\165\373\002\003
\001\000\001\243\102\060\100\060\035\006\003\125\035\016\004\026
\004\024\012\205\251\167\145\005\230\174\100\201\370\017\227\054
\070\361\012\354\074\317\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\003\202\001\001\000\114\072\243\104\254
\271\105\261\307\223\176\310\013\012\102\337\144\352\034\356\131
\154\010\272\211\137\152\312\112\225\236\172\217\007\305\332\105
\162\202\161\016\072\322\314\157\247\264\241\043\273\366\044\237
\313\027\376\214\246\316\302\322\333\314\215\374\161\374\003\051
\301\154\135\063\137\144\266\145\073\211\157\030\166\170\365\334
\242\110\037\031\077\216\223\353\361\372\027\356\315\116\343\004
\022\125\326\345\344\335\373\076\005\174\342\035\136\306\247\274
\227\117\150\072\365\351\056\012\103\266\257\127\134\142\150\174
\267\375\243\212\204\240\254\142\276\053\011\207\064\360\152\001
\273\233\051\126\074\376\000\067\317\043\154\361\116\252\266\164
\106\022\154\221\356\064\325\354\232\221\347\104\276\220\061\162
\325\111\002\366\002\345\364\037\353\174\331\226\125\251\377\354

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\212\371\231\107\377\065\132\002\252\004\313\212\133\207\161\051
\221\275\244\264\172\015\275\232\365\127\043\000\007\041\027\077
\112\071\321\005\111\013\247\266\067\201\245\135\214\252\063\136
\201\050\174\247\175\047\353\000\256\215\067
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Security Communication RootCA2"
# Issuer: OU=Security Communication RootCA2,O="SECOM
 Trust Systems CO.,LTD.",C=JP
# Serial Number: 0 (0x0)
# Subject: OU=Security Communication RootCA2,O="SECOM Trust Systems CO.,LTD.",C=JP
# Not Valid Before: Fri May 29 05:00:39 2009
# Not Valid After : Tue May 29 05:00:39 2029
# Fingerprint (SHA-256):
51:3B:2C:EC:B8:10:D4:CD:E5:DD:85:39:1A:DF:C6:C2:DD:60:D8:7B:B7:36:D2:B5:21:48:4A:A4:7A:0E:BE:F6
# Fingerprint (SHA1): 5F:3B:8C:F2:F8:10:B3:7D:78:B4:CE:EC:19:19:C3:73:34:B9:C7:74
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Security Communication RootCA2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\137\073\214\362\370\020\263\175\170\264\316\354\031\031\303\163
\064\271\307\164
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\154\071\175\244\016\125\131\262\077\326\101\261\022\120\336\103
END
CKA_ISSUER MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\047\060\045\006\003\125\004\013\023
\036\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\122\157\157\164\103\101\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

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#
# Certificate "Actalis Authentication Root CA"
#
# Issuer: CN=Actalis Authentication Root CA,O=Actalis S.p.A./03358520967,L=Milan,C=IT
# Serial Number:57:0a:11:97:42:c4:e3:cc
# Subject: CN=Actalis Authentication Root CA,O=Actalis S.p.A./03358520967,L=Milan,C=IT
# Not Valid Before: Thu Sep 22 11:22:02 2011
# Not Valid After : Sun Sep 22 11:22:02 2030
# Fingerprint (SHA-256):
55:92:60:84:EC:96:3A:64:B9:6E:2A:BE:01:CE:0B:A8:6A:64:FB:FE:BC:C7:AA:B5:AF:C1:55:B3:7F:D7:60:66
#
 Fingerprint (SHA1): F3:73:B3:87:06:5A:28:84:8A:F2:F3:4A:CE:19:2B:DD:C7:8E:9C:AC
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Actalis Authentication Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\153\061\013\060\011\006\003\125\004\006\023\002\111\124\061
\016\060\014\006\003\125\004\007\014\005\115\151\154\141\156\061
\043\060\041\006\003\125\004\012\014\032\101\143\164\141\154\151
\163\040\123\056\160\056\101\056\057\060\063\063\065\070\065\062
\060\071\066\067\061\047\060\045\006\003\125\004\003\014\036\101
\143\164\141\154\151\163\040\101\165\164\150\145\156\164\151\143
\141\164\151\157\156\040\122\157\157\164\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\153\061\013\060\011\006\003\125\004\006\023\002\111\124\061
\016\060\014\006\003\125\004\007\014\005\115\151\154\141\156\061
\043\060\041\006\003\125\004\012\014\032\101\143\164\141\154\151
\163\040\123\056\160\056\101\056\057\060\063\063\065\070\065\062
\060\071\066\067\061\047\060\045\006\003\125\004\003\014\036\101
\143\164\141\154\151\163\040\101\165\164\150\145\156\164\151\143
\141\164\151\157\156\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\010\127\012\021\227\102\304\343\314
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\273\060\202\003\243\240\003\002\001\002\002\010\127
\012\021\227\102\304\343\314\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\153\061\013\060\011\006\003\125\004
\006\023\002\111\124\061\016\060\014\006\003\125\004\007\014\005
\115\151\154\141\156\061\043\060\041\006\003\125\004\012\014\032
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\101\143\164\141\154\151\163\040\123\056\160\056\101\056\057\060
\063\063\065\070\065\062\060\071\066\067\061\047\060\045\006\003
\125\004\003\014\036\101\143\164\141\154\151\163\040\101\165\164
\150\145\156\164\151\143\141\164\151\157\156\040\122\157\157\164
\040\103\101\060\036\027\015\061\061\060\071\062\062\061\061\062
\062\060\062\132\027\015\063\060\060\071\062\062\061\061\062\062
\060\062\132\060\153\061\013\060\011\006\003\125\004\006\023\002
\111\124\061\016\060\014\006\003\125\004\007\014\005\115\151\154
\141\156\061\043\060\041\006\003\125\004\012\014\032\101\143\164
\141\154\151\163\040\123\056\160\056\101\056\057\060\063\063\065
\070\065\062\060\071\066\067\061\047\060\045\006\003\125\004\003
\014\036\101\143\164\141\154\151\163\040\101\165\164\150\145\156
\164\151\143\141\164\151\157\156\040\122\157\157\164\040\103\101
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001
\000\247\306\304\245\051\244\054\357\345\030\305\260\120\243\157
\121\073\237\012\132\311\302\110\070\012\302\034\240\030\177\221
\265\207\271\100\077\335\035\150\037\010\203\325\055\036\210\240
\370\217\126\217\155\231\002\222\220\026\325\137\010\154\211\327
\341\254\274\040\302\261\340\203\121\212\151\115\000\226\132\157
\057\300\104\176\243\016\344\221\315\130\356\334\373\307\036\105
\107\335\047\271\010\001\237\246\041\035\365\101\055\057\114\375
\050\255\340\212\255\042\264\126\145\216\206\124\217\223\103\051
\336\071\106\170\243\060\043\272\315\360\175\023\127\300\135\322
\203\153\110\114\304\253\237\200\132\133\072\275\311\247\042\077
\200\047\063\133\016\267\212\014\135\007\067\010\313\154\322\172
\107\042\104\065\305\314\314\056\216\335\052\355\267\175\146\015
\137\141\121\042\125\033\343\106\343\343\075\320\065\142\232\333
\257\024\310\133\241\314\211\033\341\060\046\374\240\233\037\201
\247\107\037\004\353\243\071\222\006\237\231\323\277\323\352\117
\120\234\031\376\226\207\036\074\145\366\243\030\044\203\206\020
\347\124\076\250\072\166\044\117\201\041\305\343\017\002\370\223
\224\107\040\273\376\324\016\323\150\271\335\304\172\204\202\343
\123\124\171\335\333\234\322\362\007\233\056\266\274\076\355\205
\155\357\045\021\362\227\032\102\141\367\112\227\350\213\261\020
\007\372\145\201\262\242\071\317\367\074\377\030\373\306\361\132
\213\131\342\002\254\173\222\320\116\024\117\131\105\366\014\136
\050\137\260\350\077\105\317\317\257\233\157\373\204\323\167\132
\225\157\254\224\204\236\356\274\300\112\217\112\223\370\104\041
\342\061\105\141\120\116\020\330\343\065\174\114\031\264\336\005
\277\243\006\237\310\265\315\344\037\327\027\006\015\172\225\164
\125\015\150\032\374\020\033\142\144\235\155\340\225\240\303\224
\007\127\015\024\346\275\005\373\270\237\346\337\213\342\306\347
\176\226\366\123\305\200\064\120\050\130\360\022\120\161\027\060
\272\346\170\143\274\364\262\255\233\053\262\376\341\071\214\136
\272\013\040\224\336\173\203\270\377\343\126\215\267\021\351\073
\214\362\261\301\135\235\244\013\114\053\331\262\030\365\265\237
\113\002\003\001\000\001\243\143\060\141\060\035\006\003\125\035

\016\004\026\004\024\122\330\210\072\310\237\170\146\355\211\363
\173\070\160\224\311\002\002\066\320\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\037\006\003\125\035
\043\004\030\060\026\200\024\122\330\210\072\310\237\170\146\355
\211\363\173\070\160\224\311\002\002\066\320\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\006\060\015\006\011\052
\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000\013
\173\162\207\300\140\246\111\114\210\130\346\035\210\367\024\144
\110\246\330\130\012\016\117\023\065\337\065\035\324\355\006\061
\310\201\076\152\325\335\073\032\062\356\220\075\021\322\056\364
\216\303\143\056\043\146\260\147\276\157\266\300\023\071\140\252
\242\064\045\223\165\122\336\247\235\255\016\207\211\122\161\152
\026\074\031\035\203\370\232\051\145\276\364\077\232\331\360\363
\132\207\041\161\200\115\313\340\070\233\077\273\372\340\060\115
\317\206\323\145\020\031\030\321\227\002\261\053\162\102\150\254
\240\275\116\132\332\030\277\153\230\201\320\375\232\276\136\025
\110\315\021\025\271\300\051\134\264\350\210\367\076\066\256\267
\142\375\036\142\336\160\170\020\034\110\133\332\274\244\070\272
\147\355\125\076\136\127\337\324\003\100\114\201\244\322\117\143
\247\011\102\011\024\374\000\251\302\200\163\117\056\300\100\331
\021\173\110\352\172\002\300\323\353\050\001\046\130\164\301\300
\163\042\155\223\225\375\071\175\273\052\343\366\202\343\054\227
\137\116\037\221\224\372\376\054\243\330\166\032\270\115\262\070
\117\233\372\035\110\140\171\046\342\363\375\251\320\232\350\160
\217\111\172\326\345\275\012\016\333\055\363\215\277\353\343\244
\175\313\307\225\161\350\332\243\174\305\302\370\164\222\004\033
\206\254\244\042\123\100\266\254\376\114\166\317\373\224\062\300
\065\237\166\077\156\345\220\156\240\246\046\242\270\054\276\321
\053\205\375\247\150\310\272\001\053\261\154\164\035\270\163\225
\347\356\267\307\045\360\000\114\000\262\176\266\013\213\034\363
\300\120\236\045\271\340\010\336\066\146\377\067\245\321\273\124
\144\054\311\047\265\113\222\176\145\377\323\055\341\271\116\274
\177\244\101\041\220\101\167\246\071\037\352\236\343\237\320\146
\157\005\354\252\166\176\277\153\026\240\353\265\307\374\222\124
\057\053\021\047\045\067\170\114\121\152\260\363\314\130\135\024
\361\152\110\025\377\302\007\266\261\215\017\216\134\120\106\263
\075\277\001\230\117\262\131\124\107\076\064\173\170\155\126\223
\056\163\352\146\050\170\315\035\024\277\240\217\057\056\270\056
\216\362\024\212\314\351\265\174\373\154\235\014\245\341\226
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Actalis Authentication Root CA"
# Issuer: CN=Actalis Authentication Root CA,O=Actalis S.p.A./03358520967,L=Milan,C=IT
# Serial Number:57:0a:11:97:42:c4:e3:cc

```
# Subject: CN=Actalis Authentication Root CA,O=Actalis S.p.A./03358520967,L=Milan,C=IT
# Not Valid Before: Thu Sep 22 11:22:02 2011
# Not Valid After : Sun Sep 22 11:22:02 2030
# Fingerprint (SHA-256):
55:92:60:84:EC:96:3A:64:B9:6E:2A:BE:01:CE:0B:A8:6A:64:FB:FE:BC:C7:AA:B5:AF:C1:55:B3:7F:D7:60:66
# Fingerprint (SHA1):
 F3:73:B3:87:06:5A:28:84:8A:F2:F3:4A:CE:19:2B:DD:C7:8E:9C:AC
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Actalis Authentication Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\363\163\263\207\006\132\050\204\212\362\363\112\316\031\053\335
\307\216\234\254
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\151\301\015\117\007\243\033\303\376\126\075\004\274\021\366\246
END
CKA_ISSUER MULTILINE_OCTAL
\060\153\061\013\060\011\006\003\125\004\006\023\002\111\124\061
\016\060\014\006\003\125\004\007\014\005\115\151\154\141\156\061
\043\060\041\006\003\125\004\012\014\032\101\143\164\141\154\151
\163\040\123\056\160\056\101\056\057\060\063\063\065\070\065\062
\060\071\066\067\061\047\060\045\006\003\125\004\003\014\036\101
\143\164\141\154\151\163\040\101\165\164\150\145\156\164\151\143
\141\164\151\157\156\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\127\012\021\227\102\304\343\314
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Buypass Class 2 Root CA"
#
# Issuer: CN=Buypass Class 2 Root CA,O=Buypass AS-983163327,C=NO
# Serial Number: 2 (0x2)
# Subject: CN=Buypass Class 2 Root CA,O=Buypass AS-983163327,C=NO
# Not Valid Before: Tue Oct 26 08:38:03 2010
# Not Valid After : Fri Oct 26 08:38:03 2040
# Fingerprint (SHA-256):
9A:11:40:25:19:7C:5B:B9:5D:94:E6:3D:55:CD:43:79:08:47:B6:46:B2:3C:DF:11:AD:A4:A0:0E:FF:15:FB:48
# Fingerprint (SHA1): 49:0A:75:74:DE:87:0A:47:FE:58:EE:F6:C7:6B:EB:C6:0B:12:40:99
```

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Buypass Class 2 Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061
\035\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163
\163\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040
\060\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163
\040\103\154\141\163\163\040\062\040\122\157\157\164\040\103\101
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061
\035\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163
\163\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040
\060\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163
\040\103\154\141\163\163\040\062\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\002
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\131\060\202\003\101\240\003\002\001\002\002\001\002
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061\035
\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163\163
\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040\060
\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163\040
\103\154\141\163\163\040\062\040\122\157\157\164\040\103\101\060
\036\027\015\061\060\061\060\062\066\060\070\063\070\060\063\132
\027\015\064\060\061\060\062\066\060\070\063\070\060\063\132\060
\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061\035
\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163\163
\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040\060
\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163\040
\103\154\141\163\163\040\062\040\122\157\157\164\040\103\101\060
\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001
\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000
\327\307\136\367\301\007\324\167\373\103\041\364\364\365\151\344
\356\062\001\333\243\206\037\344\131\015\272\347\165\203\122\353
\352\034\141\025\110\273\035\007\312\214\256\260\334\226\235\352
\303\140\222\206\202\050\163\234\126\006\377\113\144\360\014\052
\067\111\265\345\317\014\174\356\361\112\273\163\060\145\363\325
\057\203\266\176\343\347\365\236\253\140\371\323\361\235\222\164
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\212\344\034\226\254\133\200\351\265\364\061\207\243\121\374\307
\176\241\157\216\123\167\324\227\301\125\063\222\076\030\057\165
\324\255\206\111\313\225\257\124\006\154\330\006\023\215\133\377
\341\046\031\131\300\044\272\201\161\171\220\104\120\150\044\224
\137\270\263\021\361\051\101\141\243\101\313\043\066\325\301\361
\062\120\020\116\177\364\206\223\354\204\323\216\274\113\277\134
\001\116\007\075\334\024\212\224\012\244\352\163\373\013\121\350
\023\007\030\372\016\361\053\321\124\025\175\074\341\367\264\031
\102\147\142\136\167\340\242\125\354\266\331\151\027\325\072\257
\104\355\112\305\236\344\172\047\174\345\165\327\252\313\045\347
\337\153\012\333\017\115\223\116\250\240\315\173\056\362\131\001
\152\267\015\270\007\201\176\213\070\033\070\346\012\127\231\075
\356\041\350\243\365\014\026\335\213\354\064\216\234\052\034\000
\025\027\215\150\203\322\160\237\030\010\315\021\150\325\311\153
\122\315\304\106\217\334\265\363\330\127\163\036\351\224\071\004
\277\323\336\070\336\264\123\354\151\034\242\176\304\217\344\033
\160\255\362\242\371\373\367\026\144\146\151\237\111\121\242\342
\025\030\147\006\112\177\325\154\265\115\263\063\340\141\353\135
\276\351\230\017\062\327\035\113\074\056\132\001\122\221\011\362
\337\352\215\330\006\100\143\252\021\344\376\303\067\236\024\122
\077\364\342\314\362\141\223\321\375\147\153\327\122\256\277\150
\253\100\103\240\127\065\123\170\360\123\370\141\102\007\144\306
\327\157\233\114\070\015\143\254\142\257\066\213\242\163\012\015
\365\041\275\164\252\115\352\162\003\111\333\307\137\035\142\143
\307\375\335\221\354\063\356\365\155\264\156\060\150\336\310\326
\046\260\165\136\173\264\007\040\230\241\166\062\270\115\154\117
\002\003\001\000\001\243\102\060\100\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035
\016\004\026\004\024\311\200\167\340\142\222\202\365\106\234\363
\272\367\114\303\336\270\243\255\071\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\006\060\015\006\011\052\206\110
\206\367\015\001\001\013\005\000\003\202\002\001\000\123\137\041
\365\272\260\072\122\071\054\222\260\154\000\311\357\316\040\357
\006\362\226\236\351\244\164\177\172\026\374\267\365\266\373\025
\033\077\253\246\300\162\135\020\261\161\356\274\117\343\255\254
\003\155\056\161\056\257\304\343\255\243\275\014\021\247\264\377
\112\262\173\020\020\037\247\127\101\262\300\256\364\054\131\326
\107\020\210\363\041\121\051\060\312\140\206\257\106\253\035\355
\072\133\260\224\336\104\343\101\010\242\301\354\035\326\375\117
\266\326\107\320\024\013\312\346\312\265\173\167\176\101\037\136
\203\307\266\214\071\226\260\077\226\201\101\157\140\220\342\350
\371\373\042\161\331\175\263\075\106\277\264\204\257\220\034\017
\217\022\152\257\357\356\036\172\256\002\112\212\027\053\166\376
\254\124\211\044\054\117\077\266\262\247\116\214\250\221\227\373
\051\306\173\134\055\271\313\146\266\267\250\133\022\121\205\265
\011\176\142\170\160\376\251\152\140\266\035\016\171\014\375\312
\352\044\200\162\303\227\077\362\167\253\103\042\012\307\353\266
\014\204\202\054\200\153\101\212\010\300\353\245\153\337\231\022

\313\212\325\136\200\014\221\340\046\010\066\110\305\372\070\021
\065\377\045\203\055\362\172\277\332\375\216\376\245\313\105\054
\037\304\210\123\256\167\016\331\232\166\305\216\054\035\243\272
\325\354\062\256\300\252\254\367\321\172\115\353\324\007\342\110
\367\042\216\260\244\237\152\316\216\262\262\140\364\243\042\320
\043\353\224\132\172\151\335\017\277\100\127\254\153\131\120\331
\243\231\341\156\376\215\001\171\047\043\025\336\222\235\173\011
\115\132\347\113\110\060\132\030\346\012\155\346\217\340\322\273
\346\337\174\156\041\202\301\150\071\115\264\230\130\146\142\314
\112\220\136\303\372\047\004\261\171\025\164\231\314\276\255\040
\336\046\140\034\353\126\121\246\243\352\344\243\077\247\377\141
\334\361\132\115\154\062\043\103\356\254\250\356\356\112\022\011
\074\135\161\302\276\171\372\302\207\150\035\013\375\134\151\314
\006\320\232\175\124\231\052\311\071\032\031\257\113\052\103\363
\143\135\132\130\342\057\343\035\344\251\326\320\012\320\236\277
\327\201\011\361\311\307\046\015\254\230\026\126\240
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Buypass Class 2 Root CA"
# Issuer: CN=Buypass Class 2 Root CA,O=Buypass AS-983163327,C=NO
# Serial Number: 2 (0x2)
# Subject: CN=Buypass Class 2 Root CA,O=Buypass AS-983163327,C=NO
# Not Valid Before: Tue Oct 26 08:38:03 2010
# Not Valid After : Fri Oct 26 08:38:03 2040
# Fingerprint (SHA-256):
9A:11:40:25:19:7C:5B:B9:5D:94:E6:3D:55:CD:43:79:08:47:B6:46:B2:3C:DF:11:AD:A4:A0:0E:FF:15:FB:48
# Fingerprint (SHA1): 49:0A:75:74:DE:87:0A:47:FE:58:EE:F6:C7:6B:EB:C6:0B:12:40:99
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN
 CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Buypass Class 2 Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\111\012\165\164\336\207\012\107\376\130\356\366\307\153\353\306
\013\022\100\231
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\106\247\322\376\105\373\144\132\250\131\220\233\170\104\233\051
END
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061
\035\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163
\163\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040

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\060\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163
\040\103\154\141\163\163\040\062\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\002
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate
 "Buypass Class 3 Root CA"
#
# Issuer: CN=Buypass Class 3 Root CA,O=Buypass AS-983163327,C=NO
# Serial Number: 2 (0x2)
# Subject: CN=Buypass Class 3 Root CA,O=Buypass AS-983163327,C=NO
# Not Valid Before: Tue Oct 26 08:28:58 2010
# Not Valid After : Fri Oct 26 08:28:58 2040
# Fingerprint (SHA-256):
ED:F7:EB:BC:A2:7A:2A:38:4D:38:7B:7D:40:10:C6:66:E2:ED:B4:84:3E:4C:29:B4:AE:1D:5B:93:32:E6:B2:4D
# Fingerprint (SHA1): DA:FA:F7:FA:66:84:EC:06:8F:14:50:BD:C7:C2:81:A5:BC:A9:64:57
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Buypass Class 3 Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061
\035\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163
\163\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040
\060\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163
\040\103\154\141\163\163\040\063\040\122\157\157\164\040\103\101
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061
\035\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163
\163\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040
\060\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163
\040\103\154\141\163\163\040\063\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\002
END
```

CKA_VALUE MULTILINE_OCTAL
\060\202\005\131\060\202\003\101\240\003\002\001\002\002\001\002
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061\035
\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163\163
\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040\060
\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163\040
\103\154\141\163\163\040\063\040\122\157\157\164\040\103\101\060
\036\027\015\061\060\061\060\062\066\060\070\062\070\065\070\132
\027\015\064\060\061\060\062\066\060\070\062\070\065\070\132\060
\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061\035
\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163\163
\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040\060
\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163\040
\103\154\141\163\163\040\063\040\122\157\157\164\040\103\101\060
\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001
\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000
\245\332\012\225\026\120\343\225\362\136\235\166\061\006\062\172
\233\361\020\166\270\000\232\265\122\066\315\044\107\260\237\030
\144\274\232\366\372\325\171\330\220\142\114\042\057\336\070\075
\326\340\250\351\034\054\333\170\021\351\216\150\121\025\162\307
\363\063\207\344\240\135\013\134\340\127\007\052\060\365\315\304
\067\167\050\115\030\221\346\277\325\122\375\161\055\160\076\347
\306\304\212\343\360\050\013\364\166\230\241\213\207\125\262\072
\023\374\267\076\047\067\216\042\343\250\117\052\357\140\273\075
\267\071\303\016\001\107\231\135\022\117\333\103\372\127\241\355
\371\235\276\021\107\046\133\023\230\253\135\026\212\260\067\034
\127\235\105\377\210\226\066\277\273\312\007\173\157\207\143\327
\320\062\152\326\135\154\014\361\263\156\071\342\153\061\056\071
\000\047\024\336\070\300\354\031\146\206\022\350\235\162\026\023
\144\122\307\251\067\034\375\202\060\355\204\030\035\364\256\134
\377\160\023\000\353\261\365\063\172\113\326\125\370\005\215\113
\151\260\365\263\050\066\134\024\304\121\163\115\153\013\361\064
\007\333\027\071\327\334\050\173\153\365\237\363\056\301\117\027
\052\020\363\314\312\350\353\375\153\253\056\232\237\055\202\156
\004\324\122\001\223\055\075\206\374\176\374\337\357\102\035\246
\153\357\271\040\306\367\275\240\247\225\375\247\346\211\044\330
\314\214\064\154\342\043\057\331\022\032\041\271\125\221\157\013
\221\171\031\014\255\100\210\013\160\342\172\322\016\330\150\110
\273\202\023\071\020\130\351\330\052\007\306\022\333\130\333\322
\073\125\020\107\005\025\147\142\176\030\143\246\106\077\011\016
\124\062\136\277\015\142\172\047\357\200\350\333\331\113\006\132
\067\132\045\320\010\022\167\324\157\011\120\227\075\310\035\303
\337\214\105\060\126\306\323\144\253\146\363\300\136\226\234\303
\304\357\303\174\153\213\072\171\177\263\111\317\075\342\211\237
\240\060\113\205\271\234\224\044\171\217\175\153\251\105\150\017
\053\320\361\332\034\313\151\270\312\111\142\155\310\320\143\142
\335\140\017\130\252\217\241\274\005\245\146\242\317\033\166\262

\204\144\261\114\071\122\300\060\272\360\214\113\002\260\266\267
\002\003\001\000\001\243\102\060\100\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035
\016\004\026\004\024\107\270\315\377\345\157\356\370\262\354\057
\116\016\371\045\260\216\074\153\303\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\006\060\015\006\011\052\206\110
\206\367\015\001\001\013\005\000\003\202\002\001\000\000\040\043
\101\065\004\220\302\100\142\140\357\342\065\114\327\077\254\342
\064\220\270\241\157\166\372\026\026\244\110\067\054\351\220\302
\362\074\370\012\237\330\201\345\273\133\332\045\054\244\247\125
\161\044\062\366\310\013\362\274\152\370\223\254\262\007\302\137
\237\333\314\310\212\252\276\152\157\341\111\020\314\061\327\200
\273\273\310\330\242\016\144\127\352\242\365\302\251\061\025\322
\040\152\354\374\042\001\050\317\206\270\200\036\251\314\021\245
\074\362\026\263\107\235\374\322\200\041\304\313\320\107\160\101
\241\312\203\031\010\054\155\362\135\167\234\212\024\023\324\066
\034\222\360\345\006\067\334\246\346\220\233\070\217\134\153\033
\106\206\103\102\137\076\001\007\123\124\135\145\175\367\212\163
\241\232\124\132\037\051\103\024\047\302\205\017\265\210\173\032
\073\224\267\035\140\247\265\234\347\051\151\127\132\233\223\172
\103\060\033\003\327\142\310\100\246\252\374\144\344\112\327\221
\123\001\250\040\210\156\234\137\104\271\313\140\201\064\354\157
\323\175\332\110\137\353\264\220\274\055\251\034\013\254\034\325
\242\150\040\200\004\326\374\261\217\057\273\112\061\015\112\206
\034\353\342\066\051\046\365\332\330\304\362\165\141\317\176\256
\166\143\112\172\100\145\223\207\370\036\200\214\206\345\206\326
\217\016\374\123\054\140\350\026\141\032\242\076\103\173\315\071
\140\124\152\365\362\211\046\001\150\203\110\242\063\350\311\004
\221\262\021\064\021\076\352\320\103\031\037\003\223\220\014\377
\121\075\127\364\101\156\341\313\240\276\353\311\143\315\155\314
\344\370\066\252\150\235\355\275\135\227\160\104\015\266\016\065
\334\341\014\135\273\240\121\224\313\176\026\353\021\057\243\222
\105\310\114\161\331\274\311\231\122\127\106\057\120\317\275\065
\151\364\075\025\316\006\245\054\017\076\366\201\272\224\273\303
\273\277\145\170\322\206\171\377\111\073\032\203\014\360\336\170
\354\310\362\115\114\032\336\202\051\370\301\132\332\355\356\346
\047\136\350\105\320\235\034\121\250\150\253\104\343\320\213\152
\343\370\073\273\334\115\327\144\362\121\276\346\252\253\132\351
\061\356\006\274\163\277\023\142\012\237\307\271\227
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Buypass Class 3 Root CA"
# Issuer: CN=Buypass Class 3 Root CA,O=Buypass AS-983163327,C=NO
# Serial Number: 2 (0x2)

```
# Subject: CN=Buypass Class 3 Root CA,O=Buypass AS-983163327,C=NO
# Not Valid Before: Tue Oct 26 08:28:58 2010
# Not Valid After : Fri Oct 26 08:28:58 2040
# Fingerprint (SHA-256):
ED:F7:EB:BC:A2:7A:2A:38:4D:38:7B:7D:40:10:C6:66:E2:ED:B4:84:3E:4C:29:B4:AE:1D:5B:93:32:E6:B2:4D
# Fingerprint (SHA1): DA:FA:F7:FA:66:84:EC:06:8F:14:50:BD:C7:C2:81:A5:BC:A9:64:57
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Buypass Class 3 Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\332\372\367\372\146\204\354\006\217\024\120\275\307\302\201\245
\274\251\144\127
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\075\073\030\236\054\144\132\350\325\210\316\016\371\067\302\354
END
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\116\117\061
\035\060\033\006\003\125\004\012\014\024\102\165\171\160\141\163
\163\040\101\123\055\071\070\063\061\066\063\063\062\067\061\040
\060\036\006\003\125\004\003\014\027\102\165\171\160\141\163\163
\040\103\154\141\163\163\040\063\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\002
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "T-TeleSec GlobalRoot Class 3"
#
# Issuer: CN=T-TeleSec GlobalRoot Class 3,OU=T-Systems Trust Center,O=T-Systems Enterprise Services
GmbH,C=DE
# Serial Number: 1 (0x1)
# Subject: CN=T-TeleSec GlobalRoot Class 3,OU=T-Systems Trust Center,O=T-Systems
 Enterprise Services GmbH,C=DE
# Not Valid Before: Wed Oct 01 10:29:56 2008
# Not Valid After : Sat Oct 01 23:59:59 2033
# Fingerprint (SHA-256):
FD:73:DA:D3:1C:64:4F:F1:B4:3B:EF:0C:CD:DA:96:71:0B:9C:D9:87:5E:CA:7E:31:70:7A:F3:E9:6D:52:2B:BD
# Fingerprint (SHA1): 55:A6:72:3E:CB:F2:EC:CD:C3:23:74:70:19:9D:2A:BE:11:E3:81:D1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
```

CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "T-TeleSec GlobalRoot Class 3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\053\060\051\006\003\125\004\012\014\042\124\055\123\171\163
\164\145\155\163\040\105\156\164\145\162\160\162\151\163\145\040
\123\145\162\166\151\143\145\163\040\107\155\142\110\061\037\060
\035\006\003\125\004\013\014\026\124\055\123\171\163\164\145\155
\163\040\124\162\165\163\164\040\103\145\156\164\145\162\061\045
\060\043\006\003\125\004\003\014\034\124\055\124\145\154\145\123
\145\143\040\107\154\157\142\141\154\122\157\157\164\040\103\154
\141\163\163\040\063
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\053\060\051\006\003\125\004\012\014\042\124\055\123\171\163
\164\145\155\163\040\105\156\164\145\162\160\162\151\163\145\040
\123\145\162\166\151\143\145\163\040\107\155\142\110\061\037\060
\035\006\003\125\004\013\014\026\124\055\123\171\163\164\145\155
\163\040\124\162\165\163\164\040\103\145\156\164\145\162\061\045
\060\043\006\003\125\004\003\014\034\124\055\124\145\154\145\123
\145\143\040\107\154\157\142\141\154\122\157\157\164\040\103\154
\141\163\163\040\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\303\060\202\002\253\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\201\202\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\053\060\051\006\003\125\004\012\014\042\124\055\123\171\163\164
\145\155\163\040\105\156\164\145\162\160\162\151\163\145\040\123
\145\162\166\151\143\145\163\040\107\155\142\110\061\037\060\035
\006\003\125\004\013\014\026\124\055\123\171\163\164\145\155\163
\040\124\162\165\163\164\040\103\145\156\164\145\162\061\045\060
\043\006\003\125\004\003\014\034\124\055\124\145\154\145\123\145
\143\040\107\154\157\142\141\154\122\157\157\164\040\103\154\141
\163\163\040\063\060\036\027\015\060\070\061\060\060\061\061\060
\062\071\065\066\132\027\015\063\063\061\060\060\061\062\063\065
\071\065\071\132\060\201\202\061\013\060\011\006\003\125\004\006
\023\002\104\105\061\053\060\051\006\003\125\004\012\014\042\124
\055\123\171\163\164\145\155\163\040\105\156\164\145\162\160\162

\151\163\145\040\123\145\162\166\151\143\145\163\040\107\155\142
\110\061\037\060\035\006\003\125\004\013\014\026\124\055\123\171
\163\164\145\155\163\040\124\162\165\163\164\040\103\145\156\164
\145\162\061\045\060\043\006\003\125\004\003\014\034\124\055\124
\145\154\145\123\145\143\040\107\154\157\142\141\154\122\157\157
\164\040\103\154\141\163\163\040\063\060\202\001\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017
\000\060\202\001\012\002\202\001\001\000\275\165\223\360\142\042
\157\044\256\340\172\166\254\175\275\331\044\325\270\267\374\315
\360\102\340\353\170\210\126\136\233\232\124\035\115\014\212\366
\323\317\160\364\122\265\330\223\004\343\106\206\161\101\112\053
\360\052\054\125\003\326\110\303\340\071\070\355\362\134\074\077
\104\274\223\075\141\253\116\315\015\276\360\040\047\130\016\104
\177\004\032\207\245\327\226\024\066\220\320\111\173\241\165\373
\032\153\163\261\370\316\251\011\054\362\123\325\303\024\104\270
\206\245\366\213\053\071\332\243\063\124\331\372\162\032\367\042
\025\034\210\221\153\177\146\345\303\152\200\260\044\363\337\206
\105\210\375\031\177\165\207\037\037\261\033\012\163\044\133\271
\145\340\054\124\310\140\323\146\027\077\341\314\124\063\163\221
\002\072\246\177\173\166\071\242\037\226\266\070\256\265\310\223
\164\035\236\271\264\345\140\235\057\126\321\340\353\136\133\114
\022\160\014\154\104\040\253\021\330\364\031\366\322\234\122\067
\347\372\266\302\061\073\112\324\024\231\255\307\032\365\135\137
\372\007\270\174\015\037\326\203\036\263\002\003\001\000\001\243
\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\035\006\003\125\035\016\004\026\004\024\265
\003\367\166\073\141\202\152\022\252\030\123\353\003\041\224\277
\376\316\312\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\003\202\001\001\000\126\075\357\224\325\275\332\163\262
\130\276\256\220\255\230\047\227\376\001\261\260\122\000\270\115
\344\033\041\164\033\176\300\356\136\151\052\045\257\134\326\035
\332\322\171\311\363\227\051\340\206\207\336\004\131\017\361\131
\324\144\205\113\231\257\045\004\036\311\106\251\227\336\202\262
\033\160\237\234\366\257\161\061\335\173\005\245\054\323\271\312
\107\366\312\362\366\347\255\271\110\077\274\026\267\301\155\364
\352\011\257\354\363\265\347\005\236\246\036\212\123\121\326\223
\201\314\164\223\366\271\332\246\045\005\164\171\132\176\100\076
\202\113\046\021\060\156\341\077\101\307\107\000\065\325\365\323
\367\124\076\201\075\332\111\152\232\263\357\020\075\346\353\157
\321\310\042\107\313\314\317\001\061\222\331\030\343\042\276\011
\036\032\076\132\262\344\153\014\124\172\175\103\116\270\211\245
\173\327\242\075\226\206\314\362\046\064\055\152\222\235\232\032
\320\060\342\135\116\004\260\137\213\040\176\167\301\075\225\202
\321\106\232\073\074\170\270\157\241\320\015\144\242\170\036\051
\116\223\303\244\124\024\133
END
CKA_NSS_MOZILLA_CA_POLICY

```
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "T-TeleSec GlobalRoot Class 3"
# Issuer: CN=T-TeleSec GlobalRoot Class 3,OU=T-Systems Trust Center,O=T-Systems
 Enterprise Services GmbH,C=DE
# Serial Number: 1 (0x1)
# Subject: CN=T-TeleSec GlobalRoot Class 3,OU=T-Systems Trust Center,O=T-Systems Enterprise Services
GmbH,C=DE
# Not Valid Before: Wed Oct 01 10:29:56 2008
# Not Valid After : Sat Oct 01 23:59:59 2033
# Fingerprint (SHA-256):
FD:73:DA:D3:1C:64:4F:F1:B4:3B:EF:0C:CD:DA:96:71:0B:9C:D9:87:5E:CA:7E:31:70:7A:F3:E9:6D:52:2B:BD
# Fingerprint (SHA1): 55:A6:72:3E:CB:F2:EC:CD:C3:23:74:70:19:9D:2A:BE:11:E3:81:D1
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "T-TeleSec GlobalRoot Class 3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\125\246\162\076\313\362\354\315\303\043\164\160\031\235\052\276
\021\343\201\321
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\312\373\100\250\116\071\222\212\035\376\216\057\304\047\352\357
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\053\060\051\006\003\125\004\012\014\042\124\055\123\171\163
\164\145\155\163\040\105\156\164\145\162\160\162\151\163\145\040
\123\145\162\166\151\143\145\163\040\107\155\142\110\061\037\060
\035\006\003\125\004\013\014\026\124\055\123\171\163\164\145\155
\163\040\124\162\165\163\164\040\103\145\156\164\145\162\061\045
\060\043\006\003\125\004\003\014\034\124\055\124\145\154\145\123
\145\143\040\107\154\157\142\141\154\122\157\157\164\040\103\154
\141\163\163\040\063
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
```

```
# Certificate "D-TRUST Root Class 3 CA 2 2009"
#
# Issuer: CN=D-TRUST Root Class 3 CA 2 2009,O=D-Trust GmbH,C=DE
# Serial Number: 623603 (0x983f3)
# Subject: CN=D-TRUST Root Class 3 CA 2 2009,O=D-Trust GmbH,C=DE
# Not Valid Before: Thu Nov 05 08:35:58 2009
# Not Valid After : Mon Nov 05 08:35:58
 2029
# Fingerprint (SHA-256):
49:E7:A4:42:AC:F0:EA:62:87:05:00:54:B5:25:64:B6:50:E4:F4:9E:42:E3:48:D6:AA:38:E0:39:E9:57:B1:C1
# Fingerprint (SHA1): 58:E8:AB:B0:36:15:33:FB:80:F7:9B:1B:6D:29:D3:FF:8D:5F:00:F0
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST Root Class 3 CA 2 2009"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\047\060\045\006\003\125\004\003\014
\036\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\063\040\103\101\040\062\040\062\060\060\071
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\047\060\045\006\003\125\004\003\014
\036\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\063\040\103\101\040\062\040\062\060\060\071
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\003\011\203\363
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\063\060\202\003\033\240\003\002\001\002\002\003\011
\203\363\060\015\006\011\052\206\110\206\367\015\001\001\013\005
\000\060\115\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165
\163\164\040\107\155\142\110\061\047\060\045\006\003\125\004\003
\014\036\104\055\124\122\125\123\124\040\122\157\157\164\040\103
\154\141\163\163\040\063\040\103\101\040\062\040\062\060\060\071
\060\036\027\015\060\071\061\061\060\065\060\070\063\065\065\070
\132\027\015\062\071\061\061\060\065\060\070\063\065\065\070\132
\060\115\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
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\164\040\107\155\142\110\061\047\060\045\006\003\125\004\003\014
\036\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\063\040\103\101\040\062\040\062\060\060\071\060
\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001\001
\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001\000
\323\262\112\317\172\107\357\165\233\043\372\072\057\326\120\105
\211\065\072\306\153\333\376\333\000\150\250\340\003\021\035\067
\120\010\237\115\112\150\224\065\263\123\321\224\143\247\040\126
\257\336\121\170\354\052\075\363\110\110\120\076\012\337\106\125
\213\047\155\303\020\115\015\221\122\103\330\207\340\135\116\066
\265\041\312\137\071\100\004\137\133\176\314\243\306\053\251\100
\036\331\066\204\326\110\363\222\036\064\106\040\044\301\244\121
\216\112\032\357\120\077\151\135\031\177\105\303\307\001\217\121
\311\043\350\162\256\264\274\126\011\177\022\313\034\261\257\051
\220\012\311\125\314\017\323\264\032\355\107\065\132\112\355\234
\163\004\041\320\252\275\014\023\265\000\312\046\154\304\153\014
\224\132\225\224\332\120\232\361\377\245\053\146\061\244\311\070
\240\337\035\037\270\011\056\363\247\350\147\122\253\225\037\340
\106\076\330\244\303\312\132\305\061\200\350\110\232\237\224\151
\376\031\335\330\163\174\201\312\226\336\216\355\263\062\005\145
\204\064\346\346\375\127\020\265\137\166\277\057\260\020\015\305
\002\003\001\000\001\243\202\001\032\060\202\001\026\060\017\006
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\035
\006\003\125\035\016\004\026\004\024\375\332\024\304\237\060\336
\041\275\036\102\071\374\253\143\043\111\340\361\204\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\201\323
\006\003\125\035\037\004\201\313\060\201\310\060\201\200\240\176
\240\174\206\172\154\144\141\160\072\057\057\144\151\162\145\143
\164\157\162\171\056\144\055\164\162\165\163\164\056\156\145\164
\057\103\116\075\104\055\124\122\125\123\124\045\062\060\122\157
\157\164\045\062\060\103\154\141\163\163\045\062\060\063\045\062
\060\103\101\045\062\060\062\045\062\060\062\060\060\071\054\117
\075\104\055\124\162\165\163\164\045\062\060\107\155\142\110\054
\103\075\104\105\077\143\145\162\164\151\146\151\143\141\164\145
\162\145\166\157\143\141\164\151\157\156\154\151\163\164\060\103
\240\101\240\077\206\075\150\164\164\160\072\057\057\167\167\167
\056\144\055\164\162\165\163\164\056\156\145\164\057\143\162\154
\057\144\055\164\162\165\163\164\137\162\157\157\164\137\143\154
\141\163\163\137\063\137\143\141\137\062\137\062\060\060\071\056
\143\162\154\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\003\202\001\001\000\177\227\333\060\310\337\244\234\175
\041\172\200\160\316\024\022\151\210\024\225\140\104\001\254\262
\351\060\117\233\120\302\146\330\176\215\060\265\160\061\351\342
\151\307\363\160\333\040\025\206\320\015\360\276\254\001\165\204
\316\176\237\115\277\267\140\073\234\363\312\035\342\136\150\330
\243\235\227\345\100\140\322\066\041\376\320\264\270\027\332\164
\243\177\324\337\260\230\002\254\157\153\153\054\045\044\162\241
\145\356\045\132\345\346\062\347\362\337\253\111\372\363\220\151

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\043\333\004\331\347\134\130\374\145\324\227\276\314\374\056\012
\314\045\052\065\004\370\140\221\025\165\075\101\377\043\037\031
\310\154\353\202\123\004\246\344\114\042\115\215\214\272\316\133
\163\354\144\124\120\155\321\234\125\373\151\303\066\303\214\274
\074\205\246\153\012\046\015\340\223\230\140\256\176\306\044\227
\212\141\137\221\216\146\222\011\207\066\315\213\233\055\076\366
\121\324\120\324\131\050\275\203\362\314\050\173\123\206\155\330
\046\210\160\327\352\221\315\076\271\312\300\220\156\132\306\136
\164\145\327\134\376\243\342
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "D-TRUST Root Class 3 CA 2 2009"
# Issuer: CN=D-TRUST Root Class 3 CA 2 2009,O=D-Trust GmbH,C=DE
# Serial Number: 623603 (0x983f3)
# Subject: CN=D-TRUST Root Class 3 CA 2 2009,O=D-Trust GmbH,C=DE
# Not Valid Before:
 Thu Nov 05 08:35:58 2009
# Not Valid After : Mon Nov 05 08:35:58 2029
# Fingerprint (SHA-256):
49:E7:A4:42:AC:F0:EA:62:87:05:00:54:B5:25:64:B6:50:E4:F4:9E:42:E3:48:D6:AA:38:E0:39:E9:57:B1:C1
# Fingerprint (SHA1): 58:E8:AB:B0:36:15:33:FB:80:F7:9B:1B:6D:29:D3:FF:8D:5F:00:F0
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST Root Class 3 CA 2 2009"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\130\350\253\260\066\025\063\373\200\367\233\033\155\051\323\377
\215\137\000\360
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\315\340\045\151\215\107\254\234\211\065\220\367\375\121\075\057
END
CKA_ISSUER MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\047\060\045\006\003\125\004\003\014
\036\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\063\040\103\101\040\062\040\062\060\060\071
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\003\011\203\363
END
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CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "D-TRUST Root Class 3 CA 2 EV 2009"
#
# Issuer: CN=D-TRUST Root Class 3 CA 2 EV 2009,O=D-Trust GmbH,C=DE
# Serial Number: 623604 (0x983f4)
# Subject: CN=D-TRUST Root Class 3 CA 2 EV 2009,O=D-Trust GmbH,C=DE
# Not Valid Before: Thu Nov 05 08:50:46 2009
# Not Valid After : Mon Nov 05 08:50:46 2029
# Fingerprint (SHA-256):
EE:C5:49:6B:98:8C:E9:86:25:B9:34:09:2E:EC:29:08:BE:D0:B0:F3:16:C2:D4:73:0C:84:EA:F1:F3:D3:48:81
# Fingerprint (SHA1): 96:C9:1B:0B:95:B4:10:98:42:FA:D0:D8:22:79:FE:60:FA:B9:16:83
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST Root Class 3 CA
 2 EV 2009"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\052\060\050\006\003\125\004\003\014
\041\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\063\040\103\101\040\062\040\105\126\040\062\060
\060\071
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\052\060\050\006\003\125\004\003\014
\041\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\063\040\103\101\040\062\040\105\126\040\062\060
\060\071
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\011\203\364
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\103\060\202\003\053\240\003\002\001\002\002\003\011
\203\364\060\015\006\011\052\206\110\206\367\015\001\001\013\005
\000\060\120\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165
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\163\164\040\107\155\142\110\061\052\060\050\006\003\125\004\003
\014\041\104\055\124\122\125\123\124\040\122\157\157\164\040\103
\154\141\163\163\040\063\040\103\101\040\062\040\105\126\040\062
\060\060\071\060\036\027\015\060\071\061\061\060\065\060\070\065
\060\064\066\132\027\015\062\071\061\061\060\065\060\070\065\060
\064\066\132\060\120\061\013\060\011\006\003\125\004\006\023\002
\104\105\061\025\060\023\006\003\125\004\012\014\014\104\055\124
\162\165\163\164\040\107\155\142\110\061\052\060\050\006\003\125
\004\003\014\041\104\055\124\122\125\123\124\040\122\157\157\164
\040\103\154\141\163\163\040\063\040\103\101\040\062\040\105\126
\040\062\060\060\071\060\202\001\042\060\015\006\011\052\206\110
\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001
\012\002\202\001\001\000\231\361\204\064\160\272\057\267\060\240
\216\275\174\004\317\276\142\274\231\375\202\227\322\172\012\147
\226\070\011\366\020\116\225\042\163\231\215\332\025\055\347\005
\374\031\163\042\267\216\230\000\274\074\075\254\241\154\373\326
\171\045\113\255\360\314\144\332\210\076\051\270\017\011\323\064
\335\063\365\142\321\341\315\031\351\356\030\117\114\130\256\342
\036\326\014\133\025\132\330\072\270\304\030\144\036\343\063\262
\265\211\167\116\014\277\331\224\153\023\227\157\022\243\376\231
\251\004\314\025\354\140\150\066\355\010\173\267\365\277\223\355
\146\061\203\214\306\161\064\207\116\027\352\257\213\221\215\034
\126\101\256\042\067\136\067\362\035\331\321\055\015\057\151\121
\247\276\146\246\212\072\052\275\307\032\261\341\024\360\276\072
\035\271\317\133\261\152\376\264\261\106\040\242\373\036\073\160
\357\223\230\175\214\163\226\362\305\357\205\160\255\051\046\374
\036\004\076\034\240\330\017\313\122\203\142\174\356\213\123\225
\220\251\127\242\352\141\005\330\371\115\304\047\372\156\255\355
\371\327\121\367\153\245\002\003\001\000\001\243\202\001\044\060
\202\001\040\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024\323
\224\212\114\142\023\052\031\056\314\257\162\212\175\066\327\232
\034\334\147\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\201\335\006\003\125\035\037\004\201\325\060\201
\322\060\201\207\240\201\204\240\201\201\206\177\154\144\141\160
\072\057\057\144\151\162\145\143\164\157\162\171\056\144\055\164
\162\165\163\164\056\156\145\164\057\103\116\075\104\055\124\122
\125\123\124\045\062\060\122\157\157\164\045\062\060\103\154\141
\163\163\045\062\060\063\045\062\060\103\101\045\062\060\062\045
\062\060\105\126\045\062\060\062\060\060\071\054\117\075\104\055
\124\162\165\163\164\045\062\060\107\155\142\110\054\103\075\104
\105\077\143\145\162\164\151\146\151\143\141\164\145\162\145\166
\157\143\141\164\151\157\156\154\151\163\164\060\106\240\104\240
\102\206\100\150\164\164\160\072\057\057\167\167\167\056\144\055
\164\162\165\163\164\056\156\145\164\057\143\162\154\057\144\055
\164\162\165\163\164\137\162\157\157\164\137\143\154\141\163\163
\137\063\137\143\141\137\062\137\145\166\137\062\060\060\071\056
\143\162\154\060\015\006\011\052\206\110\206\367\015\001\001\013

\005\000\003\202\001\001\000\064\355\173\132\074\244\224\210\357
\032\021\165\007\057\263\376\074\372\036\121\046\353\207\366\051
\336\340\361\324\306\044\011\351\301\317\125\033\264\060\331\316
\032\376\006\121\246\025\244\055\357\262\113\277\040\050\045\111
\321\246\066\167\064\350\144\337\122\261\021\307\163\172\315\071
\236\302\255\214\161\041\362\132\153\257\337\074\116\125\257\262
\204\145\024\211\271\167\313\052\061\276\317\243\155\317\157\110
\224\062\106\157\347\161\214\240\246\204\031\067\007\362\003\105
\011\053\206\165\174\337\137\151\127\000\333\156\330\246\162\042
\113\120\324\165\230\126\337\267\030\377\103\103\120\256\172\104
\173\360\171\121\327\103\075\247\323\201\323\360\311\117\271\332
\306\227\206\320\202\303\344\102\155\376\260\342\144\116\016\046
\347\100\064\046\265\010\211\327\010\143\143\070\047\165\036\063
\352\156\250\335\237\231\117\164\115\201\211\200\113\335\232\227
\051\134\057\276\201\101\271\214\377\352\175\140\006\236\315\327
\075\323\056\243\025\274\250\346\046\345\157\303\334\270\003\041
\352\237\026\361\054\124\265
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "D-TRUST Root Class 3 CA 2 EV 2009"
# Issuer: CN=D-TRUST Root Class 3 CA 2 EV 2009,O=D-Trust GmbH,C=DE
# Serial Number: 623604 (0x983f4)
# Subject: CN=D-TRUST Root Class 3 CA 2 EV 2009,O=D-Trust GmbH,C=DE
# Not Valid Before: Thu Nov 05 08:50:46 2009
# Not Valid After : Mon Nov 05 08:50:46 2029
# Fingerprint (SHA-256):
EE:C5:49:6B:98:8C:E9:86:25:B9:34:09:2E:EC:29:08:BE:D0:B0:F3:16:C2:D4:73:0C:84:EA:F1:F3:D3:48:81
# Fingerprint (SHA1): 96:C9:1B:0B:95:B4:10:98:42:FA:D0:D8:22:79:FE:60:FA:B9:16:83
CKA_CLASS
 CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST Root Class 3 CA 2 EV 2009"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\226\311\033\013\225\264\020\230\102\372\320\330\042\171\376\140
\372\271\026\203
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\252\306\103\054\136\055\315\304\064\300\120\117\021\002\117\266
END
CKA_ISSUER MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163

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\164\040\107\155\142\110\061\052\060\050\006\003\125\004\003\014
\041\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\063\040\103\101\040\062\040\105\126\040\062\060
\060\071
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\011\203\364
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED
 CK_BBOOL CK_FALSE

#
# Certificate "CA Disig Root R2"
#
# Issuer: CN=CA Disig Root R2,O=Disig a.s.,L=Bratislava,C=SK
# Serial Number:00:92:b8:88:db:b0:8a:c1:63
# Subject: CN=CA Disig Root R2,O=Disig a.s.,L=Bratislava,C=SK
# Not Valid Before: Thu Jul 19 09:15:30 2012
# Not Valid After : Sat Jul 19 09:15:30 2042
# Fingerprint (SHA-256):
E2:3D:4A:03:6D:7B:70:E9:F5:95:B1:42:20:79:D2:B9:1E:DF:BB:1F:B6:51:A0:63:3E:AA:8A:9D:C5:F8:07:03
# Fingerprint (SHA1): B5:61:EB:EA:A4:DE:E4:25:4B:69:1A:98:A5:57:47:C2:34:C7:D9:71
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CA Disig Root R2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\123\113\061
\023\060\021\006\003\125\004\007\023\012\102\162\141\164\151\163
\154\141\166\141\061\023\060\021\006\003\125\004\012\023\012\104
\151\163\151\147\040\141\056\163\056\061\031\060\027\006\003\125
\004\003\023\020\103\101\040\104\151\163\151\147\040\122\157\157
\164\040\122\062
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\123\113\061
\023\060\021\006\003\125\004\007\023\012\102\162\141\164\151\163
\154\141\166\141\061\023\060\021\006\003\125\004\012\023\012\104
\151\163\151\147\040\141\056\163\056\061\031\060\027\006\003\125
\004\003\023\020\103\101\040\104\151\163\151\147\040\122\157\157
\164\040\122\062
```

END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\222\270\210\333\260\212\301\143
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\151\060\202\003\121\240\003\002\001\002\002\011\000
\222\270\210\333\260\212\301\143\060\015\006\011\052\206\110\206
\367\015\001\001\013\005\000\060\122\061\013\060\011\006\003\125
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\314\303\245\351\157\012\216\233\145\302\120\205\265\243\240\123
\022\314\125\207\141\363\201\256\020\106\141\275\104\041\270\302
\075\164\317\176\044\065\372\034\007\016\233\075\042\312\357\061
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\363\154\033\165\106\243\345\112\027\351\244\327\013
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

```
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "CA Disig Root R2"
# Issuer: CN=CA Disig Root R2,O=Disig a.s.,L=Bratislava,C=SK
# Serial Number:00:92:b8:88:db:b0:8a:c1:63
# Subject: CN=CA Disig Root R2,O=Disig a.s.,L=Bratislava,C=SK
# Not Valid Before: Thu Jul 19 09:15:30 2012
# Not Valid After : Sat Jul 19 09:15:30 2042
# Fingerprint (SHA-256):
E2:3D:4A:03:6D:7B:70:E9:F5:95:B1:42:20:79:D2:B9:1E:DF:BB:1F:B6:51:A0:63:3E:AA:8A:9D:C5:F8:07:03
# Fingerprint (SHA1): B5:61:EB:EA:A4:DE:E4:25:4B:69:1A:98:A5:57:47:C2:34:C7:D9:71
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
 CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CA Disig Root R2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\265\141\353\352\244\336\344\045\113\151\032\230\245\127\107\302
\064\307\331\161
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\046\001\373\330\047\247\027\232\105\124\070\032\103\001\073\003
END
CKA_ISSUER MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\123\113\061
\023\060\021\006\003\125\004\007\023\012\102\162\141\164\151\163
\154\141\166\141\061\023\060\021\006\003\125\004\012\023\012\104
\151\163\151\147\040\141\056\163\056\061\031\060\027\006\003\125
\004\003\023\020\103\101\040\104\151\163\151\147\040\122\157\157
\164\040\122\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\222\270\210\333\260\212\301\143
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "ACCVRAIZ1"
#
#
 Issuer: C=ES,O=ACCV,OU=PKIACCV,CN=ACCVRAIZ1
# Serial Number:5e:c3:b7:a6:43:7f:a4:e0
# Subject: C=ES,O=ACCV,OU=PKIACCV,CN=ACCVRAIZ1
# Not Valid Before: Thu May 05 09:37:37 2011
```

```
# Not Valid After : Tue Dec 31 09:37:37 2030
# Fingerprint (SHA-256):
9A:6E:C0:12:E1:A7:DA:9D:BE:34:19:4D:47:8A:D7:C0:DB:18:22:FB:07:1D:F1:29:81:49:6E:D1:04:38:41:13
# Fingerprint (SHA1): 93:05:7A:88:15:C6:4F:CE:88:2F:FA:91:16:52:28:78:BC:53:64:17
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ACCVRAIZ1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\102\061\022\060\020\006\003\125\004\003\014\011\101\103\103
\126\122\101\111\132\061\061\020\060\016\006\003\125\004\013\014
\007\120\113\111\101\103\103\126\061\015\060\013\006\003\125\004
\012\014\004\101\103\103\126\061\013\060\011\006\003\125\004\006
\023\002\105\123
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\102\061\022\060\020\006\003\125\004\003\014\011\101\103\103
\126\122\101\111\132\061\061\020\060\016\006\003\125\004\013\014
\007\120\113\111\101\103\103\126\061\015\060\013\006\003\125\004
\012\014\004\101\103\103\126\061\013\060\011\006\003\125\004\006
\023\002\105\123
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\010\136\303\267\246\103\177\244\340
END
CKA_VALUE MULTILINE_OCTAL
\060\202\007\323\060\202\005\273\240\003\002\001\002\002\010\136
\303\267\246\103\177\244\340\060\015\006\011\052\206\110\206\367
\015\001\001\005\005\000\060\102\061\022\060\020\006\003\125\004
\003\014\011\101\103\103\126\122\101\111\132\061\061\020\060\016
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\060\013\006\003\125\004\012\014\004\101\103\103\126\061\013\060
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\000\317\304\051\163\021\066\336\206\031\076\235\356\031\212\033
\325\260\355\216\075\234\052\300\015\330\075\146\343\074\015\275
\325\224\134\342\342\247\065\033\004\000\366\077\132\215\352\103
\275\137\211\035\251\301\260\314\231\342\115\000\012\332\311\047
\133\347\023\220\134\344\365\063\242\125\155\334\340\011\115\057
\261\046\133\047\165\000\011\304\142\167\051\010\137\236\131\254
\266\176\255\237\124\060\042\003\301\036\161\144\376\371\070\012
\226\030\335\002\024\254\043\313\006\034\036\244\175\215\015\336
\047\101\350\255\332\025\267\260\043\335\053\250\323\332\045\207
\355\350\125\104\115\210\364\066\176\204\232\170\254\367\016\126
\111\016\326\063\045\326\204\120\102\154\040\022\035\052\325\276
\274\362\160\201\244\160\140\276\005\265\233\236\004\104\276\141

```
\043\254\351\245\044\214\021\200\224\132\242\242\271\111\322\301
\334\321\247\355\061\021\054\236\031\246\356\341\125\341\300\352
\317\015\204\344\027\267\242\174\245\336\125\045\006\356\314\300
\207\134\100\332\314\225\077\125\340\065\307\270\204\276\264\135
\315\172\203\001\162\356\207\346\137\035\256\265\205\306\046\337
\346\301\232\351\036\002\107\237\052\250\155\251\133\317\354\105
\167\177\230\047\232\062\135\052\343\204\356\305\230\146\057\226
\040\035\335\330\303\047\327\260\371\376\331\175\315\320\237\217
\013\024\130\121\237\057\213\303\070\055\336\350\217\326\215\207
\244\365\126\103\026\231\054\364\244\126\264\064\270\141\067\311
\302\130\200\033\240\227\241\374\131\215\351\021\366\321\017\113
\125\064\106\052\213\206\073
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "ACCVRAIZ1"
# Issuer: C=ES,O=ACCV,OU=PKIACCV,CN=ACCVRAIZ1
# Serial Number:5e:c3:b7:a6:43:7f:a4:e0
# Subject: C=ES,O=ACCV,OU=PKIACCV,CN=ACCVRAIZ1
# Not Valid Before: Thu May 05 09:37:37 2011
# Not Valid After : Tue Dec 31 09:37:37 2030
# Fingerprint (SHA-256):
9A:6E:C0:12:E1:A7:DA:9D:BE:34:19:4D:47:8A:D7:C0:DB:18:22:FB:07:1D:F1:29:81:49:6E:D1:04:38:41:13
#
 Fingerprint (SHA1): 93:05:7A:88:15:C6:4F:CE:88:2F:FA:91:16:52:28:78:BC:53:64:17
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ACCVRAIZ1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\223\005\172\210\025\306\117\316\210\057\372\221\026\122\050\170
\274\123\144\027
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\320\240\132\356\005\266\011\224\041\241\175\361\262\051\202\002
END
CKA_ISSUER MULTILINE_OCTAL
\060\102\061\022\060\020\006\003\125\004\003\014\011\101\103\103
\126\122\101\111\132\061\061\020\060\016\006\003\125\004\013\014
\007\120\113\111\101\103\103\126\061\015\060\013\006\003\125\004
\012\014\004\101\103\103\126\061\013\060\011\006\003\125\004\006
\023\002\105\123
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
```

```
\002\010\136\303\267\246\103\177\244\340
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "TWCA Global Root CA"
#
# Issuer: CN=TWCA Global Root CA,OU=Root CA,O=TAIWAN-CA,C=TW
# Serial Number: 3262 (0xcbe)
# Subject: CN=TWCA Global Root CA,OU=Root CA,O=TAIWAN-CA,C=TW
# Not Valid Before: Wed Jun 27 06:28:33 2012
# Not Valid After : Tue Dec 31 15:59:59 2030
# Fingerprint (SHA-256):
59:76:90:07:F7:68:5D:0F:CD:50:87:2F:9F:95:D5:75:5A:5B:2B:45:7D:81:F3:69:2B:61:0A:98:67:2F:0E:1B
# Fingerprint (SHA1): 9C:BB:48:53:F6:A4:F6:D3:52:A4:E8:32:52:55:60:13:F5:AD:AF:65
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TWCA Global Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\022\060\020\006\003\125\004\012\023\011\124\101\111\127\101\116
\055\103\101\061\020\060\016\006\003\125\004\013\023\007\122\157
\157\164\040\103\101\061\034\060\032\006\003\125\004\003\023\023
\124\127\103\101\040\107\154\157\142\141\154\040\122\157\157\164
\040\103\101
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\022\060\020\006\003\125\004\012\023\011\124\101\111\127\101\116
\055\103\101\061\020\060\016\006\003\125\004\013\023\007\122\157
\157\164\040\103\101\061\034\060\032\006\003\125\004\003\023\023
\124\127\103\101\040\107\154\157\142\141\154\040\122\157\157\164
\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\002\014\276
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\101\060\202\003\051\240\003\002\001\002\002\002\014
```

\276\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000
\060\121\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\022\060\020\006\003\125\004\012\023\011\124\101\111\127\101\116
\055\103\101\061\020\060\016\006\003\125\004\013\023\007\122\157
\157\164\040\103\101\061\034\060\032\006\003\125\004\003\023\023
\124\127\103\101\040\107\154\157\142\141\154\040\122\157\157\164
\040\103\101\060\036\027\015\061\062\060\066\062\067\060\066\062
\070\063\063\132\027\015\063\060\061\062\063\061\061\065\065\071
\065\071\132\060\121\061\013\060\011\006\003\125\004\006\023\002
\124\127\061\022\060\020\006\003\125\004\012\023\011\124\101\111
\127\101\116\055\103\101\061\020\060\016\006\003\125\004\013\023
\007\122\157\157\164\040\103\101\061\034\060\032\006\003\125\004
\003\023\023\124\127\103\101\040\107\154\157\142\141\154\040\122
\157\157\164\040\103\101\060\202\002\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202
\002\012\002\202\002\001\000\260\005\333\310\353\214\304\156\212
\041\357\216\115\234\161\012\037\122\160\355\155\202\234\227\305
\327\114\116\105\111\313\100\102\265\022\064\154\031\302\164\244
\061\137\205\002\227\354\103\063\012\123\322\234\214\216\267\270
\171\333\053\325\152\362\216\146\304\356\053\001\007\222\324\263
\320\002\337\120\366\125\257\146\016\313\340\107\140\057\053\062
\071\065\122\072\050\203\370\173\026\306\030\270\142\326\107\045
\221\316\360\031\022\115\255\143\365\323\077\165\137\051\360\241
\060\034\052\240\230\246\025\275\356\375\031\066\360\342\221\103
\217\372\312\326\020\047\111\114\357\335\301\361\205\160\233\312
\352\250\132\103\374\155\206\157\163\351\067\105\251\360\066\307
\314\210\165\036\273\154\006\377\233\153\076\027\354\141\252\161
\174\306\035\242\367\111\351\025\265\074\326\241\141\365\021\367
\005\157\035\375\021\276\320\060\007\302\051\260\011\116\046\334
\343\242\250\221\152\037\302\221\105\210\134\345\230\270\161\245
\025\031\311\174\165\021\314\160\164\117\055\233\035\221\104\375
\126\050\240\376\273\206\152\310\372\134\013\130\334\306\113\166
\310\253\042\331\163\017\245\364\132\002\211\077\117\236\042\202
\356\242\164\123\052\075\123\047\151\035\154\216\062\054\144\000
\046\143\141\066\116\243\106\267\077\175\263\055\254\155\220\242
\225\242\316\317\332\202\347\007\064\031\226\351\270\041\252\051
\176\246\070\276\216\051\112\041\146\171\037\263\303\265\011\147
\336\326\324\007\106\363\052\332\346\042\067\140\313\201\266\017
\240\017\351\310\225\177\277\125\221\005\172\317\075\025\300\157
\336\011\224\001\203\327\064\033\314\100\245\360\270\233\147\325
\230\221\073\247\204\170\225\046\244\132\010\370\053\164\264\000
\004\074\337\270\024\216\350\337\251\215\154\147\222\063\035\300
\267\322\354\222\310\276\011\277\054\051\005\157\002\153\236\357
\274\277\052\274\133\300\120\217\101\160\161\207\262\115\267\004
\251\204\243\062\257\256\356\153\027\213\262\261\376\154\341\220
\214\210\250\227\110\316\310\115\313\363\006\317\137\152\012\102
\261\036\036\167\057\216\240\346\222\016\006\374\005\042\322\046
\341\061\121\175\062\334\017\002\003\001\000\001\243\043\060\041

\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000
\003\202\002\001\000\137\064\201\166\357\226\035\325\345\265\331
\002\143\204\026\301\256\240\160\121\247\367\114\107\065\310\013
\327\050\075\211\161\331\252\063\101\352\024\033\154\041\000\300
\154\102\031\176\237\151\133\040\102\337\242\322\332\304\174\227
\113\215\260\350\254\310\356\245\151\004\231\012\222\246\253\047
\056\032\115\201\277\204\324\160\036\255\107\376\375\112\235\063
\340\362\271\304\105\010\041\012\332\151\151\163\162\015\276\064
\376\224\213\255\303\036\065\327\242\203\357\345\070\307\245\205
\037\253\317\064\354\077\050\376\014\361\127\206\116\311\125\367
\034\324\330\245\175\006\172\157\325\337\020\337\201\116\041\145
\261\266\341\027\171\225\105\006\316\137\314\334\106\211\143\150
\104\215\223\364\144\160\240\075\235\050\005\303\071\160\270\142
\173\040\375\344\333\351\010\241\270\236\075\011\307\117\373\054
\370\223\166\101\336\122\340\341\127\322\235\003\274\167\236\376
\236\051\136\367\301\121\140\037\336\332\013\262\055\165\267\103
\110\223\347\366\171\306\204\135\200\131\140\224\374\170\230\217
\074\223\121\355\100\220\007\337\144\143\044\313\116\161\005\241
\327\224\032\210\062\361\042\164\042\256\245\246\330\022\151\114
\140\243\002\356\053\354\324\143\222\013\136\276\057\166\153\243
\266\046\274\217\003\330\012\362\114\144\106\275\071\142\345\226
\353\064\143\021\050\314\225\361\255\357\357\334\200\130\110\351
\113\270\352\145\254\351\374\200\265\265\310\105\371\254\301\237
\331\271\352\142\210\216\304\361\113\203\022\255\346\213\204\326
\236\302\353\203\030\237\152\273\033\044\140\063\160\314\354\367
\062\363\134\331\171\175\357\236\244\376\311\043\303\044\356\025
\222\261\075\221\117\046\206\275\146\163\044\023\352\244\256\143
\301\255\175\204\003\074\020\170\206\033\171\343\304\363\362\004
\225\040\256\043\202\304\263\072\000\142\277\346\066\044\341\127
\272\307\036\220\165\325\137\077\225\141\053\301\073\315\345\263
\150\141\320\106\046\251\041\122\151\055\353\056\307\353\167\316
\246\072\265\003\063\117\166\321\347\134\124\001\135\313\170\364
\311\014\277\317\022\216\027\055\043\150\224\347\253\376\251\262
\053\006\320\004\315
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "TWCA Global Root CA"
# Issuer: CN=TWCA Global Root CA,OU=Root CA,O=TAIWAN-CA,C=TW
# Serial Number: 3262 (0xcbe)
# Subject: CN=TWCA Global Root CA,OU=Root CA,O=TAIWAN-CA,C=TW
# Not Valid Before: Wed Jun 27 06:28:33 2012
# Not Valid After : Tue Dec 31 15:59:59 2030

```
# Fingerprint (SHA-256):
59:76:90:07:F7:68:5D:0F:CD:50:87:2F:9F:95:D5:75:5A:5B:2B:45:7D:81:F3:69:2B:61:0A:98:67:2F:0E:1B
# Fingerprint (SHA1): 9C:BB:48:53:F6:A4:F6:D3:52:A4:E8:32:52:55:60:13:F5:AD:AF:65
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TWCA Global Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\234\273\110\123\366\244\366\323\122\244\350\062\122\125\140\023
\365\255\257\145
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\371\003\176\317\346\236\074\163\172\052\220\007\151\377\053\226
END
CKA_ISSUER MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\022\060\020\006\003\125\004\012\023\011\124\101\111\127\101\116
\055\103\101\061\020\060\016\006\003\125\004\013\023\007\122\157
\157\164\040\103\101\061\034\060\032\006\003\125\004\003\023\023
\124\127\103\101\040\107\154\157\142\141\154\040\122\157\157\164
\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\002\014\276
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "TeliaSonera Root CA v1"
#
# Issuer: CN=TeliaSonera Root CA v1,O=TeliaSonera
# Serial Number:00:95:be:16:a0:f7:2e:46:f1:7b:39:82:72:fa:8b:cd:96
# Subject: CN=TeliaSonera Root CA v1,O=TeliaSonera
#
 Not Valid Before: Thu Oct 18 12:00:50 2007
# Not Valid After : Mon Oct 18 12:00:50 2032
# Fingerprint (SHA-256):
DD:69:36:FE:21:F8:F0:77:C1:23:A1:A5:21:C1:22:24:F7:22:55:B7:3E:03:A7:26:06:93:E8:A2:4B:0F:A3:89
# Fingerprint (SHA1): 43:13:BB:96:F1:D5:86:9B:C1:4E:6A:92:F6:CF:F6:34:69:87:82:37
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
```

```
CKA_LABEL UTF8 "TeliaSonera Root CA v1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\067\061\024\060\022\006\003\125\004\012\014\013\124\145\154
\151\141\123\157\156\145\162\141\061\037\060\035\006\003\125\004
\003\014\026\124\145\154\151\141\123\157\156\145\162\141\040\122
\157\157\164\040\103\101\040\166\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\067\061\024\060\022\006\003\125\004\012\014\013\124\145\154
\151\141\123\157\156\145\162\141\061\037\060\035\006\003\125\004
\003\014\026\124\145\154\151\141\123\157\156\145\162\141\040\122
\157\157\164\040\103\101\040\166\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\021\000\225\276\026\240\367\056\106\361\173\071\202\162\372
\213\315\226
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\070\060\202\003\040\240\003\002\001\002\002\021\000
\225\276\026\240\367\056\106\361\173\071\202\162\372\213\315\226
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\067\061\024\060\022\006\003\125\004\012\014\013\124\145\154\151
\141\123\157\156\145\162\141\061\037\060\035\006\003\125\004\003
\014\026\124\145\154\151\141\123\157\156\145\162\141\040\122\157
\157\164\040\103\101\040\166\061\060\036\027\015\060\067\061\060
\061\070\061\062\060\060\065\060\132\027\015\063\062\061\060\061
\070\061\062\060\060\065\060\132\060\067\061\024\060\022\006\003
\125\004\012\014\013\124\145\154\151\141\123\157\156\145\162\141
\061\037\060\035\006\003\125\004\003\014\026\124\145\154\151\141
\123\157\156\145\162\141\040\122\157\157\164\040\103\101\040\166
\061\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002
\001\000\302\276\353\047\360\041\243\363\151\046\125\176\235\305
\125\026\221\134\375\357\041\277\123\200\172\055\322\221\214\143
\061\360\354\044\360\303\245\322\162\174\020\155\364\067\267\345
\346\174\171\352\214\265\202\213\256\110\266\254\000\334\145\165
\354\052\115\137\301\207\365\040\145\053\201\250\107\076\211\043
\225\060\026\220\177\350\127\007\110\347\031\256\277\105\147\261
\067\033\006\052\376\336\371\254\175\203\373\136\272\344\217\227
\147\276\113\216\215\144\007\127\070\125\151\064\066\075\023\110
\357\117\342\323\146\036\244\317\032\267\136\066\063\324\264\006
\275\030\001\375\167\204\120\000\105\365\214\135\350\043\274\176
\376\065\341\355\120\173\251\060\215\031\323\011\216\150\147\135
\277\074\227\030\123\273\051\142\305\312\136\162\301\307\226\324
\333\055\240\264\037\151\003\354\352\342\120\361\014\074\360\254
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\363\123\055\360\034\365\355\154\071\071\163\200\026\310\122\260
\043\315\340\076\334\335\074\107\240\273\065\212\342\230\150\213
\276\345\277\162\356\322\372\245\355\022\355\374\230\030\251\046
\166\334\050\113\020\040\034\323\177\026\167\055\355\157\200\367
\111\273\123\005\273\135\150\307\324\310\165\026\077\211\132\213
\367\027\107\324\114\361\322\211\171\076\115\075\230\250\141\336
\072\036\322\370\136\003\340\301\311\034\214\323\215\115\323\225
\066\263\067\137\143\143\233\063\024\360\055\046\153\123\174\211
\214\062\302\156\354\075\041\000\071\311\241\150\342\120\203\056
\260\072\053\363\066\240\254\057\344\157\141\302\121\011\071\076
\213\123\271\273\147\332\334\123\271\166\131\066\235\103\345\040
\340\075\062\140\205\042\121\267\307\063\273\335\025\057\244\170
\246\007\173\201\106\066\004\206\335\171\065\307\225\054\073\260
\243\027\065\345\163\037\264\134\131\357\332\352\020\145\173\172
\320\177\237\263\264\052\067\073\160\213\233\133\271\053\267\354
\262\121\022\227\123\051\132\324\360\022\020\334\117\002\273\022
\222\057\142\324\077\151\103\174\015\326\374\130\165\001\210\235
\130\026\113\336\272\220\377\107\001\211\006\152\366\137\262\220
\152\263\002\246\002\210\277\263\107\176\052\331\325\372\150\170
\065\115\002\003\001\000\001\243\077\060\075\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\013\006\003
\125\035\017\004\004\003\002\001\006\060\035\006\003\125\035\016
\004\026\004\024\360\217\131\070\000\263\365\217\232\226\014\325
\353\372\173\252\027\350\023\022\060\015\006\011\052\206\110\206
\367\015\001\001\005\005\000\003\202\002\001\000\276\344\134\142
\116\044\364\014\010\377\360\323\014\150\344\223\111\042\077\104
\047\157\273\155\336\203\146\316\250\314\015\374\365\232\006\345
\167\024\221\353\235\101\173\231\052\204\345\377\374\041\301\135
\360\344\037\127\267\165\251\241\137\002\046\377\327\307\367\116
\336\117\370\367\034\106\300\172\117\100\054\042\065\360\031\261
\320\153\147\054\260\250\340\300\100\067\065\366\204\134\134\343
\257\102\170\376\247\311\015\120\352\015\204\166\366\121\357\203
\123\306\172\377\016\126\111\056\217\172\326\014\346\047\124\343
\115\012\140\162\142\315\221\007\326\245\277\310\231\153\355\304
\031\346\253\114\021\070\305\157\061\342\156\111\310\077\166\200
\046\003\046\051\340\066\366\366\040\123\343\027\160\064\027\235
\143\150\036\153\354\303\115\206\270\023\060\057\135\106\015\107
\103\325\033\252\131\016\271\134\215\006\110\255\164\207\137\307
\374\061\124\101\023\342\307\041\016\236\340\036\015\341\300\173
\103\205\220\305\212\130\306\145\012\170\127\362\306\043\017\001
\331\040\113\336\017\373\222\205\165\052\134\163\215\155\173\045
\221\312\356\105\256\006\113\000\314\323\261\131\120\332\072\210
\073\051\103\106\136\227\053\124\316\123\157\215\112\347\226\372
\277\161\016\102\213\174\375\050\240\320\110\312\332\304\201\114
\273\242\163\223\046\310\353\014\326\046\210\266\300\044\317\273
\275\133\353\165\175\351\010\216\206\063\054\171\167\011\151\245
\211\374\263\160\220\207\166\217\323\042\273\102\316\275\163\013
\040\046\052\320\233\075\160\036\044\154\315\207\166\251\027\226

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\267\317\015\222\373\216\030\251\230\111\321\236\376\140\104\162
\041\271\031\355\302\365\061\361\071\110\210\220\044\165\124\026
\255\316\364\370\151\024\144\071\373\243\270\272\160\100\307\047
\034\277\304\126\123\372\143\145\320\363\034\016\026\365\153\206
\130\115\030\324\344\015\216\245\235\133\221\334\166\044\120\077
\306\052\373\331\267\234\265\326\346\320\331\350\031\213\025\161
\110\255\267\352\330\131\210\324\220\277\026\263\331\351\254\131
\141\124\310\034\272\312\301\312\341\271\040\114\217\072\223\211
\245\240\314\277\323\366\165\244\165\226\155\126
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "TeliaSonera Root CA v1"
# Issuer: CN=TeliaSonera Root CA v1,O=TeliaSonera
# Serial Number:00:95:be:16:a0:f7:2e:46:f1:7b:39:82:72:fa:8b:cd:96
# Subject: CN=TeliaSonera Root CA v1,O=TeliaSonera
#
 Not Valid Before: Thu Oct 18 12:00:50 2007
# Not Valid After : Mon Oct 18 12:00:50 2032
# Fingerprint (SHA-256):
DD:69:36:FE:21:F8:F0:77:C1:23:A1:A5:21:C1:22:24:F7:22:55:B7:3E:03:A7:26:06:93:E8:A2:4B:0F:A3:89
# Fingerprint (SHA1): 43:13:BB:96:F1:D5:86:9B:C1:4E:6A:92:F6:CF:F6:34:69:87:82:37
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TeliaSonera Root CA v1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\103\023\273\226\361\325\206\233\301\116\152\222\366\317\366\064
\151\207\202\067
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\067\101\111\033\030\126\232\046\365\255\302\146\373\100\245\114
END
CKA_ISSUER MULTILINE_OCTAL
\060\067\061\024\060\022\006\003\125\004\012\014\013\124\145\154
\151\141\123\157\156\145\162\141\061\037\060\035\006\003\125\004
\003\014\026\124\145\154\151\141\123\157\156\145\162\141\040\122
\157\157\164\040\103\101\040\166\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\225\276\026\240\367\056\106\361\173\071\202\162\372
\213\315\226
END
CKA_TRUST_SERVER_AUTH
```

CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "T-TeleSec GlobalRoot Class 2"
#
# Issuer: CN=T-TeleSec GlobalRoot Class 2,OU=T-Systems Trust Center,O=T-Systems Enterprise Services GmbH,C=DE
# Serial Number: 1 (0x1)
# Subject: CN=T-TeleSec GlobalRoot Class 2,OU=T-Systems Trust Center,O=T-Systems Enterprise Services GmbH,C=DE
# Not Valid Before: Wed Oct 01 10:40:14 2008
# Not Valid After : Sat Oct 01 23:59:59 2033
# Fingerprint (SHA-256):
91:E2:F5:78:8D:58:10:EB:A7:BA:58:73:7D:E1:54:8A:8E:CA:CD:01:45:98:BC:0B:14:3E:04:1B:17:05:25:52
# Fingerprint (SHA1): 59:0D:2D:7D:88:4F:40:2E:61:7E:A5:62:32:17:65:CF:17:D8:94:E9
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL
CK_FALSE
CKA_LABEL UTF8 "T-TeleSec GlobalRoot Class 2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\053\060\051\006\003\125\004\012\014\042\124\055\123\171\163
\164\145\155\163\040\105\156\164\145\162\160\162\151\163\145\040
\123\145\162\166\151\143\145\163\040\107\155\142\110\061\037\060
\035\006\003\125\004\013\014\026\124\055\123\171\163\164\145\155
\163\040\124\162\165\163\164\040\103\145\156\164\145\162\061\045
\060\043\006\003\125\004\003\014\034\124\055\124\145\154\145\123
\145\143\040\107\154\157\142\141\154\122\157\157\164\040\103\154
\141\163\163\040\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\053\060\051\006\003\125\004\012\014\042\124\055\123\171\163
\164\145\155\163\040\105\156\164\145\162\160\162\151\163\145\040
\123\145\162\166\151\143\145\163\040\107\155\142\110\061\037\060
\035\006\003\125\004\013\014\026\124\055\123\171\163\164\145\155
\163\040\124\162\165\163\164\040\103\145\156\164\145\162\061\045
\060\043\006\003\125\004\003\014\034\124\055\124\145\154\145\123
\145\143\040\107\154\157\142\141\154\122\157\157\164\040\103\154
\141\163\163\040\062
END

CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\303\060\202\002\253\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\201\202\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\053\060\051\006\003\125\004\012\014\042\124\055\123\171\163\164
\145\155\163\040\105\156\164\145\162\160\162\151\163\145\040\123
\145\162\166\151\143\145\163\040\107\155\142\110\061\037\060\035
\006\003\125\004\013\014\026\124\055\123\171\163\164\145\155\163
\040\124\162\165\163\164\040\103\145\156\164\145\162\061\045\060
\043\006\003\125\004\003\014\034\124\055\124\145\154\145\123\145
\143\040\107\154\157\142\141\154\122\157\157\164\040\103\154\141
\163\163\040\062\060\036\027\015\060\070\061\060\060\061\061\060
\064\060\061\064\132\027\015\063\063\061\060\060\061\062\063\065
\071\065\071\132\060\201\202\061\013\060\011\006\003\125\004\006
\023\002\104\105\061\053\060\051\006\003\125\004\012\014\042\124
\055\123\171\163\164\145\155\163\040\105\156\164\145\162\160\162
\151\163\145\040\123\145\162\166\151\143\145\163\040\107\155\142
\110\061\037\060\035\006\003\125\004\013\014\026\124\055\123\171
\163\164\145\155\163\040\124\162\165\163\164\040\103\145\156\164
\145\162\061\045\060\043\006\003\125\004\003\014\034\124\055\124
\145\154\145\123\145\143\040\107\154\157\142\141\154\122\157\157
\164\040\103\154\141\163\163\040\062\060\202\001\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017
\000\060\202\001\012\002\202\001\001\000\252\137\332\033\137\350
\163\221\345\332\134\364\242\346\107\345\363\150\125\140\005\035
\002\244\263\233\131\363\036\212\257\064\255\374\015\302\331\110
\031\356\151\217\311\040\374\041\252\007\031\355\260\134\254\145
\307\137\355\002\174\173\174\055\033\326\272\271\200\302\030\202
\026\204\372\146\260\010\306\124\043\201\344\315\271\111\077\366
\117\156\067\110\050\070\017\305\276\347\150\160\375\071\227\115
\322\307\230\221\120\252\304\104\263\043\175\071\107\351\122\142
\326\022\223\136\267\061\226\102\005\373\166\247\036\243\365\302
\374\351\172\305\154\251\161\117\352\313\170\274\140\257\307\336
\364\331\313\276\176\063\245\156\224\203\360\064\372\041\253\352
\216\162\240\077\244\336\060\133\357\206\115\152\225\133\103\104
\250\020\025\034\345\001\127\305\230\361\346\006\050\221\252\040
\305\267\123\046\121\103\262\013\021\225\130\341\300\017\166\331
\300\215\174\201\363\162\160\236\157\376\032\216\331\137\065\306
\262\157\064\174\276\110\117\342\132\071\327\330\235\170\236\237
\206\076\003\136\031\213\104\242\325\307\002\003\001\000\001\243
\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\035\006\003\125\035\016\004\026\004\024\277
\131\040\066\000\171\240\240\042\153\214\325\362\141\322\270\054

\313\202\112\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\003\202\001\001\000\061\003\242\141\013\037\164\350\162
\066\306\155\371\115\236\372\042\250\341\201\126\317\315\273\237
\352\253\221\031\070\257\252\174\025\115\363\266\243\215\245\364
\216\366\104\251\247\350\041\225\255\076\000\142\026\210\360\002
\272\374\141\043\346\063\233\060\172\153\066\142\173\255\004\043
\204\130\145\342\333\053\212\347\045\123\067\142\123\137\274\332
\001\142\051\242\246\047\161\346\072\042\176\301\157\035\225\160
\040\112\007\064\337\352\377\025\200\345\272\327\172\330\133\165
\174\005\172\051\107\176\100\250\061\023\167\315\100\073\264\121
\107\172\056\021\343\107\021\336\235\146\320\213\325\124\146\372
\203\125\352\174\302\051\211\033\351\157\263\316\342\005\204\311
\057\076\170\205\142\156\311\137\301\170\143\164\130\300\110\030
\014\231\071\353\244\314\032\265\171\132\215\025\234\330\024\015
\366\172\007\127\307\042\203\005\055\074\233\045\046\075\030\263
\251\103\174\310\310\253\144\217\016\243\277\234\033\235\060\333
\332\320\031\056\252\074\361\373\063\200\166\344\315\255\031\117
\005\047\216\023\241\156\302
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "T-TeleSec GlobalRoot Class 2"
# Issuer: CN=T-TeleSec GlobalRoot Class 2,OU=T-Systems Trust Center,O=T-Systems Enterprise Services GmbH,C=DE
# Serial Number: 1 (0x1)
# Subject: CN=T-TeleSec GlobalRoot Class 2,OU=T-Systems Trust Center,O=T-Systems Enterprise Services GmbH,C=DE
# Not Valid Before: Wed Oct 01 10:40:14 2008
# Not Valid After : Sat Oct 01 23:59:59 2033
# Fingerprint (SHA-256):
91:E2:F5:78:8D:58:10:EB:A7:BA:58:73:7D:E1:54:8A:8E:CA:CD:01:45:98:BC:0B:14:3E:04:1B:17:05:25:52
# Fingerprint (SHA1): 59:0D:2D:7D:88:4F:40:2E:61:7E:A5:62:32:17:65:CF:17:D8:94:E9
CKA_CLASS
 CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "T-TeleSec GlobalRoot Class 2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\131\015\055\175\210\117\100\056\141\176\245\142\062\027\145\317
\027\330\224\351
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\053\233\236\344\173\154\037\000\162\032\314\301\167\171\337\152
END

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CKA_ISSUER MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\053\060\051\006\003\125\004\012\014\042\124\055\123\171\163
\164\145\155\163\040\105\156\164\145\162\160\162\151\163\145\040
\123\145\162\166\151\143\145\163\040\107\155\142\110\061\037\060
\035\006\003\125\004\013\014\026\124\055\123\171\163\164\145\155
\163\040\124\162\165\163\164\040\103\145\156\164\145\162\061\045
\060\043\006\003\125\004\003\014\034\124\055\124\145\154\145\123
\145\143\040\107\154\157\142\141\154\122\157\157\164\040\103\154
\141\163\163\040\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Atos TrustedRoot 2011"
#
# Issuer: C=DE,O=Atos,CN=Atos TrustedRoot 2011
# Serial Number:5c:33:cb:62:2c:5f:b3:32
# Subject: C=DE,O=Atos,CN=Atos TrustedRoot 2011
# Not Valid Before: Thu Jul 07 14:58:30 2011
# Not Valid After : Tue Dec 31 23:59:59 2030
# Fingerprint (SHA-256):
F3:56:BE:A2:44:B7:A9:1E:B3:5D:53:CA:9A:D7:86:4A:CE:01:8E:2D:35:D5:F8:F9:6D:DF:68:A6:F4:1A:A4:74
# Fingerprint (SHA1): 2B:B1:F5:3E:55:0C:1D:C5:F1:D4:E6:B7:6A:46:4B:55:06:02:AC:21
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Atos TrustedRoot 2011"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\074\061\036\060\034\006\003\125\004\003\014\025\101\164\157
\163\040\124\162\165\163\164\145\144\122\157\157\164\040\062\060
\061\061\061\015\060\013\006\003\125\004\012\014\004\101\164\157
\163\061\013\060\011\006\003\125\004\006\023\002\104\105
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\074\061\036\060\034\006\003\125\004\003\014\025\101\164\157
\163\040\124\162\165\163\164\145\144\122\157\157\164\040\062\060
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\061\061\061\015\060\013\006\003\125\004\012\014\004\101\164\157
\163\061\013\060\011\006\003\125\004\006\023\002\104\105
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\134\063\313\142\054\137\263\062
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\167\060\202\002\137\240\003\002\001\002\002\010\134
\063\313\142\054\137\263\062\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\074\061\036\060\034\006\003\125\004
\003\014\025\101\164\157\163\040\124\162\165\163\164\145\144\122
\157\157\164\040\062\060\061\061\061\015\060\013\006\003\125\004
\012\014\004\101\164\157\163\061\013\060\011\006\003\125\004\006
\023\002\104\105\060\036\027\015\061\061\060\067\060\067\061\064
\065\070\063\060\132\027\015\063\060\061\062\063\061\062\063\065
\071\065\071\132\060\074\061\036\060\034\006\003\125\004\003\014
\025\101\164\157\163\040\124\162\165\163\164\145\144\122\157\157
\164\040\062\060\061\061\061\015\060\013\006\003\125\004\012\014
\004\101\164\157\163\061\013\060\011\006\003\125\004\006\023\002
\104\105\060\202\001\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202
\001\001\000\225\205\073\227\157\052\073\056\073\317\246\363\051
\065\276\317\030\254\076\252\331\370\115\240\076\032\107\271\274
\232\337\362\376\314\076\107\350\172\226\302\044\216\065\364\251
\014\374\202\375\155\301\162\142\047\275\352\153\353\347\212\314
\124\076\220\120\317\200\324\225\373\350\265\202\324\024\305\266
\251\125\045\127\333\261\120\366\260\140\144\131\172\151\317\003
\267\157\015\276\312\076\157\164\162\352\252\060\052\163\142\276
\111\221\141\310\021\376\016\003\052\367\152\040\334\002\025\015
\136\025\152\374\343\202\301\265\305\235\144\011\154\243\131\230
\007\047\307\033\226\053\141\164\161\154\103\361\367\065\211\020
\340\236\354\125\241\067\042\242\207\004\005\054\107\175\264\034
\271\142\051\146\050\312\267\341\223\365\244\224\003\231\271\160
\205\265\346\110\352\215\120\374\331\336\314\157\007\016\335\013
\162\235\200\060\026\007\225\077\050\016\375\305\165\117\123\326
\164\232\264\044\056\216\002\221\317\166\305\233\036\125\164\234
\170\041\261\360\055\361\013\237\302\325\226\030\037\360\124\042
\172\214\007\002\003\001\000\001\243\175\060\173\060\035\006\003
\125\035\016\004\026\004\024\247\245\006\261\054\246\011\140\356
\321\227\351\160\256\274\073\031\154\333\041\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\037\006\003
\125\035\043\004\030\060\026\200\024\247\245\006\261\054\246\011
\140\356\321\227\351\160\256\274\073\031\154\333\041\060\030\006
\003\125\035\040\004\021\060\017\060\015\006\013\053\006\001\004
\001\260\055\003\004\001\001\060\016\006\003\125\035\017\001\001
\377\004\004\003\002\001\206\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\003\202\001\001\000\046\167\064\333\224
\110\206\052\101\235\054\076\006\220\140\304\214\254\013\124\270

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\037\271\173\323\007\071\344\372\076\173\262\075\116\355\237\043
\275\227\363\153\134\357\356\375\100\246\337\241\223\241\012\206
\254\357\040\320\171\001\275\170\367\031\330\044\061\064\004\001
\246\272\025\232\303\047\334\330\117\017\314\030\143\377\231\017
\016\221\153\165\026\341\041\374\330\046\307\107\267\246\317\130
\162\161\176\272\341\115\225\107\073\311\257\155\241\264\301\354
\211\366\264\017\070\265\342\144\334\045\317\246\333\353\232\134
\231\241\305\010\336\375\346\332\325\326\132\105\014\304\267\302
\265\024\357\264\021\377\016\025\265\365\365\333\306\275\353\132
\247\360\126\042\251\074\145\124\306\025\250\275\206\236\315\203
\226\150\172\161\201\211\341\013\341\352\021\033\150\010\314\151
\236\354\236\101\236\104\062\046\172\342\207\012\161\075\353\344
\132\244\322\333\305\315\306\336\140\177\271\363\117\104\222\357
\052\267\030\076\247\031\331\013\175\261\067\101\102\260\272\140
\035\362\376\011\021\260\360\207\173\247\235
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Atos TrustedRoot 2011"
# Issuer: C=DE,O=Atos,CN=Atos TrustedRoot 2011
# Serial Number:5c:33:cb:62:2c:5f:b3:32
# Subject: C=DE,O=Atos,CN=Atos TrustedRoot 2011
# Not Valid Before: Thu Jul 07 14:58:30 2011
# Not Valid After : Tue Dec 31 23:59:59 2030
# Fingerprint (SHA-256):
F3:56:BE:A2:44:B7:A9:1E:B3:5D:53:CA:9A:D7:86:4A:CE:01:8E:2D:35:D5:F8:F9:6D:DF:68:A6:F4:1A:A4:74
# Fingerprint (SHA1): 2B:B1:F5:3E:55:0C:1D:C5:F1:D4:E6:B7:6A:46:4B:55:06:02:AC:21
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8
 "Atos TrustedRoot 2011"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\053\261\365\076\125\014\035\305\361\324\346\267\152\106\113\125
\006\002\254\041
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\256\271\304\062\113\254\177\135\146\314\167\224\273\052\167\126
END
CKA_ISSUER MULTILINE_OCTAL
\060\074\061\036\060\034\006\003\125\004\003\014\025\101\164\157
\163\040\124\162\165\163\164\145\144\122\157\157\164\040\062\060
\061\061\061\015\060\013\006\003\125\004\012\014\004\101\164\157
\163\061\013\060\011\006\003\125\004\006\023\002\104\105
```

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END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\134\063\313\142\054\137\263\062
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "QuoVadis Root CA 1 G3"
#
# Issuer: CN=QuoVadis Root CA 1 G3,O=QuoVadis Limited,C=BM
# Serial Number:78:58:5f:2e:ad:2c:19:4b:e3:37:07:35:34:13:28:b5:96:d4:65:93
#
 Subject: CN=QuoVadis Root CA 1 G3,O=QuoVadis Limited,C=BM
# Not Valid Before: Thu Jan 12 17:27:44 2012
# Not Valid After : Sun Jan 12 17:27:44 2042
# Fingerprint (SHA-256):
8A:86:6F:D1:B2:76:B5:7E:57:8E:92:1C:65:82:8A:2B:ED:58:E9:F2:F2:88:05:41:34:B7:F1:F4:BF:C9:CC:74
# Fingerprint (SHA1): 1B:8E:EA:57:96:29:1A:C9:39:EA:B8:0A:81:1A:73:73:C0:93:79:67
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root CA 1 G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\061\040\107\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\061\040\107\063
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\024\170\130\137\056\255\054\031\113\343\067\007\065\064\023
\050\265\226\324\145\223
END
CKA_VALUE MULTILINE_OCTAL
```

\060\202\005\140\060\202\003\110\240\003\002\001\002\002\024\170
\130\137\056\255\054\031\113\343\067\007\065\064\023\050\265\226
\324\145\223\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\110\061\013\060\011\006\003\125\004\006\023\002\102
\115\061\031\060\027\006\003\125\004\012\023\020\121\165\157\126
\141\144\151\163\040\114\151\155\151\164\145\144\061\036\060\034
\006\003\125\004\003\023\025\121\165\157\126\141\144\151\163\040
\122\157\157\164\040\103\101\040\061\040\107\063\060\036\027\015
\061\062\060\061\061\062\061\067\062\067\064\064\132\027\015\064
\062\060\061\061\062\061\067\062\067\064\064\132\060\110\061\013
\060\011\006\003\125\004\006\023\002\102\115\061\031\060\027\006
\003\125\004\012\023\020\121\165\157\126\141\144\151\163\040\114
\151\155\151\164\145\144\061\036\060\034\006\003\125\004\003\023
\025\121\165\157\126\141\144\151\163\040\122\157\157\164\040\103
\101\040\061\040\107\063\060\202\002\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202
\002\012\002\202\002\001\000\240\276\120\020\216\351\362\154\100
\264\004\234\205\271\061\312\334\055\344\021\251\004\074\033\125
\301\347\130\060\035\044\264\303\357\205\336\214\054\341\301\075
\337\202\346\117\255\107\207\154\354\133\111\301\112\325\273\217
\354\207\254\177\202\232\206\354\075\003\231\122\001\322\065\236
\254\332\360\123\311\146\074\324\254\002\001\332\044\323\073\250
\002\106\257\244\034\343\370\163\130\166\267\366\016\220\015\265
\360\317\314\372\371\306\114\345\303\206\060\012\215\027\176\065
\353\305\337\273\016\234\300\215\207\343\210\070\205\147\372\076
\307\253\340\023\234\005\030\230\317\223\365\261\222\264\374\043
\323\317\325\304\047\111\340\236\074\233\010\243\213\135\052\041
\340\374\071\252\123\332\175\176\317\032\011\123\274\135\005\004
\317\241\112\217\213\166\202\015\241\370\322\307\024\167\133\220
\066\007\201\233\076\006\372\122\136\143\305\246\000\376\245\351
\122\033\122\265\222\071\162\003\011\142\275\260\140\026\156\246
\335\045\302\003\146\335\363\004\321\100\342\116\213\206\364\157
\345\203\240\047\204\136\004\301\365\220\275\060\075\304\357\250
\151\274\070\233\244\244\226\321\142\332\151\300\001\226\256\313
\304\121\064\352\014\252\377\041\216\131\217\112\134\344\141\232
\247\322\351\052\170\215\121\075\072\025\356\242\131\216\251\134
\336\305\371\220\042\345\210\105\161\335\221\231\154\172\237\075
\075\230\174\136\366\276\026\150\240\136\256\013\043\374\132\017
\252\042\166\055\311\241\020\035\344\323\104\043\220\210\237\306
\052\346\327\365\232\263\130\036\057\060\211\010\033\124\242\265
\230\043\354\010\167\034\225\135\141\321\313\211\234\137\242\112
\221\232\357\041\252\111\026\010\250\275\141\050\061\311\164\255
\205\366\331\305\261\213\321\345\020\062\115\137\213\040\072\074
\111\037\063\205\131\015\333\313\011\165\103\151\163\373\153\161
\175\360\337\304\114\175\306\243\056\310\225\171\313\163\242\216
\116\115\044\373\136\344\004\276\162\033\246\047\055\111\132\231
\172\327\134\011\040\267\177\224\271\117\361\015\034\136\210\102
\033\021\267\347\221\333\236\154\364\152\337\214\006\230\003\255

\314\050\357\245\107\363\123\002\003\001\000\001\243\102\060\100
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\006\060\035\006\003\125\035\016\004\026\004\024\243\227\326\363
\136\242\020\341\253\105\237\074\027\144\074\356\001\160\234\314
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003
\202\002\001\000\030\372\133\165\374\076\172\307\137\167\307\312
\337\317\137\303\022\304\100\135\324\062\252\270\152\327\325\025
\025\106\230\043\245\346\220\133\030\231\114\343\255\102\243\202
\061\066\210\315\351\373\304\004\226\110\213\001\307\215\001\317
\133\063\006\226\106\146\164\035\117\355\301\266\271\264\015\141
\314\143\176\327\056\167\214\226\034\052\043\150\153\205\127\166
\160\063\023\376\341\117\246\043\167\030\372\032\214\350\275\145
\311\317\077\364\311\027\334\353\307\274\300\004\056\055\106\057
\151\146\303\033\217\376\354\076\323\312\224\277\166\012\045\015
\251\173\002\034\251\320\073\137\013\300\201\072\075\144\341\277
\247\055\116\275\115\304\330\051\306\042\030\320\305\254\162\002
\202\077\252\072\242\072\042\227\061\335\010\143\303\165\024\271
\140\050\055\133\150\340\026\251\146\202\043\121\365\353\123\330
\061\233\173\351\267\235\113\353\210\026\317\371\135\070\212\111
\060\217\355\361\353\031\364\167\032\061\030\115\147\124\154\057
\157\145\371\333\075\354\041\354\136\364\364\213\312\140\145\124
\321\161\144\364\371\246\243\201\063\066\063\161\360\244\170\137
\116\255\203\041\336\064\111\215\350\131\254\235\362\166\132\066
\362\023\364\257\340\011\307\141\052\154\367\340\235\256\273\206
\112\050\157\056\356\264\171\315\220\063\303\263\166\372\365\360
\154\235\001\220\372\236\220\366\234\162\317\107\332\303\037\344
\065\040\123\362\124\321\337\141\203\246\002\342\045\070\336\205
\062\055\136\163\220\122\135\102\304\316\075\113\341\371\031\204
\035\325\242\120\314\101\373\101\024\303\275\326\311\132\243\143
\146\002\200\275\005\072\073\107\234\354\000\046\114\365\210\121
\277\250\043\177\030\007\260\013\355\213\046\241\144\323\141\112
\353\134\237\336\263\257\147\003\263\037\335\155\135\151\150\151
\253\136\072\354\174\151\274\307\073\205\116\236\025\271\264\025
\117\303\225\172\130\327\311\154\351\154\271\363\051\143\136\264
\054\360\055\075\355\132\145\340\251\133\100\302\110\231\201\155
\236\037\006\052\074\022\264\213\017\233\242\044\360\246\215\326
\172\340\113\266\144\226\143\225\204\302\112\315\034\056\044\207
\063\140\345\303
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "QuoVadis Root CA 1 G3"
# Issuer: CN=QuoVadis Root CA 1 G3,O=QuoVadis Limited,C=BM
# Serial Number:78:58:5f:2e:ad:2c:19:4b:e3:37:07:35:34:13:28:b5:96:d4:65:93

```
# Subject: CN=QuoVadis Root CA 1 G3,O=QuoVadis Limited,C=BM
# Not Valid Before: Thu Jan 12 17:27:44 2012
# Not Valid After : Sun Jan 12 17:27:44 2042
# Fingerprint (SHA-256):
8A:86:6F:D1:B2:76:B5:7E:57:8E:92:1C:65:82:8A:2B:ED:58:E9:F2:F2:88:05:41:34:B7:F1:F4:BF:C9:CC:74
# Fingerprint (SHA1): 1B:8E:EA:57:96:29:1A:C9:39:EA:B8:0A:81:1A:73:73:C0:93:79:67
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root CA 1 G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\033\216\352\127\226\051\032\311\071\352\270\012\201\032\163\163
\300\223\171\147
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\244\274\133\077\376\067\232\372\144\360\342\372\005\075\013\253
END
CKA_ISSUER MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\061\040\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\170\130\137\056\255\054\031\113\343\067\007\065\064\023
\050\265\226\324\145\223
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "QuoVadis Root CA 2 G3"
#
# Issuer: CN=QuoVadis Root CA 2 G3,O=QuoVadis Limited,C=BM
# Serial Number:44:57:34:24:5b:81:89:9b:35:f2:ce:b8:2b:3b:5b:a7:26:f0:75:28
# Subject: CN=QuoVadis Root CA 2 G3,O=QuoVadis Limited,C=BM
#
 Not Valid Before: Thu Jan 12 18:59:32 2012
# Not Valid After : Sun Jan 12 18:59:32 2042
# Fingerprint (SHA-256):
8F:E4:FB:0A:F9:3A:4D:0D:67:DB:0B:EB:B2:3E:37:C7:1B:F3:25:DC:BC:DD:24:0E:A0:4D:AF:58:B4:7E:18:40
# Fingerprint (SHA1): 09:3C:61:F3:8B:8B:DC:7D:55:DF:75:38:02:05:00:E1:25:F5:C8:36
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
```

CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root CA 2 G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\062\040\107\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\062\040\107\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\024\104\127\064\044\133\201\211\233\065\362\316\270\053\073
\133\247\046\360\165\050
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\140\060\202\003\110\240\003\002\001\002\002\024\104
\127\064\044\133\201\211\233\065\362\316\270\053\073\133\247\046
\360\165\050\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\110\061\013\060\011\006\003\125\004\006\023\002\102
\115\061\031\060\027\006\003\125\004\012\023\020\121\165\157\126
\141\144\151\163\040\114\151\155\151\164\145\144\061\036\060\034
\006\003\125\004\003\023\025\121\165\157\126\141\144\151\163\040
\122\157\157\164\040\103\101\040\062\040\107\063\060\036\027\015
\061\062\060\061\061\062\061\070\065\071\063\062\132\027\015\064
\062\060\061\061\062\061\070\065\071\063\062\132\060\110\061\013
\060\011\006\003\125\004\006\023\002\102\115\061\031\060\027\006
\003\125\004\012\023\020\121\165\157\126\141\144\151\163\040\114
\151\155\151\164\145\144\061\036\060\034\006\003\125\004\003\023
\025\121\165\157\126\141\144\151\163\040\122\157\157\164\040\103
\101\040\062\040\107\063\060\202\002\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202
\002\012\002\202\002\001\000\241\256\045\262\001\030\334\127\210
\077\106\353\371\257\342\353\043\161\342\232\321\141\146\041\137
\252\257\047\121\345\156\033\026\324\055\175\120\260\123\167\275
\170\072\140\342\144\002\233\174\206\233\326\032\216\255\377\037
\025\177\325\225\036\022\313\346\024\204\004\301\337\066\263\026
\237\212\343\311\333\230\064\316\330\063\027\050\106\374\247\311

\360\322\264\325\115\011\162\111\371\362\207\343\251\332\175\241
\175\153\262\072\045\251\155\122\104\254\370\276\156\373\334\246
\163\221\220\141\246\003\024\040\362\347\207\243\210\255\255\240
\214\377\246\013\045\122\045\347\026\001\325\313\270\065\201\014
\243\073\360\341\341\374\132\135\316\200\161\155\370\111\253\076
\073\272\270\327\200\001\373\245\353\133\263\305\136\140\052\061
\240\257\067\350\040\072\237\250\062\054\014\314\011\035\323\236
\216\135\274\114\230\356\305\032\150\173\354\123\246\351\024\065
\243\337\315\200\237\014\110\373\034\364\361\277\112\270\372\325
\214\161\112\307\037\255\376\101\232\263\203\135\362\204\126\357
\245\127\103\316\051\255\214\253\125\277\304\373\133\001\335\043
\041\241\130\000\216\303\320\152\023\355\023\343\022\053\200\334
\147\346\225\262\315\036\042\156\052\370\101\324\362\312\024\007
\215\212\125\022\306\151\365\270\206\150\057\123\136\260\322\252
\041\301\230\346\060\343\147\125\307\233\156\254\031\250\125\246
\105\006\320\043\072\333\353\145\135\052\021\021\360\073\117\312
\155\364\064\304\161\344\377\000\132\366\134\256\043\140\205\163
\361\344\020\261\045\256\325\222\273\023\301\014\340\071\332\264
\071\127\265\253\065\252\162\041\073\203\065\347\061\337\172\041
\156\270\062\010\175\035\062\221\025\112\142\162\317\343\167\241
\274\325\021\033\166\001\147\010\340\101\013\303\353\025\156\370
\244\031\331\242\253\257\342\047\122\126\053\002\212\054\024\044
\371\277\102\002\277\046\310\306\217\340\156\070\175\123\055\345
\355\230\263\225\143\150\177\371\065\364\337\210\305\140\065\222
\300\174\151\034\141\225\026\320\353\336\013\257\076\004\020\105
\145\130\120\070\257\110\362\131\266\026\362\074\015\220\002\306
\160\056\001\255\074\025\327\002\003\001\000\001\243\102\060\100
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\006\060\035\006\003\125\035\016\004\026\004\024\355\347\157\166
\132\277\140\354\111\133\306\245\167\273\162\026\161\233\304\075
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003
\202\002\001\000\221\337\200\077\103\011\176\161\302\367\353\263
\210\217\341\121\262\274\075\165\371\050\135\310\274\231\233\173
\135\252\345\312\341\012\367\350\262\323\237\335\147\061\176\272
\001\252\307\152\101\073\220\324\010\134\262\140\152\220\360\310
\316\003\142\371\213\355\373\156\052\334\006\115\074\051\017\211
\026\212\130\114\110\017\350\204\141\352\074\162\246\167\344\102
\256\210\243\103\130\171\176\256\312\245\123\015\251\075\160\275
\040\031\141\244\154\070\374\103\062\341\301\107\377\370\354\361
\021\042\062\226\234\302\366\133\151\226\173\040\014\103\101\232
\133\366\131\031\210\336\125\210\067\121\013\170\134\012\036\243
\102\375\307\235\210\017\300\362\170\002\044\124\223\257\211\207
\210\311\112\200\035\352\320\156\076\141\056\066\273\065\016\047
\226\375\146\064\073\141\162\163\361\026\134\107\006\124\111\000
\172\130\022\260\012\357\205\375\261\270\063\165\152\223\034\022
\346\140\136\157\035\177\311\037\043\313\204\141\237\036\202\104
\371\137\255\142\125\044\232\122\230\355\121\347\241\176\227\072

\346\057\037\021\332\123\200\054\205\236\253\065\020\333\042\137
\152\305\136\227\123\362\062\002\011\060\243\130\360\015\001\325
\162\306\261\174\151\173\303\365\066\105\314\141\156\136\114\224
\305\136\256\350\016\136\213\277\367\315\340\355\241\016\033\063
\356\124\030\376\017\276\357\176\204\153\103\343\160\230\333\135
\165\262\015\131\007\205\025\043\071\326\361\337\251\046\017\326
\110\307\263\246\042\365\063\067\132\225\107\237\173\272\030\025
\157\377\326\024\144\203\111\322\012\147\041\333\017\065\143\140
\050\042\343\261\225\203\315\205\246\335\057\017\347\147\122\156
\273\057\205\174\365\112\163\347\305\076\300\275\041\022\005\077
\374\267\003\111\002\133\310\045\346\342\124\070\365\171\207\214
\035\123\262\116\205\173\006\070\307\054\370\370\260\162\215\045
\345\167\122\364\003\034\110\246\120\137\210\040\060\156\362\202
\103\253\075\227\204\347\123\373\041\301\117\017\042\232\206\270
\131\052\366\107\075\031\210\055\350\205\341\236\354\205\010\152
\261\154\064\311\035\354\110\053\073\170\355\146\304\216\171\151
\203\336\177\214
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL
 CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "QuoVadis Root CA 2 G3"
# Issuer: CN=QuoVadis Root CA 2 G3,O=QuoVadis Limited,C=BM
# Serial Number:44:57:34:24:5b:81:89:9b:35:f2:ce:b8:2b:3b:5b:a7:26:f0:75:28
# Subject: CN=QuoVadis Root CA 2 G3,O=QuoVadis Limited,C=BM
# Not Valid Before: Thu Jan 12 18:59:32 2012
# Not Valid After : Sun Jan 12 18:59:32 2042
# Fingerprint (SHA-256):
8F:E4:FB:0A:F9:3A:4D:0D:67:DB:0B:EB:B2:3E:37:C7:1B:F3:25:DC:BC:DD:24:0E:A0:4D:AF:58:B4:7E:18:40
# Fingerprint (SHA1): 09:3C:61:F3:8B:8B:DC:7D:55:DF:75:38:02:05:00:E1:25:F5:C8:36
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root CA 2 G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\011\074\141\363\213\213\334\175\125\337\165\070\002\005\000\341
\045\365\310\066
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\257\014\206\156\277\100\055\177\013\076\022\120\272\022\075\006
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061

```
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\062\040\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\104\127\064\044\133\201\211\233\065\362\316\270\053\073
\133\247\046\360\165\050
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "QuoVadis Root CA 3 G3"
#
# Issuer: CN=QuoVadis Root CA 3 G3,O=QuoVadis Limited,C=BM
# Serial Number:2e:f5:9b:02:28:a7:db:7a:ff:d5:a3:a9:ee:bd:03:a0:cf:12:6a:1d
# Subject: CN=QuoVadis Root CA 3 G3,O=QuoVadis Limited,C=BM
# Not Valid Before: Thu Jan 12 20:26:32 2012
# Not Valid
 After : Sun Jan 12 20:26:32 2042
# Fingerprint (SHA-256):
88:EF:81:DE:20:2E:B0:18:45:2E:43:F8:64:72:5C:EA:5F:BD:1F:C2:D9:D2:05:73:07:09:C5:D8:B8:69:0F:46
# Fingerprint (SHA1): 48:12:BD:92:3C:A8:C4:39:06:E7:30:6D:27:96:E6:A4:CF:22:2E:7D
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root CA 3 G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\063\040\107\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\063\040\107\063
END
CKA_SERIAL_NUMBER
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MULTILINE_OCTAL
\002\024\056\365\233\002\050\247\333\172\377\325\243\251\356\275
\003\240\317\022\152\035
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\140\060\202\003\110\240\003\002\001\002\002\024\056
\365\233\002\050\247\333\172\377\325\243\251\356\275\003\240\317
\022\152\035\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\110\061\013\060\011\006\003\125\004\006\023\002\102
\115\061\031\060\027\006\003\125\004\012\023\020\121\165\157\126
\141\144\151\163\040\114\151\155\151\164\145\144\061\036\060\034
\006\003\125\004\003\023\025\121\165\157\126\141\144\151\163\040
\122\157\157\164\040\103\101\040\063\040\107\063\060\036\027\015
\061\062\060\061\061\062\062\060\062\066\063\062\132\027\015\064
\062\060\061\061\062\062\060\062\066\063\062\132\060\110\061\013
\060\011\006\003\125\004\006\023\002\102\115\061\031\060\027\006
\003\125\004\012\023\020\121\165\157\126\141\144\151\163\040\114
\151\155\151\164\145\144\061\036\060\034\006\003\125\004\003\023
\025\121\165\157\126\141\144\151\163\040\122\157\157\164\040\103
\101\040\063\040\107\063\060\202\002\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202
\002\012\002\202\002\001\000\263\313\016\020\147\216\352\024\227
\247\062\052\012\126\066\177\150\114\307\263\157\072\043\024\221
\377\031\177\245\312\254\356\263\166\235\172\351\213\033\253\153
\061\333\372\013\123\114\257\305\245\032\171\074\212\114\377\254
\337\045\336\116\331\202\062\013\104\336\312\333\214\254\243\156
\026\203\073\246\144\113\062\211\373\026\026\070\176\353\103\342
\323\164\112\302\142\012\163\012\335\111\263\127\322\260\012\205
\235\161\074\336\243\313\300\062\363\001\071\040\103\033\065\321
\123\263\261\356\305\223\151\202\076\026\265\050\106\241\336\352
\211\011\355\103\270\005\106\212\206\365\131\107\276\033\157\001
\041\020\271\375\251\322\050\312\020\071\011\312\023\066\317\234
\255\255\100\164\171\053\002\077\064\377\372\040\151\175\323\356
\141\365\272\263\347\060\320\067\043\206\162\141\105\051\110\131
\150\157\167\246\056\201\276\007\115\157\257\316\304\105\023\221
\024\160\006\217\037\237\370\207\151\261\016\357\303\211\031\353
\352\034\141\374\172\154\212\334\326\003\013\236\046\272\022\335
\324\124\071\253\046\243\063\352\165\201\332\055\315\017\117\344
\003\321\357\025\227\033\153\220\305\002\220\223\146\002\041\261
\107\336\213\232\112\200\271\125\217\265\242\057\300\326\063\147
\332\176\304\247\264\004\104\353\107\373\346\130\271\367\014\360
\173\053\261\300\160\051\303\100\142\055\073\110\151\334\043\074
\110\353\173\011\171\251\155\332\250\060\230\317\200\162\003\210
\246\133\106\256\162\171\174\010\003\041\145\256\267\341\034\245
\261\052\242\061\336\146\004\367\300\164\350\161\336\377\075\131
\314\226\046\022\213\205\225\127\032\253\153\165\013\104\075\021
\050\074\173\141\267\342\217\147\117\345\354\074\114\140\200\151
\127\070\036\001\133\215\125\350\307\337\300\314\167\043\064\111

\165\174\366\230\021\353\055\336\355\101\056\024\005\002\177\340
\376\040\353\065\347\021\254\042\316\127\075\336\311\060\155\020
\003\205\315\361\377\214\026\265\301\262\076\210\154\140\177\220
\117\225\367\366\055\255\001\071\007\004\372\165\200\175\277\111
\120\355\357\311\304\174\034\353\200\176\333\266\320\335\023\376
\311\323\234\327\262\227\251\002\003\001\000\001\243\102\060\100
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\006\060\035\006\003\125\035\016\004\026\004\024\306\027\320\274
\250\352\002\103\362\033\006\231\135\053\220\040\271\327\234\344
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003
\202\002\001\000\064\141\331\126\265\022\207\125\115\335\243\065
\061\106\273\244\007\162\274\137\141\142\350\245\373\013\067\261
\074\266\263\372\051\235\177\002\365\244\311\250\223\267\172\161
\050\151\217\163\341\122\220\332\325\276\072\345\267\166\152\126
\200\041\337\135\346\351\072\236\345\076\366\242\151\307\052\012
\260\030\107\334\040\160\175\122\243\076\131\174\301\272\311\310
\025\100\141\312\162\326\160\254\322\267\360\034\344\206\051\360
\316\357\150\143\320\265\040\212\025\141\232\176\206\230\264\311
\302\166\373\314\272\060\026\314\243\141\306\164\023\345\153\357
\243\025\352\003\376\023\213\144\344\323\301\322\350\204\373\111
\321\020\115\171\146\353\252\375\364\215\061\036\160\024\255\334
\336\147\023\114\201\025\141\274\267\331\221\167\161\031\201\140
\273\360\130\245\265\234\013\367\217\042\125\047\300\113\001\155
\073\231\015\324\035\233\143\147\057\320\356\015\312\146\274\224
\117\246\255\355\374\356\143\254\127\077\145\045\317\262\206\217
\320\010\377\270\166\024\156\336\345\047\354\253\170\265\123\271
\266\077\350\040\371\322\250\276\141\106\312\207\214\204\363\371
\361\240\150\233\042\036\201\046\233\020\004\221\161\300\006\037
\334\240\323\271\126\247\343\230\055\177\203\235\337\214\053\234
\062\216\062\224\360\001\074\042\052\237\103\302\056\303\230\071
\007\070\173\374\136\000\102\037\363\062\046\171\203\204\366\345
\360\301\121\022\300\013\036\004\043\014\124\245\114\057\111\305
\112\321\266\156\140\015\153\374\153\213\205\044\144\267\211\016
\253\045\107\133\074\317\176\111\275\307\351\012\306\332\367\176
\016\027\010\323\110\227\320\161\222\360\017\071\076\064\152\034
\175\330\362\042\256\273\151\364\063\264\246\110\125\321\017\016
\046\350\354\266\013\055\247\205\065\315\375\131\310\237\321\315
\076\132\051\064\271\075\204\316\261\145\324\131\221\221\126\165
\041\301\167\236\371\172\341\140\235\323\255\004\030\364\174\353
\136\223\217\123\112\042\051\370\110\053\076\115\206\254\133\177
\313\006\231\131\140\330\130\145\225\215\104\321\367\177\176\047
\177\175\256\200\365\007\114\266\076\234\161\124\231\004\113\375
\130\371\230\364
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

```
CKA_NSS_EMAIL_DISTRUST_AFTER
 CK_BBOOL CK_FALSE

# Trust for "QuoVadis Root CA 3 G3"
# Issuer: CN=QuoVadis Root CA 3 G3,O=QuoVadis Limited,C=BM
# Serial Number:2e:f5:9b:02:28:a7:db:7a:ff:d5:a3:a9:ee:bd:03:a0:cf:12:6a:1d
# Subject: CN=QuoVadis Root CA 3 G3,O=QuoVadis Limited,C=BM
# Not Valid Before: Thu Jan 12 20:26:32 2012
# Not Valid After : Sun Jan 12 20:26:32 2042
# Fingerprint (SHA-256):
88:EF:81:DE:20:2E:B0:18:45:2E:43:F8:64:72:5C:EA:5F:BD:1F:C2:D9:D2:05:73:07:09:C5:D8:B8:69:0F:46
# Fingerprint (SHA1): 48:12:BD:92:3C:A8:C4:39:06:E7:30:6D:27:96:E6:A4:CF:22:2E:7D
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root CA 3 G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\110\022\275\222\074\250\304\071\006\347\060\155\047\226\346\244
\317\042\056\175
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\337\175\271\255\124\157\150\241\337\211\127\003\227\103\260\327
END
CKA_ISSUER MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\036\060\034\006\003
\125\004\003\023\025\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\101\040\063\040\107\063
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\024\056\365\233\002\050\247\333\172\377\325\243\251\356\275
\003\240\317\022\152\035
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DigiCert Assured ID Root G2"
#
# Issuer: CN=DigiCert Assured ID Root G2,OU=www.digicert.com,O=DigiCert Inc,C=US
# Serial Number:0b:93:1c:3a:d6:39:67:ea:67:23:bf:c3:af:9a:f4:4b
# Subject: CN=DigiCert Assured ID Root G2,OU=www.digicert.com,O=DigiCert Inc,C=US
# Not Valid Before: Thu Aug 01 12:00:00 2013
```

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# Not Valid After : Fri Jan 15 12:00:00
 2038
# Fingerprint (SHA-256):
7D:05:EB:B6:82:33:9F:8C:94:51:EE:09:4E:EB:FE:FA:79:53:A1:14:ED:B2:F4:49:49:45:2F:AB:7D:2F:C1:85
# Fingerprint (SHA1): A1:4B:48:D9:43:EE:0A:0E:40:90:4F:3C:E0:A4:C0:91:93:51:5D:3F
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Assured ID Root G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040
\122\157\157\164\040\107\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040
\122\157\157\164\040\107\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\013\223\034\072\326\071\147\352\147\043\277\303\257\232
\364\113
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\226\060\202\002\176\240\003\002\001\002\002\020\013
\223\034\072\326\071\147\352\147\043\277\303\257\232\364\113\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\145
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025\060
\023\006\003\125\004\012\023\014\104\151\147\151\103\145\162\164
\040\111\156\143\061\031\060\027\006\003\125\004\013\023\020\167
\167\167\056\144\151\147\151\143\145\162\164\056\143\157\155\061
\044\060\042\006\003\125\004\003\023\033\104\151\147\151\103\145
\162\164\040\101\163\163\165\162\145\144\040\111\104\040\122\157
\157\164\040\107\062\060\036\027\015\061\063\060\070\060\061\061
\062\060\060\060\060\132\027\015\063\070\060\061\061\065\061\062
\060\060\060\060\132\060\145\061\013\060\011\006\003\125\004\006
```

\023\002\125\123\061\025\060\023\006\003\125\004\012\023\014\104
\151\147\151\103\145\162\164\040\111\156\143\061\031\060\027\006
\003\125\004\013\023\020\167\167\167\056\144\151\147\151\143\145
\162\164\056\143\157\155\061\044\060\042\006\003\125\004\003\023
\033\104\151\147\151\103\145\162\164\040\101\163\163\165\162\145
\144\040\111\104\040\122\157\157\164\040\107\062\060\202\001\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\001\017\000\060\202\001\012\002\202\001\001\000\331\347\050
\057\122\077\066\162\111\210\223\064\363\370\152\036\061\124\200
\237\255\124\101\265\107\337\226\250\324\257\200\055\271\012\317
\165\375\211\245\175\044\372\343\042\014\053\274\225\027\013\063
\277\031\115\101\006\220\000\275\014\115\020\376\007\265\347\034
\156\042\125\061\145\227\275\323\027\322\036\142\363\333\352\154
\120\214\077\204\014\226\317\267\313\003\340\312\155\241\024\114
\033\211\335\355\000\260\122\174\257\221\154\261\070\023\321\351
\022\010\300\000\260\034\053\021\332\167\160\066\233\256\316\171
\207\334\202\160\346\011\164\160\125\151\257\243\150\237\277\335
\266\171\263\362\235\160\051\125\364\253\377\225\141\363\311\100
\157\035\321\276\223\273\323\210\052\273\235\277\162\132\126\161
\073\077\324\363\321\012\376\050\357\243\356\331\231\257\003\323
\217\140\267\362\222\241\261\275\211\211\037\060\315\303\246\056
\142\063\256\026\002\167\104\132\347\201\012\074\247\104\056\171
\270\077\004\274\134\240\207\341\033\257\121\216\315\354\054\372
\370\376\155\360\072\174\252\213\344\147\225\061\215\002\003\001
\000\001\243\102\060\100\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001
\377\004\004\003\002\001\206\060\035\006\003\125\035\016\004\026
\004\024\316\303\112\271\231\125\362\270\333\140\277\251\176\275
\126\265\227\066\247\326\060\015\006\011\052\206\110\206\367\015
\001\001\013\005\000\003\202\001\001\000\312\245\125\214\343\310
\101\156\151\047\247\165\021\357\074\206\066\157\322\235\306\170
\070\035\151\226\242\222\151\056\070\154\233\175\004\324\211\245
\261\061\067\212\311\041\314\253\154\315\213\034\232\326\277\110
\322\062\146\301\212\300\363\057\072\357\300\343\324\221\206\321
\120\343\003\333\163\167\157\112\071\123\355\336\046\307\265\175
\257\053\102\321\165\142\343\112\053\002\307\120\113\340\151\342
\226\154\016\104\146\020\104\217\255\005\353\370\171\254\246\033
\350\067\064\235\123\311\141\252\242\122\257\112\160\026\206\302
\072\310\261\023\160\066\330\317\356\364\012\064\325\133\114\375
\007\234\242\272\331\001\162\134\363\115\301\335\016\261\034\015
\304\143\276\255\364\024\373\211\354\242\101\016\114\314\310\127
\100\320\156\003\252\315\014\216\211\231\231\154\360\074\060\257
\070\337\157\274\243\276\051\040\047\253\164\377\023\042\170\336
\227\122\125\036\203\265\124\040\003\356\256\300\117\126\336\067
\314\303\177\252\004\047\273\323\167\270\142\333\027\174\234\050
\042\023\163\154\317\046\365\212\051\347
END
CKA_NSS_MOZILLA_CA_POLICY

```
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "DigiCert Assured ID Root G2"
# Issuer: CN=DigiCert Assured ID Root G2,OU=www.digicert.com,O=DigiCert Inc,C=US
# Serial Number:0b:93:1c:3a:d6:39:67:ea:67:23:bf:c3:af:9a:f4:4b
# Subject: CN=DigiCert Assured ID Root G2,OU=www.digicert.com,O=DigiCert Inc,C=US
# Not Valid Before: Thu Aug 01 12:00:00 2013
# Not Valid After : Fri Jan 15 12:00:00 2038
# Fingerprint (SHA-256):
7D:05:EB:B6:82:33:9F:8C:94:51:EE:09:4E:EB:FE:FA:79:53:A1:14:ED:B2:F4:49:49:45:2F:AB:7D:2F:C1:85
# Fingerprint (SHA1): A1:4B:48:D9:43:EE:0A:0E:40:90:4F:3C:E0:A4:C0:91:93:51:5D:3F
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL
 CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Assured ID Root G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\241\113\110\331\103\356\012\016\100\220\117\074\340\244\300\221
\223\121\135\077
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\222\070\271\370\143\044\202\145\054\127\063\346\376\201\217\235
END
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040
\122\157\157\164\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\013\223\034\072\326\071\147\352\147\043\277\303\257\232
\364\113
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST
 CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DigiCert Assured ID Root G3"
#
```

```
# Issuer: CN=DigiCert Assured ID Root G3,OU=www.digicert.com,O=DigiCert Inc,C=US
# Serial Number:0b:a1:5a:fa:1d:df:a0:b5:49:44:af:cd:24:a0:6c:ec
# Subject: CN=DigiCert Assured ID Root G3,OU=www.digicert.com,O=DigiCert Inc,C=US
# Not Valid Before: Thu Aug 01 12:00:00 2013
# Not Valid After : Fri Jan 15 12:00:00 2038
# Fingerprint (SHA-256):
7E:37:CB:8B:4C:47:09:0C:AB:36:55:1B:A6:F4:5D:B8:40:68:0F:BA:16:6A:95:2D:B1:00:71:7F:43:05:3F:C2
# Fingerprint (SHA1): F5:17:A2:4F:9A:48:C6:C9:F8:A2:00:26:9F:DC:0F:48:2C:AB:30:89
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Assured ID Root G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040
\122\157\157\164\040\107\063
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040
\122\157\157\164\040\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\013\241\132\372\035\337\240\265\111\104\257\315\044\240
\154\354
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\106\060\202\001\315\240\003\002\001\002\002\020\013
\241\132\372\035\337\240\265\111\104\257\315\044\240\154\354\060
\012\006\010\052\206\110\316\075\004\003\003\060\145\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\025\060\023\006\003
\125\004\012\023\014\104\151\147\151\103\145\162\164\040\111\156
\143\061\031\060\027\006\003\125\004\013\023\020\167\167\167\056
\144\151\147\151\143\145\162\164\056\143\157\155\061\044\060\042
\006\003\125\004\003\023\033\104\151\147\151\103\145\162\164\040
\101\163\163\165\162\145\144\040\111\104\040\122\157\157\164\040
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\107\063\060\036\027\015\061\063\060\070\060\061\061\062\060\060
\060\060\132\027\015\063\070\060\061\061\065\061\062\060\060\060
\060\132\060\145\061\013\060\011\006\003\125\004\006\023\002\125
\123\061\025\060\023\006\003\125\004\012\023\014\104\151\147\151
\103\145\162\164\040\111\156\143\061\031\060\027\006\003\125\004
\013\023\020\167\167\167\056\144\151\147\151\143\145\162\164\056
\143\157\155\061\044\060\042\006\003\125\004\003\023\033\104\151
\147\151\103\145\162\164\040\101\163\163\165\162\145\144\040\111
\104\040\122\157\157\164\040\107\063\060\166\060\020\006\007\052
\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142\000
\004\031\347\274\254\104\145\355\315\270\077\130\373\215\261\127
\251\104\055\005\025\362\357\013\377\020\164\237\265\142\122\137
\146\176\037\345\334\033\105\171\013\314\306\123\012\235\215\135
\002\331\251\131\336\002\132\366\225\052\016\215\070\112\212\111
\306\274\306\003\070\007\137\125\332\176\011\156\342\177\136\320
\105\040\017\131\166\020\326\240\044\360\055\336\066\362\154\051
\071\243\102\060\100\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\206\060\035\006\003\125\035\016\004\026\004
\024\313\320\275\251\341\230\005\121\241\115\067\242\203\171\316
\215\035\052\344\204\060\012\006\010\052\206\110\316\075\004\003
\003\003\147\000\060\144\002\060\045\244\201\105\002\153\022\113
\165\164\117\310\043\343\160\362\165\162\336\174\211\360\317\221
\162\141\236\136\020\222\131\126\271\203\307\020\347\070\351\130
\046\066\175\325\344\064\206\071\002\060\174\066\123\360\060\345
\142\143\072\231\342\266\243\073\233\064\372\036\332\020\222\161
\136\221\023\247\335\244\156\222\314\062\326\365\041\146\307\057
\352\226\143\152\145\105\222\225\001\264
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "DigiCert Assured ID Root G3"
# Issuer: CN=DigiCert Assured ID Root G3,OU=www.digicert.com,O=DigiCert Inc,C=US
# Serial Number:0b:a1:5a:fa:1d:df:a0:b5:49:44:af:cd:24:a0:6c:ec
# Subject: CN=DigiCert Assured ID Root G3,OU=www.digicert.com,O=DigiCert Inc,C=US
# Not Valid Before: Thu Aug 01 12:00:00 2013
# Not Valid After : Fri Jan 15 12:00:00 2038
# Fingerprint (SHA-256):
7E:37:CB:8B:4C:47:09:0C:AB:36:55:1B:A6:F4:5D:B8:40:68:0F:BA:16:6A:95:2D:B1:00:71:7F:43:05:3F:C2
# Fingerprint
(SHA1): F5:17:A2:4F:9A:48:C6:C9:F8:A2:00:26:9F:DC:0F:48:2C:AB:30:89
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE

```
CKA_LABEL UTF8 "DigiCert Assured ID Root G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\365\027\242\117\232\110\306\311\370\242\000\046\237\334\017\110
\054\253\060\211
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\174\177\145\061\014\201\337\215\272\076\231\342\134\255\156\373
END
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\044\060\042\006\003\125\004\003\023\033\104\151\147\151
\103\145\162\164\040\101\163\163\165\162\145\144\040\111\104\040
\122\157\157\164\040\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\013\241\132\372\035\337\240\265\111\104\257\315\044\240
\154\354
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DigiCert Global Root G2"
#
# Issuer: CN=DigiCert Global Root G2,OU=www.digicert.com,O=DigiCert Inc,C=US
# Serial Number:03:3a:f1:e6:a7:11:a9:a0:bb:28:64:b1:1d:09:fa:e5
# Subject: CN=DigiCert Global Root G2,OU=www.digicert.com,O=DigiCert Inc,C=US
# Not Valid Before: Thu Aug 01 12:00:00 2013
# Not Valid After : Fri Jan 15 12:00:00 2038
# Fingerprint (SHA-256):
CB:3C:CB:B7:60:31:E5:E0:13:8F:8D:D3:9A:23:F9:DE:47:FF:C3:5E:43:C1:14:4C:EA:27:D4:6A:5A:B1:CB:5F
# Fingerprint (SHA1): DF:3C:24:F9:BF:D6:66:76:1B:26:80:73:FE:06:D1:CC:8D:4F:82:A4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Global Root G2"
CKA_CERTIFICATE_TYPE
 CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
```

\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164
\040\107\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164
\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\003\072\361\346\247\021\251\240\273\050\144\261\035\011
\372\345
END
CKA_VALUE
 MULTILINE_OCTAL
\060\202\003\216\060\202\002\166\240\003\002\001\002\002\020\003
\072\361\346\247\021\251\240\273\050\144\261\035\011\372\345\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\141
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025\060
\023\006\003\125\004\012\023\014\104\151\147\151\103\145\162\164
\040\111\156\143\061\031\060\027\006\003\125\004\013\023\020\167
\167\167\056\144\151\147\151\143\145\162\164\056\143\157\155\061
\040\060\036\006\003\125\004\003\023\027\104\151\147\151\103\145
\162\164\040\107\154\157\142\141\154\040\122\157\157\164\040\107
\062\060\036\027\015\061\063\060\070\060\061\061\062\060\060\060
\060\132\027\015\063\070\060\061\061\065\061\062\060\060\060\060
\132\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103
\145\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013
\023\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143
\157\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147
\151\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157
\164\040\107\062\060\202\001\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012
\002\202\001\001\000\273\067\315\064\334\173\153\311\262\150\220
\255\112\165\377\106\272\041\012\010\215\365\031\124\311\373\210
\333\363\256\362\072\211\221\074\172\346\253\006\032\153\317\254
\055\350\136\011\044\104\272\142\232\176\326\243\250\176\340\124
\165\040\005\254\120\267\234\143\032\154\060\334\332\037\031\261
\327\036\336\375\327\340\313\224\203\067\256\354\037\103\116\335
\173\054\322\275\056\245\057\344\251\270\255\072\324\231\244\266

\045\351\233\153\000\140\222\140\377\117\041\111\030\367\147\220
\253\141\006\234\217\362\272\351\264\351\222\062\153\265\363\127
\350\135\033\315\214\035\253\225\004\225\111\363\065\055\226\343
\111\155\335\167\343\373\111\113\264\254\125\007\251\217\225\263
\264\043\273\114\155\105\360\366\251\262\225\060\264\375\114\125
\214\047\112\127\024\174\202\235\315\163\222\323\026\112\006\014
\214\120\321\217\036\011\276\027\241\346\041\312\375\203\345\020
\274\203\245\012\304\147\050\366\163\024\024\075\106\166\303\207
\024\211\041\064\115\257\017\105\014\246\111\241\272\273\234\305
\261\063\203\051\205\002\003\001\000\001\243\102\060\100\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060
\035\006\003\125\035\016\004\026\004\024\116\042\124\040\030\225
\346\343\156\346\017\372\372\271\022\355\006\027\217\071\060\015
\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202\001
\001\000\140\147\050\224\157\016\110\143\353\061\335\352\147\030
\325\211\175\074\305\213\112\177\351\276\333\053\027\337\260\137
\163\167\052\062\023\071\201\147\102\204\043\362\105\147\065\354
\210\277\370\217\260\141\014\064\244\256\040\114\204\306\333\370
\065\341\166\331\337\246\102\273\307\104\010\206\177\066\164\044
\132\332\154\015\024\131\065\275\362\111\335\266\037\311\263\015
\107\052\075\231\057\273\134\273\265\324\040\341\231\137\123\106
\025\333\150\233\360\363\060\325\076\061\342\215\204\236\343\212
\332\332\226\076\065\023\245\137\360\371\160\120\160\107\101\021
\127\031\116\300\217\256\006\304\225\023\027\057\033\045\237\165
\362\261\216\231\241\157\023\261\101\161\376\210\052\310\117\020
\040\125\327\363\024\105\345\340\104\364\352\207\225\062\223\016
\376\123\106\372\054\235\377\213\042\271\113\331\011\105\244\336
\244\270\232\130\335\033\175\122\237\216\131\103\210\201\244\236
\046\325\157\255\335\015\306\067\175\355\003\222\033\345\167\137
\166\356\074\215\304\135\126\133\242\331\146\156\263\065\067\345
\062\266
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "DigiCert Global Root G2"
# Issuer: CN=DigiCert Global Root G2,OU=www.digicert.com,O=DigiCert
 Inc,C=US
# Serial Number:03:3a:f1:e6:a7:11:a9:a0:bb:28:64:b1:1d:09:fa:e5
# Subject: CN=DigiCert Global Root G2,OU=www.digicert.com,O=DigiCert Inc,C=US
# Not Valid Before: Thu Aug 01 12:00:00 2013
# Not Valid After : Fri Jan 15 12:00:00 2038
# Fingerprint (SHA-256):
CB:3C:CB:B7:60:31:E5:E0:13:8F:8D:D3:9A:23:F9:DE:47:FF:C3:5E:43:C1:14:4C:EA:27:D4:6A:5A:B1:CB:5F
# Fingerprint (SHA1): DF:3C:24:F9:BF:D6:66:76:1B:26:80:73:FE:06:D1:CC:8D:4F:82:A4

```
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Global Root G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\337\074\044\371\277\326\146\166\033\046\200\163\376\006\321\314
\215\117\202\244
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\344\246\212\310\124\254\122\102\106\012\375\162\110\033\052\104
END
CKA_ISSUER MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164
\040\107\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\003\072\361\346\247\021\251\240\273\050\144\261\035\011
\372\345
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DigiCert Global Root G3"
#
# Issuer: CN=DigiCert Global Root G3,OU=www.digicert.com,O=DigiCert Inc,C=US
# Serial Number:05:55:56:bc:f2:5e:a4:35:35:c3:a4:0f:d5:ab:45:72
# Subject: CN=DigiCert Global Root G3,OU=www.digicert.com,O=DigiCert Inc,C=US
# Not Valid Before: Thu Aug 01 12:00:00 2013
# Not Valid After : Fri Jan 15 12:00:00 2038
# Fingerprint (SHA-256):
 31:AD:66:48:F8:10:41:38:C7:38:F3:9E:A4:32:01:33:39:3E:3A:18:CC:02:29:6E:F9:7C:2A:C9:EF:67:31:D0
# Fingerprint (SHA1): 7E:04:DE:89:6A:3E:66:6D:00:E6:87:D3:3F:FA:D9:3B:E8:3D:34:9E
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Global Root G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
```

CKA_SUBJECT MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164
\040\107\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151
\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164
\040\107\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\005\125\126\274\362\136\244\065\065\303\244\017\325\253
\105\162
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\077\060\202\001\305\240\003\002\001\002\002\020\005
\125\126\274\362\136\244\065\065\303\244\017\325\253\105\162\060
\012\006\010\052\206\110\316\075\004\003\003\060\141\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\025\060\023\006\003
\125\004\012\023\014\104\151\147\151\103\145\162\164\040\111\156
\143\061\031\060\027\006\003\125\004\013\023\020\167\167\167\056
\144\151\147\151\143\145\162\164\056\143\157\155\061\040\060\036
\006\003\125\004\003\023\027\104\151\147\151\103\145\162\164\040
\107\154\157\142\141\154\040\122\157\157\164\040\107\063\060\036
\027\015\061\063\060\070\060\061\061\062\060\060\060\060\132\027
\015\063\070\060\061\061\065\061\062\060\060\060\060\132\060\141
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025\060
\023\006\003\125\004\012\023\014\104\151\147\151\103\145\162\164
\040\111\156\143\061\031\060\027\006\003\125\004\013\023\020\167
\167\167\056\144\151\147\151\143\145\162\164\056\143\157\155\061
\040\060\036\006\003\125\004\003\023\027\104\151\147\151\103\145
\162\164\040\107\154\157\142\141\154\040\122\157\157\164\040\107
\063\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005
\053\201\004\000\042\003\142\000\004\335\247\331\273\212\270\013
\373\013\177\041\322\360\276\276\163\363\063\135\032\274\064\352
\336\306\233\274\320\225\366\360\314\320\013\272\141\133\121\106
\176\236\055\237\356\216\143\014\027\354\007\160\365\317\204\056
\100\203\234\350\077\101\155\073\255\323\244\024\131\066\170\235

\003\103\356\020\023\154\162\336\256\210\247\241\153\265\103\316
\147\334\043\377\003\034\243\342\076\243\102\060\100\060\017\006
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060\035
\006\003\125\035\016\004\026\004\024\263\333\110\244\371\241\305
\330\256\066\101\314\021\143\151\142\051\274\113\306\060\012\006
\010\052\206\110\316\075\004\003\003\003\150\000\060\145\002\061
\000\255\274\362\154\077\022\112\321\055\071\303\012\011\227\163
\364\210\066\214\210\047\273\346\210\215\120\205\247\143\371\236
\062\336\146\223\017\361\314\261\011\217\335\154\253\372\153\177
\240\002\060\071\146\133\302\144\215\270\236\120\334\250\325\111
\242\355\307\334\321\111\177\027\001\270\310\206\217\116\214\210
\053\250\232\251\212\305\321\000\275\370\124\342\232\345\133\174
\263\047\027
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "DigiCert Global Root G3"
# Issuer: CN=DigiCert Global Root G3,OU=www.digicert.com,O=DigiCert
 Inc,C=US
# Serial Number:05:55:56:bc:f2:5e:a4:35:35:c3:a4:0f:d5:ab:45:72
# Subject: CN=DigiCert Global Root G3,OU=www.digicert.com,O=DigiCert Inc,C=US
# Not Valid Before: Thu Aug 01 12:00:00 2013
# Not Valid After : Fri Jan 15 12:00:00 2038
# Fingerprint (SHA-256):
31:AD:66:48:F8:10:41:38:C7:38:F3:9E:A4:32:01:33:39:3E:3A:18:CC:02:29:6E:F9:7C:2A:C9:EF:67:31:D0
# Fingerprint (SHA1): 7E:04:DE:89:6A:3E:66:6D:00:E6:87:D3:3F:FA:D9:3B:E8:3D:34:9E
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Global Root G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\176\004\336\211\152\076\146\155\000\346\207\323\077\372\331\073
\350\075\064\236
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\365\135\244\120\245\373\050\176\036\017\015\314\226\127\126\312
END
CKA_ISSUER MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\040\060\036\006\003\125\004\003\023\027\104\151\147\151

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\103\145\162\164\040\107\154\157\142\141\154\040\122\157\157\164
\040\107\063
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\005\125\126\274\362\136\244\065\065\303\244\017\325\253
\105\162
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DigiCert Trusted Root G4"
#
# Issuer: CN=DigiCert Trusted Root G4,OU=www.digicert.com,O=DigiCert Inc,C=US
# Serial Number:05:9b:1b:57:9e:8e:21:32:e2:39:07:bd:a7:77:75:5c
# Subject: CN=DigiCert Trusted Root G4,OU=www.digicert.com,O=DigiCert Inc,C=US
# Not Valid Before: Thu Aug 01 12:00:00 2013
# Not Valid After : Fri Jan 15 12:00:00 2038
# Fingerprint
 (SHA-256):
55:2F:7B:DC:F1:A7:AF:9E:6C:E6:72:01:7F:4F:12:AB:F7:72:40:C7:8E:76:1A:C2:03:D1:D9:D2:0A:C8:99:88
# Fingerprint (SHA1): DD:FB:16:CD:49:31:C9:73:A2:03:7D:3F:C8:3A:4D:7D:77:5D:05:E4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Trusted Root G4"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\041\060\037\006\003\125\004\003\023\030\104\151\147\151
\103\145\162\164\040\124\162\165\163\164\145\144\040\122\157\157
\164\040\107\064
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\041\060\037\006\003\125\004\003\023\030\104\151\147\151
\103\145\162\164\040\124\162\165\163\164\145\144\040\122\157\157
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\164\040\107\064
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\005\233\033\127\236\216\041\062\342\071\007\275\247\167
\165\134
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\220\060\202\003\170\240\003\002\001\002\002\020\005
\233\033\127\236\216\041\062\342\071\007\275\247\167\165\134\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\142
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025\060
\023\006\003\125\004\012\023\014\104\151\147\151\103\145\162\164
\040\111\156\143\061\031\060\027\006\003\125\004\013\023\020\167
\167\167\056\144\151\147\151\143\145\162\164\056\143\157\155\061
\041\060\037\006\003\125\004\003\023\030\104\151\147\151\103\145
\162\164\040\124\162\165\163\164\145\144\040\122\157\157\164\040
\107\064\060\036\027\015\061\063\060\070\060\061\061\062\060\060
\060\060\132\027\015\063\070\060\061\061\065\061\062\060\060\060
\060\132\060\142\061\013\060\011\006\003\125\004\006\023\002\125
\123\061\025\060\023\006\003\125\004\012\023\014\104\151\147\151
\103\145\162\164\040\111\156\143\061\031\060\027\006\003\125\004
\013\023\020\167\167\167\056\144\151\147\151\143\145\162\164\056
\143\157\155\061\041\060\037\006\003\125\004\003\023\030\104\151
\147\151\103\145\162\164\040\124\162\165\163\164\145\144\040\122
\157\157\164\040\107\064\060\202\002\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202
\002\012\002\202\002\001\000\277\346\220\163\150\336\273\344\135
\112\074\060\042\060\151\063\354\302\247\045\056\311\041\075\362
\212\330\131\302\341\051\247\075\130\253\166\232\315\256\173\033
\204\015\304\060\037\363\033\244\070\026\353\126\306\227\155\035
\253\262\171\362\312\021\322\344\137\326\005\074\122\017\122\037
\306\236\025\245\176\276\237\251\127\026\131\125\162\257\150\223
\160\302\262\272\165\231\152\163\062\224\321\020\104\020\056\337
\202\363\007\204\346\164\073\155\161\342\055\014\033\356\040\325
\311\040\035\143\051\055\316\354\136\116\310\223\370\041\141\233
\064\353\005\306\136\354\133\032\274\353\311\317\315\254\064\100
\137\261\172\146\356\167\310\110\250\146\127\127\237\124\130\216
\014\053\267\117\247\060\331\126\356\312\173\135\343\255\311\117
\136\345\065\347\061\313\332\223\136\334\216\217\200\332\266\221
\230\100\220\171\303\170\307\266\261\304\265\152\030\070\003\020
\215\330\324\067\244\056\005\175\210\365\202\076\020\221\160\253
\125\202\101\062\327\333\004\163\052\156\221\001\174\041\114\324
\274\256\033\003\165\135\170\146\331\072\061\104\232\063\100\277
\010\327\132\111\244\302\346\251\240\147\335\244\047\274\241\117
\071\265\021\130\027\367\044\134\106\217\144\367\301\151\210\166
\230\166\075\131\135\102\166\207\211\227\151\172\110\360\340\242
\022\033\146\232\164\312\336\113\036\347\016\143\256\346\324\357

\222\222\072\236\075\334\000\344\105\045\211\266\232\104\031\053
\176\300\224\264\322\141\155\353\063\331\305\337\113\004\000\314
\175\034\225\303\217\367\041\262\262\021\267\273\177\362\325\214
\160\054\101\140\252\261\143\030\104\225\032\166\142\176\366\200
\260\373\350\144\246\063\321\211\007\341\275\267\346\103\244\030
\270\246\167\001\341\017\224\014\041\035\262\124\051\045\211\154
\345\016\122\121\107\164\276\046\254\266\101\165\336\172\254\137
\215\077\311\274\323\101\021\022\133\345\020\120\353\061\305\312
\162\026\042\011\337\174\114\165\077\143\354\041\137\304\040\121
\153\157\261\253\206\213\117\302\326\105\137\235\040\374\241\036
\305\300\217\242\261\176\012\046\231\365\344\151\057\230\035\055
\365\331\251\262\035\345\033\002\003\001\000\001\243\102\060\100
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\206\060\035\006\003\125\035\016\004\026\004\024\354\327\343\202
\322\161\135\144\114\337\056\147\077\347\272\230\256\034\017\117
\060\015\006\011\052\206\110\206\367\015\001\001\014\005\000\003
\202\002\001\000\273\141\331\175\251\154\276\027\304\221\033\303
\241\242\000\215\343\144\150\017\126\317\167\256\160\371\375\232
\112\231\271\311\170\134\014\014\137\344\346\024\051\126\013\066
\111\135\104\143\340\255\234\226\030\146\033\043\015\075\171\351
\155\153\326\124\370\322\074\301\103\100\256\035\120\365\122\374
\220\073\273\230\231\151\153\307\301\247\250\150\244\047\334\235
\371\047\256\060\205\271\366\147\115\072\076\217\131\071\042\123
\104\353\310\135\003\312\355\120\172\175\142\041\012\200\310\163
\146\321\240\005\140\137\350\245\264\247\257\250\367\155\065\234
\174\132\212\326\242\070\231\363\170\213\364\115\322\040\013\336
\004\356\214\233\107\201\162\015\300\024\062\357\060\131\056\256
\340\161\362\126\344\152\227\157\222\120\155\226\215\150\172\232
\262\066\024\172\006\362\044\271\011\021\120\327\010\261\270\211
\172\204\043\141\102\051\345\243\315\242\040\101\327\321\234\144
\331\352\046\241\213\024\327\114\031\262\120\101\161\075\077\115
\160\043\206\014\112\334\201\322\314\062\224\204\015\010\011\227
\034\117\300\356\153\040\164\060\322\340\071\064\020\205\041\025
\001\010\350\125\062\336\161\111\331\050\027\120\115\346\276\115
\321\165\254\320\312\373\101\270\103\245\252\323\303\005\104\117
\054\066\233\342\372\342\105\270\043\123\154\006\157\147\125\177
\106\265\114\077\156\050\132\171\046\322\244\250\142\227\322\036
\342\355\112\213\274\033\375\107\112\015\337\147\146\176\262\133
\101\320\073\344\364\073\364\004\143\351\357\302\124\000\121\240
\212\052\311\316\170\314\325\352\207\004\030\263\316\257\111\210
\257\363\222\231\266\263\346\141\017\322\205\000\347\120\032\344
\033\225\235\031\241\271\234\261\233\261\000\036\357\320\017\117
\102\154\311\012\274\356\103\372\072\161\245\310\115\046\245\065
\375\211\135\274\205\142\035\062\322\240\053\124\355\232\127\301
\333\372\020\317\031\267\213\112\033\217\001\266\047\225\123\350
\266\211\155\133\274\150\324\043\350\213\121\242\126\371\360\246
\200\240\326\036\263\274\017\017\123\165\051\252\352\023\167\344

\336\214\201\041\255\007\020\107\021\255\207\075\007\321\165\274
\317\363\146\176
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "DigiCert Trusted Root G4"
# Issuer: CN=DigiCert Trusted Root G4,OU=www.digicert.com,O=DigiCert Inc,C=US
# Serial Number:05:9b:1b:57:9e:8e:21:32:e2:39:07:bd:a7:77:75:5c
# Subject: CN=DigiCert Trusted Root G4,OU=www.digicert.com,O=DigiCert Inc,C=US
# Not Valid Before: Thu Aug 01 12:00:00 2013
# Not Valid After : Fri Jan 15 12:00:00 2038
# Fingerprint (SHA-256):
55:2F:7B:DC:F1:A7:AF:9E:6C:E6:72:01:7F:4F:12:AB:F7:72:40:C7:8E:76:1A:C2:03:D1:D9:D2:0A:C8:99:88
# Fingerprint (SHA1): DD:FB:16:CD:49:31:C9:73:A2:03:7D:3F:C8:3A:4D:7D:77:5D:05:E4
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN
 CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert Trusted Root G4"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\335\373\026\315\111\061\311\163\242\003\175\077\310\072\115\175
\167\135\005\344
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\170\362\374\252\140\037\057\264\353\311\067\272\123\056\165\111
END
CKA_ISSUER MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\104\151\147\151\103\145
\162\164\040\111\156\143\061\031\060\027\006\003\125\004\013\023
\020\167\167\167\056\144\151\147\151\143\145\162\164\056\143\157
\155\061\041\060\037\006\003\125\004\003\023\030\104\151\147\151
\103\145\162\164\040\124\162\165\163\164\145\144\040\122\157\157
\164\040\107\064
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\005\233\033\127\236\216\041\062\342\071\007\275\247\167
\165\134
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```
#
# Certificate "COMODO RSA Certification Authority"
#
# Issuer: CN=COMODO RSA Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater
Manchester,C=GB
# Serial Number:4c:aa:f9:ca:db:63:6f:e0:1f:f7:4e:d8:5b:03:86:9d
# Subject: CN=COMODO RSA Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater
Manchester,C=GB
# Not Valid Before: Tue Jan 19 00:00:00 2010
# Not Valid After : Mon Jan 18 23:59:59 2038
# Fingerprint (SHA-256):
52:F0:E1:C4:E5:8E:C6:29:29:1B:60:31:7F:07:46:71:B8:5D:7E:A8:0D:5B:07:27:34:63:53:4B:32:B4:02:34
# Fingerprint (SHA1): AF:E5:D2:44:A8:D1:19:42:30:FF:47:9F:E2:F8:97:BB:CD:7A:8C:B4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "COMODO RSA Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\205\061\013\060\011\006\003\125\004\006\023\002\107\102
\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164
\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117
\040\103\101\040\114\151\155\151\164\145\144\061\053\060\051\006
\003\125\004\003\023\042\103\117\115\117\104\117\040\122\123\101
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\205\061\013\060\011\006\003\125\004\006\023\002\107\102
\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164
\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117
\040\103\101\040\114\151\155\151\164\145\144\061\053\060\051\006
\003\125\004\003\023\042\103\117\115\117\104\117\040\122\123\101
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\114\252\371\312\333\143\157\340\037\367\116\330\133\003
\206\235
```

END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\330\060\202\003\300\240\003\002\001\002\002\020\114
\252\371\312\333\143\157\340\037\367\116\330\133\003\206\235\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\201
\205\061\013\060\011\006\003\125\004\006\023\002\107\102\061\033
\060\031\006\003\125\004\010\023\022\107\162\145\141\164\145\162
\040\115\141\156\143\150\145\163\164\145\162\061\020\060\016\006
\003\125\004\007\023\007\123\141\154\146\157\162\144\061\032\060
\030\006\003\125\004\012\023\021\103\117\115\117\104\117\040\103
\101\040\114\151\155\151\164\145\144\061\053\060\051\006\003\125
\004\003\023\042\103\117\115\117\104\117\040\122\123\101\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\060\036\027\015\061\060\060\061\061\071
\060\060\060\060\060\060\132\027\015\063\070\060\061\061\070\062
\063\065\071\065\071\132\060\201\205\061\013\060\011\006\003\125
\004\006\023\002\107\102\061\033\060\031\006\003\125\004\010\023
\022\107\162\145\141\164\145\162\040\115\141\156\143\150\145\163
\164\145\162\061\020\060\016\006\003\125\004\007\023\007\123\141
\154\146\157\162\144\061\032\060\030\006\003\125\004\012\023\021
\103\117\115\117\104\117\040\103\101\040\114\151\155\151\164\145
\144\061\053\060\051\006\003\125\004\003\023\042\103\117\115\117
\104\117\040\122\123\101\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\060\202
\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\221
\350\124\222\322\012\126\261\254\015\044\335\305\317\104\147\164
\231\053\067\243\175\043\160\000\161\274\123\337\304\372\052\022
\217\113\177\020\126\275\237\160\162\267\141\177\311\113\017\027
\247\075\343\260\004\141\356\377\021\227\307\364\206\076\012\372
\076\134\371\223\346\064\172\331\024\153\347\234\263\205\240\202
\172\166\257\161\220\327\354\375\015\372\234\154\372\337\260\202
\364\024\176\371\276\304\246\057\117\177\231\177\265\374\147\103
\162\275\014\000\326\211\353\153\054\323\355\217\230\034\024\253
\176\345\343\156\374\330\250\344\222\044\332\103\153\142\270\125
\375\352\301\274\154\266\213\363\016\215\232\344\233\154\151\231
\370\170\110\060\105\325\255\341\015\074\105\140\374\062\226\121
\047\274\147\303\312\056\266\153\352\106\307\307\040\240\261\037
\145\336\110\010\272\244\116\251\362\203\106\067\204\353\350\314
\201\110\103\147\116\162\052\233\134\275\114\033\050\212\134\042
\173\264\253\230\331\356\340\121\203\303\011\106\116\155\076\231
\372\225\027\332\174\063\127\101\074\215\121\355\013\266\134\257
\054\143\032\337\127\310\077\274\351\135\304\233\257\105\231\342
\243\132\044\264\272\251\126\075\317\157\252\377\111\130\276\360
\250\377\364\270\255\351\067\373\272\270\364\013\072\371\350\103
\102\036\211\330\204\313\023\361\331\273\341\211\140\270\214\050
\126\254\024\035\234\012\347\161\353\317\016\335\075\251\226\241
\110\275\074\367\257\265\015\042\114\300\021\201\354\126\073\366

\323\242\342\133\267\262\004\042\122\225\200\223\151\350\216\114
\145\361\221\003\055\160\164\002\352\213\147\025\051\151\122\002
\273\327\337\120\152\125\106\277\240\243\050\141\177\160\320\303
\242\252\054\041\252\107\316\050\234\006\105\166\277\202\030\047
\264\325\256\264\313\120\346\153\364\114\206\161\060\351\246\337
\026\206\340\330\377\100\335\373\320\102\210\177\243\063\072\056
\134\036\101\021\201\143\316\030\161\153\053\354\246\212\267\061
\134\072\152\107\340\303\171\131\326\040\032\257\362\152\230\252
\162\274\127\112\322\113\235\273\020\374\260\114\101\345\355\035
\075\136\050\235\234\314\277\263\121\332\247\107\345\204\123\002
\003\001\000\001\243\102\060\100\060\035\006\003\125\035\016\004
\026\004\024\273\257\176\002\075\372\246\361\074\204\216\255\356
\070\230\354\331\062\062\324\060\016\006\003\125\035\017\001\001
\377\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\015\006\011\052\206\110\206
\367\015\001\001\014\005\000\003\202\002\001\000\012\361\325\106
\204\267\256\121\273\154\262\115\101\024\000\223\114\234\313\345
\300\124\317\240\045\216\002\371\375\260\242\015\365\040\230\074
\023\055\254\126\242\260\326\176\021\222\351\056\272\236\056\232
\162\261\275\031\104\154\141\065\242\232\264\026\022\151\132\214
\341\327\076\244\032\350\057\003\364\256\141\035\020\033\052\244
\213\172\305\376\005\246\341\300\326\310\376\236\256\217\053\272
\075\231\370\330\163\011\130\106\156\246\234\364\327\047\323\225
\332\067\203\162\034\323\163\340\242\107\231\003\070\135\325\111
\171\000\051\034\307\354\233\040\034\007\044\151\127\170\262\071
\374\072\204\240\265\234\174\215\277\056\223\142\047\267\071\332
\027\030\256\275\074\011\150\377\204\233\074\325\326\013\003\343
\127\236\024\367\321\353\117\310\275\207\043\267\266\111\103\171
\205\134\272\353\222\013\241\306\350\150\250\114\026\261\032\231
\012\350\123\054\222\273\241\011\030\165\014\145\250\173\313\043
\267\032\302\050\205\303\033\377\320\053\142\357\244\173\011\221
\230\147\214\024\001\315\150\006\152\143\041\165\003\200\210\212
\156\201\306\205\362\251\244\055\347\364\245\044\020\107\203\312
\315\364\215\171\130\261\006\233\347\032\052\331\235\001\327\224
\175\355\003\112\312\360\333\350\251\001\076\365\126\231\311\036
\216\111\075\273\345\011\271\340\117\111\222\075\026\202\100\314
\314\131\306\346\072\355\022\056\151\074\154\225\261\375\252\035
\173\177\206\276\036\016\062\106\373\373\023\217\165\177\114\213
\113\106\143\376\000\064\100\160\301\303\271\241\335\246\160\342
\004\263\101\274\351\200\221\352\144\234\172\341\042\003\251\234
\156\157\016\145\117\154\207\207\136\363\156\240\371\165\245\233
\100\350\123\262\047\235\112\271\300\167\041\215\377\207\362\336
\274\214\357\027\337\267\111\013\321\362\156\060\013\032\016\116
\166\355\021\374\365\351\126\262\175\277\307\155\012\223\214\245
\320\300\266\035\276\072\116\224\242\327\156\154\013\302\212\174
\372\040\363\304\344\345\315\015\250\313\221\222\261\174\205\354
\265\024\151\146\016\202\347\315\316\310\055\246\121\177\041\301
\065\123\205\006\112\135\237\255\273\033\137\164

```
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "COMODO RSA Certification Authority"
# Issuer: CN=COMODO RSA Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater
Manchester,C=GB
# Serial Number:4c:aa:f9:ca:db:63:6f:e0:1f:f7:4e:d8:5b:03:86:9d
# Subject: CN=COMODO RSA Certification Authority,O=COMODO CA Limited,L=Salford,ST=Greater
Manchester,C=GB
# Not Valid Before: Tue Jan 19 00:00:00 2010
# Not Valid After : Mon Jan 18 23:59:59 2038
# Fingerprint (SHA-256):
52:F0:E1:C4:E5:8E:C6:29:29:1B:60:31:7F:07:46:71:B8:5D:7E:A8:0D:5B:07:27:34:63:53:4B:32:B4:02:34
#
 Fingerprint (SHA1): AF:E5:D2:44:A8:D1:19:42:30:FF:47:9F:E2:F8:97:BB:CD:7A:8C:B4
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "COMODO RSA Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\257\345\322\104\250\321\031\102\060\377\107\237\342\370\227\273
\315\172\214\264
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\033\061\260\161\100\066\314\024\066\221\255\304\076\375\354\030
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\205\061\013\060\011\006\003\125\004\006\023\002\107\102
\061\033\060\031\006\003\125\004\010\023\022\107\162\145\141\164
\145\162\040\115\141\156\143\150\145\163\164\145\162\061\020\060
\016\006\003\125\004\007\023\007\123\141\154\146\157\162\144\061
\032\060\030\006\003\125\004\012\023\021\103\117\115\117\104\117
\040\103\101\040\114\151\155\151\164\145\144\061\053\060\051\006
\003\125\004\003\023\042\103\117\115\117\104\117\040\122\123\101
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\114\252\371\312\333\143\157\340\037\367\116\330\133\003
\206\235
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
```

```
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "USERTrust RSA Certification Authority"
#
# Issuer: CN=USERTrust RSA Certification Authority,O=The USERTRUST Network,L=Jersey City,ST=New
Jersey,C=US
# Serial Number:01:fd:6d:30:fc:a3:ca:51:a8:1b:bc:64:0e:35:03:2d
# Subject: CN=USERTrust RSA Certification Authority,O=The USERTRUST Network,L=Jersey City,ST=New
Jersey,C=US
# Not Valid Before: Mon Feb 01 00:00:00 2010
# Not Valid After : Mon Jan 18 23:59:59 2038
# Fingerprint (SHA-256):
E7:93:C9:B0:2F:D8:AA:13:E2:1C:31:22:8A:CC:B0:81:19:64:3B:74:9C:89:89:64:B1:74:6D:46:C3:D4:CB:D2
#
 Fingerprint (SHA1): 2B:8F:1B:57:33:0D:BB:A2:D0:7A:6C:51:F7:0E:E9:0D:DA:B9:AD:8E
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "USERTrust RSA Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\116\145\167\040\112
\145\162\163\145\171\061\024\060\022\006\003\125\004\007\023\013
\112\145\162\163\145\171\040\103\151\164\171\061\036\060\034\006
\003\125\004\012\023\025\124\150\145\040\125\123\105\122\124\122
\125\123\124\040\116\145\164\167\157\162\153\061\056\060\054\006
\003\125\004\003\023\045\125\123\105\122\124\162\165\163\164\040
\122\123\101\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\116\145\167\040\112
\145\162\163\145\171\061\024\060\022\006\003\125\004\007\023\013
\112\145\162\163\145\171\040\103\151\164\171\061\036\060\034\006
\003\125\004\012\023\025\124\150\145\040\125\123\105\122\124\122
\125\123\124\040\116\145\164\167\157\162\153\061\056\060\054\006
\003\125\004\003\023\045\125\123\105\122\124\162\165\163\164\040
\122\123\101\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER
```

MULTILINE_OCTAL
\002\020\001\375\155\060\374\243\312\121\250\033\274\144\016\065
\003\055
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\336\060\202\003\306\240\003\002\001\002\002\020\001
\375\155\060\374\243\312\121\250\033\274\144\016\065\003\055\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\201
\210\061\013\060\011\006\003\125\004\006\023\002\125\123\061\023
\060\021\006\003\125\004\010\023\012\116\145\167\040\112\145\162
\163\145\171\061\024\060\022\006\003\125\004\007\023\013\112\145
\162\163\145\171\040\103\151\164\171\061\036\060\034\006\003\125
\004\012\023\025\124\150\145\040\125\123\105\122\124\122\125\123
\124\040\116\145\164\167\157\162\153\061\056\060\054\006\003\125
\004\003\023\045\125\123\105\122\124\162\165\163\164\040\122\123
\101\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040
\101\165\164\150\157\162\151\164\171\060\036\027\015\061\060\060
\062\060\061\060\060\060\060\060\060\132\027\015\063\070\060\061
\061\070\062\063\065\071\065\071\132\060\201\210\061\013\060\011
\006\003\125\004\006\023\002\125\123\061\023\060\021\006\003\125
\004\010\023\012\116\145\167\040\112\145\162\163\145\171\061\024
\060\022\006\003\125\004\007\023\013\112\145\162\163\145\171\040
\103\151\164\171\061\036\060\034\006\003\125\004\012\023\025\124
\150\145\040\125\123\105\122\124\122\125\123\124\040\116\145\164
\167\157\162\153\061\056\060\054\006\003\125\004\003\023\045\125
\123\105\122\124\162\165\163\164\040\122\123\101\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171\060\202\002\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012
\002\202\002\001\000\200\022\145\027\066\016\303\333\010\263\320
\254\127\015\166\355\315\047\323\114\255\120\203\141\342\252\040
\115\011\055\144\011\334\316\211\237\314\075\251\354\366\317\301
\334\361\323\261\326\173\067\050\021\053\107\332\071\306\274\072
\031\264\137\246\275\175\235\243\143\102\266\166\362\251\073\053
\221\370\342\157\320\354\026\040\220\011\076\342\350\164\311\030
\264\221\324\142\144\333\177\243\006\361\210\030\152\220\042\074
\274\376\023\360\207\024\173\366\344\037\216\324\344\121\306\021
\147\106\010\121\313\206\024\124\077\274\063\376\176\154\234\377
\026\235\030\275\121\216\065\246\247\146\310\162\147\333\041\146
\261\324\233\170\003\300\120\072\350\314\360\334\274\236\114\376
\257\005\226\065\037\127\132\267\377\316\371\075\267\054\266\366
\124\335\310\347\022\072\115\256\114\212\267\134\232\264\267\040
\075\312\177\042\064\256\176\073\150\146\001\104\347\001\116\106
\123\233\063\140\367\224\276\123\067\220\163\103\363\062\303\123
\357\333\252\376\164\116\151\307\153\214\140\223\336\304\307\014
\337\341\062\256\314\223\073\121\170\225\147\213\356\075\126\376
\014\320\151\017\033\017\363\045\046\153\063\155\367\156\107\372
\163\103\345\176\016\245\146\261\051\174\062\204\143\125\211\304

\015\301\223\124\060\031\023\254\323\175\067\247\353\135\072\154
\065\134\333\101\327\022\332\251\111\013\337\330\200\212\011\223
\142\216\265\146\317\045\210\315\204\270\261\077\244\071\017\331
\002\236\353\022\114\225\174\363\153\005\251\136\026\203\314\270
\147\342\350\023\235\314\133\202\323\114\263\355\133\377\336\345
\163\254\043\073\055\000\277\065\125\164\011\111\330\111\130\032
\177\222\066\346\121\222\016\363\046\175\034\115\027\274\311\354
\103\046\320\277\101\137\100\251\104\104\364\231\347\127\207\236
\120\037\127\124\250\076\375\164\143\057\261\120\145\011\346\130
\102\056\103\032\114\264\360\045\107\131\372\004\036\223\324\046
\106\112\120\201\262\336\276\170\267\374\147\025\341\311\127\204
\036\017\143\326\351\142\272\326\137\125\056\352\134\306\050\010
\004\045\071\270\016\053\251\362\114\227\034\007\077\015\122\365
\355\357\057\202\017\002\003\001\000\001\243\102\060\100\060\035
\006\003\125\035\016\004\026\004\024\123\171\277\132\252\053\112
\317\124\200\341\330\233\300\235\362\262\003\146\313\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\017\006
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\015
\006\011\052\206\110\206\367\015\001\001\014\005\000\003\202\002
\001\000\134\324\174\015\317\367\001\175\101\231\145\014\163\305
\122\237\313\370\317\231\006\177\033\332\103\025\237\236\002\125
\127\226\024\361\122\074\047\207\224\050\355\037\072\001\067\242
\166\374\123\120\300\204\233\306\153\116\272\214\041\117\242\216
\125\142\221\363\151\025\330\274\210\343\304\252\013\375\357\250
\351\113\125\052\006\040\155\125\170\051\031\356\137\060\134\113
\044\021\125\377\044\232\156\136\052\053\356\013\115\237\177\367
\001\070\224\024\225\103\007\011\373\140\251\356\034\253\022\214
\240\232\136\247\230\152\131\155\213\077\010\373\310\321\105\257
\030\025\144\220\022\017\163\050\056\305\342\044\116\374\130\354
\360\364\105\376\042\263\353\057\216\322\331\105\141\005\301\227
\157\250\166\162\217\213\214\066\257\277\015\005\316\161\215\346
\246\157\037\154\246\161\142\305\330\320\203\162\014\361\147\021
\211\014\234\023\114\162\064\337\274\325\161\337\252\161\335\341
\271\154\214\074\022\135\145\332\275\127\022\266\103\153\377\345
\336\115\146\021\121\317\231\256\354\027\266\350\161\221\214\336
\111\376\335\065\161\242\025\047\224\034\317\141\343\046\273\157
\243\147\045\041\135\346\335\035\013\056\150\033\073\202\257\354
\203\147\205\324\230\121\164\261\271\231\200\211\377\177\170\031
\134\171\112\140\056\222\100\256\114\067\052\054\311\307\142\310
\016\135\367\066\133\312\340\045\045\001\264\335\032\007\234\167
\000\077\320\334\325\354\075\324\372\273\077\314\205\326\157\177
\251\055\337\271\002\367\365\227\232\265\065\332\303\147\260\207
\112\251\050\236\043\216\377\134\047\153\341\260\117\363\007\356
\000\056\324\131\207\313\122\101\225\352\364\107\327\356\144\101
\125\174\215\131\002\225\335\142\235\302\271\356\132\050\164\204
\245\233\267\220\307\014\007\337\365\211\066\164\062\326\050\301
\260\260\013\340\234\114\303\034\326\374\343\151\265\107\106\201
\057\242\202\253\323\143\104\160\304\215\377\055\063\272\255\217

\173\265\160\210\256\076\031\317\100\050\330\374\310\220\273\135
\231\042\365\122\346\130\305\037\210\061\103\356\210\035\327\306
\216\074\103\152\035\247\030\336\175\075\026\361\142\371\312\220
\250\375
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "USERTrust RSA Certification
Authority"
# Issuer: CN=USERTrust RSA Certification Authority,O=The USERTRUST Network,L=Jersey City,ST=New Jersey,C=US
# Serial Number:01:fd:6d:30:fc:a3:ca:51:a8:1b:bc:64:0e:35:03:2d
# Subject: CN=USERTrust RSA Certification Authority,O=The USERTRUST Network,L=Jersey City,ST=New Jersey,C=US
# Not Valid Before: Mon Feb 01 00:00:00 2010
# Not Valid After : Mon Jan 18 23:59:59 2038
# Fingerprint (SHA-256):
E7:93:C9:B0:2F:D8:AA:13:E2:1C:31:22:8A:CC:B0:81:19:64:3B:74:9C:89:89:64:B1:74:6D:46:C3:D4:CB:D2
# Fingerprint (SHA1): 2B:8F:1B:57:33:0D:BB:A2:D0:7A:6C:51:F7:0E:E9:0D:DA:B9:AD:8E
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "USERTrust RSA Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\053\217\033\127\063\015\273\242\320\172\154\121\367\016\351\015
\332\271\255\216
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\033\376\151\321\221\267\031\063\243\162\250\017\341\125\345\265
END
CKA_ISSUER
MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\116\145\167\040\112
\145\162\163\145\171\061\024\060\022\006\003\125\004\007\023\013
\112\145\162\163\145\171\040\103\151\164\171\061\036\060\034\006
\003\125\004\012\023\025\124\150\145\040\125\123\105\122\124\122
\125\123\124\040\116\145\164\167\157\162\153\061\056\060\054\006
\003\125\004\003\023\045\125\123\105\122\124\162\165\163\164\040
\122\123\101\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\001\375\155\060\374\243\312\121\250\033\274\144\016\065

```
\003\055
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "USERTrust ECC Certification Authority"
#
# Issuer: CN=USERTrust
 ECC Certification Authority,O=The USERTRUST Network,L=Jersey City,ST=New Jersey,C=US
# Serial Number:5c:8b:99:c5:5a:94:c5:d2:71:56:de:cd:89:80:cc:26
# Subject: CN=USERTrust ECC Certification Authority,O=The USERTRUST Network,L=Jersey City,ST=New
Jersey,C=US
# Not Valid Before: Mon Feb 01 00:00:00 2010
# Not Valid After : Mon Jan 18 23:59:59 2038
# Fingerprint (SHA-256):
4F:F4:60:D5:4B:9C:86:DA:BF:BC:FC:57:12:E0:40:0D:2B:ED:3F:BC:4D:4F:BD:AA:86:E0:6A:DC:D2:A9:AD:7A
# Fingerprint (SHA1): D1:CB:CA:5D:B2:D5:2A:7F:69:3B:67:4D:E5:F0:5A:1D:0C:95:7D:F0
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "USERTrust ECC Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\116\145\167\040\112
\145\162\163\145\171\061\024\060\022\006\003\125\004\007\023\013
\112\145\162\163\145\171\040\103\151\164\171\061\036\060\034\006
\003\125\004\012\023\025\124\150\145\040\125\123\105\122\124\122
\125\123\124\040\116\145\164\167\157\162\153\061\056\060\054\006
\003\125\004\003\023\045\125\123\105\122\124\162\165\163\164\040
\105\103\103\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\116\145\167\040\112
\145\162\163\145\171\061\024\060\022\006\003\125\004\007\023\013
\112\145\162\163\145\171\040\103\151\164\171\061\036\060\034\006
\003\125\004\012\023\025\124\150\145\040\125\123\105\122\124\122
\125\123\124\040\116\145\164\167\157\162\153\061\056\060\054\006
\003\125\004\003\023\045\125\123\105\122\124\162\165\163\164\040
\105\103\103\040\103\145\162\164\151\146\151\143\141\164\151\157
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\156\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\134\213\231\305\132\224\305\322\161\126\336\315\211\200
\314\046
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\217\060\202\002\025\240\003\002\001\002\002\020\134
\213\231\305\132\224\305\322\161\126\336\315\211\200\314\046\060
\012\006\010\052\206\110\316\075\004\003\003\060\201\210\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\023\060\021\006
\003\125\004\010\023\012\116\145\167\040\112\145\162\163\145\171
\061\024\060\022\006\003\125\004\007\023\013\112\145\162\163\145
\171\040\103\151\164\171\061\036\060\034\006\003\125\004\012\023
\025\124\150\145\040\125\123\105\122\124\122\125\123\124\040\116
\145\164\167\157\162\153\061\056\060\054\006\003\125\004\003\023
\045\125\123\105\122\124\162\165\163\164\040\105\103\103\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\060\036\027\015\061\060\060\062\060\061
\060\060\060\060\060\060\132\027\015\063\070\060\061\061\070\062
\063\065\071\065\071\132\060\201\210\061\013\060\011\006\003\125
\004\006\023\002\125\123\061\023\060\021\006\003\125\004\010\023
\012\116\145\167\040\112\145\162\163\145\171\061\024\060\022\006
\003\125\004\007\023\013\112\145\162\163\145\171\040\103\151\164
\171\061\036\060\034\006\003\125\004\012\023\025\124\150\145\040
\125\123\105\122\124\122\125\123\124\040\116\145\164\167\157\162
\153\061\056\060\054\006\003\125\004\003\023\045\125\123\105\122
\124\162\165\163\164\040\105\103\103\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005
\053\201\004\000\042\003\142\000\004\032\254\124\132\251\371\150
\043\347\172\325\044\157\123\306\132\330\113\253\306\325\266\321
\346\163\161\256\335\234\326\014\141\375\333\240\211\003\270\005
\024\354\127\316\356\135\077\342\041\263\316\367\324\212\171\340
\243\203\176\055\227\320\141\304\361\231\334\045\221\143\253\177
\060\243\264\160\342\307\241\063\234\363\277\056\134\123\261\137
\263\175\062\177\212\064\343\171\171\243\102\060\100\060\035\006
\003\125\035\016\004\026\004\024\072\341\011\206\324\317\031\302
\226\166\164\111\166\334\340\065\306\143\143\232\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\017\006\003
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\012\006
\010\052\206\110\316\075\004\003\003\003\150\000\060\145\002\060
\066\147\241\026\010\334\344\227\000\101\035\116\276\341\143\001
\317\073\252\102\021\144\240\235\224\071\002\021\171\134\173\035
\372\144\271\356\026\102\263\277\212\302\011\304\354\344\261\115
\002\061\000\351\052\141\107\214\122\112\113\116\030\160\366\326
\104\326\156\365\203\272\155\130\275\044\331\126\110\352\357\304

\242\106\201\210\152\072\106\321\251\233\115\311\141\332\321\135
\127\152\030
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "USERTrust ECC Certification
Authority"
# Issuer: CN=USERTrust ECC Certification Authority,O=The USERTRUST Network,L=Jersey City,ST=New Jersey,C=US
# Serial Number:5c:8b:99:c5:5a:94:c5:d2:71:56:de:cd:89:80:cc:26
# Subject: CN=USERTrust ECC Certification Authority,O=The USERTRUST Network,L=Jersey City,ST=New Jersey,C=US
# Not Valid Before: Mon Feb 01 00:00:00 2010
# Not Valid After : Mon Jan 18 23:59:59 2038
# Fingerprint (SHA-256):
4F:F4:60:D5:4B:9C:86:DA:BF:BC:FC:57:12:E0:40:0D:2B:ED:3F:BC:4D:4F:BD:AA:86:E0:6A:DC:D2:A9:AD:7A
# Fingerprint (SHA1): D1:CB:CA:5D:B2:D5:2A:7F:69:3B:67:4D:E5:F0:5A:1D:0C:95:7D:F0
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "USERTrust ECC Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\321\313\312\135\262\325\052\177\151\073\147\115\345\360\132\035
\014\225\175\360
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\372\150\274\331\265\177\255\375\311\035\006\203\050\314\044\301
END
CKA_ISSUER
MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\116\145\167\040\112
\145\162\163\145\171\061\024\060\022\006\003\125\004\007\023\013
\112\145\162\163\145\171\040\103\151\164\171\061\036\060\034\006
\003\125\004\012\023\025\124\150\145\040\125\123\105\122\124\122
\125\123\124\040\116\145\164\167\157\162\153\061\056\060\054\006
\003\125\004\003\023\045\125\123\105\122\124\162\165\163\164\040
\105\103\103\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\134\213\231\305\132\224\305\322\161\126\336\315\211\200
\314\046
END

```
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GlobalSign ECC Root CA - R5"
#
# Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign
 ECC Root CA - R5
# Serial Number:60:59:49:e0:26:2e:bb:55:f9:0a:77:8a:71:f9:4a:d8:6c
# Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign ECC Root CA - R5
# Not Valid Before: Tue Nov 13 00:00:00 2012
# Not Valid After : Tue Jan 19 03:14:07 2038
# Fingerprint (SHA-256):
17:9F:BC:14:8A:3D:D0:0F:D2:4E:A1:34:58:CC:43:BF:A7:F5:9C:81:82:D7:83:A5:13:F6:EB:EC:10:0C:89:24
# Fingerprint (SHA1): 1F:24:C6:30:CD:A4:18:EF:20:69:FF:AD:4F:DD:5F:46:3A:1B:69:AA
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign ECC Root CA - R5"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\120\061\044\060\042\006\003\125\004\013\023\033\107\154\157
\142\141\154\123\151\147\156\040\105\103\103\040\122\157\157\164
\040\103\101\040\055\040\122\065\061\023\060\021\006\003\125\004
\012\023\012\107\154\157\142\141\154\123\151\147\156\061\023\060
\021\006\003\125\004\003\023\012\107\154\157\142\141\154\123\151
\147\156
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\120\061\044\060\042\006\003\125\004\013\023\033\107\154\157
\142\141\154\123\151\147\156\040\105\103\103\040\122\157\157\164
\040\103\101\040\055\040\122\065\061\023\060\021\006\003\125\004
\012\023\012\107\154\157\142\141\154\123\151\147\156\061\023\060
\021\006\003\125\004\003\023\012\107\154\157\142\141\154\123\151
\147\156
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\140\131\111\340\046\056\273\125\371\012\167\212\161\371
\112\330\154
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\036\060\202\001\244\240\003\002\001\002\002\021\140
\131\111\340\046\056\273\125\371\012\167\212\161\371\112\330\154
```

\060\012\006\010\052\206\110\316\075\004\003\003\060\120\061\044
\060\042\006\003\125\004\013\023\033\107\154\157\142\141\154\123
\151\147\156\040\105\103\103\040\122\157\157\164\040\103\101\040
\055\040\122\065\061\023\060\021\006\003\125\004\012\023\012\107
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125
\004\003\023\012\107\154\157\142\141\154\123\151\147\156\060\036
\027\015\061\062\061\061\061\063\060\060\060\060\060\060\132\027
\015\063\070\060\061\061\071\060\063\061\064\060\067\132\060\120
\061\044\060\042\006\003\125\004\013\023\033\107\154\157\142\141
\154\123\151\147\156\040\105\103\103\040\122\157\157\164\040\103
\101\040\055\040\122\065\061\023\060\021\006\003\125\004\012\023
\012\107\154\157\142\141\154\123\151\147\156\061\023\060\021\006
\003\125\004\003\023\012\107\154\157\142\141\154\123\151\147\156
\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053
\201\004\000\042\003\142\000\004\107\105\016\226\373\175\135\277
\351\071\321\041\370\237\013\266\325\173\036\222\072\110\131\034
\360\142\061\055\300\172\050\376\032\247\134\263\266\314\227\347
\105\324\130\372\321\167\155\103\242\300\207\145\064\012\037\172
\335\353\074\063\241\305\235\115\244\157\101\225\070\177\311\036
\204\353\321\236\111\222\207\224\207\014\072\205\112\146\237\235
\131\223\115\227\141\006\206\112\243\102\060\100\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\017\006\003
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006
\003\125\035\016\004\026\004\024\075\346\051\110\233\352\007\312
\041\104\112\046\336\156\336\322\203\320\237\131\060\012\006\010
\052\206\110\316\075\004\003\003\003\150\000\060\145\002\061\000
\345\151\022\311\156\333\306\061\272\011\101\341\227\370\373\375
\232\342\175\022\311\355\174\144\323\313\005\045\213\126\331\240
\347\136\135\116\013\203\234\133\166\051\240\011\046\041\152\142
\002\060\161\322\265\217\134\352\073\341\170\011\205\250\165\222
\073\310\134\375\110\357\015\164\042\250\010\342\156\305\111\316
\307\014\274\247\141\151\361\367\073\341\052\313\371\053\363\146
\220\067
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "GlobalSign ECC Root CA - R5"
#
Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign ECC Root CA - R5
# Serial Number:60:59:49:e0:26:2e:bb:55:f9:0a:77:8a:71:f9:4a:d8:6c
# Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign ECC Root CA - R5
# Not Valid Before: Tue Nov 13 00:00:00 2012
# Not Valid After : Tue Jan 19 03:14:07 2038
# Fingerprint (SHA-256):
17:9F:BC:14:8A:3D:D0:0F:D2:4E:A1:34:58:CC:43:BF:A7:F5:9C:81:82:D7:83:A5:13:F6:EB:EC:10:0C:89:24

```
# Fingerprint (SHA1): 1F:24:C6:30:CD:A4:18:EF:20:69:FF:AD:4F:DD:5F:46:3A:1B:69:AA
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign ECC Root CA - R5"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\037\044\306\060\315\244\030\357\040\151\377\255\117\335\137\106
\072\033\151\252
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\237\255\073\034\002\036\212\272\027\164\070\201\014\242\274\010
END
CKA_ISSUER MULTILINE_OCTAL
\060\120\061\044\060\042\006\003\125\004\013\023\033\107\154\157
\142\141\154\123\151\147\156\040\105\103\103\040\122\157\157\164
\040\103\101\040\055\040\122\065\061\023\060\021\006\003\125\004
\012\023\012\107\154\157\142\141\154\123\151\147\156\061\023\060
\021\006\003\125\004\003\023\012\107\154\157\142\141\154\123\151
\147\156
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\021\140\131\111\340\046\056\273\125\371\012\167\212\161\371
\112\330\154
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Staat der Nederlanden Root CA - G3"
#
# Issuer: CN=Staat der Nederlanden Root CA - G3,O=Staat der Nederlanden,C=NL
# Serial Number: 10003001 (0x98a239)
# Subject: CN=Staat der Nederlanden Root CA - G3,O=Staat der Nederlanden,C=NL
# Not Valid Before: Thu Nov 14 11:28:42 2013
# Not Valid After : Mon Nov 13 23:00:00 2028
# Fingerprint (SHA-256):
3C:4F:B0:B9:5A:B8:B3:00:32:F4:32:B8:6F:53:5F:E1:72:C1:85:D0:FD:39:86:58:37:CF:36:18:7F:A6:F4:28
#
 Fingerprint (SHA1): D8:EB:6B:41:51:92:59:E0:F3:E7:85:00:C0:3D:B6:88:97:C9:EE:FC
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Staat der Nederlanden Root CA - G3"
```

CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\036\060\034\006\003\125\004\012\014\025\123\164\141\141\164\040
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\061
\053\060\051\006\003\125\004\003\014\042\123\164\141\141\164\040
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\040
\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\036\060\034\006\003\125\004\012\014\025\123\164\141\141\164\040
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\061
\053\060\051\006\003\125\004\003\014\042\123\164\141\141\164\040
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\040
\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\004\000\230\242\071
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\164\060\202\003\134\240\003\002\001\002\002\004\000
\230\242\071\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\132\061\013\060\011\006\003\125\004\006\023\002\116
\114\061\036\060\034\006\003\125\004\012\014\025\123\164\141\141
\164\040\144\145\162\040\116\145\144\145\162\154\141\156\144\145
\156\061\053\060\051\006\003\125\004\003\014\042\123\164\141\141
\164\040\144\145\162\040\116\145\144\145\162\154\141\156\144\145
\156\040\122\157\157\164\040\103\101\040\055\040\107\063\060\036
\027\015\061\063\061\061\061\064\061\061\062\070\064\062\132\027
\015\062\070\061\061\061\063\062\063\060\060\060\060\132\060\132
\061\013\060\011\006\003\125\004\006\023\002\116\114\061\036\060
\034\006\003\125\004\012\014\025\123\164\141\141\164\040\144\145
\162\040\116\145\144\145\162\154\141\156\144\145\156\061\053\060
\051\006\003\125\004\003\014\042\123\164\141\141\164\040\144\145
\162\040\116\145\144\145\162\154\141\156\144\145\156\040\122\157
\157\164\040\103\101\040\055\040\107\063\060\202\002\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002
\017\000\060\202\002\012\002\202\002\001\000\276\062\242\124\017
\160\373\054\134\131\353\154\304\244\121\350\205\052\263\314\112
\064\362\260\137\363\016\307\034\075\123\036\210\010\150\330\157
\075\255\302\236\314\202\147\007\047\207\150\161\072\237\165\226
\042\106\005\260\355\255\307\133\236\052\336\234\374\072\306\225
\247\365\027\147\030\347\057\111\010\014\134\317\346\314\064\355
\170\373\120\261\334\153\062\360\242\376\266\074\344\354\132\227
\307\077\036\160\010\060\240\334\305\263\155\157\320\202\162\021

\253\322\201\150\131\202\027\267\170\222\140\372\314\336\077\204
\353\215\070\063\220\012\162\043\372\065\314\046\161\061\321\162
\050\222\331\133\043\155\146\265\155\007\102\353\246\063\316\222
\333\300\366\154\143\170\315\312\116\075\265\345\122\233\361\276
\073\346\124\140\260\146\036\011\253\007\376\124\211\021\102\321
\367\044\272\140\170\032\230\367\311\021\375\026\301\065\032\124
\165\357\103\323\345\256\116\316\347\173\303\306\116\141\121\113
\253\232\105\113\241\037\101\275\110\123\025\161\144\013\206\263
\345\056\276\316\244\033\301\051\204\242\265\313\010\043\166\103
\042\044\037\027\004\324\156\234\306\374\177\053\146\032\354\212
\345\326\317\115\365\143\011\267\025\071\326\173\254\353\343\174
\351\116\374\165\102\310\355\130\225\014\006\102\242\234\367\344
\160\263\337\162\157\132\067\100\211\330\205\244\327\361\013\336
\103\031\324\112\130\054\214\212\071\236\277\204\207\361\026\073
\066\014\351\323\264\312\154\031\101\122\011\241\035\260\152\277
\202\357\160\121\041\062\334\005\166\214\313\367\144\344\003\120
\257\214\221\147\253\305\362\356\130\330\336\276\367\347\061\317
\154\311\073\161\301\325\210\265\145\274\300\350\027\027\007\022
\265\134\322\253\040\223\264\346\202\203\160\066\305\315\243\215
\255\213\354\243\301\103\207\346\103\342\064\276\225\213\065\355
\007\071\332\250\035\172\237\066\236\022\260\014\145\022\220\025
\140\331\046\100\104\343\126\140\245\020\324\152\074\375\101\334
\016\132\107\266\357\227\141\165\117\331\376\307\262\035\324\355
\135\111\263\251\152\313\146\204\023\325\134\240\334\337\156\167
\006\321\161\165\310\127\157\257\017\167\133\002\003\001\000\001
\243\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005
\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\006\060\035\006\003\125\035\016\004\026\004\024
\124\255\372\307\222\127\256\312\065\234\056\022\373\344\272\135
\040\334\224\127\060\015\006\011\052\206\110\206\367\015\001\001
\013\005\000\003\202\002\001\000\060\231\235\005\062\310\136\016
\073\230\001\072\212\244\347\007\367\172\370\347\232\337\120\103
\123\227\052\075\312\074\107\230\056\341\025\173\361\222\363\141
\332\220\045\026\145\300\237\124\135\016\003\073\133\167\002\234
\204\266\015\230\137\064\335\073\143\302\303\050\201\302\234\051
\056\051\342\310\303\001\362\063\352\052\252\314\011\010\367\145
\147\306\315\337\323\266\053\247\275\314\321\016\160\137\270\043
\321\313\221\116\012\364\310\172\345\331\143\066\301\324\337\374
\042\227\367\140\135\352\051\057\130\262\275\130\275\215\226\117
\020\165\277\110\173\075\121\207\241\074\164\042\302\374\007\177
\200\334\304\254\376\152\301\160\060\260\351\216\151\342\054\151
\201\224\011\272\335\376\115\300\203\214\224\130\300\106\040\257
\234\037\002\370\065\125\111\057\106\324\300\360\240\226\002\017
\063\305\161\363\236\043\175\224\267\375\072\323\011\203\006\041
\375\140\075\256\062\300\322\356\215\246\360\347\264\202\174\012
\314\160\311\171\200\370\376\114\367\065\204\031\212\061\373\012
\331\327\177\233\360\242\232\153\303\005\112\355\101\140\024\060
\321\252\021\102\156\323\043\002\004\013\306\145\335\335\122\167

\332\201\153\262\250\372\001\070\271\226\352\052\154\147\227\211
\224\236\274\341\124\325\344\152\170\357\112\275\053\232\075\100
\176\306\300\165\322\156\373\150\060\354\354\213\235\371\111\065
\232\032\054\331\263\225\071\325\036\222\367\246\271\145\057\345
\075\155\072\110\114\010\334\344\050\022\050\276\175\065\134\352
\340\026\176\023\033\152\327\076\327\236\374\055\165\262\301\024
\325\043\003\333\133\157\013\076\170\057\015\336\063\215\026\267
\110\347\203\232\201\017\173\301\103\115\125\004\027\070\112\121
\325\131\242\211\164\323\237\276\036\113\327\306\155\267\210\044
\157\140\221\244\202\205\133\126\101\274\320\104\253\152\023\276
\321\054\130\267\022\063\130\262\067\143\334\023\365\224\035\077
\100\121\365\117\365\072\355\310\305\353\302\036\035\026\225\172
\307\176\102\161\223\156\113\025\267\060\337\252\355\127\205\110
\254\035\152\335\071\151\344\341\171\170\276\316\005\277\241\014
\367\200\173\041\147\047\060\131
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Staat der Nederlanden Root CA - G3"
# Issuer: CN=Staat der Nederlanden Root CA - G3,O=Staat der Nederlanden,C=NL
# Serial Number: 10003001 (0x98a239)
# Subject: CN=Staat der Nederlanden Root CA - G3,O=Staat der Nederlanden,C=NL
# Not Valid Before: Thu Nov 14 11:28:42 2013
# Not Valid After : Mon Nov 13 23:00:00 2028
# Fingerprint (SHA-256):
3C:4F:B0:B9:5A:B8:B3:00:32:F4:32:B8:6F:53:5F:E1:72:C1:85:D0:FD:39:86:58:37:CF:36:18:7F:A6:F4:28
# Fingerprint (SHA1): D8:EB:6B:41:51:92:59:E0:F3:E7:85:00:C0:3D:B6:88:97:C9:EE:FC
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Staat der Nederlanden Root CA - G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\330\353\153\101\121\222\131\340\363\347\205\000\300\075\266\210
\227\311\356\374
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\013\106\147\007\333\020\057\031\214\065\120\140\321\013\364\067
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\036\060\034\006\003\125\004\012\014\025\123\164\141\141\164\040
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\061
\053\060\051\006\003\125\004\003\014\042\123\164\141\141\164\040

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\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\040
\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\000\230\242\071
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "IdenTrust Commercial Root CA 1"
#
# Issuer: CN=IdenTrust Commercial Root CA 1,O=IdenTrust,C=US
# Serial Number:0a:01:42:80:00:00:01:45:23:c8:44:b5:00:00:00:02
# Subject: CN=IdenTrust Commercial Root CA 1,O=IdenTrust,C=US
# Not Valid
 Before: Thu Jan 16 18:12:23 2014
# Not Valid After : Mon Jan 16 18:12:23 2034
# Fingerprint (SHA-256):
5D:56:49:9B:E4:D2:E0:8B:CF:CA:D0:8A:3E:38:72:3D:50:50:3B:DE:70:69:48:E4:2F:55:60:30:19:E5:28:AE
# Fingerprint (SHA1): DF:71:7E:AA:4A:D9:4E:C9:55:84:99:60:2D:48:DE:5F:BC:F0:3A:25
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "IdenTrust Commercial Root CA 1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\111\144\145\156\124\162
\165\163\164\061\047\060\045\006\003\125\004\003\023\036\111\144
\145\156\124\162\165\163\164\040\103\157\155\155\145\162\143\151
\141\154\040\122\157\157\164\040\103\101\040\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\111\144\145\156\124\162
\165\163\164\061\047\060\045\006\003\125\004\003\023\036\111\144
\145\156\124\162\165\163\164\040\103\157\155\155\145\162\143\151
\141\154\040\122\157\157\164\040\103\101\040\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\012\001\102\200\000\000\001\105\043\310\104\265\000\000
\000\002
```

END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\140\060\202\003\110\240\003\002\001\002\002\020\012
\001\102\200\000\000\001\105\043\310\104\265\000\000\000\002\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\112
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\022\060
\020\006\003\125\004\012\023\011\111\144\145\156\124\162\165\163
\164\061\047\060\045\006\003\125\004\003\023\036\111\144\145\156
\124\162\165\163\164\040\103\157\155\155\145\162\143\151\141\154
\040\122\157\157\164\040\103\101\040\061\060\036\027\015\061\064
\060\061\061\066\061\070\061\062\062\063\132\027\015\063\064\060
\061\061\066\061\070\061\062\062\063\132\060\112\061\013\060\011
\006\003\125\004\006\023\002\125\123\061\022\060\020\006\003\125
\004\012\023\011\111\144\145\156\124\162\165\163\164\061\047\060
\045\006\003\125\004\003\023\036\111\144\145\156\124\162\165\163
\164\040\103\157\155\155\145\162\143\151\141\154\040\122\157\157
\164\040\103\101\040\061\060\202\002\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202
\002\012\002\202\002\001\000\247\120\031\336\077\231\075\324\063
\106\361\157\121\141\202\262\251\117\217\147\211\135\204\331\123
\335\014\050\331\327\360\377\256\225\103\162\231\371\265\135\174
\212\301\102\341\061\120\164\321\201\015\174\315\233\041\253\103
\342\254\255\136\206\156\363\011\212\037\132\062\275\242\353\224
\371\350\134\012\354\377\230\322\257\161\263\264\123\237\116\207
\357\222\274\275\354\117\062\060\210\113\027\136\127\304\123\302
\366\002\227\215\331\142\053\277\044\037\142\215\337\303\270\051
\113\111\170\074\223\140\210\042\374\231\332\066\310\302\242\324
\054\124\000\147\065\156\163\277\002\130\360\244\335\345\260\242
\046\172\312\340\066\245\031\026\365\375\267\357\256\077\100\365
\155\132\004\375\316\064\312\044\334\164\043\033\135\063\023\022
\135\304\001\045\366\060\335\002\135\237\340\325\107\275\264\353
\033\241\273\111\111\330\237\133\002\363\212\344\044\220\344\142
\117\117\301\257\213\016\164\027\250\321\162\210\152\172\001\111
\314\264\106\171\306\027\261\332\230\036\007\131\372\165\041\205
\145\335\220\126\316\373\253\245\140\235\304\235\371\122\260\213
\275\207\371\217\053\043\012\043\166\073\367\063\341\311\000\363
\151\371\113\242\340\116\274\176\223\071\204\007\367\104\160\176
\376\007\132\345\261\254\321\030\314\362\065\345\111\111\010\312
\126\311\075\373\017\030\175\213\073\301\023\302\115\217\311\117
\016\067\351\037\241\016\152\337\142\056\313\065\006\121\171\054
\310\045\070\364\372\113\247\211\134\234\322\343\015\071\206\112
\164\174\325\131\207\302\077\116\014\134\122\364\075\367\122\202
\361\352\243\254\375\111\064\032\050\363\101\210\072\023\356\350
\336\377\231\035\137\272\313\350\036\362\271\120\140\300\061\323
\163\345\357\276\240\355\063\013\164\276\040\040\304\147\154\360
\010\003\172\125\200\177\106\116\226\247\364\036\076\341\366\330
\011\341\063\144\053\143\327\062\136\237\371\300\173\017\170\157
\227\274\223\232\371\234\022\220\170\172\200\207\025\327\162\164

\234\125\164\170\261\272\341\156\160\004\272\117\240\272\150\303
\173\377\061\360\163\075\075\224\052\261\013\101\016\240\376\115
\210\145\153\171\063\264\327\002\003\001\000\001\243\102\060\100
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\035\006\003\125\035\016\004\026\004\024\355\104\031\300
\323\360\006\213\356\244\173\276\102\347\046\124\310\216\066\166
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003
\202\002\001\000\015\256\220\062\366\246\113\174\104\166\031\141
\036\047\050\315\136\124\357\045\274\343\010\220\371\051\327\256
\150\010\341\224\000\130\357\056\056\176\123\122\214\266\134\007
\352\210\272\231\213\120\224\327\202\200\337\141\011\000\223\255
\015\024\346\316\301\362\067\224\170\260\137\234\263\242\163\270
\217\005\223\070\315\215\076\260\270\373\300\317\261\362\354\055
\055\033\314\354\252\232\263\252\140\202\033\055\073\303\204\075
\127\212\226\036\234\165\270\323\060\315\140\010\203\220\323\216
\124\361\115\146\300\135\164\003\100\243\356\205\176\302\037\167
\234\006\350\301\247\030\135\122\225\355\311\335\045\236\155\372
\251\355\243\072\064\320\131\173\332\355\120\363\065\277\355\353
\024\115\061\307\140\364\332\361\207\234\342\110\342\306\305\067
\373\006\020\372\165\131\146\061\107\051\332\166\232\034\351\202
\256\357\232\271\121\367\210\043\232\151\225\142\074\345\125\200
\066\327\124\002\377\361\271\135\316\324\043\157\330\105\204\112
\133\145\357\211\014\335\024\247\040\313\030\245\045\264\015\371
\001\360\242\322\364\000\310\164\216\241\052\110\216\145\333\023
\304\342\045\027\175\353\276\207\133\027\040\124\121\223\112\123
\003\013\354\135\312\063\355\142\375\105\307\057\133\334\130\240
\200\071\346\372\327\376\023\024\246\355\075\224\112\102\164\324
\303\167\131\163\315\217\106\276\125\070\357\372\350\221\062\352
\227\130\004\042\336\070\303\314\274\155\311\063\072\152\012\151
\077\240\310\352\162\217\214\143\206\043\275\155\074\226\236\225
\340\111\114\252\242\271\052\033\234\066\201\170\355\303\350\106
\342\046\131\104\165\036\331\165\211\121\315\020\204\235\141\140
\313\135\371\227\042\115\216\230\346\343\177\366\133\273\256\315
\312\112\201\153\136\013\363\121\341\164\053\351\176\047\247\331
\231\111\116\370\245\200\333\045\017\034\143\142\212\311\063\147
\153\074\020\203\306\255\336\250\315\026\216\215\360\007\067\161
\237\362\253\374\101\365\301\213\354\000\067\135\011\345\116\200
\357\372\261\134\070\006\245\033\112\341\334\070\055\074\334\253
\037\220\032\325\112\234\356\321\160\154\314\356\364\127\370\030
\272\204\156\207
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER
 CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

```
# Trust for "IdenTrust Commercial Root CA 1"
# Issuer: CN=IdenTrust Commercial Root CA 1,O=IdenTrust,C=US
# Serial Number:0a:01:42:80:00:00:01:45:23:c8:44:b5:00:00:00:02
# Subject: CN=IdenTrust Commercial Root CA 1,O=IdenTrust,C=US
# Not Valid Before: Thu Jan 16 18:12:23 2014
# Not Valid After : Mon Jan 16 18:12:23 2034
# Fingerprint (SHA-256):
5D:56:49:9B:E4:D2:E0:8B:CF:CA:D0:8A:3E:38:72:3D:50:50:3B:DE:70:69:48:E4:2F:55:60:30:19:E5:28:AE
# Fingerprint (SHA1): DF:71:7E:AA:4A:D9:4E:C9:55:84:99:60:2D:48:DE:5F:BC:F0:3A:25
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "IdenTrust Commercial Root CA 1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\337\161\176\252\112\331\116\311\125\204\231\140\055\110\336\137
\274\360\072\045
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\263\076\167\163\165\356\240\323\343\176\111\143\111\131\273\307
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\111\144\145\156\124\162
\165\163\164\061\047\060\045\006\003\125\004\003\023\036\111\144
\145\156\124\162\165\163\164\040\103\157\155\155\145\162\143\151
\141\154\040\122\157\157\164\040\103\101\040\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\012\001\102\200\000\000\001\105\043\310\104\265\000\000
\000\002
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "IdenTrust Public Sector Root CA 1"
#
# Issuer: CN=IdenTrust Public Sector Root CA 1,O=IdenTrust,C=US
# Serial Number:0a:01:42:80:00:00:01:45:23:cf:46:7c:00:00:00:02
# Subject: CN=IdenTrust Public Sector Root CA 1,O=IdenTrust,C=US
# Not Valid Before: Thu Jan 16 17:53:32 2014
# Not Valid
 After : Mon Jan 16 17:53:32 2034
# Fingerprint (SHA-256):
```

30:D0:89:5A:9A:44:8A:26:20:91:63:55:22:D1:F5:20:10:B5:86:7A:CA:E1:2C:78:EF:95:8F:D4:F4:38:9F:2F
# Fingerprint (SHA1): BA:29:41:60:77:98:3F:F4:F3:EF:F2:31:05:3B:2E:EA:6D:4D:45:FD
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "IdenTrust Public Sector Root CA 1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\111\144\145\156\124\162
\165\163\164\061\052\060\050\006\003\125\004\003\023\041\111\144
\145\156\124\162\165\163\164\040\120\165\142\154\151\143\040\123
\145\143\164\157\162\040\122\157\157\164\040\103\101\040\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\111\144\145\156\124\162
\165\163\164\061\052\060\050\006\003\125\004\003\023\041\111\144
\145\156\124\162\165\163\164\040\120\165\142\154\151\143\040\123
\145\143\164\157\162\040\122\157\157\164\040\103\101\040\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\012\001\102\200\000\000\001\105\043\317\106\174\000\000
\000\002
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\146\060\202\003\116\240\003\002\001\002\002\020\012
\001\102\200\000\000\001\105\043\317\106\174\000\000\000\002\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\115
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\022\060
\020\006\003\125\004\012\023\011\111\144\145\156\124\162\165\163
\164\061\052\060\050\006\003\125\004\003\023\041\111\144\145\156
\124\162\165\163\164\040\120\165\142\154\151\143\040\123\145\143
\164\157\162\040\122\157\157\164\040\103\101\040\061\060\036\027
\015\061\064\060\061\061\066\061\067\065\063\063\062\132\027\015
\063\064\060\061\061\066\061\067\065\063\063\062\132\060\115\061
\013\060\011\006\003\125\004\006\023\002\125\123\061\022\060\020
\006\003\125\004\012\023\011\111\144\145\156\124\162\165\163\164
\061\052\060\050\006\003\125\004\003\023\041\111\144\145\156\124
\162\165\163\164\040\120\165\142\154\151\143\040\123\145\143\164
\157\162\040\122\157\157\164\040\103\101\040\061\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\266\042\224
\374\244\110\257\350\107\153\012\373\047\166\344\362\077\212\073
\172\112\054\061\052\214\215\260\251\303\061\153\250\167\166\204

\046\266\254\201\102\015\010\353\125\130\273\172\370\274\145\175
\362\240\155\213\250\107\351\142\166\036\021\356\010\024\321\262
\104\026\364\352\320\372\036\057\136\333\313\163\101\256\274\000
\260\112\053\100\262\254\341\073\113\302\055\235\344\241\233\354
\032\072\036\360\010\263\320\344\044\065\007\237\234\264\311\122
\155\333\007\312\217\265\133\360\203\363\117\307\055\245\310\255
\313\225\040\244\061\050\127\130\132\344\215\033\232\253\236\015
\014\362\012\063\071\042\071\012\227\056\363\123\167\271\104\105
\375\204\313\066\040\201\131\055\232\157\155\110\110\141\312\114
\337\123\321\257\122\274\104\237\253\057\153\203\162\357\165\200
\332\006\063\033\135\310\332\143\306\115\315\254\146\061\315\321
\336\076\207\020\066\341\271\244\172\357\140\120\262\313\312\246
\126\340\067\257\253\064\023\071\045\350\071\146\344\230\172\252
\022\230\234\131\146\206\076\255\361\260\312\076\006\017\173\360
\021\113\067\240\104\155\173\313\250\214\161\364\325\265\221\066
\314\360\025\306\053\336\121\027\261\227\114\120\075\261\225\131
\174\005\175\055\041\325\000\277\001\147\242\136\173\246\134\362
\367\042\361\220\015\223\333\252\104\121\146\314\175\166\003\353
\152\250\052\070\031\227\166\015\153\212\141\371\274\366\356\166
\375\160\053\335\051\074\370\012\036\133\102\034\213\126\057\125
\033\034\241\056\265\307\026\346\370\252\074\222\216\151\266\001
\301\265\206\235\211\017\013\070\224\124\350\352\334\236\075\045
\274\123\046\355\325\253\071\252\305\100\114\124\253\262\264\331
\331\370\327\162\333\034\274\155\275\145\137\357\210\065\052\146
\057\356\366\263\145\360\063\215\174\230\101\151\106\017\103\034
\151\372\233\265\320\141\152\315\312\113\331\114\220\106\253\025
\131\241\107\124\051\056\203\050\137\034\302\242\253\162\027\000
\006\216\105\354\213\342\063\075\177\332\031\104\344\142\162\303
\337\042\306\362\126\324\335\137\225\162\355\155\137\367\110\003
\133\375\305\052\240\366\163\043\204\020\033\001\347\002\003\001
\000\001\243\102\060\100\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026
\004\024\343\161\340\236\330\247\102\331\333\161\221\153\224\223
\353\303\243\321\024\243\060\015\006\011\052\206\110\206\367\015
\001\001\013\005\000\003\202\002\001\000\107\372\335\012\260\021
\221\070\255\115\135\367\345\016\227\124\031\202\110\207\124\214
\252\144\231\330\132\376\210\001\305\130\245\231\261\043\124\043
\267\152\035\040\127\345\001\142\101\027\323\011\333\165\313\156
\124\220\165\376\032\237\201\012\302\335\327\367\011\320\133\162
\025\344\036\011\152\075\063\363\041\232\346\025\176\255\121\325
\015\020\355\175\102\300\217\356\300\232\010\325\101\326\134\016
\041\151\156\200\141\016\025\300\270\317\305\111\022\122\314\276
\072\314\324\056\070\005\336\065\375\037\157\270\200\150\230\075
\115\240\312\100\145\322\163\174\365\213\331\012\225\077\330\077
\043\155\032\321\052\044\031\331\205\263\027\357\170\156\251\130
\321\043\323\307\023\355\162\045\177\135\261\163\160\320\177\006
\227\011\204\051\200\141\035\372\136\377\163\254\240\343\211\270

\034\161\025\306\336\061\177\022\334\341\155\233\257\347\350\237
\165\170\114\253\106\073\232\316\277\005\030\135\115\025\074\026
\232\031\120\004\232\262\232\157\145\213\122\137\074\130\004\050
\045\300\146\141\061\176\271\340\165\271\032\250\201\326\162\027
\263\305\003\061\065\021\170\170\242\340\351\060\214\177\200\337
\130\337\074\272\047\226\342\200\064\155\343\230\323\144\047\254
\110\176\050\167\134\306\045\141\045\370\205\014\145\372\304\062
\057\245\230\005\344\370\013\147\026\026\306\202\270\062\031\371
\371\271\171\334\037\315\353\257\253\016\335\033\333\105\344\172
\347\002\342\225\135\374\151\360\123\151\141\225\165\171\013\136
\125\346\070\034\224\251\131\063\236\310\161\164\171\177\121\211
\266\310\152\270\060\310\152\070\303\156\236\341\067\026\352\005
\142\114\133\022\107\355\247\264\263\130\126\307\111\363\177\022
\150\011\061\161\360\155\370\116\107\373\326\205\356\305\130\100
\031\244\035\247\371\113\103\067\334\150\132\117\317\353\302\144
\164\336\264\025\331\364\124\124\032\057\034\327\227\161\124\220
\216\331\040\235\123\053\177\253\217\342\352\060\274\120\067\357
\361\107\265\175\174\054\004\354\150\235\264\111\104\020\364\162
\113\034\144\347\374\346\153\220\335\151\175\151\375\000\126\245
\267\254\266\255\267\312\076\001\357\234
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL
 CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "IdenTrust Public Sector Root CA 1"
# Issuer: CN=IdenTrust Public Sector Root CA 1,O=IdenTrust,C=US
# Serial Number:0a:01:42:80:00:00:01:45:23:cf:46:7c:00:00:00:02
# Subject: CN=IdenTrust Public Sector Root CA 1,O=IdenTrust,C=US
# Not Valid Before: Thu Jan 16 17:53:32 2014
# Not Valid After : Mon Jan 16 17:53:32 2034
# Fingerprint (SHA-256):
30:D0:89:5A:9A:44:8A:26:20:91:63:55:22:D1:F5:20:10:B5:86:7A:CA:E1:2C:78:EF:95:8F:D4:F4:38:9F:2F
# Fingerprint (SHA1): BA:29:41:60:77:98:3F:F4:F3:EF:F2:31:05:3B:2E:EA:6D:4D:45:FD
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "IdenTrust Public Sector Root CA 1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\272\051\101\140\167\230\077\364\363\357\362\061\005\073\056\352
\155\115\105\375
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\067\006\245\260\374\211\235\272\364\153\214\032\144\315\325\272
END

```
CKA_ISSUER
 MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\111\144\145\156\124\162
\165\163\164\061\052\060\050\006\003\125\004\003\023\041\111\144
\145\156\124\162\165\163\164\040\120\165\142\154\151\143\040\123
\145\143\164\157\162\040\122\157\157\164\040\103\101\040\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\012\001\102\200\000\000\001\105\043\317\106\174\000\000
\000\002
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Entrust Root Certification Authority - G2"
#
# Issuer: CN=Entrust Root Certification Authority - G2,OU="(c) 2009 Entrust, Inc. - for authorized use
only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
# Serial Number: 1246989352 (0x4a538c28)
#
 Subject: CN=Entrust Root Certification Authority - G2,OU="(c) 2009 Entrust, Inc. - for authorized use
only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
# Not Valid Before: Tue Jul 07 17:25:54 2009
# Not Valid After : Sat Dec 07 17:55:54 2030
# Fingerprint (SHA-256):
43:DF:57:74:B0:3E:7F:EF:5F:E4:0D:93:1A:7B:ED:F1:BB:2E:6B:42:73:8C:4E:6D:38:41:10:3D:3A:A7:F3:39
# Fingerprint (SHA1): 8C:F4:27:FD:79:0C:3A:D1:66:06:8D:E8:1E:57:EF:BB:93:22:72:D4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust Root Certification Authority - G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\276\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\060\071\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\062\060
\060\006\003\125\004\003\023\051\105\156\164\162\165\163\164\040
```

\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\107
\062
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\276\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\060\071\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\062\060
\060\006\003\125\004\003\023\051\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\107
\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\004\112\123\214\050
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\076\060\202\003\046\240\003\002\001\002\002\004\112
\123\214\050\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\201\276\061\013\060\011\006\003\125\004\006\023\002
\125\123\061\026\060\024\006\003\125\004\012\023\015\105\156\164
\162\165\163\164\054\040\111\156\143\056\061\050\060\046\006\003
\125\004\013\023\037\123\145\145\040\167\167\167\056\145\156\164
\162\165\163\164\056\156\145\164\057\154\145\147\141\154\055\164
\145\162\155\163\061\071\060\067\006\003\125\004\013\023\060\050
\143\051\040\062\060\060\071\040\105\156\164\162\165\163\164\054
\040\111\156\143\056\040\055\040\146\157\162\040\141\165\164\150
\157\162\151\172\145\144\040\165\163\145\040\157\156\154\171\061
\062\060\060\006\003\125\004\003\023\051\105\156\164\162\165\163
\164\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040\055
\040\107\062\060\036\027\015\060\071\060\067\060\067\061\067\062
\065\065\064\132\027\015\063\060\061\062\060\067\061\067\065\065
\065\064\132\060\201\276\061\013\060\011\006\003\125\004\006\023
\002\125\123\061\026\060\024\006\003\125\004\012\023\015\105\156
\164\162\165\163\164\054\040\111\156\143\056\061\050\060\046\006
\003\125\004\013\023\037\123\145\145\040\167\167\167\056\145\156
\164\162\165\163\164\056\156\145\164\057\154\145\147\141\154\055
\164\145\162\155\163\061\071\060\067\006\003\125\004\013\023\060

\050\143\051\040\062\060\060\071\040\105\156\164\162\165\163\164
\054\040\111\156\143\056\040\055\040\146\157\162\040\141\165\164
\150\157\162\151\172\145\144\040\165\163\145\040\157\156\154\171
\061\062\060\060\006\003\125\004\003\023\051\105\156\164\162\165
\163\164\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040
\055\040\107\062\060\202\001\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012
\002\202\001\001\000\272\204\266\162\333\236\014\153\342\231\351
\060\001\247\166\352\062\270\225\101\032\311\332\141\116\130\162
\317\376\366\202\171\277\163\141\006\012\245\047\330\263\137\323
\105\116\034\162\326\116\062\362\162\212\017\367\203\031\320\152
\200\200\000\105\036\260\307\347\232\277\022\127\047\034\243\150
\057\012\207\275\152\153\016\136\145\363\034\167\325\324\205\215
\160\041\264\263\062\347\213\242\325\206\071\002\261\270\322\107
\316\344\311\111\304\073\247\336\373\124\175\127\276\360\350\156
\302\171\262\072\013\125\342\120\230\026\062\023\134\057\170\126
\301\302\224\263\362\132\344\047\232\237\044\327\306\354\320\233
\045\202\343\314\302\304\105\305\214\227\172\006\153\052\021\237
\251\012\156\110\073\157\333\324\021\031\102\367\217\007\277\365
\123\137\234\076\364\027\054\346\151\254\116\062\114\142\167\352
\267\350\345\273\064\274\031\213\256\234\121\347\267\176\265\123
\261\063\042\345\155\317\160\074\032\372\342\233\147\266\203\364
\215\245\257\142\114\115\340\130\254\144\064\022\003\370\266\215
\224\143\044\244\161\002\003\001\000\001\243\102\060\100\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\035\006\003\125\035\016\004\026\004\024\152\162\046\172\320\036
\357\175\347\073\151\121\324\154\215\237\220\022\146\253\060\015
\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202\001
\001\000\171\237\035\226\306\266\171\077\042\215\207\323\207\003
\004\140\152\153\232\056\131\211\163\021\254\103\321\365\023\377
\215\071\053\300\362\275\117\160\214\251\057\352\027\304\013\124
\236\324\033\226\230\063\074\250\255\142\242\000\166\253\131\151
\156\006\035\176\304\271\104\215\230\257\022\324\141\333\012\031
\106\107\363\353\367\143\301\100\005\100\245\322\267\364\265\232
\066\277\251\210\166\210\004\125\004\053\234\207\177\032\067\074
\176\055\245\032\330\324\211\136\312\275\254\075\154\330\155\257
\325\363\166\017\315\073\210\070\042\235\154\223\232\304\075\277
\202\033\145\077\246\017\135\252\374\345\262\025\312\265\255\306
\274\075\320\204\350\352\006\162\260\115\071\062\170\277\076\021
\234\013\244\235\232\041\363\360\233\013\060\170\333\301\334\207
\103\376\274\143\232\312\305\302\034\311\307\215\377\073\022\130
\010\346\266\075\354\172\054\116\373\203\226\316\014\074\151\207
\124\163\244\163\302\223\377\121\020\254\025\124\001\330\374\005
\261\211\241\177\164\203\232\111\327\334\116\173\212\110\157\213
\105\366
END

```
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL
 CK_FALSE

# Trust for "Entrust Root Certification Authority - G2"
# Issuer: CN=Entrust Root Certification Authority - G2,OU="(c) 2009 Entrust, Inc. - for authorized use
only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
# Serial Number: 1246989352 (0x4a538c28)
# Subject: CN=Entrust Root Certification Authority - G2,OU="(c) 2009 Entrust, Inc. - for authorized use
only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
# Not Valid Before: Tue Jul 07 17:25:54 2009
# Not Valid After : Sat Dec 07 17:55:54 2030
# Fingerprint (SHA-256):
43:DF:57:74:B0:3E:7F:EF:5F:E4:0D:93:1A:7B:ED:F1:BB:2E:6B:42:73:8C:4E:6D:38:41:10:3D:3A:A7:F3:39
# Fingerprint (SHA1): 8C:F4:27:FD:79:0C:3A:D1:66:06:8D:E8:1E:57:EF:BB:93:22:72:D4
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust Root Certification Authority - G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\214\364\047\375\171\014\072\321\146\006\215\350\036\127\357\273
\223\042\162\324
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\113\342\311\221\226\145\014\364\016\132\223\222\240\012\376\262
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\276\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\060\071\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\062\060
\060\006\003\125\004\003\023\051\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\107
\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\112\123\214\050
END
```

CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Entrust Root Certification Authority - EC1"
#
# Issuer: CN=Entrust Root Certification Authority - EC1,OU="(c) 2012 Entrust, Inc. - for authorized use only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
# Serial Number:00:a6:8b:79:29:00:00:00:00:50:d0:91:f9
# Subject: CN=Entrust Root Certification Authority - EC1,OU="(c) 2012 Entrust, Inc. - for authorized use only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
# Not Valid Before: Tue Dec 18 15:25:36 2012
# Not Valid After : Fri Dec 18 15:55:36 2037
# Fingerprint (SHA-256): 02:ED:0E:B2:8C:14:DA:45:16:5C:56:67:91:70:0D:64:51:D7:FB:56:F0:B2:AB:1D:3B:8E:B0:70:E5:6E:DF:F5
# Fingerprint (SHA1): 20:D8:06:40:DF:9B:25:F5:12:25:3A:11:EA:F7:59:8A:EB:14:B5:47
CKA_CLASS
 CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust Root Certification Authority - EC1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\277\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\061\062\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\063\060
\061\006\003\125\004\003\023\052\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\105
\103\061
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\277\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165

\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\061\062\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\063\060
\061\006\003\125\004\003\023\052\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\105
\103\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\015\000\246\213\171\051\000\000\000\000\120\320\221\371
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\002\371\060\202\002\200\240\003\002\001\002\002\015\000
\246\213\171\051\000\000\000\000\120\320\221\371\060\012\006\010
\052\206\110\316\075\004\003\003\060\201\277\061\013\060\011\006
\003\125\004\006\023\002\125\123\061\026\060\024\006\003\125\004
\012\023\015\105\156\164\162\165\163\164\054\040\111\156\143\056
\061\050\060\046\006\003\125\004\013\023\037\123\145\145\040\167
\167\167\056\145\156\164\162\165\163\164\056\156\145\164\057\154
\145\147\141\154\055\164\145\162\155\163\061\071\060\067\006\003
\125\004\013\023\060\050\143\051\040\062\060\061\062\040\105\156
\164\162\165\163\164\054\040\111\156\143\056\040\055\040\146\157
\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163\145
\040\157\156\154\171\061\063\060\061\006\003\125\004\003\023\052
\105\156\164\162\165\163\164\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171\040\055\040\105\103\061\060\036\027\015\061\062
\061\062\061\070\061\065\062\065\063\066\132\027\015\063\067\061
\062\061\070\061\065\065\065\063\066\132\060\201\277\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\026\060\024\006\003
\125\004\012\023\015\105\156\164\162\165\163\164\054\040\111\156
\143\056\061\050\060\046\006\003\125\004\013\023\037\123\145\145
\040\167\167\167\056\145\156\164\162\165\163\164\056\156\145\164
\057\154\145\147\141\154\055\164\145\162\155\163\061\071\060\067
\006\003\125\004\013\023\060\050\143\051\040\062\060\061\062\040
\105\156\164\162\165\163\164\054\040\111\156\143\056\040\055\040
\146\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165
\163\145\040\157\156\154\171\061\063\060\061\006\003\125\004\003
\023\052\105\156\164\162\165\163\164\040\122\157\157\164\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\040\055\040\105\103\061\060\166\060\020
\006\007\052\206\110\316\075\002\001\006\005\053\201\004\000\042
\003\142\000\004\204\023\311\320\272\155\101\173\342\154\320\353
\125\137\146\002\032\044\364\133\211\151\107\343\270\302\175\361
\362\002\305\237\240\366\133\325\213\006\031\206\117\123\020\155

\007\044\047\241\240\370\325\107\031\141\114\175\312\223\047\352
\164\014\357\157\226\011\376\143\354\160\135\066\255\147\167\256
\311\235\174\125\104\072\242\143\121\037\365\343\142\324\251\107
\007\076\314\040\243\102\060\100\060\016\006\003\125\035\017\001
\001\377\004\004\003\002\001\006\060\017\006\003\125\035\023\001
\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016
\004\026\004\024\267\143\347\032\335\215\351\010\246\125\203\244
\340\152\120\101\145\021\102\111\060\012\006\010\052\206\110\316
\075\004\003\003\003\147\000\060\144\002\060\141\171\330\345\102
\107\337\034\256\123\231\027\266\157\034\175\341\277\021\224\321
\003\210\165\344\215\211\244\212\167\106\336\155\141\357\002\365
\373\265\337\314\376\116\377\376\251\346\247\002\060\133\231\327
\205\067\006\265\173\010\375\353\047\213\112\224\371\341\372\247
\216\046\010\350\174\222\150\155\163\330\157\046\254\041\002\270
\231\267\046\101\133\045\140\256\320\110\032\356\006
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Entrust Root Certification Authority - EC1"
# Issuer: CN=Entrust Root Certification Authority - EC1,OU="(c) 2012 Entrust, Inc. - for authorized use only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
# Serial Number:00:a6:8b:79:29:00:00:00:00:50:d0:91:f9
# Subject: CN=Entrust Root Certification Authority - EC1,OU="(c) 2012 Entrust, Inc. - for authorized use only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
# Not Valid Before: Tue Dec 18 15:25:36 2012
# Not Valid After : Fri Dec 18 15:55:36 2037
# Fingerprint (SHA-256):
02:ED:0E:B2:8C:14:DA:45:16:5C:56:67:91:70:0D:64:51:D7:FB:56:F0:B2:AB:1D:3B:8E:B0:70:E5:6E:DF:F5
# Fingerprint (SHA1): 20:D8:06:40:DF:9B:25:F5:12:25:3A:11:EA:F7:59:8A:EB:14:B5:47
CKA_CLASS
 CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust Root Certification Authority - EC1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\040\330\006\100\337\233\045\365\022\045\072\021\352\367\131\212
\353\024\265\107
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\266\176\035\360\130\305\111\154\044\073\075\355\230\030\355\274
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\277\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165

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\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\061\062\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\063\060
\061\006\003\125\004\003\023\052\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\105
\103\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\015\000\246\213\171\051\000\000\000\000\120\320\221\371
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "CFCA EV ROOT"
#
# Issuer: CN=CFCA EV ROOT,O=China Financial Certification Authority,C=CN
# Serial Number: 407555286 (0x184accd6)
# Subject: CN=CFCA EV ROOT,O=China Financial Certification Authority,C=CN
# Not Valid Before: Wed Aug 08 03:07:01 2012
# Not Valid After : Mon Dec 31 03:07:01 2029
# Fingerprint (SHA-256):
5C:C3:D7:8E:4E:1D:5E:45:54:7A:04:E6:87:3E:64:F9:0C:F9:53:6D:1C:CC:2E:F8:00:F3:55:C4:C5:FD:70:FD
#
 Fingerprint (SHA1): E2:B8:29:4B:55:84:AB:6B:58:C2:90:46:6C:AC:3F:B8:39:8F:84:83
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CFCA EV ROOT"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\126\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\060\060\056\006\003\125\004\012\014\047\103\150\151\156\141\040
\106\151\156\141\156\143\151\141\154\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\061\025\060\023\006\003\125\004\003\014\014\103\106\103\101
\040\105\126\040\122\117\117\124
END
CKA_ID UTF8 "0"
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CKA_ISSUER MULTILINE_OCTAL
\060\126\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\060\060\056\006\003\125\004\012\014\047\103\150\151\156\141\040
\106\151\156\141\156\143\151\141\154\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\061\025\060\023\006\003\125\004\003\014\014\103\106\103\101
\040\105\126\040\122\117\117\124
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\004\030\112\314\326
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\215\060\202\003\165\240\003\002\001\002\002\004\030
\112\314\326\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\126\061\013\060\011\006\003\125\004\006\023\002\103
\116\061\060\060\056\006\003\125\004\012\014\047\103\150\151\156
\141\040\106\151\156\141\156\143\151\141\154\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\061\025\060\023\006\003\125\004\003\014\014\103\106
\103\101\040\105\126\040\122\117\117\124\060\036\027\015\061\062
\060\070\060\070\060\063\060\067\060\061\132\027\015\062\071\061
\062\063\061\060\063\060\067\060\061\132\060\126\061\013\060\011
\006\003\125\004\006\023\002\103\116\061\060\060\056\006\003\125
\004\012\014\047\103\150\151\156\141\040\106\151\156\141\156\143
\151\141\154\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\061\025\060\023\006
\003\125\004\003\014\014\103\106\103\101\040\105\126\040\122\117
\117\124\060\202\002\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202
\002\001\000\327\135\153\315\020\077\037\005\131\325\005\115\067
\261\016\354\230\053\216\025\035\372\223\113\027\202\041\161\020
\122\327\121\144\160\026\302\125\151\115\216\025\155\237\277\014
\033\302\340\243\147\326\014\254\317\042\256\257\167\124\052\113
\114\212\123\122\172\303\356\056\336\263\161\045\301\351\135\075
\356\241\057\243\367\052\074\311\043\035\152\253\035\241\247\361
\363\354\240\325\104\317\025\317\162\057\035\143\227\350\231\371
\375\223\244\124\200\114\122\324\122\253\056\111\337\220\315\270
\137\276\077\336\241\312\115\040\324\045\350\204\051\123\267\261
\210\037\377\372\332\220\237\012\251\055\101\077\261\361\030\051
\356\026\131\054\064\111\032\250\006\327\250\210\322\003\162\172
\062\342\352\150\115\156\054\226\145\173\312\131\372\362\342\335
\356\060\054\373\314\106\254\304\143\353\157\177\066\053\064\163
\022\224\177\337\314\046\236\361\162\135\120\145\131\217\151\263
\207\136\062\157\303\030\212\265\225\217\260\172\067\336\132\105
\073\307\066\341\357\147\321\071\323\227\133\163\142\031\110\055
\207\034\006\373\164\230\040\111\163\360\005\322\033\261\240\243
\267\033\160\323\210\151\271\132\326\070\364\142\334\045\213\170

\277\370\350\176\270\134\311\225\117\137\247\055\271\040\153\317
\153\335\365\015\364\202\267\364\262\146\056\020\050\366\227\132
\173\226\026\217\001\031\055\154\156\177\071\130\006\144\203\001
\203\203\303\115\222\335\062\306\207\244\067\351\026\316\252\055
\150\257\012\201\145\072\160\301\233\255\115\155\124\312\052\055
\113\205\033\263\200\346\160\105\015\153\136\065\360\177\073\270
\234\344\004\160\211\022\045\223\332\012\231\042\140\152\143\140
\116\166\006\230\116\275\203\255\035\130\212\045\205\322\307\145
\036\055\216\306\337\266\306\341\177\212\004\041\025\051\164\360
\076\234\220\235\014\056\361\212\076\132\252\014\011\036\307\325
\074\243\355\227\303\036\064\372\070\371\010\016\343\300\135\053
\203\321\126\152\311\266\250\124\123\056\170\062\147\075\202\177
\164\320\373\341\266\005\140\271\160\333\216\013\371\023\130\157
\161\140\020\122\020\271\301\101\011\357\162\037\147\061\170\377
\226\005\215\002\003\001\000\001\243\143\060\141\060\037\006\003
\125\035\043\004\030\060\026\200\024\343\376\055\375\050\320\013
\265\272\266\242\304\277\006\252\005\214\223\373\057\060\017\006
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035
\006\003\125\035\016\004\026\004\024\343\376\055\375\050\320\013
\265\272\266\242\304\277\006\252\005\214\223\373\057\060\015\006
\011\052\206\110\206\367\015\001\001\013\005\000\003\202\002\001
\000\045\306\272\153\353\207\313\336\202\071\226\075\360\104\247
\153\204\163\003\336\235\053\117\272\040\177\274\170\262\317\227
\260\033\234\363\327\171\056\365\110\266\322\373\027\210\346\323
\172\077\355\123\023\320\342\057\152\171\313\000\043\050\346\036
\067\127\065\211\204\302\166\117\064\066\255\147\303\316\101\006
\210\305\367\356\330\032\270\326\013\177\120\377\223\252\027\113
\214\354\355\122\140\262\244\006\352\116\353\364\153\031\375\353
\365\032\340\045\052\232\334\307\101\066\367\310\164\005\204\071
\225\071\326\013\073\244\047\372\010\330\134\036\370\004\140\122
\021\050\050\003\377\357\123\146\000\245\112\064\026\146\174\375
\011\244\256\236\147\032\157\101\013\153\006\023\233\217\206\161
\005\264\057\215\211\146\063\051\166\124\232\021\370\047\372\262
\077\221\340\316\015\033\363\060\032\255\277\042\135\033\323\277
\045\005\115\341\222\032\177\231\237\074\104\223\312\324\100\111
\154\200\207\327\004\072\303\062\122\065\016\126\370\245\335\175
\304\213\015\021\037\123\313\036\262\027\266\150\167\132\340\324
\313\310\007\256\365\072\056\216\067\267\320\001\113\103\051\167
\214\071\227\217\202\132\370\121\345\211\240\030\347\150\177\135
\012\056\373\243\107\016\075\246\043\172\306\001\307\217\310\136
\277\155\200\126\276\212\044\272\063\352\237\341\062\021\236\361
\322\117\200\366\033\100\257\070\236\021\120\171\163\022\022\315
\346\154\235\054\210\162\074\060\201\006\221\042\352\131\255\332
\031\056\042\302\215\271\214\207\340\146\274\163\043\137\041\144
\143\200\110\365\240\074\030\075\224\310\110\101\035\100\272\136
\376\376\126\071\241\310\317\136\236\031\144\106\020\332\027\221
\267\005\200\254\213\231\222\175\347\242\330\007\013\066\047\347

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\110\171\140\212\303\327\023\134\370\162\100\337\112\313\317\231
\000\012\000\013\021\225\332\126\105\003\210\012\237\147\320\325
\171\261\250\215\100\155\015\302\172\100\372\363\137\144\107\222
\313\123\271\273\131\316\117\375\320\025\123\001\330\337\353\331
\346\166\357\320\043\273\073\251\171\263\325\002\051\315\211\243
\226\017\112\065\347\116\102\300\165\315\007\317\346\054\353\173
\056
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "CFCA EV ROOT"
# Issuer: CN=CFCA EV ROOT,O=China Financial Certification Authority,C=CN
# Serial Number: 407555286 (0x184accd6)
# Subject: CN=CFCA EV ROOT,O=China Financial Certification Authority,C=CN
# Not Valid Before: Wed Aug 08 03:07:01 2012
# Not Valid After : Mon Dec 31 03:07:01 2029
# Fingerprint (SHA-256):
5C:C3:D7:8E:4E:1D:5E:45:54:7A:04:E6:87:3E:64:F9:0C:F9:53:6D:1C:CC:2E:F8:00:F3:55:C4:C5:FD:70:FD
# Fingerprint (SHA1): E2:B8:29:4B:55:84:AB:6B:58:C2:90:46:6C:AC:3F:B8:39:8F:84:83
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CFCA EV ROOT"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\342\270\051\113\125\204\253\153\130\302\220\106\154\254\077\270
\071\217\204\203
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\164\341\266\355\046\172\172\104\060\063\224\253\173\047\201\060
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\126\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\060\060\056\006\003\125\004\012\014\047\103\150\151\156\141\040
\106\151\156\141\156\143\151\141\154\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\061\025\060\023\006\003\125\004\003\014\014\103\106\103\101
\040\105\126\040\122\117\117\124
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\030\112\314\326
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
```

```
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "OISTE WISeKey Global Root GB CA"
#
# Issuer: CN=OISTE WISeKey Global Root GB CA,OU=OISTE Foundation Endorsed,O=WISeKey,C=CH
# Serial Number:76:b1:20:52:74:f0:85:87:46:b3:f8:23:1a:f6:c2:c0
# Subject: CN=OISTE WISeKey Global Root GB CA,OU=OISTE Foundation Endorsed,O=WISeKey,C=CH
# Not Valid Before:
 Mon Dec 01 15:00:32 2014
# Not Valid After : Thu Dec 01 15:10:31 2039
# Fingerprint (SHA-256):
6B:9C:08:E8:6E:B0:F7:67:CF:AD:65:CD:98:B6:21:49:E5:49:4A:67:F5:84:5E:7B:D1:ED:01:9F:27:B8:6B:D6
# Fingerprint (SHA1): 0F:F9:40:76:18:D3:D7:6A:4B:98:F0:A8:35:9E:0C:FD:27:AC:CC:ED
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "OISTE WISeKey Global Root GB CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113\145
\171\061\042\060\040\006\003\125\004\013\023\031\117\111\123\124
\105\040\106\157\165\156\144\141\164\151\157\156\040\105\156\144
\157\162\163\145\144\061\050\060\046\006\003\125\004\003\023\037
\117\111\123\124\105\040\127\111\123\145\113\145\171\040\107\154
\157\142\141\154\040\122\157\157\164\040\107\102\040\103\101
END
CKA_ID UTF8
 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113\145
\171\061\042\060\040\006\003\125\004\013\023\031\117\111\123\124
\105\040\106\157\165\156\144\141\164\151\157\156\040\105\156\144
\157\162\163\145\144\061\050\060\046\006\003\125\004\003\023\037
\117\111\123\124\105\040\127\111\123\145\113\145\171\040\107\154
\157\142\141\154\040\122\157\157\164\040\107\102\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\166\261\040\122\164\360\205\207\106\263\370\043\032\366
\302\300
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\265\060\202\002\235\240\003\002\001\002\002\020\166
\261\040\122\164\360\205\207\106\263\370\043\032\366\302\300\060
```

\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\155
\061\013\060\011\006\003\125\004\006\023\002\103\110\061\020\060
\016\006\003\125\004\012\023\007\127\111\123\145\113\145\171\061
\042\060\040\006\003\125\004\013\023\031\117\111\123\124\105\040
\106\157\165\156\144\141\164\151\157\156\040\105\156\144\157\162
\163\145\144\061\050\060\046\006\003\125\004\003\023\037\117\111
\123\124\105\040\127\111\123\145\113\145\171\040\107\154\157\142
\141\154\040\122\157\157\164\040\107\102\040\103\101\060\036\027
\015\061\064\061\062\060\061\061\065\060\060\063\062\132\027\015
\063\071\061\062\060\061\061\065\061\060\063\061\132\060\155\061
\013\060\011\006\003\125\004\006\023\002\103\110\061\020\060\016
\006\003\125\004\012\023\007\127\111\123\145\113\145\171\061\042
\060\040\006\003\125\004\013\023\031\117\111\123\124\105\040\106
\157\165\156\144\141\164\151\157\156\040\105\156\144\157\162\163
\145\144\061\050\060\046\006\003\125\004\003\023\037\117\111\123
\124\105\040\127\111\123\145\113\145\171\040\107\154\157\142\141
\154\040\122\157\157\164\040\107\102\040\103\101\060\202\001\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\001\017\000\060\202\001\012\002\202\001\001\000\330\027\267
\034\112\044\052\326\227\261\312\342\036\373\175\070\357\230\365
\262\071\230\116\047\270\021\135\173\322\045\224\210\202\025\046
\152\033\061\273\250\133\041\041\053\330\017\116\237\132\361\261
\132\344\171\326\062\043\053\341\123\314\231\105\134\173\117\255
\274\277\207\112\013\113\227\132\250\366\110\354\175\173\015\315
\041\006\337\236\025\375\101\212\110\267\040\364\241\172\033\127
\324\135\120\377\272\147\330\043\231\037\310\077\343\336\377\157
\133\167\261\153\156\270\311\144\367\341\312\101\106\016\051\161
\320\271\043\374\311\201\137\116\367\157\337\277\204\255\163\144
\273\267\102\216\151\366\324\166\035\176\235\247\270\127\212\121
\147\162\327\324\250\270\225\124\100\163\003\366\352\364\353\376
\050\102\167\077\235\043\033\262\266\075\200\024\007\114\056\117
\367\325\012\026\015\275\146\103\067\176\043\103\171\303\100\206
\365\114\051\332\216\232\255\015\245\004\207\210\036\205\343\351
\123\325\233\310\213\003\143\170\353\340\031\112\156\273\057\153
\063\144\130\223\255\151\277\217\033\357\202\110\307\002\003\001
\000\001\243\121\060\117\060\013\006\003\125\035\017\004\004\003
\002\001\206\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024\065
\017\310\066\143\136\342\243\354\371\073\146\025\316\121\122\343
\221\232\075\060\020\006\011\053\006\001\004\001\202\067\025\001
\004\003\002\001\000\060\015\006\011\052\206\110\206\367\015\001
\001\013\005\000\003\202\001\001\000\100\114\373\207\262\231\201
\220\176\235\305\260\260\046\315\210\173\053\062\215\156\270\041
\161\130\227\175\256\067\024\257\076\347\367\232\342\175\366\161
\230\231\004\252\103\164\170\243\343\111\141\076\163\214\115\224
\340\371\161\304\266\026\016\123\170\037\326\242\207\057\002\071
\201\051\074\257\025\230\041\060\376\050\220\000\214\321\341\313
\372\136\310\375\370\020\106\073\242\170\102\221\027\164\125\012

\336\120\147\115\146\321\247\377\375\331\300\265\250\243\212\316
\146\365\017\103\315\247\053\127\173\143\106\152\252\056\122\330
\364\355\341\155\255\051\220\170\110\272\341\043\252\243\211\354
\265\253\226\300\264\113\242\035\227\236\172\362\156\100\161\337
\150\361\145\115\316\174\005\337\123\145\251\245\360\261\227\004
\160\025\106\003\230\324\322\277\124\264\240\130\175\122\157\332
\126\046\142\324\330\333\211\061\157\034\360\042\302\323\142\034
\065\315\114\151\025\124\032\220\230\336\353\036\137\312\167\307
\313\216\075\103\151\234\232\130\320\044\073\337\033\100\226\176
\065\255\201\307\116\161\272\210\023
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "OISTE WISeKey Global Root GB CA"
# Issuer: CN=OISTE WISeKey Global Root GB CA,OU=OISTE Foundation Endorsed,O=WISeKey,C=CH
# Serial Number:76:b1:20:52:74:f0:85:87:46:b3:f8:23:1a:f6:c2:c0
# Subject: CN=OISTE WISeKey Global Root GB CA,OU=OISTE Foundation Endorsed,O=WISeKey,C=CH
# Not Valid Before: Mon Dec 01 15:00:32 2014
# Not Valid After : Thu Dec
01 15:10:31 2039
# Fingerprint (SHA-256):
6B:9C:08:E8:6E:B0:F7:67:CF:AD:65:CD:98:B6:21:49:E5:49:4A:67:F5:84:5E:7B:D1:ED:01:9F:27:B8:6B:D6
# Fingerprint (SHA1): 0F:F9:40:76:18:D3:D7:6A:4B:98:F0:A8:35:9E:0C:FD:27:AC:CC:ED
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "OISTE WISeKey Global Root GB CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\017\371\100\166\030\323\327\152\113\230\360\250\065\236\014\375
\047\254\314\355
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\244\353\271\141\050\056\267\057\230\260\065\046\220\231\121\035
END
CKA_ISSUER MULTILINE_OCTAL
\060\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113\145
\171\061\042\060\040\006\003\125\004\013\023\031\117\111\123\124
\105\040\106\157\165\156\144\141\164\151\157\156\040\105\156\144
\157\162\163\145\144\061\050\060\046\006\003\125\004\003\023\037
\117\111\123\124\105\040\127\111\123\145\113\145\171\040\107\154
\157\142\141\154\040\122\157\157\164\040\107\102\040\103\101
END
CKA_SERIAL_NUMBER

```
 MULTILINE_OCTAL
\002\020\166\261\040\122\164\360\205\207\106\263\370\043\032\366
\302\300
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "SZAFIR ROOT CA2"
#
# Issuer: CN=SZAFIR ROOT CA2,O=Krajowa Izba Rozliczeniowa S.A.,C=PL
# Serial Number:3e:8a:5d:07:ec:55:d2:32:d5:b7:e3:b6:5f:01:eb:2d:dc:e4:d6:e4
# Subject: CN=SZAFIR ROOT CA2,O=Krajowa Izba Rozliczeniowa S.A.,C=PL
# Not Valid Before: Mon Oct 19 07:43:30 2015
# Not Valid After : Fri Oct 19 07:43:30 2035
# Fingerprint (SHA-256):
A1:33:9D:33:28:1A:0B:56:E5:57:D3:D3:2B:1C:E7:F9:36:7E:B0:94:BD:5F:A7:2A:7E:50:04:C8:DE:D7:CA:FE
# Fingerprint (SHA1): E2:52:FA:95:3F:ED:DB:24:60:BD:6E:28:F3:9C:CC:CF:5E:B3:3F:DE
CKA_CLASS CK_OBJECT_CLASS
 CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SZAFIR ROOT CA2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\050\060\046\006\003\125\004\012\014\037\113\162\141\152\157\167
\141\040\111\172\142\141\040\122\157\172\154\151\143\172\145\156
\151\157\167\141\040\123\056\101\056\061\030\060\026\006\003\125
\004\003\014\017\123\132\101\106\111\122\040\122\117\117\124\040
\103\101\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\050\060\046\006\003\125\004\012\014\037\113\162\141\152\157\167
\141\040\111\172\142\141\040\122\157\172\154\151\143\172\145\156
\151\157\167\141\040\123\056\101\056\061\030\060\026\006\003\125
\004\003\014\017\123\132\101\106\111\122\040\122\117\117\124\040
\103\101\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\076\212\135\007\354\125\322\062\325\267\343\266\137\001
\353\055\334\344\326\344
END
```

CKA_VALUE
MULTILINE_OCTAL
\060\202\003\162\060\202\002\132\240\003\002\001\002\002\024\076
\212\135\007\354\125\322\062\325\267\343\266\137\001\353\055\334
\344\326\344\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\121\061\013\060\011\006\003\125\004\006\023\002\120
\114\061\050\060\046\006\003\125\004\012\014\037\113\162\141\152
\157\167\141\040\111\172\142\141\040\122\157\172\154\151\143\172
\145\156\151\157\167\141\040\123\056\101\056\061\030\060\026\006
\003\125\004\003\014\017\123\132\101\106\111\122\040\122\117\117
\124\040\103\101\062\060\036\027\015\061\065\061\060\061\071\060
\067\064\063\063\060\132\027\015\063\065\061\060\061\071\060\067
\064\063\063\060\132\060\121\061\013\060\011\006\003\125\004\006
\023\002\120\114\061\050\060\046\006\003\125\004\012\014\037\113
\162\141\152\157\167\141\040\111\172\142\141\040\122\157\172\154
\151\143\172\145\156\151\157\167\141\040\123\056\101\056\061\030
\060\026\006\003\125\004\003\014\017\123\132\101\106\111\122\040
\122\117\117\124\040\103\101\062\060\202\001\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000
\060\202\001\012\002\202\001\001\000\267\274\076\120\250\113\315
\100\265\316\141\347\226\312\264\241\332\014\042\260\372\265\173
\166\000\167\214\013\317\175\250\206\314\046\121\344\040\075\205
\014\326\130\343\347\364\052\030\235\332\321\256\046\356\353\123
\334\364\220\326\023\112\014\220\074\303\364\332\322\216\015\222
\072\334\261\261\377\070\336\303\272\055\137\200\271\002\275\112
\235\033\017\264\303\302\301\147\003\335\334\033\234\075\263\260
\336\000\036\250\064\107\273\232\353\376\013\024\275\066\204\332
\015\040\277\372\133\313\251\026\040\255\071\140\356\057\165\266
\347\227\234\371\076\375\176\115\157\115\057\357\210\015\152\372
\335\361\075\156\040\245\240\022\264\115\160\271\316\327\162\073
\211\223\247\200\204\034\047\111\162\111\265\377\073\225\236\301
\314\310\001\354\350\016\212\012\226\347\263\246\207\345\326\371
\005\053\015\227\100\160\074\272\254\165\132\234\325\115\235\002
\012\322\113\233\146\113\106\007\027\145\255\237\154\210\000\334
\042\211\340\341\144\324\147\274\061\171\141\074\273\312\101\315
\134\152\000\310\074\070\216\130\257\002\003\001\000\001\243\102
\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060\003
\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\035\006\003\125\035\016\004\026\004\024\056\026
\251\112\030\265\313\314\365\157\120\363\043\137\370\135\347\254
\360\310\060\015\006\011\052\206\110\206\367\015\001\001\013\005
\000\003\202\001\001\000\265\163\370\003\334\131\133\035\166\351
\243\052\173\220\050\262\115\300\063\117\252\232\261\324\270\344
\047\377\251\226\231\316\106\340\155\174\114\242\070\244\006\160
\360\364\101\021\354\077\107\215\077\162\207\371\073\375\244\157
\053\123\000\340\377\071\271\152\007\016\353\035\034\366\242\162
\220\313\202\075\021\202\213\322\273\237\052\257\041\346\143\206
\235\171\031\357\367\273\014\065\220\303\212\355\117\017\365\314

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\022\331\244\076\273\240\374\040\225\137\117\046\057\021\043\203
\116\165\007\017\277\233\321\264\035\351\020\004\376\312\140\217
\242\114\270\255\317\341\220\017\315\256\012\307\135\173\267\120
\322\324\141\372\325\025\333\327\237\207\121\124\353\245\343\353
\311\205\240\045\040\067\373\216\316\014\064\204\341\074\201\262
\167\116\103\245\210\137\206\147\241\075\346\264\134\141\266\076
\333\376\267\050\305\242\007\256\265\312\312\215\052\022\357\227
\355\302\060\244\311\052\172\373\363\115\043\033\231\063\064\240
\056\365\251\013\077\324\135\341\317\204\237\342\031\302\137\212
\326\040\036\343\163\267
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "SZAFIR ROOT CA2"
# Issuer: CN=SZAFIR ROOT CA2,O=Krajowa Izba Rozliczeniowa S.A.,C=PL
# Serial Number:3e:8a:5d:07:ec:55:d2:32:d5:b7:e3:b6:5f:01:eb:2d:dc:e4:d6:e4
#
 Subject: CN=SZAFIR ROOT CA2,O=Krajowa Izba Rozliczeniowa S.A.,C=PL
# Not Valid Before: Mon Oct 19 07:43:30 2015
# Not Valid After : Fri Oct 19 07:43:30 2035
# Fingerprint (SHA-256):
A1:33:9D:33:28:1A:0B:56:E5:57:D3:D3:2B:1C:E7:F9:36:7E:B0:94:BD:5F:A7:2A:7E:50:04:C8:DE:D7:CA:FE
# Fingerprint (SHA1): E2:52:FA:95:3F:ED:DB:24:60:BD:6E:28:F3:9C:CC:CF:5E:B3:3F:DE
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SZAFIR ROOT CA2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\342\122\372\225\077\355\333\044\140\275\156\050\363\234\314\317
\136\263\077\336
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\021\144\301\211\260\044\261\214\261\007\176\211\236\121\236\231
END
CKA_ISSUER MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\050\060\046\006\003\125\004\012\014\037\113\162\141\152\157\167
\141\040\111\172\142\141\040\122\157\172\154\151\143\172\145\156
\151\157\167\141\040\123\056\101\056\061\030\060\026\006\003\125
\004\003\014\017\123\132\101\106\111\122\040\122\117\117\124\040
\103\101\062
END
CKA_SERIAL_NUMBER
```

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 MULTILINE_OCTAL
\002\024\076\212\135\007\354\125\322\062\325\267\343\266\137\001
\353\055\334\344\326\344
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Certum Trusted Network CA 2"
#
# Issuer: CN=Certum Trusted Network CA 2,OU=Certum Certification Authority,O=Unizeto Technologies
S.A.,C=PL
# Serial Number:21:d6:d0:4a:4f:25:0f:c9:32:37:fc:aa:5e:12:8d:e9
# Subject: CN=Certum Trusted Network CA 2,OU=Certum Certification Authority,O=Unizeto Technologies
S.A.,C=PL
# Not Valid Before: Thu Oct 06 08:39:56 2011
# Not Valid After : Sat Oct 06 08:39:56 2046
# Fingerprint (SHA-256):
B6:76:F2:ED:DA:E8:77:5C:D3:6C:B0:F6:3C:D1:D4:60:39:61:F4:9E:62:65:BA:01:3A:2F:03:07:B6:D0:B8:04
#
 Fingerprint (SHA1): D3:DD:48:3E:2B:BF:4C:05:E8:AF:10:F5:FA:76:26:CF:D3:DC:30:92
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certum Trusted Network CA 2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\200\061\013\060\011\006\003\125\004\006\023\002\120\114
\061\042\060\040\006\003\125\004\012\023\031\125\156\151\172\145
\164\157\040\124\145\143\150\156\157\154\157\147\151\145\163\040
\123\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103
\145\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\061\044\060
\042\006\003\125\004\003\023\033\103\145\162\164\165\155\040\124
\162\165\163\164\145\144\040\116\145\164\167\157\162\153\040\103
\101\040\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\200\061\013\060\011\006\003\125\004\006\023\002\120\114
\061\042\060\040\006\003\125\004\012\023\031\125\156\151\172\145
\164\157\040\124\145\143\150\156\157\154\157\147\151\145\163\040
\123\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103
\145\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\061\044\060
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\042\006\003\125\004\003\023\033\103\145\162\164\165\155\040\124
\162\165\163\164\145\144\040\116\145\164\167\157\162\153\040\103
\101\040\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\041\326\320\112\117\045\017\311\062\067\374\252\136\022
\215\351
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\322\060\202\003\272\240\003\002\001\002\002\020\041
\326\320\112\117\045\017\311\062\067\374\252\136\022\215\351\060
\015\006\011\052\206\110\206\367\015\001\001\015\005\000\060\201
\200\061\013\060\011\006\003\125\004\006\023\002\120\114\061\042
\060\040\006\003\125\004\012\023\031\125\156\151\172\145\164\157
\040\124\145\143\150\156\157\154\157\147\151\145\163\040\123\056
\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145\162
\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\061\044\060\042\006
\003\125\004\003\023\033\103\145\162\164\165\155\040\124\162\165
\163\164\145\144\040\116\145\164\167\157\162\153\040\103\101\040
\062\060\042\030\017\062\060\061\061\061\060\060\066\060\070\063
\071\065\066\132\030\017\062\060\064\066\061\060\060\066\060\070
\063\071\065\066\132\060\201\200\061\013\060\011\006\003\125\004
\006\023\002\120\114\061\042\060\040\006\003\125\004\012\023\031
\125\156\151\172\145\164\157\040\124\145\143\150\156\157\154\157
\147\151\145\163\040\123\056\101\056\061\047\060\045\006\003\125
\004\013\023\036\103\145\162\164\165\155\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\061\044\060\042\006\003\125\004\003\023\033\103\145\162
\164\165\155\040\124\162\165\163\164\145\144\040\116\145\164\167
\157\162\153\040\103\101\040\062\060\202\002\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000
\060\202\002\012\002\202\002\001\000\275\371\170\370\346\325\200
\014\144\235\206\033\226\144\147\077\042\072\036\165\001\175\357
\373\134\147\214\311\314\134\153\251\221\346\271\102\345\040\113
\233\332\233\173\271\231\135\331\233\200\113\327\204\100\053\047
\323\350\272\060\273\076\011\032\247\111\225\357\053\100\044\302
\227\307\247\356\233\045\357\250\012\000\227\205\132\252\235\334
\051\311\342\065\007\353\160\115\112\326\301\263\126\270\241\101
\070\233\321\373\061\177\217\340\137\341\261\077\017\216\026\111
\140\327\006\215\030\371\252\046\020\253\052\323\320\321\147\215
\033\106\276\107\060\325\056\162\321\305\143\332\347\143\171\104
\176\113\143\044\211\206\056\064\077\051\114\122\213\052\247\300
\342\221\050\211\271\300\133\371\035\331\347\047\255\377\232\002
\227\301\306\120\222\233\002\054\275\251\271\064\131\012\277\204
\112\377\337\376\263\237\353\331\236\340\230\043\354\246\153\167
\026\052\333\314\255\073\034\244\207\334\106\163\136\031\142\150

\105\127\344\220\202\102\273\102\326\360\141\340\301\243\075\146
\243\135\364\030\356\210\311\215\027\105\051\231\062\165\002\061
\356\051\046\310\153\002\346\265\142\105\177\067\025\132\043\150
\211\324\076\336\116\047\260\360\100\014\274\115\027\313\115\242
\263\036\320\006\132\335\366\223\317\127\165\231\365\372\206\032
\147\170\263\277\226\376\064\334\275\347\122\126\345\263\345\165
\173\327\101\221\005\334\135\151\343\225\015\103\271\374\203\226
\071\225\173\154\200\132\117\023\162\306\327\175\051\172\104\272
\122\244\052\325\101\106\011\040\376\042\240\266\133\060\215\274
\211\014\325\327\160\370\207\122\375\332\357\254\121\056\007\263
\116\376\320\011\332\160\357\230\372\126\346\155\333\265\127\113
\334\345\054\045\025\310\236\056\170\116\370\332\234\236\206\054
\312\127\363\032\345\310\222\213\032\202\226\172\303\274\120\022
\151\330\016\132\106\213\072\353\046\372\043\311\266\260\201\276
\102\000\244\370\326\376\060\056\307\322\106\366\345\216\165\375
\362\314\271\320\207\133\314\006\020\140\273\203\065\267\136\147
\336\107\354\231\110\361\244\241\025\376\255\214\142\216\071\125
\117\071\026\271\261\143\235\377\267\002\003\001\000\001\243\102
\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060\003
\001\001\377\060\035\006\003\125\035\016\004\026\004\024\266\241
\124\071\002\303\240\077\216\212\274\372\324\370\034\246\321\072
\016\375\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\006\060\015\006\011\052\206\110\206\367\015\001\001\015\005
\000\003\202\002\001\000\161\245\016\316\344\351\277\077\070\325
\211\132\304\002\141\373\114\305\024\027\055\213\117\123\153\020
\027\374\145\204\307\020\111\220\336\333\307\046\223\210\046\157
\160\326\002\136\071\240\367\217\253\226\265\245\023\134\201\024
\155\016\201\202\021\033\212\116\306\117\245\335\142\036\104\337
\011\131\364\133\167\013\067\351\213\040\306\370\012\116\056\130
\034\353\063\320\317\206\140\311\332\373\200\057\236\114\140\204
\170\075\041\144\326\373\101\037\030\017\347\311\165\161\275\275
\134\336\064\207\076\101\260\016\366\271\326\077\011\023\226\024
\057\336\232\035\132\271\126\316\065\072\260\137\160\115\136\343
\051\361\043\050\162\131\266\253\302\214\146\046\034\167\054\046
\166\065\213\050\247\151\240\371\073\365\043\335\205\020\164\311
\220\003\126\221\347\257\272\107\324\022\227\021\042\343\242\111
\224\154\347\267\224\113\272\055\244\332\063\213\114\246\104\377
\132\074\306\035\144\330\265\061\344\246\074\172\250\127\013\333
\355\141\032\313\361\316\163\167\143\244\207\157\114\121\070\326
\344\137\307\237\266\201\052\344\205\110\171\130\136\073\370\333
\002\202\147\301\071\333\303\164\113\075\066\036\371\051\223\210
\150\133\250\104\031\041\360\247\350\201\015\054\350\223\066\264
\067\262\312\260\033\046\172\232\045\037\232\232\200\236\113\052
\077\373\243\232\376\163\062\161\302\236\306\162\341\212\150\047
\361\344\017\264\304\114\245\141\223\370\227\020\007\052\060\045
\251\271\310\161\270\357\150\314\055\176\365\340\176\017\202\250
\157\266\272\154\203\103\167\315\212\222\027\241\236\133\170\026
\075\105\342\063\162\335\341\146\312\231\323\311\305\046\375\015

\150\004\106\256\266\331\233\214\276\031\276\261\306\362\031\343
\134\002\312\054\330\157\112\007\331\311\065\332\100\165\362\304
\247\031\157\236\102\020\230\165\346\225\213\140\274\355\305\022
\327\212\316\325\230\134\126\226\003\305\356\167\006\065\377\317
\344\356\077\023\141\356\333\332\055\205\360\315\256\235\262\030
\011\105\303\222\241\162\027\374\107\266\240\013\054\361\304\336
\103\150\010\152\137\073\360\166\143\373\314\006\054\246\306\342
\016\265\271\276\044\217
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Certum Trusted Network CA 2"
# Issuer: CN=Certum Trusted Network CA 2,OU=Certum Certification Authority,O=Unizeto Technologies S.A.,C=PL
# Serial Number:21:d6:d0:4a:4f:25:0f:c9:32:37:fc:aa:5e:12:8d:e9
# Subject: CN=Certum Trusted Network CA 2,OU=Certum Certification Authority,O=Unizeto Technologies S.A.,C=PL
# Not Valid Before: Thu Oct 06 08:39:56 2011
# Not Valid After : Sat Oct 06 08:39:56 2046
# Fingerprint (SHA-256): B6:76:F2:ED:DA:E8:77:5C:D3:6C:B0:F6:3C:D1:D4:60:39:61:F4:9E:62:65:BA:01:3A:2F:03:07:B6:D0:B8:04
# Fingerprint (SHA1): D3:DD:48:3E:2B:BF:4C:05:E8:AF:10:F5:FA:76:26:CF:D3:DC:30:92

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certum Trusted Network CA 2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\323\335\110\076\053\277\114\005\350\257\020\365\372\166\046\317
\323\334\060\222
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\155\106\236\331\045\155\010\043\133\136\164\175\036\047\333\362
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\200\061\013\060\011\006\003\125\004\006\023\002\120\114
\061\042\060\040\006\003\125\004\012\023\031\125\156\151\172\145
\164\157\040\124\145\143\150\156\157\154\157\147\151\145\163\040
\123\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103
\145\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\061\044\060
\042\006\003\125\004\003\023\033\103\145\162\164\165\155\040\124
\162\165\163\164\145\144\040\116\145\164\167\157\162\153\040\103
\101\040\062

END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\041\326\320\112\117\045\017\311\062\067\374\252\136\022
\215\351
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Hellenic Academic and Research Institutions RootCA 2015"
#
# Issuer: CN=Hellenic Academic and Research Institutions RootCA 2015,O=Hellenic Academic and Research Institutions Cert. Authority,L=Athens,C=GR
# Serial Number: 0 (0x0)
#
Subject: CN=Hellenic Academic and Research Institutions RootCA 2015,O=Hellenic Academic and Research Institutions Cert. Authority,L=Athens,C=GR
# Not Valid Before: Tue Jul 07 10:11:21 2015
# Not Valid After : Sat Jun 30 10:11:21 2040
# Fingerprint (SHA-256):
A0:40:92:9A:02:CE:53:B4:AC:F4:F2:FF:C6:98:1C:E4:49:6F:75:5E:6D:45:FE:0B:2A:69:2B:CD:52:52:3F:36
# Fingerprint (SHA1): 01:0C:06:95:A6:98:19:14:FF:BF:5F:C6:B0:B6:95:EA:29:E9:12:A6
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Hellenic Academic and Research Institutions RootCA 2015"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\246\061\013\060\011\006\003\125\004\006\023\002\107\122
\061\017\060\015\006\003\125\004\007\023\006\101\164\150\145\156
\163\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154
\145\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156
\144\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151
\164\165\164\151\157\156\163\040\103\145\162\164\056\040\101\165
\164\150\157\162\151\164\171\061\100\060\076\006\003\125\004\003
\023\067\110\145\154\154\145\156\151\143\040\101\143\141\144\145
\155\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150
\040\111\156\163\164\151\164\165\164\151\157\156\163\040\122\157
\157\164\103\101\040\062\060\061\065
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\246\061\013\060\011\006\003\125\004\006\023\002\107\122

\061\017\060\015\006\003\125\004\007\023\006\101\164\150\145\156
\163\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154
\145\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156
\144\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151
\164\165\164\151\157\156\163\040\103\145\162\164\056\040\101\165
\164\150\157\162\151\164\171\061\100\060\076\006\003\125\004\003
\023\067\110\145\154\154\145\156\151\143\040\101\143\141\144\145
\155\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150
\040\111\156\163\164\151\164\165\164\151\157\156\163\040\122\157
\157\164\103\101\040\062\060\061\065
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\000
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\013\060\202\003\363\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\201\246\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\017\060\015\006\003\125\004\007\023\006\101\164\150\145\156\163
\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154\145
\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144
\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164
\165\164\151\157\156\163\040\103\145\162\164\056\040\101\165\164
\150\157\162\151\164\171\061\100\060\076\006\003\125\004\003\023
\067\110\145\154\154\145\156\151\143\040\101\143\141\144\145\155
\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150\040
\111\156\163\164\151\164\165\164\151\157\156\163\040\122\157\157
\164\103\101\040\062\060\061\065\060\036\027\015\061\065\060\067
\060\067\061\060\061\061\062\061\132\027\015\064\060\060\066\063
\060\061\060\061\061\062\061\132\060\201\246\061\013\060\011\006
\003\125\004\006\023\002\107\122\061\017\060\015\006\003\125\004
\007\023\006\101\164\150\145\156\163\061\104\060\102\006\003\125
\004\012\023\073\110\145\154\154\145\156\151\143\040\101\143\141
\144\145\155\151\143\040\141\156\144\040\122\145\163\145\141\162
\143\150\040\111\156\163\164\151\164\165\164\151\157\156\163\040
\103\145\162\164\056\040\101\165\164\150\157\162\151\164\171\061
\100\060\076\006\003\125\004\003\023\067\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\122\157\157\164\103\101\040\062\060\061
\065\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002
\001\000\302\370\251\077\033\211\374\074\074\004\135\075\220\066
\260\221\072\171\074\146\132\357\155\071\001\111\032\264\267\317
\177\115\043\123\267\220\000\343\023\052\050\246\061\361\221\000
\343\050\354\256\041\101\316\037\332\375\175\022\133\001\203\017
\271\260\137\231\341\362\022\203\200\115\006\076\337\254\257\347

\241\210\153\061\257\360\213\320\030\063\270\333\105\152\064\364
\002\200\044\050\012\002\025\225\136\166\052\015\231\072\024\133
\366\313\313\123\274\023\115\001\210\067\224\045\033\102\274\042
\330\216\243\226\136\072\331\062\333\076\350\360\020\145\355\164
\341\057\247\174\257\047\064\273\051\175\233\266\317\011\310\345
\323\012\374\210\145\145\164\012\334\163\034\134\315\100\261\034
\324\266\204\214\114\120\317\150\216\250\131\256\302\047\116\202
\242\065\335\024\364\037\377\262\167\325\207\057\252\156\175\044
\047\347\306\313\046\346\345\376\147\007\143\330\105\015\335\072
\131\145\071\130\172\222\231\162\075\234\204\136\210\041\270\325
\364\054\374\331\160\122\117\170\270\275\074\053\213\225\230\365
\263\321\150\317\040\024\176\114\134\137\347\213\345\365\065\201
\031\067\327\021\010\267\146\276\323\112\316\203\127\000\072\303
\201\370\027\313\222\066\135\321\243\330\165\033\341\213\047\352
\172\110\101\375\105\031\006\255\047\231\116\301\160\107\335\265
\237\201\123\022\345\261\214\110\135\061\103\027\343\214\306\172
\143\226\113\051\060\116\204\116\142\031\136\074\316\227\220\245
\177\001\353\235\340\370\213\211\335\045\230\075\222\266\176\357
\331\361\121\121\175\055\046\310\151\131\141\340\254\152\270\052
\066\021\004\172\120\275\062\204\276\057\334\162\325\327\035\026
\107\344\107\146\040\077\364\226\305\257\216\001\172\245\017\172
\144\365\015\030\207\331\256\210\325\372\204\301\072\300\151\050
\055\362\015\150\121\252\343\245\167\306\244\220\016\241\067\213
\061\043\107\301\011\010\353\156\367\170\233\327\202\374\204\040
\231\111\031\266\022\106\261\373\105\125\026\251\243\145\254\234
\007\017\352\153\334\037\056\006\162\354\206\210\022\344\055\333
\137\005\057\344\360\003\323\046\063\347\200\302\315\102\241\027
\064\013\002\003\001\000\001\243\102\060\100\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003
\125\035\016\004\026\004\024\161\025\147\310\310\311\275\165\135
\162\320\070\030\152\235\363\161\044\124\013\060\015\006\011\052
\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000\165
\273\155\124\113\252\020\130\106\064\362\142\327\026\066\135\010
\136\325\154\310\207\275\264\056\106\362\061\370\174\352\102\265
\223\026\125\334\241\014\022\240\332\141\176\017\130\130\163\144
\162\307\350\105\216\334\251\362\046\077\306\171\214\261\123\010
\063\201\260\126\023\276\346\121\134\330\233\012\117\113\234\126
\123\002\351\117\366\015\140\352\115\102\125\350\174\033\041\041
\323\033\072\314\167\362\270\220\361\150\307\371\132\376\372\055
\364\277\311\365\105\033\316\070\020\052\067\212\171\243\264\343
\011\154\205\206\223\377\211\226\047\170\201\217\147\343\106\164
\124\216\331\015\151\342\112\364\115\164\003\377\262\167\355\225
\147\227\344\261\305\253\277\152\043\350\324\224\342\104\050\142
\304\113\342\360\330\342\051\153\032\160\176\044\141\223\173\117
\003\062\045\015\105\044\053\226\264\106\152\277\112\013\367\232
\217\301\254\032\305\147\363\157\064\322\372\163\143\214\357\026
\260\250\244\106\052\370\353\022\354\162\264\357\370\053\176\214

\122\300\213\204\124\371\057\076\343\125\250\334\146\261\331\341
\137\330\263\214\131\064\131\244\253\117\154\273\037\030\333\165
\253\330\313\222\315\224\070\141\016\007\006\037\113\106\020\361
\025\276\215\205\134\073\112\053\201\171\017\264\151\237\111\120
\227\115\367\016\126\135\300\225\152\302\066\303\033\150\311\365
\052\334\107\232\276\262\316\305\045\350\372\003\271\332\371\026
\156\221\204\365\034\050\310\374\046\314\327\034\220\126\247\137
\157\072\004\274\315\170\211\013\216\017\057\243\252\117\242\033
\022\075\026\010\100\017\361\106\114\327\252\173\010\301\012\365
\155\047\336\002\217\312\303\265\053\312\351\353\310\041\123\070
\245\314\073\330\167\067\060\242\117\331\157\321\362\100\255\101
\172\027\305\326\112\065\211\267\101\325\174\206\177\125\115\203
\112\245\163\040\300\072\257\220\361\232\044\216\331\216\161\312
\173\270\206\332\262\217\231\076\035\023\015\022\021\356\324\253
\360\351\025\166\002\344\340\337\252\040\036\133\141\205\144\100
\251\220\227\015\255\123\322\132\035\207\152\000\227\145\142\264
\276\157\152\247\365\054\102\355\062\255\266\041\236\276\274
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Hellenic Academic and Research Institutions RootCA 2015"
# Issuer: CN=Hellenic Academic and Research Institutions RootCA 2015,O=Hellenic Academic and Research Institutions Cert. Authority,L=Athens,C=GR
# Serial Number: 0 (0x0)
# Subject: CN=Hellenic Academic and Research Institutions RootCA 2015,O=Hellenic Academic and Research Institutions Cert. Authority,L=Athens,C=GR
# Not Valid Before: Tue Jul 07 10:11:21 2015
# Not Valid After : Sat Jun 30 10:11:21 2040
# Fingerprint (SHA-256): A0:40:92:9A:02:CE:53:B4:AC:F4:F2:FF:C6:98:1C:E4:49:6F:75:5E:6D:45:FE:0B:2A:69:2B:CD:52:52:3F:36
# Fingerprint (SHA1): 01:0C:06:95:A6:98:19:14:FF:BF:5F:C6:B0:B6:95:EA:29:E9:12:A6
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Hellenic Academic and Research Institutions RootCA 2015"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\001\014\006\225\246\230\031\024\377\277\137\306\260\266\225\352
\051\351\022\246
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\312\377\342\333\003\331\313\113\351\017\255\204\375\173\030\316
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\246\061\013\060\011\006\003\125\004\006\023\002\107\122

\061\017\060\015\006\003\125\004\007\023\006\101\164\150\145\156
\163\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154
\145\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156
\144\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151
\164\165\164\151\157\156\163\040\103\145\162\164\056\040\101\165
\164\150\157\162\151\164\171\061\100\060\076\006\003\125\004\003
\023\067\110\145\154\154\145\156\151\143\040\101\143\141\144\145
\155\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150
\040\111\156\163\164\151\164\165\164\151\157\156\163\040\122\157
\157\164\103\101\040\062\060\061\065
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Hellenic Academic and Research Institutions ECC RootCA 2015"
#
# Issuer: CN=Hellenic Academic and Research Institutions ECC RootCA 2015,O=Hellenic Academic and Research Institutions Cert. Authority,L=Athens,C=GR
#
Serial Number: 0 (0x0)
# Subject: CN=Hellenic Academic and Research Institutions ECC RootCA 2015,O=Hellenic Academic and Research Institutions Cert. Authority,L=Athens,C=GR
# Not Valid Before: Tue Jul 07 10:37:12 2015
# Not Valid After : Sat Jun 30 10:37:12 2040
# Fingerprint (SHA-256):
44:B5:45:AA:8A:25:E6:5A:73:CA:15:DC:27:FC:36:D2:4C:1C:B9:95:3A:06:65:39:B1:15:82:DC:48:7B:48:33
# Fingerprint (SHA1): 9F:F1:71:8D:92:D5:9A:F3:7D:74:97:B4:BC:6F:84:68:0B:BA:B6:66
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Hellenic Academic and Research Institutions ECC RootCA 2015"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\252\061\013\060\011\006\003\125\004\006\023\002\107\122
\061\017\060\015\006\003\125\004\007\023\006\101\164\150\145\156
\163\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154
\145\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156
\144\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151
\164\165\164\151\157\156\163\040\103\145\162\164\056\040\101\165
\164\150\157\162\151\164\171\061\104\060\102\006\003\125\004\003

\023\073\110\145\154\154\145\156\151\143\040\101\143\141\144\145
\155\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150
\040\111\156\163\164\151\164\165\164\151\157\156\163\040\105\103
\103\040\122\157\157\164\103\101\040\062\060\061\065
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\252\061\013\060\011\006\003\125\004\006\023\002\107\122
\061\017\060\015\006\003\125\004\007\023\006\101\164\150\145\156
\163\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154
\145\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156
\144\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151
\164\165\164\151\157\156\163\040\103\145\162\164\056\040\101\165
\164\150\157\162\151\164\171\061\104\060\102\006\003\125\004\003
\023\073\110\145\154\154\145\156\151\143\040\101\143\141\144\145
\155\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150
\040\111\156\163\164\151\164\165\164\151\157\156\163\040\105\103
\103\040\122\157\157\164\103\101\040\062\060\061\065
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\000
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\303\060\202\002\112\240\003\002\001\002\002\001\000
\060\012\006\010\052\206\110\316\075\004\003\002\060\201\252\061
\013\060\011\006\003\125\004\006\023\002\107\122\061\017\060\015
\006\003\125\004\007\023\006\101\164\150\145\156\163\061\104\060
\102\006\003\125\004\012\023\073\110\145\154\154\145\156\151\143
\040\101\143\141\144\145\155\151\143\040\141\156\144\040\122\145
\163\145\141\162\143\150\040\111\156\163\164\151\164\165\164\151
\157\156\163\040\103\145\162\164\056\040\101\165\164\150\157\162
\151\164\171\061\104\060\102\006\003\125\004\003\023\073\110\145
\154\154\145\156\151\143\040\101\143\141\144\145\155\151\143\040
\141\156\144\040\122\145\163\145\141\162\143\150\040\111\156\163
\164\151\164\165\164\151\157\156\163\040\105\103\103\040\122\157
\157\164\103\101\040\062\060\061\065\060\036\027\015\061\065\060
\067\060\067\061\060\063\067\061\062\132\027\015\064\060\060\066
\063\060\061\060\063\067\061\062\132\060\201\252\061\013\060\011
\006\003\125\004\006\023\002\107\122\061\017\060\015\006\003\125
\004\007\023\006\101\164\150\145\156\163\061\104\060\102\006\003
\125\004\012\023\073\110\145\154\154\145\156\151\143\040\101\143
\141\144\145\155\151\143\040\141\156\144\040\122\145\163\145\141
\162\143\150\040\111\156\163\164\151\164\165\164\151\157\156\163
\040\103\145\162\164\056\040\101\165\164\150\157\162\151\164\171
\061\104\060\102\006\003\125\004\003\023\073\110\145\154\154\145
\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144

\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164
\165\164\151\157\156\163\040\105\103\103\040\122\157\157\164\103
\101\040\062\060\061\065\060\166\060\020\006\007\052\206\110\316
\075\002\001\006\005\053\201\004\000\042\003\142\000\004\222\240
\101\350\113\202\204\134\342\370\061\021\231\206\144\116\011\045
\057\235\101\057\012\256\065\117\164\225\262\121\144\153\215\153
\346\077\160\225\360\005\104\107\246\162\070\120\166\225\002\132
\216\256\050\236\371\055\116\231\357\054\110\157\114\045\051\350
\321\161\133\337\035\301\165\067\264\327\372\173\172\102\234\152
\012\126\132\174\151\013\252\200\011\044\154\176\301\106\243\102
\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060\003
\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\035\006\003\125\035\016\004\026\004\024\264\042
\013\202\231\044\001\016\234\273\344\016\375\277\373\227\040\223
\231\052\060\012\006\010\052\206\110\316\075\004\003\002\003\147
\000\060\144\002\060\147\316\026\142\070\242\254\142\105\247\251
\225\044\300\032\047\234\062\073\300\300\325\272\251\347\370\004
\103\123\205\356\122\041\336\235\365\045\203\076\236\130\113\057
\327\147\023\016\041\002\060\005\341\165\001\336\150\355\052\037
\115\114\011\010\015\354\113\255\144\027\050\347\165\316\105\145
\162\041\027\313\042\101\016\214\023\230\070\232\124\155\233\312
\342\174\352\002\130\042\221
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Hellenic Academic and Research Institutions ECC RootCA 2015"
# Issuer: CN=Hellenic Academic and Research Institutions ECC RootCA 2015,O=Hellenic Academic and Research Institutions Cert. Authority,L=Athens,C=GR
# Serial Number: 0 (0x0)
# Subject: CN=Hellenic Academic and Research Institutions ECC RootCA 2015,O=Hellenic Academic and Research Institutions Cert. Authority,L=Athens,C=GR
# Not Valid Before: Tue Jul 07 10:37:12 2015
# Not Valid After : Sat Jun 30 10:37:12 2040
# Fingerprint (SHA-256):
44:B5:45:AA:8A:25:E6:5A:73:CA:15:DC:27:FC:36:D2:4C:1C:B9:95:3A:06:65:39:B1:15:82:DC:48:7B:48:33
# Fingerprint (SHA1): 9F:F1:71:8D:92:D5:9A:F3:7D:74:97:B4:BC:6F:84:68:0B:BA:B6:66
CKA_CLASS
 CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Hellenic Academic and Research Institutions ECC RootCA 2015"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\237\361\161\215\222\325\232\363\175\164\227\264\274\157\204\150
\013\272\266\146

```
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\201\345\264\027\353\302\365\341\113\015\101\173\111\222\376\357
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\252\061\013\060\011\006\003\125\004\006\023\002\107\122
\061\017\060\015\006\003\125\004\007\023\006\101\164\150\145\156
\163\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154
\145\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156
\144\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151
\164\165\164\151\157\156\163\040\103\145\162\164\056\040\101\165
\164\150\157\162\151\164\171\061\104\060\102\006\003\125\004\003
\023\073\110\145\154\154\145\156\151\143\040\101\143\141\144\145
\155\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150
\040\111\156\163\164\151\164\165\164\151\157\156\163\040\105\103
\103\040\122\157\157\164\103\101\040\062\060\061\065
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "ISRG Root X1"
#
# Issuer: CN=ISRG Root X1,O=Internet Security Research Group,C=US
# Serial Number:00:82:10:cf:b0:d2:40:e3:59:44:63:e0:bb:63:82:8b:00
# Subject: CN=ISRG Root X1,O=Internet Security Research Group,C=US
# Not Valid Before: Thu Jun 04 11:04:38 2015
# Not Valid After : Mon Jun 04 11:04:38 2035
# Fingerprint (SHA-256):
96:BC:EC:06:26:49:76:F3:74:60:77:9A:CF:28:C5:A7:CF:E8:A3:C0:AA:E1:1A:8F:FC:EE:05:C0:BD:DF:08:C6
# Fingerprint (SHA1): CA:BD:2A:79:A1:07:6A:31:F2:1D:25:36:35:CB:03:9D:43:29:A5:E8
CKA_CLASS CK_OBJECT_CLASS
 CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ISRG Root X1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\051\060\047\006\003\125\004\012\023\040\111\156\164\145\162\156
\145\164\040\123\145\143\165\162\151\164\171\040\122\145\163\145
```

\141\162\143\150\040\107\162\157\165\160\061\025\060\023\006\003
\125\004\003\023\014\111\123\122\107\040\122\157\157\164\040\130
\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\051\060\047\006\003\125\004\012\023\040\111\156\164\145\162\156
\145\164\040\123\145\143\165\162\151\164\171\040\122\145\163\145
\141\162\143\150\040\107\162\157\165\160\061\025\060\023\006\003
\125\004\003\023\014\111\123\122\107\040\122\157\157\164\040\130
\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\202\020\317\260\322\100\343\131\104\143\340\273\143
\202\213\000
END
CKA_VALUE
 MULTILINE_OCTAL
\060\202\005\153\060\202\003\123\240\003\002\001\002\002\021\000
\202\020\317\260\322\100\343\131\104\143\340\273\143\202\213\000
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061\051
\060\047\006\003\125\004\012\023\040\111\156\164\145\162\156\145
\164\040\123\145\143\165\162\151\164\171\040\122\145\163\145\141
\162\143\150\040\107\162\157\165\160\061\025\060\023\006\003\125
\004\003\023\014\111\123\122\107\040\122\157\157\164\040\130\061
\060\036\027\015\061\065\060\066\060\064\061\061\060\064\063\070
\132\027\015\063\065\060\066\060\064\061\061\060\064\063\070\132
\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\051\060\047\006\003\125\004\012\023\040\111\156\164\145\162\156
\145\164\040\123\145\143\165\162\151\164\171\040\122\145\163\145
\141\162\143\150\040\107\162\157\165\160\061\025\060\023\006\003
\125\004\003\023\014\111\123\122\107\040\122\157\157\164\040\130
\061\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002
\001\000\255\350\044\163\364\024\067\363\233\236\053\127\050\034
\207\276\334\267\337\070\220\214\156\074\346\127\240\170\367\165
\302\242\376\365\152\156\366\000\117\050\333\336\150\206\154\104
\223\266\261\143\375\024\022\153\277\037\322\352\061\233\041\176
\321\063\074\272\110\365\335\171\337\263\270\377\022\361\041\232
\113\301\212\206\161\151\112\146\146\154\217\176\074\160\277\255
\051\042\006\363\344\300\346\200\256\342\113\217\267\231\176\224
\003\237\323\107\227\174\231\110\043\123\350\070\256\117\012\157
\203\056\321\111\127\214\200\164\266\332\057\320\070\215\173\003
\160\041\033\165\362\060\074\372\217\256\335\332\143\253\353\026
\117\302\216\021\113\176\317\013\350\377\265\167\056\364\262\173
\112\340\114\022\045\014\160\215\003\051\240\341\123\044\354\023

\331\356\031\277\020\263\112\214\077\211\243\141\121\336\254\207
\007\224\364\143\161\354\056\342\157\133\230\201\341\211\134\064
\171\154\166\357\073\220\142\171\346\333\244\232\057\046\305\320
\020\341\016\336\331\020\216\026\373\267\367\250\367\307\345\002
\007\230\217\066\010\225\347\342\067\226\015\066\165\236\373\016
\162\261\035\233\274\003\371\111\005\330\201\335\005\264\052\326
\101\351\254\001\166\225\012\017\330\337\325\275\022\037\065\057
\050\027\154\322\230\301\250\011\144\167\156\107\067\272\316\254
\131\136\150\235\177\162\326\211\305\006\101\051\076\131\076\335
\046\365\044\311\021\247\132\243\114\100\037\106\241\231\265\247
\072\121\156\206\073\236\175\162\247\022\005\170\131\355\076\121
\170\025\013\003\217\215\320\057\005\262\076\173\112\034\113\163
\005\022\374\306\352\340\120\023\174\103\223\164\263\312\164\347
\216\037\001\010\320\060\324\133\161\066\264\007\272\301\060\060
\134\110\267\202\073\230\246\175\140\212\242\243\051\202\314\272
\275\203\004\033\242\203\003\101\241\326\005\361\033\302\266\360
\250\174\206\073\106\250\110\052\210\334\166\232\166\277\037\152
\245\075\031\217\353\070\363\144\336\310\053\015\012\050\377\367
\333\342\025\102\324\042\320\047\135\341\171\376\030\347\160\210
\255\116\346\331\213\072\306\335\047\121\156\377\274\144\365\063
\103\117\002\003\001\000\001\243\102\060\100\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\006\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003
\125\035\016\004\026\004\024\171\264\131\346\173\266\345\344\001
\163\200\010\210\310\032\130\366\351\233\156\060\015\006\011\052
\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000\125
\037\130\251\274\262\250\120\320\014\261\330\032\151\040\047\051
\010\254\141\165\134\212\156\370\202\345\151\057\325\366\126\113
\271\270\163\020\131\323\041\227\176\347\114\161\373\262\322\140
\255\071\250\013\352\027\041\126\205\361\120\016\131\353\316\340
\131\351\272\311\025\357\206\235\217\204\200\366\344\351\221\220
\334\027\233\142\033\105\360\146\225\322\174\157\302\352\073\357
\037\317\313\326\256\047\361\251\260\310\256\375\175\176\232\372
\042\004\353\377\331\177\352\221\053\042\261\027\016\217\362\212
\064\133\130\330\374\001\311\124\271\270\046\314\212\210\063\211
\114\055\204\074\202\337\356\226\127\005\272\054\273\367\304\267
\307\116\073\202\276\061\310\042\163\163\222\321\302\200\244\071
\071\020\063\043\202\114\074\237\206\262\125\230\035\276\051\206
\214\042\233\236\342\153\073\127\072\202\160\115\334\011\307\211
\313\012\007\115\154\350\135\216\311\357\316\253\307\273\265\053
\116\105\326\112\320\046\314\345\162\312\010\152\245\225\343\025
\241\367\244\355\311\054\137\245\373\377\254\050\002\056\276\327
\173\273\343\161\173\220\026\323\007\136\106\123\174\067\007\102
\214\323\304\226\234\325\231\265\052\340\225\032\200\110\256\114
\071\007\316\314\107\244\122\225\053\272\270\373\255\322\063\123
\175\345\035\115\155\325\241\261\307\102\157\346\100\047\065\134
\243\050\267\007\215\347\215\063\220\347\043\237\373\120\234\171
\154\106\325\264\025\263\226\156\176\233\014\226\072\270\122\055

\077\326\133\341\373\010\302\204\376\044\250\243\211\332\254\152
\341\030\052\261\250\103\141\133\323\037\334\073\215\166\362\055
\350\215\165\337\027\063\154\075\123\373\173\313\101\137\377\334
\242\320\141\070\341\226\270\254\135\213\067\327\165\325\063\300
\231\021\256\235\101\301\162\165\204\276\002\101\102\137\147\044
\110\224\321\233\047\276\007\077\271\270\117\201\164\121\341\172
\267\355\235\043\342\276\340\325\050\004\023\074\061\003\236\335
\172\154\217\306\007\030\306\177\336\107\216\077\050\236\004\006
\317\245\124\064\167\275\354\211\233\351\027\103\337\133\333\137
\376\216\036\127\242\315\100\235\176\142\042\332\336\030\047
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "ISRG Root X1"
# Issuer: CN=ISRG Root X1,O=Internet Security Research Group,C=US
# Serial Number:00:82:10:cf:b0:d2:40:e3:59:44:63:e0:bb:63:82:8b:00
#
Subject: CN=ISRG Root X1,O=Internet Security Research Group,C=US
# Not Valid Before: Thu Jun 04 11:04:38 2015
# Not Valid After : Mon Jun 04 11:04:38 2035
# Fingerprint (SHA-256):
96:BC:EC:06:26:49:76:F3:74:60:77:9A:CF:28:C5:A7:CF:E8:A3:C0:AA:E1:1A:8F:FC:EE:05:C0:BD:DF:08:C6
# Fingerprint (SHA1): CA:BD:2A:79:A1:07:6A:31:F2:1D:25:36:35:CB:03:9D:43:29:A5:E8
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ISRG Root X1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\312\275\052\171\241\007\152\061\362\035\045\066\065\313\003\235
\103\051\245\350
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\014\322\371\340\332\027\163\351\355\206\115\245\343\160\347\116
END
CKA_ISSUER MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\051\060\047\006\003\125\004\012\023\040\111\156\164\145\162\156
\145\164\040\123\145\143\165\162\151\164\171\040\122\145\163\145
\141\162\143\150\040\107\162\157\165\160\061\025\060\023\006\003
\125\004\003\023\014\111\123\122\107\040\122\157\157\164\040\130
\061
END
CKA_SERIAL_NUMBER

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 MULTILINE_OCTAL
\002\021\000\202\020\317\260\322\100\343\131\104\143\340\273\143
\202\213\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "AC RAIZ FNMT-RCM"
#
# Issuer: OU=AC RAIZ FNMT-RCM,O=FNMT-RCM,C=ES
# Serial Number:5d:93:8d:30:67:36:c8:06:1d:1a:c7:54:84:69:07
# Subject: OU=AC RAIZ FNMT-RCM,O=FNMT-RCM,C=ES
# Not Valid Before: Wed Oct 29 15:59:56 2008
# Not Valid After : Tue Jan 01 00:00:00 2030
# Fingerprint (SHA-256):
EB:C5:57:0C:29:01:8C:4D:67:B1:AA:12:7B:AF:12:F7:03:B4:61:1E:BC:17:B7:DA:B5:57:38:94:17:9B:93:FA
# Fingerprint (SHA1): EC:50:35:07:B2:15:C4:95:62:19:E2:A8:9A:5B:42:99:2C:4C:2C:20
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN
 CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AC RAIZ FNMT-RCM"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\073\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\021\060\017\006\003\125\004\012\014\010\106\116\115\124\055\122
\103\115\061\031\060\027\006\003\125\004\013\014\020\101\103\040
\122\101\111\132\040\106\116\115\124\055\122\103\115
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\073\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\021\060\017\006\003\125\004\012\014\010\106\116\115\124\055\122
\103\115\061\031\060\027\006\003\125\004\013\014\020\101\103\040
\122\101\111\132\040\106\116\115\124\055\122\103\115
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\017\135\223\215\060\147\066\310\006\035\032\307\124\204\151
\007
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\203\060\202\003\153\240\003\002\001\002\002\017\135
\223\215\060\147\066\310\006\035\032\307\124\204\151\007\060\015
\006\011\052\206\110\206\367\015\001\001\013\005\000\060\073\061
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\013\060\011\006\003\125\004\006\023\002\105\123\061\021\060\017
\006\003\125\004\012\014\010\106\116\115\124\055\122\103\115\061
\031\060\027\006\003\125\004\013\014\020\101\103\040\122\101\111
\132\040\106\116\115\124\055\122\103\115\060\036\027\015\060\070
\061\060\062\071\061\065\065\071\065\066\132\027\015\063\060\060
\061\060\061\060\060\060\060\060\060\132\060\073\061\013\060\011
\006\003\125\004\006\023\002\105\123\061\021\060\017\006\003\125
\004\012\014\010\106\116\115\124\055\122\103\115\061\031\060\027
\006\003\125\004\013\014\020\101\103\040\122\101\111\132\040\106
\116\115\124\055\122\103\115\060\202\002\042\060\015\006\011\052
\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060
\202\002\012\002\202\002\001\000\272\161\200\172\114\206\156\177
\310\023\155\300\306\175\034\000\227\217\054\014\043\273\020\232
\100\251\032\267\207\210\370\233\126\152\373\346\173\216\213\222
\216\247\045\135\131\021\333\066\056\267\121\027\037\251\010\037
\004\027\044\130\252\067\112\030\337\345\071\324\127\375\327\301
\054\221\001\221\342\042\324\003\300\130\374\167\107\354\217\076
\164\103\272\254\064\215\115\070\166\147\216\260\310\157\060\063
\130\161\134\264\365\153\156\324\001\120\270\023\176\154\112\243
\111\321\040\031\356\274\300\051\030\145\247\336\376\357\335\012
\220\041\347\032\147\222\102\020\230\137\117\060\274\076\034\105
\264\020\327\150\100\024\300\100\372\347\167\027\172\346\013\217
\145\133\074\331\232\122\333\265\275\236\106\317\075\353\221\005
\002\300\226\262\166\114\115\020\226\073\222\372\234\177\017\231
\337\276\043\065\105\036\002\134\376\265\250\233\231\045\332\136
\363\042\303\071\365\344\052\056\323\306\037\304\154\252\305\034
\152\001\005\112\057\322\305\301\250\064\046\135\146\245\322\002
\041\371\030\267\006\365\116\231\157\250\253\114\121\350\317\120
\030\305\167\310\071\011\054\111\222\062\231\250\273\027\027\171
\260\132\305\346\243\304\131\145\107\065\203\136\251\350\065\013
\231\273\344\315\040\306\233\112\006\071\265\150\374\042\272\356
\125\214\053\116\352\363\261\343\374\266\231\232\325\102\372\161
\115\010\317\207\036\152\161\175\371\323\264\351\245\161\201\173
\302\116\107\226\245\366\166\205\243\050\217\351\200\156\201\123
\245\155\137\270\110\371\302\371\066\246\056\111\377\270\226\302
\214\007\263\233\210\130\374\353\033\034\336\055\160\342\227\222
\060\241\211\343\274\125\250\047\326\113\355\220\255\213\372\143
\045\131\055\250\065\335\312\227\063\274\345\315\307\235\321\354
\357\136\016\112\220\006\046\143\255\271\331\065\055\007\272\166
\145\054\254\127\217\175\364\007\224\327\201\002\226\135\243\007
\111\325\172\320\127\371\033\347\123\106\165\252\260\171\102\313
\150\161\010\351\140\275\071\151\316\364\257\303\126\100\307\255
\122\242\011\344\157\206\107\212\037\353\050\047\135\203\040\257
\004\311\154\126\232\213\106\365\002\003\001\000\001\243\201\203
\060\201\200\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\035\006\003\125\035\016\004\026\004\024\367
\175\305\375\304\350\232\033\167\144\247\365\035\240\314\277\207

\140\232\155\060\076\006\003\125\035\040\004\067\060\065\060\063
\006\004\125\035\040\000\060\053\060\051\006\010\053\006\001\005
\005\007\002\001\026\035\150\164\164\160\072\057\057\167\167\167
\056\143\145\162\164\056\146\156\155\164\056\145\163\057\144\160
\143\163\057\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\003\202\002\001\000\007\220\112\337\363\043\116\360\303
\234\121\145\233\234\042\242\212\014\205\363\163\051\153\115\376
\001\342\251\014\143\001\277\004\147\245\235\230\137\375\001\023
\372\354\232\142\351\206\376\266\142\322\156\114\224\373\300\165
\105\174\145\014\370\262\067\317\254\017\317\215\157\371\031\367
\217\354\036\362\160\236\360\312\270\357\267\377\166\067\166\133
\366\156\210\363\257\142\062\042\223\015\072\152\216\024\146\014
\055\123\164\127\145\036\325\262\335\043\201\073\245\146\043\047
\147\011\217\341\167\252\103\315\145\121\010\355\121\130\376\346
\071\371\313\107\204\244\025\361\166\273\244\356\244\073\304\137
\357\262\063\226\021\030\267\311\145\276\030\341\243\244\334\372
\030\371\323\274\023\233\071\172\064\272\323\101\373\372\062\212
\052\267\053\206\013\151\203\070\276\315\212\056\013\160\255\215
\046\222\356\036\365\001\053\012\331\326\227\233\156\340\250\031
\034\072\041\213\014\036\100\255\003\347\335\146\176\365\271\040
\015\003\350\226\371\202\105\324\071\340\240\000\135\327\230\346
\175\236\147\163\303\232\052\367\253\213\241\072\024\357\064\274
\122\016\211\230\232\004\100\204\035\176\105\151\223\127\316\353
\316\370\120\174\117\034\156\004\103\233\371\326\073\043\030\351
\352\216\321\115\106\215\361\073\344\152\312\272\373\043\267\233
\372\231\001\051\132\130\132\055\343\371\324\155\016\046\255\301
\156\064\274\062\370\014\005\372\145\243\333\073\067\203\042\351
\326\334\162\063\375\135\362\040\275\166\074\043\332\050\367\371
\033\353\131\144\325\334\137\162\176\040\374\315\211\265\220\147
\115\142\172\077\116\255\035\303\071\376\172\364\050\026\337\101
\366\110\200\005\327\017\121\171\254\020\253\324\354\003\146\346
\152\260\272\061\222\102\100\152\276\072\323\162\341\152\067\125
\274\254\035\225\267\151\141\362\103\221\164\346\240\323\012\044
\106\241\010\257\326\332\105\031\226\324\123\035\133\204\171\360
\300\367\107\357\213\217\305\006\256\235\114\142\235\377\106\004
\370\323\311\266\020\045\100\165\376\026\252\311\112\140\206\057
\272\357\060\167\344\124\342\270\204\231\130\200\252\023\213\121
\072\117\110\366\213\266\263
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "AC RAIZ FNMT-RCM"
# Issuer: OU=AC RAIZ FNMT-RCM,O=FNMT-RCM,C=ES
# Serial Number:5d:93:8d:30:67:36:c8:06:1d:1a:c7:54:84:69:07
# Subject: OU=AC RAIZ FNMT-RCM,O=FNMT-RCM,C=ES

```
# Not Valid Before: Wed Oct 29 15:59:56 2008
#
 Not Valid After : Tue Jan 01 00:00:00 2030
# Fingerprint (SHA-256):
EB:C5:57:0C:29:01:8C:4D:67:B1:AA:12:7B:AF:12:F7:03:B4:61:1E:BC:17:B7:DA:B5:57:38:94:17:9B:93:FA
# Fingerprint (SHA1): EC:50:35:07:B2:15:C4:95:62:19:E2:A8:9A:5B:42:99:2C:4C:2C:20
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AC RAIZ FNMT-RCM"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\354\120\065\007\262\025\304\225\142\031\342\250\232\133\102\231
\054\114\054\040
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\342\011\004\264\323\275\321\240\024\375\032\322\107\304\127\035
END
CKA_ISSUER MULTILINE_OCTAL
\060\073\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\021\060\017\006\003\125\004\012\014\010\106\116\115\124\055\122
\103\115\061\031\060\027\006\003\125\004\013\014\020\101\103\040
\122\101\111\132\040\106\116\115\124\055\122\103\115
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\017\135\223\215\060\147\066\310\006\035\032\307\124\204\151
\007
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Amazon Root CA 1"
#
# Issuer: CN=Amazon Root CA 1,O=Amazon,C=US
# Serial Number:06:6c:9f:cf:99:bf:8c:0a:39:e2:f0:78:8a:43:e6:96:36:5b:ca
# Subject: CN=Amazon Root CA 1,O=Amazon,C=US
# Not Valid Before: Tue May 26 00:00:00 2015
# Not Valid After : Sun Jan 17 00:00:00 2038
# Fingerprint (SHA-256):
8E:CD:E6:88:4F:3D:87:B1:12:5B:A3:1A:C3:FC:B1:3D:70:16:DE:7F:57:CC:90:4F:E1:CB:97:C6:AE:98:19:6E
# Fingerprint (SHA1): 8D:A7:F9:65:EC:5E:FC:37:91:0F:1C:6E:59:FD:C1:CC:6A:6E:DE:16
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
```

CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Amazon Root CA 1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\061
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\023\006\154\237\317\231\277\214\012\071\342\360\170\212\103
\346\226\066\133\312
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\101\060\202\002\051\240\003\002\001\002\002\023\006
\154\237\317\231\277\214\012\071\342\360\170\212\103\346\226\066
\133\312\060\015\006\011\052\206\110\206\367\015\001\001\013\005
\000\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157
\156\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172
\157\156\040\122\157\157\164\040\103\101\040\061\060\036\027\015
\061\065\060\065\062\066\060\060\060\060\060\060\132\027\015\063
\070\060\061\061\067\060\060\060\060\060\060\132\060\071\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\017\060\015\006
\003\125\004\012\023\006\101\155\141\172\157\156\061\031\060\027
\006\003\125\004\003\023\020\101\155\141\172\157\156\040\122\157
\157\164\040\103\101\040\061\060\202\001\042\060\015\006\011\052
\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060
\202\001\012\002\202\001\001\000\262\170\200\161\312\170\325\343
\161\257\107\200\120\164\175\156\330\327\210\166\364\231\150\367
\130\041\140\371\164\204\001\057\254\002\055\206\323\240\103\172
\116\262\244\320\066\272\001\276\215\333\110\310\007\027\066\114
\364\356\210\043\307\076\353\067\365\265\031\370\111\150\260\336
\327\271\166\070\035\141\236\244\376\202\066\245\345\112\126\344
\105\341\371\375\264\026\372\164\332\234\233\065\071\057\372\260
\040\120\006\154\172\320\200\262\246\371\257\354\107\031\217\120
\070\007\334\242\207\071\130\370\272\325\251\371\110\147\060\226
\356\224\170\136\157\211\243\121\300\060\206\146\241\105\146\272
\124\353\243\303\221\371\110\334\377\321\350\060\055\175\055\164
\160\065\327\210\044\367\236\304\131\156\273\163\207\027\362\062

\106\050\270\103\372\267\035\252\312\264\362\237\044\016\055\113
\367\161\134\136\151\377\352\225\002\313\070\212\256\120\070\157
\333\373\055\142\033\305\307\036\124\341\167\340\147\310\017\234
\207\043\326\077\100\040\177\040\200\304\200\114\076\073\044\046
\216\004\256\154\232\310\252\015\002\003\001\000\001\243\102\060
\100\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\206\060\035\006\003\125\035\016\004\026\004\024\204\030\314
\205\064\354\274\014\224\224\056\010\131\234\307\262\020\116\012
\010\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000
\003\202\001\001\000\230\362\067\132\101\220\241\032\305\166\121
\050\040\066\043\016\256\346\050\273\252\370\224\256\110\244\060
\177\033\374\044\215\113\264\310\241\227\366\266\361\172\160\310
\123\223\314\010\050\343\230\045\317\043\244\371\336\041\323\174
\205\011\255\116\232\165\072\302\013\152\211\170\166\104\107\030
\145\154\215\101\216\073\177\232\313\364\265\247\120\327\005\054
\067\350\003\113\255\351\141\240\002\156\365\362\360\305\262\355
\133\267\334\372\224\134\167\236\023\245\177\122\255\225\362\370
\223\073\336\213\134\133\312\132\122\133\140\257\024\367\113\357
\243\373\237\100\225\155\061\124\374\102\323\307\106\037\043\255
\331\017\110\160\232\331\165\170\161\321\162\103\064\165\156\127
\131\302\002\134\046\140\051\317\043\031\026\216\210\103\245\324
\344\313\010\373\043\021\103\350\103\051\162\142\241\251\135\136
\010\324\220\256\270\330\316\024\302\320\125\362\206\366\304\223
\103\167\146\141\300\271\350\101\327\227\170\140\003\156\112\162
\256\245\321\175\272\020\236\206\154\033\212\271\131\063\370\353
\304\220\276\361\271
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Amazon Root CA 1"
# Issuer: CN=Amazon Root CA 1,O=Amazon,C=US
# Serial Number:06:6c:9f:cf:99:bf:8c:0a:39:e2:f0:78:8a:43:e6:96:36:5b:ca
# Subject: CN=Amazon Root CA 1,O=Amazon,C=US
# Not Valid Before: Tue May 26 00:00:00 2015
# Not Valid After : Sun Jan 17 00:00:00 2038
# Fingerprint (SHA-256):
8E:CD:E6:88:4F:3D:87:B1:12:5B:A3:1A:C3:FC:B1:3D:70:16:DE:7F:57:CC:90:4F:E1:CB:97:C6:AE:98:19:6E
# Fingerprint (SHA1): 8D:A7:F9:65:EC:5E:FC:37:91:0F:1C:6E:59:FD:C1:CC:6A:6E:DE:16
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Amazon Root CA 1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\215\247\371\145\354\136\374\067\221\017\034\156\131\375\301\314
\152\156\336\026
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\103\306\277\256\354\376\255\057\030\306\210\150\060\374\310\346
END
CKA_ISSUER
MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\023\006\154\237\317\231\277\214\012\071\342\360\170\212\103
\346\226\066\133\312
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Amazon Root CA 2"
#
# Issuer: CN=Amazon Root CA 2,O=Amazon,C=US
# Serial Number:06:6c:9f:d2:96:35:86:9f:0a:0f:e5:86:78:f8:5b:26:bb:8a:37
# Subject: CN=Amazon Root CA 2,O=Amazon,C=US
# Not Valid Before: Tue May 26 00:00:00 2015
# Not Valid After : Sat May 26 00:00:00 2040
# Fingerprint
(SHA-256):
1B:A5:B2:AA:8C:65:40:1A:82:96:01:18:F8:0B:EC:4F:62:30:4D:83:CE:C4:71:3A:19:C3:9C:01:1E:A4:6D:B4
# Fingerprint (SHA1): 5A:8C:EF:45:D7:A6:98:59:76:7A:8C:8B:44:96:B5:78:CF:47:4B:1A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Amazon Root CA 2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL

\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\023\006\154\237\322\226\065\206\237\012\017\345\206\170\370
\133\046\273\212\067
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\005\101\060\202\003\051\240\003\002\001\002\002\023\006
\154\237\322\226\065\206\237\012\017\345\206\170\370\133\046\273
\212\067\060\015\006\011\052\206\110\206\367\015\001\001\014\005
\000\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157
\156\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172
\157\156\040\122\157\157\164\040\103\101\040\062\060\036\027\015
\061\065\060\065\062\066\060\060\060\060\060\060\132\027\015\064
\060\060\065\062\066\060\060\060\060\060\060\132\060\071\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\017\060\015\006
\003\125\004\012\023\006\101\155\141\172\157\156\061\031\060\027
\006\003\125\004\003\023\020\101\155\141\172\157\156\040\122\157
\157\164\040\103\101\040\062\060\202\002\042\060\015\006\011\052
\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060
\202\002\012\002\202\002\001\000\255\226\237\055\234\112\114\112
\201\171\121\231\354\212\313\153\140\121\023\274\115\155\006\374
\260\010\215\335\031\020\152\307\046\014\065\330\300\157\040\204
\351\224\261\233\205\003\303\133\333\112\350\310\370\220\166\331
\133\117\343\114\350\006\066\115\314\232\254\075\014\220\053\222
\324\006\031\140\254\067\104\171\205\201\202\255\132\067\340\015
\314\235\246\114\122\166\352\103\235\267\004\321\120\366\125\340
\325\322\246\111\205\351\067\351\312\176\256\134\225\115\110\232
\077\256\040\132\155\210\225\331\064\270\122\032\103\220\260\277
\154\005\271\266\170\267\352\320\344\072\074\022\123\142\377\112
\362\173\276\065\005\251\022\064\343\363\144\164\142\054\075\000
\111\132\050\376\062\104\273\207\335\145\047\002\161\073\332\112
\367\037\332\315\367\041\125\220\117\017\354\256\202\341\237\153
\331\105\323\273\360\137\207\355\074\054\071\206\332\077\336\354
\162\125\353\171\243\255\333\335\174\260\272\034\316\374\336\117
\065\166\317\017\370\170\037\152\066\121\106\047\141\133\351\236
\317\360\242\125\175\174\045\212\157\057\264\305\317\204\056\053
\375\015\121\020\154\373\137\033\274\033\176\305\256\073\230\001
\061\222\377\013\127\364\232\262\271\127\351\253\357\015\166\321
\360\356\364\316\206\247\340\156\351\264\151\241\337\151\366\063
\306\151\056\227\023\236\245\207\260\127\020\201\067\311\123\263
\273\177\366\222\321\234\320\030\364\222\156\332\203\117\246\143
\231\114\245\373\136\357\041\144\172\040\137\154\144\205\025\313

\067\351\142\014\013\052\026\334\001\056\062\332\076\113\365\236
\072\366\027\100\224\357\236\221\010\206\372\276\143\250\132\063
\354\313\164\103\225\371\154\151\122\066\307\051\157\374\125\003
\134\037\373\237\275\107\353\347\111\107\225\013\116\211\042\011
\111\340\365\141\036\361\277\056\212\162\156\200\131\377\127\072
\371\165\062\243\116\137\354\355\050\142\331\115\163\362\314\201
\027\140\355\315\353\334\333\247\312\305\176\002\275\362\124\010
\124\375\264\055\011\054\027\124\112\230\321\124\341\121\147\010
\322\355\156\176\157\077\322\055\201\131\051\146\313\220\071\225
\021\036\164\047\376\335\353\257\002\003\001\000\001\243\102\060
\100\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\206\060\035\006\003\125\035\016\004\026\004\024\260\014\360
\114\060\364\005\130\002\110\375\063\345\122\257\113\204\343\146
\122\060\015\006\011\052\206\110\206\367\015\001\001\014\005\000
\003\202\002\001\000\252\250\200\217\016\170\243\340\242\324\315
\346\365\230\172\073\352\000\003\260\227\016\223\274\132\250\366
\054\214\162\207\251\261\374\177\163\375\143\161\170\245\207\131
\317\060\341\015\020\262\023\132\155\202\365\152\346\200\237\240
\005\013\150\344\107\153\307\152\337\266\375\167\062\162\345\030
\372\011\364\240\223\054\135\322\214\165\205\166\145\220\014\003
\171\267\061\043\143\255\170\203\011\206\150\204\312\377\371\317
\046\232\222\171\347\315\113\305\347\141\247\027\313\363\251\022
\223\223\153\247\350\057\123\222\304\140\130\260\314\002\121\030
\133\205\215\142\131\143\266\255\264\336\232\373\046\367\000\047
\300\135\125\067\164\231\311\120\177\343\131\056\104\343\054\045
\356\354\114\062\167\264\237\032\351\113\135\040\305\332\375\034
\207\026\306\103\350\324\273\046\232\105\160\136\251\013\067\123
\342\106\173\047\375\340\106\362\211\267\314\102\266\313\050\046
\156\331\245\311\072\310\101\023\140\367\120\214\025\256\262\155
\032\025\032\127\170\346\222\052\331\145\220\202\077\154\002\257
\256\022\072\047\226\066\004\327\035\242\200\143\251\233\361\345
\272\264\174\024\260\116\311\261\037\164\137\070\366\121\352\233
\372\054\242\021\324\251\055\047\032\105\261\257\262\116\161\015
\300\130\106\326\151\006\313\123\313\263\376\153\101\315\101\176
\175\114\017\174\162\171\172\131\315\136\112\016\254\233\251\230
\163\171\174\264\364\314\271\270\007\014\262\164\134\270\307\157
\210\241\220\247\364\252\371\277\147\072\364\032\025\142\036\267
\237\276\075\261\051\257\147\241\022\362\130\020\031\123\003\060
\033\270\032\211\366\234\275\227\003\216\243\011\363\035\213\041
\361\264\337\344\034\321\237\145\002\006\352\134\326\023\263\204
\357\242\245\134\214\167\051\247\150\300\153\256\100\322\250\264
\352\315\360\215\113\070\234\031\232\033\050\124\270\211\220\357
\312\165\201\076\036\362\144\044\307\030\257\116\377\107\236\007
\366\065\145\244\323\012\126\377\365\027\144\154\357\250\042\045
\111\223\266\337\000\027\332\130\176\135\356\305\033\260\321\321
\137\041\020\307\371\363\272\002\012\047\007\305\361\326\307\323
\340\373\011\140\154

```
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Amazon Root CA 2"
# Issuer: CN=Amazon Root CA 2,O=Amazon,C=US
# Serial Number:06:6c:9f:d2:96:35:86:9f:0a:0f:e5:86:78:f8:5b:26:bb:8a:37
# Subject: CN=Amazon Root CA 2,O=Amazon,C=US
# Not Valid Before: Tue May 26 00:00:00 2015
# Not Valid After :
 Sat May 26 00:00:00 2040
# Fingerprint (SHA-256):
1B:A5:B2:AA:8C:65:40:1A:82:96:01:18:F8:0B:EC:4F:62:30:4D:83:CE:C4:71:3A:19:C3:9C:01:1E:A4:6D:B4
# Fingerprint (SHA1): 5A:8C:EF:45:D7:A6:98:59:76:7A:8C:8B:44:96:B5:78:CF:47:4B:1A
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Amazon Root CA 2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\132\214\357\105\327\246\230\131\166\172\214\213\104\226\265\170
\317\107\113\032
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\310\345\215\316\250\102\342\172\300\052\134\174\236\046\277\146
END
CKA_ISSUER MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\023\006\154\237\322\226\065\206\237\012\017\345\206\170\370
\133\046\273\212\067
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Amazon Root CA 3"
#
# Issuer: CN=Amazon Root CA 3,O=Amazon,C=US
```

```
# Serial Number:06:6c:9f:d5:74:97:36:66:3f:3b:0b:9a:d9:e8:9e:76:03:f2:4a
# Subject: CN=Amazon Root CA 3,O=Amazon,C=US
# Not Valid Before: Tue May 26 00:00:00 2015
# Not Valid After : Sat May 26 00:00:00 2040
# Fingerprint (SHA-256):
18:CE:6C:FE:7B:F1:4E:60:B2:E3:47:B8:DF:E8:68:CB:31:D0:2E:BB:3A:DA:27:15:69:F5:03:43:B4:6D:B3:A4
# Fingerprint (SHA1): 0D:44:DD:8C:3C:8C:1A:1A:58:75:64:81:E9:0F:2E:2A:FF:B3:D2:6E
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Amazon Root CA 3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\063
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\023\006\154\237\325\164\227\066\146\077\073\013\232\331\350
\236\166\003\362\112
END
CKA_VALUE MULTILINE_OCTAL
\060\202\001\266\060\202\001\133\240\003\002\001\002\002\023\006
\154\237\325\164\227\066\146\077\073\013\232\331\350\236\166\003
\362\112\060\012\006\010\052\206\110\316\075\004\003\002\060\071
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\017\060
\015\006\003\125\004\012\023\006\101\155\141\172\157\156\061\031
\060\027\006\003\125\004\003\023\020\101\155\141\172\157\156\040
\122\157\157\164\040\103\101\040\063\060\036\027\015\061\065\060
\065\062\066\060\060\060\060\060\060\132\027\015\064\060\060\065
\062\066\060\060\060\060\060\060\132\060\071\061\013\060\011\006
\003\125\004\006\023\002\125\123\061\017\060\015\006\003\125\004
\012\023\006\101\155\141\172\157\156\061\031\060\027\006\003\125
\004\003\023\020\101\155\141\172\157\156\040\122\157\157\164\040
\103\101\040\063\060\131\060\023\006\007\052\206\110\316\075\002
\001\006\010\052\206\110\316\075\003\001\007\003\102\000\004\051
\227\247\306\101\177\300\015\233\350\001\033\126\306\362\122\245
\272\055\262\022\350\322\056\327\372\311\305\330\252\155\037\163
```

\201\073\073\230\153\071\174\063\245\305\116\206\216\200\027\150
\142\105\127\175\104\130\035\263\067\345\147\010\353\146\336\243
\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\206\060\035\006\003\125\035\016\004\026\004\024\253
\266\333\327\006\236\067\254\060\206\007\221\160\307\234\304\031
\261\170\300\060\012\006\010\052\206\110\316\075\004\003\002\003
\111\000\060\106\002\041\000\340\205\222\243\027\267\215\371\053
\006\245\223\254\032\230\150\141\162\372\341\241\320\373\034\170
\140\246\103\231\305\270\304\002\041\000\234\002\357\361\224\234
\263\226\371\353\306\052\370\266\054\376\072\220\024\026\327\214
\143\044\110\034\337\060\175\325\150\073
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Amazon Root CA 3"
# Issuer: CN=Amazon Root CA 3,O=Amazon,C=US
# Serial Number:06:6c:9f:d5:74:97:36:66:3f:3b:0b:9a:d9:e8:9e:76:03:f2:4a
# Subject: CN=Amazon Root CA 3,O=Amazon,C=US
# Not Valid Before: Tue May 26 00:00:00 2015
# Not Valid After : Sat May 26 00:00:00 2040
# Fingerprint (SHA-256):
18:CE:6C:FE:7B:F1:4E:60:B2:E3:47:B8:DF:E8:68:CB:31:D0:2E:BB:3A:DA:27:15:69:F5:03:43:B4:6D:B3:A4
# Fingerprint
(SHA1): 0D:44:DD:8C:3C:8C:1A:1A:58:75:64:81:E9:0F:2E:2A:FF:B3:D2:6E
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Amazon Root CA 3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\015\104\335\214\074\214\032\032\130\165\144\201\351\017\056\052
\377\263\322\156
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\240\324\357\013\367\265\330\111\225\052\354\365\304\374\201\207
END
CKA_ISSUER MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\023\006\154\237\325\164\227\066\146\077\073\013\232\331\350

```
\236\166\003\362\112
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Amazon Root CA 4"
#
# Issuer: CN=Amazon Root CA 4,O=Amazon,C=US
# Serial Number:06:6c:9f:d7:c1:bb:10:4c:29:43:e5:71:7b:7b:2c:c8:1a:c1:0e
# Subject: CN=Amazon Root CA 4,O=Amazon,C=US
# Not Valid Before: Tue May 26 00:00:00 2015
# Not Valid After : Sat May 26 00:00:00 2040
# Fingerprint (SHA-256):
E3:5D:28:41:9E:D0:20:25:CF:A6:90:38:CD:62:39:62:45:8D:A5:C6:95:FB:DE:A3:C2:2B:0B:FB:25:89:70:92
# Fingerprint (SHA1): F6:10:84:07:D6:F8:BB:67:98:0C:C2:E2:44:C2:EB:AE:1C:EF:63:BE
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Amazon Root CA 4"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\064
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\064
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\023\006\154\237\327\301\273\020\114\051\103\345\161\173\173
\054\310\032\301\016
END
CKA_VALUE MULTILINE_OCTAL
\060\202\001\362\060\202\001\170\240\003\002\001\002\002\023\006
\154\237\327\301\273\020\114\051\103\345\161\173\173\054\310\032
\301\016\060\012\006\010\052\206\110\316\075\004\003\003\060\071
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\017\060
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\015\006\003\125\004\012\023\006\101\155\141\172\157\156\061\031
\060\027\006\003\125\004\003\023\020\101\155\141\172\157\156\040
\122\157\157\164\040\103\101\040\064\060\036\027\015\061\065\060
\065\062\066\060\060\060\060\060\060\132\027\015\064\060\060\065
\062\066\060\060\060\060\060\060\132\060\071\061\013\060\011\006
\003\125\004\006\023\002\125\123\061\017\060\015\006\003\125\004
\012\023\006\101\155\141\172\157\156\061\031\060\027\006\003\125
\004\003\023\020\101\155\141\172\157\156\040\122\157\157\164\040
\103\101\040\064\060\166\060\020\006\007\052\206\110\316\075\002
\001\006\005\053\201\004\000\042\003\142\000\004\322\253\212\067
\117\243\123\015\376\301\212\173\113\250\173\106\113\143\260\142
\366\055\033\333\010\161\041\322\000\350\143\275\232\047\373\360
\071\156\135\352\075\245\311\201\252\243\133\040\230\105\135\026
\333\375\350\020\155\343\234\340\343\275\137\204\142\363\160\144
\063\240\313\044\057\160\272\210\241\052\240\165\370\201\256\142
\006\304\201\333\071\156\051\260\036\372\056\134\243\102\060\100
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\206\060\035\006\003\125\035\016\004\026\004\024\323\354\307\072
\145\156\314\341\332\166\232\126\373\234\363\206\155\127\345\201
\060\012\006\010\052\206\110\316\075\004\003\003\003\150\000\060
\145\002\060\072\213\041\361\275\176\021\255\320\357\130\226\057
\326\353\235\176\220\215\053\317\146\125\303\054\343\050\251\160
\012\107\016\360\067\131\022\377\055\231\224\050\116\052\117\065
\115\063\132\002\061\000\352\165\000\116\073\304\072\224\022\221
\311\130\106\235\041\023\162\247\210\234\212\344\114\112\333\226
\324\254\213\153\153\111\022\123\063\255\327\344\276\044\374\265
\012\166\324\245\274\020
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Amazon Root CA 4"
# Issuer: CN=Amazon Root CA 4,O=Amazon,C=US
# Serial Number:06:6c:9f:d7:c1:bb:10:4c:29:43:e5:71:7b:7b:2c:c8:1a:c1:0e
# Subject: CN=Amazon Root CA 4,O=Amazon,C=US
# Not Valid Before: Tue May 26 00:00:00 2015
# Not Valid After : Sat May 26 00:00:00 2040
# Fingerprint (SHA-256):
E3:5D:28:41:9E:D0:20:25:CF:A6:90:38:CD:62:39:62:45:8D:A5:C6:95:FB:DE:A3:C2:2B:0B:FB:25:89:70:92
#
 Fingerprint (SHA1): F6:10:84:07:D6:F8:BB:67:98:0C:C2:E2:44:C2:EB:AE:1C:EF:63:BE
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE

```
CKA_LABEL UTF8 "Amazon Root CA 4"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\366\020\204\007\326\370\273\147\230\014\302\342\104\302\353\256
\034\357\143\276
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\211\274\047\325\353\027\215\006\152\151\325\375\211\107\264\315
END
CKA_ISSUER MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\017\060\015\006\003\125\004\012\023\006\101\155\141\172\157\156
\061\031\060\027\006\003\125\004\003\023\020\101\155\141\172\157
\156\040\122\157\157\164\040\103\101\040\064
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\023\006\154\237\327\301\273\020\114\051\103\345\161\173\173
\054\310\032\301\016
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "D-TRUST Root CA 3 2013"
#
# Issuer: CN=D-TRUST Root CA 3 2013,O=D-Trust GmbH,C=DE
# Serial Number: 1039788 (0xfddac)
# Subject: CN=D-TRUST Root CA 3 2013,O=D-Trust GmbH,C=DE
# Not Valid Before: Fri Sep 20 08:25:51 2013
# Not Valid After : Wed Sep 20 08:25:51 2028
# Fingerprint (SHA-256):
A1:A8:6D:04:12:1E:B8:7F:02:7C:66:F5:33:03:C2:8E:57:39:F9:43:FC:84:B3:8A:D6:AF:00:90:35:DD:94:57
# Fingerprint (SHA1): 6C:7C:CC:E7:D4:AE:51:5F:99:08:CD:3F:F6:E8:C3:78:DF:6F:EF:97
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST Root CA 3 2013"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\037\060\035\006\003\125\004\003\014
\026\104\055\124\122\125\123\124\040\122\157\157\164\040\103\101
\040\063\040\062\060\061\063
END
```

CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\037\060\035\006\003\125\004\003\014
\026\104\055\124\122\125\123\124\040\122\157\157\164\040\103\101
\040\063\040\062\060\061\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\017\335\254
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\016\060\202\002\366\240\003\002\001\002\002\003\017
\335\254\060\015\006\011\052\206\110\206\367\015\001\001\013\005
\000\060\105\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165
\163\164\040\107\155\142\110\061\037\060\035\006\003\125\004\003
\014\026\104\055\124\122\125\123\124\040\122\157\157\164\040\103
\101\040\063\040\062\060\061\063\060\036\027\015\061\063\060\071
\062\060\060\070\062\065\065\061\132\027\015\062\070\060\071\062
\060\060\070\062\065\065\061\132\060\105\061\013\060\011\006\003
\125\004\006\023\002\104\105\061\025\060\023\006\003\125\004\012
\014\014\104\055\124\162\165\163\164\040\107\155\142\110\061\037
\060\035\006\003\125\004\003\014\026\104\055\124\122\125\123\124
\040\122\157\157\164\040\103\101\040\063\040\062\060\061\063\060
\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001\001
\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001\000
\304\173\102\222\202\037\354\355\124\230\216\022\300\312\011\337
\223\156\072\223\134\033\344\020\167\236\116\151\210\154\366\341
\151\362\366\233\242\141\261\275\007\040\164\230\145\361\214\046
\010\315\250\065\312\200\066\321\143\155\350\104\172\202\303\154
\136\336\273\350\066\322\304\150\066\214\237\062\275\204\042\340
\334\302\356\020\106\071\155\257\223\071\256\207\346\303\274\011
\311\054\153\147\133\331\233\166\165\114\013\340\273\305\327\274
\076\171\362\137\276\321\220\127\371\256\366\146\137\061\277\323
\155\217\247\272\112\363\043\145\273\267\357\243\045\327\012\352
\130\266\357\210\372\372\171\262\122\130\325\360\254\214\241\121
\164\051\225\252\121\073\220\062\003\237\034\162\164\220\336\075
\355\141\322\345\343\375\144\107\345\271\267\112\251\367\037\256
\226\206\004\254\057\343\244\201\167\267\132\026\377\330\017\077
\366\267\170\314\244\257\372\133\074\022\133\250\122\211\162\357
\210\363\325\104\201\206\225\043\237\173\335\274\331\064\357\174
\224\074\252\300\101\302\343\235\120\032\300\344\031\042\374\263
\002\003\001\000\001\243\202\001\005\060\202\001\001\060\017\006
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\035
\006\003\125\035\016\004\026\004\024\077\220\310\175\307\025\157
\363\044\217\251\303\057\113\242\017\041\262\057\347\060\016\006

\003\125\035\017\001\001\377\004\004\003\002\001\006\060\201\276
\006\003\125\035\037\004\201\266\060\201\263\060\164\240\162\240
\160\206\156\154\144\141\160\072\057\057\144\151\162\145\143\164
\157\162\171\056\144\055\164\162\165\163\164\056\156\145\164\057
\103\116\075\104\055\124\122\125\123\124\045\062\060\122\157\157
\164\045\062\060\103\101\045\062\060\063\045\062\060\062\060\061
\063\054\117\075\104\055\124\162\165\163\164\045\062\060\107\155
\142\110\054\103\075\104\105\077\143\145\162\164\151\146\151\143
\141\164\145\162\145\166\157\143\141\164\151\157\156\154\151\163
\164\060\073\240\071\240\067\206\065\150\164\164\160\072\057\057
\143\162\154\056\144\055\164\162\165\163\164\056\156\145\164\057
\143\162\154\057\144\055\164\162\165\163\164\137\162\157\157\164
\137\143\141\137\063\137\062\060\061\063\056\143\162\154\060\015
\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202\001
\001\000\016\131\016\130\344\164\110\043\104\317\064\041\265\234
\024\032\255\232\113\267\263\210\155\134\251\027\160\360\052\237
\215\173\371\173\205\372\307\071\350\020\010\260\065\053\137\317
\002\322\323\234\310\013\036\356\005\124\256\067\223\004\011\175
\154\217\302\164\274\370\034\224\276\061\001\100\055\363\044\040
\267\204\125\054\134\310\365\164\112\020\031\213\243\307\355\065
\326\011\110\323\016\300\272\071\250\260\106\002\260\333\306\210
\131\302\276\374\173\261\053\317\176\142\207\125\226\314\001\157
\233\147\041\225\065\213\370\020\374\161\033\267\113\067\151\246
\073\326\354\213\356\301\260\363\045\311\217\222\175\241\352\303
\312\104\277\046\245\164\222\234\343\164\353\235\164\331\313\115
\207\330\374\264\151\154\213\240\103\007\140\170\227\351\331\223
\174\302\106\274\233\067\122\243\355\212\074\023\251\173\123\113
\111\232\021\005\054\013\156\126\254\037\056\202\154\340\151\147
\265\016\155\055\331\344\300\025\361\077\372\030\162\341\025\155
\047\133\055\060\050\053\237\110\232\144\053\231\357\362\165\111
\137\134
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

#
 Trust for "D-TRUST Root CA 3 2013"
# Issuer: CN=D-TRUST Root CA 3 2013,O=D-Trust GmbH,C=DE
# Serial Number: 1039788 (0xfddac)
# Subject: CN=D-TRUST Root CA 3 2013,O=D-Trust GmbH,C=DE
# Not Valid Before: Fri Sep 20 08:25:51 2013
# Not Valid After : Wed Sep 20 08:25:51 2028
# Fingerprint (SHA-256):
A1:A8:6D:04:12:1E:B8:7F:02:7C:66:F5:33:03:C2:8E:57:39:F9:43:FC:84:B3:8A:D6:AF:00:90:35:DD:94:57
# Fingerprint (SHA1): 6C:7C:CC:E7:D4:AE:51:5F:99:08:CD:3F:F6:E8:C3:78:DF:6F:EF:97
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

```
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST Root CA 3 2013"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\154\174\314\347\324\256\121\137\231\010\315\077\366\350\303\170
\337\157\357\227
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\267\042\146\230\176\326\003\340\301\161\346\165\315\126\105\277
END
CKA_ISSUER MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\037\060\035\006\003\125\004\003\014
\026\104\055\124\122\125\123\124\040\122\157\157\164\040\103\101
\040\063\040\062\060\061\063
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\003\017\335\254
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "TUBITAK Kamu SM SSL Kok Sertifikasi - Surum 1"
#
# Issuer: CN=TUBITAK Kamu SM SSL Kok Sertifikasi - Surum 1,OU=Kamu Sertifikasyon Merkezi - Kamu
SM,O=Turkiye Bilimsel ve Teknolojik Arastirma Kurumu - TUBITAK,L=Gebze - Kocaeli,C=TR
# Serial Number: 1 (0x1)
# Subject: CN=TUBITAK Kamu SM SSL Kok Sertifikasi - Surum 1,OU=Kamu Sertifikasyon Merkezi - Kamu
SM,O=Turkiye Bilimsel ve Teknolojik Arastirma Kurumu - TUBITAK,L=Gebze - Kocaeli,C=TR
# Not Valid Before: Mon Nov 25 08:25:55 2013
# Not Valid After : Sun
 Oct 25 08:25:55 2043
# Fingerprint (SHA-256):
46:ED:C3:68:90:46:D5:3A:45:3F:B3:10:4A:B8:0D:CA:EC:65:8B:26:60:EA:16:29:DD:7E:86:79:90:64:87:16
# Fingerprint (SHA1): 31:43:64:9B:EC:CE:27:EC:ED:3A:3F:0B:8F:0D:E4:E8:91:DD:EE:CA
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TUBITAK Kamu SM SSL Kok Sertifikasi - Surum 1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
```

\060\201\322\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\030\060\026\006\003\125\004\007\023\017\107\145\142\172\145
\040\055\040\113\157\143\141\145\154\151\061\102\060\100\006\003
\125\004\012\023\071\124\165\162\153\151\171\145\040\102\151\154
\151\155\163\145\154\040\166\145\040\124\145\153\156\157\154\157
\152\151\153\040\101\162\141\163\164\151\162\155\141\040\113\165
\162\165\155\165\040\055\040\124\125\102\111\124\101\113\061\055
\060\053\006\003\125\004\013\023\044\113\141\155\165\040\123\145
\162\164\151\146\151\153\141\163\171\157\156\040\115\145\162\153
\145\172\151\040\055\040\113\141\155\165\040\123\115\061\066\060
\064\006\003\125\004\003\023\055\124\125\102\111\124\101\113\040
\113\141\155\165\040\123\115\040\123\123\114\040\113\157\153\040
\123\145\162\164\151\146\151\153\141\163\151\040\055\040\123\165
\162\165\155\040\061
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\322\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\030\060\026\006\003\125\004\007\023\017\107\145\142\172\145
\040\055\040\113\157\143\141\145\154\151\061\102\060\100\006\003
\125\004\012\023\071\124\165\162\153\151\171\145\040\102\151\154
\151\155\163\145\154\040\166\145\040\124\145\153\156\157\154\157
\152\151\153\040\101\162\141\163\164\151\162\155\141\040\113\165
\162\165\155\165\040\055\040\124\125\102\111\124\101\113\061\055
\060\053\006\003\125\004\013\023\044\113\141\155\165\040\123\145
\162\164\151\146\151\153\141\163\171\157\156\040\115\145\162\153
\145\172\151\040\055\040\113\141\155\165\040\123\115\061\066\060
\064\006\003\125\004\003\023\055\124\125\102\111\124\101\113\040
\113\141\155\165\040\123\115\040\123\123\114\040\113\157\153\040
\123\145\162\164\151\146\151\153\141\163\151\040\055\040\123\165
\162\165\155\040\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\143\060\202\003\113\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\201\322\061\013\060\011\006\003\125\004\006\023\002\124\122\061
\030\060\026\006\003\125\004\007\023\017\107\145\142\172\145\040
\055\040\113\157\143\141\145\154\151\061\102\060\100\006\003\125
\004\012\023\071\124\165\162\153\151\171\145\040\102\151\154\151
\155\163\145\154\040\166\145\040\124\145\153\156\157\154\157\152
\151\153\040\101\162\141\163\164\151\162\155\141\040\113\165\162
\165\155\165\040\055\040\124\125\102\111\124\101\113\061\055\060
\053\006\003\125\004\013\023\044\113\141\155\165\040\123\145\162

\164\151\146\151\153\141\163\171\157\156\040\115\145\162\153\145
\172\151\040\055\040\113\141\155\165\040\123\115\061\066\060\064
\006\003\125\004\003\023\055\124\125\102\111\124\101\113\040\113
\141\155\165\040\123\115\040\123\123\114\040\113\157\153\040\123
\145\162\164\151\146\151\153\141\163\151\040\055\040\123\165\162
\165\155\040\061\060\036\027\015\061\063\061\061\062\065\060\070
\062\065\065\065\132\027\015\064\063\061\060\062\065\060\070\062
\065\065\065\132\060\201\322\061\013\060\011\006\003\125\004\006
\023\002\124\122\061\030\060\026\006\003\125\004\007\023\017\107
\145\142\172\145\040\055\040\113\157\143\141\145\154\151\061\102
\060\100\006\003\125\004\012\023\071\124\165\162\153\151\171\145
\040\102\151\154\151\155\163\145\154\040\166\145\040\124\145\153
\156\157\154\157\152\151\153\040\101\162\141\163\164\151\162\155
\141\040\113\165\162\165\155\165\040\055\040\124\125\102\111\124
\101\113\061\055\060\053\006\003\125\004\013\023\044\113\141\155
\165\040\123\145\162\164\151\146\151\153\141\163\171\157\156\040
\115\145\162\153\145\172\151\040\055\040\113\141\155\165\040\123
\115\061\066\060\064\006\003\125\004\003\023\055\124\125\102\111
\124\101\113\040\113\141\155\165\040\123\115\040\123\123\114\040
\113\157\153\040\123\145\162\164\151\146\151\153\141\163\151\040
\055\040\123\165\162\165\155\040\061\060\202\001\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017
\000\060\202\001\012\002\202\001\001\000\257\165\060\063\252\273
\153\323\231\054\022\067\204\331\215\173\227\200\323\156\347\377
\233\120\225\076\220\225\126\102\327\031\174\046\204\215\222\372
\001\035\072\017\342\144\070\267\214\274\350\210\371\213\044\253
\056\243\365\067\344\100\216\030\045\171\203\165\037\073\377\154
\250\305\306\126\370\264\355\212\104\243\253\154\114\374\035\320
\334\357\150\275\317\344\252\316\360\125\367\242\064\324\203\153
\067\174\034\302\376\265\003\354\127\316\274\264\265\305\355\000
\017\123\067\052\115\364\117\014\203\373\206\317\313\376\214\116
\275\207\371\247\213\041\127\234\172\337\003\147\211\054\235\227
\141\247\020\270\125\220\177\016\055\047\070\164\337\347\375\332
\116\022\343\115\025\042\002\310\340\340\374\017\255\212\327\311
\124\120\314\073\017\312\026\200\204\320\121\126\303\216\126\177
\211\042\063\057\346\205\012\275\245\250\033\066\336\323\334\054
\155\073\307\023\275\131\043\054\346\345\244\367\330\013\355\352
\220\100\104\250\225\273\223\325\320\200\064\266\106\170\016\037
\000\223\106\341\356\351\371\354\117\027\002\003\001\000\001\243
\102\060\100\060\035\006\003\125\035\016\004\026\004\024\145\077
\307\212\206\306\074\335\074\124\134\065\370\072\355\122\014\107
\127\310\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\006\060\017\006\003\125\035\023\001\001\377\004\005\060\003
\001\001\377\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\003\202\001\001\000\052\077\341\361\062\216\256\341\230
\134\113\136\317\153\036\152\011\322\042\251\022\307\136\127\175
\163\126\144\200\204\172\223\344\011\271\020\315\237\052\047\341
\000\167\276\110\310\065\250\201\237\344\270\054\311\177\016\260

\322\113\067\135\352\271\325\013\136\064\275\364\163\051\303\355
\046\025\234\176\010\123\212\130\215\320\113\050\337\301\263\337
\040\363\371\343\343\072\337\314\234\224\330\116\117\303\153\027
\267\367\162\350\255\146\063\265\045\123\253\340\370\114\251\235
\375\362\015\272\256\271\331\252\306\153\371\223\273\256\253\270
\227\074\003\032\272\103\306\226\271\105\162\070\263\247\241\226
\075\221\173\176\300\041\123\114\207\355\362\013\124\225\121\223
\325\042\245\015\212\361\223\016\076\124\016\260\330\311\116\334
\362\061\062\126\352\144\371\352\265\235\026\146\102\162\363\177
\323\261\061\103\374\244\216\027\361\155\043\253\224\146\370\255
\373\017\010\156\046\055\177\027\007\011\262\214\373\120\300\237
\226\215\317\266\375\000\235\132\024\232\277\002\104\365\301\302
\237\042\136\242\017\241\343
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER
 CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "TUBITAK Kamu SM SSL Kok Sertifikasi - Surum 1"
# Issuer: CN=TUBITAK Kamu SM SSL Kok Sertifikasi - Surum 1,OU=Kamu Sertifikasyon Merkezi - Kamu SM,O=Turkiye Bilimsel ve Teknolojik Arastirma Kurumu - TUBITAK,L=Gebze - Kocaeli,C=TR
# Serial Number: 1 (0x1)
# Subject: CN=TUBITAK Kamu SM SSL Kok Sertifikasi - Surum 1,OU=Kamu Sertifikasyon Merkezi - Kamu SM,O=Turkiye Bilimsel ve Teknolojik Arastirma Kurumu - TUBITAK,L=Gebze - Kocaeli,C=TR
# Not Valid Before: Mon Nov 25 08:25:55 2013
# Not Valid After : Sun Oct 25 08:25:55 2043
# Fingerprint (SHA-256):
46:ED:C3:68:90:46:D5:3A:45:3F:B3:10:4A:B8:0D:CA:EC:65:8B:26:60:EA:16:29:DD:7E:86:79:90:64:87:16
# Fingerprint (SHA1): 31:43:64:9B:EC:CE:27:EC:ED:3A:3F:0B:8F:0D:E4:E8:91:DD:EE:CA
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TUBITAK Kamu SM SSL Kok Sertifikasi
 - Surum 1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\061\103\144\233\354\316\047\354\355\072\077\013\217\015\344\350
\221\335\356\312
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\334\000\201\334\151\057\076\057\260\073\366\075\132\221\216\111
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\322\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\030\060\026\006\003\125\004\007\023\017\107\145\142\172\145
\040\055\040\113\157\143\141\145\154\151\061\102\060\100\006\003

\125\004\012\023\071\124\165\162\153\151\171\145\040\102\151\154
\151\155\163\145\154\040\166\145\040\124\145\153\156\157\154\157
\152\151\153\040\101\162\141\163\164\151\162\155\141\040\113\165
\162\165\155\165\040\055\040\124\125\102\111\124\101\113\061\055
\060\053\006\003\125\004\013\023\044\113\141\155\165\040\123\145
\162\164\151\146\151\153\141\163\171\157\156\040\115\145\162\153
\145\172\151\040\055\040\113\141\155\165\040\123\115\061\066\060
\064\006\003\125\004\003\023\055\124\125\102\111\124\101\113\040
\113\141\155\165\040\123\115\040\123\123\114\040\113\157\153\040
\123\145\162\164\151\146\151\153\141\163\151\040\055\040\123\165
\162\165\155\040\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GDCA TrustAUTH R5 ROOT"
#
# Issuer: CN=GDCA TrustAUTH R5 ROOT,O="GUANG DONG CERTIFICATE AUTHORITY
CO.,LTD.",C=CN
# Serial Number:7d:09:97:fe:f0:47:ea:7a
# Subject: CN=GDCA TrustAUTH R5 ROOT,O="GUANG DONG CERTIFICATE AUTHORITY
CO.,LTD.",C=CN
# Not Valid Before: Wed Nov 26 05:13:15 2014
# Not Valid After : Mon Dec 31 15:59:59 2040
# Fingerprint (SHA-256):
BF:FF:8F:D0:44:33:48:7D:6A:8A:A6:0C:1A:29:76:7A:9F:C2:BB:B0:5E:42:0F:71:3A:13:B9:92:89:1D:38:93
# Fingerprint (SHA1): 0F:36:38:5B:81:1A:25:C3:9B:31:4E:83:CA:E9:34:66:70:CC:74:B4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN
 CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GDCA TrustAUTH R5 ROOT"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\062\060\060\006\003\125\004\012\014\051\107\125\101\116\107\040
\104\117\116\107\040\103\105\122\124\111\106\111\103\101\124\105
\040\101\125\124\110\117\122\111\124\131\040\103\117\056\054\114
\124\104\056\061\037\060\035\006\003\125\004\003\014\026\107\104
\103\101\040\124\162\165\163\164\101\125\124\110\040\122\065\040

\122\117\117\124
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\062\060\060\006\003\125\004\012\014\051\107\125\101\116\107\040
\104\117\116\107\040\103\105\122\124\111\106\111\103\101\124\105
\040\101\125\124\110\117\122\111\124\131\040\103\117\056\054\114
\124\104\056\061\037\060\035\006\003\125\004\003\014\026\107\104
\103\101\040\124\162\165\163\164\101\125\124\110\040\122\065\040
\122\117\117\124
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\010\175\011\227\376\360\107\352\172
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\210\060\202\003\160\240\003\002\001\002\002\010\175
\011\227\376\360\107\352\172\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\142\061\013\060\011\006\003\125\004
\006\023\002\103\116\061\062\060\060\006\003\125\004\012\014\051
\107\125\101\116\107\040\104\117\116\107\040\103\105\122\124\111
\106\111\103\101\124\105\040\101\125\124\110\117\122\111\124\131
\040\103\117\056\054\114\124\104\056\061\037\060\035\006\003\125
\004\003\014\026\107\104\103\101\040\124\162\165\163\164\101\125
\124\110\040\122\065\040\122\117\117\124\060\036\027\015\061\064
\061\061\062\066\060\065\061\063\061\065\132\027\015\064\060\061
\062\063\061\061\065\065\071\065\071\132\060\142\061\013\060\011
\006\003\125\004\006\023\002\103\116\061\062\060\060\006\003\125
\004\012\014\051\107\125\101\116\107\040\104\117\116\107\040\103
\105\122\124\111\106\111\103\101\124\105\040\101\125\124\110\117
\122\111\124\131\040\103\117\056\054\114\124\104\056\061\037\060
\035\006\003\125\004\003\014\026\107\104\103\101\040\124\162\165
\163\164\101\125\124\110\040\122\065\040\122\117\117\124\060\202
\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\331
\243\026\360\310\164\164\167\233\357\063\015\073\006\176\125\374
\265\140\217\166\206\022\102\175\126\146\076\210\202\355\162\143
\016\236\213\335\064\054\002\121\121\303\031\375\131\124\204\311
\361\153\263\114\260\351\350\106\135\070\306\242\247\056\021\127
\272\202\025\242\234\217\155\260\231\112\012\362\353\211\160\143
\116\171\304\267\133\275\242\135\261\362\101\002\053\255\251\072
\243\354\171\012\354\137\072\343\375\357\200\074\255\064\233\032
\253\210\046\173\126\242\202\206\037\353\065\211\203\177\137\256
\051\116\075\266\156\354\256\301\360\047\233\256\343\364\354\357
\256\177\367\206\075\162\172\353\245\373\131\116\247\353\225\214
\042\071\171\341\055\010\217\314\274\221\270\101\367\024\301\043
\251\303\255\232\105\104\263\262\327\054\315\306\051\342\120\020

\256\134\313\202\216\027\030\066\175\227\346\210\232\260\115\064
\011\364\054\271\132\146\052\260\027\233\236\036\166\235\112\146
\061\101\337\077\373\305\006\357\033\266\176\032\106\066\367\144
\143\073\343\071\030\043\347\147\165\024\325\165\127\222\067\275
\276\152\033\046\120\362\066\046\006\220\305\160\001\144\155\166
\146\341\221\333\156\007\300\141\200\056\262\056\057\214\160\247
\321\073\074\263\221\344\156\266\304\073\160\362\154\222\227\011
\315\107\175\030\300\363\273\236\017\326\213\256\007\266\132\017
\316\013\014\107\247\345\076\270\275\175\307\233\065\240\141\227
\072\101\165\027\314\053\226\167\052\222\041\036\331\225\166\040
\147\150\317\015\275\337\326\037\011\152\232\342\314\163\161\244
\057\175\022\200\267\123\060\106\136\113\124\231\017\147\311\245
\310\362\040\301\202\354\235\021\337\302\002\373\032\073\321\355
\040\232\357\145\144\222\020\015\052\342\336\160\361\030\147\202
\214\141\336\270\274\321\057\234\373\017\320\053\355\033\166\271
\344\071\125\370\370\241\035\270\252\200\000\114\202\347\262\177
\011\270\274\060\240\057\015\365\122\236\216\367\222\263\012\000
\035\000\124\227\006\340\261\007\331\307\017\134\145\175\074\155
\131\127\344\355\245\215\351\100\123\237\025\113\240\161\366\032
\041\343\332\160\006\041\130\024\207\205\167\171\252\202\171\002
\003\001\000\001\243\102\060\100\060\035\006\003\125\035\016\004
\026\004\024\342\311\100\237\115\316\350\232\241\174\317\016\077
\145\305\051\210\152\031\121\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\016\006\003\125\035\017\001
\001\377\004\004\003\002\001\206\060\015\006\011\052\206\110\206
\367\015\001\001\013\005\000\003\202\002\001\000\321\111\127\340
\247\314\150\130\272\001\017\053\031\315\215\260\141\105\254\021
\355\143\120\151\370\037\177\276\026\217\375\235\353\013\252\062
\107\166\322\147\044\355\275\174\063\062\227\052\307\005\206\146
\015\027\175\024\025\033\324\353\375\037\232\366\136\227\151\267
\032\045\244\012\263\221\077\137\066\254\213\354\127\250\076\347
\201\212\030\127\071\205\164\032\102\307\351\133\023\137\217\371
\010\351\222\164\215\365\107\322\253\073\326\373\170\146\116\066
\175\371\351\222\351\004\336\375\111\143\374\155\373\024\161\223
\147\057\107\112\267\271\377\036\052\163\160\106\060\277\132\362
\057\171\245\341\215\014\331\371\262\143\067\214\067\145\205\160
\152\134\133\011\162\271\255\143\074\261\335\370\374\062\277\067
\206\344\273\216\230\047\176\272\037\026\341\160\021\362\003\337
\045\142\062\047\046\030\062\204\237\377\000\072\023\272\232\115
\364\117\270\024\160\042\261\312\053\220\316\051\301\160\364\057
\235\177\362\220\036\326\132\337\267\106\374\346\206\372\313\340
\040\166\172\272\246\313\365\174\336\142\245\261\213\356\336\202
\146\212\116\072\060\037\077\200\313\255\047\272\014\136\327\320
\261\126\312\167\161\262\265\165\241\120\251\100\103\027\302\050
\331\317\122\213\133\310\143\324\102\076\240\063\172\106\056\367
\012\040\106\124\176\152\117\061\361\201\176\102\164\070\145\163
\047\356\306\174\270\216\327\245\072\327\230\241\234\214\020\125
\323\333\113\354\100\220\362\315\156\127\322\142\016\174\127\223

\261\247\155\315\235\203\273\052\347\345\266\073\161\130\255\375
\321\105\274\132\221\356\123\025\157\323\105\011\165\156\272\220
\135\036\004\317\067\337\036\250\146\261\214\346\040\152\357\374
\110\116\164\230\102\257\051\157\056\152\307\373\175\321\146\061
\042\314\206\000\176\146\203\014\102\364\275\064\222\303\032\352
\117\312\176\162\115\013\160\214\246\110\273\246\241\024\366\373
\130\104\231\024\256\252\013\223\151\240\051\045\112\245\313\053
\335\212\146\007\026\170\025\127\161\033\354\365\107\204\363\236
\061\067\172\325\177\044\255\344\274\375\375\314\156\203\350\014
\250\267\101\154\007\335\275\074\206\227\057\322
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER
 CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "GDCA TrustAUTH R5 ROOT"
# Issuer: CN=GDCA TrustAUTH R5 ROOT,O="GUANG DONG CERTIFICATE AUTHORITY
CO.,LTD.",C=CN
# Serial Number:7d:09:97:fe:f0:47:ea:7a
# Subject: CN=GDCA TrustAUTH R5 ROOT,O="GUANG DONG CERTIFICATE AUTHORITY
CO.,LTD.",C=CN
# Not Valid Before: Wed Nov 26 05:13:15 2014
# Not Valid After : Mon Dec 31 15:59:59 2040
# Fingerprint (SHA-256):
BF:FF:8F:D0:44:33:48:7D:6A:8A:A6:0C:1A:29:76:7A:9F:C2:BB:B0:5E:42:0F:71:3A:13:B9:92:89:1D:38:93
# Fingerprint (SHA1): 0F:36:38:5B:81:1A:25:C3:9B:31:4E:83:CA:E9:34:66:70:CC:74:B4
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GDCA TrustAUTH R5 ROOT"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\017\066\070\133\201\032\045\303\233\061\116\203\312\351\064\146
\160\314\164\264
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\143\314\331\075\064\065\134\157\123\243\342\010\160\110\037\264
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\062\060\060\006\003\125\004\012\014\051\107\125\101\116\107\040
\104\117\116\107\040\103\105\122\124\111\106\111\103\101\124\105
\040\101\125\124\110\117\122\111\124\131\040\103\117\056\054\114
\124\104\056\061\037\060\035\006\003\125\004\003\014\026\107\104
\103\101\040\124\162\165\163\164\101\125\124\110\040\122\065\040

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\122\117\117\124
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\175\011\227\376\360\107\352\172
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "SSL.com Root Certification Authority RSA"
#
# Issuer: CN=SSL.com Root Certification Authority RSA,O=SSL Corporation,L=Houston,ST=Texas,C=US
# Serial Number:7b:2c:9b:d3:16:80:32:99
# Subject: CN=SSL.com Root Certification
 Authority RSA,O=SSL Corporation,L=Houston,ST=Texas,C=US
# Not Valid Before: Fri Feb 12 17:39:39 2016
# Not Valid After : Tue Feb 12 17:39:39 2041
# Fingerprint (SHA-256):
85:66:6A:56:2E:E0:BE:5C:E9:25:C1:D8:89:0A:6F:76:A8:7E:C1:6D:4D:7D:5F:29:EA:74:19:CF:20:12:3B:69
# Fingerprint (SHA1): B7:AB:33:08:D1:EA:44:77:BA:14:80:12:5A:6F:BD:A9:36:49:0C:BB
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com Root Certification Authority RSA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\174\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\061\060\057\006
\003\125\004\003\014\050\123\123\114\056\143\157\155\040\122\157
\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171\040\122\123\101
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\174\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\061\060\057\006
\003\125\004\003\014\050\123\123\114\056\143\157\155\040\122\157
\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156
```

\040\101\165\164\150\157\162\151\164\171\040\122\123\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\173\054\233\323\026\200\062\231
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\335\060\202\003\305\240\003\002\001\002\002\010\173
\054\233\323\026\200\062\231\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\174\061\013\060\011\006\003\125\004
\006\023\002\125\123\061\016\060\014\006\003\125\004\010\014\005
\124\145\170\141\163\061\020\060\016\006\003\125\004\007\014\007
\110\157\165\163\164\157\156\061\030\060\026\006\003\125\004\012
\014\017\123\123\114\040\103\157\162\160\157\162\141\164\151\157
\156\061\061\060\057\006\003\125\004\003\014\050\123\123\114\056
\143\157\155\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\040\122\123\101\060\036\027\015\061\066\060\062\061\062\061\067
\063\071\063\071\132\027\015\064\061\060\062\061\062\061\067\063
\071\063\071\132\060\174\061\013\060\011\006\003\125\004\006\023
\002\125\123\061\016\060\014\006\003\125\004\010\014\005\124\145
\170\141\163\061\020\060\016\006\003\125\004\007\014\007\110\157
\165\163\164\157\156\061\030\060\026\006\003\125\004\012\014\017
\123\123\114\040\103\157\162\160\157\162\141\164\151\157\156\061
\061\060\057\006\003\125\004\003\014\050\123\123\114\056\143\157
\155\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040\122
\123\101\060\202\002\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202
\002\001\000\371\017\335\243\053\175\313\320\052\376\354\147\205
\246\347\056\033\272\167\341\343\365\257\244\354\372\112\135\221
\304\127\107\153\030\167\153\166\362\375\223\344\075\017\302\026
\236\013\146\303\126\224\236\027\203\205\316\126\357\362\026\375
\000\142\365\042\011\124\350\145\027\116\101\271\340\117\106\227
\252\033\310\270\156\142\136\151\261\137\333\052\002\176\374\154
\312\363\101\330\355\320\350\374\077\141\110\355\260\003\024\035
\020\016\113\031\340\273\116\354\206\145\377\066\363\136\147\002
\013\235\206\125\141\375\172\070\355\376\342\031\000\267\157\241
\120\142\165\164\074\240\372\310\045\222\264\156\172\042\307\370
\036\241\343\262\335\221\061\253\053\035\004\377\245\112\004\067
\351\205\244\063\053\375\342\326\125\064\174\031\244\112\150\307
\262\250\323\267\312\241\223\210\353\301\227\274\214\371\035\331
\042\204\044\164\307\004\075\152\251\051\223\314\353\270\133\341
\376\137\045\252\064\130\310\301\043\124\235\033\230\021\303\070
\234\176\075\206\154\245\017\100\206\174\002\364\134\002\117\050
\313\256\161\237\017\072\310\063\376\021\045\065\352\374\272\305
\140\075\331\174\030\325\262\251\323\165\170\003\162\042\312\072
\303\037\357\054\345\056\251\372\236\054\266\121\106\375\257\003
\326\352\140\150\352\205\026\066\153\205\351\036\300\263\335\304

\044\334\200\052\201\101\155\224\076\310\340\311\201\101\000\236
\136\277\177\305\010\230\242\030\054\102\100\263\371\157\070\047
\113\116\200\364\075\201\107\340\210\174\352\034\316\265\165\134
\121\056\034\053\177\032\162\050\347\000\265\321\164\306\327\344
\237\255\007\223\266\123\065\065\374\067\344\303\366\135\026\276
\041\163\336\222\012\370\240\143\152\274\226\222\152\076\370\274
\145\125\233\336\365\015\211\046\004\374\045\032\246\045\151\313
\302\155\312\174\342\131\137\227\254\353\357\056\310\274\327\033
\131\074\053\314\362\031\310\223\153\047\143\031\317\374\351\046
\370\312\161\233\177\223\376\064\147\204\116\231\353\374\263\170
\011\063\160\272\146\246\166\355\033\163\353\032\245\015\304\042
\023\040\224\126\012\116\054\154\116\261\375\317\234\011\272\242
\063\355\207\002\003\001\000\001\243\143\060\141\060\035\006\003
\125\035\016\004\026\004\024\335\004\011\007\242\365\172\175\122
\123\022\222\225\356\070\200\045\015\246\131\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\037\006\003
\125\035\043\004\030\060\026\200\024\335\004\011\007\242\365\172
\175\122\123\022\222\225\356\070\200\045\015\246\131\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\206\060\015\006
\011\052\206\110\206\367\015\001\001\013\005\000\003\202\002\001
\000\040\030\021\224\051\373\046\235\034\036\036\160\141\361\225
\162\223\161\044\255\150\223\130\216\062\257\033\263\160\003\374
\045\053\164\205\220\075\170\152\364\271\213\245\227\073\265\030
\221\273\036\247\371\100\133\221\371\125\231\257\036\021\320\134
\035\247\146\343\261\224\007\014\062\071\246\352\033\260\171\330
\035\234\160\104\343\212\335\304\371\225\037\212\070\103\077\001
\205\245\107\247\075\106\262\274\345\042\150\367\173\234\330\054
\076\012\041\310\055\063\254\277\305\201\231\061\164\301\165\161
\305\276\261\360\043\105\364\235\153\374\031\143\235\243\274\004
\306\030\013\045\273\123\211\017\263\200\120\336\105\356\104\177
\253\224\170\144\230\323\366\050\335\207\330\160\145\164\373\016
\271\023\353\247\017\141\251\062\226\314\336\273\355\143\114\030
\273\251\100\367\240\124\156\040\210\161\165\030\352\172\264\064
\162\340\043\047\167\134\266\220\352\206\045\100\253\357\063\017
\313\237\202\276\242\040\373\366\265\055\032\346\302\205\261\164
\017\373\310\145\002\244\122\001\107\335\111\042\301\277\330\353
\153\254\176\336\354\143\063\025\267\043\010\217\306\017\215\101
\132\335\216\305\271\217\345\105\077\170\333\272\322\033\100\261
\376\161\115\077\340\201\242\272\136\264\354\025\340\223\335\010
\037\176\341\125\231\013\041\336\223\236\012\373\346\243\111\275
\066\060\376\347\167\262\240\165\227\265\055\201\210\027\145\040
\367\332\220\000\237\311\122\314\062\312\065\174\365\075\017\330
\053\327\365\046\154\311\006\064\226\026\352\160\131\032\062\171
\171\013\266\210\177\017\122\110\075\277\154\330\242\104\056\321
\116\267\162\130\323\211\023\225\376\104\253\370\327\213\033\156
\234\274\054\240\133\325\152\000\257\137\067\341\325\372\020\013
\230\234\206\347\046\217\316\360\354\156\212\127\013\200\343\116
\262\300\240\143\141\220\272\125\150\067\164\152\266\222\333\237

\241\206\042\266\145\047\016\354\266\237\102\140\344\147\302\265
\332\101\013\304\323\213\141\033\274\372\037\221\053\327\104\007
\136\272\051\254\331\305\351\357\123\110\132\353\200\361\050\130
\041\315\260\006\125\373\047\077\123\220\160\251\004\036\127\047
\271
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER
 CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "SSL.com Root Certification Authority RSA"
# Issuer: CN=SSL.com Root Certification Authority RSA,O=SSL Corporation,L=Houston,ST=Texas,C=US
# Serial Number:7b:2c:9b:d3:16:80:32:99
# Subject: CN=SSL.com Root Certification Authority RSA,O=SSL Corporation,L=Houston,ST=Texas,C=US
# Not Valid Before: Fri Feb 12 17:39:39 2016
# Not Valid After : Tue Feb 12 17:39:39 2041
# Fingerprint (SHA-256):
85:66:6A:56:2E:E0:BE:5C:E9:25:C1:D8:89:0A:6F:76:A8:7E:C1:6D:4D:7D:5F:29:EA:74:19:CF:20:12:3B:69
# Fingerprint (SHA1): B7:AB:33:08:D1:EA:44:77:BA:14:80:12:5A:6F:BD:A9:36:49:0C:BB
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com Root Certification Authority RSA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\267\253\063\010\321\352\104\167\272\024\200\022\132\157\275\251
\066\111\014\273
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\206\151\022\300\160\361\354\254\254\302\325\274\245\133\241\051
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\174\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\061\060\057\006
\003\125\004\003\014\050\123\123\114\056\143\157\155\040\122\157
\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171\040\122\123\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\173\054\233\323\026\200\062\231
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR

```
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "SSL.com Root Certification Authority ECC"
#
# Issuer: CN=SSL.com Root Certification
 Authority ECC,O=SSL Corporation,L=Houston,ST=Texas,C=US
# Serial Number:75:e6:df:cb:c1:68:5b:a8
# Subject: CN=SSL.com Root Certification Authority ECC,O=SSL Corporation,L=Houston,ST=Texas,C=US
# Not Valid Before: Fri Feb 12 18:14:03 2016
# Not Valid After : Tue Feb 12 18:14:03 2041
# Fingerprint (SHA-256):
34:17:BB:06:CC:60:07:DA:1B:96:1C:92:0B:8A:B4:CE:3F:AD:82:0E:4A:A3:0B:9A:CB:C4:A7:4E:BD:CE:BC:65
# Fingerprint (SHA1): C3:19:7C:39:24:E6:54:AF:1B:C4:AB:20:95:7A:E2:C3:0E:13:02:6A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com Root Certification Authority ECC"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\174\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\061\060\057\006
\003\125\004\003\014\050\123\123\114\056\143\157\155\040\122\157
\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171\040\105\103\103
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\174\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\061\060\057\006
\003\125\004\003\014\050\123\123\114\056\143\157\155\040\122\157
\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171\040\105\103\103
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\165\346\337\313\301\150\133\250
END
CKA_VALUE MULTILINE_OCTAL
```

\060\202\002\215\060\202\002\024\240\003\002\001\002\002\010\165
\346\337\313\301\150\133\250\060\012\006\010\052\206\110\316\075
\004\003\002\060\174\061\013\060\011\006\003\125\004\006\023\002
\125\123\061\016\060\014\006\003\125\004\010\014\005\124\145\170
\141\163\061\020\060\016\006\003\125\004\007\014\007\110\157\165
\163\164\157\156\061\030\060\026\006\003\125\004\012\014\017\123
\123\114\040\103\157\162\160\157\162\141\164\151\157\156\061\061
\060\057\006\003\125\004\003\014\050\123\123\114\056\143\157\155
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\105\103
\103\060\036\027\015\061\066\060\062\061\062\061\070\061\064\060
\063\132\027\015\064\061\060\062\061\062\061\070\061\064\060\063
\132\060\174\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163
\061\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164
\157\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114
\040\103\157\162\160\157\162\141\164\151\157\156\061\061\060\057
\006\003\125\004\003\014\050\123\123\114\056\143\157\155\040\122
\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\040\105\103\103\060
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201
\004\000\042\003\142\000\004\105\156\251\120\304\246\043\066\236
\137\050\215\027\313\226\042\144\077\334\172\216\035\314\010\263
\242\161\044\272\216\111\271\004\033\107\226\130\253\055\225\310
\355\236\010\065\310\047\353\211\214\123\130\353\142\212\376\360
\133\017\153\061\122\143\101\073\211\315\354\354\266\215\031\323
\064\007\334\273\306\006\177\302\105\225\354\313\177\250\043\340
\011\351\201\372\363\107\323\243\143\060\141\060\035\006\003\125
\035\016\004\026\004\024\202\321\205\163\060\347\065\004\323\216
\002\222\373\345\244\321\304\041\350\315\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\037\006\003\125
\035\043\004\030\060\026\200\024\202\321\205\163\060\347\065\004
\323\216\002\222\373\345\244\321\304\041\350\315\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\206\060\012\006\010
\052\206\110\316\075\004\003\002\003\147\000\060\144\002\060\157
\347\353\131\021\244\140\317\141\260\226\173\355\005\371\057\023
\221\334\355\345\374\120\153\021\106\106\263\034\041\000\142\273
\276\303\347\350\315\007\231\371\015\013\135\162\076\304\252\002
\060\037\274\272\013\342\060\044\373\174\155\200\125\012\231\076
\200\015\063\345\146\243\263\243\273\245\325\213\217\011\054\246
\135\176\342\360\007\010\150\155\322\174\151\156\137\337\345\152
\145
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

```
# Trust for "SSL.com Root Certification Authority ECC"
# Issuer: CN=SSL.com Root Certification Authority ECC,O=SSL Corporation,L=Houston,ST=Texas,C=US
# Serial Number:75:e6:df:cb:c1:68:5b:a8
# Subject: CN=SSL.com Root Certification Authority ECC,O=SSL
 Corporation,L=Houston,ST=Texas,C=US
# Not Valid Before: Fri Feb 12 18:14:03 2016
# Not Valid After : Tue Feb 12 18:14:03 2041
# Fingerprint (SHA-256):
34:17:BB:06:CC:60:07:DA:1B:96:1C:92:0B:8A:B4:CE:3F:AD:82:0E:4A:A3:0B:9A:CB:C4:A7:4E:BD:CE:BC:65
# Fingerprint (SHA1): C3:19:7C:39:24:E6:54:AF:1B:C4:AB:20:95:7A:E2:C3:0E:13:02:6A
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com Root Certification Authority ECC"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\303\031\174\071\044\346\124\257\033\304\253\040\225\172\342\303
\016\023\002\152
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\056\332\344\071\177\234\217\067\321\160\237\046\027\121\072\216
END
CKA_ISSUER MULTILINE_OCTAL
\060\174\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\061\060\057\006
\003\125\004\003\014\050\123\123\114\056\143\157\155\040\122\157
\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171\040\105\103\103
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\010\165\346\337\313\301\150\133\250
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "SSL.com EV Root Certification Authority RSA R2"
#
# Issuer: CN=SSL.com EV Root Certification Authority RSA R2,O=SSL Corporation,L=Houston,ST=Texas,C=US
# Serial Number:56:b6:29:cd:34:bc:78:f6
# Subject: CN=SSL.com EV Root Certification Authority RSA R2,O=SSL
Corporation,L=Houston,ST=Texas,C=US
```

```
# Not Valid Before: Wed May 31 18:14:37 2017
# Not Valid After : Fri May 30 18:14:37 2042
# Fingerprint
 (SHA-256):
2E:7B:F1:6C:C2:24:85:A7:BB:E2:AA:86:96:75:07:61:B0:AE:39:BE:3B:2F:E9:D0:CC:6D:4E:F7:34:91:42:5C
# Fingerprint (SHA1): 74:3A:F0:52:9B:D0:32:A0:F4:4A:83:CD:D4:BA:A9:7B:7C:2E:C4:9A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com EV Root Certification Authority RSA R2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163
\061\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164
\157\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114
\040\103\157\162\160\157\162\141\164\151\157\156\061\067\060\065
\006\003\125\004\003\014\056\123\123\114\056\143\157\155\040\105
\126\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040\122
\123\101\040\122\062
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163
\061\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164
\157\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114
\040\103\157\162\160\157\162\141\164\151\157\156\061\067\060\065
\006\003\125\004\003\014\056\123\123\114\056\143\157\155\040\105
\126\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040\122
\123\101\040\122\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\126\266\051\315\064\274\170\366
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\353\060\202\003\323\240\003\002\001\002\002\010\126
\266\051\315\064\274\170\366\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\201\202\061\013\060\011\006\003\125
\004\006\023\002\125\123\061\016\060\014\006\003\125\004\010\014
\005\124\145\170\141\163\061\020\060\016\006\003\125\004\007\014
\007\110\157\165\163\164\157\156\061\030\060\026\006\003\125\004
\012\014\017\123\123\114\040\103\157\162\160\157\162\141\164\151
\157\156\061\067\060\065\006\003\125\004\003\014\056\123\123\114
```

\056\143\157\155\040\105\126\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171\040\122\123\101\040\122\062\060\036\027\015\061
\067\060\065\063\061\061\070\061\064\063\067\132\027\015\064\062
\060\065\063\060\061\070\061\064\063\067\132\060\201\202\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\016\060\014\006
\003\125\004\010\014\005\124\145\170\141\163\061\020\060\016\006
\003\125\004\007\014\007\110\157\165\163\164\157\156\061\030\060
\026\006\003\125\004\012\014\017\123\123\114\040\103\157\162\160
\157\162\141\164\151\157\156\061\067\060\065\006\003\125\004\003
\014\056\123\123\114\056\143\157\155\040\105\126\040\122\157\157
\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040
\101\165\164\150\157\162\151\164\171\040\122\123\101\040\122\062
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001
\000\217\066\145\100\341\326\115\300\327\264\351\106\332\153\352
\063\107\315\114\371\175\175\276\275\055\075\360\333\170\341\206
\245\331\272\011\127\150\355\127\076\240\320\010\101\203\347\050
\101\044\037\343\162\025\320\001\032\373\136\160\043\262\313\237
\071\343\317\305\116\306\222\155\046\306\173\273\263\332\047\235
\012\206\351\201\067\005\376\360\161\161\354\303\034\351\143\242
\027\024\235\357\033\147\323\205\125\002\002\326\111\311\314\132
\341\261\367\157\062\237\311\324\073\210\101\250\234\275\313\253
\333\155\173\011\037\242\114\162\220\332\053\010\374\317\074\124
\316\147\017\250\317\135\226\031\013\304\343\162\353\255\321\175
\035\047\357\222\353\020\277\133\353\073\257\317\200\335\301\322
\226\004\133\172\176\244\251\074\070\166\244\142\216\240\071\136
\352\167\317\135\000\131\217\146\054\076\007\242\243\005\046\021
\151\227\352\205\267\017\226\013\113\310\100\341\120\272\056\212
\313\367\017\232\042\347\177\232\067\023\315\362\115\023\153\041
\321\300\314\042\362\241\106\366\104\151\234\312\141\065\007\000
\157\326\141\010\021\352\272\270\366\351\263\140\345\115\271\354
\237\024\146\311\127\130\333\315\207\151\370\212\206\022\003\107
\277\146\023\166\254\167\175\064\044\205\203\315\327\252\234\220
\032\237\041\054\177\170\267\144\270\330\350\246\364\170\263\125
\313\204\322\062\304\170\256\243\217\141\335\316\010\123\255\354
\210\374\025\344\232\015\346\237\032\167\316\114\217\270\024\025
\075\142\234\206\070\006\000\146\022\344\131\166\132\123\300\002
\230\242\020\053\150\104\173\216\171\316\063\112\166\252\133\201
\026\033\265\212\330\320\000\173\136\142\264\011\326\206\143\016
\246\005\225\111\272\050\213\210\223\262\064\034\330\244\125\156
\267\034\320\336\231\125\073\043\364\042\340\371\051\146\046\354
\040\120\167\333\112\013\217\276\345\002\140\160\101\136\324\256
\120\071\042\024\046\313\262\073\163\164\125\107\007\171\201\071
\250\060\023\104\345\004\212\256\226\023\045\102\017\271\123\304
\233\374\315\344\034\336\074\372\253\326\006\112\037\147\246\230
\060\034\335\054\333\334\030\225\127\146\306\377\134\213\126\365
\167\002\003\001\000\001\243\143\060\141\060\017\006\003\125\035

\023\001\001\377\004\005\060\003\001\001\377\060\037\006\003\125
\035\043\004\030\060\026\200\024\371\140\273\324\343\325\064\366
\270\365\006\200\045\247\163\333\106\151\250\236\060\035\006\003
\125\035\016\004\026\004\024\371\140\273\324\343\325\064\366\270
\365\006\200\045\247\163\333\106\151\250\236\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\206\060\015\006\011\052
\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000\126
\263\216\313\012\235\111\216\277\244\304\221\273\146\027\005\121
\230\165\373\345\120\054\172\236\361\024\372\253\323\212\076\377
\221\051\217\143\213\330\264\251\124\001\015\276\223\206\057\371
\112\155\307\136\365\127\371\312\125\034\022\276\107\017\066\305
\337\152\267\333\165\302\107\045\177\271\361\143\370\150\055\125
\004\321\362\215\260\244\317\274\074\136\037\170\347\245\240\040
\160\260\004\305\267\367\162\247\336\042\015\275\063\045\106\214
\144\222\046\343\076\056\143\226\332\233\214\075\370\030\011\327
\003\314\175\206\202\340\312\004\007\121\120\327\377\222\325\014
\357\332\206\237\231\327\353\267\257\150\342\071\046\224\272\150
\267\277\203\323\352\172\147\075\142\147\256\045\345\162\350\342
\344\354\256\022\366\113\053\074\237\351\260\100\363\070\124\263
\375\267\150\310\332\306\217\121\074\262\373\221\334\034\347\233
\235\341\267\015\162\217\342\244\304\251\170\371\353\024\254\306
\103\005\302\145\071\050\030\002\303\202\262\235\005\276\145\355
\226\137\145\164\074\373\011\065\056\173\234\023\375\033\017\135
\307\155\201\072\126\017\314\073\341\257\002\057\042\254\106\312
\106\074\240\034\114\326\104\264\136\056\134\025\146\011\341\046
\051\376\306\122\141\272\261\163\377\303\014\234\345\154\152\224
\077\024\312\100\026\225\204\363\131\251\254\137\114\141\223\155
\321\073\314\242\225\014\042\246\147\147\104\056\271\331\322\212
\101\263\146\013\132\373\175\043\245\362\032\260\377\336\233\203
\224\056\321\077\337\222\267\221\257\005\073\145\307\240\154\261
\315\142\022\303\220\033\343\045\316\064\274\157\167\166\261\020
\303\367\005\032\300\326\257\164\142\110\027\167\222\151\220\141
\034\336\225\200\164\124\217\030\034\303\363\003\320\277\244\103
\165\206\123\030\172\012\056\011\034\066\237\221\375\202\212\042
\113\321\016\120\045\335\313\003\014\027\311\203\000\010\116\065
\115\212\213\355\360\002\224\146\054\104\177\313\225\047\226\027
\255\011\060\254\266\161\027\156\213\027\366\034\011\324\055\073
\230\245\161\323\124\023\331\140\363\365\113\146\117\372\361\356
\040\022\215\264\254\127\261\105\143\241\254\166\251\302\373
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER
CK_BBOOL CK_FALSE

# Trust for "SSL.com EV Root Certification Authority RSA R2"
# Issuer: CN=SSL.com EV Root Certification Authority RSA R2,O=SSL Corporation,L=Houston,ST=Texas,C=US

```
# Serial Number:56:b6:29:cd:34:bc:78:f6
# Subject: CN=SSL.com EV Root Certification Authority RSA R2,O=SSL
Corporation,L=Houston,ST=Texas,C=US
# Not Valid Before: Wed May 31 18:14:37 2017
# Not Valid After : Fri May 30 18:14:37 2042
# Fingerprint (SHA-256):
2E:7B:F1:6C:C2:24:85:A7:BB:E2:AA:86:96:75:07:61:B0:AE:39:BE:3B:2F:E9:D0:CC:6D:4E:F7:34:91:42:5C
# Fingerprint (SHA1): 74:3A:F0:52:9B:D0:32:A0:F4:4A:83:CD:D4:BA:A9:7B:7C:2E:C4:9A
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com EV Root Certification Authority RSA R2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\164\072\360\122\233\320\062\240\364\112\203\315\324\272\251\173
\174\056\304\232
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\341\036\061\130\032\256\124\123\002\366\027\152\021\173\115\225
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\201\202\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163
\061\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164
\157\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114
\040\103\157\162\160\157\162\141\164\151\157\156\061\067\060\065
\006\003\125\004\003\014\056\123\123\114\056\143\157\155\040\105
\126\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040\122
\123\101\040\122\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\126\266\051\315\064\274\170\366
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "SSL.com EV Root Certification Authority ECC"
#
# Issuer: CN=SSL.com
 EV Root Certification Authority ECC,O=SSL Corporation,L=Houston,ST=Texas,C=US
# Serial Number:2c:29:9c:5b:16:ed:05:95
# Subject: CN=SSL.com EV Root Certification Authority ECC,O=SSL Corporation,L=Houston,ST=Texas,C=US
# Not Valid Before: Fri Feb 12 18:15:23 2016
```

```
# Not Valid After : Tue Feb 12 18:15:23 2041
# Fingerprint (SHA-256):
22:A2:C1:F7:BD:ED:70:4C:C1:E7:01:B5:F4:08:C3:10:88:0F:E9:56:B5:DE:2A:4A:44:F9:9C:87:3A:25:A7:C8
# Fingerprint (SHA1): 4C:DD:51:A3:D1:F5:20:32:14:B0:C6:C5:32:23:03:91:C7:46:42:6D
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com EV Root Certification Authority ECC"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\064\060\062\006
\003\125\004\003\014\053\123\123\114\056\143\157\155\040\105\126
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\105\103
\103
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\064\060\062\006
\003\125\004\003\014\053\123\123\114\056\143\157\155\040\105\126
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\105\103
\103
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\054\051\234\133\026\355\005\225
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\224\060\202\002\032\240\003\002\001\002\002\010\054
\051\234\133\026\355\005\225\060\012\006\010\052\206\110\316\075
\004\003\002\060\177\061\013\060\011\006\003\125\004\006\023\002
\125\123\061\016\060\014\006\003\125\004\010\014\005\124\145\170
\141\163\061\020\060\016\006\003\125\004\007\014\007\110\157\165
\163\164\157\156\061\030\060\026\006\003\125\004\012\014\017\123
\123\114\040\103\157\162\160\157\162\141\164\151\157\156\061\064
\060\062\006\003\125\004\003\014\053\123\123\114\056\143\157\155
\040\105\126\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
```

\040\105\103\103\060\036\027\015\061\066\060\062\061\062\061\070
\061\065\062\063\132\027\015\064\061\060\062\061\062\061\070\061
\065\062\063\132\060\177\061\013\060\011\006\003\125\004\006\023
\002\125\123\061\016\060\014\006\003\125\004\010\014\005\124\145
\170\141\163\061\020\060\016\006\003\125\004\007\014\007\110\157
\165\163\164\157\156\061\030\060\026\006\003\125\004\012\014\017
\123\123\114\040\103\157\162\160\157\162\141\164\151\157\156\061
\064\060\062\006\003\125\004\003\014\053\123\123\114\056\143\157
\155\040\105\126\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\040\105\103\103\060\166\060\020\006\007\052\206\110\316\075
\002\001\006\005\053\201\004\000\042\003\142\000\004\252\022\107
\220\230\033\373\357\303\100\007\203\040\116\361\060\202\242\006
\321\362\222\206\141\362\366\041\150\312\000\304\307\352\103\000
\124\206\334\375\037\337\000\270\101\142\134\334\160\026\062\336
\037\231\324\314\305\007\310\010\037\141\026\007\121\075\175\134
\007\123\343\065\070\214\337\315\237\331\056\015\112\266\031\056
\132\160\132\006\355\276\360\241\260\312\320\011\051\243\143\060
\141\060\035\006\003\125\035\016\004\026\004\024\133\312\136\345
\336\322\201\252\315\250\055\144\121\266\331\162\233\227\346\117
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\037\006\003\125\035\043\004\030\060\026\200\024\133\312
\136\345\336\322\201\252\315\250\055\144\121\266\331\162\233\227
\346\117\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\206\060\012\006\010\052\206\110\316\075\004\003\002\003\150
\000\060\145\002\061\000\212\346\100\211\067\353\351\325\023\331
\312\324\153\044\363\260\075\207\106\130\032\354\261\337\157\373
\126\272\160\153\307\070\314\350\261\214\117\017\367\361\147\166
\016\203\320\036\121\217\002\060\075\366\043\050\046\114\306\140
\207\223\046\233\262\065\036\272\326\367\074\321\034\316\372\045
\074\246\032\201\025\133\363\022\017\154\356\145\212\311\207\250
\371\007\340\142\232\214\134\112
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "SSL.com EV Root Certification Authority ECC"
# Issuer: CN=SSL.com EV Root Certification Authority ECC,O=SSL Corporation,L=Houston,ST=Texas,C=US
# Serial Number:2c:29:9c:5b:16:ed:05:95
#
 Subject: CN=SSL.com EV Root Certification Authority ECC,O=SSL Corporation,L=Houston,ST=Texas,C=US
# Not Valid Before: Fri Feb 12 18:15:23 2016
# Not Valid After : Tue Feb 12 18:15:23 2041
# Fingerprint (SHA-256):
22:A2:C1:F7:BD:ED:70:4C:C1:E7:01:B5:F4:08:C3:10:88:0F:E9:56:B5:DE:2A:4A:44:F9:9C:87:3A:25:A7:C8
# Fingerprint (SHA1): 4C:DD:51:A3:D1:F5:20:32:14:B0:C6:C5:32:23:03:91:C7:46:42:6D

```
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com EV Root Certification Authority ECC"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\114\335\121\243\321\365\040\062\024\260\306\305\062\043\003\221
\307\106\102\155
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\131\123\042\145\203\102\001\124\300\316\102\271\132\174\362\220
END
CKA_ISSUER MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\064\060\062\006
\003\125\004\003\014\053\123\123\114\056\143\157\155\040\105\126
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\105\103
\103
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\010\054\051\234\133\026\355\005\225
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GlobalSign Root CA - R6"
#
# Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R6
# Serial Number:45:e6:bb:03:83:33:c3:85:65:48:e6:ff:45:51
# Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R6
# Not Valid Before: Wed Dec 10 00:00:00 2014
# Not Valid After : Sun Dec 10
 00:00:00 2034
# Fingerprint (SHA-256):
2C:AB:EA:FE:37:D0:6C:A2:2A:BA:73:91:C0:03:3D:25:98:29:52:C4:53:64:73:49:76:3A:3A:B5:AD:6C:CF:69
# Fingerprint (SHA1): 80:94:64:0E:B5:A7:A1:CA:11:9C:1F:DD:D5:9F:81:02:63:A7:FB:D1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
```

CKA_LABEL UTF8 "GlobalSign Root CA - R6"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\114\061\040\060\036\006\003\125\004\013\023\027\107\154\157
\142\141\154\123\151\147\156\040\122\157\157\164\040\103\101\040
\055\040\122\066\061\023\060\021\006\003\125\004\012\023\012\107
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125
\004\003\023\012\107\154\157\142\141\154\123\151\147\156
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\040\060\036\006\003\125\004\013\023\027\107\154\157
\142\141\154\123\151\147\156\040\122\157\157\164\040\103\101\040
\055\040\122\066\061\023\060\021\006\003\125\004\012\023\012\107
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125
\004\003\023\012\107\154\157\142\141\154\123\151\147\156
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\016\105\346\273\003\203\063\303\205\145\110\346\377\105\121
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\203\060\202\003\153\240\003\002\001\002\002\016\105
\346\273\003\203\063\303\205\145\110\346\377\105\121\060\015\006
\011\052\206\110\206\367\015\001\001\014\005\000\060\114\061\040
\060\036\006\003\125\004\013\023\027\107\154\157\142\141\154\123
\151\147\156\040\122\157\157\164\040\103\101\040\055\040\122\066
\061\023\060\021\006\003\125\004\012\023\012\107\154\157\142\141
\154\123\151\147\156\061\023\060\021\006\003\125\004\003\023\012
\107\154\157\142\141\154\123\151\147\156\060\036\027\015\061\064
\061\062\061\060\060\060\060\060\060\060\132\027\015\063\064\061
\062\061\060\060\060\060\060\060\060\132\060\114\061\040\060\036
\006\003\125\004\013\023\027\107\154\157\142\141\154\123\151\147
\156\040\122\157\157\164\040\103\101\040\055\040\122\066\061\023
\060\021\006\003\125\004\012\023\012\107\154\157\142\141\154\123
\151\147\156\061\023\060\021\006\003\125\004\003\023\012\107\154
\157\142\141\154\123\151\147\156\060\202\002\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000
\060\202\002\012\002\202\002\001\000\225\007\350\163\312\146\371
\354\024\312\173\074\367\015\010\361\264\105\013\054\202\264\110
\306\353\133\074\256\203\270\101\222\063\024\244\157\177\351\052
\314\306\260\210\153\305\266\211\321\306\262\377\024\316\121\024
\041\354\112\335\033\132\306\326\207\356\115\072\025\006\355\144
\146\013\222\200\312\104\336\163\224\116\363\247\211\177\117\170
\143\010\310\022\120\155\102\146\057\115\271\171\050\115\122\032
\212\032\200\267\031\201\016\176\304\212\274\144\114\041\034\103
\150\327\075\074\212\305\262\146\325\220\232\267\061\006\305\276
\342\155\062\006\246\036\371\271\353\252\243\270\277\276\202\143

\120\320\360\030\211\337\344\017\171\365\352\242\037\052\322\160
\056\173\347\274\223\273\155\123\342\110\174\214\020\007\070\377
\146\262\167\141\176\340\352\214\074\252\264\244\366\363\225\112
\022\007\155\375\214\262\211\317\320\240\141\167\310\130\164\260
\324\043\072\367\135\072\312\242\333\235\011\336\135\104\055\220
\361\201\315\127\222\372\176\274\120\004\143\064\337\153\223\030
\276\153\066\262\071\344\254\044\066\267\360\357\266\034\023\127
\223\266\336\262\370\342\205\267\163\242\270\065\252\105\362\340
\235\066\241\157\124\212\361\162\126\156\056\210\305\121\102\104
\025\224\356\243\305\070\226\233\116\116\132\013\107\363\006\066
\111\167\060\274\161\067\345\246\354\041\010\165\374\346\141\026
\077\167\325\331\221\227\204\012\154\324\002\115\164\300\024\355
\375\071\373\203\362\136\024\241\004\260\013\351\376\356\217\341
\156\013\262\010\263\141\146\011\152\261\006\072\145\226\131\300
\360\065\375\311\332\050\215\032\021\207\160\201\012\250\232\165
\035\236\072\206\005\000\236\333\200\326\045\371\334\005\236\047
\131\114\166\071\133\352\371\245\241\330\203\017\321\377\337\060
\021\371\205\317\063\110\365\312\155\144\024\054\172\130\117\323
\113\010\111\305\225\144\032\143\016\171\075\365\263\214\312\130
\255\234\102\105\171\156\016\207\031\134\124\261\145\266\277\214
\233\334\023\351\015\157\270\056\334\147\156\311\213\021\265\204
\024\212\000\031\160\203\171\221\227\221\324\032\047\277\067\036
\062\007\330\024\143\074\050\114\257\002\003\001\000\001\243\143
\060\141\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\006\060\017\006\003\125\035\023\001\001\377\004\005\060\003
\001\001\377\060\035\006\003\125\035\016\004\026\004\024\256\154
\005\243\223\023\342\242\347\342\327\034\326\307\360\177\310\147
\123\240\060\037\006\003\125\035\043\004\030\060\026\200\024\256
\154\005\243\223\023\342\242\347\342\327\034\326\307\360\177\310
\147\123\240\060\015\006\011\052\206\110\206\367\015\001\001\014
\005\000\003\202\002\001\000\203\045\355\350\321\375\225\122\315
\236\300\004\240\221\151\346\134\320\204\336\334\255\242\117\350
\107\170\326\145\230\251\133\250\074\207\174\002\212\321\156\267
\026\163\346\137\300\124\230\325\164\276\301\315\342\021\221\255
\043\030\075\335\341\162\104\226\264\225\136\300\173\216\231\170
\026\103\023\126\127\263\242\263\073\265\167\334\100\162\254\243
\353\233\065\076\261\010\041\241\347\304\103\067\171\062\276\265
\347\234\054\114\274\103\051\231\216\060\323\254\041\340\343\035
\372\330\007\063\166\124\000\042\052\271\115\040\056\160\150\332
\345\123\374\203\134\323\235\362\377\104\014\104\146\362\322\343
\275\106\000\032\155\002\272\045\135\215\241\061\121\335\124\106
\034\115\333\231\226\357\032\034\004\134\246\025\357\170\340\171
\376\135\333\076\252\114\125\375\232\025\251\157\341\246\373\337
\160\060\351\303\356\102\106\355\302\223\005\211\372\175\143\173
\077\320\161\201\174\000\350\230\256\016\170\064\303\045\373\257
\012\237\040\153\335\073\023\217\022\214\342\101\032\110\172\163
\240\167\151\307\266\134\177\202\310\036\376\130\033\050\053\250
\154\255\136\155\300\005\322\173\267\353\200\376\045\067\376\002

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\233\150\254\102\135\303\356\365\314\334\360\120\165\322\066\151
\234\346\173\004\337\156\006\151\266\336\012\011\110\131\207\353
\173\024\140\172\144\252\151\103\357\221\307\114\354\030\335\154
\357\123\055\214\231\341\136\362\162\076\317\124\310\275\147\354
\244\017\114\105\377\323\271\060\043\007\114\217\020\277\206\226
\331\231\132\264\231\127\034\244\314\273\025\211\123\272\054\005
\017\344\304\236\031\261\030\064\325\114\235\272\355\367\037\257
\044\225\004\170\250\003\273\356\201\345\332\137\174\213\112\241
\220\164\045\247\263\076\113\310\054\126\275\307\310\357\070\342
\134\222\360\171\367\234\204\272\164\055\141\001\040\176\176\321
\362\117\007\131\137\213\055\103\122\353\106\014\224\341\365\146
\107\171\167\325\124\133\037\255\044\067\313\105\132\116\240\104
\110\310\330\260\231\305\025\204\011\366\326\111\111\300\145\270
\346\032\161\156\240\250\361\202\350\105\076\154\326\002\327\012
\147\203\005\132\311\244\020
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "GlobalSign Root CA - R6"
# Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R6
# Serial Number:45:e6:bb:03:83:33:c3:85:65:48:e6:ff:45:51
# Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R6
# Not Valid Before: Wed Dec 10 00:00:00 2014
# Not Valid After : Sun Dec 10 00:00:00 2034
# Fingerprint (SHA-256):
2C:AB:EA:FE:37:D0:6C:A2:2A:BA:73:91:C0:03:3D:25:98:29:52:C4:53:64:73:49:76:3A:3A:B5:AD:6C:CF:69
# Fingerprint (SHA1): 80:94:64:0E:B5:A7:A1:CA:11:9C:1F:DD:D5:9F:81:02:63:A7:FB:D1
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Root CA - R6"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\200\224\144\016\265\247\241\312\021\234\037\335\325\237\201\002
\143\247\373\321
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\117\335\007\344\324\042\144\071\036\014\067\102\352\321\306\256
END
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\040\060\036\006\003\125\004\013\023\027\107\154\157
\142\141\154\123\151\147\156\040\122\157\157\164\040\103\101\040
\055\040\122\066\061\023\060\021\006\003\125\004\012\023\012\107
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125
```

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\004\003\023\012\107\154\157\142\141\154\123\151\147\156
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\016\105\346\273\003\203\063\303\205\145\110\346\377\105\121
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "OISTE WISeKey Global Root GC CA"
#
# Issuer: CN=OISTE WISeKey Global Root GC CA,OU=OISTE Foundation Endorsed,O=WISeKey,C=CH
# Serial Number:21:2a:56:0c:ae:da:0c:ab:40:45:bf:2b:a2:2d:3a:ea
# Subject: CN=OISTE WISeKey Global
 Root GC CA,OU=OISTE Foundation Endorsed,O=WISeKey,C=CH
# Not Valid Before: Tue May 09 09:48:34 2017
# Not Valid After : Fri May 09 09:58:33 2042
# Fingerprint (SHA-256):
85:60:F9:1C:36:24:DA:BA:95:70:B5:FE:A0:DB:E3:6F:F1:1A:83:23:BE:94:86:85:4F:B3:F3:4A:55:71:19:8D
# Fingerprint (SHA1): E0:11:84:5E:34:DE:BE:88:81:B9:9C:F6:16:26:D1:96:1F:C3:B9:31
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "OISTE WISeKey Global Root GC CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113\145
\171\061\042\060\040\006\003\125\004\013\023\031\117\111\123\124
\105\040\106\157\165\156\144\141\164\151\157\156\040\105\156\144
\157\162\163\145\144\061\050\060\046\006\003\125\004\003\023\037
\117\111\123\124\105\040\127\111\123\145\113\145\171\040\107\154
\157\142\141\154\040\122\157\157\164\040\107\103\040\103\101
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113\145
\171\061\042\060\040\006\003\125\004\013\023\031\117\111\123\124
\105\040\106\157\165\156\144\141\164\151\157\156\040\105\156\144
\157\162\163\145\144\061\050\060\046\006\003\125\004\003\023\037
\117\111\123\124\105\040\127\111\123\145\113\145\171\040\107\154
\157\142\141\154\040\122\157\157\164\040\107\103\040\103\101
END
```

CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\041\052\126\014\256\332\014\253\100\105\277\053\242\055
\072\352
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\151\060\202\001\357\240\003\002\001\002\002\020\041
\052\126\014\256\332\014\253\100\105\277\053\242\055\072\352\060
\012\006\010\052\206\110\316\075\004\003\003\060\155\061\013\060
\011\006\003\125\004\006\023\002\103\110\061\020\060\016\006\003
\125\004\012\023\007\127\111\123\145\113\145\171\061\042\060\040
\006\003\125\004\013\023\031\117\111\123\124\105\040\106\157\165
\156\144\141\164\151\157\156\040\105\156\144\157\162\163\145\144
\061\050\060\046\006\003\125\004\003\023\037\117\111\123\124\105
\040\127\111\123\145\113\145\171\040\107\154\157\142\141\154\040
\122\157\157\164\040\107\103\040\103\101\060\036\027\015\061\067
\060\065\060\071\060\071\064\070\063\064\132\027\015\064\062\060
\065\060\071\060\071\065\070\063\063\132\060\155\061\013\060\011
\006\003\125\004\006\023\002\103\110\061\020\060\016\006\003\125
\004\012\023\007\127\111\123\145\113\145\171\061\042\060\040\006
\003\125\004\013\023\031\117\111\123\124\105\040\106\157\165\156
\144\141\164\151\157\156\040\105\156\144\157\162\163\145\144\061
\050\060\046\006\003\125\004\003\023\037\117\111\123\124\105\040
\127\111\123\145\113\145\171\040\107\154\157\142\141\154\040\122
\157\157\164\040\107\103\040\103\101\060\166\060\020\006\007\052
\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142\000
\004\114\351\120\300\306\017\162\030\274\330\361\272\263\211\342
\171\112\243\026\247\153\124\044\333\121\377\352\364\011\044\303
\013\042\237\313\152\047\202\201\015\322\300\257\061\344\164\202
\156\312\045\331\214\165\235\361\333\320\232\242\113\041\176\026
\247\143\220\322\071\324\261\207\170\137\030\226\017\120\033\065
\067\017\152\306\334\331\023\115\244\216\220\067\346\275\133\061
\221\243\124\060\122\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004
\024\110\207\024\254\343\303\236\220\140\072\327\312\211\356\323
\255\214\264\120\146\060\020\006\011\053\006\001\004\001\202\067
\025\001\004\003\002\001\000\060\012\006\010\052\206\110\316\075
\004\003\003\003\150\000\060\145\002\060\046\307\151\133\334\325
\347\262\347\310\014\214\214\303\335\171\214\033\143\325\311\122
\224\116\115\202\112\163\036\262\200\204\251\045\300\114\132\155
\111\051\140\170\023\342\176\110\353\144\002\061\000\333\064\040
\062\010\377\232\111\002\266\210\336\024\257\135\154\231\161\215
\032\077\213\327\340\242\066\206\034\007\202\072\166\123\375\302
\242\355\357\173\260\200\117\130\017\113\123\071\275
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

```
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "OISTE WISeKey Global Root GC CA"
# Issuer: CN=OISTE WISeKey Global Root GC CA,OU=OISTE Foundation Endorsed,O=WISeKey,C=CH
# Serial Number:21:2a:56:0c:ae:da:0c:ab:40:45:bf:2b:a2:2d:3a:ea
# Subject: CN=OISTE WISeKey Global Root GC CA,OU=OISTE Foundation Endorsed,O=WISeKey,C=CH
# Not Valid Before: Tue May 09 09:48:34 2017
# Not Valid After : Fri May 09 09:58:33 2042
# Fingerprint (SHA-256):
85:60:F9:1C:36:24:DA:BA:95:70:B5:FE:A0:DB:E3:6F:F1:1A:83:23:BE:94:86:85:4F:B3:F3:4A:55:71:19:8D
# Fingerprint (SHA1): E0:11:84:5E:34:DE:BE:88:81:B9:9C:F6:16:26:D1:96:1F:C3:B9:31
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN
 CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "OISTE WISeKey Global Root GC CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\340\021\204\136\064\336\276\210\201\271\234\366\026\046\321\226
\037\303\271\061
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\251\326\271\055\057\223\144\370\245\151\312\221\351\150\007\043
END
CKA_ISSUER MULTILINE_OCTAL
\060\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\020\060\016\006\003\125\004\012\023\007\127\111\123\145\113\145
\171\061\042\060\040\006\003\125\004\013\023\031\117\111\123\124
\105\040\106\157\165\156\144\141\164\151\157\156\040\105\156\144
\157\162\163\145\144\061\050\060\046\006\003\125\004\003\023\037
\117\111\123\124\105\040\127\111\123\145\113\145\171\040\107\154
\157\142\141\154\040\122\157\157\164\040\107\103\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\041\052\126\014\256\332\014\253\100\105\277\053\242\055
\072\352
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "UCA Global G2 Root"
#
# Issuer: CN=UCA Global G2 Root,O=UniTrust,C=CN
# Serial Number:5d:df:b1:da:5a:a3:ed:5d:be:5a:65:20:65:03:90:ef
```

```
# Subject: CN=UCA Global G2 Root,O=UniTrust,C=CN
# Not Valid Before: Fri Mar 11 00:00:00 2016
# Not Valid After : Mon Dec 31 00:00:00 2040
# Fingerprint (SHA-256):
9B:EA:11:C9:76:FE:01:47:64:C1:BE:56:A6:F9:14:B5:A5:60:31:7A:BD:99:88:39:33:82:E5:16:1A:A0:49:3C
# Fingerprint (SHA1): 28:F9:78:16:19:7A:FF:18:25:18:AA:44:FE:C1:A0:CE:5C:B6:4C:8A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "UCA Global G2 Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\014\010\125\156\151\124\162\165
\163\164\061\033\060\031\006\003\125\004\003\014\022\125\103\101
\040\107\154\157\142\141\154\040\107\062\040\122\157\157\164
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\014\010\125\156\151\124\162\165
\163\164\061\033\060\031\006\003\125\004\003\014\022\125\103\101
\040\107\154\157\142\141\154\040\107\062\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\135\337\261\332\132\243\355\135\276\132\145\040\145\003
\220\357
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\106\060\202\003\056\240\003\002\001\002\002\020\135
\337\261\332\132\243\355\135\276\132\145\040\145\003\220\357\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\075
\061\013\060\011\006\003\125\004\006\023\002\103\116\061\021\060
\017\006\003\125\004\012\014\010\125\156\151\124\162\165\163\164
\061\033\060\031\006\003\125\004\003\014\022\125\103\101\040\107
\154\157\142\141\154\040\107\062\040\122\157\157\164\060\036\027
\015\061\066\060\063\061\061\060\060\060\060\060\060\132\027\015
\064\060\061\062\063\061\060\060\060\060\060\060\132\060\075\061
\013\060\011\006\003\125\004\006\023\002\103\116\061\021\060\017
\006\003\125\004\012\014\010\125\156\151\124\162\165\163\164\061
\033\060\031\006\003\125\004\003\014\022\125\103\101\040\107\154
\157\142\141\154\040\107\062\040\122\157\157\164\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\305\346\053
\157\174\357\046\005\047\243\201\044\332\157\313\001\371\231\232
\251\062\302\042\207\141\101\221\073\313\303\150\033\006\305\114
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\251\053\301\147\027\042\035\053\355\371\051\211\223\242\170\275
\222\153\240\243\015\242\176\312\223\263\246\321\214\065\325\165
\371\027\366\317\105\305\345\172\354\167\223\240\217\043\256\016
\032\003\177\276\324\320\355\056\173\253\106\043\133\377\054\346
\124\172\224\300\052\025\360\311\215\260\172\073\044\341\327\150
\342\061\074\006\063\106\266\124\021\246\245\057\042\124\052\130
\015\001\002\361\372\025\121\147\154\300\372\327\266\033\177\321
\126\210\057\032\072\215\073\273\202\021\340\107\000\320\122\207
\253\373\206\176\017\044\153\100\235\064\147\274\215\307\055\206
\157\171\076\216\251\074\027\113\177\260\231\343\260\161\140\334
\013\365\144\303\316\103\274\155\161\271\322\336\047\133\212\350
\330\306\256\341\131\175\317\050\055\065\270\225\126\032\361\262
\130\113\267\022\067\310\174\263\355\113\200\341\215\372\062\043
\266\157\267\110\225\010\261\104\116\205\214\072\002\124\040\057
\337\277\127\117\073\072\220\041\327\301\046\065\124\040\354\307
\077\107\354\357\132\277\113\172\301\255\073\027\120\134\142\330
\017\113\112\334\053\372\156\274\163\222\315\354\307\120\350\101
\226\327\251\176\155\330\351\035\217\212\265\271\130\222\272\112
\222\053\014\126\375\200\353\010\360\136\051\156\033\034\014\257
\217\223\211\255\333\275\243\236\041\312\211\031\354\337\265\303
\032\353\026\376\170\066\114\326\156\320\076\027\034\220\027\153
\046\272\373\172\057\277\021\034\030\016\055\163\003\217\240\345
\065\240\132\342\114\165\035\161\341\071\070\123\170\100\314\203
\223\327\012\236\235\133\217\212\344\345\340\110\344\110\262\107
\315\116\052\165\052\173\362\042\366\311\276\011\221\226\127\172
\210\210\254\356\160\254\371\334\051\343\014\034\073\022\116\104
\326\247\116\260\046\310\363\331\032\227\221\150\352\357\215\106
\006\322\126\105\130\232\074\014\017\203\270\005\045\303\071\317
\073\244\064\211\267\171\022\057\107\305\347\251\227\151\374\246
\167\147\265\337\173\361\172\145\025\344\141\126\145\002\003\001
\000\001\243\102\060\100\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026
\004\024\201\304\214\314\365\344\060\377\245\014\010\137\214\025
\147\041\164\001\337\337\060\015\006\011\052\206\110\206\367\015
\001\001\013\005\000\003\202\002\001\000\023\145\042\365\216\053
\255\104\344\313\377\271\150\346\303\200\110\075\004\173\372\043
\057\172\355\066\332\262\316\155\366\346\236\345\137\130\217\313
\067\062\241\310\145\266\256\070\075\065\033\076\274\073\266\004
\320\274\371\111\365\233\367\205\305\066\266\313\274\370\310\071
\325\344\137\007\275\025\124\227\164\312\312\355\117\272\272\144
\166\237\201\270\204\105\111\114\215\157\242\353\261\314\321\303
\224\332\104\302\346\342\352\030\350\242\037\047\005\272\327\345
\326\251\315\335\357\166\230\215\000\016\315\033\372\003\267\216
\200\130\016\047\077\122\373\224\242\312\136\145\311\326\204\332
\271\065\161\363\046\300\117\167\346\201\047\322\167\073\232\024
\157\171\364\366\320\341\323\224\272\320\127\121\275\047\005\015
\301\375\310\022\060\356\157\215\021\053\010\235\324\324\277\200

\105\024\232\210\104\332\060\352\264\247\343\356\357\133\202\325
\076\326\255\170\222\333\134\074\363\330\255\372\270\153\177\304
\066\050\266\002\025\212\124\054\234\260\027\163\216\320\067\243
\024\074\230\225\000\014\051\005\133\236\111\111\261\137\307\343
\313\317\047\145\216\065\027\267\127\310\060\331\101\133\271\024
\266\350\302\017\224\061\247\224\230\314\152\353\265\341\047\365
\020\250\001\350\216\022\142\350\210\314\265\177\106\227\300\233
\020\146\070\032\066\106\137\042\150\075\337\311\306\023\047\253
\123\006\254\242\074\206\006\145\157\261\176\261\051\104\232\243
\272\111\151\050\151\217\327\345\137\255\004\206\144\157\032\240
\014\305\010\142\316\200\243\320\363\354\150\336\276\063\307\027
\133\177\200\304\114\114\261\246\204\212\303\073\270\011\315\024
\201\272\030\343\124\127\066\376\333\057\174\107\241\072\063\310
\371\130\073\104\117\261\312\002\211\004\226\050\150\305\113\270
\046\211\273\326\063\057\120\325\376\232\211\272\030\062\222\124
\306\133\340\235\371\136\345\015\042\233\366\332\342\310\041\262
\142\041\252\206\100\262\056\144\323\137\310\343\176\021\147\105
\037\005\376\343\242\357\263\250\263\363\175\217\370\014\037\042
\037\055\160\264\270\001\064\166\060\000\345\043\170\247\126\327
\120\037\212\373\006\365\302\031\360\320
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "UCA Global G2 Root"
# Issuer: CN=UCA Global G2 Root,O=UniTrust,C=CN
# Serial Number:5d:df:b1:da:5a:a3:ed:5d:be:5a:65:20:65:03:90:ef
# Subject: CN=UCA Global G2 Root,O=UniTrust,C=CN
# Not Valid Before: Fri Mar 11 00:00:00 2016
# Not Valid After : Mon Dec 31 00:00:00 2040
# Fingerprint (SHA-256):
9B:EA:11:C9:76:FE:01:47:64:C1:BE:56:A6:F9:14:B5:A5:60:31:7A:BD:99:88:39:33:82:E5:16:1A:A0:49:3C
# Fingerprint (SHA1): 28:F9:78:16:19:7A:FF:18:25:18:AA:44:FE:C1:A0:CE:5C:B6:4C:8A
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "UCA Global G2 Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\050\371\170\026\031\172\377\030\045\030\252\104\376\301\240\316
\134\266\114\212
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\200\376\360\304\112\360\134\142\062\237\034\272\170\251\120\370
END

```
CKA_ISSUER MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\014\010\125\156\151\124\162\165
\163\164\061\033\060\031\006\003\125\004\003\014\022\125\103\101
\040\107\154\157\142\141\154\040\107\062\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\135\337\261\332\132\243\355\135\276\132\145\040\145\003
\220\357
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "UCA Extended Validation Root"
#
# Issuer: CN=UCA Extended Validation Root,O=UniTrust,C=CN
# Serial Number:4f:d2:2b:8f:f5:64:c8:33:9e:4f:34:58:66:23:70:60
# Subject: CN=UCA Extended Validation Root,O=UniTrust,C=CN
# Not Valid Before:
 Fri Mar 13 00:00:00 2015
# Not Valid After : Fri Dec 31 00:00:00 2038
# Fingerprint (SHA-256):
D4:3A:F9:B3:54:73:75:5C:96:84:FC:06:D7:D8:CB:70:EE:5C:28:E7:73:FB:29:4E:B4:1E:E7:17:22:92:4D:24
# Fingerprint (SHA1): A3:A1:B0:6F:24:61:23:4A:E3:36:A5:C2:37:FC:A6:FF:DD:F0:D7:3A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "UCA Extended Validation Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\014\010\125\156\151\124\162\165
\163\164\061\045\060\043\006\003\125\004\003\014\034\125\103\101
\040\105\170\164\145\156\144\145\144\040\126\141\154\151\144\141
\164\151\157\156\040\122\157\157\164
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\014\010\125\156\151\124\162\165
\163\164\061\045\060\043\006\003\125\004\003\014\034\125\103\101
\040\105\170\164\145\156\144\145\144\040\126\141\154\151\144\141
\164\151\157\156\040\122\157\157\164
END
```

CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\117\322\053\217\365\144\310\063\236\117\064\130\146\043
\160\140
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\132\060\202\003\102\240\003\002\001\002\002\020\117
\322\053\217\365\144\310\063\236\117\064\130\146\043\160\140\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\107
\061\013\060\011\006\003\125\004\006\023\002\103\116\061\021\060
\017\006\003\125\004\012\014\010\125\156\151\124\162\165\163\164
\061\045\060\043\006\003\125\004\003\014\034\125\103\101\040\105
\170\164\145\156\144\145\144\040\126\141\154\151\144\141\164\151
\157\156\040\122\157\157\164\060\036\027\015\061\065\060\063\061
\063\060\060\060\060\060\060\132\027\015\063\070\061\062\063\061
\060\060\060\060\060\060\132\060\107\061\013\060\011\006\003\125
\004\006\023\002\103\116\061\021\060\017\006\003\125\004\012\014
\010\125\156\151\124\162\165\163\164\061\045\060\043\006\003\125
\004\003\014\034\125\103\101\040\105\170\164\145\156\144\145\144
\040\126\141\154\151\144\141\164\151\157\156\040\122\157\157\164
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001
\000\251\011\007\050\023\002\260\231\340\144\252\036\103\026\172
\163\261\221\240\165\076\250\372\343\070\000\172\354\211\152\040
\017\213\305\260\233\063\003\132\206\306\130\206\325\301\205\273
\117\306\234\100\115\312\276\356\151\226\270\255\201\060\232\174
\222\005\353\005\053\232\110\320\270\166\076\226\310\040\273\322
\260\361\217\330\254\105\106\377\252\147\140\264\167\176\152\037
\074\032\122\172\004\075\007\074\205\015\204\320\037\166\012\367
\152\024\337\162\343\064\174\127\116\126\001\076\171\361\252\051
\073\154\372\370\217\155\115\310\065\337\256\353\334\044\356\171
\105\247\205\266\005\210\336\210\135\045\174\227\144\147\011\331
\277\132\025\005\206\363\011\036\354\130\062\063\021\363\167\144
\260\166\037\344\020\065\027\033\362\016\261\154\244\052\243\163
\374\011\037\036\062\031\123\021\347\331\263\054\056\166\056\241
\243\336\176\152\210\011\350\362\007\212\370\262\315\020\347\342
\163\100\223\273\010\321\077\341\374\013\224\263\045\357\174\246
\327\321\257\237\377\226\232\365\221\173\230\013\167\324\176\350
\007\322\142\265\225\071\343\363\361\155\017\016\145\204\212\143
\124\305\200\266\340\236\113\175\107\046\247\001\010\135\321\210
\236\327\303\062\104\372\202\112\012\150\124\177\070\123\003\314
\244\000\063\144\121\131\013\243\202\221\172\136\354\026\302\363
\052\346\142\332\052\333\131\142\020\045\112\052\201\013\107\007
\103\006\160\207\322\372\223\021\051\172\110\115\353\224\307\160
\115\257\147\325\121\261\200\040\001\001\264\172\010\246\220\177
\116\340\357\007\101\207\257\152\245\136\213\373\317\120\262\232
\124\257\303\211\272\130\055\365\060\230\261\066\162\071\176\111
\004\375\051\247\114\171\344\005\127\333\224\271\026\123\215\106

\263\035\225\141\127\126\177\257\360\026\133\141\130\157\066\120
\021\013\330\254\053\225\026\032\016\037\010\315\066\064\145\020
\142\146\325\200\137\024\040\137\055\014\240\170\012\150\326\054
\327\351\157\053\322\112\005\223\374\236\157\153\147\377\210\361
\116\245\151\112\122\067\005\352\306\026\215\322\304\231\321\202
\053\073\272\065\165\367\121\121\130\363\310\007\335\344\264\003
\177\002\003\001\000\001\243\102\060\100\060\035\006\003\125\035
\016\004\026\004\024\331\164\072\344\060\075\015\367\022\334\176
\132\005\237\036\064\232\367\341\024\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\016\006\003\125\035
\017\001\001\377\004\004\003\002\001\206\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\003\202\002\001\000\066\215
\227\314\102\025\144\051\067\233\046\054\326\373\256\025\151\054
\153\032\032\367\137\266\371\007\114\131\352\363\311\310\271\256
\314\272\056\172\334\300\365\260\055\300\073\257\237\160\005\021
\152\237\045\117\001\051\160\343\345\014\341\352\132\174\334\111
\273\301\036\052\201\365\026\113\162\221\310\242\061\271\252\332
\374\235\037\363\135\100\002\023\374\116\034\006\312\263\024\220
\124\027\031\022\032\361\037\327\014\151\132\366\161\170\364\224
\175\221\013\216\354\220\124\216\274\157\241\114\253\374\164\144
\375\161\232\370\101\007\241\315\221\344\074\232\340\233\062\071
\163\253\052\325\151\310\170\221\046\061\175\342\307\060\361\374
\024\170\167\022\016\023\364\335\026\224\277\113\147\173\160\123
\205\312\260\273\363\070\115\054\220\071\300\015\302\135\153\351
\342\345\325\210\215\326\054\277\253\033\276\265\050\207\022\027
\164\156\374\175\374\217\320\207\046\260\033\373\271\154\253\342
\236\075\025\301\073\056\147\002\130\221\237\357\370\102\037\054
\267\150\365\165\255\317\265\366\377\021\175\302\360\044\245\255
\323\372\240\074\251\372\135\334\245\240\357\104\244\276\326\350
\345\344\023\226\027\173\006\076\062\355\307\267\102\274\166\243
\330\145\070\053\070\065\121\041\016\016\157\056\064\023\100\341
\053\147\014\155\112\101\060\030\043\132\062\125\231\311\027\340
\074\336\366\354\171\255\053\130\031\242\255\054\042\032\225\216
\276\226\220\135\102\127\304\371\024\003\065\053\034\055\121\127
\010\247\072\336\077\344\310\264\003\163\302\301\046\200\273\013
\102\037\255\015\257\046\162\332\314\276\263\243\203\130\015\202
\305\037\106\121\343\234\030\314\215\233\215\354\111\353\165\120
\325\214\050\131\312\164\064\332\214\013\041\253\036\352\033\345
\307\375\025\076\300\027\252\373\043\156\046\106\313\372\371\261
\162\153\151\317\042\204\013\142\017\254\331\031\000\224\242\166
\074\324\055\232\355\004\236\055\006\142\020\067\122\034\205\162
\033\047\345\314\306\061\354\067\354\143\131\233\013\035\166\314
\176\062\232\210\225\010\066\122\273\336\166\137\166\111\111\255
\177\275\145\040\262\311\301\053\166\030\166\237\126\261
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

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CKA_NSS_EMAIL_DISTRUST_AFTER
 CK_BBOOL CK_FALSE

# Trust for "UCA Extended Validation Root"
# Issuer: CN=UCA Extended Validation Root,O=UniTrust,C=CN
# Serial Number:4f:d2:2b:8f:f5:64:c8:33:9e:4f:34:58:66:23:70:60
# Subject: CN=UCA Extended Validation Root,O=UniTrust,C=CN
# Not Valid Before: Fri Mar 13 00:00:00 2015
# Not Valid After : Fri Dec 31 00:00:00 2038
# Fingerprint (SHA-256):
D4:3A:F9:B3:54:73:75:5C:96:84:FC:06:D7:D8:CB:70:EE:5C:28:E7:73:FB:29:4E:B4:1E:E7:17:22:92:4D:24
# Fingerprint (SHA1): A3:A1:B0:6F:24:61:23:4A:E3:36:A5:C2:37:FC:A6:FF:DD:F0:D7:3A
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "UCA Extended Validation Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\243\241\260\157\044\141\043\112\343\066\245\302\067\374\246\377
\335\360\327\072
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\241\363\137\103\306\064\233\332\277\214\176\005\123\255\226\342
END
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\014\010\125\156\151\124\162\165
\163\164\061\045\060\043\006\003\125\004\003\014\034\125\103\101
\040\105\170\164\145\156\144\145\144\040\126\141\154\151\144\141
\164\151\157\156\040\122\157\157\164
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\117\322\053\217\365\144\310\063\236\117\064\130\146\043
\160\140
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Certigna Root CA"
#
# Issuer: CN=Certigna Root CA,OU=0002 48146308100036,O=Dhimyotis,C=FR
# Serial Number:00:ca:e9:1b:89:f1:55:03:0d:a3:e6:41:6d:c4:e3:a6:e1
# Subject: CN=Certigna Root CA,OU=0002 48146308100036,O=Dhimyotis,C=FR
# Not Valid Before: Tue Oct 01 08:32:27 2013
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# Not Valid After : Sat Oct 01 08:32:27 2033
# Fingerprint (SHA-256):
D4:8D:3D:23:EE:DB:50:A4:59:E5:51:97:60:1C:27:77:4B:9D:7B:18:C9:4D:5A:05:95:11:A1:02:50:B9:31:68
#
 Fingerprint (SHA1): 2D:0D:52:14:FF:9E:AD:99:24:01:74:20:47:6E:6C:85:27:27:F5:43
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certigna Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\104\150\151\155\171\157
\164\151\163\061\034\060\032\006\003\125\004\013\014\023\060\060
\060\062\040\064\070\061\064\066\063\060\070\061\060\060\060\063
\066\061\031\060\027\006\003\125\004\003\014\020\103\145\162\164
\151\147\156\141\040\122\157\157\164\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\104\150\151\155\171\157
\164\151\163\061\034\060\032\006\003\125\004\013\014\023\060\060
\060\062\040\064\070\061\064\066\063\060\070\061\060\060\060\063
\066\061\031\060\027\006\003\125\004\003\014\020\103\145\162\164
\151\147\156\141\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\021\000\312\351\033\211\361\125\003\015\243\346\101\155\304
\343\246\341
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\133\060\202\004\103\240\003\002\001\002\002\021\000
\312\351\033\211\361\125\003\015\243\346\101\155\304\343\246\341
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\132\061\013\060\011\006\003\125\004\006\023\002\106\122\061\022
\060\020\006\003\125\004\012\014\011\104\150\151\155\171\157\164
\151\163\061\034\060\032\006\003\125\004\013\014\023\060\060\060
\062\040\064\070\061\064\066\063\060\070\061\060\060\060\063\066
\061\031\060\027\006\003\125\004\003\014\020\103\145\162\164\151
\147\156\141\040\122\157\157\164\040\103\101\060\036\027\015\061
\063\061\060\060\061\060\070\063\062\062\067\132\027\015\063\063
\061\060\060\061\060\070\063\062\062\067\132\060\132\061\013\060
\011\006\003\125\004\006\023\002\106\122\061\022\060\020\006\003
\125\004\012\014\011\104\150\151\155\171\157\164\151\163\061\034
\060\032\006\003\125\004\013\014\023\060\060\060\062\040\064\070
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\061\064\066\063\060\070\061\060\060\060\063\066\061\031\060\027
\006\003\125\004\003\014\020\103\145\162\164\151\147\156\141\040
\122\157\157\164\040\103\101\060\202\002\042\060\015\006\011\052
\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060
\202\002\012\002\202\002\001\000\315\030\071\145\032\131\261\352
\144\026\016\214\224\044\225\174\203\323\305\071\046\334\014\357
\026\127\215\327\330\254\243\102\177\202\312\355\315\133\333\016
\267\055\355\105\010\027\262\331\263\313\326\027\122\162\050\333
\216\116\236\212\266\013\371\236\204\232\115\166\336\042\051\134
\322\263\322\006\076\060\071\251\164\243\222\126\034\241\157\114
\012\040\155\237\043\172\264\306\332\054\344\035\054\334\263\050
\320\023\362\114\116\002\111\241\124\100\236\346\345\005\240\055
\204\310\377\230\154\320\353\212\032\204\010\036\267\150\043\356
\043\325\160\316\155\121\151\020\356\241\172\302\321\042\061\302
\202\205\322\362\125\166\120\174\045\172\311\204\134\013\254\335
\102\116\053\347\202\242\044\211\313\220\262\320\356\043\272\146
\114\273\142\244\371\123\132\144\173\174\230\372\243\110\236\017
\225\256\247\030\364\152\354\056\003\105\257\360\164\370\052\315
\172\135\321\276\104\046\062\051\361\361\365\154\314\176\002\041
\013\237\157\244\077\276\235\123\342\317\175\251\054\174\130\032
\227\341\075\067\067\030\146\050\322\100\305\121\212\214\303\055
\316\123\210\044\130\144\060\026\305\252\340\326\012\246\100\337
\170\366\365\004\174\151\023\204\274\321\321\247\006\317\001\367
\150\300\250\127\273\072\141\255\004\214\223\343\255\374\360\333
\104\155\131\334\111\131\256\254\232\231\066\060\101\173\166\063
\042\207\243\302\222\206\156\371\160\356\256\207\207\225\033\304
\172\275\061\363\324\322\345\231\377\276\110\354\165\365\170\026
\035\246\160\301\177\074\033\241\222\373\317\310\074\326\305\223
\012\217\365\125\072\166\225\316\131\230\212\011\225\167\062\232
\203\272\054\004\072\227\275\324\057\276\327\154\233\242\312\175
\155\046\311\125\325\317\303\171\122\010\011\231\007\044\055\144
\045\153\246\041\151\233\152\335\164\115\153\227\172\101\275\253
\027\371\220\027\110\217\066\371\055\325\305\333\356\252\205\105
\101\372\315\072\105\261\150\346\066\114\233\220\127\354\043\271
\207\010\302\304\011\361\227\206\052\050\115\342\164\300\332\304
\214\333\337\342\241\027\131\316\044\131\164\061\332\177\375\060
\155\331\334\341\152\341\374\137\002\003\001\000\001\243\202\001
\032\060\202\001\026\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\035\006\003\125\035\016\004\026\004
\024\030\207\126\340\156\167\356\044\065\074\116\163\232\037\326
\341\342\171\176\053\060\037\006\003\125\035\043\004\030\060\026
\200\024\030\207\126\340\156\167\356\044\065\074\116\163\232\037
\326\341\342\171\176\053\060\104\006\003\125\035\040\004\075\060
\073\060\071\006\004\125\035\040\000\060\061\060\057\006\010\053
\006\001\005\005\007\002\001\026\043\150\164\164\160\163\072\057
\057\167\167\167\167\056\143\145\162\164\151\147\156\141\056\146
\162\057\141\165\164\157\162\151\164\145\163\057\060\155\006\003

\125\035\037\004\146\060\144\060\057\240\055\240\053\206\051\150
\164\164\160\072\057\057\143\162\154\056\143\145\162\164\151\147
\156\141\056\146\162\057\143\145\162\164\151\147\156\141\162\157
\157\164\143\141\056\143\162\154\060\061\240\057\240\055\206\053
\150\164\164\160\072\057\057\143\162\154\056\144\150\151\155\171
\157\164\151\163\056\143\157\155\057\143\145\162\164\151\147\156
\141\162\157\157\164\143\141\056\143\162\154\060\015\006\011\052
\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000\224
\270\236\117\360\343\225\010\042\347\315\150\101\367\034\125\325
\174\000\342\055\072\211\135\150\070\057\121\042\013\112\215\313
\351\273\135\076\273\134\075\261\050\376\344\123\125\023\317\241
\220\033\002\035\137\146\106\011\063\050\341\015\044\227\160\323
\020\037\352\144\127\226\273\135\332\347\304\214\117\114\144\106
\035\134\207\343\131\336\102\321\233\250\176\246\211\335\217\034
\311\060\202\355\073\234\315\300\351\031\340\152\330\002\165\067
\253\367\064\050\050\221\362\004\012\117\065\343\140\046\001\372
\320\021\214\371\021\152\356\257\075\303\120\323\217\137\063\171
\074\206\250\163\105\220\214\040\266\162\163\027\043\276\007\145
\345\170\222\015\272\001\300\353\214\034\146\277\254\206\167\001
\224\015\234\346\351\071\215\037\246\121\214\231\014\071\167\341
\264\233\372\034\147\127\157\152\152\216\251\053\114\127\171\172
\127\042\317\315\137\143\106\215\134\131\072\206\370\062\107\142
\243\147\015\030\221\334\373\246\153\365\110\141\163\043\131\216
\002\247\274\104\352\364\111\235\361\124\130\371\140\257\332\030
\244\057\050\105\334\172\240\210\206\135\363\073\347\377\051\065
\200\374\144\103\224\346\343\034\157\276\255\016\052\143\231\053
\311\176\205\366\161\350\006\003\225\376\336\217\110\034\132\324
\222\350\053\356\347\061\333\272\004\152\207\230\347\305\137\357
\175\247\042\367\001\330\115\371\211\320\016\232\005\131\244\236
\230\331\157\053\312\160\276\144\302\125\243\364\351\257\303\222
\051\334\210\026\044\231\074\215\046\230\266\133\267\314\316\267
\067\007\375\046\331\230\205\044\377\131\043\003\232\355\235\235
\250\344\136\070\316\327\122\015\157\322\077\155\261\005\153\111
\316\212\221\106\163\364\366\057\360\250\163\167\016\145\254\241
\215\146\122\151\176\113\150\014\307\036\067\047\203\245\214\307
\002\344\024\315\111\001\260\163\263\375\306\220\072\157\322\154
\355\073\356\354\221\276\242\103\135\213\000\112\146\045\104\160
\336\100\017\370\174\025\367\242\316\074\327\136\023\214\201\027
\030\027\321\275\361\167\020\072\324\145\071\301\047\254\127\054
\045\124\377\242\332\117\212\141\071\136\256\075\112\214\275
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Certigna Root CA"
# Issuer: CN=Certigna Root CA,OU=0002 48146308100036,O=Dhimyotis,C=FR

```
# Serial Number:00:ca:e9:1b:89:f1:55:03:0d:a3:e6:41:6d:c4:e3:a6:e1
# Subject: CN=Certigna Root CA,OU=0002 48146308100036,O=Dhimyotis,C=FR
# Not Valid Before: Tue Oct 01 08:32:27 2013
# Not Valid After : Sat Oct 01 08:32:27 2033
# Fingerprint (SHA-256):
D4:8D:3D:23:EE:DB:50:A4:59:E5:51:97:60:1C:27:77:4B:9D:7B:18:C9:4D:5A:05:95:11:A1:02:50:B9:31:68
# Fingerprint (SHA1): 2D:0D:52:14:FF:9E:AD:99:24:01:74:20:47:6E:6C:85:27:27:F5:43
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certigna Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\055\015\122\024\377\236\255\231\044\001\164\040\107\156\154\205
\047\047\365\103
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\016\134\060\142\047\353\133\274\327\256\142\272\351\325\337\167
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\104\150\151\155\171\157
\164\151\163\061\034\060\032\006\003\125\004\013\014\023\060\060
\060\062\040\064\070\061\064\066\063\060\070\061\060\060\060\063
\066\061\031\060\027\006\003\125\004\003\014\020\103\145\162\164
\151\147\156\141\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\312\351\033\211\361\125\003\015\243\346\101\155\304
\343\246\341
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "emSign Root CA - G1"
#
# Issuer: CN=emSign Root CA - G1,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN
# Serial Number:31:f5:e4:62:0c:6c:58:ed:d6:d8
# Subject: CN=emSign Root CA - G1,O=eMudhra Technologies
 Limited,OU=emSign PKI,C=IN
# Not Valid Before: Sun Feb 18 18:30:00 2018
# Not Valid After : Wed Feb 18 18:30:00 2043
# Fingerprint (SHA-256):
40:F6:AF:03:46:A9:9A:A1:CD:1D:55:5A:4E:9C:CE:62:C7:F9:63:46:03:EE:40:66:15:83:3D:C8:C8:D0:03:67
```

```
# Fingerprint (SHA1): 8A:C7:AD:8F:73:AC:4E:C1:B5:75:4D:A5:40:F4:FC:CF:7C:B5:8E:8C
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "emSign Root CA - G1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\147\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034\145
\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157\147
\151\145\163\040\114\151\155\151\164\145\144\061\034\060\032\006
\003\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157
\164\040\103\101\040\055\040\107\061
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\147\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034\145
\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157\147
\151\145\163\040\114\151\155\151\164\145\144\061\034\060\032\006
\003\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157
\164\040\103\101\040\055\040\107\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\012\061\365\344\142\014\154\130\355\326\330
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\224\060\202\002\174\240\003\002\001\002\002\012\061
\365\344\142\014\154\130\355\326\330\060\015\006\011\052\206\110
\206\367\015\001\001\013\005\000\060\147\061\013\060\011\006\003
\125\004\006\023\002\111\116\061\023\060\021\006\003\125\004\013
\023\012\145\155\123\151\147\156\040\120\113\111\061\045\060\043
\006\003\125\004\012\023\034\145\115\165\144\150\162\141\040\124
\145\143\150\156\157\154\157\147\151\145\163\040\114\151\155\151
\164\145\144\061\034\060\032\006\003\125\004\003\023\023\145\155
\123\151\147\156\040\122\157\157\164\040\103\101\040\055\040\107
\061\060\036\027\015\061\070\060\062\061\070\061\070\063\060\060
\060\132\027\015\064\063\060\062\061\070\061\070\063\060\060\060
\132\060\147\061\013\060\011\006\003\125\004\006\023\002\111\116
\061\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147
\156\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034
\145\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157
\147\151\145\163\040\114\151\155\151\164\145\144\061\034\060\032
\006\003\125\004\003\023\023\145\155\123\151\147\156\040\122\157
```

\157\164\040\103\101\040\055\040\107\061\060\202\001\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001
\017\000\060\202\001\012\002\202\001\001\000\223\113\273\351\146
\212\356\235\133\325\064\223\320\033\036\303\347\236\270\144\063
\177\143\170\150\264\315\056\161\165\327\233\040\306\115\051\274
\266\150\140\212\367\041\232\126\065\132\363\166\275\330\315\232
\377\223\126\113\245\131\006\241\223\064\051\335\026\064\165\116
\362\201\264\307\226\116\255\031\025\122\112\376\074\160\165\160
\315\257\053\253\025\232\063\074\252\263\213\252\315\103\375\365
\352\160\377\355\317\021\073\224\316\116\062\026\323\043\100\052
\167\263\257\074\001\054\154\355\231\054\213\331\116\151\230\262
\367\217\101\260\062\170\141\326\015\137\303\372\242\100\222\035
\134\027\346\160\076\065\347\242\267\302\142\342\253\244\070\114
\265\071\065\157\352\003\151\372\072\124\150\205\155\326\362\057
\103\125\036\221\015\016\330\325\152\244\226\321\023\074\054\170
\120\350\072\222\322\027\126\345\065\032\100\034\076\215\054\355
\071\337\102\340\203\101\164\337\243\315\302\206\140\110\150\343
\151\013\124\000\213\344\166\151\041\015\171\116\064\010\136\024
\302\314\261\267\255\327\174\160\212\307\205\002\003\001\000\001
\243\102\060\100\060\035\006\003\125\035\016\004\026\004\024\373
\357\015\206\236\260\343\335\251\271\361\041\027\177\076\374\360
\167\053\032\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\015\006\011\052\206\110\206\367\015\001\001
\013\005\000\003\202\001\001\000\131\377\362\214\365\207\175\161
\075\243\237\033\133\321\332\370\323\234\153\066\275\233\251\141
\353\336\026\054\164\075\236\346\165\332\327\272\247\274\102\027
\347\075\221\353\345\175\335\076\234\361\317\222\254\154\110\314
\302\042\077\151\073\305\266\025\057\243\065\306\150\052\034\127
\257\071\357\215\320\065\303\030\014\173\000\126\034\315\213\031
\164\336\276\017\022\340\320\252\241\077\002\064\261\160\316\235
\030\326\010\003\011\106\356\140\340\176\266\304\111\004\121\175
\160\140\274\252\262\377\171\162\172\246\035\075\137\052\370\312
\342\375\071\267\107\271\353\176\337\004\043\257\372\234\006\007
\351\373\143\223\200\100\265\306\154\012\061\050\316\014\237\317
\263\043\065\200\101\215\154\304\067\173\201\057\200\241\100\102
\205\351\331\070\215\350\241\123\315\001\277\151\350\132\006\362
\105\013\220\372\256\341\277\235\362\256\127\074\245\256\262\126
\364\213\145\100\351\375\061\201\054\364\071\011\330\356\153\247
\264\246\035\025\245\230\367\001\201\330\205\175\363\121\134\161
\210\336\272\314\037\200\176\112
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "emSign Root CA - G1"

```
# Issuer: CN=emSign Root CA - G1,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN
# Serial Number:31:f5:e4:62:0c:6c:58:ed:d6:d8
# Subject: CN=emSign Root CA - G1,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN
# Not Valid Before: Sun Feb 18 18:30:00 2018
# Not Valid After : Wed Feb 18 18:30:00 2043
# Fingerprint (SHA-256):
40:F6:AF:03:46:A9:9A:A1:CD:1D:55:5A:4E:9C:CE:62:C7:F9:63:46:03:EE:40:66:15:83:3D:C8:C8:D0:03:67
# Fingerprint (SHA1): 8A:C7:AD:8F:73:AC:4E:C1:B5:75:4D:A5:40:F4:FC:CF:7C:B5:8E:8C
CKA_CLASS
 CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "emSign Root CA - G1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\212\307\255\217\163\254\116\301\265\165\115\245\100\364\374\317
\174\265\216\214
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\234\102\204\127\335\313\013\247\056\225\255\266\363\332\274\254
END
CKA_ISSUER MULTILINE_OCTAL
\060\147\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034\145
\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157\147
\151\145\163\040\114\151\155\151\164\145\144\061\034\060\032\006
\003\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157
\164\040\103\101\040\055\040\107\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\012\061\365\344\142\014\154\130\355\326\330
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "emSign ECC Root CA - G3"
#
# Issuer: CN=emSign ECC Root CA - G3,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN
# Serial Number:3c:f6:07:a9:68:70:0e:da:8b:84
# Subject: CN=emSign ECC Root CA - G3,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN
# Not Valid Before: Sun Feb 18 18:30:00 2018
# Not Valid After : Wed Feb 18 18:30:00 2043
# Fingerprint (SHA-256):
```

86:A1:EC:BA:08:9C:4A:8D:3B:BE:27:34:C6:12:BA:34:1D:81:3E:04:3C:F9:E8:A8:62:CD:5C:57:A3:6B:BE:6B
# Fingerprint (SHA1): 30:43:FA:4F:F2:57:DC:A0:C3:80:EE:2E:58:EA:78:B2:3F:E6:BB:C1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "emSign ECC Root CA - G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\153\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034\145
\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157\147
\151\145\163\040\114\151\155\151\164\145\144\061\040\060\036\006
\003\125\004\003\023\027\145\155\123\151\147\156\040\105\103\103
\040\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\153\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034\145
\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157\147
\151\145\163\040\114\151\155\151\164\145\144\061\040\060\036\006
\003\125\004\003\023\027\145\155\123\151\147\156\040\105\103\103
\040\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\012\074\366\007\251\150\160\016\332\213\204
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\002\116\060\202\001\323\240\003\002\001\002\002\012\074
\366\007\251\150\160\016\332\213\204\060\012\006\010\052\206\110
\316\075\004\003\003\060\153\061\013\060\011\006\003\125\004\006
\023\002\111\116\061\023\060\021\006\003\125\004\013\023\012\145
\155\123\151\147\156\040\120\113\111\061\045\060\043\006\003\125
\004\012\023\034\145\115\165\144\150\162\141\040\124\145\143\150
\156\157\154\157\147\151\145\163\040\114\151\155\151\164\145\144
\061\040\060\036\006\003\125\004\003\023\027\145\155\123\151\147
\156\040\105\103\103\040\122\157\157\164\040\103\101\040\055\040
\107\063\060\036\027\015\061\070\060\062\061\070\061\070\063\060
\060\060\132\027\015\064\063\060\062\061\070\061\070\063\060\060
\060\132\060\153\061\013\060\011\006\003\125\004\006\023\002\111
\116\061\023\060\021\006\003\125\004\013\023\012\145\155\123\151
\147\156\040\120\113\111\061\045\060\043\006\003\125\004\012\023
\034\145\115\165\144\150\162\141\040\124\145\143\150\156\157\154

\157\147\151\145\163\040\114\151\155\151\164\145\144\061\040\060
\036\006\003\125\004\003\023\027\145\155\123\151\147\156\040\105
\103\103\040\122\157\157\164\040\103\101\040\055\040\107\063\060
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201
\004\000\042\003\142\000\004\043\245\014\270\055\022\365\050\363
\261\262\335\342\002\022\200\236\071\137\111\115\237\311\045\064
\131\164\354\273\006\034\347\300\162\257\350\256\057\341\101\124
\207\024\250\112\262\350\174\202\346\133\152\265\334\263\165\316
\213\006\320\206\043\277\106\325\216\017\077\004\364\327\034\222
\176\366\245\143\302\365\137\216\056\117\241\030\031\002\053\062
\012\202\144\175\026\223\321\243\102\060\100\060\035\006\003\125
\035\016\004\026\004\024\174\135\002\204\023\324\314\212\233\201
\316\027\034\056\051\036\234\110\143\102\060\016\006\003\125\035
\017\001\001\377\004\004\003\002\001\006\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\012\006\010\052
\206\110\316\075\004\003\003\003\151\000\060\146\002\061\000\276
\363\141\317\002\020\035\144\225\007\270\030\156\210\205\005\057
\203\010\027\220\312\037\212\114\350\015\033\172\261\255\325\201
\011\107\357\073\254\010\004\174\134\231\261\355\107\007\322\002
\061\000\235\272\125\374\251\112\350\355\355\346\166\001\102\173
\310\370\140\331\215\121\213\125\073\373\214\173\353\145\011\303
\370\226\315\107\250\202\362\026\125\167\044\176\022\020\225\004
\054\243
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "emSign ECC Root CA - G3"
# Issuer: CN=emSign ECC Root CA - G3,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN
# Serial Number:3c:f6:07:a9:68:70:0e:da:8b:84
# Subject: CN=emSign ECC Root CA - G3,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN
# Not Valid Before: Sun Feb 18 18:30:00 2018
# Not Valid After : Wed Feb 18 18:30:00 2043
# Fingerprint (SHA-256):
86:A1:EC:BA:08:9C:4A:8D:3B:BE:27:34:C6:12:BA:34:1D:81:3E:04:3C:F9:E8:A8:62:CD:5C:57:A3:6B:BE:6B
#
 Fingerprint (SHA1): 30:43:FA:4F:F2:57:DC:A0:C3:80:EE:2E:58:EA:78:B2:3F:E6:BB:C1
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "emSign ECC Root CA - G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\060\103\372\117\362\127\334\240\303\200\356\056\130\352\170\262
\077\346\273\301
END

```
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\316\013\162\321\237\210\216\320\120\003\350\343\270\213\147\100
END
CKA_ISSUER MULTILINE_OCTAL
\060\153\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034\145
\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157\147
\151\145\163\040\114\151\155\151\164\145\144\061\040\060\036\006
\003\125\004\003\023\027\145\155\123\151\147\156\040\105\103\103
\040\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\012\074\366\007\251\150\160\016\332\213\204
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "emSign Root CA - C1"
#
# Issuer: CN=emSign Root CA - C1,O=eMudhra Inc,OU=emSign PKI,C=US
# Serial Number:00:ae:cf:00:ba:c4:cf:32:f8:43:b2
# Subject: CN=emSign Root CA - C1,O=eMudhra Inc,OU=emSign PKI,C=US
# Not Valid Before: Sun Feb 18 18:30:00 2018
# Not Valid After : Wed Feb 18 18:30:00 2043
# Fingerprint (SHA-256):
12:56:09:AA:30:1D:A0:A2:49:B9:7A:82:39:CB:6A:34:21:6F:44:DC:AC:9F:39:54:B1:42:92:F2:E8:C8:60:8F
# Fingerprint (SHA1): E7:2E:F1:DF:FC:B2:09:28:CF:5D:D4:D5:67:37:B1:51:CB:86:4F:01
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "emSign Root CA -
 C1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\126\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145
\115\165\144\150\162\141\040\111\156\143\061\034\060\032\006\003
\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157\164
\040\103\101\040\055\040\103\061
END
CKA_ID UTF8 "0"
```

CKA_ISSUER MULTILINE_OCTAL
\060\126\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145
\115\165\144\150\162\141\040\111\156\143\061\034\060\032\006\003
\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157\164
\040\103\101\040\055\040\103\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\013\000\256\317\000\272\304\317\062\370\103\262
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\163\060\202\002\133\240\003\002\001\002\002\013\000
\256\317\000\272\304\317\062\370\103\262\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\060\126\061\013\060\011\006
\003\125\004\006\023\002\125\123\061\023\060\021\006\003\125\004
\013\023\012\145\155\123\151\147\156\040\120\113\111\061\024\060
\022\006\003\125\004\012\023\013\145\115\165\144\150\162\141\040
\111\156\143\061\034\060\032\006\003\125\004\003\023\023\145\155
\123\151\147\156\040\122\157\157\164\040\103\101\040\055\040\103
\061\060\036\027\015\061\070\060\062\061\070\061\070\063\060\060
\060\132\027\015\064\063\060\062\061\070\061\070\063\060\060\060
\132\060\126\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147
\156\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013
\145\115\165\144\150\162\141\040\111\156\143\061\034\060\032\006
\003\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157
\164\040\103\101\040\055\040\103\061\060\202\001\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017
\000\060\202\001\012\002\202\001\001\000\317\353\251\271\361\231
\005\314\330\050\041\112\363\163\064\121\204\126\020\365\240\117
\054\022\343\372\023\232\047\320\317\371\171\032\164\137\035\171
\071\374\133\370\160\216\340\222\122\367\344\045\371\124\203\331
\035\323\310\132\205\077\136\307\266\007\356\076\300\316\232\257
\254\126\102\052\071\045\160\326\277\265\173\066\255\254\366\163
\334\315\327\035\212\203\245\373\053\220\025\067\153\034\046\107
\334\073\051\126\223\152\263\301\152\072\235\075\365\301\227\070
\130\005\213\034\021\343\344\264\270\135\205\035\203\376\170\137
\013\105\150\030\110\245\106\163\064\073\376\017\310\166\273\307
\030\363\005\321\206\363\205\355\347\271\331\062\255\125\210\316
\246\266\221\260\117\254\176\025\043\226\366\077\360\040\064\026
\336\012\306\304\004\105\171\177\247\375\276\322\251\245\257\234
\305\043\052\367\074\041\154\275\257\217\116\305\072\262\363\064
\022\374\337\200\032\111\244\324\251\225\367\236\211\136\242\211
\254\224\313\250\150\233\257\212\145\047\315\211\356\335\214\265
\153\051\160\103\240\151\013\344\271\017\002\003\001\000\001\243
\102\060\100\060\035\006\003\125\035\016\004\026\004\024\376\241
\340\160\036\052\003\071\122\132\102\276\134\221\205\172\030\252

\115\265\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\006\060\017\006\003\125\035\023\001\001\377\004\005\060\003
\001\001\377\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\003\202\001\001\000\302\112\126\372\025\041\173\050\242
\351\345\035\373\370\055\304\071\226\101\114\073\047\054\304\154
\030\025\200\306\254\257\107\131\057\046\013\343\066\260\357\073
\376\103\227\111\062\231\022\025\133\337\021\051\377\253\123\370
\273\301\170\017\254\234\123\257\127\275\150\214\075\151\063\360
\243\240\043\143\073\144\147\042\104\255\325\161\313\126\052\170
\222\243\117\022\061\066\066\342\336\376\000\304\243\140\017\047
\255\240\260\212\265\066\172\122\241\275\047\364\040\047\142\350
\115\224\044\023\344\012\004\351\074\253\056\310\103\011\112\306
\141\004\345\111\064\176\323\304\310\365\017\300\252\351\272\124
\136\363\143\053\117\117\120\324\376\271\173\231\214\075\300\056
\274\002\053\323\304\100\344\212\007\061\036\233\316\046\231\023
\373\021\352\232\042\014\021\031\307\136\033\201\120\060\310\226
\022\156\347\313\101\177\221\073\242\107\267\124\200\033\334\000
\314\232\220\352\303\303\120\006\142\014\060\300\025\110\247\250
\131\174\341\256\042\242\342\012\172\017\372\142\253\122\114\341
\361\337\312\276\203\015\102
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "emSign Root CA - C1"
# Issuer: CN=emSign Root CA - C1,O=eMudhra Inc,OU=emSign PKI,C=US
# Serial Number:00:ae:cf:00:ba:c4:cf:32:f8:43:b2
# Subject: CN=emSign Root CA - C1,O=eMudhra Inc,OU=emSign PKI,C=US
# Not Valid Before: Sun Feb 18 18:30:00 2018
# Not Valid After : Wed Feb
18 18:30:00 2043
# Fingerprint (SHA-256):
12:56:09:AA:30:1D:A0:A2:49:B9:7A:82:39:CB:6A:34:21:6F:44:DC:AC:9F:39:54:B1:42:92:F2:E8:C8:60:8F
# Fingerprint (SHA1): E7:2E:F1:DF:FC:B2:09:28:CF:5D:D4:D5:67:37:B1:51:CB:86:4F:01
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "emSign Root CA - C1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\347\056\361\337\374\262\011\050\317\135\324\325\147\067\261\121
\313\206\117\001
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\330\343\135\001\041\372\170\132\260\337\272\322\356\052\137\150
END

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CKA_ISSUER MULTILINE_OCTAL
\060\126\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145
\115\165\144\150\162\141\040\111\156\143\061\034\060\032\006\003
\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157\164
\040\103\101\040\055\040\103\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\013\000\256\317\000\272\304\317\062\370\103\262
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "emSign ECC Root CA - C3"
#
# Issuer: CN=emSign ECC Root CA - C3,O=eMudhra Inc,OU=emSign PKI,C=US
# Serial Number:7b:71:b6:82:56:b8:12:7c:9c:a8
# Subject: CN=emSign ECC Root CA - C3,O=eMudhra Inc,OU=emSign PKI,C=US
# Not Valid Before: Sun Feb 18 18:30:00 2018
# Not Valid After : Wed Feb 18 18:30:00 2043
# Fingerprint (SHA-256):
BC:4D:80:9B:15:18:9D:78:DB:3E:1D:8C:F4:F9:72:6A:79:5D:A1:64:3C:A5:F1:35:8E:1D:DB:0E:DC:0D:7E:B3
# Fingerprint (SHA1): B6:AF:43:C2:9B:81:53:7D:F6:EF:6B:C3:1F:1F:60:15:0C:EE:48:66
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "emSign ECC
 Root CA - C3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145
\115\165\144\150\162\141\040\111\156\143\061\040\060\036\006\003
\125\004\003\023\027\145\155\123\151\147\156\040\105\103\103\040
\122\157\157\164\040\103\101\040\055\040\103\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145
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\115\165\144\150\162\141\040\111\156\143\061\040\060\036\006\003
\125\004\003\023\027\145\155\123\151\147\156\040\105\103\103\040
\122\157\157\164\040\103\101\040\055\040\103\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\012\173\161\266\202\126\270\022\174\234\250
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\053\060\202\001\261\240\003\002\001\002\002\012\173
\161\266\202\126\270\022\174\234\250\060\012\006\010\052\206\110
\316\075\004\003\003\060\132\061\013\060\011\006\003\125\004\006
\023\002\125\123\061\023\060\021\006\003\125\004\013\023\012\145
\155\123\151\147\156\040\120\113\111\061\024\060\022\006\003\125
\004\012\023\013\145\115\165\144\150\162\141\040\111\156\143\061
\040\060\036\006\003\125\004\003\023\027\145\155\123\151\147\156
\040\105\103\103\040\122\157\157\164\040\103\101\040\055\040\103
\063\060\036\027\015\061\070\060\062\061\070\061\070\063\060\060
\060\132\027\015\064\063\060\062\061\070\061\070\063\060\060\060
\132\060\132\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147
\156\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013
\145\115\165\144\150\162\141\040\111\156\143\061\040\060\036\006
\003\125\004\003\023\027\145\155\123\151\147\156\040\105\103\103
\040\122\157\157\164\040\103\101\040\055\040\103\063\060\166\060
\020\006\007\052\206\110\316\075\002\001\006\005\053\201\004\000
\042\003\142\000\004\375\245\141\256\173\046\020\035\351\267\042
\060\256\006\364\201\263\261\102\161\225\071\274\323\122\343\257
\257\371\362\227\065\222\066\106\016\207\225\215\271\071\132\351
\273\337\320\376\310\007\101\074\273\125\157\203\243\152\373\142
\260\201\211\002\160\175\110\305\112\343\351\042\124\042\115\223
\273\102\014\257\167\234\043\246\175\327\141\021\316\145\307\370
\177\376\365\362\251\243\102\060\100\060\035\006\003\125\035\016
\004\026\004\024\373\132\110\320\200\040\100\362\250\351\000\007
\151\031\167\247\346\303\364\317\060\016\006\003\125\035\017\001
\001\377\004\004\003\002\001\006\060\017\006\003\125\035\023\001
\001\377\004\005\060\003\001\001\377\060\012\006\010\052\206\110
\316\075\004\003\003\003\150\000\060\145\002\061\000\264\330\057
\002\211\375\266\114\142\272\103\116\023\204\162\265\256\335\034
\336\326\265\334\126\217\130\100\132\055\336\040\114\042\203\312
\223\250\176\356\022\100\307\326\207\117\370\337\205\002\060\034
\024\144\344\174\226\203\021\234\260\321\132\141\113\246\017\111
\323\000\374\241\374\344\245\377\177\255\327\060\320\307\167\177
\276\201\007\125\060\120\040\024\365\127\070\012\250\061\121
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

```
# Trust for "emSign ECC Root CA - C3"
# Issuer: CN=emSign ECC Root CA - C3,O=eMudhra Inc,OU=emSign PKI,C=US
# Serial Number:7b:71:b6:82:56:b8:12:7c:9c:a8
# Subject: CN=emSign ECC Root CA - C3,O=eMudhra Inc,OU=emSign PKI,C=US
# Not Valid Before: Sun Feb 18 18:30:00 2018
# Not Valid After : Wed Feb 18 18:30:00 2043
# Fingerprint (SHA-256):
BC:4D:80:9B:15:18:9D:78:DB:3E:1D:8C:F4:F9:72:6A:79:5D:A1:64:3C:A5:F1:35:8E:1D:DB:0E:DC:0D:7E:B3
# Fingerprint (SHA1): B6:AF:43:C2:9B:81:53:7D:F6:EF:6B:C3:1F:1F:60:15:0C:EE:48:66
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
 CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "emSign ECC Root CA - C3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\266\257\103\302\233\201\123\175\366\357\153\303\037\037\140\025
\014\356\110\146
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\076\123\263\243\201\356\327\020\370\323\260\035\027\222\365\325
END
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145
\115\165\144\150\162\141\040\111\156\143\061\040\060\036\006\003
\125\004\003\023\027\145\155\123\151\147\156\040\105\103\103\040
\122\157\157\164\040\103\101\040\055\040\103\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\012\173\161\266\202\126\270\022\174\234\250
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED
 CK_BBOOL CK_FALSE

#
# Certificate "Hongkong Post Root CA 3"
#
# Issuer: CN=Hongkong Post Root CA 3,O=Hongkong Post,L=Hong Kong,ST=Hong Kong,C=HK
# Serial Number:08:16:5f:8a:4c:a5:ec:00:c9:93:40:df:c4:c6:ae:23:b8:1c:5a:a4
# Subject: CN=Hongkong Post Root CA 3,O=Hongkong Post,L=Hong Kong,ST=Hong Kong,C=HK
# Not Valid Before: Sat Jun 03 02:29:46 2017
# Not Valid After : Tue Jun 03 02:29:46 2042
```

```
# Fingerprint (SHA-256):
5A:2F:C0:3F:0C:83:B0:90:BB:FA:40:60:4B:09:88:44:6C:76:36:18:3D:F9:84:6E:17:10:1A:44:7F:B8:EF:D6
# Fingerprint (SHA1): 58:A2:D0:EC:20:52:81:5B:C1:F3:F8:64:02:24:4E:C2:8E:02:4B:02
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Hongkong Post Root CA 3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\157\061\013\060\011\006\003\125\004\006\023\002\110\113\061
\022\060\020\006\003\125\004\010\023\011\110\157\156\147\040\113
\157\156\147\061\022\060\020\006\003\125\004\007\023\011\110\157
\156\147\040\113\157\156\147\061\026\060\024\006\003\125\004\012
\023\015\110\157\156\147\153\157\156\147\040\120\157\163\164\061
\040\060\036\006\003\125\004\003\023\027\110\157\156\147\153\157
\156\147\040\120\157\163\164\040\122\157\157\164\040\103\101\040
\063
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\157\061\013\060\011\006\003\125\004\006\023\002\110\113\061
\022\060\020\006\003\125\004\010\023\011\110\157\156\147\040\113
\157\156\147\061\022\060\020\006\003\125\004\007\023\011\110\157
\156\147\040\113\157\156\147\061\026\060\024\006\003\125\004\012
\023\015\110\157\156\147\153\157\156\147\040\120\157\163\164\061
\040\060\036\006\003\125\004\003\023\027\110\157\156\147\153\157
\156\147\040\120\157\163\164\040\122\157\157\164\040\103\101\040
\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\010\026\137\212\114\245\354\000\311\223\100\337\304\306
\256\043\270\034\132\244
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\317\060\202\003\267\240\003\002\001\002\002\024\010
\026\137\212\114\245\354\000\311\223\100\337\304\306\256\043\270
\034\132\244\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\157\061\013\060\011\006\003\125\004\006\023\002\110
\113\061\022\060\020\006\003\125\004\010\023\011\110\157\156\147
\040\113\157\156\147\061\022\060\020\006\003\125\004\007\023\011
\110\157\156\147\040\113\157\156\147\061\026\060\024\006\003\125
\004\012\023\015\110\157\156\147\153\157\156\147\040\120\157\163
\164\061\040\060\036\006\003\125\004\003\023\027\110\157\156\147
\153\157\156\147\040\120\157\163\164\040\122\157\157\164\040\103
\101\040\063\060\036\027\015\061\067\060\066\060\063\060\062\062
\071\064\066\132\027\015\064\062\060\066\060\063\060\062\062\071
```

\064\066\132\060\157\061\013\060\011\006\003\125\004\006\023\002
\110\113\061\022\060\020\006\003\125\004\010\023\011\110\157\156
\147\040\113\157\156\147\061\022\060\020\006\003\125\004\007\023
\011\110\157\156\147\040\113\157\156\147\061\026\060\024\006\003
\125\004\012\023\015\110\157\156\147\153\157\156\147\040\120\157
\163\164\061\040\060\036\006\003\125\004\003\023\027\110\157\156
\147\153\157\156\147\040\120\157\163\164\040\122\157\157\164\040
\103\101\040\063\060\202\002\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012
\002\202\002\001\000\263\210\327\352\316\017\040\116\276\346\326
\003\155\356\131\374\302\127\337\051\150\241\203\016\076\150\307
\150\130\234\034\140\113\211\103\014\271\324\025\262\356\301\116
\165\351\265\247\357\345\351\065\231\344\314\034\347\113\137\215
\063\060\040\063\123\331\246\273\325\076\023\216\351\037\207\111
\255\120\055\120\312\030\276\001\130\242\023\160\226\273\211\210
\126\200\134\370\275\054\074\341\114\127\210\273\323\271\225\357
\313\307\366\332\061\164\050\246\346\124\211\365\101\061\312\345
\046\032\315\202\340\160\332\073\051\273\325\003\365\231\272\125
\365\144\321\140\016\263\211\111\270\212\057\005\322\204\105\050
\174\217\150\120\022\170\374\013\265\123\313\302\230\034\204\243
\236\260\276\043\244\332\334\310\053\036\332\156\105\036\211\230
\332\371\000\056\006\351\014\073\160\325\120\045\210\231\313\315
\163\140\367\325\377\065\147\305\241\274\136\253\315\112\270\105
\353\310\150\036\015\015\024\106\022\343\322\144\142\212\102\230
\274\264\306\010\010\370\375\250\114\144\234\166\001\275\057\251
\154\063\017\330\077\050\270\074\151\001\102\206\176\151\301\311
\006\312\345\172\106\145\351\302\326\120\101\056\077\267\344\355
\154\327\277\046\001\021\242\026\051\112\153\064\006\220\354\023
\322\266\373\152\166\322\074\355\360\326\055\335\341\025\354\243
\233\057\054\311\076\053\344\151\073\377\162\045\261\066\206\133
\307\177\153\213\125\033\112\305\040\141\075\256\313\120\341\010
\072\276\260\217\143\101\123\060\010\131\074\230\035\167\272\143
\221\172\312\020\120\140\277\360\327\274\225\207\217\227\305\376
\227\152\001\224\243\174\133\205\035\052\071\072\320\124\241\321
\071\161\235\375\041\371\265\173\360\342\340\002\217\156\226\044
\045\054\240\036\054\250\304\211\247\357\355\231\006\057\266\012
\114\117\333\242\314\067\032\257\107\205\055\212\137\304\064\064
\114\000\375\030\223\147\023\321\067\346\110\264\213\006\305\127
\173\031\206\012\171\313\000\311\122\257\102\377\067\217\341\243
\036\172\075\120\253\143\006\347\025\265\077\266\105\067\224\067
\261\176\362\110\303\177\305\165\376\227\215\105\217\032\247\032
\162\050\032\100\017\002\003\001\000\001\243\143\060\141\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060
\037\006\003\125\035\043\004\030\060\026\200\024\027\235\315\036
\213\326\071\053\160\323\134\324\240\270\037\260\000\374\305\141
\060\035\006\003\125\035\016\004\026\004\024\027\235\315\036\213
\326\071\053\160\323\134\324\240\270\037\260\000\374\305\141\060

\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202
\002\001\000\126\325\173\156\346\042\001\322\102\233\030\325\016
\327\146\043\134\343\376\240\307\222\322\351\224\255\113\242\306
\354\022\174\164\325\110\322\131\024\231\300\353\271\321\353\364
\110\060\133\255\247\127\163\231\251\323\345\267\321\056\131\044
\130\334\150\056\056\142\330\152\344\160\013\055\040\120\040\244
\062\225\321\000\230\273\323\375\367\062\362\111\256\306\172\340
\107\276\156\316\313\243\162\072\055\151\135\313\310\350\105\071
\324\372\102\301\021\114\167\135\222\373\152\377\130\104\345\353
\201\236\257\240\231\255\276\251\001\146\313\070\035\074\337\103
\037\364\115\156\264\272\027\106\374\175\375\207\201\171\152\015
\063\017\372\057\370\024\271\200\263\135\115\252\227\341\371\344
\030\305\370\325\070\214\046\074\375\362\050\342\356\132\111\210
\054\337\171\075\216\236\220\074\275\101\112\072\335\133\366\232
\264\316\077\045\060\177\062\175\242\003\224\320\334\172\241\122
\336\156\223\215\030\046\375\125\254\275\217\233\322\317\257\347
\206\054\313\037\011\157\243\157\251\204\324\163\277\115\241\164
\033\116\043\140\362\314\016\252\177\244\234\114\045\250\262\146
\073\070\377\331\224\060\366\162\204\276\150\125\020\017\306\163
\054\026\151\223\007\376\261\105\355\273\242\125\152\260\332\265
\112\002\045\047\205\327\267\267\206\104\026\211\154\200\053\076
\227\251\234\325\176\125\114\306\336\105\020\034\352\351\073\237
\003\123\356\356\172\001\002\026\170\324\350\302\276\106\166\210
\023\077\042\273\110\022\035\122\000\264\002\176\041\032\036\234
\045\364\363\075\136\036\322\034\371\263\055\266\367\067\134\306
\313\041\116\260\367\231\107\030\205\301\053\272\125\256\006\352
\320\007\262\334\253\320\202\226\165\316\322\120\376\231\347\317
\057\237\347\166\321\141\052\373\041\273\061\320\252\237\107\244
\262\042\312\026\072\120\127\304\133\103\147\305\145\142\003\111
\001\353\103\331\330\370\236\255\317\261\143\016\105\364\240\132
\054\233\055\305\246\300\255\250\107\364\047\114\070\015\056\033
\111\073\122\364\350\210\203\053\124\050\324\362\065\122\264\062
\203\142\151\144\014\221\234\237\227\352\164\026\375\037\021\006
\232\233\364
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Hongkong Post Root CA 3"
# Issuer: CN=Hongkong Post Root CA 3,O=Hongkong Post,L=Hong Kong,ST=Hong Kong,C=HK
# Serial Number:08:16:5f:8a:4c:a5:ec:00:c9:93:40:df:c4:c6:ae:23:b8:1c:5a:a4
# Subject: CN=Hongkong Post Root CA 3,O=Hongkong Post,L=Hong Kong,ST=Hong Kong,C=HK
# Not Valid Before: Sat Jun 03 02:29:46 2017
# Not Valid After : Tue Jun 03 02:29:46 2042
# Fingerprint (SHA-256):
5A:2F:C0:3F:0C:83:B0:90:BB:FA:40:60:4B:09:88:44:6C:76:36:18:3D:F9:84:6E:17:10:1A:44:7F:B8:EF:D6

```
# Fingerprint (SHA1): 58:A2:D0:EC:20:52:81:5B:C1:F3:F8:64:02:24:4E:C2:8E:02:4B:02
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Hongkong Post Root CA 3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\130\242\320\354\040\122\201\133\301\363\370\144\002\044\116\302
\216\002\113\002
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\021\374\237\275\163\060\002\212\375\077\363\130\271\313\040\360
END
CKA_ISSUER MULTILINE_OCTAL
\060\157\061\013\060\011\006\003\125\004\006\023\002\110\113\061
\022\060\020\006\003\125\004\010\023\011\110\157\156\147\040\113
\157\156\147\061\022\060\020\006\003\125\004\007\023\011\110\157
\156\147\040\113\157\156\147\061\026\060\024\006\003\125\004\012
\023\015\110\157\156\147\153\157\156\147\040\120\157\163\164\061
\040\060\036\006\003\125\004\003\023\027\110\157\156\147\153\157
\156\147\040\120\157\163\164\040\122\157\157\164\040\103\101\040
\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\010\026\137\212\114\245\354\000\311\223\100\337\304\306
\256\043\270\034\132\244
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL
 CK_FALSE

#
# Certificate "Entrust Root Certification Authority - G4"
#
# Issuer: CN=Entrust Root Certification Authority - G4,OU="(c) 2015 Entrust, Inc. - for authorized use
only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
# Serial Number:00:d9:b5:43:7f:af:a9:39:0f:00:00:00:00:55:65:ad:58
# Subject: CN=Entrust Root Certification Authority - G4,OU="(c) 2015 Entrust, Inc. - for authorized use
only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
# Not Valid Before: Wed May 27 11:11:16 2015
# Not Valid After : Sun Dec 27 11:41:16 2037
# Fingerprint (SHA-256):
DB:35:17:D1:F6:73:2A:2D:5A:B9:7C:53:3E:C7:07:79:EE:32:70:A6:2F:B4:AC:42:38:37:24:60:E6:F0:1E:88
# Fingerprint (SHA1): 14:88:4E:86:26:37:B0:26:AF:59:62:5C:40:77:EC:35:29:BA:96:01
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
```

CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust Root Certification Authority - G4"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE
 CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\276\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\061\065\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\062\060
\060\006\003\125\004\003\023\051\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\107
\064
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\276\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\061\065\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\062\060
\060\006\003\125\004\003\023\051\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\107
\064
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\021\000\331\265\103\177\257\251\071\017\000\000\000\000\125
\145\255\130
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\113\060\202\004\063\240\003\002\001\002\002\021\000
\331\265\103\177\257\251\071\017\000\000\000\000\125\145\255\130
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\201\276\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165\163

\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004\013
\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165\163
\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162\155
\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051\040
\062\060\061\065\040\105\156\164\162\165\163\164\054\040\111\156
\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162\151
\172\145\144\040\165\163\145\040\157\156\154\171\061\062\060\060
\006\003\125\004\003\023\051\105\156\164\162\165\163\164\040\122
\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\040\055\040\107\064
\060\036\027\015\061\065\060\065\062\067\061\061\061\061\061\066
\132\027\015\063\067\061\062\062\067\061\061\064\061\061\066\132
\060\201\276\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\061\065\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\062\060
\060\006\003\125\004\003\023\051\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\107
\064\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002
\001\000\261\354\054\102\356\342\321\060\377\245\222\107\342\055
\303\272\144\227\155\312\367\015\265\131\301\263\313\250\150\031
\330\257\204\155\060\160\135\176\363\056\322\123\231\341\376\037
\136\331\110\257\135\023\215\333\377\143\063\115\323\000\002\274
\304\370\321\006\010\224\171\130\212\025\336\051\263\375\375\304
\117\350\252\342\240\073\171\315\277\153\103\062\335\331\164\020
\271\367\364\150\324\273\320\207\325\252\113\212\052\157\052\004
\265\262\246\307\240\172\346\110\253\322\321\131\314\326\176\043
\346\227\154\360\102\345\334\121\113\025\101\355\111\112\311\336
\020\227\326\166\301\357\245\265\066\024\227\065\330\170\042\065
\122\357\103\275\333\047\333\141\126\202\064\334\313\210\140\014
\013\132\345\054\001\306\124\257\327\252\301\020\173\322\005\132
\270\100\236\206\247\303\220\206\002\126\122\011\172\234\322\047
\202\123\112\145\122\152\365\074\347\250\362\234\257\213\275\323
\016\324\324\136\156\207\236\152\075\105\035\321\135\033\364\351
\012\254\140\231\373\211\264\377\230\054\317\174\035\351\002\252
\004\232\036\270\334\210\156\045\263\154\146\367\074\220\363\127
\301\263\057\365\155\362\373\312\241\370\051\235\106\213\263\152
\366\346\147\007\276\054\147\012\052\037\132\262\076\127\304\323
\041\041\143\145\122\221\033\261\231\216\171\176\346\353\215\000
\331\132\252\352\163\350\244\202\002\107\226\376\133\216\124\141
\243\353\057\113\060\260\213\043\165\162\174\041\074\310\366\361

\164\324\034\173\243\005\125\356\273\115\073\062\276\232\167\146
\236\254\151\220\042\007\037\141\072\226\276\345\232\117\314\005
\074\050\131\323\301\014\124\250\131\141\275\310\162\114\350\334
\237\207\177\275\234\110\066\136\225\243\016\271\070\044\125\374
\165\146\353\002\343\010\064\051\112\306\343\053\057\063\240\332
\243\206\245\022\227\375\200\053\332\024\102\343\222\275\076\362
\135\136\147\164\056\034\210\107\051\064\137\342\062\250\234\045
\067\214\272\230\000\227\213\111\226\036\375\045\212\254\334\332
\330\135\164\156\146\260\377\104\337\241\030\306\276\110\057\067
\224\170\370\225\112\077\177\023\136\135\131\375\164\206\103\143
\163\111\002\003\001\000\001\243\102\060\100\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003
\125\035\016\004\026\004\024\237\070\304\126\043\303\071\350\240
\161\154\350\124\114\344\350\072\261\277\147\060\015\006\011\052
\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000\022
\345\102\246\173\213\017\014\344\106\245\266\140\100\207\214\045
\176\255\270\150\056\133\306\100\166\074\003\370\311\131\364\363
\253\142\316\020\215\264\132\144\214\150\300\260\162\103\064\322
\033\013\366\054\123\322\312\220\113\206\146\374\252\203\042\364
\213\032\157\046\110\254\166\167\010\277\305\230\134\364\046\211
\236\173\303\271\144\062\001\177\323\303\335\130\155\354\261\253
\204\125\164\167\204\004\047\122\153\206\114\316\335\271\145\377
\326\306\136\237\232\020\231\113\165\152\376\152\351\227\040\344
\344\166\172\306\320\044\252\220\315\040\220\272\107\144\373\177
\007\263\123\170\265\012\142\362\163\103\316\101\053\201\152\056
\205\026\224\123\324\153\137\162\042\253\121\055\102\325\000\234
\231\277\336\273\224\073\127\375\232\365\206\313\126\073\133\210
\001\345\174\050\113\003\371\111\203\174\262\177\174\343\355\216
\241\177\140\123\216\125\235\120\064\022\017\267\227\173\154\207
\112\104\347\365\155\354\200\067\360\130\031\156\112\150\166\360
\037\222\344\352\265\222\323\141\121\020\013\255\247\331\137\307
\137\334\037\243\134\214\241\176\233\267\236\323\126\157\146\136
\007\226\040\355\013\164\373\146\116\213\021\025\351\201\111\176
\157\260\324\120\177\042\327\137\145\002\015\246\364\205\036\330
\256\006\113\112\247\322\061\146\302\370\316\345\010\246\244\002
\226\104\150\127\304\325\063\317\031\057\024\304\224\034\173\244
\331\360\237\016\261\200\342\321\236\021\144\251\210\021\072\166
\202\345\142\302\200\330\244\203\355\223\357\174\057\220\260\062
\114\226\025\150\110\122\324\231\010\300\044\350\034\343\263\245
\041\016\222\300\220\037\317\040\137\312\073\070\307\267\155\072
\363\346\104\270\016\061\153\210\216\160\353\234\027\122\250\101
\224\056\207\266\347\246\022\305\165\337\133\300\012\156\173\244
\344\136\206\371\066\224\337\167\303\351\015\300\071\361\171\273
\106\216\253\103\131\047\267\040\273\043\351\126\100\041\354\061
\075\145\252\103\362\075\337\160\104\341\272\115\046\020\073\230
\237\363\310\216\033\070\126\041\152\121\223\323\221\312\106\332
\211\267\075\123\203\054\010\037\213\217\123\335\377\254\037

```
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE

# Trust for "Entrust Root Certification Authority - G4"
# Issuer: CN=Entrust Root Certification Authority - G4,OU="(c) 2015 Entrust, Inc. - for authorized use
only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
# Serial Number:00:d9:b5:43:7f:af:a9:39:0f:00:00:00:00:55:65:ad:58
# Subject: CN=Entrust Root Certification Authority - G4,OU="(c) 2015 Entrust, Inc. - for authorized use
only",OU=See www.entrust.net/legal-terms,O="Entrust, Inc.",C=US
# Not Valid Before: Wed May 27 11:11:16 2015
# Not Valid After : Sun Dec 27 11:41:16 2037
# Fingerprint (SHA-256):
DB:35:17:D1:F6:73:2A:2D:5A:B9:7C:53:3E:C7:07:79:EE:32:70:A6:2F:B4:AC:42:38:37:24:60:E6:F0:1E:88
#
 Fingerprint (SHA1): 14:88:4E:86:26:37:B0:26:AF:59:62:5C:40:77:EC:35:29:BA:96:01
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust Root Certification Authority - G4"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\024\210\116\206\046\067\260\046\257\131\142\134\100\167\354\065
\051\272\226\001
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\211\123\361\203\043\267\174\216\005\361\214\161\070\116\037\210
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\276\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\105\156\164\162\165
\163\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\013\023\037\123\145\145\040\167\167\167\056\145\156\164\162\165
\163\164\056\156\145\164\057\154\145\147\141\154\055\164\145\162
\155\163\061\071\060\067\006\003\125\004\013\023\060\050\143\051
\040\062\060\061\065\040\105\156\164\162\165\163\164\054\040\111
\156\143\056\040\055\040\146\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\062\060
\060\006\003\125\004\003\023\051\105\156\164\162\165\163\164\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\107
\064
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\021\000\331\265\103\177\257\251\071\017\000\000\000\000\125
\145\255\130
END
```

```
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Microsoft ECC Root Certificate Authority 2017"
#
# Issuer: CN=Microsoft ECC Root Certificate Authority 2017,O=Microsoft Corporation,C=US
# Serial Number:66:f2:3d:af:87:de:8b:b1:4a:ea:0c:57:31:01:c2:ec
# Subject: CN=Microsoft ECC Root Certificate Authority
 2017,O=Microsoft Corporation,C=US
# Not Valid Before: Wed Dec 18 23:06:45 2019
# Not Valid After : Fri Jul 18 23:16:04 2042
# Fingerprint (SHA-256):
35:8D:F3:9D:76:4A:F9:E1:B7:66:E9:C9:72:DF:35:2E:E1:5C:FA:C2:27:AF:6A:D1:D7:0E:8E:4A:6E:DC:BA:02
# Fingerprint (SHA1): 99:9A:64:C3:7F:F4:7D:9F:AB:95:F1:47:69:89:14:60:EE:C4:C3:C5
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft ECC Root Certificate Authority 2017"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\066\060\064\006\003\125\004\003\023\055\115\151\143\162\157\163
\157\146\164\040\105\103\103\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\040\062\060\061\067
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\066\060\064\006\003\125\004\003\023\055\115\151\143\162\157\163
\157\146\164\040\105\103\103\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\040\062\060\061\067
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\146\362\075\257\207\336\213\261\112\352\014\127\061\001
\302\354
END
CKA_VALUE MULTILINE_OCTAL
```

\060\202\002\131\060\202\001\337\240\003\002\001\002\002\020\146
\362\075\257\207\336\213\261\112\352\014\127\061\001\302\354\060
\012\006\010\052\206\110\316\075\004\003\003\060\145\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\036\060\034\006\003
\125\004\012\023\025\115\151\143\162\157\163\157\146\164\040\103
\157\162\160\157\162\141\164\151\157\156\061\066\060\064\006\003
\125\004\003\023\055\115\151\143\162\157\163\157\146\164\040\105
\103\103\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\062\060
\061\067\060\036\027\015\061\071\061\062\061\070\062\063\060\066
\064\065\132\027\015\064\062\060\067\061\070\062\063\061\066\060
\064\132\060\145\061\013\060\011\006\003\125\004\006\023\002\125
\123\061\036\060\034\006\003\125\004\012\023\025\115\151\143\162
\157\163\157\146\164\040\103\157\162\160\157\162\141\164\151\157
\156\061\066\060\064\006\003\125\004\003\023\055\115\151\143\162
\157\163\157\146\164\040\105\103\103\040\122\157\157\164\040\103
\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150\157
\162\151\164\171\040\062\060\061\067\060\166\060\020\006\007\052
\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142\000
\004\324\274\075\002\102\165\101\023\043\315\200\004\206\002\121
\057\152\250\201\142\013\145\314\366\312\235\036\157\112\146\121
\242\003\331\235\221\372\266\026\261\214\156\336\174\315\333\171
\246\057\316\273\316\161\057\345\245\253\050\354\143\004\146\231
\370\372\362\223\020\005\341\201\050\102\343\306\150\364\346\033
\204\140\112\211\257\355\171\017\073\316\361\366\104\365\001\170
\300\243\124\060\122\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\206\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004
\024\310\313\231\162\160\122\014\370\346\276\262\004\127\051\052
\317\102\020\355\065\060\020\006\011\053\006\001\004\001\202\067
\025\001\004\003\002\001\000\060\012\006\010\052\206\110\316\075
\004\003\003\003\150\000\060\145\002\060\130\362\115\352\014\371
\137\136\356\140\051\313\072\362\333\326\062\204\031\077\174\325
\057\302\261\314\223\256\120\273\011\062\306\306\355\176\311\066
\224\022\344\150\205\006\242\033\320\057\002\061\000\231\351\026
\264\016\372\126\110\324\244\060\026\221\170\333\124\214\145\001
\212\347\120\146\302\061\267\071\272\270\032\042\007\116\374\153
\124\026\040\377\053\265\347\114\014\115\246\117\163
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Microsoft ECC Root Certificate Authority 2017"
# Issuer: CN=Microsoft ECC Root Certificate Authority 2017,O=Microsoft Corporation,C=US
# Serial Number:66:f2:3d:af:87:de:8b:b1:4a:ea:0c:57:31:01:c2:ec
# Subject: CN=Microsoft ECC Root Certificate Authority 2017,O=Microsoft Corporation,C=US

```
# Not Valid Before: Wed Dec 18 23:06:45 2019
# Not Valid After : Fri Jul 18 23:16:04 2042
# Fingerprint (SHA-256):
35:8D:F3:9D:76:4A:F9:E1:B7:66:E9:C9:72:DF:35:2E:E1:5C:FA:C2:27:AF:6A:D1:D7:0E:8E:4A:6E:DC:BA:02
# Fingerprint (SHA1): 99:9A:64:C3:7F:F4:7D:9F:AB:95:F1:47:69:89:14:60:EE:C4:C3:C5
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft ECC Root Certificate
 Authority 2017"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\231\232\144\303\177\364\175\237\253\225\361\107\151\211\024\140
\356\304\303\305
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\335\241\003\346\112\223\020\321\277\360\031\102\313\376\355\147
END
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\066\060\064\006\003\125\004\003\023\055\115\151\143\162\157\163
\157\146\164\040\105\103\103\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\040\062\060\061\067
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\146\362\075\257\207\336\213\261\112\352\014\127\061\001
\302\354
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED
 CK_BBOOL CK_FALSE

#
# Certificate "Microsoft RSA Root Certificate Authority 2017"
#
# Issuer: CN=Microsoft RSA Root Certificate Authority 2017,O=Microsoft Corporation,C=US
# Serial Number:1e:d3:97:09:5f:d8:b4:b3:47:70:1e:aa:be:7f:45:b3
# Subject: CN=Microsoft RSA Root Certificate Authority 2017,O=Microsoft Corporation,C=US
# Not Valid Before: Wed Dec 18 22:51:22 2019
# Not Valid After : Fri Jul 18 23:00:23 2042
# Fingerprint (SHA-256):
C7:41:F7:0F:4B:2A:8D:88:BF:2E:71:C1:41:22:EF:53:EF:10:EB:A0:CF:A5:E6:4C:FA:20:F4:18:85:30:73:E0
# Fingerprint (SHA1): 73:A5:E6:4A:3B:FF:83:16:FF:0E:DC:CC:61:8A:90:6E:4E:AE:4D:74
```

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft RSA Root Certificate Authority 2017"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\066\060\064\006\003\125\004\003\023\055\115\151\143\162\157\163
\157\146\164\040\122\123\101\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\040\062\060\061\067
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\066\060\064\006\003\125\004\003\023\055\115\151\143\162\157\163
\157\146\164\040\122\123\101\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\040\062\060\061\067
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\036\323\227\011\137\330\264\263\107\160\036\252\276\177
\105\263
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\250\060\202\003\220\240\003\002\001\002\002\020\036
\323\227\011\137\330\264\263\107\160\036\252\276\177\105\263\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\145
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\036\060
\034\006\003\125\004\012\023\025\115\151\143\162\157\163\157\146
\164\040\103\157\162\160\157\162\141\164\151\157\156\061\066\060
\064\006\003\125\004\003\023\055\115\151\143\162\157\163\157\146
\164\040\122\123\101\040\122\157\157\164\040\103\145\162\164\151
\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171
\040\062\060\061\067\060\036\027\015\061\071\061\062\061\070\062
\062\065\061\062\062\132\027\015\064\062\060\067\061\070\062\063
\060\060\062\063\132\060\145\061\013\060\011\006\003\125\004\006
\023\002\125\123\061\036\060\034\006\003\125\004\012\023\025\115
\151\143\162\157\163\157\146\164\040\103\157\162\160\157\162\141
\164\151\157\156\061\066\060\064\006\003\125\004\003\023\055\115
\151\143\162\157\163\157\146\164\040\122\123\101\040\122\157\157
\164\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165
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\164\150\157\162\151\164\171\040\062\060\061\067\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\312\133\276
\224\063\214\051\225\221\026\012\225\275\107\142\301\211\363\231
\066\337\106\220\311\245\355\170\152\157\107\221\150\370\047\147
\120\063\035\241\246\373\340\345\103\243\204\002\127\001\135\234
\110\100\202\123\020\274\277\307\073\150\220\266\202\055\345\364
\145\320\314\155\031\314\225\371\173\254\112\224\255\016\336\113
\103\035\207\007\222\023\220\200\203\144\065\071\004\374\345\351
\154\263\266\037\120\224\070\145\120\134\027\106\271\266\205\265
\034\265\027\350\326\105\235\330\262\046\260\312\304\160\112\256
\140\244\335\263\331\354\374\073\325\127\162\274\077\310\311\262
\336\113\153\370\043\154\003\300\005\275\225\307\315\163\073\146
\200\144\343\032\254\056\371\107\005\362\006\266\233\163\365\170
\063\133\307\241\373\047\052\241\264\232\221\214\221\323\072\202
\076\166\100\264\315\122\141\121\160\050\077\305\305\132\362\311
\214\111\273\024\133\115\310\377\147\115\114\022\226\255\365\376
\170\250\227\207\327\375\136\040\200\334\241\113\042\373\324\211
\255\272\316\107\227\107\125\173\217\105\310\147\050\204\225\034
\150\060\357\357\111\340\065\173\144\347\230\260\224\332\115\205
\073\076\125\304\050\257\127\363\236\023\333\106\047\237\036\242
\136\104\203\244\245\312\325\023\263\113\077\304\343\302\346\206
\141\244\122\060\271\172\040\117\157\017\070\123\313\063\014\023
\053\217\326\232\275\052\310\055\261\034\175\113\121\312\107\321
\110\047\162\135\207\353\325\105\346\110\145\235\257\122\220\272
\133\242\030\145\127\022\237\150\271\324\025\153\224\304\151\042
\230\364\063\340\355\371\121\216\101\120\311\064\117\166\220\254
\374\070\301\330\341\173\271\343\343\224\341\106\151\313\016\012
\120\153\023\272\254\017\067\132\267\022\265\220\201\036\126\256
\127\042\206\331\311\322\321\327\121\343\253\073\306\125\375\036
\016\323\164\012\321\332\252\352\151\270\227\050\217\110\304\007
\370\122\103\072\364\312\125\065\054\260\246\152\300\234\371\362
\201\341\022\152\300\105\331\147\263\316\377\043\242\211\012\124
\324\024\271\052\250\327\354\371\253\315\045\130\062\171\217\220
\133\230\071\304\010\006\301\254\177\016\075\000\245\002\003\001
\000\001\243\124\060\122\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026
\004\024\011\313\131\177\206\262\160\217\032\303\071\343\300\331
\351\277\273\115\262\043\060\020\006\011\053\006\001\004\001\202
\067\025\001\004\003\002\001\000\060\015\006\011\052\206\110\206
\367\015\001\001\014\005\000\003\202\002\001\000\254\257\076\135
\302\021\226\211\216\243\347\222\326\227\025\270\023\242\246\102
\056\002\315\026\005\131\047\312\040\350\272\270\350\032\354\115
\250\227\126\256\145\103\261\217\000\233\122\315\125\315\123\071
\155\142\114\213\015\133\174\056\104\277\203\020\217\363\123\202
\200\303\117\072\307\156\021\077\346\343\026\221\204\373\155\204
\177\064\164\255\211\247\316\271\327\327\237\204\144\222\276\225

\241\255\011\123\063\335\356\012\352\112\121\216\157\125\253\272
\265\224\106\256\214\177\330\242\120\045\145\140\200\106\333\063
\004\256\154\265\230\164\124\045\334\223\344\370\343\125\025\075
\270\155\303\012\244\022\301\151\205\156\337\144\361\123\231\341
\112\165\040\235\225\017\344\326\334\003\361\131\030\350\107\211
\262\127\132\224\266\251\330\027\053\027\111\345\166\313\301\126
\231\072\067\261\377\151\054\221\221\223\341\337\114\243\067\166
\115\241\237\370\155\036\035\323\372\354\373\364\105\035\023\155
\317\367\131\345\042\047\162\053\206\363\127\273\060\355\044\115
\334\175\126\273\243\263\370\064\171\211\301\340\362\002\141\367
\246\374\017\273\034\027\013\256\101\331\174\275\047\243\375\056
\072\321\223\224\261\163\035\044\213\257\133\040\211\255\267\147
\146\171\365\072\306\246\226\063\376\123\222\310\106\261\021\221
\306\231\177\217\311\326\146\061\040\101\020\207\055\014\326\301
\257\064\230\312\144\203\373\023\127\321\301\360\074\172\214\245
\301\375\225\041\240\161\301\223\147\161\022\352\217\210\012\151
\031\144\231\043\126\373\254\052\056\160\276\146\304\014\204\357
\345\213\363\223\001\370\152\220\223\147\113\262\150\243\265\142
\217\351\077\214\172\073\136\017\347\214\270\306\174\357\067\375
\164\342\310\117\063\162\341\224\071\155\275\022\257\276\014\116
\160\174\033\157\215\263\062\223\163\104\026\155\350\364\367\340
\225\200\217\226\135\070\244\364\253\336\012\060\207\223\330\115
\000\161\142\105\047\113\072\102\204\133\177\145\267\147\064\122
\055\234\026\153\252\250\330\173\243\102\114\161\307\014\312\076
\203\344\246\357\267\001\060\136\121\243\171\365\160\151\246\101
\104\017\206\260\054\221\306\075\352\256\017\204
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Microsoft RSA
Root Certificate Authority 2017"
# Issuer: CN=Microsoft RSA Root Certificate Authority 2017,O=Microsoft Corporation,C=US
# Serial Number:1e:d3:97:09:5f:d8:b4:b3:47:70:1e:aa:be:7f:45:b3
# Subject: CN=Microsoft RSA Root Certificate Authority 2017,O=Microsoft Corporation,C=US
# Not Valid Before: Wed Dec 18 22:51:22 2019
# Not Valid After : Fri Jul 18 23:00:23 2042
# Fingerprint (SHA-256):
C7:41:F7:0F:4B:2A:8D:88:BF:2E:71:C1:41:22:EF:53:EF:10:EB:A0:CF:A5:E6:4C:FA:20:F4:18:85:30:73:E0
# Fingerprint (SHA1): 73:A5:E6:4A:3B:FF:83:16:FF:0E:DC:CC:61:8A:90:6E:4E:AE:4D:74
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft RSA Root Certificate Authority 2017"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL

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\163\245\346\112\073\377\203\026\377\016\334\314\141\212\220\156
\116\256\115\164
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\020\377\000\377\317\311\370\307\172\300\356\065\216\311\017\107
END
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\066\060\064\006\003\125\004\003\023\055\115\151\143\162\157\163
\157\146\164\040\122\123\101\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\040\062\060\061\067
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\036\323\227\011\137\330\264\263\107\160\036\252\276\177
\105\263
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "e-Szigno Root CA 2017"
#
# Issuer: CN=e-Szigno Root CA 2017,OID.2.5.4.97=VATHU-23584497,O=Microsec Ltd.,L=Budapest,C=HU
# Serial Number:01:54:48:ef:21:fd:97:59:0d:f5:04:0a
# Subject: CN=e-Szigno Root CA 2017,OID.2.5.4.97=VATHU-23584497,O=Microsec
 Ltd.,L=Budapest,C=HU
# Not Valid Before: Tue Aug 22 12:07:06 2017
# Not Valid After : Fri Aug 22 12:07:06 2042
# Fingerprint (SHA-256):
BE:B0:0B:30:83:9B:9B:C3:2C:32:E4:44:79:05:95:06:41:F2:64:21:B1:5E:D0:89:19:8B:51:8A:E2:EA:1B:99
# Fingerprint (SHA1): 89:D4:83:03:4F:9E:9A:48:80:5F:72:37:D4:A9:A6:EF:CB:7C:1F:D1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "e-Szigno Root CA 2017"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\161\061\013\060\011\006\003\125\004\006\023\002\110\125\061
\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160\145
\163\164\061\026\060\024\006\003\125\004\012\014\015\115\151\143
\162\157\163\145\143\040\114\164\144\056\061\027\060\025\006\003
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\125\004\141\014\016\126\101\124\110\125\055\062\063\065\070\064
\064\071\067\061\036\060\034\006\003\125\004\003\014\025\145\055
\123\172\151\147\156\157\040\122\157\157\164\040\103\101\040\062
\060\061\067
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\161\061\013\060\011\006\003\125\004\006\023\002\110\125\061
\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160\145
\163\164\061\026\060\024\006\003\125\004\012\014\015\115\151\143
\162\157\163\145\143\040\114\164\144\056\061\027\060\025\006\003
\125\004\141\014\016\126\101\124\110\125\055\062\063\065\070\064
\064\071\067\061\036\060\034\006\003\125\004\003\014\025\145\055
\123\172\151\147\156\157\040\122\157\157\164\040\103\101\040\062
\060\061\067
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\014\001\124\110\357\041\375\227\131\015\365\004\012
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\100\060\202\001\345\240\003\002\001\002\002\014\001
\124\110\357\041\375\227\131\015\365\004\012\060\012\006\010\052
\206\110\316\075\004\003\002\060\161\061\013\060\011\006\003\125
\004\006\023\002\110\125\061\021\060\017\006\003\125\004\007\014
\010\102\165\144\141\160\145\163\164\061\026\060\024\006\003\125
\004\012\014\015\115\151\143\162\157\163\145\143\040\114\164\144
\056\061\027\060\025\006\003\125\004\141\014\016\126\101\124\110
\125\055\062\063\065\070\064\064\071\067\061\036\060\034\006\003
\125\004\003\014\025\145\055\123\172\151\147\156\157\040\122\157
\157\164\040\103\101\040\062\060\061\067\060\036\027\015\061\067
\060\070\062\062\061\062\060\067\060\066\132\027\015\064\062\060
\070\062\062\061\062\060\067\060\066\132\060\161\061\013\060\011
\006\003\125\004\006\023\002\110\125\061\021\060\017\006\003\125
\004\007\014\010\102\165\144\141\160\145\163\164\061\026\060\024
\006\003\125\004\012\014\015\115\151\143\162\157\163\145\143\040
\114\164\144\056\061\027\060\025\006\003\125\004\141\014\016\126
\101\124\110\125\055\062\063\065\070\064\064\071\067\061\036\060
\034\006\003\125\004\003\014\025\145\055\123\172\151\147\156\157
\040\122\157\157\164\040\103\101\040\062\060\061\067\060\131\060
\023\006\007\052\206\110\316\075\002\001\006\010\052\206\110\316
\075\003\001\007\003\102\000\004\226\334\075\212\330\260\173\157
\306\047\276\104\220\261\263\126\025\173\216\103\044\175\032\204
\131\356\143\150\262\306\136\207\320\025\110\036\250\220\255\275
\123\242\332\336\072\220\246\140\137\150\062\265\206\101\337\207
\133\054\173\305\376\174\172\332\243\143\060\141\060\017\006\003
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006

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\003\125\035\016\004\026\004\024\207\021\025\010\321\252\301\170
\014\261\257\316\306\311\220\357\277\060\004\300\060\037\006\003
\125\035\043\004\030\060\026\200\024\207\021\025\010\321\252\301
\170\014\261\257\316\306\311\220\357\277\060\004\300\060\012\006
\010\052\206\110\316\075\004\003\002\003\111\000\060\106\002\041
\000\265\127\335\327\212\125\013\066\341\206\104\372\324\331\150
\215\270\334\043\212\212\015\324\057\175\352\163\354\277\115\154
\250\002\041\000\313\245\264\022\372\347\265\350\317\176\223\374
\363\065\217\157\116\132\174\264\274\116\262\374\162\252\133\131
\371\347\334\061
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "e-Szigno Root CA 2017"
# Issuer: CN=e-Szigno Root CA 2017,OID.2.5.4.97=VATHU-23584497,O=Microsec Ltd.,L=Budapest,C=HU
# Serial Number:01:54:48:ef:21:fd:97:59:0d:f5:04:0a
# Subject: CN=e-Szigno Root CA 2017,OID.2.5.4.97=VATHU-23584497,O=Microsec Ltd.,L=Budapest,C=HU
# Not Valid Before: Tue Aug 22 12:07:06 2017
# Not Valid After : Fri Aug 22 12:07:06 2042
# Fingerprint (SHA-256):
BE:B0:0B:30:83:9B:9B:C3:2C:32:E4:44:79:05:95:06:41:F2:64:21:B1:5E:D0:89:19:8B:51:8A:E2:EA:1B:99
# Fingerprint (SHA1): 89:D4:83:03:4F:9E:9A:48:80:5F:72:37:D4:A9:A6:EF:CB:7C:1F:D1
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "e-Szigno Root CA 2017"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\211\324\203\003\117\236\232\110\200\137\162\067\324\251\246\357
\313\174\037\321
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\336\037\366\236\204\256\247\264\041\316\036\130\175\321\204\230
END
CKA_ISSUER MULTILINE_OCTAL
\060\161\061\013\060\011\006\003\125\004\006\023\002\110\125\061
\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160\145
\163\164\061\026\060\024\006\003\125\004\012\014\015\115\151\143
\162\157\163\145\143\040\114\164\144\056\061\027\060\025\006\003
\125\004\141\014\016\126\101\124\110\125\055\062\063\065\070\064
\064\071\067\061\036\060\034\006\003\125\004\003\014\025\145\055
\123\172\151\147\156\157\040\122\157\157\164\040\103\101\040\062
\060\061\067
END
```

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CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\014\001\124\110\357\041\375\227\131\015\365\004\012
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate
 "certSIGN Root CA G2"
#
# Issuer: OU=certSIGN ROOT CA G2,O=CERTSIGN SA,C=RO
# Serial Number:11:00:34:b6:4e:c6:36:2d:36
# Subject: OU=certSIGN ROOT CA G2,O=CERTSIGN SA,C=RO
# Not Valid Before: Mon Feb 06 09:27:35 2017
# Not Valid After : Thu Feb 06 09:27:35 2042
# Fingerprint (SHA-256):
65:7C:FE:2F:A7:3F:AA:38:46:25:71:F3:32:A2:36:3A:46:FC:E7:02:09:51:71:07:02:CD:FB:B6:EE:DA:33:05
# Fingerprint (SHA1): 26:F9:93:B4:ED:3D:28:27:B0:B9:4B:A7:E9:15:1D:A3:8D:92:E5:32
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "certSIGN Root CA G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\101\061\013\060\011\006\003\125\004\006\023\002\122\117\061
\024\060\022\006\003\125\004\012\023\013\103\105\122\124\123\111
\107\116\040\123\101\061\034\060\032\006\003\125\004\013\023\023
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\040\107\062
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\107\116\040\123\101\061\034\060\032\006\003\125\004\013\023\023
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\060\062\060\066\060\071\062\067\063\065\132\027\015\064\062\060
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\131\237\366\161\257\234\013\321\012\070\371\006\042\203\123\045
\014\374\121\304\346\276\342\071\225\013\044\255\257\321\225\344
\226\327\164\144\153\161\116\002\074\252\205\363\040\243\103\071
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CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER
 CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "certSIGN Root CA G2"
# Issuer: OU=certSIGN ROOT CA G2,O=CERTSIGN SA,C=RO
# Serial Number:11:00:34:b6:4e:c6:36:2d:36
# Subject: OU=certSIGN ROOT CA G2,O=CERTSIGN SA,C=RO
# Not Valid Before: Mon Feb 06 09:27:35 2017
# Not Valid After : Thu Feb 06 09:27:35 2042

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# Fingerprint (SHA-256):
65:7C:FE:2F:A7:3F:AA:38:46:25:71:F3:32:A2:36:3A:46:FC:E7:02:09:51:71:07:02:CD:FB:B6:EE:DA:33:05
# Fingerprint (SHA1): 26:F9:93:B4:ED:3D:28:27:B0:B9:4B:A7:E9:15:1D:A3:8D:92:E5:32
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "certSIGN Root CA G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\046\371\223\264\355\075\050\047\260\271\113\247\351\025\035\243
\215\222\345\062
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
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\107\116\040\123\101\061\034\060\032\006\003\125\004\013\023\023
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\040\107\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\011\021\000\064\266\116\306\066\055\066
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Trustwave Global Certification Authority"
#
# Issuer: CN=Trustwave Global Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US
# Serial Number:05:f7:0e:86:da:49:f3:46:35:2e:ba:b2
# Subject: CN=Trustwave Global Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US
# Not Valid Before: Wed Aug 23 19:34:12 2017
# Not Valid After : Sat Aug 23 19:34:12 2042
# Fingerprint (SHA-256):
97:55:20:15:F5:DD:FC:3C:87:88:C0:06:94:45:55:40:88:94:45:00:84:F1:00:86:70:86:BC:1A:2B:B5:8D:C8
#
 Fingerprint (SHA1): 2F:8F:36:4F:E1:58:97:44:21:59:87:A5:2A:9A:D0:69:95:26:7F:B5
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
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CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Trustwave Global Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
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\157\151\163\061\020\060\016\006\003\125\004\007\014\007\103\150
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\014\030
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\147\163\054\040\111\156\143\056\061\061\060\057\006\003\125\004
\003\014\050\124\162\165\163\164\167\141\166\145\040\107\154\157
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\157\151\163\061\020\060\016\006\003\125\004\007\014\007\103\150
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\163\164\167\141\166\145\040\107\154\157\142\141\154\040\103\145
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\071\063\064\061\062\132\027\015\064\062\060\070\062\063\061\071
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\126\047\006\151\345\162\101\201\323\266\001\211\240\057\072\162
\171\376\072\060\277\101\354\307\142\076\221\113\307\331\061\166
\102\371\367\074\143\354\046\214\163\014\175\032\035\352\250\174
\207\250\302\047\174\341\063\101\017\317\317\374\000\240\042\200
\236\112\247\157\000\260\101\105\267\042\312\150\110\305\102\242
\256\335\035\362\340\156\116\005\130\261\300\220\026\052\244\075
\020\100\276\217\142\143\203\251\234\202\175\055\002\351\203\060
\174\313\047\311\375\036\146\000\260\056\323\041\057\216\063\026
\154\230\355\020\250\007\326\314\223\317\333\321\151\034\344\312
\311\340\266\234\351\316\161\161\336\154\077\026\244\171
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for
"Trustwave Global Certification Authority"
# Issuer: CN=Trustwave Global Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US
# Serial Number:05:f7:0e:86:da:49:f3:46:35:2e:ba:b2
# Subject: CN=Trustwave Global Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US
# Not Valid Before: Wed Aug 23 19:34:12 2017
# Not Valid After : Sat Aug 23 19:34:12 2042
# Fingerprint (SHA-256):
97:55:20:15:F5:DD:FC:3C:87:88:C0:06:94:45:55:40:88:94:45:00:84:F1:00:86:70:86:BC:1A:2B:B5:8D:C8
# Fingerprint (SHA1): 2F:8F:36:4F:E1:58:97:44:21:59:87:A5:2A:9A:D0:69:95:26:7F:B5
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

```
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Trustwave Global Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\057\217\066\117\341\130\227\104\041\131\207\245\052\232\320\151
\225\046\177\265
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\370\034\030\055\057\272\137\155\241\154\274\307\253\221\307\016
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\021\060\017\006\003\125\004\010\014\010\111\154\154\151\156
\157\151\163\061\020\060\016\006\003\125\004\007\014\007\103\150
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\014\030
\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156
\147\163\054\040\111\156\143\056\061\061\060\057\006\003\125\004
\003\014\050\124\162\165\163\164\167\141\166\145\040\107\154\157
\142\141\154\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\014\005\367\016\206\332\111\363\106\065\056\272\262
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Trustwave Global ECC P256 Certification Authority"
#
#
 Issuer: CN=Trustwave Global ECC P256 Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US
# Serial Number:0d:6a:5f:08:3f:28:5c:3e:51:95:df:5d
# Subject: CN=Trustwave Global ECC P256 Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US
# Not Valid Before: Wed Aug 23 19:35:10 2017
# Not Valid After : Sat Aug 23 19:35:10 2042
# Fingerprint (SHA-256):
94:5B:BC:82:5E:A5:54:F4:89:D1:FD:51:A7:3D:DF:2E:A6:24:AC:70:19:A0:52:05:22:5C:22:A7:8C:CF:A8:B4
# Fingerprint (SHA1): B4:90:82:DD:45:0C:BE:8B:5B:B1:66:D3:E2:A4:08:26:CD:ED:42:CF
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
```

CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Trustwave Global ECC P256 Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\221\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\021\060\017\006\003\125\004\010\023\010\111\154\154\151\156
\157\151\163\061\020\060\016\006\003\125\004\007\023\007\103\150
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\023\030
\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156
\147\163\054\040\111\156\143\056\061\072\060\070\006\003\125\004
\003\023\061\124\162\165\163\164\167\141\166\145\040\107\154\157
\142\141\154\040\105\103\103\040\120\062\065\066\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\221\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\021\060\017\006\003\125\004\010\023\010\111\154\154\151\156
\157\151\163\061\020\060\016\006\003\125\004\007\023\007\103\150
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\023\030
\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156
\147\163\054\040\111\156\143\056\061\072\060\070\006\003\125\004
\003\023\061\124\162\165\163\164\167\141\166\145\040\107\154\157
\142\141\154\040\105\103\103\040\120\062\065\066\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\014\015\152\137\010\077\050\134\076\121\225\337\135
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\140\060\202\002\007\240\003\002\001\002\002\014\015
\152\137\010\077\050\134\076\121\225\337\135\060\012\006\010\052
\206\110\316\075\004\003\002\060\201\221\061\013\060\011\006\003
\125\004\006\023\002\125\123\061\021\060\017\006\003\125\004\010
\023\010\111\154\154\151\156\157\151\163\061\020\060\016\006\003
\125\004\007\023\007\103\150\151\143\141\147\157\061\041\060\037
\006\003\125\004\012\023\030\124\162\165\163\164\167\141\166\145
\040\110\157\154\144\151\156\147\163\054\040\111\156\143\056\061
\072\060\070\006\003\125\004\003\023\061\124\162\165\163\164\167
\141\166\145\040\107\154\157\142\141\154\040\105\103\103\040\120
\062\065\066\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\060\036\027\015\061
\067\060\070\062\063\061\071\063\065\061\060\132\027\015\064\062
\060\070\062\063\061\071\063\065\061\060\132\060\201\221\061\013

\060\011\006\003\125\004\006\023\002\125\123\061\021\060\017\006
\003\125\004\010\023\010\111\154\154\151\156\157\151\163\061\020
\060\016\006\003\125\004\007\023\007\103\150\151\143\141\147\157
\061\041\060\037\006\003\125\004\012\023\030\124\162\165\163\164
\167\141\166\145\040\110\157\154\144\151\156\147\163\054\040\111
\156\143\056\061\072\060\070\006\003\125\004\003\023\061\124\162
\165\163\164\167\141\166\145\040\107\154\157\142\141\154\040\105
\103\103\040\120\062\065\066\040\103\145\162\164\151\146\151\143
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171\060
\131\060\023\006\007\052\206\110\316\075\002\001\006\010\052\206
\110\316\075\003\001\007\003\102\000\004\176\373\154\346\043\343
\163\062\010\312\140\346\123\234\272\164\215\030\260\170\220\122
\200\335\070\300\112\035\321\250\314\223\244\227\006\070\312\015
\025\142\306\216\001\052\145\235\252\337\064\221\056\201\301\344
\063\222\061\304\375\011\072\246\077\255\243\103\060\101\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\017\006\003\125\035\017\001\001\377\004\005\003\003\007\006\000
\060\035\006\003\125\035\016\004\026\004\024\243\101\006\254\220
\155\321\112\353\165\245\112\020\231\263\261\241\213\112\367\060
\012\006\010\052\206\110\316\075\004\003\002\003\107\000\060\104
\002\040\007\346\124\332\016\240\132\262\256\021\237\207\305\266
\377\151\336\045\276\370\240\267\010\363\104\316\052\337\010\041
\014\067\002\040\055\046\003\240\005\275\153\321\366\134\370\145
\314\206\155\263\234\064\110\143\204\011\305\215\167\032\342\314
\234\341\164\173
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Trustwave Global ECC P256 Certification Authority"
# Issuer: CN=Trustwave Global ECC P256 Certification Authority,O="Trustwave Holdings, Inc.",L=Chicago,ST=Illinois,C=US
# Serial Number:0d:6a:5f:08:3f:28:5c:3e:51:95:df:5d
# Subject: CN=Trustwave Global ECC P256 Certification Authority,O="Trustwave Holdings, Inc.",L=Chicago,ST=Illinois,C=US
# Not Valid Before: Wed Aug 23 19:35:10 2017
# Not Valid After : Sat Aug 23 19:35:10 2042
# Fingerprint (SHA-256): 94:5B:BC:82:5E:A5:54:F4:89:D1:FD:51:A7:3D:DF:2E:A6:24:AC:70:19:A0:52:05:22:5C:22:A7:8C:CF:A8:B4
# Fingerprint (SHA1): B4:90:82:DD:45:0C:BE:8B:5B:B1:66:D3:E2:A4:08:26:CD:ED:42:CF
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Trustwave Global ECC P256 Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\264\220\202\335\105\014\276\213\133\261\146\323\342\244\010\046
\315\355\102\317
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\133\104\343\215\135\066\206\046\350\015\005\322\131\247\203\124
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\221\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\021\060\017\006\003\125\004\010\023\010\111\154\154\151\156
\157\151\163\061\020\060\016\006\003\125\004\007\023\007\103\150
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\023\030
\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156
\147\163\054\040\111\156\143\056\061\072\060\070\006\003\125\004
\003\023\061\124\162\165\163\164\167\141\166\145\040\107\154\157
\142\141\154\040\105\103\103\040\120\062\065\066\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\014\015\152\137\010\077\050\134\076\121\225\337\135
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Trustwave Global ECC P384 Certification Authority"
#
# Issuer: CN=Trustwave Global ECC
P384 Certification Authority,O="Trustwave Holdings, Inc.",L=Chicago,ST=Illinois,C=US
# Serial Number:08:bd:85:97:6c:99:27:a4:80:68:47:3b
# Subject: CN=Trustwave Global ECC P384 Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US
# Not Valid Before: Wed Aug 23 19:36:43 2017
# Not Valid After : Sat Aug 23 19:36:43 2042
# Fingerprint (SHA-256):
55:90:38:59:C8:C0:C3:EB:B8:75:9E:CE:4E:25:57:22:5F:F5:75:8B:BD:38:EB:D4:82:76:60:1E:1B:D5:80:97
# Fingerprint (SHA1): E7:F3:A3:C8:CF:6F:C3:04:2E:6D:0E:67:32:C5:9E:68:95:0D:5E:D2
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Trustwave Global ECC P384 Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\221\061\013\060\011\006\003\125\004\006\023\002\125\123

\061\021\060\017\006\003\125\004\010\023\010\111\154\154\151\156
\157\151\163\061\020\060\016\006\003\125\004\007\023\007\103\150
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\023\030
\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156
\147\163\054\040\111\156\143\056\061\072\060\070\006\003\125\004
\003\023\061\124\162\165\163\164\167\141\166\145\040\107\154\157
\142\141\154\040\105\103\103\040\120\063\070\064\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\221\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\021\060\017\006\003\125\004\010\023\010\111\154\154\151\156
\157\151\163\061\020\060\016\006\003\125\004\007\023\007\103\150
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\023\030
\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156
\147\163\054\040\111\156\143\056\061\072\060\070\006\003\125\004
\003\023\061\124\162\165\163\164\167\141\166\145\040\107\154\157
\142\141\154\040\105\103\103\040\120\063\070\064\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\014\010\275\205\227\154\231\047\244\200\150\107\073
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\235\060\202\002\044\240\003\002\001\002\002\014\010
\275\205\227\154\231\047\244\200\150\107\073\060\012\006\010\052
\206\110\316\075\004\003\003\060\201\221\061\013\060\011\006\003
\125\004\006\023\002\125\123\061\021\060\017\006\003\125\004\010
\023\010\111\154\154\151\156\157\151\163\061\020\060\016\006\003
\125\004\007\023\007\103\150\151\143\141\147\157\061\041\060\037
\006\003\125\004\012\023\030\124\162\165\163\164\167\141\166\145
\040\110\157\154\144\151\156\147\163\054\040\111\156\143\056\061
\072\060\070\006\003\125\004\003\023\061\124\162\165\163\164\167
\141\166\145\040\107\154\157\142\141\154\040\105\103\103\040\120
\063\070\064\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\060\036\027\015\061
\067\060\070\062\063\061\071\063\066\064\063\132\027\015\064\062
\060\070\062\063\061\071\063\066\064\063\132\060\201\221\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\021\060\017\006
\003\125\004\010\023\010\111\154\154\151\156\157\151\163\061\020
\060\016\006\003\125\004\007\023\007\103\150\151\143\141\147\157
\061\041\060\037\006\003\125\004\012\023\030\124\162\165\163\164
\167\141\166\145\040\110\157\154\144\151\156\147\163\054\040\111

\156\143\056\061\072\060\070\006\003\125\004\003\023\061\124\162
\165\163\164\167\141\166\145\040\107\154\157\142\141\154\040\105
\103\103\040\120\063\070\064\040\103\145\162\164\151\146\151\143
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171\060
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201
\004\000\042\003\142\000\004\153\332\015\165\065\010\061\107\005
\256\105\231\125\361\021\023\056\112\370\020\061\043\243\176\203
\323\177\050\010\072\046\032\072\317\227\202\037\200\267\047\011
\217\321\216\060\304\012\233\016\254\130\004\253\367\066\175\224
\043\244\233\012\212\213\253\353\375\071\045\146\361\136\376\214
\256\215\101\171\235\011\140\316\050\251\323\212\155\363\326\105
\324\362\230\204\070\145\240\243\103\060\101\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\017\006\003
\125\035\017\001\001\377\004\005\003\003\007\006\000\060\035\006
\003\125\035\016\004\026\004\024\125\251\204\211\322\301\062\275
\030\313\154\246\007\116\310\347\235\276\202\220\060\012\006\010
\052\206\110\316\075\004\003\003\003\147\000\060\144\002\060\067
\001\222\227\105\022\176\240\363\076\255\031\072\162\335\364\120
\223\003\022\276\104\322\117\101\244\214\234\235\037\243\366\302
\222\347\110\024\376\116\233\245\221\127\256\306\067\162\273\002
\060\147\045\012\261\014\136\356\251\143\222\157\345\220\013\376
\146\042\312\107\375\212\061\367\203\376\172\277\020\276\030\053
\036\217\366\051\036\224\131\357\216\041\067\313\121\230\245\156
\113
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER
 CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Trustwave Global ECC P384 Certification Authority"
# Issuer: CN=Trustwave Global ECC P384 Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US
# Serial Number:08:bd:85:97:6c:99:27:a4:80:68:47:3b
# Subject: CN=Trustwave Global ECC P384 Certification Authority,O="Trustwave Holdings,
Inc.",L=Chicago,ST=Illinois,C=US
# Not Valid Before: Wed Aug 23 19:36:43 2017
# Not Valid After : Sat Aug 23 19:36:43 2042
# Fingerprint (SHA-256):
55:90:38:59:C8:C0:C3:EB:B8:75:9E:CE:4E:25:57:22:5F:F5:75:8B:BD:38:EB:D4:82:76:60:1E:1B:D5:80:97
# Fingerprint (SHA1): E7:F3:A3:C8:CF:6F:C3:04:2E:6D:0E:67:32:C5:9E:68:95:0D:5E:D2
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Trustwave Global ECC P384 Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL

```
\347\363\243\310\317\157\303\004\056\155\016\147\062\305\236\150
\225\015\136\322
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\352\317\140\304\073\271\025\051\100\241\227\355\170\047\223\326
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\221\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\021\060\017\006\003\125\004\010\023\010\111\154\154\151\156
\157\151\163\061\020\060\016\006\003\125\004\007\023\007\103\150
\151\143\141\147\157\061\041\060\037\006\003\125\004\012\023\030
\124\162\165\163\164\167\141\166\145\040\110\157\154\144\151\156
\147\163\054\040\111\156\143\056\061\072\060\070\006\003\125\004
\003\023\061\124\162\165\163\164\167\141\166\145\040\107\154\157
\142\141\154\040\105\103\103\040\120\063\070\064\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\014\010\275\205\227\154\231\047\244\200\150\107\073
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "NAVER Global Root Certification Authority"
#
# Issuer: CN=NAVER Global Root Certification Authority,O=NAVER BUSINESS PLATFORM Corp.,C=KR
# Serial Number:01:94:30:1e:a2:0b:dd:f5:c5:33:2a:b1:43:44:71:f8:d6:50:4d:0d
# Subject: CN=NAVER Global Root Certification Authority,O=NAVER BUSINESS PLATFORM Corp.,C=KR
# Not Valid Before: Fri Aug 18 08:58:42 2017
# Not Valid After : Tue Aug 18 23:59:59 2037
# Fingerprint (SHA-256):
88:F4:38:DC:F8:FF:D1:FA:8F:42:91:15:FF:E5:F8:2A:E1:E0:6E:0C:70:C3:75:FA:AD:71:7B:34:A4:9E:72:65
# Fingerprint (SHA1): 8F:6B:F2:A9:27:4A:DA:14:A0:C4:F4:8E:61:27:F9:C0:1E:78:5D:D1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "NAVER Global Root Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\151\061\013\060\011\006\003\125\004\006\023\002\113\122\061
\046\060\044\006\003\125\004\012\014\035\116\101\126\105\122\040
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\102\125\123\111\116\105\123\123\040\120\114\101\124\106\117\122
\115\040\103\157\162\160\056\061\062\060\060\006\003\125\004\003
\014\051\116\101\126\105\122\040\107\154\157\142\141\154\040\122
\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\151\061\013\060\011\006\003\125\004\006\023\002\113\122\061
\046\060\044\006\003\125\004\012\014\035\116\101\126\105\122\040
\102\125\123\111\116\105\123\123\040\120\114\101\124\106\117\122
\115\040\103\157\162\160\056\061\062\060\060\006\003\125\004\003
\014\051\116\101\126\105\122\040\107\154\157\142\141\154\040\122
\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\001\224\060\036\242\013\335\365\305\063\052\261\103\104
\161\370\326\120\115\015
END
CKA_VALUE
 MULTILINE_OCTAL
\060\202\005\242\060\202\003\212\240\003\002\001\002\002\024\001
\224\060\036\242\013\335\365\305\063\052\261\103\104\161\370\326
\120\115\015\060\015\006\011\052\206\110\206\367\015\001\001\014
\005\000\060\151\061\013\060\011\006\003\125\004\006\023\002\113
\122\061\046\060\044\006\003\125\004\012\014\035\116\101\126\105
\122\040\102\125\123\111\116\105\123\123\040\120\114\101\124\106
\117\122\115\040\103\157\162\160\056\061\062\060\060\006\003\125
\004\003\014\051\116\101\126\105\122\040\107\154\157\142\141\154
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\060\036\027
\015\061\067\060\070\061\070\060\070\065\070\064\062\132\027\015
\063\067\060\070\061\070\062\063\065\071\065\071\132\060\151\061
\013\060\011\006\003\125\004\006\023\002\113\122\061\046\060\044
\006\003\125\004\012\014\035\116\101\126\105\122\040\102\125\123
\111\116\105\123\123\040\120\114\101\124\106\117\122\115\040\103
\157\162\160\056\061\062\060\060\006\003\125\004\003\014\051\116
\101\126\105\122\040\107\154\157\142\141\154\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\060\202\002\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000
\060\202\002\012\002\202\002\001\000\266\324\361\223\134\265\100
\211\012\253\015\220\133\120\143\256\220\224\164\027\105\162\326
\173\145\132\051\113\247\126\240\113\270\057\102\165\351\331\173
\044\132\061\145\253\027\027\321\063\072\331\021\334\100\066\207
\337\307\152\351\046\136\131\212\167\343\350\110\234\061\026\372

\076\221\261\312\311\243\342\237\316\041\123\243\002\066\060\313
\122\002\345\332\062\135\303\305\346\371\356\021\307\213\311\104
\036\204\223\030\112\264\237\345\022\144\151\320\046\205\142\001
\266\311\002\035\276\203\121\273\134\332\370\255\025\152\231\367
\222\124\367\064\133\351\277\352\051\201\022\324\123\221\226\263
\221\132\335\376\220\163\050\373\060\106\265\312\010\007\307\161
\162\311\146\323\064\227\366\214\364\030\112\341\320\075\132\105
\266\151\247\051\373\043\316\210\330\022\234\000\110\250\246\017
\263\073\222\215\161\016\164\305\213\310\114\371\364\233\216\270
\074\151\355\157\073\120\057\130\355\304\260\320\034\033\152\014
\342\274\104\252\330\315\024\135\224\170\141\277\016\156\332\052
\274\057\014\013\161\246\263\026\077\234\346\371\314\237\123\065
\342\003\240\240\030\277\273\361\276\364\326\214\207\015\102\367
\006\271\361\155\355\004\224\250\376\266\323\006\306\100\141\337
\235\235\363\124\166\316\123\072\001\246\222\101\354\004\243\217
\015\242\325\011\312\326\313\232\361\357\103\135\300\253\245\101
\317\134\123\160\160\311\210\246\055\324\153\141\163\120\046\206
\141\016\137\033\302\053\342\214\325\273\235\301\003\102\272\224
\332\137\251\260\312\314\115\012\357\107\151\003\057\042\373\361
\050\316\277\135\120\145\250\220\155\263\164\260\010\307\254\250
\321\353\076\234\374\135\032\203\056\053\313\265\363\104\235\072
\247\027\141\226\242\161\323\160\226\025\115\267\114\163\356\031
\134\305\133\076\101\376\254\165\140\073\033\143\316\000\335\332
\010\220\142\264\345\055\356\110\247\153\027\231\124\276\207\112
\343\251\136\004\114\353\020\155\124\326\357\361\350\362\142\026
\313\200\153\355\075\355\365\037\060\245\256\113\311\023\355\212
\001\001\311\270\121\130\300\146\072\261\146\113\304\325\061\002
\142\351\164\204\014\333\115\106\055\002\003\001\000\001\243\102
\060\100\060\035\006\003\125\035\016\004\026\004\024\322\237\210
\337\241\315\054\275\354\365\073\001\001\223\063\047\262\353\140
\113\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\006\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\015\006\011\052\206\110\206\367\015\001\001\014\005
\000\003\202\002\001\000\062\312\200\263\235\075\124\006\335\322
\322\056\360\244\001\041\013\147\110\312\155\216\340\310\252\015
\252\215\041\127\217\306\076\172\312\333\121\324\122\263\324\226
\204\245\130\140\177\345\013\216\037\365\334\012\025\201\345\073
\266\267\042\057\011\234\023\026\261\154\014\065\010\155\253\143
\162\355\334\276\354\307\127\346\060\040\161\326\327\020\301\023
\125\001\214\052\103\344\101\361\317\072\172\123\222\316\242\003
\005\015\070\337\002\273\020\056\331\073\322\233\172\300\241\246
\370\265\061\346\364\165\311\271\123\231\165\107\042\132\024\025
\307\170\033\266\235\351\014\370\033\166\361\205\204\336\241\332
\022\357\244\342\020\227\172\170\336\014\121\227\250\041\100\213
\206\275\015\360\136\116\113\066\273\073\040\037\212\102\126\341
\013\032\277\173\320\042\103\054\104\214\373\345\052\264\154\034
\034\272\224\340\023\176\041\346\232\302\313\305\102\144\264\036
\224\173\010\045\310\161\314\207\105\127\205\323\237\051\142\042

\203\121\227\000\030\227\167\152\230\222\311\174\140\154\337\154
\175\112\344\160\114\302\236\270\035\367\320\064\307\017\314\373
\247\377\003\276\255\160\220\332\013\335\310\155\227\137\232\177
\011\062\101\375\315\242\314\132\155\114\362\252\111\376\146\370
\351\330\065\353\016\050\036\356\110\057\072\320\171\011\070\174
\246\042\202\223\225\320\003\276\276\002\240\005\335\040\042\343
\157\035\210\064\140\306\346\012\271\011\165\013\360\007\350\151
\226\065\307\373\043\201\216\070\071\270\105\053\103\170\242\321
\054\024\377\015\050\162\162\225\233\136\011\333\211\104\230\252
\241\111\273\161\122\362\277\366\377\047\241\066\257\270\266\167
\210\335\072\244\155\233\064\220\334\024\135\060\277\267\353\027
\344\207\267\161\320\241\327\167\025\324\102\327\362\363\061\231
\135\233\335\026\155\077\352\006\043\370\106\242\042\355\223\366
\335\232\346\052\207\261\230\124\361\042\367\153\105\343\342\216
\166\035\232\215\304\006\215\066\267\024\363\235\124\151\267\216
\074\325\244\155\223\201\267\255\366\275\144\173\302\311\150\071
\240\222\234\315\064\206\221\220\372\144\121\235\376\376\353\245
\365\165\336\211\367\162
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER
 CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "NAVER Global Root Certification Authority"
# Issuer: CN=NAVER Global Root Certification Authority,O=NAVER BUSINESS PLATFORM Corp.,C=KR
# Serial Number:01:94:30:1e:a2:0b:dd:f5:c5:33:2a:b1:43:44:71:f8:d6:50:4d:0d
# Subject: CN=NAVER Global Root Certification Authority,O=NAVER BUSINESS PLATFORM Corp.,C=KR
# Not Valid Before: Fri Aug 18 08:58:42 2017
# Not Valid After : Tue Aug 18 23:59:59 2037
# Fingerprint (SHA-256):
88:F4:38:DC:F8:FF:D1:FA:8F:42:91:15:FF:E5:F8:2A:E1:E0:6E:0C:70:C3:75:FA:AD:71:7B:34:A4:9E:72:65
# Fingerprint (SHA1): 8F:6B:F2:A9:27:4A:DA:14:A0:C4:F4:8E:61:27:F9:C0:1E:78:5D:D1
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "NAVER Global Root Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\217\153\362\251\047\112\332\024\240\304\364\216\141\047\371\300
\036\170\135\321
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\310\176\101\366\045\073\365\011\263\027\350\106\075\277\320\233
END
CKA_ISSUER MULTILINE_OCTAL

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\060\151\061\013\060\011\006\003\125\004\006\023\002\113\122\061
\046\060\044\006\003\125\004\012\014\035\116\101\126\105\122\040
\102\125\123\111\116\105\123\123\040\120\114\101\124\106\117\122
\115\040\103\157\162\160\056\061\062\060\060\006\003\125\004\003
\014\051\116\101\126\105\122\040\107\154\157\142\141\154\040\122
\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\001\224\060\036\242\013\335\365\305\063\052\261\103\104
\161\370\326\120\115\015
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "AC RAIZ FNMT-RCM SERVIDORES SEGUROS"
#
# Issuer: CN=AC RAIZ FNMT-RCM
 SERVIDORES SEGUROS,OID.2.5.4.97=VATES-Q2826004J,OU=Ceres,O=FNMT-RCM,C=ES
# Serial Number:62:f6:32:6c:e5:c4:e3:68:5c:1b:62:dd:9c:2e:9d:95
# Subject: CN=AC RAIZ FNMT-RCM SERVIDORES SEGUROS,OID.2.5.4.97=VATES-
Q2826004J,OU=Ceres,O=FNMT-RCM,C=ES
# Not Valid Before: Thu Dec 20 09:37:33 2018
# Not Valid After : Sun Dec 20 09:37:33 2043
# Fingerprint (SHA-256):
55:41:53:B1:3D:2C:F9:DD:B7:53:BF:BE:1A:4E:0A:E0:8D:0A:A4:18:70:58:FE:60:A2:B8:62:B2:E4:B8:7B:CB
# Fingerprint (SHA1): 62:FF:D9:9E:C0:65:0D:03:CE:75:93:D2:ED:3F:2D:32:C9:E3:E5:4A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AC RAIZ FNMT-RCM SERVIDORES SEGUROS"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\170\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\021\060\017\006\003\125\004\012\014\010\106\116\115\124\055\122
\103\115\061\016\060\014\006\003\125\004\013\014\005\103\145\162
\145\163\061\030\060\026\006\003\125\004\141\014\017\126\101\124
\105\123\055\121\062\070\062\066\060\060\064\112\061\054\060\052
\006\003\125\004\003\014\043\101\103\040\122\101\111\132\040\106
\116\115\124\055\122\103\115\040\123\105\122\126\111\104\117\122
\105\123\040\123\105\107\125\122\117\123
END
CKA_ID
```

UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\170\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\021\060\017\006\003\125\004\012\014\010\106\116\115\124\055\122
\103\115\061\016\060\014\006\003\125\004\013\014\005\103\145\162
\145\163\061\030\060\026\006\003\125\004\141\014\017\126\101\124
\105\123\055\121\062\070\062\066\060\060\064\112\061\054\060\052
\006\003\125\004\003\014\043\101\103\040\122\101\111\132\040\106
\116\115\124\055\122\103\115\040\123\105\122\126\111\104\117\122
\105\123\040\123\105\107\125\122\117\123
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\142\366\062\154\345\304\343\150\134\033\142\335\234\056
\235\225
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\156\060\202\001\363\240\003\002\001\002\002\020\142
\366\062\154\345\304\343\150\134\033\142\335\234\056\235\225\060
\012\006\010\052\206\110\316\075\004\003\003\060\170\061\013\060
\011\006\003\125\004\006\023\002\105\123\061\021\060\017\006\003
\125\004\012\014\010\106\116\115\124\055\122\103\115\061\016\060
\014\006\003\125\004\013\014\005\103\145\162\145\163\061\030\060
\026\006\003\125\004\141\014\017\126\101\124\105\123\055\121\062
\070\062\066\060\060\064\112\061\054\060\052\006\003\125\004\003
\014\043\101\103\040\122\101\111\132\040\106\116\115\124\055\122
\103\115\040\123\105\122\126\111\104\117\122\105\123\040\123\105
\107\125\122\117\123\060\036\027\015\061\070\061\062\062\060\060
\071\063\067\063\063\132\027\015\064\063\061\062\062\060\060\071
\063\067\063\063\132\060\170\061\013\060\011\006\003\125\004\006
\023\002\105\123\061\021\060\017\006\003\125\004\012\014\010\106
\116\115\124\055\122\103\115\061\016\060\014\006\003\125\004\013
\014\005\103\145\162\145\163\061\030\060\026\006\003\125\004\141
\014\017\126\101\124\105\123\055\121\062\070\062\066\060\060\064
\112\061\054\060\052\006\003\125\004\003\014\043\101\103\040\122
\101\111\132\040\106\116\115\124\055\122\103\115\040\123\105\122
\126\111\104\117\122\105\123\040\123\105\107\125\122\117\123\060
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201
\004\000\042\003\142\000\004\366\272\127\123\310\312\253\337\066
\112\122\041\344\227\322\203\147\236\360\145\121\320\136\207\307
\107\261\131\362\127\107\233\000\002\223\104\027\151\333\102\307
\261\262\072\030\016\264\135\214\263\146\135\241\064\371\066\054
\111\333\363\106\374\263\104\151\104\023\146\375\327\305\375\257
\066\115\316\003\115\007\161\317\257\152\005\322\242\103\132\012
\122\157\001\003\116\216\213\243\102\060\100\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003
\125\035\016\004\026\004\024\001\271\057\357\277\021\206\140\362
\117\320\101\156\253\163\037\347\322\156\111\060\012\006\010\052

\206\110\316\075\004\003\003\003\151\000\060\146\002\061\000\256
\112\343\053\100\303\164\021\362\225\255\026\043\336\116\014\032
\346\135\245\044\136\153\104\173\374\070\342\117\313\234\105\027
\021\114\024\047\046\125\071\165\112\003\314\023\220\237\222\002
\061\000\372\112\154\140\210\163\363\356\270\230\142\251\316\053
\302\331\212\246\160\061\035\257\260\224\114\353\117\306\343\321
\363\142\247\074\377\223\056\007\134\111\001\147\151\022\002\162
\277\347
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "AC RAIZ FNMT-RCM SERVIDORES SEGUROS"
# Issuer: CN=AC RAIZ FNMT-RCM SERVIDORES SEGUROS,OID.2.5.4.97=VATES-Q2826004J,OU=Ceres,O=FNMT-RCM,C=ES
# Serial Number:62:f6:32:6c:e5:c4:e3:68:5c:1b:62:dd:9c:2e:9d:95
# Subject: CN=AC RAIZ FNMT-RCM SERVIDORES SEGUROS,OID.2.5.4.97=VATES-Q2826004J,OU=Ceres,O=FNMT-RCM,C=ES
# Not
Valid Before: Thu Dec 20 09:37:33 2018
# Not Valid After : Sun Dec 20 09:37:33 2043
# Fingerprint (SHA-256):
55:41:53:B1:3D:2C:F9:DD:B7:53:BF:BE:1A:4E:0A:E0:8D:0A:A4:18:70:58:FE:60:A2:B8:62:B2:E4:B8:7B:CB
# Fingerprint (SHA1): 62:FF:D9:9E:C0:65:0D:03:CE:75:93:D2:ED:3F:2D:32:C9:E3:E5:4A
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AC RAIZ FNMT-RCM SERVIDORES SEGUROS"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\142\377\331\236\300\145\015\003\316\165\223\322\355\077\055\062
\311\343\345\112
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\031\066\234\122\003\057\322\321\273\043\314\335\036\022\125\273
END
CKA_ISSUER MULTILINE_OCTAL
\060\170\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\021\060\017\006\003\125\004\012\014\010\106\116\115\124\055\122
\103\115\061\016\060\014\006\003\125\004\013\014\005\103\145\162
\145\163\061\030\060\026\006\003\125\004\141\014\017\126\101\124
\105\123\055\121\062\070\062\066\060\060\064\112\061\054\060\052
\006\003\125\004\003\014\043\101\103\040\122\101\111\132\040\106
\116\115\124\055\122\103\115\040\123\105\122\126\111\104\117\122
\105\123\040\123\105\107\125\122\117\123
END

```
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\142\366\062\154\345\304\343\150\134\033\142\335\234\056
\235\225
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GlobalSign Secure Mail Root R45"
#
# Issuer: CN=GlobalSign Secure Mail Root R45,O=GlobalSign nv-sa,C=BE
# Serial Number:76:53:fe:a8:4c:50:ab:9f:8d:32:b5:1d:03:8f:57:dc
# Subject: CN=GlobalSign Secure Mail Root R45,O=GlobalSign nv-sa,C=BE
# Not Valid Before: Wed Mar 18 00:00:00 2020
# Not Valid After : Sat Mar 18 00:00:00 2045
# Fingerprint (SHA-256):
31:9A:F0:A7:72:9E:6F:89:26:9C:13:1E:A6:A3:A1:6F:CD:86:38:9F:DC:AB:3C:47:A4:A6:75:C1:61:A3:F9:74
#
 Fingerprint (SHA1): 76:18:D1:F3:80:24:3D:52:40:C6:11:6A:AD:57:77:09:7D:81:30:A0
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Secure Mail Root R45"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\050\060\046\006\003
\125\004\003\023\037\107\154\157\142\141\154\123\151\147\156\040
\123\145\143\165\162\145\040\115\141\151\154\040\122\157\157\164
\040\122\064\065
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\050\060\046\006\003
\125\004\003\023\037\107\154\157\142\141\154\123\151\147\156\040
\123\145\143\165\162\145\040\115\141\151\154\040\122\157\157\164
\040\122\064\065
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\166\123\376\250\114\120\253\237\215\062\265\035\003\217
```

\127\334
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\160\060\202\003\130\240\003\002\001\002\002\020\166
\123\376\250\114\120\253\237\215\062\265\035\003\217\127\334\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\122
\061\013\060\011\006\003\125\004\006\023\002\102\105\061\031\060
\027\006\003\125\004\012\023\020\107\154\157\142\141\154\123\151
\147\156\040\156\166\055\163\141\061\050\060\046\006\003\125\004
\003\023\037\107\154\157\142\141\154\123\151\147\156\040\123\145
\143\165\162\145\040\115\141\151\154\040\122\157\157\164\040\122
\064\065\060\036\027\015\062\060\060\063\061\070\060\060\060\060
\060\060\132\027\015\064\065\060\063\061\070\060\060\060\060\060
\060\132\060\122\061\013\060\011\006\003\125\004\006\023\002\102
\105\061\031\060\027\006\003\125\004\012\023\020\107\154\157\142
\141\154\123\151\147\156\040\156\166\055\163\141\061\050\060\046
\006\003\125\004\003\023\037\107\154\157\142\141\154\123\151\147
\156\040\123\145\143\165\162\145\040\115\141\151\154\040\122\157
\157\164\040\122\064\065\060\202\002\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202
\002\012\002\202\002\001\000\334\171\314\155\006\371\155\273\340
\126\004\154\177\340\165\314\055\005\111\350\113\334\124\354\133
\167\225\162\277\177\142\235\205\251\212\044\120\137\123\345\333
\164\157\244\051\133\023\052\011\255\232\305\057\302\367\166\073
\241\105\106\252\103\346\044\376\053\260\157\062\160\031\106\132
\171\046\057\374\075\175\137\144\313\127\314\141\141\250\331\225
\156\343\225\240\156\177\107\022\030\326\357\003\311\373\212\372
\232\275\202\025\251\125\167\113\021\117\131\340\153\303\161\363
\014\330\124\325\201\150\076\023\271\025\056\207\212\074\104\047
\066\142\044\156\370\054\005\162\060\141\275\102\221\043\304\235
\045\247\331\124\232\024\243\061\255\200\171\014\247\143\154\230
\243\254\127\107\063\037\145\226\341\320\322\065\332\371\161\367
\241\246\045\265\101\135\337\076\140\330\321\366\237\245\362\270
\314\023\252\217\371\262\156\341\203\055\223\335\076\205\032\335
\350\261\134\046\001\313\111\205\374\374\322\324\177\205\142\206
\164\371\313\354\065\042\242\014\060\217\073\253\171\353\126\362
\372\102\363\355\371\037\105\211\100\051\255\352\222\164\352\122
\375\126\264\053\332\242\355\165\302\156\253\316\122\220\113\366
\336\360\111\217\232\110\324\210\031\155\105\346\314\214\271\335
\144\140\140\002\100\370\271\317\274\130\353\075\205\271\306\012
\323\234\007\146\217\307\030\071\043\106\341\074\036\243\057\120
\141\222\013\075\053\154\361\243\107\070\127\221\253\015\217\306
\235\115\004\322\046\122\134\345\245\375\052\055\026\052\001\151
\347\251\175\341\066\267\261\052\305\331\261\215\275\271\213\316
\314\213\241\076\013\110\315\120\225\064\304\330\010\131\330\153
\046\364\276\365\324\042\027\000\127\311\256\233\004\060\063\237
\013\373\337\126\242\311\156\124\166\332\261\227\142\047\131\017
\021\212\042\033\144\226\077\250\361\267\044\112\215\074\123\174

\155\203\166\075\262\046\110\163\365\104\026\001\055\011\052\216
\026\226\120\320\163\006\135\273\042\110\202\114\012\106\132\077
\200\377\134\362\362\232\254\054\010\340\326\352\360\022\070\201
\117\246\020\355\106\253\314\026\234\013\317\144\246\231\002\205
\104\147\106\255\375\115\347\002\003\001\000\001\243\102\060\100
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\206
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\035\006\003\125\035\016\004\026\004\024\240\223\025\050
\156\356\217\010\262\065\306\236\142\171\164\247\261\016\053\173
\060\015\006\011\052\206\110\206\367\015\001\001\014\005\000\003
\202\002\001\000\105\012\370\321\134\254\142\201\320\004\327\266
\377\127\121\211\013\014\313\336\044\145\067\373\253\236\355\146
\364\352\014\031\151\211\270\031\261\060\126\264\331\366\367\276
\306\256\227\313\105\366\021\214\072\060\144\114\301\237\131\300
\106\102\010\006\107\144\027\170\340\225\007\006\326\214\242\254
\251\331\077\323\173\126\117\374\304\207\050\337\266\053\026\043
\300\237\037\133\343\326\104\136\042\117\043\004\214\065\026\265
\171\007\206\134\057\227\342\366\010\144\246\334\333\250\212\343
\244\173\167\015\321\051\223\050\040\264\123\243\113\116\137\336
\301\366\165\043\374\037\074\170\117\160\061\170\057\242\065\124
\161\004\254\310\304\155\303\366\221\261\376\315\356\104\156\201
\366\100\305\076\052\001\277\253\114\261\003\077\015\021\344\017
\322\044\343\042\210\233\237\137\107\075\121\111\340\011\067\176
\027\041\061\166\267\147\161\110\050\113\045\327\020\350\237\141
\131\026\305\076\062\116\037\014\316\243\314\017\344\307\021\007
\042\057\070\010\335\133\227\353\102\154\131\232\232\356\172\320
\235\337\305\333\011\103\056\012\252\031\075\153\350\152\060\172
\127\346\277\263\152\071\251\217\343\361\117\145\150\266\275\237
\050\217\241\026\132\011\120\072\062\056\035\057\104\021\102\246
\000\346\061\230\377\055\241\017\346\244\140\126\317\171\327\262
\116\327\260\372\156\014\127\043\307\316\037\245\261\114\155\031
\111\236\016\177\160\217\161\077\130\050\237\165\335\141\340\072
\267\071\266\356\227\324\065\121\373\213\111\140\310\074\146\256
\227\356\215\046\131\127\273\170\360\172\120\060\011\260\140\252
\237\116\334\311\076\036\072\334\142\223\063\260\072\124\164\157
\054\061\105\321\153\021\062\152\150\166\366\075\366\152\023\136
\044\230\347\352\035\232\317\170\202\007\140\367\115\020\323\201
\232\105\215\236\257\233\334\200\307\103\262\225\150\244\303\016
\350\012\107\025\277\124\063\334\001\347\325\246\036\163\330\172
\262\277\057\255\343\125\060\236\337\016\101\274\340\021\365\241
\014\250\042\341\343\000\243\116\160\174\222\343\004\321\172\102
\212\165\220\131\343\233\321\114\242\144\275\163\171\233\157\362
\263\301\366\074
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER

```
 CK_BBOOL CK_FALSE

# Trust for "GlobalSign Secure Mail Root R45"
# Issuer: CN=GlobalSign Secure Mail Root R45,O=GlobalSign nv-sa,C=BE
# Serial Number:76:53:fe:a8:4c:50:ab:9f:8d:32:b5:1d:03:8f:57:dc
# Subject: CN=GlobalSign Secure Mail Root R45,O=GlobalSign nv-sa,C=BE
# Not Valid Before: Wed Mar 18 00:00:00 2020
# Not Valid After : Sat Mar 18 00:00:00 2045
# Fingerprint (SHA-256):
31:9A:F0:A7:72:9E:6F:89:26:9C:13:1E:A6:A3:A1:6F:CD:86:38:9F:DC:AB:3C:47:A4:A6:75:C1:61:A3:F9:74
# Fingerprint (SHA1): 76:18:D1:F3:80:24:3D:52:40:C6:11:6A:AD:57:77:09:7D:81:30:A0
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Secure Mail Root R45"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\166\030\321\363\200\044\075\122\100\306\021\152\255\127\167\011
\175\201\060\240
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\223\304\173\263\016\124\107\034\103\054\213\276\160\205\142\051
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\050\060\046\006\003
\125\004\003\023\037\107\154\157\142\141\154\123\151\147\156\040
\123\145\143\165\162\145\040\115\141\151\154\040\122\157\157\164
\040\122\064\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\166\123\376\250\114\120\253\237\215\062\265\035\003\217
\127\334
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GlobalSign Secure Mail Root E45"
#
# Issuer: CN=GlobalSign Secure Mail Root E45,O=GlobalSign nv-sa,C=BE
# Serial Number:76:53:fe:aa:27:1d:95:46:5d:d6:f1:9e:e5:b8:90:0a
# Subject: CN=GlobalSign Secure Mail Root E45,O=GlobalSign nv-sa,C=BE
# Not Valid Before: Wed Mar 18 00:00:00
```

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 2020
# Not Valid After : Sat Mar 18 00:00:00 2045
# Fingerprint (SHA-256):
5C:BF:6F:B8:1F:D4:17:EA:41:28:CD:6F:81:72:A3:C9:40:20:94:F7:4A:B2:ED:3A:06:B4:40:5D:04:F3:0B:19
# Fingerprint (SHA1): 18:2E:1F:32:4F:89:DF:BE:FE:88:89:F0:93:C2:C4:A0:2B:67:75:21
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Secure Mail Root E45"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\050\060\046\006\003
\125\004\003\023\037\107\154\157\142\141\154\123\151\147\156\040
\123\145\143\165\162\145\040\115\141\151\154\040\122\157\157\164
\040\105\064\065
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\050\060\046\006\003
\125\004\003\023\037\107\154\157\142\141\154\123\151\147\156\040
\123\145\143\165\162\145\040\115\141\151\154\040\122\157\157\164
\040\105\064\065
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\166\123\376\252\047\035\225\106\135\326\361\236\345\270
\220\012
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\041\060\202\001\247\240\003\002\001\002\002\020\166
\123\376\252\047\035\225\106\135\326\361\236\345\270\220\012\060
\012\006\010\052\206\110\316\075\004\003\003\060\122\061\013\060
\011\006\003\125\004\006\023\002\102\105\061\031\060\027\006\003
\125\004\012\023\020\107\154\157\142\141\154\123\151\147\156\040
\156\166\055\163\141\061\050\060\046\006\003\125\004\003\023\037
\107\154\157\142\141\154\123\151\147\156\040\123\145\143\165\162
\145\040\115\141\151\154\040\122\157\157\164\040\105\064\065\060
\036\027\015\062\060\060\063\061\070\060\060\060\060\060\060\132
\027\015\064\065\060\063\061\070\060\060\060\060\060\060\132\060
\122\061\013\060\011\006\003\125\004\006\023\002\102\105\061\031
\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154\123
\151\147\156\040\156\166\055\163\141\061\050\060\046\006\003\125
\004\003\023\037\107\154\157\142\141\154\123\151\147\156\040\123
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\145\143\165\162\145\040\115\141\151\154\040\122\157\157\164\040
\105\064\065\060\166\060\020\006\007\052\206\110\316\075\002\001
\006\005\053\201\004\000\042\003\142\000\004\371\171\213\201\107
\067\211\226\077\105\111\120\177\032\046\013\223\062\176\056\300
\300\247\010\232\303\156\217\233\076\013\042\354\067\123\267\157
\212\260\274\047\067\113\155\251\106\073\331\037\377\245\241\104
\273\055\163\277\236\101\007\134\123\233\121\010\072\132\273\157
\070\307\026\221\170\302\112\023\151\035\202\337\132\057\000\210
\226\242\056\034\164\371\235\176\146\067\212\243\102\060\100\060
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\035\006\003\125\035\016\004\026\004\024\337\023\136\213\137
\302\100\002\375\126\267\224\114\266\036\325\246\261\024\226\060
\012\006\010\052\206\110\316\075\004\003\003\003\150\000\060\145
\002\060\023\260\276\327\161\040\076\344\253\234\316\066\022\175
\137\114\037\052\265\151\105\063\137\323\055\132\262\344\210\307
\336\012\066\102\062\171\235\246\153\272\341\371\104\052\173\212
\303\022\002\061\000\240\146\034\116\207\235\207\311\355\231\114
\033\012\356\055\140\303\067\307\035\315\265\162\260\331\306\357
\274\362\377\077\360\122\335\010\347\252\144\171\303\344\151\127
\221\057\244\313\174
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "GlobalSign Secure Mail Root E45"
# Issuer: CN=GlobalSign Secure Mail Root E45,O=GlobalSign nv-sa,C=BE
# Serial Number:76:53:fe:aa:27:1d:95:46:5d:d6:f1:9e:e5:b8:90:0a
# Subject: CN=GlobalSign Secure Mail Root E45,O=GlobalSign nv-sa,C=BE
#
 Not Valid Before: Wed Mar 18 00:00:00 2020
# Not Valid After : Sat Mar 18 00:00:00 2045
# Fingerprint (SHA-256):
5C:BF:6F:B8:1F:D4:17:EA:41:28:CD:6F:81:72:A3:C9:40:20:94:F7:4A:B2:ED:3A:06:B4:40:5D:04:F3:0B:19
# Fingerprint (SHA1): 18:2E:1F:32:4F:89:DF:BE:FE:88:89:F0:93:C2:C4:A0:2B:67:75:21
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Secure Mail Root E45"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\030\056\037\062\117\211\337\276\376\210\211\360\223\302\304\240
\053\147\165\041
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\305\374\306\056\237\364\122\055\052\250\244\272\373\147\062\377
```

```
END
CKA_ISSUER MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\050\060\046\006\003
\125\004\003\023\037\107\154\157\142\141\154\123\151\147\156\040
\123\145\143\165\162\145\040\115\141\151\154\040\122\157\157\164
\040\105\064\065
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\166\123\376\252\047\035\225\106\135\326\361\236\345\270
\220\012
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GlobalSign Root R46"
#
# Issuer: CN=GlobalSign Root R46,O=GlobalSign nv-sa,C=BE
# Serial Number:11:d2:bb:b9:d7:23:18:9e:40:5f:0a:9d:2d:d0:df:25:67:d1
# Subject: CN=GlobalSign Root R46,O=GlobalSign nv-sa,C=BE
# Not Valid Before: Wed Mar 20 00:00:00 2019
# Not Valid After : Tue Mar 20 00:00:00 2046
# Fingerprint (SHA-256):
4F:A3:12:6D:8D:3A:11:D1:C4:85:5A:4F:80:7C:BA:D6:CF:91:9D:3A:5A:88:B0:3B:EA:2C:63:72:D9:3C:40:C9
# Fingerprint (SHA1): 53:A2:B0:4B:CA:6B:D6:45:E6:39:8A:8E:C4:0D:D2:BF:77:C3:A2:90
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
 CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Root R46"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\034\060\032\006\003
\125\004\003\023\023\107\154\157\142\141\154\123\151\147\156\040
\122\157\157\164\040\122\064\066
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
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\123\151\147\156\040\156\166\055\163\141\061\034\060\032\006\003
\125\004\003\023\023\107\154\157\142\141\154\123\151\147\156\040
\122\157\157\164\040\122\064\066
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\022\021\322\273\271\327\043\030\236\100\137\012\235\055\320
\337\045\147\321
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\132\060\202\003\102\240\003\002\001\002\002\022\021
\322\273\271\327\043\030\236\100\137\012\235\055\320\337\045\147
\321\060\015\006\011\052\206\110\206\367\015\001\001\014\005\000
\060\106\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\034\060\032\006\003
\125\004\003\023\023\107\154\157\142\141\154\123\151\147\156\040
\122\157\157\164\040\122\064\066\060\036\027\015\061\071\060\063
\062\060\060\060\060\060\060\060\132\027\015\064\066\060\063\062
\060\060\060\060\060\060\060\132\060\106\061\013\060\011\006\003
\125\004\006\023\002\102\105\061\031\060\027\006\003\125\004\012
\023\020\107\154\157\142\141\154\123\151\147\156\040\156\166\055
\163\141\061\034\060\032\006\003\125\004\003\023\023\107\154\157
\142\141\154\123\151\147\156\040\122\157\157\164\040\122\064\066
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001
\000\254\254\164\062\350\263\145\345\272\355\103\046\035\246\211
\015\105\272\051\210\262\244\035\143\335\323\301\054\011\127\211
\071\241\125\351\147\064\167\014\156\344\125\035\122\045\322\023
\153\136\341\035\251\267\175\211\062\137\015\236\237\054\172\143
\140\100\037\246\260\266\170\217\231\124\226\010\130\256\344\006
\274\142\005\002\026\277\257\250\043\003\266\224\017\274\156\154
\302\313\325\246\273\014\351\366\301\002\373\041\336\146\335\027
\253\164\102\357\360\164\057\045\364\352\153\125\133\220\333\235
\337\136\207\012\100\373\255\031\153\373\367\312\140\210\336\332
\301\217\326\256\325\177\324\074\203\356\327\026\114\203\105\063
\153\047\320\206\320\034\055\153\363\253\175\361\205\251\365\050
\322\255\357\363\204\113\034\207\374\023\243\072\162\242\132\021
\053\326\047\161\047\355\201\055\155\146\201\222\207\264\033\130
\172\314\077\012\372\106\117\115\170\134\370\053\110\343\004\204
\313\135\366\264\152\263\145\374\102\236\121\046\043\040\313\075
\024\371\201\355\145\026\000\117\032\144\227\146\010\317\214\173
\343\053\300\235\371\024\362\033\361\126\152\026\277\054\205\205
\315\170\070\232\353\102\152\002\064\030\203\027\116\224\126\370
\266\202\265\363\226\335\075\363\276\177\040\167\076\173\031\043
\153\054\324\162\163\103\127\175\340\370\327\151\117\027\066\004
\371\300\220\140\067\105\336\346\014\330\164\215\256\234\242\155
\164\135\102\276\006\365\331\144\156\002\020\254\211\260\114\073
\007\115\100\176\044\305\212\230\202\171\216\244\247\202\040\215

\043\372\047\161\311\337\306\101\164\240\115\366\221\026\334\106
\214\137\051\143\061\131\161\014\330\157\302\266\062\175\373\346
\135\123\246\176\025\374\273\165\174\135\354\370\366\027\034\354
\307\153\031\313\363\173\360\053\007\245\331\154\171\124\166\154
\235\034\246\156\016\351\171\014\250\043\152\243\337\033\060\061
\237\261\124\173\376\152\313\146\252\334\145\320\242\236\112\232
\007\041\153\201\217\333\304\131\372\336\042\300\004\234\343\252
\133\066\223\350\075\275\172\241\235\013\166\261\013\307\235\375
\317\230\250\006\302\370\052\243\241\203\240\267\045\162\245\002
\343\002\003\001\000\001\243\102\060\100\060\016\006\003\125\035
\017\001\001\377\004\004\003\002\001\206\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125
\035\016\004\026\004\024\003\134\253\163\201\207\250\314\260\246
\325\224\342\066\226\111\377\005\231\054\060\015\006\011\052\206
\110\206\367\015\001\001\014\005\000\003\202\002\001\000\174\170
\354\366\002\054\273\133\176\222\053\135\071\334\276\330\035\242
\102\063\115\371\357\244\052\073\104\151\036\254\331\105\243\116
\074\247\330\044\121\262\124\034\223\116\304\357\173\223\205\140
\046\352\011\110\340\365\273\307\351\150\322\273\152\061\161\314
\171\256\021\250\360\231\375\345\037\274\057\250\314\127\353\166
\304\041\246\107\123\125\115\150\277\005\244\356\327\046\253\142
\332\103\067\113\342\306\265\345\262\203\031\072\307\323\333\115
\236\010\172\363\356\317\076\142\373\254\350\140\314\321\307\241
\134\203\105\304\105\314\363\027\153\024\311\004\002\076\322\044
\246\171\351\036\316\242\347\301\131\025\237\035\342\113\232\076
\237\166\010\055\153\330\272\127\024\332\203\352\376\214\125\351
\320\116\251\314\167\061\261\104\021\172\134\261\076\323\024\105
\025\030\142\044\023\322\313\115\316\134\203\301\066\362\020\265
\016\210\155\270\341\126\237\211\336\226\146\071\107\144\054\156
\115\256\142\173\277\140\164\031\270\126\254\222\254\026\062\355
\255\150\125\376\230\272\323\064\336\364\311\141\303\016\206\366
\113\204\140\356\015\173\265\062\130\171\221\125\054\201\103\263
\164\037\172\252\045\236\035\327\241\213\271\315\102\056\004\244
\146\203\115\211\065\266\154\250\066\112\171\041\170\042\320\102
\274\321\100\061\220\241\276\004\317\312\147\355\365\360\200\323
\140\311\203\052\042\005\320\007\073\122\277\014\236\252\053\371
\273\346\037\217\045\272\205\215\027\036\002\376\135\120\004\127
\317\376\055\274\357\134\300\032\253\266\237\044\306\337\163\150
\110\220\054\024\364\077\122\032\344\322\313\024\303\141\151\317
\342\371\030\305\272\063\237\024\243\004\135\271\161\367\265\224
\330\366\063\301\132\301\064\213\174\233\335\223\072\347\023\242
\160\141\237\257\217\353\330\305\165\370\063\146\324\164\147\072
\067\167\234\347\335\244\017\166\103\146\212\103\362\237\373\014
\102\170\143\321\342\017\157\173\324\241\075\164\227\205\267\110
\071\101\326\040\374\320\072\263\372\350\157\304\212\272\161\067
\276\213\227\261\170\061\117\263\347\266\003\023\316\124\235\256
\045\131\314\177\065\137\010\367\100\105\061\170\052\172
END

```
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "GlobalSign Root R46"
# Issuer: CN=GlobalSign Root R46,O=GlobalSign nv-sa,C=BE
# Serial Number:11:d2:bb:b9:d7:23:18:9e:40:5f:0a:9d:2d:d0:df:25:67:d1
# Subject: CN=GlobalSign Root R46,O=GlobalSign nv-sa,C=BE
# Not Valid Before: Wed Mar 20 00:00:00 2019
# Not Valid After : Tue Mar 20 00:00:00 2046
# Fingerprint
 (SHA-256):
4F:A3:12:6D:8D:3A:11:D1:C4:85:5A:4F:80:7C:BA:D6:CF:91:9D:3A:5A:88:B0:3B:EA:2C:63:72:D9:3C:40:C9
# Fingerprint (SHA1): 53:A2:B0:4B:CA:6B:D6:45:E6:39:8A:8E:C4:0D:D2:BF:77:C3:A2:90
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Root R46"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\123\242\260\113\312\153\326\105\346\071\212\216\304\015\322\277
\167\303\242\220
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\304\024\060\344\372\146\103\224\052\152\033\044\137\031\320\357
END
CKA_ISSUER MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\034\060\032\006\003
\125\004\003\023\023\107\154\157\142\141\154\123\151\147\156\040
\122\157\157\164\040\122\064\066
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\022\021\322\273\271\327\043\030\236\100\137\012\235\055\320
\337\045\147\321
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GlobalSign Root E46"
#
# Issuer: CN=GlobalSign Root E46,O=GlobalSign nv-sa,C=BE
```

```
# Serial Number:11:d2:bb:ba:33:6e:d4:bc:e6:24:68:c5:0d:84:1d:98:e8:43
# Subject: CN=GlobalSign Root E46,O=GlobalSign nv-sa,C=BE
# Not Valid Before: Wed Mar 20 00:00:00 2019
# Not Valid After : Tue Mar 20 00:00:00 2046
# Fingerprint (SHA-256):
CB:B9:C4:4D:84:B8:04:3E:10:50:EA:31:A6:9F:51:49:55:D7:BF:D2:E2:C6:B4:93:01:01:9A:D6:1D:9F:50:58
# Fingerprint (SHA1): 39:B4:6C:D5:FE:80:06:EB:E2:2F:4A:BB:08:33:A0:AF:DB:B9:DD:84
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Root E46"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT
 MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\034\060\032\006\003
\125\004\003\023\023\107\154\157\142\141\154\123\151\147\156\040
\122\157\157\164\040\105\064\066
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\034\060\032\006\003
\125\004\003\023\023\107\154\157\142\141\154\123\151\147\156\040
\122\157\157\164\040\105\064\066
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\022\021\322\273\272\063\156\324\274\346\044\150\305\015\204
\035\230\350\103
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\013\060\202\001\221\240\003\002\001\002\002\022\021
\322\273\272\063\156\324\274\346\044\150\305\015\204\035\230\350
\103\060\012\006\010\052\206\110\316\075\004\003\003\060\106\061
\013\060\011\006\003\125\004\006\023\002\102\105\061\031\060\027
\006\003\125\004\012\023\020\107\154\157\142\141\154\123\151\147
\156\040\156\166\055\163\141\061\034\060\032\006\003\125\004\003
\023\023\107\154\157\142\141\154\123\151\147\156\040\122\157\157
\164\040\105\064\066\060\036\027\015\061\071\060\063\062\060\060
\060\060\060\060\060\132\027\015\064\066\060\063\062\060\060\060
\060\060\060\060\132\060\106\061\013\060\011\006\003\125\004\006
\023\002\102\105\061\031\060\027\006\003\125\004\012\023\020\107
\154\157\142\141\154\123\151\147\156\040\156\166\055\163\141\061
\034\060\032\006\003\125\004\003\023\023\107\154\157\142\141\154
\123\151\147\156\040\122\157\157\164\040\105\064\066\060\166\060
```

\020\006\007\052\206\110\316\075\002\001\006\005\053\201\004\000
\042\003\142\000\004\234\016\261\317\267\350\236\122\167\165\064
\372\245\106\247\255\062\031\062\264\007\251\047\312\224\273\014
\322\012\020\307\332\211\260\227\014\160\023\011\001\216\330\352
\107\352\276\262\200\053\315\374\050\015\333\254\274\244\206\067
\355\160\010\000\165\352\223\013\173\056\122\234\043\150\043\006
\103\354\222\057\123\204\333\373\107\024\007\350\137\224\147\135
\311\172\201\074\040\243\102\060\100\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\206\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035
\016\004\026\004\024\061\012\220\217\266\306\235\322\104\113\200
\265\242\346\037\261\022\117\033\225\060\012\006\010\052\206\110
\316\075\004\003\003\003\150\000\060\145\002\061\000\337\124\220
\355\233\357\213\224\002\223\027\202\231\276\263\236\054\366\013
\221\214\237\112\024\261\366\144\274\273\150\121\023\014\003\367
\025\213\204\140\271\213\377\122\216\347\214\274\034\002\060\074
\371\021\324\214\116\300\301\141\302\025\114\252\253\035\013\061
\137\073\034\342\000\227\104\061\346\376\163\226\057\332\226\323
\376\010\007\263\064\211\274\005\237\367\036\206\356\213\160
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER
 CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "GlobalSign Root E46"
# Issuer: CN=GlobalSign Root E46,O=GlobalSign nv-sa,C=BE
# Serial Number:11:d2:bb:ba:33:6e:d4:bc:e6:24:68:c5:0d:84:1d:98:e8:43
# Subject: CN=GlobalSign Root E46,O=GlobalSign nv-sa,C=BE
# Not Valid Before: Wed Mar 20 00:00:00 2019
# Not Valid After : Tue Mar 20 00:00:00 2046
# Fingerprint (SHA-256):
CB:B9:C4:4D:84:B8:04:3E:10:50:EA:31:A6:9F:51:49:55:D7:BF:D2:E2:C6:B4:93:01:01:9A:D6:1D:9F:50:58
# Fingerprint (SHA1): 39:B4:6C:D5:FE:80:06:EB:E2:2F:4A:BB:08:33:A0:AF:DB:B9:DD:84
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Root E46"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\071\264\154\325\376\200\006\353\342\057\112\273\010\063\240\257
\333\271\335\204
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\265\270\146\355\336\010\203\343\311\342\001\064\006\254\121\157
END
CKA_ISSUER

```
 MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\034\060\032\006\003
\125\004\003\023\023\107\154\157\142\141\154\123\151\147\156\040
\122\157\157\164\040\105\064\066
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\022\021\322\273\272\063\156\324\274\346\044\150\305\015\204
\035\230\350\103
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GLOBALTRUST 2020"
#
# Issuer: CN=GLOBALTRUST 2020,O=e-commerce monitoring GmbH,C=AT
# Serial Number:5a:4b:bd:5a:fb:4f:8a:5b:fa:65:e5
# Subject: CN=GLOBALTRUST 2020,O=e-commerce monitoring GmbH,C=AT
# Not Valid Before: Mon Feb 10 00:00:00 2020
# Not Valid After : Sun Jun 10 00:00:00 2040
# Fingerprint (SHA-256):
9A:29:6A:51:82:D1:D4:51:A2:E3:7F:43:9B:74:DA:AF:A2:67:52:33:29:F9:0F:9A:0D:20:07:C3:34:E2:3C:9A
#
 Fingerprint (SHA1): D0:67:C1:13:51:01:0C:AA:D0:C7:6A:65:37:31:16:26:4F:53:71:A2
# For Server Distrust After: Sun Jun 30 00:00:00 2024
# For Email Distrust After: Sun Jun 30 00:00:00 2024
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GLOBALTRUST 2020"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\101\124\061
\043\060\041\006\003\125\004\012\023\032\145\055\143\157\155\155
\145\162\143\145\040\155\157\156\151\164\157\162\151\156\147\040
\107\155\142\110\061\031\060\027\006\003\125\004\003\023\020\107
\114\117\102\101\114\124\122\125\123\124\040\062\060\062\060
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\101\124\061
\043\060\041\006\003\125\004\012\023\032\145\055\143\157\155\155
\145\162\143\145\040\155\157\156\151\164\157\162\151\156\147\040
```

\107\155\142\110\061\031\060\027\006\003\125\004\003\023\020\107
\114\117\102\101\114\124\122\125\123\124\040\062\060\062\060
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\013\132\113\275\132\373\117\212\133\372\145\345
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\202\060\202\003\152\240\003\002\001\002\002\013\132
\113\275\132\373\117\212\133\372\145\345\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\060\115\061\013\060\011\006
\003\125\004\006\023\002\101\124\061\043\060\041\006\003\125\004
\012\023\032\145\055\143\157\155\155\145\162\143\145\040\155\157
\156\151\164\157\162\151\156\147\040\107\155\142\110\061\031\060
\027\006\003\125\004\003\023\020\107\114\117\102\101\114\124\122
\125\123\124\040\062\060\062\060\060\036\027\015\062\060\060\062
\061\060\060\060\060\060\060\060\132\027\015\064\060\060\066\061
\060\060\060\060\060\060\060\132\060\115\061\013\060\011\006\003
\125\004\006\023\002\101\124\061\043\060\041\006\003\125\004\012
\023\032\145\055\143\157\155\155\145\162\143\145\040\155\157\156
\151\164\157\162\151\156\147\040\107\155\142\110\061\031\060\027
\006\003\125\004\003\023\020\107\114\117\102\101\114\124\122\125
\123\124\040\062\060\062\060\060\202\002\042\060\015\006\011\052
\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060
\202\002\012\002\202\002\001\000\256\056\126\255\033\034\357\366
\225\217\240\167\033\053\323\143\217\204\115\105\242\017\237\133
\105\253\131\173\121\064\371\354\213\212\170\305\335\153\257\275
\304\337\223\105\036\277\221\070\013\256\016\026\347\101\163\370
\333\273\321\270\121\340\313\203\073\163\070\156\167\212\017\131
\143\046\315\247\052\316\124\373\270\342\300\174\107\316\140\174
\077\262\163\362\300\031\266\212\222\207\065\015\220\050\242\344
\025\004\143\076\272\257\356\174\136\314\246\213\120\262\070\367
\101\143\312\316\377\151\217\150\016\225\066\345\314\271\214\011
\312\113\335\061\220\226\310\314\037\375\126\226\064\333\216\034
\352\054\276\205\056\143\335\252\251\225\323\375\051\225\023\360
\310\230\223\331\055\026\107\220\021\203\242\072\042\242\050\127
\242\353\376\300\214\050\240\246\175\347\052\102\073\202\200\143
\245\143\037\031\314\174\262\146\250\302\323\155\067\157\342\176
\006\121\331\105\204\037\022\316\044\122\144\205\013\110\200\116
\207\261\042\042\060\252\353\256\276\340\002\340\100\350\260\102
\200\003\121\252\264\176\252\104\327\103\141\363\242\153\026\211
\111\244\243\244\053\212\002\304\170\364\150\212\301\344\172\066
\261\157\033\226\033\167\111\215\324\311\006\162\217\317\123\343
\334\027\205\040\112\334\230\047\323\221\046\053\107\036\151\007
\257\336\242\344\344\324\153\013\263\136\174\324\044\200\107\051
\151\073\156\350\254\375\100\353\330\355\161\161\053\362\350\130
\035\353\101\227\042\305\037\324\071\320\047\217\207\343\030\364
\340\251\106\015\365\164\072\202\056\320\156\054\221\243\061\134

\073\106\352\173\004\020\126\136\200\035\365\245\145\350\202\374
\342\007\214\142\105\365\040\336\106\160\206\241\274\223\323\036
\164\246\154\260\054\367\003\014\210\014\313\324\162\123\206\274
\140\106\363\230\152\302\361\277\103\371\160\040\167\312\067\101
\171\125\122\143\215\133\022\237\305\150\304\210\235\254\362\060
\253\267\243\061\227\147\255\217\027\017\154\307\163\355\044\224
\153\310\203\232\320\232\067\111\004\253\261\026\310\154\111\111
\055\253\241\320\214\222\362\101\112\171\041\045\333\143\327\266
\234\247\176\102\151\373\072\143\002\003\001\000\001\243\143\060
\141\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\006\060\035\006\003\125\035\016\004\026\004\024\334\056\037
\321\141\067\171\344\253\325\325\263\022\161\150\075\152\150\234
\042\060\037\006\003\125\035\043\004\030\060\026\200\024\334\056
\037\321\141\067\171\344\253\325\325\263\022\161\150\075\152\150
\234\042\060\015\006\011\052\206\110\206\367\015\001\001\013\005
\000\003\202\002\001\000\221\360\102\002\150\100\356\303\150\300
\124\057\337\354\142\303\303\236\212\240\061\050\252\203\216\244
\126\226\022\020\206\126\272\227\162\322\124\060\174\255\031\325
\035\150\157\373\024\102\330\215\016\363\265\321\245\343\002\102
\136\334\350\106\130\007\065\002\060\340\274\164\112\301\103\052
\377\333\032\320\260\257\154\303\375\313\263\365\177\155\003\056
\131\126\235\055\055\065\214\262\326\103\027\054\222\012\313\135
\350\214\017\113\160\103\320\202\377\250\314\277\244\224\300\276
\207\275\212\343\223\173\306\217\233\026\235\047\145\274\172\305
\102\202\154\134\007\320\251\301\210\140\104\351\230\205\026\137
\370\217\312\001\020\316\045\303\371\140\033\240\305\227\303\323
\054\210\061\242\275\060\354\320\320\300\022\361\301\071\343\345
\365\370\326\112\335\064\315\373\157\301\117\343\000\213\126\342
\222\367\050\262\102\167\162\043\147\307\077\021\025\262\304\003
\005\276\273\021\173\012\277\250\156\347\377\130\103\317\233\147
\240\200\007\266\035\312\255\155\352\101\021\176\055\164\223\373
\302\274\276\121\104\305\357\150\045\047\200\343\310\240\324\022
\354\331\245\067\035\067\174\264\221\312\332\324\261\226\201\357
\150\134\166\020\111\257\176\245\067\200\261\034\122\275\063\201
\114\217\371\335\145\331\024\315\212\045\130\364\342\305\203\245
\011\220\324\154\024\143\265\100\337\353\300\374\304\130\176\015
\024\026\207\124\047\156\126\344\160\204\270\154\062\022\176\202
\061\103\276\327\335\174\241\255\256\326\253\040\022\357\012\303
\020\214\111\226\065\334\013\165\136\261\117\325\117\064\016\021
\040\007\165\103\105\351\243\021\332\254\243\231\302\266\171\047
\342\271\357\310\342\366\065\051\172\164\372\305\177\202\005\142
\246\012\352\150\262\171\107\006\156\362\127\250\025\063\306\367
\170\112\075\102\173\153\176\376\367\106\352\321\353\216\357\210
\150\133\350\301\331\161\176\375\144\357\377\147\107\210\130\045
\057\076\206\007\275\373\250\345\202\250\254\245\323\151\103\315
\061\210\111\204\123\222\300\261\071\033\071\203\001\060\304\362
\251\372\320\003\275\162\067\140\126\037\066\174\275\071\221\365

```
\155\015\277\173\327\222
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER MULTILINE_OCTAL
\062\064\060\066\063\060\060\060\060\060\060\060\132
END
CKA_NSS_EMAIL_DISTRUST_AFTER MULTILINE_OCTAL
\062\064\060\066\063\060\060\060\060\060\060\060\132
END

# Trust for "GLOBALTRUST 2020"
# Issuer: CN=GLOBALTRUST 2020,O=e-commerce monitoring GmbH,C=AT
# Serial Number:5a:4b:bd:5a:fb:4f:8a:5b:fa:65:e5
# Subject: CN=GLOBALTRUST 2020,O=e-commerce monitoring GmbH,C=AT
# Not Valid Before: Mon Feb 10 00:00:00 2020
# Not Valid After : Sun Jun 10 00:00:00 2040
# Fingerprint (SHA-256):
9A:29:6A:51:82:D1:D4:51:A2:E3:7F:43:9B:74:DA:AF:A2:67:52:33:29:F9:0F:9A:0D:20:07:C3:34:E2:3C:9A
# Fingerprint (SHA1): D0:67:C1:13:51:01:0C:AA:D0:C7:6A:65:37:31:16:26:4F:53:71:A2
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GLOBALTRUST 2020"
CKA_CERT_SHA1_HASH
 MULTILINE_OCTAL
\320\147\301\023\121\001\014\252\320\307\152\145\067\061\026\046
\117\123\161\242
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\212\307\157\313\155\343\314\242\361\174\203\372\016\170\327\350
END
CKA_ISSUER MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\101\124\061
\043\060\041\006\003\125\004\012\023\032\145\055\143\157\155\155
\145\162\143\145\040\155\157\156\151\164\157\162\151\156\147\040
\107\155\142\110\061\031\060\027\006\003\125\004\003\023\020\107
\114\117\102\101\114\124\122\125\123\124\040\062\060\062\060
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\013\132\113\275\132\373\117\212\133\372\145\345
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
#
# Certificate "ANF Secure Server Root CA"
#
# Issuer: CN=ANF Secure Server Root CA,OU=ANF CA Raiz,O=ANF Autoridad
 de Certificacion,C=ES,serialNumber=G63287510
# Serial Number:0d:d3:e3:bc:6c:f9:6b:b1
# Subject: CN=ANF Secure Server Root CA,OU=ANF CA Raiz,O=ANF Autoridad de
Certificacion,C=ES,serialNumber=G63287510
# Not Valid Before: Wed Sep 04 10:00:38 2019
# Not Valid After : Tue Aug 30 10:00:38 2039
# Fingerprint (SHA-256):
FB:8F:EC:75:91:69:B9:10:6B:1E:51:16:44:C6:18:C5:13:04:37:3F:6C:06:43:08:8D:8B:EF:FD:1B:99:75:99
# Fingerprint (SHA1): 5B:6E:68:D0:CC:15:B6:A0:5F:1E:C1:5F:AE:02:FC:6B:2F:5D:6F:74
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ANF Secure Server Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\204\061\022\060\020\006\003\125\004\005\023\011\107\066
\063\062\070\067\065\061\060\061\013\060\011\006\003\125\004\006
\023\002\105\123\061\047\060\045\006\003\125\004\012\023\036\101
\116\106\040\101\165\164\157\162\151\144\141\144\040\144\145\040
\103\145\162\164\151\146\151\143\141\143\151\157\156\061\024\060
\022\006\003\125\004\013\023\013\101\116\106\040\103\101\040\122
\141\151\172\061\042\060\040\006\003\125\004\003\023\031\101\116
\106\040\123\145\143\165\162\145\040\123\145\162\166\145\162\040
\122\157\157\164\040\103\101
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\204\061\022\060\020\006\003\125\004\005\023\011\107\066
\063\062\070\067\065\061\060\061\013\060\011\006\003\125\004\006
\023\002\105\123\061\047\060\045\006\003\125\004\012\023\036\101
\116\106\040\101\165\164\157\162\151\144\141\144\040\144\145\040
\103\145\162\164\151\146\151\143\141\143\151\157\156\061\024\060
\022\006\003\125\004\013\023\013\101\116\106\040\103\101\040\122
\141\151\172\061\042\060\040\006\003\125\004\003\023\031\101\116
\106\040\123\145\143\165\162\145\040\123\145\162\166\145\162\040
\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\015\323\343\274\154\371\153\261
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\357\060\202\003\327\240\003\002\001\002\002\010\015
```

\323\343\274\154\371\153\261\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\201\204\061\022\060\020\006\003\125
\004\005\023\011\107\066\063\062\070\067\065\061\060\061\013\060
\011\006\003\125\004\006\023\002\105\123\061\047\060\045\006\003
\125\004\012\023\036\101\116\106\040\101\165\164\157\162\151\144
\141\144\040\144\145\040\103\145\162\164\151\146\151\143\141\143
\151\157\156\061\024\060\022\006\003\125\004\013\023\013\101\116
\106\040\103\101\040\122\141\151\172\061\042\060\040\006\003\125
\004\003\023\031\101\116\106\040\123\145\143\165\162\145\040\123
\145\162\166\145\162\040\122\157\157\164\040\103\101\060\036\027
\015\061\071\060\071\060\064\061\060\060\060\063\070\132\027\015
\063\071\060\070\063\060\061\060\060\060\063\070\132\060\201\204
\061\022\060\020\006\003\125\004\005\023\011\107\066\063\062\070
\067\065\061\060\061\013\060\011\006\003\125\004\006\023\002\105
\123\061\047\060\045\006\003\125\004\012\023\036\101\116\106\040
\101\165\164\157\162\151\144\141\144\040\144\145\040\103\145\162
\164\151\146\151\143\141\143\151\157\156\061\024\060\022\006\003
\125\004\013\023\013\101\116\106\040\103\101\040\122\141\151\172
\061\042\060\040\006\003\125\004\003\023\031\101\116\106\040\123
\145\143\165\162\145\040\123\145\162\166\145\162\040\122\157\157
\164\040\103\101\060\202\002\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012
\002\202\002\001\000\333\353\153\053\346\144\124\225\202\220\243
\162\244\031\001\235\234\013\201\137\163\111\272\247\254\363\004
\116\173\226\013\354\021\340\133\246\034\316\033\322\015\203\034
\053\270\236\035\176\105\062\140\017\007\351\167\130\176\237\152
\310\141\116\266\046\301\114\215\377\114\357\064\262\037\145\330
\271\170\365\255\251\161\271\357\117\130\035\245\336\164\040\227
\241\355\150\114\336\222\027\113\274\253\377\145\232\236\373\107
\331\127\162\363\011\241\256\166\104\023\156\234\055\104\071\274
\371\307\073\244\130\075\101\275\264\302\111\243\310\015\322\227
\057\007\145\122\000\247\156\310\257\150\354\364\024\226\266\127
\037\126\303\071\237\053\155\344\363\076\366\065\144\332\014\034
\241\204\113\057\113\113\342\054\044\235\155\223\100\353\265\043
\216\062\312\157\105\323\250\211\173\036\317\036\372\133\103\213
\315\315\250\017\152\312\014\136\271\236\107\217\360\331\266\012
\013\130\145\027\063\271\043\344\167\031\175\313\112\056\222\173
\117\057\020\167\261\215\057\150\234\142\314\340\120\370\354\221
\247\124\114\127\011\325\166\143\305\350\145\036\356\155\152\317
\011\235\372\174\117\255\140\010\375\126\231\017\025\054\173\251
\200\253\214\141\217\112\007\166\102\336\075\364\335\262\044\063
\133\270\265\243\104\311\254\177\167\074\035\043\354\202\251\246
\342\310\006\114\002\376\254\134\231\231\013\057\020\212\246\364
\177\325\207\164\015\131\111\105\366\360\161\134\071\051\326\277
\112\043\213\365\137\001\143\322\207\163\050\265\113\012\365\370
\253\202\054\176\163\045\062\035\013\143\012\027\201\000\377\266
\166\136\347\264\261\100\312\041\273\325\200\121\345\110\122\147
\054\322\141\211\007\015\017\316\102\167\300\104\163\234\104\120

\240\333\020\012\055\225\034\201\257\344\034\345\024\036\361\066
\101\001\002\057\175\163\247\336\102\314\114\351\211\015\126\367
\237\221\324\003\306\154\311\217\333\330\034\340\100\230\135\146
\231\230\200\156\055\377\001\305\316\313\106\037\254\002\306\103
\346\256\242\204\074\305\116\036\075\155\311\024\114\343\056\101
\273\312\071\277\066\074\052\031\252\101\207\116\245\316\113\062
\171\335\220\111\177\002\003\001\000\001\243\143\060\141\060\037
\006\003\125\035\043\004\030\060\026\200\024\234\137\320\154\143
\243\137\223\312\223\230\010\255\214\207\245\054\134\301\067\060
\035\006\003\125\035\016\004\026\004\024\234\137\320\154\143\243
\137\223\312\223\230\010\255\214\207\245\054\134\301\067\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202
\002\001\000\116\036\271\212\306\240\230\077\156\303\151\300\152
\134\111\122\254\313\053\135\170\070\301\325\124\204\237\223\360
\207\031\075\054\146\211\353\015\102\374\314\360\165\205\077\213
\364\200\135\171\345\027\147\275\065\202\342\362\074\216\175\133
\066\313\132\200\000\051\362\316\053\054\361\217\252\155\005\223
\154\162\307\126\353\337\120\043\050\345\105\020\075\350\147\243
\257\016\125\017\220\011\142\357\113\131\242\366\123\361\300\065
\344\057\301\044\275\171\057\116\040\042\073\375\032\040\260\244
\016\054\160\355\164\077\270\023\225\006\121\310\350\207\046\312
\244\133\152\026\041\222\335\163\140\236\020\030\336\074\201\352
\350\030\303\174\211\362\213\120\076\275\021\342\025\003\250\066
\175\063\001\154\110\025\327\210\220\231\004\305\314\346\007\364
\274\364\220\355\023\342\352\213\303\217\243\063\017\301\051\114
\023\116\332\025\126\161\163\162\202\120\366\232\063\174\242\261
\250\032\064\164\145\134\316\321\353\253\123\340\032\200\330\352
\072\111\344\046\060\233\345\034\212\250\251\025\062\206\231\222
\012\020\043\126\022\340\366\316\114\342\273\276\333\215\222\163
\001\146\057\142\076\262\162\047\105\066\355\115\126\343\227\231
\377\072\065\076\245\124\112\122\131\113\140\333\356\376\170\021
\177\112\334\024\171\140\266\153\144\003\333\025\203\341\242\276
\366\043\227\120\360\011\063\066\247\161\226\045\363\271\102\175
\333\070\077\054\130\254\350\102\341\016\330\323\073\114\056\202
\351\203\056\153\061\331\335\107\206\117\155\227\221\056\117\342
\050\161\065\026\321\362\163\376\045\053\007\107\044\143\047\310
\370\366\331\153\374\022\061\126\010\300\123\102\257\234\320\063
\176\374\006\360\061\104\003\024\361\130\352\362\152\015\251\021
\262\203\276\305\032\277\007\352\131\334\243\210\065\357\234\166
\062\074\115\006\042\316\025\345\335\236\330\217\332\336\322\304
\071\345\027\201\317\070\107\353\177\210\155\131\033\337\237\102
\024\256\176\317\250\260\146\145\332\067\257\237\252\075\352\050
\266\336\325\061\130\026\202\133\352\273\031\165\002\163\032\312
\110\032\041\223\220\012\216\223\204\247\175\073\043\030\222\211
\240\215\254
END

```
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "ANF Secure Server Root CA"
# Issuer: CN=ANF Secure Server Root CA,OU=ANF CA Raiz,O=ANF Autoridad de
Certificacion,C=ES,serialNumber=G63287510
# Serial Number:0d:d3:e3:bc:6c:f9:6b:b1
# Subject: CN=ANF Secure Server Root CA,OU=ANF CA Raiz,O=ANF Autoridad de
Certificacion,C=ES,serialNumber=G63287510
# Not Valid Before: Wed Sep 04 10:00:38 2019
# Not Valid After : Tue Aug 30 10:00:38 2039
# Fingerprint (SHA-256):
FB:8F:EC:75:91:69:B9:10:6B:1E:51:16:44:C6:18:C5:13:04:37:3F:6C:06:43:08:8D:8B:EF:FD:1B:99:75:99
# Fingerprint (SHA1): 5B:6E:68:D0:CC:15:B6:A0:5F:1E:C1:5F:AE:02:FC:6B:2F:5D:6F:74
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
 CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ANF Secure Server Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\133\156\150\320\314\025\266\240\137\036\301\137\256\002\374\153
\057\135\157\164
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\046\246\104\132\331\257\116\057\262\035\266\145\260\116\350\226
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\204\061\022\060\020\006\003\125\004\005\023\011\107\066
\063\062\070\067\065\061\060\061\013\060\011\006\003\125\004\006
\023\002\105\123\061\047\060\045\006\003\125\004\012\023\036\101
\116\106\040\101\165\164\157\162\151\144\141\144\040\144\145\040
\103\145\162\164\151\146\151\143\141\143\151\157\156\061\024\060
\022\006\003\125\004\013\023\013\101\116\106\040\103\101\040\122
\141\151\172\061\042\060\040\006\003\125\004\003\023\031\101\116
\106\040\123\145\143\165\162\145\040\123\145\162\166\145\162\040
\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\015\323\343\274\154\371\153\261
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
#
# Certificate "Certum EC-384 CA"
#
# Issuer: CN=Certum EC-384 CA,OU=Certum Certification Authority,O=Asseco Data Systems S.A.,C=PL
# Serial Number:78:8f:27:5c:81:12:52:20:a5:04:d0:2d:dd:ba:73:f4
# Subject: CN=Certum EC-384 CA,OU=Certum Certification Authority,O=Asseco Data Systems S.A.,C=PL
# Not Valid Before: Mon Mar 26 07:24:54 2018
# Not Valid After : Thu Mar 26 07:24:54 2043
# Fingerprint (SHA-256):
6B:32:80:85:62:53:18:AA:50:D1:73:C9:8D:8B:DA:09:D5:7E:27:41:3D:11:4C:F7:87:A0:F5:D0:6C:03:0C:F6
# Fingerprint (SHA1): F3:3E:78:3C:AC:DF:F4:A2:CC:AC:67:55:69:56:D7:E5:16:3C:E1:ED
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certum EC-384 CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE
 CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\164\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\041\060\037\006\003\125\004\012\023\030\101\163\163\145\143\157
\040\104\141\164\141\040\123\171\163\164\145\155\163\040\123\056
\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145\162
\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\061\031\060\027\006
\003\125\004\003\023\020\103\145\162\164\165\155\040\105\103\055
\063\070\064\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\164\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\041\060\037\006\003\125\004\012\023\030\101\163\163\145\143\157
\040\104\141\164\141\040\123\171\163\164\145\155\163\040\123\056
\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145\162
\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\061\031\060\027\006
\003\125\004\003\023\020\103\145\162\164\165\155\040\105\103\055
\063\070\064\040\103\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\170\217\047\134\201\022\122\040\245\004\320\055\335\272
\163\364
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\145\060\202\001\353\240\003\002\001\002\002\020\170
\217\047\134\201\022\122\040\245\004\320\055\335\272\163\364\060
```

\012\006\010\052\206\110\316\075\004\003\003\060\164\061\013\060
\011\006\003\125\004\006\023\002\120\114\061\041\060\037\006\003
\125\004\012\023\030\101\163\163\145\143\157\040\104\141\164\141
\040\123\171\163\164\145\155\163\040\123\056\101\056\061\047\060
\045\006\003\125\004\013\023\036\103\145\162\164\165\155\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\061\031\060\027\006\003\125\004\003\023
\020\103\145\162\164\165\155\040\105\103\055\063\070\064\040\103
\101\060\036\027\015\061\070\060\063\062\066\060\067\062\064\065
\064\132\027\015\064\063\060\063\062\066\060\067\062\064\065\064
\132\060\164\061\013\060\011\006\003\125\004\006\023\002\120\114
\061\041\060\037\006\003\125\004\012\023\030\101\163\163\145\143
\157\040\104\141\164\141\040\123\171\163\164\145\155\163\040\123
\056\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145
\162\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\061\031\060\027
\006\003\125\004\003\023\020\103\145\162\164\165\155\040\105\103
\055\063\070\064\040\103\101\060\166\060\020\006\007\052\206\110
\316\075\002\001\006\005\053\201\004\000\042\003\142\000\004\304
\050\216\253\030\133\152\276\156\144\067\143\344\315\354\253\072
\367\314\241\270\016\202\111\327\206\051\237\241\224\362\343\140
\170\230\201\170\006\115\362\354\232\016\127\140\203\237\264\346
\027\057\032\263\135\002\133\211\043\074\302\021\005\052\247\210
\023\030\363\120\204\327\275\064\054\047\211\125\377\316\114\347
\337\246\037\050\304\360\124\303\271\174\267\123\255\353\302\243
\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024\215
\006\146\164\044\166\072\363\211\367\274\326\275\107\175\057\274
\020\137\113\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\012\006\010\052\206\110\316\075\004\003\003\003
\150\000\060\145\002\060\003\125\055\246\346\030\304\174\357\311
\120\156\301\047\017\234\207\257\156\325\033\010\030\275\222\051
\301\357\224\221\170\322\072\034\125\211\142\345\033\011\036\272
\144\153\361\166\264\324\002\061\000\264\102\204\231\377\253\347
\236\373\221\227\047\135\334\260\133\060\161\316\136\070\032\152
\331\045\347\352\367\141\222\126\370\352\332\066\302\207\145\226
\056\162\045\057\177\337\303\023\311
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Certum EC-384 CA"
# Issuer: CN=Certum EC-384 CA,OU=Certum Certification Authority,O=Asseco Data Systems S.A.,C=PL
# Serial Number:78:8f:27:5c:81:12:52:20:a5:04:d0:2d:dd:ba:73:f4
#

```
 Subject: CN=Certum EC-384 CA,OU=Certum Certification Authority,O=Asseco Data Systems S.A.,C=PL
# Not Valid Before: Mon Mar 26 07:24:54 2018
# Not Valid After : Thu Mar 26 07:24:54 2043
# Fingerprint (SHA-256):
6B:32:80:85:62:53:18:AA:50:D1:73:C9:8D:8B:DA:09:D5:7E:27:41:3D:11:4C:F7:87:A0:F5:D0:6C:03:0C:F6
# Fingerprint (SHA1): F3:3E:78:3C:AC:DF:F4:A2:CC:AC:67:55:69:56:D7:E5:16:3C:E1:ED
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certum EC-384 CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\363\076\170\074\254\337\364\242\314\254\147\125\151\126\327\345
\026\074\341\355
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\266\145\263\226\140\227\022\241\354\116\341\075\243\306\311\361
END
CKA_ISSUER MULTILINE_OCTAL
\060\164\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\041\060\037\006\003\125\004\012\023\030\101\163\163\145\143\157
\040\104\141\164\141\040\123\171\163\164\145\155\163\040\123\056
\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145\162
\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\061\031\060\027\006
\003\125\004\003\023\020\103\145\162\164\165\155\040\105\103\055
\063\070\064\040\103\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\170\217\047\134\201\022\122\040\245\004\320\055\335\272
\163\364
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Certum Trusted Root CA"
#
# Issuer: CN=Certum Trusted Root CA,OU=Certum Certification Authority,O=Asseco Data Systems S.A.,C=PL
# Serial Number:1e:bf:59:50:b8:c9:80:37:4c:06:f7:eb:55:4f:b5:ed
# Subject: CN=Certum Trusted Root CA,OU=Certum Certification Authority,O=Asseco Data Systems S.A.,C=PL
# Not Valid Before: Fri Mar
 16 12:10:13 2018
# Not Valid After : Mon Mar 16 12:10:13 2043
# Fingerprint (SHA-256):
```

FE:76:96:57:38:55:77:3E:37:A9:5E:7A:D4:D9:CC:96:C3:01:57:C1:5D:31:76:5B:A9:B1:57:04:E1:AE:78:FD
# Fingerprint (SHA1): C8:83:44:C0:18:AE:9F:CC:F1:87:B7:8F:22:D1:C5:D7:45:84:BA:E5
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certum Trusted Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\172\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\041\060\037\006\003\125\004\012\023\030\101\163\163\145\143\157
\040\104\141\164\141\040\123\171\163\164\145\155\163\040\123\056
\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145\162
\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\061\037\060\035\006
\003\125\004\003\023\026\103\145\162\164\165\155\040\124\162\165
\163\164\145\144\040\122\157\157\164\040\103\101
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\172\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\041\060\037\006\003\125\004\012\023\030\101\163\163\145\143\157
\040\104\141\164\141\040\123\171\163\164\145\155\163\040\123\056
\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145\162
\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\061\037\060\035\006
\003\125\004\003\023\026\103\145\162\164\165\155\040\124\162\165
\163\164\145\144\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\036\277\131\120\270\311\200\067\114\006\367\353\125\117
\265\355
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\300\060\202\003\250\240\003\002\001\002\002\020\036
\277\131\120\270\311\200\067\114\006\367\353\125\117\265\355\060
\015\006\011\052\206\110\206\367\015\001\001\015\005\000\060\172
\061\013\060\011\006\003\125\004\006\023\002\120\114\061\041\060
\037\006\003\125\004\012\023\030\101\163\163\145\143\157\040\104
\141\164\141\040\123\171\163\164\145\155\163\040\123\056\101\056
\061\047\060\045\006\003\125\004\013\023\036\103\145\162\164\165
\155\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040
\101\165\164\150\157\162\151\164\171\061\037\060\035\006\003\125
\004\003\023\026\103\145\162\164\165\155\040\124\162\165\163\164
\145\144\040\122\157\157\164\040\103\101\060\036\027\015\061\070
\060\063\061\066\061\062\061\060\061\063\132\027\015\064\063\060
\063\061\066\061\062\061\060\061\063\132\060\172\061\013\060\011

\006\003\125\004\006\023\002\120\114\061\041\060\037\006\003\125
\004\012\023\030\101\163\163\145\143\157\040\104\141\164\141\040
\123\171\163\164\145\155\163\040\123\056\101\056\061\047\060\045
\006\003\125\004\013\023\036\103\145\162\164\165\155\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171\061\037\060\035\006\003\125\004\003\023\026
\103\145\162\164\165\155\040\124\162\165\163\164\145\144\040\122
\157\157\164\040\103\101\060\202\002\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202
\002\012\002\202\002\001\000\321\055\216\273\267\066\352\155\067
\221\237\116\223\247\005\344\051\003\045\316\034\202\367\174\231
\237\101\006\315\355\243\272\300\333\011\054\301\174\337\051\176
\113\145\057\223\247\324\001\153\003\050\030\243\330\235\005\301
\052\330\105\361\221\336\337\073\320\200\002\214\317\070\017\352
\247\134\170\021\244\301\310\205\134\045\323\323\262\347\045\317
\021\124\227\253\065\300\036\166\034\357\000\123\237\071\334\024
\245\054\042\045\263\162\162\374\215\263\345\076\010\036\024\052
\067\013\210\074\312\260\364\310\302\241\256\274\301\276\051\147
\125\342\374\255\131\134\376\275\127\054\260\220\215\302\355\067
\266\174\231\210\265\325\003\232\075\025\015\075\072\250\250\105
\360\225\116\045\131\035\315\230\151\273\323\314\062\311\215\357
\201\376\255\175\211\273\272\140\023\312\145\225\147\240\363\031
\366\003\126\324\152\323\047\342\241\255\203\360\112\022\042\167
\034\005\163\342\031\161\102\300\354\165\106\232\220\130\340\152
\216\053\245\106\060\004\216\031\262\027\343\276\251\272\177\126
\361\044\003\327\262\041\050\166\016\066\060\114\171\325\101\232
\232\250\270\065\272\014\072\362\104\033\040\210\367\305\045\327
\075\306\343\076\103\335\207\376\304\352\365\123\076\114\145\377
\073\112\313\170\132\153\027\137\015\307\303\117\116\232\052\242
\355\127\115\042\342\106\232\077\017\221\064\044\175\125\343\214
\225\067\323\032\360\011\053\054\322\311\215\264\015\000\253\147
\051\050\330\001\365\031\004\266\035\276\166\376\162\134\304\205
\312\322\200\101\337\005\250\243\325\204\220\117\013\363\340\077
\233\031\322\067\211\077\362\173\122\034\214\366\341\367\074\007
\227\214\016\242\131\201\014\262\220\075\323\343\131\106\355\017
\251\247\336\200\153\132\252\007\266\031\313\274\127\363\227\041
\172\014\261\053\164\076\353\332\247\147\055\114\304\230\236\066
\011\166\146\146\374\032\077\352\110\124\034\276\060\275\200\120
\277\174\265\316\000\366\014\141\331\347\044\003\340\343\001\201
\016\275\330\205\064\210\275\262\066\250\173\134\010\345\104\200
\214\157\370\057\325\041\312\035\034\320\373\304\265\207\321\072
\116\307\166\265\065\110\265\002\003\001\000\001\243\102\060\100
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\035\006\003\125\035\016\004\026\004\024\214\373\034\165
\274\002\323\237\116\056\110\331\371\140\124\252\304\263\117\372
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006
\060\015\006\011\052\206\110\206\367\015\001\001\015\005\000\003
\202\002\001\000\110\242\325\000\013\056\320\077\274\034\325\265

\124\111\036\132\153\364\344\362\340\100\067\340\314\024\173\271
\311\372\065\265\165\027\223\152\005\151\205\234\315\117\031\170
\133\031\201\363\143\076\303\316\133\217\365\057\136\001\166\023
\077\054\000\271\315\226\122\071\111\155\004\116\305\351\017\206
\015\341\372\263\137\202\022\361\072\316\146\006\044\064\053\350
\314\312\347\151\334\207\235\302\064\327\171\321\323\167\270\252
\131\130\376\235\046\372\070\206\076\235\212\207\144\127\345\027
\072\342\371\215\271\343\063\170\301\220\330\270\335\267\203\121
\344\304\314\043\325\006\174\346\121\323\315\064\061\300\366\106
\273\013\255\374\075\020\005\052\073\112\221\045\356\214\324\204
\207\200\052\274\011\214\252\072\023\137\350\064\171\120\301\020
\031\371\323\050\036\324\321\121\060\051\263\256\220\147\326\037
\012\143\261\305\251\306\102\061\143\027\224\357\151\313\057\372
\214\024\175\304\103\030\211\331\360\062\100\346\200\342\106\137
\345\343\301\000\131\250\371\350\040\274\211\054\016\107\064\013
\352\127\302\123\066\374\247\324\257\061\315\376\002\345\165\372
\271\047\011\371\363\365\073\312\175\237\251\042\313\210\311\252
\321\107\075\066\167\250\131\144\153\047\317\357\047\301\343\044
\265\206\367\256\176\062\115\260\171\150\321\071\350\220\130\303
\203\274\017\054\326\227\353\316\014\341\040\307\332\267\076\303
\077\277\057\334\064\244\373\053\041\315\147\217\113\364\343\352
\324\077\347\117\272\271\245\223\105\034\146\037\041\372\144\136
\157\340\166\224\062\313\165\365\156\345\366\217\307\270\244\314
\250\226\175\144\373\044\132\112\003\154\153\070\306\350\003\103
\232\367\127\271\263\051\151\223\070\364\003\362\273\373\202\153
\007\040\321\122\037\232\144\002\173\230\146\333\134\115\132\017
\320\204\225\240\074\024\103\006\312\312\333\270\101\066\332\152
\104\147\207\257\257\343\105\021\025\151\010\262\276\026\071\227
\044\157\022\105\321\147\135\011\250\311\025\332\372\322\246\137
\023\141\037\277\205\254\264\255\255\005\224\010\203\036\165\027
\323\161\073\223\120\043\131\240\355\074\221\124\235\166\000\305
\303\270\070\333
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Certum Trusted Root CA"
# Issuer: CN=Certum Trusted Root CA,OU=Certum Certification Authority,O=Asseco Data Systems S.A.,C=PL
# Serial
 Number:1e:bf:59:50:b8:c9:80:37:4c:06:f7:eb:55:4f:b5:ed
# Subject: CN=Certum Trusted Root CA,OU=Certum Certification Authority,O=Asseco Data Systems S.A.,C=PL
# Not Valid Before: Fri Mar 16 12:10:13 2018
# Not Valid After : Mon Mar 16 12:10:13 2043
# Fingerprint (SHA-256):
FE:76:96:57:38:55:77:3E:37:A9:5E:7A:D4:D9:CC:96:C3:01:57:C1:5D:31:76:5B:A9:B1:57:04:E1:AE:78:FD
# Fingerprint (SHA1): C8:83:44:C0:18:AE:9F:CC:F1:87:B7:8F:22:D1:C5:D7:45:84:BA:E5

```
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certum Trusted Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\310\203\104\300\030\256\237\314\361\207\267\217\042\321\305\327
\105\204\272\345
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\121\341\302\347\376\114\204\257\131\016\057\364\124\157\352\051
END
CKA_ISSUER MULTILINE_OCTAL
\060\172\061\013\060\011\006\003\125\004\006\023\002\120\114\061
\041\060\037\006\003\125\004\012\023\030\101\163\163\145\143\157
\040\104\141\164\141\040\123\171\163\164\145\155\163\040\123\056
\101\056\061\047\060\045\006\003\125\004\013\023\036\103\145\162
\164\165\155\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\061\037\060\035\006
\003\125\004\003\023\026\103\145\162\164\165\155\040\124\162\165
\163\164\145\144\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\036\277\131\120\270\311\200\067\114\006\367\353\125\117
\265\355
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "TunTrust Root CA"
#
# Issuer: CN=TunTrust Root CA,O=Agence Nationale de Certification Electronique,C=TN
# Serial Number:13:02:d5:e2:40:4c:92:46:86:16:67:5d:b4:bb:bb:b2:6b:3e:fc:13
# Subject: CN=TunTrust Root CA,O=Agence Nationale de Certification Electronique,C=TN
#
 Not Valid Before: Fri Apr 26 08:57:56 2019
# Not Valid After : Tue Apr 26 08:57:56 2044
# Fingerprint (SHA-256):
2E:44:10:2A:B5:8C:B8:54:19:45:1C:8E:19:D9:AC:F3:66:2C:AF:BC:61:4B:6A:53:96:0A:30:F7:D0:E2:EB:41
# Fingerprint (SHA1): CF:E9:70:84:0F:E0:73:0F:9D:F6:0C:7F:2C:4B:EE:20:46:34:9C:BB
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
```

```
CKA_LABEL UTF8 "TunTrust Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\124\116\061
\067\060\065\006\003\125\004\012\014\056\101\147\145\156\143\145
\040\116\141\164\151\157\156\141\154\145\040\144\145\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\105\154\145\143
\164\162\157\156\151\161\165\145\061\031\060\027\006\003\125\004
\003\014\020\124\165\156\124\162\165\163\164\040\122\157\157\164
\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\124\116\061
\067\060\065\006\003\125\004\012\014\056\101\147\145\156\143\145
\040\116\141\164\151\157\156\141\154\145\040\144\145\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\105\154\145\143
\164\162\157\156\151\161\165\145\061\031\060\027\006\003\125\004
\003\014\020\124\165\156\124\162\165\163\164\040\122\157\157\164
\040\103\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\024\023\002\325\342\100\114\222\106\206\026\147\135\264\273
\273\262\153\076\374\023
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\263\060\202\003\233\240\003\002\001\002\002\024\023
\002\325\342\100\114\222\106\206\026\147\135\264\273\273\262\153
\076\374\023\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\141\061\013\060\011\006\003\125\004\006\023\002\124
\116\061\067\060\065\006\003\125\004\012\014\056\101\147\145\156
\143\145\040\116\141\164\151\157\156\141\154\145\040\144\145\040
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\105\154
\145\143\164\162\157\156\151\161\165\145\061\031\060\027\006\003
\125\004\003\014\020\124\165\156\124\162\165\163\164\040\122\157
\157\164\040\103\101\060\036\027\015\061\071\060\064\062\066\060
\070\065\067\065\066\132\027\015\064\064\060\064\062\066\060\070
\065\067\065\066\132\060\141\061\013\060\011\006\003\125\004\006
\023\002\124\116\061\067\060\065\006\003\125\004\012\014\056\101
\147\145\156\143\145\040\116\141\164\151\157\156\141\154\145\040
\144\145\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\105\154\145\143\164\162\157\156\151\161\165\145\061\031\060
\027\006\003\125\004\003\014\020\124\165\156\124\162\165\163\164
\040\122\157\157\164\040\103\101\060\202\002\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000
\060\202\002\012\002\202\002\001\000\303\315\323\374\275\004\123
\335\014\040\072\325\210\056\005\113\101\365\203\202\176\367\131
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\237\236\236\143\350\163\332\366\006\251\117\037\264\371\013\037
\071\214\232\040\320\176\006\324\354\064\331\206\274\165\133\207
\210\360\322\331\324\243\012\262\154\033\353\111\054\076\254\135
\330\224\003\240\354\064\345\060\304\065\175\373\046\115\033\156
\060\124\330\365\200\105\234\071\255\234\311\045\004\115\232\220
\076\116\100\156\212\153\315\051\147\306\314\055\340\164\350\005
\127\012\110\120\372\172\103\332\176\354\133\232\016\142\166\376
\352\235\035\205\162\354\021\273\065\350\037\047\277\301\241\307
\273\110\026\335\126\327\314\116\240\341\271\254\333\325\203\031
\032\205\321\224\227\327\312\243\145\013\363\070\371\002\256\335
\366\147\317\311\077\365\212\054\107\032\231\157\005\015\375\320
\035\202\061\374\051\314\000\130\227\221\114\200\000\034\063\205
\226\057\313\101\302\213\020\204\303\011\044\211\037\265\017\331
\331\167\107\030\222\224\140\134\307\231\003\074\376\367\225\247
\175\120\241\200\302\251\203\255\130\226\125\041\333\206\131\324
\257\306\274\335\201\156\007\333\140\142\376\354\020\156\332\150
\001\364\203\033\251\076\242\133\043\327\144\306\337\334\242\175
\330\113\272\202\322\121\370\146\277\006\106\344\171\052\046\066
\171\217\037\116\231\035\262\217\014\016\034\377\311\135\300\375
\220\020\246\261\067\363\315\072\044\156\264\205\220\277\200\271
\014\214\325\233\326\310\361\126\077\032\200\211\172\251\342\033
\062\121\054\076\362\337\173\366\135\172\051\031\216\345\310\275
\066\161\213\135\114\302\035\077\255\130\242\317\075\160\115\246
\120\230\045\334\043\371\270\130\101\010\161\277\117\270\204\240
\217\000\124\025\374\221\155\130\247\226\073\353\113\226\047\315
\153\242\241\206\254\015\174\124\346\146\114\146\137\220\276\041
\232\002\106\055\344\203\302\200\271\317\113\076\350\177\074\001
\354\217\136\315\177\322\050\102\001\225\212\342\227\075\020\041
\175\366\235\034\305\064\241\354\054\016\012\122\054\022\125\160
\044\075\313\302\024\065\103\135\047\116\276\300\275\252\174\226
\347\374\236\141\255\104\323\000\227\002\003\001\000\001\243\143
\060\141\060\035\006\003\125\035\016\004\026\004\024\006\232\233
\037\123\175\361\365\244\310\323\206\076\241\163\131\264\367\104
\041\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\037\006\003\125\035\043\004\030\060\026\200\024\006
\232\233\037\123\175\361\365\244\310\323\206\076\241\163\131\264
\367\104\041\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\003\202\002\001\000\252\005\156\266\335\025\311\277\263
\306\040\366\006\107\260\206\223\045\323\215\271\310\000\077\227
\365\122\047\210\161\311\164\375\353\312\144\333\133\357\036\135
\272\277\321\353\356\134\151\272\026\310\363\271\217\323\066\056
\100\111\007\015\131\336\213\020\260\111\005\342\377\221\077\113
\267\335\002\216\370\201\050\134\314\334\155\257\137\024\234\175
\130\170\015\366\200\011\271\351\016\227\051\031\270\267\353\370
\026\313\125\022\344\306\175\273\304\354\370\265\034\116\076\147
\277\305\137\033\155\155\107\050\252\004\130\141\326\166\277\042
\177\320\007\152\247\144\123\360\227\215\235\200\077\273\301\007

\333\145\257\346\233\062\232\303\124\223\304\034\010\303\104\373
\173\143\021\103\321\152\032\141\152\171\155\220\117\051\216\107
\005\301\022\151\151\326\306\066\061\341\374\372\200\272\134\117
\304\353\267\062\254\370\165\141\027\327\020\031\271\361\322\011
\357\172\102\235\133\132\013\324\306\225\116\052\316\377\007\327
\117\176\030\006\210\361\031\265\331\230\273\256\161\304\034\347
\164\131\130\357\014\211\317\213\037\165\223\032\004\024\222\110
\120\251\353\127\051\000\026\343\066\034\310\370\277\360\063\325
\101\017\304\314\074\335\351\063\103\001\221\020\053\036\321\271
\135\315\062\031\213\217\214\040\167\327\042\304\102\334\204\026
\233\045\155\350\264\125\161\177\260\174\263\323\161\111\271\317
\122\244\004\077\334\075\240\273\257\063\236\012\060\140\216\333
\235\135\224\250\275\140\347\142\200\166\201\203\014\214\314\060
\106\111\342\014\322\250\257\353\141\161\357\347\042\142\251\367
\134\144\154\237\026\214\147\066\047\105\365\011\173\277\366\020
\012\361\260\215\124\103\214\004\272\243\077\357\342\065\307\371
\164\340\157\064\101\320\277\163\145\127\040\371\233\147\172\146
\150\044\116\200\145\275\020\231\006\131\362\145\257\270\306\107
\273\375\220\170\213\101\163\056\257\125\037\334\073\222\162\156
\204\323\320\141\114\015\314\166\127\342\055\205\042\025\066\015
\353\001\235\353\330\353\304\204\231\373\300\014\314\062\350\343
\167\332\203\104\213\236\125\050\300\213\130\323\220\076\116\033
\000\361\025\255\203\053\232
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "TunTrust Root CA"
# Issuer: CN=TunTrust Root CA,O=Agence Nationale de Certification Electronique,C=TN
# Serial Number:13:02:d5:e2:40:4c:92:46:86:16:67:5d:b4:bb:bb:b2:6b:3e:fc:13
# Subject: CN=TunTrust Root CA,O=Agence Nationale de Certification Electronique,C=TN
# Not Valid Before: Fri Apr 26 08:57:56 2019
# Not Valid After : Tue Apr 26 08:57:56 2044
#
 Fingerprint (SHA-256):
2E:44:10:2A:B5:8C:B8:54:19:45:1C:8E:19:D9:AC:F3:66:2C:AF:BC:61:4B:6A:53:96:0A:30:F7:D0:E2:EB:41
# Fingerprint (SHA1): CF:E9:70:84:0F:E0:73:0F:9D:F6:0C:7F:2C:4B:EE:20:46:34:9C:BB
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TunTrust Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\317\351\160\204\017\340\163\017\235\366\014\177\054\113\356\040
\106\064\234\273
END

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CKA_CERT_MD5_HASH MULTILINE_OCTAL
\205\023\271\220\133\066\134\266\136\270\132\370\340\061\127\264
END
CKA_ISSUER MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\124\116\061
\067\060\065\006\003\125\004\012\014\056\101\147\145\156\143\145
\040\116\141\164\151\157\156\141\154\145\040\144\145\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\105\154\145\143
\164\162\157\156\151\161\165\145\061\031\060\027\006\003\125\004
\003\014\020\124\165\156\124\162\165\163\164\040\122\157\157\164
\040\103\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\024\023\002\325\342\100\114\222\106\206\026\147\135\264\273
\273\262\153\076\374\023
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "HARICA TLS RSA Root CA 2021"
#
# Issuer: CN=HARICA TLS RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Serial Number:39:ca:93:1c:ef:43:f3:c6:8e:93:c7:f4:64:89:38:7e
# Subject: CN=HARICA TLS RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Not Valid Before: Fri Feb 19 10:55:38 2021
# Not Valid After : Mon Feb 13 10:55:37 2045
# Fingerprint (SHA-256):
D9:5D:0E:8E:DA:79:52:5B:F9:BE:B1:1B:14:D2:10:0D:32:94:98:5F:0C:62:D9:FA:BD:9C:D9:99:EC:CB:7B:1D
# Fingerprint (SHA1): 02:2D:05:82:FA:88:CE:14:0C:06:79:DE:7F:14:10:E9:45:D7:A5:6D
CKA_CLASS CK_OBJECT_CLASS
 CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HARICA TLS RSA Root CA 2021"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\154\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\044\060\042\006\003\125\004
\003\014\033\110\101\122\111\103\101\040\124\114\123\040\122\123
\101\040\122\157\157\164\040\103\101\040\062\060\062\061
```

END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\154\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\044\060\042\006\003\125\004
\003\014\033\110\101\122\111\103\101\040\124\114\123\040\122\123
\101\040\122\157\157\164\040\103\101\040\062\060\062\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\071\312\223\034\357\103\363\306\216\223\307\364\144\211
\070\176
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\244\060\202\003\214\240\003\002\001\002\002\020\071
\312\223\034\357\103\363\306\216\223\307\364\144\211\070\176\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\154
\061\013\060\011\006\003\125\004\006\023\002\107\122\061\067\060
\065\006\003\125\004\012\014\056\110\145\154\154\145\156\151\143
\040\101\143\141\144\145\155\151\143\040\141\156\144\040\122\145
\163\145\141\162\143\150\040\111\156\163\164\151\164\165\164\151
\157\156\163\040\103\101\061\044\060\042\006\003\125\004\003\014
\033\110\101\122\111\103\101\040\124\114\123\040\122\123\101\040
\122\157\157\164\040\103\101\040\062\060\062\061\060\036\027\015
\062\061\060\062\061\071\061\060\065\065\063\070\132\027\015\064
\065\060\062\061\063\061\060\065\065\063\067\132\060\154\061\013
\060\011\006\003\125\004\006\023\002\107\122\061\067\060\065\006
\003\125\004\012\014\056\110\145\154\154\145\156\151\143\040\101
\143\141\144\145\155\151\143\040\141\156\144\040\122\145\163\145
\141\162\143\150\040\111\156\163\164\151\164\165\164\151\157\156
\163\040\103\101\061\044\060\042\006\003\125\004\003\014\033\110
\101\122\111\103\101\040\124\114\123\040\122\123\101\040\122\157
\157\164\040\103\101\040\062\060\062\061\060\202\002\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002
\017\000\060\202\002\012\002\202\002\001\000\213\302\347\257\145
\233\005\147\226\311\015\044\271\320\016\144\374\316\342\044\030
\054\204\177\167\121\313\004\021\066\270\136\355\151\161\247\236
\344\045\011\227\147\301\107\302\317\221\026\066\142\075\070\004
\341\121\202\377\254\322\264\151\335\056\354\021\243\105\356\153
\153\073\114\277\214\215\244\036\235\021\271\351\070\371\172\016
\014\230\342\043\035\321\116\143\324\347\270\101\104\373\153\257
\153\332\037\323\305\221\210\133\244\211\222\321\201\346\214\071
\130\240\326\151\103\251\255\230\122\130\156\333\012\373\153\317
\150\372\343\244\136\072\105\163\230\007\352\137\002\162\336\014
\245\263\237\256\251\035\267\035\263\374\212\131\347\156\162\145

\255\365\060\224\043\007\363\202\026\113\065\230\234\123\273\057
\312\344\132\331\307\215\035\374\230\231\373\054\244\202\153\360
\052\037\216\013\137\161\134\134\256\102\173\051\211\201\313\003
\243\231\312\210\236\013\100\011\101\063\333\346\130\172\375\256
\231\160\300\132\017\326\023\206\161\057\166\151\374\220\335\333
\055\156\321\362\233\365\032\153\236\157\025\214\172\360\113\050
\240\042\070\200\044\154\066\244\073\362\060\221\363\170\023\317
\301\077\065\253\361\035\021\043\265\103\042\236\001\222\267\030
\002\345\021\321\202\333\025\000\314\141\067\301\052\174\232\341
\320\272\263\120\106\356\202\254\235\061\370\373\043\342\003\000
\110\160\243\011\046\171\025\123\140\363\070\134\255\070\352\201
\000\143\024\271\063\136\335\013\333\240\105\007\032\063\011\370
\115\264\247\002\246\151\364\302\131\005\210\145\205\126\256\113
\313\340\336\074\175\055\032\310\351\373\037\243\141\112\326\052
\023\255\167\114\032\030\233\221\017\130\330\006\124\305\227\370
\252\077\040\212\246\205\246\167\366\246\374\034\342\356\156\224
\063\052\203\120\204\012\345\117\206\370\120\105\170\000\201\353
\133\150\343\046\215\314\173\134\121\364\024\054\100\276\032\140
\035\172\162\141\035\037\143\055\210\252\316\242\105\220\010\374
\153\276\263\120\052\132\375\250\110\030\106\326\220\100\222\220
\012\204\136\150\061\370\353\355\015\323\035\306\175\231\030\125
\126\047\145\056\215\105\305\044\354\316\343\002\003\001\000\001
\243\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005
\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024
\012\110\043\246\140\244\222\012\063\352\223\133\305\127\352\045
\115\275\022\356\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\206\060\015\006\011\052\206\110\206\367\015\001\001
\013\005\000\003\202\002\001\000\076\220\110\252\156\142\025\045
\146\173\014\325\214\213\211\235\327\355\116\007\357\234\320\024
\137\136\120\275\150\226\220\244\024\021\252\150\155\011\065\071
\100\011\332\364\011\054\064\245\173\131\204\111\051\227\164\310
\007\036\107\155\362\316\034\120\046\343\236\075\100\123\077\367
\177\226\166\020\305\106\245\320\040\113\120\364\065\073\030\364
\125\152\101\033\107\006\150\074\273\011\010\142\331\137\125\102
\252\254\123\205\254\225\126\066\126\253\344\005\214\305\250\332
\037\243\151\275\123\017\304\377\334\312\343\176\362\114\210\206
\107\106\032\363\000\365\200\221\242\334\103\102\224\233\040\360
\321\315\262\353\054\123\302\123\170\112\117\004\224\101\232\217
\047\062\301\345\111\031\277\361\362\302\213\250\012\071\061\050
\264\175\142\066\054\115\354\037\063\266\176\167\155\176\120\360
\237\016\327\021\217\317\030\305\343\047\376\046\357\005\235\317
\317\067\305\320\173\332\073\260\026\204\014\072\223\326\276\027
\333\017\076\016\031\170\011\307\251\002\162\042\113\367\067\166
\272\165\304\205\003\132\143\325\261\165\005\302\271\275\224\255
\214\025\231\247\223\175\366\305\363\252\164\317\004\205\224\230
\000\364\342\371\312\044\145\277\340\142\257\310\305\372\262\311
\236\126\110\332\171\375\226\166\025\276\243\216\126\304\263\064
\374\276\107\364\301\264\250\374\325\060\210\150\356\313\256\311

\143\304\166\276\254\070\030\341\136\134\317\256\072\042\121\353
\321\213\263\363\053\063\007\124\207\372\264\262\023\173\272\123
\004\142\001\235\361\300\117\356\341\072\324\213\040\020\372\002
\127\346\357\301\013\267\220\106\234\031\051\214\334\157\240\112
\151\151\224\267\044\145\240\377\254\077\316\001\373\041\056\375
\150\370\233\362\245\317\061\070\134\025\252\346\227\000\301\337
\132\245\247\071\252\351\204\177\074\121\250\072\331\224\133\214
\277\117\010\161\345\333\250\134\324\322\246\376\000\243\306\026
\307\017\350\200\316\034\050\144\164\031\010\323\102\343\316\000
\135\177\261\334\023\260\341\005\313\321\040\252\206\164\236\071
\347\221\375\377\133\326\367\255\246\057\003\013\155\343\127\124
\353\166\123\030\215\021\230\272
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "HARICA TLS RSA Root CA 2021"
# Issuer: CN=HARICA TLS RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Serial Number:39:ca:93:1c:ef:43:f3:c6:8e:93:c7:f4:64:89:38:7e
# Subject: CN=HARICA TLS RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Not Valid Before: Fri Feb 19 10:55:38 2021
# Not Valid After : Mon Feb 13 10:55:37 2045
# Fingerprint (SHA-256):
D9:5D:0E:8E:DA:79:52:5B:F9:BE:B1:1B:14:D2:10:0D:32:94:98:5F:0C:62:D9:FA:BD:9C:D9:99:EC:CB:7B:1D
# Fingerprint (SHA1): 02:2D:05:82:FA:88:CE:14:0C:06:79:DE:7F:14:10:E9:45:D7:A5:6D
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
 CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HARICA TLS RSA Root CA 2021"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\002\055\005\202\372\210\316\024\014\006\171\336\177\024\020\351
\105\327\245\155
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\145\107\233\130\206\335\054\360\374\242\204\037\036\226\304\221
END
CKA_ISSUER MULTILINE_OCTAL
\060\154\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\044\060\042\006\003\125\004
\003\014\033\110\101\122\111\103\101\040\124\114\123\040\122\123
\101\040\122\157\157\164\040\103\101\040\062\060\062\061

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END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\071\312\223\034\357\103\363\306\216\223\307\364\144\211
\070\176
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "HARICA TLS ECC Root CA 2021"
#
# Issuer: CN=HARICA TLS ECC Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Serial Number:67:74:9d:8d:77:d8:3b:6a:db:22:f4:ff:59:e2:bf:ce
# Subject: CN=HARICA TLS ECC Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Not Valid Before: Fri Feb 19 11:01:10 2021
# Not Valid After : Mon Feb 13 11:01:09 2045
# Fingerprint (SHA-256):
3F:99:CC:47:4A:CF:CE:4D:FE:D5:87:94:66:5E:47:8D:15:47:73:9F:2E:78:0F:1B:B4:CA:9B:13:30:97:D4:01
# Fingerprint (SHA1): BC:B0:C1:9D:E9:98:92:70:19:38:57:E9:8D:A7:B4:5D:6E:EE:01:48
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HARICA TLS ECC Root CA 2021"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\154\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\044\060\042\006\003\125\004
\003\014\033\110\101\122\111\103\101\040\124\114\123\040\105\103
\103\040\122\157\157\164\040\103\101\040\062\060\062\061
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\154\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\044\060\042\006\003\125\004
\003\014\033\110\101\122\111\103\101\040\124\114\123\040\105\103
\103\040\122\157\157\164\040\103\101\040\062\060\062\061
END
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CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\147\164\235\215\167\330\073\152\333\042\364\377\131\342
\277\316
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\002\124\060\202\001\333\240\003\002\001\002\002\020\147
\164\235\215\167\330\073\152\333\042\364\377\131\342\277\316\060
\012\006\010\052\206\110\316\075\004\003\003\060\154\061\013\060
\011\006\003\125\004\006\023\002\107\122\061\067\060\065\006\003
\125\004\012\014\056\110\145\154\154\145\156\151\143\040\101\143
\141\144\145\155\151\143\040\141\156\144\040\122\145\163\145\141
\162\143\150\040\111\156\163\164\151\164\165\164\151\157\156\163
\040\103\101\061\044\060\042\006\003\125\004\003\014\033\110\101
\122\111\103\101\040\124\114\123\040\105\103\103\040\122\157\157
\164\040\103\101\040\062\060\062\061\060\036\027\015\062\061\060
\062\061\071\061\061\060\061\061\060\132\027\015\064\065\060\062
\061\063\061\061\060\061\060\071\132\060\154\061\013\060\011\006
\003\125\004\006\023\002\107\122\061\067\060\065\006\003\125\004
\012\014\056\110\145\154\154\145\156\151\143\040\101\143\141\144
\145\155\151\143\040\141\156\144\040\122\145\163\145\141\162\143
\150\040\111\156\163\164\151\164\165\164\151\157\156\163\040\103
\101\061\044\060\042\006\003\125\004\003\014\033\110\101\122\111
\103\101\040\124\114\123\040\105\103\103\040\122\157\157\164\040
\103\101\040\062\060\062\061\060\166\060\020\006\007\052\206\110
\316\075\002\001\006\005\053\201\004\000\042\003\142\000\004\070
\010\376\261\240\226\322\172\254\257\111\072\320\300\340\303\073
\050\252\361\162\155\145\000\107\210\204\374\232\046\153\252\113
\272\154\004\012\210\136\027\362\125\207\374\060\260\064\342\064
\130\127\032\204\123\351\060\331\251\362\226\164\303\121\037\130
\111\061\314\230\116\140\021\207\165\323\162\224\220\117\233\020
\045\052\250\170\055\276\220\101\130\220\025\162\247\241\267\243
\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024\311
\033\123\201\022\376\004\325\026\321\252\274\232\157\267\240\225
\031\156\312\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\206\060\012\006\010\052\206\110\316\075\004\003\003\003
\147\000\060\144\002\060\021\336\256\370\334\116\210\260\251\360
\042\255\302\121\100\357\140\161\055\356\217\002\304\135\003\160
\111\244\222\352\305\024\210\160\246\323\015\260\252\312\054\100
\234\373\351\202\156\232\002\060\053\107\232\007\306\321\302\201
\174\312\013\226\030\101\033\243\364\060\011\236\265\043\050\015
\237\024\266\074\123\242\114\006\151\175\372\154\221\306\052\111
\105\346\354\267\023\341\072\154
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

```
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "HARICA TLS ECC Root CA 2021"
# Issuer: CN=HARICA TLS ECC Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Serial Number:67:74:9d:8d:77:d8:3b:6a:db:22:f4:ff:59:e2:bf:ce
# Subject: CN=HARICA TLS ECC Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Not Valid Before: Fri Feb 19 11:01:10 2021
#
 Not Valid After : Mon Feb 13 11:01:09 2045
# Fingerprint (SHA-256):
3F:99:CC:47:4A:CF:CE:4D:FE:D5:87:94:66:5E:47:8D:15:47:73:9F:2E:78:0F:1B:B4:CA:9B:13:30:97:D4:01
# Fingerprint (SHA1): BC:B0:C1:9D:E9:98:92:70:19:38:57:E9:8D:A7:B4:5D:6E:EE:01:48
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HARICA TLS ECC Root CA 2021"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\274\260\301\235\351\230\222\160\031\070\127\351\215\247\264\135
\156\356\001\110
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\256\367\114\345\146\065\321\267\233\214\042\223\164\323\113\260
END
CKA_ISSUER MULTILINE_OCTAL
\060\154\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\044\060\042\006\003\125\004
\003\014\033\110\101\122\111\103\101\040\124\114\123\040\105\103
\103\040\122\157\157\164\040\103\101\040\062\060\062\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\147\164\235\215\167\330\073\152\333\042\364\377\131\342
\277\316
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "HARICA Client RSA Root CA 2021"
#
# Issuer: CN=HARICA Client RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Serial Number:55:52:f8:1e:db:1b:24:2c:9e:bb:96:18:cd:02:28:3e
```

```
# Subject: CN=HARICA Client RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Not Valid Before: Fri Feb 19 10:58:46 2021
# Not Valid After : Mon Feb 13 10:58:45 2045
# Fingerprint (SHA-256):
1B:E7:AB:E3:06:86:B1:63:48:AF:D1:C6:1B:68:66:A0:EA:7F:48:21:E6:7D:5E:8A:F9:37:CF:80:11:BC:75:0D
# Fingerprint (SHA1):
 46:C6:90:0A:77:3A:B6:BC:F4:65:AD:AC:FC:E3:F7:07:00:6E:DE:6E
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HARICA Client RSA Root CA 2021"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\157\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\047\060\045\006\003\125\004
\003\014\036\110\101\122\111\103\101\040\103\154\151\145\156\164
\040\122\123\101\040\122\157\157\164\040\103\101\040\062\060\062
\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\157\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\047\060\045\006\003\125\004
\003\014\036\110\101\122\111\103\101\040\103\154\151\145\156\164
\040\122\123\101\040\122\157\157\164\040\103\101\040\062\060\062
\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\125\122\370\036\333\033\044\054\236\273\226\030\315\002
\050\076
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\252\060\202\003\222\240\003\002\001\002\002\020\125
\122\370\036\333\033\044\054\236\273\226\030\315\002\050\076\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\157
\061\013\060\011\006\003\125\004\006\023\002\107\122\061\067\060
\065\006\003\125\004\012\014\056\110\145\154\154\145\156\151\143
\040\101\143\141\144\145\155\151\143\040\141\156\144\040\122\145
\163\145\141\162\143\150\040\111\156\163\164\151\164\165\164\151
\157\156\163\040\103\101\061\047\060\045\006\003\125\004\003\014
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\036\110\101\122\111\103\101\040\103\154\151\145\156\164\040\122
\123\101\040\122\157\157\164\040\103\101\040\062\060\062\061\060
\036\027\015\062\061\060\062\061\071\061\060\065\070\064\066\132
\027\015\064\065\060\062\061\063\061\060\065\070\064\065\132\060
\157\061\013\060\011\006\003\125\004\006\023\002\107\122\061\067
\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156\151
\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040\122
\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165\164
\151\157\156\163\040\103\101\061\047\060\045\006\003\125\004\003
\014\036\110\101\122\111\103\101\040\103\154\151\145\156\164\040
\122\123\101\040\122\157\157\164\040\103\101\040\062\060\062\061
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001
\000\201\333\127\102\220\054\164\065\364\370\270\164\031\115\253
\011\132\167\105\201\163\142\260\065\237\370\320\267\063\000\207
\023\266\226\253\016\124\022\060\007\274\233\267\110\327\321\031
\203\256\216\330\251\361\251\000\204\260\214\136\236\350\014\217
\124\151\277\366\324\010\117\046\160\376\030\101\143\032\263\062
\213\100\370\007\253\127\061\360\306\026\166\147\232\264\335\057
\362\321\153\305\320\222\204\221\161\156\017\056\143\351\037\123
\244\335\122\023\314\011\203\051\201\014\305\123\165\104\261\016
\147\123\030\320\303\037\210\113\237\224\044\264\051\274\273\350
\116\375\157\322\025\035\111\334\215\160\362\021\032\040\121\125
\021\272\210\157\304\367\120\171\326\252\061\342\204\075\136\062
\310\167\052\120\161\345\013\057\351\266\352\357\253\012\063\071
\016\375\217\245\147\103\202\216\230\151\011\011\033\100\315\070
\147\107\352\311\354\227\161\022\336\044\365\162\074\321\367\103
\114\046\367\220\262\211\351\105\113\125\075\061\005\172\101\342
\225\272\103\300\027\305\266\205\075\031\215\144\160\363\133\254
\315\237\323\051\165\207\113\225\147\152\246\370\321\335\274\220
\206\211\103\051\251\067\133\365\135\260\046\132\123\102\166\220
\053\317\236\126\154\053\124\317\134\232\145\337\133\213\110\140
\070\174\373\305\013\317\166\004\143\002\063\052\175\365\203\147
\347\372\306\103\375\053\017\324\046\057\167\244\062\301\044\352
\144\235\277\263\070\161\061\104\362\107\270\242\146\101\241\373
\233\173\274\307\106\152\165\277\132\242\214\350\152\104\301\270
\226\265\300\062\010\055\173\164\065\163\262\312\306\376\257\021
\162\030\366\347\310\302\317\245\052\352\173\326\131\350\174\240
\262\152\100\011\151\016\245\226\333\321\000\271\361\210\156\066
\360\210\262\235\361\122\362\303\174\277\060\211\074\012\151\371
\042\244\145\341\233\340\164\306\261\205\227\226\054\256\224\217
\120\246\071\022\037\276\107\362\201\170\323\165\066\236\175\132
\040\227\342\122\256\231\237\306\174\233\146\363\376\330\317\356
\275\227\006\035\055\205\334\076\066\123\226\173\040\272\350\310
\341\255\226\142\076\021\174\263\000\204\236\247\114\161\253\112
\067\002\003\001\000\001\243\102\060\100\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125
\035\016\004\026\004\024\240\326\007\075\136\044\367\173\240\104

\056\044\122\015\031\252\053\004\221\247\060\016\006\003\125\035
\017\001\001\377\004\004\003\002\001\206\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\003\202\002\001\000\015\107
\371\011\146\061\122\354\171\356\302\250\362\150\076\355\226\105
\313\072\246\230\143\077\352\053\115\116\003\320\034\202\341\313
\323\345\326\253\133\147\050\274\235\376\014\231\012\200\125\247
\316\033\043\141\015\260\127\360\376\340\312\276\346\220\333\203
\054\276\203\216\364\171\266\376\320\015\102\247\130\037\151\352
\201\365\005\245\376\106\150\353\154\170\311\340\352\347\346\336
\061\305\322\325\054\202\143\050\235\135\250\032\176\210\346\347
\053\361\054\325\320\005\236\334\055\275\067\146\324\004\242\247
\255\277\072\302\250\073\255\377\215\235\063\340\271\232\204\241
\207\037\166\364\202\164\327\016\371\060\110\076\133\210\076\252
\134\153\326\057\014\350\216\163\302\030\221\203\071\266\146\132
\320\037\140\047\135\115\343\366\072\015\146\120\234\170\173\253
\363\023\020\256\017\057\253\350\144\263\030\040\235\106\065\144
\045\163\352\233\020\134\130\065\211\261\106\110\247\364\254\324
\035\236\133\314\251\245\032\023\117\044\120\252\331\033\155\261
\100\373\235\335\130\164\304\302\157\024\162\354\333\065\237\270
\124\165\105\303\246\310\032\050\065\072\256\145\362\251\230\316
\257\133\311\070\214\061\073\177\314\334\226\375\342\133\326\320
\131\364\166\272\013\313\117\203\020\307\100\320\035\140\351\052
\345\110\130\167\014\105\151\276\031\161\004\044\342\343\044\037
\112\310\301\076\231\365\226\230\070\110\045\241\025\260\033\327
\342\204\030\133\366\161\065\232\150\173\100\314\030\134\014\044
\235\324\225\365\231\252\106\352\256\254\277\364\024\031\044\350
\214\354\343\365\274\006\150\212\052\014\005\137\012\227\165\247
\334\176\300\375\327\172\030\337\060\321\070\113\037\260\230\160
\277\314\174\163\360\156\304\061\245\244\227\035\254\277\316\154
\041\112\276\047\043\147\363\006\126\201\012\221\216\266\341\003
\005\063\054\332\064\010\115\116\120\043\255\037\245\305\324\172
\376\352\011\354\247\050\140\213\106\174\265\352\233\335\117\371
\347\153\025\306\210\317\103\333\345\047\334\004\126\156\157\106
\025\361\126\055\350\134\014\163\303\043\201\070\040\313\311\014
\151\317\054\253\073\204\140\063\031\122\375\151\024\063
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "HARICA Client RSA Root CA 2021"
# Issuer: CN=HARICA Client RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Serial Number:55:52:f8:1e:db:1b:24:2c:9e:bb:96:18:cd:02:28:3e
# Subject: CN=HARICA Client RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Not Valid Before: Fri Feb 19 10:58:46 2021
# Not Valid After : Mon Feb 13 10:58:45 2045
# Fingerprint (SHA-256):

1B:E7:AB:E3:06:86:B1:63:48:AF:D1:C6:1B:68:66:A0:EA:7F:48:21:E6:7D:5E:8A:F9:37:CF:80:11:BC:75:0D
#
Fingerprint (SHA1): 46:C6:90:0A:77:3A:B6:BC:F4:65:AD:AC:FC:E3:F7:07:00:6E:DE:6E
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HARICA Client RSA Root CA 2021"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\106\306\220\012\167\072\266\274\364\145\255\254\374\343\367\007
\000\156\336\156
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\157\355\134\327\210\314\070\251\334\351\335\331\135\333\330\355
END
CKA_ISSUER MULTILINE_OCTAL
\060\157\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\047\060\045\006\003\125\004
\003\014\036\110\101\122\111\103\101\040\103\154\151\145\156\164
\040\122\123\101\040\122\157\157\164\040\103\101\040\062\060\062
\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\125\122\370\036\333\033\044\054\236\273\226\030\315\002
\050\076
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "HARICA Client ECC Root CA 2021"
#
# Issuer: CN=HARICA Client ECC Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Serial Number:31:68:d9:d8:e1:62:57:1e:d2:19:44:88:e6:10:7d:f0
# Subject: CN=HARICA Client ECC Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Not Valid Before: Fri Feb 19 11:03:34 2021
# Not Valid After : Mon Feb 13 11:03:33 2045
# Fingerprint (SHA-256):
8D:D4:B5:37:3C:B0:DE:36:76:9C:12:33:92:80:D8:27:46:B3:AA:6C:D4:26:E7:97:A3:1B:AB:E4:27:9C:F0:0B
# Fingerprint (SHA1): BE:64:D3:DA:14:4B:D2:6B:CD:AF:8F:DB:A6:A6:72:F8:DE:26:F9:00
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL
CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HARICA Client ECC Root CA 2021"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\157\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\047\060\045\006\003\125\004
\003\014\036\110\101\122\111\103\101\040\103\154\151\145\156\164
\040\105\103\103\040\122\157\157\164\040\103\101\040\062\060\062
\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\157\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\047\060\045\006\003\125\004
\003\014\036\110\101\122\111\103\101\040\103\154\151\145\156\164
\040\105\103\103\040\122\157\157\164\040\103\101\040\062\060\062
\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
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\175\360
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\132\060\202\001\341\240\003\002\001\002\002\020\061
\150\331\330\341\142\127\036\322\031\104\210\346\020\175\360\060
\012\006\010\052\206\110\316\075\004\003\003\060\157\061\013\060
\011\006\003\125\004\006\023\002\107\122\061\067\060\065\006\003
\125\004\012\014\056\110\145\154\154\145\156\151\143\040\101\143
\141\144\145\155\151\143\040\141\156\144\040\122\145\163\145\141
\162\143\150\040\111\156\163\164\151\164\165\164\151\157\156\163
\040\103\101\061\047\060\045\006\003\125\004\003\014\036\110\101
\122\111\103\101\040\103\154\151\145\156\164\040\105\103\103\040
\122\157\157\164\040\103\101\040\062\060\062\061\060\036\027\015
\062\061\060\062\061\071\061\061\060\063\063\064\132\027\015\064
\065\060\062\061\063\061\061\060\063\063\063\132\060\157\061\013
\060\011\006\003\125\004\006\023\002\107\122\061\067\060\065\006
\003\125\004\012\014\056\110\145\154\154\145\156\151\143\040\101
\143\141\144\145\155\151\143\040\141\156\144\040\122\145\163\145
\141\162\143\150\040\111\156\163\164\151\164\165\164\151\157\156

\163\040\103\101\061\047\060\045\006\003\125\004\003\014\036\110
\101\122\111\103\101\040\103\154\151\145\156\164\040\105\103\103
\040\122\157\157\164\040\103\101\040\062\060\062\061\060\166\060
\020\006\007\052\206\110\316\075\002\001\006\005\053\201\004\000
\042\003\142\000\004\007\030\255\225\226\224\320\134\017\202\367
\052\100\372\002\311\311\075\066\246\243\004\152\301\155\225\001
\210\140\022\124\154\134\242\053\156\023\072\210\225\014\034\046
\206\066\112\211\031\267\030\336\073\350\250\120\037\312\337\133
\277\111\200\025\333\343\060\341\035\132\307\052\212\001\007\376
\155\054\064\357\050\050\227\274\301\371\127\206\225\213\065\317
\236\132\321\150\225\243\102\060\100\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035
\016\004\026\004\024\122\010\322\276\062\201\045\375\365\032\227
\354\116\137\032\273\123\315\220\255\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\206\060\012\006\010\052\206\110
\316\075\004\003\003\003\147\000\060\144\002\060\114\061\105\106
\117\250\346\276\303\167\262\032\030\113\055\210\173\130\346\253
\224\153\104\003\260\027\377\337\202\163\104\121\054\375\223\035
\006\173\024\322\211\354\100\014\357\041\001\056\002\060\057\311
\056\132\154\054\035\331\225\340\236\260\271\134\122\174\366\370
\070\312\056\361\324\035\362\242\111\242\225\370\301\130\136\117
\376\163\012\357\061\260\253\043\130\023\214\213\336\073
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "HARICA Client ECC Root CA 2021"
# Issuer: CN=HARICA Client ECC Root CA 2021,O=Hellenic Academic and
 Research Institutions CA,C=GR
# Serial Number:31:68:d9:d8:e1:62:57:1e:d2:19:44:88:e6:10:7d:f0
# Subject: CN=HARICA Client ECC Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Not Valid Before: Fri Feb 19 11:03:34 2021
# Not Valid After : Mon Feb 13 11:03:33 2045
# Fingerprint (SHA-256):
8D:D4:B5:37:3C:B0:DE:36:76:9C:12:33:92:80:D8:27:46:B3:AA:6C:D4:26:E7:97:A3:1B:AB:E4:27:9C:F0:0B
# Fingerprint (SHA1): BE:64:D3:DA:14:4B:D2:6B:CD:AF:8F:DB:A6:A6:72:F8:DE:26:F9:00
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HARICA Client ECC Root CA 2021"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\276\144\323\332\024\113\322\153\315\257\217\333\246\246\162\370
\336\046\371\000
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL

```
\255\270\120\246\251\202\172\154\075\032\252\244\322\143\244\104
END
CKA_ISSUER MULTILINE_OCTAL
\060\157\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\047\060\045\006\003\125\004
\003\014\036\110\101\122\111\103\101\040\103\154\151\145\156\164
\040\105\103\103\040\122\157\157\164\040\103\101\040\062\060\062
\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\061\150\331\330\341\142\127\036\322\031\104\210\346\020
\175\360
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Autoridad de Certificacion Firmaprofesional CIF A62634068"
#
# Issuer: CN=Autoridad de Certificacion Firmaprofesional CIF A62634068,C=ES
# Serial Number:1b:70:e9:d2:ff:ae:6c:71
# Subject: CN=Autoridad de Certificacion Firmaprofesional CIF A62634068,C=ES
# Not Valid Before:
 Tue Sep 23 15:22:07 2014
# Not Valid After : Mon May 05 15:22:07 2036
# Fingerprint (SHA-256):
57:DE:05:83:EF:D2:B2:6E:03:61:DA:99:DA:9D:F4:64:8D:EF:7E:E8:44:1C:3B:72:8A:FA:9B:CD:E0:F9:B2:6A
# Fingerprint (SHA1): 0B:BE:C2:27:22:49:CB:39:AA:DB:35:5C:53:E3:8C:AE:78:FF:B6:FE
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Autoridad de Certificacion Firmaprofesional CIF A62634068"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\102\060\100\006\003\125\004\003\014\071\101\165\164\157\162\151
\144\141\144\040\144\145\040\103\145\162\164\151\146\151\143\141
\143\151\157\156\040\106\151\162\155\141\160\162\157\146\145\163
\151\157\156\141\154\040\103\111\106\040\101\066\062\066\063\064
\060\066\070
END
```

CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\102\060\100\006\003\125\004\003\014\071\101\165\164\157\162\151
\144\141\144\040\144\145\040\103\145\162\164\151\146\151\143\141
\143\151\157\156\040\106\151\162\155\141\160\162\157\146\145\163
\151\157\156\141\154\040\103\111\106\040\101\066\062\066\063\064
\060\066\070
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\010\033\160\351\322\377\256\154\161
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\024\060\202\003\374\240\003\002\001\002\002\010\033
\160\351\322\377\256\154\161\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\121\061\013\060\011\006\003\125\004
\006\023\002\105\123\061\102\060\100\006\003\125\004\003\014\071
\101\165\164\157\162\151\144\141\144\040\144\145\040\103\145\162
\164\151\146\151\143\141\143\151\157\156\040\106\151\162\155\141
\160\162\157\146\145\163\151\157\156\141\154\040\103\111\106\040
\101\066\062\066\063\064\060\066\070\060\036\027\015\061\064\060
\071\062\063\061\065\062\062\060\067\132\027\015\063\066\060\065
\060\065\061\065\062\062\060\067\132\060\121\061\013\060\011\006
\003\125\004\006\023\002\105\123\061\102\060\100\006\003\125\004
\003\014\071\101\165\164\157\162\151\144\141\144\040\144\145\040
\103\145\162\164\151\146\151\143\141\143\151\157\156\040\106\151
\162\155\141\160\162\157\146\145\163\151\157\156\141\154\040\103
\111\106\040\101\066\062\066\063\064\060\066\070\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\312\226\153
\216\352\370\373\361\242\065\340\177\114\332\340\303\122\327\175
\266\020\310\002\136\263\103\052\304\117\152\262\312\034\135\050
\232\170\021\032\151\131\127\257\265\040\102\344\213\017\346\337
\133\246\003\222\057\365\021\344\142\327\062\161\070\331\004\014
\161\253\075\121\176\017\007\337\143\005\134\351\277\224\157\301
\051\202\300\264\332\121\260\301\074\273\255\067\112\134\312\361
\113\066\016\044\253\277\303\204\167\375\250\120\364\261\347\306
\057\322\055\131\215\172\012\116\226\151\122\002\252\066\230\354
\374\372\024\203\014\067\037\311\222\067\177\327\201\055\345\304
\271\340\076\064\376\147\364\076\146\321\323\364\100\317\136\142
\064\017\160\006\076\040\030\132\316\367\162\033\045\154\223\164
\024\223\243\163\261\016\252\207\020\043\131\137\040\005\031\107
\355\150\216\222\022\312\135\374\326\053\262\222\074\040\317\341
\137\257\040\276\240\166\177\166\345\354\032\206\141\063\076\347
\173\264\077\240\017\216\242\271\152\157\271\207\046\157\101\154
\210\246\120\375\152\143\013\365\223\026\033\031\217\262\355\233
\233\311\220\365\001\014\337\031\075\017\076\070\043\311\057\217

\014\321\002\376\033\125\326\116\320\215\074\257\117\244\363\376
\257\052\323\005\235\171\010\241\313\127\061\264\234\310\220\262
\147\364\030\026\223\072\374\107\330\321\170\226\061\037\272\053
\014\137\135\231\255\143\211\132\044\040\166\330\337\375\253\116
\246\042\252\235\136\346\047\212\175\150\051\243\347\212\270\332
\021\273\027\055\231\235\023\044\106\367\305\342\330\237\216\177
\307\217\164\155\132\262\350\162\365\254\356\044\020\255\057\024
\332\377\055\232\106\161\107\276\102\337\273\001\333\364\177\323
\050\217\061\131\133\323\311\002\246\264\122\312\156\227\373\103
\305\010\046\157\212\364\273\375\237\050\252\015\325\105\363\023
\072\035\330\300\170\217\101\147\074\036\224\144\256\173\013\305
\350\331\001\210\071\032\227\206\144\101\325\073\207\014\156\372
\017\306\275\110\024\277\071\115\324\236\101\266\217\226\035\143
\226\223\331\225\006\170\061\150\236\067\006\073\200\211\105\141
\071\043\307\033\104\243\025\345\034\370\222\060\273\002\003\001
\000\001\243\201\357\060\201\354\060\035\006\003\125\035\016\004
\026\004\024\145\315\353\253\065\036\000\076\176\325\164\300\034
\264\163\107\016\032\144\057\060\022\006\003\125\035\023\001\001
\377\004\010\060\006\001\001\377\002\001\001\060\201\246\006\003
\125\035\040\004\201\236\060\201\233\060\201\230\006\004\125\035
\040\000\060\201\217\060\057\006\010\053\006\001\005\005\007\002
\001\026\043\150\164\164\160\072\057\057\167\167\167\056\146\151
\162\155\141\160\162\157\146\145\163\151\157\156\141\154\056\143
\157\155\057\143\160\163\060\134\006\010\053\006\001\005\005\007
\002\002\060\120\036\116\000\120\000\141\000\163\000\145\000\157
\000\040\000\144\000\145\000\040\000\154\000\141\000\040\000\102
\000\157\000\156\000\141\000\156\000\157\000\166\000\141\000\040
\000\064\000\067\000\040\000\102\000\141\000\162\000\143\000\145
\000\154\000\157\000\156\000\141\000\040\000\060\000\070\000\060
\000\061\000\067\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\015\006\011\052\206\110\206\367\015\001\001
\013\005\000\003\202\002\001\000\164\207\050\002\053\167\037\146
\211\144\355\217\164\056\106\034\273\250\370\370\013\035\203\266
\072\247\350\105\212\007\267\340\076\040\313\341\010\333\023\010
\370\050\241\065\262\200\263\013\121\300\323\126\232\215\063\105
\111\257\111\360\340\075\007\172\105\023\132\377\310\227\330\323
\030\054\175\226\370\335\242\145\103\160\223\220\025\272\220\337
\350\031\260\333\054\212\140\017\267\157\224\007\036\035\246\311
\205\366\275\064\370\100\170\142\020\160\072\276\175\113\071\201
\251\020\324\226\101\273\370\137\034\013\035\010\362\261\260\211
\172\362\367\240\340\304\217\213\170\265\073\130\245\043\216\117
\125\376\066\073\340\014\267\312\052\060\101\040\264\200\315\256
\374\166\146\163\250\256\156\341\174\332\003\350\224\040\346\042
\243\320\037\220\135\040\123\024\046\127\332\124\227\337\026\104
\020\001\036\210\146\217\162\070\223\335\040\267\064\276\327\361
\356\143\216\107\171\050\006\374\363\131\105\045\140\042\063\033
\243\137\250\272\052\332\032\075\315\100\352\214\356\005\025\225
\325\245\054\040\057\247\230\050\356\105\374\361\270\210\000\054

\217\102\332\121\325\234\345\023\150\161\105\103\213\236\013\041
\074\113\134\005\334\032\237\230\216\332\275\042\236\162\315\255
\012\313\314\243\147\233\050\164\304\233\327\032\074\004\130\246
\202\235\255\307\173\157\377\200\226\351\370\215\152\275\030\220
\035\377\111\032\220\122\067\223\057\074\002\135\202\166\013\121
\347\026\307\127\370\070\371\247\315\233\042\124\357\143\260\025
\155\123\145\003\112\136\112\240\262\247\216\111\000\131\070\325
\307\364\200\144\365\156\225\120\270\021\176\025\160\070\112\260
\177\320\304\062\160\300\031\377\311\070\055\024\054\146\364\102
\104\346\125\166\033\200\025\127\377\300\247\247\252\071\252\330
\323\160\320\056\272\353\224\152\372\137\064\206\347\142\265\375
\212\360\060\205\224\311\257\044\002\057\157\326\335\147\376\343
\260\125\117\004\230\117\244\101\126\342\223\320\152\350\326\363
\373\145\340\316\165\304\061\131\014\356\202\310\014\140\063\112
\031\272\204\147\047\017\274\102\135\275\044\124\015\354\035\160
\006\137\244\274\372\040\174\125
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Autoridad de Certificacion Firmaprofesional CIF A62634068"
# Issuer: CN=Autoridad de Certificacion Firmaprofesional
 CIF A62634068,C=ES
# Serial Number:1b:70:e9:d2:ff:ae:6c:71
# Subject: CN=Autoridad de Certificacion Firmaprofesional CIF A62634068,C=ES
# Not Valid Before: Tue Sep 23 15:22:07 2014
# Not Valid After : Mon May 05 15:22:07 2036
# Fingerprint (SHA-256):
57:DE:05:83:EF:D2:B2:6E:03:61:DA:99:DA:9D:F4:64:8D:EF:7E:E8:44:1C:3B:72:8A:FA:9B:CD:E0:F9:B2:6A
# Fingerprint (SHA1): 0B:BE:C2:27:22:49:CB:39:AA:DB:35:5C:53:E3:8C:AE:78:FF:B6:FE
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Autoridad de Certificacion Firmaprofesional CIF A62634068"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\013\276\302\047\042\111\313\071\252\333\065\134\123\343\214\256
\170\377\266\376
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\116\156\233\124\114\312\267\372\110\344\220\261\025\113\034\243
END
CKA_ISSUER MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\102\060\100\006\003\125\004\003\014\071\101\165\164\157\162\151
\144\141\144\040\144\145\040\103\145\162\164\151\146\151\143\141

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\143\151\157\156\040\106\151\162\155\141\160\162\157\146\145\163
\151\157\156\141\154\040\103\111\106\040\101\066\062\066\063\064
\060\066\070
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\010\033\160\351\322\377\256\154\161
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "vTrus ECC Root CA"
#
# Issuer: CN=vTrus ECC Root CA,O="iTrusChina Co.,Ltd.",C=CN
# Serial Number:6e:6a:bc:59:aa:53:be:98:39:67:a2:d2:6b:a4:3b:e6:6d:1c:d6:da
# Subject: CN=vTrus ECC Root CA,O="iTrusChina Co.,Ltd.",C=CN
# Not Valid Before: Tue Jul 31 07:26:44 2018
# Not Valid After : Fri Jul 31 07:26:44 2043
# Fingerprint (SHA-256):
30:FB:BA:2C:32:23:8E:2A:98:54:7A:F9:79:31:E5:50:42:8B:9B:3F:1C:8E:EB:66:33:DC:FA:86:C5:B2:7D:D3
# Fingerprint (SHA1):
 F6:9C:DB:B0:FC:F6:02:13:B6:52:32:A6:A3:91:3F:16:70:DA:C3:E1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "vTrus ECC Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\034\060\032\006\003\125\004\012\023\023\151\124\162\165\163\103
\150\151\156\141\040\103\157\056\054\114\164\144\056\061\032\060
\030\006\003\125\004\003\023\021\166\124\162\165\163\040\105\103
\103\040\122\157\157\164\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\034\060\032\006\003\125\004\012\023\023\151\124\162\165\163\103
\150\151\156\141\040\103\157\056\054\114\164\144\056\061\032\060
\030\006\003\125\004\003\023\021\166\124\162\165\163\040\105\103
\103\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\156\152\274\131\252\123\276\230\071\147\242\322\153\244
```

\073\346\155\034\326\332
END
CKA_VALUE
 MULTILINE_OCTAL
\060\202\002\017\060\202\001\225\240\003\002\001\002\002\024\156
\152\274\131\252\123\276\230\071\147\242\322\153\244\073\346\155
\034\326\332\060\012\006\010\052\206\110\316\075\004\003\003\060
\107\061\013\060\011\006\003\125\004\006\023\002\103\116\061\034
\060\032\006\003\125\004\012\023\023\151\124\162\165\163\103\150
\151\156\141\040\103\157\056\054\114\164\144\056\061\032\060\030
\006\003\125\004\003\023\021\166\124\162\165\163\040\105\103\103
\040\122\157\157\164\040\103\101\060\036\027\015\061\070\060\067
\063\061\060\067\062\066\064\064\132\027\015\064\063\060\067\063
\061\060\067\062\066\064\064\132\060\107\061\013\060\011\006\003
\125\004\006\023\002\103\116\061\034\060\032\006\003\125\004\012
\023\023\151\124\162\165\163\103\150\151\156\141\040\103\157\056
\054\114\164\144\056\061\032\060\030\006\003\125\004\003\023\021
\166\124\162\165\163\040\105\103\103\040\122\157\157\164\040\103
\101\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005
\053\201\004\000\042\003\142\000\004\145\120\112\256\214\171\226
\112\252\034\010\303\243\242\315\376\131\126\101\167\375\046\224
\102\273\035\315\010\333\163\262\133\165\363\317\234\116\202\364
\277\370\141\046\205\154\326\205\133\162\160\322\375\333\142\264
\337\123\213\275\261\104\130\142\102\011\307\372\177\133\020\347
\376\100\375\300\330\303\053\062\347\160\246\267\246\040\125\035
\173\200\135\113\217\147\114\361\020\243\102\060\100\060\035\006
\003\125\035\016\004\026\004\024\230\071\315\276\330\262\214\367
\262\253\341\255\044\257\173\174\241\333\037\317\060\017\006\003
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\012\006
\010\052\206\110\316\075\004\003\003\003\150\000\060\145\002\060
\127\235\335\126\361\307\343\351\270\111\120\153\233\151\303\157
\354\303\175\045\344\127\225\023\100\233\122\323\073\363\100\031
\274\046\307\055\006\236\265\173\066\237\365\045\324\143\153\000
\002\061\000\351\323\306\236\126\232\052\314\241\332\077\310\146
\053\323\130\234\040\205\372\253\221\212\160\160\021\070\140\144
\013\142\011\221\130\000\371\115\373\064\150\332\011\255\041\006
\030\224\316
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "vTrus ECC Root CA"
# Issuer: CN=vTrus ECC Root CA,O="iTrusChina Co.,Ltd.",C=CN
# Serial Number:6e:6a:bc:59:aa:53:be:98:39:67:a2:d2:6b:a4:3b:e6:6d:1c:d6:da
# Subject: CN=vTrus ECC Root CA,O="iTrusChina Co.,Ltd.",C=CN

```
# Not Valid Before: Tue Jul 31 07:26:44 2018
# Not Valid After : Fri Jul 31 07:26:44 2043
# Fingerprint (SHA-256):
30:FB:BA:2C:32:23:8E:2A:98:54:7A:F9:79:31:E5:50:42:8B:9B:3F:1C:8E:EB:66:33:DC:FA:86:C5:B2:7D:D3
# Fingerprint (SHA1): F6:9C:DB:B0:FC:F6:02:13:B6:52:32:A6:A3:91:3F:16:70:DA:C3:E1
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
 CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "vTrus ECC Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\366\234\333\260\374\366\002\023\266\122\062\246\243\221\077\026
\160\332\303\341
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\336\113\301\365\122\214\233\103\341\076\217\125\124\027\215\205
END
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\034\060\032\006\003\125\004\012\023\023\151\124\162\165\163\103
\150\151\156\141\040\103\157\056\054\114\164\144\056\061\032\060
\030\006\003\125\004\003\023\021\166\124\162\165\163\040\105\103
\103\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\156\152\274\131\252\123\276\230\071\147\242\322\153\244
\073\346\155\034\326\332
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
#
 Certificate "vTrus Root CA"
#
# Issuer: CN=vTrus Root CA,O="iTrusChina Co.,Ltd.",C=CN
# Serial Number:43:e3:71:13:d8:b3:59:14:5d:b7:ce:8c:fd:35:fd:6f:bc:05:8d:45
# Subject: CN=vTrus Root CA,O="iTrusChina Co.,Ltd.",C=CN
# Not Valid Before: Tue Jul 31 07:24:05 2018
# Not Valid After : Fri Jul 31 07:24:05 2043
# Fingerprint (SHA-256):
8A:71:DE:65:59:33:6F:42:6C:26:E5:38:80:D0:0D:88:A1:8D:A4:C6:A9:1F:0D:CB:61:94:E2:06:C5:C9:63:87
# Fingerprint (SHA1): 84:1A:69:FB:F5:CD:1A:25:34:13:3D:E3:F8:FC:B8:99:D0:C9:14:B7
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
```

```
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "vTrus Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\103\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\034\060\032\006\003\125\004\012\023\023\151\124\162\165\163\103
\150\151\156\141\040\103\157\056\054\114\164\144\056\061\026\060
\024\006\003\125\004\003\023\015\166\124\162\165\163\040\122\157
\157\164\040\103\101
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\103\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\034\060\032\006\003\125\004\012\023\023\151\124\162\165\163\103
\150\151\156\141\040\103\157\056\054\114\164\144\056\061\026\060
\024\006\003\125\004\003\023\015\166\124\162\165\163\040\122\157
\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\103\343\161\023\330\263\131\024\135\267\316\214\375\065
\375\157\274\005\215\105
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\126\060\202\003\076\240\003\002\001\002\002\024\103
\343\161\023\330\263\131\024\135\267\316\214\375\065\375\157\274
\005\215\105\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\103\061\013\060\011\006\003\125\004\006\023\002\103
\116\061\034\060\032\006\003\125\004\012\023\023\151\124\162\165
\163\103\150\151\156\141\040\103\157\056\054\114\164\144\056\061
\026\060\024\006\003\125\004\003\023\015\166\124\162\165\163\040
\122\157\157\164\040\103\101\060\036\027\015\061\070\060\067\063
\061\060\067\062\064\060\065\132\027\015\064\063\060\067\063\061
\060\067\062\064\060\065\132\060\103\061\013\060\011\006\003\125
\004\006\023\002\103\116\061\034\060\032\006\003\125\004\012\023
\023\151\124\162\165\163\103\150\151\156\141\040\103\157\056\054
\114\164\144\056\061\026\060\024\006\003\125\004\003\023\015\166
\124\162\165\163\040\122\157\157\164\040\103\101\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\275\125\174
\141\323\270\035\004\142\005\240\256\154\267\160\264\101\352\113
\003\136\020\077\220\132\034\213\073\260\146\213\154\110\246\034
\042\272\325\100\222\356\063\262\043\131\311\216\274\130\332\213
\236\320\031\362\057\131\306\214\143\132\272\237\243\013\260\263
\232\134\272\021\270\022\351\014\273\317\156\154\200\207\051\024
\003\054\215\044\232\310\144\203\265\152\254\023\054\063\361\237
\334\054\141\074\032\077\160\125\233\255\000\122\177\317\004\271
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\376\066\372\234\300\026\256\142\376\226\114\103\176\125\024\276
\032\263\322\155\302\257\166\146\225\153\052\260\224\167\205\136
\004\017\142\035\143\165\367\153\347\313\133\232\160\354\076\147
\005\360\376\007\010\200\317\050\333\005\306\024\047\057\206\175
\360\047\336\377\346\176\063\110\347\013\036\130\321\047\053\123
\016\127\112\145\327\373\242\200\140\374\114\274\065\123\001\152
\227\162\202\257\361\035\160\350\234\365\357\136\302\154\307\107
\176\132\224\205\046\115\073\272\353\114\350\260\011\302\145\302
\235\235\011\233\116\265\227\005\254\365\006\240\367\066\005\176
\364\220\262\153\304\264\371\144\352\351\032\012\310\015\250\355
\047\311\324\347\263\271\253\202\042\220\047\075\052\350\174\220
\357\274\117\375\342\012\044\247\336\145\044\244\135\352\300\166
\060\323\167\120\370\015\004\233\224\066\001\163\312\006\130\246
\323\073\334\372\004\106\023\125\212\311\104\107\270\121\071\032
\056\350\064\342\171\313\131\112\012\177\274\246\357\037\003\147
\152\131\053\045\142\223\331\123\031\146\074\047\142\051\206\115
\244\153\356\377\324\116\272\325\264\342\216\110\132\000\031\011
\361\005\331\316\221\261\367\353\351\071\117\366\157\004\103\232
\125\365\076\005\024\275\277\263\131\264\330\216\063\204\243\220
\122\252\263\002\225\140\371\014\114\150\371\356\325\027\015\370
\161\127\265\045\344\051\356\145\135\257\321\356\074\027\013\132
\103\305\245\206\352\044\236\342\005\007\334\064\102\022\221\326
\071\164\256\114\101\202\333\362\246\110\321\263\233\363\063\252
\363\246\300\305\116\365\364\235\166\143\346\002\306\042\113\301
\225\077\120\144\054\124\345\266\360\074\051\317\127\002\003\001
\000\001\243\102\060\100\060\035\006\003\125\035\016\004\026\004
\024\124\142\160\143\361\165\204\103\130\216\321\026\040\261\306
\254\032\274\366\211\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\015\006\011\052\206\110\206\367\015
\001\001\013\005\000\003\202\002\001\000\051\272\222\111\247\255
\360\361\160\303\344\227\360\237\251\045\325\153\236\064\376\346
\032\144\366\072\153\122\262\020\170\032\237\114\332\212\332\354
\034\067\122\340\102\113\373\154\166\312\044\013\071\022\025\235
\237\021\055\374\171\144\334\340\340\365\335\340\127\311\245\262
\166\160\120\244\376\267\012\160\325\240\064\361\165\327\115\111
\272\021\321\263\330\354\202\377\353\016\304\277\144\055\175\143
\156\027\170\354\135\174\210\310\353\216\127\166\331\131\004\372
\274\122\037\105\254\360\172\200\354\354\157\166\256\221\333\020
\216\004\334\222\337\240\366\346\256\111\323\301\154\022\033\314
\051\252\371\010\245\342\067\024\312\261\270\146\357\032\202\344
\360\370\361\247\026\151\267\333\251\141\074\237\365\061\313\344
\000\106\302\057\164\261\261\327\201\356\250\046\225\274\210\257
\114\065\007\052\002\312\170\024\155\107\053\100\126\351\313\052
\140\241\147\003\240\316\214\274\260\162\147\304\061\316\333\064
\345\045\003\140\045\173\161\230\344\300\033\053\137\164\102\322
\113\305\131\010\007\207\276\305\303\177\347\226\331\341\334\050
\227\326\217\005\343\365\233\116\312\035\120\107\005\123\260\312

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\071\347\205\240\211\301\005\073\001\067\323\077\111\342\167\353
\043\310\210\146\073\075\071\166\041\106\361\354\137\043\270\353
\242\146\165\164\301\100\367\330\150\232\223\342\055\251\056\275
\034\243\036\310\164\306\244\055\172\040\253\073\270\260\106\375
\157\335\137\122\125\165\142\360\227\240\174\327\070\375\045\337
\315\240\233\020\317\213\270\070\136\136\305\264\246\002\066\241
\036\137\034\317\342\226\235\051\252\375\230\256\122\341\363\101
\122\373\251\056\162\226\237\047\343\252\163\175\370\032\043\146
\173\073\253\145\260\062\001\113\025\076\075\242\117\014\053\065
\242\306\331\147\022\065\060\315\166\056\026\263\231\236\115\117
\116\055\073\064\103\341\232\016\015\244\146\227\272\322\034\112
\114\054\052\213\213\201\117\161\032\251\335\134\173\173\010\305
\000\015\067\100\343\174\173\124\137\057\205\137\166\366\367\247
\260\034\127\126\301\162\350\255\242\257\215\063\111\272\037\212
\334\346\164\174\140\206\157\207\227\173
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "vTrus Root CA"
# Issuer: CN=vTrus Root CA,O="iTrusChina Co.,Ltd.",C=CN
# Serial Number:43:e3:71:13:d8:b3:59:14:5d:b7:ce:8c:fd:35:fd:6f:bc:05:8d:45
# Subject: CN=vTrus Root CA,O="iTrusChina Co.,Ltd.",C=CN
# Not Valid Before: Tue Jul 31 07:24:05 2018
# Not Valid After : Fri Jul 31 07:24:05 2043
# Fingerprint (SHA-256):
8A:71:DE:65:59:33:6F:42:6C:26:E5:38:80:D0:0D:88:A1:8D:A4:C6:A9:1F:0D:CB:61:94:E2:06:C5:C9:63:87
# Fingerprint (SHA1): 84:1A:69:FB:F5:CD:1A:25:34:13:3D:E3:F8:FC:B8:99:D0:C9:14:B7
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "vTrus Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\204\032\151\373\365\315\032\045\064\023\075\343\370\374\270\231
\320\311\024\267
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\270\311\067\337\372\153\061\204\144\305\352\021\152\033\165\374
END
CKA_ISSUER MULTILINE_OCTAL
\060\103\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\034\060\032\006\003\125\004\012\023\023\151\124\162\165\163\103
\150\151\156\141\040\103\157\056\054\114\164\144\056\061\026\060
\024\006\003\125\004\003\023\015\166\124\162\165\163\040\122\157
```

```
\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\103\343\161\023\330\263\131\024\135\267\316\214\375\065
\375\157\274\005\215\105
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "ISRG Root X2"
#
# Issuer: CN=ISRG Root X2,O=Internet Security Research Group,C=US
# Serial Number:41:d2:9d:d1:72:ea:ee:a7:80:c1:2c:6c:e9:2f:87:52
# Subject: CN=ISRG Root X2,O=Internet Security
 Research Group,C=US
# Not Valid Before: Fri Sep 04 00:00:00 2020
# Not Valid After : Mon Sep 17 16:00:00 2040
# Fingerprint (SHA-256):
69:72:9B:8E:15:A8:6E:FC:17:7A:57:AF:B7:17:1D:FC:64:AD:D2:8C:2F:CA:8C:F1:50:7E:34:45:3C:CB:14:70
# Fingerprint (SHA1): BD:B1:B9:3C:D5:97:8D:45:C6:26:14:55:F8:DB:95:C7:5A:D1:53:AF
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ISRG Root X2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\051\060\047\006\003\125\004\012\023\040\111\156\164\145\162\156
\145\164\040\123\145\143\165\162\151\164\171\040\122\145\163\145
\141\162\143\150\040\107\162\157\165\160\061\025\060\023\006\003
\125\004\003\023\014\111\123\122\107\040\122\157\157\164\040\130
\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\051\060\047\006\003\125\004\012\023\040\111\156\164\145\162\156
\145\164\040\123\145\143\165\162\151\164\171\040\122\145\163\145
\141\162\143\150\040\107\162\157\165\160\061\025\060\023\006\003
\125\004\003\023\014\111\123\122\107\040\122\157\157\164\040\130
\062
END
CKA_SERIAL_NUMBER
```

```
 MULTILINE_OCTAL
\002\020\101\322\235\321\162\352\356\247\200\301\054\154\351\057
\207\122
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\033\060\202\001\241\240\003\002\001\002\002\020\101
\322\235\321\162\352\356\247\200\301\054\154\351\057\207\122\060
\012\006\010\052\206\110\316\075\004\003\003\060\117\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\051\060\047\006\003
\125\004\012\023\040\111\156\164\145\162\156\145\164\040\123\145
\143\165\162\151\164\171\040\122\145\163\145\141\162\143\150\040
\107\162\157\165\160\061\025\060\023\006\003\125\004\003\023\014
\111\123\122\107\040\122\157\157\164\040\130\062\060\036\027\015
\062\060\060\071\060\064\060\060\060\060\060\060\132\027\015\064
\060\060\071\061\067\061\066\060\060\060\060\132\060\117\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\051\060\047\006
\003\125\004\012\023\040\111\156\164\145\162\156\145\164\040\123
\145\143\165\162\151\164\171\040\122\145\163\145\141\162\143\150
\040\107\162\157\165\160\061\025\060\023\006\003\125\004\003\023
\014\111\123\122\107\040\122\157\157\164\040\130\062\060\166\060
\020\006\007\052\206\110\316\075\002\001\006\005\053\201\004\000
\042\003\142\000\004\315\233\325\237\200\203\012\354\011\112\363
\026\112\076\134\317\167\254\336\147\005\015\035\007\266\334\026
\373\132\213\024\333\342\161\140\304\272\105\225\021\211\216\352
\006\337\367\052\026\034\244\271\305\305\062\340\003\340\036\202
\030\070\213\327\105\330\012\152\156\346\000\167\373\002\121\175
\042\330\012\156\232\133\167\337\360\372\101\354\071\334\165\312
\150\007\014\037\352\243\102\060\100\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\006\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035
\016\004\026\004\024\174\102\226\256\336\113\110\073\372\222\370
\236\214\317\155\213\251\162\067\225\060\012\006\010\052\206\110
\316\075\004\003\003\003\150\000\060\145\002\060\173\171\116\106
\120\204\302\104\207\106\033\105\160\377\130\231\336\364\375\244
\322\125\246\040\055\164\326\064\274\101\243\120\137\001\047\126
\264\276\047\165\006\257\022\056\165\230\215\374\002\061\000\213
\365\167\154\324\310\145\252\340\013\054\356\024\235\047\067\244
\371\123\245\121\344\051\203\327\370\220\061\133\102\237\012\365
\376\256\000\150\347\214\111\017\266\157\133\133\025\362\347
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "ISRG Root X2"
# Issuer: CN=ISRG Root X2,O=Internet Security Research Group,C=US
# Serial Number:41:d2:9d:d1:72:ea:ee:a7:80:c1:2c:6c:e9:2f:87:52
```

```
# Subject: CN=ISRG Root X2,O=Internet Security Research Group,C=US
# Not Valid Before: Fri
 Sep 04 00:00:00 2020
# Not Valid After : Mon Sep 17 16:00:00 2040
# Fingerprint (SHA-256):
69:72:9B:8E:15:A8:6E:FC:17:7A:57:AF:B7:17:1D:FC:64:AD:D2:8C:2F:CA:8C:F1:50:7E:34:45:3C:CB:14:70
# Fingerprint (SHA1): BD:B1:B9:3C:D5:97:8D:45:C6:26:14:55:F8:DB:95:C7:5A:D1:53:AF
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ISRG Root X2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\275\261\271\074\325\227\215\105\306\046\024\125\370\333\225\307
\132\321\123\257
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\323\236\304\036\043\074\246\337\317\243\176\155\340\024\346\345
END
CKA_ISSUER MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\051\060\047\006\003\125\004\012\023\040\111\156\164\145\162\156
\145\164\040\123\145\143\165\162\151\164\171\040\122\145\163\145
\141\162\143\150\040\107\162\157\165\160\061\025\060\023\006\003
\125\004\003\023\014\111\123\122\107\040\122\157\157\164\040\130
\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\101\322\235\321\162\352\356\247\200\301\054\154\351\057
\207\122
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "HiPKI Root CA - G1"
#
# Issuer: CN=HiPKI Root CA - G1,O="Chunghwa Telecom Co., Ltd.",C=TW
# Serial Number:2d:dd:ac:ce:62:97:94:a1:43:e8:b0:cd:76:6a:5e:60
# Subject: CN=HiPKI Root CA - G1,O="Chunghwa Telecom Co., Ltd.",C=TW
# Not Valid Before: Fri Feb 22 09:46:04 2019
# Not Valid After : Thu Dec 31 15:59:59 2037
# Fingerprint (SHA-256):
F0:15:CE:3C:C2:39:BF:EF:06:4B:E9:F1:D2:C4:17:E1:A0:26:4A:0A:94:BE:1F:0C:8D:12:18:64:EB:69:49:CC
# Fingerprint (SHA1): 6A:92:E4:A8:EE:1B:EC:96:45:37:E3:29:57:49:CD:96:E3:E5:D2:60
```

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL
 CK_FALSE
CKA_LABEL UTF8 "HiPKI Root CA - G1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\043\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150
\167\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040
\114\164\144\056\061\033\060\031\006\003\125\004\003\014\022\110
\151\120\113\111\040\122\157\157\164\040\103\101\040\055\040\107
\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\043\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150
\167\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040
\114\164\144\056\061\033\060\031\006\003\125\004\003\014\022\110
\151\120\113\111\040\122\157\157\164\040\103\101\040\055\040\107
\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\055\335\254\316\142\227\224\241\103\350\260\315\166\152
\136\140
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\152\060\202\003\122\240\003\002\001\002\002\020\055
\335\254\316\142\227\224\241\103\350\260\315\166\152\136\140\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\117
\061\013\060\011\006\003\125\004\006\023\002\124\127\061\043\060
\041\006\003\125\004\012\014\032\103\150\165\156\147\150\167\141
\040\124\145\154\145\143\157\155\040\103\157\056\054\040\114\164
\144\056\061\033\060\031\006\003\125\004\003\014\022\110\151\120
\113\111\040\122\157\157\164\040\103\101\040\055\040\107\061\060
\036\027\015\061\071\060\062\062\062\060\071\064\066\060\064\132
\027\015\063\067\061\062\063\061\061\065\065\071\065\071\132\060
\117\061\013\060\011\006\003\125\004\006\023\002\124\127\061\043
\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150\167
\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040\114
\164\144\056\061\033\060\031\006\003\125\004\003\014\022\110\151
\120\113\111\040\122\157\157\164\040\103\101\040\055\040\107\061
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001
\000\364\036\177\122\163\062\014\163\344\275\023\164\243\324\060
\250\320\256\113\330\266\337\165\107\146\364\174\347\071\004\036
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\152\160\040\322\132\107\162\147\125\364\245\350\235\325\036\041
\241\360\147\272\314\041\150\276\104\123\277\215\371\342\334\057
\125\310\067\077\037\244\300\234\263\344\167\134\240\106\376\167
\372\032\240\070\352\355\232\162\336\053\275\224\127\072\272\354
\171\347\137\175\102\144\071\172\046\066\367\044\360\325\057\272
\225\230\021\146\255\227\065\326\165\001\200\340\257\364\204\141
\214\015\036\137\174\207\226\136\101\257\353\207\352\370\135\361
\056\210\005\076\114\042\273\332\037\052\335\122\106\144\071\363
\102\316\331\236\014\263\260\167\227\144\234\300\364\243\056\037
\225\007\260\027\337\060\333\000\030\226\114\241\201\113\335\004
\155\123\243\075\374\007\254\324\305\067\202\353\344\225\010\031
\050\202\322\102\072\243\330\123\354\171\211\140\110\140\310\162
\222\120\334\003\217\203\077\262\102\127\132\333\152\351\021\227
\335\205\050\274\060\114\253\343\302\261\105\104\107\037\340\212
\026\007\226\322\041\017\123\300\355\251\176\324\116\354\233\011
\354\257\102\254\060\326\277\321\020\105\340\246\026\262\245\305
\323\117\163\224\063\161\002\241\152\243\326\063\227\117\041\143
\036\133\217\331\301\136\105\161\167\017\201\135\137\041\232\255
\203\314\372\136\326\215\043\137\033\075\101\257\040\165\146\132
\112\366\237\373\253\030\367\161\300\266\035\061\354\073\040\353
\313\342\270\365\256\222\262\367\341\204\113\362\242\362\223\232
\042\236\323\024\157\066\124\275\037\136\131\025\271\163\250\301
\174\157\173\142\351\026\154\107\132\145\363\016\021\233\106\331
\375\155\334\326\234\300\264\175\245\260\335\077\126\157\241\371
\366\344\022\110\375\006\177\022\127\266\251\043\117\133\003\303
\340\161\052\043\267\367\260\261\073\274\230\275\326\230\250\014
\153\366\216\022\147\246\362\262\130\344\002\011\023\074\251\273
\020\264\322\060\105\361\354\367\000\021\337\145\370\334\053\103
\125\277\026\227\304\017\325\054\141\204\252\162\206\376\346\072
\176\302\077\175\356\374\057\024\076\346\205\335\120\157\267\111
\355\002\003\001\000\001\243\102\060\100\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125
\035\016\004\026\004\024\362\167\027\372\136\250\376\366\075\161
\325\150\272\311\106\014\070\330\257\260\060\016\006\003\125\035
\017\001\001\377\004\004\003\002\001\206\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\003\202\002\001\000\120\121
\360\165\334\160\004\343\377\252\165\324\161\242\313\236\217\250
\251\323\257\165\307\124\317\072\034\004\231\042\254\304\021\342
\357\063\112\246\043\035\016\015\107\330\067\307\157\257\064\177
\117\201\153\065\117\351\162\245\061\342\170\347\367\116\224\030
\133\100\175\317\153\041\124\206\346\225\172\373\306\312\352\234
\110\116\127\011\135\057\254\364\245\264\227\063\130\325\254\171
\251\314\137\371\205\372\122\305\215\370\221\024\353\072\015\027
\320\122\302\173\343\302\163\216\106\170\006\070\054\350\134\332
\146\304\364\244\360\126\031\063\051\132\145\222\005\107\106\112
\253\204\303\036\047\241\037\021\222\231\047\165\223\017\274\066
\073\227\127\217\046\133\014\273\234\017\324\156\060\007\324\334
\137\066\150\146\071\203\226\047\046\212\310\304\071\376\232\041

\157\325\162\206\351\177\142\345\227\116\320\044\320\100\260\320
\165\010\216\275\150\356\010\327\156\174\020\160\106\033\174\340
\210\262\236\162\206\231\001\343\277\237\111\031\264\045\276\126
\145\256\027\143\345\036\337\350\377\107\245\277\341\046\005\204
\344\260\300\257\347\010\231\250\014\136\046\200\105\324\370\150
\057\226\217\256\342\112\034\234\026\014\023\157\070\207\366\273
\310\064\137\222\003\121\171\160\246\337\313\365\231\115\171\315
\116\274\127\237\103\116\153\056\053\030\370\152\163\214\272\305
\065\357\071\152\101\036\317\161\250\242\262\206\007\133\072\311
\341\357\077\145\004\200\107\062\104\160\225\116\061\147\152\164
\133\020\105\165\352\260\237\320\346\065\376\116\237\213\314\053
\222\105\133\156\045\140\205\106\315\321\252\260\166\146\223\167
\226\276\203\276\070\266\044\116\046\013\314\355\172\126\032\340
\351\132\306\144\255\114\172\000\110\104\057\271\100\273\023\076
\276\025\170\235\205\201\112\052\127\336\325\031\103\332\333\312
\133\107\206\203\013\077\266\015\166\170\163\171\042\136\261\200
\037\317\276\321\077\126\020\230\053\225\207\241\037\235\144\024
\140\071\054\263\000\125\056\344\365\263\016\127\304\221\101\000
\234\077\350\245\337\352\366\377\310\360\255\155\122\250\027\253
\233\141\374\022\121\065\344\045\375\257\252\152\206\071
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "HiPKI Root CA - G1"
# Issuer: CN=HiPKI Root CA - G1,O="Chunghwa Telecom Co., Ltd.",C=TW
# Serial Number:2d:dd:ac:ce:62:97:94:a1:43:e8:b0:cd:76:6a:5e:60
# Subject: CN=HiPKI Root CA - G1,O="Chunghwa Telecom Co., Ltd.",C=TW
#
Not Valid Before: Fri Feb 22 09:46:04 2019
# Not Valid After : Thu Dec 31 15:59:59 2037
# Fingerprint (SHA-256):
F0:15:CE:3C:C2:39:BF:EF:06:4B:E9:F1:D2:C4:17:E1:A0:26:4A:0A:94:BE:1F:0C:8D:12:18:64:EB:69:49:CC
# Fingerprint (SHA1): 6A:92:E4:A8:EE:1B:EC:96:45:37:E3:29:57:49:CD:96:E3:E5:D2:60
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HiPKI Root CA - G1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\152\222\344\250\356\033\354\226\105\067\343\051\127\111\315\226
\343\345\322\140
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\151\105\337\026\145\113\350\150\232\217\166\137\377\200\236\323
END

```
CKA_ISSUER MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\043\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150
\167\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040
\114\164\144\056\061\033\060\031\006\003\125\004\003\014\022\110
\151\120\113\111\040\122\157\157\164\040\103\101\040\055\040\107
\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\055\335\254\316\142\227\224\241\103\350\260\315\166\152
\136\140
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GlobalSign ECC Root CA - R4"
#
# Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign ECC Root CA - R4
# Serial Number:02:03:e5:7e:f5:3f:93:fd:a5:09:21:b2:a6
# Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign ECC Root CA - R4
# Not Valid Before: Tue Nov 13 00:00:00 2012
# Not Valid After : Tue Jan 19 03:14:07 2038
# Fingerprint (SHA-256):
B0:85:D7:0B:96:4F:19:1A:73:E4:AF:0D:54:AE:7A:0E:07:AA:FD:AF:9B:71:DD:08:62:13:8A:B7:32:5A:24:A2
# Fingerprint (SHA1): 6B:A0:B0:98:E1:71:EF:5A:AD:FE:48:15:80:77:10:F4:BD:6F:0B:28
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL
 CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign ECC Root CA - R4"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\120\061\044\060\042\006\003\125\004\013\023\033\107\154\157
\142\141\154\123\151\147\156\040\105\103\103\040\122\157\157\164
\040\103\101\040\055\040\122\064\061\023\060\021\006\003\125\004
\012\023\012\107\154\157\142\141\154\123\151\147\156\061\023\060
\021\006\003\125\004\003\023\012\107\154\157\142\141\154\123\151
\147\156
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\120\061\044\060\042\006\003\125\004\013\023\033\107\154\157
\142\141\154\123\151\147\156\040\105\103\103\040\122\157\157\164
```

```
\040\103\101\040\055\040\122\064\061\023\060\021\006\003\125\004
\012\023\012\107\154\157\142\141\154\123\151\147\156\061\023\060
\021\006\003\125\004\003\023\012\107\154\157\142\141\154\123\151
\147\156
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\015\002\003\345\176\365\077\223\375\245\011\041\262\246
END
CKA_VALUE MULTILINE_OCTAL
\060\202\001\334\060\202\001\203\240\003\002\001\002\002\015\002
\003\345\176\365\077\223\375\245\011\041\262\246\060\012\006\010
\052\206\110\316\075\004\003\002\060\120\061\044\060\042\006\003
\125\004\013\023\033\107\154\157\142\141\154\123\151\147\156\040
\105\103\103\040\122\157\157\164\040\103\101\040\055\040\122\064
\061\023\060\021\006\003\125\004\012\023\012\107\154\157\142\141
\154\123\151\147\156\061\023\060\021\006\003\125\004\003\023\012
\107\154\157\142\141\154\123\151\147\156\060\036\027\015\061\062
\061\061\061\063\060\060\060\060\060\060\132\027\015\063\070\060
\061\061\071\060\063\061\064\060\067\132\060\120\061\044\060\042
\006\003\125\004\013\023\033\107\154\157\142\141\154\123\151\147
\156\040\105\103\103\040\122\157\157\164\040\103\101\040\055\040
\122\064\061\023\060\021\006\003\125\004\012\023\012\107\154\157
\142\141\154\123\151\147\156\061\023\060\021\006\003\125\004\003
\023\012\107\154\157\142\141\154\123\151\147\156\060\131\060\023
\006\007\052\206\110\316\075\002\001\006\010\052\206\110\316\075
\003\001\007\003\102\000\004\270\306\171\323\217\154\045\016\237
\056\071\031\034\003\244\256\232\345\071\007\011\026\312\143\261
\271\206\370\212\127\301\127\316\102\372\163\241\367\145\102\377
\036\301\000\262\156\163\016\377\307\041\345\030\244\252\331\161
\077\250\324\271\316\214\035\243\102\060\100\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\206\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003
\125\035\016\004\026\004\024\124\260\173\255\105\270\342\100\177
\373\012\156\373\276\063\311\074\243\204\325\060\012\006\010\052
\206\110\316\075\004\003\002\003\107\000\060\104\002\040\042\117
\164\162\271\140\257\361\346\234\240\026\005\120\137\303\136\073
\156\141\164\357\276\001\304\276\030\110\131\141\202\062\002\040
\046\235\124\143\100\336\067\140\120\317\310\330\355\235\202\256
\067\230\274\243\217\114\114\251\064\053\154\357\373\225\233\046
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL
 CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "GlobalSign ECC Root CA - R4"
# Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign ECC Root CA - R4
```

```
# Serial Number:02:03:e5:7e:f5:3f:93:fd:a5:09:21:b2:a6
# Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign ECC Root CA - R4
# Not Valid Before: Tue Nov 13 00:00:00 2012
# Not Valid After : Tue Jan 19 03:14:07 2038
# Fingerprint (SHA-256):
B0:85:D7:0B:96:4F:19:1A:73:E4:AF:0D:54:AE:7A:0E:07:AA:FD:AF:9B:71:DD:08:62:13:8A:B7:32:5A:24:A2
# Fingerprint (SHA1): 6B:A0:B0:98:E1:71:EF:5A:AD:FE:48:15:80:77:10:F4:BD:6F:0B:28
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign ECC Root CA - R4"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\153\240\260\230\341\161\357\132\255\376\110\025\200\167\020\364
\275\157\013\050
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\046\051\370\155\341\210\277\242\145\177\252\304\315\017\177\374
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\120\061\044\060\042\006\003\125\004\013\023\033\107\154\157
\142\141\154\123\151\147\156\040\105\103\103\040\122\157\157\164
\040\103\101\040\055\040\122\064\061\023\060\021\006\003\125\004
\012\023\012\107\154\157\142\141\154\123\151\147\156\061\023\060
\021\006\003\125\004\003\023\012\107\154\157\142\141\154\123\151
\147\156
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\015\002\003\345\176\365\077\223\375\245\011\041\262\246
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GTS Root R1"
#
# Issuer: CN=GTS Root R1,O=Google Trust Services LLC,C=US
# Serial Number:02:03:e5:93:6f:31:b0:13:49:88:6b:a2:17
# Subject: CN=GTS Root R1,O=Google Trust Services LLC,C=US
# Not Valid Before: Wed Jun 22 00:00:00 2016
# Not Valid After : Sun Jun 22
 00:00:00 2036
# Fingerprint (SHA-256):
D9:47:43:2A:BD:E7:B7:FA:90:FC:2E:6B:59:10:1B:12:80:E0:E1:C7:E4:E4:0F:A3:C6:88:7F:FF:57:A7:F4:CF
# Fingerprint (SHA1): E5:8C:1C:C4:91:3B:38:63:4B:E9:10:6E:E3:AD:8E:6B:9D:D9:81:4A
```

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GTS Root R1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\015\002\003\345\223\157\061\260\023\111\210\153\242\027
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\127\060\202\003\077\240\003\002\001\002\002\015\002
\003\345\223\157\061\260\023\111\210\153\242\027\060\015\006\011
\052\206\110\206\367\015\001\001\014\005\000\060\107\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\042\060\040\006\003
\125\004\012\023\031\107\157\157\147\154\145\040\124\162\165\163
\164\040\123\145\162\166\151\143\145\163\040\114\114\103\061\024
\060\022\006\003\125\004\003\023\013\107\124\123\040\122\157\157
\164\040\122\061\060\036\027\015\061\066\060\066\062\062\060\060
\060\060\060\060\132\027\015\063\066\060\066\062\062\060\060\060
\060\060\060\132\060\107\061\013\060\011\006\003\125\004\006\023
\002\125\123\061\042\060\040\006\003\125\004\012\023\031\107\157
\157\147\154\145\040\124\162\165\163\164\040\123\145\162\166\151
\143\145\163\040\114\114\103\061\024\060\022\006\003\125\004\003
\023\013\107\124\123\040\122\157\157\164\040\122\061\060\202\002
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000
\003\202\002\017\000\060\202\002\012\002\202\002\001\000\266\021
\002\213\036\343\241\167\233\073\334\277\224\076\267\225\247\100
\074\241\375\202\371\175\062\006\202\161\366\366\214\177\373\350
\333\274\152\056\227\227\243\214\113\371\053\366\261\371\316\204
\035\261\371\305\227\336\357\271\362\243\351\274\022\211\136\247
\252\122\253\370\043\047\313\244\261\234\143\333\327\231\176\360
\012\136\353\150\246\364\306\132\107\015\115\020\063\343\116\261
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\007\241\264\322\075\056\140\340\317\322\011\207\273\315\110\360
\115\302\302\172\210\212\273\272\317\131\031\326\257\217\260\007
\260\236\061\361\202\301\300\337\056\246\155\154\031\016\265\330
\176\046\032\105\003\075\260\171\244\224\050\255\017\177\046\345
\250\010\376\226\350\074\150\224\123\356\203\072\210\053\025\226
\011\262\340\172\214\056\165\326\234\353\247\126\144\217\226\117
\150\256\075\227\302\204\217\300\274\100\300\013\134\275\366\207
\263\065\154\254\030\120\177\204\340\114\315\222\323\040\351\063
\274\122\231\257\062\265\051\263\045\052\264\110\371\162\341\312
\144\367\346\202\020\215\350\235\302\212\210\372\070\146\212\374
\143\371\001\371\170\375\173\134\167\372\166\207\372\354\337\261
\016\171\225\127\264\275\046\357\326\001\321\353\026\012\273\216
\013\265\305\305\212\125\253\323\254\352\221\113\051\314\031\244
\062\045\116\052\361\145\104\320\002\316\252\316\111\264\352\237
\174\203\260\100\173\347\103\253\247\154\243\217\175\211\201\372
\114\245\377\325\216\303\316\113\340\265\330\263\216\105\317\166
\300\355\100\053\375\123\017\260\247\325\073\015\261\212\242\003
\336\061\255\314\167\352\157\173\076\326\337\221\042\022\346\276
\372\330\062\374\020\143\024\121\162\336\135\326\026\223\275\051
\150\063\357\072\146\354\007\212\046\337\023\327\127\145\170\047
\336\136\111\024\000\242\000\177\232\250\041\266\251\261\225\260
\245\271\015\026\021\332\307\154\110\074\100\340\176\015\132\315
\126\074\321\227\005\271\313\113\355\071\113\234\304\077\322\125
\023\156\044\260\326\161\372\364\301\272\314\355\033\365\376\201
\101\330\000\230\075\072\310\256\172\230\067\030\005\225\002\003
\001\000\001\243\102\060\100\060\016\006\003\125\035\017\001\001
\377\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004
\026\004\024\344\257\053\046\161\032\053\110\047\205\057\122\146
\054\357\360\211\023\161\076\060\015\006\011\052\206\110\206\367
\015\001\001\014\005\000\003\202\002\001\000\237\252\102\046\333
\013\233\276\377\036\226\222\056\076\242\145\112\152\230\272\042
\313\175\301\072\330\202\012\006\306\366\245\336\300\116\207\146
\171\241\371\246\130\234\252\371\265\346\140\347\340\350\261\036
\102\101\063\013\067\075\316\211\160\025\312\265\044\250\317\153
\265\322\100\041\230\317\042\064\317\073\305\042\204\340\305\016
\212\174\135\210\344\065\044\316\233\076\032\124\036\156\333\262
\207\247\374\363\372\201\125\024\142\012\131\251\042\005\061\076
\202\326\356\333\127\064\274\063\225\323\027\033\350\047\242\213
\173\116\046\032\172\132\144\266\321\254\067\361\375\240\363\070
\354\162\360\021\165\235\313\064\122\215\346\166\153\027\306\337
\206\253\047\216\111\053\165\146\201\020\041\246\352\076\364\256
\045\377\174\025\336\316\214\045\077\312\142\160\012\367\057\011
\146\007\310\077\034\374\360\333\105\060\337\142\210\301\265\017
\235\303\237\112\336\131\131\107\305\207\042\066\346\202\247\355
\012\271\342\007\240\215\173\172\112\074\161\322\342\003\241\037
\062\007\335\033\344\102\316\014\000\105\141\200\265\013\040\131

\051\170\275\371\125\313\143\305\074\114\364\266\377\333\152\137
\061\153\231\236\054\301\153\120\244\327\346\030\024\275\205\077
\147\253\106\237\240\377\102\247\072\177\134\313\135\260\160\035
\053\064\365\324\166\011\014\353\170\114\131\005\363\063\102\303
\141\025\020\033\167\115\316\042\214\324\205\362\105\175\267\123
\352\357\100\132\224\012\134\040\137\116\100\135\142\042\166\337
\377\316\141\275\214\043\170\322\067\002\340\216\336\321\021\067
\211\366\277\355\111\007\142\256\222\354\100\032\257\024\011\331
\320\116\262\242\367\276\356\356\330\377\334\032\055\336\270\066
\161\342\374\171\267\224\045\321\110\163\133\241\065\347\263\231
\147\165\301\031\072\053\107\116\323\102\216\375\061\310\026\146
\332\322\014\074\333\263\216\311\241\015\200\017\173\026\167\024
\277\377\333\011\224\262\223\274\040\130\025\351\333\161\103\363
\336\020\303\000\334\250\052\225\266\302\326\077\220\153\166\333
\154\376\214\274\362\160\065\014\334\231\031\065\334\327\310\106
\143\325\066\161\256\127\373\267\202\155\334
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "GTS Root R1"
# Issuer: CN=GTS Root R1,O=Google
 Trust Services LLC,C=US
# Serial Number:02:03:e5:93:6f:31:b0:13:49:88:6b:a2:17
# Subject: CN=GTS Root R1,O=Google Trust Services LLC,C=US
# Not Valid Before: Wed Jun 22 00:00:00 2016
# Not Valid After : Sun Jun 22 00:00:00 2036
# Fingerprint (SHA-256):
D9:47:43:2A:BD:E7:B7:FA:90:FC:2E:6B:59:10:1B:12:80:E0:E1:C7:E4:E4:0F:A3:C6:88:7F:FF:57:A7:F4:CF
# Fingerprint (SHA1): E5:8C:1C:C4:91:3B:38:63:4B:E9:10:6E:E3:AD:8E:6B:9D:D9:81:4A
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GTS Root R1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\345\214\034\304\221\073\070\143\113\351\020\156\343\255\216\153
\235\331\201\112
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\005\376\320\277\161\250\243\166\143\332\001\340\330\122\334\100
END
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040

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\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\015\002\003\345\223\157\061\260\023\111\210\153\242\027
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GTS Root R2"
#
# Issuer: CN=GTS Root R2,O=Google Trust Services LLC,C=US
# Serial Number:02:03:e5:ae:c5:8d:04:25:1a:ab:11:25:aa
# Subject: CN=GTS Root R2,O=Google Trust Services LLC,C=US
# Not Valid Before: Wed Jun 22 00:00:00 2016
# Not Valid After : Sun Jun 22 00:00:00 2036
# Fingerprint (SHA-256):
8D:25:CD:97:22:9D:BF:70:35:6B:DA:4E:B3:CC:73:40:31:E2:4C:F0:0F:AF:CF:D3:2D:C7:6E:B5:84:1C:7E:A8
# Fingerprint (SHA1): 9A:44:49:76:32:DB:DE:FA:D0:BC:FB:5A:7B:17:BD:9E:56:09:24:94
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN
 CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GTS Root R2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\015\002\003\345\256\305\215\004\045\032\253\021\045\252
END
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CKA_VALUE MULTILINE_OCTAL
\060\202\005\127\060\202\003\077\240\003\002\001\002\002\015\002
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\052\206\110\206\367\015\001\001\014\005\000\060\107\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\042\060\040\006\003
\125\004\012\023\031\107\157\157\147\154\145\040\124\162\165\163
\164\040\123\145\162\166\151\143\145\163\040\114\114\103\061\024
\060\022\006\003\125\004\003\023\013\107\124\123\040\122\157\157
\164\040\122\062\060\036\027\015\061\066\060\066\062\062\060\060
\060\060\060\060\132\027\015\063\066\060\066\062\062\060\060\060
\060\060\060\132\060\107\061\013\060\011\006\003\125\004\006\023
\002\125\123\061\042\060\040\006\003\125\004\012\023\031\107\157
\157\147\154\145\040\124\162\165\163\164\040\123\145\162\166\151
\143\145\163\040\114\114\103\061\024\060\022\006\003\125\004\003
\023\013\107\124\123\040\122\157\157\164\040\122\062\060\202\002
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000
\003\202\002\017\000\060\202\002\012\002\202\002\001\000\316\336
\375\246\373\354\354\024\064\074\007\006\132\154\131\367\031\065
\335\367\301\235\125\252\323\315\073\244\223\162\357\012\372\155
\235\366\360\205\200\133\241\110\122\237\071\305\267\356\050\254
\357\313\166\150\024\271\337\255\001\154\231\037\304\042\035\237
\376\162\167\340\054\133\257\344\004\277\117\162\240\032\064\230
\350\071\150\354\225\045\173\166\241\346\151\271\205\031\275\211
\214\376\255\355\066\352\163\274\377\203\342\313\175\301\322\316
\112\263\215\005\236\213\111\223\337\301\133\320\156\136\360\056
\060\056\202\374\372\274\264\027\012\110\345\210\233\305\233\153
\336\260\312\264\003\360\332\364\220\270\145\144\367\134\114\255
\350\176\146\136\231\327\270\302\076\310\320\023\235\255\356\344
\105\173\211\125\367\212\037\142\122\204\022\263\302\100\227\343
\212\037\107\221\246\164\132\322\370\261\143\050\020\270\263\011
\270\126\167\100\242\046\230\171\306\376\337\045\356\076\345\240
\177\324\141\017\121\113\074\077\214\332\341\160\164\330\302\150
\241\371\301\014\351\241\342\177\273\125\074\166\006\356\152\116
\314\222\210\060\115\232\275\117\013\110\232\204\265\230\243\325
\373\163\301\127\141\335\050\126\165\023\256\207\216\347\014\121
\011\020\165\210\114\274\215\371\173\074\324\042\110\037\052\334
\353\153\273\104\261\313\063\161\062\106\257\255\112\361\214\350
\164\072\254\347\032\042\163\200\322\060\367\045\102\307\042\073
\073\022\255\226\056\306\303\166\007\252\040\267\065\111\127\351
\222\111\350\166\026\162\061\147\053\226\176\212\243\307\224\126
\042\277\152\113\176\001\041\262\043\062\337\344\232\104\155\131
\133\135\365\000\240\034\233\306\170\227\215\220\377\233\310\252
\264\257\021\121\071\136\331\373\147\255\325\133\021\235\062\232
\033\275\325\272\133\245\311\313\045\151\123\125\047\134\340\312
\066\313\210\141\373\036\267\320\313\356\026\373\323\246\114\336
\222\245\324\342\337\365\006\124\336\056\235\113\264\223\060\252
\201\316\335\032\334\121\163\015\117\160\351\345\266\026\041\031
\171\262\346\211\013\165\144\312\325\253\274\011\301\030\241\377

\324\124\241\205\074\375\024\044\003\262\207\323\244\267\002\003
\001\000\001\243\102\060\100\060\016\006\003\125\035\017\001\001
\377\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004
\026\004\024\273\377\312\216\043\237\117\231\312\333\342\150\246
\245\025\047\027\036\331\016\060\015\006\011\052\206\110\206\367
\015\001\001\014\005\000\003\202\002\001\000\037\312\316\335\307
\276\241\237\331\047\114\013\334\027\230\021\152\210\336\075\346
\161\126\162\262\236\032\116\234\325\053\230\044\135\233\153\173
\260\063\202\011\275\337\045\106\352\230\236\266\033\376\203\074
\322\142\141\301\004\355\316\340\305\311\310\023\023\125\347\250
\143\255\214\173\001\376\167\060\341\316\150\233\005\370\022\356
\171\061\240\101\105\065\050\012\161\244\044\117\214\334\074\202
\007\137\146\334\175\020\376\014\141\263\005\225\356\341\256\201
\017\250\370\307\217\115\250\043\002\046\153\035\203\122\125\316
\265\057\000\312\200\100\340\341\164\254\140\365\207\200\235\256
\066\144\221\135\260\150\030\352\212\141\311\167\250\227\304\311
\307\245\374\125\113\363\360\177\271\145\075\047\150\320\314\153
\372\123\235\341\221\032\311\135\032\226\155\062\207\355\003\040
\310\002\316\132\276\331\352\375\262\115\304\057\033\337\137\172
\365\370\213\306\356\061\072\045\121\125\147\215\144\062\173\351
\236\303\202\272\052\055\351\036\264\340\110\006\242\374\147\257
\037\042\002\163\373\040\012\257\235\124\113\241\315\377\140\107
\260\077\135\357\033\126\275\227\041\226\055\012\321\136\235\070
\002\107\154\271\364\366\043\045\270\240\152\232\053\167\010\372
\304\261\050\220\046\130\010\074\342\176\252\327\075\157\272\061
\210\012\005\353\047\265\241\111\356\240\105\124\173\346\047\145
\231\040\041\250\243\274\373\030\226\273\122\157\014\355\203\121
\114\351\131\342\040\140\305\302\145\222\202\214\363\020\037\016
\212\227\276\167\202\155\077\217\035\135\274\111\047\275\314\117
\017\341\316\166\206\004\043\305\300\214\022\133\375\333\204\240
\044\361\110\377\144\174\320\276\134\026\321\357\231\255\300\037
\373\313\256\274\070\042\006\046\144\332\332\227\016\077\050\025
\104\250\117\000\312\360\232\314\317\164\152\264\076\074\353\225
\354\265\323\132\330\201\231\351\103\030\067\353\263\273\321\130
\142\101\363\146\322\217\252\170\225\124\040\303\132\056\164\053
\325\321\276\030\151\300\254\325\244\317\071\272\121\204\003\145
\351\142\300\142\376\330\115\125\226\342\320\021\372\110\064\021
\354\236\355\005\035\344\310\326\035\206\313
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "GTS Root R2"
# Issuer: CN=GTS Root R2,O=Google Trust Services LLC,C=US
# Serial Number:02:03:e5:ae:c5:8d:04:25:1a:ab:11:25:aa

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# Subject: CN=GTS Root R2,O=Google Trust Services LLC,C=US
# Not Valid Before: Wed Jun 22 00:00:00 2016
# Not Valid After : Sun Jun 22 00:00:00 2036
# Fingerprint (SHA-256):
8D:25:CD:97:22:9D:BF:70:35:6B:DA:4E:B3:CC:73:40:31:E2:4C:F0:0F:AF:CF:D3:2D:C7:6E:B5:84:1C:7E:A8
#
 Fingerprint (SHA1): 9A:44:49:76:32:DB:DE:FA:D0:BC:FB:5A:7B:17:BD:9E:56:09:24:94
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GTS Root R2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\232\104\111\166\062\333\336\372\320\274\373\132\173\027\275\236
\126\011\044\224
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\036\071\300\123\346\036\051\202\013\312\122\125\066\135\127\334
END
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\015\002\003\345\256\305\215\004\045\032\253\021\045\252
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GTS Root R3"
#
# Issuer: CN=GTS Root R3,O=Google Trust Services LLC,C=US
# Serial Number:02:03:e5:b8:82:eb:20:f8:25:27:6d:3d:66
# Subject: CN=GTS Root R3,O=Google Trust Services LLC,C=US
# Not Valid Before: Wed Jun 22 00:00:00 2016
# Not Valid After : Sun Jun 22 00:00:00 2036
# Fingerprint (SHA-256):
34:D8:A7:3E:E2:08:D9:BC:DB:0D:95:65:20:93:4B:4E:40:E6:94:82:59:6E:8B:6F:73:C8:42:6B:01:0A:6F:48
# Fingerprint (SHA1): ED:E5:71:80:2B:C8:92:B9:5B:83:3C:D2:32:68:3F:09:CD:A0:1E:46
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
```

CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GTS Root R3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\063
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\015\002\003\345\270\202\353\040\370\045\047\155\075\146
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\011\060\202\001\216\240\003\002\001\002\002\015\002
\003\345\270\202\353\040\370\045\047\155\075\146\060\012\006\010
\052\206\110\316\075\004\003\003\060\107\061\013\060\011\006\003
\125\004\006\023\002\125\123\061\042\060\040\006\003\125\004\012
\023\031\107\157\157\147\154\145\040\124\162\165\163\164\040\123
\145\162\166\151\143\145\163\040\114\114\103\061\024\060\022\006
\003\125\004\003\023\013\107\124\123\040\122\157\157\164\040\122
\063\060\036\027\015\061\066\060\066\062\062\060\060\060\060\060
\060\132\027\015\063\066\060\066\062\062\060\060\060\060\060\060
\132\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154
\145\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163
\040\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107
\124\123\040\122\157\157\164\040\122\063\060\166\060\020\006\007
\052\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142
\000\004\037\117\063\207\063\051\212\241\204\336\313\307\041\130
\101\211\352\126\235\053\113\205\306\035\114\047\274\177\046\121
\162\157\342\237\326\243\312\314\105\024\106\213\255\357\176\206
\214\354\261\176\057\377\251\161\235\030\204\105\004\101\125\156
\053\352\046\177\273\220\001\343\113\031\272\344\124\226\105\011
\261\325\154\221\104\255\204\023\216\232\214\015\200\014\062\366
\340\047\243\102\060\100\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026

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\004\024\301\361\046\272\240\055\256\205\201\317\323\361\052\022
\275\270\012\147\375\274\060\012\006\010\052\206\110\316\075\004
\003\003\003\151\000\060\146\002\061\000\366\341\040\225\024\173
\124\243\220\026\021\277\204\310\352\157\153\027\236\036\106\230
\040\233\237\323\015\331\254\323\057\315\174\370\133\056\125\273
\277\335\222\367\244\014\334\061\341\242\002\061\000\374\227\146
\146\345\103\026\023\203\335\307\337\057\276\024\070\355\001\316
\261\027\032\021\165\351\275\003\217\046\176\204\345\311\140\246
\225\327\124\131\267\347\021\054\211\324\271\356\027
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust
 for "GTS Root R3"
# Issuer: CN=GTS Root R3,O=Google Trust Services LLC,C=US
# Serial Number:02:03:e5:b8:82:eb:20:f8:25:27:6d:3d:66
# Subject: CN=GTS Root R3,O=Google Trust Services LLC,C=US
# Not Valid Before: Wed Jun 22 00:00:00 2016
# Not Valid After : Sun Jun 22 00:00:00 2036
# Fingerprint (SHA-256):
34:D8:A7:3E:E2:08:D9:BC:DB:0D:95:65:20:93:4B:4E:40:E6:94:82:59:6E:8B:6F:73:C8:42:6B:01:0A:6F:48
# Fingerprint (SHA1): ED:E5:71:80:2B:C8:92:B9:5B:83:3C:D2:32:68:3F:09:CD:A0:1E:46
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GTS Root R3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\355\345\161\200\053\310\222\271\133\203\074\322\062\150\077\011
\315\240\036\106
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\076\347\235\130\002\224\106\121\224\345\340\042\112\213\347\163
END
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\063
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\015\002\003\345\270\202\353\040\370\045\047\155\075\146
END
```

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CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "GTS Root R4"
#
# Issuer: CN=GTS Root R4,O=Google Trust Services LLC,C=US
# Serial Number:02:03:e5:c0:68:ef:63:1a:9c:72:90:50:52
# Subject: CN=GTS Root R4,O=Google Trust Services LLC,C=US
# Not Valid Before: Wed Jun 22 00:00:00 2016
# Not Valid After : Sun Jun 22 00:00:00 2036
# Fingerprint (SHA-256):
34:9D:FA:40:58:C5:E2:63:12:3B:39:8A:E7:95:57:3C:4E:13:13:C8:3F:E6:8F:93:55:6C:D5:E8:03:1B:3C:7D
# Fingerprint (SHA1): 77:D3:03:67:B5:E0:0C:15:F6:0C:38:61:DF:7C:E1:3B:92:46:4D:47
CKA_CLASS
 CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GTS Root R4"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\064
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\064
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\015\002\003\345\300\150\357\143\032\234\162\220\120\122
END
CKA_VALUE
 MULTILINE_OCTAL
\060\202\002\011\060\202\001\216\240\003\002\001\002\002\015\002
\003\345\300\150\357\143\032\234\162\220\120\122\060\012\006\010
\052\206\110\316\075\004\003\003\060\107\061\013\060\011\006\003
\125\004\006\023\002\125\123\061\042\060\040\006\003\125\004\012
\023\031\107\157\157\147\154\145\040\124\162\165\163\164\040\123
```

\145\162\166\151\143\145\163\040\114\114\103\061\024\060\022\006
\003\125\004\003\023\013\107\124\123\040\122\157\157\164\040\122
\064\060\036\027\015\061\066\060\066\062\062\060\060\060\060\060
\060\132\027\015\063\066\060\066\062\062\060\060\060\060\060\060
\132\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154
\145\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163
\040\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107
\124\123\040\122\157\157\164\040\122\064\060\166\060\020\006\007
\052\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142
\000\004\363\164\163\247\150\213\140\256\103\270\065\305\201\060
\173\113\111\235\373\301\141\316\346\336\106\275\153\325\141\030
\065\256\100\335\163\367\211\221\060\132\353\074\356\205\174\242
\100\166\073\251\306\270\107\330\052\347\222\221\152\163\351\261
\162\071\237\051\237\242\230\323\137\136\130\206\145\017\241\204
\145\006\321\334\213\311\307\163\310\214\152\057\345\304\253\321
\035\212\243\102\060\100\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026
\004\024\200\114\326\353\164\377\111\066\243\325\330\374\265\076
\305\152\360\224\035\214\060\012\006\010\052\206\110\316\075\004
\003\003\003\151\000\060\146\002\061\000\350\100\377\203\336\003
\364\237\256\035\172\247\056\271\257\117\366\203\035\016\055\205
\001\035\321\331\152\354\017\302\257\307\136\126\136\134\325\034
\130\042\050\013\367\060\266\057\261\174\002\061\000\360\141\074
\247\364\240\202\343\041\325\204\035\163\206\234\055\257\312\064
\233\361\237\271\043\066\342\274\140\003\235\200\263\232\126\310
\341\342\273\024\171\312\315\041\324\224\265\111\103
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "GTS Root R4"
# Issuer: CN=GTS Root R4,O=Google Trust Services LLC,C=US
# Serial Number:02:03:e5:c0:68:ef:63:1a:9c:72:90:50:52
# Subject: CN=GTS Root R4,O=Google Trust Services LLC,C=US
# Not Valid Before: Wed Jun 22 00:00:00 2016
# Not Valid After : Sun Jun 22 00:00:00 2036
# Fingerprint (SHA-256):
34:9D:FA:40:58:C5:E2:63:12:3B:39:8A:E7:95:57:3C:4E:13:13:C8:3F:E6:8F:93:55:6C:D5:E8:03:1B:3C:7D
# Fingerprint (SHA1): 77:D3:03:67:B5:E0:0C:15:F6:0C:38:61:DF:7C:E1:3B:92:46:4D:47
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GTS Root R4"

```
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\167\323\003\147\265\340\014\025\366\014\070\141\337\174\341\073
\222\106\115\107
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\103\226\203\167\031\115\166\263\235\145\122\344\035\042\245\350
END
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\042\060\040\006\003\125\004\012\023\031\107\157\157\147\154\145
\040\124\162\165\163\164\040\123\145\162\166\151\143\145\163\040
\114\114\103\061\024\060\022\006\003\125\004\003\023\013\107\124
\123\040\122\157\157\164\040\122\064
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\015\002\003\345\300\150\357\143\032\234\162\220\120\122
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Telia Root CA v2"
#
# Issuer: CN=Telia Root CA v2,O=Telia Finland Oyj,C=FI
# Serial Number:01:67:5f:27:d6:fe:7a:e3:e4:ac:be:09:5b:05:9e
# Subject: CN=Telia Root
 CA v2,O=Telia Finland Oyj,C=FI
# Not Valid Before: Thu Nov 29 11:55:54 2018
# Not Valid After : Sun Nov 29 11:55:54 2043
# Fingerprint (SHA-256):
24:2B:69:74:2F:CB:1E:5B:2A:BF:98:89:8B:94:57:21:87:54:4E:5B:4D:99:11:78:65:73:62:1F:6A:74:B8:2C
# Fingerprint (SHA1): B9:99:CD:D1:73:50:8A:C4:47:05:08:9C:8C:88:FB:BE:A0:2B:40:CD
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Telia Root CA v2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\106\111\061
\032\060\030\006\003\125\004\012\014\021\124\145\154\151\141\040
\106\151\156\154\141\156\144\040\117\171\152\061\031\060\027\006
\003\125\004\003\014\020\124\145\154\151\141\040\122\157\157\164
\040\103\101\040\166\062
END
```

CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\106\111\061
\032\060\030\006\003\125\004\012\014\021\124\145\154\151\141\040
\106\151\156\154\141\156\144\040\117\171\152\061\031\060\027\006
\003\125\004\003\014\020\124\145\154\151\141\040\122\157\157\164
\040\103\101\040\166\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\017\001\147\137\047\326\376\172\343\344\254\276\011\133\005
\236
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\164\060\202\003\134\240\003\002\001\002\002\017\001
\147\137\047\326\376\172\343\344\254\276\011\133\005\236\060\015
\006\011\052\206\110\206\367\015\001\001\013\005\000\060\104\061
\013\060\011\006\003\125\004\006\023\002\106\111\061\032\060\030
\006\003\125\004\012\014\021\124\145\154\151\141\040\106\151\156
\154\141\156\144\040\117\171\152\061\031\060\027\006\003\125\004
\003\014\020\124\145\154\151\141\040\122\157\157\164\040\103\101
\040\166\062\060\036\027\015\061\070\061\061\062\071\061\061\065
\065\065\064\132\027\015\064\063\061\061\062\071\061\061\065\065
\065\064\132\060\104\061\013\060\011\006\003\125\004\006\023\002
\106\111\061\032\060\030\006\003\125\004\012\014\021\124\145\154
\151\141\040\106\151\156\154\141\156\144\040\117\171\152\061\031
\060\027\006\003\125\004\003\014\020\124\145\154\151\141\040\122
\157\157\164\040\103\101\040\166\062\060\202\002\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017
\000\060\202\002\012\002\202\002\001\000\262\320\077\007\274\342
\173\320\153\231\370\342\167\151\347\316\235\244\003\274\202\155
\241\376\201\145\037\114\047\254\216\000\272\026\173\353\060\152
\000\300\263\164\150\176\262\257\307\325\142\263\172\077\120\312
\214\066\104\044\143\322\066\351\014\205\366\103\166\325\114\241
\140\162\147\342\050\063\245\313\061\270\072\042\043\064\270\175
\275\126\042\100\235\352\364\173\003\255\150\374\262\201\117\230
\320\164\352\215\345\175\315\143\303\243\366\336\222\302\130\031
\340\226\273\305\304\251\075\245\164\226\376\257\371\211\252\275
\225\027\124\330\170\104\361\014\167\025\222\340\230\102\247\244
\326\252\040\222\315\301\240\263\226\262\072\204\102\215\175\325
\225\344\326\333\351\142\304\130\263\171\305\214\323\065\063\203
\237\165\241\122\047\141\070\361\131\075\216\120\340\275\171\074
\347\154\226\376\136\331\002\145\264\216\134\320\021\064\337\135
\277\122\247\201\000\303\177\231\105\231\025\325\027\310\012\123
\354\143\363\231\175\314\151\022\206\302\027\360\001\236\277\204
\274\321\122\313\033\222\146\316\244\123\345\241\277\304\333\011
\326\346\211\126\053\310\343\174\336\343\377\211\345\065\156\050
\350\154\013\043\121\251\045\005\353\110\370\335\261\312\372\154

\010\121\357\267\030\154\104\312\046\341\163\306\211\006\201\345
\212\254\260\342\051\306\271\044\263\153\104\021\364\245\103\302
\114\103\345\160\066\214\266\063\127\172\225\056\202\240\364\134
\020\263\141\203\366\002\005\206\056\174\055\154\334\003\106\156
\065\223\325\172\225\057\336\040\330\133\176\224\220\004\152\272
\131\075\004\005\165\235\067\242\016\056\075\353\301\244\122\203
\376\320\153\324\146\216\334\306\351\022\116\035\052\127\252\020
\274\174\136\202\175\246\246\311\362\055\271\365\027\047\255\321
\016\211\124\053\225\372\300\255\035\230\024\170\063\102\206\012
\251\163\265\373\164\015\267\033\060\031\304\132\016\034\047\267
\332\030\320\377\212\310\005\272\361\252\034\242\067\267\346\110
\244\106\054\224\352\250\166\142\107\213\020\123\007\110\127\154
\342\222\115\266\256\005\313\334\301\112\136\217\254\075\031\116
\302\355\140\165\053\333\301\312\102\325\002\003\001\000\001\243
\143\060\141\060\037\006\003\125\035\043\004\030\060\026\200\024
\162\254\344\063\171\252\105\207\366\375\254\035\236\326\307\057
\206\330\044\071\060\035\006\003\125\035\016\004\026\004\024\162
\254\344\063\171\252\105\207\366\375\254\035\236\326\307\057\206
\330\044\071\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\015\006\011\052\206\110\206\367\015\001\001
\013\005\000\003\202\002\001\000\240\073\131\247\011\224\076\066
\204\322\176\057\071\245\226\227\372\021\255\374\147\363\161\011
\362\262\211\204\147\104\257\271\357\355\226\354\234\144\333\062
\060\157\147\232\254\176\137\262\253\001\066\176\201\372\344\204
\136\322\254\066\340\153\142\305\175\113\016\202\155\322\166\142
\321\376\227\370\237\060\174\030\371\264\122\167\202\035\166\333
\323\035\251\360\301\232\000\275\155\165\330\175\347\372\307\070
\243\234\160\350\106\171\003\257\056\164\333\165\370\156\123\014
\003\310\231\032\211\065\031\074\323\311\124\174\250\360\054\346
\156\007\171\157\152\341\346\352\221\202\151\012\035\303\176\131
\242\236\153\106\025\230\133\323\257\106\035\142\310\316\200\122
\111\021\077\311\004\022\303\023\174\077\073\212\226\333\074\240
\036\012\264\213\124\262\044\147\015\357\202\313\276\074\175\321
\342\177\256\026\326\126\130\271\332\040\261\203\025\241\357\212
\115\062\157\101\057\023\122\202\224\327\032\301\170\242\121\335
\053\160\155\267\032\371\367\260\340\147\227\126\333\174\141\123
\011\003\050\002\100\307\263\330\375\234\160\152\306\050\303\205
\351\342\355\032\223\240\336\113\230\242\204\076\005\167\001\226
\075\373\264\040\017\234\162\002\172\022\057\325\243\272\121\170
\257\052\053\104\145\116\265\375\012\350\301\315\171\207\141\053
\336\200\127\105\277\147\361\233\221\136\245\244\354\131\110\020
\015\070\307\260\372\303\104\155\004\365\170\120\034\222\226\133
\332\365\270\056\272\133\317\345\360\152\235\113\057\130\163\055
\117\055\304\034\076\364\263\077\253\025\016\073\031\101\212\244
\301\127\022\146\161\114\372\123\343\127\353\142\225\011\236\124
\335\321\302\074\127\074\275\070\255\230\144\267\270\003\232\123
\126\140\135\263\330\102\033\134\113\022\212\034\353\353\175\306

\172\151\307\047\177\244\370\213\362\344\224\146\207\113\351\224
\007\011\022\171\212\262\353\164\004\334\316\364\104\131\340\026
\312\305\054\130\327\074\173\317\142\206\152\120\175\065\066\146
\247\373\067\347\050\307\330\320\255\245\151\224\217\350\301\337
\044\370\033\007\061\207\201\330\135\366\350\050\330\112\122\200
\254\023\356\120\024\036\230\307
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Telia Root CA v2"
# Issuer: CN=Telia Root CA v2,O=Telia Finland Oyj,C=FI
# Serial Number:01:67:5f:27:d6:fe:7a:e3:e4:ac:be:09:5b:05:9e
# Subject: CN=Telia Root CA v2,O=Telia Finland Oyj,C=FI
# Not Valid Before: Thu Nov 29 11:55:54 2018
# Not Valid After : Sun Nov 29 11:55:54 2043
# Fingerprint (SHA-256):
24:2B:69:74:2F:CB:1E:5B:2A:BF:98:89:8B:94:57:21:87:54:4E:5B:4D:99:11:78:65:73:62:1F:6A:74:B8:2C
# Fingerprint (SHA1): B9:99:CD:D1:73:50:8A:C4:47:05:08:9C:8C:88:FB:BE:A0:2B:40:CD
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Telia Root CA v2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\271\231\315\321\163\120\212\304\107\005\010\234\214\210\373\276
\240\053\100\315
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\016\217\254\252\202\337\205\261\364\334\020\034\374\231\331\110
END
CKA_ISSUER
MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\106\111\061
\032\060\030\006\003\125\004\012\014\021\124\145\154\151\141\040
\106\151\156\154\141\156\144\040\117\171\152\061\031\060\027\006
\003\125\004\003\014\020\124\145\154\151\141\040\122\157\157\164
\040\103\101\040\166\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\017\001\147\137\047\326\376\172\343\344\254\276\011\133\005
\236
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

```
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "D-TRUST BR Root CA 1 2020"
#
# Issuer: CN=D-TRUST BR Root CA 1 2020,O=D-Trust GmbH,C=DE
# Serial Number:7c:c9:8f:2b:84:d7:df:ea:0f:c9:65:9a:d3:4b:4d:96
# Subject: CN=D-TRUST BR Root CA 1 2020,O=D-Trust GmbH,C=DE
# Not Valid Before: Tue Feb 11 09:45:00 2020
# Not Valid After : Sun Feb 11 09:44:59
 2035
# Fingerprint (SHA-256):
E5:9A:AA:81:60:09:C2:2B:FF:5B:25:BA:D3:7D:F3:06:F0:49:79:7C:1F:81:D8:5A:B0:89:E6:57:BD:8F:00:44
# Fingerprint (SHA1): 1F:5B:98:F0:E3:B5:F7:74:3C:ED:E6:B0:36:7D:32:CD:F4:09:41:67
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST BR Root CA 1 2020"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\042\060\040\006\003\125\004\003\023
\031\104\055\124\122\125\123\124\040\102\122\040\122\157\157\164
\040\103\101\040\061\040\062\060\062\060
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\042\060\040\006\003\125\004\003\023
\031\104\055\124\122\125\123\124\040\102\122\040\122\157\157\164
\040\103\101\040\061\040\062\060\062\060
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\174\311\217\053\204\327\337\352\017\311\145\232\323\113
\115\226
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\333\060\202\002\140\240\003\002\001\002\002\020\174
\311\217\053\204\327\337\352\017\311\145\232\323\113\115\226\060
\012\006\010\052\206\110\316\075\004\003\003\060\110\061\013\060
\011\006\003\125\004\006\023\002\104\105\061\025\060\023\006\003
\125\004\012\023\014\104\055\124\162\165\163\164\040\107\155\142
\110\061\042\060\040\006\003\125\004\003\023\031\104\055\124\122
\125\123\124\040\102\122\040\122\157\157\164\040\103\101\040\061
```

\040\062\060\062\060\060\036\027\015\062\060\060\062\061\061\060
\071\064\065\060\060\132\027\015\063\065\060\062\061\061\060\071
\064\064\065\071\132\060\110\061\013\060\011\006\003\125\004\006
\023\002\104\105\061\025\060\023\006\003\125\004\012\023\014\104
\055\124\162\165\163\164\040\107\155\142\110\061\042\060\040\006
\003\125\004\003\023\031\104\055\124\122\125\123\124\040\102\122
\040\122\157\157\164\040\103\101\040\061\040\062\060\062\060\060
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201
\004\000\042\003\142\000\004\306\313\307\050\321\373\204\365\232
\357\102\024\040\341\103\153\156\165\255\374\053\003\204\324\166
\223\045\327\131\073\101\145\153\036\346\064\052\273\164\366\022
\316\350\155\347\253\344\074\116\077\104\010\213\315\026\161\313
\277\222\231\364\244\327\074\120\124\122\220\205\203\170\224\147
\147\243\034\011\031\075\165\064\205\336\355\140\175\307\014\264
\101\122\271\156\345\356\102\243\202\001\015\060\202\001\011\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\035\006\003\125\035\016\004\026\004\024\163\221\020\253\377
\125\263\132\174\011\045\325\262\272\010\240\153\253\037\155\060
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060
\201\306\006\003\125\035\037\004\201\276\060\201\273\060\076\240
\074\240\072\206\070\150\164\164\160\072\057\057\143\162\154\056
\144\055\164\162\165\163\164\056\156\145\164\057\143\162\154\057
\144\055\164\162\165\163\164\137\142\162\137\162\157\157\164\137
\143\141\137\061\137\062\060\062\060\056\143\162\154\060\171\240
\167\240\165\206\163\154\144\141\160\072\057\057\144\151\162\145
\143\164\157\162\171\056\144\055\164\162\165\163\164\056\156\145
\164\057\103\116\075\104\055\124\122\125\123\124\045\062\060\102
\122\045\062\060\122\157\157\164\045\062\060\103\101\045\062\060
\061\045\062\060\062\060\062\060\054\117\075\104\055\124\162\165
\163\164\045\062\060\107\155\142\110\054\103\075\104\105\077\143
\145\162\164\151\146\151\143\141\164\145\162\145\166\157\143\141
\164\151\157\156\154\151\163\164\060\012\006\010\052\206\110\316
\075\004\003\003\003\151\000\060\146\002\061\000\224\220\055\023
\372\341\143\370\141\143\350\255\205\170\124\221\234\270\223\070
\076\032\101\332\100\026\123\102\010\312\057\216\361\076\201\126
\300\252\330\355\030\304\260\256\364\076\372\046\002\061\000\363
\050\342\306\333\053\231\373\267\121\270\044\243\244\224\172\032
\077\346\066\342\003\127\063\212\060\313\202\307\326\024\021\325
\165\143\133\024\225\234\037\001\317\330\325\162\247\017\073
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "D-TRUST BR Root CA 1 2020"
# Issuer: CN=D-TRUST BR Root CA 1 2020,O=D-Trust GmbH,C=DE
# Serial Number:7c:c9:8f:2b:84:d7:df:ea:0f:c9:65:9a:d3:4b:4d:96

```
# Subject: CN=D-TRUST BR Root CA 1 2020,O=D-Trust GmbH,C=DE
# Not Valid Before: Tue Feb 11 09:45:00 2020
# Not Valid After : Sun Feb 11 09:44:59 2035
# Fingerprint (SHA-256):
E5:9A:AA:81:60:09:C2:2B:FF:5B:25:BA:D3:7D:F3:06:F0:49:79:7C:1F:81:D8:5A:B0:89:E6:57:BD:8F:00:44
# Fingerprint (SHA1): 1F:5B:98:F0:E3:B5:F7:74:3C:ED:E6:B0:36:7D:32:CD:F4:09:41:67
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
 CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST BR Root CA 1 2020"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\037\133\230\360\343\265\367\164\074\355\346\260\066\175\062\315
\364\011\101\147
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\265\252\113\325\355\367\343\125\056\217\162\012\363\165\270\355
END
CKA_ISSUER MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\042\060\040\006\003\125\004\003\023
\031\104\055\124\122\125\123\124\040\102\122\040\122\157\157\164
\040\103\101\040\061\040\062\060\062\060
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\174\311\217\053\204\327\337\352\017\311\145\232\323\113
\115\226
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "D-TRUST EV Root CA 1
 2020"
#
# Issuer: CN=D-TRUST EV Root CA 1 2020,O=D-Trust GmbH,C=DE
# Serial Number:5f:02:41:d7:7a:87:7c:4c:03:a3:ac:96:8d:fb:ff:d0
# Subject: CN=D-TRUST EV Root CA 1 2020,O=D-Trust GmbH,C=DE
# Not Valid Before: Tue Feb 11 10:00:00 2020
# Not Valid After : Sun Feb 11 09:59:59 2035
# Fingerprint (SHA-256):
08:17:0D:1A:A3:64:53:90:1A:2F:95:92:45:E3:47:DB:0C:8D:37:AB:AA:BC:56:B8:1A:A1:00:DC:95:89:70:DB
# Fingerprint (SHA1): 61:DB:8C:21:59:69:03:90:D8:7C:9C:12:86:54:CF:9D:3D:F4:DD:07
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
```

CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST EV Root CA 1 2020"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\042\060\040\006\003\125\004\003\023
\031\104\055\124\122\125\123\124\040\105\126\040\122\157\157\164
\040\103\101\040\061\040\062\060\062\060
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\042\060\040\006\003\125\004\003\023
\031\104\055\124\122\125\123\124\040\105\126\040\122\157\157\164
\040\103\101\040\061\040\062\060\062\060
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\137\002\101\327\172\207\174\114\003\243\254\226\215\373
\377\320
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\333\060\202\002\140\240\003\002\001\002\002\020\137
\002\101\327\172\207\174\114\003\243\254\226\215\373\377\320\060
\012\006\010\052\206\110\316\075\004\003\003\060\110\061\013\060
\011\006\003\125\004\006\023\002\104\105\061\025\060\023\006\003
\125\004\012\023\014\104\055\124\162\165\163\164\040\107\155\142
\110\061\042\060\040\006\003\125\004\003\023\031\104\055\124\122
\125\123\124\040\105\126\040\122\157\157\164\040\103\101\040\061
\040\062\060\062\060\060\036\027\015\062\060\060\062\061\061\061
\060\060\060\060\060\132\027\015\063\065\060\062\061\061\060\071
\065\071\065\071\132\060\110\061\013\060\011\006\003\125\004\006
\023\002\104\105\061\025\060\023\006\003\125\004\012\023\014\104
\055\124\162\165\163\164\040\107\155\142\110\061\042\060\040\006
\003\125\004\003\023\031\104\055\124\122\125\123\124\040\105\126
\040\122\157\157\164\040\103\101\040\061\040\062\060\062\060\060
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201
\004\000\042\003\142\000\004\361\013\335\206\103\040\031\337\227
\205\350\042\112\233\317\235\230\277\264\005\046\311\313\343\246
\322\217\305\236\170\173\061\211\251\211\255\047\074\145\020\202
\374\337\303\235\116\360\063\043\304\322\062\365\034\260\337\063
\027\135\305\360\261\212\371\357\271\267\024\312\051\112\302\017
\251\177\165\145\111\052\060\147\364\144\367\326\032\167\332\303
\302\227\141\102\173\111\255\243\202\001\015\060\202\001\011\060

\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\035\006\003\125\035\016\004\026\004\024\177\020\001\026\067
\072\244\050\344\120\370\244\367\354\153\062\266\376\351\213\060
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060
\201\306\006\003\125\035\037\004\201\276\060\201\273\060\076\240
\074\240\072\206\070\150\164\164\160\072\057\057\143\162\154\056
\144\055\164\162\165\163\164\056\156\145\164\057\143\162\154\057
\144\055\164\162\165\163\164\137\145\166\137\162\157\157\164\137
\143\141\137\061\137\062\060\062\060\056\143\162\154\060\171\240
\167\240\165\206\163\154\144\141\160\072\057\057\144\151\162\145
\143\164\157\162\171\056\144\055\164\162\165\163\164\056\156\145
\164\057\103\116\075\104\055\124\122\125\123\124\045\062\060\105
\126\045\062\060\122\157\157\164\045\062\060\103\101\045\062\060
\061\045\062\060\062\060\062\060\054\117\075\104\055\124\162\165
\163\164\045\062\060\107\155\142\110\054\103\075\104\105\077\143
\145\162\164\151\146\151\143\141\164\145\162\145\166\157\143\141
\164\151\157\156\154\151\163\164\060\012\006\010\052\206\110\316
\075\004\003\003\003\151\000\060\146\002\061\000\312\074\306\052
\165\302\136\165\142\071\066\000\140\132\213\301\223\231\314\331
\333\101\073\073\207\231\027\073\325\314\117\312\042\367\240\200
\313\371\264\261\033\126\365\162\322\374\031\321\002\061\000\221
\367\060\223\077\020\106\053\161\244\320\073\104\233\300\051\002
\005\262\101\167\121\363\171\132\236\216\024\240\116\102\322\133
\201\363\064\152\003\347\042\070\120\133\355\031\117\103\026
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "D-TRUST EV Root CA 1 2020"
# Issuer: CN=D-TRUST EV Root CA 1 2020,O=D-Trust GmbH,C=DE
# Serial Number:5f:02:41:d7:7a:87:7c:4c:03:a3:ac:96:8d:fb:ff:d0
# Subject: CN=D-TRUST EV Root CA 1 2020,O=D-Trust GmbH,C=DE
# Not Valid Before: Tue Feb 11 10:00:00 2020
# Not Valid After : Sun Feb 11 09:59:59 2035
# Fingerprint (SHA-256):
08:17:0D:1A:A3:64:53:90:1A:2F:95:92:45:E3:47:DB:0C:8D:37:AB:AA:BC:56:B8:1A:A1:00:DC:95:89:70:DB
#
Fingerprint (SHA1): 61:DB:8C:21:59:69:03:90:D8:7C:9C:12:86:54:CF:9D:3D:F4:DD:07
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST EV Root CA 1 2020"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\141\333\214\041\131\151\003\220\330\174\234\022\206\124\317\235
\075\364\335\007

```
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\214\055\235\160\237\110\231\021\006\021\373\351\313\060\300\156
END
CKA_ISSUER MULTILINE_OCTAL
\060\110\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\042\060\040\006\003\125\004\003\023
\031\104\055\124\122\125\123\124\040\105\126\040\122\157\157\164
\040\103\101\040\061\040\062\060\062\060
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\137\002\101\327\172\207\174\114\003\243\254\226\215\373
\377\320
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DigiCert TLS ECC P384 Root G5"
#
# Issuer: CN=DigiCert TLS ECC P384 Root G5,O="DigiCert, Inc.",C=US
# Serial Number:09:e0:93:65:ac:f7:d9:c8:b9:3e:1c:0b:04:2a:2e:f3
# Subject: CN=DigiCert TLS ECC P384 Root G5,O="DigiCert, Inc.",C=US
# Not Valid Before: Fri Jan 15 00:00:00 2021
# Not Valid After : Sun Jan 14 23:59:59 2046
# Fingerprint (SHA-256):
01:8E:13:F0:77:25:32:CF:80:9B:D1:B1:72:81:86:72:83:FC:48:C6:E1:3B:E9:C6:98:12:85:4A:49:0C:1B:05
# Fingerprint (SHA1): 17:F3:DE:5E:9F:0F:19:E9:8E:F6:1F:32:26:6E:20:C4:07:AE:30:EE
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert TLS ECC P384 Root G5"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE
 CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\046\060\044\006\003\125\004
\003\023\035\104\151\147\151\103\145\162\164\040\124\114\123\040
\105\103\103\040\120\063\070\064\040\122\157\157\164\040\107\065
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
```

\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\046\060\044\006\003\125\004
\003\023\035\104\151\147\151\103\145\162\164\040\124\114\123\040
\105\103\103\040\120\063\070\064\040\122\157\157\164\040\107\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\011\340\223\145\254\367\331\310\271\076\034\013\004\052
\056\363
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\031\060\202\001\237\240\003\002\001\002\002\020\011
\340\223\145\254\367\331\310\271\076\034\013\004\052\056\363\060
\012\006\010\052\206\110\316\075\004\003\003\060\116\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\027\060\025\006\003
\125\004\012\023\016\104\151\147\151\103\145\162\164\054\040\111
\156\143\056\061\046\060\044\006\003\125\004\003\023\035\104\151
\147\151\103\145\162\164\040\124\114\123\040\105\103\103\040\120
\063\070\064\040\122\157\157\164\040\107\065\060\036\027\015\062
\061\060\061\061\065\060\060\060\060\060\060\132\027\015\064\066
\060\061\061\064\062\063\065\071\065\071\132\060\116\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\027\060\025\006\003
\125\004\012\023\016\104\151\147\151\103\145\162\164\054\040\111
\156\143\056\061\046\060\044\006\003\125\004\003\023\035\104\151
\147\151\103\145\162\164\040\124\114\123\040\105\103\103\040\120
\063\070\064\040\122\157\157\164\040\107\065\060\166\060\020\006
\007\052\206\110\316\075\002\001\006\005\053\201\004\000\042\003
\142\000\004\301\104\241\317\021\227\120\232\336\043\202\065\007
\315\320\313\030\235\322\361\177\167\065\117\073\335\224\162\122
\355\302\073\370\354\372\173\153\130\040\354\231\256\311\374\150
\263\165\271\333\011\354\310\023\365\116\306\012\035\146\060\114
\273\037\107\012\074\141\020\102\051\174\245\010\016\340\042\351
\323\065\150\316\233\143\237\204\265\231\115\130\240\216\365\124
\347\225\311\243\102\060\100\060\035\006\003\125\035\016\004\026
\004\024\301\121\105\120\131\253\076\347\054\132\372\040\042\022
\007\200\210\174\021\152\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\012\006\010\052\206\110\316\075
\004\003\003\003\150\000\060\145\002\061\000\211\152\215\107\347
\354\374\156\125\003\331\147\154\046\116\203\306\375\311\373\053
\023\274\267\172\214\264\145\322\151\151\143\023\143\073\046\120
\056\001\241\171\006\221\235\110\277\302\276\002\060\107\303\025
\173\261\240\221\231\111\223\250\074\174\350\106\006\213\054\362
\061\000\224\235\142\310\211\275\031\204\024\351\245\373\001\270
\015\166\103\214\056\123\313\174\337\014\027\226\120
END
CKA_NSS_MOZILLA_CA_POLICY

```
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "DigiCert TLS ECC P384 Root G5"
# Issuer: CN=DigiCert TLS ECC P384 Root G5,O="DigiCert, Inc.",C=US
# Serial Number:09:e0:93:65:ac:f7:d9:c8:b9:3e:1c:0b:04:2a:2e:f3
# Subject: CN=DigiCert TLS ECC P384 Root G5,O="DigiCert, Inc.",C=US
# Not Valid Before: Fri Jan 15 00:00:00 2021
# Not Valid After : Sun Jan 14 23:59:59 2046
# Fingerprint (SHA-256):
01:8E:13:F0:77:25:32:CF:80:9B:D1:B1:72:81:86:72:83:FC:48:C6:E1:3B:E9:C6:98:12:85:4A:49:0C:1B:05
# Fingerprint (SHA1): 17:F3:DE:5E:9F:0F:19:E9:8E:F6:1F:32:26:6E:20:C4:07:AE:30:EE
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert TLS ECC P384 Root G5"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\027\363\336\136\237\017\031\351\216\366\037\062\046\156\040\304
\007\256\060\356
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\323\161\004\152\103\034\333\246\131\341\250\243\252\305\161\355
END
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\046\060\044\006\003\125\004
\003\023\035\104\151\147\151\103\145\162\164\040\124\114\123\040
\105\103\103\040\120\063\070\064\040\122\157\157\164\040\107\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\011\340\223\145\254\367\331\310\271\076\034\013\004\052
\056\363
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DigiCert TLS RSA4096 Root G5"
#
# Issuer: CN=DigiCert TLS RSA4096 Root G5,O="DigiCert, Inc.",C=US
# Serial Number:08:f9:b4:78:a8:fa:7e:da:6a:33:37:89:de:7c:cf:8a
#
```

```
 Subject: CN=DigiCert TLS RSA4096 Root G5,O="DigiCert, Inc.",C=US
# Not Valid Before: Fri Jan 15 00:00:00 2021
# Not Valid After : Sun Jan 14 23:59:59 2046
# Fingerprint (SHA-256):
37:1A:00:DC:05:33:B3:72:1A:7E:EB:40:E8:41:9E:70:79:9D:2B:0A:0F:2C:1D:80:69:31:65:F7:CE:C4:AD:75
# Fingerprint (SHA1): A7:88:49:DC:5D:7C:75:8C:8C:DE:39:98:56:B3:AA:D0:B2:A5:71:35
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert TLS RSA4096 Root G5"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\045\060\043\006\003\125\004
\003\023\034\104\151\147\151\103\145\162\164\040\124\114\123\040
\122\123\101\064\060\071\066\040\122\157\157\164\040\107\065
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\045\060\043\006\003\125\004
\003\023\034\104\151\147\151\103\145\162\164\040\124\114\123\040
\122\123\101\064\060\071\066\040\122\157\157\164\040\107\065
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\010\371\264\170\250\372\176\332\152\063\067\211\336\174
\317\212
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\146\060\202\003\116\240\003\002\001\002\002\020\010
\371\264\170\250\372\176\332\152\063\067\211\336\174\317\212\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\115
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\027\060
\025\006\003\125\004\012\023\016\104\151\147\151\103\145\162\164
\054\040\111\156\143\056\061\045\060\043\006\003\125\004\003\023
\034\104\151\147\151\103\145\162\164\040\124\114\123\040\122\123
\101\064\060\071\066\040\122\157\157\164\040\107\065\060\036\027
\015\062\061\060\061\061\065\060\060\060\060\060\060\132\027\015
\064\066\060\061\061\064\062\063\065\071\065\071\132\060\115\061
\013\060\011\006\003\125\004\006\023\002\125\123\061\027\060\025
\006\003\125\004\012\023\016\104\151\147\151\103\145\162\164\054
\040\111\156\143\056\061\045\060\043\006\003\125\004\003\023\034
\104\151\147\151\103\145\162\164\040\124\114\123\040\122\123\101
\064\060\071\066\040\122\157\157\164\040\107\065\060\202\002\042
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\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\263\320\364
\311\171\021\235\375\374\146\201\347\314\325\344\274\354\201\076
\152\065\216\056\267\347\336\257\371\007\115\317\060\235\352\011
\013\231\275\154\127\332\030\112\270\170\254\072\071\250\246\110
\254\056\162\345\275\353\361\032\315\347\244\003\251\077\021\264
\330\057\211\026\373\224\001\075\273\057\370\023\005\241\170\034
\216\050\340\105\340\203\364\131\033\225\263\256\176\003\105\345
\276\302\102\376\356\362\074\266\205\023\230\062\235\026\250\051
\302\013\034\070\334\237\061\167\134\277\047\243\374\047\254\267
\053\275\164\233\027\055\362\201\332\135\260\341\043\027\076\210
\112\022\043\320\352\317\235\336\003\027\261\102\112\240\026\114
\244\155\223\351\077\072\356\072\174\235\130\235\364\116\217\374
\073\043\310\155\270\342\005\332\314\353\354\303\061\364\327\247
\051\124\200\317\104\133\114\157\060\236\363\314\335\037\224\103
\235\115\177\160\160\015\324\072\321\067\360\154\235\233\300\024
\223\130\357\315\101\070\165\274\023\003\225\174\177\343\134\351
\325\015\325\342\174\020\142\252\153\360\075\166\363\077\243\350
\260\301\375\357\252\127\115\254\206\247\030\264\051\301\054\016
\277\144\276\051\214\330\002\055\315\134\057\362\177\357\025\364
\014\025\254\012\260\361\323\015\117\152\115\167\227\001\240\361
\146\267\267\316\357\316\354\354\245\165\312\254\343\341\143\367
\270\241\004\310\274\173\077\135\055\026\042\126\355\110\111\376
\247\057\171\060\045\233\272\153\055\077\235\073\304\027\347\035
\056\373\362\317\246\374\343\024\054\226\230\041\214\264\221\351
\031\140\203\362\060\053\006\163\120\325\230\073\006\351\307\212
\014\140\214\050\370\122\233\156\341\366\115\273\006\044\233\327
\053\046\077\375\052\057\161\365\326\044\276\177\061\236\017\155
\350\217\117\115\243\077\377\065\352\337\111\136\101\217\206\371
\361\167\171\113\033\264\243\136\057\373\106\002\320\146\023\136
\136\205\117\316\330\160\210\173\316\001\265\226\227\327\315\175
\375\202\370\302\044\301\312\001\071\117\215\242\301\024\100\037
\234\146\325\014\011\106\326\362\320\321\110\166\126\072\103\313
\266\012\021\071\272\214\023\154\006\265\236\317\353\002\003\001
\000\001\243\102\060\100\060\035\006\003\125\035\016\004\026\004
\024\121\063\034\355\066\100\257\027\323\045\315\151\150\362\257
\116\043\076\263\101\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\206\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\015\006\011\052\206\110\206\367\015
\001\001\014\005\000\003\202\002\001\000\140\246\257\133\137\127
\332\211\333\113\120\251\304\043\065\041\377\320\141\060\204\221
\267\077\020\317\045\216\311\277\106\064\331\301\041\046\034\160
\031\162\036\243\311\207\376\251\103\144\226\072\310\123\004\012
\266\101\273\304\107\000\331\237\030\030\073\262\016\363\064\352
\044\367\335\257\040\140\256\222\050\137\066\347\135\344\336\307
\074\333\120\071\255\273\075\050\115\226\174\166\306\133\364\301
\333\024\245\253\031\142\007\030\100\137\227\221\334\234\307\253
\265\121\015\346\151\123\125\314\071\175\332\305\021\125\162\305

\073\213\211\370\064\055\244\027\345\027\346\231\175\060\210\041
\067\315\060\027\075\270\362\274\250\165\240\103\334\076\211\113
\220\256\155\003\340\034\243\240\226\011\273\175\243\267\052\020
\104\113\106\007\064\143\355\061\271\004\356\243\233\232\256\346
\061\170\364\352\044\141\073\253\130\144\377\273\207\047\142\045
\201\337\334\241\057\366\355\247\377\172\217\121\056\060\370\244
\001\322\205\071\137\001\231\226\157\132\133\160\031\106\376\206
\140\076\255\200\020\011\335\071\045\057\130\177\273\322\164\360
\367\106\037\106\071\112\330\123\320\363\056\073\161\245\324\157
\374\363\147\344\007\217\335\046\031\341\215\133\372\243\223\021
\233\351\310\072\303\125\150\232\222\341\122\166\070\350\341\272
\275\373\117\325\357\263\347\110\203\061\360\202\041\343\266\276
\247\253\157\357\237\337\114\317\001\270\142\152\043\075\347\011
\115\200\033\173\060\244\303\335\007\177\064\276\244\046\262\366
\101\350\011\035\343\040\230\252\067\117\377\367\361\342\051\160
\061\107\077\164\320\024\026\372\041\212\002\325\212\011\224\167
\056\362\131\050\213\174\120\222\012\146\170\070\203\165\304\265
\132\250\021\306\345\301\235\146\125\317\123\304\257\327\165\205
\251\102\023\126\354\041\167\201\223\132\014\352\226\331\111\312
\241\010\362\227\073\155\233\004\030\044\104\216\174\001\362\334
\045\330\136\206\232\261\071\333\365\221\062\152\321\246\160\212
\242\367\336\244\105\205\046\250\036\214\135\051\133\310\113\330
\232\152\003\136\160\362\205\117\154\113\150\057\312\124\366\214
\332\062\376\303\153\203\077\070\306\176
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "DigiCert TLS RSA4096 Root G5"
# Issuer: CN=DigiCert TLS RSA4096 Root G5,O="DigiCert, Inc.",C=US
# Serial Number:08:f9:b4:78:a8:fa:7e:da:6a:33:37:89:de:7c:cf:8a
# Subject: CN=DigiCert TLS RSA4096 Root G5,O="DigiCert, Inc.",C=US
# Not Valid Before: Fri Jan 15 00:00:00 2021
# Not Valid After : Sun Jan 14 23:59:59 2046
# Fingerprint (SHA-256):
37:1A:00:DC:05:33:B3:72:1A:7E:EB:40:E8:41:9E:70:79:9D:2B:0A:0F:2C:1D:80:69:31:65:F7:CE:C4:AD:75
# Fingerprint (SHA1): A7:88:49:DC:5D:7C:75:8C:8C:DE:39:98:56:B3:AA:D0:B2:A5:71:35
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert TLS RSA4096 Root G5"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\247\210\111\334\135\174\165\214\214\336\071\230\126\263\252\320
\262\245\161\065
END

```
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\254\376\367\064\226\251\362\263\264\022\113\344\047\101\157\341
END
CKA_ISSUER MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\045\060\043\006\003\125\004
\003\023\034\104\151\147\151\103\145\162\164\040\124\114\123\040
\122\123\101\064\060\071\066\040\122\157\157\164\040\107\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\010\371\264\170\250\372\176\332\152\063\067\211\336\174
\317\212
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DigiCert SMIME ECC P384 Root G5"
#
# Issuer: CN=DigiCert SMIME ECC P384 Root G5,O="DigiCert, Inc.",C=US
# Serial Number:05:3f:6e:a0:06:01:72:7d:ed:3f:c3:a3:b6:a3:d6:ef
#
 Subject: CN=DigiCert SMIME ECC P384 Root G5,O="DigiCert, Inc.",C=US
# Not Valid Before: Fri Jan 15 00:00:00 2021
# Not Valid After : Sun Jan 14 23:59:59 2046
# Fingerprint (SHA-256):
E8:E8:17:65:36:A6:0C:C2:C4:E1:01:87:C3:BE:FC:A2:0E:F2:63:49:70:18:F5:66:D5:BE:A0:F9:4D:0C:11:1B
# Fingerprint (SHA1): 1C:B8:A7:08:C9:0D:20:79:01:A0:B2:36:7F:F0:95:65:E4:53:24:FE
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert SMIME ECC P384 Root G5"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\003\023\037\104\151\147\151\103\145\162\164\040\123\115\111\115
\105\040\105\103\103\040\120\063\070\064\040\122\157\157\164\040
\107\065
END
CKA_ID
```

UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\003\023\037\104\151\147\151\103\145\162\164\040\123\115\111\115
\105\040\105\103\103\040\120\063\070\064\040\122\157\157\164\040
\107\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\005\077\156\240\006\001\162\175\355\077\303\243\266\243
\326\357
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\034\060\202\001\243\240\003\002\001\002\002\020\005
\077\156\240\006\001\162\175\355\077\303\243\266\243\326\357\060
\012\006\010\052\206\110\316\075\004\003\003\060\120\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\027\060\025\006\003
\125\004\012\023\016\104\151\147\151\103\145\162\164\054\040\111
\156\143\056\061\050\060\046\006\003\125\004\003\023\037\104\151
\147\151\103\145\162\164\040\123\115\111\115\105\040\105\103\103
\040\120\063\070\064\040\122\157\157\164\040\107\065\060\036\027
\015\062\061\060\061\061\065\060\060\060\060\060\060\132\027\015
\064\066\060\061\061\064\062\063\065\071\065\071\132\060\120\061
\013\060\011\006\003\125\004\006\023\002\125\123\061\027\060\025
\006\003\125\004\012\023\016\104\151\147\151\103\145\162\164\054
\040\111\156\143\056\061\050\060\046\006\003\125\004\003\023\037
\104\151\147\151\103\145\162\164\040\123\115\111\115\105\040\105
\103\103\040\120\063\070\064\040\122\157\157\164\040\107\065\060
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201
\004\000\042\003\142\000\004\026\235\125\345\266\324\373\373\147
\153\032\324\241\252\322\167\225\076\210\345\007\237\266\160\146
\040\050\244\210\354\160\065\257\263\062\377\067\023\112\236\274
\001\003\336\204\301\270\306\346\145\107\211\362\023\125\277\315
\245\036\010\140\177\255\177\350\141\222\051\317\011\107\136\013
\034\300\037\244\277\362\133\274\230\357\231\114\314\160\153\266
\272\320\050\035\277\276\004\243\102\060\100\060\035\006\003\125
\035\016\004\026\004\024\163\172\153\226\333\102\007\213\122\146
\302\144\062\027\376\340\147\220\056\255\060\016\006\003\125\035
\017\001\001\377\004\004\003\002\001\206\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\012\006\010\052
\206\110\316\075\004\003\003\003\147\000\060\144\002\060\067\104
\365\062\200\343\161\353\364\155\317\174\314\221\232\303\156\161
\330\322\043\135\222\115\202\102\155\134\141\225\366\221\365\247
\010\366\152\227\351\234\224\055\230\160\375\063\266\011\002\060
\007\074\057\271\130\202\136\017\243\142\250\223\147\360\040\303
\151\277\003\054\073\120\247\073\257\101\070\311\122\110\221\326
\016\373\274\140\060\174\144\077\022\036\105\177\121\076\364\246

```
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "DigiCert SMIME ECC P384 Root G5"
# Issuer: CN=DigiCert SMIME ECC P384 Root G5,O="DigiCert, Inc.",C=US
#
 Serial Number:05:3f:6e:a0:06:01:72:7d:ed:3f:c3:a3:b6:a3:d6:ef
# Subject: CN=DigiCert SMIME ECC P384 Root G5,O="DigiCert, Inc.",C=US
# Not Valid Before: Fri Jan 15 00:00:00 2021
# Not Valid After : Sun Jan 14 23:59:59 2046
# Fingerprint (SHA-256):
E8:E8:17:65:36:A6:0C:C2:C4:E1:01:87:C3:BE:FC:A2:0E:F2:63:49:70:18:F5:66:D5:BE:A0:F9:4D:0C:11:1B
# Fingerprint (SHA1): 1C:B8:A7:08:C9:0D:20:79:01:A0:B2:36:7F:F0:95:65:E4:53:24:FE
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert SMIME ECC P384 Root G5"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\034\270\247\010\311\015\040\171\001\240\262\066\177\360\225\145
\344\123\044\376
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\246\376\364\122\066\104\330\356\015\267\003\013\357\164\263\003
END
CKA_ISSUER MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\050\060\046\006\003\125\004
\003\023\037\104\151\147\151\103\145\162\164\040\123\115\111\115
\105\040\105\103\103\040\120\063\070\064\040\122\157\157\164\040
\107\065
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\005\077\156\240\006\001\162\175\355\077\303\243\266\243
\326\357
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DigiCert SMIME RSA4096 Root G5"
```

```
#
# Issuer: CN=DigiCert SMIME RSA4096 Root G5,O="DigiCert, Inc.",C=US
# Serial Number:05:f6:ba:04:23:83:46:cb:7d:5c:e6:b9:5b:ba:1c:55
# Subject: CN=DigiCert SMIME RSA4096 Root G5,O="DigiCert, Inc.",C=US
# Not Valid Before: Fri Jan 15 00:00:00 2021
# Not Valid After : Sun Jan 14 23:59:59 2046
# Fingerprint (SHA-256):
90:37:0D:3E:FA:88:BF:58:C3:01:05:BA:25:10:4A:35:84:60:A7:FA:52:DF:C2:01:1D:F2:33:A0:F4:17:91:2A
# Fingerprint
 (SHA1): 5B:C5:AD:E2:9A:A7:54:DA:84:89:53:A5:FE:D7:5B:46:86:D0:57:08
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert SMIME RSA4096 Root G5"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\047\060\045\006\003\125\004
\003\023\036\104\151\147\151\103\145\162\164\040\123\115\111\115
\105\040\122\123\101\064\060\071\066\040\122\157\157\164\040\107
\065
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\047\060\045\006\003\125\004
\003\023\036\104\151\147\151\103\145\162\164\040\123\115\111\115
\105\040\122\123\101\064\060\071\066\040\122\157\157\164\040\107
\065
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\005\366\272\004\043\203\106\313\175\134\346\271\133\272
\034\125
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\152\060\202\003\122\240\003\002\001\002\002\020\005
\366\272\004\043\203\106\313\175\134\346\271\133\272\034\125\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\117
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\027\060
\025\006\003\125\004\012\023\016\104\151\147\151\103\145\162\164
\054\040\111\156\143\056\061\047\060\045\006\003\125\004\003\023
\036\104\151\147\151\103\145\162\164\040\123\115\111\115\105\040
\122\123\101\064\060\071\066\040\122\157\157\164\040\107\065\060
\036\027\015\062\061\060\061\061\065\060\060\060\060\060\060\132
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\027\015\064\066\060\061\061\064\062\063\065\071\065\071\132\060
\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061\027
\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145\162
\164\054\040\111\156\143\056\061\047\060\045\006\003\125\004\003
\023\036\104\151\147\151\103\145\162\164\040\123\115\111\115\105
\040\122\123\101\064\060\071\066\040\122\157\157\164\040\107\065
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001
\000\340\152\133\331\370\371\175\354\265\173\357\137\335\134\064
\330\332\135\321\313\145\165\253\041\174\133\000\324\202\157\105
\205\101\212\251\022\002\162\062\360\024\365\003\165\273\143\227
\111\017\100\231\013\032\036\126\247\322\320\341\253\335\345\004
\033\343\037\024\022\002\210\365\240\200\011\366\047\232\120\360
\272\343\242\340\254\152\024\221\265\153\070\020\172\242\061\341
\221\033\267\271\360\053\133\310\167\011\166\267\121\304\066\012
\231\123\124\104\045\267\011\065\206\027\005\126\223\075\101\267
\002\327\142\037\212\222\021\207\352\021\155\352\010\021\334\261
\170\110\111\222\366\264\121\200\170\043\330\376\341\126\032\072
\220\023\126\064\211\325\342\225\213\137\336\262\314\373\077\070
\267\205\367\352\236\277\056\241\056\057\115\175\152\021\056\066
\240\377\021\010\004\225\125\340\033\073\147\223\251\224\125\352
\062\355\006\072\177\302\177\343\255\023\047\321\064\101\263\060
\303\277\264\210\370\003\202\244\337\076\253\170\167\240\131\223
\161\347\335\353\000\004\173\314\110\071\050\340\036\243\025\151
\310\066\262\241\013\227\337\125\326\357\221\234\244\366\026\367
\121\012\356\003\043\221\334\004\377\340\335\070\366\042\003\000
\302\007\161\032\022\311\327\106\052\224\033\315\326\273\033\356
\277\276\115\120\130\260\013\315\060\166\051\365\317\345\266\152
\057\166\260\260\151\152\320\155\145\030\065\176\223\274\162\027
\301\125\102\315\057\302\045\273\364\375\035\241\144\042\124\135
\342\236\162\101\204\156\161\226\352\105\007\266\136\172\112\206
\235\163\144\167\070\003\322\017\123\245\125\040\304\115\377\150
\157\125\251\352\335\161\344\117\331\205\243\174\116\051\002\236
\013\011\362\032\123\314\000\246\335\321\064\366\015\301\060\261
\234\002\144\254\065\355\245\260\051\261\322\225\063\017\322\040
\063\275\354\043\113\362\031\371\332\230\144\344\054\061\037\056
\341\215\034\004\225\050\115\214\130\315\113\345\163\202\206\214
\354\250\326\171\134\373\144\273\334\014\114\050\366\027\257\342
\150\326\026\206\230\333\374\001\334\061\272\370\234\016\371\050
\106\112\341\375\226\006\105\171\021\150\027\145\134\213\046\207
\133\002\003\001\000\001\243\102\060\100\060\035\006\003\125\035
\016\004\026\004\024\321\243\324\127\035\117\125\333\165\114\134
\102\236\143\026\316\264\306\073\037\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\206\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\015\006\011\052\206
\110\206\367\015\001\001\014\005\000\003\202\002\001\000\007\247
\012\336\123\273\232\353\160\277\262\066\220\315\344\247\270\361
\014\344\135\132\035\170\145\374\311\270\036\043\021\127\174\151

\065\155\001\377\123\120\277\007\016\272\307\001\077\130\052\224
\165\003\253\034\013\043\334\033\212\036\067\075\035\130\217\163
\331\263\052\157\337\020\240\133\014\247\312\260\177\271\044\242
\001\065\062\345\136\106\101\353\330\177\163\347\102\351\244\121
\046\167\201\012\250\353\017\012\120\235\176\212\040\147\374\013
\216\072\021\323\305\214\140\030\331\113\261\374\324\361\264\111
\116\256\207\341\321\373\166\241\137\363\006\317\227\226\014\351
\236\165\201\134\123\015\042\374\066\346\111\156\164\333\000\205
\215\174\042\240\216\373\020\114\324\142\023\133\357\113\162\046
\213\374\116\212\217\376\227\020\123\305\170\213\102\144\033\137
\340\211\375\273\011\177\120\340\124\205\046\021\152\035\145\371
\111\051\334\174\066\337\373\075\367\322\254\356\062\215\156\246
\175\071\234\105\304\312\015\365\073\264\171\123\245\057\126\307
\121\305\212\114\144\135\220\103\043\216\153\114\027\170\314\350
\277\365\073\344\250\110\317\255\233\014\337\062\112\323\331\022
\216\043\170\015\055\257\237\257\236\074\011\302\227\000\355\072
\151\034\161\077\071\337\323\217\304\146\365\357\066\224\017\363
\335\222\266\226\137\220\246\335\163\252\246\040\224\224\045\152
\011\014\162\344\023\043\140\114\243\312\027\056\173\147\000\333
\320\315\352\172\037\071\046\127\211\060\167\313\116\345\225\105
\117\137\373\066\134\075\371\040\265\072\020\045\117\223\062\132
\356\301\226\350\351\126\004\260\111\141\115\354\170\250\235\030
\301\377\330\352\057\126\357\225\053\173\004\136\147\343\125\100
\355\071\004\371\013\171\365\152\214\134\017\211\232\220\307\315
\213\336\333\046\065\241\156\315\263\102\362\242\017\073\014\216
\223\377\024\317\374\367\223\367\344\101\010\156\031\122\021\017
\123\031\163\170\014\317\330\205\201\370\255\125\310\260\236\106
\143\257\234\122\356\134\277\360\300\133\067\036\011\040\322\076
\043\306\241\025\112\016\066\176\060\305\171\152\274\042\210\331
\014\122\100\037\335\116\017\147\046\026\322\255\027\034
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "DigiCert SMIME
RSA4096 Root G5"
# Issuer: CN=DigiCert SMIME RSA4096 Root G5,O="DigiCert, Inc.",C=US
# Serial Number:05:f6:ba:04:23:83:46:cb:7d:5c:e6:b9:5b:ba:1c:55
# Subject: CN=DigiCert SMIME RSA4096 Root G5,O="DigiCert, Inc.",C=US
# Not Valid Before: Fri Jan 15 00:00:00 2021
# Not Valid After : Sun Jan 14 23:59:59 2046
# Fingerprint (SHA-256):
90:37:0D:3E:FA:88:BF:58:C3:01:05:BA:25:10:4A:35:84:60:A7:FA:52:DF:C2:01:1D:F2:33:A0:F4:17:91:2A
# Fingerprint (SHA1): 5B:C5:AD:E2:9A:A7:54:DA:84:89:53:A5:FE:D7:5B:46:86:D0:57:08
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE

```
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert SMIME RSA4096 Root G5"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\133\305\255\342\232\247\124\332\204\211\123\245\376\327\133\106
\206\320\127\010
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\321\173\340\265\077\065\162\237\175\276\013\245\244\035\251\156
END
CKA_ISSUER MULTILINE_OCTAL
\060\117\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\047\060\045\006\003\125\004
\003\023\036\104\151\147\151\103\145\162\164\040\123\115\111\115
\105\040\122\123\101\064\060\071\066\040\122\157\157\164\040\107
\065
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\005\366\272\004\043\203\106\313\175\134\346\271\133\272
\034\125
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Certainly Root R1"
#
# Issuer: CN=Certainly Root R1,O=Certainly,C=US
# Serial Number:00:8e:0f:f9:4b:90:71:68:65:33:54:f4:d4:44:39:b7:e0
# Subject: CN=Certainly Root R1,O=Certainly,C=US
# Not Valid Before: Thu Apr 01 00:00:00 2021
# Not Valid After : Sun Apr 01 00:00:00 2046
# Fingerprint (SHA-256):
77:B8:2C:D8:64:4C:43:05:F7:AC:C5:CB:15:6B:45:67:50:04:03:3D:51:C6:0C:62:02:A8:E0:C3:34:67:D3:A0
#
 Fingerprint (SHA1): A0:50:EE:0F:28:71:F4:27:B2:12:6D:6F:50:96:25:BA:CC:86:42:AF
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certainly Root R1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\125\123\061
```

\022\060\020\006\003\125\004\012\023\011\103\145\162\164\141\151
\156\154\171\061\032\060\030\006\003\125\004\003\023\021\103\145
\162\164\141\151\156\154\171\040\122\157\157\164\040\122\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\103\145\162\164\141\151
\156\154\171\061\032\060\030\006\003\125\004\003\023\021\103\145
\162\164\141\151\156\154\171\040\122\157\157\164\040\122\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\216\017\371\113\220\161\150\145\063\124\364\324\104
\071\267\340
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\005\107\060\202\003\057\240\003\002\001\002\002\021\000
\216\017\371\113\220\161\150\145\063\124\364\324\104\071\267\340
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\075\061\013\060\011\006\003\125\004\006\023\002\125\123\061\022
\060\020\006\003\125\004\012\023\011\103\145\162\164\141\151\156
\154\171\061\032\060\030\006\003\125\004\003\023\021\103\145\162
\164\141\151\156\154\171\040\122\157\157\164\040\122\061\060\036
\027\015\062\061\060\064\060\061\060\060\060\060\060\060\132\027
\015\064\066\060\064\060\061\060\060\060\060\060\060\132\060\075
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\022\060
\020\006\003\125\004\012\023\011\103\145\162\164\141\151\156\154
\171\061\032\060\030\006\003\125\004\003\023\021\103\145\162\164
\141\151\156\154\171\040\122\157\157\164\040\122\061\060\202\002
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000
\003\202\002\017\000\060\202\002\012\002\202\002\001\000\320\066
\324\037\352\335\253\344\321\266\346\373\042\300\335\023\015\152
\173\042\023\034\227\074\150\143\146\062\234\003\265\215\244\201
\203\332\170\060\021\317\334\262\053\276\222\277\216\344\304\023
\276\244\150\114\332\002\150\026\164\276\262\335\004\344\153\052
\335\067\037\140\054\333\365\367\241\174\225\267\014\160\206\056
\361\072\357\122\367\314\323\233\371\213\276\016\337\061\267\235
\150\134\222\246\365\345\363\012\064\265\377\173\242\344\207\241
\306\257\027\000\357\003\221\355\251\034\116\161\075\322\213\154
\211\364\170\206\346\152\111\240\316\265\322\260\253\233\366\364
\324\056\343\162\371\066\306\353\025\267\045\214\072\374\045\015
\263\042\163\041\164\310\112\226\141\222\365\057\013\030\245\364
\255\342\356\101\275\001\171\372\226\214\215\027\002\060\264\371
\257\170\032\214\264\066\020\020\007\005\160\320\364\061\220\212
\121\305\206\046\171\262\021\210\136\305\360\012\124\315\111\246
\277\002\234\322\104\247\355\343\170\357\106\136\155\161\321\171
\160\034\106\137\121\351\311\067\334\137\176\151\173\101\337\064

\105\340\073\204\364\241\212\012\066\236\067\314\142\122\341\211
\015\050\371\172\043\261\015\075\075\232\375\235\201\357\054\220
\300\173\104\116\273\111\340\016\112\126\222\274\313\265\335\171
\027\211\221\336\141\211\164\222\250\343\062\205\276\116\205\244
\113\131\313\053\305\170\216\161\124\320\002\067\231\214\345\111
\352\340\124\162\244\021\006\057\013\214\301\133\276\265\241\260
\123\156\234\270\140\221\037\131\153\371\055\364\224\012\227\265
\354\305\166\003\124\033\145\122\272\114\222\126\121\065\240\100
\330\051\333\256\122\166\073\055\060\100\233\212\320\102\126\264
\267\210\001\244\207\073\123\226\315\243\026\217\363\146\252\027
\261\307\140\340\301\103\005\014\356\233\133\140\157\006\134\207
\133\047\371\100\021\236\234\063\301\267\345\065\127\005\177\047
\316\027\040\214\034\374\361\373\332\061\051\111\355\365\013\204
\247\117\301\366\116\302\050\234\372\356\340\257\007\373\063\021
\172\041\117\013\041\020\266\100\072\253\042\072\004\234\213\233
\204\206\162\232\322\247\245\304\264\165\221\251\053\043\002\003
\001\000\001\243\102\060\100\060\016\006\003\125\035\017\001\001
\377\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004
\026\004\024\340\252\077\045\215\237\104\134\301\072\350\056\256
\167\114\204\076\147\014\364\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\003\202\002\001\000\271\127\257\270\022
\332\127\203\217\150\013\063\035\003\123\125\364\225\160\344\053
\075\260\071\353\372\211\142\375\367\326\030\004\057\041\064\335
\361\150\360\325\226\132\336\302\200\243\301\215\306\152\367\131
\167\256\025\144\317\133\171\005\167\146\352\214\323\153\015\335
\361\131\054\301\063\245\060\200\025\105\007\105\032\061\042\266
\222\000\253\231\115\072\217\167\257\251\042\312\057\143\312\025
\326\307\306\360\075\154\374\034\015\230\020\141\236\021\242\042
\327\012\362\221\172\153\071\016\057\060\303\066\111\237\340\351
\017\002\104\120\067\224\125\175\352\237\366\073\272\224\245\114
\351\274\076\121\264\350\312\222\066\124\155\134\045\050\332\335
\255\024\375\323\356\342\042\005\353\320\362\267\150\022\327\132
\212\101\032\306\222\245\132\073\143\105\117\277\341\072\167\042
\057\134\277\106\371\132\003\205\023\102\137\312\336\123\327\142
\265\246\065\004\302\107\377\231\375\204\337\134\316\351\136\200
\050\101\362\175\347\036\220\330\117\166\076\202\074\015\374\245
\003\372\173\032\331\105\036\140\332\304\216\371\374\053\311\173
\225\305\052\377\252\211\337\202\061\017\162\377\014\047\327\012
\036\126\000\120\036\014\220\301\226\265\330\024\205\273\247\015
\026\301\370\007\044\033\272\205\241\032\005\011\200\272\225\143
\311\072\354\045\237\177\235\272\244\107\025\233\104\160\361\152
\113\326\070\136\103\363\030\176\120\156\351\132\050\346\145\346
\167\033\072\375\035\276\003\046\243\333\324\341\273\176\226\047
\053\035\356\244\373\332\045\124\023\003\336\071\306\303\037\115
\220\354\217\033\112\322\034\355\205\225\070\120\171\106\326\301
\220\120\061\251\134\232\156\035\365\063\126\213\247\231\322\362
\310\054\063\223\222\060\307\116\214\145\063\020\144\027\375\044

\027\226\321\215\302\072\152\053\353\023\213\104\362\041\363\112
\032\267\167\137\327\355\210\244\162\345\071\037\225\235\276\147
\301\160\021\075\273\364\370\111\267\343\046\227\072\237\322\137
\174\373\300\231\174\071\051\340\173\035\277\015\247\217\322\051
\064\156\044\025\313\336\220\136\277\032\304\146\352\302\346\272
\071\137\212\231\251\101\131\007\260\054\257
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Certainly Root R1"
# Issuer: CN=Certainly Root R1,O=Certainly,C=US
# Serial Number:00:8e:0f:f9:4b:90:71:68:65:33:54:f4:d4:44:39:b7:e0
# Subject: CN=Certainly Root R1,O=Certainly,C=US
# Not Valid Before: Thu Apr 01 00:00:00 2021
# Not Valid After : Sun Apr 01 00:00:00 2046
# Fingerprint
(SHA-256):
77:B8:2C:D8:64:4C:43:05:F7:AC:C5:CB:15:6B:45:67:50:04:03:3D:51:C6:0C:62:02:A8:E0:C3:34:67:D3:A0
# Fingerprint (SHA1): A0:50:EE:0F:28:71:F4:27:B2:12:6D:6F:50:96:25:BA:CC:86:42:AF
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certainly Root R1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\240\120\356\017\050\161\364\047\262\022\155\157\120\226\045\272
\314\206\102\257
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\007\160\324\076\202\207\240\372\063\066\023\364\372\063\347\022
END
CKA_ISSUER MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\103\145\162\164\141\151
\156\154\171\061\032\060\030\006\003\125\004\003\023\021\103\145
\162\164\141\151\156\154\171\040\122\157\157\164\040\122\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\216\017\371\113\220\161\150\145\063\124\364\324\104
\071\267\340
END
CKA_TRUST_SERVER_AUTH
CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

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CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Certainly Root E1"
#
# Issuer: CN=Certainly Root E1,O=Certainly,C=US
# Serial Number:06:25:33:b1:47:03:33:27:5c:f9:8d:9a:b9:bf:cc:f8
# Subject: CN=Certainly Root E1,O=Certainly,C=US
# Not Valid Before: Thu Apr 01 00:00:00 2021
# Not Valid After : Sun Apr 01 00:00:00 2046
# Fingerprint (SHA-256):
B4:58:5F:22:E4:AC:75:6A:4E:86:12:A1:36:1C:5D:9D:03:1A:93:FD:84:FE:BB:77:8F:A3:06:8B:0F:C4:2D:C2
# Fingerprint (SHA1): F9:E1:6D:DC:01:89:CF:D5:82:45:63:3E:C5:37:7D:C2:EB:93:6F:2B
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certainly Root E1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\103\145\162\164\141\151
\156\154\171\061\032\060\030\006\003\125\004\003\023\021\103\145
\162\164\141\151\156\154\171\040\122\157\157\164\040\105\061
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\103\145\162\164\141\151
\156\154\171\061\032\060\030\006\003\125\004\003\023\021\103\145
\162\164\141\151\156\154\171\040\122\157\157\164\040\105\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\006\045\063\261\107\003\063\047\134\371\215\232\271\277
\314\370
END
CKA_VALUE MULTILINE_OCTAL
\060\202\001\367\060\202\001\175\240\003\002\001\002\002\020\006
\045\063\261\107\003\063\047\134\371\215\232\271\277\314\370\060
\012\006\010\052\206\110\316\075\004\003\003\060\075\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\022\060\020\006\003
\125\004\012\023\011\103\145\162\164\141\151\156\154\171\061\032
\060\030\006\003\125\004\003\023\021\103\145\162\164\141\151\156
\154\171\040\122\157\157\164\040\105\061\060\036\027\015\062\061
\060\064\060\061\060\060\060\060\060\060\132\027\015\064\066\060
\064\060\061\060\060\060\060\060\060\132\060\075\061\013\060\011
\006\003\125\004\006\023\002\125\123\061\022\060\020\006\003\125
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\004\012\023\011\103\145\162\164\141\151\156\154\171\061\032\060
\030\006\003\125\004\003\023\021\103\145\162\164\141\151\156\154
\171\040\122\157\157\164\040\105\061\060\166\060\020\006\007\052
\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142\000
\004\336\157\370\177\034\337\355\371\107\207\206\261\244\300\212
\370\202\227\200\352\217\310\112\136\052\175\210\150\247\001\142
\024\221\044\172\134\236\243\027\175\212\206\041\064\030\120\033
\020\336\320\067\113\046\307\031\140\200\351\064\275\140\031\066
\100\326\051\207\011\074\221\172\366\274\023\043\335\131\116\004
\136\317\310\002\034\030\123\301\061\330\332\040\351\104\215\344
\166\243\102\060\100\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004
\024\363\050\030\313\144\165\356\051\052\353\355\256\043\130\070
\205\353\310\042\007\060\012\006\010\052\206\110\316\075\004\003
\003\003\150\000\060\145\002\061\000\261\216\132\040\303\262\031
\142\115\336\260\117\337\156\322\160\212\361\237\176\152\214\346
\272\336\203\151\312\151\263\251\005\265\226\222\027\207\302\322
\352\320\173\316\330\101\133\174\256\002\060\106\336\352\313\135
\232\354\062\302\145\026\260\114\060\134\060\363\332\116\163\206
\006\330\316\211\004\110\067\067\370\335\063\121\235\160\257\173
\125\330\001\056\175\005\144\016\206\270\221
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Certainly Root E1"
# Issuer: CN=Certainly Root E1,O=Certainly,C=US
# Serial Number:06:25:33:b1:47:03:33:27:5c:f9:8d:9a:b9:bf:cc:f8
# Subject:
 CN=Certainly Root E1,O=Certainly,C=US
# Not Valid Before: Thu Apr 01 00:00:00 2021
# Not Valid After : Sun Apr 01 00:00:00 2046
# Fingerprint (SHA-256):
B4:58:5F:22:E4:AC:75:6A:4E:86:12:A1:36:1C:5D:9D:03:1A:93:FD:84:FE:BB:77:8F:A3:06:8B:0F:C4:2D:C2
# Fingerprint (SHA1): F9:E1:6D:DC:01:89:CF:D5:82:45:63:3E:C5:37:7D:C2:EB:93:6F:2B
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certainly Root E1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\371\341\155\334\001\211\317\325\202\105\143\076\305\067\175\302
\353\223\157\053
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL

```
\012\236\312\315\076\122\120\306\066\363\113\243\355\247\123\351
END
CKA_ISSUER MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\023\011\103\145\162\164\141\151
\156\154\171\061\032\060\030\006\003\125\004\003\023\021\103\145
\162\164\141\151\156\154\171\040\122\157\157\164\040\105\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\006\045\063\261\107\003\063\047\134\371\215\232\271\277
\314\370
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DIGITALSIGN GLOBAL ROOT RSA CA"
#
# Issuer: CN=DIGITALSIGN GLOBAL ROOT RSA CA,O=DigitalSign Certificadora Digital,C=PT
# Serial Number:5d:59:c8:ca:ab:09:57:f5:e6:b5:da:29:94:04:6a:ff:c5:d4:95:87
# Subject: CN=DIGITALSIGN GLOBAL ROOT RSA CA,O=DigitalSign Certificadora Digital,C=PT
# Not Valid Before: Thu Jan 21 10:50:34 2021
# Not Valid After : Mon Jan 15 10:50:34 2046
# Fingerprint (SHA-256):
82:BD:5D:85:1A:CF:7F:6E:1B:A7:BF:CB:C5:30:30:D0:E7:BC:3C:21:DF:77:2D:85:8C:AB:41:D1:99:BD:F5:95
# Fingerprint (SHA1): B9:82:07:97:AE:52:A5:68:6F:46:07:DF:FD:03:72:3D:92:86:88:2D
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL
 CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DIGITALSIGN GLOBAL ROOT RSA CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\120\124\061
\052\060\050\006\003\125\004\012\014\041\104\151\147\151\164\141
\154\123\151\147\156\040\103\145\162\164\151\146\151\143\141\144
\157\162\141\040\104\151\147\151\164\141\154\061\047\060\045\006
\003\125\004\003\014\036\104\111\107\111\124\101\114\123\111\107
\116\040\107\114\117\102\101\114\040\122\117\117\124\040\122\123
\101\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\120\124\061
```

\052\060\050\006\003\125\004\012\014\041\104\151\147\151\164\141
\154\123\151\147\156\040\103\145\162\164\151\146\151\143\141\144
\157\162\141\040\104\151\147\151\164\141\154\061\047\060\045\006
\003\125\004\003\014\036\104\111\107\111\124\101\114\123\111\107
\116\040\107\114\117\102\101\114\040\122\117\117\124\040\122\123
\101\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\024\135\131\310\312\253\011\127\365\346\265\332\051\224\004
\152\377\305\324\225\207
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\265\060\202\003\235\240\003\002\001\002\002\024\135
\131\310\312\253\011\127\365\346\265\332\051\224\004\152\377\305
\324\225\207\060\015\006\011\052\206\110\206\367\015\001\001\015
\005\000\060\142\061\013\060\011\006\003\125\004\006\023\002\120
\124\061\052\060\050\006\003\125\004\012\014\041\104\151\147\151
\164\141\154\123\151\147\156\040\103\145\162\164\151\146\151\143
\141\144\157\162\141\040\104\151\147\151\164\141\154\061\047\060
\045\006\003\125\004\003\014\036\104\111\107\111\124\101\114\123
\111\107\116\040\107\114\117\102\101\114\040\122\117\117\124\040
\122\123\101\040\103\101\060\036\027\015\062\061\060\061\062\061
\061\060\065\060\063\064\132\027\015\064\066\060\061\061\065\061
\060\065\060\063\064\132\060\142\061\013\060\011\006\003\125\004
\006\023\002\120\124\061\052\060\050\006\003\125\004\012\014\041
\104\151\147\151\164\141\154\123\151\147\156\040\103\145\162\164
\151\146\151\143\141\144\157\162\141\040\104\151\147\151\164\141
\154\061\047\060\045\006\003\125\004\003\014\036\104\111\107\111
\124\101\114\123\111\107\116\040\107\114\117\102\101\114\040\122
\117\117\124\040\122\123\101\040\103\101\060\202\002\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002
\017\000\060\202\002\012\002\202\002\001\000\310\207\266\070\323
\034\360\336\022\370\203\307\304\212\342\211\270\264\042\172\170
\370\014\146\121\150\166\067\012\325\117\302\132\010\270\026\134
\367\162\001\011\067\204\201\052\124\153\327\222\320\154\372\250
\247\103\022\064\353\016\333\067\017\051\376\212\061\121\102\350
\113\234\220\250\310\054\021\323\375\240\051\176\316\336\224\366
\202\340\130\264\116\105\045\361\042\362\075\323\017\173\124\032
\334\062\266\326\121\116\176\101\264\127\270\054\306\271\016\056
\312\127\361\325\310\323\130\347\245\351\102\021\256\323\040\045
\224\151\327\217\312\242\015\303\323\237\007\150\077\025\322\147
\056\123\375\166\202\233\013\163\251\051\015\236\021\223\024\010
\230\354\236\124\022\112\126\242\006\025\354\153\154\056\222\140
\056\206\015\256\202\037\121\115\343\262\007\327\020\031\127\042
\366\251\151\104\204\363\331\075\240\006\277\314\210\176\177\365
\316\133\245\302\052\152\164\102\352\157\246\377\371\150\261\320
\137\275\221\322\125\157\063\127\114\036\235\344\342\213\301\205

\145\240\340\152\234\000\000\210\222\335\130\010\026\362\160\061
\250\034\341\336\275\116\161\351\326\276\176\265\241\132\303\115
\367\277\233\275\224\244\375\365\252\123\223\106\311\046\001\004
\160\304\240\161\272\316\045\146\373\221\176\125\160\356\111\012
\115\142\177\302\120\232\162\362\030\147\235\351\105\250\064\204
\350\370\201\366\321\132\042\036\007\117\073\263\177\335\021\245
\163\334\276\251\031\072\151\251\155\033\062\342\211\252\245\047
\013\132\176\164\342\017\144\071\135\176\134\271\301\027\374\307
\215\136\311\354\044\355\322\362\077\172\204\105\067\002\276\076
\153\131\304\346\133\026\155\300\252\236\252\265\131\056\054\160
\125\234\314\231\226\230\044\124\321\216\332\312\264\021\264\267
\160\103\037\157\220\013\040\240\250\166\023\145\333\333\043\132
\165\113\241\013\061\167\012\356\175\150\141\032\023\214\352\121
\176\134\126\243\127\114\135\241\353\023\145\277\124\024\314\363
\356\334\327\354\074\227\362\170\126\270\337\162\134\160\374\316
\006\335\237\322\007\061\357\347\122\221\236\315\272\327\300\030
\104\007\061\145\111\062\151\023\112\353\217\002\003\001\000\001
\243\143\060\141\060\017\006\003\125\035\023\001\001\377\004\005
\060\003\001\001\377\060\037\006\003\125\035\043\004\030\060\026
\200\024\265\066\274\074\214\032\253\054\366\131\031\055\203\024
\332\223\045\025\326\206\060\035\006\003\125\035\016\004\026\004
\024\265\066\274\074\214\032\253\054\366\131\031\055\203\024\332
\223\045\025\326\206\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\006\060\015\006\011\052\206\110\206\367\015\001
\001\015\005\000\003\202\002\001\000\024\373\061\045\070\061\370
\312\010\262\043\166\070\255\370\323\131\365\314\264\127\045\341
\104\276\176\374\026\354\256\372\046\237\117\147\026\112\126\360
\375\355\307\031\001\064\216\220\132\055\326\200\134\354\161\322
\201\045\202\036\000\161\337\232\321\325\035\042\273\321\245\363
\142\017\264\353\334\044\163\376\246\126\315\232\024\305\004\065
\026\061\242\007\353\245\000\342\266\370\137\162\375\077\141\111
\216\336\176\115\070\327\172\036\164\067\154\121\334\276\000\004
\270\070\024\363\040\301\355\233\247\043\375\015\102\204\035\177
\362\163\303\320\170\143\361\237\354\327\133\351\361\276\154\240
\113\003\236\215\151\341\024\332\210\020\201\043\123\377\332\124
\053\013\306\271\226\225\004\030\106\363\173\250\227\330\133\150
\244\344\070\034\016\105\345\230\323\011\256\232\136\354\263\171
\015\071\162\362\364\224\235\016\236\140\042\346\250\366\114\205
\315\007\202\072\150\071\315\075\137\343\070\364\266\257\073\153
\112\237\140\121\105\242\100\002\345\252\014\343\076\321\170\324
\242\164\234\046\272\005\232\050\160\112\076\246\013\320\035\111
\360\272\370\256\101\020\176\244\007\022\275\250\317\051\075\127
\273\307\361\103\107\000\076\256\160\030\132\040\173\011\313\072
\072\160\200\345\114\140\230\301\025\301\035\112\367\310\360\233
\341\162\255\347\135\150\130\013\004\261\214\274\237\267\373\156
\213\133\004\125\373\353\043\125\327\170\120\332\045\313\276\047
\066\273\044\032\171\034\121\321\376\023\273\377\170\054\334\244
\276\057\366\305\113\123\317\247\114\231\136\160\254\131\210\004

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\256\144\004\277\173\246\172\115\323\350\167\275\241\176\120\025
\363\357\111\060\205\115\041\127\252\333\054\165\227\255\201\001
\207\242\261\160\235\036\006\132\003\140\261\077\246\155\202\054
\324\024\261\201\245\350\075\210\035\264\162\054\130\067\212\216
\070\224\270\163\335\251\340\270\366\167\242\263\174\130\336\256
\151\072\265\213\245\032\273\362\330\164\006\234\375\142\163\040
\041\166\261\176\160\236\031\324\353\027\142\031\070\231\315\066
\053\107\376\061\313\337\271\344\254\010\323\330\246\353\324\236
\176\113\144\244\125\135\053\027\311
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "DIGITALSIGN GLOBAL ROOT RSA CA"
# Issuer: CN=DIGITALSIGN GLOBAL ROOT RSA CA,O=DigitalSign Certificadora Digital,C=PT
# Serial Number:5d:59:c8:ca:ab:09:57:f5:e6:b5:da:29:94:04:6a:ff:c5:d4:95:87
# Subject: CN=DIGITALSIGN GLOBAL ROOT RSA CA,O=DigitalSign Certificadora Digital,C=PT
# Not Valid Before: Thu Jan 21 10:50:34 2021
# Not Valid After : Mon Jan 15 10:50:34 2046
# Fingerprint (SHA-256):
82:BD:5D:85:1A:CF:7F:6E:1B:A7:BF:CB:C5:30:30:D0:E7:BC:3C:21:DF:77:2D:85:8C:AB:41:D1:99:BD:F5:95
# Fingerprint (SHA1): B9:82:07:97:AE:52:A5:68:6F:46:07:DF:FD:03:72:3D:92:86:88:2D
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
 CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DIGITALSIGN GLOBAL ROOT RSA CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\271\202\007\227\256\122\245\150\157\106\007\337\375\003\162\075
\222\206\210\055
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\033\032\275\032\171\306\333\264\355\263\207\314\251\323\116\170
END
CKA_ISSUER MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\120\124\061
\052\060\050\006\003\125\004\012\014\041\104\151\147\151\164\141
\154\123\151\147\156\040\103\145\162\164\151\146\151\143\141\144
\157\162\141\040\104\151\147\151\164\141\154\061\047\060\045\006
\003\125\004\003\014\036\104\111\107\111\124\101\114\123\111\107
\116\040\107\114\117\102\101\114\040\122\117\117\124\040\122\123
\101\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\135\131\310\312\253\011\127\365\346\265\332\051\224\004
```

```
\152\377\305\324\225\207
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "DIGITALSIGN GLOBAL ROOT ECDSA CA"
#
# Issuer: CN=DIGITALSIGN GLOBAL ROOT ECDSA CA,O=DigitalSign Certificadora Digital,C=PT
# Serial Number:36:2d:8f:72:88:a2:28:27:e4:00:ff:24:c6:2d:e4:eb:fa:9d:b6:e1
# Subject: CN=DIGITALSIGN GLOBAL ROOT ECDSA CA,O=DigitalSign Certificadora Digital,C=PT
# Not Valid Before: Thu Jan 21 11:07:50 2021
# Not Valid After : Mon Jan 15 11:07:50 2046
# Fingerprint (SHA-256):
26:1D:71:14:AE:5F:8F:F2:D8:C7:20:9A:9D:E4:28:9E:6A:FC:9D:71:70:23:D8:54:50:90:91:99:F1:85:7C:FE
# Fingerprint (SHA1): 67:A8:08:EB:8F:88:F5:80:6C:05:45:1B:17:F3:D7:00:2F:D2:4A:8A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DIGITALSIGN GLOBAL ROOT ECDSA CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\120\124\061
\052\060\050\006\003\125\004\012\014\041\104\151\147\151\164\141
\154\123\151\147\156\040\103\145\162\164\151\146\151\143\141\144
\157\162\141\040\104\151\147\151\164\141\154\061\051\060\047\006
\003\125\004\003\014\040\104\111\107\111\124\101\114\123\111\107
\116\040\107\114\117\102\101\114\040\122\117\117\124\040\105\103
\104\123\101\040\103\101
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\120\124\061
\052\060\050\006\003\125\004\012\014\041\104\151\147\151\164\141
\154\123\151\147\156\040\103\145\162\164\151\146\151\143\141\144
\157\162\141\040\104\151\147\151\164\141\154\061\051\060\047\006
\003\125\004\003\014\040\104\111\107\111\124\101\114\123\111\107
\116\040\107\114\117\102\101\114\040\122\117\117\124\040\105\103
\104\123\101\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\066\055\217\162\210\242\050\047\344\000\377\044\306\055
\344\353\372\235\266\341
```

END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\152\060\202\001\360\240\003\002\001\002\002\024\066
\055\217\162\210\242\050\047\344\000\377\044\306\055\344\353\372
\235\266\341\060\012\006\010\052\206\110\316\075\004\003\003\060
\144\061\013\060\011\006\003\125\004\006\023\002\120\124\061\052
\060\050\006\003\125\004\012\014\041\104\151\147\151\164\141\154
\123\151\147\156\040\103\145\162\164\151\146\151\143\141\144\157
\162\141\040\104\151\147\151\164\141\154\061\051\060\047\006\003
\125\004\003\014\040\104\111\107\111\124\101\114\123\111\107\116
\040\107\114\117\102\101\114\040\122\117\117\124\040\105\103\104
\123\101\040\103\101\060\036\027\015\062\061\060\061\062\061\061
\061\060\067\065\060\132\027\015\064\066\060\061\061\065\061\061
\060\067\065\060\132\060\144\061\013\060\011\006\003\125\004\006
\023\002\120\124\061\052\060\050\006\003\125\004\012\014\041\104
\151\147\151\164\141\154\123\151\147\156\040\103\145\162\164\151
\146\151\143\141\144\157\162\141\040\104\151\147\151\164\141\154
\061\051\060\047\006\003\125\004\003\014\040\104\111\107\111\124
\101\114\123\111\107\116\040\107\114\117\102\101\114\040\122\117
\117\124\040\105\103\104\123\101\040\103\101\060\166\060\020\006
\007\052\206\110\316\075\002\001\006\005\053\201\004\000\042\003
\142\000\004\156\013\243\253\063\115\034\352\112\350\374\004\215
\024\240\175\360\010\054\137\203\253\223\321\322\173\272\327\111
\175\217\354\022\120\137\324\271\313\345\360\371\063\143\037\311
\127\354\100\330\021\013\227\350\122\026\314\051\216\364\006\206
\036\070\334\075\127\304\356\252\275\310\124\004\046\132\047\023
\121\107\075\037\037\032\216\250\225\244\063\320\314\107\314\155
\270\374\110\243\143\060\141\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\037\006\003\125\035\043\004
\030\060\026\200\024\316\257\112\213\032\165\342\361\070\347\002
\360\026\255\136\352\144\325\173\264\060\035\006\003\125\035\016
\004\026\004\024\316\257\112\213\032\165\342\361\070\347\002\360
\026\255\136\352\144\325\173\264\060\016\006\003\125\035\017\001
\001\377\004\004\003\002\001\006\060\012\006\010\052\206\110\316
\075\004\003\003\003\150\000\060\145\002\060\012\210\304\161\234
\104\003\115\215\264\307\274\250\256\331\060\047\065\152\153\026
\143\327\374\347\131\341\247\211\033\114\061\232\043\125\104\346
\363\103\041\325\107\047\157\155\127\001\252\002\061\000\373\262
\352\342\227\177\121\265\237\110\353\274\157\065\211\250\144\160
\253\127\166\315\300\306\024\140\312\177\342\202\000\163\367\314
\065\352\216\044\233\345\010\131\307\004\214\163\170\376
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "DIGITALSIGN GLOBAL ROOT ECDSA CA"

```
# Issuer: CN=DIGITALSIGN GLOBAL ROOT ECDSA CA,O=DigitalSign Certificadora Digital,C=PT
# Serial Number:36:2d:8f:72:88:a2:28:27:e4:00:ff:24:c6:2d:e4:eb:fa:9d:b6:e1
# Subject: CN=DIGITALSIGN GLOBAL ROOT ECDSA CA,O=DigitalSign Certificadora Digital,C=PT
# Not Valid Before: Thu Jan 21 11:07:50 2021
# Not
 Valid After : Mon Jan 15 11:07:50 2046
# Fingerprint (SHA-256):
26:1D:71:14:AE:5F:8F:F2:D8:C7:20:9A:9D:E4:28:9E:6A:FC:9D:71:70:23:D8:54:50:90:91:99:F1:85:7C:FE
# Fingerprint (SHA1): 67:A8:08:EB:8F:88:F5:80:6C:05:45:1B:17:F3:D7:00:2F:D2:4A:8A
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DIGITALSIGN GLOBAL ROOT ECDSA CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\147\250\010\353\217\210\365\200\154\005\105\033\027\363\327\000
\057\322\112\212
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\252\055\241\316\377\041\302\210\313\132\036\214\341\311\222\217
END
CKA_ISSUER MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\120\124\061
\052\060\050\006\003\125\004\012\014\041\104\151\147\151\164\141
\154\123\151\147\156\040\103\145\162\164\151\146\151\143\141\144
\157\162\141\040\104\151\147\151\164\141\154\061\051\060\047\006
\003\125\004\003\014\040\104\111\107\111\124\101\114\123\111\107
\116\040\107\114\117\102\101\114\040\122\117\117\124\040\105\103
\104\123\101\040\103\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\024\066\055\217\162\210\242\050\047\344\000\377\044\306\055
\344\353\372\235\266\341
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Security Communication RootCA3"
#
# Issuer: CN=Security Communication RootCA3,O="SECOM Trust Systems CO.,LTD.",C=JP
# Serial Number:00:e1:7c:37:40:fd:1b:fe:67
# Subject: CN=Security Communication RootCA3,O="SECOM Trust Systems CO.,LTD.",C=JP
# Not Valid Before: Thu Jun 16 06:17:16 2016
# Not Valid After : Mon Jan 18 06:17:16 2038
```

```
# Fingerprint (SHA-256):
24:A5:5C:2A:B0:51:44:2D:06:17:76:65:41:23:9A:4A:D0:32:D7:C5:51:75:AA:34:FF:DE:2F:BC:4F:5C:52:94
# Fingerprint (SHA1): C3:03:C8:22:74:92:E5:61:A2:9C:5F:79:91:2B:1E:44:13:91:30:3A
CKA_CLASS
 CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Security Communication RootCA3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\047\060\045\006\003\125\004\003\023
\036\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\122\157\157\164\103\101\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\047\060\045\006\003\125\004\003\023
\036\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\122\157\157\164\103\101\063
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\011\000\341\174\067\100\375\033\376\147
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\177\060\202\003\147\240\003\002\001\002\002\011\000
\341\174\067\100\375\033\376\147\060\015\006\011\052\206\110\206
\367\015\001\001\014\005\000\060\135\061\013\060\011\006\003\125
\004\006\023\002\112\120\061\045\060\043\006\003\125\004\012\023
\034\123\105\103\117\115\040\124\162\165\163\164\040\123\171\163
\164\145\155\163\040\103\117\056\054\114\124\104\056\061\047\060
\045\006\003\125\004\003\023\036\123\145\143\165\162\151\164\171
\040\103\157\155\155\165\156\151\143\141\164\151\157\156\040\122
\157\157\164\103\101\063\060\036\027\015\061\066\060\066\061\066
\060\066\061\067\061\066\132\027\015\063\070\060\061\061\070\060
\066\061\067\061\066\132\060\135\061\013\060\011\006\003\125\004
\006\023\002\112\120\061\045\060\043\006\003\125\004\012\023\034
\123\105\103\117\115\040\124\162\165\163\164\040\123\171\163\164
\145\155\163\040\103\117\056\054\114\124\104\056\061\047\060\045
\006\003\125\004\003\023\036\123\145\143\165\162\151\164\171\040
\103\157\155\155\165\156\151\143\141\164\151\157\156\040\122\157
```

\157\164\103\101\063\060\202\002\042\060\015\006\011\052\206\110
\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002
\012\002\202\002\001\000\343\311\162\111\367\060\336\011\174\251
\100\201\130\323\264\072\335\272\141\017\223\120\156\151\074\065
\302\356\133\163\220\033\147\114\041\354\137\065\273\071\076\053
\012\140\357\273\155\053\206\373\161\242\310\254\344\126\224\371
\311\257\261\162\324\040\254\164\322\270\025\255\121\376\205\164
\241\271\020\376\005\200\371\122\223\263\100\075\165\020\254\300
\226\267\247\176\166\274\343\033\122\031\316\021\037\013\004\064
\365\330\365\151\074\167\363\144\364\015\252\205\336\340\011\120
\004\027\226\204\267\310\212\274\115\162\374\034\273\317\363\006
\115\371\237\144\367\176\246\146\206\065\161\310\021\200\114\301
\161\100\130\036\276\240\163\366\374\076\120\341\340\057\046\075
\176\134\043\265\171\160\336\372\340\321\245\326\014\101\161\173
\367\352\214\034\210\307\354\213\365\321\057\125\226\106\174\132
\073\130\073\373\272\330\055\265\045\332\172\116\317\104\256\041
\246\236\230\312\040\156\174\273\210\205\133\373\300\020\142\273
\362\371\047\107\357\321\211\071\103\304\337\336\341\101\277\124
\163\040\227\055\154\332\363\324\007\243\346\271\330\157\256\374
\214\031\056\323\147\147\053\225\333\130\134\265\152\002\363\270
\203\136\264\153\276\101\176\127\011\165\104\120\125\315\132\021
\141\041\012\141\302\251\210\375\023\274\055\211\057\315\141\340
\225\276\312\265\173\341\173\064\147\013\037\266\014\307\174\036
\031\123\312\247\261\112\025\040\126\024\160\075\053\202\054\017
\235\025\035\107\200\107\377\170\231\016\061\257\157\076\217\355
\206\151\036\173\030\210\024\262\302\374\202\063\056\234\113\055
\373\160\073\161\252\053\173\046\047\363\032\302\334\373\027\270
\241\352\313\240\264\256\323\224\176\172\320\253\303\354\070\055
\021\056\210\277\324\077\255\022\073\102\254\217\002\156\175\314
\321\137\141\276\241\274\072\152\110\352\046\125\042\026\135\137
\015\377\047\063\237\030\003\164\212\133\122\040\107\153\105\115
\042\167\214\125\047\360\257\036\214\311\203\042\124\267\232\320
\117\331\316\374\331\056\034\226\050\261\002\323\003\275\045\122
\034\064\146\117\043\253\364\167\202\226\035\321\127\060\010\021
\005\375\127\321\331\307\002\003\001\000\001\243\102\060\100\060
\035\006\003\125\035\016\004\026\004\024\144\024\174\374\130\162
\026\246\012\051\064\025\157\052\313\274\374\257\250\253\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\003\202
\002\001\000\334\002\043\010\342\357\041\072\307\015\267\046\322
\142\223\247\245\043\162\007\040\202\140\337\030\327\124\255\151
\045\222\236\331\024\317\231\271\122\201\317\256\154\212\073\132
\071\310\154\001\103\302\042\155\002\360\142\315\116\143\103\300
\024\332\364\143\360\352\364\161\356\116\207\343\161\251\364\311
\127\345\056\137\034\171\273\043\252\207\104\127\351\275\065\115
\101\273\113\050\243\230\262\033\331\013\027\007\345\367\352\235
\365\166\327\277\304\266\201\130\377\310\377\144\151\142\171\255

\156\016\037\177\356\035\151\345\267\162\161\263\376\245\001\065
\224\124\053\300\122\155\217\125\304\311\322\270\313\312\064\010
\121\205\240\365\274\264\027\130\352\012\134\172\275\143\306\072
\057\377\226\111\031\204\352\147\330\004\261\141\364\000\133\112
\267\234\161\067\031\205\171\277\201\260\307\023\016\166\161\076
\072\200\006\256\006\026\247\215\265\302\304\313\377\100\245\134
\215\245\311\072\355\162\201\312\134\230\074\322\064\003\167\010
\375\360\051\131\135\041\010\307\140\277\244\161\173\270\331\036
\202\276\011\257\145\157\050\253\277\113\265\356\076\010\107\047
\240\017\157\017\213\077\254\225\030\363\271\016\334\147\125\156
\142\236\106\016\321\004\170\312\162\256\166\331\245\370\262\337
\210\011\141\213\357\044\116\321\131\077\132\324\075\311\223\074
\053\144\365\201\015\026\226\367\222\303\376\061\157\350\052\062
\164\016\364\114\230\112\030\016\060\124\325\305\353\274\305\025
\236\350\231\041\353\047\053\011\012\333\361\346\160\030\126\273
\014\344\276\371\350\020\244\023\222\270\034\340\333\147\035\123
\003\244\042\247\334\135\222\020\074\352\377\374\033\020\032\303
\330\320\234\235\145\313\320\053\047\061\003\036\066\341\075\166
\165\014\377\105\046\271\335\121\274\043\307\137\330\330\207\020
\100\022\015\075\070\067\347\104\074\030\300\123\011\144\217\377
\325\232\246\174\160\056\163\125\041\350\337\377\203\271\035\076
\062\036\326\246\175\054\361\146\351\134\035\247\243\316\136\045
\062\053\343\225\254\052\007\316\264\050\170\206\074\055\246\235
\115\322\164\060\335\144\121\025\333\203\203\121\327\257\375\063
\235\115\146
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL
 CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Security Communication RootCA3"
# Issuer: CN=Security Communication RootCA3,O="SECOM Trust Systems CO.,LTD.",C=JP
# Serial Number:00:e1:7c:37:40:fd:1b:fe:67
# Subject: CN=Security Communication RootCA3,O="SECOM Trust Systems CO.,LTD.",C=JP
# Not Valid Before: Thu Jun 16 06:17:16 2016
# Not Valid After : Mon Jan 18 06:17:16 2038
# Fingerprint (SHA-256):
24:A5:5C:2A:B0:51:44:2D:06:17:76:65:41:23:9A:4A:D0:32:D7:C5:51:75:AA:34:FF:DE:2F:BC:4F:5C:52:94
# Fingerprint (SHA1): C3:03:C8:22:74:92:E5:61:A2:9C:5F:79:91:2B:1E:44:13:91:30:3A
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Security Communication RootCA3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\303\003\310\042\164\222\345\141\242\234\137\171\221\053\036\104

```
\023\221\060\072
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\034\232\026\377\236\134\340\115\212\024\001\364\065\135\051\046
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\047\060\045\006\003\125\004\003\023
\036\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\122\157\157\164\103\101\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\341\174\067\100\375\033\376\147
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Security Communication ECC RootCA1"
#
# Issuer: CN=Security Communication ECC RootCA1,O="SECOM Trust Systems CO.,LTD.",C=JP
# Serial Number:00:d6:5d:9b:b3:78:81:2e:eb
# Subject: CN=Security Communication ECC RootCA1,O="SECOM Trust Systems CO.,LTD.",C=JP
#
 Not Valid Before: Thu Jun 16 05:15:28 2016
# Not Valid After : Mon Jan 18 05:15:28 2038
# Fingerprint (SHA-256):
E7:4F:BD:A5:5B:D5:64:C4:73:A3:6B:44:1A:A7:99:C8:A6:8E:07:74:40:E8:28:8B:9F:A1:E5:0E:4B:BA:CA:11
# Fingerprint (SHA1): B8:0E:26:A9:BF:D2:B2:3B:C0:EF:46:C9:BA:C7:BB:F6:1D:0D:41:41
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Security Communication ECC RootCA1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\053\060\051\006\003\125\004\003\023
\042\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\105\103\103\040\122\157\157\164
\103\101\061
```

END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\053\060\051\006\003\125\004\003\023
\042\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\105\103\103\040\122\157\157\164
\103\101\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\011\000\326\135\233\263\170\201\056\353
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\070\060\202\001\276\240\003\002\001\002\002\011\000
\326\135\233\263\170\201\056\353\060\012\006\010\052\206\110\316
\075\004\003\003\060\141\061\013\060\011\006\003\125\004\006\023
\002\112\120\061\045\060\043\006\003\125\004\012\023\034\123\105
\103\117\115\040\124\162\165\163\164\040\123\171\163\164\145\155
\163\040\103\117\056\054\114\124\104\056\061\053\060\051\006\003
\125\004\003\023\042\123\145\143\165\162\151\164\171\040\103\157
\155\155\165\156\151\143\141\164\151\157\156\040\105\103\103\040
\122\157\157\164\103\101\061\060\036\027\015\061\066\060\066\061
\066\060\065\061\065\062\070\132\027\015\063\070\060\061\061\070
\060\065\061\065\062\070\132\060\141\061\013\060\011\006\003\125
\004\006\023\002\112\120\061\045\060\043\006\003\125\004\012\023
\034\123\105\103\117\115\040\124\162\165\163\164\040\123\171\163
\164\145\155\163\040\103\117\056\054\114\124\104\056\061\053\060
\051\006\003\125\004\003\023\042\123\145\143\165\162\151\164\171
\040\103\157\155\155\165\156\151\143\141\164\151\157\156\040\105
\103\103\040\122\157\157\164\103\101\061\060\166\060\020\006\007
\052\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142
\000\004\244\245\157\140\003\003\303\275\061\364\323\027\234\053
\204\165\254\345\375\075\127\156\327\143\277\346\004\211\222\216
\201\234\343\351\107\156\312\220\022\310\023\340\247\235\367\145
\164\037\154\020\262\350\344\351\357\155\205\062\231\104\261\136
\375\314\166\020\330\133\275\242\306\371\326\102\344\127\166\334
\220\302\065\251\113\210\074\022\107\155\134\377\111\117\032\112
\120\261\243\102\060\100\060\035\006\003\125\035\016\004\026\004
\024\206\034\347\376\055\245\112\213\010\376\050\021\372\276\243
\146\370\140\131\057\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\012\006\010\052\206\110\316\075\004
\003\003\003\150\000\060\145\002\060\025\135\102\075\374\266\356
\367\073\261\066\350\236\366\304\106\050\111\063\320\130\103\052
\143\051\314\115\261\264\172\242\271\015\070\245\135\110\052\375

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\313\262\163\135\243\210\010\307\014\002\061\000\300\253\055\016
\155\355\030\242\333\123\351\045\333\125\010\340\120\314\337\104
\141\026\202\253\111\260\262\201\354\163\207\170\264\114\262\142
\033\022\372\026\115\045\113\143\275\036\067\331
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust
 for "Security Communication ECC RootCA1"
# Issuer: CN=Security Communication ECC RootCA1,O="SECOM Trust Systems CO.,LTD.",C=JP
# Serial Number:00:d6:5d:9b:b3:78:81:2e:eb
# Subject: CN=Security Communication ECC RootCA1,O="SECOM Trust Systems CO.,LTD.",C=JP
# Not Valid Before: Thu Jun 16 05:15:28 2016
# Not Valid After : Mon Jan 18 05:15:28 2038
# Fingerprint (SHA-256):
E7:4F:BD:A5:5B:D5:64:C4:73:A3:6B:44:1A:A7:99:C8:A6:8E:07:74:40:E8:28:8B:9F:A1:E5:0E:4B:BA:CA:11
# Fingerprint (SHA1): B8:0E:26:A9:BF:D2:B2:3B:C0:EF:46:C9:BA:C7:BB:F6:1D:0D:41:41
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Security Communication ECC RootCA1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\270\016\046\251\277\322\262\073\300\357\106\311\272\307\273\366
\035\015\101\101
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\176\103\260\222\150\354\005\103\114\230\253\135\065\056\176\206
END
CKA_ISSUER MULTILINE_OCTAL
\060\141\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\053\060\051\006\003\125\004\003\023
\042\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\105\103\103\040\122\157\157\164
\103\101\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\011\000\326\135\233\263\170\201\056\353
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
```

```
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "BJCA Global Root CA1"
#
# Issuer: CN=BJCA Global Root CA1,O=BEIJING CERTIFICATE AUTHORITY,C=CN
# Serial Number:55:6f:65:e3:b4:d9:90:6a:1b:09:d1:6c:3e:c0:6c:20
# Subject: CN=BJCA Global Root CA1,O=BEIJING CERTIFICATE AUTHORITY,C=CN
# Not Valid Before: Thu Dec 19 03:16:17 2019
# Not Valid
 After : Mon Dec 12 03:16:17 2044
# Fingerprint (SHA-256):
F3:89:6F:88:FE:7C:0A:88:27:66:A7:FA:6A:D2:74:9F:B5:7A:7F:3E:98:FB:76:9C:1F:A7:B0:9C:2C:44:D5:AE
# Fingerprint (SHA1): D5:EC:8D:7B:4C:BA:79:F4:E7:E8:CB:9D:6B:AE:77:83:10:03:21:6A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "BJCA Global Root CA1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\124\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\046\060\044\006\003\125\004\012\014\035\102\105\111\112\111\116
\107\040\103\105\122\124\111\106\111\103\101\124\105\040\101\125
\124\110\117\122\111\124\131\061\035\060\033\006\003\125\004\003
\014\024\102\112\103\101\040\107\154\157\142\141\154\040\122\157
\157\164\040\103\101\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\124\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\046\060\044\006\003\125\004\012\014\035\102\105\111\112\111\116
\107\040\103\105\122\124\111\106\111\103\101\124\105\040\101\125
\124\110\117\122\111\124\131\061\035\060\033\006\003\125\004\003
\014\024\102\112\103\101\040\107\154\157\142\141\154\040\122\157
\157\164\040\103\101\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\125\157\145\343\264\331\220\152\033\011\321\154\076\300
\154\040
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\164\060\202\003\134\240\003\002\001\002\002\020\125
\157\145\343\264\331\220\152\033\011\321\154\076\300\154\040\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\124
\061\013\060\011\006\003\125\004\006\023\002\103\116\061\046\060
\044\006\003\125\004\012\014\035\102\105\111\112\111\116\107\040
```

\103\105\122\124\111\106\111\103\101\124\105\040\101\125\124\110
\117\122\111\124\131\061\035\060\033\006\003\125\004\003\014\024
\102\112\103\101\040\107\154\157\142\141\154\040\122\157\157\164
\040\103\101\061\060\036\027\015\061\071\061\062\061\071\060\063
\061\066\061\067\132\027\015\064\064\061\062\061\062\060\063\061
\066\061\067\132\060\124\061\013\060\011\006\003\125\004\006\023
\002\103\116\061\046\060\044\006\003\125\004\012\014\035\102\105
\111\112\111\116\107\040\103\105\122\124\111\106\111\103\101\124
\105\040\101\125\124\110\117\122\111\124\131\061\035\060\033\006
\003\125\004\003\014\024\102\112\103\101\040\107\154\157\142\141
\154\040\122\157\157\164\040\103\101\061\060\202\002\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002
\017\000\060\202\002\012\002\202\002\001\000\361\146\010\275\331
\305\025\141\313\204\004\101\245\151\067\167\035\301\260\173\372
\303\167\110\220\023\162\144\321\270\174\220\065\235\030\171\210
\343\227\001\074\107\201\362\016\242\230\015\236\077\067\340\031
\262\220\362\106\034\222\261\072\141\316\372\267\106\236\003\206
\327\063\156\355\367\105\214\166\067\336\156\226\221\367\327\176
\053\207\027\325\213\065\356\204\221\162\127\334\140\303\303\271
\347\307\147\044\043\117\143\012\143\366\146\175\113\125\247\077
\170\144\111\151\022\227\340\114\015\323\011\240\062\060\072\372
\237\300\362\234\305\022\052\056\034\265\004\063\332\244\070\021
\152\336\306\030\366\107\072\042\101\207\042\374\304\211\050\124
\330\214\245\060\012\370\027\026\312\254\067\375\171\247\221\027
\170\070\231\255\130\355\262\336\314\211\175\003\234\263\211\145
\347\343\073\261\042\206\217\006\155\170\007\375\221\022\177\260
\153\034\211\015\371\270\313\164\133\007\302\310\364\065\321\144
\143\172\351\156\232\050\326\060\275\346\033\335\025\257\204\352
\234\307\312\365\016\352\362\135\051\207\217\151\163\071\276\056
\044\157\105\041\254\305\324\151\045\006\203\255\172\110\205\023
\054\015\006\270\154\171\126\374\243\147\062\201\365\127\245\312
\127\102\151\351\134\044\141\357\342\060\030\116\104\230\125\157
\172\302\223\330\031\266\336\174\107\212\021\116\111\107\333\050
\224\002\013\224\112\054\371\022\320\117\350\061\176\154\172\277
\246\077\233\071\075\002\026\243\030\263\147\254\133\077\054\203
\053\147\071\201\134\271\176\224\325\144\335\236\217\156\256\350
\174\133\264\327\152\107\110\327\176\263\324\055\216\126\166\116
\317\151\361\156\104\154\324\044\352\215\044\241\030\277\275\127
\376\251\231\065\265\333\020\167\270\075\110\272\326\301\347\361
\043\076\327\337\205\235\047\074\324\100\275\012\014\275\365\347
\215\045\326\201\164\207\106\324\051\165\242\102\154\367\163\211
\347\175\277\172\112\037\323\042\311\025\125\317\337\157\174\125
\320\244\213\007\021\067\137\203\246\046\127\246\001\133\176\376
\130\150\007\251\351\172\331\271\350\377\120\037\253\302\264\300
\316\350\352\375\017\275\215\115\270\274\161\002\003\001\000\001
\243\102\060\100\060\035\006\003\125\035\016\004\026\004\024\305
\357\355\314\330\215\041\306\110\344\343\327\024\056\247\026\223
\345\230\001\060\017\006\003\125\035\023\001\001\377\004\005\060

\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\015\006\011\052\206\110\206\367\015\001\001
\013\005\000\003\202\002\001\000\122\202\254\041\064\037\043\362
\242\330\371\270\257\067\066\040\211\321\067\003\326\151\237\270
\141\020\272\242\061\230\131\107\350\321\015\045\036\025\101\014
\340\052\125\325\127\122\313\370\344\307\151\243\035\115\161\002
\136\137\041\105\140\110\134\011\216\111\020\301\004\334\251\142
\153\002\360\103\310\116\235\070\111\164\311\062\160\124\155\301
\107\374\216\264\066\236\324\234\275\335\040\326\123\311\030\251
\265\126\271\166\213\225\147\146\356\275\230\376\256\357\276\156
\373\140\366\375\131\306\052\033\077\043\112\224\044\060\047\310
\211\274\353\104\044\232\313\075\276\117\325\172\316\216\027\313
\142\301\331\336\036\016\172\377\103\206\064\122\274\141\077\074
\137\273\331\166\264\123\274\227\263\376\212\114\022\056\053\363
\327\316\341\242\377\335\173\160\373\073\241\115\244\143\002\375
\070\227\225\077\005\160\240\153\337\142\201\103\213\264\131\015
\112\214\124\234\305\273\201\237\315\175\245\357\013\045\036\072
\040\333\034\374\037\230\147\002\012\324\163\104\023\333\121\204
\032\125\003\126\340\000\176\164\006\377\070\304\162\035\323\250
\077\150\061\135\323\011\307\056\214\133\143\340\350\334\036\322
\354\141\036\362\336\345\357\366\231\166\140\055\036\224\162\161
\306\013\052\062\307\222\116\325\106\327\035\371\251\031\012\310
\372\225\316\155\043\230\252\013\070\255\232\126\015\157\215\361
\061\000\210\301\027\234\315\031\066\065\376\125\123\240\340\074
\063\137\226\136\342\062\351\337\063\273\006\112\251\330\204\163
\316\167\322\306\254\161\341\134\243\035\014\273\012\337\137\342
\243\161\330\332\067\132\240\170\053\364\324\175\353\166\355\362
\141\160\245\145\232\323\211\064\030\253\373\162\076\327\264\075
\171\134\330\037\241\063\173\331\202\120\014\223\027\252\154\334
\302\202\273\002\127\066\257\230\047\052\071\120\341\260\211\365
\045\227\176\107\150\020\264\354\163\312\263\227\321\044\334\366
\142\240\050\323\265\243\270\144\267\210\142\102\317\235\123\315
\231\276\144\150\217\117\036\022\110\367\322\051\303\230\050\312
\362\062\013\223\214\051\117\074\140\062\315\005\226\141\354\362
\257\376\263\160\054\056\246\362
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "BJCA Global Root CA1"
# Issuer: CN=BJCA Global Root CA1,O=BEIJING CERTIFICATE AUTHORITY,C=CN
# Serial Number:55:6f:65:e3:b4:d9:90:6a:1b:09:d1:6c:3e:c0:6c:20
# Subject: CN=BJCA Global Root CA1,O=BEIJING CERTIFICATE AUTHORITY,C=CN
# Not Valid Before: Thu Dec 19 03:16:17 2019
# Not Valid After : Mon Dec 12 03:16:17 2044
# Fingerprint (SHA-256):

```
F3:89:6F:88:FE:7C:0A:88:27:66:A7:FA:6A:D2:74:9F:B5:7A:7F:3E:98:FB:76:9C:1F:A7:B0:9C:2C:44:D5:AE
# Fingerprint (SHA1): D5:EC:8D:7B:4C:BA:79:F4:E7:E8:CB:9D:6B:AE:77:83:10:03:21:6A
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "BJCA Global Root CA1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\325\354\215\173\114\272\171\364\347\350\313\235\153\256\167\203
\020\003\041\152
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\102\062\231\166\103\063\066\044\065\007\202\233\050\371\320\220
END
CKA_ISSUER MULTILINE_OCTAL
\060\124\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\046\060\044\006\003\125\004\012\014\035\102\105\111\112\111\116
\107\040\103\105\122\124\111\106\111\103\101\124\105\040\101\125
\124\110\117\122\111\124\131\061\035\060\033\006\003\125\004\003
\014\024\102\112\103\101\040\107\154\157\142\141\154\040\122\157
\157\164\040\103\101\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\125\157\145\343\264\331\220\152\033\011\321\154\076\300
\154\040
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "BJCA Global Root CA2"
#
# Issuer: CN=BJCA Global Root CA2,O=BEIJING CERTIFICATE AUTHORITY,C=CN
# Serial Number:2c:17:08:7d:64:2a:c0:fe:85:18:59:06:cf:b4:4a:eb
#
 Subject: CN=BJCA Global Root CA2,O=BEIJING CERTIFICATE AUTHORITY,C=CN
# Not Valid Before: Thu Dec 19 03:18:21 2019
# Not Valid After : Mon Dec 12 03:18:21 2044
# Fingerprint (SHA-256):
57:4D:F6:93:1E:27:80:39:66:7B:72:0A:FD:C1:60:0F:C2:7E:B6:6D:D3:09:29:79:FB:73:85:64:87:21:28:82
# Fingerprint (SHA1): F4:27:86:EB:6E:B8:6D:88:31:67:02:FB:BA:66:A4:53:00:AA:7A:A6
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
```

CKA_LABEL UTF8 "BJCA Global Root CA2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\124\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\046\060\044\006\003\125\004\012\014\035\102\105\111\112\111\116
\107\040\103\105\122\124\111\106\111\103\101\124\105\040\101\125
\124\110\117\122\111\124\131\061\035\060\033\006\003\125\004\003
\014\024\102\112\103\101\040\107\154\157\142\141\154\040\122\157
\157\164\040\103\101\062
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\124\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\046\060\044\006\003\125\004\012\014\035\102\105\111\112\111\116
\107\040\103\105\122\124\111\106\111\103\101\124\105\040\101\125
\124\110\117\122\111\124\131\061\035\060\033\006\003\125\004\003
\014\024\102\112\103\101\040\107\154\157\142\141\154\040\122\157
\157\164\040\103\101\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\054\027\010\175\144\052\300\376\205\030\131\006\317\264
\112\353
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\045\060\202\001\253\240\003\002\001\002\002\020\054
\027\010\175\144\052\300\376\205\030\131\006\317\264\112\353\060
\012\006\010\052\206\110\316\075\004\003\003\060\124\061\013\060
\011\006\003\125\004\006\023\002\103\116\061\046\060\044\006\003
\125\004\012\014\035\102\105\111\112\111\116\107\040\103\105\122
\124\111\106\111\103\101\124\105\040\101\125\124\110\117\122\111
\124\131\061\035\060\033\006\003\125\004\003\014\024\102\112\103
\101\040\107\154\157\142\141\154\040\122\157\157\164\040\103\101
\062\060\036\027\015\061\071\061\062\061\071\060\063\061\070\062
\061\132\027\015\064\064\061\062\061\062\060\063\061\070\062\061
\132\060\124\061\013\060\011\006\003\125\004\006\023\002\103\116
\061\046\060\044\006\003\125\004\012\014\035\102\105\111\112\111
\116\107\040\103\105\122\124\111\106\111\103\101\124\105\040\101
\125\124\110\117\122\111\124\131\061\035\060\033\006\003\125\004
\003\014\024\102\112\103\101\040\107\154\157\142\141\154\040\122
\157\157\164\040\103\101\062\060\166\060\020\006\007\052\206\110
\316\075\002\001\006\005\053\201\004\000\042\003\142\000\004\235
\313\200\221\215\123\147\265\271\120\261\003\370\345\111\037\101
\042\011\260\121\122\130\326\053\064\217\305\022\106\024\305\213
\057\054\204\377\054\156\250\325\361\011\343\003\041\024\304\103
\075\174\301\054\304\113\152\112\315\351\207\340\175\366\042\276
\372\112\121\270\060\212\375\341\336\030\022\012\366\107\267\347
\027\277\047\212\324\101\114\226\074\140\226\301\375\025\034\243

\102\060\100\060\035\006\003\125\035\016\004\026\004\024\322\112
\261\121\177\006\360\321\202\037\116\156\137\253\203\374\110\324
\260\221\060\017\006\003\125\035\023\001\001\377\004\005\060\003
\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\012\006\010\052\206\110\316\075\004\003\003\003
\150\000\060\145\002\060\032\274\133\327\376\251\322\124\016\112
\135\322\155\261\100\334\364\103\325\322\112\231\031\022\126\200
\367\203\064\341\065\116\110\155\004\017\127\061\060\060\055\261
\252\235\003\070\333\006\002\061\000\313\314\207\123\313\172\337
\040\121\163\220\300\250\133\141\320\305\120\071\375\205\376\301
\343\170\370\246\326\113\275\233\207\217\017\345\326\123\226\253
\074\310\100\332\141\367\123\243\367
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "BJCA Global Root CA2"
# Issuer: CN=BJCA Global Root CA2,O=BEIJING CERTIFICATE
AUTHORITY,C=CN
# Serial Number:2c:17:08:7d:64:2a:c0:fe:85:18:59:06:cf:b4:4a:eb
# Subject: CN=BJCA Global Root CA2,O=BEIJING CERTIFICATE AUTHORITY,C=CN
# Not Valid Before: Thu Dec 19 03:18:21 2019
# Not Valid After : Mon Dec 12 03:18:21 2044
# Fingerprint (SHA-256):
57:4D:F6:93:1E:27:80:39:66:7B:72:0A:FD:C1:60:0F:C2:7E:B6:6D:D3:09:29:79:FB:73:85:64:87:21:28:82
# Fingerprint (SHA1): F4:27:86:EB:6E:B8:6D:88:31:67:02:FB:BA:66:A4:53:00:AA:7A:A6
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "BJCA Global Root CA2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\364\047\206\353\156\270\155\210\061\147\002\373\272\146\244\123
\000\252\172\246
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\136\012\366\107\137\246\024\350\021\001\225\077\115\001\353\074
END
CKA_ISSUER MULTILINE_OCTAL
\060\124\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\046\060\044\006\003\125\004\012\014\035\102\105\111\112\111\116
\107\040\103\105\122\124\111\106\111\103\101\124\105\040\101\125
\124\110\117\122\111\124\131\061\035\060\033\006\003\125\004\003
\014\024\102\112\103\101\040\107\154\157\142\141\154\040\122\157
\157\164\040\103\101\062
END

```
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\054\027\010\175\144\052\300\376\205\030\131\006\317\264
\112\353
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "LAWtrust Root CA2 (4096)"
#
# Issuer: CN=LAWtrust Root CA2 (4096),O=LAWtrust,C=ZA
# Serial Number: 1427795633 (0x551a6eb1)
# Subject: CN=LAWtrust Root CA2 (4096),O=LAWtrust,C=ZA
# Not Valid Before: Tue Feb 14 09:19:38 2023
# Not Valid After : Fri Feb 14 09:49:38 2053
# Fingerprint (SHA-256):
48:E1:CF:9E:43:B6:88:A5:10:44:16:0F:46:D7:73:B8:27:7F:E4:5B:EA:AD:0E:4D:F9:0D:19:74:38:2F:EA:99
# Fingerprint (SHA1): EC:A2:D5:30:A9:AB:2C:7D:0E:75:61:64:4E:0A:E0:16:A1:54:38:7D
CKA_CLASS
 CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "LAWtrust Root CA2 (4096)"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\103\061\013\060\011\006\003\125\004\006\023\002\132\101\061
\021\060\017\006\003\125\004\012\023\010\114\101\127\164\162\165
\163\164\061\041\060\037\006\003\125\004\003\023\030\114\101\127
\164\162\165\163\164\040\122\157\157\164\040\103\101\062\040\050
\064\060\071\066\051
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\103\061\013\060\011\006\003\125\004\006\023\002\132\101\061
\021\060\017\006\003\125\004\012\023\010\114\101\127\164\162\165
\163\164\061\041\060\037\006\003\125\004\003\023\030\114\101\127
\164\162\165\163\164\040\122\157\157\164\040\103\101\062\040\050
\064\060\071\066\051
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\125\032\156\261
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\230\060\202\003\200\240\003\002\001\002\002\004\125
```

\032\156\261\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\103\061\013\060\011\006\003\125\004\006\023\002\132
\101\061\021\060\017\006\003\125\004\012\023\010\114\101\127\164
\162\165\163\164\061\041\060\037\006\003\125\004\003\023\030\114
\101\127\164\162\165\163\164\040\122\157\157\164\040\103\101\062
\040\050\064\060\071\066\051\060\040\027\015\062\063\060\062\061
\064\060\071\061\071\063\070\132\030\017\062\060\065\063\060\062
\061\064\060\071\064\071\063\070\132\060\103\061\013\060\011\006
\003\125\004\006\023\002\132\101\061\021\060\017\006\003\125\004
\012\023\010\114\101\127\164\162\165\163\164\061\041\060\037\006
\003\125\004\003\023\030\114\101\127\164\162\165\163\164\040\122
\157\157\164\040\103\101\062\040\050\064\060\071\066\051\060\202
\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\314
\027\313\053\103\272\154\371\311\223\212\145\015\022\114\354\047
\024\267\023\171\340\324\325\055\030\126\361\371\352\052\020\026
\116\154\104\307\152\145\106\363\232\211\065\321\207\370\063\211
\057\210\011\032\222\020\221\220\301\153\237\016\156\177\046\212
\023\135\030\254\150\001\015\020\170\145\160\330\216\217\204\132
\227\060\030\320\021\016\112\215\122\020\245\201\053\121\050\365
\143\304\266\354\100\263\001\345\255\167\275\345\070\357\274\215
\263\335\031\240\173\015\215\264\333\152\373\045\063\132\372\221
\257\304\161\105\060\370\210\051\173\313\277\325\272\047\004\216
\335\262\000\367\312\134\231\065\024\352\375\165\006\025\010\273
\312\127\150\373\077\373\264\064\163\143\321\325\343\310\070\132
\151\175\152\172\104\014\015\212\116\355\222\035\020\217\073\042
\054\266\337\355\305\306\360\211\171\124\145\136\137\033\275\217
\175\337\271\267\355\353\344\305\007\321\147\074\225\073\221\376
\102\172\122\100\200\004\322\071\127\113\364\222\175\377\233\357
\345\235\311\011\262\221\022\070\246\051\010\073\256\353\312\314
\355\115\347\116\041\001\007\374\157\062\316\151\214\204\122\306
\167\352\047\060\012\336\245\257\060\053\150\037\254\324\354\041
\255\042\111\166\316\017\302\362\007\052\371\152\022\203\232\073
\004\256\031\172\376\241\206\044\372\101\136\045\174\100\254\047
\266\343\051\066\157\065\342\127\320\031\130\337\377\144\366\303
\001\111\166\333\053\276\274\271\117\024\012\325\033\130\041\366
\034\056\000\174\370\224\265\313\067\032\024\344\062\271\026\324
\140\354\005\252\137\062\372\152\043\022\254\324\020\273\322\242
\202\264\113\016\213\160\047\252\326\007\301\147\210\372\204\303
\010\311\212\204\310\322\067\162\201\017\215\026\112\344\327\065
\121\245\070\017\214\204\113\225\066\300\365\327\235\340\135\217
\253\221\356\000\010\271\235\122\037\354\370\231\273\171\126\261
\111\332\322\345\330\141\213\133\257\360\253\067\305\173\032\216
\206\276\176\305\173\025\036\141\150\350\013\207\213\163\111\241
\027\163\176\051\170\216\312\340\101\057\165\163\164\242\227\072
\177\367\056\164\011\270\114\140\213\106\066\031\020\055\235\002
\003\001\000\001\243\201\221\060\201\216\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003\125

\035\017\001\001\377\004\004\003\002\001\006\060\053\006\003\125
\035\020\004\044\060\042\200\017\062\060\062\063\060\062\061\064
\060\071\061\071\063\070\132\201\017\062\060\065\063\060\062\061
\064\060\071\064\071\063\070\132\060\037\006\003\125\035\043\004
\030\060\026\200\024\327\326\126\142\134\077\027\201\346\163\104
\051\365\121\005\357\013\140\067\254\060\035\006\003\125\035\016
\004\026\004\024\327\326\126\142\134\077\027\201\346\163\104\051
\365\121\005\357\013\140\067\254\060\015\006\011\052\206\110\206
\367\015\001\001\013\005\000\003\202\002\001\000\111\234\051\376
\075\354\236\105\177\253\076\074\376\043\157\067\076\167\247\123
\377\170\237\374\111\104\200\127\146\234\156\332\171\377\315\105
\255\114\223\277\265\131\306\351\020\267\345\370\214\373\207\305
\036\213\330\263\077\002\226\012\273\212\216\357\327\264\300\203
\040\070\227\131\105\144\374\366\167\023\362\011\327\241\310\070
\164\010\352\371\110\114\372\037\004\234\264\377\354\156\126\066
\162\223\154\225\076\054\137\336\017\013\253\311\314\025\076\026
\217\146\374\262\020\270\241\321\264\336\300\143\031\314\357\123
\252\165\066\042\213\045\037\277\233\310\327\301\137\354\246\067
\011\252\173\142\274\366\042\055\361\326\130\335\214\273\122\364
\013\247\166\251\172\173\032\215\334\255\232\201\142\056\206\005
\220\162\107\057\241\311\147\204\260\015\154\260\270\233\026\267
\320\231\024\057\234\022\233\043\250\215\246\103\036\351\345\055
\345\170\247\037\144\224\144\266\167\262\250\134\373\011\253\051
\353\036\155\165\321\366\320\305\245\303\035\237\036\363\032\055
\262\310\037\345\050\012\156\363\137\375\332\346\043\241\166\220
\134\113\230\001\202\054\356\107\055\002\032\137\177\064\305\151
\265\162\255\076\363\317\236\155\370\051\350\021\047\053\340\131
\013\033\141\353\112\312\151\245\244\325\315\121\033\224\216\171
\315\337\366\256\164\135\261\054\033\206\123\376\321\060\006\101
\064\007\142\202\114\364\176\307\207\164\016\260\041\036\011\040
\200\301\263\025\075\106\155\323\361\006\222\077\357\240\225\212
\034\156\167\061\266\353\170\051\014\173\356\202\245\117\176\244
\051\136\236\252\055\370\216\300\363\374\015\006\205\233\116\334
\367\342\011\174\320\024\121\036\172\263\043\257\372\321\141\052
\145\265\001\331\270\343\007\312\044\166\322\360\112\276\357\206
\004\200\102\025\160\021\150\176\327\307\273\376\347\116\233\234
\225\245\034\112\244\311\320\011\214\252\316\110\322\036\222\227
\327\021\351\355\146\314\067\334\365\327\033\164\233\246\352\102
\254\135\062\340\130\364\201\107\377\322\022\342\176\034\334\111
\166\226\303\035\237\113\312\134\052\067\133\075\212\321\070\233
\041\332\343\277\105\103\323\340\130\167\037\050
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "LAWtrust

```
 Root CA2 (4096)"
# Issuer: CN=LAWtrust Root CA2 (4096),O=LAWtrust,C=ZA
# Serial Number: 1427795633 (0x551a6eb1)
# Subject: CN=LAWtrust Root CA2 (4096),O=LAWtrust,C=ZA
# Not Valid Before: Tue Feb 14 09:19:38 2023
# Not Valid After : Fri Feb 14 09:49:38 2053
# Fingerprint (SHA-256):
48:E1:CF:9E:43:B6:88:A5:10:44:16:0F:46:D7:73:B8:27:7F:E4:5B:EA:AD:0E:4D:F9:0D:19:74:38:2F:EA:99
# Fingerprint (SHA1): EC:A2:D5:30:A9:AB:2C:7D:0E:75:61:64:4E:0A:E0:16:A1:54:38:7D
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "LAWtrust Root CA2 (4096)"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\354\242\325\060\251\253\054\175\016\165\141\144\116\012\340\026
\241\124\070\175
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\257\035\306\323\105\305\353\365\246\141\043\060\075\056\021\261
END
CKA_ISSUER MULTILINE_OCTAL
\060\103\061\013\060\011\006\003\125\004\006\023\002\132\101\061
\021\060\017\006\003\125\004\012\023\010\114\101\127\164\162\165
\163\164\061\041\060\037\006\003\125\004\003\023\030\114\101\127
\164\162\165\163\164\040\122\157\157\164\040\103\101\062\040\050
\064\060\071\066\051
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\004\125\032\156\261
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Sectigo Public Email Protection Root E46"
#
# Issuer: CN=Sectigo Public Email Protection Root E46,O=Sectigo Limited,C=GB
# Serial Number:6e:f5:d3:a7:41:8e:a0:59:40:a7:30:6b:d2:40:65:56
# Subject: CN=Sectigo Public Email Protection Root E46,O=Sectigo Limited,C=GB
# Not Valid Before: Mon Mar 22 00:00:00 2021
# Not Valid After : Wed Mar 21 23:59:59 2046
# Fingerprint (SHA-256):
22:D9:59:92:34:D6:0F:1D:4B:C7:C7:E9:6F:43:FA:55:5B:07:30:1F:D4:75:17:50:89:DA:FB:8C:25:E4:77:B3
# Fingerprint (SHA1): 3A:C5:C3:78:34:5B:E1:82:92:46:ED:17:86:B3:93:91:7B:51:F2:14
```

CKA_CLASS
CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Sectigo Public Email Protection Root E46"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\030\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147
\157\040\114\151\155\151\164\145\144\061\061\060\057\006\003\125
\004\003\023\050\123\145\143\164\151\147\157\040\120\165\142\154
\151\143\040\105\155\141\151\154\040\120\162\157\164\145\143\164
\151\157\156\040\122\157\157\164\040\105\064\066
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\030\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147
\157\040\114\151\155\151\164\145\144\061\061\060\057\006\003\125
\004\003\023\050\123\145\143\164\151\147\157\040\120\165\142\154
\151\143\040\105\155\141\151\154\040\120\162\157\164\145\143\164
\151\157\156\040\122\157\157\164\040\105\064\066
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\156\365\323\247\101\216\240\131\100\247\060\153\322\100
\145\126
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\061\060\202\001\267\240\003\002\001\002\002\020\156
\365\323\247\101\216\240\131\100\247\060\153\322\100\145\126\060
\012\006\010\052\206\110\316\075\004\003\003\060\132\061\013\060
\011\006\003\125\004\006\023\002\107\102\061\030\060\026\006\003
\125\004\012\023\017\123\145\143\164\151\147\157\040\114\151\155
\151\164\145\144\061\061\060\057\006\003\125\004\003\023\050\123
\145\143\164\151\147\157\040\120\165\142\154\151\143\040\105\155
\141\151\154\040\120\162\157\164\145\143\164\151\157\156\040\122
\157\157\164\040\105\064\066\060\036\027\015\062\061\060\063\062
\062\060\060\060\060\060\060\132\027\015\064\066\060\063\062\061
\062\063\065\071\065\071\132\060\132\061\013\060\011\006\003\125
\004\006\023\002\107\102\061\030\060\026\006\003\125\004\012\023
\017\123\145\143\164\151\147\157\040\114\151\155\151\164\145\144
\061\061\060\057\006\003\125\004\003\023\050\123\145\143\164\151
\147\157\040\120\165\142\154\151\143\040\105\155\141\151\154\040
\120\162\157\164\145\143\164\151\157\156\040\122\157\157\164\040
\105\064\066\060\166\060\020\006\007\052\206\110\316\075\002\001
\006\005\053\201\004\000\042\003\142\000\004\270\247\122\224\365

\076\005\260\033\366\037\261\323\176\271\344\005\146\124\200\316
\154\245\150\175\344\123\122\333\202\372\304\206\337\103\170\367
\310\255\026\274\077\170\062\313\153\323\111\326\104\345\263\176
\237\173\246\306\054\362\342\266\323\211\260\232\074\113\316\211
\113\306\306\313\072\111\140\017\106\274\155\116\172\234\311\233
\205\173\012\266\260\107\302\210\343\324\321\243\102\060\100\060
\035\006\003\125\035\016\004\026\004\024\055\116\214\247\302\043
\262\127\251\006\153\076\153\053\211\363\303\136\107\316\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\012\006\010\052\206\110\316\075\004\003\003\003\150\000\060\145
\002\061\000\222\235\032\131\143\105\130\216\033\026\344\175\172
\154\066\110\060\037\053\162\347\220\063\064\375\044\242\306\006
\214\157\073\062\127\132\370\376\306\111\022\123\232\331\020\262
\231\121\162\002\060\005\045\052\063\041\374\223\346\042\242\314
\160\125\050\065\126\242\007\304\041\204\043\032\114\114\231\120
\231\222\024\313\112\334\126\373\365\323\217\152\054\365\161\072
\370\213\073\003\236
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Sectigo Public Email Protection Root E46"
# Issuer: CN=Sectigo Public Email Protection Root E46,O=Sectigo Limited,C=GB
# Serial Number:6e:f5:d3:a7:41:8e:a0:59:40:a7:30:6b:d2:40:65:56
# Subject: CN=Sectigo Public Email Protection Root E46,O=Sectigo Limited,C=GB
# Not Valid Before: Mon Mar 22 00:00:00 2021
# Not
Valid After : Wed Mar 21 23:59:59 2046
# Fingerprint (SHA-256):
22:D9:59:92:34:D6:0F:1D:4B:C7:C7:E9:6F:43:FA:55:5B:07:30:1F:D4:75:17:50:89:DA:FB:8C:25:E4:77:B3
# Fingerprint (SHA1): 3A:C5:C3:78:34:5B:E1:82:92:46:ED:17:86:B3:93:91:7B:51:F2:14
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Sectigo Public Email Protection Root E46"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\072\305\303\170\064\133\341\202\222\106\355\027\206\263\223\221
\173\121\362\024
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\271\032\257\054\211\226\100\140\047\006\073\241\177\335\211\323
END
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\107\102\061

\030\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147
\157\040\114\151\155\151\164\145\144\061\061\060\057\006\003\125
\004\003\023\050\123\145\143\164\151\147\157\040\120\165\142\154
\151\143\040\105\155\141\151\154\040\120\162\157\164\145\143\164
\151\157\156\040\122\157\157\164\040\105\064\066
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\156\365\323\247\101\216\240\131\100\247\060\153\322\100
\145\126
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Sectigo Public Email Protection Root R46"
#
# Issuer: CN=Sectigo Public Email Protection Root R46,O=Sectigo Limited,C=GB
# Serial Number:1d:44:9e:b9:0d:83:91:74:ae:dd:f2:eb:88:b7:a6:a3
# Subject: CN=Sectigo Public Email Protection Root R46,O=Sectigo Limited,C=GB
# Not Valid Before: Mon Mar 22 00:00:00 2021
# Not Valid After : Wed Mar 21 23:59:59 2046
# Fingerprint (SHA-256):
D5:91:7A:77:91:EB:7C:F2:0A:2E:57:EB:98:28:4A:67:B2:8A:57:E8:91:82:DA:53:D5:46:67:8C:9F:DE:2B:4F
# Fingerprint (SHA1): D3:7B:8B:0A:E8:42:44:FB:6B:80:38:EE:AE:91:80:26:1A:48:70:66
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN
CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Sectigo Public Email Protection Root R46"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\030\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147
\157\040\114\151\155\151\164\145\144\061\061\060\057\006\003\125
\004\003\023\050\123\145\143\164\151\147\157\040\120\165\142\154
\151\143\040\105\155\141\151\154\040\120\162\157\164\145\143\164
\151\157\156\040\122\157\157\164\040\122\064\066
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\030\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147
\157\040\114\151\155\151\164\145\144\061\061\060\057\006\003\125
\004\003\023\050\123\145\143\164\151\147\157\040\120\165\142\154

\151\143\040\105\155\141\151\154\040\120\162\157\164\145\143\164
\151\157\156\040\122\157\157\164\040\122\064\066
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\035\104\236\271\015\203\221\164\256\335\362\353\210\267
\246\243
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\200\060\202\003\150\240\003\002\001\002\002\020\035
\104\236\271\015\203\221\164\256\335\362\353\210\267\246\243\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\132
\061\013\060\011\006\003\125\004\006\023\002\107\102\061\030\060
\026\006\003\125\004\012\023\017\123\145\143\164\151\147\157\040
\114\151\155\151\164\145\144\061\061\060\057\006\003\125\004\003
\023\050\123\145\143\164\151\147\157\040\120\165\142\154\151\143
\040\105\155\141\151\154\040\120\162\157\164\145\143\164\151\157
\156\040\122\157\157\164\040\122\064\066\060\036\027\015\062\061
\060\063\062\062\060\060\060\060\060\060\132\027\015\064\066\060
\063\062\061\062\063\065\071\065\071\132\060\132\061\013\060\011
\006\003\125\004\006\023\002\107\102\061\030\060\026\006\003\125
\004\012\023\017\123\145\143\164\151\147\157\040\114\151\155\151
\164\145\144\061\061\060\057\006\003\125\004\003\023\050\123\145
\143\164\151\147\157\040\120\165\142\154\151\143\040\105\155\141
\151\154\040\120\162\157\164\145\143\164\151\157\156\040\122\157
\157\164\040\122\064\066\060\202\002\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202
\002\012\002\202\002\001\000\221\345\033\372\252\155\067\053\165
\307\056\137\024\245\333\054\227\266\054\106\217\151\331\354\226
\055\363\035\132\276\323\035\043\346\150\011\377\112\021\163\032
\256\147\237\166\232\322\347\354\270\331\137\053\371\046\126\121
\257\166\235\251\374\027\357\062\012\320\043\074\272\054\117\107
\203\354\235\005\150\102\136\006\340\325\350\053\150\110\227\262
\372\363\244\161\065\175\064\233\027\213\177\115\015\333\334\117
\005\114\224\142\277\065\372\057\310\247\034\146\331\161\137\345
\346\132\125\312\253\364\270\167\031\105\120\105\116\112\253\333
\236\146\301\031\267\067\102\310\126\245\100\022\371\063\350\070
\105\072\306\204\243\002\216\057\044\260\303\101\205\007\111\234
\317\334\321\362\046\157\355\063\034\063\147\052\105\067\331\205
\145\042\032\261\265\020\122\011\153\003\306\037\160\075\221\304
\175\220\075\355\146\370\220\377\045\340\355\222\242\213\061\051
\255\234\022\146\170\143\235\127\354\373\013\336\216\334\213\313
\072\251\167\364\272\345\354\070\214\213\346\023\146\247\151\130
\303\202\032\032\315\361\237\330\123\222\116\111\175\251\105\347
\361\103\041\132\267\076\100\315\143\211\317\331\277\307\120\013
\341\274\347\210\226\255\236\324\027\332\135\317\340\221\375\246
\020\324\271\003\201\233\151\254\373\204\250\201\065\353\033\353
\150\154\174\140\076\303\337\311\264\256\164\035\110\255\335\156

\021\206\341\052\152\066\026\256\310\316\274\333\130\374\100\223
\100\330\216\123\227\302\254\042\070\345\210\061\263\056\241\357
\354\340\102\015\352\377\223\126\112\006\244\233\114\002\150\144
\217\126\120\301\201\005\375\313\333\305\327\025\362\153\265\166
\303\243\371\062\316\312\265\112\251\033\175\031\334\177\307\152
\176\225\354\266\270\215\375\225\112\234\243\053\155\213\361\160
\345\107\053\000\134\344\271\236\324\370\331\130\051\320\313\340
\050\142\154\256\234\142\342\314\274\066\223\101\365\357\376\106
\142\225\260\127\112\164\054\107\122\051\235\335\242\241\117\102
\302\222\316\055\120\122\136\214\012\241\367\330\235\305\370\375
\066\207\116\127\375\150\241\137\231\203\034\360\265\335\350\222
\323\145\100\125\312\226\205\002\003\001\000\001\243\102\060\100
\060\035\006\003\125\035\016\004\026\004\024\247\327\225\167\353
\112\303\047\315\223\276\067\114\046\204\041\024\175\135\230\060
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\015\006\011\052\206\110\206\367\015\001\001\014\005\000\003
\202\002\001\000\064\322\361\025\363\223\001\324\162\213\360\253
\010\037\023\074\163\264\260\253\350\170\331\154\272\232\257\046
\354\020\200\345\015\123\061\335\343\372\214\121\042\044\063\067
\270\030\176\072\372\130\350\064\345\214\340\241\037\011\101\322
\067\077\314\313\011\065\102\210\351\374\021\327\317\102\252\244
\160\266\161\301\123\275\305\164\257\304\042\044\143\317\142\202
\175\311\313\121\301\210\220\155\133\134\276\373\231\250\272\266
\206\260\351\146\013\345\033\153\257\352\053\206\247\337\250\043
\114\226\077\117\127\102\030\025\203\103\361\206\046\267\052\003
\316\013\235\350\245\150\036\214\157\275\205\343\033\121\217\347
\027\057\053\320\326\170\302\055\335\162\210\324\145\236\372\231
\324\176\347\227\012\222\001\232\245\251\204\072\014\052\164\075
\063\030\310\207\367\350\244\365\206\102\071\375\153\165\051\374
\000\006\254\242\245\032\124\216\351\120\111\027\146\257\113\004
\055\233\224\200\245\124\253\214\127\027\104\237\017\326\150\144
\162\264\113\036\001\307\331\233\224\331\203\231\257\022\005\021
\243\230\042\322\362\127\312\044\371\272\070\025\022\110\272\143
\073\374\213\225\170\326\162\007\126\314\315\374\235\034\320\305
\144\073\143\064\317\004\231\212\267\060\171\172\266\362\306\325
\331\124\172\207\013\176\116\367\204\354\024\363\210\026\022\361
\325\256\012\032\011\356\206\255\345\253\375\256\303\051\171\164
\303\001\137\021\233\337\165\231\306\112\367\233\217\154\111\354
\041\057\264\002\131\263\055\320\162\220\272\013\024\164\170\113
\317\301\137\125\162\216\124\053\023\316\372\130\014\323\273\054
\331\251\221\141\370\370\361\266\173\336\274\251\314\222\004\314
\113\153\137\163\200\266\041\355\120\117\327\166\207\156\316\337
\322\267\275\142\241\175\130\142\150\105\122\266\077\336\022\333
\355\004\151\236\166\210\252\001\155\332\206\307\140\033\303\122
\254\067\354\120\161\200\162\052\041\105\012\123\107\074\031\353
\215\322\131\004\336\045\260\353\037\065\157\140\175\327\265\306
\273\013\047\215\340\115\124\345\317\035\046\001\156\073\065\310

\040\022\211\203\360\322\355\130\073\064\235\273\061\365\062\375
\061\363\126\032
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER
 CK_BBOOL CK_FALSE

# Trust for "Sectigo Public Email Protection Root R46"
# Issuer: CN=Sectigo Public Email Protection Root R46,O=Sectigo Limited,C=GB
# Serial Number:1d:44:9e:b9:0d:83:91:74:ae:dd:f2:eb:88:b7:a6:a3
# Subject: CN=Sectigo Public Email Protection Root R46,O=Sectigo Limited,C=GB
# Not Valid Before: Mon Mar 22 00:00:00 2021
# Not Valid After : Wed Mar 21 23:59:59 2046
# Fingerprint (SHA-256):
D5:91:7A:77:91:EB:7C:F2:0A:2E:57:EB:98:28:4A:67:B2:8A:57:E8:91:82:DA:53:D5:46:67:8C:9F:DE:2B:4F
# Fingerprint (SHA1): D3:7B:8B:0A:E8:42:44:FB:6B:80:38:EE:AE:91:80:26:1A:48:70:66
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Sectigo Public Email Protection Root R46"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\323\173\213\012\350\102\104\373\153\200\070\356\256\221\200\046
\032\110\160\146
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\102\047\005\220\034\246\300\373\242\015\375\337\142\211\335\133
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\030\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147
\157\040\114\151\155\151\164\145\144\061\061\060\057\006\003\125
\004\003\023\050\123\145\143\164\151\147\157\040\120\165\142\154
\151\143\040\105\155\141\151\154\040\120\162\157\164\145\143\164
\151\157\156\040\122\157\157\164\040\122\064\066
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\035\104\236\271\015\203\221\164\256\335\362\353\210\267
\246\243
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

```
#
# Certificate "Sectigo Public Server Authentication Root E46"
#
# Issuer: CN=Sectigo Public Server Authentication Root E46,O=Sectigo Limited,C=GB
# Serial Number:42:f2:cc:da:1b:69:37:44:5f:15:fe:75:28:10:b8:f4
# Subject: CN=Sectigo
 Public Server Authentication Root E46,O=Sectigo Limited,C=GB
# Not Valid Before: Mon Mar 22 00:00:00 2021
# Not Valid After : Wed Mar 21 23:59:59 2046
# Fingerprint (SHA-256):
C9:0F:26:F0:FB:1B:40:18:B2:22:27:51:9B:5C:A2:B5:3E:2C:A5:B3:BE:5C:F1:8E:FE:1B:EF:47:38:0C:53:83
# Fingerprint (SHA1): EC:8A:39:6C:40:F0:2E:BC:42:75:D4:9F:AB:1C:1A:5B:67:BE:D2:9A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Sectigo Public Server Authentication Root E46"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\030\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147
\157\040\114\151\155\151\164\145\144\061\066\060\064\006\003\125
\004\003\023\055\123\145\143\164\151\147\157\040\120\165\142\154
\151\143\040\123\145\162\166\145\162\040\101\165\164\150\145\156
\164\151\143\141\164\151\157\156\040\122\157\157\164\040\105\064
\066
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\030\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147
\157\040\114\151\155\151\164\145\144\061\066\060\064\006\003\125
\004\003\023\055\123\145\143\164\151\147\157\040\120\165\142\154
\151\143\040\123\145\162\166\145\162\040\101\165\164\150\145\156
\164\151\143\141\164\151\157\156\040\122\157\157\164\040\105\064
\066
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\102\362\314\332\033\151\067\104\137\025\376\165\050\020
\270\364
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\072\060\202\001\301\240\003\002\001\002\002\020\102
\362\314\332\033\151\067\104\137\025\376\165\050\020\270\364\060
\012\006\010\052\206\110\316\075\004\003\003\060\137\061\013\060
\011\006\003\125\004\006\023\002\107\102\061\030\060\026\006\003
\125\004\012\023\017\123\145\143\164\151\147\157\040\114\151\155
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\151\164\145\144\061\066\060\064\006\003\125\004\003\023\055\123
\145\143\164\151\147\157\040\120\165\142\154\151\143\040\123\145
\162\166\145\162\040\101\165\164\150\145\156\164\151\143\141\164
\151\157\156\040\122\157\157\164\040\105\064\066\060\036\027\015
\062\061\060\063\062\062\060\060\060\060\060\060\132\027\015\064
\066\060\063\062\061\062\063\065\071\065\071\132\060\137\061\013
\060\011\006\003\125\004\006\023\002\107\102\061\030\060\026\006
\003\125\004\012\023\017\123\145\143\164\151\147\157\040\114\151
\155\151\164\145\144\061\066\060\064\006\003\125\004\003\023\055
\123\145\143\164\151\147\157\040\120\165\142\154\151\143\040\123
\145\162\166\145\162\040\101\165\164\150\145\156\164\151\143\141
\164\151\157\156\040\122\157\157\164\040\105\064\066\060\166\060
\020\006\007\052\206\110\316\075\002\001\006\005\053\201\004\000
\042\003\142\000\004\166\372\231\251\156\040\355\371\327\167\343
\007\073\250\333\075\137\070\350\253\125\246\126\117\326\110\352
\354\177\055\252\303\262\305\171\354\231\141\177\020\171\307\002
\132\371\004\067\365\064\065\053\167\316\177\040\217\122\243\000
\211\354\325\247\242\155\133\343\113\222\223\240\200\365\001\224
\334\360\150\007\036\315\356\376\045\122\265\040\103\034\033\376
\353\031\316\103\243\243\102\060\100\060\035\006\003\125\035\016
\004\026\004\024\321\042\332\114\131\361\113\137\046\070\252\235
\326\356\353\015\303\373\251\141\060\016\006\003\125\035\017\001
\001\377\004\004\003\002\001\206\060\017\006\003\125\035\023\001
\001\377\004\005\060\003\001\001\377\060\012\006\010\052\206\110
\316\075\004\003\003\003\147\000\060\144\002\060\047\356\244\132
\250\041\273\351\107\227\224\211\245\164\040\155\171\117\310\275
\223\136\130\030\373\055\032\000\152\311\270\075\320\244\117\104
\107\224\001\126\242\370\063\045\014\102\337\252\002\060\035\352
\341\056\210\056\341\371\247\035\002\062\116\362\237\154\125\164
\343\256\256\373\245\032\356\355\322\374\302\003\021\353\105\134
\140\020\075\134\177\231\003\133\155\124\110\001\212\163
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER
 CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Sectigo Public Server Authentication Root E46"
# Issuer: CN=Sectigo Public Server Authentication Root E46,O=Sectigo Limited,C=GB
# Serial Number:42:f2:cc:da:1b:69:37:44:5f:15:fe:75:28:10:b8:f4
# Subject: CN=Sectigo Public Server Authentication Root E46,O=Sectigo Limited,C=GB
# Not Valid Before: Mon Mar 22 00:00:00 2021
# Not Valid After : Wed Mar 21 23:59:59 2046
# Fingerprint (SHA-256):
C9:0F:26:F0:FB:1B:40:18:B2:22:27:51:9B:5C:A2:B5:3E:2C:A5:B3:BE:5C:F1:8E:FE:1B:EF:47:38:0C:53:83
# Fingerprint (SHA1): EC:8A:39:6C:40:F0:2E:BC:42:75:D4:9F:AB:1C:1A:5B:67:BE:D2:9A
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

```
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Sectigo Public Server Authentication Root E46"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\354\212\071\154\100\360\056\274\102\165\324\237\253\034\032\133
\147\276\322\232
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\050\043\370\262\230\134\067\026\073\076\106\023\116\260\263\001
END
CKA_ISSUER MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\030\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147
\157\040\114\151\155\151\164\145\144\061\066\060\064\006\003\125
\004\003\023\055\123\145\143\164\151\147\157\040\120\165\142\154
\151\143\040\123\145\162\166\145\162\040\101\165\164\150\145\156
\164\151\143\141\164\151\157\156\040\122\157\157\164\040\105\064
\066
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\102\362\314\332\033\151\067\104\137\025\376\165\050\020
\270\364
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Sectigo Public Server Authentication Root R46"
#
# Issuer: CN=Sectigo Public Server Authentication Root R46,O=Sectigo Limited,C=GB
# Serial
 Number:75:8d:fd:8b:ae:7c:07:00:fa:a9:25:a7:e1:c7:ad:14
# Subject: CN=Sectigo Public Server Authentication Root R46,O=Sectigo Limited,C=GB
# Not Valid Before: Mon Mar 22 00:00:00 2021
# Not Valid After : Wed Mar 21 23:59:59 2046
# Fingerprint (SHA-256):
7B:B6:47:A6:2A:EE:AC:88:BF:25:7A:A5:22:D0:1F:FE:A3:95:E0:AB:45:C7:3F:93:F6:56:54:EC:38:F2:5A:06
# Fingerprint (SHA1): AD:98:F9:F3:E4:7D:75:3B:65:D4:82:B3:A4:52:17:BB:6E:F5:E4:38
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Sectigo Public Server Authentication Root R46"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
```

CKA_SUBJECT MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\030\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147
\157\040\114\151\155\151\164\145\144\061\066\060\064\006\003\125
\004\003\023\055\123\145\143\164\151\147\157\040\120\165\142\154
\151\143\040\123\145\162\166\145\162\040\101\165\164\150\145\156
\164\151\143\141\164\151\157\156\040\122\157\157\164\040\122\064
\066
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\107\102\061
\030\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147
\157\040\114\151\155\151\164\145\144\061\066\060\064\006\003\125
\004\003\023\055\123\145\143\164\151\147\157\040\120\165\142\154
\151\143\040\123\145\162\166\145\162\040\101\165\164\150\145\156
\164\151\143\141\164\151\157\156\040\122\157\157\164\040\122\064
\066
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\165\215\375\213\256\174\007\000\372\251\045\247\341\307
\255\024
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\212\060\202\003\162\240\003\002\001\002\002\020\165
\215\375\213\256\174\007\000\372\251\045\247\341\307\255\024\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\137
\061\013\060\011\006\003\125\004\006\023\002\107\102\061\030\060
\026\006\003\125\004\012\023\017\123\145\143\164\151\147\157\040
\114\151\155\151\164\145\144\061\066\060\064\006\003\125\004\003
\023\055\123\145\143\164\151\147\157\040\120\165\142\154\151\143
\040\123\145\162\166\145\162\040\101\165\164\150\145\156\164\151
\143\141\164\151\157\156\040\122\157\157\164\040\122\064\066\060
\036\027\015\062\061\060\063\062\062\060\060\060\060\060\060\132
\027\015\064\066\060\063\062\061\062\063\065\071\065\071\132\060
\137\061\013\060\011\006\003\125\004\006\023\002\107\102\061\030
\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147\157
\040\114\151\155\151\164\145\144\061\066\060\064\006\003\125\004
\003\023\055\123\145\143\164\151\147\157\040\120\165\142\154\151
\143\040\123\145\162\166\145\162\040\101\165\164\150\145\156\164
\151\143\141\164\151\157\156\040\122\157\157\164\040\122\064\066
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001
\000\223\276\325\066\122\165\330\001\043\240\034\107\102\111\356
\143\266\267\041\375\304\225\325\110\053\046\174\024\123\020\332
\171\375\053\267\055\244\324\054\372\352\062\335\111\302\271\275
\017\110\075\173\132\230\124\257\236\135\061\164\117\007\374\120

\041\335\244\317\150\117\033\022\143\155\045\231\114\052\231\363
\110\060\141\372\201\174\036\247\010\112\334\076\053\034\037\030
\114\161\252\065\214\255\370\156\350\073\112\331\345\224\002\326
\211\204\023\252\155\310\117\063\314\120\226\067\222\063\334\137
\210\347\237\124\331\110\360\230\103\326\146\375\237\027\070\103
\305\001\121\013\327\343\043\017\024\135\133\024\347\113\276\335
\364\310\332\003\067\321\326\071\241\041\121\060\203\260\155\327
\060\116\226\133\221\360\160\044\253\277\105\201\144\103\015\275
\041\072\057\074\351\236\015\313\040\265\102\047\314\332\157\233
\356\144\060\220\071\315\223\145\201\041\061\265\043\120\063\067
\042\343\070\355\370\061\060\314\105\376\142\371\321\135\062\171
\102\207\337\152\314\126\031\100\115\316\252\273\371\265\166\111
\224\361\047\370\221\245\203\345\006\263\143\016\200\334\340\022
\125\200\246\073\146\264\071\207\055\310\360\320\321\024\351\344
\015\115\016\366\135\127\162\305\073\034\107\126\235\342\325\373
\201\141\214\314\115\200\220\064\133\267\327\024\165\334\330\004
\110\237\300\301\050\210\264\351\034\312\247\261\361\126\267\173
\111\114\131\345\040\025\250\204\002\051\372\070\224\151\232\111
\006\217\315\037\171\024\027\022\014\203\172\336\037\261\227\356
\371\227\170\050\244\310\104\222\351\175\046\005\246\130\162\233
\171\023\330\021\137\256\305\070\142\064\150\262\206\060\216\370
\220\141\236\062\154\365\007\066\315\242\114\156\354\212\066\355
\362\346\231\025\104\160\303\174\274\234\071\300\264\341\153\367
\203\045\043\127\331\022\200\345\111\360\165\017\357\215\353\034
\233\124\050\264\041\074\374\174\012\377\357\173\153\165\377\213
\035\240\031\005\253\372\370\053\201\102\350\070\272\273\373\252
\375\075\340\363\312\337\116\227\227\051\355\363\030\126\351\245
\226\254\275\303\220\230\262\340\371\242\324\246\107\103\174\155
\317\002\003\001\000\001\243\102\060\100\060\035\006\003\125\035
\016\004\026\004\024\126\163\130\144\225\371\222\032\260\022\052
\004\142\171\241\100\025\210\041\111\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\206\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\015\006\011\052\206
\110\206\367\015\001\001\014\005\000\003\202\002\001\000\057\134
\231\074\374\006\136\214\224\056\160\352\322\062\061\215\264\360
\121\325\274\012\363\144\237\007\136\325\301\163\150\144\172\242
\271\016\350\371\135\205\055\250\067\105\252\050\364\226\005\120
\140\251\111\176\237\342\231\066\051\023\104\107\152\235\125\040
\074\330\233\361\003\062\272\332\100\241\163\352\203\241\267\104
\246\016\231\001\233\344\274\177\276\023\224\176\312\246\036\166
\200\066\075\204\006\213\063\046\145\155\312\176\236\376\037\214
\130\070\173\032\203\261\017\274\027\021\273\346\006\314\143\372
\201\362\201\114\332\013\020\153\241\372\325\050\245\317\006\100
\026\377\173\175\030\136\071\022\244\123\236\176\062\102\020\246
\041\221\251\034\116\027\174\204\274\237\214\321\350\337\346\121
\271\066\107\077\220\271\307\274\002\334\133\034\117\016\110\301
\045\203\234\012\077\236\261\003\063\022\032\047\254\367\042\154
\044\321\001\101\370\130\003\376\045\150\042\037\232\132\074\174

\154\236\165\110\363\201\361\146\147\156\114\202\300\356\272\127
\016\030\357\056\232\367\022\330\240\153\351\005\245\241\351\150
\370\274\114\077\022\036\105\350\122\300\243\277\022\047\171\271
\314\061\074\303\366\072\042\026\003\240\311\217\146\244\133\242
\115\326\201\045\006\351\166\244\000\012\076\313\315\065\233\340
\341\070\313\140\123\206\050\102\101\034\104\127\350\250\255\253
\105\343\045\020\274\333\076\145\101\373\033\246\227\017\353\271
\164\171\371\036\274\035\127\015\107\257\303\057\237\207\106\247
\353\046\132\017\126\143\265\142\140\156\000\373\343\047\021\042
\347\376\231\217\064\365\271\350\303\221\162\275\330\303\036\271
\056\362\221\104\121\320\127\315\014\064\325\110\041\277\333\023
\361\146\045\103\122\322\160\042\066\315\237\304\034\165\040\255
\143\162\143\006\017\016\047\316\322\152\015\274\265\071\032\351
\321\166\172\321\134\344\347\111\111\055\125\067\150\360\032\072
\230\076\124\027\207\124\351\246\047\120\211\173\040\057\077\377
\277\241\213\112\107\230\377\053\173\111\076\303\051\106\140\030
\102\253\063\051\272\300\051\271\023\211\323\210\212\071\101\073
\311\375\246\355\037\364\140\143\337\322\055\125\001\213
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Sectigo Public Server Authentication Root R46"
# Issuer: CN=Sectigo Public Server Authentication Root R46,O=Sectigo Limited,C=GB
# Serial Number:75:8d:fd:8b:ae:7c:07:00:fa:a9:25:a7:e1:c7:ad:14
# Subject: CN=Sectigo Public Server Authentication Root R46,O=Sectigo Limited,C=GB
# Not Valid Before: Mon Mar 22 00:00:00 2021
# Not Valid After : Wed Mar 21 23:59:59 2046
# Fingerprint
(SHA-256):
7B:B6:47:A6:2A:EE:AC:88:BF:25:7A:A5:22:D0:1F:FE:A3:95:E0:AB:45:C7:3F:93:F6:56:54:EC:38:F2:5A:06
# Fingerprint (SHA1): AD:98:F9:F3:E4:7D:75:3B:65:D4:82:B3:A4:52:17:BB:6E:F5:E4:38
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Sectigo Public Server Authentication Root R46"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\255\230\371\363\344\175\165\073\145\324\202\263\244\122\027\273
\156\365\344\070
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\062\020\011\122\000\325\176\154\103\337\025\300\261\026\223\345
END
CKA_ISSUER MULTILINE_OCTAL
\060\137\061\013\060\011\006\003\125\004\006\023\002\107\102\061

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\030\060\026\006\003\125\004\012\023\017\123\145\143\164\151\147
\157\040\114\151\155\151\164\145\144\061\066\060\064\006\003\125
\004\003\023\055\123\145\143\164\151\147\157\040\120\165\142\154
\151\143\040\123\145\162\166\145\162\040\101\165\164\150\145\156
\164\151\143\141\164\151\157\156\040\122\157\157\164\040\122\064
\066
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\165\215\375\213\256\174\007\000\372\251\045\247\341\307
\255\024
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "SSL.com TLS RSA Root CA 2022"
#
# Issuer: CN=SSL.com TLS RSA Root CA 2022,O=SSL Corporation,C=US
# Serial Number:6f:be:da:ad:73:bd:08:40:e2:8b:4d:be:d4:f7:5b:91
# Subject: CN=SSL.com TLS RSA Root CA 2022,O=SSL Corporation,C=US
# Not Valid Before: Thu Aug 25 16:34:22 2022
# Not Valid After : Sun Aug 19 16:34:21 2046
# Fingerprint (SHA-256):
8F:AF:7D:2E:2C:B4:70:9B:B8:E0:B3:36:66:BF:75:A5:DD:45:B5:DE:48:0F:8E:A8:D4:BF:E6:BE:BC:17:F2:ED
# Fingerprint (SHA1): EC:2C:83:40:72:AF:26:95:10:FF:0E:F2:03:EE:31:70:F6:78:9D:CA
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
 CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com TLS RSA Root CA 2022"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\045\060\043\006\003\125
\004\003\014\034\123\123\114\056\143\157\155\040\124\114\123\040
\122\123\101\040\122\157\157\164\040\103\101\040\062\060\062\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\045\060\043\006\003\125
\004\003\014\034\123\123\114\056\143\157\155\040\124\114\123\040
```

\122\123\101\040\122\157\157\164\040\103\101\040\062\060\062\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\157\276\332\255\163\275\010\100\342\213\115\276\324\367
\133\221
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\211\060\202\003\161\240\003\002\001\002\002\020\157
\276\332\255\163\275\010\100\342\213\115\276\324\367\133\221\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\116
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\030\060
\026\006\003\125\004\012\014\017\123\123\114\040\103\157\162\160
\157\162\141\164\151\157\156\061\045\060\043\006\003\125\004\003
\014\034\123\123\114\056\143\157\155\040\124\114\123\040\122\123
\101\040\122\157\157\164\040\103\101\040\062\060\062\062\060\036
\027\015\062\062\060\070\062\065\061\066\063\064\062\062\132\027
\015\064\066\060\070\061\071\061\066\063\064\062\061\132\060\116
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\030\060
\026\006\003\125\004\012\014\017\123\123\114\040\103\157\162\160
\157\162\141\164\151\157\156\061\045\060\043\006\003\125\004\003
\014\034\123\123\114\056\143\157\155\040\124\114\123\040\122\123
\101\040\122\157\157\164\040\103\101\040\062\060\062\062\060\202
\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\320
\244\011\162\117\100\210\022\141\076\065\043\236\356\366\164\317
\057\173\130\075\316\074\015\020\050\220\057\227\367\214\110\330
\240\330\045\261\114\260\021\114\027\163\120\320\042\112\143\273
\201\323\051\156\325\265\011\076\046\030\177\262\022\177\223\230
\267\257\360\066\277\362\356\030\236\234\073\122\305\107\031\135
\164\363\144\146\325\135\307\150\264\277\033\034\006\243\274\217
\100\043\266\036\306\204\275\121\304\033\071\301\225\322\051\354
\113\256\173\055\277\071\375\264\142\336\226\173\101\306\234\240
\340\006\162\373\360\007\227\011\071\201\164\257\367\064\131\021
\127\012\302\133\301\044\364\061\163\060\202\306\235\272\002\367
\076\174\104\137\203\015\363\361\335\040\151\026\011\120\342\324
\125\266\340\200\162\166\156\114\107\267\165\125\131\264\123\164
\331\224\306\101\255\130\212\061\146\017\036\242\033\051\100\116
\057\337\173\346\026\054\055\374\277\354\363\264\372\276\030\366
\233\111\324\356\005\156\331\064\363\234\361\354\001\213\321\040
\306\017\240\265\274\027\116\110\173\121\302\374\351\134\151\067
\107\146\263\150\370\025\050\360\271\323\244\025\314\132\117\272
\122\160\243\022\105\335\306\272\116\373\302\320\367\250\122\047
\155\156\171\265\214\374\173\214\301\026\114\356\200\177\276\360
\166\276\101\123\022\063\256\132\070\102\253\327\017\076\101\215
\166\007\062\325\253\211\366\116\147\331\261\102\165\043\156\363
\315\102\262\374\125\365\123\207\027\073\300\063\130\361\122\322
\371\200\244\360\350\360\073\213\070\314\244\306\220\177\017\234
\375\213\321\243\317\332\203\247\151\311\120\066\325\134\005\322

\012\101\164\333\143\021\067\301\245\240\226\113\036\214\026\022
\167\256\224\064\173\036\177\302\146\000\344\252\203\352\212\220
\255\316\066\104\115\321\121\351\274\037\363\152\005\375\300\164
\037\045\031\100\121\156\352\202\121\100\337\233\271\010\052\006
\002\325\043\034\023\326\351\333\333\306\260\172\313\173\047\233
\373\340\325\106\044\355\020\113\143\113\245\005\217\272\270\035
\053\246\372\221\342\222\122\275\354\353\147\227\155\232\055\237
\201\062\005\147\062\373\110\010\077\331\045\270\004\045\057\002
\003\001\000\001\243\143\060\141\060\017\006\003\125\035\023\001
\001\377\004\005\060\003\001\001\377\060\037\006\003\125\035\043
\004\030\060\026\200\024\373\056\067\356\343\204\172\047\056\315
\031\065\261\063\174\377\324\104\102\271\060\035\006\003\125\035
\016\004\026\004\024\373\056\067\356\343\204\172\047\056\315\031
\065\261\063\174\377\324\104\102\271\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\206\060\015\006\011\052\206\110
\206\367\015\001\001\013\005\000\003\202\002\001\000\215\211\155
\204\105\030\361\117\263\240\357\150\244\300\035\254\060\274\147
\146\260\232\315\266\253\042\031\146\323\073\101\265\020\235\020
\272\162\156\051\044\040\034\001\231\142\323\226\340\342\373\014
\102\327\341\132\304\226\115\124\315\217\312\103\123\375\052\270
\352\370\145\312\001\302\255\140\150\006\237\071\032\121\331\340
\215\046\371\013\116\245\123\045\172\043\244\034\316\010\033\337
\107\210\262\255\076\340\047\207\213\111\214\037\251\107\130\173
\226\362\210\035\030\256\263\321\246\012\224\372\333\323\345\070
\012\153\171\022\063\373\112\131\067\026\100\016\273\336\365\211
\014\361\154\323\367\121\153\136\065\365\333\300\046\352\022\163
\116\251\221\220\246\027\303\154\057\070\324\243\162\224\103\054
\142\341\116\134\062\075\275\114\175\031\107\242\303\111\347\226
\077\217\232\323\073\344\021\330\213\003\334\366\266\140\125\030
\246\201\121\363\341\250\025\152\353\340\013\360\024\061\326\271
\214\105\072\250\020\330\360\271\047\353\367\313\172\357\005\162
\226\265\304\217\226\163\304\350\126\163\234\274\151\121\143\274
\357\147\034\103\032\137\167\031\037\030\370\034\045\051\371\111
\231\051\266\222\075\242\203\067\261\040\221\250\233\060\351\152
\154\264\043\223\145\004\253\021\363\016\035\123\044\111\123\035
\241\077\235\110\222\021\342\175\015\117\365\327\275\242\130\076
\170\235\036\037\053\376\041\273\032\023\266\261\050\144\375\260
\002\000\307\154\200\242\275\026\120\040\017\162\201\137\314\224
\377\273\231\346\272\220\313\352\371\306\014\302\256\305\031\316
\063\241\153\134\273\176\174\064\127\027\255\360\077\256\315\352
\257\231\354\054\124\176\214\316\056\022\126\110\357\027\073\077
\112\136\140\322\334\164\066\274\245\103\143\313\017\133\243\002
\126\011\236\044\054\341\206\201\214\376\253\027\054\372\310\342
\062\032\072\377\205\010\311\203\237\362\112\110\020\124\167\067
\355\242\274\100\276\344\020\164\367\344\133\273\271\363\211\371
\217\101\330\307\344\120\220\065\200\076\034\270\115\220\323\324
\367\303\260\241\176\204\312\167\222\061\054\270\220\261\202\172
\164\116\233\023\046\264\325\120\146\124\170\256\140

```
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "SSL.com TLS RSA Root CA 2022"
# Issuer: CN=SSL.com TLS RSA Root CA 2022,O=SSL
 Corporation,C=US
# Serial Number:6f:be:da:ad:73:bd:08:40:e2:8b:4d:be:d4:f7:5b:91
# Subject: CN=SSL.com TLS RSA Root CA 2022,O=SSL Corporation,C=US
# Not Valid Before: Thu Aug 25 16:34:22 2022
# Not Valid After : Sun Aug 19 16:34:21 2046
# Fingerprint (SHA-256):
8F:AF:7D:2E:2C:B4:70:9B:B8:E0:B3:36:66:BF:75:A5:DD:45:B5:DE:48:0F:8E:A8:D4:BF:E6:BE:BC:17:F2:ED
# Fingerprint (SHA1): EC:2C:83:40:72:AF:26:95:10:FF:0E:F2:03:EE:31:70:F6:78:9D:CA
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com TLS RSA Root CA 2022"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\354\054\203\100\162\257\046\225\020\377\016\362\003\356\061\160
\366\170\235\312
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\330\116\306\131\060\330\376\240\326\172\132\054\054\151\170\332
END
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\045\060\043\006\003\125
\004\003\014\034\123\123\114\056\143\157\155\040\124\114\123\040
\122\123\101\040\122\157\157\164\040\103\101\040\062\060\062\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\157\276\332\255\163\275\010\100\342\213\115\276\324\367
\133\221
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "SSL.com TLS ECC Root CA 2022"
#
```

```
# Issuer: CN=SSL.com TLS ECC Root CA 2022,O=SSL Corporation,C=US
# Serial Number:14:03:f5:ab:fb:37:8b:17:40:5b:e2:43:b2:a5:d1:c4
# Subject: CN=SSL.com TLS ECC Root CA 2022,O=SSL Corporation,C=US
# Not Valid Before: Thu Aug 25 16:33:48 2022
# Not Valid After : Sun Aug 19 16:33:47 2046
# Fingerprint (SHA-256):
C3:2F:FD:9F:46:F9:36:D1:6C:36:73:99:09:59:43:4B:9A:D6:0A:AF:BB:9E:7C:F3:36:54:F1:44:CC:1B:A1:43
# Fingerprint
 (SHA1): 9F:5F:D9:1A:54:6D:F5:0C:71:F0:EE:7A:BD:17:49:98:84:73:E2:39
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com TLS ECC Root CA 2022"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\045\060\043\006\003\125
\004\003\014\034\123\123\114\056\143\157\155\040\124\114\123\040
\105\103\103\040\122\157\157\164\040\103\101\040\062\060\062\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\045\060\043\006\003\125
\004\003\014\034\123\123\114\056\143\157\155\040\124\114\123\040
\105\103\103\040\122\157\157\164\040\103\101\040\062\060\062\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\024\003\365\253\373\067\213\027\100\133\342\103\262\245
\321\304
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\072\060\202\001\300\240\003\002\001\002\002\020\024
\003\365\253\373\067\213\027\100\133\342\103\262\245\321\304\060
\012\006\010\052\206\110\316\075\004\003\003\060\116\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\030\060\026\006\003
\125\004\012\014\017\123\123\114\040\103\157\162\160\157\162\141
\164\151\157\156\061\045\060\043\006\003\125\004\003\014\034\123
\123\114\056\143\157\155\040\124\114\123\040\105\103\103\040\122
\157\157\164\040\103\101\040\062\060\062\062\060\036\027\015\062
\062\060\070\062\065\061\066\063\063\064\070\132\027\015\064\066
\060\070\061\071\061\066\063\063\064\067\132\060\116\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\030\060\026\006\003
\125\004\012\014\017\123\123\114\040\103\157\162\160\157\162\141
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\164\151\157\156\061\045\060\043\006\003\125\004\003\014\034\123
\123\114\056\143\157\155\040\124\114\123\040\105\103\103\040\122
\157\157\164\040\103\101\040\062\060\062\062\060\166\060\020\006
\007\052\206\110\316\075\002\001\006\005\053\201\004\000\042\003
\142\000\004\105\051\065\163\372\302\270\043\316\024\175\250\261
\115\240\133\066\356\052\054\123\303\140\011\065\262\044\146\046
\151\300\263\225\326\135\222\100\031\016\306\245\023\160\364\357
\022\121\050\135\347\314\275\371\074\205\301\317\224\220\311\053
\316\222\102\130\131\147\375\224\047\020\144\214\117\004\261\115
\111\344\173\117\233\365\347\010\370\003\210\367\247\303\222\113
\031\124\201\243\143\060\141\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\037\006\003\125\035\043\004
\030\060\026\200\024\211\217\057\243\350\053\240\024\124\173\363
\126\270\046\137\147\070\013\234\320\060\035\006\003\125\035\016
\004\026\004\024\211\217\057\243\350\053\240\024\124\173\363\126
\270\046\137\147\070\013\234\320\060\016\006\003\125\035\017\001
\001\377\004\004\003\002\001\206\060\012\006\010\052\206\110\316
\075\004\003\003\003\150\000\060\145\002\060\125\343\042\126\351
\327\222\044\130\117\036\224\062\017\014\002\066\302\375\254\164
\062\116\341\373\034\200\210\243\314\373\327\353\053\377\067\175
\360\355\327\236\165\152\065\166\122\105\340\002\061\000\307\215
\157\102\040\217\276\266\115\131\355\167\115\051\304\040\040\105
\144\206\072\120\306\304\255\055\223\365\030\175\162\355\251\317
\304\254\127\066\050\010\145\337\074\171\146\176\240\352
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "SSL.com TLS ECC Root CA 2022"
# Issuer: CN=SSL.com TLS ECC Root CA 2022,O=SSL Corporation,C=US
# Serial Number:14:03:f5:ab:fb:37:8b:17:40:5b:e2:43:b2:a5:d1:c4
# Subject: CN=SSL.com TLS ECC Root CA 2022,O=SSL Corporation,C=US
# Not Valid Before: Thu Aug 25 16:33:48 2022
# Not Valid After : Sun Aug 19 16:33:47 2046
# Fingerprint (SHA-256):
C3:2F:FD:9F:46:F9:36:D1:6C:36:73:99:09:59:43:4B:9A:D6:0A:AF:BB:9E:7C:F3:36:54:F1:44:CC:1B:A1:43
# Fingerprint (SHA1): 9F:5F:D9:1A:54:6D:F5:0C:71:F0:EE:7A:BD:17:49:98:84:73:E2:39
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com TLS ECC Root CA 2022"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\237\137\331\032\124\155\365\014\161\360\356\172\275\027\111\230
\204\163\342\071
END

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CKA_CERT_MD5_HASH MULTILINE_OCTAL
\231\327\134\361\121\066\314\351\316\331\031\056\167\161\126\305
END
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\045\060\043\006\003\125
\004\003\014\034\123\123\114\056\143\157\155\040\124\114\123\040
\105\103\103\040\122\157\157\164\040\103\101\040\062\060\062\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\024\003\365\253\373\067\213\027\100\133\342\103\262\245
\321\304
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "SSL.com Client ECC Root CA 2022"
#
# Issuer: CN=SSL.com Client ECC Root CA 2022,O=SSL Corporation,C=US
# Serial Number:76:f8:48:1e:ae:f0:3c:70:1f:e0:3f:25:54:01:83:d5
# Subject: CN=SSL.com Client ECC Root CA 2022,O=SSL Corporation,C=US
# Not Valid Before: Thu Aug 25 16:30:32 2022
# Not Valid After : Sun Aug 19 16:30:31 2046
# Fingerprint (SHA-256):
AD:7D:D5:8D:03:AE:DB:22:A3:0B:50:84:39:49:20:CE:12:23:0C:2D:80:17:AD:9B:81:AB:04:07:9B:DD:02:6B
# Fingerprint (SHA1): 80:7B:1D:9D:65:72:3D:C7:56:F9:EC:C5:00:83:49:F6:F2:AC:F4:86
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com Client ECC Root CA 2022"
CKA_CERTIFICATE_TYPE
 CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\050\060\046\006\003\125
\004\003\014\037\123\123\114\056\143\157\155\040\103\154\151\145
\156\164\040\105\103\103\040\122\157\157\164\040\103\101\040\062
\060\062\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
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\060\121\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\050\060\046\006\003\125
\004\003\014\037\123\123\114\056\143\157\155\040\103\154\151\145
\156\164\040\105\103\103\040\122\157\157\164\040\103\101\040\062
\060\062\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\166\370\110\036\256\360\074\160\037\340\077\045\124\001
\203\325
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\100\060\202\001\306\240\003\002\001\002\002\020\166
\370\110\036\256\360\074\160\037\340\077\045\124\001\203\325\060
\012\006\010\052\206\110\316\075\004\003\003\060\121\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\030\060\026\006\003
\125\004\012\014\017\123\123\114\040\103\157\162\160\157\162\141
\164\151\157\156\061\050\060\046\006\003\125\004\003\014\037\123
\123\114\056\143\157\155\040\103\154\151\145\156\164\040\105\103
\103\040\122\157\157\164\040\103\101\040\062\060\062\062\060\036
\027\015\062\062\060\070\062\065\061\066\063\060\063\062\132\027
\015\064\066\060\070\061\071\061\066\063\060\063\061\132\060\121
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\030\060
\026\006\003\125\004\012\014\017\123\123\114\040\103\157\162\160
\157\162\141\164\151\157\156\061\050\060\046\006\003\125\004\003
\014\037\123\123\114\056\143\157\155\040\103\154\151\145\156\164
\040\105\103\103\040\122\157\157\164\040\103\101\040\062\060\062
\062\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005
\053\201\004\000\042\003\142\000\004\055\123\176\237\213\076\263
\066\272\120\342\314\353\334\272\046\212\323\214\006\077\147\017
\357\365\027\345\324\256\232\106\052\101\001\007\151\347\147\161
\361\302\003\066\306\360\053\122\216\317\024\222\150\244\076\160
\121\022\151\215\170\242\202\312\051\024\300\344\224\042\262\104
\222\140\157\310\004\244\147\325\242\320\363\320\327\352\216\074
\017\272\322\100\107\220\064\356\175\243\143\060\141\060\017\006
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\037
\006\003\125\035\043\004\030\060\026\200\024\267\376\055\142\305
\201\123\315\122\032\057\135\140\240\303\135\373\262\034\034\060
\035\006\003\125\035\016\004\026\004\024\267\376\055\142\305\201
\123\315\122\032\057\135\140\240\303\135\373\262\034\034\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060\012
\006\010\052\206\110\316\075\004\003\003\003\150\000\060\145\002
\060\115\007\021\055\021\373\271\046\303\041\335\162\341\027\374
\301\317\024\352\111\316\161\207\216\326\123\334\021\315\135\124
\212\257\331\055\364\214\121\352\274\146\107\342\177\225\203\140
\145\002\061\000\214\041\114\117\273\345\260\120\337\220\142\111
\346\314\221\333\370\077\135\161\221\010\216\117\222\311\177\246
\134\352\023\176\355\155\304\350\303\052\157\134\021\341\245\363

```
\152\132\232\115
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "SSL.com Client ECC Root CA 2022"
# Issuer: CN=SSL.com Client ECC Root CA 2022,O=SSL Corporation,C=US
# Serial Number:76:f8:48:1e:ae:f0:3c:70:1f:e0:3f:25:54:01:83:d5
# Subject: CN=SSL.com Client ECC Root CA 2022,O=SSL Corporation,C=US
# Not Valid Before: Thu Aug 25 16:30:32 2022
# Not Valid After : Sun Aug 19 16:30:31 2046
# Fingerprint (SHA-256):
AD:7D:D5:8D:03:AE:DB:22:A3:0B:50:84:39:49:20:CE:12:23:0C:2D:80:17:AD:9B:81:AB:04:07:9B:DD:02:6B
# Fingerprint (SHA1): 80:7B:1D:9D:65:72:3D:C7:56:F9:EC:C5:00:83:49:F6:F2:AC:F4:86
CKA_CLASS CK_OBJECT_CLASS
 CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com Client ECC Root CA 2022"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\200\173\035\235\145\162\075\307\126\371\354\305\000\203\111\366
\362\254\364\206
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\063\271\151\231\022\166\125\274\337\257\101\334\042\213\167\200
END
CKA_ISSUER MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\050\060\046\006\003\125
\004\003\014\037\123\123\114\056\143\157\155\040\103\154\151\145
\156\164\040\105\103\103\040\122\157\157\164\040\103\101\040\062
\060\062\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\166\370\110\036\256\360\074\160\037\340\077\045\124\001
\203\325
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
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```
# Certificate "SSL.com Client RSA Root CA 2022"
#
# Issuer: CN=SSL.com Client RSA Root CA 2022,O=SSL Corporation,C=US
# Serial Number:76:af:ee:88:93:15:45:b6:50:53:9b:80:9c:a4:df:9a
# Subject: CN=SSL.com Client RSA Root CA 2022,O=SSL Corporation,C=US
# Not Valid Before: Thu Aug 25 16:31:07 2022
# Not Valid After : Sun Aug 19 16:31:06 2046
# Fingerprint (SHA-256):
1D:4C:A4:A2:AB:21:D0:09:36:59:80:4F:C0:EB:21:75:A6:17:27:9B:56:A2:47:52:45:C9:51:7A:FE:B5:91:53
# Fingerprint (SHA1): AA:59:70:E5:20:32:9F:CB:D0:D5:79:9F:FB:1B:82:1D:FD:1F:79:65
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com Client RSA Root CA 2022"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\050\060\046\006\003\125
\004\003\014\037\123\123\114\056\143\157\155\040\103\154\151\145
\156\164\040\122\123\101\040\122\157\157\164\040\103\101\040\062
\060\062\062
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\050\060\046\006\003\125
\004\003\014\037\123\123\114\056\143\157\155\040\103\154\151\145
\156\164\040\122\123\101\040\122\157\157\164\040\103\101\040\062
\060\062\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\166\257\356\210\223\025\105\266\120\123\233\200\234\244
\337\232
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\217\060\202\003\167\240\003\002\001\002\002\020\166
\257\356\210\223\025\105\266\120\123\233\200\234\244\337\232\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\121
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\030\060
\026\006\003\125\004\012\014\017\123\123\114\040\103\157\162\160
\157\162\141\164\151\157\156\061\050\060\046\006\003\125\004\003
\014\037\123\123\114\056\143\157\155\040\103\154\151\145\156\164
\040\122\123\101\040\122\157\157\164\040\103\101\040\062\060\062
\062\060\036\027\015\062\062\060\070\062\065\061\066\063\061\060
```

\067\132\027\015\064\066\060\070\061\071\061\066\063\061\060\066
\132\060\121\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103
\157\162\160\157\162\141\164\151\157\156\061\050\060\046\006\003
\125\004\003\014\037\123\123\114\056\143\157\155\040\103\154\151
\145\156\164\040\122\123\101\040\122\157\157\164\040\103\101\040
\062\060\062\062\060\202\002\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012
\002\202\002\001\000\270\130\333\106\060\373\311\077\343\310\360
\001\063\064\342\332\110\250\030\351\040\156\232\327\001\341\325
\051\217\060\264\043\152\344\313\142\260\276\342\237\040\275\076
\124\240\071\150\307\206\067\146\164\006\006\357\164\053\332\334
\237\204\251\122\057\220\322\356\176\174\373\245\042\255\157\160
\106\147\226\075\051\324\243\273\126\173\024\004\131\301\041\143
\104\036\262\037\022\134\220\207\145\015\210\366\036\210\042\342
\143\124\273\363\066\370\326\177\334\332\377\051\065\251\306\156
\016\151\133\077\330\276\202\207\025\160\135\260\307\134\022\017
\143\246\070\315\317\163\271\303\016\211\046\067\033\077\142\034
\062\151\321\233\331\377\125\220\061\336\261\143\335\317\305\164
\167\374\357\210\041\123\277\000\061\032\046\054\000\060\245\137
\154\343\344\366\000\212\312\230\207\234\164\003\172\213\146\354
\176\375\243\217\065\045\134\170\245\263\244\373\075\155\251\212
\360\154\210\202\213\375\112\320\157\344\327\243\264\216\064\111
\070\276\316\105\345\322\034\312\136\302\067\024\213\315\146\126
\063\067\235\345\153\354\103\222\144\240\102\332\165\157\300\025
\354\371\151\275\064\271\212\173\372\026\373\125\376\122\040\350
\004\004\126\126\145\365\067\104\230\310\212\106\351\267\254\270
\350\276\142\216\124\066\133\367\073\160\277\135\356\055\272\137
\336\102\031\206\360\177\213\353\010\313\330\276\352\016\102\102
\240\066\163\127\027\355\062\352\320\215\350\007\033\233\231\350
\304\232\142\004\016\110\367\074\022\272\367\130\301\232\214\351
\307\260\043\066\126\064\035\313\154\332\272\007\204\035\375\321
\254\237\346\302\211\357\303\271\154\030\263\151\207\127\137\265
\014\070\133\247\041\044\052\073\247\064\221\236\264\124\352\050
\117\323\301\243\213\344\346\053\325\362\235\277\233\141\000\042
\335\326\113\104\037\077\135\126\376\336\234\170\314\231\133\252
\344\275\272\333\103\113\255\114\046\114\243\115\064\212\154\164
\066\023\333\142\374\233\262\005\201\377\256\077\014\315\366\033
\242\364\071\347\312\365\114\134\373\124\167\065\200\132\300\022
\241\023\001\063\147\075\235\201\241\251\365\205\044\130\210\170
\347\364\343\150\125\002\003\001\000\001\243\143\060\141\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\037\006\003\125\035\043\004\030\060\026\200\024\360\070\102\224
\064\251\074\000\177\122\356\071\245\367\113\015\274\152\175\043
\060\035\006\003\125\035\016\004\026\004\024\360\070\102\224\064
\251\074\000\177\122\356\071\245\367\113\015\274\152\175\043\060
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202

\002\001\000\231\117\333\360\352\326\021\372\052\375\310\253\155
\344\016\163\142\322\102\237\025\376\174\160\122\077\144\207\202
\061\077\105\100\056\341\042\237\006\146\051\374\226\323\055\215
\266\070\307\331\363\047\301\131\051\240\214\366\163\044\017\050
\042\327\116\141\335\023\335\333\237\062\122\223\373\117\314\352
\070\074\230\152\003\253\026\257\041\321\102\256\175\105\053\352
\304\317\212\131\237\202\160\166\072\370\142\046\311\020\227\130
\100\044\244\055\271\057\051\200\047\341\211\153\162\312\111\010
\161\067\123\005\361\200\316\323\102\002\322\374\302\321\224\006
\356\007\342\366\203\342\177\237\347\273\126\303\133\277\335\225
\223\011\036\044\301\317\046\315\255\244\256\302\264\151\347\252
\265\355\067\224\351\335\321\143\205\153\232\172\112\126\166\334
\031\205\050\324\344\306\244\330\270\226\101\167\320\264\131\361
\106\005\207\207\002\037\151\271\202\030\320\103\331\046\332\032
\147\250\326\165\166\352\362\155\016\102\377\210\046\242\156\204
\376\176\142\033\360\306\075\355\300\034\152\307\221\326\270\000
\067\111\233\271\204\005\241\315\156\061\326\104\352\123\213\272
\123\230\035\241\220\212\351\205\370\033\362\223\130\303\310\334
\232\046\117\076\040\317\117\103\363\020\214\177\020\141\172\066
\312\252\013\175\314\237\107\104\131\256\245\225\306\231\123\343
\007\153\075\111\020\260\030\377\135\016\205\103\024\113\347\153
\323\112\265\262\140\141\334\151\111\002\043\135\350\222\161\303
\234\237\105\147\171\036\334\062\206\272\252\125\074\144\157\062
\265\020\100\025\336\162\100\170\340\156\160\273\156\353\011\350
\071\331\254\272\222\165\335\103\312\272\001\225\255\032\201\053
\072\360\343\305\057\014\030\115\020\306\256\300\355\376\005\122
\177\031\005\313\251\257\065\010\014\070\042\344\376\126\345\123
\076\277\344\326\263\331\010\303\075\325\063\062\201\044\305\251
\341\145\021\270\062\063\060\161\030\111\035\032\105\306\232\024
\212\130\071\050\156\363\313\121\271\111\046\144\170\003\307\221
\021\203\251\271\220\064\266\157\252\005\236\205\050\127\231\276
\177\047\006\111\142\115\241\374\011\341\053\106\011\114\024\233
\126\217\105
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "SSL.com Client RSA Root CA 2022"
# Issuer: CN=SSL.com Client RSA Root CA 2022,O=SSL Corporation,C=US
# Serial Number:76:af:ee:88:93:15:45:b6:50:53:9b:80:9c:a4:df:9a
# Subject: CN=SSL.com Client RSA Root CA 2022,O=SSL Corporation,C=US
# Not Valid Before: Thu Aug 25 16:31:07 2022
# Not Valid
After : Sun Aug 19 16:31:06 2046
# Fingerprint (SHA-256):
1D:4C:A4:A2:AB:21:D0:09:36:59:80:4F:C0:EB:21:75:A6:17:27:9B:56:A2:47:52:45:C9:51:7A:FE:B5:91:53

```
# Fingerprint (SHA1): AA:59:70:E5:20:32:9F:CB:D0:D5:79:9F:FB:1B:82:1D:FD:1F:79:65
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com Client RSA Root CA 2022"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\252\131\160\345\040\062\237\313\320\325\171\237\373\033\202\035
\375\037\171\145
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\011\215\322\312\256\154\024\276\276\014\224\157\067\027\040\316
END
CKA_ISSUER MULTILINE_OCTAL
\060\121\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\050\060\046\006\003\125
\004\003\014\037\123\123\114\056\143\157\155\040\103\154\151\145
\156\164\040\122\123\101\040\122\157\157\164\040\103\101\040\062
\060\062\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\166\257\356\210\223\025\105\266\120\123\233\200\234\244
\337\232
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Atos TrustedRoot Root CA ECC G2 2020"
#
# Issuer: CN=Atos TrustedRoot Root CA ECC G2 2020,O=Atos,C=DE
# Serial Number:0b:73:28:11:18:74:30:1c:ef:6f:08:84
# Subject: CN=Atos TrustedRoot Root CA ECC G2 2020,O=Atos,C=DE
# Not Valid Before: Tue Dec 15 08:39:10 2020
# Not Valid After : Mon Dec 10 08:39:09 2040
# Fingerprint (SHA-256):
E3:86:55:F4:B0:19:0C:84:D3:B3:89:3D:84:0A:68:7E:19:0A:25:6D:98:05:2F:15:9E:6D:4A:39:F5:89:A6:EB
# Fingerprint (SHA1): 61:25:56:DA:62:94:E5:AE:B3:3C:F8:11:BD:B1:DC:F8:A5:D8:B3:E4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
```

UTF8 "Atos TrustedRoot Root CA ECC G2 2020"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\015\060\013\006\003\125\004\012\014\004\101\164\157\163\061\055
\060\053\006\003\125\004\003\014\044\101\164\157\163\040\124\162
\165\163\164\145\144\122\157\157\164\040\122\157\157\164\040\103
\101\040\105\103\103\040\107\062\040\062\060\062\060
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\015\060\013\006\003\125\004\012\014\004\101\164\157\163\061\055
\060\053\006\003\125\004\003\014\044\101\164\157\163\040\124\162
\165\163\164\145\144\122\157\157\164\040\122\157\157\164\040\103
\101\040\105\103\103\040\107\062\040\062\060\062\060
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\014\013\163\050\021\030\164\060\034\357\157\010\204
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\061\060\202\001\266\240\003\002\001\002\002\014\013
\163\050\021\030\164\060\034\357\157\010\204\060\012\006\010\052
\206\110\316\075\004\003\003\060\113\061\013\060\011\006\003\125
\004\006\023\002\104\105\061\015\060\013\006\003\125\004\012\014
\004\101\164\157\163\061\055\060\053\006\003\125\004\003\014\044
\101\164\157\163\040\124\162\165\163\164\145\144\122\157\157\164
\040\122\157\157\164\040\103\101\040\105\103\103\040\107\062\040
\062\060\062\060\060\036\027\015\062\060\061\062\061\065\060\070
\063\071\061\060\132\027\015\064\060\061\062\061\060\060\070\063
\071\060\071\132\060\113\061\013\060\011\006\003\125\004\006\023
\002\104\105\061\015\060\013\006\003\125\004\012\014\004\101\164
\157\163\061\055\060\053\006\003\125\004\003\014\044\101\164\157
\163\040\124\162\165\163\164\145\144\122\157\157\164\040\122\157
\157\164\040\103\101\040\105\103\103\040\107\062\040\062\060\062
\060\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005
\053\201\004\000\042\003\142\000\004\310\134\200\312\116\302\050
\037\127\277\070\346\141\043\374\320\251\133\226\026\026\303\014
\136\025\245\220\011\377\070\050\264\172\036\012\326\123\052\301
\273\220\100\164\067\351\201\350\215\057\150\001\065\174\122\056
\330\364\130\263\021\034\133\331\207\030\223\221\055\354\235\332
\154\236\155\204\110\374\302\211\005\353\230\023\002\001\154\123
\036\016\111\143\130\107\261\257\302\243\143\060\141\060\017\006
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\037
\006\003\125\035\043\004\030\060\026\200\024\133\037\304\161\154
\262\033\237\276\134\037\214\375\263\266\373\263\016\011\207\060
\035\006\003\125\035\016\004\026\004\024\133\037\304\161\154\262
\033\237\276\134\037\214\375\263\266\373\263\016\011\207\060\016

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\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060\012
\006\010\052\206\110\316\075\004\003\003\003\151\000\060\146\002
\061\000\354\340\231\375\335\344\124\301\313\037\350\076\050\327
\025\131\112\202\312\123\060\354\353\066\245\271\310\316\223\107
\126\310\141\246\341\155\222\123\225\217\366\343\125\123\360\335
\172\347\002\061\000\260\207\325\033\263\140\374\221\215\200\312
\242\033\121\113\070\124\313\252\036\173\327\345\104\225\026\057
\074\104\170\056\045\272\352\220\344\354\122\356\127\354\003\204
\363\136\333\026\015
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Atos TrustedRoot Root CA ECC G2 2020"
# Issuer: CN=Atos TrustedRoot Root CA ECC G2 2020,O=Atos,C=DE
# Serial Number:0b:73:28:11:18:74:30:1c:ef:6f:08:84
# Subject: CN=Atos TrustedRoot Root CA ECC G2 2020,O=Atos,C=DE
# Not Valid Before: Tue Dec 15 08:39:10 2020
# Not Valid After : Mon Dec 10 08:39:09 2040
# Fingerprint (SHA-256):
E3:86:55:F4:B0:19:0C:84:D3:B3:89:3D:84:0A:68:7E:19:0A:25:6D:98:05:2F:15:9E:6D:4A:39:F5:89:A6:EB
# Fingerprint (SHA1): 61:25:56:DA:62:94:E5:AE:B3:3C:F8:11:BD:B1:DC:F8:A5:D8:B3:E4
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
 CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Atos TrustedRoot Root CA ECC G2 2020"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\141\045\126\332\142\224\345\256\263\074\370\021\275\261\334\370
\245\330\263\344
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\225\320\233\116\332\275\252\035\225\265\242\302\135\337\210\214
END
CKA_ISSUER MULTILINE_OCTAL
\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\015\060\013\006\003\125\004\012\014\004\101\164\157\163\061\055
\060\053\006\003\125\004\003\014\044\101\164\157\163\040\124\162
\165\163\164\145\144\122\157\157\164\040\122\157\157\164\040\103
\101\040\105\103\103\040\107\062\040\062\060\062\060
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\014\013\163\050\021\030\164\060\034\357\157\010\204
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
```

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CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Atos TrustedRoot
 Root CA RSA G2 2020"
#
# Issuer: CN=Atos TrustedRoot Root CA RSA G2 2020,O=Atos,C=DE
# Serial Number:47:ba:29:46:55:3e:16:92:97:b0:ab:40
# Subject: CN=Atos TrustedRoot Root CA RSA G2 2020,O=Atos,C=DE
# Not Valid Before: Tue Dec 15 08:41:23 2020
# Not Valid After : Mon Dec 10 08:41:22 2040
# Fingerprint (SHA-256):
78:83:3A:78:3B:B2:98:6C:25:4B:93:70:D3:C2:0E:5E:BA:8F:A7:84:0C:BF:63:FE:17:29:7A:0B:01:19:68:5E
# Fingerprint (SHA1): 32:D1:27:FA:93:B1:C1:4C:99:E2:4A:40:BC:7F:94:41:1B:5A:AC:A4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Atos TrustedRoot Root CA RSA G2 2020"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\015\060\013\006\003\125\004\012\014\004\101\164\157\163\061\055
\060\053\006\003\125\004\003\014\044\101\164\157\163\040\124\162
\165\163\164\145\144\122\157\157\164\040\122\157\157\164\040\103
\101\040\122\123\101\040\107\062\040\062\060\062\060
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\015\060\013\006\003\125\004\012\014\004\101\164\157\163\061\055
\060\053\006\003\125\004\003\014\044\101\164\157\163\040\124\162
\165\163\164\145\144\122\157\157\164\040\122\157\157\164\040\103
\101\040\122\123\101\040\107\062\040\062\060\062\060
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\014\107\272\051\106\125\076\026\222\227\260\253\100
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\177\060\202\003\147\240\003\002\001\002\002\014\107
\272\051\106\125\076\026\222\227\260\253\100\060\015\006\011\052
\206\110\206\367\015\001\001\014\005\000\060\113\061\013\060\011
\006\003\125\004\006\023\002\104\105\061\015\060\013\006\003\125
\004\012\014\004\101\164\157\163\061\055\060\053\006\003\125\004
\003\014\044\101\164\157\163\040\124\162\165\163\164\145\144\122
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\157\157\164\040\122\157\157\164\040\103\101\040\122\123\101\040
\107\062\040\062\060\062\060\060\036\027\015\062\060\061\062\061
\065\060\070\064\061\062\063\132\027\015\064\060\061\062\061\060
\060\070\064\061\062\062\132\060\113\061\013\060\011\006\003\125
\004\006\023\002\104\105\061\015\060\013\006\003\125\004\012\014
\004\101\164\157\163\061\055\060\053\006\003\125\004\003\014\044
\101\164\157\163\040\124\162\165\163\164\145\144\122\157\157\164
\040\122\157\157\164\040\103\101\040\122\123\101\040\107\062\040
\062\060\062\060\060\202\002\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012
\002\202\002\001\000\226\061\205\112\252\017\062\376\171\341\103
\207\234\373\043\267\216\177\015\124\275\307\142\223\167\344\034
\065\004\166\243\003\213\042\356\304\204\335\245\223\156\156\262
\216\011\003\353\121\026\061\027\252\151\025\030\016\147\164\043
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\255\132\115\114\170\203\101\213\317\362\035\142\232\230\004\234
\143\351\253\145\376\110\035\044\145\007\107\076\271\221\056\351
\235\233\177\032\065\251\064\260\267\345\160\063\357\112\162\121
\266\007\277\140\077\052\237\235\124\337\363\327\224\111\121\003
\132\100\251\150\335\021\131\134\370\166\246\274\120\122\020\355
\254\354\225\340\324\203\153\111\332\012\117\231\203\336\062\203
\110\203\147\225\262\176\347\201\205\075\315\202\367\312\002\355
\155\210\135\010\215\270\065\277\052\151\060\231\273\113\321\101
\333\105\240\223\231\121\201\220\066\010\252\212\266\350\217\263
\313\356\345\106\015\162\165\365\111\154\341\242\177\057\274\355
\204\246\067\356\336\302\117\071\116\366\236\360\311\321\233\060
\235\111\155\341\332\377\022\020\214\326\345\231\173\005\266\175
\260\011\307\244\370\262\034\071\225\071\063\364\065\316\045\142
\173\260\137\040\363\313\155\370\154\122\024\144\104\217\323\310
\251\166\007\345\257\161\231\055\055\004\045\110\166\257\303\347
\314\103\362\007\274\112\044\044\067\335\372\156\224\011\157\114
\136\001\264\376\124\354\043\226\245\136\335\206\377\351\106\052
\361\350\334\354\245\075\257\157\252\016\017\264\165\372\076\010
\271\046\105\117\146\206\114\274\031\270\341\325\065\356\202\204
\310\323\253\022\347\315\163\063\142\167\364\027\313\275\064\166
\052\005\316\225\345\170\171\113\236\260\215\371\074\130\070\221
\352\136\207\070\300\267\102\375\252\114\207\043\255\004\040\261
\176\166\102\332\273\266\026\272\127\310\216\023\372\165\325\010
\114\257\070\221\252\357\217\372\237\111\056\124\174\012\126\261
\172\372\304\116\057\324\243\372\026\212\320\225\345\227\246\377
\303\374\174\016\107\130\363\177\007\173\022\334\127\077\055\343
\241\115\133\122\114\063\207\231\250\011\173\154\176\016\362\317
\126\102\236\353\005\002\003\001\000\001\243\143\060\141\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\037\006\003\125\035\043\004\030\060\026\200\024\040\045\363\007
\375\247\157\361\226\356\221\020\151\314\232\357\175\310\150\170
\060\035\006\003\125\035\016\004\026\004\024\040\045\363\007\375
\247\157\361\226\356\221\020\151\314\232\357\175\310\150\170\060

\016\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\003\202
\002\001\000\044\053\116\230\362\035\027\355\331\166\046\266\060
\063\350\151\105\241\121\113\122\330\172\072\060\266\344\022\352
\277\237\114\340\004\244\366\065\306\376\241\060\367\123\205\222
\255\124\005\127\137\222\345\052\336\066\047\236\173\023\107\311
\152\165\257\374\363\067\347\014\365\075\001\163\265\151\121\370
\275\131\321\272\013\370\272\272\144\047\103\263\174\203\225\212
\347\236\023\226\327\157\112\226\101\111\213\016\040\255\026\306
\367\246\207\133\210\022\211\213\211\312\022\322\126\257\042\001
\041\106\351\253\230\077\247\210\336\344\313\052\232\165\031\372
\071\136\011\005\327\003\062\032\270\027\121\010\307\000\100\175
\364\276\370\014\131\364\151\166\156\323\244\130\133\136\046\163
\344\102\125\006\136\170\100\017\323\070\237\357\046\121\160\164
\221\361\167\142\001\350\331\313\353\241\337\071\062\035\273\153
\375\161\376\353\317\245\346\024\375\000\200\023\306\232\000\110
\260\231\005\351\256\200\110\373\011\077\121\024\265\271\347\140
\115\115\312\057\201\041\356\122\014\145\172\334\365\211\111\114
\060\222\064\130\200\062\131\261\015\377\044\141\017\347\012\102
\320\173\274\370\216\047\107\077\160\235\047\331\266\006\075\245
\273\313\136\217\256\016\123\307\234\152\157\073\114\017\243\100
\160\250\232\007\316\324\156\133\007\242\322\342\124\266\275\157
\063\162\143\255\121\230\341\217\166\361\152\007\070\045\376\366
\142\316\137\333\143\302\156\231\357\006\334\271\336\031\032\350
\124\075\175\322\166\165\331\136\076\062\110\247\214\362\236\162
\014\370\270\130\270\027\043\245\024\207\165\130\172\000\201\007
\042\071\152\114\224\240\265\242\333\247\054\301\260\361\243\233
\300\114\367\155\160\352\061\237\361\256\175\076\163\050\331\241
\337\372\223\360\233\260\360\342\315\045\040\165\357\342\175\062
\005\311\233\166\356\313\275\061\036\371\224\230\113\044\130\126
\110\300\336\006\114\275\246\064\135\355\026\141\143\163\373\031
\342\372\133\330\227\165\324\155\236\140\071\136\224\213\002\054
\353\231\316\140\052\156\033\214\247\113\274\375\066\346\230\037
\145\362\177\361\343\217\114\200\106\066\130\266\241\145\313\316
\034\104\165
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Atos TrustedRoot Root CA RSA G2 2020"
# Issuer: CN=Atos TrustedRoot Root CA RSA G2 2020,O=Atos,C=DE
# Serial Number:47:ba:29:46:55:3e:16:92:97:b0:ab:40
# Subject: CN=Atos TrustedRoot Root CA RSA G2 2020,O=Atos,C=DE
# Not Valid Before: Tue Dec 15 08:41:23 2020
# Not Valid After : Mon Dec 10 08:41:22 2040
# Fingerprint (SHA-256):

```
78:83:3A:78:3B:B2:98:6C:25:4B:93:70:D3:C2:0E:5E:BA:8F:A7:84:0C:BF:63:FE:17:29:7A:0B:01:19:68:5E
# Fingerprint (SHA1): 32:D1:27:FA:93:B1:C1:4C:99:E2:4A:40:BC:7F:94:41:1B:5A:AC:A4
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN
 CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Atos TrustedRoot Root CA RSA G2 2020"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\062\321\047\372\223\261\301\114\231\342\112\100\274\177\224\101
\033\132\254\244
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\333\077\351\043\365\264\214\335\350\263\076\250\265\137\146\066
END
CKA_ISSUER MULTILINE_OCTAL
\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\015\060\013\006\003\125\004\012\014\004\101\164\157\163\061\055
\060\053\006\003\125\004\003\014\044\101\164\157\163\040\124\162
\165\163\164\145\144\122\157\157\164\040\122\157\157\164\040\103
\101\040\122\123\101\040\107\062\040\062\060\062\060
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\014\107\272\051\106\125\076\026\222\227\260\253\100
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED
 CK_BBOOL CK_FALSE

#
# Certificate "Atos TrustedRoot Root CA ECC TLS 2021"
#
# Issuer: C=DE,O=Atos,CN=Atos TrustedRoot Root CA ECC TLS 2021
# Serial Number:3d:98:3b:a6:66:3d:90:63:f7:7e:26:57:38:04:ef:00
# Subject: C=DE,O=Atos,CN=Atos TrustedRoot Root CA ECC TLS 2021
# Not Valid Before: Thu Apr 22 09:26:23 2021
# Not Valid After : Wed Apr 17 09:26:22 2041
# Fingerprint (SHA-256):
B2:FA:E5:3E:14:CC:D7:AB:92:12:06:47:01:AE:27:9C:1D:89:88:FA:CB:77:5F:A8:A0:08:91:4E:66:39:88:A8
# Fingerprint (SHA1): 9E:BC:75:10:42:B3:02:F3:81:F4:F7:30:62:D4:8F:C3:A7:51:B2:DD
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Atos TrustedRoot Root CA ECC TLS 2021"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
```

CKA_SUBJECT MULTILINE_OCTAL
\060\114\061\056\060\054\006\003\125\004\003\014\045\101\164\157
\163\040\124\162\165\163\164\145\144\122\157\157\164\040\122\157
\157\164\040\103\101\040\105\103\103\040\124\114\123\040\062\060
\062\061\061\015\060\013\006\003\125\004\012\014\004\101\164\157
\163\061\013\060\011\006\003\125\004\006\023\002\104\105
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\056\060\054\006\003\125\004\003\014\045\101\164\157
\163\040\124\162\165\163\164\145\144\122\157\157\164\040\122\157
\157\164\040\103\101\040\105\103\103\040\124\114\123\040\062\060
\062\061\061\015\060\013\006\003\125\004\012\014\004\101\164\157
\163\061\013\060\011\006\003\125\004\006\023\002\104\105
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\075\230\073\246\146\075\220\143\367\176\046\127\070\004
\357\000
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\025\060\202\001\233\240\003\002\001\002\002\020\075
\230\073\246\146\075\220\143\367\176\046\127\070\004\357\000\060
\012\006\010\052\206\110\316\075\004\003\003\060\114\061\056\060
\054\006\003\125\004\003\014\045\101\164\157\163\040\124\162\165
\163\164\145\144\122\157\157\164\040\122\157\157\164\040\103\101
\040\105\103\103\040\124\114\123\040\062\060\062\061\061\015\060
\013\006\003\125\004\012\014\004\101\164\157\163\061\013\060\011
\006\003\125\004\006\023\002\104\105\060\036\027\015\062\061\060
\064\062\062\060\071\062\066\062\063\132\027\015\064\061\060\064
\061\067\060\071\062\066\062\062\132\060\114\061\056\060\054\006
\003\125\004\003\014\045\101\164\157\163\040\124\162\165\163\164
\145\144\122\157\157\164\040\122\157\157\164\040\103\101\040\105
\103\103\040\124\114\123\040\062\060\062\061\061\015\060\013\006
\003\125\004\012\014\004\101\164\157\163\061\013\060\011\006\003
\125\004\006\023\002\104\105\060\166\060\020\006\007\052\206\110
\316\075\002\001\006\005\053\201\004\000\042\003\142\000\004\226
\206\130\050\067\012\147\320\240\336\044\031\031\341\344\005\007
\037\227\355\350\144\202\271\366\304\161\120\316\212\014\377\327
\265\166\273\241\154\223\154\203\242\150\156\245\331\276\054\210
\225\101\315\135\335\261\312\203\143\203\314\300\276\164\331\340
\235\244\356\112\116\126\340\230\051\101\223\122\020\325\044\070
\002\062\147\361\224\022\157\357\327\305\336\056\375\031\200\243
\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024\166
\050\045\326\175\340\146\232\172\011\262\152\073\216\063\327\066
\323\117\242\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\206\060\012\006\010\052\206\110\316\075\004\003\003\003

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\150\000\060\145\002\060\133\231\051\363\234\061\266\211\153\154
\326\275\167\341\174\347\121\176\270\072\315\243\066\137\174\367
\074\167\076\344\120\255\250\347\322\131\014\046\216\060\073\156
\010\052\302\247\132\310\002\061\000\231\343\014\347\243\303\257
\323\111\056\106\202\043\146\135\311\000\024\022\375\070\364\341
\230\153\167\051\172\333\044\317\145\100\277\322\334\214\021\350
\364\175\177\040\204\251\102\344\050
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Atos TrustedRoot
 Root CA ECC TLS 2021"
# Issuer: C=DE,O=Atos,CN=Atos TrustedRoot Root CA ECC TLS 2021
# Serial Number:3d:98:3b:a6:66:3d:90:63:f7:7e:26:57:38:04:ef:00
# Subject: C=DE,O=Atos,CN=Atos TrustedRoot Root CA ECC TLS 2021
# Not Valid Before: Thu Apr 22 09:26:23 2021
# Not Valid After : Wed Apr 17 09:26:22 2041
# Fingerprint (SHA-256):
B2:FA:E5:3E:14:CC:D7:AB:92:12:06:47:01:AE:27:9C:1D:89:88:FA:CB:77:5F:A8:A0:08:91:4E:66:39:88:A8
# Fingerprint (SHA1): 9E:BC:75:10:42:B3:02:F3:81:F4:F7:30:62:D4:8F:C3:A7:51:B2:DD
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Atos TrustedRoot Root CA ECC TLS 2021"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\236\274\165\020\102\263\002\363\201\364\367\060\142\324\217\303
\247\121\262\335
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\026\237\255\361\160\255\171\326\355\051\264\321\305\171\160\250
END
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\056\060\054\006\003\125\004\003\014\045\101\164\157
\163\040\124\162\165\163\164\145\144\122\157\157\164\040\122\157
\157\164\040\103\101\040\105\103\103\040\124\114\123\040\062\060
\062\061\061\015\060\013\006\003\125\004\012\014\004\101\164\157
\163\061\013\060\011\006\003\125\004\006\023\002\104\105
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\075\230\073\246\146\075\220\143\367\176\046\127\070\004
\357\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
```

```
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Atos TrustedRoot Root CA RSA TLS 2021"
#
# Issuer: C=DE,O=Atos,CN=Atos TrustedRoot Root CA RSA TLS 2021
# Serial Number:53:d5:cf:e6:19:93:0b:fb:2b:05:12:d8:c2:2a:a2:a4
# Subject: C=DE,O=Atos,CN=Atos TrustedRoot Root CA RSA TLS 2021
# Not Valid Before: Thu Apr 22 09:21:10 2021
# Not Valid After : Wed Apr 17 09:21:09 2041
# Fingerprint (SHA-256):
81:A9:08:8E:A5:9F:B3:64:C5:48:A6:F8:55:59:09:9B:6F:04:05:EF:BF:18:E5:32:4E:C9:F4:57:BA:00:11:2F
#
 Fingerprint (SHA1): 18:52:3B:0D:06:37:E4:D6:3A:DF:23:E4:98:FB:5B:16:FB:86:74:48
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Atos TrustedRoot Root CA RSA TLS 2021"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\114\061\056\060\054\006\003\125\004\003\014\045\101\164\157
\163\040\124\162\165\163\164\145\144\122\157\157\164\040\122\157
\157\164\040\103\101\040\122\123\101\040\124\114\123\040\062\060
\062\061\061\015\060\013\006\003\125\004\012\014\004\101\164\157
\163\061\013\060\011\006\003\125\004\006\023\002\104\105
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\056\060\054\006\003\125\004\003\014\045\101\164\157
\163\040\124\162\165\163\164\145\144\122\157\157\164\040\122\157
\157\164\040\103\101\040\122\123\101\040\124\114\123\040\062\060
\062\061\061\015\060\013\006\003\125\004\012\014\004\101\164\157
\163\061\013\060\011\006\003\125\004\006\023\002\104\105
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\123\325\317\346\031\223\013\373\053\005\022\330\302\052
\242\244
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\144\060\202\003\114\240\003\002\001\002\002\020\123
\325\317\346\031\223\013\373\053\005\022\330\302\052\242\244\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\114
\061\056\060\054\006\003\125\004\003\014\045\101\164\157\163\040
\124\162\165\163\164\145\144\122\157\157\164\040\122\157\157\164
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\040\103\101\040\122\123\101\040\124\114\123\040\062\060\062\061
\061\015\060\013\006\003\125\004\012\014\004\101\164\157\163\061
\013\060\011\006\003\125\004\006\023\002\104\105\060\036\027\015
\062\061\060\064\062\062\060\071\062\061\061\060\132\027\015\064
\061\060\064\061\067\060\071\062\061\060\071\132\060\114\061\056
\060\054\006\003\125\004\003\014\045\101\164\157\163\040\124\162
\165\163\164\145\144\122\157\157\164\040\122\157\157\164\040\103
\101\040\122\123\101\040\124\114\123\040\062\060\062\061\061\015
\060\013\006\003\125\004\012\014\004\101\164\157\163\061\013\060
\011\006\003\125\004\006\023\002\104\105\060\202\002\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002
\017\000\060\202\002\012\002\202\002\001\000\266\200\016\304\171
\275\005\214\175\260\243\235\115\042\115\313\360\101\227\115\131
\340\321\376\126\214\227\362\327\275\217\154\267\043\217\137\325
\304\330\101\313\362\002\036\161\345\351\366\136\313\010\052\136
\060\362\055\146\307\204\033\144\127\070\235\165\055\126\306\057
\141\357\226\374\040\106\275\353\324\173\077\077\174\107\070\004
\251\033\252\122\337\023\067\323\025\025\116\275\137\174\257\255
\143\307\171\334\010\173\325\240\345\367\133\165\254\200\125\231
\222\141\233\315\052\027\175\333\217\364\265\152\352\027\112\144
\050\146\025\051\154\002\361\153\325\272\243\063\334\132\147\247
\005\342\277\145\266\026\260\020\355\315\120\063\311\160\120\354
\031\216\260\307\362\164\133\153\104\306\175\226\271\230\010\131
\146\336\051\001\233\364\052\155\323\025\072\220\152\147\361\264
\153\146\331\041\353\312\331\142\174\106\020\134\336\165\111\147
\236\102\371\376\165\251\243\255\377\166\012\147\100\343\305\367
\215\307\205\232\131\236\142\232\152\355\105\207\230\147\262\325
\112\074\327\264\073\000\015\300\217\037\341\100\304\256\154\041
\334\111\176\176\312\262\215\155\266\277\223\057\241\134\076\217
\312\355\200\216\130\341\333\127\317\205\066\070\262\161\244\011
\214\222\211\010\210\110\361\100\143\030\262\133\214\132\343\303
\323\027\252\253\031\243\054\033\344\325\306\342\146\172\327\202
\031\246\073\026\054\057\161\207\137\105\236\225\163\223\302\102
\201\041\023\226\327\235\273\223\150\025\372\235\244\035\214\362
\201\340\130\006\275\311\266\343\366\211\135\211\371\254\104\241
\313\153\372\026\361\307\120\075\044\332\367\303\344\207\325\126
\361\117\220\060\372\105\011\131\332\064\316\340\023\034\004\174
\000\324\233\206\244\100\274\331\334\114\127\176\256\267\063\266
\136\166\341\145\213\146\337\215\312\327\230\257\316\066\230\214
\234\203\231\003\160\363\257\164\355\306\016\066\347\275\354\301
\163\247\224\132\313\222\144\202\246\000\301\160\241\156\054\051
\341\130\127\354\132\174\231\153\045\244\220\072\200\364\040\235
\232\316\307\055\371\262\113\051\225\203\351\065\215\247\111\110
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\243\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005
\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024
\164\111\231\321\377\264\172\150\105\165\303\176\264\334\314\316
\071\063\332\010\060\016\006\003\125\035\017\001\001\377\004\004

\003\002\001\206\060\015\006\011\052\206\110\206\367\015\001\001
\014\005\000\003\202\002\001\000\043\103\123\044\142\134\155\375
\076\302\317\125\000\154\305\126\210\271\016\335\072\342\045\015
\225\112\227\312\200\211\356\052\315\145\370\333\026\340\011\222
\340\030\307\170\230\273\363\354\102\122\373\251\244\202\327\115
\330\212\374\344\116\375\253\220\304\070\165\062\204\237\377\263
\260\053\002\063\066\300\020\220\157\035\234\257\341\151\223\354
\243\105\057\024\237\365\114\052\145\103\162\014\367\303\370\225
\213\024\363\205\040\142\335\124\123\335\054\334\030\225\151\117
\203\107\160\100\063\130\167\022\014\242\353\122\061\036\114\311
\250\316\305\357\303\321\255\340\153\003\000\064\046\264\124\041
\065\227\001\334\137\033\361\174\347\125\372\055\150\167\173\323
\151\314\323\016\153\272\115\166\104\326\302\025\232\046\354\260
\305\365\273\321\172\164\302\154\315\305\265\136\366\114\346\133
\055\201\333\263\267\072\227\236\355\317\106\262\120\075\204\140
\231\161\265\063\265\127\105\346\102\107\165\152\016\260\010\014
\256\275\336\367\273\017\130\075\217\003\061\350\075\202\120\312
\057\136\014\135\264\227\276\040\064\007\364\304\022\341\356\327
\260\331\131\055\151\367\061\004\364\362\371\253\371\023\061\370
\001\167\016\075\102\043\046\314\232\162\147\121\041\172\314\074
\205\250\352\041\152\073\333\132\074\245\064\236\232\300\054\337
\200\234\051\340\337\167\224\321\242\200\102\377\152\114\133\021
\320\365\315\242\276\256\314\121\134\303\325\124\173\014\256\326
\271\006\167\200\342\357\007\032\150\314\131\121\255\176\134\147
\153\271\333\342\007\102\133\270\001\005\130\071\115\344\273\230
\243\261\062\354\331\243\326\157\224\043\377\073\267\051\145\346
\007\351\357\266\031\352\347\302\070\035\062\210\220\074\023\053
\156\314\357\253\167\006\064\167\204\117\162\344\201\204\371\271
\164\064\336\166\117\222\052\123\261\045\071\333\074\377\345\076
\246\016\345\153\236\377\333\354\057\164\203\337\216\264\263\251
\336\024\115\377\061\243\105\163\044\372\225\051\314\022\227\004
\242\070\266\215\260\360\067\374\310\041\177\077\263\044\033\075
\213\156\314\115\260\026\015\226\035\203\037\106\300\233\275\103
\231\347\304\226\056\316\137\311
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

#
 Trust for "Atos TrustedRoot Root CA RSA TLS 2021"
# Issuer: C=DE,O=Atos,CN=Atos TrustedRoot Root CA RSA TLS 2021
# Serial Number:53:d5:cf:e6:19:93:0b:fb:2b:05:12:d8:c2:2a:a2:a4
# Subject: C=DE,O=Atos,CN=Atos TrustedRoot Root CA RSA TLS 2021
# Not Valid Before: Thu Apr 22 09:21:10 2021
# Not Valid After : Wed Apr 17 09:21:09 2041
# Fingerprint (SHA-256):

```
81:A9:08:8E:A5:9F:B3:64:C5:48:A6:F8:55:59:09:9B:6F:04:05:EF:BF:18:E5:32:4E:C9:F4:57:BA:00:11:2F
# Fingerprint (SHA1): 18:52:3B:0D:06:37:E4:D6:3A:DF:23:E4:98:FB:5B:16:FB:86:74:48
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Atos TrustedRoot Root CA RSA TLS 2021"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\030\122\073\015\006\067\344\326\072\337\043\344\230\373\133\026
\373\206\164\110
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\324\323\106\270\232\300\234\166\135\236\072\303\271\231\061\322
END
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\056\060\054\006\003\125\004\003\014\045\101\164\157
\163\040\124\162\165\163\164\145\144\122\157\157\164\040\122\157
\157\164\040\103\101\040\122\123\101\040\124\114\123\040\062\060
\062\061\061\015\060\013\006\003\125\004\012\014\004\101\164\157
\163\061\013\060\011\006\003\125\004\006\023\002\104\105
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\123\325\317\346\031\223\013\373\053\005\022\330\302\052
\242\244
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "TrustAsia Global Root CA G3"
#
# Issuer: CN=TrustAsia Global Root CA G3,O="TrustAsia Technologies, Inc.",C=CN
# Serial Number:64:f6:0e:65:77:61:6a:ab:3b:b4:ea:85:84:bb:b1:89:b8:71:93:0f
# Subject: CN=TrustAsia Global Root CA G3,O="TrustAsia Technologies, Inc.",C=CN
# Not Valid Before: Thu May 20 02:10:19 2021
# Not Valid After : Sat May 19 02:10:19
 2046
# Fingerprint (SHA-256):
E0:D3:22:6A:EB:11:63:C2:E4:8F:F9:BE:3B:50:B4:C6:43:1B:E7:BB:1E:AC:C5:C3:6B:5D:5E:C5:09:03:9A:08
# Fingerprint (SHA1): 63:CF:B6:C1:27:2B:56:E4:88:8E:1C:23:9A:B6:2E:81:47:24:C3:C7
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TrustAsia Global Root CA G3"
```

CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\045\060\043\006\003\125\004\012\014\034\124\162\165\163\164\101
\163\151\141\040\124\145\143\150\156\157\154\157\147\151\145\163
\054\040\111\156\143\056\061\044\060\042\006\003\125\004\003\014
\033\124\162\165\163\164\101\163\151\141\040\107\154\157\142\141
\154\040\122\157\157\164\040\103\101\040\107\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\045\060\043\006\003\125\004\012\014\034\124\162\165\163\164\101
\163\151\141\040\124\145\143\150\156\157\154\157\147\151\145\163
\054\040\111\156\143\056\061\044\060\042\006\003\125\004\003\014
\033\124\162\165\163\164\101\163\151\141\040\107\154\157\142\141
\154\040\122\157\157\164\040\103\101\040\107\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\024\144\366\016\145\167\141\152\253\073\264\352\205\204\273
\261\211\270\161\223\017
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\245\060\202\003\215\240\003\002\001\002\002\024\144
\366\016\145\167\141\152\253\073\264\352\205\204\273\261\211\270
\161\223\017\060\015\006\011\052\206\110\206\367\015\001\001\014
\005\000\060\132\061\013\060\011\006\003\125\004\006\023\002\103
\116\061\045\060\043\006\003\125\004\012\014\034\124\162\165\163
\164\101\163\151\141\040\124\145\143\150\156\157\154\157\147\151
\145\163\054\040\111\156\143\056\061\044\060\042\006\003\125\004
\003\014\033\124\162\165\163\164\101\163\151\141\040\107\154\157
\142\141\154\040\122\157\157\164\040\103\101\040\107\063\060\036
\027\015\062\061\060\065\062\060\060\062\061\060\061\071\132\027
\015\064\066\060\065\061\071\060\062\061\060\061\071\132\060\132
\061\013\060\011\006\003\125\004\006\023\002\103\116\061\045\060
\043\006\003\125\004\012\014\034\124\162\165\163\164\101\163\151
\141\040\124\145\143\150\156\157\154\157\147\151\145\163\054\040
\111\156\143\056\061\044\060\042\006\003\125\004\003\014\033\124
\162\165\163\164\101\163\151\141\040\107\154\157\142\141\154\040
\122\157\157\164\040\103\101\040\107\063\060\202\002\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002
\017\000\060\202\002\012\002\202\002\001\000\300\061\202\141\222
\344\224\033\012\052\145\320\276\006\251\207\073\121\022\352\160
\101\256\342\373\164\352\012\215\271\263\114\334\217\267\023\122
\117\124\030\341\054\163\225\221\305\146\073\152\317\254\143\155
\207\123\360\367\361\071\267\240\103\143\260\304\003\135\127\251
\347\104\316\304\241\203\145\366\120\076\261\176\026\270\072\212

\002\320\226\037\000\315\005\041\357\006\155\335\041\234\031\103
\105\241\305\350\200\312\302\255\100\142\027\006\306\252\274\363
\326\346\374\120\176\146\102\037\074\213\246\171\171\206\100\065
\237\040\357\077\353\213\107\037\217\216\305\324\216\266\054\311
\104\004\343\324\103\165\077\325\077\257\034\314\176\106\137\254
\337\144\020\212\357\106\360\220\360\017\055\364\210\013\261\051
\252\257\205\252\111\130\250\277\143\240\070\221\346\263\346\167
\150\304\371\052\031\204\273\016\341\365\257\211\354\245\057\120
\040\164\036\022\101\163\036\044\331\312\316\054\241\131\065\300
\310\035\106\047\141\132\217\371\115\323\162\171\146\036\237\025
\220\041\055\375\355\213\126\160\003\112\111\076\177\151\061\022
\151\307\036\134\312\172\023\213\350\346\365\140\017\314\223\054
\204\177\361\374\152\374\233\107\235\333\255\210\075\363\166\165
\063\327\113\244\310\213\371\365\103\130\117\313\310\003\124\217
\245\205\170\004\032\363\163\362\327\207\035\101\237\347\330\027
\316\032\234\017\112\374\334\104\150\124\150\342\101\074\376\054
\204\206\067\074\315\077\057\242\333\347\367\124\003\137\131\323
\367\221\170\307\213\167\152\026\345\111\205\220\105\162\160\057
\221\135\370\076\145\100\013\031\231\311\046\040\132\150\301\065
\277\117\247\121\361\330\021\053\133\340\232\236\050\073\012\072
\012\037\301\201\345\056\360\246\271\151\245\210\224\346\153\023
\177\321\144\077\075\234\160\106\345\242\205\173\130\204\047\334
\304\200\076\147\232\232\307\232\061\016\060\354\346\027\100\225
\331\105\355\001\226\252\277\014\363\113\321\143\367\023\130\300
\270\363\372\147\335\233\175\155\112\377\062\114\265\045\073\377
\034\147\017\205\042\131\005\221\221\101\167\201\320\205\114\207
\020\161\377\236\103\033\256\225\165\055\201\002\003\001\000\001
\243\143\060\141\060\017\006\003\125\035\023\001\001\377\004\005
\060\003\001\001\377\060\037\006\003\125\035\043\004\030\060\026
\200\024\100\344\344\362\043\357\070\312\260\256\127\177\362\041
\060\026\064\333\274\222\060\035\006\003\125\035\016\004\026\004
\024\100\344\344\362\043\357\070\312\260\256\127\177\362\041\060
\026\064\333\274\222\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\006\060\015\006\011\052\206\110\206\367\015\001
\001\014\005\000\003\202\002\001\000\046\073\121\341\115\070\363
\062\030\264\264\136\341\145\136\304\224\117\324\247\141\243\370
\300\317\063\001\002\351\303\252\065\017\361\224\023\167\167\065
\236\055\126\121\104\156\341\306\056\050\036\377\332\354\107\315
\227\104\027\367\340\114\302\341\174\174\062\172\146\310\132\266
\134\123\105\127\132\105\324\005\231\057\056\043\125\356\143\150
\337\323\033\170\247\022\224\006\000\165\015\162\204\351\056\274
\132\152\325\336\057\131\307\243\354\322\207\146\333\267\124\265
\044\253\364\103\170\333\113\004\304\157\335\346\076\146\076\051
\362\113\150\161\042\207\240\370\261\063\143\166\343\015\205\162
\104\042\125\077\034\174\351\374\270\025\350\122\372\252\076\243
\041\071\065\164\211\246\152\302\071\372\170\317\266\254\347\347
\326\126\377\043\222\056\120\013\251\265\007\063\364\070\137\244
\111\246\313\145\160\166\350\012\205\200\113\066\075\063\367\225

\124\165\045\332\254\304\163\202\145\351\122\365\134\375\070\225
\002\152\151\060\305\034\012\127\007\256\042\244\054\371\305\101
\267\270\354\237\117\110\000\371\001\004\125\314\254\371\062\061
\304\165\225\006\240\177\321\215\047\335\263\251\244\162\207\376
\131\213\232\172\164\026\335\026\245\142\051\353\072\226\334\213
\247\150\131\323\353\167\221\071\370\327\313\331\217\137\132\047
\001\175\135\150\031\142\330\310\315\364\267\162\107\276\133\227
\316\362\255\242\231\223\255\224\313\223\366\022\011\225\266\253
\327\073\320\077\021\313\060\026\056\171\200\344\147\201\055\135
\355\160\170\266\140\131\254\341\135\105\143\217\310\337\162\150
\133\352\035\270\001\361\176\373\347\212\263\343\124\240\070\011
\340\074\336\102\362\302\355\056\233\363\037\065\266\066\330\343
\200\241\213\315\231\144\017\302\252\253\261\312\365\157\236\103
\215\204\124\231\263\156\300\022\146\330\160\020\361\006\065\063
\103\250\234\056\272\024\061\316\020\177\034\206\343\217\322\325
\370\167\354\233\253\361\057\143\331\102\137\340\147\201\144\221
\361\227\057\374\156\046\366\063\370\323\265\370\304\142\253\061
\121\045\002\172\370\335\153\145\325\155\115\060\310\145\272\150
\024\145\254\047\013\164\212\362\207
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "TrustAsia Global Root CA G3"
# Issuer: CN=TrustAsia Global Root CA G3,O="TrustAsia Technologies, Inc.",C=CN
# Serial Number:64:f6:0e:65:77:61:6a:ab:3b:b4:ea:85:84:bb:b1:89:b8:71:93:0f
# Subject: CN=TrustAsia Global Root CA G3,O="TrustAsia Technologies, Inc.",C=CN
# Not Valid Before: Thu May 20 02:10:19 2021
# Not Valid After : Sat May 19 02:10:19 2046
# Fingerprint (SHA-256):
E0:D3:22:6A:EB:11:63:C2:E4:8F:F9:BE:3B:50:B4:C6:43:1B:E7:BB:1E:AC:C5:C3:6B:5D:5E:C5:09:03:9A:08
# Fingerprint (SHA1): 63:CF:B6:C1:27:2B:56:E4:88:8E:1C:23:9A:B6:2E:81:47:24:C3:C7
CKA_CLASS
 CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TrustAsia Global Root CA G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\143\317\266\301\047\053\126\344\210\216\034\043\232\266\056\201
\107\044\303\307
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\060\102\033\267\273\201\165\065\344\026\117\123\322\224\336\004
END
CKA_ISSUER MULTILINE_OCTAL

```
\060\132\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\045\060\043\006\003\125\004\012\014\034\124\162\165\163\164\101
\163\151\141\040\124\145\143\150\156\157\154\157\147\151\145\163
\054\040\111\156\143\056\061\044\060\042\006\003\125\004\003\014
\033\124\162\165\163\164\101\163\151\141\040\107\154\157\142\141
\154\040\122\157\157\164\040\103\101\040\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\144\366\016\145\167\141\152\253\073\264\352\205\204\273
\261\211\270\161\223\017
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "TrustAsia Global Root CA G4"
#
# Issuer: CN=TrustAsia Global Root CA G4,O="TrustAsia Technologies, Inc.",C=CN
# Serial Number:4f:23:64:b8:8e:97:63:9e:c6:53:81:c1:76:4e:cb:2a:74:15:d6:d7
# Subject: CN=TrustAsia Global Root CA G4,O="TrustAsia Technologies, Inc.",C=CN
# Not Valid Before: Thu May 20 02:10:22 2021
# Not Valid After : Sat May 19 02:10:22 2046
# Fingerprint (SHA-256):
BE:4B:56:CB:50:56:C0:13:6A:52:6D:F4:44:50:8D:AA:36:A0:B5:4F:42:E4:AC:38:F7:2A:F4:70:E4:79:65:4C
# Fingerprint (SHA1): 57:73:A5:61:5D:80:B2:E6:AC:38:82:FC:68:07:31:AC:9F:B5:92:5A
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TrustAsia Global Root CA G4"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\045\060\043\006\003\125\004\012\014\034\124\162\165\163\164\101
\163\151\141\040\124\145\143\150\156\157\154\157\147\151\145\163
\054\040\111\156\143\056\061\044\060\042\006\003\125\004\003\014
\033\124\162\165\163\164\101\163\151\141\040\107\154\157\142\141
\154\040\122\157\157\164\040\103\101\040\107\064
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\045\060\043\006\003\125\004\012\014\034\124\162\165\163\164\101
\163\151\141\040\124\145\143\150\156\157\154\157\147\151\145\163
```

\054\040\111\156\143\056\061\044\060\042\006\003\125\004\003\014
\033\124\162\165\163\164\101\163\151\141\040\107\154\157\142\141
\154\040\122\157\157\164\040\103\101\040\107\064
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\117\043\144\270\216\227\143\236\306\123\201\301\166\116
\313\052\164\025\326\327
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\125\060\202\001\334\240\003\002\001\002\002\024\117
\043\144\270\216\227\143\236\306\123\201\301\166\116\313\052\164
\025\326\327\060\012\006\010\052\206\110\316\075\004\003\003\060
\132\061\013\060\011\006\003\125\004\006\023\002\103\116\061\045
\060\043\006\003\125\004\012\014\034\124\162\165\163\164\101\163
\151\141\040\124\145\143\150\156\157\154\157\147\151\145\163\054
\040\111\156\143\056\061\044\060\042\006\003\125\004\003\014\033
\124\162\165\163\164\101\163\151\141\040\107\154\157\142\141\154
\040\122\157\157\164\040\103\101\040\107\064\060\036\027\015\062
\061\060\065\062\060\060\062\061\060\062\062\132\027\015\064\066
\060\065\061\071\060\062\061\060\062\062\132\060\132\061\013\060
\011\006\003\125\004\006\023\002\103\116\061\045\060\043\006\003
\125\004\012\014\034\124\162\165\163\164\101\163\151\141\040\124
\145\143\150\156\157\154\157\147\151\145\163\054\040\111\156\143
\056\061\044\060\042\006\003\125\004\003\014\033\124\162\165\163
\164\101\163\151\141\040\107\154\157\142\141\154\040\122\157\157
\164\040\103\101\040\107\064\060\166\060\020\006\007\052\206\110
\316\075\002\001\006\005\053\201\004\000\042\003\142\000\004\361
\263\315\070\344\045\103\345\336\031\011\273\201\171\242\025\137
\025\143\001\336\302\253\335\263\246\033\147\113\200\203\257\231
\313\254\027\333\053\226\312\174\122\125\342\032\341\075\126\360
\057\026\010\372\025\274\233\273\107\346\077\356\250\341\114\214
\365\323\066\371\070\135\253\160\232\107\015\342\201\101\006\353
\111\371\260\051\335\063\354\120\245\177\171\051\270\040\230\243
\143\060\141\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\037\006\003\125\035\043\004\030\060\026\200
\024\245\273\112\227\316\263\053\177\244\061\336\227\203\131\203
\246\157\161\313\336\060\035\006\003\125\035\016\004\026\004\024
\245\273\112\227\316\263\053\177\244\061\336\227\203\131\203\246
\157\161\313\336\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\012\006\010\052\206\110\316\075\004\003\003
\003\147\000\060\144\002\060\136\362\353\006\314\111\061\237\100
\000\155\267\176\066\360\115\021\117\363\313\211\072\054\170\221
\120\243\133\300\312\165\046\362\277\220\135\013\202\214\140\050
\237\306\160\232\150\344\361\002\060\134\130\016\126\166\317\130
\303\327\020\214\272\216\256\343\274\144\165\107\305\125\220\343
\375\272\125\353\007\304\123\253\067\251\356\041\262\041\133\140
\217\075\062\361\325\043\224\326\130
END

```
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "TrustAsia Global Root CA G4"
# Issuer: CN=TrustAsia Global Root CA G4,O="TrustAsia Technologies, Inc.",C=CN
# Serial Number:4f:23:64:b8:8e:97:63:9e:c6:53:81:c1:76:4e:cb:2a:74:15:d6:d7
# Subject: CN=TrustAsia Global Root CA G4,O="TrustAsia Technologies, Inc.",C=CN
# Not Valid Before: Thu May 20 02:10:22 2021
# Not Valid After : Sat May 19 02:10:22 2046
# Fingerprint (SHA-256):
BE:4B:56:CB:50:56:C0:13:6A:52:6D:F4:44:50:8D:AA:36:A0:B5:4F:42:E4:AC:38:F7:2A:F4:70:E4:79:65:4C
#
 Fingerprint (SHA1): 57:73:A5:61:5D:80:B2:E6:AC:38:82:FC:68:07:31:AC:9F:B5:92:5A
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TrustAsia Global Root CA G4"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\127\163\245\141\135\200\262\346\254\070\202\374\150\007\061\254
\237\265\222\132
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\124\335\262\327\137\330\076\355\174\340\013\056\314\355\353\353
END
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\045\060\043\006\003\125\004\012\014\034\124\162\165\163\164\101
\163\151\141\040\124\145\143\150\156\157\154\157\147\151\145\163
\054\040\111\156\143\056\061\044\060\042\006\003\125\004\003\014
\033\124\162\165\163\164\101\163\151\141\040\107\154\157\142\141
\154\040\122\157\157\164\040\103\101\040\107\064
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\117\043\144\270\216\227\143\236\306\123\201\301\166\116
\313\052\164\025\326\327
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "CommScope Public Trust ECC Root-01"
#
```

```
# Issuer: CN=CommScope Public Trust ECC Root-01,O=CommScope,C=US
# Serial Number:43:70:82:77:cf:4d:5d:34:f1:ca:ae:32:2f:37:f7:f4:7f:75:a0:9e
# Subject: CN=CommScope Public Trust ECC Root-01,O=CommScope,C=US
# Not Valid Before: Wed Apr 28 17:35:43 2021
# Not Valid After : Sat Apr 28 17:35:42 2046
# Fingerprint (SHA-256):
11:43:7C:DA:7B:B4:5E:41:36:5F:45:B3:9A:38:98:6B:0D:E0:0D:EF:34:8E:0C:7B:B0:87:36:33:80:0B:C3:8B
# Fingerprint (SHA1): 07:86:C0:D8:DD:8E:C0:80:98:06:98:D0:58:7A:EF:DE:A6:CC:A2:5D
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CommScope Public Trust ECC Root-01"
CKA_CERTIFICATE_TYPE
 CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143
\157\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157
\155\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124
\162\165\163\164\040\105\103\103\040\122\157\157\164\055\060\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143
\157\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157
\155\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124
\162\165\163\164\040\105\103\103\040\122\157\157\164\055\060\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\103\160\202\167\317\115\135\064\361\312\256\062\057\067
\367\364\177\165\240\236
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\035\060\202\001\243\240\003\002\001\002\002\024\103
\160\202\167\317\115\135\064\361\312\256\062\057\067\367\364\177
\165\240\236\060\012\006\010\052\206\110\316\075\004\003\003\060
\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061\022
\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143\157
\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157\155
\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124\162
\165\163\164\040\105\103\103\040\122\157\157\164\055\060\061\060
\036\027\015\062\061\060\064\062\070\061\067\063\065\064\063\132
\027\015\064\066\060\064\062\070\061\067\063\065\064\062\132\060
\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061\022
\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143\157
\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157\155
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\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124\162
\165\163\164\040\105\103\103\040\122\157\157\164\055\060\061\060
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201
\004\000\042\003\142\000\004\113\066\351\256\127\136\250\160\327
\320\217\164\142\167\303\136\172\252\345\266\242\361\170\375\002
\176\127\335\221\171\234\154\271\122\210\124\274\057\004\276\270
\315\366\020\321\051\354\265\320\240\303\360\211\160\031\273\121
\145\305\103\234\303\233\143\235\040\203\076\006\013\246\102\104
\205\021\247\112\072\055\351\326\150\057\110\116\123\053\007\077
\115\275\271\254\167\071\127\243\102\060\100\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003
\125\035\016\004\026\004\024\216\007\142\300\120\335\306\031\006
\000\106\164\004\367\363\256\175\165\115\060\060\012\006\010\052
\206\110\316\075\004\003\003\003\150\000\060\145\002\061\000\234
\063\337\101\343\043\250\102\066\046\227\065\134\173\353\333\113
\370\252\213\163\125\025\134\254\170\051\017\272\041\330\304\240
\330\321\003\335\155\321\071\075\304\223\140\322\343\162\262\002
\060\174\305\176\210\323\120\365\036\045\350\372\116\165\346\130
\226\244\065\137\033\145\352\141\232\160\043\265\015\243\233\222
\122\157\151\240\214\215\112\320\356\213\016\313\107\216\320\215
\021
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "CommScope Public Trust ECC Root-01"
# Issuer: CN=CommScope Public Trust ECC Root-01,O=CommScope,C=US
# Serial Number:43:70:82:77:cf:4d:5d:34:f1:ca:ae:32:2f:37:f7:f4:7f:75:a0:9e
# Subject: CN=CommScope Public Trust ECC Root-01,O=CommScope,C=US
# Not Valid Before: Wed Apr 28 17:35:43 2021
# Not Valid After : Sat Apr 28 17:35:42 2046
# Fingerprint (SHA-256):
11:43:7C:DA:7B:B4:5E:41:36:5F:45:B3:9A:38:98:6B:0D:E0:0D:EF:34:8E:0C:7B:B0:87:36:33:80:0B:C3:8B
# Fingerprint (SHA1): 07:86:C0:D8:DD:8E:C0:80:98:06:98:D0:58:7A:EF:DE:A6:CC:A2:5D
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CommScope
 Public Trust ECC Root-01"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\007\206\300\330\335\216\300\200\230\006\230\320\130\172\357\336
\246\314\242\135
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL

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\072\100\247\374\003\214\234\070\171\057\072\242\154\266\012\026
END
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143
\157\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157
\155\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124
\162\165\163\164\040\105\103\103\040\122\157\157\164\055\060\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\103\160\202\167\317\115\135\064\361\312\256\062\057\067
\367\364\177\165\240\236
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "CommScope Public Trust
 ECC Root-02"
#
# Issuer: CN=CommScope Public Trust ECC Root-02,O=CommScope,C=US
# Serial Number:28:fd:99:60:41:47:a6:01:3a:ca:14:7b:1f:ef:f9:68:08:83:5d:7d
# Subject: CN=CommScope Public Trust ECC Root-02,O=CommScope,C=US
# Not Valid Before: Wed Apr 28 17:44:54 2021
# Not Valid After : Sat Apr 28 17:44:53 2046
# Fingerprint (SHA-256):
2F:FB:7F:81:3B:BB:B3:C8:9A:B4:E8:16:2D:0F:16:D7:15:09:A8:30:CC:9D:73:C2:62:E5:14:08:75:D1:AD:4A
# Fingerprint (SHA1): 3C:3F:EF:57:0F:FE:65:93:86:9E:A0:FE:B0:F6:ED:8E:D1:13:C7:E5
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CommScope Public Trust ECC Root-02"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143
\157\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157
\155\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124
\162\165\163\164\040\105\103\103\040\122\157\157\164\055\060\062
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143
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\157\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157
\155\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124
\162\165\163\164\040\105\103\103\040\122\157\157\164\055\060\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\050\375\231\140\101\107\246\001\072\312\024\173\037\357
\371\150\010\203\135\175
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\034\060\202\001\243\240\003\002\001\002\002\024\050
\375\231\140\101\107\246\001\072\312\024\173\037\357\371\150\010
\203\135\175\060\012\006\010\052\206\110\316\075\004\003\003\060
\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061\022
\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143\157
\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157\155
\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124\162
\165\163\164\040\105\103\103\040\122\157\157\164\055\060\062\060
\036\027\015\062\061\060\064\062\070\061\067\064\064\065\064\132
\027\015\064\066\060\064\062\070\061\067\064\064\065\063\132\060
\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061\022
\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143\157
\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157\155
\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124\162
\165\163\164\040\105\103\103\040\122\157\157\164\055\060\062\060
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201
\004\000\042\003\142\000\004\170\060\201\350\143\036\345\353\161
\121\017\367\007\007\312\071\231\174\116\325\017\314\060\060\013
\217\146\223\076\317\275\305\206\275\371\261\267\264\076\264\007
\310\363\226\061\363\355\244\117\370\243\116\215\051\025\130\270
\325\157\177\356\154\042\265\260\257\110\105\012\275\250\111\224
\277\204\103\260\333\204\112\003\043\031\147\152\157\301\156\274
\006\071\067\321\210\042\367\243\102\060\100\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003
\125\035\016\004\026\004\024\346\030\165\377\357\140\336\204\244
\365\106\307\336\112\125\343\062\066\171\365\060\012\006\010\052
\206\110\316\075\004\003\003\003\147\000\060\144\002\060\046\163
\111\172\266\253\346\111\364\175\122\077\324\101\004\256\200\103
\203\145\165\271\205\200\070\073\326\157\344\223\206\253\217\347
\211\310\177\233\176\153\012\022\125\141\252\021\340\171\002\060
\167\350\061\161\254\074\161\003\326\204\046\036\024\270\363\073
\073\336\355\131\374\153\114\060\177\131\316\105\351\163\140\025
\232\114\360\346\136\045\042\025\155\302\207\131\320\262\216\152
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

```
# Trust for
 "CommScope Public Trust ECC Root-02"
# Issuer: CN=CommScope Public Trust ECC Root-02,O=CommScope,C=US
# Serial Number:28:fd:99:60:41:47:a6:01:3a:ca:14:7b:1f:ef:f9:68:08:83:5d:7d
# Subject: CN=CommScope Public Trust ECC Root-02,O=CommScope,C=US
# Not Valid Before: Wed Apr 28 17:44:54 2021
# Not Valid After : Sat Apr 28 17:44:53 2046
# Fingerprint (SHA-256):
2F:FB:7F:81:3B:BB:B3:C8:9A:B4:E8:16:2D:0F:16:D7:15:09:A8:30:CC:9D:73:C2:62:E5:14:08:75:D1:AD:4A
# Fingerprint (SHA1): 3C:3F:EF:57:0F:FE:65:93:86:9E:A0:FE:B0:F6:ED:8E:D1:13:C7:E5
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CommScope Public Trust ECC Root-02"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\074\077\357\127\017\376\145\223\206\236\240\376\260\366\355\216
\321\023\307\345
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\131\260\104\325\145\115\270\134\125\031\222\002\266\321\224\262
END
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143
\157\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157
\155\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124
\162\165\163\164\040\105\103\103\040\122\157\157\164\055\060\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\024\050\375\231\140\101\107\246\001\072\312\024\173\037\357
\371\150\010\203\135\175
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "CommScope Public Trust RSA Root-01"
#
# Issuer: CN=CommScope Public Trust RSA Root-01,O=CommScope,C=US
# Serial Number:3e:03:49:81:75:16:74:31:8e:4c:ab:d5:c5:90:29:96:c5:39:10:dd
# Subject: CN=CommScope Public Trust RSA Root-01,O=CommScope,C=US
# Not Valid Before: Wed Apr 28 16:45:54 2021
# Not Valid After : Sat Apr 28 16:45:53 2046
```

```
#
 Fingerprint (SHA-256):
02:BD:F9:6E:2A:45:DD:9B:F1:8F:C7:E1:DB:DF:21:A0:37:9B:A3:C9:C2:61:03:44:CF:D8:D6:06:FE:C1:ED:81
# Fingerprint (SHA1): 6D:0A:5F:F7:B4:23:06:B4:85:B3:B7:97:64:FC:AC:75:F5:33:F2:93
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CommScope Public Trust RSA Root-01"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143
\157\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157
\155\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124
\162\165\163\164\040\122\123\101\040\122\157\157\164\055\060\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143
\157\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157
\155\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124
\162\165\163\164\040\122\123\101\040\122\157\157\164\055\060\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\024\076\003\111\201\165\026\164\061\216\114\253\325\305\220
\051\226\305\071\020\335
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\154\060\202\003\124\240\003\002\001\002\002\024\076
\003\111\201\165\026\164\061\216\114\253\325\305\220\051\226\305
\071\020\335\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\116\061\013\060\011\006\003\125\004\006\023\002\125
\123\061\022\060\020\006\003\125\004\012\014\011\103\157\155\155
\123\143\157\160\145\061\053\060\051\006\003\125\004\003\014\042
\103\157\155\155\123\143\157\160\145\040\120\165\142\154\151\143
\040\124\162\165\163\164\040\122\123\101\040\122\157\157\164\055
\060\061\060\036\027\015\062\061\060\064\062\070\061\066\064\065
\065\064\132\027\015\064\066\060\064\062\070\061\066\064\065\065
\063\132\060\116\061\013\060\011\006\003\125\004\006\023\002\125
\123\061\022\060\020\006\003\125\004\012\014\011\103\157\155\155
\123\143\157\160\145\061\053\060\051\006\003\125\004\003\014\042
\103\157\155\155\123\143\157\160\145\040\120\165\142\154\151\143
\040\124\162\165\163\164\040\122\123\101\040\122\157\157\164\055
\060\061\060\202\002\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202
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\126\226\375\233\050\354\173\164\013\347\102\153\125\316\311\141
\262\350\255\100\074\272\271\101\012\005\117\033\046\205\217\103
\265\100\265\205\321\324\161\334\203\101\363\366\105\307\200\242
\204\120\227\106\316\240\014\304\140\126\004\035\007\133\106\245
\016\262\113\244\016\245\174\356\370\324\142\003\271\223\152\212
\024\270\160\370\056\202\106\070\043\016\164\307\153\101\267\320
\051\243\235\200\260\176\167\223\143\102\373\064\203\073\163\243
\132\041\066\353\107\372\030\027\331\272\146\302\223\244\217\374
\135\244\255\374\120\152\225\254\274\044\063\321\275\210\177\206
\365\365\262\163\052\217\174\257\010\362\032\230\077\251\201\145
\077\301\214\211\305\226\060\232\012\317\364\324\310\064\355\235
\057\274\215\070\206\123\356\227\237\251\262\143\224\027\215\017
\334\146\052\174\122\121\165\313\231\216\350\075\134\277\236\073
\050\215\203\002\017\251\237\162\342\054\053\263\334\146\227\000
\100\320\244\124\216\233\135\173\105\066\046\326\162\103\353\317
\300\352\015\334\316\022\346\175\070\237\005\047\250\227\076\351
\121\306\154\005\050\301\002\017\351\030\155\354\275\234\006\324
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\302\313\032\050\111\115\177\144\340\372\053\332\163\203\201\377
\221\003\275\224\273\344\270\216\234\062\143\315\237\273\150\201
\261\204\133\257\066\277\167\356\035\177\367\111\233\122\354\322
\167\132\175\221\235\115\302\071\055\344\272\202\370\157\362\116
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\243\071\012\001\252\300\262\061\140\203\042\241\117\022\011\001
\021\257\064\324\317\327\256\142\323\005\007\264\061\165\340\015
\155\127\117\151\207\371\127\251\272\025\366\310\122\155\241\313
\234\037\345\374\170\250\065\232\237\101\024\316\245\264\316\224
\010\034\011\255\126\345\332\266\111\232\112\352\143\030\123\234
\054\056\303\002\003\001\000\001\243\102\060\100\060\017\006\003
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006
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\065\143\361\314\201\310\306\013\350\056\122\065\244\246\111\220
\143\121\254\064\254\005\073\127\000\351\323\142\323\331\051\325
\124\276\034\020\221\234\262\155\376\131\375\171\367\352\126\320
\236\150\124\102\217\046\122\342\114\337\057\227\246\057\322\007
\230\250\363\140\135\113\232\130\127\210\357\202\345\372\257\154
\201\113\222\217\100\232\223\106\131\313\137\170\026\261\147\076
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\027\044\215\173\135\225\351\253\301\140\253\133\030\144\200\373

\255\340\006\175\035\312\131\270\363\170\051\147\306\126\035\257
\266\265\164\052\166\241\077\373\165\060\237\224\136\073\245\140
\363\313\134\014\342\016\311\140\370\311\037\026\212\046\335\347
\047\177\353\045\246\212\275\270\055\066\020\232\261\130\115\232
\150\117\140\124\345\366\106\023\216\210\254\274\041\102\022\255
\306\112\211\175\233\301\330\055\351\226\003\364\242\164\014\274
\000\035\277\326\067\045\147\264\162\213\257\205\275\352\052\003
\217\314\373\074\104\044\202\342\001\245\013\131\266\064\215\062
\013\022\015\353\047\302\375\101\327\100\074\162\106\051\300\214
\352\272\017\361\006\223\056\367\234\250\364\140\076\243\361\070
\136\216\023\301\263\072\227\207\077\222\312\170\251\034\257\320
\260\033\046\036\276\160\354\172\365\063\230\352\134\377\053\013
\004\116\103\335\143\176\016\247\116\170\003\225\076\324\055\060
\225\021\020\050\056\277\240\002\076\377\136\131\323\005\016\225
\137\123\105\357\153\207\325\110\315\026\246\226\203\341\337\263
\006\363\301\024\333\247\354\034\213\135\220\220\015\162\121\347
\141\371\024\312\257\203\217\277\257\261\012\131\135\334\134\327
\344\226\255\133\140\035\332\256\227\262\071\331\006\365\166\000
\023\370\150\114\041\260\065\304\334\125\262\311\301\101\132\034
\211\300\214\157\164\240\153\063\115\265\001\050\375\255\255\211
\027\073\246\232\204\274\353\214\352\304\161\044\250\272\051\371
\010\262\047\126\065\062\137\352\071\373\061\232\325\031\314\360
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "CommScope Public Trust RSA Root-01"
# Issuer: CN=CommScope Public Trust RSA Root-01,O=CommScope,C=US
# Serial Number:3e:03:49:81:75:16:74:31:8e:4c:ab:d5:c5:90:29:96:c5:39:10:dd
# Subject: CN=CommScope Public Trust RSA Root-01,O=CommScope,C=US
# Not Valid Before: Wed Apr 28 16:45:54 2021
# Not Valid After : Sat Apr 28 16:45:53 2046
# Fingerprint (SHA-256):
02:BD:F9:6E:2A:45:DD:9B:F1:8F:C7:E1:DB:DF:21:A0:37:9B:A3:C9:C2:61:03:44:CF:D8:D6:06:FE:C1:ED:81
# Fingerprint (SHA1): 6D:0A:5F:F7:B4:23:06:B4:85:B3:B7:97:64:FC:AC:75:F5:33:F2:93
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CommScope Public Trust RSA Root-01"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\155\012\137\367\264\043\006\264\205\263\267\227\144\374\254\165
\365\063\362\223
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\016\264\025\274\207\143\135\135\002\163\324\046\070\150\163\330

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END
CKA_ISSUER
 MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143
\157\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157
\155\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124
\162\165\163\164\040\122\123\101\040\122\157\157\164\055\060\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\076\003\111\201\165\026\164\061\216\114\253\325\305\220
\051\226\305\071\020\335
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "CommScope Public Trust RSA Root-02"
#
# Issuer: CN=CommScope Public Trust RSA Root-02,O=CommScope,C=US
# Serial Number:54:16:bf:3b:7e:39:95:71:8d:d1:aa:00:a5:86:0d:2b:8f:7a:05:4e
# Subject: CN=CommScope
 Public Trust RSA Root-02,O=CommScope,C=US
# Not Valid Before: Wed Apr 28 17:16:43 2021
# Not Valid After : Sat Apr 28 17:16:42 2046
# Fingerprint (SHA-256):
FF:E9:43:D7:93:42:4B:4F:7C:44:0C:1C:3D:64:8D:53:63:F3:4B:82:DC:87:AA:7A:9F:11:8F:C5:DE:E1:01:F1
# Fingerprint (SHA1): EA:B0:E2:52:1B:89:93:4C:11:68:F2:D8:9A:AC:22:4C:A3:8A:57:AE
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CommScope Public Trust RSA Root-02"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143
\157\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157
\155\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124
\162\165\163\164\040\122\123\101\040\122\157\157\164\055\060\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143
\157\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157
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\155\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124
\162\165\163\164\040\122\123\101\040\122\157\157\164\055\060\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\024\124\026\277\073\176\071\225\161\215\321\252\000\245\206
\015\053\217\172\005\116
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\154\060\202\003\124\240\003\002\001\002\002\024\124
\026\277\073\176\071\225\161\215\321\252\000\245\206\015\053\217
\172\005\116\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\116\061\013\060\011\006\003\125\004\006\023\002\125
\123\061\022\060\020\006\003\125\004\012\014\011\103\157\155\155
\123\143\157\160\145\061\053\060\051\006\003\125\004\003\014\042
\103\157\155\155\123\143\157\160\145\040\120\165\142\154\151\143
\040\124\162\165\163\164\040\122\123\101\040\122\157\157\164\055
\060\062\060\036\027\015\062\061\060\064\062\070\061\067\061\066
\064\063\132\027\015\064\066\060\064\062\070\061\067\061\066\064
\062\132\060\116\061\013\060\011\006\003\125\004\006\023\002\125
\123\061\022\060\020\006\003\125\004\012\014\011\103\157\155\155
\123\143\157\160\145\061\053\060\051\006\003\125\004\003\014\042
\103\157\155\155\123\143\157\160\145\040\120\165\142\154\151\143
\040\124\162\165\163\164\040\122\123\101\040\122\157\157\164\055
\060\062\060\202\002\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202
\002\001\000\341\372\016\373\150\000\022\310\115\325\254\042\304
\065\001\073\305\124\345\131\166\143\245\177\353\301\304\152\230
\275\062\215\027\200\353\135\272\321\142\075\045\043\031\065\024
\351\177\211\247\033\142\074\326\120\347\064\225\003\062\261\264
\223\042\075\247\342\261\355\346\173\116\056\207\233\015\063\165
\012\336\252\065\347\176\345\066\230\242\256\045\236\225\263\062
\226\244\053\130\036\357\077\376\142\064\110\121\321\264\215\102
\255\140\332\111\152\225\160\335\322\000\342\314\127\143\002\173
\226\335\111\227\133\222\116\225\323\371\313\051\037\030\112\370
\001\052\322\143\011\156\044\351\211\322\345\307\042\114\334\163
\206\107\000\252\015\210\216\256\205\175\112\351\273\063\117\016
\122\160\235\225\343\174\155\226\133\055\075\137\241\203\106\135
\266\343\045\270\174\247\031\200\034\352\145\103\334\221\171\066
\054\164\174\362\147\006\311\211\311\333\277\332\150\277\043\355
\334\153\255\050\203\171\057\354\070\245\015\067\001\147\047\232
\351\063\331\063\137\067\241\305\360\253\075\372\170\260\347\054
\237\366\076\237\140\340\357\110\351\220\105\036\005\121\170\032
\054\022\054\134\050\254\015\242\043\236\064\217\005\346\242\063
\316\021\167\023\324\016\244\036\102\037\206\315\160\376\331\056
\025\075\035\273\270\362\123\127\333\314\306\164\051\234\030\263
\066\165\070\056\017\124\241\370\222\037\211\226\117\273\324\356
\235\351\073\066\102\265\012\073\052\324\144\171\066\020\341\371

\221\003\053\173\040\124\315\015\031\032\310\101\062\064\321\260
\231\341\220\036\001\100\066\265\267\372\251\345\167\165\244\042
\201\135\260\213\344\047\022\017\124\210\306\333\205\164\346\267
\300\327\246\051\372\333\336\363\223\227\047\004\125\057\012\157
\067\305\075\023\257\012\000\251\054\213\034\201\050\327\357\206
\061\251\256\362\156\270\312\152\054\124\107\330\052\210\056\257
\301\007\020\170\254\021\242\057\102\360\067\305\362\270\126\335
\016\142\055\316\055\126\176\125\362\247\104\366\053\062\364\043
\250\107\350\324\052\001\170\317\152\303\067\250\236\145\322\054
\345\372\272\063\301\006\104\366\346\317\245\015\247\146\010\064
\212\054\363\002\003\001\000\001\243\102\060\100\060\017\006\003
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006
\003\125\035\016\004\026\004\024\107\320\347\261\042\377\235\054
\365\331\127\140\263\261\261\160\225\357\141\172\060\015\006\011
\052\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000
\206\151\261\115\057\351\237\117\042\223\150\216\344\041\231\243
\316\105\123\033\163\104\123\000\201\141\315\061\343\010\272\201
\050\050\172\222\271\266\250\310\103\236\307\023\046\115\302\330
\345\125\234\222\135\120\330\302\053\333\376\346\250\227\317\122
\072\044\303\145\144\134\107\061\243\145\065\023\303\223\271\367
\371\121\227\273\244\360\142\207\305\326\006\323\227\203\040\251
\176\273\266\041\302\245\015\204\000\341\362\047\020\203\272\335
\003\201\325\335\150\303\146\020\310\321\166\264\263\157\051\236
\000\371\302\051\365\261\223\031\122\151\032\054\114\240\213\340
\025\232\061\057\323\210\225\131\156\345\304\263\120\310\024\010
\112\233\213\023\203\261\244\162\262\073\166\063\101\334\334\252
\246\007\157\035\044\022\237\310\166\275\057\331\216\364\054\356
\267\322\070\020\044\066\121\057\343\134\135\201\041\247\332\273
\116\377\346\007\250\376\271\015\047\154\273\160\132\125\172\023
\351\361\052\111\151\307\137\207\127\114\103\171\155\072\145\351
\060\134\101\356\353\167\245\163\022\210\350\277\175\256\345\304
\250\037\015\216\034\155\120\002\117\046\030\103\336\217\125\205
\261\013\067\005\140\311\125\071\022\004\241\052\317\161\026\237
\066\121\111\277\160\073\236\147\234\373\173\171\311\071\034\170
\254\167\221\124\232\270\165\012\201\122\227\343\146\141\153\355
\076\070\036\226\141\125\341\221\124\214\355\214\044\037\201\311
\020\232\163\231\053\026\116\162\000\077\124\033\370\215\272\213
\347\024\326\266\105\117\140\354\226\256\303\057\002\116\135\235
\226\111\162\000\262\253\165\134\017\150\133\035\145\302\137\063
\017\036\017\360\073\206\365\260\116\273\234\367\352\045\005\334
\255\242\233\113\027\001\276\102\337\065\041\035\255\253\256\364
\277\256\037\033\323\342\073\374\263\162\163\034\233\050\220\211
\023\075\035\301\000\107\011\226\232\070\033\335\261\317\015\302
\264\104\363\226\225\316\062\072\217\064\234\340\027\307\136\316
\256\015\333\207\070\345\077\133\375\233\031\341\061\101\172\160
\252\043\153\001\341\105\114\315\224\316\073\236\055\347\210\002
\042\364\156\350\310\354\326\074\363\271\262\327\167\172\254\173

```
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "CommScope Public Trust RSA Root-02"
# Issuer: CN=CommScope Public Trust RSA Root-02,O=CommScope,C=US
# Serial Number:54:16:bf:3b:7e:39:95:71:8d:d1:aa:00:a5:86:0d:2b:8f:7a:05:4e
# Subject: CN=CommScope Public Trust RSA Root-02,O=CommScope,C=US
# Not Valid Before: Wed Apr 28 17:16:43 2021
# Not Valid After : Sat Apr 28 17:16:42 2046
# Fingerprint (SHA-256):
FF:E9:43:D7:93:42:4B:4F:7C:44:0C:1C:3D:64:8D:53:63:F3:4B:82:DC:87:AA:7A:9F:11:8F:C5:DE:E1:01:F1
# Fingerprint (SHA1): EA:B0:E2:52:1B:89:93:4C:11:68:F2:D8:9A:AC:22:4C:A3:8A:57:AE
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CommScope Public Trust RSA Root-02"
CKA_CERT_SHA1_HASH
 MULTILINE_OCTAL
\352\260\342\122\033\211\223\114\021\150\362\330\232\254\042\114
\243\212\127\256
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\341\051\371\142\173\166\342\226\155\363\324\327\017\256\037\252
END
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\022\060\020\006\003\125\004\012\014\011\103\157\155\155\123\143
\157\160\145\061\053\060\051\006\003\125\004\003\014\042\103\157
\155\155\123\143\157\160\145\040\120\165\142\154\151\143\040\124
\162\165\163\164\040\122\123\101\040\122\157\157\164\055\060\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\124\026\277\073\176\071\225\161\215\321\252\000\245\206
\015\053\217\172\005\116
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "D-Trust SBR Root CA 1 2022"
#
# Issuer: CN=D-Trust SBR Root CA 1 2022,O=D-Trust
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 GmbH,C=DE
# Serial Number:52:cf:e4:8c:6d:a0:4a:f7:3f:82:97:0c:80:09:8c:95
# Subject: CN=D-Trust SBR Root CA 1 2022,O=D-Trust GmbH,C=DE
# Not Valid Before: Wed Jul 06 11:30:00 2022
# Not Valid After : Mon Jul 06 11:29:59 2037
# Fingerprint (SHA-256):
D9:2C:17:1F:5C:F8:90:BA:42:80:19:29:29:27:FE:22:F3:20:7F:D2:B5:44:49:CB:6F:67:5A:F4:92:21:46:E2
# Fingerprint (SHA1): 0F:52:3A:6B:4E:7D:1D:18:05:A5:48:F9:4D:CD:E4:C3:1E:1B:E9:E6
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-Trust SBR Root CA 1 2022"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\111\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\043\060\041\006\003\125\004\003\023
\032\104\055\124\162\165\163\164\040\123\102\122\040\122\157\157
\164\040\103\101\040\061\040\062\060\062\062
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\111\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\043\060\041\006\003\125\004\003\023
\032\104\055\124\162\165\163\164\040\123\102\122\040\122\157\157
\164\040\103\101\040\061\040\062\060\062\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\122\317\344\214\155\240\112\367\077\202\227\014\200\011
\214\225
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\136\060\202\001\343\240\003\002\001\002\002\020\122
\317\344\214\155\240\112\367\077\202\227\014\200\011\214\225\060
\012\006\010\052\206\110\316\075\004\003\003\060\111\061\013\060
\011\006\003\125\004\006\023\002\104\105\061\025\060\023\006\003
\125\004\012\023\014\104\055\124\162\165\163\164\040\107\155\142
\110\061\043\060\041\006\003\125\004\003\023\032\104\055\124\162
\165\163\164\040\123\102\122\040\122\157\157\164\040\103\101\040
\061\040\062\060\062\062\060\036\027\015\062\062\060\067\060\066
\061\061\063\060\060\060\132\027\015\063\067\060\067\060\066\061
\061\062\071\065\071\132\060\111\061\013\060\011\006\003\125\004
\006\023\002\104\105\061\025\060\023\006\003\125\004\012\023\014
\104\055\124\162\165\163\164\040\107\155\142\110\061\043\060\041
\006\003\125\004\003\023\032\104\055\124\162\165\163\164\040\123
```

\102\122\040\122\157\157\164\040\103\101\040\061\040\062\060\062
\062\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005
\053\201\004\000\042\003\142\000\004\131\223\071\366\214\111\146
\050\327\141\014\310\253\177\014\243\055\337\242\244\174\222\053
\150\325\056\176\036\100\313\264\150\111\177\022\241\253\177\127
\237\031\056\143\056\133\376\146\161\014\063\017\271\336\153\304
\210\303\261\357\354\071\100\343\226\253\333\345\173\256\037\334
\371\257\106\232\152\106\006\057\307\067\144\213\027\142\376\226
\303\242\356\204\340\260\227\071\274\243\201\217\060\201\214\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\035\006\003\125\035\016\004\026\004\024\361\051\243\036\001
\022\035\075\165\126\115\307\120\174\305\031\252\017\030\267\060
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060
\112\006\003\125\035\037\004\103\060\101\060\077\240\075\240\073
\206\071\150\164\164\160\072\057\057\143\162\154\056\144\055\164
\162\165\163\164\056\156\145\164\057\143\162\154\057\144\055\164
\162\165\163\164\137\163\142\162\137\162\157\157\164\137\143\141
\137\061\137\062\060\062\062\056\143\162\154\060\012\006\010\052
\206\110\316\075\004\003\003\003\151\000\060\146\002\061\000\227
\371\336\256\113\217\230\265\036\100\177\062\175\115\124\103\332
\211\315\302\252\222\074\321\202\036\163\317\372\114\222\040\373
\143\047\305\365\163\075\011\075\367\247\141\206\214\363\152\002
\061\000\347\057\174\270\365\045\214\073\071\037\066\253\215\365
\206\242\056\341\172\144\332\147\071\002\376\376\063\077\331\163
\266\130\133\072\374\262\244\331\140\170\167\314\171\247\246\256
\125\275
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "D-Trust SBR Root CA 1 2022"
# Issuer: CN=D-Trust SBR Root CA 1 2022,O=D-Trust GmbH,C=DE
# Serial Number:52:cf:e4:8c:6d:a0:4a:f7:3f:82:97:0c:80:09:8c:95
# Subject: CN=D-Trust SBR Root CA 1 2022,O=D-Trust GmbH,C=DE
# Not Valid Before: Wed Jul 06 11:30:00 2022
# Not Valid After : Mon Jul 06 11:29:59 2037
# Fingerprint (SHA-256):
D9:2C:17:1F:5C:F8:90:BA:42:80:19:29:29:27:FE:22:F3:20:7F:D2:B5:44:49:CB:6F:67:5A:F4:92:21:46:E2
# Fingerprint (SHA1): 0F:52:3A:6B:4E:7D:1D:18:05:A5:48:F9:4D:CD:E4:C3:1E:1B:E9:E6
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-Trust SBR Root CA 1 2022"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\017\122\072\153\116\175\035\030\005\245\110\371\115\315\344\303

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\036\033\351\346
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\023\074\033\202\352\156\352\355\144\142\351\132\171\005\151\004
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\111\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\043\060\041\006\003\125\004\003\023
\032\104\055\124\162\165\163\164\040\123\102\122\040\122\157\157
\164\040\103\101\040\061\040\062\060\062\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\122\317\344\214\155\240\112\367\077\202\227\014\200\011
\214\225
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "D-Trust SBR Root CA 2 2022"
#
# Issuer: CN=D-Trust SBR Root CA 2 2022,O=D-Trust GmbH,C=DE
# Serial Number:54:d5:a3:95:1e:3d:95:ba:72:1b:9a:d0:31:21:4a:ba
# Subject: CN=D-Trust SBR Root CA 2 2022,O=D-Trust GmbH,C=DE
# Not Valid Before: Thu Jul 07 07:30:00 2022
# Not Valid After
 : Tue Jul 07 07:29:59 2037
# Fingerprint (SHA-256):
DB:A8:4D:D7:EF:62:2D:48:54:63:A9:01:37:EA:4D:57:4D:F8:55:09:28:F6:AF:A0:3B:4D:8B:11:41:E6:36:CC
# Fingerprint (SHA1): 27:FF:63:B9:EF:34:29:31:03:38:1A:D8:60:60:DA:CC:60:28:35:E1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-Trust SBR Root CA 2 2022"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\111\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\043\060\041\006\003\125\004\003\023
\032\104\055\124\162\165\163\164\040\123\102\122\040\122\157\157
\164\040\103\101\040\062\040\062\060\062\062
END
CKA_ID UTF8 "0"
```

CKA_ISSUER MULTILINE_OCTAL
\060\111\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\043\060\041\006\003\125\004\003\023
\032\104\055\124\162\165\163\164\040\123\102\122\040\122\157\157
\164\040\103\101\040\062\040\062\060\062\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\124\325\243\225\036\075\225\272\162\033\232\320\061\041
\112\272
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\254\060\202\003\224\240\003\002\001\002\002\020\124
\325\243\225\036\075\225\272\162\033\232\320\061\041\112\272\060
\015\006\011\052\206\110\206\367\015\001\001\015\005\000\060\111
\061\013\060\011\006\003\125\004\006\023\002\104\105\061\025\060
\023\006\003\125\004\012\023\014\104\055\124\162\165\163\164\040
\107\155\142\110\061\043\060\041\006\003\125\004\003\023\032\104
\055\124\162\165\163\164\040\123\102\122\040\122\157\157\164\040
\103\101\040\062\040\062\060\062\062\060\036\027\015\062\062\060
\067\060\067\060\067\063\060\060\060\132\027\015\063\067\060\067
\060\067\060\067\062\071\065\071\132\060\111\061\013\060\011\006
\003\125\004\006\023\002\104\105\061\025\060\023\006\003\125\004
\012\023\014\104\055\124\162\165\163\164\040\107\155\142\110\061
\043\060\041\006\003\125\004\003\023\032\104\055\124\162\165\163
\164\040\123\102\122\040\122\157\157\164\040\103\101\040\062\040
\062\060\062\062\060\202\002\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012
\002\202\002\001\000\257\054\274\216\066\214\353\144\257\121\152
\326\156\074\136\221\072\352\232\303\312\154\373\252\047\236\144
\042\251\100\337\271\050\105\132\354\123\141\026\050\230\302\212
\244\165\170\120\204\335\372\040\110\222\007\145\101\065\146\121
\022\164\141\235\007\006\205\071\061\127\173\050\077\325\234\245
\354\132\351\034\113\047\237\316\047\006\363\067\365\122\330\021
\063\026\101\072\037\365\143\170\145\143\206\311\277\310\001\004
\037\156\356\342\354\254\014\356\202\222\342\366\032\015\077\071
\371\235\145\223\255\370\271\005\301\075\370\067\201\126\303\240
\376\005\354\340\224\026\072\043\026\004\332\246\012\223\205\162
\155\141\073\241\215\105\326\343\177\276\025\275\066\204\010\366
\013\203\153\046\252\242\275\340\260\347\252\340\256\147\304\323
\202\245\014\251\244\360\063\171\015\120\077\360\357\220\075\044
\271\177\322\040\154\352\227\363\277\234\334\107\336\011\141\275
\224\171\225\132\002\166\065\140\304\107\042\015\367\166\143\003
\323\306\373\203\306\135\253\255\355\151\045\053\003\133\115\045
\000\101\343\214\207\027\122\250\340\005\053\103\115\024\023\312
\347\077\103\042\274\067\244\165\361\366\277\072\357\062\036\256
\356\130\206\220\162\272\004\254\100\110\357\134\304\170\247\251

\217\047\132\313\172\354\130\362\302\010\130\220\155\115\003\205
\171\161\025\005\016\116\076\371\337\017\005\367\137\024\110\126
\041\015\063\222\261\254\214\345\030\376\277\017\356\340\004\252
\275\041\362\130\266\134\211\012\213\030\011\042\032\263\065\306
\146\302\365\063\025\231\200\340\010\371\226\057\023\214\356\332
\267\210\304\351\067\265\327\152\327\072\204\115\253\160\214\323
\116\024\125\240\242\020\374\144\332\147\350\361\313\063\335\311
\232\212\217\226\057\130\201\331\370\232\000\103\314\220\373\125
\166\373\206\343\067\001\050\014\157\364\351\131\115\025\167\121
\102\112\314\064\270\200\103\120\201\357\127\245\023\333\247\224
\171\017\113\312\176\027\175\257\243\041\144\350\161\125\126\217
\006\260\107\354\131\017\135\160\133\054\026\102\360\206\236\165
\336\153\115\110\230\204\342\127\030\266\234\202\231\145\072\213
\200\170\127\014\111\002\003\001\000\001\243\201\217\060\201\214
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\035\006\003\125\035\016\004\026\004\024\135\263\200\224
\033\345\206\277\150\272\024\064\244\366\356\155\362\335\337\347
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006
\060\112\006\003\125\035\037\004\103\060\101\060\077\240\075\240
\073\206\071\150\164\164\160\072\057\057\143\162\154\056\144\055
\164\162\165\163\164\056\156\145\164\057\143\162\154\057\144\055
\164\162\165\163\164\137\163\142\162\137\162\157\157\164\137\143
\141\137\062\137\062\060\062\062\056\143\162\154\060\015\006\011
\052\206\110\206\367\015\001\001\015\005\000\003\202\002\001\000
\064\124\056\130\030\126\315\112\275\227\323\365\175\053\334\257
\017\121\341\115\274\041\113\223\364\000\104\023\007\020\013\045
\030\076\110\131\226\367\241\341\223\220\170\146\032\075\043\353
\042\253\001\246\216\014\121\063\346\155\214\061\356\254\244\001
\160\071\110\336\307\146\054\153\015\313\163\237\207\222\351\076
\107\037\270\357\057\356\267\126\214\110\211\360\070\247\025\071
\262\356\300\077\027\244\163\002\010\234\274\006\212\244\302\267
\141\141\371\303\333\304\320\172\174\141\336\261\130\221\365\335
\145\114\057\013\370\353\075\265\355\212\276\167\034\272\131\002
\022\146\161\345\230\047\316\016\075\257\121\242\105\371\202\373
\132\245\224\160\367\213\204\303\114\145\045\233\173\342\037\060
\160\263\100\216\072\356\275\364\347\150\305\235\311\051\107\161
\016\223\310\265\110\116\365\146\273\007\210\161\151\153\173\110
\216\157\360\021\304\264\311\160\024\230\040\275\355\247\352\001
\332\156\245\233\022\376\076\104\060\263\360\353\165\122\300\364
\303\372\167\046\244\167\202\055\157\363\050\036\116\225\360\060
\367\211\370\054\242\120\133\362\276\062\176\154\124\333\162\311
\052\132\340\034\266\013\330\122\232\131\241\343\260\001\047\305
\240\026\120\146\334\353\256\155\364\233\133\075\204\155\133\207
\347\251\211\273\156\270\340\233\123\211\300\377\056\100\032\211
\104\056\030\103\147\070\344\174\162\137\331\243\051\045\101\101
\075\034\167\033\144\250\303\125\356\143\161\146\142\203\364\177
\046\231\240\124\073\241\022\155\160\142\316\323\371\270\275\042
\374\324\232\324\273\342\070\026\057\267\175\071\302\260\251\003

\351\234\317\176\030\215\166\334\137\021\273\353\102\354\120\011
\076\134\354\220\061\330\032\162\272\077\151\007\356\230\064\302
\064\244\326\332\023\326\251\204\362\000\206\300\124\272\036\021
\260\342\271\304\007\264\221\347\252\346\061\126\157\261\104\304
\052\142\274\311\260\145\234\064\374\014\032\123\337\041\027\273
\302\155\241\012\346\361\260\252\104\011\120\111\070\172\135\161
\342\061\056\031\260\337\225\102\004\175\204\210\316\012\043\147
\153\070\235\026\336\006\376\050\160\070\245\132\256\374\203\355
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "D-Trust SBR Root CA 2 2022"
# Issuer: CN=D-Trust SBR Root CA 2 2022,O=D-Trust GmbH,C=DE
# Serial Number:54:d5:a3:95:1e:3d:95:ba:72:1b:9a:d0:31:21:4a:ba
# Subject: CN=D-Trust SBR Root CA 2 2022,O=D-Trust GmbH,C=DE
# Not Valid Before: Thu Jul 07 07:30:00 2022
# Not Valid After : Tue Jul 07 07:29:59 2037
# Fingerprint (SHA-256):
DB:A8:4D:D7:EF:62:2D:48:54:63:A9:01:37:EA:4D:57:4D:F8:55:09:28:F6:AF:A0:3B:4D:8B:11:41:E6:36:CC
# Fingerprint (SHA1): 27:FF:63:B9:EF:34:29:31:03:38:1A:D8:60:60:DA:CC:60:28:35:E1
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
UTF8 "D-Trust SBR Root CA 2 2022"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\047\377\143\271\357\064\051\061\003\070\032\330\140\140\332\314
\140\050\065\341
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\220\361\364\053\074\247\312\112\210\073\005\053\010\124\205\336
END
CKA_ISSUER MULTILINE_OCTAL
\060\111\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\023\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\043\060\041\006\003\125\004\003\023
\032\104\055\124\162\165\163\164\040\123\102\122\040\122\157\157
\164\040\103\101\040\062\040\062\060\062\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\124\325\243\225\036\075\225\272\162\033\232\320\061\041
\112\272
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

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CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Telekom Security SMIME ECC Root 2021"
#
# Issuer: CN=Telekom
 Security SMIME ECC Root 2021,O=Deutsche Telekom Security GmbH,C=DE
# Serial Number:15:2a:dd:14:c9:18:d1:a4:56:40:86:a6:25:af:07:5f
# Subject: CN=Telekom Security SMIME ECC Root 2021,O=Deutsche Telekom Security GmbH,C=DE
# Not Valid Before: Thu Mar 18 11:08:30 2021
# Not Valid After : Sat Mar 17 23:59:59 2046
# Fingerprint (SHA-256):
3A:E6:DF:7E:0D:63:7A:65:A8:C8:16:12:EC:6F:9A:14:2F:85:A1:68:34:C1:02:80:D8:8E:70:70:28:51:87:55
# Fingerprint (SHA1): B7:F9:1D:98:EC:25:93:F3:50:14:84:9A:A8:7E:22:10:3C:C4:39:27
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Telekom Security SMIME ECC Root 2021"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143
\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\107\155\142\110\061\055\060\053\006\003\125\004
\003\014\044\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\123\115\111\115\105\040\105\103\103\040\122\157
\157\164\040\062\060\062\061
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143
\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\107\155\142\110\061\055\060\053\006\003\125\004
\003\014\044\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\123\115\111\115\105\040\105\103\103\040\122\157
\157\164\040\062\060\062\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\025\052\335\024\311\030\321\244\126\100\206\246\045\257
\007\137
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\107\060\202\001\315\240\003\002\001\002\002\020\025
```

\052\335\024\311\030\321\244\126\100\206\246\045\257\007\137\060
\012\006\010\052\206\110\316\075\004\003\003\060\145\061\013\060
\011\006\003\125\004\006\023\002\104\105\061\047\060\045\006\003
\125\004\012\014\036\104\145\165\164\163\143\150\145\040\124\145
\154\145\153\157\155\040\123\145\143\165\162\151\164\171\040\107
\155\142\110\061\055\060\053\006\003\125\004\003\014\044\124\145
\154\145\153\157\155\040\123\145\143\165\162\151\164\171\040\123
\115\111\115\105\040\105\103\103\040\122\157\157\164\040\062\060
\062\061\060\036\027\015\062\061\060\063\061\070\061\061\060\070
\063\060\132\027\015\064\066\060\063\061\067\062\063\065\071\065
\071\132\060\145\061\013\060\011\006\003\125\004\006\023\002\104
\105\061\047\060\045\006\003\125\004\012\014\036\104\145\165\164
\163\143\150\145\040\124\145\154\145\153\157\155\040\123\145\143
\165\162\151\164\171\040\107\155\142\110\061\055\060\053\006\003
\125\004\003\014\044\124\145\154\145\153\157\155\040\123\145\143
\165\162\151\164\171\040\123\115\111\115\105\040\105\103\103\040
\122\157\157\164\040\062\060\062\061\060\166\060\020\006\007\052
\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142\000
\004\260\031\217\242\153\265\307\315\017\060\231\067\014\303\140
\133\361\361\047\040\125\075\300\222\213\253\127\241\157\163\203
\041\302\103\023\014\136\211\252\307\005\065\171\223\142\220\326
\135\023\037\321\172\240\274\236\020\247\146\174\106\012\260\127
\154\277\346\124\071\070\041\154\022\134\161\314\323\132\137\155
\267\247\206\337\263\337\356\302\347\211\101\226\065\366\057\112
\265\243\102\060\100\060\035\006\003\125\035\016\004\026\004\024
\053\313\001\014\143\303\123\022\245\250\127\257\320\234\203\373
\275\220\072\113\060\017\006\003\125\035\023\001\001\377\004\005
\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\006\060\012\006\010\052\206\110\316\075\004\003
\003\003\150\000\060\145\002\061\000\326\274\110\222\207\107\003
\307\160\073\045\266\037\256\106\147\163\164\000\047\113\344\245
\004\242\003\337\136\050\255\156\136\003\310\335\150\234\266\277
\224\020\110\225\057\017\377\030\213\002\060\001\100\063\236\227
\227\115\005\362\164\124\014\315\071\375\152\153\011\301\044\077
\141\216\070\241\267\350\327\104\025\021\142\377\016\141\067\107
\113\100\177\112\137\262\147\132\163\165\302
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Telekom Security SMIME ECC Root 2021"
# Issuer: CN=Telekom Security SMIME ECC Root 2021,O=Deutsche Telekom Security GmbH,C=DE
# Serial Number:15:2a:dd:14:c9:18:d1:a4:56:40:86:a6:25:af:07:5f
# Subject: CN=Telekom Security SMIME ECC Root 2021,O=Deutsche Telekom Security GmbH,C=DE
# Not Valid Before: Thu Mar 18 11:08:30 2021
# Not Valid After : Sat Mar 17 23:59:59 2046

```
# Fingerprint (SHA-256):
3A:E6:DF:7E:0D:63:7A:65:A8:C8:16:12:EC:6F:9A:14:2F:85:A1:68:34:C1:02:80:D8:8E:70:70:28:51:87:55
# Fingerprint (SHA1): B7:F9:1D:98:EC:25:93:F3:50:14:84:9A:A8:7E:22:10:3C:C4:39:27
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
 CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Telekom Security SMIME ECC Root 2021"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\267\371\035\230\354\045\223\363\120\024\204\232\250\176\042\020
\074\304\071\047
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\165\275\136\355\174\015\146\076\007\244\233\274\002\007\330\264
END
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143
\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\107\155\142\110\061\055\060\053\006\003\125\004
\003\014\044\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\123\115\111\115\105\040\105\103\103\040\122\157
\157\164\040\062\060\062\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\025\052\335\024\311\030\321\244\126\100\206\246\045\257
\007\137
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Telekom Security TLS ECC Root 2020"
#
# Issuer: CN=Telekom Security TLS ECC Root 2020,O=Deutsche Telekom Security GmbH,C=DE
# Serial Number:36:3a:96:8c:c9:5c:b2:58:cd:d0:01:5d:c5:e5:57:00
# Subject: CN=Telekom Security TLS ECC Root 2020,O=Deutsche Telekom Security GmbH,C=DE
# Not Valid Before: Tue Aug 25 07:48:20 2020
# Not Valid After : Fri Aug 25 23:59:59 2045
# Fingerprint (SHA-256):
57:8A:F4:DE:D0:85:3F:4E:59:98:DB:4A:EA:F9:CB:EA:8D:94:5F:60:B6:20:A3:8D:1A:3C:13:B2:BC:7B:A8:E1
# Fingerprint (SHA1): C0:F8:96:C5:A9:3B:01:06:21:07:DA:18:42:48:BC:E9:9D:88:D5:EC
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
```

```
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Telekom Security TLS ECC Root 2020"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143
\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\107\155\142\110\061\053\060\051\006\003\125\004
\003\014\042\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\124\114\123\040\105\103\103\040\122\157\157\164
\040\062\060\062\060
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143
\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\107\155\142\110\061\053\060\051\006\003\125\004
\003\014\042\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\124\114\123\040\105\103\103\040\122\157\157\164
\040\062\060\062\060
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\066\072\226\214\311\134\262\130\315\320\001\135\305\345
\127\000
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\102\060\202\001\311\240\003\002\001\002\002\020\066
\072\226\214\311\134\262\130\315\320\001\135\305\345\127\000\060
\012\006\010\052\206\110\316\075\004\003\003\060\143\061\013\060
\011\006\003\125\004\006\023\002\104\105\061\047\060\045\006\003
\125\004\012\014\036\104\145\165\164\163\143\150\145\040\124\145
\154\145\153\157\155\040\123\145\143\165\162\151\164\171\040\107
\155\142\110\061\053\060\051\006\003\125\004\003\014\042\124\145
\154\145\153\157\155\040\123\145\143\165\162\151\164\171\040\124
\114\123\040\105\103\103\040\122\157\157\164\040\062\060\062\060
\060\036\027\015\062\060\060\070\062\065\060\067\064\070\062\060
\132\027\015\064\065\060\070\062\065\062\063\065\071\065\071\132
\060\143\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143
\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\107\155\142\110\061\053\060\051\006\003\125\004
\003\014\042\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\124\114\123\040\105\103\103\040\122\157\157\164
\040\062\060\062\060\060\166\060\020\006\007\052\206\110\316\075
\002\001\006\005\053\201\004\000\042\003\142\000\004\316\277\376
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\127\250\277\325\252\367\020\232\315\274\321\021\242\275\147\102
\314\220\353\025\030\220\331\242\315\014\052\045\353\076\117\316
\265\322\217\017\363\065\332\103\213\002\200\276\157\121\044\035
\017\153\053\312\237\302\157\120\062\345\067\040\266\040\377\210
\015\017\155\111\273\333\006\244\207\220\222\224\364\011\320\317
\177\310\200\013\301\227\263\273\065\047\311\302\033\243\102\060
\100\060\035\006\003\125\035\016\004\026\004\024\343\162\314\156
\225\231\107\261\346\263\141\114\321\313\253\343\272\315\336\237
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\006\060\012\006\010\052\206\110\316\075\004\003\003\003\147\000
\060\144\002\060\165\122\213\267\244\020\117\256\112\020\213\262
\204\133\102\341\346\052\066\002\332\240\156\031\077\045\277\332
\131\062\216\344\373\220\334\223\144\316\255\264\101\107\140\342
\317\247\313\036\002\060\067\101\214\146\337\101\153\326\203\000
\101\375\057\132\367\120\264\147\321\054\250\161\327\103\312\234
\047\044\221\203\110\015\317\315\367\124\201\257\354\177\344\147
\333\270\220\356\335\045
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Telekom Security TLS ECC Root 2020"
# Issuer: CN=Telekom Security TLS ECC Root 2020,O=Deutsche Telekom Security GmbH,C=DE
# Serial Number:36:3a:96:8c:c9:5c:b2:58:cd:d0:01:5d:c5:e5:57:00
# Subject: CN=Telekom Security TLS ECC Root 2020,O=Deutsche Telekom Security GmbH,C=DE
# Not Valid Before: Tue Aug 25 07:48:20 2020
# Not Valid After : Fri Aug 25 23:59:59 2045
# Fingerprint (SHA-256):
57:8A:F4:DE:D0:85:3F:4E:59:98:DB:4A:EA:F9:CB:EA:8D:94:5F:60:B6:20:A3:8D:1A:3C:13:B2:BC:7B:A8:E1
# Fingerprint (SHA1):
 C0:F8:96:C5:A9:3B:01:06:21:07:DA:18:42:48:BC:E9:9D:88:D5:EC
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Telekom Security TLS ECC Root 2020"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\300\370\226\305\251\073\001\006\041\007\332\030\102\110\274\351
\235\210\325\354
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\301\253\376\152\020\054\003\215\274\034\042\062\300\205\247\375
END
CKA_ISSUER MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\104\105\061

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\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143
\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\107\155\142\110\061\053\060\051\006\003\125\004
\003\014\042\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\124\114\123\040\105\103\103\040\122\157\157\164
\040\062\060\062\060
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\066\072\226\214\311\134\262\130\315\320\001\135\305\345
\127\000
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "Telekom Security SMIME RSA Root 2023"
#
# Issuer: CN=Telekom Security SMIME RSA Root 2023,O=Deutsche Telekom Security GmbH,C=DE
# Serial Number:0c:7e:62:f5:79:73:3b:9d:43:8e:8b:63:ed:91:95:b8
# Subject: CN=Telekom Security SMIME RSA Root 2023,O=Deutsche Telekom Security GmbH,C=DE
# Not Valid Before: Tue Mar 28 12:09:22 2023
# Not Valid After : Fri Mar 27 23:59:59 2048
# Fingerprint (SHA-256):
78:A6:56:34:4F:94:7E:9C:C0:F7:34:D9:05:3D:32:F6:74:20:86:B6:B9:CD:2C:AE:4F:AE:1A:2E:4E:FD:E0:48
# Fingerprint (SHA1): 89:3F:6F:1C:E2:4D:7F:FB:C3:D3:14:7A:05:80:A7:DE:E1:0A:5E:4D
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Telekom Security
 SMIME RSA Root 2023"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143
\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\107\155\142\110\061\055\060\053\006\003\125\004
\003\014\044\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\123\115\111\115\105\040\122\123\101\040\122\157
\157\164\040\062\060\062\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143
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\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\107\155\142\110\061\055\060\053\006\003\125\004
\003\014\044\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\123\115\111\115\105\040\122\123\101\040\122\157
\157\164\040\062\060\062\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\014\176\142\365\171\163\073\235\103\216\213\143\355\221
\225\270
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\267\060\202\003\237\240\003\002\001\002\002\020\014
\176\142\365\171\163\073\235\103\216\213\143\355\221\225\270\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\145
\061\013\060\011\006\003\125\004\006\023\002\104\105\061\047\060
\045\006\003\125\004\012\014\036\104\145\165\164\163\143\150\145
\040\124\145\154\145\153\157\155\040\123\145\143\165\162\151\164
\171\040\107\155\142\110\061\055\060\053\006\003\125\004\003\014
\044\124\145\154\145\153\157\155\040\123\145\143\165\162\151\164
\171\040\123\115\111\115\105\040\122\123\101\040\122\157\157\164
\040\062\060\062\063\060\036\027\015\062\063\060\063\062\070\061
\062\060\071\062\062\132\027\015\064\070\060\063\062\067\062\063
\065\071\065\071\132\060\145\061\013\060\011\006\003\125\004\006
\023\002\104\105\061\047\060\045\006\003\125\004\012\014\036\104
\145\165\164\163\143\150\145\040\124\145\154\145\153\157\155\040
\123\145\143\165\162\151\164\171\040\107\155\142\110\061\055\060
\053\006\003\125\004\003\014\044\124\145\154\145\153\157\155\040
\123\145\143\165\162\151\164\171\040\123\115\111\115\105\040\122
\123\101\040\122\157\157\164\040\062\060\062\063\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\357\305\016
\213\276\062\322\147\107\377\012\114\147\263\052\277\310\303\305
\221\353\265\307\036\221\341\146\250\210\213\125\040\200\037\121
\136\167\227\236\031\012\134\307\153\067\041\174\003\066\001\364
\210\045\331\250\056\101\252\374\330\046\340\226\100\142\171\256
\127\236\003\070\032\034\262\167\024\076\351\241\162\320\344\340
\067\321\027\106\355\120\134\172\130\305\370\053\367\165\057\317
\201\236\132\054\267\072\254\240\131\230\004\121\014\377\111\305
\120\375\036\323\107\205\113\063\117\242\067\265\257\004\232\047
\062\235\126\325\077\125\141\343\213\157\256\121\376\227\376\151
\007\372\142\133\046\346\024\171\025\245\023\070\256\137\067\276
\224\112\326\015\200\026\151\244\221\262\072\111\230\165\235\106
\020\212\134\172\177\204\245\350\257\036\307\253\263\132\106\265
\243\113\365\246\043\066\000\106\261\333\005\266\033\316\236\172
\062\134\232\325\162\303\235\206\115\053\204\323\036\265\210\332
\020\170\234\042\303\073\043\265\353\023\007\275\157\123\354\233
\354\233\323\145\365\007\011\343\135\247\231\265\176\206\216\325

\002\377\267\205\011\343\107\024\335\226\146\030\064\336\010\325
\337\313\030\231\142\013\053\354\000\135\122\104\323\306\226\374
\062\126\045\221\317\315\031\073\225\071\076\002\207\231\143\266
\325\076\064\172\017\021\165\201\274\175\004\312\140\264\050\165
\327\002\121\335\122\000\056\307\375\211\361\134\363\313\244\047
\022\070\217\273\373\211\360\344\304\070\054\276\202\240\161\141
\142\221\217\110\014\057\053\251\260\361\313\020\004\347\164\277
\067\220\357\117\052\103\065\227\022\306\052\160\015\336\054\125
\107\171\143\051\365\312\037\152\006\122\034\256\055\044\042\203
\042\257\320\252\060\267\052\037\377\145\043\130\145\223\310\216
\175\100\020\061\206\170\331\125\313\074\060\360\336\121\052\000
\066\322\047\105\137\330\350\241\041\075\176\106\126\073\051\105
\361\035\005\011\316\266\103\060\334\105\220\020\060\114\244\153
\206\213\077\075\057\061\221\161\357\046\271\366\276\235\260\154
\337\021\356\130\077\103\171\206\071\200\361\046\027\007\230\360
\231\252\060\054\103\131\024\316\355\342\100\023\205\002\003\001
\000\001\243\143\060\141\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\035\006\003\125\035\016\004\026\004
\024\232\316\254\052\354\001\372\145\160\336\227\235\361\322\000
\214\245\243\144\273\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\037\006\003\125\035\043\004\030\060
\026\200\024\232\316\254\052\354\001\372\145\160\336\227\235\361
\322\000\214\245\243\144\273\060\015\006\011\052\206\110\206\367
\015\001\001\014\005\000\003\202\002\001\000\343\120\375\365\100
\026\042\011\226\072\015\251\357\201\347\056\062\360\241\361\111
\136\173\210\015\004\162\327\276\147\250\272\035\356\120\273\162
\156\172\321\273\014\162\060\106\310\325\327\002\022\026\231\116
\036\337\132\226\356\217\221\276\256\206\370\020\167\245\304\156
\107\141\300\362\046\331\117\141\150\005\110\165\010\025\245\241
\173\325\270\263\211\171\346\355\361\363\141\000\206\173\056\061
\376\243\134\370\171\075\264\133\210\173\340\043\273\015\241\027
\372\313\150\015\230\167\161\010\342\155\103\164\153\304\066\305
\224\101\244\000\326\127\055\231\212\213\040\022\025\002\062\016
\322\111\354\201\110\305\152\047\122\327\262\163\125\123\226\074
\236\117\114\265\240\320\117\127\320\147\050\110\144\276\306\270
\272\354\144\317\310\173\305\152\347\052\346\131\127\266\326\324
\326\300\147\134\331\236\050\011\100\277\363\251\065\061\145\140
\003\313\031\154\202\225\003\036\137\077\341\275\352\111\161\345
\133\267\013\107\026\033\040\211\155\224\231\014\176\210\154\035
\015\364\267\041\032\131\227\254\313\350\276\027\037\225\174\123
\233\257\120\122\252\215\013\056\257\132\327\140\362\052\151\052
\271\356\124\160\030\252\275\365\241\077\322\335\241\143\031\000
\370\247\014\353\243\171\362\160\131\243\370\242\022\003\354\023
\377\344\002\206\066\327\301\303\244\265\324\244\302\067\105\266
\224\160\075\305\275\353\243\025\035\343\066\172\025\151\052\126
\064\071\317\245\232\066\252\310\355\171\274\317\366\316\004\123
\013\332\262\120\043\174\274\076\046\255\360\016\103\273\046\313
\256\302\100\336\067\037\012\240\121\315\143\235\266\117\330\306

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\107\174\274\330\264\355\236\213\363\021\342\250\265\076\354\256
\160\076\176\042\273\065\110\027\140\142\024\221\060\243\166\075
\246\121\066\213\037\015\335\152\061\034\245\355\335\226\243\156
\162\017\023\115\252\247\251\134\170\371\003\022\030\223\067\105
\022\211\075\370\276\312\275\331\276\014\331\030\144\247\310\101
\076\165\202\041\070\175\145\364\240\324\023\113\007\170\051\371
\235\176\314\207\077\304\332\056\210\335\343\013\334\132\121\132
\351\331\022\117\236\002\333\367\005\045\121
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Telekom Security SMIME RSA Root 2023"
# Issuer: CN=Telekom Security SMIME RSA Root 2023,O=Deutsche Telekom Security GmbH,C=DE
# Serial Number:0c:7e:62:f5:79:73:3b:9d:43:8e:8b:63:ed:91:95:b8
# Subject: CN=Telekom Security SMIME RSA Root 2023,O=Deutsche Telekom Security GmbH,C=DE
# Not Valid Before: Tue Mar 28 12:09:22 2023
# Not Valid After : Fri Mar 27 23:59:59 2048
# Fingerprint (SHA-256):
78:A6:56:34:4F:94:7E:9C:C0:F7:34:D9:05:3D:32:F6:74:20:86:B6:B9:CD:2C:AE:4F:AE:1A:2E:4E:FD:E0:48
# Fingerprint (SHA1): 89:3F:6F:1C:E2:4D:7F:FB:C3:D3:14:7A:05:80:A7:DE:E1:0A:5E:4D
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Telekom Security SMIME RSA Root 2023"
CKA_CERT_SHA1_HASH
 MULTILINE_OCTAL
\211\077\157\034\342\115\177\373\303\323\024\172\005\200\247\336
\341\012\136\115
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\353\335\044\371\050\017\243\302\303\156\012\077\320\303\015\033
END
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143
\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\107\155\142\110\061\055\060\053\006\003\125\004
\003\014\044\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\123\115\111\115\105\040\122\123\101\040\122\157
\157\164\040\062\060\062\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\014\176\142\365\171\163\073\235\103\216\213\143\355\221
\225\270
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END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL
 CK_FALSE

#
# Certificate "Telekom Security TLS RSA Root 2023"
#
# Issuer: CN=Telekom Security TLS RSA Root 2023,O=Deutsche Telekom Security GmbH,C=DE
# Serial Number:21:9c:54:2d:e8:f6:ec:71:77:fa:4e:e8:c3:70:57:97
# Subject: CN=Telekom Security TLS RSA Root 2023,O=Deutsche Telekom Security GmbH,C=DE
# Not Valid Before: Tue Mar 28 12:16:45 2023
# Not Valid After : Fri Mar 27 23:59:59 2048
# Fingerprint (SHA-256):
EF:C6:5C:AD:BB:59:AD:B6:EF:E8:4D:A2:23:11:B3:56:24:B7:1B:3B:1E:A0:DA:8B:66:55:17:4E:C8:97:86:46
# Fingerprint (SHA1): 54:D3:AC:B3:BD:57:56:F6:85:9D:CE:E5:C3:21:E2:D4:AD:83:D0:93
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Telekom Security TLS RSA Root 2023"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143
\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\107\155\142\110\061\053\060\051\006\003\125\004
\003\014\042\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\124\114\123\040\122\123\101\040\122\157\157\164
\040\062\060\062\063
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143
\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\107\155\142\110\061\053\060\051\006\003\125\004
\003\014\042\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\124\114\123\040\122\123\101\040\122\157\157\164
\040\062\060\062\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\041\234\124\055\350\366\354\161\167\372\116\350\303\160
\127\227
END
```

CKA_VALUE MULTILINE_OCTAL
\060\202\005\263\060\202\003\233\240\003\002\001\002\002\020\041
\234\124\055\350\366\354\161\167\372\116\350\303\160\127\227\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\143
\061\013\060\011\006\003\125\004\006\023\002\104\105\061\047\060
\045\006\003\125\004\012\014\036\104\145\165\164\163\143\150\145
\040\124\145\154\145\153\157\155\040\123\145\143\165\162\151\164
\171\040\107\155\142\110\061\053\060\051\006\003\125\004\003\014
\042\124\145\154\145\153\157\155\040\123\145\143\165\162\151\164
\171\040\124\114\123\040\122\123\101\040\122\157\157\164\040\062
\060\062\063\060\036\027\015\062\063\060\063\062\070\061\062\061
\066\064\065\132\027\015\064\070\060\063\062\067\062\063\065\071
\065\071\132\060\143\061\013\060\011\006\003\125\004\006\023\002
\104\105\061\047\060\045\006\003\125\004\012\014\036\104\145\165
\164\163\143\150\145\040\124\145\154\145\153\157\155\040\123\145
\143\165\162\151\164\171\040\107\155\142\110\061\053\060\051\006
\003\125\004\003\014\042\124\145\154\145\153\157\155\040\123\145
\143\165\162\151\164\171\040\124\114\123\040\122\123\101\040\122
\157\157\164\040\062\060\062\063\060\202\002\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000
\060\202\002\012\002\202\002\001\000\355\065\241\201\200\363\313
\112\151\133\302\373\121\203\256\046\375\341\156\363\201\022\175
\161\100\377\207\165\102\051\041\355\201\122\054\337\022\301\031
\204\211\301\275\305\050\325\325\113\154\104\326\114\333\007\226
\112\125\172\312\066\202\004\066\250\245\374\047\366\111\361\325
\162\236\221\371\043\326\160\173\273\365\233\301\354\223\317\031
\352\145\176\210\160\240\163\374\366\377\265\126\142\341\163\152
\064\230\076\202\270\254\225\123\364\001\240\047\007\162\243\000
\123\240\344\262\253\203\070\127\063\045\224\237\276\110\035\230
\341\243\272\236\134\315\004\161\121\175\165\170\253\363\131\252
\304\340\140\276\217\203\122\270\165\032\101\065\355\274\363\072
\143\351\251\024\105\327\346\122\321\156\322\336\274\343\365\013
\073\346\340\304\275\103\144\023\246\316\364\230\067\154\212\225
\250\227\310\107\017\360\136\020\213\347\035\034\376\261\073\240
\005\063\150\005\101\202\301\003\053\001\310\347\217\115\253\350
\265\366\315\153\104\265\347\335\213\354\352\045\264\000\042\127
\115\260\261\262\061\301\026\316\377\375\024\204\267\107\372\262
\361\160\336\333\213\154\066\130\244\174\263\021\321\303\167\177
\137\266\045\340\015\305\322\263\371\270\270\167\333\067\161\161
\107\343\140\030\117\044\266\165\067\170\271\243\142\257\275\311
\162\216\057\314\273\256\333\344\025\122\031\007\063\373\152\267
\055\113\220\050\202\163\376\030\213\065\215\333\247\004\152\276
\352\301\115\066\073\026\066\221\062\357\266\100\211\221\103\340
\362\242\253\004\056\346\362\114\016\026\064\040\254\207\301\055
\176\311\146\107\027\024\021\244\363\367\241\044\211\253\330\032
\310\241\134\261\243\367\214\155\310\001\311\117\311\354\304\374
\254\121\063\321\310\203\321\311\237\035\324\107\064\051\076\313
\260\016\372\203\013\050\130\345\051\334\077\174\250\237\311\266

\012\273\246\350\106\026\017\226\345\173\344\152\172\110\155\166
\230\005\245\334\155\036\102\036\102\332\032\340\122\367\265\203
\300\032\173\170\065\054\070\365\037\375\111\243\056\322\131\143
\277\200\260\214\223\163\313\065\246\231\225\042\141\145\003\140
\373\057\223\113\372\232\234\200\073\002\003\001\000\001\243\143
\060\141\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\006\060\035\006\003\125\035\016\004\026\004\024\266\247\227
\202\075\164\205\233\367\074\237\223\232\225\171\165\122\214\155
\107\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\037\006\003\125\035\043\004\030\060\026\200\024\266
\247\227\202\075\164\205\233\367\074\237\223\232\225\171\165\122
\214\155\107\060\015\006\011\052\206\110\206\367\015\001\001\014
\005\000\003\202\002\001\000\250\314\141\246\276\165\236\025\120
\244\153\373\250\160\105\174\272\176\261\132\374\133\043\372\012
\167\370\230\161\202\014\155\340\136\106\252\223\364\036\240\303
\341\223\333\113\255\262\246\135\253\260\324\142\313\136\273\146
\365\055\356\227\100\074\142\353\136\326\024\326\214\342\226\213
\101\151\223\065\346\271\231\153\142\264\241\027\146\064\246\153
\143\306\271\116\362\042\351\130\015\126\101\321\372\014\112\360
\063\315\073\273\155\041\072\256\216\162\265\303\112\373\351\175
\345\261\233\206\356\342\340\175\264\367\062\375\042\204\361\205
\311\067\171\351\265\077\277\134\344\164\262\217\021\142\000\335
\030\146\241\331\173\043\137\361\216\325\147\350\124\332\133\072
\153\066\157\371\201\261\063\107\063\167\100\371\122\252\335\324
\203\317\205\170\231\232\223\271\163\147\102\106\021\041\352\376
\012\251\033\032\145\151\263\217\256\026\266\366\113\126\262\055
\371\245\310\354\073\142\243\355\153\320\116\325\100\011\244\037
\230\327\072\245\222\131\040\344\260\175\315\133\163\150\275\155
\304\242\023\016\147\031\270\215\102\176\154\014\232\156\240\044
\055\325\105\033\334\304\002\024\376\205\133\145\227\312\116\220
\120\010\172\102\065\371\352\302\146\324\370\001\256\036\264\276
\303\250\357\376\166\232\242\246\037\106\366\204\355\374\333\316
\304\002\316\167\110\054\214\262\354\303\000\243\354\054\125\030
\301\176\031\356\341\057\362\255\203\233\236\253\031\337\306\212
\057\214\167\345\267\005\354\073\301\354\276\206\263\206\274\300
\367\334\347\352\133\256\262\314\265\065\206\113\320\342\077\266
\330\370\016\000\356\135\343\367\215\130\377\317\213\067\351\143
\137\156\367\011\161\066\302\022\135\127\362\310\264\315\363\356
\002\337\021\334\152\271\127\204\035\131\115\214\316\310\016\043
\302\267\046\232\020\024\161\376\223\262\212\270\200\360\016\020
\236\323\250\120\014\067\202\057\352\340\212\235\341\054\071\377
\265\264\163\000\344\367\110\246\163\254\277\262\336\167\004\207
\264\243\315\233\065\044\067\372\220\223\023\201\102\306\230\046
\165\067\146\101\020\254\273\365\224\343\302\061\053\255\347\043
\126\314\065\045\222\263\120
END
CKA_NSS_MOZILLA_CA_POLICY

```
 CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "Telekom Security TLS RSA Root
 2023"
# Issuer: CN=Telekom Security TLS RSA Root 2023,O=Deutsche Telekom Security GmbH,C=DE
# Serial Number:21:9c:54:2d:e8:f6:ec:71:77:fa:4e:e8:c3:70:57:97
# Subject: CN=Telekom Security TLS RSA Root 2023,O=Deutsche Telekom Security GmbH,C=DE
# Not Valid Before: Tue Mar 28 12:16:45 2023
# Not Valid After : Fri Mar 27 23:59:59 2048
# Fingerprint (SHA-256):
EF:C6:5C:AD:BB:59:AD:B6:EF:E8:4D:A2:23:11:B3:56:24:B7:1B:3B:1E:A0:DA:8B:66:55:17:4E:C8:97:86:46
# Fingerprint (SHA1): 54:D3:AC:B3:BD:57:56:F6:85:9D:CE:E5:C3:21:E2:D4:AD:83:D0:93
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Telekom Security TLS RSA Root 2023"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\124\323\254\263\275\127\126\366\205\235\316\345\303\041\342\324
\255\203\320\223
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\277\133\353\124\100\315\110\161\304\040\215\175\336\012\102\362
END
CKA_ISSUER MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\047\060\045\006\003\125\004\012\014\036\104\145\165\164\163\143
\150\145\040\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\107\155\142\110\061\053\060\051\006\003\125\004
\003\014\042\124\145\154\145\153\157\155\040\123\145\143\165\162
\151\164\171\040\124\114\123\040\122\123\101\040\122\157\157\164
\040\062\060\062\063
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\041\234\124\055\350\366\354\161\167\372\116\350\303\160
\127\227
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
# Certificate "FIRMAPROFESIONAL CA ROOT-A WEB"
#
```

```
# Issuer: CN=FIRMAPROFESIONAL CA ROOT-A WEB,OID.2.5.4.97=VATES-A62634068,O=Firmaprofesional
SA,C=ES
# Serial Number:31:97:21:ed:af:89:42:7f:35:41:87:a1:67:56:4c:6d
# Subject: CN=FIRMAPROFESIONAL CA ROOT-A WEB,OID.2.5.4.97=VATES-
A62634068,O=Firmaprofesional
 SA,C=ES
# Not Valid Before: Wed Apr 06 09:01:36 2022
# Not Valid After : Sun Mar 31 09:01:36 2047
# Fingerprint (SHA-256):
BE:F2:56:DA:F2:6E:9C:69:BD:EC:16:02:35:97:98:F3:CA:F7:18:21:A0:3E:01:82:57:C5:3C:65:61:7F:3D:4A
# Fingerprint (SHA1): A8:31:11:74:A6:14:15:0D:CA:77:DD:0E:E4:0C:5D:58:FC:A0:72:A5
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "FIRMAPROFESIONAL CA ROOT-A WEB"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\156\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\034\060\032\006\003\125\004\012\014\023\106\151\162\155\141\160
\162\157\146\145\163\151\157\156\141\154\040\123\101\061\030\060
\026\006\003\125\004\141\014\017\126\101\124\105\123\055\101\066
\062\066\063\064\060\066\070\061\047\060\045\006\003\125\004\003
\014\036\106\111\122\115\101\120\122\117\106\105\123\111\117\116
\101\114\040\103\101\040\122\117\117\124\055\101\040\127\105\102
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\156\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\034\060\032\006\003\125\004\012\014\023\106\151\162\155\141\160
\162\157\146\145\163\151\157\156\141\154\040\123\101\061\030\060
\026\006\003\125\004\141\014\017\126\101\124\105\123\055\101\066
\062\066\063\064\060\066\070\061\047\060\045\006\003\125\004\003
\014\036\106\111\122\115\101\120\122\117\106\105\123\111\117\116
\101\114\040\103\101\040\122\117\117\124\055\101\040\127\105\102
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\061\227\041\355\257\211\102\177\065\101\207\241\147\126
\114\155
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\172\060\202\002\000\240\003\002\001\002\002\020\061
\227\041\355\257\211\102\177\065\101\207\241\147\126\114\155\060
\012\006\010\052\206\110\316\075\004\003\003\060\156\061\013\060
\011\006\003\125\004\006\023\002\105\123\061\034\060\032\006\003
\125\004\012\014\023\106\151\162\155\141\160\162\157\146\145\163
\151\157\156\141\154\040\123\101\061\030\060\026\006\003\125\004
```

\141\014\017\126\101\124\105\123\055\101\066\062\066\063\064\060
\066\070\061\047\060\045\006\003\125\004\003\014\036\106\111\122
\115\101\120\122\117\106\105\123\111\117\116\101\114\040\103\101
\040\122\117\117\124\055\101\040\127\105\102\060\036\027\015\062
\062\060\064\060\066\060\071\060\061\063\066\132\027\015\064\067
\060\063\063\061\060\071\060\061\063\066\132\060\156\061\013\060
\011\006\003\125\004\006\023\002\105\123\061\034\060\032\006\003
\125\004\012\014\023\106\151\162\155\141\160\162\157\146\145\163
\151\157\156\141\154\040\123\101\061\030\060\026\006\003\125\004
\141\014\017\126\101\124\105\123\055\101\066\062\066\063\064\060
\066\070\061\047\060\045\006\003\125\004\003\014\036\106\111\122
\115\101\120\122\117\106\105\123\111\117\116\101\114\040\103\101
\040\122\117\117\124\055\101\040\127\105\102\060\166\060\020\006
\007\052\206\110\316\075\002\001\006\005\053\201\004\000\042\003
\142\000\004\107\123\352\054\021\244\167\307\052\352\363\326\137
\173\323\004\221\134\372\210\306\042\271\203\020\142\167\204\063
\055\351\003\210\324\340\063\367\355\167\054\112\140\352\344\157
\255\155\264\370\114\212\244\344\037\312\352\117\070\112\056\202
\163\053\307\146\233\012\214\100\234\174\212\366\362\071\140\262
\336\313\354\270\344\157\352\233\135\267\123\220\030\062\125\305
\040\267\224\243\143\060\141\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\037\006\003\125\035\043\004
\030\060\026\200\024\223\341\103\143\134\074\235\326\047\363\122
\354\027\262\251\257\054\367\166\370\060\035\006\003\125\035\016
\004\026\004\024\223\341\103\143\134\074\235\326\047\363\122\354
\027\262\251\257\054\367\166\370\060\016\006\003\125\035\017\001
\001\377\004\004\003\002\001\006\060\012\006\010\052\206\110\316
\075\004\003\003\003\150\000\060\145\002\060\035\174\244\173\303
\211\165\063\341\073\251\105\277\106\351\351\241\335\311\042\026
\267\107\021\013\330\232\272\361\310\013\160\120\123\002\221\160
\205\131\251\036\244\346\352\043\061\240\000\002\061\000\375\342
\370\263\257\026\271\036\163\304\226\343\301\060\031\330\176\346
\303\227\336\034\117\270\211\057\063\353\110\017\031\367\207\106
\135\046\220\245\205\305\271\172\224\076\207\250\275\000
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_TRUE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Trust for "FIRMAPROFESIONAL CA ROOT-A WEB"
# Issuer: CN=FIRMAPROFESIONAL CA ROOT-A WEB,OID.2.5.4.97=VATES-A62634068,O=Firmaprofesional SA,C=ES
# Serial Number:31:97:21:ed:af:89:42:7f:35:41:87:a1:67:56:4c:6d
# Subject: CN=FIRMAPROFESIONAL CA ROOT-A WEB,OID.2.5.4.97=VATES-A62634068,O=Firmaprofesional SA,C=ES
# Not Valid Before: Wed Apr 06 09:01:36 2022
# Not Valid After : Sun Mar 31 09:01:36 2047

```
# Fingerprint (SHA-256):
BE:F2:56:DA:F2:6E:9C:69:BD:EC:16:02:35:97:98:F3:CA:F7:18:21:A0:3E:01:82:57:C5:3C:65:61:7F:3D:4A
# Fingerprint (SHA1): A8:31:11:74:A6:14:15:0D:CA:77:DD:0E:E4:0C:5D:58:FC:A0:72:A5
CKA_CLASS
 CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "FIRMAPROFESIONAL CA ROOT-A WEB"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\250\061\021\164\246\024\025\015\312\167\335\016\344\014\135\130
\374\240\162\245
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\202\262\255\105\000\202\260\146\143\370\137\303\147\116\316\243
END
CKA_ISSUER MULTILINE_OCTAL
\060\156\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\034\060\032\006\003\125\004\012\014\023\106\151\162\155\141\160
\162\157\146\145\163\151\157\156\141\154\040\123\101\061\030\060
\026\006\003\125\004\141\014\017\126\101\124\105\123\055\101\066
\062\066\063\064\060\066\070\061\047\060\045\006\003\125\004\003
\014\036\106\111\122\115\101\120\122\117\106\105\123\111\117\116
\101\114\040\103\101\040\122\117\117\124\055\101\040\127\105\102
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\061\227\041\355\257\211\102\177\065\101\207\241\147\126
\114\155
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "CAEDICOM Root"
# Issuer: C=ES,O=EDICOM,CN=CAEDICOM Root
# Serial Number:fb:71:26:58:ad:99:e5
# Subject: C=ES,O=EDICOM,CN=CAEDICOM Root
# Not Valid Before: Wed May 21 11:06:35 2014
# Not Valid After: Sun May 21 10:20:00 2034
# Fingerprint (MD5): cd:d5:a1:fe:28:31:9c:13:be:d5:c1:e8:cf:56:f0:76
# Fingerprint (SHA1): 55:9b:ba:7b:0f:fe:80:d6:d3:82:9b:1f:d0:7a:a4:d3:22:19:47:90
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
```

```
CKA_LABEL UTF8 "CAEDICOM Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\066\061\026\060\024\006\003\125\004\003\014\015\103\101\105
\104\111\103\117\115\040\122\157\157\164\061\017\060\015\006\003
\125\004\012\014\006\105\104\111\103\117\115\061\013\060\011\006
\003\125\004\006\023\002\105\123
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\066\061\026\060\024\006\003\125\004\003\014\015\103\101\105
\104\111\103\117\115\040\122\157\157\164\061\017\060\015\006\003
\125\004\012\014\006\105\104\111\103\117\115\061\013\060\011\006
\003\125\004\006\023\002\105\123
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\000\373\161\046\130\255\231\345
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\121\060\202\003\071\240\003\002\001\002\002\010\000
\373\161\046\130\255\231\345\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\066\061\026\060\024\006\003\125\004
\003\014\015\103\101\105\104\111\103\117\115\040\122\157\157\164
\061\017\060\015\006\003\125\004\012\014\006\105\104\111\103\117
\115\061\013\060\011\006\003\125\004\006\023\002\105\123\060\036
\027\015\061\064\060\065\062\061\061\061\060\066\063\065\132\027
\015\063\064\060\065\062\061\061\060\062\060\060\060\132\060\066
\061\026\060\024\006\003\125\004\003\014\015\103\101\105\104\111
\103\117\115\040\122\157\157\164\061\017\060\015\006\003\125\004
\012\014\006\105\104\111\103\117\115\061\013\060\011\006\003\125
\004\006\023\002\105\123\060\202\002\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202
\002\012\002\202\002\001\000\333\200\312\350\111\164\307\323\070
\056\361\305\043\142\374\066\214\057\036\176\071\013\351\006\364
\125\233\245\230\051\224\355\206\107\062\203\363\305\222\172\005
\327\051\002\076\026\303\050\177\065\144\051\172\171\273\241\342
\036\141\024\215\347\000\320\334\242\124\145\212\337\151\271\161
\107\177\070\070\026\106\247\151\061\021\065\114\341\052\177\377
\155\117\225\075\343\135\110\115\031\123\010\132\153\041\325\022
\060\151\227\220\257\055\301\365\177\101\137\111\066\217\115\270
\036\032\225\137\332\017\157\134\025\065\304\021\274\137\205\233
\275\255\073\125\136\273\337\316\273\257\134\231\140\335\037\151
\032\111\110\041\371\011\012\317\162\247\360\362\336\345\170\031
\276\022\335\315\207\171\101\316\057\105\327\013\221\020\021\004
\036\022\235\362\070\003\137\026\151\256\240\012\332\300\371\353
\240\015\030\017\171\136\221\235\344\037\024\234\064\023\031\002
\104\272\121\303\356\171\262\140\024\243\257\274\110\055\050\070
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\150\001\103\144\312\016\206\203\142\320\212\031\246\047\361\053
\173\113\051\041\133\232\314\150\102\020\310\113\117\017\043\262
\210\174\304\134\156\027\160\305\167\257\225\300\045\244\042\012
\323\174\371\330\162\310\320\055\275\247\350\322\055\213\114\241
\156\012\374\264\100\063\273\232\153\374\244\352\311\376\340\064
\210\103\314\306\274\077\165\322\245\251\257\372\227\271\076\267
\316\124\240\115\300\135\056\301\050\330\143\124\162\270\254\132
\365\072\373\040\141\006\072\364\240\053\070\253\314\203\014\111
\324\156\076\155\017\076\163\057\066\346\363\117\263\300\000\321
\105\111\133\214\366\243\230\035\204\177\231\012\303\352\012\074
\303\323\044\170\110\147\365\033\073\016\035\016\103\261\004\165
\301\240\071\166\213\366\331\002\245\035\341\236\133\007\273\066
\127\112\041\115\371\211\151\264\154\017\327\257\240\025\044\231
\347\370\327\123\224\354\022\277\244\245\327\355\356\216\065\167
\167\334\246\177\040\124\222\326\143\326\162\236\115\052\266\217
\163\363\031\241\304\260\037\346\064\243\013\000\076\227\111\047
\141\252\252\004\101\063\070\265\120\121\314\066\025\333\037\377
\275\312\110\203\110\247\263\002\003\001\000\001\243\143\060\141
\060\035\006\003\125\035\016\004\026\004\024\024\315\052\131\170
\143\253\141\031\350\270\075\241\340\132\300\165\347\371\313\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\037\006\003\125\035\043\004\030\060\026\200\024\024\315\052
\131\170\143\253\141\031\350\270\075\241\340\132\300\165\347\371
\313\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\006\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000
\003\202\002\001\000\075\011\031\000\266\221\002\154\354\016\367
\341\342\142\260\277\063\015\375\125\022\364\010\232\367\053\055
\256\367\234\107\330\037\006\001\023\265\216\347\262\202\013\075
\204\131\103\324\007\330\053\134\020\172\044\054\312\215\350\325
\243\071\234\061\314\353\340\072\341\325\277\317\307\207\173\140
\377\107\071\327\243\104\326\010\046\133\317\132\124\354\210\323
\216\017\171\074\310\243\117\246\302\216\047\360\336\022\256\136
\031\255\347\042\126\212\130\062\340\371\006\320\251\052\264\065
\233\014\206\046\121\000\224\107\120\374\245\304\045\141\371\130
\360\105\160\056\111\166\177\021\326\157\265\371\051\005\341\015
\303\116\130\037\257\035\354\067\320\112\371\006\006\201\323\333
\240\226\270\016\221\060\171\346\120\337\210\270\013\251\134\324
\007\364\311\250\314\175\217\223\143\011\144\000\005\052\150\146
\103\273\242\273\376\225\256\371\304\245\012\210\142\110\170\045
\174\052\077\021\144\246\323\042\040\107\235\062\326\362\343\310
\244\141\164\347\202\302\104\272\240\321\135\137\274\361\104\016
\203\117\034\120\205\304\351\347\154\374\346\270\125\341\242\032
\200\267\220\104\247\204\042\227\107\042\336\253\070\067\317\265
\362\034\076\102\160\273\165\266\145\050\153\313\177\202\065\252
\366\363\040\170\050\163\007\226\060\160\245\052\161\134\241\171
\244\026\271\106\075\136\264\000\111\205\211\323\016\337\201\256
\130\215\130\326\341\305\104\170\056\034\040\273\242\107\227\277
\166\024\073\251\050\217\237\013\165\322\241\074\355\053\307\216

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\220\241\172\242\231\060\142\374\205\035\065\163\073\363\265\131
\042\033\315\010\261\014\235\165\152\333\205\073\016\207\237\062
\117\222\000\001\001\114\111\150\202\200\101\154\371\375\161\275
\213\364\170\012\140\243\236\261\122\035\300\212\343\236\305\277
\053\031\152\230\247\261\336\025\120\237\252\224\045\217\251\200
\202\247\162\272\111\144\011\047\141\053\156\274\043\050\063\135
\236\156\360\271\275\040\062\214\335\240\013\231\273\264\204\004
\044\165\051\226\367\247\245\027\270\121\005\353\164\255\121\171
\226\374\273\373\337\011\055\010\222\104\316\300\322\263\030\307
\024\042\277\041\361
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "CAEDICOM Root"
# Issuer: C=ES,O=EDICOM,CN=CAEDICOM Root
# Serial Number:fb:71:26:58:ad:99:e5
# Subject: C=ES,O=EDICOM,CN=CAEDICOM Root
# Not Valid Before: Wed May 21 11:06:35 2014
# Not Valid After: Sun May 21 10:20:00 2034
# Fingerprint (MD5): cd:d5:a1:fe:28:31:9c:13:be:d5:c1:e8:cf:56:f0:76
# Fingerprint (SHA1): 55:9b:ba:7b:0f:fe:80:d6:d3:82:9b:1f:d0:7a:a4:d3:22:19:47:90
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CAEDICOM Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\125\233\272\173\017\376\200\326\323\202\233\037\320\172\244\323
\042\031\107\220
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\315\325\241\376\050\061\234\023\276\325\301\350\317\126\360\166
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\066\061\026\060\024\006\003\125\004\003\014\015\103\101\105
\104\111\103\117\115\040\122\157\157\164\061\017\060\015\006\003
\125\004\012\014\006\105\104\111\103\117\115\061\013\060\011\006
\003\125\004\006\023\002\105\123
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\000\373\161\046\130\255\231\345
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
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CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Symantec Enterprise Mobile Root for Microsoft"
# Issuer: CN=Symantec Enterprise Mobile Root for Microsoft,O=Symantec Corporation,C=US
# Serial Number:0f:6b:55:2f:9e:bf:90:7b:0f:66:29:a9:bd:f4:d8:ce
# Subject: CN=Symantec Enterprise Mobile Root for Microsoft,O=Symantec Corporation,C=US
# Not Valid Before: Thu Mar 15 00:00:00 2012
# Not Valid
 After: Sun Mar 14 23:59:59 2032
# Fingerprint (MD5): 71:d0:a5:ff:2d:59:74:16:94:be:e3:7d:1e:5c:86:0b
# Fingerprint (SHA1): 92:b4:6c:76:e1:30:54:e1:04:f2:30:51:7e:6e:50:4d:43:ab:10:b5
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Symantec Enterprise Mobile Root for Microsoft"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\035\060\033\006\003\125\004\012\023\024\123\171\155\141\156\164
\145\143\040\103\157\162\160\157\162\141\164\151\157\156\061\066
\060\064\006\003\125\004\003\023\055\123\171\155\141\156\164\145
\143\040\105\156\164\145\162\160\162\151\163\145\040\115\157\142
\151\154\145\040\122\157\157\164\040\146\157\162\040\115\151\143
\162\157\163\157\146\164
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\035\060\033\006\003\125\004\012\023\024\123\171\155\141\156\164
\145\143\040\103\157\162\160\157\162\141\164\151\157\156\061\066
\060\064\006\003\125\004\003\023\055\123\171\155\141\156\164\145
\143\040\105\156\164\145\162\160\162\151\163\145\040\115\157\142
\151\154\145\040\122\157\157\164\040\146\157\162\040\115\151\143
\162\157\163\157\146\164
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\017\153\125\057\236\277\220\173\017\146\051\251\275\364
\330\316
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\275\060\202\002\245\240\003\002\001\002\002\020\017
\153\125\057\236\277\220\173\017\146\051\251\275\364\330\316\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\144
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\061\013\060\011\006\003\125\004\006\023\002\125\123\061\035\060
\033\006\003\125\004\012\023\024\123\171\155\141\156\164\145\143
\040\103\157\162\160\157\162\141\164\151\157\156\061\066\060\064
\006\003\125\004\003\023\055\123\171\155\141\156\164\145\143\040
\105\156\164\145\162\160\162\151\163\145\040\115\157\142\151\154
\145\040\122\157\157\164\040\146\157\162\040\115\151\143\162\157
\163\157\146\164\060\036\027\015\061\062\060\063\061\065\060\060
\060\060\060\060\132\027\015\063\062\060\063\061\064\062\063\065
\071\065\071\132\060\144\061\013\060\011\006\003\125\004\006\023
\002\125\123\061\035\060\033\006\003\125\004\012\023\024\123\171
\155\141\156\164\145\143\040\103\157\162\160\157\162\141\164\151
\157\156\061\066\060\064\006\003\125\004\003\023\055\123\171\155
\141\156\164\145\143\040\105\156\164\145\162\160\162\151\163\145
\040\115\157\142\151\154\145\040\122\157\157\164\040\146\157\162
\040\115\151\143\162\157\163\157\146\164\060\202\001\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001
\017\000\060\202\001\012\002\202\001\001\000\265\075\260\162\356
\221\351\245\151\234\021\115\172\371\263\372\075\362\224\233\043
\267\246\003\354\142\030\374\205\022\042\376\301\161\175\124\223
\271\221\175\142\366\312\250\070\025\145\370\167\075\345\202\040
\072\324\265\321\156\215\006\111\275\337\202\016\044\205\347\357
\170\055\030\362\340\013\150\106\076\044\020\310\127\356\016\155
\161\246\323\261\126\034\327\051\325\262\352\124\005\012\250\074
\241\270\045\122\007\005\240\337\347\334\356\134\073\101\265\253
\134\063\062\322\316\353\351\226\370\100\364\012\272\063\035\370
\126\003\011\202\365\147\007\304\300\064\301\135\374\105\273\352
\074\232\325\164\161\155\325\206\323\302\374\205\274\124\353\243
\325\362\117\325\105\257\127\274\360\042\300\217\242\105\310\165
\064\167\336\241\155\067\162\263\163\215\014\153\123\272\131\341
\250\076\200\127\322\137\131\356\150\165\317\201\234\243\312\105
\214\067\333\005\162\064\034\062\002\370\325\371\054\015\332\130
\236\304\027\264\233\311\220\304\210\131\077\161\221\220\104\030
\276\042\213\171\222\056\102\260\213\227\133\002\003\001\000\001
\243\153\060\151\060\017\006\003\125\035\023\001\001\377\004\005
\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\006\060\047\006\003\125\035\021\004\040\060\036
\244\034\060\032\061\030\060\026\006\003\125\004\003\023\017\115
\120\113\111\055\062\060\064\070\055\061\055\061\061\061\060\035
\006\003\125\035\016\004\026\004\024\115\354\337\046\006\334\044
\020\300\266\231\364\327\071\307\157\031\370\046\050\060\015\006
\011\052\206\110\206\367\015\001\001\013\005\000\003\202\001\001
\000\251\127\131\320\001\124\024\106\257\307\171\124\014\152\052
\133\330\072\035\201\344\210\243\061\264\361\363\065\361\106\163
\134\103\311\376\274\242\152\031\300\275\057\137\313\070\243\155
\156\350\024\136\362\170\176\105\172\341\273\364\056\233\105\353
\340\035\120\034\064\133\177\230\212\206\017\207\332\344\144\046
\167\374\011\337\043\101\117\016\237\372\016\372\104\205\360\051
\227\244\224\342\364\100\055\221\034\166\364\250\140\336\161\246

\260\005\342\117\151\331\031\013\211\072\340\372\253\053\372\361
\263\062\355\374\174\160\145\136\320\173\021\173\235\350\133\032
\112\166\244\173\121\071\254\175\251\014\164\070\350\273\125\337
\304\316\300\247\041\132\270\033\237\001\305\247\020\376\175\371
\152\010\231\001\321\366\065\120\070\344\366\103\344\030\330\200
\114\354\307\004\342\141\214\175\111\355\317\264\245\361\362\220
\222\011\010\065\163\240\043\062\312\351\234\236\034\276\013\007
\054\167\136\027\114\332\234\202\341\200\033\245\363\332\367\210
\277\277\071\047\370\044\376\261\113\310\227\355\344\022\024\045
\210
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Symantec Enterprise Mobile Root for Microsoft"
# Issuer: CN=Symantec Enterprise Mobile Root for Microsoft,O=Symantec Corporation,C=US
# Serial Number:0f:6b:55:2f:9e:bf:90:7b:0f:66:29:a9:bd:f4:d8:ce
# Subject: CN=Symantec Enterprise Mobile Root for Microsoft,O=Symantec Corporation,C=US
# Not Valid Before: Thu Mar 15 00:00:00 2012
# Not Valid After: Sun Mar 14 23:59:59 2032
# Fingerprint (MD5): 71:d0:a5:ff:2d:59:74:16:94:be:e3:7d:1e:5c:86:0b
#
Fingerprint (SHA1): 92:b4:6c:76:e1:30:54:e1:04:f2:30:51:7e:6e:50:4d:43:ab:10:b5
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Symantec Enterprise Mobile Root for Microsoft"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\222\264\154\166\341\060\124\341\004\362\060\121\176\156\120\115
\103\253\020\265
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\161\320\245\377\055\131\164\026\224\276\343\175\036\134\206\013
END
CKA_ISSUER MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\035\060\033\006\003\125\004\012\023\024\123\171\155\141\156\164
\145\143\040\103\157\162\160\157\162\141\164\151\157\156\061\066
\060\064\006\003\125\004\003\023\055\123\171\155\141\156\164\145
\143\040\105\156\164\145\162\160\162\151\163\145\040\115\157\142
\151\154\145\040\122\157\157\164\040\146\157\162\040\115\151\143
\162\157\163\157\146\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL

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\002\020\017\153\125\057\236\277\220\173\017\146\051\251\275\364
\330\316
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "I.CA Root CA/RSA"
# Issuer: 2.5.4.5=NTRCZ-26439395,CN=I.CA Root CA/RSA,O=První certifikaní autorita\, a.s.,C=CZ
# Serial Number:05:f5:e1:00
# Subject: 2.5.4.5=NTRCZ-26439395,CN=I.CA Root CA/RSA,O=První certifikaní autorita\, a.s.,C=CZ
# Not Valid Before: Wed May 27 12:20:00 2015
# Not Valid After: Sun May 27 12:20:00 2040
# Fingerprint (MD5): 34:ba:8d:c4:33:9a:b5:27:ee:bd:5b:7c:7d:82:97:7f
# Fingerprint (SHA1): 9b:09:59:89:81:54:08:1b:f6:a9:0e:9b:9e:58:a4:69:0c:9b:a1:04
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "I.CA Root CA/RSA"
CKA_CERTIFICATE_TYPE
 CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\160\061\013\060\011\006\003\125\004\006\023\002\103\132\061
\055\060\053\006\003\125\004\012\014\044\120\162\166\156\303\255
\040\143\145\162\164\151\146\151\153\141\304\215\156\303\255\040
\141\165\164\157\162\151\164\141\054\040\141\056\163\056\061\031
\060\027\006\003\125\004\003\014\020\111\056\103\101\040\122\157
\157\164\040\103\101\057\122\123\101\061\027\060\025\006\003\125
\004\005\023\016\116\124\122\103\132\055\062\066\064\063\071\063
\071\065
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\160\061\013\060\011\006\003\125\004\006\023\002\103\132\061
\055\060\053\006\003\125\004\012\014\044\120\162\166\156\303\255
\040\143\145\162\164\151\146\151\153\141\304\215\156\303\255\040
\141\165\164\157\162\151\164\141\054\040\141\056\163\056\061\031
\060\027\006\003\125\004\003\014\020\111\056\103\101\040\122\157
\157\164\040\103\101\057\122\123\101\061\027\060\025\006\003\125
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\132\061\055\060\053\006\003\125\004\012\014\044\120\162\166\156
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\071\063\071\065\060\036\027\015\061\065\060\065\062\067\061\062
\062\060\060\060\132\027\015\064\060\060\065\062\067\061\062\062
\060\060\060\132\060\160\061\013\060\011\006\003\125\004\006\023
\002\103\132\061\055\060\053\006\003\125\004\012\014\044\120\162
\166\156\303\255\040\143\145\162\164\151\146\151\153\141\304\215
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\163\056\061\031\060\027\006\003\125\004\003\014\020\111\056\103
\101\040\122\157\157\164\040\103\101\057\122\123\101\061\027\060
\025\006\003\125\004\005\023\016\116\124\122\103\132\055\062\066
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\025\205\143\021\052\167\006\221\222\006\210\263\374\024\341\231
\106\264\051\202\256\204\203\356\265\046\207\156\370\213\125\104
\235\100\330\377\052\132\252\350\177\322\145\341\024\107\302\174
\061\375\165\141\012\033\214\200\112\236\264\342\056\024\107\061
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\021\326\132\032\000\171\345\073\346\010\313\122\236\244\011\253
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\115\243\134\215\011\363\136\014\205\062\316\126\154\002\010\361
\113\243\253\277\310\124\240\005\205\164\344\165\035\172\274\234
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\166\141\156\171\040\163\171\163\164\145\155\157\166\171\040\143
\145\162\164\151\146\151\153\141\164\040\142\171\154\040\166\171
\144\141\156\040\160\157\144\154\145\040\172\141\153\157\156\141
\040\062\062\067\057\062\060\060\060\040\123\142\056\040\166\040
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\164\145\155\040\143\145\162\164\151\146\151\143\141\164\145\040
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\144\151\156\147\040\164\157\040\101\143\164\040\116\157\056\040
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\367\171\247\216\277\330\007\025\124\136\122\014\276\370\246\330
\310\101\104\361\366\023\334\203\031\133\257\335\144\367\063\026
\207\017\025\132\361\144\274\324\347\125\077\062\070\211\232\363
\314\110\305\154\061\161\222\232\046\027\302\174\107\002\155\065
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\333\032\306\125\360\310\370\035\041\156\057\000\152\261\342\155
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\365\056\210\351\121\266\361\111\220\114\377\046\307\303\131\335
\164\137\301\120\135\070\134\235\150\125\151\152\264\100\167\311
\137\062\051\110\124\223\301\263\041\043\166\241\125\060\151\043
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\227\331\273\246\223\107\272\174\370\107\266\071\327\214\362\100
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\216\113\270\273\322\172\071\052\305\334\320\135\015\335\004\047
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END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL
 CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "I.CA Root CA/RSA"
# Issuer: 2.5.4.5=NTRCZ-26439395,CN=I.CA Root CA/RSA,O=První certifikaní autorita\, a.s.,C=CZ
# Serial Number:05:f5:e1:00
# Subject: 2.5.4.5=NTRCZ-26439395,CN=I.CA Root CA/RSA,O=První certifikaní autorita\, a.s.,C=CZ
# Not Valid Before: Wed May 27 12:20:00 2015
# Not Valid After: Sun May 27 12:20:00 2040
# Fingerprint (MD5): 34:ba:8d:c4:33:9a:b5:27:ee:bd:5b:7c:7d:82:97:7f
# Fingerprint (SHA1): 9b:09:59:89:81:54:08:1b:f6:a9:0e:9b:9e:58:a4:69:0c:9b:a1:04
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "I.CA Root CA/RSA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\233\011\131\211\201\124\010\033\366\251\016\233\236\130\244\151
\014\233\241\004
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\064\272\215\304\063\232\265\047\356\275\133\174\175\202\227\177
END
CKA_ISSUER MULTILINE_OCTAL
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\055\060\053\006\003\125\004\012\014\044\120\162\166\156\303\255
\040\143\145\162\164\151\146\151\153\141\304\215\156\303\255\040
\141\165\164\157\162\151\164\141\054\040\141\056\163\056\061\031
\060\027\006\003\125\004\003\014\020\111\056\103\101\040\122\157
\157\164\040\103\101\057\122\123\101\061\027\060\025\006\003\125

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\004\005\023\016\116\124\122\103\132\055\062\066\064\063\071\063
\071\065
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\004\005\365\341\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "MULTICERT Root Certification Authority 01"
# Issuer: CN=MULTICERT Root Certification Authority 01,O=MULTICERT - Serviços de Certificação
Electrónica S.A.,C=PT
# Serial Number:54:4d:a5:bc:40:35:56:5a
#
 Subject: CN=MULTICERT Root Certification Authority 01,O=MULTICERT - Serviços de Certificação
Electrónica S.A.,C=PT
# Not Valid Before: Fri Apr 04 08:59:47 2014
# Not Valid After: Mon Apr 04 08:59:47 2039
# Fingerprint (MD5): 30:b4:c2:a5:23:02:1d:2e:1b:c0:59:f2:ca:23:99:20
# Fingerprint (SHA1): 46:af:7a:31:b5:99:46:0d:46:9d:60:41:14:5b:13:65:1d:f9:17:0a
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "MULTICERT Root Certification Authority 01"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
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\061\102\060\100\006\003\125\004\012\014\071\115\125\114\124\111
\103\105\122\124\040\055\040\123\145\162\166\151\303\247\157\163
\040\144\145\040\103\145\162\164\151\146\151\143\141\303\247\303
\243\157\040\105\154\145\143\164\162\303\263\156\151\143\141\040
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END
CKA_ID
 UTF8 "0"
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\103\105\122\124\040\055\040\123\145\162\166\151\303\247\157\163
\040\144\145\040\103\145\162\164\151\146\151\143\141\303\247\303
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\243\157\040\105\154\145\143\164\162\303\263\156\151\143\141\040
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\125\114\124\111\103\105\122\124\040\122\157\157\164\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171\040\060\061
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\015\001\001\013\005\000\060\201\205\061\013\060\011\006\003\125
\004\006\023\002\120\124\061\102\060\100\006\003\125\004\012\014
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\166\151\303\247\157\163\040\144\145\040\103\145\162\164\151\146
\151\143\141\303\247\303\243\157\040\105\154\145\143\164\162\303
\263\156\151\143\141\040\123\056\101\056\061\062\060\060\006\003
\125\004\003\014\051\115\125\114\124\111\103\105\122\124\040\122
\157\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\040\060\061\060\036
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\015\063\071\060\064\060\064\060\070\065\071\064\067\132\060\201
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\060\100\006\003\125\004\012\014\071\115\125\114\124\111\103\105
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\145\040\103\145\162\164\151\146\151\143\141\303\247\303\243\157
\040\105\154\145\143\164\162\303\263\156\151\143\141\040\123\056
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\206\364\344\315\347\072\160\073\307\232\213\073\203\000\201\133
\373\040\026\132\276\277\130\000\137\051\346\127\157\176\212\054
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\033\141\263\167\200\200\052\155\022\002\226\213\121\331\301\157
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\302\245\355\210\326\241\300\373\043\361\047\071\314\341\204\007
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\323\277\371\212\145\330\142\022\051\167\302\272\302\111\064\117
\212\171\151\311\113\025\363\064\336\317\257\206\342\345\310\251
\126\141\114\006\124\132\305\154\031\352\363\310\104\315\044\032
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\043\022\337\107\300\260\025\354\265\261\236\154\017\221\252\246
\072\345\301\015\140\154\120\100\160\134\134\310\316\263\314\353
\355\252\210\031\126\245\244\310\014\172\345\166\100\147\063\264
\075\226\334\167\313\043\170\371\123\133\317\215\336\261\247\216
\132\172\242\062\143\243\210\327\045\141\132\135\111\072\162\346
\317\252\224\206\154\156\367\202\340\216\147\223\050\305\250\015
\115\357\070\255\171\112\146\215\204\001\010\004\171\363\122\306
\101\347\232\142\006\263\365\022\036\354\331\000\103\323\353\226
\167\164\341\171\371\024\224\204\155\272\124\202\005\214\337\001
\362\060\210\201\254\172\057\213\103\054\166\064\316\065\347\207
\216\116\013\012\245\032\127\261\123\132\277\153\330\276\000\176
\306\371\356\146\061\010\261\337\224\063\204\234\167\117\173\144
\057\357\216\017\131\050\042\313\360\134\076\053\375\065\326\225
\377\003\354\145\122\176\276\362\031\370\173\325\122\054\122\167
\232\221\146\101\160\215\325\111\347\013\110\177\212\256\336\105
\075\335\376\346\322\344\222\303\173\316\060\240\111\156\067\255
\250\323\054\266\075\236\041\333\006\127\342\360\256\006\373\331

\305\021\067\241\173\333\035\021\174\150\166\040\076\365\274\245
\331\146\265\041\255\105\046\306\135\036\002\243\101\304\324\175
\201\031\313\027\227\006\017\346\354\164\000\106\304\165\335\075
\360\103\064\257\246\274\374\366\202\373\317\305\372\263\017\045
\245\077\146\020\326\236\202\245\333\072\023\171\336\215\251\327
\246\215\206\322\057\331\151\015\342\165\170\176\111\137\042\253
\206\160\050\121\263\172\266\240\171\372\324\345\203\247\260\167
\312\333\001\202\357\342\276\115\057\323\300\115\320\343\151\156
\174\046\233\353\246\373\105\357\261\004\212\057\252\041\006\366
\346\324\274\101\043
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "MULTICERT Root Certification Authority 01"
# Issuer: CN=MULTICERT Root Certification Authority 01,O=MULTICERT - Serviços de Certificação Electrónica S.A.,C=PT
# Serial Number:54:4d:a5:bc:40:35:56:5a
# Subject: CN=MULTICERT Root Certification Authority 01,O=MULTICERT - Serviços de Certificação Electrónica S.A.,C=PT
# Not Valid Before: Fri Apr 04 08:59:47 2014
# Not Valid After: Mon Apr 04 08:59:47 2039
# Fingerprint (MD5): 30:b4:c2:a5:23:02:1d:2e:1b:c0:59:f2:ca:23:99:20
# Fingerprint (SHA1): 46:af:7a:31:b5:99:46:0d:46:9d:60:41:14:5b:13:65:1d:f9:17:0a
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
 UTF8 "MULTICERT Root Certification Authority 01"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\106\257\172\061\265\231\106\015\106\235\140\101\024\133\023\145
\035\371\027\012
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\060\264\302\245\043\002\035\056\033\300\131\362\312\043\231\040
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\205\061\013\060\011\006\003\125\004\006\023\002\120\124
\061\102\060\100\006\003\125\004\012\014\071\115\125\114\124\111
\103\105\122\124\040\055\040\123\145\162\166\151\303\247\157\163
\040\144\145\040\103\145\162\164\151\146\151\143\141\303\247\303
\243\157\040\105\154\145\143\164\162\303\263\156\151\143\141\040
\123\056\101\056\061\062\060\060\006\003\125\004\003\014\051\115
\125\114\124\111\103\105\122\124\040\122\157\157\164\040\103\145

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\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171\040\060\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\124\115\245\274\100\065\126\132
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Certification Authority of WoSign G2"
# Issuer: CN=Certification Authority of WoSign G2,O=WoSign CA Limited,C=CN
# Serial Number:6b:25:da:8a:88:9d:7c:bc:0f:05:b3:b1:7a:61:45:44
# Subject: CN=Certification Authority of WoSign G2,O=WoSign CA Limited,C=CN
# Not Valid Before: Sat Nov 08 00:58:58 2014
# Not Valid After: Tue Nov 08 00:58:58 2044
# Fingerprint (MD5): c8:1c:7d:19:aa:cb:71:93:f2:50:f8:52:a8:1e:ba:60
# Fingerprint (SHA1): fb:ed:dc:90:65:b7:27:20:37:bc:55:0c:9c:56:de:bb:f2:78:94:e1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certification Authority of WoSign G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\130\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\032\060\030\006\003\125\004\012\023\021\127\157\123\151\147\156
\040\103\101\040\114\151\155\151\164\145\144\061\055\060\053\006
\003\125\004\003\023\044\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\157\146
\040\127\157\123\151\147\156\040\107\062
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\130\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\032\060\030\006\003\125\004\012\023\021\127\157\123\151\147\156
\040\103\101\040\114\151\155\151\164\145\144\061\055\060\053\006
\003\125\004\003\023\044\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\157\146
\040\127\157\123\151\147\156\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\153\045\332\212\210\235\174\274\017\005\263\261\172\141
\105\104
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END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\174\060\202\002\144\240\003\002\001\002\002\020\153
\045\332\212\210\235\174\274\017\005\263\261\172\141\105\104\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\130
\061\013\060\011\006\003\125\004\006\023\002\103\116\061\032\060
\030\006\003\125\004\012\023\021\127\157\123\151\147\156\040\103
\101\040\114\151\155\151\164\145\144\061\055\060\053\006\003\125
\004\003\023\044\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\040\157\146\040\127
\157\123\151\147\156\040\107\062\060\036\027\015\061\064\061\061
\060\070\060\060\065\070\065\070\132\027\015\064\064\061\061\060
\070\060\060\065\070\065\070\132\060\130\061\013\060\011\006\003
\125\004\006\023\002\103\116\061\032\060\030\006\003\125\004\012
\023\021\127\157\123\151\147\156\040\103\101\040\114\151\155\151
\164\145\144\061\055\060\053\006\003\125\004\003\023\044\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171\040\157\146\040\127\157\123\151\147\156\040
\107\062\060\202\001\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202
\001\001\000\276\305\304\240\042\200\111\117\277\331\207\021\306
\123\341\273\017\275\140\177\257\366\202\016\037\334\260\216\075
\227\340\120\074\217\072\357\146\073\105\007\233\040\370\343\327
\045\206\065\220\026\242\135\157\060\031\010\207\013\177\006\262
\235\142\217\336\257\222\245\140\324\053\200\232\122\077\365\232
\203\351\064\132\313\331\325\142\134\346\016\340\337\006\230\016
\200\174\312\264\035\023\210\153\016\250\044\167\003\320\356\133
\363\312\151\221\065\071\126\305\155\343\367\075\117\136\223\070
\044\312\030\351\044\313\222\003\335\314\034\075\011\160\344\040
\344\361\256\254\273\163\151\243\143\072\017\105\017\241\112\232
\302\321\143\254\313\020\370\075\346\116\050\267\353\304\225\261
\254\375\136\253\372\101\313\135\235\113\334\364\174\166\357\147
\177\000\172\215\322\240\032\134\115\042\341\265\332\335\166\263
\324\166\337\136\270\213\230\310\024\124\314\153\027\222\267\340
\112\277\111\224\141\013\070\220\217\135\044\154\045\173\073\171
\331\342\176\235\255\237\230\241\006\374\170\024\140\127\370\356
\200\167\261\002\003\001\000\001\243\102\060\100\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\017\006\003
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006
\003\125\035\016\004\026\004\024\372\140\251\353\145\305\335\026
\024\010\116\014\017\215\233\340\367\144\257\147\060\015\006\011
\052\206\110\206\367\015\001\001\013\005\000\003\202\001\001\000
\127\303\172\066\202\234\215\230\342\253\100\252\107\217\307\247
\133\355\174\347\075\146\132\073\061\273\337\363\026\063\221\374
\174\173\245\302\246\146\343\252\260\267\047\230\077\111\327\140
\147\147\077\066\117\112\313\361\024\372\132\207\050\034\355\217
\101\062\306\225\371\175\332\275\173\133\302\260\041\343\217\106
\334\041\070\103\164\114\373\060\370\027\162\301\062\374\310\221

\027\304\314\130\067\116\013\314\132\367\041\065\050\203\154\140
\055\104\353\122\214\120\075\265\154\022\327\372\011\273\154\262
\112\261\305\211\344\374\323\122\330\141\027\376\172\224\204\217
\171\266\063\131\272\017\304\013\342\160\240\113\170\056\372\310
\237\375\257\221\145\012\170\070\025\345\227\027\024\335\371\340
\054\064\370\070\320\204\042\000\300\024\121\030\053\002\334\060
\132\360\350\001\174\065\072\043\257\010\344\257\252\216\050\102
\111\056\360\365\231\064\276\355\017\113\030\341\322\044\074\273
\135\107\267\041\362\215\321\012\231\216\343\156\076\255\160\340
\217\271\312\314\156\201\061\366\173\234\172\171\344\147\161\030
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Certification Authority of WoSign G2"
# Issuer: CN=Certification Authority of WoSign G2,O=WoSign CA Limited,C=CN
# Serial Number:6b:25:da:8a:88:9d:7c:bc:0f:05:b3:b1:7a:61:45:44
# Subject: CN=Certification Authority of WoSign G2,O=WoSign CA Limited,C=CN
# Not Valid
Before: Sat Nov 08 00:58:58 2014
# Not Valid After: Tue Nov 08 00:58:58 2044
# Fingerprint (MD5): c8:1c:7d:19:aa:cb:71:93:f2:50:f8:52:a8:1e:ba:60
# Fingerprint (SHA1): fb:ed:dc:90:65:b7:27:20:37:bc:55:0c:9c:56:de:bb:f2:78:94:e1
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certification Authority of WoSign G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\373\355\334\220\145\267\047\040\067\274\125\014\234\126\336\273
\362\170\224\341
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\310\034\175\031\252\313\161\223\362\120\370\122\250\036\272\140
END
CKA_ISSUER MULTILINE_OCTAL
\060\130\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\032\060\030\006\003\125\004\012\023\021\127\157\123\151\147\156
\040\103\101\040\114\151\155\151\164\145\144\061\055\060\053\006
\003\125\004\003\023\044\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\157\146
\040\127\157\123\151\147\156\040\107\062
END
CKA_SERIAL_NUMBER

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 MULTILINE_OCTAL
\002\020\153\045\332\212\210\235\174\274\017\005\263\261\172\141
\105\104
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "CA WoSign ECC Root"
# Issuer: CN=CA WoSign ECC Root,O=WoSign CA Limited,C=CN
# Serial Number:68:4a:58:70:80:6b:f0:8f:02:fa:f6:de:e8:b0:90:90
# Subject: CN=CA WoSign ECC Root,O=WoSign CA Limited,C=CN
# Not Valid Before: Sat Nov 08 00:58:58 2014
# Not Valid After: Tue Nov 08 00:58:58 2044
# Fingerprint (MD5): 80:c6:53:ee:61:82:28:72:f0:ff:21:b9:17:ca:b2:20
# Fingerprint (SHA1): d2:7a:d2:be:ed:94:c0:a1:3c:c7:25:21:ea:5d:71:be:81:19:f3:2b
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
 UTF8 "CA WoSign ECC Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\032\060\030\006\003\125\004\012\023\021\127\157\123\151\147\156
\040\103\101\040\114\151\155\151\164\145\144\061\033\060\031\006
\003\125\004\003\023\022\103\101\040\127\157\123\151\147\156\040
\105\103\103\040\122\157\157\164
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\032\060\030\006\003\125\004\012\023\021\127\157\123\151\147\156
\040\103\101\040\114\151\155\151\164\145\144\061\033\060\031\006
\003\125\004\003\023\022\103\101\040\127\157\123\151\147\156\040
\105\103\103\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\150\112\130\160\200\153\360\217\002\372\366\336\350\260
\220\220
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\011\060\202\001\217\240\003\002\001\002\002\020\150
\112\130\160\200\153\360\217\002\372\366\336\350\260\220\220\060
\012\006\010\052\206\110\316\075\004\003\003\060\106\061\013\060
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\011\006\003\125\004\006\023\002\103\116\061\032\060\030\006\003
\125\004\012\023\021\127\157\123\151\147\156\040\103\101\040\114
\151\155\151\164\145\144\061\033\060\031\006\003\125\004\003\023
\022\103\101\040\127\157\123\151\147\156\040\105\103\103\040\122
\157\157\164\060\036\027\015\061\064\061\061\060\070\060\060\065
\070\065\070\132\027\015\064\064\061\061\060\070\060\060\065\070
\065\070\132\060\106\061\013\060\011\006\003\125\004\006\023\002
\103\116\061\032\060\030\006\003\125\004\012\023\021\127\157\123
\151\147\156\040\103\101\040\114\151\155\151\164\145\144\061\033
\060\031\006\003\125\004\003\023\022\103\101\040\127\157\123\151
\147\156\040\105\103\103\040\122\157\157\164\060\166\060\020\006
\007\052\206\110\316\075\002\001\006\005\053\201\004\000\042\003
\142\000\004\341\375\216\270\103\044\253\226\173\205\302\272\013
\255\215\340\072\343\044\271\322\261\276\210\072\312\277\112\270
\371\357\054\057\257\121\120\074\107\165\154\370\224\267\233\374
\050\036\305\124\314\143\235\026\113\123\301\347\040\253\315\254
\045\322\177\217\302\301\132\202\136\060\213\172\124\316\003\265
\221\177\252\224\320\321\212\110\314\202\005\046\241\325\121\022
\326\173\066\243\102\060\100\060\016\006\003\125\035\017\001\001
\377\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004
\026\004\024\252\375\325\132\243\366\207\213\062\205\375\321\062
\133\200\105\223\363\003\270\060\012\006\010\052\206\110\316\075
\004\003\003\003\150\000\060\145\002\061\000\344\244\204\260\201
\325\075\260\164\254\224\244\350\016\075\000\164\114\241\227\153
\371\015\121\074\241\331\073\364\015\253\251\237\276\116\162\312
\205\324\331\354\265\062\105\030\157\253\255\002\060\175\307\367
\151\143\057\241\341\230\357\023\020\321\171\077\321\376\352\073
\177\336\126\364\220\261\025\021\330\262\042\025\320\057\303\046
\056\153\361\221\262\220\145\364\232\346\220\356\112
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "CA WoSign ECC Root"
# Issuer: CN=CA WoSign ECC Root,O=WoSign CA Limited,C=CN
# Serial Number:68:4a:58:70:80:6b:f0:8f:02:fa:f6:de:e8:b0:90:90
# Subject: CN=CA WoSign ECC Root,O=WoSign CA Limited,C=CN
# Not Valid Before: Sat Nov 08 00:58:58 2014
# Not Valid After: Tue Nov 08 00:58:58 2044
# Fingerprint (MD5): 80:c6:53:ee:61:82:28:72:f0:ff:21:b9:17:ca:b2:20
# Fingerprint (SHA1): d2:7a:d2:be:ed:94:c0:a1:3c:c7:25:21:ea:5d:71:be:81:19:f3:2b
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE

```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CA WoSign ECC Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\322\172\322\276\355\224\300\241\074\307\045\041\352\135\161\276
\201\031\363\053
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\200\306\123\356\141\202\050\162\360\377\041\271\027\312\262\040
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\032\060\030\006\003\125\004\012\023\021\127\157\123\151\147\156
\040\103\101\040\114\151\155\151\164\145\144\061\033\060\031\006
\003\125\004\003\023\022\103\101\040\127\157\123\151\147\156\040
\105\103\103\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\150\112\130\160\200\153\360\217\002\372\366\336\350\260
\220\220
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "CCA India 2015 SPL"
# Issuer: CN=CCA India 2015 SPL,O=India PKI,C=IN
# Serial Number: 10165 (0x27b5)
# Subject: CN=CCA India 2015 SPL,O=India PKI,C=IN
# Not Valid Before: Thu Jan 29 11:36:43 2015
# Not Valid After: Wed Jan 29 11:36:43 2025
#
 Fingerprint (MD5): 16:da:3e:ac:1d:0a:57:a9:b4:e2:de:d0:93:96:dc:d4
# Fingerprint (SHA1): 3b:c6:dc:e0:03:07:bd:67:60:41:eb:d8:59:70:c6:2f:8f:da:51:09
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CCA India 2015 SPL"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\022\060\020\006\003\125\004\012\023\011\111\156\144\151\141\040
\120\113\111\061\033\060\031\006\003\125\004\003\023\022\103\103
\101\040\111\156\144\151\141\040\062\060\061\065\040\123\120\114
END
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CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\022\060\020\006\003\125\004\012\023\011\111\156\144\151\141\040
\120\113\111\061\033\060\031\006\003\125\004\003\023\022\103\103
\101\040\111\156\144\151\141\040\062\060\061\065\040\123\120\114
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\002\047\265
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\003\053\060\202\002\023\240\003\002\001\002\002\002\047
\265\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000
\060\076\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\022\060\020\006\003\125\004\012\023\011\111\156\144\151\141\040
\120\113\111\061\033\060\031\006\003\125\004\003\023\022\103\103
\101\040\111\156\144\151\141\040\062\060\061\065\040\123\120\114
\060\036\027\015\061\065\060\061\062\071\061\061\063\066\064\063
\132\027\015\062\065\060\061\062\071\061\061\063\066\064\063\132
\060\076\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\022\060\020\006\003\125\004\012\023\011\111\156\144\151\141\040
\120\113\111\061\033\060\031\006\003\125\004\003\023\022\103\103
\101\040\111\156\144\151\141\040\062\060\061\065\040\123\120\114
\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001
\000\227\327\066\211\075\067\101\016\221\077\153\040\137\374\072
\176\073\132\135\057\303\014\207\123\074\030\242\310\141\163\015
\010\016\126\036\322\156\140\245\127\145\334\376\317\120\206\017
\132\116\253\142\213\004\312\126\357\341\321\236\256\164\255\252
\372\077\101\130\321\125\160\160\076\105\311\033\200\163\374\010
\210\344\213\162\250\012\265\051\127\260\255\012\221\101\032\234
\137\120\175\254\027\032\045\133\041\360\225\053\347\337\067\254
\064\363\007\260\361\035\301\023\357\173\056\072\305\251\141\220
\262\170\137\124\120\074\263\132\125\143\266\313\020\243\157\373
\015\364\266\357\346\010\336\242\020\277\166\227\177\352\331\226
\321\324\303\163\002\161\264\251\260\254\254\037\027\040\245\107
\106\326\104\002\070\231\276\313\024\170\376\346\137\304\177\335
\157\351\252\107\024\220\021\330\035\200\300\025\324\214\240\231
\343\031\016\012\017\314\032\010\234\324\123\007\000\340\037\111
\277\202\202\114\317\233\330\156\323\324\021\000\022\154\017\175
\140\147\112\214\120\333\362\057\340\271\171\207\203\303\134\302
\071\002\003\001\000\001\243\063\060\061\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\021\006\003\125
\035\016\004\012\004\010\114\021\160\252\217\335\037\007\060\013
\006\003\125\035\017\004\004\003\002\001\006\060\015\006\011\052
\206\110\206\367\015\001\001\013\005\000\003\202\001\001\000\055
\274\214\025\312\064\355\114\050\042\273\341\123\045\113\072\227

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\251\355\046\242\244\253\115\373\012\022\156\347\065\346\147\016
\030\201\142\066\245\314\302\337\032\345\150\001\201\116\263\231
\324\107\025\022\235\166\351\241\246\023\035\260\377\175\273\127
\343\357\131\233\310\073\120\151\306\143\072\254\240\301\345\220
\350\144\051\134\110\101\151\067\254\073\273\335\343\125\306\327
\222\015\225\203\260\050\127\302\243\251\226\247\312\336\114\036
\232\377\076\245\056\047\136\333\146\147\047\205\357\253\212\134
\163\174\210\315\107\146\360\235\203\314\204\217\342\051\364\037
\101\157\267\365\041\015\365\224\126\121\343\374\377\023\130\267
\237\003\356\051\237\322\001\260\142\236\224\275\031\206\132\103
\372\152\211\201\260\352\134\030\207\312\200\225\373\355\001\277
\021\032\337\225\024\256\056\342\257\315\221\220\272\263\047\303
\157\020\330\331\016\264\245\164\154\201\267\137\031\314\376\047
\116\263\105\230\130\030\234\127\304\222\162\022\317\247\202\071
\325\341\020\227\012\206\060\105\205\143\250\153\115\232\374
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "CCA India 2015 SPL"
# Issuer: CN=CCA India 2015 SPL,O=India PKI,C=IN
# Serial Number: 10165 (0x27b5)
# Subject: CN=CCA India 2015 SPL,O=India PKI,C=IN
# Not Valid Before: Thu Jan 29 11:36:43 2015
# Not Valid After: Wed Jan 29 11:36:43 2025
# Fingerprint (MD5): 16:da:3e:ac:1d:0a:57:a9:b4:e2:de:d0:93:96:dc:d4
# Fingerprint (SHA1): 3b:c6:dc:e0:03:07:bd:67:60:41:eb:d8:59:70:c6:2f:8f:da:51:09
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN
 CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CCA India 2015 SPL"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\073\306\334\340\003\007\275\147\140\101\353\330\131\160\306\057
\217\332\121\011
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\026\332\076\254\035\012\127\251\264\342\336\320\223\226\334\324
END
CKA_ISSUER MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\022\060\020\006\003\125\004\012\023\011\111\156\144\151\141\040
\120\113\111\061\033\060\031\006\003\125\004\003\023\022\103\103
\101\040\111\156\144\151\141\040\062\060\061\065\040\123\120\114
```

```
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\002\047\265
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Swedish Government Root Authority
 v3"
# Issuer: CN=Swedish Government Root Authority v3,O=Swedish Social Insurance Agency,C=SE
# Serial Number:32:69:a2:bf:40:6b:8d:b4:47:83:64:3c:8b:0d:c9:43
# Subject: CN=Swedish Government Root Authority v3,O=Swedish Social Insurance Agency,C=SE
# Not Valid Before: Tue Sep 29 11:32:32 2015
# Not Valid After: Sat Sep 29 11:42:09 2040
# Fingerprint (MD5): 63:e2:fd:ea:a2:55:6a:70:54:fb:3a:22:e3:34:b1:17
# Fingerprint (SHA1): 74:6f:88:f9:ac:16:3c:53:00:9e:ef:92:0c:40:67:75:6a:15:71:7e
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Swedish Government Root Authority v3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\146\061\013\060\011\006\003\125\004\006\023\002\123\105\061
\050\060\046\006\003\125\004\012\023\037\123\167\145\144\151\163
\150\040\123\157\143\151\141\154\040\111\156\163\165\162\141\156
\143\145\040\101\147\145\156\143\171\061\055\060\053\006\003\125
\004\003\023\044\123\167\145\144\151\163\150\040\107\157\166\145
\162\156\155\145\156\164\040\122\157\157\164\040\101\165\164\150
\157\162\151\164\171\040\166\063
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\146\061\013\060\011\006\003\125\004\006\023\002\123\105\061
\050\060\046\006\003\125\004\012\023\037\123\167\145\144\151\163
\150\040\123\157\143\151\141\154\040\111\156\163\165\162\141\156
\143\145\040\101\147\145\156\143\171\061\055\060\053\006\003\125
\004\003\023\044\123\167\145\144\151\163\150\040\107\157\166\145
\162\156\155\145\156\164\040\122\157\157\164\040\101\165\164\150
\157\162\151\164\171\040\166\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\062\151\242\277\100\153\215\264\107\203\144\074\213\015
\311\103
```

END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\252\060\202\003\222\240\003\002\001\002\002\020\062
\151\242\277\100\153\215\264\107\203\144\074\213\015\311\103\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\146
\061\013\060\011\006\003\125\004\006\023\002\123\105\061\050\060
\046\006\003\125\004\012\023\037\123\167\145\144\151\163\150\040
\123\157\143\151\141\154\040\111\156\163\165\162\141\156\143\145
\040\101\147\145\156\143\171\061\055\060\053\006\003\125\004\003
\023\044\123\167\145\144\151\163\150\040\107\157\166\145\162\156
\155\145\156\164\040\122\157\157\164\040\101\165\164\150\157\162
\151\164\171\040\166\063\060\036\027\015\061\065\060\071\062\071
\061\061\063\062\063\062\132\027\015\064\060\060\071\062\071\061
\061\064\062\060\071\132\060\146\061\013\060\011\006\003\125\004
\006\023\002\123\105\061\050\060\046\006\003\125\004\012\023\037
\123\167\145\144\151\163\150\040\123\157\143\151\141\154\040\111
\156\163\165\162\141\156\143\145\040\101\147\145\156\143\171\061
\055\060\053\006\003\125\004\003\023\044\123\167\145\144\151\163
\150\040\107\157\166\145\162\156\155\145\156\164\040\122\157\157
\164\040\101\165\164\150\157\162\151\164\171\040\166\063\060\202
\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\272
\036\242\151\033\150\117\134\217\272\364\043\307\136\146\005\170
\205\066\130\243\242\177\147\357\242\014\026\222\244\112\213\340
\240\222\207\125\067\013\304\321\304\320\100\103\227\062\120\117
\354\225\107\267\077\257\103\005\345\204\227\011\357\126\124\347
\103\063\107\375\255\361\072\233\230\244\341\344\121\243\271\254
\214\013\356\045\006\011\362\323\272\065\147\141\214\302\275\046
\313\327\143\314\327\203\063\331\114\342\357\371\033\237\250\313
\015\166\001\055\162\311\042\273\150\221\336\220\017\073\075\264
\102\275\031\175\237\204\134\074\176\102\067\206\261\140\302\110
\207\122\116\134\127\376\316\222\256\312\076\126\267\263\236\225
\232\224\370\057\241\320\242\056\302\124\132\154\314\314\326\255
\113\107\320\056\207\202\063\250\173\120\071\247\052\054\261\133
\047\012\237\255\365\024\353\374\215\123\262\163\053\124\043\364
\214\227\231\227\373\065\334\314\265\372\063\024\046\215\165\247
\044\246\350\024\056\055\246\200\050\203\232\077\270\312\073\307
\365\030\340\375\354\216\171\373\252\102\154\112\113\026\176\363
\202\003\156\272\347\021\006\245\237\204\053\322\140\155\351\106
\356\101\132\226\271\024\375\034\077\206\022\361\124\046\046\375
\147\200\057\345\250\055\050\056\103\267\144\302\357\344\267\176
\226\334\204\213\047\331\166\075\230\201\123\024\334\102\105\241
\124\147\371\332\030\146\220\012\264\107\220\074\001\345\053\243
\146\357\157\373\062\203\361\063\175\062\041\154\245\105\025\077
\057\363\125\221\110\223\237\045\317\055\074\071\073\122\015\032
\257\307\337\253\157\200\330\220\313\236\161\162\152\102\151\223
\352\222\000\075\111\004\331\243\134\272\105\373\002\020\377\255
\151\164\122\245\070\143\232\146\210\004\262\021\272\023\252\071

\325\203\137\355\145\133\123\310\235\134\262\205\240\170\160\065
\115\134\044\020\244\366\061\052\222\125\101\331\363\027\154\231
\023\130\372\335\050\320\154\023\275\133\207\215\223\203\255\130
\051\126\025\264\130\047\112\233\021\154\240\246\147\105\072\316
\320\330\316\377\220\063\354\132\061\115\017\122\022\373\255\366
\141\137\344\057\157\015\146\060\345\240\117\317\317\375\137\002
\003\001\000\001\243\124\060\122\060\016\006\003\125\035\017\001
\001\377\004\004\003\002\001\006\060\017\006\003\125\035\023\001
\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016
\004\026\004\024\234\274\001\347\253\144\065\365\061\233\215\265
\373\027\231\210\002\313\233\362\060\020\006\011\053\006\001\004
\001\202\067\025\001\004\003\002\001\000\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\003\202\002\001\000\207\253
\152\344\347\153\044\122\075\366\042\203\117\123\004\105\062\234
\141\132\026\134\234\104\265\243\321\226\320\100\376\317\146\025
\136\176\100\000\040\025\375\247\252\144\332\247\141\146\150\302
\335\122\161\045\240\152\271\335\300\315\316\206\010\324\074\065
\021\057\175\364\157\322\332\014\227\003\145\227\203\264\076\072
\313\011\164\215\353\005\312\172\351\200\260\267\121\055\042\223
\343\232\031\356\355\227\010\041\203\255\307\012\221\137\304\312
\333\136\257\270\347\214\272\072\111\322\125\003\065\031\031\120
\112\342\206\247\273\170\075\225\375\261\037\106\362\117\146\362
\373\277\205\144\266\012\043\030\222\011\236\111\105\061\266\326
\024\127\236\374\211\105\164\177\071\314\300\152\150\310\317\107
\320\341\036\307\323\057\055\371\054\044\073\374\152\272\224\023
\336\314\162\362\242\035\313\037\237\325\203\167\046\136\176\233
\240\257\151\237\170\333\245\301\156\161\134\110\102\116\053\330
\170\270\325\017\245\077\154\313\217\220\315\107\330\220\031\111
\205\326\154\374\342\253\252\102\277\313\023\227\277\151\104\165
\143\065\055\332\240\307\375\141\367\312\101\075\124\234\364\066
\300\344\156\041\110\237\135\161\142\201\323\362\045\346\131\214
\131\101\046\110\247\343\353\147\152\323\354\064\267\230\367\314
\312\243\066\006\225\347\310\060\131\367\377\311\241\321\344\171
\274\337\023\037\056\331\263\165\321\004\267\043\011\041\314\035
\041\034\047\234\016\053\372\301\207\030\311\372\371\111\203\214
\022\026\373\305\022\316\073\017\102\372\360\005\145\176\250\307
\353\122\112\371\230\136\161\243\254\022\307\050\161\032\132\165
\317\207\312\037\067\050\034\024\235\220\120\157\306\277\112\314
\307\045\317\061\335\133\221\116\166\250\021\325\166\146\331\277
\200\163\142\260\354\303\376\104\274\315\131\023\013\014\055\330
\241\314\252\142\115\124\105\136\244\122\243\214\127\074\024\061
\223\124\316\245\026\124\136\055\102\263\356\145\251\266\235\077
\154\316\141\331\126\313\336\352\240\126\336\155\206\003\372\267
\201\152\214\322\330\363\327\266\300\254\051\204\131\043\016\233
\227\152\346\240\316\325\052\124\030\357\120\230\171\040
END
CKA_NSS_MOZILLA_CA_POLICY

```
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Swedish Government Root Authority v3"
# Issuer: CN=Swedish Government Root Authority v3,O=Swedish Social
 Insurance Agency,C=SE
# Serial Number:32:69:a2:bf:40:6b:8d:b4:47:83:64:3c:8b:0d:c9:43
# Subject: CN=Swedish Government Root Authority v3,O=Swedish Social Insurance Agency,C=SE
# Not Valid Before: Tue Sep 29 11:32:32 2015
# Not Valid After: Sat Sep 29 11:42:09 2040
# Fingerprint (MD5): 63:e2:fd:ea:a2:55:6a:70:54:fb:3a:22:e3:34:b1:17
# Fingerprint (SHA1): 74:6f:88:f9:ac:16:3c:53:00:9e:ef:92:0c:40:67:75:6a:15:71:7e
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Swedish Government Root Authority v3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\164\157\210\371\254\026\074\123\000\236\357\222\014\100\147\165
\152\025\161\176
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\143\342\375\352\242\125\152\160\124\373\072\042\343\064\261\027
END
CKA_ISSUER MULTILINE_OCTAL
\060\146\061\013\060\011\006\003\125\004\006\023\002\123\105\061
\050\060\046\006\003\125\004\012\023\037\123\167\145\144\151\163
\150\040\123\157\143\151\141\154\040\111\156\163\165\162\141\156
\143\145\040\101\147\145\156\143\171\061\055\060\053\006\003\125
\004\003\023\044\123\167\145\144\151\163\150\040\107\157\166\145
\162\156\155\145\156\164\040\122\157\157\164\040\101\165\164\150
\157\162\151\164\171\040\166\063
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\062\151\242\277\100\153\215\264\107\203\144\074\213\015
\311\103
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Swedish Government Root Authority v2"
# Issuer: CN=Swedish Government Root Authority v2,O=Swedish Social Insurance Agency,C=SE
```

```
# Serial Number:54:12:15:9f:ab:8a:75:93:44:94:ca:77:40:56:2e:ef
# Subject: CN=Swedish Government Root Authority v2,O=Swedish Social Insurance Agency,C=SE
# Not Valid Before: Tue May 05 11:15:23 2015
#
 Not Valid After: Sat May 05 11:24:19 2040
# Fingerprint (MD5): 33:85:e1:95:66:4b:83:50:73:42:c2:e0:da:a0:40:92
# Fingerprint (SHA1): 32:f4:42:09:3b:36:d7:03:1b:75:ca:4d:ad:dc:b3:27:fa:a0:2b:9c
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Swedish Government Root Authority v2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\146\061\013\060\011\006\003\125\004\006\023\002\123\105\061
\050\060\046\006\003\125\004\012\023\037\123\167\145\144\151\163
\150\040\123\157\143\151\141\154\040\111\156\163\165\162\141\156
\143\145\040\101\147\145\156\143\171\061\055\060\053\006\003\125
\004\003\023\044\123\167\145\144\151\163\150\040\107\157\166\145
\162\156\155\145\156\164\040\122\157\157\164\040\101\165\164\150
\157\162\151\164\171\040\166\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\146\061\013\060\011\006\003\125\004\006\023\002\123\105\061
\050\060\046\006\003\125\004\012\023\037\123\167\145\144\151\163
\150\040\123\157\143\151\141\154\040\111\156\163\165\162\141\156
\143\145\040\101\147\145\156\143\171\061\055\060\053\006\003\125
\004\003\023\044\123\167\145\144\151\163\150\040\107\157\166\145
\162\156\155\145\156\164\040\122\157\157\164\040\101\165\164\150
\157\162\151\164\171\040\166\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\124\022\025\237\253\212\165\223\104\224\312\167\100\126
\056\357
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\013\060\202\003\363\240\003\002\001\002\002\020\124
\022\025\237\253\212\165\223\104\224\312\167\100\126\056\357\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\146
\061\013\060\011\006\003\125\004\006\023\002\123\105\061\050\060
\046\006\003\125\004\012\023\037\123\167\145\144\151\163\150\040
\123\157\143\151\141\154\040\111\156\163\165\162\141\156\143\145
\040\101\147\145\156\143\171\061\055\060\053\006\003\125\004\003
\023\044\123\167\145\144\151\163\150\040\107\157\166\145\162\156
\155\145\156\164\040\122\157\157\164\040\101\165\164\150\157\162
\151\164\171\040\166\062\060\036\027\015\061\065\060\065\060\065
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\061\061\061\065\062\063\132\027\015\064\060\060\065\060\065\061
\061\062\064\061\071\132\060\146\061\013\060\011\006\003\125\004
\006\023\002\123\105\061\050\060\046\006\003\125\004\012\023\037
\123\167\145\144\151\163\150\040\123\157\143\151\141\154\040\111
\156\163\165\162\141\156\143\145\040\101\147\145\156\143\171\061
\055\060\053\006\003\125\004\003\023\044\123\167\145\144\151\163
\150\040\107\157\166\145\162\156\155\145\156\164\040\122\157\157
\164\040\101\165\164\150\157\162\151\164\171\040\166\062\060\202
\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\310
\256\265\103\274\102\105\113\065\143\077\002\113\305\377\333\066
\327\047\305\302\256\105\146\243\161\207\026\115\211\117\141\224
\340\126\106\270\320\104\023\346\163\220\360\141\170\101\212\340
\032\176\067\254\002\051\276\350\377\002\046\306\032\174\012\261
\217\144\051\242\332\007\212\325\044\205\150\031\222\062\337\237
\051\140\130\155\052\205\200\021\066\311\266\302\323\236\204\014
\272\121\021\314\124\351\253\006\060\022\217\040\167\005\300\306
\215\232\233\131\310\266\205\350\160\007\002\261\036\377\327\151
\317\026\106\213\141\057\102\315\122\246\330\016\172\057\207\055
\306\057\074\042\103\261\223\176\303\026\166\331\314\327\213\354
\021\033\320\311\161\024\302\211\111\176\361\244\020\252\065\074
\250\033\273\377\354\062\100\345\275\052\363\246\001\023\310\214
\227\031\220\316\143\371\260\153\175\367\371\212\316\156\340\205
\347\333\224\325\172\040\045\240\065\360\251\367\257\132\050\132
\014\310\363\164\071\213\061\073\042\314\111\045\311\157\270\134
\172\056\054\226\343\057\243\076\312\171\167\151\221\132\370\360
\305\123\067\116\123\155\111\047\126\142\312\345\371\163\140\251
\027\073\133\242\045\257\055\173\311\267\333\317\031\021\072\063
\161\071\131\132\003\351\347\054\014\377\155\234\162\143\143\200
\005\130\123\206\334\050\165\026\302\345\360\023\131\241\201\377
\005\014\231\250\266\074\154\056\305\016\000\230\201\351\203\167
\146\103\073\132\216\205\105\114\262\317\271\075\344\234\066\223
\100\172\123\025\051\324\021\220\272\241\140\212\235\253\364\112
\112\152\335\207\252\301\355\005\332\236\133\126\341\210\117\052
\153\225\050\206\146\120\241\357\332\112\262\220\012\066\067\111
\205\227\102\170\007\147\346\233\040\241\014\154\311\317\317\376
\167\225\204\132\172\073\027\260\357\114\367\055\221\252\317\031
\157\306\371\022\050\347\036\012\246\226\315\041\260\003\142\120
\203\006\040\346\350\336\337\103\026\026\271\201\240\360\201\064
\133\313\301\211\366\363\350\042\270\316\270\122\076\121\036\261
\005\270\267\003\053\013\254\164\165\123\044\341\166\270\117\045
\166\135\357\321\232\363\156\112\270\174\113\370\212\300\031\002
\003\001\000\001\243\201\264\060\201\261\060\016\006\003\125\035
\017\001\001\377\004\004\003\002\001\006\060\022\006\003\125\035
\023\001\001\377\004\010\060\006\001\001\377\002\001\001\060\035
\006\003\125\035\016\004\026\004\024\143\153\102\140\123\127\021
\273\310\044\211\045\002\146\104\164\241\015\045\156\060\020\006
\011\053\006\001\004\001\202\067\025\001\004\003\002\001\000\060

\021\006\003\125\035\040\004\012\060\010\060\006\006\004\125\035
\040\000\060\107\006\003\125\035\045\004\100\060\076\006\010\053
\006\001\005\005\007\003\001\006\010\053\006\001\005\005\007\003
\002\006\010\053\006\001\005\005\007\003\004\006\012\053\006\001
\004\001\202\067\012\003\014\006\010\053\006\001\005\005\007\003
\003\006\010\053\006\001\005\005\007\003\010\060\015\006\011\052
\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000\043
\056\252\205\227\113\244\134\020\257\332\370\075\275\223\130\057
\170\373\031\167\003\071\026\107\111\162\125\314\207\350\275\244
\177\322\253\044\254\347\324\120\356\235\330\203\306\231\040\373
\026\057\210\306\027\067\312\213\036\253\320\342\154\007\130\270
\144\221\241\020\241\151\067\165\136\376\332\163\024\346\212\153
\276\302\140\041\057\300\371\243\004\110\066\133\067\276\332\154
\375\351\226\216\236\361\123\174\217\145\104\247\125\175\013\224
\116\124\366\377\062\275\057\175\234\245\136\102\304\114\051\343
\020\144\057\346\317\132\073\064\125\050\141\321\047\022\273\156
\124\233\201\130\254\325\136\235\127\003\240\115\321\377\067\164
\246\215\363\371\225\375\052\211\165\172\171\067\375\046\171\057
\047\163\177\251\031\040\345\320\137\230\350\226\005\217\230\171
\351\171\020\101\051\001\103\365\151\067\314\120\020\150\265\330
\104\116\016\362\231\343\047\054\152\216\137\273\175\273\153\161
\113\006\212\335\052\330\012\077\133\310\162\056\130\141\012\017
\201\150\036\107\307\351\055\272\357\215\334\016\243\043\303\262
\055\265\107\261\213\264\076\047\110\347\334\010\142\014\124\376
\103\327\225\112\277\007\057\112\100\176\006\245\121\207\046\211
\005\335\074\312\117\376\034\047\351\333\210\036\300\262\376\343
\357\037\176\261\350\131\225\240\117\253\012\211\000\340\163\262
\347\034\301\027\120\200\207\114\322\103\031\131\225\322\133\024
\133\012\133\300\174\211\161\172\265\012\300\212\105\057\356\304
\300\376\124\055\347\225\044\167\005\056\356\164\306\240\220\261
\163\334\102\326\240\165\311\130\131\005\242\336\021\277\131\351
\015\247\046\302\156\300\106\212\306\036\323\365\352\017\175\075
\162\315\031\225\114\272\340\150\227\215\130\300\152\357\171\367
\262\150\152\270\162\066\303\044\014\350\062\355\275\361\237\310
\357\336\165\322\333\166\251\224\047\070\364\001\141\277\146\070
\217\152\075\334\000\133\263\374\104\337\003\113\371\361\166\045
\065\377\122\037\010\035\320\245\024\351\213\006\053\170\203\054
\161\134\117\221\207\143\326\014\016\005\210\074\224\240\261\132
\124\026\337\335\121\303\250\066\056\054\202\174\271\232\260
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Swedish

```
 Government Root Authority v2"
# Issuer: CN=Swedish Government Root Authority v2,O=Swedish Social Insurance Agency,C=SE
# Serial Number:54:12:15:9f:ab:8a:75:93:44:94:ca:77:40:56:2e:ef
# Subject: CN=Swedish Government Root Authority v2,O=Swedish Social Insurance Agency,C=SE
# Not Valid Before: Tue May 05 11:15:23 2015
# Not Valid After: Sat May 05 11:24:19 2040
# Fingerprint (MD5): 33:85:e1:95:66:4b:83:50:73:42:c2:e0:da:a0:40:92
# Fingerprint (SHA1): 32:f4:42:09:3b:36:d7:03:1b:75:ca:4d:ad:dc:b3:27:fa:a0:2b:9c
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Swedish Government Root Authority v2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\062\364\102\011\073\066\327\003\033\165\312\115\255\334\263\047
\372\240\053\234
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\063\205\341\225\146\113\203\120\163\102\302\340\332\240\100\222
END
CKA_ISSUER MULTILINE_OCTAL
\060\146\061\013\060\011\006\003\125\004\006\023\002\123\105\061
\050\060\046\006\003\125\004\012\023\037\123\167\145\144\151\163
\150\040\123\157\143\151\141\154\040\111\156\163\165\162\141\156
\143\145\040\101\147\145\156\143\171\061\055\060\053\006\003\125
\004\003\023\044\123\167\145\144\151\163\150\040\107\157\166\145
\162\156\155\145\156\164\040\122\157\157\164\040\101\165\164\150
\157\162\151\164\171\040\166\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\124\022\025\237\253\212\165\223\104\224\312\167\100\126
\056\357
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Tunisian Root Certificate Authority - TunRootCA2"
# Issuer: O=National Digital Certification Agency,CN=Tunisian Root Certificate Authority - TunRootCA2,C=TN
# Serial Number:21:66:15:05:05:27:05:05:bc:8a:b0:1d:af:0a:be:c4
# Subject:
 O=National Digital Certification Agency,CN=Tunisian Root Certificate Authority - TunRootCA2,C=TN
# Not Valid Before: Tue May 05 08:57:01 2015
# Not Valid After: Wed May 05 08:57:01 2027
# Fingerprint (MD5): 03:d1:25:b1:f0:55:ad:ca:dd:7c:59:93:50:ef:17:21
```

```
# Fingerprint (SHA1): 96:38:63:3c:90:56:ae:88:14:a0:65:d2:3b:dc:60:a0:ee:70:2f:a7
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Tunisian Root Certificate Authority - TunRootCA2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\170\061\013\060\011\006\003\125\004\006\023\002\124\116\061
\071\060\067\006\003\125\004\003\023\060\124\165\156\151\163\151
\141\156\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\055\040
\124\165\156\122\157\157\164\103\101\062\061\056\060\054\006\003
\125\004\012\023\045\116\141\164\151\157\156\141\154\040\104\151
\147\151\164\141\154\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\147\145\156\143\171
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\170\061\013\060\011\006\003\125\004\006\023\002\124\116\061
\071\060\067\006\003\125\004\003\023\060\124\165\156\151\163\151
\141\156\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\055\040
\124\165\156\122\157\157\164\103\101\062\061\056\060\054\006\003
\125\004\012\023\045\116\141\164\151\157\156\141\154\040\104\151
\147\151\164\141\154\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\147\145\156\143\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\041\146\025\005\005\047\005\005\274\212\260\035\257\012
\276\304
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\274\060\202\003\244\240\003\002\001\002\002\020\041
\146\025\005\005\047\005\005\274\212\260\035\257\012\276\304\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\170
\061\013\060\011\006\003\125\004\006\023\002\124\116\061\071\060
\067\006\003\125\004\003\023\060\124\165\156\151\163\151\141\156
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\145\040\101\165\164\150\157\162\151\164\171\040\055\040\124\165
\156\122\157\157\164\103\101\062\061\056\060\054\006\003\125\004
\012\023\045\116\141\164\151\157\156\141\154\040\104\151\147\151
\164\141\154\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\147\145\156\143\171\060\036\027\015\061\065\060\065
\060\065\060\070\065\067\060\061\132\027\015\062\067\060\065\060
\065\060\070\065\067\060\061\132\060\170\061\013\060\011\006\003
\125\004\006\023\002\124\116\061\071\060\067\006\003\125\004\003
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\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150
\157\162\151\164\171\040\055\040\124\165\156\122\157\157\164\103
\101\062\061\056\060\054\006\003\125\004\012\023\045\116\141\164
\151\157\156\141\154\040\104\151\147\151\164\141\154\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\147\145\156
\143\171\060\202\002\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202
\002\001\000\260\007\347\142\373\320\015\125\316\147\267\127\215
\156\014\251\047\124\036\353\251\044\253\147\217\217\234\141\017
\333\050\062\057\073\370\054\145\222\055\256\272\063\222\300\053
\236\362\037\136\155\043\135\263\130\037\215\241\300\155\165\205
\012\260\023\116\133\126\106\213\071\275\013\202\273\072\103\233
\010\272\106\356\371\027\353\315\310\327\343\165\023\336\256\121
\110\012\316\040\225\106\237\002\354\125\214\164\252\132\374\374
\352\011\063\065\156\243\107\006\307\335\176\204\150\016\307\022
\312\224\303\355\346\154\002\155\336\002\211\065\263\004\313\105
\370\174\107\244\323\037\337\345\134\043\342\363\042\173\271\113
\242\375\027\065\135\110\351\277\365\263\045\143\213\347\170\353
\374\165\047\275\210\134\246\205\077\101\337\225\174\335\172\106
\217\376\036\332\261\253\330\323\216\315\006\214\311\330\122\102
\021\122\242\203\217\134\203\173\344\047\266\217\037\240\136\075
\322\165\175\171\123\223\006\227\343\003\307\226\054\332\001\074
\171\305\073\120\350\260\323\241\244\342\323\203\175\104\370\020
\317\240\032\052\362\145\200\275\167\301\230\145\166\256\022\041
\142\312\072\276\276\265\231\303\133\304\321\277\233\300\012\312
\130\036\025\246\327\041\136\261\115\012\345\160\170\232\150\346
\164\146\062\024\052\036\021\276\210\367\006\366\125\243\303\037
\156\027\220\125\321\212\100\211\126\103\325\117\346\242\311\210
\144\000\005\121\077\127\264\074\266\276\152\221\161\100\361\242
\134\361\327\355\234\266\127\366\131\324\052\021\345\324\345\277
\273\036\321\310\327\137\104\005\233\273\211\072\255\247\103\167
\176\025\140\174\210\135\233\354\245\134\322\106\255\014\213\124
\105\324\224\121\125\105\122\252\134\330\021\254\370\126\042\154
\331\322\024\351\267\116\102\205\124\106\370\001\306\075\046\006
\167\350\262\065\033\360\235\102\311\177\376\200\047\001\120\313
\177\305\254\124\372\153\155\226\214\101\244\241\322\347\265\221
\110\157\167\034\213\302\053\164\376\074\134\304\135\224\316\253
\361\040\226\153\301\014\132\137\371\345\065\271\154\243\020\147
\357\221\252\110\016\357\110\267\166\130\142\331\276\236\102\263
\244\275\065\002\003\001\000\001\243\102\060\100\060\035\006\003
\125\035\016\004\026\004\024\314\163\305\243\152\051\061\227\247
\215\240\330\124\301\012\165\266\043\077\246\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\015\006\011
\052\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000
\056\362\207\110\355\231\236\237\001\014\074\311\012\170\123\174
\030\065\336\266\345\154\364\000\200\341\233\213\331\372\373\252

\373\145\267\322\311\365\327\247\313\176\311\261\242\161\130\155
\131\067\326\340\063\020\312\265\331\162\333\116\045\067\252\246
\335\035\030\275\365\311\212\234\172\210\356\037\002\304\055\222
\124\175\127\342\134\031\030\043\002\172\134\111\225\266\230\347
\302\140\101\145\100\273\354\132\267\161\234\120\362\163\166\373
\137\015\357\065\317\264\151\215\205\350\114\220\027\003\013\311
\263\056\040\067\143\021\142\246\117\343\064\340\373\171\125\347
\306\302\256\102\376\260\064\154\111\043\016\162\007\173\146\005
\125\110\373\022\017\240\300\372\116\321\373\075\314\376\375\026
\113\126\120\315\021\054\247\233\367\261\012\317\246\353\357\335
\216\270\256\102\010\174\244\214\224\352\206\307\103\343\367\074
\212\337\107\322\060\100\310\055\123\365\157\021\111\314\041\214
\226\103\117\020\240\107\241\126\215\037\034\133\330\126\133\353
\064\166\341\065\072\161\324\314\041\057\236\065\050\362\132\336
\236\344\356\107\152\020\350\070\275\112\264\175\004\177\005\256
\110\012\264\003\277\056\263\012\033\237\313\255\335\115\320\207
\041\267\107\166\202\203\055\307\127\276\232\025\243\033\060\030
\154\243\072\161\157\144\107\050\222\333\021\141\040\232\167\145
\055\371\254\126\023\154\113\243\137\377\233\244\350\357\347\130
\350\173\236\073\177\152\247\276\071\012\023\224\311\110\116\146
\144\330\123\114\354\101\153\375\374\066\056\327\016\337\141\013
\173\265\100\254\335\102\111\155\236\200\277\140\225\360\351\300
\077\173\273\030\351\070\265\126\116\247\176\212\142\357\230\036
\370\170\100\251\273\330\351\345\264\264\371\343\147\234\354\123
\317\270\102\264\057\223\201\065\240\154\366\272\040\212\150\075
\367\155\377\177\323\114\367\172\224\150\003\167\103\073\065\121
\252\123\022\076\107\023\024\071\254\326\145\217\250\106\377\074
\041\364\322\277\320\110\244\176\247\121\233\227\022\365\231\064
\027\043\126\204\023\143\313\064\312\037\312\272\250\007\051\363
\103\044\012\111\177\375\016\324\220\360\253\103\041\142\234\217
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Tunisian Root Certificate
 Authority - TunRootCA2"
# Issuer: O=National Digital Certification Agency,CN=Tunisian Root Certificate Authority - TunRootCA2,C=TN
# Serial Number:21:66:15:05:05:27:05:05:bc:8a:b0:1d:af:0a:be:c4
# Subject: O=National Digital Certification Agency,CN=Tunisian Root Certificate Authority - TunRootCA2,C=TN
# Not Valid Before: Tue May 05 08:57:01 2015
# Not Valid After: Wed May 05 08:57:01 2027
# Fingerprint (MD5): 03:d1:25:b1:f0:55:ad:ca:dd:7c:59:93:50:ef:17:21
# Fingerprint (SHA1): 96:38:63:3c:90:56:ae:88:14:a0:65:d2:3b:dc:60:a0:ee:70:2f:a7
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE

```
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Tunisian Root Certificate Authority - TunRootCA2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\226\070\143\074\220\126\256\210\024\240\145\322\073\334\140\240
\356\160\057\247
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\003\321\045\261\360\125\255\312\335\174\131\223\120\357\027\041
END
CKA_ISSUER MULTILINE_OCTAL
\060\170\061\013\060\011\006\003\125\004\006\023\002\124\116\061
\071\060\067\006\003\125\004\003\023\060\124\165\156\151\163\151
\141\156\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\055\040
\124\165\156\122\157\157\164\103\101\062\061\056\060\054\006\003
\125\004\012\023\045\116\141\164\151\157\156\141\154\040\104\151
\147\151\164\141\154\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\147\145\156\143\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\041\146\025\005\005\047\005\005\274\212\260\035\257\012
\276\304
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "OpenTrust Root CA G2"
# Issuer: CN=OpenTrust Root CA G2,O=OpenTrust,C=FR
# Serial Number:11:20:a1:69:1b:bf:bd:b9:bd:52:96:8f:23:e8:48:bf:26:11
#
 Subject: CN=OpenTrust Root CA G2,O=OpenTrust,C=FR
# Not Valid Before: Mon May 26 00:00:00 2014
# Not Valid After: Fri Jan 15 00:00:00 2038
# Fingerprint (MD5): 57:24:b6:59:24:6b:ae:c8:fe:1c:0c:20:f2:c0:4e:eb
# Fingerprint (SHA1): 79:5f:88:60:c5:ab:7c:3d:92:e6:cb:f4:8d:e1:45:cd:11:ef:60:0b
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "OpenTrust Root CA G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\100\061\013\060\011\006\003\125\004\006\023\002\106\122\061
```

\022\060\020\006\003\125\004\012\014\011\117\160\145\156\124\162
\165\163\164\061\035\060\033\006\003\125\004\003\014\024\117\160
\145\156\124\162\165\163\164\040\122\157\157\164\040\103\101\040
\107\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\100\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\117\160\145\156\124\162
\165\163\164\061\035\060\033\006\003\125\004\003\014\024\117\160
\145\156\124\162\165\163\164\040\122\157\157\164\040\103\101\040
\107\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\022\021\040\241\151\033\277\275\271\275\122\226\217\043\350
\110\277\046\021
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\157\060\202\003\127\240\003\002\001\002\002\022\021
\040\241\151\033\277\275\271\275\122\226\217\043\350\110\277\046
\021\060\015\006\011\052\206\110\206\367\015\001\001\015\005\000
\060\100\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\117\160\145\156\124\162
\165\163\164\061\035\060\033\006\003\125\004\003\014\024\117\160
\145\156\124\162\165\163\164\040\122\157\157\164\040\103\101\040
\107\062\060\036\027\015\061\064\060\065\062\066\060\060\060\060
\060\060\132\027\015\063\070\060\061\061\065\060\060\060\060\060
\060\132\060\100\061\013\060\011\006\003\125\004\006\023\002\106
\122\061\022\060\020\006\003\125\004\012\014\011\117\160\145\156
\124\162\165\163\164\061\035\060\033\006\003\125\004\003\014\024
\117\160\145\156\124\162\165\163\164\040\122\157\157\164\040\103
\101\040\107\062\060\202\002\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012
\002\202\002\001\000\314\266\127\245\063\224\020\201\062\123\337
\141\176\017\166\071\317\134\302\123\165\035\111\172\226\070\335
\242\163\152\361\157\336\136\242\132\271\161\041\276\066\331\241
\374\274\356\154\250\174\064\032\161\032\350\032\330\137\016\104
\006\355\247\340\363\322\141\013\340\062\242\226\321\070\360\302
\332\001\027\374\344\254\117\350\356\211\036\164\253\117\277\036
\011\266\066\152\126\363\341\356\226\211\146\044\006\344\315\102
\072\112\335\340\232\260\304\202\105\263\376\311\253\134\174\076
\311\353\027\057\014\175\156\256\245\217\310\254\045\012\157\372
\325\105\230\322\065\011\366\003\103\224\376\331\277\040\225\171
\200\230\212\331\211\065\273\121\033\244\067\175\374\231\073\253
\377\277\254\015\217\103\261\231\173\026\020\176\035\157\107\304
\025\217\004\226\010\006\102\004\370\204\326\035\274\221\246\102
\276\111\325\152\210\077\274\055\121\321\236\215\340\122\314\127

\335\065\065\130\333\264\217\044\210\344\213\337\334\153\124\322
\201\053\262\316\222\113\034\037\106\372\035\330\222\313\166\147
\265\011\231\011\345\254\027\024\125\160\306\074\240\126\012\003
\263\334\142\031\337\310\265\060\177\365\074\046\165\021\275\327
\033\263\207\236\007\257\145\161\345\240\317\032\247\011\020\035
\223\211\146\133\350\074\142\062\265\265\072\156\351\205\001\213
\236\103\214\147\163\050\131\133\353\343\334\054\314\245\046\162
\142\022\264\346\234\203\104\366\121\244\342\300\172\044\127\312
\016\245\077\072\265\073\213\345\166\356\160\346\222\336\026\134
\050\133\227\031\047\222\376\172\222\124\316\223\071\012\026\207
\274\143\263\365\261\223\134\340\156\267\320\352\371\142\062\210
\104\373\277\047\050\266\060\225\135\022\050\271\225\276\217\123
\030\345\242\030\026\342\126\244\262\054\020\365\035\067\246\370
\267\366\320\131\134\211\367\302\325\265\224\164\321\325\376\033
\266\360\346\326\036\173\322\074\313\250\343\365\030\363\041\037
\156\357\115\150\006\173\055\135\156\103\211\246\300\371\240\277
\202\036\317\123\177\264\353\054\333\135\366\152\175\100\044\005
\162\211\070\001\223\313\161\302\071\135\006\021\366\157\170\370
\067\015\071\204\047\002\003\001\000\001\243\143\060\141\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\035\006\003\125\035\016\004\026\004\024\152\071\372\102\042\367
\346\211\000\115\136\175\063\203\313\270\156\167\206\257\060\037
\006\003\125\035\043\004\030\060\026\200\024\152\071\372\102\042
\367\346\211\000\115\136\175\063\203\313\270\156\167\206\257\060
\015\006\011\052\206\110\206\367\015\001\001\015\005\000\003\202
\002\001\000\230\313\253\100\074\345\063\002\227\177\055\207\246
\217\324\136\112\257\270\036\347\273\161\373\200\144\045\251\263
\032\076\150\135\047\046\247\272\052\341\360\127\203\012\144\117
\036\042\164\033\351\220\137\360\254\317\377\117\150\172\070\244
\020\154\015\261\307\244\167\200\030\266\242\050\104\166\247\064
\235\161\204\057\312\131\322\107\210\231\101\042\311\060\230\141
\156\075\250\250\005\155\321\037\300\121\104\126\177\047\065\002
\335\136\230\012\102\353\060\277\215\241\233\121\252\073\352\223
\106\144\305\000\171\336\041\153\366\127\240\206\327\006\162\354
\160\106\113\213\163\335\240\041\165\076\334\035\300\217\323\117
\163\034\205\331\376\177\142\310\225\157\266\323\173\214\272\123
\302\157\233\104\114\171\320\035\160\263\327\237\002\364\262\007
\260\307\345\370\255\043\016\246\126\311\051\022\167\110\331\057
\106\375\073\360\374\164\160\222\245\216\070\010\037\144\060\266
\267\113\373\066\254\020\216\240\122\063\143\235\003\065\126\305
\151\275\306\043\132\047\224\366\244\022\370\055\063\074\241\126
\245\137\326\031\351\355\174\010\275\167\315\047\144\314\224\332
\116\106\120\207\340\371\301\123\200\036\273\255\373\107\122\213
\033\375\242\371\336\016\042\267\075\063\131\154\324\336\365\225
\006\062\015\121\031\101\134\076\117\006\367\271\053\200\047\366
\243\252\172\174\006\341\103\303\023\071\142\032\066\275\340\050
\056\224\002\344\051\056\140\125\256\100\075\260\164\222\136\360

\040\144\226\077\137\105\135\210\265\212\332\002\240\133\105\124
\336\070\075\011\300\250\112\145\106\026\374\252\277\124\116\115
\133\276\070\103\267\050\312\213\063\252\032\045\272\045\134\051
\057\133\112\156\214\352\055\234\052\366\005\166\340\167\227\200
\210\335\147\023\157\035\150\044\213\117\267\164\201\345\364\140
\237\172\125\327\076\067\332\026\153\076\167\254\256\030\160\225
\010\171\051\003\212\376\301\073\263\077\032\017\244\073\136\037
\130\241\225\311\253\057\163\112\320\055\156\232\131\017\125\030
\170\055\074\121\246\227\213\346\273\262\160\252\114\021\336\377
\174\053\067\324\172\321\167\064\217\347\371\102\367\074\201\014
\113\122\012
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL
 CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "OpenTrust Root CA G2"
# Issuer: CN=OpenTrust Root CA G2,O=OpenTrust,C=FR
# Serial Number:11:20:a1:69:1b:bf:bd:b9:bd:52:96:8f:23:e8:48:bf:26:11
# Subject: CN=OpenTrust Root CA G2,O=OpenTrust,C=FR
# Not Valid Before: Mon May 26 00:00:00 2014
# Not Valid After: Fri Jan 15 00:00:00 2038
# Fingerprint (MD5): 57:24:b6:59:24:6b:ae:c8:fe:1c:0c:20:f2:c0:4e:eb
# Fingerprint (SHA1): 79:5f:88:60:c5:ab:7c:3d:92:e6:cb:f4:8d:e1:45:cd:11:ef:60:0b
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "OpenTrust Root CA G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\171\137\210\140\305\253\174\075\222\346\313\364\215\341\105\315
\021\357\140\013
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\127\044\266\131\044\153\256\310\376\034\014\040\362\300\116\353
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\100\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\117\160\145\156\124\162
\165\163\164\061\035\060\033\006\003\125\004\003\014\024\117\160
\145\156\124\162\165\163\164\040\122\157\157\164\040\103\101\040
\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL

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\002\022\021\040\241\151\033\277\275\271\275\122\226\217\043\350
\110\277\046\021
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "OpenTrust Root CA G3"
# Issuer: CN=OpenTrust Root CA G3,O=OpenTrust,C=FR
# Serial Number:11:20:e6:f8:4c:fc:24:b0:be:05:40:ac:da:83:1b:34:60:3f
# Subject: CN=OpenTrust Root CA G3,O=OpenTrust,C=FR
# Not Valid Before: Mon May 26 00:00:00 2014
# Not Valid After: Fri Jan 15 00:00:00 2038
# Fingerprint (MD5):
 21:37:b4:17:16:92:7b:67:46:70:a9:96:d7:a8:13:24
# Fingerprint (SHA1): 6e:26:64:f3:56:bf:34:55:bf:d1:93:3f:7c:01:de:d8:13:da:8a:a6
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "OpenTrust Root CA G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\100\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\117\160\145\156\124\162
\165\163\164\061\035\060\033\006\003\125\004\003\014\024\117\160
\145\156\124\162\165\163\164\040\122\157\157\164\040\103\101\040
\107\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\100\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\117\160\145\156\124\162
\165\163\164\061\035\060\033\006\003\125\004\003\014\024\117\160
\145\156\124\162\165\163\164\040\122\157\157\164\040\103\101\040
\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\022\021\040\346\370\114\374\044\260\276\005\100\254\332\203
\033\064\140\077
END
CKA_VALUE
 MULTILINE_OCTAL
\060\202\002\041\060\202\001\246\240\003\002\001\002\002\022\021
\040\346\370\114\374\044\260\276\005\100\254\332\203\033\064\140
\077\060\012\006\010\052\206\110\316\075\004\003\003\060\100\061
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\013\060\011\006\003\125\004\006\023\002\106\122\061\022\060\020
\006\003\125\004\012\014\011\117\160\145\156\124\162\165\163\164
\061\035\060\033\006\003\125\004\003\014\024\117\160\145\156\124
\162\165\163\164\040\122\157\157\164\040\103\101\040\107\063\060
\036\027\015\061\064\060\065\062\066\060\060\060\060\060\060\132
\027\015\063\070\060\061\061\065\060\060\060\060\060\060\132\060
\100\061\013\060\011\006\003\125\004\006\023\002\106\122\061\022
\060\020\006\003\125\004\012\014\011\117\160\145\156\124\162\165
\163\164\061\035\060\033\006\003\125\004\003\014\024\117\160\145
\156\124\162\165\163\164\040\122\157\157\164\040\103\101\040\107
\063\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005
\053\201\004\000\042\003\142\000\004\112\356\130\256\115\312\146
\336\006\072\243\021\374\340\030\360\156\034\272\055\060\014\211
\331\326\356\233\163\203\251\043\025\214\057\131\212\132\335\024
\352\235\131\053\103\267\006\354\062\266\272\356\101\265\255\135
\241\205\314\352\035\024\146\243\147\176\106\342\224\363\347\266
\126\241\025\131\241\117\067\227\271\042\036\275\021\353\364\262
\037\136\303\024\232\345\331\227\231\243\143\060\141\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\017\006
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\035
\006\003\125\035\016\004\026\004\024\107\167\303\024\213\142\071
\014\311\157\341\120\115\320\020\130\334\225\210\155\060\037\006
\003\125\035\043\004\030\060\026\200\024\107\167\303\024\213\142
\071\014\311\157\341\120\115\320\020\130\334\225\210\155\060\012
\006\010\052\206\110\316\075\004\003\003\003\151\000\060\146\002
\061\000\217\250\334\235\272\014\004\027\372\025\351\075\057\051
\001\227\277\201\026\063\100\223\154\374\371\355\200\160\157\252
\217\333\204\302\213\365\065\312\006\334\144\157\150\026\341\217
\221\271\002\061\000\330\113\245\313\302\320\010\154\351\030\373
\132\335\115\137\044\013\260\000\041\045\357\217\247\004\046\161
\342\174\151\345\135\232\370\101\037\073\071\223\223\235\125\352
\315\215\361\373\301
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "OpenTrust Root CA G3"
# Issuer: CN=OpenTrust Root CA G3,O=OpenTrust,C=FR
# Serial Number:11:20:e6:f8:4c:fc:24:b0:be:05:40:ac:da:83:1b:34:60:3f
# Subject: CN=OpenTrust Root CA G3,O=OpenTrust,C=FR
# Not Valid Before: Mon May 26 00:00:00 2014
# Not Valid After: Fri Jan 15 00:00:00 2038
# Fingerprint (MD5): 21:37:b4:17:16:92:7b:67:46:70:a9:96:d7:a8:13:24
# Fingerprint (SHA1): 6e:26:64:f3:56:bf:34:55:bf:d1:93:3f:7c:01:de:d8:13:da:8a:a6
CKA_CLASS CK_OBJECT_CLASS

```
 CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "OpenTrust Root CA G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\156\046\144\363\126\277\064\125\277\321\223\077\174\001\336\330
\023\332\212\246
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\041\067\264\027\026\222\173\147\106\160\251\226\327\250\023\044
END
CKA_ISSUER MULTILINE_OCTAL
\060\100\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\014\011\117\160\145\156\124\162
\165\163\164\061\035\060\033\006\003\125\004\003\014\024\117\160
\145\156\124\162\165\163\164\040\122\157\157\164\040\103\101\040
\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\022\021\040\346\370\114\374\044\260\276\005\100\254\332\203
\033\064\140\077
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL
 CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Certplus Root CA G1"
# Issuer: CN=Certplus Root CA G1,O=Certplus,C=FR
# Serial Number:11:20:55:83:e4:2d:3e:54:56:85:2d:83:37:b7:2c:dc:46:11
# Subject: CN=Certplus Root CA G1,O=Certplus,C=FR
# Not Valid Before: Mon May 26 00:00:00 2014
# Not Valid After: Fri Jan 15 00:00:00 2038
# Fingerprint (MD5): 7f:09:9c:f7:d9:b9:5c:69:69:56:d5:37:3e:14:0d:42
# Fingerprint (SHA1): 22:fd:d0:b7:fd:a2:4e:0d:ac:49:2c:a0:ac:a6:7b:6a:1f:e3:f7:66
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certplus Root CA G1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\021\060\017\006\003\125\004\012\014\010\103\145\162\164\160\154
\165\163\061\034\060\032\006\003\125\004\003\014\023\103\145\162
```

\164\160\154\165\163\040\122\157\157\164\040\103\101\040\107\061
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\021\060\017\006\003\125\004\012\014\010\103\145\162\164\160\154
\165\163\061\034\060\032\006\003\125\004\003\014\023\103\145\162
\164\160\154\165\163\040\122\157\157\164\040\103\101\040\107\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\022\021\040\125\203\344\055\076\124\126\205\055\203\067\267
\054\334\106\021
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\153\060\202\003\123\240\003\002\001\002\002\022\021
\040\125\203\344\055\076\124\126\205\055\203\067\267\054\334\106
\021\060\015\006\011\052\206\110\206\367\015\001\001\015\005\000
\060\076\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\021\060\017\006\003\125\004\012\014\010\103\145\162\164\160\154
\165\163\061\034\060\032\006\003\125\004\003\014\023\103\145\162
\164\160\154\165\163\040\122\157\157\164\040\103\101\040\107\061
\060\036\027\015\061\064\060\065\062\066\060\060\060\060\060\060
\132\027\015\063\070\060\061\061\065\060\060\060\060\060\060\132
\060\076\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\021\060\017\006\003\125\004\012\014\010\103\145\162\164\160\154
\165\163\061\034\060\032\006\003\125\004\003\014\023\103\145\162
\164\160\154\165\163\040\122\157\157\164\040\103\101\040\107\061
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001
\000\332\120\207\266\332\270\251\076\235\144\372\126\063\232\126
\075\026\345\003\225\262\064\034\232\155\142\005\324\330\217\347
\211\144\237\272\333\144\213\144\346\171\052\141\315\257\217\132
\211\221\145\271\130\374\264\003\137\221\077\055\020\025\340\176
\317\274\374\177\103\147\250\255\136\066\043\330\230\263\115\363
\103\236\071\174\052\374\354\210\325\210\356\160\275\205\026\055
\352\113\211\074\243\161\102\376\034\375\323\034\055\020\270\206
\124\352\103\270\333\306\207\332\250\256\200\045\317\172\046\035
\252\221\260\110\157\256\265\336\236\330\327\372\000\375\306\217
\320\121\273\142\175\244\261\214\262\377\040\021\272\065\143\005
\206\107\140\103\063\220\366\107\242\003\117\226\115\235\117\301
\352\352\234\242\376\064\056\336\267\312\033\166\244\267\255\237
\351\250\324\170\077\170\376\362\070\011\066\035\322\026\002\310
\354\052\150\257\365\216\224\357\055\023\172\036\102\112\035\025
\061\256\014\004\127\374\141\163\363\061\126\206\061\200\240\304
\021\156\060\166\343\224\360\137\004\304\254\207\162\211\230\305
\235\314\127\010\232\364\014\374\175\172\005\072\372\107\200\071
\266\317\204\023\167\157\047\352\377\226\147\027\010\155\351\015

\326\043\120\060\260\025\164\023\076\345\057\377\016\315\304\013
\112\135\360\330\000\063\111\146\353\241\030\174\131\056\075\050
\271\141\161\313\265\245\272\270\352\334\342\160\157\010\152\334
\207\147\064\357\337\060\162\335\363\311\077\043\377\065\341\276
\041\051\040\060\201\344\031\245\040\351\045\312\163\061\164\051
\276\342\102\325\363\262\046\146\307\150\375\031\263\347\040\223
\231\350\135\340\136\207\347\106\350\045\234\012\051\044\324\315
\130\206\122\100\044\262\173\017\230\022\040\044\366\220\154\107
\310\015\273\030\040\056\331\375\374\213\362\051\352\207\164\225
\340\102\120\170\204\004\101\141\260\364\041\043\217\055\313\050
\041\362\152\154\364\032\246\305\024\264\067\145\117\225\375\200
\310\370\162\345\045\153\304\140\261\173\155\216\112\212\163\316
\131\373\160\172\163\006\023\331\323\164\067\044\101\012\021\157
\227\334\347\344\176\241\275\025\362\272\207\017\075\150\212\026
\007\002\003\001\000\001\243\143\060\141\060\016\006\003\125\035
\017\001\001\377\004\004\003\002\001\006\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125
\035\016\004\026\004\024\250\301\300\233\221\250\103\025\174\135
\006\047\264\052\121\330\227\013\201\261\060\037\006\003\125\035
\043\004\030\060\026\200\024\250\301\300\233\221\250\103\025\174
\135\006\047\264\052\121\330\227\013\201\261\060\015\006\011\052
\206\110\206\367\015\001\001\015\005\000\003\202\002\001\000\234
\126\157\001\176\321\275\114\365\212\306\360\046\037\344\340\070
\030\314\062\303\051\073\235\101\051\064\141\306\327\360\000\241
\353\244\162\217\224\027\274\023\054\165\264\127\356\012\174\011
\172\334\325\312\241\320\064\023\370\167\253\237\345\376\330\036
\164\212\205\007\217\177\314\171\172\312\226\315\315\375\117\373
\375\043\015\220\365\364\136\323\306\141\175\236\021\340\002\356
\011\004\331\007\335\246\212\267\014\203\044\273\203\120\222\376
\140\165\021\076\330\235\260\212\172\265\340\235\233\313\220\122
\113\260\223\052\324\076\026\063\345\236\306\145\025\076\144\073
\004\077\333\014\217\137\134\035\151\037\257\363\351\041\214\363
\357\227\366\232\267\031\266\204\164\234\243\124\265\160\116\143
\330\127\135\123\041\233\100\222\103\372\326\167\125\063\117\144
\325\373\320\054\152\216\155\045\246\357\205\350\002\304\123\076
\271\236\207\274\314\065\032\336\241\351\212\143\207\145\036\021
\052\333\143\167\227\024\276\232\024\231\021\262\300\356\260\117
\370\024\041\062\103\117\237\253\242\313\250\017\252\073\006\125
\306\022\051\127\010\324\067\327\207\047\255\111\131\247\221\253
\104\172\136\215\160\333\227\316\110\120\261\163\223\366\360\203
\140\371\315\361\341\061\375\133\174\161\041\143\024\024\252\257
\305\336\223\176\150\261\354\042\242\252\220\165\236\265\103\162
\352\144\243\204\113\375\014\250\046\153\161\227\356\126\143\146
\350\102\124\371\307\035\337\320\217\133\337\310\060\157\210\376
\015\304\063\034\123\250\243\375\110\020\362\344\012\116\341\025
\127\374\156\144\060\302\125\021\334\352\251\315\112\124\254\051
\143\104\317\112\100\240\326\150\131\033\063\371\357\072\213\333
\040\222\334\102\204\277\001\253\207\300\325\040\202\333\306\271

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\203\205\102\134\017\103\073\152\111\065\325\230\364\025\277\372
\141\201\014\011\040\030\322\320\027\014\313\110\000\120\351\166
\202\214\144\327\072\240\007\125\314\036\061\300\357\072\264\145
\373\343\277\102\153\236\017\250\275\153\230\334\330\333\313\213
\244\335\327\131\364\156\335\376\252\303\221\320\056\102\007\300
\014\115\123\315\044\261\114\133\036\121\364\337\351\222\372
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Certplus Root CA G1"
# Issuer: CN=Certplus Root CA G1,O=Certplus,C=FR
# Serial Number:11:20:55:83:e4:2d:3e:54:56:85:2d:83:37:b7:2c:dc:46:11
# Subject: CN=Certplus Root CA G1,O=Certplus,C=FR
# Not Valid Before: Mon May 26 00:00:00 2014
# Not Valid After: Fri Jan 15 00:00:00 2038
# Fingerprint (MD5): 7f:09:9c:f7:d9:b9:5c:69:69:56:d5:37:3e:14:0d:42
# Fingerprint (SHA1): 22:fd:d0:b7:fd:a2:4e:0d:ac:49:2c:a0:ac:a6:7b:6a:1f:e3:f7:66
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certplus Root CA G1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\042\375\320\267\375\242\116\015\254\111\054\240\254\246\173\152
\037\343\367\146
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\177\011\234\367\331\271\134\151\151\126\325\067\076\024\015\102
END
CKA_ISSUER MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\021\060\017\006\003\125\004\012\014\010\103\145\162\164\160\154
\165\163\061\034\060\032\006\003\125\004\003\014\023\103\145\162
\164\160\154\165\163\040\122\157\157\164\040\103\101\040\107\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\022\021\040\125\203\344\055\076\124\126\205\055\203\067\267
\054\334\106\021
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
# Microsoft Code Signing Only Certificate
# Certificate "Certplus Root CA G2"
# Issuer: CN=Certplus Root CA G2,O=Certplus,C=FR
# Serial Number:11:20:d9:91:ce:ae:a3:e8:c5:e7:ff:e9:02:af:cf:73:bc:55
# Subject: CN=Certplus Root CA G2,O=Certplus,C=FR
#
 Not Valid Before: Mon May 26 00:00:00 2014
# Not Valid After: Fri Jan 15 00:00:00 2038
# Fingerprint (MD5): a7:ee:c4:78:2d:1b:ee:2d:b9:29:ce:d6:a7:96:32:31
# Fingerprint (SHA1): 4f:65:8e:1f:e9:06:d8:28:02:e9:54:47:41:c9:54:25:5d:69:cc:1a
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certplus Root CA G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\021\060\017\006\003\125\004\012\014\010\103\145\162\164\160\154
\165\163\061\034\060\032\006\003\125\004\003\014\023\103\145\162
\164\160\154\165\163\040\122\157\157\164\040\103\101\040\107\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\021\060\017\006\003\125\004\012\014\010\103\145\162\164\160\154
\165\163\061\034\060\032\006\003\125\004\003\014\023\103\145\162
\164\160\154\165\163\040\122\157\157\164\040\103\101\040\107\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\022\021\040\331\221\316\256\243\350\305\347\377\351\002\257
\317\163\274\125
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\034\060\202\001\242\240\003\002\001\002\002\022\021
\040\331\221\316\256\243\350\305\347\377\351\002\257\317\163\274
\125\060\012\006\010\052\206\110\316\075\004\003\003\060\076\061
\013\060\011\006\003\125\004\006\023\002\106\122\061\021\060\017
\006\003\125\004\012\014\010\103\145\162\164\160\154\165\163\061
\034\060\032\006\003\125\004\003\014\023\103\145\162\164\160\154
\165\163\040\122\157\157\164\040\103\101\040\107\062\060\036\027
\015\061\064\060\065\062\066\060\060\060\060\060\060\132\027\015
\063\070\060\061\061\065\060\060\060\060\060\060\132\060\076\061
\013\060\011\006\003\125\004\006\023\002\106\122\061\021\060\017
\006\003\125\004\012\014\010\103\145\162\164\160\154\165\163\061
\034\060\032\006\003\125\004\003\014\023\103\145\162\164\160\154
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\165\163\040\122\157\157\164\040\103\101\040\107\062\060\166\060
\020\006\007\052\206\110\316\075\002\001\006\005\053\201\004\000
\042\003\142\000\004\315\017\133\126\202\337\360\105\032\326\255
\367\171\360\035\311\254\226\326\236\116\234\037\264\102\021\312
\206\277\155\373\205\243\305\345\031\134\327\356\246\077\151\147
\330\170\342\246\311\304\333\055\171\056\347\213\215\002\157\061
\042\115\006\343\140\162\105\235\016\102\167\236\316\317\345\177
\205\233\030\344\374\314\056\162\323\026\223\116\312\231\143\134
\241\005\052\154\006\243\143\060\141\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\006\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035
\016\004\026\004\024\332\203\143\002\171\216\332\114\306\074\043
\024\330\217\303\040\253\050\140\131\060\037\006\003\125\035\043
\004\030\060\026\200\024\332\203\143\002\171\216\332\114\306\074
\043\024\330\217\303\040\253\050\140\131\060\012\006\010\052\206
\110\316\075\004\003\003\003\150\000\060\145\002\060\160\376\260
\013\331\367\203\227\354\363\125\035\324\334\263\006\016\376\063
\230\235\213\071\220\153\224\041\355\266\327\135\326\114\327\041
\247\347\277\041\017\053\315\367\052\334\205\007\235\002\061\000
\206\024\026\345\334\260\145\302\300\216\024\237\277\044\026\150
\345\274\371\171\151\334\255\105\053\367\266\061\163\314\006\245
\123\223\221\032\223\256\160\152\147\272\327\236\345\141\032\137
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Certplus Root CA G2"
# Issuer: CN=Certplus Root CA G2,O=Certplus,C=FR
# Serial Number:11:20:d9:91:ce:ae:a3:e8:c5:e7:ff:e9:02:af:cf:73:bc:55
# Subject: CN=Certplus Root CA G2,O=Certplus,C=FR
# Not Valid Before: Mon May 26 00:00:00 2014
# Not Valid After: Fri Jan 15 00:00:00 2038
# Fingerprint (MD5): a7:ee:c4:78:2d:1b:ee:2d:b9:29:ce:d6:a7:96:32:31
# Fingerprint (SHA1):
4f:65:8e:1f:e9:06:d8:28:02:e9:54:47:41:c9:54:25:5d:69:cc:1a
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certplus Root CA G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\117\145\216\037\351\006\330\050\002\351\124\107\101\311\124\045
\135\151\314\032
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL

```
\247\356\304\170\055\033\356\055\271\051\316\326\247\226\062\061
END
CKA_ISSUER MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\021\060\017\006\003\125\004\012\014\010\103\145\162\164\160\154
\165\163\061\034\060\032\006\003\125\004\003\014\023\103\145\162
\164\160\154\165\163\040\122\157\157\164\040\103\101\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\022\021\040\331\221\316\256\243\350\305\347\377\351\002\257
\317\163\274\125
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Government Root Certification Authority"
# Issuer: O=Government Root Certification Authority,C=TW
# Serial Number:b6:4b:88:07:e2:23:ee:c8:5c:12:ad:a6:0e:06:a1:f2
# Subject: O=Government Root Certification Authority,C=TW
# Not Valid Before: Fri Sep 28 08:58:51 2012
# Not Valid After: Thu Dec 31 15:59:59 2037
# Fingerprint (MD5): 2f:d4:2d:cd:86:7f:36:b0:5f:1c:e0:53:8d:b6:a2:5b
# Fingerprint (SHA1): b0:91:aa:91:38:47:f3:13:d7:27:bc:ef:c8:17:9f:08:6f:3a:8c:0f
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Government Root Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\077\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\060\060\056\006\003\125\004\012\014\047\107\157\166\145\162\156
\155\145\156\164\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\077\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\060\060\056\006\003\125\004\012\014\047\107\157\166\145\162\156
\155\145\156\164\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171
```

END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\266\113\210\007\342\043\356\310\134\022\255\246\016
\006\241\362
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\113\060\202\003\063\240\003\002\001\002\002\021\000
\266\113\210\007\342\043\356\310\134\022\255\246\016\006\241\362
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\077\061\013\060\011\006\003\125\004\006\023\002\124\127\061\060
\060\056\006\003\125\004\012\014\047\107\157\166\145\162\156\155
\145\156\164\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\060\036\027\015\061\062\060\071\062\070\060\070\065\070\065\061
\132\027\015\063\067\061\062\063\061\061\065\065\071\065\071\132
\060\077\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\060\060\056\006\003\125\004\012\014\047\107\157\166\145\162\156
\155\145\156\164\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002
\001\000\266\377\227\074\201\276\001\130\044\047\257\216\001\053
\326\162\222\060\062\033\137\233\174\324\324\177\350\241\140\163
\060\127\020\000\372\120\226\044\376\120\346\214\072\225\321\127
\171\204\325\147\123\014\052\202\076\030\134\270\060\046\032\326
\136\306\055\262\004\121\016\357\337\014\143\107\353\304\022\010
\121\053\231\161\136\325\151\173\341\135\311\167\035\040\354\126
\216\345\141\140\055\374\351\034\200\337\372\152\203\273\005\265
\036\043\022\234\202\312\012\363\024\035\040\344\006\217\103\044
\231\237\266\012\223\132\163\033\026\071\276\005\266\361\214\245
\144\222\217\005\344\134\166\367\071\303\317\055\275\016\330\313
\250\016\061\233\311\106\017\147\123\103\004\217\310\262\310\203
\200\137\272\362\017\253\201\065\242\040\041\227\316\017\211\064
\170\017\317\037\116\351\373\214\050\074\336\064\347\355\237\322
\146\365\305\312\061\170\322\316\120\321\140\202\143\235\340\114
\367\007\256\203\064\235\111\111\103\324\176\275\055\342\352\307
\161\145\200\010\344\066\236\171\160\012\074\207\051\351\344\222
\224\352\006\222\051\047\170\346\255\327\075\351\012\013\136\364
\340\326\206\235\055\162\313\213\144\126\346\364\256\170\245\240
\071\063\130\074\334\250\217\215\264\152\055\375\210\163\351\225
\120\163\004\337\021\210\076\102\326\002\164\373\054\304\157\274
\154\326\340\200\157\321\206\245\062\127\003\326\115\364\116\012
\231\042\166\176\112\100\202\370\311\344\116\313\123\055\307\261
\266\342\323\302\165\047\156\271\016\161\262\064\374\277\034\116
\302\075\370\066\351\012\314\130\232\241\030\206\116\342\341\252
\263\163\131\156\136\235\264\302\010\257\257\134\375\244\002\157
\377\270\015\273\325\253\327\156\237\032\117\221\100\360\037\106
\125\155\240\222\303\211\315\267\261\377\034\263\313\243\234\012

\343\376\315\252\274\001\354\335\124\312\221\335\117\023\207\244
\366\230\357\375\111\326\127\052\074\246\134\366\140\067\277\330
\076\176\116\150\052\043\062\072\276\156\344\042\075\007\044\317
\212\313\233\135\121\263\060\322\161\155\316\106\212\155\174\112
\063\104\332\022\057\066\113\362\351\361\121\011\155\333\152\227
\016\027\002\003\001\000\001\243\102\060\100\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003
\125\035\016\004\026\004\024\325\147\035\340\234\172\054\234\313
\305\230\347\035\007\046\052\206\354\164\315\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\006\060\015\006\011\052
\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000\220
\073\345\302\123\102\050\352\365\061\116\216\075\221\236\115\011
\363\330\261\122\346\117\254\014\061\041\273\361\352\231\314\203
\374\266\050\344\354\204\007\016\017\116\227\273\157\150\106\217
\016\121\025\225\370\072\073\037\137\202\016\014\161\016\274\221
\117\256\063\056\043\101\364\046\153\117\023\207\372\170\366\056
\302\017\221\005\227\252\152\301\152\237\274\204\236\010\052\047
\335\332\207\027\206\341\263\312\135\355\070\251\051\156\204\336
\106\153\374\047\031\120\245\022\172\214\175\142\374\332\347\314
\274\237\111\257\006\270\047\047\362\211\367\026\075\030\346\275
\336\365\214\022\221\237\343\004\215\376\007\024\032\132\254\071
\202\033\361\070\031\341\143\343\257\154\266\246\121\027\353\372
\113\353\213\042\366\227\376\020\072\137\224\240\113\123\161\077
\132\341\020\370\162\217\226\200\335\215\002\230\000\141\075\215
\274\055\261\107\314\332\135\341\040\247\214\061\134\361\343\332
\271\012\206\107\310\241\075\007\243\074\246\163\156\224\221\355
\156\044\072\371\311\060\321\007\250\201\175\046\175\175\204\337
\206\311\213\345\256\015\036\276\211\110\121\025\203\230\226\057
\112\353\163\064\327\164\315\311\157\320\302\272\053\366\232\376
\231\335\140\024\216\033\371\234\071\074\177\103\211\123\350\345
\302\253\276\042\255\047\070\233\167\050\267\243\143\143\247\201
\347\251\151\105\353\216\170\126\314\005\204\307\373\255\266\060
\174\143\005\237\055\214\044\177\113\213\222\374\070\036\237\240
\245\127\263\156\235\330\144\270\160\232\140\122\160\310\251\320
\377\306\234\355\020\141\136\315\203\016\156\350\115\002\101\112
\342\166\004\171\326\124\077\212\230\062\024\240\335\055\234\347
\272\202\161\243\206\125\051\231\322\051\333\165\072\367\333\103
\377\266\133\373\267\176\065\200\216\015\154\256\171\267\066\055
\227\122\241\260\007\234\007\345\053\066\315\003\227\224\275\055
\016\064\006\374\300\026\211\374\067\124\344\326\317\075\023\004
\362\221\331\311\066\056\076\305\132\320\245\114\202\303\377\056
\174\046\166\367\363\375\105\242\245\156\125\256\056\314\317\054
\211\064\332\366\015\347\221\250\020\352\027\235\362\366\354
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

```
# Microsoft Code Signing Only Certificate
# Trust for "Government Root Certification Authority"
# Issuer: O=Government Root Certification Authority,C=TW
# Serial Number:b6:4b:88:07:e2:23:ee:c8:5c:12:ad:a6:0e:06:a1:f2
# Subject: O=Government Root Certification Authority,C=TW
# Not Valid Before: Fri Sep 28 08:58:51 2012
# Not Valid After: Thu Dec 31 15:59:59 2037
# Fingerprint (MD5): 2f:d4:2d:cd:86:7f:36:b0:5f:1c:e0:53:8d:b6:a2:5b
# Fingerprint (SHA1): b0:91:aa:91:38:47:f3:13:d7:27:bc:ef:c8:17:9f:08:6f:3a:8c:0f
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Government Root Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\260\221\252\221\070\107\363\023\327\047\274\357\310\027\237\010
\157\072\214\017
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\057\324\055\315\206\177\066\260\137\034\340\123\215\266\242\133
END
CKA_ISSUER MULTILINE_OCTAL
\060\077\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\060\060\056\006\003\125\004\012\014\047\107\157\166\145\162\156
\155\145\156\164\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\266\113\210\007\342\043\356\310\134\022\255\246\016
\006\241\362
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "A-Trust-Root-05"
# Issuer: CN=A-Trust-Root-05,OU=A-Trust-Root-05,O=A-Trust Ges. f. Sicherheitssysteme im elektr. Datenverkehr
 GmbH,C=AT
# Serial Number: 1035700 (0xfcdb4)
# Subject: CN=A-Trust-Root-05,OU=A-Trust-Root-05,O=A-Trust Ges. f. Sicherheitssysteme im elektr.
Datenverkehr GmbH,C=AT
# Not Valid Before: Mon Sep 23 13:24:11 2013
# Not Valid After: Wed Sep 20 11:24:11 2023
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# Fingerprint (MD5): f4:6f:96:17:87:40:f4:cf:37:d3:18:29:89:76:e6:0a
# Fingerprint (SHA1): 2e:66:c9:84:11:81:c0:8f:b1:df:ab:d4:ff:8d:5c:c7:2b:e0:8f:02
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "A-Trust-Root-05"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\213\061\013\060\011\006\003\125\004\006\023\002\101\124
\061\110\060\106\006\003\125\004\012\014\077\101\055\124\162\165
\163\164\040\107\145\163\056\040\146\056\040\123\151\143\150\145
\162\150\145\151\164\163\163\171\163\164\145\155\145\040\151\155
\040\145\154\145\153\164\162\056\040\104\141\164\145\156\166\145
\162\153\145\150\162\040\107\155\142\110\061\030\060\026\006\003
\125\004\013\014\017\101\055\124\162\165\163\164\055\122\157\157
\164\055\060\065\061\030\060\026\006\003\125\004\003\014\017\101
\055\124\162\165\163\164\055\122\157\157\164\055\060\065
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\213\061\013\060\011\006\003\125\004\006\023\002\101\124
\061\110\060\106\006\003\125\004\012\014\077\101\055\124\162\165
\163\164\040\107\145\163\056\040\146\056\040\123\151\143\150\145
\162\150\145\151\164\163\163\171\163\164\145\155\145\040\151\155
\040\145\154\145\153\164\162\056\040\104\141\164\145\156\166\145
\162\153\145\150\162\040\107\155\142\110\061\030\060\026\006\003
\125\004\013\014\017\101\055\124\162\165\163\164\055\122\157\157
\164\055\060\065\061\030\060\026\006\003\125\004\003\014\017\101
\055\124\162\165\163\164\055\122\157\157\164\055\060\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\017\315\264
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\311\060\202\003\261\240\003\002\001\002\002\003\017
\315\264\060\015\006\011\052\206\110\206\367\015\001\001\013\005
\000\060\201\213\061\013\060\011\006\003\125\004\006\023\002\101
\124\061\110\060\106\006\003\125\004\012\014\077\101\055\124\162
\165\163\164\040\107\145\163\056\040\146\056\040\123\151\143\150
\145\162\150\145\151\164\163\163\171\163\164\145\155\145\040\151
\155\040\145\154\145\153\164\162\056\040\104\141\164\145\156\166
\145\162\153\145\150\162\040\107\155\142\110\061\030\060\026\006
\003\125\004\013\014\017\101\055\124\162\165\163\164\055\122\157
\157\164\055\060\065\061\030\060\026\006\003\125\004\003\014\017
\101\055\124\162\165\163\164\055\122\157\157\164\055\060\065\060
\036\027\015\061\063\060\071\062\063\061\063\062\064\061\061\132
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\027\015\062\063\060\071\062\060\061\061\062\064\061\061\132\060
\201\213\061\013\060\011\006\003\125\004\006\023\002\101\124\061
\110\060\106\006\003\125\004\012\014\077\101\055\124\162\165\163
\164\040\107\145\163\056\040\146\056\040\123\151\143\150\145\162
\150\145\151\164\163\163\171\163\164\145\155\145\040\151\155\040
\145\154\145\153\164\162\056\040\104\141\164\145\156\166\145\162
\153\145\150\162\040\107\155\142\110\061\030\060\026\006\003\125
\004\013\014\017\101\055\124\162\165\163\164\055\122\157\157\164
\055\060\065\061\030\060\026\006\003\125\004\003\014\017\101\055
\124\162\165\163\164\055\122\157\157\164\055\060\065\060\202\002
\040\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000
\003\202\002\015\000\060\202\002\010\002\202\002\001\000\344\373
\214\122\046\245\147\201\204\150\335\202\311\315\250\162\001\131
\042\077\044\351\022\244\222\227\305\120\316\362\105\077\153\104
\005\030\272\173\161\257\346\215\273\155\366\344\363\345\334\274
\344\170\023\043\262\012\104\235\267\275\067\100\326\045\104\120
\211\316\150\322\303\142\247\104\241\043\105\257\137\006\161\166
\106\341\151\377\342\041\340\077\317\062\225\352\210\046\247\040
\254\302\161\135\060\311\014\354\104\055\316\305\145\174\327\007
\176\065\366\015\030\026\115\173\253\363\252\017\175\336\350\214
\224\056\223\320\267\156\110\070\304\002\042\032\337\040\245\202
\143\277\123\325\104\025\006\073\244\073\172\334\266\356\220\213
\100\002\264\237\300\366\161\063\131\246\042\323\260\150\043\077
\375\204\310\226\260\371\160\113\057\064\206\375\045\125\231\321
\315\167\047\070\304\155\134\031\352\353\176\023\206\001\240\020
\100\046\107\037\276\024\276\137\245\270\077\140\241\156\341\041
\216\023\045\170\056\247\172\315\130\257\176\133\254\077\316\017
\263\362\127\174\325\173\155\311\323\374\255\225\255\033\277\207
\230\117\047\346\013\251\150\073\344\054\054\365\024\107\327\251
\135\202\366\342\233\267\040\341\345\032\153\054\170\010\215\154
\165\214\352\067\226\211\235\131\351\164\062\057\030\060\030\072
\004\045\113\006\355\306\147\147\046\200\152\137\201\167\060\036
\236\321\164\217\137\214\300\124\152\354\244\030\141\231\172\035
\371\235\371\350\371\361\357\162\276\316\057\031\222\174\343\050
\257\321\270\270\157\320\140\276\170\130\244\056\067\072\262\047
\211\021\121\242\136\211\274\035\314\127\145\113\111\114\023\020
\002\256\127\276\114\041\361\042\252\036\240\222\324\124\054\270
\233\174\063\150\047\020\052\035\113\377\006\012\002\223\200\207
\031\257\277\250\203\022\020\216\175\020\245\053\220\350\016\340
\024\206\105\366\327\345\126\163\226\037\217\236\074\052\243\032
\136\054\220\146\205\157\001\166\275\263\360\051\310\047\212\251
\251\043\260\325\362\360\312\325\275\266\062\160\314\057\034\131
\277\352\303\006\244\140\337\253\211\156\107\024\357\205\220\153
\150\043\226\116\006\323\261\047\243\003\303\271\331\275\002\001
\003\243\066\060\064\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\021\006\003\125\035\016\004\012\004
\010\100\371\271\147\276\003\322\010\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\006\060\015\006\011\052\206\110

\206\367\015\001\001\013\005\000\003\202\002\001\000\342\052\145
\306\153\132\053\310\250\064\313\227\021\035\046\037\243\262\316
\270\074\053\041\237\230\364\027\037\015\266\173\256\313\020\155
\203\362\143\301\210\256\351\300\122\102\256\067\237\013\231\127
\122\350\105\176\230\224\351\051\107\237\361\007\301\102\010\363
\163\074\252\153\065\263\154\025\053\221\061\033\344\176\222\347
\303\305\246\041\070\337\033\276\321\237\226\015\120\266\365\173
\224\243\055\252\257\267\215\322\073\055\174\202\020\324\152\112
\311\141\243\246\217\247\262\240\331\124\303\227\177\321\211\314
\143\370\331\337\070\130\225\272\001\120\314\012\363\213\111\074
\177\077\075\250\363\150\314\307\230\323\331\065\060\367\016\202
\136\370\020\141\256\274\116\360\053\064\172\242\232\366\333\215
\257\353\003\114\047\303\336\256\154\335\125\024\257\077\035\353
\217\232\266\170\111\356\274\371\036\167\140\002\044\334\336\336
\351\245\373\221\246\034\172\262\111\340\367\277\035\007\256\206
\313\273\331\000\327\313\001\030\357\350\303\217\014\007\060\160
\130\301\362\143\352\214\375\266\255\343\350\007\074\075\133\005
\207\164\313\065\345\357\011\267\273\240\204\151\274\101\161\143
\333\062\234\101\341\137\176\332\166\155\223\243\256\205\372\345
\214\311\122\254\047\313\140\263\066\054\111\251\004\336\270\047
\053\011\061\304\222\223\351\214\321\244\113\375\276\126\121\260
\330\267\316\235\105\303\033\110\057\321\263\060\367\176\134\251
\133\061\077\345\005\233\341\166\251\327\365\051\206\163\127\034
\275\057\333\327\031\026\364\045\064\361\203\026\264\062\130\013
\261\131\116\343\213\320\243\053\213\033\100\302\367\343\122\250
\116\112\356\165\351\355\143\231\033\006\373\060\215\374\036\127
\231\354\316\024\050\343\240\215\055\353\357\007\036\014\002\216
\214\110\314\210\332\246\255\171\224\264\254\351\014\060\266\377
\006\073\024\161\225\205\373\260\172\313\213\110\131\162\333\120
\000\362\267\215\171\053\315\004\225\222\165\111\002\226\124\242
\035\124\205\273\140\257\175\175\252\263\275\371\160\074\131\172
\301\201\374\254\120\000\030\022\344\265\334\135\330\245\130\136
\035\137\047\151\216\314\333\357\252\127\032\253\204
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "A-Trust-Root-05"
# Issuer: CN=A-Trust-Root-05,OU=A-Trust-Root-05,O=A-Trust Ges. f. Sicherheitssysteme im elektr. Datenverkehr GmbH,C=AT
# Serial Number: 1035700 (0xfcdb4)
# Subject: CN=A-Trust-Root-05,OU=A-Trust-Root-05,O=A-Trust Ges. f. Sicherheitssysteme im elektr. Datenverkehr GmbH,C=AT
# Not Valid Before: Mon Sep 23 13:24:11 2013
# Not Valid After: Wed Sep 20 11:24:11 2023

# Fingerprint (MD5): f4:6f:96:17:87:40:f4:cf:37:d3:18:29:89:76:e6:0a
# Fingerprint (SHA1): 2e:66:c9:84:11:81:c0:8f:b1:df:ab:d4:ff:8d:5c:c7:2b:e0:8f:02
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "A-Trust-Root-05"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\056\146\311\204\021\201\300\217\261\337\253\324\377\215\134\307
\053\340\217\002
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\364\157\226\027\207\100\364\317\067\323\030\051\211\166\346\012
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\213\061\013\060\011\006\003\125\004\006\023\002\101\124
\061\110\060\106\006\003\125\004\012\014\077\101\055\124\162\165
\163\164\040\107\145\163\056\040\146\056\040\123\151\143\150\145
\162\150\145\151\164\163\163\171\163\164\145\155\145\040\151\155
\040\145\154\145\153\164\162\056\040\104\141\164\145\156\166\145
\162\153\145\150\162\040\107\155\142\110\061\030\060\026\006\003
\125\004\013\014\017\101\055\124\162\165\163\164\055\122\157\157
\164\055\060\065\061\030\060\026\006\003\125\004\003\014\017\101
\055\124\162\165\163\164\055\122\157\157\164\055\060\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\017\315\264
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code
Signing Only Certificate
# Certificate "A-Trust-Qual-02"
# Issuer: CN=A-Trust-Qual-02,OU=A-Trust-Qual-02,O=A-Trust Ges. f. Sicherheitssysteme im elektr. Datenverkehr GmbH,C=AT
# Serial Number:14:4d:e4
# Subject: CN=A-Trust-Qual-02,OU=A-Trust-Qual-02,O=A-Trust Ges. f. Sicherheitssysteme im elektr. Datenverkehr GmbH,C=AT
# Not Valid Before: Tue Jul 01 11:23:33 2014
# Not Valid After: Mon Jul 01 09:23:33 2024
# Fingerprint (MD5): 4b:d4:35:43:a8:b2:43:6d:d7:78:e2:89:a2:a9:39:ab
# Fingerprint (SHA1): cd:78:7a:3d:5c:ba:82:07:08:28:48:36:5e:9a:cd:e9:68:33:64:d8
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE

CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "A-Trust-Qual-02"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\213\061\013\060\011\006\003\125\004\006\023\002\101\124
\061\110\060\106\006\003\125\004\012\014\077\101\055\124\162\165
\163\164\040\107\145\163\056\040\146\056\040\123\151\143\150\145
\162\150\145\151\164\163\163\171\163\164\145\155\145\040\151\155
\040\145\154\145\153\164\162\056\040\104\141\164\145\156\166\145
\162\153\145\150\162\040\107\155\142\110\061\030\060\026\006\003
\125\004\013\014\017\101\055\124\162\165\163\164\055\121\165\141
\154\055\060\062\061\030\060\026\006\003\125\004\003\014\017\101
\055\124\162\165\163\164\055\121\165\141\154\055\060\062
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\213\061\013\060\011\006\003\125\004\006\023\002\101\124
\061\110\060\106\006\003\125\004\012\014\077\101\055\124\162\165
\163\164\040\107\145\163\056\040\146\056\040\123\151\143\150\145
\162\150\145\151\164\163\163\171\163\164\145\155\145\040\151\155
\040\145\154\145\153\164\162\056\040\104\141\164\145\156\166\145
\162\153\145\150\162\040\107\155\142\110\061\030\060\026\006\003
\125\004\013\014\017\101\055\124\162\165\163\164\055\121\165\141
\154\055\060\062\061\030\060\026\006\003\125\004\003\014\017\101
\055\124\162\165\163\164\055\121\165\141\154\055\060\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\003\024\115\344
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\313\060\202\002\263\240\003\002\001\002\002\003\024
\115\344\060\015\006\011\052\206\110\206\367\015\001\001\005\005
\000\060\201\213\061\013\060\011\006\003\125\004\006\023\002\101
\124\061\110\060\106\006\003\125\004\012\014\077\101\055\124\162
\165\163\164\040\107\145\163\056\040\146\056\040\123\151\143\150
\145\162\150\145\151\164\163\163\171\163\164\145\155\145\040\151
\155\040\145\154\145\153\164\162\056\040\104\141\164\145\156\166
\145\162\153\145\150\162\040\107\155\142\110\061\030\060\026\006
\003\125\004\013\014\017\101\055\124\162\165\163\164\055\121\165
\141\154\055\060\062\061\030\060\026\006\003\125\004\003\014\017
\101\055\124\162\165\163\164\055\121\165\141\154\055\060\062\060
\036\027\015\061\064\060\067\060\061\061\061\062\063\063\063\132
\027\015\062\064\060\067\060\061\060\071\062\063\063\063\132\060
\201\213\061\013\060\011\006\003\125\004\006\023\002\101\124\061
\110\060\106\006\003\125\004\012\014\077\101\055\124\162\165\163

\164\040\107\145\163\056\040\146\056\040\123\151\143\150\145\162
\150\145\151\164\163\163\171\163\164\145\155\145\040\151\155\040
\145\154\145\153\164\162\056\040\104\141\164\145\156\166\145\162
\153\145\150\162\040\107\155\142\110\061\030\060\026\006\003\125
\004\013\014\017\101\055\124\162\165\163\164\055\121\165\141\154
\055\060\062\061\030\060\026\006\003\125\004\003\014\017\101\055
\124\162\165\163\164\055\121\165\141\154\055\060\062\060\202\001
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000
\003\202\001\017\000\060\202\001\012\002\202\001\001\000\226\221
\253\327\216\260\131\270\001\275\264\036\255\231\375\241\374\352
\014\226\153\217\056\111\110\330\351\344\044\202\341\330\272\314
\353\336\007\134\110\306\031\202\001\107\102\011\341\174\271\237
\256\217\366\356\136\153\250\250\126\210\070\126\263\346\376\311
\235\117\064\070\121\074\234\276\363\254\234\034\310\075\134\232
\204\256\367\224\054\024\262\144\067\140\216\024\260\073\052\315
\211\265\042\257\367\344\177\356\054\053\063\371\216\074\255\114
\242\127\017\373\202\305\216\037\001\337\123\214\301\025\244\335
\356\232\222\022\322\050\351\142\027\045\140\061\357\317\061\224
\363\175\363\344\074\041\253\220\374\155\317\143\247\306\022\000
\161\111\327\034\310\240\355\143\232\175\343\217\050\335\140\371
\330\346\026\253\046\321\320\057\275\347\015\011\337\156\324\354
\345\070\123\364\144\013\272\132\314\200\265\070\131\354\200\131
\145\204\061\152\137\125\221\114\044\345\044\232\203\204\172\276
\200\361\356\137\040\007\252\167\027\154\013\342\125\252\226\170
\010\002\236\227\360\053\256\130\365\200\120\077\376\073\002\003
\001\000\001\243\066\060\064\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\021\006\003\125\035\016\004
\012\004\010\102\075\053\044\246\301\105\316\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\006\060\015\006\011\052
\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000\141
\061\363\210\065\011\270\136\234\305\350\071\244\072\146\377\002
\264\227\035\376\113\071\272\205\230\203\050\240\332\366\116\114
\263\255\104\312\374\321\076\231\332\346\327\224\137\166\333\073
\221\225\152\374\200\237\101\041\136\150\373\326\150\005\152\342
\231\107\377\156\216\216\363\023\126\376\303\176\007\317\005\114
\103\132\251\102\270\071\303\234\360\025\103\354\250\376\216\142
\004\016\156\122\123\033\247\234\347\154\073\145\307\001\177\346
\005\252\162\177\341\053\024\224\010\375\156\210\343\310\224\247
\336\126\373\021\230\027\011\001\332\042\305\063\077\041\315\164
\245\253\311\060\143\210\333\112\047\002\273\320\144\005\004\155
\164\013\003\307\054\362\166\261\174\136\201\243\176\224\366\171
\072\302\176\352\361\123\327\205\130\236\220\034\235\327\261\172
\364\017\232\207\102\052\303\204\217\177\320\152\065\022\036\325
\214\161\214\070\102\232\065\255\335\252\062\023\166\105\006\341
\243\133\352\366\212\226\377\274\145\065\373\152\062\313\141\135
\331\323\046\210\304\073\200\150\126\137\325\372\201\142\335
END
CKA_NSS_MOZILLA_CA_POLICY

```
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "A-Trust-Qual-02"
# Issuer: CN=A-Trust-Qual-02,OU=A-Trust-Qual-02,O=A-Trust Ges. f. Sicherheitssysteme im elektr. Datenverkehr
GmbH,C=AT
# Serial Number:14:4d:e4
# Subject: CN=A-Trust-Qual-02,OU=A-Trust-Qual-02,O=A-Trust Ges. f. Sicherheitssysteme im elektr.
Datenverkehr GmbH,C=AT
# Not Valid Before: Tue Jul 01 11:23:33 2014
# Not Valid After: Mon Jul 01 09:23:33 2024
# Fingerprint (MD5): 4b:d4:35:43:a8:b2:43:6d:d7:78:e2:89:a2:a9:39:ab
# Fingerprint (SHA1): cd:78:7a:3d:5c:ba:82:07:08:28:48:36:5e:9a:cd:e9:68:33:64:d8
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "A-Trust-Qual-02"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\315\170\172\075\134\272\202\007\010\050\110\066\136\232\315\351
\150\063\144\330
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\113\324\065\103\250\262\103\155\327\170\342\211\242\251\071\253
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\213\061\013\060\011\006\003\125\004\006\023\002\101\124
\061\110\060\106\006\003\125\004\012\014\077\101\055\124\162\165
\163\164\040\107\145\163\056\040\146\056\040\123\151\143\150\145
\162\150\145\151\164\163\163\171\163\164\145\155\145\040\151\155
\040\145\154\145\153\164\162\056\040\104\141\164\145\156\166\145
\162\153\145\150\162\040\107\155\142\110\061\030\060\026\006\003
\125\004\013\014\017\101\055\124\162\165\163\164\055\121\165\141
\154\055\060\062\061\030\060\026\006\003\125\004\003\014\017\101
\055\124\162\165\163\164\055\121\165\141\154\055\060\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\024\115\344
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED
 CK_BBOOL CK_FALSE
```

```
# Microsoft Code Signing Only Certificate
# Certificate "Thailand National Root Certification Authority - G1"
# Issuer: CN=Thailand National Root Certification Authority - G1,OU=Thailand National Root Certification
Authority,O=Electronic Transactions Development Agency (Public Organization),C=TH
# Serial Number:51:52:c5:8c
# Subject: CN=Thailand National Root Certification Authority - G1,OU=Thailand National Root Certification
Authority,O=Electronic Transactions Development Agency (Public Organization),C=TH
# Not Valid Before: Wed Mar 27 09:40:22 2013
# Not Valid After: Thu Mar 27 10:10:22 2036
# Fingerprint (MD5): da:9d:b6:26:4a:e5:22:a0:bb:8d:a4:f7:bc:0d:25:cc
# Fingerprint (SHA1): 66:f2:dc:fb:3f:81:4d:de:e9:b3:20:6f:11:de:fe:1b:fb:df:e1:32
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Thailand National Root Certification Authority
 - G1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\317\061\013\060\011\006\003\125\004\006\023\002\124\110
\061\111\060\107\006\003\125\004\012\014\100\105\154\145\143\164
\162\157\156\151\143\040\124\162\141\156\163\141\143\164\151\157
\156\163\040\104\145\166\145\154\157\160\155\145\156\164\040\101
\147\145\156\143\171\040\050\120\165\142\154\151\143\040\117\162
\147\141\156\151\172\141\164\151\157\156\051\061\067\060\065\006
\003\125\004\013\014\056\124\150\141\151\154\141\156\144\040\116
\141\164\151\157\156\141\154\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171\061\074\060\072\006\003\125\004\003\014\063\124
\150\141\151\154\141\156\144\040\116\141\164\151\157\156\141\154
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040
\107\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\317\061\013\060\011\006\003\125\004\006\023\002\124\110
\061\111\060\107\006\003\125\004\012\014\100\105\154\145\143\164
\162\157\156\151\143\040\124\162\141\156\163\141\143\164\151\157
\156\163\040\104\145\166\145\154\157\160\155\145\156\164\040\101
\147\145\156\143\171\040\050\120\165\142\154\151\143\040\117\162
\147\141\156\151\172\141\164\151\157\156\051\061\067\060\065\006
\003\125\004\013\014\056\124\150\141\151\154\141\156\144\040\116
\141\164\151\157\156\141\154\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171\061\074\060\072\006\003\125\004\003\014\063\124
\150\141\151\154\141\156\144\040\116\141\164\151\157\156\141\154
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
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\151\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040
\107\061
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 MULTILINE_OCTAL
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END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\201\060\202\004\151\240\003\002\001\002\002\004\121
\122\305\214\060\015\006\011\052\206\110\206\367\015\001\001\015
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\124\110\061\111\060\107\006\003\125\004\012\014\100\105\154\145
\143\164\162\157\156\151\143\040\124\162\141\156\163\141\143\164
\151\157\156\163\040\104\145\166\145\154\157\160\155\145\156\164
\040\101\147\145\156\143\171\040\050\120\165\142\154\151\143\040
\117\162\147\141\156\151\172\141\164\151\157\156\051\061\067\060
\065\006\003\125\004\013\014\056\124\150\141\151\154\141\156\144
\040\116\141\164\151\157\156\141\154\040\122\157\157\164\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\061\074\060\072\006\003\125\004\003\014
\063\124\150\141\151\154\141\156\144\040\116\141\164\151\157\156
\141\154\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040
\055\040\107\061\060\036\027\015\061\063\060\063\062\067\060\071
\064\060\062\062\132\027\015\063\066\060\063\062\067\061\060\061
\060\062\062\132\060\201\317\061\013\060\011\006\003\125\004\006
\023\002\124\110\061\111\060\107\006\003\125\004\012\014\100\105
\154\145\143\164\162\157\156\151\143\040\124\162\141\156\163\141
\143\164\151\157\156\163\040\104\145\166\145\154\157\160\155\145
\156\164\040\101\147\145\156\143\171\040\050\120\165\142\154\151
\143\040\117\162\147\141\156\151\172\141\164\151\157\156\051\061
\067\060\065\006\003\125\004\013\014\056\124\150\141\151\154\141
\156\144\040\116\141\164\151\157\156\141\154\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\061\074\060\072\006\003\125\004
\003\014\063\124\150\141\151\154\141\156\144\040\116\141\164\151
\157\156\141\154\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
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\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202
\002\012\002\202\002\001\000\326\272\112\344\214\361\232\056\211
\027\302\100\363\202\000\061\376\023\002\172\145\312\010\330\253
\042\261\002\232\161\064\112\144\131\202\345\102\106\353\043\366
\213\132\042\261\317\066\347\163\155\024\155\367\111\224\136\357
\347\064\131\147\366\250\317\126\131\043\204\125\342\373\032\021
\312\243\371\212\253\147\036\202\023\320\213\071\232\277\017\302
\017\074\326\141\330\352\233\317\025\016\276\324\360\314\077\163
\234\004\364\242\161\163\175\200\260\235\061\361\006\371\260\023

\345\210\111\060\366\026\175\210\127\051\072\054\242\214\220\230
\316\021\026\316\115\121\017\374\307\262\314\362\146\030\041\200
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\126\317\156\272\163\046\013\326\367\245\106\152\151\116\226\266
\247\006\126\314\346\056\061\237\156\213\355\234\000\125\107\364
\173\246\172\266\337\001\035\110\004\013\253\102\302\160\112\224
\275\374\254\121\362\253\077\326\353\140\337\010\377\365\022\262
\211\052\172\271\105\231\045\175\174\357\317\025\320\110\054\020
\326\324\274\010\047\265\206\051\324\343\323\304\052\220\022\366
\242\052\371\213\257\026\377\002\363\172\156\317\242\313\152\264
\340\162\013\373\076\205\177\342\207\340\057\103\043\370\205\311
\231\352\326\100\336\240\373\347\336\166\377\217\200\071\353\147
\022\023\246\373\345\243\374\046\200\131\143\362\322\043\353\037
\306\110\163\121\235\267\263\240\133\253\152\210\371\277\373\161
\121\334\156\266\166\357\260\133\362\313\210\060\272\006\333\033
\101\323\125\264\255\264\352\040\041\374\324\167\266\075\133\241
\014\055\045\041\122\043\122\327\064\123\155\026\004\122\146\370
\325\352\361\054\130\362\073\261\361\176\103\265\334\202\270\136
\343\207\341\243\244\137\347\211\016\274\234\351\051\072\045\247
\330\117\152\207\324\226\104\227\030\026\207\302\161\122\205\316
\172\214\255\036\147\276\272\055\277\243\041\047\305\347\060\351
\006\231\033\260\014\343\276\122\145\223\115\141\113\362\070\346
\217\030\361\002\122\230\056\246\016\035\005\317\046\354\001\043
\007\066\366\340\023\067\251\107\210\003\207\107\313\335\262\001
\037\137\144\033\004\233\305\002\003\001\000\001\243\143\060\141
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\006\060\037\006\003\125\035\043\004\030\060\026\200\024\177\043
\166\267\203\052\161\367\054\321\210\017\335\114\137\062\012\150
\273\177\060\035\006\003\125\035\016\004\026\004\024\177\043\166
\267\203\052\161\367\054\321\210\017\335\114\137\062\012\150\273
\177\060\015\006\011\052\206\110\206\367\015\001\001\015\005\000
\003\202\002\001\000\015\145\034\132\007\251\236\254\114\311\137
\117\335\061\154\331\342\123\035\077\221\215\132\263\214\275\064
\236\056\115\312\130\323\257\131\142\111\066\163\260\141\166\021
\276\213\066\307\224\252\370\066\151\007\040\337\134\057\013\366
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\070\155\120\115\345\337\345\121\276\035\004\226\364\334\352\345
\331\352\216\336\237\164\313\202\224\123\201\154\373\136\054\325
\241\165\226\115\373\060\134\315\141\240\236\241\314\202\271\122
\162\013\207\143\141\173\141\064\164\266\056\335\342\341\207\265
\111\024\141\025\107\112\113\076\167\271\010\322\066\117\130\147
\102\211\200\170\132\022\043\355\105\073\335\277\040\046\124\374
\133\077\140\001\030\101\343\147\165\023\267\052\025\160\314\313
\171\322\024\370\363\302\340\052\020\367\371\102\330\334\332\012
\323\001\005\333\127\230\311\266\353\014\231\012\312\214\175\357
\073\026\050\300\367\137\341\107\121\323\370\006\105\007\360\013
\272\302\234\230\354\322\177\115\176\375\006\374\163\302\302\125

\022\142\320\043\104\337\042\344\370\171\347\245\020\116\076\311
\216\252\203\351\066\352\253\171\306\005\204\315\226\150\174\164
\254\077\062\377\256\311\100\354\217\120\277\120\250\267\116\325
\255\066\152\327\047\063\372\347\330\055\331\067\230\205\033\246
\014\352\173\020\023\160\036\236\210\305\334\076\216\271\015\125
\337\001\316\320\111\166\121\333\020\142\170\101\255\151\143\245
\225\011\267\030\006\157\375\004\147\324\020\017\116\333\073\137
\014\143\174\353\144\275\156\113\000\250\201\372\222\062\206\060
\214\011\277\175\130\077\145\015\251\067\321\105\343\146\151\304
\150\364\142\251\250\036\067\331\056\231\111\240\260\006\214\100
\177\205\261\365\361\114\113\070\240\010\314\052\331\226\300\354
\300\015\074\056\105\127\303\357\225\332\266\313\356\133\145\250
\053\062\257\311\047\371\025\123\067\165\130\037\113\352\227\242
\042\134\147\126\342\240\314\065\304\254\303\061\100\271\234\003
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\225\345\223\056\374
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Thailand National Root Certification Authority - G1"
# Issuer: CN=Thailand National Root
Certification Authority - G1,OU=Thailand National Root Certification Authority,O=Electronic Transactions
Development Agency (Public Organization),C=TH
# Serial Number:51:52:c5:8c
# Subject: CN=Thailand National Root Certification Authority - G1,OU=Thailand National Root Certification
Authority,O=Electronic Transactions Development Agency (Public Organization),C=TH
# Not Valid Before: Wed Mar 27 09:40:22 2013
# Not Valid After: Thu Mar 27 10:10:22 2036
# Fingerprint (MD5): da:9d:b6:26:4a:e5:22:a0:bb:8d:a4:f7:bc:0d:25:cc
# Fingerprint (SHA1): 66:f2:dc:fb:3f:81:4d:de:e9:b3:20:6f:11:de:fe:1b:fb:df:e1:32
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Thailand National Root Certification Authority - G1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\146\362\334\373\077\201\115\336\351\263\040\157\021\336\376\033
\373\337\341\062
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\332\235\266\046\112\345\042\240\273\215\244\367\274\015\045\314
END
CKA_ISSUER

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 MULTILINE_OCTAL
\060\201\317\061\013\060\011\006\003\125\004\006\023\002\124\110
\061\111\060\107\006\003\125\004\012\014\100\105\154\145\143\164
\162\157\156\151\143\040\124\162\141\156\163\141\143\164\151\157
\156\163\040\104\145\166\145\154\157\160\155\145\156\164\040\101
\147\145\156\143\171\040\050\120\165\142\154\151\143\040\117\162
\147\141\156\151\172\141\164\151\157\156\051\061\067\060\065\006
\003\125\004\013\014\056\124\150\141\151\154\141\156\144\040\116
\141\164\151\157\156\141\154\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171\061\074\060\072\006\003\125\004\003\014\063\124
\150\141\151\154\141\156\144\040\116\141\164\151\157\156\141\154
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040
\107\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\121\122\305\214
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Certification Authority of WoSign"
# Issuer: CN=Certification Authority of WoSign,O=WoSign CA Limited,C=CN
# Serial Number:5e:68:d6:11:71:94:63:50:56:00:68:f3:3e:c9:c5:91
# Subject: CN=Certification Authority of WoSign,O=WoSign CA Limited,C=CN
# Not Valid Before: Sat Aug 08 01:00:01 2009
# Not Valid After: Mon Aug 08 01:00:01 2039
# Fingerprint (MD5): a1:f2:f9:b5:d2:c8:7a:74:b8:f3:05:f1:d7:e1:84:8d
# Fingerprint (SHA1): b9:42:94:bf:91:ea:8f:b6:4b:e6:10:97:c7:fb:00:13:59:b6:76:cb
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certification Authority of WoSign"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\125\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\032\060\030\006\003\125\004\012\023\021\127\157\123\151\147\156
\040\103\101\040\114\151\155\151\164\145\144\061\052\060\050\006
\003\125\004\003\023\041\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\157\146
\040\127\157\123\151\147\156
END
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CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\125\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\032\060\030\006\003\125\004\012\023\021\127\157\123\151\147\156
\040\103\101\040\114\151\155\151\164\145\144\061\052\060\050\006
\003\125\004\003\023\041\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\157\146
\040\127\157\123\151\147\156
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\136\150\326\021\161\224\143\120\126\000\150\363\076\311
\305\221
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\166\060\202\003\136\240\003\002\001\002\002\020\136
\150\326\021\161\224\143\120\126\000\150\363\076\311\305\221\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\125
\061\013\060\011\006\003\125\004\006\023\002\103\116\061\032\060
\030\006\003\125\004\012\023\021\127\157\123\151\147\156\040\103
\101\040\114\151\155\151\164\145\144\061\052\060\050\006\003\125
\004\003\023\041\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\040\157\146\040\127
\157\123\151\147\156\060\036\027\015\060\071\060\070\060\070\060
\061\060\060\060\061\132\027\015\063\071\060\070\060\070\060\061
\060\060\060\061\132\060\125\061\013\060\011\006\003\125\004\006
\023\002\103\116\061\032\060\030\006\003\125\004\012\023\021\127
\157\123\151\147\156\040\103\101\040\114\151\155\151\164\145\144
\061\052\060\050\006\003\125\004\003\023\041\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\157\146\040\127\157\123\151\147\156\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\275\312\215
\254\270\221\025\126\227\173\153\134\172\302\336\153\331\241\260
\303\020\043\372\247\241\262\314\061\372\076\331\246\051\157\026
\075\340\153\370\270\100\137\333\071\250\000\172\213\240\115\124
\175\302\042\170\374\216\011\270\250\205\327\314\225\227\113\164
\330\236\176\360\000\344\016\211\256\111\050\104\032\020\231\062
\017\045\210\123\244\015\263\017\022\010\026\013\003\161\047\034
\177\341\333\322\375\147\150\304\005\135\012\016\135\160\327\330
\227\240\274\123\101\232\221\215\364\236\066\146\172\176\126\301
\220\137\346\261\150\040\066\244\214\044\054\054\107\013\131\166
\146\060\265\276\336\355\217\370\235\323\273\001\060\346\362\363
\016\340\054\222\200\363\205\371\050\212\264\124\056\232\355\367
\166\374\025\150\026\353\112\154\353\056\022\217\324\317\376\014
\307\134\035\013\176\005\062\276\136\260\011\052\102\325\311\116
\220\263\131\015\273\172\176\315\325\010\132\264\177\330\034\151
\021\371\047\017\173\006\257\124\203\030\173\341\335\124\172\121

\150\156\167\374\306\277\122\112\146\106\241\262\147\032\273\243
\117\167\240\276\135\377\374\126\013\103\162\167\220\312\236\371
\362\071\365\015\251\364\352\327\347\263\020\057\060\102\067\041
\314\060\160\311\206\230\017\314\130\115\203\273\175\345\032\245
\067\215\266\254\062\227\000\072\143\161\044\036\236\067\304\377
\164\324\067\300\342\376\210\106\140\021\335\010\077\120\066\253
\270\172\244\225\142\152\156\260\312\152\041\132\151\363\363\373
\035\160\071\225\363\247\156\246\201\211\241\210\305\073\161\312
\243\122\356\203\273\375\240\167\364\344\157\347\102\333\155\112
\231\212\064\110\274\027\334\344\200\010\042\266\362\061\300\077
\004\076\353\237\040\171\326\270\006\144\144\002\061\327\251\315
\122\373\204\105\151\011\000\052\334\125\213\304\006\106\113\300
\112\035\011\133\071\050\375\251\253\316\000\371\056\110\113\046
\346\060\114\245\130\312\264\104\202\117\347\221\036\063\303\260
\223\377\021\374\201\322\312\037\161\051\335\166\117\222\045\257
\035\201\267\017\057\214\303\006\314\057\047\243\112\344\016\231
\272\174\036\105\037\177\252\031\105\226\375\374\075\002\003\001
\000\001\243\102\060\100\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026
\004\024\341\146\317\016\321\361\263\113\267\006\040\024\376\207
\022\325\366\376\373\076\060\015\006\011\052\206\110\206\367\015
\001\001\005\005\000\003\202\002\001\000\250\313\162\100\262\166
\301\176\173\374\255\144\343\062\173\314\074\266\135\106\323\365
\054\342\160\135\310\056\330\006\175\230\321\013\041\240\211\131
\044\001\235\371\257\011\175\012\043\202\064\325\374\174\162\231
\271\243\327\124\364\352\122\160\016\305\365\326\073\341\072\011
\062\346\041\071\223\275\263\025\352\117\152\364\365\213\077\057
\174\215\130\056\305\341\071\240\076\307\075\112\163\236\100\172
\300\053\141\251\147\311\363\044\271\263\155\125\054\132\035\236
\045\162\316\013\255\252\307\125\142\013\276\373\143\263\141\104
\043\243\313\341\032\016\367\232\006\115\336\324\043\116\041\226
\133\071\133\127\035\057\135\010\136\011\171\377\174\227\265\115
\203\256\015\326\346\243\171\340\063\320\231\226\002\060\247\076
\377\322\243\103\077\005\132\006\352\104\002\332\174\370\110\320
\063\251\371\007\307\225\341\365\076\365\135\161\272\362\225\251
\164\210\141\131\343\277\312\132\023\272\162\264\214\135\066\207
\351\246\305\074\023\277\336\320\104\046\356\267\354\056\160\372
\327\235\267\254\345\305\100\132\346\327\154\173\054\303\126\233
\107\315\013\316\372\033\264\041\327\267\146\270\364\045\060\213
\134\015\271\352\147\262\364\155\256\325\241\236\117\330\237\351
\047\002\260\035\006\326\217\343\373\110\022\237\177\021\241\020
\076\114\121\072\226\260\321\023\361\307\330\046\256\072\312\221
\304\151\235\337\001\051\144\121\157\150\332\024\354\010\101\227
\220\215\320\262\200\362\317\302\075\277\221\150\305\200\147\036
\304\140\023\125\325\141\231\127\174\272\225\017\141\111\072\312
\165\274\311\012\223\077\147\016\022\362\050\342\061\033\300\127
\026\337\010\174\031\301\176\017\037\205\036\012\066\174\133\176

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\047\274\172\277\340\333\364\332\122\275\336\014\124\160\061\221
\103\225\310\274\360\076\335\011\176\060\144\120\355\177\001\244
\063\147\115\150\117\276\025\357\260\366\002\021\242\033\023\045
\072\334\302\131\361\343\134\106\273\147\054\002\106\352\036\110
\246\346\133\331\265\274\121\242\222\226\333\252\306\067\042\246
\376\314\040\164\243\055\251\056\153\313\300\202\021\041\265\223
\171\356\104\206\276\327\036\344\036\373
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Certification Authority of WoSign"
# Issuer: CN=Certification Authority of WoSign,O=WoSign CA Limited,C=CN
# Serial Number:5e:68:d6:11:71:94:63:50:56:00:68:f3:3e:c9:c5:91
# Subject: CN=Certification Authority
 of WoSign,O=WoSign CA Limited,C=CN
# Not Valid Before: Sat Aug 08 01:00:01 2009
# Not Valid After: Mon Aug 08 01:00:01 2039
# Fingerprint (MD5): a1:f2:f9:b5:d2:c8:7a:74:b8:f3:05:f1:d7:e1:84:8d
# Fingerprint (SHA1): b9:42:94:bf:91:ea:8f:b6:4b:e6:10:97:c7:fb:00:13:59:b6:76:cb
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certification Authority of WoSign"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\271\102\224\277\221\352\217\266\113\346\020\227\307\373\000\023
\131\266\166\313
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\241\362\371\265\322\310\172\164\270\363\005\361\327\341\204\215
END
CKA_ISSUER MULTILINE_OCTAL
\060\125\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\032\060\030\006\003\125\004\012\023\021\127\157\123\151\147\156
\040\103\101\040\114\151\155\151\164\145\144\061\052\060\050\006
\003\125\004\003\023\041\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\157\146
\040\127\157\123\151\147\156
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\136\150\326\021\161\224\143\120\126\000\150\363\076\311
\305\221
END
```

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CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "CA "
# Issuer: CN=CA ,O=WoSign CA Limited,C=CN
# Serial Number:50:70:6b:cd:d8:13:fc:1b:4e:3b:33:72:d2:11:48:8d
# Subject: CN=CA ,O=WoSign CA Limited,C=CN
# Not Valid Before: Sat Aug 08 01:00:01 2009
# Not Valid After: Mon Aug 08 01:00:01 2039
# Fingerprint (MD5): 78:83:5b:52:16:76:c4:24:3b:83:78:e8:ac:da:9a:93
# Fingerprint (SHA1): 16:32:47:8d:89:f9:21:3a:92:00:85:63:f5:a4:a7:d3:12:40:8a:d6
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
 UTF8 "CA "
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\032\060\030\006\003\125\004\012\023\021\127\157\123\151\147\156
\040\103\101\040\114\151\155\151\164\145\144\061\033\060\031\006
\003\125\004\003\014\022\103\101\040\346\262\203\351\200\232\346
\240\271\350\257\201\344\271\246
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\032\060\030\006\003\125\004\012\023\021\127\157\123\151\147\156
\040\103\101\040\114\151\155\151\164\145\144\061\033\060\031\006
\003\125\004\003\014\022\103\101\040\346\262\203\351\200\232\346
\240\271\350\257\201\344\271\246
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\120\160\153\315\330\023\374\033\116\073\063\162\322\021
\110\215
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\130\060\202\003\100\240\003\002\001\002\002\020\120
\160\153\315\330\023\374\033\116\073\063\162\322\021\110\215\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\106
\061\013\060\011\006\003\125\004\006\023\002\103\116\061\032\060
\030\006\003\125\004\012\023\021\127\157\123\151\147\156\040\103
\101\040\114\151\155\151\164\145\144\061\033\060\031\006\003\125
\004\003\014\022\103\101\040\346\262\203\351\200\232\346\240\271
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\350\257\201\344\271\246\060\036\027\015\060\071\060\070\060\070
\060\061\060\060\060\061\132\027\015\063\071\060\070\060\070\060
\061\060\060\060\061\132\060\106\061\013\060\011\006\003\125\004
\006\023\002\103\116\061\032\060\030\006\003\125\004\012\023\021
\127\157\123\151\147\156\040\103\101\040\114\151\155\151\164\145
\144\061\033\060\031\006\003\125\004\003\014\022\103\101\040\346
\262\203\351\200\232\346\240\271\350\257\201\344\271\246\060\202
\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\320
\111\041\036\045\374\207\301\052\302\254\333\166\206\006\116\347
\320\164\064\334\355\145\065\374\120\326\210\077\244\360\177\353
\017\137\171\057\211\261\375\274\143\130\067\223\233\070\370\267
\133\251\372\330\161\307\264\274\200\227\215\154\113\361\120\325
\052\051\252\250\031\172\226\346\225\216\164\355\227\012\127\165
\364\005\333\155\013\071\271\001\177\252\366\326\332\154\346\005
\340\244\115\122\374\333\320\164\267\021\214\173\215\117\377\207
\203\256\377\005\003\023\127\120\067\376\214\226\122\020\114\137
\277\224\161\151\331\226\076\014\103\117\276\060\300\237\071\164
\117\006\105\135\243\326\126\071\150\007\314\207\117\120\167\223
\161\331\104\010\261\212\064\351\211\254\333\233\116\341\331\344
\122\105\214\056\024\037\221\153\031\035\150\051\054\126\304\342
\036\023\127\144\360\141\343\271\021\337\260\341\127\240\033\255
\327\137\321\257\333\053\055\077\320\150\216\017\352\237\017\213
\065\130\033\023\034\364\336\065\241\012\135\326\352\337\022\157
\300\373\151\007\106\162\334\201\366\004\043\027\340\115\165\341
\162\157\260\050\353\233\341\341\203\241\237\112\135\257\314\233
\372\002\040\266\030\142\167\221\073\243\325\145\255\334\174\220
\167\034\104\101\244\112\213\353\225\162\351\366\011\144\334\250
\055\237\164\170\350\301\242\011\143\234\357\240\333\117\235\225
\253\040\117\267\260\367\207\134\246\240\344\067\070\307\134\343
\065\017\054\255\243\200\242\354\056\135\300\317\355\213\005\302
\346\163\156\366\211\325\365\322\106\216\352\155\143\033\036\212
\311\175\246\370\234\353\345\325\143\205\115\163\146\151\021\376
\310\016\364\301\307\146\111\123\176\344\031\153\361\351\172\131
\243\155\176\305\027\346\047\306\357\033\333\157\374\015\115\006
\001\264\016\134\060\106\125\140\257\070\145\072\312\107\272\254
\054\314\106\037\262\106\226\077\363\355\046\005\356\167\241\152
\153\176\055\155\130\134\112\324\216\147\270\361\332\325\106\212
\047\371\021\362\311\102\376\116\336\337\037\134\304\244\206\207
\026\063\241\247\027\030\245\015\344\005\345\053\302\053\013\242
\225\220\271\375\140\074\116\211\076\347\234\356\037\273\001\002
\003\001\000\001\243\102\060\100\060\016\006\003\125\035\017\001
\001\377\004\004\003\002\001\006\060\017\006\003\125\035\023\001
\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016
\004\026\004\024\340\115\277\334\233\101\135\023\350\144\360\247
\351\025\244\341\201\301\272\061\060\015\006\011\052\206\110\206
\367\015\001\001\013\005\000\003\202\002\001\000\152\212\160\070
\131\266\332\213\030\310\276\052\323\266\031\325\146\051\172\135

\315\133\057\163\034\046\116\243\175\157\253\267\051\115\246\351
\245\021\203\247\071\163\257\020\104\222\346\045\135\117\141\372
\310\006\276\116\113\357\376\363\061\376\306\174\160\012\101\130
\332\350\231\113\226\311\170\274\230\174\002\051\355\011\200\346
\012\072\202\002\052\342\311\057\310\126\031\046\356\170\034\043
\375\367\223\145\116\347\363\230\230\257\315\335\331\236\100\210
\061\050\072\253\056\013\260\254\014\044\372\172\046\230\363\022
\141\020\364\135\027\367\176\342\170\227\124\342\214\350\051\272
\214\020\062\275\335\063\153\070\206\176\071\075\016\003\162\247
\135\171\217\105\212\131\256\133\041\156\061\106\325\131\215\317
\025\137\335\061\045\317\333\140\326\201\104\162\051\002\127\366
\226\324\326\377\352\051\333\071\305\270\054\212\032\215\316\313
\347\102\061\206\005\150\016\236\024\335\000\220\272\151\105\010
\333\156\220\201\206\247\052\005\077\346\204\071\370\267\371\127
\137\114\244\171\132\020\014\136\325\153\377\065\137\005\121\036
\154\243\165\251\317\120\203\323\174\364\146\367\202\215\075\014
\175\350\337\173\250\016\033\054\234\256\100\160\207\332\355\247
\026\202\132\276\065\154\040\116\042\141\331\274\121\172\315\172
\141\334\113\021\371\376\147\064\317\056\004\146\141\134\127\227
\043\214\363\206\033\110\337\052\257\247\301\377\330\216\076\003
\273\330\052\260\372\024\045\262\121\153\206\103\205\056\007\043
\026\200\215\114\373\264\143\073\314\303\164\355\033\243\036\376
\065\017\137\174\035\026\206\365\016\303\225\361\057\257\135\045
\073\121\346\327\166\101\070\321\113\003\071\050\245\036\221\162
\324\175\253\227\063\304\323\076\340\151\266\050\171\240\011\215
\034\321\377\101\162\110\006\374\232\056\347\040\371\233\242\336
\211\355\256\074\011\257\312\127\263\222\211\160\100\344\057\117
\302\160\203\100\327\044\054\153\347\011\037\323\325\307\301\010
\364\333\016\073\034\007\013\103\021\204\041\206\351\200\324\165
\330\253\361\002\142\301\261\176\125\141\317\023\327\046\260\327
\234\313\051\213\070\112\013\016\220\215\272\241
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "CA "
# Issuer: CN=CA ,O=WoSign CA Limited,C=CN
# Serial Number:50:70:6b:cd:d8:13:fc:1b:4e:3b:33:72:d2:11:48:8d
# Subject: CN=CA ,O=WoSign CA Limited,C=CN
# Not Valid Before: Sat Aug 08 01:00:01 2009
# Not Valid After: Mon Aug 08 01:00:01 2039
# Fingerprint (MD5): 78:83:5b:52:16:76:c4:24:3b:83:78:e8:ac:da:9a:93
# Fingerprint
(SHA1): 16:32:47:8d:89:f9:21:3a:92:00:85:63:f5:a4:a7:d3:12:40:8a:d6
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

```
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CA "
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\026\062\107\215\211\371\041\072\222\000\205\143\365\244\247\323
\022\100\212\326
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\170\203\133\122\026\166\304\044\073\203\170\350\254\332\232\223
END
CKA_ISSUER MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\032\060\030\006\003\125\004\012\023\021\127\157\123\151\147\156
\040\103\101\040\114\151\155\151\164\145\144\061\033\060\031\006
\003\125\004\003\014\022\103\101\040\346\262\203\351\200\232\346
\240\271\350\257\201\344\271\246
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\120\160\153\315\330\023\374\033\116\073\063\162\322\021
\110\215
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "SSC GDL CA Root B"
# Issuer: CN=SSC GDL CA Root B,OU=CA ROOT Services,O=Skaitmeninio sertifikavimo centras,C=LT
# Serial Number:3e:8c:4f:bc:e4:29:83:82:4d:84:55:8e:d5:35:80:cf
# Subject: CN=SSC GDL CA Root B,OU=CA ROOT Services,O=Skaitmeninio sertifikavimo centras,C=LT
# Not Valid Before: Tue Jun 04 14:20:15 2013
# Not Valid After: Sat Jun 04 14:21:55 2033
# Fingerprint (MD5): ca:b5:ab:b2:55:7b:93:36:32:53:23:ed:79:27:30:4a
# Fingerprint (SHA1): c8:60:a3:18:fc:f5:b7:13:0b:10:07:ad:7f:61:4a:40:ff:ff:18:5f
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSC GDL CA Root B"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\161\061\013\060\011\006\003\125\004\006\023\002\114\124\061
\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\031\060\027
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\006\003\125\004\013\023\020\103\101\040\122\117\117\124\040\123
\145\162\166\151\143\145\163\061\032\060\030\006\003\125\004\003
\023\021\123\123\103\040\107\104\114\040\103\101\040\122\157\157
\164\040\102
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\161\061\013\060\011\006\003\125\004\006\023\002\114\124\061
\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\031\060\027
\006\003\125\004\013\023\020\103\101\040\122\117\117\124\040\123
\145\162\166\151\143\145\163\061\032\060\030\006\003\125\004\003
\023\021\123\123\103\040\107\104\114\040\103\101\040\122\157\157
\164\040\102
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\076\214\117\274\344\051\203\202\115\204\125\216\325\065
\200\317
END
CKA_VALUE
 MULTILINE_OCTAL
\060\202\005\256\060\202\003\226\240\003\002\001\002\002\020\076
\214\117\274\344\051\203\202\115\204\125\216\325\065\200\317\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\161
\061\013\060\011\006\003\125\004\006\023\002\114\124\061\053\060
\051\006\003\125\004\012\023\042\123\153\141\151\164\155\145\156
\151\156\151\157\040\163\145\162\164\151\146\151\153\141\166\151
\155\157\040\143\145\156\164\162\141\163\061\031\060\027\006\003
\125\004\013\023\020\103\101\040\122\117\117\124\040\123\145\162
\166\151\143\145\163\061\032\060\030\006\003\125\004\003\023\021
\123\123\103\040\107\104\114\040\103\101\040\122\157\157\164\040
\102\060\036\027\015\061\063\060\066\060\064\061\064\062\060\061
\065\132\027\015\063\063\060\066\060\064\061\064\062\061\065\065
\132\060\161\061\013\060\011\006\003\125\004\006\023\002\114\124
\061\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164
\155\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153
\141\166\151\155\157\040\143\145\156\164\162\141\163\061\031\060
\027\006\003\125\004\013\023\020\103\101\040\122\117\117\124\040
\123\145\162\166\151\143\145\163\061\032\060\030\006\003\125\004
\003\023\021\123\123\103\040\107\104\114\040\103\101\040\122\157
\157\164\040\102\060\202\002\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012
\002\202\002\001\000\217\225\351\322\353\301\163\045\307\070\147
\360\203\216\123\274\266\313\316\272\163\333\117\047\366\042\220
\077\102\277\041\326\336\142\202\264\157\004\005\111\011\073\167
\001\327\113\137\122\322\331\031\307\155\174\014\251\072\011\142

\344\052\030\151\214\240\335\353\254\023\266\016\071\021\200\151
\116\143\137\334\074\015\372\331\214\142\276\144\205\062\062\131
\227\120\223\211\337\373\377\324\330\145\161\307\106\125\242\033
\231\141\037\334\120\000\310\027\171\350\120\260\014\136\346\376
\166\246\001\116\011\310\160\154\372\220\263\136\334\075\007\315
\111\243\116\126\136\022\117\144\101\177\176\014\025\303\240\336
\263\243\051\006\111\104\241\137\157\077\201\240\104\115\360\173
\012\070\050\355\022\356\143\227\303\173\135\214\117\161\335\225
\072\332\056\250\001\106\012\363\154\350\265\361\037\010\000\361
\100\222\033\046\000\061\165\071\106\111\046\271\244\324\161\167
\021\244\117\063\314\011\333\331\321\041\113\222\104\254\316\170
\142\202\027\373\372\022\264\175\325\362\206\355\364\176\226\024
\346\215\003\122\257\315\027\242\325\034\245\376\201\246\232\355
\175\344\331\016\062\146\020\217\333\331\063\061\201\176\051\127
\357\314\262\241\140\356\212\133\271\145\333\177\033\232\054\217
\047\061\211\212\050\265\257\261\126\324\003\042\356\045\117\330
\232\275\322\154\127\274\203\246\110\037\054\125\007\011\064\053
\271\171\054\002\245\240\137\174\166\237\044\062\074\055\222\337
\353\110\127\207\241\366\376\043\372\064\253\211\365\150\033\216
\037\252\156\016\245\322\041\322\357\271\321\261\111\127\065\132
\204\323\036\342\002\155\122\020\177\342\214\115\041\333\062\062
\034\175\314\226\042\003\055\152\247\006\102\155\156\220\207\372
\034\134\260\117\320\003\101\023\372\013\123\346\301\020\002\110
\013\167\143\364\245\234\121\173\230\146\327\305\166\062\345\157
\135\024\141\175\014\273\155\225\100\332\251\046\307\367\251\313
\322\376\047\301\053\366\261\150\206\376\343\142\122\231\120\216
\053\336\101\041\007\033\207\365\100\035\160\255\317\375\302\103
\250\065\126\021\102\305\313\136\146\241\310\250\150\367\376\114
\127\141\066\122\201\002\003\001\000\001\243\102\060\100\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\035\006\003\125\035\016\004\026\004\024\162\003\106\207\141\366
\035\263\324\225\143\271\120\167\156\015\253\230\376\057\060\015
\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202\002
\001\000\010\333\212\062\201\164\063\161\026\354\041\205\123\110
\012\157\037\162\343\343\004\370\056\267\077\363\044\225\117\234
\355\023\341\210\202\002\366\146\367\267\261\055\200\047\255\256
\270\155\376\043\007\021\010\253\164\141\214\050\022\371\366\020
\064\360\317\266\174\243\165\055\022\324\224\337\164\356\261\230
\253\261\356\042\142\113\131\037\177\376\032\145\255\115\342\244
\021\077\023\041\264\330\065\213\166\100\246\137\275\063\021\337
\230\343\041\136\035\243\273\170\066\002\073\330\375\144\204\332
\067\315\131\355\374\014\320\164\244\153\161\074\066\022\104\236
\176\156\117\012\041\034\145\037\113\022\154\277\216\162\326\335
\076\000\160\230\001\105\053\354\225\220\343\323\151\070\347\053
\235\176\145\131\133\341\333\205\312\143\376\253\277\344\320\375
\344\122\272\032\346\376\306\220\272\173\316\361\244\142\305\107
\276\044\307\240\172\345\041\341\306\010\340\014\211\203\217\200

\151\375\356\240\337\172\114\072\323\110\052\026\277\256\246\225
\265\335\150\037\373\016\265\005\214\321\262\104\174\140\060\126
\166\027\265\065\117\250\325\012\353\302\265\156\002\356\234\137
\016\243\261\001\250\345\123\157\176\203\101\037\025\330\377\341
\302\266\032\361\106\234\144\240\032\340\112\312\270\246\264\211
\044\356\173\225\231\142\324\342\100\273\316\243\232\175\035\162
\363\033\201\101\167\000\136\354\074\242\060\005\074\315\174\110
\066\023\310\062\260\153\157\237\070\050\070\151\134\173\346\342
\255\203\273\155\023\321\056\267\321\166\157\135\060\136\271\120
\105\110\326\110\200\223\121\311\026\251\020\135\147\306\313\176
\147\175\005\117\364\040\357\044\045\136\355\147\103\306\373\156
\171\373\262\362\310\311\316\101\174\005\340\255\213\315\012\105
\056\342\142\237\227\221\364\371\143\354\362\302\140\212\334\033
\377\041\250\377\043\207\214\163\215\260\072\314\037\217\061\162
\012\375\226\241\337\032\123\323\066\266\260\167\106\336\003\366
\302\200\056\157\227\043\341\021\314\121\230\077\356\100\377\364
\075\233\210\177\214\273\341\131\206\275\011\064\047\134\236\012
\223\062\073\125\052\251\136\013\015\017\251\246\121\004\342\233
\052\021
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL
 CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "SSC GDL CA Root B"
# Issuer: CN=SSC GDL CA Root B,OU=CA ROOT Services,O=Skaitmeninio sertifikavimo centras,C=LT
# Serial Number:3e:8c:4f:bc:e4:29:83:82:4d:84:55:8e:d5:35:80:cf
# Subject: CN=SSC GDL CA Root B,OU=CA ROOT Services,O=Skaitmeninio sertifikavimo centras,C=LT
# Not Valid Before: Tue Jun 04 14:20:15 2013
# Not Valid After: Sat Jun 04 14:21:55 2033
# Fingerprint (MD5): ca:b5:ab:b2:55:7b:93:36:32:53:23:ed:79:27:30:4a
# Fingerprint (SHA1): c8:60:a3:18:fc:f5:b7:13:0b:10:07:ad:7f:61:4a:40:ff:ff:18:5f
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSC GDL CA Root B"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\310\140\243\030\374\365\267\023\013\020\007\255\177\141\112\100
\377\377\030\137
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\312\265\253\262\125\173\223\066\062\123\043\355\171\047\060\112
END
CKA_ISSUER

MULTILINE_OCTAL
\060\161\061\013\060\011\006\003\125\004\006\023\002\114\124\061
\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\031\060\027
\006\003\125\004\013\023\020\103\101\040\122\117\117\124\040\123
\145\162\166\151\143\145\163\061\032\060\030\006\003\125\004\003
\023\021\123\123\103\040\107\104\114\040\103\101\040\122\157\157
\164\040\102
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\076\214\117\274\344\051\203\202\115\204\125\216\325\065
\200\317
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "SAPO Class 2 Root CA"
# Issuer: 1.2.840.113549.1.9.1=pkiadmin@trustcentre.co.za,CN=SAPO Class 2 Root CA,OU=SAPO Trust Centre,O=South African Post Office Limited,L=Somerset West,ST=Western Cape,C=ZA
# Serial Number: 1 (0x1)
# Subject: 1.2.840.113549.1.9.1=pkiadmin@trustcentre.co.za,CN=SAPO Class 2 Root CA,OU=SAPO Trust Centre,O=South African Post Office Limited,L=Somerset West,ST=Western Cape,C=ZA
# Not Valid Before: Wed Sep 15 00:00:00 2010
# Not Valid After: Sat Sep 14 00:00:00 2030
# Fingerprint (MD5): 0a:7b:e7:df:15:44:93:ed:92:72:42:1a:28:4b:0c:ee
# Fingerprint (SHA1): e4:55:01:60:8a:a1:ef:89:e2:7b:8c:d3:c3:b3:4c:03:b0:38:e6:d7
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SAPO Class 2 Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145
\162\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007
\023\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061
\052\060\050\006\003\125\004\012\023\041\123\157\165\164\150\040
\101\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146
\151\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006
\003\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164
\040\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003
\023\024\123\101\120\117\040\103\154\141\163\163\040\062\040\122

\157\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206
\367\015\001\011\001\026\032\160\153\151\141\144\155\151\156\100
\164\162\165\163\164\143\145\156\164\162\145\056\143\157\056\172
\141
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145
\162\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007
\023\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061
\052\060\050\006\003\125\004\012\023\041\123\157\165\164\150\040
\101\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146
\151\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006
\003\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164
\040\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003
\023\024\123\101\120\117\040\103\154\141\163\163\040\062\040\122
\157\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206
\367\015\001\011\001\026\032\160\153\151\141\144\155\151\156\100
\164\162\165\163\164\143\145\156\164\162\145\056\143\157\056\172
\141
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\130\060\202\003\100\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101\061
\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145\162
\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007\023
\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061\052
\060\050\006\003\125\004\012\023\041\123\157\165\164\150\040\101
\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146\151
\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006\003
\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164\040
\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003\023
\024\123\101\120\117\040\103\154\141\163\163\040\062\040\122\157
\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206\367
\015\001\011\001\026\032\160\153\151\141\144\155\151\156\100\164
\162\165\163\164\143\145\156\164\162\145\056\143\157\056\172\141
\060\036\027\015\061\060\060\071\061\065\060\060\060\060\060\060
\132\027\015\063\060\060\071\061\064\060\060\060\060\060\060\132
\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145
\162\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007

\023\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061
\052\060\050\006\003\125\004\012\023\041\123\157\165\164\150\040
\101\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146
\151\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006
\003\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164
\040\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003
\023\024\123\101\120\117\040\103\154\141\163\163\040\062\040\122
\157\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206
\367\015\001\011\001\026\032\160\153\151\141\144\155\151\156\100
\164\162\165\163\164\143\145\156\164\162\145\056\143\157\056\172
\141\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001
\001\000\267\174\151\174\140\365\154\046\364\252\034\027\177\135
\324\021\113\347\363\332\347\163\247\372\244\102\111\150\077\332
\245\100\134\006\150\137\116\314\275\276\201\070\044\055\314\046
\240\104\155\003\313\043\340\273\336\205\123\113\224\137\137\173
\252\310\032\227\376\327\043\223\355\260\152\275\330\374\000\076
\263\222\004\340\113\276\117\073\230\247\235\355\315\143\360\201
\347\154\230\324\154\140\125\000\345\271\074\346\064\225\135\340
\375\161\207\351\377\201\356\345\167\157\030\377\363\311\174\245
\225\335\202\334\024\331\242\341\276\315\047\163\273\105\133\077
\164\261\142\170\146\020\042\054\365\150\363\027\210\026\073\232
\033\035\373\024\256\015\272\362\220\125\242\325\060\326\053\225
\062\307\071\156\173\145\322\167\070\316\156\126\245\331\043\253
\070\262\073\121\205\300\035\033\267\021\057\005\151\107\330\002
\312\222\250\341\063\336\205\010\233\355\220\325\330\041\231\161
\277\266\365\163\357\147\010\230\144\322\362\052\172\113\041\026
\341\037\130\141\336\221\107\037\041\237\037\376\214\043\206\203
\030\047\002\003\001\000\001\243\077\060\075\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\006\060\014\006\003\125
\035\023\004\005\060\003\001\001\377\060\035\006\003\125\035\016
\004\026\004\024\253\235\043\223\375\037\063\112\062\055\252\044
\132\362\055\144\251\001\232\101\060\015\006\011\052\206\110\206
\367\015\001\001\005\005\000\003\202\001\001\000\126\122\121\271
\017\002\341\366\056\234\261\061\132\246\370\316\274\356\002\204
\025\011\361\050\122\137\347\341\054\275\333\171\012\172\277\353
\142\236\325\206\107\051\356\164\060\354\114\165\265\036\343\252
\063\357\255\341\152\114\277\067\001\276\125\203\114\251\122\330
\067\230\120\157\150\335\107\101\267\054\060\310\156\114\007\054
\306\323\111\271\265\134\322\313\314\324\066\306\007\015\030\117
\077\143\000\304\354\266\210\373\001\144\143\255\321\367\167\174
\144\124\053\022\075\064\025\205\360\240\272\171\051\137\230\233
\102\352\256\301\250\237\023\211\212\155\351\270\070\311\141\355
\140\354\367\052\130\005\233\241\140\170\203\027\341\176\137\350
\375\170\340\153\126\052\206\166\256\133\302\136\353\105\344\060
\270\061\355\144\261\135\056\300\075\200\015\307\047\023\323\166
\342\206\373\334\333\200\012\201\341\375\010\371\013\304\061\264
\143\133\347\214\063\345\006\266\122\152\263\327\351\153\343\062

\170\062\146\224\116\335\215\167\155\323\044\050\133\124\141\167
\002\147\165\224\113\127\113\346\154\305\071\157
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "SAPO Class 2 Root CA"
# Issuer: 1.2.840.113549.1.9.1=pkiadmin@trustcentre.co.za,CN=SAPO Class 2 Root CA,OU=SAPO Trust Centre,O=South African Post Office Limited,L=Somerset West,ST=Western Cape,C=ZA
# Serial Number: 1 (0x1)
# Subject: 1.2.840.113549.1.9.1=pkiadmin@trustcentre.co.za,CN=SAPO Class 2 Root CA,OU=SAPO Trust Centre,O=South African Post Office Limited,L=Somerset West,ST=Western Cape,C=ZA
# Not Valid Before: Wed Sep 15 00:00:00 2010
# Not Valid After: Sat Sep 14 00:00:00 2030
# Fingerprint (MD5): 0a:7b:e7:df:15:44:93:ed:92:72:42:1a:28:4b:0c:ee
# Fingerprint (SHA1): e4:55:01:60:8a:a1:ef:89:e2:7b:8c:d3:c3:b3:4c:03:b0:38:e6:d7
CKA_CLASS
 CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SAPO Class 2 Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\344\125\001\140\212\241\357\211\342\173\214\323\303\263\114\003
\260\070\346\327
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\012\173\347\337\025\104\223\355\222\162\102\032\050\113\014\356
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145
\162\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007
\023\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061
\052\060\050\006\003\125\004\012\023\041\123\157\165\164\150\040
\101\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146
\151\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006
\003\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164
\040\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003
\023\024\123\101\120\117\040\103\154\141\163\163\040\062\040\122
\157\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206
\367\015\001\011\001\026\032\160\153\151\141\144\155\151\156\100
\164\162\165\163\164\143\145\156\164\162\145\056\143\157\056\172
\141
END

```
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "SAPO Class 3 Root CA"
# Issuer: 1.2.840.113549.1.9.1=pkiadmin@trustcentre.co.za,CN=SAPO Class 3 Root CA,OU=SAPO Trust
Centre,O=South African Post Office Limited,L=Somerset West,ST=Western Cape,C=ZA
# Serial Number: 2 (0x2)
# Subject: 1.2.840.113549.1.9.1=pkiadmin@trustcentre.co.za,CN=SAPO Class 3 Root CA,OU=SAPO Trust
Centre,O=South African Post
 Office Limited,L=Somerset West,ST=Western Cape,C=ZA
# Not Valid Before: Wed Sep 15 00:00:00 2010
# Not Valid After: Sat Sep 14 00:00:00 2030
# Fingerprint (MD5): 54:e5:eb:35:d1:75:05:3c:7c:df:30:d6:bf:f3:ff:53
# Fingerprint (SHA1): 38:dd:76:59:c7:35:10:0b:00:a2:37:e4:91:b7:bc:0f:fc:d2:31:6c
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SAPO Class 3 Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145
\162\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007
\023\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061
\052\060\050\006\003\125\004\012\023\041\123\157\165\164\150\040
\101\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146
\151\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006
\003\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164
\040\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003
\023\024\123\101\120\117\040\103\154\141\163\163\040\063\040\122
\157\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206
\367\015\001\011\001\026\032\160\153\151\141\144\155\151\156\100
\164\162\165\163\164\143\145\156\164\162\145\056\143\157\056\172
\141
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145
```

\162\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007
\023\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061
\052\060\050\006\003\125\004\012\023\041\123\157\165\164\150\040
\101\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146
\151\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006
\003\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164
\040\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003
\023\024\123\101\120\117\040\103\154\141\163\163\040\063\040\122
\157\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206
\367\015\001\011\001\026\032\160\153\151\141\144\155\151\156\100
\164\162\165\163\164\143\145\156\164\162\145\056\143\157\056\172
\141
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\002
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\130\060\202\004\100\240\003\002\001\002\002\001\002
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101\061
\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145\162
\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007\023
\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061\052
\060\050\006\003\125\004\012\023\041\123\157\165\164\150\040\101
\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146\151
\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006\003
\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164\040
\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003\023
\024\123\101\120\117\040\103\154\141\163\163\040\063\040\122\157
\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206\367
\015\001\011\001\026\032\160\153\151\141\144\155\151\156\100\164
\162\165\163\164\143\145\156\164\162\145\056\143\157\056\172\141
\060\036\027\015\061\060\060\071\061\065\060\060\060\060\060\060
\132\027\015\063\060\060\071\061\064\060\060\060\060\060\060\132
\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145
\162\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007
\023\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061
\052\060\050\006\003\125\004\012\023\041\123\157\165\164\150\040
\101\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146
\151\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006
\003\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164
\040\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003
\023\024\123\101\120\117\040\103\154\141\163\163\040\063\040\122
\157\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206
\367\015\001\011\001\026\032\160\153\151\141\144\155\151\156\100
\164\162\165\163\164\143\145\156\164\162\145\056\143\157\056\172

\141\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002
\001\000\312\170\032\007\274\366\373\264\267\211\274\320\031\126
\070\052\131\235\007\352\032\371\370\370\150\147\136\217\357\312
\367\365\152\211\346\243\225\177\251\333\051\044\034\065\320\070
\226\154\076\126\044\377\136\142\121\220\056\207\350\234\307\332
\274\063\361\236\241\157\013\216\012\044\364\370\115\220\246\262
\315\136\021\323\302\227\114\365\137\100\035\046\044\115\215\011
\020\013\377\273\040\033\223\046\031\014\103\077\351\216\274\061
\067\020\156\221\312\110\202\126\106\307\274\271\072\236\106\201
\146\317\331\350\134\020\317\071\236\145\303\236\305\132\364\113
\314\104\231\146\206\364\162\033\243\123\111\352\256\107\315\062
\015\160\346\240\240\166\007\235\377\130\357\344\074\221\300\265
\344\334\270\001\014\323\376\263\102\240\073\141\002\324\067\133
\327\114\105\225\322\165\135\365\156\060\137\127\121\213\262\377
\176\310\213\234\252\243\101\067\014\020\221\250\246\205\134\271
\307\217\005\121\262\320\170\322\342\113\111\351\324\032\247\073
\254\252\063\346\232\052\003\100\230\157\164\122\023\061\224\321
\022\301\264\313\060\371\377\104\270\222\133\122\326\060\331\063
\321\165\343\031\245\026\025\267\124\127\361\126\120\316\116\276
\003\073\057\354\266\060\356\024\140\136\137\172\065\364\116\144
\007\021\352\245\007\146\033\156\223\342\260\117\136\326\340\104
\340\263\334\256\357\270\375\250\263\354\354\345\071\210\104\264
\241\273\024\140\144\217\326\222\223\313\363\314\120\335\351\007
\310\147\147\371\360\207\204\221\262\000\142\351\277\112\025\164
\305\277\004\114\005\106\135\012\313\345\352\141\000\341\157\101
\261\064\216\246\000\242\174\246\245\246\372\154\114\103\345\250
\046\232\064\230\036\207\230\347\114\170\321\217\237\005\125\135
\212\113\311\317\240\013\175\006\220\234\030\222\262\304\262\327
\343\105\331\153\163\303\227\071\277\051\036\006\011\125\100\272
\274\332\110\165\103\355\376\104\176\075\054\346\142\221\003\375
\075\211\357\176\364\135\044\217\245\013\053\263\076\172\051\050
\274\273\077\277\353\167\205\004\046\213\224\262\220\365\353\215
\117\242\104\042\120\250\234\052\104\110\000\170\031\253\235\010
\226\025\002\003\001\000\001\243\077\060\075\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\006\060\014\006\003\125
\035\023\004\005\060\003\001\001\377\060\035\006\003\125\035\016
\004\026\004\024\141\263\171\122\235\112\225\222\121\216\202\044
\160\323\216\100\310\305\146\320\060\015\006\011\052\206\110\206
\367\015\001\001\005\005\000\003\202\002\001\000\177\306\263\044
\204\120\067\371\304\260\305\060\074\026\351\120\015\172\272\264
\073\322\043\345\351\211\170\152\345\343\033\005\036\221\034\316
\006\227\215\146\026\007\104\357\201\271\010\176\243\307\071\064
\270\277\232\155\215\260\301\040\102\056\015\367\013\006\003\117
\156\313\274\267\260\057\031\161\215\216\257\012\115\130\061\213
\104\231\052\050\146\205\307\200\046\146\260\107\302\071\262\372
\117\076\125\275\334\211\047\113\163\063\004\376\173\107\220\311
\005\300\055\063\370\267\010\202\051\101\103\375\046\123\346\372

\037\067\126\215\117\027\272\330\375\072\204\160\330\076\360\063
\256\304\005\110\124\241\271\325\041\077\352\076\307\251\061\107
\367\233\256\112\142\230\321\147\040\145\336\171\341\261\062\036
\153\337\373\200\153\107\134\071\307\016\010\252\307\243\356\051
\351\064\342\233\371\165\270\046\353\210\235\264\071\021\056\160
\375\121\004\062\273\017\171\204\120\041\105\174\057\344\331\377
\045\070\006\043\253\116\261\016\334\073\061\012\255\332\113\000
\151\153\056\342\303\014\311\005\001\105\146\341\245\211\141\034
\144\231\215\013\230\220\263\176\146\073\013\330\253\350\165\016
\331\177\232\156\175\311\203\047\311\274\350\064\070\302\132\207
\062\162\007\014\376\325\224\321\360\300\170\362\200\250\106\365
\153\232\354\342\331\026\216\212\372\204\366\321\122\311\234\262
\041\126\140\103\246\020\367\177\111\277\276\007\323\120\144\155
\002\272\052\125\054\317\331\302\156\257\174\013\110\320\361\341
\247\302\255\164\217\206\344\355\252\372\134\203\175\102\350\175
\007\035\007\125\314\053\151\062\271\167\202\150\306\167\362\042
\151\246\311\012\135\207\231\345\161\236\175\057\023\036\322\364
\375\011\171\047\130\053\012\207\201\052\373\152\043\055\113\044
\205\164\026\107\030\017\011\305\376\251\110\044\343\254\320\151
\075\137\123\230\062\275\354\340\121\301\123\112\261\366\073\360
\064\110\365\232\336\334\321\340\343\275\045\263\104\350\072\163
\311\171\320\254\321\355\342\000\012\137\241\035\146\131\112\163
\150\324\005\162\063\070\247\153\257\221\333\015\307\214\100\350
\236\220\210\311\373\376\044\327\201\254\363\336
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "SAPO Class 3 Root CA"
# Issuer: 1.2.840.113549.1.9.1=pkiadmin@trustcentre.co.za,CN=SAPO Class 3 Root CA,OU=SAPO Trust Centre,O=South African Post Office Limited,L=Somerset West,ST=Western Cape,C=ZA
# Serial Number: 2 (0x2)
# Subject: 1.2.840.113549.1.9.1=pkiadmin@trustcentre.co.za,CN=SAPO Class 3 Root CA,OU=SAPO Trust Centre,O=South African Post Office Limited,L=Somerset West,ST=Western Cape,C=ZA
# Not Valid Before: Wed Sep 15 00:00:00 2010
# Not Valid After: Sat Sep 14 00:00:00 2030
# Fingerprint (MD5): 54:e5:eb:35:d1:75:05:3c:7c:df:30:d6:bf:f3:ff:53
# Fingerprint (SHA1): 38:dd:76:59:c7:35:10:0b:00:a2:37:e4:91:b7:bc:0f:fc:d2:31:6c
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SAPO Class 3 Root CA"
CKA_CERT_SHA1_HASH

```
 MULTILINE_OCTAL
\070\335\166\131\307\065\020\013\000\242\067\344\221\267\274\017
\374\322\061\154
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\124\345\353\065\321\165\005\074\174\337\060\326\277\363\377\123
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145
\162\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007
\023\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061
\052\060\050\006\003\125\004\012\023\041\123\157\165\164\150\040
\101\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146
\151\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006
\003\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164
\040\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003
\023\024\123\101\120\117\040\103\154\141\163\163\040\063\040\122
\157\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206
\367\015\001\011\001\026\032\160\153\151\141\144\155\151\156\100
\164\162\165\163\164\143\145\156\164\162\145\056\143\157\056\172
\141
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\002
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "SAPO Class 4 Root CA"
# Issuer: 1.2.840.113549.1.9.1=pkiadmin@trustcentre.co.za,CN=SAPO Class 4 Root CA,OU=SAPO Trust
Centre,O=South African Post Office Limited,L=Somerset West,ST=Western Cape,C=ZA
# Serial Number: 3 (0x3)
# Subject: 1.2.840.113549.1.9.1=pkiadmin@trustcentre.co.za,CN=SAPO Class 4 Root CA,OU=SAPO Trust
Centre,O=South African Post Office Limited,L=Somerset West,ST=Western Cape,C=ZA
# Not Valid Before: Wed Sep 15 00:00:00 2010
# Not Valid After: Sat Sep 14 00:00:00 2030
# Fingerprint (MD5): f8:a7:f6:89:94:8c:61:f7:43:98:36:df:22:82:9b:3b
# Fingerprint (SHA1):
 20:a8:f5:ff:c4:3a:f4:a9:bc:89:88:1e:bf:99:20:ff:91:e9:fd:0a
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
```

CKA_LABEL UTF8 "SAPO Class 4 Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145
\162\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007
\023\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061
\052\060\050\006\003\125\004\012\023\041\123\157\165\164\150\040
\101\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146
\151\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006
\003\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164
\040\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003
\023\024\123\101\120\117\040\103\154\141\163\163\040\064\040\122
\157\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206
\367\015\001\011\001\026\032\160\153\151\141\144\155\151\156\100
\164\162\165\163\164\143\145\156\164\162\145\056\143\157\056\172
\141
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145
\162\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007
\023\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061
\052\060\050\006\003\125\004\012\023\041\123\157\165\164\150\040
\101\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146
\151\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006
\003\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164
\040\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003
\023\024\123\101\120\117\040\103\154\141\163\163\040\064\040\122
\157\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206
\367\015\001\011\001\026\032\160\153\151\141\144\155\151\156\100
\164\162\165\163\164\143\145\156\164\162\145\056\143\157\056\172
\141
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\003
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\130\060\202\004\100\240\003\002\001\002\002\001\003
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101\061
\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145\162
\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007\023
\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061\052
\060\050\006\003\125\004\012\023\041\123\157\165\164\150\040\101

\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146\151
\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006\003
\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164\040
\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003\023
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\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206\367
\015\001\011\001\026\032\160\153\151\141\144\155\151\156\100\164
\162\165\163\164\143\145\156\164\162\145\056\143\157\056\172\141
\060\036\027\015\061\060\060\071\061\065\060\060\060\060\060\060
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\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145
\162\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007
\023\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061
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\101\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146
\151\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006
\003\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164
\040\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003
\023\024\123\101\120\117\040\103\154\141\163\163\040\064\040\122
\157\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206
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\141\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001
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\001\000\333\334\355\110\232\240\243\237\340\021\216\331\310\222
\165\072\125\301\121\042\312\013\172\244\065\015\305\346\127\055
\203\360\052\157\042\070\067\061\155\174\205\044\242\006\057\103
\202\075\105\060\100\045\034\356\130\107\101\346\360\236\000\036
\370\364\057\021\273\222\262\230\105\055\323\037\200\311\166\024
\023\303\314\100\346\255\353\071\140\374\317\310\337\052\375\214
\022\121\357\317\014\144\306\127\350\043\121\135\347\146\122\352
\146\275\223\177\235\172\050\361\031\160\156\204\237\060\107\267
\260\071\153\023\054\353\113\115\056\257\077\277\375\002\023\112
\071\347\076\063\305\020\221\121\276\017\107\235\115\122\374\054
\363\343\023\242\000\202\341\024\014\315\322\236\263\362\340\201
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\034\032\222\321\324\051\236\217\315\263\350\175\120\361\302\202
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\026\047\101\347\225\065\246\313\212\247\226\363\245\314\121\371
\055\175\036\103\373\334\155\265\271\070\275\005\373\130\372\056
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\204\273\345\214\036\352\340\146\273\300\277\214\376\236\012\115
\075\150\077\100\166\326\062\251\352\105\270\152\007\122\216\315

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\152\227\040\353\041\102\367\264\040\122\267\112\375\165\274\313
\017\014\147\021\127\037\367\060\361\253\220\314\135\074\226\005
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\352\327\243\234\323\256\177\324\123\331\050\374\127\336\345\077
\122\112\273\310\046\044\107\123\034\163\272\317\306\264\060\315
\136\161\307\126\274\111\070\045\346\305\020\011\170\331\324\035
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\216\033\002\003\001\000\001\243\077\060\075\060\016\006\003\125
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\040\032\156\176\117\221\127\002\060\015\006\011\052\206\110\206
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\072\144\040\155\314\374\054\270\351\326\253\333\327\253\046\051
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\320\071\154\162\006\030\311\134\212\172\164\010\067\110\151\375
\042\241\135\305\327\170\023\360\050\102\101\303\311\303\071\011
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\361\262\067\165\314\256\322\063\226\214\066\367\001\355\343\144
\351\013\150\133\020\252\001\066\231\174\317\232\224\135\375\032
\131\141\242\145\025\175\236\027\144\324\237\123\230\001\375\161
\127\320\135\100\021\026\077\077\104\322\257\311\374\010\062\175
\166\370\325\103\350\334\066\150\007\303\116\303\226\227\127\306
\175\066\136\333\160\255\376\256\324\210\235\265\244\140\326\243
\142\276\174\371\064\036\374\273\364\112\162\305\203\036\106\150
\303\016\227\203\030\075\323\016\012\021\065\174\151\225\305\253
\052\365\310\071\020\115\014\211\060\051\211\111\033\104\227\221
\364\352\145\041\033\077\012\103\162\202\034\155\021\135\340\042
\105\137\141\114\242\246\372\337\243\106\272\341\201\140\154\062
\264\374\344\334\066\005\344\063\367\353\217\167\111\252\215\012
\357\110\212\346\101\227\176\073\253\103\207\362\010\140\013\157
\327\131\146\375\053\273\057\316\063\117\162\340\266\327\263\123
\127\211\360\073\274\156\342\020\277\163\076\142\217\245\010\351
\123\147\301\116\301\056\102\103\247\262\244\371\026\213\102\356
\334\064\177\110\263\220\333\044\342\310\344\123\065\123\234\352
\067\205\317\277\230\006\065\107\046\327\256\155\335\204\251\143
\130\046\101\365\165\062\056\141\236\117\223\122\122\366\132\043
\353\301\240\163\046\045\042\102\221\221\221\200\117\377\210\316
\136\163\347\226\302\355\011\022\367\166\226\251\171\142\220\111
\201\203\237\014\062\062\342\133\312\335\110\064\254\207\216\161
\225\256\114\344\174\170\035\247\121\303\275\021\372\002\321\225
\211\163\010\106\042\211\151\000\317\117\200\301\115\133\224\304
\312\231\121\230\057\015\275\175\124\144\324\012\332\047\131\247
\067\273\126\014\320\006\242\162\271\022\271\133
END

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CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "SAPO Class 4 Root CA"
# Issuer: 1.2.840.113549.1.9.1=pkiadmin@trustcentre.co.za,CN=SAPO
 Class 4 Root CA,OU=SAPO Trust Centre,O=South African Post Office Limited,L=Somerset West,ST=Western
Cape,C=ZA
# Serial Number: 3 (0x3)
# Subject: 1.2.840.113549.1.9.1=pkiadmin@trustcentre.co.za,CN=SAPO Class 4 Root CA,OU=SAPO Trust
Centre,O=South African Post Office Limited,L=Somerset West,ST=Western Cape,C=ZA
# Not Valid Before: Wed Sep 15 00:00:00 2010
# Not Valid After: Sat Sep 14 00:00:00 2030
# Fingerprint (MD5): f8:a7:f6:89:94:8c:61:f7:43:98:36:df:22:82:9b:3b
# Fingerprint (SHA1): 20:a8:f5:ff:c4:3a:f4:a9:bc:89:88:1e:bf:99:20:ff:91:e9:fd:0a
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SAPO Class 4 Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\040\250\365\377\304\072\364\251\274\211\210\036\277\231\040\377
\221\351\375\012
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\370\247\366\211\224\214\141\367\103\230\066\337\042\202\233\073
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145
\162\156\040\103\141\160\145\061\026\060\024\006\003\125\004\007
\023\015\123\157\155\145\162\163\145\164\040\127\145\163\164\061
\052\060\050\006\003\125\004\012\023\041\123\157\165\164\150\040
\101\146\162\151\143\141\156\040\120\157\163\164\040\117\146\146
\151\143\145\040\114\151\155\151\164\145\144\061\032\060\030\006
\003\125\004\013\023\021\123\101\120\117\040\124\162\165\163\164
\040\103\145\156\164\162\145\061\035\060\033\006\003\125\004\003
\023\024\123\101\120\117\040\103\154\141\163\163\040\064\040\122
\157\157\164\040\103\101\061\051\060\047\006\011\052\206\110\206
\367\015\001\011\001\026\032\160\153\151\141\144\155\151\156\100
\164\162\165\163\164\143\145\156\164\162\145\056\143\157\056\172
\141
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\003
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END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "CA Disig Root R1"
# Issuer: CN=CA Disig Root R1,O=Disig a.s.,L=Bratislava,C=SK
# Serial Number:c3:03:9a:ee:50:90:6e:28
# Subject: CN=CA Disig Root R1,O=Disig a.s.,L=Bratislava,C=SK
# Not Valid Before: Thu Jul 19 09:06:56 2012
# Not Valid After: Sat Jul 19 09:06:56 2042
# Fingerprint (MD5): be:ec:11:93:9a:f5:69:21:bc:d7:c1:c0:67:89:cc:2a
# Fingerprint (SHA1): 8e:1c:74:f8:a6:20:b9:e5:8a:f4:61:fa:ec:2b:47:56:51:1a:52:c6
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CA Disig Root R1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\123\113\061
\023\060\021\006\003\125\004\007\023\012\102\162\141\164\151\163
\154\141\166\141\061\023\060\021\006\003\125\004\012\023\012\104
\151\163\151\147\040\141\056\163\056\061\031\060\027\006\003\125
\004\003\023\020\103\101\040\104\151\163\151\147\040\122\157\157
\164\040\122\061
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\123\113\061
\023\060\021\006\003\125\004\007\023\012\102\162\141\164\151\163
\154\141\166\141\061\023\060\021\006\003\125\004\012\023\012\104
\151\163\151\147\040\141\056\163\056\061\031\060\027\006\003\125
\004\003\023\020\103\101\040\104\151\163\151\147\040\122\157\157
\164\040\122\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\303\003\232\356\120\220\156\050
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\151\060\202\003\121\240\003\002\001\002\002\011\000
\303\003\232\356\120\220\156\050\060\015\006\011\052\206\110\206
\367\015\001\001\005\005\000\060\122\061\013\060\011\006\003\125
\004\006\023\002\123\113\061\023\060\021\006\003\125\004\007\023
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\012\102\162\141\164\151\163\154\141\166\141\061\023\060\021\006
\003\125\004\012\023\012\104\151\163\151\147\040\141\056\163\056
\061\031\060\027\006\003\125\004\003\023\020\103\101\040\104\151
\163\151\147\040\122\157\157\164\040\122\061\060\036\027\015\061
\062\060\067\061\071\060\071\060\066\065\066\132\027\015\064\062
\060\067\061\071\060\071\060\066\065\066\132\060\122\061\013\060
\011\006\003\125\004\006\023\002\123\113\061\023\060\021\006\003
\125\004\007\023\012\102\162\141\164\151\163\154\141\166\141\061
\023\060\021\006\003\125\004\012\023\012\104\151\163\151\147\040
\141\056\163\056\061\031\060\027\006\003\125\004\003\023\020\103
\101\040\104\151\163\151\147\040\122\157\157\164\040\122\061\060
\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001
\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000
\252\303\170\367\334\230\243\247\132\136\167\030\262\335\004\144
\017\143\375\233\226\011\200\325\350\252\245\342\234\046\224\072
\350\231\163\214\235\337\327\337\203\363\170\117\100\341\177\322
\247\322\345\312\023\223\347\355\306\167\137\066\265\224\257\350
\070\216\333\233\345\174\273\314\215\353\165\163\341\044\315\346
\247\055\031\056\330\326\212\153\024\353\010\142\012\330\334\263
\000\115\303\043\174\137\103\010\043\062\022\334\355\014\255\300
\175\017\245\172\102\331\132\160\331\277\247\327\001\034\366\233
\253\216\267\112\206\170\240\036\126\061\256\357\202\012\200\101
\367\033\311\256\253\062\046\324\054\153\355\175\153\344\342\136
\042\012\105\313\204\061\115\254\376\333\321\107\272\371\140\227
\071\261\145\307\336\373\231\344\012\042\261\055\115\345\110\046
\151\253\342\252\363\373\374\222\051\062\351\263\076\115\037\047
\241\315\216\271\027\373\045\076\311\156\363\167\332\015\022\366
\135\307\273\066\020\325\124\326\363\340\342\107\110\346\336\024
\332\141\122\257\046\264\365\161\117\311\327\322\006\337\143\312
\377\041\350\131\006\340\010\325\204\025\123\367\103\345\174\305
\240\211\230\153\163\306\150\316\145\336\275\177\005\367\261\356
\366\127\241\140\225\305\314\352\223\072\276\231\256\233\002\243
\255\311\026\265\316\335\136\231\170\176\032\071\176\262\300\005
\244\300\202\245\243\107\236\214\352\134\266\274\147\333\346\052
\115\322\004\334\243\256\105\367\274\213\234\034\247\326\325\003
\334\010\313\056\026\312\134\100\063\350\147\303\056\347\246\104
\352\021\105\034\065\145\055\036\105\141\044\033\202\056\245\235
\063\135\145\370\101\371\056\313\224\077\037\243\014\061\044\104
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\157\133\240\012\064\074\356\327\352\210\237\230\371\257\116\044
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\310\055\237\203\257\147\151\006\247\061\125\325\317\113\157\377
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\025\115\320\362\245\123\365\313\341\075\116\150\055\330\022\335
\252\362\346\115\233\111\345\305\050\241\272\260\132\306\240\265
\002\003\001\000\001\243\102\060\100\060\017\006\003\125\035\023
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\017\001\001\377\004\004\003\002\001\006\060\035\006\003\125\035

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\235\112\311\276\024\345\214\254\070\312\072\011\324\033\316\206
\263\335\353\324\272\050\276\022\256\105\054\004\164\254\023\121
\305\130\030\146\115\202\332\325\334\223\300\047\341\276\174\237
\122\236\022\126\366\325\234\251\364\165\234\372\067\022\217\034
\223\354\127\376\007\017\253\325\022\367\017\256\141\136\126\200
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\332\002\166\355\011\317\154\301\270\034\203\034\026\372\224\315
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\036\242\117\140\327\007\051\374\262\243\244\235\156\025\222\126
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\133\335\230\176\244\115\314\162\003\203\130\135\357\223\072\101
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\017\067\130\244\362\122\161\147\077\014\210\170\200\211\301\310
\265\037\222\143\276\247\172\212\126\054\032\250\246\234\265\135
\263\143\320\023\040\241\353\221\154\320\215\175\257\337\013\344
\027\271\206\236\070\261\224\014\130\214\340\125\252\073\143\155
\232\211\140\270\144\052\222\306\067\364\176\103\103\267\163\350
\001\347\177\227\017\327\362\173\031\375\032\327\217\311\372\205
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\243\312\352\357\171\107\041\265\376\062\342\307\303\121\157\276
\200\164\360\244\303\072\362\117\351\137\337\031\012\362\073\023
\103\254\061\244\263\347\353\374\030\326\001\251\363\052\217\066
\016\353\264\261\274\267\114\311\153\277\241\363\331\364\355\342
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END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "CA Disig Root R1"
# Issuer: CN=CA Disig Root R1,O=Disig a.s.,L=Bratislava,C=SK
# Serial Number:c3:03:9a:ee:50:90:6e:28
# Subject: CN=CA Disig Root R1,O=Disig a.s.,L=Bratislava,C=SK
# Not Valid Before: Thu Jul 19 09:06:56 2012
# Not Valid After: Sat Jul 19 09:06:56 2042

```
# Fingerprint (MD5): be:ec:11:93:9a:f5:69:21:bc:d7:c1:c0:67:89:cc:2a
# Fingerprint (SHA1): 8e:1c:74:f8:a6:20:b9:e5:8a:f4:61:fa:ec:2b:47:56:51:1a:52:c6
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN
 CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CA Disig Root R1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\216\034\164\370\246\040\271\345\212\364\141\372\354\053\107\126
\121\032\122\306
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\276\354\021\223\232\365\151\041\274\327\301\300\147\211\314\052
END
CKA_ISSUER MULTILINE_OCTAL
\060\122\061\013\060\011\006\003\125\004\006\023\002\123\113\061
\023\060\021\006\003\125\004\007\023\012\102\162\141\164\151\163
\154\141\166\141\061\023\060\021\006\003\125\004\012\023\012\104
\151\163\151\147\040\141\056\163\056\061\031\060\027\006\003\125
\004\003\023\020\103\101\040\104\151\163\151\147\040\122\157\157
\164\040\122\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\303\003\232\356\120\220\156\050
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED
 CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Autoridad Certificadora Raíz Nacional de Uruguay"
# Issuer: C=UY,O=AGESIC,CN=Autoridad Certificadora Raíz Nacional de Uruguay
# Serial Number:02:ee:00:9b:66:d8:6a:1d:67:fe:da:8a:25:6f:21:5a:75:1b
# Subject: C=UY,O=AGESIC,CN=Autoridad Certificadora Raíz Nacional de Uruguay
# Not Valid Before: Thu Nov 03 15:02:49 2011
# Not Valid After: Wed Oct 29 15:02:49 2031
# Fingerprint (MD5): 7b:b7:e7:2e:64:18:e4:11:0c:f7:42:78:3e:65:a2:ae
# Fingerprint (SHA1): 7a:1c:dd:e3:d2:19:7e:71:37:43:3d:3f:99:c0:b3:69:f7:06:c7:49
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Autoridad Certificadora Raíz Nacional de Uruguay"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
```

\060\132\061\072\060\070\006\003\125\004\003\014\061\101\165\164
\157\162\151\144\141\144\040\103\145\162\164\151\146\151\143\141
\144\157\162\141\040\122\141\303\255\172\040\116\141\143\151\157
\156\141\154\040\144\145\040\125\162\165\147\165\141\171\061\017
\060\015\006\003\125\004\012\023\006\101\107\105\123\111\103\061
\013\060\011\006\003\125\004\006\023\002\125\131
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\072\060\070\006\003\125\004\003\014\061\101\165\164
\157\162\151\144\141\144\040\103\145\162\164\151\146\151\143\141
\144\157\162\141\040\122\141\303\255\172\040\116\141\143\151\157
\156\141\154\040\144\145\040\125\162\165\147\165\141\171\061\017
\060\015\006\003\125\004\012\023\006\101\107\105\123\111\103\061
\013\060\011\006\003\125\004\006\023\002\125\131
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\022\002\356\000\233\146\330\152\035\147\376\332\212\045\157
\041\132\165\033
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\235\060\202\004\205\240\003\002\001\002\002\022\002
\356\000\233\146\330\152\035\147\376\332\212\045\157\041\132\165
\033\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000
\060\132\061\072\060\070\006\003\125\004\003\014\061\101\165\164
\157\162\151\144\141\144\040\103\145\162\164\151\146\151\143\141
\144\157\162\141\040\122\141\303\255\172\040\116\141\143\151\157
\156\141\154\040\144\145\040\125\162\165\147\165\141\171\061\017
\060\015\006\003\125\004\012\023\006\101\107\105\123\111\103\061
\013\060\011\006\003\125\004\006\023\002\125\131\060\036\027\015
\061\061\061\061\060\063\061\065\060\062\064\071\132\027\015\063
\061\061\060\062\071\061\065\060\062\064\071\132\060\132\061\072
\060\070\006\003\125\004\003\014\061\101\165\164\157\162\151\144
\141\144\040\103\145\162\164\151\146\151\143\141\144\157\162\141
\040\122\141\303\255\172\040\116\141\143\151\157\156\141\154\040
\144\145\040\125\162\165\147\165\141\171\061\017\060\015\006\003
\125\004\012\023\006\101\107\105\123\111\103\061\013\060\011\006
\003\125\004\006\023\002\125\131\060\202\002\040\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\015\000
\060\202\002\010\002\202\002\001\000\227\304\037\052\104\241\201
\113\110\221\165\335\353\332\217\312\033\213\362\264\074\054\306
\345\364\301\036\321\270\060\023\157\134\237\345\121\226\177\032
\244\026\376\322\324\035\045\366\320\346\067\140\137\000\243\031
\251\354\047\277\120\055\005\240\134\136\223\353\343\150\375\233
\075\271\024\066\055\347\045\025\020\220\032\222\311\021\261\051
\227\223\126\125\142\255\107\254\177\325\014\167\226\322\223\150
\152\061\335\124\357\223\362\012\117\240\137\002\132\357\266\104

\076\347\231\262\216\105\336\240\367\300\350\110\260\107\354\336
\102\024\333\065\173\240\151\374\036\300\001\051\026\332\063\241
\041\241\062\062\020\166\175\250\307\300\056\163\203\144\374\132
\367\233\066\214\151\355\040\125\043\171\315\363\363\154\153\140
\134\170\215\374\075\205\054\274\251\367\160\350\245\312\115\330
\174\230\357\206\166\030\204\325\100\051\020\047\062\347\357\003
\104\013\117\311\052\361\266\264\053\240\325\003\224\204\041\323
\164\363\051\155\170\360\005\152\256\001\017\141\037\306\245\360
\307\202\025\331\073\373\335\213\164\151\356\344\307\307\364\021
\334\024\121\301\204\032\045\126\023\153\133\316\137\054\375\213
\033\055\017\310\300\125\252\030\117\230\234\317\242\167\010\264
\065\225\330\271\213\234\111\016\264\020\013\374\374\107\115\324
\232\127\371\237\172\275\351\127\273\264\017\137\025\220\330\150
\154\325\205\045\203\055\206\014\107\142\227\263\171\115\271\145
\010\167\122\157\112\343\156\200\300\254\243\325\274\352\111\342
\145\342\114\131\152\202\336\053\365\252\076\376\145\350\121\160
\115\067\204\006\004\077\222\203\324\126\050\343\045\325\124\312
\205\356\126\300\056\316\371\160\020\022\137\135\236\306\274\113
\020\035\126\155\312\162\301\123\011\052\023\075\330\265\371\034
\073\105\306\207\024\320\070\176\236\041\137\374\166\035\377\013
\051\102\333\241\304\171\071\341\115\325\206\120\343\362\340\263
\327\131\233\336\077\036\032\003\363\324\151\206\113\107\034\062
\177\074\007\011\023\020\247\233\007\060\167\063\274\151\021\321
\064\075\174\020\052\270\036\216\275\107\336\371\262\171\125\146
\041\002\007\373\071\054\012\027\241\002\001\003\243\202\001\135
\060\202\001\131\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004\005
\060\003\001\001\377\060\142\006\003\125\035\037\004\133\060\131
\060\054\240\052\240\050\206\046\150\164\164\160\072\057\057\167
\167\167\056\141\147\145\163\151\143\056\147\165\142\056\165\171
\057\141\143\162\156\057\141\143\162\156\056\143\162\154\060\051
\240\047\240\045\206\043\150\164\164\160\072\057\057\167\167\167
\056\165\143\145\056\147\165\142\056\165\171\057\141\143\162\156
\057\141\143\162\156\056\143\162\154\060\201\262\006\003\125\035
\040\004\201\252\060\201\247\060\134\006\013\140\206\132\204\342
\256\035\204\210\005\000\060\115\060\113\006\010\053\006\001\005
\005\007\002\001\026\077\150\164\164\160\072\057\057\167\167\167
\056\165\143\145\056\147\165\142\056\165\171\057\151\156\146\157
\162\155\141\143\151\157\156\055\164\145\143\156\151\143\141\057
\160\157\154\151\164\151\143\141\163\057\143\160\137\141\143\162
\156\056\160\144\146\060\107\006\013\140\206\132\204\342\256\035
\204\210\005\001\060\070\060\066\006\010\053\006\001\005\005\007
\002\001\026\052\150\164\164\160\072\057\057\167\167\167\056\141
\147\145\163\151\143\056\147\165\142\056\165\171\057\141\143\162
\156\057\143\160\163\137\141\143\162\156\056\160\144\146\060\035
\006\003\125\035\016\004\026\004\024\222\236\221\270\125\050\075
\167\102\054\063\245\230\137\320\311\254\215\265\243\060\015\006
\011\052\206\110\206\367\015\001\001\013\005\000\003\202\002\001

\000\135\347\253\131\352\111\334\277\106\103\375\224\273\230\160
\224\024\372\316\003\135\361\175\061\023\222\116\205\044\060\024
\153\154\323\347\316\346\171\325\333\116\125\116\027\053\327\223
\105\337\023\014\047\147\035\307\102\220\124\060\306\361\250\151
\050\264\116\246\155\245\065\246\120\226\150\111\243\356\057\013
\253\374\003\002\120\150\361\225\051\076\161\054\334\332\345\055
\331\166\056\356\126\063\176\027\241\047\002\341\241\047\050\041
\212\277\001\347\142\307\273\262\045\004\332\033\246\043\214\174
\223\272\311\213\353\012\371\067\267\224\071\375\115\217\176\242
\334\201\157\033\255\024\017\133\040\003\170\101\163\147\236\322
\227\027\220\052\212\124\113\247\171\177\044\022\221\237\073\054
\307\067\244\014\134\162\152\023\236\062\011\047\353\103\062\165
\137\327\107\303\052\105\123\025\126\166\117\273\011\350\204\140
\021\357\163\325\347\120\156\151\050\375\353\306\313\312\116\023
\143\015\016\067\054\061\037\333\247\130\240\262\375\015\027\207
\263\222\256\033\050\200\037\266\222\176\206\021\341\366\114\230
\177\146\213\037\023\111\003\102\374\373\230\234\356\206\226\251
\056\005\176\160\034\301\167\310\351\135\202\270\016\316\133\144
\005\143\356\077\006\055\066\014\351\037\162\133\036\254\335\046
\365\034\070\156\375\214\075\115\206\353\047\313\312\003\215\100
\363\052\321\212\330\064\016\302\255\265\210\355\207\232\212\205
\242\207\357\351\271\070\347\150\226\243\001\317\202\075\034\113
\050\235\047\365\371\231\226\173\110\375\254\320\360\062\367\070
\004\335\115\231\256\016\222\202\303\372\074\033\023\307\150\267
\135\340\223\106\270\270\270\244\014\304\033\306\272\106\226\335
\236\125\017\107\235\366\201\245\254\145\131\330\335\256\006\154
\340\103\202\306\147\330\160\002\065\365\066\004\343\112\071\251
\165\002\036\346\077\106\317\234\054\036\204\210\027\252\046\251
\246\103\200\340\300\133\243\144\203\233\232\355\153\001\145\266
\301\075\030\354\223\031\146\224\250\323\021\120\231\172\210\175
\257\076\177\224\220\073\012\303\152\267\215\137\322\247\121\321
\062\037\271\362\062\175\167\223\155\103\354\101\151\253\317\311
\141
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Autoridad Certificadora Raíz Nacional de Uruguay"
# Issuer: C=UY,O=AGESIC,CN=Autoridad
Certificadora Raíz Nacional de Uruguay
# Serial Number:02:ee:00:9b:66:d8:6a:1d:67:fe:da:8a:25:6f:21:5a:75:1b
# Subject: C=UY,O=AGESIC,CN=Autoridad Certificadora Raíz Nacional de Uruguay
# Not Valid Before: Thu Nov 03 15:02:49 2011
# Not Valid After: Wed Oct 29 15:02:49 2031
# Fingerprint (MD5): 7b:b7:e7:2e:64:18:e4:11:0c:f7:42:78:3e:65:a2:ae

```
# Fingerprint (SHA1): 7a:1c:dd:e3:d2:19:7e:71:37:43:3d:3f:99:c0:b3:69:f7:06:c7:49
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Autoridad Certificadora Raíz Nacional de Uruguay"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\172\034\335\343\322\031\176\161\067\103\075\077\231\300\263\151
\367\006\307\111
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\173\267\347\056\144\030\344\021\014\367\102\170\076\145\242\256
END
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\072\060\070\006\003\125\004\003\014\061\101\165\164
\157\162\151\144\141\144\040\103\145\162\164\151\146\151\143\141
\144\157\162\141\040\122\141\303\255\172\040\116\141\143\151\157
\156\141\154\040\144\145\040\125\162\165\147\165\141\171\061\017
\060\015\006\003\125\004\012\023\006\101\107\105\123\111\103\061
\013\060\011\006\003\125\004\006\023\002\125\131
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\022\002\356\000\233\146\330\152\035\147\376\332\212\045\157
\041\132\165\033
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "E-Tugra Certification Authority"
# Issuer: CN=E-Tugra Certification Authority,OU=E-Tugra Sertifikasyon Merkezi,O=E-Tura EBG Biliim
Teknolojileri ve Hizmetleri A..,L=Ankara,C=TR
# Serial Number:6a:68:3e:9c:51:9b:cb:53
# Subject: CN=E-Tugra Certification Authority,OU=E-Tugra Sertifikasyon Merkezi,O=E-Tura EBG Biliim
Teknolojileri ve
 Hizmetleri A..,L=Ankara,C=TR
# Not Valid Before: Tue Mar 05 12:09:48 2013
# Not Valid After: Fri Mar 03 12:09:48 2023
# Fingerprint (MD5): b8:a1:03:63:b0:bd:21:71:70:8a:6f:13:3a:bb:79:49
# Fingerprint (SHA1): 51:c6:e7:08:49:06:6e:f3:92:d4:5c:a0:0d:6d:a3:62:8f:c3:52:39
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "E-Tugra Certification Authority"
```

CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\262\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\017\060\015\006\003\125\004\007\014\006\101\156\153\141\162
\141\061\100\060\076\006\003\125\004\012\014\067\105\055\124\165
\304\237\162\141\040\105\102\107\040\102\151\154\151\305\237\151
\155\040\124\145\153\156\157\154\157\152\151\154\145\162\151\040
\166\145\040\110\151\172\155\145\164\154\145\162\151\040\101\056
\305\236\056\061\046\060\044\006\003\125\004\013\014\035\105\055
\124\165\147\162\141\040\123\145\162\164\151\146\151\153\141\163
\171\157\156\040\115\145\162\153\145\172\151\061\050\060\046\006
\003\125\004\003\014\037\105\055\124\165\147\162\141\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\262\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\017\060\015\006\003\125\004\007\014\006\101\156\153\141\162
\141\061\100\060\076\006\003\125\004\012\014\067\105\055\124\165
\304\237\162\141\040\105\102\107\040\102\151\154\151\305\237\151
\155\040\124\145\153\156\157\154\157\152\151\154\145\162\151\040
\166\145\040\110\151\172\155\145\164\154\145\162\151\040\101\056
\305\236\056\061\046\060\044\006\003\125\004\013\014\035\105\055
\124\165\147\162\141\040\123\145\162\164\151\146\151\153\141\163
\171\157\156\040\115\145\162\153\145\172\151\061\050\060\046\006
\003\125\004\003\014\037\105\055\124\165\147\162\141\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\010\152\150\076\234\121\233\313\123
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\113\060\202\004\063\240\003\002\001\002\002\010\152
\150\076\234\121\233\313\123\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\201\262\061\013\060\011\006\003\125
\004\006\023\002\124\122\061\017\060\015\006\003\125\004\007\014
\006\101\156\153\141\162\141\061\100\060\076\006\003\125\004\012
\014\067\105\055\124\165\304\237\162\141\040\105\102\107\040\102
\151\154\151\305\237\151\155\040\124\145\153\156\157\154\157\152
\151\154\145\162\151\040\166\145\040\110\151\172\155\145\164\154
\145\162\151\040\101\056\305\236\056\061\046\060\044\006\003\125
\004\013\014\035\105\055\124\165\147\162\141\040\123\145\162\164
\151\146\151\153\141\163\171\157\156\040\115\145\162\153\145\172
\151\061\050\060\046\006\003\125\004\003\014\037\105\055\124\165

\147\162\141\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\060\036\027\015\061
\063\060\063\060\065\061\062\060\071\064\070\132\027\015\062\063
\060\063\060\063\061\062\060\071\064\070\132\060\201\262\061\013
\060\011\006\003\125\004\006\023\002\124\122\061\017\060\015\006
\003\125\004\007\014\006\101\156\153\141\162\141\061\100\060\076
\006\003\125\004\012\014\067\105\055\124\165\304\237\162\141\040
\105\102\107\040\102\151\154\151\305\237\151\155\040\124\145\153
\156\157\154\157\152\151\154\145\162\151\040\166\145\040\110\151
\172\155\145\164\154\145\162\151\040\101\056\305\236\056\061\046
\060\044\006\003\125\004\013\014\035\105\055\124\165\147\162\141
\040\123\145\162\164\151\146\151\153\141\163\171\157\156\040\115
\145\162\153\145\172\151\061\050\060\046\006\003\125\004\003\014
\037\105\055\124\165\147\162\141\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001
\000\342\365\077\223\005\121\036\205\142\124\136\172\013\365\030
\007\203\256\176\257\174\367\324\212\153\245\143\103\071\271\113
\367\303\306\144\211\075\224\056\124\200\122\071\071\007\113\113
\335\205\007\166\207\314\277\057\225\114\314\175\247\075\274\107
\017\230\160\370\214\205\036\164\216\222\155\033\100\321\231\015
\273\165\156\310\251\153\232\300\204\061\257\312\103\313\353\053
\064\350\217\227\153\001\233\325\016\112\010\252\133\222\164\205
\103\323\200\256\241\210\133\256\263\352\136\313\026\232\167\104
\310\241\366\124\150\316\336\217\227\053\272\133\100\002\014\144
\027\300\265\223\315\341\361\023\146\316\014\171\357\321\221\050
\253\137\240\022\122\060\163\031\216\217\341\214\007\242\303\273
\112\360\352\037\025\250\356\045\314\244\106\370\033\042\357\263
\016\103\272\054\044\270\305\054\134\324\034\370\135\144\275\303
\223\136\050\247\077\047\361\216\036\323\052\120\005\243\125\331
\313\347\071\123\300\230\236\214\124\142\213\046\260\367\175\215
\174\344\306\236\146\102\125\202\107\347\262\130\215\146\367\007
\174\056\066\346\120\034\077\333\103\044\305\277\206\107\171\263
\171\034\367\132\364\023\354\154\370\077\342\131\037\225\356\102
\076\271\255\250\062\205\111\227\106\376\113\061\217\132\313\255
\164\107\037\351\221\267\337\050\004\042\240\324\017\135\342\171
\117\352\154\205\206\275\250\246\316\344\372\303\341\263\256\336
\074\121\356\313\023\174\001\177\204\016\135\121\224\236\023\014
\266\056\245\114\371\071\160\066\157\226\312\056\014\104\125\305
\312\372\135\002\243\337\326\144\214\132\263\001\012\251\265\012
\107\027\377\357\221\100\052\216\241\106\072\061\230\345\021\374
\314\273\111\126\212\374\271\320\141\232\157\145\154\346\303\313
\076\165\111\376\217\247\342\211\305\147\327\235\106\023\116\061
\166\073\044\263\236\021\145\206\253\177\357\035\324\370\274\347
\254\132\134\267\132\107\134\125\316\125\264\042\161\133\133\013
\360\317\334\240\141\144\352\251\327\150\012\143\247\340\015\077
\240\257\323\252\322\176\357\121\240\346\121\053\125\222\025\027

\123\313\267\146\016\146\114\370\371\165\114\220\347\022\160\307
\105\002\003\001\000\001\243\143\060\141\060\035\006\003\125\035
\016\004\026\004\024\056\343\333\262\111\320\234\124\171\134\372
\047\052\376\314\116\322\350\116\124\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\037\006\003\125\035
\043\004\030\060\026\200\024\056\343\333\262\111\320\234\124\171
\134\372\047\052\376\314\116\322\350\116\124\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\006\060\015\006\011\052
\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000\005
\067\072\364\115\267\105\342\105\165\044\217\266\167\122\350\034
\330\020\223\145\363\362\131\006\244\076\036\051\354\135\321\320
\253\174\340\012\220\110\170\355\116\230\003\231\376\050\140\221
\035\060\035\270\143\174\250\346\065\265\372\323\141\166\346\326
\007\113\312\151\232\262\204\172\167\223\105\027\025\237\044\320
\230\023\022\377\273\240\056\375\116\114\207\370\316\134\252\230
\033\005\340\000\106\112\202\200\245\063\213\050\334\355\070\323
\337\345\076\351\376\373\131\335\141\204\117\322\124\226\023\141
\023\076\217\200\151\276\223\107\265\065\103\322\132\273\075\134
\357\263\102\107\315\073\125\023\006\260\011\333\375\143\366\072
\210\012\231\157\176\341\316\033\123\152\104\146\043\121\010\173
\274\133\122\242\375\006\067\070\100\141\217\112\226\270\220\067
\370\146\307\170\220\000\025\056\213\255\121\065\123\007\250\153
\150\256\371\116\074\007\046\315\010\005\160\314\071\077\166\275
\245\323\147\046\001\206\246\123\322\140\073\174\103\177\125\212
\274\225\032\301\050\071\114\037\103\322\221\364\162\131\212\271
\126\374\077\264\235\332\160\234\166\132\214\103\120\356\216\060
\162\115\337\377\111\367\306\251\147\331\155\254\002\021\342\072
\026\045\247\130\010\313\157\123\101\234\110\070\107\150\063\321
\327\307\217\324\164\041\324\303\005\220\172\377\316\226\210\261
\025\051\135\043\253\320\140\241\022\117\336\364\027\315\062\345
\311\277\310\103\255\375\056\216\361\257\342\364\230\372\022\037
\040\330\300\247\014\205\305\220\364\073\055\226\046\261\054\276
\114\253\353\261\322\212\311\333\170\023\017\036\011\235\155\217
\000\237\002\332\301\372\037\172\172\011\304\112\346\210\052\227
\237\211\213\375\067\137\137\072\316\070\131\206\113\257\161\013
\264\330\362\160\117\237\062\023\343\260\247\127\345\332\332\103
\313\204\064\362\050\304\352\155\364\052\357\301\153\166\332\373
\176\273\205\074\322\123\302\115\276\161\341\105\321\375\043\147
\015\023\165\373\317\145\147\042\235\256\260\011\321\011\377\035
\064\277\376\043\227\067\322\071\372\075\015\006\013\264\333\073
\243\253\157\134\035\266\176\350\263\202\064\355\006\134\044
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate

```
# Trust for "E-Tugra Certification Authority"
# Issuer: CN=E-Tugra Certification Authority,OU=E-Tugra
 Sertifikasyon Merkezi,O=E-Tura EBG Biliim Teknolojileri ve Hizmetleri A..,L=Ankara,C=TR
# Serial Number:6a:68:3e:9c:51:9b:cb:53
# Subject: CN=E-Tugra Certification Authority,OU=E-Tugra Sertifikasyon Merkezi,O=E-Tura EBG Biliim
Teknolojileri ve Hizmetleri A..,L=Ankara,C=TR
# Not Valid Before: Tue Mar 05 12:09:48 2013
# Not Valid After: Fri Mar 03 12:09:48 2023
# Fingerprint (MD5): b8:a1:03:63:b0:bd:21:71:70:8a:6f:13:3a:bb:79:49
# Fingerprint (SHA1): 51:c6:e7:08:49:06:6e:f3:92:d4:5c:a0:0d:6d:a3:62:8f:c3:52:39
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "E-Tugra Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\121\306\347\010\111\006\156\363\222\324\134\240\015\155\243\142
\217\303\122\071
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\270\241\003\143\260\275\041\161\160\212\157\023\072\273\171\111
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\262\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\017\060\015\006\003\125\004\007\014\006\101\156\153\141\162
\141\061\100\060\076\006\003\125\004\012\014\067\105\055\124\165
\304\237\162\141\040\105\102\107\040\102\151\154\151\305\237\151
\155\040\124\145\153\156\157\154\157\152\151\154\145\162\151\040
\166\145\040\110\151\172\155\145\164\154\145\162\151\040\101\056
\305\236\056\061\046\060\044\006\003\125\004\013\014\035\105\055
\124\165\147\162\141\040\123\145\162\164\151\146\151\153\141\163
\171\157\156\040\115\145\162\153\145\172\151\061\050\060\046\006
\003\125\004\003\014\037\105\055\124\165\147\162\141\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\010\152\150\076\234\121\233\313\123
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
 Microsoft Code Signing Only Certificate
# Certificate "ApplicationCA2 Root"
```

```
# Issuer: CN=ApplicationCA2 Root,OU=GPKI,O=Japanese Government,C=JP
# Serial Number:31:32:35:33:37:32:38:32:38:32:38
# Subject: CN=ApplicationCA2 Root,OU=GPKI,O=Japanese Government,C=JP
# Not Valid Before: Tue Mar 12 15:00:00 2013
# Not Valid After: Sat Mar 12 15:00:00 2033
# Fingerprint (MD5): 7b:4c:15:74:3b:54:96:07:aa:95:3b:60:10:23:cf:f3
# Fingerprint (SHA1): f0:0f:c3:7d:6a:1c:92:61:fb:6b:c1:c2:18:49:8c:5a:a4:dc:51:fb
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ApplicationCA2 Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\130\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\034\060\032\006\003\125\004\012\023\023\112\141\160\141\156\145
\163\145\040\107\157\166\145\162\156\155\145\156\164\061\015\060
\013\006\003\125\004\013\023\004\107\120\113\111\061\034\060\032
\006\003\125\004\003\023\023\101\160\160\154\151\143\141\164\151
\157\156\103\101\062\040\122\157\157\164
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\130\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\034\060\032\006\003\125\004\012\023\023\112\141\160\141\156\145
\163\145\040\107\157\166\145\162\156\155\145\156\164\061\015\060
\013\006\003\125\004\013\023\004\107\120\113\111\061\034\060\032
\006\003\125\004\003\023\023\101\160\160\154\151\143\141\164\151
\157\156\103\101\062\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\013\061\062\065\063\067\062\070\062\070\062\070
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\367\060\202\002\337\240\003\002\001\002\002\013\061
\062\065\063\067\062\070\062\070\062\070\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\060\130\061\013\060\011\006
\003\125\004\006\023\002\112\120\061\034\060\032\006\003\125\004
\012\023\023\112\141\160\141\156\145\163\145\040\107\157\166\145
\162\156\155\145\156\164\061\015\060\013\006\003\125\004\013\023
\004\107\120\113\111\061\034\060\032\006\003\125\004\003\023\023
\101\160\160\154\151\143\141\164\151\157\156\103\101\062\040\122
\157\157\164\060\036\027\015\061\063\060\063\061\062\061\065\060
\060\060\060\132\027\015\063\063\060\063\061\062\061\065\060\060
\060\060\132\060\130\061\013\060\011\006\003\125\004\006\023\002
\112\120\061\034\060\032\006\003\125\004\012\023\023\112\141\160
\141\156\145\163\145\040\107\157\166\145\162\156\155\145\156\164
```

\061\015\060\013\006\003\125\004\013\023\004\107\120\113\111\061
\034\060\032\006\003\125\004\003\023\023\101\160\160\154\151\143
\141\164\151\157\156\103\101\062\040\122\157\157\164\060\202\001
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000
\003\202\001\017\000\060\202\001\012\002\202\001\001\000\246\252
\255\045\145\326\000\021\326\350\172\166\252\364\346\264\113\363
\314\303\122\264\215\254\246\117\265\222\161\157\106\265\325\255
\213\022\042\027\045\316\105\350\024\172\205\232\344\043\020\250
\372\261\147\120\345\155\107\340\152\211\023\343\256\256\065\361
\364\102\305\005\367\115\227\176\074\050\374\260\046\221\036\214
\036\070\032\226\334\130\104\227\142\343\062\310\321\025\101\115
\165\230\170\276\253\150\251\136\355\107\276\244\272\216\241\002
\227\336\223\164\231\155\147\264\005\045\356\224\310\355\252\244
\272\062\154\102\021\353\276\313\027\006\220\341\223\205\310\144
\050\316\037\107\307\300\135\140\356\166\066\334\063\073\121\353
\173\317\162\330\017\170\250\031\202\010\220\076\032\230\215\216
\264\317\025\066\246\156\335\267\342\115\100\040\123\331\166\052
\320\170\254\211\360\117\213\062\155\104\352\056\272\260\251\353
\211\335\267\157\171\017\253\201\156\270\346\213\051\013\131\257
\266\111\015\121\054\251\375\235\050\143\146\270\160\225\163\232
\330\372\073\063\274\102\102\033\062\254\261\062\373\075\002\003
\001\000\001\243\201\301\060\201\276\060\035\006\003\125\035\016
\004\026\004\024\126\247\254\252\002\035\262\254\075\220\016\240
\157\056\101\306\166\347\173\332\060\016\006\003\125\035\017\001
\001\377\004\004\003\002\001\006\060\174\006\003\125\035\021\004
\165\060\163\244\161\060\157\061\013\060\011\006\003\125\004\006
\023\002\112\120\061\030\060\026\006\003\125\004\012\014\017\346
\227\245\346\234\254\345\233\275\346\224\277\345\272\234\061\033
\060\031\006\003\125\004\013\014\022\346\224\277\345\272\234\350
\252\215\350\250\274\345\237\272\347\233\244\061\051\060\047\006
\003\125\004\003\014\040\343\202\242\343\203\227\343\203\252\343
\202\261\343\203\274\343\202\267\343\203\247\343\203\263\103\101
\062\040\122\157\157\164\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\003\202\001\001\000\177\232\011\165\254
\007\321\162\164\056\167\127\060\302\004\234\324\200\246\203\347
\245\240\033\237\376\253\363\200\275\325\112\243\241\217\266\114
\140\021\347\312\341\140\201\327\110\301\040\131\245\141\062\213
\235\236\227\323\146\203\332\145\056\130\076\333\345\057\245\315
\214\163\246\121\276\130\050\240\171\134\151\057\103\337\143\262
\211\107\312\273\336\271\064\021\143\240\016\045\027\345\207\364
\035\260\260\245\317\101\250\164\306\350\123\325\102\364\202\055
\123\011\021\150\046\161\224\165\023\115\252\166\210\074\164\261
\326\343\114\117\142\303\111\114\116\155\361\160\176\303\177\246
\005\314\170\233\351\201\333\250\310\307\134\236\374\222\222\055
\246\227\362\070\265\156\163\225\014\300\077\316\246\224\060\265
\372\005\267\336\236\040\252\374\023\144\311\212\272\144\357\342
\143\344\330\230\256\153\265\076\246\125\270\063\076\054\162\373

```
\054\021\000\373\133\026\057\204\322\023\236\372\005\305\301\313
\162\116\042\335\204\312\113\274\322\055\206\032\004\166\131\037
\111\102\142\073\023\037\026\350\272\327\375
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "ApplicationCA2
 Root"
# Issuer: CN=ApplicationCA2 Root,OU=GPKI,O=Japanese Government,C=JP
# Serial Number:31:32:35:33:37:32:38:32:38:32:38
# Subject: CN=ApplicationCA2 Root,OU=GPKI,O=Japanese Government,C=JP
# Not Valid Before: Tue Mar 12 15:00:00 2013
# Not Valid After: Sat Mar 12 15:00:00 2033
# Fingerprint (MD5): 7b:4c:15:74:3b:54:96:07:aa:95:3b:60:10:23:cf:f3
# Fingerprint (SHA1): f0:0f:c3:7d:6a:1c:92:61:fb:6b:c1:c2:18:49:8c:5a:a4:dc:51:fb
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ApplicationCA2 Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\360\017\303\175\152\034\222\141\373\153\301\302\030\111\214\132
\244\334\121\373
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\173\114\025\164\073\124\226\007\252\225\073\140\020\043\317\363
END
CKA_ISSUER MULTILINE_OCTAL
\060\130\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\034\060\032\006\003\125\004\012\023\023\112\141\160\141\156\145
\163\145\040\107\157\166\145\162\156\155\145\156\164\061\015\060
\013\006\003\125\004\013\023\004\107\120\113\111\061\034\060\032
\006\003\125\004\003\023\023\101\160\160\154\151\143\141\164\151
\157\156\103\101\062\040\122\157\157\164
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\013\061\062\065\063\067\062\070\062\070\062\070
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
# Microsoft Code Signing Only Certificate
# Certificate "ADOCA02"
# Issuer: CN=ADOCA02,OU=CAs,OU=PKI,OU=DoD,O=GOV,C=AU
# Serial Number: 1813 (0x715)
# Subject: CN=ADOCA02,OU=CAs,OU=PKI,OU=DoD,O=GOV,C=AU
# Not Valid Before: Thu Sep 01 04:26:07 2011
# Not Valid After: Sun Jan 27 02:31:24 2019
# Fingerprint (MD5): c4:4f:6a:cd:50:fd:44:c4:36:e0:b3:38:d3:7c:c0:97
# Fingerprint (SHA1): 84:42:9d:9f:e2:e7:3a:0d:c8:aa:0a:e0:a9:02:f2:74:99:33:fe:02
CKA_CLASS CK_OBJECT_CLASS
 CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ADOCA02"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\127\061\013\060\011\006\003\125\004\006\023\002\101\125\061
\014\060\012\006\003\125\004\012\023\003\107\117\126\061\014\060
\012\006\003\125\004\013\023\003\104\157\104\061\014\060\012\006
\003\125\004\013\023\003\120\113\111\061\014\060\012\006\003\125
\004\013\023\003\103\101\163\061\020\060\016\006\003\125\004\003
\023\007\101\104\117\103\101\060\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\127\061\013\060\011\006\003\125\004\006\023\002\101\125\061
\014\060\012\006\003\125\004\012\023\003\107\117\126\061\014\060
\012\006\003\125\004\013\023\003\104\157\104\061\014\060\012\006
\003\125\004\013\023\003\120\113\111\061\014\060\012\006\003\125
\004\013\023\003\103\101\163\061\020\060\016\006\003\125\004\003
\023\007\101\104\117\103\101\060\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\002\007\025
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\331\060\202\002\301\240\003\002\001\002\002\002\007
\025\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000
\060\127\061\013\060\011\006\003\125\004\006\023\002\101\125\061
\014\060\012\006\003\125\004\012\023\003\107\117\126\061\014\060
\012\006\003\125\004\013\023\003\104\157\104\061\014\060\012\006
\003\125\004\013\023\003\120\113\111\061\014\060\012\006\003\125
\004\013\023\003\103\101\163\061\020\060\016\006\003\125\004\003
\023\007\101\104\117\103\101\060\062\060\036\027\015\061\061\060
\071\060\061\060\064\062\066\060\067\132\027\015\061\071\060\061
\062\067\060\062\063\061\062\064\132\060\127\061\013\060\011\006
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\003\125\004\006\023\002\101\125\061\014\060\012\006\003\125\004
\012\023\003\107\117\126\061\014\060\012\006\003\125\004\013\023
\003\104\157\104\061\014\060\012\006\003\125\004\013\023\003\120
\113\111\061\014\060\012\006\003\125\004\013\023\003\103\101\163
\061\020\060\016\006\003\125\004\003\023\007\101\104\117\103\101
\060\062\060\202\001\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202
\001\001\000\344\120\205\110\167\217\276\377\111\321\273\165\256
\207\040\012\226\101\045\053\274\106\007\335\313\004\206\225\054
\111\056\275\106\014\016\367\130\240\140\026\205\332\135\073\343
\165\136\102\175\144\154\217\301\135\051\144\101\262\205\267\033
\106\275\205\332\327\072\035\262\264\361\112\075\376\036\332\310
\356\206\235\243\152\121\013\344\105\230\257\330\033\110\274\074
\024\042\355\053\237\073\177\157\063\074\326\175\254\340\171\117
\277\145\223\313\027\052\157\274\172\017\351\133\137\341\014\052
\373\100\122\066\112\135\145\070\313\131\301\110\263\244\221\205
\026\135\170\175\302\317\055\063\356\131\112\310\346\141\263\206
\037\204\310\270\032\154\236\321\140\264\202\065\353\275\043\250
\057\223\124\120\316\044\136\061\256\323\152\064\054\141\207\067
\106\036\103\211\306\200\313\042\003\323\311\205\056\037\233\261
\254\071\113\115\140\362\212\141\033\377\203\261\054\163\217\210
\102\300\055\261\312\236\300\225\147\164\173\226\344\152\172\216
\101\105\240\064\363\316\270\347\342\217\363\120\125\144\157\271
\040\053\223\002\003\001\000\001\243\201\256\060\201\253\060\014
\006\003\125\035\023\004\005\060\003\001\001\377\060\113\006\003
\125\035\040\004\104\060\102\060\070\006\011\052\044\001\202\116
\001\001\001\001\060\053\060\051\006\010\053\006\001\005\005\007
\002\001\026\035\150\164\164\160\072\057\057\167\167\167\056\144
\145\146\145\156\143\145\056\147\157\166\056\141\165\057\160\153
\151\060\006\006\004\125\035\040\000\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\306\060\037\006\003\125\035\043
\004\030\060\026\200\024\351\347\235\353\065\275\270\262\053\111
\130\364\274\222\175\213\161\212\021\132\060\035\006\003\125\035
\016\004\026\004\024\351\347\235\353\065\275\270\262\053\111\130
\364\274\222\175\213\161\212\021\132\060\015\006\011\052\206\110
\206\367\015\001\001\005\005\000\003\202\001\001\000\126\320\250
\310\154\311\264\254\361\073\201\165\053\021\304\366\126\264\127
\256\302\222\031\134\226\163\012\355\056\103\234\144\052\131\170
\023\265\120\214\116\152\220\124\363\031\076\026\030\317\103\023
\311\062\163\370\125\340\312\320\222\031\076\145\243\336\200\022
\034\121\245\030\054\300\151\335\267\206\062\257\360\255\317\340
\303\043\304\345\374\266\077\013\005\327\226\072\144\136\167\214
\204\316\361\334\315\004\012\334\227\361\041\034\307\175\060\045
\135\327\040\065\225\303\207\035\266\077\333\123\342\052\244\370
\031\027\072\014\025\356\263\005\070\061\356\105\161\335\227\373
\170\161\206\002\364\237\064\031\163\111\020\053\240\177\361\311
\372\240\362\130\043\061\026\370\020\120\202\273\135\322\352\357
\151\335\147\166\125\070\307\250\016\003\200\070\117\000\040\153

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\337\053\145\223\333\010\257\140\154\064\040\250\255\110\077\020
\176\246\303\224\001\225\341\201\054\240\355\214\256\124\116\072
\113\303\322\302\317\176\002\174\357\052\054\273\354\332\336\305
\001\257\224\111\355\017\302\277\016\220\151\055\153
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "ADOCA02"
# Issuer: CN=ADOCA02,OU=CAs,OU=PKI,OU=DoD,O=GOV,C=AU
# Serial Number: 1813 (0x715)
# Subject: CN=ADOCA02,OU=CAs,OU=PKI,OU=DoD,O=GOV,C=AU
# Not Valid Before: Thu Sep 01 04:26:07 2011
# Not Valid After: Sun Jan 27 02:31:24 2019
# Fingerprint (MD5): c4:4f:6a:cd:50:fd:44:c4:36:e0:b3:38:d3:7c:c0:97
# Fingerprint (SHA1): 84:42:9d:9f:e2:e7:3a:0d:c8:aa:0a:e0:a9:02:f2:74:99:33:fe:02
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ADOCA02"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\204\102\235\237\342\347\072\015\310\252\012\340\251\002\362\164
\231\063\376\002
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\304\117\152\315\120\375\104\304\066\340\263\070\323\174\300\227
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\127\061\013\060\011\006\003\125\004\006\023\002\101\125\061
\014\060\012\006\003\125\004\012\023\003\107\117\126\061\014\060
\012\006\003\125\004\013\023\003\104\157\104\061\014\060\012\006
\003\125\004\013\023\003\120\113\111\061\014\060\012\006\003\125
\004\013\023\003\103\101\163\061\020\060\016\006\003\125\004\003
\023\007\101\104\117\103\101\060\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\002\007\025
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
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```
# Microsoft Code Signing Only Certificate
# Certificate "StartCom Certification Authority G2"
# Issuer: CN=StartCom Certification Authority G2,O=StartCom Ltd.,C=IL
# Serial Number: 59 (0x3b)
# Subject: CN=StartCom Certification Authority G2,O=StartCom Ltd.,C=IL
# Not Valid
 Before: Fri Jan 01 01:00:01 2010
# Not Valid After: Sat Dec 31 23:59:01 2039
# Fingerprint (MD5): 78:4b:fb:9e:64:82:0a:d3:b8:4c:62:f3:64:f2:90:64
# Fingerprint (SHA1): 31:f1:fd:68:22:63:20:ee:c6:3b:3f:9d:ea:4a:3e:53:7c:7c:39:17
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "StartCom Certification Authority G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\123\061\013\060\011\006\003\125\004\006\023\002\111\114\061
\026\060\024\006\003\125\004\012\023\015\123\164\141\162\164\103
\157\155\040\114\164\144\056\061\054\060\052\006\003\125\004\003
\023\043\123\164\141\162\164\103\157\155\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\107\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\123\061\013\060\011\006\003\125\004\006\023\002\111\114\061
\026\060\024\006\003\125\004\012\023\015\123\164\141\162\164\103
\157\155\040\114\164\144\056\061\054\060\052\006\003\125\004\003
\023\043\123\164\141\162\164\103\157\155\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\107\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\073
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\143\060\202\003\113\240\003\002\001\002\002\001\073
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\123\061\013\060\011\006\003\125\004\006\023\002\111\114\061\026
\060\024\006\003\125\004\012\023\015\123\164\141\162\164\103\157
\155\040\114\164\144\056\061\054\060\052\006\003\125\004\003\023
\043\123\164\141\162\164\103\157\155\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\040\107\062\060\036\027\015\061\060\060\061\060\061\060\061
\060\060\060\061\132\027\015\063\071\061\062\063\061\062\063\065
\071\060\061\132\060\123\061\013\060\011\006\003\125\004\006\023
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\002\111\114\061\026\060\024\006\003\125\004\012\023\015\123\164
\141\162\164\103\157\155\040\114\164\144\056\061\054\060\052\006
\003\125\004\003\023\043\123\164\141\162\164\103\157\155\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\040\107\062\060\202\002\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017
\000\060\202\002\012\002\202\002\001\000\266\211\066\133\007\267
\040\066\275\202\273\341\026\040\003\225\172\257\016\243\125\311
\045\231\112\305\320\126\101\207\220\115\041\140\244\024\207\073
\315\375\262\076\264\147\003\152\355\341\017\113\300\221\205\160
\105\340\102\236\336\051\043\324\001\015\240\020\171\270\333\003
\275\363\251\057\321\306\340\017\313\236\212\024\012\270\275\366
\126\142\361\305\162\266\062\045\331\262\363\275\145\305\015\054
\156\325\222\157\030\213\000\101\024\202\157\100\040\046\172\050
\017\365\036\177\047\367\224\261\067\075\267\307\221\367\342\001
\354\375\224\211\341\314\156\323\066\326\012\031\171\256\327\064
\202\145\377\174\102\273\266\335\013\246\064\257\113\140\376\177
\103\111\006\213\214\103\270\126\362\331\177\041\103\027\352\247
\110\225\001\165\165\352\053\245\103\225\352\025\204\235\010\215
\046\156\125\233\253\334\322\071\322\061\035\140\342\254\314\126
\105\044\365\034\124\253\356\206\335\226\062\205\370\114\117\350
\225\166\266\005\335\066\043\147\274\377\025\342\312\073\346\246
\354\073\354\046\021\064\110\215\366\200\053\032\043\002\353\212
\034\072\166\052\173\126\026\034\162\052\263\252\343\140\245\000
\237\004\233\342\157\036\024\130\133\245\154\213\130\074\303\272
\116\072\134\367\341\226\053\076\357\007\274\244\345\135\314\115
\237\015\341\334\252\273\341\156\032\354\217\341\266\114\115\171
\162\135\027\065\013\035\327\301\107\332\226\044\340\320\162\250
\132\137\146\055\020\334\057\052\023\256\046\376\012\034\031\314
\320\076\013\234\310\011\056\371\133\226\172\107\234\351\172\363
\005\120\164\225\163\236\060\011\363\227\202\136\346\217\071\010
\036\131\345\065\024\102\023\377\000\234\367\276\252\120\317\342
\121\110\327\270\157\257\370\116\176\063\230\222\024\142\072\165
\143\317\173\372\336\202\073\251\273\071\342\304\275\054\000\016
\310\027\254\023\357\115\045\216\330\263\220\057\251\332\051\175
\035\257\164\072\262\047\300\301\036\076\165\243\026\251\257\172
\042\135\237\023\032\317\247\240\353\343\206\012\323\375\346\226
\225\327\043\310\067\335\304\174\252\066\254\230\032\022\261\340
\116\350\261\073\365\326\157\361\060\327\002\003\001\000\001\243
\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\035\006\003\125\035\016\004\026\004\024\113
\305\264\100\153\255\034\263\245\034\145\156\106\066\211\207\005
\014\016\266\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\003\202\002\001\000\163\127\077\054\325\225\062\176\067
\333\226\222\353\031\136\176\123\347\101\354\021\266\107\357\265
\336\355\164\134\305\361\216\111\340\374\156\231\023\315\237\212
\332\315\072\012\330\072\132\011\077\137\064\320\057\003\322\146

\035\032\275\234\220\067\310\014\216\007\132\224\105\106\052\346
\276\172\332\241\251\244\151\022\222\260\175\066\324\104\207\327
\121\361\051\143\326\165\315\026\344\047\211\035\370\302\062\110
\375\333\231\320\217\137\124\164\314\254\147\064\021\142\331\014
\012\067\207\321\243\027\110\216\322\027\035\366\327\375\333\145
\353\375\250\324\365\326\117\244\133\165\350\305\322\140\262\333
\011\176\045\213\173\272\122\222\236\076\350\305\167\241\074\340
\112\163\153\141\317\206\334\103\377\377\041\376\043\135\044\112
\365\323\155\017\142\004\005\127\202\332\156\244\063\045\171\113
\056\124\031\213\314\054\075\060\351\321\006\377\350\062\106\276
\265\063\166\167\250\001\135\226\301\301\325\276\256\045\300\311
\036\012\011\040\210\241\016\311\363\157\115\202\124\000\040\247
\322\217\344\071\124\027\056\215\036\270\033\273\033\275\232\116
\073\020\064\334\234\210\123\357\242\061\133\130\117\221\142\310
\302\232\232\315\025\135\070\251\326\276\370\023\265\237\022\151
\362\120\142\254\373\027\067\364\356\270\165\147\140\020\373\203
\120\371\104\265\165\234\100\027\262\376\375\171\135\156\130\130
\137\060\374\000\256\257\063\301\016\116\154\272\247\246\241\177
\062\333\070\340\261\162\027\012\053\221\354\152\143\046\355\211
\324\170\314\164\036\005\370\153\376\214\152\166\071\051\256\145
\043\022\225\010\042\034\227\316\133\006\356\014\342\273\274\037
\104\223\366\330\070\105\005\041\355\344\255\253\022\266\003\244
\102\056\055\304\011\072\003\147\151\204\232\341\131\220\212\050
\205\325\135\164\261\321\016\040\130\233\023\245\260\143\246\355
\173\107\375\105\125\060\244\356\232\324\346\342\207\357\230\311
\062\202\021\051\042\274\000\012\061\136\055\017\300\216\351\153
\262\217\056\006\330\321\221\307\306\022\364\114\375\060\027\303
\301\332\070\133\343\251\352\346\241\272\171\357\163\330\266\123
\127\055\366\320\341\327\110
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER
 CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "StartCom Certification Authority G2"
# Issuer: CN=StartCom Certification Authority G2,O=StartCom Ltd.,C=IL
# Serial Number: 59 (0x3b)
# Subject: CN=StartCom Certification Authority G2,O=StartCom Ltd.,C=IL
# Not Valid Before: Fri Jan 01 01:00:01 2010
# Not Valid After: Sat Dec 31 23:59:01 2039
# Fingerprint (MD5): 78:4b:fb:9e:64:82:0a:d3:b8:4c:62:f3:64:f2:90:64
# Fingerprint (SHA1): 31:f1:fd:68:22:63:20:ee:c6:3b:3f:9d:ea:4a:3e:53:7c:7c:39:17
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE

```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "StartCom Certification Authority G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\061\361\375\150\042\143\040\356\306\073\077\235\352\112\076\123
\174\174\071\027
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\170\113\373\236\144\202\012\323\270\114\142\363\144\362\220\144
END
CKA_ISSUER MULTILINE_OCTAL
\060\123\061\013\060\011\006\003\125\004\006\023\002\111\114\061
\026\060\024\006\003\125\004\012\023\015\123\164\141\162\164\103
\157\155\040\114\164\144\056\061\054\060\052\006\003\125\004\003
\023\043\123\164\141\162\164\103\157\155\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\107\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\073
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Symantec Class 3 Public Primary Certification Authority - G6"
# Issuer: CN=Symantec Class 3 Public Primary Certification Authority - G6,OU=Symantec Trust
Network,O=Symantec Corporation,C=US
# Serial Number:65:63:71:85:d3:6f:45:c6:8f:7f:31:f9:09:87:92:82
# Subject: CN=Symantec Class 3 Public Primary Certification
 Authority - G6,OU=Symantec Trust Network,O=Symantec Corporation,C=US
# Not Valid Before: Thu Oct 18 00:00:00 2012
# Not Valid After: Tue Dec 01 23:59:59 2037
# Fingerprint (MD5): 8d:d1:96:24:c4:4c:8f:5d:26:f4:6c:8d:52:41:1a:c6
# Fingerprint (SHA1): 26:a1:6c:23:5a:24:72:22:9b:23:62:80:25:bc:80:97:c8:85:24:a1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Symantec Class 3 Public Primary Certification Authority - G6"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\224\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\035\060\033\006\003\125\004\012\023\024\123\171\155\141\156
\164\145\143\040\103\157\162\160\157\162\141\164\151\157\156\061
\037\060\035\006\003\125\004\013\023\026\123\171\155\141\156\164
```

\145\143\040\124\162\165\163\164\040\116\145\164\167\157\162\153
\061\105\060\103\006\003\125\004\003\023\074\123\171\155\141\156
\164\145\143\040\103\154\141\163\163\040\063\040\120\165\142\154
\151\143\040\120\162\151\155\141\162\171\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\055\040\107\066
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\224\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\035\060\033\006\003\125\004\012\023\024\123\171\155\141\156
\164\145\143\040\103\157\162\160\157\162\141\164\151\157\156\061
\037\060\035\006\003\125\004\013\023\026\123\171\155\141\156\164
\145\143\040\124\162\165\163\164\040\116\145\164\167\157\162\153
\061\105\060\103\006\003\125\004\003\023\074\123\171\155\141\156
\164\145\143\040\103\154\141\163\163\040\063\040\120\165\142\154
\151\143\040\120\162\151\155\141\162\171\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\055\040\107\066
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\145\143\161\205\323\157\105\306\217\177\061\371\011\207
\222\202
END
CKA_VALUE
 MULTILINE_OCTAL
\060\202\005\366\060\202\003\336\240\003\002\001\002\002\020\145
\143\161\205\323\157\105\306\217\177\061\371\011\207\222\202\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\201
\224\061\013\060\011\006\003\125\004\006\023\002\125\123\061\035
\060\033\006\003\125\004\012\023\024\123\171\155\141\156\164\145
\143\040\103\157\162\160\157\162\141\164\151\157\156\061\037\060
\035\006\003\125\004\013\023\026\123\171\155\141\156\164\145\143
\040\124\162\165\163\164\040\116\145\164\167\157\162\153\061\105
\060\103\006\003\125\004\003\023\074\123\171\155\141\156\164\145
\143\040\103\154\141\163\163\040\063\040\120\165\142\154\151\143
\040\120\162\151\155\141\162\171\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\040\055\040\107\066\060\036\027\015\061\062\061\060\061\070\060
\060\060\060\060\060\132\027\015\063\067\061\062\060\061\062\063
\065\071\065\071\132\060\201\224\061\013\060\011\006\003\125\004
\006\023\002\125\123\061\035\060\033\006\003\125\004\012\023\024
\123\171\155\141\156\164\145\143\040\103\157\162\160\157\162\141
\164\151\157\156\061\037\060\035\006\003\125\004\013\023\026\123
\171\155\141\156\164\145\143\040\124\162\165\163\164\040\116\145
\164\167\157\162\153\061\105\060\103\006\003\125\004\003\023\074
\123\171\155\141\156\164\145\143\040\103\154\141\163\163\040\063

\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171\040
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165
\164\150\157\162\151\164\171\040\055\040\107\066\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\267\016\262
\372\115\274\232\162\025\373\167\133\333\375\103\017\313\013\367
\140\056\263\053\176\014\273\123\362\314\116\145\363\031\273\377
\065\035\367\323\251\273\100\055\265\335\170\324\246\371\067\352
\205\005\173\155\267\346\023\113\006\174\373\166\143\217\040\035
\055\070\053\004\205\362\350\260\321\137\115\112\041\311\152\330
\224\352\036\002\120\246\252\220\007\240\107\041\352\146\371\004
\240\346\203\360\304\365\136\226\342\047\115\141\303\263\301\214
\042\266\146\241\000\321\126\051\373\355\301\177\044\312\075\372
\132\224\260\204\303\307\272\103\034\375\144\016\361\050\373\107
\131\362\046\341\061\271\104\371\253\335\373\276\276\054\067\343
\254\013\030\323\374\001\242\361\244\012\065\202\107\114\253\275
\212\136\337\023\205\374\040\314\110\131\257\257\101\157\313\043
\315\312\223\247\335\325\137\310\144\073\377\001\003\240\012\117
\055\156\075\204\276\257\310\062\262\123\051\220\025\367\260\005
\232\012\074\366\271\006\220\311\245\341\135\240\073\260\376\250
\266\277\365\211\050\127\044\072\041\206\161\344\334\212\213\101
\125\354\036\060\044\131\321\300\131\270\170\257\252\132\164\336
\045\200\060\230\355\060\104\157\041\160\034\333\022\123\016\326
\246\050\146\223\054\037\314\117\074\033\201\305\271\366\170\157
\320\062\072\010\162\333\153\016\106\027\205\224\363\274\357\274
\367\244\136\216\351\351\265\144\345\267\113\105\022\054\114\067
\267\140\103\012\115\161\006\000\224\046\065\164\037\273\172\071
\134\116\073\346\270\003\342\307\223\213\204\054\045\111\105\335
\177\043\224\140\037\313\351\315\366\253\227\367\141\347\373\177
\142\201\310\334\012\060\134\030\174\346\316\357\307\156\036\207
\174\263\351\312\310\173\152\364\150\374\203\245\014\126\264\272
\262\215\112\012\307\227\227\305\210\060\025\075\020\010\124\025
\162\162\147\063\063\364\174\267\316\000\047\123\145\316\044\361
\132\144\347\066\057\362\056\002\302\227\337\162\350\002\036\240
\367\075\265\373\150\140\003\372\063\251\346\022\155\006\341\251
\250\135\116\074\376\331\347\000\145\254\266\031\115\173\203\177
\064\107\352\341\030\155\261\213\034\171\253\347\235\002\003\001
\000\001\243\102\060\100\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026
\004\024\071\161\010\000\076\336\310\206\347\220\377\344\375\041
\017\316\044\031\026\366\060\015\006\011\052\206\110\206\367\015
\001\001\014\005\000\003\202\002\001\000\120\153\210\115\140\110
\316\132\343\042\316\147\174\204\247\315\034\375\351\014\003\214
\066\257\012\207\016\152\256\127\256\001\320\066\273\362\375\271
\163\301\137\265\250\256\114\242\372\111\313\007\106\026\066\275
\343\310\127\070\176\070\344\277\045\063\140\306\334\067\234\143
\273\136\230\036\032\262\202\360\256\246\167\021\200\104\107\241

\051\305\360\263\072\316\230\360\270\354\323\016\200\006\167\043
\060\114\377\171\144\143\042\133\167\223\103\113\165\263\333\073
\156\073\112\335\361\310\256\265\067\212\225\210\072\020\150\160
\070\271\133\160\176\325\103\311\374\137\117\345\346\173\066\356
\360\040\355\107\127\023\046\020\136\024\006\015\173\166\007\302
\306\055\026\364\256\247\154\017\274\210\017\117\054\002\266\243
\327\042\346\231\107\065\330\215\245\117\201\022\072\021\175\263
\314\013\165\363\036\160\243\033\003\352\372\232\350\346\056\066
\071\314\231\316\072\077\014\267\256\370\103\231\260\223\156\157
\252\331\017\152\061\221\273\234\323\264\050\373\203\114\172\163
\202\120\147\322\016\254\355\140\305\262\135\065\230\317\207\176
\036\131\035\044\274\126\272\332\244\132\330\314\346\274\036\020
\217\033\214\216\363\301\333\267\276\324\260\133\145\217\026\150
\363\126\305\052\031\026\115\017\270\145\207\155\044\203\270\142
\334\340\107\141\032\210\173\316\116\177\375\334\306\015\132\232
\244\363\265\114\366\335\061\246\350\035\021\041\063\060\004\141
\175\034\340\076\117\215\077\265\213\022\000\132\175\251\241\000
\324\203\353\160\273\030\370\244\322\034\201\055\267\010\021\310
\046\173\266\324\345\017\003\106\162\324\045\100\036\276\111\135
\155\223\361\134\262\073\165\124\151\072\240\356\114\042\272\254
\232\342\010\255\105\143\005\112\122\065\166\304\064\365\136\007
\062\255\334\174\046\321\133\217\255\344\346\252\033\165\237\353
\135\264\350\300\251\025\174\116\112\007\162\337\106\311\324\221
\222\165\126\260\341\356\067\066\145\050\305\025\310\053\166\314
\155\157\031\203\364\375\332\025\342\101\347\063\171\106\203\127
\371\361\245\266\155\323\274\327\123\347\356\161\155\170\251\227
\247\356\040\234\031\025\162\025\075\004
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Symantec Class 3 Public Primary Certification Authority - G6"
# Issuer: CN=Symantec Class 3 Public Primary Certification Authority - G6,OU=Symantec Trust Network,O=Symantec Corporation,C=US
# Serial Number:65:63:71:85:d3:6f:45:c6:8f:7f:31:f9:09:87:92:82
# Subject: CN=Symantec Class 3 Public Primary Certification Authority - G6,OU=Symantec Trust Network,O=Symantec Corporation,C=US
# Not Valid Before: Thu Oct 18 00:00:00 2012
# Not Valid After: Tue Dec 01 23:59:59 2037
# Fingerprint (MD5): 8d:d1:96:24:c4:4c:8f:5d:26:f4:6c:8d:52:41:1a:c6
# Fingerprint (SHA1): 26:a1:6c:23:5a:24:72:22:9b:23:62:80:25:bc:80:97:c8:85:24:a1
CKA_CLASS
 CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE

```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Symantec Class 3 Public Primary Certification Authority - G6"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\046\241\154\043\132\044\162\042\233\043\142\200\045\274\200\227
\310\205\044\241
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\215\321\226\044\304\114\217\135\046\364\154\215\122\101\032\306
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\224\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\035\060\033\006\003\125\004\012\023\024\123\171\155\141\156
\164\145\143\040\103\157\162\160\157\162\141\164\151\157\156\061
\037\060\035\006\003\125\004\013\023\026\123\171\155\141\156\164
\145\143\040\124\162\165\163\164\040\116\145\164\167\157\162\153
\061\105\060\103\006\003\125\004\003\023\074\123\171\155\141\156
\164\145\143\040\103\154\141\163\163\040\063\040\120\165\142\154
\151\143\040\120\162\151\155\141\162\171\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\055\040\107\066
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\145\143\161\205\323\157\105\306\217\177\061\371\011\207
\222\202
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Symantec Class 3 Public Primary Certification Authority - G4"
# Issuer: CN=Symantec Class 3 Public Primary Certification Authority - G4,OU=Symantec Trust
Network,O=Symantec Corporation,C=US
# Serial Number:4c:79:b5:9a:28:9c:76:31:64:f5:89:44:d0:91:02:de
# Subject: CN=Symantec Class 3 Public Primary Certification Authority - G4,OU=Symantec Trust
Network,O=Symantec Corporation,C=US
# Not Valid Before: Thu Oct 18 00:00:00 2012
# Not Valid After: Tue Dec 01 23:59:59 2037
#
 Fingerprint (MD5): 36:c9:b7:4b:6c:b0:21:4c:c7:11:17:b1:18:fe:2b:4d
# Fingerprint (SHA1): 58:d5:2d:b9:33:01:a4:fd:29:1a:8c:96:45:a0:8f:ee:7f:52:92:82
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Symantec Class 3 Public Primary Certification Authority - G4"
```

CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\224\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\035\060\033\006\003\125\004\012\023\024\123\171\155\141\156
\164\145\143\040\103\157\162\160\157\162\141\164\151\157\156\061
\037\060\035\006\003\125\004\013\023\026\123\171\155\141\156\164
\145\143\040\124\162\165\163\164\040\116\145\164\167\157\162\153
\061\105\060\103\006\003\125\004\003\023\074\123\171\155\141\156
\164\145\143\040\103\154\141\163\163\040\063\040\120\165\142\154
\151\143\040\120\162\151\155\141\162\171\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\055\040\107\064
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\224\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\035\060\033\006\003\125\004\012\023\024\123\171\155\141\156
\164\145\143\040\103\157\162\160\157\162\141\164\151\157\156\061
\037\060\035\006\003\125\004\013\023\026\123\171\155\141\156\164
\145\143\040\124\162\165\163\164\040\116\145\164\167\157\162\153
\061\105\060\103\006\003\125\004\003\023\074\123\171\155\141\156
\164\145\143\040\103\154\141\163\163\040\063\040\120\165\142\154
\151\143\040\120\162\151\155\141\162\171\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\055\040\107\064
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\114\171\265\232\050\234\166\061\144\365\211\104\320\221
\002\336
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\247\060\202\002\055\240\003\002\001\002\002\020\114
\171\265\232\050\234\166\061\144\365\211\104\320\221\002\336\060
\012\006\010\052\206\110\316\075\004\003\003\060\201\224\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\035\060\033\006
\003\125\004\012\023\024\123\171\155\141\156\164\145\143\040\103
\157\162\160\157\162\141\164\151\157\156\061\037\060\035\006\003
\125\004\013\023\026\123\171\155\141\156\164\145\143\040\124\162
\165\163\164\040\116\145\164\167\157\162\153\061\105\060\103\006
\003\125\004\003\023\074\123\171\155\141\156\164\145\143\040\103
\154\141\163\163\040\063\040\120\165\142\154\151\143\040\120\162
\151\155\141\162\171\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040
\107\064\060\036\027\015\061\062\061\060\061\070\060\060\060\060
\060\060\132\027\015\063\067\061\062\060\061\062\063\065\071\065
\071\132\060\201\224\061\013\060\011\006\003\125\004\006\023\002
\125\123\061\035\060\033\006\003\125\004\012\023\024\123\171\155

\141\156\164\145\143\040\103\157\162\160\157\162\141\164\151\157
\156\061\037\060\035\006\003\125\004\013\023\026\123\171\155\141
\156\164\145\143\040\124\162\165\163\164\040\116\145\164\167\157
\162\153\061\105\060\103\006\003\125\004\003\023\074\123\171\155
\141\156\164\145\143\040\103\154\141\163\163\040\063\040\120\165
\142\154\151\143\040\120\162\151\155\141\162\171\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171\040\055\040\107\064\060\166\060\020\006\007\052
\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142\000
\004\127\317\352\263\071\115\077\241\041\340\156\057\070\162\306
\207\227\363\205\013\107\347\017\121\310\321\364\231\233\312\131
\145\377\114\371\352\013\267\045\325\322\366\354\061\055\062\142
\022\327\166\206\247\372\070\311\145\324\376\163\342\204\071\370
\114\111\142\023\335\272\325\210\240\137\075\310\117\260\077\217
\241\120\021\344\223\106\255\303\137\313\361\244\152\225\126\350
\300\243\102\060\100\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004
\024\044\235\274\322\161\367\035\302\045\276\042\361\211\245\054
\025\073\064\036\136\060\012\006\010\052\206\110\316\075\004\003
\003\003\150\000\060\145\002\061\000\271\146\150\145\333\005\320
\070\175\016\363\310\165\141\270\320\050\304\261\112\063\121\130
\373\362\074\020\310\256\107\170\166\312\146\044\027\206\076\120
\126\156\245\055\231\210\270\275\044\002\060\003\352\247\347\250
\074\352\235\142\306\137\124\332\230\364\167\275\117\217\030\234
\221\134\107\153\100\115\020\035\263\341\211\312\013\042\310\032
\305\305\376\213\335\301\337\157\170\237\221
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Symantec Class 3 Public Primary Certification Authority - G4"
# Issuer: CN=Symantec Class 3 Public Primary Certification Authority - G4,OU=Symantec Trust Network,O=Symantec
Corporation,C=US
# Serial Number:4c:79:b5:9a:28:9c:76:31:64:f5:89:44:d0:91:02:de
# Subject: CN=Symantec Class 3 Public Primary Certification Authority - G4,OU=Symantec Trust Network,O=Symantec Corporation,C=US
# Not Valid Before: Thu Oct 18 00:00:00 2012
# Not Valid After: Tue Dec 01 23:59:59 2037
# Fingerprint (MD5): 36:c9:b7:4b:6c:b0:21:4c:c7:11:17:b1:18:fe:2b:4d
# Fingerprint (SHA1): 58:d5:2d:b9:33:01:a4:fd:29:1a:8c:96:45:a0:8f:ee:7f:52:92:82
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE

```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Symantec Class 3 Public Primary Certification Authority - G4"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\130\325\055\271\063\001\244\375\051\032\214\226\105\240\217\356
\177\122\222\202
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\066\311\267\113\154\260\041\114\307\021\027\261\030\376\053\115
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\224\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\035\060\033\006\003\125\004\012\023\024\123\171\155\141\156
\164\145\143\040\103\157\162\160\157\162\141\164\151\157\156\061
\037\060\035\006\003\125\004\013\023\026\123\171\155\141\156\164
\145\143\040\124\162\165\163\164\040\116\145\164\167\157\162\153
\061\105\060\103\006\003\125\004\003\023\074\123\171\155\141\156
\164\145\143\040\103\154\141\163\163\040\063\040\120\165\142\154
\151\143\040\120\162\151\155\141\162\171\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\055\040\107\064
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\114\171\265\232\050\234\166\061\144\365\211\104\320\221
\002\336
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Hellenic Academic and Research Institutions RootCA 2011"
# Issuer: CN=Hellenic
 Academic and Research Institutions RootCA 2011,O=Hellenic Academic and Research Institutions Cert.
Authority,C=GR
# Serial Number: 0 (0x0)
# Subject: CN=Hellenic Academic and Research Institutions RootCA 2011,O=Hellenic Academic and Research
Institutions Cert. Authority,C=GR
# Not Valid Before: Tue Dec 06 13:49:52 2011
# Not Valid After: Mon Dec 01 13:49:52 2031
# Fingerprint (MD5): 73:9f:4c:4b:73:5b:79:e9:fa:ba:1c:ef:6e:cb:d5:c9
# Fingerprint (SHA1): fe:45:65:9b:79:03:5b:98:a1:61:b5:51:2e:ac:da:58:09:48:22:4d
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Hellenic Academic and Research Institutions RootCA 2011"
```

CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\225\061\013\060\011\006\003\125\004\006\023\002\107\122
\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154\145
\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144
\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164
\165\164\151\157\156\163\040\103\145\162\164\056\040\101\165\164
\150\157\162\151\164\171\061\100\060\076\006\003\125\004\003\023
\067\110\145\154\154\145\156\151\143\040\101\143\141\144\145\155
\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150\040
\111\156\163\164\151\164\165\164\151\157\156\163\040\122\157\157
\164\103\101\040\062\060\061\061
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\225\061\013\060\011\006\003\125\004\006\023\002\107\122
\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154\145
\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144
\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164
\165\164\151\157\156\163\040\103\145\162\164\056\040\101\165\164
\150\157\162\151\164\171\061\100\060\076\006\003\125\004\003\023
\067\110\145\154\154\145\156\151\143\040\101\143\141\144\145\155
\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150\040
\111\156\163\164\151\164\165\164\151\157\156\163\040\122\157\157
\164\103\101\040\062\060\061\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\000
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\061\060\202\003\031\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\201\225\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\104\060\102\006\003\125\004\012\023\073\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\145\162\164\056\040\101\165\164\150
\157\162\151\164\171\061\100\060\076\006\003\125\004\003\023\067
\110\145\154\154\145\156\151\143\040\101\143\141\144\145\155\151
\143\040\141\156\144\040\122\145\163\145\141\162\143\150\040\111
\156\163\164\151\164\165\164\151\157\156\163\040\122\157\157\164
\103\101\040\062\060\061\061\060\036\027\015\061\061\061\062\060
\066\061\063\064\071\065\062\132\027\015\063\061\061\062\060\061
\061\063\064\071\065\062\132\060\201\225\061\013\060\011\006\003
\125\004\006\023\002\107\122\061\104\060\102\006\003\125\004\012
\023\073\110\145\154\154\145\156\151\143\040\101\143\141\144\145

\155\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150
\040\111\156\163\164\151\164\165\164\151\157\156\163\040\103\145
\162\164\056\040\101\165\164\150\157\162\151\164\171\061\100\060
\076\006\003\125\004\003\023\067\110\145\154\154\145\156\151\143
\040\101\143\141\144\145\155\151\143\040\141\156\144\040\122\145
\163\145\141\162\143\150\040\111\156\163\164\151\164\165\164\151
\157\156\163\040\122\157\157\164\103\101\040\062\060\061\061\060
\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001\001
\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001\000
\251\123\000\343\056\246\366\216\372\140\330\055\225\076\370\054
\052\124\116\315\271\204\141\224\130\117\217\075\213\344\103\363
\165\211\215\121\344\303\067\322\212\210\115\171\036\267\022\335
\103\170\112\212\222\346\327\110\325\017\244\072\051\104\065\270
\007\366\150\035\125\315\070\121\360\214\044\061\205\257\203\311
\175\351\167\257\355\032\173\235\027\371\263\235\070\120\017\246
\132\171\221\200\257\067\256\246\323\061\373\265\046\011\235\074
\132\357\121\305\053\337\226\135\353\062\036\002\332\160\111\354
\156\014\310\232\067\215\367\361\066\140\113\046\054\202\236\320
\170\363\015\017\143\244\121\060\341\371\053\047\022\007\330\352
\275\030\142\230\260\131\067\175\276\356\363\040\121\102\132\203
\357\223\272\151\025\361\142\235\237\231\071\202\241\267\164\056
\213\324\305\013\173\057\360\310\012\332\075\171\012\232\223\034
\245\050\162\163\221\103\232\247\321\115\205\204\271\251\164\217
\024\100\307\334\336\254\101\144\154\264\031\233\002\143\155\044
\144\217\104\262\045\352\316\135\164\014\143\062\134\215\207\345
\002\003\001\000\001\243\201\211\060\201\206\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\013\006\003
\125\035\017\004\004\003\002\001\006\060\035\006\003\125\035\016
\004\026\004\024\246\221\102\375\023\141\112\043\236\010\244\051
\345\330\023\004\043\356\101\045\060\107\006\003\125\035\036\004
\100\060\076\240\074\060\005\202\003\056\147\162\060\005\202\003
\056\145\165\060\006\202\004\056\145\144\165\060\006\202\004\056
\157\162\147\060\005\201\003\056\147\162\060\005\201\003\056\145
\165\060\006\201\004\056\145\144\165\060\006\201\004\056\157\162
\147\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000
\003\202\001\001\000\037\357\171\101\341\173\156\077\262\214\206
\067\102\112\116\034\067\036\215\146\272\044\201\311\117\022\017
\041\300\003\227\206\045\155\135\323\042\051\250\154\242\015\251
\353\075\006\133\231\072\307\314\303\232\064\177\253\016\310\116
\034\341\372\344\334\315\015\276\277\044\376\154\347\153\302\015
\310\006\236\116\215\141\050\246\152\375\345\366\142\352\030\074
\116\240\123\235\262\072\234\353\245\234\221\026\266\115\202\340
\014\005\110\251\154\365\314\370\313\235\111\264\360\002\245\375
\160\003\355\212\041\245\256\023\206\111\303\063\163\276\207\073
\164\213\027\105\046\114\026\221\203\376\147\175\315\115\143\147
\372\363\003\022\226\170\006\215\261\147\355\216\077\276\237\117
\002\365\263\011\057\363\114\207\337\052\313\225\174\001\314\254
\066\172\277\242\163\172\367\217\301\265\232\241\024\262\217\063

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\237\015\357\042\334\146\173\204\275\105\027\006\075\074\312\271
\167\064\217\312\352\317\077\061\076\343\210\343\200\111\045\310
\227\265\235\232\231\115\260\074\370\112\000\233\144\335\237\071
\113\321\047\327\270
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Hellenic Academic and Research Institutions RootCA 2011"
# Issuer: CN=Hellenic Academic and Research Institutions RootCA 2011,O=Hellenic Academic and Research
Institutions Cert. Authority,C=GR
# Serial Number: 0 (0x0)
# Subject: CN=Hellenic Academic and Research
 Institutions RootCA 2011,O=Hellenic Academic and Research Institutions Cert. Authority,C=GR
# Not Valid Before: Tue Dec 06 13:49:52 2011
# Not Valid After: Mon Dec 01 13:49:52 2031
# Fingerprint (MD5): 73:9f:4c:4b:73:5b:79:e9:fa:ba:1c:ef:6e:cb:d5:c9
# Fingerprint (SHA1): fe:45:65:9b:79:03:5b:98:a1:61:b5:51:2e:ac:da:58:09:48:22:4d
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Hellenic Academic and Research Institutions RootCA 2011"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\376\105\145\233\171\003\133\230\241\141\265\121\056\254\332\130
\011\110\042\115
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\163\237\114\113\163\133\171\351\372\272\034\357\156\313\325\311
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\225\061\013\060\011\006\003\125\004\006\023\002\107\122
\061\104\060\102\006\003\125\004\012\023\073\110\145\154\154\145
\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144
\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164
\165\164\151\157\156\163\040\103\145\162\164\056\040\101\165\164
\150\157\162\151\164\171\061\100\060\076\006\003\125\004\003\023
\067\110\145\154\154\145\156\151\143\040\101\143\141\144\145\155
\151\143\040\141\156\144\040\122\145\163\145\141\162\143\150\040
\111\156\163\164\151\164\165\164\151\157\156\163\040\122\157\157
\164\103\101\040\062\060\061\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\000
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END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "ATHEX Root CA"
# Issuer: CN=ATHEX Root CA,O=Athens Exchange S.A.,C=GR
# Serial Number: 10012 (0x271c)
# Subject: CN=ATHEX Root CA,O=Athens Exchange S.A.,C=GR
# Not Valid Before: Mon Oct 18 15:56:03 2010
# Not Valid After: Thu Oct 17 21:00:00 2030
# Fingerprint
 (MD5): af:2b:7a:55:2d:3a:35:02:a4:92:40:16:0c:fa:98:26
# Fingerprint (SHA1): db:2b:7b:43:4d:fb:7f:c1:cb:59:26:ec:5d:95:21:fe:35:0f:f2:79
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ATHEX Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\035\060\033\006\003\125\004\012\023\024\101\164\150\145\156\163
\040\105\170\143\150\141\156\147\145\040\123\056\101\056\061\026
\060\024\006\003\125\004\003\023\015\101\124\110\105\130\040\122
\157\157\164\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\035\060\033\006\003\125\004\012\023\024\101\164\150\145\156\163
\040\105\170\143\150\141\156\147\145\040\123\056\101\056\061\026
\060\024\006\003\125\004\003\023\015\101\124\110\105\130\040\122
\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\002\047\034
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\067\060\202\002\037\240\003\002\001\002\002\002\047
\034\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000
\060\104\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\035\060\033\006\003\125\004\012\023\024\101\164\150\145\156\163
\040\105\170\143\150\141\156\147\145\040\123\056\101\056\061\026
\060\024\006\003\125\004\003\023\015\101\124\110\105\130\040\122
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\157\157\164\040\103\101\060\036\027\015\061\060\061\060\061\070
\061\065\065\066\060\063\132\027\015\063\060\061\060\061\067\062
\061\060\060\060\060\132\060\104\061\013\060\011\006\003\125\004
\006\023\002\107\122\061\035\060\033\006\003\125\004\012\023\024
\101\164\150\145\156\163\040\105\170\143\150\141\156\147\145\040
\123\056\101\056\061\026\060\024\006\003\125\004\003\023\015\101
\124\110\105\130\040\122\157\157\164\040\103\101\060\202\001\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\001\017\000\060\202\001\012\002\202\001\001\000\315\032\075
\060\265\263\070\262\277\172\273\256\241\326\327\205\360\042\072
\244\211\151\304\341\142\004\311\160\323\074\063\022\342\346\070
\345\167\244\044\104\144\015\267\256\114\132\335\341\030\006\076
\355\233\132\005\365\341\336\022\355\066\052\334\107\331\221\121
\231\355\261\277\152\163\241\012\010\044\250\212\215\034\013\131
\323\277\160\043\125\104\240\214\060\305\316\155\117\260\354\276
\363\214\061\337\012\132\334\323\127\134\005\240\063\225\073\227
\217\124\013\270\365\153\175\307\305\254\265\171\216\006\070\361
\250\051\125\075\232\066\320\047\137\064\152\022\170\027\050\331
\230\111\354\331\132\122\332\046\072\372\356\114\246\046\216\250
\076\125\037\262\037\341\265\233\371\072\065\366\355\221\034\375
\013\020\044\375\037\371\323\343\000\045\261\013\045\300\267\175
\232\074\007\072\200\013\326\250\376\221\105\350\301\322\305\042
\157\323\345\161\037\266\054\066\264\130\240\355\315\112\150\344
\152\127\364\241\165\354\327\000\231\325\366\231\134\353\116\311
\273\327\032\243\105\131\000\017\214\073\333\164\065\002\003\001
\000\001\243\063\060\061\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\021\006\003\125\035\016\004\012
\004\010\103\342\200\350\273\322\267\301\060\013\006\003\125\035
\017\004\004\003\002\001\006\060\015\006\011\052\206\110\206\367
\015\001\001\005\005\000\003\202\001\001\000\077\001\143\165\007
\062\053\137\165\377\166\216\323\251\270\157\314\120\075\204\127
\117\050\203\350\174\243\156\242\274\367\302\272\256\072\253\116
\320\017\222\050\270\335\133\054\333\345\326\037\072\223\341\221
\016\327\252\137\001\141\054\076\141\117\336\225\025\115\314\075
\352\062\342\243\376\370\026\251\362\274\051\374\051\236\175\162
\245\135\241\153\002\325\137\110\364\240\073\313\030\106\360\075
\027\125\203\320\051\141\221\273\232\101\111\321\023\276\101\224
\362\076\303\044\253\237\307\153\102\220\102\171\176\132\121\373
\074\136\013\041\037\313\331\110\023\025\261\152\177\003\304\321
\272\121\322\160\211\252\010\112\207\034\366\172\230\261\324\121
\005\125\306\220\027\157\303\340\004\300\172\364\057\030\242\126
\102\163\056\266\262\233\321\071\276\011\302\002\112\044\027\371
\367\254\275\161\007\277\225\342\227\345\241\204\010\215\262\342
\104\241\334\211\060\073\250\014\005\172\135\166\000\117\036\157
\161\177\053\071\332\105\102\071\061\322\251\062\100\324\070\143
\023\226\067\232\111\135\331\307\375\270\114
END
CKA_NSS_MOZILLA_CA_POLICY

```
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "ATHEX Root CA"
# Issuer: CN=ATHEX Root CA,O=Athens Exchange S.A.,C=GR
# Serial Number: 10012 (0x271c)
# Subject: CN=ATHEX Root CA,O=Athens Exchange S.A.,C=GR
# Not Valid Before: Mon Oct 18 15:56:03 2010
# Not Valid After: Thu Oct 17 21:00:00 2030
# Fingerprint (MD5): af:2b:7a:55:2d:3a:35:02:a4:92:40:16:0c:fa:98:26
# Fingerprint (SHA1): db:2b:7b:43:4d:fb:7f:c1:cb:59:26:ec:5d:95:21:fe:35:0f:f2:79
CKA_CLASS
 CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ATHEX Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\333\053\173\103\115\373\177\301\313\131\046\354\135\225\041\376
\065\017\362\171
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\257\053\172\125\055\072\065\002\244\222\100\026\014\372\230\046
END
CKA_ISSUER MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\035\060\033\006\003\125\004\012\023\024\101\164\150\145\156\163
\040\105\170\143\150\141\156\147\145\040\123\056\101\056\061\026
\060\024\006\003\125\004\003\023\015\101\124\110\105\130\040\122
\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\002\047\034
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED
 CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Halcom Root CA"
# Issuer: CN=Halcom Root CA,O=Halcom,C=SI
# Serial Number: 504275 (0x7b1d3)
# Subject: CN=Halcom Root CA,O=Halcom,C=SI
# Not Valid Before: Wed Feb 08 09:55:41 2012
```

```
# Not Valid After: Sun Feb 08 09:55:41 2032
# Fingerprint (MD5): c3:8b:d2:53:ac:00:ec:d1:db:97:61:a5:38:d9:7d:87
# Fingerprint (SHA1): 53:5b:00:16:72:ab:bf:7b:6c:c2:54:05:ae:4d:24:fe:03:3f:d1:cc
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Halcom Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\067\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\017\060\015\006\003\125\004\012\023\006\110\141\154\143\157\155
\061\027\060\025\006\003\125\004\003\023\016\110\141\154\143\157
\155\040\122\157\157\164\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\067\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\017\060\015\006\003\125\004\012\023\006\110\141\154\143\157\155
\061\027\060\025\006\003\125\004\003\023\016\110\141\154\143\157
\155\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\003\007\261\323
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\036\060\202\002\006\240\003\002\001\002\002\003\007
\261\323\060\015\006\011\052\206\110\206\367\015\001\001\015\005
\000\060\067\061\013\060\011\006\003\125\004\006\023\002\123\111
\061\017\060\015\006\003\125\004\012\023\006\110\141\154\143\157
\155\061\027\060\025\006\003\125\004\003\023\016\110\141\154\143
\157\155\040\122\157\157\164\040\103\101\060\036\027\015\061\062
\060\062\060\070\060\071\065\065\064\061\132\027\015\063\062\060
\062\060\070\060\071\065\065\064\061\132\060\067\061\013\060\011
\006\003\125\004\006\023\002\123\111\061\017\060\015\006\003\125
\004\012\023\006\110\141\154\143\157\155\061\027\060\025\006\003
\125\004\003\023\016\110\141\154\143\157\155\040\122\157\157\164
\040\103\101\060\202\001\042\060\015\006\011\052\206\110\206\367
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002
\202\001\001\000\211\271\205\312\376\364\165\175\177\354\235\102
\067\272\272\215\274\354\075\027\003\375\331\105\145\326\315\311
\116\137\214\110\134\227\010\127\024\213\055\234\074\220\111\231
\317\151\257\111\215\333\034\001\260\156\351\364\352\221\147\135
\312\263\151\117\330\314\301\015\075\356\252\003\166\340\311\160
\242\237\376\353\233\320\266\311\226\323\360\373\133\320\360\007
\253\114\136\115\244\342\107\136\005\150\164\246\216\042\107\356
\176\323\147\204\124\067\222\107\016\363\243\354\025\032\363\155
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\173\277\031\065\041\217\202\113\254\124\234\011\315\156\266\301
\127\275\320\111\075\157\237\163\216\261\154\176\275\376\326\273
\075\003\350\346\114\032\264\356\257\264\203\116\062\220\124\366
\116\033\341\057\316\245\064\032\216\243\040\371\331\076\042\153
\157\156\343\372\331\063\134\010\240\367\025\000\075\234\020\222
\112\125\315\200\262\006\252\375\327\217\267\132\222\047\044\017
\063\074\050\272\361\037\150\265\167\051\136\256\302\332\215\066
\160\342\172\062\033\043\246\336\305\141\015\232\245\022\040\265
\363\226\131\265\002\003\001\000\001\243\063\060\061\060\017\006
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\021
\006\003\125\035\016\004\012\004\010\116\224\330\212\143\302\317
\171\060\013\006\003\125\035\017\004\004\003\002\001\006\060\015
\006\011\052\206\110\206\367\015\001\001\015\005\000\003\202\001
\001\000\051\276\347\261\344\372\003\242\017\257\166\131\235\370
\116\123\115\074\004\203\237\241\342\214\366\224\331\264\256\150
\052\126\153\062\123\050\203\007\162\114\260\116\250\035\201\203
\041\147\003\067\321\214\306\301\116\204\351\064\073\323\365\365
\047\266\215\043\005\122\270\114\062\362\056\332\321\052\175\076
\203\003\052\322\261\343\232\351\212\203\102\360\054\012\241\123
\017\300\053\342\217\032\116\225\271\105\274\113\147\072\275\062
\363\255\245\217\217\303\056\352\366\364\173\142\320\156\156\305
\141\061\023\146\346\147\111\231\073\057\200\117\172\174\163\212
\003\015\137\365\263\062\050\012\212\300\341\371\270\243\046\356
\334\033\127\317\166\032\117\123\276\366\112\213\127\027\053\057
\231\206\252\336\214\332\266\250\154\337\150\066\326\141\213\156
\300\163\116\267\071\105\364\175\316\111\304\363\035\371\251\167
\154\357\357\222\025\023\047\231\106\350\237\251\212\033\237\051
\057\242\035\076\326\053\307\344\125\020\072\030\367\263\173\117
\056\307\000\042\355\344\061\320\347\270\344\124\117\301\200\105
\045\156
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Halcom Root CA"
# Issuer: CN=Halcom Root CA,O=Halcom,C=SI
# Serial Number: 504275 (0x7b1d3)
# Subject: CN=Halcom Root CA,O=Halcom,C=SI
# Not Valid Before: Wed Feb 08 09:55:41 2012
# Not Valid After: Sun Feb 08 09:55:41 2032
# Fingerprint (MD5): c3:8b:d2:53:ac:00:ec:d1:db:97:61:a5:38:d9:7d:87
#
Fingerprint (SHA1): 53:5b:00:16:72:ab:bf:7b:6c:c2:54:05:ae:4d:24:fe:03:3f:d1:cc
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE

```
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Halcom Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\123\133\000\026\162\253\277\173\154\302\124\005\256\115\044\376
\003\077\321\314
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\303\213\322\123\254\000\354\321\333\227\141\245\070\331\175\207
END
CKA_ISSUER MULTILINE_OCTAL
\060\067\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\017\060\015\006\003\125\004\012\023\006\110\141\154\143\157\155
\061\027\060\025\006\003\125\004\003\023\016\110\141\154\143\157
\155\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\007\261\323
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED
 CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Swisscom Root EV CA 2"
# Issuer: CN=Swisscom Root EV CA 2,OU=Digital Certificate Services,O=Swisscom,C=ch
# Serial Number:f2:fa:64:e2:74:63:d3:8d:fd:10:1d:04:1f:76:ca:58
# Subject: CN=Swisscom Root EV CA 2,OU=Digital Certificate Services,O=Swisscom,C=ch
# Not Valid Before: Fri Jun 24 09:45:08 2011
# Not Valid After: Wed Jun 25 08:45:08 2031
# Fingerprint (MD5): 7b:30:34:9f:dd:0a:4b:6b:35:ca:31:51:28:5d:ae:ec
# Fingerprint (SHA1): e7:a1:90:29:d3:d5:52:dc:0d:0f:c6:92:d3:ea:88:0d:15:2e:1a:6b
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Swisscom Root EV CA 2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\147\061\013\060\011\006\003\125\004\006\023\002\143\150\061
\021\060\017\006\003\125\004\012\023\010\123\167\151\163\163\143
\157\155\061\045\060\043\006\003\125\004\013\023\034\104\151\147
\151\164\141\154\040\103\145\162\164\151\146\151\143\141\164\145
\040\123\145\162\166\151\143\145\163\061\036\060\034\006\003\125
\004\003\023\025\123\167\151\163\163\143\157\155\040\122\157\157
\164\040\105\126\040\103\101\040\062
```

END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\147\061\013\060\011\006\003\125\004\006\023\002\143\150\061
\021\060\017\006\003\125\004\012\023\010\123\167\151\163\163\143
\157\155\061\045\060\043\006\003\125\004\013\023\034\104\151\147
\151\164\141\154\040\103\145\162\164\151\146\151\143\141\164\145
\040\123\145\162\166\151\143\145\163\061\036\060\034\006\003\125
\004\003\023\025\123\167\151\163\163\143\157\155\040\122\157\157
\164\040\105\126\040\103\101\040\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\362\372\144\342\164\143\323\215\375\020\035\004\037
\166\312\130
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\340\060\202\003\310\240\003\002\001\002\002\021\000
\362\372\144\342\164\143\323\215\375\020\035\004\037\166\312\130
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\147\061\013\060\011\006\003\125\004\006\023\002\143\150\061\021
\060\017\006\003\125\004\012\023\010\123\167\151\163\163\143\157
\155\061\045\060\043\006\003\125\004\013\023\034\104\151\147\151
\164\141\154\040\103\145\162\164\151\146\151\143\141\164\145\040
\123\145\162\166\151\143\145\163\061\036\060\034\006\003\125\004
\003\023\025\123\167\151\163\163\143\157\155\040\122\157\157\164
\040\105\126\040\103\101\040\062\060\036\027\015\061\061\060\066
\062\064\060\071\064\065\060\070\132\027\015\063\061\060\066\062
\065\060\070\064\065\060\070\132\060\147\061\013\060\011\006\003
\125\004\006\023\002\143\150\061\021\060\017\006\003\125\004\012
\023\010\123\167\151\163\163\143\157\155\061\045\060\043\006\003
\125\004\013\023\034\104\151\147\151\164\141\154\040\103\145\162
\164\151\146\151\143\141\164\145\040\123\145\162\166\151\143\145
\163\061\036\060\034\006\003\125\004\003\023\025\123\167\151\163
\163\143\157\155\040\122\157\157\164\040\105\126\040\103\101\040
\062\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002
\001\000\304\367\035\057\127\352\127\154\367\160\135\143\260\161
\122\011\140\104\050\063\243\172\116\012\372\330\352\154\213\121
\026\032\125\256\124\046\304\314\105\007\101\117\020\171\177\161
\322\172\116\077\070\116\263\000\306\225\312\133\315\301\052\203
\327\047\037\061\016\043\026\267\045\313\034\264\271\200\062\136
\032\235\223\361\350\074\140\054\247\136\127\031\130\121\136\274
\054\126\013\270\330\357\213\202\264\074\270\302\044\250\023\307
\240\041\066\033\172\127\051\050\247\056\277\161\045\220\363\104
\203\151\120\244\344\341\033\142\031\224\011\243\363\303\274\357
\364\275\354\333\023\235\317\235\110\011\122\147\300\067\051\021
\036\373\322\021\247\205\030\164\171\344\117\205\024\353\122\067

\342\261\105\330\314\015\103\177\256\023\322\153\053\077\247\302
\342\250\155\166\133\103\237\276\264\235\263\046\206\073\037\177
\345\362\350\146\050\026\045\320\113\227\070\247\344\317\011\321
\066\303\013\276\332\073\104\130\215\276\361\236\011\153\076\363
\062\307\053\207\306\354\136\234\366\207\145\255\063\051\304\057
\211\331\271\313\311\003\235\373\154\224\121\227\020\033\206\013
\032\033\077\366\002\176\173\324\305\121\144\050\235\365\323\254
\203\201\210\323\164\264\131\235\301\353\141\063\132\105\321\313
\071\320\006\152\123\140\035\257\366\373\151\274\152\334\001\317
\275\371\217\331\275\133\301\072\137\216\332\017\113\251\233\235
\052\050\153\032\012\174\074\253\042\013\345\167\055\161\366\202
\065\201\256\370\173\201\346\352\376\254\364\032\233\164\134\350
\217\044\366\135\235\106\304\054\322\036\053\041\152\203\047\147
\125\112\244\343\310\062\227\146\220\162\332\343\324\144\056\137
\343\241\152\366\140\324\347\065\315\312\304\150\215\327\161\310
\323\044\063\163\261\154\371\152\341\050\333\137\306\075\350\276
\125\346\067\033\355\044\331\017\031\217\137\143\030\130\120\201
\121\145\157\362\237\176\152\004\347\064\044\161\272\166\113\130
\036\031\275\025\140\105\252\014\022\100\001\235\020\342\307\070
\007\162\012\145\300\266\273\045\051\332\026\236\213\065\213\141
\355\345\161\127\203\265\074\161\237\343\117\277\176\036\201\237
\101\227\002\003\001\000\001\243\201\206\060\201\203\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\206\060\035\006
\003\125\035\041\004\026\060\024\060\022\006\007\140\205\164\001
\123\002\002\006\007\140\205\164\001\123\002\002\060\022\006\003
\125\035\023\001\001\377\004\010\060\006\001\001\377\002\001\003
\060\035\006\003\125\035\016\004\026\004\024\105\331\245\201\156
\075\210\115\215\161\322\106\301\156\105\036\363\304\200\235\060
\037\006\003\125\035\043\004\030\060\026\200\024\105\331\245\201
\156\075\210\115\215\161\322\106\301\156\105\036\363\304\200\235
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003
\202\002\001\000\224\072\163\006\237\122\113\060\134\324\376\261
\134\045\371\327\216\157\365\207\144\237\355\024\216\270\004\216
\050\113\217\252\173\216\071\264\331\130\366\173\241\065\012\241
\235\212\367\143\345\353\275\071\202\324\343\172\055\157\337\023
\074\272\376\176\126\230\013\363\124\237\315\104\116\156\074\341
\076\025\277\006\046\235\344\360\220\266\324\302\236\060\056\037
\357\307\172\304\120\307\352\173\332\120\313\172\046\313\000\264
\132\253\265\223\037\200\211\204\004\225\215\215\177\011\223\277
\324\250\250\344\143\155\331\144\344\270\051\132\010\277\120\341
\204\017\125\173\137\010\042\033\365\275\231\036\024\366\316\364
\130\020\202\263\012\075\031\301\277\133\253\252\231\330\362\061
\275\345\070\146\334\130\005\307\355\143\032\056\012\227\174\207
\223\053\262\212\343\361\354\030\345\165\266\051\207\347\334\213
\032\176\264\330\311\323\212\027\154\175\051\104\276\212\252\365
\176\072\056\150\061\223\271\152\332\232\340\333\351\056\245\204
\315\034\012\270\112\010\371\234\361\141\046\230\223\267\173\146
\354\221\136\335\121\077\333\163\017\255\004\130\011\335\004\002

\225\012\076\323\166\337\246\020\036\200\075\350\315\244\144\321
\063\307\222\307\342\116\104\343\011\311\116\302\135\207\016\022
\236\277\017\311\005\020\336\172\243\261\074\362\077\245\252\047
\171\255\061\175\037\375\374\031\151\305\335\271\077\174\315\306
\264\302\060\036\176\156\222\327\177\141\166\132\217\353\225\115
\274\021\156\041\174\131\067\231\320\006\274\371\006\155\062\026
\245\331\151\250\341\334\074\200\036\140\121\334\327\124\041\036
\312\142\167\117\372\330\217\263\053\072\015\170\162\311\150\101
\132\107\112\302\243\353\032\327\012\253\074\062\125\310\012\021
\234\337\164\326\360\100\025\035\310\271\217\265\066\305\257\370
\042\270\312\035\363\326\266\031\017\237\141\145\152\352\164\310
\174\217\303\117\135\145\202\037\331\015\211\332\165\162\373\357
\361\107\147\023\263\310\321\031\210\047\046\232\231\171\177\036
\344\054\077\173\356\361\336\115\213\226\227\303\325\077\174\033
\043\355\244\263\035\026\162\103\113\040\341\131\176\302\350\255
\046\277\242\367
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Swisscom Root EV CA 2"
# Issuer: CN=Swisscom Root EV CA 2,OU=Digital Certificate Services,O=Swisscom,C=ch
# Serial Number:f2:fa:64:e2:74:63:d3:8d:fd:10:1d:04:1f:76:ca:58
# Subject: CN=Swisscom Root EV CA 2,OU=Digital Certificate Services,O=Swisscom,C=ch
# Not Valid Before: Fri Jun 24 09:45:08 2011
# Not Valid After: Wed Jun 25 08:45:08 2031
# Fingerprint (MD5): 7b:30:34:9f:dd:0a:4b:6b:35:ca:31:51:28:5d:ae:ec
# Fingerprint (SHA1): e7:a1:90:29:d3:d5:52:dc:0d:0f:c6:92:d3:ea:88:0d:15:2e:1a:6b
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Swisscom Root EV CA 2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\347\241\220\051\323\325\122\334\015\017\306\222\323\352\210\015
\025\056\032\153
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\173\060\064\237\335\012\113\153\065\312\061\121\050\135\256\354
END
CKA_ISSUER MULTILINE_OCTAL
\060\147\061\013\060\011\006\003\125\004\006\023\002\143\150\061
\021\060\017\006\003\125\004\012\023\010\123\167\151\163\163\143
\157\155\061\045\060\043\006\003\125\004\013\023\034\104\151\147

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\151\164\141\154\040\103\145\162\164\151\146\151\143\141\164\145
\040\123\145\162\166\151\143\145\163\061\036\060\034\006\003\125
\004\003\023\025\123\167\151\163\163\143\157\155\040\122\157\157
\164\040\105\126\040\103\101\040\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\362\372\144\342\164\143\323\215\375\020\035\004\037
\166\312\130
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "CFCA GT CA"
# Issuer: O=CFCA
 GT CA,C=CN
# Serial Number:19:99:3c:3f
# Subject: O=CFCA GT CA,C=CN
# Not Valid Before: Mon Jun 13 08:15:09 2011
# Not Valid After: Tue Jun 09 08:15:09 2026
# Fingerprint (MD5): 2c:cd:f3:c5:59:a6:84:64:a0:67:50:ff:4b:4c:d6:14
# Fingerprint (SHA1): ea:bd:a2:40:44:0a:bb:d6:94:93:0a:01:d0:97:64:c6:c2:d7:79:66
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CFCA GT CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\042\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\023\060\021\006\003\125\004\012\023\012\103\106\103\101\040\107
\124\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\042\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\023\060\021\006\003\125\004\012\023\012\103\106\103\101\040\107
\124\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\031\231\074\077
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\037\060\202\002\007\240\003\002\001\002\002\004\031
\231\074\077\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\042\061\013\060\011\006\003\125\004\006\023\002\103
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\116\061\023\060\021\006\003\125\004\012\023\012\103\106\103\101
\040\107\124\040\103\101\060\036\027\015\061\061\060\066\061\063
\060\070\061\065\060\071\132\027\015\062\066\060\066\060\071\060
\070\061\065\060\071\132\060\042\061\013\060\011\006\003\125\004
\006\023\002\103\116\061\023\060\021\006\003\125\004\012\023\012
\103\106\103\101\040\107\124\040\103\101\060\202\001\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001
\017\000\060\202\001\012\002\202\001\001\000\277\163\306\132\053
\214\170\366\130\267\374\322\027\220\245\053\164\354\201\054\223
\315\122\314\156\344\052\313\044\241\061\344\255\060\156\343\230
\042\061\327\041\233\237\325\017\067\057\132\273\070\242\267\171
\046\147\326\015\305\027\052\234\271\124\004\341\015\165\206\156
\330\314\305\200\147\033\310\214\055\000\046\206\074\172\171\076
\266\251\302\116\040\260\067\227\306\205\166\022\202\012\347\124
\273\213\376\075\256\343\354\153\130\103\366\245\067\353\130\242
\275\220\304\345\373\312\153\312\060\154\267\173\211\366\061\322
\214\377\117\302\226\045\103\251\161\065\045\013\030\341\254\310
\243\044\266\161\223\214\361\135\374\234\020\005\173\377\300\133
\340\261\227\255\037\330\376\105\365\300\037\235\133\107\071\034
\006\372\333\146\205\333\044\043\352\173\322\071\040\370\353\052
\262\032\121\363\224\132\050\002\116\247\134\107\156\317\374\331
\350\346\141\132\026\047\307\025\015\230\331\350\323\003\065\220
\051\337\262\057\215\020\167\043\310\270\172\323\021\141\152\363
\377\201\222\245\354\102\113\150\116\200\327\002\003\001\000\001
\243\135\060\133\060\037\006\003\125\035\043\004\030\060\026\200
\024\214\166\120\316\045\323\171\053\074\364\155\235\232\341\236
\005\117\350\075\045\060\014\006\003\125\035\023\004\005\060\003
\001\001\377\060\013\006\003\125\035\017\004\004\003\002\001\306
\060\035\006\003\125\035\016\004\026\004\024\214\166\120\316\045
\323\171\053\074\364\155\235\232\341\236\005\117\350\075\045\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003\202
\001\001\000\276\273\226\130\324\335\211\211\017\054\315\372\143
\105\166\015\071\200\232\215\372\250\105\141\075\041\125\350\316
\150\307\031\351\302\261\007\302\213\073\057\317\141\205\220\247
\122\027\062\072\257\012\005\025\310\306\316\335\216\224\046\006
\370\320\140\356\263\156\324\015\272\132\335\253\240\174\120\162
\246\325\220\223\126\327\131\071\333\350\177\263\225\170\123\201
\122\122\137\364\222\201\002\301\373\042\271\321\003\127\247\176
\313\373\300\106\274\023\164\114\050\053\166\222\151\037\301\120
\221\021\305\114\336\013\224\214\027\203\214\257\067\207\264\352
\153\157\242\132\065\101\141\205\057\234\027\300\373\271\016\242
\141\006\107\166\274\220\011\230\164\015\322\010\057\275\344\015
\162\361\246\137\303\174\300\175\352\274\323\253\040\221\313\134
\005\214\235\250\065\372\066\126\273\011\363\204\135\326\361\342
\054\236\331\176\361\202\240\341\267\057\176\355\371\173\240\000
\270\262\336\035\171\341\201\363\122\131\232\024\135\347\302\021
\363\232\303\072\170\043\276\116\146\336\244\071\151\362\230\072
\054\012\000

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END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "CFCA GT CA"
# Issuer: O=CFCA GT CA,C=CN
# Serial Number:19:99:3c:3f
# Subject: O=CFCA GT CA,C=CN
# Not Valid Before: Mon Jun 13 08:15:09 2011
# Not Valid After: Tue Jun 09 08:15:09 2026
# Fingerprint (MD5): 2c:cd:f3:c5:59:a6:84:64:a0:67:50:ff:4b:4c:d6:14
# Fingerprint (SHA1): ea:bd:a2:40:44:0a:bb:d6:94:93:0a:01:d0:97:64:c6:c2:d7:79:66
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CFCA GT CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\352\275\242\100\104\012\273\326\224\223\012\001\320\227\144\306
\302\327\171\146
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\054\315\363\305\131\246\204\144\240\147\120\377\113\114\326\024
END
CKA_ISSUER MULTILINE_OCTAL
\060\042\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\023\060\021\006\003\125\004\012\023\012\103\106\103\101\040\107
\124\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\031\231\074\077
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Digidentity L3 Root CA - G2"
# Issuer: CN=Digidentity L3 Root CA - G2,O=Digidentity B.V.,C=NL
# Serial Number: 1 (0x1)
# Subject: CN=Digidentity L3 Root CA - G2,O=Digidentity B.V.,C=NL
# Not Valid Before: Fri Apr 29 10:44:19 2011
# Not Valid After: Mon Nov 10 10:44:19 2031
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# Fingerprint (MD5): 26:8f:5b:c8:b6:3f:88:8c:4c:49:08:2e:18:c1:02:10
#
 Fingerprint (SHA1): f1:38:a3:30:a4:ea:98:6b:eb:52:0b:b1:10:35:87:6e:fb:9d:7f:1c
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Digidentity L3 Root CA - G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\031\060\027\006\003\125\004\012\023\020\104\151\147\151\144\145
\156\164\151\164\171\040\102\056\126\056\061\044\060\042\006\003
\125\004\003\023\033\104\151\147\151\144\145\156\164\151\164\171
\040\114\063\040\122\157\157\164\040\103\101\040\055\040\107\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\031\060\027\006\003\125\004\012\023\020\104\151\147\151\144\145
\156\164\151\164\171\040\102\056\126\056\061\044\060\042\006\003
\125\004\003\023\033\104\151\147\151\144\145\156\164\151\164\171
\040\114\063\040\122\157\157\164\040\103\101\040\055\040\107\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\241\060\202\003\211\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\116\061\013\060\011\006\003\125\004\006\023\002\116\114\061\031
\060\027\006\003\125\004\012\023\020\104\151\147\151\144\145\156
\164\151\164\171\040\102\056\126\056\061\044\060\042\006\003\125
\004\003\023\033\104\151\147\151\144\145\156\164\151\164\171\040
\114\063\040\122\157\157\164\040\103\101\040\055\040\107\062\060
\036\027\015\061\061\060\064\062\071\061\060\064\064\061\071\132
\027\015\063\061\061\061\061\060\061\060\064\064\061\071\132\060
\116\061\013\060\011\006\003\125\004\006\023\002\116\114\061\031
\060\027\006\003\125\004\012\023\020\104\151\147\151\144\145\156
\164\151\164\171\040\102\056\126\056\061\044\060\042\006\003\125
\004\003\023\033\104\151\147\151\144\145\156\164\151\164\171\040
\114\063\040\122\157\157\164\040\103\101\040\055\040\107\062\060
\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001
\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000
\270\021\243\105\336\001\107\126\015\142\270\216\272\130\146\134
\372\062\306\153\200\156\270\177\370\123\337\176\337\142\250\301
\127\117\232\105\045\310\112\105\055\123\070\044\263\040\254\117
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\352\255\377\232\020\257\177\342\016\312\264\016\044\045\221\316
\166\216\020\251\057\231\123\247\220\113\004\213\155\172\271\101
\033\323\001\171\214\237\101\153\271\220\327\201\022\032\007\226
\320\011\257\351\344\152\041\123\200\270\206\236\142\150\103\255
\263\152\025\372\366\155\003\062\152\065\261\120\023\110\307\172
\265\041\023\234\004\234\332\223\371\152\053\301\247\030\375\366
\300\176\131\366\373\347\016\021\265\334\043\352\034\357\147\005
\127\316\027\351\361\173\261\321\062\044\214\317\145\347\324\274
\066\031\160\174\242\047\041\326\200\322\055\025\117\112\265\340
\125\220\225\121\223\041\200\363\234\104\037\377\035\125\125\344
\342\020\021\224\026\123\320\376\257\363\357\227\272\106\342\167
\133\313\326\242\131\021\210\246\347\125\101\303\222\145\035\043
\024\142\024\177\045\162\040\366\244\207\051\157\007\374\376\340
\320\030\322\227\371\024\216\066\306\350\014\030\227\361\166\034
\364\044\332\343\112\371\267\114\022\031\147\363\360\341\123\373
\135\344\300\164\143\137\045\221\012\331\076\364\063\254\344\013
\165\137\316\346\230\274\124\015\235\242\061\305\025\124\135\042
\034\213\072\124\246\015\321\327\043\072\254\076\252\112\027\144
\166\055\015\373\124\345\353\202\074\071\101\103\235\341\256\171
\140\317\146\356\307\161\203\173\014\153\011\333\236\242\115\116
\106\223\150\267\372\147\341\332\277\337\221\200\332\243\242\211
\255\136\154\314\113\167\165\144\157\215\044\343\210\210\013\343
\077\351\277\247\345\126\142\015\203\177\275\152\141\310\220\211
\170\133\014\257\022\052\342\223\255\144\347\331\105\056\366\260
\310\253\105\356\160\070\157\273\065\076\026\376\253\236\303\146
\057\363\276\011\140\325\157\200\275\115\333\257\215\376\014\140
\063\153\017\350\235\153\304\060\167\237\054\120\070\320\230\151
\354\067\350\236\017\344\142\352\372\377\021\104\124\331\357\315
\223\165\221\114\341\211\145\246\224\271\123\371\371\111\143\305
\002\003\001\000\001\243\201\211\060\201\206\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003
\125\035\016\004\026\004\024\053\043\040\140\275\055\212\210\107
\254\255\053\276\002\071\272\230\324\354\230\060\104\006\003\125
\035\040\004\075\060\073\060\071\006\004\125\035\040\000\060\061
\060\057\006\010\053\006\001\005\005\007\002\001\026\043\150\164
\164\160\072\057\057\160\153\151\056\144\151\147\151\144\145\156
\164\151\164\171\056\145\165\057\166\141\154\151\144\141\164\151
\145\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000
\003\202\002\001\000\251\375\357\272\217\033\176\062\022\147\035
\101\015\055\246\213\317\362\364\255\126\170\176\012\230\330\233
\250\321\264\113\054\046\254\344\322\177\147\067\275\011\215\345
\271\163\021\072\156\011\307\127\144\007\041\064\370\016\135\052
\330\221\174\361\124\121\274\234\360\014\152\102\364\074\001\116
\223\105\101\075\254\363\230\113\036\161\036\063\131\062\377\174
\060\360\134\344\341\276\055\056\265\352\335\142\041\016\075\264
\015\225\374\311\270\331\272\240\367\142\247\355\303\003\256\010
\054\101\325\357\103\161\070\267\024\162\256\077\364\024\164\107

\330\336\214\121\171\316\357\261\124\254\160\107\226\176\055\056
\335\233\356\241\001\056\031\357\276\130\140\161\055\255\227\133
\132\140\060\313\062\202\142\116\126\345\147\152\264\322\061\124
\162\077\002\320\274\060\071\217\267\103\011\052\037\046\073\014
\307\174\035\233\200\140\204\016\351\056\322\371\025\273\133\340
\212\244\000\351\343\051\373\050\133\275\066\105\140\041\103\061
\377\160\241\137\134\203\133\227\174\015\267\123\131\354\230\265
\116\342\051\261\324\174\106\343\350\343\103\352\072\226\065\037
\123\361\004\026\045\343\054\363\150\241\246\221\337\025\373\275
\237\346\116\236\302\124\153\176\042\127\343\244\234\134\042\045
\037\201\257\231\310\337\021\025\110\103\370\263\063\251\043\177
\016\063\217\274\106\035\103\264\073\140\365\227\205\031\242\026
\260\125\334\032\160\051\145\332\331\176\011\027\064\353\211\272
\351\141\222\330\336\064\143\074\112\125\152\277\332\206\355\316
\063\336\273\123\157\317\034\332\224\117\166\124\254\145\125\020
\123\232\310\270\153\334\006\346\272\345\121\325\101\177\037\304
\300\101\241\140\221\064\363\023\202\321\241\167\323\367\114\344
\031\377\327\104\232\260\265\274\334\312\136\217\334\316\361\240
\151\066\340\104\222\056\231\372\274\257\263\307\170\072\125\146
\307\153\245\344\151\046\351\064\035\037\052\227\012\351\167\251
\167\133\163\110\062\201\277\377\321\354\203\305\160\203\151\236
\230\033\303\127\337\221\225\034\200\374\215\350\226\203\005\323
\237\172\210\173\372\350\127\361\301\204\050\275\315\326\034\314
\245\342\111\012\163
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Digidentity L3 Root CA - G2"
# Issuer: CN=Digidentity L3 Root CA - G2,O=Digidentity B.V.,C=NL
# Serial Number: 1 (0x1)
# Subject: CN=Digidentity L3 Root CA - G2,O=Digidentity B.V.,C=NL
# Not Valid Before: Fri Apr 29 10:44:19 2011
# Not Valid After: Mon Nov 10 10:44:19 2031
# Fingerprint (MD5): 26:8f:5b:c8:b6:3f:88:8c:4c:49:08:2e:18:c1:02:10
# Fingerprint (SHA1): f1:38:a3:30:a4:ea:98:6b:eb:52:0b:b1:10:35:87:6e:fb:9d:7f:1c
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Digidentity L3 Root CA - G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\361\070\243\060\244\352\230\153\353\122\013\261\020\065\207\156
\373\235\177\034
END

```
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\046\217\133\310\266\077\210\214\114\111\010\056\030\301\002\020
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\031\060\027\006\003\125\004\012\023\020\104\151\147\151\144\145
\156\164\151\164\171\040\102\056\126\056\061\044\060\042\006\003
\125\004\003\023\033\104\151\147\151\144\145\156\164\151\164\171
\040\114\063\040\122\157\157\164\040\103\101\040\055\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "SITHS Root CA v1"
# Issuer: CN=SITHS Root CA v1,O=Inera AB,C=SE
# Serial Number:90:66:61:a8:62:3d:65:44:77:04:3f:71:9a:c3:97:0c
# Subject: CN=SITHS Root CA v1,O=Inera AB,C=SE
# Not Valid Before: Thu Mar 29 07:54:49 2012
# Not Valid After: Mon Mar 29 07:54:49 2032
# Fingerprint
 (MD5): 7f:7b:02:6c:68:9f:32:03:c7:af:04:9d:ec:23:df:f3
# Fingerprint (SHA1): 58:5f:78:75:be:e7:43:3e:b0:79:ea:ab:7d:05:bb:0f:7a:f2:bc:cc
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SITHS Root CA v1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\073\061\013\060\011\006\003\125\004\006\023\002\123\105\061
\021\060\017\006\003\125\004\012\014\010\111\156\145\162\141\040
\101\102\061\031\060\027\006\003\125\004\003\014\020\123\111\124
\110\123\040\122\157\157\164\040\103\101\040\166\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\073\061\013\060\011\006\003\125\004\006\023\002\123\105\061
\021\060\017\006\003\125\004\012\014\010\111\156\145\162\141\040
\101\102\061\031\060\027\006\003\125\004\003\014\020\123\111\124
\110\123\040\122\157\157\164\040\103\101\040\166\061
END
```

CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\220\146\141\250\142\075\145\104\167\004\077\161\232
\303\227\014
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\005\223\060\202\003\173\240\003\002\001\002\002\021\000
\220\146\141\250\142\075\145\104\167\004\077\161\232\303\227\014
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\073\061\013\060\011\006\003\125\004\006\023\002\123\105\061\021
\060\017\006\003\125\004\012\014\010\111\156\145\162\141\040\101
\102\061\031\060\027\006\003\125\004\003\014\020\123\111\124\110
\123\040\122\157\157\164\040\103\101\040\166\061\060\036\027\015
\061\062\060\063\062\071\060\067\065\064\064\071\132\027\015\063
\062\060\063\062\071\060\067\065\064\064\071\132\060\073\061\013
\060\011\006\003\125\004\006\023\002\123\105\061\021\060\017\006
\003\125\004\012\014\010\111\156\145\162\141\040\101\102\061\031
\060\027\006\003\125\004\003\014\020\123\111\124\110\123\040\122
\157\157\164\040\103\101\040\166\061\060\202\002\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017
\000\060\202\002\012\002\202\002\001\000\300\355\346\236\250\254
\250\377\330\065\271\374\373\360\225\117\077\075\107\043\321\222
\311\311\370\360\342\037\206\255\210\077\340\000\317\117\021\225
\141\075\245\326\040\031\321\210\322\302\126\011\105\040\241\052
\352\042\303\352\272\314\102\151\236\270\205\237\160\300\154\247
\276\157\243\134\335\103\210\007\315\312\051\337\151\172\037\055
\237\126\152\033\142\040\041\141\306\120\113\145\165\111\106\277
\134\327\051\036\302\036\205\102\341\016\070\115\303\066\161\102
\104\121\072\321\130\314\311\264\252\154\100\307\203\361\307\011
\237\112\363\153\363\007\026\065\364\202\216\136\213\204\334\161
\171\271\373\156\127\105\267\305\160\072\377\102\002\321\064\277
\205\160\155\117\217\347\037\031\041\367\325\064\274\356\131\346
\056\042\363\161\202\142\031\237\005\144\174\073\042\161\030\245
\055\301\170\130\231\321\257\336\224\100\006\031\166\023\120\207
\043\313\107\127\256\154\305\023\352\232\205\122\303\312\127\046
\037\336\026\155\255\161\176\362\330\141\375\346\066\116\161\032
\235\323\040\065\255\022\041\130\165\066\213\211\026\244\067\050
\317\240\203\072\100\243\312\021\357\264\345\220\033\343\145\222
\147\230\157\016\051\345\147\030\327\210\372\215\266\307\172\245
\240\177\221\036\253\266\371\164\230\166\122\140\057\132\067\231
\250\333\321\076\326\204\152\157\122\323\264\332\032\307\270\262
\321\224\021\037\305\210\211\351\133\251\243\224\346\242\175\115
\247\062\211\241\336\046\153\315\325\243\362\062\033\332\065\023
\211\021\111\115\277\106\061\273\351\055\023\370\016\000\245\376
\003\365\126\106\074\217\023\053\340\345\307\036\003\337\212\352
\106\205\105\206\331\355\136\013\270\144\223\364\320\130\056\051
\215\105\127\115\211\165\220\145\314\152\073\301\234\200\271\264
\200\065\003\216\337\156\052\223\276\246\276\012\001\104\157\100

\163\252\052\202\034\204\166\177\151\335\261\273\222\130\350\100
\121\162\134\367\076\071\104\372\245\231\240\177\215\213\260\101
\130\167\255\042\305\240\300\272\375\061\231\065\152\331\311\040
\032\136\363\275\274\010\177\335\111\055\057\235\221\020\015\133
\250\077\317\264\127\163\073\133\340\147\002\003\001\000\001\243
\201\221\060\201\216\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\114\006\003\125\035\040\004\105\060
\103\060\101\006\011\052\205\160\112\010\001\002\001\001\060\064
\060\062\006\010\053\006\001\005\005\007\002\001\026\046\150\164
\164\160\072\057\057\143\160\163\056\163\151\164\150\163\056\163
\145\057\163\151\164\150\163\162\157\157\164\143\141\166\061\056
\150\164\155\154\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\035\006\003\125\035\016\004\026\004\024\062
\371\235\117\151\351\230\215\240\326\214\175\371\035\316\243\074
\272\166\025\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\003\202\002\001\000\037\077\343\170\130\310\012\312\064
\042\011\330\262\005\213\321\145\234\341\327\327\175\012\300\034
\230\245\044\122\070\063\332\144\042\043\200\256\376\075\200\276
\117\217\335\203\366\015\114\063\132\325\243\073\120\212\122\132
\046\024\163\121\224\344\122\227\143\333\267\006\250\357\217\255
\342\355\336\243\277\040\321\106\333\055\170\350\054\047\104\234
\074\354\267\027\374\211\227\363\243\242\136\302\131\123\340\317
\344\265\001\073\143\123\050\323\257\146\113\064\071\257\141\016
\076\233\356\263\211\326\223\240\073\001\304\263\043\124\020\074
\115\327\252\260\332\331\154\312\060\104\055\335\262\050\142\212
\101\140\362\100\023\154\260\174\076\101\340\213\246\064\361\347
\256\121\207\003\216\231\177\331\150\242\366\234\015\171\202\262
\237\337\044\310\146\140\350\266\110\104\047\310\153\126\267\104
\205\316\002\267\323\212\161\134\127\121\127\041\214\352\302\121
\017\120\077\200\253\004\115\311\122\335\344\245\362\056\037\155
\165\272\207\035\220\013\356\030\204\200\163\273\213\225\204\212
\141\015\116\135\142\237\343\146\014\373\066\016\047\323\110\370
\006\210\006\245\137\356\176\134\335\255\012\035\075\034\252\100
\171\230\171\270\120\214\066\215\013\012\066\013\325\076\347\135
\201\335\154\334\155\261\157\015\164\236\054\057\302\005\362\104
\021\262\063\372\201\305\112\155\076\105\326\054\342\153\137\056
\344\103\225\121\033\231\061\005\337\045\033\163\321\173\234\304
\163\111\373\142\140\331\151\143\335\321\076\145\155\107\372\144
\114\003\130\120\331\246\276\345\052\150\353\077\213\020\361\346
\273\042\006\050\232\240\244\230\151\157\066\264\324\015\016\014
\175\300\051\061\273\054\003\047\341\147\247\275\321\213\056\266
\207\304\012\340\011\013\202\241\346\117\130\235\373\330\370\141
\341\312\227\304\270\267\120\071\314\061\116\375\055\034\032\366
\107\343\154\354\033\005\350\177\027\065\020\204\332\063\347\064
\346\265\244\353\304\042\007\112\366\233\130\330\017\234\100\373
\261\213\137\242\375\231\352\242\173\131\142\321\136\256\321\112
\162\030\053\113\066\071\162\007\232\132\360\143\072\317\033\371
\317\335\110\163\131\160\344

```
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER
 CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "SITHS Root CA v1"
# Issuer: CN=SITHS Root CA v1,O=Inera AB,C=SE
# Serial Number:90:66:61:a8:62:3d:65:44:77:04:3f:71:9a:c3:97:0c
# Subject: CN=SITHS Root CA v1,O=Inera AB,C=SE
# Not Valid Before: Thu Mar 29 07:54:49 2012
# Not Valid After: Mon Mar 29 07:54:49 2032
# Fingerprint (MD5): 7f:7b:02:6c:68:9f:32:03:c7:af:04:9d:ec:23:df:f3
# Fingerprint (SHA1): 58:5f:78:75:be:e7:43:3e:b0:79:ea:ab:7d:05:bb:0f:7a:f2:bc:cc
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SITHS Root CA v1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\130\137\170\165\276\347\103\076\260\171\352\253\175\005\273\017
\172\362\274\314
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\177\173\002\154\150\237\062\003\307\257\004\235\354\043\337\363
END
CKA_ISSUER MULTILINE_OCTAL
\060\073\061\013\060\011\006\003\125\004\006\023\002\123\105\061
\021\060\017\006\003\125\004\012\014\010\111\156\145\162\141\040
\101\102\061\031\060\027\006\003\125\004\003\014\020\123\111\124
\110\123\040\122\157\157\164\040\103\101\040\166\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\021\000\220\146\141\250\142\075\145\104\167\004\077\161\232
\303\227\014
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Macao Post eSignTrust Root Certification Authority (G02)"
# Issuer: CN=Macao Post eSignTrust Root Certification Authority (G02),O=Macao Post,C=MO
# Serial Number:52:ac:be:07:11:49:97:bb:1f:bf:87:1b:25:17:bf:a4
```

```
# Subject: CN=Macao Post eSignTrust Root Certification Authority (G02),O=Macao Post,C=MO
# Not Valid Before: Wed Jan 06 00:00:00 2010
# Not Valid After: Sun Jan 05 23:59:59 2020
# Fingerprint (MD5): a1:2d:ed:eb:8a:3b:88:2f:fa:38:f3:86:a4:fb:bc:f2
#
 Fingerprint (SHA1): 06:14:31:51:e0:2b:45:dd:ba:dd:5d:8e:56:53:0d:aa:e3:28:cf:90
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Macao Post eSignTrust Root Certification Authority (G02)"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\115\117\061
\023\060\021\006\003\125\004\012\023\012\115\141\143\141\157\040
\120\157\163\164\061\101\060\077\006\003\125\004\003\023\070\115
\141\143\141\157\040\120\157\163\164\040\145\123\151\147\156\124
\162\165\163\164\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\040\050\107\060\062\051
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\115\117\061
\023\060\021\006\003\125\004\012\023\012\115\141\143\141\157\040
\120\157\163\164\061\101\060\077\006\003\125\004\003\023\070\115
\141\143\141\157\040\120\157\163\164\040\145\123\151\147\156\124
\162\165\163\164\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\040\050\107\060\062\051
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\122\254\276\007\021\111\227\273\037\277\207\033\045\027
\277\244
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\226\060\202\003\176\240\003\002\001\002\002\020\122
\254\276\007\021\111\227\273\037\277\207\033\045\027\277\244\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\145
\061\013\060\011\006\003\125\004\006\023\002\115\117\061\023\060
\021\006\003\125\004\012\023\012\115\141\143\141\157\040\120\157
\163\164\061\101\060\077\006\003\125\004\003\023\070\115\141\143
\141\157\040\120\157\163\164\040\145\123\151\147\156\124\162\165
\163\164\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040
\050\107\060\062\051\060\036\027\015\061\060\060\061\060\066\060
\060\060\060\060\060\132\027\015\062\060\060\061\060\065\062\063
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\065\071\065\071\132\060\145\061\013\060\011\006\003\125\004\006
\023\002\115\117\061\023\060\021\006\003\125\004\012\023\012\115
\141\143\141\157\040\120\157\163\164\061\101\060\077\006\003\125
\004\003\023\070\115\141\143\141\157\040\120\157\163\164\040\145
\123\151\147\156\124\162\165\163\164\040\122\157\157\164\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\040\050\107\060\062\051\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\266\370\207
\247\164\314\135\043\136\256\253\226\334\327\044\050\035\244\024
\146\327\240\150\214\136\235\105\324\324\051\323\263\013\353\255
\026\352\235\122\021\311\244\341\160\345\335\276\016\034\021\167
\353\237\243\160\170\027\217\271\076\027\123\151\251\353\365\125
\371\225\227\351\337\071\166\236\037\122\027\264\033\000\022\320
\315\074\343\252\111\321\236\101\067\066\365\141\315\043\017\127
\261\366\115\323\333\015\102\123\002\210\364\360\251\206\213\127
\317\162\012\325\224\113\132\332\067\345\075\107\131\147\276\323
\216\126\325\127\071\320\047\333\237\111\117\250\026\124\277\170
\137\317\034\235\136\241\013\214\203\003\263\014\024\311\132\251
\273\377\306\256\131\317\365\145\037\043\211\001\123\212\325\133
\027\235\233\377\230\121\017\103\111\367\252\054\355\345\351\206
\072\063\120\163\334\122\245\153\143\204\351\023\242\174\307\167
\032\363\252\251\015\013\116\116\035\104\303\162\073\231\131\347
\101\042\073\054\124\136\022\061\226\150\101\031\325\355\165\247
\271\127\133\021\366\232\244\111\057\142\363\013\230\121\033\263
\063\102\322\314\324\141\031\303\323\334\233\373\223\262\142\315
\066\373\214\351\032\156\032\261\071\044\216\135\331\076\073\206
\174\210\346\267\047\003\370\225\121\260\277\120\067\376\370\116
\023\001\033\047\055\233\222\320\162\127\327\243\232\126\350\153
\243\367\125\336\100\135\342\010\037\134\273\121\246\236\264\335
\016\246\032\131\142\147\206\163\020\225\235\225\315\272\277\330
\234\052\016\213\166\231\223\324\113\260\350\124\077\015\330\212
\371\200\317\101\375\001\172\105\174\175\326\075\116\371\142\117
\101\045\174\252\155\130\126\033\007\264\163\252\037\021\037\074
\272\123\043\340\355\112\315\226\211\334\110\320\115\142\313\223
\007\366\240\256\123\027\174\137\134\007\034\005\114\253\114\152
\252\302\017\240\031\153\171\171\302\174\263\251\375\075\373\314
\174\161\305\273\276\045\155\041\247\373\326\276\140\363\265\251
\251\154\164\030\077\250\236\102\140\101\362\071\055\035\302\015
\163\362\340\261\266\112\032\030\275\167\151\031\327\322\172\261
\334\226\065\232\330\046\205\203\266\023\051\302\343\002\003\001
\000\001\243\102\060\100\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001
\377\004\004\003\002\001\006\060\035\006\003\125\035\016\004\026
\004\024\002\201\267\266\146\370\222\105\155\302\161\322\237\354
\057\323\272\037\271\377\060\015\006\011\052\206\110\206\367\015
\001\001\005\005\000\003\202\002\001\000\130\123\213\276\317\101
\262\117\266\325\336\112\150\315\145\317\306\100\212\254\113\232

\133\143\155\275\361\077\131\120\102\320\337\232\343\137\126\221
\263\133\233\331\105\006\103\357\223\033\375\063\167\035\006\124
\070\110\361\124\214\072\123\153\073\161\065\011\166\145\351\127
\017\103\366\221\232\336\020\273\272\150\222\052\045\313\147\104
\011\153\277\235\227\146\313\251\105\266\276\067\231\035\165\045
\276\075\074\143\154\277\251\023\107\307\162\214\313\303\317\364
\366\207\005\231\211\027\250\064\040\361\337\241\047\147\323\247
\043\357\253\131\203\075\032\330\052\315\302\255\112\060\014\006
\072\040\213\244\370\332\106\067\103\056\264\211\035\204\163\212
\140\276\144\061\047\102\300\353\162\141\155\314\336\174\163\053
\350\277\071\102\136\171\221\354\200\033\252\066\166\116\041\350
\206\004\227\011\050\313\107\347\100\324\054\136\032\136\110\372
\256\307\351\004\352\107\044\233\276\361\107\236\325\325\172\321
\136\324\205\362\013\043\004\230\324\053\232\126\162\106\114\101
\232\063\360\222\264\277\101\324\275\233\260\263\361\365\023\326
\257\133\324\362\321\101\360\107\135\172\274\172\131\361\175\140
\150\224\016\112\117\201\222\042\252\037\304\074\276\034\072\072
\114\360\160\241\177\273\237\334\322\305\244\361\046\156\341\363
\046\251\160\373\361\211\226\142\025\134\131\240\265\043\372\226
\152\262\032\222\075\015\044\112\053\270\010\376\157\337\334\302
\356\226\377\316\277\173\270\371\204\357\101\073\344\115\271\207
\221\272\306\137\310\355\360\313\213\323\017\221\366\040\336\221
\230\306\347\110\144\321\316\123\022\356\304\025\155\334\200\120
\033\023\140\117\171\133\374\032\234\376\242\237\240\021\063\221
\311\113\155\072\146\226\055\323\070\370\331\231\201\264\104\046
\177\261\347\236\160\155\035\155\365\042\011\344\254\031\066\373
\047\005\330\172\233\331\274\236\033\332\031\067\330\361\335\025
\230\144\033\217\123\360\050\235\254\024\272\137\151\317\226\043
\356\126\254\231\315\072\217\325\136\031\346\142\023\072\137\353
\213\137\026\300\073\341\321\223\217\126\141\067\005\320\171\033
\375\250\274\017\171\322\263\346\323\146
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Macao Post eSignTrust Root Certification Authority (G02)"
# Issuer: CN=Macao Post eSignTrust Root Certification Authority (G02),O=Macao Post,C=MO
# Serial Number:52:ac:be:07:11:49:97:bb:1f:bf:87:1b:25:17:bf:a4
# Subject: CN=Macao Post eSignTrust Root Certification Authority (G02),O=Macao Post,C=MO
# Not Valid Before: Wed Jan 06 00:00:00 2010
# Not Valid After: Sun Jan 05 23:59:59 2020
# Fingerprint (MD5): a1:2d:ed:eb:8a:3b:88:2f:fa:38:f3:86:a4:fb:bc:f2
# Fingerprint (SHA1): 06:14:31:51:e0:2b:45:dd:ba:dd:5d:8e:56:53:0d:aa:e3:28:cf:90
CKA_CLASS CK_OBJECT_CLASS

```
 CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Macao Post eSignTrust Root Certification Authority (G02)"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\006\024\061\121\340\053\105\335\272\335\135\216\126\123\015\252
\343\050\317\220
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\241\055\355\353\212\073\210\057\372\070\363\206\244\373\274\362
END
CKA_ISSUER MULTILINE_OCTAL
\060\145\061\013\060\011\006\003\125\004\006\023\002\115\117\061
\023\060\021\006\003\125\004\012\023\012\115\141\143\141\157\040
\120\157\163\164\061\101\060\077\006\003\125\004\003\023\070\115
\141\143\141\157\040\120\157\163\164\040\145\123\151\147\156\124
\162\165\163\164\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\040\050\107\060\062\051
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\122\254\276\007\021\111\227\273\037\277\207\033\045\027
\277\244
END
CKA_TRUST_SERVER_AUTH CK_TRUST
 CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Autoridade Certificadora Raiz Brasileira v2"
# Issuer: CN=Autoridade Certificadora Raiz Brasileira v2,OU=Instituto Nacional de Tecnologia da Informacao -
ITI,O=ICP-Brasil,C=BR
# Serial Number: 1 (0x1)
# Subject: CN=Autoridade Certificadora Raiz Brasileira v2,OU=Instituto Nacional de Tecnologia da Informacao -
ITI,O=ICP-Brasil,C=BR
# Not Valid Before: Mon Jun 21 19:04:57 2010
# Not Valid After: Wed Jun 21 19:04:57 2023
# Fingerprint (MD5): 00:11:ae:73:15:fb:2d:6d:88:d8:43:bd:b4:b6:4c:5f
# Fingerprint (SHA1): a9:82:2e:6c:69:33:c6:3c:14:8c:2d:ca:a4:4a:5c:f1:aa:d2:c4:2e
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Autoridade Certificadora Raiz
```

Brasileira v2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\227\061\013\060\011\006\003\125\004\006\023\002\102\122
\061\023\060\021\006\003\125\004\012\023\012\111\103\120\055\102
\162\141\163\151\154\061\075\060\073\006\003\125\004\013\023\064
\111\156\163\164\151\164\165\164\157\040\116\141\143\151\157\156
\141\154\040\144\145\040\124\145\143\156\157\154\157\147\151\141
\040\144\141\040\111\156\146\157\162\155\141\143\141\157\040\055
\040\111\124\111\061\064\060\062\006\003\125\004\003\023\053\101
\165\164\157\162\151\144\141\144\145\040\103\145\162\164\151\146
\151\143\141\144\157\162\141\040\122\141\151\172\040\102\162\141
\163\151\154\145\151\162\141\040\166\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\227\061\013\060\011\006\003\125\004\006\023\002\102\122
\061\023\060\021\006\003\125\004\012\023\012\111\103\120\055\102
\162\141\163\151\154\061\075\060\073\006\003\125\004\013\023\064
\111\156\163\164\151\164\165\164\157\040\116\141\143\151\157\156
\141\154\040\144\145\040\124\145\143\156\157\154\157\147\151\141
\040\144\141\040\111\156\146\157\162\155\141\143\141\157\040\055
\040\111\124\111\061\064\060\062\006\003\125\004\003\023\053\101
\165\164\157\162\151\144\141\144\145\040\103\145\162\164\151\146
\151\143\141\144\157\162\141\040\122\141\151\172\040\102\162\141
\163\151\154\145\151\162\141\040\166\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\241\060\202\004\211\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\015\005\000\060
\201\227\061\013\060\011\006\003\125\004\006\023\002\102\122\061
\023\060\021\006\003\125\004\012\023\012\111\103\120\055\102\162
\141\163\151\154\061\075\060\073\006\003\125\004\013\023\064\111
\156\163\164\151\164\165\164\157\040\116\141\143\151\157\156\141
\154\040\144\145\040\124\145\143\156\157\154\157\147\151\141\040
\144\141\040\111\156\146\157\162\155\141\143\141\157\040\055\040
\111\124\111\061\064\060\062\006\003\125\004\003\023\053\101\165
\164\157\162\151\144\141\144\145\040\103\145\162\164\151\146\151
\143\141\144\157\162\141\040\122\141\151\172\040\102\162\141\163
\151\154\145\151\162\141\040\166\062\060\036\027\015\061\060\060
\066\062\061\061\071\060\064\065\067\132\027\015\062\063\060\066
\062\061\061\071\060\064\065\067\132\060\201\227\061\013\060\011
\006\003\125\004\006\023\002\102\122\061\023\060\021\006\003\125
\004\012\023\012\111\103\120\055\102\162\141\163\151\154\061\075

\060\073\006\003\125\004\013\023\064\111\156\163\164\151\164\165
\164\157\040\116\141\143\151\157\156\141\154\040\144\145\040\124
\145\143\156\157\154\157\147\151\141\040\144\141\040\111\156\146
\157\162\155\141\143\141\157\040\055\040\111\124\111\061\064\060
\062\006\003\125\004\003\023\053\101\165\164\157\162\151\144\141
\144\145\040\103\145\162\164\151\146\151\143\141\144\157\162\141
\040\122\141\151\172\040\102\162\141\163\151\154\145\151\162\141
\040\166\062\060\202\002\042\060\015\006\011\052\206\110\206\367
\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002
\202\002\001\000\272\106\244\016\335\347\100\362\265\240\174\122
\225\127\105\374\155\204\363\206\001\311\205\003\255\230\253\322
\362\136\005\231\311\273\157\142\147\375\167\104\271\003\007\074
\322\033\000\142\324\160\054\102\203\171\146\253\231\126\256\201
\274\152\111\275\363\164\017\142\267\353\133\007\146\224\102\044
\235\106\254\232\102\030\060\360\044\250\121\101\352\253\225\361
\250\053\002\170\151\265\051\047\136\234\056\163\306\376\043\245
\343\246\316\375\154\033\153\000\124\353\000\255\117\072\114\074
\347\012\210\133\332\136\232\013\126\344\265\124\070\035\362\012
\223\144\116\303\101\222\123\040\052\317\374\164\156\324\333\063
\070\142\344\376\216\114\130\034\367\217\052\115\377\305\222\331
\011\122\275\317\160\000\235\151\232\063\152\210\207\105\041\231
\026\121\015\064\337\202\275\264\151\250\174\174\324\335\323\362
\025\134\113\305\130\020\352\205\031\313\066\042\130\052\162\014
\232\226\336\312\317\010\121\141\277\264\005\051\006\053\206\220
\376\351\115\303\004\005\107\313\317\166\331\177\161\246\207\173
\025\100\344\063\200\170\007\035\244\362\216\233\100\073\311\162
\120\337\151\276\360\054\226\037\220\265\325\256\164\343\145\264
\214\032\351\152\033\373\162\134\305\202\124\352\340\123\007\304
\314\022\351\367\336\327\057\324\110\057\107\077\046\141\004\261
\022\232\063\153\265\206\113\023\053\320\206\235\107\355\151\373
\374\204\022\146\370\126\345\016\212\154\166\304\153\032\172\302
\240\132\022\321\043\211\130\001\174\010\130\332\025\216\025\331
\176\175\067\266\244\105\365\003\205\314\107\372\213\171\105\270
\146\142\063\323\046\112\336\034\351\324\177\346\155\046\271\074
\175\315\017\050\012\051\017\233\335\143\253\271\246\107\032\204
\327\205\244\003\145\006\004\113\122\215\203\064\102\177\061\216
\021\056\346\263\147\225\100\176\227\172\100\000\371\021\154\203
\070\130\255\003\063\133\246\304\301\305\260\254\015\251\006\360
\246\151\001\064\266\351\370\224\110\117\076\246\165\011\354\112
\305\073\340\311\136\260\062\377\237\151\131\317\074\060\157\015
\316\047\127\354\132\033\150\377\354\117\157\170\062\076\171\305
\264\135\225\177\002\003\001\000\001\243\201\365\060\201\362\060
\116\006\003\125\035\040\004\107\060\105\060\103\006\005\140\114
\001\001\000\060\072\060\070\006\010\053\006\001\005\005\007\002
\001\026\054\150\164\164\160\072\057\057\141\143\162\141\151\172
\056\151\143\160\142\162\141\163\151\154\056\147\157\166\056\142
\162\057\104\120\103\141\143\162\141\151\172\056\160\144\146\060
\077\006\003\125\035\037\004\070\060\066\060\064\240\062\240\060

\206\056\150\164\164\160\072\057\057\141\143\162\141\151\172\056
\151\143\160\142\162\141\163\151\154\056\147\157\166\056\142\162
\057\114\103\122\141\143\162\141\151\172\166\062\056\143\162\154
\060\037\006\003\125\035\043\004\030\060\026\200\024\014\071\040
\072\267\001\037\313\327\050\175\101\240\307\372\112\255\062\044
\276\060\035\006\003\125\035\016\004\026\004\024\014\071\040\072
\267\001\037\313\327\050\175\101\240\307\372\112\255\062\044\276
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\006\060\015\006\011\052\206\110\206\367\015\001\001\015\005\000
\003\202\002\001\000\131\232\024\151\030\155\175\051\103\160\175
\166\233\141\337\167\216\032\166\344\251\326\313\166\244\026\014
\114\224\022\306\220\321\201\003\305\255\006\331\055\104\274\262
\011\166\011\200\071\147\000\030\064\155\006\012\346\265\020\131
\110\272\165\140\374\077\216\035\030\125\160\053\236\113\225\254
\211\253\012\167\044\173\141\304\307\221\046\216\106\023\121\067
\266\214\047\012\323\015\360\232\053\042\203\203\263\275\203\065
\255\233\074\274\170\203\051\065\141\066\370\021\161\063\040\124
\143\123\105\001\330\023\132\204\073\327\146\023\044\267\304\106
\305\042\330\163\044\356\034\023\027\226\310\045\350\033\036\317
\337\205\120\155\074\352\367\120\236\033\227\336\247\153\333\326
\163\322\317\174\120\300\260\214\345\123\022\172\206\071\254\065
\133\147\307\352\324\373\321\302\135\352\016\227\163\230\256\051
\277\344\072\363\004\066\120\054\355\336\036\333\205\350\035\204
\011\356\363\246\203\063\133\157\107\171\117\110\265\374\270\046
\023\253\252\263\364\141\021\373\105\147\363\035\076\156\376\052
\113\046\104\032\237\261\242\340\074\332\340\344\005\072\170\254
\373\250\241\115\277\135\054\167\051\220\315\023\035\357\006\050
\330\267\024\363\133\310\311\236\247\176\061\022\212\170\142\304
\321\005\274\006\002\143\004\053\015\211\335\344\134\133\062\200
\104\324\102\354\052\363\362\100\207\061\325\076\342\012\062\014
\024\215\325\162\155\013\346\375\215\344\250\363\005\215\165\027
\167\233\012\271\372\220\222\231\145\210\062\147\103\005\216\055
\013\025\273\065\361\141\350\331\147\167\355\026\345\350\001\055
\153\064\077\216\203\263\367\352\017\112\036\076\065\204\235\214
\200\064\077\251\225\350\303\255\304\315\236\312\024\026\054\031
\236\344\066\213\271\271\243\102\045\007\076\303\345\325\150\117
\240\146\034\246\263\266\163\034\220\032\077\100\271\032\126\102
\160\207\377\157\055\017\021\375\036\377\367\205\060\025\016\343
\027\061\356\047\225\314\311\351\231\036\227\307\155\133\007\265
\005\152\075\362\105\337\272\202\171\044\160\056\233\202\037\146
\251\245\155\047\314\366\052\242\321\137\205\157\340\106\235\252
\322\245\116\125\016
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

```
# Microsoft Code Signing Only Certificate
# Trust for "Autoridade Certificadora Raiz Brasileira v2"
# Issuer: CN=Autoridade Certificadora Raiz Brasileira v2,OU=Instituto Nacional de Tecnologia da Informacao -
ITI,O=ICP-Brasil,C=BR
# Serial Number: 1 (0x1)
# Subject: CN=Autoridade Certificadora Raiz Brasileira v2,OU=Instituto Nacional de Tecnologia da Informacao -
ITI,O=ICP-Brasil,C=BR
# Not Valid Before: Mon Jun 21 19:04:57 2010
# Not Valid After: Wed Jun 21 19:04:57
 2023
# Fingerprint (MD5): 00:11:ae:73:15:fb:2d:6d:88:d8:43:bd:b4:b6:4c:5f
# Fingerprint (SHA1): a9:82:2e:6c:69:33:c6:3c:14:8c:2d:ca:a4:4a:5c:f1:aa:d2:c4:2e
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Autoridade Certificadora Raiz Brasileira v2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\251\202\056\154\151\063\306\074\024\214\055\312\244\112\134\361
\252\322\304\056
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\000\021\256\163\025\373\055\155\210\330\103\275\264\266\114\137
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\227\061\013\060\011\006\003\125\004\006\023\002\102\122
\061\023\060\021\006\003\125\004\012\023\012\111\103\120\055\102
\162\141\163\151\154\061\075\060\073\006\003\125\004\013\023\064
\111\156\163\164\151\164\165\164\157\040\116\141\143\151\157\156
\141\154\040\144\145\040\124\145\143\156\157\154\157\147\151\141
\040\144\141\040\111\156\146\157\162\155\141\143\141\157\040\055
\040\111\124\111\061\064\060\062\006\003\125\004\003\023\053\101
\165\164\157\162\151\144\141\144\145\040\103\145\162\164\151\146
\151\143\141\144\157\162\141\040\122\141\151\172\040\102\162\141
\163\151\154\145\151\162\141\040\166\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Swisscom Root CA 2"
```

```
# Issuer: CN=Swisscom Root CA 2,OU=Digital Certificate Services,O=Swisscom,C=ch
# Serial Number:1e:9e:28:e8:48:f2:e5:ef:c3:7c:4a:1e:5a:18:67:b6
# Subject: CN=Swisscom Root CA 2,OU=Digital Certificate Services,O=Swisscom,C=ch
# Not Valid Before: Fri Jun 24 08:38:14 2011
# Not Valid After: Wed Jun 25 07:38:14 2031
# Fingerprint (MD5): 5b:04:69:ec:a5:83:94:63:18:a7:86:d0:e4:f2:6e:19
# Fingerprint (SHA1): 77:47:4f:c6:30:e4:0f:4c:47:64:3f:84:ba:b8:c6:95:4a:8a:41:ec
CKA_CLASS
 CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Swisscom Root CA 2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\143\150\061
\021\060\017\006\003\125\004\012\023\010\123\167\151\163\163\143
\157\155\061\045\060\043\006\003\125\004\013\023\034\104\151\147
\151\164\141\154\040\103\145\162\164\151\146\151\143\141\164\145
\040\123\145\162\166\151\143\145\163\061\033\060\031\006\003\125
\004\003\023\022\123\167\151\163\163\143\157\155\040\122\157\157
\164\040\103\101\040\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\143\150\061
\021\060\017\006\003\125\004\012\023\010\123\167\151\163\163\143
\157\155\061\045\060\043\006\003\125\004\013\023\034\104\151\147
\151\164\141\154\040\103\145\162\164\151\146\151\143\141\164\145
\040\123\145\162\166\151\143\145\163\061\033\060\031\006\003\125
\004\003\023\022\123\167\151\163\163\143\157\155\040\122\157\157
\164\040\103\101\040\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\036\236\050\350\110\362\345\357\303\174\112\036\132\030
\147\266
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\331\060\202\003\301\240\003\002\001\002\002\020\036
\236\050\350\110\362\345\357\303\174\112\036\132\030\147\266\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\144
\061\013\060\011\006\003\125\004\006\023\002\143\150\061\021\060
\017\006\003\125\004\012\023\010\123\167\151\163\163\143\157\155
\061\045\060\043\006\003\125\004\013\023\034\104\151\147\151\164
\141\154\040\103\145\162\164\151\146\151\143\141\164\145\040\123
\145\162\166\151\143\145\163\061\033\060\031\006\003\125\004\003
\023\022\123\167\151\163\163\143\157\155\040\122\157\157\164\040
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\151\163\163\143\157\155\061\045\060\043\006\003\125\004\013\023
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\143\141\164\145\040\123\145\162\166\151\143\145\163\061\033\060
\031\006\003\125\004\003\023\022\123\167\151\163\163\143\157\155
\040\122\157\157\164\040\103\101\040\062\060\202\002\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002
\017\000\060\202\002\012\002\202\002\001\000\225\102\116\204\235
\121\346\323\011\350\162\132\043\151\333\170\160\216\026\361\053
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\346\027\114\253\236\270\107\024\062\167\062\335\050\014\336\030
\113\137\166\237\370\071\073\374\116\211\330\174\305\147\357\253
\322\271\064\137\153\072\363\144\066\316\302\260\317\023\150\312
\310\313\353\265\342\075\056\041\337\352\054\324\340\371\160\226
\114\377\152\130\230\267\027\344\033\122\345\176\007\000\035\137
\332\346\076\225\004\267\151\210\071\241\101\140\045\141\113\225
\071\150\142\034\261\013\005\211\300\066\202\024\041\077\256\333
\241\375\274\157\034\140\206\266\123\224\111\271\053\106\305\117
\000\053\277\241\273\313\077\340\307\127\034\127\350\326\151\370
\301\044\122\235\210\125\335\302\207\056\164\043\320\024\375\052
\107\132\273\246\235\375\224\344\321\212\245\137\206\143\166\205
\313\257\377\111\050\374\200\355\114\171\322\273\344\300\357\001
\356\120\101\010\065\043\160\053\251\026\264\214\156\205\351\266
\021\317\061\335\123\046\033\337\055\132\112\002\100\374\304\300
\266\351\061\032\010\050\345\140\303\037\304\220\216\020\142\140
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\353\054\122\064\260\212\375\022\116\226\260\353\160\177\236\071
\367\146\102\261\253\254\122\332\166\100\127\173\052\275\350\156
\003\262\013\200\205\210\235\014\307\302\167\260\232\232\127\364
\270\372\023\134\150\223\072\147\244\227\320\033\231\267\206\062
\113\140\330\316\357\320\014\177\225\237\157\207\117\207\212\216
\137\010\174\252\133\374\132\276\241\221\237\125\175\116\260\013
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\165\036\313\264\030\142\232\260\247\071\252\233\237\146\330\215
\246\154\226\025\343\346\362\370\361\203\142\154\273\125\351\141
\223\243\075\365\261\127\213\117\043\260\233\345\224\152\057\337
\214\337\225\121\051\140\241\013\051\344\134\125\130\267\250\374
\231\356\045\115\114\016\263\323\114\217\204\350\051\017\375\020
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\004\004\003\002\001\206\060\035\006\003\125\035\041\004\026\060
\024\060\022\006\007\140\205\164\001\123\002\001\006\007\140\205
\164\001\123\002\001\060\022\006\003\125\035\023\001\001\377\004
\010\060\006\001\001\377\002\001\007\060\035\006\003\125\035\016

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\030\060\026\200\024\115\046\040\042\211\113\323\325\244\012\241
\157\336\342\022\201\305\361\074\056\060\015\006\011\052\206\110
\206\367\015\001\001\013\005\000\003\202\002\001\000\062\012\262
\244\033\313\175\276\202\127\211\271\152\177\363\364\301\056\021
\175\270\031\076\171\267\250\250\162\067\146\233\032\355\254\023
\073\016\277\142\360\234\337\236\173\241\123\110\016\101\172\312
\040\247\027\033\266\170\354\100\221\363\102\255\020\303\134\357
\377\140\131\177\315\205\243\213\075\110\034\045\002\074\147\175
\365\062\351\057\060\345\175\245\172\070\320\363\146\052\146\036
\215\063\203\212\157\174\156\250\132\165\232\270\327\332\130\110
\104\107\250\114\372\114\111\012\112\302\022\067\250\100\014\303
\310\341\320\127\015\227\062\225\307\072\237\227\323\127\370\013
\336\345\162\363\243\333\377\265\330\131\262\163\335\115\052\161
\262\272\111\365\313\034\325\365\171\310\231\263\374\301\114\164
\343\264\275\051\067\025\004\050\036\336\105\106\160\354\257\272
\170\016\212\052\316\000\171\334\300\137\031\147\054\153\113\357
\150\150\013\103\343\254\301\142\011\357\246\335\145\141\240\257
\204\125\110\221\122\034\306\045\221\052\320\301\042\043\141\131
\257\105\021\205\035\001\044\064\217\317\263\377\027\162\040\023
\302\200\252\041\054\161\071\016\320\217\134\301\323\321\216\042
\162\106\114\035\226\256\117\161\261\341\005\051\226\131\364\273
\236\165\075\317\015\067\015\142\333\046\214\143\251\043\337\147
\006\074\174\072\332\064\102\341\146\264\106\004\336\306\226\230
\017\113\110\172\044\062\165\221\237\254\367\150\351\052\271\125
\145\316\135\141\323\047\160\330\067\376\237\271\257\240\056\126
\267\243\145\121\355\073\253\024\277\114\121\003\350\137\212\005
\233\356\212\156\234\357\277\150\372\310\332\013\343\102\311\320
\027\024\234\267\112\340\257\223\047\041\125\046\265\144\057\215
\361\377\246\100\005\205\005\134\312\007\031\134\013\023\050\114
\130\177\302\245\357\105\332\140\323\256\145\141\235\123\203\164
\302\256\362\134\302\026\355\222\076\204\076\163\140\210\274\166
\364\054\317\320\175\175\323\270\136\321\221\022\020\351\315\335
\312\045\343\325\355\231\057\276\165\201\113\044\371\105\106\224
\311\051\041\123\234\046\105\252\023\027\344\347\315\170\342\071
\301\053\022\236\246\236\033\305\346\016\331\061\331
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Swisscom Root CA 2"
# Issuer: CN=Swisscom Root CA 2,OU=Digital Certificate Services,O=Swisscom,C=ch
# Serial Number:1e:9e:28:e8:48:f2:e5:ef:c3:7c:4a:1e:5a:18:67:b6
# Subject: CN=Swisscom Root CA 2,OU=Digital Certificate Services,O=Swisscom,C=ch

```
# Not Valid Before: Fri Jun 24 08:38:14 2011
# Not Valid After: Wed Jun 25 07:38:14 2031
# Fingerprint (MD5): 5b:04:69:ec:a5:83:94:63:18:a7:86:d0:e4:f2:6e:19
#
 Fingerprint (SHA1): 77:47:4f:c6:30:e4:0f:4c:47:64:3f:84:ba:b8:c6:95:4a:8a:41:ec
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Swisscom Root CA 2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\167\107\117\306\060\344\017\114\107\144\077\204\272\270\306\225
\112\212\101\354
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\133\004\151\354\245\203\224\143\030\247\206\320\344\362\156\031
END
CKA_ISSUER MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\143\150\061
\021\060\017\006\003\125\004\012\023\010\123\167\151\163\163\143
\157\155\061\045\060\043\006\003\125\004\013\023\034\104\151\147
\151\164\141\154\040\103\145\162\164\151\146\151\143\141\164\145
\040\123\145\162\166\151\143\145\163\061\033\060\031\006\003\125
\004\003\023\022\123\167\151\163\163\143\157\155\040\122\157\157
\164\040\103\101\040\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\036\236\050\350\110\362\345\357\303\174\112\036\132\030
\147\266
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "IGC/A AC racine Etat francais"
# Issuer: CN=IGC/A AC racine Etat francais,OU=0002 130007669,O=ANSSI,C=FR
# Serial Number:11:21:85:0c:b3:9c:6a:32:fa:be:67:1b:81:3f:a4:86:15:8f
# Subject: CN=IGC/A AC racine Etat francais,OU=0002 130007669,O=ANSSI,C=FR
# Not Valid Before: Fri Jul 08 09:00:00 2011
# Not Valid After: Sat Apr 15 09:00:00 2028
# Fingerprint (MD5): f4:f5:81:33:de:2e:15:b5:70:3a:57:3c:26:0a:72:8d
# Fingerprint (SHA1): 1a:c9:2f:09:ea:89:e2:8b:12:6d:fa:c5:1e:3a:f7:ea:90:95:a3:ee
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
```

CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "IGC/A AC racine Etat francais"
CKA_CERTIFICATE_TYPE
 CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\136\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\016\060\014\006\003\125\004\012\023\005\101\116\123\123\111\061
\027\060\025\006\003\125\004\013\023\016\060\060\060\062\040\061
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\003\023\035\111\107\103\057\101\040\101\103\040\162\141\143\151
\156\145\040\105\164\141\164\040\146\162\141\156\143\141\151\163
END
CKA_ID UTF8 "0"
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\016\060\014\006\003\125\004\012\023\005\101\116\123\123\111\061
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\003\023\035\111\107\103\057\101\040\101\103\040\162\141\143\151
\156\145\040\105\164\141\164\040\146\162\141\156\143\141\151\163
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\022\021\041\205\014\263\234\152\062\372\276\147\033\201\077
\244\206\025\217
END
CKA_VALUE
 MULTILINE_OCTAL
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\217\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000
\060\136\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\016\060\014\006\003\125\004\012\023\005\101\116\123\123\111\061
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\156\145\040\105\164\141\164\040\146\162\141\156\143\141\151\163
\060\036\027\015\061\061\060\067\060\070\060\071\060\060\060\060
\132\027\015\062\070\060\064\061\065\060\071\060\060\060\060\132
\060\136\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\016\060\014\006\003\125\004\012\023\005\101\116\123\123\111\061
\027\060\025\006\003\125\004\013\023\016\060\060\060\062\040\061
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\156\145\040\105\164\141\164\040\146\162\141\156\143\141\151\163
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\063\355\242\365\123\035\050\043\145\277\100\065\156\316\152\013
\303\251\365\045\014\253\042\360\270\300\304\175\067\014\243\142
\174\356\264\333\075\041\071\247\234\211\343\233\242\020\370\212
\266\112\057\056\230\151\053\152\240\206\332\361\010\345\276\114
\147\026\055\045\141\363\325\015\013\027\104\107\011\324\106\005
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\337\340\335\023\002\274\314\175\377\055\346\007\251\276\165\226
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\105\324\310\355\172\171\205\354\204\167\156\147\115\144\017\103
\336\172\203\244\247\330\333\265\123\114\376\142\310\023\303\142
\066\245\050\061\062\233\264\226\207\342\231\306\037\126\277\106
\243\251\144\061\345\325\261\113\250\146\314\133\241\377\026\374
\012\070\052\150\217\167\045\046\255\221\164\205\150\310\177\032
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\001\001\002\060\035\006\003\125\035\016\004\026\004\024\237\252
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\252\323\051\226\337\000\345\103\340\361\143\254\336\022\216\302
\047\170\372\060\015\006\011\052\206\110\206\367\015\001\001\013
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\367\205\015\116\005\273\115\232\234\264\016\050\242\004\274\120
\060\273\364\224\114\230\220\205\253\340\122\144\117\322\322\056
\142\223\220\260\205\015\210\124\373\306\124\154\236\353\225\171
\200\136\242\227\026\037\362\147\164\101\234\125\364\267\152\233
\112\026\206\275\005\037\146\200\160\176\311\321\365\055\041\161
\120\071\245\255\210\246\046\034\213\327\045\034\072\326\343\364
\302\014\237\127\301\144\310\127\121\043\026\043\215\017\043\152
\126\113\377\372\306\237\065\223\306\042\300\145\361\257\336\251

\154\030\276\127\145\131\315\364\043\125\144\041\330\355\225\141
\151\063\162\152\121\366\237\345\225\155\216\336\153\163\047\023
\224\136\176\227\110\300\062\026\276\075\067\355\326\334\216\274
\134\055\374\142\250\317\366\220\367\261\213\011\353\072\044\143
\015\310\226\105\324\057\167\110\102\365\055\142\347\047\013\340
\021\206\031\335\247\020\367\143\006\221\060\151\132\165\364\254
\371\241\215\227\306\240\357\072\037\223\045\110\126\072\032\210
\041\031\223\303\225\040\111\010\125\111\115\242\123\234\231\234
\163\151\056\247\365\312\267\016\045\357\067\043\137\220\330\103
\176\356\204\027\152\047\136\177\322\055\077\254\076\257\060\247
\215\221\304\364\217\011\035\363\367\221\016\343\030\272\334\104
\311\175\005\123\003\267\156\240\363\171\327\321\032\117\320\270
\154\210\166\301\200\230\125\205\123\141\317\104\127\114\336\116
\015\026\121\361\075\211\201\256\175\013\255\212\265\356\126\304
\306\314\021\013\030\324\374\375\171\373\376\004\021\234\043\357
\166\162\307\215\276\271\036\170\166\362\232\034\255\143\102\307
\330\355\155\141\220\302\041\052\017\010\024\055\040\103\045\174
\030\265\267\240\244\175\271\245\014\031\376\311\253\075\347\133
\336\257\372\127\031\047\205\347\043\016\364\315\015\031\060\076
\212\344\306\021\036\360\264\175\151\143\233\016\226\206\220\340
\373\003\157\133\131\076\035\041\365\127\147\126\046\362\207\031
\007\204\272\054\220\072\303\050\244\005\132\040\315\251\133\225
\165\071\177\042\120\012\116\177\027\367\263\254\323\007\246\276
\055\122\012\060\114\170\020
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "IGC/A AC racine Etat francais"
# Issuer: CN=IGC/A AC racine Etat francais,OU=0002 130007669,O=ANSSI,C=FR
# Serial Number:11:21:85:0c:b3:9c:6a:32:fa:be:67:1b:81:3f:a4:86:15:8f
# Subject: CN=IGC/A AC racine Etat francais,OU=0002 130007669,O=ANSSI,C=FR
# Not Valid Before: Fri Jul 08 09:00:00 2011
# Not Valid After: Sat Apr 15 09:00:00 2028
# Fingerprint (MD5): f4:f5:81:33:de:2e:15:b5:70:3a:57:3c:26:0a:72:8d
# Fingerprint (SHA1): 1a:c9:2f:09:ea:89:e2:8b:12:6d:fa:c5:1e:3a:f7:ea:90:95:a3:ee
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "IGC/A AC racine Etat francais"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\032\311\057\011\352\211\342\213\022\155\372\305\036\072\367\352
\220\225\243\356
END

```
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\364\365\201\063\336\056\025\265\160\072\127\074\046\012\162\215
END
CKA_ISSUER MULTILINE_OCTAL
\060\136\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\016\060\014\006\003\125\004\012\023\005\101\116\123\123\111\061
\027\060\025\006\003\125\004\013\023\016\060\060\060\062\040\061
\063\060\060\060\067\066\066\071\061\046\060\044\006\003\125\004
\003\023\035\111\107\103\057\101\040\101\103\040\162\141\143\151
\156\145\040\105\164\141\164\040\146\162\141\156\143\141\151\163
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\022\021\041\205\014\263\234\152\062\372\276\147\033\201\077
\244\206\025\217
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "PersonalID Trustworthy RootCA 2011"
#
 Issuer: CN=PersonalID Trustworthy RootCA 2011,OU=Certificate Services,O=PersonalID Ltd.,C=IL
# Serial Number:58:cb:f9:64:96:71:74:95:40:f4:ad:08:ac:64:e4:e3
# Subject: CN=PersonalID Trustworthy RootCA 2011,OU=Certificate Services,O=PersonalID Ltd.,C=IL
# Not Valid Before: Thu Sep 01 08:35:21 2011
# Not Valid After: Sun Sep 01 08:45:16 2041
# Fingerprint (MD5): 20:3c:23:dc:f6:7a:97:14:0e:5f:48:b4:7d:ad:ac:c8
# Fingerprint (SHA1): 43:94:ce:31:26:ff:1a:22:4c:dd:4d:ee:b4:f4:ec:1d:a3:68:ef:6a
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "PersonalID Trustworthy RootCA 2011"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\163\061\013\060\011\006\003\125\004\006\023\002\111\114\061
\030\060\026\006\003\125\004\012\014\017\120\145\162\163\157\156
\141\154\111\104\040\114\164\144\056\061\035\060\033\006\003\125
\004\013\014\024\103\145\162\164\151\146\151\143\141\164\145\040
\123\145\162\166\151\143\145\163\061\053\060\051\006\003\125\004
\003\014\042\120\145\162\163\157\156\141\154\111\104\040\124\162
\165\163\164\167\157\162\164\150\171\040\122\157\157\164\103\101
\040\062\060\061\061
END
CKA_ID
```

UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\163\061\013\060\011\006\003\125\004\006\023\002\111\114\061
\030\060\026\006\003\125\004\012\014\017\120\145\162\163\157\156
\141\154\111\104\040\114\164\144\056\061\035\060\033\006\003\125
\004\013\014\024\103\145\162\164\151\146\151\143\141\164\145\040
\123\145\162\166\151\143\145\163\061\053\060\051\006\003\125\004
\003\014\042\120\145\162\163\157\156\141\154\111\104\040\124\162
\165\163\164\167\157\162\164\150\171\040\122\157\157\164\103\101
\040\062\060\061\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\130\313\371\144\226\161\164\225\100\364\255\010\254\144
\344\343
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\062\060\202\004\032\240\003\002\001\002\002\020\130
\313\371\144\226\161\164\225\100\364\255\010\254\144\344\343\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\163
\061\013\060\011\006\003\125\004\006\023\002\111\114\061\030\060
\026\006\003\125\004\012\014\017\120\145\162\163\157\156\141\154
\111\104\040\114\164\144\056\061\035\060\033\006\003\125\004\013
\014\024\103\145\162\164\151\146\151\143\141\164\145\040\123\145
\162\166\151\143\145\163\061\053\060\051\006\003\125\004\003\014
\042\120\145\162\163\157\156\141\154\111\104\040\124\162\165\163
\164\167\157\162\164\150\171\040\122\157\157\164\103\101\040\062
\060\061\061\060\036\027\015\061\061\060\071\060\061\060\070\063
\065\062\061\132\027\015\064\061\060\071\060\061\060\070\064\065
\061\066\132\060\163\061\013\060\011\006\003\125\004\006\023\002
\111\114\061\030\060\026\006\003\125\004\012\014\017\120\145\162
\163\157\156\141\154\111\104\040\114\164\144\056\061\035\060\033
\006\003\125\004\013\014\024\103\145\162\164\151\146\151\143\141
\164\145\040\123\145\162\166\151\143\145\163\061\053\060\051\006
\003\125\004\003\014\042\120\145\162\163\157\156\141\154\111\104
\040\124\162\165\163\164\167\157\162\164\150\171\040\122\157\157
\164\103\101\040\062\060\061\061\060\202\002\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000
\060\202\002\012\002\202\002\001\000\260\225\214\140\376\005\016
\152\063\355\367\213\343\362\325\362\174\323\126\102\124\367\053
\362\210\245\365\347\267\154\207\001\053\151\276\005\111\104\330
\333\041\172\052\327\212\061\241\041\020\236\323\342\156\143\202
\205\124\204\115\050\046\033\342\023\367\121\373\057\353\022\325
\075\071\214\144\237\244\023\207\303\330\311\372\051\043\216\011
\217\111\106\304\324\311\127\130\151\237\027\317\163\164\245\356
\312\030\271\307\301\060\315\117\072\065\010\123\370\354\032\373
\157\060\355\366\237\011\360\360\320\304\216\073\171\116\056\205
\042\134\324\175\160\321\377\222\272\037\324\125\123\147\272\050
\130\055\367\023\214\374\245\013\234\070\246\106\034\016\350\252

\170\053\365\012\060\323\073\140\206\310\177\245\233\242\143\001
\057\320\323\022\045\205\176\226\315\061\261\344\233\216\352\054
\223\244\142\250\067\325\366\217\337\041\232\323\076\035\341\120
\021\160\124\233\004\027\235\115\253\141\316\217\052\054\357\171
\346\167\105\131\326\150\325\266\113\232\253\221\113\016\141\027
\271\130\302\236\146\241\217\211\301\103\040\102\260\177\200\234
\112\052\267\172\040\101\306\115\304\222\157\172\176\135\133\271
\243\311\116\312\345\120\145\274\000\000\171\107\360\105\004\260
\042\373\016\230\252\141\035\117\140\143\162\217\265\260\004\224
\177\020\254\031\077\047\142\151\326\034\127\335\071\117\070\352
\000\232\375\050\235\100\046\300\100\235\304\240\111\310\101\265
\147\075\240\113\224\051\022\251\130\047\131\004\177\217\321\214
\176\014\263\010\027\064\254\217\271\134\275\351\160\241\176\302
\245\145\141\351\266\020\120\217\334\344\164\141\361\137\162\173
\177\134\057\055\174\253\326\103\061\020\034\131\167\312\110\112
\030\242\144\013\000\131\147\307\324\312\303\233\032\010\122\025
\276\327\305\306\267\057\346\142\234\246\307\330\336\360\025\373
\256\071\125\055\157\120\165\056\375\240\007\264\137\172\176\004
\213\366\231\242\165\355\311\073\325\075\317\147\122\075\076\357
\037\160\232\030\074\247\040\006\111\014\261\145\254\063\273\324
\177\107\151\210\366\212\201\356\235\324\264\307\057\003\350\256
\032\311\126\005\147\151\250\310\201\002\003\001\000\001\243\201
\301\060\201\276\060\013\006\003\125\035\017\004\004\003\002\001
\206\060\022\006\003\125\035\023\001\001\377\004\010\060\006\001
\001\377\002\001\002\060\035\006\003\125\035\016\004\026\004\024
\307\177\013\310\057\127\216\051\362\366\001\213\353\047\245\126
\216\375\244\036\060\020\006\011\053\006\001\004\001\202\067\025
\001\004\003\002\001\000\060\152\006\003\125\035\040\004\143\060
\141\060\137\006\010\053\006\001\004\001\341\030\001\060\123\060
\121\006\010\053\006\001\005\005\007\002\001\026\105\150\164\164
\160\072\057\057\167\167\167\056\151\143\141\056\143\157\056\151
\154\057\162\145\160\157\163\151\164\157\162\171\057\143\160\163
\057\120\145\162\163\157\156\141\154\111\104\137\120\162\141\143
\164\151\143\145\137\123\164\141\164\145\155\145\156\164\056\160
\144\146\060\015\006\011\052\206\110\206\367\015\001\001\013\005
\000\003\202\002\001\000\102\145\213\044\372\222\025\064\032\034
\372\310\316\115\172\057\173\337\320\003\101\034\324\244\341\373
\350\314\255\011\335\035\244\010\331\250\040\175\227\237\014\111
\361\245\302\346\325\167\106\227\176\244\220\242\171\351\275\032
\136\064\202\146\011\122\374\120\321\217\320\253\034\242\377\377
\075\356\376\043\370\277\043\263\315\276\341\367\317\344\330\022
\343\224\310\116\314\327\173\260\067\233\167\352\355\134\201\310
\314\217\316\071\343\344\145\135\336\202\330\217\043\151\341\121
\257\137\267\117\220\151\244\231\145\123\272\346\375\257\170\147
\224\112\310\303\177\214\002\117\112\346\207\230\366\070\267\110
\370\155\050\177\367\306\154\045\124\375\056\326\352\332\006\342
\261\375\007\150\360\257\200\214\264\302\351\164\025\244\032\277
\271\312\103\133\022\347\205\107\136\122\003\360\221\340\351\120

\161\324\041\002\054\173\206\221\160\066\306\234\266\164\371\052
\125\367\041\373\157\240\006\135\327\060\022\362\121\361\311\070
\066\217\310\146\141\101\331\307\113\202\150\122\243\365\211\014
\025\274\116\052\225\254\061\151\247\033\342\324\327\110\364\221
\365\003\174\171\026\076\054\015\151\341\212\067\036\237\174\030
\125\101\057\137\347\244\162\233\125\363\343\001\260\002\245\204
\022\152\100\246\253\344\241\254\353\003\331\274\137\044\126\047
\255\040\340\146\065\105\075\107\011\360\005\261\157\161\176\100
\260\320\025\136\053\254\122\201\250\373\203\365\054\127\104\206
\064\344\024\152\343\317\175\232\167\330\154\110\134\313\232\341
\246\373\277\021\242\006\345\037\161\275\064\265\317\275\304\102
\026\305\051\370\324\300\114\212\262\336\305\224\202\206\233\314
\340\251\006\104\061\044\044\115\372\355\341\102\045\146\242\301
\327\200\027\357\172\225\145\103\076\146\323\005\361\001\344\102
\126\104\000\170\153\235\066\040\373\145\377\100\134\350\150\065
\037\341\046\240\202\003\166\003\313\160\106\021\044\256\337\057
\140\375\361\047\000\003\275\113\047\333\274\234\227\067\121\053
\345\170\264\301\066\220\020\214\377\075\000\324\272\110\237\110
\312\207\061\232\355\304\232\123\322\335\163\024\077\011\202\241
\135\145\116\115\046\342
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "PersonalID Trustworthy RootCA 2011"
# Issuer: CN=PersonalID Trustworthy RootCA 2011,OU=Certificate Services,O=PersonalID Ltd.,C=IL
# Serial Number:58:cb:f9:64:96:71:74:95:40:f4:ad:08:ac:64:e4:e3
# Subject: CN=PersonalID Trustworthy RootCA 2011,OU=Certificate Services,O=PersonalID Ltd.,C=IL
# Not Valid Before: Thu Sep 01 08:35:21 2011
# Not Valid After: Sun Sep 01 08:45:16 2041
# Fingerprint (MD5): 20:3c:23:dc:f6:7a:97:14:0e:5f:48:b4:7d:ad:ac:c8
#
Fingerprint (SHA1): 43:94:ce:31:26:ff:1a:22:4c:dd:4d:ee:b4:f4:ec:1d:a3:68:ef:6a
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "PersonalID Trustworthy RootCA 2011"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\103\224\316\061\046\377\032\042\114\335\115\356\264\364\354\035
\243\150\357\152
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\040\074\043\334\366\172\227\024\016\137\110\264\175\255\254\310
END

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CKA_ISSUER MULTILINE_OCTAL
\060\163\061\013\060\011\006\003\125\004\006\023\002\111\114\061
\030\060\026\006\003\125\004\012\014\017\120\145\162\163\157\156
\141\154\111\104\040\114\164\144\056\061\035\060\033\006\003\125
\004\013\014\024\103\145\162\164\151\146\151\143\141\164\145\040
\123\145\162\166\151\143\145\163\061\053\060\051\006\003\125\004
\003\014\042\120\145\162\163\157\156\141\154\111\104\040\124\162
\165\163\164\167\157\162\164\150\171\040\122\157\157\164\103\101
\040\062\060\061\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\130\313\371\144\226\161\164\225\100\364\255\010\254\144
\344\343
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Swiss Government Root CA II"
# Issuer: CN=Swiss Government Root CA II,OU=Certification Authorities,OU=Services,O=The Federal Authorities
of the Swiss Confederation,C=CH
# Serial Number:0e:9f:17:99:a5:b1:3d:9c:cb:ec:06:eb:a3:f0:0e:69
# Subject: CN=Swiss Government Root CA II,OU=Certification Authorities,OU=Services,O=The Federal
Authorities of the Swiss Confederation,C=CH
# Not Valid Before: Wed Feb 16 09:00:00 2011
# Not Valid After: Fri Feb 16 08:59:59 2035
# Fingerprint (MD5): 30:b0:e4:cf:bf:f5:89:dc:bf:52:2d:88:1c:cb:aa:b3
# Fingerprint (SHA1): c7:f7:cb:e2:02:36:66:f9:86:02:5d:4a:3e:31:3f:29:eb:0c:5b:38
CKA_CLASS
 CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Swiss Government Root CA II"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\247\061\013\060\011\006\003\125\004\006\023\002\103\110
\061\073\060\071\006\003\125\004\012\023\062\124\150\145\040\106
\145\144\145\162\141\154\040\101\165\164\150\157\162\151\164\151
\145\163\040\157\146\040\164\150\145\040\123\167\151\163\163\040
\103\157\156\146\145\144\145\162\141\164\151\157\156\061\021\060
\017\006\003\125\004\013\023\010\123\145\162\166\151\143\145\163
\061\042\060\040\006\003\125\004\013\023\031\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\151\145\163\061\044\060\042\006\003\125\004\003\023\033\123
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\167\151\163\163\040\107\157\166\145\162\156\155\145\156\164\040
\122\157\157\164\040\103\101\040\111\111
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
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\103\157\156\146\145\144\145\162\141\164\151\157\156\061\021\060
\017\006\003\125\004\013\023\010\123\145\162\166\151\143\145\163
\061\042\060\040\006\003\125\004\013\023\031\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\151\145\163\061\044\060\042\006\003\125\004\003\023\033\123
\167\151\163\163\040\107\157\166\145\162\156\155\145\156\164\040
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\016\151
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\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\201
\247\061\013\060\011\006\003\125\004\006\023\002\103\110\061\073
\060\071\006\003\125\004\012\023\062\124\150\145\040\106\145\144
\145\162\141\154\040\101\165\164\150\157\162\151\164\151\145\163
\040\157\146\040\164\150\145\040\123\167\151\163\163\040\103\157
\156\146\145\144\145\162\141\164\151\157\156\061\021\060\017\006
\003\125\004\013\023\010\123\145\162\166\151\143\145\163\061\042
\060\040\006\003\125\004\013\023\031\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\151
\145\163\061\044\060\042\006\003\125\004\003\023\033\123\167\151
\163\163\040\107\157\166\145\162\156\155\145\156\164\040\122\157
\157\164\040\103\101\040\111\111\060\036\027\015\061\061\060\062
\061\066\060\071\060\060\060\060\132\027\015\063\065\060\062\061
\066\060\070\065\071\065\071\132\060\201\247\061\013\060\011\006
\003\125\004\006\023\002\103\110\061\073\060\071\006\003\125\004
\012\023\062\124\150\145\040\106\145\144\145\162\141\154\040\101
\165\164\150\157\162\151\164\151\145\163\040\157\146\040\164\150
\145\040\123\167\151\163\163\040\103\157\156\146\145\144\145\162
\141\164\151\157\156\061\021\060\017\006\003\125\004\013\023\010
\123\145\162\166\151\143\145\163\061\042\060\040\006\003\125\004
\013\023\031\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\151\145\163\061\044\060\042
\006\003\125\004\003\023\033\123\167\151\163\163\040\107\157\166

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\203\233\150\005\157\026\343\210\250\001\017\313\161\236\177\107
\220\113\314\045\167\310\360\327\151\056\221\150\127\041\262\262
\007\041\063\356\114\244\067\045\230\114\264\106\062\116\326\371
\153\213\121\212\357\054\067\362\230\325\365\324\264\267\347\000
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\335\003\172\310\372\340\204\346\331\275\116\176\372\156\117\166
\321\135\076\250\350\207\105\220\171\363\255\256\365\302\135\021
\115\051\367\210\023\311\325\223\163\001\253\335\355\375\257\167
\373\151\116\357\217\122\034\317\365\054\132\154\354\376\202\233
\333\174\071\253\165\043\176\070\220\117\224\216\055\142\130\236
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\266\223\234\255\254\005\122\042\123\040\231\016\275\227\306\341
\332\163\251\035\211\362\304\131\346\207\346\126\053\016\225\002
\032\207\306\171\376\231\152\351\164\354\360\022\371\024\050\040
\225\226\072\057\135\127\265\157\377\223\274\266\050\152\054\244
\050\170\106\141\257\101\044\244\363\372\004\216\361\212\031\242
\221\163\342\167\217\264\247\371\234\377\156\121\354\275\037\226
\023\350\143\221\136\207\150\157\353\330\174\056\020\117\120\030
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\054\174\322\053\267\143\014\376\255\173\275\266\072\227\271\075
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\314\323\177\160\213\140\140\347\262\240\266\212\122\114\376\012
\226\313\317\072\260\130\010\356\034\102\311\206\167\102\156\077
\264\254\220\000\130\102\034\100\304\156\270\105\310\274\063\066
\337\275\047\002\003\001\000\001\243\202\002\134\060\202\002\130
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\201\235\006\003\125\035\040\004\201\225\060\201\222\060
\201\217\006\010\140\205\164\001\021\003\025\001\060\201\202\060
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\160\072\057\057\167\167\167\056\160\153\151\056\141\144\155\151
\156\056\143\150\057\143\160\163\057\103\120\123\137\062\137\061
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\040\123\167\151\163\163\040\107\157\166\145\162\156\155\145\156
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\144\155\151\156\144\151\162\056\141\144\155\151\156\056\143\150
\072\063\070\071\057\143\156\075\123\167\151\163\163\045\062\060
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\145\162\164\151\146\151\143\141\164\151\157\156\045\062\060\101
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\341\142\060\016\006\003\125\035\017\001\001\377\004\004\003\002
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\200\024\345\204\157\211\151\075\166\000\027\177\301\253\275\256
\137\301\175\272\341\142\241\201\255\244\201\252\060\201\247\061
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\141\154\040\101\165\164\150\157\162\151\164\151\145\163\040\157
\146\040\164\150\145\040\123\167\151\163\163\040\103\157\156\146
\145\144\145\162\141\164\151\157\156\061\021\060\017\006\003\125
\004\013\023\010\123\145\162\166\151\143\145\163\061\042\060\040
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\061\044\060\042\006\003\125\004\003\023\033\123\167\151\163\163
\040\107\157\166\145\162\156\155\145\156\164\040\122\157\157\164
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\367\015\001\001\013\005\000\003\202\002\001\000\203\067\127\165
\311\070\120\277\101\006\226\160\302\331\307\327\260\132\000\315
\243\100\117\323\322\371\212\207\221\262\211\313\135\244\274\157
\117\076\124\366\312\074\263\304\114\213\307\076\364\331\304\142
\335\307\125\236\321\371\322\104\347\036\117\317\350\356\053\034
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\102\306\171\130\205\252\373\334\333\160\312\225\371\364\016\142
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\045\350\241\247\157\260\241\046\307\327\312\040\144\334\300\163
\074\020\242\024\036\364\255\301\076\024\220\071\066\143\210\157
\050\340\140\245\221\367\142\344\232\317\322\265\161\236\135\073
\366\231\054\355\221\072\010\234\264\204\205\111\343\341\272\246
\266\150\263\266\266\117\113\134\123\012\127\154\241\007\222\366
\142\236\250\372\212\326\363\153\247\017\262\053\146\275\257\102
\107\010\117\350\327\174\237\206\017\372\132\203\276\055\157\000
\004\265\166\207\026\257\335\117\072\226\264\064\127\267\342\377
\101\377\336\102\034\146\305\205\353\302\162\037\270\034\116\356
\027\362\142\357\012\004\254\233\253\241\362\356\356\242\100\044
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\012\036\026\064\246\304\064\167\303\202\070\110\041\002\376\022
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\365\013\175\004\055\204\015\302\331\114\053\227\361\325\124\367
\217\263\012\342\275\130\074\231\362\257\071\033\220\371\073\347
\267\105\347\132\152\175\301\237\024\157\060\127\230\031\240\007
\103\353\356\321\010\206\327\111\234\022\012\000\073\017\247\101
\261\112\253\220\263\324\275\011\347\210\017\236\044\016\053\373
\141\075\125\231\323\130\344\270\307\175\364\025\115\145\016\030
\171\101\311\273\351\232\301\131\030\104\064\142\325\350\070\173
\312\205\030\230\206\171\315\175\272\107\333\225
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CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Swiss Government Root CA II"
# Issuer: CN=Swiss Government Root CA II,OU=Certification Authorities,OU=Services,O=The Federal Authorities of the Swiss Confederation,C=CH
# Serial Number:0e:9f:17:99:a5:b1:3d:9c:cb:ec:06:eb:a3:f0:0e:69
# Subject: CN=Swiss Government Root CA II,OU=Certification Authorities,OU=Services,O=The Federal Authorities of the Swiss Confederation,C=CH
# Not Valid Before: Wed
Feb 16 09:00:00 2011
# Not Valid After: Fri Feb 16 08:59:59 2035
# Fingerprint (MD5): 30:b0:e4:cf:bf:f5:89:dc:bf:52:2d:88:1c:cb:aa:b3
# Fingerprint (SHA1): c7:f7:cb:e2:02:36:66:f9:86:02:5d:4a:3e:31:3f:29:eb:0c:5b:38
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Swiss Government Root CA II"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\307\367\313\342\002\066\146\371\206\002\135\112\076\061\077\051
\353\014\133\070
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\060\260\344\317\277\365\211\334\277\122\055\210\034\313\252\263
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\247\061\013\060\011\006\003\125\004\006\023\002\103\110
\061\073\060\071\006\003\125\004\012\023\062\124\150\145\040\106
\145\144\145\162\141\154\040\101\165\164\150\157\162\151\164\151
\145\163\040\157\146\040\164\150\145\040\123\167\151\163\163\040
\103\157\156\146\145\144\145\162\141\164\151\157\156\061\021\060
\017\006\003\125\004\013\023\010\123\145\162\166\151\143\145\163

\061\042\060\040\006\003\125\004\013\023\031\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\151\145\163\061\044\060\042\006\003\125\004\003\023\033\123
\167\151\163\163\040\107\157\166\145\162\156\155\145\156\164\040
\122\157\157\164\040\103\101\040\111\111
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\016\237\027\231\245\261\075\234\313\354\006\353\243\360
\016\151
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Swiss Government Root CA I"
# Issuer: CN=Swiss Government Root CA I,OU=Certification Authorities,OU=Services,O=The Federal Authorities of the Swiss Confederation,C=CH
# Serial Number:fd:75:04:8d:7a:60:86:93:69:4c:aa:00:3c:65:d3:3d
# Subject: CN=Swiss Government Root CA
I,OU=Certification Authorities,OU=Services,O=The Federal Authorities of the Swiss Confederation,C=CH
# Not Valid Before: Tue Feb 15 09:00:00 2011
# Not Valid After: Thu Feb 15 08:59:59 2035
# Fingerprint (MD5): c7:c9:da:9b:76:e1:ac:86:6b:34:bd:03:3f:e3:cf:d2
# Fingerprint (SHA1): a1:58:51:87:15:65:86:ce:f9:c4:54:e2:2a:b1:5c:58:74:56:07:b4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Swiss Government Root CA I"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\246\061\013\060\011\006\003\125\004\006\023\002\103\110
\061\073\060\071\006\003\125\004\012\023\062\124\150\145\040\106
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\145\163\040\157\146\040\164\150\145\040\123\167\151\163\163\040
\103\157\156\146\145\144\145\162\141\164\151\157\156\061\021\060
\017\006\003\125\004\013\023\010\123\145\162\166\151\143\145\163
\061\042\060\040\006\003\125\004\013\023\031\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\151\145\163\061\043\060\041\006\003\125\004\003\023\032\123
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END
CKA_ID

UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
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\145\163\040\157\146\040\164\150\145\040\123\167\151\163\163\040
\103\157\156\146\145\144\145\162\141\164\151\157\156\061\021\060
\017\006\003\125\004\013\023\010\123\145\162\166\151\143\145\163
\061\042\060\040\006\003\125\004\013\023\031\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\151\145\163\061\043\060\041\006\003\125\004\003\023\032\123
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\122\157\157\164\040\103\101\040\111
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\201\246\061\013\060\011\006\003\125\004\006\023\002\103\110\061
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\163\040\157\146\040\164\150\145\040\123\167\151\163\163\040\103
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\151\145\163\061\043\060\041\006\003\125\004\003\023\032\123\167
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\061\065\060\071\060\060\060\060\132\027\015\063\065\060\062\061
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\040\101\165\164\150\157\162\151\164\151\145\163\061\043\060\041
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\145\162\156\155\145\156\164\040\122\157\157\164\040\103\101\040
\111\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002

\001\000\310\016\162\364\001\057\206\173\013\302\143\260\215\150
\355\037\075\336\271\203\233\134\241\135\272\017\066\047\021\004
\255\006\124\040\267\036\240\346\316\276\360\231\151\162\031\065
\144\146\061\215\054\275\216\102\012\237\306\312\251\220\054\332
\274\205\060\003\331\062\226\226\360\276\240\042\015\044\154\324
\306\177\132\114\121\044\055\124\162\010\174\063\351\314\050\307
\146\145\043\151\153\225\264\353\276\343\207\347\143\327\344\373
\007\255\022\222\353\347\344\012\103\262\251\337\307\220\274\046
\133\221\371\243\267\207\234\224\271\020\215\210\305\130\134\062
\274\026\354\016\127\117\376\247\223\170\217\340\305\071\273\007
\210\140\301\124\145\353\207\276\237\061\227\161\074\372\213\310
\203\154\122\226\340\254\300\357\313\151\010\225\133\340\340\273
\257\047\244\302\027\361\121\237\204\166\141\330\044\342\376\141
\155\144\065\111\352\071\304\041\142\275\314\342\002\377\110\153
\070\257\151\307\271\222\055\202\021\215\275\013\211\205\052\352
\267\264\262\315\113\353\321\372\252\360\340\114\011\074\115\337
\366\061\035\206\060\250\101\210\127\160\054\047\121\336\317\213
\116\077\002\362\120\245\027\340\147\033\162\014\101\061\037\001
\242\226\076\074\333\002\266\235\224\346\002\116\363\360\031\202
\262\010\043\023\353\221\315\121\323\252\106\302\163\230\230\077
\272\303\356\232\374\372\315\257\162\012\067\023\217\371\240\120
\263\352\373\077\054\274\372\143\125\065\364\322\274\270\161\322
\221\353\351\312\312\134\354\121\146\250\236\131\005\042\057\243
\032\333\117\340\105\142\043\074\135\125\373\060\225\053\064\242
\317\247\264\113\300\063\311\064\121\235\323\263\053\337\305\352
\054\054\307\337\104\037\266\215\271\376\363\134\315\067\057\260
\154\234\112\010\275\350\365\326\372\160\345\151\062\067\134\137
\013\313\077\344\210\002\314\312\263\170\057\175\277\110\263\041
\260\037\210\171\233\132\212\161\330\041\204\051\017\112\004\061
\052\275\015\041\104\316\164\235\046\323\111\035\370\206\250\345
\022\167\305\300\163\014\120\203\152\220\153\241\312\370\320\225
\331\065\206\307\021\243\073\024\307\313\206\130\126\015\373\203
\367\001\002\003\001\000\001\243\202\002\131\060\202\002\125\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\201\233\006\003\125\035\040\004\201\223\060\201\220\060\201
\215\006\010\140\205\164\001\021\003\001\000\060\201\200\060\103
\006\010\053\006\001\005\005\007\002\001\026\067\150\164\164\160
\072\057\057\167\167\167\056\160\153\151\056\141\144\155\151\156
\056\143\150\057\143\160\163\057\103\120\123\137\062\137\061\066
\137\067\065\066\137\061\137\061\067\137\063\137\061\137\060\056
\160\144\146\060\071\006\010\053\006\001\005\005\007\002\002\060
\055\032\053\124\150\151\163\040\151\163\040\164\150\145\040\123
\167\151\163\163\040\107\157\166\145\162\156\155\145\156\164\040
\122\157\157\164\040\103\101\040\111\040\103\120\123\056\060\201
\216\006\003\125\035\037\004\201\206\060\201\203\060\201\200\240
\176\240\174\206\172\154\144\141\160\072\057\057\141\144\155\151
\156\144\151\162\056\141\144\155\151\156\056\143\150\072\063\070
\071\057\143\156\075\123\167\151\163\163\045\062\060\107\157\166

\145\162\156\155\145\156\164\045\062\060\122\157\157\164\045\062
\060\103\101\045\062\060\111\054\157\165\075\103\145\162\164\151
\146\151\143\141\164\151\157\156\045\062\060\101\165\164\150\157
\162\151\164\151\145\163\054\157\165\075\123\145\162\166\151\143
\145\163\054\157\075\101\144\155\151\156\054\143\075\103\110\060
\035\006\003\125\035\016\004\026\004\024\265\033\203\273\073\117
\262\322\373\345\003\216\324\141\135\321\032\216\260\242\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\201
\343\006\003\125\035\043\004\201\333\060\201\330\200\024\265\033
\203\273\073\117\262\322\373\345\003\216\324\141\135\321\032\216
\260\242\241\201\254\244\201\251\060\201\246\061\013\060\011\006
\003\125\004\006\023\002\103\110\061\073\060\071\006\003\125\004
\012\023\062\124\150\145\040\106\145\144\145\162\141\154\040\101
\165\164\150\157\162\151\164\151\145\163\040\157\146\040\164\150
\145\040\123\167\151\163\163\040\103\157\156\146\145\144\145\162
\141\164\151\157\156\061\021\060\017\006\003\125\004\013\023\010
\123\145\162\166\151\143\145\163\061\042\060\040\006\003\125\004
\013\023\031\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\151\145\163\061\043\060\041
\006\003\125\004\003\023\032\123\167\151\163\163\040\107\157\166
\145\162\156\155\145\156\164\040\122\157\157\164\040\103\101\040
\111\202\021\000\375\165\004\215\172\140\206\223\151\114\252\000
\074\145\323\075\060\015\006\011\052\206\110\206\367\015\001\001
\013\005\000\003\202\002\001\000\045\332\337\170\260\046\334\237
\231\353\063\234\311\105\272\134\143\122\215\156\003\163\252\164
\110\305\015\013\322\027\014\054\013\322\306\045\203\324\124\315
\007\201\124\057\147\166\045\247\351\327\177\226\107\167\244\035
\233\105\377\361\330\366\236\107\016\164\214\023\304\362\276\326
\007\050\030\074\230\165\301\333\353\222\210\046\346\006\144\216
\371\322\375\342\231\065\201\321\330\165\027\265\163\352\335\350
\030\042\225\026\031\012\131\052\042\334\206\132\103\117\045\150
\066\251\330\223\000\217\136\305\303\141\206\360\322\024\011\225
\121\304\176\330\122\356\260\215\212\210\161\245\327\050\247\364
\334\006\130\045\136\304\125\030\010\225\164\174\270\001\347\116
\330\326\366\174\040\103\110\015\243\340\336\124\304\250\137\000
\111\103\323\105\073\202\145\156\356\213\243\001\042\126\232\361
\316\051\345\014\304\153\355\347\116\370\261\125\201\255\161\377
\204\373\010\127\346\107\312\255\207\370\106\370\372\360\065\204
\355\264\330\210\227\042\167\244\217\026\310\074\147\321\341\156
\004\254\173\217\066\315\336\245\010\254\052\215\365\247\035\237
\307\303\221\041\102\243\206\201\271\052\330\261\351\070\035\124
\010\230\071\012\021\312\062\016\063\315\364\114\352\250\112\006
\351\030\076\101\306\317\240\366\340\053\153\040\216\247\040\002
\353\060\101\201\260\350\344\256\244\030\211\053\337\024\360\022
\051\155\170\372\115\104\373\262\064\345\257\363\216\065\367\303
\316\054\013\030\264\320\171\217\023\277\003\213\146\270\265\141
\324\254\016\375\170\075\011\255\265\322\054\117\126\101\231\210
\104\014\176\147\343\144\237\372\132\052\130\167\121\151\261\315

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\054\232\247\064\020\005\164\372\156\105\143\313\213\122\255\107
\221\242\022\310\242\046\004\305\320\042\036\003\263\262\222\067
\124\127\375\211\203\165\003\155\055\073\263\361\244\242\020\174
\234\223\215\243\120\204\071\213\225\131\101\366\002\166\006\212
\274\016\220\347\331\072\353\255\046\136\127\123\321\157\310\165
\340\253\221\173\153\241\177\371\033\120\250\334\376\115\006\341
\025\212\244\020\353\036\006\317\124\110\025\226\050\266\043\037
\032\343\174\245\217\372\067\127
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Swiss Government Root CA I"
# Issuer: CN=Swiss Government Root CA I,OU=Certification Authorities,OU=Services,O=The
 Federal Authorities of the Swiss Confederation,C=CH
# Serial Number:fd:75:04:8d:7a:60:86:93:69:4c:aa:00:3c:65:d3:3d
# Subject: CN=Swiss Government Root CA I,OU=Certification Authorities,OU=Services,O=The Federal
Authorities of the Swiss Confederation,C=CH
# Not Valid Before: Tue Feb 15 09:00:00 2011
# Not Valid After: Thu Feb 15 08:59:59 2035
# Fingerprint (MD5): c7:c9:da:9b:76:e1:ac:86:6b:34:bd:03:3f:e3:cf:d2
# Fingerprint (SHA1): a1:58:51:87:15:65:86:ce:f9:c4:54:e2:2a:b1:5c:58:74:56:07:b4
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Swiss Government Root CA I"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\241\130\121\207\025\145\206\316\371\304\124\342\052\261\134\130
\164\126\007\264
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\307\311\332\233\166\341\254\206\153\064\275\003\077\343\317\322
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\246\061\013\060\011\006\003\125\004\006\023\002\103\110
\061\073\060\071\006\003\125\004\012\023\062\124\150\145\040\106
\145\144\145\162\141\154\040\101\165\164\150\157\162\151\164\151
\145\163\040\157\146\040\164\150\145\040\123\167\151\163\163\040
\103\157\156\146\145\144\145\162\141\164\151\157\156\061\021\060
\017\006\003\125\004\013\023\010\123\145\162\166\151\143\145\163
\061\042\060\040\006\003\125\004\013\023\031\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\151\145\163\061\043\060\041\006\003\125\004\003\023\032\123
\167\151\163\163\040\107\157\166\145\162\156\155\145\156\164\040
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\122\157\157\164\040\103\101\040\111
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\021\000\375\165\004\215\172\140\206\223\151\114\252\000\074
\145\323\075
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing
 Only Certificate
# Certificate "Network Solutions Certificate Authority"
# Issuer: CN=Network Solutions Certificate Authority,O=Network Solutions L.L.C.,C=US
# Serial Number:1c:a0:2d:c1:52:3b:6a:6d:8b:5c:1f:95:4a:ed:ac:30
# Subject: CN=Network Solutions Certificate Authority,O=Network Solutions L.L.C.,C=US
# Not Valid Before: Sat Jan 01 00:00:00 2011
# Not Valid After: Tue Dec 31 23:59:59 2030
# Fingerprint (MD5): bd:a4:1d:36:de:c2:7a:8a:04:37:cb:f2:00:a6:65:54
# Fingerprint (SHA1): 71:89:9a:67:bf:33:af:31:be:fd:c0:71:f8:f7:33:b1:83:85:63:32
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Network Solutions Certificate Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\041\060\037\006\003\125\004\012\023\030\116\145\164\167\157\162
\153\040\123\157\154\165\164\151\157\156\163\040\114\056\114\056
\103\056\061\060\060\056\006\003\125\004\003\023\047\116\145\164
\167\157\162\153\040\123\157\154\165\164\151\157\156\163\040\103
\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150\157
\162\151\164\171
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\041\060\037\006\003\125\004\012\023\030\116\145\164\167\157\162
\153\040\123\157\154\165\164\151\157\156\163\040\114\056\114\056
\103\056\061\060\060\056\006\003\125\004\003\023\047\116\145\164
\167\157\162\153\040\123\157\154\165\164\151\157\156\163\040\103
\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150\157
\162\151\164\171
END
```

CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\034\240\055\301\122\073\152\155\213\134\037\225\112\355
\254\060
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\220\060\202\002\170\240\003\002\001\002\002\020\034
\240\055\301\122\073\152\155\213\134\037\225\112\355\254\060\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\142
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\041\060
\037\006\003\125\004\012\023\030\116\145\164\167\157\162\153\040
\123\157\154\165\164\151\157\156\163\040\114\056\114\056\103\056
\061\060\060\056\006\003\125\004\003\023\047\116\145\164\167\157
\162\153\040\123\157\154\165\164\151\157\156\163\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\060\036\027\015\061\061\060\061\060\061\060\060\060\060
\060\060\132\027\015\063\060\061\062\063\061\062\063\065\071\065
\071\132\060\142\061\013\060\011\006\003\125\004\006\023\002\125
\123\061\041\060\037\006\003\125\004\012\023\030\116\145\164\167
\157\162\153\040\123\157\154\165\164\151\157\156\163\040\114\056
\114\056\103\056\061\060\060\056\006\003\125\004\003\023\047\116
\145\164\167\157\162\153\040\123\157\154\165\164\151\157\156\163
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164
\150\157\162\151\164\171\060\202\001\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202
\001\012\002\202\001\001\000\344\274\176\222\060\155\306\330\216
\053\013\274\106\316\340\047\226\336\336\371\372\022\323\074\063
\163\263\004\057\274\161\214\345\237\266\042\140\076\137\135\316
\011\377\202\014\033\232\121\120\032\046\211\335\325\141\135\031
\334\022\017\055\012\242\103\135\027\320\064\222\040\352\163\317
\070\054\006\046\011\172\162\367\372\120\062\370\302\223\323\151
\242\043\316\101\261\314\344\325\037\066\321\212\072\370\214\143
\342\024\131\151\355\015\323\177\153\350\270\003\345\117\152\345
\230\143\151\110\005\276\056\377\063\266\351\227\131\151\370\147
\031\256\223\141\226\104\025\323\162\260\077\274\152\175\354\110
\177\215\303\253\252\161\053\123\151\101\123\064\265\260\271\305
\006\012\304\260\105\365\101\135\156\211\105\173\075\073\046\214
\164\302\345\322\321\175\262\021\324\373\130\062\042\232\200\311
\334\375\014\351\177\136\003\227\316\073\000\024\207\047\160\070
\251\216\156\263\047\166\230\121\340\005\343\041\253\032\325\205
\042\074\051\265\232\026\305\200\250\364\273\153\060\217\057\106
\002\242\261\014\042\340\323\002\003\001\000\001\243\102\060\100
\060\035\006\003\125\035\016\004\026\004\024\041\060\311\373\000
\327\116\230\332\207\252\052\320\247\056\261\100\061\247\114\060
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003
\202\001\001\000\302\211\204\240\350\214\146\375\377\023\005\033
\303\072\216\230\111\212\370\252\000\134\046\375\162\152\243\176

\022\033\224\256\124\370\041\217\247\223\117\367\026\357\271\271
\263\062\300\045\041\061\146\067\054\011\260\376\062\260\067\354
\074\270\316\217\010\252\010\220\007\134\165\325\341\116\054\313
\002\044\351\242\136\351\365\170\065\042\006\034\362\037\210\261
\341\134\314\226\124\372\157\111\314\215\361\126\003\355\317\054
\237\047\336\345\312\203\104\276\106\100\371\127\056\322\177\061
\055\316\203\334\376\160\153\204\320\243\237\377\227\320\250\327
\002\354\261\054\360\357\163\070\075\231\254\304\117\001\277\325
\152\352\306\056\062\051\027\012\313\346\151\236\321\112\265\366
\337\216\031\370\225\351\105\251\016\315\155\101\131\040\236\163
\306\154\161\034\234\324\115\060\250\163\011\240\025\363\240\105
\046\303\133\375\273\271\330\055\327\037\365\005\060\031\366\256
\017\216\142\217\337\310\117\206\331\035\141\026\263\311\360\273
\373\307\365\257\001\042\107\354\330\332\317\034\363\123\146\272
\123\011\001\371
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Network Solutions Certificate Authority"
# Issuer: CN=Network Solutions Certificate Authority,O=Network Solutions L.L.C.,C=US
# Serial Number:1c:a0:2d:c1:52:3b:6a:6d:8b:5c:1f:95:4a:ed:ac:30
# Subject: CN=Network Solutions Certificate Authority,O=Network Solutions
 L.L.C.,C=US
# Not Valid Before: Sat Jan 01 00:00:00 2011
# Not Valid After: Tue Dec 31 23:59:59 2030
# Fingerprint (MD5): bd:a4:1d:36:de:c2:7a:8a:04:37:cb:f2:00:a6:65:54
# Fingerprint (SHA1): 71:89:9a:67:bf:33:af:31:be:fd:c0:71:f8:f7:33:b1:83:85:63:32
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Network Solutions Certificate Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\161\211\232\147\277\063\257\061\276\375\300\161\370\367\063\261
\203\205\143\062
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\275\244\035\066\336\302\172\212\004\067\313\362\000\246\145\124
END
CKA_ISSUER MULTILINE_OCTAL
\060\142\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\041\060\037\006\003\125\004\012\023\030\116\145\164\167\157\162
\153\040\123\157\154\165\164\151\157\156\163\040\114\056\114\056
\103\056\061\060\060\056\006\003\125\004\003\023\047\116\145\164

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\167\157\162\153\040\123\157\154\165\164\151\157\156\163\040\103
\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150\157
\162\151\164\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\034\240\055\301\122\073\152\155\213\134\037\225\112\355
\254\060
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "LuxTrust Global Root"
# Issuer: CN=LuxTrust Global Root,O=LuxTrust s.a.,C=LU
# Serial Number: 3000 (0xbb8)
# Subject: CN=LuxTrust Global Root,O=LuxTrust s.a.,C=LU
# Not Valid Before: Thu Mar 17 09:51:37 2011
# Not Valid After: Wed Mar 17 09:51:37 2021
# Fingerprint (MD5): 42:a5:21:7a:4c:af:c7:bf:fd:a7:f5:b2:10:4c:3e:be
# Fingerprint (SHA1): c9:3c:34:ea:90:d9:13:0c:0f:03:00:4b:98:bd:8b:35:70:91:56:11
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
 CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "LuxTrust Global Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\114\125\061
\026\060\024\006\003\125\004\012\023\015\114\165\170\124\162\165
\163\164\040\163\056\141\056\061\035\060\033\006\003\125\004\003
\023\024\114\165\170\124\162\165\163\164\040\107\154\157\142\141
\154\040\122\157\157\164
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\114\125\061
\026\060\024\006\003\125\004\012\023\015\114\165\170\124\162\165
\163\164\040\163\056\141\056\061\035\060\033\006\003\125\004\003
\023\024\114\165\170\124\162\165\163\164\040\107\154\157\142\141
\154\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\002\013\270
END
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CKA_VALUE MULTILINE_OCTAL
\060\202\003\144\060\202\002\114\240\003\002\001\002\002\002\013
\270\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000
\060\104\061\013\060\011\006\003\125\004\006\023\002\114\125\061
\026\060\024\006\003\125\004\012\023\015\114\165\170\124\162\165
\163\164\040\163\056\141\056\061\035\060\033\006\003\125\004\003
\023\024\114\165\170\124\162\165\163\164\040\107\154\157\142\141
\154\040\122\157\157\164\060\036\027\015\061\061\060\063\061\067
\060\071\065\061\063\067\132\027\015\062\061\060\063\061\067\060
\071\065\061\063\067\132\060\104\061\013\060\011\006\003\125\004
\006\023\002\114\125\061\026\060\024\006\003\125\004\012\023\015
\114\165\170\124\162\165\163\164\040\163\056\141\056\061\035\060
\033\006\003\125\004\003\023\024\114\165\170\124\162\165\163\164
\040\107\154\157\142\141\154\040\122\157\157\164\060\202\001\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\001\017\000\060\202\001\012\002\202\001\001\000\262\177\247
\100\360\042\312\014\366\353\261\361\313\016\225\127\100\165\257
\240\077\076\316\354\252\062\127\346\031\261\147\103\230\132\153
\174\263\270\372\170\234\252\246\204\262\140\033\200\101\316\143
\315\037\027\010\231\244\365\357\076\022\307\114\260\127\232\134
\170\100\170\374\105\215\332\221\147\334\072\121\271\155\163\346
\267\071\216\166\072\264\037\005\365\151\125\371\223\317\170\210
\112\276\252\233\327\173\107\133\106\004\114\202\026\246\065\366
\374\164\337\326\264\257\330\342\265\047\021\164\131\242\302\146
\054\150\012\341\230\210\210\074\212\005\165\024\343\270\256\363
\010\204\233\152\301\077\061\030\257\047\245\113\233\244\375\171
\061\336\230\075\016\141\312\207\230\301\370\212\060\234\372\076
\063\325\245\304\003\007\341\367\226\164\030\000\047\070\047\321
\053\252\252\341\101\105\213\157\361\045\302\334\242\227\225\307
\102\024\063\135\171\204\043\152\347\145\300\127\240\330\135\251
\143\001\347\260\344\213\350\370\305\143\270\345\154\164\220\075
\307\167\374\053\272\171\351\244\306\022\170\247\377\002\003\001
\000\001\243\140\060\136\060\014\006\003\125\035\023\004\005\060
\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\037\006\003\125\035\043\004\030\060\026\200
\024\027\025\205\211\011\057\044\207\157\077\035\033\344\362\226
\171\203\110\023\316\060\035\006\003\125\035\016\004\026\004\024
\027\025\205\211\011\057\044\207\157\077\035\033\344\362\226\171
\203\110\023\316\060\015\006\011\052\206\110\206\367\015\001\001
\013\005\000\003\202\001\001\000\132\360\034\320\324\120\317\101
\176\346\270\235\175\303\160\320\136\066\377\156\216\172\057\336
\110\021\325\064\056\074\267\105\302\124\045\247\341\301\036\067
\203\266\224\256\266\105\110\003\352\225\276\353\234\152\264\067
\134\037\056\323\153\202\201\103\133\012\077\021\125\143\254\372
\174\010\002\067\240\074\071\004\063\376\227\062\310\122\345\331
\045\115\260\306\356\150\037\160\252\163\316\127\003\334\175\012
\015\063\362\322\132\337\012\154\073\314\021\121\227\032\244\041
\242\205\065\002\327\200\042\322\204\262\370\300\252\150\277\325

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\353\252\303\013\253\241\174\053\367\365\073\207\341\124\127\354
\005\044\357\171\102\116\363\213\150\237\344\156\313\202\231\311
\314\052\334\123\302\037\160\203\253\041\017\126\264\110\377\337
\007\042\263\214\371\035\246\004\337\055\003\066\271\335\157\376
\061\210\146\377\154\155\104\064\257\010\167\076\046\322\162\364
\273\107\126\223\074\230\143\341\063\273\231\043\222\265\203\171
\350\035\237\147\255\142\326\211\326\366\374\047\336\062\047\313
\204\332\167\205\041\241\022\041
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "LuxTrust Global Root"
# Issuer: CN=LuxTrust Global Root,O=LuxTrust s.a.,C=LU
# Serial Number: 3000 (0xbb8)
# Subject: CN=LuxTrust Global Root,O=LuxTrust s.a.,C=LU
# Not Valid Before: Thu Mar 17 09:51:37 2011
# Not Valid After: Wed Mar 17 09:51:37 2021
# Fingerprint (MD5): 42:a5:21:7a:4c:af:c7:bf:fd:a7:f5:b2:10:4c:3e:be
# Fingerprint (SHA1): c9:3c:34:ea:90:d9:13:0c:0f:03:00:4b:98:bd:8b:35:70:91:56:11
CKA_CLASS
 CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "LuxTrust Global Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\311\074\064\352\220\331\023\014\017\003\000\113\230\275\213\065
\160\221\126\021
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\102\245\041\172\114\257\307\277\375\247\365\262\020\114\076\276
END
CKA_ISSUER MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\114\125\061
\026\060\024\006\003\125\004\012\023\015\114\165\170\124\162\165
\163\164\040\163\056\141\056\061\035\060\033\006\003\125\004\003
\023\024\114\165\170\124\162\165\163\164\040\107\154\157\142\141
\154\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\002\013\270
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
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CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code
Signing Only Certificate
# Certificate "AC1 RAIZ MTIN"
# Issuer: C=ES,L=MADRID,O=MINISTERIO DE TRABAJO E INMIGRACION,OU=SUBDIRECCION GENERAL DE PROCESO DE DATOS,OU=PRESTADOR DE SERVICIOS DE CERTIFICACION MTIN,2.5.4.5=S2819001E,CN=AC1 RAIZ MTIN
# Serial Number:05:0b:41:5e:82:7b
# Subject: C=ES,L=MADRID,O=MINISTERIO DE TRABAJO E INMIGRACION,OU=SUBDIRECCION GENERAL DE PROCESO DE DATOS,OU=PRESTADOR DE SERVICIOS DE CERTIFICACION MTIN,2.5.4.5=S2819001E,CN=AC1 RAIZ MTIN
# Not Valid Before: Thu Nov 05 16:17:45 2009
# Not Valid After: Sun Nov 03 16:17:45 2019
# Fingerprint (MD5): 27:13:d5:2c:70:06:3e:15:7b:d3:62:59:32:ea:01:05
# Fingerprint (SHA1): 6a:d2:3b:9d:c4:8e:37:5f:85:9a:d9:ca:b5:85:32:5c:23:89:40:71
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AC1 RAIZ MTIN"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\342\061\026\060\024\006\003\125\004\003\023\015\101\103
\061\040\122\101\111\132\040\115\124\111\116\061\022\060\020\006
\003\125\004\005\023\011\123\062\070\061\071\060\060\061\105\061
\065\060\063\006\003\125\004\013\023\054\120\122\105\123\124\101
\104\117\122\040\104\105\040\123\105\122\126\111\103\111\117\123
\040\104\105\040\103\105\122\124\111\106\111\103\101\103\111\117
\116\040\115\124\111\116\061\061\060\057\006\003\125\004\013\023
\050\123\125\102\104\111\122\105\103\103\111\117\116\040\107\105
\116\105\122\101\114\040\104\105\040\120\122\117\103\105\123\117
\040\104\105\040\104\101\124\117\123\061\054\060\052\006\003\125
\004\012\023\043\115\111\116\111\123\124\105\122\111\117\040\104
\105\040\124\122\101\102\101\112\117\040\105\040\111\116\115\111
\107\122\101\103\111\117\116\061\017\060\015\006\003\125\004\007
\023\006\115\101\104\122\111\104\061\013\060\011\006\003\125\004
\006\023\002\105\123
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\342\061\026\060\024\006\003\125\004\003\023\015\101\103
\061\040\122\101\111\132\040\115\124\111\116\061\022\060\020\006
\003\125\004\005\023\011\123\062\070\061\071\060\060\061\105\061
\065\060\063\006\003\125\004\013\023\054\120\122\105\123\124\101
\104\117\122\040\104\105\040\123\105\122\126\111\103\111\117\123

\040\104\105\040\103\105\122\124\111\106\111\103\101\103\111\117
\116\040\115\124\111\116\061\061\060\057\006\003\125\004\013\023
\050\123\125\102\104\111\122\105\103\103\111\117\116\040\107\105
\116\105\122\101\114\040\104\105\040\120\122\117\103\105\123\117
\040\104\105\040\104\101\124\117\123\061\054\060\052\006\003\125
\004\012\023\043\115\111\116\111\123\124\105\122\111\117\040\104
\105\040\124\122\101\102\101\112\117\040\105\040\111\116\115\111
\107\122\101\103\111\117\116\061\017\060\015\006\003\125\004\007
\023\006\115\101\104\122\111\104\061\013\060\011\006\003\125\004
\006\023\002\105\123
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\006\005\013\101\136\202\173
END
CKA_VALUE MULTILINE_OCTAL
\060\202\011\111\060\202\007\061\240\003\002\001\002\002\006\005
\013\101\136\202\173\060\015\006\011\052\206\110\206\367\015\001
\001\005\005\000\060\201\342\061\026\060\024\006\003\125\004\003
\023\015\101\103\061\040\122\101\111\132\040\115\124\111\116\061
\022\060\020\006\003\125\004\005\023\011\123\062\070\061\071\060
\060\061\105\061\065\060\063\006\003\125\004\013\023\054\120\122
\105\123\124\101\104\117\122\040\104\105\040\123\105\122\126\111
\103\111\117\123\040\104\105\040\103\105\122\124\111\106\111\103
\101\103\111\117\116\040\115\124\111\116\061\061\060\057\006\003
\125\004\013\023\050\123\125\102\104\111\122\105\103\103\111\117
\116\040\107\105\116\105\122\101\114\040\104\105\040\120\122\117
\103\105\123\117\040\104\105\040\104\101\124\117\123\061\054\060
\052\006\003\125\004\012\023\043\115\111\116\111\123\124\105\122
\111\117\040\104\105\040\124\122\101\102\101\112\117\040\105\040
\111\116\115\111\107\122\101\103\111\117\116\061\017\060\015\006
\003\125\004\007\023\006\115\101\104\122\111\104\061\013\060\011
\006\003\125\004\006\023\002\105\123\060\036\027\015\060\071\061
\061\060\065\061\066\061\067\064\065\132\027\015\061\071\061\061
\060\063\061\066\061\067\064\065\132\060\201\342\061\026\060\024
\006\003\125\004\003\023\015\101\103\061\040\122\101\111\132\040
\115\124\111\116\061\022\060\020\006\003\125\004\005\023\011\123
\062\070\061\071\060\060\061\105\061\065\060\063\006\003\125\004
\013\023\054\120\122\105\123\124\101\104\117\122\040\104\105\040
\123\105\122\126\111\103\111\117\123\040\104\105\040\103\105\122
\124\111\106\111\103\101\103\111\117\116\040\115\124\111\116\061
\061\060\057\006\003\125\004\013\023\050\123\125\102\104\111\122
\105\103\103\111\117\116\040\107\105\116\105\122\101\114\040\104
\105\040\120\122\117\103\105\123\117\040\104\105\040\104\101\124
\117\123\061\054\060\052\006\003\125\004\012\023\043\115\111\116
\111\123\124\105\122\111\117\040\104\105\040\124\122\101\102\101
\112\117\040\105\040\111\116\115\111\107\122\101\103\111\117\116
\061\017\060\015\006\003\125\004\007\023\006\115\101\104\122\111

\104\061\013\060\011\006\003\125\004\006\023\002\105\123\060\202
\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\334
\315\315\261\277\336\045\365\377\034\063\163\231\074\033\241\155
\365\240\304\175\233\070\146\215\011\337\003\154\127\065\264\023
\101\376\343\137\346\042\004\130\030\271\116\151\063\004\077\225
\307\331\116\377\063\064\247\062\100\062\223\127\376\201\257\045
\103\134\035\375\173\127\013\142\010\147\147\142\264\343\345\130
\045\200\346\252\206\142\100\347\117\020\141\051\111\046\253\115
\174\241\253\133\141\061\201\006\152\144\224\115\047\370\113\036
\321\325\103\342\327\261\155\366\366\377\264\160\125\366\010\231
\267\164\001\340\363\236\265\174\344\004\210\010\120\131\170\037
\032\224\333\357\310\311\211\323\067\270\363\075\206\321\031\313
\203\132\020\007\010\117\231\164\002\007\360\062\121\310\373\346
\320\074\046\166\175\162\176\254\166\067\301\212\165\040\134\100
\334\204\077\320\111\174\115\147\256\071\357\344\316\200\341\312
\235\346\055\253\056\346\022\225\332\371\373\337\343\342\214\075
\207\373\105\156\104\253\366\170\222\047\024\241\135\153\117\160
\173\127\163\357\371\135\250\017\165\237\357\021\140\031\204\260
\144\100\356\330\251\206\372\245\327\105\364\021\157\361\206\310
\064\133\210\110\316\272\335\315\233\335\210\343\001\066\350\254
\152\350\022\013\260\340\173\220\036\205\013\111\211\001\366\377
\202\337\130\145\042\203\110\326\007\320\034\146\374\146\050\072
\304\303\345\370\231\145\047\122\130\363\153\361\157\002\104\204
\165\320\244\343\150\123\141\162\357\366\057\251\263\254\365\364
\366\320\134\334\151\114\314\171\322\244\033\310\163\006\064\164
\264\361\152\312\051\050\307\064\204\133\043\330\272\000\214\314
\011\301\307\157\135\004\253\267\117\046\167\251\065\317\040\326
\263\377\061\151\320\064\373\045\354\150\226\012\242\335\203\037
\312\074\217\164\066\045\124\357\365\030\173\302\044\061\321\373
\202\004\256\004\202\326\365\002\051\161\341\222\161\164\216\333
\252\161\035\304\073\306\142\046\154\206\074\043\125\353\051\321
\037\253\312\036\143\347\263\163\264\247\270\052\072\366\037\373
\207\145\210\374\363\237\376\277\353\325\035\266\250\003\351\145
\203\031\214\340\030\355\027\330\034\015\075\234\212\130\177\002
\003\001\000\001\243\202\003\001\060\202\002\375\060\067\006\010
\053\006\001\005\005\007\001\001\004\053\060\051\060\047\006\010
\053\006\001\005\005\007\060\001\206\033\150\164\164\160\072\057
\057\143\141\056\155\164\151\156\056\145\163\057\155\164\151\156
\057\157\143\163\160\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\006\060\033\006\003\125\035\021\004\024\060\022
\201\020\141\144\155\151\156\137\143\141\100\155\164\151\156\056
\145\163\060\033\006\003\125\035\022\004\024\060\022\201\020\141
\144\155\151\156\137\143\141\100\155\164\151\156\056\145\163\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\162\006\003\125\035\037\004\153\060\151\060\062\240\060\240
\056\206\054\150\164\164\160\072\057\057\143\141\056\155\164\151
\156\056\145\163\057\155\164\151\156\057\143\162\154\057\115\124

\111\116\101\165\164\157\162\151\144\141\144\122\141\151\172\060
\063\240\061\240\057\206\055\150\164\164\160\072\057\057\143\141
\062\056\155\164\151\156\056\145\163\057\155\164\151\156\057\143
\162\154\057\115\124\111\116\101\165\164\157\162\151\144\141\144
\122\141\151\172\060\201\271\006\003\125\035\040\004\201\261\060
\201\256\060\201\253\006\013\053\006\001\004\001\201\331\005\002
\004\001\060\201\233\060\060\006\010\053\006\001\005\005\007\002
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\154\151\164\151\143\141\163\060\147\006\010\053\006\001\005\005
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\144\157\040\162\141\355\172\056\040\103\157\156\163\165\154\164
\145\040\154\141\163\040\143\157\156\144\151\143\151\157\156\145
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\072\057\057\143\141\056\155\164\151\156\056\145\163\057\155\164
\151\156\057\104\120\103\171\120\157\154\151\164\151\143\141\163
\060\035\006\003\125\035\016\004\026\004\024\063\103\030\263\304
\113\035\313\037\371\360\116\374\337\112\344\025\140\310\203\060
\202\001\026\006\003\125\035\043\004\202\001\015\060\202\001\011
\200\024\063\103\030\263\304\113\035\313\037\371\360\116\374\337
\112\344\025\140\310\203\241\201\350\244\201\345\060\201\342\061
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\003\125\004\013\023\054\120\122\105\123\124\101\104\117\122\040
\104\105\040\123\105\122\126\111\103\111\117\123\040\104\105\040
\103\105\122\124\111\106\111\103\101\103\111\117\116\040\115\124
\111\116\061\061\060\057\006\003\125\004\013\023\050\123\125\102
\104\111\122\105\103\103\111\117\116\040\107\105\116\105\122\101
\114\040\104\105\040\120\122\117\103\105\123\117\040\104\105\040
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\101\102\101\112\117\040\105\040\111\116\115\111\107\122\101\103
\111\117\116\061\017\060\015\006\003\125\004\007\023\006\115\101
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\123\202\006\005\013\101\136\202\173\060\015\006\011\052\206\110
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\016\221\323\222\251\352\377\104\147\323\240\055\040\147\363\020
\017\032\067\167\135\122\106\346\152\270\367\210\363\202\303\052
\364\141\015\054\237\057\206\055\141\351\140\131\275\267\117\257
\223\011\034\371\063\167\100\234\241\174\145\334\136\220\225\251
\364\276\202\364\374\202\035\036\305\075\340\134\256\336\055\325
\143\166\253\361\354\044\247\040\370\036\350\317\161\202\003\335
\216\166\142\052\265\051\210\023\044\255\134\364\240\112\270\352
\023\212\126\215\152\057\150\071\162\206\130\304\244\253\165\174
\104\347\032\204\014\215\021\334\031\271\034\066\356\363\377\121
\233\263\103\310\045\176\347\016\110\243\344\117\006\055\025\036
\240\246\107\220\127\073\370\057\055\333\043\272\353\043\223\260

\270\122\033\140\034\324\031\260\155\170\217\113\235\247\013\050
\147\112\335\170\110\275\261\076\230\324\273\025\376\263\137\155
\035\165\310\036\317\017\256\112\032\135\207\054\006\164\154\012
\205\123\044\136\172\311\240\174\161\233\222\135\157\110\177\266
\130\161\262\114\246\032\011\043\064\120\161\025\153\107\333\373
\276\032\155\302\214\224\057\007\147\040\042\147\143\267\253\306
\031\234\226\015\142\352\010\244\032\160\357\251\271\357\116\305
\100\274\342\207\127\363\003\312\050\231\032\300\125\140\165\173
\143\276\144\077\226\116\113\217\375\055\246\164\300\337\111\072
\354\125\176\146\323\272\375\357\223\261\143\362\133\077\355\166
\241\331\323\014\376\056\157\012\246\123\113\357\321\363\107\255
\271\036\354\114\037\276\320\203\123\303\233\025\105\377\056\007
\321\332\152\222\105\346\154\127\133\044\056\121\151\311\060\317
\327\373\244\001\065\132\315\247\353\024\157\264\267\140\042\010
\305\161\310\223\342\276\045\137\365\014\372\130\121\075\173\310
\057\067\371\223\034\052\011\340\147\375\226\211\102\312\353\066
\260\326\033\246\120\017\132\235\166\377\244\117\306\354\015\304
\341\320\347\130\076\326\171\300\167\115\014\325\263\344\230\115
\335\106\056\122\260\342\017\015\102\066\245\020\044\122\050\276
\142\065\102\071\311\172\226\037\356\346\113\131\077\044\163\213
\277\042\113\146\362\333\017\065\361\067\235\240\044
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "AC1 RAIZ MTIN"
# Issuer: C=ES,L=MADRID,O=MINISTERIO DE TRABAJO E INMIGRACION,OU=SUBDIRECCION
GENERAL DE PROCESO DE DATOS,OU=PRESTADOR DE SERVICIOS DE CERTIFICACION
MTIN,2.5.4.5=S2819001E,CN=AC1
 RAIZ MTIN
# Serial Number:05:0b:41:5e:82:7b
# Subject: C=ES,L=MADRID,O=MINISTERIO DE TRABAJO E INMIGRACION,OU=SUBDIRECCION
GENERAL DE PROCESO DE DATOS,OU=PRESTADOR DE SERVICIOS DE CERTIFICACION
MTIN,2.5.4.5=S2819001E,CN=AC1 RAIZ MTIN
# Not Valid Before: Thu Nov 05 16:17:45 2009
# Not Valid After: Sun Nov 03 16:17:45 2019
# Fingerprint (MD5): 27:13:d5:2c:70:06:3e:15:7b:d3:62:59:32:ea:01:05
# Fingerprint (SHA1): 6a:d2:3b:9d:c4:8e:37:5f:85:9a:d9:ca:b5:85:32:5c:23:89:40:71
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AC1 RAIZ MTIN"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\152\322\073\235\304\216\067\137\205\232\331\312\265\205\062\134

```
\043\211\100\161
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\047\023\325\054\160\006\076\025\173\323\142\131\062\352\001\005
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\342\061\026\060\024\006\003\125\004\003\023\015\101\103
\061\040\122\101\111\132\040\115\124\111\116\061\022\060\020\006
\003\125\004\005\023\011\123\062\070\061\071\060\060\061\105\061
\065\060\063\006\003\125\004\013\023\054\120\122\105\123\124\101
\104\117\122\040\104\105\040\123\105\122\126\111\103\111\117\123
\040\104\105\040\103\105\122\124\111\106\111\103\101\103\111\117
\116\040\115\124\111\116\061\061\060\057\006\003\125\004\013\023
\050\123\125\102\104\111\122\105\103\103\111\117\116\040\107\105
\116\105\122\101\114\040\104\105\040\120\122\117\103\105\123\117
\040\104\105\040\104\101\124\117\123\061\054\060\052\006\003\125
\004\012\023\043\115\111\116\111\123\124\105\122\111\117\040\104
\105\040\124\122\101\102\101\112\117\040\105\040\111\116\115\111
\107\122\101\103\111\117\116\061\017\060\015\006\003\125\004\007
\023\006\115\101\104\122\111\104\061\013\060\011\006\003\125\004
\006\023\002\105\123
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\006\005\013\101\136\202\173
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Microsoft Root Certificate Authority 2011"
# Issuer: CN=Microsoft Root Certificate Authority 2011,O=Microsoft
Corporation,L=Redmond,ST=Washington,C=US
# Serial Number:3f:8b:c8:b5:fc:9f:b2:96:43:b5:69:d6:6c:42:e1:44
# Subject: CN=Microsoft Root Certificate Authority 2011,O=Microsoft
Corporation,L=Redmond,ST=Washington,C=US
# Not Valid Before: Tue Mar 22 22:05:28 2011
# Not Valid After: Sat Mar 22 22:13:04 2036
# Fingerprint (MD5): ce:04:90:d5:e5:6c:34:a5:ae:0b:e9:8b:e5:81:18:5d
# Fingerprint (SHA1): 8f:43:28:8a:d2:72:f3:10:3b:6f:b1:42:84:85:ea:30:14:c0:bc:fe
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft Root Certificate Authority 2011"
```

CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT
MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\127\141\163\150\151
\156\147\164\157\156\061\020\060\016\006\003\125\004\007\023\007
\122\145\144\155\157\156\144\061\036\060\034\006\003\125\004\012
\023\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160
\157\162\141\164\151\157\156\061\062\060\060\006\003\125\004\003
\023\051\115\151\143\162\157\163\157\146\164\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164
\150\157\162\151\164\171\040\062\060\061\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\127\141\163\150\151
\156\147\164\157\156\061\020\060\016\006\003\125\004\007\023\007
\122\145\144\155\157\156\144\061\036\060\034\006\003\125\004\012
\023\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160
\157\162\141\164\151\157\156\061\062\060\060\006\003\125\004\003
\023\051\115\151\143\162\157\163\157\146\164\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164
\150\157\162\151\164\171\040\062\060\061\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\077\213\310\265\374\237\262\226\103\265\151\326\154\102
\341\104
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\355\060\202\003\325\240\003\002\001\002\002\020\077
\213\310\265\374\237\262\226\103\265\151\326\154\102\341\104\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\201
\210\061\013\060\011\006\003\125\004\006\023\002\125\123\061\023
\060\021\006\003\125\004\010\023\012\127\141\163\150\151\156\147
\164\157\156\061\020\060\016\006\003\125\004\007\023\007\122\145
\144\155\157\156\144\061\036\060\034\006\003\125\004\012\023\025
\115\151\143\162\157\163\157\146\164\040\103\157\162\160\157\162
\141\164\151\157\156\061\062\060\060\006\003\125\004\003\023\051
\115\151\143\162\157\163\157\146\164\040\122\157\157\164\040\103
\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150\157
\162\151\164\171\040\062\060\061\061\060\036\027\015\061\061\060
\063\062\062\062\062\060\065\062\070\132\027\015\063\066\060\063
\062\062\062\062\061\063\060\064\132\060\201\210\061\013\060\011
\006\003\125\004\006\023\002\125\123\061\023\060\021\006\003\125
\004\010\023\012\127\141\163\150\151\156\147\164\157\156\061\020
\060\016\006\003\125\004\007\023\007\122\145\144\155\157\156\144

\061\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157
\163\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156
\061\062\060\060\006\003\125\004\003\023\051\115\151\143\162\157
\163\157\146\164\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171\040
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\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012
\002\202\002\001\000\262\200\101\252\065\070\115\023\162\062\150
\042\115\270\262\361\377\325\122\274\154\307\365\322\112\214\066
\356\321\302\134\176\214\212\256\257\023\050\157\300\163\343\072
\316\320\045\250\132\072\155\357\250\270\131\253\023\043\150\315
\014\051\207\321\157\200\134\217\104\177\135\220\001\122\130\254
\121\305\137\052\207\334\334\330\012\035\301\003\271\173\260\126
\350\243\336\144\141\302\236\370\363\174\271\354\015\265\124\376
\114\266\145\117\210\360\234\110\231\014\102\013\011\174\061\131
\027\171\006\170\050\215\211\072\114\003\045\276\161\152\134\013
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\273\126\171\344\037\204\272\036\270\264\304\111\134\117\061\113
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\244\123\271\367\062\051\203\014\023\277\066\136\004\263\113\103
\107\057\153\342\221\036\323\230\117\335\102\007\310\350\035\022
\374\231\251\153\076\222\176\310\326\151\072\374\144\275\266\011
\235\312\375\014\013\242\233\167\140\113\003\224\244\060\151\022
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\374\261\321\343\263\311\177\110\172\315\044\360\101\217\134\164
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\060\221\317\101\074\222\307\345\272\206\035\141\204\307\137\203
\071\142\256\264\222\057\107\363\013\370\125\353\240\037\131\320
\273\164\233\036\320\166\346\362\351\006\327\020\350\372\144\336
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\051\065\367\110\026\002\065\217\325\171\174\115\002\317\137\353
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\111\033\116\004\016\143\121\214\136\330\000\301\125\054\266\306
\340\302\145\116\311\064\071\365\234\263\304\176\350\141\156\023
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\354\070\366\160\355\253\134\023\301\331\017\015\307\200\262\125
\355\064\367\254\233\344\303\332\347\107\074\246\265\217\061\337
\305\113\257\353\361\002\003\001\000\001\243\121\060\117\060\013
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\125\035\016\004\026\004\024\162\055\072\002\061\220\103\271\024
\005\116\341\352\247\307\061\321\043\211\064\060\020\006\011\053
\006\001\004\001\202\067\025\001\004\003\002\001\000\060\015\006
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\000\177\162\317\017\267\305\025\333\233\300\111\312\046\133\376
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\314\015\117\153\250\027\014\155\010\222\176\213\335\201\252\055
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\042\275\113\000\006\333\227\034\330\136\324\305\013\134\207\156
\120\244\350\303\070\244\373\313\054\305\222\146\233\205\136\313
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\053\315\110\000\361\214\231\031\107\005\001\351\321\277\321\116
\320\346\050\103\067\231\244\012\112\010\331\232\161\163\322\252
\315\061\023\143\166\241\067\157\222\070\036\175\022\074\146\062
\347\313\155\341\374\122\211\335\312\326\146\005\232\226\141\276
\242\050\307\034\243\247\066\120\074\072\244\337\112\156\346\207
\073\316\353\360\340\201\067\235\023\074\122\216\275\271\035\064
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\110\037\334\364\357\245\305\273\125\032\070\143\204\116\267\154
\255\225\124\354\145\042\020\111\027\270\300\036\307\017\254\124
\107
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Microsoft Root Certificate Authority 2011"
# Issuer: CN=Microsoft Root Certificate Authority 2011,O=Microsoft
Corporation,L=Redmond,ST=Washington,C=US
# Serial Number:3f:8b:c8:b5:fc:9f:b2:96:43:b5:69:d6:6c:42:e1:44
# Subject: CN=Microsoft Root Certificate Authority 2011,O=Microsoft
Corporation,L=Redmond,ST=Washington,C=US
# Not Valid Before: Tue Mar 22 22:05:28 2011
# Not Valid After: Sat Mar 22 22:13:04 2036
# Fingerprint (MD5): ce:04:90:d5:e5:6c:34:a5:ae:0b:e9:8b:e5:81:18:5d
# Fingerprint (SHA1): 8f:43:28:8a:d2:72:f3:10:3b:6f:b1:42:84:85:ea:30:14:c0:bc:fe

```
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft Root Certificate Authority 2011"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\217\103\050\212\322\162\363\020\073\157\261\102\204\205\352\060
\024\300\274\376
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\316\004\220\325\345\154\064\245\256\013\351\213\345\201\030\135
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\127\141\163\150\151
\156\147\164\157\156\061\020\060\016\006\003\125\004\007\023\007
\122\145\144\155\157\156\144\061\036\060\034\006\003\125\004\012
\023\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160
\157\162\141\164\151\157\156\061\062\060\060\006\003\125\004\003
\023\051\115\151\143\162\157\163\157\146\164\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164
\150\157\162\151\164\171\040\062\060\061\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\077\213\310\265\374\237\262\226\103\265\151\326\154\102
\341\104
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "CCA India 2011"
# Issuer: CN=CCA India 2011,O=India PKI,C=IN
# Serial Number: 10126 (0x278e)
# Subject: CN=CCA India 2011,O=India PKI,C=IN
# Not Valid Before: Fri Mar 11 06:48:52 2011
# Not Valid After: Fri Mar 11 06:48:52 2016
# Fingerprint (MD5): 6e:3e:bc:f1:11:03:dc:4f:58:d5:2c:b0:74:f4:18:c8
# Fingerprint
 (SHA1): be:d5:25:d1:ac:63:a7:fc:6a:66:0b:a7:a8:95:81:8d:5e:8d:d5:64
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CCA India 2011"
```

CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\072\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\022\060\020\006\003\125\004\012\023\011\111\156\144\151\141\040
\120\113\111\061\027\060\025\006\003\125\004\003\023\016\103\103
\101\040\111\156\144\151\141\040\062\060\061\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\072\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\022\060\020\006\003\125\004\012\023\011\111\156\144\151\141\040
\120\113\111\061\027\060\025\006\003\125\004\003\023\016\103\103
\101\040\111\156\144\151\141\040\062\060\061\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\002\047\216
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\043\060\202\002\013\240\003\002\001\002\002\002\047
\216\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000
\060\072\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\022\060\020\006\003\125\004\012\023\011\111\156\144\151\141\040
\120\113\111\061\027\060\025\006\003\125\004\003\023\016\103\103
\101\040\111\156\144\151\141\040\062\060\061\061\060\036\027\015
\061\061\060\063\061\061\060\066\064\070\065\062\132\027\015\061
\066\060\063\061\061\060\066\064\070\065\062\132\060\072\061\013
\060\011\006\003\125\004\006\023\002\111\116\061\022\060\020\006
\003\125\004\012\023\011\111\156\144\151\141\040\120\113\111\061
\027\060\025\006\003\125\004\003\023\016\103\103\101\040\111\156
\144\151\141\040\062\060\061\061\060\202\001\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000
\060\202\001\012\002\202\001\001\000\207\012\036\016\271\240\250
\040\230\032\270\172\025\366\107\361\277\322\306\047\344\022\152
\226\004\147\165\315\214\306\343\364\335\312\325\304\034\065\356
\115\351\344\042\324\227\070\327\254\143\151\110\300\174\171\142
\277\307\042\111\133\106\301\361\030\024\116\030\035\054\245\132
\222\270\205\025\257\027\126\023\216\237\026\016\042\226\201\204
\171\043\102\354\117\336\257\366\277\211\117\000\136\346\327\010
\322\225\224\232\023\054\004\021\203\357\221\217\010\125\254\172
\126\104\233\305\364\324\027\353\344\167\115\224\341\101\130\021
\351\242\252\011\206\055\046\041\040\365\300\314\303\025\314\114
\011\273\335\334\365\122\003\171\140\217\074\171\072\045\064\043
\207\110\165\362\101\160\115\032\060\010\206\165\316\130\031\250
\327\025\176\043\362\347\111\276\377\376\127\122\170\102\363\046
\167\335\172\367\142\345\313\135\226\063\224\223\273\304\032\026
\257\010\127\353\234\345\367\043\164\215\351\035\013\261\212\224
\163\231\021\221\305\150\240\361\212\015\201\255\264\121\150\156
\111\206\000\006\122\116\051\103\347\002\003\001\000\001\243\063

\060\061\060\017\006\003\125\035\023\001\001\377\004\005\060\003
\001\001\377\060\021\006\003\125\035\016\004\012\004\010\115\007
\250\143\362\333\034\337\060\013\006\003\125\035\017\004\004\003
\002\001\006\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\003\202\001\001\000\156\024\332\040\362\110\153\144\377
\052\164\315\126\265\305\071\017\176\141\037\065\131\033\035\050
\155\043\164\235\170\277\253\255\211\000\271\160\205\365\350\024
\076\344\354\237\226\144\134\322\261\042\040\243\010\234\350\014
\113\150\050\216\125\005\277\076\340\116\332\330\234\320\156\040
\354\376\172\073\302\066\107\227\330\053\010\263\256\302\321\346
\010\077\112\350\072\077\126\365\340\345\077\362\151\266\171\022
\340\360\071\267\030\354\322\351\204\016\030\070\026\212\111\073
\157\127\325\071\073\277\023\360\300\247\315\362\075\036\154\221
\247\167\143\274\253\331\126\070\017\112\271\031\300\053\214\373
\227\037\306\247\354\206\316\323\215\343\321\373\165\321\361\367
\246\143\304\317\350\261\244\222\105\150\362\350\214\261\255\176
\055\040\373\270\245\124\355\312\015\217\062\035\150\246\061\156
\260\310\236\325\372\277\006\233\157\051\175\172\003\111\277\053
\173\131\223\024\305\352\313\361\114\051\202\016\051\356\212\124
\174\074\315\125\202\045\162\016\161\116\045\170\115\323\116\131
\100\312\316\363\231\321\242
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "CCA India 2011"
# Issuer: CN=CCA India 2011,O=India PKI,C=IN
# Serial Number: 10126 (0x278e)
# Subject: CN=CCA India 2011,O=India PKI,C=IN
# Not Valid Before: Fri Mar 11 06:48:52 2011
# Not Valid After: Fri Mar 11 06:48:52 2016
# Fingerprint (MD5): 6e:3e:bc:f1:11:03:dc:4f:58:d5:2c:b0:74:f4:18:c8
# Fingerprint (SHA1): be:d5:25:d1:ac:63:a7:fc:6a:66:0b:a7:a8:95:81:8d:5e:8d:d5:64
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CCA India 2011"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\276\325\045\321\254\143\247\374\152\146\013\247\250\225\201\215
\136\215\325\144
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\156\076\274\361\021\003\334\117\130\325\054\260\164\364\030\310

```
END
CKA_ISSUER MULTILINE_OCTAL
\060\072\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\022\060\020\006\003\125\004\012\023\011\111\156\144\151\141\040
\120\113\111\061\027\060\025\006\003\125\004\003\023\016\103\103
\101\040\111\156\144\151\141\040\062\060\061\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\002\047\216
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "ANCERT Certificados Notariales V2"
# Issuer: CN=ANCERT Certificados Notariales V2,O=Agencia Notarial de Certificacion S.L.U. - CIF
B83395988,C=ES
# Serial Number:09:bd:56:05:2a:13:16:f4:68:4f:74:0e:a9:7d:1c:48
#
 Subject: CN=ANCERT Certificados Notariales V2,O=Agencia Notarial de Certificacion S.L.U. - CIF
B83395988,C=ES
# Not Valid Before: Tue May 25 16:56:14 2010
# Not Valid After: Sat May 25 16:56:14 2030
# Fingerprint (MD5): 75:70:cb:6e:6b:d6:9b:7d:90:bb:69:5e:59:f0:62:b4
# Fingerprint (SHA1): 6f:62:de:b8:6c:85:58:5a:e4:2e:47:8d:b4:d7:6d:b3:67:58:5a:e6
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ANCERT Certificados Notariales V2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\174\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\101\060\077\006\003\125\004\012\023\070\101\147\145\156\143\151
\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103\145
\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114\056
\125\056\040\055\040\103\111\106\040\102\070\063\063\071\065\071
\070\070\061\052\060\050\006\003\125\004\003\023\041\101\116\103
\105\122\124\040\103\145\162\164\151\146\151\143\141\144\157\163
\040\116\157\164\141\162\151\141\154\145\163\040\126\062
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\174\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\101\060\077\006\003\125\004\012\023\070\101\147\145\156\143\151
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\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103\145
\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114\056
\125\056\040\055\040\103\111\106\040\102\070\063\063\071\065\071
\070\070\061\052\060\050\006\003\125\004\003\023\041\101\116\103
\105\122\124\040\103\145\162\164\151\146\151\143\141\144\157\163
\040\116\157\164\141\162\151\141\154\145\163\040\126\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\011\275\126\005\052\023\026\364\150\117\164\016\251\175
\034\110
END
CKA_VALUE MULTILINE_OCTAL
\060\202\007\022\060\202\004\372\240\003\002\001\002\002\020\011
\275\126\005\052\023\026\364\150\117\164\016\251\175\034\110\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\174
\061\013\060\011\006\003\125\004\006\023\002\105\123\061\101\060
\077\006\003\125\004\012\023\070\101\147\145\156\143\151\141\040
\116\157\164\141\162\151\141\154\040\144\145\040\103\145\162\164
\151\146\151\143\141\143\151\157\156\040\123\056\114\056\125\056
\040\055\040\103\111\106\040\102\070\063\063\071\065\071\070\070
\061\052\060\050\006\003\125\004\003\023\041\101\116\103\105\122
\124\040\103\145\162\164\151\146\151\143\141\144\157\163\040\116
\157\164\141\162\151\141\154\145\163\040\126\062\060\036\027\015
\061\060\060\065\062\065\061\066\065\066\061\064\132\027\015\063
\060\060\065\062\065\061\066\065\066\061\064\132\060\174\061\013
\060\011\006\003\125\004\006\023\002\105\123\061\101\060\077\006
\003\125\004\012\023\070\101\147\145\156\143\151\141\040\116\157
\164\141\162\151\141\154\040\144\145\040\103\145\162\164\151\146
\151\143\141\143\151\157\156\040\123\056\114\056\125\056\040\055
\040\103\111\106\040\102\070\063\063\071\065\071\070\070\061\052
\060\050\006\003\125\004\003\023\041\101\116\103\105\122\124\040
\103\145\162\164\151\146\151\143\141\144\157\163\040\116\157\164
\141\162\151\141\154\145\163\040\126\062\060\202\002\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002
\017\000\060\202\002\012\002\202\002\001\000\262\346\271\306\035
\152\052\055\111\305\374\374\324\144\100\320\340\024\056\367\240
\302\377\222\363\101\246\264\077\332\276\031\024\221\224\166\323
\025\314\136\177\170\120\172\333\332\305\105\252\313\034\043\171
\163\220\250\273\147\001\163\216\316\100\371\032\251\252\207\344
\223\222\017\134\150\134\136\360\006\140\053\130\334\074\155\074
\307\172\060\153\005\252\222\206\163\052\322\362\032\210\304\333
\345\132\146\216\165\311\102\077\233\210\050\100\036\365\251\134
\036\372\310\101\241\060\253\013\234\356\026\242\301\055\245\205
\372\355\240\014\350\177\226\112\173\275\217\232\242\030\166\322
\257\335\267\075\020\253\122\020\210\256\035\353\270\062\164\226
\364\267\252\047\367\245\007\015\343\224\127\152\124\040\167\315
\035\274\171\055\344\234\264\336\121\210\376\126\326\075\213\241
\317\372\122\036\214\005\163\167\326\005\317\143\000\121\207\141

\343\120\276\231\227\341\374\036\021\171\153\116\152\317\234\205
\012\034\226\052\300\040\066\024\305\011\027\142\073\364\255\352
\325\327\375\320\071\052\170\323\320\242\317\310\163\060\011\107
\305\116\031\375\270\060\324\017\200\230\210\206\301\114\101\172
\043\305\103\375\136\022\270\076\017\261\267\201\142\014\176\157
\343\173\232\302\302\107\021\041\037\317\236\321\060\316\203\301
\020\115\100\167\327\265\302\113\062\100\102\372\233\260\254\317
\353\041\330\031\353\144\305\153\335\125\055\200\207\104\174\114
\074\253\015\330\022\277\064\202\214\261\252\304\270\153\350\016
\106\167\322\213\006\035\102\373\254\275\311\347\063\263\042\157
\176\325\056\003\305\137\005\026\206\174\355\343\236\321\026\167
\032\106\330\311\320\214\344\134\134\041\005\221\361\144\344\254
\305\067\256\265\275\147\023\256\051\345\263\102\304\160\011\243
\135\114\353\067\040\343\360\365\163\063\073\302\374\216\121\205
\066\052\313\201\333\016\211\043\331\342\341\150\272\054\104\167
\076\034\100\272\360\147\216\030\207\360\075\327\351\077\107\133
\065\102\315\247\004\316\110\162\051\005\032\264\321\242\347\015
\171\212\226\155\147\122\055\073\043\346\371\202\234\326\263\171
\136\024\336\145\110\063\374\035\102\350\055\002\003\001\000\001
\243\202\001\216\060\202\001\212\060\017\006\003\125\035\023\001
\001\377\004\005\060\003\001\001\377\060\202\001\045\006\003\125
\035\040\004\202\001\034\060\202\001\030\060\202\001\024\006\011
\053\006\001\004\001\201\223\150\001\060\202\001\005\060\045\006
\010\053\006\001\005\005\007\002\001\026\031\150\164\164\160\072
\057\057\167\167\167\056\141\156\143\145\162\164\056\143\157\155
\057\143\160\163\060\201\333\006\010\053\006\001\005\005\007\002
\002\060\201\316\060\015\026\006\101\116\103\105\122\124\060\003
\002\001\001\036\201\274\000\101\000\147\000\145\000\156\000\143
\000\151\000\141\000\040\000\116\000\157\000\164\000\141\000\162
\000\151\000\141\000\154\000\040\000\144\000\145\000\040\000\103
\000\145\000\162\000\164\000\151\000\146\000\151\000\143\000\141
\000\143\000\151\000\157\000\156\000\056\000\040\000\120\000\141
\000\163\000\145\000\157\000\040\000\144\000\145\000\154\000\240
\000\107\000\145\000\156\000\145\000\162\000\141\000\154\000\040
\000\115\000\141\000\162\000\164\000\151\000\156\000\145\000\172
\000\040\000\103\000\141\000\155\000\160\000\157\000\163\000\040
\000\064\000\066\000\040\000\066\000\141\000\040\000\160\000\154
\000\141\000\156\000\164\000\141\000\040\000\062\000\070\000\060
\000\061\000\060\000\040\000\115\000\141\000\144\000\162\000\151
\000\144\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\206\060\035\006\003\125\035\016\004\026\004\024\366\022\072
\253\173\130\301\215\103\157\166\201\322\362\270\323\357\027\352
\013\060\037\006\003\125\035\043\004\030\060\026\200\024\366\022
\072\253\173\130\301\215\103\157\166\201\322\362\270\323\357\027
\352\013\060\015\006\011\052\206\110\206\367\015\001\001\013\005
\000\003\202\002\001\000\124\065\323\242\145\311\331\066\305\123
\321\264\215\162\064\211\272\247\010\237\351\065\020\271\270\014
\006\371\144\252\225\226\050\250\310\243\200\334\126\300\277\162

\115\126\277\177\135\004\325\255\050\133\115\275\363\303\017\025
\260\161\332\126\215\100\125\127\246\175\142\242\255\023\151\121
\252\224\120\272\275\000\060\120\365\335\244\116\011\172\224\061
\153\333\163\003\275\363\332\032\017\214\057\262\311\067\274\124
\325\013\043\067\365\344\133\067\146\211\117\264\307\005\244\145
\334\131\060\246\023\053\176\025\355\354\020\027\211\122\311\235
\337\242\114\355\366\017\036\246\111\260\015\121\263\061\261\121
\231\313\264\321\043\170\322\113\250\264\035\026\246\240\320\076
\007\176\145\077\045\316\144\116\033\056\113\115\202\205\032\145
\333\356\342\003\360\131\044\005\217\231\357\171\202\337\356\052
\067\150\303\152\120\001\131\137\237\150\334\054\121\140\053\135
\340\122\074\073\160\270\000\323\067\250\076\133\036\166\010\132
\324\273\166\060\256\371\310\362\216\244\217\012\165\175\032\230
\341\277\320\066\224\057\074\301\122\323\151\352\032\140\067\214
\200\333\115\155\306\232\135\215\240\141\121\273\075\015\346\022
\240\237\157\131\126\164\062\147\012\374\067\006\301\072\344\053
\216\204\037\332\041\014\111\210\103\323\245\365\202\015\166\206
\303\054\314\220\273\263\270\253\306\313\256\300\027\121\236\323
\200\367\044\332\034\354\316\022\203\316\116\066\060\071\165\370
\164\166\220\202\236\076\100\114\014\024\271\032\036\110\152\260
\061\352\210\177\200\101\100\123\173\070\113\207\220\140\172\113
\316\147\106\150\165\167\216\000\135\040\260\344\223\067\155\003
\337\130\071\350\232\305\244\353\354\141\063\010\205\044\153\117
\006\351\255\220\245\066\142\154\343\335\175\011\037\063\277\267
\273\367\311\165\005\367\133\253\372\207\131\257\032\147\020\176
\204\334\214\160\326\104\351\020\301\330\233\056\321\306\100\152
\352\346\132\017\020\175\154\373\125\207\272\115\265\161\003\236
\027\217\170\332\125\075\127\136\042\012\152\230\360\215\010\315
\335\226\102\132\033\315\272\157\047\270\164\047\250\077\345\240
\326\163\307\136\057\041
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "ANCERT Certificados Notariales V2"
# Issuer: CN=ANCERT Certificados Notariales V2,O=Agencia Notarial de Certificacion S.L.U. - CIF B83395988,C=ES
# Serial Number:09:bd:56:05:2a:13:16:f4:68:4f:74:0e:a9:7d:1c:48
# Subject: CN=ANCERT Certificados Notariales V2,O=Agencia Notarial de Certificacion S.L.U. - CIF B83395988,C=ES
# Not Valid Before: Tue May 25 16:56:14 2010
# Not Valid After: Sat May 25 16:56:14 2030
# Fingerprint (MD5): 75:70:cb:6e:6b:d6:9b:7d:90:bb:69:5e:59:f0:62:b4
# Fingerprint (SHA1): 6f:62:de:b8:6c:85:58:5a:e4:2e:47:8d:b4:d7:6d:b3:67:58:5a:e6
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

```
CKA_TOKEN
 CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ANCERT Certificados Notariales V2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\157\142\336\270\154\205\130\132\344\056\107\215\264\327\155\263
\147\130\132\346
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\165\160\313\156\153\326\233\175\220\273\151\136\131\360\142\264
END
CKA_ISSUER MULTILINE_OCTAL
\060\174\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\101\060\077\006\003\125\004\012\023\070\101\147\145\156\143\151
\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103\145
\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114\056
\125\056\040\055\040\103\111\106\040\102\070\063\063\071\065\071
\070\070\061\052\060\050\006\003\125\004\003\023\041\101\116\103
\105\122\124\040\103\145\162\164\151\146\151\143\141\144\157\163
\040\116\157\164\141\162\151\141\154\145\163\040\126\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\011\275\126\005\052\023\026\364\150\117\164\016\251\175
\034\110
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "ANCERT Certificados CGN V2"
# Issuer: CN=ANCERT Certificados CGN V2,O=Agencia Notarial de Certificacion S.L.U. - CIF B83395988,C=ES
# Serial Number:0f:38:8c:70:fe:a6:95:5d:e9:5d:9c:87:af:79:04:99
# Subject: CN=ANCERT Certificados CGN V2,O=Agencia Notarial de Certificacion S.L.U. - CIF
B83395988,C=ES
# Not Valid Before: Tue May 25 16:31:22 2010
# Not Valid After: Sat May 25 16:31:23 2030
# Fingerprint (MD5): 92:45:af:c3:89:71:e6:87:1d:8e:5a:20:a6:33:0e:93
# Fingerprint (SHA1): 7e:b1:a0:42:9b:e5:f4:28:ac:2b:93:97:1d:7c:84:48:a5:36:07:0c
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ANCERT Certificados
```

CGN V2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\101\060\077\006\003\125\004\012\023\070\101\147\145\156\143\151
\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103\145
\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114\056
\125\056\040\055\040\103\111\106\040\102\070\063\063\071\065\071
\070\070\061\043\060\041\006\003\125\004\003\023\032\101\116\103
\105\122\124\040\103\145\162\164\151\146\151\143\141\144\157\163
\040\103\107\116\040\126\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\101\060\077\006\003\125\004\012\023\070\101\147\145\156\143\151
\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103\145
\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114\056
\125\056\040\055\040\103\111\106\040\102\070\063\063\071\065\071
\070\070\061\043\060\041\006\003\125\004\003\023\032\101\116\103
\105\122\124\040\103\145\162\164\151\146\151\143\141\144\157\163
\040\103\107\116\040\126\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\017\070\214\160\376\246\225\135\351\135\234\207\257\171
\004\231
END
CKA_VALUE MULTILINE_OCTAL
\060\202\007\004\060\202\004\354\240\003\002\001\002\002\020\017
\070\214\160\376\246\225\135\351\135\234\207\257\171\004\231\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\165
\061\013\060\011\006\003\125\004\006\023\002\105\123\061\101\060
\077\006\003\125\004\012\023\070\101\147\145\156\143\151\141\040
\116\157\164\141\162\151\141\154\040\144\145\040\103\145\162\164
\151\146\151\143\141\143\151\157\156\040\123\056\114\056\125\056
\040\055\040\103\111\106\040\102\070\063\063\071\065\071\070\070
\061\043\060\041\006\003\125\004\003\023\032\101\116\103\105\122
\124\040\103\145\162\164\151\146\151\143\141\144\157\163\040\103
\107\116\040\126\062\060\036\027\015\061\060\060\065\062\065\061
\066\063\061\062\062\132\027\015\063\060\060\065\062\065\061\066
\063\061\062\063\132\060\165\061\013\060\011\006\003\125\004\006
\023\002\105\123\061\101\060\077\006\003\125\004\012\023\070\101
\147\145\156\143\151\141\040\116\157\164\141\162\151\141\154\040
\144\145\040\103\145\162\164\151\146\151\143\141\143\151\157\156
\040\123\056\114\056\125\056\040\055\040\103\111\106\040\102\070
\063\063\071\065\071\070\070\061\043\060\041\006\003\125\004\003
\023\032\101\116\103\105\122\124\040\103\145\162\164\151\146\151

\143\141\144\157\163\040\103\107\116\040\126\062\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\235\122\160
\351\047\030\203\312\352\304\231\330\246\341\056\024\257\156\036
\016\144\312\201\067\125\047\034\027\167\130\147\037\214\311\371
\302\212\142\145\050\164\233\342\321\276\125\007\166\166\356\174
\155\116\143\133\036\112\045\165\340\007\241\320\322\202\247\316
\017\063\353\272\024\300\145\262\112\056\345\145\274\042\322\257
\032\016\312\313\363\144\145\053\054\231\243\227\213\213\165\060
\376\146\372\301\117\113\067\120\214\077\363\336\231\172\116\207
\234\040\106\162\227\376\126\033\146\116\240\202\123\243\134\330
\050\106\014\005\027\157\070\326\134\237\016\045\042\301\206\343
\134\032\124\333\256\235\145\175\000\222\337\250\041\041\305\133
\020\046\164\341\261\163\127\144\174\175\027\003\014\352\367\024
\227\017\371\305\356\135\165\260\305\306\012\013\264\076\111\343
\031\306\233\104\223\374\132\025\144\012\262\203\377\200\136\210
\011\320\312\040\243\133\373\333\315\341\032\167\043\030\160\032
\213\355\104\077\326\032\250\066\070\341\235\057\247\167\304\172
\263\300\162\262\162\315\036\077\020\136\032\210\164\215\360\022
\305\367\257\111\334\225\257\053\115\264\220\312\371\356\357\014
\343\277\026\067\043\123\343\051\372\364\164\151\150\075\127\155
\024\140\212\144\151\050\144\115\372\066\107\375\270\022\316\303
\206\252\134\334\146\071\007\117\073\343\343\305\150\256\316\340
\071\134\040\203\077\022\012\070\263\000\301\134\023\227\042\136
\072\113\065\231\370\304\036\336\371\210\021\216\204\311\213\062
\362\322\327\277\042\007\077\140\170\056\165\034\242\272\043\022
\323\360\117\120\071\354\311\167\047\307\132\052\216\323\271\265
\164\004\231\025\057\056\206\137\217\006\301\312\352\342\250\037
\115\175\063\204\221\244\222\303\320\246\110\135\146\032\167\204
\040\120\234\352\004\013\014\043\226\317\261\234\374\271\272\037
\227\250\323\253\003\145\057\175\256\124\307\171\342\034\066\335
\155\322\006\230\001\375\316\374\077\113\303\322\256\377\211\330
\071\061\003\330\261\144\167\003\306\370\243\215\374\052\171\347
\020\275\271\155\221\034\076\235\313\274\125\177\042\376\141\204
\370\330\324\247\041\172\071\136\162\062\353\114\165\002\003\001
\000\001\243\202\001\216\060\202\001\212\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\202\001\045\006
\003\125\035\040\004\202\001\034\060\202\001\030\060\202\001\024
\006\011\053\006\001\004\001\201\223\150\004\060\202\001\005\060
\045\006\010\053\006\001\005\005\007\002\001\026\031\150\164\164
\160\072\057\057\167\167\167\056\141\156\143\145\162\164\056\143
\157\155\057\143\160\163\060\201\333\006\010\053\006\001\005\005
\007\002\002\060\201\316\060\015\026\006\101\116\103\105\122\124
\060\003\002\001\001\036\201\274\000\101\000\147\000\145\000\156
\000\143\000\151\000\141\000\040\000\116\000\157\000\164\000\141
\000\162\000\151\000\141\000\154\000\040\000\144\000\145\000\040
\000\103\000\145\000\162\000\164\000\151\000\146\000\151\000\143
\000\141\000\143\000\151\000\157\000\156\000\056\000\040\000\120

\000\141\000\163\000\145\000\157\000\040\000\144\000\145\000\154
\000\240\000\107\000\145\000\156\000\145\000\162\000\141\000\154
\000\040\000\115\000\141\000\162\000\164\000\151\000\156\000\145
\000\172\000\040\000\103\000\141\000\155\000\160\000\157\000\163
\000\040\000\064\000\066\000\040\000\066\000\141\000\040\000\160
\000\154\000\141\000\156\000\164\000\141\000\040\000\062\000\070
\000\060\000\061\000\060\000\040\000\115\000\141\000\144\000\162
\000\151\000\144\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\206\060\035\006\003\125\035\016\004\026\004\024\005
\156\341\241\232\356\007\257\316\365\264\323\145\075\004\120\342
\320\233\104\060\037\006\003\125\035\043\004\030\060\026\200\024
\005\156\341\241\232\356\007\257\316\365\264\323\145\075\004\120
\342\320\233\104\060\015\006\011\052\206\110\206\367\015\001\001
\013\005\000\003\202\002\001\000\177\124\100\031\044\312\114\023
\366\023\371\134\142\225\060\325\270\340\223\200\154\324\025\106
\324\047\076\222\122\252\334\201\143\206\100\333\325\045\257\237
\223\154\012\365\115\241\376\124\226\135\207\257\021\223\017\213
\362\343\360\037\112\237\374\251\321\311\120\167\137\230\010\010
\055\172\213\201\020\314\073\002\124\130\345\306\247\364\367\312
\350\366\067\006\176\347\021\327\154\205\143\367\250\243\016\342
\045\142\004\244\362\142\123\234\107\264\247\144\273\201\345\326
\136\126\021\276\105\021\141\302\146\351\364\015\164\250\253\371
\133\277\202\262\221\246\120\373\207\176\157\273\310\353\005\242
\271\020\327\033\102\007\125\317\211\346\277\373\271\360\152\071
\127\123\160\214\275\113\243\151\277\037\213\246\134\115\145\212
\271\000\011\350\150\277\011\047\007\115\136\332\122\011\214\345
\161\223\212\314\205\216\322\067\136\123\334\202\155\013\126\112
\204\171\012\364\020\045\104\365\157\135\032\146\265\315\325\020
\113\207\132\116\324\177\344\161\254\356\150\237\274\372\056\130
\301\304\236\177\244\131\205\340\122\016\362\307\107\165\025\055
\054\166\214\017\105\005\065\140\370\173\073\167\062\177\050\200
\011\332\061\274\161\175\341\254\221\315\140\012\171\040\354\156
\073\267\204\340\162\363\251\112\320\057\344\133\343\322\032\324
\112\274\365\166\371\177\052\031\110\353\335\016\317\231\126\105
\270\175\326\011\216\016\316\263\204\150\111\204\124\065\113\344
\231\033\257\363\250\024\363\124\230\012\200\176\117\274\362\146
\055\046\377\060\215\247\366\275\333\232\217\345\341\337\273\267
\062\016\371\222\157\151\343\344\166\323\000\066\361\055\136\307
\023\137\325\331\152\055\350\321\033\153\166\313\030\156\016\005
\020\365\132\362\111\033\131\264\205\352\312\031\164\314\273\122
\342\067\214\302\152\002\045\302\322\161\244\222\333\216\311\326
\251\156\320\205\050\155\134\155\010\170\002\260\171\014\127\157
\013\132\001\343\204\204\002\366\317\362\253\143\353\002\152\271
\313\112\030\325\071\042\074\126\112\252\225\210\346\060\000\037
\215\041\041\311\127\356\271\267\104\051\210\117\266\053\247\024
\356\216\356\157\276\026\320\023
END
CKA_NSS_MOZILLA_CA_POLICY

```
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "ANCERT Certificados CGN V2"
# Issuer: CN=ANCERT Certificados CGN V2,O=Agencia Notarial de Certificacion S.L.U. - CIF B83395988,C=ES
# Serial Number:0f:38:8c:70:fe:a6:95:5d:e9:5d:9c:87:af:79:04:99
# Subject: CN=ANCERT Certificados CGN V2,O=Agencia
 Notarial de Certificacion S.L.U. - CIF B83395988,C=ES
# Not Valid Before: Tue May 25 16:31:22 2010
# Not Valid After: Sat May 25 16:31:23 2030
# Fingerprint (MD5): 92:45:af:c3:89:71:e6:87:1d:8e:5a:20:a6:33:0e:93
# Fingerprint (SHA1): 7e:b1:a0:42:9b:e5:f4:28:ac:2b:93:97:1d:7c:84:48:a5:36:07:0c
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ANCERT Certificados CGN V2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\176\261\240\102\233\345\364\050\254\053\223\227\035\174\204\110
\245\066\007\014
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\222\105\257\303\211\161\346\207\035\216\132\040\246\063\016\223
END
CKA_ISSUER MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\101\060\077\006\003\125\004\012\023\070\101\147\145\156\143\151
\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103\145
\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114\056
\125\056\040\055\040\103\111\106\040\102\070\063\063\071\065\071
\070\070\061\043\060\041\006\003\125\004\003\023\032\101\116\103
\105\122\124\040\103\145\162\164\151\146\151\143\141\144\157\163
\040\103\107\116\040\126\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\017\070\214\160\376\246\225\135\351\135\234\207\257\171
\004\231
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "EE Certification Centre Root CA"
```

```
# Issuer: 1.2.840.113549.1.9.1=pki@sk.ee,CN=EE Certification Centre Root CA,O=AS
Sertifitseerimiskeskus,C=EE
# Serial Number:54:80:f9:a0:73:ed:3f:00:4c:ca:89:d8:e3:71:e6:4a
# Subject: 1.2.840.113549.1.9.1=pki@sk.ee,CN=EE Certification Centre Root CA,O=AS
Sertifitseerimiskeskus,C=EE
# Not Valid Before: Sat Oct 30 10:10:30 2010
# Not Valid After: Tue Dec 17
 23:59:59 2030
# Fingerprint (MD5): 43:5e:88:d4:7d:1a:4a:7e:fd:84:2e:52:eb:01:d4:6f
# Fingerprint (SHA1): c9:a8:b9:e7:55:80:5e:58:e3:53:77:a7:25:eb:af:c3:7b:27:cc:d7
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "EE Certification Centre Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\105\105\061
\042\060\040\006\003\125\004\012\014\031\101\123\040\123\145\162
\164\151\146\151\164\163\145\145\162\151\155\151\163\153\145\163
\153\165\163\061\050\060\046\006\003\125\004\003\014\037\105\105
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\103
\145\156\164\162\145\040\122\157\157\164\040\103\101\061\030\060
\026\006\011\052\206\110\206\367\015\001\011\001\026\011\160\153
\151\100\163\153\056\145\145
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\105\105\061
\042\060\040\006\003\125\004\012\014\031\101\123\040\123\145\162
\164\151\146\151\164\163\145\145\162\151\155\151\163\153\145\163
\153\165\163\061\050\060\046\006\003\125\004\003\014\037\105\105
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\103
\145\156\164\162\145\040\122\157\157\164\040\103\101\061\030\060
\026\006\011\052\206\110\206\367\015\001\011\001\026\011\160\153
\151\100\163\153\056\145\145
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\124\200\371\240\163\355\077\000\114\312\211\330\343\161
\346\112
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\003\060\202\002\353\240\003\002\001\002\002\020\124
\200\371\240\163\355\077\000\114\312\211\330\343\161\346\112\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\165
\061\013\060\011\006\003\125\004\006\023\002\105\105\061\042\060
\040\006\003\125\004\012\014\031\101\123\040\123\145\162\164\151
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\146\151\164\163\145\145\162\151\155\151\163\153\145\163\153\165
\163\061\050\060\046\006\003\125\004\003\014\037\105\105\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\103\145\156
\164\162\145\040\122\157\157\164\040\103\101\061\030\060\026\006
\011\052\206\110\206\367\015\001\011\001\026\011\160\153\151\100
\163\153\056\145\145\060\042\030\017\062\060\061\060\061\060\063
\060\061\060\061\060\063\060\132\030\017\062\060\063\060\061\062
\061\067\062\063\065\071\065\071\132\060\165\061\013\060\011\006
\003\125\004\006\023\002\105\105\061\042\060\040\006\003\125\004
\012\014\031\101\123\040\123\145\162\164\151\146\151\164\163\145
\145\162\151\155\151\163\153\145\163\153\165\163\061\050\060\046
\006\003\125\004\003\014\037\105\105\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\103\145\156\164\162\145\040\122
\157\157\164\040\103\101\061\030\060\026\006\011\052\206\110\206
\367\015\001\011\001\026\011\160\153\151\100\163\153\056\145\145
\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001
\000\310\040\300\354\340\305\113\253\007\170\225\363\104\356\373
\013\014\377\164\216\141\273\261\142\352\043\330\253\241\145\062
\172\353\216\027\117\226\330\012\173\221\242\143\154\307\214\114
\056\171\277\251\005\374\151\134\225\215\142\371\271\160\355\303
\121\175\320\223\346\154\353\060\113\341\274\175\277\122\233\316
\156\173\145\362\070\261\300\242\062\357\142\262\150\340\141\123
\301\066\225\377\354\224\272\066\256\234\034\247\062\017\345\174
\264\306\157\164\375\173\030\350\254\127\355\006\040\113\062\060
\130\133\375\315\250\346\241\374\160\274\216\222\163\333\227\247
\174\041\256\075\301\365\110\207\154\047\275\237\045\164\201\125
\260\367\165\366\075\244\144\153\326\117\347\316\100\255\017\335
\062\323\274\212\022\123\230\311\211\373\020\035\115\176\315\176
\037\126\015\041\160\205\366\040\203\037\366\272\037\004\217\352
\167\210\065\304\377\352\116\241\213\115\077\143\033\104\303\104
\324\045\166\312\267\215\327\036\112\146\144\315\134\305\234\203
\341\302\010\210\232\354\116\243\361\076\034\054\331\154\035\241
\113\002\003\001\000\001\243\201\212\060\201\207\060\017\006\003
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006
\003\125\035\016\004\026\004\024\022\362\132\076\352\126\034\277
\315\006\254\361\361\045\311\251\113\324\024\231\060\105\006\003
\125\035\045\004\076\060\074\006\010\053\006\001\005\005\007\003
\002\006\010\053\006\001\005\005\007\003\001\006\010\053\006\001
\005\005\007\003\003\006\010\053\006\001\005\005\007\003\004\006
\010\053\006\001\005\005\007\003\010\006\010\053\006\001\005\005
\007\003\011\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\003\202\001\001\000\173\366\344\300\015\252\031\107\267
\115\127\243\376\255\273\261\152\325\017\236\333\344\143\305\216
\241\120\126\223\226\270\070\300\044\042\146\274\123\024\141\225
\277\320\307\052\226\071\077\175\050\263\020\100\041\152\304\257
\260\122\167\030\341\226\330\126\135\343\335\066\136\035\247\120

\124\240\305\052\344\252\214\224\212\117\235\065\377\166\244\006
\023\221\242\242\175\000\104\077\125\323\202\074\032\325\133\274
\126\114\042\056\106\103\212\044\100\055\363\022\270\073\160\032
\244\226\271\032\257\207\101\032\152\030\015\006\117\307\076\156
\271\051\115\015\111\211\021\207\062\133\346\113\004\310\344\134
\346\164\163\224\135\026\230\023\225\376\373\333\261\104\345\072
\160\254\067\153\346\263\063\162\050\311\263\127\240\366\002\026
\210\006\013\266\246\113\040\050\324\336\075\213\255\067\005\123
\164\376\156\314\274\103\027\161\136\371\305\314\032\251\141\356
\367\166\014\363\162\364\162\255\317\162\002\066\007\107\317\357
\031\120\211\140\314\351\044\225\017\302\313\035\362\157\166\220
\307\314\165\301\226\305\235
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "EE Certification Centre Root CA"
#
Issuer: 1.2.840.113549.1.9.1=pki@sk.ee,CN=EE Certification Centre Root CA,O=AS Sertifitseerimiskeskus,C=EE
# Serial Number:54:80:f9:a0:73:ed:3f:00:4c:ca:89:d8:e3:71:e6:4a
# Subject: 1.2.840.113549.1.9.1=pki@sk.ee,CN=EE Certification Centre Root CA,O=AS
Sertifitseerimiskeskus,C=EE
# Not Valid Before: Sat Oct 30 10:10:30 2010
# Not Valid After: Tue Dec 17 23:59:59 2030
# Fingerprint (MD5): 43:5e:88:d4:7d:1a:4a:7e:fd:84:2e:52:eb:01:d4:6f
# Fingerprint (SHA1): c9:a8:b9:e7:55:80:5e:58:e3:53:77:a7:25:eb:af:c3:7b:27:cc:d7
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "EE Certification Centre Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\311\250\271\347\125\200\136\130\343\123\167\247\045\353\257\303
\173\047\314\327
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\103\136\210\324\175\032\112\176\375\204\056\122\353\001\324\157
END
CKA_ISSUER MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\105\105\061
\042\060\040\006\003\125\004\012\014\031\101\123\040\123\145\162
\164\151\146\151\164\163\145\145\162\151\155\151\163\153\145\163
\153\165\163\061\050\060\046\006\003\125\004\003\014\037\105\105
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\103
\145\156\164\162\145\040\122\157\157\164\040\103\101\061\030\060

\026\006\011\052\206\110\206\367\015\001\011\001\026\011\160\153
\151\100\163\153\056\145\145
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\124\200\371\240\163\355\077\000\114\312\211\330\343\161
\346\112
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Autoridad de Certificacion Raiz del Estado Venezolano"
# Issuer: 1.2.840.113549.1.9.1=acraiz@suscerte.gob.ve,OU=Superintendencia de Servicios de Certificacion Electronica,O=Sistema
Nacional de Certificacion Electronica,ST=Distrito Capital,L=Caracas,C=VE,CN=Autoridad de Certificacion Raiz del Estado Venezolano
# Serial Number: 10 (0xa)
# Subject: 1.2.840.113549.1.9.1=acraiz@suscerte.gob.ve,OU=Superintendencia de Servicios de Certificacion Electronica,O=Sistema Nacional de Certificacion Electronica,ST=Distrito Capital,L=Caracas,C=VE,CN=Autoridad de Certificacion Raiz del Estado Venezolano
# Not Valid Before: Tue Dec 28 16:41:36 2010
# Not Valid After: Mon Dec 23 23:59:59 2030
# Fingerprint (MD5): 96:14:69:08:a8:36:59:d7:a0:35:14:89:58:50:5b:ab
# Fingerprint (SHA1): 39:8e:be:9c:0f:46:c0:79:c3:c7:af:e0:7a:2f:dd:9f:ae:5f:8a:5c
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Autoridad de Certificacion Raiz del Estado Venezolano"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\202\001\036\061\076\060\074\006\003\125\004\003\023\065\101
\165\164\157\162\151\144\141\144\040\144\145\040\103\145\162\164
\151\146\151\143\141\143\151\157\156\040\122\141\151\172\040\144
\145\154\040\105\163\164\141\144\157\040\126\145\156\145\172\157
\154\141\156\157\061\013\060\011\006\003\125\004\006\023\002\126
\105\061\020\060\016\006\003\125\004\007\023\007\103\141\162\141
\143\141\163\061\031\060\027\006\003\125\004\010\023\020\104\151
\163\164\162\151\164\157\040\103\141\160\151\164\141\154\061\066
\060\064\006\003\125\004\012\023\055\123\151\163\164\145\155\141
\040\116\141\143\151\157\156\141\154\040\144\145\040\103\145\162
\164\151\146\151\143\141\143\151\157\156\040\105\154\145\143\164
\162\157\156\151\143\141\061\103\060\101\006\003\125\004\013\023
\072\123\165\160\145\162\151\156\164\145\156\144\145\156\143\151
\141\040\144\145\040\123\145\162\166\151\143\151\157\163\040\144

\145\040\103\145\162\164\151\146\151\143\141\143\151\157\156\040
\105\154\145\143\164\162\157\156\151\143\141\061\045\060\043\006
\011\052\206\110\206\367\015\001\011\001\026\026\141\143\162\141
\151\172\100\163\165\163\143\145\162\164\145\056\147\157\142\056
\166\145
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\202\001\036\061\076\060\074\006\003\125\004\003\023\065\101
\165\164\157\162\151\144\141\144\040\144\145\040\103\145\162\164
\151\146\151\143\141\143\151\157\156\040\122\141\151\172\040\144
\145\154\040\105\163\164\141\144\157\040\126\145\156\145\172\157
\154\141\156\157\061\013\060\011\006\003\125\004\006\023\002\126
\105\061\020\060\016\006\003\125\004\007\023\007\103\141\162\141
\143\141\163\061\031\060\027\006\003\125\004\010\023\020\104\151
\163\164\162\151\164\157\040\103\141\160\151\164\141\154\061\066
\060\064\006\003\125\004\012\023\055\123\151\163\164\145\155\141
\040\116\141\143\151\157\156\141\154\040\144\145\040\103\145\162
\164\151\146\151\143\141\143\151\157\156\040\105\154\145\143\164
\162\157\156\151\143\141\061\103\060\101\006\003\125\004\013\023
\072\123\165\160\145\162\151\156\164\145\156\144\145\156\143\151
\141\040\144\145\040\123\145\162\166\151\143\151\157\163\040\144
\145\040\103\145\162\164\151\146\151\143\141\143\151\157\156\040
\105\154\145\143\164\162\157\156\151\143\141\061\045\060\043\006
\011\052\206\110\206\367\015\001\011\001\026\026\141\143\162\141
\151\172\100\163\165\163\143\145\162\164\145\056\147\157\142\056
\166\145
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\012
END
CKA_VALUE MULTILINE_OCTAL
\060\202\011\230\060\202\007\200\240\003\002\001\002\002\001\012
\060\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060
\202\001\036\061\076\060\074\006\003\125\004\003\023\065\101\165
\164\157\162\151\144\141\144\040\144\145\040\103\145\162\164\151
\146\151\143\141\143\151\157\156\040\122\141\151\172\040\144\145
\154\040\105\163\164\141\144\157\040\126\145\156\145\172\157\154
\141\156\157\061\013\060\011\006\003\125\004\006\023\002\126\105
\061\020\060\016\006\003\125\004\007\023\007\103\141\162\141\143
\141\163\061\031\060\027\006\003\125\004\010\023\020\104\151\163
\164\162\151\164\157\040\103\141\160\151\164\141\154\061\066\060
\064\006\003\125\004\012\023\055\123\151\163\164\145\155\141\040
\116\141\143\151\157\156\141\154\040\144\145\040\103\145\162\164
\151\146\151\143\141\143\151\157\156\040\105\154\145\143\164\162
\157\156\151\143\141\061\103\060\101\006\003\125\004\013\023\072

\123\165\160\145\162\151\156\164\145\156\144\145\156\143\151\141
\040\144\145\040\123\145\162\166\151\143\151\157\163\040\144\145
\040\103\145\162\164\151\146\151\143\141\143\151\157\156\040\105
\154\145\143\164\162\157\156\151\143\141\061\045\060\043\006\011
\052\206\110\206\367\015\001\011\001\026\026\141\143\162\141\151
\172\100\163\165\163\143\145\162\164\145\056\147\157\142\056\166
\145\060\036\027\015\061\060\061\062\062\070\061\066\064\061\063
\066\132\027\015\063\060\061\062\062\063\062\063\065\071\065\071
\132\060\202\001\036\061\076\060\074\006\003\125\004\003\023\065
\101\165\164\157\162\151\144\141\144\040\144\145\040\103\145\162
\164\151\146\151\143\141\143\151\157\156\040\122\141\151\172\040
\144\145\154\040\105\163\164\141\144\157\040\126\145\156\145\172
\157\154\141\156\157\061\013\060\011\006\003\125\004\006\023\002
\126\105\061\020\060\016\006\003\125\004\007\023\007\103\141\162
\141\143\141\163\061\031\060\027\006\003\125\004\010\023\020\104
\151\163\164\162\151\164\157\040\103\141\160\151\164\141\154\061
\066\060\064\006\003\125\004\012\023\055\123\151\163\164\145\155
\141\040\116\141\143\151\157\156\141\154\040\144\145\040\103\145
\162\164\151\146\151\143\141\143\151\157\156\040\105\154\145\143
\164\162\157\156\151\143\141\061\103\060\101\006\003\125\004\013
\023\072\123\165\160\145\162\151\156\164\145\156\144\145\156\143
\151\141\040\144\145\040\123\145\162\166\151\143\151\157\163\040
\144\145\040\103\145\162\164\151\146\151\143\141\143\151\157\156
\040\105\154\145\143\164\162\157\156\151\143\141\061\045\060\043
\006\011\052\206\110\206\367\015\001\011\001\026\026\141\143\162
\141\151\172\100\163\165\163\143\145\162\164\145\056\147\157\142
\056\166\145\060\202\002\042\060\015\006\011\052\206\110\206\367
\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002
\202\002\001\000\301\073\357\023\122\361\231\126\343\264\154\005
\341\032\151\026\141\046\206\170\257\016\374\345\100\005\012\343
\331\070\005\114\250\324\265\300\306\052\317\057\171\253\241\244
\120\357\065\021\037\356\202\044\027\374\243\034\253\376\007\006
\177\067\177\007\130\133\023\331\177\000\137\053\260\117\332\237
\311\260\130\063\141\341\117\320\025\316\056\153\350\044\214\345
\045\276\205\133\355\114\077\001\201\216\346\231\030\122\046\131
\233\022\230\145\034\225\276\165\231\026\014\144\104\341\367\362
\171\010\264\341\107\127\261\112\334\107\102\233\160\113\072\332
\314\321\151\221\006\077\316\150\373\371\206\115\003\334\203\242
\272\025\026\376\254\311\266\016\147\263\261\064\072\073\316\104
\213\243\216\110\356\003\060\267\032\226\147\305\144\045\231\002
\363\352\164\165\176\246\222\025\023\321\000\025\353\206\134\364
\173\031\210\177\350\056\021\044\136\070\153\201\235\274\160\136
\367\061\162\052\057\035\137\310\316\044\074\175\162\070\230\277
\107\275\247\063\002\373\017\344\235\352\146\140\043\115\371\117
\033\207\135\315\277\270\354\027\174\252\353\116\066\211\017\077
\011\247\240\335\172\313\016\223\022\040\220\245\321\214\377\205
\053\174\336\336\176\015\120\204\106\204\144\155\312\361\043\053
\336\177\332\015\066\267\243\336\142\046\025\032\352\372\256\344

\270\366\175\021\001\244\222\323\362\311\157\245\363\150\000\036
\322\151\216\331\353\347\022\254\110\053\014\266\231\224\115\075
\360\025\133\131\167\300\051\326\211\114\053\310\025\072\072\306
\305\160\121\153\102\157\264\323\003\242\161\173\316\114\160\114
\152\040\225\001\126\123\157\324\122\057\050\276\054\235\145\227
\062\131\073\172\152\334\204\142\210\030\367\360\332\050\243\355
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\111\124\057\055\042\376\143\017\222\251\254\062\173\074\031\270
\004\233\247\267\177\322\273\255\103\237\135\363\134\345\154\313
\167\047\274\201\347\256\353\117\142\052\043\047\120\362\240\126
\223\347\346\137\070\041\137\357\305\211\326\054\207\366\212\373
\066\173\133\056\274\220\241\356\314\114\065\126\251\032\267\220
\306\263\345\163\002\003\001\000\001\243\202\002\333\060\202\002
\327\060\022\006\003\125\035\023\001\001\377\004\010\060\006\001
\001\377\002\001\002\060\067\006\003\125\035\022\004\060\060\056
\202\017\163\165\163\143\145\162\164\145\056\147\157\142\056\166
\145\240\033\006\005\140\206\136\002\002\240\022\014\020\122\111
\106\055\107\055\062\060\060\060\064\060\063\066\055\060\060\035
\006\003\125\035\016\004\026\004\024\255\273\042\035\306\340\322
\001\250\375\166\120\122\223\355\230\301\115\256\323\060\202\001
\120\006\003\125\035\043\004\202\001\107\060\202\001\103\200\024
\255\273\042\035\306\340\322\001\250\375\166\120\122\223\355\230
\301\115\256\323\241\202\001\046\244\202\001\042\060\202\001\036
\061\076\060\074\006\003\125\004\003\023\065\101\165\164\157\162
\151\144\141\144\040\144\145\040\103\145\162\164\151\146\151\143
\141\143\151\157\156\040\122\141\151\172\040\144\145\154\040\105
\163\164\141\144\157\040\126\145\156\145\172\157\154\141\156\157
\061\013\060\011\006\003\125\004\006\023\002\126\105\061\020\060
\016\006\003\125\004\007\023\007\103\141\162\141\143\141\163\061
\031\060\027\006\003\125\004\010\023\020\104\151\163\164\162\151
\164\157\040\103\141\160\151\164\141\154\061\066\060\064\006\003
\125\004\012\023\055\123\151\163\164\145\155\141\040\116\141\143
\151\157\156\141\154\040\144\145\040\103\145\162\164\151\146\151
\143\141\143\151\157\156\040\105\154\145\143\164\162\157\156\151
\143\141\061\103\060\101\006\003\125\004\013\023\072\123\165\160
\145\162\151\156\164\145\156\144\145\156\143\151\141\040\144\145
\040\123\145\162\166\151\143\151\157\163\040\144\145\040\103\145
\162\164\151\146\151\143\141\143\151\157\156\040\105\154\145\143
\164\162\157\156\151\143\141\061\045\060\043\006\011\052\206\110
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\165\163\143\145\162\164\145\056\147\157\142\056\166\145\202\001
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\162\164\145\056\147\157\142\056\166\145\240\033\006\005\140\206
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\060\113\060\044\240\042\240\040\206\036\150\164\164\160\072\057
\057\167\167\167\056\163\165\163\143\145\162\164\145\056\147\157

\142\056\166\145\057\154\143\162\060\043\240\041\240\037\206\035
\154\144\141\160\072\057\057\141\143\162\141\151\172\056\163\165
\163\143\145\162\164\145\056\147\157\142\056\166\145\060\067\006
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\057\057\157\143\163\160\056\163\165\163\143\145\162\164\145\056
\147\157\142\056\166\145\060\100\006\003\125\035\040\004\071\060
\067\060\065\006\005\140\206\136\001\002\060\054\060\052\006\010
\053\006\001\005\005\007\002\001\026\036\150\164\164\160\072\057
\057\167\167\167\056\163\165\163\143\145\162\164\145\056\147\157
\142\056\166\145\057\144\160\143\060\015\006\011\052\206\110\206
\367\015\001\001\014\005\000\003\202\002\001\000\034\131\020\345
\136\244\121\301\107\273\145\262\013\125\342\057\251\243\047\274
\341\074\212\307\154\003\126\243\251\051\242\233\212\225\330\037
\367\266\022\140\026\276\172\364\375\003\201\117\375\201\201\252
\117\201\160\036\056\357\300\222\022\173\273\017\205\210\304\371
\035\101\265\272\044\052\303\050\046\023\312\371\000\373\327\303
\134\371\150\351\033\301\030\042\311\242\154\144\303\370\071\303
\116\041\335\326\302\336\345\266\054\311\134\070\360\336\136\152
\344\047\364\270\063\304\313\141\222\063\123\250\314\374\235\315
\123\373\050\013\357\355\177\260\217\164\042\266\065\127\200\250
\256\005\256\051\012\073\262\244\375\075\343\324\301\220\366\077
\316\274\344\104\376\321\301\176\050\057\375\000\044\062\040\210
\304\157\030\173\221\016\110\220\274\226\142\140\201\155\024\000
\032\121\272\265\135\151\215\141\107\034\054\254\116\105\040\251
\110\105\243\207\111\243\170\220\335\066\102\177\330\166\157\375
\155\203\001\306\371\177\230\040\177\226\056\042\140\253\242\047
\300\260\065\044\320\311\277\063\231\042\123\016\156\037\142\114
\046\374\044\063\312\301\003\314\251\027\141\143\063\044\314\150
\100\357\257\242\342\205\303\210\060\323\105\033\356\126\352\126
\012\017\012\107\233\060\131\330\111\321\060\220\014\047\052\046
\010\050\134\062\037\047\327\255\013\111\345\027\121\143\317\346
\015\073\140\121\032\275\103\011\120\346\221\265\143\346\144\227
\252\013\227\023\001\006\206\134\245\037\225\276\120\216\013\262
\322\144\177\333\253\114\346\103\306\344\205\215\152\376\215\376
\273\224\125\036\221\123\047\010\323\272\147\075\072\241\311\301
\305\024\272\371\103\134\305\216\041\214\202\242\375\052\062\045
\325\026\214\025\126\300\230\374\056\262\216\031\244\026\161\303
\113\335\161\376\161\354\042\035\360\301\214\230\201\207\264\277
\002\270\304\060\061\107\302\300\260\257\173\063\143\012\335\254
\105\233\301\314\200\207\364\331\230\136\234\206\376\232\004\377
\146\112\374\173\141\124\276\127\143\005\007\306\247\001\165\131
\344\156\071\073\000\364\252\235\363\237\210\277\317\321\045\053
\337\177\163\355\026\206\251\220\145\017\160\051
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

```
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Autoridad de Certificacion Raiz del Estado Venezolano"
# Issuer: 1.2.840.113549.1.9.1=acraiz@suscerte.gob.ve,OU=Superintendencia de Servicios de Certificacion
Electronica,O=Sistema Nacional de Certificacion Electronica,ST=Distrito Capital,L=Caracas,C=VE,CN=Autoridad
de Certificacion Raiz del Estado Venezolano
# Serial Number: 10 (0xa)
# Subject: 1.2.840.113549.1.9.1=acraiz@suscerte.gob.ve,OU=Superintendencia
 de Servicios de Certificacion Electronica,O=Sistema Nacional de Certificacion Electronica,ST=Distrito
Capital,L=Caracas,C=VE,CN=Autoridad de Certificacion Raiz del Estado Venezolano
# Not Valid Before: Tue Dec 28 16:41:36 2010
# Not Valid After: Mon Dec 23 23:59:59 2030
# Fingerprint (MD5): 96:14:69:08:a8:36:59:d7:a0:35:14:89:58:50:5b:ab
# Fingerprint (SHA1): 39:8e:be:9c:0f:46:c0:79:c3:c7:af:e0:7a:2f:dd:9f:ae:5f:8a:5c
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Autoridad de Certificacion Raiz del Estado Venezolano"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\071\216\276\234\017\106\300\171\303\307\257\340\172\057\335\237
\256\137\212\134
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\226\024\151\010\250\066\131\327\240\065\024\211\130\120\133\253
END
CKA_ISSUER MULTILINE_OCTAL
\060\202\001\036\061\076\060\074\006\003\125\004\003\023\065\101
\165\164\157\162\151\144\141\144\040\144\145\040\103\145\162\164
\151\146\151\143\141\143\151\157\156\040\122\141\151\172\040\144
\145\154\040\105\163\164\141\144\157\040\126\145\156\145\172\157
\154\141\156\157\061\013\060\011\006\003\125\004\006\023\002\126
\105\061\020\060\016\006\003\125\004\007\023\007\103\141\162\141
\143\141\163\061\031\060\027\006\003\125\004\010\023\020\104\151
\163\164\162\151\164\157\040\103\141\160\151\164\141\154\061\066
\060\064\006\003\125\004\012\023\055\123\151\163\164\145\155\141
\040\116\141\143\151\157\156\141\154\040\144\145\040\103\145\162
\164\151\146\151\143\141\143\151\157\156\040\105\154\145\143\164
\162\157\156\151\143\141\061\103\060\101\006\003\125\004\013\023
\072\123\165\160\145\162\151\156\164\145\156\144\145\156\143\151
\141\040\144\145\040\123\145\162\166\151\143\151\157\163\040\144
\145\040\103\145\162\164\151\146\151\143\141\143\151\157\156\040
\105\154\145\143\164\162\157\156\151\143\141\061\045\060\043\006
\011\052\206\110\206\367\015\001\011\001\026\026\141\143\162\141
\151\172\100\163\165\163\143\145\162\164\145\056\147\157\142\056
\166\145
END
```

CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\012
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "China Internet Network Information Center EV Certificates Root"
# Issuer: CN=China Internet Network Information Center EV Certificates Root,O=China Internet Network Information Center,C=CN
# Serial Number:48:9f:00:01
# Subject: CN=China Internet Network Information Center EV Certificates Root,O=China Internet Network Information Center,C=CN
# Not Valid Before: Tue Aug 31 07:11:25 2010
# Not Valid After: Sat Aug 31 07:11:25 2030
# Fingerprint (MD5): 55:5d:63:00:97:bd:6a:97:f5:67:ab:4b:fb:6e:63:15
# Fingerprint (SHA1): 4f:99:aa:93:fb:2b:d1:37:26:a1:99:4a:ce:7f:f0:05:f2:93:5d:1e
CKA_CLASS
CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "China Internet Network Information Center EV Certificates Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\212\061\013\060\011\006\003\125\004\006\023\002\103\116
\061\062\060\060\006\003\125\004\012\014\051\103\150\151\156\141
\040\111\156\164\145\162\156\145\164\040\116\145\164\167\157\162
\153\040\111\156\146\157\162\155\141\164\151\157\156\040\103\145
\156\164\145\162\061\107\060\105\006\003\125\004\003\014\076\103
\150\151\156\141\040\111\156\164\145\162\156\145\164\040\116\145
\164\167\157\162\153\040\111\156\146\157\162\155\141\164\151\157
\156\040\103\145\156\164\145\162\040\105\126\040\103\145\162\164
\151\146\151\143\141\164\145\163\040\122\157\157\164
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\212\061\013\060\011\006\003\125\004\006\023\002\103\116
\061\062\060\060\006\003\125\004\012\014\051\103\150\151\156\141
\040\111\156\164\145\162\156\145\164\040\116\145\164\167\157\162
\153\040\111\156\146\157\162\155\141\164\151\157\156\040\103\145
\156\164\145\162\061\107\060\105\006\003\125\004\003\014\076\103
\150\151\156\141\040\111\156\164\145\162\156\145\164\040\116\145
\164\167\157\162\153\040\111\156\146\157\162\155\141\164\151\157
\156\040\103\145\156\164\145\162\040\105\126\040\103\145\162\164

\151\146\151\143\141\164\145\163\040\122\157\157\164
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\004\110\237\000\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\367\060\202\002\337\240\003\002\001\002\002\004\110
\237\000\001\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\201\212\061\013\060\011\006\003\125\004\006\023\002
\103\116\061\062\060\060\006\003\125\004\012\014\051\103\150\151
\156\141\040\111\156\164\145\162\156\145\164\040\116\145\164\167
\157\162\153\040\111\156\146\157\162\155\141\164\151\157\156\040
\103\145\156\164\145\162\061\107\060\105\006\003\125\004\003\014
\076\103\150\151\156\141\040\111\156\164\145\162\156\145\164\040
\116\145\164\167\157\162\153\040\111\156\146\157\162\155\141\164
\151\157\156\040\103\145\156\164\145\162\040\105\126\040\103\145
\162\164\151\146\151\143\141\164\145\163\040\122\157\157\164\060
\036\027\015\061\060\060\070\063\061\060\067\061\061\062\065\132
\027\015\063\060\060\070\063\061\060\067\061\061\062\065\132\060
\201\212\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\062\060\060\006\003\125\004\012\014\051\103\150\151\156\141\040
\111\156\164\145\162\156\145\164\040\116\145\164\167\157\162\153
\040\111\156\146\157\162\155\141\164\151\157\156\040\103\145\156
\164\145\162\061\107\060\105\006\003\125\004\003\014\076\103\150
\151\156\141\040\111\156\164\145\162\156\145\164\040\116\145\164
\167\157\162\153\040\111\156\146\157\162\155\141\164\151\157\156
\040\103\145\156\164\145\162\040\105\126\040\103\145\162\164\151
\146\151\143\141\164\145\163\040\122\157\157\164\060\202\001\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\001\017\000\060\202\001\012\002\202\001\001\000\233\176\163
\356\275\073\170\252\144\103\101\365\120\337\224\362\056\262\215
\112\216\106\124\322\041\022\310\071\062\102\006\351\203\325\237
\122\355\345\147\003\073\124\301\214\231\231\314\351\300\017\377
\015\331\204\021\262\270\321\313\133\334\036\371\150\061\144\341
\233\372\164\353\150\271\040\225\367\306\017\215\107\254\132\006
\335\141\253\342\354\330\237\027\055\234\312\074\065\227\125\161
\315\103\205\261\107\026\365\054\123\200\166\317\323\000\144\275
\100\231\335\314\330\333\304\237\326\023\137\101\203\213\371\015
\207\222\126\064\154\032\020\013\027\325\132\034\227\130\204\074
\204\032\056\134\221\064\156\031\137\177\027\151\305\145\357\153
\041\306\325\120\072\277\141\271\005\215\357\157\064\072\262\157
\024\143\277\026\073\233\251\052\375\267\053\070\146\006\305\054
\342\252\147\036\105\247\215\004\146\102\366\217\053\357\210\040
\151\217\062\214\024\163\332\053\206\221\143\042\232\362\247\333
\316\211\213\253\135\307\024\301\133\060\152\037\261\267\236\056
\201\001\002\355\317\226\136\143\333\250\346\070\267\002\003\001
\000\001\243\143\060\141\060\037\006\003\125\035\043\004\030\060

\026\200\024\174\162\113\071\307\300\333\142\245\117\233\252\030
\064\222\242\312\203\202\131\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\016\006\003\125\035\017\001
\001\377\004\004\003\002\001\006\060\035\006\003\125\035\016\004
\026\004\024\174\162\113\071\307\300\333\142\245\117\233\252\030
\064\222\242\312\203\202\131\060\015\006\011\052\206\110\206\367
\015\001\001\005\005\000\003\202\001\001\000\052\303\307\103\067
\217\335\255\244\262\014\356\334\024\155\217\050\244\230\111\313
\014\200\352\363\355\043\146\165\175\305\323\041\147\171\321\163
\305\265\003\267\130\254\014\124\057\306\126\023\017\061\332\006
\347\145\073\035\157\066\333\310\035\371\375\200\006\312\243\075
\146\026\250\235\114\026\175\300\225\106\265\121\344\342\037\327
\352\006\115\143\215\226\214\357\347\063\127\102\072\353\214\301
\171\310\115\166\175\336\366\261\267\201\340\240\371\241\170\106
\027\032\126\230\360\116\075\253\034\355\354\071\334\007\110\367
\143\376\006\256\302\244\134\152\133\062\210\305\307\063\205\254
\146\102\107\302\130\044\231\341\345\076\345\165\054\216\103\326
\135\074\170\036\250\225\202\051\120\321\321\026\272\357\301\276
\172\331\264\330\314\036\114\106\341\167\261\061\253\275\052\310
\316\217\156\241\135\177\003\165\064\344\255\211\105\124\136\276
\256\050\245\273\077\170\171\353\163\263\012\015\375\276\311\367
\126\254\366\267\355\057\233\041\051\307\070\266\225\304\004\362
\303\055\375\024\052\220\231\271\007\314\237
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "China Internet Network Information Center EV Certificates Root"
# Issuer:
CN=China Internet Network Information Center EV Certificates Root,O=China Internet Network Information Center,C=CN
# Serial Number:48:9f:00:01
# Subject: CN=China Internet Network Information Center EV Certificates Root,O=China Internet Network Information Center,C=CN
# Not Valid Before: Tue Aug 31 07:11:25 2010
# Not Valid After: Sat Aug 31 07:11:25 2030
# Fingerprint (MD5): 55:5d:63:00:97:bd:6a:97:f5:67:ab:4b:fb:6e:63:15
# Fingerprint (SHA1): 4f:99:aa:93:fb:2b:d1:37:26:a1:99:4a:ce:7f:f0:05:f2:93:5d:1e
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "China Internet Network Information Center EV Certificates Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\117\231\252\223\373\053\321\067\046\241\231\112\316\177\360\005

```
\362\223\135\036
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\125\135\143\000\227\275\152\227\365\147\253\113\373\156\143\025
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\212\061\013\060\011\006\003\125\004\006\023\002\103\116
\061\062\060\060\006\003\125\004\012\014\051\103\150\151\156\141
\040\111\156\164\145\162\156\145\164\040\116\145\164\167\157\162
\153\040\111\156\146\157\162\155\141\164\151\157\156\040\103\145
\156\164\145\162\061\107\060\105\006\003\125\004\003\014\076\103
\150\151\156\141\040\111\156\164\145\162\156\145\164\040\116\145
\164\167\157\162\153\040\111\156\146\157\162\155\141\164\151\157
\156\040\103\145\156\164\145\162\040\105\126\040\103\145\162\164
\151\146\151\143\141\164\145\163\040\122\157\157\164
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\004\110\237\000\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Verizon Global Root CA"
# Issuer: CN=Verizon Global Root CA,OU=OmniRoot,O=Verizon Business,C=US
# Serial Number:
 1 (0x1)
# Subject: CN=Verizon Global Root CA,OU=OmniRoot,O=Verizon Business,C=US
# Not Valid Before: Thu Jul 30 14:27:04 2009
# Not Valid After: Sun Jul 30 14:27:04 2034
# Fingerprint (MD5): f4:c3:f3:e9:53:c2:94:65:27:3d:52:89:f1:8e:5b:1c
# Fingerprint (SHA1): 91:21:98:ee:f2:3d:ca:c4:09:39:31:2f:ee:97:dd:56:0b:ae:49:b1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Verizon Global Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\134\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\031\060\027\006\003\125\004\012\014\020\126\145\162\151\172\157
\156\040\102\165\163\151\156\145\163\163\061\021\060\017\006\003
\125\004\013\014\010\117\155\156\151\122\157\157\164\061\037\060
\035\006\003\125\004\003\014\026\126\145\162\151\172\157\156\040
\107\154\157\142\141\154\040\122\157\157\164\040\103\101
```

END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\134\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\031\060\027\006\003\125\004\012\014\020\126\145\162\151\172\157
\156\040\102\165\163\151\156\145\163\163\061\021\060\017\006\003
\125\004\013\014\010\117\155\156\151\122\157\157\164\061\037\060
\035\006\003\125\004\003\014\026\126\145\162\151\172\157\156\040
\107\154\157\142\141\154\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\165\060\202\002\135\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\134\061\013\060\011\006\003\125\004\006\023\002\125\123\061\031
\060\027\006\003\125\004\012\014\020\126\145\162\151\172\157\156
\040\102\165\163\151\156\145\163\163\061\021\060\017\006\003\125
\004\013\014\010\117\155\156\151\122\157\157\164\061\037\060\035
\006\003\125\004\003\014\026\126\145\162\151\172\157\156\040\107
\154\157\142\141\154\040\122\157\157\164\040\103\101\060\036\027
\015\060\071\060\067\063\060\061\064\062\067\060\064\132\027\015
\063\064\060\067\063\060\061\064\062\067\060\064\132\060\134\061
\013\060\011\006\003\125\004\006\023\002\125\123\061\031\060\027
\006\003\125\004\012\014\020\126\145\162\151\172\157\156\040\102
\165\163\151\156\145\163\163\061\021\060\017\006\003\125\004\013
\014\010\117\155\156\151\122\157\157\164\061\037\060\035\006\003
\125\004\003\014\026\126\145\162\151\172\157\156\040\107\154\157
\142\141\154\040\122\157\157\164\040\103\101\060\202\001\042\060
\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202
\001\017\000\060\202\001\012\002\202\001\001\000\212\000\014\160
\035\277\353\064\206\303\231\105\065\036\177\103\367\253\157\044
\055\315\031\302\020\273\260\312\051\133\251\040\253\253\162\054
\304\342\002\071\155\202\270\305\021\352\370\373\263\236\142\370
\063\036\260\037\311\343\366\067\333\004\310\073\143\117\066\342
\205\244\045\035\307\151\037\004\275\150\105\023\226\007\037\224
\120\365\076\305\047\124\236\300\111\127\104\216\007\143\324\246
\256\355\042\231\314\115\226\151\004\023\156\166\211\237\164\026
\224\371\035\124\275\242\271\322\203\001\042\014\115\104\200\252
\376\065\211\047\045\247\206\211\306\325\032\222\343\217\305\225
\240\024\162\232\350\126\305\002\125\034\227\371\040\056\320\365
\074\023\031\132\366\341\371\013\003\202\151\247\214\267\326\157
\234\126\076\235\350\052\011\140\155\113\346\373\213\231\024\367
\064\117\145\131\200\215\271\127\310\242\065\041\330\210\161\126
\135\356\202\127\055\046\220\030\237\232\234\234\217\357\324\305
\143\247\124\175\107\221\207\175\032\022\250\033\030\157\251\157

\261\047\272\344\004\164\316\067\036\177\146\305\002\003\001\000
\001\243\102\060\100\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\035\006\003\125\035\016\004\026\004
\024\114\070\021\270\230\000\133\132\053\160\076\252\170\344\325
\147\147\147\247\176\060\015\006\011\052\206\110\206\367\015\001
\001\013\005\000\003\202\001\001\000\001\137\240\261\006\001\364
\171\327\145\030\140\076\317\171\240\272\302\043\117\043\337\207
\226\137\201\016\070\025\056\134\310\002\150\051\040\374\213\356
\245\212\030\201\144\134\230\065\176\071\060\202\244\202\212\120
\265\272\303\350\132\326\250\236\342\303\027\333\333\304\353\260
\012\040\015\351\236\343\377\140\124\107\361\073\235\324\050\074
\242\256\243\373\252\213\202\042\052\065\207\220\270\034\131\107
\220\325\235\056\372\111\343\145\250\066\353\307\344\034\150\334
\263\061\154\253\116\316\044\200\025\310\020\131\020\021\162\115
\172\234\230\234\304\374\141\340\263\262\235\116\240\306\302\131
\253\030\326\242\125\105\354\051\252\045\067\326\116\112\075\013
\100\301\344\223\344\374\315\221\013\370\346\253\314\263\166\304
\142\277\031\355\206\266\171\303\051\124\124\274\231\175\106\127
\317\246\317\364\124\052\232\003\145\107\001\241\102\052\313\045
\107\156\174\136\000\113\221\331\371\033\020\006\160\371\102\025
\246\137\252\327\100\036\375\311\110\235\227\201\352\134\150\302
\240\347\211\241\123\115\277\307\343
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Verizon Global Root CA"
# Issuer: CN=Verizon Global Root CA,OU=OmniRoot,O=Verizon Business,C=US
# Serial Number: 1 (0x1)
# Subject: CN=Verizon Global Root CA,OU=OmniRoot,O=Verizon Business,C=US
# Not Valid Before: Thu Jul 30 14:27:04 2009
# Not Valid After: Sun Jul 30 14:27:04 2034
# Fingerprint (MD5): f4:c3:f3:e9:53:c2:94:65:27:3d:52:89:f1:8e:5b:1c
# Fingerprint (SHA1): 91:21:98:ee:f2:3d:ca:c4:09:39:31:2f:ee:97:dd:56:0b:ae:49:b1
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Verizon Global Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\221\041\230\356\362\075\312\304\011\071\061\057\356\227\335\126
\013\256\111\261
END
CKA_CERT_MD5_HASH

```
 MULTILINE_OCTAL
\364\303\363\351\123\302\224\145\047\075\122\211\361\216\133\034
END
CKA_ISSUER MULTILINE_OCTAL
\060\134\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\031\060\027\006\003\125\004\012\014\020\126\145\162\151\172\157
\156\040\102\165\163\151\156\145\163\163\061\021\060\017\006\003
\125\004\013\014\010\117\155\156\151\122\157\157\164\061\037\060
\035\006\003\125\004\003\014\026\126\145\162\151\172\157\156\040
\107\154\157\142\141\154\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "SwissSign Silver Root CA - G3"
# Issuer: CN=SwissSign Silver Root CA - G3,O=SwissSign AG,C=CH
# Serial Number:aa:88:b0:5a:0b:b1:76:9b
# Subject: CN=SwissSign
 Silver Root CA - G3,O=SwissSign AG,C=CH
# Not Valid Before: Tue Aug 04 13:19:14 2009
# Not Valid After: Tue Aug 04 13:19:14 2037
# Fingerprint (MD5): 40:e4:e0:25:6e:96:e0:01:a1:c8:4c:43:4c:f9:dc:33
# Fingerprint (SHA1): 8d:08:fc:43:c0:77:0c:a8:4f:4d:cc:b2:d4:1a:5d:95:6d:78:6d:c4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SwissSign Silver Root CA - G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\114\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\046\060\044\006\003\125\004\003\023
\035\123\167\151\163\163\123\151\147\156\040\123\151\154\166\145
\162\040\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\046\060\044\006\003\125\004\003\023
\035\123\167\151\163\163\123\151\147\156\040\123\151\154\166\145
```

\162\040\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\011\000\252\210\260\132\013\261\166\233
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\176\060\202\003\146\240\003\002\001\002\002\011\000
\252\210\260\132\013\261\166\233\060\015\006\011\052\206\110\206
\367\015\001\001\013\005\000\060\114\061\013\060\011\006\003\125
\004\006\023\002\103\110\061\025\060\023\006\003\125\004\012\023
\014\123\167\151\163\163\123\151\147\156\040\101\107\061\046\060
\044\006\003\125\004\003\023\035\123\167\151\163\163\123\151\147
\156\040\123\151\154\166\145\162\040\122\157\157\164\040\103\101
\040\055\040\107\063\060\036\027\015\060\071\060\070\060\064\061
\063\061\071\061\064\132\027\015\063\067\060\070\060\064\061\063
\061\071\061\064\132\060\114\061\013\060\011\006\003\125\004\006
\023\002\103\110\061\025\060\023\006\003\125\004\012\023\014\123
\167\151\163\163\123\151\147\156\040\101\107\061\046\060\044\006
\003\125\004\003\023\035\123\167\151\163\163\123\151\147\156\040
\123\151\154\166\145\162\040\122\157\157\164\040\103\101\040\055
\040\107\063\060\202\002\042\060\015\006\011\052\206\110\206\367
\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002
\202\002\001\000\276\207\233\005\346\161\174\122\157\155\354\067
\251\351\263\334\314\137\177\323\120\352\041\233\004\360\075\277
\276\216\311\245\024\026\062\020\317\231\374\354\160\255\110\066
\147\044\014\027\062\326\051\345\112\071\261\067\353\246\170\014
\154\157\031\312\116\367\121\332\032\350\372\041\070\154\225\234
\057\326\213\314\073\002\233\277\046\233\021\105\266\270\064\132
\035\246\124\110\122\310\235\170\161\316\110\112\314\247\170\203
\334\150\253\146\036\167\007\323\066\030\010\327\324\155\140\370
\360\171\323\063\066\011\222\143\267\004\232\365\247\226\332\105
\257\164\032\374\202\343\250\133\016\072\077\122\127\230\176\274
\234\214\301\300\262\132\337\304\176\376\014\246\124\166\203\176
\272\335\347\052\364\112\066\117\207\145\056\245\272\071\215\131
\141\051\363\323\216\044\160\214\123\233\021\245\107\007\262\165
\005\134\015\204\331\104\331\315\311\046\104\127\156\002\175\225
\001\324\253\044\206\356\075\160\373\127\372\260\051\024\320\235
\362\305\227\313\011\312\361\362\075\347\330\113\226\351\210\057
\236\107\121\212\124\145\230\110\322\022\344\124\167\014\007\346
\276\133\234\361\335\003\176\215\204\374\276\311\142\325\374\311
\072\350\211\265\137\302\005\122\141\360\234\076\354\056\115\214
\162\221\216\310\103\301\242\050\136\365\200\044\334\342\057\207
\073\123\000\345\313\360\262\174\215\171\031\240\210\315\170\370
\305\212\132\167\345\006\254\335\112\336\346\160\156\276\257\276
\365\261\253\016\010\260\333\240\077\224\305\276\022\271\274\173
\047\171\265\062\051\135\256\305\040\043\222\003\173\124\071\260
\211\042\124\155\022\343\303\170\352\072\100\375\244\223\254\351

\055\210\074\333\246\107\146\114\337\330\027\355\026\336\032\326
\327\101\146\277\035\200\361\244\340\144\021\051\136\014\047\005
\142\353\345\304\004\142\321\304\237\014\152\125\326\130\070\234
\146\017\235\373\253\124\200\231\234\354\111\326\202\237\332\105
\326\077\123\006\003\267\375\037\354\206\175\164\340\244\264\350
\062\266\252\007\043\370\357\044\101\236\143\060\170\364\124\335
\216\360\132\070\216\022\177\170\307\157\002\126\041\063\316\270
\270\255\151\125\002\003\001\000\001\243\143\060\141\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\017\006
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\035
\006\003\125\035\016\004\026\004\024\241\214\105\223\012\022\143
\013\247\127\137\062\112\175\341\041\347\267\076\146\060\037\006
\003\125\035\043\004\030\060\026\200\024\241\214\105\223\012\022
\143\013\247\127\137\062\112\175\341\041\347\267\076\146\060\015
\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202\002
\001\000\207\256\141\155\110\070\052\306\034\334\112\056\204\170
\111\300\043\052\105\270\065\115\321\005\372\271\005\063\304\144
\275\333\255\124\026\052\260\076\015\132\050\332\246\032\200\163
\014\304\101\157\257\270\064\266\167\324\133\216\035\013\213\106
\220\104\265\263\356\111\030\211\301\113\064\263\207\065\164\242
\236\105\147\355\105\161\146\266\271\241\045\163\327\302\254\210
\373\322\035\247\153\332\300\132\346\330\131\144\064\227\145\040
\061\063\003\117\316\255\011\236\256\351\302\076\030\165\264\063
\045\022\273\005\354\120\272\161\100\342\275\336\210\106\005\041
\204\213\243\053\036\353\060\060\211\277\021\365\134\104\370\221
\213\113\131\105\013\060\015\312\014\117\157\143\276\004\376\301
\355\340\207\376\310\315\126\277\345\334\216\172\324\326\051\116
\200\333\253\233\077\216\145\007\042\367\104\315\226\037\055\307
\365\011\266\230\160\377\070\334\120\025\021\204\073\177\251\360
\330\044\124\310\027\214\053\023\111\326\231\177\105\321\017\216
\277\151\162\067\123\007\364\346\256\375\133\076\171\271\006\315
\270\201\170\264\115\240\320\065\272\344\256\377\323\111\274\065
\355\143\306\263\374\343\253\141\132\005\266\013\344\377\251\052
\276\337\124\116\302\113\134\150\332\243\062\242\311\115\127\030
\123\064\131\074\146\231\327\074\002\170\247\114\161\320\277\333
\361\304\074\347\001\346\004\362\104\366\110\046\060\063\311\261
\001\031\353\002\361\314\041\372\072\002\060\027\235\310\137\200
\077\335\045\254\002\233\343\027\336\275\312\222\024\322\122\201
\123\346\352\374\060\147\062\251\142\366\223\027\025\007\061\136
\017\033\151\365\364\251\267\174\055\263\355\204\104\062\107\050
\007\073\206\151\105\251\307\066\226\220\162\164\330\022\246\163
\043\321\116\271\266\172\072\304\051\241\120\006\021\271\331\364
\046\156\142\010\022\040\026\360\001\127\027\324\005\066\147\227
\353\121\371\377\063\044\014\005\017\126\277\357\075\034\122\216
\212\336\151\017\132\037\360\325\003\061\104\263\222\306\352\165
\250\256\273\307\140\003\210\230\377\307\004\204\122\220\206\341
\264\223\251\120\057\350\353\322\066\254\060\140\247\320\003\023
\265\012

```
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "SwissSign Silver Root CA - G3"
# Issuer: CN=SwissSign Silver Root CA - G3,O=SwissSign AG,C=CH
# Serial Number:aa:88:b0:5a:0b:b1:76:9b
# Subject: CN=SwissSign Silver Root CA - G3,O=SwissSign AG,C=CH
# Not Valid Before: Tue Aug 04 13:19:14 2009
# Not Valid After: Tue Aug 04 13:19:14 2037
# Fingerprint (MD5): 40:e4:e0:25:6e:96:e0:01:a1:c8:4c:43:4c:f9:dc:33
# Fingerprint (SHA1): 8d:08:fc:43:c0:77:0c:a8:4f:4d:cc:b2:d4:1a:5d:95:6d:78:6d:c4
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SwissSign Silver Root CA - G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\215\010\374\103\300\167\014\250\117\115\314\262\324\032\135\225
\155\170\155\304
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\100\344\340\045\156\226\340\001\241\310\114\103\114\371\334\063
END
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\046\060\044\006\003\125\004\003\023
\035\123\167\151\163\163\123\151\147\156\040\123\151\154\166\145
\162\040\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\252\210\260\132\013\261\166\233
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "SwissSign Platinum Root CA - G3"
# Issuer: CN=SwissSign Platinum Root CA - G3,O=SwissSign AG,C=CH
# Serial Number:22:3f:a9:17:20:de:81:94
# Subject: CN=SwissSign Platinum Root CA
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 - G3,O=SwissSign AG,C=CH
# Not Valid Before: Tue Aug 04 13:34:04 2009
# Not Valid After: Tue Aug 04 13:34:04 2037
# Fingerprint (MD5): 20:de:12:0b:a8:6e:d9:34:a8:4e:b2:0d:1e:a6:43:39
# Fingerprint (SHA1): a1:e7:c6:00:aa:41:70:e5:b7:4b:c9:4f:9b:97:03:ed:c2:61:b4:b9
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SwissSign Platinum Root CA - G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\050\060\046\006\003\125\004\003\023
\037\123\167\151\163\163\123\151\147\156\040\120\154\141\164\151
\156\165\155\040\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\050\060\046\006\003\125\004\003\023
\037\123\167\151\163\163\123\151\147\156\040\120\154\141\164\151
\156\165\155\040\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\010\042\077\251\027\040\336\201\224
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\201\060\202\003\151\240\003\002\001\002\002\010\042
\077\251\027\040\336\201\224\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\116\061\013\060\011\006\003\125\004
\006\023\002\103\110\061\025\060\023\006\003\125\004\012\023\014
\123\167\151\163\163\123\151\147\156\040\101\107\061\050\060\046
\006\003\125\004\003\023\037\123\167\151\163\163\123\151\147\156
\040\120\154\141\164\151\156\165\155\040\122\157\157\164\040\103
\101\040\055\040\107\063\060\036\027\015\060\071\060\070\060\064
\061\063\063\064\060\064\132\027\015\063\067\060\070\060\064\061
\063\063\064\060\064\132\060\116\061\013\060\011\006\003\125\004
\006\023\002\103\110\061\025\060\023\006\003\125\004\012\023\014
\123\167\151\163\163\123\151\147\156\040\101\107\061\050\060\046
\006\003\125\004\003\023\037\123\167\151\163\163\123\151\147\156
\040\120\154\141\164\151\156\165\155\040\122\157\157\164\040\103
\101\040\055\040\107\063\060\202\002\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202
\002\012\002\202\002\001\000\224\240\357\023\033\237\104\040\033
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\315\305\252\042\273\331\362\122\076\172\132\130\167\346\215\241
\053\311\334\244\363\344\263\023\224\000\142\233\034\362\103\120
\103\201\176\257\060\066\111\254\030\211\014\030\105\270\076\307
\124\155\343\330\232\131\153\212\032\045\251\266\265\015\267\175
\043\360\137\175\250\007\251\367\076\206\056\310\001\115\334\346
\066\355\035\345\067\007\151\022\113\343\203\321\004\034\044\360
\037\160\161\347\031\355\163\110\156\225\053\025\266\126\346\002
\337\126\351\233\372\352\246\356\340\302\303\272\340\314\306\310
\173\327\157\072\225\233\072\217\276\133\054\322\251\240\070\076
\326\210\341\261\142\023\216\334\253\060\147\315\250\152\246\143
\053\202\260\313\307\075\116\355\162\366\175\253\062\116\145\002
\353\017\231\164\370\034\032\050\214\016\105\000\223\054\024\237
\155\307\033\236\366\212\334\173\170\343\264\224\107\035\115\005
\155\204\172\220\124\262\236\213\165\302\200\337\207\071\077\237
\373\110\124\007\215\240\051\365\371\140\137\132\162\350\273\233
\240\102\340\010\000\064\243\025\074\023\343\326\032\153\002\262
\224\041\243\235\101\274\052\153\116\063\073\246\224\070\374\075
\307\053\063\263\056\053\006\164\254\233\020\157\305\116\105\367
\135\241\126\003\054\015\137\172\275\036\336\035\167\220\153\332
\245\055\212\114\351\337\101\364\347\113\354\175\225\102\237\114
\251\011\017\103\210\077\075\223\347\053\364\172\110\332\150\304
\335\022\200\061\032\135\044\124\046\246\044\041\263\114\255\332
\027\010\066\002\127\306\234\206\160\311\165\311\236\174\141\330
\170\346\271\350\024\151\371\034\020\050\022\135\113\165\120\272
\074\320\147\160\125\125\126\113\373\075\034\330\333\171\115\227
\337\270\236\333\027\054\325\065\007\270\120\251\367\216\367\126
\377\172\147\103\117\040\331\312\146\326\070\140\113\356\224\061
\326\015\242\110\233\377\064\151\224\306\065\365\226\210\357\252
\146\314\201\246\353\114\123\377\062\164\247\266\235\230\127\264
\272\046\251\361\063\063\142\176\072\260\003\021\127\377\334\157
\021\043\255\076\306\012\320\314\124\267\055\302\223\035\345\302
\246\214\307\330\357\123\367\002\003\001\000\001\243\143\060\141
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\035\006\003\125\035\016\004\026\004\024\126\052\077\220
\130\364\027\132\024\262\327\010\033\205\133\124\152\124\032\050
\060\037\006\003\125\035\043\004\030\060\026\200\024\126\052\077
\220\130\364\027\132\024\262\327\010\033\205\133\124\152\124\032
\050\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000
\003\202\002\001\000\154\355\212\347\103\250\171\047\233\270\317
\207\076\144\070\030\214\021\102\222\206\067\340\130\303\033\356
\004\056\367\204\354\203\020\150\014\177\170\055\234\302\227\216
\066\116\026\330\016\352\153\110\255\117\236\135\015\314\015\251
\076\030\205\176\314\150\231\071\065\326\330\237\206\301\062\373
\115\145\263\042\024\113\310\205\146\332\027\377\161\221\254\234
\126\127\336\161\054\126\102\277\370\315\016\360\242\323\377\322
\042\025\373\320\170\012\176\341\260\132\316\216\067\333\251\236
\347\225\317\143\362\054\015\322\372\157\363\310\325\373\000\267

\367\065\147\020\323\173\122\354\020\062\370\277\335\136\311\246
\202\244\361\260\277\035\056\335\045\344\275\115\360\065\251\221
\001\107\370\020\002\224\133\353\076\353\015\272\325\035\143\054
\245\056\253\347\343\036\243\356\113\252\137\261\146\001\264\202
\132\371\106\113\307\361\370\337\054\276\375\165\335\226\070\232
\067\072\156\245\346\062\025\156\263\220\300\071\212\164\245\225
\240\276\015\056\211\171\315\051\126\216\303\136\127\121\304\005
\157\004\125\217\201\351\114\275\131\106\313\052\274\115\311\035
\362\306\117\005\344\310\004\015\367\156\117\332\303\072\234\322
\302\365\351\306\044\172\024\076\034\102\060\250\002\105\061\251
\374\120\251\334\334\206\070\017\133\223\077\177\010\116\152\015
\047\072\020\171\126\303\025\270\076\006\206\366\331\160\147\257
\165\172\213\342\130\314\306\165\117\062\125\305\154\024\011\050
\073\362\225\344\152\336\054\050\007\255\240\175\007\050\335\324
\132\243\351\246\174\023\214\231\013\122\170\333\331\321\337\076
\132\103\166\177\106\140\123\302\315\347\166\107\174\125\315\264
\071\144\020\133\225\113\065\135\104\203\044\325\340\056\044\014
\301\200\156\151\000\200\006\167\012\146\202\020\014\121\157\067
\211\127\333\363\114\345\270\271\356\043\146\227\140\267\122\335
\331\226\373\272\212\073\240\115\316\136\360\104\114\220\314\041
\117\033\072\230\153\216\061\203\371\203\010\122\313\031\301\065
\153\356\241\025\133\210\077\155\254\362\064\222\123\246\060\052
\023\327\346\206\250\135\331\102\322\307\235\251\172\213\313\337
\356\242\061\302\345
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "SwissSign Platinum Root CA - G3"
# Issuer: CN=SwissSign Platinum Root CA - G3,O=SwissSign AG,C=CH
# Serial Number:22:3f:a9:17:20:de:81:94
# Subject: CN=SwissSign Platinum Root CA - G3,O=SwissSign AG,C=CH
# Not Valid Before: Tue Aug 04 13:34:04 2009
# Not Valid After: Tue Aug 04 13:34:04 2037
# Fingerprint (MD5): 20:de:12:0b:a8:6e:d9:34:a8:4e:b2:0d:1e:a6:43:39
# Fingerprint (SHA1): a1:e7:c6:00:aa:41:70:e5:b7:4b:c9:4f:9b:97:03:ed:c2:61:b4:b9
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SwissSign Platinum Root CA - G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\241\347\306\000\252\101\160\345\267\113\311\117\233\227\003\355
\302\141\264\271
END

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CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\040\336\022\013\250\156\331\064\250\116\262\015\036\246\103\071
END
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\050\060\046\006\003\125\004\003\023
\037\123\167\151\163\163\123\151\147\156\040\120\154\141\164\151
\156\165\155\040\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\042\077\251\027\040\336\201\224
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "SwissSign Gold Root CA - G3"
# Issuer: CN=SwissSign Gold Root CA - G3,O=SwissSign AG,C=CH
# Serial Number:de:c4:f2:44:f3:1d:a6:fc
# Subject: CN=SwissSign Gold Root CA
 - G3,O=SwissSign AG,C=CH
# Not Valid Before: Tue Aug 04 13:31:47 2009
# Not Valid After: Tue Aug 04 13:31:47 2037
# Fingerprint (MD5): c2:64:4c:e2:7d:eb:6c:7b:ec:36:e0:39:df:68:9c:67
# Fingerprint (SHA1): 0b:71:99:a1:c7:f3:ad:df:7b:a7:ea:b8:eb:57:4a:e8:0d:60:dd:de
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SwissSign Gold Root CA - G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\044\060\042\006\003\125\004\003\023
\033\123\167\151\163\163\123\151\147\156\040\107\157\154\144\040
\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\044\060\042\006\003\125\004\003\023
\033\123\167\151\163\163\123\151\147\156\040\107\157\154\144\040
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\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\011\000\336\304\362\104\363\035\246\374
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\172\060\202\003\142\240\003\002\001\002\002\011\000
\336\304\362\104\363\035\246\374\060\015\006\011\052\206\110\206
\367\015\001\001\013\005\000\060\112\061\013\060\011\006\003\125
\004\006\023\002\103\110\061\025\060\023\006\003\125\004\012\023
\014\123\167\151\163\163\123\151\147\156\040\101\107\061\044\060
\042\006\003\125\004\003\023\033\123\167\151\163\163\123\151\147
\156\040\107\157\154\144\040\122\157\157\164\040\103\101\040\055
\040\107\063\060\036\027\015\060\071\060\070\060\064\061\063\063
\061\064\067\132\027\015\063\067\060\070\060\064\061\063\063\061
\064\067\132\060\112\061\013\060\011\006\003\125\004\006\023\002
\103\110\061\025\060\023\006\003\125\004\012\023\014\123\167\151
\163\163\123\151\147\156\040\101\107\061\044\060\042\006\003\125
\004\003\023\033\123\167\151\163\163\123\151\147\156\040\107\157
\154\144\040\122\157\157\164\040\103\101\040\055\040\107\063\060
\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001
\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000
\303\350\237\310\145\132\235\147\033\301\105\227\264\264\207\103
\133\141\140\200\236\362\177\136\371\147\104\335\104\372\253\265
\253\167\377\052\031\114\316\157\304\217\101\237\340\342\315\162
\340\321\324\122\141\101\011\012\277\012\160\373\340\203\151\141
\051\312\333\042\232\133\245\346\335\027\225\260\157\204\216\072
\076\144\132\101\373\033\130\374\375\053\076\262\244\346\254\311
\202\274\316\366\225\370\227\167\355\046\366\130\256\236\047\342
\017\203\354\305\066\130\310\173\317\325\207\241\251\207\032\023
\147\141\001\155\246\151\234\342\220\361\053\150\145\363\350\260
\174\374\202\075\336\255\330\012\000\011\104\171\023\234\360\376
\156\165\173\302\274\263\131\001\013\174\305\325\055\360\277\377
\155\127\322\111\201\353\264\263\120\254\133\371\013\025\025\214
\151\377\243\071\001\355\374\334\334\047\227\216\173\213\325\152
\246\326\340\035\137\315\001\221\346\365\042\230\272\056\011\030
\070\157\023\250\201\322\373\041\067\347\055\264\142\347\201\220
\260\306\171\131\267\147\165\376\276\217\073\372\066\354\257\255
\322\117\164\066\001\345\127\253\043\004\314\112\136\227\317\176
\306\357\214\314\225\043\151\215\313\070\307\031\366\326\212\000
\024\036\064\075\157\332\014\013\303\272\227\374\021\113\122\141
\076\277\063\147\123\020\277\170\033\011\302\107\272\036\257\130
\365\165\201\177\275\126\361\353\126\327\331\151\014\007\351\067
\061\260\022\034\062\357\126\331\276\172\053\174\275\323\075\274
\152\063\115\072\074\120\020\207\047\307\172\012\147\123\333\177
\200\233\350\236\043\372\371\010\072\213\241\216\064\132\110\063
\137\144\323\227\206\007\031\175\210\224\316\052\174\305\152\337

\257\274\251\237\315\072\246\272\273\124\371\177\217\337\317\016
\132\304\255\232\274\263\072\167\163\203\114\223\074\220\150\265
\174\120\225\021\310\202\136\224\161\320\101\030\373\311\306\145
\354\316\211\266\316\042\263\021\133\077\340\235\076\033\030\150
\015\252\003\241\147\131\277\153\235\274\370\362\145\057\232\101
\072\105\330\136\320\066\154\157\073\036\143\264\216\230\114\023
\333\041\016\237\173\355\352\240\252\161\303\353\243\240\322\045
\002\003\001\000\001\243\143\060\141\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\006\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035
\016\004\026\004\024\134\227\006\106\064\253\337\060\305\174\305
\015\125\161\146\060\265\140\217\236\060\037\006\003\125\035\043
\004\030\060\026\200\024\134\227\006\106\064\253\337\060\305\174
\305\015\125\161\146\060\265\140\217\236\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\003\202\002\001\000\167\113
\115\336\352\205\112\253\054\047\326\105\307\361\137\040\301\133
\140\355\007\313\242\063\334\066\317\307\224\361\006\307\325\332
\317\315\255\204\076\377\022\110\177\101\350\245\146\127\060\304
\035\344\247\032\057\055\102\301\357\106\163\262\325\365\132\375
\016\172\153\322\310\061\243\015\110\226\127\145\143\125\030\300
\374\344\212\314\230\206\133\253\014\212\047\067\372\043\150\131
\134\046\327\241\301\302\271\116\054\377\051\136\346\224\013\276
\315\162\117\225\350\217\366\367\270\076\136\316\317\236\021\311
\254\003\051\110\212\251\266\246\064\271\254\100\377\304\266\163
\067\261\307\177\251\121\333\113\052\107\137\100\044\007\210\006
\267\044\263\373\177\367\260\213\063\372\277\043\165\243\134\376
\252\145\032\302\276\361\175\201\167\003\201\261\215\327\225\015
\172\074\102\230\267\217\251\175\120\341\337\122\006\232\240\122
\124\170\203\007\141\122\011\067\136\212\234\247\306\121\321\134
\143\321\204\334\302\333\322\372\133\030\066\175\146\274\324\050
\227\057\165\226\034\204\007\254\213\216\123\021\276\044\041\252
\147\362\301\255\210\234\323\260\170\147\170\365\323\130\003\040
\012\135\040\361\265\347\145\314\016\040\343\325\337\346\057\031
\053\205\150\301\004\046\317\217\355\005\123\241\335\007\016\353
\101\046\307\264\251\054\133\343\151\075\146\300\142\033\300\252
\206\300\067\303\061\004\206\160\071\276\153\137\041\100\101\240
\177\345\331\017\070\113\160\137\111\370\205\270\053\056\252\037
\223\101\103\370\373\262\164\074\037\113\127\133\267\324\121\241
\222\112\316\276\020\242\356\330\024\042\173\271\101\275\215\351
\210\251\321\217\003\032\140\377\077\207\211\240\231\047\042\146
\260\076\150\236\162\210\121\070\235\023\076\105\155\005\345\106
\265\163\355\103\206\261\024\012\036\274\332\015\277\036\044\134
\146\217\016\276\241\375\306\353\151\274\103\171\327\003\166\371
\334\207\231\270\230\304\315\177\155\020\371\020\276\054\102\376
\234\051\115\203\153\012\275\265\216\304\110\212\375\041\007\246
\200\175\037\233\351\253\275\202\141\104\012\161\047\137\155\233
\220\236\256\377\066\044\263\150\003\326\225\214\153\163
END

```
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "SwissSign Gold Root CA - G3"
# Issuer: CN=SwissSign Gold Root CA - G3,O=SwissSign AG,C=CH
# Serial Number:de:c4:f2:44:f3:1d:a6:fc
# Subject: CN=SwissSign Gold Root CA - G3,O=SwissSign AG,C=CH
# Not Valid Before: Tue Aug 04 13:31:47 2009
# Not Valid After: Tue Aug 04 13:31:47 2037
# Fingerprint (MD5): c2:64:4c:e2:7d:eb:6c:7b:ec:36:e0:39:df:68:9c:67
# Fingerprint (SHA1): 0b:71:99:a1:c7:f3:ad:df:7b:a7:ea:b8:eb:57:4a:e8:0d:60:dd:de
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SwissSign Gold Root CA - G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\013\161\231\241\307\363\255\337\173\247\352\270\353\127\112\350
\015\140\335\336
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\302\144\114\342\175\353\154\173\354\066\340\071\337\150\234\147
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\044\060\042\006\003\125\004\003\023
\033\123\167\151\163\163\123\151\147\156\040\107\157\154\144\040
\122\157\157\164\040\103\101\040\055\040\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\011\000\336\304\362\104\363\035\246\374
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "SITHS CA v3"
# Issuer: CN=SITHS CA v3,O=Carelink,C=SE
# Serial Number:1b:d4:0e:d4:34:d1:da:15:a6:00:30:15:02:4d:a4:6c
# Subject: CN=SITHS CA v3,O=Carelink,C=SE
# Not Valid Before: Mon Nov 28 10:27:50 2005
```

# Not Valid After: Sat Nov 28 06:02:38 2015
# Fingerprint
 (MD5): 51:c6:bb:37:df:2c:7b:55:0f:84:d4:f3:68:5a:be:eb
# Fingerprint (SHA1): 16:d8:66:35:af:13:41:cd:34:79:94:45:eb:60:3e:27:37:02:96:5d
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SITHS CA v3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\066\061\013\060\011\006\003\125\004\006\023\002\123\105\061
\021\060\017\006\003\125\004\012\014\010\103\141\162\145\154\151
\156\153\061\024\060\022\006\003\125\004\003\014\013\123\111\124
\110\123\040\103\101\040\166\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\066\061\013\060\011\006\003\125\004\006\023\002\123\105\061
\021\060\017\006\003\125\004\012\014\010\103\141\162\145\154\151
\156\153\061\024\060\022\006\003\125\004\003\014\013\123\111\124
\110\123\040\103\101\040\166\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\033\324\016\324\064\321\332\025\246\000\060\025\002\115
\244\154
END
CKA_VALUE
 MULTILINE_OCTAL
\060\202\003\141\060\202\002\111\240\003\002\001\002\002\020\033
\324\016\324\064\321\332\025\246\000\060\025\002\115\244\154\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\066
\061\013\060\011\006\003\125\004\006\023\002\123\105\061\021\060
\017\006\003\125\004\012\014\010\103\141\162\145\154\151\156\153
\061\024\060\022\006\003\125\004\003\014\013\123\111\124\110\123
\040\103\101\040\166\063\060\036\027\015\060\065\061\061\062\070
\061\060\062\067\065\060\132\027\015\061\065\061\061\062\070\060
\066\060\062\063\070\132\060\066\061\013\060\011\006\003\125\004
\006\023\002\123\105\061\021\060\017\006\003\125\004\012\014\010
\103\141\162\145\154\151\156\153\061\024\060\022\006\003\125\004
\003\014\013\123\111\124\110\123\040\103\101\040\166\063\060\202
\001\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\001\017\000\060\202\001\012\002\202\001\001\000\305
\331\133\321\324\053\177\100\147\356\241\133\135\321\332\152\271
\031\061\362\360\046\111\001\145\374\101\124\361\226\221\354\052
\356\004\104\044\036\100\234\347\027\120\077\352\034\174\356\270
\067\071\374\307\323\257\233\156\135\337\076\276\005\374\352\312
\331\371\105\126\341\225\234\261\320\132\217\376\310\052\246\327

\152\154\340\155\135\354\134\166\376\341\231\107\232\251\173\247
\352\346\157\124\002\047\115\121\116\050\075\254\006\072\201\202
\246\034\275\113\244\355\122\022\334\212\052\353\047\364\301\042
\112\020\204\132\165\265\200\042\126\145\353\314\200\362\245\341
\144\276\174\336\017\275\047\007\114\051\133\252\261\357\264\173
\377\207\064\350\243\223\102\313\075\140\273\167\323\302\057\136
\024\370\163\157\244\177\240\234\001\325\325\251\273\014\127\217
\314\300\073\221\170\236\222\071\171\062\114\104\177\307\013\175
\336\372\314\176\332\314\336\015\324\146\266\142\246\063\277\154
\371\325\335\107\122\160\224\313\145\340\105\267\015\327\257\225
\110\327\101\243\073\040\120\015\074\024\125\223\314\352\015\002
\003\001\000\001\243\153\060\151\060\022\006\003\125\035\023\001
\001\377\004\010\060\006\001\001\377\002\001\000\060\021\006\011
\140\206\110\001\206\370\102\001\001\004\004\003\002\002\004\060
\024\006\003\125\035\040\004\015\060\013\060\011\006\007\052\205
\160\112\001\001\003\060\013\006\003\125\035\017\004\004\003\002
\001\006\060\035\006\003\125\035\016\004\026\004\024\174\056\071
\043\062\104\350\017\116\146\362\015\050\376\100\276\302\266\342
\240\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000
\003\202\001\001\000\010\123\132\210\051\015\365\124\330\253\261
\203\271\047\151\132\252\137\053\130\111\324\271\337\157\353\307
\006\353\375\207\232\277\312\022\337\172\236\001\042\045\143\122
\205\157\247\057\016\227\164\140\214\340\110\200\163\335\102\215
\041\355\017\162\177\164\006\156\120\126\073\055\207\354\201\130
\213\066\307\312\000\373\244\004\266\057\070\130\216\167\361\006
\304\055\054\047\055\030\202\013\212\137\042\224\024\025\143\070
\306\245\261\272\340\254\276\076\046\077\221\273\034\203\374\016
\312\311\067\276\067\327\360\173\363\214\330\274\220\013\364\000
\277\124\274\152\112\130\347\312\133\014\031\123\102\007\225\127
\065\270\117\226\123\232\250\230\335\116\175\125\264\234\343\272
\300\066\271\267\334\002\230\370\366\345\060\276\054\167\262\363
\311\342\002\243\346\367\104\174\326\152\177\320\170\276\071\163
\370\013\302\037\122\000\016\115\173\306\012\356\142\313\011\325
\017\012\060\207\202\223\274\312\021\244\037\011\372\372\067\120
\354\073\342\074\044\240\200\050\314\373\246\335\357\067\232\251
\061\335\337\352\121
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "SITHS CA v3"
# Issuer: CN=SITHS CA v3,O=Carelink,C=SE
# Serial Number:1b:d4:0e:d4:34:d1:da:15:a6:00:30:15:02:4d:a4:6c
# Subject: CN=SITHS CA v3,O=Carelink,C=SE
# Not Valid Before: Mon Nov 28 10:27:50 2005

```
# Not Valid After: Sat Nov 28 06:02:38
 2015
# Fingerprint (MD5): 51:c6:bb:37:df:2c:7b:55:0f:84:d4:f3:68:5a:be:eb
# Fingerprint (SHA1): 16:d8:66:35:af:13:41:cd:34:79:94:45:eb:60:3e:27:37:02:96:5d
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SITHS CA v3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\026\330\146\065\257\023\101\315\064\171\224\105\353\140\076\047
\067\002\226\135
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\121\306\273\067\337\054\173\125\017\204\324\363\150\132\276\353
END
CKA_ISSUER MULTILINE_OCTAL
\060\066\061\013\060\011\006\003\125\004\006\023\002\123\105\061
\021\060\017\006\003\125\004\012\014\010\103\141\162\145\154\151
\156\153\061\024\060\022\006\003\125\004\003\014\013\123\111\124
\110\123\040\103\101\040\166\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\033\324\016\324\064\321\332\025\246\000\060\025\002\115
\244\154
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST
 CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Certinomis - Autorité Racine"
# Issuer: CN=Certinomis - Autorité Racine,OU=0002 433998903,O=Certinomis,C=FR
# Serial Number: 1 (0x1)
# Subject: CN=Certinomis - Autorité Racine,OU=0002 433998903,O=Certinomis,C=FR
# Not Valid Before: Wed Sep 17 08:28:59 2008
# Not Valid After: Sun Sep 17 08:28:59 2028
# Fingerprint (MD5): 7f:30:78:8c:03:e3:ca:c9:0a:e2:c9:ea:1e:aa:55:1a
# Fingerprint (SHA1): 2e:14:da:ec:28:f0:fa:1e:8e:38:9a:4e:ab:eb:26:c0:0a:d3:83:c3
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certinomis - Autorité Racine"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
```

\060\143\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\023\060\021\006\003\125\004\012\023\012\103\145\162\164\151\156
\157\155\151\163\061\027\060\025\006\003\125\004\013\023\016\060
\060\060\062\040\064\063\063\071\071\070\071\060\063\061\046\060
\044\006\003\125\004\003\014\035\103\145\162\164\151\156\157\155
\151\163\040\055\040\101\165\164\157\162\151\164\303\251\040\122
\141\143\151\156\145
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\023\060\021\006\003\125\004\012\023\012\103\145\162\164\151\156
\157\155\151\163\061\027\060\025\006\003\125\004\013\023\016\060
\060\060\062\040\064\063\063\071\071\070\071\060\063\061\046\060
\044\006\003\125\004\003\014\035\103\145\162\164\151\156\157\155
\151\163\040\055\040\101\165\164\157\162\151\164\303\251\040\122
\141\143\151\156\145
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\234\060\202\003\204\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\143\061\013\060\011\006\003\125\004\006\023\002\106\122\061\023
\060\021\006\003\125\004\012\023\012\103\145\162\164\151\156\157
\155\151\163\061\027\060\025\006\003\125\004\013\023\016\060\060
\060\062\040\064\063\063\071\071\070\071\060\063\061\046\060\044
\006\003\125\004\003\014\035\103\145\162\164\151\156\157\155\151
\163\040\055\040\101\165\164\157\162\151\164\303\251\040\122\141
\143\151\156\145\060\036\027\015\060\070\060\071\061\067\060\070
\062\070\065\071\132\027\015\062\070\060\071\061\067\060\070\062
\070\065\071\132\060\143\061\013\060\011\006\003\125\004\006\023
\002\106\122\061\023\060\021\006\003\125\004\012\023\012\103\145
\162\164\151\156\157\155\151\163\061\027\060\025\006\003\125\004
\013\023\016\060\060\060\062\040\064\063\063\071\071\070\071\060
\063\061\046\060\044\006\003\125\004\003\014\035\103\145\162\164
\151\156\157\155\151\163\040\055\040\101\165\164\157\162\151\164
\303\251\040\122\141\143\151\156\145\060\202\002\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017
\000\060\202\002\012\002\202\002\001\000\235\205\237\206\323\343
\257\307\262\153\156\063\340\236\267\102\064\125\235\371\201\276
\143\330\043\166\016\227\124\315\231\114\032\361\071\307\210\330
\027\120\014\236\141\332\300\116\125\336\347\132\270\172\116\167
\207\015\345\270\353\372\236\136\173\036\304\317\050\164\307\223
\365\024\306\042\050\004\371\221\303\253\047\163\152\016\056\115
\363\056\050\037\160\337\125\057\116\355\307\161\157\011\162\056

\355\325\062\227\320\361\130\167\321\140\274\116\136\333\232\204
\366\107\141\105\053\366\120\246\177\152\161\047\110\204\065\236
\254\376\151\251\236\172\136\065\045\372\264\247\111\065\167\226
\247\066\133\341\315\337\043\160\330\135\114\245\010\203\361\246
\044\070\023\250\354\057\250\241\147\307\246\055\206\107\356\212
\374\354\233\016\164\364\053\111\002\173\220\165\214\374\231\071
\001\071\326\112\211\345\236\166\253\076\226\050\070\046\213\335
\215\214\300\366\001\036\157\245\061\022\070\175\225\302\161\356
\355\164\256\344\066\242\103\165\325\361\000\233\342\344\327\314
\102\003\113\170\172\345\175\273\270\256\056\040\223\323\344\141
\337\161\341\166\147\227\077\266\337\152\163\132\144\042\345\102
\333\317\201\003\223\330\364\343\020\340\162\366\000\160\254\360
\301\172\017\005\177\317\064\151\105\265\223\344\031\333\122\026
\043\005\211\016\215\110\344\045\157\263\170\277\142\365\007\372
\225\044\302\226\262\350\243\043\302\135\003\374\303\323\345\174
\311\165\043\327\364\365\274\336\344\337\315\200\277\221\210\175
\247\023\264\071\272\054\272\275\321\153\314\363\245\050\355\104
\236\175\122\243\157\226\056\031\176\034\363\133\307\026\216\273
\140\175\167\146\107\124\202\000\021\140\154\062\301\250\070\033
\353\156\230\023\326\356\070\365\360\237\016\357\376\061\201\301
\322\044\225\057\123\172\151\242\360\017\206\105\216\130\202\053
\114\042\324\136\240\347\175\046\047\110\337\045\106\215\112\050
\174\206\236\371\233\032\131\271\145\277\005\335\266\102\135\075
\346\000\110\202\136\040\367\021\202\336\312\330\237\346\067\107
\046\036\353\170\367\141\303\101\144\130\002\101\371\332\340\321
\370\371\350\375\122\070\266\365\211\337\002\003\001\000\001\243
\133\060\131\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\035\006\003\125\035\016\004\026\004\024\015
\214\266\141\332\104\270\321\024\175\303\276\175\136\110\360\316
\312\152\260\060\027\006\003\125\035\040\004\020\060\016\060\014
\006\012\052\201\172\001\126\002\002\000\001\001\060\015\006\011
\052\206\110\206\367\015\001\001\005\005\000\003\202\002\001\000
\044\076\140\006\176\035\357\072\076\333\352\257\034\232\054\001
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\242\375\377\342\006\310\071\237\361\132\251\335\042\130\025\250
\212\323\261\346\062\011\202\003\154\327\077\010\307\370\271\272
\000\155\271\326\374\122\062\135\244\177\244\061\224\273\266\114
\070\177\050\060\065\377\237\043\123\267\266\356\024\160\000\100
\053\332\107\253\064\176\136\247\126\060\141\053\213\103\254\375
\266\210\050\365\153\266\076\140\112\272\102\220\064\147\215\352
\353\137\105\124\073\027\254\213\344\306\145\017\356\320\214\135
\146\071\316\062\247\330\020\227\300\176\064\234\237\224\363\366
\206\037\317\033\163\255\224\171\207\150\160\303\063\245\160\347
\330\325\070\224\157\143\171\353\277\012\016\010\347\305\057\017
\102\240\053\024\100\377\041\340\005\305\047\341\204\021\023\272
\326\206\035\101\013\023\043\211\323\311\013\350\212\272\172\243
\243\163\067\065\200\175\022\270\063\167\100\070\300\372\136\060

\322\362\266\243\261\326\242\225\227\201\233\122\355\151\114\377
\200\344\123\333\124\133\003\155\124\137\261\270\357\044\275\157
\237\021\303\307\144\302\017\050\142\205\146\136\032\173\262\267
\357\256\065\311\031\063\250\270\047\333\063\125\277\150\341\165
\110\104\126\373\315\323\110\273\107\211\072\254\151\365\200\306
\344\104\120\057\124\304\252\103\305\061\061\130\275\226\305\352
\165\154\232\165\261\115\370\367\227\377\226\026\362\227\115\350
\366\363\021\371\072\175\212\070\156\004\313\341\323\105\025\252
\245\321\035\235\135\143\350\044\346\066\024\342\207\255\033\131
\365\104\233\373\327\167\174\037\001\160\142\241\040\032\242\305
\032\050\364\041\003\356\056\331\301\200\352\271\331\202\326\133
\166\302\313\073\265\322\000\360\243\016\341\255\156\100\367\333
\240\264\320\106\256\025\327\104\302\115\065\371\322\013\362\027
\366\254\146\325\044\262\117\321\034\231\300\156\365\175\353\164
\004\270\371\115\167\011\327\264\317\007\060\011\361\270\000\126
\331\027\026\026\012\053\206\337\217\001\031\032\345\273\202\143
\377\276\013\166\026\136\067\067\346\330\164\227\242\231\105\171
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Certinomis - Autorité Racine"
# Issuer: CN=Certinomis - Autorité Racine,OU=0002 433998903,O=Certinomis,C=FR
#
 Serial Number: 1 (0x1)
# Subject: CN=Certinomis - Autorité Racine,OU=0002 433998903,O=Certinomis,C=FR
# Not Valid Before: Wed Sep 17 08:28:59 2008
# Not Valid After: Sun Sep 17 08:28:59 2028
# Fingerprint (MD5): 7f:30:78:8c:03:e3:ca:c9:0a:e2:c9:ea:1e:aa:55:1a
# Fingerprint (SHA1): 2e:14:da:ec:28:f0:fa:1e:8e:38:9a:4e:ab:eb:26:c0:0a:d3:83:c3
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certinomis - Autorité Racine"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\056\024\332\354\050\360\372\036\216\070\232\116\253\353\046\300
\012\323\203\303
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\177\060\170\214\003\343\312\311\012\342\311\352\036\252\125\032
END
CKA_ISSUER MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\023\060\021\006\003\125\004\012\023\012\103\145\162\164\151\156

\157\155\151\163\061\027\060\025\006\003\125\004\013\023\016\060
\060\060\062\040\064\063\063\071\071\070\071\060\063\061\046\060
\044\006\003\125\004\003\014\035\103\145\162\164\151\156\157\155
\151\163\040\055\040\101\165\164\157\162\151\164\303\251\040\122
\141\143\151\156\145
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "ANF Server CA"
# Issuer: CN=ANF Server CA,2.5.4.5=G63287510,OU=ANF Clase 1 CA,O=ANF Autoridad de Certificación,L=Barcelona (see current address at https://www.anf.es/address/),ST=Barcelona,C=ES
# Serial Number: 78923 (0x1344b)
# Subject: CN=ANF Server CA,2.5.4.5=G63287510,OU=ANF Clase 1 CA,O=ANF Autoridad de Certificación,L=Barcelona (see current address at https://www.anf.es/address/),ST=Barcelona,C=ES
# Not Valid Before: Mon Nov 30 23:00:00 2009
# Not Valid After: Tue
Nov 30 23:00:00 2021
# Fingerprint (MD5): 8c:18:ed:28:bf:45:19:e6:49:98:e1:35:22:2f:54:c6
# Fingerprint (SHA1): ce:a9:89:0d:85:d8:07:53:a6:26:28:6c:da:d7:8c:b5:66:d7:0c:f2
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ANF Server CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\331\061\013\060\011\006\003\125\004\006\023\002\105\123
\061\022\060\020\006\003\125\004\010\014\011\102\141\162\143\145
\154\157\156\141\061\107\060\105\006\003\125\004\007\014\076\102
\141\162\143\145\154\157\156\141\040\050\163\145\145\040\143\165
\162\162\145\156\164\040\141\144\144\162\145\163\163\040\141\164
\040\150\164\164\160\163\072\057\057\167\167\167\056\141\156\146
\056\145\163\057\141\144\144\162\145\163\163\057\051\061\050\060
\046\006\003\125\004\012\014\037\101\116\106\040\101\165\164\157
\162\151\144\141\144\040\144\145\040\103\145\162\164\151\146\151
\143\141\143\151\303\263\156\061\027\060\025\006\003\125\004\013
\014\016\101\116\106\040\103\154\141\163\145\040\061\040\103\101
\061\022\060\020\006\003\125\004\005\023\011\107\066\063\062\070
\067\065\061\060\061\026\060\024\006\003\125\004\003\014\015\101
\116\106\040\123\145\162\166\145\162\040\103\101

END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\331\061\013\060\011\006\003\125\004\006\023\002\105\123
\061\022\060\020\006\003\125\004\010\014\011\102\141\162\143\145
\154\157\156\141\061\107\060\105\006\003\125\004\007\014\076\102
\141\162\143\145\154\157\156\141\040\050\163\145\145\040\143\165
\162\162\145\156\164\040\141\144\144\162\145\163\163\040\141\164
\040\150\164\164\160\163\072\057\057\167\167\167\056\141\156\146
\056\145\163\057\141\144\144\162\145\163\163\057\051\061\050\060
\046\006\003\125\004\012\014\037\101\116\106\040\101\165\164\157
\162\151\144\141\144\040\144\145\040\103\145\162\164\151\146\151
\143\141\143\151\303\263\156\061\027\060\025\006\003\125\004\013
\014\016\101\116\106\040\103\154\141\163\145\040\061\040\103\101
\061\022\060\020\006\003\125\004\005\023\011\107\066\063\062\070
\067\065\061\060\061\026\060\024\006\003\125\004\003\014\015\101
\116\106\040\123\145\162\166\145\162\040\103\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\003\001\064\113
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\235\060\202\005\205\240\003\002\001\002\002\003\001
\064\113\060\015\006\011\052\206\110\206\367\015\001\001\005\005
\000\060\201\331\061\013\060\011\006\003\125\004\006\023\002\105
\123\061\022\060\020\006\003\125\004\010\014\011\102\141\162\143
\145\154\157\156\141\061\107\060\105\006\003\125\004\007\014\076
\102\141\162\143\145\154\157\156\141\040\050\163\145\145\040\143
\165\162\162\145\156\164\040\141\144\144\162\145\163\163\040\141
\164\040\150\164\164\160\163\072\057\057\167\167\167\056\141\156
\146\056\145\163\057\141\144\144\162\145\163\163\057\051\061\050
\060\046\006\003\125\004\012\014\037\101\116\106\040\101\165\164
\157\162\151\144\141\144\040\144\145\040\103\145\162\164\151\146
\151\143\141\143\151\303\263\156\061\027\060\025\006\003\125\004
\013\014\016\101\116\106\040\103\154\141\163\145\040\061\040\103
\101\061\022\060\020\006\003\125\004\005\023\011\107\066\063\062
\070\067\065\061\060\061\026\060\024\006\003\125\004\003\014\015
\101\116\106\040\123\145\162\166\145\162\040\103\101\060\036\027
\015\060\071\061\061\063\060\062\063\060\060\060\060\132\027\015
\062\061\061\061\063\060\062\063\060\060\060\060\132\060\201\331
\061\013\060\011\006\003\125\004\006\023\002\105\123\061\022\060
\020\006\003\125\004\010\014\011\102\141\162\143\145\154\157\156
\141\061\107\060\105\006\003\125\004\007\014\076\102\141\162\143
\145\154\157\156\141\040\050\163\145\145\040\143\165\162\162\145
\156\164\040\141\144\144\162\145\163\163\040\141\164\040\150\164
\164\160\163\072\057\057\167\167\167\056\141\156\146\056\145\163

\057\141\144\144\162\145\163\163\057\051\061\050\060\046\006\003
\125\004\012\014\037\101\116\106\040\101\165\164\157\162\151\144
\141\144\040\144\145\040\103\145\162\164\151\146\151\143\141\143
\151\303\263\156\061\027\060\025\006\003\125\004\013\014\016\101
\116\106\040\103\154\141\163\145\040\061\040\103\101\061\022\060
\020\006\003\125\004\005\023\011\107\066\063\062\070\067\065\061
\060\061\026\060\024\006\003\125\004\003\014\015\101\116\106\040
\123\145\162\166\145\162\040\103\101\060\202\001\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017
\000\060\202\001\012\002\202\001\001\000\277\352\110\247\232\210
\071\153\054\110\100\007\004\223\174\367\270\055\176\245\067\342
\141\326\041\374\220\067\313\151\076\136\213\067\337\133\157\073
\330\266\303\210\100\220\364\235\014\134\020\122\261\263\345\137
\221\020\346\375\250\200\024\137\323\213\275\134\275\017\043\222
\011\067\343\162\322\146\224\013\134\164\224\057\136\362\116\330
\003\306\263\316\126\245\034\331\173\375\117\007\114\324\267\332
\137\051\115\165\362\037\125\317\062\043\034\106\011\047\035\105
\354\361\214\064\211\336\173\026\247\103\136\212\053\351\224\103
\036\327\076\223\155\157\211\075\274\356\261\310\267\377\311\175
\343\137\015\157\167\170\365\052\056\215\304\213\230\227\060\261
\106\132\013\143\160\324\170\307\206\263\177\377\047\102\252\237
\212\156\155\241\224\312\354\207\002\034\326\124\113\375\274\211
\233\246\143\070\146\214\026\211\211\227\303\120\350\366\102\001
\247\167\175\020\031\222\003\350\135\105\310\025\305\207\033\015
\221\362\306\071\234\173\363\300\012\231\370\356\203\157\176\102
\167\021\216\303\037\034\162\057\075\033\002\003\001\000\001\243
\202\002\152\060\202\002\146\060\035\006\003\125\035\016\004\026
\004\024\276\073\366\264\061\267\163\044\110\071\305\127\023\224
\165\252\237\201\077\054\060\202\001\011\006\003\125\035\043\004
\202\001\000\060\201\375\200\024\276\073\366\264\061\267\163\044
\110\071\305\127\023\224\165\252\237\201\077\054\241\201\337\244
\201\334\060\201\331\061\013\060\011\006\003\125\004\006\023\002
\105\123\061\022\060\020\006\003\125\004\010\014\011\102\141\162
\143\145\154\157\156\141\061\107\060\105\006\003\125\004\007\014
\076\102\141\162\143\145\154\157\156\141\040\050\163\145\145\040
\143\165\162\162\145\156\164\040\141\144\144\162\145\163\163\040
\141\164\040\150\164\164\160\163\072\057\057\167\167\167\056\141
\156\146\056\145\163\057\141\144\144\162\145\163\163\057\051\061
\050\060\046\006\003\125\004\012\014\037\101\116\106\040\101\165
\164\157\162\151\144\141\144\040\144\145\040\103\145\162\164\151
\146\151\143\141\143\151\303\263\156\061\027\060\025\006\003\125
\004\013\014\016\101\116\106\040\103\154\141\163\145\040\061\040
\103\101\061\022\060\020\006\003\125\004\005\023\011\107\066\063
\062\070\067\065\061\060\061\026\060\024\006\003\125\004\003\014
\015\101\116\106\040\123\145\162\166\145\162\040\103\101\202\003
\001\064\113\060\014\006\003\125\035\023\004\005\060\003\001\001
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\006\060\061\006\012\053\006\001\004\001\201\217\034\052\006\004

\043\033\041\150\164\164\160\163\072\057\057\167\167\167\056\141
\156\146\056\145\163\057\101\103\057\101\103\124\101\123\057\067
\070\071\062\063\060\030\006\012\053\006\001\004\001\201\217\034
\023\001\004\012\033\010\070\060\061\055\063\064\060\060\060\070
\006\010\053\006\001\005\005\007\001\001\004\054\060\052\060\050
\006\010\053\006\001\005\005\007\060\001\206\034\150\164\164\160
\072\057\057\167\167\167\056\141\156\146\056\145\163\057\101\103
\057\122\103\057\157\143\163\160\060\143\006\003\125\035\037\004
\134\060\132\060\053\240\051\240\047\206\045\150\164\164\160\163
\072\057\057\167\167\167\056\141\156\146\056\145\163\057\101\103
\057\101\116\106\123\145\162\166\145\162\103\101\056\143\162\154
\060\053\240\051\240\047\206\045\150\164\164\160\163\072\057\057
\143\162\154\056\141\156\146\056\145\163\057\101\103\057\101\116
\106\123\145\162\166\145\162\103\101\056\143\162\154\060\026\006
\003\125\035\022\004\017\060\015\201\013\151\156\146\157\100\141
\156\146\056\145\163\060\026\006\003\125\035\021\004\017\060\015
\201\013\151\156\146\157\100\141\156\146\056\145\163\060\015\006
\011\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001
\000\265\306\307\274\106\372\102\134\023\301\224\165\063\126\277
\057\247\007\163\354\067\343\103\164\352\371\146\117\136\215\177
\360\346\171\303\115\365\331\070\245\314\312\103\364\123\200\206
\277\274\320\021\135\220\304\302\100\107\353\305\207\223\301\266
\170\136\232\256\207\365\142\020\131\114\114\155\006\276\231\023
\025\263\263\372\034\162\176\340\042\041\001\130\065\070\150\242
\344\370\341\360\360\066\120\221\340\264\167\334\143\204\063\222
\140\270\313\026\362\322\143\073\114\134\065\072\347\254\002\123
\305\034\201\001\167\307\034\021\037\124\060\357\124\217\045\372
\211\047\224\064\243\017\024\117\157\351\163\331\030\142\347\356
\010\350\311\203\173\310\063\233\174\104\232\174\032\220\265\322
\161\211\337\075\364\034\117\116\121\340\311\153\266\252\013\036
\331\060\017\323\143\325\355\160\364\301\203\355\006\105\232\250
\352\264\211\067\375\132\067\107\357\221\171\247\065\377\360\334
\060\355\015\024\147\333\174\132\340\217\155\063\376\074\236\025
\063\303\303\055\016\135\252\174\015\216\061\226\115\213\377\005
\325
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "ANF Server CA"
# Issuer: CN=ANF Server CA,2.5.4.5=G63287510,OU=ANF Clase 1 CA,O=ANF Autoridad de Certificación,L=Barcelona (see current address at https://www.anf.es/address/),ST=Barcelona,C=ES
# Serial Number: 78923 (0x1344b)
# Subject: CN=ANF Server CA,2.5.4.5=G63287510,OU=ANF Clase 1 CA,O=ANF Autoridad de Certificación,L=Barcelona (see current address at https://www.anf.es/address/),ST=Barcelona,C=ES

```
# Not Valid Before: Mon Nov 30 23:00:00 2009
# Not Valid After: Tue Nov 30 23:00:00 2021
# Fingerprint (MD5): 8c:18:ed:28:bf:45:19:e6:49:98:e1:35:22:2f:54:c6
#
 Fingerprint (SHA1): ce:a9:89:0d:85:d8:07:53:a6:26:28:6c:da:d7:8c:b5:66:d7:0c:f2
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ANF Server CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\316\251\211\015\205\330\007\123\246\046\050\154\332\327\214\265
\146\327\014\362
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\214\030\355\050\277\105\031\346\111\230\341\065\042\057\124\306
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\331\061\013\060\011\006\003\125\004\006\023\002\105\123
\061\022\060\020\006\003\125\004\010\014\011\102\141\162\143\145
\154\157\156\141\061\107\060\105\006\003\125\004\007\014\076\102
\141\162\143\145\154\157\156\141\040\050\163\145\145\040\143\165
\162\162\145\156\164\040\141\144\144\162\145\163\163\040\141\164
\040\150\164\164\160\163\072\057\057\167\167\167\056\141\156\146
\056\145\163\057\141\144\144\162\145\163\163\057\051\061\050\060
\046\006\003\125\004\012\014\037\101\116\106\040\101\165\164\157
\162\151\144\141\144\040\144\145\040\103\145\162\164\151\146\151
\143\141\143\151\303\263\156\061\027\060\025\006\003\125\004\013
\014\016\101\116\106\040\103\154\141\163\145\040\061\040\103\101
\061\022\060\020\006\003\125\004\005\023\011\107\066\063\062\070
\067\065\061\060\061\026\060\024\006\003\125\004\003\014\015\101
\116\106\040\123\145\162\166\145\162\040\103\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\003\001\064\113
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "KEYNECTIS ROOT CA"
# Issuer: CN=KEYNECTIS ROOT CA,OU=ROOT,O=KEYNECTIS,C=FR
# Serial Number:11:21:bc:27:6c:55:47:af:58:4e:ef:d4:ce:d6:29:b2:a2:85
# Subject: CN=KEYNECTIS ROOT CA,OU=ROOT,O=KEYNECTIS,C=FR
# Not Valid Before: Tue May 26 00:00:00 2009
```

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# Not Valid After: Tue
 May 26 00:00:00 2020
# Fingerprint (MD5): cc:4d:ae:fb:30:6b:d8:38:fe:50:eb:86:61:4b:d2:26
# Fingerprint (SHA1): 9c:61:5c:4d:4d:85:10:3a:53:26:c2:4d:ba:ea:e4:a2:d2:d5:cc:97
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "KEYNECTIS ROOT CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\114\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\023\011\113\105\131\116\105\103
\124\111\123\061\015\060\013\006\003\125\004\013\023\004\122\117
\117\124\061\032\060\030\006\003\125\004\003\023\021\113\105\131
\116\105\103\124\111\123\040\122\117\117\124\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\023\011\113\105\131\116\105\103
\124\111\123\061\015\060\013\006\003\125\004\013\023\004\122\117
\117\124\061\032\060\030\006\003\125\004\003\023\021\113\105\131
\116\105\103\124\111\123\040\122\117\117\124\040\103\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\022\021\041\274\047\154\125\107\257\130\116\357\324\316\326
\051\262\242\205
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\345\060\202\002\315\240\003\002\001\002\002\022\021
\041\274\047\154\125\107\257\130\116\357\324\316\326\051\262\242
\205\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000
\060\114\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\023\011\113\105\131\116\105\103
\124\111\123\061\015\060\013\006\003\125\004\013\023\004\122\117
\117\124\061\032\060\030\006\003\125\004\003\023\021\113\105\131
\116\105\103\124\111\123\040\122\117\117\124\040\103\101\060\036
\027\015\060\071\060\065\062\066\060\060\060\060\060\060\132\027
\015\062\060\060\065\062\066\060\060\060\060\060\060\132\060\114
\061\013\060\011\006\003\125\004\006\023\002\106\122\061\022\060
\020\006\003\125\004\012\023\011\113\105\131\116\105\103\124\111
\123\061\015\060\013\006\003\125\004\013\023\004\122\117\117\124
\061\032\060\030\006\003\125\004\003\023\021\113\105\131\116\105
\103\124\111\123\040\122\117\117\124\040\103\101\060\202\001\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\001\017\000\060\202\001\012\002\202\001\001\000\306\375\263
```

\027\205\241\255\046\033\225\151\065\041\075\244\210\372\336\333
\140\066\100\027\151\302\024\143\373\270\331\302\164\025\067\056
\234\320\040\315\151\215\204\062\242\205\114\024\264\233\362\045
\263\124\052\203\077\055\276\017\363\073\144\321\377\240\120\357
\167\117\073\116\341\077\013\144\205\232\272\130\176\322\303\142
\323\144\045\242\324\262\227\074\167\135\143\052\063\222\374\315
\202\015\233\124\225\207\365\265\353\214\315\133\321\312\060\057
\311\210\106\265\315\015\021\264\030\217\356\321\241\076\135\025
\350\050\317\337\303\220\233\154\314\321\014\105\167\263\072\353
\212\220\035\351\257\144\152\211\173\251\075\103\164\372\344\147
\042\241\373\334\115\304\365\142\311\312\045\264\311\200\140\063
\251\335\173\240\002\277\226\045\012\136\311\137\051\173\264\027
\201\213\155\201\031\320\331\203\134\005\217\101\151\032\151\103
\200\237\250\257\340\351\214\221\213\047\053\242\046\140\315\017
\362\244\243\002\203\216\030\201\302\027\212\103\025\371\155\363
\035\020\244\132\234\104\141\043\041\172\330\373\321\002\003\001
\000\001\243\201\300\060\201\275\060\022\006\003\125\035\023\001
\001\377\004\010\060\006\001\001\377\002\001\004\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\127\006\003
\125\035\037\004\120\060\116\060\114\240\112\240\110\206\106\150
\164\164\160\072\057\057\164\162\165\163\164\143\145\156\164\145
\162\055\143\162\154\056\143\145\162\164\151\146\151\143\141\164
\062\056\143\157\155\057\113\145\171\156\145\143\164\151\163\057
\113\105\131\116\105\103\124\111\123\137\122\117\117\124\137\103
\101\056\143\162\154\060\035\006\003\125\035\016\004\026\004\024
\357\267\043\227\320\250\221\177\246\317\246\041\300\064\237\314
\167\101\341\320\060\037\006\003\125\035\043\004\030\060\026\200
\024\357\267\043\227\320\250\221\177\246\317\246\041\300\064\237
\314\167\101\341\320\060\015\006\011\052\206\110\206\367\015\001
\001\013\005\000\003\202\001\001\000\032\061\151\231\102\302\345
\100\205\242\237\222\303\143\324\217\041\071\250\031\041\376\172
\374\303\115\100\363\053\350\113\254\133\114\131\223\306\334\176
\013\257\174\137\225\205\153\275\307\157\272\301\276\370\306\072
\147\113\223\306\005\151\076\044\055\360\033\221\306\076\077\354
\102\030\223\154\003\044\212\156\371\040\147\053\174\155\253\064
\311\052\042\063\015\327\175\217\356\322\066\144\102\310\065\232
\156\031\141\313\215\147\360\150\247\320\044\005\346\303\027\272
\105\256\174\103\265\200\170\003\115\040\163\005\374\103\020\235
\065\151\102\165\224\045\202\053\246\073\220\030\336\301\251\257
\363\055\225\277\225\247\317\030\227\341\131\342\242\257\032\026
\141\015\367\023\161\123\223\067\375\074\257\000\035\154\213\024
\257\106\226\214\266\122\174\314\055\116\315\341\351\113\012\356
\232\376\172\230\347\051\272\033\332\034\272\334\153\315\004\016
\046\100\251\353\163\074\376\120\250\021\047\125\275\333\216\113
\357\117\030\355\025\377\275\206\230\146\356\232\045\161\064\154
\120\361\262\121\313\146\235\115\051
END
CKA_NSS_MOZILLA_CA_POLICY

```
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "KEYNECTIS ROOT CA"
# Issuer: CN=KEYNECTIS ROOT CA,OU=ROOT,O=KEYNECTIS,C=FR
# Serial Number:11:21:bc:27:6c:55:47:af:58:4e:ef:d4:ce:d6:29:b2:a2:85
# Subject: CN=KEYNECTIS ROOT CA,OU=ROOT,O=KEYNECTIS,C=FR
# Not Valid Before: Tue May 26 00:00:00 2009
# Not Valid After: Tue May 26 00:00:00 2020
# Fingerprint (MD5): cc:4d:ae:fb:30:6b:d8:38:fe:50:eb:86:61:4b:d2:26
# Fingerprint (SHA1): 9c:61:5c:4d:4d:85:10:3a:53:26:c2:4d:ba:ea:e4:a2:d2:d5:cc:97
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN
 CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "KEYNECTIS ROOT CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\234\141\134\115\115\205\020\072\123\046\302\115\272\352\344\242
\322\325\314\227
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\314\115\256\373\060\153\330\070\376\120\353\206\141\113\322\046
END
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\022\060\020\006\003\125\004\012\023\011\113\105\131\116\105\103
\124\111\123\061\015\060\013\006\003\125\004\013\023\004\122\117
\117\124\061\032\060\030\006\003\125\004\003\023\021\113\105\131
\116\105\103\124\111\123\040\122\117\117\124\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\022\021\041\274\047\154\125\107\257\130\116\357\324\316\326
\051\262\242\205
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED
 CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "I.CA - Standard Certification Authority, 09/2009"
# Issuer: OU=I.CA - Provider of Certification Services,O=První certifikaní autorita\, a.s.,CN=I.CA - Standard
Certification Authority\, 09/2009,C=CZ
# Serial Number:16:e3:60
```

# Subject: OU=I.CA - Provider of Certification Services,O=První certifikaní autorita\, a.s.,CN=I.CA - Standard Certification Authority\, 09/2009,C=CZ
# Not Valid Before: Tue Sep 01 00:00:00 2009
# Not Valid After: Sun Sep 01 00:00:00 2019
# Fingerprint (MD5): 86:ef:8e:31:9d:9f:85:69:a2:a4:1a:12:71:68:ba:1b
# Fingerprint (SHA1): 90:de:ce:77:f8:c8:25:34:0e:62:eb:d6:35:e1:be:20:cf:73:27:dd
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "I.CA - Standard Certification Authority, 09/2009"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\253\061\013\060\011\006\003\125\004\006\023\002\103\132
\061\071\060\067\006\003\125\004\003\014\060\111\056\103\101\040
\055\040\123\164\141\156\144\141\162\144\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\054\040\060\071\057\062\060\060\071\061\055\060\053\006
\003\125\004\012\014\044\120\162\166\156\303\255\040\143\145\162
\164\151\146\151\153\141\304\215\156\303\255\040\141\165\164\157
\162\151\164\141\054\040\141\056\163\056\061\062\060\060\006\003
\125\004\013\014\051\111\056\103\101\040\055\040\120\162\157\166
\151\144\145\162\040\157\146\040\103\145\162\164\151\146\151\143
\141\164\151\157\156\040\123\145\162\166\151\143\145\163
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\253\061\013\060\011\006\003\125\004\006\023\002\103\132
\061\071\060\067\006\003\125\004\003\014\060\111\056\103\101\040
\055\040\123\164\141\156\144\141\162\144\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\054\040\060\071\057\062\060\060\071\061\055\060\053\006
\003\125\004\012\014\044\120\162\166\156\303\255\040\143\145\162
\164\151\146\151\153\141\304\215\156\303\255\040\141\165\164\157
\162\151\164\141\054\040\141\056\163\056\061\062\060\060\006\003
\125\004\013\014\051\111\056\103\101\040\055\040\120\162\157\166
\151\144\145\162\040\157\146\040\103\145\162\164\151\146\151\143
\141\164\151\157\156\040\123\145\162\166\151\143\145\163
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\003\026\343\140
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\052\060\202\003\022\240\003\002\001\002\002\003\026
\343\140\060\015\006\011\052\206\110\206\367\015\001\001\013\005
\000\060\201\253\061\013\060\011\006\003\125\004\006\023\002\103

\132\061\071\060\067\006\003\125\004\003\014\060\111\056\103\101
\040\055\040\123\164\141\156\144\141\162\144\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\054\040\060\071\057\062\060\060\071\061\055\060\053
\006\003\125\004\012\014\044\120\162\166\156\303\255\040\143\145
\162\164\151\146\151\153\141\304\215\156\303\255\040\141\165\164
\157\162\151\164\141\054\040\141\056\163\056\061\062\060\060\006
\003\125\004\013\014\051\111\056\103\101\040\055\040\120\162\157
\166\151\144\145\162\040\157\146\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\123\145\162\166\151\143\145\163\060
\036\027\015\060\071\060\071\060\061\060\060\060\060\060\060\132
\027\015\061\071\060\071\060\061\060\060\060\060\060\060\132\060
\201\253\061\013\060\011\006\003\125\004\006\023\002\103\132\061
\071\060\067\006\003\125\004\003\014\060\111\056\103\101\040\055
\040\123\164\141\156\144\141\162\144\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\054\040\060\071\057\062\060\060\071\061\055\060\053\006\003
\125\004\012\014\044\120\162\166\156\303\255\040\143\145\162\164
\151\146\151\153\141\304\215\156\303\255\040\141\165\164\157\162
\151\164\141\054\040\141\056\163\056\061\062\060\060\006\003\125
\004\013\014\051\111\056\103\101\040\055\040\120\162\157\166\151
\144\145\162\040\157\146\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\123\145\162\166\151\143\145\163\060\202\001
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000
\003\202\001\017\000\060\202\001\012\002\202\001\001\000\250\010
\126\022\077\373\224\203\251\140\166\275\105\203\176\226\064\074
\317\111\116\326\317\374\040\341\341\261\002\024\155\255\312\176
\120\162\051\251\375\234\167\046\070\144\367\103\101\077\024\202
\004\242\101\220\002\347\231\367\203\142\170\104\205\350\235\005
\160\324\376\170\241\164\064\307\254\073\205\002\335\356\121\133
\106\073\123\063\326\147\354\354\024\056\343\304\345\263\164\203
\000\314\306\226\346\034\203\332\334\030\120\151\372\335\103\321
\216\100\375\026\244\267\214\145\207\340\276\254\227\037\260\161
\353\000\145\127\026\316\154\207\257\227\210\360\135\367\207\115
\072\021\012\242\302\104\024\300\026\362\117\365\333\225\102\257
\051\263\051\240\203\121\156\376\074\121\127\223\060\045\046\272
\073\152\206\310\366\013\321\161\077\234\267\072\310\316\147\011
\214\372\100\033\172\154\336\310\034\240\306\134\273\141\030\210
\077\056\131\035\126\374\172\105\234\246\331\070\331\305\140\314
\271\101\125\267\312\274\115\356\264\247\304\366\240\016\274\211
\305\001\225\261\134\337\117\360\314\302\315\102\273\137\002\003
\001\000\001\243\125\060\123\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\016\006\003\125\035\017\001
\001\377\004\004\003\002\001\006\060\021\006\003\125\035\040\004
\012\060\010\060\006\006\004\125\035\040\000\060\035\006\003\125
\035\016\004\026\004\024\301\114\070\224\325\200\206\110\331\042
\220\054\323\356\031\020\333\147\107\207\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\003\202\001\001\000\243\313

\321\175\164\373\065\170\007\222\350\356\150\351\344\122\136\360
\330\143\221\224\237\150\373\276\133\272\251\341\143\167\253\120
\166\306\351\126\107\124\120\231\264\045\213\350\301\031\162\066
\132\011\276\347\326\372\302\266\062\075\107\303\120\116\231\156
\223\066\305\212\121\167\143\340\111\063\253\074\037\212\351\073
\331\206\265\050\307\302\165\161\133\146\152\215\130\016\363\165
\220\265\255\054\201\030\315\234\330\303\315\117\361\373\151\040
\227\300\110\317\023\105\022\265\034\366\076\203\342\116\136\335
\131\306\153\112\340\110\316\331\052\235\145\072\275\057\360\360
\114\274\011\172\313\067\000\244\077\073\014\043\335\343\373\306
\102\242\264\266\346\322\162\205\114\337\263\336\026\247\176\035
\347\324\317\255\253\263\120\344\160\214\337\260\160\220\311\206
\236\356\174\204\213\144\034\153\341\150\025\176\311\245\164\340
\116\367\132\352\335\022\061\253\221\100\205\161\013\316\051\050
\371\156\070\024\134\035\376\354\021\277\115\103\176\236\137\070
\277\327\352\236\223\057\320\035\164\265\005\011\323\042
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER
 CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "I.CA - Standard Certification Authority, 09/2009"
# Issuer: OU=I.CA - Provider of Certification Services,O=První certifikaní autorita\, a.s.,CN=I.CA - Standard Certification Authority\, 09/2009,C=CZ
# Serial Number:16:e3:60
# Subject: OU=I.CA - Provider of Certification Services,O=První certifikaní autorita\, a.s.,CN=I.CA - Standard Certification Authority\, 09/2009,C=CZ
# Not Valid Before: Tue Sep 01 00:00:00 2009
# Not Valid After: Sun Sep 01 00:00:00 2019
# Fingerprint (MD5): 86:ef:8e:31:9d:9f:85:69:a2:a4:1a:12:71:68:ba:1b
# Fingerprint (SHA1): 90:de:ce:77:f8:c8:25:34:0e:62:eb:d6:35:e1:be:20:cf:73:27:dd
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "I.CA - Standard Certification Authority, 09/2009"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\220\336\316\167\370\310\045\064\016\142\353\326\065\341\276\040
\317\163\047\335
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\206\357\216\061\235\237\205\151\242\244\032\022\161\150\272\033
END
CKA_ISSUER MULTILINE_OCTAL

```
\060\201\253\061\013\060\011\006\003\125\004\006\023\002\103\132
\061\071\060\067\006\003\125\004\003\014\060\111\056\103\101\040
\055\040\123\164\141\156\144\141\162\144\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\054\040\060\071\057\062\060\060\071\061\055\060\053\006
\003\125\004\012\014\044\120\162\166\156\303\255\040\143\145\162
\164\151\146\151\153\141\304\215\156\303\255\040\141\165\164\157
\162\151\164\141\054\040\141\056\163\056\061\062\060\060\006\003
\125\004\013\014\051\111\056\103\101\040\055\040\120\162\157\166
\151\144\145\162\040\157\146\040\103\145\162\164\151\146\151\143
\141\164\151\157\156\040\123\145\162\166\151\143\145\163
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\026\343\140
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "I.CA - Qualified Certification Authority, 09/2009"
# Issuer: OU=I.CA - Accredited Provider of Certification Services,O=První certifikaní autorita\, a.s.,CN=I.CA -
Qualified Certification Authority\, 09/2009,C=CZ
# Serial Number:a0:37:a0
# Subject: OU=I.CA - Accredited Provider of Certification Services,O=První certifikaní autorita\, a.s.,CN=I.CA -
Qualified Certification Authority\, 09/2009,C=CZ
# Not Valid Before: Tue Sep 01 00:00:00 2009
# Not Valid After: Sun Sep 01 00:00:00 2019
# Fingerprint (MD5): 8d:63:9b:56:c1:14:e4:ee:9a:12:85:86:11:90:82:a3
# Fingerprint (SHA1): d2:44:1a:a8:c2:03:ae:ca:a9:6e:50:1f:12:4d:52:b6:8f:e4:c3:75
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "I.CA - Qualified
 Certification Authority, 09/2009"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\267\061\013\060\011\006\003\125\004\006\023\002\103\132
\061\072\060\070\006\003\125\004\003\014\061\111\056\103\101\040
\055\040\121\165\141\154\151\146\151\145\144\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\054\040\060\071\057\062\060\060\071\061\055\060\053
\006\003\125\004\012\014\044\120\162\166\156\303\255\040\143\145
\162\164\151\146\151\153\141\304\215\156\303\255\040\141\165\164
\157\162\151\164\141\054\040\141\056\163\056\061\075\060\073\006
```

\003\125\004\013\014\064\111\056\103\101\040\055\040\101\143\143
\162\145\144\151\164\145\144\040\120\162\157\166\151\144\145\162
\040\157\146\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\123\145\162\166\151\143\145\163
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\267\061\013\060\011\006\003\125\004\006\023\002\103\132
\061\072\060\070\006\003\125\004\003\014\061\111\056\103\101\040
\055\040\121\165\141\154\151\146\151\145\144\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\054\040\060\071\057\062\060\060\071\061\055\060\053
\006\003\125\004\012\014\044\120\162\166\156\303\255\040\143\145
\162\164\151\146\151\153\141\304\215\156\303\255\040\141\165\164
\157\162\151\164\141\054\040\141\056\163\056\061\075\060\073\006
\003\125\004\013\014\064\111\056\103\101\040\055\040\101\143\143
\162\145\144\151\164\145\144\040\120\162\157\166\151\144\145\162
\040\157\146\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\123\145\162\166\151\143\145\163
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\004\000\240\067\240
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\036\060\202\004\006\240\003\002\001\002\002\004\000
\240\067\240\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\201\267\061\013\060\011\006\003\125\004\006\023\002
\103\132\061\072\060\070\006\003\125\004\003\014\061\111\056\103
\101\040\055\040\121\165\141\154\151\146\151\145\144\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171\054\040\060\071\057\062\060\060\071\061\055
\060\053\006\003\125\004\012\014\044\120\162\166\156\303\255\040
\143\145\162\164\151\146\151\153\141\304\215\156\303\255\040\141
\165\164\157\162\151\164\141\054\040\141\056\163\056\061\075\060
\073\006\003\125\004\013\014\064\111\056\103\101\040\055\040\101
\143\143\162\145\144\151\164\145\144\040\120\162\157\166\151\144
\145\162\040\157\146\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\123\145\162\166\151\143\145\163\060\036\027\015
\060\071\060\071\060\061\060\060\060\060\060\060\132\027\015\061
\071\060\071\060\061\060\060\060\060\060\060\132\060\201\267\061
\013\060\011\006\003\125\004\006\023\002\103\132\061\072\060\070
\006\003\125\004\003\014\061\111\056\103\101\040\055\040\121\165
\141\154\151\146\151\145\144\040\103\145\162\164\151\146\151\143
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171\054
\040\060\071\057\062\060\060\071\061\055\060\053\006\003\125\004
\012\014\044\120\162\166\156\303\255\040\143\145\162\164\151\146
\151\153\141\304\215\156\303\255\040\141\165\164\157\162\151\164

\141\054\040\141\056\163\056\061\075\060\073\006\003\125\004\013
\014\064\111\056\103\101\040\055\040\101\143\143\162\145\144\151
\164\145\144\040\120\162\157\166\151\144\145\162\040\157\146\040
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\123\145
\162\166\151\143\145\163\060\202\001\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202
\001\012\002\202\001\001\000\265\066\204\313\102\202\360\317\145
\342\124\232\130\163\054\343\353\025\127\122\360\317\042\130\210
\204\015\170\052\357\324\161\346\375\212\106\041\326\077\147\256
\064\161\346\247\222\064\057\041\176\346\333\160\112\340\344\202
\350\243\274\221\226\000\337\072\051\073\076\206\024\043\212\127
\143\357\056\351\033\163\347\066\212\141\172\220\261\304\277\252
\215\003\305\261\204\366\321\337\022\260\224\160\360\007\154\241
\133\072\073\127\164\025\200\064\106\363\173\056\202\244\047\264
\246\002\334\271\345\114\146\311\244\323\376\003\076\366\202\223
\275\000\165\047\374\200\141\026\116\044\261\317\045\141\055\213
\364\140\262\364\053\046\164\244\201\077\277\051\367\017\013\307
\273\303\056\251\003\202\335\177\314\032\334\121\151\222\111\276
\300\023\360\117\021\343\053\311\005\165\041\322\072\236\121\247
\006\025\244\134\346\037\350\144\235\153\042\160\363\246\355\273
\020\273\276\040\312\066\266\351\343\201\343\101\026\222\306\172
\172\073\167\255\243\134\170\015\370\230\167\017\330\154\221\136
\354\110\344\305\044\001\313\002\003\001\000\001\243\202\001\056
\060\202\001\052\060\017\006\003\125\035\023\001\001\377\004\005
\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\006\060\201\347\006\003\125\035\040\004\201\337
\060\201\334\060\201\331\006\004\125\035\040\000\060\201\320\060
\201\315\006\010\053\006\001\005\005\007\002\002\060\201\300\032
\201\275\124\145\156\164\157\040\143\145\162\164\151\146\151\153
\141\164\040\152\145\040\166\171\144\141\156\040\152\141\153\157
\040\153\166\141\154\151\146\151\153\157\166\141\156\171\040\163
\171\163\164\145\155\157\166\171\040\143\145\162\164\151\146\151
\153\141\164\040\160\157\144\154\145\040\172\141\153\157\156\141
\040\143\056\040\062\062\067\057\062\060\060\060\040\123\142\056
\040\166\040\160\154\141\164\156\145\155\040\172\156\145\156\151
\057\124\150\151\163\040\151\163\040\161\165\141\154\151\146\151
\145\144\040\163\171\163\164\145\155\040\143\145\162\164\151\146
\151\143\141\164\145\040\141\143\143\157\162\144\151\156\147\040
\164\157\040\103\172\145\143\150\040\101\143\164\040\116\157\056
\040\062\062\067\057\062\060\060\060\040\103\157\154\154\056\060
\035\006\003\125\035\016\004\026\004\024\171\313\320\043\351\072
\147\160\221\164\117\323\121\342\340\040\375\341\050\373\060\015
\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202\001
\001\000\175\225\245\066\327\210\130\150\021\317\145\373\133\015
\057\366\164\201\213\131\331\235\111\270\365\071\226\311\360\262
\017\004\314\130\214\372\004\062\254\300\107\276\055\303\336\223
\213\246\226\105\256\126\164\345\232\113\242\077\252\046\304\050
\126\141\044\005\127\137\231\244\307\147\260\030\122\311\373\101

\250\371\344\361\236\062\316\236\025\105\331\135\254\373\236\333
\233\307\074\217\257\333\113\242\043\350\073\051\160\161\030\245
\370\343\207\256\041\023\152\364\151\052\131\016\061\263\050\123
\072\142\232\254\010\223\174\251\207\266\137\132\246\030\302\320
\302\363\135\214\157\247\077\060\211\070\353\224\023\052\110\132
\336\171\345\220\313\136\244\271\027\266\143\006\071\137\310\066
\143\021\364\266\022\317\110\166\211\074\152\127\371\353\163\042
\367\372\076\005\256\072\300\306\016\222\115\317\324\211\124\321
\032\202\152\067\133\226\050\250\000\042\203\316\320\052\271\263
\215\123\130\056\145\134\325\362\333\214\001\045\163\154\227\213
\374\140\001\354\100\223\301\355\121\270\252\313\142\330\045\060
\242\075
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "I.CA - Qualified Certification Authority, 09/2009"
# Issuer: OU=I.CA - Accredited Provider of Certification Services,O=První certifikaní autorita\, a.s.,CN=I.CA - Qualified Certification Authority\, 09/2009,C=CZ
# Serial Number:a0:37:a0
# Subject: OU=I.CA - Accredited Provider of Certification Services,O=První certifikaní autorita\, a.s.,CN=I.CA - Qualified Certification Authority\, 09/2009,C=CZ
# Not Valid Before: Tue Sep 01 00:00:00 2009
# Not Valid After: Sun Sep 01 00:00:00 2019
# Fingerprint (MD5): 8d:63:9b:56:c1:14:e4:ee:9a:12:85:86:11:90:82:a3
# Fingerprint (SHA1): d2:44:1a:a8:c2:03:ae:ca:a9:6e:50:1f:12:4d:52:b6:8f:e4:c3:75
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL
 CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "I.CA - Qualified Certification Authority, 09/2009"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\322\104\032\250\302\003\256\312\251\156\120\037\022\115\122\266
\217\344\303\165
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\215\143\233\126\301\024\344\356\232\022\205\206\021\220\202\243
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\267\061\013\060\011\006\003\125\004\006\023\002\103\132
\061\072\060\070\006\003\125\004\003\014\061\111\056\103\101\040
\055\040\121\165\141\154\151\146\151\145\144\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\054\040\060\071\057\062\060\060\071\061\055\060\053

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\006\003\125\004\012\014\044\120\162\166\156\303\255\040\143\145
\162\164\151\146\151\153\141\304\215\156\303\255\040\141\165\164
\157\162\151\164\141\054\040\141\056\163\056\061\075\060\073\006
\003\125\004\013\014\064\111\056\103\101\040\055\040\101\143\143
\162\145\144\151\164\145\144\040\120\162\157\166\151\144\145\162
\040\157\146\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\123\145\162\166\151\143\145\163
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\004\000\240\067\240
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "VI Registru Centras RCSC (RootCA)"
# Issuer: CN=VI Registru Centras RCSC (RootCA),OU=Registru Centro Sertifikavimo Centras,O=VI Registru
Centras - I.k. 124110246,C=LT
# Serial Number:03:a3:a4:57:b5:f0:f3:86:4a:11:63:e8:98:ff:16:9c
# Subject: CN=VI Registru Centras RCSC (RootCA),OU=Registru Centro Sertifikavimo Centras,O=VI Registru
Centras - I.k. 124110246,C=LT
# Not Valid Before: Mon Jul 21 11:47:46 2008
# Not Valid After: Sun Jul 21 11:47:46 2024
# Fingerprint (MD5): 41:5b:95:78:0d:d1:c3:a7:dc:d9:ba:fe:e7:27:b6:14
#
 Fingerprint (SHA1): 97:1d:34:86:fc:1e:8e:63:15:f7:c6:f2:e1:29:67:c7:24:34:22:14
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "VI Registru Centras RCSC (RootCA)"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\230\061\013\060\011\006\003\125\004\006\023\002\114\124
\061\055\060\053\006\003\125\004\012\023\044\126\111\040\122\145
\147\151\163\164\162\165\040\103\145\156\164\162\141\163\040\055
\040\111\056\153\056\040\061\062\064\061\061\060\062\064\066\061
\056\060\054\006\003\125\004\013\023\045\122\145\147\151\163\164
\162\165\040\103\145\156\164\162\157\040\123\145\162\164\151\146
\151\153\141\166\151\155\157\040\103\145\156\164\162\141\163\061
\052\060\050\006\003\125\004\003\023\041\126\111\040\122\145\147
\151\163\164\162\165\040\103\145\156\164\162\141\163\040\122\103
\123\103\040\050\122\157\157\164\103\101\051
END
CKA_ID
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UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\230\061\013\060\011\006\003\125\004\006\023\002\114\124
\061\055\060\053\006\003\125\004\012\023\044\126\111\040\122\145
\147\151\163\164\162\165\040\103\145\156\164\162\141\163\040\055
\040\111\056\153\056\040\061\062\064\061\061\060\062\064\066\061
\056\060\054\006\003\125\004\013\023\045\122\145\147\151\163\164
\162\165\040\103\145\156\164\162\157\040\123\145\162\164\151\146
\151\153\141\166\151\155\157\040\103\145\156\164\162\141\163\061
\052\060\050\006\003\125\004\003\023\041\126\111\040\122\145\147
\151\163\164\162\165\040\103\145\156\164\162\141\163\040\122\103
\123\103\040\050\122\157\157\164\103\101\051
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\003\243\244\127\265\360\363\206\112\021\143\350\230\377
\026\234
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\212\060\202\004\162\240\003\002\001\002\002\020\003
\243\244\127\265\360\363\206\112\021\143\350\230\377\026\234\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\201
\230\061\013\060\011\006\003\125\004\006\023\002\114\124\061\055
\060\053\006\003\125\004\012\023\044\126\111\040\122\145\147\151
\163\164\162\165\040\103\145\156\164\162\141\163\040\055\040\111
\056\153\056\040\061\062\064\061\061\060\062\064\066\061\056\060
\054\006\003\125\004\013\023\045\122\145\147\151\163\164\162\165
\040\103\145\156\164\162\157\040\123\145\162\164\151\146\151\153
\141\166\151\155\157\040\103\145\156\164\162\141\163\061\052\060
\050\006\003\125\004\003\023\041\126\111\040\122\145\147\151\163
\164\162\165\040\103\145\156\164\162\141\163\040\122\103\123\103
\040\050\122\157\157\164\103\101\051\060\036\027\015\060\070\060
\067\062\061\061\061\064\067\064\066\132\027\015\062\064\060\067
\062\061\061\061\064\067\064\066\132\060\201\230\061\013\060\011
\006\003\125\004\006\023\002\114\124\061\055\060\053\006\003\125
\004\012\023\044\126\111\040\122\145\147\151\163\164\162\165\040
\103\145\156\164\162\141\163\040\055\040\111\056\153\056\040\061
\062\064\061\061\060\062\064\066\061\056\060\054\006\003\125\004
\013\023\045\122\145\147\151\163\164\162\165\040\103\145\156\164
\162\157\040\123\145\162\164\151\146\151\153\141\166\151\155\157
\040\103\145\156\164\162\141\163\061\052\060\050\006\003\125\004
\003\023\041\126\111\040\122\145\147\151\163\164\162\165\040\103
\145\156\164\162\141\163\040\122\103\123\103\040\050\122\157\157
\164\103\101\051\060\202\002\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012
\002\202\002\001\000\310\231\362\042\307\263\207\025\056\247\313
\115\106\253\147\227\317\017\163\167\003\367\144\174\166\110\062
\040\364\243\330\131\235\024\251\037\240\036\221\016\015\255\365
\376\147\222\221\023\040\041\115\012\125\156\161\372\254\027\313

\000\375\016\120\002\063\333\251\330\275\141\032\375\340\020\127
\261\125\171\140\031\264\124\171\236\373\200\060\342\310\102\311
\122\002\010\330\254\057\303\161\101\124\002\365\201\212\022\343
\151\002\245\207\241\160\175\005\276\245\142\277\005\260\010\226
\107\157\177\223\212\255\340\254\323\102\336\275\346\217\024\345
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\127\110\263\223\216\234\373\072\311\113\155\061\327\122\325\126
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\064\147\271\257\004\060\103\366\257\102\107\336\374\001\056\350
\102\234\276\262\013\024\344\064\334\335\255\123\204\172\330\003
\126\321\302\014\324\227\051\370\114\362\265\034\337\235\203\256
\137\132\045\113\242\260\050\345\277\132\013\320\234\250\234\160
\052\155\016\056\341\047\277\255\013\157\021\323\370\106\055\364
\227\104\113\312\260\310\346\066\157\042\272\216\344\122\225\026
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\141\267\265\016\363\177\045\054\021\143\257\361\022\303\364\244
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\004\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\035\006\003\125\035\016\004\026\004\024\274\163\076
\057\234\221\014\273\217\315\167\231\076\314\205\344\314\130\150
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\051\006\010\053\006\001\005\005\007\002\001\026\035\150\164\164
\160\072\057\057\167\167\167\056\162\143\163\143\056\154\164\057
\162\145\160\157\163\151\164\157\162\171\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\003\202\002\001\000\031\170
\054\121\023\137\274\231\116\134\247\001\374\336\266\376\251\035
\206\061\021\173\172\231\212\263\210\222\245\140\322\004\143\071
\274\257\216\330\361\053\105\162\062\051\074\055\342\331\330\075
\164\372\107\065\207\334\020\000\066\101\075\355\252\176\262\314
\304\032\351\061\264\365\221\321\204\112\347\365\334\317\106\147

\002\231\257\270\167\372\176\355\041\157\226\043\024\161\077\320
\130\276\252\333\103\054\067\240\035\006\151\064\360\117\217\165
\356\263\322\001\273\354\034\351\217\251\211\357\370\324\033\101
\002\231\276\360\137\272\216\054\302\041\160\336\121\201\330\367
\274\270\303\063\203\303\227\312\011\163\304\351\167\310\162\364
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\051\025\357\131\234\257\254\222\202\160\014\230\330\042\235\057
\230\065\251\321\212\211\274\325\235\125\302\056\236\007\045\106
\366\222\115\120\372\075\211\362\337\223\277\223\224\320\331\257
\127\243\363\146\346\216\361\350\240\033\030\006\223\132\054\211
\015\066\304\372\040\263\334\050\365\152\356\217\061\233\131\070
\330\116\152\240\043\041\344\206\253\345\373\140\243\321\315\132
\054\102\111\246\016\125\044\045\065\375\322\072\257\153\130\246
\221\106\137\151\313\275\176\046\233\336\010\275\036\354\236\246
\370\234\165\244\100\066\225\113\042\117\306\266\175\162\121\274
\343\302\150\315\315\345\213\276\300\302\117\233\156\145\316\026
\267\010\210\307\207\336\377\062\214\313\353\102\101\254\373\327
\317\001\103\370\157\300\326\013\360\367\222\351\313\105\135\144
\261\367\312\074\273\211\010\226\311\332\016\341\161\052\017\354
\244\102\055\343\152\017\107\107\260\123\246\326\205\120\227\060
\327\214\056\137\106\042\320\254\316\074\136\234\036\162\203\375
\014\247\370\027\062\273\141\336\343\117\057\030\216\202\265\207
\033\164\005\060\112\277\152\036\110\074\124\050\261\135\235\222
\137\233\020\343\056\042\212\257\335\066\144\177\023\166\107\203
\065\225\032\224\217\365\304\123\155\071\275\325\213\365\312\317
\030\103\005\001\223\244\066\336\060\322\024\363\260\144\265\312
\316\225\367\272\164\354\212\163\076\122\323\136\123\000
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "VI Registru Centras RCSC (RootCA)"
# Issuer: CN=VI Registru Centras RCSC (RootCA),OU=Registru Centro Sertifikavimo Centras,O=VI Registru Centras - I.k. 124110246,C=LT
# Serial
Number:03:a3:a4:57:b5:f0:f3:86:4a:11:63:e8:98:ff:16:9c
# Subject: CN=VI Registru Centras RCSC (RootCA),OU=Registru Centro Sertifikavimo Centras,O=VI Registru Centras - I.k. 124110246,C=LT
# Not Valid Before: Mon Jul 21 11:47:46 2008
# Not Valid After: Sun Jul 21 11:47:46 2024
# Fingerprint (MD5): 41:5b:95:78:0d:d1:c3:a7:dc:d9:ba:fe:e7:27:b6:14
# Fingerprint (SHA1): 97:1d:34:86:fc:1e:8e:63:15:f7:c6:f2:e1:29:67:c7:24:34:22:14
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE

```
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "VI Registru Centras RCSC (RootCA)"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\227\035\064\206\374\036\216\143\025\367\306\362\341\051\147\307
\044\064\042\024
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\101\133\225\170\015\321\303\247\334\331\272\376\347\047\266\024
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\230\061\013\060\011\006\003\125\004\006\023\002\114\124
\061\055\060\053\006\003\125\004\012\023\044\126\111\040\122\145
\147\151\163\164\162\165\040\103\145\156\164\162\141\163\040\055
\040\111\056\153\056\040\061\062\064\061\061\060\062\064\066\061
\056\060\054\006\003\125\004\013\023\045\122\145\147\151\163\164
\162\165\040\103\145\156\164\162\157\040\123\145\162\164\151\146
\151\153\141\166\151\155\157\040\103\145\156\164\162\141\163\061
\052\060\050\006\003\125\004\003\023\041\126\111\040\122\145\147
\151\163\164\162\165\040\103\145\156\164\162\141\163\040\122\103
\123\103\040\050\122\157\157\164\103\101\051
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\003\243\244\127\265\360\363\206\112\021\143\350\230\377
\026\234
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Autoridade Certificadora Raiz Brasileira v1"
# Issuer: CN=Autoridade Certificadora Raiz Brasileira v1,OU=Instituto
 Nacional de Tecnologia da Informacao - ITI,O=ICP-Brasil,C=BR
# Serial Number: 1 (0x1)
# Subject: CN=Autoridade Certificadora Raiz Brasileira v1,OU=Instituto Nacional de Tecnologia da Informacao -
ITI,O=ICP-Brasil,C=BR
# Not Valid Before: Tue Jul 29 19:17:10 2008
# Not Valid After: Thu Jul 29 19:17:10 2021
# Fingerprint (MD5): 93:f1:ad:34:0b:2b:e7:a8:54:60:e2:73:8c:a4:94:31
# Fingerprint (SHA1): 70:5d:2b:45:65:c7:04:7a:54:06:94:a7:9a:f7:ab:b8:42:bd:c1:61
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Autoridade Certificadora Raiz Brasileira v1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
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CKA_SUBJECT MULTILINE_OCTAL
\060\201\227\061\013\060\011\006\003\125\004\006\023\002\102\122
\061\023\060\021\006\003\125\004\012\023\012\111\103\120\055\102
\162\141\163\151\154\061\075\060\073\006\003\125\004\013\023\064
\111\156\163\164\151\164\165\164\157\040\116\141\143\151\157\156
\141\154\040\144\145\040\124\145\143\156\157\154\157\147\151\141
\040\144\141\040\111\156\146\157\162\155\141\143\141\157\040\055
\040\111\124\111\061\064\060\062\006\003\125\004\003\023\053\101
\165\164\157\162\151\144\141\144\145\040\103\145\162\164\151\146
\151\143\141\144\157\162\141\040\122\141\151\172\040\102\162\141
\163\151\154\145\151\162\141\040\166\061
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\227\061\013\060\011\006\003\125\004\006\023\002\102\122
\061\023\060\021\006\003\125\004\012\023\012\111\103\120\055\102
\162\141\163\151\154\061\075\060\073\006\003\125\004\013\023\064
\111\156\163\164\151\164\165\164\157\040\116\141\143\151\157\156
\141\154\040\144\145\040\124\145\143\156\157\154\157\147\151\141
\040\144\141\040\111\156\146\157\162\155\141\143\141\157\040\055
\040\111\124\111\061\064\060\062\006\003\125\004\003\023\053\101
\165\164\157\162\151\144\141\144\145\040\103\145\162\164\151\146
\151\143\141\144\157\162\141\040\122\141\151\172\040\102\162\141
\163\151\154\145\151\162\141\040\166\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\200\060\202\003\150\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\201\227\061\013\060\011\006\003\125\004\006\023\002\102\122\061
\023\060\021\006\003\125\004\012\023\012\111\103\120\055\102\162
\141\163\151\154\061\075\060\073\006\003\125\004\013\023\064\111
\156\163\164\151\164\165\164\157\040\116\141\143\151\157\156\141
\154\040\144\145\040\124\145\143\156\157\154\157\147\151\141\040
\144\141\040\111\156\146\157\162\155\141\143\141\157\040\055\040
\111\124\111\061\064\060\062\006\003\125\004\003\023\053\101\165
\164\157\162\151\144\141\144\145\040\103\145\162\164\151\146\151
\143\141\144\157\162\141\040\122\141\151\172\040\102\162\141\163
\151\154\145\151\162\141\040\166\061\060\036\027\015\060\070\060
\067\062\071\061\071\061\067\061\060\132\027\015\062\061\060\067
\062\071\061\071\061\067\061\060\132\060\201\227\061\013\060\011
\006\003\125\004\006\023\002\102\122\061\023\060\021\006\003\125
\004\012\023\012\111\103\120\055\102\162\141\163\151\154\061\075
\060\073\006\003\125\004\013\023\064\111\156\163\164\151\164\165

\164\157\040\116\141\143\151\157\156\141\154\040\144\145\040\124
\145\143\156\157\154\157\147\151\141\040\144\141\040\111\156\146
\157\162\155\141\143\141\157\040\055\040\111\124\111\061\064\060
\062\006\003\125\004\003\023\053\101\165\164\157\162\151\144\141
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\040\122\141\151\172\040\102\162\141\163\151\154\145\151\162\141
\040\166\061\060\202\001\042\060\015\006\011\052\206\110\206\367
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\202\001\001\000\316\034\350\276\223\064\316\311\261\344\124\356
\011\366\354\244\010\205\240\077\306\212\306\160\060\247\200\214
\355\076\001\124\007\214\031\043\073\237\273\307\264\213\040\261
\342\367\101\026\055\136\207\146\272\260\007\335\157\321\077\074
\332\310\131\063\235\025\260\237\222\310\126\124\130\212\072\047
\242\064\036\233\170\265\267\315\345\233\351\300\056\022\236\160
\170\007\372\216\362\114\300\370\345\162\174\036\251\251\140\003
\127\046\107\333\203\166\303\316\310\022\273\321\377\357\256\263
\142\175\232\240\344\274\156\175\001\056\064\140\334\207\340\137
\177\005\160\134\060\025\054\302\165\243\077\120\003\146\043\146
\054\347\164\167\170\333\146\027\337\371\037\015\202\150\217\165
\207\367\351\061\172\123\117\317\130\142\273\100\242\064\317\300
\160\204\120\227\025\332\040\113\351\373\114\102\255\053\150\216
\243\331\255\005\142\376\010\164\304\350\301\314\205\023\316\255
\050\060\120\335\336\300\201\301\111\260\136\056\046\070\351\143
\004\063\167\265\200\166\315\052\177\362\074\254\135\223\102\071
\364\242\163\105\002\003\001\000\001\243\201\324\060\201\321\060
\116\006\003\125\035\040\004\107\060\105\060\103\006\005\140\114
\001\001\000\060\072\060\070\006\010\053\006\001\005\005\007\002
\001\026\054\150\164\164\160\072\057\057\141\143\162\141\151\172
\056\151\143\160\142\162\141\163\151\154\056\147\157\166\056\142
\162\057\104\120\103\141\143\162\141\151\172\056\160\144\146\060
\077\006\003\125\035\037\004\070\060\066\060\064\240\062\240\060
\206\056\150\164\164\160\072\057\057\141\143\162\141\151\172\056
\151\143\160\142\162\141\163\151\154\056\147\157\166\056\142\162
\057\114\103\122\141\143\162\141\151\172\166\061\056\143\162\154
\060\035\006\003\125\035\016\004\026\004\024\102\262\054\134\164
\001\007\276\233\377\125\063\073\356\051\273\135\221\277\006\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003
\202\001\001\000\131\154\212\166\351\031\161\127\203\376\247\364
\172\017\236\201\320\317\007\034\014\043\351\044\015\121\313\063
\350\052\011\303\172\377\016\243\200\206\140\301\160\227\340\300
\012\125\335\244\145\114\217\247\107\260\127\267\363\253\304\303
\031\343\230\354\015\260\033\121\221\311\331\011\326\351\152\263
\347\014\260\262\222\207\373\216\115\025\354\022\024\031\170\014
\142\352\024\071\030\012\305\125\333\123\205\334\173\050\372\025
\161\243\312\164\045\202\017\147\047\064\327\256\122\023\002\373
\305\357\232\200\045\245\122\236\071\016\355\072\364\170\007\137

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\325\050\172\012\112\365\320\303\147\367\214\130\027\157\012\000
\243\046\020\264\140\042\072\112\110\245\332\340\251\204\336\103
\333\237\103\247\077\050\004\107\222\057\367\347\144\165\041\322
\117\201\316\252\076\144\016\343\016\255\125\232\176\224\233\064
\301\320\256\151\116\036\243\331\263\207\127\332\160\302\132\175
\207\315\371\277\067\336\355\126\065\367\267\042\016\117\222\270
\077\010\337\234\236\230\136\362\157\271\372\233\054\370\315\105
\330\162\262\040
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
#
 Trust for "Autoridade Certificadora Raiz Brasileira v1"
# Issuer: CN=Autoridade Certificadora Raiz Brasileira v1,OU=Instituto Nacional de Tecnologia da Informacao -
ITI,O=ICP-Brasil,C=BR
# Serial Number: 1 (0x1)
# Subject: CN=Autoridade Certificadora Raiz Brasileira v1,OU=Instituto Nacional de Tecnologia da Informacao -
ITI,O=ICP-Brasil,C=BR
# Not Valid Before: Tue Jul 29 19:17:10 2008
# Not Valid After: Thu Jul 29 19:17:10 2021
# Fingerprint (MD5): 93:f1:ad:34:0b:2b:e7:a8:54:60:e2:73:8c:a4:94:31
# Fingerprint (SHA1): 70:5d:2b:45:65:c7:04:7a:54:06:94:a7:9a:f7:ab:b8:42:bd:c1:61
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Autoridade Certificadora Raiz Brasileira v1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\160\135\053\105\145\307\004\172\124\006\224\247\232\367\253\270
\102\275\301\141
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\223\361\255\064\013\053\347\250\124\140\342\163\214\244\224\061
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\201\227\061\013\060\011\006\003\125\004\006\023\002\102\122
\061\023\060\021\006\003\125\004\012\023\012\111\103\120\055\102
\162\141\163\151\154\061\075\060\073\006\003\125\004\013\023\064
\111\156\163\164\151\164\165\164\157\040\116\141\143\151\157\156
\141\154\040\144\145\040\124\145\143\156\157\154\157\147\151\141
\040\144\141\040\111\156\146\157\162\155\141\143\141\157\040\055
\040\111\124\111\061\064\060\062\006\003\125\004\003\023\053\101
\165\164\157\162\151\144\141\144\145\040\103\145\162\164\151\146
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\151\143\141\144\157\162\141\040\122\141\151\172\040\102\162\141
\163\151\154\145\151\162\141\040\166\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Actalis Authentication
 CA G1"
# Issuer: CN=Actalis Authentication CA G1,O=Actalis S.p.A./03358520967,L=Milano,C=IT
# Serial Number: 1 (0x1)
# Subject: CN=Actalis Authentication CA G1,O=Actalis S.p.A./03358520967,L=Milano,C=IT
# Not Valid Before: Tue Jun 23 14:06:00 2009
# Not Valid After: Sat Jun 25 14:06:00 2022
# Fingerprint (MD5): c2:2a:59:ab:cf:15:2f:4c:f7:e6:31:a3:16:ae:84:0c
# Fingerprint (SHA1): 91:58:c5:ef:98:73:01:a8:90:3c:fd:ab:03:d7:2d:a1:d8:89:09:c9
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Actalis Authentication CA G1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\152\061\013\060\011\006\003\125\004\006\023\002\111\124\061
\017\060\015\006\003\125\004\007\014\006\115\151\154\141\156\157
\061\043\060\041\006\003\125\004\012\014\032\101\143\164\141\154
\151\163\040\123\056\160\056\101\056\057\060\063\063\065\070\065
\062\060\071\066\067\061\045\060\043\006\003\125\004\003\014\034
\101\143\164\141\154\151\163\040\101\165\164\150\145\156\164\151
\143\141\164\151\157\156\040\103\101\040\107\061
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\152\061\013\060\011\006\003\125\004\006\023\002\111\124\061
\017\060\015\006\003\125\004\007\014\006\115\151\154\141\156\157
\061\043\060\041\006\003\125\004\012\014\032\101\143\164\141\154
\151\163\040\123\056\160\056\101\056\057\060\063\063\065\070\065
\062\060\071\066\067\061\045\060\043\006\003\125\004\003\014\034
\101\143\164\141\154\151\163\040\101\165\164\150\145\156\164\151
\143\141\164\151\157\156\040\103\101\040\107\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
```

\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\224\060\202\002\174\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\152\061\013\060\011\006\003\125\004\006\023\002\111\124\061\017
\060\015\006\003\125\004\007\014\006\115\151\154\141\156\157\061
\043\060\041\006\003\125\004\012\014\032\101\143\164\141\154\151
\163\040\123\056\160\056\101\056\057\060\063\063\065\070\065\062
\060\071\066\067\061\045\060\043\006\003\125\004\003\014\034\101
\143\164\141\154\151\163\040\101\165\164\150\145\156\164\151\143
\141\164\151\157\156\040\103\101\040\107\061\060\036\027\015\060
\071\060\066\062\063\061\064\060\066\060\060\132\027\015\062\062
\060\066\062\065\061\064\060\066\060\060\132\060\152\061\013\060
\011\006\003\125\004\006\023\002\111\124\061\017\060\015\006\003
\125\004\007\014\006\115\151\154\141\156\157\061\043\060\041\006
\003\125\004\012\014\032\101\143\164\141\154\151\163\040\123\056
\160\056\101\056\057\060\063\063\065\070\065\062\060\071\066\067
\061\045\060\043\006\003\125\004\003\014\034\101\143\164\141\154
\151\163\040\101\165\164\150\145\156\164\151\143\141\164\151\157
\156\040\103\101\040\107\061\060\202\001\042\060\015\006\011\052
\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060
\202\001\012\002\202\001\001\000\303\034\206\064\077\047\122\102
\140\272\053\140\320\041\053\311\327\351\100\165\072\154\130\017
\043\073\317\206\076\324\144\253\156\332\352\310\052\330\225\105
\337\311\034\322\045\222\236\020\230\132\213\161\151\300\225\351
\366\153\150\334\367\266\304\015\376\156\365\160\073\301\244\250
\117\040\242\047\013\237\361\022\165\174\317\256\177\136\313\170
\002\130\050\327\057\252\333\240\256\164\075\176\253\366\351\162
\241\052\317\326\220\140\337\340\240\065\312\300\333\004\304\007
\126\374\146\165\214\216\172\023\241\074\006\153\032\346\177\071
\234\210\344\204\157\242\342\177\153\237\354\001\252\322\304\313
\262\354\232\075\270\027\030\254\037\140\231\063\346\353\005\335
\314\362\151\147\260\016\276\050\044\103\313\055\271\107\204\031
\371\352\344\361\365\150\364\237\307\173\120\121\257\242\374\157
\167\210\061\277\222\333\177\234\305\265\254\241\010\230\347\152
\063\376\321\273\000\341\267\005\010\257\363\246\126\210\066\075
\343\212\112\342\015\235\200\206\146\237\324\302\243\120\272\034
\022\327\207\212\061\112\270\025\002\003\001\000\001\243\105\060
\103\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\006\060\022\006\003\125\035\023\001\001\377\004\010\060\006\001
\001\377\002\001\000\060\035\006\003\125\035\016\004\026\004\024
\001\273\326\233\126\264\176\346\305\130\335\054\230\364\312\162
\366\137\063\206\060\015\006\011\052\206\110\206\367\015\001\001
\005\005\000\003\202\001\001\000\241\040\326\313\242\064\155\074
\156\341\125\322\112\320\331\272\262\067\121\210\167\047\356\002
\110\223\105\101\342\165\121\362\031\224\011\240\363\270\175\272
\003\200\043\240\045\357\001\031\265\331\032\172\055\343\102\212

\261\206\061\017\226\354\146\204\362\316\043\022\106\226\153\061
\136\006\272\257\243\122\252\102\040\250\321\256\252\233\337\304
\027\236\123\160\001\264\251\032\332\150\310\143\017\266\132\163
\123\321\151\021\006\023\122\347\153\250\005\061\267\260\374\207
\106\305\165\210\201\361\137\170\002\347\237\255\234\273\124\355
\137\231\152\067\325\353\125\263\052\300\103\140\121\334\264\161
\222\046\243\017\314\172\075\334\300\102\211\027\051\010\147\124
\144\305\371\250\104\274\204\161\130\226\075\147\127\177\273\254
\220\263\161\042\277\076\272\254\146\046\105\020\263\360\037\072
\072\150\245\120\065\312\264\027\221\006\001\054\367\015\260\160
\262\133\126\165\271\167\231\300\331\225\205\002\055\163\146\007
\311\117\231\021\356\133\053\250\343\150\043\005\250\363\004\017
\006\273\037\011\216\306\133\035
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Actalis Authentication CA G1"
# Issuer: CN=Actalis Authentication CA G1,O=Actalis S.p.A./03358520967,L=Milano,C=IT
# Serial Number: 1 (0x1)
# Subject: CN=Actalis Authentication CA G1,O=Actalis S.p.A./03358520967,L=Milano,C=IT
# Not Valid Before: Tue Jun 23 14:06:00 2009
# Not Valid After: Sat Jun 25 14:06:00 2022
# Fingerprint (MD5): c2:2a:59:ab:cf:15:2f:4c:f7:e6:31:a3:16:ae:84:0c
#
Fingerprint (SHA1): 91:58:c5:ef:98:73:01:a8:90:3c:fd:ab:03:d7:2d:a1:d8:89:09:c9
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Actalis Authentication CA G1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\221\130\305\357\230\163\001\250\220\074\375\253\003\327\055\241
\330\211\011\311
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\302\052\131\253\317\025\057\114\367\346\061\243\026\256\204\014
END
CKA_ISSUER MULTILINE_OCTAL
\060\152\061\013\060\011\006\003\125\004\006\023\002\111\124\061
\017\060\015\006\003\125\004\007\014\006\115\151\154\141\156\157
\061\043\060\041\006\003\125\004\012\014\032\101\143\164\141\154
\151\163\040\123\056\160\056\101\056\057\060\063\063\065\070\065
\062\060\071\066\067\061\045\060\043\006\003\125\004\003\014\034
\101\143\164\141\154\151\163\040\101\165\164\150\145\156\164\151

\143\141\164\151\157\156\040\103\101\040\107\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "A-Trust-Qual-03"
# Issuer: CN=A-Trust-Qual-03,OU=A-Trust-Qual-03,O=A-Trust Ges. f. Sicherheitssysteme im elektr. Datenverkehr GmbH,C=AT
# Serial Number: 255636 (0x3e694)
# Subject: CN=A-Trust-Qual-03,OU=A-Trust-Qual-03,O=A-Trust Ges. f. Sicherheitssysteme im elektr. Datenverkehr GmbH,C=AT
# Not Valid Before: Thu Apr 24 22:00:00 2008
# Not Valid After: Tue Apr 24 22:00:00 2018
# Fingerprint (MD5): d8:7e:32:ef:69:f8:bf:72:03:1d:40:82:e8:a7:75:af
# Fingerprint (SHA1): 42:ef:dd:e6:bf:f3:5e:d0:ba:e6:ac:dd:20:4c:50:ae:86:c4:f4:fa
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "A-Trust-Qual-03"
CKA_CERTIFICATE_TYPE
 CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\213\061\013\060\011\006\003\125\004\006\023\002\101\124
\061\110\060\106\006\003\125\004\012\014\077\101\055\124\162\165
\163\164\040\107\145\163\056\040\146\056\040\123\151\143\150\145
\162\150\145\151\164\163\163\171\163\164\145\155\145\040\151\155
\040\145\154\145\153\164\162\056\040\104\141\164\145\156\166\145
\162\153\145\150\162\040\107\155\142\110\061\030\060\026\006\003
\125\004\013\014\017\101\055\124\162\165\163\164\055\121\165\141
\154\055\060\063\061\030\060\026\006\003\125\004\003\014\017\101
\055\124\162\165\163\164\055\121\165\141\154\055\060\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\213\061\013\060\011\006\003\125\004\006\023\002\101\124
\061\110\060\106\006\003\125\004\012\014\077\101\055\124\162\165
\163\164\040\107\145\163\056\040\146\056\040\123\151\143\150\145
\162\150\145\151\164\163\163\171\163\164\145\155\145\040\151\155
\040\145\154\145\153\164\162\056\040\104\141\164\145\156\166\145
\162\153\145\150\162\040\107\155\142\110\061\030\060\026\006\003

\125\004\013\014\017\101\055\124\162\165\163\164\055\121\165\141
\154\055\060\063\061\030\060\026\006\003\125\004\003\014\017\101
\055\124\162\165\163\164\055\121\165\141\154\055\060\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\003\003\346\224
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\313\060\202\002\263\240\003\002\001\002\002\003\003
\346\224\060\015\006\011\052\206\110\206\367\015\001\001\005\005
\000\060\201\213\061\013\060\011\006\003\125\004\006\023\002\101
\124\061\110\060\106\006\003\125\004\012\014\077\101\055\124\162
\165\163\164\040\107\145\163\056\040\146\056\040\123\151\143\150
\145\162\150\145\151\164\163\163\171\163\164\145\155\145\040\151
\155\040\145\154\145\153\164\162\056\040\104\141\164\145\156\166
\145\162\153\145\150\162\040\107\155\142\110\061\030\060\026\006
\003\125\004\013\014\017\101\055\124\162\165\163\164\055\121\165
\141\154\055\060\063\061\030\060\026\006\003\125\004\003\014\017
\101\055\124\162\165\163\164\055\121\165\141\154\055\060\063\060
\036\027\015\060\070\060\064\062\064\062\062\060\060\060\060\132
\027\015\061\070\060\064\062\064\062\062\060\060\060\060\132\060
\201\213\061\013\060\011\006\003\125\004\006\023\002\101\124\061
\110\060\106\006\003\125\004\012\014\077\101\055\124\162\165\163
\164\040\107\145\163\056\040\146\056\040\123\151\143\150\145\162
\150\145\151\164\163\163\171\163\164\145\155\145\040\151\155\040
\145\154\145\153\164\162\056\040\104\141\164\145\156\166\145\162
\153\145\150\162\040\107\155\142\110\061\030\060\026\006\003\125
\004\013\014\017\101\055\124\162\165\163\164\055\121\165\141\154
\055\060\063\061\030\060\026\006\003\125\004\003\014\017\101\055
\124\162\165\163\164\055\121\165\141\154\055\060\063\060\202\001
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000
\003\202\001\017\000\060\202\001\012\002\202\001\001\000\263\236
\044\210\034\322\317\100\003\110\152\252\245\240\053\275\226\365
\174\012\237\237\253\120\220\333\101\316\126\200\171\052\300\375
\223\123\172\234\133\363\131\141\044\210\143\243\325\030\356\233
\204\164\204\234\354\214\075\332\301\206\172\157\066\056\046\353
\176\075\311\076\255\347\256\113\164\167\050\053\044\040\377\052
\056\302\225\144\020\366\176\173\303\267\332\021\175\236\253\355
\057\214\031\242\034\235\214\314\063\160\165\011\007\376\136\373
\100\244\045\214\057\375\265\121\147\072\250\053\114\237\326\150
\235\140\233\244\305\143\260\356\160\315\050\077\112\164\352\131
\371\165\305\000\006\156\037\260\143\301\052\252\023\135\374\313
\322\145\033\071\061\042\132\302\171\042\135\031\361\113\302\276
\316\034\210\001\164\361\046\101\167\062\071\306\214\120\150\317
\123\205\103\212\017\240\217\356\216\013\222\243\000\100\276\300
\242\131\136\054\241\104\270\376\037\042\323\014\272\320\350\357
\051\344\162\067\112\213\370\026\354\042\062\007\052\043\054\363

\243\327\315\312\251\247\117\162\277\274\021\216\250\033\002\003
\001\000\001\243\066\060\064\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\021\006\003\125\035\016\004
\012\004\010\106\006\337\067\362\302\067\020\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\006\060\015\006\011\052
\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000\161
\010\324\046\104\276\200\342\153\102\265\052\120\375\135\350\214
\140\363\234\266\222\201\162\070\262\157\251\076\201\362\303\064
\044\123\241\121\122\310\245\211\323\274\334\333\022\271\333\251
\260\130\357\300\010\146\062\142\343\341\363\243\130\243\167\156
\356\344\241\273\127\021\150\167\063\010\364\315\131\270\352\135
\033\011\306\254\314\215\013\272\315\337\326\232\276\253\166\000
\255\175\026\113\144\134\337\230\076\153\155\136\054\174\071\025
\131\102\067\040\074\237\303\334\177\365\123\066\267\342\307\244
\042\214\172\276\161\275\115\263\150\310\270\251\211\377\161\060
\213\317\221\155\362\205\056\245\112\042\176\162\336\324\256\261
\355\014\357\374\105\175\055\334\044\255\355\171\007\345\255\117
\262\351\122\164\111\270\214\122\372\275\022\344\031\303\374\121
\215\026\343\153\150\156\071\232\337\051\071\245\273\261\241\027
\301\027\343\165\152\374\175\261\162\074\337\301\352\345\243\034
\324\235\131\033\032\164\037\151\052\203\124\044\030\323\356\345
\340\203\127\276\033\342\320\037\255\154\065\276\215\272\137
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "A-Trust-Qual-03"
# Issuer: CN=A-Trust-Qual-03,OU=A-Trust-Qual-03,O=A-Trust Ges. f. Sicherheitssysteme im elektr. Datenverkehr GmbH,C=AT
# Serial Number: 255636 (0x3e694)
# Subject: CN=A-Trust-Qual-03,OU=A-Trust-Qual-03,O=A-Trust Ges. f. Sicherheitssysteme im elektr. Datenverkehr GmbH,C=AT
# Not Valid Before: Thu Apr 24 22:00:00 2008
# Not Valid After: Tue Apr 24 22:00:00 2018
# Fingerprint (MD5): d8:7e:32:ef:69:f8:bf:72:03:1d:40:82:e8:a7:75:af
# Fingerprint
(SHA1): 42:ef:dd:e6:bf:f3:5e:d0:ba:e6:ac:dd:20:4c:50:ae:86:c4:f4:fa
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "A-Trust-Qual-03"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\102\357\335\346\277\363\136\320\272\346\254\335\040\114\120\256
\206\304\364\372

```
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\330\176\062\357\151\370\277\162\003\035\100\202\350\247\165\257
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\213\061\013\060\011\006\003\125\004\006\023\002\101\124
\061\110\060\106\006\003\125\004\012\014\077\101\055\124\162\165
\163\164\040\107\145\163\056\040\146\056\040\123\151\143\150\145
\162\150\145\151\164\163\163\171\163\164\145\155\145\040\151\155
\040\145\154\145\153\164\162\056\040\104\141\164\145\156\166\145
\162\153\145\150\162\040\107\155\142\110\061\030\060\026\006\003
\125\004\013\014\017\101\055\124\162\165\163\164\055\121\165\141
\154\055\060\063\061\030\060\026\006\003\125\004\003\014\017\101
\055\124\162\165\163\164\055\121\165\141\154\055\060\063
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\003\003\346\224
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "AddTrust External CA Root"
# Issuer: CN=AddTrust External CA Root,OU=AddTrust External TTP Network,O=AddTrust AB,C=SE
# Serial Number: 1 (0x1)
# Subject: CN=AddTrust External CA Root,OU=AddTrust External TTP Network,O=AddTrust AB,C=SE
# Not Valid Before: Tue May 30 10:48:38 2000
# Not Valid After: Sat May 30 10:48:38 2020
# Fingerprint (MD5): 1d:35:54:04:85:78:b0:3f:42:42:4d:bf:20:73:0a:3f
# Fingerprint (SHA1): 02:fa:f3:e2:91:43:54:68:60:78:57:69:4d:f5:e4:5b:68:85:18:68
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL
 CK_FALSE
CKA_LABEL UTF8 "AddTrust External CA Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\157\061\013\060\011\006\003\125\004\006\023\002\123\105\061
\024\060\022\006\003\125\004\012\023\013\101\144\144\124\162\165
\163\164\040\101\102\061\046\060\044\006\003\125\004\013\023\035
\101\144\144\124\162\165\163\164\040\105\170\164\145\162\156\141
\154\040\124\124\120\040\116\145\164\167\157\162\153\061\042\060
\040\006\003\125\004\003\023\031\101\144\144\124\162\165\163\164
\040\105\170\164\145\162\156\141\154\040\103\101\040\122\157\157
```

\164
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\157\061\013\060\011\006\003\125\004\006\023\002\123\105\061
\024\060\022\006\003\125\004\012\023\013\101\144\144\124\162\165
\163\164\040\101\102\061\046\060\044\006\003\125\004\013\023\035
\101\144\144\124\162\165\163\164\040\105\170\164\145\162\156\141
\154\040\124\124\120\040\116\145\164\167\157\162\153\061\042\060
\040\006\003\125\004\003\023\031\101\144\144\124\162\165\163\164
\040\105\170\164\145\162\156\141\154\040\103\101\040\122\157\157
\164
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\066\060\202\003\036\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\157\061\013\060\011\006\003\125\004\006\023\002\123\105\061\024
\060\022\006\003\125\004\012\023\013\101\144\144\124\162\165\163
\164\040\101\102\061\046\060\044\006\003\125\004\013\023\035\101
\144\144\124\162\165\163\164\040\105\170\164\145\162\156\141\154
\040\124\124\120\040\116\145\164\167\157\162\153\061\042\060\040
\006\003\125\004\003\023\031\101\144\144\124\162\165\163\164\040
\105\170\164\145\162\156\141\154\040\103\101\040\122\157\157\164
\060\036\027\015\060\060\060\065\063\060\061\060\064\070\063\070
\132\027\015\062\060\060\065\063\060\061\060\064\070\063\070\132
\060\157\061\013\060\011\006\003\125\004\006\023\002\123\105\061
\024\060\022\006\003\125\004\012\023\013\101\144\144\124\162\165
\163\164\040\101\102\061\046\060\044\006\003\125\004\013\023\035
\101\144\144\124\162\165\163\164\040\105\170\164\145\162\156\141
\154\040\124\124\120\040\116\145\164\167\157\162\153\061\042\060
\040\006\003\125\004\003\023\031\101\144\144\124\162\165\163\164
\040\105\170\164\145\162\156\141\154\040\103\101\040\122\157\157
\164\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001
\001\000\267\367\032\063\346\362\000\004\055\071\340\116\133\355
\037\274\154\017\315\265\372\043\266\316\336\233\021\063\227\244
\051\114\175\223\237\275\112\274\223\355\003\032\343\217\317\345
\155\120\132\326\227\051\224\132\200\260\111\172\333\056\225\375
\270\312\277\067\070\055\036\076\221\101\255\160\126\307\360\117
\077\350\062\236\164\312\310\220\124\351\306\137\017\170\235\232
\100\074\016\254\141\252\136\024\217\236\207\241\152\120\334\327
\232\116\257\005\263\246\161\224\234\161\263\120\140\012\307\023
\235\070\007\206\002\250\351\250\151\046\030\220\253\114\260\117
\043\253\072\117\204\330\337\316\237\341\151\157\273\327\102\327

\153\104\344\307\255\356\155\101\137\162\132\161\010\067\263\171
\145\244\131\240\224\067\367\000\057\015\302\222\162\332\320\070
\162\333\024\250\105\304\135\052\175\267\264\326\304\356\254\315
\023\104\267\311\053\335\103\000\045\372\141\271\151\152\130\043
\021\267\247\063\217\126\165\131\365\315\051\327\106\267\012\053
\145\266\323\102\157\025\262\270\173\373\357\351\135\123\325\064
\132\047\002\003\001\000\001\243\201\334\060\201\331\060\035\006
\003\125\035\016\004\026\004\024\255\275\230\172\064\264\046\367
\372\304\046\124\357\003\275\340\044\313\124\032\060\013\006\003
\125\035\017\004\004\003\002\001\006\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\201\231\006\003\125
\035\043\004\201\221\060\201\216\200\024\255\275\230\172\064\264
\046\367\372\304\046\124\357\003\275\340\044\313\124\032\241\163
\244\161\060\157\061\013\060\011\006\003\125\004\006\023\002\123
\105\061\024\060\022\006\003\125\004\012\023\013\101\144\144\124
\162\165\163\164\040\101\102\061\046\060\044\006\003\125\004\013
\023\035\101\144\144\124\162\165\163\164\040\105\170\164\145\162
\156\141\154\040\124\124\120\040\116\145\164\167\157\162\153\061
\042\060\040\006\003\125\004\003\023\031\101\144\144\124\162\165
\163\164\040\105\170\164\145\162\156\141\154\040\103\101\040\122
\157\157\164\202\001\001\060\015\006\011\052\206\110\206\367\015
\001\001\005\005\000\003\202\001\001\000\260\233\340\205\045\302
\326\043\342\017\226\006\222\235\101\230\234\331\204\171\201\331
\036\133\024\007\043\066\145\217\260\330\167\273\254\101\154\107
\140\203\121\260\371\062\075\347\374\366\046\023\307\200\026\245
\277\132\374\207\317\170\171\211\041\232\342\114\007\012\206\065
\274\362\336\121\304\322\226\267\334\176\116\356\160\375\034\071
\353\014\002\121\024\055\216\275\026\340\301\337\106\165\347\044
\255\354\364\102\264\205\223\160\020\147\272\235\006\065\112\030
\323\053\172\314\121\102\241\172\143\321\346\273\241\305\053\302
\066\276\023\015\346\275\143\176\171\173\247\011\015\100\253\152
\335\217\212\303\366\366\214\032\102\005\121\324\105\365\237\247
\142\041\150\025\040\103\074\231\347\174\275\044\330\251\221\027
\163\210\077\126\033\061\070\030\264\161\017\232\315\310\016\236
\216\056\033\341\214\230\203\313\037\061\361\104\114\306\004\163
\111\166\140\017\307\370\275\027\200\153\056\351\314\114\016\132
\232\171\017\040\012\056\325\236\143\046\036\125\222\224\330\202
\027\132\173\320\274\307\217\116\206\004
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "AddTrust External CA Root"
# Issuer: CN=AddTrust External CA Root,OU=AddTrust External TTP Network,O=AddTrust AB,C=SE
# Serial Number: 1 (0x1)

```
# Subject: CN=AddTrust External CA Root,OU=AddTrust External TTP Network,O=AddTrust
 AB,C=SE
# Not Valid Before: Tue May 30 10:48:38 2000
# Not Valid After: Sat May 30 10:48:38 2020
# Fingerprint (MD5): 1d:35:54:04:85:78:b0:3f:42:42:4d:bf:20:73:0a:3f
# Fingerprint (SHA1): 02:fa:f3:e2:91:43:54:68:60:78:57:69:4d:f5:e4:5b:68:85:18:68
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AddTrust External CA Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\002\372\363\342\221\103\124\150\140\170\127\151\115\365\344\133
\150\205\030\150
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\035\065\124\004\205\170\260\077\102\102\115\277\040\163\012\077
END
CKA_ISSUER MULTILINE_OCTAL
\060\157\061\013\060\011\006\003\125\004\006\023\002\123\105\061
\024\060\022\006\003\125\004\012\023\013\101\144\144\124\162\165
\163\164\040\101\102\061\046\060\044\006\003\125\004\013\023\035
\101\144\144\124\162\165\163\164\040\105\170\164\145\162\156\141
\154\040\124\124\120\040\116\145\164\167\157\162\153\061\042\060
\040\006\003\125\004\003\023\031\101\144\144\124\162\165\163\164
\040\105\170\164\145\162\156\141\154\040\103\101\040\122\157\157
\164
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "ECRaizEstado"
# Issuer: CN=ECRaizEstado,O=SCEE,C=PT
# Serial Number:42:ea:5b:0a:51:11:26:7c:d8:27:74:b7:df:7f:71
# Subject: CN=ECRaizEstado,O=SCEE,C=PT
# Not Valid Before: Fri Jun 23 13:41:27 2006
# Not Valid After: Sun Jun 23 13:41:27 2030
# Fingerprint (MD5): c2:db:ab:8e:96:52:c5:ee:ae:f2:55:00:89:6d:55:95
# Fingerprint (SHA1): 39:13:85:3e:45:c4:39:a2:da:71:8c:df:b6:f3:e0:33:e0:4f:ee:71
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
```

CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
UTF8 "ECRaizEstado"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\063\061\013\060\011\006\003\125\004\006\023\002\120\124\061
\015\060\013\006\003\125\004\012\014\004\123\103\105\105\061\025
\060\023\006\003\125\004\003\014\014\105\103\122\141\151\172\105
\163\164\141\144\157
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\063\061\013\060\011\006\003\125\004\006\023\002\120\124\061
\015\060\013\006\003\125\004\012\014\004\123\103\105\105\061\025
\060\023\006\003\125\004\003\014\014\105\103\122\141\151\172\105
\163\164\141\144\157
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\017\102\352\133\012\121\021\046\174\330\047\164\267\337\177
\161
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\156\060\202\003\126\240\003\002\001\002\002\017\102
\352\133\012\121\021\046\174\330\047\164\267\337\177\161\060\015
\006\011\052\206\110\206\367\015\001\001\005\005\000\060\063\061
\013\060\011\006\003\125\004\006\023\002\120\124\061\015\060\013
\006\003\125\004\012\014\004\123\103\105\105\061\025\060\023\006
\003\125\004\003\014\014\105\103\122\141\151\172\105\163\164\141
\144\157\060\036\027\015\060\066\060\066\062\063\061\063\064\061
\062\067\132\027\015\063\060\060\066\062\063\061\063\064\061\062
\067\132\060\063\061\013\060\011\006\003\125\004\006\023\002\120
\124\061\015\060\013\006\003\125\004\012\014\004\123\103\105\105
\061\025\060\023\006\003\125\004\003\014\014\105\103\122\141\151
\172\105\163\164\141\144\157\060\202\002\042\060\015\006\011\052
\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060
\202\002\012\002\202\002\001\000\333\357\242\103\156\310\251\375
\156\327\337\254\242\222\204\241\310\131\240\014\232\123\376\357
\256\314\031\015\162\212\244\302\063\043\357\347\006\162\352\155
\113\072\101\122\017\311\110\016\055\347\272\144\356\242\072\114
\143\134\146\051\213\337\251\210\305\275\350\361\367\216\113\374
\001\074\104\022\071\052\160\242\300\333\305\242\337\137\307\113
\306\250\334\075\141\174\112\130\301\104\062\223\336\160\231\241
\043\046\126\077\243\341\352\137\060\106\330\170\365\060\243\226
\011\211\260\075\361\206\223\005\266\022\152\030\215\360\245\144
\073\053\207\144\136\075\027\216\013\156\346\230\314\227\070\070
\040\214\160\132\151\053\275\145\215\315\067\131\134\154\321\162
\164\131\006\116\310\267\001\327\167\277\360\110\206\250\263\032

\135\101\324\067\027\021\020\137\112\156\215\165\305\003\100\175
\041\256\000\360\333\374\237\154\072\146\244\337\367\312\337\200
\146\132\331\330\177\024\242\046\031\364\256\013\041\340\312\076
\005\335\026\330\176\131\332\241\260\151\303\235\064\023\372\145
\111\071\207\356\166\057\215\275\074\047\031\003\116\255\016\013
\053\054\306\056\161\023\065\051\127\351\160\334\033\121\352\315
\227\361\225\215\262\206\372\046\006\057\200\032\225\361\230\073
\356\366\345\206\245\316\033\001\345\364\351\063\312\017\125\104
\137\150\212\054\307\133\146\050\335\226\113\203\235\136\035\176
\030\325\376\262\140\373\232\121\150\303\226\214\037\150\113\120
\122\013\066\346\061\047\344\327\051\014\033\332\033\057\341\004
\123\270\324\171\111\260\073\201\136\010\210\042\167\342\051\300
\256\162\252\253\264\162\122\275\154\273\365\272\170\331\234\270
\040\157\060\215\112\235\062\371\364\001\346\142\171\230\102\100
\005\172\157\034\052\077\265\373\337\315\030\100\216\345\020\304
\071\133\126\361\074\127\005\253\322\071\115\077\370\213\043\307
\153\271\100\261\342\376\377\263\034\012\151\037\233\214\017\264
\037\340\012\336\110\375\215\137\217\231\365\001\166\005\066\135
\216\334\063\216\121\156\021\342\101\375\314\267\215\052\137\076
\222\345\362\261\340\244\043\342\242\267\306\215\030\233\051\112
\321\106\177\364\144\040\030\335\002\003\001\000\001\243\177\060
\175\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\006\060\035\006\003\125\035\016\004\026\004\024\161\177\065
\336\365\167\161\155\035\022\234\341\220\244\272\360\251\203\217
\200\060\073\006\003\125\035\040\004\064\060\062\060\060\006\004
\125\035\040\000\060\050\060\046\006\010\053\006\001\005\005\007
\002\001\026\032\150\164\164\160\072\057\057\167\167\167\056\145
\143\145\145\056\147\157\166\056\160\164\057\144\160\143\060\015
\006\011\052\206\110\206\367\015\001\001\005\005\000\003\202\002
\001\000\214\255\234\162\245\265\147\166\147\070\207\351\072\214
\376\235\131\065\276\220\361\003\000\240\130\330\230\321\277\374
\374\363\120\334\264\145\325\332\272\360\214\056\174\015\346\011
\221\137\115\243\366\135\170\234\130\135\152\160\224\243\257\333
\057\000\311\003\100\153\337\121\003\026\031\214\053\274\231\066
\366\300\255\222\030\023\214\247\355\035\322\337\003\220\005\354
\260\223\230\233\367\115\132\023\370\347\233\367\066\166\336\174
\046\370\021\070\117\111\116\263\163\037\137\047\133\341\236\062
\036\366\300\230\033\331\040\054\134\226\215\206\311\013\105\327
\222\255\212\275\352\127\242\243\126\266\040\074\354\262\307\071
\176\260\200\376\275\121\053\052\264\303\162\151\303\371\107\056
\156\377\234\207\355\334\165\313\020\210\340\264\316\056\016\123
\035\013\350\156\036\102\114\320\276\071\170\165\311\024\336\047
\221\163\252\354\152\200\360\360\027\226\142\117\276\004\313\342
\247\345\135\017\223\105\313\131\110\046\023\336\335\261\365\012
\332\026\261\250\035\217\176\130\033\267\325\011\336\210\153\316
\204\076\250\276\122\142\312\322\241\241\307\313\074\026\340\166
\126\060\077\346\017\153\006\167\376\144\235\132\152\163\174\356

\336\041\351\232\111\227\067\266\204\177\242\221\076\105\373\327
\132\006\305\207\065\334\272\110\114\206\001\010\107\066\266\070
\120\225\021\231\163\321\067\111\012\372\102\117\057\020\124\323
\101\220\372\310\334\273\021\334\015\314\175\174\233\334\016\221
\161\206\115\270\362\025\232\053\070\027\021\241\362\236\250\154
\234\343\316\256\342\346\113\213\362\212\006\073\007\167\002\021
\356\203\352\235\146\206\312\360\142\251\325\127\203\244\025\361
\105\024\376\032\165\177\245\017\334\122\164\131\165\012\370\373
\125\101\251\134\215\061\104\335\315\224\116\063\321\033\101\252
\333\327\241\074\360\305\110\155\105\101\065\265\171\203\346\371
\115\361\126\070\327\277\100\042\373\040\200\343\034\302\131\106
\007\143\002\141\000\073\233\120\273\103\303\260\351\012\232\270
\166\364\107\141\125\144\160\117\067\331\234\021\243\023\262\341
\335\100\102\273\230\327\240\006\213\346\150\127\113\016\070\150
\177\272
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "ECRaizEstado"
# Issuer: CN=ECRaizEstado,O=SCEE,C=PT
# Serial Number:42:ea:5b:0a:51:11:26:7c:d8:27:74:b7:df:7f:71
# Subject: CN=ECRaizEstado,O=SCEE,C=PT
# Not Valid Before: Fri Jun 23 13:41:27 2006
# Not Valid After: Sun Jun 23 13:41:27 2030
# Fingerprint (MD5): c2:db:ab:8e:96:52:c5:ee:ae:f2:55:00:89:6d:55:95
# Fingerprint (SHA1): 39:13:85:3e:45:c4:39:a2:da:71:8c:df:b6:f3:e0:33:e0:4f:ee:71
CKA_CLASS CK_OBJECT_CLASS
 CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ECRaizEstado"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\071\023\205\076\105\304\071\242\332\161\214\337\266\363\340\063
\340\117\356\161
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\302\333\253\216\226\122\305\356\256\362\125\000\211\155\125\225
END
CKA_ISSUER MULTILINE_OCTAL
\060\063\061\013\060\011\006\003\125\004\006\023\002\120\124\061
\015\060\013\006\003\125\004\012\014\004\123\103\105\105\061\025
\060\023\006\003\125\004\003\014\014\105\103\122\141\151\172\105
\163\164\141\144\157

```
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\017\102\352\133\012\121\021\046\174\330\047\164\267\337\177
\161
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Configuration"
#
 Issuer: CN=Posta CA Root,CN=AIA,CN=Public Key
Services,CN=Services,CN=Configuration,DC=ca,DC=posta,DC=rs
# Serial Number:48:fc:7e:f5
# Subject: CN=Posta CA Root,CN=AIA,CN=Public Key
Services,CN=Services,CN=Configuration,DC=ca,DC=posta,DC=rs
# Not Valid Before: Mon Oct 20 12:22:08 2008
# Not Valid After: Fri Oct 20 12:52:08 2028
# Fingerprint (MD5): 18:02:b0:01:27:03:6a:19:1b:32:3b:83:de:9a:a9:85
# Fingerprint (SHA1): d6:bf:79:94:f4:2b:e5:fa:29:da:0b:d7:58:7b:59:1f:47:a4:4f:22
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Configuration"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\256\061\022\060\020\006\012\011\222\046\211\223\362\054
\144\001\031\026\002\162\163\061\025\060\023\006\012\011\222\046
\211\223\362\054\144\001\031\026\005\160\157\163\164\141\061\022
\060\020\006\012\011\222\046\211\223\362\054\144\001\031\026\002
\143\141\061\026\060\024\006\003\125\004\003\023\015\103\157\156
\146\151\147\165\162\141\164\151\157\156\061\021\060\017\006\003
\125\004\003\023\010\123\145\162\166\151\143\145\163\061\034\060
\032\006\003\125\004\003\023\023\120\165\142\154\151\143\040\113
\145\171\040\123\145\162\166\151\143\145\163\061\014\060\012\006
\003\125\004\003\023\003\101\111\101\061\026\060\024\006\003\125
\004\003\023\015\120\157\163\164\141\040\103\101\040\122\157\157
\164
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\256\061\022\060\020\006\012\011\222\046\211\223\362\054
\144\001\031\026\002\162\163\061\025\060\023\006\012\011\222\046
\211\223\362\054\144\001\031\026\005\160\157\163\164\141\061\022
```

\060\020\006\012\011\222\046\211\223\362\054\144\001\031\026\002
\143\141\061\026\060\024\006\003\125\004\003\023\015\103\157\156
\146\151\147\165\162\141\164\151\157\156\061\021\060\017\006\003
\125\004\003\023\010\123\145\162\166\151\143\145\163\061\034\060
\032\006\003\125\004\003\023\023\120\165\142\154\151\143\040\113
\145\171\040\123\145\162\166\151\143\145\163\061\014\060\012\006
\003\125\004\003\023\003\101\111\101\061\026\060\024\006\003\125
\004\003\023\015\120\157\163\164\141\040\103\101\040\122\157\157
\164
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\004\110\374\176\365
END
CKA_VALUE MULTILINE_OCTAL
\060\202\007\037\060\202\006\007\240\003\002\001\002\002\004\110
\374\176\365\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\201\256\061\022\060\020\006\012\011\222\046\211\223
\362\054\144\001\031\026\002\162\163\061\025\060\023\006\012\011
\222\046\211\223\362\054\144\001\031\026\005\160\157\163\164\141
\061\022\060\020\006\012\011\222\046\211\223\362\054\144\001\031
\026\002\143\141\061\026\060\024\006\003\125\004\003\023\015\103
\157\156\146\151\147\165\162\141\164\151\157\156\061\021\060\017
\006\003\125\004\003\023\010\123\145\162\166\151\143\145\163\061
\034\060\032\006\003\125\004\003\023\023\120\165\142\154\151\143
\040\113\145\171\040\123\145\162\166\151\143\145\163\061\014\060
\012\006\003\125\004\003\023\003\101\111\101\061\026\060\024\006
\003\125\004\003\023\015\120\157\163\164\141\040\103\101\040\122
\157\157\164\060\036\027\015\060\070\061\060\062\060\061\062\062
\062\060\070\132\027\015\062\070\061\060\062\060\061\062\065\062
\060\070\132\060\201\256\061\022\060\020\006\012\011\222\046\211
\223\362\054\144\001\031\026\002\162\163\061\025\060\023\006\012
\011\222\046\211\223\362\054\144\001\031\026\005\160\157\163\164
\141\061\022\060\020\006\012\011\222\046\211\223\362\054\144\001
\031\026\002\143\141\061\026\060\024\006\003\125\004\003\023\015
\103\157\156\146\151\147\165\162\141\164\151\157\156\061\021\060
\017\006\003\125\004\003\023\010\123\145\162\166\151\143\145\163
\061\034\060\032\006\003\125\004\003\023\023\120\165\142\154\151
\143\040\113\145\171\040\123\145\162\166\151\143\145\163\061\014
\060\012\006\003\125\004\003\023\003\101\111\101\061\026\060\024
\006\003\125\004\003\023\015\120\157\163\164\141\040\103\101\040
\122\157\157\164\060\202\001\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012
\002\202\001\001\000\250\362\275\210\276\300\257\104\276\233\112
\242\143\034\326\126\253\035\051\262\034\252\025\036\105\321\254
\235\240\141\325\065\371\344\132\203\066\143\103\336\070\127\025
\374\360\224\142\364\007\200\127\203\127\250\263\025\274\373\115
\043\170\137\332\366\307\201\026\276\253\337\347\334\203\123\163

\053\266\335\143\210\215\105\363\015\335\175\277\350\210\260\146
\301\103\135\067\322\155\241\234\232\106\303\263\077\320\302\240
\212\224\056\203\246\074\303\140\275\054\314\036\213\143\202\166
\101\050\344\025\153\134\014\141\071\125\070\101\312\310\146\350
\307\270\227\122\020\046\160\267\007\267\011\036\246\023\136\256
\231\132\046\157\144\075\354\304\323\245\271\134\166\144\255\143
\175\210\203\342\113\314\015\336\324\306\323\010\102\365\133\027
\365\161\341\221\055\003\237\236\034\334\213\162\244\350\107\144
\020\207\144\060\163\330\362\264\361\127\046\223\127\313\266\307
\015\210\213\035\317\005\060\135\004\326\166\067\350\040\062\127
\277\017\234\063\306\010\214\366\264\302\251\006\260\133\060\241
\036\055\022\272\077\002\003\001\000\001\243\202\003\101\060\202
\003\075\060\017\006\003\125\035\023\001\001\377\004\005\060\003
\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\201\272\006\003\125\035\040\004\201\262\060\201
\257\060\201\254\006\013\053\006\001\004\001\372\070\012\012\001
\001\060\201\234\060\060\006\010\053\006\001\005\005\007\002\001
\026\044\150\164\164\160\072\057\057\167\167\167\056\143\141\056
\160\157\163\164\141\056\162\163\057\144\157\153\165\155\145\156
\164\141\143\151\152\141\060\150\006\010\053\006\001\005\005\007
\002\002\060\134\032\132\117\166\157\040\152\145\040\145\154\145
\153\164\162\157\156\163\153\151\040\163\145\162\164\151\146\151
\153\141\164\040\122\117\117\124\040\103\101\040\163\145\162\166
\145\162\141\040\123\145\162\164\151\146\151\153\141\143\151\157
\156\157\147\040\164\145\154\141\040\120\157\163\164\145\072\040
\042\120\157\163\164\141\040\103\101\040\122\157\157\164\042\056
\060\021\006\011\140\206\110\001\206\370\102\001\001\004\004\003
\002\000\007\060\202\001\274\006\003\125\035\037\004\202\001\263
\060\202\001\257\060\201\311\240\201\306\240\201\303\244\201\300
\060\201\275\061\022\060\020\006\012\011\222\046\211\223\362\054
\144\001\031\026\002\162\163\061\025\060\023\006\012\011\222\046
\211\223\362\054\144\001\031\026\005\160\157\163\164\141\061\022
\060\020\006\012\011\222\046\211\223\362\054\144\001\031\026\002
\143\141\061\026\060\024\006\003\125\004\003\023\015\103\157\156
\146\151\147\165\162\141\164\151\157\156\061\021\060\017\006\003
\125\004\003\023\010\123\145\162\166\151\143\145\163\061\034\060
\032\006\003\125\004\003\023\023\120\165\142\154\151\143\040\113
\145\171\040\123\145\162\166\151\143\145\163\061\014\060\012\006
\003\125\004\003\023\003\101\111\101\061\026\060\024\006\003\125
\004\003\023\015\120\157\163\164\141\040\103\101\040\122\157\157
\164\061\015\060\013\006\003\125\004\003\023\004\103\122\114\061
\060\201\340\240\201\335\240\201\332\206\201\243\154\144\141\160
\072\057\057\154\144\141\160\056\143\141\056\160\157\163\164\141
\056\162\163\057\143\156\075\120\157\163\164\141\045\062\060\103
\101\045\062\060\122\157\157\164\054\143\156\075\101\111\101\054
\143\156\075\120\165\142\154\151\143\045\062\060\113\145\171\045
\062\060\123\145\162\166\151\143\145\163\054\143\156\075\123\145
\162\166\151\143\145\163\054\143\156\075\103\157\156\146\151\147

\165\162\141\164\151\157\156\054\144\143\075\143\141\054\144\143
\075\160\157\163\164\141\054\144\143\075\162\163\077\143\145\162
\164\151\146\151\143\141\164\145\122\145\166\157\143\141\164\151
\157\156\114\151\163\164\045\063\102\142\151\156\141\162\171\206
\062\150\164\164\160\072\057\057\163\145\162\164\151\146\151\153
\141\164\151\056\143\141\056\160\157\163\164\141\056\162\163\057
\143\162\154\057\120\157\163\164\141\103\101\122\157\157\164\056
\143\162\154\060\053\006\003\125\035\020\004\044\060\042\200\017
\062\060\060\070\061\060\062\060\061\062\062\062\060\070\132\201
\017\062\060\062\070\061\060\062\060\061\062\065\062\060\070\132
\060\037\006\003\125\035\043\004\030\060\026\200\024\362\313\215
\342\065\357\020\103\304\332\173\312\372\353\211\003\241\042\257
\270\060\035\006\003\125\035\016\004\026\004\024\362\313\215\342
\065\357\020\103\304\332\173\312\372\353\211\003\241\042\257\270
\060\035\006\011\052\206\110\206\366\175\007\101\000\004\020\060
\016\033\010\126\067\056\061\072\064\056\060\003\002\004\220\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003\202
\001\001\000\160\106\241\310\344\027\005\146\017\235\342\103\061
\110\035\222\220\031\304\205\001\205\026\156\370\222\316\173\256
\122\026\304\227\215\012\050\175\325\313\154\343\325\345\016\062
\117\310\150\055\064\010\075\163\250\223\102\051\063\106\014\104
\147\361\320\232\234\151\001\345\221\361\015\311\151\074\063\113
\116\031\223\143\063\005\051\041\241\330\377\076\124\253\236\366
\241\172\002\327\334\377\245\076\124\170\371\323\301\312\022\225
\371\211\236\024\342\362\241\104\262\313\351\055\165\065\314\226
\125\273\070\013\210\046\332\326\254\357\323\122\242\013\113\072
\123\332\113\042\123\314\312\052\044\232\142\252\304\062\232\176
\334\314\301\262\154\315\217\331\264\300\317\365\002\300\214\053
\204\133\033\100\274\020\320\120\341\141\326\146\126\232\004\221
\245\343\325\275\240\056\042\201\261\331\070\332\344\250\207\137
\074\106\004\226\336\311\232\073\277\255\170\154\035\111\111\264
\151\271\160\017\005\222\126\266\375\257\256\370\040\055\107\043
\317\266\034\315\304\233\200\116\371\277\061\300\124\276\273\061
\177\363\076
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Configuration"
# Issuer: CN=Posta CA Root,CN=AIA,CN=Public Key
 Services,CN=Services,CN=Configuration,DC=ca,DC=posta,DC=rs
# Serial Number:48:fc:7e:f5
# Subject: CN=Posta CA Root,CN=AIA,CN=Public Key
Services,CN=Services,CN=Configuration,DC=ca,DC=posta,DC=rs
# Not Valid Before: Mon Oct 20 12:22:08 2008

```
# Not Valid After: Fri Oct 20 12:52:08 2028
# Fingerprint (MD5): 18:02:b0:01:27:03:6a:19:1b:32:3b:83:de:9a:a9:85
# Fingerprint (SHA1): d6:bf:79:94:f4:2b:e5:fa:29:da:0b:d7:58:7b:59:1f:47:a4:4f:22
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Configuration"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\326\277\171\224\364\053\345\372\051\332\013\327\130\173\131\037
\107\244\117\042
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\030\002\260\001\047\003\152\031\033\062\073\203\336\232\251\205
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\256\061\022\060\020\006\012\011\222\046\211\223\362\054
\144\001\031\026\002\162\163\061\025\060\023\006\012\011\222\046
\211\223\362\054\144\001\031\026\005\160\157\163\164\141\061\022
\060\020\006\012\011\222\046\211\223\362\054\144\001\031\026\002
\143\141\061\026\060\024\006\003\125\004\003\023\015\103\157\156
\146\151\147\165\162\141\164\151\157\156\061\021\060\017\006\003
\125\004\003\023\010\123\145\162\166\151\143\145\163\061\034\060
\032\006\003\125\004\003\023\023\120\165\142\154\151\143\040\113
\145\171\040\123\145\162\166\151\143\145\163\061\014\060\012\006
\003\125\004\003\023\003\101\111\101\061\026\060\024\006\003\125
\004\003\023\015\120\157\163\164\141\040\103\101\040\122\157\157
\164
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\004\110\374\176\365
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "StartCom Certification Authority"
# Issuer: CN=StartCom Certification Authority,OU=Secure
 Digital Certificate Signing,O=StartCom Ltd.,C=IL
# Serial Number: 1 (0x1)
# Subject: CN=StartCom Certification Authority,OU=Secure Digital Certificate Signing,O=StartCom Ltd.,C=IL
# Not Valid Before: Sun Sep 17 19:46:36 2006
# Not Valid After: Wed Sep 17 19:46:36 2036
# Fingerprint (MD5): 22:4d:8f:8a:fc:f7:35:c2:bb:57:34:90:7b:8b:22:16
# Fingerprint (SHA1): 3e:2b:f7:f2:03:1b:96:f3:8c:e6:c4:d8:a8:5d:3e:2d:58:47:6a:0f
```

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "StartCom Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\175\061\013\060\011\006\003\125\004\006\023\002\111\114\061
\026\060\024\006\003\125\004\012\023\015\123\164\141\162\164\103
\157\155\040\114\164\144\056\061\053\060\051\006\003\125\004\013
\023\042\123\145\143\165\162\145\040\104\151\147\151\164\141\154
\040\103\145\162\164\151\146\151\143\141\164\145\040\123\151\147
\156\151\156\147\061\051\060\047\006\003\125\004\003\023\040\123
\164\141\162\164\103\157\155\040\103\145\162\164\151\146\151\143
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\175\061\013\060\011\006\003\125\004\006\023\002\111\114\061
\026\060\024\006\003\125\004\012\023\015\123\164\141\162\164\103
\157\155\040\114\164\144\056\061\053\060\051\006\003\125\004\013
\023\042\123\145\143\165\162\145\040\104\151\147\151\164\141\154
\040\103\145\162\164\151\146\151\143\141\164\145\040\123\151\147
\156\151\156\147\061\051\060\047\006\003\125\004\003\023\040\123
\164\141\162\164\103\157\155\040\103\145\162\164\151\146\151\143
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\007\311\060\202\005\261\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\175\061\013\060\011\006\003\125\004\006\023\002\111\114\061\026
\060\024\006\003\125\004\012\023\015\123\164\141\162\164\103\157
\155\040\114\164\144\056\061\053\060\051\006\003\125\004\013\023
\042\123\145\143\165\162\145\040\104\151\147\151\164\141\154\040
\103\145\162\164\151\146\151\143\141\164\145\040\123\151\147\156
\151\156\147\061\051\060\047\006\003\125\004\003\023\040\123\164
\141\162\164\103\157\155\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\060\036
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CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL
 CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "StartCom Certification Authority"
# Issuer: CN=StartCom Certification Authority,OU=Secure Digital Certificate Signing,O=StartCom Ltd.,C=IL
# Serial Number: 1 (0x1)
# Subject: CN=StartCom Certification Authority,OU=Secure Digital Certificate Signing,O=StartCom Ltd.,C=IL
# Not Valid Before: Sun Sep 17 19:46:36 2006
# Not Valid After: Wed Sep 17 19:46:36 2036
# Fingerprint (MD5): 22:4d:8f:8a:fc:f7:35:c2:bb:57:34:90:7b:8b:22:16
# Fingerprint (SHA1): 3e:2b:f7:f2:03:1b:96:f3:8c:e6:c4:d8:a8:5d:3e:2d:58:47:6a:0f
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "StartCom Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\076\053\367\362\003\033\226\363\214\346\304\330\250\135\076\055
\130\107\152\017
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\042\115\217\212\374\367\065\302\273\127\064\220\173\213\042\026
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\175\061\013\060\011\006\003\125\004\006\023\002\111\114\061
\026\060\024\006\003\125\004\012\023\015\123\164\141\162\164\103
\157\155\040\114\164\144\056\061\053\060\051\006\003\125\004\013
\023\042\123\145\143\165\162\145\040\104\151\147\151\164\141\154
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END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
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END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "VeriSign Class 3 Public Primary Certification Authority
 - G4"
# Issuer: CN=VeriSign Class 3 Public Primary Certification Authority - G4,OU=(c) 2007 VeriSign\, Inc. - For
authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US
# Serial Number:2f:80:fe:23:8c:0e:22:0f:48:67:12:28:91:87:ac:b3
# Subject: CN=VeriSign Class 3 Public Primary Certification Authority - G4,OU=(c) 2007 VeriSign\, Inc. - For
authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US
# Not Valid Before: Mon Nov 05 00:00:00 2007
# Not Valid After: Mon Jan 18 23:59:59 2038
# Fingerprint (MD5): 3a:52:e1:e7:fd:6f:3a:e3:6f:f3:6f:99:1b:f9:22:41
# Fingerprint (SHA1): 22:d5:d8:df:8f:02:31:d1:8d:f7:9d:b7:cf:8a:2d:64:c9:3f:6c:3a
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "VeriSign Class 3 Public Primary Certification Authority - G4"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
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\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
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 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
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\043\320\254\326\174\065\006\316\315\151\275\220\015\333\154\110
\102\035\016\252\102\002\061\000\234\075\110\071\043\071\130\032
\025\022\131\152\236\357\325\131\262\035\122\054\231\161\315\307
\051\337\033\052\141\173\161\321\336\363\300\345\015\072\112\252
\055\247\330\206\052\335\056\020
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "VeriSign Class 3 Public Primary Certification Authority - G4"
# Issuer: CN=VeriSign Class 3 Public Primary Certification Authority - G4,OU=(c) 2007 VeriSign\, Inc. - For authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US
# Serial Number:2f:80:fe:23:8c:0e:22:0f:48:67:12:28:91:87:ac:b3
# Subject:
CN=VeriSign Class 3 Public Primary Certification Authority - G4,OU=(c) 2007 VeriSign\, Inc. - For authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US
# Not Valid Before: Mon Nov 05 00:00:00 2007
# Not Valid After: Mon Jan 18 23:59:59 2038
# Fingerprint (MD5): 3a:52:e1:e7:fd:6f:3a:e3:6f:f3:6f:99:1b:f9:22:41
# Fingerprint (SHA1): 22:d5:d8:df:8f:02:31:d1:8d:f7:9d:b7:cf:8a:2d:64:c9:3f:6c:3a
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

```
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "VeriSign Class 3 Public Primary Certification Authority - G4"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\042\325\330\337\217\002\061\321\215\367\235\267\317\212\055\144
\311\077\154\072
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\072\122\341\347\375\157\072\343\157\363\157\231\033\371\042\101
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\062\060\060\067\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040
\063\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\055\040\107\064
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\057\200\376\043\214\016\042\017\110\147\022\050\221\207
\254\263
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED
 CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "thawte Primary Root CA - G2"
# Issuer: CN=thawte Primary Root CA - G2,OU=(c) 2007 thawte\, Inc. - For authorized use only,O=thawte\,
Inc.,C=US
# Serial Number:35:fc:26:5c:d9:84:4f:c9:3d:26:3d:57:9b:ae:d7:56
# Subject: CN=thawte Primary Root CA - G2,OU=(c) 2007 thawte\, Inc. - For authorized use only,O=thawte\,
Inc.,C=US
# Not Valid Before: Mon Nov 05 00:00:00 2007
# Not Valid After: Mon Jan 18 23:59:59 2038
# Fingerprint (MD5): 74:9d:ea:60:24:c4:fd:22:53:3e:cc:3a:72:d9:29:4f
# Fingerprint (SHA1): aa:db:bc:22:23:8f:c4:01:a1:27:bb:38:dd:f4:1d:db:08:9e:f0:12
```

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "thawte Primary Root CA - G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\204\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\025\060\023\006\003\125\004\012\023\014\164\150\141\167\164
\145\054\040\111\156\143\056\061\070\060\066\006\003\125\004\013
\023\057\050\143\051\040\062\060\060\067\040\164\150\141\167\164
\145\054\040\111\156\143\056\040\055\040\106\157\162\040\141\165
\164\150\157\162\151\172\145\144\040\165\163\145\040\157\156\154
\171\061\044\060\042\006\003\125\004\003\023\033\164\150\141\167
\164\145\040\120\162\151\155\141\162\171\040\122\157\157\164\040
\103\101\040\055\040\107\062
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\204\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\025\060\023\006\003\125\004\012\023\014\164\150\141\167\164
\145\054\040\111\156\143\056\061\070\060\066\006\003\125\004\013
\023\057\050\143\051\040\062\060\060\067\040\164\150\141\167\164
\145\054\040\111\156\143\056\040\055\040\106\157\162\040\141\165
\164\150\157\162\151\172\145\144\040\165\163\145\040\157\156\154
\171\061\044\060\042\006\003\125\004\003\023\033\164\150\141\167
\164\145\040\120\162\151\155\141\162\171\040\122\157\157\164\040
\103\101\040\055\040\107\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\065\374\046\134\331\204\117\311\075\046\075\127\233\256
\327\126
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\210\060\202\002\015\240\003\002\001\002\002\020\065
\374\046\134\331\204\117\311\075\046\075\127\233\256\327\126\060
\012\006\010\052\206\110\316\075\004\003\003\060\201\204\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\025\060\023\006
\003\125\004\012\023\014\164\150\141\167\164\145\054\040\111\156
\143\056\061\070\060\066\006\003\125\004\013\023\057\050\143\051
\040\062\060\060\067\040\164\150\141\167\164\145\054\040\111\156
\143\056\040\055\040\106\157\162\040\141\165\164\150\157\162\151
\172\145\144\040\165\163\145\040\157\156\154\171\061\044\060\042
\006\003\125\004\003\023\033\164\150\141\167\164\145\040\120\162
\151\155\141\162\171\040\122\157\157\164\040\103\101\040\055\040
\107\062\060\036\027\015\060\067\061\061\060\065\060\060\060\060
```

\060\060\132\027\015\063\070\060\061\061\070\062\063\065\071\065
\071\132\060\201\204\061\013\060\011\006\003\125\004\006\023\002
\125\123\061\025\060\023\006\003\125\004\012\023\014\164\150\141
\167\164\145\054\040\111\156\143\056\061\070\060\066\006\003\125
\004\013\023\057\050\143\051\040\062\060\060\067\040\164\150\141
\167\164\145\054\040\111\156\143\056\040\055\040\106\157\162\040
\141\165\164\150\157\162\151\172\145\144\040\165\163\145\040\157
\156\154\171\061\044\060\042\006\003\125\004\003\023\033\164\150
\141\167\164\145\040\120\162\151\155\141\162\171\040\122\157\157
\164\040\103\101\040\055\040\107\062\060\166\060\020\006\007\052
\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142\000
\004\242\325\234\202\173\225\235\361\122\170\207\376\212\026\277
\005\346\337\243\002\117\015\007\306\000\121\272\014\002\122\055
\042\244\102\071\304\376\217\352\311\301\276\324\115\377\237\172
\236\342\261\174\232\255\247\206\011\163\207\321\347\232\343\172
\245\252\156\373\272\263\160\300\147\210\242\065\324\243\232\261
\375\255\302\357\061\372\250\271\363\373\010\306\221\321\373\051
\225\243\102\060\100\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\035\006\003\125\035\016\004\026\004
\024\232\330\000\060\000\347\153\177\205\030\356\213\266\316\212
\014\370\021\341\273\060\012\006\010\052\206\110\316\075\004\003
\003\003\151\000\060\146\002\061\000\335\370\340\127\107\133\247
\346\012\303\275\365\200\212\227\065\015\033\211\074\124\206\167
\050\312\241\364\171\336\265\346\070\260\360\145\160\214\177\002
\124\302\277\377\330\241\076\331\317\002\061\000\304\215\224\374
\334\123\322\334\235\170\026\037\025\063\043\123\122\343\132\061
\135\235\312\256\275\023\051\104\015\047\133\250\347\150\234\022
\367\130\077\056\162\002\127\243\217\241\024\056
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft
Code Signing Only Certificate
# Trust for "thawte Primary Root CA - G2"
# Issuer: CN=thawte Primary Root CA - G2,OU=(c) 2007 thawte\, Inc. - For authorized use only,O=thawte\, Inc.,C=US
# Serial Number:35:fc:26:5c:d9:84:4f:c9:3d:26:3d:57:9b:ae:d7:56
# Subject: CN=thawte Primary Root CA - G2,OU=(c) 2007 thawte\, Inc. - For authorized use only,O=thawte\, Inc.,C=US
# Not Valid Before: Mon Nov 05 00:00:00 2007
# Not Valid After: Mon Jan 18 23:59:59 2038
# Fingerprint (MD5): 74:9d:ea:60:24:c4:fd:22:53:3e:cc:3a:72:d9:29:4f
# Fingerprint (SHA1): aa:db:bc:22:23:8f:c4:01:a1:27:bb:38:dd:f4:1d:db:08:9e:f0:12
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

```
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "thawte Primary Root CA - G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\252\333\274\042\043\217\304\001\241\047\273\070\335\364\035\333
\010\236\360\022
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\164\235\352\140\044\304\375\042\123\076\314\072\162\331\051\117
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\201\204\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\025\060\023\006\003\125\004\012\023\014\164\150\141\167\164
\145\054\040\111\156\143\056\061\070\060\066\006\003\125\004\013
\023\057\050\143\051\040\062\060\060\067\040\164\150\141\167\164
\145\054\040\111\156\143\056\040\055\040\106\157\162\040\141\165
\164\150\157\162\151\172\145\144\040\165\163\145\040\157\156\154
\171\061\044\060\042\006\003\125\004\003\023\033\164\150\141\167
\164\145\040\120\162\151\155\141\162\171\040\122\157\157\164\040
\103\101\040\055\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\065\374\046\134\331\204\117\311\075\046\075\127\233\256
\327\126
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "GeoTrust Primary
 Certification Authority - G2"
# Issuer: CN=GeoTrust Primary Certification Authority - G2,OU=(c) 2007 GeoTrust Inc. - For authorized use
only,O=GeoTrust Inc.,C=US
# Serial Number:3c:b2:f4:48:0a:00:e2:fe:eb:24:3b:5e:60:3e:c3:6b
# Subject: CN=GeoTrust Primary Certification Authority - G2,OU=(c) 2007 GeoTrust Inc. - For authorized use
only,O=GeoTrust Inc.,C=US
# Not Valid Before: Mon Nov 05 00:00:00 2007
# Not Valid After: Mon Jan 18 23:59:59 2038
# Fingerprint (MD5): 01:5e:d8:6b:bd:6f:3d:8e:a1:31:f8:12:e0:98:73:6a
# Fingerprint (SHA1): 8d:17:84:d5:37:f3:03:7d:ec:70:fe:57:8b:51:9a:99:e6:10:d7:b0
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
```

```
CKA_LABEL UTF8 "GeoTrust Primary Certification Authority - G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\230\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162
\165\163\164\040\111\156\143\056\061\071\060\067\006\003\125\004
\013\023\060\050\143\051\040\062\060\060\067\040\107\145\157\124
\162\165\163\164\040\111\156\143\056\040\055\040\106\157\162\040
\141\165\164\150\157\162\151\172\145\144\040\165\163\145\040\157
\156\154\171\061\066\060\064\006\003\125\004\003\023\055\107\145
\157\124\162\165\163\164\040\120\162\151\155\141\162\171\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\040\055\040\107\062
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\230\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162
\165\163\164\040\111\156\143\056\061\071\060\067\006\003\125\004
\013\023\060\050\143\051\040\062\060\060\067\040\107\145\157\124
\162\165\163\164\040\111\156\143\056\040\055\040\106\157\162\040
\141\165\164\150\157\162\151\172\145\144\040\165\163\145\040\157
\156\154\171\061\066\060\064\006\003\125\004\003\023\055\107\145
\157\124\162\165\163\164\040\120\162\151\155\141\162\171\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\040\055\040\107\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\074\262\364\110\012\000\342\376\353\044\073\136\140\076
\303\153
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\256\060\202\002\065\240\003\002\001\002\002\020\074
\262\364\110\012\000\342\376\353\044\073\136\140\076\303\153\060
\012\006\010\052\206\110\316\075\004\003\003\060\201\230\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\026\060\024\006
\003\125\004\012\023\015\107\145\157\124\162\165\163\164\040\111
\156\143\056\061\071\060\067\006\003\125\004\013\023\060\050\143
\051\040\062\060\060\067\040\107\145\157\124\162\165\163\164\040
\111\156\143\056\040\055\040\106\157\162\040\141\165\164\150\157
\162\151\172\145\144\040\165\163\145\040\157\156\154\171\061\066
\060\064\006\003\125\004\003\023\055\107\145\157\124\162\165\163
\164\040\120\162\151\155\141\162\171\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\040\055\040\107\062\060\036\027\015\060\067\061\061\060\065
\060\060\060\060\060\060\132\027\015\063\070\060\061\061\070\062
```

\063\065\071\065\071\132\060\201\230\061\013\060\011\006\003\125
\004\006\023\002\125\123\061\026\060\024\006\003\125\004\012\023
\015\107\145\157\124\162\165\163\164\040\111\156\143\056\061\071
\060\067\006\003\125\004\013\023\060\050\143\051\040\062\060\060
\067\040\107\145\157\124\162\165\163\164\040\111\156\143\056\040
\055\040\106\157\162\040\141\165\164\150\157\162\151\172\145\144
\040\165\163\145\040\157\156\154\171\061\066\060\064\006\003\125
\004\003\023\055\107\145\157\124\162\165\163\164\040\120\162\151
\155\141\162\171\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\040\055\040\107
\062\060\166\060\020\006\007\052\206\110\316\075\002\001\006\005
\053\201\004\000\042\003\142\000\004\025\261\350\375\003\025\103
\345\254\353\207\067\021\142\357\322\203\066\122\175\105\127\013
\112\215\173\124\073\072\156\137\025\002\300\120\246\317\045\057
\175\312\110\270\307\120\143\034\052\041\010\174\232\066\330\013
\376\321\046\305\130\061\060\050\045\363\135\135\243\270\266\245
\264\222\355\154\054\237\353\335\103\211\242\074\113\110\221\035
\120\354\046\337\326\140\056\275\041\243\102\060\100\060\017\006
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035
\006\003\125\035\016\004\026\004\024\025\137\065\127\121\125\373
\045\262\255\003\151\374\001\243\372\276\021\125\325\060\012\006
\010\052\206\110\316\075\004\003\003\003\147\000\060\144\002\060
\144\226\131\246\350\011\336\213\272\372\132\210\210\360\037\221
\323\106\250\362\112\114\002\143\373\154\137\070\333\056\101\223
\251\016\346\235\334\061\034\262\240\247\030\034\171\341\307\066
\002\060\072\126\257\232\164\154\366\373\203\340\063\323\010\137
\241\234\302\133\237\106\326\266\313\221\006\143\242\006\347\063
\254\076\250\201\022\320\313\272\320\222\013\266\236\226\252\004
\017\212
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "GeoTrust Primary Certification Authority - G2"
# Issuer: CN=GeoTrust Primary Certification Authority - G2,OU=(c) 2007 GeoTrust Inc. - For authorized use only,O=GeoTrust Inc.,C=US
# Serial Number:3c:b2:f4:48:0a:00:e2:fe:eb:24:3b:5e:60:3e:c3:6b
# Subject: CN=GeoTrust Primary Certification Authority - G2,OU=(c) 2007 GeoTrust Inc. - For authorized use only,O=GeoTrust Inc.,C=US
# Not Valid Before: Mon Nov 05 00:00:00 2007
# Not Valid After: Mon Jan 18 23:59:59 2038
# Fingerprint (MD5): 01:5e:d8:6b:bd:6f:3d:8e:a1:31:f8:12:e0:98:73:6a
# Fingerprint (SHA1): 8d:17:84:d5:37:f3:03:7d:ec:70:fe:57:8b:51:9a:99:e6:10:d7:b0
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

```
CKA_TOKEN CK_BBOOL
 CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GeoTrust Primary Certification Authority - G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\215\027\204\325\067\363\003\175\354\160\376\127\213\121\232\231
\346\020\327\260
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\001\136\330\153\275\157\075\216\241\061\370\022\340\230\163\152
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\230\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162
\165\163\164\040\111\156\143\056\061\071\060\067\006\003\125\004
\013\023\060\050\143\051\040\062\060\060\067\040\107\145\157\124
\162\165\163\164\040\111\156\143\056\040\055\040\106\157\162\040
\141\165\164\150\157\162\151\172\145\144\040\165\163\145\040\157
\156\154\171\061\066\060\064\006\003\125\004\003\023\055\107\145
\157\124\162\165\163\164\040\120\162\151\155\141\162\171\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\040\055\040\107\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\074\262\364\110\012\000\342\376\353\044\073\136\140\076
\303\153
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "VeriSign Universal Root Certification Authority"
# Issuer: CN=VeriSign Universal Root Certification Authority,OU=(c) 2008 VeriSign\, Inc. - For authorized use
only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US
# Serial Number:40:1a:c4:64:21:b3:13:21:03:0e:bb:e4:12:1a:c5:1d
# Subject: CN=VeriSign Universal Root Certification Authority,OU=(c) 2008 VeriSign\, Inc. - For authorized use
only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US
# Not Valid Before: Wed Apr 02 00:00:00 2008
# Not Valid After: Tue Dec 01 23:59:59 2037
# Fingerprint (MD5): 8e:ad:b5:01:aa:4d:81:e4:8c:1d:d1:e1:14:00:95:19
#
 Fingerprint (SHA1): 36:79:ca:35:66:87:72:30:4d:30:a5:fb:87:3b:0f:a7:7b:b7:0d:54
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
```

CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "VeriSign Universal Root Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\275\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\062\060\060\070\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\070\060\066\006\003\125\004\003\023
\057\126\145\162\151\123\151\147\156\040\125\156\151\166\145\162
\163\141\154\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\275\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\062\060\060\070\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\070\060\066\006\003\125\004\003\023
\057\126\145\162\151\123\151\147\156\040\125\156\151\166\145\162
\163\141\154\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\100\032\304\144\041\263\023\041\003\016\273\344\022\032
\305\035
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\004\271\060\202\003\241\240\003\002\001\002\002\020\100
\032\304\144\041\263\023\041\003\016\273\344\022\032\305\035\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\201
\275\061\013\060\011\006\003\125\004\006\023\002\125\123\061\027
\060\025\006\003\125\004\012\023\016\126\145\162\151\123\151\147
\156\054\040\111\156\143\056\061\037\060\035\006\003\125\004\013
\023\026\126\145\162\151\123\151\147\156\040\124\162\165\163\164
\040\116\145\164\167\157\162\153\061\072\060\070\006\003\125\004

\013\023\061\050\143\051\040\062\060\060\070\040\126\145\162\151
\123\151\147\156\054\040\111\156\143\056\040\055\040\106\157\162
\040\141\165\164\150\157\162\151\172\145\144\040\165\163\145\040
\157\156\154\171\061\070\060\066\006\003\125\004\003\023\057\126
\145\162\151\123\151\147\156\040\125\156\151\166\145\162\163\141
\154\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\060\036
\027\015\060\070\060\064\060\062\060\060\060\060\060\060\132\027
\015\063\067\061\062\060\061\062\063\065\071\065\071\132\060\201
\275\061\013\060\011\006\003\125\004\006\023\002\125\123\061\027
\060\025\006\003\125\004\012\023\016\126\145\162\151\123\151\147
\156\054\040\111\156\143\056\061\037\060\035\006\003\125\004\013
\023\026\126\145\162\151\123\151\147\156\040\124\162\165\163\164
\040\116\145\164\167\157\162\153\061\072\060\070\006\003\125\004
\013\023\061\050\143\051\040\062\060\060\070\040\126\145\162\151
\123\151\147\156\054\040\111\156\143\056\040\055\040\106\157\162
\040\141\165\164\150\157\162\151\172\145\144\040\165\163\145\040
\157\156\154\171\061\070\060\066\006\003\125\004\003\023\057\126
\145\162\151\123\151\147\156\040\125\156\151\166\145\162\163\141
\154\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\060\202
\001\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\001\017\000\060\202\001\012\002\202\001\001\000\307
\141\067\136\261\001\064\333\142\327\025\233\377\130\132\214\043
\043\326\140\216\221\327\220\230\203\172\346\130\031\070\214\305
\366\345\144\205\264\242\161\373\355\275\271\332\315\115\000\264
\310\055\163\245\307\151\161\225\037\071\074\262\104\007\234\350
\016\372\115\112\304\041\337\051\141\217\062\042\141\202\305\207
\037\156\214\174\137\026\040\121\104\321\160\117\127\352\343\034
\343\314\171\356\130\330\016\302\263\105\223\300\054\347\232\027
\053\173\000\067\172\101\063\170\341\063\342\363\020\032\177\207
\054\276\366\365\367\102\342\345\277\207\142\211\137\000\113\337
\305\335\344\165\104\062\101\072\036\161\156\151\313\013\165\106
\010\321\312\322\053\225\320\317\373\271\100\153\144\214\127\115
\374\023\021\171\204\355\136\124\366\064\237\010\001\363\020\045
\006\027\112\332\361\035\172\146\153\230\140\146\244\331\357\322
\056\202\361\360\357\011\352\104\311\025\152\342\003\156\063\323
\254\237\125\000\307\366\010\152\224\271\137\334\340\063\361\204
\140\371\133\047\021\264\374\026\362\273\126\152\200\045\215\002
\003\001\000\001\243\201\262\060\201\257\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\006\060\155\006\010\053
\006\001\005\005\007\001\014\004\141\060\137\241\135\240\133\060
\131\060\127\060\125\026\011\151\155\141\147\145\057\147\151\146
\060\041\060\037\060\007\006\005\053\016\003\002\032\004\024\217
\345\323\032\206\254\215\216\153\303\317\200\152\324\110\030\054
\173\031\056\060\045\026\043\150\164\164\160\072\057\057\154\157
\147\157\056\166\145\162\151\163\151\147\156\056\143\157\155\057

\166\163\154\157\147\157\056\147\151\146\060\035\006\003\125\035
\016\004\026\004\024\266\167\372\151\110\107\237\123\022\325\302
\352\007\062\166\007\321\227\007\031\060\015\006\011\052\206\110
\206\367\015\001\001\013\005\000\003\202\001\001\000\112\370\370
\260\003\346\054\147\173\344\224\167\143\314\156\114\371\175\016
\015\334\310\271\065\271\160\117\143\372\044\372\154\203\214\107
\235\073\143\363\232\371\166\062\225\221\261\167\274\254\232\276
\261\344\061\041\306\201\225\126\132\016\261\302\324\261\246\131
\254\361\143\313\270\114\035\131\220\112\357\220\026\050\037\132
\256\020\373\201\120\070\014\154\314\361\075\303\365\143\343\263
\343\041\311\044\071\351\375\025\146\106\364\033\021\320\115\163
\243\175\106\371\075\355\250\137\142\324\361\077\370\340\164\127
\053\030\235\201\264\304\050\332\224\227\245\160\353\254\035\276
\007\021\360\325\333\335\345\214\360\325\062\260\203\346\127\342
\217\277\276\241\252\277\075\035\265\324\070\352\327\260\134\072
\117\152\077\217\300\146\154\143\252\351\331\244\026\364\201\321
\225\024\016\175\315\225\064\331\322\217\160\163\201\173\234\176
\275\230\141\330\105\207\230\220\305\353\206\060\306\065\277\360
\377\303\125\210\203\113\357\005\222\006\161\362\270\230\223\267
\354\315\202\141\361\070\346\117\227\230\052\132\215
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "VeriSign Universal Root Certification Authority"
# Issuer: CN=VeriSign Universal Root Certification Authority,OU=(c) 2008 VeriSign\, Inc. - For authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US
# Serial Number:40:1a:c4:64:21:b3:13:21:03:0e:bb:e4:12:1a:c5:1d
# Subject: CN=VeriSign Universal Root Certification Authority,OU=(c) 2008 VeriSign\, Inc. - For authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US
# Not Valid Before: Wed Apr 02 00:00:00 2008
# Not Valid After: Tue Dec 01 23:59:59 2037
# Fingerprint (MD5): 8e:ad:b5:01:aa:4d:81:e4:8c:1d:d1:e1:14:00:95:19
# Fingerprint (SHA1): 36:79:ca:35:66:87:72:30:4d:30:a5:fb:87:3b:0f:a7:7b:b7:0d:54
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
 CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "VeriSign Universal Root Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\066\171\312\065\146\207\162\060\115\060\245\373\207\073\017\247
\173\267\015\124
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL

\216\255\265\001\252\115\201\344\214\035\321\341\024\000\225\031
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\275\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\062\060\060\070\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\070\060\066\006\003\125\004\003\023
\057\126\145\162\151\123\151\147\156\040\125\156\151\166\145\162
\163\141\154\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\100\032\304\144\041\263\023\041\003\016\273\344\022\032
\305\035
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "thawte Primary Root CA - G3"
# Issuer: CN=thawte Primary Root CA - G3,OU=(c) 2008 thawte\, Inc. - For authorized use only,OU=Certification Services Division,O=thawte\, Inc.,C=US
# Serial Number:60:01:97:b7:46:a7:ea:b4:b4:9a:d6:4b:2f:f7:90:fb
# Subject: CN=thawte Primary Root CA - G3,OU=(c) 2008 thawte\, Inc. - For authorized use only,OU=Certification Services Division,O=thawte\, Inc.,C=US
# Not Valid Before: Wed Apr 02 00:00:00 2008
# Not Valid After:
Tue Dec 01 23:59:59 2037
# Fingerprint (MD5): fb:1b:5d:43:8a:94:cd:44:c6:76:f2:43:4b:47:e7:31
# Fingerprint (SHA1): f1:8b:53:8d:1b:e9:03:b6:a6:f0:56:43:5b:17:15:89:ca:f3:6b:f2
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "thawte Primary Root CA - G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\256\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\025\060\023\006\003\125\004\012\023\014\164\150\141\167\164
\145\054\040\111\156\143\056\061\050\060\046\006\003\125\004\013

\023\037\103\145\162\164\151\146\151\143\141\164\151\157\156\040
\123\145\162\166\151\143\145\163\040\104\151\166\151\163\151\157
\156\061\070\060\066\006\003\125\004\013\023\057\050\143\051\040
\062\060\060\070\040\164\150\141\167\164\145\054\040\111\156\143
\056\040\055\040\106\157\162\040\141\165\164\150\157\162\151\172
\145\144\040\165\163\145\040\157\156\154\171\061\044\060\042\006
\003\125\004\003\023\033\164\150\141\167\164\145\040\120\162\151
\155\141\162\171\040\122\157\157\164\040\103\101\040\055\040\107
\063
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\256\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\025\060\023\006\003\125\004\012\023\014\164\150\141\167\164
\145\054\040\111\156\143\056\061\050\060\046\006\003\125\004\013
\023\037\103\145\162\164\151\146\151\143\141\164\151\157\156\040
\123\145\162\166\151\143\145\163\040\104\151\166\151\163\151\157
\156\061\070\060\066\006\003\125\004\013\023\057\050\143\051\040
\062\060\060\070\040\164\150\141\167\164\145\054\040\111\156\143
\056\040\055\040\106\157\162\040\141\165\164\150\157\162\151\172
\145\144\040\165\163\145\040\157\156\154\171\061\044\060\042\006
\003\125\004\003\023\033\164\150\141\167\164\145\040\120\162\151
\155\141\162\171\040\122\157\157\164\040\103\101\040\055\040\107
\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\140\001\227\267\106\247\352\264\264\232\326\113\057\367
\220\373
END
CKA_VALUE
 MULTILINE_OCTAL
\060\202\004\052\060\202\003\022\240\003\002\001\002\002\020\140
\001\227\267\106\247\352\264\264\232\326\113\057\367\220\373\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\201
\256\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025
\060\023\006\003\125\004\012\023\014\164\150\141\167\164\145\054
\040\111\156\143\056\061\050\060\046\006\003\125\004\013\023\037
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\123\145
\162\166\151\143\145\163\040\104\151\166\151\163\151\157\156\061
\070\060\066\006\003\125\004\013\023\057\050\143\051\040\062\060
\060\070\040\164\150\141\167\164\145\054\040\111\156\143\056\040
\055\040\106\157\162\040\141\165\164\150\157\162\151\172\145\144
\040\165\163\145\040\157\156\154\171\061\044\060\042\006\003\125
\004\003\023\033\164\150\141\167\164\145\040\120\162\151\155\141
\162\171\040\122\157\157\164\040\103\101\040\055\040\107\063\060
\036\027\015\060\070\060\064\060\062\060\060\060\060\060\060\132
\027\015\063\067\061\062\060\061\062\063\065\071\065\071\132\060

\201\256\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\025\060\023\006\003\125\004\012\023\014\164\150\141\167\164\145
\054\040\111\156\143\056\061\050\060\046\006\003\125\004\013\023
\037\103\145\162\164\151\146\151\143\141\164\151\157\156\040\123
\145\162\166\151\143\145\163\040\104\151\166\151\163\151\157\156
\061\070\060\066\006\003\125\004\013\023\057\050\143\051\040\062
\060\060\070\040\164\150\141\167\164\145\054\040\111\156\143\056
\040\055\040\106\157\162\040\141\165\164\150\157\162\151\172\145
\144\040\165\163\145\040\157\156\154\171\061\044\060\042\006\003
\125\004\003\023\033\164\150\141\167\164\145\040\120\162\151\155
\141\162\171\040\122\157\157\164\040\103\101\040\055\040\107\063
\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001
\000\262\277\047\054\373\333\330\133\335\170\173\033\236\167\146
\201\313\076\274\174\256\363\246\047\232\064\243\150\061\161\070
\063\142\344\363\161\146\171\261\251\145\243\245\213\325\217\140
\055\077\102\314\252\153\062\300\043\313\054\101\335\344\337\374
\141\234\342\163\262\042\225\021\103\030\137\304\266\037\127\154
\012\005\130\042\310\066\114\072\174\245\321\317\206\257\210\247
\104\002\023\164\161\163\012\102\131\002\370\033\024\153\102\337
\157\137\272\153\202\242\235\133\347\112\275\036\001\162\333\113
\164\350\073\177\177\175\037\004\264\046\233\340\264\132\254\107
\075\125\270\327\260\046\122\050\001\061\100\146\330\331\044\275
\366\052\330\354\041\111\134\233\366\172\351\177\125\065\176\226
\153\215\223\223\047\313\222\273\352\254\100\300\237\302\370\200
\317\135\364\132\334\316\164\206\246\076\154\013\123\312\275\222
\316\031\006\162\346\014\134\070\151\307\004\326\274\154\316\133
\366\367\150\234\334\045\025\110\210\241\351\251\370\230\234\340
\363\325\061\050\141\021\154\147\226\215\071\231\313\302\105\044
\071\002\003\001\000\001\243\102\060\100\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003\125
\035\016\004\026\004\024\255\154\252\224\140\234\355\344\377\372
\076\012\164\053\143\003\367\266\131\277\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\003\202\001\001\000\032\100
\330\225\145\254\011\222\211\306\071\364\020\345\251\016\146\123
\135\170\336\372\044\221\273\347\104\121\337\306\026\064\012\357
\152\104\121\352\053\007\212\003\172\303\353\077\012\054\122\026
\240\053\103\271\045\220\077\160\251\063\045\155\105\032\050\073
\047\317\252\303\051\102\033\337\073\114\300\063\064\133\101\210
\277\153\053\145\257\050\357\262\365\303\252\146\316\173\126\356
\267\310\313\147\301\311\234\032\030\270\304\303\111\003\361\140
\016\120\315\106\305\363\167\171\367\266\025\340\070\333\307\057
\050\240\014\077\167\046\164\331\045\022\332\061\332\032\036\334
\051\101\221\042\074\151\247\273\002\362\266\134\047\003\211\364
\006\352\233\344\162\202\343\241\011\301\351\000\031\323\076\324
\160\153\272\161\246\252\130\256\364\273\351\154\266\357\207\314
\233\273\377\071\346\126\141\323\012\247\304\134\114\140\173\005

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\167\046\172\277\330\007\122\054\142\367\160\143\331\071\274\157
\034\302\171\334\166\051\257\316\305\054\144\004\136\210\066\156
\061\324\100\032\142\064\066\077\065\001\256\254\143\240
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "thawte Primary Root CA - G3"
# Issuer: CN=thawte Primary Root CA - G3,OU=(c) 2008 thawte\, Inc. - For authorized use only,OU=Certification
Services Division,O=thawte\, Inc.,C=US
# Serial Number:60:01:97:b7:46:a7:ea:b4:b4:9a:d6:4b:2f:f7:90:fb
# Subject: CN=thawte Primary Root CA - G3,OU=(c) 2008 thawte\, Inc. - For authorized use only,OU=Certification
Services Division,O=thawte\, Inc.,C=US
#
 Not Valid Before: Wed Apr 02 00:00:00 2008
# Not Valid After: Tue Dec 01 23:59:59 2037
# Fingerprint (MD5): fb:1b:5d:43:8a:94:cd:44:c6:76:f2:43:4b:47:e7:31
# Fingerprint (SHA1): f1:8b:53:8d:1b:e9:03:b6:a6:f0:56:43:5b:17:15:89:ca:f3:6b:f2
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "thawte Primary Root CA - G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\361\213\123\215\033\351\003\266\246\360\126\103\133\027\025\211
\312\363\153\362
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\373\033\135\103\212\224\315\104\306\166\362\103\113\107\347\061
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\256\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\025\060\023\006\003\125\004\012\023\014\164\150\141\167\164
\145\054\040\111\156\143\056\061\050\060\046\006\003\125\004\013
\023\037\103\145\162\164\151\146\151\143\141\164\151\157\156\040
\123\145\162\166\151\143\145\163\040\104\151\166\151\163\151\157
\156\061\070\060\066\006\003\125\004\013\023\057\050\143\051\040
\062\060\060\070\040\164\150\141\167\164\145\054\040\111\156\143
\056\040\055\040\106\157\162\040\141\165\164\150\157\162\151\172
\145\144\040\165\163\145\040\157\156\154\171\061\044\060\042\006
\003\125\004\003\023\033\164\150\141\167\164\145\040\120\162\151
\155\141\162\171\040\122\157\157\164\040\103\101\040\055\040\107
\063
END
CKA_SERIAL_NUMBER
```

MULTILINE_OCTAL
\002\020\140\001\227\267\106\247\352\264\264\232\326\113\057\367
\220\373
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "GeoTrust Primary Certification Authority - G3"
# Issuer: CN=GeoTrust Primary Certification Authority - G3,OU=(c) 2008 GeoTrust Inc. - For authorized use only,O=GeoTrust Inc.,C=US
# Serial Number:15:ac:6e:94:19:b2:79:4b:41:f6:27:a9:c3:18:0f:1f
#
Subject: CN=GeoTrust Primary Certification Authority - G3,OU=(c) 2008 GeoTrust Inc. - For authorized use only,O=GeoTrust Inc.,C=US
# Not Valid Before: Wed Apr 02 00:00:00 2008
# Not Valid After: Tue Dec 01 23:59:59 2037
# Fingerprint (MD5): b5:e8:34:36:c9:10:44:58:48:70:6d:2e:83:d4:b8:05
# Fingerprint (SHA1): 03:9e:ed:b8:0b:e7:a0:3c:69:53:89:3b:20:d2:d9:32:3a:4c:2a:fd
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GeoTrust Primary Certification Authority - G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\230\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162
\165\163\164\040\111\156\143\056\061\071\060\067\006\003\125\004
\013\023\060\050\143\051\040\062\060\060\070\040\107\145\157\124
\162\165\163\164\040\111\156\143\056\040\055\040\106\157\162\040
\141\165\164\150\157\162\151\172\145\144\040\165\163\145\040\157
\156\154\171\061\066\060\064\006\003\125\004\003\023\055\107\145
\157\124\162\165\163\164\040\120\162\151\155\141\162\171\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\040\055\040\107\063
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\230\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162
\165\163\164\040\111\156\143\056\061\071\060\067\006\003\125\004
\013\023\060\050\143\051\040\062\060\060\070\040\107\145\157\124
\162\165\163\164\040\111\156\143\056\040\055\040\106\157\162\040
\141\165\164\150\157\162\151\172\145\144\040\165\163\145\040\157

\156\154\171\061\066\060\064\006\003\125\004\003\023\055\107\145
\157\124\162\165\163\164\040\120\162\151\155\141\162\171\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\040\055\040\107\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\025\254\156\224\031\262\171\113\101\366\047\251\303\030
\017\037
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\376\060\202\002\346\240\003\002\001\002\002\020\025
\254\156\224\031\262\171\113\101\366\047\251\303\030\017\037\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\201
\230\061\013\060\011\006\003\125\004\006\023\002\125\123\061\026
\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165\163
\164\040\111\156\143\056\061\071\060\067\006\003\125\004\013\023
\060\050\143\051\040\062\060\060\070\040\107\145\157\124\162\165
\163\164\040\111\156\143\056\040\055\040\106\157\162\040\141\165
\164\150\157\162\151\172\145\144\040\165\163\145\040\157\156\154
\171\061\066\060\064\006\003\125\004\003\023\055\107\145\157\124
\162\165\163\164\040\120\162\151\155\141\162\171\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171\040\055\040\107\063\060\036\027\015\060\070\060
\064\060\062\060\060\060\060\060\060\132\027\015\063\067\061\062
\060\061\062\063\065\071\065\071\132\060\201\230\061\013\060\011
\006\003\125\004\006\023\002\125\123\061\026\060\024\006\003\125
\004\012\023\015\107\145\157\124\162\165\163\164\040\111\156\143
\056\061\071\060\067\006\003\125\004\013\023\060\050\143\051\040
\062\060\060\070\040\107\145\157\124\162\165\163\164\040\111\156
\143\056\040\055\040\106\157\162\040\141\165\164\150\157\162\151
\172\145\144\040\165\163\145\040\157\156\154\171\061\066\060\064
\006\003\125\004\003\023\055\107\145\157\124\162\165\163\164\040
\120\162\151\155\141\162\171\040\103\145\162\164\151\146\151\143
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040
\055\040\107\063\060\202\001\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012
\002\202\001\001\000\334\342\136\142\130\035\063\127\071\062\063
\372\353\313\207\214\247\324\112\335\006\210\352\144\216\061\230
\245\070\220\036\230\317\056\143\053\360\106\274\104\262\211\241
\300\050\014\111\160\041\225\237\144\300\246\223\022\002\145\046
\206\306\245\211\360\372\327\204\240\160\257\117\032\227\077\006
\104\325\311\353\162\020\175\344\061\050\373\034\141\346\050\007
\104\163\222\042\151\247\003\210\154\235\143\310\122\332\230\047
\347\010\114\160\076\264\311\022\301\305\147\203\135\063\363\003
\021\354\152\320\123\342\321\272\066\140\224\200\273\141\143\154
\133\027\176\337\100\224\036\253\015\302\041\050\160\210\377\326
\046\154\154\140\004\045\116\125\176\175\357\277\224\110\336\267

\035\335\160\215\005\137\210\245\233\362\302\356\352\321\100\101
\155\142\070\035\126\006\305\003\107\121\040\031\374\173\020\013
\016\142\256\166\125\277\137\167\276\076\111\001\123\075\230\045
\003\166\044\132\035\264\333\211\352\171\345\266\263\073\077\272
\114\050\101\177\006\254\152\216\301\320\366\005\035\175\346\102
\206\343\245\325\107\002\003\001\000\001\243\102\060\100\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060
\035\006\003\125\035\016\004\026\004\024\304\171\312\216\241\116
\003\035\034\334\153\333\061\133\224\076\077\060\177\055\060\015
\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202\001
\001\000\055\305\023\317\126\200\173\172\170\275\237\256\054\231
\347\357\332\337\224\136\011\151\247\347\156\150\214\275\162\276
\107\251\016\227\022\270\112\361\144\323\071\337\045\064\324\301
\315\116\201\360\017\004\304\044\263\064\226\306\246\252\060\337
\150\141\163\327\371\216\205\211\357\016\136\225\050\112\052\047
\217\020\216\056\174\206\304\002\236\332\014\167\145\016\104\015
\222\375\375\263\026\066\372\021\015\035\214\016\007\211\152\051
\126\367\162\364\335\025\234\167\065\146\127\253\023\123\330\216
\301\100\305\327\023\026\132\162\307\267\151\001\304\172\261\203
\001\150\175\215\101\241\224\030\301\045\134\374\360\376\203\002
\207\174\015\015\317\056\010\134\112\100\015\076\354\201\141\346
\044\333\312\340\016\055\007\262\076\126\334\215\365\101\205\007
\110\233\014\013\313\111\077\175\354\267\375\313\215\147\211\032
\253\355\273\036\243\000\010\010\027\052\202\134\061\135\106\212
\055\017\206\233\164\331\105\373\324\100\261\172\252\150\055\206
\262\231\042\341\301\053\307\234\370\363\137\250\202\022\353\031
\021\055
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "GeoTrust Primary Certification Authority - G3"
# Issuer: CN=GeoTrust Primary Certification Authority - G3,OU=(c) 2008 GeoTrust Inc. - For authorized use only,O=GeoTrust Inc.,C=US
# Serial Number:15:ac:6e:94:19:b2:79:4b:41:f6:27:a9:c3:18:0f:1f
# Subject: CN=GeoTrust Primary Certification Authority - G3,OU=(c) 2008 GeoTrust Inc. - For authorized use only,O=GeoTrust Inc.,C=US
# Not Valid Before: Wed Apr 02 00:00:00 2008
# Not Valid After: Tue Dec 01 23:59:59 2037
# Fingerprint (MD5): b5:e8:34:36:c9:10:44:58:48:70:6d:2e:83:d4:b8:05
#
Fingerprint (SHA1): 03:9e:ed:b8:0b:e7:a0:3c:69:53:89:3b:20:d2:d9:32:3a:4c:2a:fd
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE

```
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GeoTrust Primary Certification Authority - G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\003\236\355\270\013\347\240\074\151\123\211\073\040\322\331\062
\072\114\052\375
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\265\350\064\066\311\020\104\130\110\160\155\056\203\324\270\005
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\230\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162
\165\163\164\040\111\156\143\056\061\071\060\067\006\003\125\004
\013\023\060\050\143\051\040\062\060\060\070\040\107\145\157\124
\162\165\163\164\040\111\156\143\056\040\055\040\106\157\162\040
\141\165\164\150\157\162\151\172\145\144\040\165\163\145\040\157
\156\154\171\061\066\060\064\006\003\125\004\003\023\055\107\145
\157\124\162\165\163\164\040\120\162\151\155\141\162\171\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\040\055\040\107\063
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\025\254\156\224\031\262\171\113\101\366\047\251\303\030
\017\037
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "E-ME SSI (RCA)"
# Issuer: CN=E-ME SSI (RCA),OU=Sertifikacijas pakalpojumu dala,C=LV
# Serial Number:2e:ef:db:fb:d8:89:3d:8f:49:1c:93:72:fe:45:df:ed
# Subject: CN=E-ME SSI (RCA),OU=Sertifikacijas pakalpojumu dala,C=LV
# Not Valid Before: Tue May 19 08:45:56 2009
# Not Valid After: Wed May 19 08:48:15 2027
# Fingerprint (MD5): cb:bd:c3:68:2d:b3:cb:18:59:d3:29:52:e8:c6:64:89
# Fingerprint (SHA1): c9:32:1d:e6:b5:a8:26:66:cf:69:71:a1:8a:56:f2:d3:a8:67:56:02
CKA_CLASS
 CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "E-ME SSI (RCA)"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
```

CKA_SUBJECT MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\114\126\061
\050\060\046\006\003\125\004\013\023\037\123\145\162\164\151\146
\151\153\141\143\151\152\141\163\040\160\141\153\141\154\160\157
\152\165\155\165\040\144\141\154\141\061\027\060\025\006\003\125
\004\003\023\016\105\055\115\105\040\123\123\111\040\050\122\103
\101\051
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\114\126\061
\050\060\046\006\003\125\004\013\023\037\123\145\162\164\151\146
\151\153\141\143\151\152\141\163\040\160\141\153\141\154\160\157
\152\165\155\165\040\144\141\154\141\061\027\060\025\006\003\125
\004\003\023\016\105\055\115\105\040\123\123\111\040\050\122\103
\101\051
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\056\357\333\373\330\211\075\217\111\034\223\162\376\105
\337\355
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\340\060\202\003\310\240\003\002\001\002\002\020\056
\357\333\373\330\211\075\217\111\034\223\162\376\105\337\355\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\120
\061\013\060\011\006\003\125\004\006\023\002\114\126\061\050\060
\046\006\003\125\004\013\023\037\123\145\162\164\151\146\151\153
\141\143\151\152\141\163\040\160\141\153\141\154\160\157\152\165
\155\165\040\144\141\154\141\061\027\060\025\006\003\125\004\003
\023\016\105\055\115\105\040\123\123\111\040\050\122\103\101\051
\060\036\027\015\060\071\060\065\061\071\060\070\064\065\065\066
\132\027\015\062\067\060\065\061\071\060\070\064\070\061\065\132
\060\120\061\013\060\011\006\003\125\004\006\023\002\114\126\061
\050\060\046\006\003\125\004\013\023\037\123\145\162\164\151\146
\151\153\141\143\151\152\141\163\040\160\141\153\141\154\160\157
\152\165\155\165\040\144\141\154\141\061\027\060\025\006\003\125
\004\003\023\016\105\055\115\105\040\123\123\111\040\050\122\103
\101\051\060\202\002\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202
\002\001\000\304\004\153\000\303\260\340\056\073\350\123\005\005
\010\276\310\204\047\125\326\035\212\022\342\027\042\132\154\377
\263\335\266\231\303\312\301\352\371\330\045\265\337\072\235\235
\077\122\305\351\362\254\277\211\164\212\124\256\116\317\156\362
\136\256\332\275\022\007\231\225\317\144\253\376\231\221\144\131
\214\311\276\104\152\061\233\230\352\272\352\321\041\016\050\013
\071\233\343\326\212\246\367\002\272\077\075\331\131\364\171\231
\336\323\044\233\213\160\033\052\204\326\345\011\017\046\046\044

\130\217\045\136\363\305\235\164\211\245\066\305\345\122\262\353
\350\206\223\107\156\247\051\207\244\176\334\264\243\313\062\126
\367\105\200\332\134\307\057\240\247\327\357\365\374\265\250\315
\204\225\142\370\251\053\043\073\155\323\267\222\310\352\301\274
\024\115\350\153\234\026\172\323\354\007\373\007\045\020\117\024
\207\173\222\066\316\126\202\145\113\023\046\006\330\243\243\246
\337\302\172\373\173\065\005\242\023\075\076\166\274\034\127\203
\003\121\307\064\336\132\365\074\275\066\045\234\026\017\115\316
\350\015\032\313\135\103\242\024\157\272\174\140\324\002\205\166
\305\153\052\270\105\261\134\167\107\021\255\240\045\251\146\221
\214\121\027\155\141\125\012\031\077\233\002\377\304\365\326\322
\263\351\045\123\341\004\075\217\042\320\242\145\345\256\247\264
\340\035\221\152\302\206\222\367\072\135\023\247\172\114\102\337
\132\263\112\210\104\054\357\107\272\251\257\326\317\142\163\212
\006\042\026\054\302\354\037\006\250\323\107\120\131\062\022\345
\271\235\142\065\236\312\136\012\264\235\043\210\302\323\117\054
\054\311\223\350\176\270\011\354\246\331\335\143\341\311\250\152
\150\334\204\121\254\132\022\347\073\246\265\007\012\261\252\116
\263\264\242\127\337\067\154\026\116\253\231\062\172\360\234\043
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\014\022\131\006\201\046\066\132\017\065\163\324\026\105\375\336
\225\336\326\113\134\237\163\331\276\031\275\347\277\344\125\152
\310\153\104\367\307\270\063\210\171\031\015\006\144\350\257\013
\241\165\014\122\145\272\012\043\225\161\367\143\374\176\345\214
\217\314\321\002\003\001\000\001\243\201\265\060\201\262\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\030
\006\010\053\006\001\005\005\007\001\003\004\014\060\012\060\010
\006\006\004\000\216\106\001\001\060\017\006\003\125\035\023\001
\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016
\004\026\004\024\073\046\003\272\317\343\131\106\102\120\255\024
\234\277\003\073\357\326\076\061\060\020\006\011\053\006\001\004
\001\202\067\025\001\004\003\002\001\000\060\104\006\003\125\035
\040\004\075\060\073\060\071\006\013\053\006\001\004\001\201\372
\075\001\001\001\060\052\060\050\006\010\053\006\001\005\005\007
\002\001\026\034\150\164\164\160\072\057\057\167\167\167\056\145
\155\145\056\154\166\057\162\145\160\157\163\151\164\157\162\171
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003
\202\002\001\000\205\346\246\224\344\331\106\137\235\277\223\273
\371\153\166\144\050\256\277\074\105\052\212\223\171\154\323\113
\210\206\040\153\042\046\070\075\034\023\252\353\141\227\154\056
\076\127\234\154\103\242\336\155\100\304\061\362\155\272\106\026
\263\055\306\273\246\334\345\057\261\330\301\325\221\036\021\177
\373\137\241\334\035\141\370\155\233\141\360\342\077\053\161\325
\015\313\336\337\145\077\240\157\225\233\172\313\333\065\067\051
\135\136\235\271\124\261\254\140\022\345\143\331\315\257\122\033
\005\226\023\174\332\044\165\001\255\324\236\245\313\301\022\105
\117\127\257\043\277\051\274\352\216\255\170\370\207\043\350\110
\313\100\250\276\135\063\326\354\306\006\103\302\147\052\350\343

\205\056\140\236\104\057\053\117\061\261\007\235\225\041\325\052
\222\257\200\221\323\307\051\275\315\361\025\014\237\001\356\370
\055\073\244\007\160\111\171\044\355\274\241\323\226\121\202\237
\302\310\274\336\043\232\307\120\053\232\266\170\122\252\316\225
\366\140\073\242\231\371\046\146\364\107\054\101\045\274\101\372
\326\213\177\275\137\202\174\323\105\205\264\114\330\354\263\027
\357\104\072\365\050\145\357\365\236\161\314\041\336\350\326\121
\034\020\373\100\374\111\345\134\204\027\257\252\031\136\242\355
\116\036\242\373\312\107\034\034\144\076\024\221\242\071\031\064
\210\177\221\313\073\235\031\160\352\050\373\374\120\017\314\275
\075\136\002\003\153\171\065\104\101\166\356\266\055\164\204\341
\202\161\323\045\260\323\303\231\104\253\077\342\014\245\356\275
\246\374\244\021\000\356\234\275\067\321\326\142\304\060\024\055
\020\012\227\212\210\365\045\074\226\276\106\100\032\212\300\205
\166\304\240\111\340\111\245\347\031\265\011\363\314\115\355\026
\136\232\324\323\310\151\320\330\212\067\205\153\116\344\252\007
\222\134\324\161\161\201\110\323\170\365\126\140\376\314\002\324
\000\223\037\114\222\100\227\276\162\123\171\056\046\122\276\246
\243\164\261\224\331\024\143\072\156\133\321\074\222\047\122\220
\062\132\222\322\017\116\133\013\006\072\142\345\326\047\014\001
\366\045\002\270\213\020\051\102\251\367\151\312\334\353\012\222
\113\050\061\206
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "E-ME SSI (RCA)"
# Issuer: CN=E-ME SSI (RCA),OU=Sertifikacijas pakalpojumu dala,C=LV
# Serial Number:2e:ef:db:fb:d8:89:3d:8f:49:1c:93:72:fe:45:df:ed
# Subject: CN=E-ME SSI (RCA),OU=Sertifikacijas pakalpojumu dala,C=LV
# Not Valid Before: Tue May 19 08:45:56 2009
# Not Valid After: Wed May 19 08:48:15 2027
# Fingerprint (MD5): cb:bd:c3:68:2d:b3:cb:18:59:d3:29:52:e8:c6:64:89
# Fingerprint (SHA1): c9:32:1d:e6:b5:a8:26:66:cf:69:71:a1:8a:56:f2:d3:a8:67:56:02
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL
 CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "E-ME SSI (RCA)"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\311\062\035\346\265\250\046\146\317\151\161\241\212\126\362\323
\250\147\126\002
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL

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\313\275\303\150\055\263\313\030\131\323\051\122\350\306\144\211
END
CKA_ISSUER MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\114\126\061
\050\060\046\006\003\125\004\013\023\037\123\145\162\164\151\146
\151\153\141\143\151\152\141\163\040\160\141\153\141\154\160\157
\152\165\155\165\040\144\141\154\141\061\027\060\025\006\003\125
\004\003\023\016\105\055\115\105\040\123\123\111\040\050\122\103
\101\051
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\056\357\333\373\330\211\075\217\111\034\223\162\376\105
\337\355
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

#
 Microsoft Code Signing Only Certificate
# Certificate "ACEDICOM Root"
# Issuer: C=ES,O=EDICOM,OU=PKI,CN=ACEDICOM Root
# Serial Number:61:8d:c7:86:3b:01:82:05
# Subject: C=ES,O=EDICOM,OU=PKI,CN=ACEDICOM Root
# Not Valid Before: Fri Apr 18 16:24:22 2008
# Not Valid After: Thu Apr 13 16:24:22 2028
# Fingerprint (MD5): 42:81:a0:e2:1c:e3:55:10:de:55:89:42:65:96:22:e6
# Fingerprint (SHA1): e0:b4:32:2e:b2:f6:a5:68:b6:54:53:84:48:18:4a:50:36:87:43:84
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ACEDICOM Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\104\061\026\060\024\006\003\125\004\003\014\015\101\103\105
\104\111\103\117\115\040\122\157\157\164\061\014\060\012\006\003
\125\004\013\014\003\120\113\111\061\017\060\015\006\003\125\004
\012\014\006\105\104\111\103\117\115\061\013\060\011\006\003\125
\004\006\023\002\105\123
END
CKA_ID UTF8 "0"
CKA_ISSUER
 MULTILINE_OCTAL
\060\104\061\026\060\024\006\003\125\004\003\014\015\101\103\105
\104\111\103\117\115\040\122\157\157\164\061\014\060\012\006\003
\125\004\013\014\003\120\113\111\061\017\060\015\006\003\125\004
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\012\014\006\105\104\111\103\117\115\061\013\060\011\006\003\125
\004\006\023\002\105\123
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\141\215\307\206\073\001\202\005
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\265\060\202\003\235\240\003\002\001\002\002\010\141
\215\307\206\073\001\202\005\060\015\006\011\052\206\110\206\367
\015\001\001\005\005\000\060\104\061\026\060\024\006\003\125\004
\003\014\015\101\103\105\104\111\103\117\115\040\122\157\157\164
\061\014\060\012\006\003\125\004\013\014\003\120\113\111\061\017
\060\015\006\003\125\004\012\014\006\105\104\111\103\117\115\061
\013\060\011\006\003\125\004\006\023\002\105\123\060\036\027\015
\060\070\060\064\061\070\061\066\062\064\062\062\132\027\015\062
\070\060\064\061\063\061\066\062\064\062\062\132\060\104\061\026
\060\024\006\003\125\004\003\014\015\101\103\105\104\111\103\117
\115\040\122\157\157\164\061\014\060\012\006\003\125\004\013\014
\003\120\113\111\061\017\060\015\006\003\125\004\012\014\006\105
\104\111\103\117\115\061\013\060\011\006\003\125\004\006\023\002
\105\123\060\202\002\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202
\002\001\000\377\222\225\341\150\006\166\264\054\310\130\110\312
\375\200\124\051\125\143\044\377\220\145\233\020\165\173\303\152
\333\142\002\001\362\030\206\265\174\132\070\261\344\130\271\373
\323\330\055\237\275\062\067\277\054\025\155\276\265\364\041\322
\023\221\331\007\255\001\005\326\363\275\167\316\137\102\201\012
\371\152\343\203\000\250\053\056\125\023\143\201\312\107\034\173
\134\026\127\172\033\203\140\004\072\076\145\303\315\001\336\336
\244\326\014\272\216\336\331\004\356\027\126\042\233\217\143\375
\115\026\013\267\173\167\214\371\045\265\321\155\231\022\056\117
\032\270\346\352\004\222\256\075\021\271\121\102\075\207\260\061
\205\257\171\132\234\376\347\116\136\222\117\103\374\253\072\255
\245\022\046\146\271\342\014\327\230\316\324\130\245\225\100\012
\267\104\235\023\164\053\302\245\353\042\025\230\020\330\213\305
\004\237\035\217\140\345\006\033\233\317\271\171\240\075\242\043
\077\102\077\153\372\034\003\173\060\215\316\154\300\277\346\033
\137\277\147\270\204\031\325\025\357\173\313\220\066\061\142\311
\274\002\253\106\137\233\376\032\150\224\064\075\220\216\255\366
\344\035\011\177\112\210\070\077\276\147\375\064\226\365\035\274
\060\164\313\070\356\325\154\253\324\374\364\000\267\000\133\205
\062\026\166\063\351\330\243\231\235\005\000\252\026\346\363\201
\175\157\175\252\206\155\255\025\164\323\304\242\161\252\364\024
\175\347\062\270\037\274\325\361\116\275\157\027\002\071\327\016
\225\102\072\307\000\076\351\046\143\021\352\013\321\112\377\030
\235\262\327\173\057\072\331\226\373\350\036\222\256\023\125\310
\331\047\366\334\110\033\260\044\301\205\343\167\235\232\244\363
\014\021\035\015\310\264\024\356\265\202\127\011\277\040\130\177

\057\042\043\330\160\313\171\154\311\113\362\251\052\310\374\207
\053\327\032\120\370\047\350\057\103\343\072\275\330\127\161\375
\316\246\122\133\371\335\115\355\345\366\157\211\355\273\223\234
\166\041\165\360\222\114\051\367\057\234\001\056\376\120\106\236
\144\014\024\263\007\133\305\302\163\154\361\007\134\105\044\024
\065\256\203\361\152\115\211\172\372\263\330\055\146\360\066\207
\365\053\123\002\003\001\000\001\243\201\252\060\201\247\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\037\006\003\125\035\043\004\030\060\026\200\024\246\263\341\053
\053\111\266\327\163\241\252\224\365\001\347\163\145\114\254\120
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\206
\060\035\006\003\125\035\016\004\026\004\024\246\263\341\053\053
\111\266\327\163\241\252\224\365\001\347\163\145\114\254\120\060
\104\006\003\125\035\040\004\075\060\073\060\071\006\004\125\035
\040\000\060\061\060\057\006\010\053\006\001\005\005\007\002\001
\026\043\150\164\164\160\072\057\057\141\143\145\144\151\143\157
\155\056\145\144\151\143\157\155\147\162\157\165\160\056\143\157
\155\057\144\157\143\060\015\006\011\052\206\110\206\367\015\001
\001\005\005\000\003\202\002\001\000\316\054\013\122\121\142\046
\175\014\047\203\217\305\366\332\240\150\173\117\222\136\352\244
\163\062\021\123\104\262\104\313\235\354\017\171\102\263\020\246
\307\015\235\313\266\372\077\072\174\352\277\210\123\033\074\367
\202\372\005\065\063\341\065\250\127\300\347\375\215\117\077\223
\062\117\170\146\003\167\007\130\351\225\310\176\076\320\171\000
\214\362\033\121\063\233\274\224\351\072\173\156\122\055\062\236
\043\244\105\373\266\056\023\260\213\030\261\335\316\325\035\247
\102\177\125\276\373\133\273\107\324\374\044\315\004\256\226\005
\025\326\254\316\060\363\312\013\305\272\342\042\340\246\255\042
\344\002\356\164\021\177\114\377\170\035\065\332\346\002\064\353
\030\022\141\167\006\011\026\143\352\030\255\242\207\037\362\307
\200\011\011\165\116\020\250\217\075\206\270\165\021\300\044\142
\212\226\173\112\105\351\354\131\305\276\153\203\346\341\350\254
\265\060\036\376\005\007\200\371\341\043\015\120\217\005\230\377
\054\137\350\073\266\255\317\201\265\041\207\312\010\052\043\047
\060\040\053\317\355\224\133\254\262\172\322\307\050\241\212\013
\233\115\112\054\155\205\077\011\162\074\147\342\331\334\007\272
\353\145\173\132\001\143\326\220\133\117\027\146\075\177\013\031
\243\223\143\020\122\052\237\024\026\130\342\334\245\364\241\026
\213\016\221\213\201\312\233\131\372\330\153\221\007\145\125\137
\122\037\257\072\373\220\335\151\245\133\234\155\016\054\266\372
\316\254\245\174\062\112\147\100\334\060\064\043\335\327\004\043
\146\360\374\125\200\247\373\146\031\202\065\147\142\160\071\136
\157\307\352\220\100\104\010\036\270\262\326\333\356\131\247\015
\030\171\064\274\124\030\136\123\312\064\121\355\105\012\346\216
\307\202\066\076\247\070\143\251\060\054\027\020\140\222\237\125
\207\022\131\020\302\017\147\151\021\314\116\036\176\112\232\255
\257\100\250\165\254\126\220\164\270\240\234\245\171\157\334\351
\032\310\151\005\351\272\372\003\263\174\344\340\116\302\316\235

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\350\266\106\015\156\176\127\072\147\224\302\313\037\234\167\112
\147\116\151\206\103\223\070\373\266\333\117\203\221\324\140\176
\113\076\053\070\007\125\230\136\244
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "ACEDICOM Root"
# Issuer: C=ES,O=EDICOM,OU=PKI,CN=ACEDICOM Root
# Serial Number:61:8d:c7:86:3b:01:82:05
# Subject: C=ES,O=EDICOM,OU=PKI,CN=ACEDICOM Root
# Not Valid Before: Fri Apr 18 16:24:22 2008
# Not Valid After: Thu Apr 13 16:24:22 2028
# Fingerprint (MD5): 42:81:a0:e2:1c:e3:55:10:de:55:89:42:65:96:22:e6
# Fingerprint (SHA1): e0:b4:32:2e:b2:f6:a5:68:b6:54:53:84:48:18:4a:50:36:87:43:84
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN
 CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ACEDICOM Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\340\264\062\056\262\366\245\150\266\124\123\204\110\030\112\120
\066\207\103\204
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\102\201\240\342\034\343\125\020\336\125\211\102\145\226\042\346
END
CKA_ISSUER MULTILINE_OCTAL
\060\104\061\026\060\024\006\003\125\004\003\014\015\101\103\105
\104\111\103\117\115\040\122\157\157\164\061\014\060\012\006\003
\125\004\013\014\003\120\113\111\061\017\060\015\006\003\125\004
\012\014\006\105\104\111\103\117\115\061\013\060\011\006\003\125
\004\006\023\002\105\123
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\141\215\307\206\073\001\202\005
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
#
```

Certificate "Autoridad Certificadora Raiz de la Secretaria de Economia"
# Issuer: 1.2.840.113549.1.9.1=acrse@economia.gob.mx,O=Secretaria de Economia,OU=Direccion General de Normatividad Mercantil,CN=Autoridad Certificadora Raiz de la Secretaria de Economia,STREET=Insurgentes Sur 1940,2.5.4.17=01030,C=MX,ST=Distrito Federal,L=Alvaro Obregon
# Serial Number: 1 (0x1)
# Subject: 1.2.840.113549.1.9.1=acrse@economia.gob.mx,O=Secretaria de Economia,OU=Direccion General de Normatividad Mercantil,CN=Autoridad Certificadora Raiz de la Secretaria de Economia,STREET=Insurgentes Sur 1940,2.5.4.17=01030,C=MX,ST=Distrito Federal,L=Alvaro Obregon
# Not Valid Before: Sun May 08 00:00:00 2005
# Not Valid After: Thu May 08 00:00:00 2025
# Fingerprint (MD5): 07:61:92:04:7e:a6:b9:cd:5e:6b:00:7a:e3:bf:1d:04
# Fingerprint (SHA1): 34:d4:99:42:6f:9f:c2:bb:27:b0:75:ba:b6:82:aa:e5:ef:fc:ba:74
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Autoridad Certificadora Raiz de la Secretaria de Economia"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\202\001\061\061\027\060\025\006\003\125\004\007\023\016\101
\154\166\141\162\157\040\117\142\162\145\147\157\156\061\031\060
\027\006\003\125\004\010\023\020\104\151\163\164\162\151\164\157
\040\106\145\144\145\162\141\154\061\013\060\011\006\003\125\004
\006\023\002\115\130\061\016\060\014\006\003\125\004\021\023\005
\060\061\060\063\060\061\035\060\033\006\003\125\004\011\023\024
\111\156\163\165\162\147\145\156\164\145\163\040\123\165\162\040
\061\071\064\060\061\102\060\100\006\003\125\004\003\023\071\101
\165\164\157\162\151\144\141\144\040\103\145\162\164\151\146\151
\143\141\144\157\162\141\040\122\141\151\172\040\144\145\040\154
\141\040\123\145\143\162\145\164\141\162\151\141\040\144\145\040
\105\143\157\156\157\155\151\141\061\064\060\062\006\003\125\004
\013\023\053\104\151\162\145\143\143\151\157\156\040\107\145\156
\145\162\141\154\040\144\145\040\116\157\162\155\141\164\151\166
\151\144\141\144\040\115\145\162\143\141\156\164\151\154\061\037
\060\035\006\003\125\004\012\023\026\123\145\143\162\145\164\141
\162\151\141\040\144\145\040\105\143\157\156\157\155\151\141\061
\044\060\042\006\011\052\206\110\206\367\015\001\011\001\026\025
\141\143\162\163\145\100\145\143\157\156\157\155\151\141\056\147
\157\142\056\155\170
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\202\001\061\061\027\060\025\006\003\125\004\007\023\016\101
\154\166\141\162\157\040\117\142\162\145\147\157\156\061\031\060
\027\006\003\125\004\010\023\020\104\151\163\164\162\151\164\157
\040\106\145\144\145\162\141\154\061\013\060\011\006\003\125\004

\006\023\002\115\130\061\016\060\014\006\003\125\004\021\023\005
\060\061\060\063\060\061\035\060\033\006\003\125\004\011\023\024
\111\156\163\165\162\147\145\156\164\145\163\040\123\165\162\040
\061\071\064\060\061\102\060\100\006\003\125\004\003\023\071\101
\165\164\157\162\151\144\141\144\040\103\145\162\164\151\146\151
\143\141\144\157\162\141\040\122\141\151\172\040\144\145\040\154
\141\040\123\145\143\162\145\164\141\162\151\141\040\144\145\040
\105\143\157\156\157\155\151\141\061\064\060\062\006\003\125\004
\013\023\053\104\151\162\145\143\143\151\157\156\040\107\145\156
\145\162\141\154\040\144\145\040\116\157\162\155\141\164\151\166
\151\144\141\144\040\115\145\162\143\141\156\164\151\154\061\037
\060\035\006\003\125\004\012\023\026\123\145\143\162\145\164\141
\162\151\141\040\144\145\040\105\143\157\156\157\155\151\141\061
\044\060\042\006\011\052\206\110\206\367\015\001\011\001\026\025
\141\143\162\163\145\100\145\143\157\156\157\155\151\141\056\147
\157\142\056\155\170
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\224\060\202\004\174\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\202\001\061\061\027\060\025\006\003\125\004\007\023\016\101\154
\166\141\162\157\040\117\142\162\145\147\157\156\061\031\060\027
\006\003\125\004\010\023\020\104\151\163\164\162\151\164\157\040
\106\145\144\145\162\141\154\061\013\060\011\006\003\125\004\006
\023\002\115\130\061\016\060\014\006\003\125\004\021\023\005\060
\061\060\063\060\061\035\060\033\006\003\125\004\011\023\024\111
\156\163\165\162\147\145\156\164\145\163\040\123\165\162\040\061
\071\064\060\061\102\060\100\006\003\125\004\003\023\071\101\165
\164\157\162\151\144\141\144\040\103\145\162\164\151\146\151\143
\141\144\157\162\141\040\122\141\151\172\040\144\145\040\154\141
\040\123\145\143\162\145\164\141\162\151\141\040\144\145\040\105
\143\157\156\157\155\151\141\061\064\060\062\006\003\125\004\013
\023\053\104\151\162\145\143\143\151\157\156\040\107\145\156\145
\162\141\154\040\144\145\040\116\157\162\155\141\164\151\166\151
\144\141\144\040\115\145\162\143\141\156\164\151\154\061\037\060
\035\006\003\125\004\012\023\026\123\145\143\162\145\164\141\162
\151\141\040\144\145\040\105\143\157\156\157\155\151\141\061\044
\060\042\006\011\052\206\110\206\367\015\001\011\001\026\025\141
\143\162\163\145\100\145\143\157\156\157\155\151\141\056\147\157
\142\056\155\170\060\036\027\015\060\065\060\065\060\070\060\060
\060\060\060\060\132\027\015\062\065\060\065\060\070\060\060\060
\060\060\060\132\060\202\001\061\061\027\060\025\006\003\125\004
\007\023\016\101\154\166\141\162\157\040\117\142\162\145\147\157
\156\061\031\060\027\006\003\125\004\010\023\020\104\151\163\164

\162\151\164\157\040\106\145\144\145\162\141\154\061\013\060\011
\006\003\125\004\006\023\002\115\130\061\016\060\014\006\003\125
\004\021\023\005\060\061\060\063\060\061\035\060\033\006\003\125
\004\011\023\024\111\156\163\165\162\147\145\156\164\145\163\040
\123\165\162\040\061\071\064\060\061\102\060\100\006\003\125\004
\003\023\071\101\165\164\157\162\151\144\141\144\040\103\145\162
\164\151\146\151\143\141\144\157\162\141\040\122\141\151\172\040
\144\145\040\154\141\040\123\145\143\162\145\164\141\162\151\141
\040\144\145\040\105\143\157\156\157\155\151\141\061\064\060\062
\006\003\125\004\013\023\053\104\151\162\145\143\143\151\157\156
\040\107\145\156\145\162\141\154\040\144\145\040\116\157\162\155
\141\164\151\166\151\144\141\144\040\115\145\162\143\141\156\164
\151\154\061\037\060\035\006\003\125\004\012\023\026\123\145\143
\162\145\164\141\162\151\141\040\144\145\040\105\143\157\156\157
\155\151\141\061\044\060\042\006\011\052\206\110\206\367\015\001
\011\001\026\025\141\143\162\163\145\100\145\143\157\156\157\155
\151\141\056\147\157\142\056\155\170\060\202\001\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017
\000\060\202\001\012\002\202\001\001\000\301\144\240\364\347\122
\160\262\352\223\023\364\065\072\037\352\072\034\305\033\213\130
\341\226\326\002\101\136\216\205\100\377\101\146\100\123\374\230
\265\321\062\062\227\147\100\200\235\356\040\077\016\124\373\102
\007\373\167\032\231\330\206\364\034\052\210\045\363\351\104\243
\116\376\007\276\261\310\357\074\215\207\340\036\312\111\020\073
\050\357\044\121\241\374\210\027\112\347\034\310\124\147\143\350
\152\061\346\103\154\366\100\021\206\304\126\356\275\311\035\246
\106\074\036\106\302\202\215\056\251\350\356\166\012\103\340\162
\115\214\364\305\006\372\054\001\000\063\140\316\070\160\064\153
\027\032\353\172\144\141\247\223\244\145\152\327\043\307\166\172
\224\121\013\354\236\250\317\073\242\120\062\034\102\275\143\341
\207\313\271\205\110\016\300\325\130\266\366\316\113\362\007\317
\343\004\325\037\302\326\243\156\243\273\266\267\156\304\361\242
\037\026\274\266\055\260\357\364\132\233\051\215\274\341\374\007
\133\036\011\063\202\170\314\100\155\161\263\143\023\057\323\114
\066\254\071\117\306\301\260\266\365\205\002\003\001\000\001\243
\201\262\060\201\257\060\063\006\003\125\035\037\004\054\060\052
\060\050\240\046\240\044\206\042\150\164\164\160\072\057\057\141
\143\056\145\143\157\156\157\155\151\141\056\147\157\142\056\155
\170\057\154\141\163\164\056\143\162\154\060\107\006\003\125\035
\040\004\100\060\076\060\074\006\010\140\203\144\145\012\202\074
\001\060\060\060\056\006\010\053\006\001\005\005\007\002\001\026
\042\150\164\164\160\072\057\057\141\143\056\145\143\157\156\157
\155\151\141\056\147\157\142\056\155\170\057\143\160\163\056\150
\164\155\154\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\013\006\003\125\035\017\004\004\003\002\001
\006\060\021\006\011\140\206\110\001\206\370\102\001\001\004\004
\003\002\000\007\060\015\006\011\052\206\110\206\367\015\001\001
\005\005\000\003\202\001\001\000\114\052\170\123\004\226\163\140

\253\065\254\300\304\343\347\310\160\245\051\057\207\030\345\250
\202\336\007\325\010\364\317\236\075\236\374\112\054\026\174\237
\242\235\145\020\314\301\033\233\152\147\332\262\263\035\377\315
\144\172\070\143\255\110\375\363\162\341\372\237\273\127\335\277
\314\302\124\330\225\074\146\327\153\006\272\257\251\340\155\010
\357\244\266\220\075\014\156\040\027\247\226\247\174\150\112\234
\230\304\007\157\301\002\142\221\070\233\235\343\212\171\123\235
\237\044\166\045\366\255\050\126\006\252\357\007\254\272\366\154
\344\045\061\175\210\200\072\170\106\370\171\341\070\340\023\347
\141\051\107\363\313\024\000\323\332\342\335\355\163\337\113\362
\143\344\046\330\165\320\115\103\024\220\026\224\107\001\377\241
\131\113\344\166\233\131\003\336\326\027\366\173\327\134\370\351
\343\157\310\116\340\107\046\261\342\234\174\112\061\345\144\021
\340\260\137\332\221\066\110\037\372\011\212\145\150\365\016\302
\237\357\270\152\317\167\376\022\355\066\332\021\066\255\031\152
\302\324\216\122\327\150\357\061
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Autoridad Certificadora Raiz de la Secretaria de Economia"
# Issuer: 1.2.840.113549.1.9.1=acrse@economia.gob.mx,O=Secretaria de Economia,OU=Direccion General de Normatividad
Mercantil,CN=Autoridad Certificadora Raiz de la Secretaria de Economia,STREET=Insurgentes Sur 1940,2.5.4.17=01030,C=MX,ST=Distrito Federal,L=Alvaro Obregon
# Serial Number: 1 (0x1)
# Subject: 1.2.840.113549.1.9.1=acrse@economia.gob.mx,O=Secretaria de Economia,OU=Direccion General de Normatividad Mercantil,CN=Autoridad Certificadora Raiz de la Secretaria de Economia,STREET=Insurgentes Sur 1940,2.5.4.17=01030,C=MX,ST=Distrito Federal,L=Alvaro Obregon
# Not Valid Before: Sun May 08 00:00:00 2005
# Not Valid After: Thu May 08 00:00:00 2025
# Fingerprint (MD5): 07:61:92:04:7e:a6:b9:cd:5e:6b:00:7a:e3:bf:1d:04
# Fingerprint (SHA1): 34:d4:99:42:6f:9f:c2:bb:27:b0:75:ba:b6:82:aa:e5:ef:fc:ba:74
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Autoridad Certificadora Raiz de la Secretaria de Economia"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\064\324\231\102\157\237\302\273\047\260\165\272\266\202\252\345
\357\374\272\164
END
CKA_CERT_MD5_HASH
MULTILINE_OCTAL
\007\141\222\004\176\246\271\315\136\153\000\172\343\277\035\004

```
END
CKA_ISSUER MULTILINE_OCTAL
\060\202\001\061\061\027\060\025\006\003\125\004\007\023\016\101
\154\166\141\162\157\040\117\142\162\145\147\157\156\061\031\060
\027\006\003\125\004\010\023\020\104\151\163\164\162\151\164\157
\040\106\145\144\145\162\141\154\061\013\060\011\006\003\125\004
\006\023\002\115\130\061\016\060\014\006\003\125\004\021\023\005
\060\061\060\063\060\061\035\060\033\006\003\125\004\011\023\024
\111\156\163\165\162\147\145\156\164\145\163\040\123\165\162\040
\061\071\064\060\061\102\060\100\006\003\125\004\003\023\071\101
\165\164\157\162\151\144\141\144\040\103\145\162\164\151\146\151
\143\141\144\157\162\141\040\122\141\151\172\040\144\145\040\154
\141\040\123\145\143\162\145\164\141\162\151\141\040\144\145\040
\105\143\157\156\157\155\151\141\061\064\060\062\006\003\125\004
\013\023\053\104\151\162\145\143\143\151\157\156\040\107\145\156
\145\162\141\154\040\144\145\040\116\157\162\155\141\164\151\166
\151\144\141\144\040\115\145\162\143\141\156\164\151\154\061\037
\060\035\006\003\125\004\012\023\026\123\145\143\162\145\164\141
\162\151\141\040\144\145\040\105\143\157\156\157\155\151\141\061
\044\060\042\006\011\052\206\110\206\367\015\001\011\001\026\025
\141\143\162\163\145\100\145\143\157\156\157\155\151\141\056\147
\157\142\056\155\170
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Correo Uruguayo - Root CA"
# Issuer: CN=Correo Uruguayo - Root CA,OU=SERVICIOS ELECTRONICOS,O=ADMINISTRACION
NACIONAL DE CORREOS,C=UY
# Serial Number:ca:22:79:08:23:2a:f0:f5:82:b8:85:d3:63:dd:f1
# Subject: CN=Correo Uruguayo - Root CA,OU=SERVICIOS ELECTRONICOS,O=ADMINISTRACION
 NACIONAL DE CORREOS,C=UY
# Not Valid Before: Mon Jul 14 16:52:15 2008
# Not Valid After: Tue Dec 31 02:59:59 2030
# Fingerprint (MD5): 24:6d:ab:d2:f2:ea:4a:66:ae:5b:bc:ae:50:ad:6e:56
# Fingerprint (SHA1): f9:dd:19:26:6b:20:43:f1:fe:4b:3d:cb:01:90:af:f1:1f:31:a6:9d
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Correo Uruguayo - Root CA"
```

```
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\125\131\061
\053\060\051\006\003\125\004\012\014\042\101\104\115\111\116\111
\123\124\122\101\103\111\117\116\040\116\101\103\111\117\116\101
\114\040\104\105\040\103\117\122\122\105\117\123\061\037\060\035
\006\003\125\004\013\014\026\123\105\122\126\111\103\111\117\123
\040\105\114\105\103\124\122\117\116\111\103\117\123\061\042\060
\040\006\003\125\004\003\014\031\103\157\162\162\145\157\040\125
\162\165\147\165\141\171\157\040\055\040\122\157\157\164\040\103
\101
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\125\131\061
\053\060\051\006\003\125\004\012\014\042\101\104\115\111\116\111
\123\124\122\101\103\111\117\116\040\116\101\103\111\117\116\101
\114\040\104\105\040\103\117\122\122\105\117\123\061\037\060\035
\006\003\125\004\013\014\026\123\105\122\126\111\103\111\117\123
\040\105\114\105\103\124\122\117\116\111\103\117\123\061\042\060
\040\006\003\125\004\003\014\031\103\157\162\162\145\157\040\125
\162\165\147\165\141\171\157\040\055\040\122\157\157\164\040\103
\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\000\312\042\171\010\043\052\360\365\202\270\205\323\143
\335\361
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\032\060\202\004\002\240\003\002\001\002\002\020\000
\312\042\171\010\043\052\360\365\202\270\205\323\143\335\361\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\177
\061\013\060\011\006\003\125\004\006\023\002\125\131\061\053\060
\051\006\003\125\004\012\014\042\101\104\115\111\116\111\123\124
\122\101\103\111\117\116\040\116\101\103\111\117\116\101\114\040
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END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Correo Uruguayo - Root CA"
# Issuer: CN=Correo Uruguayo - Root CA,OU=SERVICIOS ELECTRONICOS,O=ADMINISTRACION NACIONAL DE CORREOS,C=UY
# Serial Number:ca:22:79:08:23:2a:f0:f5:82:b8:85:d3:63:dd:f1
# Subject: CN=Correo Uruguayo - Root CA,OU=SERVICIOS ELECTRONICOS,O=ADMINISTRACION NACIONAL DE CORREOS,C=UY
# Not Valid Before: Mon Jul 14 16:52:15 2008
# Not Valid After: Tue Dec 31 02:59:59 2030
# Fingerprint (MD5): 24:6d:ab:d2:f2:ea:4a:66:ae:5b:bc:ae:50:ad:6e:56

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# Fingerprint (SHA1): f9:dd:19:26:6b:20:43:f1:fe:4b:3d:cb:01:90:af:f1:1f:31:a6:9d
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
 CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Correo Uruguayo - Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\371\335\031\046\153\040\103\361\376\113\075\313\001\220\257\361
\037\061\246\235
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\044\155\253\322\362\352\112\146\256\133\274\256\120\255\156\126
END
CKA_ISSUER MULTILINE_OCTAL
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\053\060\051\006\003\125\004\012\014\042\101\104\115\111\116\111
\123\124\122\101\103\111\117\116\040\116\101\103\111\117\116\101
\114\040\104\105\040\103\117\122\122\105\117\123\061\037\060\035
\006\003\125\004\013\014\026\123\105\122\126\111\103\111\117\123
\040\105\114\105\103\124\122\117\116\111\103\117\123\061\042\060
\040\006\003\125\004\003\014\031\103\157\162\162\145\157\040\125
\162\165\147\165\141\171\157\040\055\040\122\157\157\164\040\103
\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
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\335\361
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Chambers of Commerce Root - 2008"
# Issuer: CN=Chambers of Commerce Root - 2008,O=AC Camerfirma S.A.,2.5.4.5=A82743287,L=Madrid (see
current address at www.camerfirma.com/address),C=EU
# Serial Number:a3:da:42:7e:a4:b1:ae:da
# Subject: CN=Chambers of Commerce Root - 2008,O=AC Camerfirma S.A.,2.5.4.5=A82743287,L=Madrid (see
current address at www.camerfirma.com/address),C=EU
# Not Valid Before: Fri Aug 01 12:29:50 2008
# Not Valid After: Sat Jul 31 12:29:50 2038
# Fingerprint (MD5): 5e:80:9e:84:5a:0e:65:0b:17:02:f3:55:18:2a:3e:d7
# Fingerprint (SHA1): 78:6a:74:ac:76:ab:14:7f:9c:6a:30:50:ba:9e:a8:7e:fe:9a:ce:3c
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
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CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Chambers
 of Commerce Root - 2008"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
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\061\103\060\101\006\003\125\004\007\023\072\115\141\144\162\151
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\040\103\150\141\155\142\145\162\163\040\157\146\040\103\157\155
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\070
END
CKA_ID UTF8 "0"
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\070
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CKA_SERIAL_NUMBER
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END
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\040\103\157\155\155\145\162\143\145\040\122\157\157\164\040\055
\040\062\060\060\070\202\011\000\243\332\102\176\244\261\256\332
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006
\060\075\006\003\125\035\040\004\066\060\064\060\062\006\004\125
\035\040\000\060\052\060\050\006\010\053\006\001\005\005\007\002
\001\026\034\150\164\164\160\072\057\057\160\157\154\151\143\171
\056\143\141\155\145\162\146\151\162\155\141\056\143\157\155\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003\202
\002\001\000\220\022\257\042\065\302\243\071\360\056\336\351\265
\351\170\174\110\276\077\175\105\222\136\351\332\261\031\374\026
\074\237\264\133\146\236\152\347\303\271\135\210\350\017\255\317
\043\017\336\045\072\136\314\117\245\301\265\055\254\044\322\130
\007\336\242\317\151\204\140\063\350\020\015\023\251\043\320\205
\345\216\173\246\236\075\162\023\162\063\365\252\175\306\143\037
\010\364\376\001\177\044\317\053\054\124\011\336\342\053\155\222
\306\071\117\026\352\074\176\172\106\324\105\152\106\250\353\165
\202\126\247\253\240\174\150\023\063\366\235\060\360\157\047\071
\044\043\052\220\375\220\051\065\362\223\337\064\245\306\367\370
\357\214\017\142\112\174\256\323\365\124\370\215\266\232\126\207
\026\202\072\063\253\132\042\010\367\202\272\352\056\340\107\232
\264\265\105\243\005\073\331\334\056\105\100\073\352\334\177\350
\073\353\321\354\046\330\065\244\060\305\072\254\127\236\263\166
\245\040\173\371\036\112\005\142\001\246\050\165\140\227\222\015
\156\076\115\067\103\015\222\025\234\030\042\315\121\231\240\051
\032\074\137\212\062\063\133\060\307\211\057\107\230\017\243\003
\306\366\361\254\337\062\360\331\201\032\344\234\275\366\200\024
\360\321\054\271\205\365\330\243\261\310\245\041\345\034\023\227
\356\016\275\337\051\251\357\064\123\133\323\344\152\023\204\006

\266\062\002\304\122\256\042\322\334\262\041\102\032\332\100\360
\051\311\354\012\014\134\342\320\272\314\110\323\067\012\314\022
\012\212\171\260\075\003\177\151\113\364\064\040\175\263\064\352
\216\113\144\365\076\375\263\043\147\025\015\004\270\360\055\301
\011\121\074\262\154\025\360\245\043\327\203\164\344\345\056\311
\376\230\047\102\306\253\306\236\260\320\133\070\245\233\120\336
\176\030\230\265\105\073\366\171\264\350\367\032\173\006\203\373
\320\213\332\273\307\275\030\253\010\157\074\200\153\100\077\031
\031\272\145\212\346\276\325\134\323\066\327\357\100\122\044\140
\070\147\004\061\354\217\363\202\306\336\271\125\363\073\061\221
\132\334\265\010\025\255\166\045\012\015\173\056\207\342\014\246
\006\274\046\020\155\067\235\354\335\170\214\174\200\305\360\331
\167\110\320
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Chambers of Commerce Root - 2008"
# Issuer: CN=Chambers of Commerce Root - 2008,O=AC Camerfirma S.A.,2.5.4.5=A82743287,L=Madrid (see current address at www.camerfirma.com/address),C=EU
# Serial Number:a3:da:42:7e:a4:b1:ae:da
# Subject: CN=Chambers of Commerce Root - 2008,O=AC Camerfirma S.A.,2.5.4.5=A82743287,L=Madrid (see current address at www.camerfirma.com/address),C=EU
# Not Valid Before: Fri Aug 01 12:29:50 2008
# Not Valid After: Sat Jul 31 12:29:50 2038
# Fingerprint
(MD5): 5e:80:9e:84:5a:0e:65:0b:17:02:f3:55:18:2a:3e:d7
# Fingerprint (SHA1): 78:6a:74:ac:76:ab:14:7f:9c:6a:30:50:ba:9e:a8:7e:fe:9a:ce:3c
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Chambers of Commerce Root - 2008"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\170\152\164\254\166\253\024\177\234\152\060\120\272\236\250\176
\376\232\316\074
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\136\200\236\204\132\016\145\013\027\002\363\125\030\052\076\327
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\256\061\013\060\011\006\003\125\004\006\023\002\105\125
\061\103\060\101\006\003\125\004\007\023\072\115\141\144\162\151
\144\040\050\163\145\145\040\143\165\162\162\145\156\164\040\141
\144\144\162\145\163\163\040\141\164\040\167\167\167\056\143\141

\155\145\162\146\151\162\155\141\056\143\157\155\057\141\144\144
\162\145\163\163\051\061\022\060\020\006\003\125\004\005\023\011
\101\070\062\067\064\063\062\070\067\061\033\060\031\006\003\125
\004\012\023\022\101\103\040\103\141\155\145\162\146\151\162\155
\141\040\123\056\101\056\061\051\060\047\006\003\125\004\003\023
\040\103\150\141\155\142\145\162\163\040\157\146\040\103\157\155
\155\145\162\143\145\040\122\157\157\164\040\055\040\062\060\060
\070
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\011\000\243\332\102\176\244\261\256\332
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Global Chambersign Root - 2008"
# Issuer: CN=Global Chambersign Root - 2008,O=AC Camerfirma S.A.,2.5.4.5=A82743287,L=Madrid (see current address at www.camerfirma.com/address),C=EU
# Serial Number:c9:cd:d3:e9:d5:7d:23:ce
# Subject: CN=Global Chambersign Root - 2008,O=AC Camerfirma S.A.,2.5.4.5=A82743287,L=Madrid (see current address
at www.camerfirma.com/address),C=EU
# Not Valid Before: Fri Aug 01 12:31:40 2008
# Not Valid After: Sat Jul 31 12:31:40 2038
# Fingerprint (MD5): 9e:80:ff:78:01:0c:2e:c1:36:bd:fe:96:90:6e:08:f3
# Fingerprint (SHA1): 4a:bd:ee:ec:95:0d:35:9c:89:ae:c7:52:a1:2c:5b:29:f6:d6:aa:0c
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Global Chambersign Root - 2008"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\254\061\013\060\011\006\003\125\004\006\023\002\105\125
\061\103\060\101\006\003\125\004\007\023\072\115\141\144\162\151
\144\040\050\163\145\145\040\143\165\162\162\145\156\164\040\141
\144\144\162\145\163\163\040\141\164\040\167\167\167\056\143\141
\155\145\162\146\151\162\155\141\056\143\157\155\057\141\144\144
\162\145\163\163\051\061\022\060\020\006\003\125\004\005\023\011
\101\070\062\067\064\063\062\070\067\061\033\060\031\006\003\125
\004\012\023\022\101\103\040\103\141\155\145\162\146\151\162\155
\141\040\123\056\101\056\061\047\060\045\006\003\125\004\003\023
\036\107\154\157\142\141\154\040\103\150\141\155\142\145\162\163
\151\147\156\040\122\157\157\164\040\055\040\062\060\060\070

END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\254\061\013\060\011\006\003\125\004\006\023\002\105\125
\061\103\060\101\006\003\125\004\007\023\072\115\141\144\162\151
\144\040\050\163\145\145\040\143\165\162\162\145\156\164\040\141
\144\144\162\145\163\163\040\141\164\040\167\167\167\056\143\141
\155\145\162\146\151\162\155\141\056\143\157\155\057\141\144\144
\162\145\163\163\051\061\022\060\020\006\003\125\004\005\023\011
\101\070\062\067\064\063\062\070\067\061\033\060\031\006\003\125
\004\012\023\022\101\103\040\103\141\155\145\162\146\151\162\155
\141\040\123\056\101\056\061\047\060\045\006\003\125\004\003\023
\036\107\154\157\142\141\154\040\103\150\141\155\142\145\162\163
\151\147\156\040\122\157\157\164\040\055\040\062\060\060\070
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\011\000\311\315\323\351\325\175\043\316
END
CKA_VALUE MULTILINE_OCTAL
\060\202\007\111\060\202\005\061\240\003\002\001\002\002\011\000
\311\315\323\351\325\175\043\316\060\015\006\011\052\206\110\206
\367\015\001\001\005\005\000\060\201\254\061\013\060\011\006\003
\125\004\006\023\002\105\125\061\103\060\101\006\003\125\004\007
\023\072\115\141\144\162\151\144\040\050\163\145\145\040\143\165
\162\162\145\156\164\040\141\144\144\162\145\163\163\040\141\164
\040\167\167\167\056\143\141\155\145\162\146\151\162\155\141\056
\143\157\155\057\141\144\144\162\145\163\163\051\061\022\060\020
\006\003\125\004\005\023\011\101\070\062\067\064\063\062\070\067
\061\033\060\031\006\003\125\004\012\023\022\101\103\040\103\141
\155\145\162\146\151\162\155\141\040\123\056\101\056\061\047\060
\045\006\003\125\004\003\023\036\107\154\157\142\141\154\040\103
\150\141\155\142\145\162\163\151\147\156\040\122\157\157\164\040
\055\040\062\060\060\070\060\036\027\015\060\070\060\070\060\061
\061\062\063\061\064\060\132\027\015\063\070\060\067\063\061\061
\062\063\061\064\060\132\060\201\254\061\013\060\011\006\003\125
\004\006\023\002\105\125\061\103\060\101\006\003\125\004\007\023
\072\115\141\144\162\151\144\040\050\163\145\145\040\143\165\162
\162\145\156\164\040\141\144\144\162\145\163\163\040\141\164\040
\167\167\167\056\143\141\155\145\162\146\151\162\155\141\056\143
\157\155\057\141\144\144\162\145\163\163\051\061\022\060\020\006
\003\125\004\005\023\011\101\070\062\067\064\063\062\070\067\061
\033\060\031\006\003\125\004\012\023\022\101\103\040\103\141\155
\145\162\146\151\162\155\141\040\123\056\101\056\061\047\060\045
\006\003\125\004\003\023\036\107\154\157\142\141\154\040\103\150
\141\155\142\145\162\163\151\147\156\040\122\157\157\164\040\055
\040\062\060\060\070\060\202\002\042\060\015\006\011\052\206\110

\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002
\012\002\202\002\001\000\300\337\126\323\344\072\233\166\105\264
\023\333\377\301\266\031\213\067\101\030\225\122\107\353\027\235
\051\210\216\065\154\006\062\056\107\142\363\111\004\277\175\104
\066\261\161\314\275\132\011\163\325\331\205\104\377\221\127\045
\337\136\066\216\160\321\134\161\103\035\331\332\357\134\322\373
\033\275\072\265\313\255\243\314\104\247\015\256\041\025\077\271
\172\133\222\165\330\244\022\070\211\031\212\267\200\322\342\062
\157\126\234\221\326\210\020\013\263\164\144\222\164\140\363\366
\317\030\117\140\262\043\320\307\073\316\141\113\231\217\302\014
\320\100\262\230\334\015\250\116\243\271\012\256\140\240\255\105
\122\143\272\146\275\150\340\371\276\032\250\201\273\036\101\170
\165\323\301\376\000\125\260\207\124\350\047\220\065\035\114\063
\255\227\374\227\056\230\204\277\054\311\243\277\321\230\021\024
\355\143\370\312\230\210\130\027\231\355\105\003\227\176\074\206
\036\210\214\276\362\221\204\217\145\064\330\000\114\175\267\061
\027\132\051\172\012\030\044\060\243\067\265\172\251\001\175\046
\326\371\016\216\131\361\375\033\063\265\051\073\027\073\101\266
\041\335\324\300\075\245\237\237\037\103\120\311\273\274\154\172
\227\230\356\315\214\037\373\234\121\256\213\160\275\047\237\161
\300\153\254\175\220\146\350\327\135\072\015\260\325\302\215\325
\310\235\235\301\155\320\320\277\121\344\343\370\303\070\066\256
\326\247\165\346\257\204\103\135\223\222\014\152\007\336\073\035
\230\042\326\254\301\065\333\243\240\045\377\162\265\166\035\336
\155\351\054\146\054\122\204\320\105\222\316\034\345\345\063\035
\334\007\123\124\243\252\202\073\232\067\057\334\335\240\144\351
\346\335\275\256\374\144\205\035\074\247\311\006\336\204\377\153
\350\153\032\074\305\242\263\102\373\213\011\076\137\010\122\307
\142\304\324\005\161\277\304\144\344\370\241\203\350\076\022\233
\250\036\324\066\115\057\161\366\215\050\366\203\251\023\322\141
\301\221\273\110\300\064\217\101\214\113\114\333\151\022\377\120
\224\234\040\203\131\163\355\174\241\362\361\375\335\367\111\323
\103\130\240\126\143\312\075\075\345\065\126\131\351\016\312\040
\314\053\113\223\051\017\002\003\001\000\001\243\202\001\152\060
\202\001\146\060\022\006\003\125\035\023\001\001\377\004\010\060
\006\001\001\377\002\001\014\060\035\006\003\125\035\016\004\026
\004\024\271\011\312\234\036\333\323\154\072\153\256\355\124\361
\133\223\006\065\056\136\060\201\341\006\003\125\035\043\004\201
\331\060\201\326\200\024\271\011\312\234\036\333\323\154\072\153
\256\355\124\361\133\223\006\065\056\136\241\201\262\244\201\257
\060\201\254\061\013\060\011\006\003\125\004\006\023\002\105\125
\061\103\060\101\006\003\125\004\007\023\072\115\141\144\162\151
\144\040\050\163\145\145\040\143\165\162\162\145\156\164\040\141
\144\144\162\145\163\163\040\141\164\040\167\167\167\056\143\141
\155\145\162\146\151\162\155\141\056\143\157\155\057\141\144\144
\162\145\163\163\051\061\022\060\020\006\003\125\004\005\023\011
\101\070\062\067\064\063\062\070\067\061\033\060\031\006\003\125
\004\012\023\022\101\103\040\103\141\155\145\162\146\151\162\155

\141\040\123\056\101\056\061\047\060\045\006\003\125\004\003\023
\036\107\154\157\142\141\154\040\103\150\141\155\142\145\162\163
\151\147\156\040\122\157\157\164\040\055\040\062\060\060\070\202
\011\000\311\315\323\351\325\175\043\316\060\016\006\003\125\035
\017\001\001\377\004\004\003\002\001\006\060\075\006\003\125\035
\040\004\066\060\064\060\062\006\004\125\035\040\000\060\052\060
\050\006\010\053\006\001\005\005\007\002\001\026\034\150\164\164
\160\072\057\057\160\157\154\151\143\171\056\143\141\155\145\162
\146\151\162\155\141\056\143\157\155\060\015\006\011\052\206\110
\206\367\015\001\001\005\005\000\003\202\002\001\000\200\210\177
\160\336\222\050\331\005\224\106\377\220\127\251\361\057\337\032
\015\153\372\174\016\034\111\044\171\047\330\106\252\157\051\131
\122\210\160\022\352\335\075\365\233\123\124\157\341\140\242\250
\011\271\354\353\131\174\306\065\361\334\030\351\361\147\345\257
\272\105\340\011\336\312\104\017\302\027\016\167\221\105\172\063
\137\137\226\054\150\213\301\107\217\230\233\075\300\354\313\365
\325\202\222\204\065\321\276\066\070\126\162\061\133\107\055\252
\027\244\143\121\353\012\001\255\177\354\165\236\313\241\037\361
\177\022\261\271\344\144\177\147\326\043\052\364\270\071\135\230
\350\041\247\341\275\075\102\032\164\232\160\257\150\154\120\135
\111\317\377\373\016\135\346\054\107\327\201\072\131\000\265\163
\153\143\040\366\061\105\010\071\016\364\160\176\100\160\132\077
\320\153\102\251\164\075\050\057\002\155\165\162\225\011\215\110
\143\306\306\043\127\222\223\136\065\301\215\371\012\367\054\235
\142\034\366\255\174\335\246\061\036\266\261\307\176\205\046\372
\244\152\265\332\143\060\321\357\223\067\262\146\057\175\005\367
\347\267\113\230\224\065\300\331\072\051\301\235\262\120\063\035
\112\251\132\246\311\003\357\355\364\347\250\156\212\264\127\204
\353\244\077\320\356\252\252\207\133\143\350\223\342\153\250\324
\270\162\170\153\033\355\071\344\135\313\233\252\207\325\117\116
\000\376\331\152\237\074\061\017\050\002\001\175\230\350\247\260
\242\144\236\171\370\110\362\025\251\314\346\310\104\353\077\170
\231\362\173\161\076\074\361\230\247\305\030\022\077\346\273\050
\063\102\351\105\012\174\155\362\206\171\057\305\202\031\175\011
\211\174\262\124\166\210\256\336\301\363\314\341\156\333\061\326
\223\256\231\240\357\045\152\163\230\211\133\072\056\023\210\036
\277\300\222\224\064\033\343\047\267\213\036\157\102\377\347\351
\067\233\120\035\055\242\371\002\356\313\130\130\072\161\274\150
\343\252\301\257\034\050\037\242\334\043\145\077\201\352\256\231
\323\330\060\317\023\015\117\025\311\204\274\247\110\055\370\060
\043\167\330\106\113\171\155\366\214\355\072\177\140\021\170\364
\351\233\256\325\124\300\164\200\321\013\102\237\301
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

```
# Microsoft Code Signing Only Certificate
# Trust for "Global Chambersign Root - 2008"
# Issuer: CN=Global Chambersign Root - 2008,O=AC Camerfirma
 S.A.,2.5.4.5=A82743287,L=Madrid (see current address at www.camerfirma.com/address),C=EU
# Serial Number:c9:cd:d3:e9:d5:7d:23:ce
# Subject: CN=Global Chambersign Root - 2008,O=AC Camerfirma S.A.,2.5.4.5=A82743287,L=Madrid (see
current address at www.camerfirma.com/address),C=EU
# Not Valid Before: Fri Aug 01 12:31:40 2008
# Not Valid After: Sat Jul 31 12:31:40 2038
# Fingerprint (MD5): 9e:80:ff:78:01:0c:2e:c1:36:bd:fe:96:90:6e:08:f3
# Fingerprint (SHA1): 4a:bd:ee:ec:95:0d:35:9c:89:ae:c7:52:a1:2c:5b:29:f6:d6:aa:0c
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Global Chambersign Root - 2008"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\112\275\356\354\225\015\065\234\211\256\307\122\241\054\133\051
\366\326\252\014
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\236\200\377\170\001\014\056\301\066\275\376\226\220\156\010\363
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\254\061\013\060\011\006\003\125\004\006\023\002\105\125
\061\103\060\101\006\003\125\004\007\023\072\115\141\144\162\151
\144\040\050\163\145\145\040\143\165\162\162\145\156\164\040\141
\144\144\162\145\163\163\040\141\164\040\167\167\167\056\143\141
\155\145\162\146\151\162\155\141\056\143\157\155\057\141\144\144
\162\145\163\163\051\061\022\060\020\006\003\125\004\005\023\011
\101\070\062\067\064\063\062\070\067\061\033\060\031\006\003\125
\004\012\023\022\101\103\040\103\141\155\145\162\146\151\162\155
\141\040\123\056\101\056\061\047\060\045\006\003\125\004\003\023
\036\107\154\157\142\141\154\040\103\150\141\155\142\145\162\163
\151\147\156\040\122\157\157\164\040\055\040\062\060\060\070
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\011\000\311\315\323\351\325\175\043\316
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only
 Certificate
# Certificate "CNNIC ROOT"
```

```
# Issuer: CN=CNNIC ROOT,O=CNNIC,C=CN
# Serial Number:49:33:00:01
# Subject: CN=CNNIC ROOT,O=CNNIC,C=CN
# Not Valid Before: Mon Apr 16 07:09:14 2007
# Not Valid After: Fri Apr 16 07:09:14 2027
# Fingerprint (MD5): 21:bc:82:ab:49:c4:13:3b:4b:b2:2b:5c:6b:90:9c:19
# Fingerprint (SHA1): 8b:af:4c:9b:1d:f0:2a:92:f7:da:12:8e:b9:1b:ac:f4:98:60:4b:6f
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CNNIC ROOT"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\062\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\016\060\014\006\003\125\004\012\023\005\103\116\116\111\103\061
\023\060\021\006\003\125\004\003\023\012\103\116\116\111\103\040
\122\117\117\124
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\062\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\016\060\014\006\003\125\004\012\023\005\103\116\116\111\103\061
\023\060\021\006\003\125\004\003\023\012\103\116\116\111\103\040
\122\117\117\124
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\004\111\063\000\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\125\060\202\002\075\240\003\002\001\002\002\004\111
\063\000\001\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\062\061\013\060\011\006\003\125\004\006\023\002\103
\116\061\016\060\014\006\003\125\004\012\023\005\103\116\116\111
\103\061\023\060\021\006\003\125\004\003\023\012\103\116\116\111
\103\040\122\117\117\124\060\036\027\015\060\067\060\064\061\066
\060\067\060\071\061\064\132\027\015\062\067\060\064\061\066\060
\067\060\071\061\064\132\060\062\061\013\060\011\006\003\125\004
\006\023\002\103\116\061\016\060\014\006\003\125\004\012\023\005
\103\116\116\111\103\061\023\060\021\006\003\125\004\003\023\012
\103\116\116\111\103\040\122\117\117\124\060\202\001\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001
\017\000\060\202\001\012\002\202\001\001\000\323\065\367\077\163
\167\255\350\133\163\027\302\321\157\355\125\274\156\352\350\244
\171\262\154\303\243\357\341\237\261\073\110\205\365\232\134\041
\042\020\054\305\202\316\332\343\232\156\067\341\207\054\334\271
\014\132\272\210\125\337\375\252\333\037\061\352\001\361\337\071
```

\001\301\023\375\110\122\041\304\125\337\332\330\263\124\166\272
\164\261\267\175\327\300\350\366\131\305\115\310\275\255\037\024
\332\337\130\104\045\062\031\052\307\176\176\216\256\070\260\060
\173\107\162\011\061\360\060\333\303\033\166\051\273\151\166\116
\127\371\033\144\242\223\126\267\157\231\156\333\012\004\234\021
\343\200\037\313\143\224\020\012\251\341\144\202\061\371\214\047
\355\246\231\000\366\160\223\030\370\241\064\206\243\335\172\302
\030\171\366\172\145\065\317\220\353\275\063\223\237\123\253\163
\073\346\233\064\040\057\035\357\251\035\143\032\240\200\333\003
\057\371\046\032\206\322\215\273\251\276\122\072\207\147\110\015
\277\264\240\330\046\276\043\137\163\067\177\046\346\222\004\243
\177\317\040\247\267\363\072\312\313\231\313\002\003\001\000\001
\243\163\060\161\060\021\006\011\140\206\110\001\206\370\102\001
\001\004\004\003\002\000\007\060\037\006\003\125\035\043\004\030
\060\026\200\024\145\362\061\255\052\367\367\335\122\226\012\307
\002\301\016\357\246\325\073\021\060\017\006\003\125\035\023\001
\001\377\004\005\060\003\001\001\377\060\013\006\003\125\035\017
\004\004\003\002\001\376\060\035\006\003\125\035\016\004\026\004
\024\145\362\061\255\052\367\367\335\122\226\012\307\002\301\016
\357\246\325\073\021\060\015\006\011\052\206\110\206\367\015\001
\001\005\005\000\003\202\001\001\000\113\065\356\314\344\256\277
\303\156\255\237\225\073\113\077\133\036\337\127\051\242\131\312
\070\342\271\032\377\236\346\156\062\335\036\256\352\065\267\365
\223\221\116\332\102\341\303\027\140\120\362\321\134\046\271\202
\267\352\155\344\234\204\347\003\171\027\257\230\075\224\333\307
\272\000\347\270\277\001\127\301\167\105\062\014\073\361\264\034
\010\260\375\121\240\241\335\232\035\023\066\232\155\267\307\074
\271\341\305\331\027\372\203\325\075\025\240\074\273\036\013\342
\310\220\077\250\206\014\374\371\213\136\205\313\117\133\113\142
\021\107\305\105\174\005\057\101\261\236\020\151\033\231\226\340
\125\171\373\116\206\231\270\224\332\206\070\152\223\243\347\313
\156\345\337\352\041\125\211\234\175\175\177\230\365\000\211\356
\343\204\300\134\226\265\305\106\352\106\340\205\125\266\033\311
\022\326\301\315\315\200\363\002\001\074\310\151\313\105\110\143
\330\224\320\354\205\016\073\116\021\145\364\202\214\246\075\256
\056\042\224\011\310\134\352\074\201\135\026\052\003\227\026\125
\011\333\212\101\202\236\146\233\021
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "CNNIC ROOT"
# Issuer: CN=CNNIC ROOT,O=CNNIC,C=CN
# Serial Number:49:33:00:01
# Subject: CN=CNNIC ROOT,O=CNNIC,C=CN

```
# Not Valid Before:
 Mon Apr 16 07:09:14 2007
# Not Valid After: Fri Apr 16 07:09:14 2027
# Fingerprint (MD5): 21:bc:82:ab:49:c4:13:3b:4b:b2:2b:5c:6b:90:9c:19
# Fingerprint (SHA1): 8b:af:4c:9b:1d:f0:2a:92:f7:da:12:8e:b9:1b:ac:f4:98:60:4b:6f
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CNNIC ROOT"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\213\257\114\233\035\360\052\222\367\332\022\216\271\033\254\364
\230\140\113\157
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\041\274\202\253\111\304\023\073\113\262\053\134\153\220\234\031
END
CKA_ISSUER MULTILINE_OCTAL
\060\062\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\016\060\014\006\003\125\004\012\023\005\103\116\116\111\103\061
\023\060\021\006\003\125\004\003\023\012\103\116\116\111\103\040
\122\117\117\124
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\111\063\000\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST
 CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Common Policy"
# Issuer: CN=Common Policy,OU=FBCA,O=U.S. Government,C=us
# Serial Number:29:36:47:aa:e3:8a:ac:86:4a:23:56:f2:ca:b7:61:af
# Subject: CN=Common Policy,OU=FBCA,O=U.S. Government,C=us
# Not Valid Before: Mon Oct 15 15:58:00 2007
# Not Valid After: Fri Oct 15 16:08:00 2027
# Fingerprint (MD5): f0:58:c5:03:82:67:17:ab:8f:da:03:10:27:8e:19:c2
# Fingerprint (SHA1): cb:44:a0:97:85:7c:45:fa:18:7e:d9:52:08:6c:b9:84:1f:2d:51:b5
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Common Policy"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
```

\060\116\061\013\060\011\006\003\125\004\006\023\002\165\163\061
\030\060\026\006\003\125\004\012\023\017\125\056\123\056\040\107
\157\166\145\162\156\155\145\156\164\061\015\060\013\006\003\125
\004\013\023\004\106\102\103\101\061\026\060\024\006\003\125\004
\003\023\015\103\157\155\155\157\156\040\120\157\154\151\143\171
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\165\163\061
\030\060\026\006\003\125\004\012\023\017\125\056\123\056\040\107
\157\166\145\162\156\155\145\156\164\061\015\060\013\006\003\125
\004\013\023\004\106\102\103\101\061\026\060\024\006\003\125\004
\003\023\015\103\157\155\155\157\156\040\120\157\154\151\143\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\051\066\107\252\343\212\254\206\112\043\126\362\312\267
\141\257
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\241\060\202\002\211\240\003\002\001\002\002\020\051
\066\107\252\343\212\254\206\112\043\126\362\312\267\141\257\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\116
\061\013\060\011\006\003\125\004\006\023\002\165\163\061\030\060
\026\006\003\125\004\012\023\017\125\056\123\056\040\107\157\166
\145\162\156\155\145\156\164\061\015\060\013\006\003\125\004\013
\023\004\106\102\103\101\061\026\060\024\006\003\125\004\003\023
\015\103\157\155\155\157\156\040\120\157\154\151\143\171\060\036
\027\015\060\067\061\060\061\065\061\065\065\070\060\060\132\027
\015\062\067\061\060\061\065\061\066\060\070\060\060\132\060\116
\061\013\060\011\006\003\125\004\006\023\002\165\163\061\030\060
\026\006\003\125\004\012\023\017\125\056\123\056\040\107\157\166
\145\162\156\155\145\156\164\061\015\060\013\006\003\125\004\013
\023\004\106\102\103\101\061\026\060\024\006\003\125\004\003\023
\015\103\157\155\155\157\156\040\120\157\154\151\143\171\060\202
\001\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\001\017\000\060\202\001\012\002\202\001\001\000\227
\215\275\063\047\344\255\133\373\170\275\057\107\107\156\307\170
\351\223\234\244\336\311\034\375\057\033\071\070\254\107\027\300
\176\167\051\000\073\003\037\150\017\315\115\245\356\167\270\054
\142\153\061\366\372\162\011\175\060\051\006\174\347\174\243\075
\204\030\212\035\256\054\222\250\037\350\136\117\215\216\353\077
\032\370\234\012\147\235\260\147\115\360\056\320\060\336\303\224
\260\240\317\056\012\064\177\124\011\323\066\275\244\111\127\122
\163\351\235\376\344\110\171\106\033\133\215\062\344\245\110\144
\363\042\015\222\235\010\025\277\140\074\203\367\107\042\045\042
\255\051\161\267\167\357\027\311\242\266\224\136\310\060\220\244
\024\110\134\126\127\013\101\114\005\324\052\114\077\256\022\233

\131\021\165\160\007\042\151\055\054\323\061\314\222\176\314\315
\244\176\224\107\252\234\011\010\366\113\257\122\350\152\100\221
\305\125\275\100\261\310\155\127\206\225\027\346\037\163\276\107
\056\076\213\114\027\271\271\045\034\245\122\027\066\010\131\300
\102\276\012\053\264\126\121\074\033\125\311\214\220\167\353\002
\003\001\000\001\243\173\060\171\060\016\006\003\125\035\017\001
\001\377\004\004\003\002\001\006\060\017\006\003\125\035\023\001
\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016
\004\026\004\024\057\130\227\330\251\005\230\245\126\037\373\331
\253\165\357\002\074\066\064\307\060\022\006\011\053\006\001\004
\001\202\067\025\001\004\005\002\003\001\000\001\060\043\006\011
\053\006\001\004\001\202\067\025\002\004\026\004\024\166\267\140
\226\335\024\126\051\254\165\205\323\160\143\301\274\107\206\034
\213\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000
\003\202\001\001\000\140\256\363\110\026\100\162\246\010\210\311
\274\107\054\044\113\135\240\221\163\355\145\170\220\360\147\220
\172\245\277\012\255\266\052\371\231\147\337\203\305\167\037\064
\011\070\371\176\236\101\340\110\140\376\342\252\135\207\210\352
\210\375\134\105\262\311\152\332\175\244\255\261\117\277\034\015
\237\036\232\300\325\024\163\070\053\212\170\100\156\060\367\142
\341\315\231\374\121\151\147\154\021\335\270\020\243\150\336\046
\245\126\375\066\154\067\230\154\373\356\174\074\154\153\160\077
\367\110\067\011\217\013\102\201\255\106\106\270\013\203\006\364
\033\070\240\177\117\315\013\357\203\211\207\227\034\212\060\147
\334\375\124\241\003\176\001\313\205\114\261\013\051\303\276\354
\174\341\077\017\011\122\074\057\247\232\110\376\067\351\021\006
\130\341\066\101\212\304\266\277\216\335\316\112\263\274\032\300
\315\372\032\231\322\161\233\372\317\274\362\304\124\243\210\065
\166\314\033\054\106\157\014\264\321\303\141\166\222\164\021\352
\113\200\215\034\211\021\213\354\133\377\027\311\110\374\347\340
\006\021\342\204\136
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Common Policy"
# Issuer: CN=Common Policy,OU=FBCA,O=U.S. Government,C=us
# Serial Number:29:36:47:aa:e3:8a:ac:86:4a:23:56:f2:ca:b7:61:af
# Subject: CN=Common Policy,OU=FBCA,O=U.S. Government,C=us
# Not Valid Before: Mon Oct 15 15:58:00 2007
# Not Valid After: Fri Oct 15 16:08:00 2027
# Fingerprint (MD5):
 f0:58:c5:03:82:67:17:ab:8f:da:03:10:27:8e:19:c2
# Fingerprint (SHA1): cb:44:a0:97:85:7c:45:fa:18:7e:d9:52:08:6c:b9:84:1f:2d:51:b5
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

```
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Common Policy"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\313\104\240\227\205\174\105\372\030\176\331\122\010\154\271\204
\037\055\121\265
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\360\130\305\003\202\147\027\253\217\332\003\020\047\216\031\302
END
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\165\163\061
\030\060\026\006\003\125\004\012\023\017\125\056\123\056\040\107
\157\166\145\162\156\155\145\156\164\061\015\060\013\006\003\125
\004\013\023\004\106\102\103\101\061\026\060\024\006\003\125\004
\003\023\015\103\157\155\155\157\156\040\120\157\154\151\143\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\051\066\107\252\343\212\254\206\112\043\126\362\312\267
\141\257
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Staat der Nederlanden Root CA - G2"
# Issuer: CN=Staat der Nederlanden Root CA - G2,O=Staat der Nederlanden,C=NL
# Serial Number:98:96:8c
# Subject: CN=Staat der Nederlanden Root CA - G2,O=Staat der Nederlanden,C=NL
# Not Valid Before: Wed Mar 26 11:18:17 2008
# Not Valid After: Wed Mar 25 11:03:10 2020
# Fingerprint (MD5): 7c:a5:0f:f8:5b:9a:7d:6d:30:ae:54:5a:e3:42:a2:8a
# Fingerprint (SHA1): 59:af:82:79:91:86:c7:b4:75:07:cb:cf:03:57:46:eb:04:dd:b7:16
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Staat der Nederlanden Root CA - G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\036\060\034\006\003\125\004\012\014\025\123\164\141\141\164\040
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\061
\053\060\051\006\003\125\004\003\014\042\123\164\141\141\164\040
```

\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\040
\122\157\157\164\040\103\101\040\055\040\107\062
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\036\060\034\006\003\125\004\012\014\025\123\164\141\141\164\040
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\061
\053\060\051\006\003\125\004\003\014\042\123\164\141\141\164\040
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\040
\122\157\157\164\040\103\101\040\055\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\000\230\226\214
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\312\060\202\003\262\240\003\002\001\002\002\004\000
\230\226\214\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\132\061\013\060\011\006\003\125\004\006\023\002\116
\114\061\036\060\034\006\003\125\004\012\014\025\123\164\141\141
\164\040\144\145\162\040\116\145\144\145\162\154\141\156\144\145
\156\061\053\060\051\006\003\125\004\003\014\042\123\164\141\141
\164\040\144\145\162\040\116\145\144\145\162\154\141\156\144\145
\156\040\122\157\157\164\040\103\101\040\055\040\107\062\060\036
\027\015\060\070\060\063\062\066\061\061\061\070\061\067\132\027
\015\062\060\060\063\062\065\061\061\060\063\061\060\132\060\132
\061\013\060\011\006\003\125\004\006\023\002\116\114\061\036\060
\034\006\003\125\004\012\014\025\123\164\141\141\164\040\144\145
\162\040\116\145\144\145\162\154\141\156\144\145\156\061\053\060
\051\006\003\125\004\003\014\042\123\164\141\141\164\040\144\145
\162\040\116\145\144\145\162\154\141\156\144\145\156\040\122\157
\157\164\040\103\101\040\055\040\107\062\060\202\002\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002
\017\000\060\202\002\012\002\202\002\001\000\305\131\347\157\165
\252\076\113\234\265\270\254\236\013\344\371\331\312\253\135\217
\265\071\020\202\327\257\121\340\073\341\000\110\152\317\332\341
\006\103\021\231\252\024\045\022\255\042\350\000\155\103\304\251
\270\345\037\211\113\147\275\141\110\357\375\322\340\140\210\345
\271\030\140\050\303\167\053\255\260\067\252\067\336\144\131\052
\106\127\344\113\271\370\067\174\325\066\347\200\301\266\363\324
\147\233\226\350\316\327\306\012\123\320\153\111\226\363\243\013
\005\167\110\367\045\345\160\254\060\024\040\045\343\177\165\132
\345\110\370\116\173\003\007\004\372\202\141\207\156\360\073\304
\244\307\320\365\164\076\245\135\032\010\362\233\045\322\366\254
\004\046\076\125\072\142\050\245\173\262\060\257\370\067\302\321
\272\326\070\375\364\357\111\060\067\231\046\041\110\205\001\251
\345\026\347\334\220\125\337\017\350\070\315\231\067\041\117\135

\365\042\157\152\305\022\026\140\027\125\362\145\146\246\247\060
\221\070\301\070\035\206\004\204\272\032\045\170\136\235\257\314
\120\140\326\023\207\122\355\143\037\155\145\175\302\025\030\164
\312\341\176\144\051\214\162\330\026\023\175\013\111\112\361\050
\033\040\164\153\305\075\335\260\252\110\011\075\056\202\224\315
\032\145\331\053\210\232\231\274\030\176\237\356\175\146\174\076
\275\224\270\201\316\315\230\060\170\301\157\147\320\276\137\340
\150\355\336\342\261\311\054\131\170\222\252\337\053\140\143\362
\345\136\271\343\312\372\177\120\206\076\242\064\030\014\011\150
\050\021\034\344\341\271\134\076\107\272\062\077\030\314\133\204
\365\363\153\164\304\162\164\341\343\213\240\112\275\215\146\057
\352\255\065\332\040\323\210\202\141\360\022\042\266\274\320\325
\244\354\257\124\210\045\044\074\247\155\261\162\051\077\076\127
\246\177\125\257\156\046\306\376\347\314\100\134\121\104\201\012
\170\336\112\316\125\277\035\325\331\267\126\357\360\166\377\013
\171\265\257\275\373\251\151\221\106\227\150\200\024\066\035\263
\177\273\051\230\066\245\040\372\202\140\142\063\244\354\326\272
\007\247\156\305\317\024\246\347\326\222\064\330\201\365\374\035
\135\252\134\036\366\243\115\073\270\367\071\002\003\001\000\001
\243\201\227\060\201\224\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\122\006\003\125\035\040\004\113
\060\111\060\107\006\004\125\035\040\000\060\077\060\075\006\010
\053\006\001\005\005\007\002\001\026\061\150\164\164\160\072\057
\057\167\167\167\056\160\153\151\157\166\145\162\150\145\151\144
\056\156\154\057\160\157\154\151\143\151\145\163\057\162\157\157
\164\055\160\157\154\151\143\171\055\107\062\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003\125
\035\016\004\026\004\024\221\150\062\207\025\035\211\342\265\361
\254\066\050\064\215\013\174\142\210\353\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\003\202\002\001\000\250\101
\112\147\052\222\201\202\120\156\341\327\330\263\071\073\363\002
\025\011\120\121\357\055\275\044\173\210\206\073\371\264\274\222
\011\226\271\366\300\253\043\140\006\171\214\021\116\121\322\171
\200\063\373\235\110\276\354\101\103\201\037\176\107\100\034\345
\172\010\312\252\213\165\255\024\304\302\350\146\074\202\007\247
\346\047\202\133\030\346\017\156\331\120\076\212\102\030\051\306
\264\126\374\126\020\240\005\027\275\014\043\177\364\223\355\234
\032\121\276\335\105\101\277\221\044\264\037\214\351\137\317\173
\041\231\237\225\237\071\072\106\034\154\371\315\173\234\220\315
\050\251\307\251\125\273\254\142\064\142\065\023\113\024\072\125
\203\271\206\215\222\246\306\364\007\045\124\314\026\127\022\112
\202\170\310\024\331\027\202\046\055\135\040\037\171\256\376\324
\160\026\026\225\203\330\065\071\377\122\135\165\034\026\305\023
\125\317\107\314\165\145\122\112\336\360\260\247\344\012\226\013
\373\255\302\342\045\204\262\335\344\275\176\131\154\233\360\360
\330\347\312\362\351\227\070\176\211\276\314\373\071\027\141\077
\162\333\072\221\330\145\001\031\035\255\120\244\127\012\174\113
\274\234\161\163\052\105\121\031\205\314\216\375\107\247\164\225

\035\250\321\257\116\027\261\151\046\302\252\170\127\133\305\115
\247\345\236\005\027\224\312\262\137\240\111\030\215\064\351\046
\154\110\036\252\150\222\005\341\202\163\132\233\334\007\133\010
\155\175\235\327\215\041\331\374\024\040\252\302\105\337\077\347
\000\262\121\344\302\370\005\271\171\032\214\064\363\236\133\344
\067\133\153\112\337\054\127\212\100\132\066\272\335\165\104\010
\067\102\160\014\376\334\136\041\240\243\212\300\220\234\150\332
\120\346\105\020\107\170\266\116\322\145\311\303\067\337\341\102
\143\260\127\067\105\055\173\212\234\277\005\352\145\125\063\367
\071\020\305\050\052\041\172\033\212\304\044\371\077\025\310\232
\025\040\365\125\142\226\355\155\223\120\274\344\252\170\255\331
\313\012\145\207\246\146\301\304\201\243\167\072\130\036\013\356
\203\213\235\036\322\122\244\314\035\157\260\230\155\224\061\265
\370\161\012\334\271\374\175\062\140\346\353\257\212\001
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER
 CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Staat der Nederlanden Root CA - G2"
# Issuer: CN=Staat der Nederlanden Root CA - G2,O=Staat der Nederlanden,C=NL
# Serial Number:98:96:8c
# Subject: CN=Staat der Nederlanden Root CA - G2,O=Staat der Nederlanden,C=NL
# Not Valid Before: Wed Mar 26 11:18:17 2008
# Not Valid After: Wed Mar 25 11:03:10 2020
# Fingerprint (MD5): 7c:a5:0f:f8:5b:9a:7d:6d:30:ae:54:5a:e3:42:a2:8a
# Fingerprint (SHA1): 59:af:82:79:91:86:c7:b4:75:07:cb:cf:03:57:46:eb:04:dd:b7:16
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Staat der Nederlanden Root CA - G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\131\257\202\171\221\206\307\264\165\007\313\317\003\127\106\353
\004\335\267\026
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\174\245\017\370\133\232\175\155\060\256\124\132\343\102\242\212
END
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\036\060\034\006\003\125\004\012\014\025\123\164\141\141\164\040
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\061
\053\060\051\006\003\125\004\003\014\042\123\164\141\141\164\040
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\040

\122\157\157\164\040\103\101\040\055\040\107\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\004\000\230\226\214
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "NetLock Platina (Class Platinum) Ftanúsítvány"
# Issuer: CN=NetLock Platina (Class Platinum) Ftanúsítvány,OU=Tanúsítványkiadók (Certification Services),O=NetLock Kft.,L=Budapest,C=HU
# Serial Number:49:41:2d:ec:00:10
# Subject: CN=NetLock Platina (Class Platinum) Ftanúsítvány,OU=Tanúsítványkiadók (Certification Services),O=NetLock Kft.,L=Budapest,C=HU
# Not Valid Before: Thu Dec 11 15:12:44 2008
# Not Valid After: Wed Dec 06 15:12:44 2028
# Fingerprint (MD5): d5:97:88:da:64:16:e7:1d:66:4a:a6:ea:37:fc:7a:dc
# Fingerprint (SHA1): ec:93:de:08:3c:93:d9:33:a9:86:b3:d5:cd:e2:5a:cb:2f:ee:cf:8e
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "NetLock Platina (Class Platinum) Ftanúsítvány"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\255\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160
\145\163\164\061\025\060\023\006\003\125\004\012\014\014\116\145
\164\114\157\143\153\040\113\146\164\056\061\067\060\065\006\003
\125\004\013\014\056\124\141\156\303\272\163\303\255\164\166\303
\241\156\171\153\151\141\144\303\263\153\040\050\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\123\145\162\166\151\143
\145\163\051\061\073\060\071\006\003\125\004\003\014\062\116\145
\164\114\157\143\153\040\120\154\141\164\151\156\141\040\050\103
\154\141\163\163\040\120\154\141\164\151\156\165\155\051\040\106
\305\221\164\141\156\303\272\163\303\255\164\166\303\241\156\171
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\255\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160
\145\163\164\061\025\060\023\006\003\125\004\012\014\014\116\145
\164\114\157\143\153\040\113\146\164\056\061\067\060\065\006\003

\125\004\013\014\056\124\141\156\303\272\163\303\255\164\166\303
\241\156\171\153\151\141\144\303\263\153\040\050\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\123\145\162\166\151\143
\145\163\051\061\073\060\071\006\003\125\004\003\014\062\116\145
\164\114\157\143\153\040\120\154\141\164\151\156\141\040\050\103
\154\141\163\163\040\120\154\141\164\151\156\165\155\051\040\106
\305\221\164\141\156\303\272\163\303\255\164\166\303\241\156\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\006\111\101\055\354\000\020
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\041\060\202\004\011\240\003\002\001\002\002\006\111
\101\055\354\000\020\060\015\006\011\052\206\110\206\367\015\001
\001\013\005\000\060\201\255\061\013\060\011\006\003\125\004\006
\023\002\110\125\061\021\060\017\006\003\125\004\007\014\010\102
\165\144\141\160\145\163\164\061\025\060\023\006\003\125\004\012
\014\014\116\145\164\114\157\143\153\040\113\146\164\056\061\067
\060\065\006\003\125\004\013\014\056\124\141\156\303\272\163\303
\255\164\166\303\241\156\171\153\151\141\144\303\263\153\040\050
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\123\145
\162\166\151\143\145\163\051\061\073\060\071\006\003\125\004\003
\014\062\116\145\164\114\157\143\153\040\120\154\141\164\151\156
\141\040\050\103\154\141\163\163\040\120\154\141\164\151\156\165
\155\051\040\106\305\221\164\141\156\303\272\163\303\255\164\166
\303\241\156\171\060\036\027\015\060\070\061\062\061\061\061\065
\061\062\064\064\132\027\015\062\070\061\062\060\066\061\065\061
\062\064\064\132\060\201\255\061\013\060\011\006\003\125\004\006
\023\002\110\125\061\021\060\017\006\003\125\004\007\014\010\102
\165\144\141\160\145\163\164\061\025\060\023\006\003\125\004\012
\014\014\116\145\164\114\157\143\153\040\113\146\164\056\061\067
\060\065\006\003\125\004\013\014\056\124\141\156\303\272\163\303
\255\164\166\303\241\156\171\153\151\141\144\303\263\153\040\050
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\123\145
\162\166\151\143\145\163\051\061\073\060\071\006\003\125\004\003
\014\062\116\145\164\114\157\143\153\040\120\154\141\164\151\156
\141\040\050\103\154\141\163\163\040\120\154\141\164\151\156\165
\155\051\040\106\305\221\164\141\156\303\272\163\303\255\164\166
\303\241\156\171\060\202\002\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012
\002\202\002\001\000\315\362\356\304\032\172\353\164\051\114\266
\275\344\326\012\027\154\145\342\146\075\304\321\274\014\266\132
\326\053\160\137\055\314\041\321\131\020\344\261\023\275\366\314
\042\225\326\154\106\116\221\062\263\353\365\254\313\004\001\117
\166\335\123\076\170\237\371\136\274\265\202\023\106\312\020\343
\035\055\151\053\224\062\020\163\041\253\251\070\305\343\156\023
\144\325\143\251\355\011\146\354\212\157\211\215\021\206\320\365

\277\062\226\013\165\160\365\050\130\102\136\254\151\264\365\374
\221\071\056\242\221\100\321\074\124\101\207\043\144\120\110\171
\150\113\150\223\113\162\353\200\151\263\112\034\220\276\262\101
\243\245\315\027\300\321\032\151\177\002\030\112\265\142\207\046
\127\055\154\250\054\041\071\365\227\136\233\232\246\370\347\114
\171\304\173\073\126\334\172\370\264\130\316\166\012\256\042\125
\353\217\307\204\144\173\275\153\312\225\117\330\276\061\023\277
\215\241\012\053\325\171\267\365\166\255\332\121\134\201\107\142
\250\252\377\317\123\340\064\161\317\015\045\123\251\236\143\107
\257\205\221\370\317\031\021\345\116\371\317\355\343\065\005\001
\042\003\317\232\174\352\035\121\132\313\375\163\075\071\013\061
\353\304\073\312\205\052\021\024\000\240\033\201\242\011\210\110
\363\174\242\144\241\354\147\264\130\207\360\024\352\251\276\245
\042\101\115\354\275\244\016\350\075\207\367\057\252\316\065\206
\117\060\127\222\215\066\256\170\326\375\030\374\327\045\036\317
\172\374\031\375\240\077\162\027\066\010\101\077\227\066\225\014
\211\225\161\105\372\204\326\324\040\140\263\105\012\362\267\225
\075\013\345\244\303\270\022\362\221\154\351\155\140\203\366\105
\021\005\272\346\107\203\331\221\342\156\341\273\106\153\110\033
\274\306\373\317\176\336\054\273\220\204\356\266\047\071\347\215
\242\061\017\337\201\267\054\154\000\342\261\330\052\027\134\033
\036\107\211\113\027\121\024\100\100\117\304\071\030\062\302\200
\140\066\345\172\107\147\366\250\005\124\301\135\226\240\037\266
\210\122\014\002\276\215\125\176\024\113\303\242\001\356\234\212
\101\135\371\137\226\221\011\216\264\344\265\305\004\337\326\066
\255\131\264\262\327\002\003\000\363\221\243\105\060\103\060\022
\006\003\125\035\023\001\001\377\004\010\060\006\001\001\377\002
\001\004\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\006\060\035\006\003\125\035\016\004\026\004\024\346\241\023
\203\376\227\113\362\330\377\061\241\247\164\063\211\316\136\177
\244\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000
\003\202\002\001\000\151\204\102\300\343\136\023\141\227\040\111
\361\364\026\205\245\237\244\021\010\045\304\143\206\217\360\113
\257\263\051\365\007\127\032\142\307\033\105\156\257\135\026\267
\301\320\144\203\073\227\365\103\266\105\220\361\146\052\203\044
\052\377\210\351\172\013\371\302\133\172\257\143\367\011\170\206
\110\131\064\136\233\152\020\116\361\156\225\211\066\112\150\320
\157\233\340\176\117\267\065\017\343\171\261\005\257\047\174\252
\211\012\103\336\372\014\357\331\127\057\050\161\315\151\153\122
\102\311\212\060\105\131\241\314\372\131\112\217\367\326\335\104
\245\263\056\133\021\030\342\262\265\347\021\123\070\376\202\114
\323\163\276\145\222\032\072\250\322\322\252\274\324\276\155\066
\122\377\153\324\322\265\033\067\363\027\102\361\056\247\325\220
\154\164\235\164\365\372\137\042\033\323\334\165\250\265\377\362
\032\321\274\053\000\134\074\305\270\206\010\124\111\242\234\043
\373\357\246\215\160\364\102\122\115\033\040\000\201\370\240\270
\364\164\043\234\276\364\271\016\354\036\152\330\145\112\025\165
\361\167\133\156\330\261\346\017\264\226\270\035\372\206\310\222

\156\213\351\175\337\242\016\325\361\361\174\256\112\343\146\277
\135\374\133\357\110\262\236\151\307\175\220\240\125\266\224\160
\201\271\012\275\211\165\123\354\204\251\003\245\337\121\231\010
\320\164\014\002\326\163\162\006\173\213\273\135\252\116\374\147
\147\330\216\020\003\031\055\067\072\324\167\251\072\034\235\300
\171\173\154\051\167\062\115\112\213\060\210\302\347\066\316\150
\243\232\230\206\371\211\025\236\277\252\121\175\361\120\106\124
\017\002\056\134\237\343\336\127\063\025\376\030\222\141\250\322
\051\005\135\145\104\036\233\343\357\373\334\005\337\025\253\246
\330\013\244\163\262\114\072\340\236\324\263\152\345\072\016\012
\360\116\317\170\201\037\276\251\230\157\261\107\121\175\102\063
\066\263\246\251\002\122\005\164\176\052\154\324\252\222\126\260
\076\073\043\130\261\215\065\247\023\217\147\036\161\025\246\263
\265\003\206\270\040\146\300\110\157\271\254\324\112\003\125\262
\067\337\004\335\042\014\123\206\052\112\052\241\301\070\076\074
\345\074\337\165\227
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "NetLock Platina (Class Platinum) Ftanúsítvány"
# Issuer: CN=NetLock Platina (Class Platinum) Ftanúsítvány,OU=Tanúsítványkiadók (Certification Services),O=NetLock Kft.,L=Budapest,C=HU
# Serial Number:49:41:2d:ec:00:10
# Subject: CN=NetLock Platina
 (Class Platinum) Ftanúsítvány,OU=Tanúsítványkiadók (Certification Services),O=NetLock Kft.,L=Budapest,C=HU
# Not Valid Before: Thu Dec 11 15:12:44 2008
# Not Valid After: Wed Dec 06 15:12:44 2028
# Fingerprint (MD5): d5:97:88:da:64:16:e7:1d:66:4a:a6:ea:37:fc:7a:dc
# Fingerprint (SHA1): ec:93:de:08:3c:93:d9:33:a9:86:b3:d5:cd:e2:5a:cb:2f:ee:cf:8e
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "NetLock Platina (Class Platinum) Ftanúsítvány"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\354\223\336\010\074\223\331\063\251\206\263\325\315\342\132\313
\057\356\317\216
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\325\227\210\332\144\026\347\035\146\112\246\352\067\374\172\334
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\255\061\013\060\011\006\003\125\004\006\023\002\110\125

\061\021\060\017\006\003\125\004\007\014\010\102\165\144\141\160
\145\163\164\061\025\060\023\006\003\125\004\012\014\014\116\145
\164\114\157\143\153\040\113\146\164\056\061\067\060\065\006\003
\125\004\013\014\056\124\141\156\303\272\163\303\255\164\166\303
\241\156\171\153\151\141\144\303\263\153\040\050\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\123\145\162\166\151\143
\145\163\051\061\073\060\071\006\003\125\004\003\014\062\116\145
\164\114\157\143\153\040\120\154\141\164\151\156\141\040\050\103
\154\141\163\163\040\120\154\141\164\151\156\165\155\051\040\106
\305\221\164\141\156\303\272\163\303\255\164\166\303\241\156\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\006\111\101\055\354\000\020
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "AC Raíz Certicámara S.A."
# Issuer: CN=AC Raíz Certicámara S.A.,O=Sociedad Cameral de Certificación Digital - Certicámara S.A.,C=CO
#
Serial Number:07:7e:52:93:7b:e0:15:e3:57:f0:69:8c:cb:ec:0c
# Subject: CN=AC Raíz Certicámara S.A.,O=Sociedad Cameral de Certificación Digital - Certicámara S.A.,C=CO
# Not Valid Before: Mon Nov 27 20:46:29 2006
# Not Valid After: Tue Apr 02 21:42:02 2030
# Fingerprint (MD5): 93:2a:3e:f6:fd:23:69:0d:71:20:d4:2b:47:99:2b:a6
# Fingerprint (SHA1): cb:a1:c5:f8:b0:e3:5e:b8:b9:45:12:d3:f9:34:a2:e9:06:10:d3:36
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AC Raíz Certicámara S.A."
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\173\061\013\060\011\006\003\125\004\006\023\002\103\117\061
\107\060\105\006\003\125\004\012\014\076\123\157\143\151\145\144
\141\144\040\103\141\155\145\162\141\154\040\144\145\040\103\145
\162\164\151\146\151\143\141\143\151\303\263\156\040\104\151\147
\151\164\141\154\040\055\040\103\145\162\164\151\143\303\241\155
\141\162\141\040\123\056\101\056\061\043\060\041\006\003\125\004
\003\014\032\101\103\040\122\141\303\255\172\040\103\145\162\164
\151\143\303\241\155\141\162\141\040\123\056\101\056
END
CKA_ID

UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\173\061\013\060\011\006\003\125\004\006\023\002\103\117\061
\107\060\105\006\003\125\004\012\014\076\123\157\143\151\145\144
\141\144\040\103\141\155\145\162\141\154\040\144\145\040\103\145
\162\164\151\146\151\143\141\143\151\303\263\156\040\104\151\147
\151\164\141\154\040\055\040\103\145\162\164\151\143\303\241\155
\141\162\141\040\123\056\101\056\061\043\060\041\006\003\125\004
\003\014\032\101\103\040\122\141\303\255\172\040\103\145\162\164
\151\143\303\241\155\141\162\141\040\123\056\101\056
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\017\007\176\122\223\173\340\025\343\127\360\151\214\313\354
\014
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\146\060\202\004\116\240\003\002\001\002\002\017\007
\176\122\223\173\340\025\343\127\360\151\214\313\354\014\060\015
\006\011\052\206\110\206\367\015\001\001\005\005\000\060\173\061
\013\060\011\006\003\125\004\006\023\002\103\117\061\107\060\105
\006\003\125\004\012\014\076\123\157\143\151\145\144\141\144\040
\103\141\155\145\162\141\154\040\144\145\040\103\145\162\164\151
\146\151\143\141\143\151\303\263\156\040\104\151\147\151\164\141
\154\040\055\040\103\145\162\164\151\143\303\241\155\141\162\141
\040\123\056\101\056\061\043\060\041\006\003\125\004\003\014\032
\101\103\040\122\141\303\255\172\040\103\145\162\164\151\143\303
\241\155\141\162\141\040\123\056\101\056\060\036\027\015\060\066
\061\061\062\067\062\060\064\066\062\071\132\027\015\063\060\060
\064\060\062\062\061\064\062\060\062\132\060\173\061\013\060\011
\006\003\125\004\006\023\002\103\117\061\107\060\105\006\003\125
\004\012\014\076\123\157\143\151\145\144\141\144\040\103\141\155
\145\162\141\154\040\144\145\040\103\145\162\164\151\146\151\143
\141\143\151\303\263\156\040\104\151\147\151\164\141\154\040\055
\040\103\145\162\164\151\143\303\241\155\141\162\141\040\123\056
\101\056\061\043\060\041\006\003\125\004\003\014\032\101\103\040
\122\141\303\255\172\040\103\145\162\164\151\143\303\241\155\141
\162\141\040\123\056\101\056\060\202\002\042\060\015\006\011\052
\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060
\202\002\012\002\202\002\001\000\253\153\211\243\123\314\110\043
\010\373\303\317\121\226\010\056\270\010\172\155\074\220\027\206
\251\351\355\056\023\064\107\262\320\160\334\311\074\320\215\312
\356\113\027\253\320\205\260\247\043\004\313\250\242\374\345\165
\333\100\312\142\211\217\120\236\001\075\046\133\030\204\034\313
\174\067\267\175\354\323\177\163\031\260\152\262\330\210\212\055
\105\164\250\367\263\270\300\324\332\315\042\211\164\115\132\025
\071\163\030\164\117\265\353\231\247\301\036\210\264\302\223\220
\143\227\363\247\247\022\262\011\042\007\063\331\221\315\016\234
\037\016\040\307\356\273\063\215\217\302\322\130\247\137\375\145

\067\342\210\302\330\217\206\165\136\371\055\247\207\063\362\170
\067\057\213\274\035\206\067\071\261\224\362\330\274\112\234\203
\030\132\006\374\363\324\324\272\214\025\011\045\360\371\266\215
\004\176\027\022\063\153\127\110\114\117\333\046\036\353\314\220
\347\213\371\150\174\160\017\243\052\320\072\070\337\067\227\342
\133\336\200\141\323\200\330\221\203\102\132\114\004\211\150\021
\074\254\137\150\200\101\314\140\102\316\015\132\052\014\017\233
\060\300\246\360\206\333\253\111\327\227\155\110\213\371\003\300
\122\147\233\022\367\302\362\056\230\145\102\331\326\232\343\320
\031\061\014\255\207\325\127\002\172\060\350\206\046\373\217\043
\212\124\207\344\277\074\356\353\303\165\110\137\036\071\157\201
\142\154\305\055\304\027\124\031\267\067\215\234\067\221\310\366
\013\325\352\143\157\203\254\070\302\363\077\336\232\373\341\043
\141\360\310\046\313\066\310\241\363\060\217\244\243\242\241\335
\123\263\336\360\232\062\037\203\221\171\060\301\251\037\123\233
\123\242\025\123\077\335\235\263\020\073\110\175\211\017\374\355
\003\365\373\045\144\165\016\027\031\015\217\000\026\147\171\172
\100\374\055\131\007\331\220\372\232\255\075\334\200\212\346\134
\065\242\147\114\021\153\261\370\200\144\000\055\157\042\141\305
\254\113\046\345\132\020\202\233\244\203\173\064\367\236\211\221
\040\227\216\267\102\307\146\303\320\351\244\326\365\040\215\304
\303\225\254\104\012\235\133\163\074\046\075\057\112\276\247\311
\247\020\036\373\237\120\151\363\002\003\001\000\001\243\201\346
\060\201\343\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\035\006\003\125\035\016\004\026\004\024\321
\011\320\351\327\316\171\164\124\371\072\060\263\364\155\054\003
\003\033\150\060\201\240\006\003\125\035\040\004\201\230\060\201
\225\060\201\222\006\004\125\035\040\000\060\201\211\060\053\006
\010\053\006\001\005\005\007\002\001\026\037\150\164\164\160\072
\057\057\167\167\167\056\143\145\162\164\151\143\141\155\141\162
\141\056\143\157\155\057\144\160\143\057\060\132\006\010\053\006
\001\005\005\007\002\002\060\116\032\114\114\151\155\151\164\141
\143\151\157\156\145\163\040\144\145\040\147\141\162\141\156\164
\355\141\163\040\144\145\040\145\163\164\145\040\143\145\162\164
\151\146\151\143\141\144\157\040\163\145\040\160\165\145\144\145
\156\040\145\156\143\157\156\164\162\141\162\040\145\156\040\154
\141\040\104\120\103\056\060\015\006\011\052\206\110\206\367\015
\001\001\005\005\000\003\202\002\001\000\134\224\265\270\105\221
\115\216\141\037\003\050\017\123\174\346\244\131\251\263\212\172
\305\260\377\010\174\054\243\161\034\041\023\147\241\225\022\100
\065\203\203\217\164\333\063\134\360\111\166\012\201\122\335\111
\324\232\062\063\357\233\247\313\165\345\172\313\227\022\220\134
\272\173\305\233\337\273\071\043\310\377\230\316\012\115\042\001
\110\007\176\212\300\325\040\102\224\104\357\277\167\242\211\147
\110\033\100\003\005\241\211\354\317\142\343\075\045\166\146\277
\046\267\273\042\276\157\377\071\127\164\272\172\311\001\225\301
\225\121\350\253\054\370\261\206\040\351\077\313\065\133\322\027

\351\052\376\203\023\027\100\356\210\142\145\133\325\073\140\351
\173\074\270\311\325\177\066\002\045\252\150\302\061\025\267\060
\145\353\177\035\110\171\261\317\071\342\102\200\026\323\365\223
\043\374\114\227\311\132\067\154\174\042\330\112\315\322\216\066
\203\071\221\220\020\310\361\311\065\176\077\270\323\201\306\040
\144\032\266\120\302\041\244\170\334\320\057\073\144\223\164\360
\226\220\361\357\373\011\132\064\100\226\360\066\022\301\243\164
\214\223\176\101\336\167\213\354\206\331\322\017\077\055\321\314
\100\242\211\146\110\036\040\263\234\043\131\163\251\104\163\274
\044\171\220\126\067\263\306\051\176\243\017\361\051\071\357\176
\134\050\062\160\065\254\332\270\310\165\146\374\233\114\071\107
\216\033\157\233\115\002\124\042\063\357\141\272\236\051\204\357
\116\113\063\107\166\227\152\313\176\137\375\025\246\236\102\103
\133\146\132\212\210\015\367\026\271\077\121\145\053\146\152\213
\321\070\122\242\326\106\021\372\374\232\034\164\236\217\227\013
\002\117\144\306\365\150\323\113\055\377\244\067\036\213\077\277
\104\276\141\106\241\204\075\010\047\114\201\040\167\211\010\352
\147\100\136\154\010\121\137\064\132\214\226\150\315\327\367\211
\302\034\323\062\000\257\122\313\323\140\133\052\072\107\176\153
\060\063\241\142\051\177\112\271\341\055\347\024\043\016\016\030
\107\341\171\374\025\125\320\261\374\045\161\143\165\063\034\043
\053\257\134\331\355\107\167\140\016\073\017\036\322\300\334\144
\005\211\374\170\326\134\054\046\103\251
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "AC Raíz Certicámara S.A."
# Issuer: CN=AC Raíz Certicámara S.A.,O=Sociedad Cameral de Certificación Digital - Certicámara S.A.,C=CO
# Serial Number:07:7e:52:93:7b:e0:15:e3:57:f0:69:8c:cb:ec:0c
# Subject: CN=AC Raíz Certicámara S.A.,O=Sociedad Cameral de Certificación
 Digital - Certicámara S.A.,C=CO
# Not Valid Before: Mon Nov 27 20:46:29 2006
# Not Valid After: Tue Apr 02 21:42:02 2030
# Fingerprint (MD5): 93:2a:3e:f6:fd:23:69:0d:71:20:d4:2b:47:99:2b:a6
# Fingerprint (SHA1): cb:a1:c5:f8:b0:e3:5e:b8:b9:45:12:d3:f9:34:a2:e9:06:10:d3:36
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AC Raíz Certicámara S.A."
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\313\241\305\370\260\343\136\270\271\105\022\323\371\064\242\351
\006\020\323\066
END

```
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\223\052\076\366\375\043\151\015\161\040\324\053\107\231\053\246
END
CKA_ISSUER MULTILINE_OCTAL
\060\173\061\013\060\011\006\003\125\004\006\023\002\103\117\061
\107\060\105\006\003\125\004\012\014\076\123\157\143\151\145\144
\141\144\040\103\141\155\145\162\141\154\040\144\145\040\103\145
\162\164\151\146\151\143\141\143\151\303\263\156\040\104\151\147
\151\164\141\154\040\055\040\103\145\162\164\151\143\303\241\155
\141\162\141\040\123\056\101\056\061\043\060\041\006\003\125\004
\003\014\032\101\103\040\122\141\303\255\172\040\103\145\162\164
\151\143\303\241\155\141\162\141\040\123\056\101\056
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\017\007\176\122\223\173\340\025\343\127\360\151\214\313\354
\014
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Cisco Root CA 2048"
# Issuer: CN=Cisco Root CA 2048,O=Cisco Systems
# Serial Number:5f:f8:7b:28:2b:54:dc:8d:42:a3:15:b5:68:c9:ad:ff
# Subject: CN=Cisco Root CA 2048,O=Cisco Systems
# Not Valid Before: Fri May 14 20:17:12 2004
# Not Valid After: Mon May 14 20:25:42 2029
# Fingerprint (MD5): be:39:5a:be:07:8a:b1:12:17:25:cc:1d:46:34:3c:b2
# Fingerprint (SHA1): de:99:0c:ed:99:e0:43:1f:60:ed:c3:93:7e:7c:d5:bf:0e:d9:e5:fa
CKA_CLASS
 CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Cisco Root CA 2048"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\065\061\026\060\024\006\003\125\004\012\023\015\103\151\163
\143\157\040\123\171\163\164\145\155\163\061\033\060\031\006\003
\125\004\003\023\022\103\151\163\143\157\040\122\157\157\164\040
\103\101\040\062\060\064\070
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\065\061\026\060\024\006\003\125\004\012\023\015\103\151\163
```

\143\157\040\123\171\163\164\145\155\163\061\033\060\031\006\003
\125\004\003\023\022\103\151\163\143\157\040\122\157\157\164\040
\103\101\040\062\060\064\070
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\137\370\173\050\053\124\334\215\102\243\025\265\150\311
\255\377
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\103\060\202\002\053\240\003\002\001\002\002\020\137
\370\173\050\053\124\334\215\102\243\025\265\150\311\255\377\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\065
\061\026\060\024\006\003\125\004\012\023\015\103\151\163\143\157
\040\123\171\163\164\145\155\163\061\033\060\031\006\003\125\004
\003\023\022\103\151\163\143\157\040\122\157\157\164\040\103\101
\040\062\060\064\070\060\036\027\015\060\064\060\065\061\064\062
\060\061\067\061\062\132\027\015\062\071\060\065\061\064\062\060
\062\065\064\062\132\060\065\061\026\060\024\006\003\125\004\012
\023\015\103\151\163\143\157\040\123\171\163\164\145\155\163\061
\033\060\031\006\003\125\004\003\023\022\103\151\163\143\157\040
\122\157\157\164\040\103\101\040\062\060\064\070\060\202\001\040
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\001\015\000\060\202\001\010\002\202\001\001\000\260\232\271
\253\247\257\012\167\247\342\161\266\264\146\142\224\170\210\107
\306\142\125\204\100\062\277\300\253\056\245\034\161\326\274\156
\173\250\252\272\156\322\025\210\110\105\235\242\374\203\320\314
\271\214\340\046\150\160\112\170\337\041\027\236\364\141\005\311
\025\310\317\026\332\065\141\211\224\103\250\204\250\061\230\170
\233\271\116\157\054\123\022\154\315\035\255\053\044\273\061\304
\053\377\203\104\157\266\075\044\167\011\352\277\052\250\037\152
\126\366\040\017\021\124\227\201\165\247\045\316\131\152\202\145
\357\267\352\347\342\215\165\213\156\362\335\117\246\136\142\234
\317\020\012\144\320\116\155\316\053\314\133\365\140\245\047\107
\215\151\364\177\316\033\160\336\160\033\040\326\156\315\246\001
\250\074\022\322\251\077\240\153\136\273\216\040\213\172\221\343
\265\150\356\240\347\304\001\164\250\123\013\053\112\232\017\145
\022\016\202\115\216\143\375\357\353\233\032\333\123\246\023\140
\257\302\175\327\307\154\027\045\324\163\373\107\144\120\201\200
\224\114\341\277\256\113\034\337\222\355\056\005\337\002\001\003
\243\121\060\117\060\013\006\003\125\035\017\004\004\003\002\001
\206\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\035\006\003\125\035\016\004\026\004\024\047\363\310
\025\036\156\232\002\011\026\255\053\240\211\140\137\332\173\057
\252\060\020\006\011\053\006\001\004\001\202\067\025\001\004\003
\002\001\000\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\003\202\001\001\000\235\235\204\204\243\101\251\174\167
\014\267\123\312\116\104\120\142\357\124\174\323\165\027\034\350
\340\306\110\113\266\376\114\072\031\201\126\260\126\356\031\226

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\142\252\132\243\144\301\366\116\124\063\306\167\376\305\034\272
\345\135\045\312\365\360\223\232\203\021\056\346\313\370\164\105
\376\347\005\270\253\347\337\313\113\341\067\204\332\271\213\227
\160\036\360\342\213\327\260\330\016\235\261\151\326\052\221\173
\251\111\117\176\346\216\225\330\203\047\074\325\150\111\016\324
\235\366\056\353\247\276\353\060\244\254\037\104\374\225\253\063
\006\373\175\140\012\336\264\212\143\260\234\251\362\244\271\123
\001\207\320\150\244\047\177\253\377\351\372\311\100\070\210\147
\264\071\306\204\157\127\311\123\333\272\216\356\300\103\262\370
\011\203\156\377\146\317\076\357\027\263\130\030\045\011\064\136
\343\313\326\024\266\354\362\222\157\164\344\057\201\052\325\222
\221\340\340\227\074\062\150\005\205\113\321\367\127\342\122\035
\223\032\124\237\005\160\300\112\161\140\036\103\013\140\036\376
\243\316\201\031\341\013\065
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Cisco Root CA 2048"
# Issuer: CN=Cisco Root CA 2048,O=Cisco Systems
# Serial Number:5f:f8:7b:28:2b:54:dc:8d:42:a3:15:b5:68:c9:ad:ff
# Subject: CN=Cisco Root CA 2048,O=Cisco Systems
# Not Valid Before: Fri May 14 20:17:12 2004
# Not Valid After: Mon May 14 20:25:42 2029
# Fingerprint (MD5): be:39:5a:be:07:8a:b1:12:17:25:cc:1d:46:34:3c:b2
# Fingerprint (SHA1): de:99:0c:ed:99:e0:43:1f:60:ed:c3:93:7e:7c:d5:bf:0e:d9:e5:fa
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
 CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Cisco Root CA 2048"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\336\231\014\355\231\340\103\037\140\355\303\223\176\174\325\277
\016\331\345\372
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\276\071\132\276\007\212\261\022\027\045\314\035\106\064\074\262
END
CKA_ISSUER MULTILINE_OCTAL
\060\065\061\026\060\024\006\003\125\004\012\023\015\103\151\163
\143\157\040\123\171\163\164\145\155\163\061\033\060\031\006\003
\125\004\003\023\022\103\151\163\143\157\040\122\157\157\164\040
\103\101\040\062\060\064\070
END
```

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CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\137\370\173\050\053\124\334\215\102\243\025\265\150\311
\255\377
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "CA Disig"
# Issuer: CN=CA Disig,O=Disig
 a.s.,L=Bratislava,C=SK
# Serial Number: 1 (0x1)
# Subject: CN=CA Disig,O=Disig a.s.,L=Bratislava,C=SK
# Not Valid Before: Wed Mar 22 01:39:34 2006
# Not Valid After: Tue Mar 22 01:39:34 2016
# Fingerprint (MD5): 3f:45:96:39:e2:50:87:f7:bb:fe:98:0c:3c:20:98:e6
# Fingerprint (SHA1): 2a:c8:d5:8b:57:ce:bf:2f:49:af:f2:fc:76:8f:51:14:62:90:7a:41
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CA Disig"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\123\113\061
\023\060\021\006\003\125\004\007\023\012\102\162\141\164\151\163
\154\141\166\141\061\023\060\021\006\003\125\004\012\023\012\104
\151\163\151\147\040\141\056\163\056\061\021\060\017\006\003\125
\004\003\023\010\103\101\040\104\151\163\151\147
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\123\113\061
\023\060\021\006\003\125\004\007\023\012\102\162\141\164\151\163
\154\141\166\141\061\023\060\021\006\003\125\004\012\023\012\104
\151\163\151\147\040\141\056\163\056\061\021\060\017\006\003\125
\004\003\023\010\103\101\040\104\151\163\151\147
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\017\060\202\002\367\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\112\061\013\060\011\006\003\125\004\006\023\002\123\113\061\023
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\060\021\006\003\125\004\007\023\012\102\162\141\164\151\163\154
\141\166\141\061\023\060\021\006\003\125\004\012\023\012\104\151
\163\151\147\040\141\056\163\056\061\021\060\017\006\003\125\004
\003\023\010\103\101\040\104\151\163\151\147\060\036\027\015\060
\066\060\063\062\062\060\061\063\071\063\064\132\027\015\061\066
\060\063\062\062\060\061\063\071\063\064\132\060\112\061\013\060
\011\006\003\125\004\006\023\002\123\113\061\023\060\021\006\003
\125\004\007\023\012\102\162\141\164\151\163\154\141\166\141\061
\023\060\021\006\003\125\004\012\023\012\104\151\163\151\147\040
\141\056\163\056\061\021\060\017\006\003\125\004\003\023\010\103
\101\040\104\151\163\151\147\060\202\001\042\060\015\006\011\052
\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060
\202\001\012\002\202\001\001\000\222\366\061\301\175\210\375\231
\001\251\330\173\362\161\165\361\061\306\363\165\146\372\121\050
\106\204\227\170\064\274\154\374\274\105\131\210\046\030\112\304
\067\037\241\112\104\275\343\161\004\365\104\027\342\077\374\110
\130\157\134\236\172\011\272\121\067\042\043\146\103\041\260\074
\144\242\370\152\025\016\077\353\121\341\124\251\335\006\231\327
\232\074\124\213\071\003\077\017\305\316\306\353\203\162\002\250
\037\161\363\055\370\165\010\333\142\114\350\372\316\371\347\152
\037\266\153\065\202\272\342\217\026\222\175\005\014\154\106\003
\135\300\355\151\277\072\301\212\240\350\216\331\271\105\050\207
\010\354\264\312\025\276\202\335\265\104\213\055\255\206\014\150
\142\155\205\126\362\254\024\143\072\306\321\231\254\064\170\126
\113\317\266\255\077\214\212\327\004\345\343\170\114\365\206\252
\365\217\372\075\154\161\243\055\312\147\353\150\173\156\063\251
\014\202\050\250\114\152\041\100\025\040\014\046\133\203\302\251
\026\025\300\044\202\135\053\026\255\312\143\366\164\000\260\337
\103\304\020\140\126\147\143\105\002\003\001\000\001\243\201\377
\060\201\374\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024\215
\262\111\150\235\162\010\045\271\300\047\365\120\223\126\110\106
\161\371\217\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\066\006\003\125\035\021\004\057\060\055\201\023
\143\141\157\160\145\162\141\164\157\162\100\144\151\163\151\147
\056\163\153\206\026\150\164\164\160\072\057\057\167\167\167\056
\144\151\163\151\147\056\163\153\057\143\141\060\146\006\003\125
\035\037\004\137\060\135\060\055\240\053\240\051\206\047\150\164
\164\160\072\057\057\167\167\167\056\144\151\163\151\147\056\163
\153\057\143\141\057\143\162\154\057\143\141\137\144\151\163\151
\147\056\143\162\154\060\054\240\052\240\050\206\046\150\164\164
\160\072\057\057\143\141\056\144\151\163\151\147\056\163\153\057
\143\141\057\143\162\154\057\143\141\137\144\151\163\151\147\056
\143\162\154\060\032\006\003\125\035\040\004\023\060\021\060\017
\006\015\053\201\036\221\223\346\012\000\000\000\001\001\001\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003\202
\001\001\000\135\064\164\141\114\257\073\330\377\237\155\130\066
\034\075\013\201\015\022\053\106\020\200\375\347\074\047\320\172

\310\251\266\176\164\060\063\243\072\212\173\164\300\171\171\102
\223\155\377\261\051\024\202\253\041\214\057\027\371\077\046\057
\365\131\306\357\200\006\267\232\111\051\354\316\176\161\074\152
\020\101\300\366\323\232\262\174\132\221\234\300\254\133\310\115
\136\367\341\123\377\103\167\374\236\113\147\154\327\363\203\321
\240\340\177\045\337\270\230\013\232\062\070\154\060\240\363\377
\010\025\063\367\120\112\173\076\243\076\040\251\334\057\126\200
\012\355\101\120\260\311\364\354\262\343\046\104\000\016\157\236
\006\274\042\226\123\160\145\304\120\012\106\153\244\057\047\201
\022\047\023\137\020\241\166\316\212\173\067\352\303\071\141\003
\225\230\072\347\154\210\045\010\374\171\150\015\207\175\142\370
\264\137\373\305\330\114\275\130\274\077\103\133\324\036\001\115
\074\143\276\043\357\214\315\132\120\270\150\124\371\012\231\063
\021\000\341\236\302\106\167\202\365\131\006\214\041\114\207\011
\315\345\250
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "CA Disig"
# Issuer: CN=CA Disig,O=Disig a.s.,L=Bratislava,C=SK
# Serial Number: 1 (0x1)
# Subject: CN=CA Disig,O=Disig a.s.,L=Bratislava,C=SK
# Not Valid Before: Wed Mar 22 01:39:34 2006
# Not Valid After: Tue Mar 22 01:39:34 2016
#
 Fingerprint (MD5): 3f:45:96:39:e2:50:87:f7:bb:fe:98:0c:3c:20:98:e6
# Fingerprint (SHA1): 2a:c8:d5:8b:57:ce:bf:2f:49:af:f2:fc:76:8f:51:14:62:90:7a:41
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CA Disig"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\052\310\325\213\127\316\277\057\111\257\362\374\166\217\121\024
\142\220\172\101
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\077\105\226\071\342\120\207\367\273\376\230\014\074\040\230\346
END
CKA_ISSUER MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\123\113\061
\023\060\021\006\003\125\004\007\023\012\102\162\141\164\151\163
\154\141\166\141\061\023\060\021\006\003\125\004\012\023\012\104
\151\163\151\147\040\141\056\163\056\061\021\060\017\006\003\125

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\004\003\023\010\103\101\040\104\151\163\151\147
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "UCA Global Root"
# Issuer: CN=UCA Global Root,O=UniTrust,C=CN
# Serial Number: 8 (0x8)
# Subject: CN=UCA Global Root,O=UniTrust,C=CN
# Not Valid Before: Tue Jan 01 00:00:00 2008
# Not Valid After: Thu Dec 31 00:00:00 2037
# Fingerprint (MD5): c1:d9:51:c0:84:b8:6a:75:e8:2f:d7:d6:5f:7e:ac:46
# Fingerprint (SHA1): 0b:97:2c:9e:a6:e7:cc:58:d9:3b:20:bf:71:ec:41:2e:72:09:fa:bf
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "UCA Global Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\072\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\023\010\125\156\151\124\162\165
\163\164\061\030\060\026\006\003\125\004\003\023\017\125\103\101
\040\107\154\157\142\141\154\040\122\157\157\164
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\072\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\023\010\125\156\151\124\162\165
\163\164\061\030\060\026\006\003\125\004\003\023\017\125\103\101
\040\107\154\157\142\141\154\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\010
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\222\060\202\003\172\240\003\002\001\002\002\001\010
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\072\061\013\060\011\006\003\125\004\006\023\002\103\116\061\021
\060\017\006\003\125\004\012\023\010\125\156\151\124\162\165\163
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\164\061\030\060\026\006\003\125\004\003\023\017\125\103\101\040
\107\154\157\142\141\154\040\122\157\157\164\060\036\027\015\060
\070\060\061\060\061\060\060\060\060\060\060\132\027\015\063\067
\061\062\063\061\060\060\060\060\060\060\060\132\060\072\061\013\060
\011\006\003\125\004\006\023\002\103\116\061\021\060\017\006\003
\125\004\012\023\010\125\156\151\124\162\165\163\164\061\030\060
\026\006\003\125\004\003\023\017\125\103\101\040\107\154\157\142
\141\154\040\122\157\157\164\060\202\002\042\060\015\006\011\052
\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060
\202\002\012\002\202\002\001\000\332\263\345\006\120\077\366\163
\367\304\062\277\106\245\045\142\063\207\260\150\376\247\337\210
\003\143\175\002\226\375\353\207\311\356\342\010\273\235\273\273
\344\101\217\307\060\211\017\155\044\300\004\154\024\224\201\115
\240\015\164\146\363\360\205\257\370\144\031\336\271\351\201\223
\320\050\205\231\107\102\112\054\074\070\047\112\314\377\371\154
\031\327\265\363\357\233\256\133\064\006\327\217\242\023\006\234
\212\204\102\325\263\243\220\150\155\201\220\356\115\204\354\114
\160\116\055\336\044\071\316\031\000\103\223\170\371\010\206\035
\103\321\364\162\274\005\300\147\372\300\121\322\311\205\007\044
\256\071\036\172\315\101\322\066\253\141\352\053\253\360\040\125
\231\074\155\055\034\056\056\165\226\330\162\227\340\014\312\151
\163\356\165\053\025\011\340\216\155\273\332\023\377\106\250\350
\000\014\254\007\057\035\271\272\271\321\240\367\231\236\164\134
\031\005\146\061\317\076\052\122\376\157\237\363\271\275\371\301
\201\365\067\332\056\114\201\045\135\366\331\224\232\323\065\213
\040\050\067\137\121\353\175\142\307\251\223\321\371\320\064\313
\251\047\046\054\050\220\222\073\125\143\267\027\016\124\163\253
\257\174\354\072\253\160\063\254\041\373\042\046\263\206\254\043
\251\327\177\155\313\010\040\362\257\100\365\377\104\107\161\335
\047\335\023\050\241\352\166\071\371\020\240\240\115\100\244\047
\262\131\025\053\154\055\044\267\044\143\170\367\103\030\172\017
\115\021\343\350\254\207\102\215\347\130\161\244\253\156\242\300
\227\174\273\343\023\113\312\333\273\153\010\371\151\264\004\162
\325\303\106\271\167\352\377\272\373\351\360\072\014\065\366\217
\017\256\006\204\026\335\224\125\324\357\312\047\267\003\074\305
\034\046\052\365\074\250\245\225\233\206\361\212\211\147\370\307
\014\146\261\355\101\277\202\246\000\150\072\042\064\356\036\353
\345\157\211\164\117\152\252\152\250\127\147\122\324\040\141\301
\316\123\313\375\044\177\137\046\337\241\010\151\226\240\236\376
\111\103\342\323\352\332\304\361\210\061\041\156\034\341\315\363
\165\016\040\104\026\314\175\163\164\065\105\054\073\201\324\040
\354\266\011\214\076\110\262\111\002\003\001\000\001\243\201\242
\060\201\237\060\013\006\003\125\035\017\004\004\003\002\001\006
\060\014\006\003\125\035\023\004\005\060\003\001\001\377\060\143
\006\003\125\035\045\004\134\060\132\006\010\053\006\001\005\005
\007\003\001\006\010\053\006\001\005\005\007\003\002\006\010\053
\006\001\005\005\007\003\003\006\010\053\006\001\005\005\007\003
\004\006\010\053\006\001\005\005\007\003\005\006\010\053\006\001

\005\005\007\003\006\006\010\053\006\001\005\005\007\003\007\006
\010\053\006\001\005\005\007\003\010\006\010\053\006\001\005\005
\007\003\011\060\035\006\003\125\035\016\004\026\004\024\331\303
\323\370\200\222\147\314\135\322\072\242\327\161\242\264\304\070
\200\055\060\015\006\011\052\206\110\206\367\015\001\001\005\005
\000\003\202\002\001\000\320\210\171\312\010\252\367\013\064\240
\116\011\302\351\176\065\110\211\160\204\043\057\121\303\053\057
\136\333\123\153\133\165\010\052\124\272\062\016\325\306\161\205
\261\227\111\200\366\204\320\360\272\267\161\224\310\171\153\246
\305\104\350\102\242\255\045\055\127\057\346\326\061\051\372\031
\211\124\051\176\267\176\107\066\151\055\156\062\274\324\165\332
\102\163\270\116\345\203\100\163\262\135\337\324\104\163\246\142
\013\333\252\156\005\214\310\177\106\117\071\205\220\235\274\033
\124\051\254\245\327\376\345\130\126\127\155\054\231\241\111\041
\325\141\306\214\141\341\165\044\301\001\335\055\033\066\303\057
\022\314\013\326\170\213\165\200\351\101\271\210\261\312\074\251
\026\306\116\025\343\162\066\366\324\240\101\205\257\212\145\160
\115\265\104\020\120\354\355\337\155\346\331\306\300\022\361\113
\072\057\163\351\074\251\356\033\252\057\065\245\233\237\115\305
\064\204\137\046\024\151\263\043\261\211\162\024\370\351\115\121
\042\003\377\112\206\304\034\350\173\171\012\333\107\045\201\176
\374\064\204\254\131\270\130\103\344\075\103\011\124\164\302\320
\375\331\357\156\131\367\162\140\231\166\157\365\047\247\273\203
\244\112\201\354\051\201\364\167\113\341\102\022\125\324\206\052
\022\266\360\125\233\001\056\335\366\250\343\031\303\316\107\057
\300\170\141\030\132\307\145\374\235\106\133\127\334\174\016\273
\226\203\020\174\125\030\011\004\256\321\367\213\052\076\240\346
\120\326\060\066\327\347\213\070\123\354\111\104\340\317\244\337
\361\123\173\213\132\266\366\021\220\113\326\165\363\376\002\363
\051\257\360\043\162\175\024\355\251\135\337\172\201\236\233\222
\042\374\036\370\001\105\101\227\307\153\001\141\276\063\150\362
\240\145\204\146\274\340\052\244\150\323\161\354\307\010\336\243
\303\311\066\112\064\361\027\342\200\257\040\041\223\224\036\346
\025\323\124\142\361\265\070\057\343\314\271\147\004\251\272\345
\356\371\020\156\313\056\176\023\257\222\024\376\363\047\163\173
\070\374\163\155\271\271\210\366\156\214\013\365\374\377\011\016
\263\055\136\173\165\343\222\044\342\346\341\130\076\113\050\003
\165\153\030\233\107\014
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "UCA Global Root"
# Issuer: CN=UCA Global Root,O=UniTrust,C=CN
# Serial Number: 8 (0x8)

```
# Subject: CN=UCA Global Root,O=UniTrust,C=CN
# Not Valid Before: Tue Jan 01 00:00:00 2008
# Not Valid After: Thu Dec 31 00:00:00 2037
# Fingerprint (MD5): c1:d9:51:c0:84:b8:6a:75:e8:2f:d7:d6:5f:7e:ac:46
# Fingerprint (SHA1): 0b:97:2c:9e:a6:e7:cc:58:d9:3b:20:bf:71:ec:41:2e:72:09:fa:bf
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "UCA Global Root"
CKA_CERT_SHA1_HASH
 MULTILINE_OCTAL
\013\227\054\236\246\347\314\130\331\073\040\277\161\354\101\056
\162\011\372\277
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\301\331\121\300\204\270\152\165\350\057\327\326\137\176\254\106
END
CKA_ISSUER MULTILINE_OCTAL
\060\072\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\023\010\125\156\151\124\162\165
\163\164\061\030\060\026\006\003\125\004\003\023\017\125\103\101
\040\107\154\157\142\141\154\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\010
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "UCA Root"
# Issuer: CN=UCA Root,O=UniTrust,C=CN
# Serial Number: 9 (0x9)
# Subject: CN=UCA Root,O=UniTrust,C=CN
# Not Valid Before: Thu Jan 01 00:00:00 2004
# Not Valid After: Mon Dec 31 00:00:00
 2029
# Fingerprint (MD5): 8f:91:e7:ee:e3:fc:da:86:ca:fc:dc:70:ed:b7:b7:0c
# Fingerprint (SHA1): 82:50:be:d5:a2:14:43:3a:66:37:7c:bc:10:ef:83:f6:69:da:3a:67
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "UCA Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
```

CKA_SUBJECT MULTILINE_OCTAL
\060\063\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\023\010\125\156\151\124\162\165
\163\164\061\021\060\017\006\003\125\004\003\023\010\125\103\101
\040\122\157\157\164
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\063\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\023\010\125\156\151\124\162\165
\163\164\061\021\060\017\006\003\125\004\003\023\010\125\103\101
\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\011
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\204\060\202\002\154\240\003\002\001\002\002\001\011
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\063\061\013\060\011\006\003\125\004\006\023\002\103\116\061\021
\060\017\006\003\125\004\012\023\010\125\156\151\124\162\165\163
\164\061\021\060\017\006\003\125\004\003\023\010\125\103\101\040
\122\157\157\164\060\036\027\015\060\064\060\061\060\061\060\060
\060\060\060\060\132\027\015\062\071\061\062\063\061\060\060\060
\060\060\060\132\060\063\061\013\060\011\006\003\125\004\006\023
\002\103\116\061\021\060\017\006\003\125\004\012\023\010\125\156
\151\124\162\165\163\164\061\021\060\017\006\003\125\004\003\023
\010\125\103\101\040\122\157\157\164\060\202\001\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017
\000\060\202\001\012\002\202\001\001\000\263\135\007\312\206\046
\175\153\342\373\070\011\016\314\202\302\152\032\000\242\025\137
\326\351\324\001\267\126\003\001\131\217\365\070\151\044\166\302
\136\053\305\366\053\277\257\373\101\375\017\132\374\253\327\203
\160\115\060\230\321\236\262\166\273\222\326\273\351\020\050\151
\050\066\104\350\361\054\327\130\174\044\326\177\002\072\360\201
\153\141\140\077\364\063\336\155\345\352\050\122\117\374\251\035
\143\174\013\272\352\256\304\150\106\344\336\217\301\247\262\266
\130\132\155\035\054\331\214\072\267\210\313\205\324\367\350\003
\136\375\262\115\120\350\326\037\377\256\002\077\213\117\226\041
\074\233\327\045\311\035\077\373\230\261\131\344\360\251\073\257
\263\315\205\054\342\140\106\314\157\216\240\353\360\064\305\361
\102\030\140\256\022\355\106\165\034\345\330\251\226\132\276\336
\132\326\170\147\226\133\223\167\120\362\156\033\336\226\121\112
\246\326\113\103\165\041\146\215\167\354\002\204\166\134\104\020
\266\035\141\154\344\243\040\175\267\215\272\017\221\165\307\215
\337\274\002\140\250\051\250\275\075\103\002\003\001\000\001\243
\201\242\060\201\237\060\013\006\003\125\035\017\004\004\003\002
\001\006\060\014\006\003\125\035\023\004\005\060\003\001\001\377

\060\143\006\003\125\035\045\004\134\060\132\006\010\053\006\001
\005\005\007\003\001\006\010\053\006\001\005\005\007\003\002\006
\010\053\006\001\005\005\007\003\003\006\010\053\006\001\005\005
\007\003\004\006\010\053\006\001\005\005\007\003\005\006\010\053
\006\001\005\005\007\003\006\006\010\053\006\001\005\005\007\003
\007\006\010\053\006\001\005\005\007\003\010\006\010\053\006\001
\005\005\007\003\011\060\035\006\003\125\035\016\004\026\004\024
\333\037\065\363\153\114\377\102\061\144\233\315\273\132\036\035
\110\020\267\356\060\015\006\011\052\206\110\206\367\015\001\001
\005\005\000\003\202\001\001\000\070\154\267\210\361\255\372\130
\067\164\321\350\160\336\234\047\131\313\344\025\327\240\303\140
\327\210\200\004\305\060\114\075\324\032\353\006\136\131\107\346
\274\146\313\340\010\374\350\065\354\142\175\312\300\332\301\170
\257\345\106\157\373\211\202\043\217\366\327\123\146\125\240\336
\045\022\073\161\066\026\125\022\166\373\075\370\124\133\061\272
\000\006\370\175\125\345\247\166\203\252\134\112\227\246\052\050
\337\275\306\154\013\043\225\216\063\177\036\136\100\037\023\124
\054\234\345\265\016\335\027\050\256\153\001\323\122\051\365\042
\037\220\071\364\334\142\150\360\074\206\107\354\270\005\105\273
\267\014\226\224\306\147\313\043\161\320\216\164\042\326\101\353
\003\250\266\352\276\304\001\022\265\263\135\100\166\006\040\324
\144\270\051\106\006\212\316\037\223\232\020\356\373\252\132\264
\334\057\325\053\313\366\327\005\204\230\005\221\013\204\367\075
\372\326\371\172\372\054\025\352\066\202\103\267\267\270\343\363
\161\001\355\103\103\242\005\105\303\050\005\007\065\343\001\245
\070\036\200\324\327\303\331\336
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "UCA Root"
# Issuer: CN=UCA Root,O=UniTrust,C=CN
# Serial Number: 9 (0x9)
# Subject: CN=UCA Root,O=UniTrust,C=CN
# Not Valid Before: Thu Jan 01 00:00:00 2004
# Not Valid
After: Mon Dec 31 00:00:00 2029
# Fingerprint (MD5): 8f:91:e7:ee:e3:fc:da:86:ca:fc:dc:70:ed:b7:b7:0c
# Fingerprint (SHA1): 82:50:be:d5:a2:14:43:3a:66:37:7c:bc:10:ef:83:f6:69:da:3a:67
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "UCA Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL

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\202\120\276\325\242\024\103\072\146\067\174\274\020\357\203\366
\151\332\072\147
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\217\221\347\356\343\374\332\206\312\374\334\160\355\267\267\014
END
CKA_ISSUER MULTILINE_OCTAL
\060\063\061\013\060\011\006\003\125\004\006\023\002\103\116\061
\021\060\017\006\003\125\004\012\023\010\125\156\151\124\162\165
\163\164\061\021\060\017\006\003\125\004\003\023\010\125\103\101
\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\011
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Starfield Services Root Certificate Authority"
# Issuer: CN=Starfield Services Root Certificate
Authority,OU=http://certificates.starfieldtech.com/repository/,O=Starfield Technologies\,
Inc.,L=Scottsdale,ST=Arizona,C=US
# Serial Number: 0 (0x0)
# Subject: CN=Starfield Services Root Certificate
Authority,OU=http://certificates.starfieldtech.com/repository/,O=Starfield Technologies\,
Inc.,L=Scottsdale,ST=Arizona,C=US
# Not Valid Before: Mon Jun 02 00:00:00 2008
# Not Valid After: Mon Dec 31 23:59:59 2029
# Fingerprint (MD5): cf:8f:3b:62:a3:ca:ca:71:1b:a3:e1:cb:48:57:35:1f
# Fingerprint (SHA1): 5d:00:38:60:f0:02:ed:82:9d:ea:a4:18:68:f7:88:18:6d:62:12:7f
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Starfield Services Root Certificate Authority"
CKA_CERTIFICATE_TYPE
 CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\317\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012
\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150
\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061\072
```

\060\070\006\003\125\004\013\023\061\150\164\164\160\072\057\057
\143\145\162\164\151\146\151\143\141\164\145\163\056\163\164\141
\162\146\151\145\154\144\164\145\143\150\056\143\157\155\057\162
\145\160\157\163\151\164\157\162\171\057\061\066\060\064\006\003
\125\004\003\023\055\123\164\141\162\146\151\145\154\144\040\123
\145\162\166\151\143\145\163\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\317\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012
\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150
\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061\072
\060\070\006\003\125\004\013\023\061\150\164\164\160\072\057\057
\143\145\162\164\151\146\151\143\141\164\145\163\056\163\164\141
\162\146\151\145\154\144\164\145\143\150\056\143\157\155\057\162
\145\160\157\163\151\164\157\162\171\057\061\066\060\064\006\003
\125\004\003\023\055\123\164\141\162\146\151\145\154\144\040\123
\145\162\166\151\143\145\163\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\000
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\176\060\202\003\146\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\201\317\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157\156
\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157\164
\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012\023
\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150\156
\157\154\157\147\151\145\163\054\040\111\156\143\056\061\072\060
\070\006\003\125\004\013\023\061\150\164\164\160\072\057\057\143
\145\162\164\151\146\151\143\141\164\145\163\056\163\164\141\162
\146\151\145\154\144\164\145\143\150\056\143\157\155\057\162\145
\160\157\163\151\164\157\162\171\057\061\066\060\064\006\003\125
\004\003\023\055\123\164\141\162\146\151\145\154\144\040\123\145
\162\166\151\143\145\163\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164
\171\060\036\027\015\060\070\060\066\060\062\060\060\060\060\060
\060\132\027\015\062\071\061\062\063\061\062\063\065\071\065\071

\132\060\201\317\061\013\060\011\006\003\125\004\006\023\002\125
\123\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172
\157\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143
\157\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004
\012\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143
\150\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061
\072\060\070\006\003\125\004\013\023\061\150\164\164\160\072\057
\057\143\145\162\164\151\146\151\143\141\164\145\163\056\163\164
\141\162\146\151\145\154\144\164\145\143\150\056\143\157\155\057
\162\145\160\157\163\151\164\157\162\171\057\061\066\060\064\006
\003\125\004\003\023\055\123\164\141\162\146\151\145\154\144\040
\123\145\162\166\151\143\145\163\040\122\157\157\164\040\103\145
\162\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162
\151\164\171\060\202\001\042\060\015\006\011\052\206\110\206\367
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002
\202\001\001\000\362\314\126\052\115\346\026\067\132\227\352\155
\065\070\321\020\233\333\270\334\251\004\011\225\063\056\011\305
\000\173\032\170\102\217\310\364\005\216\376\322\150\203\036\116
\231\315\027\333\107\076\120\363\211\322\347\334\230\373\005\370
\252\326\143\364\124\115\301\161\003\260\037\033\166\263\032\064
\060\163\361\050\062\140\203\375\264\234\327\266\322\042\067\174
\031\252\073\336\023\020\151\156\134\006\323\157\243\362\146\132
\166\102\110\257\200\321\124\131\075\324\271\324\333\355\271\253
\071\231\364\356\142\253\341\170\162\173\330\070\215\100\266\314
\334\022\000\160\103\205\151\330\030\343\312\127\162\237\264\337
\077\374\042\250\102\122\365\167\133\231\360\126\055\046\160\026
\066\022\302\047\236\127\246\174\320\043\361\171\334\243\223\130
\050\070\075\237\255\066\103\356\067\373\370\371\103\255\310\126
\362\224\022\136\102\353\163\270\023\015\313\246\325\206\271\252
\050\152\124\003\241\077\017\051\353\011\000\350\077\136\242\177
\027\075\241\053\370\276\320\165\035\244\204\343\253\027\145\006
\122\000\257\261\002\003\001\000\001\243\143\060\141\060\017\006
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035
\006\003\125\035\016\004\026\004\024\264\306\177\032\103\314\233
\165\135\057\304\113\362\213\230\020\351\361\121\020\060\037\006
\003\125\035\043\004\030\060\026\200\024\264\306\177\032\103\314
\233\165\135\057\304\113\362\213\230\020\351\361\121\020\060\015
\006\011\052\206\110\206\367\015\001\001\005\005\000\003\202\001
\001\000\254\200\273\304\045\005\013\130\244\344\176\051\176\257
\274\073\354\055\300\104\056\371\221\340\322\073\062\047\220\055
\366\200\011\134\302\253\145\044\332\070\020\106\304\111\322\375
\232\253\050\110\167\210\306\351\157\321\107\221\325\065\117\024
\011\250\133\100\007\035\174\161\126\313\211\102\324\277\141\300
\042\367\056\337\253\363\162\103\213\100\350\224\353\260\046\332
\321\023\323\253\320\066\055\056\072\225\263\167\056\025\071\030
\014\151\272\252\200\355\361\123\116\063\233\150\004\342\240\060
\056\327\321\135\324\246\146\235\204\346\347\273\074\211\273\066

\235\374\027\251\075\125\053\212\373\233\304\114\204\377\337\322
\276\151\033\164\260\250\366\352\260\234\262\051\164\201\114\150
\072\232\177\163\045\071\365\023\340\146\221\151\324\127\113\267
\356\255\105\340\054\303\210\323\276\224\111\211\037\377\160\325
\133\155\071\023\260\035\313\230\346\147\143\015\143\366\373\303
\327\141\162\203\210\077\160\176\123\311\236\211\124\326\117\177
\175\161\271\256\361\140\213\167\140\354\370\277\372\152\243\234
\001\042
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Starfield Services Root Certificate Authority"
# Issuer: CN=Starfield Services Root Certificate
Authority,OU=http://certificates.starfieldtech.com/repository/,O=Starfield Technologies\,
Inc.,L=Scottsdale,ST=Arizona,C=US
#
 Serial Number: 0 (0x0)
# Subject: CN=Starfield Services Root Certificate
Authority,OU=http://certificates.starfieldtech.com/repository/,O=Starfield Technologies\,
Inc.,L=Scottsdale,ST=Arizona,C=US
# Not Valid Before: Mon Jun 02 00:00:00 2008
# Not Valid After: Mon Dec 31 23:59:59 2029
# Fingerprint (MD5): cf:8f:3b:62:a3:ca:ca:71:1b:a3:e1:cb:48:57:35:1f
# Fingerprint (SHA1): 5d:00:38:60:f0:02:ed:82:9d:ea:a4:18:68:f7:88:18:6d:62:12:7f
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Starfield Services Root Certificate Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\135\000\070\140\360\002\355\202\235\352\244\030\150\367\210\030
\155\142\022\177
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\317\217\073\142\243\312\312\161\033\243\341\313\110\127\065\037
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\317\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\020\060\016\006\003\125\004\010\023\007\101\162\151\172\157
\156\141\061\023\060\021\006\003\125\004\007\023\012\123\143\157
\164\164\163\144\141\154\145\061\045\060\043\006\003\125\004\012
\023\034\123\164\141\162\146\151\145\154\144\040\124\145\143\150
\156\157\154\157\147\151\145\163\054\040\111\156\143\056\061\072
\060\070\006\003\125\004\013\023\061\150\164\164\160\072\057\057

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\143\145\162\164\151\146\151\143\141\164\145\163\056\163\164\141
\162\146\151\145\154\144\164\145\143\150\056\143\157\155\057\162
\145\160\157\163\151\164\157\162\171\057\061\066\060\064\006\003
\125\004\003\023\055\123\164\141\162\146\151\145\154\144\040\123
\145\162\166\151\143\145\163\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED
 CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "I.CA - Qualified root certificate"
# Issuer: O=První certifikaní autorita\, a.s.,CN=I.CA - Qualified root certificate,C=CZ
# Serial Number:9d:2a:60
# Subject: O=První certifikaní autorita\, a.s.,CN=I.CA - Qualified root certificate,C=CZ
# Not Valid Before: Tue Apr 01 00:00:00 2008
# Not Valid After: Sun Apr 01 00:00:00 2018
# Fingerprint (MD5): 48:d1:1e:62:78:01:c2:6e:43:69:a4:2c:ee:13:0a:b5
# Fingerprint (SHA1): 64:90:2a:d7:27:7a:f3:e3:2c:d8:cc:1d:c7:9d:e1:fd:7f:80:69:ea
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "I.CA - Qualified root certificate"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\103\132\061
\052\060\050\006\003\125\004\003\014\041\111\056\103\101\040\055
\040\121\165\141\154\151\146\151\145\144\040\162\157\157\164\040
\143\145\162\164\151\146\151\143\141\164\145\061\055\060\053\006
\003\125\004\012\014\044\120\162\166\156\303\255\040\143\145\162
\164\151\146\151\153\141\304\215\156\303\255\040\141\165\164\157
\162\151\164\141\054\040\141\056\163\056
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\103\132\061
\052\060\050\006\003\125\004\003\014\041\111\056\103\101\040\055
\040\121\165\141\154\151\146\151\145\144\040\162\157\157\164\040
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\143\145\162\164\151\146\151\143\141\164\145\061\055\060\053\006
\003\125\004\012\014\044\120\162\166\156\303\255\040\143\145\162
\164\151\146\151\153\141\304\215\156\303\255\040\141\165\164\157
\162\151\164\141\054\040\141\056\163\056
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\000\235\052\140
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\071\060\202\003\041\240\003\002\001\002\002\004\000
\235\052\140\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\150\061\013\060\011\006\003\125\004\006\023\002\103
\132\061\052\060\050\006\003\125\004\003\014\041\111\056\103\101
\040\055\040\121\165\141\154\151\146\151\145\144\040\162\157\157
\164\040\143\145\162\164\151\146\151\143\141\164\145\061\055\060
\053\006\003\125\004\012\014\044\120\162\166\156\303\255\040\143
\145\162\164\151\146\151\153\141\304\215\156\303\255\040\141\165
\164\157\162\151\164\141\054\040\141\056\163\056\060\036\027\015
\060\070\060\064\060\061\060\060\060\060\060\060\132\027\015\061
\070\060\064\060\061\060\060\060\060\060\060\132\060\150\061\013
\060\011\006\003\125\004\006\023\002\103\132\061\052\060\050\006
\003\125\004\003\014\041\111\056\103\101\040\055\040\121\165\141
\154\151\146\151\145\144\040\162\157\157\164\040\143\145\162\164
\151\146\151\143\141\164\145\061\055\060\053\006\003\125\004\012
\014\044\120\162\166\156\303\255\040\143\145\162\164\151\146\151
\153\141\304\215\156\303\255\040\141\165\164\157\162\151\164\141
\054\040\141\056\163\056\060\202\001\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202
\001\012\002\202\001\001\000\253\010\210\244\360\164\362\237\370
\333\326\167\215\060\031\076\246\305\307\212\305\275\335\346\002
\256\216\075\120\165\270\257\175\066\253\376\365\355\010\147\264
\000\212\230\301\003\143\210\121\362\033\066\211\164\132\055\310
\304\202\304\077\271\210\375\154\375\072\035\025\005\104\225\200
\032\246\206\313\041\165\220\205\134\260\160\000\207\064\250\321
\037\111\375\154\070\155\152\254\270\105\237\274\024\327\146\324
\041\343\047\012\215\165\340\132\057\012\113\264\347\176\163\243
\052\275\160\361\221\206\010\217\277\220\204\034\207\251\365\231
\045\045\224\301\343\156\007\301\113\007\133\124\374\064\313\106
\067\234\305\241\040\316\246\254\207\251\203\074\070\117\300\100
\363\351\377\233\327\071\166\344\023\043\165\265\377\241\102\256
\134\206\117\305\116\103\266\231\013\122\123\040\250\263\302\114
\323\000\054\025\322\131\154\012\237\041\265\163\026\171\036\206
\045\356\032\373\223\236\255\143\361\114\342\166\061\136\067\357
\374\320\251\066\344\371\021\351\172\374\120\347\101\043\003\064
\270\175\272\016\317\335\123\002\003\001\000\001\243\201\352\060
\201\347\060\017\006\003\125\035\023\001\001\377\004\005\060\003
\001\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\201\244\006\003\125\035\040\004\201\234\060\201

\231\060\201\226\006\014\053\006\001\004\001\201\270\110\001\004
\000\001\060\201\205\060\201\202\006\010\053\006\001\005\005\007
\002\002\060\166\032\164\124\145\156\164\157\040\143\145\162\164
\151\146\151\153\141\164\040\152\145\040\166\171\144\141\156\040
\152\141\153\157\040\153\166\141\154\151\146\151\153\157\166\141
\156\171\040\163\171\163\164\145\155\157\166\171\040\143\145\162
\164\151\146\151\153\141\164\040\166\040\163\157\165\154\141\144
\165\040\163\145\040\172\141\153\157\156\145\155\040\062\062\067
\057\062\060\060\060\040\123\142\056\040\166\040\160\154\141\164
\156\145\155\040\172\156\145\156\151\056\060\035\006\003\125\035
\016\004\026\004\024\150\235\176\326\304\045\071\373\073\240\067
\326\117\334\214\321\172\360\126\131\060\015\006\011\052\206\110
\206\367\015\001\001\005\005\000\003\202\001\001\000\162\365\274
\006\215\322\054\226\362\202\333\130\173\107\360\100\144\345\056
\033\357\372\340\372\323\361\162\110\001\104\362\210\364\336\230
\201\123\204\347\175\116\107\347\061\067\126\256\263\301\060\157
\306\253\110\203\365\230\123\122\151\052\050\301\100\145\353\145
\347\264\060\013\360\253\016\245\022\045\277\364\120\135\277\243
\176\345\321\164\370\012\050\256\102\234\260\024\122\304\240\140
\135\367\105\027\102\272\102\055\233\222\373\156\224\263\160\107
\040\010\235\123\360\260\255\275\251\204\132\335\007\052\014\315
\053\155\141\050\337\073\222\050\354\121\201\177\121\174\216\056
\177\235\351\274\301\064\075\213\255\201\255\361\036\164\146\103
\074\101\115\270\056\063\117\261\072\036\333\022\337\066\216\161
\377\127\143\261\326\217\264\075\206\022\152\317\102\060\264\223
\026\352\231\352\002\133\376\010\356\262\117\160\277\063\000\347
\172\112\070\241\362\110\221\246\036\313\043\262\070\235\360\056
\111\242\311\210\126\145\145\216\072\147\105\214\214\013\342\252
\261\113\007\377\261\037\272\024\317\162\372\247\170
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "I.CA - Qualified root certificate"
# Issuer: O=První certifikaní autorita\, a.s.,CN=I.CA - Qualified root certificate,C=CZ
# Serial Number:9d:2a:60
# Subject: O=První certifikaní autorita\, a.s.,CN=I.CA - Qualified root certificate,C=CZ
# Not Valid Before: Tue Apr 01 00:00:00 2008
# Not Valid After: Sun Apr 01 00:00:00 2018
# Fingerprint (MD5): 48:d1:1e:62:78:01:c2:6e:43:69:a4:2c:ee:13:0a:b5
# Fingerprint (SHA1): 64:90:2a:d7:27:7a:f3:e3:2c:d8:cc:1d:c7:9d:e1:fd:7f:80:69:ea
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL

```
 CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "I.CA - Qualified root certificate"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\144\220\052\327\047\172\363\343\054\330\314\035\307\235\341\375
\177\200\151\352
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\110\321\036\142\170\001\302\156\103\151\244\054\356\023\012\265
END
CKA_ISSUER MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\103\132\061
\052\060\050\006\003\125\004\003\014\041\111\056\103\101\040\055
\040\121\165\141\154\151\146\151\145\144\040\162\157\157\164\040
\143\145\162\164\151\146\151\143\141\164\145\061\055\060\053\006
\003\125\004\012\014\044\120\162\166\156\303\255\040\143\145\162
\164\151\146\151\153\141\304\215\156\303\255\040\141\165\164\157
\162\151\164\141\054\040\141\056\163\056
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\000\235\052\140
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST
 CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "I.CA - Standard root certificate"
# Issuer: O=Prvni certifikacni autorita a.s.,CN=I.CA - Standard root certificate,C=CZ
# Serial Number:13:d6:20
# Subject: O=Prvni certifikacni autorita a.s.,CN=I.CA - Standard root certificate,C=CZ
# Not Valid Before: Tue Apr 01 00:00:00 2008
# Not Valid After: Sun Apr 01 00:00:00 2018
# Fingerprint (MD5): 04:68:e9:24:7e:41:ce:d7:6c:44:16:30:70:3d:dd:b9
# Fingerprint (SHA1): ab:16:dd:14:4e:cd:c0:fc:4b:aa:b6:2e:cf:04:08:89:6f:de:52:b7
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "I.CA - Standard root certificate"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\103\132\061
\051\060\047\006\003\125\004\003\023\040\111\056\103\101\040\055
\040\123\164\141\156\144\141\162\144\040\162\157\157\164\040\143
\145\162\164\151\146\151\143\141\164\145\061\051\060\047\006\003
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\125\004\012\023\040\120\162\166\156\151\040\143\145\162\164\151
\146\151\153\141\143\156\151\040\141\165\164\157\162\151\164\141
\040\141\056\163\056
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\103\132\061
\051\060\047\006\003\125\004\003\023\040\111\056\103\101\040\055
\040\123\164\141\156\144\141\162\144\040\162\157\157\164\040\143
\145\162\164\151\146\151\143\141\164\145\061\051\060\047\006\003
\125\004\012\023\040\120\162\166\156\151\040\143\145\162\164\151
\146\151\153\141\143\156\151\040\141\165\164\157\162\151\164\141
\040\141\056\163\056
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\023\326\040
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\056\060\202\003\026\240\003\002\001\002\002\003\023
\326\040\060\015\006\011\052\206\110\206\367\015\001\001\005\005
\000\060\143\061\013\060\011\006\003\125\004\006\023\002\103\132
\061\051\060\047\006\003\125\004\003\023\040\111\056\103\101\040
\055\040\123\164\141\156\144\141\162\144\040\162\157\157\164\040
\143\145\162\164\151\146\151\143\141\164\145\061\051\060\047\006
\003\125\004\012\023\040\120\162\166\156\151\040\143\145\162\164
\151\146\151\153\141\143\156\151\040\141\165\164\157\162\151\164
\141\040\141\056\163\056\060\036\027\015\060\070\060\064\060\061
\060\060\060\060\060\060\132\027\015\061\070\060\064\060\061\060
\060\060\060\060\060\132\060\143\061\013\060\011\006\003\125\004
\006\023\002\103\132\061\051\060\047\006\003\125\004\003\023\040
\111\056\103\101\040\055\040\123\164\141\156\144\141\162\144\040
\162\157\157\164\040\143\145\162\164\151\146\151\143\141\164\145
\061\051\060\047\006\003\125\004\012\023\040\120\162\166\156\151
\040\143\145\162\164\151\146\151\153\141\143\156\151\040\141\165
\164\157\162\151\164\141\040\141\056\163\056\060\202\001\042\060
\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202
\001\017\000\060\202\001\012\002\202\001\001\000\321\055\025\304
\071\114\152\241\304\345\363\053\264\375\251\026\351\270\121\217
\067\221\331\247\323\227\220\266\160\151\207\365\257\131\322\142
\101\130\325\363\225\215\002\025\372\146\234\301\041\024\330\037
\255\372\052\154\164\126\241\142\341\361\260\255\270\376\322\243
\340\221\241\265\256\123\255\215\244\015\017\131\140\227\052\374
\243\056\163\065\043\163\314\250\246\241\024\155\277\211\303\204
\070\363\144\131\314\061\363\340\371\047\140\012\074\101\005\157
\132\122\360\217\156\122\156\354\136\210\157\340\100\214\041\107
\127\042\351\070\156\346\372\363\044\264\256\257\057\163\077\200
\325\062\217\214\331\204\031\330\140\316\333\151\215\076\257\002

\257\256\336\257\120\365\317\346\263\141\030\304\340\335\360\116
\112\146\015\172\163\040\267\344\324\223\206\107\141\330\117\312
\072\216\253\302\077\306\042\027\243\135\235\040\306\305\016\044
\151\310\246\175\146\006\315\106\346\063\341\103\164\223\365\203
\142\322\260\105\042\001\244\166\275\353\121\223\130\154\372\032
\241\237\165\200\332\330\000\342\361\210\115\077\002\003\001\000
\001\243\201\352\060\201\347\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\016\006\003\125\035\017\001
\001\377\004\004\003\002\001\006\060\035\006\003\125\035\016\004
\026\004\024\353\067\244\276\271\157\140\027\373\323\377\055\140
\341\004\036\257\317\306\323\060\201\244\006\003\125\035\040\004
\201\234\060\201\231\060\201\226\006\014\053\006\001\004\001\201
\270\110\001\001\000\001\060\201\205\060\201\202\006\010\053\006
\001\005\005\007\002\002\060\166\032\164\124\145\156\164\157\040
\143\145\162\164\151\146\151\153\141\164\040\152\145\040\166\171
\144\141\156\040\152\141\153\157\040\153\166\141\154\151\146\151
\153\157\166\141\156\171\040\163\171\163\164\145\155\157\166\171
\040\143\145\162\164\151\146\151\153\141\164\040\166\040\163\157
\165\154\141\144\165\040\163\145\040\172\141\153\157\156\145\155
\040\062\062\067\057\062\060\060\060\040\123\142\056\040\166\040
\160\154\141\164\156\145\155\040\172\156\145\156\151\056\060\015
\006\011\052\206\110\206\367\015\001\001\005\005\000\003\202\001
\001\000\027\042\130\252\057\030\125\002\241\114\066\111\067\113
\233\163\272\256\143\066\016\213\053\204\105\067\314\372\340\147
\367\240\163\152\147\150\126\274\141\250\064\232\050\272\146\054
\141\233\213\034\370\004\160\214\206\343\101\357\224\171\015\335
\064\207\004\356\265\236\061\153\071\364\176\130\345\362\260\004
\115\251\127\045\111\340\013\325\344\354\175\016\076\073\001\340
\214\374\122\220\223\346\362\260\253\365\061\167\314\321\311\103
\202\253\017\056\264\371\230\256\076\343\104\364\244\003\151\125
\332\134\216\333\301\271\254\344\230\325\166\025\106\241\056\132
\014\042\140\240\302\353\160\177\161\003\260\150\323\061\144\315
\352\313\113\125\211\202\076\134\146\313\032\010\230\107\302\336
\331\056\070\114\005\375\055\214\372\343\042\045\271\222\375\326
\262\055\312\242\064\234\337\111\357\325\204\001\054\222\377\005
\101\012\147\306\102\153\236\313\330\237\220\274\015\017\020\175
\307\146\275\352\163\007\340\030\352\121\201\264\105\100\074\017
\241\042\067\025\001\205\251\056\174\016\137\135\316\152\223\276
\331\276
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "I.CA - Standard root certificate"
# Issuer: O=Prvni certifikacni autorita a.s.,CN=I.CA - Standard root certificate,C=CZ

```
# Serial Number:13:d6:20
# Subject: O=Prvni certifikacni autorita a.s.,CN=I.CA - Standard root certificate,C=CZ
# Not Valid Before: Tue Apr 01 00:00:00 2008
# Not Valid After: Sun Apr 01 00:00:00 2018
# Fingerprint (MD5): 04:68:e9:24:7e:41:ce:d7:6c:44:16:30:70:3d:dd:b9
# Fingerprint (SHA1): ab:16:dd:14:4e:cd:c0:fc:4b:aa:b6:2e:cf:04:08:89:6f:de:52:b7
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8
 "I.CA - Standard root certificate"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\253\026\335\024\116\315\300\374\113\252\266\056\317\004\010\211
\157\336\122\267
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\004\150\351\044\176\101\316\327\154\104\026\060\160\075\335\271
END
CKA_ISSUER MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\103\132\061
\051\060\047\006\003\125\004\003\023\040\111\056\103\101\040\055
\040\123\164\141\156\144\141\162\144\040\162\157\157\164\040\143
\145\162\164\151\146\151\143\141\164\145\061\051\060\047\006\003
\125\004\012\023\040\120\162\166\156\151\040\143\145\162\164\151
\146\151\153\141\143\156\151\040\141\165\164\157\162\151\164\141
\040\141\056\163\056
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\023\326\040
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code
 Signing Only Certificate
# Certificate "e-Guven Kok Elektronik Sertifika Hizmet Saglayicisi"
# Issuer: CN=e-Guven Kok Elektronik Sertifika Hizmet Saglayicisi,O=Elektronik Bilgi Guvenligi A.S.,C=TR
# Serial Number:44:99:8d:3c:c0:03:27:bd:9c:76:95:b9:ea:db:ac:b5
# Subject: CN=e-Guven Kok Elektronik Sertifika Hizmet Saglayicisi,O=Elektronik Bilgi Guvenligi A.S.,C=TR
# Not Valid Before: Thu Jan 04 11:32:48 2007
# Not Valid After: Wed Jan 04 11:32:48 2017
# Fingerprint (MD5): 3d:41:29:cb:1e:aa:11:74:cd:5d:b0:62:af:b0:43:5b
# Fingerprint (SHA1): dd:e1:d2:a9:01:80:2e:1d:87:5e:84:b3:80:7e:4b:b1:fd:99:41:34
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
```

CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "e-Guven Kok Elektronik Sertifika Hizmet Saglayicisi"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\124\122\061
\050\060\046\006\003\125\004\012\023\037\105\154\145\153\164\162
\157\156\151\153\040\102\151\154\147\151\040\107\165\166\145\156
\154\151\147\151\040\101\056\123\056\061\074\060\072\006\003\125
\004\003\023\063\145\055\107\165\166\145\156\040\113\157\153\040
\105\154\145\153\164\162\157\156\151\153\040\123\145\162\164\151
\146\151\153\141\040\110\151\172\155\145\164\040\123\141\147\154
\141\171\151\143\151\163\151
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\124\122\061
\050\060\046\006\003\125\004\012\023\037\105\154\145\153\164\162
\157\156\151\153\040\102\151\154\147\151\040\107\165\166\145\156
\154\151\147\151\040\101\056\123\056\061\074\060\072\006\003\125
\004\003\023\063\145\055\107\165\166\145\156\040\113\157\153\040
\105\154\145\153\164\162\157\156\151\153\040\123\145\162\164\151
\146\151\153\141\040\110\151\172\155\145\164\040\123\141\147\154
\141\171\151\143\151\163\151
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\104\231\215\074\300\003\047\275\234\166\225\271\352\333
\254\265
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\003\266\060\202\002\236\240\003\002\001\002\002\020\104
\231\215\074\300\003\047\275\234\166\225\271\352\333\254\265\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\165
\061\013\060\011\006\003\125\004\006\023\002\124\122\061\050\060
\046\006\003\125\004\012\023\037\105\154\145\153\164\162\157\156
\151\153\040\102\151\154\147\151\040\107\165\166\145\156\154\151
\147\151\040\101\056\123\056\061\074\060\072\006\003\125\004\003
\023\063\145\055\107\165\166\145\156\040\113\157\153\040\105\154
\145\153\164\162\157\156\151\153\040\123\145\162\164\151\146\151
\153\141\040\110\151\172\155\145\164\040\123\141\147\154\141\171
\151\143\151\163\151\060\036\027\015\060\067\060\061\060\064\061
\061\063\062\064\070\132\027\015\061\067\060\061\060\064\061\061
\063\062\064\070\132\060\165\061\013\060\011\006\003\125\004\006
\023\002\124\122\061\050\060\046\006\003\125\004\012\023\037\105
\154\145\153\164\162\157\156\151\153\040\102\151\154\147\151\040
\107\165\166\145\156\154\151\147\151\040\101\056\123\056\061\074

\060\072\006\003\125\004\003\023\063\145\055\107\165\166\145\156
\040\113\157\153\040\105\154\145\153\164\162\157\156\151\153\040
\123\145\162\164\151\146\151\153\141\040\110\151\172\155\145\164
\040\123\141\147\154\141\171\151\143\151\163\151\060\202\001\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\001\017\000\060\202\001\012\002\202\001\001\000\303\022\040
\236\260\136\000\145\215\116\106\273\200\134\351\054\006\227\325
\363\162\311\160\271\347\113\145\200\301\113\276\176\074\327\124
\061\224\336\325\022\272\123\026\002\352\130\143\357\133\330\363
\355\052\032\252\161\110\243\334\020\055\137\137\353\134\113\234
\226\010\102\045\050\021\314\212\132\142\001\120\325\353\011\123
\057\370\303\217\376\263\374\375\235\242\343\137\175\276\355\013
\340\140\353\151\354\063\355\330\215\373\022\111\203\000\311\213
\227\214\073\163\052\062\263\022\367\271\115\362\364\115\155\307
\346\326\046\067\010\362\331\375\153\134\243\345\110\134\130\274
\102\276\003\132\201\272\034\065\014\000\323\365\043\176\161\060
\010\046\070\334\045\021\107\055\363\272\043\020\245\277\274\002
\367\103\136\307\376\260\067\120\231\173\017\223\316\346\103\054
\303\176\015\362\034\103\146\140\313\141\061\107\207\243\117\256
\275\126\154\114\274\274\370\005\312\144\364\351\064\241\054\265
\163\341\302\076\350\310\311\064\045\010\134\363\355\246\307\224
\237\255\210\103\045\327\341\071\140\376\254\071\131\002\003\001
\000\001\243\102\060\100\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026
\004\024\237\356\104\263\224\325\372\221\117\056\331\125\232\004
\126\333\055\304\333\245\060\015\006\011\052\206\110\206\367\015
\001\001\005\005\000\003\202\001\001\000\177\137\271\123\133\143
\075\165\062\347\372\304\164\032\313\106\337\106\151\034\122\317
\252\117\302\150\353\377\200\251\121\350\075\142\167\211\075\012
\165\071\361\156\135\027\207\157\150\005\301\224\154\331\135\337
\332\262\131\313\245\020\212\312\314\071\315\237\353\116\336\122
\377\014\360\364\222\251\362\154\123\253\233\322\107\240\037\164
\367\233\232\361\057\025\237\172\144\060\030\007\074\052\017\147
\312\374\017\211\141\235\145\245\074\345\274\023\133\010\333\343
\377\355\273\006\273\152\006\261\172\117\145\306\202\375\036\234
\213\265\015\356\110\273\270\275\252\010\264\373\243\174\313\237
\315\220\166\134\206\226\170\127\012\146\371\130\032\235\375\227
\051\140\336\021\246\220\034\031\034\356\001\226\042\064\064\056
\221\371\267\304\047\321\173\346\277\373\200\104\132\026\345\353
\340\324\012\070\274\344\221\343\325\353\134\301\254\337\033\152
\174\236\345\165\322\266\227\207\333\314\207\053\103\072\204\010
\257\253\074\333\367\074\146\061\206\260\235\123\171\355\370\043
\336\102\343\055\202\361\017\345\372\227
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL

```
 CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "e-Guven Kok Elektronik Sertifika Hizmet Saglayicisi"
# Issuer: CN=e-Guven Kok Elektronik Sertifika Hizmet Saglayicisi,O=Elektronik Bilgi Guvenligi A.S.,C=TR
# Serial Number:44:99:8d:3c:c0:03:27:bd:9c:76:95:b9:ea:db:ac:b5
# Subject: CN=e-Guven Kok Elektronik Sertifika Hizmet Saglayicisi,O=Elektronik Bilgi Guvenligi A.S.,C=TR
# Not Valid Before: Thu Jan 04 11:32:48 2007
# Not Valid After: Wed Jan 04 11:32:48 2017
# Fingerprint (MD5): 3d:41:29:cb:1e:aa:11:74:cd:5d:b0:62:af:b0:43:5b
# Fingerprint (SHA1): dd:e1:d2:a9:01:80:2e:1d:87:5e:84:b3:80:7e:4b:b1:fd:99:41:34
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "e-Guven Kok Elektronik Sertifika Hizmet Saglayicisi"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\335\341\322\251\001\200\056\035\207\136\204\263\200\176\113\261
\375\231\101\064
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\075\101\051\313\036\252\021\164\315\135\260\142\257\260\103\133
END
CKA_ISSUER MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\124\122\061
\050\060\046\006\003\125\004\012\023\037\105\154\145\153\164\162
\157\156\151\153\040\102\151\154\147\151\040\107\165\166\145\156
\154\151\147\151\040\101\056\123\056\061\074\060\072\006\003\125
\004\003\023\063\145\055\107\165\166\145\156\040\113\157\153\040
\105\154\145\153\164\162\157\156\151\153\040\123\145\162\164\151
\146\151\153\141\040\110\151\172\155\145\164\040\123\141\147\154
\141\171\151\143\151\163\151
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\104\231\215\074\300\003\047\275\234\166\225\271\352\333
\254\265
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
#
 Certificate "Japanese Government"
# Issuer: OU=ApplicationCA,O=Japanese Government,C=JP
```

```
# Serial Number: 49 (0x31)
# Subject: OU=ApplicationCA,O=Japanese Government,C=JP
# Not Valid Before: Wed Dec 12 15:00:00 2007
# Not Valid After: Tue Dec 12 15:00:00 2017
# Fingerprint (MD5): 7e:23:4e:5b:a7:a5:b4:25:e9:00:07:74:11:62:ae:d6
# Fingerprint (SHA1): 7f:8a:b0:cf:d0:51:87:6a:66:f3:36:0f:47:c8:8d:8c:d3:35:fc:74
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Japanese Government"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\103\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\034\060\032\006\003\125\004\012\023\023\112\141\160\141\156\145
\163\145\040\107\157\166\145\162\156\155\145\156\164\061\026\060
\024\006\003\125\004\013\023\015\101\160\160\154\151\143\141\164
\151\157\156\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\103\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\034\060\032\006\003\125\004\012\023\023\112\141\160\141\156\145
\163\145\040\107\157\166\145\162\156\155\145\156\164\061\026\060
\024\006\003\125\004\013\023\015\101\160\160\154\151\143\141\164
\151\157\156\103\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\061
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\240\060\202\002\210\240\003\002\001\002\002\001\061
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\103\061\013\060\011\006\003\125\004\006\023\002\112\120\061\034
\060\032\006\003\125\004\012\023\023\112\141\160\141\156\145\163
\145\040\107\157\166\145\162\156\155\145\156\164\061\026\060\024
\006\003\125\004\013\023\015\101\160\160\154\151\143\141\164\151
\157\156\103\101\060\036\027\015\060\067\061\062\061\062\061\065
\060\060\060\060\132\027\015\061\067\061\062\061\062\061\065\060
\060\060\060\132\060\103\061\013\060\011\006\003\125\004\006\023
\002\112\120\061\034\060\032\006\003\125\004\012\023\023\112\141
\160\141\156\145\163\145\040\107\157\166\145\162\156\155\145\156
\164\061\026\060\024\006\003\125\004\013\023\015\101\160\160\154
\151\143\141\164\151\157\156\103\101\060\202\001\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017
\000\060\202\001\012\002\202\001\001\000\247\155\340\164\116\207
\217\245\006\336\150\242\333\206\231\113\144\015\161\360\012\005
```

\233\216\252\341\314\056\322\152\073\301\172\264\227\141\215\212
\276\306\232\234\006\264\206\121\344\067\016\164\170\176\137\212
\177\224\244\327\107\010\375\120\132\126\344\150\254\050\163\240
\173\351\177\030\222\100\117\055\235\365\256\104\110\163\066\006
\236\144\054\073\064\043\333\134\046\344\161\171\217\324\156\171
\042\271\223\301\312\315\301\126\355\210\152\327\240\071\041\004
\127\054\242\365\274\107\101\117\136\064\042\225\265\037\051\155
\136\112\363\115\162\276\101\126\040\207\374\351\120\107\327\060
\024\356\134\214\125\272\131\215\207\374\043\336\223\320\004\214
\375\357\155\275\320\172\311\245\072\152\162\063\306\112\015\005
\027\052\055\173\261\247\330\326\360\276\364\077\352\016\050\155
\101\141\043\166\170\303\270\145\244\363\132\256\314\302\252\331
\347\130\336\266\176\235\205\156\237\052\012\157\237\003\051\060
\227\050\035\274\267\317\124\051\116\121\061\371\047\266\050\046
\376\242\143\346\101\026\360\063\230\107\002\003\001\000\001\243
\201\236\060\201\233\060\035\006\003\125\035\016\004\026\004\024
\124\132\313\046\077\161\314\224\106\015\226\123\352\153\110\320
\223\376\102\165\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\131\006\003\125\035\021\004\122\060\120\244
\116\060\114\061\013\060\011\006\003\125\004\006\023\002\112\120
\061\030\060\026\006\003\125\004\012\014\017\346\227\245\346\234
\254\345\233\275\346\224\277\345\272\234\061\043\060\041\006\003
\125\004\013\014\032\343\202\242\343\203\227\343\203\252\343\202
\261\343\203\274\343\202\267\343\203\247\343\203\263\103\101\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003
\202\001\001\000\071\152\104\166\167\070\072\354\243\147\106\017
\371\213\006\250\373\152\220\061\316\176\354\332\321\211\174\172
\353\056\014\275\231\062\347\260\044\326\303\377\365\262\210\011
\207\054\343\124\341\243\246\262\010\013\300\205\250\310\322\234
\161\366\035\237\140\374\070\063\023\341\236\334\013\137\332\026
\120\051\173\057\160\221\017\231\272\064\064\215\225\164\305\176
\170\251\146\135\275\312\041\167\102\020\254\146\046\075\336\221
\253\375\025\360\157\355\154\137\020\370\363\026\366\003\212\217
\247\022\021\014\313\375\077\171\301\234\375\142\356\243\317\124
\014\321\053\137\027\076\343\076\277\300\053\076\011\233\376\210
\246\176\264\222\027\374\043\224\201\275\156\247\305\214\302\353
\021\105\333\370\101\311\226\166\352\160\137\171\022\153\344\243
\007\132\005\357\047\111\317\041\237\212\114\011\160\146\251\046
\301\053\021\116\063\322\016\374\326\154\322\016\062\144\150\377
\255\005\170\137\003\035\250\343\220\254\044\340\017\100\247\113
\256\213\050\267\202\312\030\007\346\267\133\164\351\040\031\177
\262\033\211\124
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

```
# Microsoft Code Signing Only Certificate
# Trust for "Japanese Government"
# Issuer: OU=ApplicationCA,O=Japanese Government,C=JP
# Serial Number: 49 (0x31)
# Subject: OU=ApplicationCA,O=Japanese Government,C=JP
# Not Valid Before: Wed Dec 12 15:00:00 2007
# Not Valid After: Tue Dec 12 15:00:00 2017
# Fingerprint (MD5): 7e:23:4e:5b:a7:a5:b4:25:e9:00:07:74:11:62:ae:d6
# Fingerprint (SHA1): 7f:8a:b0:cf:d0:51:87:6a:66:f3:36:0f:47:c8:8d:8c:d3:35:fc:74
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Japanese Government"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\177\212\260\317\320\121\207\152\146\363\066\017\107\310\215\214
\323\065\374\164
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\176\043\116\133\247\245\264\045\351\000\007\164\021\142\256\326
END
CKA_ISSUER MULTILINE_OCTAL
\060\103\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\034\060\032\006\003\125\004\012\023\023\112\141\160\141\156\145
\163\145\040\107\157\166\145\162\156\155\145\156\164\061\026\060
\024\006\003\125\004\013\023\015\101\160\160\154\151\143\141\164
\151\157\156\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\061
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "AdminCA-CD-T01"
# Issuer: CN=AdminCA-CD-T01,OU=Certification Authorities,OU=Services,O=admin,C=CH
# Serial Number: 1 (0x1)
# Subject: CN=AdminCA-CD-T01,OU=Certification Authorities,OU=Services,O=admin,C=CH
# Not Valid Before: Wed Jan
 25 13:36:19 2006
# Not Valid After: Mon Jan 25 12:36:19 2016
# Fingerprint (MD5): 5b:9e:fd:3b:60:35:ea:68:8e:52:fe:13:19:14:4a:a3
# Fingerprint (SHA1): 6b:81:44:6a:5c:dd:f4:74:a0:f8:00:ff:be:69:fd:0d:b6:28:75:16
```

```
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AdminCA-CD-T01"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\016\060\014\006\003\125\004\012\023\005\141\144\155\151\156\061
\021\060\017\006\003\125\004\013\023\010\123\145\162\166\151\143
\145\163\061\042\060\040\006\003\125\004\013\023\031\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\151\145\163\061\027\060\025\006\003\125\004\003\023
\016\101\144\155\151\156\103\101\055\103\104\055\124\060\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\016\060\014\006\003\125\004\012\023\005\141\144\155\151\156\061
\021\060\017\006\003\125\004\013\023\010\123\145\162\166\151\143
\145\163\061\042\060\040\006\003\125\004\013\023\031\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\151\145\163\061\027\060\025\006\003\125\004\003\023
\016\101\144\155\151\156\103\101\055\103\104\055\124\060\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\115\060\202\003\065\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061\016
\060\014\006\003\125\004\012\023\005\141\144\155\151\156\061\021
\060\017\006\003\125\004\013\023\010\123\145\162\166\151\143\145
\163\061\042\060\040\006\003\125\004\013\023\031\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\151\145\163\061\027\060\025\006\003\125\004\003\023\016
\101\144\155\151\156\103\101\055\103\104\055\124\060\061\060\036
\027\015\060\066\060\061\062\065\061\063\063\066\061\071\132\027
\015\061\066\060\061\062\065\061\062\063\066\061\071\132\060\155
\061\013\060\011\006\003\125\004\006\023\002\103\110\061\016\060
\014\006\003\125\004\012\023\005\141\144\155\151\156\061\021\060
\017\006\003\125\004\013\023\010\123\145\162\166\151\143\145\163
\061\042\060\040\006\003\125\004\013\023\031\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\151\145\163\061\027\060\025\006\003\125\004\003\023\016\101
\144\155\151\156\103\101\055\103\104\055\124\060\061\060\202\001
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\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000
\003\202\001\017\000\060\202\001\012\002\202\001\001\000\322\064
\045\061\231\251\054\070\125\370\143\121\365\060\050\110\331\136
\046\004\001\343\020\027\044\102\320\177\237\362\110\307\350\024
\016\014\232\062\252\141\164\044\007\243\006\076\344\012\301\037
\127\105\024\217\177\255\157\251\277\030\076\307\143\106\150\051
\157\041\301\161\107\171\267\103\174\105\176\260\105\225\047\074
\305\276\154\040\250\331\132\200\123\205\305\156\171\134\332\001
\312\151\251\264\301\324\355\154\024\327\022\113\364\211\342\007
\177\020\237\027\025\352\112\304\253\353\102\044\027\375\277\305
\272\300\201\137\320\017\234\207\223\242\036\361\367\200\125\154
\042\345\113\132\026\253\156\340\270\205\022\035\220\063\054\154
\073\054\365\071\313\312\316\103\066\203\316\367\267\050\204\356
\074\314\201\223\376\133\015\355\211\271\066\027\337\236\351\227
\242\007\176\323\054\351\225\266\370\051\232\274\054\341\370\210
\254\123\127\021\204\226\005\132\324\115\271\374\325\116\073\311
\154\316\201\376\137\020\163\364\355\264\125\345\003\202\314\051
\275\366\243\142\232\306\313\350\041\273\235\076\374\011\002\003
\001\000\001\243\201\367\060\201\364\060\022\006\003\125\035\023
\001\001\377\004\010\060\006\001\001\377\002\001\000\060\201\256
\006\003\125\035\040\004\201\246\060\201\243\060\201\240\006\010
\140\205\164\001\021\003\025\001\060\201\223\060\110\006\010\053
\006\001\005\005\007\002\002\060\074\032\072\124\150\151\163\040
\151\163\040\164\150\145\040\101\144\155\151\156\103\101\055\103
\104\055\124\060\061\040\103\145\162\164\151\146\151\143\141\164
\145\040\120\162\141\143\164\151\143\145\040\123\164\141\164\145
\155\145\156\164\056\060\107\006\010\053\006\001\005\005\007\002
\001\026\073\150\164\164\160\072\057\057\167\167\167\056\160\153
\151\056\141\144\155\151\156\056\143\150\057\160\157\154\151\143
\171\057\103\120\123\137\062\137\061\066\137\067\065\066\137\061
\137\061\067\137\063\137\062\061\137\061\056\160\144\146\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035
\006\003\125\035\016\004\026\004\024\052\304\151\012\241\306\125
\306\003\156\160\316\206\201\263\244\017\252\031\333\060\015\006
\011\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001
\000\237\176\172\155\273\254\214\216\140\224\145\321\103\120\321
\277\155\152\101\375\022\342\315\306\037\046\146\355\312\235\072
\101\145\170\316\364\002\260\123\372\103\217\344\331\273\256\124
\200\027\045\140\022\111\201\164\350\073\263\333\145\134\051\124
\311\346\105\236\236\224\021\204\124\162\050\317\067\300\365\125
\243\121\053\243\310\120\346\351\014\024\023\320\057\244\001\374
\106\367\076\057\333\324\364\113\024\370\262\000\035\013\374\120
\027\053\371\360\132\175\154\371\373\243\013\212\300\247\062\010
\175\127\113\050\277\006\236\027\024\102\345\054\346\242\200\026
\116\377\017\235\074\034\370\025\302\122\165\230\324\370\026\211
\320\115\347\050\010\307\225\050\116\346\213\201\111\231\332\047
\075\351\372\171\060\331\154\250\337\253\072\033\020\212\321\166
\344\110\376\071\212\170\210\033\201\146\303\006\144\242\166\005

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\312\224\047\264\166\361\332\202\373\265\104\020\143\103\303\243
\306\306\004\307\017\313\361\266\217\347\134\212\246\121\226\311
\337\200\314\265\321\040\263\103\323\024\307\335\261\120\155\225
\172
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "AdminCA-CD-T01"
# Issuer: CN=AdminCA-CD-T01,OU=Certification Authorities,OU=Services,O=admin,C=CH
# Serial Number: 1 (0x1)
# Subject: CN=AdminCA-CD-T01,OU=Certification Authorities,OU=Services,O=admin,C=CH
# Not Valid Before: Wed Jan 25 13:36:19 2006
# Not Valid After: Mon Jan 25 12:36:19 2016
# Fingerprint (MD5): 5b:9e:fd:3b:60:35:ea:68:8e:52:fe:13:19:14:4a:a3
# Fingerprint (SHA1): 6b:81:44:6a:5c:dd:f4:74:a0:f8:00:ff:be:69:fd:0d:b6:28:75:16
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AdminCA-CD-T01"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\153\201\104\152\134\335\364\164\240\370\000\377\276\151\375\015
\266\050\165\026
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\133\236\375\073\140\065\352\150\216\122\376\023\031\024\112\243
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\155\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\016\060\014\006\003\125\004\012\023\005\141\144\155\151\156\061
\021\060\017\006\003\125\004\013\023\010\123\145\162\166\151\143
\145\163\061\042\060\040\006\003\125\004\013\023\031\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\151\145\163\061\027\060\025\006\003\125\004\003\023
\016\101\144\155\151\156\103\101\055\103\104\055\124\060\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
# Microsoft Code Signing Only Certificate
# Certificate "Admin-Root-CA"
# Issuer: CN=Admin-Root-CA,OU=Certification Authorities,OU=Services,O=admin,C=ch
# Serial Number:3b:f3:81:d0
# Subject: CN=Admin-Root-CA,OU=Certification Authorities,OU=Services,O=admin,C=ch
#
 Not Valid Before: Thu Nov 15 08:51:07 2001
# Not Valid After: Wed Nov 10 07:51:07 2021
# Fingerprint (MD5): f3:7e:3a:13:dc:74:63:06:74:1a:3c:38:32:8c:fb:a9
# Fingerprint (SHA1): 25:3f:77:5b:0e:77:97:ab:64:5f:15:91:55:97:c3:9e:26:36:31:d1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Admin-Root-CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\154\061\013\060\011\006\003\125\004\006\023\002\143\150\061
\016\060\014\006\003\125\004\012\023\005\141\144\155\151\156\061
\021\060\017\006\003\125\004\013\023\010\123\145\162\166\151\143
\145\163\061\042\060\040\006\003\125\004\013\023\031\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\151\145\163\061\026\060\024\006\003\125\004\003\023
\015\101\144\155\151\156\055\122\157\157\164\055\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\154\061\013\060\011\006\003\125\004\006\023\002\143\150\061
\016\060\014\006\003\125\004\012\023\005\141\144\155\151\156\061
\021\060\017\006\003\125\004\013\023\010\123\145\162\166\151\143
\145\163\061\042\060\040\006\003\125\004\013\023\031\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\151\145\163\061\026\060\024\006\003\125\004\003\023
\015\101\144\155\151\156\055\122\157\157\164\055\103\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\004\073\363\201\320
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\125\060\202\004\075\240\003\002\001\002\002\004\073
\363\201\320\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\154\061\013\060\011\006\003\125\004\006\023\002\143
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\153\216\064\305\071\071\366\224\230\273\037\016\036\021\057\250
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\051\151\037\235\045\120\121\004\312\027\303\071\070\007\161\347
\321\230\233\325\321\030\025\226\274\342\363\311\147\053\361\011
\262\316\234\364\103\046\001\372\127\153\220\251\261\276\350\065
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\371\361\077\365\164\117\337\270\145
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Admin-Root-CA"
# Issuer: CN=Admin-Root-CA,OU=Certification Authorities,OU=Services,O=admin,C=ch
# Serial Number:3b:f3:81:d0
# Subject: CN=Admin-Root-CA,OU=Certification Authorities,OU=Services,O=admin,C=ch
# Not Valid Before: Thu Nov 15 08:51:07 2001
# Not Valid After: Wed Nov 10 07:51:07 2021
# Fingerprint (MD5): f3:7e:3a:13:dc:74:63:06:74:1a:3c:38:32:8c:fb:a9
# Fingerprint (SHA1): 25:3f:77:5b:0e:77:97:ab:64:5f:15:91:55:97:c3:9e:26:36:31:d1
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE

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CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Admin-Root-CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\045\077\167\133\016\167\227\253\144\137\025\221\125\227\303\236
\046\066\061\321
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\363\176\072\023\334\164\143\006\164\032\074\070\062\214\373\251
END
CKA_ISSUER MULTILINE_OCTAL
\060\154\061\013\060\011\006\003\125\004\006\023\002\143\150\061
\016\060\014\006\003\125\004\012\023\005\141\144\155\151\156\061
\021\060\017\006\003\125\004\013\023\010\123\145\162\166\151\143
\145\163\061\042\060\040\006\003\125\004\013\023\031\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\151\145\163\061\026\060\024\006\003\125\004\003\023
\015\101\144\155\151\156\055\122\157\157\164\055\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\073\363\201\320
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "TÜBTAK UEKAE Kök Sertifika Hizmet Salaycs
 - Sürüm 3"
# Issuer: CN=TÜBTAK UEKAE Kök Sertifika Hizmet Salaycs - Sürüm 3,OU=Kamu Sertifikasyon
Merkezi,OU=Ulusal Elektronik ve Kriptoloji Aratrma Enstitüsü - UEKAE,O=Türkiye Bilimsel ve Teknolojik
Aratrma Kurumu - TÜBTAK,L=Gebze - Kocaeli,C=TR
# Serial Number: 17 (0x11)
# Subject: CN=TÜBTAK UEKAE Kök Sertifika Hizmet Salaycs - Sürüm 3,OU=Kamu Sertifikasyon
Merkezi,OU=Ulusal Elektronik ve Kriptoloji Aratrma Enstitüsü - UEKAE,O=Türkiye Bilimsel ve Teknolojik
Aratrma Kurumu - TÜBTAK,L=Gebze - Kocaeli,C=TR
# Not Valid Before: Fri Aug 24 11:37:07 2007
# Not Valid After: Mon Aug 21 11:37:07 2017
# Fingerprint (MD5): ed:41:f5:8c:50:c5:2b:9c:73:e6:ee:6c:eb:c2:a8:26
# Fingerprint (SHA1): 1b:4b:39:61:26:27:6b:64:91:a2:68:6d:d7:02:43:21:2d:1f:1d:96
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TÜBTAK UEKAE Kök Sertifika Hizmet Salaycs - Sürüm 3"
CKA_CERTIFICATE_TYPE
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CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\202\001\053\061\013\060\011\006\003\125\004\006\023\002\124
\122\061\030\060\026\006\003\125\004\007\014\017\107\145\142\172
\145\040\055\040\113\157\143\141\145\154\151\061\107\060\105\006
\003\125\004\012\014\076\124\303\274\162\153\151\171\145\040\102
\151\154\151\155\163\145\154\040\166\145\040\124\145\153\156\157
\154\157\152\151\153\040\101\162\141\305\237\164\304\261\162\155
\141\040\113\165\162\165\155\165\040\055\040\124\303\234\102\304
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\060\041\006\003\125\004\013\014\032\113\141\155\165\040\123\145
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\145\172\151\061\112\060\110\006\003\125\004\003\014\101\124\303
\234\102\304\260\124\101\113\040\125\105\113\101\105\040\113\303
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END
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UTF8 "0"
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\040\166\145\040\113\162\151\160\164\157\154\157\152\151\040\101
\162\141\305\237\164\304\261\162\155\141\040\105\156\163\164\151
\164\303\274\163\303\274\040\055\040\125\105\113\101\105\061\043
\060\041\006\003\125\004\013\014\032\113\141\155\165\040\123\145
\162\164\151\146\151\153\141\163\171\157\156\040\115\145\162\153
\145\172\151\061\112\060\110\006\003\125\004\003\014\101\124\303
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END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\021

END
CKA_VALUE MULTILINE_OCTAL
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\303\043\237\151\074\206\070\034\236\357\332\047\170\321\204\067
\161\212\074\113\071\317\176\105\006\326\055\330\212\115\170\022
\326\255\302\323\313\322\320\101\363\046\066\112\233\225\154\014
\356\345\321\103\047\146\301\210\367\172\263\040\154\352\260\151
\053\307\040\350\014\003\304\101\005\231\342\077\344\153\370\240
\206\201\307\204\306\037\325\113\201\022\262\026\041\054\023\241
\200\262\136\014\112\023\236\040\330\142\100\253\220\352\144\112
\057\254\015\001\022\171\105\250\057\207\031\150\310\342\205\307
\060\262\165\371\070\077\262\300\223\264\153\342\003\104\316\147
\240\337\211\326\255\214\166\243\023\303\224\141\053\153\331\154
\301\007\012\042\007\205\154\205\044\106\251\276\077\213\170\204
\202\176\044\014\235\375\201\067\343\045\250\355\066\116\225\054
\311\234\220\332\354\251\102\074\255\266\002
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER
 CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "TÜBTAK UEKAE Kök Sertifika Hizmet Salaycs - Sürüm 3"
# Issuer: CN=TÜBTAK UEKAE Kök Sertifika Hizmet Salaycs - Sürüm 3,OU=Kamu Sertifikasyon Merkezi,OU=Ulusal Elektronik ve Kriptoloji Aratrma Enstitüsü - UEKAE,O=Türkiye Bilimsel ve Teknolojik Aratrma Kurumu - TÜBTAK,L=Gebze - Kocaeli,C=TR

# Serial Number: 17 (0x11)
# Subject: CN=TÜBTAK UEKAE Kök Sertifika Hizmet Salaycs - Sürüm 3,OU=Kamu Sertifikasyon Merkezi,OU=Ulusal Elektronik ve Kriptoloji Aratrma Enstitüsü - UEKAE,O=Türkiye Bilimsel ve Teknolojik Aratrma Kurumu - TÜBTAK,L=Gebze - Kocaeli,C=TR
# Not Valid Before: Fri Aug 24 11:37:07 2007
# Not Valid After: Mon Aug 21 11:37:07 2017
# Fingerprint (MD5): ed:41:f5:8c:50:c5:2b:9c:73:e6:ee:6c:eb:c2:a8:26
# Fingerprint (SHA1): 1b:4b:39:61:26:27:6b:64:91:a2:68:6d:d7:02:43:21:2d:1f:1d:96
CKA_CLASS CK_OBJECT_CLASS
 CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "TÜBTAK UEKAE Kök Sertifika Hizmet Salaycs - Sürüm 3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\033\113\071\141\046\047\153\144\221\242\150\155\327\002\103\041
\055\037\035\226
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\355\101\365\214\120\305\053\234\163\346\356\154\353\302\250\046
END
CKA_ISSUER MULTILINE_OCTAL
\060\202\001\053\061\013\060\011\006\003\125\004\006\023\002\124
\122\061\030\060\026\006\003\125\004\007\014\017\107\145\142\172
\145\040\055\040\113\157\143\141\145\154\151\061\107\060\105\006
\003\125\004\012\014\076\124\303\274\162\153\151\171\145\040\102
\151\154\151\155\163\145\154\040\166\145\040\124\145\153\156\157
\154\157\152\151\153\040\101\162\141\305\237\164\304\261\162\155
\141\040\113\165\162\165\155\165\040\055\040\124\303\234\102\304
\260\124\101\113\061\110\060\106\006\003\125\004\013\014\077\125
\154\165\163\141\154\040\105\154\145\153\164\162\157\156\151\153
\040\166\145\040\113\162\151\160\164\157\154\157\152\151\040\101
\162\141\305\237\164\304\261\162\155\141\040\105\156\163\164\151
\164\303\274\163\303\274\040\055\040\125\105\113\101\105\061\043
\060\041\006\003\125\004\013\014\032\113\141\155\165\040\123\145
\162\164\151\146\151\153\141\163\171\157\156\040\115\145\162\153
\145\172\151\061\112\060\110\006\003\125\004\003\014\101\124\303
\234\102\304\260\124\101\113\040\125\105\113\101\105\040\113\303
\266\153\040\123\145\162\164\151\146\151\153\141\040\110\151\172
\155\145\164\040\123\141\304\237\154\141\171\304\261\143\304\261
\163\304\261\040\055\040\123\303\274\162\303\274\155\040\063
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\021
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

```
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Halcom
 CA FO"
# Issuer: CN=Halcom CA FO,O=Halcom,C=SI
# Serial Number: 113253 (0x1ba65)
# Subject: CN=Halcom CA FO,O=Halcom,C=SI
# Not Valid Before: Sun Jun 05 10:33:31 2005
# Not Valid After: Fri Jun 05 10:33:31 2020
# Fingerprint (MD5): 0b:09:2c:1c:d7:21:86:6f:94:37:6f:e6:a7:f3:22:4d
# Fingerprint (SHA1): 04:09:56:5b:77:da:58:2e:64:95:ac:00:60:a7:23:54:e6:4b:01:92
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Halcom CA FO"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\065\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\017\060\015\006\003\125\004\012\023\006\110\141\154\143\157\155
\061\025\060\023\006\003\125\004\003\023\014\110\141\154\143\157
\155\040\103\101\040\106\117
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\065\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\017\060\015\006\003\125\004\012\023\006\110\141\154\143\157\155
\061\025\060\023\006\003\125\004\003\023\014\110\141\154\143\157
\155\040\103\101\040\106\117
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\003\001\272\145
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\032\060\202\002\002\240\003\002\001\002\002\003\001
\272\145\060\015\006\011\052\206\110\206\367\015\001\001\005\005
\000\060\065\061\013\060\011\006\003\125\004\006\023\002\123\111
\061\017\060\015\006\003\125\004\012\023\006\110\141\154\143\157
\155\061\025\060\023\006\003\125\004\003\023\014\110\141\154\143
\157\155\040\103\101\040\106\117\060\036\027\015\060\065\060\066
\060\065\061\060\063\063\063\061\132\027\015\062\060\060\066\060
\065\061\060\063\063\063\061\132\060\065\061\013\060\011\006\003
\125\004\006\023\002\123\111\061\017\060\015\006\003\125\004\012
\023\006\110\141\154\143\157\155\061\025\060\023\006\003\125\004
\003\023\014\110\141\154\143\157\155\040\103\101\040\106\117\060
```

\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001\001
\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001\000
\274\243\046\001\226\345\235\254\032\002\002\071\174\254\334\006
\114\067\112\256\007\110\165\350\047\034\244\061\375\012\247\043
\135\174\077\016\372\360\214\221\157\125\064\204\003\164\314\003
\065\170\315\161\301\107\033\273\352\041\156\270\007\336\041\222
\252\254\271\336\067\242\037\364\232\034\033\310\356\020\203\326
\123\103\310\335\351\363\220\106\071\162\012\116\374\022\051\111
\201\130\046\072\161\023\014\173\123\217\337\146\162\074\027\334
\336\341\171\112\237\351\140\076\155\065\344\115\121\321\034\300
\032\060\134\006\077\163\103\310\315\066\364\036\302\207\214\117
\110\237\332\165\127\052\114\257\215\124\074\104\137\230\074\120
\332\320\030\006\174\140\156\322\204\377\147\205\220\075\136\306
\353\330\172\243\265\155\014\276\165\270\251\332\126\161\066\132
\356\353\111\123\076\342\031\166\174\102\253\241\220\361\367\057
\270\272\112\101\264\053\244\056\141\066\347\326\332\177\365\237
\215\270\113\133\204\065\120\305\275\005\252\252\302\014\164\101
\143\127\031\216\377\341\106\346\173\005\044\376\231\335\061\275
\002\003\001\000\001\243\063\060\061\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\021\006\003\125\035
\016\004\012\004\010\110\040\034\142\015\130\122\045\060\013\006
\003\125\035\017\004\004\003\002\001\006\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\003\202\001\001\000\133\165
\365\346\060\106\130\212\367\017\321\117\013\001\130\004\271\144
\344\060\015\076\166\331\153\023\255\034\156\311\114\360\154\346
\102\021\375\353\203\357\120\330\273\124\235\264\221\212\132\265
\204\017\214\106\315\074\202\250\245\036\040\234\320\365\101\006
\312\001\053\230\260\352\051\120\037\342\164\173\131\202\312\012
\345\156\116\256\260\067\355\076\314\272\062\331\077\013\150\054
\262\323\074\334\070\305\021\326\033\063\356\271\242\152\104\223
\033\120\352\141\033\171\127\121\126\236\062\320\063\170\264\317
\107\052\373\367\315\361\347\155\340\272\144\373\025\233\276\312
\261\362\107\001\177\340\114\267\245\101\254\036\331\032\154\221
\341\320\250\112\303\136\170\053\172\200\300\117\315\045\137\120
\047\306\274\130\165\234\035\265\232\135\225\163\363\204\146\323
\315\155\035\315\340\132\316\040\070\357\222\163\170\136\002\326
\215\371\164\324\267\211\330\214\373\173\325\213\161\325\031\027
\046\330\044\111\074\125\274\202\207\332\143\273\071\327\216\221
\317\064\160\134\163\117\320\120\107\132\373\345\132\121
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Halcom CA FO"
# Issuer: CN=Halcom CA FO,O=Halcom,C=SI

```
# Serial Number: 113253 (0x1ba65)
# Subject: CN=Halcom CA FO,O=Halcom,C=SI
# Not Valid Before: Sun Jun 05 10:33:31 2005
# Not Valid After: Fri Jun 05 10:33:31 2020
# Fingerprint (MD5): 0b:09:2c:1c:d7:21:86:6f:94:37:6f:e6:a7:f3:22:4d
# Fingerprint (SHA1): 04:09:56:5b:77:da:58:2e:64:95:ac:00:60:a7:23:54:e6:4b:01:92
CKA_CLASS
 CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Halcom CA FO"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\004\011\126\133\167\332\130\056\144\225\254\000\140\247\043\124
\346\113\001\222
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\013\011\054\034\327\041\206\157\224\067\157\346\247\363\042\115
END
CKA_ISSUER MULTILINE_OCTAL
\060\065\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\017\060\015\006\003\125\004\012\023\006\110\141\154\143\157\155
\061\025\060\023\006\003\125\004\003\023\014\110\141\154\143\157
\155\040\103\101\040\106\117
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\001\272\145
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Halcom CA PO 2"
# Issuer:
 CN=Halcom CA PO 2,O=Halcom,C=SI
# Serial Number: 79074 (0x134e2)
# Subject: CN=Halcom CA PO 2,O=Halcom,C=SI
# Not Valid Before: Sat Feb 07 18:33:31 2004
# Not Valid After: Thu Feb 07 18:33:31 2019
# Fingerprint (MD5): 1d:64:96:af:2d:82:1a:30:0b:a0:62:0d:76:bc:53:aa
# Fingerprint (SHA1): 7f:bb:6a:cd:7e:0a:b4:38:da:af:6f:d5:02:10:d0:07:c6:c0:82:9c
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Halcom CA PO 2"
```

CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\067\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\017\060\015\006\003\125\004\012\023\006\110\141\154\143\157\155
\061\027\060\025\006\003\125\004\003\023\016\110\141\154\143\157
\155\040\103\101\040\120\117\040\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\067\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\017\060\015\006\003\125\004\012\023\006\110\141\154\143\157\155
\061\027\060\025\006\003\125\004\003\023\016\110\141\154\143\157
\155\040\103\101\040\120\117\040\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\003\001\064\342
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\031\060\202\001\202\240\003\002\001\002\002\003\001
\064\342\060\015\006\011\052\206\110\206\367\015\001\001\005\005
\000\060\067\061\013\060\011\006\003\125\004\006\023\002\123\111
\061\017\060\015\006\003\125\004\012\023\006\110\141\154\143\157
\155\061\027\060\025\006\003\125\004\003\023\016\110\141\154\143
\157\155\040\103\101\040\120\117\040\062\060\036\027\015\060\064
\060\062\060\067\061\070\063\063\063\061\132\027\015\061\071\060
\062\060\067\061\070\063\063\063\061\132\060\067\061\013\060\011
\006\003\125\004\006\023\002\123\111\061\017\060\015\006\003\125
\004\012\023\006\110\141\154\143\157\155\061\027\060\025\006\003
\125\004\003\023\016\110\141\154\143\157\155\040\103\101\040\120
\117\040\062\060\201\237\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\201\215\000\060\201\211\002\201\201\000
\224\027\362\111\067\060\062\011\010\074\276\365\067\267\164\154
\020\073\313\042\161\007\006\271\306\354\332\110\363\237\047\155
\144\215\125\336\171\107\120\373\150\316\171\001\276\247\033\366
\141\255\175\061\013\123\040\255\061\361\133\316\043\372\377\314
\022\002\132\000\234\374\315\153\022\122\350\254\324\063\073\163
\046\020\161\220\100\277\003\210\337\274\137\041\015\214\326\212
\223\037\347\256\025\124\306\114\344\231\141\222\340\367\215\162
\307\334\142\023\063\243\076\111\051\373\204\277\160\072\221\041
\002\003\001\000\001\243\063\060\061\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\021\006\003\125\035
\016\004\012\004\010\110\257\127\146\277\322\300\002\060\013\006
\003\125\035\017\004\004\003\002\001\006\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\003\201\201\000\220\026\127
\166\270\171\316\374\304\321\067\000\242\315\377\070\007\021\163
\023\005\111\355\337\301\305\316\306\100\330\367\002\226\015\267
\157\021\204\070\146\373\161\367\020\001\147\174\135\175\044\332

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\366\144\073\010\200\110\246\116\275\104\342\260\007\062\217\174
\206\067\106\157\300\203\003\223\265\364\363\022\174\243\350\313
\342\072\043\170\372\150\157\376\130\312\014\247\127\121\055\142
\220\371\344\250\334\365\312\337\016\207\121\156\067\165\046\016
\327\176\170\212\003\242\225\031\266\136\221\001\126
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Halcom CA PO 2"
# Issuer: CN=Halcom CA PO 2,O=Halcom,C=SI
# Serial Number: 79074 (0x134e2)
# Subject: CN=Halcom CA PO 2,O=Halcom,C=SI
# Not Valid Before: Sat Feb 07 18:33:31 2004
# Not Valid After: Thu Feb 07 18:33:31 2019
# Fingerprint (MD5): 1d:64:96:af:2d:82:1a:30:0b:a0:62:0d:76:bc:53:aa
# Fingerprint (SHA1): 7f:bb:6a:cd:7e:0a:b4:38:da:af:6f:d5:02:10:d0:07:c6:c0:82:9c
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN
 CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Halcom CA PO 2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\177\273\152\315\176\012\264\070\332\257\157\325\002\020\320\007
\306\300\202\234
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\035\144\226\257\055\202\032\060\013\240\142\015\166\274\123\252
END
CKA_ISSUER MULTILINE_OCTAL
\060\067\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\017\060\015\006\003\125\004\012\023\006\110\141\154\143\157\155
\061\027\060\025\006\003\125\004\003\023\016\110\141\154\143\157
\155\040\103\101\040\120\117\040\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\001\064\342
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
```

```
# Certificate "ACNLB"
# Issuer: O=ACNLB,C=SI
# Serial Number:3e:c3:86:8e
#
 Subject: O=ACNLB,C=SI
# Not Valid Before: Thu May 15 11:52:45 2003
# Not Valid After: Mon May 15 12:22:45 2023
# Fingerprint (MD5): ba:92:64:42:16:1f:cb:a1:16:48:1a:f6:40:5c:59:87
# Fingerprint (SHA1): 04:56:f2:3d:1e:9c:43:ae:cb:0d:80:7f:1c:06:47:55:1a:05:f4:56
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ACNLB"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\035\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\016\060\014\006\003\125\004\012\023\005\101\103\116\114\102
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\035\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\016\060\014\006\003\125\004\012\023\005\101\103\116\114\102
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\076\303\206\216
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\267\060\202\002\237\240\003\002\001\002\002\004\076
\303\206\216\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\035\061\013\060\011\006\003\125\004\006\023\002\123
\111\061\016\060\014\006\003\125\004\012\023\005\101\103\116\114
\102\060\036\027\015\060\063\060\065\061\065\061\061\065\062\064
\065\132\027\015\062\063\060\065\061\065\061\062\062\062\064\065
\132\060\035\061\013\060\011\006\003\125\004\006\023\002\123\111
\061\016\060\014\006\003\125\004\012\023\005\101\103\116\114\102
\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001
\000\277\166\165\075\014\174\100\072\146\137\115\214\373\335\074
\056\376\175\224\144\355\112\324\111\110\241\356\221\161\262\171
\310\216\053\037\252\360\062\264\050\262\243\302\165\117\244\351
\246\032\366\242\146\141\043\047\141\054\156\027\220\013\372\336
\036\161\122\002\051\004\231\171\254\300\260\300\146\230\230\021
\067\144\020\317\234\274\073\102\034\051\134\125\220\366\172\042
\116\126\257\067\150\277\164\072\154\074\306\230\314\140\041\277
\342\010\047\344\331\053\274\343\204\225\327\324\044\140\374\176
\055\057\235\041\353\235\221\306\273\244\321\353\311\022\255\243
\350\310\265\177\125\113\353\231\002\124\304\201\034\014\256\071
```

\344\152\172\005\330\116\160\240\372\003\167\263\256\330\270\024
\222\373\101\167\023\065\152\267\242\312\210\113\255\055\121\274
\166\232\154\273\100\275\347\044\114\042\246\346\375\116\010\173
\235\013\020\326\022\322\246\306\241\144\062\364\001\163\226\201
\342\110\260\301\050\143\075\073\347\147\254\156\305\024\365\027
\023\242\234\037\053\127\360\025\047\165\135\335\261\064\326\223
\021\002\003\001\000\001\243\201\376\060\201\373\060\021\006\011
\140\206\110\001\206\370\102\001\001\004\004\003\002\000\007\060
\077\006\003\125\035\037\004\070\060\066\060\064\240\062\240\060
\244\056\060\054\061\013\060\011\006\003\125\004\006\023\002\123
\111\061\016\060\014\006\003\125\004\012\023\005\101\103\116\114
\102\061\015\060\013\006\003\125\004\003\023\004\103\122\114\061
\060\053\006\003\125\035\020\004\044\060\042\200\017\062\060\060
\063\060\065\061\065\061\061\065\062\064\065\132\201\017\062\060
\062\063\060\065\061\065\061\062\062\062\064\065\132\060\013\006
\003\125\035\017\004\004\003\002\001\006\060\037\006\003\125\035
\043\004\030\060\026\200\024\314\273\273\206\326\157\370\276\264
\107\042\167\263\266\255\327\001\131\226\115\060\035\006\003\125
\035\016\004\026\004\024\314\273\273\206\326\157\370\276\264\107
\042\167\263\266\255\327\001\131\226\115\060\014\006\003\125\035
\023\004\005\060\003\001\001\377\060\035\006\011\052\206\110\206
\366\175\007\101\000\004\020\060\016\033\010\126\066\056\060\072
\064\056\060\003\002\004\220\060\015\006\011\052\206\110\206\367
\015\001\001\005\005\000\003\202\001\001\000\021\147\313\313\232
\153\040\041\335\157\151\203\325\077\015\272\223\025\227\116\160
\166\046\134\350\236\044\347\067\376\074\120\364\324\371\052\057
\014\023\241\135\004\274\320\260\351\302\003\027\205\005\141\075
\300\247\252\166\114\303\270\072\203\251\206\317\003\371\167\016
\053\262\075\166\033\145\321\152\161\140\161\333\273\270\172\216
\362\371\041\203\370\127\114\250\307\335\145\306\356\357\157\263
\266\231\273\264\303\320\253\137\262\240\176\335\164\041\054\303
\132\353\215\241\312\330\360\310\027\355\166\272\204\143\156\133
\271\265\312\155\327\374\064\071\200\057\272\117\337\215\330\374
\030\304\074\212\065\057\167\202\226\255\040\222\030\262\347\066
\364\256\062\164\270\107\321\330\017\330\054\313\152\302\000\165
\371\054\370\102\016\313\376\163\223\251\217\341\307\256\041\067
\363\312\271\014\264\347\211\176\161\034\126\064\040\303\361\064
\271\125\113\323\123\122\361\007\055\053\076\133\031\100\237\020
\355\323\051\063\305\257\017\020\126\207\332\073\310\261\355\070
\331\031\373\113\360\120\055\244\315\324\130
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "ACNLB"

```
# Issuer: O=ACNLB,C=SI
#
 Serial Number:3e:c3:86:8e
# Subject: O=ACNLB,C=SI
# Not Valid Before: Thu May 15 11:52:45 2003
# Not Valid After: Mon May 15 12:22:45 2023
# Fingerprint (MD5): ba:92:64:42:16:1f:cb:a1:16:48:1a:f6:40:5c:59:87
# Fingerprint (SHA1): 04:56:f2:3d:1e:9c:43:ae:cb:0d:80:7f:1c:06:47:55:1a:05:f4:56
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ACNLB"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\004\126\362\075\036\234\103\256\313\015\200\177\034\006\107\125
\032\005\364\126
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\272\222\144\102\026\037\313\241\026\110\032\366\100\134\131\207
END
CKA_ISSUER MULTILINE_OCTAL
\060\035\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\016\060\014\006\003\125\004\012\023\005\101\103\116\114\102
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\076\303\206\216
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "state-institutions"
# Issuer: OU=sigen-ca,O=state-institutions,C=si
# Serial Number:3b:3c:f9:c9
# Subject: OU=sigen-ca,O=state-institutions,C=si
# Not Valid Before: Fri Jun 29 21:27:46 2001
# Not Valid After: Tue Jun 29 21:57:46 2021
# Fingerprint (MD5): 49:ef:a6:a1:f0:de:8e:a7:6a:ee:5b:7d:1e:5f:c4:46
# Fingerprint (SHA1): 3e:42:a1:87:06:bd:0c:9c:cf:59:47:50:d2:e4:d6:ab:00:48:fd:c4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "state-institutions"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
```

CKA_SUBJECT MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\163\151\061
\033\060\031\006\003\125\004\012\023\022\163\164\141\164\145\055
\151\156\163\164\151\164\165\164\151\157\156\163\061\021\060\017
\006\003\125\004\013\023\010\163\151\147\145\156\055\143\141
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\163\151\061
\033\060\031\006\003\125\004\012\023\022\163\164\141\164\145\055
\151\156\163\164\151\164\165\164\151\157\156\163\061\021\060\017
\006\003\125\004\013\023\010\163\151\147\145\156\055\143\141
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\073\074\371\311
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\031\060\202\003\001\240\003\002\001\002\002\004\073
\074\371\311\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\075\061\013\060\011\006\003\125\004\006\023\002\163
\151\061\033\060\031\006\003\125\004\012\023\022\163\164\141\164
\145\055\151\156\163\164\151\164\165\164\151\157\156\163\061\021
\060\017\006\003\125\004\013\023\010\163\151\147\145\156\055\143
\141\060\036\027\015\060\061\060\066\062\071\062\061\062\067\064
\066\132\027\015\062\061\060\066\062\071\062\061\065\067\064\066
\132\060\075\061\013\060\011\006\003\125\004\006\023\002\163\151
\061\033\060\031\006\003\125\004\012\023\022\163\164\141\164\145
\055\151\156\163\164\151\164\165\164\151\157\156\163\061\021\060
\017\006\003\125\004\013\023\010\163\151\147\145\156\055\143\141
\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001
\000\260\345\145\262\300\254\144\226\362\210\033\263\355\236\344
\002\306\117\053\210\316\056\212\121\200\165\257\020\133\362\313
\070\146\233\242\016\155\064\107\226\245\222\021\257\366\065\107
\242\167\042\014\316\026\210\142\252\323\111\156\030\274\056\104
\330\276\306\236\302\032\031\254\101\216\374\060\007\002\362\306
\152\324\133\043\000\357\101\064\330\244\163\143\337\042\222\063
\204\001\245\215\363\203\134\372\270\324\172\065\337\354\370\155
\017\340\114\355\255\234\072\175\206\326\245\010\224\276\175\172
\021\037\376\205\077\124\132\210\143\207\234\245\261\247\116\315
\267\104\163\257\317\212\111\153\037\343\315\327\111\115\132\053
\027\346\134\166\263\273\162\271\157\047\322\233\211\025\210\337
\020\137\166\041\001\152\307\025\061\012\321\234\130\370\050\026
\005\155\331\116\331\241\327\007\040\313\113\046\211\115\222\262
\247\272\226\350\343\130\217\042\234\001\226\132\304\367\061\115
\013\111\265\341\170\141\342\124\030\006\273\236\124\064\176\014
\076\353\356\265\200\037\335\026\204\035\150\070\146\147\163\370

\221\002\003\001\000\001\243\202\001\037\060\202\001\033\060\021
\006\011\140\206\110\001\206\370\102\001\001\004\004\003\002\000
\007\060\137\006\003\125\035\037\004\130\060\126\060\124\240\122
\240\120\244\116\060\114\061\013\060\011\006\003\125\004\006\023
\002\163\151\061\033\060\031\006\003\125\004\012\023\022\163\164
\141\164\145\055\151\156\163\164\151\164\165\164\151\157\156\163
\061\021\060\017\006\003\125\004\013\023\010\163\151\147\145\156
\055\143\141\061\015\060\013\006\003\125\004\003\023\004\103\122
\114\061\060\053\006\003\125\035\020\004\044\060\042\200\017\062
\060\060\061\060\066\062\071\062\061\062\067\064\066\132\201\017
\062\060\062\061\060\066\062\071\062\061\065\067\064\066\132\060
\013\006\003\125\035\017\004\004\003\002\001\006\060\037\006\003
\125\035\043\004\030\060\026\200\024\161\173\212\006\037\061\005
\125\253\140\022\167\107\040\036\003\210\030\354\211\060\035\006
\003\125\035\016\004\026\004\024\161\173\212\006\037\061\005\125
\253\140\022\167\107\040\036\003\210\030\354\211\060\014\006\003
\125\035\023\004\005\060\003\001\001\377\060\035\006\011\052\206
\110\206\366\175\007\101\000\004\020\060\016\033\010\126\065\056
\060\072\064\056\060\003\002\004\220\060\015\006\011\052\206\110
\206\367\015\001\001\005\005\000\003\202\001\001\000\000\272\143
\064\363\030\030\356\256\176\215\222\307\065\365\302\023\324\326
\000\252\041\062\026\326\320\133\372\051\260\215\372\027\167\222
\371\245\266\366\371\207\077\006\017\040\356\142\075\064\367\251
\057\307\251\073\320\047\210\114\254\335\311\251\345\132\130\205
\327\022\065\075\334\260\202\133\162\364\273\163\267\373\376\070
\041\230\004\200\262\210\142\017\036\254\072\026\251\346\263\012
\366\025\020\105\003\243\227\342\315\254\020\334\371\000\036\277
\163\154\103\354\167\042\026\006\057\226\203\211\173\260\270\123
\104\101\010\334\200\037\005\333\031\011\166\207\276\065\235\116
\041\113\264\223\301\150\072\235\137\066\376\241\256\060\054\113
\336\170\044\072\130\326\026\103\357\235\231\070\213\052\230\376
\060\321\302\352\326\257\045\325\245\166\013\271\357\100\071\056
\366\353\337\062\136\035\175\207\265\104\314\002\071\322\046\225
\162\330\157\205\103\250\217\016\243\106\316\327\316\350\271\126
\251\370\211\027\022\037\103\111\006\172\062\347\077\276\157\171
\276\326\063\327\114\074\050\374\022\361\166\166\030
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "state-institutions"
# Issuer: OU=sigen-ca,O=state-institutions,C=si
#
 Serial Number:3b:3c:f9:c9
# Subject: OU=sigen-ca,O=state-institutions,C=si

```
# Not Valid Before: Fri Jun 29 21:27:46 2001
# Not Valid After: Tue Jun 29 21:57:46 2021
# Fingerprint (MD5): 49:ef:a6:a1:f0:de:8e:a7:6a:ee:5b:7d:1e:5f:c4:46
# Fingerprint (SHA1): 3e:42:a1:87:06:bd:0c:9c:cf:59:47:50:d2:e4:d6:ab:00:48:fd:c4
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "state-institutions"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\076\102\241\207\006\275\014\234\317\131\107\120\322\344\326\253
\000\110\375\304
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\111\357\246\241\360\336\216\247\152\356\133\175\036\137\304\106
END
CKA_ISSUER MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\163\151\061
\033\060\031\006\003\125\004\012\023\022\163\164\141\164\145\055
\151\156\163\164\151\164\165\164\151\157\156\163\061\021\060\017
\006\003\125\004\013\023\010\163\151\147\145\156\055\143\141
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\004\073\074\371\311
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "SECOM Trust Systems CO.,LTD."
# Issuer: OU=Security Communication EV RootCA1,O=SECOM Trust Systems CO.\,LTD.,C=JP
# Serial Number: 0 (0x0)
# Subject: OU=Security Communication EV RootCA1,O=SECOM Trust Systems CO.\,LTD.,C=JP
# Not Valid Before: Wed Jun 06 02:12:32 2007
# Not Valid After: Sat Jun 06 02:12:32 2037
# Fingerprint (MD5): 22:2d:a6:01:ea:7c:0a:f7:f0:6c:56:43:3f:77:76:d3
# Fingerprint (SHA1): fe:b8:c4:32:dc:f9:76:9a:ce:ae:3d:d8:90:8f:fd:28:86:65:64:7d
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SECOM Trust Systems CO.,LTD."
CKA_CERTIFICATE_TYPE
 CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
```

\060\140\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\052\060\050\006\003\125\004\013\023
\041\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\105\126\040\122\157\157\164\103
\101\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\140\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\052\060\050\006\003\125\004\013\023
\041\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\105\126\040\122\157\157\164\103
\101\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\000
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\175\060\202\002\145\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\140\061\013\060\011\006\003\125\004\006\023\002\112\120\061\045
\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040\124
\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117\056
\054\114\124\104\056\061\052\060\050\006\003\125\004\013\023\041
\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156\151
\143\141\164\151\157\156\040\105\126\040\122\157\157\164\103\101
\061\060\036\027\015\060\067\060\066\060\066\060\062\061\062\063
\062\132\027\015\063\067\060\066\060\066\060\062\061\062\063\062
\132\060\140\061\013\060\011\006\003\125\004\006\023\002\112\120
\061\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115
\040\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103
\117\056\054\114\124\104\056\061\052\060\050\006\003\125\004\013
\023\041\123\145\143\165\162\151\164\171\040\103\157\155\155\165
\156\151\143\141\164\151\157\156\040\105\126\040\122\157\157\164
\103\101\061\060\202\001\042\060\015\006\011\052\206\110\206\367
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002
\202\001\001\000\274\177\354\127\233\044\340\376\234\272\102\171
\251\210\212\372\200\340\365\007\051\103\352\216\012\064\066\215
\034\372\247\265\071\170\377\227\165\367\057\344\252\153\004\204
\104\312\246\342\150\216\375\125\120\142\017\244\161\016\316\007
\070\055\102\205\120\255\074\226\157\213\325\242\016\317\336\111
\211\075\326\144\056\070\345\036\154\265\127\212\236\357\110\016
\315\172\151\026\207\104\265\220\344\006\235\256\241\004\227\130
\171\357\040\112\202\153\214\042\277\354\037\017\351\204\161\355

\361\016\344\270\030\023\314\126\066\135\321\232\036\121\153\071
\156\140\166\210\064\013\363\263\321\260\235\312\141\342\144\035
\301\106\007\270\143\335\036\063\145\263\216\011\125\122\075\265
\275\377\007\353\255\141\125\030\054\251\151\230\112\252\100\305
\063\024\145\164\000\371\221\336\257\003\110\305\100\124\334\017
\204\220\150\040\305\222\226\334\056\345\002\105\252\300\137\124
\370\155\352\111\317\135\154\113\257\357\232\302\126\134\306\065
\126\102\152\060\137\302\253\366\342\075\077\263\311\021\217\061
\114\327\237\111\002\003\001\000\001\243\102\060\100\060\035\006
\003\125\035\016\004\026\004\024\065\112\365\115\257\077\327\202
\070\254\253\161\145\027\165\214\235\125\223\346\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\017\006\003
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\015\006
\011\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001
\000\250\207\351\354\370\100\147\135\303\301\146\307\100\113\227
\374\207\023\220\132\304\357\240\312\137\213\267\247\267\361\326
\265\144\267\212\263\270\033\314\332\373\254\146\210\101\316\350
\374\344\333\036\210\246\355\047\120\033\002\060\044\106\171\376
\004\207\160\227\100\163\321\300\301\127\031\232\151\245\047\231
\253\235\142\204\366\121\301\054\311\043\025\330\050\267\253\045
\023\265\106\341\206\002\377\046\214\304\210\222\035\126\376\031
\147\362\125\344\200\243\153\234\253\167\341\121\161\015\040\333
\020\232\333\275\166\171\007\167\231\050\255\232\136\332\261\117
\104\054\065\216\245\226\307\375\203\360\130\306\171\326\230\174
\250\215\376\206\076\007\026\222\341\173\347\035\354\063\166\176
\102\056\112\205\371\221\211\150\204\003\201\245\233\232\276\343
\067\305\124\253\126\073\030\055\101\244\014\370\102\333\231\240
\340\162\157\273\135\341\026\117\123\012\144\371\116\364\277\116
\124\275\170\154\210\352\277\234\023\044\302\160\151\242\177\017
\310\074\255\010\311\260\230\100\243\052\347\210\203\355\167\217
\164
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "SECOM Trust Systems CO.,LTD."
# Issuer: OU=Security Communication EV RootCA1,O=SECOM Trust Systems CO.\,LTD.,C=JP
# Serial Number: 0 (0x0)
# Subject: OU=Security Communication
 EV RootCA1,O=SECOM Trust Systems CO.\,LTD.,C=JP
# Not Valid Before: Wed Jun 06 02:12:32 2007
# Not Valid After: Sat Jun 06 02:12:32 2037
# Fingerprint (MD5): 22:2d:a6:01:ea:7c:0a:f7:f0:6c:56:43:3f:77:76:d3
# Fingerprint (SHA1): fe:b8:c4:32:dc:f9:76:9a:ce:ae:3d:d8:90:8f:fd:28:86:65:64:7d
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

```
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SECOM Trust Systems CO.,LTD."
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\376\270\304\062\334\371\166\232\316\256\075\330\220\217\375\050
\206\145\144\175
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\042\055\246\001\352\174\012\367\360\154\126\103\077\167\166\323
END
CKA_ISSUER MULTILINE_OCTAL
\060\140\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\045\060\043\006\003\125\004\012\023\034\123\105\103\117\115\040
\124\162\165\163\164\040\123\171\163\164\145\155\163\040\103\117
\056\054\114\124\104\056\061\052\060\050\006\003\125\004\013\023
\041\123\145\143\165\162\151\164\171\040\103\157\155\155\165\156
\151\143\141\164\151\157\156\040\105\126\040\122\157\157\164\103
\101\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "D-TRUST Root Class 2 CA 2007"
# Issuer: CN=D-TRUST Root Class 2 CA 2007,O=D-Trust GmbH,C=DE
# Serial Number: 200341 (0x30e95)
# Subject: CN=D-TRUST Root Class 2 CA 2007,O=D-Trust GmbH,C=DE
# Not Valid Before: Wed May 16 05:20:47 2007
# Not Valid After: Mon May 16 05:20:47 2022
# Fingerprint (MD5): 2c:c2:b0:d5:d6:22:c5:2e:90:1e:f4:63:3f:0f:bb:32
# Fingerprint (SHA1): 4a:05:8f:df:d7:61:db:21:b0:c2:ee:48:57:9b:e2:7f:42:a4:da:1c
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
 CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST Root Class 2 CA 2007"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
```

\164\040\107\155\142\110\061\045\060\043\006\003\125\004\003\014
\034\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\062\040\103\101\040\062\060\060\067
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\045\060\043\006\003\125\004\003\014
\034\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\062\040\103\101\040\062\060\060\067
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\003\016\225
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\225\060\202\003\175\240\003\002\001\002\002\003\003
\016\225\060\015\006\011\052\206\110\206\367\015\001\001\005\005
\000\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165
\163\164\040\107\155\142\110\061\045\060\043\006\003\125\004\003
\014\034\104\055\124\122\125\123\124\040\122\157\157\164\040\103
\154\141\163\163\040\062\040\103\101\040\062\060\060\067\060\036
\027\015\060\067\060\065\061\066\060\065\062\060\064\067\132\027
\015\062\062\060\065\061\066\060\065\062\060\064\067\132\060\113
\061\013\060\011\006\003\125\004\006\023\002\104\105\061\025\060
\023\006\003\125\004\012\014\014\104\055\124\162\165\163\164\040
\107\155\142\110\061\045\060\043\006\003\125\004\003\014\034\104
\055\124\122\125\123\124\040\122\157\157\164\040\103\154\141\163
\163\040\062\040\103\101\040\062\060\060\067\060\202\001\042\060
\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202
\001\017\000\060\202\001\012\002\202\001\001\000\263\315\344\204
\025\111\370\344\326\316\204\263\232\255\366\060\165\220\015\204
\353\356\332\263\172\165\052\342\073\244\352\060\054\353\075\167
\215\201\204\150\112\246\244\150\334\220\163\141\064\145\007\035
\043\245\014\346\277\323\335\063\135\332\062\355\246\015\123\246
\164\152\134\031\131\246\114\265\057\171\001\136\236\177\112\372
\272\311\047\176\324\377\315\000\131\040\353\006\314\263\104\317
\326\205\351\355\073\014\154\301\352\214\134\340\271\251\002\360
\023\000\047\223\234\120\376\315\023\117\155\033\152\252\335\017
\377\106\045\031\334\341\136\120\254\032\177\016\313\332\356\040
\374\303\364\234\112\170\065\156\356\061\307\105\026\162\205\322
\202\040\333\122\105\174\074\277\131\127\371\207\164\126\230\133
\035\120\216\314\057\263\263\077\213\356\354\067\111\001\210\357
\330\041\014\223\323\366\156\211\117\272\027\313\104\201\267\173
\247\043\273\164\012\323\330\352\067\105\047\377\334\360\236\103
\343\272\173\212\033\232\175\351\206\240\376\057\321\326\366\207
\127\252\362\051\224\207\163\025\372\152\116\255\002\003\001\000

\001\243\202\001\200\060\202\001\174\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035
\016\004\026\004\024\221\060\253\366\363\306\104\267\353\335\050
\274\017\024\237\122\135\142\177\002\060\071\006\010\053\006\001
\005\005\007\001\001\004\055\060\053\060\051\006\010\053\006\001
\005\005\007\060\001\206\035\150\164\164\160\072\057\057\165\163
\145\162\163\056\157\143\163\160\056\144\055\164\162\165\163\164
\056\156\145\164\060\063\006\003\125\035\021\004\054\060\052\201
\020\151\156\146\157\100\144\055\164\162\165\163\164\056\156\145
\164\206\026\150\164\164\160\072\057\057\167\167\167\056\144\055
\164\162\165\163\164\056\156\145\164\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\006\060\201\311\006\003\125\035
\037\004\201\301\060\201\276\060\201\273\240\201\270\240\201\265
\206\166\154\144\141\160\072\057\057\144\151\162\145\143\164\157
\162\171\056\144\055\164\162\165\163\164\056\156\145\164\057\103
\116\075\104\055\124\122\125\123\124\045\062\060\122\157\157\164
\045\062\060\103\154\141\163\163\045\062\060\062\045\062\060\103
\101\045\062\060\062\060\060\067\054\117\075\104\055\124\162\165
\163\164\045\062\060\107\155\142\110\054\103\075\104\105\077\143
\145\162\164\151\146\151\143\141\164\145\162\145\166\157\143\141
\164\151\157\156\154\151\163\164\206\073\150\164\164\160\072\057
\057\167\167\167\056\144\055\164\162\165\163\164\056\156\145\164
\057\143\162\154\057\144\055\164\162\165\163\164\137\162\157\157
\164\137\143\154\141\163\163\137\062\137\143\141\137\062\060\060
\067\056\143\162\154\060\015\006\011\052\206\110\206\367\015\001
\001\005\005\000\003\202\001\001\000\133\213\362\103\343\005\056
\144\037\325\222\251\121\153\144\374\016\106\314\007\231\342\267
\374\223\051\040\334\374\057\140\344\254\175\045\062\355\020\341
\017\157\333\362\274\116\356\101\311\263\324\007\110\172\012\257
\244\266\377\121\060\355\313\322\234\353\177\120\356\113\342\142
\247\064\302\040\366\363\366\365\066\300\313\221\020\353\355\056
\215\364\007\032\041\014\065\167\364\174\055\215\111\245\327\013
\104\150\325\322\342\345\014\170\070\023\312\261\114\122\252\052
\345\325\257\134\005\071\235\055\255\276\043\126\325\057\125\363
\336\235\253\202\066\240\115\267\131\221\107\356\336\203\245\352
\073\136\047\005\200\013\155\054\120\364\001\067\325\243\167\027
\354\376\335\204\364\305\370\120\222\320\113\306\056\243\213\100
\344\303\067\243\167\275\316\054\125\342\254\337\135\144\000\272
\276\247\152\061\006\374\231\153\120\025\045\235\251\166\232\247
\115\052\232\002\143\353\160\347\376\021\046\320\030\305\246\037
\012\103\223\362\030\331\365\071\171\270\007\135\214\037\346\077
\363\305\313\041\146\061\173\173\317
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

```
# Microsoft Code Signing Only Certificate
# Trust for "D-TRUST Root Class 2 CA 2007"
# Issuer: CN=D-TRUST Root Class 2 CA 2007,O=D-Trust GmbH,C=DE
# Serial Number:
 200341 (0x30e95)
# Subject: CN=D-TRUST Root Class 2 CA 2007,O=D-Trust GmbH,C=DE
# Not Valid Before: Wed May 16 05:20:47 2007
# Not Valid After: Mon May 16 05:20:47 2022
# Fingerprint (MD5): 2c:c2:b0:d5:d6:22:c5:2e:90:1e:f4:63:3f:0f:bb:32
# Fingerprint (SHA1): 4a:05:8f:df:d7:61:db:21:b0:c2:ee:48:57:9b:e2:7f:42:a4:da:1c
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST Root Class 2 CA 2007"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\112\005\217\337\327\141\333\041\260\302\356\110\127\233\342\177
\102\244\332\034
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\054\302\260\325\326\042\305\056\220\036\364\143\077\017\273\062
END
CKA_ISSUER MULTILINE_OCTAL
\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\045\060\043\006\003\125\004\003\014
\034\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\062\040\103\101\040\062\060\060\067
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\003\003\016\225
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "D-TRUST Root Class 3 CA 2007"
# Issuer: CN=D-TRUST Root Class 3 CA 2007,O=D-Trust GmbH,C=DE
# Serial Number: 200342 (0x30e96)
# Subject: CN=D-TRUST Root Class 3 CA 2007,O=D-Trust GmbH,C=DE
# Not Valid Before: Wed May 16 05:20:47 2007
# Not Valid After: Mon May 16 05:20:47 2022
# Fingerprint (MD5): 1e:24:0e:a0:f8:76:d7:85:a3:f5:f8:a1:49:3d:2e:ba
# Fingerprint (SHA1): fd:1e:d1:e2:02:1b:0b:9f:73:e8:eb:75:ce:23:43:6b:bc:c7:46:eb
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
```

CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST Root Class 3
 CA 2007"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\045\060\043\006\003\125\004\003\014
\034\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\063\040\103\101\040\062\060\060\067
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\045\060\043\006\003\125\004\003\014
\034\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\063\040\103\101\040\062\060\060\067
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\003\016\226
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\225\060\202\003\175\240\003\002\001\002\002\003\003
\016\226\060\015\006\011\052\206\110\206\367\015\001\001\005\005
\000\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165
\163\164\040\107\155\142\110\061\045\060\043\006\003\125\004\003
\014\034\104\055\124\122\125\123\124\040\122\157\157\164\040\103
\154\141\163\163\040\063\040\103\101\040\062\060\060\067\060\036
\027\015\060\067\060\065\061\066\060\065\062\060\064\067\132\027
\015\062\062\060\065\061\066\060\065\062\060\064\067\132\060\113
\061\013\060\011\006\003\125\004\006\023\002\104\105\061\025\060
\023\006\003\125\004\012\014\014\104\055\124\162\165\163\164\040
\107\155\142\110\061\045\060\043\006\003\125\004\003\014\034\104
\055\124\122\125\123\124\040\122\157\157\164\040\103\154\141\163
\163\040\063\040\103\101\040\062\060\060\067\060\202\001\042\060
\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202
\001\017\000\060\202\001\012\002\202\001\001\000\272\215\315\065
\123\062\356\246\275\110\220\232\362\352\350\130\017\107\146\250
\314\156\011\022\344\241\313\133\337\223\270\366\351\071\071\370
\306\330\351\317\032\206\274\246\256\017\214\257\010\105\343\362
\216\053\302\134\131\053\372\214\066\263\160\035\310\120\074\245
\126\276\352\256\351\107\366\347\111\017\257\177\224\046\324\002
\032\007\270\272\071\125\316\237\273\042\071\051\330\065\305\231
\003\041\330\247\070\143\361\344\064\337\107\256\237\067\361\154

\240\231\302\042\260\155\162\334\042\311\061\071\350\126\327\240
\217\072\041\133\206\232\117\050\371\034\166\367\314\117\077\371
\116\167\213\052\234\212\252\171\101\212\325\034\331\071\157\230
\311\136\105\227\035\011\224\031\331\120\121\205\162\163\277\254
\113\235\164\064\161\207\041\026\017\176\356\322\111\176\312\111
\323\371\222\052\107\110\117\017\135\132\241\313\325\050\354\360
\222\305\162\103\106\353\263\003\246\363\127\045\112\012\141\204
\012\046\326\357\246\270\330\024\215\170\271\323\267\045\321\116
\343\132\026\252\354\237\007\356\043\020\175\265\002\003\001\000
\001\243\202\001\200\060\202\001\174\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035
\016\004\026\004\024\202\057\066\043\111\170\040\102\327\260\122
\130\240\326\164\124\025\170\277\252\060\071\006\010\053\006\001
\005\005\007\001\001\004\055\060\053\060\051\006\010\053\006\001
\005\005\007\060\001\206\035\150\164\164\160\072\057\057\165\163
\145\162\163\056\157\143\163\160\056\144\055\164\162\165\163\164
\056\156\145\164\060\063\006\003\125\035\021\004\054\060\052\201
\020\151\156\146\157\100\144\055\164\162\165\163\164\056\156\145
\164\206\026\150\164\164\160\072\057\057\167\167\167\056\144\055
\164\162\165\163\164\056\156\145\164\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\006\060\201\311\006\003\125\035
\037\004\201\301\060\201\276\060\201\273\240\201\270\240\201\265
\206\166\154\144\141\160\072\057\057\144\151\162\145\143\164\157
\162\171\056\144\055\164\162\165\163\164\056\156\145\164\057\103
\116\075\104\055\124\122\125\123\124\045\062\060\122\157\157\164
\045\062\060\103\154\141\163\163\045\062\060\063\045\062\060\103
\101\045\062\060\062\060\060\067\054\117\075\104\055\124\162\165
\163\164\045\062\060\107\155\142\110\054\103\075\104\105\077\143
\145\162\164\151\146\151\143\141\164\145\162\145\166\157\143\141
\164\151\157\156\154\151\163\164\206\073\150\164\164\160\072\057
\057\167\167\167\056\144\055\164\162\165\163\164\056\156\145\164
\057\143\162\154\057\144\055\164\162\165\163\164\137\162\157\157
\164\137\143\154\141\163\163\137\063\137\143\141\137\062\060\060
\067\056\143\162\154\060\015\006\011\052\206\110\206\367\015\001
\001\005\005\000\003\202\001\001\000\125\016\150\012\215\334\331
\250\206\140\002\151\171\215\175\351\220\302\331\035\035\265\016
\273\163\222\144\143\024\106\114\320\152\273\243\165\135\206\031
\070\141\206\035\270\212\042\064\243\264\065\025\263\251\140\114
\124\027\237\261\336\133\062\342\176\153\336\117\042\360\055\035
\042\004\236\266\112\117\253\054\126\235\343\335\354\261\046\116
\052\327\125\302\076\275\202\327\276\125\273\105\310\051\133\206
\074\235\077\150\104\104\104\066\015\150\277\256\001\242\031\265
\114\227\377\362\226\074\147\262\102\336\017\341\240\227\116\312
\347\064\145\256\225\202\141\147\046\163\055\335\173\347\225\113
\016\041\252\222\256\114\374\306\263\251\345\231\203\062\071\360
\140\302\114\121\250\301\107\024\065\211\245\115\066\017\237\033
\002\161\101\215\102\112\044\370\257\156\235\015\160\206\215\252
\142\023\036\003\213\044\371\303\124\223\111\205\033\165\166\142

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\177\042\377\111\275\166\163\014\077\230\255\052\262\372\347\305
\337\164\365\377\151\061\125\012\072\300\031\142\065\304\111\271
\053\031\035\364\160\231\356\330\334
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "D-TRUST Root Class 3 CA 2007"
# Issuer: CN=D-TRUST Root Class 3 CA 2007,O=D-Trust GmbH,C=DE
# Serial Number: 200342 (0x30e96)
# Subject: CN=D-TRUST Root Class 3 CA 2007,O=D-Trust
 GmbH,C=DE
# Not Valid Before: Wed May 16 05:20:47 2007
# Not Valid After: Mon May 16 05:20:47 2022
# Fingerprint (MD5): 1e:24:0e:a0:f8:76:d7:85:a3:f5:f8:a1:49:3d:2e:ba
# Fingerprint (SHA1): fd:1e:d1:e2:02:1b:0b:9f:73:e8:eb:75:ce:23:43:6b:bc:c7:46:eb
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "D-TRUST Root Class 3 CA 2007"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\375\036\321\342\002\033\013\237\163\350\353\165\316\043\103\153
\274\307\106\353
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\036\044\016\240\370\166\327\205\243\365\370\241\111\075\056\272
END
CKA_ISSUER MULTILINE_OCTAL
\060\113\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\025\060\023\006\003\125\004\012\014\014\104\055\124\162\165\163
\164\040\107\155\142\110\061\045\060\043\006\003\125\004\003\014
\034\104\055\124\122\125\123\124\040\122\157\157\164\040\103\154
\141\163\163\040\063\040\103\101\040\062\060\060\067
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\003\003\016\226
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
```

```
# Certificate "SSC Root CA A"
# Issuer: CN=SSC Root CA A,OU=Certification Authority,O=Skaitmeninio sertifikavimo centras,C=LT
# Serial Number:66:07:a3:d2:9d:29:56:18:0e:e1:5e:59:98:b1:84:55
# Subject: CN=SSC Root CA A,OU=Certification Authority,O=Skaitmeninio sertifikavimo centras,C=LT
# Not Valid Before: Wed Dec 27 12:18:52 2006
# Not Valid After: Mon Dec 28 12:05:04 2026
# Fingerprint (MD5): 46:8c:21:0e:ab:92:21:46:59:db:a6:db:00:61:de:26
# Fingerprint (SHA1): 5a:5a:4d:af:78:61:26:7c:4b:1f:1e:67:58:6b:ae:6e:d4:fe:b9:3f
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8
 "SSC Root CA A"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\164\061\013\060\011\006\003\125\004\006\023\002\114\124\061
\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\040\060\036
\006\003\125\004\013\023\027\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\061\026
\060\024\006\003\125\004\003\023\015\123\123\103\040\122\157\157
\164\040\103\101\040\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\164\061\013\060\011\006\003\125\004\006\023\002\114\124\061
\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\040\060\036
\006\003\125\004\013\023\027\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\061\026
\060\024\006\003\125\004\003\023\015\123\123\103\040\122\157\157
\164\040\103\101\040\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\146\007\243\322\235\051\126\030\016\341\136\131\230\261
\204\125
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\052\060\202\004\022\240\003\002\001\002\002\020\146
\007\243\322\235\051\126\030\016\341\136\131\230\261\204\125\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\164
\061\013\060\011\006\003\125\004\006\023\002\114\124\061\053\060
\051\006\003\125\004\012\023\042\123\153\141\151\164\155\145\156
\151\156\151\157\040\163\145\162\164\151\146\151\153\141\166\151
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\155\157\040\143\145\156\164\162\141\163\061\040\060\036\006\003
\125\004\013\023\027\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\061\026\060\024
\006\003\125\004\003\023\015\123\123\103\040\122\157\157\164\040
\103\101\040\101\060\036\027\015\060\066\061\062\062\067\061\062
\061\070\065\062\132\027\015\062\066\061\062\062\070\061\062\060
\065\060\064\132\060\164\061\013\060\011\006\003\125\004\006\023
\002\114\124\061\053\060\051\006\003\125\004\012\023\042\123\153
\141\151\164\155\145\156\151\156\151\157\040\163\145\162\164\151
\146\151\153\141\166\151\155\157\040\143\145\156\164\162\141\163
\061\040\060\036\006\003\125\004\013\023\027\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\061\026\060\024\006\003\125\004\003\023\015\123\123\103
\040\122\157\157\164\040\103\101\040\101\060\202\002\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002
\017\000\060\202\002\012\002\202\002\001\000\272\352\117\276\204
\300\031\044\212\041\251\114\231\175\367\014\325\245\121\222\250
\145\343\211\243\013\146\347\102\370\171\322\017\203\043\173\267
\246\301\044\326\065\326\330\345\001\312\160\261\026\326\107\156
\276\020\154\176\351\120\156\166\367\345\344\203\017\170\325\240
\163\365\215\321\231\037\224\104\043\226\306\356\162\132\371\332
\135\074\221\257\154\350\227\350\206\135\367\236\213\372\304\254
\146\117\344\162\077\073\335\236\116\065\322\023\037\175\273\104
\113\364\123\254\326\024\327\100\071\272\300\077\374\205\040\323
\304\000\320\347\330\107\231\004\171\207\206\100\262\254\136\311
\165\040\303\011\024\257\004\216\246\242\255\052\127\210\145\241
\314\050\276\066\311\037\045\017\303\153\042\204\071\167\116\072
\003\300\152\333\076\272\266\211\236\344\327\056\232\267\103\001
\077\371\332\254\251\254\344\167\063\207\355\013\071\335\307\301
\255\015\131\203\060\321\066\004\130\264\144\116\346\377\010\350
\102\261\200\253\370\230\377\363\051\206\026\021\044\116\011\241
\317\060\177\274\136\260\012\152\241\161\153\365\232\022\153\045
\155\167\002\242\106\136\371\151\057\373\073\030\225\137\216\134
\227\224\140\136\035\161\250\101\264\135\317\132\172\147\343\324
\112\065\037\067\340\166\026\003\073\364\121\234\230\024\051\111
\210\014\102\320\055\155\251\247\100\046\072\171\000\060\073\300
\273\104\230\255\044\316\321\226\334\211\170\201\366\132\133\102
\274\164\341\207\323\145\310\107\346\066\262\314\301\157\300\307
\334\200\045\122\074\061\220\335\311\310\120\250\172\273\166\340
\357\023\224\316\004\176\152\266\116\167\371\203\320\157\370\072
\320\012\103\312\272\020\266\377\074\035\224\140\224\204\155\365
\245\311\175\114\012\176\057\217\157\375\335\055\173\112\351\357
\064\333\273\176\377\014\157\067\372\371\303\314\311\057\321\351
\054\075\052\254\154\046\073\320\011\136\304\200\047\213\335\141
\360\347\225\121\103\304\015\346\061\320\170\326\301\306\302\146
\001\321\343\314\307\323\036\025\005\066\333\224\232\354\122\303
\221\307\057\261\364\003\367\007\254\323\113\221\253\126\074\320
\256\375\137\155\055\323\000\021\317\223\275\002\003\001\000\001

\243\201\267\060\201\264\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\075\006\003\125\035\040\004\066
\060\064\060\062\006\013\053\006\001\004\001\201\257\145\001\002
\000\060\043\060\041\006\010\053\006\001\005\005\007\002\001\026
\025\150\164\164\160\072\057\057\167\167\167\056\163\163\143\056
\154\164\057\143\160\163\060\063\006\003\125\035\037\004\054\060
\052\060\050\240\046\240\044\206\042\150\164\164\160\072\057\057
\143\162\154\056\163\163\143\056\154\164\057\162\157\157\164\055
\141\057\143\141\143\162\154\056\143\162\154\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003\125
\035\016\004\026\004\024\314\277\336\247\220\167\142\152\035\170
\151\056\012\070\233\167\121\123\003\360\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\003\202\002\001\000\076\257
\310\250\307\063\117\360\156\232\103\341\362\260\127\122\341\234
\236\006\137\102\326\361\375\312\213\121\077\341\307\145\151\117
\164\031\120\212\317\030\223\111\215\240\034\260\073\075\216\110
\223\331\350\005\176\304\011\261\017\122\212\153\227\157\327\216
\074\200\000\320\101\163\255\075\303\104\007\161\152\217\142\176
\005\330\123\140\162\261\001\351\000\142\252\015\330\330\111\302
\264\175\015\133\263\227\051\066\231\271\247\321\113\230\153\104
\274\262\022\216\166\144\165\114\015\315\302\056\263\130\374\172
\117\125\263\131\177\135\340\057\060\063\317\210\033\151\351\115
\212\220\236\220\271\061\072\363\242\005\274\376\371\335\120\215
\016\224\031\235\176\215\252\025\176\017\122\223\045\344\201\016
\226\055\034\003\034\060\203\021\226\102\251\230\244\235\137\311
\251\134\073\111\150\302\204\155\231\332\366\376\242\362\334\067
\136\215\172\345\245\127\312\043\113\223\135\222\052\125\204\263
\226\263\036\230\224\111\174\154\074\334\236\035\266\253\303\254
\011\305\235\336\067\327\124\304\234\255\077\260\326\151\001\345
\020\206\175\271\201\203\156\234\146\116\225\005\222\220\061\207
\046\262\332\221\164\275\204\344\161\150\344\166\000\340\166\163
\064\107\206\225\145\272\133\220\242\155\005\051\170\140\353\206
\371\022\115\350\010\126\244\314\214\242\126\112\316\200\364\024
\141\042\345\253\035\072\101\073\204\327\202\170\005\057\254\035
\043\150\253\162\171\205\315\106\346\172\247\202\132\050\320\025
\075\035\333\214\230\120\316\373\257\130\073\323\251\256\200\073
\026\000\166\047\325\160\351\011\215\066\224\011\177\343\357\140
\020\121\312\306\125\160\146\253\121\157\363\121\117\022\126\256
\373\327\331\015\340\372\253\020\336\152\201\254\205\167\055\254
\172\143\173\106\341\067\332\127\156\255\145\374\041\004\231\205
\001\317\043\072\062\305\355\132\233\325\241\202\004\167\021\105
\216\244\104\175\302\313\313\247\017\350\022\272\362\156\272\217
\063\060\033\335\051\370\360\102\243\156\102\245\156\372\126\245
\251\120\203\321\005\146\026\213\055\373\346\222\321\346\154\013
\325\132\051\155\053\317\171\327\331\332\117\360\150\266
END
CKA_NSS_MOZILLA_CA_POLICY

```
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "SSC Root CA A"
# Issuer: CN=SSC Root CA A,OU=Certification Authority,O=Skaitmeninio sertifikavimo centras,C=LT
# Serial Number:66:07:a3:d2:9d:29:56:18:0e:e1:5e:59:98:b1:84:55
#
 Subject: CN=SSC Root CA A,OU=Certification Authority,O=Skaitmeninio sertifikavimo centras,C=LT
# Not Valid Before: Wed Dec 27 12:18:52 2006
# Not Valid After: Mon Dec 28 12:05:04 2026
# Fingerprint (MD5): 46:8c:21:0e:ab:92:21:46:59:db:a6:db:00:61:de:26
# Fingerprint (SHA1): 5a:5a:4d:af:78:61:26:7c:4b:1f:1e:67:58:6b:ae:6e:d4:fe:b9:3f
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSC Root CA A"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\132\132\115\257\170\141\046\174\113\037\036\147\130\153\256\156
\324\376\271\077
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\106\214\041\016\253\222\041\106\131\333\246\333\000\141\336\046
END
CKA_ISSUER MULTILINE_OCTAL
\060\164\061\013\060\011\006\003\125\004\006\023\002\114\124\061
\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\040\060\036
\006\003\125\004\013\023\027\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\061\026
\060\024\006\003\125\004\003\023\015\123\123\103\040\122\157\157
\164\040\103\101\040\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\146\007\243\322\235\051\126\030\016\341\136\131\230\261
\204\125
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "SSC Root CA B"
```

# Issuer: CN=SSC Root CA B,OU=Certification Authority,O=Skaitmeninio sertifikavimo centras,C=LT
# Serial Number:be:92:83:18:f3:55:8a:78:a3:67:59:1c:69:24:09:3f
# Subject: CN=SSC Root CA B,OU=Certification Authority,O=Skaitmeninio sertifikavimo centras,C=LT
# Not Valid Before: Wed Dec 27 12:22:50 2006
# Not Valid
After: Fri Dec 25 12:08:26 2026
# Fingerprint (MD5): da:26:b6:e6:c7:c2:f7:b7:9e:46:59:b3:57:77:18:65
# Fingerprint (SHA1): 3e:84:d3:bc:c5:44:c0:f6:fa:19:43:5c:85:1f:3f:2f:cb:a8:e8:14
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSC Root CA B"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\164\061\013\060\011\006\003\125\004\006\023\002\114\124\061
\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\040\060\036
\006\003\125\004\013\023\027\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\061\026
\060\024\006\003\125\004\003\023\015\123\123\103\040\122\157\157
\164\040\103\101\040\102
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
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\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\040\060\036
\006\003\125\004\013\023\027\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\061\026
\060\024\006\003\125\004\003\023\015\123\123\103\040\122\157\157
\164\040\103\101\040\102
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
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\044\011\077
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\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\164\061\013\060\011\006\003\125\004\006\023\002\114\124\061\053
\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155\145
\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141\166
\151\155\157\040\143\145\156\164\162\141\163\061\040\060\036\006

\003\125\004\013\023\027\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\061\026\060
\024\006\003\125\004\003\023\015\123\123\103\040\122\157\157\164
\040\103\101\040\102\060\036\027\015\060\066\061\062\062\067\061
\062\062\062\065\060\132\027\015\062\066\061\062\062\065\061\062
\060\070\062\066\132\060\164\061\013\060\011\006\003\125\004\006
\023\002\114\124\061\053\060\051\006\003\125\004\012\023\042\123
\153\141\151\164\155\145\156\151\156\151\157\040\163\145\162\164
\151\146\151\153\141\166\151\155\157\040\143\145\156\164\162\141
\163\061\040\060\036\006\003\125\004\013\023\027\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\061\026\060\024\006\003\125\004\003\023\015\123\123
\103\040\122\157\157\164\040\103\101\040\102\060\202\002\042\060
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\107\121\116\125\027\145\215\260\262\101\050\241\112\321\237\113
\366\163\377\076\322\311\115\131\077\344\267\307\237\006\135\330
\074\243\210\204\340\163\135\375\005\352\307\216\327\244\004\152
\353\237\275\103\375\024\222\106\270\305\272\252\355\140\354\354
\312\220\215\012\162\251\101\233\324\235\274\260\154\242\021\037
\144\313\347\035\324\105\147\016\011\153\345\170\354\361\077\004
\124\363\232\231\307\131\321\322\171\247\244\032\260\174\111\374
\034\207\124\136\170\006\325\335\035\314\205\240\102\170\325\320
\260\212\352\350\361\241\236\126\357\323\301\175\207\254\347\332
\150\117\031\326\157\340\223\255\111\134\163\024\301\106\152\235
\367\130\100\331\127\130\116\154\067\364\162\043\004\370\333\112
\260\336\361\101\226\022\100\241\025\213\147\270\136\170\126\313
\177\344\276\300\111\150\221\270\107\010\223\201\301\265\033\061
\006\323\200\173\321\105\241\317\014\075\141\363\222\370\361\260
\025\016\370\056\060\133\000\243\111\367\155\376\356\334\277\210
\317\360\175\127\076\257\300\321\212\353\174\322\155\061\125\372
\204\215\163\152\332\160\200\304\364\302\317\220\216\060\232\341
\306\065\162\001\010\346\077\346\146\000\243\362\370\222\035\274
\122\354\217\366\334\367\012\357\274\020\207\371\204\030\214\136
\037\003\270\377\065\057\001\152\345\360\133\142\174\343\263\177
\063\252\224\327\116\121\201\265\350\127\170\217\042\226\251\014
\211\124\076\266\356\331\163\137\144\364\104\341\361\152\030\377
\122\226\304\034\277\211\227\244\303\247\312\176\030\156\026\334
\023\214\273\325\265\045\011\206\257\366\057\105\224\052\060\301
\024\224\065\366\135\312\045\225\234\261\130\211\270\265\140\205
\311\306\276\024\031\243\076\371\126\205\253\312\154\326\231\171
\242\112\024\157\303\072\330\347\146\121\012\351\034\376\314\151
\346\064\154\364\201\333\175\242\021\370\114\304\207\005\026\075
\353\227\164\077\156\354\234\271\266\047\214\044\337\055\263\257
\335\023\141\166\217\377\362\114\340\010\031\060\062\044\062\134
\066\200\027\356\206\311\337\057\121\342\126\256\203\222\360\263
\275\330\207\072\054\236\304\334\151\231\371\313\002\003\001\000
\001\243\201\267\060\201\264\060\017\006\003\125\035\023\001\001

\377\004\005\060\003\001\001\377\060\075\006\003\125\035\040\004
\066\060\064\060\062\006\013\053\006\001\004\001\201\257\145\001
\002\000\060\043\060\041\006\010\053\006\001\005\005\007\002\001
\026\025\150\164\164\160\072\057\057\167\167\167\056\163\163\143
\056\154\164\057\143\160\163\060\063\006\003\125\035\037\004\054
\060\052\060\050\240\046\240\044\206\042\150\164\164\160\072\057
\057\143\162\154\056\163\163\143\056\154\164\057\162\157\157\164
\055\142\057\143\141\143\162\154\056\143\162\154\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003
\125\035\016\004\026\004\024\234\003\360\250\322\230\162\150\256
\362\355\340\117\342\205\016\262\045\116\317\060\015\006\011\052
\206\110\206\367\015\001\001\005\005\000\003\202\002\001\000\254
\134\274\057\374\256\001\044\246\020\076\254\250\341\247\047\231
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\141\370\011\276\315\032\045\141\164\264\303\257\102\132\011\017
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\375\200\054\275\343\146\065\012\270\261\372\140\332\345\330\124
\265\113\227\272\242\032\303\040\151\215\264\106\163\134\252\277
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\242\226\013\153\122\173\360\053\113\073\322\213\240\153\223\075
\311\127\143\212\153\314\120\023\217\167\250\121\276\032\114\055
\114\135\014\220\133\216\363\357\120\040\155\201\346\121\111\253
\304\347\327\135\010\053\121\374\075\106\022\347\321\245\166\305
\123\044\005\311\252\323\216\130\305\363\212\164\222\062\355\360
\057\335\253\255\351\322\065\217\164\043\343\231\000\342\213\060
\344\303\102\256\360\273\351\342\010\033\112\160\055\175\370\322
\232\047\221\102\160\165\172\010\176\276\057\034\177\067\075\250
\213\334\106\162\365\350\157\066\150\372\156\215\040\235\324\365
\007\161\277\275\047\102\271\163\050\326\354\111\264\005\205\117
\150\110\366\253\224\337\016\243\106\024\140\302\061\040\073\353
\056\133\336\325\241\054\155\345\122\372\201\137\227\210\311\143
\275\001\354\343\315\153\012\065\302\311\070\343\016\363\130\033
\175\332\220\155\267\365\310\130\126\235\256\001\337\221\235\255
\125\202\003\014\021\164\004\221\206\307\174\223\214\363\047\373
\305\044\127\156\213\331\033\230\235\210\061\360\257\167\270\015
\264\314\317\366\012\157\022\233\354\011\053\123\211\354\104\340
\241\151\213\250\164\206\164\030\122\340\322\277\240\241\145\041
\271\010\203\172\363\244\365\370\136\067\045\107\231\246\135\327
\042\132\333\223\147\027\333\020\343\214\321\022\221\107\212\225
\245\107\241\003\370\113\056\041\305\220\142\260\177\047\243\333
\025\177\070\177\154\177\116\005\305\003\264\055\337\105\137\165
\054\035\361\137\246\265\366\027\071\101\351\370\145\302\036\130
\021\312\174\216\342\265\272\222\017\147\267\217\353\231\324\061
\373\162\173\132\230\137\222\224\307\004\352\060\366\273\032
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

```
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "SSC Root CA B"
# Issuer: CN=SSC Root CA B,OU=Certification Authority,O=Skaitmeninio sertifikavimo centras,C=LT
# Serial Number:be:92:83:18:f3:55:8a:78:a3:67:59:1c:69:24:09:3f
# Subject: CN=SSC Root CA B,OU=Certification Authority,O=Skaitmeninio sertifikavimo centras,C=LT
# Not Valid Before: Wed Dec 27 12:22:50 2006
# Not Valid After: Fri Dec 25 12:08:26 2026
# Fingerprint (MD5): da:26:b6:e6:c7:c2:f7:b7:9e:46:59:b3:57:77:18:65
# Fingerprint (SHA1): 3e:84:d3:bc:c5:44:c0:f6:fa:19:43:5c:85:1f:3f:2f:cb:a8:e8:14
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSC Root CA B"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\076\204\323\274\305\104\300\366\372\031\103\134\205\037\077\057
\313\250\350\024
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\332\046\266\346\307\302\367\267\236\106\131\263\127\167\030\145
END
CKA_ISSUER MULTILINE_OCTAL
\060\164\061\013\060\011\006\003\125\004\006\023\002\114\124\061
\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\040\060\036
\006\003\125\004\013\023\027\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\061\026
\060\024\006\003\125\004\003\023\015\123\123\103\040\122\157\157
\164\040\103\101\040\102
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\276\222\203\030\363\125\212\170\243\147\131\034\151
\044\011\077
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
#
 Certificate "SSC Root CA C"
# Issuer: CN=SSC Root CA C,OU=Certification Authority,O=Skaitmeninio sertifikavimo centras,C=LT
# Serial Number:34:b9:12:9f:ac:c7:92:55:42:5c:de:57:ff:e3:c0:05
```

```
# Subject: CN=SSC Root CA C,OU=Certification Authority,O=Skaitmeninio sertifikavimo centras,C=LT
# Not Valid Before: Wed Dec 27 12:26:30 2006
# Not Valid After: Tue Dec 22 12:11:30 2026
# Fingerprint (MD5): 3c:4c:25:cc:0a:19:ca:ee:6a:eb:55:16:00:86:72:5f
# Fingerprint (SHA1): 23:e8:33:23:3e:7d:0c:c9:2b:7c:42:79:ac:19:c2:f4:74:d6:04:ca
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSC Root CA C"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\164\061\013\060\011\006\003\125\004\006\023\002\114\124\061
\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\040\060\036
\006\003\125\004\013\023\027\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\061\026
\060\024\006\003\125\004\003\023\015\123\123\103\040\122\157\157
\164\040\103\101\040\103
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
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\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\040\060\036
\006\003\125\004\013\023\027\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\061\026
\060\024\006\003\125\004\003\023\015\123\123\103\040\122\157\157
\164\040\103\101\040\103
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\064\271\022\237\254\307\222\125\102\134\336\127\377\343
\300\005
END
CKA_VALUE MULTILINE_OCTAL
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\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\164
\061\013\060\011\006\003\125\004\006\023\002\114\124\061\053\060
\051\006\003\125\004\012\023\042\123\153\141\151\164\155\145\156
\151\156\151\157\040\163\145\162\164\151\146\151\153\141\166\151
\155\157\040\143\145\156\164\162\141\163\061\040\060\036\006\003
\125\004\013\023\027\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\101\165\164\150\157\162\151\164\171\061\026\060\024
\006\003\125\004\003\023\015\123\123\103\040\122\157\157\164\040
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\062\066\063\060\132\027\015\062\066\061\062\062\062\061\062\061
\061\063\060\132\060\164\061\013\060\011\006\003\125\004\006\023
\002\114\124\061\053\060\051\006\003\125\004\012\023\042\123\153
\141\151\164\155\145\156\151\156\151\157\040\163\145\162\164\151
\146\151\153\141\166\151\155\157\040\143\145\156\164\162\141\163
\061\040\060\036\006\003\125\004\013\023\027\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\061\026\060\024\006\003\125\004\003\023\015\123\123\103
\040\122\157\157\164\040\103\101\040\103\060\202\002\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002
\017\000\060\202\002\012\002\202\002\001\000\241\105\042\372\214
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\121\140\160\032\230\335\170\170\226\230\142\367\160\113\201\250
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\027\040\361\042\357\360\077\105\107\100\264\313\262\270\040\077
\076\112\150\120\377\232\006\327\227\305\267\212\026\056\161\322
\107\163\135\030\145\057\357\071\063\350\266\125\257\046\255\002
\200\351\143\327\041\160\007\076\314\276\137\211\300\370\316\035
\045\156\303\374\177\126\071\141\321\216\302\046\172\347\170\002
\012\131\335\125\043\260\370\065\247\342\253\363\253\057\327\265
\213\012\052\162\124\053\155\171\274\362\331\351\103\371\317\361
\216\146\022\367\227\131\052\331\327\224\334\370\224\263\105\243
\257\026\055\263\200\312\075\316\350\246\307\012\224\164\374\067
\232\351\077\014\067\026\040\103\311\107\160\273\214\205\374\230
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\244\135\060\005\051\174\250\367\266\136\007\060\025\210\256\115
\025\240\312\315\327\377\253\243\006\127\017\247\343\211\151\034
\326\032\321\324\047\337\226\306\070\134\257\167\376\025\253\104
\101\175\323\230\273\250\040\030\257\213\155\324\132\302\330\226
\215\110\365\007\061\176\141\364\141\233\122\201\100\216\112\047
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\201\365\000\007\246\215\210\005\115\304\217\226\316\324\266\300
\301\146\214\052\254\150\112\311\106\334\015\346\056\250\171\050
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\062\273\011\106\021\015\164\274\047\345\330\355\055\372\120\051
\334\045\312\227\020\347\251\242\141\056\072\211\246\104\141\276
\117\136\222\011\355\334\056\246\357\123\273\141\045\330\047\245
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\005\027\221\234\112\140\100\044\155\265\155\172\171\373\234\232
\143\303\230\151\345\167\142\043\052\121\211\017\154\262\375\303
\312\330\364\032\103\224\320\175\013\341\130\076\032\310\164\204
\233\367\254\202\256\121\105\222\322\006\131\341\263\301\336\245
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\143\162\154\056\163\163\143\056\154\164\057\162\157\157\164\055
\143\057\143\141\143\162\154\056\143\162\154\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003\125
\035\016\004\026\004\024\210\007\163\366\361\274\122\032\132\035
\075\221\142\355\135\254\235\013\345\267\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\003\202\002\001\000\037\220
\161\120\230\325\331\064\322\226\204\030\302\254\106\002\040\034
\313\071\261\267\257\005\244\327\130\363\221\121\175\216\201\047
\234\350\222\261\347\034\237\072\213\020\122\163\114\302\307\102
\035\320\353\336\052\312\042\121\175\214\164\172\032\374\274\244
\363\163\310\146\043\304\056\103\020\107\340\212\151\127\356\057
\362\000\122\260\060\222\252\326\324\025\305\127\313\140\172\364
\016\215\376\036\011\143\164\217\340\376\276\120\331\001\071\126
\272\120\114\366\343\105\232\273\122\166\336\176\235\373\215\302
\124\061\076\307\261\074\076\337\343\117\375\335\233\044\151\174
\355\350\161\266\102\006\307\037\305\137\373\040\165\333\301\375
\351\154\242\052\220\324\206\375\315\015\377\340\005\212\130\141
\075\237\304\231\057\355\333\174\304\015\230\230\125\234\164\242
\027\136\333\252\021\344\067\014\044\377\040\147\321\045\333\232
\211\240\145\210\061\221\004\161\137\040\224\130\063\066\035\062
\336\157\327\147\010\251\240\073\375\333\244\120\045\226\036\251
\137\211\027\245\227\231\121\225\151\333\304\361\217\364\157\060
\053\131\363\254\165\207\063\175\006\335\341\301\153\326\304\311
\136\160\104\172\152\307\234\167\073\026\376\376\165\276\237\054
\321\300\003\356\021\171\165\354\251\133\034\172\205\265\050\120
\040\251\032\035\346\173\214\063\030\377\301\355\310\166\145\037
\035\360\114\073\247\333\352\315\126\330\224\127\077\340\110\251
\177\214\063\113\275\364\014\145\024\200\202\364\065\167\330\004
\020\160\316\017\154\301\131\313\231\255\201\356\336\075\110\320
\172\210\057\100\223\327\234\272\171\204\030\200\165\337\320\132
\337\121\167\076\130\211\151\165\107\061\344\152\026\160\124\004
\354\275\134\171\123\143\322\342\136\275\115\045\332\021\266\017
\252\351\054\256\365\321\251\215\002\126\313\374\260\044\352\214
\272\160\377\062\320\267\306\004\052\143\325\312\106\221\325\231
\162\011\007\136\050\003\253\022\034\045\263\154\072\131\145\264
\164\155\055\055\031\162\157\375\347\230\021\207\036\163\043\277
\065\361\233\266\303\331\314\073\120\174\162\350\317\136\300\230
\314\056\003\375\037\057\312\164\134\261\034\321\354\151
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate

```
# Trust for "SSC Root CA C"
# Issuer: CN=SSC Root CA C,OU=Certification Authority,O=Skaitmeninio sertifikavimo centras,C=LT
# Serial Number:34:b9:12:9f:ac:c7:92:55:42:5c:de:57:ff:e3:c0:05
# Subject: CN=SSC Root CA C,OU=Certification Authority,O=Skaitmeninio sertifikavimo centras,C=LT
# Not Valid Before: Wed Dec 27 12:26:30 2006
# Not Valid After: Tue Dec 22 12:11:30 2026
# Fingerprint (MD5): 3c:4c:25:cc:0a:19:ca:ee:6a:eb:55:16:00:86:72:5f
# Fingerprint (SHA1): 23:e8:33:23:3e:7d:0c:c9:2b:7c:42:79:ac:19:c2:f4:74:d6:04:ca
CKA_CLASS
 CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSC Root CA C"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\043\350\063\043\076\175\014\311\053\174\102\171\254\031\302\364
\164\326\004\312
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\074\114\045\314\012\031\312\356\152\353\125\026\000\206\162\137
END
CKA_ISSUER MULTILINE_OCTAL
\060\164\061\013\060\011\006\003\125\004\006\023\002\114\124\061
\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\040\060\036
\006\003\125\004\013\023\027\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\061\026
\060\024\006\003\125\004\003\023\015\123\123\103\040\122\157\157
\164\040\103\101\040\103
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\064\271\022\237\254\307\222\125\102\134\336\127\377\343
\300\005
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Autoridad de Certificacion de la Abogacia"
# Issuer: CN=Autoridad de Certificacion de la Abogacia,O=Consejo General de la Abogacia NIF:Q-2863006I,C=ES
# Serial Number:90:8b:32:4f:c1:90:1a:ce:b4:c3:38:09:cd:cf:e4
# Subject: CN=Autoridad de Certificacion de la Abogacia,O=Consejo General de la Abogacia NIF:Q-
2863006I,C=ES
# Not Valid Before: Mon Jun 13 22:00:00 2005
```

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# Not Valid After: Thu Jun 13 22:00:00 2030
# Fingerprint (MD5): 15:ee:9f:5a:a0:85:28:df:6b:dd:34:a3:a0:56:d8:30
# Fingerprint (SHA1): 7f:8a:77:83:6b:dc:6d:06:8f:8b:07:37:fc:c5:72:54:13:06:8c:a4
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
 CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Autoridad de Certificacion de la Abogacia"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\171\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\066\060\064\006\003\125\004\012\023\055\103\157\156\163\145\152
\157\040\107\145\156\145\162\141\154\040\144\145\040\154\141\040
\101\142\157\147\141\143\151\141\040\116\111\106\072\121\055\062
\070\066\063\060\060\066\111\061\062\060\060\006\003\125\004\003
\023\051\101\165\164\157\162\151\144\141\144\040\144\145\040\103
\145\162\164\151\146\151\143\141\143\151\157\156\040\144\145\040
\154\141\040\101\142\157\147\141\143\151\141
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\171\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\066\060\064\006\003\125\004\012\023\055\103\157\156\163\145\152
\157\040\107\145\156\145\162\141\154\040\144\145\040\154\141\040
\101\142\157\147\141\143\151\141\040\116\111\106\072\121\055\062
\070\066\063\060\060\066\111\061\062\060\060\006\003\125\004\003
\023\051\101\165\164\157\162\151\144\141\144\040\144\145\040\103
\145\162\164\151\146\151\143\141\143\151\157\156\040\144\145\040
\154\141\040\101\142\157\147\141\143\151\141
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\000\220\213\062\117\301\220\032\316\264\303\070\011\315
\317\344
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\274\060\202\003\244\240\003\002\001\002\002\020\000
\220\213\062\117\301\220\032\316\264\303\070\011\315\317\344\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\171
\061\013\060\011\006\003\125\004\006\023\002\105\123\061\066\060
\064\006\003\125\004\012\023\055\103\157\156\163\145\152\157\040
\107\145\156\145\162\141\154\040\144\145\040\154\141\040\101\142
\157\147\141\143\151\141\040\116\111\106\072\121\055\062\070\066
\063\060\060\066\111\061\062\060\060\006\003\125\004\003\023\051
\101\165\164\157\162\151\144\141\144\040\144\145\040\103\145\162
\164\151\146\151\143\141\143\151\157\156\040\144\145\040\154\141
\040\101\142\157\147\141\143\151\141\060\036\027\015\060\065\060
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\066\061\063\062\062\060\060\060\060\132\027\015\063\060\060\066
\061\063\062\062\060\060\060\060\132\060\171\061\013\060\011\006
\003\125\004\006\023\002\105\123\061\066\060\064\006\003\125\004
\012\023\055\103\157\156\163\145\152\157\040\107\145\156\145\162
\141\154\040\144\145\040\154\141\040\101\142\157\147\141\143\151
\141\040\116\111\106\072\121\055\062\070\066\063\060\060\066\111
\061\062\060\060\006\003\125\004\003\023\051\101\165\164\157\162
\151\144\141\144\040\144\145\040\103\145\162\164\151\146\151\143
\141\143\151\157\156\040\144\145\040\154\141\040\101\142\157\147
\141\143\151\141\060\202\001\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012
\002\202\001\001\000\264\262\127\356\205\360\043\350\015\373\262
\200\204\361\020\147\253\262\371\111\337\134\336\133\344\217\051
\031\123\311\325\350\034\120\153\141\002\214\207\360\217\074\301
\105\222\013\254\231\241\306\032\205\326\075\255\176\046\246\035
\270\075\262\263\076\212\305\012\062\323\113\221\357\111\165\176
\126\367\376\240\010\142\106\053\316\352\362\121\237\140\336\062
\310\355\032\247\317\165\134\353\075\300\275\232\110\245\206\224
\316\130\120\024\352\152\341\232\364\214\145\225\341\140\025\045
\225\022\366\272\170\213\262\300\355\346\154\227\044\132\035\344
\164\103\312\070\304\065\224\130\216\365\212\260\150\074\050\054
\104\226\011\277\011\133\162\012\347\147\074\220\271\124\070\164
\124\273\155\055\152\103\310\274\357\011\254\037\043\350\122\126
\136\065\027\137\053\273\136\315\145\122\245\024\174\073\262\252
\351\335\047\265\067\043\073\006\015\054\173\215\272\332\157\146
\027\206\247\266\327\036\007\135\036\154\031\227\310\345\043\163
\170\321\256\371\036\272\241\256\111\042\355\145\161\037\177\367
\132\164\104\215\103\002\003\001\000\001\243\202\001\076\060\202
\001\072\060\067\006\003\125\035\021\004\060\060\056\201\021\141
\143\100\141\143\141\142\157\147\141\143\151\141\056\157\162\147
\206\031\150\164\164\160\072\057\057\167\167\167\056\141\143\141
\142\157\147\141\143\151\141\056\157\162\147\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\021\006\011
\140\206\110\001\206\370\102\001\001\004\004\003\002\000\007\060
\035\006\003\125\035\016\004\026\004\024\374\210\114\216\155\004
\241\040\220\323\370\034\232\263\147\004\137\171\200\306\060\201
\253\006\003\125\035\040\004\201\243\060\201\240\060\201\235\006
\013\053\006\001\004\001\201\201\025\012\001\001\060\201\215\060
\051\006\010\053\006\001\005\005\007\002\001\026\035\150\164\164
\160\072\057\057\167\167\167\056\141\143\141\142\157\147\141\143
\151\141\056\157\162\147\057\144\157\143\060\140\006\010\053\006
\001\005\005\007\002\002\060\124\032\122\103\157\156\163\165\154
\164\145\040\154\141\040\144\145\143\154\141\162\141\143\151\157
\156\040\144\145\040\160\162\141\143\164\151\143\141\163\040\144
\145\040\143\145\162\164\151\146\151\143\141\143\151\157\156\040
\145\156\040\150\164\164\160\072\057\057\167\167\167\056\141\143
\141\142\157\147\141\143\151\141\056\157\162\147\060\015\006\011

\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000
\230\247\372\071\265\163\021\046\177\274\211\077\264\153\045\063
\061\012\206\070\153\311\036\025\227\024\340\322\114\055\205\364
\074\164\233\215\050\021\373\314\016\046\271\200\203\026\321\371
\106\230\266\106\007\216\146\205\155\160\300\272\114\200\363\244
\360\325\067\124\053\257\146\204\162\163\371\110\057\011\316\341
\205\001\312\217\340\207\336\240\227\320\224\264\015\265\115\016
\147\054\310\140\304\062\224\300\101\201\007\215\272\277\251\350
\014\100\232\102\170\005\135\201\353\142\034\344\117\024\012\075
\013\076\037\351\364\315\175\356\105\273\274\336\135\363\230\227
\046\173\306\023\051\370\053\177\032\324\352\372\262\156\040\236
\332\027\352\241\222\275\067\351\016\273\273\221\325\045\366\140
\135\205\041\120\133\377\124\135\365\113\073\264\303\051\021\130
\002\366\045\344\341\202\202\273\242\215\347\221\044\136\100\221
\236\107\007\214\063\127\324\142\061\121\166\165\205\103\157\011
\253\021\245\045\051\271\330\377\137\245\367\077\353\145\073\035
\357\206\345\026\042\325\036\312\062\151\175\176\005\327\060\047
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Autoridad de Certificacion de la Abogacia"
# Issuer: CN=Autoridad de Certificacion de la Abogacia,O=Consejo General de la Abogacia NIF:Q-2863006I,C=ES
# Serial Number:90:8b:32:4f:c1:90:1a:ce:b4:c3:38:09:cd:cf:e4
# Subject: CN=Autoridad de Certificacion de la Abogacia,O=Consejo General de la Abogacia NIF:Q-2863006I,C=ES
# Not Valid Before: Mon Jun 13 22:00:00 2005
# Not Valid After: Thu Jun 13 22:00:00 2030
# Fingerprint (MD5): 15:ee:9f:5a:a0:85:28:df:6b:dd:34:a3:a0:56:d8:30
# Fingerprint (SHA1):
7f:8a:77:83:6b:dc:6d:06:8f:8b:07:37:fc:c5:72:54:13:06:8c:a4
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Autoridad de Certificacion de la Abogacia"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\177\212\167\203\153\334\155\006\217\213\007\067\374\305\162\124
\023\006\214\244
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\025\356\237\132\240\205\050\337\153\335\064\243\240\126\330\060
END
CKA_ISSUER MULTILINE_OCTAL
\060\171\061\013\060\011\006\003\125\004\006\023\002\105\123\061

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\066\060\064\006\003\125\004\012\023\055\103\157\156\163\145\152
\157\040\107\145\156\145\162\141\154\040\144\145\040\154\141\040
\101\142\157\147\141\143\151\141\040\116\111\106\072\121\055\062
\070\066\063\060\060\066\111\061\062\060\060\006\003\125\004\003
\023\051\101\165\164\157\162\151\144\141\144\040\144\145\040\103
\145\162\164\151\146\151\143\141\143\151\157\156\040\144\145\040
\154\141\040\101\142\157\147\141\143\151\141
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\000\220\213\062\117\301\220\032\316\264\303\070\011\315
\317\344
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Root CA Generalitat Valenciana"
# Issuer: CN=Root CA Generalitat Valenciana,OU=PKIGVA,O=Generalitat Valenciana,C=ES
# Serial Number:3b:45:e5:68
# Subject: CN=Root CA Generalitat Valenciana,OU=PKIGVA,O=Generalitat Valenciana,C=ES
# Not Valid Before: Fri Jul 06 16:22:47 2001
# Not Valid After: Thu Jul 01 15:22:47 2021
# Fingerprint (MD5): 2c:8c:17:5e:b1:54:ab:93:17:b5:36:5a:db:d1:c6:f2
# Fingerprint (SHA1): a0:73:e5:c5:bd:43:61:0d:86:4c:21:13:0a:85:58:57:cc:9c:ea:46
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
 UTF8 "Root CA Generalitat Valenciana"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\037\060\035\006\003\125\004\012\023\026\107\145\156\145\162\141
\154\151\164\141\164\040\126\141\154\145\156\143\151\141\156\141
\061\017\060\015\006\003\125\004\013\023\006\120\113\111\107\126
\101\061\047\060\045\006\003\125\004\003\023\036\122\157\157\164
\040\103\101\040\107\145\156\145\162\141\154\151\164\141\164\040
\126\141\154\145\156\143\151\141\156\141
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\037\060\035\006\003\125\004\012\023\026\107\145\156\145\162\141
\154\151\164\141\164\040\126\141\154\145\156\143\151\141\156\141
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\061\017\060\015\006\003\125\004\013\023\006\120\113\111\107\126
\101\061\047\060\045\006\003\125\004\003\023\036\122\157\157\164
\040\103\101\040\107\145\156\145\162\141\154\151\164\141\164\040
\126\141\154\145\156\143\151\141\156\141
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\004\073\105\345\150
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\213\060\202\005\163\240\003\002\001\002\002\004\073
\105\345\150\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\150\061\013\060\011\006\003\125\004\006\023\002\105
\123\061\037\060\035\006\003\125\004\012\023\026\107\145\156\145
\162\141\154\151\164\141\164\040\126\141\154\145\156\143\151\141
\156\141\061\017\060\015\006\003\125\004\013\023\006\120\113\111
\107\126\101\061\047\060\045\006\003\125\004\003\023\036\122\157
\157\164\040\103\101\040\107\145\156\145\162\141\154\151\164\141
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\304\163\304\163\030\137\120\165\026\061\237\267\350\174\303
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER
 CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Root CA Generalitat Valenciana"
# Issuer: CN=Root CA Generalitat Valenciana,OU=PKIGVA,O=Generalitat Valenciana,C=ES
# Serial Number:3b:45:e5:68
# Subject: CN=Root CA Generalitat Valenciana,OU=PKIGVA,O=Generalitat Valenciana,C=ES
# Not Valid Before: Fri Jul 06 16:22:47 2001
# Not Valid After: Thu Jul 01 15:22:47 2021
# Fingerprint (MD5): 2c:8c:17:5e:b1:54:ab:93:17:b5:36:5a:db:d1:c6:f2
# Fingerprint (SHA1): a0:73:e5:c5:bd:43:61:0d:86:4c:21:13:0a:85:58:57:cc:9c:ea:46
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Root CA Generalitat Valenciana"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\240\163\345\305\275\103\141\015\206\114\041\023\012\205\130\127
\314\234\352\106
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\054\214\027\136\261\124\253\223\027\265\066\132\333\321\306\362
END
CKA_ISSUER
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 MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\037\060\035\006\003\125\004\012\023\026\107\145\156\145\162\141
\154\151\164\141\164\040\126\141\154\145\156\143\151\141\156\141
\061\017\060\015\006\003\125\004\013\023\006\120\113\111\107\126
\101\061\047\060\045\006\003\125\004\003\023\036\122\157\157\164
\040\103\101\040\107\145\156\145\162\141\154\151\164\141\164\040
\126\141\154\145\156\143\151\141\156\141
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\073\105\345\150
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "EBG Elektronik Sertifika Hizmet Salaycs"
# Issuer: C=TR,O=EBG Biliim Teknolojileri ve Hizmetleri A..,CN=EBG Elektronik Sertifika Hizmet Salaycs
# Serial Number:4c:af:73:42:1c:8e:74:02
#
 Subject: C=TR,O=EBG Biliim Teknolojileri ve Hizmetleri A..,CN=EBG Elektronik Sertifika Hizmet Salaycs
# Not Valid Before: Thu Aug 17 00:21:09 2006
# Not Valid After: Sun Aug 14 00:31:09 2016
# Fingerprint (MD5): 2c:20:26:9d:cb:1a:4a:00:85:b5:b7:5a:ae:c2:01:37
# Fingerprint (SHA1): 8c:96:ba:eb:dd:2b:07:07:48:ee:30:32:66:a0:f3:98:6e:7c:ae:58
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "EBG Elektronik Sertifika Hizmet Salaycs"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\200\061\070\060\066\006\003\125\004\003\014\057\105\102
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\164\151\146\151\153\141\040\110\151\172\155\145\164\040\123\141
\304\237\154\141\171\304\261\143\304\261\163\304\261\061\067\060
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\162\151\040\166\145\040\110\151\172\155\145\164\154\145\162\151
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\002\124\122
END
CKA_ID
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END
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\357\220\277\300\354\202\023\133\215\326\162\054\223\116\217\152
\051\337\205\074\323\015\340\242\030\022\314\125\057\107\267\247
\233\002\376\101\366\210\114\155\332\251\001\107\203\144\047\142
\020\202\326\022\173\136\003\037\064\251\311\221\376\257\135\155
\206\047\267\043\252\165\030\312\040\347\260\017\327\211\016\246
\147\042\143\364\203\101\053\006\113\273\130\325\321\327\267\271
\020\143\330\211\112\264\252\335\026\143\365\156\276\140\241\370
\355\350\326\220\117\032\306\305\240\051\323\247\041\250\365\132
\074\367\307\111\242\041\232\112\225\122\040\226\162\232\146\313
\367\322\206\103\174\042\276\226\371\275\001\250\107\335\345\073
\100\371\165\053\233\053\106\144\206\215\036\364\217\373\007\167
\320\352\111\242\034\215\122\024\246\012\223
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "EBG Elektronik Sertifika Hizmet Salaycs"
# Issuer: C=TR,O=EBG Biliim Teknolojileri ve Hizmetleri A..,CN=EBG Elektronik Sertifika Hizmet Salaycs
# Serial Number:4c:af:73:42:1c:8e:74:02
# Subject: C=TR,O=EBG Biliim Teknolojileri ve Hizmetleri A..,CN=EBG Elektronik Sertifika Hizmet Salaycs
# Not Valid Before: Thu Aug 17 00:21:09 2006
# Not Valid After: Sun Aug 14 00:31:09 2016
# Fingerprint (MD5): 2c:20:26:9d:cb:1a:4a:00:85:b5:b7:5a:ae:c2:01:37
# Fingerprint (SHA1): 8c:96:ba:eb:dd:2b:07:07:48:ee:30:32:66:a0:f3:98:6e:7c:ae:58
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "EBG Elektronik Sertifika Hizmet Salaycs"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\214\226\272\353\335\053\007\007\110\356\060\062\146\240\363\230
\156\174\256\130
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\054\040\046\235\313\032\112\000\205\265\267\132\256\302\001\067
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\200\061\070\060\066\006\003\125\004\003\014\057\105\102
\107\040\105\154\145\153\164\162\157\156\151\153\040\123\145\162
\164\151\146\151\153\141\040\110\151\172\155\145\164\040\123\141
\304\237\154\141\171\304\261\143\304\261\163\304\261\061\067\060
\065\006\003\125\004\012\014\056\105\102\107\040\102\151\154\151
\305\237\151\155\040\124\145\153\156\157\154\157\152\151\154\145
\162\151\040\166\145\040\110\151\172\155\145\164\154\145\162\151

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\040\101\056\305\236\056\061\013\060\011\006\003\125\004\006\023
\002\124\122
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\114\257\163\102\034\216\164\002
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED
 CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "VAS Latvijas Pasts SSI(RCA)"
# Issuer: CN=VAS Latvijas Pasts SSI(RCA),OU=Sertifikacijas pakalpojumi,O=VAS Latvijas Pasts -
Vien.reg.Nr.40003052790,C=LV
# Serial Number:63:06:86:a7:c5:37:65:a5:43:90:a8:6a:58:cc:d4:32
# Subject: CN=VAS Latvijas Pasts SSI(RCA),OU=Sertifikacijas pakalpojumi,O=VAS Latvijas Pasts -
Vien.reg.Nr.40003052790,C=LV
# Not Valid Before: Wed Sep 13 09:22:10 2006
# Not Valid After: Fri Sep 13 09:27:57 2024
# Fingerprint (MD5): fd:49:be:5b:18:5a:25:ec:f9:c3:54:85:10:40:e8:d4
# Fingerprint (SHA1): 08:64:18:e9:06:ce:e8:9c:23:53:b6:e2:7f:bd:9e:74:39:f7:63:16
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "VAS Latvijas Pasts SSI(RCA)"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\217\061\013\060\011\006\003\125\004\006\023\002\114\126
\061\065\060\063\006\003\125\004\012\023\054\126\101\123\040\114
\141\164\166\151\152\141\163\040\120\141\163\164\163\040\055\040
\126\151\145\156\056\162\145\147\056\116\162\056\064\060\060\060
\063\060\065\062\067\071\060\061\043\060\041\006\003\125\004\013
\023\032\123\145\162\164\151\146\151\153\141\143\151\152\141\163
\040\160\141\153\141\154\160\157\152\165\155\151\061\044\060\042
\006\003\125\004\003\023\033\126\101\123\040\114\141\164\166\151
\152\141\163\040\120\141\163\164\163\040\123\123\111\050\122\103
\101\051
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\217\061\013\060\011\006\003\125\004\006\023\002\114\126
\061\065\060\063\006\003\125\004\012\023\054\126\101\123\040\114
\141\164\166\151\152\141\163\040\120\141\163\164\163\040\055\040
\126\151\145\156\056\162\145\147\056\116\162\056\064\060\060\060
```

\063\060\065\062\067\071\060\061\043\060\041\006\003\125\004\013
\023\032\123\145\162\164\151\146\151\153\141\143\151\152\141\163
\040\160\141\153\141\154\160\157\152\165\155\151\061\044\060\042
\006\003\125\004\003\023\033\126\101\123\040\114\141\164\166\151
\152\141\163\040\120\141\163\164\163\040\123\123\111\050\122\103
\101\051
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\143\006\206\247\305\067\145\245\103\220\250\152\130\314
\324\062
END
CKA_VALUE MULTILINE_OCTAL
\060\202\007\251\060\202\005\221\240\003\002\001\002\002\020\143
\006\206\247\305\067\145\245\103\220\250\152\130\314\324\062\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\201
\217\061\013\060\011\006\003\125\004\006\023\002\114\126\061\065
\060\063\006\003\125\004\012\023\054\126\101\123\040\114\141\164
\166\151\152\141\163\040\120\141\163\164\163\040\055\040\126\151
\145\156\056\162\145\147\056\116\162\056\064\060\060\060\063\060
\065\062\067\071\060\061\043\060\041\006\003\125\004\013\023\032
\123\145\162\164\151\146\151\153\141\143\151\152\141\163\040\160
\141\153\141\154\160\157\152\165\155\151\061\044\060\042\006\003
\125\004\003\023\033\126\101\123\040\114\141\164\166\151\152\141
\163\040\120\141\163\164\163\040\123\123\111\050\122\103\101\051
\060\036\027\015\060\066\060\071\061\063\060\071\062\062\061\060
\132\027\015\062\064\060\071\061\063\060\071\062\067\065\067\132
\060\201\217\061\013\060\011\006\003\125\004\006\023\002\114\126
\061\065\060\063\006\003\125\004\012\023\054\126\101\123\040\114
\141\164\166\151\152\141\163\040\120\141\163\164\163\040\055\040
\126\151\145\156\056\162\145\147\056\116\162\056\064\060\060\060
\063\060\065\062\067\071\060\061\043\060\041\006\003\125\004\013
\023\032\123\145\162\164\151\146\151\153\141\143\151\152\141\163
\040\160\141\153\141\154\160\157\152\165\155\151\061\044\060\042
\006\003\125\004\003\023\033\126\101\123\040\114\141\164\166\151
\152\141\163\040\120\141\163\164\163\040\123\123\111\050\122\103
\101\051\060\202\002\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202
\002\001\000\233\270\371\375\141\125\057\117\244\245\024\265\056
\216\271\044\217\254\373\261\124\077\100\377\117\305\345\206\150
\173\123\223\373\065\202\065\250\120\056\224\122\240\333\203\076
\165\332\025\160\254\011\317\356\202\111\255\066\111\271\264\161
\213\264\000\241\102\006\312\010\012\143\227\266\010\374\356\264
\334\230\170\031\202\311\370\177\144\076\252\311\376\261\215\353
\260\144\365\274\363\304\076\072\220\352\116\216\077\033\031\274
\152\203\303\221\074\154\125\373\012\122\300\350\341\135\167\205
\063\305\111\337\354\152\277\277\154\067\376\216\111\242\025\030
\316\213\216\153\036\070\243\060\157\210\201\176\162\126\104\032

\304\172\071\017\366\304\217\226\324\262\353\000\116\134\336\273
\347\073\267\346\044\005\223\153\115\346\221\104\277\356\230\033
\307\205\033\021\101\173\042\066\247\276\076\350\172\067\334\030
\336\220\235\217\315\262\327\232\077\342\027\177\133\014\341\357
\077\146\075\156\044\344\260\316\303\014\210\154\224\332\070\045
\174\122\071\343\163\024\263\000\105\143\232\014\102\100\136\004
\306\367\162\144\316\311\156\063\263\344\323\155\044\225\067\223
\176\362\000\135\031\213\037\363\103\163\250\237\105\322\006\251
\354\264\102\273\372\356\014\307\117\077\121\037\321\257\320\254
\030\177\207\201\042\376\251\335\007\226\155\174\370\116\331\115
\072\120\151\325\101\176\305\332\164\330\216\163\345\176\203\341
\303\031\201\267\275\277\100\216\276\056\232\242\014\252\116\002
\056\273\052\341\010\135\061\003\311\254\047\260\257\334\325\310
\024\175\100\235\125\211\041\371\220\314\324\311\140\101\163\253
\350\315\330\072\125\071\012\202\231\376\233\365\365\074\034\221
\313\300\372\106\124\256\041\374\052\254\134\173\336\172\227\161
\375\154\153\315\110\232\244\333\201\174\030\067\057\220\175\141
\224\275\027\311\134\266\124\026\167\312\011\112\252\351\274\117
\224\165\001\132\126\274\222\322\217\271\327\227\336\126\164\001
\367\026\161\111\261\365\030\106\231\101\356\142\341\263\054\145
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\216\254\227\325\260\063\276\237\030\334\055\367\101\170\124\112
\142\104\347\002\003\001\000\001\243\202\001\375\060\202\001\371
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006
\060\030\006\010\053\006\001\005\005\007\001\003\004\014\060\012
\060\010\006\006\004\000\216\106\001\001\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125
\035\016\004\026\004\024\314\303\365\146\377\163\254\070\132\226
\033\041\211\270\201\114\037\313\136\045\060\020\006\011\053\006
\001\004\001\202\067\025\001\004\003\002\001\000\060\202\001\211
\006\003\125\035\040\004\202\001\200\060\202\001\174\060\202\001
\170\006\013\053\006\001\004\001\201\304\131\001\001\002\060\202
\001\147\060\202\001\070\006\010\053\006\001\005\005\007\002\002
\060\202\001\052\036\202\001\046\000\123\000\151\000\163\000\040
\000\151\000\162\000\040\000\163\000\145\000\162\000\164\000\151
\000\146\000\151\000\153\000\141\000\164\000\163\000\054\000\040
\000\153\000\157\000\040\000\151\000\172\000\144\000\145\000\166
\000\151\000\163\000\040\000\126\000\101\000\123\000\040\000\114
\000\141\000\164\000\166\000\151\000\152\000\141\000\163\000\040
\000\120\000\141\000\163\000\164\000\163\000\054\000\040\000\156
\000\157\000\144\000\162\000\157\000\163\000\151\000\156\000\157
\000\164\000\040\000\141\000\164\000\142\000\151\000\154\000\163
\000\164\000\151\000\142\000\165\000\040\000\105\000\154\000\145
\000\153\000\164\000\162\000\157\000\156\000\151\000\163\000\153
\000\157\000\040\000\144\000\157\000\153\000\165\000\155\000\145
\000\156\000\164\000\165\000\040\000\154\000\151\000\153\000\165
\000\155\000\141\000\155\000\040\000\165\000\156\000\040\000\105
\000\151\000\162\000\157\000\160\000\141\000\163\000\040\000\120

\000\141\000\162\000\154\000\141\000\155\000\145\000\156\000\164
\000\141\000\040\000\144\000\151\000\162\000\145\000\153\000\164
\000\151\000\166\000\141\000\151\000\040\000\061\000\071\000\071
\000\071\000\057\000\071\000\063\000\057\000\105\000\113\060\051
\006\010\053\006\001\005\005\007\002\001\026\035\150\164\164\160
\072\057\057\167\167\167\056\145\055\155\145\056\154\166\057\162
\145\160\157\163\151\164\157\162\171\060\015\006\011\052\206\110
\206\367\015\001\001\005\005\000\003\202\002\001\000\037\050\112
\065\220\041\143\150\012\057\170\257\243\036\202\046\227\243\077
\047\031\322\113\243\102\172\006\023\145\133\301\004\313\353\175
\174\357\224\362\361\211\365\267\337\122\002\041\151\322\352\226
\064\345\240\317\227\270\234\125\016\020\205\243\024\136\054\005
\370\265\072\166\363\371\172\270\336\266\014\047\151\362\313\224
\221\013\035\271\325\216\157\231\057\315\362\031\126\071\072\110
\126\360\001\377\202\165\266\262\375\321\324\365\362\143\127\114
\115\241\176\314\020\272\004\151\357\364\024\374\263\227\037\105
\356\157\112\050\177\321\306\047\274\307\243\251\153\173\355\202
\023\157\253\336\017\373\161\353\134\021\032\251\054\320\060\237
\374\066\067\126\357\225\351\272\267\023\266\256\237\002\141\255
\236\354\153\004\157\066\237\017\231\367\302\311\310\114\050\271
\050\324\041\327\236\124\325\300\316\364\216\344\125\224\173\217
\044\306\070\374\253\172\244\126\167\075\250\105\357\144\222\244
\320\112\176\273\163\213\364\015\122\163\270\072\110\136\103\200
\323\251\160\167\142\377\307\050\034\163\036\103\346\047\044\133
\111\271\346\066\244\216\375\305\055\057\172\245\171\022\172\327
\041\262\045\155\310\017\242\303\141\113\345\110\342\127\272\237
\362\212\041\335\333\144\360\332\031\337\316\300\233\200\071\302
\167\167\143\025\123\162\204\372\244\217\007\067\206\041\175\120
\372\075\152\067\333\221\016\067\263\375\316\013\312\173\141\320
\234\164\234\175\070\150\155\351\173\035\326\361\052\264\357\073
\140\122\167\005\346\002\302\137\214\133\274\360\175\267\163\307
\221\153\262\052\263\143\243\064\325\253\255\045\161\107\377\032
\076\172\266\215\225\166\303\356\246\315\003\011\154\356\105\147
\230\317\231\110\166\301\316\212\164\232\150\122\001\064\042\310
\355\342\024\013\204\275\156\020\214\261\162\233\276\350\010\327
\127\325\177\352\264\001\075\116\344\342\350\147\347\214\176\351
\347\102\021\357\225\106\310\221\326\276\047\027\200\031\064\230
\347\306\337\036\374\041\137\236\206\075\274\176\360\234\275\162
\236\364\107\202\133\161\147\363\372\334\124\114\250\134\330\131
\307\320\007\016\023\063\047\274\364\151\360\153\041
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "VAS Latvijas Pasts SSI(RCA)"

```
# Issuer: CN=VAS Latvijas Pasts SSI(RCA),OU=Sertifikacijas pakalpojumi,O=VAS Latvijas Pasts -
Vien.reg.Nr.40003052790,C=LV
# Serial Number:63:06:86:a7:c5:37:65:a5:43:90:a8:6a:58:cc:d4:32
# Subject: CN=VAS Latvijas Pasts SSI(RCA),OU=Sertifikacijas pakalpojumi,O=VAS Latvijas Pasts -
Vien.reg.Nr.40003052790,C=LV
# Not Valid Before: Wed Sep 13 09:22:10 2006
# Not Valid After: Fri Sep 13 09:27:57 2024
# Fingerprint (MD5): fd:49:be:5b:18:5a:25:ec:f9:c3:54:85:10:40:e8:d4
# Fingerprint
 (SHA1): 08:64:18:e9:06:ce:e8:9c:23:53:b6:e2:7f:bd:9e:74:39:f7:63:16
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "VAS Latvijas Pasts SSI(RCA)"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\010\144\030\351\006\316\350\234\043\123\266\342\177\275\236\164
\071\367\143\026
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\375\111\276\133\030\132\045\354\371\303\124\205\020\100\350\324
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\217\061\013\060\011\006\003\125\004\006\023\002\114\126
\061\065\060\063\006\003\125\004\012\023\054\126\101\123\040\114
\141\164\166\151\152\141\163\040\120\141\163\164\163\040\055\040
\126\151\145\156\056\162\145\147\056\116\162\056\064\060\060\060
\063\060\065\062\067\071\060\061\043\060\041\006\003\125\004\013
\023\032\123\145\162\164\151\146\151\153\141\143\151\152\141\163
\040\160\141\153\141\154\160\157\152\165\155\151\061\044\060\042
\006\003\125\004\003\023\033\126\101\123\040\114\141\164\166\151
\152\141\163\040\120\141\163\164\163\040\123\123\111\050\122\103
\101\051
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\143\006\206\247\305\067\145\245\103\220\250\152\130\314
\324\062
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "ANCERT Certificados CGN"
# Issuer: CN=ANCERT Certificados CGN,O=Agencia Notarial de Certificacion S.L. Unipersonal - CIF
B83395988,C=ES
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# Serial Number:44:74:ec:c8:6c:72:1e:58:dd:b8:2c:7e:f4:fc:95
# Subject: CN=ANCERT Certificados CGN,O=Agencia Notarial de Certificacion S.L. Unipersonal - CIF
B83395988,C=ES
# Not Valid Before: Wed Feb 11 17:27:12 2004
# Not Valid After: Sun Feb 11 17:27:12 2024
# Fingerprint (MD5): 1c:4b:e2:c6:2d:b9:ac:31:14:f4:40:07:69:cb:1f:40
# Fingerprint (SHA1): 11:c5:b5:f7:55:52:b0:11:66:9c:2e:97:17:de:6d:9b:ff:5f:a8:10
CKA_CLASS
 CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ANCERT Certificados CGN"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
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\113\060\111\006\003\125\004\012\023\102\101\147\145\156\143\151
\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103\145
\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114\056
\040\125\156\151\160\145\162\163\157\156\141\154\040\055\040\103
\111\106\040\102\070\063\063\071\065\071\070\070\061\040\060\036
\006\003\125\004\003\023\027\101\116\103\105\122\124\040\103\145
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END
CKA_ID UTF8 "0"
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\113\060\111\006\003\125\004\012\023\102\101\147\145\156\143\151
\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103\145
\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114\056
\040\125\156\151\160\145\162\163\157\156\141\154\040\055\040\103
\111\106\040\102\070\063\063\071\065\071\070\070\061\040\060\036
\006\003\125\004\003\023\027\101\116\103\105\122\124\040\103\145
\162\164\151\146\151\143\141\144\157\163\040\103\107\116
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\017\104\164\354\310\154\162\036\130\335\270\054\176\364\374
\225
END
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\164\354\310\154\162\036\130\335\270\054\176\364\374\225\060\015
\006\011\052\206\110\206\367\015\001\001\005\005\000\060\174\061
\013\060\011\006\003\125\004\006\023\002\105\123\061\113\060\111
\006\003\125\004\012\023\102\101\147\145\156\143\151\141\040\116
\157\164\141\162\151\141\154\040\144\145\040\103\145\162\164\151
\146\151\143\141\143\151\157\156\040\123\056\114\056\040\125\156
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\004\003\023\027\101\116\103\105\122\124\040\103\145\162\164\151
\146\151\143\141\144\157\163\040\103\107\116\060\036\027\015\060
\064\060\062\061\061\061\067\062\067\061\062\132\027\015\062\064
\060\062\061\061\061\067\062\067\061\062\132\060\174\061\013\060
\011\006\003\125\004\006\023\002\105\123\061\113\060\111\006\003
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\145\162\163\157\156\141\154\040\055\040\103\111\106\040\102\070
\063\063\071\065\071\070\070\061\040\060\036\006\003\125\004\003
\023\027\101\116\103\105\122\124\040\103\145\162\164\151\146\151
\143\141\144\157\163\040\103\107\116\060\202\001\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017
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\312\324\174\304\110\247\030\273\072\273\241\273\325\173\337\213
\031\344\202\104\373\145\354\266\022\141\076\151\042\031\142\065
\044\266\325\020\006\251\105\152\044\052\365\047\214\170\074\310
\271\363\005\154\305\002\003\322\116\200\144\354\206\253\170\224
\042\002\000\265\150\233\324\345\125\137\340\310\200\060\347\013
\277\153\327\004\216\116\171\230\160\114\034\046\271\263\250\352
\360\021\242\271\212\123\002\046\165\022\211\341\373\210\116\131
\172\000\321\202\330\026\256\345\266\274\225\045\140\100\167\045
\033\236\357\215\344\375\360\117\063\061\045\277\356\172\012\124
\360\220\070\147\022\173\245\140\332\014\001\211\232\166\207\056
\365\033\103\173\345\347\046\112\373\025\142\253\105\033\173\325
\012\245\115\154\115\253\237\050\110\204\341\203\165\270\030\160
\125\123\333\320\337\051\220\257\071\306\027\225\301\224\305\136
\331\145\137\135\377\156\026\225\230\041\237\136\115\360\315\061
\071\041\003\027\015\221\037\241\125\231\101\354\125\311\273\075
\231\134\233\305\177\321\034\136\352\123\002\003\001\000\001\243
\202\001\247\060\202\001\243\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\202\001\040\006\003\125\035
\040\004\202\001\027\060\202\001\023\060\202\001\017\006\011\053
\006\001\004\001\201\223\150\004\060\202\001\000\060\045\006\010
\053\006\001\005\005\007\002\001\026\031\150\164\164\160\072\057
\057\167\167\167\056\141\156\143\145\162\164\056\143\157\155\057
\143\160\163\060\201\326\006\010\053\006\001\005\005\007\002\002
\060\201\311\060\015\026\006\101\116\103\105\122\124\060\003\002
\001\001\032\201\267\101\147\145\156\143\151\141\040\116\157\164
\141\162\151\141\154\040\144\145\040\103\145\162\164\151\146\151
\143\141\143\151\157\156\056\040\114\141\040\144\145\143\154\141
\162\141\143\151\157\156\040\144\145\040\160\162\141\143\164\151
\143\141\163\040\144\145\040\143\145\162\164\151\146\151\141\143
\151\157\156\040\161\165\145\040\162\151\147\145\040\145\154\040
\146\165\156\143\151\157\156\141\155\151\145\156\164\157\040\144
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\156\164\162\141\040\144\151\163\160\157\156\151\142\154\145\040
\145\156\040\150\164\164\160\072\057\057\167\167\167\056\141\156
\143\145\162\164\056\143\157\155\057\143\160\163\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\206\060\034\006\003
\125\035\021\004\025\060\023\201\021\141\156\143\145\162\164\100
\141\156\143\145\162\164\056\143\157\155\060\037\006\003\125\035
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\256\133\360\055\241\142\130\321\215\002\314\060\035\006\003\125
\035\016\004\026\004\024\354\127\237\310\166\042\157\314\072\256
\133\360\055\241\142\130\321\215\002\314\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\003\202\001\001\000\213\075
\337\334\066\054\177\047\234\374\265\130\123\161\012\022\135\020
\144\121\161\265\112\126\364\136\104\147\036\357\035\262\361\244
\121\074\147\154\054\145\226\172\241\022\243\257\013\010\067\016
\231\326\156\050\207\013\142\253\116\170\116\162\201\233\337\021
\117\211\140\310\121\246\033\006\011\161\163\174\067\267\034\070
\067\232\371\207\341\357\241\356\177\327\300\352\071\024\372\174
\157\013\371\206\312\346\305\167\151\240\237\215\051\243\167\156
\305\314\332\366\335\006\172\323\151\146\076\140\073\343\062\337
\256\360\033\236\052\235\314\204\337\032\020\107\355\245\126\226
\102\067\265\055\162\015\101\022\223\272\062\210\104\310\256\011
\304\275\200\355\375\140\017\162\262\266\144\366\143\040\062\160
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\325\327\135\322\335\303\374\141\015\060\005\117\005\213
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER
 CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "ANCERT Certificados CGN"
# Issuer: CN=ANCERT Certificados CGN,O=Agencia Notarial de Certificacion S.L. Unipersonal - CIF B83395988,C=ES
# Serial Number:44:74:ec:c8:6c:72:1e:58:dd:b8:2c:7e:f4:fc:95
# Subject: CN=ANCERT Certificados CGN,O=Agencia Notarial de Certificacion S.L. Unipersonal - CIF B83395988,C=ES
# Not Valid Before: Wed Feb 11 17:27:12 2004
# Not Valid After: Sun Feb 11 17:27:12 2024
# Fingerprint (MD5): 1c:4b:e2:c6:2d:b9:ac:31:14:f4:40:07:69:cb:1f:40
# Fingerprint (SHA1): 11:c5:b5:f7:55:52:b0:11:66:9c:2e:97:17:de:6d:9b:ff:5f:a8:10
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE

```
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ANCERT Certificados CGN"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\021\305\265\367\125\122\260\021\146\234\056\227\027\336\155\233
\377\137\250\020
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\034\113\342\306\055\271\254\061\024\364\100\007\151\313\037\100
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\174\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\113\060\111\006\003\125\004\012\023\102\101\147\145\156\143\151
\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103\145
\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114\056
\040\125\156\151\160\145\162\163\157\156\141\154\040\055\040\103
\111\106\040\102\070\063\063\071\065\071\070\070\061\040\060\036
\006\003\125\004\003\023\027\101\116\103\105\122\124\040\103\145
\162\164\151\146\151\143\141\144\157\163\040\103\107\116
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\017\104\164\354\310\154\162\036\130\335\270\054\176\364\374
\225
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "ANCERT Certificados Notariales"
# Issuer:
 CN=ANCERT Certificados Notariales,O=Agencia Notarial de Certificacion S.L. Unipersonal - CIF
B83395988,C=ES
# Serial Number:f4:cf:89:ea:dd:a4:c6:3e:91:ad:48:0e:2d:22:36:84
# Subject: CN=ANCERT Certificados Notariales,O=Agencia Notarial de Certificacion S.L. Unipersonal - CIF
B83395988,C=ES
# Not Valid Before: Wed Feb 11 15:58:30 2004
# Not Valid After: Sun Feb 11 15:58:26 2024
# Fingerprint (MD5): 45:f7:50:11:4e:c5:ad:bd:53:68:86:63:ec:7b:6a:e1
# Fingerprint (SHA1): c0:9a:b0:c8:ad:71:14:71:4e:d5:e2:1a:5a:27:6a:dc:d5:e7:ef:cb
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ANCERT Certificados Notariales"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
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CKA_SUBJECT MULTILINE_OCTAL
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\061\113\060\111\006\003\125\004\012\023\102\101\147\145\156\143
\151\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103
\145\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114
\056\040\125\156\151\160\145\162\163\157\156\141\154\040\055\040
\103\111\106\040\102\070\063\063\071\065\071\070\070\061\047\060
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\145\162\164\151\146\151\143\141\144\157\163\040\116\157\164\141
\162\151\141\154\145\163
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\203\061\013\060\011\006\003\125\004\006\023\002\105\123
\061\113\060\111\006\003\125\004\012\023\102\101\147\145\156\143
\151\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103
\145\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114
\056\040\125\156\151\160\145\162\163\157\156\141\154\040\055\040
\103\111\106\040\102\070\063\063\071\065\071\070\070\061\047\060
\045\006\003\125\004\003\023\036\101\116\103\105\122\124\040\103
\145\162\164\151\146\151\143\141\144\157\163\040\116\157\164\141
\162\151\141\154\145\163
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\364\317\211\352\335\244\306\076\221\255\110\016\055
\042\066\204
END
CKA_VALUE
 MULTILINE_OCTAL
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\201\203\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\113\060\111\006\003\125\004\012\023\102\101\147\145\156\143\151
\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103\145
\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114\056
\040\125\156\151\160\145\162\163\157\156\141\154\040\055\040\103
\111\106\040\102\070\063\063\071\065\071\070\070\061\047\060\045
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\162\164\151\146\151\143\141\144\157\163\040\116\157\164\141\162
\151\141\154\145\163\060\036\027\015\060\064\060\062\061\061\061
\065\065\070\063\060\132\027\015\062\064\060\062\061\061\061\065
\065\070\062\066\132\060\201\203\061\013\060\011\006\003\125\004
\006\023\002\105\123\061\113\060\111\006\003\125\004\012\023\102
\101\147\145\156\143\151\141\040\116\157\164\141\162\151\141\154
\040\144\145\040\103\145\162\164\151\146\151\143\141\143\151\157
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\040\116\157\164\141\162\151\141\154\145\163\060\202\001\042\060
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\130\223\047\144\117\247\325\133\202\005\162\233\177\035\256\010
\322\214\320\321\311\140\260\231\031\065\326\031\306\000\071\151
\175\042\357\164\042\203\264\176\352\020\213\076\063\034\341\335
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\346\020\244\074\130\033\313\123\142\022\365\207\132\106\242\171
\243\140\343\026\250\336\204\246\372\345\314\304\020\062\366\102
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\321\224\064\151\012\376\075\350\146\252\046\014\325\143\071\006
\160\223\255\174\263\344\107\301\073\107\216\151\227\014\221\240
\114\007\217\311\200\114\256\160\223\150\217\241\303\042\302\361
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\235\027\334\271\100\011\133\364\055\023\046\163\002\003\001\000
\001\243\202\001\247\060\202\001\243\060\034\006\003\125\035\021
\004\025\060\023\201\021\141\156\143\145\162\164\100\141\156\143
\145\162\164\056\143\157\155\060\037\006\003\125\035\043\004\030
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\001\377\004\005\060\003\001\001\377\060\202\001\040\006\003\125
\035\040\004\202\001\027\060\202\001\023\060\202\001\017\006\011
\053\006\001\004\001\201\223\150\001\060\202\001\000\060\045\006
\010\053\006\001\005\005\007\002\001\026\031\150\164\164\160\072
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\057\143\160\163\060\201\326\006\010\053\006\001\005\005\007\002
\002\060\201\311\060\015\026\006\101\116\103\105\122\124\060\003
\002\001\001\032\201\267\101\147\145\156\143\151\141\040\116\157
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\151\143\141\143\151\157\156\056\040\114\141\040\144\145\143\154
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\151\143\141\163\040\144\145\040\143\145\162\164\151\146\151\141
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\144\145\040\154\141\040\160\162\145\163\145\156\164\145\040\141
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\145\156\164\162\141\040\144\151\163\160\157\156\151\142\154\145
\040\145\156\040\150\164\164\160\072\057\057\167\167\167\056\141
\156\143\145\162\164\056\143\157\155\057\143\160\163\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\206\060\035\006
\003\125\035\016\004\026\004\024\204\367\372\162\136\210\144\146

\035\050\214\260\167\275\014\152\237\114\115\142\060\015\006\011
\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000
\057\370\345\330\063\245\302\224\156\136\300\361\356\241\114\012
\255\206\017\300\063\335\236\322\331\233\356\305\053\205\051\166
\254\245\022\123\223\035\252\007\354\351\071\144\013\150\360\165
\044\351\321\206\214\234\123\152\353\025\241\011\267\031\007\271
\235\217\002\262\033\111\160\302\143\164\335\013\252\376\007\306
\067\126\306\203\376\300\117\034\314\070\252\375\356\125\230\211
\134\302\123\255\040\207\272\026\144\122\141\354\301\237\273\324
\142\321\052\310\135\360\053\370\332\022\316\043\313\261\314\301
\322\012\275\374\300\200\116\125\111\372\211\330\144\243\112\312
\356\213\327\345\355\222\373\140\342\342\052\317\055\050\076\246
\377\200\234\145\314\022\236\245\034\164\131\220\245\207\177\147
\025\200\020\300\241\321\250\060\354\241\002\221\212\132\323\043
\027\223\132\107\041\171\352\063\172\017\177\070\065\232\312\126
\270\277\144\272\247\260\265\121\035\026\236\216\211\175\070\072
\313\204\115\007\230\330\345\341\214\005\152\245\067\014\326\171
\051\076\361\102\304\266\367\352\031\240\141\340\002\116\277\022
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "ANCERT Certificados Notariales"
# Issuer: CN=ANCERT Certificados Notariales,O=Agencia Notarial de Certificacion S.L. Unipersonal - CIF B83395988,C=ES
# Serial Number:f4:cf:89:ea:dd:a4:c6:3e:91:ad:48:0e:2d:22:36:84
# Subject: CN=ANCERT Certificados Notariales,O=Agencia
Notarial de Certificacion S.L. Unipersonal - CIF B83395988,C=ES
# Not Valid Before: Wed Feb 11 15:58:30 2004
# Not Valid After: Sun Feb 11 15:58:26 2024
# Fingerprint (MD5): 45:f7:50:11:4e:c5:ad:bd:53:68:86:63:ec:7b:6a:e1
# Fingerprint (SHA1): c0:9a:b0:c8:ad:71:14:71:4e:d5:e2:1a:5a:27:6a:dc:d5:e7:ef:cb
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ANCERT Certificados Notariales"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\300\232\260\310\255\161\024\161\116\325\342\032\132\047\152\334
\325\347\357\313
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\105\367\120\021\116\305\255\275\123\150\206\143\354\173\152\341
END
CKA_ISSUER MULTILINE_OCTAL

```
\060\201\203\061\013\060\011\006\003\125\004\006\023\002\105\123
\061\113\060\111\006\003\125\004\012\023\102\101\147\145\156\143
\151\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103
\145\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114
\056\040\125\156\151\160\145\162\163\157\156\141\154\040\055\040
\103\111\106\040\102\070\063\063\071\065\071\070\070\061\047\060
\045\006\003\125\004\003\023\036\101\116\103\105\122\124\040\103
\145\162\164\151\146\151\143\141\144\157\163\040\116\157\164\141
\162\151\141\154\145\163
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\021\000\364\317\211\352\335\244\306\076\221\255\110\016\055
\042\066\204
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "ANCERT Corporaciones de Derecho Publico"
# Issuer: CN=ANCERT Corporaciones de Derecho Publico,O=Agencia Notarial de Certificacion S.L. Unipersonal -
CIF B83395988,C=ES
# Serial Number:3f:b2:e5:f2:d1:7c:8b:18:64:56:62:a9:39:81:7f:a7
# Subject: CN=ANCERT Corporaciones de Derecho Publico,O=Agencia Notarial de Certificacion
 S.L. Unipersonal - CIF B83395988,C=ES
# Not Valid Before: Wed Feb 11 17:22:45 2004
# Not Valid After: Sun Feb 11 17:22:45 2024
# Fingerprint (MD5): 20:6b:d6:8b:4a:8f:48:ab:e4:88:09:0d:e5:65:1a:50
# Fingerprint (SHA1): 0c:fd:83:db:ae:44:b9:a0:c8:f6:76:f3:b5:70:65:0b:94:b6:9d:bf
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ANCERT Corporaciones de Derecho Publico"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\214\061\013\060\011\006\003\125\004\006\023\002\105\123
\061\113\060\111\006\003\125\004\012\023\102\101\147\145\156\143
\151\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103
\145\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114
\056\040\125\156\151\160\145\162\163\157\156\141\154\040\055\040
\103\111\106\040\102\070\063\063\071\065\071\070\070\061\060\060
\056\006\003\125\004\003\023\047\101\116\103\105\122\124\040\103
\157\162\160\157\162\141\143\151\157\156\145\163\040\144\145\040
\104\145\162\145\143\150\157\040\120\165\142\154\151\143\157
END
```

CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\214\061\013\060\011\006\003\125\004\006\023\002\105\123
\061\113\060\111\006\003\125\004\012\023\102\101\147\145\156\143
\151\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103
\145\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114
\056\040\125\156\151\160\145\162\163\157\156\141\154\040\055\040
\103\111\106\040\102\070\063\063\071\065\071\070\070\061\060\060
\056\006\003\125\004\003\023\047\101\116\103\105\122\124\040\103
\157\162\160\157\162\141\143\151\157\156\145\163\040\144\145\040
\104\145\162\145\143\150\157\040\120\165\142\154\151\143\157
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\077\262\345\362\321\174\213\030\144\126\142\251\071\201
\177\247
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\115\060\202\004\065\240\003\002\001\002\002\020\077
\262\345\362\321\174\213\030\144\126\142\251\071\201\177\247\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\201
\214\061\013\060\011\006\003\125\004\006\023\002\105\123\061\113
\060\111\006\003\125\004\012\023\102\101\147\145\156\143\151\141
\040\116\157\164\141\162\151\141\154\040\144\145\040\103\145\162
\164\151\146\151\143\141\143\151\157\156\040\123\056\114\056\040
\125\156\151\160\145\162\163\157\156\141\154\040\055\040\103\111
\106\040\102\070\063\063\071\065\071\070\070\061\060\060\056\006
\003\125\004\003\023\047\101\116\103\105\122\124\040\103\157\162
\160\157\162\141\143\151\157\156\145\163\040\144\145\040\104\145
\162\145\143\150\157\040\120\165\142\154\151\143\157\060\036\027
\015\060\064\060\062\061\061\061\067\062\062\064\065\132\027\015
\062\064\060\062\061\061\061\067\062\062\064\065\132\060\201\214
\061\013\060\011\006\003\125\004\006\023\002\105\123\061\113\060
\111\006\003\125\004\012\023\102\101\147\145\156\143\151\141\040
\116\157\164\141\162\151\141\154\040\144\145\040\103\145\162\164
\151\146\151\143\141\143\151\157\156\040\123\056\114\056\040\125
\156\151\160\145\162\163\157\156\141\154\040\055\040\103\111\106
\040\102\070\063\063\071\065\071\070\070\061\060\060\056\006\003
\125\004\003\023\047\101\116\103\105\122\124\040\103\157\162\160
\157\162\141\143\151\157\156\145\163\040\144\145\040\104\145\162
\145\143\150\157\040\120\165\142\154\151\143\157\060\202\001\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\001\017\000\060\202\001\012\002\202\001\001\000\242\041\225
\207\334\212\353\326\172\220\250\150\065\375\027\374\164\072\124
\020\222\065\223\102\165\056\330\076\313\251\224\241\276\152\067
\077\122\272\244\173\332\204\231\026\171\116\000\150\324\037\023
\351\106\073\074\112\235\203\072\330\041\357\302\362\100\105\341
\017\140\105\004\355\374\212\030\056\371\075\344\244\021\062\040

\216\072\267\356\226\100\025\032\231\351\041\235\162\254\315\037
\211\256\252\331\241\100\260\250\147\276\374\172\016\107\261\136
\274\370\060\152\216\067\237\005\102\354\054\303\246\033\213\253
\304\120\075\372\344\163\365\041\260\270\125\137\207\340\242\107
\070\057\100\137\117\154\253\224\044\126\343\114\217\176\220\351
\047\202\050\233\230\272\232\326\265\233\127\157\153\025\034\371
\273\160\051\175\074\367\023\250\321\161\361\260\376\210\105\161
\251\245\164\145\313\303\371\365\003\017\020\303\206\060\000\156
\301\300\046\242\210\376\041\307\062\075\273\306\173\033\267\233
\212\263\372\261\174\161\331\001\247\102\220\252\057\230\220\204
\252\336\306\255\354\074\121\112\005\035\001\121\233\002\003\001
\000\001\243\202\001\247\060\202\001\243\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\202\001\040\006
\003\125\035\040\004\202\001\027\060\202\001\023\060\202\001\017
\006\011\053\006\001\004\001\201\223\150\003\060\202\001\000\060
\045\006\010\053\006\001\005\005\007\002\001\026\031\150\164\164
\160\072\057\057\167\167\167\056\141\156\143\145\162\164\056\143
\157\155\057\143\160\163\060\201\326\006\010\053\006\001\005\005
\007\002\002\060\201\311\060\015\026\006\101\116\103\105\122\124
\060\003\002\001\001\032\201\267\101\147\145\156\143\151\141\040
\116\157\164\141\162\151\141\154\040\144\145\040\103\145\162\164
\151\146\151\143\141\143\151\157\156\056\040\114\141\040\144\145
\143\154\141\162\141\143\151\157\156\040\144\145\040\160\162\141
\143\164\151\143\141\163\040\144\145\040\143\145\162\164\151\146
\151\141\143\151\157\156\040\161\165\145\040\162\151\147\145\040
\145\154\040\146\165\156\143\151\157\156\141\155\151\145\156\164
\157\040\144\145\040\154\141\040\160\162\145\163\145\156\164\145
\040\141\165\164\157\162\151\144\141\144\040\163\145\040\145\156
\143\165\145\156\164\162\141\040\144\151\163\160\157\156\151\142
\154\145\040\145\156\040\150\164\164\160\072\057\057\167\167\167
\056\141\156\143\145\162\164\056\143\157\155\057\143\160\163\060
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060
\034\006\003\125\035\021\004\025\060\023\201\021\141\156\143\145
\162\164\100\141\156\143\145\162\164\056\143\157\155\060\037\006
\003\125\035\043\004\030\060\026\200\024\214\114\036\067\014\261
\237\322\254\104\013\072\276\002\317\364\215\055\146\225\060\035
\006\003\125\035\016\004\026\004\024\214\114\036\067\014\261\237
\322\254\104\013\072\276\002\317\364\215\055\146\225\060\015\006
\011\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001
\000\107\164\300\224\221\342\245\373\230\122\104\223\154\304\300
\035\340\171\333\151\144\055\141\256\244\167\221\065\265\267\312
\227\252\300\261\206\365\033\150\153\252\130\262\174\077\347\003
\047\370\101\161\274\246\322\040\251\200\225\242\107\255\155\106
\164\255\204\233\330\157\251\365\271\057\155\233\300\335\231\207
\355\131\262\165\201\245\211\205\052\314\320\205\201\115\363\257
\167\336\214\301\050\232\102\254\005\207\014\064\234\161\207\375
\354\001\024\037\276\303\056\360\337\372\044\246\135\037\074\361
\242\013\121\210\001\256\022\207\244\265\135\161\262\337\357\015

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\174\040\343\177\023\013\115\246\300\167\314\077\326\017\161\307
\161\114\056\036\372\031\006\145\311\255\126\154\167\215\106\077
\275\060\203\036\340\056\125\270\170\043\164\074\130\012\143\072
\115\201\173\157\065\160\256\266\045\331\366\044\376\043\306\332
\032\210\257\250\024\223\163\340\300\133\260\061\151\032\366\051
\137\126\267\032\012\302\371\013\352\002\301\063\021\142\152\174
\103\350\352\032\253\220\000\205\340\105\017\175\216\272\120\325
\306
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "ANCERT Corporaciones de Derecho Publico"
# Issuer: CN=ANCERT Corporaciones de Derecho Publico,O=Agencia Notarial de Certificacion S.L. Unipersonal -
CIF B83395988,C=ES
# Serial Number:3f:b2:e5:f2:d1:7c:8b:18:64:56:62:a9:39:81:7f:a7
# Subject: CN=ANCERT Corporaciones de Derecho Publico,O=Agencia Notarial de Certificacion S.L. Unipersonal
- CIF B83395988,C=ES
# Not Valid
 Before: Wed Feb 11 17:22:45 2004
# Not Valid After: Sun Feb 11 17:22:45 2024
# Fingerprint (MD5): 20:6b:d6:8b:4a:8f:48:ab:e4:88:09:0d:e5:65:1a:50
# Fingerprint (SHA1): 0c:fd:83:db:ae:44:b9:a0:c8:f6:76:f3:b5:70:65:0b:94:b6:9d:bf
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ANCERT Corporaciones de Derecho Publico"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\014\375\203\333\256\104\271\240\310\366\166\363\265\160\145\013
\224\266\235\277
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\040\153\326\213\112\217\110\253\344\210\011\015\345\145\032\120
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\214\061\013\060\011\006\003\125\004\006\023\002\105\123
\061\113\060\111\006\003\125\004\012\023\102\101\147\145\156\143
\151\141\040\116\157\164\141\162\151\141\154\040\144\145\040\103
\145\162\164\151\146\151\143\141\143\151\157\156\040\123\056\114
\056\040\125\156\151\160\145\162\163\157\156\141\154\040\055\040
\103\111\106\040\102\070\063\063\071\065\071\070\070\061\060\060
\056\006\003\125\004\003\023\047\101\116\103\105\122\124\040\103
\157\162\160\157\162\141\143\151\157\156\145\163\040\144\145\040
\104\145\162\145\143\150\157\040\120\165\142\154\151\143\157
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END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\077\262\345\362\321\174\213\030\144\126\142\251\071\201
\177\247
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "GLOBALTRUST"
# Issuer: 1.2.840.113549.1.9.1=info@globaltrust.info,CN=GLOBALTRUST,OU=GLOBALTRUST Certification
Service,O=ARGE DATEN - Austrian Society for Data Protection,ST=Austria,L=Vienna,C=AT
# Serial Number: 0 (0x0)
# Subject: 1.2.840.113549.1.9.1=info@globaltrust.info,CN=GLOBALTRUST,OU=GLOBALTRUST Certification
Service,O=ARGE DATEN - Austrian Society
 for Data Protection,ST=Austria,L=Vienna,C=AT
# Not Valid Before: Mon Aug 07 14:12:35 2006
# Not Valid After: Thu Sep 18 14:12:35 2036
# Fingerprint (MD5): df:0d:bc:7c:c8:36:b7:76:99:a1:ab:f0:d2:0f:89:6a
# Fingerprint (SHA1): 34:2c:d9:d3:06:2d:a4:8c:34:69:65:29:7f:08:1e:bc:2e:f6:8f:dc
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GLOBALTRUST"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\324\061\013\060\011\006\003\125\004\006\023\002\101\124
\061\017\060\015\006\003\125\004\007\023\006\126\151\145\156\156
\141\061\020\060\016\006\003\125\004\010\023\007\101\165\163\164
\162\151\141\061\072\060\070\006\003\125\004\012\023\061\101\122
\107\105\040\104\101\124\105\116\040\055\040\101\165\163\164\162
\151\141\156\040\123\157\143\151\145\164\171\040\146\157\162\040
\104\141\164\141\040\120\162\157\164\145\143\164\151\157\156\061
\052\060\050\006\003\125\004\013\023\041\107\114\117\102\101\114
\124\122\125\123\124\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\123\145\162\166\151\143\145\061\024\060\022\006
\003\125\004\003\023\013\107\114\117\102\101\114\124\122\125\123
\124\061\044\060\042\006\011\052\206\110\206\367\015\001\011\001
\026\025\151\156\146\157\100\147\154\157\142\141\154\164\162\165
\163\164\056\151\156\146\157
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
```

\060\201\324\061\013\060\011\006\003\125\004\006\023\002\101\124
\061\017\060\015\006\003\125\004\007\023\006\126\151\145\156\156
\141\061\020\060\016\006\003\125\004\010\023\007\101\165\163\164
\162\151\141\061\072\060\070\006\003\125\004\012\023\061\101\122
\107\105\040\104\101\124\105\116\040\055\040\101\165\163\164\162
\151\141\156\040\123\157\143\151\145\164\171\040\146\157\162\040
\104\141\164\141\040\120\162\157\164\145\143\164\151\157\156\061
\052\060\050\006\003\125\004\013\023\041\107\114\117\102\101\114
\124\122\125\123\124\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\123\145\162\166\151\143\145\061\024\060\022\006
\003\125\004\003\023\013\107\114\117\102\101\114\124\122\125\123
\124\061\044\060\042\006\011\052\206\110\206\367\015\001\011\001
\026\025\151\156\146\157\100\147\154\157\142\141\154\164\162\165
\163\164\056\151\156\146\157
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\000
END
CKA_VALUE MULTILINE_OCTAL
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\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\201\324\061\013\060\011\006\003\125\004\006\023\002\101\124\061
\017\060\015\006\003\125\004\007\023\006\126\151\145\156\156\141
\061\020\060\016\006\003\125\004\010\023\007\101\165\163\164\162
\151\141\061\072\060\070\006\003\125\004\012\023\061\101\122\107
\105\040\104\101\124\105\116\040\055\040\101\165\163\164\162\151
\141\156\040\123\157\143\151\145\164\171\040\146\157\162\040\104
\141\164\141\040\120\162\157\164\145\143\164\151\157\156\061\052
\060\050\006\003\125\004\013\023\041\107\114\117\102\101\114\124
\122\125\123\124\040\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\123\145\162\166\151\143\145\061\024\060\022\006\003
\125\004\003\023\013\107\114\117\102\101\114\124\122\125\123\124
\061\044\060\042\006\011\052\206\110\206\367\015\001\011\001\026
\025\151\156\146\157\100\147\154\157\142\141\154\164\162\165\163
\164\056\151\156\146\157\060\036\027\015\060\066\060\070\060\067
\061\064\061\062\063\065\132\027\015\063\066\060\071\061\070\061
\064\061\062\063\065\132\060\201\324\061\013\060\011\006\003\125
\004\006\023\002\101\124\061\017\060\015\006\003\125\004\007\023
\006\126\151\145\156\156\141\061\020\060\016\006\003\125\004\010
\023\007\101\165\163\164\162\151\141\061\072\060\070\006\003\125
\004\012\023\061\101\122\107\105\040\104\101\124\105\116\040\055
\040\101\165\163\164\162\151\141\156\040\123\157\143\151\145\164
\171\040\146\157\162\040\104\141\164\141\040\120\162\157\164\145
\143\164\151\157\156\061\052\060\050\006\003\125\004\013\023\041
\107\114\117\102\101\114\124\122\125\123\124\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\123\145\162\166\151\143
\145\061\024\060\022\006\003\125\004\003\023\013\107\114\117\102

\101\114\124\122\125\123\124\061\044\060\042\006\011\052\206\110
\206\367\015\001\011\001\026\025\151\156\146\157\100\147\154\157
\142\141\154\164\162\165\163\164\056\151\156\146\157\060\202\002
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000
\003\202\002\017\000\060\202\002\012\002\202\002\001\000\322\022
\107\354\137\230\350\015\206\025\111\304\335\354\236\361\154\315
\121\266\373\225\117\213\304\220\075\123\063\261\323\023\305\110
\342\245\277\365\364\003\204\017\234\170\161\366\222\227\361\133
\131\165\030\077\047\013\121\057\134\150\307\241\353\000\363\366
\225\075\151\303\176\302\254\304\012\066\162\172\133\246\320\367
\001\173\050\307\052\307\062\140\356\131\270\327\013\047\335\263
\105\005\053\173\144\247\163\134\350\223\002\227\150\354\374\204
\333\236\324\325\201\107\306\234\300\254\227\313\031\352\207\245
\012\243\270\165\044\347\120\047\015\253\026\371\126\135\261\201
\001\026\175\363\351\341\044\363\010\041\271\272\254\135\236\307
\110\171\177\152\312\337\071\167\004\155\033\156\072\315\177\316
\134\110\254\022\074\131\362\152\317\200\110\341\366\000\147\170
\040\340\375\265\144\173\027\227\263\345\047\335\105\153\233\141
\231\006\276\362\347\236\244\155\213\073\153\014\201\356\264\157
\241\276\032\022\101\113\236\255\016\371\106\264\132\321\003\000
\224\026\300\300\363\254\373\174\274\226\300\051\330\371\063\026
\211\243\016\035\225\331\003\324\041\014\335\126\010\111\145\310
\215\253\041\037\124\273\231\274\361\104\133\173\000\030\375\052
\031\130\322\005\311\331\051\066\045\376\167\356\153\131\124\117
\010\024\242\231\011\105\127\255\007\336\042\374\207\034\240\357
\240\171\335\012\175\300\177\065\350\014\146\115\343\265\152\026
\131\161\133\363\220\260\122\136\221\002\307\250\271\302\004\157
\236\117\264\000\055\354\010\354\256\100\156\360\051\047\042\071
\266\315\240\206\020\272\013\065\354\173\132\015\266\171\303\372
\307\255\301\373\353\355\053\204\015\352\336\371\353\232\131\063
\154\301\053\022\214\270\076\305\066\043\070\032\326\167\223\220
\326\167\165\152\130\031\027\241\025\216\156\166\016\243\163\341
\134\225\111\333\301\017\224\024\305\325\142\033\231\253\070\325
\147\156\322\251\031\341\132\072\207\152\110\077\221\226\343\306
\305\047\153\127\164\061\230\366\076\161\161\355\176\336\260\115
\054\363\356\217\333\173\150\327\020\104\051\255\354\253\120\131
\122\232\154\152\162\024\115\026\024\121\367\327\176\037\002\003
\001\000\001\243\202\001\327\060\202\001\323\060\035\006\003\125
\035\016\004\026\004\024\300\001\325\340\170\037\057\164\072\343
\353\300\041\122\246\004\356\046\313\244\060\202\001\001\006\003
\125\035\043\004\201\371\060\201\366\200\024\300\001\325\340\170
\037\057\164\072\343\353\300\041\122\246\004\356\046\313\244\241
\201\332\244\201\327\060\201\324\061\013\060\011\006\003\125\004
\006\023\002\101\124\061\017\060\015\006\003\125\004\007\023\006
\126\151\145\156\156\141\061\020\060\016\006\003\125\004\010\023
\007\101\165\163\164\162\151\141\061\072\060\070\006\003\125\004
\012\023\061\101\122\107\105\040\104\101\124\105\116\040\055\040
\101\165\163\164\162\151\141\156\040\123\157\143\151\145\164\171

\040\146\157\162\040\104\141\164\141\040\120\162\157\164\145\143
\164\151\157\156\061\052\060\050\006\003\125\004\013\023\041\107
\114\117\102\101\114\124\122\125\123\124\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\123\145\162\166\151\143\145
\061\024\060\022\006\003\125\004\003\023\013\107\114\117\102\101
\114\124\122\125\123\124\061\044\060\042\006\011\052\206\110\206
\367\015\001\011\001\026\025\151\156\146\157\100\147\154\157\142
\141\154\164\162\165\163\164\056\151\156\146\157\202\001\000\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\013\006\003\125\035\017\004\004\003\002\001\306\060\021\006
\003\125\035\040\004\012\060\010\060\006\006\004\125\035\040\000
\060\075\006\003\125\035\021\004\066\060\064\201\025\151\156\146
\157\100\147\154\157\142\141\154\164\162\165\163\164\056\151\156
\146\157\206\033\150\164\164\160\072\057\057\167\167\167\056\147
\154\157\142\141\154\164\162\165\163\164\056\151\156\146\157\060
\075\006\003\125\035\022\004\066\060\064\201\025\151\156\146\157
\100\147\154\157\142\141\154\164\162\165\163\164\056\151\156\146
\157\206\033\150\164\164\160\072\057\057\167\167\167\056\147\154
\157\142\141\154\164\162\165\163\164\056\151\156\146\157\060\015
\006\011\052\206\110\206\367\015\001\001\005\005\000\003\202\002
\001\000\025\073\210\203\136\016\336\076\360\076\135\334\055\241
\112\372\050\245\326\007\245\044\110\316\236\171\350\171\232\134
\044\216\130\162\024\101\205\307\105\356\074\050\151\070\111\256
\042\215\273\214\005\155\256\145\273\207\271\176\166\073\050\143
\152\326\157\063\060\210\176\125\005\272\271\025\003\230\035\142
\322\316\300\017\156\034\232\064\356\344\257\037\142\321\354\264
\171\317\317\151\222\212\130\375\301\307\166\013\134\315\122\064
\110\153\345\013\177\311\062\022\337\230\012\026\331\063\126\026
\217\337\103\077\327\275\077\305\036\305\255\041\254\207\054\232
\344\034\037\205\003\254\213\307\267\063\142\111\301\370\252\053
\116\135\207\076\166\122\256\131\176\061\341\174\272\122\213\130
\220\327\200\106\013\064\066\336\357\021\311\134\042\106\302\074
\247\177\142\004\157\337\076\110\216\352\013\076\010\254\030\032
\122\326\361\366\324\142\057\003\271\232\326\074\123\177\125\046
\306\065\053\041\164\260\211\220\124\344\001\210\134\234\205\052
\232\145\136\113\127\362\200\034\354\147\064\232\106\334\002\166
\376\162\067\162\011\261\360\043\217\130\263\002\175\356\170\016
\271\075\163\022\055\125\237\027\143\257\256\330\256\163\266\307
\120\152\205\301\333\175\373\224\131\160\306\303\007\154\126\305
\260\007\374\116\175\223\035\271\047\300\260\225\325\347\174\005
\274\367\017\012\263\364\156\025\127\111\033\265\024\000\244\060
\053\132\364\126\130\277\166\064\242\075\376\001\046\360\335\270
\155\360\244\347\274\040\366\121\010\366\343\067\211\127\066\366
\367\057\376\315\270\144\275\352\327\246\320\377\170\357\176\341
\034\036\124\176\017\064\031\201\020\163\322\343\170\006\027\266
\322\121\373\065\170\166\332\167\203\067\101\076\055\106\250\176
\206\336\126\364\312\220\236\264\255\260\036\105\030\074\064\210
\002\207\350\360\066\221\353\362\347\265\322\004\271\056\270\135

\215\035\232\056\013\026\031\315\166\244\253\373\321\342\243\242
\334\204\175\173\352\120\352\365\262\004\073\211\122\072\262\303
\031\117\271\046\261\274\274\054\262\341\201\246\263\141\265\364
\105\140\057\054\165\305\310\055\210\113\046\273\160\356\073\177
\001\055
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "GLOBALTRUST"
# Issuer: 1.2.840.113549.1.9.1=info@globaltrust.info,CN=GLOBALTRUST,OU=GLOBALTRUST Certification Service,O=ARGE DATEN - Austrian Society for Data Protection,ST=Austria,L=Vienna,C=AT
# Serial Number: 0 (0x0)
# Subject: 1.2.840.113549.1.9.1=info@globaltrust.info,CN=GLOBALTRUST,OU=GLOBALTRUST Certification Service,O=ARGE DATEN - Austrian Society for Data Protection,ST=Austria,L=Vienna,C=AT
# Not Valid Before: Mon Aug 07 14:12:35 2006
# Not Valid After: Thu Sep 18 14:12:35 2036
# Fingerprint (MD5): df:0d:bc:7c:c8:36:b7:76:99:a1:ab:f0:d2:0f:89:6a
# Fingerprint (SHA1): 34:2c:d9:d3:06:2d:a4:8c:34:69:65:29:7f:08:1e:bc:2e:f6:8f:dc

CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GLOBALTRUST"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\064\054\331\323\006\055\244\214\064\151\145\051\177\010\036\274
\056\366\217\334
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\337\015\274\174\310\066\267\166\231\241\253\360\322\017\211\152
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\324\061\013\060\011\006\003\125\004\006\023\002\101\124
\061\017\060\015\006\003\125\004\007\023\006\126\151\145\156\156
\141\061\020\060\016\006\003\125\004\010\023\007\101\165\163\164
\162\151\141\061\072\060\070\006\003\125\004\012\023\061\101\122
\107\105\040\104\101\124\105\116\040\055\040\101\165\163\164\162
\151\141\156\040\123\157\143\151\145\164\171\040\146\157\162\040
\104\141\164\141\040\120\162\157\164\145\143\164\151\157\156\061
\052\060\050\006\003\125\004\013\023\041\107\114\117\102\101\114
\124\122\125\123\124\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\123\145\162\166\151\143\145\061\024\060\022\006
\003\125\004\003\023\013\107\114\117\102\101\114\124\122\125\123
\124\061\044\060\042\006\011\052\206\110\206\367\015\001\011\001
\026\025\151\156\146\157\100\147\154\157\142\141\154\164\162\165

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\163\164\056\151\156\146\157
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST
 CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Certipost E-Trust TOP Root CA"
# Issuer: CN=Certipost E-Trust TOP Root CA,O=Certipost s.a./n.v.,C=BE
# Serial Number:04:00:00:00:00:01:05:52:64:c1:95
# Subject: CN=Certipost E-Trust TOP Root CA,O=Certipost s.a./n.v.,C=BE
# Not Valid Before: Tue Jul 26 10:00:00 2005
# Not Valid After: Sat Jul 26 10:00:00 2025
# Fingerprint (MD5): b8:d3:12:03:4e:8c:0c:5a:47:c9:b6:c5:9e:5b:97:fd
# Fingerprint (SHA1): 05:60:a2:c7:38:ff:98:d1:17:2a:94:fe:45:fb:8a:47:d6:65:37:1e
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certipost E-Trust TOP Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\123\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\034\060\032\006\003\125\004\012\023\023\103\145\162\164\151\160
\157\163\164\040\163\056\141\056\057\156\056\166\056\061\046\060
\044\006\003\125\004\003\023\035\103\145\162\164\151\160\157\163
\164\040\105\055\124\162\165\163\164\040\124\117\120\040\122\157
\157\164\040\103\101
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\123\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\034\060\032\006\003\125\004\012\023\023\103\145\162\164\151\160
\157\163\164\040\163\056\141\056\057\156\056\166\056\061\046\060
\044\006\003\125\004\003\023\035\103\145\162\164\151\160\157\163
\164\040\105\055\124\162\165\163\164\040\124\117\120\040\122\157
\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\005\122\144\301\225
END
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CKA_VALUE MULTILINE_OCTAL

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\110\206\367\015\001\001\005\005\000\060\123\061\013\060\011\006
\003\125\004\006\023\002\102\105\061\034\060\032\006\003\125\004
\012\023\023\103\145\162\164\151\160\157\163\164\040\163\056\141
\056\057\156\056\166\056\061\046\060\044\006\003\125\004\003\023
\035\103\145\162\164\151\160\157\163\164\040\105\055\124\162\165
\163\164\040\124\117\120\040\122\157\157\164\040\103\101\060\036
\027\015\060\065\060\067\062\066\061\060\060\060\060\060\132\027
\015\062\065\060\067\062\066\061\060\060\060\060\060\132\060\123
\061\013\060\011\006\003\125\004\006\023\002\102\105\061\034\060
\032\006\003\125\004\012\023\023\103\145\162\164\151\160\157\163
\164\040\163\056\141\056\057\156\056\166\056\061\046\060\044\006
\003\125\004\003\023\035\103\145\162\164\151\160\157\163\164\040
\105\055\124\162\165\163\164\040\124\117\120\040\122\157\157\164
\040\103\101\060\202\001\042\060\015\006\011\052\206\110\206\367
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002
\202\001\001\000\245\324\113\100\326\373\361\065\030\073\242\260
\103\344\311\125\241\300\007\273\010\276\072\031\265\043\303\036
\235\263\010\112\364\103\113\351\301\031\140\220\337\204\327\130
\306\072\335\012\054\225\054\275\227\177\376\242\165\332\006\343
\253\233\154\321\270\317\104\206\301\122\140\267\334\076\073\260
\362\351\304\121\074\112\271\203\271\116\141\152\003\233\034\122
\200\072\120\264\040\262\333\323\262\306\124\177\313\140\233\310
\044\236\257\011\307\145\015\050\366\332\232\042\302\063\156\362
\363\045\324\244\371\226\365\157\252\074\153\334\101\060\345\346
\157\312\110\037\060\170\035\171\175\247\321\277\256\305\136\103
\371\306\057\203\166\233\064\112\244\050\130\053\250\210\205\104
\152\053\362\126\102\166\231\220\063\252\356\371\041\317\362\075
\371\167\204\313\335\051\204\304\324\212\052\244\071\134\076\371
\034\045\150\115\365\347\233\135\261\032\064\136\312\002\163\371
\010\304\014\155\136\335\022\052\345\173\305\066\170\122\235\062
\301\305\050\245\040\250\345\230\015\271\157\317\271\200\236\345
\276\271\233\375\002\003\001\000\001\243\201\240\060\201\235\060
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\035\006\003\125\035\016\004\026\004\024\113\336\276\005\061
\056\363\065\310\330\312\247\126\305\224\015\264\132\145\305\060
\110\006\003\125\035\040\004\101\060\077\060\075\006\011\003\220
\016\007\001\000\001\002\000\060\060\060\056\006\010\053\006\001
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\167\056\145\055\164\162\165\163\164\056\142\145\057\103\120\123
\057\121\116\143\145\162\164\163\040\060\021\006\011\140\206\110
\001\206\370\102\001\001\004\004\003\002\000\007\060\015\006\011
\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000
\211\143\314\242\316\370\124\152\174\131\064\170\253\001\264\226
\055\052\041\156\100\055\137\320\226\042\231\203\005\034\345\044

\315\342\365\065\004\277\000\226\007\354\262\244\072\152\053\043
\076\311\017\312\023\035\270\044\226\011\046\330\074\052\201\316
\341\201\310\311\163\076\365\273\017\010\036\220\340\260\222\271
\322\072\227\120\340\006\216\344\202\060\074\140\040\267\244\356
\253\211\006\341\374\045\273\221\324\371\267\137\150\143\250\240
\150\206\153\247\354\222\313\042\372\120\133\023\130\047\256\053
\103\013\266\027\306\060\162\004\063\104\046\112\104\007\037\163
\240\203\101\051\340\222\006\274\325\001\352\376\274\257\161\353
\040\037\012\135\015\240\051\136\316\344\101\121\125\226\303\037
\264\061\245\243\363\123\352\377\302\234\206\162\317\066\114\126
\132\006\062\176\136\253\112\241\316\247\353\237\244\214\052\271
\044\213\270\265\363\006\115\246\312\175\231\373\366\125\352\256
\110\171\356\046\131\323\037\014\123\025\367\142\121\371\204\015
\226\154\136\261\010\346\131\010\053\046\051\012\301\203\100\163
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Certipost E-Trust TOP Root CA"
# Issuer: CN=Certipost E-Trust TOP
Root CA,O=Certipost s.a./n.v.,C=BE
# Serial Number:04:00:00:00:00:01:05:52:64:c1:95
# Subject: CN=Certipost E-Trust TOP Root CA,O=Certipost s.a./n.v.,C=BE
# Not Valid Before: Tue Jul 26 10:00:00 2005
# Not Valid After: Sat Jul 26 10:00:00 2025
# Fingerprint (MD5): b8:d3:12:03:4e:8c:0c:5a:47:c9:b6:c5:9e:5b:97:fd
# Fingerprint (SHA1): 05:60:a2:c7:38:ff:98:d1:17:2a:94:fe:45:fb:8a:47:d6:65:37:1e
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certipost E-Trust TOP Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\005\140\242\307\070\377\230\321\027\052\224\376\105\373\212\107
\326\145\067\036
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\270\323\022\003\116\214\014\132\107\311\266\305\236\133\227\375
END
CKA_ISSUER MULTILINE_OCTAL
\060\123\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\034\060\032\006\003\125\004\012\023\023\103\145\162\164\151\160
\157\163\164\040\163\056\141\056\057\156\056\166\056\061\046\060
\044\006\003\125\004\003\023\035\103\145\162\164\151\160\157\163
\164\040\105\055\124\162\165\163\164\040\124\117\120\040\122\157

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\157\164\040\103\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\005\122\144\301\225
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Certipost E-Trust Primary Qualified CA"
# Issuer: CN=Certipost E-Trust Primary Qualified CA,O=Certipost s.a./n.v.,C=BE
# Serial Number:04:00:00:00:00:01:05:52:64:c4:25
# Subject: CN=Certipost E-Trust Primary Qualified CA,O=Certipost s.a./n.v.,C=BE
# Not Valid Before: Tue Jul 26 10:00:00 2005
# Not Valid After: Sun Jul 26 10:00:00 2020
# Fingerprint (MD5): 10:0e:ad:f3:5c:84:1d:8e:03:5f:2d:c9:39:37:f5:52
# Fingerprint (SHA1): 74:2c:df:15:94:04:9c:bf:17:a2:04:6c:c6:39:bb:38:88:e0:2e:33
CKA_CLASS
 CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certipost E-Trust Primary Qualified CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\134\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\034\060\032\006\003\125\004\012\023\023\103\145\162\164\151\160
\157\163\164\040\163\056\141\056\057\156\056\166\056\061\057\060
\055\006\003\125\004\003\023\046\103\145\162\164\151\160\157\163
\164\040\105\055\124\162\165\163\164\040\120\162\151\155\141\162
\171\040\121\165\141\154\151\146\151\145\144\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\134\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\034\060\032\006\003\125\004\012\023\023\103\145\162\164\151\160
\157\163\164\040\163\056\141\056\057\156\056\166\056\061\057\060
\055\006\003\125\004\003\023\046\103\145\162\164\151\160\157\163
\164\040\105\055\124\162\165\163\164\040\120\162\151\155\141\162
\171\040\121\165\141\154\151\146\151\145\144\040\103\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\005\122\144\304\045
END
```

CKA_VALUE MULTILINE_OCTAL
\060\202\003\336\060\202\002\306\240\003\002\001\002\002\013\004
\000\000\000\000\001\005\122\144\304\045\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\060\134\061\013\060\011\006
\003\125\004\006\023\002\102\105\061\034\060\032\006\003\125\004
\012\023\023\103\145\162\164\151\160\157\163\164\040\163\056\141
\056\057\156\056\166\056\061\057\060\055\006\003\125\004\003\023
\046\103\145\162\164\151\160\157\163\164\040\105\055\124\162\165
\163\164\040\120\162\151\155\141\162\171\040\121\165\141\154\151
\146\151\145\144\040\103\101\060\036\027\015\060\065\060\067\062
\066\061\060\060\060\060\060\132\027\015\062\060\060\067\062\066
\061\060\060\060\060\060\132\060\134\061\013\060\011\006\003\125
\004\006\023\002\102\105\061\034\060\032\006\003\125\004\012\023
\023\103\145\162\164\151\160\157\163\164\040\163\056\141\056\057
\156\056\166\056\061\057\060\055\006\003\125\004\003\023\046\103
\145\162\164\151\160\157\163\164\040\105\055\124\162\165\163\164
\040\120\162\151\155\141\162\171\040\121\165\141\154\151\146\151
\145\144\040\103\101\060\202\001\042\060\015\006\011\052\206\110
\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001
\012\002\202\001\001\000\256\040\322\170\333\232\240\162\234\004
\122\045\054\155\122\330\327\047\211\063\240\341\262\325\373\060
\165\153\055\177\034\147\216\016\347\037\022\337\027\171\030\273
\264\033\157\370\075\165\033\236\147\067\360\361\372\017\165\355
\206\235\003\004\241\050\160\055\074\262\153\240\163\121\343\065
\251\164\245\010\076\224\205\047\066\052\252\162\144\374\167\356
\166\224\034\162\353\277\062\307\167\003\152\045\202\011\005\257
\137\140\074\177\254\033\274\222\350\074\164\131\316\361\174\124
\055\070\256\226\360\254\157\241\063\014\041\132\001\272\043\040
\133\240\206\002\325\123\334\111\037\250\062\263\257\073\106\073
\266\357\237\071\263\070\013\347\172\212\366\050\371\247\157\120
\051\310\171\130\213\111\322\245\330\205\176\126\361\151\025\170
\104\021\065\327\245\124\076\253\146\045\322\333\343\030\361\056
\053\342\161\043\011\067\144\103\102\164\062\226\167\336\227\242
\351\226\206\234\045\104\011\324\001\235\121\176\063\267\011\104
\345\200\227\015\144\133\167\030\227\245\113\251\236\020\235\207
\372\126\247\317\012\175\002\003\001\000\001\243\201\240\060\201
\235\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\006\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\035\006\003\125\035\016\004\026\004\024\360\170\371
\007\167\020\273\334\036\241\256\171\373\060\020\333\306\064\370
\027\060\110\006\003\125\035\040\004\101\060\077\060\075\006\011
\003\220\016\007\001\000\001\002\000\060\060\060\056\006\010\053
\006\001\005\005\007\002\001\026\042\150\164\164\160\072\057\057
\167\167\167\056\145\055\164\162\165\163\164\056\142\145\057\103
\120\123\057\121\116\143\145\162\164\163\040\060\021\006\011\140
\206\110\001\206\370\102\001\001\004\004\003\002\000\007\060\015
\006\011\052\206\110\206\367\015\001\001\005\005\000\003\202\001
\001\000\154\341\330\137\164\130\351\160\111\326\312\015\054\130

\332\312\144\266\121\117\303\006\144\001\351\212\163\035\236\317
\106\170\277\073\205\206\342\075\112\030\224\052\201\167\157\202
\370\157\364\356\042\374\235\030\041\162\140\273\030\200\202\225
\373\371\367\225\044\201\146\301\265\303\265\322\266\166\213\073
\201\134\270\241\016\053\001\024\213\200\011\100\356\370\140\114
\031\344\027\315\047\001\263\143\022\005\244\010\311\264\277\236
\120\116\265\336\017\222\063\146\165\320\075\347\043\174\352\045
\161\174\376\076\056\066\171\241\345\051\120\043\065\005\225\170
\273\237\171\144\334\127\110\047\054\342\134\063\315\302\273\176
\150\167\247\057\243\111\027\162\341\000\204\153\175\172\257\071
\013\054\325\330\127\144\062\154\204\012\152\166\072\323\254\315
\235\261\347\067\334\354\014\057\305\127\140\337\210\365\103\261
\001\144\046\264\047\202\020\262\243\120\357\227\346\177\277\221
\207\263\333\220\251\052\342\172\064\154\163\111\364\350\215\056
\153\212\335\241\212\177\143\320\277\130\036\257\314\077\222\120
\055\321
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Certipost E-Trust Primary Qualified CA"
# Issuer: CN=Certipost E-Trust Primary Qualified CA,O=Certipost s.a./n.v.,C=BE
# Serial Number:04:00:00:00:00:01:05:52:64:c4:25
# Subject: CN=Certipost E-Trust Primary Qualified CA,O=Certipost s.a./n.v.,C=BE
# Not Valid Before: Tue Jul 26 10:00:00 2005
# Not Valid After: Sun Jul 26 10:00:00 2020
# Fingerprint (MD5): 10:0e:ad:f3:5c:84:1d:8e:03:5f:2d:c9:39:37:f5:52
# Fingerprint (SHA1): 74:2c:df:15:94:04:9c:bf:17:a2:04:6c:c6:39:bb:38:88:e0:2e:33
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN
 CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certipost E-Trust Primary Qualified CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\164\054\337\025\224\004\234\277\027\242\004\154\306\071\273\070
\210\340\056\063
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\020\016\255\363\134\204\035\216\003\137\055\311\071\067\365\122
END
CKA_ISSUER MULTILINE_OCTAL
\060\134\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\034\060\032\006\003\125\004\012\023\023\103\145\162\164\151\160
\157\163\164\040\163\056\141\056\057\156\056\166\056\061\057\060

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\055\006\003\125\004\003\023\046\103\145\162\164\151\160\157\163
\164\040\105\055\124\162\165\163\164\040\120\162\151\155\141\162
\171\040\121\165\141\154\151\146\151\145\144\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\005\122\144\304\045
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Certipost E-Trust Primary Normalised CA"
# Issuer: CN=Certipost E-Trust Primary Normalised CA,O=Certipost s.a./n.v.,C=BE
# Serial Number:04:00:00:00:00:01:05:52:64:c7:61
# Subject: CN=Certipost E-Trust Primary Normalised CA,O=Certipost s.a./n.v.,C=BE
# Not Valid Before: Tue Jul 26 10:00:00 2005
# Not Valid After: Sun Jul 26 10:00:00 2020
# Fingerprint (MD5): 21:ef:b8:50:40:39:3f:75:6f:27:fe:e3:ea:58:70:eb
# Fingerprint (SHA1): a5:9c:9b:10:ec:73:57:51:5a:bb:66:0c:4d:94:f7:3b:9e:6e:92:72
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certipost E-Trust Primary Normalised CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\034\060\032\006\003\125\004\012\023\023\103\145\162\164\151\160
\157\163\164\040\163\056\141\056\057\156\056\166\056\061\060\060
\056\006\003\125\004\003\023\047\103\145\162\164\151\160\157\163
\164\040\105\055\124\162\165\163\164\040\120\162\151\155\141\162
\171\040\116\157\162\155\141\154\151\163\145\144\040\103\101
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\034\060\032\006\003\125\004\012\023\023\103\145\162\164\151\160
\157\163\164\040\163\056\141\056\057\156\056\166\056\061\060\060
\056\006\003\125\004\003\023\047\103\145\162\164\151\160\157\163
\164\040\105\055\124\162\165\163\164\040\120\162\151\155\141\162
\171\040\116\157\162\155\141\154\151\163\145\144\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\005\122\144\307\141
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END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\340\060\202\002\310\240\003\002\001\002\002\013\004
\000\000\000\000\001\005\122\144\307\141\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\060\135\061\013\060\011\006
\003\125\004\006\023\002\102\105\061\034\060\032\006\003\125\004
\012\023\023\103\145\162\164\151\160\157\163\164\040\163\056\141
\056\057\156\056\166\056\061\060\060\056\006\003\125\004\003\023
\047\103\145\162\164\151\160\157\163\164\040\105\055\124\162\165
\163\164\040\120\162\151\155\141\162\171\040\116\157\162\155\141
\154\151\163\145\144\040\103\101\060\036\027\015\060\065\060\067
\062\066\061\060\060\060\060\060\132\027\015\062\060\060\067\062
\066\061\060\060\060\060\060\132\060\135\061\013\060\011\006\003
\125\004\006\023\002\102\105\061\034\060\032\006\003\125\004\012
\023\023\103\145\162\164\151\160\157\163\164\040\163\056\141\056
\057\156\056\166\056\061\060\060\056\006\003\125\004\003\023\047
\103\145\162\164\151\160\157\163\164\040\105\055\124\162\165\163
\164\040\120\162\151\155\141\162\171\040\116\157\162\155\141\154
\151\163\145\144\040\103\101\060\202\001\042\060\015\006\011\052
\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060
\202\001\012\002\202\001\001\000\325\263\252\122\204\172\027\223
\042\017\270\004\030\312\311\362\202\052\254\025\013\247\120\161
\266\114\045\153\367\377\001\252\127\132\167\116\136\023\024\015
\125\362\036\361\205\315\205\327\202\034\014\332\011\053\275\375
\274\236\376\155\211\115\242\002\044\346\121\352\067\177\061\106
\132\173\232\166\263\056\240\135\137\344\370\231\012\007\276\356
\222\046\022\311\173\347\135\154\320\203\107\016\300\214\247\321
\171\127\300\013\031\234\233\236\103\305\116\221\045\316\210\053
\155\171\331\171\212\326\146\116\042\303\032\105\116\357\310\260
\142\046\116\046\124\120\237\014\157\263\153\314\174\237\177\336
\017\015\265\217\303\153\324\341\302\373\273\126\120\252\214\075
\217\000\213\074\374\110\027\152\322\132\363\165\155\145\201\275
\106\135\237\242\142\123\256\316\363\251\344\221\053\132\046\303
\171\146\321\246\123\146\065\034\006\161\261\356\231\016\304\373
\130\022\254\042\106\055\342\042\222\333\341\074\277\273\376\206
\347\223\064\163\317\170\151\323\313\336\371\014\262\150\332\311
\212\012\140\124\304\363\126\143\002\003\001\000\001\243\201\240
\060\201\235\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\110\006\003\125\035\040\004\101\060\077\060
\075\006\011\003\220\016\007\001\000\001\002\000\060\060\060\056
\006\010\053\006\001\005\005\007\002\001\026\042\150\164\164\160
\072\057\057\167\167\167\056\145\055\164\162\165\163\164\056\142
\145\057\103\120\123\057\121\116\143\145\162\164\163\040\060\035
\006\003\125\035\016\004\026\004\024\021\362\013\226\322\063\070
\201\127\130\023\375\100\244\021\157\116\231\372\147\060\021\006
\011\140\206\110\001\206\370\102\001\001\004\004\003\002\000\007
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003

\202\001\001\000\065\153\117\336\235\363\003\266\035\310\274\215
\347\136\152\236\251\351\355\242\053\227\352\257\321\341\106\323
\002\111\175\304\122\205\353\272\366\323\277\071\142\030\235\223
\111\275\170\003\277\323\136\025\335\357\047\034\341\273\105\001
\042\201\000\115\072\340\205\312\132\062\003\314\040\217\257\357
\301\333\250\372\363\334\327\262\261\017\003\201\011\051\340\161
\174\213\372\177\313\066\156\033\350\024\316\360\113\046\241\062
\051\117\314\264\365\207\110\014\023\374\307\235\257\253\324\223
\365\052\115\177\110\202\130\076\027\377\303\200\052\253\077\127
\125\270\071\054\146\020\144\046\155\214\153\326\335\240\203\032
\132\126\021\226\106\275\256\160\050\326\070\127\133\221\325\077
\115\351\254\263\303\044\112\226\145\134\064\320\036\324\277\010
\245\227\135\367\106\333\166\360\315\076\165\143\000\053\257\255
\256\206\336\137\246\231\124\015\205\043\245\374\272\355\033\122
\372\111\030\167\205\133\252\162\233\047\010\065\105\067\047\333
\227\311\372\213\075\310\320\235\336\132\357\135\243\026\266\230
\171\312\174\313
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER
 CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Certipost E-Trust Primary Normalised CA"
# Issuer: CN=Certipost E-Trust Primary Normalised CA,O=Certipost s.a./n.v.,C=BE
# Serial Number:04:00:00:00:00:01:05:52:64:c7:61
# Subject: CN=Certipost E-Trust Primary Normalised CA,O=Certipost s.a./n.v.,C=BE
# Not Valid Before: Tue Jul 26 10:00:00 2005
# Not Valid After: Sun Jul 26 10:00:00 2020
# Fingerprint (MD5): 21:ef:b8:50:40:39:3f:75:6f:27:fe:e3:ea:58:70:eb
# Fingerprint (SHA1): a5:9c:9b:10:ec:73:57:51:5a:bb:66:0c:4d:94:f7:3b:9e:6e:92:72
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Certipost E-Trust Primary Normalised CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\245\234\233\020\354\163\127\121\132\273\146\014\115\224\367\073
\236\156\222\162
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\041\357\270\120\100\071\077\165\157\047\376\343\352\130\160\353
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\102\105\061

```
\034\060\032\006\003\125\004\012\023\023\103\145\162\164\151\160
\157\163\164\040\163\056\141\056\057\156\056\166\056\061\060\060
\056\006\003\125\004\003\023\047\103\145\162\164\151\160\157\163
\164\040\105\055\124\162\165\163\164\040\120\162\151\155\141\162
\171\040\116\157\162\155\141\154\151\163\145\144\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\005\122\144\307\141
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Cybertrust Global Root"
# Issuer: CN=Cybertrust Global Root,O=Cybertrust\, Inc
# Serial Number:04:00:00:00:00:01:0f:85:aa:2d:48
# Subject: CN=Cybertrust Global Root,O=Cybertrust\, Inc
# Not Valid Before: Fri Dec
 15 08:00:00 2006
# Not Valid After: Wed Dec 15 08:00:00 2021
# Fingerprint (MD5): 72:e4:4a:87:e3:69:40:80:77:ea:bc:e3:f4:ff:f0:e1
# Fingerprint (SHA1): 5f:43:e5:b1:bf:f8:78:8c:ac:1c:c7:ca:4a:9a:c6:22:2b:cc:34:c6
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Cybertrust Global Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\073\061\030\060\026\006\003\125\004\012\023\017\103\171\142
\145\162\164\162\165\163\164\054\040\111\156\143\061\037\060\035
\006\003\125\004\003\023\026\103\171\142\145\162\164\162\165\163
\164\040\107\154\157\142\141\154\040\122\157\157\164
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\073\061\030\060\026\006\003\125\004\012\023\017\103\171\142
\145\162\164\162\165\163\164\054\040\111\156\143\061\037\060\035
\006\003\125\004\003\023\026\103\171\142\145\162\164\162\165\163
\164\040\107\154\157\142\141\154\040\122\157\157\164
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\017\205\252\055\110
END
CKA_VALUE MULTILINE_OCTAL
```

\060\202\003\241\060\202\002\211\240\003\002\001\002\002\013\004
\000\000\000\000\001\017\205\252\055\110\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\060\073\061\030\060\026\006
\003\125\004\012\023\017\103\171\142\145\162\164\162\165\163\164
\054\040\111\156\143\061\037\060\035\006\003\125\004\003\023\026
\103\171\142\145\162\164\162\165\163\164\040\107\154\157\142\141
\154\040\122\157\157\164\060\036\027\015\060\066\061\062\061\065
\060\070\060\060\060\060\132\027\015\062\061\061\062\061\065\060
\070\060\060\060\060\132\060\073\061\030\060\026\006\003\125\004
\012\023\017\103\171\142\145\162\164\162\165\163\164\054\040\111
\156\143\061\037\060\035\006\003\125\004\003\023\026\103\171\142
\145\162\164\162\165\163\164\040\107\154\157\142\141\154\040\122
\157\157\164\060\202\001\042\060\015\006\011\052\206\110\206\367
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002
\202\001\001\000\370\310\274\275\024\120\146\023\377\360\323\171
\354\043\362\267\032\307\216\205\361\022\163\246\031\252\020\333
\234\242\145\164\132\167\076\121\175\126\366\334\043\266\324\355
\137\130\261\067\115\325\111\016\156\365\152\207\326\322\214\322
\047\306\342\377\066\237\230\145\240\023\116\306\052\144\233\325
\220\022\317\024\006\364\073\343\324\050\276\350\016\370\253\116
\110\224\155\216\225\061\020\134\355\242\055\275\325\072\155\262
\034\273\140\300\106\113\001\365\111\256\176\106\212\320\164\215
\241\014\002\316\356\374\347\217\270\153\146\363\177\104\000\277
\146\045\024\053\335\020\060\035\007\226\077\115\366\153\270\217
\267\173\014\245\070\353\336\107\333\325\135\071\374\210\247\363
\327\052\164\361\350\132\242\073\237\120\272\246\214\105\065\302
\120\145\225\334\143\202\357\335\277\167\115\234\142\311\143\163
\026\320\051\017\111\251\110\360\263\252\267\154\305\247\060\071
\100\135\256\304\342\135\046\123\360\316\034\043\010\141\250\224
\031\272\004\142\100\354\037\070\160\167\022\006\161\247\060\030
\135\045\047\245\002\003\001\000\001\243\201\245\060\201\242\060
\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\035\006\003\125\035\016\004\026\004\024\266\010\173\015\172
\314\254\040\114\206\126\062\136\317\253\156\205\055\160\127\060
\077\006\003\125\035\037\004\070\060\066\060\064\240\062\240\060
\206\056\150\164\164\160\072\057\057\167\167\167\062\056\160\165
\142\154\151\143\055\164\162\165\163\164\056\143\157\155\057\143
\162\154\057\143\164\057\143\164\162\157\157\164\056\143\162\154
\060\037\006\003\125\035\043\004\030\060\026\200\024\266\010\173
\015\172\314\254\040\114\206\126\062\136\317\253\156\205\055\160
\127\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000
\003\202\001\001\000\126\357\012\043\240\124\116\225\227\311\370
\211\332\105\301\324\243\000\045\364\037\023\253\267\243\205\130
\151\302\060\255\330\025\212\055\343\311\315\201\132\370\163\043
\132\247\174\005\363\375\042\073\016\321\006\304\333\066\114\163
\004\216\345\260\042\344\305\363\056\245\331\043\343\270\116\112
\040\247\156\002\044\237\042\140\147\173\213\035\162\011\305\061

\134\351\171\237\200\107\075\255\241\013\007\024\075\107\377\003
\151\032\014\013\104\347\143\045\247\177\262\311\270\166\204\355
\043\366\175\007\253\105\176\323\337\263\277\351\212\266\315\250
\242\147\053\122\325\267\145\360\071\114\143\240\221\171\223\122
\017\124\335\203\273\237\321\217\247\123\163\303\313\377\060\354
\174\004\270\330\104\037\223\137\161\011\042\267\156\076\352\034
\003\116\235\032\040\141\373\201\067\354\136\374\012\105\253\327
\347\027\125\320\240\352\140\233\246\366\343\214\133\051\302\006
\140\024\235\055\227\114\251\223\025\235\141\304\001\137\110\326
\130\275\126\061\022\116\021\310\041\340\263\021\221\145\333\264
\246\210\070\316\125
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL
 CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Cybertrust Global Root"
# Issuer: CN=Cybertrust Global Root,O=Cybertrust\, Inc
# Serial Number:04:00:00:00:00:01:0f:85:aa:2d:48
# Subject: CN=Cybertrust Global Root,O=Cybertrust\, Inc
# Not Valid Before: Fri Dec 15 08:00:00 2006
# Not Valid After: Wed Dec 15 08:00:00 2021
# Fingerprint (MD5): 72:e4:4a:87:e3:69:40:80:77:ea:bc:e3:f4:ff:f0:e1
# Fingerprint (SHA1): 5f:43:e5:b1:bf:f8:78:8c:ac:1c:c7:ca:4a:9a:c6:22:2b:cc:34:c6
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Cybertrust Global Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\137\103\345\261\277\370\170\214\254\034\307\312\112\232\306\042
\053\314\064\306
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\162\344\112\207\343\151\100\200\167\352\274\343\364\377\360\341
END
CKA_ISSUER MULTILINE_OCTAL
\060\073\061\030\060\026\006\003\125\004\012\023\017\103\171\142
\145\162\164\162\165\163\164\054\040\111\156\143\061\037\060\035
\006\003\125\004\003\023\026\103\171\142\145\162\164\162\165\163
\164\040\107\154\157\142\141\154\040\122\157\157\164
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\017\205\252\055\110

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END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "GlobalSign"
# Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R2
# Serial Number:04:00:00:00:00:01:0f:86:26:e6:0d
# Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R2
# Not Valid Before: Fri Dec 15 08:00:00 2006
# Not Valid After: Wed Dec 15 08:00:00 2021
# Fingerprint (MD5): 94:14:77:7e:3e:5e:fd:8f:30:bd:41:b0:cf:e7:d0:30
# Fingerprint (SHA1): 75:e0:ab:b6:13:85:12:27:1c:04:f8:5f:dd:de:38:e4:b7:24:2e:fe
CKA_CLASS
 CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\114\061\040\060\036\006\003\125\004\013\023\027\107\154\157
\142\141\154\123\151\147\156\040\122\157\157\164\040\103\101\040
\055\040\122\062\061\023\060\021\006\003\125\004\012\023\012\107
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125
\004\003\023\012\107\154\157\142\141\154\123\151\147\156
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\040\060\036\006\003\125\004\013\023\027\107\154\157
\142\141\154\123\151\147\156\040\122\157\157\164\040\103\101\040
\055\040\122\062\061\023\060\021\006\003\125\004\012\023\012\107
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125
\004\003\023\012\107\154\157\142\141\154\123\151\147\156
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\017\206\046\346\015
END
CKA_VALUE
 MULTILINE_OCTAL
\060\202\003\272\060\202\002\242\240\003\002\001\002\002\013\004
\000\000\000\000\001\017\206\046\346\015\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\060\114\061\040\060\036\006
\003\125\004\013\023\027\107\154\157\142\141\154\123\151\147\156
\040\122\157\157\164\040\103\101\040\055\040\122\062\061\023\060
\021\006\003\125\004\012\023\012\107\154\157\142\141\154\123\151
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\147\156\061\023\060\021\006\003\125\004\003\023\012\107\154\157
\142\141\154\123\151\147\156\060\036\027\015\060\066\061\062\061
\065\060\070\060\060\060\060\132\027\015\062\061\061\062\061\065
\060\070\060\060\060\060\132\060\114\061\040\060\036\006\003\125
\004\013\023\027\107\154\157\142\141\154\123\151\147\156\040\122
\157\157\164\040\103\101\040\055\040\122\062\061\023\060\021\006
\003\125\004\012\023\012\107\154\157\142\141\154\123\151\147\156
\061\023\060\021\006\003\125\004\003\023\012\107\154\157\142\141
\154\123\151\147\156\060\202\001\042\060\015\006\011\052\206\110
\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001
\012\002\202\001\001\000\246\317\044\016\276\056\157\050\231\105
\102\304\253\076\041\124\233\013\323\177\204\160\372\022\263\313
\277\207\137\306\177\206\323\262\060\134\326\375\255\361\173\334
\345\370\140\226\011\222\020\365\320\123\336\373\173\176\163\210
\254\122\210\173\112\246\312\111\246\136\250\247\214\132\021\274
\172\202\353\276\214\351\263\254\226\045\007\227\112\231\052\007
\057\264\036\167\277\212\017\265\002\174\033\226\270\305\271\072
\054\274\326\022\271\353\131\175\342\320\006\206\137\136\111\152
\265\071\136\210\064\354\274\170\014\010\230\204\154\250\315\113
\264\240\175\014\171\115\360\270\055\313\041\312\325\154\133\175
\341\240\051\204\241\371\323\224\111\313\044\142\221\040\274\335
\013\325\331\314\371\352\047\012\053\163\221\306\235\033\254\310
\313\350\340\240\364\057\220\213\115\373\260\066\033\366\031\172
\205\340\155\362\141\023\210\134\237\340\223\012\121\227\212\132
\316\257\253\325\367\252\011\252\140\275\334\331\137\337\162\251
\140\023\136\000\001\311\112\372\077\244\352\007\003\041\002\216
\202\312\003\302\233\217\002\003\001\000\001\243\201\234\060\201
\231\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\006\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\035\006\003\125\035\016\004\026\004\024\233\342\007
\127\147\034\036\300\152\006\336\131\264\232\055\337\334\031\206
\056\060\066\006\003\125\035\037\004\057\060\055\060\053\240\051
\240\047\206\045\150\164\164\160\072\057\057\143\162\154\056\147
\154\157\142\141\154\163\151\147\156\056\156\145\164\057\162\157
\157\164\055\162\062\056\143\162\154\060\037\006\003\125\035\043
\004\030\060\026\200\024\233\342\007\127\147\034\036\300\152\006
\336\131\264\232\055\337\334\031\206\056\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\003\202\001\001\000\231\201
\123\207\034\150\227\206\221\354\340\112\270\104\013\253\201\254
\047\117\326\301\270\034\103\170\263\014\232\374\352\054\074\156
\141\033\115\113\051\365\237\005\035\046\301\270\351\203\000\142
\105\266\251\010\223\271\251\063\113\030\232\302\370\207\210\116
\333\335\161\064\032\301\124\332\106\077\340\323\052\253\155\124
\042\365\072\142\315\040\157\272\051\211\327\335\221\356\323\134
\242\076\241\133\101\365\337\345\144\103\055\351\325\071\253\322
\242\337\267\213\320\300\200\031\034\105\300\055\214\350\370\055
\244\164\126\111\305\005\265\117\025\336\156\104\170\071\207\250
\176\273\363\171\030\221\273\364\157\235\301\360\214\065\214\135

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\001\373\303\155\271\357\104\155\171\106\061\176\012\376\251\202
\301\377\357\253\156\040\304\120\311\137\235\115\233\027\214\014
\345\001\311\240\101\152\163\123\372\245\120\264\156\045\017\373
\114\030\364\375\122\331\216\151\261\350\021\017\336\210\330\373
\035\111\367\252\336\225\317\040\170\302\140\022\333\045\100\214
\152\374\176\102\070\100\144\022\367\236\201\341\223\056
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER
 CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "GlobalSign"
# Issuer: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R2
# Serial Number:04:00:00:00:00:01:0f:86:26:e6:0d
# Subject: CN=GlobalSign,O=GlobalSign,OU=GlobalSign Root CA - R2
# Not Valid Before: Fri Dec 15 08:00:00 2006
# Not Valid After: Wed Dec 15 08:00:00 2021
# Fingerprint (MD5): 94:14:77:7e:3e:5e:fd:8f:30:bd:41:b0:cf:e7:d0:30
# Fingerprint (SHA1): 75:e0:ab:b6:13:85:12:27:1c:04:f8:5f:dd:de:38:e4:b7:24:2e:fe
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\165\340\253\266\023\205\022\047\034\004\370\137\335\336\070\344
\267\044\056\376
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\224\024\167\176\076\136\375\217\060\275\101\260\317\347\320\060
END
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\040\060\036\006\003\125\004\013\023\027\107\154\157
\142\141\154\123\151\147\156\040\122\157\157\164\040\103\101\040
\055\040\122\062\061\023\060\021\006\003\125\004\012\023\012\107
\154\157\142\141\154\123\151\147\156\061\023\060\021\006\003\125
\004\003\023\012\107\154\157\142\141\154\123\151\147\156
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\013\004\000\000\000\000\001\017\206\046\346\015
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
```

```
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "IGC/A"
# Issuer:
1.2.840.113549.1.9.1=igca@sgdn.pm.gouv.fr,CN=IGC/A,OU=DCSSI,O=PM/SGDN,L=Paris,ST=France,C=FR
# Serial Number:39:11:45:10:94
# Subject:
1.2.840.113549.1.9.1=igca@sgdn.pm.gouv.fr,CN=IGC/A,OU=DCSSI,O=PM/SGDN,L=Paris,ST=France,C=FR
# Not Valid Before: Fri Dec 13 14:29:23 2002
# Not Valid After: Sat Oct 17 14:29:22
 2020
# Fingerprint (MD5): 0c:7f:dd:6a:f4:2a:b9:c8:9b:bd:20:7e:a9:db:5c:37
# Fingerprint (SHA1): 60:d6:89:74:b5:c2:65:9e:8a:0f:c1:88:7c:88:d2:46:69:1b:18:2c
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "IGC/A"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\205\061\013\060\011\006\003\125\004\006\023\002\106\122
\061\017\060\015\006\003\125\004\010\023\006\106\162\141\156\143
\145\061\016\060\014\006\003\125\004\007\023\005\120\141\162\151
\163\061\020\060\016\006\003\125\004\012\023\007\120\115\057\123
\107\104\116\061\016\060\014\006\003\125\004\013\023\005\104\103
\123\123\111\061\016\060\014\006\003\125\004\003\023\005\111\107
\103\057\101\061\043\060\041\006\011\052\206\110\206\367\015\001
\011\001\026\024\151\147\143\141\100\163\147\144\156\056\160\155
\056\147\157\165\166\056\146\162
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\205\061\013\060\011\006\003\125\004\006\023\002\106\122
\061\017\060\015\006\003\125\004\010\023\006\106\162\141\156\143
\145\061\016\060\014\006\003\125\004\007\023\005\120\141\162\151
\163\061\020\060\016\006\003\125\004\012\023\007\120\115\057\123
\107\104\116\061\016\060\014\006\003\125\004\013\023\005\104\103
\123\123\111\061\016\060\014\006\003\125\004\003\023\005\111\107
\103\057\101\061\043\060\041\006\011\052\206\110\206\367\015\001
\011\001\026\024\151\147\143\141\100\163\147\144\156\056\160\155
\056\147\157\165\166\056\146\162
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\005\071\021\105\020\224
END
CKA_VALUE MULTILINE_OCTAL
```

\060\202\004\002\060\202\002\352\240\003\002\001\002\002\005\071
\021\105\020\224\060\015\006\011\052\206\110\206\367\015\001\001
\005\005\000\060\201\205\061\013\060\011\006\003\125\004\006\023
\002\106\122\061\017\060\015\006\003\125\004\010\023\006\106\162
\141\156\143\145\061\016\060\014\006\003\125\004\007\023\005\120
\141\162\151\163\061\020\060\016\006\003\125\004\012\023\007\120
\115\057\123\107\104\116\061\016\060\014\006\003\125\004\013\023
\005\104\103\123\123\111\061\016\060\014\006\003\125\004\003\023
\005\111\107\103\057\101\061\043\060\041\006\011\052\206\110\206
\367\015\001\011\001\026\024\151\147\143\141\100\163\147\144\156
\056\160\155\056\147\157\165\166\056\146\162\060\036\027\015\060
\062\061\062\061\063\061\064\062\071\062\063\132\027\015\062\060
\061\060\061\067\061\064\062\071\062\062\132\060\201\205\061\013
\060\011\006\003\125\004\006\023\002\106\122\061\017\060\015\006
\003\125\004\010\023\006\106\162\141\156\143\145\061\016\060\014
\006\003\125\004\007\023\005\120\141\162\151\163\061\020\060\016
\006\003\125\004\012\023\007\120\115\057\123\107\104\116\061\016
\060\014\006\003\125\004\013\023\005\104\103\123\123\111\061\016
\060\014\006\003\125\004\003\023\005\111\107\103\057\101\061\043
\060\041\006\011\052\206\110\206\367\015\001\011\001\026\024\151
\147\143\141\100\163\147\144\156\056\160\155\056\147\157\165\166
\056\146\162\060\202\001\042\060\015\006\011\052\206\110\206\367
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002
\202\001\001\000\262\037\321\320\142\305\063\073\300\004\206\210
\263\334\370\210\367\375\337\103\337\172\215\232\111\134\366\116
\252\314\034\271\241\353\047\211\362\106\351\073\112\161\325\035
\216\055\317\346\255\253\143\120\307\124\013\156\022\311\220\066
\306\330\057\332\221\252\150\305\162\376\027\012\262\027\176\171
\265\062\210\160\312\160\300\226\112\216\344\125\315\035\047\224
\277\316\162\052\354\134\371\163\040\376\275\367\056\211\147\270
\273\107\163\022\367\321\065\151\072\362\012\271\256\377\106\102
\106\242\277\241\205\032\371\277\344\377\111\205\367\243\160\206
\062\034\135\237\140\367\251\255\245\377\317\321\064\371\175\133
\027\306\334\326\016\050\153\302\335\361\365\063\150\235\116\374
\207\174\066\022\326\243\200\350\103\015\125\141\224\352\144\067
\107\352\167\312\320\262\130\005\303\135\176\261\250\106\220\061
\126\316\160\052\226\262\060\270\167\346\171\300\275\051\073\375
\224\167\114\275\040\315\101\045\340\056\307\033\273\356\244\004
\101\322\135\255\022\152\212\233\107\373\311\335\106\100\341\235
\074\063\320\265\002\003\001\000\001\243\167\060\165\060\017\006
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\013
\006\003\125\035\017\004\004\003\002\001\106\060\025\006\003\125
\035\040\004\016\060\014\060\012\006\010\052\201\172\001\171\001
\001\001\060\035\006\003\125\035\016\004\026\004\024\243\005\057
\030\140\120\302\211\012\335\053\041\117\377\216\116\250\060\061
\066\060\037\006\003\125\035\043\004\030\060\026\200\024\243\005
\057\030\140\120\302\211\012\335\053\041\117\377\216\116\250\060
\061\066\060\015\006\011\052\206\110\206\367\015\001\001\005\005

\000\003\202\001\001\000\005\334\046\330\372\167\025\104\150\374
\057\146\072\164\340\135\344\051\377\006\007\023\204\112\253\317
\155\240\037\121\224\370\111\313\164\066\024\274\025\335\333\211
\057\335\217\240\135\174\365\022\353\237\236\070\244\107\314\263
\226\331\276\234\045\253\003\176\063\017\225\201\015\375\026\340
\210\276\067\360\154\135\320\061\233\062\053\135\027\145\223\230
\140\274\156\217\261\250\074\036\331\034\363\251\046\102\371\144
\035\302\347\222\366\364\036\132\252\031\122\135\257\350\242\367
\140\240\366\215\360\211\365\156\340\012\005\001\225\311\213\040
\012\272\132\374\232\054\074\275\303\267\311\135\170\045\005\077
\126\024\233\014\332\373\072\110\376\227\151\136\312\020\206\367
\116\226\004\010\115\354\260\276\135\334\073\216\117\301\375\232
\066\064\232\114\124\176\027\003\110\225\010\021\034\007\157\205
\010\176\135\115\304\235\333\373\256\316\262\321\263\270\203\154
\035\262\263\171\361\330\160\231\176\360\023\002\316\136\335\121
\323\337\066\201\241\033\170\057\161\263\361\131\114\106\030\050
\253\205\322\140\126\132
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing
 Only Certificate
# Trust for "IGC/A"
# Issuer:
1.2.840.113549.1.9.1=igca@sgdn.pm.gouv.fr,CN=IGC/A,OU=DCSSI,O=PM/SGDN,L=Paris,ST=France,C=FR
# Serial Number:39:11:45:10:94
# Subject:
1.2.840.113549.1.9.1=igca@sgdn.pm.gouv.fr,CN=IGC/A,OU=DCSSI,O=PM/SGDN,L=Paris,ST=France,C=FR
# Not Valid Before: Fri Dec 13 14:29:23 2002
# Not Valid After: Sat Oct 17 14:29:22 2020
# Fingerprint (MD5): 0c:7f:dd:6a:f4:2a:b9:c8:9b:bd:20:7e:a9:db:5c:37
# Fingerprint (SHA1): 60:d6:89:74:b5:c2:65:9e:8a:0f:c1:88:7c:88:d2:46:69:1b:18:2c
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "IGC/A"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\140\326\211\164\265\302\145\236\212\017\301\210\174\210\322\106
\151\033\030\054
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\014\177\335\152\364\052\271\310\233\275\040\176\251\333\134\067
END
CKA_ISSUER MULTILINE_OCTAL

```
\060\201\205\061\013\060\011\006\003\125\004\006\023\002\106\122
\061\017\060\015\006\003\125\004\010\023\006\106\162\141\156\143
\145\061\016\060\014\006\003\125\004\007\023\005\120\141\162\151
\163\061\020\060\016\006\003\125\004\012\023\007\120\115\057\123
\107\104\116\061\016\060\014\006\003\125\004\013\023\005\104\103
\123\123\111\061\016\060\014\006\003\125\004\003\023\005\111\107
\103\057\101\061\043\060\041\006\011\052\206\110\206\367\015\001
\011\001\026\024\151\147\143\141\100\163\147\144\156\056\160\155
\056\147\157\165\166\056\146\162
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\005\071\021\105\020\224
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "SwissSign Platinum CA - G2"
# Issuer: CN=SwissSign Platinum CA - G2,O=SwissSign AG,C=CH
# Serial Number:4e:b2:00:67:0c:03:5d:4f
# Subject: CN=SwissSign Platinum CA - G2,O=SwissSign
 AG,C=CH
# Not Valid Before: Wed Oct 25 08:36:00 2006
# Not Valid After: Sat Oct 25 08:36:00 2036
# Fingerprint (MD5): c9:98:27:77:28:1e:3d:0e:15:3c:84:00:b8:85:03:e6
# Fingerprint (SHA1): 56:e0:fa:c0:3b:8f:18:23:55:18:e5:d3:11:ca:e8:c2:43:31:ab:66
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SwissSign Platinum CA - G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\111\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\043\060\041\006\003\125\004\003\023
\032\123\167\151\163\163\123\151\147\156\040\120\154\141\164\151
\156\165\155\040\103\101\040\055\040\107\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\111\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\043\060\041\006\003\125\004\003\023
\032\123\167\151\163\163\123\151\147\156\040\120\154\141\164\151
```

\156\165\155\040\103\101\040\055\040\107\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\010\116\262\000\147\014\003\135\117
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\301\060\202\003\251\240\003\002\001\002\002\010\116
\262\000\147\014\003\135\117\060\015\006\011\052\206\110\206\367
\015\001\001\005\005\000\060\111\061\013\060\011\006\003\125\004
\006\023\002\103\110\061\025\060\023\006\003\125\004\012\023\014
\123\167\151\163\163\123\151\147\156\040\101\107\061\043\060\041
\006\003\125\004\003\023\032\123\167\151\163\163\123\151\147\156
\040\120\154\141\164\151\156\165\155\040\103\101\040\055\040\107
\062\060\036\027\015\060\066\061\060\062\065\060\070\063\066\060
\060\132\027\015\063\066\061\060\062\065\060\070\063\066\060\060
\132\060\111\061\013\060\011\006\003\125\004\006\023\002\103\110
\061\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163
\123\151\147\156\040\101\107\061\043\060\041\006\003\125\004\003
\023\032\123\167\151\163\163\123\151\147\156\040\120\154\141\164
\151\156\165\155\040\103\101\040\055\040\107\062\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\312\337\242
\002\342\332\370\374\007\026\261\336\140\252\336\226\134\144\037
\307\057\176\317\147\372\104\102\326\166\143\225\256\353\257\162
\040\212\105\107\206\142\170\206\326\040\071\046\364\256\243\375
\043\347\245\234\265\042\041\031\267\067\223\042\300\120\234\202
\173\324\325\004\104\134\313\264\302\237\222\276\044\330\173\147
\042\342\151\137\345\005\170\324\207\331\161\160\063\045\123\264
\207\073\051\220\050\066\232\125\104\060\150\244\203\227\177\015
\036\234\166\377\025\235\140\227\000\215\212\205\003\354\200\276
\352\054\156\020\121\222\314\176\325\243\063\330\326\111\336\130
\052\257\366\026\353\113\173\220\062\227\271\272\235\130\361\370
\127\111\004\036\242\135\006\160\335\161\333\371\335\213\232\033
\214\317\075\243\115\316\313\174\366\273\234\240\372\011\316\043
\142\262\351\015\037\342\162\050\217\237\254\150\040\175\157\073
\250\205\061\011\177\013\307\350\145\351\343\170\016\011\147\060
\213\064\202\373\135\340\314\235\201\155\142\356\010\036\004\054
\116\233\354\376\251\117\137\375\151\170\357\011\037\241\264\277
\372\363\357\220\036\114\005\213\036\352\172\221\172\303\327\345
\373\060\274\154\033\020\130\230\367\032\137\320\051\062\003\023
\106\115\141\152\205\114\122\164\057\006\037\173\021\342\204\227
\306\231\363\155\177\327\147\203\176\023\150\330\161\050\132\330
\316\335\350\020\024\232\376\155\043\207\156\216\132\160\074\325
\215\011\000\247\252\274\260\061\067\155\310\204\024\036\133\275
\105\143\040\153\113\164\214\275\333\072\016\301\317\132\026\217
\245\230\362\166\211\262\023\022\073\013\167\167\254\273\345\074
\051\112\222\162\312\141\032\053\136\114\342\203\164\167\372\065

\110\172\205\115\215\232\123\304\337\170\312\227\221\110\053\105
\053\001\367\034\032\242\355\030\272\012\275\203\372\157\274\215
\127\223\073\324\324\246\316\036\361\240\261\316\253\375\053\050
\232\117\033\327\303\162\333\244\304\277\135\114\365\335\173\226
\151\356\150\200\346\347\230\272\066\267\376\156\355\053\275\040
\370\145\031\332\125\011\176\045\334\376\141\142\162\371\176\030
\002\357\143\264\320\373\257\345\073\143\214\147\217\002\003\001
\000\001\243\201\254\060\201\251\060\016\006\003\125\035\017\001
\001\377\004\004\003\002\001\006\060\017\006\003\125\035\023\001
\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016
\004\026\004\024\120\257\314\007\207\025\107\157\070\305\264\145
\321\336\225\252\351\337\234\314\060\037\006\003\125\035\043\004
\030\060\026\200\024\120\257\314\007\207\025\107\157\070\305\264
\145\321\336\225\252\351\337\234\314\060\106\006\003\125\035\040
\004\077\060\075\060\073\006\011\140\205\164\001\131\001\001\001
\001\060\056\060\054\006\010\053\006\001\005\005\007\002\001\026
\040\150\164\164\160\072\057\057\162\145\160\157\163\151\164\157
\162\171\056\163\167\151\163\163\163\151\147\156\056\143\157\155
\057\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000
\003\202\002\001\000\010\205\246\365\026\014\374\104\032\301\143
\340\371\125\106\010\374\160\034\102\050\226\216\267\305\301\101
\165\116\011\161\171\345\155\226\312\113\245\210\140\320\060\164
\270\312\010\334\264\060\236\100\007\026\153\145\225\167\001\256
\244\267\065\013\201\332\161\025\251\164\027\070\173\130\312\371
\057\373\300\145\166\215\133\001\271\175\336\202\075\144\270\276
\024\164\243\012\124\323\054\225\030\027\065\365\121\153\077\217
\242\226\141\071\170\153\113\345\246\240\370\123\337\121\020\223
\142\347\200\057\342\321\340\274\216\066\106\167\063\354\270\373
\216\232\054\211\115\061\021\017\046\236\004\273\267\004\215\013
\362\271\374\132\235\073\026\267\057\310\230\253\376\212\120\131
\056\243\073\374\051\135\213\301\113\311\342\212\023\035\261\277
\273\102\035\122\335\116\330\024\136\020\306\061\007\357\161\047
\367\033\071\011\334\202\352\213\263\225\206\136\375\365\332\135
\061\246\340\061\266\224\346\104\111\164\305\026\345\367\037\003
\141\050\305\310\313\022\240\102\113\371\153\210\010\215\264\062
\030\363\165\237\304\177\000\117\005\225\234\243\027\002\303\263
\123\233\252\040\071\051\053\146\372\235\257\136\263\222\322\265
\246\341\032\371\055\101\151\201\024\264\264\265\355\211\075\316
\373\251\235\065\102\104\261\034\024\163\201\317\052\001\065\232
\061\325\055\217\155\204\337\200\115\127\343\077\305\204\165\332
\211\306\060\273\353\217\313\042\010\240\256\252\361\003\154\072
\113\115\011\245\016\162\306\126\153\041\102\116\043\045\024\150
\256\166\012\174\014\007\160\144\371\232\057\366\005\071\046\306
\014\217\031\177\103\136\156\364\133\025\057\333\141\135\346\147
\057\077\010\224\371\140\264\230\061\332\164\361\204\223\161\115
\137\373\140\130\321\373\304\301\155\211\242\273\040\037\235\161
\221\313\062\233\023\075\076\175\222\122\065\254\222\224\242\323
\030\302\174\307\352\257\166\005\026\335\147\047\302\176\034\007

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\042\041\363\100\012\033\064\007\104\023\302\204\152\216\337\031
\132\277\177\353\035\342\032\070\321\134\257\107\222\153\200\265
\060\245\311\215\330\253\061\201\037\337\302\146\067\323\223\251
\205\206\171\145\322
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "SwissSign Platinum CA - G2"
# Issuer: CN=SwissSign Platinum CA - G2,O=SwissSign AG,C=CH
# Serial Number:4e:b2:00:67:0c:03:5d:4f
# Subject: CN=SwissSign Platinum CA - G2,O=SwissSign AG,C=CH
# Not Valid Before: Wed Oct 25 08:36:00 2006
# Not Valid After: Sat Oct 25 08:36:00 2036
# Fingerprint (MD5): c9:98:27:77:28:1e:3d:0e:15:3c:84:00:b8:85:03:e6
# Fingerprint (SHA1): 56:e0:fa:c0:3b:8f:18:23:55:18:e5:d3:11:ca:e8:c2:43:31:ab:66
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
 CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SwissSign Platinum CA - G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\126\340\372\300\073\217\030\043\125\030\345\323\021\312\350\302
\103\061\253\146
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\311\230\047\167\050\036\075\016\025\074\204\000\270\205\003\346
END
CKA_ISSUER MULTILINE_OCTAL
\060\111\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\025\060\023\006\003\125\004\012\023\014\123\167\151\163\163\123
\151\147\156\040\101\107\061\043\060\041\006\003\125\004\003\023
\032\123\167\151\163\163\123\151\147\156\040\120\154\141\164\151
\156\165\155\040\103\101\040\055\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\116\262\000\147\014\003\135\117
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
```

```
# Certificate "S-TRUST
 Authentication and Encryption Root CA 2005:PN"
# Issuer: CN=S-TRUST Authentication and Encryption Root CA 2005:PN,O=Deutscher Sparkassen Verlag
GmbH,L=Stuttgart,ST=Baden-Wuerttemberg (BW),C=DE
# Serial Number:37:19:18:e6:53:54:7c:1a:b5:b8:cb:59:5a:db:35:b7
# Subject: CN=S-TRUST Authentication and Encryption Root CA 2005:PN,O=Deutscher Sparkassen Verlag
GmbH,L=Stuttgart,ST=Baden-Wuerttemberg (BW),C=DE
# Not Valid Before: Wed Jun 22 00:00:00 2005
# Not Valid After: Fri Jun 21 23:59:59 2030
# Fingerprint (MD5): 04:4b:fd:c9:6c:da:2a:32:85:7c:59:84:61:46:8a:64
# Fingerprint (SHA1): be:b5:a9:95:74:6b:9e:df:73:8b:56:e6:df:43:7a:77:be:10:6b:81
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "S-TRUST Authentication and Encryption Root CA 2005:PN"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\256\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\040\060\036\006\003\125\004\010\023\027\102\141\144\145\156
\055\127\165\145\162\164\164\145\155\142\145\162\147\040\050\102
\127\051\061\022\060\020\006\003\125\004\007\023\011\123\164\165
\164\164\147\141\162\164\061\051\060\047\006\003\125\004\012\023
\040\104\145\165\164\163\143\150\145\162\040\123\160\141\162\153
\141\163\163\145\156\040\126\145\162\154\141\147\040\107\155\142
\110\061\076\060\074\006\003\125\004\003\023\065\123\055\124\122
\125\123\124\040\101\165\164\150\145\156\164\151\143\141\164\151
\157\156\040\141\156\144\040\105\156\143\162\171\160\164\151\157
\156\040\122\157\157\164\040\103\101\040\062\060\060\065\072\120
\116
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\256\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\040\060\036\006\003\125\004\010\023\027\102\141\144\145\156
\055\127\165\145\162\164\164\145\155\142\145\162\147\040\050\102
\127\051\061\022\060\020\006\003\125\004\007\023\011\123\164\165
\164\164\147\141\162\164\061\051\060\047\006\003\125\004\012\023
\040\104\145\165\164\163\143\150\145\162\040\123\160\141\162\153
\141\163\163\145\156\040\126\145\162\154\141\147\040\107\155\142
\110\061\076\060\074\006\003\125\004\003\023\065\123\055\124\122
\125\123\124\040\101\165\164\150\145\156\164\151\143\141\164\151
\157\156\040\141\156\144\040\105\156\143\162\171\160\164\151\157
\156\040\122\157\157\164\040\103\101\040\062\060\060\065\072\120
\116
END
CKA_SERIAL_NUMBER
```

MULTILINE_OCTAL
\002\020\067\031\030\346\123\124\174\032\265\270\313\131\132\333
\065\267
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\173\060\202\003\143\240\003\002\001\002\002\020\067
\031\030\346\123\124\174\032\265\270\313\131\132\333\065\267\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\201
\256\061\013\060\011\006\003\125\004\006\023\002\104\105\061\040
\060\036\006\003\125\004\010\023\027\102\141\144\145\156\055\127
\165\145\162\164\164\145\155\142\145\162\147\040\050\102\127\051
\061\022\060\020\006\003\125\004\007\023\011\123\164\165\164\164
\147\141\162\164\061\051\060\047\006\003\125\004\012\023\040\104
\145\165\164\163\143\150\145\162\040\123\160\141\162\153\141\163
\163\145\156\040\126\145\162\154\141\147\040\107\155\142\110\061
\076\060\074\006\003\125\004\003\023\065\123\055\124\122\125\123
\124\040\101\165\164\150\145\156\164\151\143\141\164\151\157\156
\040\141\156\144\040\105\156\143\162\171\160\164\151\157\156\040
\122\157\157\164\040\103\101\040\062\060\060\065\072\120\116\060
\036\027\015\060\065\060\066\062\062\060\060\060\060\060\060\132
\027\015\063\060\060\066\062\061\062\063\065\071\065\071\132\060
\201\256\061\013\060\011\006\003\125\004\006\023\002\104\105\061
\040\060\036\006\003\125\004\010\023\027\102\141\144\145\156\055
\127\165\145\162\164\164\145\155\142\145\162\147\040\050\102\127
\051\061\022\060\020\006\003\125\004\007\023\011\123\164\165\164
\164\147\141\162\164\061\051\060\047\006\003\125\004\012\023\040
\104\145\165\164\163\143\150\145\162\040\123\160\141\162\153\141
\163\163\145\156\040\126\145\162\154\141\147\040\107\155\142\110
\061\076\060\074\006\003\125\004\003\023\065\123\055\124\122\125
\123\124\040\101\165\164\150\145\156\164\151\143\141\164\151\157
\156\040\141\156\144\040\105\156\143\162\171\160\164\151\157\156
\040\122\157\157\164\040\103\101\040\062\060\060\065\072\120\116
\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001
\000\331\265\112\301\323\063\352\323\106\263\321\342\114\322\365
\266\203\320\157\325\030\351\223\257\047\216\023\315\265\045\066
\120\064\022\144\051\241\125\341\072\140\223\236\050\311\343\363
\233\341\004\260\043\277\225\212\216\133\033\101\177\132\303\350
\115\114\325\044\026\076\207\110\324\047\256\346\367\123\035\273
\014\000\357\076\141\161\255\277\072\172\130\037\224\075\134\201
\325\325\157\337\270\233\322\365\345\313\203\162\222\302\123\262
\202\002\353\255\255\137\026\055\222\123\166\361\211\266\054\365
\301\057\340\247\112\157\240\060\152\062\353\232\164\003\150\170
\023\235\312\057\233\013\035\276\317\165\015\046\227\233\307\365
\136\012\237\170\337\263\274\354\232\272\357\125\217\033\232\246
\007\143\051\027\131\142\011\052\171\007\167\245\340\321\027\151
\351\133\335\366\220\253\342\230\012\000\321\045\155\236\327\205
\207\057\222\361\321\166\203\117\013\072\131\067\050\057\063\247

\027\120\326\040\013\012\364\046\371\237\070\347\055\244\270\233
\211\215\255\255\311\152\175\211\027\273\366\177\200\203\172\346
\355\002\003\001\000\001\243\201\222\060\201\217\060\022\006\003
\125\035\023\001\001\377\004\010\060\006\001\001\377\002\001\000
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006
\060\051\006\003\125\035\021\004\042\060\040\244\036\060\034\061
\032\060\030\006\003\125\004\003\023\021\123\124\122\157\156\154
\151\156\145\061\055\062\060\064\070\055\065\060\035\006\003\125
\035\016\004\026\004\024\017\312\036\134\171\340\242\363\051\266
\322\205\263\013\112\265\145\354\153\122\060\037\006\003\125\035
\043\004\030\060\026\200\024\017\312\036\134\171\340\242\363\051
\266\322\205\263\013\112\265\145\354\153\122\060\015\006\011\052
\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000\257
\001\360\355\031\074\050\350\115\134\273\245\143\034\210\063\003
\247\000\207\244\037\040\253\326\034\343\006\037\227\176\124\275
\267\321\262\311\325\332\200\354\027\327\212\365\173\302\000\366
\351\021\157\204\240\132\045\061\342\211\371\244\000\077\061\150
\056\325\075\350\156\346\325\035\074\077\262\275\237\167\353\235
\323\214\272\300\327\266\115\354\123\234\017\004\156\352\065\147
\127\343\012\145\173\220\072\341\117\076\303\000\222\172\273\005
\211\163\214\313\246\115\300\373\366\002\326\260\007\243\003\302
\047\100\237\014\344\205\202\055\257\232\102\035\320\307\215\370
\100\356\235\006\127\034\331\242\330\200\024\376\341\143\055\062
\207\325\224\122\226\072\106\306\161\226\075\367\230\016\262\221
\252\217\332\364\116\044\000\071\125\350\255\027\271\323\064\053
\112\251\100\314\027\052\125\145\101\164\102\176\365\300\257\310
\223\255\362\030\133\075\211\014\333\107\071\044\370\340\114\362
\037\260\075\012\312\005\116\211\041\032\343\052\231\254\374\177
\241\361\017\033\037\075\236\004\203\335\226\331\035\072\224
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "S-TRUST Authentication and Encryption Root CA 2005:PN"
# Issuer: CN=S-TRUST Authentication and Encryption Root CA 2005:PN,O=Deutscher Sparkassen Verlag GmbH,L=Stuttgart,ST=Baden-Wuerttemberg (BW),C=DE
# Serial Number:37:19:18:e6:53:54:7c:1a:b5:b8:cb:59:5a:db:35:b7
# Subject: CN=S-TRUST Authentication and Encryption Root CA 2005:PN,O=Deutscher Sparkassen Verlag GmbH,L=Stuttgart,ST=Baden-Wuerttemberg (BW),C=DE
# Not Valid Before: Wed Jun 22 00:00:00 2005
# Not Valid After: Fri Jun 21 23:59:59 2030
# Fingerprint (MD5): 04:4b:fd:c9:6c:da:2a:32:85:7c:59:84:61:46:8a:64
#
Fingerprint (SHA1): be:b5:a9:95:74:6b:9e:df:73:8b:56:e6:df:43:7a:77:be:10:6b:81
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

```
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "S-TRUST Authentication and Encryption Root CA 2005:PN"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\276\265\251\225\164\153\236\337\163\213\126\346\337\103\172\167
\276\020\153\201
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\004\113\375\311\154\332\052\062\205\174\131\204\141\106\212\144
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\256\061\013\060\011\006\003\125\004\006\023\002\104\105
\061\040\060\036\006\003\125\004\010\023\027\102\141\144\145\156
\055\127\165\145\162\164\164\145\155\142\145\162\147\040\050\102
\127\051\061\022\060\020\006\003\125\004\007\023\011\123\164\165
\164\164\147\141\162\164\061\051\060\047\006\003\125\004\012\023
\040\104\145\165\164\163\143\150\145\162\040\123\160\141\162\153
\141\163\163\145\156\040\126\145\162\154\141\147\040\107\155\142
\110\061\076\060\074\006\003\125\004\003\023\065\123\055\124\122
\125\123\124\040\101\165\164\150\145\156\164\151\143\141\164\151
\157\156\040\141\156\144\040\105\156\143\162\171\160\164\151\157
\156\040\122\157\157\164\040\103\101\040\062\060\060\065\072\120
\116
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\067\031\030\346\123\124\174\032\265\270\313\131\132\333
\065\267
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "GeoTrust Primary Certification Authority"
# Issuer: CN=GeoTrust Primary Certification Authority,O=GeoTrust Inc.,C=US
# Serial Number:18:ac:b5:6a:fd:69:b6:15:3a:63:6c:af:da:fa:c4:a1
# Subject: CN=GeoTrust Primary Certification Authority,O=GeoTrust Inc.,C=US
# Not Valid Before: Mon Nov 27 00:00:00 2006
# Not Valid After: Wed Jul 16 23:59:59 2036
#
 Fingerprint (MD5): 02:26:c3:01:5e:08:30:37:43:a9:d0:7d:cf:37:e6:bf
# Fingerprint (SHA1): 32:3c:11:8e:1b:f7:b8:b6:52:54:e2:e2:10:0d:d6:02:90:37:f0:96
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
```

CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GeoTrust Primary Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\130\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\061\060\057\006\003\125\004\003
\023\050\107\145\157\124\162\165\163\164\040\120\162\151\155\141
\162\171\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\130\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\061\060\057\006\003\125\004\003
\023\050\107\145\157\124\162\165\163\164\040\120\162\151\155\141
\162\171\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\030\254\265\152\375\151\266\025\072\143\154\257\332\372
\304\241
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\174\060\202\002\144\240\003\002\001\002\002\020\030
\254\265\152\375\151\266\025\072\143\154\257\332\372\304\241\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\130
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\026\060
\024\006\003\125\004\012\023\015\107\145\157\124\162\165\163\164
\040\111\156\143\056\061\061\060\057\006\003\125\004\003\023\050
\107\145\157\124\162\165\163\164\040\120\162\151\155\141\162\171
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\060\036\027\015\060\066\061\061
\062\067\060\060\060\060\060\060\132\027\015\063\066\060\067\061
\066\062\063\065\071\065\071\132\060\130\061\013\060\011\006\003
\125\004\006\023\002\125\123\061\026\060\024\006\003\125\004\012
\023\015\107\145\157\124\162\165\163\164\040\111\156\143\056\061
\061\060\057\006\003\125\004\003\023\050\107\145\157\124\162\165
\163\164\040\120\162\151\155\141\162\171\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\060\202\001\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202
\001\001\000\276\270\025\173\377\324\174\175\147\255\203\144\173
\310\102\123\055\337\366\204\010\040\141\326\001\131\152\234\104
\021\257\357\166\375\225\176\316\141\060\273\172\203\137\002\275
\001\146\312\356\025\215\157\241\060\234\275\241\205\236\224\072

\363\126\210\000\061\317\330\356\152\226\002\331\355\003\214\373
\165\155\347\352\270\125\026\005\026\232\364\340\136\261\210\300
\144\205\134\025\115\210\307\267\272\340\165\351\255\005\075\235
\307\211\110\340\273\050\310\003\341\060\223\144\136\122\300\131
\160\042\065\127\210\212\361\225\012\203\327\274\061\163\001\064
\355\357\106\161\340\153\002\250\065\162\153\227\233\146\340\313
\034\171\137\330\032\004\150\036\107\002\346\235\140\342\066\227
\001\337\316\065\222\337\276\147\307\155\167\131\073\217\235\326
\220\025\224\274\102\064\020\301\071\371\261\047\076\176\326\212
\165\305\262\257\226\323\242\336\233\344\230\276\175\341\351\201
\255\266\157\374\327\016\332\340\064\260\015\032\167\347\343\010
\230\357\130\372\234\204\267\066\257\302\337\254\322\364\020\006
\160\161\065\002\003\001\000\001\243\102\060\100\060\017\006\003
\125\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006
\003\125\035\016\004\026\004\024\054\325\120\101\227\025\213\360
\217\066\141\133\112\373\153\331\231\311\063\222\060\015\006\011
\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000
\132\160\177\054\335\267\064\117\365\206\121\251\046\276\113\270
\252\361\161\015\334\141\307\240\352\064\036\172\167\017\004\065
\350\047\217\154\220\277\221\026\044\106\076\112\116\316\053\026
\325\013\122\035\374\037\147\242\002\105\061\117\316\363\372\003
\247\171\235\123\152\331\332\143\072\370\200\327\323\231\341\245
\341\276\324\125\161\230\065\072\276\223\352\256\255\102\262\220
\157\340\374\041\115\065\143\063\211\111\326\233\116\312\307\347
\116\011\000\367\332\307\357\231\142\231\167\266\225\042\136\212
\240\253\364\270\170\230\312\070\031\231\311\162\236\170\315\113
\254\257\031\240\163\022\055\374\302\101\272\201\221\332\026\132
\061\267\371\264\161\200\022\110\231\162\163\132\131\123\301\143
\122\063\355\247\311\322\071\002\160\372\340\261\102\146\051\252
\233\121\355\060\124\042\024\137\331\253\035\301\344\224\360\370
\365\053\367\352\312\170\106\326\270\221\375\246\015\053\032\024
\001\076\200\360\102\240\225\007\136\155\315\314\113\244\105\215
\253\022\350\263\336\132\345\240\174\350\017\042\035\132\351\131
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "GeoTrust Primary Certification Authority"
# Issuer: CN=GeoTrust Primary Certification Authority,O=GeoTrust Inc.,C=US
# Serial Number:18:ac:b5:6a:fd:69:b6:15:3a:63:6c:af:da:fa:c4:a1
# Subject: CN=GeoTrust Primary Certification Authority,O=GeoTrust Inc.,C=US
# Not Valid Before: Mon Nov 27 00:00:00 2006
# Not Valid After: Wed Jul 16 23:59:59 2036
# Fingerprint (MD5): 02:26:c3:01:5e:08:30:37:43:a9:d0:7d:cf:37:e6:bf

```
# Fingerprint (SHA1): 32:3c:11:8e:1b:f7:b8:b6:52:54:e2:e2:10:0d:d6:02:90:37:f0:96
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GeoTrust Primary Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\062\074\021\216\033\367\270\266\122\124\342\342\020\015\326\002
\220\067\360\226
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\002\046\303\001\136\010\060\067\103\251\320\175\317\067\346\277
END
CKA_ISSUER MULTILINE_OCTAL
\060\130\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\061\060\057\006\003\125\004\003
\023\050\107\145\157\124\162\165\163\164\040\120\162\151\155\141
\162\171\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\030\254\265\152\375\151\266\025\072\143\154\257\332\372
\304\241
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "thawte Primary Root CA"
# Issuer: CN=thawte Primary Root CA,OU=(c) 2006 thawte\, Inc. - For authorized use only,OU=Certification
 Services Division,O=thawte\, Inc.,C=US
# Serial Number:34:4e:d5:57:20:d5:ed:ec:49:f4:2f:ce:37:db:2b:6d
# Subject: CN=thawte Primary Root CA,OU=(c) 2006 thawte\, Inc. - For authorized use only,OU=Certification
Services Division,O=thawte\, Inc.,C=US
# Not Valid Before: Fri Nov 17 00:00:00 2006
# Not Valid After: Wed Jul 16 23:59:59 2036
# Fingerprint (MD5): 8c:ca:dc:0b:22:ce:f5:be:72:ac:41:1a:11:a8:d8:12
# Fingerprint (SHA1): 91:c6:d6:ee:3e:8a:c8:63:84:e5:48:c2:99:29:5c:75:6c:81:7b:81
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "thawte Primary Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
```

CKA_SUBJECT MULTILINE_OCTAL
\060\201\251\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\025\060\023\006\003\125\004\012\023\014\164\150\141\167\164
\145\054\040\111\156\143\056\061\050\060\046\006\003\125\004\013
\023\037\103\145\162\164\151\146\151\143\141\164\151\157\156\040
\123\145\162\166\151\143\145\163\040\104\151\166\151\163\151\157
\156\061\070\060\066\006\003\125\004\013\023\057\050\143\051\040
\062\060\060\066\040\164\150\141\167\164\145\054\040\111\156\143
\056\040\055\040\106\157\162\040\141\165\164\150\157\162\151\172
\145\144\040\165\163\145\040\157\156\154\171\061\037\060\035\006
\003\125\004\003\023\026\164\150\141\167\164\145\040\120\162\151
\155\141\162\171\040\122\157\157\164\040\103\101
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\251\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\025\060\023\006\003\125\004\012\023\014\164\150\141\167\164
\145\054\040\111\156\143\056\061\050\060\046\006\003\125\004\013
\023\037\103\145\162\164\151\146\151\143\141\164\151\157\156\040
\123\145\162\166\151\143\145\163\040\104\151\166\151\163\151\157
\156\061\070\060\066\006\003\125\004\013\023\057\050\143\051\040
\062\060\060\066\040\164\150\141\167\164\145\054\040\111\156\143
\056\040\055\040\106\157\162\040\141\165\164\150\157\162\151\172
\145\144\040\165\163\145\040\157\156\154\171\061\037\060\035\006
\003\125\004\003\023\026\164\150\141\167\164\145\040\120\162\151
\155\141\162\171\040\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\064\116\325\127\040\325\355\354\111\364\057\316\067\333
\053\155
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\040\060\202\003\010\240\003\002\001\002\002\020\064
\116\325\127\040\325\355\354\111\364\057\316\067\333\053\155\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\201
\251\061\013\060\011\006\003\125\004\006\023\002\125\123\061\025
\060\023\006\003\125\004\012\023\014\164\150\141\167\164\145\054
\040\111\156\143\056\061\050\060\046\006\003\125\004\013\023\037
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\123\145
\162\166\151\143\145\163\040\104\151\166\151\163\151\157\156\061
\070\060\066\006\003\125\004\013\023\057\050\143\051\040\062\060
\060\066\040\164\150\141\167\164\145\054\040\111\156\143\056\040
\055\040\106\157\162\040\141\165\164\150\157\162\151\172\145\144
\040\165\163\145\040\157\156\154\171\061\037\060\035\006\003\125
\004\003\023\026\164\150\141\167\164\145\040\120\162\151\155\141
\162\171\040\122\157\157\164\040\103\101\060\036\027\015\060\066

\061\061\061\067\060\060\060\060\060\060\132\027\015\063\066\060
\067\061\066\062\063\065\071\065\071\132\060\201\251\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\025\060\023\006\003
\125\004\012\023\014\164\150\141\167\164\145\054\040\111\156\143
\056\061\050\060\046\006\003\125\004\013\023\037\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\123\145\162\166\151\143
\145\163\040\104\151\166\151\163\151\157\156\061\070\060\066\006
\003\125\004\013\023\057\050\143\051\040\062\060\060\066\040\164
\150\141\167\164\145\054\040\111\156\143\056\040\055\040\106\157
\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163\145
\040\157\156\154\171\061\037\060\035\006\003\125\004\003\023\026
\164\150\141\167\164\145\040\120\162\151\155\141\162\171\040\122
\157\157\164\040\103\101\060\202\001\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202
\001\012\002\202\001\001\000\254\240\360\373\200\131\324\234\307
\244\317\235\241\131\163\011\020\105\014\015\054\156\150\361\154
\133\110\150\111\131\067\374\013\063\031\302\167\177\314\020\055
\225\064\034\346\353\115\011\247\034\322\270\311\227\066\002\267
\211\324\044\137\006\300\314\104\224\224\215\002\142\157\353\132
\335\021\215\050\232\134\204\220\020\172\015\275\164\146\057\152
\070\240\342\325\124\104\353\035\007\237\007\272\157\356\351\375
\116\013\051\365\076\204\240\001\361\234\253\370\034\176\211\244
\350\241\330\161\145\015\243\121\173\356\274\322\042\140\015\271
\133\235\337\272\374\121\133\013\257\230\262\351\056\351\004\350
\142\207\336\053\310\327\116\301\114\144\036\335\317\207\130\272
\112\117\312\150\007\035\034\235\112\306\325\057\221\314\174\161
\162\034\305\300\147\353\062\375\311\222\134\224\332\205\300\233
\277\123\175\053\011\364\214\235\221\037\227\152\122\313\336\011
\066\244\167\330\173\207\120\104\325\076\156\051\151\373\071\111
\046\036\011\245\200\173\100\055\353\350\047\205\311\376\141\375
\176\346\174\227\035\325\235\002\003\001\000\001\243\102\060\100
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\006\060\035\006\003\125\035\016\004\026\004\024\173\133\105\317
\257\316\313\172\375\061\222\032\152\266\363\106\353\127\110\120
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003
\202\001\001\000\171\021\300\113\263\221\266\374\360\351\147\324
\015\156\105\276\125\350\223\322\316\003\077\355\332\045\260\035
\127\313\036\072\166\240\114\354\120\166\350\144\162\014\244\251
\361\270\213\326\326\207\204\273\062\345\101\021\300\167\331\263
\140\235\353\033\325\321\156\104\104\251\246\001\354\125\142\035
\167\270\134\216\110\111\174\234\073\127\021\254\255\163\067\216
\057\170\134\220\150\107\331\140\140\346\374\007\075\042\040\027
\304\367\026\351\304\330\162\371\310\163\174\337\026\057\025\251
\076\375\152\047\266\241\353\132\272\230\037\325\343\115\144\012
\235\023\310\141\272\365\071\034\207\272\270\275\173\042\177\366
\376\254\100\171\345\254\020\157\075\217\033\171\166\213\304\067
\263\041\030\204\345\066\000\353\143\040\231\271\351\376\063\004

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\273\101\310\301\002\371\104\143\040\236\201\316\102\323\326\077
\054\166\323\143\234\131\335\217\246\341\016\240\056\101\367\056
\225\107\317\274\375\063\363\366\013\141\176\176\221\053\201\107
\302\047\060\356\247\020\135\067\217\134\071\053\344\004\360\173
\215\126\214\150
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "thawte Primary Root CA"
# Issuer: CN=thawte Primary Root CA,OU=(c) 2006 thawte\, Inc. - For authorized use only,OU=Certification
Services Division,O=thawte\, Inc.,C=US
#
 Serial Number:34:4e:d5:57:20:d5:ed:ec:49:f4:2f:ce:37:db:2b:6d
# Subject: CN=thawte Primary Root CA,OU=(c) 2006 thawte\, Inc. - For authorized use only,OU=Certification
Services Division,O=thawte\, Inc.,C=US
# Not Valid Before: Fri Nov 17 00:00:00 2006
# Not Valid After: Wed Jul 16 23:59:59 2036
# Fingerprint (MD5): 8c:ca:dc:0b:22:ce:f5:be:72:ac:41:1a:11:a8:d8:12
# Fingerprint (SHA1): 91:c6:d6:ee:3e:8a:c8:63:84:e5:48:c2:99:29:5c:75:6c:81:7b:81
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "thawte Primary Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\221\306\326\356\076\212\310\143\204\345\110\302\231\051\134\165
\154\201\173\201
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\214\312\334\013\042\316\365\276\162\254\101\032\021\250\330\022
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\251\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\025\060\023\006\003\125\004\012\023\014\164\150\141\167\164
\145\054\040\111\156\143\056\061\050\060\046\006\003\125\004\013
\023\037\103\145\162\164\151\146\151\143\141\164\151\157\156\040
\123\145\162\166\151\143\145\163\040\104\151\166\151\163\151\157
\156\061\070\060\066\006\003\125\004\013\023\057\050\143\051\040
\062\060\060\066\040\164\150\141\167\164\145\054\040\111\156\143
\056\040\055\040\106\157\162\040\141\165\164\150\157\162\151\172
\145\144\040\165\163\145\040\157\156\154\171\061\037\060\035\006
\003\125\004\003\023\026\164\150\141\167\164\145\040\120\162\151
\155\141\162\171\040\122\157\157\164\040\103\101
END
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CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\064\116\325\127\040\325\355\354\111\364\057\316\067\333
\053\155
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "VeriSign Class 3 Public Primary
 Certification Authority - G5"
# Issuer: CN=VeriSign Class 3 Public Primary Certification Authority - G5,OU=(c) 2006 VeriSign\, Inc. - For
authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US
# Serial Number:18:da:d1:9e:26:7d:e8:bb:4a:21:58:cd:cc:6b:3b:4a
# Subject: CN=VeriSign Class 3 Public Primary Certification Authority - G5,OU=(c) 2006 VeriSign\, Inc. - For
authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US
# Not Valid Before: Wed Nov 08 00:00:00 2006
# Not Valid After: Wed Jul 16 23:59:59 2036
# Fingerprint (MD5): cb:17:e4:31:67:3e:e2:09:fe:45:57:93:f3:0a:fa:1c
# Fingerprint (SHA1): 4e:b6:d5:78:49:9b:1c:cf:5f:58:1e:ad:56:be:3d:9b:67:44:a5:e5
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "VeriSign Class 3 Public Primary Certification Authority - G5"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\062\060\060\066\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040
\063\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\055\040\107\065
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
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\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\062\060\060\066\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040
\063\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\055\040\107\065
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\030\332\321\236\046\175\350\273\112\041\130\315\314\153
\073\112
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\323\060\202\003\273\240\003\002\001\002\002\020\030
\332\321\236\046\175\350\273\112\041\130\315\314\153\073\112\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\201
\312\061\013\060\011\006\003\125\004\006\023\002\125\123\061\027
\060\025\006\003\125\004\012\023\016\126\145\162\151\123\151\147
\156\054\040\111\156\143\056\061\037\060\035\006\003\125\004\013
\023\026\126\145\162\151\123\151\147\156\040\124\162\165\163\164
\040\116\145\164\167\157\162\153\061\072\060\070\006\003\125\004
\013\023\061\050\143\051\040\062\060\060\066\040\126\145\162\151
\123\151\147\156\054\040\111\156\143\056\040\055\040\106\157\162
\040\141\165\164\150\157\162\151\172\145\144\040\165\163\145\040
\157\156\154\171\061\105\060\103\006\003\125\004\003\023\074\126
\145\162\151\123\151\147\156\040\103\154\141\163\163\040\063\040
\120\165\142\154\151\143\040\120\162\151\155\141\162\171\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\040\055\040\107\065\060\036\027\015\060
\066\061\061\060\070\060\060\060\060\060\060\132\027\015\063\066
\060\067\061\066\062\063\065\071\065\071\132\060\201\312\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\027\060\025\006
\003\125\004\012\023\016\126\145\162\151\123\151\147\156\054\040
\111\156\143\056\061\037\060\035\006\003\125\004\013\023\026\126
\145\162\151\123\151\147\156\040\124\162\165\163\164\040\116\145
\164\167\157\162\153\061\072\060\070\006\003\125\004\013\023\061
\050\143\051\040\062\060\060\066\040\126\145\162\151\123\151\147
\156\054\040\111\156\143\056\040\055\040\106\157\162\040\141\165
\164\150\157\162\151\172\145\144\040\165\163\145\040\157\156\154
\171\061\105\060\103\006\003\125\004\003\023\074\126\145\162\151
\123\151\147\156\040\103\154\141\163\163\040\063\040\120\165\142
\154\151\143\040\120\162\151\155\141\162\171\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162

\151\164\171\040\055\040\107\065\060\202\001\042\060\015\006\011
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\060\202\001\012\002\202\001\001\000\257\044\010\010\051\172\065
\236\140\014\252\347\113\073\116\334\174\274\074\105\034\273\053
\340\376\051\002\371\127\010\243\144\205\025\047\365\361\255\310
\061\211\135\042\350\052\252\246\102\263\217\370\271\125\267\261
\267\113\263\376\217\176\007\127\354\357\103\333\146\142\025\141
\317\140\015\244\330\336\370\340\303\142\010\075\124\023\353\111
\312\131\124\205\046\345\053\217\033\237\353\365\241\221\302\063
\111\330\103\143\152\122\113\322\217\350\160\121\115\321\211\151
\173\307\160\366\263\334\022\164\333\173\135\113\126\323\226\277
\025\167\241\260\364\242\045\362\257\034\222\147\030\345\364\006
\004\357\220\271\344\000\344\335\072\265\031\377\002\272\364\074
\356\340\213\353\067\213\354\364\327\254\362\366\360\075\257\335
\165\221\063\031\035\034\100\313\164\044\031\041\223\331\024\376
\254\052\122\307\217\325\004\111\344\215\143\107\210\074\151\203
\313\376\107\275\053\176\117\305\225\256\016\235\324\321\103\300
\147\163\343\024\010\176\345\077\237\163\270\063\012\317\135\077
\064\207\226\212\356\123\350\045\025\002\003\001\000\001\243\201
\262\060\201\257\060\017\006\003\125\035\023\001\001\377\004\005
\060\003\001\001\377\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\006\060\155\006\010\053\006\001\005\005\007\001
\014\004\141\060\137\241\135\240\133\060\131\060\127\060\125\026
\011\151\155\141\147\145\057\147\151\146\060\041\060\037\060\007
\006\005\053\016\003\002\032\004\024\217\345\323\032\206\254\215
\216\153\303\317\200\152\324\110\030\054\173\031\056\060\045\026
\043\150\164\164\160\072\057\057\154\157\147\157\056\166\145\162
\151\163\151\147\156\056\143\157\155\057\166\163\154\157\147\157
\056\147\151\146\060\035\006\003\125\035\016\004\026\004\024\177
\323\145\247\302\335\354\273\360\060\011\363\103\071\372\002\257
\063\061\063\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\003\202\001\001\000\223\044\112\060\137\142\317\330\032
\230\057\075\352\334\231\055\275\167\366\245\171\042\070\354\304
\247\240\170\022\255\142\016\105\160\144\305\347\227\146\055\230
\011\176\137\257\326\314\050\145\362\001\252\010\032\107\336\371
\371\174\222\132\010\151\040\015\331\076\155\156\074\015\156\330
\346\006\221\100\030\271\370\301\355\337\333\101\252\340\226\040
\311\315\144\025\070\201\311\224\356\242\204\051\013\023\157\216
\333\014\335\045\002\333\244\213\031\104\322\101\172\005\151\112
\130\117\140\312\176\202\152\013\002\252\045\027\071\265\333\177
\347\204\145\052\225\212\275\206\336\136\201\026\203\055\020\314
\336\375\250\202\052\155\050\037\015\013\304\345\347\032\046\031
\341\364\021\157\020\265\225\374\347\102\005\062\333\316\235\121
\136\050\266\236\205\323\133\357\245\175\105\100\162\216\267\016
\153\016\006\373\063\065\110\161\270\235\047\213\304\145\137\015
\206\166\234\104\172\366\225\134\366\135\062\010\063\244\124\266
\030\077\150\134\362\102\112\205\070\124\203\137\321\350\054\362
\254\021\326\250\355\143\152

```
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL
 CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "VeriSign Class 3 Public Primary Certification Authority - G5"
# Issuer: CN=VeriSign Class 3 Public Primary Certification Authority - G5,OU=(c) 2006 VeriSign\, Inc. - For
authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US
# Serial Number:18:da:d1:9e:26:7d:e8:bb:4a:21:58:cd:cc:6b:3b:4a
# Subject: CN=VeriSign Class 3 Public Primary Certification Authority - G5,OU=(c) 2006 VeriSign\, Inc. - For
authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US
# Not Valid Before: Wed Nov 08 00:00:00 2006
# Not Valid After: Wed Jul 16 23:59:59 2036
# Fingerprint (MD5): cb:17:e4:31:67:3e:e2:09:fe:45:57:93:f3:0a:fa:1c
# Fingerprint (SHA1): 4e:b6:d5:78:49:9b:1c:cf:5f:58:1e:ad:56:be:3d:9b:67:44:a5:e5
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "VeriSign Class 3 Public Primary Certification Authority - G5"
CKA_CERT_SHA1_HASH
 MULTILINE_OCTAL
\116\266\325\170\111\233\034\317\137\130\036\255\126\276\075\233
\147\104\245\345
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\313\027\344\061\147\076\342\011\376\105\127\223\363\012\372\034
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\062\060\060\066\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040
\063\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\055\040\107\065
END
CKA_SERIAL_NUMBER
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 MULTILINE_OCTAL
\002\020\030\332\321\236\046\175\350\273\112\041\130\315\314\153
\073\112
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Swisscom Root CA 1"
# Issuer: CN=Swisscom Root CA 1,OU=Digital Certificate Services,O=Swisscom,C=ch
# Serial Number:5c:0b:85:5c:0b:e7:59:41:df:57:cc:3f:7f:9d:a8:36
# Subject: CN=Swisscom Root CA 1,OU=Digital Certificate Services,O=Swisscom,C=ch
# Not Valid Before: Thu Aug 18 12:06:20 2005
# Not Valid After: Mon Aug 18 22:06:20 2025
# Fingerprint (MD5): f8:38:7c:77:88:df:2c:16:68:2e:c2:e2:52:4b:b8:f9
# Fingerprint (SHA1): 5f:3a:fc:0a:8b:64:f6:86:67:34:74:df:7e:a9:a2:fe:f9:fa:7a:51
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN
 CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Swisscom Root CA 1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\143\150\061
\021\060\017\006\003\125\004\012\023\010\123\167\151\163\163\143
\157\155\061\045\060\043\006\003\125\004\013\023\034\104\151\147
\151\164\141\154\040\103\145\162\164\151\146\151\143\141\164\145
\040\123\145\162\166\151\143\145\163\061\033\060\031\006\003\125
\004\003\023\022\123\167\151\163\163\143\157\155\040\122\157\157
\164\040\103\101\040\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\143\150\061
\021\060\017\006\003\125\004\012\023\010\123\167\151\163\163\143
\157\155\061\045\060\043\006\003\125\004\013\023\034\104\151\147
\151\164\141\154\040\103\145\162\164\151\146\151\143\141\164\145
\040\123\145\162\166\151\143\145\163\061\033\060\031\006\003\125
\004\003\023\022\123\167\151\163\163\143\157\155\040\122\157\157
\164\040\103\101\040\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\134\013\205\134\013\347\131\101\337\127\314\077\177\235
\250\066
```

END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\331\060\202\003\301\240\003\002\001\002\002\020\134
\013\205\134\013\347\131\101\337\127\314\077\177\235\250\066\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\144
\061\013\060\011\006\003\125\004\006\023\002\143\150\061\021\060
\017\006\003\125\004\012\023\010\123\167\151\163\163\143\157\155
\061\045\060\043\006\003\125\004\013\023\034\104\151\147\151\164
\141\154\040\103\145\162\164\151\146\151\143\141\164\145\040\123
\145\162\166\151\143\145\163\061\033\060\031\006\003\125\004\003
\023\022\123\167\151\163\163\143\157\155\040\122\157\157\164\040
\103\101\040\061\060\036\027\015\060\065\060\070\061\070\061\062
\060\066\062\060\132\027\015\062\065\060\070\061\070\062\062\060
\066\062\060\132\060\144\061\013\060\011\006\003\125\004\006\023
\002\143\150\061\021\060\017\006\003\125\004\012\023\010\123\167
\151\163\163\143\157\155\061\045\060\043\006\003\125\004\013\023
\034\104\151\147\151\164\141\154\040\103\145\162\164\151\146\151
\143\141\164\145\040\123\145\162\166\151\143\145\163\061\033\060
\031\006\003\125\004\003\023\022\123\167\151\163\163\143\157\155
\040\122\157\157\164\040\103\101\040\061\060\202\002\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002
\017\000\060\202\002\012\002\202\002\001\000\320\271\260\250\014
\331\273\077\041\370\033\325\063\223\200\026\145\040\165\262\075
\233\140\155\106\310\214\061\157\027\303\372\232\154\126\355\074
\305\221\127\303\315\253\226\111\220\052\031\113\036\243\155\127
\335\361\053\142\050\165\105\136\252\326\133\372\013\045\330\241
\026\371\034\304\056\346\225\052\147\314\320\051\156\074\205\064
\070\141\111\261\000\237\326\072\161\137\115\155\316\137\271\251
\344\211\177\152\122\372\312\233\362\334\251\371\235\231\107\077
\116\051\137\264\246\215\135\173\013\231\021\003\003\376\347\333
\333\243\377\035\245\315\220\036\001\037\065\260\177\000\333\220
\157\306\176\173\321\356\172\172\247\252\014\127\157\244\155\305
\023\073\260\245\331\355\062\034\264\136\147\213\124\334\163\207
\345\323\027\174\146\120\162\135\324\032\130\301\331\317\330\211
\002\157\247\111\264\066\135\320\244\336\007\054\266\165\267\050
\221\326\227\276\050\365\230\036\352\133\046\311\275\260\227\163
\332\256\221\046\353\150\301\371\071\025\326\147\113\012\155\117
\313\317\260\344\102\161\214\123\171\347\356\341\333\035\240\156
\035\214\032\167\065\134\026\036\053\123\037\064\213\321\154\374
\362\147\007\172\365\255\355\326\232\253\241\261\113\341\314\067
\137\375\177\315\115\256\270\037\234\103\371\052\130\125\103\105
\274\226\315\160\016\374\311\343\146\272\116\215\073\201\313\025
\144\173\271\224\350\135\063\122\205\161\056\117\216\242\006\021
\121\311\343\313\241\156\061\010\144\014\302\322\074\365\066\350
\327\320\016\170\043\040\221\311\044\052\145\051\133\042\367\041
\316\203\136\244\363\336\113\323\150\217\106\165\134\203\011\156
\051\153\304\160\214\365\235\327\040\057\377\106\322\053\070\302
\057\165\034\075\176\332\245\357\036\140\205\151\102\323\314\370

\143\376\036\103\071\205\246\266\143\101\020\263\163\036\274\323
\372\312\175\026\107\342\247\325\320\243\212\012\010\226\142\126
\156\064\333\331\002\271\060\165\343\004\322\347\217\302\260\021
\100\012\254\325\161\002\142\213\061\276\335\306\043\130\061\102
\103\055\164\371\306\236\246\212\017\351\376\277\203\346\103\127
\044\272\357\106\064\252\327\022\001\070\355\002\003\001\000\001
\243\201\206\060\201\203\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\206\060\035\006\003\125\035\041\004\026\060
\024\060\022\006\007\140\205\164\001\123\000\001\006\007\140\205
\164\001\123\000\001\060\022\006\003\125\035\023\001\001\377\004
\010\060\006\001\001\377\002\001\007\060\037\006\003\125\035\043
\004\030\060\026\200\024\003\045\057\336\157\202\001\072\134\054
\334\053\241\151\265\147\324\214\323\375\060\035\006\003\125\035
\016\004\026\004\024\003\045\057\336\157\202\001\072\134\054\334
\053\241\151\265\147\324\214\323\375\060\015\006\011\052\206\110
\206\367\015\001\001\005\005\000\003\202\002\001\000\065\020\313
\354\246\004\015\015\017\315\300\333\253\250\362\210\227\014\337
\223\057\115\174\100\126\061\172\353\244\017\140\315\172\363\276
\303\047\216\003\076\244\335\022\357\176\036\164\006\074\077\061
\362\034\173\221\061\041\264\360\320\154\227\324\351\227\262\044
\126\036\126\303\065\275\210\005\017\133\020\032\144\341\307\202
\060\371\062\255\236\120\054\347\170\005\320\061\261\132\230\212
\165\116\220\134\152\024\052\340\122\107\202\140\346\036\332\201
\261\373\024\013\132\361\237\322\225\272\076\320\033\326\025\035
\243\276\206\325\333\017\300\111\144\273\056\120\031\113\322\044
\370\335\036\007\126\320\070\240\225\160\040\166\214\327\335\036
\336\237\161\304\043\357\203\023\134\243\044\025\115\051\100\074
\152\304\251\330\267\246\104\245\015\364\340\235\167\036\100\160
\046\374\332\331\066\344\171\344\265\077\274\233\145\276\273\021
\226\317\333\306\050\071\072\010\316\107\133\123\132\305\231\376
\135\251\335\357\114\324\306\245\255\002\346\214\007\022\036\157
\003\321\157\240\243\363\051\275\022\307\120\242\260\177\210\251
\231\167\232\261\300\245\071\056\134\174\151\342\054\260\352\067
\152\244\341\132\341\365\120\345\203\357\245\273\052\210\347\214
\333\375\155\136\227\031\250\176\146\165\153\161\352\277\261\307
\157\240\364\216\244\354\064\121\133\214\046\003\160\241\167\325
\001\022\127\000\065\333\043\336\016\212\050\231\375\261\020\157
\113\377\070\055\140\116\054\234\353\147\265\255\111\356\113\037
\254\257\373\015\220\132\146\140\160\135\252\315\170\324\044\356
\310\101\240\223\001\222\234\152\236\374\271\044\305\263\025\202
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\204\126\141\276\161\027\376\035\023\017\376\306\207\105\351\376
\062\240\032\015\023\244\224\125\161\245\026\213\272\312\211\260
\262\307\374\217\330\124\265\223\142\235\316\317\131\373\075\030
\316\052\313\065\025\202\135\377\124\042\133\161\122\373\267\311
\376\140\233\000\101\144\360\252\052\354\266\102\103\316\211\146
\201\310\213\237\071\124\003\045\323\026\065\216\204\320\137\372
\060\032\365\232\154\364\016\123\371\072\133\321\034

```
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Swisscom Root CA 1"
# Issuer: CN=Swisscom Root CA 1,OU=Digital Certificate Services,O=Swisscom,C=ch
# Serial Number:5c:0b:85:5c:0b:e7:59:41:df:57:cc:3f:7f:9d:a8:36
# Subject: CN=Swisscom Root CA 1,OU=Digital Certificate Services,O=Swisscom,C=ch
# Not Valid Before: Thu Aug 18 12:06:20 2005
# Not Valid After: Mon Aug 18 22:06:20 2025
# Fingerprint (MD5): f8:38:7c:77:88:df:2c:16:68:2e:c2:e2:52:4b:b8:f9
# Fingerprint (SHA1): 5f:3a:fc:0a:8b:64:f6:86:67:34:74:df:7e:a9:a2:fe:f9:fa:7a:51
CKA_CLASS
 CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Swisscom Root CA 1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\137\072\374\012\213\144\366\206\147\064\164\337\176\251\242\376
\371\372\172\121
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\370\070\174\167\210\337\054\026\150\056\302\342\122\113\270\371
END
CKA_ISSUER MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\143\150\061
\021\060\017\006\003\125\004\012\023\010\123\167\151\163\163\143
\157\155\061\045\060\043\006\003\125\004\013\023\034\104\151\147
\151\164\141\154\040\103\145\162\164\151\146\151\143\141\164\145
\040\123\145\162\166\151\143\145\163\061\033\060\031\006\003\125
\004\003\023\022\123\167\151\163\163\143\157\155\040\122\157\157
\164\040\103\101\040\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\134\013\205\134\013\347\131\101\337\127\314\077\177\235
\250\066
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
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```
# Certificate "Microsec e-Szigno Root CA"
# Issuer: CN=Microsec e-Szigno Root CA,OU=e-Szigno CA,O=Microsec Ltd.,L=Budapest,C=HU
# Serial Number:cc:b8:e7:bf:4e:29:1a:fd:a2:dc:66:a5:1c:2c:0f:11
# Subject: CN=Microsec e-Szigno Root CA,OU=e-Szigno CA,O=Microsec Ltd.,L=Budapest,C=HU
# Not Valid Before: Wed Apr 06 12:28:44 2005
# Not Valid After: Thu Apr 06 12:28:44 2017
# Fingerprint (MD5): f0:96:b6:2f:c5:10:d5:67:8e:83:25:32:e8:5e:2e:e5
# Fingerprint (SHA1): 23:88:c9:d3:71:cc:9e:96:3d:ff:7d:3c:a7:ce:fc:d6:25:ec:19:0d
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsec e-Szigno Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\162\061\013\060\011\006\003\125\004\006\023\002\110\125\061
\021\060\017\006\003\125\004\007\023\010\102\165\144\141\160\145
\163\164\061\026\060\024\006\003\125\004\012\023\015\115\151\143
\162\157\163\145\143\040\114\164\144\056\061\024\060\022\006\003
\125\004\013\023\013\145\055\123\172\151\147\156\157\040\103\101
\061\042\060\040\006\003\125\004\003\023\031\115\151\143\162\157
\163\145\143\040\145\055\123\172\151\147\156\157\040\122\157\157
\164\040\103\101
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\162\061\013\060\011\006\003\125\004\006\023\002\110\125\061
\021\060\017\006\003\125\004\007\023\010\102\165\144\141\160\145
\163\164\061\026\060\024\006\003\125\004\012\023\015\115\151\143
\162\157\163\145\143\040\114\164\144\056\061\024\060\022\006\003
\125\004\013\023\013\145\055\123\172\151\147\156\157\040\103\101
\061\042\060\040\006\003\125\004\003\023\031\115\151\143\162\157
\163\145\143\040\145\055\123\172\151\147\156\157\040\122\157\157
\164\040\103\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\021\000\314\270\347\277\116\051\032\375\242\334\146\245\034
\054\017\021
END
CKA_VALUE MULTILINE_OCTAL
\060\202\007\250\060\202\006\220\240\003\002\001\002\002\021\000
\314\270\347\277\116\051\032\375\242\334\146\245\034\054\017\021
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\162\061\013\060\011\006\003\125\004\006\023\002\110\125\061\021
\060\017\006\003\125\004\007\023\010\102\165\144\141\160\145\163
\164\061\026\060\024\006\003\125\004\012\023\015\115\151\143\162
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\157\163\145\143\040\114\164\144\056\061\024\060\022\006\003\125
\004\013\023\013\145\055\123\172\151\147\156\157\040\103\101\061
\042\060\040\006\003\125\004\003\023\031\115\151\143\162\157\163
\145\143\040\145\055\123\172\151\147\156\157\040\122\157\157\164
\040\103\101\060\036\027\015\060\065\060\064\060\066\061\062\062
\070\064\064\132\027\015\061\067\060\064\060\066\061\062\062\070
\064\064\132\060\162\061\013\060\011\006\003\125\004\006\023\002
\110\125\061\021\060\017\006\003\125\004\007\023\010\102\165\144
\141\160\145\163\164\061\026\060\024\006\003\125\004\012\023\015
\115\151\143\162\157\163\145\143\040\114\164\144\056\061\024\060
\022\006\003\125\004\013\023\013\145\055\123\172\151\147\156\157
\040\103\101\061\042\060\040\006\003\125\004\003\023\031\115\151
\143\162\157\163\145\143\040\145\055\123\172\151\147\156\157\040
\122\157\157\164\040\103\101\060\202\001\042\060\015\006\011\052
\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060
\202\001\012\002\202\001\001\000\355\310\000\325\201\173\315\070
\000\107\314\333\204\301\041\151\054\164\220\014\041\331\123\207
\355\076\103\104\123\257\253\370\200\233\074\170\215\324\215\256
\270\357\323\021\334\201\346\317\073\226\214\326\157\025\306\167
\176\241\057\340\137\222\266\047\327\166\232\035\103\074\352\331
\354\057\356\071\363\152\147\113\213\202\317\042\370\145\125\376
\054\313\057\175\110\172\075\165\371\252\240\047\273\170\302\006
\312\121\302\176\146\113\257\315\242\247\115\002\202\077\202\254
\205\306\341\017\220\107\231\224\012\161\162\223\052\311\246\300
\276\074\126\114\163\222\047\361\153\265\365\375\374\060\005\140
\222\306\353\226\176\001\221\302\151\261\036\035\173\123\105\270
\334\101\037\311\213\161\326\124\024\343\213\124\170\077\276\364
\142\073\133\365\243\354\325\222\164\342\164\060\357\001\333\341
\324\253\231\233\052\153\370\275\246\034\206\043\102\137\354\111
\336\232\213\133\364\162\072\100\305\111\076\245\276\216\252\161
\353\154\372\365\032\344\152\375\173\175\125\100\357\130\156\346
\331\325\274\044\253\301\357\267\002\003\001\000\001\243\202\004
\067\060\202\004\063\060\147\006\010\053\006\001\005\005\007\001
\001\004\133\060\131\060\050\006\010\053\006\001\005\005\007\060
\001\206\034\150\164\164\160\163\072\057\057\162\143\141\056\145
\055\163\172\151\147\156\157\056\150\165\057\157\143\163\160\060
\055\006\010\053\006\001\005\005\007\060\002\206\041\150\164\164
\160\072\057\057\167\167\167\056\145\055\163\172\151\147\156\157
\056\150\165\057\122\157\157\164\103\101\056\143\162\164\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\202\001\163\006\003\125\035\040\004\202\001\152\060\202\001\146
\060\202\001\142\006\014\053\006\001\004\001\201\250\030\002\001
\001\001\060\202\001\120\060\050\006\010\053\006\001\005\005\007
\002\001\026\034\150\164\164\160\072\057\057\167\167\167\056\145
\055\163\172\151\147\156\157\056\150\165\057\123\132\123\132\057
\060\202\001\042\006\010\053\006\001\005\005\007\002\002\060\202
\001\024\036\202\001\020\000\101\000\040\000\164\000\141\000\156
\000\372\000\163\000\355\000\164\000\166\000\341\000\156\000\171

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\000\172\000\351\000\163\000\351\000\150\000\145\000\172\000\040
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\000\141\000\144\000\341\000\163\000\341\000\150\000\157\000\172
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\000\341\000\154\000\164\000\141\000\164\000\363\000\040\000\123
\000\172\000\157\000\154\000\147\000\341\000\154\000\164\000\141
\000\164\000\341\000\163\000\151\000\040\000\123\000\172\000\141
\000\142\000\341\000\154\000\171\000\172\000\141\000\164\000\141
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\000\152\000\341\000\162\000\156\000\151\000\072\000\040\000\150
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\000\167\000\056\000\145\000\055\000\163\000\172\000\151\000\147
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\000\123\000\132\000\057\060\201\310\006\003\125\035\037\004\201
\300\060\201\275\060\201\272\240\201\267\240\201\264\206\041\150
\164\164\160\072\057\057\167\167\167\056\145\055\163\172\151\147
\156\157\056\150\165\057\122\157\157\164\103\101\056\143\162\154
\206\201\216\154\144\141\160\072\057\057\154\144\141\160\056\145
\055\163\172\151\147\156\157\056\150\165\057\103\116\075\115\151
\143\162\157\163\145\143\045\062\060\145\055\123\172\151\147\156
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\075\145\055\123\172\151\147\156\157\045\062\060\103\101\054\117
\075\115\151\143\162\157\163\145\143\045\062\060\114\164\144\056
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\143\141\164\151\157\156\114\151\163\164\073\142\151\156\141\162
\171\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\006\060\201\226\006\003\125\035\021\004\201\216\060\201\213\201
\020\151\156\146\157\100\145\055\163\172\151\147\156\157\056\150
\165\244\167\060\165\061\043\060\041\006\003\125\004\003\014\032
\115\151\143\162\157\163\145\143\040\145\055\123\172\151\147\156
\303\263\040\122\157\157\164\040\103\101\061\026\060\024\006\003
\125\004\013\014\015\145\055\123\172\151\147\156\303\263\040\110
\123\132\061\026\060\024\006\003\125\004\012\023\015\115\151\143
\162\157\163\145\143\040\113\146\164\056\061\021\060\017\006\003
\125\004\007\023\010\102\165\144\141\160\145\163\164\061\013\060
\011\006\003\125\004\006\023\002\110\125\060\201\254\006\003\125
\035\043\004\201\244\060\201\241\200\024\307\240\111\165\026\141
\204\333\061\113\204\322\361\067\100\220\357\116\334\367\241\166
\244\164\060\162\061\013\060\011\006\003\125\004\006\023\002\110
\125\061\021\060\017\006\003\125\004\007\023\010\102\165\144\141
\160\145\163\164\061\026\060\024\006\003\125\004\012\023\015\115
\151\143\162\157\163\145\143\040\114\164\144\056\061\024\060\022
\006\003\125\004\013\023\013\145\055\123\172\151\147\156\157\040
\103\101\061\042\060\040\006\003\125\004\003\023\031\115\151\143
\162\157\163\145\143\040\145\055\123\172\151\147\156\157\040\122

\157\157\164\040\103\101\202\021\000\314\270\347\277\116\051\032
\375\242\334\146\245\034\054\017\021\060\035\006\003\125\035\016
\004\026\004\024\307\240\111\165\026\141\204\333\061\113\204\322
\361\067\100\220\357\116\334\367\060\015\006\011\052\206\110\206
\367\015\001\001\005\005\000\003\202\001\001\000\323\023\234\146
\143\131\056\312\134\160\014\374\203\274\125\261\364\216\007\154
\146\047\316\301\073\040\251\034\273\106\124\160\356\132\314\240
\167\352\150\104\047\353\362\051\335\167\251\325\373\343\324\247
\004\304\225\270\013\341\104\150\140\007\103\060\061\102\141\345
\356\331\345\044\325\033\337\341\112\033\252\237\307\137\370\172
\021\352\023\223\000\312\212\130\261\356\355\016\115\264\327\250
\066\046\174\340\072\301\325\127\202\361\165\266\375\211\137\332
\363\250\070\237\065\006\010\316\042\225\276\315\325\374\276\133
\336\171\153\334\172\251\145\146\276\261\045\132\137\355\176\323
\254\106\155\114\364\062\207\264\040\004\340\154\170\260\167\321
\205\106\113\246\022\267\165\350\112\311\126\154\327\222\253\235
\365\111\070\322\117\123\343\125\220\021\333\230\226\306\111\362
\076\364\237\033\340\367\210\334\045\142\231\104\330\163\277\077
\060\363\014\067\076\324\302\050\200\163\261\001\267\235\132\226
\024\001\113\251\021\235\051\152\056\320\135\201\300\317\262\040
\103\307\003\340\067\116\135\012\334\131\040\045
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Microsec e-Szigno Root CA"
# Issuer: CN=Microsec e-Szigno Root CA,OU=e-Szigno CA,O=Microsec Ltd.,L=Budapest,C=HU
# Serial Number:cc:b8:e7:bf:4e:29:1a:fd:a2:dc:66:a5:1c:2c:0f:11
# Subject: CN=Microsec e-Szigno Root CA,OU=e-Szigno CA,O=Microsec Ltd.,L=Budapest,C=HU
# Not Valid Before: Wed Apr 06 12:28:44 2005
# Not Valid After: Thu Apr 06 12:28:44 2017
# Fingerprint (MD5): f0:96:b6:2f:c5:10:d5:67:8e:83:25:32:e8:5e:2e:e5
# Fingerprint (SHA1): 23:88:c9:d3:71:cc:9e:96:3d:ff:7d:3c:a7:ce:fc:d6:25:ec:19:0d
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsec e-Szigno Root CA"
CKA_CERT_SHA1_HASH
 MULTILINE_OCTAL
\043\210\311\323\161\314\236\226\075\377\175\074\247\316\374\326
\045\354\031\015
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\360\226\266\057\305\020\325\147\216\203\045\062\350\136\056\345

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END
CKA_ISSUER MULTILINE_OCTAL
\060\162\061\013\060\011\006\003\125\004\006\023\002\110\125\061
\021\060\017\006\003\125\004\007\023\010\102\165\144\141\160\145
\163\164\061\026\060\024\006\003\125\004\012\023\015\115\151\143
\162\157\163\145\143\040\114\164\144\056\061\024\060\022\006\003
\125\004\013\023\013\145\055\123\172\151\147\156\157\040\103\101
\061\042\060\040\006\003\125\004\003\023\031\115\151\143\162\157
\163\145\143\040\145\055\123\172\151\147\156\157\040\122\157\157
\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\314\270\347\277\116\051\032\375\242\334\146\245\034
\054\017\021
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED
 CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "LGPKI"
# Issuer: OU=Application CA G2,O=LGPKI,C=JP
# Serial Number: 49 (0x31)
# Subject: OU=Application CA G2,O=LGPKI,C=JP
# Not Valid Before: Fri Mar 31 15:00:00 2006
# Not Valid After: Thu Mar 31 14:59:59 2016
# Fingerprint (MD5): f3:d7:52:a8:75:fd:18:ec:e1:7d:35:b1:70:6e:a5:9c
# Fingerprint (SHA1): 96:83:38:f1:13:e3:6a:7b:ab:dd:08:f7:77:63:91:a6:87:36:58:2e
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "LGPKI"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\016\060\014\006\003\125\004\012\023\005\114\107\120\113\111\061
\032\060\030\006\003\125\004\013\023\021\101\160\160\154\151\143
\141\164\151\157\156\040\103\101\040\107\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\016\060\014\006\003\125\004\012\023\005\114\107\120\113\111\061
\032\060\030\006\003\125\004\013\023\021\101\160\160\154\151\143
\141\164\151\157\156\040\103\101\040\107\062
```

END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\061
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\240\060\202\002\210\240\003\002\001\002\002\001\061
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\071\061\013\060\011\006\003\125\004\006\023\002\112\120\061\016
\060\014\006\003\125\004\012\023\005\114\107\120\113\111\061\032
\060\030\006\003\125\004\013\023\021\101\160\160\154\151\143\141
\164\151\157\156\040\103\101\040\107\062\060\036\027\015\060\066
\060\063\063\061\061\065\060\060\060\060\132\027\015\061\066\060
\063\063\061\061\064\065\071\065\071\132\060\071\061\013\060\011
\006\003\125\004\006\023\002\112\120\061\016\060\014\006\003\125
\004\012\023\005\114\107\120\113\111\061\032\060\030\006\003\125
\004\013\023\021\101\160\160\154\151\143\141\164\151\157\156\040
\103\101\040\107\062\060\202\001\042\060\015\006\011\052\206\110
\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001
\012\002\202\001\001\000\271\065\306\020\370\333\150\333\007\304
\100\114\260\035\036\066\334\303\101\366\317\125\025\155\010\177
\134\306\150\125\345\347\127\361\226\121\346\341\115\170\017\156
\100\025\160\073\145\376\021\337\347\323\326\130\065\073\341\237
\002\374\224\122\106\056\263\236\140\233\002\236\311\202\322\366
\343\256\011\117\204\104\266\142\233\000\121\150\270\072\255\354
\144\321\062\113\351\224\104\203\264\016\316\041\211\153\260\066
\300\230\306\113\234\302\076\133\140\052\011\061\053\055\253\114
\336\261\240\375\130\126\302\203\035\040\274\304\204\011\207\173
\250\225\227\306\045\216\203\340\076\223\015\321\307\175\163\251
\250\374\031\000\100\056\042\270\172\063\101\365\170\375\132\161
\347\202\331\110\210\134\354\250\205\207\055\155\200\211\147\032
\151\276\020\300\132\216\355\210\175\076\157\054\070\153\067\316
\107\330\242\061\060\336\176\123\145\154\213\206\123\101\040\154
\275\110\245\176\257\000\132\126\022\130\201\321\334\211\131\371
\265\356\370\115\232\330\104\051\213\171\247\367\042\252\352\174
\134\264\026\210\040\015\002\003\001\000\001\243\201\262\060\201
\257\060\035\006\003\125\035\016\004\026\004\024\177\270\135\216
\304\030\153\306\175\314\056\351\256\316\064\347\027\135\340\241
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006
\060\114\006\003\125\035\037\004\105\060\103\060\101\240\077\240
\075\244\073\060\071\061\013\060\011\006\003\125\004\006\023\002
\112\120\061\016\060\014\006\003\125\004\012\023\005\114\107\120
\113\111\061\032\060\030\006\003\125\004\013\023\021\101\160\160
\154\151\143\141\164\151\157\156\040\103\101\040\107\062\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\037\006\003\125\035\043\004\030\060\026\200\024\177\270\135\216
\304\030\153\306\175\314\056\351\256\316\064\347\027\135\340\241
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003

\202\001\001\000\074\330\163\066\100\006\110\112\124\031\365\047
\110\071\045\245\156\102\347\266\315\033\313\071\064\267\233\354
\117\052\276\167\344\312\204\374\035\353\233\042\100\325\364\373
\150\207\162\374\107\135\152\016\122\112\343\265\135\110\306\042
\226\346\063\155\155\253\366\315\327\313\044\132\214\250\105\236
\076\141\202\175\224\325\005\360\032\065\137\161\057\056\124\265
\101\005\357\206\015\122\357\234\230\033\361\054\114\072\321\363
\206\323\214\076\172\057\206\105\216\203\062\046\133\277\123\312
\016\121\126\334\232\302\132\060\031\015\247\236\325\252\233\040
\071\151\170\041\364\227\155\321\016\021\114\056\323\033\132\260
\371\227\170\134\052\217\122\145\356\114\102\045\302\067\060\016
\155\053\065\224\203\006\350\257\105\073\004\146\247\060\273\371
\340\041\073\143\156\175\104\135\072\152\123\357\021\027\044\375
\124\262\132\154\163\126\041\311\154\055\227\244\102\263\047\141
\005\041\143\155\352\050\274\117\032\157\102\334\230\253\125\323
\036\033\300\222\077\233\301\346\073\027\126\342\304\230\103\045
\356\266\313\000
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "LGPKI"
# Issuer: OU=Application CA G2,O=LGPKI,C=JP
# Serial Number: 49 (0x31)
# Subject: OU=Application CA G2,O=LGPKI,C=JP
# Not Valid Before: Fri Mar 31 15:00:00 2006
# Not Valid After: Thu Mar 31 14:59:59 2016
# Fingerprint (MD5): f3:d7:52:a8:75:fd:18:ec:e1:7d:35:b1:70:6e:a5:9c
# Fingerprint (SHA1): 96:83:38:f1:13:e3:6a:7b:ab:dd:08:f7:77:63:91:a6:87:36:58:2e
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "LGPKI"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\226\203\070\361\023\343\152\173\253\335\010\367\167\143\221\246
\207\066\130\056
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\363\327\122\250\165\375\030\354\341\175\065\261\160\156\245\234
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\016\060\014\006\003\125\004\012\023\005\114\107\120\113\111\061

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\032\060\030\006\003\125\004\013\023\021\101\160\160\154\151\143
\141\164\151\157\156\040\103\101\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\061
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "AC RAIZ DNIE"
# Issuer: CN=AC RAIZ DNIE,OU=DNIE,O=DIRECCION GENERAL DE LA POLICIA,C=ES
# Serial Number:d2:85:70:fd:ae:a7:d6:5f:11:84:15:c6:31:b5:cb
# Subject: CN=AC RAIZ DNIE,OU=DNIE,O=DIRECCION GENERAL DE LA POLICIA,C=ES
# Not Valid Before: Thu Feb 16 10:37:25 2006
# Not Valid After: Fri Feb 08 22:59:59 2036
# Fingerprint (MD5): 15:5e:f5:11:7a:a2:c1:15:0e:92:7e:66:fe:3b:84:c3
#
 Fingerprint (SHA1): b3:8f:ec:ec:0b:14:8a:a6:86:c3:d0:0f:01:ec:c8:84:8e:80:85:eb
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AC RAIZ DNIE"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\050\060\046\006\003\125\004\012\014\037\104\111\122\105\103\103
\111\117\116\040\107\105\116\105\122\101\114\040\104\105\040\114
\101\040\120\117\114\111\103\111\101\061\015\060\013\006\003\125
\004\013\014\004\104\116\111\105\061\025\060\023\006\003\125\004
\003\014\014\101\103\040\122\101\111\132\040\104\116\111\105
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\050\060\046\006\003\125\004\012\014\037\104\111\122\105\103\103
\111\117\116\040\107\105\116\105\122\101\114\040\104\105\040\114
\101\040\120\117\114\111\103\111\101\061\015\060\013\006\003\125
\004\013\014\004\104\116\111\105\061\025\060\023\006\003\125\004
\003\014\014\101\103\040\122\101\111\132\040\104\116\111\105
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\000\322\205\160\375\256\247\326\137\021\204\025\306\061
\265\313
```

END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\277\060\202\003\247\240\003\002\001\002\002\020\000
\322\205\160\375\256\247\326\137\021\204\025\306\061\265\313\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\135
\061\013\060\011\006\003\125\004\006\023\002\105\123\061\050\060
\046\006\003\125\004\012\014\037\104\111\122\105\103\103\111\117
\116\040\107\105\116\105\122\101\114\040\104\105\040\114\101\040
\120\117\114\111\103\111\101\061\015\060\013\006\003\125\004\013
\014\004\104\116\111\105\061\025\060\023\006\003\125\004\003\014
\014\101\103\040\122\101\111\132\040\104\116\111\105\060\036\027
\015\060\066\060\062\061\066\061\060\063\067\062\065\132\027\015
\063\066\060\062\060\070\062\062\065\071\065\071\132\060\135\061
\013\060\011\006\003\125\004\006\023\002\105\123\061\050\060\046
\006\003\125\004\012\014\037\104\111\122\105\103\103\111\117\116
\040\107\105\116\105\122\101\114\040\104\105\040\114\101\040\120
\117\114\111\103\111\101\061\015\060\013\006\003\125\004\013\014
\004\104\116\111\105\061\025\060\023\006\003\125\004\003\014\014
\101\103\040\122\101\111\132\040\104\116\111\105\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\200\000\255
\014\303\243\040\007\243\143\377\367\064\240\315\356\152\124\010
\027\135\261\001\025\247\346\271\137\212\161\377\014\302\035\352
\067\363\336\223\177\326\005\115\204\262\325\327\034\014\364\304
\221\160\100\016\132\310\230\244\200\350\015\063\300\007\363\267
\365\254\241\070\172\300\146\124\044\374\122\314\060\052\362\303
\304\241\054\166\277\301\300\277\202\361\233\360\150\172\023\100
\310\227\274\034\045\007\010\012\267\226\357\314\051\124\340\346
\145\055\352\262\056\261\011\151\022\116\060\325\330\370\274\000
\200\057\115\223\017\315\056\127\033\063\273\237\060\116\304\245
\313\171\247\373\342\064\030\266\040\236\033\237\135\247\311\072
\255\105\144\263\030\316\021\022\234\155\036\125\105\050\204\234
\127\147\115\371\313\342\213\217\130\011\324\071\377\310\066\322
\070\342\014\145\177\025\016\175\301\007\335\251\042\337\221\000
\304\154\161\064\164\334\071\352\352\117\104\151\177\130\333\130
\012\122\161\053\354\251\035\120\164\063\371\051\152\372\376\231
\364\347\314\105\105\155\312\132\045\242\022\343\316\327\070\005
\071\360\032\011\365\166\131\316\142\157\172\064\015\054\321\274
\004\022\354\075\123\310\372\320\002\313\316\075\041\265\305\340
\071\063\145\317\071\123\311\233\106\371\235\063\363\131\200\010
\101\276\157\113\240\372\112\316\244\166\034\205\342\257\257\024
\235\145\254\367\177\227\344\063\111\246\257\276\316\053\067\361
\056\301\163\005\234\234\140\114\235\060\015\227\124\236\201\142
\273\347\340\057\367\024\007\024\251\167\221\351\334\221\225\216
\323\210\220\063\107\157\161\303\024\151\372\246\055\001\036\033
\352\323\056\342\177\013\334\317\347\042\360\361\101\243\001\222
\345\200\323\276\251\142\250\125\210\013\064\064\354\334\041\025
\252\357\326\042\136\211\365\121\222\023\052\157\200\026\331\261

\015\331\056\370\020\270\302\376\122\105\063\234\035\070\174\334
\025\151\064\163\277\240\054\273\021\173\224\315\370\067\055\157
\075\357\203\132\306\036\233\164\111\217\331\302\215\276\026\166
\120\310\132\321\045\026\366\366\314\214\234\132\060\236\145\276
\320\232\110\223\327\372\150\015\165\061\207\371\367\002\003\001
\000\001\243\173\060\171\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\016\006\003\125\035\017\001\001
\377\004\004\003\002\001\006\060\035\006\003\125\035\016\004\026
\004\024\216\105\364\237\163\305\377\057\033\005\333\001\107\140
\033\003\212\201\267\272\060\067\006\003\125\035\040\004\060\060
\056\060\054\006\004\125\035\040\000\060\044\060\042\006\010\053
\006\001\005\005\007\002\001\026\026\150\164\164\160\072\057\057
\167\167\167\056\144\156\151\145\056\145\163\057\144\160\143\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003\202
\002\001\000\165\345\163\311\121\121\057\213\031\240\207\351\377
\256\066\066\246\374\101\037\343\036\327\161\140\031\306\157\232
\002\060\275\142\161\255\163\376\221\055\116\344\046\100\104\251
\256\170\046\043\061\151\334\232\163\226\036\111\121\013\340\357
\301\270\103\357\161\234\356\101\267\305\120\037\062\204\236\042
\206\361\367\037\217\331\255\053\116\332\227\050\227\273\226\232
\032\370\261\331\172\004\363\124\231\022\031\226\025\200\147\071
\377\002\137\172\374\125\102\120\132\346\271\242\377\270\250\142
\036\024\315\331\077\276\243\145\110\305\073\327\067\316\015\372
\050\220\332\277\371\343\121\107\045\175\112\323\147\115\207\252
\142\274\136\354\172\200\104\174\367\237\012\275\145\127\224\312
\362\021\146\326\122\177\344\072\160\165\004\315\073\227\324\066
\162\367\121\126\277\064\365\322\101\341\264\332\250\103\376\153
\022\111\022\264\135\317\042\102\226\214\010\043\046\214\262\020
\116\135\252\123\356\001\057\165\345\271\242\021\063\304\327\152
\375\370\016\312\156\202\331\347\273\131\043\116\265\371\021\035
\057\153\043\365\173\021\040\352\101\022\220\062\106\333\061\073
\251\301\133\163\150\072\106\033\214\376\227\267\126\271\141\231
\314\116\360\203\372\067\361\336\034\235\034\161\213\003\223\303
\304\163\202\056\250\230\035\144\242\232\214\367\124\010\115\317
\352\201\313\365\133\011\231\143\257\165\214\226\370\171\065\325
\334\353\101\201\171\070\204\136\157\361\157\142\166\333\221\316
\132\205\140\071\035\133\342\052\057\103\045\333\302\172\044\323
\025\260\242\361\214\240\175\153\110\011\023\377\242\114\146\212
\354\160\122\011\123\214\060\314\270\325\272\044\334\060\231\076
\241\136\267\337\201\254\354\067\276\116\233\047\130\336\176\241
\233\124\177\006\266\057\344\062\120\375\347\020\273\250\315\332
\030\033\324\143\146\075\352\121\161\071\364\234\076\337\132\364
\332\307\114\046\355\213\265\041\272\064\171\002\163\141\020\332
\230\061\250\140\313\176\007\247\320\267\005\103\211\133\315\205
\046\331\260\121\257\367\214\122\252\022\247\130\337\222\233\147
\362\235\362\346\364\151\061\364\026\347\336\167\133\036\335\232
\005\001\255
END

```
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "AC RAIZ DNIE"
# Issuer: CN=AC RAIZ DNIE,OU=DNIE,O=DIRECCION GENERAL DE LA POLICIA,C=ES
# Serial Number:d2:85:70:fd:ae:a7:d6:5f:11:84:15:c6:31:b5:cb
# Subject: CN=AC RAIZ DNIE,OU=DNIE,O=DIRECCION GENERAL DE LA POLICIA,C=ES
# Not Valid Before: Thu Feb 16 10:37:25 2006
# Not Valid After: Fri Feb 08 22:59:59 2036
# Fingerprint (MD5): 15:5e:f5:11:7a:a2:c1:15:0e:92:7e:66:fe:3b:84:c3
# Fingerprint (SHA1): b3:8f:ec:ec:0b:14:8a:a6:86:c3:d0:0f:01:ec:c8:84:8e:80:85:eb
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN
 CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "AC RAIZ DNIE"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\263\217\354\354\013\024\212\246\206\303\320\017\001\354\310\204
\216\200\205\353
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\025\136\365\021\172\242\301\025\016\222\176\146\376\073\204\303
END
CKA_ISSUER MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\050\060\046\006\003\125\004\012\014\037\104\111\122\105\103\103
\111\117\116\040\107\105\116\105\122\101\114\040\104\105\040\114
\101\040\120\117\114\111\103\111\101\061\015\060\013\006\003\125
\004\013\014\004\104\116\111\105\061\025\060\023\006\003\125\004
\003\014\014\101\103\040\122\101\111\132\040\104\116\111\105
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\000\322\205\160\375\256\247\326\137\021\204\025\306\061
\265\313
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING
 CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "EC-ACC"
# Issuer: CN=EC-ACC,OU=Jerarquia Entitats de Certificacio Catalanes,OU=Vegeu https://www.catcert.net/verarrel
```

(c)03,OU=Serveis Publics de Certificacio,O=Agencia Catalana de Certificacio (NIF Q-0801176-I),C=ES
# Serial Number: -237015792479557091396265551265248204 79 (0x-11d4c2142bde21eb579d53fb0c223bff)
# Subject: CN=EC-ACC,OU=Jerarquia Entitats de Certificacio Catalanes,OU=Vegeu
https://www.catcert.net/verarrel (c)03,OU=Serveis Publics de Certificacio,O=Agencia Catalana de Certificacio (NIF Q-0801176-I),C=ES
# Not Valid Before: Tue Jan 07 23:00:00 2003
# Not Valid After: Tue Jan 07 22:59:59 2031
# Fingerprint (MD5): eb:f5:9d:29:0d:61:f9:42:1f:7c:c2:ba:6d:e3:15:09
# Fingerprint (SHA1): 28:90:3a:63:5b:52:80:fa:e6:77:4c:0b:6d:a7:d6:ba:a6:4a:f2:e8
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
 CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "EC-ACC"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\363\061\013\060\011\006\003\125\004\006\023\002\105\123
\061\073\060\071\006\003\125\004\012\023\062\101\147\145\156\143
\151\141\040\103\141\164\141\154\141\156\141\040\144\145\040\103
\145\162\164\151\146\151\143\141\143\151\157\040\050\116\111\106
\040\121\055\060\070\060\061\061\067\066\055\111\051\061\050\060
\046\006\003\125\004\013\023\037\123\145\162\166\145\151\163\040
\120\165\142\154\151\143\163\040\144\145\040\103\145\162\164\151
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\040\121\055\060\070\060\061\061\067\066\055\111\051\061\050\060
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\040\103\141\164\141\154\141\156\141\040\144\145\040\103\145\162
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\040\105\156\164\151\164\141\164\163\040\144\145\040\103\145\162
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\265\224\145\031\042\025\027\302\103\154\146\104\232\015\004\076
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\145\270\242\165\270\036\363\345\102\175\257\355\363\212\110\144
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\303\333\075\310\227\172\356\160\355\247\346\174\333\161\317\055
\224\142\337\155\326\365\070\276\077\245\205\012\031\270\250\330
\011\165\102\160\304\352\357\313\016\310\064\250\022\042\230\014
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\164\056\156\145\164\060\017\006\003\125\035\023\001\001\377\004
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\141\162\162\145\154\040\060\015\006\011\052\206\110\206\367\015
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\375\175\117\315\240\101\340\064\223\277\313\342\206\234\067\222
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\210\277\102\325\053\075\345\371\272\236\056\263\312\364\163\222
\002\013\276\114\146\353\040\376\271\313\265\231\177\346\266\023
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CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER
CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "EC-ACC"
# Issuer: CN=EC-ACC,OU=Jerarquia Entitats de Certificacio Catalanes,OU=Vegeu https://www.catcert.net/verarrel (c)03,OU=Serveis Publics de Certificacio,O=Agencia Catalana de Certificacio (NIF Q-0801176-I),C=ES
# Serial Number: -237015792479557091396265551265248204 79 (0x-11d4c2142bde21eb579d53fb0c223bff)
# Subject: CN=EC-ACC,OU=Jerarquia Entitats de Certificacio Catalanes,OU=Vegeu https://www.catcert.net/verarrel (c)03,OU=Serveis Publics de Certificacio,O=Agencia Catalana de Certificacio (NIF Q-0801176-I),C=ES
# Not Valid Before: Tue Jan 07 23:00:00 2003
# Not Valid After: Tue Jan 07 22:59:59 2031
# Fingerprint (MD5): eb:f5:9d:29:0d:61:f9:42:1f:7c:c2:ba:6d:e3:15:09
# Fingerprint (SHA1): 28:90:3a:63:5b:52:80:fa:e6:77:4c:0b:6d:a7:d6:ba:a6:4a:f2:e8
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
UTF8 "EC-ACC"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\050\220\072\143\133\122\200\372\346\167\114\013\155\247\326\272
\246\112\362\350
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END
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\060\063\006\003\125\004\013\023\054\112\145\162\141\162\161\165
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CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "A-Trust-nQual-03"
# Issuer: CN=A-Trust-nQual-03,OU=A-Trust-nQual-03,O=A-Trust Ges. f. Sicherheitssysteme im elektr.
Datenverkehr GmbH,C=AT
# Serial Number:14:b4:f9
# Subject: CN=A-Trust-nQual-03,OU=A-Trust-nQual-03,O=A-Trust Ges. f. Sicherheitssysteme im elektr.
Datenverkehr GmbH,C=AT
# Not Valid Before: Wed Jul 23 10:38:29 2014
#
 Not Valid After: Wed Jul 23 08:38:29 2025
# Fingerprint (MD5): a6:b2:ec:05:6b:b4:86:f0:e4:05:05:b0:d3:26:fc:fa
# Fingerprint (SHA1): 4c:ae:e3:89:31:d1:9a:e7:3b:31:aa:75:ca:33:d6:21:29:0f:a7:5e
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CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "A-Trust-nQual-03"
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\040\145\154\145\153\164\162\056\040\104\141\164\145\156\166\145
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\225\131\120\252\072\137\060\177\162\133\001\114\107\113\326\353
\160\122\244\263\340\211\050\372\372\251\016\207\372\306\365\243
\335\166\355\317\110\101\046\130\077\164\277\200\300\032\033\015
\034\111\071\154\236\213\004\320\376\124\257\233\307\261\252\146
\025\135\325\371\123\243\140\333\066\030\264\256\341\164\002\142
\364\210\246\307\303\046\237\025\260\237\301\061\204\275\032\241
\257\103\377\152\031\255\037\300\106\304\061\247\133\346\147\011
\267\017\304\052\016\040\046\330\114\203\023\237\073\227\225\270
\044\067\074\001\026\071\356\145\254\352\323\166\364\310\226\032
\141\122\351\354\346\032\010\166\134\213\270\332\236\300\255\354
\024\236\215\343\253\024\354\270\311\056\244\212\140\100\174\272
\312\010\213
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "A-Trust-nQual-03"
# Issuer: CN=A-Trust-nQual-03,OU=A-Trust-nQual-03,O=A-Trust
Ges. f. Sicherheitssysteme im elektr. Datenverkehr GmbH,C=AT
# Serial Number:14:b4:f9
# Subject: CN=A-Trust-nQual-03,OU=A-Trust-nQual-03,O=A-Trust Ges. f. Sicherheitssysteme im elektr.
Datenverkehr GmbH,C=AT
# Not Valid Before: Wed Jul 23 10:38:29 2014
# Not Valid After: Wed Jul 23 08:38:29 2025
# Fingerprint (MD5): a6:b2:ec:05:6b:b4:86:f0:e4:05:05:b0:d3:26:fc:fa
# Fingerprint (SHA1): 4c:ae:e3:89:31:d1:9a:e7:3b:31:aa:75:ca:33:d6:21:29:0f:a7:5e
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "A-Trust-nQual-03"

```
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\114\256\343\211\061\321\232\347\073\061\252\165\312\063\326\041
\051\017\247\136
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\246\262\354\005\153\264\206\360\344\005\005\260\323\046\374\372
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\215\061\013\060\011\006\003\125\004\006\023\002\101\124
\061\110\060\106\006\003\125\004\012\014\077\101\055\124\162\165
\163\164\040\107\145\163\056\040\146\056\040\123\151\143\150\145
\162\150\145\151\164\163\163\171\163\164\145\155\145\040\151\155
\040\145\154\145\153\164\162\056\040\104\141\164\145\156\166\145
\162\153\145\150\162\040\107\155\142\110\061\031\060\027\006\003
\125\004\013\014\020\101\055\124\162\165\163\164\055\156\121\165
\141\154\055\060\063\061\031\060\027\006\003\125\004\003\014\020
\101\055\124\162\165\163\164\055\156\121\165\141\154\055\060\063
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\003\024\264\371
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "KISA RootCA 1"
# Issuer: CN=KISA RootCA 1,OU=Korea Certification Authority Central,O=KISA,C=KR
# Serial Number: 4 (0x4)
# Subject: CN=KISA RootCA 1,OU=Korea Certification Authority Central,O=KISA,C=KR
# Not
 Valid Before: Wed Aug 24 08:05:46 2005
# Not Valid After: Sun Aug 24 08:05:46 2025
# Fingerprint (MD5): 68:9b:17:c6:54:e0:e0:e0:99:55:16:42:f7:5a:86:d8
# Fingerprint (SHA1): 02:72:68:29:3e:5f:5d:17:aa:a4:b3:c3:e6:36:1e:1f:92:57:5e:aa
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "KISA RootCA 1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\113\122\061
\015\060\013\006\003\125\004\012\014\004\113\111\123\101\061\056
\060\054\006\003\125\004\013\014\045\113\157\162\145\141\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
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\150\157\162\151\164\171\040\103\145\156\164\162\141\154\061\026
\060\024\006\003\125\004\003\014\015\113\111\123\101\040\122\157
\157\164\103\101\040\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\113\122\061
\015\060\013\006\003\125\004\012\014\004\113\111\123\101\061\056
\060\054\006\003\125\004\013\014\045\113\157\162\145\141\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\040\103\145\156\164\162\141\154\061\026
\060\024\006\003\125\004\003\014\015\113\111\123\101\040\122\157
\157\164\103\101\040\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\004
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\163\060\202\002\133\240\003\002\001\002\002\001\004
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\144\061\013\060\011\006\003\125\004\006\023\002\113\122\061\015
\060\013\006\003\125\004\012\014\004\113\111\123\101\061\056\060
\054\006\003\125\004\013\014\045\113\157\162\145\141\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171\040\103\145\156\164\162\141\154\061\026\060
\024\006\003\125\004\003\014\015\113\111\123\101\040\122\157\157
\164\103\101\040\061\060\036\027\015\060\065\060\070\062\064\060
\070\060\065\064\066\132\027\015\062\065\060\070\062\064\060\070
\060\065\064\066\132\060\144\061\013\060\011\006\003\125\004\006
\023\002\113\122\061\015\060\013\006\003\125\004\012\014\004\113
\111\123\101\061\056\060\054\006\003\125\004\013\014\045\113\157
\162\145\141\040\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\101\165\164\150\157\162\151\164\171\040\103\145\156\164
\162\141\154\061\026\060\024\006\003\125\004\003\014\015\113\111
\123\101\040\122\157\157\164\103\101\040\061\060\202\001\040\060
\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202
\001\015\000\060\202\001\010\002\202\001\001\000\274\004\344\372
\023\071\360\064\226\040\153\154\150\273\372\333\167\377\047\367
\254\354\057\347\375\360\177\155\157\214\052\315\045\011\133\044
\364\241\150\374\050\354\311\045\342\254\355\336\310\063\204\365
\260\245\011\072\247\261\107\110\305\314\117\214\171\234\371\006
\127\175\335\356\070\366\317\024\262\234\352\323\300\135\167\142
\360\107\015\271\032\100\123\134\144\160\257\010\132\300\367\317
\165\371\154\215\144\050\036\040\376\267\033\031\323\132\146\203
\162\342\260\233\275\323\045\025\015\062\157\144\067\224\205\106
\310\162\276\167\325\156\037\050\057\307\151\355\347\203\211\063
\130\323\336\240\277\100\350\103\120\356\334\115\153\274\245\352

\246\310\141\216\365\303\144\257\006\025\334\051\213\077\165\214
\274\161\104\333\374\255\265\027\035\155\211\203\317\306\063\275
\277\105\242\376\012\237\243\021\137\017\271\037\234\032\302\106
\314\234\050\146\237\160\046\074\056\337\252\200\376\214\305\004
\011\045\117\315\223\107\074\067\352\002\147\222\376\374\042\044
\134\254\322\054\340\134\001\063\212\301\031\333\002\001\003\243
\062\060\060\060\035\006\003\125\035\016\004\026\004\024\277\266
\047\330\003\132\166\145\114\141\001\101\126\061\345\213\173\072
\331\314\060\017\006\003\125\035\023\001\001\377\004\005\060\003
\001\001\377\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\003\202\001\001\000\023\257\121\013\336\212\152\133\346
\232\012\310\261\220\112\116\241\002\235\314\210\322\253\146\275
\075\354\273\261\102\225\152\262\134\132\377\241\143\144\226\251
\150\025\177\045\136\212\370\244\163\301\200\212\205\012\016\122
\350\062\347\105\370\116\145\200\221\231\164\103\345\105\235\111
\052\360\224\225\335\351\341\060\322\023\156\311\116\261\167\345
\004\317\255\132\036\224\011\132\327\074\010\034\256\172\351\024
\062\301\105\255\322\046\110\162\254\250\101\332\360\041\207\071
\136\337\374\144\377\141\164\052\234\331\233\213\137\302\067\223
\330\243\067\057\073\223\153\262\033\007\247\177\011\120\357\323
\072\276\041\153\212\220\073\047\112\121\116\153\236\234\207\235
\370\170\220\061\355\021\047\306\250\131\276\374\030\013\373\216
\176\056\102\341\355\347\011\041\275\271\023\305\126\147\364\046
\246\102\103\220\104\124\264\161\233\166\344\032\022\254\032\050
\000\337\233\301\325\370\333\134\243\370\222\261\275\264\324\371
\120\331\000\002\117\333\203\320\021\117\244\102\126\141\072\176
\023\062\323\204\037\311\272
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "KISA RootCA 1"
# Issuer: CN=KISA RootCA 1,OU=Korea Certification Authority Central,O=KISA,C=KR
# Serial Number: 4 (0x4)
# Subject: CN=KISA RootCA 1,OU=Korea Certification Authority Central,O=KISA,C=KR
# Not Valid Before: Wed Aug 24 08:05:46 2005
# Not Valid After: Sun Aug 24 08:05:46 2025
# Fingerprint (MD5): 68:9b:17:c6:54:e0:e0:e0:99:55:16:42:f7:5a:86:d8
# Fingerprint (SHA1): 02:72:68:29:3e:5f:5d:17:aa:a4:b3:c3:e6:36:1e:1f:92:57:5e:aa
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "KISA RootCA 1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL

\002\162\150\051\076\137\135\027\252\244\263\303\346\066\036\037
\222\127\136\252
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\150\233\027\306\124\340\340\340\231\125\026\102\367\132\206\330
END
CKA_ISSUER
MULTILINE_OCTAL
\060\144\061\013\060\011\006\003\125\004\006\023\002\113\122\061
\015\060\013\006\003\125\004\012\014\004\113\111\123\101\061\056
\060\054\006\003\125\004\013\014\045\113\157\162\145\141\040\103
\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164
\150\157\162\151\164\171\040\103\145\156\164\162\141\154\061\026
\060\024\006\003\125\004\003\014\015\113\111\123\101\040\122\157
\157\164\103\101\040\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\004
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "NetLock Minositett Kozjegyzoi (Class QA) Tanusitvanykiado"
# Issuer: 1.2.840.113549.1.9.1=info@netlock.hu,CN=NetLock Minositett Kozjegyzoi (Class QA) Tanusitvanykiado,OU=Tanusitvanykiadok,O=NetLock
Halozatbiztonsagi Kft.,L=Budapest,C=HU
# Serial Number: 123 (0x7b)
# Subject: 1.2.840.113549.1.9.1=info@netlock.hu,CN=NetLock Minositett Kozjegyzoi (Class QA) Tanusitvanykiado,OU=Tanusitvanykiadok,O=NetLock Halozatbiztonsagi Kft.,L=Budapest,C=HU
# Not Valid Before: Sun Mar 30 01:47:11 2003
# Not Valid After: Thu Dec 15 01:47:11 2022
# Fingerprint (MD5): d4:80:65:68:24:f9:89:22:28:db:f5:a4:9a:17:8f:14
# Fingerprint (SHA1): 01:68:97:e1:a0:b8:f2:c3:b1:34:66:5c:20:a7:27:b7:a1:58:e2:8f
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "NetLock Minositett Kozjegyzoi (Class QA) Tanusitvanykiado"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\311\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\023\010\102\165\144\141\160
\145\163\164\061\047\060\045\006\003\125\004\012\023\036\116\145
\164\114\157\143\153\040\110\141\154\157\172\141\164\142\151\172
\164\157\156\163\141\147\151\040\113\146\164\056\061\032\060\030

\006\003\125\004\013\023\021\124\141\156\165\163\151\164\166\141
\156\171\153\151\141\144\157\153\061\102\060\100\006\003\125\004
\003\023\071\116\145\164\114\157\143\153\040\115\151\156\157\163
\151\164\145\164\164\040\113\157\172\152\145\147\171\172\157\151
\040\050\103\154\141\163\163\040\121\101\051\040\124\141\156\165
\163\151\164\166\141\156\171\153\151\141\144\157\061\036\060\034
\006\011\052\206\110\206\367\015\001\011\001\026\017\151\156\146
\157\100\156\145\164\154\157\143\153\056\150\165
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\311\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\023\010\102\165\144\141\160
\145\163\164\061\047\060\045\006\003\125\004\012\023\036\116\145
\164\114\157\143\153\040\110\141\154\157\172\141\164\142\151\172
\164\157\156\163\141\147\151\040\113\146\164\056\061\032\060\030
\006\003\125\004\013\023\021\124\141\156\165\163\151\164\166\141
\156\171\153\151\141\144\157\153\061\102\060\100\006\003\125\004
\003\023\071\116\145\164\114\157\143\153\040\115\151\156\157\163
\151\164\145\164\164\040\113\157\172\152\145\147\171\172\157\151
\040\050\103\154\141\163\163\040\121\101\051\040\124\141\156\165
\163\151\164\166\141\156\171\153\151\141\144\157\061\036\060\034
\006\011\052\206\110\206\367\015\001\011\001\026\017\151\156\146
\157\100\156\145\164\154\157\143\153\056\150\165
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\173
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\321\060\202\005\271\240\003\002\001\002\002\001\173
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\201\311\061\013\060\011\006\003\125\004\006\023\002\110\125\061
\021\060\017\006\003\125\004\007\023\010\102\165\144\141\160\145
\163\164\061\047\060\045\006\003\125\004\012\023\036\116\145\164
\114\157\143\153\040\110\141\154\157\172\141\164\142\151\172\164
\157\156\163\141\147\151\040\113\146\164\056\061\032\060\030\006
\003\125\004\013\023\021\124\141\156\165\163\151\164\166\141\156
\171\153\151\141\144\157\153\061\102\060\100\006\003\125\004\003
\023\071\116\145\164\114\157\143\153\040\115\151\156\157\163\151
\164\145\164\164\040\113\157\172\152\145\147\171\172\157\151\040
\050\103\154\141\163\163\040\121\101\051\040\124\141\156\165\163
\151\164\166\141\156\171\153\151\141\144\157\061\036\060\034\006
\011\052\206\110\206\367\015\001\011\001\026\017\151\156\146\157
\100\156\145\164\154\157\143\153\056\150\165\060\036\027\015\060
\063\060\063\063\060\060\061\064\067\061\061\132\027\015\062\062
\061\062\061\065\060\061\064\067\061\061\132\060\201\311\061\013

\060\011\006\003\125\004\006\023\002\110\125\061\021\060\017\006
\003\125\004\007\023\010\102\165\144\141\160\145\163\164\061\047
\060\045\006\003\125\004\012\023\036\116\145\164\114\157\143\153
\040\110\141\154\157\172\141\164\142\151\172\164\157\156\163\141
\147\151\040\113\146\164\056\061\032\060\030\006\003\125\004\013
\023\021\124\141\156\165\163\151\164\166\141\156\171\153\151\141
\144\157\153\061\102\060\100\006\003\125\004\003\023\071\116\145
\164\114\157\143\153\040\115\151\156\157\163\151\164\145\164\164
\040\113\157\172\152\145\147\171\172\157\151\040\050\103\154\141
\163\163\040\121\101\051\040\124\141\156\165\163\151\164\166\141
\156\171\153\151\141\144\157\061\036\060\034\006\011\052\206\110
\206\367\015\001\011\001\026\017\151\156\146\157\100\156\145\164
\154\157\143\153\056\150\165\060\202\001\042\060\015\006\011\052
\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000\060
\202\001\012\002\202\001\001\000\307\122\045\262\330\075\324\204
\125\011\247\033\275\154\271\024\364\212\002\333\166\374\152\052
\170\253\345\167\360\156\340\214\043\147\333\245\144\231\271\335
\001\076\157\357\055\232\074\042\360\135\311\127\240\125\101\177
\362\103\136\130\202\123\061\145\316\036\362\046\272\000\124\036
\257\260\274\034\344\122\214\240\062\257\267\067\261\123\147\150
\164\147\120\366\055\056\144\336\256\046\171\337\337\231\206\253
\253\177\205\354\240\373\200\314\364\270\014\036\223\105\143\271
\334\270\133\233\355\133\071\324\137\142\260\247\216\174\146\070
\054\252\261\010\143\027\147\175\314\275\263\361\303\077\317\120
\071\355\321\031\203\025\333\207\022\047\226\267\332\352\345\235
\274\272\352\071\117\213\357\164\232\347\305\320\322\352\206\121
\034\344\376\144\010\050\004\171\005\353\312\305\161\016\013\357
\253\352\354\022\021\241\030\005\062\151\321\014\054\032\075\045
\231\077\265\174\312\155\260\256\231\231\372\010\140\347\031\302
\362\275\121\323\314\323\002\254\301\021\014\200\316\253\334\224
\235\153\243\071\123\072\326\205\002\003\000\305\175\243\202\002
\300\060\202\002\274\060\022\006\003\125\035\023\001\001\377\004
\010\060\006\001\001\377\002\001\004\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\006\060\202\002\165\006\011\140
\206\110\001\206\370\102\001\015\004\202\002\146\026\202\002\142
\106\111\107\131\105\114\105\115\041\040\105\172\145\156\040\164
\141\156\165\163\151\164\166\141\156\171\040\141\040\116\145\164
\114\157\143\153\040\113\146\164\056\040\115\151\156\157\163\151
\164\145\164\164\040\123\172\157\154\147\141\154\164\141\164\141
\163\151\040\123\172\141\142\141\154\171\172\141\164\141\142\141
\156\040\154\145\151\162\164\040\145\154\152\141\162\141\163\157
\153\040\141\154\141\160\152\141\156\040\153\145\163\172\165\154
\164\056\040\101\040\155\151\156\157\163\151\164\145\164\164\040
\145\154\145\153\164\162\157\156\151\153\165\163\040\141\154\141
\151\162\141\163\040\152\157\147\150\141\164\141\163\040\145\162
\166\145\156\171\145\163\165\154\145\163\145\156\145\153\054\040
\166\141\154\141\155\151\156\164\040\145\154\146\157\147\141\144
\141\163\141\156\141\153\040\146\145\154\164\145\164\145\154\145

\040\141\040\115\151\156\157\163\151\164\145\164\164\040\123\172
\157\154\147\141\154\164\141\164\141\163\151\040\123\172\141\142
\141\154\171\172\141\164\142\141\156\054\040\141\172\040\101\154
\164\141\154\141\156\157\163\040\123\172\145\162\172\157\144\145
\163\151\040\106\145\154\164\145\164\145\154\145\153\142\145\156
\040\145\154\157\151\162\164\040\145\154\154\145\156\157\162\172
\145\163\151\040\145\154\152\141\162\141\163\040\155\145\147\164
\145\164\145\154\145\056\040\101\040\144\157\153\165\155\145\156
\164\165\155\157\153\040\155\145\147\164\141\154\141\154\150\141
\164\157\153\040\141\040\150\164\164\160\163\072\057\057\167\167
\167\056\156\145\164\154\157\143\153\056\150\165\057\144\157\143
\163\057\040\143\151\155\145\156\040\166\141\147\171\040\153\145
\162\150\145\164\157\153\040\141\172\040\151\156\146\157\100\156
\145\164\154\157\143\153\056\156\145\164\040\145\055\155\141\151
\154\040\143\151\155\145\156\056\040\127\101\122\116\111\116\107
\041\040\124\150\145\040\151\163\163\165\141\156\143\145\040\141
\156\144\040\164\150\145\040\165\163\145\040\157\146\040\164\150
\151\163\040\143\145\162\164\151\146\151\143\141\164\145\040\141
\162\145\040\163\165\142\152\145\143\164\040\164\157\040\164\150
\145\040\116\145\164\114\157\143\153\040\121\165\141\154\151\146
\151\145\144\040\103\120\123\040\141\166\141\151\154\141\142\154
\145\040\141\164\040\150\164\164\160\163\072\057\057\167\167\167
\056\156\145\164\154\157\143\153\056\150\165\057\144\157\143\163
\057\040\157\162\040\142\171\040\145\055\155\141\151\154\040\141
\164\040\151\156\146\157\100\156\145\164\154\157\143\153\056\156
\145\164\060\035\006\003\125\035\016\004\026\004\024\011\152\142
\026\222\260\132\273\125\016\313\165\062\072\062\345\262\041\311
\050\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000
\003\202\001\001\000\221\152\120\234\333\170\201\233\077\213\102
\343\073\374\246\303\356\103\340\317\363\342\200\065\111\105\166
\002\342\343\057\005\305\361\052\347\300\101\063\306\266\233\320
\063\071\315\300\333\241\255\154\067\002\114\130\101\073\362\227
\222\306\110\250\315\345\212\071\211\141\371\122\227\351\275\366
\371\224\164\350\161\016\274\167\206\303\006\314\132\174\112\176
\064\120\060\056\373\177\062\232\215\075\363\040\133\370\152\312
\206\363\061\114\054\131\200\002\175\376\070\311\060\165\034\267
\125\343\274\237\272\250\155\204\050\005\165\263\213\015\300\221
\124\041\347\246\013\264\231\365\121\101\334\315\243\107\042\331
\307\001\201\304\334\107\117\046\352\037\355\333\315\015\230\364
\243\234\264\163\062\112\226\231\376\274\177\310\045\130\370\130
\363\166\146\211\124\244\246\076\304\120\134\272\211\030\202\165
\110\041\322\117\023\350\140\176\007\166\333\020\265\121\346\252
\271\150\252\315\366\235\220\165\022\352\070\032\312\104\350\267
\231\247\052\150\225\146\225\253\255\357\211\313\140\251\006\022
\306\224\107\351\050
END
CKA_NSS_MOZILLA_CA_POLICY

```
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "NetLock Minositett Kozjegyzoi (Class QA) Tanusitvanykiado"
# Issuer: 1.2.840.113549.1.9.1=info@netlock.hu,CN=NetLock
 Minositett Kozjegyzoi (Class QA) Tanusitvanykiado,OU=Tanusitvanykiadok,O=NetLock Halozatbiztonsagi
Kft.,L=Budapest,C=HU
# Serial Number: 123 (0x7b)
# Subject: 1.2.840.113549.1.9.1=info@netlock.hu,CN=NetLock Minositett Kozjegyzoi (Class QA)
Tanusitvanykiado,OU=Tanusitvanykiadok,O=NetLock Halozatbiztonsagi Kft.,L=Budapest,C=HU
# Not Valid Before: Sun Mar 30 01:47:11 2003
# Not Valid After: Thu Dec 15 01:47:11 2022
# Fingerprint (MD5): d4:80:65:68:24:f9:89:22:28:db:f5:a4:9a:17:8f:14
# Fingerprint (SHA1): 01:68:97:e1:a0:b8:f2:c3:b1:34:66:5c:20:a7:27:b7:a1:58:e2:8f
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "NetLock Minositett Kozjegyzoi (Class QA) Tanusitvanykiado"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\001\150\227\341\240\270\362\303\261\064\146\134\040\247\047\267
\241\130\342\217
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\324\200\145\150\044\371\211\042\050\333\365\244\232\027\217\024
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\201\311\061\013\060\011\006\003\125\004\006\023\002\110\125
\061\021\060\017\006\003\125\004\007\023\010\102\165\144\141\160
\145\163\164\061\047\060\045\006\003\125\004\012\023\036\116\145
\164\114\157\143\153\040\110\141\154\157\172\141\164\142\151\172
\164\157\156\163\141\147\151\040\113\146\164\056\061\032\060\030
\006\003\125\004\013\023\021\124\141\156\165\163\151\164\166\141
\156\171\153\151\141\144\157\153\061\102\060\100\006\003\125\004
\003\023\071\116\145\164\114\157\143\153\040\115\151\156\157\163
\151\164\145\164\164\040\113\157\172\152\145\147\171\172\157\151
\040\050\103\154\141\163\163\040\121\101\051\040\124\141\156\165
\163\151\164\166\141\156\171\153\151\141\144\157\061\036\060\034
\006\011\052\206\110\206\367\015\001\011\001\026\017\151\156\146
\157\100\156\145\164\154\157\143\153\056\150\165
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\173
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
```

```
CKA_TRUST_EMAIL_PROTECTION
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Staat der Nederlanden Root CA"
# Issuer: CN=Staat der Nederlanden Root CA,O=Staat der Nederlanden,C=NL
# Serial Number:98:96:8a
# Subject: CN=Staat der Nederlanden Root CA,O=Staat der Nederlanden,C=NL
# Not Valid Before: Tue Dec 17 09:23:49 2002
# Not Valid After: Wed Dec 16 09:15:38 2015
# Fingerprint (MD5): 60:84:7c:5a:ce:db:0c:d4:cb:a7:e9:fe:02:c6:a9:c0
# Fingerprint (SHA1): 10:1d:fa:3f:d5:0b:cb:bb:9b:b5:60:0c:19:55:a4:1a:f4:73:3a:04
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Staat der Nederlanden Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\125\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\036\060\034\006\003\125\004\012\023\025\123\164\141\141\164\040
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\061
\046\060\044\006\003\125\004\003\023\035\123\164\141\141\164\040
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\040
\122\157\157\164\040\103\101
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\125\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\036\060\034\006\003\125\004\012\023\025\123\164\141\141\164\040
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\061
\046\060\044\006\003\125\004\003\023\035\123\164\141\141\164\040
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\040
\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\000\230\226\212
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\272\060\202\002\242\240\003\002\001\002\002\004\000
\230\226\212\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\125\061\013\060\011\006\003\125\004\006\023\002\116
\114\061\036\060\034\006\003\125\004\012\023\025\123\164\141\141
\164\040\144\145\162\040\116\145\144\145\162\154\141\156\144\145
\156\061\046\060\044\006\003\125\004\003\023\035\123\164\141\141
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\164\040\144\145\162\040\116\145\144\145\162\154\141\156\144\145
\156\040\122\157\157\164\040\103\101\060\036\027\015\060\062\061
\062\061\067\060\071\062\063\064\071\132\027\015\061\065\061\062
\061\066\060\071\061\065\063\070\132\060\125\061\013\060\011\006
\003\125\004\006\023\002\116\114\061\036\060\034\006\003\125\004
\012\023\025\123\164\141\141\164\040\144\145\162\040\116\145\144
\145\162\154\141\156\144\145\156\061\046\060\044\006\003\125\004
\003\023\035\123\164\141\141\164\040\144\145\162\040\116\145\144
\145\162\154\141\156\144\145\156\040\122\157\157\164\040\103\101
\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001
\000\230\322\265\121\021\172\201\246\024\230\161\155\276\314\347
\023\033\326\047\016\172\263\152\030\034\266\141\132\325\141\011
\277\336\220\023\307\147\356\335\363\332\305\014\022\236\065\125
\076\054\047\210\100\153\367\334\335\042\141\365\302\307\016\365
\366\325\166\123\115\217\214\274\030\166\067\205\235\350\312\111
\307\322\117\230\023\011\242\076\042\210\234\177\326\362\020\145
\264\356\137\030\325\027\343\370\305\375\342\235\242\357\123\016
\205\167\242\017\341\060\107\356\000\347\063\175\104\147\032\013
\121\350\213\240\236\120\230\150\064\122\037\056\155\001\362\140
\105\362\061\353\251\061\150\051\273\172\101\236\306\031\177\224
\264\121\071\003\177\262\336\247\062\233\264\107\216\157\264\112
\256\345\257\261\334\260\033\141\274\231\162\336\344\211\267\172
\046\135\332\063\111\133\122\234\016\365\212\255\303\270\075\350
\006\152\302\325\052\013\154\173\204\275\126\005\313\206\145\222
\354\104\053\260\216\271\334\160\013\106\332\255\274\143\210\071
\372\333\152\376\043\372\274\344\110\364\147\053\152\021\020\041
\111\002\003\001\000\001\243\201\221\060\201\216\060\014\006\003
\125\035\023\004\005\060\003\001\001\377\060\117\006\003\125\035
\040\004\110\060\106\060\104\006\004\125\035\040\000\060\074\060
\072\006\010\053\006\001\005\005\007\002\001\026\056\150\164\164
\160\072\057\057\167\167\167\056\160\153\151\157\166\145\162\150
\145\151\144\056\156\154\057\160\157\154\151\143\151\145\163\057
\162\157\157\164\055\160\157\154\151\143\171\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003\125
\035\016\004\026\004\024\250\175\353\274\143\244\164\023\164\000
\354\226\340\323\064\301\054\277\154\370\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\003\202\001\001\000\005\204
\207\125\164\066\141\301\273\321\324\306\025\250\023\264\237\244
\376\273\356\025\264\057\006\014\051\362\250\222\244\141\015\374
\253\134\010\133\121\023\053\115\302\052\141\310\370\011\130\374
\055\002\262\071\175\231\146\201\277\156\134\225\105\040\154\346
\171\247\321\330\034\051\374\302\040\047\121\310\361\174\135\064
\147\151\205\021\060\306\000\322\327\363\323\174\266\360\061\127
\050\022\202\163\351\063\057\246\125\264\013\221\224\107\234\372
\273\172\102\062\350\256\176\055\310\274\254\024\277\331\017\331
\133\374\301\371\172\225\341\175\176\226\374\161\260\302\114\310
\337\105\064\311\316\015\362\234\144\010\320\073\303\051\305\262

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\355\220\004\301\261\051\221\305\060\157\301\251\162\063\314\376
\135\026\027\054\021\151\347\176\376\305\203\010\337\274\334\042
\072\056\040\151\043\071\126\140\147\220\213\056\166\071\373\021
\210\227\366\174\275\113\270\040\026\147\005\215\342\073\301\162
\077\224\225\067\307\135\271\236\330\223\241\027\217\377\014\146
\025\301\044\174\062\174\003\035\073\241\130\105\062\223
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Staat der Nederlanden Root CA"
# Issuer: CN=Staat der Nederlanden Root CA,O=Staat der Nederlanden,C=NL
# Serial Number:98:96:8a
# Subject: CN=Staat der Nederlanden
 Root CA,O=Staat der Nederlanden,C=NL
# Not Valid Before: Tue Dec 17 09:23:49 2002
# Not Valid After: Wed Dec 16 09:15:38 2015
# Fingerprint (MD5): 60:84:7c:5a:ce:db:0c:d4:cb:a7:e9:fe:02:c6:a9:c0
# Fingerprint (SHA1): 10:1d:fa:3f:d5:0b:cb:bb:9b:b5:60:0c:19:55:a4:1a:f4:73:3a:04
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Staat der Nederlanden Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\020\035\372\077\325\013\313\273\233\265\140\014\031\125\244\032
\364\163\072\004
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\140\204\174\132\316\333\014\324\313\247\351\376\002\306\251\300
END
CKA_ISSUER MULTILINE_OCTAL
\060\125\061\013\060\011\006\003\125\004\006\023\002\116\114\061
\036\060\034\006\003\125\004\012\023\025\123\164\141\141\164\040
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\061
\046\060\044\006\003\125\004\003\023\035\123\164\141\141\164\040
\144\145\162\040\116\145\144\145\162\154\141\156\144\145\156\040
\122\157\157\164\040\103\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\004\000\230\226\212
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
```

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CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "America Online Root Certification Authority 1"
# Issuer: CN=America Online Root Certification Authority 1,O=America Online Inc.,C=US
# Serial Number: 1 (0x1)
# Subject: CN=America Online Root Certification Authority 1,O=America Online Inc.,C=US
# Not Valid Before: Tue May 28 06:00:00 2002
# Not Valid After: Thu Nov 19 20:43:00 2037
# Fingerprint (MD5): 14:f1:08:ad:9d:fa:64:e2:89:e7:1c:cf:a8:ad:7d:5e
# Fingerprint (SHA1): 39:21:c1:15:c1:5d:0e:ca:5c:cb:5b:c4:f0:7d:21:d8:05:0b:56:6a
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
 CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "America Online Root Certification Authority 1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\034\060\032\006\003\125\004\012\023\023\101\155\145\162\151\143
\141\040\117\156\154\151\156\145\040\111\156\143\056\061\066\060
\064\006\003\125\004\003\023\055\101\155\145\162\151\143\141\040
\117\156\154\151\156\145\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\040\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\034\060\032\006\003\125\004\012\023\023\101\155\145\162\151\143
\141\040\117\156\154\151\156\145\040\111\156\143\056\061\066\060
\064\006\003\125\004\003\023\055\101\155\145\162\151\143\141\040
\117\156\154\151\156\145\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\040\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\244\060\202\002\214\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\143\061\013\060\011\006\003\125\004\006\023\002\125\123\061\034
\060\032\006\003\125\004\012\023\023\101\155\145\162\151\143\141
\040\117\156\154\151\156\145\040\111\156\143\056\061\066\060\064
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\006\003\125\004\003\023\055\101\155\145\162\151\143\141\040\117
\156\154\151\156\145\040\122\157\157\164\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\061\060\036\027\015\060\062\060\065\062\070\060\066
\060\060\060\060\132\027\015\063\067\061\061\061\071\062\060\064
\063\060\060\132\060\143\061\013\060\011\006\003\125\004\006\023
\002\125\123\061\034\060\032\006\003\125\004\012\023\023\101\155
\145\162\151\143\141\040\117\156\154\151\156\145\040\111\156\143
\056\061\066\060\064\006\003\125\004\003\023\055\101\155\145\162
\151\143\141\040\117\156\154\151\156\145\040\122\157\157\164\040
\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101\165
\164\150\157\162\151\164\171\040\061\060\202\001\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017
\000\060\202\001\012\002\202\001\001\000\250\057\350\244\151\006
\003\107\303\351\052\230\377\031\242\160\232\306\120\262\176\245
\337\150\115\033\174\017\266\227\150\175\055\246\213\227\351\144
\206\311\243\357\240\206\277\140\145\234\113\124\210\302\110\305
\112\071\277\024\343\131\125\345\031\264\164\310\264\005\071\134
\026\245\342\225\005\340\022\256\131\213\242\063\150\130\034\246
\324\025\267\330\237\327\334\161\253\176\232\277\233\216\063\017
\042\375\037\056\347\007\066\357\142\071\305\335\313\272\045\024
\043\336\014\306\075\074\316\202\010\346\146\076\332\121\073\026
\072\243\005\177\240\334\207\325\234\374\162\251\240\175\170\344
\267\061\125\036\145\273\324\141\260\041\140\355\020\062\162\305
\222\045\036\370\220\112\030\170\107\337\176\060\067\076\120\033
\333\034\323\153\232\206\123\007\260\357\254\006\170\370\204\231
\376\041\215\114\200\266\014\202\366\146\160\171\032\323\117\243
\317\361\317\106\260\113\017\076\335\210\142\270\214\251\011\050
\073\172\307\227\341\036\345\364\237\300\300\256\044\240\310\241
\331\017\326\173\046\202\151\062\075\247\002\003\001\000\001\243
\143\060\141\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024\000
\255\331\243\366\171\366\156\164\251\177\063\075\201\027\327\114
\317\063\336\060\037\006\003\125\035\043\004\030\060\026\200\024
\000\255\331\243\366\171\366\156\164\251\177\063\075\201\027\327
\114\317\063\336\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\206\060\015\006\011\052\206\110\206\367\015\001\001
\005\005\000\003\202\001\001\000\174\212\321\037\030\067\202\340
\270\260\243\355\126\225\310\142\141\234\005\242\315\302\142\046
\141\315\020\026\327\314\264\145\064\320\021\212\255\250\251\005
\146\357\164\363\155\137\235\231\257\366\213\373\353\122\262\005
\230\242\157\052\305\124\275\045\275\137\256\310\206\352\106\054
\301\263\275\301\351\111\160\030\026\227\010\023\214\040\340\033
\056\072\107\313\036\344\000\060\225\133\364\105\243\300\032\260
\001\116\253\275\300\043\156\143\077\200\112\305\007\355\334\342
\157\307\301\142\361\343\162\326\004\310\164\147\013\372\210\253
\241\001\310\157\360\024\257\322\231\315\121\223\176\355\056\070
\307\275\316\106\120\075\162\343\171\045\235\233\210\053\020\040

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\335\245\270\062\237\215\340\051\337\041\164\206\202\333\057\202
\060\306\307\065\206\263\371\226\137\106\333\014\105\375\363\120
\303\157\306\303\110\255\106\246\341\047\107\012\035\016\233\266
\302\167\177\143\362\340\175\032\276\374\340\337\327\307\247\154
\260\371\256\272\074\375\164\264\021\350\130\015\200\274\323\250
\200\072\231\355\165\314\106\173
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER
 CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "America Online Root Certification Authority 1"
# Issuer: CN=America Online Root Certification Authority 1,O=America Online Inc.,C=US
# Serial Number: 1 (0x1)
# Subject: CN=America Online Root Certification Authority 1,O=America Online Inc.,C=US
# Not Valid Before: Tue May 28 06:00:00 2002
# Not Valid After: Thu Nov 19 20:43:00 2037
# Fingerprint (MD5): 14:f1:08:ad:9d:fa:64:e2:89:e7:1c:cf:a8:ad:7d:5e
# Fingerprint (SHA1): 39:21:c1:15:c1:5d:0e:ca:5c:cb:5b:c4:f0:7d:21:d8:05:0b:56:6a
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "America Online Root Certification Authority 1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\071\041\301\025\301\135\016\312\134\313\133\304\360\175\041\330
\005\013\126\152
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\024\361\010\255\235\372\144\342\211\347\034\317\250\255\175\136
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\034\060\032\006\003\125\004\012\023\023\101\155\145\162\151\143
\141\040\117\156\154\151\156\145\040\111\156\143\056\061\066\060
\064\006\003\125\004\003\023\055\101\155\145\162\151\143\141\040
\117\156\154\151\156\145\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\040\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
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CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Juur-SK"
# Issuer: CN=Juur-SK,O=AS Sertifitseerimiskeskus,C=EE,1.2.840.113549.1.9.1=pki@sk.ee
# Serial Number:3b:8e:4b:fc
# Subject: CN=Juur-SK,O=AS Sertifitseerimiskeskus,C=EE,1.2.840.113549.1.9.1=pki@sk.ee
#
 Not Valid Before: Thu Aug 30 14:23:01 2001
# Not Valid After: Fri Aug 26 14:23:01 2016
# Fingerprint (MD5): aa:8e:5d:d9:f8:db:0a:58:b7:8d:26:87:6c:82:35:55
# Fingerprint (SHA1): 40:9d:4b:d9:17:b5:5c:27:b6:9b:64:cb:98:22:44:0d:cd:09:b8:89
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Juur-SK"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\135\061\030\060\026\006\011\052\206\110\206\367\015\001\011
\001\026\011\160\153\151\100\163\153\056\145\145\061\013\060\011
\006\003\125\004\006\023\002\105\105\061\042\060\040\006\003\125
\004\012\023\031\101\123\040\123\145\162\164\151\146\151\164\163
\145\145\162\151\155\151\163\153\145\163\153\165\163\061\020\060
\016\006\003\125\004\003\023\007\112\165\165\162\055\123\113
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\135\061\030\060\026\006\011\052\206\110\206\367\015\001\011
\001\026\011\160\153\151\100\163\153\056\145\145\061\013\060\011
\006\003\125\004\006\023\002\105\105\061\042\060\040\006\003\125
\004\012\023\031\101\123\040\123\145\162\164\151\146\151\164\163
\145\145\162\151\155\151\163\153\145\163\153\165\163\061\020\060
\016\006\003\125\004\003\023\007\112\165\165\162\055\123\113
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\004\073\216\113\374
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\346\060\202\003\316\240\003\002\001\002\002\004\073
\216\113\374\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\135\061\030\060\026\006\011\052\206\110\206\367\015
\001\011\001\026\011\160\153\151\100\163\153\056\145\145\061\013
\060\011\006\003\125\004\006\023\002\105\105\061\042\060\040\006
\003\125\004\012\023\031\101\123\040\123\145\162\164\151\146\151
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\164\163\145\145\162\151\155\151\163\153\145\163\153\165\163\061
\020\060\016\006\003\125\004\003\023\007\112\165\165\162\055\123
\113\060\036\027\015\060\061\060\070\063\060\061\064\062\063\060
\061\132\027\015\061\066\060\070\062\066\061\064\062\063\060\061
\132\060\135\061\030\060\026\006\011\052\206\110\206\367\015\001
\011\001\026\011\160\153\151\100\163\153\056\145\145\061\013\060
\011\006\003\125\004\006\023\002\105\105\061\042\060\040\006\003
\125\004\012\023\031\101\123\040\123\145\162\164\151\146\151\164
\163\145\145\162\151\155\151\163\153\145\163\153\165\163\061\020
\060\016\006\003\125\004\003\023\007\112\165\165\162\055\123\113
\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001
\000\201\161\066\076\063\007\326\343\060\215\023\176\167\062\106
\313\317\031\262\140\061\106\227\206\364\230\106\244\302\145\105
\317\323\100\174\343\132\042\250\020\170\063\314\210\261\323\201
\112\366\142\027\173\137\115\012\056\320\317\213\043\356\117\002
\116\273\353\016\312\275\030\143\350\200\034\215\341\034\215\075
\340\377\133\137\352\144\345\227\350\077\231\177\014\012\011\063
\000\032\123\247\041\341\070\113\326\203\033\255\257\144\302\371
\034\172\214\146\110\115\146\037\030\012\342\076\273\037\007\145
\223\205\271\032\260\271\304\373\015\021\366\365\326\371\033\307
\054\053\267\030\121\376\340\173\366\250\110\257\154\073\117\057
\357\370\321\107\036\046\127\360\121\035\063\226\377\357\131\075
\332\115\321\025\064\307\352\077\026\110\173\221\034\200\103\017
\075\270\005\076\321\263\225\315\330\312\017\302\103\147\333\267
\223\340\042\202\056\276\365\150\050\203\271\301\073\151\173\040
\332\116\234\155\341\272\315\217\172\154\260\011\042\327\213\013
\333\034\325\132\046\133\015\300\352\345\140\320\237\376\065\337
\077\002\003\001\000\001\243\202\001\254\060\202\001\250\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\202\001\026\006\003\125\035\040\004\202\001\015\060\202\001\011
\060\202\001\005\006\012\053\006\001\004\001\316\037\001\001\001
\060\201\366\060\201\320\006\010\053\006\001\005\005\007\002\002
\060\201\303\036\201\300\000\123\000\145\000\145\000\040\000\163
\000\145\000\162\000\164\000\151\000\146\000\151\000\153\000\141
\000\141\000\164\000\040\000\157\000\156\000\040\000\166\000\344
\000\154\000\152\000\141\000\163\000\164\000\141\000\164\000\165
\000\144\000\040\000\101\000\123\000\055\000\151\000\163\000\040
\000\123\000\145\000\162\000\164\000\151\000\146\000\151\000\164
\000\163\000\145\000\145\000\162\000\151\000\155\000\151\000\163
\000\153\000\145\000\163\000\153\000\165\000\163\000\040\000\141
\000\154\000\141\000\155\000\055\000\123\000\113\000\040\000\163
\000\145\000\162\000\164\000\151\000\146\000\151\000\153\000\141
\000\141\000\164\000\151\000\144\000\145\000\040\000\153\000\151
\000\156\000\156\000\151\000\164\000\141\000\155\000\151\000\163
\000\145\000\153\000\163\060\041\006\010\053\006\001\005\005\007
\002\001\026\025\150\164\164\160\072\057\057\167\167\167\056\163
\153\056\145\145\057\143\160\163\057\060\053\006\003\125\035\037

\004\044\060\042\060\040\240\036\240\034\206\032\150\164\164\160
\072\057\057\167\167\167\056\163\153\056\145\145\057\152\165\165
\162\057\143\162\154\057\060\035\006\003\125\035\016\004\026\004
\024\004\252\172\107\243\344\211\257\032\317\012\100\247\030\077
\157\357\351\175\276\060\037\006\003\125\035\043\004\030\060\026
\200\024\004\252\172\107\243\344\211\257\032\317\012\100\247\030
\077\157\357\351\175\276\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\346\060\015\006\011\052\206\110\206\367\015
\001\001\005\005\000\003\202\001\001\000\173\301\030\224\123\242
\011\363\376\046\147\232\120\344\303\005\057\053\065\170\221\114
\174\250\021\021\171\114\111\131\254\310\367\205\145\134\106\273
\073\020\240\002\257\315\117\265\314\066\052\354\135\376\357\240
\221\311\266\223\157\174\200\124\354\307\010\160\015\216\373\202
\354\052\140\170\151\066\066\321\305\234\213\151\265\100\310\224
\145\167\362\127\041\146\073\316\205\100\266\063\143\032\277\171
\036\374\134\035\323\035\223\033\213\014\135\205\275\231\060\062
\030\011\221\122\351\174\241\272\377\144\222\232\354\376\065\356
\214\057\256\374\040\206\354\112\336\033\170\062\067\246\201\322
\235\257\132\022\026\312\231\133\374\157\155\016\305\240\036\206
\311\221\320\134\230\202\137\143\014\212\132\253\330\225\246\314
\313\212\326\277\144\113\216\312\212\262\260\351\041\062\236\252
\250\205\230\064\201\071\041\073\250\072\122\062\075\366\153\067
\206\006\132\025\230\334\360\021\146\376\064\040\267\003\364\101
\020\175\071\204\171\226\162\143\266\226\002\345\153\271\255\031
\115\273\306\104\333\066\313\052\234\216
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Juur-SK"
# Issuer: CN=Juur-SK,O=AS Sertifitseerimiskeskus,C=EE,1.2.840.113549.1.9.1=pki@sk.ee
# Serial Number:3b:8e:4b:fc
# Subject: CN=Juur-SK,O=AS Sertifitseerimiskeskus,C=EE,1.2.840.113549.1.9.1=pki@sk.ee
# Not Valid Before: Thu Aug 30 14:23:01 2001
# Not Valid After: Fri Aug 26 14:23:01 2016
#
Fingerprint (MD5): aa:8e:5d:d9:f8:db:0a:58:b7:8d:26:87:6c:82:35:55
# Fingerprint (SHA1): 40:9d:4b:d9:17:b5:5c:27:b6:9b:64:cb:98:22:44:0d:cd:09:b8:89
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Juur-SK"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\100\235\113\331\027\265\134\047\266\233\144\313\230\042\104\015

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\315\011\270\211
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\252\216\135\331\370\333\012\130\267\215\046\207\154\202\065\125
END
CKA_ISSUER MULTILINE_OCTAL
\060\135\061\030\060\026\006\011\052\206\110\206\367\015\001\011
\001\026\011\160\153\151\100\163\153\056\145\145\061\013\060\011
\006\003\125\004\006\023\002\105\105\061\042\060\040\006\003\125
\004\012\023\031\101\123\040\123\145\162\164\151\146\151\164\163
\145\145\162\151\155\151\163\153\145\163\153\165\163\061\020\060
\016\006\003\125\004\003\023\007\112\165\165\162\055\123\113
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\073\216\113\374
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "SECOM Trust.net"
# Issuer: OU=Security Communication RootCA1,O=SECOM Trust.net,C=JP
# Serial Number: 0 (0x0)
# Subject: OU=Security Communication RootCA1,O=SECOM Trust.net,C=JP
# Not Valid Before: Tue Sep 30 04:20:49 2003
# Not Valid After: Sat Sep 30 04:20:49 2023
# Fingerprint (MD5): f1:bc:63:6a:54:e0:b5:27:f5:cd:e7:1a:e3:4d:6e:4a
# Fingerprint (SHA1): 36:b1:2b:49:f9:81:9e:d7:4c:9e:bc:38:0f:c6:56:8f:5d:ac:b2:f7
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SECOM Trust.net"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\030\060\026\006\003\125\004\012\023\017\123\105\103\117\115\040
\124\162\165\163\164\056\156\145\164\061\047\060\045\006\003\125
\004\013\023\036\123\145\143\165\162\151\164\171\040\103\157\155
\155\165\156\151\143\141\164\151\157\156\040\122\157\157\164\103
\101\061
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
```

\060\120\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\030\060\026\006\003\125\004\012\023\017\123\105\103\117\115\040
\124\162\165\163\164\056\156\145\164\061\047\060\045\006\003\125
\004\013\023\036\123\145\143\165\162\151\164\171\040\103\157\155
\155\165\156\151\143\141\164\151\157\156\040\122\157\157\164\103
\101\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\000
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\132\060\202\002\102\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\120\061\013\060\011\006\003\125\004\006\023\002\112\120\061\030
\060\026\006\003\125\004\012\023\017\123\105\103\117\115\040\124
\162\165\163\164\056\156\145\164\061\047\060\045\006\003\125\004
\013\023\036\123\145\143\165\162\151\164\171\040\103\157\155\155
\165\156\151\143\141\164\151\157\156\040\122\157\157\164\103\101
\061\060\036\027\015\060\063\060\071\063\060\060\064\062\060\064
\071\132\027\015\062\063\060\071\063\060\060\064\062\060\064\071
\132\060\120\061\013\060\011\006\003\125\004\006\023\002\112\120
\061\030\060\026\006\003\125\004\012\023\017\123\105\103\117\115
\040\124\162\165\163\164\056\156\145\164\061\047\060\045\006\003
\125\004\013\023\036\123\145\143\165\162\151\164\171\040\103\157
\155\155\165\156\151\143\141\164\151\157\156\040\122\157\157\164
\103\101\061\060\202\001\042\060\015\006\011\052\206\110\206\367
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002
\202\001\001\000\263\263\376\177\323\155\261\357\026\174\127\245
\014\155\166\212\057\113\277\144\373\114\356\212\360\363\051\174
\365\377\356\052\340\351\351\272\133\144\042\232\232\157\054\072
\046\151\121\005\231\046\334\325\034\152\161\306\232\175\036\235
\335\174\154\306\214\147\147\112\076\370\161\260\031\047\251\011
\014\246\225\277\113\214\014\372\125\230\073\330\350\042\241\113
\161\070\171\254\227\222\151\263\211\176\352\041\150\006\230\024
\226\207\322\141\066\274\155\047\126\236\127\356\300\300\126\375
\062\317\244\331\216\302\043\327\215\250\363\330\045\254\227\344
\160\070\364\266\072\264\235\073\227\046\103\243\241\274\111\131
\162\114\043\060\207\001\130\366\116\276\034\150\126\146\257\315
\101\135\310\263\115\052\125\106\253\037\332\036\342\100\075\333
\315\175\271\222\200\234\067\335\014\226\144\235\334\042\367\144
\213\337\141\336\025\224\122\025\240\175\122\311\113\250\041\311
\306\261\355\313\303\225\140\321\017\360\253\160\370\337\313\115
\176\354\326\372\253\331\275\177\124\362\245\351\171\372\331\326
\166\044\050\163\002\003\001\000\001\243\077\060\075\060\035\006
\003\125\035\016\004\026\004\024\240\163\111\231\150\334\205\133
\145\343\233\050\057\127\237\275\063\274\007\110\060\013\006\003
\125\035\017\004\004\003\002\001\006\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\015\006\011\052\206

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\110\206\367\015\001\001\005\005\000\003\202\001\001\000\150\100
\251\250\273\344\117\135\171\263\005\265\027\263\140\023\353\306
\222\135\340\321\323\152\376\373\276\233\155\277\307\005\155\131
\040\304\034\360\267\332\204\130\002\143\372\110\026\357\117\245
\013\367\112\230\362\077\236\033\255\107\153\143\316\010\107\353
\122\077\170\234\257\115\256\370\325\117\317\232\230\052\020\101
\071\122\304\335\331\233\016\357\223\001\256\262\056\312\150\102
\044\102\154\260\263\072\076\315\351\332\110\304\025\313\351\371
\007\017\222\120\111\212\335\061\227\137\311\351\067\252\073\131
\145\227\224\062\311\263\237\076\072\142\130\305\111\255\142\016
\161\245\062\252\057\306\211\166\103\100\023\023\147\075\242\124
\045\020\313\361\072\362\331\372\333\111\126\273\246\376\247\101
\065\303\340\210\141\311\210\307\337\066\020\042\230\131\352\260
\112\373\126\026\163\156\254\115\367\042\241\117\255\035\172\055
\105\047\345\060\301\136\362\332\023\313\045\102\121\225\107\003
\214\154\041\314\164\102\355\123\377\063\213\217\017\127\001\026
\057\317\246\356\311\160\042\024\275\375\276\154\013\003
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "SECOM Trust.net"
# Issuer: OU=Security Communication RootCA1,O=SECOM Trust.net,C=JP
# Serial Number: 0 (0x0)
# Subject: OU=Security Communication RootCA1,O=SECOM Trust.net,C=JP
# Not Valid Before: Tue Sep 30 04:20:49 2003
# Not Valid After: Sat Sep 30 04:20:49 2023
# Fingerprint (MD5): f1:bc:63:6a:54:e0:b5:27:f5:cd:e7:1a:e3:4d:6e:4a
# Fingerprint (SHA1): 36:b1:2b:49:f9:81:9e:d7:4c:9e:bc:38:0f:c6:56:8f:5d:ac:b2:f7
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
 UTF8 "SECOM Trust.net"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\066\261\053\111\371\201\236\327\114\236\274\070\017\306\126\217
\135\254\262\367
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\361\274\143\152\124\340\265\047\365\315\347\032\343\115\156\112
END
CKA_ISSUER MULTILINE_OCTAL
\060\120\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\030\060\026\006\003\125\004\012\023\017\123\105\103\117\115\040
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\124\162\165\163\164\056\156\145\164\061\047\060\045\006\003\125
\004\013\023\036\123\145\143\165\162\151\164\171\040\103\157\155
\155\165\156\151\143\141\164\151\157\156\040\122\157\157\164\103
\101\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "ComSign CA"
# Issuer: C=IL,O=ComSign,CN=ComSign
 CA
# Serial Number:14:13:96:83:14:55:8c:ea:7b:63:e5:fc:34:87:77:44
# Subject: C=IL,O=ComSign,CN=ComSign CA
# Not Valid Before: Wed Mar 24 11:32:18 2004
# Not Valid After: Mon Mar 19 15:02:18 2029
# Fingerprint (MD5): cd:f4:39:f3:b5:18:50:d7:3e:a4:c5:91:a0:3e:21:4b
# Fingerprint (SHA1): e1:a4:5b:14:1a:21:da:1a:79:f4:1a:42:a9:61:d6:69:cd:06:34:c1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ComSign CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\064\061\023\060\021\006\003\125\004\003\023\012\103\157\155
\123\151\147\156\040\103\101\061\020\060\016\006\003\125\004\012
\023\007\103\157\155\123\151\147\156\061\013\060\011\006\003\125
\004\006\023\002\111\114
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\064\061\023\060\021\006\003\125\004\003\023\012\103\157\155
\123\151\147\156\040\103\101\061\020\060\016\006\003\125\004\012
\023\007\103\157\155\123\151\147\156\061\013\060\011\006\003\125
\004\006\023\002\111\114
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\024\023\226\203\024\125\214\352\173\143\345\374\064\207
\167\104
END
CKA_VALUE MULTILINE_OCTAL
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\060\202\003\223\060\202\002\173\240\003\002\001\002\002\020\024
\023\226\203\024\125\214\352\173\143\345\374\064\207\167\104\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\064
\061\023\060\021\006\003\125\004\003\023\012\103\157\155\123\151
\147\156\040\103\101\061\020\060\016\006\003\125\004\012\023\007
\103\157\155\123\151\147\156\061\013\060\011\006\003\125\004\006
\023\002\111\114\060\036\027\015\060\064\060\063\062\064\061\061
\063\062\061\070\132\027\015\062\071\060\063\061\071\061\065\060
\062\061\070\132\060\064\061\023\060\021\006\003\125\004\003\023
\012\103\157\155\123\151\147\156\040\103\101\061\020\060\016\006
\003\125\004\012\023\007\103\157\155\123\151\147\156\061\013\060
\011\006\003\125\004\006\023\002\111\114\060\202\001\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001
\017\000\060\202\001\012\002\202\001\001\000\360\344\124\151\053
\323\307\217\152\104\344\176\130\047\370\013\320\344\224\022\212
\361\033\070\070\057\037\061\234\006\324\054\247\336\013\052\256
\032\240\343\236\152\277\237\074\307\156\242\371\213\144\154\072
\255\205\125\121\124\245\070\125\270\253\203\004\362\077\144\066
\367\300\215\103\103\152\146\321\367\027\052\325\357\066\372\060
\020\102\327\123\315\371\372\063\163\114\263\351\204\040\212\326
\101\047\065\344\070\372\224\233\270\172\344\171\037\063\373\033
\330\041\011\050\174\115\030\151\136\144\212\172\031\223\312\176
\354\363\162\347\067\007\130\131\050\254\102\371\305\377\315\077
\347\245\372\070\261\320\014\307\331\122\032\123\326\201\314\102
\172\065\133\355\113\072\172\366\265\216\314\377\017\174\344\140
\066\207\057\255\360\241\045\175\377\322\113\021\210\160\124\246
\101\250\147\123\122\102\136\344\064\236\344\276\243\354\252\142
\135\335\303\114\246\202\101\344\063\013\254\311\063\017\144\202
\127\052\375\014\255\066\341\014\256\113\305\357\073\231\331\043
\263\133\135\264\127\354\164\160\014\052\117\002\003\001\000\001
\243\201\240\060\201\235\060\014\006\003\125\035\023\004\005\060
\003\001\001\377\060\075\006\003\125\035\037\004\066\060\064\060
\062\240\060\240\056\206\054\150\164\164\160\072\057\057\146\145
\144\151\162\056\143\157\155\163\151\147\156\056\143\157\056\151
\154\057\143\162\154\057\103\157\155\123\151\147\156\103\101\056
\143\162\154\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\206\060\037\006\003\125\035\043\004\030\060\026\200\024
\113\001\233\076\126\032\145\066\166\313\173\227\252\222\005\356
\062\347\050\061\060\035\006\003\125\035\016\004\026\004\024\113
\001\233\076\126\032\145\066\166\313\173\227\252\222\005\356\062
\347\050\061\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\003\202\001\001\000\320\331\245\176\376\051\140\105\235
\176\203\317\156\274\107\156\365\032\236\124\166\102\161\264\074
\130\077\055\100\045\102\366\201\234\361\211\020\310\016\252\170
\117\070\011\127\260\074\300\010\374\065\216\361\110\121\215\014
\161\164\272\204\304\327\162\233\204\174\070\116\144\006\047\052
\341\247\265\354\010\231\264\012\015\324\205\163\310\022\341\065
\355\361\005\061\035\163\231\014\353\226\312\335\323\346\205\252

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\360\212\373\165\301\362\011\074\145\145\144\363\114\330\255\313
\210\151\363\344\203\267\014\275\027\132\226\027\312\133\377\255
\273\034\351\055\204\200\330\041\276\205\122\331\324\164\271\151
\205\272\115\355\050\062\353\371\141\112\344\304\066\036\031\334
\157\204\021\037\225\365\203\050\030\250\063\222\103\047\335\135
\023\004\105\117\207\325\106\315\075\250\272\360\363\270\126\044
\105\353\067\307\341\166\117\162\071\030\337\176\164\162\307\163
\055\071\352\140\346\255\021\242\126\207\173\303\150\232\376\370
\214\160\250\337\145\062\364\244\100\214\241\302\104\003\016\224
\000\147\240\161\000\202\110
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER
 CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "ComSign CA"
# Issuer: C=IL,O=ComSign,CN=ComSign CA
# Serial Number:14:13:96:83:14:55:8c:ea:7b:63:e5:fc:34:87:77:44
# Subject: C=IL,O=ComSign,CN=ComSign CA
# Not Valid Before: Wed Mar 24 11:32:18 2004
# Not Valid After: Mon Mar 19 15:02:18 2029
# Fingerprint (MD5): cd:f4:39:f3:b5:18:50:d7:3e:a4:c5:91:a0:3e:21:4b
# Fingerprint (SHA1): e1:a4:5b:14:1a:21:da:1a:79:f4:1a:42:a9:61:d6:69:cd:06:34:c1
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ComSign CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\341\244\133\024\032\041\332\032\171\364\032\102\251\141\326\151
\315\006\064\301
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\315\364\071\363\265\030\120\327\076\244\305\221\240\076\041\113
END
CKA_ISSUER MULTILINE_OCTAL
\060\064\061\023\060\021\006\003\125\004\003\023\012\103\157\155
\123\151\147\156\040\103\101\061\020\060\016\006\003\125\004\012
\023\007\103\157\155\123\151\147\156\061\013\060\011\006\003\125
\004\006\023\002\111\114
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\024\023\226\203\024\125\214\352\173\143\345\374\064\207
\167\104
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END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "ComSign Secured CA"
# Issuer: C=IL,O=ComSign,CN=ComSign Secured CA
# Serial Number:c7:28:47:09:b3:b8:6c:45:8c:1d:fa:24:f5:36:4e:e9
# Subject: C=IL,O=ComSign,CN=ComSign Secured CA
# Not Valid Before: Wed Mar 24 11:37:20 2004
# Not Valid After: Fri Mar 16 15:04:56 2029
# Fingerprint (MD5): 40:01:25:06:8d:21:43:6a:0e:43:00:9c:e7:43:f3:d5
# Fingerprint (SHA1): f9:cd:0e:2c:da:76:24:c1:8f:bd:f0:f0:ab:b6:45:b8:f7:fe:d5:7a
CKA_CLASS CK_OBJECT_CLASS
 CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ComSign Secured CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\074\061\033\060\031\006\003\125\004\003\023\022\103\157\155
\123\151\147\156\040\123\145\143\165\162\145\144\040\103\101\061
\020\060\016\006\003\125\004\012\023\007\103\157\155\123\151\147
\156\061\013\060\011\006\003\125\004\006\023\002\111\114
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\074\061\033\060\031\006\003\125\004\003\023\022\103\157\155
\123\151\147\156\040\123\145\143\165\162\145\144\040\103\101\061
\020\060\016\006\003\125\004\012\023\007\103\157\155\123\151\147
\156\061\013\060\011\006\003\125\004\006\023\002\111\114
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\307\050\107\011\263\270\154\105\214\035\372\044\365
\066\116\351
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\253\060\202\002\223\240\003\002\001\002\002\021\000
\307\050\107\011\263\270\154\105\214\035\372\044\365\066\116\351
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\074\061\033\060\031\006\003\125\004\003\023\022\103\157\155\123
\151\147\156\040\123\145\143\165\162\145\144\040\103\101\061\020
\060\016\006\003\125\004\012\023\007\103\157\155\123\151\147\156
\061\013\060\011\006\003\125\004\006\023\002\111\114\060\036\027
\015\060\064\060\063\062\064\061\061\063\067\062\060\132\027\015
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\062\071\060\063\061\066\061\065\060\064\065\066\132\060\074\061
\033\060\031\006\003\125\004\003\023\022\103\157\155\123\151\147
\156\040\123\145\143\165\162\145\144\040\103\101\061\020\060\016
\006\003\125\004\012\023\007\103\157\155\123\151\147\156\061\013
\060\011\006\003\125\004\006\023\002\111\114\060\202\001\042\060
\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202
\001\017\000\060\202\001\012\002\202\001\001\000\306\265\150\137
\035\224\025\303\244\010\125\055\343\240\127\172\357\351\164\052
\273\271\174\127\111\032\021\136\117\051\207\014\110\326\152\347
\217\324\176\127\044\271\006\211\344\034\074\352\254\343\332\041
\200\163\041\012\357\171\230\154\037\010\377\241\120\175\362\230
\033\311\124\157\076\245\050\354\041\004\017\105\273\007\075\241
\300\372\052\230\035\116\006\223\373\365\210\073\253\137\313\026
\277\346\363\236\112\207\355\031\352\302\237\103\344\361\201\245
\177\020\117\076\321\112\142\255\123\033\313\203\377\007\145\245
\222\055\146\251\133\270\132\364\035\264\041\221\112\027\173\236
\062\376\126\044\071\262\124\204\103\365\204\302\330\274\101\220
\314\235\326\150\332\351\202\120\251\073\150\317\265\135\002\224
\140\026\261\103\331\103\135\335\135\207\156\352\273\263\311\153
\366\003\224\011\160\336\026\021\172\053\350\166\217\111\020\230
\167\271\143\134\213\063\227\165\366\013\214\262\253\133\336\164
\040\045\077\343\363\021\371\207\150\206\065\161\303\035\214\055
\353\345\032\254\017\163\325\202\131\100\200\323\002\003\001\000
\001\243\201\247\060\201\244\060\014\006\003\125\035\023\004\005
\060\003\001\001\377\060\104\006\003\125\035\037\004\075\060\073
\060\071\240\067\240\065\206\063\150\164\164\160\072\057\057\146
\145\144\151\162\056\143\157\155\163\151\147\156\056\143\157\056
\151\154\057\143\162\154\057\103\157\155\123\151\147\156\123\145
\143\165\162\145\144\103\101\056\143\162\154\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\206\060\037\006\003\125
\035\043\004\030\060\026\200\024\301\113\355\160\266\367\076\174
\000\073\000\217\307\076\016\105\237\036\135\354\060\035\006\003
\125\035\016\004\026\004\024\301\113\355\160\266\367\076\174\000
\073\000\217\307\076\016\105\237\036\135\354\060\015\006\011\052
\206\110\206\367\015\001\001\005\005\000\003\202\001\001\000\026
\317\356\222\023\120\253\173\024\236\063\266\102\040\152\324\025
\275\011\253\374\162\350\357\107\172\220\254\121\301\144\116\351
\210\275\103\105\201\343\146\043\077\022\206\115\031\344\005\260
\346\067\302\215\332\006\050\311\017\211\244\123\251\165\077\260
\226\373\253\114\063\125\371\170\046\106\157\033\066\230\373\102
\166\301\202\271\216\336\373\105\371\143\033\142\073\071\006\312
\167\172\250\074\011\317\154\066\075\017\012\105\113\151\026\032
\105\175\063\003\145\371\122\161\220\046\225\254\114\014\365\213
\223\077\314\165\164\205\230\272\377\142\172\115\037\211\376\256
\275\224\000\231\277\021\245\334\340\171\305\026\013\175\002\141
\035\352\205\371\002\025\117\347\132\211\116\024\157\343\067\113
\205\365\301\074\141\340\375\005\101\262\222\177\303\035\240\320
\256\122\144\140\153\030\306\046\234\330\365\144\344\066\032\142

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\237\212\017\076\377\155\116\031\126\116\040\221\154\237\064\063
\072\064\127\120\072\157\201\136\006\306\365\076\174\116\216\053
\316\145\006\056\135\322\052\123\164\136\323\156\047\236\217
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "ComSign Secured CA"
# Issuer: C=IL,O=ComSign,CN=ComSign
 Secured CA
# Serial Number:c7:28:47:09:b3:b8:6c:45:8c:1d:fa:24:f5:36:4e:e9
# Subject: C=IL,O=ComSign,CN=ComSign Secured CA
# Not Valid Before: Wed Mar 24 11:37:20 2004
# Not Valid After: Fri Mar 16 15:04:56 2029
# Fingerprint (MD5): 40:01:25:06:8d:21:43:6a:0e:43:00:9c:e7:43:f3:d5
# Fingerprint (SHA1): f9:cd:0e:2c:da:76:24:c1:8f:bd:f0:f0:ab:b6:45:b8:f7:fe:d5:7a
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ComSign Secured CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\371\315\016\054\332\166\044\301\217\275\360\360\253\266\105\270
\367\376\325\172
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\100\001\045\006\215\041\103\152\016\103\000\234\347\103\363\325
END
CKA_ISSUER MULTILINE_OCTAL
\060\074\061\033\060\031\006\003\125\004\003\023\022\103\157\155
\123\151\147\156\040\123\145\143\165\162\145\144\040\103\101\061
\020\060\016\006\003\125\004\012\023\007\103\157\155\123\151\147
\156\061\013\060\011\006\003\125\004\006\023\002\111\114
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\021\000\307\050\107\011\263\270\154\105\214\035\372\044\365
\066\116\351
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
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```
# Certificate "ComSign Advanced Security CA"
# Issuer: CN=ComSign Advanced Security CA
# Serial Number:7a:5d:e9:33:d0:04:9e:b3:4a:1a:17:74:cb:16:9b:6d
# Subject: CN=ComSign Advanced Security CA
# Not Valid Before: Wed Mar 24 21:52:04 2004
# Not Valid After: Sat Mar 24 21:55:55 2029
# Fingerprint (MD5): f0:9e:63:93:76:a5:95:bc:18:61:f1:9b:fb:d3:64:dd
# Fingerprint (SHA1): 80:bf:3d:e9:a4:1d:76:8d:19:4b:29:3c:85:63:2c:db:c8:ea:8c:f7
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
 UTF8 "ComSign Advanced Security CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\047\061\045\060\043\006\003\125\004\003\023\034\103\157\155
\123\151\147\156\040\101\144\166\141\156\143\145\144\040\123\145
\143\165\162\151\164\171\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\047\061\045\060\043\006\003\125\004\003\023\034\103\157\155
\123\151\147\156\040\101\144\166\141\156\143\145\144\040\123\145
\143\165\162\151\164\171\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\172\135\351\063\320\004\236\263\112\032\027\164\313\026
\233\155
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\033\060\202\004\003\240\003\002\001\002\002\020\172
\135\351\063\320\004\236\263\112\032\027\164\313\026\233\155\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\047
\061\045\060\043\006\003\125\004\003\023\034\103\157\155\123\151
\147\156\040\101\144\166\141\156\143\145\144\040\123\145\143\165
\162\151\164\171\040\103\101\060\036\027\015\060\064\060\063\062
\064\062\061\065\062\060\064\132\027\015\062\071\060\063\062\064
\062\061\065\065\065\065\132\060\047\061\045\060\043\006\003\125
\004\003\023\034\103\157\155\123\151\147\156\040\101\144\166\141
\156\143\145\144\040\123\145\143\165\162\151\164\171\040\103\101
\060\202\002\040\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\015\000\060\202\002\010\002\202\002\001
\000\235\234\134\073\001\204\127\132\364\053\376\155\024\262\154
\267\355\220\327\373\127\103\240\317\140\033\131\057\115\121\140
\075\034\111\242\152\101\143\253\270\355\146\276\100\106\215\252
\222\133\075\056\053\301\141\230\124\154\274\114\253\151\372\215
\105\105\201\052\032\155\370\263\370\017\143\313\216\174\355\124
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\051\243\024\030\374\341\311\261\330\124\272\234\312\052\033\320
\254\302\211\030\026\112\376\112\004\322\322\233\265\207\206\301
\311\173\037\066\026\105\271\360\272\206\302\167\212\063\061\102
\242\316\014\162\075\022\345\221\070\364\047\147\141\114\314\342
\365\115\054\022\360\315\263\204\301\011\165\237\000\117\370\167
\323\363\062\157\201\217\027\176\073\233\153\363\036\347\372\223
\117\014\056\227\335\160\130\023\175\363\221\203\215\242\075\061
\332\143\343\071\166\166\063\346\324\146\015\224\216\025\224\234
\070\173\334\161\037\332\265\340\327\227\132\202\164\336\073\006
\332\357\305\053\361\150\335\047\123\370\271\354\214\017\123\042
\344\071\202\344\371\256\141\374\030\050\176\307\151\351\150\364
\176\340\321\274\340\155\310\326\321\253\104\061\141\264\354\170
\065\054\106\336\350\363\266\074\230\263\251\034\007\112\230\315
\107\046\202\360\324\221\357\020\223\347\150\346\122\152\227\176
\271\040\227\027\372\031\062\224\043\236\307\163\262\110\350\230
\265\367\165\126\240\113\235\167\250\032\051\164\070\130\340\310
\315\261\063\033\057\376\230\223\170\005\001\164\253\256\102\305
\033\035\057\174\101\174\245\323\140\252\120\301\363\310\210\101
\130\366\265\222\030\375\256\146\216\234\347\073\232\321\267\333
\332\307\114\313\042\033\112\077\140\337\071\366\332\352\256\314
\207\225\270\122\233\132\235\121\105\014\166\357\051\101\245\012
\271\370\136\304\275\054\114\064\110\107\325\213\310\314\317\321
\073\130\345\172\306\375\041\354\167\051\257\363\132\124\016\251
\244\144\174\367\134\321\241\023\345\073\324\133\113\000\224\311
\313\015\335\004\117\333\150\262\267\147\043\366\141\245\254\017
\071\076\232\303\057\251\144\303\022\205\232\244\242\122\324\171
\374\272\043\253\011\032\355\075\231\235\331\347\050\370\017\120
\117\002\001\003\243\202\001\103\060\202\001\077\060\013\006\003
\125\035\017\004\004\003\002\001\206\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125\035
\016\004\026\004\024\351\372\047\345\355\113\041\160\144\326\161
\252\174\345\202\034\060\322\015\172\060\115\006\003\125\035\037
\004\106\060\104\060\102\240\100\240\076\206\074\150\164\164\160
\072\057\057\146\145\144\151\162\056\143\157\155\163\151\147\156
\056\143\157\056\151\154\057\143\162\154\057\103\157\155\123\151
\147\156\101\144\166\141\156\143\145\144\123\145\143\165\162\151
\164\171\103\101\056\143\162\154\060\020\006\011\053\006\001\004
\001\202\067\025\001\004\003\002\001\000\060\102\006\003\125\035
\040\004\073\060\071\060\067\006\011\052\003\004\005\006\007\010
\011\012\060\052\060\050\006\010\053\006\001\005\005\007\002\001
\026\034\150\164\164\160\072\057\057\167\167\167\056\143\157\155
\163\151\147\156\056\143\157\056\151\154\057\143\160\163\060\133
\006\010\053\006\001\005\005\007\001\001\004\117\060\115\060\113
\006\010\053\006\001\005\005\007\060\002\206\077\150\164\164\160
\072\057\057\146\145\144\151\162\056\143\157\155\163\151\147\156
\056\143\157\056\151\154\057\143\141\143\145\162\164\057\103\157
\155\123\151\147\156\101\144\166\141\156\143\145\144\123\145\143
\165\162\151\164\171\103\101\056\143\162\164\060\015\006\011\052

\206\110\206\367\015\001\001\005\005\000\003\202\002\001\000\234
\215\135\232\006\021\241\156\026\030\117\313\262\002\073\222\217
\035\046\245\313\353\110\356\125\035\252\020\340\151\116\301\376
\062\000\336\017\316\015\264\143\274\340\142\032\340\367\365\251
\345\311\124\024\213\100\370\255\363\155\002\354\216\173\334\245
\171\222\001\265\377\241\131\143\071\021\265\276\122\256\164\332
\331\041\243\022\330\307\225\370\333\157\126\125\277\225\022\275
\062\043\307\311\154\145\001\357\373\164\216\273\044\206\117\175
\335\360\132\217\073\204\214\171\165\051\364\206\266\323\301\014
\131\025\302\003\127\253\075\110\327\054\105\224\100\334\340\251
\113\137\314\020\327\226\277\251\234\003\052\144\362\274\176\370
\245\247\231\221\047\005\376\111\247\330\255\012\206\066\074\016
\075\246\341\174\152\201\021\173\105\273\150\215\065\061\375\046
\123\101\076\074\156\153\036\330\253\055\211\201\231\306\037\227
\363\132\365\037\141\275\376\025\131\223\012\336\372\121\372\106
\337\106\364\374\142\154\130\243\014\336\311\031\036\300\034\133
\070\073\101\217\005\061\016\256\355\054\135\267\017\334\071\304
\137\042\263\245\262\130\060\044\277\371\011\255\360\226\033\067
\157\100\146\376\267\052\211\325\306\343\176\003\130\260\175\070
\346\212\253\077\365\201\363\012\101\167\002\163\355\247\124\335
\007\061\134\266\265\166\222\164\167\271\157\246\011\272\016\335
\014\347\166\304\113\276\313\073\325\105\300\211\343\053\167\172
\142\230\303\133\374\175\127\136\216\356\335\033\120\041\155\221
\277\031\134\217\227\171\052\301\213\141\157\252\136\122\365\351
\117\064\230\060\275\034\007\303\267\304\174\201\331\243\103\062
\146\306\055\274\071\133\251\135\211\353\004\053\104\225\107\371
\122\364\117\005\356\243\052\143\021\015\036\272\304\370\112\133
\120\100\121\167\056\364\344\337\361\003\024\346\171\151\332\130
\104\202\130\024\203\221\064\003\327\172\155\152\321\062\042\051
\221\033\032\344\013\275\062\025\047\040\277\032\157\122\202\323
\371\057\111\017\220\154\001\200\111\256\030\356\062\054\316\021
\307\376\240\004\230\150\224\360\374\213\305\054\157\207\375\331
\302\304\034\351\055\314\016\254\237\365\361\374\222\070\215
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "ComSign Advanced Security CA"
# Issuer: CN=ComSign Advanced Security CA
# Serial Number:7a:5d:e9:33:d0:04:9e:b3:4a:1a:17:74:cb:16:9b:6d
# Subject: CN=ComSign Advanced Security CA
# Not Valid Before: Wed Mar 24 21:52:04 2004
# Not Valid After: Sat Mar 24 21:55:55 2029
# Fingerprint (MD5): f0:9e:63:93:76:a5:95:bc:18:61:f1:9b:fb:d3:64:dd
# Fingerprint (SHA1): 80:bf:3d:e9:a4:1d:76:8d:19:4b:29:3c:85:63:2c:db:c8:ea:8c:f7

```
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ComSign Advanced Security CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\200\277\075\351\244\035\166\215\031\113\051\074\205\143\054\333
\310\352\214\367
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\360\236\143\223\166\245\225\274\030\141\361\233\373\323\144\335
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\047\061\045\060\043\006\003\125\004\003\023\034\103\157\155
\123\151\147\156\040\101\144\166\141\156\143\145\144\040\123\145
\143\165\162\151\164\171\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\172\135\351\063\320\004\236\263\112\032\027\164\313\026
\233\155
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Chambers of Commerce Root"
# Issuer: CN=Chambers of Commerce Root,OU=http://www.chambersign.org,O=AC Camerfirma SA CIF
A82743287,C=EU
# Serial Number: 0 (0x0)
# Subject: CN=Chambers of Commerce Root,OU=http://www.chambersign.org,O=AC Camerfirma SA CIF
A82743287,C=EU
# Not Valid Before: Tue Sep 30 16:13:43 2003
# Not Valid After: Wed Sep 30 16:13:44 2037
# Fingerprint (MD5): b0:01:ee:14:d9:af:29:18:94:76:8e:f1:69:33:2a:84
#
 Fingerprint (SHA1): 6e:3a:55:a4:19:0c:19:5c:93:84:3c:c0:db:72:2e:31:30:61:f0:b1
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Chambers of Commerce Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\105\125\061
\047\060\045\006\003\125\004\012\023\036\101\103\040\103\141\155
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\145\162\146\151\162\155\141\040\123\101\040\103\111\106\040\101
\070\062\067\064\063\062\070\067\061\043\060\041\006\003\125\004
\013\023\032\150\164\164\160\072\057\057\167\167\167\056\143\150
\141\155\142\145\162\163\151\147\156\056\157\162\147\061\042\060
\040\006\003\125\004\003\023\031\103\150\141\155\142\145\162\163
\040\157\146\040\103\157\155\155\145\162\143\145\040\122\157\157
\164
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\105\125\061
\047\060\045\006\003\125\004\012\023\036\101\103\040\103\141\155
\145\162\146\151\162\155\141\040\123\101\040\103\111\106\040\101
\070\062\067\064\063\062\070\067\061\043\060\041\006\003\125\004
\013\023\032\150\164\164\160\072\057\057\167\167\167\056\143\150
\141\155\142\145\162\163\151\147\156\056\157\162\147\061\042\060
\040\006\003\125\004\003\023\031\103\150\141\155\142\145\162\163
\040\157\146\040\103\157\155\155\145\162\143\145\040\122\157\157
\164
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\000
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\275\060\202\003\245\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\177\061\013\060\011\006\003\125\004\006\023\002\105\125\061\047
\060\045\006\003\125\004\012\023\036\101\103\040\103\141\155\145
\162\146\151\162\155\141\040\123\101\040\103\111\106\040\101\070
\062\067\064\063\062\070\067\061\043\060\041\006\003\125\004\013
\023\032\150\164\164\160\072\057\057\167\167\167\056\143\150\141
\155\142\145\162\163\151\147\156\056\157\162\147\061\042\060\040
\006\003\125\004\003\023\031\103\150\141\155\142\145\162\163\040
\157\146\040\103\157\155\155\145\162\143\145\040\122\157\157\164
\060\036\027\015\060\063\060\071\063\060\061\066\061\063\064\063
\132\027\015\063\067\060\071\063\060\061\066\061\063\064\064\132
\060\177\061\013\060\011\006\003\125\004\006\023\002\105\125\061
\047\060\045\006\003\125\004\012\023\036\101\103\040\103\141\155
\145\162\146\151\162\155\141\040\123\101\040\103\111\106\040\101
\070\062\067\064\063\062\070\067\061\043\060\041\006\003\125\004
\013\023\032\150\164\164\160\072\057\057\167\167\167\056\143\150
\141\155\142\145\162\163\151\147\156\056\157\162\147\061\042\060
\040\006\003\125\004\003\023\031\103\150\141\155\142\145\162\163
\040\157\146\040\103\157\155\155\145\162\143\145\040\122\157\157
\164\060\202\001\040\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\001\015\000\060\202\001\010\002\202\001
\001\000\267\066\125\345\245\135\030\060\340\332\211\124\221\374

\310\307\122\370\057\120\331\357\261\165\163\145\107\175\033\133
\272\165\305\374\241\210\044\372\057\355\312\010\112\071\124\304
\121\172\265\332\140\352\070\074\201\262\313\361\273\331\221\043
\077\110\001\160\165\251\005\052\255\037\161\363\311\124\075\035
\006\152\100\076\263\014\205\356\134\033\171\302\142\304\270\066
\216\065\135\001\014\043\004\107\065\252\233\140\116\240\146\075
\313\046\012\234\100\241\364\135\230\277\161\253\245\000\150\052
\355\203\172\017\242\024\265\324\042\263\200\260\074\014\132\121
\151\055\130\030\217\355\231\236\361\256\342\225\346\366\107\250
\326\014\017\260\130\130\333\303\146\067\236\233\221\124\063\067
\322\224\034\152\110\311\311\362\245\332\245\014\043\367\043\016
\234\062\125\136\161\234\204\005\121\232\055\375\346\116\052\064
\132\336\312\100\067\147\014\124\041\125\167\332\012\014\314\227
\256\200\334\224\066\112\364\076\316\066\023\036\123\344\254\116
\072\005\354\333\256\162\234\070\213\320\071\073\211\012\076\167
\376\165\002\001\003\243\202\001\104\060\202\001\100\060\022\006
\003\125\035\023\001\001\377\004\010\060\006\001\001\377\002\001
\014\060\074\006\003\125\035\037\004\065\060\063\060\061\240\057
\240\055\206\053\150\164\164\160\072\057\057\143\162\154\056\143
\150\141\155\142\145\162\163\151\147\156\056\157\162\147\057\143
\150\141\155\142\145\162\163\162\157\157\164\056\143\162\154\060
\035\006\003\125\035\016\004\026\004\024\343\224\365\261\115\351
\333\241\051\133\127\213\115\166\006\166\341\321\242\212\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\021
\006\011\140\206\110\001\206\370\102\001\001\004\004\003\002\000
\007\060\047\006\003\125\035\021\004\040\060\036\201\034\143\150
\141\155\142\145\162\163\162\157\157\164\100\143\150\141\155\142
\145\162\163\151\147\156\056\157\162\147\060\047\006\003\125\035
\022\004\040\060\036\201\034\143\150\141\155\142\145\162\163\162
\157\157\164\100\143\150\141\155\142\145\162\163\151\147\156\056
\157\162\147\060\130\006\003\125\035\040\004\121\060\117\060\115
\006\013\053\006\001\004\001\201\207\056\012\003\001\060\076\060
\074\006\010\053\006\001\005\005\007\002\001\026\060\150\164\164
\160\072\057\057\143\160\163\056\143\150\141\155\142\145\162\163
\151\147\156\056\157\162\147\057\143\160\163\057\143\150\141\155
\142\145\162\163\162\157\157\164\056\150\164\155\154\060\015\006
\011\052\206\110\206\367\015\001\001\005\005\000\003\202\001\001
\000\014\101\227\302\032\206\300\042\174\237\373\220\363\032\321
\003\261\357\023\371\041\137\004\234\332\311\245\215\047\154\226
\207\221\276\101\220\001\162\223\347\036\175\137\366\211\306\135
\247\100\011\075\254\111\105\105\334\056\215\060\150\262\011\272
\373\303\057\314\272\013\337\077\167\173\106\175\072\022\044\216
\226\217\074\005\012\157\322\224\050\035\155\014\300\056\210\042
\325\330\317\035\023\307\360\110\327\327\005\247\317\307\107\236
\073\074\064\310\200\117\324\024\273\374\015\120\367\372\263\354
\102\137\251\335\155\310\364\165\317\173\301\162\046\261\001\034
\134\054\375\172\116\264\001\305\005\127\271\347\074\252\005\331
\210\351\007\106\101\316\357\101\201\256\130\337\203\242\256\312

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\327\167\037\347\000\074\235\157\216\344\062\011\035\115\170\064
\170\064\074\224\233\046\355\117\161\306\031\172\275\040\042\110
\132\376\113\175\003\267\347\130\276\306\062\116\164\036\150\335
\250\150\133\263\076\356\142\175\331\200\350\012\165\172\267\356
\264\145\232\041\220\340\252\320\230\274\070\265\163\074\213\370
\334
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Chambers of Commerce Root"
# Issuer: CN=Chambers of Commerce Root,OU=http://www.chambersign.org,O=AC Camerfirma SA CIF
A82743287,C=EU
# Serial Number: 0 (0x0)
# Subject: CN=Chambers of Commerce Root,OU=http://www.chambersign.org,O=AC Camerfirma SA CIF
A82743287,C=EU
# Not Valid Before: Tue Sep
 30 16:13:43 2003
# Not Valid After: Wed Sep 30 16:13:44 2037
# Fingerprint (MD5): b0:01:ee:14:d9:af:29:18:94:76:8e:f1:69:33:2a:84
# Fingerprint (SHA1): 6e:3a:55:a4:19:0c:19:5c:93:84:3c:c0:db:72:2e:31:30:61:f0:b1
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Chambers of Commerce Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\156\072\125\244\031\014\031\134\223\204\074\300\333\162\056\061
\060\141\360\261
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\260\001\356\024\331\257\051\030\224\166\216\361\151\063\052\204
END
CKA_ISSUER MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\105\125\061
\047\060\045\006\003\125\004\012\023\036\101\103\040\103\141\155
\145\162\146\151\162\155\141\040\123\101\040\103\111\106\040\101
\070\062\067\064\063\062\070\067\061\043\060\041\006\003\125\004
\013\023\032\150\164\164\160\072\057\057\167\167\167\056\143\150
\141\155\142\145\162\163\151\147\156\056\157\162\147\061\042\060
\040\006\003\125\004\003\023\031\103\150\141\155\142\145\162\163
\040\157\146\040\103\157\155\155\145\162\143\145\040\122\157\157
\164
END
CKA_SERIAL_NUMBER
```

```
 MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Global Chambersign Root"
# Issuer: CN=Global Chambersign Root,OU=http://www.chambersign.org,O=AC Camerfirma SA CIF
A82743287,C=EU
# Serial Number: 0 (0x0)
# Subject: CN=Global Chambersign Root,OU=http://www.chambersign.org,O=AC Camerfirma SA CIF
A82743287,C=EU
# Not Valid Before: Tue Sep 30 16:14:18 2003
# Not Valid After: Wed Sep 30 16:14:18 2037
# Fingerprint (MD5): c5:e6:7b:bf:06:d0:4f:43:ed:c4:7a:65:8a:fb:6b:19
# Fingerprint (SHA1): 33:9b:6b:14:50:24:9b:55:7a:01:87:72:84:d9:e0:2f:c3:d2:d8:e9
CKA_CLASS
 CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Global Chambersign Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\175\061\013\060\011\006\003\125\004\006\023\002\105\125\061
\047\060\045\006\003\125\004\012\023\036\101\103\040\103\141\155
\145\162\146\151\162\155\141\040\123\101\040\103\111\106\040\101
\070\062\067\064\063\062\070\067\061\043\060\041\006\003\125\004
\013\023\032\150\164\164\160\072\057\057\167\167\167\056\143\150
\141\155\142\145\162\163\151\147\156\056\157\162\147\061\040\060
\036\006\003\125\004\003\023\027\107\154\157\142\141\154\040\103
\150\141\155\142\145\162\163\151\147\156\040\122\157\157\164
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\175\061\013\060\011\006\003\125\004\006\023\002\105\125\061
\047\060\045\006\003\125\004\012\023\036\101\103\040\103\141\155
\145\162\146\151\162\155\141\040\123\101\040\103\111\106\040\101
\070\062\067\064\063\062\070\067\061\043\060\041\006\003\125\004
\013\023\032\150\164\164\160\072\057\057\167\167\167\056\143\150
\141\155\142\145\162\163\151\147\156\056\157\162\147\061\040\060
\036\006\003\125\004\003\023\027\107\154\157\142\141\154\040\103
\150\141\155\142\145\162\163\151\147\156\040\122\157\157\164
END
CKA_SERIAL_NUMBER
```

MULTILINE_OCTAL
\002\001\000
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\305\060\202\003\255\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\175\061\013\060\011\006\003\125\004\006\023\002\105\125\061\047
\060\045\006\003\125\004\012\023\036\101\103\040\103\141\155\145
\162\146\151\162\155\141\040\123\101\040\103\111\106\040\101\070
\062\067\064\063\062\070\067\061\043\060\041\006\003\125\004\013
\023\032\150\164\164\160\072\057\057\167\167\167\056\143\150\141
\155\142\145\162\163\151\147\156\056\157\162\147\061\040\060\036
\006\003\125\004\003\023\027\107\154\157\142\141\154\040\103\150
\141\155\142\145\162\163\151\147\156\040\122\157\157\164\060\036
\027\015\060\063\060\071\063\060\061\066\061\064\061\070\132\027
\015\063\067\060\071\063\060\061\066\061\064\061\070\132\060\175
\061\013\060\011\006\003\125\004\006\023\002\105\125\061\047\060
\045\006\003\125\004\012\023\036\101\103\040\103\141\155\145\162
\146\151\162\155\141\040\123\101\040\103\111\106\040\101\070\062
\067\064\063\062\070\067\061\043\060\041\006\003\125\004\013\023
\032\150\164\164\160\072\057\057\167\167\167\056\143\150\141\155
\142\145\162\163\151\147\156\056\157\162\147\061\040\060\036\006
\003\125\004\003\023\027\107\154\157\142\141\154\040\103\150\141
\155\142\145\162\163\151\147\156\040\122\157\157\164\060\202\001
\040\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000
\003\202\001\015\000\060\202\001\010\002\202\001\001\000\242\160
\242\320\237\102\256\133\027\307\330\175\317\024\203\374\117\311
\241\267\023\257\212\327\236\076\004\012\222\213\140\126\372\264
\062\057\210\115\241\140\010\364\267\011\116\240\111\057\111\326
\323\337\235\227\132\237\224\004\160\354\077\131\331\267\314\146
\213\230\122\050\011\002\337\305\057\204\215\172\227\167\277\354
\100\235\045\162\253\265\077\062\230\373\267\267\374\162\204\345
\065\207\371\125\372\243\037\016\157\056\050\335\151\240\331\102
\020\306\370\265\104\302\320\103\177\333\274\344\242\074\152\125
\170\012\167\251\330\352\031\062\267\057\376\134\077\033\356\261
\230\354\312\255\172\151\105\343\226\017\125\366\346\355\165\352
\145\350\062\126\223\106\211\250\045\212\145\006\356\153\277\171
\007\320\361\267\257\355\054\115\222\273\300\250\137\247\147\175
\004\362\025\010\160\254\222\326\175\004\322\063\373\114\266\013
\013\373\032\311\304\215\003\251\176\134\362\120\253\022\245\241
\317\110\120\245\357\322\310\032\023\372\260\177\261\202\034\167
\152\017\137\334\013\225\217\357\103\176\346\105\011\045\002\001
\003\243\202\001\120\060\202\001\114\060\022\006\003\125\035\023
\001\001\377\004\010\060\006\001\001\377\002\001\014\060\077\006
\003\125\035\037\004\070\060\066\060\064\240\062\240\060\206\056
\150\164\164\160\072\057\057\143\162\154\056\143\150\141\155\142
\145\162\163\151\147\156\056\157\162\147\057\143\150\141\155\142
\145\162\163\151\147\156\162\157\157\164\056\143\162\154\060\035

\006\003\125\035\016\004\026\004\024\103\234\066\237\260\236\060
\115\306\316\137\255\020\253\345\003\245\372\251\024\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\006\060\021\006
\011\140\206\110\001\206\370\102\001\001\004\004\003\002\000\007
\060\052\006\003\125\035\021\004\043\060\041\201\037\143\150\141
\155\142\145\162\163\151\147\156\162\157\157\164\100\143\150\141
\155\142\145\162\163\151\147\156\056\157\162\147\060\052\006\003
\125\035\022\004\043\060\041\201\037\143\150\141\155\142\145\162
\163\151\147\156\162\157\157\164\100\143\150\141\155\142\145\162
\163\151\147\156\056\157\162\147\060\133\006\003\125\035\040\004
\124\060\122\060\120\006\013\053\006\001\004\001\201\207\056\012
\001\001\060\101\060\077\006\010\053\006\001\005\005\007\002\001
\026\063\150\164\164\160\072\057\057\143\160\163\056\143\150\141
\155\142\145\162\163\151\147\156\056\157\162\147\057\143\160\163
\057\143\150\141\155\142\145\162\163\151\147\156\162\157\157\164
\056\150\164\155\154\060\015\006\011\052\206\110\206\367\015\001
\001\005\005\000\003\202\001\001\000\074\073\160\221\371\004\124
\047\221\341\355\355\376\150\177\141\135\345\101\145\117\062\361
\030\005\224\152\034\336\037\160\333\076\173\062\002\064\265\014
\154\241\212\174\245\364\217\377\324\330\255\027\325\055\004\321
\077\130\200\342\201\131\210\276\300\343\106\223\044\376\220\275
\046\242\060\055\350\227\046\127\065\211\164\226\030\366\025\342
\257\044\031\126\002\002\262\272\017\024\352\306\212\146\301\206
\105\125\213\276\222\276\234\244\004\307\111\074\236\350\051\172
\211\327\376\257\377\150\365\245\027\220\275\254\231\314\245\206
\127\011\147\106\333\326\026\302\106\361\344\251\120\365\217\321
\222\025\323\137\076\306\000\111\072\156\130\262\321\321\047\015
\045\310\062\370\040\021\315\175\062\063\110\224\124\114\335\334
\171\304\060\237\353\216\270\125\265\327\210\134\305\152\044\075
\262\323\005\003\121\306\007\357\314\024\162\164\075\156\162\316
\030\050\214\112\240\167\345\011\053\105\104\107\254\267\147\177
\001\212\005\132\223\276\241\301\377\370\347\016\147\244\107\111
\166\135\165\220\032\365\046\217\360
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Global Chambersign Root"
# Issuer: CN=Global Chambersign Root,OU=http://www.chambersign.org,O=AC Camerfirma SA CIF A82743287,C=EU
# Serial Number: 0 (0x0)
# Subject: CN=Global Chambersign Root,OU=http://www.chambersign.org,O=AC Camerfirma SA CIF A82743287,C=EU
# Not Valid Before: Tue Sep 30 16:14:18 2003
# Not Valid After: Wed Sep 30 16:14:18 2037

```
# Fingerprint (MD5): c5:e6:7b:bf:06:d0:4f:43:ed:c4:7a:65:8a:fb:6b:19
#
 Fingerprint (SHA1): 33:9b:6b:14:50:24:9b:55:7a:01:87:72:84:d9:e0:2f:c3:d2:d8:e9
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Global Chambersign Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\063\233\153\024\120\044\233\125\172\001\207\162\204\331\340\057
\303\322\330\351
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\305\346\173\277\006\320\117\103\355\304\172\145\212\373\153\031
END
CKA_ISSUER MULTILINE_OCTAL
\060\175\061\013\060\011\006\003\125\004\006\023\002\105\125\061
\047\060\045\006\003\125\004\012\023\036\101\103\040\103\141\155
\145\162\146\151\162\155\141\040\123\101\040\103\111\106\040\101
\070\062\067\064\063\062\070\067\061\043\060\041\006\003\125\004
\013\023\032\150\164\164\160\072\057\057\167\167\167\056\143\150
\141\155\142\145\162\163\151\147\156\056\157\162\147\061\040\060
\036\006\003\125\004\003\023\027\107\154\157\142\141\154\040\103
\150\141\155\142\145\162\163\151\147\156\040\122\157\157\164
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "GeoTrust Global CA"
# Issuer: CN=GeoTrust Global CA,O=GeoTrust Inc.,C=US
# Serial Number: 144470 (0x23456)
# Subject: CN=GeoTrust Global CA,O=GeoTrust Inc.,C=US
# Not Valid Before: Tue May 21 04:00:00 2002
# Not Valid After: Sat May 21 04:00:00 2022
# Fingerprint (MD5): f7:75:ab:29:fb:51:4e:b7:77:5e:ff:05:3c:99:8e:f5
# Fingerprint (SHA1): de:28:f4:a4:ff:e5:b9:2f:a3:c5:03:d1:a3:49:a7:f9:96:2a:82:12
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GeoTrust Global CA"
```

CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\102\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\033\060\031\006\003\125\004\003
\023\022\107\145\157\124\162\165\163\164\040\107\154\157\142\141
\154\040\103\101
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\102\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\033\060\031\006\003\125\004\003
\023\022\107\145\157\124\162\165\163\164\040\107\154\157\142\141
\154\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\002\064\126
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\124\060\202\002\074\240\003\002\001\002\002\003\002
\064\126\060\015\006\011\052\206\110\206\367\015\001\001\005\005
\000\060\102\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162
\165\163\164\040\111\156\143\056\061\033\060\031\006\003\125\004
\003\023\022\107\145\157\124\162\165\163\164\040\107\154\157\142
\141\154\040\103\101\060\036\027\015\060\062\060\065\062\061\060
\064\060\060\060\060\132\027\015\062\062\060\065\062\061\060\064
\060\060\060\060\132\060\102\061\013\060\011\006\003\125\004\006
\023\002\125\123\061\026\060\024\006\003\125\004\012\023\015\107
\145\157\124\162\165\163\164\040\111\156\143\056\061\033\060\031
\006\003\125\004\003\023\022\107\145\157\124\162\165\163\164\040
\107\154\157\142\141\154\040\103\101\060\202\001\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017
\000\060\202\001\012\002\202\001\001\000\332\314\030\143\060\375
\364\027\043\032\126\176\133\337\074\154\070\344\161\267\170\221
\324\274\241\330\114\370\250\103\266\003\351\115\041\007\010\210
\332\130\057\146\071\051\275\005\170\213\235\070\350\005\267\152
\176\161\244\346\304\140\246\260\357\200\344\211\050\017\236\045
\326\355\203\363\255\246\221\307\230\311\102\030\065\024\235\255
\230\106\222\056\117\312\361\207\103\301\026\225\127\055\120\357
\211\055\200\172\127\255\362\356\137\153\322\000\215\271\024\370
\024\025\065\331\300\106\243\173\162\310\221\277\311\125\053\315
\320\227\076\234\046\144\314\337\316\203\031\161\312\116\346\324
\325\173\251\031\315\125\336\310\354\322\136\070\123\345\134\117
\214\055\376\120\043\066\374\146\346\313\216\244\071\031\000\267
\225\002\071\221\013\016\376\070\056\321\035\005\232\366\115\076

\157\017\007\035\257\054\036\217\140\071\342\372\066\123\023\071
\324\136\046\053\333\075\250\024\275\062\353\030\003\050\122\004
\161\345\253\063\075\341\070\273\007\066\204\142\234\171\352\026
\060\364\137\300\053\350\161\153\344\371\002\003\001\000\001\243
\123\060\121\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024\300
\172\230\150\215\211\373\253\005\144\014\021\175\252\175\145\270
\312\314\116\060\037\006\003\125\035\043\004\030\060\026\200\024
\300\172\230\150\215\211\373\253\005\144\014\021\175\252\175\145
\270\312\314\116\060\015\006\011\052\206\110\206\367\015\001\001
\005\005\000\003\202\001\001\000\065\343\051\152\345\057\135\124
\216\051\120\224\237\231\032\024\344\217\170\052\142\224\242\047
\147\236\320\317\032\136\107\351\301\262\244\317\335\101\032\005
\116\233\113\356\112\157\125\122\263\044\241\067\012\353\144\166
\052\056\054\363\375\073\165\220\277\372\161\330\307\075\067\322
\265\005\225\142\271\246\336\211\075\066\173\070\167\110\227\254
\246\040\217\056\246\311\014\302\262\231\105\000\307\316\021\121
\042\042\340\245\352\266\025\110\011\144\352\136\117\164\367\005
\076\307\212\122\014\333\025\264\275\155\233\345\306\261\124\150
\251\343\151\220\266\232\245\017\270\271\077\040\175\256\112\265
\270\234\344\035\266\253\346\224\245\301\307\203\255\333\365\047
\207\016\004\154\325\377\335\240\135\355\207\122\267\053\025\002
\256\071\246\152\164\351\332\304\347\274\115\064\036\251\134\115
\063\137\222\011\057\210\146\135\167\227\307\035\166\023\251\325
\345\361\026\011\021\065\325\254\333\044\161\160\054\230\126\013
\331\027\264\321\343\121\053\136\165\350\325\320\334\117\064\355
\302\005\146\200\241\313\346\063
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "GeoTrust Global CA"
# Issuer: CN=GeoTrust Global CA,O=GeoTrust Inc.,C=US
# Serial Number: 144470 (0x23456)
# Subject: CN=GeoTrust Global CA,O=GeoTrust Inc.,C=US
# Not Valid Before: Tue May 21 04:00:00 2002
# Not Valid After: Sat May 21 04:00:00 2022
# Fingerprint (MD5): f7:75:ab:29:fb:51:4e:b7:77:5e:ff:05:3c:99:8e:f5
# Fingerprint (SHA1): de:28:f4:a4:ff:e5:b9:2f:a3:c5:03:d1:a3:49:a7:f9:96:2a:82:12
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GeoTrust Global CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL

```
\336\050\364\244\377\345\271\057\243\305\003\321\243\111\247\371
\226\052\202\022
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\367\165\253\051\373\121\116\267\167\136\377\005\074\231\216\365
END
CKA_ISSUER MULTILINE_OCTAL
\060\102\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\033\060\031\006\003\125\004\003
\023\022\107\145\157\124\162\165\163\164\040\107\154\157\142\141
\154\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\003\002\064\126
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "GeoTrust Global CA 2"
# Issuer: CN=GeoTrust Global CA 2,O=GeoTrust Inc.,C=US
# Serial Number: 1 (0x1)
# Subject: CN=GeoTrust Global CA 2,O=GeoTrust Inc.,C=US
# Not Valid Before: Thu Mar 04
 05:00:00 2004
# Not Valid After: Mon Mar 04 05:00:00 2019
# Fingerprint (MD5): 0e:40:a7:6c:de:03:5d:8f:d1:0f:e4:d1:8d:f9:6c:a9
# Fingerprint (SHA1): a9:e9:78:08:14:37:58:88:f2:05:19:b0:6d:2b:0d:2b:60:16:90:7d
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GeoTrust Global CA 2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\035\060\033\006\003\125\004\003
\023\024\107\145\157\124\162\165\163\164\040\107\154\157\142\141
\154\040\103\101\040\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061
```

\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\035\060\033\006\003\125\004\003
\023\024\107\145\157\124\162\165\163\164\040\107\154\157\142\141
\154\040\103\101\040\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\146\060\202\002\116\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061\026
\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165\163
\164\040\111\156\143\056\061\035\060\033\006\003\125\004\003\023
\024\107\145\157\124\162\165\163\164\040\107\154\157\142\141\154
\040\103\101\040\062\060\036\027\015\060\064\060\063\060\064\060
\065\060\060\060\060\132\027\015\061\071\060\063\060\064\060\065
\060\060\060\060\132\060\104\061\013\060\011\006\003\125\004\006
\023\002\125\123\061\026\060\024\006\003\125\004\012\023\015\107
\145\157\124\162\165\163\164\040\111\156\143\056\061\035\060\033
\006\003\125\004\003\023\024\107\145\157\124\162\165\163\164\040
\107\154\157\142\141\154\040\103\101\040\062\060\202\001\042\060
\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202
\001\017\000\060\202\001\012\002\202\001\001\000\357\074\115\100
\075\020\337\073\123\000\341\147\376\224\140\025\076\205\210\361
\211\015\220\310\050\043\231\005\350\053\040\235\306\363\140\106
\330\301\262\325\214\061\331\334\040\171\044\201\277\065\062\374
\143\151\333\261\052\153\356\041\130\362\010\351\170\313\157\313
\374\026\122\310\221\304\377\075\163\336\261\076\247\302\175\146
\301\365\176\122\044\032\342\325\147\221\320\202\020\327\170\113
\117\053\102\071\275\144\055\100\240\260\020\323\070\110\106\210
\241\014\273\072\063\052\142\230\373\000\235\023\131\177\157\073
\162\252\356\246\017\206\371\005\141\352\147\177\014\067\226\213
\346\151\026\107\021\302\047\131\003\263\246\140\302\041\100\126
\372\240\307\175\072\023\343\354\127\307\263\326\256\235\211\200
\367\001\347\054\366\226\053\023\015\171\054\331\300\344\206\173
\113\214\014\162\202\212\373\027\315\000\154\072\023\074\260\204
\207\113\026\172\051\262\117\333\035\324\013\363\146\067\275\330
\366\127\273\136\044\172\270\074\213\271\372\222\032\032\204\236
\330\164\217\252\033\177\136\364\376\105\042\041\002\003\001\000
\001\243\143\060\141\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004
\024\161\070\066\362\002\061\123\107\053\156\272\145\106\251\020
\025\130\040\005\011\060\037\006\003\125\035\043\004\030\060\026
\200\024\161\070\066\362\002\061\123\107\053\156\272\145\106\251
\020\025\130\040\005\011\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\206\060\015\006\011\052\206\110\206\367\015

\001\001\005\005\000\003\202\001\001\000\003\367\265\053\253\135
\020\374\173\262\262\136\254\233\016\176\123\170\131\076\102\004
\376\165\243\255\254\201\116\327\002\213\136\304\055\310\122\166
\307\054\037\374\201\062\230\321\113\306\222\223\063\065\061\057
\374\330\035\104\335\340\201\177\235\351\213\341\144\221\142\013
\071\010\214\254\164\235\131\331\172\131\122\227\021\271\026\173
\157\105\323\226\331\061\175\002\066\017\234\073\156\317\054\015
\003\106\105\353\240\364\177\110\104\306\010\100\314\336\033\160
\265\051\255\272\213\073\064\145\165\033\161\041\035\054\024\012
\260\226\225\270\326\352\362\145\373\051\272\117\352\221\223\164
\151\266\362\377\341\032\320\014\321\166\205\313\212\045\275\227
\136\054\157\025\231\046\347\266\051\377\042\354\311\002\307\126
\000\315\111\271\263\154\173\123\004\032\342\250\311\252\022\005
\043\302\316\347\273\004\002\314\300\107\242\344\304\051\057\133
\105\127\211\121\356\074\353\122\010\377\007\065\036\237\065\152
\107\112\126\230\321\132\205\037\214\365\042\277\253\316\203\363
\342\042\051\256\175\203\100\250\272\154
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "GeoTrust Global CA 2"
# Issuer: CN=GeoTrust Global CA 2,O=GeoTrust Inc.,C=US
# Serial Number:
 1 (0x1)
# Subject: CN=GeoTrust Global CA 2,O=GeoTrust Inc.,C=US
# Not Valid Before: Thu Mar 04 05:00:00 2004
# Not Valid After: Mon Mar 04 05:00:00 2019
# Fingerprint (MD5): 0e:40:a7:6c:de:03:5d:8f:d1:0f:e4:d1:8d:f9:6c:a9
# Fingerprint (SHA1): a9:e9:78:08:14:37:58:88:f2:05:19:b0:6d:2b:0d:2b:60:16:90:7d
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GeoTrust Global CA 2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\251\351\170\010\024\067\130\210\362\005\031\260\155\053\015\053
\140\026\220\175
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\016\100\247\154\336\003\135\217\321\017\344\321\215\371\154\251
END
CKA_ISSUER MULTILINE_OCTAL
\060\104\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165

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\163\164\040\111\156\143\056\061\035\060\033\006\003\125\004\003
\023\024\107\145\157\124\162\165\163\164\040\107\154\157\142\141
\154\040\103\101\040\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "GeoTrust Universal CA"
# Issuer: CN=GeoTrust Universal CA,O=GeoTrust Inc.,C=US
# Serial Number: 1 (0x1)
# Subject: CN=GeoTrust Universal CA,O=GeoTrust Inc.,C=US
# Not Valid Before: Thu Mar 04 05:00:00 2004
# Not Valid After: Sun Mar 04 05:00:00 2029
# Fingerprint (MD5): 92:65:58:8b:a2:1a:31:72:73:68:5c:b4:a5:7a:07:48
# Fingerprint (SHA1): e6:21:f3:35:43:79:05:9a:4b:68:30:9d:8a:2f:74:22:15:87:ec:79
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GeoTrust Universal CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\036\060\034\006\003\125\004\003
\023\025\107\145\157\124\162\165\163\164\040\125\156\151\166\145
\162\163\141\154\040\103\101
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\036\060\034\006\003\125\004\003
\023\025\107\145\157\124\162\165\163\164\040\125\156\151\166\145
\162\163\141\154\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
```

\060\202\005\150\060\202\003\120\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\105\061\013\060\011\006\003\125\004\006\023\002\125\123\061\026
\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165\163
\164\040\111\156\143\056\061\036\060\034\006\003\125\004\003\023
\025\107\145\157\124\162\165\163\164\040\125\156\151\166\145\162
\163\141\154\040\103\101\060\036\027\015\060\064\060\063\060\064
\060\065\060\060\060\060\132\027\015\062\071\060\063\060\064\060
\065\060\060\060\060\132\060\105\061\013\060\011\006\003\125\004
\006\023\002\125\123\061\026\060\024\006\003\125\004\012\023\015
\107\145\157\124\162\165\163\164\040\111\156\143\056\061\036\060
\034\006\003\125\004\003\023\025\107\145\157\124\162\165\163\164
\040\125\156\151\166\145\162\163\141\154\040\103\101\060\202\002
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000
\003\202\002\017\000\060\202\002\012\002\202\002\001\000\246\025
\125\240\243\306\340\037\214\235\041\120\327\301\276\053\133\265
\244\236\241\331\162\130\275\000\033\114\277\141\311\024\035\105
\202\253\306\035\200\326\075\353\020\234\072\257\155\044\370\274
\161\001\236\006\365\174\137\036\301\016\125\312\203\232\131\060
\256\031\313\060\110\225\355\042\067\215\364\112\232\162\146\076
\255\225\300\340\026\000\340\020\037\053\061\016\327\224\124\323
\102\063\240\064\035\036\105\166\335\117\312\030\067\354\205\025
\172\031\010\374\325\307\234\360\362\251\056\020\251\222\346\075
\130\075\251\026\150\074\057\165\041\030\177\050\167\245\341\141
\027\267\246\351\370\036\231\333\163\156\364\012\242\041\154\356
\332\252\205\222\146\257\366\172\153\202\332\272\042\010\065\017
\317\102\361\065\372\152\356\176\053\045\314\072\021\344\155\257
\163\262\166\035\255\320\262\170\147\032\244\071\034\121\013\147
\126\203\375\070\135\015\316\335\360\273\053\226\037\336\173\062
\122\375\035\273\265\006\241\262\041\136\245\326\225\150\177\360
\231\236\334\105\010\076\347\322\011\015\065\224\335\200\116\123
\227\327\265\011\104\040\144\026\027\003\002\114\123\015\150\336
\325\252\162\115\223\155\202\016\333\234\275\317\264\363\134\135
\124\172\151\011\226\326\333\021\301\215\165\250\264\317\071\310
\316\074\274\044\174\346\142\312\341\275\175\247\275\127\145\013
\344\376\045\355\266\151\020\334\050\032\106\275\001\035\320\227
\265\341\230\073\300\067\144\326\075\224\356\013\341\365\050\256
\013\126\277\161\213\043\051\101\216\206\305\113\122\173\330\161
\253\037\212\025\246\073\203\132\327\130\001\121\306\114\101\331
\177\330\101\147\162\242\050\337\140\203\251\236\310\173\374\123
\163\162\131\365\223\172\027\166\016\316\367\345\134\331\013\125
\064\242\252\133\265\152\124\347\023\312\127\354\227\155\364\136
\006\057\105\213\130\324\043\026\222\344\026\156\050\143\131\060
\337\120\001\234\143\211\032\237\333\027\224\202\160\067\303\044
\236\232\107\326\132\312\116\250\151\211\162\037\221\154\333\176
\236\033\255\307\037\163\335\054\117\031\145\375\177\223\100\020
\056\322\360\355\074\236\056\050\076\151\046\063\305\173\002\003
\001\000\001\243\143\060\141\060\017\006\003\125\035\023\001\001

\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004
\026\004\024\332\273\056\252\260\014\270\210\046\121\164\134\155
\003\323\300\330\217\172\326\060\037\006\003\125\035\043\004\030
\060\026\200\024\332\273\056\252\260\014\270\210\046\121\164\134
\155\003\323\300\330\217\172\326\060\016\006\003\125\035\017\001
\001\377\004\004\003\002\001\206\060\015\006\011\052\206\110\206
\367\015\001\001\005\005\000\003\202\002\001\000\061\170\346\307
\265\337\270\224\100\311\161\304\250\065\354\106\035\302\205\363
\050\130\206\260\013\374\216\262\071\217\104\125\253\144\204\134
\151\251\320\232\070\074\372\345\037\065\345\104\343\200\171\224
\150\244\273\304\237\075\341\064\315\060\106\213\124\053\225\245
\357\367\077\231\204\375\065\346\317\061\306\334\152\277\247\327
\043\010\341\230\136\303\132\010\166\251\246\257\167\057\267\140
\275\104\106\152\357\227\377\163\225\301\216\350\223\373\375\061
\267\354\127\021\021\105\233\060\361\032\210\071\301\117\074\247
\000\325\307\374\253\155\200\042\160\245\014\340\135\004\051\002
\373\313\240\221\321\174\326\303\176\120\325\235\130\276\101\070
\353\271\165\074\025\331\233\311\112\203\131\300\332\123\375\063
\273\066\030\233\205\017\025\335\356\055\254\166\223\271\331\001
\215\110\020\250\373\365\070\206\361\333\012\306\275\204\243\043
\101\336\326\167\157\205\324\205\034\120\340\256\121\212\272\215
\076\166\342\271\312\047\362\137\237\357\156\131\015\006\330\053
\027\244\322\174\153\273\137\024\032\110\217\032\114\347\263\107
\034\216\114\105\053\040\356\110\337\347\335\011\216\030\250\332
\100\215\222\046\021\123\141\163\135\353\275\347\304\115\051\067
\141\353\254\071\055\147\056\026\326\365\000\203\205\241\314\177
\166\304\175\344\267\113\146\357\003\105\140\151\266\014\122\226
\222\204\136\246\243\265\244\076\053\331\314\330\033\107\252\362
\104\332\117\371\003\350\360\024\313\077\363\203\336\320\301\124
\343\267\350\012\067\115\213\040\131\003\060\031\241\054\310\275
\021\037\337\256\311\112\305\363\047\146\146\206\254\150\221\377
\331\346\123\034\017\213\134\151\145\012\046\310\036\064\303\135
\121\173\327\251\234\006\241\066\335\325\211\224\274\331\344\055
\014\136\011\154\010\227\174\243\075\174\223\377\077\241\024\247
\317\265\135\353\333\333\034\304\166\337\210\271\275\105\005\225
\033\256\374\106\152\114\257\110\343\316\256\017\322\176\353\346
\154\234\117\201\152\172\144\254\273\076\325\347\313\166\056\305
\247\110\301\134\220\017\313\310\077\372\346\062\341\215\033\157
\244\346\216\330\371\051\110\212\316\163\376\054
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "GeoTrust Universal CA"
# Issuer: CN=GeoTrust Universal CA,O=GeoTrust Inc.,C=US

```
# Serial Number: 1 (0x1)
# Subject: CN=GeoTrust Universal CA,O=GeoTrust Inc.,C=US
# Not Valid Before: Thu Mar 04 05:00:00 2004
# Not Valid After: Sun Mar 04 05:00:00 2029
# Fingerprint (MD5): 92:65:58:8b:a2:1a:31:72:73:68:5c:b4:a5:7a:07:48
# Fingerprint (SHA1): e6:21:f3:35:43:79:05:9a:4b:68:30:9d:8a:2f:74:22:15:87:ec:79
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
 CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GeoTrust Universal CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\346\041\363\065\103\171\005\232\113\150\060\235\212\057\164\042
\025\207\354\171
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\222\145\130\213\242\032\061\162\163\150\134\264\245\172\007\110
END
CKA_ISSUER MULTILINE_OCTAL
\060\105\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\036\060\034\006\003\125\004\003
\023\025\107\145\157\124\162\165\163\164\040\125\156\151\166\145
\162\163\141\154\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "GeoTrust Universal
 CA 2"
# Issuer: CN=GeoTrust Universal CA 2,O=GeoTrust Inc.,C=US
# Serial Number: 1 (0x1)
# Subject: CN=GeoTrust Universal CA 2,O=GeoTrust Inc.,C=US
# Not Valid Before: Thu Mar 04 05:00:00 2004
# Not Valid After: Sun Mar 04 05:00:00 2029
# Fingerprint (MD5): 34:fc:b8:d0:36:db:9e:14:b3:c2:f2:db:8f:e4:94:c7
# Fingerprint (SHA1): 37:9a:19:7b:41:85:45:35:0c:a6:03:69:f3:3c:2e:af:47:4f:20:79
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
```

CKA_LABEL UTF8 "GeoTrust Universal CA 2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\040\060\036\006\003\125\004\003
\023\027\107\145\157\124\162\165\163\164\040\125\156\151\166\145
\162\163\141\154\040\103\101\040\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\040\060\036\006\003\125\004\003
\023\027\107\145\157\124\162\165\163\164\040\125\156\151\166\145
\162\163\141\154\040\103\101\040\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\154\060\202\003\124\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061\026
\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165\163
\164\040\111\156\143\056\061\040\060\036\006\003\125\004\003\023
\027\107\145\157\124\162\165\163\164\040\125\156\151\166\145\162
\163\141\154\040\103\101\040\062\060\036\027\015\060\064\060\063
\060\064\060\065\060\060\060\060\132\027\015\062\071\060\063\060
\064\060\065\060\060\060\060\132\060\107\061\013\060\011\006\003
\125\004\006\023\002\125\123\061\026\060\024\006\003\125\004\012
\023\015\107\145\157\124\162\165\163\164\040\111\156\143\056\061
\040\060\036\006\003\125\004\003\023\027\107\145\157\124\162\165
\163\164\040\125\156\151\166\145\162\163\141\154\040\103\101\040
\062\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002
\001\000\263\124\122\301\311\076\362\331\334\261\123\032\131\051
\347\261\303\105\050\345\327\321\355\305\305\113\241\252\164\173
\127\257\112\046\374\330\365\136\247\156\031\333\164\014\117\065
\133\062\013\001\343\333\353\172\167\065\352\252\132\340\326\350
\241\127\224\360\220\243\164\126\224\104\060\003\036\134\116\053
\205\046\164\202\172\014\166\240\157\115\316\101\055\240\025\006
\024\137\267\102\315\173\217\130\141\064\334\052\010\371\056\303
\001\246\042\104\034\114\007\202\346\133\316\320\112\174\004\323
\031\163\047\360\252\230\177\056\257\116\353\207\036\044\167\152
\135\266\350\133\105\272\334\303\241\005\157\126\216\217\020\046
\245\111\303\056\327\101\207\042\340\117\206\312\140\265\352\241

\143\300\001\227\020\171\275\000\074\022\155\053\025\261\254\113
\261\356\030\271\116\226\334\334\166\377\073\276\317\137\003\300
\374\073\350\276\106\033\377\332\100\302\122\367\376\343\072\367
\152\167\065\320\332\215\353\136\030\152\061\307\036\272\074\033
\050\326\153\124\306\252\133\327\242\054\033\031\314\242\002\366
\233\131\275\067\153\206\265\155\202\272\330\352\311\126\274\251
\066\130\375\076\031\363\355\014\046\251\223\070\370\117\301\135
\042\006\320\227\352\341\255\306\125\340\201\053\050\203\072\372
\364\173\041\121\000\276\122\070\316\315\146\171\250\364\201\126
\342\320\203\011\107\121\133\120\152\317\333\110\032\135\076\367
\313\366\145\367\154\361\225\370\002\073\062\126\202\071\172\133
\275\057\211\033\277\241\264\350\377\177\215\214\337\003\361\140
\116\130\021\114\353\243\077\020\053\203\232\001\163\331\224\155
\204\000\047\146\254\360\160\100\011\102\222\255\117\223\015\141
\011\121\044\330\222\325\013\224\141\262\207\262\355\377\232\065
\377\205\124\312\355\104\103\254\033\074\026\153\110\112\012\034
\100\210\037\222\302\013\000\005\377\362\310\002\112\244\252\251
\314\231\226\234\057\130\340\175\341\276\273\007\334\137\004\162
\134\061\064\303\354\137\055\340\075\144\220\042\346\321\354\270
\056\335\131\256\331\241\067\277\124\065\334\163\062\117\214\004
\036\063\262\311\106\361\330\134\310\125\120\311\150\275\250\272
\066\011\002\003\001\000\001\243\143\060\141\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003
\125\035\016\004\026\004\024\166\363\125\341\372\244\066\373\360
\237\134\142\161\355\074\364\107\070\020\053\060\037\006\003\125
\035\043\004\030\060\026\200\024\166\363\125\341\372\244\066\373
\360\237\134\142\161\355\074\364\107\070\020\053\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\206\060\015\006\011
\052\206\110\206\367\015\001\001\005\005\000\003\202\002\001\000
\146\301\306\043\363\331\340\056\156\137\350\317\256\260\260\045
\115\053\370\073\130\233\100\044\067\132\313\253\026\111\377\263
\165\171\063\241\057\155\160\027\064\221\376\147\176\217\354\233
\345\136\202\251\125\037\057\334\324\121\007\022\376\254\026\076
\054\065\306\143\374\334\020\353\015\243\252\320\174\314\321\320
\057\121\056\304\024\132\336\350\031\341\076\306\314\244\051\347
\056\204\252\006\060\170\166\124\163\050\230\131\070\340\000\015
\142\323\102\175\041\237\256\075\072\214\325\372\167\015\030\053
\026\016\137\066\341\374\052\265\060\044\317\340\143\014\173\130
\032\376\231\272\102\022\261\221\364\174\150\342\310\350\257\054
\352\311\176\256\273\052\075\015\025\334\064\225\266\030\164\250
\152\017\307\264\364\023\304\344\133\355\012\322\244\227\114\052
\355\057\154\022\211\075\361\047\160\252\152\003\122\041\237\100
\250\147\120\362\363\132\037\337\337\043\366\334\170\116\346\230
\117\125\072\123\343\357\362\364\237\307\174\330\130\257\051\042
\227\270\340\275\221\056\260\166\354\127\021\317\357\051\104\363
\351\205\172\140\143\344\135\063\211\027\331\061\252\332\326\363
\030\065\162\317\207\053\057\143\043\204\135\204\214\077\127\240
\210\374\231\221\050\046\151\231\324\217\227\104\276\216\325\110

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\261\244\050\051\361\025\264\341\345\236\335\370\217\246\157\046
\327\011\074\072\034\021\016\246\154\067\367\255\104\207\054\050
\307\330\164\202\263\320\157\112\127\273\065\051\047\240\213\350
\041\247\207\144\066\135\314\330\026\254\307\262\047\100\222\125
\070\050\215\121\156\335\024\147\123\154\161\134\046\204\115\165
\132\266\176\140\126\251\115\255\373\233\036\227\363\015\331\322
\227\124\167\332\075\022\267\340\036\357\010\006\254\371\205\207
\351\242\334\257\176\030\022\203\375\126\027\101\056\325\051\202
\175\231\364\061\366\161\251\317\054\001\047\245\005\271\252\262
\110\116\052\357\237\223\122\121\225\074\122\163\216\126\114\027
\100\300\011\050\344\213\152\110\123\333\354\315\125\125\361\306
\370\351\242\054\114\246\321\046\137\176\257\132\114\332\037\246
\362\034\054\176\256\002\026\322\126\320\057\127\123\107\350\222
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "GeoTrust Universal CA 2"
# Issuer: CN=GeoTrust Universal CA 2,O=GeoTrust Inc.,C=US
# Serial Number: 1 (0x1)
# Subject: CN=GeoTrust Universal CA 2,O=GeoTrust Inc.,C=US
# Not Valid Before: Thu Mar 04 05:00:00 2004
# Not Valid After: Sun Mar 04 05:00:00 2029
# Fingerprint (MD5): 34:fc:b8:d0:36:db:9e:14:b3:c2:f2:db:8f:e4:94:c7
# Fingerprint (SHA1): 37:9a:19:7b:41:85:45:35:0c:a6:03:69:f3:3c:2e:af:47:4f:20:79
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GeoTrust Universal CA 2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\067\232\031\173\101\205\105\065\014\246\003\151\363\074\056\257
\107\117\040\171
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\064\374\270\320\066\333\236\024\263\302\362\333\217\344\224\307
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\107\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\023\015\107\145\157\124\162\165
\163\164\040\111\156\143\056\061\040\060\036\006\003\125\004\003
\023\027\107\145\157\124\162\165\163\164\040\125\156\151\166\145
\162\163\141\154\040\103\101\040\062
END
```

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CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "QuoVadis Root Certification Authority"
# Issuer: CN=QuoVadis Root Certification Authority,OU=Root Certification Authority,O=QuoVadis
Limited,C=BM
# Serial Number:3a:b6:50:8b
# Subject: CN=QuoVadis Root Certification Authority,OU=Root Certification Authority,O=QuoVadis
Limited,C=BM
# Not Valid Before: Mon Mar 19 18:33:33
 2001
# Not Valid After: Wed Mar 17 18:33:33 2021
# Fingerprint (MD5): 27:de:36:fe:72:b7:00:03:00:9d:f4:f0:1e:6c:04:24
# Fingerprint (SHA1): de:3f:40:bd:50:93:d3:9b:6c:60:f6:da:bc:07:62:01:00:89:76:c9
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root Certification Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\045\060\043\006\003
\125\004\013\023\034\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\061\056\060\054\006\003\125\004\003\023\045\121\165\157\126
\141\144\151\163\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\045\060\043\006\003
\125\004\013\023\034\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\061\056\060\054\006\003\125\004\003\023\045\121\165\157\126
\141\144\151\163\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
```

\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\072\266\120\213
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\320\060\202\004\270\240\003\002\001\002\002\004\072
\266\120\213\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\177\061\013\060\011\006\003\125\004\006\023\002\102
\115\061\031\060\027\006\003\125\004\012\023\020\121\165\157\126
\141\144\151\163\040\114\151\155\151\164\145\144\061\045\060\043
\006\003\125\004\013\023\034\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\061\056\060\054\006\003\125\004\003\023\045\121\165
\157\126\141\144\151\163\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\060\036\027\015\060\061\060\063\061\071\061\070\063
\063\063\063\132\027\015\062\061\060\063\061\067\061\070\063\063
\063\063\132\060\177\061\013\060\011\006\003\125\004\006\023\002
\102\115\061\031\060\027\006\003\125\004\012\023\020\121\165\157
\126\141\144\151\163\040\114\151\155\151\164\145\144\061\045\060
\043\006\003\125\004\013\023\034\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171\061\056\060\054\006\003\125\004\003\023\045\121
\165\157\126\141\144\151\163\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171\060\202\001\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012
\002\202\001\001\000\277\141\265\225\123\272\127\374\372\362\147
\013\072\032\337\021\200\144\225\264\321\274\315\172\317\366\051
\226\056\044\124\100\044\070\367\032\205\334\130\114\313\244\047
\102\227\320\237\203\212\303\344\006\003\133\000\245\121\036\160
\004\164\342\301\324\072\253\327\255\073\007\030\005\216\375\203
\254\352\146\331\030\033\150\212\365\127\032\230\272\365\355\166
\075\174\331\336\224\152\073\113\027\301\325\217\275\145\070\072
\225\320\075\125\066\116\337\171\127\061\052\036\330\131\145\111
\130\040\230\176\253\137\176\237\351\326\115\354\203\164\251\307
\154\330\356\051\112\205\052\006\024\371\124\346\323\332\145\007
\213\143\067\022\327\320\354\303\173\040\101\104\243\355\313\240
\027\341\161\145\316\035\146\061\367\166\001\031\310\175\003\130
\266\225\111\035\246\022\046\350\306\014\166\340\343\146\313\352
\135\246\046\356\345\314\137\275\147\247\001\047\016\242\312\124
\305\261\172\225\035\161\036\112\051\212\003\334\152\105\301\244
\031\136\157\066\315\303\242\260\267\376\134\070\342\122\274\370
\104\103\346\220\273\002\003\001\000\001\243\202\002\122\060\202
\002\116\060\075\006\010\053\006\001\005\005\007\001\001\004\061
\060\057\060\055\006\010\053\006\001\005\005\007\060\001\206\041
\150\164\164\160\163\072\057\057\157\143\163\160\056\161\165\157

\166\141\144\151\163\157\146\146\163\150\157\162\145\056\143\157
\155\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\202\001\032\006\003\125\035\040\004\202\001\021\060
\202\001\015\060\202\001\011\006\011\053\006\001\004\001\276\130
\000\001\060\201\373\060\201\324\006\010\053\006\001\005\005\007
\002\002\060\201\307\032\201\304\122\145\154\151\141\156\143\145
\040\157\156\040\164\150\145\040\121\165\157\126\141\144\151\163
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\145\040\142\171\040\141\156\171\040\160\141\162\164\171\040\141
\163\163\165\155\145\163\040\141\143\143\145\160\164\141\156\143
\145\040\157\146\040\164\150\145\040\164\150\145\156\040\141\160
\160\154\151\143\141\142\154\145\040\163\164\141\156\144\141\162
\144\040\164\145\162\155\163\040\141\156\144\040\143\157\156\144
\151\164\151\157\156\163\040\157\146\040\165\163\145\054\040\143
\145\162\164\151\146\151\143\141\164\151\157\156\040\160\162\141
\143\164\151\143\145\163\054\040\141\156\144\040\164\150\145\040
\121\165\157\126\141\144\151\163\040\103\145\162\164\151\146\151
\143\141\164\145\040\120\157\154\151\143\171\056\060\042\006\010
\053\006\001\005\005\007\002\001\026\026\150\164\164\160\072\057
\057\167\167\167\056\161\165\157\166\141\144\151\163\056\142\155
\060\035\006\003\125\035\016\004\026\004\024\213\113\155\355\323
\051\271\006\031\354\071\071\251\360\227\204\152\313\357\337\060
\201\256\006\003\125\035\043\004\201\246\060\201\243\200\024\213
\113\155\355\323\051\271\006\031\354\071\071\251\360\227\204\152
\313\357\337\241\201\204\244\201\201\060\177\061\013\060\011\006
\003\125\004\006\023\002\102\115\061\031\060\027\006\003\125\004
\012\023\020\121\165\157\126\141\144\151\163\040\114\151\155\151
\164\145\144\061\045\060\043\006\003\125\004\013\023\034\122\157
\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171\061\056\060\054\006\003
\125\004\003\023\045\121\165\157\126\141\144\151\163\040\122\157
\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171\202\004\072\266\120\213
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003
\202\001\001\000\212\324\024\265\376\364\232\222\247\031\324\244
\176\162\030\217\331\150\174\122\044\335\147\157\071\172\304\252
\136\075\342\130\260\115\160\230\204\141\350\033\343\151\030\016
\316\373\107\120\240\116\377\360\044\037\275\262\316\365\047\374
\354\057\123\252\163\173\003\075\164\156\346\026\236\353\245\056
\304\277\126\047\120\053\142\272\276\113\034\074\125\134\101\035
\044\276\202\040\107\135\325\104\176\172\026\150\337\175\115\121
\160\170\127\035\063\036\375\002\231\234\014\315\012\005\117\307
\273\216\244\165\372\112\155\261\200\216\011\126\271\234\032\140
\376\135\301\327\172\334\021\170\320\326\135\301\267\325\255\062
\231\003\072\212\314\124\045\071\061\201\173\023\042\121\272\106
\154\241\273\236\372\004\154\111\046\164\217\322\163\353\314\060
\242\346\352\131\042\207\370\227\365\016\375\352\314\222\244\026

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\304\122\030\352\041\316\261\361\346\204\201\345\272\251\206\050
\362\103\132\135\022\235\254\036\331\250\345\012\152\247\177\240
\207\051\317\362\211\115\324\354\305\342\346\172\320\066\043\212
\112\164\066\371
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "QuoVadis Root Certification Authority"
# Issuer: CN=QuoVadis Root Certification Authority,OU=Root
 Certification Authority,O=QuoVadis Limited,C=BM
# Serial Number:3a:b6:50:8b
# Subject: CN=QuoVadis Root Certification Authority,OU=Root Certification Authority,O=QuoVadis
Limited,C=BM
# Not Valid Before: Mon Mar 19 18:33:33 2001
# Not Valid After: Wed Mar 17 18:33:33 2021
# Fingerprint (MD5): 27:de:36:fe:72:b7:00:03:00:9d:f4:f0:1e:6c:04:24
# Fingerprint (SHA1): de:3f:40:bd:50:93:d3:9b:6c:60:f6:da:bc:07:62:01:00:89:76:c9
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "QuoVadis Root Certification Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\336\077\100\275\120\223\323\233\154\140\366\332\274\007\142\001
\000\211\166\311
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\047\336\066\376\162\267\000\003\000\235\364\360\036\154\004\044
END
CKA_ISSUER MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\102\115\061
\031\060\027\006\003\125\004\012\023\020\121\165\157\126\141\144
\151\163\040\114\151\155\151\164\145\144\061\045\060\043\006\003
\125\004\013\023\034\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\061\056\060\054\006\003\125\004\003\023\045\121\165\157\126
\141\144\151\163\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\004\072\266\120\213
END
```

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CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Sonera Class2 CA"
# Issuer: CN=Sonera Class2 CA,O=Sonera,C=FI
# Serial Number: 29 (0x1d)
# Subject: CN=Sonera Class2 CA,O=Sonera,C=FI
# Not Valid Before: Fri Apr 06 07:29:40 2001
# Not Valid After: Tue Apr 06 07:29:40 2021
# Fingerprint (MD5): a3:ec:75:0f:2e:88:df:fa:48:01:4e:0b:5c:48:6f:fb
#
 Fingerprint (SHA1): 37:f7:6d:e6:07:7c:90:c5:b1:3e:93:1a:b7:41:10:b4:f2:e4:9a:27
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Sonera Class2 CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\106\111\061
\017\060\015\006\003\125\004\012\023\006\123\157\156\145\162\141
\061\031\060\027\006\003\125\004\003\023\020\123\157\156\145\162
\141\040\103\154\141\163\163\062\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\106\111\061
\017\060\015\006\003\125\004\012\023\006\123\157\156\145\162\141
\061\031\060\027\006\003\125\004\003\023\020\123\157\156\145\162
\141\040\103\154\141\163\163\062\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\035
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\040\060\202\002\010\240\003\002\001\002\002\001\035
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\071\061\013\060\011\006\003\125\004\006\023\002\106\111\061\017
\060\015\006\003\125\004\012\023\006\123\157\156\145\162\141\061
\031\060\027\006\003\125\004\003\023\020\123\157\156\145\162\141
\040\103\154\141\163\163\062\040\103\101\060\036\027\015\060\061
\060\064\060\066\060\067\062\071\064\060\132\027\015\062\061\060
\064\060\066\060\067\062\071\064\060\132\060\071\061\013\060\011
\006\003\125\004\006\023\002\106\111\061\017\060\015\006\003\125
\004\012\023\006\123\157\156\145\162\141\061\031\060\027\006\003
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\125\004\003\023\020\123\157\156\145\162\141\040\103\154\141\163
\163\062\040\103\101\060\202\001\042\060\015\006\011\052\206\110
\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001
\012\002\202\001\001\000\220\027\112\065\235\312\360\015\226\307
\104\372\026\067\374\110\275\275\177\200\055\065\073\341\157\250
\147\251\277\003\034\115\214\157\062\107\325\101\150\244\023\004
\301\065\014\232\204\103\374\134\035\377\211\263\350\027\030\315
\221\137\373\211\343\352\277\116\135\174\033\046\323\165\171\355
\346\204\343\127\345\255\051\304\364\072\050\347\245\173\204\066
\151\263\375\136\166\275\243\055\231\323\220\116\043\050\175\030
\143\361\124\073\046\235\166\133\227\102\262\377\256\360\116\354
\335\071\225\116\203\006\177\347\111\100\310\305\001\262\124\132
\146\035\075\374\371\351\074\012\236\201\270\160\360\001\213\344
\043\124\174\310\256\370\220\036\000\226\162\324\124\317\141\043
\274\352\373\235\002\225\321\266\271\161\072\151\010\077\017\264
\341\102\307\210\365\077\230\250\247\272\034\340\161\161\357\130
\127\201\120\172\134\153\164\106\016\203\003\230\303\216\250\156
\362\166\062\156\047\203\302\163\363\334\030\350\264\223\352\165
\104\153\004\140\040\161\127\207\235\363\276\240\220\043\075\212
\044\341\332\041\333\303\002\003\001\000\001\243\063\060\061\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\021\006\003\125\035\016\004\012\004\010\112\240\252\130\204
\323\136\074\060\013\006\003\125\035\017\004\004\003\002\001\006
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\003
\202\001\001\000\132\316\207\371\026\162\025\127\113\035\331\233
\347\242\046\060\354\223\147\337\326\055\322\064\257\367\070\245
\316\253\026\271\253\057\174\065\313\254\320\017\264\114\053\374
\200\357\153\214\221\137\066\166\367\333\263\033\031\352\364\262
\021\375\141\161\104\277\050\263\072\035\277\263\103\350\237\277
\334\061\010\161\260\235\215\326\064\107\062\220\306\145\044\367
\240\112\174\004\163\217\071\157\027\214\162\265\275\113\310\172
\370\173\203\303\050\116\234\011\352\147\077\262\147\004\033\303
\024\332\370\347\111\044\221\320\035\152\372\141\071\357\153\347
\041\165\006\007\330\022\264\041\040\160\102\161\201\332\074\232
\066\276\246\133\015\152\154\232\037\221\173\371\371\357\102\272
\116\116\236\314\014\215\224\334\331\105\234\136\354\102\120\143
\256\364\135\304\261\022\334\312\073\250\056\235\024\132\005\165
\267\354\327\143\342\272\065\266\004\010\221\350\332\235\234\366
\146\265\030\254\012\246\124\046\064\063\322\033\301\324\177\032
\072\216\013\252\062\156\333\374\117\045\237\331\062\307\226\132
\160\254\337\114
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate

```
# Trust for "Sonera Class2 CA"
# Issuer: CN=Sonera Class2 CA,O=Sonera,C=FI
# Serial Number: 29 (0x1d)
# Subject: CN=Sonera Class2 CA,O=Sonera,C=FI
# Not Valid Before: Fri Apr 06 07:29:40 2001
# Not Valid After: Tue Apr 06 07:29:40 2021
# Fingerprint (MD5): a3:ec:75:0f:2e:88:df:fa:48:01:4e:0b:5c:48:6f:fb
# Fingerprint (SHA1): 37:f7:6d:e6:07:7c:90:c5:b1:3e:93:1a:b7:41:10:b4:f2:e4:9a:27
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Sonera Class2 CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\067\367\155\346\007\174\220\305\261\076\223\032\267\101\020\264
\362\344\232\047
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\243\354\165\017\056\210\337\372\110\001\116\013\134\110\157\373
END
CKA_ISSUER MULTILINE_OCTAL
\060\071\061\013\060\011\006\003\125\004\006\023\002\106\111\061
\017\060\015\006\003\125\004\012\023\006\123\157\156\145\162\141
\061\031\060\027\006\003\125\004\003\023\020\123\157\156\145\162
\141\040\103\154\141\163\163\062\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\035
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "VeriSign Class 2 Public Primary Certification Authority - G3"
# Issuer: CN=VeriSign Class 2 Public Primary Certification Authority - G3,OU=(c) 1999 VeriSign\, Inc. - For
authorized use only,OU=VeriSign
 Trust Network,O=VeriSign\, Inc.,C=US
# Serial Number:61:70:cb:49:8c:5f:98:45:29:e7:b0:a6:d9:50:5b:7a
# Subject: CN=VeriSign Class 2 Public Primary Certification Authority - G3,OU=(c) 1999 VeriSign\, Inc. - For
authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US
# Not Valid Before: Fri Oct 01 00:00:00 1999
# Not Valid After: Wed Jul 16 23:59:59 2036
# Fingerprint (MD5): f8:be:c4:63:22:c9:a8:46:74:8b:b8:1d:1e:4a:2b:f6
# Fingerprint (SHA1): 61:ef:43:d7:7f:ca:d4:61:51:bc:98:e0:c3:59:12:af:9f:eb:63:11
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
```

CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "VeriSign Class 2 Public Primary Certification Authority - G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\061\071\071\071\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040
\062\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\055\040\107\063
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\061\071\071\071\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040
\062\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\055\040\107\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\141\160\313\111\214\137\230\105\051\347\260\246\331\120
\133\172
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\031\060\202\003\001\002\020\141\160\313\111\214\137
\230\105\051\347\260\246\331\120\133\172\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\060\201\312\061\013\060\011
\006\003\125\004\006\023\002\125\123\061\027\060\025\006\003\125
\004\012\023\016\126\145\162\151\123\151\147\156\054\040\111\156

\143\056\061\037\060\035\006\003\125\004\013\023\026\126\145\162
\151\123\151\147\156\040\124\162\165\163\164\040\116\145\164\167
\157\162\153\061\072\060\070\006\003\125\004\013\023\061\050\143
\051\040\061\071\071\071\040\126\145\162\151\123\151\147\156\054
\040\111\156\143\056\040\055\040\106\157\162\040\141\165\164\150
\157\162\151\172\145\144\040\165\163\145\040\157\156\154\171\061
\105\060\103\006\003\125\004\003\023\074\126\145\162\151\123\151
\147\156\040\103\154\141\163\163\040\062\040\120\165\142\154\151
\143\040\120\162\151\155\141\162\171\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164
\171\040\055\040\107\063\060\036\027\015\071\071\061\060\060\061
\060\060\060\060\060\060\132\027\015\063\066\060\067\061\066\062
\063\065\071\065\071\132\060\201\312\061\013\060\011\006\003\125
\004\006\023\002\125\123\061\027\060\025\006\003\125\004\012\023
\016\126\145\162\151\123\151\147\156\054\040\111\156\143\056\061
\037\060\035\006\003\125\004\013\023\026\126\145\162\151\123\151
\147\156\040\124\162\165\163\164\040\116\145\164\167\157\162\153
\061\072\060\070\006\003\125\004\013\023\061\050\143\051\040\061
\071\071\071\040\126\145\162\151\123\151\147\156\054\040\111\156
\143\056\040\055\040\106\157\162\040\141\165\164\150\157\162\151
\172\145\144\040\165\163\145\040\157\156\154\171\061\105\060\103
\006\003\125\004\003\023\074\126\145\162\151\123\151\147\156\040
\103\154\141\163\163\040\062\040\120\165\142\154\151\143\040\120
\162\151\155\141\162\171\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040\055
\040\107\063\060\202\001\042\060\015\006\011\052\206\110\206\367
\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012\002
\202\001\001\000\257\012\015\302\325\054\333\147\271\055\345\224
\047\335\245\276\340\260\115\217\263\141\126\074\326\174\303\364
\315\076\206\313\242\210\342\341\330\244\151\305\265\342\277\301
\246\107\120\136\106\071\213\325\226\272\265\157\024\277\020\316
\047\023\236\005\107\233\061\172\023\330\037\331\323\002\067\213
\255\054\107\360\216\201\006\247\015\060\014\353\367\074\017\040
\035\334\162\106\356\245\002\310\133\303\311\126\151\114\305\030
\301\221\173\013\325\023\000\233\274\357\303\110\076\106\140\040
\205\052\325\220\266\315\213\240\314\062\335\267\375\100\125\262
\120\034\126\256\314\215\167\115\307\040\115\247\061\166\357\150
\222\212\220\036\010\201\126\262\255\151\243\122\320\313\034\304
\043\075\037\231\376\114\350\026\143\216\306\010\216\366\061\366
\322\372\345\166\335\265\034\222\243\111\315\315\001\315\150\315
\251\151\272\243\353\035\015\234\244\040\246\301\240\305\321\106
\114\027\155\322\254\146\077\226\214\340\204\324\066\377\042\131
\305\371\021\140\250\137\004\175\362\032\366\045\102\141\017\304
\112\270\076\211\002\003\001\000\001\060\015\006\011\052\206\110
\206\367\015\001\001\005\005\000\003\202\001\001\000\064\046\025
\074\300\215\115\103\111\035\275\351\041\222\327\146\234\267\336
\305\270\320\344\135\137\166\042\300\046\371\204\072\072\371\214
\265\373\354\140\361\350\316\004\260\310\335\247\003\217\060\363

\230\337\244\346\244\061\337\323\034\013\106\334\162\040\077\256
\356\005\074\244\063\077\013\071\254\160\170\163\113\231\053\337
\060\302\124\260\250\073\125\241\376\026\050\315\102\275\164\156
\200\333\047\104\247\316\104\135\324\033\220\230\015\036\102\224
\261\000\054\004\320\164\243\002\005\042\143\143\315\203\265\373
\301\155\142\153\151\165\375\135\160\101\271\365\277\174\337\276
\301\062\163\042\041\213\130\201\173\025\221\172\272\343\144\110
\260\177\373\066\045\332\225\320\361\044\024\027\335\030\200\153
\106\043\071\124\365\216\142\011\004\035\224\220\246\233\346\045
\342\102\105\252\270\220\255\276\010\217\251\013\102\030\224\317
\162\071\341\261\103\340\050\317\267\347\132\154\023\153\111\263
\377\343\030\174\211\213\063\135\254\063\327\247\371\332\072\125
\311\130\020\371\252\357\132\266\317\113\113\337\052
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER
 CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "VeriSign Class 2 Public Primary Certification Authority - G3"
# Issuer: CN=VeriSign Class 2 Public Primary Certification Authority - G3,OU=(c) 1999 VeriSign\, Inc. - For authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US
# Serial Number:61:70:cb:49:8c:5f:98:45:29:e7:b0:a6:d9:50:5b:7a
# Subject: CN=VeriSign Class 2 Public Primary Certification Authority - G3,OU=(c) 1999 VeriSign\, Inc. - For authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US
# Not Valid Before: Fri Oct 01 00:00:00 1999
# Not Valid After: Wed Jul 16 23:59:59 2036
# Fingerprint (MD5): f8:be:c4:63:22:c9:a8:46:74:8b:b8:1d:1e:4a:2b:f6
# Fingerprint (SHA1): 61:ef:43:d7:7f:ca:d4:61:51:bc:98:e0:c3:59:12:af:9f:eb:63:11
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
 UTF8 "VeriSign Class 2 Public Primary Certification Authority - G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\141\357\103\327\177\312\324\141\121\274\230\340\303\131\022\257
\237\353\143\021
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\370\276\304\143\042\311\250\106\164\213\270\035\036\112\053\366
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125

\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\061\071\071\071\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040
\062\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\055\040\107\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\141\160\313\111\214\137\230\105\051\347\260\246\331\120
\133\172
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "VeriSign Class 3 Public Primary Certification Authority - G3"
# Issuer: CN=VeriSign Class 3 Public Primary Certification Authority - G3,OU=(c) 1999 VeriSign\, Inc. - For authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US
# Serial Number:9b:7e:06:49:a3:3e:62:b9:d5:ee:90:48:71:29:ef:57
# Subject: CN=VeriSign Class 3 Public Primary Certification Authority - G3,OU=(c) 1999 VeriSign\, Inc. - For authorized use only,OU=VeriSign
Trust Network,O=VeriSign\, Inc.,C=US
# Not Valid Before: Fri Oct 01 00:00:00 1999
# Not Valid After: Wed Jul 16 23:59:59 2036
# Fingerprint (MD5): cd:68:b6:a7:c7:c4:ce:75:e0:1d:4f:57:44:61:92:09
# Fingerprint (SHA1): 13:2d:0d:45:53:4b:69:97:cd:b2:d5:c3:39:e2:55:76:60:9b:5c:c6
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "VeriSign Class 3 Public Primary Certification Authority - G3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\061\071\071\071\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163

\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040
\063\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\055\040\107\063
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
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\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\061\071\071\071\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040
\063\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\055\040\107\063
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\021\000\233\176\006\111\243\076\142\271\325\356\220\110\161
\051\357\127
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\032\060\202\003\002\002\021\000\233\176\006\111\243
\076\142\271\325\356\220\110\161\051\357\127\060\015\006\011\052
\206\110\206\367\015\001\001\005\005\000\060\201\312\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\027\060\025\006\003
\125\004\012\023\016\126\145\162\151\123\151\147\156\054\040\111
\156\143\056\061\037\060\035\006\003\125\004\013\023\026\126\145
\162\151\123\151\147\156\040\124\162\165\163\164\040\116\145\164
\167\157\162\153\061\072\060\070\006\003\125\004\013\023\061\050
\143\051\040\061\071\071\071\040\126\145\162\151\123\151\147\156
\054\040\111\156\143\056\040\055\040\106\157\162\040\141\165\164
\150\157\162\151\172\145\144\040\165\163\145\040\157\156\154\171
\061\105\060\103\006\003\125\004\003\023\074\126\145\162\151\123
\151\147\156\040\103\154\141\163\163\040\063\040\120\165\142\154
\151\143\040\120\162\151\155\141\162\171\040\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\171\040\055\040\107\063\060\036\027\015\071\071\061\060\060
\061\060\060\060\060\060\060\132\027\015\063\066\060\067\061\066
\062\063\065\071\065\071\132\060\201\312\061\013\060\011\006\003
\125\004\006\023\002\125\123\061\027\060\025\006\003\125\004\012

\023\016\126\145\162\151\123\151\147\156\054\040\111\156\143\056
\061\037\060\035\006\003\125\004\013\023\026\126\145\162\151\123
\151\147\156\040\124\162\165\163\164\040\116\145\164\167\157\162
\153\061\072\060\070\006\003\125\004\013\023\061\050\143\051\040
\061\071\071\071\040\126\145\162\151\123\151\147\156\054\040\111
\156\143\056\040\055\040\106\157\162\040\141\165\164\150\157\162
\151\172\145\144\040\165\163\145\040\157\156\154\171\061\105\060
\103\006\003\125\004\003\023\074\126\145\162\151\123\151\147\156
\040\103\154\141\163\163\040\063\040\120\165\142\154\151\143\040
\120\162\151\155\141\162\171\040\103\145\162\164\151\146\151\143
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040
\055\040\107\063\060\202\001\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001\012
\002\202\001\001\000\313\272\234\122\374\170\037\032\036\157\033
\067\163\275\370\311\153\224\022\060\117\360\066\107\365\320\221
\012\365\027\310\245\141\301\026\100\115\373\212\141\220\345\166
\040\301\021\006\175\253\054\156\246\365\021\101\216\372\055\255
\052\141\131\244\147\046\114\320\350\274\122\133\160\040\004\130
\321\172\311\244\151\274\203\027\144\255\005\213\274\320\130\316
\215\214\365\353\360\102\111\013\235\227\047\147\062\156\341\256
\223\025\034\160\274\040\115\057\030\336\222\210\350\154\205\127
\021\032\351\176\343\046\021\124\242\105\226\125\203\312\060\211
\350\334\330\243\355\052\200\077\177\171\145\127\076\025\040\146
\010\057\225\223\277\252\107\057\250\106\227\360\022\342\376\302
\012\053\121\346\166\346\267\106\267\342\015\246\314\250\303\114
\131\125\211\346\350\123\134\034\352\235\360\142\026\013\247\311
\137\014\360\336\302\166\316\257\367\152\362\372\101\246\242\063
\024\311\345\172\143\323\236\142\067\325\205\145\236\016\346\123
\044\164\033\136\035\022\123\133\307\054\347\203\111\073\025\256
\212\150\271\127\227\002\003\001\000\001\060\015\006\011\052\206
\110\206\367\015\001\001\005\005\000\003\202\001\001\000\021\024
\226\301\253\222\010\367\077\057\311\262\376\344\132\237\144\336
\333\041\117\206\231\064\166\066\127\335\320\025\057\305\255\177
\025\037\067\142\163\076\324\347\137\316\027\003\333\065\372\053
\333\256\140\011\137\036\137\217\156\273\013\075\352\132\023\036
\014\140\157\265\300\265\043\042\056\007\013\313\251\164\313\107
\273\035\301\327\245\153\314\057\322\102\375\111\335\247\211\317
\123\272\332\000\132\050\277\202\337\370\272\023\035\120\206\202
\375\216\060\217\051\106\260\036\075\065\332\070\142\026\030\112
\255\346\266\121\154\336\257\142\353\001\320\036\044\376\172\217
\022\032\022\150\270\373\146\231\024\024\105\134\256\347\256\151
\027\201\053\132\067\311\136\052\364\306\342\241\134\124\233\246
\124\000\317\360\361\301\307\230\060\032\073\066\026\333\243\156
\352\375\255\262\302\332\357\002\107\023\212\300\361\263\061\255
\117\034\341\117\234\257\017\014\235\367\170\015\330\364\065\126
\200\332\267\155\027\217\235\036\201\144\341\376\305\105\272\255
\153\271\012\172\116\117\113\204\356\113\361\175\335\021
END

```
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "VeriSign Class 3 Public Primary Certification Authority - G3"
# Issuer: CN=VeriSign Class 3 Public
 Primary Certification Authority - G3,OU=(c) 1999 VeriSign\, Inc. - For authorized use only,OU=VeriSign Trust
Network,O=VeriSign\, Inc.,C=US
# Serial Number:9b:7e:06:49:a3:3e:62:b9:d5:ee:90:48:71:29:ef:57
# Subject: CN=VeriSign Class 3 Public Primary Certification Authority - G3,OU=(c) 1999 VeriSign\, Inc. - For
authorized use only,OU=VeriSign Trust Network,O=VeriSign\, Inc.,C=US
# Not Valid Before: Fri Oct 01 00:00:00 1999
# Not Valid After: Wed Jul 16 23:59:59 2036
# Fingerprint (MD5): cd:68:b6:a7:c7:c4:ce:75:e0:1d:4f:57:44:61:92:09
# Fingerprint (SHA1): 13:2d:0d:45:53:4b:69:97:cd:b2:d5:c3:39:e2:55:76:60:9b:5c:c6
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "VeriSign Class 3 Public Primary Certification Authority - G3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\023\055\015\105\123\113\151\227\315\262\325\303\071\342\125\166
\140\233\134\306
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\315\150\266\247\307\304\316\165\340\035\117\127\104\141\222\011
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\201\312\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151\123
\151\147\156\054\040\111\156\143\056\061\037\060\035\006\003\125
\004\013\023\026\126\145\162\151\123\151\147\156\040\124\162\165
\163\164\040\116\145\164\167\157\162\153\061\072\060\070\006\003
\125\004\013\023\061\050\143\051\040\061\071\071\071\040\126\145
\162\151\123\151\147\156\054\040\111\156\143\056\040\055\040\106
\157\162\040\141\165\164\150\157\162\151\172\145\144\040\165\163
\145\040\157\156\154\171\061\105\060\103\006\003\125\004\003\023
\074\126\145\162\151\123\151\147\156\040\103\154\141\163\163\040
\063\040\120\165\142\154\151\143\040\120\162\151\155\141\162\171
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\055\040\107\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\233\176\006\111\243\076\142\271\325\356\220\110\161
\051\357\127
```

```
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "VeriSign, Inc."
# Issuer: OU=VeriSign Commercial Software Publishers CA,O=VeriSign\, Inc.,L=Internet
# Serial Number:03:c7:8f:37:db:92:28:df:3c:bb:1a:ad:82:fa:67:10
# Subject: OU=VeriSign Commercial Software Publishers CA,O=VeriSign\, Inc.,L=Internet
# Not Valid Before: Tue Apr 09 00:00:00 1996
# Not Valid After: Wed Jan 07 23:59:59 2004
# Fingerprint (MD5): dd:75:3f:56:bf:bb:c5:a1:7a:15:53:c6:90:f9:fb:cc
# Fingerprint (SHA1): 24:a4:0a:1f:57:36:43:a6:7f:0a:4b:07:49:f6:a2:2b:f2:8a:bb:6b
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "VeriSign, Inc."
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE
 CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\141\061\021\060\017\006\003\125\004\007\023\010\111\156\164
\145\162\156\145\164\061\027\060\025\006\003\125\004\012\023\016
\126\145\162\151\123\151\147\156\054\040\111\156\143\056\061\063
\060\061\006\003\125\004\013\023\052\126\145\162\151\123\151\147
\156\040\103\157\155\155\145\162\143\151\141\154\040\123\157\146
\164\167\141\162\145\040\120\165\142\154\151\163\150\145\162\163
\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\141\061\021\060\017\006\003\125\004\007\023\010\111\156\164
\145\162\156\145\164\061\027\060\025\006\003\125\004\012\023\016
\126\145\162\151\123\151\147\156\054\040\111\156\143\056\061\063
\060\061\006\003\125\004\013\023\052\126\145\162\151\123\151\147
\156\040\103\157\155\155\145\162\143\151\141\154\040\123\157\146
\164\167\141\162\145\040\120\165\142\154\151\163\150\145\162\163
\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\003\307\217\067\333\222\050\337\074\273\032\255\202\372
\147\020
END
CKA_VALUE
```

MULTILINE_OCTAL
\060\202\002\100\060\202\001\251\002\020\003\307\217\067\333\222
\050\337\074\273\032\255\202\372\147\020\060\015\006\011\052\206
\110\206\367\015\001\001\002\005\000\060\141\061\021\060\017\006
\003\125\004\007\023\010\111\156\164\145\162\156\145\164\061\027
\060\025\006\003\125\004\012\023\016\126\145\162\151\123\151\147
\156\054\040\111\156\143\056\061\063\060\061\006\003\125\004\013
\023\052\126\145\162\151\123\151\147\156\040\103\157\155\155\145
\162\143\151\141\154\040\123\157\146\164\167\141\162\145\040\120
\165\142\154\151\163\150\145\162\163\040\103\101\060\036\027\015
\071\066\060\064\060\071\060\060\060\060\060\060\132\027\015\060
\064\060\061\060\067\062\063\065\071\065\071\132\060\141\061\021
\060\017\006\003\125\004\007\023\010\111\156\164\145\162\156\145
\164\061\027\060\025\006\003\125\004\012\023\016\126\145\162\151
\123\151\147\156\054\040\111\156\143\056\061\063\060\061\006\003
\125\004\013\023\052\126\145\162\151\123\151\147\156\040\103\157
\155\155\145\162\143\151\141\154\040\123\157\146\164\167\141\162
\145\040\120\165\142\154\151\163\150\145\162\163\040\103\101\060
\201\237\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\201\215\000\060\201\211\002\201\201\000\303\323\151\145
\122\001\224\124\253\050\306\142\030\263\124\125\305\104\207\105
\112\073\302\176\330\323\327\310\200\206\215\330\014\361\026\234
\314\153\251\051\262\217\166\163\222\310\305\142\246\074\355\036
\005\165\360\023\000\154\024\115\324\230\220\007\276\151\163\201
\270\142\116\061\036\321\374\311\014\353\175\220\277\256\264\107
\121\354\157\316\144\065\002\326\175\147\005\167\342\217\331\121
\327\373\227\031\274\076\327\167\201\306\103\335\362\335\337\312
\243\203\213\313\101\301\075\042\110\110\246\031\002\003\001\000
\001\060\015\006\011\052\206\110\206\367\015\001\001\002\005\000
\003\201\201\000\265\274\260\165\152\211\242\206\275\144\170\303
\247\062\165\162\021\252\046\002\027\140\060\114\343\110\064\031
\271\122\112\121\030\200\376\123\055\173\325\061\214\305\145\231
\101\101\057\362\256\143\172\350\163\231\025\220\032\037\172\213
\101\320\216\072\320\315\070\064\104\320\165\370\352\161\304\201
\031\070\027\065\112\256\305\076\062\346\041\270\005\300\223\341
\307\070\134\330\367\223\070\144\220\355\124\316\312\323\323\320
\137\357\004\233\336\002\202\335\210\051\261\303\117\245\315\161
\144\061\074\074
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "VeriSign, Inc."
# Issuer: OU=VeriSign Commercial Software Publishers CA,O=VeriSign\, Inc.,L=Internet
# Serial Number:03:c7:8f:37:db:92:28:df:3c:bb:1a:ad:82:fa:67:10

```
# Subject: OU=VeriSign Commercial Software Publishers CA,O=VeriSign\, Inc.,L=Internet
# Not Valid Before: Tue Apr 09 00:00:00 1996
# Not Valid After: Wed Jan 07 23:59:59 2004
# Fingerprint (MD5): dd:75:3f:56:bf:bb:c5:a1:7a:15:53:c6:90:f9:fb:cc
#
 Fingerprint (SHA1): 24:a4:0a:1f:57:36:43:a6:7f:0a:4b:07:49:f6:a2:2b:f2:8a:bb:6b
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "VeriSign, Inc."
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\044\244\012\037\127\066\103\246\177\012\113\007\111\366\242\053
\362\212\273\153
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\335\165\077\126\277\273\305\241\172\025\123\306\220\371\373\314
END
CKA_ISSUER MULTILINE_OCTAL
\060\141\061\021\060\017\006\003\125\004\007\023\010\111\156\164
\145\162\156\145\164\061\027\060\025\006\003\125\004\012\023\016
\126\145\162\151\123\151\147\156\054\040\111\156\143\056\061\063
\060\061\006\003\125\004\013\023\052\126\145\162\151\123\151\147
\156\040\103\157\155\155\145\162\143\151\141\154\040\123\157\146
\164\167\141\162\145\040\120\165\142\154\151\163\150\145\162\163
\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\003\307\217\067\333\222\050\337\074\273\032\255\202\372
\147\020
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Microsoft Root Authority"
# Issuer: CN=Microsoft Root Authority,OU=Microsoft Corporation,OU=Copyright (c) 1997 Microsoft Corp.
# Serial Number:c1:00:8b:3c:3c:88:11:d1:3e:f6:63:ec:df:40
# Subject: CN=Microsoft Root Authority,OU=Microsoft Corporation,OU=Copyright (c) 1997 Microsoft Corp.
# Not Valid Before: Fri Jan 10 07:00:00 1997
# Not Valid After: Thu Dec 31 07:00:00 2020
# Fingerprint (MD5): 2a:95:4e:ca:79:b2:87:45:73:d9:2d:90:ba:f9:9f:b6
# Fingerprint (SHA1): a4:34:89:15:9a:52:0f:0d:93:d0:32:cc:af:37:e7:fe:20:a8:b4:19
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
```

```
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft Root Authority"
CKA_CERTIFICATE_TYPE
 CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\160\061\053\060\051\006\003\125\004\013\023\042\103\157\160
\171\162\151\147\150\164\040\050\143\051\040\061\071\071\067\040
\115\151\143\162\157\163\157\146\164\040\103\157\162\160\056\061
\036\060\034\006\003\125\004\013\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\041\060\037\006\003\125\004\003\023\030\115\151\143\162\157\163
\157\146\164\040\122\157\157\164\040\101\165\164\150\157\162\151
\164\171
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\160\061\053\060\051\006\003\125\004\013\023\042\103\157\160
\171\162\151\147\150\164\040\050\143\051\040\061\071\071\067\040
\115\151\143\162\157\163\157\146\164\040\103\157\162\160\056\061
\036\060\034\006\003\125\004\013\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\041\060\037\006\003\125\004\003\023\030\115\151\143\162\157\163
\157\146\164\040\122\157\157\164\040\101\165\164\150\157\162\151
\164\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\017\000\301\000\213\074\074\210\021\321\076\366\143\354\337
\100
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\022\060\202\002\372\240\003\002\001\002\002\017\000
\301\000\213\074\074\210\021\321\076\366\143\354\337\100\060\015
\006\011\052\206\110\206\367\015\001\001\004\005\000\060\160\061
\053\060\051\006\003\125\004\013\023\042\103\157\160\171\162\151
\147\150\164\040\050\143\051\040\061\071\071\067\040\115\151\143
\162\157\163\157\146\164\040\103\157\162\160\056\061\036\060\034
\006\003\125\004\013\023\025\115\151\143\162\157\163\157\146\164
\040\103\157\162\160\157\162\141\164\151\157\156\061\041\060\037
\006\003\125\004\003\023\030\115\151\143\162\157\163\157\146\164
\040\122\157\157\164\040\101\165\164\150\157\162\151\164\171\060
\036\027\015\071\067\060\061\061\060\060\067\060\060\060\060\132
\027\015\062\060\061\062\063\061\060\067\060\060\060\060\132\060
\160\061\053\060\051\006\003\125\004\013\023\042\103\157\160\171
\162\151\147\150\164\040\050\143\051\040\061\071\071\067\040\115
\151\143\162\157\163\157\146\164\040\103\157\162\160\056\061\036
\060\034\006\003\125\004\013\023\025\115\151\143\162\157\163\157
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\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061\041
\060\037\006\003\125\004\003\023\030\115\151\143\162\157\163\157
\146\164\040\122\157\157\164\040\101\165\164\150\157\162\151\164
\171\060\202\001\042\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\202\001\017\000\060\202\001\012\002\202\001
\001\000\251\002\275\301\160\346\073\362\116\033\050\237\227\170
\136\060\352\242\251\215\045\137\370\376\225\114\243\267\376\235
\242\040\076\174\121\242\233\242\217\140\062\153\321\102\144\171
\356\254\166\311\124\332\362\353\234\206\034\217\237\204\146\263
\305\153\172\142\043\326\035\074\336\017\001\222\350\226\304\277
\055\146\232\232\150\046\231\320\072\054\277\014\265\130\046\301
\106\347\012\076\070\226\054\251\050\071\250\354\111\203\102\343
\204\017\273\232\154\125\141\254\202\174\241\140\055\167\114\351
\231\264\144\073\232\120\034\061\010\044\024\237\251\347\221\053
\030\346\075\230\143\024\140\130\005\145\237\035\067\122\207\367
\247\357\224\002\306\033\323\277\125\105\263\211\200\277\072\354
\124\224\116\256\375\247\172\155\164\116\257\030\314\226\011\050
\041\000\127\220\140\151\067\273\113\022\007\074\126\377\133\373
\244\146\012\010\246\322\201\126\127\357\266\073\136\026\201\167
\004\332\366\276\256\200\225\376\260\315\177\326\247\032\162\134
\074\312\274\360\010\243\042\060\263\006\205\311\263\040\167\023
\205\337\002\003\001\000\001\243\201\250\060\201\245\060\201\242
\006\003\125\035\001\004\201\232\060\201\227\200\020\133\320\160
\357\151\162\236\043\121\176\024\262\115\216\377\313\241\162\060
\160\061\053\060\051\006\003\125\004\013\023\042\103\157\160\171
\162\151\147\150\164\040\050\143\051\040\061\071\071\067\040\115
\151\143\162\157\163\157\146\164\040\103\157\162\160\056\061\036
\060\034\006\003\125\004\013\023\025\115\151\143\162\157\163\157
\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061\041
\060\037\006\003\125\004\003\023\030\115\151\143\162\157\163\157
\146\164\040\122\157\157\164\040\101\165\164\150\157\162\151\164
\171\202\017\000\301\000\213\074\074\210\021\321\076\366\143\354
\337\100\060\015\006\011\052\206\110\206\367\015\001\001\004\005
\000\003\202\001\001\000\225\350\013\300\215\363\227\030\065\355
\270\001\044\330\167\021\363\134\140\062\237\236\013\313\076\005
\221\210\217\311\072\346\041\362\360\127\223\054\265\240\107\310
\142\357\374\327\314\073\073\132\251\066\124\151\376\044\155\077
\311\314\252\336\005\174\335\061\215\075\237\020\160\152\273\376
\022\117\030\151\300\374\320\103\343\021\132\040\117\352\142\173
\257\252\031\310\053\067\045\055\276\145\241\022\212\045\017\143
\243\367\124\034\371\041\311\326\025\363\122\254\156\103\062\007
\375\202\027\370\345\147\154\015\121\366\275\361\122\307\275\347
\304\060\374\040\061\011\210\035\225\051\032\115\325\035\002\245
\361\200\340\003\264\133\364\261\335\310\127\356\145\111\307\122
\124\266\264\003\050\022\377\220\326\360\010\217\176\270\227\305
\253\067\054\344\172\344\250\167\343\166\240\000\320\152\077\301
\322\066\212\340\101\022\250\065\152\033\152\333\065\341\324\034
\004\344\250\105\004\310\132\063\070\156\115\034\015\142\267\012

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\242\214\323\325\124\077\106\315\034\125\246\160\333\022\072\207
\223\165\237\247\322\240
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Microsoft Root Authority"
# Issuer: CN=Microsoft Root Authority,OU=Microsoft Corporation,OU=Copyright (c) 1997 Microsoft Corp.
# Serial Number:c1:00:8b:3c:3c:88:11:d1:3e:f6:63:ec:df:40
# Subject: CN=Microsoft Root Authority,OU=Microsoft Corporation,OU=Copyright (c) 1997 Microsoft Corp.
# Not Valid Before: Fri Jan 10 07:00:00 1997
# Not Valid After:
 Thu Dec 31 07:00:00 2020
# Fingerprint (MD5): 2a:95:4e:ca:79:b2:87:45:73:d9:2d:90:ba:f9:9f:b6
# Fingerprint (SHA1): a4:34:89:15:9a:52:0f:0d:93:d0:32:cc:af:37:e7:fe:20:a8:b4:19
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft Root Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\244\064\211\025\232\122\017\015\223\320\062\314\257\067\347\376
\040\250\264\031
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\052\225\116\312\171\262\207\105\163\331\055\220\272\371\237\266
END
CKA_ISSUER MULTILINE_OCTAL
\060\160\061\053\060\051\006\003\125\004\013\023\042\103\157\160
\171\162\151\147\150\164\040\050\143\051\040\061\071\071\067\040
\115\151\143\162\157\163\157\146\164\040\103\157\162\160\056\061
\036\060\034\006\003\125\004\013\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\041\060\037\006\003\125\004\003\023\030\115\151\143\162\157\163
\157\146\164\040\122\157\157\164\040\101\165\164\150\157\162\151
\164\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\017\000\301\000\213\074\074\210\021\321\076\366\143\354\337
\100
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
```

```
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Microsoft Root Certificate Authority"
# Issuer: CN=Microsoft Root Certificate Authority,DC=microsoft,DC=com
# Serial Number:79:ad:16:a1:4a:a0:a5:ad:4c:73:58:f4:07:13:2e:65
# Subject: CN=Microsoft Root Certificate Authority,DC=microsoft,DC=com
# Not Valid Before: Wed May 09 23:19:22 2001
# Not Valid After: Sun May 09 23:28:13 2021
# Fingerprint (MD5): e1:c0:7e:a0:aa:bb:d4:b7:7b:84:c2:28:11:78:08:a7
# Fingerprint (SHA1): cd:d4:ee:ae:60:00:ac:7f:40:c3:80:2c:17:1e:30:14:80:30:c0:72
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL
 CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft Root Certificate Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\137\061\023\060\021\006\012\011\222\046\211\223\362\054\144
\001\031\026\003\143\157\155\061\031\060\027\006\012\011\222\046
\211\223\362\054\144\001\031\026\011\155\151\143\162\157\163\157
\146\164\061\055\060\053\006\003\125\004\003\023\044\115\151\143
\162\157\163\157\146\164\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164
\171
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\137\061\023\060\021\006\012\011\222\046\211\223\362\054\144
\001\031\026\003\143\157\155\061\031\060\027\006\012\011\222\046
\211\223\362\054\144\001\031\026\011\155\151\143\162\157\163\157
\146\164\061\055\060\053\006\003\125\004\003\023\044\115\151\143
\162\157\163\157\146\164\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164
\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\171\255\026\241\112\240\245\255\114\163\130\364\007\023
\056\145
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\231\060\202\003\201\240\003\002\001\002\002\020\171
\255\026\241\112\240\245\255\114\163\130\364\007\023\056\145\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\137
\061\023\060\021\006\012\011\222\046\211\223\362\054\144\001\031
\026\003\143\157\155\061\031\060\027\006\012\011\222\046\211\223
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\362\054\144\001\031\026\011\155\151\143\162\157\163\157\146\164
\061\055\060\053\006\003\125\004\003\023\044\115\151\143\162\157
\163\157\146\164\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171\060
\036\027\015\060\061\060\065\060\071\062\063\061\071\062\062\132
\027\015\062\061\060\065\060\071\062\063\062\070\061\063\132\060
\137\061\023\060\021\006\012\011\222\046\211\223\362\054\144\001
\031\026\003\143\157\155\061\031\060\027\006\012\011\222\046\211
\223\362\054\144\001\031\026\011\155\151\143\162\157\163\157\146
\164\061\055\060\053\006\003\125\004\003\023\044\115\151\143\162
\157\163\157\146\164\040\122\157\157\164\040\103\145\162\164\151
\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001
\000\363\135\372\200\147\324\132\247\251\014\054\220\040\320\065
\010\074\165\204\315\267\007\211\234\211\332\336\316\303\140\372
\221\150\132\236\224\161\051\030\166\174\302\340\310\045\166\224
\016\130\372\004\064\066\346\337\257\367\200\272\351\130\013\053
\223\345\235\005\343\167\042\221\367\064\144\074\042\221\035\136
\341\011\220\274\024\376\374\165\130\031\341\171\267\007\222\243
\256\210\131\010\330\237\007\312\003\130\374\150\051\155\062\327
\322\250\313\113\374\341\013\110\062\117\346\353\270\255\117\344
\134\157\023\224\231\333\225\325\165\333\250\032\267\224\221\264
\167\133\365\110\014\217\152\171\175\024\160\004\175\155\257\220
\365\332\160\330\107\267\277\233\057\154\347\005\267\341\021\140
\254\171\221\024\174\305\326\246\344\341\176\325\303\176\345\222
\322\074\000\265\066\202\336\171\341\155\363\265\156\370\237\063
\311\313\122\175\163\230\066\333\213\241\153\242\225\227\233\243
\336\302\115\046\377\006\226\147\045\006\310\347\254\344\356\022
\063\225\061\231\310\065\010\116\064\312\171\123\325\265\276\143
\062\131\100\066\300\245\116\004\115\075\333\133\007\063\344\130
\277\357\077\123\144\330\102\131\065\127\375\017\105\174\044\004
\115\236\326\070\164\021\227\042\220\316\150\104\164\222\157\325
\113\157\260\206\343\307\066\102\240\320\374\301\300\132\371\243
\141\271\060\107\161\226\012\026\260\221\300\102\225\357\020\177
\050\152\343\052\037\261\344\315\003\077\167\161\004\307\040\374
\111\017\035\105\210\244\327\313\176\210\255\216\055\354\105\333
\304\121\004\311\052\374\354\206\236\232\021\227\133\336\316\123
\210\346\342\267\375\254\225\302\050\100\333\357\004\220\337\201
\063\071\331\262\105\245\043\207\006\245\125\211\061\273\006\055
\140\016\101\030\175\037\056\265\227\313\021\353\025\325\044\245
\224\357\025\024\211\375\113\163\372\062\133\374\321\063\000\371
\131\142\160\007\062\352\056\253\100\055\173\312\335\041\147\033
\060\231\217\026\252\043\250\101\321\260\156\021\233\066\304\336
\100\164\234\341\130\145\301\140\036\172\133\070\310\217\273\004
\046\174\324\026\100\345\266\153\154\252\206\375\000\277\316\301
\065\002\003\001\000\001\243\121\060\117\060\013\006\003\125\035
\017\004\004\003\002\001\306\060\017\006\003\125\035\023\001\001

\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004
\026\004\024\016\254\202\140\100\126\047\227\345\045\023\374\052
\341\012\123\225\131\344\244\060\020\006\011\053\006\001\004\001
\202\067\025\001\004\003\002\001\000\060\015\006\011\052\206\110
\206\367\015\001\001\005\005\000\003\202\002\001\000\305\021\115
\003\072\140\335\135\122\021\167\217\262\273\066\310\262\005\277
\264\267\250\330\040\235\134\023\003\266\034\042\372\006\023\065
\266\310\143\324\232\107\157\046\127\322\125\361\004\261\046\137
\326\251\120\150\240\274\322\270\156\314\303\351\254\337\031\315
\170\254\131\164\254\146\064\066\304\033\076\154\070\114\063\016
\060\022\015\243\046\376\121\123\000\377\257\132\116\204\015\017
\037\344\155\005\056\116\205\113\215\154\063\157\124\322\144\253
\277\120\257\175\172\071\240\067\355\143\003\017\374\023\006\316
\026\066\324\124\073\225\033\121\142\072\345\115\027\324\005\071
\222\232\047\250\133\252\275\354\273\276\343\040\211\140\161\154
\126\263\245\023\320\155\016\043\176\225\003\355\150\075\362\330
\143\270\153\115\266\350\060\265\341\312\224\113\367\242\252\135
\231\060\262\075\247\302\121\154\050\040\001\044\047\053\113\000
\267\235\021\153\160\276\262\020\202\274\014\233\150\320\215\073
\044\207\252\231\050\162\235\063\137\131\220\275\365\336\223\236
\072\142\132\064\071\342\210\125\035\271\006\260\301\211\153\055
\327\151\303\031\022\066\204\320\311\240\332\377\057\151\170\262
\345\172\332\353\327\014\300\367\275\143\027\270\071\023\070\242
\066\133\173\362\205\126\152\035\144\142\301\070\342\252\277\121
\146\242\224\365\022\234\146\042\020\153\362\267\060\222\055\362
\051\360\075\073\024\103\150\242\361\234\051\067\313\316\070\040
\045\155\174\147\363\176\044\022\044\003\010\201\107\354\245\236
\227\365\030\327\317\273\325\357\166\226\357\375\316\333\126\235
\225\240\102\371\227\130\341\327\061\042\323\137\131\346\076\156
\042\000\352\103\204\266\045\333\331\363\010\126\150\300\144\153
\035\174\354\266\223\242\142\127\156\056\330\347\130\217\304\061
\111\046\335\336\051\065\207\365\060\161\160\133\024\074\151\275
\211\022\175\353\056\243\376\330\177\236\202\132\122\012\053\301
\103\053\331\060\210\237\310\020\373\211\215\346\241\205\165\063
\176\154\236\333\163\023\144\142\151\245\057\175\312\226\155\237
\370\004\115\060\222\075\156\041\024\041\311\075\340\303\375\212
\153\235\112\375\321\241\235\231\103\167\077\260\332
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Microsoft Root Certificate Authority"
# Issuer: CN=Microsoft Root Certificate Authority,DC=microsoft,DC=com
# Serial Number:79:ad:16:a1:4a:a0:a5:ad:4c:73:58:f4:07:13:2e:65
# Subject: CN=Microsoft Root Certificate Authority,DC=microsoft,DC=com

```
# Not Valid Before: Wed May 09 23:19:22 2001
# Not Valid After: Sun May 09 23:28:13 2021
# Fingerprint (MD5): e1:c0:7e:a0:aa:bb:d4:b7:7b:84:c2:28:11:78:08:a7
# Fingerprint (SHA1): cd:d4:ee:ae:60:00:ac:7f:40:c3:80:2c:17:1e:30:14:80:30:c0:72
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft Root Certificate Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\315\324\356\256\140\000\254\177\100\303\200\054\027\036\060\024
\200\060\300\162
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\341\300\176\240\252\273\324\267\173\204\302\050\021\170\010\247
END
CKA_ISSUER MULTILINE_OCTAL
\060\137\061\023\060\021\006\012\011\222\046\211\223\362\054\144
\001\031\026\003\143\157\155\061\031\060\027\006\012\011\222\046
\211\223\362\054\144\001\031\026\011\155\151\143\162\157\163\157
\146\164\061\055\060\053\006\003\125\004\003\023\044\115\151\143
\162\157\163\157\146\164\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164
\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\171\255\026\241\112\240\245\255\114\163\130\364\007\023
\056\145
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Microsoft Root Certificate Authority 2010"
# Issuer: CN=Microsoft Root
 Certificate Authority 2010,O=Microsoft Corporation,L=Redmond,ST=Washington,C=US
# Serial Number:28:cc:3a:25:bf:ba:44:ac:44:9a:9b:58:6b:43:39:aa
# Subject: CN=Microsoft Root Certificate Authority 2010,O=Microsoft
Corporation,L=Redmond,ST=Washington,C=US
# Not Valid Before: Wed Jun 23 21:57:24 2010
# Not Valid After: Sat Jun 23 22:04:01 2035
# Fingerprint (MD5): a2:66:bb:7d:cc:38:a5:62:63:13:61:bb:f6:1d:d1:1b
# Fingerprint (SHA1): 3b:1e:fd:3a:66:ea:28:b1:66:97:39:47:03:a7:2c:a3:40:a0:5b:d5
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
```

```
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft Root Certificate Authority 2010"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\127\141\163\150\151
\156\147\164\157\156\061\020\060\016\006\003\125\004\007\023\007
\122\145\144\155\157\156\144\061\036\060\034\006\003\125\004\012
\023\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160
\157\162\141\164\151\157\156\061\062\060\060\006\003\125\004\003
\023\051\115\151\143\162\157\163\157\146\164\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164
\150\157\162\151\164\171\040\062\060\061\060
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\127\141\163\150\151
\156\147\164\157\156\061\020\060\016\006\003\125\004\007\023\007
\122\145\144\155\157\156\144\061\036\060\034\006\003\125\004\012
\023\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160
\157\162\141\164\151\157\156\061\062\060\060\006\003\125\004\003
\023\051\115\151\143\162\157\163\157\146\164\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164
\150\157\162\151\164\171\040\062\060\061\060
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\050\314\072\045\277\272\104\254\104\232\233\130\153\103
\071\252
END
CKA_VALUE
 MULTILINE_OCTAL
\060\202\005\355\060\202\003\325\240\003\002\001\002\002\020\050
\314\072\045\277\272\104\254\104\232\233\130\153\103\071\252\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\201
\210\061\013\060\011\006\003\125\004\006\023\002\125\123\061\023
\060\021\006\003\125\004\010\023\012\127\141\163\150\151\156\147
\164\157\156\061\020\060\016\006\003\125\004\007\023\007\122\145
\144\155\157\156\144\061\036\060\034\006\003\125\004\012\023\025
\115\151\143\162\157\163\157\146\164\040\103\157\162\160\157\162
\141\164\151\157\156\061\062\060\060\006\003\125\004\003\023\051
\115\151\143\162\157\163\157\146\164\040\122\157\157\164\040\103
\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150\157
\162\151\164\171\040\062\060\061\060\060\036\027\015\061\060\060
\066\062\063\062\061\065\067\062\064\132\027\015\063\065\060\066
\062\063\062\062\060\064\060\061\132\060\201\210\061\013\060\011
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\006\003\125\004\006\023\002\125\123\061\023\060\021\006\003\125
\004\010\023\012\127\141\163\150\151\156\147\164\157\156\061\020
\060\016\006\003\125\004\007\023\007\122\145\144\155\157\156\144
\061\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157
\163\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156
\061\062\060\060\006\003\125\004\003\023\051\115\151\143\162\157
\163\157\146\164\040\122\157\157\164\040\103\145\162\164\151\146
\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171\040
\062\060\061\060\060\202\002\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012
\002\202\002\001\000\271\010\236\050\344\344\354\006\116\120\150
\263\101\305\173\353\256\266\216\257\201\272\042\104\037\145\064
\151\114\276\160\100\027\362\026\173\342\171\375\206\355\015\071
\364\033\250\255\222\220\036\313\075\166\217\132\331\265\221\020
\056\074\005\215\212\155\044\124\347\037\355\126\255\203\264\120
\234\025\245\027\164\210\131\040\374\010\305\204\166\323\150\324
\157\050\170\316\134\270\363\120\220\104\377\343\143\137\276\241
\232\054\226\025\004\326\007\376\036\204\041\340\102\061\021\304
\050\066\224\317\120\244\142\236\311\326\253\161\000\262\133\014
\346\226\324\012\044\226\365\377\306\325\267\033\327\313\267\041
\142\257\022\334\241\135\067\343\032\373\032\106\230\300\233\300
\347\143\037\052\010\223\002\176\036\152\216\362\237\030\211\344
\042\205\242\261\204\127\100\377\365\016\330\157\234\355\342\105
\061\001\315\027\351\177\260\201\105\343\252\041\100\046\241\162
\252\247\117\074\001\005\176\356\203\130\261\136\006\143\231\142
\221\170\202\267\015\223\014\044\152\264\033\333\047\354\137\225
\004\077\223\112\060\365\227\030\263\247\371\031\247\223\063\035
\001\310\333\042\122\134\327\045\311\106\371\242\373\207\131\103
\276\233\142\261\215\055\206\104\032\106\254\170\141\176\060\011
\372\256\211\304\101\052\042\146\003\221\071\105\234\307\213\014
\250\312\015\057\373\122\352\014\367\143\063\043\235\376\260\037
\255\147\326\247\120\003\306\004\160\143\265\054\261\206\132\103
\267\373\256\371\156\051\156\041\041\101\046\006\214\311\303\356
\260\302\205\223\241\271\205\331\346\062\154\113\114\077\326\135
\243\345\265\235\167\303\234\300\125\267\164\000\343\270\070\253
\203\227\120\341\232\102\044\035\306\300\243\060\321\032\132\310
\122\064\367\163\361\307\030\037\063\255\172\354\313\101\140\363
\043\224\040\302\110\105\254\134\121\306\056\200\302\342\167\025
\275\205\207\355\066\235\226\221\356\000\265\243\160\354\237\343
\215\200\150\203\166\272\257\135\160\122\042\026\342\146\373\272
\263\305\302\367\076\057\167\246\312\336\301\246\306\110\114\303
\067\121\043\323\047\327\270\116\160\226\360\241\104\166\257\170
\317\232\341\146\023\002\003\001\000\001\243\121\060\117\060\013
\006\003\125\035\017\004\004\003\002\001\206\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003
\125\035\016\004\026\004\024\325\366\126\313\217\350\242\134\142
\150\321\075\224\220\133\327\316\232\030\304\060\020\006\011\053
\006\001\004\001\202\067\025\001\004\003\002\001\000\060\015\006

\011\052\206\110\206\367\015\001\001\013\005\000\003\202\002\001
\000\254\245\226\214\277\273\256\246\366\327\161\207\103\061\126
\210\375\034\062\161\133\065\267\324\360\221\362\257\067\342\024
\361\363\002\046\005\076\026\024\177\024\272\270\117\373\211\262
\262\347\324\011\314\155\271\133\073\144\145\160\146\267\362\261
\132\337\032\002\363\365\121\270\147\155\171\363\277\126\173\344
\204\271\053\036\233\100\234\046\064\371\107\030\230\151\330\034
\327\266\321\277\217\141\302\147\304\265\357\140\103\216\020\033
\066\111\344\040\312\255\247\301\261\047\145\011\370\315\365\133
\052\320\204\063\363\357\037\362\365\234\013\130\223\067\240\165
\240\336\162\336\154\165\052\146\042\365\214\006\060\126\237\100
\271\060\252\100\167\025\202\327\213\354\300\323\262\275\203\305
\167\014\036\256\257\031\123\240\115\171\161\237\017\257\060\316
\147\371\326\054\314\042\101\172\007\362\227\102\030\316\131\171
\020\125\336\157\020\344\270\332\203\146\100\026\011\150\043\133
\227\056\046\232\002\273\127\214\305\270\272\151\142\062\200\211
\236\241\375\300\222\174\173\053\063\031\204\052\143\305\000\150
\142\372\237\107\215\231\172\105\072\247\351\355\356\151\102\265
\363\201\233\107\126\020\173\374\160\066\204\030\163\352\357\371
\227\115\236\063\043\335\046\013\272\052\267\077\104\334\203\047
\377\275\141\131\053\021\267\312\117\333\305\213\014\034\061\256
\062\370\370\271\102\367\177\334\141\232\166\261\132\004\341\021
\075\146\105\267\030\161\276\311\044\205\326\363\324\272\101\064
\135\022\055\045\271\215\246\023\110\155\113\260\007\175\231\223
\011\141\201\164\127\046\212\253\151\343\344\331\307\210\314\044
\330\354\122\044\134\036\274\221\024\342\226\336\353\012\332\236
\335\137\263\133\333\324\202\354\306\040\120\207\045\100\072\373
\307\356\315\376\063\345\156\303\204\011\125\003\045\071\300\351
\065\135\145\061\250\366\277\240\011\315\051\307\263\066\062\056
\334\225\363\203\301\132\317\213\215\366\352\263\041\370\244\355
\036\061\016\266\114\021\253\140\013\244\022\043\042\027\243\066
\144\202\221\004\022\340\253\157\036\313\120\005\141\264\100\377
\131\206\161\321\325\063\151\174\251\163\212\070\327\144\014\361
\151
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Microsoft Root Certificate Authority 2010"
# Issuer: CN=Microsoft Root Certificate Authority 2010,O=Microsoft Corporation,L=Redmond,ST=Washington,C=US
# Serial Number:28:cc:3a:25:bf:ba:44:ac:44:9a:9b:58:6b:43:39:aa
# Subject: CN=Microsoft Root Certificate Authority 2010,O=Microsoft Corporation,L=Redmond,ST=Washington,C=US
# Not Valid Before: Wed Jun 23 21:57:24 2010

```
# Not Valid After: Sat Jun 23 22:04:01 2035
# Fingerprint (MD5): a2:66:bb:7d:cc:38:a5:62:63:13:61:bb:f6:1d:d1:1b
# Fingerprint (SHA1): 3b:1e:fd:3a:66:ea:28:b1:66:97:39:47:03:a7:2c:a3:40:a0:5b:d5
CKA_CLASS
 CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft Root Certificate Authority 2010"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\073\036\375\072\146\352\050\261\146\227\071\107\003\247\054\243
\100\240\133\325
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\242\146\273\175\314\070\245\142\143\023\141\273\366\035\321\033
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\210\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\127\141\163\150\151
\156\147\164\157\156\061\020\060\016\006\003\125\004\007\023\007
\122\145\144\155\157\156\144\061\036\060\034\006\003\125\004\012
\023\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160
\157\162\141\164\151\157\156\061\062\060\060\006\003\125\004\003
\023\051\115\151\143\162\157\163\157\146\164\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164
\150\157\162\151\164\171\040\062\060\061\060
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\050\314\072\045\277\272\104\254\104\232\233\130\153\103
\071\252
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "GTE CyberTrust Global Root"
# Issuer: CN=GTE CyberTrust Global Root,OU=GTE CyberTrust Solutions\, Inc.,O=GTE Corporation,C=US
# Serial Number: 421 (0x1a5)
# Subject: CN=GTE CyberTrust Global Root,OU=GTE CyberTrust Solutions\, Inc.,O=GTE Corporation,C=US
# Not Valid Before: Thu Aug 13 00:29:00 1998
# Not Valid After: Mon Aug 13 23:59:00 2018
# Fingerprint (MD5): ca:3d:d3:68:f1:03:5c:d0:32:fa:b8:2b:59:e8:5a:db
# Fingerprint (SHA1): 97:81:79:50:d8:1c:96:70:cc:34:d8:09:cf:79:44:31:36:7e:f4:74
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
```

CKA_PRIVATE
CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GTE CyberTrust Global Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\023\017\107\124\105\040\103\157
\162\160\157\162\141\164\151\157\156\061\047\060\045\006\003\125
\004\013\023\036\107\124\105\040\103\171\142\145\162\124\162\165
\163\164\040\123\157\154\165\164\151\157\156\163\054\040\111\156
\143\056\061\043\060\041\006\003\125\004\003\023\032\107\124\105
\040\103\171\142\145\162\124\162\165\163\164\040\107\154\157\142
\141\154\040\122\157\157\164
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\023\017\107\124\105\040\103\157
\162\160\157\162\141\164\151\157\156\061\047\060\045\006\003\125
\004\013\023\036\107\124\105\040\103\171\142\145\162\124\162\165
\163\164\040\123\157\154\165\164\151\157\156\163\054\040\111\156
\143\056\061\043\060\041\006\003\125\004\003\023\032\107\124\105
\040\103\171\142\145\162\124\162\165\163\164\040\107\154\157\142
\141\154\040\122\157\157\164
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\002\001\245
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\132\060\202\001\303\002\002\001\245\060\015\006\011
\052\206\110\206\367\015\001\001\004\005\000\060\165\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\030\060\026\006\003
\125\004\012\023\017\107\124\105\040\103\157\162\160\157\162\141
\164\151\157\156\061\047\060\045\006\003\125\004\013\023\036\107
\124\105\040\103\171\142\145\162\124\162\165\163\164\040\123\157
\154\165\164\151\157\156\163\054\040\111\156\143\056\061\043\060
\041\006\003\125\004\003\023\032\107\124\105\040\103\171\142\145
\162\124\162\165\163\164\040\107\154\157\142\141\154\040\122\157
\157\164\060\036\027\015\071\070\060\070\061\063\060\060\062\071
\060\060\132\027\015\061\070\060\070\061\063\062\063\065\071\060
\060\132\060\165\061\013\060\011\006\003\125\004\006\023\002\125
\123\061\030\060\026\006\003\125\004\012\023\017\107\124\105\040
\103\157\162\160\157\162\141\164\151\157\156\061\047\060\045\006
\003\125\004\013\023\036\107\124\105\040\103\171\142\145\162\124
\162\165\163\164\040\123\157\154\165\164\151\157\156\163\054\040
\111\156\143\056\061\043\060\041\006\003\125\004\003\023\032\107

\124\105\040\103\171\142\145\162\124\162\165\163\164\040\107\154
\157\142\141\154\040\122\157\157\164\060\201\237\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\201\215\000\060
\201\211\002\201\201\000\225\017\240\266\360\120\234\350\172\307
\210\315\335\027\016\056\260\224\320\033\075\016\366\224\300\212
\224\307\006\310\220\227\310\270\144\032\172\176\154\074\123\341
\067\050\163\140\177\262\227\123\007\237\123\371\155\130\224\322
\257\215\155\210\147\200\346\355\262\225\317\162\061\312\245\034
\162\272\134\002\347\144\102\347\371\251\054\326\072\015\254\215
\102\252\044\001\071\346\234\077\001\205\127\015\130\207\105\370
\323\205\252\223\151\046\205\160\110\200\077\022\025\307\171\264
\037\005\057\073\142\231\002\003\001\000\001\060\015\006\011\052
\206\110\206\367\015\001\001\004\005\000\003\201\201\000\155\353
\033\011\351\136\331\121\333\147\042\141\244\052\074\110\167\343
\240\174\246\336\163\242\024\003\205\075\373\253\016\060\305\203
\026\063\201\023\010\236\173\064\116\337\100\310\164\327\271\175
\334\364\166\125\175\233\143\124\030\351\360\352\363\134\261\331
\213\102\036\271\300\225\116\272\372\325\342\174\365\150\141\277
\216\354\005\227\137\133\260\327\243\205\064\304\044\247\015\017
\225\223\357\313\224\330\236\037\235\134\205\155\307\252\256\117
\037\042\265\315\225\255\272\247\314\371\253\013\172\177
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "GTE CyberTrust Global Root"
# Issuer: CN=GTE CyberTrust Global Root,OU=GTE
 CyberTrust Solutions\, Inc.,O=GTE Corporation,C=US
# Serial Number: 421 (0x1a5)
# Subject: CN=GTE CyberTrust Global Root,OU=GTE CyberTrust Solutions\, Inc.,O=GTE Corporation,C=US
# Not Valid Before: Thu Aug 13 00:29:00 1998
# Not Valid After: Mon Aug 13 23:59:00 2018
# Fingerprint (MD5): ca:3d:d3:68:f1:03:5c:d0:32:fa:b8:2b:59:e8:5a:db
# Fingerprint (SHA1): 97:81:79:50:d8:1c:96:70:cc:34:d8:09:cf:79:44:31:36:7e:f4:74
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GTE CyberTrust Global Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\227\201\171\120\330\034\226\160\314\064\330\011\317\171\104\061
\066\176\364\164
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\312\075\323\150\361\003\134\320\062\372\270\053\131\350\132\333

```
END
CKA_ISSUER MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\023\017\107\124\105\040\103\157
\162\160\157\162\141\164\151\157\156\061\047\060\045\006\003\125
\004\013\023\036\107\124\105\040\103\171\142\145\162\124\162\165
\163\164\040\123\157\154\165\164\151\157\156\163\054\040\111\156
\143\056\061\043\060\041\006\003\125\004\003\023\032\107\124\105
\040\103\171\142\145\162\124\162\165\163\164\040\107\154\157\142
\141\154\040\122\157\157\164
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\002\001\245
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Thawte Server CA"
# Issuer: 1.2.840.113549.1.9.1=server-certs@thawte.com,CN=Thawte Server CA,OU=Certification Services
Division,O=Thawte Consulting cc,L=Cape Town,ST=Western Cape,C=ZA
# Serial Number: 1 (0x1)
# Subject: 1.2.840.113549.1.9.1=server-certs@thawte.com,CN=Thawte Server CA,OU=Certification Services
Division,O=Thawte
 Consulting cc,L=Cape Town,ST=Western Cape,C=ZA
# Not Valid Before: Thu Aug 01 00:00:00 1996
# Not Valid After: Thu Dec 31 23:59:59 2020
# Fingerprint (MD5): c5:70:c4:a2:ed:53:78:0c:c8:10:53:81:64:cb:d0:1d
# Fingerprint (SHA1): 23:e5:94:94:51:95:f2:41:48:03:b4:d5:64:d2:a3:a3:f5:d8:8b:8c
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Thawte Server CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\304\061\013\060\011\006\003\125\004\006\023\002\132\101
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145
\162\156\040\103\141\160\145\061\022\060\020\006\003\125\004\007
\023\011\103\141\160\145\040\124\157\167\156\061\035\060\033\006
\003\125\004\012\023\024\124\150\141\167\164\145\040\103\157\156
\163\165\154\164\151\156\147\040\143\143\061\050\060\046\006\003
\125\004\013\023\037\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\123\145\162\166\151\143\145\163\040\104\151\166\151
\163\151\157\156\061\031\060\027\006\003\125\004\003\023\020\124
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\150\141\167\164\145\040\123\145\162\166\145\162\040\103\101\061
\046\060\044\006\011\052\206\110\206\367\015\001\011\001\026\027
\163\145\162\166\145\162\055\143\145\162\164\163\100\164\150\141
\167\164\145\056\143\157\155
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\304\061\013\060\011\006\003\125\004\006\023\002\132\101
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145
\162\156\040\103\141\160\145\061\022\060\020\006\003\125\004\007
\023\011\103\141\160\145\040\124\157\167\156\061\035\060\033\006
\003\125\004\012\023\024\124\150\141\167\164\145\040\103\157\156
\163\165\154\164\151\156\147\040\143\143\061\050\060\046\006\003
\125\004\013\023\037\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\123\145\162\166\151\143\145\163\040\104\151\166\151
\163\151\157\156\061\031\060\027\006\003\125\004\003\023\020\124
\150\141\167\164\145\040\123\145\162\166\145\162\040\103\101\061
\046\060\044\006\011\052\206\110\206\367\015\001\011\001\026\027
\163\145\162\166\145\162\055\143\145\162\164\163\100\164\150\141
\167\164\145\056\143\157\155
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\023\060\202\002\174\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\004\005\000\060
\201\304\061\013\060\011\006\003\125\004\006\023\002\132\101\061
\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145\162
\156\040\103\141\160\145\061\022\060\020\006\003\125\004\007\023
\011\103\141\160\145\040\124\157\167\156\061\035\060\033\006\003
\125\004\012\023\024\124\150\141\167\164\145\040\103\157\156\163
\165\154\164\151\156\147\040\143\143\061\050\060\046\006\003\125
\004\013\023\037\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\123\145\162\166\151\143\145\163\040\104\151\166\151\163
\151\157\156\061\031\060\027\006\003\125\004\003\023\020\124\150
\141\167\164\145\040\123\145\162\166\145\162\040\103\101\061\046
\060\044\006\011\052\206\110\206\367\015\001\011\001\026\027\163
\145\162\166\145\162\055\143\145\162\164\163\100\164\150\141\167
\164\145\056\143\157\155\060\036\027\015\071\066\060\070\060\061
\060\060\060\060\060\060\132\027\015\062\060\061\062\063\061\062
\063\065\071\065\071\132\060\201\304\061\013\060\011\006\003\125
\004\006\023\002\132\101\061\025\060\023\006\003\125\004\010\023
\014\127\145\163\164\145\162\156\040\103\141\160\145\061\022\060
\020\006\003\125\004\007\023\011\103\141\160\145\040\124\157\167
\156\061\035\060\033\006\003\125\004\012\023\024\124\150\141\167

\164\145\040\103\157\156\163\165\154\164\151\156\147\040\143\143
\061\050\060\046\006\003\125\004\013\023\037\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\123\145\162\166\151\143\145
\163\040\104\151\166\151\163\151\157\156\061\031\060\027\006\003
\125\004\003\023\020\124\150\141\167\164\145\040\123\145\162\166
\145\162\040\103\101\061\046\060\044\006\011\052\206\110\206\367
\015\001\011\001\026\027\163\145\162\166\145\162\055\143\145\162
\164\163\100\164\150\141\167\164\145\056\143\157\155\060\201\237
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\201\215\000\060\201\211\002\201\201\000\323\244\120\156\310\377
\126\153\346\317\135\266\352\014\150\165\107\242\252\302\332\204
\045\374\250\364\107\121\332\205\265\040\164\224\206\036\017\165
\311\351\010\141\365\006\155\060\156\025\031\002\351\122\300\142
\333\115\231\236\342\152\014\104\070\315\376\276\343\144\011\160
\305\376\261\153\051\266\057\111\310\073\324\047\004\045\020\227
\057\347\220\155\300\050\102\231\327\114\103\336\303\365\041\155
\124\237\135\303\130\341\300\344\331\133\260\270\334\264\173\337
\066\072\302\265\146\042\022\326\207\015\002\003\001\000\001\243
\023\060\021\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\015\006\011\052\206\110\206\367\015\001\001
\004\005\000\003\201\201\000\007\372\114\151\134\373\225\314\106
\356\205\203\115\041\060\216\312\331\250\157\111\032\346\332\121
\343\140\160\154\204\141\021\241\032\310\110\076\131\103\175\117
\225\075\241\213\267\013\142\230\172\165\212\335\210\116\116\236
\100\333\250\314\062\164\271\157\015\306\343\263\104\013\331\212
\157\232\051\233\231\030\050\073\321\343\100\050\232\132\074\325
\265\347\040\033\213\312\244\253\215\351\121\331\342\114\054\131
\251\332\271\262\165\033\366\102\362\357\307\362\030\371\211\274
\243\377\212\043\056\160\107
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Thawte Server CA"
# Issuer: 1.2.840.113549.1.9.1=server-certs@thawte.com,CN=Thawte Server CA,OU=Certification Services Division,O=Thawte Consulting cc,L=Cape Town,ST=Western Cape,C=ZA
# Serial Number: 1 (0x1)
# Subject: 1.2.840.113549.1.9.1=server-certs@thawte.com,CN=Thawte Server CA,OU=Certification Services Division,O=Thawte Consulting cc,L=Cape Town,ST=Western Cape,C=ZA
# Not Valid Before: Thu Aug 01 00:00:00 1996
# Not Valid After: Thu Dec 31 23:59:59 2020
# Fingerprint (MD5): c5:70:c4:a2:ed:53:78:0c:c8:10:53:81:64:cb:d0:1d
# Fingerprint (SHA1): 23:e5:94:94:51:95:f2:41:48:03:b4:d5:64:d2:a3:a3:f5:d8:8b:8c
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE

```
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Thawte Server CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\043\345\224\224\121\225\362\101\110\003\264\325\144\322\243\243
\365\330\213\214
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\305\160\304\242\355\123\170\014\310\020\123\201\144\313\320\035
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\304\061\013\060\011\006\003\125\004\006\023\002\132\101
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145
\162\156\040\103\141\160\145\061\022\060\020\006\003\125\004\007
\023\011\103\141\160\145\040\124\157\167\156\061\035\060\033\006
\003\125\004\012\023\024\124\150\141\167\164\145\040\103\157\156
\163\165\154\164\151\156\147\040\143\143\061\050\060\046\006\003
\125\004\013\023\037\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\123\145\162\166\151\143\145\163\040\104\151\166\151
\163\151\157\156\061\031\060\027\006\003\125\004\003\023\020\124
\150\141\167\164\145\040\123\145\162\166\145\162\040\103\101\061
\046\060\044\006\011\052\206\110\206\367\015\001\011\001\026\027
\163\145\162\166\145\162\055\143\145\162\164\163\100\164\150\141
\167\164\145\056\143\157\155
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Thawte Premium Server CA"
# Issuer: 1.2.840.113549.1.9.1=premium-server@thawte.com,CN=Thawte Premium Server CA,OU=Certification
 Services Division,O=Thawte Consulting cc,L=Cape Town,ST=Western Cape,C=ZA
# Serial Number: 1 (0x1)
# Subject: 1.2.840.113549.1.9.1=premium-server@thawte.com,CN=Thawte Premium Server CA,OU=Certification
Services Division,O=Thawte Consulting cc,L=Cape Town,ST=Western Cape,C=ZA
# Not Valid Before: Thu Aug 01 00:00:00 1996
# Not Valid After: Thu Dec 31 23:59:59 2020
# Fingerprint (MD5): 06:9f:69:79:16:66:90:02:1b:8c:8c:a2:c3:07:6f:3a
# Fingerprint (SHA1): 62:7f:8d:78:27:65:63:99:d2:7d:7f:90:44:c9:fe:b3:f3:3e:fa:9a
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
```

CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Thawte Premium Server CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145
\162\156\040\103\141\160\145\061\022\060\020\006\003\125\004\007
\023\011\103\141\160\145\040\124\157\167\156\061\035\060\033\006
\003\125\004\012\023\024\124\150\141\167\164\145\040\103\157\156
\163\165\154\164\151\156\147\040\143\143\061\050\060\046\006\003
\125\004\013\023\037\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\123\145\162\166\151\143\145\163\040\104\151\166\151
\163\151\157\156\061\041\060\037\006\003\125\004\003\023\030\124
\150\141\167\164\145\040\120\162\145\155\151\165\155\040\123\145
\162\166\145\162\040\103\101\061\050\060\046\006\011\052\206\110
\206\367\015\001\011\001\026\031\160\162\145\155\151\165\155\055
\163\145\162\166\145\162\100\164\150\141\167\164\145\056\143\157
\155
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145
\162\156\040\103\141\160\145\061\022\060\020\006\003\125\004\007
\023\011\103\141\160\145\040\124\157\167\156\061\035\060\033\006
\003\125\004\012\023\024\124\150\141\167\164\145\040\103\157\156
\163\165\154\164\151\156\147\040\143\143\061\050\060\046\006\003
\125\004\013\023\037\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\123\145\162\166\151\143\145\163\040\104\151\166\151
\163\151\157\156\061\041\060\037\006\003\125\004\003\023\030\124
\150\141\167\164\145\040\120\162\145\155\151\165\155\040\123\145
\162\166\145\162\040\103\101\061\050\060\046\006\011\052\206\110
\206\367\015\001\011\001\026\031\160\162\145\155\151\165\155\055
\163\145\162\166\145\162\100\164\150\141\167\164\145\056\143\157
\155
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\047\060\202\002\220\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\004\005\000\060
\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101\061
\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145\162
\156\040\103\141\160\145\061\022\060\020\006\003\125\004\007\023
\011\103\141\160\145\040\124\157\167\156\061\035\060\033\006\003

\125\004\012\023\024\124\150\141\167\164\145\040\103\157\156\163
\165\154\164\151\156\147\040\143\143\061\050\060\046\006\003\125
\004\013\023\037\103\145\162\164\151\146\151\143\141\164\151\157
\156\040\123\145\162\166\151\143\145\163\040\104\151\166\151\163
\151\157\156\061\041\060\037\006\003\125\004\003\023\030\124\150
\141\167\164\145\040\120\162\145\155\151\165\155\040\123\145\162
\166\145\162\040\103\101\061\050\060\046\006\011\052\206\110\206
\367\015\001\011\001\026\031\160\162\145\155\151\165\155\055\163
\145\162\166\145\162\100\164\150\141\167\164\145\056\143\157\155
\060\036\027\015\071\066\060\070\060\061\060\060\060\060\060\060
\132\027\015\062\060\061\062\063\061\062\063\065\071\065\071\132
\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145
\162\156\040\103\141\160\145\061\022\060\020\006\003\125\004\007
\023\011\103\141\160\145\040\124\157\167\156\061\035\060\033\006
\003\125\004\012\023\024\124\150\141\167\164\145\040\103\157\156
\163\165\154\164\151\156\147\040\143\143\061\050\060\046\006\003
\125\004\013\023\037\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\123\145\162\166\151\143\145\163\040\104\151\166\151
\163\151\157\156\061\041\060\037\006\003\125\004\003\023\030\124
\150\141\167\164\145\040\120\162\145\155\151\165\155\040\123\145
\162\166\145\162\040\103\101\061\050\060\046\006\011\052\206\110
\206\367\015\001\011\001\026\031\160\162\145\155\151\165\155\055
\163\145\162\166\145\162\100\164\150\141\167\164\145\056\143\157
\155\060\201\237\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\201\215\000\060\201\211\002\201\201\000\322\066
\066\152\213\327\302\133\236\332\201\101\142\217\070\356\111\004
\125\326\320\357\034\033\225\026\107\357\030\110\065\072\122\364
\053\152\006\217\073\057\352\126\343\257\206\215\236\027\367\236
\264\145\165\002\115\357\313\011\242\041\121\330\233\320\147\320
\272\015\222\006\024\163\324\223\313\227\052\000\234\134\116\014
\274\372\025\122\374\362\104\156\332\021\112\156\010\237\057\055
\343\371\252\072\206\163\266\106\123\130\310\211\005\275\203\021
\270\163\077\252\007\215\364\102\115\347\100\235\034\067\002\003
\001\000\001\243\023\060\021\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\015\006\011\052\206\110\206
\367\015\001\001\004\005\000\003\201\201\000\046\110\054\026\302
\130\372\350\026\164\014\252\252\137\124\077\362\327\311\170\140
\136\136\156\067\143\042\167\066\176\262\027\304\064\271\365\010
\205\374\311\001\070\377\115\276\362\026\102\103\347\273\132\106
\373\301\306\021\037\361\112\260\050\106\311\303\304\102\175\274
\372\253\131\156\325\267\121\210\021\343\244\205\031\153\202\114
\244\014\022\255\351\244\256\077\361\303\111\145\232\214\305\310
\076\045\267\224\231\273\222\062\161\007\360\206\136\355\120\047
\246\015\246\043\371\273\313\246\007\024\102
END
CKA_NSS_MOZILLA_CA_POLICY

```
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER
 CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Thawte Premium Server CA"
# Issuer: 1.2.840.113549.1.9.1=premium-server@thawte.com,CN=Thawte Premium Server CA,OU=Certification
Services Division,O=Thawte Consulting cc,L=Cape Town,ST=Western Cape,C=ZA
# Serial Number: 1 (0x1)
# Subject: 1.2.840.113549.1.9.1=premium-server@thawte.com,CN=Thawte Premium Server CA,OU=Certification
Services Division,O=Thawte Consulting cc,L=Cape Town,ST=Western Cape,C=ZA
# Not Valid Before: Thu Aug 01 00:00:00 1996
# Not Valid After: Thu Dec 31 23:59:59 2020
# Fingerprint (MD5): 06:9f:69:79:16:66:90:02:1b:8c:8c:a2:c3:07:6f:3a
# Fingerprint (SHA1): 62:7f:8d:78:27:65:63:99:d2:7d:7f:90:44:c9:fe:b3:f3:3e:fa:9a
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Thawte Premium Server CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\142\177\215\170\047\145\143\231\322\175\177\220\104\311\376\263
\363\076\372\232
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\006\237\151\171\026\146\220\002\033\214\214\242\303\007\157\072
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\316\061\013\060\011\006\003\125\004\006\023\002\132\101
\061\025\060\023\006\003\125\004\010\023\014\127\145\163\164\145
\162\156\040\103\141\160\145\061\022\060\020\006\003\125\004\007
\023\011\103\141\160\145\040\124\157\167\156\061\035\060\033\006
\003\125\004\012\023\024\124\150\141\167\164\145\040\103\157\156
\163\165\154\164\151\156\147\040\143\143\061\050\060\046\006\003
\125\004\013\023\037\103\145\162\164\151\146\151\143\141\164\151
\157\156\040\123\145\162\166\151\143\145\163\040\104\151\166\151
\163\151\157\156\061\041\060\037\006\003\125\004\003\023\030\124
\150\141\167\164\145\040\120\162\145\155\151\165\155\040\123\145
\162\166\145\162\040\103\101\061\050\060\046\006\011\052\206\110
\206\367\015\001\011\001\026\031\160\162\145\155\151\165\155\055
\163\145\162\166\145\162\100\164\150\141\167\164\145\056\143\157
\155
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
```

```
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Equifax Secure Global eBusiness CA-1"
# Issuer: CN=Equifax Secure Global eBusiness CA-1,O=Equifax Secure Inc.,C=US
# Serial Number: 1 (0x1)
# Subject: CN=Equifax Secure Global eBusiness CA-1,O=Equifax Secure Inc.,C=US
# Not Valid Before: Mon Jun 21 04:00:00 1999
# Not Valid After: Sun Jun 21 04:00:00 2020
# Fingerprint (MD5): 8f:5d:77:06:27:c4:98:3c:5b:93:78:e7:d7:7d:9b:cc
# Fingerprint (SHA1): 7e:78:4a:10:1c:82:65:cc:2d:e1:f1:6d:47:b4:40:ca:d9:0a:19:45
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Equifax Secure Global eBusiness CA-1"
CKA_CERTIFICATE_TYPE
 CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\034\060\032\006\003\125\004\012\023\023\105\161\165\151\146\141
\170\040\123\145\143\165\162\145\040\111\156\143\056\061\055\060
\053\006\003\125\004\003\023\044\105\161\165\151\146\141\170\040
\123\145\143\165\162\145\040\107\154\157\142\141\154\040\145\102
\165\163\151\156\145\163\163\040\103\101\055\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\034\060\032\006\003\125\004\012\023\023\105\161\165\151\146\141
\170\040\123\145\143\165\162\145\040\111\156\143\056\061\055\060
\053\006\003\125\004\003\023\044\105\161\165\151\146\141\170\040
\123\145\143\165\162\145\040\107\154\157\142\141\154\040\145\102
\165\163\151\156\145\163\163\040\103\101\055\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\001
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\220\060\202\001\371\240\003\002\001\002\002\001\001
\060\015\006\011\052\206\110\206\367\015\001\001\004\005\000\060
\132\061\013\060\011\006\003\125\004\006\023\002\125\123\061\034
\060\032\006\003\125\004\012\023\023\105\161\165\151\146\141\170
\040\123\145\143\165\162\145\040\111\156\143\056\061\055\060\053
```

\006\003\125\004\003\023\044\105\161\165\151\146\141\170\040\123
\145\143\165\162\145\040\107\154\157\142\141\154\040\145\102\165
\163\151\156\145\163\163\040\103\101\055\061\060\036\027\015\071
\071\060\066\062\061\060\064\060\060\060\060\132\027\015\062\060
\060\066\062\061\060\064\060\060\060\060\132\060\132\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\034\060\032\006\003
\125\004\012\023\023\105\161\165\151\146\141\170\040\123\145\143
\165\162\145\040\111\156\143\056\061\055\060\053\006\003\125\004
\003\023\044\105\161\165\151\146\141\170\040\123\145\143\165\162
\145\040\107\154\157\142\141\154\040\145\102\165\163\151\156\145
\163\163\040\103\101\055\061\060\201\237\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\201\215\000\060\201\211
\002\201\201\000\272\347\027\220\002\145\261\064\125\074\111\302
\121\325\337\247\321\067\217\321\347\201\163\101\122\140\233\235
\241\027\046\170\255\307\261\350\046\224\062\265\336\063\215\072
\057\333\362\232\172\132\163\230\243\134\351\373\212\163\033\134
\347\303\277\200\154\315\251\364\326\053\300\367\371\231\252\143
\242\261\107\002\017\324\344\121\072\022\074\154\212\132\124\204
\160\333\301\305\220\317\162\105\313\250\131\300\315\063\235\077
\243\226\353\205\063\041\034\076\036\076\140\156\166\234\147\205
\305\310\303\141\002\003\001\000\001\243\146\060\144\060\021\006
\011\140\206\110\001\206\370\102\001\001\004\004\003\002\000\007
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\037\006\003\125\035\043\004\030\060\026\200\024\276\250
\240\164\162\120\153\104\267\311\043\330\373\250\377\263\127\153
\150\154\060\035\006\003\125\035\016\004\026\004\024\276\250\240
\164\162\120\153\104\267\311\043\330\373\250\377\263\127\153\150
\154\060\015\006\011\052\206\110\206\367\015\001\001\004\005\000
\003\201\201\000\060\342\001\121\252\307\352\137\332\271\320\145
\017\060\326\076\332\015\024\111\156\221\223\047\024\061\357\304
\367\055\105\370\354\307\277\242\101\015\043\264\222\371\031\000
\147\275\001\257\315\340\161\374\132\317\144\304\340\226\230\320
\243\100\342\001\212\357\047\007\361\145\001\212\104\055\006\145
\165\122\300\206\020\040\041\137\154\153\017\154\256\011\034\257
\362\242\030\064\304\165\244\163\034\361\215\334\357\255\371\263
\166\264\222\277\334\225\020\036\276\313\310\073\132\204\140\031
\126\224\251\125
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Equifax Secure Global eBusiness CA-1"
# Issuer: CN=Equifax Secure Global eBusiness CA-1,O=Equifax Secure Inc.,C=US
# Serial Number: 1 (0x1)
# Subject: CN=Equifax Secure Global

```
 eBusiness CA-1,O=Equifax Secure Inc.,C=US
# Not Valid Before: Mon Jun 21 04:00:00 1999
# Not Valid After: Sun Jun 21 04:00:00 2020
# Fingerprint (MD5): 8f:5d:77:06:27:c4:98:3c:5b:93:78:e7:d7:7d:9b:cc
# Fingerprint (SHA1): 7e:78:4a:10:1c:82:65:cc:2d:e1:f1:6d:47:b4:40:ca:d9:0a:19:45
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Equifax Secure Global eBusiness CA-1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\176\170\112\020\034\202\145\314\055\341\361\155\107\264\100\312
\331\012\031\105
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\217\135\167\006\047\304\230\074\133\223\170\347\327\175\233\314
END
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\034\060\032\006\003\125\004\012\023\023\105\161\165\151\146\141
\170\040\123\145\143\165\162\145\040\111\156\143\056\061\055\060
\053\006\003\125\004\003\023\044\105\161\165\151\146\141\170\040
\123\145\143\165\162\145\040\107\154\157\142\141\154\040\145\102
\165\163\151\156\145\163\163\040\103\101\055\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\001
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Equifax"
# Issuer: OU=Equifax Secure Certificate Authority,O=Equifax,C=US
# Serial Number:35:de:f4:cf
# Subject: OU=Equifax Secure Certificate Authority,O=Equifax,C=US
# Not Valid Before: Sat Aug 22 16:41:51 1998
# Not Valid After: Wed Aug 22 16:41:51 2018
# Fingerprint (MD5): 67:cb:9d:c0:13:24:8a:82:9b:b2:17:1e:d1:1b:ec:d4
# Fingerprint (SHA1): d2:32:09:ad:23:d3:14:23:21:74:e4:0d:7f:9d:62:13:97:86:63:3a
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Equifax"
```

```
CKA_CERTIFICATE_TYPE
 CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\020\060\016\006\003\125\004\012\023\007\105\161\165\151\146\141
\170\061\055\060\053\006\003\125\004\013\023\044\105\161\165\151
\146\141\170\040\123\145\143\165\162\145\040\103\145\162\164\151
\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\020\060\016\006\003\125\004\012\023\007\105\161\165\151\146\141
\170\061\055\060\053\006\003\125\004\013\023\044\105\161\165\151
\146\141\170\040\123\145\143\165\162\145\040\103\145\162\164\151
\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\065\336\364\317
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\040\060\202\002\211\240\003\002\001\002\002\004\065
\336\364\317\060\015\006\011\052\206\110\206\367\015\001\001\005
\005\000\060\116\061\013\060\011\006\003\125\004\006\023\002\125
\123\061\020\060\016\006\003\125\004\012\023\007\105\161\165\151
\146\141\170\061\055\060\053\006\003\125\004\013\023\044\105\161
\165\151\146\141\170\040\123\145\143\165\162\145\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\060\036\027\015\071\070\060\070\062\062\061\066\064\061
\065\061\132\027\015\061\070\060\070\062\062\061\066\064\061\065
\061\132\060\116\061\013\060\011\006\003\125\004\006\023\002\125
\123\061\020\060\016\006\003\125\004\012\023\007\105\161\165\151
\146\141\170\061\055\060\053\006\003\125\004\013\023\044\105\161
\165\151\146\141\170\040\123\145\143\165\162\145\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\060\201\237\060\015\006\011\052\206\110\206\367\015\001
\001\001\005\000\003\201\215\000\060\201\211\002\201\201\000\301
\135\261\130\147\010\142\356\240\232\055\037\010\155\221\024\150
\230\012\036\376\332\004\157\023\204\142\041\303\321\174\316\237
\005\340\270\001\360\116\064\354\342\212\225\004\144\254\361\153
\123\137\005\263\313\147\200\277\102\002\216\376\335\001\011\354
\341\000\024\117\374\373\360\014\335\103\272\133\053\341\037\200
\160\231\025\127\223\026\361\017\227\152\267\302\150\043\034\314
\115\131\060\254\121\036\073\257\053\326\356\143\105\173\305\331
\137\120\322\343\120\017\072\210\347\277\024\375\340\307\271\002
\003\001\000\001\243\202\001\011\060\202\001\005\060\160\006\003
\125\035\037\004\151\060\147\060\145\240\143\240\141\244\137\060
\135\061\013\060\011\006\003\125\004\006\023\002\125\123\061\020
```

\060\016\006\003\125\004\012\023\007\105\161\165\151\146\141\170
\061\055\060\053\006\003\125\004\013\023\044\105\161\165\151\146
\141\170\040\123\145\143\165\162\145\040\103\145\162\164\151\146
\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171\061
\015\060\013\006\003\125\004\003\023\004\103\122\114\061\060\032
\006\003\125\035\020\004\023\060\021\201\017\062\060\061\070\060
\070\062\062\061\066\064\061\065\061\132\060\013\006\003\125\035
\017\004\004\003\002\001\006\060\037\006\003\125\035\043\004\030
\060\026\200\024\110\346\150\371\053\322\262\225\327\107\330\043
\040\020\117\063\230\220\237\324\060\035\006\003\125\035\016\004
\026\004\024\110\346\150\371\053\322\262\225\327\107\330\043\040
\020\117\063\230\220\237\324\060\014\006\003\125\035\023\004\005
\060\003\001\001\377\060\032\006\011\052\206\110\206\366\175\007
\101\000\004\015\060\013\033\005\126\063\056\060\143\003\002\006
\300\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000
\003\201\201\000\130\316\051\352\374\367\336\265\316\002\271\027
\265\205\321\271\343\340\225\314\045\061\015\000\246\222\156\177
\266\222\143\236\120\225\321\232\157\344\021\336\143\205\156\230
\356\250\377\132\310\323\125\262\146\161\127\336\300\041\353\075
\052\247\043\111\001\004\206\102\173\374\356\177\242\026\122\265
\147\147\323\100\333\073\046\130\262\050\167\075\256\024\167\141
\326\372\052\146\047\240\015\372\247\163\134\352\160\361\224\041
\145\104\137\372\374\357\051\150\251\242\207\171\357\171\357\117
\254\007\167\070
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Equifax"
# Issuer: OU=Equifax Secure Certificate Authority,O=Equifax,C=US
# Serial Number:35:de:f4:cf
# Subject: OU=Equifax Secure Certificate Authority,O=Equifax,C=US
# Not Valid Before: Sat Aug 22 16:41:51 1998
# Not Valid After: Wed Aug 22 16:41:51 2018
# Fingerprint (MD5): 67:cb:9d:c0:13:24:8a:82:9b:b2:17:1e:d1:1b:ec:d4
# Fingerprint (SHA1): d2:32:09:ad:23:d3:14:23:21:74:e4:0d:7f:9d:62:13:97:86:63:3a
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Equifax"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\322\062\011\255\043\323\024\043\041\164\344\015\177\235\142\023
\227\206\143\072
END

```
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\147\313\235\300\023\044\212\202\233\262\027\036\321\033\354\324
END
CKA_ISSUER MULTILINE_OCTAL
\060\116\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\020\060\016\006\003\125\004\012\023\007\105\161\165\151\146\141
\170\061\055\060\053\006\003\125\004\013\023\044\105\161\165\151
\146\141\170\040\123\145\143\165\162\145\040\103\145\162\164\151
\146\151\143\141\164\145\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\004\065\336\364\317
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Class 1 Primary CA"
# Issuer: CN=Class 1 Primary CA,O=Certplus,C=FR
# Serial Number:86:fe:1d:5f:c3:81:f8:47:d7:33:2c:73:94:75:7b:37
# Subject: CN=Class 1 Primary CA,O=Certplus,C=FR
# Not Valid
 Before: Wed Jul 07 17:01:00 1999
# Not Valid After: Mon Jul 06 23:59:59 2020
# Fingerprint (MD5): 21:24:a6:81:c1:d8:f2:19:af:49:98:e3:9d:fe:0b:f4
# Fingerprint (SHA1): 6a:17:45:70:a9:16:fb:e8:44:53:ee:d3:d0:70:a1:d8:da:44:28:29
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Class 1 Primary CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\021\060\017\006\003\125\004\012\023\010\103\145\162\164\160\154
\165\163\061\033\060\031\006\003\125\004\003\023\022\103\154\141
\163\163\040\061\040\120\162\151\155\141\162\171\040\103\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\021\060\017\006\003\125\004\012\023\010\103\145\162\164\160\154
\165\163\061\033\060\031\006\003\125\004\003\023\022\103\154\141
\163\163\040\061\040\120\162\151\155\141\162\171\040\103\101
END
```

CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\021\000\206\376\035\137\303\201\370\107\327\063\054\163\224
\165\173\067
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\222\060\202\002\172\240\003\002\001\002\002\021\000
\206\376\035\137\303\201\370\107\327\063\054\163\224\165\173\067
\060\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060
\075\061\013\060\011\006\003\125\004\006\023\002\106\122\061\021
\060\017\006\003\125\004\012\023\010\103\145\162\164\160\154\165
\163\061\033\060\031\006\003\125\004\003\023\022\103\154\141\163
\163\040\061\040\120\162\151\155\141\162\171\040\103\101\060\036
\027\015\071\071\060\067\060\067\061\067\060\061\060\060\132\027
\015\062\060\060\067\060\066\062\063\065\071\065\071\132\060\075
\061\013\060\011\006\003\125\004\006\023\002\106\122\061\021\060
\017\006\003\125\004\012\023\010\103\145\162\164\160\154\165\163
\061\033\060\031\006\003\125\004\003\023\022\103\154\141\163\163
\040\061\040\120\162\151\155\141\162\171\040\103\101\060\202\001
\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000
\003\202\001\017\000\060\202\001\012\002\202\001\001\000\303\153
\051\310\056\307\256\174\122\005\351\223\211\126\012\132\171\311
\314\334\045\357\207\212\055\005\330\201\027\004\033\072\105\370
\171\016\015\111\324\201\101\310\253\105\373\165\310\025\362\342
\320\274\331\141\154\204\244\023\031\247\331\371\362\111\334\114
\017\306\175\127\264\023\334\036\011\161\051\066\235\200\130\364
\033\330\211\024\353\323\322\223\113\052\361\167\347\152\145\275
\031\345\252\375\014\112\143\341\302\231\264\017\004\266\132\033
\066\074\067\074\277\305\345\136\361\137\127\016\037\307\375\054
\347\344\157\152\233\142\226\071\021\233\146\360\054\266\122\334
\341\047\377\333\155\376\353\253\143\024\035\143\210\143\342\026
\014\371\040\124\017\233\335\025\152\166\203\117\275\047\213\123
\246\067\322\207\362\107\120\122\073\146\351\321\170\032\033\262
\073\151\360\131\074\070\133\321\052\114\063\136\016\312\126\245
\355\055\133\202\203\115\326\070\116\212\126\266\152\057\044\153
\022\060\246\052\336\257\014\273\252\104\022\034\023\305\145\017
\343\375\330\032\061\113\344\077\014\174\105\350\026\063\002\003
\001\000\001\243\201\214\060\201\211\060\017\006\003\125\035\023
\004\010\060\006\001\001\377\002\001\012\060\013\006\003\125\035
\017\004\004\003\002\001\006\060\035\006\003\125\035\016\004\026
\004\024\043\056\337\351\201\264\320\204\375\216\273\251\335\371
\014\243\343\363\111\123\060\021\006\011\140\206\110\001\206\370
\102\001\001\004\004\003\002\001\006\060\067\006\003\125\035\037
\004\060\060\056\060\054\240\052\240\050\206\046\150\164\164\160
\072\057\057\167\167\167\056\143\145\162\164\160\154\165\163\056
\143\157\155\057\103\122\114\057\143\154\141\163\163\061\056\143
\162\154\060\015\006\011\052\206\110\206\367\015\001\001\005\005
\000\003\202\001\001\000\276\046\123\326\136\237\220\077\001\224

\002\354\010\301\210\232\320\247\372\120\015\332\374\224\035\250
\324\120\043\320\237\034\213\141\261\262\252\104\017\254\330\023
\015\325\326\241\350\061\170\320\357\036\203\100\232\345\375\101
\351\222\375\356\243\225\220\363\300\270\157\176\367\064\245\241
\337\074\363\336\126\262\307\337\207\046\104\307\342\203\271\023
\157\060\105\161\051\042\025\253\304\333\077\117\363\167\371\231
\030\064\365\163\222\175\067\146\147\111\156\063\232\115\051\224
\213\275\120\071\143\145\017\020\347\173\020\152\321\107\371\236
\045\014\047\051\302\333\010\210\347\252\211\072\105\252\237\111
\262\175\352\150\212\100\376\221\301\302\111\377\041\321\147\016
\032\022\035\112\056\034\373\224\371\155\073\171\062\371\036\051
\221\012\102\226\105\361\357\312\130\017\162\235\014\251\203\274
\062\335\230\004\321\131\341\144\027\275\314\201\243\003\136\226
\140\345\177\026\070\012\153\321\372\263\204\235\052\312\076\373
\102\370\117\350\247\133\050\031\030\255\340\246\146\036\260\051
\041\362\270\231\217\377
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL
 CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Class 1 Primary CA"
# Issuer: CN=Class 1 Primary CA,O=Certplus,C=FR
# Serial Number:86:fe:1d:5f:c3:81:f8:47:d7:33:2c:73:94:75:7b:37
# Subject: CN=Class 1 Primary CA,O=Certplus,C=FR
# Not Valid Before: Wed Jul 07 17:01:00 1999
# Not Valid After: Mon Jul 06 23:59:59 2020
# Fingerprint (MD5): 21:24:a6:81:c1:d8:f2:19:af:49:98:e3:9d:fe:0b:f4
# Fingerprint (SHA1): 6a:17:45:70:a9:16:fb:e8:44:53:ee:d3:d0:70:a1:d8:da:44:28:29
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Class 1 Primary CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\152\027\105\160\251\026\373\350\104\123\356\323\320\160\241\330
\332\104\050\051
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\041\044\246\201\301\330\362\031\257\111\230\343\235\376\013\364
END
CKA_ISSUER MULTILINE_OCTAL
\060\075\061\013\060\011\006\003\125\004\006\023\002\106\122\061
\021\060\017\006\003\125\004\012\023\010\103\145\162\164\160\154
\165\163\061\033\060\031\006\003\125\004\003\023\022\103\154\141

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\163\163\040\061\040\120\162\151\155\141\162\171\040\103\101
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\021\000\206\376\035\137\303\201\370\107\327\063\054\163\224
\165\173\067
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "UTN-USERFirst-Object"
# Issuer: CN=UTN-USERFirst-Object,OU=http://www.usertrust.com,O=The USERTRUST Network,L=Salt Lake
City,ST=UT,C=US
# Serial Number:44:be:0c:8b:50:00:24:b4:11:d3:36:2d:e0:b3:5f:1b
# Subject: CN=UTN-USERFirst-Object,OU=http://www.usertrust.com,O=The USERTRUST Network,L=Salt Lake
City,ST=UT,C=US
# Not Valid Before: Fri Jul 09 18:31:20 1999
# Not Valid After: Tue Jul 09 18:40:36
 2019
# Fingerprint (MD5): a7:f2:e4:16:06:41:11:50:30:6b:9c:e3:b4:9c:b0:c9
# Fingerprint (SHA1): e1:2d:fb:4b:41:d7:d9:c3:2b:30:51:4b:ac:1d:81:d8:38:5e:2d:46
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "UTN-USERFirst-Object"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\225\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\013\060\011\006\003\125\004\010\023\002\125\124\061\027\060
\025\006\003\125\004\007\023\016\123\141\154\164\040\114\141\153
\145\040\103\151\164\171\061\036\060\034\006\003\125\004\012\023
\025\124\150\145\040\125\123\105\122\124\122\125\123\124\040\116
\145\164\167\157\162\153\061\041\060\037\006\003\125\004\013\023
\030\150\164\164\160\072\057\057\167\167\167\056\165\163\145\162
\164\162\165\163\164\056\143\157\155\061\035\060\033\006\003\125
\004\003\023\024\125\124\116\055\125\123\105\122\106\151\162\163
\164\055\117\142\152\145\143\164
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\225\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\013\060\011\006\003\125\004\010\023\002\125\124\061\027\060
\025\006\003\125\004\007\023\016\123\141\154\164\040\114\141\153
```

\145\040\103\151\164\171\061\036\060\034\006\003\125\004\012\023
\025\124\150\145\040\125\123\105\122\124\122\125\123\124\040\116
\145\164\167\157\162\153\061\041\060\037\006\003\125\004\013\023
\030\150\164\164\160\072\057\057\167\167\167\056\165\163\145\162
\164\162\165\163\164\056\143\157\155\061\035\060\033\006\003\125
\004\003\023\024\125\124\116\055\125\123\105\122\106\151\162\163
\164\055\117\142\152\145\143\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\104\276\014\213\120\000\044\264\021\323\066\055\340\263
\137\033
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\146\060\202\003\116\240\003\002\001\002\002\020\104
\276\014\213\120\000\044\264\021\323\066\055\340\263\137\033\060
\015\006\011\052\206\110\206\367\015\001\001\005\005\000\060\201
\225\061\013\060\011\006\003\125\004\006\023\002\125\123\061\013
\060\011\006\003\125\004\010\023\002\125\124\061\027\060\025\006
\003\125\004\007\023\016\123\141\154\164\040\114\141\153\145\040
\103\151\164\171\061\036\060\034\006\003\125\004\012\023\025\124
\150\145\040\125\123\105\122\124\122\125\123\124\040\116\145\164
\167\157\162\153\061\041\060\037\006\003\125\004\013\023\030\150
\164\164\160\072\057\057\167\167\167\056\165\163\145\162\164\162
\165\163\164\056\143\157\155\061\035\060\033\006\003\125\004\003
\023\024\125\124\116\055\125\123\105\122\106\151\162\163\164\055
\117\142\152\145\143\164\060\036\027\015\071\071\060\067\060\071
\061\070\063\061\062\060\132\027\015\061\071\060\067\060\071\061
\070\064\060\063\066\132\060\201\225\061\013\060\011\006\003\125
\004\006\023\002\125\123\061\013\060\011\006\003\125\004\010\023
\002\125\124\061\027\060\025\006\003\125\004\007\023\016\123\141
\154\164\040\114\141\153\145\040\103\151\164\171\061\036\060\034
\006\003\125\004\012\023\025\124\150\145\040\125\123\105\122\124
\122\125\123\124\040\116\145\164\167\157\162\153\061\041\060\037
\006\003\125\004\013\023\030\150\164\164\160\072\057\057\167\167
\167\056\165\163\145\162\164\162\165\163\164\056\143\157\155\061
\035\060\033\006\003\125\004\003\023\024\125\124\116\055\125\123
\105\122\106\151\162\163\164\055\117\142\152\145\143\164\060\202
\001\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\001\017\000\060\202\001\012\002\202\001\001\000\316
\252\201\077\243\243\141\170\252\061\000\125\225\021\236\047\017
\037\034\337\072\233\202\150\060\300\112\141\035\361\057\016\372
\276\171\367\245\043\357\125\121\226\204\315\333\343\271\156\076
\061\330\012\040\147\307\364\331\277\224\353\107\004\076\002\316
\052\242\135\207\004\011\366\060\235\030\212\227\262\252\034\374
\101\322\241\066\313\373\075\221\272\347\331\160\065\372\344\347
\220\303\233\243\233\323\074\365\022\231\167\261\267\011\340\150
\346\034\270\363\224\143\210\152\152\376\013\166\311\276\364\042
\344\147\271\253\032\136\167\301\205\007\335\015\154\277\356\006

\307\167\152\101\236\247\017\327\373\356\224\027\267\374\205\276
\244\253\304\034\061\335\327\266\321\344\360\357\337\026\217\262
\122\223\327\241\324\211\241\007\056\277\341\001\022\102\036\032
\341\330\225\064\333\144\171\050\377\272\056\021\302\345\350\133
\222\110\373\107\013\302\154\332\255\062\203\101\363\245\345\101
\160\375\145\220\155\372\372\121\304\371\275\226\053\031\004\054
\323\155\247\334\360\177\157\203\145\342\152\253\207\206\165\002
\003\001\000\001\243\201\257\060\201\254\060\013\006\003\125\035
\017\004\004\003\002\001\306\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004
\026\004\024\332\355\144\164\024\234\024\074\253\335\231\251\275
\133\050\115\213\074\311\330\060\102\006\003\125\035\037\004\073
\060\071\060\067\240\065\240\063\206\061\150\164\164\160\072\057
\057\143\162\154\056\165\163\145\162\164\162\165\163\164\056\143
\157\155\057\125\124\116\055\125\123\105\122\106\151\162\163\164
\055\117\142\152\145\143\164\056\143\162\154\060\051\006\003\125
\035\045\004\042\060\040\006\010\053\006\001\005\005\007\003\003
\006\010\053\006\001\005\005\007\003\010\006\012\053\006\001\004
\001\202\067\012\003\004\060\015\006\011\052\206\110\206\367\015
\001\001\005\005\000\003\202\001\001\000\010\037\122\261\067\104
\170\333\375\316\271\332\225\226\230\252\125\144\200\265\132\100
\335\041\245\305\301\363\137\054\114\310\107\132\151\352\350\360
\065\065\364\320\045\363\310\246\244\207\112\275\033\261\163\010
\275\324\303\312\266\065\273\131\206\167\061\315\247\200\024\256
\023\357\374\261\110\371\153\045\045\055\121\266\054\155\105\301
\230\310\212\126\135\076\356\103\116\076\153\047\216\320\072\113
\205\013\137\323\355\152\247\165\313\321\132\207\057\071\165\023
\132\162\260\002\201\237\276\360\017\204\124\040\142\154\151\324
\341\115\306\015\231\103\001\015\022\226\214\170\235\277\120\242
\261\104\252\152\317\027\172\317\157\017\324\370\044\125\137\360
\064\026\111\146\076\120\106\311\143\161\070\061\142\270\142\271
\363\123\255\154\265\053\242\022\252\031\117\011\332\136\347\223
\306\216\024\010\376\360\060\200\030\240\206\205\115\310\175\327
\213\003\376\156\325\367\235\026\254\222\054\240\043\345\234\221
\122\037\224\337\027\224\163\303\263\301\301\161\005\040\000\170
\275\023\122\035\250\076\315\000\037\310
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "UTN-USERFirst-Object"
# Issuer: CN=UTN-USERFirst-Object,OU=http://www.usertrust.com,O=The USERTRUST Network,L=Salt Lake City,ST=UT,C=US
# Serial Number:44:be:0c:8b:50:00:24:b4:11:d3:36:2d:e0:b3:5f:1b
# Subject: CN=UTN-USERFirst-Object,OU=http://www.usertrust.com,O=The USERTRUST Network,L=Salt Lake

```
City,ST=UT,C=US
# Not Valid Before: Fri Jul 09 18:31:20 1999
# Not Valid After:
 Tue Jul 09 18:40:36 2019
# Fingerprint (MD5): a7:f2:e4:16:06:41:11:50:30:6b:9c:e3:b4:9c:b0:c9
# Fingerprint (SHA1): e1:2d:fb:4b:41:d7:d9:c3:2b:30:51:4b:ac:1d:81:d8:38:5e:2d:46
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "UTN-USERFirst-Object"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\341\055\373\113\101\327\331\303\053\060\121\113\254\035\201\330
\070\136\055\106
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\247\362\344\026\006\101\021\120\060\153\234\343\264\234\260\311
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\225\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\013\060\011\006\003\125\004\010\023\002\125\124\061\027\060
\025\006\003\125\004\007\023\016\123\141\154\164\040\114\141\153
\145\040\103\151\164\171\061\036\060\034\006\003\125\004\012\023
\025\124\150\145\040\125\123\105\122\124\122\125\123\124\040\116
\145\164\167\157\162\153\061\041\060\037\006\003\125\004\013\023
\030\150\164\164\160\072\057\057\167\167\167\056\165\163\145\162
\164\162\165\163\164\056\143\157\155\061\035\060\033\006\003\125
\004\003\023\024\125\124\116\055\125\123\105\122\106\151\162\163
\164\055\117\142\152\145\143\164
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\104\276\014\213\120\000\044\264\021\323\066\055\340\263
\137\033
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "BYTE Root Certification Authority 001"
# Issuer: CN=BYTE Root Certification Authority 001,O=BYTE Computer S.A.,C=GR
# Serial Number:71:8c:2f:39:7c:40:74:40
# Subject: CN=BYTE Root Certification Authority 001,O=BYTE Computer S.A.,C=GR
# Not Valid Before: Wed Sep 10 22:01:54 2014
# Not Valid After: Sat Sep 10 22:01:54 2039
# Fingerprint (MD5): fa:fb:82:6a:e5:b3:a2:83:50:9b:83:28:b6:41:42:03
```

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#
 Fingerprint (SHA1): 3f:0f:eb:17:a7:ef:58:04:cf:d9:0a:77:b7:bb:02:1e:a6:9c:64:18
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "BYTE Root Certification Authority 001"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\033\060\031\006\003\125\004\012\014\022\102\131\124\105\040\103
\157\155\160\165\164\145\162\040\123\056\101\056\061\056\060\054
\006\003\125\004\003\014\045\102\131\124\105\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\060\060\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\033\060\031\006\003\125\004\012\014\022\102\131\124\105\040\103
\157\155\160\165\164\145\162\040\123\056\101\056\061\056\060\054
\006\003\125\004\003\014\045\102\131\124\105\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\060\060\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\010\161\214\057\071\174\100\164\100
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\231\060\202\003\201\240\003\002\001\002\002\010\161
\214\057\071\174\100\164\100\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\132\061\013\060\011\006\003\125\004
\006\023\002\107\122\061\033\060\031\006\003\125\004\012\014\022
\102\131\124\105\040\103\157\155\160\165\164\145\162\040\123\056
\101\056\061\056\060\054\006\003\125\004\003\014\045\102\131\124
\105\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040\060
\060\061\060\036\027\015\061\064\060\071\061\060\062\062\060\061
\065\064\132\027\015\063\071\060\071\061\060\062\062\060\061\065
\064\132\060\132\061\013\060\011\006\003\125\004\006\023\002\107
\122\061\033\060\031\006\003\125\004\012\014\022\102\131\124\105
\040\103\157\155\160\165\164\145\162\040\123\056\101\056\061\056
\060\054\006\003\125\004\003\014\045\102\131\124\105\040\122\157
\157\164\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\101\165\164\150\157\162\151\164\171\040\060\060\061\060\202
\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001\005
\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000\355
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\022\056\027\163\236\157\364\363\231\350\236\010\127\011\064\044
\021\100\037\214\041\176\033\257\070\303\321\307\346\024\345\372
\033\272\136\146\365\045\151\367\355\315\156\202\160\257\272\102
\360\261\031\134\053\374\105\204\030\054\172\027\117\141\205\106
\031\174\316\301\215\237\124\236\167\045\146\017\340\366\370\222
\312\051\316\047\127\025\052\154\202\070\155\047\346\276\115\163
\016\163\257\343\161\075\274\011\102\017\325\015\241\355\175\153
\256\367\301\360\154\315\302\227\241\130\375\065\025\226\027\114
\237\277\365\361\071\113\160\267\347\112\154\034\077\301\160\133
\317\326\213\353\357\157\060\350\137\310\106\167\041\142\026\136
\306\124\105\071\365\164\272\147\044\150\245\161\133\076\301\373
\011\223\353\042\231\370\322\365\173\002\154\217\130\342\253\357
\335\164\041\344\044\151\224\100\326\301\004\030\016\330\102\360
\375\327\212\005\300\137\033\212\353\056\300\015\007\006\163\001
\205\216\037\301\300\212\241\130\246\121\271\130\221\102\017\156
\341\274\012\350\273\050\203\025\165\345\015\376\111\060\051\051
\102\302\302\066\377\244\074\175\056\367\332\362\242\057\026\274
\141\250\231\130\030\244\111\306\152\007\022\353\033\174\264\316
\347\373\041\200\053\160\246\310\316\255\125\036\037\035\204\320
\375\124\152\114\126\143\310\335\176\240\371\071\333\357\174\132
\367\214\065\245\156\052\126\372\376\343\137\223\124\162\016\150
\343\111\053\223\115\065\042\227\024\225\146\117\247\167\072\056
\045\114\366\011\213\022\033\161\305\162\247\233\271\274\353\034
\240\245\311\124\203\141\334\127\125\255\265\346\332\170\053\166
\247\376\370\333\376\214\063\244\212\243\106\134\255\262\012\022
\016\212\344\120\236\360\270\313\231\123\114\144\041\153\212\070
\052\340\210\206\000\324\027\254\146\262\347\276\055\073\051\345
\370\247\224\333\214\130\370\322\113\060\237\362\304\142\145\120
\107\162\200\317\244\160\100\266\275\104\376\331\277\050\053\056
\067\307\263\121\016\202\051\265\261\157\255\176\054\223\300\251
\177\221\372\307\037\065\360\273\227\311\117\141\050\220\204\101
\350\175\041\100\305\311\206\074\355\232\255\205\234\242\123\002
\003\001\000\001\243\143\060\141\060\035\006\003\125\035\016\004
\026\004\024\264\115\146\267\323\263\310\231\174\001\062\320\221
\072\367\326\250\022\061\336\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\037\006\003\125\035\043\004
\030\060\026\200\024\264\115\146\267\323\263\310\231\174\001\062
\320\221\072\367\326\250\022\061\336\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\006\060\015\006\011\052\206\110
\206\367\015\001\001\013\005\000\003\202\002\001\000\034\032\353
\006\256\125\275\073\077\066\054\141\236\352\307\123\374\160\252
\062\157\344\102\252\353\275\205\354\033\212\132\362\225\226\051
\241\004\006\222\316\044\127\377\100\043\170\116\311\370\060\115
\102\125\104\116\067\242\175\153\216\150\376\016\376\177\337\260
\237\143\121\363\341\305\245\224\237\212\043\050\110\363\101\213
\322\376\170\355\331\320\010\017\155\175\325\235\225\254\325\376
\022\146\032\344\276\165\124\363\321\115\234\116\023\324\236\160
\064\155\250\272\012\063\210\215\255\005\067\376\113\171\177\175

\003\101\171\023\015\237\075\367\070\234\065\132\104\117\076\074
\242\345\201\305\177\137\166\117\033\073\156\157\232\155\267\355
\017\313\062\037\210\264\105\014\234\021\322\370\004\132\023\067
\131\230\201\316\114\364\345\224\050\004\304\265\123\311\124\215
\160\077\150\001\333\314\023\012\344\045\243\154\231\355\020\263
\172\040\251\111\274\005\364\370\033\150\326\272\040\035\202\147
\146\340\260\237\134\312\065\322\105\256\325\210\031\333\172\006
\233\214\240\067\207\121\043\276\105\332\134\263\177\153\317\306
\250\034\063\212\173\035\221\372\236\274\354\175\073\105\025\117
\033\247\073\065\264\171\363\133\202\120\340\234\247\355\026\165
\333\143\200\142\241\332\030\002\152\200\336\202\252\104\115\104
\070\050\252\156\372\030\143\071\140\367\103\051\111\132\272\044
\300\277\263\012\227\035\147\111\132\042\262\147\004\234\130\251
\370\014\064\134\100\226\264\207\265\105\141\031\345\216\357\006
\336\221\025\300\270\212\312\224\311\012\165\175\161\073\130\201
\063\310\367\007\101\125\230\051\103\265\313\232\103\351\162\372
\317\360\213\061\274\347\357\271\152\343\101\235\041\076\015\025
\250\205\275\033\116\207\216\107\262\020\376\067\030\152\204\345
\211\034\024\143\350\271\203\251\265\273\350\143\232\172\031\214
\313\164\367\370\027\010\361\213\031\330\264\354\036\156\111\163
\077\134\040\335\065\052\226\167\351\106\157\026\073\313\251\357
\233\012\041\021\310\303\244\311\043\105\155\077\142\225\235\323
\050\307\235\017\263\376\067\215\035\110\262\120\346\045\271\116
\063\141\066\326\026\034\312\062\067\040\166\034\054
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "BYTE Root Certification Authority 001"
# Issuer: CN=BYTE Root Certification Authority 001,O=BYTE Computer S.A.,C=GR
# Serial Number:71:8c:2f:39:7c:40:74:40
# Subject: CN=BYTE Root Certification Authority 001,O=BYTE Computer S.A.,C=GR
# Not Valid Before: Wed Sep 10 22:01:54 2014
# Not Valid After: Sat Sep 10 22:01:54 2039
# Fingerprint (MD5): fa:fb:82:6a:e5:b3:a2:83:50:9b:83:28:b6:41:42:03
# Fingerprint (SHA1): 3f:0f:eb:17:a7:ef:58:04:cf:d9:0a:77:b7:bb:02:1e:a6:9c:64:18
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "BYTE Root Certification Authority 001"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\077\017\353\027\247\357\130\004\317\331\012\167\267\273\002\036
\246\234\144\030
END

```
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\372\373\202\152\345\263\242\203\120\233\203\050\266\101\102\003
END
CKA_ISSUER MULTILINE_OCTAL
\060\132\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\033\060\031\006\003\125\004\012\014\022\102\131\124\105\040\103
\157\155\160\165\164\145\162\040\123\056\101\056\061\056\060\054
\006\003\125\004\003\014\045\102\131\124\105\040\122\157\157\164
\040\103\145\162\164\151\146\151\143\141\164\151\157\156\040\101
\165\164\150\157\162\151\164\171\040\060\060\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\161\214\057\071\174\100\164\100
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "CISRCA1"
# Issuer: CN=CISRCA1,OU=Certification Authorities,O=Carillon
 Information Security Inc.,C=CA
# Serial Number:0b:82:dc:94:33:76
# Subject: CN=CISRCA1,OU=Certification Authorities,O=Carillon Information Security Inc.,C=CA
# Not Valid Before: Tue Oct 16 18:28:33 2012
# Not Valid After: Sat Oct 16 18:28:33 2032
# Fingerprint (MD5): 21:48:4b:8f:d5:50:78:27:86:80:c9:86:93:ad:b1:38
# Fingerprint (SHA1): a6:9e:03:36:c4:e5:90:23:ff:65:3c:71:f9:28:eb:73:f2:1c:00:f0
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CISRCA1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\160\061\013\060\011\006\003\125\004\006\023\002\103\101\061
\053\060\051\006\003\125\004\012\023\042\103\141\162\151\154\154
\157\156\040\111\156\146\157\162\155\141\164\151\157\156\040\123
\145\143\165\162\151\164\171\040\111\156\143\056\061\042\060\040
\006\003\125\004\013\023\031\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\151\145\163
\061\020\060\016\006\003\125\004\003\023\007\103\111\123\122\103
\101\061
END
CKA_ID
```

UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\160\061\013\060\011\006\003\125\004\006\023\002\103\101\061
\053\060\051\006\003\125\004\012\023\042\103\141\162\151\154\154
\157\156\040\111\156\146\157\162\155\141\164\151\157\156\040\123
\145\143\165\162\151\164\171\040\111\156\143\056\061\042\060\040
\006\003\125\004\013\023\031\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\151\145\163
\061\020\060\016\006\003\125\004\003\023\007\103\111\123\122\103
\101\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\006\013\202\334\224\063\166
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\242\060\202\003\212\240\003\002\001\002\002\006\013
\202\334\224\063\166\060\015\006\011\052\206\110\206\367\015\001
\001\013\005\000\060\160\061\013\060\011\006\003\125\004\006\023
\002\103\101\061\053\060\051\006\003\125\004\012\023\042\103\141
\162\151\154\154\157\156\040\111\156\146\157\162\155\141\164\151
\157\156\040\123\145\143\165\162\151\164\171\040\111\156\143\056
\061\042\060\040\006\003\125\004\013\023\031\103\145\162\164\151
\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162\151
\164\151\145\163\061\020\060\016\006\003\125\004\003\023\007\103
\111\123\122\103\101\061\060\036\027\015\061\062\061\060\061\066
\061\070\062\070\063\063\132\027\015\063\062\061\060\061\066\061
\070\062\070\063\063\132\060\160\061\013\060\011\006\003\125\004
\006\023\002\103\101\061\053\060\051\006\003\125\004\012\023\042
\103\141\162\151\154\154\157\156\040\111\156\146\157\162\155\141
\164\151\157\156\040\123\145\143\165\162\151\164\171\040\111\156
\143\056\061\042\060\040\006\003\125\004\013\023\031\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\151\145\163\061\020\060\016\006\003\125\004\003\023
\007\103\111\123\122\103\101\061\060\202\002\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000
\060\202\002\012\002\202\002\001\000\304\166\361\142\152\137\315
\051\315\004\066\177\156\141\176\163\364\235\146\337\042\132\232
\203\104\201\146\375\116\021\260\076\254\350\210\262\123\071\377
\343\272\276\324\377\323\205\330\275\133\257\150\117\063\254\270
\024\175\022\133\172\225\153\307\066\376\053\217\364\210\140\211
\072\252\131\070\114\301\135\125\201\245\337\330\037\061\172\323
\243\116\360\121\313\303\061\207\256\013\336\312\136\033\241\164
\070\360\222\167\161\074\313\023\176\240\301\012\230\275\330\270
\370\124\064\230\116\147\026\232\127\113\046\206\137\033\146\162
\252\301\362\150\202\235\130\101\174\161\042\342\317\001\061\376
\342\340\126\251\150\340\255\063\257\065\071\056\234\156\006\114
\363\043\166\057\151\046\350\005\071\151\267\365\110\032\367\337
\331\071\067\062\125\021\047\004\201\037\235\074\213\214\203\122

\167\301\256\054\315\053\052\112\345\055\361\031\151\272\207\136
\213\235\340\161\310\164\322\315\356\156\070\067\152\135\031\000
\322\166\335\242\353\156\073\252\035\365\066\006\117\137\136\154
\302\020\363\335\157\265\332\171\132\376\325\106\104\064\110\257
\206\000\064\174\044\204\335\105\220\371\026\202\254\250\221\324
\351\106\063\157\176\272\107\037\341\357\257\345\120\326\306\371
\247\355\154\227\252\053\051\116\135\305\370\036\366\164\311\253
\044\370\015\123\307\150\025\276\374\134\253\075\162\013\322\160
\004\267\026\343\151\251\361\147\272\306\000\114\173\200\064\065
\056\136\355\037\240\045\367\245\202\152\020\177\277\217\131\157
\303\106\246\312\102\116\102\043\205\006\071\065\214\265\361\327
\301\043\102\105\375\057\045\161\370\363\007\323\007\150\276\333
\230\154\052\366\245\107\367\260\145\140\255\256\174\346\021\035
\047\124\010\145\260\330\202\300\141\153\351\176\217\042\326\161
\035\153\101\040\145\330\127\232\037\174\016\132\124\340\224\260
\155\165\357\050\062\065\074\125\303\155\147\370\044\275\373\100
\363\132\235\066\331\065\114\273\342\153\331\261\066\017\344\157
\040\032\305\157\172\303\221\071\257\257\314\363\366\275\040\206
\272\323\044\041\074\037\067\051\346\237\374\032\277\230\337\074
\272\040\041\022\251\302\072\052\223\002\003\001\000\001\243\102
\060\100\060\035\006\003\125\035\016\004\026\004\024\352\225\025
\332\134\071\000\342\232\333\304\272\055\147\372\241\367\165\064
\355\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\306\060\015\006\011\052\206\110\206\367\015\001\001\013\005
\000\003\202\002\001\000\065\320\330\270\236\362\011\370\360\237
\262\156\110\262\327\352\241\233\050\211\071\315\376\026\152\035
\351\234\202\137\121\107\072\365\236\321\274\256\037\237\342\134
\112\310\354\355\106\102\361\174\103\007\025\337\156\227\366\355
\206\374\237\305\010\136\202\016\243\056\250\012\056\274\216\033
\061\022\050\366\171\050\301\042\266\321\225\151\100\350\131\011
\047\242\221\144\166\352\320\023\215\160\374\145\303\157\021\237
\052\110\312\247\142\365\203\024\345\032\026\307\221\213\264\011
\305\316\173\343\344\035\155\227\242\351\313\046\036\153\264\334
\076\203\166\057\136\115\250\150\211\124\375\116\322\106\250\100
\366\330\312\170\317\066\032\075\131\145\214\233\365\053\037\114
\202\337\170\170\115\046\112\107\151\255\157\063\037\003\036\042
\116\331\006\131\236\106\374\120\065\137\306\205\033\344\033\370
\000\311\340\323\072\253\046\103\315\107\372\132\370\205\013\307
\062\332\265\015\055\060\051\072\171\263\024\351\245\017\160\045
\321\215\011\120\224\355\115\222\236\060\067\100\333\132\170\111
\217\017\071\057\275\056\327\253\010\224\311\051\212\367\335\214
\275\202\174\060\133\142\350\065\106\126\070\135\221\366\016\157
\214\356\225\237\375\164\235\355\355\020\253\316\213\217\267\255
\177\115\151\111\360\307\021\125\233\232\202\367\242\372\063\362
\104\021\372\025\113\106\251\233\153\227\102\326\264\267\011\021
\024\171\123\246\347\177\055\047\072\012\064\044\104\316\125\214
\172\200\165\163\002\113\342\372\106\224\175\063\024\015\102\126

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\271\240\346\057\205\110\221\237\104\272\241\050\251\261\037\211
\172\046\012\123\134\205\271\174\204\230\214\050\140\245\266\172
\215\075\240\000\075\334\177\252\110\351\250\056\254\137\336\207
\055\134\244\153\026\352\275\350\225\265\316\170\011\370\161\066
\345\220\150\322\007\226\272\274\000\213\016\230\155\115\160\123
\300\303\314\033\023\234\110\232\231\075\022\300\047\216\141\222
\114\150\122\157\215\003\034\211\365\323\206\300\377\161\111\117
\040\153\375\321\157\221\044\365\361\107\043\115\131\337\320\275
\111\102\375\100\070\076\342\361\005\134\045\350\020\344\132\002
\003\343\273\174\045\052
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "CISRCA1"
# Issuer: CN=CISRCA1,OU=Certification Authorities,O=Carillon Information Security Inc.,C=CA
# Serial Number:0b:82:dc:94:33:76
# Subject: CN=CISRCA1,OU=Certification Authorities,O=Carillon Information
 Security Inc.,C=CA
# Not Valid Before: Tue Oct 16 18:28:33 2012
# Not Valid After: Sat Oct 16 18:28:33 2032
# Fingerprint (MD5): 21:48:4b:8f:d5:50:78:27:86:80:c9:86:93:ad:b1:38
# Fingerprint (SHA1): a6:9e:03:36:c4:e5:90:23:ff:65:3c:71:f9:28:eb:73:f2:1c:00:f0
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CISRCA1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\246\236\003\066\304\345\220\043\377\145\074\161\371\050\353\163
\362\034\000\360
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\041\110\113\217\325\120\170\047\206\200\311\206\223\255\261\070
END
CKA_ISSUER MULTILINE_OCTAL
\060\160\061\013\060\011\006\003\125\004\006\023\002\103\101\061
\053\060\051\006\003\125\004\012\023\042\103\141\162\151\154\154
\157\156\040\111\156\146\157\162\155\141\164\151\157\156\040\123
\145\143\165\162\151\164\171\040\111\156\143\056\061\042\060\040
\006\003\125\004\013\023\031\103\145\162\164\151\146\151\143\141
\164\151\157\156\040\101\165\164\150\157\162\151\164\151\145\163
\061\020\060\016\006\003\125\004\003\023\007\103\111\123\122\103
\101\061
END
```

CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\006\013\202\334\224\063\166
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "ePKI Root Certification Authority - G2"
# Issuer: CN=ePKI Root Certification Authority - G2,O=Chunghwa Telecom Co.\, Ltd.,C=TW
# Serial Number:d6:96:2e:c1:0a:15:93:12:af:8f:63:bc:d4:44:c9:5b
# Subject: CN=ePKI Root Certification Authority - G2,O=Chunghwa Telecom Co.\, Ltd.,C=TW
# Not Valid Before: Tue Nov 17 08:23:42 2015
# Not Valid After: Thu Dec 31 15:59:59 2037
# Fingerprint (MD5): 7d:f0:01:73:ed:fc:31:9d:16:86:7b:35:c7:26:dd:72
# Fingerprint (SHA1): d9:9b:10:42:98:59:47:63:f0:b9:a9:27:b7:92:69:cb:47:dd:15:8b
CKA_CLASS
CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ePKI Root Certification Authority - G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\043\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150
\167\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040
\114\164\144\056\061\057\060\055\006\003\125\004\003\014\046\145
\120\113\111\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\040\055\040\107\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\043\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150
\167\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040
\114\164\144\056\061\057\060\055\006\003\125\004\003\014\046\145
\120\113\111\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\040\055\040\107\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\021\000\326\226\056\301\012\025\223\022\257\217\143\274\324
\104\311\133

END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\223\060\202\003\173\240\003\002\001\002\002\021\000
\326\226\056\301\012\025\223\022\257\217\143\274\324\104\311\133
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\143\061\013\060\011\006\003\125\004\006\023\002\124\127\061\043
\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150\167
\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040\114
\164\144\056\061\057\060\055\006\003\125\004\003\014\046\145\120
\113\111\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171\040
\055\040\107\062\060\036\027\015\061\065\061\061\061\067\060\070
\062\063\064\062\132\027\015\063\067\061\062\063\061\061\065\065
\071\065\071\132\060\143\061\013\060\011\006\003\125\004\006\023
\002\124\127\061\043\060\041\006\003\125\004\012\014\032\103\150
\165\156\147\150\167\141\040\124\145\154\145\143\157\155\040\103
\157\056\054\040\114\164\144\056\061\057\060\055\006\003\125\004
\003\014\046\145\120\113\111\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171\040\055\040\107\062\060\202\002\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017
\000\060\202\002\012\002\202\002\001\000\244\131\037\240\057\337
\276\340\373\351\334\265\211\376\132\227\003\311\072\167\247\216
\134\257\362\343\030\071\365\252\335\017\106\322\150\017\127\234
\247\143\140\323\130\316\065\302\247\366\210\302\117\177\033\050
\351\320\247\000\304\027\115\155\342\017\305\016\046\043\040\253
\367\072\050\242\114\012\013\314\216\316\346\000\232\132\100\015
\324\120\032\233\321\015\234\224\371\333\356\134\320\361\212\007
\315\232\053\100\054\111\244\135\142\137\247\153\337\356\126\010
\120\363\102\030\154\061\260\136\345\234\163\222\274\016\322\014
\175\305\070\127\274\273\130\333\046\031\002\355\343\103\204\212
\116\126\153\333\255\241\061\331\314\042\147\226\170\377\167\235
\314\144\305\062\040\152\357\116\060\325\044\045\375\210\171\257
\161\032\376\325\113\033\025\210\274\030\160\252\275\255\070\012
\146\060\106\345\211\205\325\166\044\251\251\263\346\131\140\017
\264\251\123\302\072\235\105\032\326\256\343\167\136\304\142\066
\063\057\060\304\277\225\361\055\070\245\165\350\321\152\223\056
\105\207\113\112\242\337\277\130\047\232\312\142\031\252\136\324
\261\200\111\226\335\053\354\137\217\233\340\235\227\210\365\204
\003\243\257\263\245\163\055\101\272\345\007\267\157\153\161\367
\367\311\132\257\151\231\263\057\310\117\102\353\154\153\161\147
\170\337\012\254\117\327\112\205\000\106\032\325\315\270\237\352
\225\235\017\174\321\306\005\205\346\010\336\210\027\201\366\325
\265\156\352\241\034\327\141\252\343\131\102\211\234\131\176\261
\174\144\064\335\141\043\052\071\265\020\253\374\206\251\123\032
\305\353\152\342\200\116\131\221\300\070\211\376\263\135\326\373
\221\351\327\260\175\331\170\010\314\365\053\314\053\341\241\326
\224\163\301\376\121\364\214\175\012\265\232\212\271\365\332\340

\311\263\330\217\252\202\203\215\151\123\055\375\000\004\030\112
\240\332\124\341\171\214\211\353\177\365\202\347\240\271\167\115
\256\371\272\002\073\210\166\353\174\135\263\132\023\333\174\051
\026\153\231\321\035\344\110\041\242\015\136\001\210\350\276\361
\230\115\076\307\026\127\034\137\341\010\157\034\114\130\103\126
\367\200\145\214\161\016\242\004\147\117\002\003\001\000\001\243
\102\060\100\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\035\006\003\125\035\016\004\026\004\024\162
\133\272\252\162\070\356\045\220\044\265\224\042\372\011\210\312
\213\012\373\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\003\202\002\001\000\006\243\361\266\163\125\306\147\146
\041\345\235\133\326\224\056\112\042\140\362\124\001\220\241\375
\265\277\300\225\277\030\137\054\366\153\065\016\374\061\310\355
\104\016\222\227\334\257\335\126\317\265\037\272\162\234\060\310
\233\261\221\300\166\167\324\017\032\225\032\351\115\024\210\241
\317\153\002\246\152\353\144\105\115\144\215\336\374\353\154\362
\123\011\241\205\121\025\320\117\236\142\372\021\271\316\310\044
\016\162\144\210\165\064\043\060\052\077\274\074\071\314\314\335
\013\066\273\275\006\202\217\022\001\305\161\005\321\044\241\231
\154\312\344\367\252\355\212\327\247\012\255\257\360\340\200\273
\241\262\077\132\207\144\160\206\063\173\015\036\327\000\206\203
\103\227\165\365\073\301\110\375\266\016\103\250\002\156\270\076
\177\217\116\342\135\264\175\236\060\064\057\250\361\353\047\207
\150\015\132\012\115\001\333\311\024\130\225\362\232\115\026\252
\163\333\364\045\210\027\070\267\257\131\011\011\264\037\055\017
\253\365\270\047\125\356\105\060\063\270\355\033\216\274\210\154
\257\370\132\052\153\340\254\261\005\044\241\011\374\243\017\363
\260\055\173\226\272\266\224\007\025\105\216\051\334\130\016\251
\005\330\073\072\240\173\315\212\307\146\202\227\317\326\063\340
\147\374\246\333\100\057\005\345\305\213\172\052\172\360\260\066
\233\014\030\366\067\351\101\241\375\261\050\371\157\153\275\353
\037\114\143\161\173\120\335\051\362\377\356\367\307\105\137\350
\066\012\350\154\133\042\303\350\300\347\046\334\343\250\225\200
\345\271\072\023\333\000\113\032\375\256\063\107\176\170\224\343
\261\135\053\265\126\265\102\213\237\201\305\374\223\114\020\265
\272\012\274\176\067\343\372\124\155\365\004\305\160\263\251\004
\322\121\327\205\315\175\157\103\217\131\150\345\061\126\021\161
\371\144\051\011\023\376\320\037\274\213\000\070\262\320\312\064
\126\166\020\071\126\163\146\303\321\111\331\276\127\117\077\026
\175\152\170\267\250\202\270\133\316\256\205\212\012\102\014\003
\321\027\304\030\367\330\127\210\306\202\270\007\271\076\375\244
\351\056\334\157\272\220\222\356\145\260\120\064\323\007\332\001
\227\017\274\347\163\202\173
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

```
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "ePKI Root Certification Authority - G2"
# Issuer: CN=ePKI Root Certification Authority - G2,O=Chunghwa Telecom Co.\, Ltd.,C=TW
# Serial Number:d6:96:2e:c1:0a:15:93:12:af:8f:63:bc:d4:44:c9:5b
# Subject: CN=ePKI Root Certification Authority - G2,O=Chunghwa Telecom Co.\, Ltd.,C=TW
# Not Valid Before: Tue Nov 17 08:23:42 2015
# Not Valid After: Thu Dec 31 15:59:59 2037
# Fingerprint (MD5): 7d:f0:01:73:ed:fc:31:9d:16:86:7b:35:c7:26:dd:72
# Fingerprint (SHA1): d9:9b:10:42:98:59:47:63:f0:b9:a9:27:b7:92:69:cb:47:dd:15:8b
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ePKI Root Certification Authority
 - G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\331\233\020\102\230\131\107\143\360\271\251\047\267\222\151\313
\107\335\025\213
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\175\360\001\163\355\374\061\235\026\206\173\065\307\046\335\162
END
CKA_ISSUER MULTILINE_OCTAL
\060\143\061\013\060\011\006\003\125\004\006\023\002\124\127\061
\043\060\041\006\003\125\004\012\014\032\103\150\165\156\147\150
\167\141\040\124\145\154\145\143\157\155\040\103\157\056\054\040
\114\164\144\056\061\057\060\055\006\003\125\004\003\014\046\145
\120\113\111\040\122\157\157\164\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\040\055\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\326\226\056\301\012\025\223\022\257\217\143\274\324
\104\311\133
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL
 CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "SSL.com EV Root Certification Authority RSA"
# Issuer: CN=SSL.com EV Root Certification Authority RSA,O=SSL Corporation,L=Houston,ST=Texas,C=US
# Serial Number:1d:6c:11:eb:6f:da:39:9d
# Subject: CN=SSL.com EV Root Certification Authority RSA,O=SSL Corporation,L=Houston,ST=Texas,C=US
```

```
# Not Valid Before: Fri Feb 12 17:50:48 2016
# Not Valid After: Tue Feb 12 17:50:48 2041
# Fingerprint (MD5): ad:b7:7b:b6:c4:5a:d9:dd:9f:eb:b3:ef:3f:c6:31:31
# Fingerprint (SHA1): 1c:b7:ed:e1:76:bc:df:ef:0c:86:6f:46:fb:f9:80:e9:01:e5:ce:35
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com EV Root Certification Authority RSA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\064\060\062\006
\003\125\004\003\014\053\123\123\114\056\143\157\155\040\105\126
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\122\123
\101
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\064\060\062\006
\003\125\004\003\014\053\123\123\114\056\143\157\155\040\105\126
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\122\123
\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\035\154\021\353\157\332\071\235
END
CKA_VALUE
 MULTILINE_OCTAL
\060\202\005\343\060\202\003\313\240\003\002\001\002\002\010\035
\154\021\353\157\332\071\235\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\177\061\013\060\011\006\003\125\004
\006\023\002\125\123\061\016\060\014\006\003\125\004\010\014\005
\124\145\170\141\163\061\020\060\016\006\003\125\004\007\014\007
\110\157\165\163\164\157\156\061\030\060\026\006\003\125\004\012
\014\017\123\123\114\040\103\157\162\160\157\162\141\164\151\157
\156\061\064\060\062\006\003\125\004\003\014\053\123\123\114\056
\143\157\155\040\105\126\040\122\157\157\164\040\103\145\162\164
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\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\040\122\123\101\060\036\027\015\061\066\060\062\061
\062\061\067\065\060\064\070\132\027\015\064\061\060\062\061\062
\061\067\065\060\064\070\132\060\177\061\013\060\011\006\003\125
\004\006\023\002\125\123\061\016\060\014\006\003\125\004\010\014
\005\124\145\170\141\163\061\020\060\016\006\003\125\004\007\014
\007\110\157\165\163\164\157\156\061\030\060\026\006\003\125\004
\012\014\017\123\123\114\040\103\157\162\160\157\162\141\164\151
\157\156\061\064\060\062\006\003\125\004\003\014\053\123\123\114
\056\143\157\155\040\105\126\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157
\162\151\164\171\040\122\123\101\060\202\002\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000
\060\202\002\012\002\202\002\001\000\306\067\174\023\157\317\017
\331\120\317\346\327\252\150\057\134\121\324\277\315\114\246\325
\067\061\100\020\064\101\172\375\313\224\215\142\177\270\220\315
\316\151\226\072\304\377\331\327\143\346\320\204\045\200\021\277
\321\355\060\350\204\006\341\240\227\270\125\220\035\255\363\244
\232\033\116\234\021\367\365\331\326\217\140\052\076\067\370\165
\354\200\243\125\240\364\047\101\302\252\071\344\122\337\020\371
\365\145\071\077\214\235\314\173\047\317\006\024\167\116\075\122
\347\204\201\061\154\022\062\254\204\132\027\152\304\301\134\200
\061\302\332\107\173\166\017\102\350\347\042\024\323\215\304\133
\217\213\145\130\051\054\217\016\216\111\324\324\330\012\132\323
\046\323\011\216\330\103\262\224\117\322\300\034\335\164\142\021
\151\274\124\042\350\072\036\320\125\126\105\217\160\160\215\057
\357\302\135\275\136\124\335\056\173\351\030\213\212\111\331\117
\215\020\363\245\127\341\153\253\030\113\216\256\056\361\362\272
\365\135\101\367\071\330\243\302\135\336\237\132\261\057\104\223
\076\077\361\042\071\224\100\155\047\306\314\015\170\014\013\275
\052\126\046\255\051\127\270\161\344\177\353\023\262\310\175\365
\153\135\363\362\000\060\063\372\133\313\022\152\172\101\157\157
\011\114\267\151\015\017\171\043\043\032\146\215\131\066\143\226
\200\173\030\042\153\036\042\030\055\344\245\165\012\020\131\373
\243\176\046\020\123\306\310\031\056\036\047\030\373\060\005\075
\221\004\172\256\160\306\314\017\240\064\323\044\026\030\001\005
\147\151\345\105\321\126\250\233\277\257\372\254\125\010\014\002
\176\113\167\254\067\301\330\355\231\064\240\101\263\065\072\353
\061\064\311\073\337\304\075\051\105\065\124\270\177\226\317\010
\017\351\261\236\125\312\147\204\240\047\140\253\372\120\061\071
\325\173\312\266\232\355\221\214\170\036\371\356\340\342\131\101
\324\037\102\200\171\365\364\203\120\010\255\363\107\101\137\120
\243\237\211\363\264\047\052\124\271\032\131\153\011\234\121\300
\050\153\133\270\050\322\157\065\176\325\223\003\156\164\045\145
\352\026\005\221\001\361\007\143\117\253\204\305\162\331\315\150
\233\115\054\176\004\070\360\352\107\002\003\001\000\001\243\143
\060\141\060\035\006\003\125\035\016\004\026\004\024\331\132\052
\377\245\316\235\241\221\175\377\207\135\253\152\065\022\331\311

\114\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\037\006\003\125\035\043\004\030\060\026\200\024\331
\132\052\377\245\316\235\241\221\175\377\207\135\253\152\065\022
\331\311\114\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\206\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\003\202\002\001\000\274\214\317\043\372\275\063\127\226
\037\320\202\360\022\256\064\104\352\361\274\041\327\365\211\306
\064\036\170\246\342\121\337\335\170\200\325\352\155\306\252\157
\011\002\214\247\346\313\310\211\132\224\172\112\263\126\357\335
\335\123\062\143\360\151\357\335\100\271\220\242\056\003\167\226
\265\051\000\122\356\373\016\247\224\150\305\074\003\055\351\153
\252\235\356\247\330\147\222\342\021\132\070\337\230\146\243\240
\216\313\014\102\066\114\305\126\133\237\165\360\100\321\350\073
\052\010\233\122\303\034\137\220\064\127\373\306\371\035\161\374
\045\174\317\172\175\036\151\306\273\364\024\376\035\035\347\227
\242\206\233\362\337\127\222\006\122\144\223\051\131\012\057\241
\027\334\273\356\255\073\263\000\145\070\331\250\234\201\255\315
\065\234\213\351\342\364\204\217\016\317\215\161\155\000\200\071
\157\263\004\065\240\070\141\251\362\057\364\065\215\330\337\336
\244\151\060\372\240\046\174\132\042\171\360\150\376\313\315\274
\357\225\214\047\345\204\371\375\204\102\306\272\375\271\311\306
\132\161\060\166\066\002\037\320\174\251\023\016\341\040\331\122
\014\254\036\210\167\240\051\206\072\210\146\123\257\303\245\311
\333\124\261\244\350\356\114\156\077\271\173\060\243\102\350\002
\246\275\204\155\052\174\375\364\355\105\267\060\372\154\134\043
\126\132\074\141\052\307\233\346\305\362\104\267\007\277\166\235
\102\344\134\360\356\271\076\020\363\317\122\322\315\316\122\030
\177\140\366\056\225\114\065\000\114\106\326\020\354\064\313\130
\173\152\015\344\143\125\314\130\331\117\143\147\061\302\122\241
\171\017\052\317\311\116\314\022\313\215\032\132\252\106\061\023
\073\015\351\127\150\132\013\204\004\066\057\237\021\274\074\172
\255\132\277\106\343\267\040\211\035\334\007\174\334\172\353\351
\166\311\000\015\160\267\237\227\032\142\357\030\346\144\276\010
\247\244\231\273\177\214\150\232\230\311\206\142\366\241\230\066
\071\243\363\226\127\244\002\143\371\125\076\260\214\237\277\251
\172\113\074\331\271\256\017\212\364\272\034\045\253\125\131\241
\126\302\063\271\072\304\100\317\213\032\367\003\016\275\033\140
\143\175\045\324\251\276\345
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "SSL.com EV Root Certification Authority RSA"
# Issuer: CN=SSL.com EV Root Certification Authority RSA,O=SSL Corporation,L=Houston,ST=Texas,C=US
# Serial Number:1d:6c:11:eb:6f:da:39:9d

```
# Subject: CN=SSL.com EV Root Certification Authority RSA,O=SSL Corporation,L=Houston,ST=Texas,C=US
# Not Valid Before: Fri Feb 12 17:50:48 2016
# Not Valid After: Tue Feb 12 17:50:48 2041
# Fingerprint (MD5): ad:b7:7b:b6:c4:5a:d9:dd:9f:eb:b3:ef:3f:c6:31:31
# Fingerprint (SHA1): 1c:b7:ed:e1:76:bc:df:ef:0c:86:6f:46:fb:f9:80:e9:01:e5:ce:35
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
 CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com EV Root Certification Authority RSA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\034\267\355\341\166\274\337\357\014\206\157\106\373\371\200\351
\001\345\316\065
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\255\267\173\266\304\132\331\335\237\353\263\357\077\306\061\061
END
CKA_ISSUER MULTILINE_OCTAL
\060\177\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\016\060\014\006\003\125\004\010\014\005\124\145\170\141\163\061
\020\060\016\006\003\125\004\007\014\007\110\157\165\163\164\157
\156\061\030\060\026\006\003\125\004\012\014\017\123\123\114\040
\103\157\162\160\157\162\141\164\151\157\156\061\064\060\062\006
\003\125\004\003\014\053\123\123\114\056\143\157\155\040\105\126
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\151\157\156\040\101\165\164\150\157\162\151\164\171\040\122\123
\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\010\035\154\021\353\157\332\071\235
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "LuxTrust Global Root 2"
# Issuer: CN=LuxTrust Global Root 2,O=LuxTrust S.A.,C=LU
# Serial Number:0a:7e:a6:df:4b:44:9e:da:6a:24:85:9e:e6:b8:15:d3:16:7f:bb:b1
# Subject: CN=LuxTrust Global Root 2,O=LuxTrust S.A.,C=LU
# Not Valid Before: Thu Mar 05 13:21:57 2015
# Not Valid After: Mon Mar 05 13:21:57 2035
# Fingerprint (MD5): b2:e1:09:00:61:af:f7:f1:91:6f:c4:ad:8d:5e:3b:7c
# Fingerprint (SHA1): 1e:0e:56:19:0a:d1:8b:25:98:b2:04:44:ff:66:8a:04:17:99:5f:3f
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
```

CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "LuxTrust Global Root 2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\114\125\061
\026\060\024\006\003\125\004\012\014\015\114\165\170\124\162\165
\163\164\040\123\056\101\056\061\037\060\035\006\003\125\004\003
\014\026\114\165\170\124\162\165\163\164\040\107\154\157\142\141
\154\040\122\157\157\164\040\062
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\114\125\061
\026\060\024\006\003\125\004\012\014\015\114\165\170\124\162\165
\163\164\040\123\056\101\056\061\037\060\035\006\003\125\004\003
\014\026\114\165\170\124\162\165\163\164\040\107\154\157\142\141
\154\040\122\157\157\164\040\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\012\176\246\337\113\104\236\332\152\044\205\236\346\270
\025\323\026\177\273\261
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\303\060\202\003\253\240\003\002\001\002\002\024\012
\176\246\337\113\104\236\332\152\044\205\236\346\270\025\323\026
\177\273\261\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\106\061\013\060\011\006\003\125\004\006\023\002\114
\125\061\026\060\024\006\003\125\004\012\014\015\114\165\170\124
\162\165\163\164\040\123\056\101\056\061\037\060\035\006\003\125
\004\003\014\026\114\165\170\124\162\165\163\164\040\107\154\157
\142\141\154\040\122\157\157\164\040\062\060\036\027\015\061\065
\060\063\060\065\061\063\062\061\065\067\132\027\015\063\065\060
\063\060\065\061\063\062\061\065\067\132\060\106\061\013\060\011
\006\003\125\004\006\023\002\114\125\061\026\060\024\006\003\125
\004\012\014\015\114\165\170\124\162\165\163\164\040\123\056\101
\056\061\037\060\035\006\003\125\004\003\014\026\114\165\170\124
\162\165\163\164\040\107\154\157\142\141\154\040\122\157\157\164
\040\062\060\202\002\042\060\015\006\011\052\206\110\206\367\015
\001\001\001\005\000\003\202\002\017\000\060\202\002\012\002\202
\002\001\000\327\205\227\277\021\230\351\360\142\203\114\074\207
\371\123\152\067\013\362\017\074\207\316\157\334\046\051\275\305
\211\272\311\203\075\367\356\312\133\306\155\111\163\264\311\106
\243\033\064\023\077\301\211\105\127\364\331\261\373\066\145\113
\373\010\342\110\161\021\310\156\073\236\235\337\211\145\067\246
\205\366\073\104\030\266\306\067\060\142\104\222\227\151\175\102

\060\044\344\015\014\211\153\143\336\305\341\337\116\251\024\154
\123\340\141\316\366\027\057\035\074\275\346\042\114\035\223\365
\020\304\241\166\354\152\336\305\154\337\226\264\126\100\102\300
\142\222\060\241\055\025\224\240\322\040\006\011\156\152\155\345
\353\267\276\324\360\361\025\174\213\346\116\272\023\314\113\047
\136\231\074\027\135\217\201\177\063\075\117\323\077\033\354\134
\077\360\074\114\165\156\362\246\325\235\332\055\007\143\002\306
\162\351\224\274\114\111\225\117\210\122\310\333\350\151\202\370
\314\064\133\042\360\206\247\211\275\110\012\155\146\201\155\310
\310\144\373\001\341\364\341\336\331\236\335\333\133\324\052\231
\046\025\033\036\114\222\051\202\236\325\222\201\222\101\160\031
\367\244\345\223\113\274\167\147\061\335\034\375\061\160\015\027
\231\014\371\014\071\031\052\027\265\060\161\125\325\017\256\130
\341\075\057\064\233\317\237\366\170\205\302\223\172\162\076\146
\217\234\026\021\140\217\236\211\157\147\276\340\107\132\073\014
\232\147\213\317\106\306\256\070\243\362\247\274\346\326\205\153
\063\044\160\042\113\313\010\233\273\310\370\002\051\035\276\040
\014\106\277\153\207\233\263\052\146\102\065\106\154\252\272\255
\371\230\173\351\120\125\024\061\277\261\332\055\355\200\255\150
\044\373\151\253\330\161\023\060\346\147\263\207\100\375\211\176
\362\103\321\021\337\057\145\057\144\316\137\024\271\261\277\061
\275\207\170\132\131\145\210\252\374\131\062\110\206\326\114\271
\051\113\225\323\166\363\167\045\155\102\034\070\203\115\375\243
\137\233\177\055\254\171\033\016\102\061\227\143\244\373\212\151
\325\042\015\064\220\060\056\250\264\340\155\266\224\254\274\213
\116\327\160\374\305\070\216\144\045\341\115\071\220\316\311\207
\204\130\161\002\003\001\000\001\243\201\250\060\201\245\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\102\006\003\125\035\040\004\073\060\071\060\067\006\007\053\201
\053\001\001\001\012\060\054\060\052\006\010\053\006\001\005\005
\007\002\001\026\036\150\164\164\160\163\072\057\057\162\145\160
\157\163\151\164\157\162\171\056\154\165\170\164\162\165\163\164
\056\154\165\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\037\006\003\125\035\043\004\030\060\026\200\024
\377\030\050\166\371\110\005\054\241\256\361\053\033\053\262\123
\370\113\174\263\060\035\006\003\125\035\016\004\026\004\024\377
\030\050\166\371\110\005\054\241\256\361\053\033\053\262\123\370
\113\174\263\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\003\202\002\001\000\152\031\024\355\156\171\301\054\207
\324\015\160\176\327\366\170\311\013\004\116\304\261\316\223\160
\376\260\124\300\062\315\231\060\144\027\277\017\345\342\063\375
\007\066\100\162\016\032\266\152\131\326\000\345\150\040\335\056
\162\015\037\152\144\061\040\204\175\111\246\132\067\353\105\311
\205\365\324\307\027\231\007\346\233\125\344\014\350\251\264\316
\214\133\265\021\134\317\212\016\015\326\254\167\201\376\062\234
\044\236\162\316\124\363\320\157\242\126\326\354\303\067\054\145
\130\276\127\000\032\362\065\372\353\173\061\135\302\301\022\075
\226\201\210\226\211\301\131\134\172\346\177\160\064\347\203\342

\261\341\341\270\130\357\324\225\344\140\234\360\226\227\162\214
\353\204\002\056\145\217\244\267\322\177\147\335\310\323\236\134
\252\251\244\240\045\024\006\233\354\117\176\055\013\177\035\165
\361\063\330\355\316\270\165\155\076\133\271\230\035\061\015\126
\330\103\017\060\221\262\004\153\335\126\276\225\200\125\147\276
\330\315\203\331\030\356\056\017\206\055\222\236\160\023\354\336
\121\311\103\170\002\245\115\310\371\137\304\221\130\106\026\167
\132\164\252\100\274\007\237\060\271\261\367\022\027\335\343\377
\044\100\035\172\152\321\117\030\012\252\220\035\353\100\036\337
\241\036\104\222\020\232\362\215\341\321\113\106\236\350\105\102
\227\352\105\231\363\354\146\325\002\372\362\246\112\044\252\336
\316\271\312\371\077\223\157\371\243\272\352\245\076\231\255\375
\377\173\231\365\145\356\360\131\050\147\327\220\225\244\023\204
\251\204\301\350\316\316\165\223\143\032\274\074\352\325\144\037
\055\052\022\071\306\303\132\062\355\107\221\026\016\274\070\301
\120\336\217\312\052\220\064\034\356\101\224\234\136\031\056\370
\105\111\231\164\221\260\004\157\343\004\132\261\253\052\253\376
\307\320\226\266\332\341\112\144\006\156\140\115\275\102\116\377
\170\332\044\312\033\264\327\226\071\154\256\361\016\252\247\175
\110\213\040\114\317\144\326\270\227\106\260\116\321\052\126\072
\240\223\275\257\200\044\340\012\176\347\312\325\312\350\205\125
\334\066\052\341\224\150\223\307\146\162\104\017\200\041\062\154
\045\307\043\200\203\012\353
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "LuxTrust Global Root 2"
# Issuer:
 CN=LuxTrust Global Root 2,O=LuxTrust S.A.,C=LU
# Serial Number:0a:7e:a6:df:4b:44:9e:da:6a:24:85:9e:e6:b8:15:d3:16:7f:bb:b1
# Subject: CN=LuxTrust Global Root 2,O=LuxTrust S.A.,C=LU
# Not Valid Before: Thu Mar 05 13:21:57 2015
# Not Valid After: Mon Mar 05 13:21:57 2035
# Fingerprint (MD5): b2:e1:09:00:61:af:f7:f1:91:6f:c4:ad:8d:5e:3b:7c
# Fingerprint (SHA1): 1e:0e:56:19:0a:d1:8b:25:98:b2:04:44:ff:66:8a:04:17:99:5f:3f
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "LuxTrust Global Root 2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\036\016\126\031\012\321\213\045\230\262\004\104\377\146\212\004
\027\231\137\077
END

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CKA_CERT_MD5_HASH MULTILINE_OCTAL
\262\341\011\000\141\257\367\361\221\157\304\255\215\136\073\174
END
CKA_ISSUER MULTILINE_OCTAL
\060\106\061\013\060\011\006\003\125\004\006\023\002\114\125\061
\026\060\024\006\003\125\004\012\014\015\114\165\170\124\162\165
\163\164\040\123\056\101\056\061\037\060\035\006\003\125\004\003
\014\026\114\165\170\124\162\165\163\164\040\107\154\157\142\141
\154\040\122\157\157\164\040\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\024\012\176\246\337\113\104\236\332\152\044\205\236\346\270
\025\323\026\177\273\261
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "ACA ROOT"
# Issuer: CN=ACA ROOT,O=CONSEJO GENERAL DE LA ABOGACIA,2.5.4.5=Q2863006I,C=ES
# Serial Number:47:43:91:24:3f:ce:c3:0d:57:48:28:6b:ee:80:5d:ab
# Subject: CN=ACA ROOT,O=CONSEJO GENERAL DE LA ABOGACIA,2.5.4.5=Q2863006I,C=ES
# Not Valid Before: Fri May 27 10:58:51 2016
# Not Valid After: Mon May 27 10:58:51 2041
# Fingerprint (MD5): cc:49:10:f6:2f:f5:db:be:2f:8c:51:f3:8f:74:7c:12
# Fingerprint (SHA1): d4:96:59:2b:30:57:07:38:6c:c5:f3:cd:b2:59:ae:66:d7:66:1f:ca
CKA_CLASS
 CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ACA ROOT"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\022\060\020\006\003\125\004\005\023\011\121\062\070\066\063\060
\060\066\111\061\047\060\045\006\003\125\004\012\014\036\103\117
\116\123\105\112\117\040\107\105\116\105\122\101\114\040\104\105
\040\114\101\040\101\102\117\107\101\103\111\101\061\021\060\017
\006\003\125\004\003\014\010\101\103\101\040\122\117\117\124
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\022\060\020\006\003\125\004\005\023\011\121\062\070\066\063\060
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\060\066\111\061\047\060\045\006\003\125\004\012\014\036\103\117
\116\123\105\112\117\040\107\105\116\105\122\101\114\040\104\105
\040\114\101\040\101\102\117\107\101\103\111\101\061\021\060\017
\006\003\125\004\003\014\010\101\103\101\040\122\117\117\124
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\107\103\221\044\077\316\303\015\127\110\050\153\356\200
\135\253
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\310\060\202\003\260\240\003\002\001\002\002\020\107
\103\221\044\077\316\303\015\127\110\050\153\356\200\135\253\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\135
\061\013\060\011\006\003\125\004\006\023\002\105\123\061\022\060
\020\006\003\125\004\005\023\011\121\062\070\066\063\060\060\066
\111\061\047\060\045\006\003\125\004\012\014\036\103\117\116\123
\105\112\117\040\107\105\116\105\122\101\114\040\104\105\040\114
\101\040\101\102\117\107\101\103\111\101\061\021\060\017\006\003
\125\004\003\014\010\101\103\101\040\122\117\117\124\060\036\027
\015\061\066\060\065\062\067\061\060\065\070\065\061\132\027\015
\064\061\060\065\062\067\061\060\065\070\065\061\132\060\135\061
\013\060\011\006\003\125\004\006\023\002\105\123\061\022\060\020
\006\003\125\004\005\023\011\121\062\070\066\063\060\060\066\111
\061\047\060\045\006\003\125\004\012\014\036\103\117\116\123\105
\112\117\040\107\105\116\105\122\101\114\040\104\105\040\114\101
\040\101\102\117\107\101\103\111\101\061\021\060\017\006\003\125
\004\003\014\010\101\103\101\040\122\117\117\124\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\271\053\136
\365\076\272\211\036\235\365\321\023\317\273\243\136\272\351\337
\071\162\144\230\122\207\151\245\266\336\341\277\224\105\276\305
\370\244\123\147\025\120\334\122\117\052\166\054\056\215\040\152
\214\346\135\271\331\150\276\221\033\272\151\003\030\255\030\116
\066\242\254\106\253\040\370\003\152\252\255\171\325\337\035\301
\356\105\157\041\164\371\115\261\261\075\220\073\074\062\200\355
\377\025\317\121\312\327\244\207\056\252\345\016\266\321\172\132
\307\271\370\121\273\331\224\335\076\306\206\116\012\376\073\211
\362\370\156\044\316\221\003\130\005\022\112\335\120\253\101\172
\316\355\251\037\021\123\036\245\023\333\141\360\365\252\200\336
\164\171\035\244\343\051\326\373\340\374\227\332\242\270\253\042
\076\145\260\041\304\345\305\020\104\207\262\343\340\052\202\056
\175\346\364\270\244\023\045\363\167\140\137\143\123\256\056\261
\235\212\153\166\173\072\161\275\222\201\066\260\234\202\361\367
\305\211\050\135\377\274\102\006\263\010\152\117\141\315\244\055
\220\323\071\270\167\377\310\307\243\171\273\003\271\221\003\001
\064\022\330\060\213\266\214\002\312\344\110\354\070\052\062\114
\155\312\166\050\132\206\012\272\324\040\216\257\240\137\040\055

\142\234\210\371\361\025\155\133\275\261\003\120\300\077\066\327
\256\077\121\321\312\343\130\146\104\346\243\233\167\056\061\372
\331\177\042\304\005\114\353\164\033\134\143\172\246\002\223\176
\103\016\166\024\017\115\157\062\225\210\200\222\122\227\024\365
\074\374\224\007\323\154\051\005\225\106\017\344\161\341\177\370
\155\024\022\202\222\265\363\123\076\231\021\227\107\166\112\011
\162\356\324\303\226\011\254\332\377\361\113\113\266\327\045\317
\036\114\227\046\013\064\273\266\224\361\054\144\161\137\211\362
\025\073\067\247\002\344\015\117\110\211\063\243\214\150\170\061
\121\147\012\031\333\264\342\164\057\075\172\363\167\000\237\161
\022\143\377\163\052\144\151\124\354\254\072\256\332\362\130\143
\064\176\370\074\136\300\102\072\245\333\263\250\324\132\301\116
\130\270\151\266\254\202\142\333\321\373\032\103\041\042\374\035
\365\234\117\116\073\345\215\377\166\132\043\136\133\002\003\001
\000\001\243\201\203\060\201\200\060\017\006\003\125\035\023\001
\001\377\004\005\060\003\001\001\377\060\016\006\003\125\035\017
\001\001\377\004\004\003\002\001\006\060\035\006\003\125\035\016
\004\026\004\024\032\125\344\025\061\342\061\233\021\324\210\161
\172\000\075\160\050\005\277\315\060\076\006\003\125\035\040\004
\067\060\065\060\063\006\004\125\035\040\000\060\053\060\051\006
\010\053\006\001\005\005\007\002\001\026\035\150\164\164\160\072
\057\057\167\167\167\056\141\143\141\142\157\147\141\143\151\141
\056\157\162\147\057\144\157\143\060\015\006\011\052\206\110\206
\367\015\001\001\013\005\000\003\202\002\001\000\173\060\312\125
\206\323\257\356\032\327\270\225\230\354\371\073\335\220\023\243
\234\222\105\240\222\211\151\241\161\221\274\161\205\207\240\055
\060\011\344\302\123\075\364\251\267\150\055\115\231\315\244\317
\236\073\220\235\232\012\051\015\052\102\301\075\133\153\100\202
\305\213\023\261\101\147\217\276\244\167\340\300\166\344\363\266
\051\126\054\357\161\117\302\144\361\332\264\013\312\320\071\137
\123\262\203\001\373\262\175\331\203\164\172\065\320\301\135\217
\233\367\136\347\122\337\356\252\067\223\253\331\075\175\036\361
\275\034\333\350\165\335\270\133\114\343\026\243\366\165\210\016
\217\074\303\013\154\333\140\131\344\005\253\050\106\367\146\151
\045\167\336\312\112\063\330\130\136\173\217\232\317\122\216\075
\155\375\321\262\275\076\171\127\206\036\104\034\007\115\364\302
\020\252\170\313\363\121\027\015\166\075\215\156\150\111\351\357
\007\111\321\270\026\311\171\235\314\256\013\005\107\172\375\230
\254\061\241\220\132\207\142\371\370\253\142\132\340\041\166\320
\150\102\350\034\276\162\201\360\306\147\175\176\164\074\325\125
\157\217\245\150\226\021\361\312\323\060\027\275\106\266\061\257
\160\351\244\204\067\127\272\011\074\056\331\013\023\126\007\076
\225\304\265\160\057\223\302\256\257\201\135\106\024\060\373\256
\305\363\232\367\101\172\261\336\113\026\331\105\165\107\002\174
\024\036\325\261\073\240\054\101\265\233\113\173\243\203\360\271
\314\316\036\224\267\136\056\043\006\225\221\034\070\107\034\355
\304\170\016\244\017\374\033\174\326\362\153\320\212\133\352\226
\363\061\324\136\152\304\224\270\060\237\225\341\007\211\270\210

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\322\047\205\244\141\164\345\250\104\061\172\040\165\350\370\330
\353\263\117\252\377\123\077\226\355\352\273\374\121\100\246\053
\354\044\241\373\371\104\215\043\347\246\227\000\017\313\244\152
\277\120\240\312\161\242\154\256\157\337\331\203\202\146\334\123
\135\257\372\124\367\203\377\253\077\211\225\247\264\155\363\017
\012\015\110\063\057\201\051\307\113\005\304\306\127\164\204\303
\230\066\377\357\205\062\253\142\234\023\321\042\207\261\276\230
\333\164\232\217\352\302\326\223\171\105\040\303
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "ACA ROOT"
# Issuer: CN=ACA ROOT,O=CONSEJO GENERAL DE LA ABOGACIA,2.5.4.5=Q2863006I,C=ES
# Serial Number:47:43:91:24:3f:ce:c3:0d:57:48:28:6b:ee:80:5d:ab
# Subject: CN=ACA ROOT,O=CONSEJO GENERAL DE LA ABOGACIA,2.5.4.5=Q2863006I,C=ES
# Not Valid Before: Fri May 27 10:58:51 2016
# Not Valid After: Mon May 27 10:58:51 2041
# Fingerprint (MD5): cc:49:10:f6:2f:f5:db:be:2f:8c:51:f3:8f:74:7c:12
# Fingerprint (SHA1): d4:96:59:2b:30:57:07:38:6c:c5:f3:cd:b2:59:ae:66:d7:66:1f:ca
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL
 CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "ACA ROOT"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\324\226\131\053\060\127\007\070\154\305\363\315\262\131\256\146
\327\146\037\312
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\314\111\020\366\057\365\333\276\057\214\121\363\217\164\174\022
END
CKA_ISSUER MULTILINE_OCTAL
\060\135\061\013\060\011\006\003\125\004\006\023\002\105\123\061
\022\060\020\006\003\125\004\005\023\011\121\062\070\066\063\060
\060\066\111\061\047\060\045\006\003\125\004\012\014\036\103\117
\116\123\105\112\117\040\107\105\116\105\122\101\114\040\104\105
\040\114\101\040\101\102\117\107\101\103\111\101\061\021\060\017
\006\003\125\004\003\014\010\101\103\101\040\122\117\117\124
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\107\103\221\044\077\316\303\015\127\110\050\153\356\200
\135\253
END
```

CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED
CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "CHAMBERS OF COMMERCE ROOT - 2016"
# Issuer: CN=CHAMBERS OF COMMERCE ROOT - 2016,O=AC CAMERFIRMA S.A.,2.5.4.97=VATES-A82743287,2.5.4.5=A82743287,OU=CHAMBERS OF COMMERCE ROOT - 2016,OU=see current address at www.camerfirma.com/address,L=MADRID,ST=MADRID,C=ES
# Serial Number:34:9a:2d:a1:82:06:b2:b3
# Subject: CN=CHAMBERS OF COMMERCE ROOT - 2016,O=AC CAMERFIRMA S.A.,2.5.4.97=VATES-A82743287,2.5.4.5=A82743287,OU=CHAMBERS OF COMMERCE ROOT - 2016,OU=see current address at www.camerfirma.com/address,L=MADRID,ST=MADRID,C=ES
# Not Valid Before: Thu Apr 14 07:35:48 2016
# Not Valid After: Sun Apr 08 07:35:48 2040
# Fingerprint (MD5): d9:84:45:a4:8b:62:ec:c1:fc:51:54:8a:d1:58:8d:e8
# Fingerprint (SHA1): 2d:e1:6a:56:77:ba:ca:39:e1:d6:8c:30:dc:b1:4a:be:22:a6:17:9b
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
UTF8 "CHAMBERS OF COMMERCE ROOT - 2016"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\202\001\014\061\013\060\011\006\003\125\004\006\023\002\105
\123\061\017\060\015\006\003\125\004\010\014\006\115\101\104\122
\111\104\061\017\060\015\006\003\125\004\007\014\006\115\101\104
\122\111\104\061\072\060\070\006\003\125\004\013\014\061\163\145
\145\040\143\165\162\162\145\156\164\040\141\144\144\162\145\163
\163\040\141\164\040\167\167\167\056\143\141\155\145\162\146\151
\162\155\141\056\143\157\155\057\141\144\144\162\145\163\163\061
\051\060\047\006\003\125\004\013\014\040\103\110\101\115\102\105
\122\123\040\117\106\040\103\117\115\115\105\122\103\105\040\122
\117\117\124\040\055\040\062\060\061\066\061\022\060\020\006\003
\125\004\005\023\011\101\070\062\067\064\063\062\070\067\061\030
\060\026\006\003\125\004\141\014\017\126\101\124\105\123\055\101
\070\062\067\064\063\062\070\067\061\033\060\031\006\003\125\004
\012\014\022\101\103\040\103\101\115\105\122\106\111\122\115\101
\040\123\056\101\056\061\051\060\047\006\003\125\004\003\014\040
\103\110\101\115\102\105\122\123\040\117\106\040\103\117\115\115
\105\122\103\105\040\122\117\117\124\040\055\040\062\060\061\066
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL

\060\202\001\014\061\013\060\011\006\003\125\004\006\023\002\105
\123\061\017\060\015\006\003\125\004\010\014\006\115\101\104\122
\111\104\061\017\060\015\006\003\125\004\007\014\006\115\101\104
\122\111\104\061\072\060\070\006\003\125\004\013\014\061\163\145
\145\040\143\165\162\162\145\156\164\040\141\144\144\162\145\163
\163\040\141\164\040\167\167\167\056\143\141\155\145\162\146\151
\162\155\141\056\143\157\155\057\141\144\144\162\145\163\163\061
\051\060\047\006\003\125\004\013\014\040\103\110\101\115\102\105
\122\123\040\117\106\040\103\117\115\115\105\122\103\105\040\122
\117\117\124\040\055\040\062\060\061\066\061\022\060\020\006\003
\125\004\005\023\011\101\070\062\067\064\063\062\070\067\061\030
\060\026\006\003\125\004\141\014\017\126\101\124\105\123\055\101
\070\062\067\064\063\062\070\067\061\033\060\031\006\003\125\004
\012\014\022\101\103\040\103\101\115\105\122\106\111\122\115\101
\040\123\056\101\056\061\051\060\047\006\003\125\004\003\014\040
\103\110\101\115\102\105\122\123\040\117\106\040\103\117\115\115
\105\122\103\105\040\122\117\117\124\040\055\040\062\060\061\066
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\010\064\232\055\241\202\006\262\263
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\340\060\202\004\310\240\003\002\001\002\002\010\064
\232\055\241\202\006\262\263\060\015\006\011\052\206\110\206\367
\015\001\001\013\005\000\060\202\001\014\061\013\060\011\006\003
\125\004\006\023\002\105\123\061\017\060\015\006\003\125\004\010
\014\006\115\101\104\122\111\104\061\017\060\015\006\003\125\004
\007\014\006\115\101\104\122\111\104\061\072\060\070\006\003\125
\004\013\014\061\163\145\145\040\143\165\162\162\145\156\164\040
\141\144\144\162\145\163\163\040\141\164\040\167\167\167\056\143
\141\155\145\162\146\151\162\155\141\056\143\157\155\057\141\144
\144\162\145\163\163\061\051\060\047\006\003\125\004\013\014\040
\103\110\101\115\102\105\122\123\040\117\106\040\103\117\115\115
\105\122\103\105\040\122\117\117\124\040\055\040\062\060\061\066
\061\022\060\020\006\003\125\004\005\023\011\101\070\062\067\064
\063\062\070\067\061\030\060\026\006\003\125\004\141\014\017\126
\101\124\105\123\055\101\070\062\067\064\063\062\070\067\061\033
\060\031\006\003\125\004\012\014\022\101\103\040\103\101\115\105
\122\106\111\122\115\101\040\123\056\101\056\061\051\060\047\006
\003\125\004\003\014\040\103\110\101\115\102\105\122\123\040\117
\106\040\103\117\115\115\105\122\103\105\040\122\117\117\124\040
\055\040\062\060\061\066\060\036\027\015\061\066\060\064\061\064
\060\067\063\065\064\070\132\027\015\064\060\060\064\060\070\060
\067\063\065\064\070\132\060\202\001\014\061\013\060\011\006\003
\125\004\006\023\002\105\123\061\017\060\015\006\003\125\004\010
\014\006\115\101\104\122\111\104\061\017\060\015\006\003\125\004
\007\014\006\115\101\104\122\111\104\061\072\060\070\006\003\125

\004\013\014\061\163\145\145\040\143\165\162\162\145\156\164\040
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\141\155\145\162\146\151\162\155\141\056\143\157\155\057\141\144
\144\162\145\163\163\061\051\060\047\006\003\125\004\013\014\040
\103\110\101\115\102\105\122\123\040\117\106\040\103\117\115\115
\105\122\103\105\040\122\117\117\124\040\055\040\062\060\061\066
\061\022\060\020\006\003\125\004\005\023\011\101\070\062\067\064
\063\062\070\067\061\030\060\026\006\003\125\004\141\014\017\126
\101\124\105\123\055\101\070\062\067\064\063\062\070\067\061\033
\060\031\006\003\125\004\012\014\022\101\103\040\103\101\115\105
\122\106\111\122\115\101\040\123\056\101\056\061\051\060\047\006
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\106\040\103\117\115\115\105\122\103\105\040\122\117\117\124\040
\055\040\062\060\061\066\060\202\002\042\060\015\006\011\052\206
\110\206\367\015\001\001\001\005\000\003\202\002\017\000\060\202
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\203\214\004\253\323\016\173\127\040\311\324\257\145\364\207\335
\060\010\327\316\101\243\166\012\333\212\106\344\246\375\355\010
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\041\266\165\232\334\136\366\016\231\374\370\302\337\101\216\057
\253\307\133\155\034\120\131\300\355\350\254\202\102\376\271\257
\057\014\101\121\234\275\000\156\144\121\262\073\345\066\253\225
\221\022\373\061\307\163\254\034\330\145\166\073\316\033\114\116
\260\037\040\006\373\120\264\373\233\241\171\216\026\225\343\237
\353\030\113\204\253\071\223\315\067\203\320\351\174\013\047\217
\355\102\010\351\206\106\062\254\232\046\151\160\141\055\030\275
\077\120\360\236\366\150\120\116\151\225\160\301\355\223\251\227
\116\051\242\272\335\302\237\156\111\010\053\243\372\043\361\051
\136\260\175\061\131\233\355\214\315\246\156\370\370\367\330\030
\350\332\126\351\110\362\100\164\176\236\315\040\257\024\044\131
\356\167\065\205\277\112\231\112\251\165\335\263\046\343\006\316
\175\157\113\144\243\166\064\031\076\024\157\205\124\070\342\213
\055\100\265\144\146\037\127\063\034\160\315\303\264\050\132\024
\043\134\374\270\275\263\376\073\022\137\366\271\214\035\310\224
\012\126\333\162\176\357\047\007\015\000\264\277\175\231\077\115
\105\263\233\367\035\031\320\117\004\372\307\163\224\210\175\213
\024\052\231\340\351\231\222\011\306\326\001\153\267\360\333\103
\127\142\033\307\104\122\342\227\143\272\317\352\316\140\346\012
\345\030\150\055\063\200\165\240\060\007\150\366\325\367\023\054
\072\260\236\350\130\125\156\214\126\104\115\103\027\101\002\314
\167\334\137\105\005\131\317\315\140\323\277\322\366\342\364\325
\334\207\161\063\007\032\365\157\264\177\075\227\373\137\144\364
\116\016\000\104\011\351\353\354\076\161\031\004\027\071\110\140
\270\113\377\136\310\145\231\053\246\062\362\133\206\250\235\350
\043\164\020\170\357\313\047\235\061\272\140\213\116\006\120\342
\120\035\007\140\302\101\214\025\264\133\067\034\012\345\011\031
\162\004\212\074\343\001\333\002\003\001\000\001\243\102\060\100

\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\035\006\003\125\035\016\004\026\004\024\236\056\145\117
\076\127\365\253\175\226\306\213\337\263\065\155\112\350\236\213
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\006
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003
\202\002\001\000\005\151\052\205\227\046\120\272\102\071\034\223
\054\322\117\133\321\135\104\046\332\157\151\053\265\173\236\320
\364\112\056\110\307\354\177\237\312\131\172\271\104\367\076\275
\367\120\153\121\237\164\377\220\032\100\320\223\171\222\017\212
\043\136\213\257\201\013\320\213\255\146\340\052\334\232\051\275
\065\330\154\100\024\111\102\075\211\057\272\233\053\070\274\032
\243\013\267\210\327\255\306\024\014\356\174\111\254\256\354\362
\075\030\117\214\155\024\135\016\252\267\337\167\253\073\217\142
\116\213\014\145\306\031\216\315\300\014\241\167\252\264\335\172
\247\023\005\346\071\030\307\225\144\176\003\266\213\220\301\345
\137\000\043\230\346\163\332\021\322\020\377\036\123\042\047\307
\323\001\311\057\305\073\062\156\360\303\070\312\022\147\274\272
\043\051\273\304\225\111\132\006\335\324\132\220\324\023\155\347
\325\302\174\342\130\004\300\354\304\275\242\074\176\306\043\201
\165\174\253\160\137\064\204\225\367\263\325\107\226\117\161\312
\170\062\010\040\264\102\244\102\153\325\045\234\262\047\353\301
\016\107\104\011\341\053\017\320\043\066\156\034\271\272\116\254
\314\360\014\224\316\101\017\153\335\017\325\310\340\027\213\336
\072\135\122\276\351\165\045\035\272\005\007\332\126\031\074\215
\321\327\361\121\066\331\222\357\242\170\121\005\130\275\122\314
\012\136\157\257\332\320\345\014\333\154\301\043\357\071\061\167
\027\007\000\214\366\272\017\160\371\274\276\341\344\175\341\314
\104\172\244\041\354\107\077\250\326\025\245\354\001\251\310\160
\350\230\147\035\275\131\124\176\241\127\025\065\007\305\162\311
\076\267\051\206\215\237\332\062\171\062\334\333\250\345\011\377
\357\126\052\376\223\261\216\052\023\355\255\242\053\153\057\004
\336\315\057\222\222\326\076\140\265\170\001\225\007\010\251\154
\343\034\332\373\345\233\043\126\040\133\351\320\134\306\112\044
\073\274\343\266\042\026\052\204\222\377\250\376\227\277\243\235
\333\141\136\356\031\052\054\327\353\015\166\126\070\165\176\111
\000\223\127\311\374\043\132\374\364\361\337\052\235\260\214\151
\364\020\243\125\235\160\074\042\377\007\326\053\266\231\300\227
\320\364\052\240
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "CHAMBERS OF COMMERCE ROOT - 2016"
# Issuer: CN=CHAMBERS OF COMMERCE ROOT - 2016,O=AC CAMERFIRMA S.A.,2.5.4.97=VATES-A82743287,2.5.4.5=A82743287,OU=CHAMBERS

OF COMMERCE ROOT - 2016,OU=see current address at
www.camerfirma.com/address,L=MADRID,ST=MADRID,C=ES
# Serial Number:34:9a:2d:a1:82:06:b2:b3
# Subject: CN=CHAMBERS OF COMMERCE ROOT - 2016,O=AC CAMERFIRMA S.A.,2.5.4.97=VATES-A82743287,2.5.4.5=A82743287,OU=CHAMBERS OF COMMERCE ROOT - 2016,OU=see current address at
www.camerfirma.com/address,L=MADRID,ST=MADRID,C=ES
# Not Valid Before: Thu Apr 14 07:35:48 2016
# Not Valid After: Sun Apr 08 07:35:48 2040
# Fingerprint (MD5): d9:84:45:a4:8b:62:ec:c1:fc:51:54:8a:d1:58:8d:e8
# Fingerprint (SHA1): 2d:e1:6a:56:77:ba:ca:39:e1:d6:8c:30:dc:b1:4a:be:22:a6:17:9b
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "CHAMBERS OF COMMERCE ROOT - 2016"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\055\341\152\126\167\272\312\071\341\326\214\060\334\261\112\276
\042\246\027\233
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\331\204\105\244\213\142\354\301\374\121\124\212\321\130\215\350
END
CKA_ISSUER
MULTILINE_OCTAL
\060\202\001\014\061\013\060\011\006\003\125\004\006\023\002\105
\123\061\017\060\015\006\003\125\004\010\014\006\115\101\104\122
\111\104\061\017\060\015\006\003\125\004\007\014\006\115\101\104
\122\111\104\061\072\060\070\006\003\125\004\013\014\061\163\145
\145\040\143\165\162\162\145\156\164\040\141\144\144\162\145\163
\163\040\141\164\040\167\167\167\056\143\141\155\145\162\146\151
\162\155\141\056\143\157\155\057\141\144\144\162\145\163\163\061
\051\060\047\006\003\125\004\013\014\040\103\110\101\115\102\105
\122\123\040\117\106\040\103\117\115\115\105\122\103\105\040\122
\117\117\124\040\055\040\062\060\061\066\061\022\060\020\006\003
\125\004\005\023\011\101\070\062\067\064\063\062\070\067\061\030
\060\026\006\003\125\004\141\014\017\126\101\124\105\123\055\101
\070\062\067\064\063\062\070\067\061\033\060\031\006\003\125\004
\012\014\022\101\103\040\103\101\115\105\122\106\111\122\115\101
\040\123\056\101\056\061\051\060\047\006\003\125\004\003\014\040
\103\110\101\115\102\105\122\123\040\117\106\040\103\117\115\115
\105\122\103\105\040\122\117\117\124\040\055\040\062\060\061\066
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\010\064\232\055\241\202\006\262\263
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST

```
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Network Solutions RSA Certificate Authority"
# Issuer: CN=Network Solutions RSA Certificate Authority,O=Network Solutions
L.L.C.,L=Jacksonville,ST=FL,C=US
# Serial Number:4c:03:4b:ac:67:18:4c:7f:af:44:08:4d:82:96:c7:b2
# Subject: CN=Network Solutions RSA Certificate Authority,O=Network Solutions
L.L.C.,L=Jacksonville,ST=FL,C=US
# Not Valid Before: Wed Nov 18 00:00:00 2015
# Not Valid After: Mon Jan 18 23:59:59 2038
# Fingerprint (MD5): 5a:2f:58:bc:83:2c:2d:99:b4:9b:78:24:d4:8f:f9:67
#
 Fingerprint (SHA1): 8e:92:8c:0f:c2:7b:b7:ab:a3:4e:6b:c0:ca:12:50:cb:57:b6:0f:84
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Network Solutions RSA Certificate Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\212\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\013\060\011\006\003\125\004\010\023\002\106\114\061\025\060
\023\006\003\125\004\007\023\014\112\141\143\153\163\157\156\166
\151\154\154\145\061\041\060\037\006\003\125\004\012\023\030\116
\145\164\167\157\162\153\040\123\157\154\165\164\151\157\156\163
\040\114\056\114\056\103\056\061\064\060\062\006\003\125\004\003
\023\053\116\145\164\167\157\162\153\040\123\157\154\165\164\151
\157\156\163\040\122\123\101\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\212\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\013\060\011\006\003\125\004\010\023\002\106\114\061\025\060
\023\006\003\125\004\007\023\014\112\141\143\153\163\157\156\166
\151\154\154\145\061\041\060\037\006\003\125\004\012\023\030\116
\145\164\167\157\162\153\040\123\157\154\165\164\151\157\156\163
\040\114\056\114\056\103\056\061\064\060\062\006\003\125\004\003
\023\053\116\145\164\167\157\162\153\040\123\157\154\165\164\151
\157\156\163\040\122\123\101\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\114\003\113\254\147\030\114\177\257\104\010\115\202\226
\307\262
```

END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\342\060\202\003\312\240\003\002\001\002\002\020\114
\003\113\254\147\030\114\177\257\104\010\115\202\226\307\262\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\201
\212\061\013\060\011\006\003\125\004\006\023\002\125\123\061\013
\060\011\006\003\125\004\010\023\002\106\114\061\025\060\023\006
\003\125\004\007\023\014\112\141\143\153\163\157\156\166\151\154
\154\145\061\041\060\037\006\003\125\004\012\023\030\116\145\164
\167\157\162\153\040\123\157\154\165\164\151\157\156\163\040\114
\056\114\056\103\056\061\064\060\062\006\003\125\004\003\023\053
\116\145\164\167\157\162\153\040\123\157\154\165\164\151\157\156
\163\040\122\123\101\040\103\145\162\164\151\146\151\143\141\164
\145\040\101\165\164\150\157\162\151\164\171\060\036\027\015\061
\065\061\061\061\070\060\060\060\060\060\060\132\027\015\063\070
\060\061\061\070\062\063\065\071\065\071\132\060\201\212\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\013\060\011\006
\003\125\004\010\023\002\106\114\061\025\060\023\006\003\125\004
\007\023\014\112\141\143\153\163\157\156\166\151\154\154\145\061
\041\060\037\006\003\125\004\012\023\030\116\145\164\167\157\162
\153\040\123\157\154\165\164\151\157\156\163\040\114\056\114\056
\103\056\061\064\060\062\006\003\125\004\003\023\053\116\145\164
\167\157\162\153\040\123\157\154\165\164\151\157\156\163\040\122
\123\101\040\103\145\162\164\151\146\151\143\141\164\145\040\101
\165\164\150\157\162\151\164\171\060\202\002\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000
\060\202\002\012\002\202\002\001\000\204\337\250\246\243\214\013
\170\036\310\115\031\225\335\051\220\222\040\065\220\052\224\215
\202\063\055\160\022\130\245\010\212\236\301\010\363\223\326\150
\300\057\024\276\171\244\374\175\314\325\274\076\217\355\234\112
\002\141\131\075\252\303\157\164\000\322\370\032\064\324\124\236
\152\164\107\232\057\340\322\367\017\367\303\335\077\245\277\301
\372\175\102\151\140\000\200\354\074\346\273\201\067\244\036\006
\024\075\127\217\220\244\065\112\064\163\207\266\032\303\135\220
\357\006\115\160\166\066\074\202\211\355\317\144\031\203\045\103
\116\034\342\361\152\122\206\376\121\344\176\070\337\025\215\114
\154\140\101\112\117\260\100\125\106\071\165\311\201\071\000\163
\212\142\352\017\145\267\217\117\227\100\316\317\356\301\152\050
\240\161\251\231\047\321\075\311\065\163\172\200\231\370\175\206
\271\235\171\072\355\323\052\372\176\246\270\377\127\052\163\262
\246\277\332\211\272\006\033\332\145\240\346\276\140\224\210\366
\337\146\341\047\152\033\376\320\136\251\215\040\213\012\304\037
\176\210\101\057\262\301\320\363\266\150\355\310\073\361\357\252
\007\336\176\327\042\340\201\366\245\352\173\026\364\102\124\235
\226\176\366\142\026\123\315\375\012\253\262\102\241\116\052\210
\102\165\203\275\214\345\115\172\347\035\343\114\270\336\343\253
\140\070\055\147\051\376\344\137\256\302\250\350\277\256\154\371
\353\263\122\361\177\351\354\302\057\331\235\312\027\236\102\372

\073\130\301\076\210\142\117\137\223\301\227\155\146\217\034\042
\363\232\301\364\355\271\153\032\176\066\204\310\061\270\360\136
\053\176\225\344\171\317\165\114\302\330\004\277\070\216\050\263
\335\133\266\330\117\043\156\222\350\067\225\256\203\256\326\374
\071\052\106\006\037\361\204\165\041\326\270\116\246\052\227\130
\145\365\232\030\001\327\365\303\177\051\311\020\356\163\112\103
\166\173\321\246\060\121\377\326\053\035\036\142\204\276\371\276
\151\227\231\307\015\347\174\044\120\165\027\375\244\040\347\065
\150\003\140\224\247\331\015\306\032\054\345\342\116\325\314\016
\300\172\060\126\357\140\222\276\331\056\365\307\360\350\105\317
\332\206\256\357\330\167\251\022\047\002\003\001\000\001\243\102
\060\100\060\035\006\003\125\035\016\004\026\004\024\017\361\112
\112\165\164\005\021\014\035\330\133\231\353\277\376\252\175\136
\327\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\206\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\015\006\011\052\206\110\206\367\015\001\001\014\005
\000\003\202\002\001\000\075\313\322\106\170\365\366\072\027\350
\303\173\144\321\305\273\220\170\215\365\117\271\304\055\227\373
\013\346\305\270\361\266\352\350\130\113\064\255\167\171\054\065
\037\162\175\002\076\356\265\320\026\212\006\067\226\265\357\103
\320\011\020\054\227\146\307\201\037\036\346\047\305\202\221\130
\136\363\310\133\101\150\200\203\221\271\234\201\370\047\372\105
\337\356\171\362\134\155\160\002\124\356\300\123\330\103\353\005
\172\314\364\121\335\251\324\042\175\152\073\362\376\210\324\122
\111\072\205\222\144\123\370\152\123\140\210\217\362\133\324\256
\053\122\340\352\377\124\176\241\344\357\206\033\247\203\013\006
\146\136\060\200\214\125\240\107\063\377\153\036\104\110\113\141
\252\036\076\350\114\144\307\330\155\175\016\256\074\074\102\075
\312\044\032\160\361\141\024\234\072\030\325\360\006\051\221\042
\262\072\072\241\026\124\143\032\371\063\225\104\237\044\243\041
\144\004\010\342\233\325\336\010\122\034\142\034\123\026\107\065
\102\046\307\247\014\375\363\133\023\167\002\214\134\342\026\360
\030\037\331\175\365\337\002\044\210\172\363\136\377\027\016\263
\142\147\241\253\261\027\216\075\072\106\260\365\106\214\253\204
\330\365\016\241\040\353\302\360\231\164\075\216\263\003\330\044
\305\154\353\153\014\123\277\140\151\335\214\050\305\157\317\273
\322\201\167\053\306\174\261\304\112\154\025\020\067\051\135\256
\370\261\021\005\304\024\215\354\023\243\104\375\115\213\150\270
\301\377\235\325\067\056\110\370\050\174\334\371\163\123\331\266
\001\165\102\172\277\013\337\121\120\270\123\262\341\356\164\220
\313\274\252\320\161\203\242\253\116\311\020\266\075\034\357\100
\327\117\103\220\063\271\001\226\124\135\052\325\006\133\222\206
\270\006\020\201\006\310\221\333\051\040\262\123\275\363\113\133
\114\333\151\037\211\156\124\077\327\211\135\347\265\315\014\276
\077\175\170\070\001\322\266\147\246\317\130\110\224\032\105\375
\220\163\111\312\265\103\240\041\142\215\111\004\046\252\370\037
\056\077\362\056\241\362\253\364\006\036\260\055\304\301\160\102
\075\375\303\121\111\210\000\016\312\202\015\233\171\002\342\300

```
\056\223\337\344\362\361
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing
 Only Certificate
# Trust for "Network Solutions RSA Certificate Authority"
# Issuer: CN=Network Solutions RSA Certificate Authority,O=Network Solutions
L.L.C.,L=Jacksonville,ST=FL,C=US
# Serial Number:4c:03:4b:ac:67:18:4c:7f:af:44:08:4d:82:96:c7:b2
# Subject: CN=Network Solutions RSA Certificate Authority,O=Network Solutions
L.L.C.,L=Jacksonville,ST=FL,C=US
# Not Valid Before: Wed Nov 18 00:00:00 2015
# Not Valid After: Mon Jan 18 23:59:59 2038
# Fingerprint (MD5): 5a:2f:58:bc:83:2c:2d:99:b4:9b:78:24:d4:8f:f9:67
# Fingerprint (SHA1): 8e:92:8c:0f:c2:7b:b7:ab:a3:4e:6b:c0:ca:12:50:cb:57:b6:0f:84
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Network Solutions RSA Certificate Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\216\222\214\017\302\173\267\253\243\116\153\300\312\022\120\313
\127\266\017\204
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\132\057\130\274\203\054\055\231\264\233\170\044\324\217\371\147
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\201\212\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\013\060\011\006\003\125\004\010\023\002\106\114\061\025\060
\023\006\003\125\004\007\023\014\112\141\143\153\163\157\156\166
\151\154\154\145\061\041\060\037\006\003\125\004\012\023\030\116
\145\164\167\157\162\153\040\123\157\154\165\164\151\157\156\163
\040\114\056\114\056\103\056\061\064\060\062\006\003\125\004\003
\023\053\116\145\164\167\157\162\153\040\123\157\154\165\164\151
\157\156\163\040\122\123\101\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\114\003\113\254\147\030\114\177\257\104\010\115\202\226
\307\262
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
```

```
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
#
 Certificate "Network Solutions ECC Certificate Authority"
# Issuer: CN=Network Solutions ECC Certificate Authority,O=Network Solutions
L.L.C.,L=Jacksonville,ST=FL,C=US
# Serial Number:79:38:4b:b4:19:1a:8d:74:22:cc:ff:85:32:f2:e4:ba
# Subject: CN=Network Solutions ECC Certificate Authority,O=Network Solutions
L.L.C.,L=Jacksonville,ST=FL,C=US
# Not Valid Before: Wed Nov 18 00:00:00 2015
# Not Valid After: Mon Jan 18 23:59:59 2038
# Fingerprint (MD5): a5:a8:cc:e3:1c:41:11:8c:6a:8c:38:bd:a2:47:fe:b2
# Fingerprint (SHA1): 80:f9:5b:74:1c:38:39:94:95:c3:4f:20:c2:3e:73:36:31:4d:3c:6b
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Network Solutions ECC Certificate Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\212\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\013\060\011\006\003\125\004\010\023\002\106\114\061\025\060
\023\006\003\125\004\007\023\014\112\141\143\153\163\157\156\166
\151\154\154\145\061\041\060\037\006\003\125\004\012\023\030\116
\145\164\167\157\162\153\040\123\157\154\165\164\151\157\156\163
\040\114\056\114\056\103\056\061\064\060\062\006\003\125\004\003
\023\053\116\145\164\167\157\162\153\040\123\157\154\165\164\151
\157\156\163\040\105\103\103\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\212\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\013\060\011\006\003\125\004\010\023\002\106\114\061\025\060
\023\006\003\125\004\007\023\014\112\141\143\153\163\157\156\166
\151\154\154\145\061\041\060\037\006\003\125\004\012\023\030\116
\145\164\167\157\162\153\040\123\157\154\165\164\151\157\156\163
\040\114\056\114\056\103\056\061\064\060\062\006\003\125\004\003
\023\053\116\145\164\167\157\162\153\040\123\157\154\165\164\151
\157\156\163\040\105\103\103\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER
```

MULTILINE_OCTAL
\002\020\171\070\113\264\031\032\215\164\042\314\377\205\062\362
\344\272
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\224\060\202\002\031\240\003\002\001\002\002\020\171
\070\113\264\031\032\215\164\042\314\377\205\062\362\344\272\060
\012\006\010\052\206\110\316\075\004\003\003\060\201\212\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\013\060\011\006
\003\125\004\010\023\002\106\114\061\025\060\023\006\003\125\004
\007\023\014\112\141\143\153\163\157\156\166\151\154\154\145\061
\041\060\037\006\003\125\004\012\023\030\116\145\164\167\157\162
\153\040\123\157\154\165\164\151\157\156\163\040\114\056\114\056
\103\056\061\064\060\062\006\003\125\004\003\023\053\116\145\164
\167\157\162\153\040\123\157\154\165\164\151\157\156\163\040\105
\103\103\040\103\145\162\164\151\146\151\143\141\164\145\040\101
\165\164\150\157\162\151\164\171\060\036\027\015\061\065\061\061
\061\070\060\060\060\060\060\060\132\027\015\063\070\060\061\061
\070\062\063\065\071\065\071\132\060\201\212\061\013\060\011\006
\003\125\004\006\023\002\125\123\061\013\060\011\006\003\125\004
\010\023\002\106\114\061\025\060\023\006\003\125\004\007\023\014
\112\141\143\153\163\157\156\166\151\154\154\145\061\041\060\037
\006\003\125\004\012\023\030\116\145\164\167\157\162\153\040\123
\157\154\165\164\151\157\156\163\040\114\056\114\056\103\056\061
\064\060\062\006\003\125\004\003\023\053\116\145\164\167\157\162
\153\040\123\157\154\165\164\151\157\156\163\040\105\103\103\040
\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150
\157\162\151\164\171\060\166\060\020\006\007\052\206\110\316\075
\002\001\006\005\053\201\004\000\042\003\142\000\004\024\341\003
\013\145\157\255\131\326\036\356\311\277\264\114\305\306\134\057
\060\307\237\122\333\150\141\300\151\020\342\222\172\032\303\277
\222\250\211\071\212\373\347\240\273\161\244\240\303\337\167\326
\224\067\023\137\176\123\135\120\272\343\114\010\307\145\342\101
\260\346\131\362\234\370\300\262\167\301\012\221\046\167\362\151
\266\273\320\101\074\052\210\032\224\221\026\306\076\243\102\060
\100\060\035\006\003\125\035\016\004\026\004\024\233\173\353\310
\377\203\362\122\230\107\060\012\126\370\070\276\343\353\000\316
\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001\206
\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001
\377\060\012\006\010\052\206\110\316\075\004\003\003\003\151\000
\060\146\002\061\000\251\144\130\367\234\271\023\146\042\111\177
\262\321\002\351\023\374\034\373\244\064\222\344\312\007\015\267
\261\122\170\050\064\313\362\041\126\221\206\206\310\212\013\257
\062\204\124\145\211\002\061\000\354\171\015\235\211\360\014\030
\352\173\127\122\255\013\346\324\171\133\313\233\342\006\105\165
\030\275\320\374\247\335\307\341\307\042\266\343\101\044\135\043
\346\250\237\000\152\120\062\045
END

```
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER
 CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Network Solutions ECC Certificate Authority"
# Issuer: CN=Network Solutions ECC Certificate Authority,O=Network Solutions
L.L.C.,L=Jacksonville,ST=FL,C=US
# Serial Number:79:38:4b:b4:19:1a:8d:74:22:cc:ff:85:32:f2:e4:ba
# Subject: CN=Network Solutions ECC Certificate Authority,O=Network Solutions
L.L.C.,L=Jacksonville,ST=FL,C=US
# Not Valid Before: Wed Nov 18 00:00:00 2015
# Not Valid After: Mon Jan 18 23:59:59 2038
# Fingerprint (MD5): a5:a8:cc:e3:1c:41:11:8c:6a:8c:38:bd:a2:47:fe:b2
# Fingerprint (SHA1): 80:f9:5b:74:1c:38:39:94:95:c3:4f:20:c2:3e:73:36:31:4d:3c:6b
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Network Solutions ECC Certificate Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\200\371\133\164\034\070\071\224\225\303\117\040\302\076\163\066
\061\115\074\153
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\245\250\314\343\034\101\021\214\152\214\070\275\242\107\376\262
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\201\212\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\013\060\011\006\003\125\004\010\023\002\106\114\061\025\060
\023\006\003\125\004\007\023\014\112\141\143\153\163\157\156\166
\151\154\154\145\061\041\060\037\006\003\125\004\012\023\030\116
\145\164\167\157\162\153\040\123\157\154\165\164\151\157\156\163
\040\114\056\114\056\103\056\061\064\060\062\006\003\125\004\003
\023\053\116\145\164\167\157\162\153\040\123\157\154\165\164\151
\157\156\163\040\105\103\103\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\171\070\113\264\031\032\215\164\042\314\377\205\062\362
\344\272
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
```

```
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL
 CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Australian Defence Public Root CA"
# Issuer: CN=Australian Defence Public Root CA,OU=CAs,OU=PKI,OU=DoD,O=GOV,C=AU
# Serial Number:29:eb:92:33:46:4f:32:41:ff:83:19:00:a9:ad:c4:d9:f8:e3:e2:7f
# Subject: CN=Australian Defence Public Root CA,OU=CAs,OU=PKI,OU=DoD,O=GOV,C=AU
# Not Valid Before: Mon Nov 28 22:25:28 2016
# Not Valid After: Fri Nov 28 22:13:48 2036
# Fingerprint (MD5): a2:6b:fb:f8:f3:14:59:bf:16:d7:3c:ce:f3:20:0a:97
# Fingerprint (SHA1): a9:ca:fe:9d:fd:67:f4:14:5a:d3:97:d0:e2:f3:05:0d:19:8d:e6:ee
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Australian Defence Public Root CA"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\161\061\013\060\011\006\003\125\004\006\023\002\101\125\061
\014\060\012\006\003\125\004\012\023\003\107\117\126\061\014\060
\012\006\003\125\004\013\023\003\104\157\104\061\014\060\012\006
\003\125\004\013\023\003\120\113\111\061\014\060\012\006\003\125
\004\013\023\003\103\101\163\061\052\060\050\006\003\125\004\003
\023\041\101\165\163\164\162\141\154\151\141\156\040\104\145\146
\145\156\143\145\040\120\165\142\154\151\143\040\122\157\157\164
\040\103\101
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\161\061\013\060\011\006\003\125\004\006\023\002\101\125\061
\014\060\012\006\003\125\004\012\023\003\107\117\126\061\014\060
\012\006\003\125\004\013\023\003\104\157\104\061\014\060\012\006
\003\125\004\013\023\003\120\113\111\061\014\060\012\006\003\125
\004\013\023\003\103\101\163\061\052\060\050\006\003\125\004\003
\023\041\101\165\163\164\162\141\154\151\141\156\040\104\145\146
\145\156\143\145\040\120\165\142\154\151\143\040\122\157\157\164
\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\051\353\222\063\106\117\062\101\377\203\031\000\251\255
\304\331\370\343\342\177
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\042\060\202\003\012\240\003\002\001\002\002\024\051
\353\222\063\106\117\062\101\377\203\031\000\251\255\304\331\370
\343\342\177\060\015\006\011\052\206\110\206\367\015\001\001\013
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\005\000\060\161\061\013\060\011\006\003\125\004\006\023\002\101
\125\061\014\060\012\006\003\125\004\012\023\003\107\117\126\061
\014\060\012\006\003\125\004\013\023\003\104\157\104\061\014\060
\012\006\003\125\004\013\023\003\120\113\111\061\014\060\012\006
\003\125\004\013\023\003\103\101\163\061\052\060\050\006\003\125
\004\003\023\041\101\165\163\164\162\141\154\151\141\156\040\104
\145\146\145\156\143\145\040\120\165\142\154\151\143\040\122\157
\157\164\040\103\101\060\036\027\015\061\066\061\061\062\070\062
\062\062\065\062\070\132\027\015\063\066\061\061\062\070\062\062
\061\063\064\070\132\060\161\061\013\060\011\006\003\125\004\006
\023\002\101\125\061\014\060\012\006\003\125\004\012\023\003\107
\117\126\061\014\060\012\006\003\125\004\013\023\003\104\157\104
\061\014\060\012\006\003\125\004\013\023\003\120\113\111\061\014
\060\012\006\003\125\004\013\023\003\103\101\163\061\052\060\050
\006\003\125\004\003\023\041\101\165\163\164\162\141\154\151\141
\156\040\104\145\146\145\156\143\145\040\120\165\142\154\151\143
\040\122\157\157\164\040\103\101\060\202\001\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017\000
\060\202\001\012\002\202\001\001\000\323\116\124\004\033\320\364
\233\235\270\043\207\340\040\307\236\230\261\161\172\006\220\056
\342\255\110\376\223\005\154\354\206\277\050\100\205\263\114\171
\357\107\123\230\020\036\124\356\175\170\270\030\023\014\104\122
\375\320\201\252\223\010\043\071\276\137\017\153\335\045\227\363
\001\102\337\324\201\000\304\120\276\172\211\055\031\257\163\112
\077\314\072\300\277\242\250\305\025\367\076\174\101\164\202\153
\056\167\146\342\152\245\221\210\156\006\061\247\257\013\346\132
\340\256\175\132\257\057\107\320\362\373\204\163\234\106\241\036
\204\104\121\304\137\056\332\220\002\137\201\337\021\016\322\373
\273\072\027\163\243\362\215\143\252\117\377\162\172\145\142\203
\132\052\074\362\315\054\043\215\317\353\041\037\277\324\003\127
\365\067\026\014\136\345\127\021\302\250\372\377\154\071\362\075
\122\346\265\171\300\133\342\262\352\143\040\014\016\245\052\136
\022\341\346\257\137\213\174\240\255\071\065\065\230\137\361\257
\070\320\046\323\115\275\142\167\165\075\257\153\024\206\173\132
\366\041\217\326\352\342\247\016\255\002\003\001\000\001\243\201
\261\060\201\256\060\017\006\003\125\035\023\001\001\377\004\005
\060\003\001\001\377\060\113\006\003\125\035\040\004\104\060\102
\060\006\006\004\125\035\040\000\060\070\006\011\052\044\001\202
\116\001\001\001\007\060\053\060\051\006\010\053\006\001\005\005
\007\002\001\026\035\150\164\164\160\072\057\057\143\162\154\056
\144\145\146\145\156\143\145\056\147\157\166\056\141\165\057\160
\153\151\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\306\060\037\006\003\125\035\043\004\030\060\026\200\024\254
\231\341\002\057\350\134\113\101\267\064\270\036\351\233\203\066
\015\224\264\060\035\006\003\125\035\016\004\026\004\024\254\231
\341\002\057\350\134\113\101\267\064\270\036\351\233\203\066\015
\224\264\060\015\006\011\052\206\110\206\367\015\001\001\013\005
\000\003\202\001\001\000\170\274\201\112\330\072\127\273\275\046

\277\352\052\050\360\210\212\362\120\114\220\147\332\113\365\270
\024\010\272\333\177\162\250\232\131\274\361\034\211\250\364\072
\003\020\124\023\172\135\306\332\272\076\017\210\325\152\323\033
\227\055\142\141\072\157\371\000\257\162\006\163\354\020\300\141
\036\314\134\117\031\062\106\070\301\335\077\322\067\032\245\216
\206\240\360\011\314\065\326\031\002\174\315\071\374\367\371\037
\347\224\171\116\075\267\370\227\116\073\104\152\315\224\260\271
\367\176\342\343\371\231\177\305\323\246\120\264\111\373\026\176
\116\101\054\317\076\307\171\100\272\201\030\046\010\371\305\235
\343\330\361\157\034\150\077\152\133\167\027\122\243\006\336\031
\302\113\156\242\225\374\325\010\277\054\265\151\065\121\343\343
\337\117\032\051\155\203\170\075\070\044\312\002\077\124\020\341
\263\144\341\325\232\336\363\067\366\063\020\265\166\263\253\327
\311\037\123\072\255\125\101\034\110\311\066\236\207\377\165\334
\151\320\257\331\172\127\306\312\261\103\374\071\201\374\334\172
\243\232\245\230\120\124
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Australian Defence Public Root CA"
# Issuer: CN=Australian Defence Public Root CA,OU=CAs,OU=PKI,OU=DoD,O=GOV,C=AU
# Serial Number:29:eb:92:33:46:4f:32:41:ff:83:19:00:a9:ad:c4:d9:f8:e3:e2:7f
# Subject: CN=Australian Defence Public Root CA,OU=CAs,OU=PKI,OU=DoD,O=GOV,C=AU
# Not Valid Before: Mon Nov 28 22:25:28 2016
# Not Valid After: Fri Nov 28 22:13:48 2036
# Fingerprint (MD5): a2:6b:fb:f8:f3:14:59:bf:16:d7:3c:ce:f3:20:0a:97
# Fingerprint (SHA1): a9:ca:fe:9d:fd:67:f4:14:5a:d3:97:d0:e2:f3:05:0d:19:8d:e6:ee
CKA_CLASS
 CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Australian Defence Public Root CA"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\251\312\376\235\375\147\364\024\132\323\227\320\342\363\005\015
\031\215\346\356
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\242\153\373\370\363\024\131\277\026\327\074\316\363\040\012\227
END
CKA_ISSUER MULTILINE_OCTAL
\060\161\061\013\060\011\006\003\125\004\006\023\002\101\125\061
\014\060\012\006\003\125\004\012\023\003\107\117\126\061\014\060
\012\006\003\125\004\013\023\003\104\157\104\061\014\060\012\006

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\003\125\004\013\023\003\120\113\111\061\014\060\012\006\003\125
\004\013\023\003\103\101\163\061\052\060\050\006\003\125\004\003
\023\041\101\165\163\164\162\141\154\151\141\156\040\104\145\146
\145\156\143\145\040\120\165\142\154\151\143\040\122\157\157\164
\040\103\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\051\353\222\063\106\117\062\101\377\203\031\000\251\255
\304\331\370\343\342\177
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "SI-TRUST Root"
# Issuer: CN=SI-TRUST Root,2.5.4.97=VATSI-17659957,O=Republika Slovenija,C=SI
# Serial Number:90:ae:77:76:00:00:00:00:57:1d:d0:6f
# Subject: CN=SI-TRUST Root,2.5.4.97=VATSI-17659957,O=Republika Slovenija,C=SI
# Not Valid Before: Mon Apr 25 07:38:17 2016
# Not Valid After: Fri Dec 25 08:08:17 2037
# Fingerprint (MD5): 3a:ba:c6:f3:c7:d1:b7:8a:86:22:7d:ee:99:81:fc:90
# Fingerprint (SHA1): 3a:49:79:b4:0f:a8:41:48:82:00:b5:82:fb:ee:b6:3a:ab:99:19:ae
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SI-TRUST Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT
 MULTILINE_OCTAL
\060\134\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\034\060\032\006\003\125\004\012\023\023\122\145\160\165\142\154
\151\153\141\040\123\154\157\166\145\156\151\152\141\061\027\060
\025\006\003\125\004\141\023\016\126\101\124\123\111\055\061\067
\066\065\071\071\065\067\061\026\060\024\006\003\125\004\003\023
\015\123\111\055\124\122\125\123\124\040\122\157\157\164
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\134\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\034\060\032\006\003\125\004\012\023\023\122\145\160\165\142\154
\151\153\141\040\123\154\157\166\145\156\151\152\141\061\027\060
\025\006\003\125\004\141\023\016\126\101\124\123\111\055\061\067
\066\065\071\071\065\067\061\026\060\024\006\003\125\004\003\023
\015\123\111\055\124\122\125\123\124\040\122\157\157\164
```

END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\015\000\220\256\167\166\000\000\000\000\127\035\320\157
END
CKA_VALUE MULTILINE_OCTAL
\060\202\004\212\060\202\002\362\240\003\002\001\002\002\015\000
\220\256\167\166\000\000\000\000\127\035\320\157\060\015\006\011
\052\206\110\206\367\015\001\001\013\005\000\060\134\061\013\060
\011\006\003\125\004\006\023\002\123\111\061\034\060\032\006\003
\125\004\012\023\023\122\145\160\165\142\154\151\153\141\040\123
\154\157\166\145\156\151\152\141\061\027\060\025\006\003\125\004
\141\023\016\126\101\124\123\111\055\061\067\066\065\071\071\065
\067\061\026\060\024\006\003\125\004\003\023\015\123\111\055\124
\122\125\123\124\040\122\157\157\164\060\036\027\015\061\066\060
\064\062\065\060\067\063\070\061\067\132\027\015\063\067\061\062
\062\065\060\070\060\070\061\067\132\060\134\061\013\060\011\006
\003\125\004\006\023\002\123\111\061\034\060\032\006\003\125\004
\012\023\023\122\145\160\165\142\154\151\153\141\040\123\154\157
\166\145\156\151\152\141\061\027\060\025\006\003\125\004\141\023
\016\126\101\124\123\111\055\061\067\066\065\071\071\065\067\061
\026\060\024\006\003\125\004\003\023\015\123\111\055\124\122\125
\123\124\040\122\157\157\164\060\202\001\242\060\015\006\011\052
\206\110\206\367\015\001\001\001\005\000\003\202\001\217\000\060
\202\001\212\002\202\001\201\000\323\313\234\055\302\340\060\103
\145\061\044\377\113\260\070\331\251\123\327\065\321\333\267\113
\223\264\162\215\361\313\225\322\123\053\164\233\062\232\244\057
\076\002\006\335\257\160\025\241\252\317\021\207\212\146\173\313
\314\035\160\104\134\217\254\312\346\303\133\047\264\215\243\216
\020\277\156\124\164\010\160\212\043\350\312\307\164\304\146\221
\040\335\113\350\245\204\165\245\230\225\202\213\033\341\040\044
\007\106\253\014\145\066\100\147\213\165\356\251\331\221\051\033
\355\157\055\105\302\326\342\140\001\261\363\116\071\053\073\157
\077\205\276\010\366\123\053\173\242\311\105\241\104\201\200\146
\232\140\072\033\304\276\014\314\060\020\177\021\066\070\112\346
\233\241\226\123\234\224\314\021\306\004\114\242\125\113\377\200
\341\257\214\034\065\374\271\223\067\337\371\135\075\334\353\015
\047\154\104\311\131\146\053\126\157\377\004\033\367\365\151\303
\135\303\030\376\275\247\331\144\057\242\237\140\331\162\154\075
\074\165\362\045\047\230\056\072\270\311\335\115\165\275\253\260
\042\141\130\001\067\050\246\040\235\056\140\134\373\220\274\106
\103\270\376\155\330\300\146\042\044\153\064\170\042\345\271\342
\130\351\110\070\356\114\275\001\173\156\076\100\352\321\302\012
\102\223\147\303\046\057\077\007\133\317\257\343\035\350\072\342
\145\341\204\221\077\365\146\000\375\252\063\106\102\354\026\076
\322\023\145\057\016\011\123\366\344\052\165\024\234\031\063\026
\232\105\341\333\127\317\317\070\324\247\367\355\130\103\344\016
\230\134\304\340\061\077\224\244\157\113\112\242\325\112\215\046
\251\035\144\045\010\065\015\347\002\003\001\000\001\243\113\060

\111\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\006\060\023\006\003\125\035\043\004\014\060\012\200\010\114
\243\303\150\136\010\002\143\060\021\006\003\125\035\016\004\012
\004\010\114\243\303\150\136\010\002\143\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\003\202\001\201\000\046\043
\205\273\135\101\031\156\222\203\212\356\001\213\004\065\031\177
\253\217\334\326\063\301\371\171\226\136\043\365\360\316\335\352
\333\141\073\132\257\335\130\351\102\211\100\357\371\331\147\021
\177\115\361\355\351\021\173\261\101\017\355\244\322\026\266\357
\301\375\213\366\021\053\054\357\374\007\006\106\014\317\002\013
\355\073\336\217\011\271\063\253\046\200\124\104\102\145\327\347
\257\315\120\016\312\310\210\241\022\234\052\225\073\076\124\074
\110\163\366\174\170\324\233\377\223\367\105\344\051\204\143\374
\372\176\032\347\134\340\162\127\260\057\170\035\060\306\023\375
\210\137\261\145\210\332\136\227\023\201\173\376\036\317\173\277
\127\060\301\160\222\103\246\231\360\125\237\230\305\043\102\275
\164\034\061\216\022\245\331\105\152\052\132\310\130\315\275\326
\335\076\065\013\031\177\003\034\316\007\017\207\105\223\025\241
\153\275\064\034\340\336\365\324\270\345\221\034\113\005\265\047
\046\274\317\321\011\230\026\306\341\361\125\113\072\173\155\336
\306\147\266\301\067\055\237\250\216\131\307\267\246\305\357\337
\026\342\355\336\262\267\363\242\066\244\050\062\072\012\224\313
\077\136\376\156\131\355\272\066\262\223\326\306\303\031\376\365
\231\170\353\107\107\345\255\102\172\354\274\173\311\056\101\116
\115\017\004\016\212\113\063\207\334\361\166\174\132\030\214\234
\012\022\327\242\263\302\205\207\256\155\061\120\142\062\041\240
\150\026\137\224\065\164\125\051\322\161\201\010\112\341\327\135
\252\124\001\263\033\174\131\256\276\254\014\312\270\100\144\147
\133\235\352\006\006\021\326\320\060\163\036\343\274\053
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "SI-TRUST Root"
# Issuer: CN=SI-TRUST Root,2.5.4.97=VATSI-17659957,O=Republika Slovenija,C=SI
# Serial
Number:90:ae:77:76:00:00:00:00:57:1d:d0:6f
# Subject: CN=SI-TRUST Root,2.5.4.97=VATSI-17659957,O=Republika Slovenija,C=SI
# Not Valid Before: Mon Apr 25 07:38:17 2016
# Not Valid After: Fri Dec 25 08:08:17 2037
# Fingerprint (MD5): 3a:ba:c6:f3:c7:d1:b7:8a:86:22:7d:ee:99:81:fc:90
# Fingerprint (SHA1): 3a:49:79:b4:0f:a8:41:48:82:00:b5:82:fb:ee:b6:3a:ab:99:19:ae
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE

```
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SI-TRUST Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\072\111\171\264\017\250\101\110\202\000\265\202\373\356\266\072
\253\231\031\256
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\072\272\306\363\307\321\267\212\206\042\175\356\231\201\374\220
END
CKA_ISSUER MULTILINE_OCTAL
\060\134\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\034\060\032\006\003\125\004\012\023\023\122\145\160\165\142\154
\151\153\141\040\123\154\157\166\145\156\151\152\141\061\027\060
\025\006\003\125\004\141\023\016\126\101\124\123\111\055\061\067
\066\065\071\071\065\067\061\026\060\024\006\003\125\004\003\023
\015\123\111\055\124\122\125\123\124\040\122\157\157\164
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\015\000\220\256\167\166\000\000\000\000\127\035\320\157
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Swiss Government Root CA III"
# Issuer: CN=Swiss Government Root CA III,OU=www.pki.admin.ch,O=Swiss Government PKI,C=CH
# Serial Number:fb:1f:0b:42:2b:a8:41:3e:57:d1:ee:2a:6e:5a:4f:bb
# Subject: CN=Swiss Government Root CA III,OU=www.pki.admin.ch,O=Swiss Government PKI,C=CH
# Not Valid Before: Fri Apr 15 07:00:00 2016
# Not Valid After: Mon Apr 15 06:59:59 2041
# Fingerprint (MD5): 56:83:cb:f2:76:2c:93:dc:11:3b:ea:c2:09:19:17:46
# Fingerprint (SHA1): cc:ea:e3:24:45:cd:42:18:dd:18:8e:ad:ce:b3:13:3c:7f:b3:40:ad
CKA_CLASS
 CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Swiss Government Root CA III"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\156\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\035\060\033\006\003\125\004\012\023\024\123\167\151\163\163\040
\107\157\166\145\162\156\155\145\156\164\040\120\113\111\061\031
\060\027\006\003\125\004\013\023\020\167\167\167\056\160\153\151
```

\056\141\144\155\151\156\056\143\150\061\045\060\043\006\003\125
\004\003\023\034\123\167\151\163\163\040\107\157\166\145\162\156
\155\145\156\164\040\122\157\157\164\040\103\101\040\111\111\111
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\156\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\035\060\033\006\003\125\004\012\023\024\123\167\151\163\163\040
\107\157\166\145\162\156\155\145\156\164\040\120\113\111\061\031
\060\027\006\003\125\004\013\023\020\167\167\167\056\160\153\151
\056\141\144\155\151\156\056\143\150\061\045\060\043\006\003\125
\004\003\023\034\123\167\151\163\163\040\107\157\166\145\162\156
\155\145\156\164\040\122\157\157\164\040\103\101\040\111\111\111
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\021\000\373\037\013\102\053\250\101\076\127\321\356\052\156
\132\117\273
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\126\060\202\004\076\240\003\002\001\002\002\021\000
\373\037\013\102\053\250\101\076\127\321\356\052\156\132\117\273
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\156\061\013\060\011\006\003\125\004\006\023\002\103\110\061\035
\060\033\006\003\125\004\012\023\024\123\167\151\163\163\040\107
\157\166\145\162\156\155\145\156\164\040\120\113\111\061\031\060
\027\006\003\125\004\013\023\020\167\167\167\056\160\153\151\056
\141\144\155\151\156\056\143\150\061\045\060\043\006\003\125\004
\003\023\034\123\167\151\163\163\040\107\157\166\145\162\156\155
\145\156\164\040\122\157\157\164\040\103\101\040\111\111\111\060
\036\027\015\061\066\060\064\061\065\060\067\060\060\060\060\132
\027\015\064\061\060\064\061\065\060\066\065\071\065\071\132\060
\156\061\013\060\011\006\003\125\004\006\023\002\103\110\061\035
\060\033\006\003\125\004\012\023\024\123\167\151\163\163\040\107
\157\166\145\162\156\155\145\156\164\040\120\113\111\061\031\060
\027\006\003\125\004\013\023\020\167\167\167\056\160\153\151\056
\141\144\155\151\156\056\143\150\061\045\060\043\006\003\125\004
\003\023\034\123\167\151\163\163\040\107\157\166\145\162\156\155
\145\156\164\040\122\157\157\164\040\103\101\040\111\111\111\060
\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001\001
\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001\000
\341\103\206\216\117\030\224\272\323\302\071\160\155\135\151\121
\204\131\274\273\310\177\057\375\027\243\170\234\275\330\222\343
\330\170\041\076\273\232\137\373\262\145\120\162\266\247\354\245
\347\301\305\000\004\343\314\263\002\112\371\000\333\157\155\273
\223\027\104\371\043\302\126\072\060\037\201\171\373\144\277\365
\124\205\277\073\053\157\225\004\006\135\150\012\303\217\270\053
\146\022\276\242\330\132\224\005\175\257\301\023\006\246\221\072

\077\031\013\205\203\300\226\135\363\201\310\023\212\365\020\113
\240\165\072\133\243\100\007\275\241\146\030\145\204\124\171\221
\232\323\162\204\146\325\015\346\073\132\352\372\333\241\124\375
\000\043\131\350\127\352\234\267\364\217\101\013\151\261\107\260
\232\057\142\332\232\031\255\240\225\060\315\056\255\147\273\155
\371\066\103\267\224\171\311\220\011\000\151\137\227\246\323\157
\045\350\357\142\207\167\327\246\331\116\034\137\141\146\320\261
\160\325\340\142\040\066\330\226\100\370\136\061\336\101\231\151
\020\326\240\356\075\255\023\056\322\224\112\215\200\035\334\214
\106\041\126\213\111\133\336\241\330\003\312\316\330\145\264\260
\005\075\046\151\112\155\245\214\171\057\244\217\022\170\020\351
\262\011\010\103\303\306\004\273\063\076\107\065\245\134\040\040
\012\342\066\370\143\206\344\015\364\076\024\171\276\105\007\264
\213\011\223\365\366\052\046\241\275\104\307\363\120\015\015\141
\233\073\021\337\250\203\352\042\054\225\104\015\071\101\143\115
\250\053\155\150\245\113\237\100\207\152\074\105\012\276\162\247
\210\276\360\071\052\133\357\131\244\040\357\264\334\303\332\101
\333\101\245\272\042\137\227\243\310\143\241\044\055\116\045\240
\303\027\050\305\210\101\223\226\144\146\067\103\005\233\025\174
\266\276\236\373\033\310\146\030\272\024\357\271\030\317\204\151
\233\237\275\202\007\022\155\033\031\277\060\176\361\222\016\300
\114\026\377\321\076\157\370\253\262\141\232\150\103\342\012\124
\307\001\243\127\216\363\104\006\042\303\160\246\273\245\263\314
\202\030\330\100\216\275\352\160\101\157\224\127\014\276\007\164
\156\216\223\172\031\217\306\150\374\033\245\105\263\271\205\251
\002\003\001\000\001\243\201\356\060\201\353\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003
\125\035\016\004\026\004\024\007\353\216\252\161\313\047\245\273
\307\061\140\276\355\037\317\240\063\304\346\060\201\250\006\003
\125\035\043\004\201\240\060\201\235\200\024\007\353\216\252\161
\313\047\245\273\307\061\140\276\355\037\317\240\063\304\346\241
\162\244\160\060\156\061\013\060\011\006\003\125\004\006\023\002
\103\110\061\035\060\033\006\003\125\004\012\023\024\123\167\151
\163\163\040\107\157\166\145\162\156\155\145\156\164\040\120\113
\111\061\031\060\027\006\003\125\004\013\023\020\167\167\167\056
\160\153\151\056\141\144\155\151\156\056\143\150\061\045\060\043
\006\003\125\004\003\023\034\123\167\151\163\163\040\107\157\166
\145\162\156\155\145\156\164\040\122\157\157\164\040\103\101\040
\111\111\111\202\021\000\373\037\013\102\053\250\101\076\127\321
\356\052\156\132\117\273\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\006\060\015\006\011\052\206\110\206\367\015
\001\001\013\005\000\003\202\002\001\000\263\117\146\274\336\351
\214\145\374\267\123\020\056\374\374\335\211\032\021\100\160\224
\061\211\225\166\306\326\052\314\075\247\243\301\270\316\022\153
\064\120\301\165\052\057\347\141\046\357\113\077\336\215\043\237
\015\230\076\037\073\326\152\316\074\361\337\321\113\167\214\250
\117\362\120\345\050\251\301\152\352\126\157\107\264\202\053\246
\047\262\045\360\335\043\012\077\351\075\214\045\354\303\265\117

\067\372\123\012\351\070\230\153\051\354\123\065\327\206\220\232
\372\143\272\166\124\343\120\117\312\326\347\300\161\320\322\347
\352\150\124\255\223\344\062\374\172\161\100\207\005\050\270\352
\270\302\074\215\000\136\301\116\050\126\345\303\154\265\365\252
\215\357\147\026\007\320\216\305\362\132\031\073\273\301\213\263
\104\237\014\245\307\313\336\323\104\140\247\275\033\151\332\016
\232\377\227\105\206\155\372\261\144\212\037\354\337\121\130\122
\115\326\352\272\006\366\123\161\133\336\351\125\365\054\023\162
\006\114\123\226\372\312\133\364\077\034\247\337\122\375\313\116
\175\237\020\100\224\247\241\125\272\163\076\164\164\060\370\243
\340\237\252\137\037\135\300\337\101\317\001\201\041\333\250\256
\263\063\255\106\023\167\233\073\060\264\244\340\027\202\300\212
\265\064\024\034\005\213\256\340\075\332\305\174\253\046\010\114
\275\112\140\351\160\354\250\130\210\165\147\361\030\227\166\015
\154\013\175\031\055\002\265\202\231\167\317\142\372\235\022\001
\053\331\365\264\127\261\072\353\325\051\360\214\323\102\247\065
\110\214\142\203\076\012\076\141\335\261\363\007\241\307\163\260
\211\360\266\131\173\243\043\330\067\003\065\210\253\105\167\143
\114\377\160\353\216\152\007\321\042\340\062\221\313\025\161\132
\053\305\204\076\221\315\335\264\231\147\215\264\252\214\145\027
\246\254\234\136\126\230\247\364\342\100\022\325\101\227\265\063
\361\355\027\241\245\002\020\341\144\265\100\332\036\255\321\246
\356\254\036\307\021\333\027\161\172\331\232\036\306\116\233\364
\250\263\224\237\011\212\177\114\233\376\010\013\054\253\120\320
\067\262\111\065\032\267\036\051\041\166\341\233\360\241\252\130
\147\044\003\341\031\244\321\023\152\361
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Swiss Government Root CA III"
# Issuer: CN=Swiss Government Root CA III,OU=www.pki.admin.ch,O=Swiss Government PKI,C=CH
# Serial Number:fb:1f:0b:42:2b:a8:41:3e:57:d1:ee:2a:6e:5a:4f:bb
# Subject: CN=Swiss Government Root CA III,OU=www.pki.admin.ch,O=Swiss Government PKI,C=CH
# Not Valid Before: Fri Apr 15 07:00:00 2016
# Not Valid After: Mon Apr 15 06:59:59 2041
# Fingerprint (MD5): 56:83:cb:f2:76:2c:93:dc:11:3b:ea:c2:09:19:17:46
# Fingerprint (SHA1): cc:ea:e3:24:45:cd:42:18:dd:18:8e:ad:ce:b3:13:3c:7f:b3:40:ad
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Swiss Government Root CA III"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\314\352\343\044\105\315\102\030\335\030\216\255\316\263\023\074

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\177\263\100\255
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\126\203\313\362\166\054\223\334\021\073\352\302\011\031\027\106
END
CKA_ISSUER MULTILINE_OCTAL
\060\156\061\013\060\011\006\003\125\004\006\023\002\103\110\061
\035\060\033\006\003\125\004\012\023\024\123\167\151\163\163\040
\107\157\166\145\162\156\155\145\156\164\040\120\113\111\061\031
\060\027\006\003\125\004\013\023\020\167\167\167\056\160\153\151
\056\141\144\155\151\156\056\143\150\061\045\060\043\006\003\125
\004\003\023\034\123\167\151\163\163\040\107\157\166\145\162\156
\155\145\156\164\040\122\157\157\164\040\103\101\040\111\111\111
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\021\000\373\037\013\102\053\250\101\076\127\321\356\052\156
\132\117\273
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
#
 Certificate "Application CA G4 Root"
# Issuer: CN=Application CA G4 Root,O=LGPKI,C=JP
# Serial Number:31:a5:f3:ca:90:ea:23:ac:d2:9e:bd
# Subject: CN=Application CA G4 Root,O=LGPKI,C=JP
# Not Valid Before: Wed Feb 15 15:00:00 2017
# Not Valid After: Sun Feb 15 14:59:59 2037
# Fingerprint (MD5): 80:88:87:a3:29:65:03:a4:53:f1:23:08:41:e6:6b:66
# Fingerprint (SHA1): 21:da:ce:4c:2c:34:e6:64:68:ee:06:31:4d:b0:55:a0:a8:9d:4c:1d
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Application CA G4 Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\016\060\014\006\003\125\004\012\023\005\114\107\120\113\111\061
\037\060\035\006\003\125\004\003\023\026\101\160\160\154\151\143
\141\164\151\157\156\040\103\101\040\107\064\040\122\157\157\164
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
```

\060\076\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\016\060\014\006\003\125\004\012\023\005\114\107\120\113\111\061
\037\060\035\006\003\125\004\003\023\026\101\160\160\154\151\143
\141\164\151\157\156\040\103\101\040\107\064\040\122\157\157\164
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\013\061\245\363\312\220\352\043\254\322\236\275
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\144\060\202\002\114\240\003\002\001\002\002\013\061
\245\363\312\220\352\043\254\322\236\275\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\060\076\061\013\060\011\006
\003\125\004\006\023\002\112\120\061\016\060\014\006\003\125\004
\012\023\005\114\107\120\113\111\061\037\060\035\006\003\125\004
\003\023\026\101\160\160\154\151\143\141\164\151\157\156\040\103
\101\040\107\064\040\122\157\157\164\060\036\027\015\061\067\060
\062\061\065\061\065\060\060\060\060\132\027\015\063\067\060\062
\061\065\061\064\065\071\065\071\132\060\076\061\013\060\011\006
\003\125\004\006\023\002\112\120\061\016\060\014\006\003\125\004
\012\023\005\114\107\120\113\111\061\037\060\035\006\003\125\004
\003\023\026\101\160\160\154\151\143\141\164\151\157\156\040\103
\101\040\107\064\040\122\157\157\164\060\202\001\042\060\015\006
\011\052\206\110\206\367\015\001\001\001\005\000\003\202\001\017
\000\060\202\001\012\002\202\001\001\000\257\253\307\345\214\246
\130\236\057\326\005\311\221\167\060\276\336\032\324\016\143\142
\321\314\055\261\321\206\070\215\035\205\146\123\237\252\101\145
\340\130\322\345\051\276\224\250\225\223\074\137\152\305\233\237
\064\350\155\301\306\323\247\345\103\240\022\060\300\071\064\140
\014\213\364\150\365\110\337\351\216\034\256\110\247\273\252\075
\170\267\342\111\273\301\043\004\132\033\220\001\305\175\253\112
\001\241\302\223\152\322\205\263\266\347\166\353\153\157\070\353
\040\122\060\225\010\365\371\054\356\310\300\165\271\001\355\301
\067\126\060\134\235\177\144\302\312\100\040\271\225\205\274\245
\007\175\014\276\056\241\335\306\046\351\052\051\154\237\050\230
\051\121\350\166\023\033\357\056\013\067\132\063\236\300\045\147
\252\017\055\250\324\222\046\070\001\247\320\142\030\056\042\070
\070\170\013\272\122\231\241\174\046\002\261\342\305\342\336\316
\212\002\104\204\242\243\351\213\210\143\061\311\057\070\000\351
\304\002\115\036\043\047\022\110\334\021\261\360\322\342\016\060
\031\257\003\241\007\263\065\224\042\245\002\003\001\000\001\243
\143\060\141\060\035\006\003\125\035\016\004\026\004\024\156\334
\012\065\037\040\302\350\241\323\175\005\116\117\114\140\345\244
\304\147\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\006\060\017\006\003\125\035\023\001\001\377\004\005\060\003
\001\001\377\060\037\006\003\125\035\043\004\030\060\026\200\024
\156\334\012\065\037\040\302\350\241\323\175\005\116\117\114\140
\345\244\304\147\060\015\006\011\052\206\110\206\367\015\001\001

\013\005\000\003\202\001\001\000\125\063\325\100\267\032\176\117
\334\164\203\016\104\272\077\275\122\225\310\223\226\043\362\001
\271\024\353\312\022\164\315\141\210\064\257\115\136\364\131\212
\253\036\330\343\131\301\036\370\060\265\100\306\273\270\257\321
\355\077\154\252\163\230\202\344\230\064\256\222\101\016\131\066
\032\272\120\034\026\364\027\072\054\033\342\227\157\262\257\321
\332\336\024\122\337\200\074\307\117\075\207\236\272\225\275\170
\274\125\074\211\366\056\046\325\025\345\320\100\022\305\263\161
\077\154\146\037\243\374\113\265\116\342\156\334\200\007\303\371
\050\024\173\367\136\026\152\103\247\256\221\001\037\117\145\251
\110\263\316\156\032\006\041\244\323\061\210\210\245\111\021\202
\153\353\271\235\140\376\237\376\305\367\370\177\253\067\356\257
\347\130\106\272\011\344\135\071\247\113\004\330\003\002\311\140
\052\136\125\151\021\013\140\170\201\172\364\161\365\217\106\256
\217\004\250\227\034\200\211\043\143\333\376\353\246\027\016\131
\266\056\271\206\353\137\136\154\335\201\347\253\060\201\043\220
\047\261\367\053\220\071\013\270
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER
CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Application CA G4 Root"
# Issuer: CN=Application CA G4 Root,O=LGPKI,C=JP
# Serial Number:31:a5:f3:ca:90:ea:23:ac:d2:9e:bd
# Subject: CN=Application CA G4 Root,O=LGPKI,C=JP
# Not Valid Before: Wed Feb 15 15:00:00 2017
# Not Valid After: Sun Feb 15 14:59:59 2037
# Fingerprint (MD5): 80:88:87:a3:29:65:03:a4:53:f1:23:08:41:e6:6b:66
# Fingerprint (SHA1): 21:da:ce:4c:2c:34:e6:64:68:ee:06:31:4d:b0:55:a0:a8:9d:4c:1d
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Application CA G4 Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\041\332\316\114\054\064\346\144\150\356\006\061\115\260\125\240
\250\235\114\035
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\200\210\207\243\051\145\003\244\123\361\043\010\101\346\153\146
END
CKA_ISSUER MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\016\060\014\006\003\125\004\012\023\005\114\107\120\113\111\061

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\037\060\035\006\003\125\004\003\023\026\101\160\160\154\151\143
\141\164\151\157\156\040\103\101\040\107\064\040\122\157\157\164
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\013\061\245\363\312\220\352\043\254\322\236\275
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "SSC GDL CA Root A"
# Issuer: CN=SSC GDL CA Root A,OU=CA ROOT Services,O=Skaitmeninio sertifikavimo centras,C=LT
# Serial Number:50:96:6e:72:bd:10:d6:8c:4f:6b:c7:62:3f:9c:70:38
# Subject: CN=SSC GDL CA Root A,OU=CA ROOT Services,O=Skaitmeninio sertifikavimo centras,C=LT
# Not Valid Before: Tue Jun 04 13:00:47 2013
# Not Valid After: Sat Jun 04 13:00:47 2033
# Fingerprint (MD5): 59:3f:bc:3d:18:77:a4:ae:1c:d8:a2:25:cd:c3:44:3e
#
 Fingerprint (SHA1): 0c:20:09:a4:a8:8d:8b:42:02:18:52:50:54:0c:c4:2b:df:b5:b0:89
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSC GDL CA Root A"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\161\061\013\060\011\006\003\125\004\006\023\002\114\124\061
\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\031\060\027
\006\003\125\004\013\023\020\103\101\040\122\117\117\124\040\123
\145\162\166\151\143\145\163\061\032\060\030\006\003\125\004\003
\023\021\123\123\103\040\107\104\114\040\103\101\040\122\157\157
\164\040\101
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\161\061\013\060\011\006\003\125\004\006\023\002\114\124\061
\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\031\060\027
\006\003\125\004\013\023\020\103\101\040\122\117\117\124\040\123
\145\162\166\151\143\145\163\061\032\060\030\006\003\125\004\003
\023\021\123\123\103\040\107\104\114\040\103\101\040\122\157\157
\164\040\101
```

END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\120\226\156\162\275\020\326\214\117\153\307\142\077\234
\160\070
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\256\060\202\003\226\240\003\002\001\002\002\020\120
\226\156\162\275\020\326\214\117\153\307\142\077\234\160\070\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\161
\061\013\060\011\006\003\125\004\006\023\002\114\124\061\053\060
\051\006\003\125\004\012\023\042\123\153\141\151\164\155\145\156
\151\156\151\157\040\163\145\162\164\151\146\151\153\141\166\151
\155\157\040\143\145\156\164\162\141\163\061\031\060\027\006\003
\125\004\013\023\020\103\101\040\122\117\117\124\040\123\145\162
\166\151\143\145\163\061\032\060\030\006\003\125\004\003\023\021
\123\123\103\040\107\104\114\040\103\101\040\122\157\157\164\040
\101\060\036\027\015\061\063\060\066\060\064\061\063\060\060\064
\067\132\027\015\063\063\060\066\060\064\061\063\060\060\064\067
\132\060\161\061\013\060\011\006\003\125\004\006\023\002\114\124
\061\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164
\155\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153
\141\166\151\155\157\040\143\145\156\164\162\141\163\061\031\060
\027\006\003\125\004\013\023\020\103\101\040\122\117\117\124\040
\123\145\162\166\151\143\145\163\061\032\060\030\006\003\125\004
\003\023\021\123\123\103\040\107\104\114\040\103\101\040\122\157
\157\164\040\101\060\202\002\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012
\002\202\002\001\000\237\134\112\374\034\153\267\031\227\331\001
\067\076\012\351\030\206\323\005\352\242\332\337\011\202\127\356
\155\053\215\232\026\075\125\076\211\327\311\276\341\001\243\200
\065\243\106\354\341\021\355\250\074\225\345\072\122\201\312\116
\230\010\052\017\204\334\273\351\244\371\171\266\111\302\025\236
\240\225\350\017\110\367\120\327\371\246\103\324\007\013\060\101
\311\066\022\142\267\154\170\013\006\077\056\263\236\352\060\375
\101\143\117\204\054\067\316\007\246\071\144\173\161\025\133\053
\001\362\327\175\230\015\030\076\333\205\232\340\001\120\041\044
\270\033\243\143\103\323\201\133\115\014\201\116\070\153\316\140
\305\352\007\342\047\342\353\366\303\124\232\310\311\263\321\053
\062\067\002\274\155\173\236\220\167\043\215\223\023\046\073\207
\127\243\145\117\046\130\024\152\143\045\232\345\141\372\034\127
\375\015\054\151\017\306\012\360\046\071\027\002\243\326\163\201
\102\303\102\061\203\213\340\372\113\116\130\141\061\050\222\074
\306\311\020\010\311\014\133\104\254\143\302\327\142\031\362\161
\356\040\267\111\203\031\236\107\332\126\305\034\254\244\071\150
\027\137\021\032\154\252\245\222\217\275\033\313\305\340\002\200
\125\323\160\123\345\213\052\376\102\352\275\073\134\343\122\000
\175\170\077\046\314\021\256\064\321\062\014\370\173\240\321\175

\075\343\212\274\276\036\036\222\077\070\262\137\062\136\065\304
\176\302\222\015\235\266\313\131\325\353\022\152\335\162\041\121
\021\260\163\345\062\351\326\314\016\335\263\071\132\042\357\344
\365\351\006\151\206\052\174\163\257\030\042\163\054\066\045\334
\125\251\122\061\263\212\216\025\175\262\116\020\173\120\212\000
\114\272\207\342\105\123\167\176\115\145\002\153\214\223\266\153
\165\355\357\226\267\110\216\250\340\272\271\202\262\122\155\041
\377\222\272\321\076\260\134\261\253\031\016\031\163\106\053\323
\122\110\145\064\332\004\065\322\170\076\317\143\065\244\123\346
\113\343\120\203\275\363\233\207\262\041\332\110\241\172\113\354
\262\342\361\324\045\005\224\123\026\114\053\146\044\020\310\340
\327\234\022\244\224\302\001\043\223\241\000\246\340\156\273\071
\342\365\172\150\251\002\003\001\000\001\243\102\060\100\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\006\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\035\006\003\125\035\016\004\026\004\024\240\021\176\037\344\224
\144\121\073\022\071\172\154\335\111\223\371\375\300\134\060\015
\006\011\052\206\110\206\367\015\001\001\013\005\000\003\202\002
\001\000\014\361\113\214\341\117\026\026\322\352\142\222\266\255
\324\122\216\013\031\144\113\071\360\230\071\163\112\122\352\116
\315\216\144\107\260\060\217\074\017\055\332\042\145\363\031\130
\062\074\177\203\217\012\014\345\124\346\251\276\270\256\227\126
\346\267\015\031\174\275\227\054\152\052\245\126\163\202\336\116
\230\213\075\034\304\320\053\053\273\305\014\370\116\376\055\256
\277\251\147\177\127\263\157\355\377\213\323\126\014\357\060\214
\301\136\246\351\131\212\074\056\334\107\317\314\224\136\203\254
\024\166\372\176\274\014\243\016\134\033\210\354\053\033\065\150
\210\261\365\173\305\363\263\305\032\274\373\357\265\136\337\360
\071\036\165\150\355\104\302\113\042\160\076\134\153\224\311\020
\254\360\375\310\057\176\043\342\201\247\033\316\014\272\105\062
\047\120\105\071\254\340\376\000\264\052\165\007\014\147\033\273
\161\300\202\343\227\126\227\320\344\167\131\271\377\174\147\134
\204\145\273\010\066\250\113\116\221\302\151\376\035\354\232\023
\037\165\063\054\051\306\351\260\150\220\043\377\043\137\177\306
\073\247\050\020\270\037\242\210\315\144\026\045\117\343\200\267
\300\112\200\127\360\220\333\072\262\002\062\040\325\153\310\330
\024\100\311\331\070\031\124\070\353\350\145\073\157\134\325\105
\172\257\333\331\330\225\236\266\247\225\315\034\011\035\002\036
\001\351\004\225\135\205\227\070\025\275\250\307\231\336\323\104
\102\135\206\203\101\044\174\121\211\252\103\011\047\064\350\361
\012\265\226\113\264\363\240\376\362\000\215\152\073\164\271\103
\271\146\271\317\352\353\067\316\377\233\351\043\370\154\323\043
\375\350\351\340\156\370\373\015\122\100\212\254\200\153\040\020
\135\320\250\375\252\075\071\021\053\057\377\122\221\072\240\334
\212\307\166\066\021\131\205\273\060\212\244\110\060\234\141\103
\253\324\257\166\355\300\277\027\224\170\065\333\110\067\010\324
\216\152\000\351\042\335\312\360\323\022\070\074\230\237\140\114
\155\077\102\375\357\214\232\267\036\161\172\032\111\324\140\311

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\353\217\364\351\306\277\160\124\210\322\307\127\073\126\315\327
\156\334\355\015\164\176\345\165\101\221\127\223\064\175\251\365
\275\207
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "SSC GDL CA Root A"
# Issuer: CN=SSC GDL CA Root A,OU=CA ROOT Services,O=Skaitmeninio sertifikavimo centras,C=LT
# Serial Number:50:96:6e:72:bd:10:d6:8c:4f:6b:c7:62:3f:9c:70:38
# Subject: CN=SSC GDL CA Root A,OU=CA ROOT Services,O=Skaitmeninio sertifikavimo centras,C=LT
# Not Valid Before: Tue Jun 04 13:00:47 2013
# Not Valid After: Sat Jun 04 13:00:47 2033
# Fingerprint (MD5): 59:3f:bc:3d:18:77:a4:ae:1c:d8:a2:25:cd:c3:44:3e
#
 Fingerprint (SHA1): 0c:20:09:a4:a8:8d:8b:42:02:18:52:50:54:0c:c4:2b:df:b5:b0:89
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSC GDL CA Root A"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\014\040\011\244\250\215\213\102\002\030\122\120\124\014\304\053
\337\265\260\211
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\131\077\274\075\030\167\244\256\034\330\242\045\315\303\104\076
END
CKA_ISSUER MULTILINE_OCTAL
\060\161\061\013\060\011\006\003\125\004\006\023\002\114\124\061
\053\060\051\006\003\125\004\012\023\042\123\153\141\151\164\155
\145\156\151\156\151\157\040\163\145\162\164\151\146\151\153\141
\166\151\155\157\040\143\145\156\164\162\141\163\061\031\060\027
\006\003\125\004\013\023\020\103\101\040\122\117\117\124\040\123
\145\162\166\151\143\145\163\061\032\060\030\006\003\125\004\003
\023\021\123\123\103\040\107\104\114\040\103\101\040\122\157\157
\164\040\101
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\120\226\156\162\275\020\326\214\117\153\307\142\077\234
\160\070
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
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CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Halcom Root Certificate Authority"
# Issuer: CN=Halcom Root Certificate Authority,2.5.4.97=VATSI-43353126,O=Halcom d.d.,C=SI
# Serial Number: 843675 (0xcdf9b)
# Subject: CN=Halcom Root Certificate Authority,2.5.4.97=VATSI-43353126,O=Halcom d.d.,C=SI
# Not Valid Before: Fri Jun 10 07:07:50 2016
# Not Valid After: Tue Jun 10 07:07:50 2036
# Fingerprint (MD5): 69:16:83:a1:f7:27:b9:ec:7c:d2:c6:b3:79:b2:a3:61
# Fingerprint (SHA1): 23:d7:31:fe:dc:5c:8b:b9:7d:e6:dc:8e:13:b4:11:bd:4f:24:00:4f
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
 UTF8 "Halcom Root Certificate Authority"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\024\060\022\006\003\125\004\012\023\013\110\141\154\143\157\155
\040\144\056\144\056\061\027\060\025\006\003\125\004\141\023\016
\126\101\124\123\111\055\064\063\063\065\063\061\062\066\061\052
\060\050\006\003\125\004\003\023\041\110\141\154\143\157\155\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\145
\040\101\165\164\150\157\162\151\164\171
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\024\060\022\006\003\125\004\012\023\013\110\141\154\143\157\155
\040\144\056\144\056\061\027\060\025\006\003\125\004\141\023\016
\126\101\124\123\111\055\064\063\063\065\063\061\062\066\061\052
\060\050\006\003\125\004\003\023\041\110\141\154\143\157\155\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\145
\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\003\014\337\233
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\200\060\202\002\150\240\003\002\001\002\002\003\014
\337\233\060\015\006\011\052\206\110\206\367\015\001\001\013\005
\000\060\150\061\013\060\011\006\003\125\004\006\023\002\123\111
\061\024\060\022\006\003\125\004\012\023\013\110\141\154\143\157
\155\040\144\056\144\056\061\027\060\025\006\003\125\004\141\023
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\016\126\101\124\123\111\055\064\063\063\065\063\061\062\066\061
\052\060\050\006\003\125\004\003\023\041\110\141\154\143\157\155
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\145\040\101\165\164\150\157\162\151\164\171\060\036\027\015\061
\066\060\066\061\060\060\067\060\067\065\060\132\027\015\063\066
\060\066\061\060\060\067\060\067\065\060\132\060\150\061\013\060
\011\006\003\125\004\006\023\002\123\111\061\024\060\022\006\003
\125\004\012\023\013\110\141\154\143\157\155\040\144\056\144\056
\061\027\060\025\006\003\125\004\141\023\016\126\101\124\123\111
\055\064\063\063\065\063\061\062\066\061\052\060\050\006\003\125
\004\003\023\041\110\141\154\143\157\155\040\122\157\157\164\040
\103\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150
\157\162\151\164\171\060\202\001\042\060\015\006\011\052\206\110
\206\367\015\001\001\001\005\000\003\202\001\017\000\060\202\001
\012\002\202\001\001\000\351\122\246\306\032\357\143\273\255\201
\364\220\262\132\217\015\325\026\063\264\034\030\373\313\211\052
\060\273\145\201\304\341\373\002\251\224\007\166\345\327\025\344
\172\144\020\200\352\074\320\263\242\255\256\034\037\352\273\201
\141\230\324\371\215\151\225\304\105\056\003\011\312\206\372\134
\132\021\027\100\060\076\360\306\143\011\311\361\215\101\245\126
\015\005\144\151\113\130\254\052\051\226\273\100\063\026\064\113
\147\154\327\361\264\106\245\352\131\250\103\150\017\214\070\052
\252\074\366\104\003\206\370\212\333\105\041\053\051\036\022\267
\372\245\145\101\336\006\010\130\160\225\076\364\114\331\353\017
\051\251\221\212\236\255\312\022\365\345\225\346\070\331\032\246
\213\234\117\246\110\023\020\245\171\104\275\152\073\051\365\026
\167\100\313\176\233\134\337\276\213\353\347\240\031\157\237\025
\077\047\236\051\261\365\015\374\137\107\242\074\335\056\013\002
\373\364\215\352\354\014\261\371\264\005\254\371\217\251\075\156
\054\035\071\237\320\116\237\116\310\152\236\200\003\141\334\317
\370\155\224\313\017\317\002\003\001\000\001\243\063\060\061\060
\017\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377
\060\021\006\003\125\035\016\004\012\004\010\102\256\246\103\307
\230\050\260\060\013\006\003\125\035\017\004\004\003\002\001\006
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\003
\202\001\001\000\122\271\171\320\333\143\376\031\201\373\014\371
\301\345\120\131\312\235\262\373\134\063\320\070\250\253\265\032
\116\123\045\165\042\323\111\277\312\201\317\323\341\173\243\221
\106\165\312\032\353\331\365\135\274\173\206\065\375\201\227\234
\204\327\046\230\042\374\261\065\320\251\225\266\174\377\344\227
\264\100\176\111\135\150\310\342\324\071\165\047\117\003\221\262
\061\127\277\206\327\155\312\161\000\042\067\320\073\130\044\120
\240\234\214\232\211\216\365\050\106\154\347\026\355\260\201\253
\364\106\046\257\246\350\032\105\167\160\026\222\262\173\161\161
\334\367\337\111\147\300\063\010\016\056\123\301\167\253\307\112
\221\114\022\357\347\016\011\345\165\061\040\256\156\374\132\212
\200\234\020\260\333\250\112\314\363\053\334\066\064\246\367\251
\013\147\235\220\313\075\046\237\165\315\114\311\035\006\012\165

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\213\122\300\201\360\321\046\254\314\222\246\024\234\134\074\026
\102\373\223\314\002\250\023\363\332\256\012\303\270\025\364\260
\320\324\340\026\040\117\254\120\230\170\046\224\036\150\353\224
\162\376\367\213
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Halcom Root Certificate
 Authority"
# Issuer: CN=Halcom Root Certificate Authority,2.5.4.97=VATSI-43353126,O=Halcom d.d.,C=SI
# Serial Number: 843675 (0xcdf9b)
# Subject: CN=Halcom Root Certificate Authority,2.5.4.97=VATSI-43353126,O=Halcom d.d.,C=SI
# Not Valid Before: Fri Jun 10 07:07:50 2016
# Not Valid After: Tue Jun 10 07:07:50 2036
# Fingerprint (MD5): 69:16:83:a1:f7:27:b9:ec:7c:d2:c6:b3:79:b2:a3:61
# Fingerprint (SHA1): 23:d7:31:fe:dc:5c:8b:b9:7d:e6:dc:8e:13:b4:11:bd:4f:24:00:4f
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Halcom Root Certificate Authority"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\043\327\061\376\334\134\213\271\175\346\334\216\023\264\021\275
\117\044\000\117
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\151\026\203\241\367\047\271\354\174\322\306\263\171\262\243\141
END
CKA_ISSUER MULTILINE_OCTAL
\060\150\061\013\060\011\006\003\125\004\006\023\002\123\111\061
\024\060\022\006\003\125\004\012\023\013\110\141\154\143\157\155
\040\144\056\144\056\061\027\060\025\006\003\125\004\141\023\016
\126\101\124\123\111\055\064\063\063\065\063\061\062\066\061\052
\060\050\006\003\125\004\003\023\041\110\141\154\143\157\155\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\145
\040\101\165\164\150\157\162\151\164\171
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\003\014\337\233
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
```

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CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Application CA G3 Root"
# Issuer: CN=Application CA G3 Root,O=LGPKI,C=JP
# Serial Number: 49 (0x31)
# Subject: CN=Application CA G3 Root,O=LGPKI,C=JP
# Not Valid Before: Tue Jun 03 15:00:00 2014
# Not Valid After: Sat Jun 03 14:59:59 2034
# Fingerprint (MD5): 47:5e:d1:73:5a:e8:95:77:04:01:a3:3f:33:02:5c:20
# Fingerprint (SHA1):
 6f:38:84:56:8e:99:c8:c6:ac:0e:5d:de:2d:b2:02:dd:00:2e:36:63
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Application CA G3 Root"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\016\060\014\006\003\125\004\012\023\005\114\107\120\113\111\061
\037\060\035\006\003\125\004\003\023\026\101\160\160\154\151\143
\141\164\151\157\156\040\103\101\040\107\063\040\122\157\157\164
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\016\060\014\006\003\125\004\012\023\005\114\107\120\113\111\061
\037\060\035\006\003\125\004\003\023\026\101\160\160\154\151\143
\141\164\151\157\156\040\103\101\040\107\063\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\061
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\132\060\202\002\102\240\003\002\001\002\002\001\061
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\076\061\013\060\011\006\003\125\004\006\023\002\112\120\061\016
\060\014\006\003\125\004\012\023\005\114\107\120\113\111\061\037
\060\035\006\003\125\004\003\023\026\101\160\160\154\151\143\141
\164\151\157\156\040\103\101\040\107\063\040\122\157\157\164\060
\036\027\015\061\064\060\066\060\063\061\065\060\060\060\060\132
\027\015\063\064\060\066\060\063\061\064\065\071\065\071\132\060
\076\061\013\060\011\006\003\125\004\006\023\002\112\120\061\016
\060\014\006\003\125\004\012\023\005\114\107\120\113\111\061\037
\060\035\006\003\125\004\003\023\026\101\160\160\154\151\143\141
\164\151\157\156\040\103\101\040\107\063\040\122\157\157\164\060
\202\001\042\060\015\006\011\052\206\110\206\367\015\001\001\001
```

\005\000\003\202\001\017\000\060\202\001\012\002\202\001\001\000
\315\105\076\367\321\226\042\134\221\057\076\012\000\003\314\266
\367\154\124\374\050\067\324\004\030\354\255\230\311\257\323\245
\271\347\331\277\116\346\243\231\074\231\156\241\040\036\106\033
\342\165\125\274\322\354\366\210\032\354\064\105\113\203\235\323
\262\346\335\007\211\301\010\331\370\073\213\222\144\162\135\232
\073\314\255\067\211\307\334\140\171\010\340\160\254\367\053\355
\237\003\111\037\216\076\203\250\156\342\222\134\124\321\171\337
\354\030\072\175\270\155\217\326\243\045\115\255\037\100\246\137
\324\252\116\261\160\030\131\231\362\013\124\151\076\171\050\104
\210\367\161\227\315\177\005\334\312\334\166\112\220\114\153\140
\350\372\046\061\330\265\370\347\374\155\213\044\152\266\357\102
\327\043\124\305\032\143\212\073\307\374\252\155\074\217\313\154
\332\040\260\362\274\145\034\001\114\042\225\015\034\043\037\254
\325\371\316\165\133\352\060\275\114\001\044\037\165\324\141\111
\303\033\231\145\216\010\134\071\070\315\051\303\070\105\315\144
\171\267\233\115\107\352\130\062\372\246\366\222\360\301\267\137
\002\003\001\000\001\243\143\060\141\060\035\006\003\125\035\016
\004\026\004\024\251\065\052\110\276\054\067\355\206\333\174\125
\207\000\046\276\030\055\134\056\060\016\006\003\125\035\017\001
\001\377\004\004\003\002\001\006\060\017\006\003\125\035\023\001
\001\377\004\005\060\003\001\001\377\060\037\006\003\125\035\043
\004\030\060\026\200\024\251\065\052\110\276\054\067\355\206\333
\174\125\207\000\046\276\030\055\134\056\060\015\006\011\052\206
\110\206\367\015\001\001\013\005\000\003\202\001\001\000\266\202
\275\305\106\320\161\213\245\221\075\176\055\132\371\234\204\175
\007\047\225\035\347\115\310\174\354\346\223\350\126\032\172\060
\110\073\014\372\116\365\011\262\257\210\255\224\354\375\262\255
\057\346\005\164\041\033\204\213\070\052\303\355\357\106\150\265
\335\122\372\160\302\165\117\377\243\101\056\074\027\224\114\011
\042\264\216\301\177\304\246\254\355\203\150\317\145\136\354\172
\275\305\146\356\320\243\177\362\127\261\010\302\171\160\353\162
\177\101\131\011\171\165\361\274\261\041\376\203\263\104\075\211
\243\276\261\172\330\235\303\037\346\304\124\341\215\345\330\120
\334\344\126\067\173\276\050\000\363\054\167\332\043\177\140\230
\075\005\026\362\170\151\255\231\303\072\164\154\076\232\262\224
\355\217\252\366\123\153\347\310\267\350\074\214\373\307\174\117
\031\135\244\146\025\351\177\207\240\320\325\255\040\244\106\011
\105\254\345\310\145\207\273\006\337\374\327\150\126\103\163\242
\000\231\062\222\302\016\240\034\016\221\275\225\130\274\223\237
\204\302\245\146\347\145\315\051\342\142\362\005\222\140
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate

```
# Trust for "Application CA G3 Root"
# Issuer: CN=Application CA G3 Root,O=LGPKI,C=JP
# Serial Number: 49 (0x31)
# Subject: CN=Application CA G3 Root,O=LGPKI,C=JP
# Not Valid Before: Tue Jun 03 15:00:00 2014
# Not Valid After: Sat Jun 03 14:59:59 2034
# Fingerprint (MD5): 47:5e:d1:73:5a:e8:95:77:04:01:a3:3f:33:02:5c:20
# Fingerprint (SHA1): 6f:38:84:56:8e:99:c8:c6:ac:0e:5d:de:2d:b2:02:dd:00:2e:36:63
CKA_CLASS
 CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Application CA G3 Root"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\157\070\204\126\216\231\310\306\254\016\135\336\055\262\002\335
\000\056\066\143
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\107\136\321\163\132\350\225\167\004\001\243\077\063\002\134\040
END
CKA_ISSUER MULTILINE_OCTAL
\060\076\061\013\060\011\006\003\125\004\006\023\002\112\120\061
\016\060\014\006\003\125\004\012\023\005\114\107\120\113\111\061
\037\060\035\006\003\125\004\003\023\026\101\160\160\154\151\143
\141\164\151\157\156\040\103\101\040\107\063\040\122\157\157\164
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\001\061
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL
 CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "GLOBALTRUST 2015"
# Issuer: CN=GLOBALTRUST 2015,OU=GLOBALTRUST Certification Service,O=e-commerce monitoring
GmbH,L=Wien,ST=Wien,C=AT
# Serial Number: 0 (0x0)
# Subject: CN=GLOBALTRUST 2015,OU=GLOBALTRUST Certification Service,O=e-commerce monitoring
GmbH,L=Wien,ST=Wien,C=AT
# Not Valid Before: Thu Jun 11 00:00:00 2015
# Not Valid After: Sun Jun 10 00:00:00 2040
# Fingerprint (MD5): da:5a:b9:da:8e:0a:38:d4:82:63:03:9d:6c:96:6c:ed
# Fingerprint (SHA1): 46:5b:26:be:be:71:06:dd:85:44:c1:13:9d:9f:a2:57:00:c1:d7:bd
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
```

CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GLOBALTRUST 2015"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\227\061\013\060\011\006\003\125\004\006\023\002\101\124
\061\015\060\013\006\003\125\004\010\023\004\127\151\145\156\061
\015\060\013\006\003\125\004\007\023\004\127\151\145\156\061\043
\060\041\006\003\125\004\012\023\032\145\055\143\157\155\155\145
\162\143\145\040\155\157\156\151\164\157\162\151\156\147\040\107
\155\142\110\061\052\060\050\006\003\125\004\013\023\041\107\114
\117\102\101\114\124\122\125\123\124\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\123\145\162\166\151\143\145\061
\031\060\027\006\003\125\004\003\023\020\107\114\117\102\101\114
\124\122\125\123\124\040\062\060\061\065
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\227\061\013\060\011\006\003\125\004\006\023\002\101\124
\061\015\060\013\006\003\125\004\010\023\004\127\151\145\156\061
\015\060\013\006\003\125\004\007\023\004\127\151\145\156\061\043
\060\041\006\003\125\004\012\023\032\145\055\143\157\155\155\145
\162\143\145\040\155\157\156\151\164\157\162\151\156\147\040\107
\155\142\110\061\052\060\050\006\003\125\004\013\023\041\107\114
\117\102\101\114\124\122\125\123\124\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\123\145\162\166\151\143\145\061
\031\060\027\006\003\125\004\003\023\020\107\114\117\102\101\114
\124\122\125\123\124\040\062\060\061\065
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\001\000
END
CKA_VALUE MULTILINE_OCTAL
\060\202\006\014\060\202\003\364\240\003\002\001\002\002\001\000
\060\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060
\201\227\061\013\060\011\006\003\125\004\006\023\002\101\124\061
\015\060\013\006\003\125\004\010\023\004\127\151\145\156\061\015
\060\013\006\003\125\004\007\023\004\127\151\145\156\061\043\060
\041\006\003\125\004\012\023\032\145\055\143\157\155\155\145\162
\143\145\040\155\157\156\151\164\157\162\151\156\147\040\107\155
\142\110\061\052\060\050\006\003\125\004\013\023\041\107\114\117
\102\101\114\124\122\125\123\124\040\103\145\162\164\151\146\151
\143\141\164\151\157\156\040\123\145\162\166\151\143\145\061\031
\060\027\006\003\125\004\003\023\020\107\114\117\102\101\114\124
\122\125\123\124\040\062\060\061\065\060\036\027\015\061\065\060

\066\061\061\060\060\060\060\060\060\132\027\015\064\060\060\066
\061\060\060\060\060\060\060\060\132\060\201\227\061\013\060\011
\006\003\125\004\006\023\002\101\124\061\015\060\013\006\003\125
\004\010\023\004\127\151\145\156\061\015\060\013\006\003\125\004
\007\023\004\127\151\145\156\061\043\060\041\006\003\125\004\012
\023\032\145\055\143\157\155\155\145\162\143\145\040\155\157\156
\151\164\157\162\151\156\147\040\107\155\142\110\061\052\060\050
\006\003\125\004\013\023\041\107\114\117\102\101\114\124\122\125
\123\124\040\103\145\162\164\151\146\151\143\141\164\151\157\156
\040\123\145\162\166\151\143\145\061\031\060\027\006\003\125\004
\003\023\020\107\114\117\102\101\114\124\122\125\123\124\040\062
\060\061\065\060\202\002\040\060\015\006\011\052\206\110\206\367
\015\001\001\001\005\000\003\202\002\015\000\060\202\002\010\002
\202\002\001\000\324\246\227\250\362\364\220\021\103\255\264\202
\106\101\361\057\221\157\143\242\315\015\040\334\275\014\070\212
\145\112\012\053\072\250\164\251\167\241\213\216\362\057\201\367
\204\030\315\255\353\142\266\222\175\340\101\345\116\124\070\067
\202\357\313\340\355\317\273\312\314\243\113\367\133\376\270\174
\247\010\155\313\103\304\114\042\024\146\343\235\003\271\167\041
\253\104\153\041\107\043\310\040\372\052\313\221\166\035\165\154
\370\233\351\017\046\351\103\057\232\040\005\150\030\307\216\231
\205\055\101\007\246\144\216\130\341\215\225\200\244\115\137\365
\002\330\201\171\333\325\347\337\242\042\375\024\247\147\026\354
\331\130\114\312\251\335\352\032\216\251\010\144\117\121\041\266
\162\242\116\377\120\161\275\073\145\344\275\177\123\021\256\337
\020\071\173\135\366\107\160\027\367\103\221\003\172\141\045\137
\054\374\370\211\021\074\354\071\124\026\111\304\041\232\161\340
\171\213\166\035\166\075\007\131\270\007\261\214\334\307\315\116
\341\373\255\103\115\077\100\357\041\142\057\061\104\116\151\307
\157\042\313\253\124\113\350\302\372\021\150\254\310\156\016\336
\154\305\047\226\011\121\002\115\001\266\127\277\062\050\325\011
\103\226\367\304\210\265\371\124\376\032\072\152\267\054\265\044
\144\373\112\170\162\303\374\331\117\310\116\043\271\051\330\015
\241\110\101\223\002\155\277\022\205\233\306\305\140\055\360\221
\374\231\375\040\224\236\161\143\253\325\111\253\220\354\207\071
\205\177\215\205\314\013\350\333\113\073\016\374\302\166\175\106
\347\071\046\236\337\125\337\036\204\371\101\066\046\154\002\131
\053\216\373\274\351\037\047\044\142\004\147\204\341\077\330\235
\030\116\226\240\045\356\312\050\003\117\002\121\317\367\065\067
\151\244\264\326\326\325\036\031\103\047\026\037\107\121\356\112
\011\114\021\132\266\133\075\141\350\073\020\276\326\106\346\364
\034\375\270\105\275\174\372\165\132\354\341\122\043\015\216\037
\206\227\123\221\134\233\233\050\326\216\345\156\047\255\040\214
\247\301\101\251\227\067\213\054\352\156\030\005\227\366\316\003
\122\361\275\171\064\233\100\307\043\222\164\363\157\355\243\351
\131\360\125\113\002\001\003\243\143\060\141\060\017\006\003\125
\035\023\001\001\377\004\005\060\003\001\001\377\060\016\006\003
\125\035\017\001\001\377\004\004\003\002\001\006\060\035\006\003

\125\035\016\004\026\004\024\313\260\335\075\214\074\337\142\054
\053\146\074\236\074\351\025\155\161\264\327\060\037\006\003\125
\035\043\004\030\060\026\200\024\313\260\335\075\214\074\337\142
\054\053\146\074\236\074\351\025\155\161\264\327\060\015\006\011
\052\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000
\242\175\125\004\146\356\026\024\274\202\201\207\045\031\071\142
\364\376\073\037\341\300\163\000\161\312\165\251\342\163\361\305
\015\101\243\135\216\301\055\331\145\133\331\211\342\360\216\305
\240\175\275\313\314\106\123\037\137\355\040\266\002\052\326\023
\362\235\175\121\112\100\125\161\255\236\354\166\352\105\040\216
\252\372\172\103\232\160\147\176\023\336\230\350\313\215\335\037
\254\064\322\241\265\355\376\270\347\026\317\370\321\070\060\215
\064\211\322\316\175\201\322\036\377\121\030\123\066\223\334\011
\313\010\026\270\010\327\132\060\220\212\012\371\057\265\317\304
\315\124\162\052\306\275\001\347\130\013\156\006\100\264\011\316
\264\216\263\232\351\211\221\224\254\172\124\341\373\343\204\054
\203\240\117\376\353\350\301\364\353\266\046\323\070\304\055\255
\254\105\200\064\155\041\075\135\205\072\342\173\376\124\267\335
\350\205\124\313\244\361\253\051\120\170\327\044\265\243\057\236
\257\021\146\256\030\270\375\135\050\317\100\327\125\340\054\353
\122\061\150\103\146\005\227\222\273\305\361\041\054\375\022\144
\061\231\103\157\213\235\113\140\376\024\136\122\263\043\250\341
\230\172\356\024\311\241\342\314\077\166\041\142\375\153\015\331
\264\112\225\346\156\133\172\044\303\323\306\326\037\242\353\067
\153\116\243\337\142\353\353\016\112\010\277\353\030\210\373\107
\032\255\302\121\303\325\174\367\037\053\263\310\112\120\016\151
\130\040\142\001\112\133\312\143\226\046\042\256\366\351\234\100
\254\147\003\235\235\151\025\302\300\370\135\247\044\261\047\074
\277\005\342\253\242\312\311\260\055\176\243\301\061\040\106\041
\145\222\335\312\336\337\223\033\274\155\057\137\251\026\244\127
\207\054\162\232\132\202\147\321\104\342\075\011\012\201\214\036
\020\375\306\064\150\354\377\167\141\166\177\046\367\333\374\022
\106\022\252\300\321\370\171\205\242\002\314\213\252\244\255\154
\024\300\275\374\150\256\104\175\042\371\012\105\135\354\004\346
\372\343\244\305\346\371\262\031\303\331\214\250\223\173\072\212
\151\073\122\023\074\035\063\002\116\226\100\237\271\225\375\223
\027\063\301\311\013\366\375\275\151\020\365\255\051\373\343\332
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "GLOBALTRUST 2015"
# Issuer: CN=GLOBALTRUST 2015,OU=GLOBALTRUST Certification Service,O=e-commerce monitoring GmbH,L=Wien,ST=Wien,C=AT
# Serial Number: 0 (0x0)

```
# Subject: CN=GLOBALTRUST 2015,OU=GLOBALTRUST Certification Service,O=e-commerce monitoring
GmbH,L=Wien,ST=Wien,C=AT
# Not Valid
 Before: Thu Jun 11 00:00:00 2015
# Not Valid After: Sun Jun 10 00:00:00 2040
# Fingerprint (MD5): da:5a:b9:da:8e:0a:38:d4:82:63:03:9d:6c:96:6c:ed
# Fingerprint (SHA1): 46:5b:26:be:be:71:06:dd:85:44:c1:13:9d:9f:a2:57:00:c1:d7:bd
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GLOBALTRUST 2015"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\106\133\046\276\276\161\006\335\205\104\301\023\235\237\242\127
\000\301\327\275
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\332\132\271\332\216\012\070\324\202\143\003\235\154\226\154\355
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\227\061\013\060\011\006\003\125\004\006\023\002\101\124
\061\015\060\013\006\003\125\004\010\023\004\127\151\145\156\061
\015\060\013\006\003\125\004\007\023\004\127\151\145\156\061\043
\060\041\006\003\125\004\012\023\032\145\055\143\157\155\155\145
\162\143\145\040\155\157\156\151\164\157\162\151\156\147\040\107
\155\142\110\061\052\060\050\006\003\125\004\013\023\041\107\114
\117\102\101\114\124\122\125\123\124\040\103\145\162\164\151\146
\151\143\141\164\151\157\156\040\123\145\162\166\151\143\145\061
\031\060\027\006\003\125\004\003\023\020\107\114\117\102\101\114
\124\122\125\123\124\040\062\060\061\065
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\001\000
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Microsoft ECC Product Root Certificate Authority 2018"
# Issuer: CN=Microsoft ECC Product Root Certificate Authority 2018,O=Microsoft
Corporation,L=Redmond,ST=Washington,C=US
# Serial Number:14:98:26:66:dc:7c:cd:8f:40:53:67:7b:b9:99:ec:85
# Subject: CN=Microsoft ECC Product Root Certificate Authority 2018,O=Microsoft
Corporation,L=Redmond,ST=Washington,C=US
# Not Valid Before: Tue Feb 27 20:42:08
```

```
 2018
# Not Valid After: Fri Feb 27 20:50:46 2043
# Fingerprint (MD5): 1f:12:4e:de:13:e0:6a:02:3c:d7:c0:9a:4f:48:c3:d6
# Fingerprint (SHA1): 06:f1:aa:33:0b:92:7b:75:3a:40:e6:8c:df:22:e3:4b:cb:ef:33:52
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft ECC Product Root Certificate Authority 2018"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\224\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\127\141\163\150\151
\156\147\164\157\156\061\020\060\016\006\003\125\004\007\023\007
\122\145\144\155\157\156\144\061\036\060\034\006\003\125\004\012
\023\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160
\157\162\141\164\151\157\156\061\076\060\074\006\003\125\004\003
\023\065\115\151\143\162\157\163\157\146\164\040\105\103\103\040
\120\162\157\144\165\143\164\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\040\062\060\061\070
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\224\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\127\141\163\150\151
\156\147\164\157\156\061\020\060\016\006\003\125\004\007\023\007
\122\145\144\155\157\156\144\061\036\060\034\006\003\125\004\012
\023\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160
\157\162\141\164\151\157\156\061\076\060\074\006\003\125\004\003
\023\065\115\151\143\162\157\163\157\146\164\040\105\103\103\040
\120\162\157\144\165\143\164\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\040\062\060\061\070
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\024\230\046\146\334\174\315\217\100\123\147\173\271\231
\354\205
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\043\060\202\002\250\240\003\002\001\002\002\020\024
\230\046\146\334\174\315\217\100\123\147\173\271\231\354\205\060
\012\006\010\052\206\110\316\075\004\003\003\060\201\224\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\023\060\021\006
\003\125\004\010\023\012\127\141\163\150\151\156\147\164\157\156
\061\020\060\016\006\003\125\004\007\023\007\122\145\144\155\157
\156\144\061\036\060\034\006\003\125\004\012\023\025\115\151\143
```

\162\157\163\157\146\164\040\103\157\162\160\157\162\141\164\151
\157\156\061\076\060\074\006\003\125\004\003\023\065\115\151\143
\162\157\163\157\146\164\040\105\103\103\040\120\162\157\144\165
\143\164\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\062\060
\061\070\060\036\027\015\061\070\060\062\062\067\062\060\064\062
\060\070\132\027\015\064\063\060\062\062\067\062\060\065\060\064
\066\132\060\201\224\061\013\060\011\006\003\125\004\006\023\002
\125\123\061\023\060\021\006\003\125\004\010\023\012\127\141\163
\150\151\156\147\164\157\156\061\020\060\016\006\003\125\004\007
\023\007\122\145\144\155\157\156\144\061\036\060\034\006\003\125
\004\012\023\025\115\151\143\162\157\163\157\146\164\040\103\157
\162\160\157\162\141\164\151\157\156\061\076\060\074\006\003\125
\004\003\023\065\115\151\143\162\157\163\157\146\164\040\105\103
\103\040\120\162\157\144\165\143\164\040\122\157\157\164\040\103
\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150\157
\162\151\164\171\040\062\060\061\070\060\166\060\020\006\007\052
\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142\000
\004\307\021\026\052\166\035\126\216\276\271\142\145\324\303\316
\264\360\303\060\354\217\155\327\156\071\274\310\111\253\253\270
\343\103\170\325\201\006\135\357\307\175\237\316\326\263\220\165
\336\014\260\220\336\043\272\310\321\076\147\340\031\251\033\206
\061\036\137\064\055\356\027\375\025\373\176\047\212\062\241\352
\311\217\311\176\030\313\057\073\054\110\172\175\246\364\001\007
\254\243\201\274\060\201\271\060\016\006\003\125\035\017\001\001
\377\004\004\003\002\001\206\060\017\006\003\125\035\023\001\001
\377\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004
\026\004\024\103\357\160\207\270\235\277\354\210\031\334\306\304
\153\165\015\165\064\063\010\060\020\006\011\053\006\001\004\001
\202\067\025\001\004\003\002\001\000\060\145\006\003\125\035\040
\004\136\060\134\060\006\006\004\125\035\040\000\060\122\006\014
\053\006\001\004\001\202\067\114\203\175\001\001\060\102\060\100
\006\010\053\006\001\005\005\007\002\001\026\064\150\164\164\160
\072\057\057\167\167\167\056\155\151\143\162\157\163\157\146\164
\056\143\157\155\057\160\153\151\157\160\163\057\104\157\143\163
\057\122\145\160\157\163\151\164\157\162\171\056\150\164\155\000
\060\012\006\010\052\206\110\316\075\004\003\003\003\151\000\060
\146\002\061\000\241\300\111\104\135\062\125\047\314\076\220\156
\045\042\235\044\133\233\121\065\307\221\111\111\052\243\371\157
\117\034\315\335\234\341\265\127\311\236\302\042\105\233\006\025
\160\034\105\277\002\061\000\305\323\050\353\162\307\076\260\254
\047\011\177\142\075\140\171\345\222\361\105\052\271\245\002\344
\140\273\376\172\053\234\140\247\265\231\024\362\260\276\360\273
\005\226\126\126\217\301\150
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

```
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Microsoft ECC Product Root Certificate Authority 2018"
# Issuer: CN=Microsoft ECC Product Root Certificate Authority 2018,O=Microsoft
Corporation,L=Redmond,ST=Washington,C=US
# Serial Number:14:98:26:66:dc:7c:cd:8f:40:53:67:7b:b9:99:ec:85
# Subject: CN=Microsoft ECC Product Root Certificate Authority 2018,O=Microsoft
Corporation,L=Redmond,ST=Washington,C=US
# Not Valid Before: Tue Feb 27 20:42:08 2018
# Not Valid After: Fri Feb 27 20:50:46 2043
# Fingerprint (MD5): 1f:12:4e:de:13:e0:6a:02:3c:d7:c0:9a:4f:48:c3:d6
# Fingerprint (SHA1): 06:f1:aa:33:0b:92:7b:75:3a:40:e6:8c:df:22:e3:4b:cb:ef:33:52
CKA_CLASS CK_OBJECT_CLASS
 CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft ECC Product Root Certificate Authority 2018"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\006\361\252\063\013\222\173\165\072\100\346\214\337\042\343\113
\313\357\063\122
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\037\022\116\336\023\340\152\002\074\327\300\232\117\110\303\326
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\224\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\127\141\163\150\151
\156\147\164\157\156\061\020\060\016\006\003\125\004\007\023\007
\122\145\144\155\157\156\144\061\036\060\034\006\003\125\004\012
\023\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160
\157\162\141\164\151\157\156\061\076\060\074\006\003\125\004\003
\023\065\115\151\143\162\157\163\157\146\164\040\105\103\103\040
\120\162\157\144\165\143\164\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\040\062\060\061\070
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\024\230\046\146\334\174\315\217\100\123\147\173\271\231
\354\205
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

```
# Microsoft Code Signing Only Certificate
# Certificate "emSign Root CA - G2"
# Issuer: CN=emSign Root CA - G2,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN
# Serial Number:86:4d:bf:0f:e3:5e:d7:7d:8e:d8
# Subject: CN=emSign Root CA - G2,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN
# Not Valid Before: Sun Feb 18 18:30:00 2018
# Not Valid After: Wed Feb 18 18:30:00 2043
# Fingerprint (MD5): 63:ac:61:e5:f7:da:aa:05:80:53:bd:e4:ab:fd:bb:30
# Fingerprint (SHA1): 1e:65:77:b9:cf:70:d0:17:ca:e1:bd:a1:35:1d:47:25:a9:73:c0:6d
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
 CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "emSign Root CA - G2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\147\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034\145
\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157\147
\151\145\163\040\114\151\155\151\164\145\144\061\034\060\032\006
\003\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157
\164\040\103\101\040\055\040\107\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\147\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034\145
\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157\147
\151\145\163\040\114\151\155\151\164\145\144\061\034\060\032\006
\003\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157
\164\040\103\101\040\055\040\107\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\013\000\206\115\277\017\343\136\327\175\216\330
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\225\060\202\003\175\240\003\002\001\002\002\013\000
\206\115\277\017\343\136\327\175\216\330\060\015\006\011\052\206
\110\206\367\015\001\001\014\005\000\060\147\061\013\060\011\006
\003\125\004\006\023\002\111\116\061\023\060\021\006\003\125\004
\013\023\012\145\155\123\151\147\156\040\120\113\111\061\045\060
\043\006\003\125\004\012\023\034\145\115\165\144\150\162\141\040
\124\145\143\150\156\157\154\157\147\151\145\163\040\114\151\155
\151\164\145\144\061\034\060\032\006\003\125\004\003\023\023\145
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\155\123\151\147\156\040\122\157\157\164\040\103\101\040\055\040
\107\062\060\036\027\015\061\070\060\062\061\070\061\070\063\060
\060\060\132\027\015\064\063\060\062\061\070\061\070\063\060\060
\060\132\060\147\061\013\060\011\006\003\125\004\006\023\002\111
\116\061\023\060\021\006\003\125\004\013\023\012\145\155\123\151
\147\156\040\120\113\111\061\045\060\043\006\003\125\004\012\023
\034\145\115\165\144\150\162\141\040\124\145\143\150\156\157\154
\157\147\151\145\163\040\114\151\155\151\164\145\144\061\034\060
\032\006\003\125\004\003\023\023\145\155\123\151\147\156\040\122
\157\157\164\040\103\101\040\055\040\107\062\060\202\002\042\060
\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202
\002\017\000\060\202\002\012\002\202\002\001\000\303\160\030\205
\226\332\101\337\034\257\254\135\063\160\304\135\073\053\342\025
\311\044\356\310\123\066\257\133\364\323\154\024\175\307\123\373
\073\071\070\316\120\154\306\005\026\167\235\135\002\072\200\041
\113\262\062\253\161\247\243\343\306\155\337\263\262\021\275\342
\150\373\073\012\303\370\220\014\223\303\062\207\365\246\136\352
\005\330\036\262\152\343\117\331\124\303\134\101\122\066\075\302
\051\343\100\177\110\003\166\201\106\176\145\245\055\040\353\325
\214\114\166\353\367\233\065\245\321\042\313\141\226\103\206\375
\306\201\371\004\160\017\015\155\227\275\367\361\231\157\320\315
\250\114\025\062\340\035\336\355\321\217\346\230\027\037\275\114
\216\241\317\012\203\150\373\033\375\177\103\123\005\077\241\120
\066\274\207\314\024\265\301\220\253\320\203\170\224\351\215\147
\003\331\263\366\000\307\125\033\252\025\244\300\024\171\114\350
\160\054\240\226\373\105\165\103\043\202\014\101\157\016\052\205
\253\265\035\163\306\360\353\175\207\002\373\144\310\274\266\104
\363\256\365\010\307\026\374\033\322\305\377\271\012\170\041\073
\264\146\132\127\060\323\235\173\242\176\135\346\261\036\004\254
\173\020\340\376\345\126\355\200\042\062\000\206\260\027\241\347
\103\211\326\373\244\307\037\355\060\001\166\266\024\117\122\150
\033\360\042\053\342\175\214\356\206\116\067\200\014\076\013\060
\064\201\146\021\314\270\022\277\074\237\340\322\101\201\267\357
\302\324\277\277\035\104\163\102\022\144\062\124\147\063\244\157
\136\200\255\174\252\051\112\131\354\346\332\331\231\070\275\357
\125\243\156\177\074\101\163\372\326\121\251\004\045\017\300\050
\354\356\272\116\142\364\224\046\322\076\225\306\305\373\176\352
\220\212\216\135\211\025\117\167\056\244\064\251\303\341\374\366
\101\155\217\221\212\143\345\347\313\202\361\143\355\310\274\062
\021\213\047\172\223\055\103\076\076\365\334\062\064\312\253\336
\022\233\010\257\160\064\075\334\056\311\102\073\011\055\143\203
\103\147\030\124\372\137\034\253\323\020\176\124\073\174\334\122
\130\133\313\365\352\115\251\155\244\070\221\134\100\335\245\335
\137\327\131\143\045\121\325\056\175\050\316\371\002\003\001\000
\001\243\102\060\100\060\035\006\003\125\035\016\004\026\004\024
\355\354\115\105\141\030\050\347\263\043\050\021\034\115\245\047
\015\136\354\364\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\006\060\017\006\003\125\035\023\001\001\377\004\005

\060\003\001\001\377\060\015\006\011\052\206\110\206\367\015\001
\001\014\005\000\003\202\002\001\000\010\120\277\212\124\040\360
\244\302\124\034\105\045\157\354\153\072\046\221\055\044\065\206
\304\041\230\070\007\172\033\253\013\011\355\045\375\363\077\031
\201\374\301\247\075\047\140\051\160\300\230\326\154\123\165\107
\154\330\362\220\204\242\336\277\166\011\200\361\126\352\320\154
\141\300\363\071\140\337\322\146\253\215\311\022\061\073\167\024
\166\120\034\301\377\257\111\354\335\124\047\375\300\354\357\110
\001\167\253\106\271\226\073\333\165\263\111\066\227\322\161\005
\151\355\105\035\346\300\154\146\117\043\134\355\112\103\370\050
\375\127\377\030\063\347\254\201\146\306\220\010\030\115\354\202
\163\274\224\013\375\027\065\032\001\353\257\354\165\236\343\274
\115\364\236\376\155\014\305\367\174\207\270\205\300\010\364\313
\245\001\341\203\154\314\277\220\273\004\006\356\014\167\333\217
\120\256\333\336\031\363\175\262\205\047\301\163\070\226\032\311
\016\276\135\336\263\141\034\037\053\133\113\327\075\077\355\063
\062\231\032\357\061\202\324\121\353\274\266\377\026\207\156\037
\316\223\171\233\164\102\066\172\245\312\145\067\072\032\304\071
\303\277\064\311\350\040\266\022\174\276\250\177\300\074\120\256
\125\113\371\377\010\360\027\341\317\233\303\356\247\140\021\217
\327\004\247\335\276\322\247\036\255\361\332\160\332\271\204\307
\206\145\326\300\375\334\335\121\037\371\317\234\327\167\020\044
\236\137\046\161\361\233\321\343\015\111\065\320\232\140\177\213
\200\036\160\331\353\357\153\230\217\071\132\135\101\230\067\263
\153\157\245\350\270\155\051\236\035\077\004\033\126\132\235\024
\112\022\017\245\141\000\252\316\321\044\030\372\373\126\124\141
\166\170\071\272\302\303\336\266\017\030\115\332\235\175\037\034
\075\056\333\224\121\302\352\251\063\353\025\166\057\300\356\055
\242\350\373\050\231\300\221\244\324\175\161\235\021\241\125\264
\130\240\324\100\067\321\154\311\143\145\365\274\004\073\205\131
\347\210\050\340\151\160\006\252\073\024\352\311\045\064\317\147
\304\074\171\254\120\202\010\113\143\364\250\174\120\170\306\053
\144\052\200\376\144\302\013\155\214\340\051\100\306\202\241\354
\314\174\256\012\017\265\251\071\165
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "emSign Root CA - G2"
# Issuer: CN=emSign Root CA - G2,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN
# Serial Number:86:4d:bf:0f:e3:5e:d7:7d:8e:d8
# Subject: CN=emSign Root CA - G2,O=eMudhra Technologies Limited,OU=emSign PKI,C=IN
# Not Valid Before: Sun Feb 18 18:30:00 2018
# Not Valid After: Wed Feb 18 18:30:00 2043
# Fingerprint (MD5): 63:ac:61:e5:f7:da:aa:05:80:53:bd:e4:ab:fd:bb:30

```
# Fingerprint (SHA1): 1e:65:77:b9:cf:70:d0:17:ca:e1:bd:a1:35:1d:47:25:a9:73:c0:6d
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "emSign Root CA - G2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\036\145\167\271\317\160\320\027\312\341\275\241\065\035\107\045
\251\163\300\155
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\143\254\141\345\367\332\252\005\200\123\275\344\253\375\273\060
END
CKA_ISSUER
 MULTILINE_OCTAL
\060\147\061\013\060\011\006\003\125\004\006\023\002\111\116\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\045\060\043\006\003\125\004\012\023\034\145
\115\165\144\150\162\141\040\124\145\143\150\156\157\154\157\147
\151\145\163\040\114\151\155\151\164\145\144\061\034\060\032\006
\003\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157
\164\040\103\101\040\055\040\107\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\013\000\206\115\277\017\343\136\327\175\216\330
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "emSign Root CA - C2"
# Issuer: CN=emSign Root CA - C2,O=eMudhra Inc,OU=emSign PKI,C=US
# Serial
 Number:2f:0a:b7:6b:0d:cb:4a:af:27:58
# Subject: CN=emSign Root CA - C2,O=eMudhra Inc,OU=emSign PKI,C=US
# Not Valid Before: Sun Feb 18 18:30:00 2018
# Not Valid After: Wed Feb 18 18:30:00 2043
# Fingerprint (MD5): eb:24:3b:fa:70:63:c8:e1:cd:5f:0e:ea:c8:97:2f:21
# Fingerprint (SHA1): bc:a2:18:80:74:c3:14:7e:16:f4:c4:8c:59:10:a8:9e:f7:52:f4:79
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "emSign Root CA - C2"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
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\060\126\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145
\115\165\144\150\162\141\040\111\156\143\061\034\060\032\006\003
\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157\164
\040\103\101\040\055\040\103\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\126\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145
\115\165\144\150\162\141\040\111\156\143\061\034\060\032\006\003
\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157\164
\040\103\101\040\055\040\103\062
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\012\057\012\267\153\015\313\112\257\047\130
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\162\060\202\003\132\240\003\002\001\002\002\012\057
\012\267\153\015\313\112\257\047\130\060\015\006\011\052\206\110
\206\367\015\001\001\014\005\000\060\126\061\013\060\011\006\003
\125\004\006\023\002\125\123\061\023\060\021\006\003\125\004\013
\023\012\145\155\123\151\147\156\040\120\113\111\061\024\060\022
\006\003\125\004\012\023\013\145\115\165\144\150\162\141\040\111
\156\143\061\034\060\032\006\003\125\004\003\023\023\145\155\123
\151\147\156\040\122\157\157\164\040\103\101\040\055\040\103\062
\060\036\027\015\061\070\060\062\061\070\061\070\063\060\060\060
\132\027\015\064\063\060\062\061\070\061\070\063\060\060\060\132
\060\126\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145
\115\165\144\150\162\141\040\111\156\143\061\034\060\032\006\003
\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157\164
\040\103\101\040\055\040\103\062\060\202\002\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000
\060\202\002\012\002\202\002\001\000\214\175\175\145\003\344\333
\232\037\130\042\171\221\200\345\275\354\205\161\340\265\011\177
\140\321\145\373\074\337\262\153\232\137\251\313\256\032\126\166
\040\130\356\055\350\056\374\176\010\337\113\270\327\371\316\023
\212\162\063\022\253\226\160\217\263\213\107\335\341\047\074\064
\067\373\044\343\151\333\265\126\137\112\260\121\212\263\054\064
\102\267\353\073\316\222\334\177\035\144\313\114\325\040\230\372
\057\116\256\077\042\267\220\212\375\371\200\054\255\130\376\337
\333\255\233\247\266\060\024\054\104\333\055\110\215\337\011\006
\000\032\372\020\115\017\037\120\266\256\116\243\126\151\200\044

\065\201\136\350\165\007\035\003\351\332\355\124\153\115\050\164
\305\342\017\232\021\027\022\334\016\161\200\160\115\110\377\321
\075\230\260\235\222\010\027\212\066\024\232\047\050\357\345\360
\145\341\150\076\033\332\351\342\011\346\235\067\056\335\303\273
\225\267\021\301\321\321\302\146\231\215\151\311\340\067\350\226
\227\051\144\115\063\322\021\215\203\025\064\047\051\342\070\101
\332\322\030\211\237\213\126\117\033\301\017\177\325\315\267\267
\031\257\336\357\173\265\246\145\127\155\215\027\213\155\113\132
\252\334\237\214\072\235\050\031\102\301\316\222\237\107\035\052
\031\132\233\076\351\020\064\140\043\070\262\015\360\240\315\100
\334\333\107\130\200\227\147\174\037\343\022\242\047\001\243\200
\042\167\304\343\055\147\015\277\217\050\011\142\371\335\232\305
\004\304\303\215\242\000\351\372\306\326\336\010\245\271\307\151
\320\073\250\042\111\173\152\251\044\336\247\331\344\012\001\111
\372\122\044\003\034\373\022\250\320\145\161\110\120\341\217\364
\143\111\224\346\270\041\233\143\201\366\265\320\113\121\133\324
\224\102\174\223\015\234\222\046\344\005\001\333\355\221\133\072
\271\116\014\373\111\264\241\243\303\154\146\115\024\155\011\305
\305\310\252\103\333\250\125\060\054\053\136\022\223\332\006\361
\015\363\176\303\064\361\307\117\241\026\364\132\122\031\222\124
\172\230\240\373\057\311\307\377\067\306\273\303\310\046\377\170
\030\140\175\105\237\124\340\016\275\257\167\217\233\057\014\276
\274\337\067\021\312\264\176\254\277\002\003\001\000\001\243\102
\060\100\060\035\006\003\125\035\016\004\026\004\024\263\367\212
\244\326\017\210\000\131\350\121\027\117\325\176\354\206\042\201
\235\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\006\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\015\006\011\052\206\110\206\367\015\001\001\014\005
\000\003\202\002\001\000\064\045\246\045\214\321\313\366\235\235
\007\346\065\154\006\255\061\332\256\266\103\102\360\250\004\354
\010\133\362\271\276\340\304\320\262\265\033\250\003\313\055\230
\363\204\273\371\140\360\210\061\217\201\110\216\214\241\042\265
\224\127\034\242\055\116\315\243\203\376\132\061\024\073\005\023
\304\212\144\020\353\157\031\104\075\176\043\245\160\141\355\041
\220\315\006\126\152\355\152\144\265\160\061\171\136\171\104\363
\354\242\275\272\247\141\115\000\304\105\175\224\041\322\302\327
\204\250\044\362\053\245\111\050\040\253\037\036\316\003\362\173
\255\305\152\046\004\213\207\077\167\064\143\334\163\202\236\306
\142\301\226\124\323\147\137\345\212\115\026\074\122\301\233\304
\343\127\043\032\233\053\245\143\037\100\122\066\263\235\321\155
\345\351\343\271\122\003\026\004\340\334\343\004\123\036\370\114
\005\270\113\336\004\042\101\020\001\371\256\366\056\336\230\266
\242\273\011\343\156\023\251\141\020\127\133\102\260\051\020\317
\346\052\374\351\032\227\274\207\002\102\203\170\345\334\077\272
\015\340\017\223\165\167\066\245\332\261\271\120\247\004\355\021
\231\154\366\046\221\222\111\342\143\211\071\077\070\374\021\260
\363\126\267\001\277\051\162\364\342\215\255\153\170\342\076\222
\156\040\045\155\130\060\034\365\035\332\270\021\040\046\136\153

\112\024\146\005\333\063\033\102\346\316\301\356\144\360\205\111
\200\265\345\020\103\010\340\154\153\306\303\104\237\051\004\125
\066\132\057\302\125\160\200\010\113\232\276\012\057\170\016\005
\153\226\355\337\312\064\075\154\154\004\377\214\246\207\002\165
\133\103\062\254\320\207\034\275\042\210\112\271\165\200\032\267
\254\240\213\312\016\015\361\026\116\253\004\352\343\175\134\011
\172\134\042\377\020\042\262\210\307\074\225\120\277\325\265\315
\122\050\036\237\204\102\017\370\061\000\266\324\326\310\137\144
\150\212\200\176\127\170\112\343\177\133\377\016\335\171\117\061
\330\317\034\227\123\206\322\163\337\156\160\021\227\221\217\063
\273\311\202\056\073\322\073\150\341\047\214\203\241\314\001\155
\304\201\276\172\265\007\015\057\002\075\123\311\231\234\333\321
\201\103\053\220\010\013
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "emSign Root CA - C2"
# Issuer: CN=emSign Root CA - C2,O=eMudhra Inc,OU=emSign PKI,C=US
# Serial Number:2f:0a:b7:6b:0d:cb:4a:af:27:58
# Subject: CN=emSign Root CA - C2,O=eMudhra Inc,OU=emSign PKI,C=US
# Not Valid Before: Sun Feb 18 18:30:00 2018
# Not Valid After: Wed Feb 18 18:30:00 2043
# Fingerprint (MD5): eb:24:3b:fa:70:63:c8:e1:cd:5f:0e:ea:c8:97:2f:21
# Fingerprint (SHA1): bc:a2:18:80:74:c3:14:7e:16:f4:c4:8c:59:10:a8:9e:f7:52:f4:79
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "emSign Root CA - C2"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\274\242\030\200\164\303\024\176\026\364\304\214\131\020\250\236
\367\122\364\171
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\353\044\073\372\160\143\310\341\315\137\016\352\310\227\057\041
END
CKA_ISSUER MULTILINE_OCTAL
\060\126\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\023\060\021\006\003\125\004\013\023\012\145\155\123\151\147\156
\040\120\113\111\061\024\060\022\006\003\125\004\012\023\013\145
\115\165\144\150\162\141\040\111\156\143\061\034\060\032\006\003
\125\004\003\023\023\145\155\123\151\147\156\040\122\157\157\164
\040\103\101\040\055\040\103\062

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END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\012\057\012\267\153\015\313\112\257\047\130
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Microsoft ECC TS Root Certificate Authority 2018"
# Issuer:
 CN=Microsoft ECC TS Root Certificate Authority 2018,O=Microsoft
Corporation,L=Redmond,ST=Washington,C=US
# Serial Number:15:38:75:e1:64:7e:d1:b0:47:b4:ef:af:41:12:82:45
# Subject: CN=Microsoft ECC TS Root Certificate Authority 2018,O=Microsoft
Corporation,L=Redmond,ST=Washington,C=US
# Not Valid Before: Tue Feb 27 20:51:34 2018
# Not Valid After: Fri Feb 27 21:00:12 2043
# Fingerprint (MD5): 37:94:29:58:86:2a:06:e6:bb:cf:d7:ab:59:c7:f2:3c
# Fingerprint (SHA1): 31:f9:fc:8b:a3:80:59:86:b7:21:ea:72:95:c6:5b:3a:44:53:42:74
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft ECC TS Root Certificate Authority 2018"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\217\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\127\141\163\150\151
\156\147\164\157\156\061\020\060\016\006\003\125\004\007\023\007
\122\145\144\155\157\156\144\061\036\060\034\006\003\125\004\012
\023\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160
\157\162\141\164\151\157\156\061\071\060\067\006\003\125\004\003
\023\060\115\151\143\162\157\163\157\146\164\040\105\103\103\040
\124\123\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\062\060
\061\070
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\217\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\127\141\163\150\151
\156\147\164\157\156\061\020\060\016\006\003\125\004\007\023\007
\122\145\144\155\157\156\144\061\036\060\034\006\003\125\004\012
\023\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160
\157\162\141\164\151\157\156\061\071\060\067\006\003\125\004\003
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\023\060\115\151\143\162\157\163\157\146\164\040\105\103\103\040
\124\123\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\062\060
\061\070
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\025\070\165\341\144\176\321\260\107\264\357\257\101\022
\202\105
END
CKA_VALUE MULTILINE_OCTAL
\060\202\003\027\060\202\002\236\240\003\002\001\002\002\020\025
\070\165\341\144\176\321\260\107\264\357\257\101\022\202\105\060
\012\006\010\052\206\110\316\075\004\003\003\060\201\217\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\023\060\021\006
\003\125\004\010\023\012\127\141\163\150\151\156\147\164\157\156
\061\020\060\016\006\003\125\004\007\023\007\122\145\144\155\157
\156\144\061\036\060\034\006\003\125\004\012\023\025\115\151\143
\162\157\163\157\146\164\040\103\157\162\160\157\162\141\164\151
\157\156\061\071\060\067\006\003\125\004\003\023\060\115\151\143
\162\157\163\157\146\164\040\105\103\103\040\124\123\040\122\157
\157\164\040\103\145\162\164\151\146\151\143\141\164\145\040\101
\165\164\150\157\162\151\164\171\040\062\060\061\070\060\036\027
\015\061\070\060\062\062\067\062\060\065\061\063\064\132\027\015
\064\063\060\062\062\067\062\061\060\060\061\062\132\060\201\217
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\023\060
\021\006\003\125\004\010\023\012\127\141\163\150\151\156\147\164
\157\156\061\020\060\016\006\003\125\004\007\023\007\122\145\144
\155\157\156\144\061\036\060\034\006\003\125\004\012\023\025\115
\151\143\162\157\163\157\146\164\040\103\157\162\160\157\162\141
\164\151\157\156\061\071\060\067\006\003\125\004\003\023\060\115
\151\143\162\157\163\157\146\164\040\105\103\103\040\124\123\040
\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164\145
\040\101\165\164\150\157\162\151\164\171\040\062\060\061\070\060
\166\060\020\006\007\052\206\110\316\075\002\001\006\005\053\201
\004\000\042\003\142\000\004\336\315\273\160\040\361\045\040\264
\224\350\327\264\073\017\156\207\335\253\254\317\115\100\057\201
\063\153\131\011\030\326\207\015\046\043\234\264\215\225\235\166
\237\245\271\006\102\346\255\066\262\304\263\256\172\074\010\325
\313\235\072\136\105\041\154\013\343\040\365\233\302\335\104\063
\343\102\271\352\362\050\102\222\252\376\014\007\312\212\023\231
\073\142\000\355\332\363\065\243\201\274\060\201\271\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\206\060\017\006
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\035
\006\003\125\035\016\004\026\004\024\350\107\310\102\232\260\235
\256\157\013\050\073\230\025\217\343\261\350\200\262\060\020\006
\011\053\006\001\004\001\202\067\025\001\004\003\002\001\000\060
\145\006\003\125\035\040\004\136\060\134\060\006\006\004\125\035

\040\000\060\122\006\014\053\006\001\004\001\202\067\114\203\175
\001\001\060\102\060\100\006\010\053\006\001\005\005\007\002\001
\026\064\150\164\164\160\072\057\057\167\167\167\056\155\151\143
\162\157\163\157\146\164\056\143\157\155\057\160\153\151\157\160
\163\057\104\157\143\163\057\122\145\160\157\163\151\164\157\162
\171\056\150\164\155\000\060\012\006\010\052\206\110\316\075\004
\003\003\003\147\000\060\144\002\060\024\206\120\300\046\032\353
\352\241\024\167\072\133\337\143\071\245\063\307\120\100\325\153
\065\153\017\264\337\175\126\271\341\245\235\170\031\202\241\103
\156\032\327\130\243\125\003\102\333\002\060\030\224\264\036\072
\215\144\372\014\047\033\207\023\112\322\267\072\000\224\306\362
\345\143\277\257\343\372\334\223\325\347\106\232\153\201\151\076
\002\337\121\015\217\050\161\101\211\221\057
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Microsoft ECC TS Root Certificate Authority 2018"
# Issuer: CN=Microsoft ECC TS Root Certificate Authority 2018,O=Microsoft
Corporation,L=Redmond,ST=Washington,C=US
# Serial Number:15:38:75:e1:64:7e:d1:b0:47:b4:ef:af:41:12:82:45
# Subject: CN=Microsoft ECC TS Root Certificate Authority 2018,O=Microsoft
Corporation,L=Redmond,ST=Washington,C=US
# Not Valid Before: Tue Feb 27 20:51:34 2018
#
 Not Valid After: Fri Feb 27 21:00:12 2043
# Fingerprint (MD5): 37:94:29:58:86:2a:06:e6:bb:cf:d7:ab:59:c7:f2:3c
# Fingerprint (SHA1): 31:f9:fc:8b:a3:80:59:86:b7:21:ea:72:95:c6:5b:3a:44:53:42:74
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft ECC TS Root Certificate Authority 2018"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\061\371\374\213\243\200\131\206\267\041\352\162\225\306\133\072
\104\123\102\164
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\067\224\051\130\206\052\006\346\273\317\327\253\131\307\362\074
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\217\061\013\060\011\006\003\125\004\006\023\002\125\123
\061\023\060\021\006\003\125\004\010\023\012\127\141\163\150\151
\156\147\164\157\156\061\020\060\016\006\003\125\004\007\023\007
\122\145\144\155\157\156\144\061\036\060\034\006\003\125\004\012

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\023\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160
\157\162\141\164\151\157\156\061\071\060\067\006\003\125\004\003
\023\060\115\151\143\162\157\163\157\146\164\040\105\103\103\040
\124\123\040\122\157\157\164\040\103\145\162\164\151\146\151\143
\141\164\145\040\101\165\164\150\157\162\151\164\171\040\062\060
\061\070
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\025\070\165\341\144\176\321\260\107\264\357\257\101\022
\202\105
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "GlobalSign Code Signing Root E45"
# Issuer: CN=GlobalSign Code Signing Root E45,O=GlobalSign nv-sa,C=BE
# Serial Number:76:53:fe:ae:18:26:43:6f:69:f5:1c:c2:77:16:f2:5e
# Subject: CN=GlobalSign Code Signing Root E45,O=GlobalSign nv-sa,C=BE
# Not Valid Before: Wed Mar 18 00:00:00 2020
# Not Valid After: Sat Mar 18 00:00:00 2045
# Fingerprint (MD5): 1c:65:05:d0:f3:fb:48:c5:29:e4:c4:3e:4d:f8:8d:22
#
 Fingerprint (SHA1): 79:aa:50:5e:dd:09:b3:21:e3:6d:57:91:0a:5d:f5:a9:fb:85:cc:57
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Code Signing Root E45"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\123\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\051\060\047\006\003
\125\004\003\023\040\107\154\157\142\141\154\123\151\147\156\040
\103\157\144\145\040\123\151\147\156\151\156\147\040\122\157\157
\164\040\105\064\065
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\123\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\051\060\047\006\003
\125\004\003\023\040\107\154\157\142\141\154\123\151\147\156\040
\103\157\144\145\040\123\151\147\156\151\156\147\040\122\157\157
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\164\040\105\064\065
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\166\123\376\256\030\046\103\157\151\365\034\302\167\026
\362\136
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\042\060\202\001\251\240\003\002\001\002\002\020\166
\123\376\256\030\046\103\157\151\365\034\302\167\026\362\136\060
\012\006\010\052\206\110\316\075\004\003\003\060\123\061\013\060
\011\006\003\125\004\006\023\002\102\105\061\031\060\027\006\003
\125\004\012\023\020\107\154\157\142\141\154\123\151\147\156\040
\156\166\055\163\141\061\051\060\047\006\003\125\004\003\023\040
\107\154\157\142\141\154\123\151\147\156\040\103\157\144\145\040
\123\151\147\156\151\156\147\040\122\157\157\164\040\105\064\065
\060\036\027\015\062\060\060\063\061\070\060\060\060\060\060\060
\132\027\015\064\065\060\063\061\070\060\060\060\060\060\060\132
\060\123\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\051\060\047\006\003
\125\004\003\023\040\107\154\157\142\141\154\123\151\147\156\040
\103\157\144\145\040\123\151\147\156\151\156\147\040\122\157\157
\164\040\105\064\065\060\166\060\020\006\007\052\206\110\316\075
\002\001\006\005\053\201\004\000\042\003\142\000\004\166\031\155
\003\265\365\204\043\253\062\152\056\141\335\204\045\057\357\350
\171\047\211\203\303\203\165\363\266\170\152\010\155\242\255\041
\052\002\220\006\354\232\100\234\172\206\221\271\130\205\310\050
\232\056\013\367\342\166\251\337\262\275\251\303\351\051\031\171
\010\262\120\320\302\305\235\012\141\014\343\135\067\006\112\134
\376\204\275\300\200\204\372\113\125\043\340\342\076\243\102\060
\100\060\016\006\003\125\035\017\001\001\377\004\004\003\002\001
\206\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\035\006\003\125\035\016\004\026\004\024\247\237\335
\323\124\315\333\370\154\277\046\154\016\344\327\133\157\200\314
\102\060\012\006\010\052\206\110\316\075\004\003\003\003\147\000
\060\144\002\060\154\214\126\266\305\067\256\055\220\053\170\355
\261\036\106\010\322\303\112\050\357\170\031\010\216\044\064\106
\117\207\161\141\137\251\021\112\157\062\253\034\321\122\173\252
\072\352\345\232\002\060\125\053\167\057\316\370\077\233\150\112
\332\327\250\113\105\015\176\262\153\366\154\332\261\025\342\274
\110\031\167\213\127\301\135\024\327\101\000\314\046\122\320\040
\270\031\117\226\347\232
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

```
# Microsoft Code Signing Only Certificate
# Trust for "GlobalSign Code Signing Root E45"
# Issuer: CN=GlobalSign Code Signing Root E45,O=GlobalSign nv-sa,C=BE
# Serial Number:76:53:fe:ae:18:26:43:6f:69:f5:1c:c2:77:16:f2:5e
# Subject: CN=GlobalSign Code Signing Root E45,O=GlobalSign nv-sa,C=BE
# Not Valid Before: Wed Mar 18 00:00:00 2020
# Not Valid After: Sat Mar 18 00:00:00
 2045
# Fingerprint (MD5): 1c:65:05:d0:f3:fb:48:c5:29:e4:c4:3e:4d:f8:8d:22
# Fingerprint (SHA1): 79:aa:50:5e:dd:09:b3:21:e3:6d:57:91:0a:5d:f5:a9:fb:85:cc:57
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Code Signing Root E45"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\171\252\120\136\335\011\263\041\343\155\127\221\012\135\365\251
\373\205\314\127
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\034\145\005\320\363\373\110\305\051\344\304\076\115\370\215\042
END
CKA_ISSUER MULTILINE_OCTAL
\060\123\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\051\060\047\006\003
\125\004\003\023\040\107\154\157\142\141\154\123\151\147\156\040
\103\157\144\145\040\123\151\147\156\151\156\147\040\122\157\157
\164\040\105\064\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\166\123\376\256\030\046\103\157\151\365\034\302\167\026
\362\136
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "GlobalSign Code Signing Root R45"
# Issuer: CN=GlobalSign Code Signing Root R45,O=GlobalSign nv-sa,C=BE
# Serial Number:76:53:fe:ac:75:46:48:93:f5:e5:d7:4a:48:3a:4e:f8
# Subject: CN=GlobalSign Code Signing Root R45,O=GlobalSign nv-sa,C=BE
# Not Valid Before: Wed Mar 18 00:00:00 2020
# Not Valid After: Sat Mar 18 00:00:00 2045
```

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# Fingerprint (MD5): e9:4f:b5:48:71:20:8c:00:df:70:f7:08:ac:47:08:5b
# Fingerprint (SHA1): 4e:fc:31:46:0c:61:9e:ca:e5:9c:1b:ce:2c:00:80:36:d9:4c:84:b8
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Code Signing Root R45"
CKA_CERTIFICATE_TYPE
 CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\123\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\051\060\047\006\003
\125\004\003\023\040\107\154\157\142\141\154\123\151\147\156\040
\103\157\144\145\040\123\151\147\156\151\156\147\040\122\157\157
\164\040\122\064\065
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\123\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\051\060\047\006\003
\125\004\003\023\040\107\154\157\142\141\154\123\151\147\156\040
\103\157\144\145\040\123\151\147\156\151\156\147\040\122\157\157
\164\040\122\064\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\166\123\376\254\165\106\110\223\365\345\327\112\110\072
\116\370
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\162\060\202\003\132\240\003\002\001\002\002\020\166
\123\376\254\165\106\110\223\365\345\327\112\110\072\116\370\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\123
\061\013\060\011\006\003\125\004\006\023\002\102\105\061\031\060
\027\006\003\125\004\012\023\020\107\154\157\142\141\154\123\151
\147\156\040\156\166\055\163\141\061\051\060\047\006\003\125\004
\003\023\040\107\154\157\142\141\154\123\151\147\156\040\103\157
\144\145\040\123\151\147\156\151\156\147\040\122\157\157\164\040
\122\064\065\060\036\027\015\062\060\060\063\061\070\060\060\060
\060\060\060\132\027\015\064\065\060\063\061\070\060\060\060\060
\060\060\132\060\123\061\013\060\011\006\003\125\004\006\023\002
\102\105\061\031\060\027\006\003\125\004\012\023\020\107\154\157
\142\141\154\123\151\147\156\040\156\166\055\163\141\061\051\060
\047\006\003\125\004\003\023\040\107\154\157\142\141\154\123\151
\147\156\040\103\157\144\145\040\123\151\147\156\151\156\147\040
\122\157\157\164\040\122\064\065\060\202\002\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000
```

\060\202\002\012\002\202\002\001\000\266\055\305\060\335\172\350
\253\220\075\003\162\260\072\113\231\026\141\262\345\377\245\147
\035\067\034\345\176\354\223\203\252\204\365\243\103\233\230\105
\212\270\143\127\135\233\000\210\004\045\351\370\150\222\113\202
\330\113\311\112\003\363\250\177\152\217\212\141\047\275\241\104
\320\375\365\077\042\302\243\117\221\215\263\005\262\050\202\221
\135\373\131\210\005\013\227\006\302\230\370\054\247\063\044\356
\120\072\101\314\360\240\260\173\035\115\322\250\130\070\226\351
\337\371\033\221\273\213\020\054\322\307\103\035\242\011\164\241
\200\257\173\346\063\012\014\131\153\216\274\364\253\132\227\173
\177\256\125\373\204\360\200\376\204\114\327\342\272\275\304\165
\241\157\275\141\020\164\104\262\230\007\342\164\253\377\150\334
\154\046\076\351\037\345\340\004\207\255\060\323\014\215\003\174
\125\270\026\160\134\044\170\040\045\353\147\147\210\253\272\116
\064\230\153\160\021\336\070\312\324\276\241\300\234\341\337\036
\002\001\330\073\341\147\103\204\266\317\374\164\267\057\204\243
\277\272\011\067\075\147\154\261\105\134\031\141\253\101\203\365
\254\035\353\167\015\106\107\163\316\277\275\225\225\355\235\053
\210\020\376\372\130\350\247\127\341\263\317\250\132\351\007\045
\233\022\304\236\200\162\075\223\334\214\224\337\073\104\346\046
\200\374\322\303\003\360\214\014\322\105\326\056\347\217\230\236
\346\004\356\102\156\147\176\102\026\161\142\347\004\371\140\306
\144\241\266\234\201\041\116\053\306\155\150\224\206\306\231\164
\163\147\061\172\221\362\324\214\171\156\174\246\273\176\106\157
\115\305\205\022\053\317\232\042\104\010\250\205\067\316\007\141
\127\006\027\022\044\300\304\061\163\241\230\065\127\107\176\020
\072\105\331\055\244\121\220\230\251\240\007\067\304\145\032\252
\034\153\026\167\367\247\227\354\077\031\060\231\157\061\373\352
\100\262\347\322\304\372\311\320\360\120\166\164\131\372\215\155
\027\062\276\370\351\176\003\364\347\207\165\232\324\112\221\054
\205\003\023\002\053\102\200\362\211\152\066\317\310\114\240\316
\236\370\313\215\255\026\247\323\336\325\233\030\247\306\222\072
\361\202\143\361\056\016\044\144\337\002\003\001\000\001\243\102
\060\100\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\206\060\017\006\003\125\035\023\001\001\377\004\005\060\003
\001\001\377\060\035\006\003\125\035\016\004\026\004\024\037\000
\277\106\200\012\374\170\071\267\245\264\103\331\126\120\273\316
\226\073\060\015\006\011\052\206\110\206\367\015\001\001\014\005
\000\003\202\002\001\000\136\053\272\164\227\064\104\137\166\110
\050\100\204\223\356\001\156\351\241\263\326\200\045\346\173\344
\274\011\221\075\017\374\166\255\327\324\060\040\273\217\140\320
\221\326\034\362\234\357\170\032\053\224\062\002\301\044\226\122
\122\002\320\363\321\374\362\233\071\156\231\341\037\216\103\101
\175\232\036\133\311\135\232\204\374\046\346\207\363\164\162\046
\255\244\033\331\075\073\152\122\240\074\011\036\057\036\173\263
\063\264\105\307\367\254\261\257\223\140\255\166\256\270\262\025
\170\353\203\152\353\377\333\106\253\044\345\356\002\372\220\037
\131\300\057\135\326\267\135\244\134\020\267\162\123\370\101\116

\314\372\170\032\045\112\312\376\205\142\103\141\303\264\067\252
\201\322\364\326\072\017\275\215\131\176\060\107\336\053\153\347
\041\120\063\137\324\147\233\324\270\147\237\074\047\231\003\377
\205\103\216\163\022\312\040\315\350\141\325\261\146\334\027\326
\071\155\017\333\317\043\067\241\202\211\116\034\153\077\326\240
\315\252\007\235\076\102\046\252\327\014\356\372\107\277\032\122
\176\321\165\201\323\311\212\142\027\155\117\210\240\041\240\046
\076\257\155\331\142\060\037\351\230\050\256\156\215\325\216\114
\162\146\223\200\215\052\343\125\307\140\147\220\102\126\134\042
\121\017\263\334\116\071\356\115\335\331\035\170\020\124\073\156
\320\227\157\003\265\036\262\043\163\306\022\262\232\144\320\374
\225\205\044\250\377\337\241\260\334\221\100\256\337\011\063\253
\271\335\222\267\361\314\221\164\073\151\353\147\227\033\220\277
\347\307\240\157\161\273\127\277\267\217\132\355\172\100\152\026
\315\200\204\055\057\341\002\324\044\224\103\263\025\374\014\053
\033\375\161\157\374\313\274\165\027\072\136\203\322\311\263\057
\033\325\234\215\177\124\376\176\176\344\126\243\207\247\235\341
\131\122\224\101\217\155\133\276\206\225\232\377\032\166\335\100
\322\121\112\160\264\037\063\143\043\167\077\354\047\036\131\344
\010\207\355\064\202\112\017\077\376\240\035\301\365\147\163\105
\206\170\364\252\051\351\047\207\306\031\333\306\023\024\303\071
\111\207\115\240\227\340\145\023\365\235\167\126\351\332\263\130
\307\072\362\300\315\202
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "GlobalSign Code Signing Root R45"
# Issuer: CN=GlobalSign Code Signing Root R45,O=GlobalSign nv-sa,C=BE
# Serial Number:76:53:fe:ac:75:46:48:93:f5:e5:d7:4a:48:3a:4e:f8
#
 Subject: CN=GlobalSign Code Signing Root R45,O=GlobalSign nv-sa,C=BE
# Not Valid Before: Wed Mar 18 00:00:00 2020
# Not Valid After: Sat Mar 18 00:00:00 2045
# Fingerprint (MD5): e9:4f:b5:48:71:20:8c:00:df:70:f7:08:ac:47:08:5b
# Fingerprint (SHA1): 4e:fc:31:46:0c:61:9e:ca:e5:9c:1b:ce:2c:00:80:36:d9:4c:84:b8
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "GlobalSign Code Signing Root R45"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\116\374\061\106\014\141\236\312\345\234\033\316\054\000\200\066
\331\114\204\270
END

```
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\351\117\265\110\161\040\214\000\337\160\367\010\254\107\010\133
END
CKA_ISSUER MULTILINE_OCTAL
\060\123\061\013\060\011\006\003\125\004\006\023\002\102\105\061
\031\060\027\006\003\125\004\012\023\020\107\154\157\142\141\154
\123\151\147\156\040\156\166\055\163\141\061\051\060\047\006\003
\125\004\003\023\040\107\154\157\142\141\154\123\151\147\156\040
\103\157\144\145\040\123\151\147\156\151\156\147\040\122\157\157
\164\040\122\064\065
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\166\123\376\254\165\106\110\223\365\345\327\112\110\072
\116\370
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "DigiCert CS ECC P384 Root G5"
# Issuer: CN=DigiCert CS ECC P384 Root G5,O=DigiCert\, Inc.,C=US
# Serial Number:03:69:8f:e7:12:d5:19:f3:ce:d0:fd:b7:b1:64:30:11
# Subject: CN=DigiCert CS ECC P384 Root G5,O=DigiCert\, Inc.,C=US
# Not Valid Before: Fri Jan 15 00:00:00 2021
# Not Valid After: Sun Jan 14 23:59:59 2046
# Fingerprint (MD5): dd:b4:30:09:e8:67:1f:45:a0:80:ec:9d:d9:b1:a1:54
# Fingerprint (SHA1): 84:35:73:11:2a:3b:31:93:44:e5:e4:ec:ab:c9:f2:6c:7c:d5:4d:07
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN
 CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert CS ECC P384 Root G5"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\045\060\043\006\003\125\004
\003\023\034\104\151\147\151\103\145\162\164\040\103\123\040\105
\103\103\040\120\063\070\064\040\122\157\157\164\040\107\065
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
```

\162\164\054\040\111\156\143\056\061\045\060\043\006\003\125\004
\003\023\034\104\151\147\151\103\145\162\164\040\103\123\040\105
\103\103\040\120\063\070\064\040\122\157\157\164\040\107\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\003\151\217\347\022\325\031\363\316\320\375\267\261\144
\060\021
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\002\026\060\202\001\235\240\003\002\001\002\002\020\003
\151\217\347\022\325\031\363\316\320\375\267\261\144\060\021\060
\012\006\010\052\206\110\316\075\004\003\003\060\115\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\027\060\025\006\003
\125\004\012\023\016\104\151\147\151\103\145\162\164\054\040\111
\156\143\056\061\045\060\043\006\003\125\004\003\023\034\104\151
\147\151\103\145\162\164\040\103\123\040\105\103\103\040\120\063
\070\064\040\122\157\157\164\040\107\065\060\036\027\015\062\061
\060\061\061\065\060\060\060\060\060\060\132\027\015\064\066\060
\061\061\064\062\063\065\071\065\071\132\060\115\061\013\060\011
\006\003\125\004\006\023\002\125\123\061\027\060\025\006\003\125
\004\012\023\016\104\151\147\151\103\145\162\164\054\040\111\156
\143\056\061\045\060\043\006\003\125\004\003\023\034\104\151\147
\151\103\145\162\164\040\103\123\040\105\103\103\040\120\063\070
\064\040\122\157\157\164\040\107\065\060\166\060\020\006\007\052
\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142\000
\004\177\024\255\205\266\227\375\002\041\065\115\140\350\070\223
\223\233\075\005\020\155\257\323\376\357\372\273\373\163\231\363
\354\062\022\215\307\150\270\213\336\211\242\210\124\167\215\273
\041\176\063\225\126\226\011\350\325\214\241\004\270\233\156\031
\000\142\350\102\050\246\130\067\204\031\125\046\173\063\067\147
\362\232\162\255\241\256\256\000\102\074\034\176\270\172\236\041
\234\243\102\060\100\060\035\006\003\125\035\016\004\026\004\024
\360\214\230\161\071\070\145\302\072\033\246\027\146\035\310\355
\145\336\222\066\060\016\006\003\125\035\017\001\001\377\004\004
\003\002\001\206\060\017\006\003\125\035\023\001\001\377\004\005
\060\003\001\001\377\060\012\006\010\052\206\110\316\075\004\003
\003\003\147\000\060\144\002\060\043\157\341\000\031\046\120\344
\106\040\145\213\067\247\317\353\006\341\314\062\311\052\241\354
\062\015\163\242\036\002\034\065\141\052\116\151\253\071\167\355
\227\210\300\175\153\352\211\335\002\060\103\361\321\130\243\165
\076\206\233\266\125\021\213\027\367\075\376\012\151\305\177\116
\306\165\033\132\224\313\352\021\021\306\010\042\210\336\320\172
\242\245\171\350\343\041\247\315\023\263
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

```
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "DigiCert CS ECC P384 Root G5"
# Issuer: CN=DigiCert CS ECC P384 Root G5,O=DigiCert\, Inc.,C=US
# Serial Number:03:69:8f:e7:12:d5:19:f3:ce:d0:fd:b7:b1:64:30:11
# Subject: CN=DigiCert CS ECC P384 Root G5,O=DigiCert\, Inc.,C=US
# Not Valid Before: Fri Jan 15 00:00:00 2021
# Not Valid After: Sun Jan 14 23:59:59 2046
# Fingerprint (MD5): dd:b4:30:09:e8:67:1f:45:a0:80:ec:9d:d9:b1:a1:54
# Fingerprint (SHA1): 84:35:73:11:2a:3b:31:93:44:e5:e4:ec:ab:c9:f2:6c:7c:d5:4d:07
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
 CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert CS ECC P384 Root G5"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\204\065\163\021\052\073\061\223\104\345\344\354\253\311\362\154
\174\325\115\007
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\335\264\060\011\350\147\037\105\240\200\354\235\331\261\241\124
END
CKA_ISSUER MULTILINE_OCTAL
\060\115\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\045\060\043\006\003\125\004
\003\023\034\104\151\147\151\103\145\162\164\040\103\123\040\105
\103\103\040\120\063\070\064\040\122\157\157\164\040\107\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\003\151\217\347\022\325\031\363\316\320\375\267\261\144
\060\021
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing
 Only Certificate
# Certificate "DigiCert CS RSA4096 Root G5"
# Issuer: CN=DigiCert CS RSA4096 Root G5,O=DigiCert\, Inc.,C=US
# Serial Number:06:ce:e1:31:be:6d:55:c8:07:f7:c0:c7:fb:44:e6:20
# Subject: CN=DigiCert CS RSA4096 Root G5,O=DigiCert\, Inc.,C=US
# Not Valid Before: Fri Jan 15 00:00:00 2021
# Not Valid After: Sun Jan 14 23:59:59 2046
```

```
# Fingerprint (MD5): a7:33:ed:bf:1b:5d:e1:19:c4:91:c9:4a:ea:f7:6d:c7
# Fingerprint (SHA1): 5e:ee:d8:6f:a3:7c:67:52:30:64:2f:55:c8:4d:db:f6:7c:d3:3c:80
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert CS RSA4096 Root G5"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\114\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\044\060\042\006\003\125\004
\003\023\033\104\151\147\151\103\145\162\164\040\103\123\040\122
\123\101\064\060\071\066\040\122\157\157\164\040\107\065
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\114\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\044\060\042\006\003\125\004
\003\023\033\104\151\147\151\103\145\162\164\040\103\123\040\122
\123\101\064\060\071\066\040\122\157\157\164\040\107\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\006\316\341\061\276\155\125\310\007\367\300\307\373\104
\346\040
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\144\060\202\003\114\240\003\002\001\002\002\020\006
\316\341\061\276\155\125\310\007\367\300\307\373\104\346\040\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\114
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\027\060
\025\006\003\125\004\012\023\016\104\151\147\151\103\145\162\164
\054\040\111\156\143\056\061\044\060\042\006\003\125\004\003\023
\033\104\151\147\151\103\145\162\164\040\103\123\040\122\123\101
\064\060\071\066\040\122\157\157\164\040\107\065\060\036\027\015
\062\061\060\061\061\065\060\060\060\060\060\060\132\027\015\064
\066\060\061\061\064\062\063\065\071\065\071\132\060\114\061\013
\060\011\006\003\125\004\006\023\002\125\123\061\027\060\025\006
\003\125\004\012\023\016\104\151\147\151\103\145\162\164\054\040
\111\156\143\056\061\044\060\042\006\003\125\004\003\023\033\104
\151\147\151\103\145\162\164\040\103\123\040\122\123\101\064\060
\071\066\040\122\157\157\164\040\107\065\060\202\002\042\060\015
\006\011\052\206\110\206\367\015\001\001\001\005\000\003\202\002
\017\000\060\202\002\012\002\202\002\001\000\266\063\163\200\330
\142\003\160\024\054\021\034\071\136\174\256\174\203\206\035\376
\046\057\114\044\255\213\352\203\137\251\274\075\133\374\013\230
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\010\035\156\321\033\012\335\037\315\231\211\372\017\017\163\304
\341\234\035\165\062\315\157\227\332\052\152\225\262\154\311\011
\320\352\013\173\175\027\006\111\231\357\326\336\340\310\123\324
\256\306\167\361\206\273\043\034\270\300\337\131\367\216\175\321
\357\202\346\046\213\132\070\265\377\165\325\262\331\117\011\363
\067\210\120\332\021\244\212\024\024\321\123\004\000\175\363\152
\104\030\376\120\160\062\007\034\250\232\016\072\035\305\012\037
\156\013\046\151\267\074\242\127\160\054\206\372\114\156\225\251
\130\103\271\254\022\326\377\077\355\327\103\027\153\114\316\236
\304\220\253\377\372\020\120\232\243\220\127\326\347\214\020\256
\237\026\032\317\065\035\177\327\166\355\212\234\065\247\050\270
\247\135\041\374\060\067\335\336\010\031\117\025\306\347\246\332
\220\107\216\367\224\123\114\216\123\002\276\375\231\345\352\206
\320\257\003\002\323\233\252\223\361\253\050\216\040\001\377\114
\373\314\267\051\100\365\207\244\022\023\005\037\103\156\327\121
\120\237\070\264\040\355\027\011\022\217\314\271\031\257\237\315
\276\151\021\323\257\125\020\155\027\206\171\226\122\306\262\000
\235\345\257\070\260\065\364\210\153\217\016\004\075\174\356\257
\315\323\152\020\112\306\315\206\312\042\075\241\112\134\373\016
\377\210\337\134\142\247\300\271\036\331\254\154\176\070\067\376
\167\223\045\302\205\212\117\265\067\006\132\006\201\024\361\316
\224\235\231\221\352\062\132\316\147\075\156\004\146\255\014\117
\055\243\056\367\236\365\170\235\367\012\375\176\217\343\102\212
\125\226\274\361\237\067\055\374\236\137\225\376\214\030\033\374
\216\375\113\220\257\327\003\150\022\143\254\342\223\247\242\313
\004\345\117\144\316\003\372\306\024\237\331\213\350\314\324\142
\214\153\344\000\054\031\237\032\006\306\061\201\124\373\123\044
\232\257\125\231\272\235\165\256\270\302\335\002\003\001\000\001
\243\102\060\100\060\035\006\003\125\035\016\004\026\004\024\150
\001\223\261\322\112\100\102\151\224\106\054\034\132\210\251\045
\264\107\117\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\206\060\017\006\003\125\035\023\001\001\377\004\005\060
\003\001\001\377\060\015\006\011\052\206\110\206\367\015\001\001
\014\005\000\003\202\002\001\000\222\374\356\270\002\171\027\002
\121\175\041\305\111\147\247\244\361\250\044\070\353\014\150\352
\132\102\153\234\364\163\301\151\112\055\263\067\005\120\102\230
\222\236\006\171\054\056\006\231\366\357\337\053\240\315\263\222
\001\203\265\240\313\047\265\074\043\032\230\111\242\354\055\231
\245\131\103\254\322\261\223\326\127\327\034\274\223\326\306\100
\341\263\157\031\125\267\023\327\345\103\063\244\265\253\313\332
\301\061\144\015\164\326\054\355\303\215\156\353\273\257\031\107
\141\141\055\300\364\005\271\157\170\334\072\367\102\100\145\123
\221\275\231\015\223\222\124\246\251\067\131\053\233\313\231\306
\274\075\367\004\204\360\224\063\035\017\202\132\071\313\056\105
\303\050\031\243\262\233\230\310\374\061\153\140\217\366\351\206
\050\274\340\074\175\164\135\026\211\133\151\044\307\020\213\304

\113\273\066\117\324\131\077\303\260\244\221\231\370\056\321\112
\001\235\365\210\022\357\277\132\021\152\131\117\131\153\132\147
\363\217\264\023\017\300\330\057\075\050\162\252\031\177\021\175
\152\133\237\225\347\137\267\224\117\361\076\241\132\377\055\314
\235\337\047\167\217\062\163\034\147\012\166\363\372\134\261\277
\274\035\275\014\050\233\262\307\027\147\013\063\017\303\275\066
\334\373\272\102\013\253\355\204\303\142\326\204\026\251\261\007
\153\251\156\356\306\317\346\260\104\051\302\360\263\141\200\052
\213\157\322\024\134\045\207\124\144\363\244\114\301\241\370\247
\153\352\376\352\072\374\171\333\016\217\334\306\363\311\324\154
\336\351\203\241\216\035\042\354\311\072\262\000\173\334\073\247
\102\032\177\334\213\251\021\075\216\247\300\040\157\135\011\135
\103\104\346\217\146\314\251\133\007\361\357\233\172\016\263\124
\341\224\375\016\054\306\223\327\125\375\161\230\065\270\011\112
\377\306\051\050\054\366\122\055\333\024\030\222\047\342\026\176
\214\312\324\141\276\202\207\221\353\230\067\077\277\137\135\167
\077\064\254\033\070\103\253\150\162\231\062\036\072\032\031\245
\243\070\114\043\327\243\347\314\325\052\222\027\220\013\132\113
\275\026\275\373\206\152\342\211\231\354\344\240\125\030\311\243
\010\037\023\340\062\010\162\320
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "DigiCert CS RSA4096 Root G5"
# Issuer: CN=DigiCert CS RSA4096 Root G5,O=DigiCert\, Inc.,C=US
# Serial Number:06:ce:e1:31:be:6d:55:c8:07:f7:c0:c7:fb:44:e6:20
# Subject: CN=DigiCert CS RSA4096 Root G5,O=DigiCert\, Inc.,C=US
# Not Valid Before: Fri Jan 15 00:00:00 2021
# Not Valid After: Sun Jan 14 23:59:59 2046
# Fingerprint (MD5): a7:33:ed:bf:1b:5d:e1:19:c4:91:c9:4a:ea:f7:6d:c7
# Fingerprint (SHA1): 5e:ee:d8:6f:a3:7c:67:52:30:64:2f:55:c8:4d:db:f6:7c:d3:3c:80
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL
 UTF8 "DigiCert CS RSA4096 Root G5"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\136\356\330\157\243\174\147\122\060\144\057\125\310\115\333\366
\174\323\074\200
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\247\063\355\277\033\135\341\031\304\221\311\112\352\367\155\307
END

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CKA_ISSUER MULTILINE_OCTAL
\060\114\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\044\060\042\006\003\125\004
\003\023\033\104\151\147\151\103\145\162\164\040\103\123\040\122
\123\101\064\060\071\066\040\122\157\157\164\040\107\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\006\316\341\061\276\155\125\310\007\367\300\307\373\104
\346\040
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "DigiCert
 RSA4096 Root G5"
# Issuer: CN=DigiCert RSA4096 Root G5,O=DigiCert\, Inc.,C=US
# Serial Number:08:bf:a2:6f:9a:3f:33:65:a2:ac:f0:a6:38:c4:01:70
# Subject: CN=DigiCert RSA4096 Root G5,O=DigiCert\, Inc.,C=US
# Not Valid Before: Fri Jan 15 00:00:00 2021
# Not Valid After: Sun Jan 14 23:59:59 2046
# Fingerprint (MD5): 26:18:9c:6e:60:22:79:b6:8d:0f:65:4c:99:17:56:12
# Fingerprint (SHA1): 87:b8:e6:d3:8f:1a:39:cd:97:f0:4a:9e:17:4b:3c:9e:e7:ee:11:15
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert RSA4096 Root G5"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\111\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\041\060\037\006\003\125\004
\003\023\030\104\151\147\151\103\145\162\164\040\122\123\101\064
\060\071\066\040\122\157\157\164\040\107\065
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\111\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\041\060\037\006\003\125\004
\003\023\030\104\151\147\151\103\145\162\164\040\122\123\101\064
\060\071\066\040\122\157\157\164\040\107\065
END
```

CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\010\277\242\157\232\077\063\145\242\254\360\246\070\304
\001\160
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\136\060\202\003\106\240\003\002\001\002\002\020\010
\277\242\157\232\077\063\145\242\254\360\246\070\304\001\160\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\111
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\027\060
\025\006\003\125\004\012\023\016\104\151\147\151\103\145\162\164
\054\040\111\156\143\056\061\041\060\037\006\003\125\004\003\023
\030\104\151\147\151\103\145\162\164\040\122\123\101\064\060\071
\066\040\122\157\157\164\040\107\065\060\036\027\015\062\061\060
\061\061\065\060\060\060\060\060\060\132\027\015\064\066\060\061
\061\064\062\063\065\071\065\071\132\060\111\061\013\060\011\006
\003\125\004\006\023\002\125\123\061\027\060\025\006\003\125\004
\012\023\016\104\151\147\151\103\145\162\164\054\040\111\156\143
\056\061\041\060\037\006\003\125\004\003\023\030\104\151\147\151
\103\145\162\164\040\122\123\101\064\060\071\066\040\122\157\157
\164\040\107\065\060\202\002\042\060\015\006\011\052\206\110\206
\367\015\001\001\001\005\000\003\202\002\017\000\060\202\002\012
\002\202\002\001\000\252\276\015\262\006\175\046\371\107\352\344
\033\347\102\151\270\231\302\271\356\044\261\106\220\313\131\044
\122\124\065\246\044\302\137\221\031\310\266\102\326\363\107\145
\225\144\347\205\145\147\251\256\174\000\117\340\170\003\120\255
\363\177\216\270\021\347\201\142\261\213\337\362\111\046\011\336
\017\026\274\332\050\233\241\310\227\057\223\220\332\040\052\343
\204\324\377\251\236\260\055\277\264\000\336\233\037\310\240\143
\123\150\205\157\115\205\306\252\143\371\215\262\065\166\142\164
\003\334\223\230\150\005\236\315\220\145\335\322\172\061\253\044
\055\155\100\056\220\077\143\154\054\353\372\036\200\124\215\171
\002\220\024\263\265\117\116\365\210\004\103\200\303\110\263\046
\057\254\121\225\062\125\045\057\101\226\260\126\241\010\073\334
\230\037\162\205\054\167\312\230\314\070\373\216\162\311\155\354
\005\354\355\115\267\074\133\024\120\205\335\227\373\131\367\220
\022\364\023\277\203\115\200\262\025\145\021\227\140\345\326\134
\346\004\265\120\346\161\063\266\040\223\251\150\000\070\316\111
\333\264\134\073\162\327\105\134\124\277\315\074\001\043\036\174
\326\370\151\054\245\000\012\154\062\110\264\336\160\055\072\023
\027\301\177\144\313\363\060\355\241\075\226\147\361\224\265\140
\154\133\151\150\365\202\063\011\242\266\331\363\205\262\156\240
\224\360\302\304\175\241\054\312\163\365\256\340\122\234\242\146
\346\003\316\352\337\355\030\324\271\143\213\367\350\377\373\263
\133\217\103\305\257\267\164\224\120\065\145\256\326\057\361\205
\217\123\241\160\364\215\062\135\274\226\303\036\302\004\004\234
\004\017\263\135\176\211\040\312\136\047\015\211\112\022\043\264
\366\304\335\330\037\370\150\263\066\370\036\274\306\367\204\266
\350\212\116\210\060\070\300\046\330\160\012\011\072\064\016\153

\202\022\226\034\057\346\236\255\330\161\065\201\261\214\006\156
\364\156\146\377\113\112\256\275\360\376\327\134\137\123\273\062
\074\315\142\321\024\240\051\037\020\336\251\162\117\261\255\144
\345\203\052\217\213\352\204\225\356\230\045\230\232\263\161\074
\301\247\120\362\254\102\142\061\302\241\220\306\356\342\267\212
\250\265\266\033\073\002\003\001\000\001\243\102\060\100\060\035
\006\003\125\035\016\004\026\004\024\142\155\267\221\117\304\352
\243\142\140\217\240\320\276\265\217\006\174\150\000\060\016\006
\003\125\035\017\001\001\377\004\004\003\002\001\206\060\017\006
\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060\015
\006\011\052\206\110\206\367\015\001\001\014\005\000\003\202\002
\001\000\141\350\373\047\155\326\342\270\263\011\257\252\360\261
\202\114\376\075\027\211\115\055\025\235\373\356\320\273\204\354
\204\165\333\103\023\336\214\237\307\051\357\207\164\313\023\160
\201\126\000\164\374\256\364\331\072\336\042\010\121\245\240\134
\202\146\266\173\114\251\332\217\253\254\034\101\226\146\326\235
\336\126\346\277\116\261\262\136\137\300\303\156\324\302\204\220
\365\175\261\272\026\321\051\212\310\235\351\317\320\307\031\073
\077\317\356\367\341\063\256\102\310\230\300\010\236\363\132\363
\337\324\053\073\216\250\050\126\031\307\116\167\074\045\124\334
\270\110\110\321\371\047\152\076\354\023\257\262\005\211\375\125
\137\363\175\216\015\234\011\135\054\212\176\205\316\370\341\277
\021\075\062\214\132\327\176\075\364\063\130\317\242\005\230\243
\263\373\316\211\277\375\302\026\335\156\334\210\111\015\013\240
\003\377\347\105\351\004\301\351\375\252\235\165\370\270\037\207
\203\331\353\071\323\132\247\313\230\254\023\211\000\374\157\225
\116\341\175\021\106\155\366\070\106\243\023\240\054\001\365\142
\317\277\034\120\221\047\164\135\267\354\107\174\320\321\165\313
\173\356\321\115\043\012\303\140\245\167\055\200\332\147\017\216
\153\166\007\360\246\017\352\204\256\036\171\277\010\212\332\011
\363\364\356\265\066\363\324\172\103\272\224\065\341\372\301\073
\033\226\231\244\127\143\353\265\250\202\367\255\370\167\327\166
\206\363\166\123\126\133\374\046\102\204\316\237\203\221\221\257
\364\276\160\025\200\245\330\350\151\261\330\221\124\270\031\262
\142\371\242\372\125\355\004\277\271\104\206\344\317\361\233\000
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\350\021\353\167\155\332\312\202\221\276\244\204\223\114\332\241
\376\314\006\204\350\041\350\124\272\346\323\035\143\075\302\132
\374\346\311\203\236\162\144\251\206\131\000\214\302\367\023\203
\266\320\244\061\306\254\221\216\173\244\042\126\023\306\165\307
\043\274\213\133\374\106\075\376\135\122\051\257\257\350\311\303
\166\113\350\253\107\002\362\232\015\323\054\210\200\007\206\300
\143\017\002\114\216\004\123\166\271\130\102\157\174\051\160\135
\277\047
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

```
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "DigiCert RSA4096 Root G5"
# Issuer: CN=DigiCert RSA4096 Root G5,O=DigiCert\, Inc.,C=US
# Serial Number:08:bf:a2:6f:9a:3f:33:65:a2:ac:f0:a6:38:c4:01:70
# Subject: CN=DigiCert RSA4096 Root G5,O=DigiCert\, Inc.,C=US
# Not Valid Before: Fri Jan 15 00:00:00 2021
# Not Valid After: Sun Jan 14 23:59:59 2046
# Fingerprint (MD5): 26:18:9c:6e:60:22:79:b6:8d:0f:65:4c:99:17:56:12
# Fingerprint (SHA1): 87:b8:e6:d3:8f:1a:39:cd:97:f0:4a:9e:17:4b:3c:9e:e7:ee:11:15
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert RSA4096 Root G5"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\207\270\346\323\217\032\071\315\227\360\112\236\027\113\074\236
\347\356\021\025
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\046\030\234\156\140\042\171\266\215\017\145\114\231\027\126\022
END
CKA_ISSUER MULTILINE_OCTAL
\060\111\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\041\060\037\006\003\125\004
\003\023\030\104\151\147\151\103\145\162\164\040\122\123\101\064
\060\071\066\040\122\157\157\164\040\107\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\010\277\242\157\232\077\063\145\242\254\360\246\070\304
\001\160
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "DigiCert ECC P384 Root G5"
# Issuer: CN=DigiCert ECC P384 Root G5,O=DigiCert\, Inc.,C=US
# Serial Number:0d:f3:d9:37:65:a3:79:c5:95:66:ea:92:e2:24:4f:34
#
 Subject: CN=DigiCert ECC P384 Root G5,O=DigiCert\, Inc.,C=US
# Not Valid Before: Fri Jan 15 00:00:00 2021
# Not Valid After: Sun Jan 14 23:59:59 2046
```

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# Fingerprint (MD5): 11:7f:85:ae:47:1f:51:61:6e:06:94:1e:6a:43:08:0b
# Fingerprint (SHA1): d1:ee:b1:e8:c0:90:20:ba:b8:5d:3d:e2:7f:78:ee:33:a0:6c:ae:db
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert ECC P384 Root G5"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\042\060\040\006\003\125\004
\003\023\031\104\151\147\151\103\145\162\164\040\105\103\103\040
\120\063\070\064\040\122\157\157\164\040\107\065
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\042\060\040\006\003\125\004
\003\023\031\104\151\147\151\103\145\162\164\040\105\103\103\040
\120\063\070\064\040\122\157\157\164\040\107\065
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\015\363\331\067\145\243\171\305\225\146\352\222\342\044
\117\064
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\021\060\202\001\227\240\003\002\001\002\002\020\015
\363\331\067\145\243\171\305\225\146\352\222\342\044\117\064\060
\012\006\010\052\206\110\316\075\004\003\003\060\112\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\027\060\025\006\003
\125\004\012\023\016\104\151\147\151\103\145\162\164\054\040\111
\156\143\056\061\042\060\040\006\003\125\004\003\023\031\104\151
\147\151\103\145\162\164\040\105\103\103\040\120\063\070\064\040
\122\157\157\164\040\107\065\060\036\027\015\062\061\060\061\061
\065\060\060\060\060\060\060\132\027\015\064\066\060\061\061\064
\062\063\065\071\065\071\132\060\112\061\013\060\011\006\003\125
\004\006\023\002\125\123\061\027\060\025\006\003\125\004\012\023
\016\104\151\147\151\103\145\162\164\054\040\111\156\143\056\061
\042\060\040\006\003\125\004\003\023\031\104\151\147\151\103\145
\162\164\040\105\103\103\040\120\063\070\064\040\122\157\157\164
\040\107\065\060\166\060\020\006\007\052\206\110\316\075\002\001
\006\005\053\201\004\000\042\003\142\000\004\374\131\037\316\231
\154\177\233\016\266\051\143\157\306\205\363\012\323\326\233\256
\127\025\114\016\355\135\343\011\176\155\052\243\206\252\272\170
\240\247\161\275\104\372\010\300\112\006\326\157\335\054\112\070
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\164\345\320\275\377\172\377\345\071\116\275\275\027\036\037\103
\255\325\274\047\330\113\277\166\214\060\062\244\373\371\123\345
\330\252\070\123\135\250\240\067\240\147\012\243\102\060\100\060
\035\006\003\125\035\016\004\026\004\024\222\226\367\346\272\325
\021\272\371\042\056\173\176\132\331\360\045\345\005\033\060\016
\006\003\125\035\017\001\001\377\004\004\003\002\001\206\060\017
\006\003\125\035\023\001\001\377\004\005\060\003\001\001\377\060
\012\006\010\052\206\110\316\075\004\003\003\003\150\000\060\145
\002\061\000\375\300\115\361\244\247\333\247\014\046\021\364\111
\275\007\070\143\053\104\142\006\171\010\307\303\324\317\233\076
\253\072\047\252\220\307\375\131\242\270\062\122\333\312\216\027
\013\012\220\002\060\135\032\354\121\211\324\144\334\371\345\036
\070\275\133\056\343\345\104\344\073\030\172\327\360\225\100\217
\362\353\317\364\371\320\145\242\101\362\260\346\174\301\066\054
\217\136\071\335\067
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "DigiCert ECC P384 Root G5"
# Issuer: CN=DigiCert ECC P384 Root G5,O=DigiCert\, Inc.,C=US
# Serial Number:0d:f3:d9:37:65:a3:79:c5:95:66:ea:92:e2:24:4f:34
# Subject: CN=DigiCert ECC P384 Root G5,O=DigiCert\, Inc.,C=US
# Not Valid Before: Fri
Jan 15 00:00:00 2021
# Not Valid After: Sun Jan 14 23:59:59 2046
# Fingerprint (MD5): 11:7f:85:ae:47:1f:51:61:6e:06:94:1e:6a:43:08:0b
# Fingerprint (SHA1): d1:ee:b1:e8:c0:90:20:ba:b8:5d:3d:e2:7f:78:ee:33:a0:6c:ae:db
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "DigiCert ECC P384 Root G5"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\321\356\261\350\300\220\040\272\270\135\075\342\177\170\356\063
\240\154\256\333
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\021\177\205\256\107\037\121\141\156\006\224\036\152\103\010\013
END
CKA_ISSUER MULTILINE_OCTAL
\060\112\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\027\060\025\006\003\125\004\012\023\016\104\151\147\151\103\145
\162\164\054\040\111\156\143\056\061\042\060\040\006\003\125\004
\003\023\031\104\151\147\151\103\145\162\164\040\105\103\103\040

\120\063\070\064\040\122\157\157\164\040\107\065
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\015\363\331\067\145\243\171\305\225\146\352\222\342\044
\117\064
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "HARICA Code Signing RSA Root CA 2021"
# Issuer: CN=HARICA Code Signing RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Serial Number:15:c2:ae:2a:4d:99:9a:63:8c:d3:ba:13:19:76:08:f5
# Subject: CN=HARICA Code Signing RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Not Valid Before: Fri Feb 19 10:59:54 2021
# Not Valid After: Mon Feb 13 10:59:53 2045
# Fingerprint (MD5): 00:5d:c9:e3:b2:c0:90:e0:61:9a:42:c0:29:a1:6b:ba
# Fingerprint (SHA1): 8d:de:b8:20:46:b6:22:7c:79:24:6a:3e:ad:7b:32:c3:e8:8f:fc:ac
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
 CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HARICA Code Signing RSA Root CA 2021"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\055\060\053\006\003\125\004
\003\014\044\110\101\122\111\103\101\040\103\157\144\145\040\123
\151\147\156\151\156\147\040\122\123\101\040\122\157\157\164\040
\103\101\040\062\060\062\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\055\060\053\006\003\125\004
\003\014\044\110\101\122\111\103\101\040\103\157\144\145\040\123

\151\147\156\151\156\147\040\122\123\101\040\122\157\157\164\040
\103\101\040\062\060\062\061
END
CKA_SERIAL_NUMBER
MULTILINE_OCTAL
\002\020\025\302\256\052\115\231\232\143\214\323\272\023\031\166
\010\365
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\266\060\202\003\236\240\003\002\001\002\002\020\025
\302\256\052\115\231\232\143\214\323\272\023\031\166\010\365\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\165
\061\013\060\011\006\003\125\004\006\023\002\107\122\061\067\060
\065\006\003\125\004\012\014\056\110\145\154\154\145\156\151\143
\040\101\143\141\144\145\155\151\143\040\141\156\144\040\122\145
\163\145\141\162\143\150\040\111\156\163\164\151\164\165\164\151
\157\156\163\040\103\101\061\055\060\053\006\003\125\004\003\014
\044\110\101\122\111\103\101\040\103\157\144\145\040\123\151\147
\156\151\156\147\040\122\123\101\040\122\157\157\164\040\103\101
\040\062\060\062\061\060\036\027\015\062\061\060\062\061\071\061
\060\065\071\065\064\132\027\015\064\065\060\062\061\063\061\060
\065\071\065\063\132\060\165\061\013\060\011\006\003\125\004\006
\023\002\107\122\061\067\060\065\006\003\125\004\012\014\056\110
\145\154\154\145\156\151\143\040\101\143\141\144\145\155\151\143
\040\141\156\144\040\122\145\163\145\141\162\143\150\040\111\156
\163\164\151\164\165\164\151\157\156\163\040\103\101\061\055\060
\053\006\003\125\004\003\014\044\110\101\122\111\103\101\040\103
\157\144\145\040\123\151\147\156\151\156\147\040\122\123\101\040
\122\157\157\164\040\103\101\040\062\060\062\061\060\202\002\042
\060\015\006\011\052\206\110\206\367\015\001\001\001\005\000\003
\202\002\017\000\060\202\002\012\002\202\002\001\000\212\152\356
\252\012\043\125\014\213\006\102\343\225\133\124\170\137\305\216
\006\054\174\074\061\276\257\015\251\241\354\112\040\130\005\235
\342\150\262\273\353\137\177\052\063\271\362\125\234\157\252\244
\036\355\020\276\203\051\021\066\346\236\077\372\155\173\121\341
\325\167\245\275\313\151\016\073\042\040\224\014\061\145\100\015
\011\257\020\065\172\233\352\171\010\104\244\213\147\251\053\115
\301\347\320\327\247\366\265\072\215\331\243\251\171\270\244\145
\134\274\363\076\367\237\231\366\270\303\145\150\055\253\203\056
\335\205\231\004\251\365\321\134\325\121\102\001\271\237\101\265
\113\042\262\000\364\313\147\020\357\151\304\020\255\372\224\006
\166\120\022\127\202\256\305\024\255\074\175\273\235\361\163\341
\174\360\256\161\336\133\367\022\335\367\200\361\334\076\361\140
\272\311\031\227\157\165\164\205\114\375\071\103\303\144\156\064
\254\023\301\034\145\266\122\102\361\106\353\057\372\135\246\317
\016\111\235\367\164\174\170\015\006\072\054\022\373\342\113\046
\344\157\213\041\201\063\102\071\023\350\102\253\133\125\324\033
\273\067\266\022\221\367\363\175\274\322\377\354\261\303\325\240

\314\262\053\307\217\135\176\114\122\102\110\373\217\375\132\220
\163\020\325\251\162\124\215\111\333\070\122\252\106\110\016\057
\372\000\054\314\163\014\066\113\044\316\023\154\246\244\244\243
\326\174\233\351\070\013\306\044\333\115\254\147\041\111\133\101
\067\144\346\140\153\037\355\052\057\140\031\060\036\330\074\234
\031\103\207\337\300\012\364\344\312\140\210\172\326\243\271\344
\045\056\171\342\376\301\313\074\267\367\317\116\130\114\373\303
\255\253\175\252\312\210\373\016\070\015\037\236\134\071\353\270
\007\304\120\042\115\370\205\177\156\354\214\372\266\161\115\336
\175\226\151\304\335\076\036\336\046\220\012\054\115\025\225\251
\242\076\334\075\016\167\174\215\101\050\117\270\203\121\276\076
\267\217\220\072\160\061\211\132\372\223\123\374\140\311\215\165
\220\356\132\057\035\204\237\000\251\346\303\206\043\242\036\335
\022\343\241\106\140\033\147\277\120\025\042\222\174\112\264\214
\217\156\234\225\302\054\334\073\072\040\266\274\213\002\003\001
\000\001\243\102\060\100\060\017\006\003\125\035\023\001\001\377
\004\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026
\004\024\264\144\026\110\350\374\132\113\063\051\211\353\231\100
\271\040\264\366\141\032\060\016\006\003\125\035\017\001\001\377
\004\004\003\002\001\206\060\015\006\011\052\206\110\206\367\015
\001\001\013\005\000\003\202\002\001\000\053\254\131\213\346\071
\104\334\373\255\112\210\340\144\377\253\303\362\322\316\160\057
\003\345\157\262\304\365\066\326\123\153\207\253\035\213\231\007
\310\060\216\107\162\375\241\270\165\326\027\241\026\275\144\163
\221\060\127\255\175\375\005\100\206\223\321\111\226\262\013\324
\174\144\023\213\323\041\111\070\273\373\350\314\076\061\361\256
\173\114\052\337\202\006\243\216\005\204\234\177\160\316\300\273
\105\027\337\135\145\014\344\120\110\007\104\213\244\057\126\332
\306\172\366\140\215\244\070\361\235\207\026\060\262\360\137\172
\102\125\040\161\317\314\356\000\261\022\107\277\102\271\344\263
\265\035\031\204\271\230\155\340\151\264\025\101\265\342\120\110
\307\037\352\232\267\171\221\335\325\325\123\031\374\256\030\154
\151\333\255\131\050\233\144\230\247\074\307\125\216\321\060\000
\317\324\062\236\142\261\303\052\356\065\042\306\273\360\174\273
\203\270\000\211\365\334\032\227\331\070\232\051\123\141\031\246
\247\364\073\107\375\335\147\225\017\216\244\146\054\202\232\267
\055\161\346\337\256\370\370\150\301\273\017\352\120\240\105\227
\267\032\225\022\157\310\263\266\005\150\332\152\036\016\065\205
\204\254\164\014\212\264\364\165\237\042\257\260\124\273\266\236
\042\371\331\353\325\212\015\307\334\370\230\061\137\236\372\306
\227\364\101\020\165\323\201\266\061\137\172\335\210\205\010\257
\160\107\002\067\173\342\112\354\135\362\335\051\022\104\310\212
\252\335\322\125\170\027\165\257\161\151\015\167\160\112\260\037
\177\102\333\307\161\334\130\326\030\275\120\305\271\162\004\307
\147\173\174\123\140\312\111\030\025\274\100\163\256\053\250\053
\254\157\021\104\071\354\202\110\176\021\312\373\326\077\266\300
\271\270\006\223\165\275\223\047\167\027\015\134\245\236\352\301
\133\000\055\014\250\065\140\307\342\157\065\033\075\166\265\347

\255\335\164\043\117\206\262\107\357\310\057\320\205\174\071\226
\067\241\053\051\002\275\076\207\317\250\366\035\165\062\317\070
\343\163\261\356\020\201\265\052\261\210\006\121\036\132\072\110
\121\363\066\131\142\337\102\146\131\120\267\130\276\365\166\100
\232\022\026\346\016\252\327\154\240\325
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "HARICA Code Signing RSA Root CA 2021"
# Issuer: CN=HARICA Code Signing RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Serial Number:15:c2:ae:2a:4d:99:9a:63:8c:d3:ba:13:19:76:08:f5
# Subject: CN=HARICA Code Signing RSA Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Not Valid Before: Fri Feb 19 10:59:54 2021
# Not Valid After: Mon Feb 13 10:59:53 2045
# Fingerprint (MD5): 00:5d:c9:e3:b2:c0:90:e0:61:9a:42:c0:29:a1:6b:ba
# Fingerprint (SHA1): 8d:de:b8:20:46:b6:22:7c:79:24:6a:3e:ad:7b:32:c3:e8:8f:fc:ac
CKA_CLASS
 CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HARICA Code Signing RSA Root CA 2021"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\215\336\270\040\106\266\042\174\171\044\152\076\255\173\062\303
\350\217\374\254
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\000\135\311\343\262\300\220\340\141\232\102\300\051\241\153\272
END
CKA_ISSUER MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\055\060\053\006\003\125\004
\003\014\044\110\101\122\111\103\101\040\103\157\144\145\040\123
\151\147\156\151\156\147\040\122\123\101\040\122\157\157\164\040
\103\101\040\062\060\062\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\025\302\256\052\115\231\232\143\214\323\272\023\031\166
\010\365

END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "HARICA Code Signing ECC Root CA 2021"
# Issuer: CN=HARICA Code Signing ECC Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Serial Number:4c:8a:63:1d:a9:63:8f:05:a2:fb:76:14:ff:5b:a2:cd
# Subject: CN=HARICA Code Signing ECC Root CA 2021,O=Hellenic Academic and Research Institutions CA,C=GR
# Not Valid Before: Fri Feb 19 11:04:36 2021
# Not Valid After: Mon Feb 13 11:04:35 2045
# Fingerprint (MD5): 9d:dd:7d:39:b4:1c:95:fa:82:e0:c3:11:38:ba:69:84
# Fingerprint (SHA1): e4:36:e5:37:b7:13:42:b6:2e:8e:00:30:5a:d9:a3:d1:d7:33:47:e9
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE
 CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HARICA Code Signing ECC Root CA 2021"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\055\060\053\006\003\125\004
\003\014\044\110\101\122\111\103\101\040\103\157\144\145\040\123
\151\147\156\151\156\147\040\105\103\103\040\122\157\157\164\040
\103\101\040\062\060\062\061
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\055\060\053\006\003\125\004
\003\014\044\110\101\122\111\103\101\040\103\157\144\145\040\123
\151\147\156\151\156\147\040\105\103\103\040\122\157\157\164\040
\103\101\040\062\060\062\061
END
CKA_SERIAL_NUMBER

MULTILINE_OCTAL
\002\020\114\212\143\035\251\143\217\005\242\373\166\024\377\133
\242\315
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\146\060\202\001\355\240\003\002\001\002\002\020\114
\212\143\035\251\143\217\005\242\373\166\024\377\133\242\315\060
\012\006\010\052\206\110\316\075\004\003\003\060\165\061\013\060
\011\006\003\125\004\006\023\002\107\122\061\067\060\065\006\003
\125\004\012\014\056\110\145\154\154\145\156\151\143\040\101\143
\141\144\145\155\151\143\040\141\156\144\040\122\145\163\145\141
\162\143\150\040\111\156\163\164\151\164\165\164\151\157\156\163
\040\103\101\061\055\060\053\006\003\125\004\003\014\044\110\101
\122\111\103\101\040\103\157\144\145\040\123\151\147\156\151\156
\147\040\105\103\103\040\122\157\157\164\040\103\101\040\062\060
\062\061\060\036\027\015\062\061\060\062\061\071\061\061\060\064
\063\066\132\027\015\064\065\060\062\061\063\061\061\060\064\063
\065\132\060\165\061\013\060\011\006\003\125\004\006\023\002\107
\122\061\067\060\065\006\003\125\004\012\014\056\110\145\154\154
\145\156\151\143\040\101\143\141\144\145\155\151\143\040\141\156
\144\040\122\145\163\145\141\162\143\150\040\111\156\163\164\151
\164\165\164\151\157\156\163\040\103\101\061\055\060\053\006\003
\125\004\003\014\044\110\101\122\111\103\101\040\103\157\144\145
\040\123\151\147\156\151\156\147\040\105\103\103\040\122\157\157
\164\040\103\101\040\062\060\062\061\060\166\060\020\006\007\052
\206\110\316\075\002\001\006\005\053\201\004\000\042\003\142\000
\004\103\237\274\134\102\152\103\341\254\113\270\016\137\200\006
\343\005\167\213\177\013\171\327\141\240\220\277\362\123\050\243
\130\272\224\300\146\152\034\131\332\200\130\201\000\114\274\311
\171\230\020\014\307\035\013\343\223\334\205\071\150\331\277\247
\103\322\061\314\202\202\047\272\210\321\322\055\126\067\367\072
\332\156\071\334\161\020\145\356\070\013\207\172\003\272\060\137
\144\243\102\060\100\060\017\006\003\125\035\023\001\001\377\004
\005\060\003\001\001\377\060\035\006\003\125\035\016\004\026\004
\024\152\161\301\163\152\223\102\246\227\162\136\273\220\137\202
\222\017\053\326\353\060\016\006\003\125\035\017\001\001\377\004
\004\003\002\001\206\060\012\006\010\052\206\110\316\075\004\003
\003\003\147\000\060\144\002\060\036\245\325\013\104\225\020\344
\147\174\116\205\136\271\105\111\002\163\260\262\034\263\247\042
\321\000\141\100\017\263\207\067\026\215\000\355\266\213\125\045
\006\224\220\334\327\347\165\237\002\060\177\164\153\361\112\337
\360\367\204\173\362\305\171\060\003\110\362\036\040\042\127\144
\124\127\064\200\167\267\077\043\117\264\365\200\230\302\301\126
\133\240\347\326\241\217\365\014\157\035
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE

```
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
#
 Trust for "HARICA Code Signing ECC Root CA 2021"
# Issuer: CN=HARICA Code Signing ECC Root CA 2021,O=Hellenic Academic and Research Institutions
CA,C=GR
# Serial Number:4c:8a:63:1d:a9:63:8f:05:a2:fb:76:14:ff:5b:a2:cd
# Subject: CN=HARICA Code Signing ECC Root CA 2021,O=Hellenic Academic and Research Institutions
CA,C=GR
# Not Valid Before: Fri Feb 19 11:04:36 2021
# Not Valid After: Mon Feb 13 11:04:35 2045
# Fingerprint (MD5): 9d:dd:7d:39:b4:1c:95:fa:82:e0:c3:11:38:ba:69:84
# Fingerprint (SHA1): e4:36:e5:37:b7:13:42:b6:2e:8e:00:30:5a:d9:a3:d1:d7:33:47:e9
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "HARICA Code Signing ECC Root CA 2021"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\344\066\345\067\267\023\102\266\056\216\000\060\132\331\243\321
\327\063\107\351
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\235\335\175\071\264\034\225\372\202\340\303\021\070\272\151\204
END
CKA_ISSUER MULTILINE_OCTAL
\060\165\061\013\060\011\006\003\125\004\006\023\002\107\122\061
\067\060\065\006\003\125\004\012\014\056\110\145\154\154\145\156
\151\143\040\101\143\141\144\145\155\151\143\040\141\156\144\040
\122\145\163\145\141\162\143\150\040\111\156\163\164\151\164\165
\164\151\157\156\163\040\103\101\061\055\060\053\006\003\125\004
\003\014\044\110\101\122\111\103\101\040\103\157\144\145\040\123
\151\147\156\151\156\147\040\105\103\103\040\122\157\157\164\040
\103\101\040\062\060\062\061
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\114\212\143\035\251\143\217\005\242\373\166\024\377\133
\242\315
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Microsoft Identity Verification Root Certificate Authority 2020"
```

```
# Issuer: CN=Microsoft Identity Verification
 Root Certificate Authority 2020,O=Microsoft Corporation,C=US
# Serial Number:54:98:d2:d1:d4:5b:19:95:48:13:79:c8:11:c0:87:99
# Subject: CN=Microsoft Identity Verification Root Certificate Authority 2020,O=Microsoft Corporation,C=US
# Not Valid Before: Thu Apr 16 18:36:16 2020
# Not Valid After: Sun Apr 16 18:44:40 2045
# Fingerprint (MD5): be:95:4f:16:01:21:22:44:8c:a8:bc:27:96:02:ac:f5
# Fingerprint (SHA1): f4:00:42:e2:e5:f7:e8:ef:81:89:fe:d1:55:19:ae:ce:42:c3:bf:a2
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft Identity Verification Root Certificate Authority 2020"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\167\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\110\060\106\006\003\125\004\003\023\077\115\151\143\162\157\163
\157\146\164\040\111\144\145\156\164\151\164\171\040\126\145\162
\151\146\151\143\141\164\151\157\156\040\122\157\157\164\040\103
\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150\157
\162\151\164\171\040\062\060\062\060
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\167\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\110\060\106\006\003\125\004\003\023\077\115\151\143\162\157\163
\157\146\164\040\111\144\145\156\164\151\164\171\040\126\145\162
\151\146\151\143\141\164\151\157\156\040\122\157\157\164\040\103
\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150\157
\162\151\164\171\040\062\060\062\060
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\124\230\322\321\324\133\031\225\110\023\171\310\021\300
\207\231
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\314\060\202\003\264\240\003\002\001\002\002\020\124
\230\322\321\324\133\031\225\110\023\171\310\021\300\207\231\060
\015\006\011\052\206\110\206\367\015\001\001\014\005\000\060\167
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\036\060
\034\006\003\125\004\012\023\025\115\151\143\162\157\163\157\146
\164\040\103\157\162\160\157\162\141\164\151\157\156\061\110\060
\106\006\003\125\004\003\023\077\115\151\143\162\157\163\157\146
```

\164\040\111\144\145\156\164\151\164\171\040\126\145\162\151\146
\151\143\141\164\151\157\156\040\122\157\157\164\040\103\145\162
\164\151\146\151\143\141\164\145\040\101\165\164\150\157\162\151
\164\171\040\062\060\062\060\060\036\027\015\062\060\060\064\061
\066\061\070\063\066\061\066\132\027\015\064\065\060\064\061\066
\061\070\064\064\064\060\132\060\167\061\013\060\011\006\003\125
\004\006\023\002\125\123\061\036\060\034\006\003\125\004\012\023
\025\115\151\143\162\157\163\157\146\164\040\103\157\162\160\157
\162\141\164\151\157\156\061\110\060\106\006\003\125\004\003\023
\077\115\151\143\162\157\163\157\146\164\040\111\144\145\156\164
\151\164\171\040\126\145\162\151\146\151\143\141\164\151\157\156
\040\122\157\157\164\040\103\145\162\164\151\146\151\143\141\164
\145\040\101\165\164\150\157\162\151\164\171\040\062\060\062\060
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001
\000\263\221\052\007\203\006\147\375\236\235\340\307\300\267\244
\346\102\004\177\017\246\333\137\373\325\132\327\105\240\373\167
\013\360\200\363\246\155\132\115\171\123\330\240\206\204\127\105
\040\307\242\124\373\307\242\277\212\307\156\065\363\242\025\304
\057\116\343\112\205\226\111\015\377\276\231\330\024\366\274\047
\007\356\102\233\053\365\013\222\006\344\375\151\023\145\250\221
\162\362\230\204\353\203\075\016\344\327\161\022\110\041\313\015
\355\366\107\111\267\233\371\311\307\027\266\204\117\377\270\254
\232\327\163\147\111\205\343\206\275\067\100\320\045\206\324\336
\265\302\155\142\152\325\251\170\274\055\157\111\371\345\154\024
\024\375\024\307\323\145\026\067\336\313\156\274\136\051\215\375
\142\233\025\054\326\005\346\271\211\062\063\243\142\307\327\326
\122\147\010\304\056\364\126\053\236\013\207\314\354\247\264\246
\252\353\005\315\031\127\245\072\013\004\047\034\221\147\236\055
\142\055\057\036\276\332\300\040\313\004\031\312\063\373\211\276
\230\342\162\240\162\065\276\171\341\234\203\157\344\155\027\157
\220\363\075\000\206\165\070\216\320\340\111\232\273\333\323\370
\060\312\325\127\210\150\115\162\323\277\155\177\161\330\375\275
\015\256\222\144\110\267\133\157\171\046\265\315\233\225\041\204
\321\357\017\062\075\173\127\214\363\105\007\114\174\340\136\030
\016\065\166\213\155\236\313\066\164\253\005\370\340\163\135\062
\126\224\147\227\045\012\306\065\075\224\227\347\301\104\213\200
\375\301\370\364\164\031\345\060\366\006\373\041\127\076\006\034
\213\153\025\206\047\111\173\202\223\312\131\350\165\107\350\077
\070\364\307\123\171\240\266\264\342\134\121\357\275\137\070\301
\023\346\170\014\225\132\056\305\100\131\050\314\017\044\300\354
\272\011\167\043\231\070\246\266\034\332\307\272\040\266\327\067
\330\177\067\257\010\343\073\161\333\156\163\033\175\231\162\260
\344\206\063\131\164\265\026\000\173\120\155\306\206\023\332\375
\304\071\202\075\044\000\232\140\332\272\224\300\005\121\054\064
\254\120\231\023\207\273\263\005\200\262\115\060\002\134\270\046
\203\135\264\143\163\357\256\043\225\117\140\050\276\067\325\133
\245\002\003\001\000\001\243\124\060\122\060\016\006\003\125\035

\017\001\001\377\004\004\003\002\001\206\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\035\006\003\125
\035\016\004\026\004\024\310\176\322\152\205\052\033\312\031\230
\004\007\047\317\120\020\117\150\250\242\060\020\006\011\053\006
\001\004\001\202\067\025\001\004\003\002\001\000\060\015\006\011
\052\206\110\206\367\015\001\001\014\005\000\003\202\002\001\000
\257\152\335\346\031\347\055\224\103\031\116\313\351\120\225\144
\245\003\221\002\213\342\066\200\073\025\242\122\302\026\031\266
\152\132\135\164\103\060\364\233\377\140\164\011\261\041\036\220
\026\155\305\044\217\134\146\210\143\364\117\314\175\362\022\114
\100\020\213\001\237\332\251\310\256\362\225\033\317\235\005\353
\111\076\164\240\150\133\345\126\054\145\034\202\176\123\332\126
\331\106\027\171\222\105\304\020\066\010\122\051\027\313\057\246
\362\176\324\151\044\212\036\217\260\163\015\314\034\112\253\262
\252\355\247\221\143\001\144\042\250\062\270\176\062\050\263\147
\163\055\221\264\334\061\001\013\367\107\012\246\361\327\112\355
\126\140\304\054\010\243\173\100\260\274\164\047\122\207\326\276
\210\335\067\212\211\156\147\210\035\365\311\135\240\376\266\253
\072\200\327\032\227\074\027\066\042\101\036\254\115\325\203\346
\074\070\275\117\060\351\124\251\323\266\004\303\062\166\141\273
\260\030\305\053\030\263\300\200\325\267\225\260\136\121\115\042
\374\354\130\252\350\330\224\264\245\056\355\222\336\347\030\174
\041\127\335\125\143\367\277\155\315\037\322\246\167\050\160\307
\342\133\072\133\010\322\133\116\310\000\226\263\341\203\066\257
\206\012\145\134\164\366\352\354\172\152\164\240\360\113\356\357
\224\243\254\120\362\207\355\327\072\060\203\311\373\175\127\276
\345\343\370\101\312\345\144\256\263\243\354\130\354\205\232\314
\357\271\352\363\126\030\271\134\163\232\257\305\167\027\203\131
\333\067\032\030\162\124\245\101\322\266\043\165\243\103\232\345
\167\174\226\171\267\101\215\277\354\334\200\240\237\321\167\165
\130\137\065\023\340\045\032\147\013\175\316\045\372\007\012\344
\141\041\330\324\034\345\007\306\066\231\364\226\320\306\025\376
\116\315\327\256\213\235\333\026\375\004\306\222\275\324\210\346
\251\243\252\273\367\144\070\073\137\314\014\320\065\276\164\031
\003\246\305\252\114\242\141\066\202\076\035\363\053\274\227\135
\333\113\170\073\055\365\073\357\140\043\350\365\354\013\043\066
\225\257\230\146\277\123\323\173\270\151\112\052\226\146\151\304
\224\306\364\137\156\254\230\170\210\200\006\134\242\262\355\242
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Microsoft Identity Verification Root Certificate Authority 2020"
# Issuer: CN=Microsoft Identity Verification Root Certificate Authority 2020,O=Microsoft Corporation,C=US
# Serial Number:54:98:d2:d1:d4:5b:19:95:48:13:79:c8:11:c0:87:99

```
# Subject: CN=Microsoft Identity Verification Root Certificate Authority 2020,O=Microsoft Corporation,C=US
# Not Valid Before: Thu Apr 16 18:36:16 2020
# Not Valid After: Sun Apr 16 18:44:40 2045
# Fingerprint (MD5): be:95:4f:16:01:21:22:44:8c:a8:bc:27:96:02:ac:f5
# Fingerprint (SHA1): f4:00:42:e2:e5:f7:e8:ef:81:89:fe:d1:55:19:ae:ce:42:c3:bf:a2
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Microsoft Identity Verification Root Certificate Authority 2020"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\364\000\102\342\345\367\350\357\201\211\376\321\125\031\256\316
\102\303\277\242
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\276\225\117\026\001\041\042\104\214\250\274\047\226\002\254\365
END
CKA_ISSUER MULTILINE_OCTAL
\060\167\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\036\060\034\006\003\125\004\012\023\025\115\151\143\162\157\163
\157\146\164\040\103\157\162\160\157\162\141\164\151\157\156\061
\110\060\106\006\003\125\004\003\023\077\115\151\143\162\157\163
\157\146\164\040\111\144\145\156\164\151\164\171\040\126\145\162
\151\146\151\143\141\164\151\157\156\040\122\157\157\164\040\103
\145\162\164\151\146\151\143\141\164\145\040\101\165\164\150\157
\162\151\164\171\040\062\060\062\060
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\124\230\322\321\324\133\031\225\110\023\171\310\021\300
\207\231
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED
 CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "Entrust Code Signing Root Certification Authority - CSBR1"
# Issuer: CN=Entrust Code Signing Root Certification Authority - CSBR1,O=Entrust\, Inc.,C=US
# Serial Number:7f:f1:a8:f9:f4:3a:e8:87:6e:2d:c6:ff:5e:43:3d:b2:ee:30:a6:43
# Subject: CN=Entrust Code Signing Root Certification Authority - CSBR1,O=Entrust\, Inc.,C=US
# Not Valid Before: Fri May 07 13:26:36 2021
# Not Valid After: Sun Dec 30 13:26:36 2040
# Fingerprint (MD5): 3a:07:e2:0b:54:91:63:95:fd:01:e5:7b:71:aa:46:be
# Fingerprint (SHA1): 89:74:24:05:3a:4a:88:7a:c0:98:38:02:91:03:4d:88:5c:87:14:b9
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
```

CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust Code Signing Root Certification Authority - CSBR1"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\151\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\014\015\105\156\164\162\165\163
\164\054\040\111\156\143\056\061\102\060\100\006\003\125\004\003
\014\071\105\156\164\162\165\163\164\040\103\157\144\145\040\123
\151\147\156\151\156\147\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\040\055\040\103\123\102\122\061
END
CKA_ID
UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\151\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\014\015\105\156\164\162\165\163
\164\054\040\111\156\143\056\061\102\060\100\006\003\125\004\003
\014\071\105\156\164\162\165\163\164\040\103\157\144\145\040\123
\151\147\156\151\156\147\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\040\055\040\103\123\102\122\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\177\361\250\371\364\072\350\207\156\055\306\377\136\103
\075\262\356\060\246\103
END
CKA_VALUE
MULTILINE_OCTAL
\060\202\005\242\060\202\003\212\240\003\002\001\002\002\024\177
\361\250\371\364\072\350\207\156\055\306\377\136\103\075\262\356
\060\246\103\060\015\006\011\052\206\110\206\367\015\001\001\015
\005\000\060\151\061\013\060\011\006\003\125\004\006\023\002\125
\123\061\026\060\024\006\003\125\004\012\014\015\105\156\164\162
\165\163\164\054\040\111\156\143\056\061\102\060\100\006\003\125
\004\003\014\071\105\156\164\162\165\163\164\040\103\157\144\145
\040\123\151\147\156\151\156\147\040\122\157\157\164\040\103\145
\162\164\151\146\151\143\141\164\151\157\156\040\101\165\164\150
\157\162\151\164\171\040\055\040\103\123\102\122\061\060\036\027
\015\062\061\060\065\060\067\061\063\062\066\063\066\132\027\015
\064\060\061\062\063\060\061\063\062\066\063\066\132\060\151\061
\013\060\011\006\003\125\004\006\023\002\125\123\061\026\060\024
\006\003\125\004\012\014\015\105\156\164\162\165\163\164\054\040
\111\156\143\056\061\102\060\100\006\003\125\004\003\014\071\105
\156\164\162\165\163\164\040\103\157\144\145\040\123\151\147\156
\151\156\147\040\122\157\157\164\040\103\145\162\164\151\146\151

\143\141\164\151\157\156\040\101\165\164\150\157\162\151\164\171
\040\055\040\103\123\102\122\061\060\202\002\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000
\060\202\002\012\002\202\002\001\000\247\201\217\367\024\105\266
\142\103\362\330\256\323\045\136\110\117\121\277\305\175\237\120
\034\065\321\326\176\141\052\224\031\155\047\106\244\246\032\135
\367\124\121\152\200\042\306\250\146\165\115\124\203\311\136\150
\033\253\366\133\144\260\255\255\040\275\124\357\106\153\155\002
\347\105\256\165\366\216\212\271\062\056\213\270\167\034\122\115
\171\210\137\245\072\030\311\120\054\227\047\055\277\332\000\175
\143\177\357\062\354\106\207\143\333\232\237\303\132\041\066\173
\371\233\325\312\240\156\162\054\374\341\361\236\160\115\010\126
\025\157\220\253\373\110\272\271\327\301\202\170\205\145\056\177
\265\311\300\342\024\267\067\021\101\006\342\212\340\250\366\345
\176\266\170\005\001\303\140\355\117\007\101\056\012\023\111\343
\220\233\177\335\275\372\254\277\144\121\321\134\233\264\365\134
\347\134\377\073\233\245\240\032\327\175\011\262\302\267\377\156
\034\274\310\175\346\351\053\374\162\263\024\351\112\125\022\204
\234\104\045\165\035\366\052\360\117\245\040\075\150\045\353\141
\227\174\017\345\266\075\363\256\303\301\021\274\033\216\314\340
\107\060\136\102\000\206\161\343\130\254\006\312\145\037\173\224
\246\113\127\147\014\176\136\255\170\147\133\125\343\136\353\307
\330\354\114\156\206\313\363\334\370\237\207\252\162\130\022\017
\175\246\370\370\102\071\073\074\054\344\062\115\111\214\340\341
\000\302\070\240\234\372\204\076\101\334\156\126\256\306\032\133
\364\147\150\005\001\315\033\277\256\207\274\235\123\366\056\350
\266\153\344\231\336\305\117\207\130\250\322\145\036\310\037\325
\162\156\356\131\034\127\073\011\162\235\327\312\267\220\306\315
\173\105\222\221\102\003\114\175\077\312\362\252\270\302\016\206
\363\020\237\106\056\244\146\206\150\132\150\030\160\051\070\021
\200\140\153\212\103\243\163\154\343\263\153\067\377\346\235\147
\001\222\206\337\057\110\321\373\120\140\325\134\376\041\323\001
\102\143\376\357\160\264\027\300\217\250\356\323\301\113\137\022
\352\375\375\056\016\207\104\140\343\251\364\302\030\243\343\375
\316\014\204\042\015\363\247\170\332\223\363\333\070\317\271\057
\063\306\377\007\074\136\276\105\323\002\003\001\000\001\243\102
\060\100\060\035\006\003\125\035\016\004\026\004\024\202\272\326
\075\227\316\237\317\161\350\222\067\257\375\263\265\151\065\127
\317\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\206\060\015\006\011\052\206\110\206\367\015\001\001\015\005
\000\003\202\002\001\000\022\357\070\241\210\341\241\243\326\145
\334\107\234\363\274\334\317\254\113\214\074\032\276\053\364\367
\320\147\027\150\206\115\160\250\362\315\320\061\002\127\175\251
\014\212\073\127\071\236\360\156\367\044\042\005\147\321\301\226
\301\276\321\360\370\126\147\013\336\272\327\210\233\215\327\153
\010\166\365\130\221\331\265\303\100\123\032\244\361\205\315\077
\000\116\077\116\223\073\170\271\322\007\122\144\014\206\151\155

\350\124\145\126\027\350\000\123\204\212\363\333\373\263\316\013
\125\142\217\315\114\111\006\070\177\122\303\363\034\327\075\367
\063\312\062\255\301\251\257\157\353\021\313\356\254\121\277\260
\046\232\172\116\043\264\112\366\151\264\102\151\326\240\215\266
\214\107\112\073\040\067\267\101\007\357\057\040\330\146\034\151
\227\250\154\060\174\167\103\136\153\276\046\230\203\017\072\326
\307\160\052\026\106\055\045\124\206\143\145\127\102\367\043\101
\351\120\152\007\103\316\116\265\351\037\150\330\330\326\011\112
\250\350\262\374\220\147\222\344\220\046\363\107\372\326\040\373
\211\200\342\104\163\071\367\212\206\063\013\370\252\251\347\115
\354\334\157\325\317\061\115\253\216\037\220\100\326\174\134\202
\017\256\027\122\161\351\254\347\115\070\355\052\330\166\171\207
\255\027\243\114\253\267\102\127\277\006\254\345\320\115\060\351
\125\117\343\105\312\363\340\152\041\064\215\307\237\034\243\143
\110\222\322\226\007\276\245\107\076\302\052\231\070\247\216\332
\041\174\121\155\334\313\075\007\351\251\275\111\324\135\065\137
\133\214\004\121\352\232\130\220\272\033\257\150\170\261\026\017
\224\051\073\217\233\052\217\311\040\360\161\102\114\134\115\253
\061\214\253\351\177\046\150\151\240\245\026\015\201\304\321\005
\014\303\207\146\345\007\143\252\033\116\377\262\007\101\117\245
\042\106\120\254\146\000\207\122\154\074\262\073\234\227\241\106
\264\133\336\317\302\152\131\125\007\214\243\244\321\167\065\147
\106\004\057\331\070\271\106\257\272\216\033\162\046\002\057\166
\124\357\203\302\057\054\167\160\314\167\020\222\252\003\255\312
\314\340\117\351\203\106\345\263\074\031\157\172\171\207\266\070
\232\275\102\316\244\142
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER
 CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "Entrust Code Signing Root Certification Authority - CSBR1"
# Issuer: CN=Entrust Code Signing Root Certification Authority - CSBR1,O=Entrust\, Inc.,C=US
# Serial Number:7f:f1:a8:f9:f4:3a:e8:87:6e:2d:c6:ff:5e:43:3d:b2:ee:30:a6:43
# Subject: CN=Entrust Code Signing Root Certification Authority - CSBR1,O=Entrust\, Inc.,C=US
# Not Valid Before: Fri May 07 13:26:36 2021
# Not Valid After: Sun Dec 30 13:26:36 2040
# Fingerprint (MD5): 3a:07:e2:0b:54:91:63:95:fd:01:e5:7b:71:aa:46:be
# Fingerprint (SHA1): 89:74:24:05:3a:4a:88:7a:c0:98:38:02:91:03:4d:88:5c:87:14:b9
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "Entrust Code Signing Root Certification Authority - CSBR1"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL

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\211\164\044\005\072\112\210\172\300\230\070\002\221\003\115\210
\134\207\024\271
END
CKA_CERT_MD5_HASH
 MULTILINE_OCTAL
\072\007\342\013\124\221\143\225\375\001\345\173\161\252\106\276
END
CKA_ISSUER MULTILINE_OCTAL
\060\151\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\026\060\024\006\003\125\004\012\014\015\105\156\164\162\165\163
\164\054\040\111\156\143\056\061\102\060\100\006\003\125\004\003
\014\071\105\156\164\162\165\163\164\040\103\157\144\145\040\123
\151\147\156\151\156\147\040\122\157\157\164\040\103\145\162\164
\151\146\151\143\141\164\151\157\156\040\101\165\164\150\157\162
\151\164\171\040\055\040\103\123\102\122\061
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\177\361\250\371\364\072\350\207\156\055\306\377\136\103
\075\262\356\060\246\103
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "E-Tugra Global Root CA RSA
 v3"
# Issuer: CN=E-Tugra Global Root CA RSA v3,OU=E-Tugra Trust Center,O=E-Tugra EBG A.S.,L=Ankara,C=TR
# Serial Number:0d:4d:c5:cd:16:22:95:96:08:7e:b8:0b:7f:15:06:34:fb:79:10:34
# Subject: CN=E-Tugra Global Root CA RSA v3,OU=E-Tugra Trust Center,O=E-Tugra EBG
A.S.,L=Ankara,C=TR
# Not Valid Before: Wed Mar 18 09:07:17 2020
# Not Valid After: Sun Mar 12 09:07:17 2045
# Fingerprint (MD5): 22:be:10:f6:c2:f8:03:88:73:5f:33:29:47:28:47:a4
# Fingerprint (SHA1): e9:a8:5d:22:14:52:1c:5b:aa:0a:b4:be:24:6a:23:8a:c9:ba:e2:a9
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "E-Tugra Global Root CA RSA v3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\200\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\017\060\015\006\003\125\004\007\023\006\101\156\153\141\162
\141\061\031\060\027\006\003\125\004\012\023\020\105\055\124\165
\147\162\141\040\105\102\107\040\101\056\123\056\061\035\060\033
\006\003\125\004\013\023\024\105\055\124\165\147\162\141\040\124
```

\162\165\163\164\040\103\145\156\164\145\162\061\046\060\044\006
\003\125\004\003\023\035\105\055\124\165\147\162\141\040\107\154
\157\142\141\154\040\122\157\157\164\040\103\101\040\122\123\101
\040\166\063
END
CKA_ID
 UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\200\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\017\060\015\006\003\125\004\007\023\006\101\156\153\141\162
\141\061\031\060\027\006\003\125\004\012\023\020\105\055\124\165
\147\162\141\040\105\102\107\040\101\056\123\056\061\035\060\033
\006\003\125\004\013\023\024\105\055\124\165\147\162\141\040\124
\162\165\163\164\040\103\145\156\164\145\162\061\046\060\044\006
\003\125\004\003\023\035\105\055\124\165\147\162\141\040\107\154
\157\142\141\154\040\122\157\157\164\040\103\101\040\122\123\101
\040\166\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\015\115\305\315\026\042\225\226\010\176\270\013\177\025
\006\064\373\171\020\064
END
CKA_VALUE
 MULTILINE_OCTAL
\060\202\005\363\060\202\003\333\240\003\002\001\002\002\024\015
\115\305\315\026\042\225\226\010\176\270\013\177\025\006\064\373
\171\020\064\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\060\201\200\061\013\060\011\006\003\125\004\006\023\002
\124\122\061\017\060\015\006\003\125\004\007\023\006\101\156\153
\141\162\141\061\031\060\027\006\003\125\004\012\023\020\105\055
\124\165\147\162\141\040\105\102\107\040\101\056\123\056\061\035
\060\033\006\003\125\004\013\023\024\105\055\124\165\147\162\141
\040\124\162\165\163\164\040\103\145\156\164\145\162\061\046\060
\044\006\003\125\004\003\023\035\105\055\124\165\147\162\141\040
\107\154\157\142\141\154\040\122\157\157\164\040\103\101\040\122
\123\101\040\166\063\060\036\027\015\062\060\060\063\061\070\060
\071\060\067\061\067\132\027\015\064\065\060\063\061\062\060\071
\060\067\061\067\132\060\201\200\061\013\060\011\006\003\125\004
\006\023\002\124\122\061\017\060\015\006\003\125\004\007\023\006
\101\156\153\141\162\141\061\031\060\027\006\003\125\004\012\023
\020\105\055\124\165\147\162\141\040\105\102\107\040\101\056\123
\056\061\035\060\033\006\003\125\004\013\023\024\105\055\124\165
\147\162\141\040\124\162\165\163\164\040\103\145\156\164\145\162
\061\046\060\044\006\003\125\004\003\023\035\105\055\124\165\147
\162\141\040\107\154\157\142\141\154\040\122\157\157\164\040\103
\101\040\122\123\101\040\166\063\060\202\002\042\060\015\006\011
\052\206\110\206\367\015\001\001\001\005\000\003\202\002\017\000
\060\202\002\012\002\202\002\001\000\242\146\360\211\267\162\173

\356\011\311\143\322\323\103\335\136\303\246\204\070\112\361\215
\201\273\024\275\107\350\100\027\363\075\303\170\105\162\246\056
\220\336\232\072\324\040\161\312\274\237\035\113\227\012\307\061
\272\076\327\376\045\251\052\216\066\364\321\057\307\267\251\135
\063\334\060\160\370\100\154\113\262\246\061\141\321\064\074\075
\061\172\307\257\304\247\247\204\341\227\244\350\113\366\027\174
\356\074\007\355\342\212\127\334\266\373\370\103\045\120\352\047
\201\250\206\274\217\122\112\226\072\140\032\226\273\375\163\364
\205\375\203\375\177\204\155\064\154\177\152\267\113\001\003\277
\255\151\267\327\062\331\365\127\152\351\206\202\076\245\146\061
\263\026\075\302\363\046\140\062\323\122\036\260\154\244\067\076
\364\365\257\353\341\337\200\006\317\052\101\347\146\011\341\113
\227\347\167\275\041\155\051\266\147\303\055\176\355\326\171\145
\321\317\072\266\321\261\136\126\141\120\172\132\316\116\120\061
\200\003\230\107\347\344\030\174\104\132\306\244\263\073\306\306
\303\072\360\154\303\213\310\244\221\005\363\365\331\266\252\006
\241\267\253\344\261\352\041\024\134\203\244\374\377\266\120\323
\214\022\046\231\166\160\351\300\017\246\164\374\273\320\033\170
\316\162\222\342\050\234\274\346\351\011\330\072\323\211\346\276
\056\167\337\001\012\157\226\366\345\215\074\115\122\166\032\126
\341\163\176\027\254\075\255\154\243\122\022\030\160\346\200\116
\063\362\176\046\062\254\005\215\070\244\346\166\074\237\020\151
\016\155\235\322\301\171\040\153\133\317\063\215\321\224\166\065
\347\135\125\307\267\254\050\253\106\314\347\073\041\265\012\012
\344\112\131\334\201\065\113\104\225\022\012\147\245\241\377\133
\000\007\322\300\314\371\077\374\237\063\362\000\370\214\154\207
\235\006\055\361\357\343\346\006\372\305\146\023\133\374\120\007
\236\161\206\262\332\157\164\060\317\223\123\350\334\042\326\336
\040\037\141\215\243\056\243\170\062\220\154\334\254\062\265\005
\344\365\074\063\015\326\340\207\167\027\114\235\260\330\011\250
\015\127\367\104\205\360\310\004\276\134\135\132\343\027\216\124
\143\151\177\111\164\144\005\214\243\002\003\001\000\001\243\143
\060\141\060\017\006\003\125\035\023\001\001\377\004\005\060\003
\001\001\377\060\037\006\003\125\035\043\004\030\060\026\200\024
\262\264\256\346\055\367\046\325\252\165\055\166\113\300\033\123
\041\320\110\357\060\035\006\003\125\035\016\004\026\004\024\262
\264\256\346\055\367\046\325\252\165\055\166\113\300\033\123\041
\320\110\357\060\016\006\003\125\035\017\001\001\377\004\004\003
\002\001\006\060\015\006\011\052\206\110\206\367\015\001\001\013
\005\000\003\202\002\001\000\211\250\162\177\214\353\316\056\030
\304\020\200\055\020\014\377\373\024\315\004\340\024\074\116\232
\373\237\051\277\042\236\127\271\202\163\022\143\046\265\314\220
\351\322\052\051\356\234\055\314\054\231\276\105\047\344\261\161
\355\344\070\225\061\101\362\175\172\143\170\337\312\066\026\057
\202\210\237\274\021\107\117\166\115\310\055\216\353\337\055\174
\116\073\332\256\366\343\332\135\024\246\256\350\205\104\235\006
\156\216\373\357\172\112\152\055\053\050\030\376\277\220\054\165
\026\237\017\352\226\175\005\356\233\023\245\104\154\370\003\320

\335\043\341\375\003\022\022\010\364\030\064\263\340\067\013\167
\021\001\110\277\141\264\265\370\031\331\313\115\352\243\214\357
\375\360\006\265\155\222\364\112\141\120\204\355\354\111\323\344
\276\150\346\056\343\061\013\124\013\032\222\326\202\330\266\242
\145\074\146\004\371\125\332\154\373\333\265\024\146\115\224\203
\073\315\036\246\053\262\376\167\100\206\253\347\337\012\311\375
\366\335\207\126\030\330\260\054\125\140\226\372\010\176\122\220
\365\113\246\056\207\174\313\040\333\006\076\240\135\003\167\175
\242\074\023\033\051\242\023\125\240\075\024\042\257\157\270\320
\232\033\162\335\005\001\215\206\140\277\244\147\356\265\245\015
\321\177\346\032\053\142\146\303\007\272\347\240\110\034\070\303
\351\105\373\247\177\374\355\002\150\032\312\167\022\167\246\000
\125\050\024\354\326\307\022\242\033\145\102\351\221\350\313\076
\207\211\124\135\331\257\235\227\234\151\347\012\377\017\132\170
\213\143\052\114\175\107\224\077\336\113\351\123\320\060\361\305
\366\236\111\337\073\240\221\243\243\376\315\130\314\352\337\257
\157\050\073\240\151\233\217\354\254\256\053\124\235\233\004\261
\107\040\257\226\022\076\143\224\035\004\347\056\273\206\307\014
\232\210\277\166\107\357\367\260\013\227\146\322\104\317\140\122
\007\341\325\054\112\072\047\141\167\312\327\217\347\207\016\060
\377\014\273\004\342\141\303\242\310\227\141\216\264\060\152\074
\155\302\007\137\112\163\057\077\371\026\212\001\146\357\272\221
\312\122\127\173\256\324\346\017\335\013\172\177\213\236\046\040
\317\073\357\201\161\203\131
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "E-Tugra Global Root CA RSA v3"
# Issuer: CN=E-Tugra Global Root CA RSA v3,OU=E-Tugra Trust Center,O=E-Tugra EBG A.S.,L=Ankara,C=TR
# Serial Number:0d:4d:c5:cd:16:22:95:96:08:7e:b8:0b:7f:15:06:34:fb:79:10:34
# Subject: CN=E-Tugra Global Root CA RSA v3,OU=E-Tugra Trust Center,O=E-Tugra EBG
A.S.,L=Ankara,C=TR
# Not Valid Before: Wed Mar 18 09:07:17 2020
# Not Valid After: Sun Mar 12 09:07:17 2045
# Fingerprint (MD5): 22:be:10:f6:c2:f8:03:88:73:5f:33:29:47:28:47:a4
# Fingerprint (SHA1): e9:a8:5d:22:14:52:1c:5b:aa:0a:b4:be:24:6a:23:8a:c9:ba:e2:a9
CKA_CLASS
 CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "E-Tugra Global Root CA RSA v3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\351\250\135\042\024\122\034\133\252\012\264\276\044\152\043\212

```
\311\272\342\251
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\042\276\020\366\302\370\003\210\163\137\063\051\107\050\107\244
END
CKA_ISSUER MULTILINE_OCTAL
\060\201\200\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\017\060\015\006\003\125\004\007\023\006\101\156\153\141\162
\141\061\031\060\027\006\003\125\004\012\023\020\105\055\124\165
\147\162\141\040\105\102\107\040\101\056\123\056\061\035\060\033
\006\003\125\004\013\023\024\105\055\124\165\147\162\141\040\124
\162\165\163\164\040\103\145\156\164\145\162\061\046\060\044\006
\003\125\004\003\023\035\105\055\124\165\147\162\141\040\107\154
\157\142\141\154\040\122\157\157\164\040\103\101\040\122\123\101
\040\166\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\015\115\305\315\026\042\225\226\010\176\270\013\177\025
\006\064\373\171\020\064
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "E-Tugra Global Root CA ECC v3"
# Issuer: CN=E-Tugra Global Root CA ECC v3,OU=E-Tugra Trust Center,O=E-Tugra EBG A.S.,L=Ankara,C=TR
# Serial Number:26:46:19:77:31:e1:4f:6f:28:36:de:39:51:86:e6:d4:97:88:22:c1
# Subject: CN=E-Tugra Global Root CA ECC v3,OU=E-Tugra Trust Center,O=E-Tugra EBG
A.S.,L=Ankara,C=TR
# Not Valid Before: Wed Mar 18 09:46:58 2020
# Not Valid After: Sun Mar 12 09:46:58 2045
# Fingerprint (MD5): 46:bc:81:bb:f1:b5:1e:f7:4b:96:bc:14:e2:e7:27:64
# Fingerprint (SHA1): 8a:2f:af:57:53:b1:b0:e6:a1:04:ec:5b:6a:69:71:6d:f6:1c:e2:84
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE
 CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "E-Tugra Global Root CA ECC v3"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\201\200\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\017\060\015\006\003\125\004\007\023\006\101\156\153\141\162
\141\061\031\060\027\006\003\125\004\012\023\020\105\055\124\165
\147\162\141\040\105\102\107\040\101\056\123\056\061\035\060\033
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\006\003\125\004\013\023\024\105\055\124\165\147\162\141\040\124
\162\165\163\164\040\103\145\156\164\145\162\061\046\060\044\006
\003\125\004\003\023\035\105\055\124\165\147\162\141\040\107\154
\157\142\141\154\040\122\157\157\164\040\103\101\040\105\103\103
\040\166\063
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\201\200\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\017\060\015\006\003\125\004\007\023\006\101\156\153\141\162
\141\061\031\060\027\006\003\125\004\012\023\020\105\055\124\165
\147\162\141\040\105\102\107\040\101\056\123\056\061\035\060\033
\006\003\125\004\013\023\024\105\055\124\165\147\162\141\040\124
\162\165\163\164\040\103\145\156\164\145\162\061\046\060\044\006
\003\125\004\003\023\035\105\055\124\165\147\162\141\040\107\154
\157\142\141\154\040\122\157\157\164\040\103\101\040\105\103\103
\040\166\063
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\024\046\106\031\167\061\341\117\157\050\066\336\071\121\206
\346\324\227\210\042\301
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\245\060\202\002\052\240\003\002\001\002\002\024\046
\106\031\167\061\341\117\157\050\066\336\071\121\206\346\324\227
\210\042\301\060\012\006\010\052\206\110\316\075\004\003\003\060
\201\200\061\013\060\011\006\003\125\004\006\023\002\124\122\061
\017\060\015\006\003\125\004\007\023\006\101\156\153\141\162\141
\061\031\060\027\006\003\125\004\012\023\020\105\055\124\165\147
\162\141\040\105\102\107\040\101\056\123\056\061\035\060\033\006
\003\125\004\013\023\024\105\055\124\165\147\162\141\040\124\162
\165\163\164\040\103\145\156\164\145\162\061\046\060\044\006\003
\125\004\003\023\035\105\055\124\165\147\162\141\040\107\154\157
\142\141\154\040\122\157\157\164\040\103\101\040\105\103\103\040
\166\063\060\036\027\015\062\060\060\063\061\070\060\071\064\066
\065\070\132\027\015\064\065\060\063\061\062\060\071\064\066\065
\070\132\060\201\200\061\013\060\011\006\003\125\004\006\023\002
\124\122\061\017\060\015\006\003\125\004\007\023\006\101\156\153
\141\162\141\061\031\060\027\006\003\125\004\012\023\020\105\055
\124\165\147\162\141\040\105\102\107\040\101\056\123\056\061\035
\060\033\006\003\125\004\013\023\024\105\055\124\165\147\162\141
\040\124\162\165\163\164\040\103\145\156\164\145\162\061\046\060
\044\006\003\125\004\003\023\035\105\055\124\165\147\162\141\040
\107\154\157\142\141\154\040\122\157\157\164\040\103\101\040\105
\103\103\040\166\063\060\166\060\020\006\007\052\206\110\316\075
\002\001\006\005\053\201\004\000\042\003\142\000\004\216\230\051
\277\307\020\036\047\333\253\003\314\050\054\330\136\110\031\020

\051\314\313\131\201\314\214\270\222\027\211\203\052\222\366\303
\244\035\114\142\325\237\326\240\106\334\034\274\166\301\343\107
\320\133\023\332\347\245\263\146\110\347\041\232\112\117\206\012
\175\154\352\115\062\200\012\262\172\011\233\151\113\230\201\342
\056\354\002\160\226\037\375\365\106\316\312\334\202\243\143\060
\141\060\017\006\003\125\035\023\001\001\377\004\005\060\003\001
\001\377\060\037\006\003\125\035\043\004\030\060\026\200\024\377
\202\061\162\076\371\304\146\154\255\070\236\321\260\121\210\245
\220\314\365\060\035\006\003\125\035\016\004\026\004\024\377\202
\061\162\076\371\304\146\154\255\070\236\321\260\121\210\245\220
\314\365\060\016\006\003\125\035\017\001\001\377\004\004\003\002
\001\006\060\012\006\010\052\206\110\316\075\004\003\003\003\151
\000\060\146\002\061\000\346\005\130\151\141\345\055\312\015\313
\361\031\010\275\326\375\121\222\032\176\143\124\004\220\221\232
\065\221\071\231\372\007\251\146\223\272\310\150\324\212\077\372
\355\156\026\002\047\267\002\061\000\335\132\027\053\166\035\145
\102\226\246\254\135\212\171\126\330\212\033\337\232\336\137\307
\120\217\261\133\161\014\046\337\152\100\000\354\063\221\041\161
\276\150\344\043\244\331\255\241\067
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Trust for "E-Tugra Global Root CA ECC v3"
# Issuer: CN=E-Tugra Global Root CA ECC v3,OU=E-Tugra Trust Center,O=E-Tugra EBG A.S.,L=Ankara,C=TR
# Serial Number:26:46:19:77:31:e1:4f:6f:28:36:de:39:51:86:e6:d4:97:88:22:c1
# Subject: CN=E-Tugra Global Root CA ECC v3,OU=E-Tugra Trust Center,O=E-Tugra EBG
A.S.,L=Ankara,C=TR
# Not Valid Before: Wed Mar 18 09:46:58 2020
# Not Valid After: Sun Mar 12 09:46:58 2045
# Fingerprint (MD5): 46:bc:81:bb:f1:b5:1e:f7:4b:96:bc:14:e2:e7:27:64
# Fingerprint (SHA1): 8a:2f:af:57:53:b1:b0:e6:a1:04:ec:5b:6a:69:71:6d:f6:1c:e2:84
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN
 CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "E-Tugra Global Root CA ECC v3"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\212\057\257\127\123\261\260\346\241\004\354\133\152\151\161\155
\366\034\342\204
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\106\274\201\273\361\265\036\367\113\226\274\024\342\347\047\144
END

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CKA_ISSUER MULTILINE_OCTAL
\060\201\200\061\013\060\011\006\003\125\004\006\023\002\124\122
\061\017\060\015\006\003\125\004\007\023\006\101\156\153\141\162
\141\061\031\060\027\006\003\125\004\012\023\020\105\055\124\165
\147\162\141\040\105\102\107\040\101\056\123\056\061\035\060\033
\006\003\125\004\013\023\024\105\055\124\165\147\162\141\040\124
\162\165\163\164\040\103\145\156\164\145\162\061\046\060\044\006
\003\125\004\003\023\035\105\055\124\165\147\162\141\040\107\154
\157\142\141\154\040\122\157\157\164\040\103\101\040\105\103\103
\040\166\063
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\024\046\106\031\167\061\341\117\157\050\066\336\071\121\206
\346\324\227\210\042\301
END
CKA_TRUST_SERVER_AUTH
 CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "SSL.com Code Signing RSA Root CA 2022"
# Issuer: CN=SSL.com Code Signing RSA Root CA 2022,O=SSL Corporation,C=US
# Serial Number:10:97:c4:9c:8c:25:43:28:bb:a6:e8:b9:9b:ab:4f:a1
# Subject: CN=SSL.com Code Signing RSA Root CA 2022,O=SSL Corporation,C=US
# Not Valid Before: Thu Aug 25 16:32:08 2022
# Not Valid After: Sun Aug 19 16:32:07 2046
# Fingerprint (MD5): 5b:a8:b3:07:28:99:7b:83:d4:78:17:4b:f3:af:25:18
# Fingerprint (SHA1): d4:69:52:84:cd:17:98:d9:cb:16:99:46:4c:06:49:94:c4:e2:bb:fd
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com Code Signing
 RSA Root CA 2022"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\127\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\056\060\054\006\003\125
\004\003\014\045\123\123\114\056\143\157\155\040\103\157\144\145
\040\123\151\147\156\151\156\147\040\122\123\101\040\122\157\157
\164\040\103\101\040\062\060\062\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\127\061\013\060\011\006\003\125\004\006\023\002\125\123\061
```

\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\056\060\054\006\003\125
\004\003\014\045\123\123\114\056\143\157\155\040\103\157\144\145
\040\123\151\147\156\151\156\147\040\122\123\101\040\122\157\157
\164\040\103\101\040\062\060\062\062
END
CKA_SERIAL_NUMBER MULTILINE_OCTAL
\002\020\020\227\304\234\214\045\103\050\273\246\350\271\233\253
\117\241
END
CKA_VALUE MULTILINE_OCTAL
\060\202\005\233\060\202\003\203\240\003\002\001\002\002\020\020
\227\304\234\214\045\103\050\273\246\350\271\233\253\117\241\060
\015\006\011\052\206\110\206\367\015\001\001\013\005\000\060\127
\061\013\060\011\006\003\125\004\006\023\002\125\123\061\030\060
\026\006\003\125\004\012\014\017\123\123\114\040\103\157\162\160
\157\162\141\164\151\157\156\061\056\060\054\006\003\125\004\003
\014\045\123\123\114\056\143\157\155\040\103\157\144\145\040\123
\151\147\156\151\156\147\040\122\123\101\040\122\157\157\164\040
\103\101\040\062\060\062\062\060\036\027\015\062\062\060\070\062
\065\061\066\063\062\060\070\132\027\015\064\066\060\070\061\071
\061\066\063\062\060\067\132\060\127\061\013\060\011\006\003\125
\004\006\023\002\125\123\061\030\060\026\006\003\125\004\012\014
\017\123\123\114\040\103\157\162\160\157\162\141\164\151\157\156
\061\056\060\054\006\003\125\004\003\014\045\123\123\114\056\143
\157\155\040\103\157\144\145\040\123\151\147\156\151\156\147\040
\122\123\101\040\122\157\157\164\040\103\101\040\062\060\062\062
\060\202\002\042\060\015\006\011\052\206\110\206\367\015\001\001
\001\005\000\003\202\002\017\000\060\202\002\012\002\202\002\001
\000\214\165\040\310\214\334\116\221\121\006\265\133\357\105\273
\331\376\140\353\112\223\207\354\377\227\217\140\223\236\161\141
\100\352\357\113\313\222\130\330\153\026\334\336\055\210\362\363
\323\004\226\300\045\147\041\345\035\333\237\122\201\366\000\053
\146\220\361\254\036\250\117\141\044\335\166\057\003\307\065\310
\066\254\201\123\140\042\300\121\222\231\357\350\046\056\231\124
\315\011\217\137\134\074\360\253\347\073\263\247\253\006\306\061
\227\276\114\355\364\006\201\061\202\113\120\020\265\240\021\171
\334\130\313\300\345\036\263\301\157\110\134\255\227\012\263\036
\254\056\127\330\275\276\070\120\104\343\063\375\327\301\265\277
\242\116\373\170\264\073\070\230\050\351\126\055\124\200\213\153
\176\035\343\225\206\247\236\027\124\106\133\136\377\237\346\153
\065\212\121\245\246\173\134\012\042\015\302\327\203\057\332\074
\075\362\212\036\375\036\076\241\330\034\117\156\010\122\156\117
\254\037\311\376\237\231\115\273\122\124\261\222\203\133\100\023
\357\024\265\063\221\074\202\244\253\365\252\110\152\351\270\373
\200\100\006\374\345\036\176\077\274\012\253\046\342\305\253\007
\004\327\115\170\265\353\332\153\123\133\123\212\246\362\327\136
\121\042\115\037\314\252\213\272\300\016\202\331\024\272\331\362

\055\367\045\270\313\251\103\322\114\104\036\026\165\314\265\344
\160\037\051\201\125\064\262\076\376\377\321\170\032\100\222\047
\052\150\045\265\322\236\357\274\370\024\113\157\122\043\026\153
\020\211\324\337\272\334\314\030\131\161\251\346\313\330\220\161
\275\040\364\244\152\046\111\225\235\106\030\105\026\211\037\025
\135\250\103\260\140\227\236\327\066\332\072\262\157\113\162\116
\231\166\327\060\067\367\246\235\273\333\135\246\356\174\030\354
\102\371\025\350\016\270\333\154\102\153\020\135\104\014\326\324
\316\202\214\357\053\060\213\161\341\010\362\101\221\143\343\376
\340\300\250\245\215\231\000\101\142\316\102\106\241\235\312\345
\232\234\121\333\140\172\104\125\016\052\052\160\244\231\377\052
\176\140\264\035\226\127\272\073\374\333\277\306\061\200\252\072
\000\031\057\210\037\111\244\353\167\100\367\114\203\356\202\221
\057\002\003\001\000\001\243\143\060\141\060\017\006\003\125\035
\023\001\001\377\004\005\060\003\001\001\377\060\037\006\003\125
\035\043\004\030\060\026\200\024\307\366\310\013\142\355\024\014
\243\027\266\252\271\036\321\340\203\126\241\135\060\035\006\003
\125\035\016\004\026\004\024\307\366\310\013\142\355\024\014\243
\027\266\252\271\036\321\340\203\126\241\135\060\016\006\003\125
\035\017\001\001\377\004\004\003\002\001\206\060\015\006\011\052
\206\110\206\367\015\001\001\013\005\000\003\202\002\001\000\142
\120\336\062\077\353\066\065\170\215\211\167\110\017\017\243\135
\007\250\272\366\122\077\066\122\316\265\300\171\114\353\135\053
\370\022\254\103\333\347\173\214\051\052\237\153\072\323\174\365
\025\167\227\073\375\041\375\363\310\134\311\076\005\224\257\173
\253\350\215\342\257\015\300\240\033\337\257\013\272\252\264\105
\125\201\310\141\231\141\270\260\232\350\131\314\011\023\331\247
\126\007\206\356\355\240\354\215\001\145\232\231\314\043\242\300
\221\035\135\006\335\015\247\372\074\304\304\131\042\306\233\072
\300\035\151\075\054\266\261\036\212\276\075\202\017\153\061\162
\140\127\220\013\124\212\336\125\012\036\165\111\000\154\266\112
\063\357\106\330\326\313\304\361\174\154\011\226\351\251\341\030
\375\257\377\264\317\147\157\177\007\245\110\215\005\020\226\071
\220\171\132\226\267\343\346\067\070\062\261\306\061\001\044\164
\002\304\313\013\317\272\166\276\134\212\040\303\351\164\147\353
\155\022\234\071\075\340\212\325\053\113\044\343\171\214\110\234
\221\253\327\202\041\070\277\304\263\301\007\356\220\075\255\372
\242\276\051\133\122\061\252\154\263\034\165\363\346\240\330\214
\003\226\210\272\370\312\121\063\141\013\035\325\153\234\023\031
\056\026\317\317\015\207\113\227\304\007\331\013\253\230\221\352
\272\007\203\230\222\100\012\040\315\270\153\232\367\200\376\073
\311\342\371\103\310\050\347\115\227\027\300\167\363\060\352\046
\204\033\325\123\274\060\205\137\151\356\074\264\011\350\261\233
\244\070\202\272\353\300\152\214\155\053\050\060\170\344\062\253
\267\033\341\122\044\000\221\347\113\032\333\241\210\014\156\352
\135\034\107\231\215\161\115\275\336\336\100\231\004\263\100\341
\303\213\252\304\222\030\227\173\374\314\203\200\074\332\051\362
\177\316\304\151\000\233\141\175\155\226\326\025\202\214\365\203

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\052\034\367\123\166\162\045\360\051\200\304\062\144\123\017\117
\124\364\127\015\326\013\334\376\162\210\264\137\113\331\036\077
\003\206\057\071\020\066\247\061\305\046\007\225\213\110\161\361
\253\054\006\352\322\034\116\225\215\347\027\352\255\261\106\105
\323\066\375\313\304\141\157\011\042\104\062\047\247\153\150
END
CKA_NSS_MOZILLA_CA_POLICY
 CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

#
 Microsoft Code Signing Only Certificate
# Trust for "SSL.com Code Signing RSA Root CA 2022"
# Issuer: CN=SSL.com Code Signing RSA Root CA 2022,O=SSL Corporation,C=US
# Serial Number:10:97:c4:9c:8c:25:43:28:bb:a6:e8:b9:9b:ab:4f:a1
# Subject: CN=SSL.com Code Signing RSA Root CA 2022,O=SSL Corporation,C=US
# Not Valid Before: Thu Aug 25 16:32:08 2022
# Not Valid After: Sun Aug 19 16:32:07 2046
# Fingerprint (MD5): 5b:a8:b3:07:28:99:7b:83:d4:78:17:4b:f3:af:25:18
# Fingerprint (SHA1): d4:69:52:84:cd:17:98:d9:cb:16:99:46:4c:06:49:94:c4:e2:bb:fd
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com Code Signing RSA Root CA 2022"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\324\151\122\204\315\027\230\331\313\026\231\106\114\006\111\224
\304\342\273\375
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\133\250\263\007\050\231\173\203\324\170\027\113\363\257\045\030
END
CKA_ISSUER MULTILINE_OCTAL
\060\127\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\056\060\054\006\003\125
\004\003\014\045\123\123\114\056\143\157\155\040\103\157\144\145
\040\123\151\147\156\151\156\147\040\122\123\101\040\122\157\157
\164\040\103\101\040\062\060\062\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\020\227\304\234\214\045\103\050\273\246\350\271\233\253
\117\241
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
```

```
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
# Certificate "SSL.com Code Signing ECC Root CA 2022"
# Issuer: CN=SSL.com Code Signing ECC Root CA 2022,O=SSL Corporation,C=US
# Serial Number:6e:8e:e4:5b:10:4c:c9:0c:7e:b4:d8:88:8f:e5:ec:64
# Subject: CN=SSL.com Code Signing ECC Root CA 2022,O=SSL Corporation,C=US
# Not
 Valid Before: Thu Aug 25 16:31:35 2022
# Not Valid After: Sun Aug 19 16:31:34 2046
# Fingerprint (MD5): aa:b1:b5:a9:b3:57:91:7d:fa:8f:2e:68:33:fb:55:a5
# Fingerprint (SHA1): 0d:9e:9a:b2:07:65:a8:9e:d9:cd:8d:f2:c7:a6:3b:c7:74:95:ef:31
CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com Code Signing ECC Root CA 2022"
CKA_CERTIFICATE_TYPE CK_CERTIFICATE_TYPE CKC_X_509
CKA_SUBJECT MULTILINE_OCTAL
\060\127\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\056\060\054\006\003\125
\004\003\014\045\123\123\114\056\143\157\155\040\103\157\144\145
\040\123\151\147\156\151\156\147\040\105\103\103\040\122\157\157
\164\040\103\101\040\062\060\062\062
END
CKA_ID UTF8 "0"
CKA_ISSUER MULTILINE_OCTAL
\060\127\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\056\060\054\006\003\125
\004\003\014\045\123\123\114\056\143\157\155\040\103\157\144\145
\040\123\151\147\156\151\156\147\040\105\103\103\040\122\157\157
\164\040\103\101\040\062\060\062\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\156\216\344\133\020\114\311\014\176\264\330\210\217\345
\354\144
END
CKA_VALUE MULTILINE_OCTAL
\060\202\002\113\060\202\001\322\240\003\002\001\002\002\020\156
\216\344\133\020\114\311\014\176\264\330\210\217\345\354\144\060
\012\006\010\052\206\110\316\075\004\003\003\060\127\061\013\060
\011\006\003\125\004\006\023\002\125\123\061\030\060\026\006\003
\125\004\012\014\017\123\123\114\040\103\157\162\160\157\162\141
\164\151\157\156\061\056\060\054\006\003\125\004\003\014\045\123
```

\123\114\056\143\157\155\040\103\157\144\145\040\123\151\147\156
\151\156\147\040\105\103\103\040\122\157\157\164\040\103\101\040
\062\060\062\062\060\036\027\015\062\062\060\070\062\065\061\066
\063\061\063\065\132\027\015\064\066\060\070\061\071\061\066\063
\061\063\064\132\060\127\061\013\060\011\006\003\125\004\006\023
\002\125\123\061\030\060\026\006\003\125\004\012\014\017\123\123
\114\040\103\157\162\160\157\162\141\164\151\157\156\061\056\060
\054\006\003\125\004\003\014\045\123\123\114\056\143\157\155\040
\103\157\144\145\040\123\151\147\156\151\156\147\040\105\103\103
\040\122\157\157\164\040\103\101\040\062\060\062\062\060\166\060
\020\006\007\052\206\110\316\075\002\001\006\005\053\201\004\000
\042\003\142\000\004\166\310\254\324\326\225\222\174\027\062\345
\313\153\101\371\051\273\261\353\242\166\265\066\330\154\113\215
\345\076\112\127\046\046\307\237\073\137\106\146\047\121\300\054
\143\034\164\335\254\071\323\157\075\016\224\276\276\053\060\222
\316\242\102\126\015\120\324\244\054\161\364\047\141\333\240\201
\077\325\115\126\026\265\314\034\067\313\063\064\021\150\307\074
\173\015\351\224\315\243\143\060\141\060\017\006\003\125\035\023
\001\001\377\004\005\060\003\001\001\377\060\037\006\003\125\035
\043\004\030\060\026\200\024\130\136\026\303\055\263\346\352\243
\111\263\245\276\326\336\256\171\225\153\215\060\035\006\003\125
\035\016\004\026\004\024\130\136\026\303\055\263\346\352\243\111
\263\245\276\326\336\256\171\225\153\215\060\016\006\003\125\035
\017\001\001\377\004\004\003\002\001\206\060\012\006\010\052\206
\110\316\075\004\003\003\003\147\000\060\144\002\060\123\214\163
\061\116\200\134\267\236\073\017\010\130\023\276\331\100\366\361
\277\175\367\231\240\353\314\200\000\015\252\160\066\355\066\043
\173\101\270\024\025\126\166\323\226\343\025\205\144\002\060\044
\344\366\370\275\023\156\072\267\077\334\277\315\170\337\046\200
\127\022\257\150\147\117\377\362\053\261\242\241\231\264\303\223
\033\216\172\313\174\277\024\216\353\352\270\376\341\003\137
END
CKA_NSS_MOZILLA_CA_POLICY
CK_BBOOL CK_FALSE
CKA_NSS_SERVER_DISTRUST_AFTER CK_BBOOL CK_FALSE
CKA_NSS_EMAIL_DISTRUST_AFTER CK_BBOOL CK_FALSE

# Microsoft Code Signing Only Certificate
#
Trust for "SSL.com Code Signing ECC Root CA 2022"
# Issuer: CN=SSL.com Code Signing ECC Root CA 2022,O=SSL Corporation,C=US
# Serial Number:6e:8e:e4:5b:10:4c:c9:0c:7e:b4:d8:88:8f:e5:ec:64
# Subject: CN=SSL.com Code Signing ECC Root CA 2022,O=SSL Corporation,C=US
# Not Valid Before: Thu Aug 25 16:31:35 2022
# Not Valid After: Sun Aug 19 16:31:34 2046
# Fingerprint (MD5): aa:b1:b5:a9:b3:57:91:7d:fa:8f:2e:68:33:fb:55:a5
# Fingerprint (SHA1): 0d:9e:9a:b2:07:65:a8:9e:d9:cd:8d:f2:c7:a6:3b:c7:74:95:ef:31
CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST

```
CKA_TOKEN CK_BBOOL CK_TRUE
CKA_PRIVATE CK_BBOOL CK_FALSE
CKA_MODIFIABLE CK_BBOOL CK_FALSE
CKA_LABEL UTF8 "SSL.com Code Signing ECC Root CA 2022"
CKA_CERT_SHA1_HASH MULTILINE_OCTAL
\015\236\232\262\007\145\250\236\331\315\215\362\307\246\073\307
\164\225\357\061
END
CKA_CERT_MD5_HASH MULTILINE_OCTAL
\252\261\265\251\263\127\221\175\372\217\056\150\063\373\125\245
END
CKA_ISSUER MULTILINE_OCTAL
\060\127\061\013\060\011\006\003\125\004\006\023\002\125\123\061
\030\060\026\006\003\125\004\012\014\017\123\123\114\040\103\157
\162\160\157\162\141\164\151\157\156\061\056\060\054\006\003\125
\004\003\014\045\123\123\114\056\143\157\155\040\103\157\144\145
\040\123\151\147\156\151\156\147\040\105\103\103\040\122\157\157
\164\040\103\101\040\062\060\062\062
END
CKA_SERIAL_NUMBER
 MULTILINE_OCTAL
\002\020\156\216\344\133\020\114\311\014\176\264\330\210\217\345
\354\144
END
CKA_TRUST_SERVER_AUTH CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_EMAIL_PROTECTION CK_TRUST CKT_NSS_MUST_VERIFY_TRUST
CKA_TRUST_CODE_SIGNING CK_TRUST CKT_NSS_TRUSTED_DELEGATOR
CKA_TRUST_STEP_UP_APPROVED CK_BBOOL CK_FALSE
```

Found in path(s):
* /ca-certificates-2024.2.69_v8.0.303-91.4.el9_4.src.rpm-cosi-expand-archive-UkBj2Hnl/certdata.txt
No license file was found, but licenses were detected in source scan.

```
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```

Found in path(s):
* /ca-certificates-2024.2.69_v8.0.303-91.4.el9_4.src.rpm-cosi-expand-archive-UkBj2Hnl/certdata2pem.py
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- update License: field to SPDX

Found in path(s):
* /ca-certificates-2024.2.69_v8.0.303-91.4.el9_4.src.rpm-cosi-expand-archive-UkBj2Hnl/ca-certificates.spec
No license file was found, but licenses were detected in source scan.

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////

update-ca-trust(8)
==========
:doctype: manpage
:man source: update-ca-trust

NAME
---
update-ca-trust - manage consolidated and dynamic configuration of CA
certificates and associated trust

SYNOPSIS
---
*update-ca-trust* [extract] [-o 'DIR'|--output='DIR']

DESCRIPTION
---
update-ca-trust(8) is used to manage a consolidated and dynamic configuration
feature of Certificate Authority
 (CA) certificates and associated trust.

The feature is available for new applications that read the
consolidated configuration files found in the /etc/pki/ca-trust/extracted directory
or that load the PKCS#11 module p11-kit-trust.so

Parts of the new feature are also provided in a way to make it useful
for legacy applications.

Many legacy applications expect CA certificates and trust configuration
in a fixed location, contained in files with particular path and name,
or by referring to a classic PKCS#11 trust module provided by the
NSS cryptographic library.

The dynamic configuration feature provides functionally compatible replacements
for classic configuration files and for the classic NSS trust module named libnssckbi.

In order to enable legacy applications, that read the classic files or
access the classic module, to make use of the new consolidated and dynamic configuration
feature, the classic filenames have been changed to symbolic links.
The symbolic links refer to
dynamically created and consolidated
output stored below the /etc/pki/ca-trust/extracted directory hierarchy.

The output is produced using the 'update-ca-trust' command (without parameters),
or using the 'update-ca-trust extract' command.
In order to produce the output, a flexible set of source configuration
is read, as described in section <<sourceconf,SOURCE CONFIGURATION>>.

In addition, the classic PKCS#11 module
is replaced with a new PKCS#11 module (p11-kit-trust.so) that dynamically
reads the same source configuration.

[[sourceconf]]
SOURCE CONFIGURATION
---
The dynamic configuration feature uses several source directories that
will be scanned for any number of source files. *It is important to select
the correct subdirectory for adding files, as the subdirectory defines how
contained certificates will be trusted or distrusted, and which file formats are read.*

Files in *subdirectories below the directory hierarchy /usr/share/pki/ca-trust-source/* contain
CA certificates and
trust settings in the PEM file format. The trust settings found here will be
interpreted with a *low priority*.

Files in *subdirectories below the directory hierarchy /etc/pki/ca-trust/source/* contain CA certificates and
trust settings in the PEM file format. The trust settings found here will be
interpreted with a *high priority*.

.You may use the following rules of thumb to decide, whether your configuration files should be added to the /etc or
rather to the /usr directory hierarchy:

* If you are manually adding a configuration file to a system, you probably
want it to override any other default configuration, and you most likely should
add it to the respective subdirectory in the /etc hierarchy.
* If you are creating a package that provides additional root CA certificates,
that is intended for distribution to several computer systems, but you still
want to allow the administrator to override your list, then your package should
add your files to the respective
subdirectory in the /usr hierarchy.
* If you are creating a package that is supposed to override the default system
trust settings, that is intended for distribution to several computer systems, then your package should install the files to the respective
subdirectory in the /etc hierarchy.

.*QUICK HELP 1*: To add a certificate in the simple PEM or DER file formats to the list of CAs trusted on the system:
* add it as a new file to directory /etc/pki/ca-trust/source/anchors/
* run 'update-ca-trust extract'

.*QUICK HELP 2*: If your certificate is in the extended BEGIN TRUSTED file format (which may contain distrust/blocklist trust flags, or trust flags for usages other than TLS) then:
* add it as a new file to directory /etc/pki/ca-trust/source/
* run 'update-ca-trust extract'

.In order to offer simplicity and flexibility, the way certificate files are treated depends on the subdirectory they are installed to.
* simple trust anchors subdirectory: /usr/share/pki/ca-trust-source/anchors/
or /etc/pki/ca-trust/source/anchors/
* simple blocklist (distrust) subdirectory: /usr/share/pki/ca-trust-source/blocklist/ or /etc/pki/ca-trust/source/blocklist/
* extended format directory: /usr/share/pki/ca-trust-source/ or /etc/pki/ca-trust/source/

.In the main directories /usr/share/pki/ca-trust-source/ or /etc/pki/ca-trust/source/ you may install one or multiple files in the following file formats:
* certificate files that include trust flags,
in the BEGIN/END TRUSTED CERTIFICATE file format
(any file name), which have been created using the openssl x509 tool
and the -addreject -addtrust options.
Bundle files with multiple certificates are supported.
* files in the p11-kit file format using the .p11-kit file name
extension, which can (e.g.) be used to distrust certificates
based on serial number and issuer name, without having the
full certificate available.
(This is currently an undocumented format, to be extended later.
For examples of the supported
formats, see the files
shipped with the ca-certificates package.)
* certificate files without trust flags in either the DER file format or in
the PEM (BEGIN/END CERTIFICATE) file format (any file name). Such files

will be added with neutral trust, neither trusted nor distrusted.
They will simply be known to the system, which might be helpful to
assist cryptographic software in constructing chains of certificates.
(If you want a CA certificate in these file formats to be trusted, you
should remove it from this directory and move it to the
./anchors subdirectory instead.)

In the anchors subdirectories /usr/share/pki/ca-trust-source/anchors/ or /etc/pki/ca-trust/source/anchors/
you may install one or multiple certificates in either the DER file
format or in the PEM (BEGIN/END CERTIFICATE) file format.
Each certificate will be treated as *trusted* for all purposes.

In the blocklist subdirectories /usr/share/pki/ca-trust-source/blocklist/ or /etc/pki/ca-trust/source/blocklist/
you
may install one or multiple certificates in either the DER file
format or in the PEM (BEGIN/END CERTIFICATE) file format.
Each certificate will be treated as *distrusted* for all purposes.

Please refer to the x509(1) manual page for the documentation of the
BEGIN/END CERTIFICATE and BEGIN/END TRUSTED CERTIFICATE file formats.

Applications that rely on a static file for a list of trusted CAs
may load one of the files found in the /etc/pki/ca-trust/extracted
directory. After modifying any file in the
/usr/share/pki/ca-trust-source/ or /etc/pki/ca-trust/source/
directories or in any of their subdirectories, or after adding a file,
it is necessary to run the 'update-ca-trust extract' command,
in order to update the consolidated files in /etc/pki/ca-trust/extracted/ .

Applications that load the classic PKCS#11 module using filename libnssckbi.so
(which has been converted into a symbolic link pointing to the new module)
and any application capable of
loading PKCS#11 modules
and loading p11-kit-trust.so, will benefit from
the dynamically merged set of certificates and trust information stored in the
/usr/share/pki/ca-trust-source/ and /etc/pki/ca-trust/source/ directories.

[[extractconf]]
EXTRACTED CONFIGURATION
---
The directory /etc/pki/ca-trust/extracted/ contains generated CA certificate
bundle files which are created and updated, based on the <<sourceconf,SOURCE CONFIGURATION>>
by running the 'update-ca-trust extract' command.

If your application isn't able to load the PKCS#11 module p11-kit-trust.so,
then you can use these files in your application to load a list of global
root CA certificates.

Please never manually edit the files stored in this directory,
because your changes will be lost and the files automatically overwritten,
each time the 'update-ca-trust extract' command gets executed.

In order to install new trusted or distrusted certificates,
please rather install them in the respective subdirectory below the
/usr/share/pki/ca-trust-source/
 or /etc/pki/ca-trust/source/
directories, as described in the <<sourceconf,SOURCE CONFIGURATION>> section.

The directory /etc/pki/ca-trust/extracted/java/ contains
a CA certificate bundle in the java keystore file format.
Distrust information cannot be represented in this file format,
and distrusted certificates are missing from these files.
File cacerts contains CA certificates trusted for TLS server authentication.

The directory /etc/pki/ca-trust/extracted/openssl/ contains
CA certificate bundle files in the extended BEGIN/END TRUSTED CERTIFICATE file format,
as described in the x509(1) manual page.
File ca-bundle.trust.crt contains the full set of all trusted
or distrusted certificates, including the associated trust flags.

The directory /etc/pki/ca-trust/extracted/pem/ contains
CA certificate bundle files in the simple BEGIN/END CERTIFICATE file format,
as described in the x509(1) manual page.
Distrust information cannot be represented in this
 file format,
and distrusted certificates are missing from these files.
File tls-ca-bundle.pem contains CA certificates
trusted for TLS server authentication.
File email-ca-bundle.pem contains CA certificates
trusted for E-Mail protection.
File objsign-ca-bundle.pem contains CA certificates
trusted for code signing.

The directory /etc/pki/ca-trust/extracted/edk2/ contains a CA
certificate bundle ("cacerts.bin") in the "sequence of
EFI_SIGNATURE_LISTs" format, defined in the UEFI-2.7 specification,
sections "31.4.1 Signature Database" and
"EFI_CERT_X509_GUID". Distrust information cannot be represented in
this file format, and distrusted certificates are missing from these
files. File "cacerts.bin" contains CA certificates trusted for TLS
server authentication.

COMMANDS
---

(absent/empty command)
~~~~~~~~~~~~~~~~~~~~~~
Same as the *extract* command described below. (However, the command may print
fewer warnings, as this command is being run during rpm package installation,
where
 non-fatal status output is undesired.)

extract
~~~~~~~~
Instruct update-ca-trust to scan the <<sourceconf,SOURCE CONFIGURATION>> and
produce updated versions of the consolidated configuration files stored below
the /etc/pki/ca-trust/extracted directory hierarchy.

EXTRACT OPTIONS
^^^^^^^^^^^^^^^
*-o DIR*, *--output=DIR*::
 Write the extracted trust store into the given directory instead of
 updating /etc/pki/ca-trust/extracted.

FILES
-----
/etc/pki/tls/certs/ca-bundle.crt::
 Classic filename, file contains a list of CA certificates trusted for TLS server authentication usage, in the simple BEGIN/END CERTIFICATE file format, without distrust information.
 This file is a symbolic link that refers to the consolidated output created by the update-ca-trust command.

/etc/pki/tls/certs/ca-bundle.trust.crt::
 Classic filename, file contains a list of CA certificates in the extended BEGIN/END TRUSTED CERTIFICATE file format, which includes trust (and/or distrust) flags specific to certificate
 usage.
 This file is a symbolic link that refers to the consolidated output created by the update-ca-trust command.

/etc/pki/java/cacerts::
 Classic filename, file contains a list of CA certificates trusted for TLS server authentication usage, in the Java keystore file format, without distrust information.
 This file is a symbolic link that refers to the consolidated output created by the update-ca-trust command.

/usr/share/pki/ca-trust-source::
 Contains multiple, low priority source configuration files as explained in section <<sourceconf,SOURCE CONFIGURATION>>. Please pay attention to the specific meanings of the respective subdirectories.

/etc/pki/ca-trust/source::
 Contains multiple, high priority source configuration files as explained in section <<sourceconf,SOURCE CONFIGURATION>>. Please pay attention to the specific meanings of the respective subdirectories.

/etc/pki/ca-trust/extracted::
 Contains consolidated and automatically generated configuration files for consumption

by applications,
which are created using the 'update-ca-trust extract' command. Don't edit files in this directory, because they will be overwritten.
See section <<extractconf,EXTRACTED CONFIGURATION>> for additional details.

AUTHOR
---
Written by Kai Engert and Stef Walter.

Found in path(s):
* /ca-certificates-2024.2.69_v8.0.303-91.4.el9_4.src.rpm-cosi-expand-archive-UkBj2Hnl/update-ca-trust.8.txt
No license file was found, but licenses were detected in source scan.

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* file, You can obtain one at http://mozilla.org/MPL/2.0/. */

Found in path(s):
* /ca-certificates-2024.2.69_v8.0.303-91.4.el9_4.src.rpm-cosi-expand-archive-UkBj2Hnl/nssckbi.h

# 1.2167 dc 1.4

## 1.2167.1 Available under license :

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* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/Example/Example/BarButtonItemViewController.h
* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/Example/Example/BarButtonItemViewController.m
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* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/Example-Swift/Example-Swift-Bridging-Header.h
* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/Example-Swift/Example-Swift/AppDelegate.swift
* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/Example-Swift/Example-SwiftTests/Example_SwiftTests.swift
* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/Example-Swift/Example-Swift/ViewController.swift
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```
<string>The DCPathButton use the MIT license</string>
```

Found in path(s):
* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/Example/Pods/Target Support Files/Pods/Pods-acknowledgements.plist
No license file was found, but licenses were detected in source scan.

```
Pod::Spec.new do |s|

 s.name         = "DCPathButton"
 s.version      = "2.1.1"
 s.summary      = " A beautiful button copy from Path® "

 s.description  = <<-DESC
   DCPathButton is a menu button, design by an famous App Path®.
   Since Path® 4.0, it return to use a tab bar instead of a side bar,
   and also change the menu button. So I try to implement it and then
   the DCPathButton born :)
                DESC

 s.homepage     = "https://github.com/Tangdixi/DCPathButton"

 s.license      = {
 :type => 'MIT',
 :text => 'The DCPathButton use the MIT license'
 }

 s.author             = { "Tangdixi" => "Tangdixi@gmail.com" }

 s.platform     = :ios, '7.0'

 s.source       = {
 :git => "https://github.com/Tangdixi/DCPathButton.git",
 :tag => "2.1.1"
 }

 s.source_files  = 'DCPathButton/Classes/*.{h,m}'

 s.resources  = ["DCPathButton/Sounds/*"]

 s.frameworks = 'QuartzCore','AudioToolbox'

  s.requires_arc = true

end
```

Found in path(s):
* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/DCPathButton.podspec

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<label opaque="NO" clipsSubviews="YES" userInteractionEnabled="NO" contentMode="left" horizontalHuggingPriority="251" verticalHuggingPriority="251" text="  Copyright (c) 2015 DC. All rights reserved." textAlignment="center" lineBreakMode="tailTruncation" baselineAdjustment="alignBaselines" minimumFontSize="9" translatesAutoresizingMaskIntoConstraints="NO" id="8ie-xW-0ye">

Found in path(s):
* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/Example-Swift/Example-Swift/Base.lproj/LaunchScreen.xib
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Found in path(s):
* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/Example/Example/ViewController.h
* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/DCPathButton/Classes/DCPathItemButton.h
* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/Example/Example/AppDelegate.h
* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/Example-Swift/DCPathButton/Classes/DCPathButton.h
* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/Example-Swift/DCPathButton/Classes/DCPathItemButton.m
* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/Example/Example/main.m
* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/Example/ExampleTests/ExampleTests.m
* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/DCPathButton/Classes/DCPathButton.h
*
 /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/Example/Example/ViewController.m
* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/Example/Pods/DCPathButton/DCPathButton/Classes/DCPathButton.m
* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/Example/Pods/DCPathButton/DCPathButton/Classes/DCPathButton.h
* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/Example/Pods/DCPathButton/DCPathButton/Classes/DCPathItemButton.h
* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/DCPathButton/Classes/DCPathItemButton.m
* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/DCPathButton/Classes/DCPathButton.m
* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/Example/Example/AppDelegate.m
* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/Example-Swift/DCPathButton/Classes/DCPathButton.m
*

/tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/Example-Swift/DCPathButton/Classes/DCPathItemButton.h
* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/Example/Pods/DCPathButton/DCPathButton/Classes/DCPathItemButton.m
No license file was found, but licenses were detected in source scan.

# Acknowledgements
This application makes use of the following third party libraries:

## DCPathButton

The DCPathButton use the MIT license
Generated by CocoaPods - http://cocoapods.org

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* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/Example/Pods/DCPathButton/README.md
* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/README.md
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* /tangdixi-dcpathbutton-2-1-4-0-gdd7873d-tar-gz/Tangdixi-DCPathButton-ecfc086/LISENCE

# 1.2168 sgml-common 0.6.3-58.el9

## 1.2168.1 Available under license :

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```
<!-- Schema for XML Signatures
   http://www.w3.org/2000/09/xmldsig#
   $Revision: 1.2 $ on $Date: 2013-04-16 12:48:49 $ by $Author: denis $

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-->
```

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Found in path(s):
* /sgml-common-0.6.3-58.el9.src.rpm-cosi-expand-archive-KOZIJfSx/sgml-common-0.6.3.tgz-cosi-expand-archive-vYzWYo3g/sgml-common-0.6.3/doc/sgml-common.sgml
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License: GPL+
License: GPL+
- Change Copyright: to License:.

Found in path(s):
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Found in path(s):
* /sgml-common-0.6.3-58.el9.src.rpm-cosi-expand-archive-KOZIJfSx/sgml-common-0.6.3.tgz-cosi-expand-archive-vYzWYo3g/sgml-common-0.6.3/doc/HTML/fdl.html
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Found in path(s):
* /sgml-common-0.6.3-58.el9.src.rpm-cosi-expand-archive-KOZIJfSx/sgml-common-0.6.3.tgz-cosi-expand-archive-vYzWYo3g/sgml-common-0.6.3/doc/HTML/index.html
No license file was found, but licenses were detected in source scan.

and released under GPL licence.</P

Found in path(s):
* /sgml-common-0.6.3-58.el9.src.rpm-cosi-expand-archive-KOZIJfSx/sgml-common-0.6.3.tgz-cosi-expand-archive-vYzWYo3g/sgml-common-0.6.3/doc/HTML/introduction.html

# 1.2169 jackc-pgerrcode 0.0.0-20240316143900-6e2875d9b438

## 1.2169.1 Available under license :

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# 1.2170 rtcp 1.2.15

## 1.2170.1 Available under license :

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# 1.2173 jwt 2.7.4

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```
package migration

import "fmt"

// Notice is a migration warning
type Notice struct {
 Plugin     string
 Option     string
 Severity   string // 'deprecated', 'removed', or 'unsupported'
```

```
 ReplacedBy string
 Additional string
 Version    string
}

func (n *Notice) ToString() string {
 s := ""
 if n.Option == "" {
  s += fmt.Sprintf(`Plugin "%v" `, n.Plugin)
 } else {
  s += fmt.Sprintf(`Option "%v" in plugin "%v" `, n.Option, n.Plugin)
 }
 if n.Severity == SevUnsupported {
  s += "is unsupported by this migration tool in " + n.Version + "."
 } else if n.Severity == SevNewDefault {
  s += "is added as a default in " + n.Version + "."
 } else {
  s += "is " + n.Severity + " in " + n.Version + "."
 }
 if n.ReplacedBy != "" {
  s += fmt.Sprintf(` It is replaced by "%v".`, n.ReplacedBy)
 }
 if n.Additional != "" {
  s += " " + n.Additional
 }
 return s
}

const (
 // The following statuses are used to indicate the state of support/deprecation in a given release.
 SevDeprecated  = "deprecated"
  // deprecated, but still completely functional
 SevIgnored     = "ignored"     // if included in the corefile, it will be ignored by CoreDNS
 SevRemoved     = "removed"     // completely removed from CoreDNS, and would cause CoreDNS to exit if present
in the Corefile
 SevNewDefault  = "newdefault"  // added to the default corefile.  CoreDNS may not function properly if it is not
present in the corefile.
 SevUnsupported = "unsupported" // the plugin/option is not supported by the migration tool

 // The following statuses are used for selecting/filtering notifications
 SevAll = "all" // show all statuses
)
```

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==========
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```
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 Name string `json:"name,omitempty"`
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Protocol Buffers for Go with Gadgets

Go support for Protocol Buffers - Google's data interchange format

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procfs provides functions to retrieve system, kernel and process
metrics from the pseudo-filesystem proc.

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==========
The common/types/pb/equal.go modification of proto.Equal logic
==========
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# 1.2175 character-entities 2.0.2

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# 1.2176 @babel/helper-validator-identifier 7.22.15

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# 1.2177 sys-signal 0.7.1

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# 1.2179 go-yaml 2.4.0

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Douglas Gilbert
4th October 2021

# 1.2182 patch 2.7.6-16.el9

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# 1.2185 etcd-api 3.5.21

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# 1.2187 stdr 1.2.2

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```
# Contributor: Carlo Landmeter <clandmeter@alpinelinux.org>
# Maintainer: Kevin Daudt <kdaudt@alpinelinux.org>
pkgname=spdx-licenses
pkgver=3.27.0
pkgrel=0
pkgdesc="Various data formats for the SPDX License List"
url="https://spdx.org/"
arch="noarch"
options="!check" # no test suite
license="CC-BY-3.0"
source="license-list-data-$pkgver.tar.gz::https://github.com/spdx/license-list-data/archive/v$pkgver.tar.gz"
builddir="$srcdir/license-list-data-$pkgver"
subpackages="$pkgname-list"

_types="html json rdfa rdfnt rdfturtle rdfxml template text"

for type in $_types; do
 subpackages="$subpackages $pkgname-$type:_subpkg"
done

package() {
```

```
 mkdir -p "$pkgdir"
}

_subpkg() {
 local type=${subpkgname/$pkgname-/}
 pkgdesc="$pkgdesc ($type)"
 install_if="$pkgname=$pkgver-r$pkgrel"
 mkdir -p "$subpkgdir"/usr/share/spdx
 cp -r "$builddir"/$type "$subpkgdir"/usr/share/spdx/
}

list() {
 pkgdesc="$pkgdesc (licence list)"
 mkdir -p "$subpkgdir"/usr/share/spdx
 local i; for i in "$builddir"/text/*.txt;
 do
  local license=${i##*/}
  echo ${license%.*} >> "$subpkgdir"/usr/share/spdx/license.lst
 done
}

sha512sums="
16d59c81e331b54b52639826f83408d98144cdaa70eacc3e8ce35dc3b13992e4794cf7515eb9db200efd390a0c0e35ae9
d4706fbe0ca6a8d236189e88870720c  license-list-data-3.27.0.tar.gz
"
# Automatically generated by apkbuild-cpan, template 4
# Contributor: Valery Kartel <valery.kartel@gmail.com>
# Maintainer: Celeste <cielesti@protonmail.com>
maintainer="Celeste <cielesti@protonmail.com>"
pkgname=perl-bsd-resource
pkgver=1.2911
pkgrel=11
#_pkgreal is used by apkbuild-cpan to find modules at MetaCpan
_pkgreal=BSD-Resource
pkgdesc="Perl extension implements the BSD process resource limit functions"
url="https://metacpan.org/release/BSD-Resource/"
arch="all"
license="Artistic-2.0 OR LGPL-2.0"
depends="perl"
makedepends="perl-dev"
subpackages="$pkgname-doc"
source="https://cpan.metacpan.org/authors/id/J/JH/JHI/BSD-Resource-$pkgver.tar.gz"
builddir="$srcdir/$_pkgreal-$pkgver"

build() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 PERL_MM_USE_DEFAULT=1 perl -I. Makefile.PL \
  INSTALLDIRS=vendor \
```

```
  NO_PACKLIST=1 \
  NO_PERLLOCAL=1
 make
}

check() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 make test
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="
d0032d41c7c0468ed1c6d8f57b885f6cb97a5039d754c8cb60b2067daedaf53bd15fb6561a3d0f828df16dfa5417f663b
8065ba65f4fea16dc9262728b3b6b85
  BSD-Resource-1.2911.tar.gz
"
maintainer="Achill Gilgenast <achill@achill.org>"
pkgname=cargo-license
pkgver=0.7.0
pkgrel=1
pkgdesc="Cargo subcommand to see license of dependencies"
url="https://github.com/onur/cargo-license"
arch="all"
license="MIT"
makedepends="cargo cargo-auditable"
source="$pkgname-$pkgver.tar.gz::https://crates.io/api/v1/crates/cargo-license/$pkgver/download"

prepare() {
 default_prepare

 cargo fetch --target="$CTARGET" --locked
}

build() {
 cargo auditable build --release --frozen
}

check() {
 cargo test --frozen
}

package() {
 install -Dm755 target/release/cargo-license -t "$pkgdir"/usr/bin
}
```

```
sha512sums="
9b3f0ead35515e85ef4074ebdbdbe5b9ec8bcaec244fabe414e2ed60f90366e8b1692d8bf7ffe4c07d778e60d94bab86bc
0c8be9823232e9c360a38bc65e9c5a  cargo-license-0.7.0.tar.gz
"
#!/sbin/openrc-run

command="/usr/libexec/xdg-permission-store"
supervisor=supervise-daemon
command_args="--replace $command_args"
error_logger="logger -t '${RC_SVCNAME}' -p daemon.error"

depend() {
 need dbus
}
# Contributor: Maxim Karasev <begs@disroot.org>
# Maintainer: mio <miyopan@e.email>
pkgname=bsd-games
pkgver=3.3
pkgrel=2
pkgdesc="traditional text mode games from BSD"
url="https://bsd-games.sourceforge.io/"
arch="all"
license="BSD-3-Clause"
install="$pkgname.post-install"
makedepends="ncurses-dev coreutils" # configure causes busybox expr error
subpackages="$pkgname-doc"
source="https://sourceforge.net/projects/bsd-games/files/bsd-games-$pkgver.tar.gz
 0001-bsd-games-scores-dir.patch
 "
options="!check" # no tests

build() {
 # some GNU autoconf options are ignored, but it works
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr \
  --sysconfdir=/etc \
  --mandir=/usr/share/man \
  --scoredir=/usr/share/$pkgname
 make
}

package() {
 make DESTDIR="$pkgdir" install
 install -Dm644 LICENSE "$pkgdir"/usr/share/licenses/bsd-games/LICENSE
}
```

```
sha512sums="
aaf36d09d4fe68514a5c279063d7e77a9a9a84c447037cba974b29faa07eb80c2aab2379d0699c196b5c27ffe1b2bb2c6
8d3390143e0e62d5e3d210ccfb61294
  bsd-games-3.3.tar.gz
e1def0d4835a877242c4173fae862e278a7858738e0bacacbb045a42bcabec2aa7c72d000bbd2421ce35fe66cdc1f52c0
577b7e278029ca5ed50f7aab22319f6  0001-bsd-games-scores-dir.patch
"
```

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```
# Maintainer: Natanael Copa <ncopa@alpinelinux.org>
pkgname=libart-lgpl
pkgver=2.3.21
pkgrel=8
pkgdesc="A library for high-performance 2D graphics"
url="https://www.levien.com/libart/"
arch="all"
options="!check"  # No test suite.
license="LGPL-2.0-or-later"
subpackages="$pkgname-dev"
source="https://download.gnome.org/sources/libart_lgpl/2.3/libart_lgpl-$pkgver.tar.bz2
 "

builddir="$srcdir"/libart_lgpl-$pkgver

prepare() {
 update_config_sub
 default_prepare
}
```

```
build() {
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr
 make
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="8a632a6a4da59e5e8c02ec2f5a57e36d182b325b46513765425e5f171ff9ae326af1b133725beba28f7e7
6654309e001aee9bace727b5b4c8589405256a3c020  libart_lgpl-2.3.21.tar.bz2"
mini_sendmail - accept email on behalf of real sendmail

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LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY
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SUCH DAMAGE.
# Contributor: Patrycja Rosa <alpine@ptrcnull.me>
# Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=bsd-compat-headers
pkgver=0.7.2
pkgrel=6
pkgdesc="BSD compatibility headers (cdefs, queue, tree)"
url="https://gitlab.alpinelinux.org/alpine/aports"
```

```
arch="noarch"
license="BSD-2-Clause AND BSD-3-Clause"
source="
 cdefs.h
 queue.h
 tree.h
"
builddir="$srcdir"
options="!check" # just headers

package() {
 mkdir -p "$pkgdir"
 install -Dm644 -t "$pkgdir"/usr/include/sys \
  cdefs.h queue.h tree.h
}
sha512sums="
37c8fc73c7aea7b490f7850927e2bb91d12137c9e59e22c084146d515696dbc7973b5de92f4c987ba080dd2502ba8312
7006442c3f019b6447a620c0cae73178  cdefs.h
2f0d5e6e4dc3350285cf17009265dddcbe12431c111868eea39bc8cb038ab7c1f2acacbb21735c4e9d4a1fd106a8fc0f86
11ea33987d4faba37dde5ce6da0750  queue.h
d9ac210d81feb8ad2655bc80fb065d3fe20ae4417b32b4a1711e6738a4870140005c13373b5d1846ef3ce5ae6da45f2da
cef2092881eded0a2e94f6a07752ef3  tree.h
"
```

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bordeaux.fr) starting from an initial implementation done by C. Feuille, S. Grosbois, L. Maziere and L. Minihot as a student practice (Universite Bordeaux, France). For additional information about X-splines, see:
"X-Splines: A Spline Model Designed for the End User" by C. Blanc and C. Schlick, Proceedings of SIGGRAPH'95
http://dept-info.labri.u-bordeaux.fr/~schlick/DOC/sig1.html

```
/* $NetBSD: queue.h,v 1.70 2015/11/02 15:21:23 christos Exp $ */

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*
* @(#)queue.h 8.5 (Berkeley) 8/20/94
*/

#ifndef _SYS_QUEUE_H_
#define _SYS_QUEUE_H_

/*
* This file defines five types of data structures: singly-linked lists,
* lists, simple queues, tail queues, and circular queues.
*
* A singly-linked list is headed by a single forward pointer. The
* elements are singly linked for minimum space and
```

```
 pointer manipulation
* overhead at the expense of O(n) removal for arbitrary elements. New
* elements can be added to the list after an existing element or at the
* head of the list.  Elements being removed from the head of the list
* should use the explicit macro for this purpose for optimum
* efficiency. A singly-linked list may only be traversed in the forward
* direction.  Singly-linked lists are ideal for applications with large
* datasets and few or no removals or for implementing a LIFO queue.
*
* A list is headed by a single forward pointer (or an array of forward
* pointers for a hash table header). The elements are doubly linked
* so that an arbitrary element can be removed without a need to
* traverse the list. New elements can be added to the list before
* or after an existing element or at the head of the list. A list
* may only be traversed in the forward direction.
*
* A simple queue is headed by a pair of pointers, one the head of the
* list and the
 other to the tail of the list. The elements are singly
* linked to save space, so elements can only be removed from the
* head of the list. New elements can be added to the list after
* an existing element, at the head of the list, or at the end of the
* list. A simple queue may only be traversed in the forward direction.
*
* A tail queue is headed by a pair of pointers, one to the head of the
* list and the other to the tail of the list. The elements are doubly
* linked so that an arbitrary element can be removed without a need to
* traverse the list. New elements can be added to the list before or
* after an existing element, at the head of the list, or at the end of
* the list. A tail queue may be traversed in either direction.
*
* A circle queue is headed by a pair of pointers, one to the head of the
* list and the other to the tail of the list. The elements are doubly
* linked so that an arbitrary element can be removed without a need to
* traverse the list. New elements
 can be added to the list before or after
* an existing element, at the head of the list, or at the end of the list.
* A circle queue may be traversed in either direction, but has a more
* complex end of list detection.
*
* For details on the use of these macros, see the queue(3) manual page.
*/

/*
* Include the definition of NULL only on NetBSD because sys/null.h
* is not available elsewhere.  This conditional makes the header
* portable and it can simply be dropped verbatim into any system.
* The caveat is that on other systems some other header
```

```
* must provide NULL before the macros can be used.
*/
#ifdef __NetBSD__
#include <sys/null.h>
#endif

#if defined(QUEUEDEBUG)
# if defined(_KERNEL)
#  define QUEUEDEBUG_ABORT(...) panic(__VA_ARGS__)
# else
#  include <err.h>
#  define QUEUEDEBUG_ABORT(...) err(1, __VA_ARGS__)
# endif
#endif

/*
* Singly-linked List definitions.
*/
#define SLIST_HEAD(name, type)      \
struct name {        \
 struct type *slh_first; /* first
 element */   \
}

#define SLIST_HEAD_INITIALIZER(head)     \
 { NULL }

#define SLIST_ENTRY(type)      \
struct {        \
 struct type *sle_next; /* next element */   \
}

/*
* Singly-linked List access methods.
*/
#define SLIST_FIRST(head) ((head)->slh_first)
#define SLIST_END(head)  NULL
#define SLIST_EMPTY(head) ((head)->slh_first == NULL)
#define SLIST_NEXT(elm, field) ((elm)->field.sle_next)

#define SLIST_FOREACH(var, head, field)     \
 for((var) = (head)->slh_first;     \
     (var) != SLIST_END(head);     \
     (var) = (var)->field.sle_next)

#define SLIST_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = SLIST_FIRST((head));    \
     (var) != SLIST_END(head) &&     \
```

```
    ((tvar) = SLIST_NEXT((var), field), 1);   \
    (var) = (tvar))

/*
* Singly-linked List functions.
*/
#define SLIST_INIT(head) do {      \
 (head)->slh_first = SLIST_END(head);    \
} while (/*CONSTCOND*/0)

#define SLIST_INSERT_AFTER(slistelm, elm, field) do {   \
 (elm)->field.sle_next = (slistelm)->field.sle_next;  \
 (slistelm)->field.sle_next
 = (elm);    \
} while (/*CONSTCOND*/0)

#define SLIST_INSERT_HEAD(head, elm, field) do {   \
 (elm)->field.sle_next = (head)->slh_first;   \
 (head)->slh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE_AFTER(slistelm, field) do {   \
 (slistelm)->field.sle_next =     \
    SLIST_NEXT(SLIST_NEXT((slistelm), field), field);  \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE_HEAD(head, field) do {    \
 (head)->slh_first = (head)->slh_first->field.sle_next;  \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE(head, elm, type, field) do {   \
 if ((head)->slh_first == (elm)) {    \
  SLIST_REMOVE_HEAD((head), field);   \
 }        \
 else {        \
  struct type *curelm = (head)->slh_first;  \
  while(curelm->field.sle_next != (elm))   \
   curelm = curelm->field.sle_next;  \
  curelm->field.sle_next =    \
     curelm->field.sle_next->field.sle_next;  \
 }        \
} while (/*CONSTCOND*/0)


/*
* List definitions.
 */
#define LIST_HEAD(name, type)      \
```

```
struct name {        \
 struct type *lh_first; /* first element */   \
}

#define LIST_HEAD_INITIALIZER(head)     \
 { NULL }

#define LIST_ENTRY(type)      \
struct {        \
 struct type *le_next; /* next element */   \
 struct type **le_prev; /* address of previous next element */ \
}

/*
* List access methods.
*/
#define LIST_FIRST(head)  ((head)->lh_first)
#define LIST_END(head)   NULL
#define LIST_EMPTY(head)  ((head)->lh_first == LIST_END(head))
#define LIST_NEXT(elm, field)  ((elm)->field.le_next)

#define LIST_FOREACH(var, head, field)     \
 for ((var) = ((head)->lh_first);    \
     (var) != LIST_END(head);     \
     (var) = ((var)->field.le_next))

#define LIST_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = LIST_FIRST((head));    \
     (var) != LIST_END(head) &&     \
     ((tvar) = LIST_NEXT((var), field), 1);   \
     (var) = (tvar))

#define LIST_MOVE(head1, head2) do {     \
 LIST_INIT((head2));      \
 if (!LIST_EMPTY((head1)))
 {     \
  (head2)->lh_first = (head1)->lh_first;   \
  LIST_INIT((head1));     \
 }        \
} while (/*CONSTCOND*/0)

/*
* List functions.
*/
#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_LIST_INSERT_HEAD(head, elm, field)   \
 if ((head)->lh_first &&      \
     (head)->lh_first->field.le_prev != &(head)->lh_first) \
```

```
  QUEUEDEBUG_ABORT("LIST_INSERT_HEAD %p %s:%d", (head), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_LIST_OP(elm, field)     \
 if ((elm)->field.le_next &&     \
     (elm)->field.le_next->field.le_prev !=   \
     &(elm)->field.le_next)     \
  QUEUEDEBUG_ABORT("LIST_* forw %p %s:%d", (elm),  \
      __FILE__, __LINE__);    \
 if (*(elm)->field.le_prev != (elm))    \
  QUEUEDEBUG_ABORT("LIST_* back %p %s:%d", (elm),  \
      __FILE__, __LINE__);
#define QUEUEDEBUG_LIST_POSTREMOVE(elm, field)    \
 (elm)->field.le_next = (void *)1L;    \
 (elm)->field.le_prev = (void *)1L;
#else
#define QUEUEDEBUG_LIST_INSERT_HEAD(head, elm, field)
#define QUEUEDEBUG_LIST_OP(elm,
 field)
#define QUEUEDEBUG_LIST_POSTREMOVE(elm, field)
#endif

#define LIST_INIT(head) do {      \
 (head)->lh_first = LIST_END(head);    \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_AFTER(listelm, elm, field) do {   \
 QUEUEDEBUG_LIST_OP((listelm), field)    \
 if (((elm)->field.le_next = (listelm)->field.le_next) !=  \
     LIST_END(head))      \
  (listelm)->field.le_next->field.le_prev =  \
      &(elm)->field.le_next;    \
 (listelm)->field.le_next = (elm);    \
 (elm)->field.le_prev = &(listelm)->field.le_next;  \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_BEFORE(listelm, elm, field) do {   \
 QUEUEDEBUG_LIST_OP((listelm), field)    \
 (elm)->field.le_prev = (listelm)->field.le_prev;  \
 (elm)->field.le_next = (listelm);    \
 *(listelm)->field.le_prev = (elm);    \
 (listelm)->field.le_prev = &(elm)->field.le_next;  \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_HEAD(head, elm, field) do {    \
 QUEUEDEBUG_LIST_INSERT_HEAD((head), (elm), field)  \
 if (((elm)->field.le_next
 = (head)->lh_first) != LIST_END(head))\
  (head)->lh_first->field.le_prev = &(elm)->field.le_next;\
```

```
 (head)->lh_first = (elm);     \
 (elm)->field.le_prev = &(head)->lh_first;   \
} while (/*CONSTCOND*/0)

#define LIST_REMOVE(elm, field) do {     \
 QUEUEDEBUG_LIST_OP((elm), field)    \
 if ((elm)->field.le_next != NULL)    \
  (elm)->field.le_next->field.le_prev =    \
      (elm)->field.le_prev;    \
 *(elm)->field.le_prev = (elm)->field.le_next;   \
 QUEUEDEBUG_LIST_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

#define LIST_REPLACE(elm, elm2, field) do {    \
 if (((elm2)->field.le_next = (elm)->field.le_next) != NULL) \
  (elm2)->field.le_next->field.le_prev =   \
      &(elm2)->field.le_next;    \
 (elm2)->field.le_prev = (elm)->field.le_prev;   \
 *(elm2)->field.le_prev = (elm2);    \
 QUEUEDEBUG_LIST_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

/*
* Simple queue definitions.
*/
#define SIMPLEQ_HEAD(name, type)     \
struct name {        \
 struct
 type *sqh_first; /* first element */   \
 struct type **sqh_last; /* addr of last next element */  \
}

#define SIMPLEQ_HEAD_INITIALIZER(head)     \
 { NULL, &(head).sqh_first }

#define SIMPLEQ_ENTRY(type)      \
struct {        \
 struct type *sqe_next; /* next element */   \
}

/*
* Simple queue access methods.
*/
#define SIMPLEQ_FIRST(head)  ((head)->sqh_first)
#define SIMPLEQ_END(head)  NULL
#define SIMPLEQ_EMPTY(head)  ((head)->sqh_first == SIMPLEQ_END(head))
#define SIMPLEQ_NEXT(elm, field) ((elm)->field.sqe_next)
```

```
#define SIMPLEQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->sqh_first);    \
     (var) != SIMPLEQ_END(head);     \
     (var) = ((var)->field.sqe_next))

#define SIMPLEQ_FOREACH_SAFE(var, head, field, next)   \
 for ((var) = ((head)->sqh_first);    \
     (var) != SIMPLEQ_END(head) &&    \
     ((next = ((var)->field.sqe_next)), 1);   \
     (var) = (next))

/*
* Simple queue functions.
*/
#define SIMPLEQ_INIT(head) do {      \
 (head)->sqh_first = NULL;     \
 (head)->sqh_last
 = &(head)->sqh_first;    \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_HEAD(head, elm, field) do {   \
 if (((elm)->field.sqe_next = (head)->sqh_first) == NULL) \
  (head)->sqh_last = &(elm)->field.sqe_next;  \
 (head)->sqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_TAIL(head, elm, field) do {   \
 (elm)->field.sqe_next = NULL;     \
 *(head)->sqh_last = (elm);     \
 (head)->sqh_last = &(elm)->field.sqe_next;   \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 if (((elm)->field.sqe_next = (listelm)->field.sqe_next) == NULL)\
  (head)->sqh_last = &(elm)->field.sqe_next;  \
 (listelm)->field.sqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE_HEAD(head, field) do {    \
 if (((head)->sqh_first = (head)->sqh_first->field.sqe_next) == NULL) \
  (head)->sqh_last = &(head)->sqh_first;   \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE_AFTER(head, elm, field) do {   \
 if
 (((elm)->field.sqe_next = (elm)->field.sqe_next->field.sqe_next) \
     == NULL)       \
  (head)->sqh_last = &(elm)->field.sqe_next;  \
```

```
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE(head, elm, type, field) do {   \
 if ((head)->sqh_first == (elm)) {    \
  SIMPLEQ_REMOVE_HEAD((head), field);   \
 } else {       \
  struct type *curelm = (head)->sqh_first;  \
  while (curelm->field.sqe_next != (elm))   \
   curelm = curelm->field.sqe_next;  \
  if ((curelm->field.sqe_next =    \
   curelm->field.sqe_next->field.sqe_next) == NULL) \
       (head)->sqh_last = &(curelm)->field.sqe_next; \
 }        \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_CONCAT(head1, head2) do {    \
 if (!SIMPLEQ_EMPTY((head2))) {     \
  *(head1)->sqh_last = (head2)->sqh_first;  \
  (head1)->sqh_last = (head2)->sqh_last;  \
  SIMPLEQ_INIT((head2));     \
 }        \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_LAST(head, type, field)     \
 (SIMPLEQ_EMPTY((head)) ?      \
  NULL :       \
        ((struct type
 *)(void *)    \
  ((char *)((head)->sqh_last) - offsetof(struct type, field))))

/*
* Tail queue definitions.
*/
#define _TAILQ_HEAD(name, type, qual)     \
struct name {        \
 qual type *tqh_first;  /* first element */  \
 qual type *qual *tqh_last; /* addr of last next element */ \
}
#define TAILQ_HEAD(name, type) _TAILQ_HEAD(name, struct type,)

#define TAILQ_HEAD_INITIALIZER(head)     \
 { TAILQ_END(head), &(head).tqh_first }

#define _TAILQ_ENTRY(type, qual)     \
struct {        \
 qual type *tqe_next;  /* next element */  \
 qual type *qual *tqe_prev; /* address of previous next element */\
}
```

```
#define TAILQ_ENTRY(type) _TAILQ_ENTRY(struct type,)

/*
* Tail queue access methods.
*/
#define TAILQ_FIRST(head)  ((head)->tqh_first)
#define TAILQ_END(head)   (NULL)
#define TAILQ_NEXT(elm, field)  ((elm)->field.tqe_next)
#define TAILQ_LAST(head, headname) \
 (*(((struct headname *)(void *)((head)->tqh_last))->tqh_last))
#define TAILQ_PREV(elm, headname, field) \
 (*(((struct headname
 *)(void *)((elm)->field.tqe_prev))->tqh_last))
#define TAILQ_EMPTY(head)  (TAILQ_FIRST(head) == TAILQ_END(head))


#define TAILQ_FOREACH(var, head, field)     \
 for ((var) = ((head)->tqh_first);    \
     (var) != TAILQ_END(head);     \
     (var) = ((var)->field.tqe_next))

#define TAILQ_FOREACH_SAFE(var, head, field, next)   \
 for ((var) = ((head)->tqh_first);    \
     (var) != TAILQ_END(head) &&     \
     ((next) = TAILQ_NEXT(var, field), 1); (var) = (next))

#define TAILQ_FOREACH_REVERSE(var, head, headname, field)  \
 for ((var) = TAILQ_LAST((head), headname);   \
     (var) != TAILQ_END(head);     \
     (var) = TAILQ_PREV((var), headname, field))

#define TAILQ_FOREACH_REVERSE_SAFE(var, head, headname, field, prev) \
 for ((var) = TAILQ_LAST((head), headname);   \
     (var) != TAILQ_END(head) &&     \
     ((prev) = TAILQ_PREV((var), headname, field), 1); (var) = (prev))

/*
* Tail queue functions.
*/
#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_TAILQ_INSERT_HEAD(head,
 elm, field)   \
 if ((head)->tqh_first &&     \
     (head)->tqh_first->field.tqe_prev != &(head)->tqh_first) \
  QUEUEDEBUG_ABORT("TAILQ_INSERT_HEAD %p %s:%d", (head), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_INSERT_TAIL(head, elm, field)   \
 if (*(head)->tqh_last != NULL)     \
```

```
  QUEUEDEBUG_ABORT("TAILQ_INSERT_TAIL %p %s:%d", (head), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_OP(elm, field)     \
 if ((elm)->field.tqe_next &&     \
     (elm)->field.tqe_next->field.tqe_prev !=   \
     &(elm)->field.tqe_next)     \
  QUEUEDEBUG_ABORT("TAILQ_* forw %p %s:%d", (elm), \
      __FILE__, __LINE__);    \
 if (*(elm)->field.tqe_prev != (elm))    \
  QUEUEDEBUG_ABORT("TAILQ_* back %p %s:%d", (elm), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_PREREMOVE(head, elm, field)   \
 if ((elm)->field.tqe_next == NULL &&    \
     (head)->tqh_last != &(elm)->field.tqe_next)   \
  QUEUEDEBUG_ABORT("TAILQ_PREREMOVE head %p elm %p %s:%d",\
      (head), (elm), __FILE__,
 __LINE__);
#define QUEUEDEBUG_TAILQ_POSTREMOVE(elm, field)    \
 (elm)->field.tqe_next = (void *)1L;    \
 (elm)->field.tqe_prev = (void *)1L;
#else
#define QUEUEDEBUG_TAILQ_INSERT_HEAD(head, elm, field)
#define QUEUEDEBUG_TAILQ_INSERT_TAIL(head, elm, field)
#define QUEUEDEBUG_TAILQ_OP(elm, field)
#define QUEUEDEBUG_TAILQ_PREREMOVE(head, elm, field)
#define QUEUEDEBUG_TAILQ_POSTREMOVE(elm, field)
#endif

#define TAILQ_INIT(head) do {      \
 (head)->tqh_first = TAILQ_END(head);    \
 (head)->tqh_last = &(head)->tqh_first;    \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_HEAD(head, elm, field) do {   \
 QUEUEDEBUG_TAILQ_INSERT_HEAD((head), (elm), field)  \
 if (((elm)->field.tqe_next = (head)->tqh_first) != TAILQ_END(head))\
  (head)->tqh_first->field.tqe_prev =   \
      &(elm)->field.tqe_next;    \
 else       \
  (head)->tqh_last = &(elm)->field.tqe_next;  \
 (head)->tqh_first = (elm);     \
 (elm)->field.tqe_prev = &(head)->tqh_first;   \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_TAIL(head,
 elm, field) do {   \
 QUEUEDEBUG_TAILQ_INSERT_TAIL((head), (elm), field)  \
 (elm)->field.tqe_next = TAILQ_END(head);   \
```

```
 (elm)->field.tqe_prev = (head)->tqh_last;   \
 *(head)->tqh_last = (elm);     \
 (head)->tqh_last = &(elm)->field.tqe_next;   \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 QUEUEDEBUG_TAILQ_OP((listelm), field)    \
 if (((elm)->field.tqe_next = (listelm)->field.tqe_next) !=  \
     TAILQ_END(head))      \
  (elm)->field.tqe_next->field.tqe_prev =   \
      &(elm)->field.tqe_next;    \
 else       \
  (head)->tqh_last = &(elm)->field.tqe_next;  \
 (listelm)->field.tqe_next = (elm);    \
 (elm)->field.tqe_prev = &(listelm)->field.tqe_next;  \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_BEFORE(listelm, elm, field) do {   \
 QUEUEDEBUG_TAILQ_OP((listelm), field)    \
 (elm)->field.tqe_prev = (listelm)->field.tqe_prev;  \
 (elm)->field.tqe_next = (listelm);    \
 *(listelm)->field.tqe_prev = (elm);    \
 (listelm)->field.tqe_prev
 = &(elm)->field.tqe_next;  \
} while (/*CONSTCOND*/0)

#define TAILQ_REMOVE(head, elm, field) do {    \
 QUEUEDEBUG_TAILQ_PREREMOVE((head), (elm), field)  \
 QUEUEDEBUG_TAILQ_OP((elm), field)    \
 if (((elm)->field.tqe_next) != TAILQ_END(head))   \
  (elm)->field.tqe_next->field.tqe_prev =   \
      (elm)->field.tqe_prev;    \
 else       \
  (head)->tqh_last = (elm)->field.tqe_prev;  \
 *(elm)->field.tqe_prev = (elm)->field.tqe_next;   \
 QUEUEDEBUG_TAILQ_POSTREMOVE((elm), field);   \
} while (/*CONSTCOND*/0)

#define TAILQ_REPLACE(head, elm, elm2, field) do {   \
       if (((elm2)->field.tqe_next = (elm)->field.tqe_next) !=  \
     TAILQ_END(head))        \
              (elm2)->field.tqe_next->field.tqe_prev =  \
                 &(elm2)->field.tqe_next;    \
       else       \
              (head)->tqh_last = &(elm2)->field.tqe_next;  \
       (elm2)->field.tqe_prev = (elm)->field.tqe_prev;   \
       *(elm2)->field.tqe_prev = (elm2);    \
 QUEUEDEBUG_TAILQ_POSTREMOVE((elm),
```

```
 field);   \
} while (/*CONSTCOND*/0)

#define TAILQ_CONCAT(head1, head2, field) do {    \
 if (!TAILQ_EMPTY(head2)) {     \
  *(head1)->tqh_last = (head2)->tqh_first;  \
  (head2)->tqh_first->field.tqe_prev = (head1)->tqh_last; \
  (head1)->tqh_last = (head2)->tqh_last;   \
  TAILQ_INIT((head2));     \
 }        \
} while (/*CONSTCOND*/0)

/*
* Singly-linked Tail queue declarations.
*/
#define STAILQ_HEAD(name, type)      \
struct name {        \
 struct type *stqh_first; /* first element */  \
 struct type **stqh_last; /* addr of last next element */ \
}

#define STAILQ_HEAD_INITIALIZER(head)     \
 { NULL, &(head).stqh_first }

#define STAILQ_ENTRY(type)      \
struct {        \
 struct type *stqe_next; /* next element */   \
}

/*
* Singly-linked Tail queue access methods.
*/
#define STAILQ_FIRST(head) ((head)->stqh_first)
#define STAILQ_END(head) NULL
#define STAILQ_NEXT(elm, field) ((elm)->field.stqe_next)
#define STAILQ_EMPTY(head) (STAILQ_FIRST(head)
 == STAILQ_END(head))

/*
* Singly-linked Tail queue functions.
*/
#define STAILQ_INIT(head) do {      \
 (head)->stqh_first = NULL;     \
 (head)->stqh_last = &(head)->stqh_first;    \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_HEAD(head, elm, field) do {   \
 if (((elm)->field.stqe_next = (head)->stqh_first) == NULL) \
```

```
  (head)->stqh_last = &(elm)->field.stqe_next;  \
 (head)->stqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_TAIL(head, elm, field) do {   \
 (elm)->field.stqe_next = NULL;     \
 *(head)->stqh_last = (elm);     \
 (head)->stqh_last = &(elm)->field.stqe_next;   \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 if (((elm)->field.stqe_next = (listelm)->field.stqe_next) == NULL)\
  (head)->stqh_last = &(elm)->field.stqe_next;  \
 (listelm)->field.stqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define STAILQ_REMOVE_HEAD(head, field) do {    \
 if (((head)->stqh_first = (head)->stqh_first->field.stqe_next)
 == NULL) \
  (head)->stqh_last = &(head)->stqh_first;   \
} while (/*CONSTCOND*/0)

#define STAILQ_REMOVE(head, elm, type, field) do {   \
 if ((head)->stqh_first == (elm)) {    \
  STAILQ_REMOVE_HEAD((head), field);   \
 } else {       \
  struct type *curelm = (head)->stqh_first;  \
  while (curelm->field.stqe_next != (elm))   \
   curelm = curelm->field.stqe_next;  \
  if ((curelm->field.stqe_next =    \
   curelm->field.stqe_next->field.stqe_next) == NULL) \
       (head)->stqh_last = &(curelm)->field.stqe_next; \
 }        \
} while (/*CONSTCOND*/0)

#define STAILQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->stqh_first);    \
  (var);       \
  (var) = ((var)->field.stqe_next))

#define STAILQ_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = STAILQ_FIRST((head));    \
     (var) && ((tvar) = STAILQ_NEXT((var), field), 1);  \
     (var) = (tvar))

#define STAILQ_CONCAT(head1, head2) do {    \
 if (!STAILQ_EMPTY((head2))) {     \
  *(head1)->stqh_last
```

```
 = (head2)->stqh_first;  \
  (head1)->stqh_last = (head2)->stqh_last;  \
  STAILQ_INIT((head2));     \
 }        \
} while (/*CONSTCOND*/0)

#define STAILQ_LAST(head, type, field)     \
 (STAILQ_EMPTY((head)) ?      \
  NULL :       \
        ((struct type *)(void *)    \
  ((char *)((head)->stqh_last) - offsetof(struct type, field))))


#ifndef _KERNEL
/*
* Circular queue definitions. Do not use. We still keep the macros
* for compatibility but because of pointer aliasing issues their use
* is discouraged!
*/

/*
* __launder_type():  We use this ugly hack to work around the the compiler
* noticing that two types may not alias each other and elide tests in code.
* We hit this in the CIRCLEQ macros when comparing 'struct name *' and
* 'struct type *' (see CIRCLEQ_HEAD()).  Modern compilers (such as GCC
* 4.8) declare these comparisons as always false, causing the code to
* not run as designed.
*
* This hack is only to be used for comparisons and thus can be fully const.
 * Do not use for assignment.
*
* If we ever choose to change the ABI of the CIRCLEQ macros, we could fix
* this by changing the head/tail sentinal values, but see the note above
* this one.
*/
static __inline const void * __launder_type(const void *);
static __inline const void *
__launder_type(const void *__x)
{
 __asm __volatile("" : "+r" (__x));
 return __x;
}

#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_CIRCLEQ_HEAD(head, field)    \
 if ((head)->cqh_first != CIRCLEQ_ENDC(head) &&   \
     (head)->cqh_first->field.cqe_prev != CIRCLEQ_ENDC(head)) \
  QUEUEDEBUG_ABORT("CIRCLEQ head forw %p %s:%d", (head), \
```

```
        __FILE__, __LINE__);    \
 if ((head)->cqh_last != CIRCLEQ_ENDC(head) &&   \
     (head)->cqh_last->field.cqe_next != CIRCLEQ_ENDC(head)) \
  QUEUEDEBUG_ABORT("CIRCLEQ head back %p %s:%d", (head), \
        __FILE__, __LINE__);
#define QUEUEDEBUG_CIRCLEQ_ELM(head, elm, field)   \
 if ((elm)->field.cqe_next == CIRCLEQ_ENDC(head)) {  \
  if ((head)->cqh_last != (elm))    \
   QUEUEDEBUG_ABORT("CIRCLEQ
 elm last %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 } else {       \
  if ((elm)->field.cqe_next->field.cqe_prev != (elm)) \
   QUEUEDEBUG_ABORT("CIRCLEQ elm forw %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 }       \
 if ((elm)->field.cqe_prev == CIRCLEQ_ENDC(head)) {  \
  if ((head)->cqh_first != (elm))    \
   QUEUEDEBUG_ABORT("CIRCLEQ elm first %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 } else {       \
  if ((elm)->field.cqe_prev->field.cqe_next != (elm)) \
   QUEUEDEBUG_ABORT("CIRCLEQ elm prev %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 }
#define QUEUEDEBUG_CIRCLEQ_POSTREMOVE(elm, field)   \
 (elm)->field.cqe_next = (void *)1L;    \
 (elm)->field.cqe_prev = (void *)1L;
#else
#define QUEUEDEBUG_CIRCLEQ_HEAD(head, field)
#define QUEUEDEBUG_CIRCLEQ_ELM(head, elm, field)
#define QUEUEDEBUG_CIRCLEQ_POSTREMOVE(elm, field)
#endif

#define CIRCLEQ_HEAD(name, type)     \
struct name {        \
 struct type *cqh_first;  /*
 first element */  \
 struct type *cqh_last;  /* last element */  \
}

#define CIRCLEQ_HEAD_INITIALIZER(head)     \
 { CIRCLEQ_END(&head), CIRCLEQ_END(&head) }

#define CIRCLEQ_ENTRY(type)      \
struct {        \
 struct type *cqe_next;  /* next element */  \
 struct type *cqe_prev;  /* previous element */  \
```

```
}

/*
* Circular queue functions.
*/
#define CIRCLEQ_INIT(head) do {      \
 (head)->cqh_first = CIRCLEQ_END(head);    \
 (head)->cqh_last = CIRCLEQ_END(head);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (listelm), field)  \
 (elm)->field.cqe_next = (listelm)->field.cqe_next;  \
 (elm)->field.cqe_prev = (listelm);    \
 if ((listelm)->field.cqe_next == CIRCLEQ_ENDC(head))  \
  (head)->cqh_last = (elm);    \
 else       \
  (listelm)->field.cqe_next->field.cqe_prev = (elm); \
 (listelm)->field.cqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_BEFORE(head,
 listelm, elm, field) do {  \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (listelm), field)  \
 (elm)->field.cqe_next = (listelm);    \
 (elm)->field.cqe_prev = (listelm)->field.cqe_prev;  \
 if ((listelm)->field.cqe_prev == CIRCLEQ_ENDC(head))  \
  (head)->cqh_first = (elm);    \
 else       \
  (listelm)->field.cqe_prev->field.cqe_next = (elm); \
 (listelm)->field.cqe_prev = (elm);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_HEAD(head, elm, field) do {   \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 (elm)->field.cqe_next = (head)->cqh_first;   \
 (elm)->field.cqe_prev = CIRCLEQ_END(head);   \
 if ((head)->cqh_last == CIRCLEQ_ENDC(head))   \
  (head)->cqh_last = (elm);    \
 else       \
  (head)->cqh_first->field.cqe_prev = (elm);  \
 (head)->cqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_TAIL(head, elm, field) do {   \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
```

```
 (elm)->field.cqe_next
 = CIRCLEQ_END(head);   \
 (elm)->field.cqe_prev = (head)->cqh_last;   \
 if ((head)->cqh_first == CIRCLEQ_ENDC(head))   \
  (head)->cqh_first = (elm);    \
 else       \
  (head)->cqh_last->field.cqe_next = (elm);  \
 (head)->cqh_last = (elm);     \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_REMOVE(head, elm, field) do {    \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (elm), field)   \
 if ((elm)->field.cqe_next == CIRCLEQ_ENDC(head))  \
  (head)->cqh_last = (elm)->field.cqe_prev;  \
 else       \
  (elm)->field.cqe_next->field.cqe_prev =   \
      (elm)->field.cqe_prev;    \
 if ((elm)->field.cqe_prev == CIRCLEQ_ENDC(head))  \
  (head)->cqh_first = (elm)->field.cqe_next;  \
 else       \
  (elm)->field.cqe_prev->field.cqe_next =   \
      (elm)->field.cqe_next;    \
 QUEUEDEBUG_CIRCLEQ_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->cqh_first);    \
  (var) != CIRCLEQ_ENDC(head);    \
  (var)
 = ((var)->field.cqe_next))

#define CIRCLEQ_FOREACH_REVERSE(var, head, field)   \
 for ((var) = ((head)->cqh_last);    \
  (var) != CIRCLEQ_ENDC(head);    \
  (var) = ((var)->field.cqe_prev))

/*
* Circular queue access methods.
*/
#define CIRCLEQ_FIRST(head)  ((head)->cqh_first)
#define CIRCLEQ_LAST(head)  ((head)->cqh_last)
/* For comparisons */
#define CIRCLEQ_ENDC(head)  (__launder_type(head))
/* For assignments */
#define CIRCLEQ_END(head)  ((void *)(head))
#define CIRCLEQ_NEXT(elm, field) ((elm)->field.cqe_next)
#define CIRCLEQ_PREV(elm, field) ((elm)->field.cqe_prev)
```

```
#define CIRCLEQ_EMPTY(head)      \
   (CIRCLEQ_FIRST(head) == CIRCLEQ_ENDC(head))

#define CIRCLEQ_LOOP_NEXT(head, elm, field)    \
 (((elm)->field.cqe_next == CIRCLEQ_ENDC(head))   \
     ? ((head)->cqh_first)     \
     : (elm->field.cqe_next))
#define CIRCLEQ_LOOP_PREV(head, elm, field)    \
 (((elm)->field.cqe_prev == CIRCLEQ_ENDC(head))   \
     ? ((head)->cqh_last)     \
     :
 (elm->field.cqe_prev))
#endif /* !_KERNEL */

#endif /* !_SYS_QUEUE_H_ */
#ifndef _SYS_CDEFS_H_
#define _SYS_CDEFS_H_

#warning usage of non-standard #include <sys/cdefs.h> is deprecated

#undef __P
#undef __PMT

#define __P(args) args
#define __PMT(args) args

#define __CONCAT(x,y) x ## y
#define __STRING(x) #x

#ifdef  __cplusplus
# define __BEGIN_DECLS extern "C" {
# define __END_DECLS }
#else
# define __BEGIN_DECLS
# define __END_DECLS
#endif

#if defined(__GNUC__) && !defined(__cplusplus)
# define __THROW __attribute__ ((__nothrow__))
# define __NTH(fct) __attribute__ ((__nothrow__)) fct
#else
# define __THROW
# define __NTH(fct)     fct
#endif

#endif /* _SYS_CDEFS_H_ */
# Contributor: Fabian Affolter <fabian@affolter-engineering.ch>
# Maintainer: Fabian Affolter <fabian@affolter-engineering.ch>
```

```
pkgname=py3-flake8-copyright
_pkgname=flake8-copyright
pkgver=0.2.4
pkgrel=3
pkgdesc="Extension for flake8 which checks for copyrights"
options="!check" # No testsuite
url="https://github.com/savoirfairelinux/flake8-copyright"
arch="noarch"
license="MIT"
depends="py3-flake8 py3-setuptools"
makedepends="py3-gpep517 py3-wheel"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/${_pkgname:0:1}/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir"/$_pkgname-$pkgver

replaces="py-flake8-copyright"                # Backwards compatibility
provides="py-flake8-copyright=$pkgver-r$pkgrel" # Backwards compatibility

build() {
 gpep517 build-wheel \
  --wheel-dir .dist \
  --output-fd 3 3>&1 >&2
}

package() {
 gpep517 install-wheel --destdir "$pkgdir" \
  .dist/*.whl
}

sha512sums="
a6ab47e1bb715618f075c51f398e18180404871b3b0faf1c2d30701d5203db6bc23771bf22ffb5bafcd8ee856b9b64237
b316bd503ae7dceed6ca284ccd5a74d
  flake8-copyright-0.2.4.tar.gz
"
```

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/* $NetBSD: tree.h,v 1.20 2013/09/14 13:20:45 joerg Exp $ */
/* $OpenBSD: tree.h,v 1.13 2011/07/09 00:19:45 pirofti Exp $ */
/* Modified by Void Linux. */
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*/

#ifndef _SYS_TREE_H_
#define _SYS_TREE_H_

#ifdef __GNUC__
#define __GNUC_PREREQ__(x, y)      \
 ((__GNUC__ == (x) && __GNUC_MINOR__ >= (y)) ||   \
  (__GNUC__ > (x)))
#else
#define __GNUC_PREREQ__(x, y) 0
#endif
```

```
#if __GNUC_PREREQ__(2, 7) || defined(__lint__)
#define _sys_tree_h_unused __attribute__((__unused__))
#else
#define _sys_tree_h_unused /* delete */
#endif

/*
* This file defines data structures for different types of trees:
* splay trees and red-black trees.
*
* A splay tree is a self-organizing
 data structure.  Every operation
* on the tree causes a splay to happen.  The splay moves the requested
* node to the root of the tree and partly rebalances it.
*
* This has the benefit that request locality causes faster lookups as
* the requested nodes move to the top of the tree.  On the other hand,
* every lookup causes memory writes.
*
* The Balance Theorem bounds the total access time for m operations
* and n inserts on an initially empty tree as O((m + n)lg n).  The
* amortized cost for a sequence of m accesses to a splay tree is O(lg n);
*
* A red-black tree is a binary search tree with the node color as an
* extra attribute.  It fulfills a set of conditions:
* - every search path from the root to a leaf consists of the
*   same number of black nodes,
* - each red node (except for the root) has a black parent,
* - each leaf node is black.
*
* Every operation on a red-black tree is bounded as O(lg n).
* The maximum height of a red-black tree is 2lg (n+1).
 */

#define SPLAY_HEAD(name, type)      \
struct name {       \
 struct type *sph_root; /* root of the tree */   \
}

#define SPLAY_INITIALIZER(root)      \
 { NULL }

#define SPLAY_INIT(root) do {      \
 (root)->sph_root = NULL;     \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ENTRY(type)      \
```

```
struct {        \
 struct type *spe_left; /* left element */   \
 struct type *spe_right; /* right element */   \
}

#define SPLAY_LEFT(elm, field)  (elm)->field.spe_left
#define SPLAY_RIGHT(elm, field)  (elm)->field.spe_right
#define SPLAY_ROOT(head)  (head)->sph_root
#define SPLAY_EMPTY(head)  (SPLAY_ROOT(head) == NULL)

/* SPLAY_ROTATE_{LEFT,RIGHT} expect that tmp hold SPLAY_{RIGHT,LEFT} */
#define SPLAY_ROTATE_RIGHT(head, tmp, field) do {   \
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(tmp, field); \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;      \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ROTATE_LEFT(head, tmp, field) do {   \
 SPLAY_RIGHT((head)->sph_root,
 field) = SPLAY_LEFT(tmp, field); \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;      \
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKLEFT(head, tmp, field) do {    \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;      \
 (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);  \
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKRIGHT(head, tmp, field) do {    \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;      \
 (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field); \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ASSEMBLE(head, node, left, right, field) do {  \
 SPLAY_RIGHT(left, field) = SPLAY_LEFT((head)->sph_root, field); \
 SPLAY_LEFT(right, field) = SPLAY_RIGHT((head)->sph_root, field);\
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(node, field); \
 SPLAY_RIGHT((head)->sph_root, field) = SPLAY_LEFT(node, field); \
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */

#define
 SPLAY_PROTOTYPE(name, type, field, cmp)    \
void name##_SPLAY(struct name *, struct type *);   \
```

```
void name##_SPLAY_MINMAX(struct name *, int);    \
struct type *name##_SPLAY_INSERT(struct name *, struct type *);  \
struct type *name##_SPLAY_REMOVE(struct name *, struct type *);  \
        \
/* Finds the node with the same key as elm */    \
static __inline struct type *      \
name##_SPLAY_FIND(struct name *head, struct type *elm)   \
{        \
 if (SPLAY_EMPTY(head))      \
  return(NULL);      \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0)    \
  return (head->sph_root);    \
 return (NULL);       \
}        \
        \
static __inline _sys_tree_h_unused struct type *   \
name##_SPLAY_NEXT(struct name *head, struct type *elm)   \
{        \
 name##_SPLAY(head, elm);     \
 if (SPLAY_RIGHT(elm, field) != NULL) {    \
  elm = SPLAY_RIGHT(elm, field);    \
  while (SPLAY_LEFT(elm, field) != NULL) {  \
   elm = SPLAY_LEFT(elm, field);   \
  }       \
 }
 else       \
  elm = NULL;      \
 return (elm);       \
}        \
        \
static _sys_tree_h_unused __inline struct type *   \
name##_SPLAY_MIN_MAX(struct name *head, int val)   \
{        \
 name##_SPLAY_MINMAX(head, val);     \
      return (SPLAY_ROOT(head));     \
}

/* Main splay operation.
* Moves node close to the key of elm to top
*/
#define SPLAY_GENERATE(name, type, field, cmp)    \
struct type *        \
name##_SPLAY_INSERT(struct name *head, struct type *elm)  \
{        \
   if (SPLAY_EMPTY(head)) {      \
     SPLAY_LEFT(elm, field) = SPLAY_RIGHT(elm, field) = NULL; \
   } else {        \
```

```
    int __comp;       \
    name##_SPLAY(head, elm);     \
    __comp = (cmp)(elm, (head)->sph_root);   \
    if(__comp < 0) {      \
     SPLAY_LEFT(elm, field) = SPLAY_LEFT((head)->sph_root, field);\
     SPLAY_RIGHT(elm, field) = (head)->sph_root;  \
     SPLAY_LEFT((head)->sph_root, field) = NULL;  \
    } else if (__comp > 0) {     \
     SPLAY_RIGHT(elm,
 field) = SPLAY_RIGHT((head)->sph_root, field);\
     SPLAY_LEFT(elm, field) = (head)->sph_root;  \
     SPLAY_RIGHT((head)->sph_root, field) = NULL; \
    } else       \
     return ((head)->sph_root);    \
   }         \
   (head)->sph_root = (elm);      \
   return (NULL);       \
}         \
         \
struct type *        \
name##_SPLAY_REMOVE(struct name *head, struct type *elm)  \
{         \
 struct type *__tmp;      \
 if (SPLAY_EMPTY(head))      \
  return (NULL);      \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0) {   \
  if (SPLAY_LEFT((head)->sph_root, field) == NULL) { \
   (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field);\
  } else {      \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);\
   name##_SPLAY(head, elm);   \
   SPLAY_RIGHT((head)->sph_root, field) = __tmp; \
  }       \
  return (elm);      \
 }        \
 return (NULL);       \
}         \
         \
void         \
name##_SPLAY(struct
 name *head, struct type *elm)   \
{         \
 struct type __node, *__left, *__right, *__tmp;   \
 int __comp;       \
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
```

```
 __left = __right = &__node;     \
\
 while ((__comp = (cmp)(elm, (head)->sph_root)) != 0) {  \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if ((cmp)(elm, __tmp) < 0){   \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKLEFT(head, __right, field);  \
  } else if (__comp > 0) {    \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if ((cmp)(elm, __tmp) > 0){   \
    SPLAY_ROTATE_LEFT(head, __tmp, field); \
    if (SPLAY_RIGHT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKRIGHT(head, __left, field);  \
  }       \
 }        \
 SPLAY_ASSEMBLE(head,
 &__node, __left, __right, field);  \
}         \
         \
/* Splay with either the minimum or the maximum element   \
* Used to find minimum or maximum element in tree.   \
*/         \
void name##_SPLAY_MINMAX(struct name *head, int __comp) \
{         \
 struct type __node, *__left, *__right, *__tmp;   \
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
 __left = __right = &__node;     \
\
 while (1) {       \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if (__comp < 0){    \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
```

```
  }      \
  SPLAY_LINKLEFT(head, __right, field);  \
 } else if (__comp > 0) {    \
  __tmp = SPLAY_RIGHT((head)->sph_root, field); \
  if (__tmp == NULL)    \
   break;     \
  if (__comp > 0) {    \
   SPLAY_ROTATE_LEFT(head, __tmp, field); \
   if (SPLAY_RIGHT((head)->sph_root,
field) == NULL)\
    break;    \
  }      \
  SPLAY_LINKRIGHT(head, __left, field);  \
 }       \
}       \
SPLAY_ASSEMBLE(head, &__node, __left, __right, field);  \
}

#define SPLAY_NEGINF -1
#define SPLAY_INF 1

#define SPLAY_INSERT(name, x, y) name##_SPLAY_INSERT(x, y)
#define SPLAY_REMOVE(name, x, y) name##_SPLAY_REMOVE(x, y)
#define SPLAY_FIND(name, x, y)  name##_SPLAY_FIND(x, y)
#define SPLAY_NEXT(name, x, y)  name##_SPLAY_NEXT(x, y)
#define SPLAY_MIN(name, x)  (SPLAY_EMPTY(x) ? NULL \
    : name##_SPLAY_MIN_MAX(x, SPLAY_NEGINF))
#define SPLAY_MAX(name, x)  (SPLAY_EMPTY(x) ? NULL \
    : name##_SPLAY_MIN_MAX(x, SPLAY_INF))

#define SPLAY_FOREACH(x, name, head)     \
 for ((x) = SPLAY_MIN(name, head);    \
     (x) != NULL;      \
     (x) = SPLAY_NEXT(name, head, x))

/* Macros that define a red-black tree */
#define RB_HEAD(name, type)      \
struct name {        \
 struct type *rbh_root; /* root of the tree */   \
}

#define RB_INITIALIZER(root)      \
 {
 NULL }

#define RB_INIT(root) do {      \
 (root)->rbh_root = NULL;     \
} while (/*CONSTCOND*/ 0)
```

```
#define RB_BLACK 0
#define RB_RED  1
#define RB_ENTRY(type)       \
struct {        \
 struct type *rbe_left;  /* left element */  \
 struct type *rbe_right;  /* right element */  \
 struct type *rbe_parent; /* parent element */  \
 int rbe_color;   /* node color */  \
}

#define RB_LEFT(elm, field)  (elm)->field.rbe_left
#define RB_RIGHT(elm, field)  (elm)->field.rbe_right
#define RB_PARENT(elm, field)  (elm)->field.rbe_parent
#define RB_COLOR(elm, field)  (elm)->field.rbe_color
#define RB_ROOT(head)   (head)->rbh_root
#define RB_EMPTY(head)   (RB_ROOT(head) == NULL)

#define RB_SET(elm, parent, field) do {     \
 RB_PARENT(elm, field) = parent;     \
 RB_LEFT(elm, field) = RB_RIGHT(elm, field) = NULL;  \
 RB_COLOR(elm, field) = RB_RED;     \
} while (/*CONSTCOND*/ 0)

#define RB_SET_BLACKRED(black, red, field) do {    \
 RB_COLOR(black, field) = RB_BLACK;    \
 RB_COLOR(red, field)
 = RB_RED;     \
} while (/*CONSTCOND*/ 0)

#ifndef RB_AUGMENT
#define RB_AUGMENT(x) do {} while (/*CONSTCOND*/ 0)
#endif

#define RB_ROTATE_LEFT(head, elm, tmp, field) do {   \
 (tmp) = RB_RIGHT(elm, field);     \
 if ((RB_RIGHT(elm, field) = RB_LEFT(tmp, field)) != NULL) { \
  RB_PARENT(RB_LEFT(tmp, field), field) = (elm);  \
 }        \
 RB_AUGMENT(elm);      \
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
   RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
  else       \
   RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else        \
  (head)->rbh_root = (tmp);    \
 RB_LEFT(tmp, field) = (elm);     \
```

```
 RB_PARENT(elm, field) = (tmp);     \
 RB_AUGMENT(tmp);      \
 if ((RB_PARENT(tmp, field)))     \
  RB_AUGMENT(RB_PARENT(tmp, field));   \
} while (/*CONSTCOND*/ 0)

#define RB_ROTATE_RIGHT(head, elm, tmp, field) do {   \
 (tmp) = RB_LEFT(elm, field);     \
 if ((RB_LEFT(elm, field) = RB_RIGHT(tmp, field))
 != NULL) { \
  RB_PARENT(RB_RIGHT(tmp, field), field) = (elm);  \
 }        \
 RB_AUGMENT(elm);      \
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
   RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
  else       \
   RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else       \
  (head)->rbh_root = (tmp);    \
 RB_RIGHT(tmp, field) = (elm);     \
 RB_PARENT(elm, field) = (tmp);     \
 RB_AUGMENT(tmp);      \
 if ((RB_PARENT(tmp, field)))     \
  RB_AUGMENT(RB_PARENT(tmp, field));   \
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */
#define RB_PROTOTYPE(name, type, field, cmp)    \
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp,)
#define RB_PROTOTYPE_STATIC(name, type, field, cmp)   \
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_PROTOTYPE_INTERNAL(name, type, field, cmp, attr)  \
attr void name##_RB_INSERT_COLOR(struct name *, struct
 type *);  \
attr void name##_RB_REMOVE_COLOR(struct name *, struct type *, struct type *);\
attr struct type *name##_RB_REMOVE(struct name *, struct type *); \
attr struct type *name##_RB_INSERT(struct name *, struct type *); \
attr struct type *name##_RB_FIND(struct name *, struct type *);  \
attr struct type *name##_RB_NFIND(struct name *, struct type *); \
attr struct type *name##_RB_NEXT(struct type *);   \
attr struct type *name##_RB_PREV(struct type *);   \
attr struct type *name##_RB_MINMAX(struct name *, int);   \
         \

/* Main rb operation.
* Moves node close to the key of elm to top
*/
```

```
#define RB_GENERATE(name, type, field, cmp)    \
 RB_GENERATE_INTERNAL(name, type, field, cmp,)
#define RB_GENERATE_STATIC(name, type, field, cmp)   \
 RB_GENERATE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_GENERATE_INTERNAL(name, type, field, cmp, attr)  \
attr void        \
name##_RB_INSERT_COLOR(struct name *head, struct type *elm)  \
{        \
 struct type
 *parent, *gparent, *tmp;    \
 while ((parent = RB_PARENT(elm, field)) != NULL &&  \
     RB_COLOR(parent, field) == RB_RED) {   \
  gparent = RB_PARENT(parent, field);   \
  if (parent == RB_LEFT(gparent, field)) {  \
   tmp = RB_RIGHT(gparent, field);   \
   if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
    RB_COLOR(tmp, field) = RB_BLACK; \
    RB_SET_BLACKRED(parent, gparent, field);\
    elm = gparent;    \
    continue;    \
   }      \
   if (RB_RIGHT(parent, field) == elm) {  \
    RB_ROTATE_LEFT(head, parent, tmp, field);\
    tmp = parent;    \
    parent = elm;    \
    elm = tmp;    \
   }      \
   RB_SET_BLACKRED(parent, gparent, field); \
   RB_ROTATE_RIGHT(head, gparent, tmp, field); \
  } else {      \
   tmp = RB_LEFT(gparent, field);   \
   if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
    RB_COLOR(tmp, field) = RB_BLACK; \
    RB_SET_BLACKRED(parent, gparent, field);\
    elm = gparent;    \
    continue;    \
   }      \
   if (RB_LEFT(parent, field) == elm)
  {  \
    RB_ROTATE_RIGHT(head, parent, tmp, field);\
    tmp = parent;    \
    parent = elm;    \
    elm = tmp;    \
   }      \
   RB_SET_BLACKRED(parent, gparent, field); \
   RB_ROTATE_LEFT(head, gparent, tmp, field); \
  }       \
 }        \
```

```
 RB_COLOR(head->rbh_root, field) = RB_BLACK;   \
}        \
         \
attr void        \
name##_RB_REMOVE_COLOR(struct name *head, struct type *parent, struct type *elm) \
{        \
 struct type *tmp;      \
 while ((elm == NULL || RB_COLOR(elm, field) == RB_BLACK) && \
     elm != RB_ROOT(head)) {     \
  if (RB_LEFT(parent, field) == elm) {   \
   tmp = RB_RIGHT(parent, field);   \
   if (RB_COLOR(tmp, field) == RB_RED) {  \
    RB_SET_BLACKRED(tmp, parent, field); \
    RB_ROTATE_LEFT(head, parent, tmp, field);\
    tmp = RB_RIGHT(parent, field);  \
   }      \
   if ((RB_LEFT(tmp, field) == NULL ||  \
       RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
       (RB_RIGHT(tmp, field) == NULL ||  \
       RB_COLOR(RB_RIGHT(tmp,
 field), field) == RB_BLACK)) {\
    RB_COLOR(tmp, field) = RB_RED;  \
    elm = parent;    \
    parent = RB_PARENT(elm, field);  \
   } else {     \
    if (RB_RIGHT(tmp, field) == NULL || \
        RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK) {\
     struct type *oleft;  \
     if ((oleft = RB_LEFT(tmp, field)) \
         != NULL)   \
      RB_COLOR(oleft, field) = RB_BLACK;\
     RB_COLOR(tmp, field) = RB_RED; \
     RB_ROTATE_RIGHT(head, tmp, oleft, field);\
     tmp = RB_RIGHT(parent, field); \
    }     \
    RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
    RB_COLOR(parent, field) = RB_BLACK; \
    if (RB_RIGHT(tmp, field))  \
     RB_COLOR(RB_RIGHT(tmp, field), field) = RB_BLACK;\
    RB_ROTATE_LEFT(head, parent, tmp, field);\
    elm = RB_ROOT(head);   \
    break;     \
   }      \
  } else {      \
   tmp = RB_LEFT(parent, field);   \
   if (RB_COLOR(tmp, field) == RB_RED) {  \
    RB_SET_BLACKRED(tmp, parent, field); \
    RB_ROTATE_RIGHT(head, parent, tmp, field);\
```

```
   tmp
 = RB_LEFT(parent, field);  \
  }      \
  if ((RB_LEFT(tmp, field) == NULL ||  \
      RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
      (RB_RIGHT(tmp, field) == NULL ||  \
      RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK)) {\
   RB_COLOR(tmp, field) = RB_RED;  \
   elm = parent;    \
   parent = RB_PARENT(elm, field);  \
  } else {     \
   if (RB_LEFT(tmp, field) == NULL || \
       RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) {\
    struct type *oright;  \
    if ((oright = RB_RIGHT(tmp, field)) \
        != NULL)   \
     RB_COLOR(oright, field) = RB_BLACK;\
    RB_COLOR(tmp, field) = RB_RED; \
    RB_ROTATE_LEFT(head, tmp, oright, field);\
    tmp = RB_LEFT(parent, field); \
   }     \
   RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
   RB_COLOR(parent, field) = RB_BLACK; \
   if (RB_LEFT(tmp, field))  \
    RB_COLOR(RB_LEFT(tmp, field), field) = RB_BLACK;\
   RB_ROTATE_RIGHT(head, parent, tmp, field);\
   elm = RB_ROOT(head);   \
   break;     \
  }      \
 }       \
}        \
if
(elm)       \
 RB_COLOR(elm, field) = RB_BLACK;   \
}         \
         \
attr struct type *       \
name##_RB_REMOVE(struct name *head, struct type *elm)   \
{         \
 struct type *child, *parent, *old = elm;   \
 int color;       \
 if (RB_LEFT(elm, field) == NULL)    \
  child = RB_RIGHT(elm, field);    \
 else if (RB_RIGHT(elm, field) == NULL)    \
  child = RB_LEFT(elm, field);    \
 else {        \
  struct type *left;     \
  elm = RB_RIGHT(elm, field);    \
```

```
 while ((left = RB_LEFT(elm, field)) != NULL)  \
  elm = left;     \
 child = RB_RIGHT(elm, field);    \
 parent = RB_PARENT(elm, field);    \
 color = RB_COLOR(elm, field);    \
 if (child)      \
  RB_PARENT(child, field) = parent;  \
 if (parent) {      \
  if (RB_LEFT(parent, field) == elm)  \
   RB_LEFT(parent, field) = child;  \
  else      \
   RB_RIGHT(parent, field) = child; \
  RB_AUGMENT(parent);    \
 } else       \
  RB_ROOT(head)
= child;    \
 if (RB_PARENT(elm, field) == old)   \
  parent = elm;     \
 (elm)->field = (old)->field;    \
 if (RB_PARENT(old, field)) {    \
  if (RB_LEFT(RB_PARENT(old, field), field) == old)\
   RB_LEFT(RB_PARENT(old, field), field) = elm;\
  else      \
   RB_RIGHT(RB_PARENT(old, field), field) = elm;\
  RB_AUGMENT(RB_PARENT(old, field));  \
 } else       \
  RB_ROOT(head) = elm;    \
 RB_PARENT(RB_LEFT(old, field), field) = elm;  \
 if (RB_RIGHT(old, field))    \
  RB_PARENT(RB_RIGHT(old, field), field) = elm; \
 if (parent) {      \
  left = parent;     \
  do {      \
   RB_AUGMENT(left);   \
  } while ((left = RB_PARENT(left, field)) != NULL); \
 }       \
 goto color;      \
}        \
parent = RB_PARENT(elm, field);     \
color = RB_COLOR(elm, field);     \
if (child)       \
 RB_PARENT(child, field) = parent;   \
if (parent) {       \
 if (RB_LEFT(parent, field) == elm)   \
  RB_LEFT(parent, field) = child;   \
 else       \
  RB_RIGHT(parent,
```

```
 field) = child;  \
  RB_AUGMENT(parent);     \
 } else        \
  RB_ROOT(head) = child;     \
color:        \
 if (color == RB_BLACK)      \
  name##_RB_REMOVE_COLOR(head, parent, child);  \
 return (old);       \
}         \
         \
/* Inserts a node into the RB tree */     \
attr struct type *       \
name##_RB_INSERT(struct name *head, struct type *elm)   \
{         \
 struct type *tmp;      \
 struct type *parent = NULL;     \
 int comp = 0;       \
 tmp = RB_ROOT(head);      \
 while (tmp) {       \
  parent = tmp;      \
  comp = (cmp)(elm, parent);    \
  if (comp < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else if (comp > 0)     \
   tmp = RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }        \
 RB_SET(elm, parent, field);     \
 if (parent != NULL) {      \
  if (comp < 0)      \
   RB_LEFT(parent, field) = elm;   \
  else       \
   RB_RIGHT(parent, field) = elm;   \
  RB_AUGMENT(parent);     \
 } else        \
  RB_ROOT(head) = elm;     \
 name##_RB_INSERT_COLOR(head,
 elm);    \
 return (NULL);       \
}         \
         \
/* Finds the node with the same key as elm */    \
attr struct type *       \
name##_RB_FIND(struct name *head, struct type *elm)   \
{         \
 struct type *tmp = RB_ROOT(head);    \
 int comp;       \
```

```
 while (tmp) {       \
  comp = cmp(elm, tmp);     \
  if (comp < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else if (comp > 0)     \
   tmp = RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }        \
 return (NULL);       \
}         \
         \
/* Finds the first node greater than or equal to the search key */ \
attr struct type *       \
name##_RB_NFIND(struct name *head, struct type *elm)   \
{         \
 struct type *tmp = RB_ROOT(head);    \
 struct type *res = NULL;     \
 int comp;       \
 while (tmp) {       \
  comp = cmp(elm, tmp);     \
  if (comp < 0) {      \
   res = tmp;     \
   tmp = RB_LEFT(tmp, field);   \
  }       \
  else if (comp > 0)     \
   tmp =
 RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }        \
 return (res);       \
}         \
         \
/* ARGSUSED */        \
attr struct type *       \
name##_RB_NEXT(struct type *elm)     \
{         \
 if (RB_RIGHT(elm, field)) {     \
  elm = RB_RIGHT(elm, field);    \
  while (RB_LEFT(elm, field))    \
   elm = RB_LEFT(elm, field);   \
 } else {       \
  if (RB_PARENT(elm, field) &&    \
      (elm == RB_LEFT(RB_PARENT(elm, field), field))) \
   elm = RB_PARENT(elm, field);   \
  else {       \
   while (RB_PARENT(elm, field) &&   \
```

```
      (elm == RB_RIGHT(RB_PARENT(elm, field), field)))\
    elm = RB_PARENT(elm, field);  \
   elm = RB_PARENT(elm, field);   \
  }       \
 }        \
 return (elm);       \
}         \
         \
/* ARGSUSED */        \
attr struct type *       \
name##_RB_PREV(struct type *elm)     \
{         \
 if (RB_LEFT(elm, field)) {     \
  elm = RB_LEFT(elm, field);    \
  while (RB_RIGHT(elm, field))    \
   elm = RB_RIGHT(elm, field);   \
 }
 else {       \
  if (RB_PARENT(elm, field) &&    \
      (elm == RB_RIGHT(RB_PARENT(elm, field), field))) \
   elm = RB_PARENT(elm, field);   \
  else {       \
   while (RB_PARENT(elm, field) &&   \
       (elm == RB_LEFT(RB_PARENT(elm, field), field)))\
    elm = RB_PARENT(elm, field);  \
   elm = RB_PARENT(elm, field);   \
  }       \
 }        \
 return (elm);       \
}         \
         \
attr struct type *       \
name##_RB_MINMAX(struct name *head, int val)    \
{         \
 struct type *tmp = RB_ROOT(head);    \
 struct type *parent = NULL;     \
 while (tmp) {       \
  parent = tmp;      \
  if (val < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else       \
   tmp = RB_RIGHT(tmp, field);   \
 }        \
 return (parent);      \
}

#define RB_NEGINF -1
#define RB_INF 1
```

```
#define RB_INSERT(name, x, y) name##_RB_INSERT(x, y)
#define RB_REMOVE(name, x, y) name##_RB_REMOVE(x, y)
#define RB_FIND(name, x, y) name##_RB_FIND(x, y)
#define RB_NFIND(name, x, y) name##_RB_NFIND(x,
 y)
#define RB_NEXT(name, x, y) name##_RB_NEXT(y)
#define RB_PREV(name, x, y) name##_RB_PREV(y)
#define RB_MIN(name, x)  name##_RB_MINMAX(x, RB_NEGINF)
#define RB_MAX(name, x)  name##_RB_MINMAX(x, RB_INF)

#define RB_FOREACH(x, name, head)     \
 for ((x) = RB_MIN(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_NEXT(x))

#define RB_FOREACH_FROM(x, name, y)     \
 for ((x) = (y);       \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_SAFE(x, name, head, y)    \
 for ((x) = RB_MIN(name, head);     \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_REVERSE(x, name, head)    \
 for ((x) = RB_MAX(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_PREV(x))

#define RB_FOREACH_REVERSE_FROM(x, name, y)    \
 for ((x) = (y);       \
     ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_REVERSE_SAFE(x, name,
 head, y)   \
 for ((x) = RB_MAX(name, head);     \
     ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
      (x) = (y))

#endif /* _SYS_TREE_H_ */
# Contributor: Wen Heping <wenhepingalpine@sohu.com>
# Maintainer: Wen Heping <wenhepingalpine@sohu.com>
pkgname=perl-software-license
pkgver=0.104007
pkgrel=0
```

```
# _pkgreal is used by apkbuild-cpan to find modules at MetaCpan
_pkgreal=Software-License
pkgdesc="packages that provide templated software licenses"
url="https://metacpan.org/release/Software-License/"
arch="noarch"
license="GPL-1.0-or-later OR Artistic-1.0-Perl"
depends="perl perl-data-section perl-text-template"
checkdepends="perl-try-tiny"
subpackages="$pkgname-doc"
source="https://cpan.metacpan.org/authors/id/L/LE/LEONT/Software-License-$pkgver.tar.gz"
builddir="$srcdir/$_pkgreal-$pkgver"

build() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 PERL_MM_USE_DEFAULT=1 perl -I. Makefile.PL \
  INSTALLDIRS=vendor \
  NO_PACKLIST=1 \
  NO_PERLLOCAL=1
 make
}

check() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 make test
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="
12d75e9583b3013d9b4a282467f1ac80ab6b7f3251926d66591d01404489b528f22adc396dfd4528a0f0ca650f0eed6d
9c959e69eace2169c6ed1cfffe5277e4
  Software-License-0.104007.tar.gz
"
```

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```
# Contributor: Dhruvin Gandhi <contact@dhru.vin>
# Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=py3-license-expression
_pkgname=license_expression
pkgver=30.4.4
pkgrel=0
pkgdesc="Library to parse, compare, simplify and normalize license expressions"
url="https://github.com/nexB/license-expression"
arch="noarch"
license="Apache-2.0"
depends="python3 py3-boolean.py"
makedepends="py3-setuptools py3-setuptools_scm py3-gpep517 py3-wheel"
checkdepends="py3-pytest py3-pytest-xdist"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/l/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir/$_pkgname-$pkgver"

build() {
 gpep517 build-wheel \
  --wheel-dir .dist \
  --output-fd 3 3>&1 >&2
}

check() {
 python3 -m venv --clear --without-pip --system-site-packages .testenv
 .testenv/bin/python3 -m installer .dist/*.whl
 .testenv/bin/python3 -m pytest
}

package() {
 python3 -m installer -d "$pkgdir" \
  .dist/*.whl
}

sha512sums="
f46dd4cf524b3962115fe26f5545bfdd6767275b482724af51e7ca07da79244969a3bfc5d2fd5b95bc0f19d1b95a26a8f3
ab36c676e56ec302178d7166588066
```

license_expression-30.4.4.tar.gz
"

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#endif /* GDB_HPPA_BSD_TDEP_H */
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#ifndef DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif
```

```
/*
 Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
            FILENAME      RESULT
            "foo.c"       "foo.c"
            "foo/bar.c"   "bar.c"
            "/foo/bar.c"  "bar.c"
            "foo/bar/"    "bar/"
            "foo/bar//"   "bar//"
            "/"           ""
            "//"          ""
            ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(), defined in <string.h>, does
      not consider trailing slashes to be part of the component:

 FILENAME      RESULT
            "foo/bar/"    ""
            "foo/bar//"   ""
    * The 'basename' command eliminates trailing slashes and for a root
      produces a non-empty result:
            FILENAME      RESULT
            "foo/bar/"    "bar"
            "foo/bar//"   "bar"
            "/"           "/"
            "//"          "/"
*/
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;



#ifdef __cplusplus
} /* extern "C" */
#endif
```

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```
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#ifndef GDB_BSD_UTHREAD_H
#define GDB_BSD_UTHREAD_H

/* Set the function that supplies registers for an inactive thread for
   architecture GDBARCH to SUPPLY_UTHREAD.  */

extern void bsd_uthread_set_supply_uthread (struct gdbarch
 *gdbarch,
        void (*supply_uthread) (struct regcache *,
           int, CORE_ADDR));


/* Set the function that collects registers for an inactive thread for
   architecture GDBARCH to SUPPLY_UTHREAD.  */

extern void bsd_uthread_set_collect_uthread (struct gdbarch *gdbarch,
        void (*collect_uthread) (const struct regcache *,
            int, CORE_ADDR));

#endif /* GDB_BSD_UTHREAD_H */
```

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```
/* Native-dependent code for modern i386 BSD's.

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#ifndef GDB_I386_BSD_NAT_H
#define GDB_I386_BSD_NAT_H

#include "x86-bsd-nat.h"

/* Helper functions.  See definitions.  */
extern void i386bsd_fetch_inferior_registers (struct regcache *regcache,
        int regnum);
extern
 void i386bsd_store_inferior_registers (struct regcache *regcache,
        int regnum);

/* A prototype *BSD/i386 target.  */
```

```
template<typename BaseTarget>
class i386_bsd_nat_target : public x86bsd_nat_target<BaseTarget>
{
public:
 void fetch_registers (struct regcache *regcache, int regnum) override
 { i386bsd_fetch_inferior_registers (regcache, regnum); }

 void store_registers (struct regcache *regcache, int regnum) override
 { i386bsd_store_inferior_registers (regcache, regnum); }
};

#endif /* GDB_I386_BSD_NAT_H */
```

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@c man end
/* Common target dependent code for Alpha BSD's.

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```
#ifndef GDB_ALPHA_BSD_TDEP_H
#define GDB_ALPHA_BSD_TDEP_H

#include "gdbarch.h"

struct regcache;

void alphabsd_supply_reg (struct regcache *, const char *, int);
void alphabsd_fill_reg (const struct regcache *, char
 *, int);

void alphabsd_supply_fpreg (struct regcache *, const char *, int);
void alphabsd_fill_fpreg (const struct regcache *, char *, int);
```

```
/* Functions exported from alpha-netbsd-tdep.c.  */

/* Iterate over supported core file register note sections. */
void alphanbsd_iterate_over_regset_sections (struct gdbarch *gdbarch,
        iterate_over_regset_sections_cb *cb,
        void *cb_data,
        const struct regcache *regcache);

#endif /* GDB_ALPHA_BSD_TDEP_H */
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  02110-1301, USA.  */


#ifndef __VTV_H__
#define __VTV_H__

/* We could have used an enumeration here but it just makes it more
  difficult for the compiler to generate a call to this.  These are
  used as arguments to the function __VLTChangePermission, declared
  below.  */
#define __VLTP_READ_ONLY  0
```

```
#define __VLTP_READ_WRITE 1

#ifdef __cplusplus
extern "C" void __VLTChangePermission (int);
#else
extern void __VLTChangePermission (int);
#endif

#ifdef BIG_PAGE_SIZE
/* TODO - Replace '4096' below with correct big page size.  */
#define VTV_PAGE_SIZE 4096
#else
#if defined(__sun__) && defined(__svr4__) && defined(__sparc__)
#define VTV_PAGE_SIZE 8192
#elif defined(__loongarch_lp64)
/* The page size is configurable by the kernel to
 be 4, 16 or 64 KiB.
  For now, only the default page size of 16KiB is supported.  */
#define VTV_PAGE_SIZE 16384
#else
#define VTV_PAGE_SIZE 4096
#endif
#endif



#endif /* __VTV_H__ */
/* Native-dependent code for modern AMD64 BSD's.

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#ifndef GDB_AMD64_BSD_NAT_H
#define GDB_AMD64_BSD_NAT_H
```

```
#include "x86-bsd-nat.h"

/* Helper functions.  See definitions.  */
extern void amd64bsd_fetch_inferior_registers (struct regcache *regcache,
          int
 regnum);
extern void amd64bsd_store_inferior_registers (struct regcache *regcache,
          int regnum);

/* A prototype *BSD/AMD64 target.  */

template<typename BaseTarget>
class amd64_bsd_nat_target : public x86bsd_nat_target<BaseTarget>
{
public:
 void fetch_registers (struct regcache *regcache, int regnum) override
 { amd64bsd_fetch_inferior_registers (regcache, regnum); }

 void store_registers (struct regcache *regcache, int regnum) override
 { amd64bsd_store_inferior_registers (regcache, regnum); }
};

#endif /* GDB_AMD64_BSD_NAT_H */
/* BSD Kernel Data Access Library (libkvm) interface.

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#ifndef GDB_BSD_KVM_H
#define GDB_BSD_KVM_H

struct pcb;
struct regcache;
```

```
/* Add the libkvm interface to the list of all possible targets and
  register CUPPLY_PCB as the architecture-specific process control
   block interpreter.  */

extern void
 bsd_kvm_add_target (int (*supply_pcb)(struct regcache *, struct pcb *));

#endif /* GDB_BSD_KVM_H */
/* Native-dependent code for x86 BSD's.

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#ifndef GDB_X86_BSD_NAT_H
#define GDB_X86_BSD_NAT_H

#include "x86-nat.h"

/* A prototype *BSD/x86 target.  */

#ifdef HAVE_PT_GETDBREGS
template<typename BaseTarget>
class x86bsd_nat_target : public x86_nat_target<BaseTarget>
{
  using base_class = x86_nat_target<BaseTarget>;
public:
 void mourn_inferior () override
 {
   x86_cleanup_dregs ();
   base_class::mourn_inferior ();
 }
};
#else /* !HAVE_PT_GETDBREGS */
```

```
template<typename BaseTarget>
class x86bsd_nat_target : public BaseTarget
{
};
#endif /* HAVE_PT_GETDBREGS */

#endif /* GDB_X86_BSD_NAT_H */
```

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Version 2, June 1991

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user can modify the Library and then relink to produce a modified
executable containing the modified Library. (It is understood
that the user who changes the contents of definitions files in the
Library will not necessarily be able to recompile the application
to use the modified definitions.)

b) Accompany the
work with a written offer, valid for at
least three years, to give the same user the materials
specified in Subsection 6a, above, for a charge no more
than the cost of performing this distribution.

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from a designated place, offer equivalent access to copy the above
specified materials from the same place.

d) Verify that the user has already received a copy of these
materials or that you have already sent this user a copy.

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Library" must include any data and utility programs needed for
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which the executable runs, unless that component itself accompanies
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# 1.2196 e2fsprogs 1.46.5-8.el9

## 1.2196.1 Available under license :

This package was added to the e2fsprogs debian source package by
Theodore Ts'o <tytso@mit.edu> on Sat Mar 15 15:33:37 EST 2003

It is part of the main e2fsprogs distribution, which can be found at:

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Upstream Author: Theodore Ts'o <tytso@mit.edu>

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This is the Debian GNU/Linux prepackaged version of the static EXT2
file system consistency checker (e2fsck.static). The EXT2 utilities
were written by Theodore Ts'o <tytso@mit.edu> and Remy Card
<card@masi.ibp.fr>.

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```
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Public License can be found in `/usr/share/common-licenses/GPL-2'.
#
# This is a Makefile stub which handles the creation of BSD shared
# libraries.
#
# In order to use this stub, the following makefile variables must be defined.
#
# BSDLIB_VERSION = 1.0
# BSDLIB_IMAGE = libce
# BSDLIB_MYDIR = et
# BSDLIB_INSTALL_DIR = $(SHLIBDIR)
#

all:: image

real-subdirs:: Makefile
 @echo " MKDIR pic"
 @mkdir -p pic

BSD_LIB = $(BSDLIB_IMAGE).so.$(BSDLIB_VERSION)
BSDLIB_PIC_FLAG = -fpic

image:  $(BSD_LIB)

$(BSD_LIB): $(OBJS)
 (cd pic; ld -Bshareable -o $(BSD_LIB) $(LDFLAGS_SHLIB) $(OBJS))
 $(MV) pic/$(BSD_LIB) .
 $(RM) -f ../$(BSD_LIB)
 (cd ..; $(LN) $(LINK_BUILD_FLAGS) \
  `echo $(my_dir) | sed -e 's;lib/;;'`/$(BSD_LIB) $(BSD_LIB))

install-shlibs install:: $(BSD_LIB)
 @echo " INSTALL_PROGRAM $(BSDLIB_INSTALL_DIR)/$(BSD_LIB)"
 @$(INSTALL_PROGRAM) $(BSD_LIB) \
  $(DESTDIR)$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)
 @-$(LDCONFIG)

install-strip: install

install-shlibs-strip:: install-shlibs
```

```
uninstall-shlibs uninstall::
 $(RM) -f $(DESTDIR)$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)

clean::
 $(RM)
 -rf pic
 $(RM) -f $(BSD_LIB)
 $(RM) -f ../$(BSD_LIB)
```

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files of the EXT2 file system utilities. The EXT2 utilities were
written by Theodore Ts'o <tytso@mit.edu> and Remy Card
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*/
Index: tdbsa/tdb.c
==========
--- tdbsa.orig/tdb.c
+++ tdbsa/tdb.c
@@ -4,11 +4,11 @@ Rev: 23371
Last Changed Date: 2007-06-06 20:14:06 -0400 (Wed, 06 Jun 2007)
*/
 /*
-   Unix SMB/CIFS implementation.
+   trivial database library - standalone version

-   trivial database library - private includes
-
-   Copyright (C) Andrew Tridgell            2005
+   Copyright (C) Andrew Tridgell            1999-2005
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    ** NOTE! The following LGPL license applies to the tdb
    ** library. This does NOT imply that all of Samba is released
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Gadi Oxman, August 1995

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Theodore Ts'o
23-June-2007

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This is the Debian GNU/Linux prepackaged version of the EXT2 file system utilities (e2fsck, mke2fs, etc.). The EXT2 utilities were written by Theodore Ts'o <tytso@mit.edu> and Remy Card <card@masi.ibp.fr>.

Sources were obtained from http://sourceforge.net/projects/e2fsprogs

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This package was added to the e2fsprogs debian source package by
Theodore Ts'o <tytso@mit.edu> on Sat Mar 15 15:33:37 EST 2003

It is part of the main e2fsprogs distribution, which can be found at:

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For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

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2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no

charge to all third parties under the
terms of this License.

d) If a facility in the modified Library refers to a function or a
table of data to be supplied by an application program that uses
the facility, other than as an argument passed when the facility
is invoked, then you must make a good faith effort to ensure that,
in the event an application does not supply such function or
table, the facility still operates, and performs whatever part of
its purpose remains meaningful.

(For example, a function in a library to compute square roots has
a purpose that is entirely well-defined independent of the
application. Therefore, Subsection 2d requires that any
application-supplied function or table used by this function must
be optional: if the application does not supply it, the square
root function must still compute square roots.)

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reasonably considered independent and separate works in
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Thus, it is not the intent of this section to claim rights or contest
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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the

Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the
object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany
the work with the complete corresponding
machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate
properly with a modified version of the library, if
the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more

than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

a) Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above.

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=========

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ready to extend this provision to those domains in future versions of the GPL, as needed to protect the freedom of users.

Finally, every program is threatened constantly by software patents. States should not allow patents to restrict development and use of software on general-purpose computers, but in those that do, we wish to avoid the special danger that patents applied to a free program could make it effectively proprietary. To prevent this, the GPL assures that patents cannot be used to render the program non-free.

The precise terms and conditions for copying, distribution and modification follow.

TERMS AND CONDITIONS

0. Definitions.

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To "convey" a work means any kind of propagation that enables other parties to make or receive copies. Mere interaction with a user through a computer network, with no transfer of a copy, is not conveying.

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The "source code" for a work means the preferred form of the work for making modifications to it. "Object code" means any non-source form of a work.

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b) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years and valid for as long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a copy of the Corresponding Source for all the software in the product that is covered by this License, on a durable physical medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the Corresponding Source from a network server at no charge.

c) Convey individual copies of the object code with a copy of the written offer to provide the Corresponding Source. This alternative is allowed only occasionally and noncommercially, and only if you received the object code with such an offer, in accord with subsection 6b.

d) Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements.

e) Convey the object code using peer-to-peer transmission, provided you inform other peers where the object code and Corresponding Source of the work are being offered to the general public at no charge under subsection 6d.

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#ifndef _BASENAME_LGPL_H
#define _BASENAME_LGPL_H

#include <stddef.h>

#ifndef DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
```

```
#endif

#ifdef __cplusplus
extern "C" {
#endif


/*
 Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
            FILENAME      RESULT
            "foo.c"       "foo.c"
            "foo/bar.c"   "bar.c"
            "/foo/bar.c"  "bar.c"
            "foo/bar/"    "bar/"
            "foo/bar//"   "bar//"
            "/"           ""
            "//"          ""
            ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(), defined in <string.h>, does
      not consider trailing slashes to be part of the component:

 FILENAME      RESULT
            "foo/bar/"    ""
            "foo/bar//"   ""
    * The 'basename' command eliminates trailing slashes and for a root
      produces a non-empty result:
            FILENAME      RESULT
            "foo/bar/"    "bar"
            "foo/bar//"   "bar"
            "/"           "/"
            "//"          "/"
*/
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;
```

```
#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
```

==========

Written by Andy Polyakov <appro@fy.chalmers.se> for the OpenSSL project. The module is, however, dual licensed under OpenSSL and CRYPTOGAMS licenses depending on where you obtain it. For further details see https://www.openssl.org/~appro/cryptogams/.

==========

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##
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*
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Summary: The basic required files for the root user's directory

Found in path(s):
* /rootfiles-8.1-35.el9.src.rpm-cosi-expand-archive-QIFHevHo/rootfiles.spec

# 1.2199 python-setuptools 53.0.0-15.el9

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# 1.2201 ncurses 6.2-12.20210508.el9

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Current ncurses maintainer: Thomas Dickey <dickey@invisible-island.net>

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This script is compatible with the BSD install script, but was written
from scratch. It can only install one file at a time, a restriction
shared with many OS's install programs.

On Debian systems, the complete text of the GNU General
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-- vile: txtmode file-encoding=utf-8
Upstream source https://invisible-island.net/ncurses/ncurses.html
This package is used for testing builds of ncurses.

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# Jackson JSON processor

Jackson is a high-performance, Free/Open Source JSON processing library.
It was originally written by Tatu Saloranta (tatu.saloranta@iki.fi), and has
been in development since 2007.
It is currently developed by a community of developers.

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# 1.2203 kubernetes-kube-aggregator 0.33.5

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# 1.2215 base-64 0.13.1

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# 1.2216 unicode-segmentation 1.12.0

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# 1.2222 pyo3-ffi 0.26.0

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# 1.2227 url 2.5.4

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# 1.2228 idna 1.0.3

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# 1.2229 lexical-parse-float 1.0.5

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## `write-floats, not(compact)`

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## `write-floats, compact`

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## `write-floats, radix`

`lexical-write-float/src/radix.rs` is adapted from the V8 implementation found [here]().
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## `parse-floats, compact`

`lexical-parse-float/src/bellerophon.rs` is loosely based off the Golang implementation,
found
[here](https://github.com/golang/go/blob/b10849fbb97a2244c086991b4623ae9f32c212d0/src/strconv/extfloat.go).
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# 1.2234 smallvec 1.15.1

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# 1.2239 same-file 1.0.6

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# 1.2243 hex 0.4.3

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# 1.2244 serde_json 1.0.145

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# 1.2245 idna 1.1.0

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# 1.2247 speedate 0.17.0

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# 1.2248 ipnet 2.11.0

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# 1.2249 tracing-log 0.2.0

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# 1.2250 dashmap 6.1.0

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# 1.2251 reqwest-middleware 0.4.2

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# 1.2262 http 1.3.1

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# 1.2264 tracing-core 0.1.33

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# 1.2265 csv 1.3.1

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# 1.2267 zstd-safe 7.2.1

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Upstream-Name: zstd-safe
Upstream-Contact: Alexandre Bury <alexandre.bury@gmail.com>
Source: https://github.com/gyscos/zstd-rs

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# 1.2268 tokio 1.47.1

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```
//! FreeBSD and NetBSD xattr support.

use libc::{c_int, c_void, size_t, EPERM};
use std::ffi::{CString, OsStr, OsString};
use std::io;
use std::mem;
use std::os::unix::ffi::{OsStrExt, OsStringExt};
use std::os::unix::io::{AsRawFd, BorrowedFd};
use std::path::Path;
use std::ptr;
```

```
use libc::{
   extattr_delete_fd, extattr_delete_file, extattr_delete_link, extattr_get_fd, extattr_get_file,
   extattr_get_link, extattr_list_fd, extattr_list_file, extattr_list_link, extattr_set_fd,
   extattr_set_file, extattr_set_link, EXTATTR_NAMESPACE_SYSTEM, EXTATTR_NAMESPACE_USER,
};

use crate::util::allocate_loop;

pub const ENOATTR: i32 = libc::ENOATTR;
pub const ERANGE: i32 = libc::ERANGE;

const EXTATTR_NAMESPACE_USER_STRING: &str = "user";
const EXTATTR_NAMESPACE_SYSTEM_STRING: &str = "system";
const EXTATTR_NAMESPACE_NAMES: [&str; 3] = [
   "empty",
   EXTATTR_NAMESPACE_USER_STRING,
   EXTATTR_NAMESPACE_SYSTEM_STRING,
];

fn path_to_c(path: &Path) -> io::Result<CString> {
   match CString::new(path.as_os_str().as_bytes())
 {
       Ok(name) => Ok(name),
       Err(_) => Err(io::Error::new(io::ErrorKind::NotFound, "file not found")),
   }
}

#[inline]
fn slice_parts(buf: &mut [u8]) -> (*mut c_void, size_t) {
   if buf.is_empty() {
       (ptr::null_mut(), 0)
   } else {
       (buf.as_mut_ptr().cast(), buf.len() as size_t)
   }
}

/// An iterator over a set of extended attributes names.
#[derive(Default)]
pub struct XAttrs {
   user_attrs: Box<[u8]>,
   system_attrs: Box<[u8]>,
   offset: usize,
}

impl Clone for XAttrs {
   fn clone(&self) -> Self {
       XAttrs {
```

```
            user_attrs: Vec::from(&*self.user_attrs).into_boxed_slice(),
            system_attrs: Vec::from(&*self.system_attrs).into_boxed_slice(),
            offset: self.offset,
        }
    }

    fn clone_from(&mut self, other: &XAttrs) {
        self.offset = other.offset;

        let mut data = mem::replace(&mut self.user_attrs, Box::new([])).into_vec();
        data.extend(other.user_attrs.iter().cloned());
         self.user_attrs = data.into_boxed_slice();

        data = mem::replace(&mut self.system_attrs, Box::new([])).into_vec();
        data.extend(other.system_attrs.iter().cloned());
        self.system_attrs = data.into_boxed_slice();
    }
}

impl Iterator for XAttrs {
    type Item = OsString;
    fn next(&mut self) -> Option<OsString> {
        if self.user_attrs.is_empty() && self.system_attrs.is_empty() {
            return None;
        }

        if self.offset == self.user_attrs.len() + self.system_attrs.len() {
            return None;
        }

        let data = if self.offset < self.system_attrs.len() {
            &self.system_attrs[self.offset..]
        } else {
            &self.user_attrs[self.offset - self.system_attrs.len()..]
        };

        let siz = data[0] as usize;

        self.offset += siz + 1;
        if self.offset < self.system_attrs.len() {
            Some(prefix_namespace(
                OsStr::from_bytes(&data[1..siz
 + 1]),
                EXTATTR_NAMESPACE_SYSTEM,
            ))
        } else {
            Some(prefix_namespace(
                OsStr::from_bytes(&data[1..siz + 1]),
```

```
            EXTATTR_NAMESPACE_USER,
        ))
    }
  }

  fn size_hint(&self) -> (usize, Option<usize>) {
    if self.user_attrs.len() + self.system_attrs.len() == self.offset {
        (0, Some(0))
    } else {
        (1, None)
    }
  }
}

// This could use libc::extattr_string_to_namespace, but it's awkward because
// that requires nul-terminated strings, which Rust's std is loathe to provide.
fn name_to_ns(name: &OsStr) -> io::Result<(c_int, CString)> {
  let mut groups = name.as_bytes().splitn(2, |&b| b == b'.').take(2);
  let nsname = match groups.next() {
    Some(s) => s,
    None => {
        return Err(io::Error::new(
            io::ErrorKind::InvalidInput,
            "couldn't find namespace",
        ))
    }
  };

  let propname
 = match groups.next() {
    Some(s) => s,
    None => {
        return Err(io::Error::new(
            io::ErrorKind::InvalidInput,
            "couldn't find attribute",
        ))
    }
  };

  let ns_int = match EXTATTR_NAMESPACE_NAMES
    .iter()
    .position(|&s| s.as_bytes() == nsname)
  {
    Some(i) => i,
    None => {
        return Err(io::Error::new(
            io::ErrorKind::InvalidInput,
            "no matching namespace",
```

```
        ))
      }
    };

    Ok((ns_int as c_int, CString::new(propname)?))
  }

  fn prefix_namespace(attr: &OsStr, ns: c_int) -> OsString {
    let nsname = EXTATTR_NAMESPACE_NAMES[ns as usize];
    let mut v = Vec::with_capacity(nsname.as_bytes().len() + attr.as_bytes().len() + 1);
    v.extend(nsname.as_bytes());
    v.extend(".".as_bytes());
    v.extend(attr.as_bytes());
    OsString::from_vec(v)
  }

  fn cvt(res: libc::ssize_t) -> io::Result<usize> {
    if res < 0 {
      Err(io::Error::last_os_error())
     } else {
      Ok(res as usize)
    }
  }

  pub fn get_fd(fd: BorrowedFd<'_>, name: &OsStr) -> io::Result<Vec<u8>> {
    let (ns, name) = name_to_ns(name)?;
    unsafe {
      allocate_loop(|buf| {
        let (ptr, len) = slice_parts(buf);
        cvt(extattr_get_fd(fd.as_raw_fd(), ns, name.as_ptr(), ptr, len))
      })
    }
  }

  pub fn set_fd(fd: BorrowedFd<'_>, name: &OsStr, value: &[u8]) -> io::Result<()> {
    let (ns, name) = name_to_ns(name)?;
    let ret = unsafe {
      extattr_set_fd(
        fd.as_raw_fd(),
        ns,
        name.as_ptr(),
        value.as_ptr() as *const c_void,
        value.len() as size_t,
      )
    };
    if ret == -1 {
      Err(io::Error::last_os_error())
    } else {
```

```
        Ok(())
    }
}

pub fn remove_fd(fd: BorrowedFd<'_>, name: &OsStr) -> io::Result<()> {
    let (ns, name) = name_to_ns(name)?;
    let ret = unsafe { extattr_delete_fd(fd.as_raw_fd(), ns, name.as_ptr()) };

 if ret != 0 {
        Err(io::Error::last_os_error())
    } else {
        Ok(())
    }
}

pub fn list_fd(fd: BorrowedFd<'_>) -> io::Result<XAttrs> {
    let sysvec = unsafe {
        let res = allocate_loop(|buf| {
            let (ptr, len) = slice_parts(buf);
            cvt(extattr_list_fd(
                fd.as_raw_fd(),
                EXTATTR_NAMESPACE_SYSTEM,
                ptr,
                len,
            ))
        });
        // On FreeBSD, system attributes require root privileges to view. However,
        // to mimic the behavior of listxattr in linux and osx, we need to query
        // them anyway and return empty results if we get EPERM
        match res {
            Ok(v) => v,
            Err(err) => {
                if err.raw_os_error() == Some(EPERM) {
                    Vec::new()
                } else {
                    return Err(err);
                }
            }
        }
    };

    let uservec = unsafe {
        let res = allocate_loop(|buf|
 {
            let (ptr, len) = slice_parts(buf);
            cvt(extattr_list_fd(
                fd.as_raw_fd(),
                EXTATTR_NAMESPACE_USER,
```

```
            ptr,
            len,
        ))
    });
    match res {
        Ok(v) => v,
        Err(err) => return Err(err),
    }
  };

  Ok(XAttrs {
    system_attrs: sysvec.into_boxed_slice(),
    user_attrs: uservec.into_boxed_slice(),
    offset: 0,
  })
}

pub fn get_path(path: &Path, name: &OsStr, deref: bool) -> io::Result<Vec<u8>> {
  let (ns, name) = name_to_ns(name)?;
  let path = path_to_c(path)?;
  let extattr_get_func = if deref {
    extattr_get_file
  } else {
    extattr_get_link
  };
  unsafe {
    allocate_loop(|buf| {
        let (ptr, len) = slice_parts(buf);
        cvt(extattr_get_func(path.as_ptr(), ns, name.as_ptr(), ptr, len))
    })
  }
}

pub fn set_path(path: &Path, name: &OsStr, value: &[u8], deref: bool) -> io::Result<()>
 {
  let (ns, name) = name_to_ns(name)?;
  let path = path_to_c(path)?;
  let extattr_set_func = if deref {
    extattr_set_file
  } else {
    extattr_set_link
  };
  let ret = unsafe {
    extattr_set_func(
        path.as_ptr(),
        ns,
        name.as_ptr(),
        value.as_ptr() as *const c_void,
```

```
            value.len() as size_t,
        )
    };
    if ret == -1 {
        Err(io::Error::last_os_error())
    } else {
        Ok(())
    }
}

pub fn remove_path(path: &Path, name: &OsStr, deref: bool) -> io::Result<()> {
    let (ns, name) = name_to_ns(name)?;
    let path = path_to_c(path)?;
    let extattr_delete_func = if deref {
        extattr_delete_file
    } else {
        extattr_delete_link
    };
    let ret = unsafe { extattr_delete_func(path.as_ptr(), ns, name.as_ptr()) };
    if ret != 0 {
        Err(io::Error::last_os_error())
    } else {
        Ok(())
    }
}

pub fn list_path(path: &Path, deref: bool) -> io::Result<XAttrs>
 {
    let path = path_to_c(path)?;
    let extattr_list_func = if deref {
        extattr_list_file
    } else {
        extattr_list_link
    };
    let sysvec = unsafe {
        let res = allocate_loop(|buf| {
            let (ptr, len) = slice_parts(buf);
            cvt(extattr_list_func(
                path.as_ptr(),
                EXTATTR_NAMESPACE_SYSTEM,
                ptr,
                len,
            ))
        });
        // On FreeBSD, system attributes require root privileges to view. However,
        // to mimic the behavior of listxattr in linux and osx, we need to query
        // them anyway and return empty results if we get EPERM
        match res {
```

```
        Ok(v) => v,
        Err(err) => {
            if err.raw_os_error() == Some(EPERM) {
                Vec::new()
            } else {
                return Err(err);
            }
        }
    }
  };

  let uservec = unsafe {
    let res = allocate_loop(|buf|
 {
        let (ptr, len) = slice_parts(buf);
        cvt(extattr_list_func(
            path.as_ptr(),
            EXTATTR_NAMESPACE_USER,
            ptr,
            len,
        ))
    });
    match res {
        Ok(v) => v,
        Err(err) => return Err(err),
    }
  };

  Ok(XAttrs {
    system_attrs: sysvec.into_boxed_slice(),
    user_attrs: uservec.into_boxed_slice(),
    offset: 0,
  })
}
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(https://github.com/rust-lang/rust/blob/ab32548539ec38a939c1b58599249f3b54130026/library/core/src/str/iter.rs).

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Lizenz

DER GEGENSTAND DIESER LIZENZ (WIE UNTER "SCHUTZGEGENSTAND" DEFINIERT) WIRD UNTER DEN BEDINGUNGEN DIESER CREATIVE COMMONS PUBLIC LICENSE ("CCPL", "LIZENZ" ODER "LIZENZVERTRAG") ZUR VERFGUNG GESTELLT. DER SCHUTZGEGENSTAND IST DURCH DAS URHEBERRECHT UND/ODER ANDERE GESETZE GESCHTZT. JEDE FORM DER NUTZUNG DES SCHUTZGEGENSTANDES, DIE NICHT AUFGRUND DIESER LIZENZ ODER DURCH GESETZE GESTATTET IST, IST UNZULSSIG.

DURCH DIE AUSBUNG EINES DURCH DIESE LIZENZ GEWHRTEN RECHTS AN DEM SCHUTZGEGENSTAND ERKLREN SIE SICH MIT DEN LIZENZBEDINGUNGEN RECHTSVERBINDLICH EINVERSTANDEN. SOWEIT DIESE LIZENZ ALS LIZENZVERTRAG ANZUSEHEN IST, GEWHRT IHNEN DER LIZENZGEBER DIE IN DER LIZENZ GENANNTEN RECHTE UNENTGELTLICH UND IM AUSTAUSCH DAFR, DASS SIE DAS GEBUNDENSEIN AN DIE LIZENZBEDINGUNGEN AKZEPTIEREN.

1. Definitionen

a. Der Begriff "Abwandlung" im Sinne dieser Lizenz bezeichnet das Ergebnis jeglicher Art von Vernderung des Schutzgegenstandes, solange die eigenpersnlichen Zge des Schutzgegenstandes darin nicht verblassen und daran eigene Schutzrechte entstehen. Das kann insbesondere eine Bearbeitung, Umgestaltung, nderung, Anpassung, bersetzung oder Heranziehung des Schutzgegenstandes zur Vertonung von Laufbildern sein. Nicht als Abwandlung des Schutzgegenstandes gelten seine Aufnahme in eine Sammlung oder ein Sammelwerk und die freie Benutzung des Schutzgegenstandes.

b. Der Begriff "Sammelwerk" im Sinne dieser Lizenz meint eine Zusammenstellung von literarischen, knstlerischen oder wissenschaftlichen Inhalten, sofern diese Zusammenstellung aufgrund von Auswahl und Anordnung der darin enthaltenen selbstndigen Elemente eine geistige Schpfung darstellt, unabhngig davon, ob die Elemente systematisch oder methodisch angelegt und dadurch einzeln zugnglich sind oder nicht.

c. "Verbreiten" im Sinne dieser Lizenz bedeutet, den Schutzgegenstand oder Abwandlungen im Original oder in Form von Vervielfltigungsstcken, mithin in krperlich fixierter Form der ffentlichkeit anzubieten oder in Verkehr zu bringen.

d. Unter "Lizenzelementen" werden im Sinne dieser Lizenz die folgenden bergeordneten Lizenzcharakteristika verstanden, die vom Lizenzgeber ausgewhlt wurden und in der Bezeichnung der Lizenz zum Ausdruck kommen: "Namensnennung", "Weitergabe unter gleichen Bedingungen".

e. Der "*Lizenzgeber*" im Sinne dieser Lizenz ist diejenige natrliche oder juristische Person oder Gruppe, die den Schutzgegenstand unter den Bedingungen dieser Lizenz anbietet und insoweit als Rechteinhaberin auftritt.

f. "Rechteinhaber" im Sinne dieser Lizenz ist der Urheber des Schutzgegenstandes oder jede andere natrliche oder juristische Person oder Gruppe von Personen, die am Schutzgegenstand ein Immaterialgterrecht erlangt hat, welches die in Abschnitt 3 genannten Handlungen erfasst und bei dem eine Einrumung von Nutzungsrechten oder eine Weiterbertragung an Dritte mglich ist.

g. Der Begriff "Schutzgegenstand" bezeichnet in dieser Lizenz den literarischen, knstlerischen oder

wissenschaftlichen Inhalt, der unter den Bedingungen dieser Lizenz angeboten wird. Das kann insbesondere eine persnliche geistige Schpfung jeglicher Art, ein Werk der kleinen Mnze, ein nachgelassenes Werk oder auch ein Lichtbild oder anderes Objekt eines verwandten Schutzrechts sein, unabhngig von der Art seiner Fixierung und unabhngig davon, auf welche Weise jeweils eine Wahrnehmung erfolgen kann, gleichviel ob in analoger oder digitaler Form. Soweit Datenbanken oder Zusammenstellungen von Daten einen immaterialgterrechtlichen Schutz eigener Art genieen, unterfallen auch sie dem Begriff "Schutzgegenstand" im Sinne dieser Lizenz.

h. Mit "Sie" bzw. "Ihnen" ist die natrliche oder juristische Person gemeint, die in dieser Lizenz im Abschnitt 3 genannte Nutzungen des Schutzgegenstandes vornimmt und zuvor in Hinblick auf den Schutzgegenstand nicht gegen Bedingungen dieser Lizenz verstoen oder aber die ausdrckliche Erlaubnis des Lizenzgebers erhalten hat, die durch diese Lizenz gewhrten Nutzungsrechte trotz eines vorherigen Verstoes auszuben.

i. Unter "ffentlich Zeigen" im Sinne dieser Lizenz sind Verffentlichungen und Prsentationen des Schutzgegenstandes zu verstehen, die fr eine Mehrzahl von Mitgliedern der ffentlichkeit bestimmt sind und in unkrperlicher Form mittels ffentlicher Wiedergabe in Form von Vortrag, Auffhrung, Vorfhrung, Darbietung, Sendung, Weitersendung, zeit- und ortsunabhngiger Zugnglichmachung oder in krperlicher Form mittels Ausstellung erfolgen, unabhngig von bestimmten Veranstaltungen und unabhngig von den zum Einsatz kommenden Techniken und Verfahren, einschlielich drahtgebundener oder drahtloser Mittel und Einstellen in das Internet.

j. "Vervielfltigen" im Sinne dieser Lizenz bedeutet, mittels beliebiger Verfahren Vervielfltigungsstcke des Schutzgegenstandes herzustellen, insbesondere durch Ton- oder Bildaufzeichnungen, und umfasst auch den Vorgang, erstmals krperliche Fixierungen des Schutzgegenstandes sowie Vervielfltigungsstcke dieser Fixierungen anzufertigen, sowie die bertragung des Schutzgegenstandes auf einen Bild- oder Tontrger oder auf ein anderes elektronisches Medium, gleichviel ob in digitaler oder analoger Form.

k. "Mit Creative Commons kompatible Lizenz" bezeichnet eine Lizenz, die unter https://creativecommons.org/compatiblelicenses aufgelistet ist und die durch Creative Commons als grundstzlich zur vorliegenden Lizenz quivalent akzeptiert wurde, da zumindest folgende Voraussetzungen erfllt sind:

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i. enthlt Bestimmungen, welche die gleichen Ziele verfolgen, die gleiche Bedeutung haben und die gleichen Wirkungen erzeugen wie die Lizenzelemente der vorliegenden Lizenz; und

ii. erlaubt ausdrcklich das Lizenzieren von ihr unterstellten Abwandlungen unter vorliegender Lizenz, unter einer anderen rechtsordnungsspezifisch angepassten Creative-Commons-Lizenz mit denselben Lizenzelementen, wie sie die vorliegende Lizenz aufweist, oder unter der entsprechenden Creative-Commons-Unported-Lizenz.

2. Schranken des Immaterialgterrechts. Diese Lizenz ist in keiner Weise darauf gerichtet, Befugnisse zur Nutzung des Schutzgegenstandes zu vermindern, zu beschrnken oder zu vereiteln, die Ihnen aufgrund der Schranken des Urheberrechts oder anderer Rechtsnormen bereits ohne Weiteres zustehen oder sich aus dem Fehlen eines immaterialgterrechtlichen Schutzes ergeben.

3. Einrumung von Nutzungsrechten. Unter den Bedingungen dieser Lizenz rumt Ihnen der Lizenzgeber - unbeschadet unverzichtbarer Rechte und vorbehaltlich des Abschnitts 3.e) - das vergtungsfreie, rumlich und zeitlich (fr die Dauer des Schutzrechts am Schutzgegenstand) unbeschrnkte einfache Recht ein, den

Schutzgegenstand auf die folgenden Arten und Weisen zu nutzen ("unentgeltlich eingerumtes einfaches Nutzungsrecht fr jedermann"):

a. Den Schutzgegenstand in beliebiger Form und Menge zu vervielfltigen, ihn in Sammelwerke zu integrieren und ihn als Teil solcher Sammelwerke zu vervielfltigen;

b. Abwandlungen des Schutzgegenstandes anzufertigen, einschlielich bersetzungen unter Nutzung jedweder Medien, sofern deutlich erkennbar gemacht wird, dass es sich um Abwandlungen handelt;

c. den Schutzgegenstand, allein oder in Sammelwerke aufgenommen, ffentlich zu zeigen und zu verbreiten;

d. Abwandlungen des Schutzgegenstandes zu verffentlichen, ffentlich zu zeigen und zu verbreiten.

e. Bezglich Vergtung fr die Nutzung des Schutzgegenstandes gilt Folgendes:

i. Unverzichtbare gesetzliche Vergtungsansprche: Soweit unverzichtbare Vergtungsansprche im Gegenzug fr gesetzliche Lizenzen vorgesehen oder Pauschalabgabensysteme (zum Beispiel fr Leermedien) vorhanden sind, behlt sich der Lizenzgeber das ausschlieliche Recht vor, die entsprechende Vergtung einzuziehen fr jede Ausbung eines Rechts aus dieser Lizenz durch Sie.

ii. Vergtung bei Zwangslizenzen: Sofern Zwangslizenzen auerhalb dieser Lizenz vorgesehen sind und zustande kommen, verzichtet der Lizenzgeber fr alle Flle einer lizenzgerechten Nutzung des Schutzgegenstandes durch Sie auf jegliche Vergtung.

iii. Vergtung in sonstigen Fllen: Bezglich lizenzgerechter Nutzung des Schutzgegenstandes durch Sie, die nicht unter die beiden vorherigen Abschnitte (i) und (ii) fllt, verzichtet der Lizenzgeber auf jegliche Vergtung, unabhngig davon, ob eine Einziehung der Vergtung durch ihn selbst oder nur durch eine Verwertungsgesellschaft mglich wre.

Das vorgenannte
Nutzungsrecht wird fr alle bekannten sowie fr alle noch nicht bekannten Nutzungsarten eingerumt. Es beinhaltet auch das Recht, solche nderungen am Schutzgegenstand vorzunehmen, die fr bestimmte nach dieser Lizenz zulssige Nutzungen technisch erforderlich sind. Alle sonstigen Rechte, die ber diesen Abschnitt hinaus nicht ausdrcklich durch den Lizenzgeber eingerumt werden, bleiben diesem allein vorbehalten. Soweit Datenbanken oder Zusammenstellungen von Daten Schutzgegenstand dieser Lizenz oder Teil dessen sind und einen immaterialgterrechtlichen Schutz eigener Art genieen, verzichtet der Lizenzgeber auf smtliche aus diesem Schutz resultierenden Rechte.

4. Bedingungen. Die Einrumung des Nutzungsrechts gem Abschnitt 3 dieser Lizenz erfolgt ausdrcklich nur unter den folgenden Bedingungen:

a. Sie drfen den Schutzgegenstand ausschlielich unter den Bedingungen dieser Lizenz verbreiten oder ffentlich zeigen. Sie mssen dabei stets eine Kopie dieser Lizenz oder deren vollstndige Internetadresse
in Form des Uniform-Resource-Identifier (URI) beifgen. Sie drfen keine Vertrags- oder Nutzungsbedingungen anbieten oder fordern, die die Bedingungen dieser Lizenz oder die durch diese Lizenz gewhrten Rechte beschrnken. Sie drfen den Schutzgegenstand nicht unterlizenzieren. Bei jeder Kopie des Schutzgegenstandes, die Sie verbreiten oder ffentlich zeigen, mssen Sie alle Hinweise unverndert lassen, die auf diese Lizenz und den Haftungsausschluss hinweisen. Wenn Sie den Schutzgegenstand verbreiten oder ffentlich zeigen, drfen Sie (in Bezug auf den Schutzgegenstand) keine technischen Manahmen ergreifen, die den Nutzer des Schutzgegenstandes in der Ausbung

der ihm durch diese Lizenz gewhrten Rechte behindern knnen. Dieser Abschnitt 4.a) gilt auch fr den Fall, dass der Schutzgegenstand einen Bestandteil eines Sammelwerkes bildet, was jedoch nicht bedeutet, dass das Sammelwerk insgesamt dieser Lizenz unterstellt werden muss. Sofern Sie ein Sammelwerk erstellen, mssen Sie auf die Mitteilung eines Lizenzgebers hin aus dem Sammelwerk die in Abschnitt 4.c) aufgezhlten Hinweise entfernen. Wenn Sie eine Abwandlung vornehmen, mssen Sie auf die Mitteilung eines Lizenzgebers hin von der Abwandlung die in Abschnitt 4.c) aufgezhlten Hinweise entfernen.

b. Sie drfen eine Abwandlung ausschlielich unter den Bedingungen

i. dieser Lizenz,

ii. einer spteren Version dieser Lizenz mit denselben Lizenzelementen,

iii. einer rechtsordnungsspezifischen Creative-Commons-Lizenz mit denselben Lizenzelementen ab Version 3.0 aufwrts (z.B. Namensnennung - Weitergabe unter gleichen Bedingungen 3.0 US),

iv. der Creative-Commons-Unported-Lizenz mit denselben Lizenzelementen ab Version 3.0 aufwrts, oder

v. einer mit Creative Commons kompatiblen Lizenz

verbreiten oder ffentlich zeigen.

Falls Sie die Abwandlung gem Abschnitt (v) unter einer mit Creative Commons kompatiblen Lizenz lizenzieren, mssen Sie deren Lizenzbestimmungen
Folge leisten.

Falls Sie die Abwandlungen unter einer der unter (i)-(iv) genannten Lizenzen ("Verwendbare Lizenzen") lizenzieren, mssen Sie deren Lizenzbestimmungen sowie folgenden Bestimmungen Folge leisten: Sie mssen stets eine Kopie der verwendbaren Lizenz oder deren vollstndige Internetadresse in Form des Uniform-Resource-Identifier (URI) beifgen, wenn Sie die Abwandlung verbreiten oder ffentlich zeigen. Sie drfen keine Vertrags- oder Nutzungsbedingungen anbieten oder fordern, die die Bedingungen der verwendbaren Lizenz oder die durch sie gewhrten Rechte beschrnken. Bei jeder Abwandlung, die Sie verbreiten oder ffentlich zeigen, mssen Sie alle Hinweise auf die verwendbare Lizenz und den Haftungsausschluss unverndert lassen. Wenn Sie die Abwandlung verbreiten oder ffentlich zeigen, drfen Sie (in Bezug auf die Abwandlung) keine technischen Manahmen ergreifen, die den Nutzer der Abwandlung in der Ausbung der ihm durch die verwendbare Lizenz gewhrten Rechte behindern knnen.
Dieser Abschnitt 4.b) gilt auch fr den Fall, dass die Abwandlung einen Bestandteil eines Sammelwerkes bildet, was jedoch nicht bedeutet, dass das Sammelwerk insgesamt der verwendbaren Lizenz unterstellt werden muss.

c. Die Verbreitung und das ffentliche Zeigen des Schutzgegenstandes oder auf ihm aufbauender Abwandlungen oder ihn enthaltender Sammelwerke ist Ihnen nur unter der Bedingung gestattet, dass Sie, vorbehaltlich etwaiger Mitteilungen im Sinne von Abschnitt 4.a), alle dazu gehrenden Rechtevermerke unberhrt lassen. Sie sind verpflichtet, die Rechteinhaberschaft in einer der Nutzung entsprechenden, angemessenen Form anzuerkennen, indem Sie - soweit bekannt - Folgendes angeben:

i. Den Namen (oder das Pseudonym, falls ein solches verwendet wird) des Rechteinhabers und / oder, falls der Lizenzgeber im Rechtevermerk, in den Nutzungsbedingungen oder auf andere angemessene Weise eine Zuschreibung an Dritte vorgenommen hat (z.B. an eine Stiftung, ein Verlagshaus oder

eine Zeitung) ("Zuschreibungsempfnger"), Namen bzw. Bezeichnung dieses oder dieser Dritten;

ii. den Titel des Inhaltes;

iii. in einer praktikablen Form den Uniform-Resource-Identifier (URI, z.B. Internetadresse), den der Lizenzgeber zum Schutzgegenstand angegeben hat, es sei denn, dieser URI verweist nicht auf den Rechtevermerk oder die Lizenzinformationen zum Schutzgegenstand;

iv. und im Falle einer Abwandlung des Schutzgegenstandes in bereinstimmung mit Abschnitt 3.b) einen Hinweis darauf, dass es sich um eine Abwandlung handelt.

Die nach diesem Abschnitt 4.c) erforderlichen Angaben knnen in jeder angemessenen Form gemacht werden; im Falle einer Abwandlung des Schutzgegenstandes oder eines Sammelwerkes mssen diese Angaben das Minimum darstellen und bei gemeinsamer Nennung mehrerer Rechteinhaber dergestalt erfolgen, dass sie zumindest ebenso hervorgehoben sind wie die Hinweise auf die brigen Rechteinhaber. Die Angaben nach diesem Abschnitt drfen Sie ausschlielich zur Angabe der Rechteinhaberschaft in der oben bezeichneten Weise verwenden. Durch die Ausbung Ihrer Rechte aus dieser Lizenz drfen Sie ohne eine vorherige, separat und schriftlich vorliegende Zustimmung des Lizenzgebers und / oder des Zuschreibungsempfngers weder explizit noch implizit irgendeine Verbindung zum Lizenzgeber oder Zuschreibungsempfnger und ebenso wenig eine Untersttzung oder Billigung durch ihn andeuten.

d. Die oben unter 4.a) bis c) genannten Einschrnkungen gelten nicht fr solche Teile des Schutzgegenstandes, die allein deshalb unter den Schutzgegenstandsbegriff fallen, weil sie als Datenbanken oder Zusammenstellungen von Daten einen immaterialgterrechtlichen Schutz eigener Art genieen.

e. Persnlichkeitsrechte bleiben - soweit sie bestehen - von dieser Lizenz unberhrt.

5. Gewhrleistung

SOFERN KEINE ANDERS LAUTENDE, SCHRIFTLICHE VEREINBARUNG ZWISCHEN DEM LIZENZGEBER UND IHNEN GESCHLOSSEN WURDE UND SOWEIT MNGEL NICHT ARGLISTIG VERSCHWIEGEN
WURDEN, BIETET DER LIZENZGEBER DEN SCHUTZGEGENSTAND UND DIE EINRUMUNG VON RECHTEN UNTER AUSSCHLUSS JEGLICHER GEWHRLEISTUNG AN UND BERNIMMT WEDER AUSDRCKLICH NOCH KONKLUDENT GARANTIEN IRGENDEINER ART. DIES UMFASST INSBESONDERE DAS FREISEIN VON SACH- UND RECHTSMNGELN, UNABHNGIG VON DEREN ERKENNBARKEIT FR DEN LIZENZGEBER, DIE VERKEHRSFHIGKEIT DES SCHUTZGEGENSTANDES, SEINE VERWENDBARKEIT FR EINEN BESTIMMTEN ZWECK SOWIE DIE KORREKTHEIT VON BESCHREIBUNGEN. DIESE GEWHRLEISTUNGSBESCHRNKUNG GILT NICHT, SOWEIT MNGEL ZU SCHDEN DER IN ABSCHNITT 6 BEZEICHNETEN ART FHREN UND AUF SEITEN DES LIZENZGEBERS DAS JEWEILS GENANNTE VERSCHULDEN BZW. VERTRETENMSSEN EBENFALLS VORLIEGT.

6. Haftungsbeschrnkung

DER LIZENZGEBER HAFTET IHNEN GEGENBER IN BEZUG AUF SCHDEN AUS DER VERLETZUNG DES LEBENS, DES KRPERS ODER DER GESUNDHEIT NUR, SOFERN IHM WENIGSTENS FAHRLSSIGKEIT VORZUWERFEN IST, FR SONSTIGE SCHDEN NUR BEI GROBER FAHRLSSIGKEIT ODER VORSATZ, UND BERNIMMT DARBER HINAUS KEINERLEI FREIWILLIGE HAFTUNG.

7.
Erlschen

a. Diese Lizenz und die durch sie eingerumten Nutzungsrechte erlschen mit Wirkung fr die Zukunft im Falle eines Verstoes gegen die Lizenzbedingungen durch Sie, ohne dass es dazu der Kenntnis des Lizenzgebers vom Versto oder einer weiteren Handlung einer der Vertragsparteien bedarf. Mit natrlichen oder juristischen Personen, die Abwandlungen des Schutzgegenstandes oder diesen enthaltende Sammelwerke unter den Bedingungen dieser Lizenz von Ihnen erhalten haben, bestehen nachtrglich entstandene Lizenzbeziehungen jedoch solange weiter, wie die genannten Personen sich ihrerseits an smtliche Lizenzbedingungen halten. Darber hinaus gelten die Ziffern 1, 2, 5, 6, 7, und 8 auch nach einem Erlschen dieser Lizenz fort.

b. Vorbehaltlich der oben genannten Bedingungen gilt diese Lizenz unbefristet bis der rechtliche Schutz fr den Schutzgegenstand ausluft. Davon abgesehen behlt der Lizenzgeber das Recht, den Schutzgegenstand unter anderen Lizenzbedingungen anzubieten oder die
eigene Weitergabe des Schutzgegenstandes jederzeit einzustellen, solange die Ausbung dieses Rechts nicht einer Kndigung oder einem Widerruf dieser Lizenz (oder irgendeiner Weiterlizenzierung, die auf Grundlage dieser Lizenz bereits erfolgt ist bzw. zuknftig noch erfolgen muss) dient und diese Lizenz unter Bercksichtigung der oben zum Erlschen genannten Bedingungen vollumfnglich wirksam bleibt.

8. Sonstige Bestimmungen

a. Jedes Mal wenn Sie den Schutzgegenstand fr sich genommen oder als Teil eines Sammelwerkes verbreiten oder ffentlich zeigen, bietet der Lizenzgeber dem Empfnger eine Lizenz zu den gleichen Bedingungen und im gleichen Umfang an, wie Ihnen in Form dieser Lizenz.

b. Jedes Mal wenn Sie eine Abwandlung des Schutzgegenstandes verbreiten oder ffentlich zeigen, bietet der Lizenzgeber dem Empfnger eine Lizenz am ursprnglichen Schutzgegenstand zu den gleichen Bedingungen und im gleichen Umfang an, wie Ihnen in Form dieser Lizenz.

c. Sollte eine Bestimmung dieser
Lizenz unwirksam sein, so bleibt davon die Wirksamkeit der Lizenz im brigen unberhrt.

d. Keine Bestimmung dieser Lizenz soll als abbedungen und kein Versto gegen sie als zulssig gelten, solange die von dem Verzicht oder von dem Versto betroffene Seite nicht schriftlich zugestimmt hat.

e. Diese Lizenz (zusammen mit in ihr ausdrcklich vorgesehenen Erlaubnissen, Mitteilungen und Zustimmungen, soweit diese tatschlich vorliegen) stellt die vollstndige Vereinbarung zwischen dem Lizenzgeber und Ihnen in Bezug auf den Schutzgegenstand dar. Es bestehen keine Abreden, Vereinbarungen oder Erklrungen in Bezug auf den Schutzgegenstand, die in dieser Lizenz nicht genannt sind. Rechtsgeschftliche nderungen des Verhltnisses zwischen dem Lizenzgeber und Ihnen sind nur ber Modifikationen dieser Lizenz mglich. Der Lizenzgeber ist an etwaige zustzliche, einseitig durch Sie bermittelte Bestimmungen nicht gebunden. Diese Lizenz kann nur durch schriftliche Vereinbarung zwischen Ihnen und dem Lizenzgeber
modifiziert werden. Derlei Modifikationen wirken ausschlielich zwischen dem Lizenzgeber und Ihnen und wirken sich nicht auf die Dritten gem Ziffern 8.a) und b) angeboteten Lizenzen aus.

f. Sofern zwischen Ihnen und dem Lizenzgeber keine anderweitige Vereinbarung getroffen wurde und soweit Wahlfreiheit besteht, findet auf diesen Lizenzvertrag das Recht der Bundesrepublik Deutschland Anwendung.

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"#

```
//! This file contains the BSD APIs available in Haiku. It corresponds to the
//! header files in `headers/compatibility/bsd`.
//!
//! Note that Haiku's BSD compatibility is a combination of system APIs and
//! utility libraries. There should only be system APIs in `libc`. When you are
//! trying to determine whether something should be included in this file, the
//! best indicator is whether it also exists in the BSD-specific definitions in
//! this libc crate.

use crate::prelude::*;

// stringlist.h (utility library)
// Note: this is kept because it was previously introduced
pub type StringList = _stringlist;
```

```
s! {
  // stringlist.h (utility library)
  // Note: this is kept because it was previously introduced
  pub struct _stringlist {
      pub sl_str: *mut *mut c_char,
      pub sl_max: size_t,
      pub sl_cur: size_t,
  }

  // sys/event.h
  pub struct kevent {
      pub ident: crate::uintptr_t,
      pub filter: c_short,
      pub flags: c_ushort,

  pub fflags: c_uint,
      pub data: i64,
      pub udata: *mut c_void,
      pub ext: [u64; 4],
  }

  // sys/link_elf.h
  pub struct dl_phdr_info {
      pub dlpi_addr: crate::Elf_Addr,
      pub dlpi_name: *const c_char,
      pub dlpi_phdr: *const crate::Elf_Phdr,
      pub dlpi_phnum: crate::Elf_Half,
  }
}

// sys/event.h
pub const EVFILT_READ: i16 = -1;
pub const EVFILT_WRITE: i16 = -2;
pub const EVFILT_PROC: i16 = -5;
pub const EV_ADD: u16 = 0x0001;
pub const EV_DELETE: u16 = 0x0002;
pub const EV_ONESHOT: u16 = 0x0010;
pub const EV_CLEAR: u16 = 0x0020;
pub const EV_EOF: u16 = 0x8000;
pub const EV_ERROR: u16 = 0x4000;
pub const NOTE_EXIT: u32 = 0x80000000;

// sys/ioccom.h
pub const IOC_VOID: c_ulong = 0x20000000;
pub const IOC_OUT: c_ulong = 0x40000000;
pub const IOC_IN: c_ulong = 0x80000000;
pub const IOC_INOUT: c_ulong = IOC_IN | IOC_OUT;
```

```
pub const IOC_DIRMASK: c_ulong = 0xe0000000;

#[link(name = "bsd")]
extern "C" {
  // stdlib.h
  pub fn daemon(nochdir:
 c_int, noclose: c_int) -> c_int;
  pub fn getprogname() -> *const c_char;
  pub fn setprogname(progname: *const c_char);
  pub fn arc4random() -> u32;
  pub fn arc4random_uniform(upper_bound: u32) -> u32;
  pub fn arc4random_buf(buf: *mut c_void, n: size_t);
  pub fn mkstemps(template: *mut c_char, suffixlen: c_int) -> c_int;
  pub fn strtonum(
      nptr: *const c_char,
      minval: c_longlong,
      maxval: c_longlong,
      errstr: *mut *const c_char,
  ) -> c_longlong;

  // pty.h
  pub fn openpty(
      amaster: *mut c_int,
      aslave: *mut c_int,
      name: *mut c_char,
      termp: *mut crate::termios,
      winp: *mut crate::winsize,
  ) -> c_int;
  pub fn login_tty(_fd: c_int) -> c_int;
  pub fn forkpty(
      amaster: *mut c_int,
      name: *mut c_char,
      termp: *mut crate::termios,
      winp: *mut crate::winsize,
  ) -> crate::pid_t;

  // string.h
  pub fn strsep(string: *mut *mut c_char, delimiters:
 *const c_char) -> *mut c_char;
  pub fn explicit_bzero(buf: *mut c_void, len: size_t);

  // stringlist.h (utility library)
  // Note: this is kept because it was previously introduced
  pub fn sl_init() -> *mut StringList;
  pub fn sl_add(sl: *mut StringList, n: *mut c_char) -> c_int;
  pub fn sl_free(sl: *mut StringList, i: c_int);
  pub fn sl_find(sl: *mut StringList, n: *mut c_char) -> *mut c_char;
```

```
  // sys/event.h
  pub fn kqueue() -> c_int;
  pub fn kevent(
      kq: c_int,
      changelist: *const kevent,
      nchanges: c_int,
      eventlist: *mut kevent,
      nevents: c_int,
      timeout: *const crate::timespec,
  ) -> c_int;

  // sys/link_elf.h
  pub fn dl_iterate_phdr(
      callback: Option<
          unsafe extern "C" fn(info: *mut dl_phdr_info, size: usize, data: *mut c_void) -> c_int,
      >,
      data: *mut c_void,
  ) -> c_int;

  // sys/time.h
  pub fn lutimes(file: *const c_char, times: *const crate::timeval)
-> c_int;

  // sys/uov.h
  pub fn preadv(
      fd: c_int,
      iov: *const crate::iovec,
      iovcnt: c_int,
      offset: crate::off_t,
  ) -> ssize_t;
  pub fn pwritev(
      fd: c_int,
      iov: *const crate::iovec,
      iovcnt: c_int,
      offset: crate::off_t,
  ) -> ssize_t;

  // sys/wait.h
  pub fn wait4(
      pid: crate::pid_t,
      status: *mut c_int,
      options: c_int,
      rusage: *mut crate::rusage,
  ) -> crate::pid_t;
}
==============================================================================
```

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Lizenzvertrag

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DURCH DIE AUSBUNG EINES DURCH DIESEN LIZENZVERTRAG GEWHRTEN RECHTS AN DEM SCHUTZGEGENSTAND ERKLREN SIE SICH MIT DEN LIZENZBEDINGUNGEN RECHTSVERBINDLICH EINVERSTANDEN. DER LIZENZGEBER RUMT IHNEN DIE HIER BESCHRIEBENEN RECHTE UNTER DER VORAUSSETZUNGEIN, DASS SIE SICH MIT DIESEN VERTRAGSBEDINGUNGEN EINVERSTANDEN ERKLREN.

1. Definitionen

a. Unter einer Bearbeitung wird eine bersetzung oder andere Bearbeitung des Werkes verstanden, die Ihre persnliche geistige Schpfung  ist. Eine freie Benutzung des Werkes wird nicht als Bearbeitung angesehen.

b. Unter den Lizenzelementen werden die folgenden Lizenzcharakteristika verstanden, die vom Lizenzgeber ausgewhlt und in der Bezeichnung der Lizenz genannt werden: Namensnennung, Nicht-kommerziell, Weitergabe unter gleichen Bedingungen.

c. Unter dem Lizenzgeber wird die natrliche oder juristische Person verstanden, die den Schutzgegenstand unter den Bedingungen dieser Lizenz anbietet.

d. Unter einem Sammelwerk wird eine Sammlung von Werken, Daten oder anderen unabhngigen Elementen verstanden, die aufgrund der Auswahl oder Anordnung der Elemente eine persnliche geistige Schpfung ist. Darunter fallen auch solche Sammelwerke, deren Elemente systematisch oder methodisch angeordnet und einzeln mit Hilfe elektronischer Mittel oder auf andere Weise zugnglich sind (Datenbankwerke). Ein Sammelwerk wird im Zusammenhang mit dieser Lizenz nicht als Bearbeitung (wie oben beschrieben) angesehen.

e. Mit SIE und Ihnen ist die natrliche oder juristische Person gemeint, die die durch diese Lizenz gewhrten Nutzungsrechte ausbt und die zuvor die Bedingungen dieser Lizenz im Hinblick auf das Werk nicht verletzt hat, oder die die ausdrckliche Erlaubnis des Lizenzgebers erhalten hat, die durch diese Lizenz gewhrten Nutzungsrechte trotz einer vorherigen Verletzung auszuben.

f. Unter dem Schutzgegenstandwird das Werk oder Sammelwerk oder das Schutzobjekt eines verwandten Schutzrechts, das Ihnen unter den Bedingungen dieser Lizenz angeboten wird, verstanden

g. Unter dem Urheber wird die natrliche Person verstanden, die das Werk geschaffen hat.

h. Unter einem verwandten Schutzrecht wird das Recht an einem anderen urheberrechtlichen Schutzgegenstand als einem Werk verstanden, zum Beispiel einer wissenschaftlichen Ausgabe, einem nachgelassenen Werk, einem Lichtbild, einer Datenbank, einem Tontrger, einer Funksendung, einem Laufbild oder einer Darbietung eines ausbenden Knstlers.

i. Unter dem Werk wird eine persnliche geistige Schpfung verstanden, die Ihnen unter den Bedingungen dieser Lizenz angeboten wird.

2. Schranken des Urheberrechts. Diese Lizenz lsst smtliche Befugnisse unberhrt, die sich aus den Schranken des Urheberrechts,aus dem Erschpfungsgrundsatz oder anderen Beschrnkungen der Ausschlielichkeitsrechte des Rechtsinhabers ergeben.

3. Lizenzierung. Unter den Bedingungen dieses Lizenzvertrages rumt Ihnen der Lizenzgeber ein lizenzgebhrenfreies, rumlich und zeitlich (fr die Dauer des Urheberrechts oder verwandten Schutzrechts) unbeschrnktes einfaches Nutzungsrecht ein, den Schutzgegenstand in der folgenden Art und Weise zu nutzen:

a. den Schutzgegenstand in krperlicher Form zu verwerten, insbesondere zu vervielfltigen, zu verbreiten und auszustellen;

b. den Schutzgegenstand in unkrperlicher Form ffentlich wiederzugeben, insbesondere vorzutragen, aufzufhren und vorzufhren, ffentlich zugnglich zu machen, zu senden, durch Bild- und Tontrger wiederzugeben sowie Funksendungen und ffentliche Zugnglichmachungen wiederzugeben;

c. den Schutzgegenstand auf Bild- oder Tontrger aufzunehmen, Lichtbilder davon herzustellen, weiterzusenden

und in dem in a. und b. genannten Umfang zu verwerten;

d. den Schutzgegenstand zu bearbeiten oder in anderer Weise umzugestalten und die Bearbeitungen zu verffentlichen und in dem in a. bis c. genannten Umfang zu verwerten;

Die genannten Nutzungsrechte knnen fr alle bekannten Nutzungsarten ausgebt werden. Die genannten Nutzungsrechte beinhalten das Recht, solche Vernderungen an dem Werk vorzunehmen, die technisch erforderlich sind, um die Nutzungsrechte fr alle Nutzungsarten wahrzunehmen. Insbesondere sind davon die Anpassung an andere Medien und auf andere Dateiformate umfasst.

4. Beschrnkungen. Die Einrumung der Nutzungsrechte gem Ziffer 3 erfolgt ausdrcklich nur unter den folgenden Bedingungen:

a. Sie drfen den Schutzgegenstand ausschlielich unter den Bedingungen dieser Lizenz vervielfltigen, verbreiten oder ffentlich wiedergeben, und Sie mssen stets eine Kopie oder die vollstndige Internetadresse in Form des Uniform-Resource-Identifier (URI) dieser Lizenz beifgen, wenn Sie den Schutzgegenstandvervielfltigen, verbreiten oder ffentlich wiedergeben. Sie drfen keine Vertragsbedingungen anbieten oder fordern, die die Bedingungen dieser Lizenz oder die durch sie gewhrten Rechte ndern oder beschrnken. Sie drfen den Schutzgegenstand nicht unterlizenzieren. Sie mssen alle Hinweise unverndert lassen, die auf diese Lizenz und den Haftungsausschluss hinweisen. Sie drfen den Schutzgegenstand mit keinen technischen Schutzmanahmen versehen, die den Zugang oder den Gebrauch des Schutzgegenstandes in einer Weise kontrollieren, die mit den Bedingungen dieser Lizenz im Widerspruch stehen. Die genannten Beschrnkungen gelten auch fr den Fall, dass der Schutzgegenstand einen Bestandteil eines Sammelwerkes bildet; sie verlangen aber nicht, dass das Sammelwerk insgesamt zum Gegenstand dieser Lizenz gemacht wird. Wenn Sie ein Sammelwerk erstellen, mssen Sie - soweit dies praktikabel ist - auf die Mitteilung eines Lizenzgebers oder Urhebers hin aus dem Sammelwerk jeglichen Hinweis auf diesen Lizenzgeber oder diesen Urheber entfernen. Wenn Sie den Schutzgegenstand bearbeiten, mssen Sie - soweit dies praktikabel ist- auf die Aufforderung eines Rechtsinhabers hin von der Bearbeitung jeglichen Hinweis auf diesen Rechtsinhaber entfernen.

b. Sie drfen eine Bearbeitung ausschlielich unter den Bedingungen dieser Lizenz, einer spteren Version dieser Lizenz mit denselben Lizenzelementen wie diese Lizenz oder einer Creative Commons iCommons Lizenz, die dieselben Lizenzelemente wie diese Lizenz enthlt (z.B. Namensnennung - Nicht-kommerziell - Weitergabe unter gleichen Bedingungen 2.0 Japan), vervielfltigen, verbreiten oder ffentlich wiedergeben. Sie mssen stets eine Kopie oder die Internetadresse in Form des Uniform-Resource-Identifier (URI) dieser Lizenz oder einer anderen Lizenz der im vorhergehenden Satz beschriebenen Art beifgen, wenn Sie die Bearbeitung vervielfltigen, verbreiten oder ffentlich wiedergeben. Sie drfen keine Vertragsbedingungen anbieten oder fordern, die die Bedingungen dieser Lizenz oder die durch sie gewhrten Rechte ndern oder beschrnken, und Sie mssen alle Hinweise unverndert lassen, die auf diese Lizenz und den Haftungsausschluss hinweisen. Sie drfen eine Bearbeitung nicht mit technischen Schutzmanahmen versehen, die den Zugang oder den Gebrauch der Bearbeitung in einer Weise kontrollieren, die mit den Bedingungen dieser Lizenz im Widerspruch stehen. Die genannten Beschrnkungen gelten auch fr eine Bearbeitung als Bestandteil eines Sammelwerkes; sie erfordern aber nicht, dass das Sammelwerk insgesamt zum Gegenstand dieser Lizenz gemacht wird.

c. Sie drfen die in Ziffer 3 gewhrten Nutzungsrechte in keiner Weise verwenden, die hauptschlich auf einen geschftlichen Vorteil oder eine vertraglich geschuldete geldwerte Vergtung abzielt oder darauf gerichtet ist. Erhalten Sie im Zusammenhang mit der Einrumung der Nutzungsrechte ebenfalls einen Schutzgegenstand, ohne dass eine vertragliche Verpflichtung hierzu besteht, so wird dies nicht als geschftlicher Vorteil oder vertraglich geschuldete

geldwerte Vergtung angesehen, wenn keine Zahlung oder geldwerte Vergtung in Verbindung mit dem Austausch der Schutzgegenstnde geleistet wird (z.B. File-Sharing).

d. Wenn Sie den Schutzgegenstand oder eine Bearbeitung oder ein Sammelwerk vervielfltigen, verbreiten oder ffentlich wiedergeben, mssen Sie alle Urhebervermerke fr den Schutzgegenstand unverndert lassen und die Urheberschaft oder Rechtsinhaberschaft in einer der von Ihnen vorgenommenen Nutzung angemessenen Form anerkennen, indem Sie den Namen (oder das Pseudonym, falls ein solches verwendet wird) des Urhebers oder Rechteinhabers nennen, wenn dieser angegeben ist. Dies gilt auch fr den Titel des Schutzgegenstandes, wenn dieser angeben ist, sowie - in einem vernnftigerweise durchfhrbaren Umfang - fr die mit dem Schutzgegenstand zu verbindende Internetadresse in Form des Uniform-Resource-Identifier (URI), wie sie der Lizenzgeber angegeben hat, sofern dies geschehen ist, es sei denn, diese Internetadresse verweist nicht auf den Urhebervermerk oder die Lizenzinformationen zu dem Schutzgegenstand. Bei einer Bearbeitung ist ein Hinweis darauf aufzufhren, in welcher Form der Schutzgegenstand in die Bearbeitung eingegangen ist (z.B. Franzsische bersetzung des ... (Werk) durch ... (Urheber) oder Das Drehbuch beruht auf dem Werk des ... (Urheber)). Ein solcher Hinweis kann in jeder angemessenen Weise erfolgen, wobei jedoch bei einer Bearbeitung, einer Datenbank oder einem Sammelwerk der Hinweis zumindest an gleicher Stelle und in ebenso auffliger Weise zu erfolgen hat wie vergleichbare Hinweise auf andere Rechtsinhaber.

e. Obwohl die gemss Ziffer 3 gewhrten Nutzungsrechte in umfassender Weise ausgebt werden drfen, findet diese Erlaubnis ihre gesetzliche Grenze in den Persnlichkeitsrechten der Urheber und ausbenden Knstler, deren berechtigte geistige und persnliche Interessen bzw. deren Ansehen oder Ruf nicht dadurch gefhrdet werden drfen, dass ein Schutzgegenstand ber das gesetzlich zulssige Ma hinaus beeintrchtigt wird.

5. Gewhrleistung. Sofern dies von den Vertragsparteien nicht anderweitig schriftlich vereinbart,, bietet der Lizenzgeber keine Gewhrleistung fr die erteilten Rechte, auer fr den Fall, dass Mngel arglistig verschwiegen wurden. Fr Mngel anderer Art, insbesondere bei der mangelhaften Lieferung von Verkrperungen des Schutzgegenstandes, richtet sich die Gewhrleistung nach der Regelung, die die Person, die Ihnen den Schutzgegenstand zur Verfgung stellt, mit Ihnen auerhalb dieser Lizenz vereinbart, oder - wenn eine solche Regelung nicht getroffen wurde - nach den gesetzlichen Vorschriften.

6. Haftung. ber die in Ziffer 5 genannte Gewhrleistung hinaus haftet Ihnen der Lizenzgeber nur fr Vorsatz und grobe Fahrlssigkeit.

7. Vertragsende

a. Dieser Lizenzvertrag und die durch ihn eingerumten Nutzungsrechte enden automatisch bei jeder Verletzung der Vertragsbedingungen durch Sie. Fr natrliche und juristische Personen, die von Ihnen eine Bearbeitung, eine Datenbank oder ein Sammelwerk unter diesen Lizenzbedingungen erhalten haben, gilt die Lizenz jedoch weiter, vorausgesetzt, diese natrlichen oder juristischen Personen erfllen smtliche Vertragsbedingungen. Die Ziffern 1, 2, 5, 6, 7 und 8 gelten bei einer Vertragsbeendigung fort.

b. Unter den oben genannten Bedingungen erfolgt die Lizenz auf unbegrenzte Zeit (fr die Dauer des Schutzrechts). Dennoch behlt sich der Lizenzgeber das Recht vor, den Schutzgegenstand unter anderen Lizenzbedingungen zu nutzen oder die eigene Weitergabe des Schutzgegenstandes jederzeit zu beenden, vorausgesetzt, dass solche Handlungen nicht dem Widerruf dieser Lizenz dienen (oder jeder anderen Lizenzierung, die auf Grundlage dieser Lizenz erfolgt ist oder erfolgen muss) und diese Lizenz wirksam bleibt, bis Sie unter den oben genannten Voraussetzungen endet.

8. Schlussbestimmungen

a. Jedes Mal, wenn Sie den Schutzgegenstand vervielfltigen, verbreiten oder ffentlich wiedergeben, bietet der Lizenzgeber dem Erwerber eine Lizenz fr den Schutzgegenstand unter denselben Vertragsbedingungen an, unter denen er Ihnen die Lizenz eingerumt hat.

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c. Sollte eine Bestimmung dieses Lizenzvertrages unwirksam sein, so wird die Wirksamkeit der brigen Lizenzbestimmungen dadurch nicht berhrt, und an die Stelle der unwirksamen Bestimmung tritt eine Ersatzregelung, die dem mit der unwirksamen Bestimmung angestrebten Zweck am nchsten kommt.

d. Nichts soll dahingehend ausgelegt werden, dass auf eine Bestimmung dieses Lizenzvertrages verzichtet oder einer Vertragsverletzung zugestimmt wird, so lange ein solcher Verzicht oder eine solche Zustimmung nicht schriftlich vorliegen und von der verzichtenden oder zustimmenden Vertragspartei unterschrieben sind

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f. Auf diesen Lizenzvertrag findet das Recht der Bundesrepublik Deutschland Anwendung.

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e. Der "Lizenzgeber" im Sinne dieser Lizenz ist diejenige natrliche oder juristische Person oder Gruppe, die den

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b. Abwandlungen des Schutzgegenstandes anzufertigen, einschlielich bersetzungen unter Nutzung jedweder Medien, sofern deutlich erkennbar gemacht wird, dass es sich um Abwandlungen handelt;

c. den Schutzgegenstand, allein oder in Sammelwerke aufgenommen, ffentlich zu zeigen und zu verbreiten;

d. Abwandlungen des Schutzgegenstandes zu verffentlichen, ffentlich zu zeigen und zu verbreiten.

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b. Sie drfen eine Abwandlung ausschlielich unter den Bedingungen

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ii. den Titel des Inhaltes;

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Die nach diesem Abschnitt
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fallen, weil sie als Datenbanken oder Zusammenstellungen von Daten einen immaterialgterrechtlichen Schutz eigener Art genieen.

f. Bezglich Vergtung fr die Nutzung des Schutzgegenstandes gilt Folgendes:

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g. Persnlichkeitsrechte bleiben - soweit sie bestehen - von dieser Lizenz unberhrt.

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b. Vorbehaltlich der oben genannten Bedingungen gilt diese Lizenz unbefristet bis der rechtliche Schutz fr den Schutzgegenstand ausluft. Davon abgesehen behlt der Lizenzgeber das Recht, den Schutzgegenstand unter anderen Lizenzbedingungen anzubieten oder die eigene Weitergabe des Schutzgegenstandes
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c. Sollte eine Bestimmung dieser Lizenz unwirksam sein, so bleibt
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```
//! `ioctl` opcode behavior for BSD platforms.

use super::{Direction, Opcode};

pub(super) const fn compose_opcode(
   dir: Direction,
   group: Opcode,
   num: Opcode,
   size: Opcode,
) -> Opcode {
   let dir = match dir {
      Direction::None => NONE,
      Direction::Read => READ,
      Direction::Write => WRITE,
      Direction::ReadWrite => READ | WRITE,
   };

   dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}

// `IOC_VOID`
pub const NONE: Opcode = 0x2000_0000;
// `IOC_OUT` (out is from the perspective of the kernel)
pub const READ: Opcode = 0x4000_0000;
// `IOC_IN` (in is from the perspective of the kernel)
pub const WRITE: Opcode = 0x8000_0000;
pub const IOCPARAM_MASK: Opcode = 0x1FFF;
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```
//! `ioctl` opcode behavior for BSD platforms.

use super::{Direction, RawOpcode};

pub(super) const fn compose_opcode(
   dir: Direction,
   group: RawOpcode,
   num: RawOpcode,
   size: RawOpcode,
) -> RawOpcode {
   let dir = match dir {
      Direction::None => NONE,
      Direction::Read => READ,
      Direction::Write => WRITE,
      Direction::ReadWrite => READ | WRITE,
   };

   dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}

// `IOC_VOID`
pub const NONE: RawOpcode = 0x2000_0000;
// `IOC_OUT` (out is from the perspective of the kernel)
pub const READ: RawOpcode = 0x4000_0000;
// `IOC_IN` (in is from the perspective of the kernel)
pub const WRITE: RawOpcode = 0x8000_0000;
pub const IOCPARAM_MASK: RawOpcode = 0x1FFF;
```

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The IJG distribution formerly included code to read and write GIF files. To avoid entanglement with the Unisys LZW patent, GIF reading support has been removed altogether, and the GIF writer has been simplified to produce "uncompressed GIFs". This technique does not use the LZW algorithm; the resulting GIF files are larger than usual, but are readable by all standard GIF decoders.

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Version 2.1, February 1999

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By Shawn Hargreaves, 18 October 1998.

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b. L'Acceptant peut reproduire, distribuer, reprsenter ou communiquer au public une Oeuvre dite Drive y compris par voie numrique uniquement sous les termes de ce Contrat, ou d'une version ultrieure de ce Contrat comprenant les mmes Options du Contrat que le prsent Contrat, ou un Contrat Creative Commons iCommons comprenant les mmes Options du Contrat que le prsent Contrat (par exemple Paternit - Pas d'Utilisation Commerciale - Partage Des Conditions Initiales A l'Identique 2.0 Japon). L'Acceptant doit inclure une copie ou l'adresse Internet (Identifiant Uniforme de Ressource) du prsent Contrat, ou d'un autre Contrat tel que dcrit  la phrase prcdente,  toute reproduction ou enregistrement de l'Oeuvre dite Drive que l'Acceptant distribue, reprsente ou communique au public y compris par voie numrique. L'Acceptant ne peut pas offrir ou imposer de conditions d'utilisation sur l'Oeuvre dite Drive qui altrent ou restreignent les termes du prsent Contrat ou l'exercice des droits qui y sont accords au bnficiaire, et doit conserver intactes toutes les informations qui renvoient  ce Contrat et  l'avertissement sur les garanties. L'Acceptant ne peut pas reproduire, distribuer, reprsenter ou communiquer au public y compris par voie numrique l'Oeuvre dite Drive en utilisant une mesure technique de contrle d'accs ou de contrle d'utilisation qui serait contradictoire avec les termes de cet Accord contractuel. Les mentions ci-dessus s'appliquent  l'Oeuvre dite Drive telle qu'incorpore dans une Oeuvre dite Collective, mais, en dehors de l'Oeuvre dite Drive en elle-mme, ne soumettent pas l'Oeuvre Collective, aux termes du prsent Contrat.

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droit de la proprit littraire et artistique par le partage lectronique de fichiers, ou par tout autre moyen, n'est pas considr comme un change avec l'intention ou l'objectif d'un profit commercial ou d'une compensation financire personnelle, dans la mesure o aucun paiement ou compensation financire n'intervient en relation avec l'change d'Oeuvres protges.

d. Si l'Acceptant
reproduit, distribue, reprsente ou communique au public, y compris par voie numrique, l'Oeuvre ou toute Oeuvre dite Drive ou toute Oeuvre dite Collective, il doit conserver intactes toutes les informations sur le rgime des droits et en attribuer la paternit  l'Auteur Original, de manire raisonnable au regard au mdium ou au moyen utilis. Il doit communiquer le nom de l'Auteur Original ou son ventuel pseudonyme s'il est indiqu ; le titre de l'Oeuvre Originale s'il est indiqu ; dans la mesure du possible, l'adresse Internet ou Identifiant Uniforme de Ressource (URI), s'il existe, spcifi par l'Offrant comme associ  l'Oeuvre,  moins que cette adresse ne renvoie pas aux informations lgales (paternit et conditions d'utilisation de l'Oeuvre). Dans le cas d'une Oeuvre dite Drive, il doit indiquer les lments identifiant l'utilisation l'Oeuvre dans l'Oeuvre dite Drive par exemple  Traduction anglaise de l'Oeuvre par l'Auteur Original  ou Scnario bas sur l'Oeuvre par l'Auteur Original .
Ces obligations d'attribution de paternit doivent tre excutes de manire raisonnable. Cependant, dans le cas d'une Oeuvre dite Drive ou d'une Oeuvre dite Collective, ces informations doivent, au minimum, apparatre  la place et de manire aussi visible que celles  laquelle apparaissent les informations de mme nature.

e. Dans le cas o une utilisation de l'Oeuvre serait soumise  un rgime lgal de gestion collective obligatoire, l'Offrant se rserve le droit exclusif de collecter ces redevances par l'intermdiaire de la socit de perception et de rpartition des droits comptente. Sont notamment concerns la radiodiffusion et la communication dans un lieu public de phonogrammes publis  des fins de commerce, certains cas de retransmission par cble et satellite, la copie prive d'Oeuvres fixes sur phonogrammes ou vidogrammes, la reproduction par reprographie.

5. Garantie et exonration de responsabilit

a. En mettant l'Oeuvre  la disposition du public selon les termes de ce Contrat, l'Offrant
dclare de bonne foi qu' sa connaissance et dans les limites d'une enqute raisonnable :

i. L'Offrant a obtenu tous les droits sur l'Oeuvre ncessaires pour pouvoir autoriser l'exercice des droits accords par le prsent Contrat, et permettre la jouissance paisible et l'exercice licite de ces droits, ceci sans que l'Acceptant n'ait aucune obligation de verser de rmunration ou tout autre paiement ou droits, dans la limite des mcanismes de gestion collective obligatoire applicables dcrits  l'article 4(e);

ii. L'Oeuvre n'est constitutive ni d'une violation des droits de tiers, notamment du droit de la proprit littraire et artistique, du droit des marques, du droit de l'information, du droit civil ou de tout autre droit, ni de diffamation, de violation de la vie prive ou de tout autre prjudice dlictuel  l'gard de toute tierce partie.

b. A l'exception des situations expressment mentionnes dans le prsent Contrat ou dans un autre accord crit, ou exiges par la loi applicable,
l'Oeuvre est mise  disposition en l'tat sans garantie d'aucune sorte, qu'elle soit expresse ou tacite, y compris  l'gard du contenu ou de l'exactitude de l'Oeuvre.

6. Limitation de responsabilit. A l'exception des garanties d'ordre public imposes par la loi applicable et des rparations imposes par le rgime de la responsabilit vis--vis d'un tiers en raison de la violation des garanties prvues par l'article 5 du prsent contrat, l'Offrant ne sera en aucun cas tenu responsable vis--vis de l'Acceptant, sur la base

d'aucune thorie lgale ni en raison d'aucun prjudice direct, indirect, matriel ou moral, rsultant de l'excution du prsent Contrat ou de l'utilisation de l'Oeuvre, y compris dans l'hypothse o l'Offrant avait connaissance de la possible existence d'un tel prjudice.

7. Rsiliation

a. Tout manquement aux termes du contrat par l'Acceptant entrane la rsiliation automatique du Contrat et la fin des droits qui en dcoulent. Cependant, le contrat conserve ses effets envers les personnes physiques ou morales qui ont reu de la part de l'Acceptant, en excution du prsent contrat, la mise disposition d'Oeuvres dites Drives, ou d'Oeuvres dites Collectives, ceci tant qu'elles respectent pleinement leurs obligations. Les sections 1, 2, 5, 6 et 7 du contrat continuent s'appliquer aprs la rsiliation de celui-ci.

b. Dans les limites indiques ci-dessus, le prsent Contrat s'applique pendant toute la dure de protection de l'Oeuvre selon le droit applicable. Nanmoins, l'Offrant se rserve tout moment le droit d'exploiter l'Oeuvre sous des conditions contractuelles diffrentes, ou d'en cesser la diffusion; cependant, le recours cette option ne doit pas conduire retirer les effets du prsent Contrat (ou de tout contrat qui a t ou doit tre accord selon les termes de ce Contrat), et ce Contrat continuera s'appliquer dans tous ses effets jusqu' ce que sa rsiliation intervienne dans les conditions dcrites ci-dessus.

8. Divers

a. A chaque reproduction ou communication au public par voie numrique de l'Oeuvre ou d'une Oeuvre dite Collective par l'Acceptant, l'Offrant propose au bnficiaire une offre de mise disposition de l'Oeuvre dans des termes et conditions identiques ceux accords la partie Acceptante dans le prsent Contrat.

b. A chaque reproduction ou communication au public par voie numrique d'une Oeuvre dite Drive par l'Acceptant, l'Offrant propose au bnficiaire une offre de mise disposition du bnficiaire de l'Oeuvre originale dans des termes et conditions identiques ceux accords la partie Acceptante dans le prsent Contrat.

c. La nullit ou l'inapplicabilit d'une quelconque disposition de ce Contrat au regard de la loi applicable n'affecte pas celle des autres dispositions qui resteront pleinement valides et applicables. Sans action additionnelle par les parties cet accord, lesdites dispositions devront tre interprtes dans la mesure minimum ncessaire leur validit et leur applicabilit.

d. Aucune limite, renonciation ou modification des termes ou dispositions du prsent Contrat ne pourra tre accepte sans le consentement crit et sign de la partie comptente.

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f. Le droit applicable est le droit franais.

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Version 2.1, February 1999

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program
that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.
(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.
If distribution of object
code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.
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Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6.
As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.
You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above);
and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)
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c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.
d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.
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For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself

accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

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b. 'Afgeleid werk' een werk dat is gebaseerd op het Werk of op het Werk en andere reeds bestaande werken. Voorbeelden van een Afgeleid werk zijn
een vertaling, een muziekschikking (arrangement), een toneelbewerking, een literaire bewerking, een verfilming, een geluidsopname, een kunstreproductie, een verkorte versie, een samenvatting of enig andere bewerking van het Werk, met dien verstande dat een Verzamelwerk voor de toepassing van deze Licentie niet als een Afgeleid werk zal

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d. het verspreiden van exemplaren van Afgeleide werken, het in het openbaar te tonen, op- en uitvoeren en het on-line beschikbaar stellen van Afgeleide werken;

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/// The datatype used for the ioctl number
#[doc(hidden)]
#[cfg(not(solarish))]
pub type ioctl_num_type = ::libc::c_ulong;

```
#[doc(hidden)]
#[cfg(solarish)]
pub type ioctl_num_type = ::libc::c_int;

/// The datatype used for the 3rd argument
#[doc(hidden)]
pub type ioctl_param_type = ::libc::c_int;

mod consts {
  use crate::sys::ioctl::ioctl_num_type;
  #[doc(hidden)]
  pub const VOID: ioctl_num_type = 0x2000_0000;
  #[doc(hidden)]
  pub const OUT: ioctl_num_type = 0x4000_0000;
  #[doc(hidden)]
  #[allow(overflowing_literals)]
  pub const IN: ioctl_num_type = 0x8000_0000;
  #[doc(hidden)]
  pub const INOUT: ioctl_num_type = IN | OUT;
  #[doc(hidden)]
  pub const IOCPARM_MASK: ioctl_num_type = 0x1fff;
}

pub use self::consts::*;

#[macro_export]
#[doc(hidden)]
macro_rules! ioc {
  ($inout:expr, $group:expr, $num:expr, $len:expr) => {
    $inout
      | (($len as $crate::sys::ioctl::ioctl_num_type
        & $crate::sys::ioctl::IOCPARM_MASK)

        << 16)
      | (($group as $crate::sys::ioctl::ioctl_num_type) << 8)
      | ($num as $crate::sys::ioctl::ioctl_num_type)
  };
}

/// Generate an ioctl request code for a command that passes no data.
///
/// This is equivalent to the `_IO()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_none!()` directly.
///
/// # Example
```

```
///
/// ```
/// # #[macro_use] extern crate nix;
/// const KVMIO: u8 = 0xAE;
/// ioctl_write_int_bad!(kvm_create_vm, request_code_none!(KVMIO, 0x03));
/// # fn main() {}
/// ```
#[macro_export(local_inner_macros)]
macro_rules! request_code_none {
  ($g:expr, $n:expr) => {
    ioc!($crate::sys::ioctl::VOID, $g, $n, 0)
  };
}

/// Generate an ioctl request code for a command that passes an integer
///
/// This is equivalent to the `_IOWINT()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the
 `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write_int!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write_int {
  ($g:expr, $n:expr) => {
    ioc!(
      $crate::sys::ioctl::VOID,
      $g,
      $n,
      ::std::mem::size_of::<$crate::libc::c_int>()
    )
  };
}

/// Generate an ioctl request code for a command that reads.
///
/// This is equivalent to the `_IOR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_read!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is reading and the kernel is
/// writing.
#[macro_export(local_inner_macros)]
macro_rules! request_code_read {
  ($g:expr, $n:expr, $len:expr) => {
    ioc!($crate::sys::ioctl::OUT, $g, $n, $len)
  };
```

```
}

/// Generate an ioctl request code for a command that writes.
///
///
 This is equivalent to the `_IOW()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is writing and the kernel is
/// reading.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::IN, $g, $n, $len)
   };
}

/// Generate an ioctl request code for a command that reads and writes.
///
/// This is equivalent to the `_IOWR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_readwrite!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_readwrite {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::INOUT, $g, $n, $len)

 };
}
```

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"#
use crate::errno::Errno;
use crate::sys::signal::Signal;
use crate::unistd::Pid;
use crate::Result;
use cfg_if::cfg_if;
use libc::{self, c_int};
use std::ptr;

```
pub type RequestType = c_int;

cfg_if! {
  if #[cfg(any(freebsdlike, apple_targets, target_os = "openbsd"))] {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_char;
  } else {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_void;
  }
}

libc_enum! {
  #[repr(i32)]
  /// Ptrace Request enum defining the action to be taken.
  #[non_exhaustive]
  pub enum Request {
    PT_TRACE_ME,
    PT_READ_I,
    PT_READ_D,
    #[cfg(apple_targets)]
    PT_READ_U,
    PT_WRITE_I,
    PT_WRITE_D,
    #[cfg(apple_targets)]
    PT_WRITE_U,
    PT_CONTINUE,
    PT_KILL,
    #[cfg(any(any(freebsdlike, apple_targets),
          all(target_os = "openbsd", target_arch = "x86_64"),
          all(target_os = "netbsd", any(target_arch = "x86_64",
                                target_arch = "powerpc"))))]
    PT_STEP,
    PT_ATTACH,
    PT_DETACH,
    #[cfg(apple_targets)]
    PT_SIGEXC,
    #[cfg(apple_targets)]
    PT_THUPDATE,
    #[cfg(apple_targets)]
    PT_ATTACHEXC
  }
}

unsafe fn ptrace_other(
  request: Request,
  pid: Pid,
  addr: AddressType,
```

```
    data: c_int,
) -> Result<c_int> {
    unsafe {
        Errno::result(libc::ptrace(
            request as RequestType,
            libc::pid_t::from(pid),
            addr,
            data,
        ))
        .map(|_| 0)
    }
}

/// Sets the process as traceable, as with `ptrace(PT_TRACEME, ...)`
///
/// Indicates that this process is to be traced by its parent.
/// This is the only ptrace request to be issued by the tracee.
pub fn traceme() -> Result<()> {
    unsafe {
        ptrace_other(Request::PT_TRACE_ME, Pid::from_raw(0), ptr::null_mut(), 0)
            .map(drop)
    }
}

/// Attach to a running
 process, as with `ptrace(PT_ATTACH, ...)`
///
/// Attaches to the process specified by `pid`, making it a tracee of the calling process.
pub fn attach(pid: Pid) -> Result<()> {
    unsafe {
        ptrace_other(Request::PT_ATTACH, pid, ptr::null_mut(), 0).map(drop)
    }
}

/// Detaches the current running process, as with `ptrace(PT_DETACH, ...)`
///
/// Detaches from the process specified by `pid` allowing it to run freely, optionally delivering a
/// signal specified by `sig`.
pub fn detach<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
    let data = match sig.into() {
        Some(s) => s as c_int,
        None => 0,
    };
    unsafe {
        ptrace_other(Request::PT_DETACH, pid, ptr::null_mut(), data).map(drop)
    }
}
```

```
/// Restart the stopped tracee process, as with `ptrace(PTRACE_CONT, ...)`
///
/// Continues the execution of the process with PID `pid`, optionally
/// delivering a signal specified by `sig`.
pub fn cont<T: Into<Option<Signal>>>(pid: Pid, sig: T)
 -> Result<()> {
   let data = match sig.into() {
       Some(s) => s as c_int,
       None => 0,
   };
   unsafe {
       // Ignore the useless return value
       ptrace_other(Request::PT_CONTINUE, pid, 1 as AddressType, data)
           .map(drop)
   }
}

/// Issues a kill request as with `ptrace(PT_KILL, ...)`
///
/// This request is equivalent to `ptrace(PT_CONTINUE, ..., SIGKILL);`
pub fn kill(pid: Pid) -> Result<()> {
   unsafe {
       ptrace_other(Request::PT_KILL, pid, 0 as AddressType, 0).map(drop)
   }
}

/// Move the stopped tracee process forward by a single step as with
/// `ptrace(PT_STEP, ...)`
///
/// Advances the execution of the process with PID `pid` by a single step optionally delivering a
/// signal specified by `sig`.
///
/// # Example
/// ```rust
/// use nix::sys::ptrace::step;
/// use nix::unistd::Pid;
/// use nix::sys::signal::Signal;
/// use nix::sys::wait::*;
/// // If a process changes state to the stopped state because of a SIGUSR1
/// // signal,
 this will step the process forward and forward the user
/// // signal to the stopped process
/// match waitpid(Pid::from_raw(-1), None) {
///     Ok(WaitStatus::Stopped(pid, Signal::SIGUSR1)) => {
///         let _ = step(pid, Signal::SIGUSR1);
///     }
///     _ => {},
/// }
```

```
/// ```
#[cfg(any(
  any(freebsdlike, apple_targets),
  all(target_os = "openbsd", target_arch = "x86_64"),
  all(
    target_os = "netbsd",
    any(target_arch = "x86_64", target_arch = "powerpc")
  )
))]
pub fn step<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
  let data = match sig.into() {
    Some(s) => s as c_int,
    None => 0,
  };
  unsafe {
    ptrace_other(Request::PT_STEP, pid, ptr::null_mut(), data).map(drop)
  }
}

/// Reads a word from a processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn read(pid: Pid, addr: AddressType)
 -> Result<c_int> {
  unsafe {
    // Traditionally there was a difference between reading data or
    // instruction memory but not in modern systems.
    ptrace_other(Request::PT_READ_D, pid, addr, 0)
  }
}

/// Writes a word into the processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn write(pid: Pid, addr: AddressType, data: c_int) -> Result<()> {
  unsafe { ptrace_other(Request::PT_WRITE_D, pid, addr, data).map(drop) }
}
```

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Version 1.1 - 26 February 2007

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# 1.2269 memchr 2.7.5

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# 1.2270 csv-core 0.1.12

## 1.2270.1 Available under license :

```
//! FreeBSD and NetBSD xattr support.

use libc::{c_int, c_void, size_t, EPERM};
use std::ffi::{CString, OsStr, OsString};
use std::io;
use std::mem;
use std::os::unix::ffi::{OsStrExt, OsStringExt};
use std::os::unix::io::{AsRawFd, BorrowedFd};
use std::path::Path;
use std::ptr;

use libc::{
  extattr_delete_fd, extattr_delete_file, extattr_delete_link, extattr_get_fd, extattr_get_file,
  extattr_get_link, extattr_list_fd, extattr_list_file, extattr_list_link, extattr_set_fd,
  extattr_set_file, extattr_set_link, EXTATTR_NAMESPACE_SYSTEM, EXTATTR_NAMESPACE_USER,
};

use crate::util::allocate_loop;

pub const ENOATTR: i32 = libc::ENOATTR;
pub const ERANGE: i32 = libc::ERANGE;

const EXTATTR_NAMESPACE_USER_STRING: &str = "user";
const EXTATTR_NAMESPACE_SYSTEM_STRING: &str = "system";
const EXTATTR_NAMESPACE_NAMES: [&str; 3] = [
  "empty",
  EXTATTR_NAMESPACE_USER_STRING,
  EXTATTR_NAMESPACE_SYSTEM_STRING,
];

fn path_to_c(path: &Path) -> io::Result<CString> {
  match CString::new(path.as_os_str().as_bytes())
 {
     Ok(name) => Ok(name),
     Err(_) => Err(io::Error::new(io::ErrorKind::NotFound, "file not found")),
  }
}
```

```
#[inline]
fn slice_parts(buf: &mut [u8]) -> (*mut c_void, size_t) {
  if buf.is_empty() {
    (ptr::null_mut(), 0)
  } else {
    (buf.as_mut_ptr().cast(), buf.len() as size_t)
  }
}

/// An iterator over a set of extended attributes names.
#[derive(Default)]
pub struct XAttrs {
  user_attrs: Box<[u8]>,
  system_attrs: Box<[u8]>,
  offset: usize,
}

impl Clone for XAttrs {
  fn clone(&self) -> Self {
    XAttrs {
      user_attrs: Vec::from(&*self.user_attrs).into_boxed_slice(),
      system_attrs: Vec::from(&*self.system_attrs).into_boxed_slice(),
      offset: self.offset,
    }
  }

  fn clone_from(&mut self, other: &XAttrs) {
    self.offset = other.offset;

    let mut data = mem::replace(&mut self.user_attrs, Box::new([])).into_vec();
    data.extend(other.user_attrs.iter().cloned());
     self.user_attrs = data.into_boxed_slice();

    data = mem::replace(&mut self.system_attrs, Box::new([])).into_vec();
    data.extend(other.system_attrs.iter().cloned());
    self.system_attrs = data.into_boxed_slice();
  }
}

impl Iterator for XAttrs {
  type Item = OsString;
  fn next(&mut self) -> Option<OsString> {
    if self.user_attrs.is_empty() && self.system_attrs.is_empty() {
      return None;
    }

    if self.offset == self.user_attrs.len() + self.system_attrs.len() {
```

```
            return None;
        }

        let data = if self.offset < self.system_attrs.len() {
            &self.system_attrs[self.offset..]
        } else {
            &self.user_attrs[self.offset - self.system_attrs.len()..]
        };

        let siz = data[0] as usize;

        self.offset += siz + 1;
        if self.offset < self.system_attrs.len() {
            Some(prefix_namespace(
                OsStr::from_bytes(&data[1..siz
 + 1]),
                EXTATTR_NAMESPACE_SYSTEM,
            ))
        } else {
            Some(prefix_namespace(
                OsStr::from_bytes(&data[1..siz + 1]),
                EXTATTR_NAMESPACE_USER,
            ))
        }
    }

    fn size_hint(&self) -> (usize, Option<usize>) {
        if self.user_attrs.len() + self.system_attrs.len() == self.offset {
            (0, Some(0))
        } else {
            (1, None)
        }
    }
}

// This could use libc::extattr_string_to_namespace, but it's awkward because
// that requires nul-terminated strings, which Rust's std is loathe to provide.
fn name_to_ns(name: &OsStr) -> io::Result<(c_int, CString)> {
    let mut groups = name.as_bytes().splitn(2, |&b| b == b'.').take(2);
    let nsname = match groups.next() {
        Some(s) => s,
        None => {
            return Err(io::Error::new(
                io::ErrorKind::InvalidInput,
                "couldn't find namespace",
            ))
        }
    };
```

```
  let propname
 = match groups.next() {
      Some(s) => s,
      None => {
         return Err(io::Error::new(
            io::ErrorKind::InvalidInput,
            "couldn't find attribute",
         ))
      }
  };

  let ns_int = match EXTATTR_NAMESPACE_NAMES
      .iter()
      .position(|&s| s.as_bytes() == nsname)
  {
      Some(i) => i,
      None => {
         return Err(io::Error::new(
            io::ErrorKind::InvalidInput,
            "no matching namespace",
         ))
      }
  };

  Ok((ns_int as c_int, CString::new(propname)?))
}

fn prefix_namespace(attr: &OsStr, ns: c_int) -> OsString {
  let nsname = EXTATTR_NAMESPACE_NAMES[ns as usize];
  let mut v = Vec::with_capacity(nsname.as_bytes().len() + attr.as_bytes().len() + 1);
  v.extend(nsname.as_bytes());
  v.extend(".".as_bytes());
  v.extend(attr.as_bytes());
  OsString::from_vec(v)
}

fn cvt(res: libc::ssize_t) -> io::Result<usize> {
  if res < 0 {
      Err(io::Error::last_os_error())
   } else {
      Ok(res as usize)
  }
}

pub fn get_fd(fd: BorrowedFd<'_>, name: &OsStr) -> io::Result<Vec<u8>> {
  let (ns, name) = name_to_ns(name)?;
  unsafe {
```

```
        allocate_loop(|buf| {
            let (ptr, len) = slice_parts(buf);
            cvt(extattr_get_fd(fd.as_raw_fd(), ns, name.as_ptr(), ptr, len))
        })
    }
}

pub fn set_fd(fd: BorrowedFd<'_>, name: &OsStr, value: &[u8]) -> io::Result<()> {
    let (ns, name) = name_to_ns(name)?;
    let ret = unsafe {
        extattr_set_fd(
            fd.as_raw_fd(),
            ns,
            name.as_ptr(),
            value.as_ptr() as *const c_void,
            value.len() as size_t,
        )
    };
    if ret == -1 {
        Err(io::Error::last_os_error())
    } else {
        Ok(())
    }
}

pub fn remove_fd(fd: BorrowedFd<'_>, name: &OsStr) -> io::Result<()> {
    let (ns, name) = name_to_ns(name)?;
    let ret = unsafe { extattr_delete_fd(fd.as_raw_fd(), ns, name.as_ptr()) };

 if ret != 0 {
        Err(io::Error::last_os_error())
    } else {
        Ok(())
    }
}

pub fn list_fd(fd: BorrowedFd<'_>) -> io::Result<XAttrs> {
    let sysvec = unsafe {
        let res = allocate_loop(|buf| {
            let (ptr, len) = slice_parts(buf);
            cvt(extattr_list_fd(
                fd.as_raw_fd(),
                EXTATTR_NAMESPACE_SYSTEM,
                ptr,
                len,
            ))
        });
        // On FreeBSD, system attributes require root privileges to view. However,
```

```
        // to mimic the behavior of listxattr in linux and osx, we need to query
        // them anyway and return empty results if we get EPERM
        match res {
            Ok(v) => v,
            Err(err) => {
                if err.raw_os_error() == Some(EPERM) {
                    Vec::new()
                } else {
                    return Err(err);
                }
            }
        }
    };

    let uservec = unsafe {
        let res = allocate_loop(|buf|
   {
            let (ptr, len) = slice_parts(buf);
            cvt(extattr_list_fd(
                fd.as_raw_fd(),
                EXTATTR_NAMESPACE_USER,
                ptr,
                len,
            ))
        });
        match res {
            Ok(v) => v,
            Err(err) => return Err(err),
        }
    };

    Ok(XAttrs {
        system_attrs: sysvec.into_boxed_slice(),
        user_attrs: uservec.into_boxed_slice(),
        offset: 0,
    })
}

pub fn get_path(path: &Path, name: &OsStr, deref: bool) -> io::Result<Vec<u8>> {
    let (ns, name) = name_to_ns(name)?;
    let path = path_to_c(path)?;
    let extattr_get_func = if deref {
        extattr_get_file
    } else {
        extattr_get_link
    };
    unsafe {
        allocate_loop(|buf| {
```

```
            let (ptr, len) = slice_parts(buf);
            cvt(extattr_get_func(path.as_ptr(), ns, name.as_ptr(), ptr, len))
        })
    }
}

pub fn set_path(path: &Path, name: &OsStr, value: &[u8], deref: bool) -> io::Result<()>
 {
    let (ns, name) = name_to_ns(name)?;
    let path = path_to_c(path)?;
    let extattr_set_func = if deref {
        extattr_set_file
    } else {
        extattr_set_link
    };
    let ret = unsafe {
        extattr_set_func(
            path.as_ptr(),
            ns,
            name.as_ptr(),
            value.as_ptr() as *const c_void,
            value.len() as size_t,
        )
    };
    if ret == -1 {
        Err(io::Error::last_os_error())
    } else {
        Ok(())
    }
}

pub fn remove_path(path: &Path, name: &OsStr, deref: bool) -> io::Result<()> {
    let (ns, name) = name_to_ns(name)?;
    let path = path_to_c(path)?;
    let extattr_delete_func = if deref {
        extattr_delete_file
    } else {
        extattr_delete_link
    };
    let ret = unsafe { extattr_delete_func(path.as_ptr(), ns, name.as_ptr()) };
    if ret != 0 {
        Err(io::Error::last_os_error())
    } else {
        Ok(())
    }
}

pub fn list_path(path: &Path, deref: bool) -> io::Result<XAttrs>
```

```
{
  let path = path_to_c(path)?;
  let extattr_list_func = if deref {
      extattr_list_file
  } else {
      extattr_list_link
  };
  let sysvec = unsafe {
      let res = allocate_loop(|buf| {
          let (ptr, len) = slice_parts(buf);
          cvt(extattr_list_func(
              path.as_ptr(),
              EXTATTR_NAMESPACE_SYSTEM,
              ptr,
              len,
          ))
      });
      // On FreeBSD, system attributes require root privileges to view. However,
      // to mimic the behavior of listxattr in linux and osx, we need to query
      // them anyway and return empty results if we get EPERM
      match res {
          Ok(v) => v,
          Err(err) => {
              if err.raw_os_error() == Some(EPERM) {
                  Vec::new()
              } else {
                  return Err(err);
              }
          }
      }
  };

  let uservec = unsafe {
      let res = allocate_loop(|buf|
{
          let (ptr, len) = slice_parts(buf);
          cvt(extattr_list_func(
              path.as_ptr(),
              EXTATTR_NAMESPACE_USER,
              ptr,
              len,
          ))
      });
      match res {
          Ok(v) => v,
          Err(err) => return Err(err),
      }
  };
```

```
  Ok(XAttrs {
      system_attrs: sysvec.into_boxed_slice(),
      user_attrs: uservec.into_boxed_slice(),
      offset: 0,
  })
}
```

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The implementation for Utf8CharIndices was adapted from the
CharIndices implementation of the Rust standard library at revision
ab32548539ec38a939c1b58599249f3b54130026
(https://github.com/rust-lang/rust/blob/ab32548539ec38a939c1b58599249f3b54130026/library/core/src/str/iter.rs).

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"#

```
//! This file contains the BSD APIs available in Haiku. It corresponds to the
//! header files in `headers/compatibility/bsd`.
//!
//! Note that Haiku's BSD compatibility is a combination of system APIs and
//! utility libraries. There should only be system APIs in `libc`. When you are
//! trying to determine whether something should be included in this file, the
//! best indicator is whether it also exists in the BSD-specific definitions in
//! this libc crate.

use crate::prelude::*;

// stringlist.h (utility library)
// Note: this is kept because it was previously introduced
pub type StringList = _stringlist;

s! {
  // stringlist.h (utility library)
  // Note: this is kept because it was previously introduced
  pub struct _stringlist {
      pub sl_str: *mut *mut c_char,
      pub sl_max: size_t,
```

```
        pub sl_cur: size_t,
    }

    // sys/event.h
    pub struct kevent {
        pub ident: crate::uintptr_t,
        pub filter: c_short,
        pub flags: c_ushort,

    pub fflags: c_uint,
        pub data: i64,
        pub udata: *mut c_void,
        pub ext: [u64; 4],
    }

    // sys/link_elf.h
    pub struct dl_phdr_info {
        pub dlpi_addr: crate::Elf_Addr,
        pub dlpi_name: *const c_char,
        pub dlpi_phdr: *const crate::Elf_Phdr,
        pub dlpi_phnum: crate::Elf_Half,
    }
}

// sys/event.h
pub const EVFILT_READ: i16 = -1;
pub const EVFILT_WRITE: i16 = -2;
pub const EVFILT_PROC: i16 = -5;
pub const EV_ADD: u16 = 0x0001;
pub const EV_DELETE: u16 = 0x0002;
pub const EV_ONESHOT: u16 = 0x0010;
pub const EV_CLEAR: u16 = 0x0020;
pub const EV_EOF: u16 = 0x8000;
pub const EV_ERROR: u16 = 0x4000;
pub const NOTE_EXIT: u32 = 0x80000000;

// sys/ioccom.h
pub const IOC_VOID: c_ulong = 0x20000000;
pub const IOC_OUT: c_ulong = 0x40000000;
pub const IOC_IN: c_ulong = 0x80000000;
pub const IOC_INOUT: c_ulong = IOC_IN | IOC_OUT;
pub const IOC_DIRMASK: c_ulong = 0xe0000000;

#[link(name = "bsd")]
extern "C" {
    // stdlib.h
    pub fn daemon(nochdir:
```

```
c_int, noclose: c_int) -> c_int;
  pub fn getprogname() -> *const c_char;
  pub fn setprogname(progname: *const c_char);
  pub fn arc4random() -> u32;
  pub fn arc4random_uniform(upper_bound: u32) -> u32;
  pub fn arc4random_buf(buf: *mut c_void, n: size_t);
  pub fn mkstemps(template: *mut c_char, suffixlen: c_int) -> c_int;
  pub fn strtonum(
      nptr: *const c_char,
      minval: c_longlong,
      maxval: c_longlong,
      errstr: *mut *const c_char,
  ) -> c_longlong;

  // pty.h
  pub fn openpty(
      amaster: *mut c_int,
      aslave: *mut c_int,
      name: *mut c_char,
      termp: *mut crate::termios,
      winp: *mut crate::winsize,
  ) -> c_int;
  pub fn login_tty(_fd: c_int) -> c_int;
  pub fn forkpty(
      amaster: *mut c_int,
      name: *mut c_char,
      termp: *mut crate::termios,
      winp: *mut crate::winsize,
  ) -> crate::pid_t;

  // string.h
  pub fn strsep(string: *mut *mut c_char, delimiters:
*const c_char) -> *mut c_char;
  pub fn explicit_bzero(buf: *mut c_void, len: size_t);

  // stringlist.h (utility library)
  // Note: this is kept because it was previously introduced
  pub fn sl_init() -> *mut StringList;
  pub fn sl_add(sl: *mut StringList, n: *mut c_char) -> c_int;
  pub fn sl_free(sl: *mut StringList, i: c_int);
  pub fn sl_find(sl: *mut StringList, n: *mut c_char) -> *mut c_char;

  // sys/event.h
  pub fn kqueue() -> c_int;
  pub fn kevent(
      kq: c_int,
      changelist: *const kevent,
      nchanges: c_int,
```

```
        eventlist: *mut kevent,
        nevents: c_int,
        timeout: *const crate::timespec,
    ) -> c_int;

    // sys/link_elf.h
    pub fn dl_iterate_phdr(
        callback: Option<
            unsafe extern "C" fn(info: *mut dl_phdr_info, size: usize, data: *mut c_void) -> c_int,
        >,
        data: *mut c_void,
    ) -> c_int;

    // sys/time.h
    pub fn lutimes(file: *const c_char, times: *const crate::timeval)
  -> c_int;

    // sys/uov.h
    pub fn preadv(
        fd: c_int,
        iov: *const crate::iovec,
        iovcnt: c_int,
        offset: crate::off_t,
    ) -> ssize_t;
    pub fn pwritev(
        fd: c_int,
        iov: *const crate::iovec,
        iovcnt: c_int,
        offset: crate::off_t,
    ) -> ssize_t;

    // sys/wait.h
    pub fn wait4(
        pid: crate::pid_t,
        status: *mut c_int,
        options: c_int,
        rusage: *mut crate::rusage,
    ) -> crate::pid_t;
}
================================================================================
```

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Lizenzvertrag

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1. Definitionen

a. Unter einer Bearbeitung wird eine bersetzung oder andere Bearbeitung des Werkes verstanden, die Ihre persnliche geistige Schpfung  ist. Eine freie Benutzung des Werkes wird nicht als Bearbeitung angesehen.

b. Unter den Lizenzelementen werden die folgenden Lizenzcharakteristika verstanden, die vom Lizenzgeber ausgewhlt und  in der Bezeichnung  der Lizenz genannt werden: Namensnennung, Nicht-kommerziell, Weitergabe unter gleichen Bedingungen.

c. Unter dem Lizenzgeber wird die natrliche oder juristische Person verstanden, die den Schutzgegenstand unter den Bedingungen dieser Lizenz anbietet.

d. Unter einem Sammelwerk wird eine Sammlung von Werken, Daten oder anderen unabhngigen Elementen

verstanden, die aufgrund der Auswahl oder Anordnung der Elemente eine persnliche geistige Schpfung ist. Darunter fallen auch solche Sammelwerke, deren Elemente
systematisch oder methodisch angeordnet und einzeln mit Hilfe elektronischer Mittel oder auf andere Weise zugnglich sind (Datenbankwerke). Ein Sammelwerk wird im Zusammenhang mit dieser Lizenz nicht als Bearbeitung (wie oben beschrieben) angesehen.

e. Mit SIE und Ihnen ist die natrliche oder juristische Person gemeint, die die durch diese Lizenz gewhrten Nutzungsrechte ausbt und die zuvor die Bedingungen dieser Lizenz im Hinblick auf das Werk nicht verletzt hat, oder die die ausdrckliche Erlaubnis des Lizenzgebers erhalten hat, die durch diese Lizenz gewhrten Nutzungsrechte trotz einer vorherigen Verletzung auszuben.

f. Unter dem Schutzgegenstandwird das Werk oder Sammelwerk oder das Schutzobjekt eines verwandten Schutzrechts, das Ihnen unter den Bedingungen dieser Lizenz angeboten wird, verstanden

g. Unter dem Urheber wird die natrliche Person verstanden, die das Werk geschaffen hat.

h. Unter einem verwandten Schutzrecht wird das Recht an einem anderen
urheberrechtlichen Schutzgegenstand als einem Werk verstanden, zum Beispiel einer wissenschaftlichen Ausgabe, einem nachgelassenen Werk, einem Lichtbild, einer Datenbank, einem Tontrger, einer Funksendung, einem Laufbild oder einer Darbietung eines ausbenden Knstlers.

i. Unter dem Werk wird eine persnliche geistige Schpfung verstanden, die Ihnen unter den Bedingungen dieser Lizenz angeboten wird.

2. Schranken des Urheberrechts. Diese Lizenz lsst smtliche Befugnisse unberhrt, die sich aus den Schranken des Urheberrechts,aus dem Erschpfungsgrundsatz oder anderen Beschrnkungen der Ausschlielichkeitsrechte des Rechtsinhabers ergeben.

3. Lizenzierung. Unter den Bedingungen dieses Lizenzvertrages rumt Ihnen der Lizenzgeber ein lizenzgebhrenfreies, rumlich und zeitlich (fr die Dauer des Urheberrechts oder verwandten Schutzrechts) unbeschrnktes einfaches Nutzungsrecht ein, den Schutzgegenstand in der folgenden Art und Weise zu nutzen:

a. den Schutzgegenstand in krperlicher Form
zu verwerten, insbesondere zu vervielfltigen, zu verbreiten und auszustellen;

b. den Schutzgegenstand in unkrperlicher Form ffentlich wiederzugeben, insbesondere vorzutragen, aufzufhren und vorzufhren, ffentlich zugnglich zu machen, zu senden, durch Bild- und Tontrger wiederzugeben sowie Funksendungen und ffentliche Zugnglichmachungen wiederzugeben;

c. den Schutzgegenstand auf Bild- oder Tontrger aufzunehmen, Lichtbilder davon herzustellen, weiterzusenden und in dem in a. und b. genannten Umfang zu verwerten;

d. den Schutzgegenstand zu bearbeiten oder in anderer Weise umzugestalten und die Bearbeitungen zu verffentlichen und in dem in a. bis c. genannten Umfang zu verwerten;

Die genannten Nutzungsrechte knnen fr alle bekannten Nutzungsarten ausgebt werden. Die genannten Nutzungsrechte beinhalten das Recht, solche Vernderungen an dem Werk vorzunehmen, die technisch erforderlich sind, um die Nutzungsrechte fr alle Nutzungsarten wahrzunehmen. Insbesondere sind davon

die Anpassung an andere Medien und auf andere Dateiformate umfasst.

4. Beschrnkungen. Die Einrumung der Nutzungsrechte gem Ziffer 3 erfolgt ausdrcklich nur unter den folgenden Bedingungen:

a. Sie drfen den Schutzgegenstand ausschlielich unter den Bedingungen dieser Lizenz vervielfltigen, verbreiten oder ffentlich wiedergeben, und Sie mssen stets eine Kopie oder die vollstndige Internetadresse in Form des Uniform-Resource-Identifier (URI) dieser Lizenz beifgen, wenn Sie den Schutzgegenstandvervielfltigen, verbreiten oder ffentlich wiedergeben. Sie drfen keine Vertragsbedingungen anbieten oder fordern, die die Bedingungen dieser Lizenz oder die durch sie gewhrten Rechte ndern oder beschrnken. Sie drfen den Schutzgegenstand nicht unterlizenzieren. Sie mssen alle Hinweise unverndert lassen, die auf diese Lizenz und den Haftungsausschluss hinweisen. Sie drfen den Schutzgegenstand mit keinen technischen Schutzmanahmen versehen, die den Zugang oder den Gebrauch des Schutzgegenstandes
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b. Sie drfen eine Bearbeitung ausschlielich unter den Bedingungen dieser Lizenz, einer spteren Version dieser Lizenz mit denselben Lizenzelementen wie diese Lizenz oder einer Creative Commons iCommons Lizenz, die dieselben Lizenzelemente wie diese Lizenz
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c. Sie drfen die in Ziffer 3 gewhrten Nutzungsrechte in keiner Weise verwenden, die hauptschlich auf einen geschftlichen Vorteil oder eine vertraglich geschuldete geldwerte Vergtung abzielt oder darauf gerichtet ist. Erhalten Sie im Zusammenhang mit der Einrumung der Nutzungsrechte ebenfalls einen Schutzgegenstand, ohne dass eine vertragliche Verpflichtung hierzu besteht, so wird dies nicht als geschftlicher Vorteil oder vertraglich geschuldete geldwerte Vergtung angesehen, wenn keine Zahlung oder geldwerte Vergtung in Verbindung mit dem Austausch der Schutzgegenstnde geleistet wird (z.B. File-Sharing).

d. Wenn Sie den Schutzgegenstand oder eine Bearbeitung oder ein Sammelwerk vervielfltigen, verbreiten oder ffentlich wiedergeben, mssen Sie alle Urhebervermerke fr den Schutzgegenstand unverndert lassen und die Urheberschaft oder Rechtsinhaberschaft in einer der von Ihnen vorgenommenen
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e. Obwohl die gemss Ziffer 3 gewhrten Nutzungsrechte in umfassender Weise ausgebt werden drfen, findet diese Erlaubnis ihre gesetzliche Grenze in den Persnlichkeitsrechten der Urheber und ausbenden Knstler, deren berechtigte geistige und persnliche Interessen bzw. deren Ansehen oder Ruf nicht dadurch gefhrdet werden drfen, dass ein Schutzgegenstand ber das gesetzlich zulssige Ma hinaus beeintrchtigt wird.

5. Gewhrleistung. Sofern dies von den Vertragsparteien nicht anderweitig schriftlich vereinbart,, bietet der Lizenzgeber keine Gewhrleistung fr die erteilten Rechte, auer fr den Fall, dass Mngel arglistig verschwiegen wurden. Fr Mngel anderer Art, insbesondere bei der mangelhaften Lieferung von Verkrperungen des Schutzgegenstandes, richtet sich die Gewhrleistung nach der Regelung, die die Person, die Ihnen den Schutzgegenstand
zur Verfgung stellt, mit Ihnen auerhalb dieser Lizenz vereinbart, oder - wenn eine solche Regelung nicht getroffen wurde - nach den gesetzlichen Vorschriften.

6. Haftung. ber die in Ziffer 5 genannte Gewhrleistung hinaus haftet Ihnen der Lizenzgeber nur fr Vorsatz und grobe Fahrlssigkeit.

7. Vertragsende

a. Dieser Lizenzvertrag und die durch ihn eingerumten Nutzungsrechte enden automatisch bei jeder Verletzung der Vertragsbedingungen durch Sie. Fr natrliche und juristische Personen, die von Ihnen eine Bearbeitung, eine Datenbank oder ein Sammelwerk unter diesen Lizenzbedingungen erhalten haben, gilt die Lizenz jedoch weiter, vorausgesetzt, diese natrlichen oder juristischen Personen erfllen smtliche Vertragsbedingungen. Die Ziffern 1, 2, 5, 6, 7 und 8 gelten bei einer Vertragsbeendigung fort.

b. Unter den oben genannten Bedingungen erfolgt die Lizenz auf unbegrenzte Zeit (fr die Dauer des Schutzrechts). Dennoch behlt sich der Lizenzgeber das Recht vor, den Schutzgegenstand
unter anderen Lizenzbedingungen zu nutzen oder die eigene Weitergabe des Schutzgegenstandes jederzeit zu beenden, vorausgesetzt, dass solche Handlungen nicht dem Widerruf dieser Lizenz dienen (oder jeder anderen Lizenzierung, die auf Grundlage dieser Lizenz erfolgt ist oder erfolgen muss) und diese Lizenz wirksam bleibt, bis Sie unter den oben genannten Voraussetzungen endet.

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a. Jedes Mal, wenn Sie den Schutzgegenstand vervielfltigen, verbreiten oder ffentlich wiedergeben, bietet der Lizenzgeber dem Erwerber eine Lizenz fr den Schutzgegenstand unter denselben Vertragsbedingungen an, unter denen er Ihnen die Lizenz eingerumt hat.

b. Jedes Mal, wenn Sie eine Bearbeitung vervielfltigen, verbreiten oder ffentlich wiedergeben, bietet der

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c. Sollte eine Bestimmung dieses Lizenzvertrages unwirksam sein, so wird die Wirksamkeit der brigen Lizenzbestimmungen dadurch nicht berhrt, und an die Stelle der unwirksamen Bestimmung tritt eine Ersatzregelung, die dem mit der unwirksamen Bestimmung angestrebten Zweck am nchsten kommt.

d. Nichts soll dahingehend ausgelegt werden, dass auf eine Bestimmung dieses Lizenzvertrages verzichtet oder einer Vertragsverletzung zugestimmt wird, so lange ein solcher Verzicht oder eine solche Zustimmung nicht schriftlich vorliegen und von der verzichtenden oder zustimmenden Vertragspartei unterschrieben sind

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f. Auf diesen Lizenzvertrag findet das Recht der Bundesrepublik Deutschland Anwendung.

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Version 2, June 1991

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[This is the first released version of the library GPL. It is numbered 2 because it goes with version 2 of the ordinary GPL.]

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Version 3, 29 June 2007

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Die nach diesem Abschnitt
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//! `ioctl` opcode behavior for BSD platforms.

```
use super::{Direction, Opcode};

pub(super) const fn compose_opcode(
   dir: Direction,
   group: Opcode,
   num: Opcode,
   size: Opcode,
) -> Opcode {
   let dir = match dir {
       Direction::None => NONE,
       Direction::Read => READ,
```

```
        Direction::Write => WRITE,
        Direction::ReadWrite => READ | WRITE,
    };

    dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}

// `IOC_VOID`
pub const NONE: Opcode = 0x2000_0000;
// `IOC_OUT` (out is from the perspective of the kernel)
pub const READ: Opcode = 0x4000_0000;
// `IOC_IN` (in is from the perspective of the kernel)
pub const WRITE: Opcode = 0x8000_0000;
pub const IOCPARAM_MASK: Opcode = 0x1FFF;
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SOFTWARE.
//! `ioctl` opcode behavior for BSD platforms.

use super::{Direction, RawOpcode};

```
pub(super) const fn compose_opcode(
  dir: Direction,
  group: RawOpcode,
  num: RawOpcode,
  size: RawOpcode,
) -> RawOpcode {
  let dir = match dir {
    Direction::None => NONE,
    Direction::Read => READ,
    Direction::Write => WRITE,
    Direction::ReadWrite => READ | WRITE,
  };

  dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}

// `IOC_VOID`
pub const NONE: RawOpcode = 0x2000_0000;
// `IOC_OUT` (out is from the perspective of the kernel)
pub const READ: RawOpcode = 0x4000_0000;
// `IOC_IN` (in is from the perspective of the kernel)
pub const WRITE: RawOpcode = 0x8000_0000;
pub const IOCPARAM_MASK: RawOpcode = 0x1FFF;
```

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By Shawn Hargreaves, 18 October 1998.

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Lizenz

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DURCH DIE AUSBUNG EINES DURCH DIESE LIZENZ GEWHRTEN RECHTS AN DEM SCHUTZGEGENSTAND ERKLREN SIE SICH MIT DEN LIZENZBEDINGUNGEN RECHTSVERBINDLICH EINVERSTANDEN. SOWEIT DIESE LIZENZ ALS LIZENZVERTRAG ANZUSEHEN IST,
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1. Definitionen

a. Der Begriff "Bearbeitung" im Sinne dieser Lizenz bezeichnet das Ergebnis jeglicher Art von Vernderung des Schutzgegenstandes, solange dieses erkennbar vom Schutzgegenstand abgeleitet wurde. Dies kann insbesondere auch eine Umgestaltung, nderung, Anpassung, bersetzung oder Heranziehung des Schutzgegenstandes zur Vertonung von Laufbildern sein. Nicht als Bearbeitung des Schutzgegenstandes gelten seine Aufnahme in eine Sammlung oder ein Sammelwerk und die freie Nutzung des Schutzgegenstandes.

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c. "Verbreiten" im Sinne dieser Lizenz bedeutet, den Schutzgegenstand oder Bearbeitungen im Original oder in Form von Vervielfltigungsstcken, mithin in krperlich fixierter Form der ffentlichkeit zugnglich zu machen oder in Verkehr zu bringen.

d. Unter "Lizenzelementen" werden im Sinne dieser Lizenz die folgenden bergeordneten Lizenzcharakteristika verstanden, die vom Lizenzgeber ausgewhlt wurden und in der Bezeichnung der Lizenz zum Ausdruck kommen: "Namensnennung", "Weitergabe unter gleichen Bedingungen".

e. Der "Lizenzgeber" im Sinne dieser Lizenz ist diejenige natrliche oder juristische Person oder Gruppe, die den Schutzgegenstand unter den Bedingungen dieser Lizenz anbietet und insoweit als Rechteinhaberin auftritt.

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ii. erlaubt ausdrcklich das Lizenzieren von ihr unterstellten Abwandlungen unter vorliegender Lizenz, unter einer anderen rechtsordnungsspezifisch angepassten Creative-Commons-Lizenz mit denselben Lizenzelementen wie vorliegende Lizenz aufweist oder unter der entsprechenden Creative-Commons-Unported-Lizenz.

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a. Den Schutzgegenstand in beliebiger Form und Menge zu vervielfltigen, ihn in Sammelwerke zu integrieren und ihn als Teil solcher Sammelwerke zu vervielfltigen;

b. Den Schutzgegenstand zu bearbeiten, einschlielich bersetzungen unter Nutzung jedweder Medien anzufertigen, sofern deutlich erkennbar gemacht wird, dass es sich um eine Bearbeitung handelt;

c. Den Schutzgegenstand, allein oder in Sammelwerke aufgenommen, ffentlich wiederzugeben und zu verbreiten; und

d. Bearbeitungen des Schutzgegenstandes zu verffentlichen, ffentlich wiederzugeben und zu verbreiten.

e. Bezglich Vergtung fr die Nutzung des Schutzgegenstandes gilt Folgendes:

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4. Bedingungen

Die Erteilung der Nutzungsbewilligung gem Abschnitt 3 dieser Lizenz erfolgt ausdrcklich nur unter den folgenden Bedingungen:

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b. Sie drfen eine Bearbeitung ausschlielich unter den Bedingungen

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ii. einer spteren Version dieser Lizenz mit denselben Lizenzelementen,

iii. einer rechtsordnungsspezifischen Creative-Commons-Lizenz mit denselben Lizenzelementen ab Version 3.0 aufwrts (z.B. Namensnennung - Weitergabe unter gleichen Bedingungen 3.0 US),

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Folge leisten.

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ii. den Titel des Inhaltes;

iii. in einer praktikablen Form den Uniform-Resource-Identifier (URI, z.B. Internetadresse), den der Lizenzgeber zum Schutzgegenstand angegeben hat, es sei denn, dieser URI verweist nicht auf den Rechtevermerk oder die Lizenzinformationen zum Schutzgegenstand;

iv. und im Falle einer Bearbeitung des Schutzgegenstandes in bereinstimmung mit Abschnitt 3.b) einen Hinweis darauf, dass es sich um eine Bearbeitung handelt.

Die nach diesem Abschnitt 4.c) erforderlichen Angaben knnen in jeder angemessenen Form gemacht werden; im Falle einer Bearbeitung des Schutzgegenstandes oder eines Sammelwerkes mssen diese Angaben das Minimum darstellen und bei gemeinsamer Nennung aller Beitragenden dergestalt erfolgen, dass sie zumindest ebenso

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6. Haftungsbeschrnkung

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a. Diese Lizenz und die durch sie erteilte Nutzungsbewilligung erlschen mit Wirkung fr die Zukunft im Falle eines Verstoes
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Licentie

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DE LICENTIEGEVER VERLEENT DE GEBRUIKER DE IN DEZE LICENTIE OMSCHREVEN RECHTEN MET INACHTNEMING VAN DE DESBETREFFENDE VOORWAARDEN.

1. Definities

a. 'Verzamelwerk' een werk waarin het Werk, in zijn geheel en in ongewijzigde vorm, samen met een of meer andere werken, die elk een afzonderlijk en zelfstandig werk vormen, tot een geheel is samengevoegd. Voorbeelden van een verzamelwerk zijn een tijdschrift, een bloemlezing of een encyclopedie. Een Verzamelwerk zal voor de

toepassing van deze Licentie niet als een Afgeleid werk (als hieronder omschreven) worden beschouwd.

b. 'Afgeleid werk' een werk dat is gebaseerd op het Werk of op het Werk en andere reeds bestaande werken. Voorbeelden van een Afgeleid werk zijn
een vertaling, een muziekschikking (arrangement), een toneelbewerking, een literaire bewerking, een verfilming, een geluidsopname, een kunstreproductie, een verkorte versie, een samenvatting of enig andere bewerking van het Werk, met dien verstande dat een Verzamelwerk voor de toepassing van deze Licentie niet als een Afgeleid werk zal worden beschouwd.

Indien het Werk een muziekwerk betreft, zal de synchronisatie van de tijdslijnen van het Werk en een bewegend beeld ('synching') voor de toepassing van deze Licentie als een Afgeleid Werk worden beschouwd.

c. 'Licentiegever' de natuurlijke persoon/personen of rechtspersoon/rechtspersonen die het Werk volgens de voorwaarden van deze Licentie aanbiedt/aanbieden.

d. 'Maker' de natuurlijke persoon/personen of rechtspersoon/personen die het oorspronkelijke werk gemaakt heeft/hebben. Voor de toepassing van deze Licentie wordt onder de Maker mede verstaan de uitvoerende kunstenaar, film- en fonogramproducent en omroeporganisaties
in de zin van de Wet op de naburige rechten en de producent van een databank in de zin van de Databankenwet.

e. 'Werk' het auteursrechtelijk beschermde werk dat volgens de voorwaarden van deze Licentie wordt aangeboden. Voor de toepassing van deze Licentie wordt onder het Werk mede verstaan het fonogram, de eerste vastlegging van een film en het (omroep)programma in de zin van de Wet op de naburige rechten en de databank in de zin van de Databankenwet, voor zover dit fonogram, deze eerste vastlegging van een film, dit (omroep)programma en deze databank beschermd wordt krachtens de toepasselijke wet in de jurisdictie van de Gebruiker.

f. 'Gebruiker' de natuurlijke persoon of rechtspersoon die rechten ingevolge deze Licentie uitoefent en die de voorwaarden van deze Licentie met betrekking tot het Werk niet eerder geschonden heeft, of die van de Licentiegever uitdrukkelijke toestemming gekregen heeft om rechten ingevolge deze Licentie uit te oefenen ondanks een eerdere schending.

2.
Beperkingen van de uitsluitende rechten. Niets in deze Licentie strekt ertoe om de rechten te beperken die voortvloeien uit de beperkingen en uitputting van de uitsluitende rechten van de rechthebbende krachtens het auteursrecht, de naburige rechten, het databankenrecht of enige andere toepasselijke rechten.

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b. het maken en reproduceren van Afgeleide werken met dien verstande dat met betrekking tot het Afgeleide werk, met inbegrip van welke vertaling in welk medium dan ook, duidelijk wordt gemaakt
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c. het verspreiden van exemplaren van het Werk, het in het openbaar tonen, op- en uitvoeren en het on-line beschikbaar stellen van het Werk, afzonderlijk en als deel van een Verzamelwerk;

d. het verspreiden van exemplaren van Afgeleide werken, het in het openbaar te tonen, op- en uitvoeren en het on-line beschikbaar stellen van Afgeleide werken;

e. het opvragen en hergebruiken van het Werk;

f. Volledigheidshalve dient te worden vermeld dat:

i. Niet voor afstand vatbare heffingsregelingen. in het geval van niet voor afstand vatbare heffingsregelingen (bijvoorbeeld met betrekking tot thuiskopien) de Licentiegever zich het recht voorbehoudt om dergelijke heffingen te innen
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ii. Voor afstand vatbare heffingsregeling. in het geval van voor afstand vatbare heffingsregelingen (bijvoorbeeld met betrekking tot leenrechten) de Licentiegever afstand doet van het recht om dergelijke heffingen te innen bij zowel commercieel als niet-commercieel gebruik van het Werk;

iii. Collectief rechtenbeheer. de Licentiegever afstand doet van het recht om vergoedingen te innen (zelfstandig of, indien de Licentiegever lid is van een auteursrechtenorganisatie, door middel van die organisatie) bij zowel commercieel als niet-commercieel gebruik van het Werk.

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uitdrukkelijk verleende rechten zijn hierbij voorbehouden aan de Licentiegever, met inbegrip van maar niet beperkt tot de rechten die in artikel 4(d) worden genoemd. Voor zover de Licentiegever op basis van het nationale recht ter implementatie van de Europese Databankenrichtlijn over uitsluitende rechten beschickt doet de Licentiegever afstand van deze rechten.

4. Beperkingen. De in artikel 3 verleende Licentie is uitdrukkelijk gebonden aan de volgende beperkingen:

a. De Gebruiker mag het Werk uitsluitend verspreiden, in het openbaar tonen, op- of uitvoeren of on-line beschikbaar stellen met inachtneming van de voorwaarden van deze Licentie, en de Gebruiker dient een exemplaar van, of de Uniform Resource Identifier voor, deze Licentie toe te voegen aan elk exemplaar van het Werk dat de Gebruiker verspreidt, in het openbaar toont, op- of uitvoert, of on-line beschikbaar stelt. Het is de Gebruiker niet toegestaan om het Werk onder enige afwijkende voorwaarden aan te bieden waardoor
de voorwaarden van deze Licentie dan wel de mogelijkheid van de ontvangers van het Werk om de rechten krachtens deze Licentie uit te oefenen worden beperkt. Het is de Gebruiker niet toegestaan om het Werk in sublicentie te geven. De Gebruiker dient alle vermeldingen die verwijzen naar deze Licentie dan wel naar de uitsluiting van garantie te laten staan. Het is de Gebruiker niet toegestaan om het Werk te verspreiden, in het openbaar te tonen, op- of uit te voeren of on-line beschikbaar te stellen met toepassing van technologische voorzieningen waardoor de voorwaarden van deze Licentie dan wel de mogelijkheid van de ontvangers van het Werk om de rechten krachtens deze Licentie uit te oefenen worden beperkt. Het voorgaande is tevens van toepassing op het Werk dat deel uitmaakt van een Verzamelwerk, maar dat houdt niet in dat het Verzamelwerk, afgezien van

het Werk zelf, gebonden is aan de voorwaarden van deze Licentie. Indien de Gebruiker een Verzamelwerk maakt, dient deze, op verzoek
van welke Licentiegever ook, de op grond van artikel 4(b) vereiste naamsvermelding uit het Verzamelwerk te verwijderen, voor zover praktisch mogelijk, conform het verzoek. Indien de Gebruiker een Afgeleid werk maakt, dient hij, op verzoek van welke Licentiegever ook, de op grond van artikel 4(b) vereiste naamsvermelding uit het Afgeleide werk te verwijderen, voorzover praktisch mogelijk, conform het verzoek.

b. Indien de Gebruiker het Werk, Afgeleide Werken of Verzamelwerken verspreidt, in het openbaar toont, op- of uitvoert of on-line beschikbaar stelt, dient de Gebruiker, tenzij er sprake is van een verzoek als vermeld in lid 4(a), alle auteursrechtvermeldingen met betrekking tot het Werk te laten staan. Tevens dient de Gebruiker, op een wijze die redelijk is in verhouding tot het gebruikte medium, de naam te vermelden van (i) de Maker (of zijn/haar pseudoniem indien van toepassing) indien deze wordt vermeld; en/of (ii) van (een) andere partij(en) (b.v. sponsor, uitgeverij, tijdschrift)
indien de naamsvermelding van deze partij(en) ("Naamsvermeldingsgerechtigden") in de auteursrechtvermelding of algemene voorwaarden van de Licentiegever of op een andere redelijke wijze verplicht is gesteld door de Maker en/of de Licentiegever; de titel van het Werk indien deze wordt vermeld; voorzover redelijkerwijs toepasbaar de Uniform Resource Identifier, indien aanwezig, waarvan de Licentiegever heeft aangegeven dat deze bij het Werk hoort, tenzij de URI niet verwijst naar de auteursrechtvermeldingen of de licentie-informatie betreffende het Werk; in overeenstemming met artikel 3(b) in geval van een Afgeleid werk, door te verwijzen naar het gebruik van het Werk in het Afgeleide werk (bijvoorbeeld: 'De Franse vertaling van het Werk van de Maker' of 'Scenario gebaseerd op het Werk van de Maker'). De Gebruiker dient op redelijke wijze aan de in dit artikel genoemde vereisten te voldoen; echter, met dien verstande dat, in geval van een Afgeleid werk of een Verzamelwerk, de
naamsvermeldingen in ieder geval geplaatst dienen te worden, indien er een naamsvermelding van alle makers van het Afgeleide werk of het Verzamelwerk geplaatst wordt dan als deel van die naamsvermeldingen, en op een wijze die in ieder geval even duidelijk is als de naamsvermeldingen van de overige makers.

Volledigheidshalve dient te worden vermeld dat de Gebruiker uitsluitend gebruik mag maken van de naamsvermelding op de in dit artikel omschreven wijze teneinde te voldoen aan de naamsvermeldingsverplichting en, door gebruikmaking van zijn rechten krachtens deze Licentie, is het de Gebruiker niet toegestaan om op enigerlei wijze de indruk te wekken dat er sprake is van enig verband met, sponsorschap van of goedkeuring van de (toepasselijke) Maker, Licentiegever c.q. Naamsvermeldingsgerechtigden van de Gebruiker of diens gebruik van het Werk, zonder de afzonderlijke, uitdrukkelijke, voorafgaande, schriftelijke toestemming van de Maker, Licentiegever c.q. Naamsvermeldingsgerechtigden.

c. Volledigheidshalve dient te worden vermeld, dat de hierboven vermelde beperkingen (lid 4(a) en lid 4(b)) niet van toepassing zijn op die onderdelen van het Werk die geacht worden te vallen onder de definitie van het 'Werk' zoals vermeld in deze Licentie uitsluitend omdat zij voldoen aan de criteria van het sui generis databankenrecht krachtens het nationale recht ter implementatie van de Europese Databankenrichtlijn.

d. De in artikel 3 verleende rechten moeten worden uitgeoefend met inachtneming van het morele recht van de Maker (en/of de uitvoerende kunstenaar) om zich te verzetten tegen elke misvorming, verminking of andere aantasting van het werk, welke nadeel zou kunnen toebrengen aan de eer of de naam van de Maker (en/of de uitvoerende kunstenaar) of aan zijn waarde in deze hoedanigheid, indien en voor zover de Maker (en/of de uitvoerende kunstenaar) op grond van een op hem van toepassing zijnde wettelijke bepaling geen afstand kan doen van dat morele recht.

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```
/// The datatype used for the ioctl number
#[doc(hidden)]
#[cfg(not(solarish))]
pub type ioctl_num_type = ::libc::c_ulong;

#[doc(hidden)]
#[cfg(solarish)]
pub type ioctl_num_type = ::libc::c_int;

/// The datatype used for the 3rd argument
#[doc(hidden)]
pub type ioctl_param_type = ::libc::c_int;

mod consts {
  use crate::sys::ioctl::ioctl_num_type;
  #[doc(hidden)]
  pub const VOID: ioctl_num_type = 0x2000_0000;
  #[doc(hidden)]
  pub const OUT: ioctl_num_type = 0x4000_0000;
  #[doc(hidden)]
  #[allow(overflowing_literals)]
  pub const IN: ioctl_num_type = 0x8000_0000;
  #[doc(hidden)]
  pub const INOUT: ioctl_num_type = IN | OUT;
  #[doc(hidden)]
  pub const IOCPARM_MASK: ioctl_num_type = 0x1fff;
}

pub use self::consts::*;

#[macro_export]
#[doc(hidden)]
macro_rules! ioc {
  ($inout:expr, $group:expr, $num:expr, $len:expr) => {
    $inout
      | (($len as $crate::sys::ioctl::ioctl_num_type
        & $crate::sys::ioctl::IOCPARM_MASK)
```

```
            << 16)
          | (($group as $crate::sys::ioctl::ioctl_num_type) << 8)
          | ($num as $crate::sys::ioctl::ioctl_num_type)
   };
}

/// Generate an ioctl request code for a command that passes no data.
///
/// This is equivalent to the `_IO()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_none!()` directly.
///
/// # Example
///
/// ```
/// # #[macro_use] extern crate nix;
/// const KVMIO: u8 = 0xAE;
/// ioctl_write_int_bad!(kvm_create_vm, request_code_none!(KVMIO, 0x03));
/// # fn main() {}
/// ```
#[macro_export(local_inner_macros)]
macro_rules! request_code_none {
   ($g:expr, $n:expr) => {
      ioc!($crate::sys::ioctl::VOID, $g, $n, 0)
   };
}

/// Generate an ioctl request code for a command that passes an integer
///
/// This is equivalent to the `_IOWINT()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the
 `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write_int!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write_int {
   ($g:expr, $n:expr) => {
      ioc!(
         $crate::sys::ioctl::VOID,
         $g,
         $n,
         ::std::mem::size_of::<$crate::libc::c_int>()
      )
   };
}

/// Generate an ioctl request code for a command that reads.
```

```
///
/// This is equivalent to the `_IOR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_read!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is reading and the kernel is
/// writing.
#[macro_export(local_inner_macros)]
macro_rules! request_code_read {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::OUT, $g, $n, $len)
   };
}

/// Generate an ioctl request code for a command that writes.
///
///
 This is equivalent to the `_IOW()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is writing and the kernel is
/// reading.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::IN, $g, $n, $len)
   };
}

/// Generate an ioctl request code for a command that reads and writes.
///
/// This is equivalent to the `_IOWR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_readwrite!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_readwrite {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::INOUT, $g, $n, $len)

 };
}
```

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"#

```
use crate::errno::Errno;
use crate::sys::signal::Signal;
use crate::unistd::Pid;
use crate::Result;
use cfg_if::cfg_if;
use libc::{self, c_int};
use std::ptr;

pub type RequestType = c_int;

cfg_if! {
  if #[cfg(any(freebsdlike, apple_targets, target_os = "openbsd"))] {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_char;
```

```
  } else {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_void;
  }
}

libc_enum! {
  #[repr(i32)]
  /// Ptrace Request enum defining the action to be taken.
  #[non_exhaustive]
  pub enum Request {
    PT_TRACE_ME,
    PT_READ_I,
    PT_READ_D,
    #[cfg(apple_targets)]
    PT_READ_U,
    PT_WRITE_I,
    PT_WRITE_D,
    #[cfg(apple_targets)]
    PT_WRITE_U,
    PT_CONTINUE,
    PT_KILL,
    #[cfg(any(any(freebsdlike, apple_targets),
          all(target_os = "openbsd", target_arch = "x86_64"),
          all(target_os = "netbsd", any(target_arch = "x86_64",
                                target_arch = "powerpc"))))]
    PT_STEP,
    PT_ATTACH,
    PT_DETACH,
    #[cfg(apple_targets)]
    PT_SIGEXC,
    #[cfg(apple_targets)]
    PT_THUPDATE,
    #[cfg(apple_targets)]
    PT_ATTACHEXC
  }
}

unsafe fn ptrace_other(
  request: Request,
  pid: Pid,
  addr: AddressType,
  data: c_int,
) -> Result<c_int> {
  unsafe {
    Errno::result(libc::ptrace(
      request as RequestType,
      libc::pid_t::from(pid),
```

```
            addr,
            data,
        ))
        .map(|_| 0)
    }
}

/// Sets the process as traceable, as with `ptrace(PT_TRACEME, ...)`
///
/// Indicates that this process is to be traced by its parent.
/// This is the only ptrace request to be issued by the tracee.
pub fn traceme() -> Result<()> {
    unsafe {
        ptrace_other(Request::PT_TRACE_ME, Pid::from_raw(0), ptr::null_mut(), 0)
            .map(drop)
    }
}

/// Attach to a running
 process, as with `ptrace(PT_ATTACH, ...)`
///
/// Attaches to the process specified by `pid`, making it a tracee of the calling process.
pub fn attach(pid: Pid) -> Result<()> {
    unsafe {
        ptrace_other(Request::PT_ATTACH, pid, ptr::null_mut(), 0).map(drop)
    }
}

/// Detaches the current running process, as with `ptrace(PT_DETACH, ...)`
///
/// Detaches from the process specified by `pid` allowing it to run freely, optionally delivering a
/// signal specified by `sig`.
pub fn detach<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
    let data = match sig.into() {
        Some(s) => s as c_int,
        None => 0,
    };
    unsafe {
        ptrace_other(Request::PT_DETACH, pid, ptr::null_mut(), data).map(drop)
    }
}

/// Restart the stopped tracee process, as with `ptrace(PTRACE_CONT, ...)`
///
/// Continues the execution of the process with PID `pid`, optionally
/// delivering a signal specified by `sig`.
pub fn cont<T: Into<Option<Signal>>>(pid: Pid, sig: T)
```

```
 -> Result<()> {
   let data = match sig.into() {
       Some(s) => s as c_int,
       None => 0,
   };
   unsafe {
       // Ignore the useless return value
       ptrace_other(Request::PT_CONTINUE, pid, 1 as AddressType, data)
           .map(drop)
   }
}

/// Issues a kill request as with `ptrace(PT_KILL, ...)`
///
/// This request is equivalent to `ptrace(PT_CONTINUE, ..., SIGKILL);`
pub fn kill(pid: Pid) -> Result<()> {
   unsafe {
       ptrace_other(Request::PT_KILL, pid, 0 as AddressType, 0).map(drop)
   }
}

/// Move the stopped tracee process forward by a single step as with
/// `ptrace(PT_STEP, ...)`
///
/// Advances the execution of the process with PID `pid` by a single step optionally delivering a
/// signal specified by `sig`.
///
/// # Example
/// ```rust
/// use nix::sys::ptrace::step;
/// use nix::unistd::Pid;
/// use nix::sys::signal::Signal;
/// use nix::sys::wait::*;
/// // If a process changes state to the stopped state because of a SIGUSR1
/// // signal,
 this will step the process forward and forward the user
/// // signal to the stopped process
/// match waitpid(Pid::from_raw(-1), None) {
///     Ok(WaitStatus::Stopped(pid, Signal::SIGUSR1)) => {
///         let _ = step(pid, Signal::SIGUSR1);
///     }
///     _ => {},
/// }
/// ```
#[cfg(any(
   any(freebsdlike, apple_targets),
   all(target_os = "openbsd", target_arch = "x86_64"),
   all(
```

```
        target_os = "netbsd",
        any(target_arch = "x86_64", target_arch = "powerpc")
    )
))]
pub fn step<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
    let data = match sig.into() {
        Some(s) => s as c_int,
        None => 0,
    };
    unsafe {
        ptrace_other(Request::PT_STEP, pid, ptr::null_mut(), data).map(drop)
    }
}

/// Reads a word from a processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn read(pid: Pid, addr: AddressType)
 -> Result<c_int> {
    unsafe {
        // Traditionally there was a difference between reading data or
        // instruction memory but not in modern systems.
        ptrace_other(Request::PT_READ_D, pid, addr, 0)
    }
}

/// Writes a word into the processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn write(pid: Pid, addr: AddressType, data: c_int) -> Result<()> {
    unsafe { ptrace_other(Request::PT_WRITE_D, pid, addr, data).map(drop) }
}
```

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Version 1.0 dated 2006-09-05.
"#
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Version 1.1 - 26 February 2007

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# 1.2271 anyhow 1.0.99

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# 1.2272 tracing-subscriber 0.3.20

## 1.2272.1 Available under license :

```
//! FreeBSD and NetBSD xattr support.

use libc::{c_int, c_void, size_t, EPERM};
use std::ffi::{CString, OsStr, OsString};
use std::io;
use std::mem;
use std::os::unix::ffi::{OsStrExt, OsStringExt};
use std::os::unix::io::{AsRawFd, BorrowedFd};
use std::path::Path;
use std::ptr;

use libc::{
  extattr_delete_fd, extattr_delete_file, extattr_delete_link, extattr_get_fd, extattr_get_file,
  extattr_get_link, extattr_list_fd, extattr_list_file, extattr_list_link, extattr_set_fd,
  extattr_set_file, extattr_set_link, EXTATTR_NAMESPACE_SYSTEM, EXTATTR_NAMESPACE_USER,
};

use crate::util::allocate_loop;

pub const ENOATTR: i32 = libc::ENOATTR;
pub const ERANGE: i32 = libc::ERANGE;

const EXTATTR_NAMESPACE_USER_STRING: &str = "user";
const EXTATTR_NAMESPACE_SYSTEM_STRING: &str = "system";
const EXTATTR_NAMESPACE_NAMES: [&str; 3] = [
  "empty",
  EXTATTR_NAMESPACE_USER_STRING,
  EXTATTR_NAMESPACE_SYSTEM_STRING,
];

fn path_to_c(path: &Path) -> io::Result<CString> {
```

```
  match CString::new(path.as_os_str().as_bytes())
 {
      Ok(name) => Ok(name),
      Err(_) => Err(io::Error::new(io::ErrorKind::NotFound, "file not found")),
  }
}

#[inline]
fn slice_parts(buf: &mut [u8]) -> (*mut c_void, size_t) {
  if buf.is_empty() {
      (ptr::null_mut(), 0)
  } else {
      (buf.as_mut_ptr().cast(), buf.len() as size_t)
  }
}

/// An iterator over a set of extended attributes names.
#[derive(Default)]
pub struct XAttrs {
  user_attrs: Box<[u8]>,
  system_attrs: Box<[u8]>,
  offset: usize,
}

impl Clone for XAttrs {
  fn clone(&self) -> Self {
      XAttrs {
          user_attrs: Vec::from(&*self.user_attrs).into_boxed_slice(),
          system_attrs: Vec::from(&*self.system_attrs).into_boxed_slice(),
          offset: self.offset,
      }
  }

  fn clone_from(&mut self, other: &XAttrs) {
      self.offset = other.offset;

      let mut data = mem::replace(&mut self.user_attrs, Box::new([])).into_vec();
      data.extend(other.user_attrs.iter().cloned());
       self.user_attrs = data.into_boxed_slice();

      data = mem::replace(&mut self.system_attrs, Box::new([])).into_vec();
      data.extend(other.system_attrs.iter().cloned());
      self.system_attrs = data.into_boxed_slice();
  }
}

impl Iterator for XAttrs {
  type Item = OsString;
```

```
  fn next(&mut self) -> Option<OsString> {
      if self.user_attrs.is_empty() && self.system_attrs.is_empty() {
          return None;
      }

      if self.offset == self.user_attrs.len() + self.system_attrs.len() {
          return None;
      }

      let data = if self.offset < self.system_attrs.len() {
          &self.system_attrs[self.offset..]
      } else {
          &self.user_attrs[self.offset - self.system_attrs.len()..]
      };

      let siz = data[0] as usize;

      self.offset += siz + 1;
      if self.offset < self.system_attrs.len() {
          Some(prefix_namespace(
              OsStr::from_bytes(&data[1..siz
+ 1]),
              EXTATTR_NAMESPACE_SYSTEM,
          ))
      } else {
          Some(prefix_namespace(
              OsStr::from_bytes(&data[1..siz + 1]),
              EXTATTR_NAMESPACE_USER,
          ))
      }
  }

  fn size_hint(&self) -> (usize, Option<usize>) {
      if self.user_attrs.len() + self.system_attrs.len() == self.offset {
          (0, Some(0))
      } else {
          (1, None)
      }
  }
}

// This could use libc::extattr_string_to_namespace, but it's awkward because
// that requires nul-terminated strings, which Rust's std is loathe to provide.
fn name_to_ns(name: &OsStr) -> io::Result<(c_int, CString)> {
  let mut groups = name.as_bytes().splitn(2, |&b| b == b'.').take(2);
  let nsname = match groups.next() {
      Some(s) => s,
      None => {
```

```
            return Err(io::Error::new(
                io::ErrorKind::InvalidInput,
                "couldn't find namespace",
            ))
        }
    };

    let propname
   = match groups.next() {
        Some(s) => s,
        None => {
            return Err(io::Error::new(
                io::ErrorKind::InvalidInput,
                "couldn't find attribute",
            ))
        }
    };

    let ns_int = match EXTATTR_NAMESPACE_NAMES
        .iter()
        .position(|&s| s.as_bytes() == nsname)
    {
        Some(i) => i,
        None => {
            return Err(io::Error::new(
                io::ErrorKind::InvalidInput,
                "no matching namespace",
            ))
        }
    };

    Ok((ns_int as c_int, CString::new(propname)?))
}

fn prefix_namespace(attr: &OsStr, ns: c_int) -> OsString {
    let nsname = EXTATTR_NAMESPACE_NAMES[ns as usize];
    let mut v = Vec::with_capacity(nsname.as_bytes().len() + attr.as_bytes().len() + 1);
    v.extend(nsname.as_bytes());
    v.extend(".".as_bytes());
    v.extend(attr.as_bytes());
    OsString::from_vec(v)
}

fn cvt(res: libc::ssize_t) -> io::Result<usize> {
    if res < 0 {
        Err(io::Error::last_os_error())
     } else {
        Ok(res as usize)
```

```
    }
}

pub fn get_fd(fd: BorrowedFd<'_>, name: &OsStr) -> io::Result<Vec<u8>> {
    let (ns, name) = name_to_ns(name)?;
    unsafe {
        allocate_loop(|buf| {
            let (ptr, len) = slice_parts(buf);
            cvt(extattr_get_fd(fd.as_raw_fd(), ns, name.as_ptr(), ptr, len))
        })
    }
}

pub fn set_fd(fd: BorrowedFd<'_>, name: &OsStr, value: &[u8]) -> io::Result<()> {
    let (ns, name) = name_to_ns(name)?;
    let ret = unsafe {
        extattr_set_fd(
            fd.as_raw_fd(),
            ns,
            name.as_ptr(),
            value.as_ptr() as *const c_void,
            value.len() as size_t,
        )
    };
    if ret == -1 {
        Err(io::Error::last_os_error())
    } else {
        Ok(())
    }
}

pub fn remove_fd(fd: BorrowedFd<'_>, name: &OsStr) -> io::Result<()> {
    let (ns, name) = name_to_ns(name)?;
    let ret = unsafe { extattr_delete_fd(fd.as_raw_fd(), ns, name.as_ptr()) };

 if ret != 0 {
        Err(io::Error::last_os_error())
    } else {
        Ok(())
    }
}

pub fn list_fd(fd: BorrowedFd<'_>) -> io::Result<XAttrs> {
    let sysvec = unsafe {
        let res = allocate_loop(|buf| {
            let (ptr, len) = slice_parts(buf);
            cvt(extattr_list_fd(
                fd.as_raw_fd(),
```

```
            EXTATTR_NAMESPACE_SYSTEM,
            ptr,
            len,
        ))
    });
    // On FreeBSD, system attributes require root privileges to view. However,
    // to mimic the behavior of listxattr in linux and osx, we need to query
    // them anyway and return empty results if we get EPERM
    match res {
        Ok(v) => v,
        Err(err) => {
            if err.raw_os_error() == Some(EPERM) {
                Vec::new()
            } else {
                return Err(err);
            }
        }
    }
  };

  let uservec = unsafe {
    let res = allocate_loop(|buf|
 {
        let (ptr, len) = slice_parts(buf);
        cvt(extattr_list_fd(
            fd.as_raw_fd(),
            EXTATTR_NAMESPACE_USER,
            ptr,
            len,
        ))
    });
    match res {
        Ok(v) => v,
        Err(err) => return Err(err),
    }
  };

  Ok(XAttrs {
    system_attrs: sysvec.into_boxed_slice(),
    user_attrs: uservec.into_boxed_slice(),
    offset: 0,
  })
}

pub fn get_path(path: &Path, name: &OsStr, deref: bool) -> io::Result<Vec<u8>> {
  let (ns, name) = name_to_ns(name)?;
  let path = path_to_c(path)?;
  let extattr_get_func = if deref {
```

```
        extattr_get_file
    } else {
        extattr_get_link
    };
    unsafe {
        allocate_loop(|buf| {
            let (ptr, len) = slice_parts(buf);
            cvt(extattr_get_func(path.as_ptr(), ns, name.as_ptr(), ptr, len))
        })
    }
}

pub fn set_path(path: &Path, name: &OsStr, value: &[u8], deref: bool) -> io::Result<()>
 {
    let (ns, name) = name_to_ns(name)?;
    let path = path_to_c(path)?;
    let extattr_set_func = if deref {
        extattr_set_file
    } else {
        extattr_set_link
    };
    let ret = unsafe {
        extattr_set_func(
            path.as_ptr(),
            ns,
            name.as_ptr(),
            value.as_ptr() as *const c_void,
            value.len() as size_t,
        )
    };
    if ret == -1 {
        Err(io::Error::last_os_error())
    } else {
        Ok(())
    }
}

pub fn remove_path(path: &Path, name: &OsStr, deref: bool) -> io::Result<()> {
    let (ns, name) = name_to_ns(name)?;
    let path = path_to_c(path)?;
    let extattr_delete_func = if deref {
        extattr_delete_file
    } else {
        extattr_delete_link
    };
    let ret = unsafe { extattr_delete_func(path.as_ptr(), ns, name.as_ptr()) };
    if ret != 0 {
        Err(io::Error::last_os_error())
```

```
  } else {
      Ok(())
  }
}

pub fn list_path(path: &Path, deref: bool) -> io::Result<XAttrs>
 {
  let path = path_to_c(path)?;
  let extattr_list_func = if deref {
      extattr_list_file
  } else {
      extattr_list_link
  };
  let sysvec = unsafe {
      let res = allocate_loop(|buf| {
          let (ptr, len) = slice_parts(buf);
          cvt(extattr_list_func(
              path.as_ptr(),
              EXTATTR_NAMESPACE_SYSTEM,
              ptr,
              len,
          ))
      });
      // On FreeBSD, system attributes require root privileges to view. However,
      // to mimic the behavior of listxattr in linux and osx, we need to query
      // them anyway and return empty results if we get EPERM
      match res {
          Ok(v) => v,
          Err(err) => {
              if err.raw_os_error() == Some(EPERM) {
                  Vec::new()
              } else {
                  return Err(err);
              }
          }
      }
  };

  let uservec = unsafe {
      let res = allocate_loop(|buf|
 {
          let (ptr, len) = slice_parts(buf);
          cvt(extattr_list_func(
              path.as_ptr(),
              EXTATTR_NAMESPACE_USER,
              ptr,
              len,
          ))
```

```
        });
        match res {
            Ok(v) => v,
            Err(err) => return Err(err),
        }
    };

    Ok(XAttrs {
        system_attrs: sysvec.into_boxed_slice(),
        user_attrs: uservec.into_boxed_slice(),
        offset: 0,
    })
}
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CharIndices implementation of the Rust standard library at revision
ab32548539ec38a939c1b58599249f3b54130026
(https://github.com/rust-lang/rust/blob/ab32548539ec38a939c1b58599249f3b54130026/library/core/src/str/iter.rs).

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```
//! This file contains the BSD APIs available in Haiku. It corresponds to the
//! header files in `headers/compatibility/bsd`.
//!
//! Note that Haiku's BSD compatibility is a combination of system APIs and
//! utility libraries. There should only be system APIs in `libc`. When you are
//! trying to determine whether something should be included in this file, the
//! best indicator is whether it also exists in the BSD-specific definitions in
//! this libc crate.

use crate::prelude::*;

// stringlist.h (utility library)
// Note: this is kept because it was previously introduced
pub type StringList = _stringlist;

s! {
  // stringlist.h (utility library)
  // Note: this is kept because it was previously introduced
  pub struct _stringlist {
      pub sl_str: *mut *mut c_char,
      pub sl_max: size_t,
      pub sl_cur: size_t,
  }

  // sys/event.h
  pub struct kevent {
      pub ident: crate::uintptr_t,
      pub filter: c_short,
      pub flags: c_ushort,

  pub fflags: c_uint,
      pub data: i64,
      pub udata: *mut c_void,
      pub ext: [u64; 4],
  }
```

```
    // sys/link_elf.h
    pub struct dl_phdr_info {
        pub dlpi_addr: crate::Elf_Addr,
        pub dlpi_name: *const c_char,
        pub dlpi_phdr: *const crate::Elf_Phdr,
        pub dlpi_phnum: crate::Elf_Half,
    }
}

// sys/event.h
pub const EVFILT_READ: i16 = -1;
pub const EVFILT_WRITE: i16 = -2;
pub const EVFILT_PROC: i16 = -5;
pub const EV_ADD: u16 = 0x0001;
pub const EV_DELETE: u16 = 0x0002;
pub const EV_ONESHOT: u16 = 0x0010;
pub const EV_CLEAR: u16 = 0x0020;
pub const EV_EOF: u16 = 0x8000;
pub const EV_ERROR: u16 = 0x4000;
pub const NOTE_EXIT: u32 = 0x80000000;

// sys/ioccom.h
pub const IOC_VOID: c_ulong = 0x20000000;
pub const IOC_OUT: c_ulong = 0x40000000;
pub const IOC_IN: c_ulong = 0x80000000;
pub const IOC_INOUT: c_ulong = IOC_IN | IOC_OUT;
pub const IOC_DIRMASK: c_ulong = 0xe0000000;

#[link(name = "bsd")]
extern "C" {
    // stdlib.h
    pub fn daemon(nochdir:
 c_int, noclose: c_int) -> c_int;
    pub fn getprogname() -> *const c_char;
    pub fn setprogname(progname: *const c_char);
    pub fn arc4random() -> u32;
    pub fn arc4random_uniform(upper_bound: u32) -> u32;
    pub fn arc4random_buf(buf: *mut c_void, n: size_t);
    pub fn mkstemps(template: *mut c_char, suffixlen: c_int) -> c_int;
    pub fn strtonum(
        nptr: *const c_char,
        minval: c_longlong,
        maxval: c_longlong,
        errstr: *mut *const c_char,
    ) -> c_longlong;

    // pty.h
    pub fn openpty(
```

```
    amaster: *mut c_int,
    aslave: *mut c_int,
    name: *mut c_char,
    termp: *mut crate::termios,
    winp: *mut crate::winsize,
) -> c_int;
pub fn login_tty(_fd: c_int) -> c_int;
pub fn forkpty(
    amaster: *mut c_int,
    name: *mut c_char,
    termp: *mut crate::termios,
    winp: *mut crate::winsize,
) -> crate::pid_t;

// string.h
pub fn strsep(string: *mut *mut c_char, delimiters:
*const c_char) -> *mut c_char;
pub fn explicit_bzero(buf: *mut c_void, len: size_t);

// stringlist.h (utility library)
// Note: this is kept because it was previously introduced
pub fn sl_init() -> *mut StringList;
pub fn sl_add(sl: *mut StringList, n: *mut c_char) -> c_int;
pub fn sl_free(sl: *mut StringList, i: c_int);
pub fn sl_find(sl: *mut StringList, n: *mut c_char) -> *mut c_char;

// sys/event.h
pub fn kqueue() -> c_int;
pub fn kevent(
    kq: c_int,
    changelist: *const kevent,
    nchanges: c_int,
    eventlist: *mut kevent,
    nevents: c_int,
    timeout: *const crate::timespec,
) -> c_int;

// sys/link_elf.h
pub fn dl_iterate_phdr(
    callback: Option<
        unsafe extern "C" fn(info: *mut dl_phdr_info, size: usize, data: *mut c_void) -> c_int,
    >,
    data: *mut c_void,
) -> c_int;

// sys/time.h
pub fn lutimes(file: *const c_char, times: *const crate::timeval)
```

```
 -> c_int;

  // sys/uov.h
  pub fn preadv(
      fd: c_int,
      iov: *const crate::iovec,
      iovcnt: c_int,
      offset: crate::off_t,
  ) -> ssize_t;
  pub fn pwritev(
      fd: c_int,
      iov: *const crate::iovec,
      iovcnt: c_int,
      offset: crate::off_t,
  ) -> ssize_t;

  // sys/wait.h
  pub fn wait4(
      pid: crate::pid_t,
      status: *mut c_int,
      options: c_int,
      rusage: *mut crate::rusage,
  ) -> crate::pid_t;
}
```

==========

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b. Unter den Lizenzelementen werden die folgenden Lizenzcharakteristika verstanden, die vom Lizenzgeber ausgewhlt und in der Bezeichnung der Lizenz genannt werden: Namensnennung, Nicht-kommerziell, Weitergabe unter gleichen Bedingungen.

c. Unter dem Lizenzgeber wird die natrliche oder juristische Person verstanden, die den Schutzgegenstand unter den Bedingungen dieser Lizenz anbietet.

d. Unter einem Sammelwerk wird eine Sammlung von Werken, Daten oder anderen unabhngigen Elementen verstanden, die aufgrund der Auswahl oder Anordnung der Elemente eine persnliche geistige Schpfung ist. Darunter fallen auch solche Sammelwerke, deren Elemente systematisch oder methodisch angeordnet und einzeln mit Hilfe elektronischer Mittel oder auf andere Weise zugnglich sind (Datenbankwerke). Ein Sammelwerk wird im Zusammenhang mit dieser Lizenz nicht als Bearbeitung (wie oben beschrieben) angesehen.

e. Mit SIE und Ihnen ist die natrliche oder juristische Person gemeint, die die durch diese Lizenz gewhrten Nutzungsrechte ausbt und die zuvor die Bedingungen dieser Lizenz im Hinblick auf das Werk nicht verletzt hat, oder die die ausdrckliche Erlaubnis des Lizenzgebers erhalten hat, die durch diese Lizenz gewhrten Nutzungsrechte trotz einer vorherigen Verletzung auszuben.

f. Unter dem Schutzgegenstandwird das Werk oder Sammelwerk oder das Schutzobjekt eines verwandten Schutzrechts, das Ihnen unter den Bedingungen dieser Lizenz angeboten wird, verstanden

g. Unter dem Urheber wird die natrliche Person verstanden, die das Werk geschaffen hat.

h. Unter einem verwandten Schutzrecht wird das Recht an einem anderen

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i. Unter dem Werk wird eine persnliche geistige Schpfung verstanden, die Ihnen unter den Bedingungen dieser Lizenz angeboten wird.

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b. den Schutzgegenstand in unkrperlicher Form ffentlich wiederzugeben, insbesondere vorzutragen, aufzufhren und vorzufhren, ffentlich zugnglich zu machen, zu senden, durch Bild- und Tontrger wiederzugeben sowie Funksendungen und ffentliche Zugnglichmachungen wiederzugeben;

c. den Schutzgegenstand auf Bild- oder Tontrger aufzunehmen, Lichtbilder davon herzustellen, weiterzusenden und in dem in a. und b. genannten Umfang zu verwerten;

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been removed from OpenSSH, i.e.,

- RSA is no longer included, found in the OpenSSL library
- IDEA is no longer included, its use is deprecated
- DES is now external, in the OpenSSL library
- GMP is no longer used, and instead we call BN code from OpenSSL

- Zlib is now external, in a library
- The make-ssh-known-hosts script is no longer included
- TSS has been removed
- MD5 is now external, in the OpenSSL library
- RC4 support has been replaced with ARC4 support from OpenSSL
- Blowfish is now external, in the OpenSSL library

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SIE SICH MIT DEN LIZENZBEDINGUNGEN RECHTSVERBINDLICH EINVERSTANDEN. SOWEIT DIESE LIZENZ ALS LIZENZVERTRAG ANZUSEHEN IST, GEWHRT IHNEN DER LIZENZGEBER DIE IN DER LIZENZ GENANNTEN RECHTE UNENTGELTLICH UND IM AUSTAUSCH DAFR, DASS SIE DAS GEBUNDENSEIN AN DIE LIZENZBEDINGUNGEN AKZEPTIEREN.

1. Definitionen

a. Der Begriff "Abwandlung" im Sinne dieser Lizenz bezeichnet das Ergebnis jeglicher Art von Vernderung des Schutzgegenstandes, solange die eigenpersnlichen Zge des Schutzgegenstandes darin nicht verblassen und daran eigene Schutzrechte entstehen. Das kann insbesondere eine Bearbeitung, Umgestaltung, nderung, Anpassung, bersetzung oder Heranziehung des Schutzgegenstandes zur Vertonung von Laufbildern sein. Nicht als Abwandlung des Schutzgegenstandes gelten seine Aufnahme in eine Sammlung oder ein Sammelwerk und die freie Benutzung des Schutzgegenstandes.

b. Der Begriff "Sammelwerk" im Sinne dieser Lizenz meint eine Zusammenstellung von literarischen, knstlerischen oder wissenschaftlichen
Inhalten, sofern diese Zusammenstellung aufgrund von Auswahl und Anordnung der darin enthaltenen selbstndigen Elemente eine geistige Schpfung darstellt, unabhngig davon, ob die Elemente systematisch oder methodisch angelegt und dadurch einzeln zugnglich sind oder nicht.

c. "Verbreiten" im Sinne dieser Lizenz bedeutet, den Schutzgegenstand oder Abwandlungen im Original oder in Form von Vervielfltigungsstcken, mithin in krperlich fixierter Form der ffentlichkeit anzubieten oder in Verkehr zu bringen.

d. Unter "Lizenzelementen" werden im Sinne dieser Lizenz die folgenden bergeordneten Lizenzcharakteristika verstanden, die vom Lizenzgeber ausgewhlt wurden und in der Bezeichnung der Lizenz zum Ausdruck kommen: "Namensnennung", "Keine kommerzielle Nutzung", "Weitergabe unter gleichen Bedingungen".

e. Der "Lizenzgeber" im Sinne dieser Lizenz ist diejenige natrliche oder juristische Person oder Gruppe, die den Schutzgegenstand unter den Bedingungen dieser Lizenz
anbietet und insoweit als Rechteinhaberin auftritt.

f. "Rechteinhaber" im Sinne dieser Lizenz ist der Urheber des Schutzgegenstandes oder jede andere natrliche oder juristische Person oder Gruppe von Personen, die am Schutzgegenstand ein Immaterialgterrecht erlangt hat, welches die in Abschnitt 3 genannten Handlungen erfasst und bei dem eine Einrumung von Nutzungsrechten oder eine Weiterbertragung an Dritte mglich ist.

g. Der Begriff "Schutzgegenstand" bezeichnet in dieser Lizenz den literarischen, knstlerischen oder wissenschaftlichen Inhalt, der unter den Bedingungen dieser Lizenz angeboten wird. Das kann insbesondere eine persnliche geistige Schpfung jeglicher Art, ein Werk der kleinen Mnze, ein nachgelassenes Werk oder auch ein Lichtbild oder anderes Objekt eines verwandten Schutzrechts sein, unabhngig von der Art seiner Fixierung und unabhngig davon, auf welche Weise jeweils eine Wahrnehmung erfolgen kann, gleichviel ob in analoger oder digitaler Form. Soweit Datenbanken
oder Zusammenstellungen von Daten einen immaterialgterrechtlichen Schutz eigener Art genieen, unterfallen auch sie dem Begriff "Schutzgegenstand" im Sinne dieser Lizenz.

h. Mit "Sie" bzw. "Ihnen" ist die natrliche oder juristische Person gemeint, die in dieser Lizenz im Abschnitt 3 genannte Nutzungen des Schutzgegenstandes vornimmt und zuvor in Hinblick auf den Schutzgegenstand nicht gegen Bedingungen dieser Lizenz verstoen oder aber die ausdrckliche Erlaubnis des Lizenzgebers erhalten hat, die durch diese Lizenz gewhrten Nutzungsrechte trotz eines vorherigen Verstoes auszuben.

i. Unter "ffentlich Zeigen" im Sinne dieser Lizenz sind Verffentlichungen und Prsentationen des Schutzgegenstandes zu verstehen, die fr eine Mehrzahl von Mitgliedern der ffentlichkeit bestimmt sind und in unkrperlicher Form mittels ffentlicher Wiedergabe in Form von Vortrag, Auffhrung, Vorfhrung, Darbietung, Sendung, Weitersendung, zeit- und ortsunabhngiger Zugnglichmachung oder in krperlicher Form
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j. "Vervielfltigen" im Sinne dieser Lizenz bedeutet, mittels beliebiger Verfahren Vervielfltigungsstcke des Schutzgegenstandes herzustellen, insbesondere durch Ton- oder Bildaufzeichnungen, und umfasst auch den Vorgang, erstmals krperliche Fixierungen des Schutzgegenstandes sowie Vervielfltigungsstcke dieser Fixierungen anzufertigen, sowie die bertragung des Schutzgegenstandes auf einen Bild- oder Tontrger oder auf ein anderes elektronisches Medium, gleichviel ob in digitaler oder analoger Form.

2. Schranken des Immaterialgterrechts. Diese Lizenz ist in keiner Weise darauf gerichtet, Befugnisse zur Nutzung des Schutzgegenstandes zu vermindern, zu beschrnken oder zu vereiteln, die Ihnen aufgrund der Schranken des Urheberrechts oder anderer Rechtsnormen bereits
ohne Weiteres zustehen oder sich aus dem Fehlen eines immaterialgterrechtlichen Schutzes ergeben.

3. Einrumung von Nutzungsrechten. Unter den Bedingungen dieser Lizenz rumt Ihnen der Lizenzgeber - unbeschadet unverzichtbarer Rechte und vorbehaltlich des Abschnitts 4.f) - das vergtungsfreie, rumlich und zeitlich (fr die Dauer des Schutzrechts am Schutzgegenstand) unbeschrnkte einfache Recht ein, den Schutzgegenstand auf die folgenden Arten und Weisen zu nutzen ("unentgeltlich eingerumtes einfaches Nutzungsrecht fr jedermann"):

a. Den Schutzgegenstand in beliebiger Form und Menge zu vervielfltigen, ihn in Sammelwerke zu integrieren und ihn als Teil solcher Sammelwerke zu vervielfltigen;

b. Abwandlungen des Schutzgegenstandes anzufertigen, einschlielich bersetzungen unter Nutzung jedweder Medien, sofern deutlich erkennbar gemacht wird, dass es sich um Abwandlungen handelt;

c. den Schutzgegenstand, allein oder in Sammelwerke aufgenommen, ffentlich zu zeigen und zu verbreiten;

d. Abwandlungen des Schutzgegenstandes zu verffentlichen, ffentlich zu zeigen und zu verbreiten.

Das vorgenannte Nutzungsrecht wird fr alle bekannten sowie fr alle noch nicht bekannten Nutzungsarten eingerumt. Es beinhaltet auch das Recht, solche nderungen am Schutzgegenstand vorzunehmen, die fr bestimmte nach dieser Lizenz zulssige Nutzungen technisch erforderlich sind. Alle sonstigen Rechte, die ber diesen Abschnitt hinaus nicht ausdrcklich durch den Lizenzgeber eingerumt werden, bleiben diesem allein vorbehalten. Soweit Datenbanken oder Zusammenstellungen von Daten Schutzgegenstand dieser Lizenz oder Teil dessen sind und einen immaterialgterrechtlichen Schutz eigener Art genieen, verzichtet der Lizenzgeber auf smtliche aus diesem Schutz resultierenden Rechte.

4. Bedingungen. Die Einrumung des Nutzungsrechts gem Abschnitt 3 dieser Lizenz erfolgt ausdrcklich nur unter den folgenden Bedingungen:

a. Sie drfen den Schutzgegenstand ausschlielich unter den Bedingungen dieser Lizenz verbreiten oder ffentlich zeigen. Sie mssen dabei stets eine Kopie dieser Lizenz oder deren vollstndige Internetadresse in Form des Uniform-Resource-Identifier (URI) beifgen. Sie drfen keine Vertrags- oder Nutzungsbedingungen anbieten oder fordern, die die Bedingungen dieser Lizenz oder die durch diese Lizenz gewhrten Rechte beschrnken. Sie drfen den Schutzgegenstand nicht unterlizenzieren. Bei jeder Kopie des Schutzgegenstandes, die Sie verbreiten oder ffentlich zeigen, mssen Sie alle Hinweise unverndert lassen, die auf diese Lizenz und den Haftungsausschluss hinweisen. Wenn Sie den Schutzgegenstand verbreiten oder ffentlich zeigen, drfen Sie (in Bezug auf den Schutzgegenstand) keine technischen Manahmen ergreifen, die den Nutzer des Schutzgegenstandes in der Ausbung der ihm durch diese Lizenz gewhrten Rechte behindern knnen. Dieser Abschnitt 4.a) gilt auch fr den Fall, dass der Schutzgegenstand einen Bestandteil eines Sammelwerkes bildet, was jedoch nicht bedeutet, dass das Sammelwerk insgesamt dieser Lizenz unterstellt werden muss. Sofern Sie ein Sammelwerk erstellen, mssen Sie auf die Mitteilung eines Lizenzgebers hin aus dem Sammelwerk die in Abschnitt 4.d) aufgezhlten Hinweise entfernen. Wenn Sie eine Abwandlung vornehmen, mssen Sie auf die Mitteilung eines Lizenzgebers hin von der Abwandlung die in Abschnitt 4.d) aufgezhlten Hinweise entfernen.

b. Sie drfen eine Abwandlung ausschlielich unter den Bedingungen

i. dieser Lizenz,

ii. einer spteren Version dieser Lizenz mit denselben Lizenzelementen;

iii. einer rechtsordnungsspezifischen Creative-Commons-Lizenz mit denselben Lizenzelementen ab Version 3.0 aufwrts (z.B. Namensnennung - Keine kommerzielle Nutzung - Weitergabe unter gleichen Bedingungen 3.0 US) oder

iv. der Creative-Commons-Unported-Lizenz mit denselben Lizenzelementen ab Version 3.0 aufwrts

verbreiten oder ffentlich zeigen ("Verwendbare Lizenz").

Sie mssen stets eine
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c. Die Rechteeinrumung
gem Abschnitt 3 gilt nur fr Handlungen, die nicht vorrangig auf einen geschftlichen Vorteil oder eine geldwerte Vergtung gerichtet sind ("nicht-kommerzielle Nutzung", "Non-commercial-Option"). Wird Ihnen in Zusammenhang mit dem Schutzgegenstand dieser Lizenz ein anderer Schutzgegenstand berlassen, ohne dass eine vertragliche Verpflichtung hierzu besteht (etwa im Wege von File-Sharing), so wird dies nicht als auf geschftlichen Vorteil oder geldwerte Vergtung gerichtet angesehen, wenn in Verbindung mit dem Austausch der Schutzgegenstnde tatschlich keine Zahlung oder geldwerte Vergtung geleistet wird.

d. Die Verbreitung und das ffentliche Zeigen des Schutzgegenstandes oder auf ihm aufbauender Abwandlungen oder ihn enthaltender Sammelwerke ist Ihnen nur unter der Bedingung gestattet, dass Sie, vorbehaltlich etwaiger Mitteilungen im Sinne von Abschnitt 4.a), alle dazu gehrenden Rechtevermerke unberhrt lassen. Sie sind verpflichtet, die Rechteinhaberschaft in einer der Nutzung
entsprechenden, angemessenen Form anzuerkennen, indem Sie - soweit bekannt - Folgendes angeben:

i. Den Namen (oder das Pseudonym, falls ein solches verwendet wird) des Rechteinhabers und / oder, falls der Lizenzgeber im Rechtevermerk, in den Nutzungsbedingungen oder auf andere angemessene Weise eine Zuschreibung an Dritte vorgenommen hat (z.B. an eine Stiftung, ein Verlagshaus oder eine Zeitung) ("Zuschreibungsempfnger"), Namen bzw. Bezeichnung dieses oder dieser Dritten;

ii. den Titel des Inhaltes;

iii. in einer praktikablen Form den Uniform-Resource-Identifier (URI, z.B. Internetadresse), den der Lizenzgeber zum Schutzgegenstand angegeben hat, es sei denn, dieser URI verweist nicht auf den Rechtevermerk oder die Lizenzinformationen zum Schutzgegenstand;

iv. und im Falle einer Abwandlung des Schutzgegenstandes in bereinstimmung mit Abschnitt 3.b) einen Hinweis darauf, dass es sich um eine Abwandlung handelt.

Die nach diesem Abschnitt
4.d) erforderlichen Angaben knnen in jeder angemessenen Form gemacht werden; im Falle einer Abwandlung des Schutzgegenstandes oder eines Sammelwerkes mssen diese Angaben das Minimum darstellen und bei gemeinsamer Nennung mehrerer Rechteinhaber dergestalt erfolgen, dass sie zumindest ebenso hervorgehoben sind wie die

Hinweise auf die brigen Rechteinhaber. Die Angaben nach diesem Abschnitt drfen Sie ausschlielich zur Angabe der Rechteinhaberschaft in der oben bezeichneten Weise verwenden. Durch die Ausbung Ihrer Rechte aus dieser Lizenz drfen Sie ohne eine vorherige, separat und schriftlich vorliegende Zustimmung des Lizenzgebers und / oder des Zuschreibungsempfngers weder explizit noch implizit irgendeine Verbindung zum Lizenzgeber oder Zuschreibungsempfnger und ebenso wenig eine Untersttzung oder Billigung durch ihn andeuten.

e. Die oben unter 4.a) bis d) genannten Einschrnkungen gelten nicht fr solche Teile des Schutzgegenstandes, die allein deshalb unter den Schutzgegenstandsbegriff
fallen, weil sie als Datenbanken oder Zusammenstellungen von Daten einen immaterialgterrechtlichen Schutz eigener Art genieen.

f. Bezglich Vergtung fr die Nutzung des Schutzgegenstandes gilt Folgendes:

i. Unverzichtbare gesetzliche Vergtungsansprche: Soweit unverzichtbare Vergtungsansprche im Gegenzug fr gesetzliche Lizenzen vorgesehen oder Pauschalabgabensysteme (zum Beispiel fr Leermedien) vorhanden sind, behlt sich der Lizenzgeber das ausschlieliche Recht vor, die entsprechende Vergtung einzuziehen fr jede Ausbung eines Rechts aus dieser Lizenz durch Sie.

ii. Vergtung bei Zwangslizenzen: Sofern Zwangslizenzen auerhalb dieser Lizenz vorgesehen sind und zustande kommen, behlt sich der Lizenzgeber das ausschlieliche Recht auf Einziehung der entsprechenden Vergtung fr den Fall vor, dass Sie eine Nutzung des Schutzgegenstandes fr andere als die in Abschnitt 4.c) als nicht-kommerziell definierten Zwecke vornehmen, verzichtet fr alle brigen, lizenzgerechten
Flle von Nutzung jedoch auf jegliche Vergtung.

iii. Vergtung in sonstigen Fllen: Bezglich lizenzgerechter Nutzung des Schutzgegenstandes durch Sie, die nicht unter die beiden vorherigen Abschnitte (i) und (ii) fllt, verzichtet der Lizenzgeber auf jegliche Vergtung, unabhngig davon, ob eine Einziehung der Vergtung durch ihn selbst oder nur durch eine Verwertungsgesellschaft mglich wre. Der Lizenzgeber behlt sich jedoch das ausschlieliche Recht auf Einziehung der entsprechenden Vergtung (durch ihn selbst oder eine Verwertungsgesellschaft) fr den Fall vor, dass Sie eine Nutzung des Schutzgegenstandes fr andere als die in Abschnitt 4.c) als nicht-kommerziell definierten Zwecke vornehmen.

g. Persnlichkeitsrechte bleiben - soweit sie bestehen - von dieser Lizenz unberhrt.

5. Gewhrleistung

SOFERN KEINE ANDERS LAUTENDE, SCHRIFTLICHE VEREINBARUNG ZWISCHEN DEM LIZENZGEBER UND IHNEN GESCHLOSSEN WURDE UND SOWEIT MNGEL NICHT ARGLISTIG VERSCHWIEGEN WURDEN, BIETET DER LIZENZGEBER
DEN SCHUTZGEGENSTAND UND DIE EINRUMUNG VON RECHTEN UNTER AUSSCHLUSS JEGLICHER GEWHRLEISTUNG AN UND BERNIMMT WEDER AUSDRCKLICH NOCH KONKLUDENT GARANTIEN IRGENDEINER ART. DIES UMFASST INSBESONDERE DAS FREISEIN VON SACH- UND RECHTSMNGELN, UNABHNGIG VON DEREN ERKENNBARKEIT FR DEN LIZENZGEBER, DIE VERKEHRSFHIGKEIT DES SCHUTZGEGENSTANDES, SEINE VERWENDBARKEIT FR EINEN BESTIMMTEN ZWECK SOWIE DIE KORREKTHEIT VON BESCHREIBUNGEN. DIESE GEWHRLEISTUNGSBESCHRNKUNG GILT NICHT, SOWEIT MNGEL ZU SCHDEN DER IN ABSCHNITT 6 BEZEICHNETEN ART FHREN UND AUF SEITEN DES LIZENZGEBERS DAS JEWEILS GENANNTE VERSCHULDEN BZW. VERTRETENMSSEN EBENFALLS VORLIEGT.

6. Haftungsbeschrnkung

DER LIZENZGEBER HAFTET IHNEN GEGENBER IN BEZUG AUF SCHDEN AUS DER VERLETZUNG DES LEBENS, DES KRPERS ODER DER GESUNDHEIT NUR, SOFERN IHM WENIGSTENS FAHRLSSIGKEIT VORZUWERFEN IST, FR SONSTIGE SCHDEN NUR BEI GROBER FAHRLSSIGKEIT ODER VORSATZ, UND BERNIMMT DARBER HINAUS KEINERLEI FREIWILLIGE HAFTUNG.

7. Erlschen

a. Diese Lizenz und die durch sie eingerumten Nutzungsrechte erlschen mit Wirkung fr die Zukunft im Falle eines Verstoes gegen die Lizenzbedingungen durch Sie, ohne dass es dazu der Kenntnis des Lizenzgebers vom Versto oder einer weiteren Handlung einer der Vertragsparteien bedarf. Mit natrlichen oder juristischen Personen, die Abwandlungen des Schutzgegenstandes oder diesen enthaltende Sammelwerke unter den Bedingungen dieser Lizenz von Ihnen erhalten haben, bestehen nachtrglich entstandene Lizenzbeziehungen jedoch solange weiter, wie die genannten Personen sich ihrerseits an smtliche Lizenzbedingungen halten. Darber hinaus gelten die Ziffern 1, 2, 5, 6, 7, und 8 auch nach einem Erlschen dieser Lizenz fort.

b. Vorbehaltlich der oben genannten Bedingungen gilt diese Lizenz unbefristet bis der rechtliche Schutz fr den Schutzgegenstand ausluft. Davon abgesehen behlt der Lizenzgeber das Recht, den Schutzgegenstand unter anderen Lizenzbedingungen anzubieten oder die eigene Weitergabe des Schutzgegenstandes jederzeit einzustellen, solange die Ausbung dieses Rechts nicht einer Kndigung oder einem Widerruf dieser Lizenz (oder irgendeiner Weiterlizenzierung, die auf Grundlage dieser Lizenz bereits erfolgt ist bzw. zuknftig noch erfolgen muss) dient und diese Lizenz unter Bercksichtigung der oben zum Erlschen genannten Bedingungen vollumfnglich wirksam bleibt.

8. Sonstige Bestimmungen

a. Jedes Mal wenn Sie den Schutzgegenstand fr sich genommen oder als Teil eines Sammelwerkes verbreiten oder ffentlich zeigen, bietet der Lizenzgeber dem Empfnger eine Lizenz zu den gleichen Bedingungen und im gleichen Umfang an, wie Ihnen in Form dieser Lizenz.

b. Jedes Mal wenn Sie eine Abwandlung des Schutzgegenstandes verbreiten oder ffentlich zeigen, bietet der Lizenzgeber dem Empfnger eine Lizenz am ursprnglichen Schutzgegenstand zu den gleichen Bedingungen und im gleichen Umfang an, wie Ihnen in Form dieser Lizenz.

c. Sollte eine Bestimmung dieser Lizenz unwirksam sein, so bleibt davon die Wirksamkeit der Lizenz im brigen unberhrt.

d. Keine Bestimmung dieser Lizenz soll als abbedungen und kein Versto gegen sie als zulssig gelten, solange die von dem Verzicht oder von dem Versto betroffene Seite nicht schriftlich zugestimmt hat.

e. Diese Lizenz (zusammen mit in ihr ausdrcklich vorgesehenen Erlaubnissen, Mitteilungen und Zustimmungen, soweit diese tatschlich vorliegen) stellt die vollstndige Vereinbarung zwischen dem Lizenzgeber und Ihnen in Bezug auf den Schutzgegenstand dar. Es bestehen keine Abreden, Vereinbarungen oder Erklrungen in Bezug auf den Schutzgegenstand, die in dieser Lizenz nicht genannt sind. Rechtsgeschftliche nderungen des Verhltnisses zwischen dem Lizenzgeber und Ihnen sind nur ber Modifikationen dieser Lizenz mglich. Der Lizenzgeber ist an etwaige zustzliche, einseitig durch Sie bermittelte Bestimmungen nicht gebunden. Diese Lizenz kann nur durch schriftliche

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Modifikationen wirken ausschlielich zwischen dem Lizenzgeber und Ihnen und wirken sich nicht auf die Dritten gem Ziffern 8.a) und b) angeboteten Lizenzen aus.

f. Sofern zwischen Ihnen und dem Lizenzgeber keine anderweitige Vereinbarung getroffen wurde und soweit Wahlfreiheit besteht, findet auf diesen Lizenzvertrag das Recht der Bundesrepublik Deutschland Anwendung.

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```
at your option.
//! `ioctl` opcode behavior for BSD platforms.

use super::{Direction, Opcode};

pub(super) const fn compose_opcode(
   dir: Direction,
   group: Opcode,
   num: Opcode,
   size: Opcode,
) -> Opcode {
   let dir = match dir {
      Direction::None => NONE,
      Direction::Read => READ,
      Direction::Write => WRITE,
      Direction::ReadWrite => READ | WRITE,
   };

   dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}

// `IOC_VOID`
pub const NONE: Opcode = 0x2000_0000;
// `IOC_OUT` (out is from the perspective of the kernel)
pub const READ: Opcode = 0x4000_0000;
// `IOC_IN` (in is from the perspective of the kernel)
pub const WRITE: Opcode = 0x8000_0000;
pub const IOCPARAM_MASK: Opcode = 0x1FFF;
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```
//! `ioctl` opcode behavior for BSD platforms.

use super::{Direction, RawOpcode};

pub(super) const fn compose_opcode(
   dir: Direction,
   group: RawOpcode,
   num: RawOpcode,
   size: RawOpcode,
) -> RawOpcode {
   let dir = match dir {
      Direction::None => NONE,
      Direction::Read => READ,
      Direction::Write => WRITE,
      Direction::ReadWrite => READ | WRITE,
   };

   dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}

// `IOC_VOID`
pub const NONE: RawOpcode = 0x2000_0000;
// `IOC_OUT` (out is from the perspective of the kernel)
pub const READ: RawOpcode = 0x4000_0000;
// `IOC_IN` (in is from the perspective of the kernel)
pub const WRITE: RawOpcode = 0x8000_0000;
pub const IOCPARAM_MASK: RawOpcode = 0x1FFF;
```

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It appears that the arithmetic coding option of the JPEG spec is covered by patents owned by IBM, AT&T, and Mitsubishi. Hence arithmetic coding cannot legally be used without obtaining one or more licenses. For this reason, support for arithmetic coding has been removed from the free JPEG software. (Since arithmetic coding provides only a marginal gain over the unpatented Huffman mode, it is unlikely that very many implementations will support it.) So far as we are aware, there are no patent restrictions on the remaining code.

The IJG distribution formerly included code to read and write GIF files. To avoid entanglement with the Unisys LZW patent, GIF reading support has been removed altogether, and the GIF writer has been simplified to produce "uncompressed GIFs". This technique does not use the LZW algorithm; the resulting GIF files are larger than usual, but are readable by all standard GIF decoders.

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Version 2.1, February 1999

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By Shawn Hargreaves, 18 October 1998.

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cre une Oeuvre dite Collective,  la demande de tout Offrant, il devra, dans la mesure du possible, retirer de l'Oeuvre dite Collective toute rfrence au dit Offrant, comme demand. Si l'Acceptant cre une Oeuvre dite Collective,  la demande de tout Auteur, il devra, dans la mesure du possible, retirer de l'Oeuvre dite Collective toute rfrence au dit Auteur, comme demand. Si l'Acceptant cre une Oeuvre dite Drive,  la demande de tout Offrant, il devra, dans la mesure du possible, retirer de l'Oeuvre dite Drive toute rfrence au dit Offrant, comme demand. Si l'Acceptant cre une Oeuvre dite Drive,  la demande de tout Auteur, il devra, dans la mesure du possible, retirer de l'Oeuvre dite Drive toute rfrence au dit Auteur, comme demand.

b. L'Acceptant peut reproduire, distribuer, reprsenter ou communiquer au public une Oeuvre dite Drive y compris par voie numrique uniquement sous les termes de ce Contrat, ou d'une version ultrieure de ce Contrat comprenant les mmes Options du Contrat que le
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dite Drive en utilisant une mesure technique de contrle d'accs ou de contrle d'utilisation qui serait contradictoire avec les termes de cet Accord contractuel. Les mentions ci-dessus s'appliquent  l'Oeuvre dite Drive telle qu'incorpore dans une Oeuvre dite Collective, mais, en dehors de l'Oeuvre dite Drive en elle-mme, ne soumettent pas l'Oeuvre Collective, aux termes du prsent Contrat.

c. L'Acceptant ne peut exercer aucun des droits confrs par l'article 3 avec l'intention ou l'objectif d'obtenir un profit commercial ou une compensation financire personnelle. L'change de l'Oeuvre avec d'autres Oeuvres protges par le droit de la proprit littraire et artistique par le partage lectronique de fichiers, ou par tout autre moyen, n'est pas considr comme un change avec l'intention ou l'objectif d'un profit commercial ou d'une compensation financire personnelle, dans la mesure o aucun paiement ou compensation financire n'intervient en relation avec l'change d'Oeuvres protges.

d. Si l'Acceptant
reproduit, distribue, reprsente ou communique au public, y compris par voie numrique, l'Oeuvre ou toute Oeuvre dite Drive ou toute Oeuvre dite Collective, il doit conserver intactes toutes les informations sur le rgime des droits et en attribuer la paternit  l'Auteur Original, de manire raisonnable au regard au mdium ou au moyen utilis. Il doit communiquer le nom de l'Auteur Original ou son ventuel pseudonyme s'il est indiqu ; le titre de l'Oeuvre Originale s'il est indiqu ; dans la mesure du possible, l'adresse Internet ou Identifiant Uniforme de Ressource (URI), s'il existe, spcifi par l'Offrant comme associ  l'Oeuvre,  moins que cette adresse ne renvoie pas aux informations lgales (paternit et conditions d'utilisation de l'Oeuvre). Dans le cas d'une Oeuvre dite Drive, il doit indiquer les lments identifiant l'utilisation l'Oeuvre dans l'Oeuvre dite Drive par exemple  Traduction anglaise de l'Oeuvre par l'Auteur Original  ou Scnario bas sur l'Oeuvre par l'Auteur Original .
Ces obligations d'attribution de paternit doivent tre excutes de manire raisonnable. Cependant, dans le cas d'une Oeuvre dite Drive ou d'une Oeuvre dite Collective, ces informations doivent, au minimum, apparatre  la place et de manire aussi visible que celles  laquelle apparaissent les informations de mme nature.

e. Dans le cas o une utilisation de l'Oeuvre serait soumise  un rgime lgal de gestion collective obligatoire, l'Offrant se rserve le droit exclusif de collecter ces redevances par l'intermdiaire de la socit de perception et de rpartition des

droits comptente. Sont notamment concerns la radiodiffusion et la communication dans un lieu public de phonogrammes publis des fins de commerce, certains cas de retransmission par cble et satellite, la copie prive d'Oeuvres fixes sur phonogrammes ou vidogrammes, la reproduction par reprographie.

5. Garantie et exonration de responsabilit

a. En mettant l'Oeuvre la disposition du public selon les termes de ce Contrat, l'Offrant dclare de bonne foi qu' sa connaissance et dans les limites d'une enqute raisonnable :

i. L'Offrant a obtenu tous les droits sur l'Oeuvre ncessaires pour pouvoir autoriser l'exercice des droits accords par le prsent Contrat, et permettre la jouissance paisible et l'exercice licite de ces droits, ceci sans que l'Acceptant n'ait aucune obligation de verser de rmunration ou tout autre paiement ou droits, dans la limite des mcanismes de gestion collective obligatoire applicables dcrits l'article 4(e);

ii. L'Oeuvre n'est constitutive ni d'une violation des droits de tiers, notamment du droit de la proprit littraire et artistique, du droit des marques, du droit de l'information, du droit civil ou de tout autre droit, ni de diffamation, de violation de la vie prive ou de tout autre prjudice dlictuel l'gard de toute tierce partie.

b. A l'exception des situations expressment mentionnes dans le prsent Contrat ou dans un autre accord crit, ou exiges par la loi applicable,
l'Oeuvre est mise disposition en l'tat sans garantie d'aucune sorte, qu'elle soit expresse ou tacite, y compris l'gard du contenu ou de l'exactitude de l'Oeuvre.

6. Limitation de responsabilit. A l'exception des garanties d'ordre public imposes par la loi applicable et des rparations imposes par le rgime de la responsabilit vis--vis d'un tiers en raison de la violation des garanties prvues par l'article 5 du prsent contrat, l'Offrant ne sera en aucun cas tenu responsable vis--vis de l'Acceptant, sur la base d'aucune thorie lgale ni en raison d'aucun prjudice direct, indirect, matriel ou moral, rsultant de l'excution du prsent Contrat ou de l'utilisation de l'Oeuvre, y compris dans l'hypothse o l'Offrant avait connaissance de la possible existence d'un tel prjudice.

7. Rsiliation

a. Tout manquement aux termes du contrat par l'Acceptant entrane la rsiliation automatique du Contrat et la fin des droits qui en dcoulent. Cependant, le contrat conserve ses effets envers les personnes
physiques ou morales qui ont reu de la part de l'Acceptant, en excution du prsent contrat, la mise disposition d'Oeuvres dites Drives, ou d'Oeuvres dites Collectives, ceci tant qu'elles respectent pleinement leurs obligations. Les sections 1, 2, 5, 6 et 7 du contrat continuent s'appliquer aprs la rsiliation de celui-ci.

b. Dans les limites indiques ci-dessus, le prsent Contrat s'applique pendant toute la dure de protection de l'Oeuvre selon le droit applicable. Nanmoins, l'Offrant se rserve tout moment le droit d'exploiter l'Oeuvre sous des conditions contractuelles diffrentes, ou d'en cesser la diffusion; cependant, le recours cette option ne doit pas conduire retirer les effets du prsent Contrat (ou de tout contrat qui a t ou doit tre accord selon les termes de ce Contrat), et ce Contrat continuera s'appliquer dans tous ses effets jusqu' ce que sa rsiliation intervienne dans les conditions dcrites ci-dessus.

8. Divers

a. A chaque reproduction ou communication au
public par voie numrique de l'Oeuvre ou d'une Oeuvre dite Collective par l'Acceptant, l'Offrant propose au bnficiaire une offre de mise  disposition de l'Oeuvre dans des termes et conditions identiques  ceux accords  la partie Acceptante dans le prsent Contrat.

b. A chaque reproduction ou communication au public par voie numrique d'une Oeuvre dite Drive par l'Acceptant, l'Offrant propose au bnficiaire une offre de mise  disposition du bnficiaire de l'Oeuvre originale dans des termes et conditions identiques  ceux accords  la partie Acceptante dans le prsent Contrat.

c. La nullit ou l'inapplicabilit d'une quelconque disposition de ce Contrat au regard de la loi applicable n'affecte pas celle des autres dispositions qui resteront pleinement valides et applicables. Sans action additionnelle par les parties  cet accord, lesdites dispositions devront tre interprtes dans la mesure minimum ncessaire  leur validit et leur applicabilit.

d. Aucune limite, renonciation ou modification
des termes ou dispositions du prsent Contrat ne pourra tre accepte sans le consentement crit et sign de la partie comptente.

e. Ce Contrat constitue le seul accord entre les parties  propos de l'Oeuvre mise ici  disposition. Il n'existe aucun lment annexe, accord supplmentaire ou mandat portant sur cette Oeuvre en dehors des lments mentionns ici. L'Offrant ne sera tenu par aucune disposition supplmentaire qui pourrait apparatre dans une quelconque communication en provenance de l'Acceptant. Ce Contrat ne peut tre modifi sans l'accord mutuel crit de l'Offrant et de l'Acceptant.

f. Le droit applicable est le droit franais.

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Version 2.1, February 1999

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.
If distribution of object
code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

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6.
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a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above);
and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

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c) Accompany the work with a written offer, valid for at least
three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the
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7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

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2. If this search is successful, then enquire whether the Work is still maintained.

a. If it is being maintained, then ask the Current Maintainer to update their communication data within one month.

b. If the search is unsuccessful or no action to resume active maintenance is taken by the Current Maintainer, then announce within the pertinent community your intention to take over maintenance. (If the Work is a LaTeX work, this could be done, for example, by posting to comp.text.tex.)

3a. If the Current Maintainer is reachable and agrees to pass maintenance of the Work to you, then this takes effect immediately upon announcement.

b. If the Current Maintainer is not reachable and the Copyright Holder agrees that maintenance of the Work be passed to you, then this takes effect immediately upon announcement.

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Licentie

HET WERK (ALS HIERONDER OMSCHREVEN) WORDT TER BESCHIKKING GESTELD OVEREENKOMSTIG DE VOORWAARDEN VAN DEZE CREATIVE COMMONS PUBLIEKE LICENTIE ('CCPL' OF 'LICENTIE'). HET WERK WORDT BESCHERMD OP GROND VAN HET AUTEURSRECHT, NABURIGE RECHTEN, HET DATABANKENRECHT EN/OF ENIGE ANDERE TOEPASSELIJKE RECHTEN. MET UITZONDERING VAN HET IN DEZE LICENTIE OMSCHREVEN TOEGESTANE GEBRUIK VAN HET WERK IS ENIG ANDER GEBRUIK VAN HET WERK NIET TOEGESTAAN.

DOOR HET UITOEFENEN VAN DE IN DEZE
LICENTIE VERLEENDE RECHTEN MET BETREKKING TOT HET WERK AANVAARDT EN GAAT DE GEBRUIKER AKKOORD MET DE VOORWAARDEN VAN DEZE LICENTIE, MET DIEN VERSTANDE DAT (DE INHOUD VAN) DEZE LICENTIE OP VOORHAND VOLDOENDE DUIDELIJK KENBAAR DIENT TE ZIJN VOOR DE ONTVANGER VAN HET WERK.

DE LICENTIEGEVER VERLEENT DE GEBRUIKER DE IN DEZE LICENTIE OMSCHREVEN RECHTEN MET INACHTNEMING VAN DE DESBETREFFENDE VOORWAARDEN.

1. Definities

a. 'Verzamelwerk' een werk waarin het Werk, in zijn geheel en in ongewijzigde vorm, samen met een of meer andere werken, die elk een afzonderlijk en zelfstandig werk vormen, tot een geheel is samengevoegd. Voorbeelden van een verzamelwerk zijn een tijdschrift, een bloemlezing of een encyclopedie. Een Verzamelwerk zal voor de toepassing van deze Licentie niet als een Afgeleid werk (als hieronder omschreven) worden beschouwd.

b. 'Afgeleid werk' een werk dat is gebaseerd op het Werk of op het Werk en andere reeds bestaande werken. Voorbeelden van een Afgeleid werk zijn
een vertaling, een muziekschikking (arrangement), een toneelbewerking, een literaire bewerking, een verfilming, een geluidsopname, een kunstreproductie, een verkorte versie, een samenvatting of enig andere bewerking van het Werk, met dien verstande dat een Verzamelwerk voor de toepassing van deze Licentie niet als een Afgeleid werk zal

worden beschouwd.

Indien het Werk een muziekwerk betreft, zal de synchronisatie van de tijdslijnen van het Werk en een bewegend beeld ('synching') voor de toepassing van deze Licentie als een Afgeleid Werk worden beschouwd.

c. 'Licentiegever' de natuurlijke persoon/personen of rechtspersoon/rechtspersonen die het Werk volgens de voorwaarden van deze Licentie aanbiedt/aanbieden.

d. 'Maker' de natuurlijke persoon/personen of rechtspersoon/personen die het oorspronkelijke werk gemaakt heeft/hebben. Voor de toepassing van deze Licentie wordt onder de Maker mede verstaan de uitvoerende kunstenaar, film- en fonogramproducent en omroeporganisaties
in de zin van de Wet op de naburige rechten en de producent van een databank in de zin van de Databankenwet.

e. 'Werk' het auteursrechtelijk beschermde werk dat volgens de voorwaarden van deze Licentie wordt aangeboden. Voor de toepassing van deze Licentie wordt onder het Werk mede verstaan het fonogram, de eerste vastlegging van een film en het (omroep)programma in de zin van de Wet op de naburige rechten en de databank in de zin van de Databankenwet, voor zover dit fonogram, deze eerste vastlegging van een film, dit (omroep)programma en deze databank beschermd wordt krachtens de toepasselijke wet in de jurisdictie van de Gebruiker.

f. 'Gebruiker' de natuurlijke persoon of rechtspersoon die rechten ingevolge deze Licentie uitoefent en die de voorwaarden van deze Licentie met betrekking tot het Werk niet eerder geschonden heeft, of die van de Licentiegever uitdrukkelijke toestemming gekregen heeft om rechten ingevolge deze Licentie uit te oefenen ondanks een eerdere schending.

2.
Beperkingen van de uitsluitende rechten. Niets in deze Licentie strekt ertoe om de rechten te beperken die voortvloeien uit de beperkingen en uitputting van de uitsluitende rechten van de rechthebbende krachtens het auteursrecht, de naburige rechten, het databankenrecht of enige andere toepasselijke rechten.

3. Licentieverlening. Met inachtneming van de voorwaarden van deze Licentie verleent de Licentiegever hierbij aan de Gebruiker een wereldwijde, niet-exclusieve licentie om de navolgende rechten met betrekking tot het Werk vrij van royalty's uit te oefenen voor de duur van de toepasselijke intellectuele eigendomsrechten:

a. het reproduceren van het Werk, het opnemen van het Werk in een of meerdere Verzamelwerken, en het reproduceren van het in de Verzamelwerken opgenomen Werk;

b. het maken en reproduceren van Afgeleide werken met dien verstande dat met betrekking tot het Afgeleide werk, met inbegrip van welke vertaling in welk medium dan ook, duidelijk wordt gemaakt
dat er wijzigingen in het oorspronkelijke Werk zijn aangebracht. Bijvoorbeeld, aan een vertaling kan worden toegevoegd dat 'het oorspronkelijke Werk is van het Engels in het Spaans vertaald', of in geval van een verandering kan worden aangegeven dat 'het oorspronkelijke werk is veranderd';

c. het verspreiden van exemplaren van het Werk, het in het openbaar tonen, op- en uitvoeren en het on-line beschikbaar stellen van het Werk, afzonderlijk en als deel van een Verzamelwerk;

d. het verspreiden van exemplaren van Afgeleide werken, het in het openbaar te tonen, op- en uitvoeren en het on-line beschikbaar stellen van Afgeleide werken;

e. het opvragen en hergebruiken van het Werk;

f. Volledigheidshalve dient te worden vermeld dat:

i. Niet voor afstand vatbare heffingsregelingen. in het geval van niet voor afstand vatbare heffingsregelingen (bijvoorbeeld met betrekking tot thuiskopien) de Licentiegever zich het recht voorbehoudt om dergelijke heffingen te innen
(al dan niet door middel van een auteursrechtenorganisatie) bij zowel commercieel als niet-commercieel gebruik van het Werk;

ii. Voor afstand vatbare heffingsregeling. in het geval van voor afstand vatbare heffingsregelingen (bijvoorbeeld met betrekking tot leenrechten) de Licentiegever afstand doet van het recht om dergelijke heffingen te innen bij zowel commercieel als niet-commercieel gebruik van het Werk;

iii. Collectief rechtenbeheer. de Licentiegever afstand doet van het recht om vergoedingen te innen (zelfstandig of, indien de Licentiegever lid is van een auteursrechtenorganisatie, door middel van die organisatie) bij zowel commercieel als niet-commercieel gebruik van het Werk.

De Gebruiker mag deze rechten uitoefenen met behulp van alle thans bekende media, dragers en formats. De Gebruiker is tevens gerechtigd om technische wijzigingen aan te brengen die noodzakelijk zijn om de rechten met behulp van andere media, dragers en formats uit te oefenen. Alle niet
uitdrukkelijk verleende rechten zijn hierbij voorbehouden aan de Licentiegever, met inbegrip van maar niet beperkt tot de rechten die in artikel 4(d) worden genoemd. Voor zover de Licentiegever op basis van het nationale recht ter implementatie van de Europese Databankenrichtlijn over uitsluitende rechten beschickt doet de Licentiegever afstand van deze rechten.

4. Beperkingen. De in artikel 3 verleende Licentie is uitdrukkelijk gebonden aan de volgende beperkingen:

a. De Gebruiker mag het Werk uitsluitend verspreiden, in het openbaar tonen, op- of uitvoeren of on-line beschikbaar stellen met inachtneming van de voorwaarden van deze Licentie, en de Gebruiker dient een exemplaar van, of de Uniform Resource Identifier voor, deze Licentie toe te voegen aan elk exemplaar van het Werk dat de Gebruiker verspreidt, in het openbaar toont, op- of uitvoert, of on-line beschikbaar stelt. Het is de Gebruiker niet toegestaan om het Werk onder enige afwijkende voorwaarden aan te bieden waardoor
de voorwaarden van deze Licentie dan wel de mogelijkheid van de ontvangers van het Werk om de rechten krachtens deze Licentie uit te oefenen worden beperkt. Het is de Gebruiker niet toegestaan om het Werk in sublicentie te geven. De Gebruiker dient alle vermeldingen die verwijzen naar deze Licentie dan wel naar de uitsluiting van garantie te laten staan. Het is de Gebruiker niet toegestaan om het Werk te verspreiden, in het openbaar te tonen, op- of uit te voeren of on-line beschikbaar te stellen met toepassing van technologische voorzieningen waardoor de voorwaarden van deze Licentie dan wel de mogelijkheid van de ontvangers van het Werk om de rechten krachtens deze Licentie uit te oefenen worden beperkt. Het voorgaande is tevens van toepassing op het Werk dat deel uitmaakt van een Verzamelwerk, maar dat houdt niet in dat het Verzamelwerk, afgezien van het Werk zelf, gebonden is aan de voorwaarden van deze Licentie. Indien de Gebruiker een Verzamelwerk maakt, dient deze, op verzoek
van welke Licentiegever ook, de op grond van artikel 4(b) vereiste naamsvermelding uit het Verzamelwerk te verwijderen, voor zover praktisch mogelijk, conform het verzoek. Indien de Gebruiker een Afgeleid werk maakt, dient hij, op verzoek van welke Licentiegever ook, de op grond van artikel 4(b) vereiste naamsvermelding uit het Afgeleide werk te verwijderen, voorzover praktisch mogelijk, conform het verzoek.

b. Indien de Gebruiker het Werk, Afgeleide Werken of Verzamelwerken verspreidt, in het openbaar toont, op- of uitvoert of on-line beschikbaar stelt, dient de Gebruiker, tenzij er sprake is van een verzoek als vermeld in lid 4(a), alle auteursrechtvermeldingen met betrekking tot het Werk te laten staan. Tevens dient de Gebruiker, op een wijze die redelijk is in verhouding tot het gebruikte medium, de naam te vermelden van (i) de Maker (of zijn/haar pseudoniem indien van toepassing) indien deze wordt vermeld; en/of (ii) van (een) andere partij(en) (b.v. sponsor, uitgeverij, tijdschrift)
indien de naamsvermelding van deze partij(en) ("Naamsvermeldingsgerechtigden") in de auteursrechtvermelding of algemene voorwaarden van de Licentiegever of op een andere redelijke wijze verplicht is gesteld door de Maker en/of de Licentiegever; de titel van het Werk indien deze wordt vermeld; voorzover redelijkerwijs toepasbaar de Uniform Resource Identifier, indien aanwezig, waarvan de Licentiegever heeft aangegeven dat deze bij het Werk hoort, tenzij de URI niet verwijst naar de auteursrechtvermeldingen of de licentie-informatie betreffende het Werk; in overeenstemming met artikel 3(b) in geval van een Afgeleid werk, door te verwijzen naar het gebruik van het Werk in het Afgeleide werk (bijvoorbeeld: 'De Franse vertaling van het Werk van de Maker' of 'Scenario gebaseerd op het Werk van de Maker'). De Gebruiker dient op redelijke wijze aan de in dit artikel genoemde vereisten te voldoen; echter, met dien verstande dat, in geval van een Afgeleid werk of een Verzamelwerk, de naamsvermeldingen in ieder geval geplaatst dienen te worden, indien er een naamsvermelding van alle makers van het Afgeleide werk of het Verzamelwerk geplaatst wordt dan als deel van die naamsvermeldingen, en op een wijze die in ieder geval even duidelijk is als de naamsvermeldingen van de overige makers.

Volledigheidshalve dient te worden vermeld dat de Gebruiker uitsluitend gebruik mag maken van de naamsvermelding op de in dit artikel omschreven wijze teneinde te voldoen aan de naamsvermeldingsverplichting en, door gebruikmaking van zijn rechten krachtens deze Licentie, is het de Gebruiker niet toegestaan om op enigerlei wijze de indruk te wekken dat er sprake is van enig verband met, sponsorschap van of goedkeuring van de (toepasselijke) Maker, Licentiegever c.q. Naamsvermeldingsgerechtigden van de Gebruiker of diens gebruik van het Werk, zonder de afzonderlijke, uitdrukkelijke, voorafgaande, schriftelijke toestemming van de Maker, Licentiegever c.q. Naamsvermeldingsgerechtigden.

c. Volledigheidshalve dient te worden vermeld, dat de hierboven vermelde beperkingen (lid 4(a) en lid 4(b)) niet van toepassing zijn op die onderdelen van het Werk die geacht worden te vallen onder de definitie van het 'Werk' zoals vermeld in deze Licentie uitsluitend omdat zij voldoen aan de criteria van het sui generis databankenrecht krachtens het nationale recht ter implementatie van de Europese Databankenrichtlijn.

d. De in artikel 3 verleende rechten moeten worden uitgeoefend met inachtneming van het morele recht van de Maker (en/of de uitvoerende kunstenaar) om zich te verzetten tegen elke misvorming, verminking of andere aantasting van het werk, welke nadeel zou kunnen toebrengen aan de eer of de naam van de Maker (en/of de uitvoerende kunstenaar) of aan zijn waarde in deze hoedanigheid, indien en voor zover de Maker (en/of de uitvoerende kunstenaar) op grond van een op hem van toepassing zijnde wettelijke bepaling geen afstand kan doen van dat morele recht.

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AFWEZIGHEID VAN FOUTEN, ONGEACHT DE OPSPOORBAARHEID DAARVAN, INDIEN EN VOORZOVER DE WET NIET ANDERS BEPAALT.

6. Beperking van de aansprakelijkheid.

DE LICENTIEGEVER AANVAARDT GEEN ENKELE AANSPRAKELIJKHEID JEGENS DE GEBRUIKER VOOR ENIGE BIJZONDERE OF INCIDENTELE SCHADE OF GEVOLGSCHADE VOORTVLOEIEND UIT DEZE LICENTIE OF HET GEBRUIK VAN HET WERK, ZELFS NIET INDIEN DE LICENTIEGEVER OP DE HOOGTE IS GESTELD VAN HET RISICO VAN DERGELIJKE SCHADE, INDIEN EN VOORZOVER DE WET NIET ANDERS BEPAALT.

7. Beindiging

a. Deze Licentie en de daarin verleende rechten vervallen automatisch op het moment dat de Gebruiker in strijd handelt met de voorwaarden van deze Licentie. De licenties van natuurlijke personen of rechtspersonen die Verzamelwerken hebben ontvangen van de Gebruiker krachtens deze Licentie blijven echter in stand zolang dergelijke natuurlijke personen of rechtspersonen zich houden aan de voorwaarden van die licenties. Na de beindiging van deze Licentie blijven artikelen 1, 2, 5, 6, 7 en 8 onverminderd van kracht.

b. Met inachtneming van de hierboven vermelde voorwaarden wordt de Licentie verleend voor de duur van de toepasselijke intellectuele eigendomsrechten op het Werk. De Licentiegever behoudt zich desalniettemin te allen tijde het recht voor om het Werk volgens gewijzigde licentievoorwaarden te verspreiden of om het Werk niet langer te verspreiden; met dien verstande dat een dergelijk besluit niet de intrekking van deze Licentie (of enig andere licentie die volgens de voorwaarden van deze Licentie (verplicht) is verleend) tot gevolg heeft, en deze Licentie onverminderd van kracht blijft tenzij zij op de in lid a omschreven wijze wordt beindigd.

8. Diversen

a. Elke keer dat de Gebruiker het Werk of een Verzamelwerk verspreidt of on-line beschikbaar stelt, biedt de Licentiegever de ontvanger een licentie op het Werk aan volgens de algemene voorwaarden van deze Licentie.

b. Elke keer dat de Gebruiker een Afgeleid werk verspreidt of on-line beschikbaar stelt, biedt de Licentiegever de ontvanger een licentie op het oorspronkelijke werk aan volgens de algemene voorwaarden van deze Licentie.

c. Indien enige bepaling van deze Licentie nietig of niet rechtens afdwingbaar is, zullen de overige voorwaarden van deze Licentie volledig van kracht blijven. De nietige of niet-afdwingbare bepaling zal, zonder tussenkomst van de partijen, worden vervangen door een geldige en afdwingbare bepaling waarbij het doel en de strekking van de oorspronkelijke bepaling zoveel mogelijk in acht worden genomen.

d. Een verklaring van afstand van in deze Licentie verleende rechten of een wijziging van de voorwaarden van deze Licentie dient schriftelijk te geschieden en getekend te zijn door de partij die verantwoordelijk is voor de verklaring van afstand respectievelijk de partij wiens toestemming voor de wijziging is vereist.

f. Deze Licentie bevat de volledige overeenkomst tussen de partijen met betrekking tot het in licentie gegeven Werk. Er zijn geen andere afspraken gemaakt met betrekking tot het Werk. De Licentiegever is niet gebonden aan

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```
/// The datatype used for the ioctl number
#[doc(hidden)]
#[cfg(not(solarish))]
pub type ioctl_num_type = ::libc::c_ulong;

#[doc(hidden)]
#[cfg(solarish)]
pub type ioctl_num_type = ::libc::c_int;

/// The datatype used for the 3rd argument
#[doc(hidden)]
pub type ioctl_param_type = ::libc::c_int;

mod consts {
  use crate::sys::ioctl::ioctl_num_type;
  #[doc(hidden)]
  pub const VOID: ioctl_num_type = 0x2000_0000;
  #[doc(hidden)]
  pub const OUT: ioctl_num_type = 0x4000_0000;
  #[doc(hidden)]
  #[allow(overflowing_literals)]
  pub const IN: ioctl_num_type = 0x8000_0000;
  #[doc(hidden)]
  pub const INOUT: ioctl_num_type = IN | OUT;
  #[doc(hidden)]
  pub const IOCPARM_MASK: ioctl_num_type = 0x1fff;
}

pub use self::consts::*;

#[macro_export]
#[doc(hidden)]
macro_rules! ioc {
  ($inout:expr, $group:expr, $num:expr, $len:expr) => {
    $inout
      | (($len as $crate::sys::ioctl::ioctl_num_type
        & $crate::sys::ioctl::IOCPARM_MASK)

        << 16)
      | (($group as $crate::sys::ioctl::ioctl_num_type) << 8)
      | ($num as $crate::sys::ioctl::ioctl_num_type)
  };
}
```

```
/// Generate an ioctl request code for a command that passes no data.
///
/// This is equivalent to the `_IO()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_none!()` directly.
///
/// # Example
///
/// ```
/// # #[macro_use] extern crate nix;
/// const KVMIO: u8 = 0xAE;
/// ioctl_write_int_bad!(kvm_create_vm, request_code_none!(KVMIO, 0x03));
/// # fn main() {}
/// ```
#[macro_export(local_inner_macros)]
macro_rules! request_code_none {
  ($g:expr, $n:expr) => {
    ioc!($crate::sys::ioctl::VOID, $g, $n, 0)
  };
}

/// Generate an ioctl request code for a command that passes an integer
///
/// This is equivalent to the `_IOWINT()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the
 `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write_int!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write_int {
  ($g:expr, $n:expr) => {
    ioc!(
      $crate::sys::ioctl::VOID,
      $g,
      $n,
      ::std::mem::size_of::<$crate::libc::c_int>()
    )
  };
}

/// Generate an ioctl request code for a command that reads.
///
/// This is equivalent to the `_IOR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_read!()` directly.
```

```
///
/// The read/write direction is relative to userland, so this
/// command would be userland is reading and the kernel is
/// writing.
#[macro_export(local_inner_macros)]
macro_rules! request_code_read {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::OUT, $g, $n, $len)
   };
}

/// Generate an ioctl request code for a command that writes.
///
///
 This is equivalent to the `_IOW()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is writing and the kernel is
/// reading.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::IN, $g, $n, $len)
   };
}

/// Generate an ioctl request code for a command that reads and writes.
///
/// This is equivalent to the `_IOWR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_readwrite!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_readwrite {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::INOUT, $g, $n, $len)

 };
}
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```
use crate::errno::Errno;
use crate::sys::signal::Signal;
use crate::unistd::Pid;
use crate::Result;
use cfg_if::cfg_if;
use libc::{self, c_int};
use std::ptr;

pub type RequestType = c_int;

cfg_if! {
  if #[cfg(any(freebsdlike, apple_targets, target_os = "openbsd"))] {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_char;
  } else {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_void;
  }
```

```
}

libc_enum! {
  #[repr(i32)]
  /// Ptrace Request enum defining the action to be taken.
  #[non_exhaustive]
  pub enum Request {
    PT_TRACE_ME,
    PT_READ_I,
    PT_READ_D,
    #[cfg(apple_targets)]
    PT_READ_U,
    PT_WRITE_I,
    PT_WRITE_D,
    #[cfg(apple_targets)]
    PT_WRITE_U,
    PT_CONTINUE,
    PT_KILL,
    #[cfg(any(any(freebsdlike, apple_targets),
          all(target_os = "openbsd", target_arch = "x86_64"),
          all(target_os = "netbsd", any(target_arch = "x86_64",
                                target_arch = "powerpc"))))]
    PT_STEP,
    PT_ATTACH,
    PT_DETACH,
    #[cfg(apple_targets)]
    PT_SIGEXC,
    #[cfg(apple_targets)]
    PT_THUPDATE,
    #[cfg(apple_targets)]
    PT_ATTACHEXC
  }
}

unsafe fn ptrace_other(
  request: Request,
  pid: Pid,
  addr: AddressType,
  data: c_int,
) -> Result<c_int> {
  unsafe {
    Errno::result(libc::ptrace(
      request as RequestType,
      libc::pid_t::from(pid),
      addr,
      data,
    ))
    .map(|_| 0)
```

```
    }
}

/// Sets the process as traceable, as with `ptrace(PT_TRACEME, ...)`
///
/// Indicates that this process is to be traced by its parent.
/// This is the only ptrace request to be issued by the tracee.
pub fn traceme() -> Result<()> {
    unsafe {
        ptrace_other(Request::PT_TRACE_ME, Pid::from_raw(0), ptr::null_mut(), 0)
            .map(drop)
    }
}

/// Attach to a running
 process, as with `ptrace(PT_ATTACH, ...)`
///
/// Attaches to the process specified by `pid`, making it a tracee of the calling process.
pub fn attach(pid: Pid) -> Result<()> {
    unsafe {
        ptrace_other(Request::PT_ATTACH, pid, ptr::null_mut(), 0).map(drop)
    }
}

/// Detaches the current running process, as with `ptrace(PT_DETACH, ...)`
///
/// Detaches from the process specified by `pid` allowing it to run freely, optionally delivering a
/// signal specified by `sig`.
pub fn detach<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
    let data = match sig.into() {
        Some(s) => s as c_int,
        None => 0,
    };
    unsafe {
        ptrace_other(Request::PT_DETACH, pid, ptr::null_mut(), data).map(drop)
    }
}

/// Restart the stopped tracee process, as with `ptrace(PTRACE_CONT, ...)`
///
/// Continues the execution of the process with PID `pid`, optionally
/// delivering a signal specified by `sig`.
pub fn cont<T: Into<Option<Signal>>>(pid: Pid, sig: T)
 -> Result<()> {
    let data = match sig.into() {
        Some(s) => s as c_int,
        None => 0,
    };
```

```
  unsafe {
      // Ignore the useless return value
      ptrace_other(Request::PT_CONTINUE, pid, 1 as AddressType, data)
          .map(drop)
  }
}

/// Issues a kill request as with `ptrace(PT_KILL, ...)`
///
/// This request is equivalent to `ptrace(PT_CONTINUE, ..., SIGKILL);`
pub fn kill(pid: Pid) -> Result<()> {
  unsafe {
      ptrace_other(Request::PT_KILL, pid, 0 as AddressType, 0).map(drop)
  }
}

/// Move the stopped tracee process forward by a single step as with
/// `ptrace(PT_STEP, ...)`
///
/// Advances the execution of the process with PID `pid` by a single step optionally delivering a
/// signal specified by `sig`.
///
/// # Example
/// ```rust
/// use nix::sys::ptrace::step;
/// use nix::unistd::Pid;
/// use nix::sys::signal::Signal;
/// use nix::sys::wait::*;
/// // If a process changes state to the stopped state because of a SIGUSR1
/// // signal,
 this will step the process forward and forward the user
/// // signal to the stopped process
/// match waitpid(Pid::from_raw(-1), None) {
///     Ok(WaitStatus::Stopped(pid, Signal::SIGUSR1)) => {
///         let _ = step(pid, Signal::SIGUSR1);
///     }
///     _ => {},
/// }
/// ```
#[cfg(any(
  any(freebsdlike, apple_targets),
  all(target_os = "openbsd", target_arch = "x86_64"),
  all(
      target_os = "netbsd",
      any(target_arch = "x86_64", target_arch = "powerpc")
  )
))]
pub fn step<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
```

```
  let data = match sig.into() {
      Some(s) => s as c_int,
      None => 0,
  };
  unsafe {
      ptrace_other(Request::PT_STEP, pid, ptr::null_mut(), data).map(drop)
  }
}

/// Reads a word from a processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn read(pid: Pid, addr: AddressType)
 -> Result<c_int> {
  unsafe {
      // Traditionally there was a difference between reading data or
      // instruction memory but not in modern systems.
      ptrace_other(Request::PT_READ_D, pid, addr, 0)
  }
}

/// Writes a word into the processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn write(pid: Pid, addr: AddressType, data: c_int) -> Result<()> {
  unsafe { ptrace_other(Request::PT_WRITE_D, pid, addr, data).map(drop) }
}
```

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# 1.2273 percent-encoding 2.3.2

## 1.2273.1 Available under license :

```
//! FreeBSD and NetBSD xattr support.

use libc::{c_int, c_void, size_t, EPERM};
use std::ffi::{CString, OsStr, OsString};
use std::io;
use std::mem;
use std::os::unix::ffi::{OsStrExt, OsStringExt};
use std::os::unix::io::{AsRawFd, BorrowedFd};
use std::path::Path;
use std::ptr;

use libc::{
  extattr_delete_fd, extattr_delete_file, extattr_delete_link, extattr_get_fd, extattr_get_file,
  extattr_get_link, extattr_list_fd, extattr_list_file, extattr_list_link, extattr_set_fd,
  extattr_set_file, extattr_set_link, EXTATTR_NAMESPACE_SYSTEM, EXTATTR_NAMESPACE_USER,
};

use crate::util::allocate_loop;

pub const ENOATTR: i32 = libc::ENOATTR;
pub const ERANGE: i32 = libc::ERANGE;

const EXTATTR_NAMESPACE_USER_STRING: &str = "user";
const EXTATTR_NAMESPACE_SYSTEM_STRING: &str = "system";
const EXTATTR_NAMESPACE_NAMES: [&str; 3] = [
  "empty",
  EXTATTR_NAMESPACE_USER_STRING,
  EXTATTR_NAMESPACE_SYSTEM_STRING,
];

fn path_to_c(path: &Path) -> io::Result<CString> {
  match CString::new(path.as_os_str().as_bytes())
 {
     Ok(name) => Ok(name),
     Err(_) => Err(io::Error::new(io::ErrorKind::NotFound, "file not found")),
```

```
    }
}

#[inline]
fn slice_parts(buf: &mut [u8]) -> (*mut c_void, size_t) {
    if buf.is_empty() {
        (ptr::null_mut(), 0)
    } else {
        (buf.as_mut_ptr().cast(), buf.len() as size_t)
    }
}

/// An iterator over a set of extended attributes names.
#[derive(Default)]
pub struct XAttrs {
    user_attrs: Box<[u8]>,
    system_attrs: Box<[u8]>,
    offset: usize,
}

impl Clone for XAttrs {
    fn clone(&self) -> Self {
        XAttrs {
            user_attrs: Vec::from(&*self.user_attrs).into_boxed_slice(),
            system_attrs: Vec::from(&*self.system_attrs).into_boxed_slice(),
            offset: self.offset,
        }
    }

    fn clone_from(&mut self, other: &XAttrs) {
        self.offset = other.offset;

        let mut data = mem::replace(&mut self.user_attrs, Box::new([])).into_vec();
        data.extend(other.user_attrs.iter().cloned());
         self.user_attrs = data.into_boxed_slice();

        data = mem::replace(&mut self.system_attrs, Box::new([])).into_vec();
        data.extend(other.system_attrs.iter().cloned());
        self.system_attrs = data.into_boxed_slice();
    }
}

impl Iterator for XAttrs {
    type Item = OsString;
    fn next(&mut self) -> Option<OsString> {
        if self.user_attrs.is_empty() && self.system_attrs.is_empty() {
            return None;
        }
```

```
        if self.offset == self.user_attrs.len() + self.system_attrs.len() {
            return None;
        }

        let data = if self.offset < self.system_attrs.len() {
            &self.system_attrs[self.offset..]
        } else {
            &self.user_attrs[self.offset - self.system_attrs.len()..]
        };

        let siz = data[0] as usize;

        self.offset += siz + 1;
        if self.offset < self.system_attrs.len() {
            Some(prefix_namespace(
                OsStr::from_bytes(&data[1..siz
 + 1]),
                EXTATTR_NAMESPACE_SYSTEM,
            ))
        } else {
            Some(prefix_namespace(
                OsStr::from_bytes(&data[1..siz + 1]),
                EXTATTR_NAMESPACE_USER,
            ))
        }
    }

    fn size_hint(&self) -> (usize, Option<usize>) {
        if self.user_attrs.len() + self.system_attrs.len() == self.offset {
            (0, Some(0))
        } else {
            (1, None)
        }
    }
}

// This could use libc::extattr_string_to_namespace, but it's awkward because
// that requires nul-terminated strings, which Rust's std is loathe to provide.
fn name_to_ns(name: &OsStr) -> io::Result<(c_int, CString)> {
    let mut groups = name.as_bytes().splitn(2, |&b| b == b'.').take(2);
    let nsname = match groups.next() {
        Some(s) => s,
        None => {
            return Err(io::Error::new(
                io::ErrorKind::InvalidInput,
                "couldn't find namespace",
            ))
```

```
        }
    };

    let propname
  = match groups.next() {
        Some(s) => s,
        None => {
            return Err(io::Error::new(
                io::ErrorKind::InvalidInput,
                "couldn't find attribute",
            ))
        }
    };

    let ns_int = match EXTATTR_NAMESPACE_NAMES
        .iter()
        .position(|&s| s.as_bytes() == nsname)
    {
        Some(i) => i,
        None => {
            return Err(io::Error::new(
                io::ErrorKind::InvalidInput,
                "no matching namespace",
            ))
        }
    };

    Ok((ns_int as c_int, CString::new(propname)?))
}

fn prefix_namespace(attr: &OsStr, ns: c_int) -> OsString {
    let nsname = EXTATTR_NAMESPACE_NAMES[ns as usize];
    let mut v = Vec::with_capacity(nsname.as_bytes().len() + attr.as_bytes().len() + 1);
    v.extend(nsname.as_bytes());
    v.extend(".".as_bytes());
    v.extend(attr.as_bytes());
    OsString::from_vec(v)
}

fn cvt(res: libc::ssize_t) -> io::Result<usize> {
    if res < 0 {
        Err(io::Error::last_os_error())
     } else {
        Ok(res as usize)
    }
}

pub fn get_fd(fd: BorrowedFd<'_>, name: &OsStr) -> io::Result<Vec<u8>> {
```

```
  let (ns, name) = name_to_ns(name)?;
  unsafe {
     allocate_loop(|buf| {
        let (ptr, len) = slice_parts(buf);
        cvt(extattr_get_fd(fd.as_raw_fd(), ns, name.as_ptr(), ptr, len))
     })
  }
}

pub fn set_fd(fd: BorrowedFd<'_>, name: &OsStr, value: &[u8]) -> io::Result<()> {
  let (ns, name) = name_to_ns(name)?;
  let ret = unsafe {
     extattr_set_fd(
        fd.as_raw_fd(),
        ns,
        name.as_ptr(),
        value.as_ptr() as *const c_void,
        value.len() as size_t,
     )
  };
  if ret == -1 {
     Err(io::Error::last_os_error())
  } else {
     Ok(())
  }
}

pub fn remove_fd(fd: BorrowedFd<'_>, name: &OsStr) -> io::Result<()> {
  let (ns, name) = name_to_ns(name)?;
  let ret = unsafe { extattr_delete_fd(fd.as_raw_fd(), ns, name.as_ptr()) };

 if ret != 0 {
     Err(io::Error::last_os_error())
  } else {
     Ok(())
  }
}

pub fn list_fd(fd: BorrowedFd<'_>) -> io::Result<XAttrs> {
  let sysvec = unsafe {
     let res = allocate_loop(|buf| {
        let (ptr, len) = slice_parts(buf);
        cvt(extattr_list_fd(
           fd.as_raw_fd(),
           EXTATTR_NAMESPACE_SYSTEM,
           ptr,
           len,
        ))
```

```
        });
        // On FreeBSD, system attributes require root privileges to view. However,
        // to mimic the behavior of listxattr in linux and osx, we need to query
        // them anyway and return empty results if we get EPERM
        match res {
            Ok(v) => v,
            Err(err) => {
                if err.raw_os_error() == Some(EPERM) {
                    Vec::new()
                } else {
                    return Err(err);
                }
            }
        }
    };

    let uservec = unsafe {
        let res = allocate_loop(|buf|
  {
            let (ptr, len) = slice_parts(buf);
            cvt(extattr_list_fd(
                fd.as_raw_fd(),
                EXTATTR_NAMESPACE_USER,
                ptr,
                len,
            ))
        });
        match res {
            Ok(v) => v,
            Err(err) => return Err(err),
        }
    };

    Ok(XAttrs {
        system_attrs: sysvec.into_boxed_slice(),
        user_attrs: uservec.into_boxed_slice(),
        offset: 0,
    })
  }

  pub fn get_path(path: &Path, name: &OsStr, deref: bool) -> io::Result<Vec<u8>> {
    let (ns, name) = name_to_ns(name)?;
    let path = path_to_c(path)?;
    let extattr_get_func = if deref {
        extattr_get_file
    } else {
        extattr_get_link
    };
```

```
  unsafe {
      allocate_loop(|buf| {
          let (ptr, len) = slice_parts(buf);
          cvt(extattr_get_func(path.as_ptr(), ns, name.as_ptr(), ptr, len))
      })
  }
}

pub fn set_path(path: &Path, name: &OsStr, value: &[u8], deref: bool) -> io::Result<()>
 {
  let (ns, name) = name_to_ns(name)?;
  let path = path_to_c(path)?;
  let extattr_set_func = if deref {
      extattr_set_file
  } else {
      extattr_set_link
  };
  let ret = unsafe {
      extattr_set_func(
          path.as_ptr(),
          ns,
          name.as_ptr(),
          value.as_ptr() as *const c_void,
          value.len() as size_t,
      )
  };
  if ret == -1 {
      Err(io::Error::last_os_error())
  } else {
      Ok(())
  }
}

pub fn remove_path(path: &Path, name: &OsStr, deref: bool) -> io::Result<()> {
  let (ns, name) = name_to_ns(name)?;
  let path = path_to_c(path)?;
  let extattr_delete_func = if deref {
      extattr_delete_file
  } else {
      extattr_delete_link
  };
  let ret = unsafe { extattr_delete_func(path.as_ptr(), ns, name.as_ptr()) };
  if ret != 0 {
      Err(io::Error::last_os_error())
  } else {
      Ok(())
  }
}
```

```
pub fn list_path(path: &Path, deref: bool) -> io::Result<XAttrs>
 {
  let path = path_to_c(path)?;
  let extattr_list_func = if deref {
      extattr_list_file
  } else {
      extattr_list_link
  };
  let sysvec = unsafe {
      let res = allocate_loop(|buf| {
          let (ptr, len) = slice_parts(buf);
          cvt(extattr_list_func(
              path.as_ptr(),
              EXTATTR_NAMESPACE_SYSTEM,
              ptr,
              len,
          ))
      });
      // On FreeBSD, system attributes require root privileges to view. However,
      // to mimic the behavior of listxattr in linux and osx, we need to query
      // them anyway and return empty results if we get EPERM
      match res {
          Ok(v) => v,
          Err(err) => {
              if err.raw_os_error() == Some(EPERM) {
                  Vec::new()
              } else {
                  return Err(err);
              }
          }
      }
  };

  let uservec = unsafe {
      let res = allocate_loop(|buf|
 {
          let (ptr, len) = slice_parts(buf);
          cvt(extattr_list_func(
              path.as_ptr(),
              EXTATTR_NAMESPACE_USER,
              ptr,
              len,
          ))
      });
      match res {
          Ok(v) => v,
          Err(err) => return Err(err),
```

```
        }
    };

    Ok(XAttrs {
        system_attrs: sysvec.into_boxed_slice(),
        user_attrs: uservec.into_boxed_slice(),
        offset: 0,
    })
}
```

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The implementation for Utf8CharIndices was adapted from the
CharIndices implementation of the Rust standard library at revision
ab32548539ec38a939c1b58599249f3b54130026
(https://github.com/rust-lang/rust/blob/ab32548539ec38a939c1b58599249f3b54130026/library/core/src/str/iter.rs).

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Version 1.3b

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b. If the Current Maintainer is not reachable and the Copyright Holder agrees that maintenance of the Work be passed to you, then this takes effect immediately upon announcement.

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```
//! This file contains the BSD APIs available in Haiku. It corresponds to the
//! header files in `headers/compatibility/bsd`.
//!
//! Note that Haiku's BSD compatibility is a combination of system APIs and
//! utility libraries. There should only be system APIs in `libc`. When you are
//! trying to determine whether something should be included in this file, the
//! best indicator is whether it also exists in the BSD-specific definitions in
//! this libc crate.

use crate::prelude::*;

// stringlist.h (utility library)
// Note: this is kept because it was previously introduced
pub type StringList = _stringlist;

s! {
  // stringlist.h (utility library)
  // Note: this is kept because it was previously introduced
  pub struct _stringlist {
      pub sl_str: *mut *mut c_char,
      pub sl_max: size_t,
      pub sl_cur: size_t,
  }

  // sys/event.h
  pub struct kevent {
```

```
        pub ident: crate::uintptr_t,
        pub filter: c_short,
        pub flags: c_ushort,

    pub fflags: c_uint,
        pub data: i64,
        pub udata: *mut c_void,
        pub ext: [u64; 4],
    }

    // sys/link_elf.h
    pub struct dl_phdr_info {
        pub dlpi_addr: crate::Elf_Addr,
        pub dlpi_name: *const c_char,
        pub dlpi_phdr: *const crate::Elf_Phdr,
        pub dlpi_phnum: crate::Elf_Half,
    }
}

// sys/event.h
pub const EVFILT_READ: i16 = -1;
pub const EVFILT_WRITE: i16 = -2;
pub const EVFILT_PROC: i16 = -5;
pub const EV_ADD: u16 = 0x0001;
pub const EV_DELETE: u16 = 0x0002;
pub const EV_ONESHOT: u16 = 0x0010;
pub const EV_CLEAR: u16 = 0x0020;
pub const EV_EOF: u16 = 0x8000;
pub const EV_ERROR: u16 = 0x4000;
pub const NOTE_EXIT: u32 = 0x80000000;

// sys/ioccom.h
pub const IOC_VOID: c_ulong = 0x20000000;
pub const IOC_OUT: c_ulong = 0x40000000;
pub const IOC_IN: c_ulong = 0x80000000;
pub const IOC_INOUT: c_ulong = IOC_IN | IOC_OUT;
pub const IOC_DIRMASK: c_ulong = 0xe0000000;

#[link(name = "bsd")]
extern "C" {
    // stdlib.h
    pub fn daemon(nochdir:
 c_int, noclose: c_int) -> c_int;
    pub fn getprogname() -> *const c_char;
    pub fn setprogname(progname: *const c_char);
    pub fn arc4random() -> u32;
    pub fn arc4random_uniform(upper_bound: u32) -> u32;
    pub fn arc4random_buf(buf: *mut c_void, n: size_t);
```

```
pub fn mkstemps(template: *mut c_char, suffixlen: c_int) -> c_int;
pub fn strtonum(
    nptr: *const c_char,
    minval: c_longlong,
    maxval: c_longlong,
    errstr: *mut *const c_char,
) -> c_longlong;

// pty.h
pub fn openpty(
    amaster: *mut c_int,
    aslave: *mut c_int,
    name: *mut c_char,
    termp: *mut crate::termios,
    winp: *mut crate::winsize,
) -> c_int;
pub fn login_tty(_fd: c_int) -> c_int;
pub fn forkpty(
    amaster: *mut c_int,
    name: *mut c_char,
    termp: *mut crate::termios,
    winp: *mut crate::winsize,
) -> crate::pid_t;

// string.h
pub fn strsep(string: *mut *mut c_char, delimiters:
*const c_char) -> *mut c_char;
pub fn explicit_bzero(buf: *mut c_void, len: size_t);

// stringlist.h (utility library)
// Note: this is kept because it was previously introduced
pub fn sl_init() -> *mut StringList;
pub fn sl_add(sl: *mut StringList, n: *mut c_char) -> c_int;
pub fn sl_free(sl: *mut StringList, i: c_int);
pub fn sl_find(sl: *mut StringList, n: *mut c_char) -> *mut c_char;

// sys/event.h
pub fn kqueue() -> c_int;
pub fn kevent(
    kq: c_int,
    changelist: *const kevent,
    nchanges: c_int,
    eventlist: *mut kevent,
    nevents: c_int,
    timeout: *const crate::timespec,
) -> c_int;

// sys/link_elf.h
```

```
  pub fn dl_iterate_phdr(
      callback: Option<
          unsafe extern "C" fn(info: *mut dl_phdr_info, size: usize, data: *mut c_void) -> c_int,
      >,
      data: *mut c_void,
  ) -> c_int;

  // sys/time.h
  pub fn lutimes(file: *const c_char, times: *const crate::timeval)
-> c_int;

  // sys/uov.h
  pub fn preadv(
      fd: c_int,
      iov: *const crate::iovec,
      iovcnt: c_int,
      offset: crate::off_t,
  ) -> ssize_t;
  pub fn pwritev(
      fd: c_int,
      iov: *const crate::iovec,
      iovcnt: c_int,
      offset: crate::off_t,
  ) -> ssize_t;

  // sys/wait.h
  pub fn wait4(
      pid: crate::pid_t,
      status: *mut c_int,
      options: c_int,
      rusage: *mut crate::rusage,
  ) -> crate::pid_t;
}
==============================================================================
```

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```
at your option.
//! `ioctl` opcode behavior for BSD platforms.

use super::{Direction, Opcode};

pub(super) const fn compose_opcode(
   dir: Direction,
   group: Opcode,
   num: Opcode,
   size: Opcode,
) -> Opcode {
   let dir = match dir {
      Direction::None => NONE,
      Direction::Read => READ,
      Direction::Write => WRITE,
      Direction::ReadWrite => READ | WRITE,
   };

   dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}

// `IOC_VOID`
pub const NONE: Opcode = 0x2000_0000;
// `IOC_OUT` (out is from the perspective of the kernel)
pub const READ: Opcode = 0x4000_0000;
// `IOC_IN` (in is from the perspective of the kernel)
pub const WRITE: Opcode = 0x8000_0000;
pub const IOCPARAM_MASK: Opcode = 0x1FFF;
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```
//! `ioctl` opcode behavior for BSD platforms.

use super::{Direction, RawOpcode};

pub(super) const fn compose_opcode(
    dir: Direction,
    group: RawOpcode,
    num: RawOpcode,
    size: RawOpcode,
) -> RawOpcode {
    let dir = match dir {
        Direction::None => NONE,
        Direction::Read => READ,
```

```
    Direction::Write => WRITE,
    Direction::ReadWrite => READ | WRITE,
  };

  dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}

// `IOC_VOID`
pub const NONE: RawOpcode = 0x2000_0000;
// `IOC_OUT` (out is from the perspective of the kernel)
pub const READ: RawOpcode = 0x4000_0000;
// `IOC_IN` (in is from the perspective of the kernel)
pub const WRITE: RawOpcode = 0x8000_0000;
pub const IOCPARAM_MASK: RawOpcode = 0x1FFF;
```

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bzip2/libbzip2 version 1.0.8 of 13 July 2019

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11.2 Any failure by either Party, on one or more occasions, to invoke one or more of the provisions hereof, shall under no circumstances be interpreted as being a waiver by the interested Party of its right to invoke said provision(s) subsequently.

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Version 1.0 dated 2006-09-05.
"#
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By Shawn Hargreaves, 18 October 1998.

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L'Oeuvre (telle que dfinie ci-dessous) est mise disposition selon les termes du prsent contrat appel Contrat Public Creative Commons (dnomm ici CPCC ou Contrat ). L'Oeuvre est protge par le droit de la proprit littraire et artistique (droit d'auteur, droits voisins, droits des producteurs de bases de donnes) ou toute autre loi applicable. Toute utilisation de l'Oeuvre autrement qu'explicitement autorise
selon ce Contrat ou le droit applicable est interdite.

L'exercice sur l'Oeuvre de tout droit propos par le prsent contrat vaut acceptation de celui-ci. Selon les termes et les obligations du prsent contrat, la partie Offrante propose la partie Acceptante l'exercice de certains droits prsents ci-aprs, et l'Acceptant en approuve les termes et conditions d'utilisation.

1. Dfinitions

a. Oeuvre : oeuvre de l'esprit protgeable par le droit de la proprit littraire et artistique ou toute loi applicable et qui est mise disposition selon les termes du prsent Contrat.

b. Oeuvre dite Collective : une oeuvre dans laquelle l'oeuvre, dans sa forme intgrale et non modifie, est assemble en un ensemble collectif avec d'autres contributions qui constituent en elles-mmes des oeuvres spares et

indpendantes. Constituent notamment des Oeuvres dites Collectives les publications priodiques, les anthologies ou les encyclopdies. Aux termes de la prsente autorisation, une oeuvre qui constitue une Oeuvre dite Collective ne sera pas considre comme une Oeuvre dite Drive (telle que dfinie ci-aprs).

c. Oeuvre dite Drive : une oeuvre cre soit partir de l'Oeuvre seule, soit partir de l'Oeuvre et d'autres oeuvres prexistantes. Constituent notamment des Oeuvres dites Drives les traductions, les arrangements musicaux, les adaptations thtrales, littraires ou cinmatographiques, les enregistrements sonores, les reproductions par un art ou un procd quelconque, les rsums, ou toute autre forme sous laquelle l'Oeuvre puisse tre remanie, modifie, transforme ou adapte, l'exception d'une oeuvre qui constitue une Oeuvre dite Collective. Une Oeuvre dite Collective ne sera pas considre comme une Oeuvre dite Drive aux termes du prsent Contrat. Dans le cas o l'Oeuvre serait une composition musicale ou un enregistrement sonore, la synchronisation de l'oeuvre avec une image anime sera considre comme une Oeuvre dite Drive pour les propos de ce Contrat.

d. Auteur original : la ou les personnes physiques qui ont cr l'Oeuvre.

e. Offrant : la ou les personne(s) physique(s) ou morale(s) qui proposent la mise disposition de l'Oeuvre selon les termes du prsent Contrat.

f. Acceptant : la personne physique ou morale qui accepte le prsent contrat et exerce des droits sans en avoir viol les termes au pralable ou qui a reu l'autorisation expresse de l'Offrant d'exercer des droits dans le cadre du prsent contrat malgr une prcdente violation de ce contrat.

g. Options du Contrat : les attributs gnriques du Contrat tels qu'ils ont t choisis par l'Offrant et indiqus dans le titre de ce Contrat : Paternit - Pas d'Utilisation Commerciale - Partage Des Conditions Initiales A l'Identique.

2. Exceptions aux droits exclusifs. Aucune disposition de ce contrat n'a pour intention de rduire, limiter ou restreindre les prrogatives issues des exceptions aux droits, de l'puisement des droits ou d'autres limitations aux droits exclusifs des ayants droit selon le droit de la proprit littraire et artistique ou les autres lois applicables.

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a. reproduire l'Oeuvre, incorporer l'Oeuvre dans une ou plusieurs Oeuvres dites Collectives et reproduire l'Oeuvre telle qu'incorpore dans lesdites Oeuvres dites Collectives;

b. crer et reproduire des Oeuvres dites Drives;

c. distribuer des exemplaires ou enregistrements, prsenter, reprsenter ou communiquer l'Oeuvre au public par tout procd technique, y compris incorpore dans des Oeuvres Collectives;

d. distribuer des exemplaires ou phonogrammes, prsenter, reprsenter ou communiquer au public des Oeuvres dites Drives par tout procd technique;

e. lorsque l'Oeuvre est une base

de donnes, extraire et rutiliser des parties substantielles de l'Oeuvre.

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a. L'Acceptant peut reproduire, distribuer, reprsenter ou communiquer au public l'Oeuvre y compris par voie numrique uniquement selon les termes de ce Contrat. L'Acceptant doit inclure une copie ou l'adresse Internet (Identifiant Uniforme de Ressource) du prsent Contrat toute reproduction ou enregistrement de l'Oeuvre que l'Acceptant distribue, reprsente ou communique au public y compris par voie numrique. L'Acceptant ne peut pas offrir ou imposer de conditions d'utilisation de l'Oeuvre qui altrent ou restreignent les termes du prsent Contrat ou l'exercice des droits qui y sont accords au bnficiaire. L'Acceptant ne peut pas cder de droits sur l'Oeuvre. L'Acceptant doit conserver intactes toutes les informations qui renvoient ce Contrat et l'exonration de responsabilit. L'Acceptant ne peut pas reproduire, distribuer, reprsenter ou communiquer au public l'Oeuvre, y compris par voie numrique, en utilisant une mesure technique de contrle d'accs ou de contrle d'utilisation qui serait contradictoire avec les termes de cet Accord contractuel. Les mentions ci-dessus s'appliquent l'Oeuvre telle qu'incorpore dans une Oeuvre dite Collective, mais, en dehors de l'Oeuvre en elle-mme, ne soumettent pas l'Oeuvre dite Collective, aux termes du prsent Contrat. Si l'Acceptant cre une Oeuvre dite Collective, la demande de tout Offrant, il devra, dans la mesure du possible, retirer de l'Oeuvre dite Collective toute rfrence au dit Offrant, comme demand. Si l'Acceptant cre une Oeuvre dite Collective, la demande de tout Auteur, il devra, dans la mesure du possible, retirer de l'Oeuvre dite Collective toute rfrence au dit Auteur, comme demand. Si l'Acceptant cre une Oeuvre dite Drive, la demande de tout Offrant, il devra, dans la mesure du possible, retirer de l'Oeuvre dite Drive toute rfrence au dit Offrant, comme demand. Si l'Acceptant cre une Oeuvre dite Drive, la demande de tout Auteur, il devra, dans la mesure du possible, retirer de l'Oeuvre dite Drive toute rfrence au dit Auteur, comme demand.

b. L'Acceptant peut reproduire, distribuer, reprsenter ou communiquer au public une Oeuvre dite Drive y compris par voie numrique uniquement sous les termes de ce Contrat, ou d'une version ultrieure de ce Contrat comprenant les mmes Options du Contrat que le prsent Contrat, ou un Contrat Creative Commons iCommons comprenant les mmes Options du Contrat que le prsent Contrat (par exemple Paternit - Pas d'Utilisation Commerciale - Partage Des Conditions Initiales A l'Identique 2.0 Japon). L'Acceptant doit inclure une copie ou l'adresse Internet (Identifiant Uniforme de Ressource) du prsent Contrat, ou d'un autre Contrat tel que dcrit la phrase prcdente, toute reproduction ou enregistrement de l'Oeuvre dite Drive que l'Acceptant distribue, reprsente ou communique au public y compris par voie numrique. L'Acceptant ne peut pas offrir ou imposer de conditions d'utilisation sur l'Oeuvre dite Drive qui altrent ou restreignent les termes du prsent Contrat ou l'exercice des droits qui y sont accords au bnficiaire, et doit conserver intactes toutes les informations qui renvoient ce Contrat et l'avertissement sur les garanties. L'Acceptant ne peut pas reproduire, distribuer, reprsenter ou communiquer au public y compris par voie numrique l'Oeuvre dite Drive en utilisant une mesure technique de contrle d'accs ou de contrle d'utilisation qui serait contradictoire avec les termes de cet Accord contractuel. Les mentions ci-dessus s'appliquent l'Oeuvre dite Drive telle qu'incorpore dans une Oeuvre dite Collective, mais, en dehors de l'Oeuvre dite Drive en elle-mme, ne soumettent pas l'Oeuvre Collective, aux termes du prsent Contrat.

c. L'Acceptant ne peut exercer aucun des droits confrs par l'article 3 avec l'intention ou l'objectif d'obtenir un profit commercial ou une compensation financire personnelle. L'change de l'Oeuvre avec d'autres Oeuvres protges par le droit de la proprit littraire et artistique par le partage lectronique de fichiers, ou par tout autre moyen, n'est pas considr comme un change avec l'intention ou l'objectif d'un profit commercial ou d'une compensation financire personnelle, dans la mesure o aucun paiement ou compensation financire n'intervient en relation avec l'change d'Oeuvres protges.

d. Si l'Acceptant
reproduit, distribue, reprsente ou communique au public, y compris par voie numrique, l'Oeuvre ou toute Oeuvre dite Drive ou toute Oeuvre dite Collective, il doit conserver intactes toutes les informations sur le rgime des droits et en attribuer la paternit l'Auteur Original, de manire raisonnable au regard au mdium ou au moyen utilis. Il doit communiquer le nom de l'Auteur Original ou son ventuel pseudonyme s'il est indiqu ; le titre de l'Oeuvre Originale s'il est indiqu ; dans la mesure du possible, l'adresse Internet ou Identifiant Uniforme de Ressource (URI), s'il existe, spcifi par l'Offrant comme associ l'Oeuvre, moins que cette adresse ne renvoie pas aux informations lgales (paternit et conditions d'utilisation de l'Oeuvre). Dans le cas d'une Oeuvre dite Drive, il doit indiquer les lments identifiant l'utilisation l'Oeuvre dans l'Oeuvre dite Drive par exemple Traduction anglaise de l'Oeuvre par l'Auteur Original ou Scnario bas sur l'Oeuvre par l'Auteur Original .
Ces obligations d'attribution de paternit doivent tre excutes de manire raisonnable. Cependant, dans le cas d'une Oeuvre dite Drive ou d'une Oeuvre dite Collective, ces informations doivent, au minimum, apparatre la place et de manire aussi visible que celles laquelle apparaissent les informations de mme nature.

e. Dans le cas o une utilisation de l'Oeuvre serait soumise un rgime lgal de gestion collective obligatoire, l'Offrant se rserve le droit exclusif de collecter ces redevances par l'intermdiaire de la socit de perception et de rpartition des droits comptente. Sont notamment concerns la radiodiffusion et la communication dans un lieu public de phonogrammes publis des fins de commerce, certains cas de retransmission par cble et satellite, la copie prive d'Oeuvres fixes sur phonogrammes ou vidogrammes, la reproduction par reprographie.

5. Garantie et exonration de responsabilit

a. En mettant l'Oeuvre la disposition du public selon les termes de ce Contrat, l'Offrant
dclare de bonne foi qu' sa connaissance et dans les limites d'une enqute raisonnable :

i. L'Offrant a obtenu tous les droits sur l'Oeuvre ncessaires pour pouvoir autoriser l'exercice des droits accords par le prsent Contrat, et permettre la jouissance paisible et l'exercice licite de ces droits, ceci sans que l'Acceptant n'ait aucune obligation de verser de rmunration ou tout autre paiement ou droits, dans la limite des mcanismes de gestion collective obligatoire applicables dcrits l'article 4(e);

ii. L'Oeuvre n'est constitutive ni d'une violation des droits de tiers, notamment du droit de la proprit littraire et artistique, du droit des marques, du droit de l'information, du droit civil ou de tout autre droit, ni de diffamation, de violation de la vie prive ou de tout autre prjudice dlictuel l'gard de toute tierce partie.

b. A l'exception des situations expressment mentionnes dans le prsent Contrat ou dans un autre accord crit, ou exiges par la loi applicable,
l'Oeuvre est mise disposition en l'tat sans garantie d'aucune sorte, qu'elle soit expresse ou tacite, y compris l'gard du contenu ou de l'exactitude de l'Oeuvre.

6. Limitation de responsabilit. A l'exception des garanties d'ordre public imposes par la loi applicable et des rparations imposes par le rgime de la responsabilit vis--vis d'un tiers en raison de la violation des garanties prvues par l'article 5 du prsent contrat, l'Offrant ne sera en aucun cas tenu responsable vis--vis de l'Acceptant, sur la base d'aucune thorie lgale ni en raison d'aucun prjudice direct, indirect, matriel ou moral, rsultant de l'excution du prsent Contrat ou de l'utilisation de l'Oeuvre, y compris dans l'hypothse o l'Offrant avait connaissance de la possible existence d'un tel prjudice.

7. Rsiliation

a. Tout manquement aux termes du contrat par l'Acceptant entrane la rsiliation automatique du Contrat et la fin des droits qui en dcoulent. Cependant, le contrat conserve ses effets envers les personnes physiques ou morales qui ont reu de la part de l'Acceptant, en excution du prsent contrat, la mise  disposition d'Oeuvres dites Drives, ou d'Oeuvres dites Collectives, ceci tant qu'elles respectent pleinement leurs obligations. Les sections 1, 2, 5, 6 et 7 du contrat continuent  s'appliquer aprs la rsiliation de celui-ci.

b. Dans les limites indiques ci-dessus, le prsent Contrat s'applique pendant toute la dure de protection de l'Oeuvre selon le droit applicable. Nanmoins, l'Offrant se rserve  tout moment le droit d'exploiter l'Oeuvre sous des conditions contractuelles diffrentes, ou d'en cesser la diffusion; cependant, le recours  cette option ne doit pas conduire  retirer les effets du prsent Contrat (ou de tout contrat qui a t ou doit tre accord selon les termes de ce Contrat), et ce Contrat continuera  s'appliquer dans tous ses effets jusqu' ce que sa rsiliation intervienne dans les conditions dcrites ci-dessus.

8. Divers

a. A chaque reproduction ou communication au public par voie numrique de l'Oeuvre ou d'une Oeuvre dite Collective par l'Acceptant, l'Offrant propose au bnficiaire une offre de mise  disposition de l'Oeuvre dans des termes et conditions identiques  ceux accords  la partie Acceptante dans le prsent Contrat.

b. A chaque reproduction ou communication au public par voie numrique d'une Oeuvre dite Drive par l'Acceptant, l'Offrant propose au bnficiaire une offre de mise  disposition du bnficiaire de l'Oeuvre originale dans des termes et conditions identiques  ceux accords  la partie Acceptante dans le prsent Contrat.

c. La nullit ou l'inapplicabilit d'une quelconque disposition de ce Contrat au regard de la loi applicable n'affecte pas celle des autres dispositions qui resteront pleinement valides et applicables. Sans action additionnelle par les parties  cet accord, lesdites dispositions devront tre interprtes dans la mesure minimum ncessaire  leur validit et leur applicabilit.

d. Aucune limite, renonciation ou modification des termes ou dispositions du prsent Contrat ne pourra tre accepte sans le consentement crit et sign de la partie comptente.

e. Ce Contrat constitue le seul accord entre les parties  propos de l'Oeuvre mise ici  disposition. Il n'existe aucun lment annexe, accord supplmentaire ou mandat portant sur cette Oeuvre en dehors des lments mentionns ici. L'Offrant ne sera tenu par aucune disposition supplmentaire qui pourrait apparatre dans une quelconque communication en provenance de l'Acceptant. Ce Contrat ne peut tre modifi sans l'accord mutuel crit de l'Offrant et de l'Acceptant.

f. Le droit applicable est le droit franais.

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Version 2.1, February 1999

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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```
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```

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Glenn Randers-Pehrson
glennrp at users.sourceforge.net
December 9, 2010
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"#

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```
/// The datatype used for the ioctl number
#[doc(hidden)]
#[cfg(not(solarish))]
pub type ioctl_num_type = ::libc::c_ulong;

#[doc(hidden)]
#[cfg(solarish)]
pub type ioctl_num_type = ::libc::c_int;

/// The datatype used for the 3rd argument
#[doc(hidden)]
pub type ioctl_param_type = ::libc::c_int;
```

```
mod consts {
  use crate::sys::ioctl::ioctl_num_type;
  #[doc(hidden)]
  pub const VOID: ioctl_num_type = 0x2000_0000;
  #[doc(hidden)]
  pub const OUT: ioctl_num_type = 0x4000_0000;
  #[doc(hidden)]
  #[allow(overflowing_literals)]
  pub const IN: ioctl_num_type = 0x8000_0000;
  #[doc(hidden)]
  pub const INOUT: ioctl_num_type = IN | OUT;
  #[doc(hidden)]
  pub const IOCPARM_MASK: ioctl_num_type = 0x1fff;
}

pub use self::consts::*;

#[macro_export]
#[doc(hidden)]
macro_rules! ioc {
  ($inout:expr, $group:expr, $num:expr, $len:expr) => {
    $inout
      | (($len as $crate::sys::ioctl::ioctl_num_type
        & $crate::sys::ioctl::IOCPARM_MASK)

        << 16)
      | (($group as $crate::sys::ioctl::ioctl_num_type) << 8)
      | ($num as $crate::sys::ioctl::ioctl_num_type)
  };
}

/// Generate an ioctl request code for a command that passes no data.
///
/// This is equivalent to the `_IO()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_none!()` directly.
///
/// # Example
///
/// ```
/// # #[macro_use] extern crate nix;
/// const KVMIO: u8 = 0xAE;
/// ioctl_write_int_bad!(kvm_create_vm, request_code_none!(KVMIO, 0x03));
/// # fn main() {}
/// ```
#[macro_export(local_inner_macros)]
macro_rules! request_code_none {
```

```
  ($g:expr, $n:expr) => {
      ioc!($crate::sys::ioctl::VOID, $g, $n, 0)
  };
}

/// Generate an ioctl request code for a command that passes an integer
///
/// This is equivalent to the `_IOWINT()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the
 `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write_int!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write_int {
  ($g:expr, $n:expr) => {
      ioc!(
          $crate::sys::ioctl::VOID,
          $g,
          $n,
          ::std::mem::size_of::<$crate::libc::c_int>()
      )
  };
}

/// Generate an ioctl request code for a command that reads.
///
/// This is equivalent to the `_IOR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_read!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is reading and the kernel is
/// writing.
#[macro_export(local_inner_macros)]
macro_rules! request_code_read {
  ($g:expr, $n:expr, $len:expr) => {
      ioc!($crate::sys::ioctl::OUT, $g, $n, $len)
  };
}

/// Generate an ioctl request code for a command that writes.
///
///
 This is equivalent to the `_IOW()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write!()` directly.
```

```
///
/// The read/write direction is relative to userland, so this
/// command would be userland is writing and the kernel is
/// reading.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::IN, $g, $n, $len)
   };
}

/// Generate an ioctl request code for a command that reads and writes.
///
/// This is equivalent to the `_IOWR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_readwrite!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_readwrite {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::INOUT, $g, $n, $len)

 };
}
```

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"#

```
use crate::errno::Errno;
use crate::sys::signal::Signal;
use crate::unistd::Pid;
use crate::Result;
use cfg_if::cfg_if;
use libc::{self, c_int};
use std::ptr;

pub type RequestType = c_int;

cfg_if! {
  if #[cfg(any(freebsdlike, apple_targets, target_os = "openbsd"))] {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_char;
  } else {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_void;
  }
}
```

```
libc_enum! {
  #[repr(i32)]
  /// Ptrace Request enum defining the action to be taken.
  #[non_exhaustive]
  pub enum Request {
    PT_TRACE_ME,
    PT_READ_I,
    PT_READ_D,
    #[cfg(apple_targets)]
    PT_READ_U,
    PT_WRITE_I,
    PT_WRITE_D,
    #[cfg(apple_targets)]
    PT_WRITE_U,
    PT_CONTINUE,
    PT_KILL,
    #[cfg(any(any(freebsdlike, apple_targets),
          all(target_os = "openbsd", target_arch = "x86_64"),
          all(target_os = "netbsd", any(target_arch = "x86_64",
                        target_arch = "powerpc"))))]
    PT_STEP,
    PT_ATTACH,
    PT_DETACH,
    #[cfg(apple_targets)]
    PT_SIGEXC,
    #[cfg(apple_targets)]
    PT_THUPDATE,
    #[cfg(apple_targets)]
    PT_ATTACHEXC
  }
}

unsafe fn ptrace_other(
  request: Request,
  pid: Pid,
  addr: AddressType,
  data: c_int,
) -> Result<c_int> {
  unsafe {
    Errno::result(libc::ptrace(
      request as RequestType,
      libc::pid_t::from(pid),
      addr,
      data,
    ))
    .map(|_| 0)
  }
}
```

```
/// Sets the process as traceable, as with `ptrace(PT_TRACEME, ...)`
///
/// Indicates that this process is to be traced by its parent.
/// This is the only ptrace request to be issued by the tracee.
pub fn traceme() -> Result<()> {
  unsafe {
      ptrace_other(Request::PT_TRACE_ME, Pid::from_raw(0), ptr::null_mut(), 0)
          .map(drop)
  }
}

/// Attach to a running
 process, as with `ptrace(PT_ATTACH, ...)`
///
/// Attaches to the process specified by `pid`, making it a tracee of the calling process.
pub fn attach(pid: Pid) -> Result<()> {
  unsafe {
      ptrace_other(Request::PT_ATTACH, pid, ptr::null_mut(), 0).map(drop)
  }
}

/// Detaches the current running process, as with `ptrace(PT_DETACH, ...)`
///
/// Detaches from the process specified by `pid` allowing it to run freely, optionally delivering a
/// signal specified by `sig`.
pub fn detach<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
  let data = match sig.into() {
      Some(s) => s as c_int,
      None => 0,
  };
  unsafe {
      ptrace_other(Request::PT_DETACH, pid, ptr::null_mut(), data).map(drop)
  }
}

/// Restart the stopped tracee process, as with `ptrace(PTRACE_CONT, ...)`
///
/// Continues the execution of the process with PID `pid`, optionally
/// delivering a signal specified by `sig`.
pub fn cont<T: Into<Option<Signal>>>(pid: Pid, sig: T)
 -> Result<()> {
  let data = match sig.into() {
      Some(s) => s as c_int,
      None => 0,
  };
  unsafe {
      // Ignore the useless return value
```

```
        ptrace_other(Request::PT_CONTINUE, pid, 1 as AddressType, data)
            .map(drop)
    }
}

/// Issues a kill request as with `ptrace(PT_KILL, ...)`
///
/// This request is equivalent to `ptrace(PT_CONTINUE, ..., SIGKILL);`
pub fn kill(pid: Pid) -> Result<()> {
    unsafe {
        ptrace_other(Request::PT_KILL, pid, 0 as AddressType, 0).map(drop)
    }
}

/// Move the stopped tracee process forward by a single step as with
/// `ptrace(PT_STEP, ...)`
///
/// Advances the execution of the process with PID `pid` by a single step optionally delivering a
/// signal specified by `sig`.
///
/// # Example
/// ```rust
/// use nix::sys::ptrace::step;
/// use nix::unistd::Pid;
/// use nix::sys::signal::Signal;
/// use nix::sys::wait::*;
/// // If a process changes state to the stopped state because of a SIGUSR1
/// // signal,
 this will step the process forward and forward the user
/// // signal to the stopped process
/// match waitpid(Pid::from_raw(-1), None) {
///     Ok(WaitStatus::Stopped(pid, Signal::SIGUSR1)) => {
///         let _ = step(pid, Signal::SIGUSR1);
///     }
///     _ => {},
/// }
/// ```
#[cfg(any(
    any(freebsdlike, apple_targets),
    all(target_os = "openbsd", target_arch = "x86_64"),
    all(
        target_os = "netbsd",
        any(target_arch = "x86_64", target_arch = "powerpc")
    )
))]
pub fn step<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
    let data = match sig.into() {
        Some(s) => s as c_int,
```

```
        None => 0,
    };
    unsafe {
        ptrace_other(Request::PT_STEP, pid, ptr::null_mut(), data).map(drop)
    }
}

/// Reads a word from a processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn read(pid: Pid, addr: AddressType)
 -> Result<c_int> {
    unsafe {
        // Traditionally there was a difference between reading data or
        // instruction memory but not in modern systems.
        ptrace_other(Request::PT_READ_D, pid, addr, 0)
    }
}

/// Writes a word into the processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn write(pid: Pid, addr: AddressType, data: c_int) -> Result<()> {
    unsafe { ptrace_other(Request::PT_WRITE_D, pid, addr, data).map(drop) }
}
```

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# 1.2276 hyper 1.7.0

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```
//! FreeBSD and NetBSD xattr support.

use libc::{c_int, c_void, size_t, EPERM};
use std::ffi::{CString, OsStr, OsString};
use std::io;
use std::mem;
use std::os::unix::ffi::{OsStrExt, OsStringExt};
use std::os::unix::io::{AsRawFd, BorrowedFd};
use std::path::Path;
use std::ptr;

use libc::{
  extattr_delete_fd, extattr_delete_file, extattr_delete_link, extattr_get_fd, extattr_get_file,
  extattr_get_link, extattr_list_fd, extattr_list_file, extattr_list_link, extattr_set_fd,
  extattr_set_file, extattr_set_link, EXTATTR_NAMESPACE_SYSTEM, EXTATTR_NAMESPACE_USER,
};

use crate::util::allocate_loop;

pub const ENOATTR: i32 = libc::ENOATTR;
pub const ERANGE: i32 = libc::ERANGE;

const EXTATTR_NAMESPACE_USER_STRING: &str = "user";
const EXTATTR_NAMESPACE_SYSTEM_STRING: &str = "system";
const EXTATTR_NAMESPACE_NAMES: [&str; 3] = [
  "empty",
  EXTATTR_NAMESPACE_USER_STRING,
  EXTATTR_NAMESPACE_SYSTEM_STRING,
];

fn path_to_c(path: &Path) -> io::Result<CString> {
  match CString::new(path.as_os_str().as_bytes())
 {
      Ok(name) => Ok(name),
      Err(_) => Err(io::Error::new(io::ErrorKind::NotFound, "file not found")),
  }
}

#[inline]
fn slice_parts(buf: &mut [u8]) -> (*mut c_void, size_t) {
  if buf.is_empty() {
      (ptr::null_mut(), 0)
  } else {
```

```
        (buf.as_mut_ptr().cast(), buf.len() as size_t)
    }
}

/// An iterator over a set of extended attributes names.
#[derive(Default)]
pub struct XAttrs {
    user_attrs: Box<[u8]>,
    system_attrs: Box<[u8]>,
    offset: usize,
}

impl Clone for XAttrs {
    fn clone(&self) -> Self {
        XAttrs {
            user_attrs: Vec::from(&*self.user_attrs).into_boxed_slice(),
            system_attrs: Vec::from(&*self.system_attrs).into_boxed_slice(),
            offset: self.offset,
        }
    }

    fn clone_from(&mut self, other: &XAttrs) {
        self.offset = other.offset;

        let mut data = mem::replace(&mut self.user_attrs, Box::new([])).into_vec();
        data.extend(other.user_attrs.iter().cloned());
         self.user_attrs = data.into_boxed_slice();

        data = mem::replace(&mut self.system_attrs, Box::new([])).into_vec();
        data.extend(other.system_attrs.iter().cloned());
        self.system_attrs = data.into_boxed_slice();
    }
}

impl Iterator for XAttrs {
    type Item = OsString;
    fn next(&mut self) -> Option<OsString> {
        if self.user_attrs.is_empty() && self.system_attrs.is_empty() {
            return None;
        }

        if self.offset == self.user_attrs.len() + self.system_attrs.len() {
            return None;
        }

        let data = if self.offset < self.system_attrs.len() {
            &self.system_attrs[self.offset..]
        } else {
```

```
            &self.user_attrs[self.offset - self.system_attrs.len()..]
        };

        let siz = data[0] as usize;

        self.offset += siz + 1;
        if self.offset < self.system_attrs.len() {
            Some(prefix_namespace(
                OsStr::from_bytes(&data[1..siz
 + 1]),
                EXTATTR_NAMESPACE_SYSTEM,
            ))
        } else {
            Some(prefix_namespace(
                OsStr::from_bytes(&data[1..siz + 1]),
                EXTATTR_NAMESPACE_USER,
            ))
        }
    }

    fn size_hint(&self) -> (usize, Option<usize>) {
        if self.user_attrs.len() + self.system_attrs.len() == self.offset {
            (0, Some(0))
        } else {
            (1, None)
        }
    }
}

// This could use libc::extattr_string_to_namespace, but it's awkward because
// that requires nul-terminated strings, which Rust's std is loathe to provide.
fn name_to_ns(name: &OsStr) -> io::Result<(c_int, CString)> {
    let mut groups = name.as_bytes().splitn(2, |&b| b == b'.').take(2);
    let nsname = match groups.next() {
        Some(s) => s,
        None => {
            return Err(io::Error::new(
                io::ErrorKind::InvalidInput,
                "couldn't find namespace",
            ))
        }
    };

    let propname
 = match groups.next() {
        Some(s) => s,
        None => {
            return Err(io::Error::new(
```

```
            io::ErrorKind::InvalidInput,
            "couldn't find attribute",
        ))
    }
  };

  let ns_int = match EXTATTR_NAMESPACE_NAMES
    .iter()
    .position(|&s| s.as_bytes() == nsname)
  {
    Some(i) => i,
    None => {
        return Err(io::Error::new(
            io::ErrorKind::InvalidInput,
            "no matching namespace",
        ))
    }
  };

  Ok((ns_int as c_int, CString::new(propname)?))
}

fn prefix_namespace(attr: &OsStr, ns: c_int) -> OsString {
  let nsname = EXTATTR_NAMESPACE_NAMES[ns as usize];
  let mut v = Vec::with_capacity(nsname.as_bytes().len() + attr.as_bytes().len() + 1);
  v.extend(nsname.as_bytes());
  v.extend(".".as_bytes());
  v.extend(attr.as_bytes());
  OsString::from_vec(v)
}

fn cvt(res: libc::ssize_t) -> io::Result<usize> {
  if res < 0 {
    Err(io::Error::last_os_error())
   } else {
    Ok(res as usize)
  }
}

pub fn get_fd(fd: BorrowedFd<'_>, name: &OsStr) -> io::Result<Vec<u8>> {
  let (ns, name) = name_to_ns(name)?;
  unsafe {
    allocate_loop(|buf| {
        let (ptr, len) = slice_parts(buf);
        cvt(extattr_get_fd(fd.as_raw_fd(), ns, name.as_ptr(), ptr, len))
    })
  }
}
```

```
pub fn set_fd(fd: BorrowedFd<'_>, name: &OsStr, value: &[u8]) -> io::Result<()> {
  let (ns, name) = name_to_ns(name)?;
  let ret = unsafe {
     extattr_set_fd(
        fd.as_raw_fd(),
        ns,
        name.as_ptr(),
        value.as_ptr() as *const c_void,
        value.len() as size_t,
     )
  };
  if ret == -1 {
     Err(io::Error::last_os_error())
  } else {
     Ok(())
  }
}

pub fn remove_fd(fd: BorrowedFd<'_>, name: &OsStr) -> io::Result<()> {
  let (ns, name) = name_to_ns(name)?;
  let ret = unsafe { extattr_delete_fd(fd.as_raw_fd(), ns, name.as_ptr()) };

 if ret != 0 {
     Err(io::Error::last_os_error())
  } else {
     Ok(())
  }
}

pub fn list_fd(fd: BorrowedFd<'_>) -> io::Result<XAttrs> {
  let sysvec = unsafe {
     let res = allocate_loop(|buf| {
        let (ptr, len) = slice_parts(buf);
        cvt(extattr_list_fd(
           fd.as_raw_fd(),
           EXTATTR_NAMESPACE_SYSTEM,
           ptr,
           len,
        ))
     });
     // On FreeBSD, system attributes require root privileges to view. However,
     // to mimic the behavior of listxattr in linux and osx, we need to query
     // them anyway and return empty results if we get EPERM
     match res {
        Ok(v) => v,
        Err(err) => {
           if err.raw_os_error() == Some(EPERM) {
```

```
                Vec::new()
            } else {
                return Err(err);
            }
        }
    }
  };

  let uservec = unsafe {
    let res = allocate_loop(|buf|
 {
        let (ptr, len) = slice_parts(buf);
        cvt(extattr_list_fd(
            fd.as_raw_fd(),
            EXTATTR_NAMESPACE_USER,
            ptr,
            len,
        ))
    });
    match res {
        Ok(v) => v,
        Err(err) => return Err(err),
    }
  };

  Ok(XAttrs {
    system_attrs: sysvec.into_boxed_slice(),
    user_attrs: uservec.into_boxed_slice(),
    offset: 0,
  })
}

pub fn get_path(path: &Path, name: &OsStr, deref: bool) -> io::Result<Vec<u8>> {
  let (ns, name) = name_to_ns(name)?;
  let path = path_to_c(path)?;
  let extattr_get_func = if deref {
    extattr_get_file
  } else {
    extattr_get_link
  };
  unsafe {
    allocate_loop(|buf| {
        let (ptr, len) = slice_parts(buf);
        cvt(extattr_get_func(path.as_ptr(), ns, name.as_ptr(), ptr, len))
    })
  }
}
```

```
pub fn set_path(path: &Path, name: &OsStr, value: &[u8], deref: bool) -> io::Result<()>
 {
   let (ns, name) = name_to_ns(name)?;
   let path = path_to_c(path)?;
   let extattr_set_func = if deref {
       extattr_set_file
   } else {
       extattr_set_link
   };
   let ret = unsafe {
       extattr_set_func(
           path.as_ptr(),
           ns,
           name.as_ptr(),
           value.as_ptr() as *const c_void,
           value.len() as size_t,
       )
   };
   if ret == -1 {
       Err(io::Error::last_os_error())
   } else {
       Ok(())
   }
}

pub fn remove_path(path: &Path, name: &OsStr, deref: bool) -> io::Result<()> {
   let (ns, name) = name_to_ns(name)?;
   let path = path_to_c(path)?;
   let extattr_delete_func = if deref {
       extattr_delete_file
   } else {
       extattr_delete_link
   };
   let ret = unsafe { extattr_delete_func(path.as_ptr(), ns, name.as_ptr()) };
   if ret != 0 {
       Err(io::Error::last_os_error())
   } else {
       Ok(())
   }
}

pub fn list_path(path: &Path, deref: bool) -> io::Result<XAttrs>
 {
   let path = path_to_c(path)?;
   let extattr_list_func = if deref {
       extattr_list_file
   } else {
       extattr_list_link
```

```
};
let sysvec = unsafe {
    let res = allocate_loop(|buf| {
        let (ptr, len) = slice_parts(buf);
        cvt(extattr_list_func(
            path.as_ptr(),
            EXTATTR_NAMESPACE_SYSTEM,
            ptr,
            len,
        ))
    });
    // On FreeBSD, system attributes require root privileges to view. However,
    // to mimic the behavior of listxattr in linux and osx, we need to query
    // them anyway and return empty results if we get EPERM
    match res {
        Ok(v) => v,
        Err(err) => {
            if err.raw_os_error() == Some(EPERM) {
                Vec::new()
            } else {
                return Err(err);
            }
        }
    }
};

let uservec = unsafe {
    let res = allocate_loop(|buf|
{
        let (ptr, len) = slice_parts(buf);
        cvt(extattr_list_func(
            path.as_ptr(),
            EXTATTR_NAMESPACE_USER,
            ptr,
            len,
        ))
    });
    match res {
        Ok(v) => v,
        Err(err) => return Err(err),
    }
};

Ok(XAttrs {
    system_attrs: sysvec.into_boxed_slice(),
    user_attrs: uservec.into_boxed_slice(),
    offset: 0,
})
```

}
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CharIndices implementation of the Rust standard library at revision
ab32548539ec38a939c1b58599249f3b54130026
(https://github.com/rust-lang/rust/blob/ab32548539ec38a939c1b58599249f3b54130026/library/core/src/str/iter.rs).

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a. If it is being maintained, then ask the Current Maintainer to update their communication data within one month.

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3a. If the Current Maintainer is reachable and agrees to pass maintenance of the Work to you, then this takes effect immediately upon announcement.

b. If the Current Maintainer is not reachable and the Copyright Holder agrees that maintenance of the Work be passed to you, then this takes effect immediately upon announcement.

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```
//! This file contains the BSD APIs available in Haiku. It corresponds to the
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//!
//! Note that Haiku's BSD compatibility is a combination of system APIs and
//! utility libraries. There should only be system APIs in `libc`. When you are
//! trying to determine whether something should be included in this file, the
//! best indicator is whether it also exists in the BSD-specific definitions in
//! this libc crate.

use crate::prelude::*;

// stringlist.h (utility library)
// Note: this is kept because it was previously introduced
pub type StringList = _stringlist;

s! {
  // stringlist.h (utility library)
  // Note: this is kept because it was previously introduced
  pub struct _stringlist {
      pub sl_str: *mut *mut c_char,
      pub sl_max: size_t,
      pub sl_cur: size_t,
  }

  // sys/event.h
  pub struct kevent {
      pub ident: crate::uintptr_t,
      pub filter: c_short,
      pub flags: c_ushort,

  pub fflags: c_uint,
      pub data: i64,
      pub udata: *mut c_void,
```

```
        pub ext: [u64; 4],
    }

    // sys/link_elf.h
    pub struct dl_phdr_info {
        pub dlpi_addr: crate::Elf_Addr,
        pub dlpi_name: *const c_char,
        pub dlpi_phdr: *const crate::Elf_Phdr,
        pub dlpi_phnum: crate::Elf_Half,
    }
}

// sys/event.h
pub const EVFILT_READ: i16 = -1;
pub const EVFILT_WRITE: i16 = -2;
pub const EVFILT_PROC: i16 = -5;
pub const EV_ADD: u16 = 0x0001;
pub const EV_DELETE: u16 = 0x0002;
pub const EV_ONESHOT: u16 = 0x0010;
pub const EV_CLEAR: u16 = 0x0020;
pub const EV_EOF: u16 = 0x8000;
pub const EV_ERROR: u16 = 0x4000;
pub const NOTE_EXIT: u32 = 0x80000000;

// sys/ioccom.h
pub const IOC_VOID: c_ulong = 0x20000000;
pub const IOC_OUT: c_ulong = 0x40000000;
pub const IOC_IN: c_ulong = 0x80000000;
pub const IOC_INOUT: c_ulong = IOC_IN | IOC_OUT;
pub const IOC_DIRMASK: c_ulong = 0xe0000000;

#[link(name = "bsd")]
extern "C" {
    // stdlib.h
    pub fn daemon(nochdir:
 c_int, noclose: c_int) -> c_int;
    pub fn getprogname() -> *const c_char;
    pub fn setprogname(progname: *const c_char);
    pub fn arc4random() -> u32;
    pub fn arc4random_uniform(upper_bound: u32) -> u32;
    pub fn arc4random_buf(buf: *mut c_void, n: size_t);
    pub fn mkstemps(template: *mut c_char, suffixlen: c_int) -> c_int;
    pub fn strtonum(
        nptr: *const c_char,
        minval: c_longlong,
        maxval: c_longlong,
        errstr: *mut *const c_char,
    ) -> c_longlong;
```

```
// pty.h
pub fn openpty(
    amaster: *mut c_int,
    aslave: *mut c_int,
    name: *mut c_char,
    termp: *mut crate::termios,
    winp: *mut crate::winsize,
) -> c_int;
pub fn login_tty(_fd: c_int) -> c_int;
pub fn forkpty(
    amaster: *mut c_int,
    name: *mut c_char,
    termp: *mut crate::termios,
    winp: *mut crate::winsize,
) -> crate::pid_t;

// string.h
pub fn strsep(string: *mut *mut c_char, delimiters:
*const c_char) -> *mut c_char;
pub fn explicit_bzero(buf: *mut c_void, len: size_t);

// stringlist.h (utility library)
// Note: this is kept because it was previously introduced
pub fn sl_init() -> *mut StringList;
pub fn sl_add(sl: *mut StringList, n: *mut c_char) -> c_int;
pub fn sl_free(sl: *mut StringList, i: c_int);
pub fn sl_find(sl: *mut StringList, n: *mut c_char) -> *mut c_char;

// sys/event.h
pub fn kqueue() -> c_int;
pub fn kevent(
    kq: c_int,
    changelist: *const kevent,
    nchanges: c_int,
    eventlist: *mut kevent,
    nevents: c_int,
    timeout: *const crate::timespec,
) -> c_int;

// sys/link_elf.h
pub fn dl_iterate_phdr(
    callback: Option<
        unsafe extern "C" fn(info: *mut dl_phdr_info, size: usize, data: *mut c_void) -> c_int,
    >,
    data: *mut c_void,
) -> c_int;
```

```
  // sys/time.h
  pub fn lutimes(file: *const c_char, times: *const crate::timeval)
 -> c_int;

  // sys/uov.h
  pub fn preadv(
      fd: c_int,
      iov: *const crate::iovec,
      iovcnt: c_int,
      offset: crate::off_t,
  ) -> ssize_t;
  pub fn pwritev(
      fd: c_int,
      iov: *const crate::iovec,
      iovcnt: c_int,
      offset: crate::off_t,
  ) -> ssize_t;

  // sys/wait.h
  pub fn wait4(
      pid: crate::pid_t,
      status: *mut c_int,
      options: c_int,
      rusage: *mut crate::rusage,
  ) -> crate::pid_t;
}
================================================================================
```

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h. Unter einem verwandten Schutzrecht wird das Recht an einem anderen urheberrechtlichen Schutzgegenstand als einem Werk verstanden, zum Beispiel einer wissenschaftlichen Ausgabe, einem nachgelassenen Werk, einem Lichtbild, einer Datenbank, einem Tontrger, einer Funksendung, einem Laufbild oder einer Darbietung eines ausbenden Knstlers.

i. Unter dem Werk wird eine persnliche geistige Schpfung verstanden, die Ihnen unter den Bedingungen dieser Lizenz angeboten wird.

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b. den Schutzgegenstand in unkrperlicher Form ffentlich wiederzugeben, insbesondere vorzutragen, aufzufhren und vorzufhren, ffentlich zugnglich zu machen, zu senden, durch Bild- und Tontrger wiederzugeben sowie Funksendungen und ffentliche Zugnglichmachungen wiederzugeben;

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6. Haftung. ber die in Ziffer 5 genannte Gewhrleistung hinaus haftet Ihnen der Lizenzgeber nur fr Vorsatz und grobe Fahrlssigkeit.

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c. Sollte eine Bestimmung dieses Lizenzvertrages
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d. Nichts soll dahingehend ausgelegt werden, dass auf eine Bestimmung dieses Lizenzvertrages verzichtet oder einer Vertragsverletzung zugestimmt wird, so lange ein solcher Verzicht oder eine solche Zustimmung nicht schriftlich vorliegen und von der verzichtenden oder zustimmenden Vertragspartei unterschrieben sind

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been removed from OpenSSH, i.e.,

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- IDEA is no longer included, its use is deprecated
- DES is now external, in the OpenSSL library
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- Zlib is now external, in a library
- The make-ssh-known-hosts script is no longer included
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```
//! `ioctl` opcode behavior for BSD platforms.

use super::{Direction, Opcode};

pub(super) const fn compose_opcode(
   dir: Direction,
   group: Opcode,
   num: Opcode,
   size: Opcode,
) -> Opcode {
   let dir = match dir {
      Direction::None => NONE,
      Direction::Read => READ,
      Direction::Write => WRITE,
      Direction::ReadWrite => READ | WRITE,
   };

   dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}

// `IOC_VOID`
pub const NONE: Opcode = 0x2000_0000;
// `IOC_OUT` (out is from the perspective of the kernel)
pub const READ: Opcode = 0x4000_0000;
// `IOC_IN` (in is from the perspective of the kernel)
pub const WRITE: Opcode = 0x8000_0000;
```

pub const IOCPARAM_MASK: Opcode = 0x1FFF;
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```
//! `ioctl` opcode behavior for BSD platforms.

use super::{Direction, RawOpcode};

pub(super) const fn compose_opcode(
   dir: Direction,
   group: RawOpcode,
   num: RawOpcode,
   size: RawOpcode,
) -> RawOpcode {
   let dir = match dir {
      Direction::None => NONE,
      Direction::Read => READ,
      Direction::Write => WRITE,
```

```
      Direction::ReadWrite => READ | WRITE,
   };

   dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}

// `IOC_VOID`
pub const NONE: RawOpcode = 0x2000_0000;
// `IOC_OUT` (out is from the perspective of the kernel)
pub const READ: RawOpcode = 0x4000_0000;
// `IOC_IN` (in is from the perspective of the kernel)
pub const WRITE: RawOpcode = 0x8000_0000;
pub const IOCPARAM_MASK: RawOpcode = 0x1FFF;
```

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Version 3.0, 18 August 2009

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By Shawn Hargreaves, 18 October 1998.

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1. Dfinitions

a. Oeuvre : oeuvre de l'esprit protgeable par le droit de la proprit littraire et artistique ou toute loi applicable et qui est mise disposition selon les termes du prsent Contrat.

b. Oeuvre dite Collective : une oeuvre dans laquelle l'oeuvre, dans sa forme intgrale et non modifie, est assemble en un ensemble collectif avec d'autres contributions qui constituent en elles-mmes des oeuvres spares et indpendantes. Constituent notamment des Oeuvres dites Collectives les publications priodiques, les anthologies ou les encyclopdies. Aux termes de la prsente autorisation, une oeuvre qui constitue
une Oeuvre dite Collective ne sera pas considre comme une Oeuvre dite Drive (telle que dfinie ci-aprs).

c. Oeuvre dite Drive : une oeuvre cre soit partir de l'Oeuvre seule, soit partir de l'Oeuvre et d'autres oeuvres

prexistantes. Constituent notamment des Oeuvres dites Drives les traductions, les arrangements musicaux, les adaptations thtrales, littraires ou cinmatographiques, les enregistrements sonores, les reproductions par un art ou un procd quelconque, les rsums, ou toute autre forme sous laquelle l'Oeuvre puisse tre remanie, modifie, transforme ou adapte, l'exception d'une oeuvre qui constitue une Oeuvre dite Collective. Une Oeuvre dite Collective ne sera pas considre comme une Oeuvre dite Drive aux termes du prsent Contrat. Dans le cas o l'Oeuvre serait une composition musicale ou un enregistrement sonore, la synchronisation de l'oeuvre avec une image anime sera considre comme une Oeuvre dite Drive pour les propos de ce Contrat.

d. Auteur original : la ou les personnes physiques qui ont cr l'Oeuvre.

e. Offrant : la ou les personne(s) physique(s) ou morale(s) qui proposent la mise disposition de l'Oeuvre selon les termes du prsent Contrat.

f. Acceptant : la personne physique ou morale qui accepte le prsent contrat et exerce des droits sans en avoir viol les termes au pralable ou qui a reu l'autorisation expresse de l'Offrant d'exercer des droits dans le cadre du prsent contrat malgr une prcdente violation de ce contrat.

g. Options du Contrat : les attributs gnriques du Contrat tels qu'ils ont t choisis par l'Offrant et indiqus dans le titre de ce Contrat : Paternit - Pas d'Utilisation Commerciale - Partage Des Conditions Initiales A l'Identique.

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a. reproduire l'Oeuvre, incorporer l'Oeuvre dans une ou plusieurs Oeuvres dites Collectives et reproduire l'Oeuvre telle qu'incorpore dans lesdites Oeuvres dites Collectives;

b. crer et reproduire des Oeuvres dites Drives;

c. distribuer des exemplaires ou enregistrements, prsenter, reprsenter ou communiquer l'Oeuvre au public par tout procd technique, y compris incorpore dans des Oeuvres Collectives;

d. distribuer des exemplaires ou phonogrammes, prsenter, reprsenter ou communiquer au public des Oeuvres dites Drives par tout procd technique;

e. lorsque l'Oeuvre est une base de donnes, extraire et rutiliser des parties substantielles de l'Oeuvre.

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applicables dcrits  l'article 4(e).

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a. L'Acceptant peut reproduire, distribuer, reprsenter ou communiquer au public l'Oeuvre y compris par voie numrique uniquement selon les termes de ce Contrat. L'Acceptant doit inclure une copie ou l'adresse Internet (Identifiant Uniforme de Ressource) du prsent Contrat  toute reproduction ou enregistrement de l'Oeuvre que l'Acceptant distribue, reprsente ou communique au public y compris par voie numrique. L'Acceptant ne peut pas offrir ou imposer de conditions d'utilisation de l'Oeuvre qui altrent ou restreignent les termes du prsent Contrat ou l'exercice des droits qui y sont accords au bnficiaire. L'Acceptant ne peut pas cder de droits sur l'Oeuvre. L'Acceptant doit conserver intactes toutes les informations qui renvoient  ce Contrat et  l'exonration de responsabilit. L'Acceptant ne peut pas reproduire, distribuer, reprsenter ou communiquer au public l'Oeuvre, y compris par voie numrique, en utilisant une mesure technique de contrle d'accs ou de contrle d'utilisation qui serait contradictoire avec les termes de cet Accord contractuel. Les mentions ci-dessus s'appliquent l'Oeuvre telle qu'incorpore dans une Oeuvre dite Collective, mais, en dehors de l'Oeuvre en elle-mme, ne soumettent pas l'Oeuvre dite Collective, aux termes du prsent Contrat. Si l'Acceptant cre une Oeuvre dite Collective,  la demande de tout Offrant, il devra, dans la mesure du possible, retirer de l'Oeuvre dite Collective toute rfrence au dit Offrant, comme demand. Si l'Acceptant cre une Oeuvre dite Collective,  la demande de tout Auteur, il devra, dans la mesure du possible, retirer de l'Oeuvre dite Collective toute rfrence au dit Auteur, comme demand. Si l'Acceptant cre une Oeuvre dite Drive,  la demande de tout Offrant, il devra, dans la mesure du possible, retirer de l'Oeuvre dite Drive toute rfrence au dit Offrant, comme demand. Si l'Acceptant cre une Oeuvre dite Drive,  la demande de tout Auteur, il devra, dans la mesure du possible, retirer de l'Oeuvre dite Drive toute rfrence au dit Auteur, comme demand.

b. L'Acceptant peut reproduire, distribuer, reprsenter ou communiquer au public une Oeuvre dite Drive y compris par voie numrique uniquement sous les termes de ce Contrat, ou d'une version ultrieure de ce Contrat comprenant les mmes Options du Contrat que le prsent Contrat, ou un Contrat Creative Commons iCommons comprenant les mmes Options du Contrat que le prsent Contrat (par exemple Paternit - Pas d'Utilisation Commerciale - Partage Des Conditions Initiales A l'Identique 2.0 Japon). L'Acceptant doit inclure une copie ou l'adresse Internet (Identifiant Uniforme de Ressource) du prsent Contrat, ou d'un autre Contrat tel que dcrit  la phrase prcdente,  toute reproduction ou enregistrement de l'Oeuvre dite Drive que l'Acceptant distribue, reprsente ou communique au public y compris par voie numrique. L'Acceptant ne peut pas offrir ou imposer de conditions d'utilisation sur l'Oeuvre dite Drive qui altrent ou restreignent les termes du prsent Contrat ou l'exercice des droits qui y sont accords au bnficiaire, et doit conserver intactes toutes les informations qui renvoient  ce Contrat et  l'avertissement sur les garanties. L'Acceptant ne peut pas reproduire, distribuer, reprsenter ou communiquer au public y compris par voie numrique l'Oeuvre dite Drive en utilisant une mesure technique de contrle d'accs ou de contrle d'utilisation qui serait contradictoire avec les termes de cet Accord contractuel. Les mentions ci-dessus s'appliquent  l'Oeuvre dite Drive telle qu'incorpore dans une Oeuvre dite Collective, mais, en dehors de l'Oeuvre dite Drive en elle-mme, ne soumettent pas l'Oeuvre Collective, aux termes du prsent Contrat.

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d'Oeuvres protges.

d. Si l'Acceptant
reproduit, distribue, reprsente ou communique au public, y compris par voie numrique, l'Oeuvre ou toute Oeuvre dite Drive ou toute Oeuvre dite Collective, il doit conserver intactes toutes les informations sur le rgime des droits et en attribuer la paternit l'Auteur Original, de manire raisonnable au regard au mdium ou au moyen utilis. Il doit communiquer le nom de l'Auteur Original ou son ventuel pseudonyme s'il est indiqu ; le titre de l'Oeuvre Originale s'il est indiqu ; dans la mesure du possible, l'adresse Internet ou Identifiant Uniforme de Ressource (URI), s'il existe, spcifi par l'Offrant comme associ l'Oeuvre, moins que cette adresse ne renvoie pas aux informations lgales (paternit et conditions d'utilisation de l'Oeuvre). Dans le cas d'une Oeuvre dite Drive, il doit indiquer les lments identifiant l'utilisation l'Oeuvre dans l'Oeuvre dite Drive par exemple Traduction anglaise de l'Oeuvre par l'Auteur Original ou Scnario bas sur l'Oeuvre par l'Auteur Original .
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e. Dans le cas o une utilisation de l'Oeuvre serait soumise un rgime lgal de gestion collective obligatoire, l'Offrant se rserve le droit exclusif de collecter ces redevances par l'intermdiaire de la socit de perception et de rpartition des droits comptente. Sont notamment concerns la radiodiffusion et la communication dans un lieu public de phonogrammes publis des fins de commerce, certains cas de retransmission par cble et satellite, la copie prive d'Oeuvres fixes sur phonogrammes ou vidogrammes, la reproduction par reprographie.

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a. En mettant l'Oeuvre la disposition du public selon les termes de ce Contrat, l'Offrant
dclare de bonne foi qu' sa connaissance et dans les limites d'une enqute raisonnable :

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ii. L'Oeuvre n'est constitutive ni d'une violation des droits de tiers, notamment du droit de la proprit littraire et artistique, du droit des marques, du droit de l'information, du droit civil ou de tout autre droit, ni de diffamation, de violation de la vie prive ou de tout autre prjudice dlictuel l'gard de toute tierce partie.

b. A l'exception des situations expressment mentionnes dans le prsent Contrat ou dans un autre accord crit, ou exiges par la loi applicable,
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b. Dans les limites indiques ci-dessus, le prsent Contrat s'applique pendant toute la dure de protection de l'Oeuvre selon le droit applicable. Nanmoins, l'Offrant se rserve tout moment le droit d'exploiter l'Oeuvre sous des conditions contractuelles diffrentes, ou d'en cesser la diffusion; cependant, le recours cette option ne doit pas conduire retirer les effets du prsent Contrat (ou de tout contrat qui a t ou doit tre accord selon les termes de ce Contrat), et ce Contrat continuera s'appliquer dans tous ses effets jusqu' ce que sa rsiliation intervienne dans les conditions dcrites ci-dessus.

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b. A chaque reproduction ou communication au public par voie numrique d'une Oeuvre dite Drive par l'Acceptant, l'Offrant propose au bnficiaire une offre de mise disposition du bnficiaire de l'Oeuvre originale dans des termes et conditions identiques ceux accords la partie Acceptante dans le prsent Contrat.

c. La nullit ou l'inapplicabilit d'une quelconque disposition de ce Contrat au regard de la loi applicable n'affecte pas celle des autres dispositions qui resteront pleinement valides et applicables. Sans action additionnelle par les parties cet accord, lesdites dispositions devront tre interprtes dans la mesure minimum ncessaire leur validit et leur applicabilit.

d. Aucune limite, renonciation ou modification des termes ou dispositions du prsent Contrat ne pourra tre accepte sans le consentement crit et sign de la partie comptente.

e. Ce Contrat constitue le seul accord entre les parties propos de l'Oeuvre mise ici disposition. Il n'existe aucun lment annexe, accord supplmentaire ou mandat portant sur cette Oeuvre en dehors des lments mentionns ici. L'Offrant ne sera tenu par aucune disposition supplmentaire qui pourrait apparatre dans une quelconque communication en provenance de l'Acceptant. Ce Contrat ne peut tre modifi sans l'accord mutuel crit de l'Offrant et de l'Acceptant.

f. Le droit applicable est le droit franais.

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2006-Jan-27

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Licentie

HET WERK (ALS HIERONDER OMSCHREVEN) WORDT TER BESCHIKKING GESTELD OVEREENKOMSTIG DE VOORWAARDEN VAN DEZE CREATIVE COMMONS PUBLIEKE LICENTIE

('CCPL' OF 'LICENTIE'). HET WERK WORDT BESCHERMD OP GROND VAN HET AUTEURSRECHT, NABURIGE RECHTEN, HET DATABANKENRECHT EN/OF ENIGE ANDERE TOEPASSELIJKE RECHTEN. MET UITZONDERING VAN HET IN DEZE LICENTIE OMSCHREVEN TOEGESTANE GEBRUIK VAN HET WERK IS ENIG ANDER GEBRUIK VAN HET WERK NIET TOEGESTAAN.

DOOR HET UITOEFENEN VAN DE IN DEZE LICENTIE VERLEENDE RECHTEN MET BETREKKING TOT HET WERK AANVAARDT EN GAAT DE GEBRUIKER AKKOORD MET DE VOORWAARDEN VAN DEZE LICENTIE, MET DIEN VERSTANDE DAT (DE INHOUD VAN) DEZE LICENTIE OP VOORHAND VOLDOENDE DUIDELIJK KENBAAR DIENT TE ZIJN VOOR DE ONTVANGER VAN HET WERK.

DE LICENTIEGEVER VERLEENT DE GEBRUIKER DE IN DEZE LICENTIE OMSCHREVEN RECHTEN MET INACHTNEMING VAN DE DESBETREFFENDE VOORWAARDEN.

1. Definities

a. 'Verzamelwerk' een werk waarin het Werk, in zijn geheel en in ongewijzigde vorm, samen met een of meer andere werken, die elk een afzonderlijk en zelfstandig werk vormen, tot een geheel is samengevoegd. Voorbeelden van een verzamelwerk zijn een tijdschrift, een bloemlezing of een encyclopedie. Een Verzamelwerk zal voor de toepassing van deze Licentie niet als een Afgeleid werk (als hieronder omschreven) worden beschouwd.

b. 'Afgeleid werk' een werk dat is gebaseerd op het Werk of op het Werk en andere reeds bestaande werken. Voorbeelden van een Afgeleid werk zijn een vertaling, een muziekschikking (arrangement), een toneelbewerking, een literaire bewerking, een verfilming, een geluidsopname, een kunstreproductie, een verkorte versie, een samenvatting of enig andere bewerking van het Werk, met dien verstande dat een Verzamelwerk voor de toepassing van deze Licentie niet als een Afgeleid werk zal worden beschouwd.

Indien het Werk een muziekwerk betreft, zal de synchronisatie van de tijdslijnen van het Werk en een bewegend beeld ('synching') voor de toepassing van deze Licentie als een Afgeleid Werk worden beschouwd.

c. 'Licentiegever' de natuurlijke persoon/personen of rechtspersoon/rechtspersonen die het Werk volgens de voorwaarden van deze Licentie aanbiedt/aanbieden.

d. 'Maker' de natuurlijke persoon/personen of rechtspersoon/personen die het oorspronkelijke werk gemaakt heeft/hebben. Voor de toepassing van deze Licentie wordt onder de Maker mede verstaan de uitvoerende kunstenaar, film- en fonogramproducent en omroeporganisaties in de zin van de Wet op de naburige rechten en de producent van een databank in de zin van de Databankenwet.

e. 'Werk' het auteursrechtelijk beschermde werk dat volgens de voorwaarden van deze Licentie wordt aangeboden. Voor de toepassing van deze Licentie wordt onder het Werk mede verstaan het fonogram, de eerste vastlegging van een film en het (omroep)programma in de zin van de Wet op de naburige rechten en de databank in de zin van de Databankenwet, voor zover dit fonogram, deze eerste vastlegging van een film, dit (omroep)programma en deze databank beschermd wordt krachtens de toepasselijke wet in de jurisdictie van de Gebruiker.

f. 'Gebruiker' de natuurlijke persoon of rechtspersoon die rechten ingevolge deze Licentie uitoefent en die de voorwaarden van deze Licentie met betrekking tot het Werk niet eerder geschonden heeft, of die van de Licentiegever uitdrukkelijke toestemming gekregen heeft om rechten ingevolge deze Licentie uit te oefenen ondanks

een eerdere schending.

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b. het maken en reproduceren van Afgeleide werken met dien verstande dat met betrekking tot het Afgeleide werk, met inbegrip van welke vertaling in welk medium dan ook, duidelijk wordt gemaakt
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c. het verspreiden van exemplaren van het Werk, het in het openbaar tonen, op- en uitvoeren en het on-line beschikbaar stellen van het Werk, afzonderlijk en als deel van een Verzamelwerk;

d. het verspreiden van exemplaren van Afgeleide werken, het in het openbaar te tonen, op- en uitvoeren en het on-line beschikbaar stellen van Afgeleide werken;

e. het opvragen en hergebruiken van het Werk;

f. Volledigheidshalve dient te worden vermeld dat:

i. Niet voor afstand vatbare heffingsregelingen. in het geval van niet voor afstand vatbare heffingsregelingen (bijvoorbeeld met betrekking tot thuiskopien) de Licentiegever zich het recht voorbehoudt om dergelijke heffingen te innen
(al dan niet door middel van een auteursrechtenorganisatie) bij zowel commercieel als niet-commercieel gebruik van het Werk;

ii. Voor afstand vatbare heffingsregeling. in het geval van voor afstand vatbare heffingsregelingen (bijvoorbeeld met betrekking tot leenrechten) de Licentiegever afstand doet van het recht om dergelijke heffingen te innen bij zowel commercieel als niet-commercieel gebruik van het Werk;

iii. Collectief rechtenbeheer. de Licentiegever afstand doet van het recht om vergoedingen te innen (zelfstandig of, indien de Licentiegever lid is van een auteursrechtenorganisatie, door middel van die organisatie) bij zowel commercieel als niet-commercieel gebruik van het Werk.

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uitdrukkelijk verleende rechten zijn hierbij voorbehouden aan de Licentiegever, met inbegrip van maar niet beperkt tot de rechten die in artikel 4(d) worden genoemd. Voor zover de Licentiegever op basis van het nationale recht ter implementatie van de Europese Databankenrichtlijn over uitsluitende rechten beschickt doet de Licentiegever afstand van deze rechten.

4. Beperkingen. De in artikel 3 verleende Licentie is uitdrukkelijk gebonden aan de volgende beperkingen:

a. De Gebruiker mag het Werk uitsluitend verspreiden, in het openbaar tonen, op- of uitvoeren of on-line beschikbaar stellen met inachtneming van de voorwaarden van deze Licentie, en de Gebruiker dient een exemplaar van, of de Uniform Resource Identifier voor, deze Licentie toe te voegen aan elk exemplaar van het Werk dat de Gebruiker verspreidt, in het openbaar toont, op- of uitvoert, of on-line beschikbaar stelt. Het is de Gebruiker niet toegestaan om het Werk onder enige afwijkende voorwaarden aan te bieden waardoor de voorwaarden van deze Licentie dan wel de mogelijkheid van de ontvangers van het Werk om de rechten krachtens deze Licentie uit te oefenen worden beperkt. Het is de Gebruiker niet toegestaan om het Werk in sublicentie te geven. De Gebruiker dient alle vermeldingen die verwijzen naar deze Licentie dan wel naar de uitsluiting van garantie te laten staan. Het is de Gebruiker niet toegestaan om het Werk te verspreiden, in het openbaar te tonen, op- of uit te voeren of on-line beschikbaar te stellen met toepassing van technologische voorzieningen waardoor de voorwaarden van deze Licentie dan wel de mogelijkheid van de ontvangers van het Werk om de rechten krachtens deze Licentie uit te oefenen worden beperkt. Het voorgaande is tevens van toepassing op het Werk dat deel uitmaakt van een Verzamelwerk, maar dat houdt niet in dat het Verzamelwerk, afgezien van het Werk zelf, gebonden is aan de voorwaarden van deze Licentie. Indien de Gebruiker een Verzamelwerk maakt, dient deze, op verzoek van welke Licentiegever ook, de op grond van artikel 4(b) vereiste naamsvermelding uit het Verzamelwerk te verwijderen, voor zover praktisch mogelijk, conform het verzoek. Indien de Gebruiker een Afgeleid werk maakt, dient hij, op verzoek van welke Licentiegever ook, de op grond van artikel 4(b) vereiste naamsvermelding uit het Afgeleide werk te verwijderen, voorzover praktisch mogelijk, conform het verzoek.

b. Indien de Gebruiker het Werk, Afgeleide Werken of Verzamelwerken verspreidt, in het openbaar toont, op- of uitvoert of on-line beschikbaar stelt, dient de Gebruiker, tenzij er sprake is van een verzoek als vermeld in lid 4(a), alle auteursrechtvermeldingen met betrekking tot het Werk te laten staan. Tevens dient de Gebruiker, op een wijze die redelijk is in verhouding tot het gebruikte medium, de naam te vermelden van (i) de Maker (of zijn/haar pseudoniem indien van toepassing) indien deze wordt vermeld; en/of (ii) van (een) andere partij(en) (b.v. sponsor, uitgeverij, tijdschrift) indien de naamsvermelding van deze partij(en) ("Naamsvermeldingsgerechtigden") in de auteursrechtvermelding of algemene voorwaarden van de Licentiegever of op een andere redelijke wijze verplicht is gesteld door de Maker en/of de Licentiegever; de titel van het Werk indien deze wordt vermeld; voorzover redelijkerwijs toepasbaar de Uniform Resource Identifier, indien aanwezig, waarvan de Licentiegever heeft aangegeven dat deze bij het Werk hoort, tenzij de URI niet verwijst naar de auteursrechtvermeldingen of de licentie-informatie betreffende het Werk; in overeenstemming met artikel 3(b) in geval van een Afgeleid werk, door te verwijzen naar het gebruik van het Werk in het Afgeleide werk (bijvoorbeeld: 'De Franse vertaling van het Werk van de Maker' of 'Scenario gebaseerd op het Werk van de Maker'). De Gebruiker dient op redelijke wijze aan de in dit artikel genoemde vereisten te voldoen; echter, met dien verstande dat, in geval van een Afgeleid werk of een Verzamelwerk, de naamsvermeldingen in ieder geval geplaatst dienen te worden, indien er een naamsvermelding van alle makers van het Afgeleide werk of het Verzamelwerk geplaatst wordt dan als deel van die naamsvermeldingen, en op een wijze die in ieder geval even duidelijk is als de naamsvermeldingen van de overige makers.

Volledigheidshalve dient te worden vermeld dat de Gebruiker uitsluitend gebruik mag maken van de naamsvermelding op de in dit artikel omschreven wijze teneinde te voldoen aan de naamsvermeldingsverplichting

en, door gebruikmaking van zijn rechten krachtens deze Licentie, is het de Gebruiker niet toegestaan om op enigerlei wijze de indruk te wekken dat er sprake is van enig verband met, sponsorschap van of goedkeuring van de (toepasselijke) Maker, Licentiegever c.q. Naamsvermeldingsgerechtigden van de Gebruiker of diens gebruik van het Werk, zonder de afzonderlijke, uitdrukkelijke, voorafgaande, schriftelijke toestemming van de Maker, Licentiegever c.q. Naamsvermeldingsgerechtigden.

c. Volledigheidshalve dient te worden vermeld, dat de hierboven vermelde beperkingen (lid 4(a) en lid 4(b)) niet van toepassing zijn op die onderdelen van het Werk die geacht worden te vallen onder de definitie van het 'Werk' zoals vermeld in deze Licentie uitsluitend omdat zij voldoen aan de criteria van het sui generis databankenrecht krachtens het nationale recht ter implementatie van de Europese Databankenrichtlijn.

d. De in artikel 3 verleende rechten moeten worden uitgeoefend met inachtneming van het morele recht van de Maker (en/of de uitvoerende kunstenaar) om zich te verzetten tegen elke misvorming, verminking of andere aantasting van het werk, welke nadeel zou kunnen toebrengen aan de eer of de naam van de Maker (en/of de uitvoerende kunstenaar) of aan zijn waarde in deze hoedanigheid, indien en voor zover de Maker (en/of de uitvoerende kunstenaar) op grond van een op hem van toepassing zijnde wettelijke bepaling geen afstand kan doen van dat morele recht.

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DE LICENTIEGEVER AANVAARDT GEEN ENKELE AANSPRAKELIJKHEID JEGENS DE GEBRUIKER VOOR ENIGE BIJZONDERE OF INCIDENTELE SCHADE OF GEVOLGSCHADE VOORTVLOEIEND UIT DEZE LICENTIE OF HET GEBRUIK VAN HET WERK, ZELFS NIET INDIEN DE LICENTIEGEVER OP DE HOOGTE IS GESTELD VAN HET RISICO VAN DERGELIJKE SCHADE, INDIEN EN VOORZOVER DE WET NIET ANDERS BEPAALT.

7. Beindiging

a. Deze Licentie en de daarin verleende rechten vervallen automatisch op het moment dat de Gebruiker in strijd handelt met de voorwaarden van deze Licentie. De licenties van natuurlijke personen of rechtspersonen die Verzamelwerken hebben ontvangen van de Gebruiker krachtens deze Licentie blijven echter in stand zolang dergelijke natuurlijke personen of rechtspersonen zich houden aan de voorwaarden van die licenties. Na de beindiging van deze Licentie blijven artikelen 1, 2, 5, 6, 7 en 8 onverminderd van kracht.

b. Met inachtneming van de hierboven vermelde voorwaarden wordt de Licentie verleend voor de duur van de

toepasselijke intellectuele eigendomsrechten op het Werk. De Licentiegever behoudt zich desalniettemin te allen tijde het recht voor om het Werk volgens gewijzigde licentievoorwaarden te verspreiden of om het Werk niet langer te verspreiden; met dien verstande dat een dergelijk besluit niet de intrekking van deze Licentie (of enig andere licentie die volgens de voorwaarden van deze Licentie (verplicht) is verleend) tot gevolg heeft, en deze Licentie onverminderd van kracht blijft tenzij zij op de in lid a omschreven wijze wordt beindigd.

8. Diversen

a. Elke keer dat de Gebruiker het Werk of een Verzamelwerk verspreidt of on-line beschikbaar stelt, biedt de Licentiegever de ontvanger een licentie op het Werk aan volgens de algemene voorwaarden van deze Licentie.

b. Elke keer dat de Gebruiker een Afgeleid werk verspreidt of on-line beschikbaar stelt, biedt de Licentiegever de ontvanger een licentie op het oorspronkelijke werk aan volgens de algemene voorwaarden van deze Licentie.

c. Indien enige bepaling van deze Licentie nietig of niet rechtens afdwingbaar is, zullen de overige voorwaarden van deze Licentie volledig van kracht blijven. De nietige of niet-afdwingbare bepaling zal, zonder tussenkomst van de partijen, worden vervangen door een geldige en afdwingbare bepaling waarbij het doel en de strekking van de oorspronkelijke bepaling zoveel mogelijk in acht worden genomen.

d. Een verklaring van afstand van in deze Licentie verleende rechten of een wijziging van de voorwaarden van deze Licentie dient schriftelijk te geschieden en getekend te zijn door de partij die verantwoordelijk is voor de verklaring van afstand respectievelijk de partij wiens toestemming voor de wijziging is vereist.

f. Deze Licentie bevat de volledige overeenkomst tussen de partijen met betrekking tot het in licentie gegeven Werk. Er zijn geen andere afspraken gemaakt met betrekking tot het Werk. De Licentiegever is niet gebonden aan enige aanvullende bepalingen die worden vermeld in mededelingen van de Gebruiker. Deze licentie kan uitsluitend worden gewijzigd met de wederzijdse, schriftelijke instemming van de Licentiegever en de Gebruiker.

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```
/// The datatype used for the ioctl number
#[doc(hidden)]
#[cfg(not(solarish))]
pub type ioctl_num_type = ::libc::c_ulong;

#[doc(hidden)]
#[cfg(solarish)]
pub type ioctl_num_type = ::libc::c_int;

/// The datatype used for the 3rd argument
#[doc(hidden)]
pub type ioctl_param_type = ::libc::c_int;

mod consts {
  use crate::sys::ioctl::ioctl_num_type;
  #[doc(hidden)]
```

```
  pub const VOID: ioctl_num_type = 0x2000_0000;
  #[doc(hidden)]
  pub const OUT: ioctl_num_type = 0x4000_0000;
  #[doc(hidden)]
  #[allow(overflowing_literals)]
  pub const IN: ioctl_num_type = 0x8000_0000;
  #[doc(hidden)]
  pub const INOUT: ioctl_num_type = IN | OUT;
  #[doc(hidden)]
  pub const IOCPARM_MASK: ioctl_num_type = 0x1fff;
}

pub use self::consts::*;

#[macro_export]
#[doc(hidden)]
macro_rules! ioc {
  ($inout:expr, $group:expr, $num:expr, $len:expr) => {
      $inout
          | (($len as $crate::sys::ioctl::ioctl_num_type
              & $crate::sys::ioctl::IOCPARM_MASK)

            << 16)
          | (($group as $crate::sys::ioctl::ioctl_num_type) << 8)
          | ($num as $crate::sys::ioctl::ioctl_num_type)
  };
}

/// Generate an ioctl request code for a command that passes no data.
///
/// This is equivalent to the `_IO()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_none!()` directly.
///
/// # Example
///
/// ```
/// # #[macro_use] extern crate nix;
/// const KVMIO: u8 = 0xAE;
/// ioctl_write_int_bad!(kvm_create_vm, request_code_none!(KVMIO, 0x03));
/// # fn main() {}
/// ```
#[macro_export(local_inner_macros)]
macro_rules! request_code_none {
  ($g:expr, $n:expr) => {
      ioc!($crate::sys::ioctl::VOID, $g, $n, 0)
  };
```

```
}

/// Generate an ioctl request code for a command that passes an integer
///
/// This is equivalent to the `_IOWINT()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the
 `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write_int!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write_int {
   ($g:expr, $n:expr) => {
       ioc!(
           $crate::sys::ioctl::VOID,
           $g,
           $n,
           ::std::mem::size_of::<$crate::libc::c_int>()
       )
   };
}

/// Generate an ioctl request code for a command that reads.
///
/// This is equivalent to the `_IOR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_read!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is reading and the kernel is
/// writing.
#[macro_export(local_inner_macros)]
macro_rules! request_code_read {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::OUT, $g, $n, $len)
   };
}

/// Generate an ioctl request code for a command that writes.
///
///
 This is equivalent to the `_IOW()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is writing and the kernel is
```

```
/// reading.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::IN, $g, $n, $len)
   };
}

/// Generate an ioctl request code for a command that reads and writes.
///
/// This is equivalent to the `_IOWR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_readwrite!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_readwrite {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::INOUT, $g, $n, $len)

 };
}
```

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"#

```
use crate::errno::Errno;
use crate::sys::signal::Signal;
use crate::unistd::Pid;
use crate::Result;
use cfg_if::cfg_if;
use libc::{self, c_int};
use std::ptr;

pub type RequestType = c_int;

cfg_if! {
  if #[cfg(any(freebsdlike, apple_targets, target_os = "openbsd"))] {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_char;
  } else {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_void;
  }
}
```

```
libc_enum! {
  #[repr(i32)]
  /// Ptrace Request enum defining the action to be taken.
  #[non_exhaustive]
  pub enum Request {
    PT_TRACE_ME,
    PT_READ_I,
    PT_READ_D,
    #[cfg(apple_targets)]
    PT_READ_U,
    PT_WRITE_I,
    PT_WRITE_D,
    #[cfg(apple_targets)]
    PT_WRITE_U,
    PT_CONTINUE,
    PT_KILL,
    #[cfg(any(any(freebsdlike, apple_targets),
          all(target_os = "openbsd", target_arch = "x86_64"),
          all(target_os = "netbsd", any(target_arch = "x86_64",
                        target_arch = "powerpc"))))]
    PT_STEP,
    PT_ATTACH,
    PT_DETACH,
    #[cfg(apple_targets)]
    PT_SIGEXC,
    #[cfg(apple_targets)]
    PT_THUPDATE,
    #[cfg(apple_targets)]
    PT_ATTACHEXC
  }
}

unsafe fn ptrace_other(
  request: Request,
  pid: Pid,
  addr: AddressType,
  data: c_int,
) -> Result<c_int> {
  unsafe {
    Errno::result(libc::ptrace(
      request as RequestType,
      libc::pid_t::from(pid),
      addr,
      data,
    ))
    .map(|_| 0)
  }
}
```

```
/// Sets the process as traceable, as with `ptrace(PT_TRACEME, ...)`
///
/// Indicates that this process is to be traced by its parent.
/// This is the only ptrace request to be issued by the tracee.
pub fn traceme() -> Result<()> {
   unsafe {
       ptrace_other(Request::PT_TRACE_ME, Pid::from_raw(0), ptr::null_mut(), 0)
           .map(drop)
   }
}

/// Attach to a running
 process, as with `ptrace(PT_ATTACH, ...)`
///
/// Attaches to the process specified by `pid`, making it a tracee of the calling process.
pub fn attach(pid: Pid) -> Result<()> {
   unsafe {
       ptrace_other(Request::PT_ATTACH, pid, ptr::null_mut(), 0).map(drop)
   }
}

/// Detaches the current running process, as with `ptrace(PT_DETACH, ...)`
///
/// Detaches from the process specified by `pid` allowing it to run freely, optionally delivering a
/// signal specified by `sig`.
pub fn detach<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
   let data = match sig.into() {
       Some(s) => s as c_int,
       None => 0,
   };
   unsafe {
       ptrace_other(Request::PT_DETACH, pid, ptr::null_mut(), data).map(drop)
   }
}

/// Restart the stopped tracee process, as with `ptrace(PTRACE_CONT, ...)`
///
/// Continues the execution of the process with PID `pid`, optionally
/// delivering a signal specified by `sig`.
pub fn cont<T: Into<Option<Signal>>>(pid: Pid, sig: T)
 -> Result<()> {
   let data = match sig.into() {
       Some(s) => s as c_int,
       None => 0,
   };
   unsafe {
       // Ignore the useless return value
```

```
        ptrace_other(Request::PT_CONTINUE, pid, 1 as AddressType, data)
            .map(drop)
    }
}

/// Issues a kill request as with `ptrace(PT_KILL, ...)`
///
/// This request is equivalent to `ptrace(PT_CONTINUE, ..., SIGKILL);`
pub fn kill(pid: Pid) -> Result<()> {
    unsafe {
        ptrace_other(Request::PT_KILL, pid, 0 as AddressType, 0).map(drop)
    }
}

/// Move the stopped tracee process forward by a single step as with
/// `ptrace(PT_STEP, ...)`
///
/// Advances the execution of the process with PID `pid` by a single step optionally delivering a
/// signal specified by `sig`.
///
/// # Example
/// ```rust
/// use nix::sys::ptrace::step;
/// use nix::unistd::Pid;
/// use nix::sys::signal::Signal;
/// use nix::sys::wait::*;
/// // If a process changes state to the stopped state because of a SIGUSR1
/// // signal,
 this will step the process forward and forward the user
/// // signal to the stopped process
/// match waitpid(Pid::from_raw(-1), None) {
///     Ok(WaitStatus::Stopped(pid, Signal::SIGUSR1)) => {
///         let _ = step(pid, Signal::SIGUSR1);
///     }
///     _ => {},
/// }
/// ```
#[cfg(any(
    any(freebsdlike, apple_targets),
    all(target_os = "openbsd", target_arch = "x86_64"),
    all(
        target_os = "netbsd",
        any(target_arch = "x86_64", target_arch = "powerpc")
    )
))]
pub fn step<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
    let data = match sig.into() {
        Some(s) => s as c_int,
```

```
        None => 0,
    };
    unsafe {
        ptrace_other(Request::PT_STEP, pid, ptr::null_mut(), data).map(drop)
    }
}

/// Reads a word from a processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn read(pid: Pid, addr: AddressType)
 -> Result<c_int> {
    unsafe {
        // Traditionally there was a difference between reading data or
        // instruction memory but not in modern systems.
        ptrace_other(Request::PT_READ_D, pid, addr, 0)
    }
}

/// Writes a word into the processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn write(pid: Pid, addr: AddressType, data: c_int) -> Result<()> {
    unsafe { ptrace_other(Request::PT_WRITE_D, pid, addr, data).map(drop) }
}
```

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Version 1.0 dated 2006-09-05.
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Version 1.1 - 26 February 2007

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# 1.2277 socket2 0.6.0

## 1.2277.1 Available under license :

```
//! FreeBSD and NetBSD xattr support.

use libc::{c_int, c_void, size_t, EPERM};
use std::ffi::{CString, OsStr, OsString};
use std::io;
use std::mem;
use std::os::unix::ffi::{OsStrExt, OsStringExt};
use std::os::unix::io::{AsRawFd, BorrowedFd};
use std::path::Path;
```

```
use std::ptr;

use libc::{
   extattr_delete_fd, extattr_delete_file, extattr_delete_link, extattr_get_fd, extattr_get_file,
   extattr_get_link, extattr_list_fd, extattr_list_file, extattr_list_link, extattr_set_fd,
   extattr_set_file, extattr_set_link, EXTATTR_NAMESPACE_SYSTEM, EXTATTR_NAMESPACE_USER,
};

use crate::util::allocate_loop;

pub const ENOATTR: i32 = libc::ENOATTR;
pub const ERANGE: i32 = libc::ERANGE;

const EXTATTR_NAMESPACE_USER_STRING: &str = "user";
const EXTATTR_NAMESPACE_SYSTEM_STRING: &str = "system";
const EXTATTR_NAMESPACE_NAMES: [&str; 3] = [
   "empty",
   EXTATTR_NAMESPACE_USER_STRING,
   EXTATTR_NAMESPACE_SYSTEM_STRING,
];

fn path_to_c(path: &Path) -> io::Result<CString> {
   match CString::new(path.as_os_str().as_bytes())
 {
       Ok(name) => Ok(name),
       Err(_) => Err(io::Error::new(io::ErrorKind::NotFound, "file not found")),
   }
}

#[inline]
fn slice_parts(buf: &mut [u8]) -> (*mut c_void, size_t) {
   if buf.is_empty() {
       (ptr::null_mut(), 0)
   } else {
       (buf.as_mut_ptr().cast(), buf.len() as size_t)
   }
}

/// An iterator over a set of extended attributes names.
#[derive(Default)]
pub struct XAttrs {
   user_attrs: Box<[u8]>,
   system_attrs: Box<[u8]>,
   offset: usize,
}

impl Clone for XAttrs {
   fn clone(&self) -> Self {
```

```
        XAttrs {
            user_attrs: Vec::from(&*self.user_attrs).into_boxed_slice(),
            system_attrs: Vec::from(&*self.system_attrs).into_boxed_slice(),
            offset: self.offset,
        }
    }

    fn clone_from(&mut self, other: &XAttrs) {
        self.offset = other.offset;

        let mut data = mem::replace(&mut self.user_attrs, Box::new([])).into_vec();
        data.extend(other.user_attrs.iter().cloned());
         self.user_attrs = data.into_boxed_slice();

        data = mem::replace(&mut self.system_attrs, Box::new([])).into_vec();
        data.extend(other.system_attrs.iter().cloned());
        self.system_attrs = data.into_boxed_slice();
    }
}

impl Iterator for XAttrs {
    type Item = OsString;
    fn next(&mut self) -> Option<OsString> {
        if self.user_attrs.is_empty() && self.system_attrs.is_empty() {
            return None;
        }

        if self.offset == self.user_attrs.len() + self.system_attrs.len() {
            return None;
        }

        let data = if self.offset < self.system_attrs.len() {
            &self.system_attrs[self.offset..]
        } else {
            &self.user_attrs[self.offset - self.system_attrs.len()..]
        };

        let siz = data[0] as usize;

        self.offset += siz + 1;
        if self.offset < self.system_attrs.len() {
            Some(prefix_namespace(
                OsStr::from_bytes(&data[1..siz
 + 1]),
                EXTATTR_NAMESPACE_SYSTEM,
            ))
        } else {
            Some(prefix_namespace(
```

```
            OsStr::from_bytes(&data[1..siz + 1]),
            EXTATTR_NAMESPACE_USER,
        ))
    }
  }

  fn size_hint(&self) -> (usize, Option<usize>) {
    if self.user_attrs.len() + self.system_attrs.len() == self.offset {
        (0, Some(0))
    } else {
        (1, None)
    }
  }
}

// This could use libc::extattr_string_to_namespace, but it's awkward because
// that requires nul-terminated strings, which Rust's std is loathe to provide.
fn name_to_ns(name: &OsStr) -> io::Result<(c_int, CString)> {
  let mut groups = name.as_bytes().splitn(2, |&b| b == b'.').take(2);
  let nsname = match groups.next() {
    Some(s) => s,
    None => {
        return Err(io::Error::new(
            io::ErrorKind::InvalidInput,
            "couldn't find namespace",
        ))
    }
  };

  let propname
 = match groups.next() {
    Some(s) => s,
    None => {
        return Err(io::Error::new(
            io::ErrorKind::InvalidInput,
            "couldn't find attribute",
        ))
    }
  };

  let ns_int = match EXTATTR_NAMESPACE_NAMES
    .iter()
    .position(|&s| s.as_bytes() == nsname)
  {
    Some(i) => i,
    None => {
        return Err(io::Error::new(
            io::ErrorKind::InvalidInput,
```

```
            "no matching namespace",
        ))
    }
  };

  Ok((ns_int as c_int, CString::new(propname)?))
}

fn prefix_namespace(attr: &OsStr, ns: c_int) -> OsString {
  let nsname = EXTATTR_NAMESPACE_NAMES[ns as usize];
  let mut v = Vec::with_capacity(nsname.as_bytes().len() + attr.as_bytes().len() + 1);
  v.extend(nsname.as_bytes());
  v.extend(".".as_bytes());
  v.extend(attr.as_bytes());
  OsString::from_vec(v)
}

fn cvt(res: libc::ssize_t) -> io::Result<usize> {
  if res < 0 {
    Err(io::Error::last_os_error())
   } else {
    Ok(res as usize)
  }
}

pub fn get_fd(fd: BorrowedFd<'_>, name: &OsStr) -> io::Result<Vec<u8>> {
  let (ns, name) = name_to_ns(name)?;
  unsafe {
    allocate_loop(|buf| {
      let (ptr, len) = slice_parts(buf);
      cvt(extattr_get_fd(fd.as_raw_fd(), ns, name.as_ptr(), ptr, len))
    })
  }
}

pub fn set_fd(fd: BorrowedFd<'_>, name: &OsStr, value: &[u8]) -> io::Result<()> {
  let (ns, name) = name_to_ns(name)?;
  let ret = unsafe {
    extattr_set_fd(
      fd.as_raw_fd(),
      ns,
      name.as_ptr(),
      value.as_ptr() as *const c_void,
      value.len() as size_t,
    )
  };
  if ret == -1 {
    Err(io::Error::last_os_error())
```

```
  } else {
      Ok(())
  }
}

pub fn remove_fd(fd: BorrowedFd<'_>, name: &OsStr) -> io::Result<()> {
  let (ns, name) = name_to_ns(name)?;
  let ret = unsafe { extattr_delete_fd(fd.as_raw_fd(), ns, name.as_ptr()) };

 if ret != 0 {
      Err(io::Error::last_os_error())
  } else {
      Ok(())
  }
}

pub fn list_fd(fd: BorrowedFd<'_>) -> io::Result<XAttrs> {
  let sysvec = unsafe {
      let res = allocate_loop(|buf| {
          let (ptr, len) = slice_parts(buf);
          cvt(extattr_list_fd(
              fd.as_raw_fd(),
              EXTATTR_NAMESPACE_SYSTEM,
              ptr,
              len,
          ))
      });
      // On FreeBSD, system attributes require root privileges to view. However,
      // to mimic the behavior of listxattr in linux and osx, we need to query
      // them anyway and return empty results if we get EPERM
      match res {
          Ok(v) => v,
          Err(err) => {
              if err.raw_os_error() == Some(EPERM) {
                  Vec::new()
              } else {
                  return Err(err);
              }
          }
      }
  };

  let uservec = unsafe {
      let res = allocate_loop(|buf|
 {
          let (ptr, len) = slice_parts(buf);
          cvt(extattr_list_fd(
              fd.as_raw_fd(),
```

```
            EXTATTR_NAMESPACE_USER,
            ptr,
            len,
        ))
    });
    match res {
        Ok(v) => v,
        Err(err) => return Err(err),
    }
  };

  Ok(XAttrs {
    system_attrs: sysvec.into_boxed_slice(),
    user_attrs: uservec.into_boxed_slice(),
    offset: 0,
  })
}

pub fn get_path(path: &Path, name: &OsStr, deref: bool) -> io::Result<Vec<u8>> {
  let (ns, name) = name_to_ns(name)?;
  let path = path_to_c(path)?;
  let extattr_get_func = if deref {
    extattr_get_file
  } else {
    extattr_get_link
  };
  unsafe {
    allocate_loop(|buf| {
        let (ptr, len) = slice_parts(buf);
        cvt(extattr_get_func(path.as_ptr(), ns, name.as_ptr(), ptr, len))
    })
  }
}

pub fn set_path(path: &Path, name: &OsStr, value: &[u8], deref: bool) -> io::Result<()>
 {
  let (ns, name) = name_to_ns(name)?;
  let path = path_to_c(path)?;
  let extattr_set_func = if deref {
    extattr_set_file
  } else {
    extattr_set_link
  };
  let ret = unsafe {
    extattr_set_func(
        path.as_ptr(),
        ns,
        name.as_ptr(),
```

```
            value.as_ptr() as *const c_void,
            value.len() as size_t,
        )
    };
    if ret == -1 {
        Err(io::Error::last_os_error())
    } else {
        Ok(())
    }
}

pub fn remove_path(path: &Path, name: &OsStr, deref: bool) -> io::Result<()> {
    let (ns, name) = name_to_ns(name)?;
    let path = path_to_c(path)?;
    let extattr_delete_func = if deref {
        extattr_delete_file
    } else {
        extattr_delete_link
    };
    let ret = unsafe { extattr_delete_func(path.as_ptr(), ns, name.as_ptr()) };
    if ret != 0 {
        Err(io::Error::last_os_error())
    } else {
        Ok(())
    }
}

pub fn list_path(path: &Path, deref: bool) -> io::Result<XAttrs>
 {
    let path = path_to_c(path)?;
    let extattr_list_func = if deref {
        extattr_list_file
    } else {
        extattr_list_link
    };
    let sysvec = unsafe {
        let res = allocate_loop(|buf| {
            let (ptr, len) = slice_parts(buf);
            cvt(extattr_list_func(
                path.as_ptr(),
                EXTATTR_NAMESPACE_SYSTEM,
                ptr,
                len,
            ))
        });
        // On FreeBSD, system attributes require root privileges to view. However,
        // to mimic the behavior of listxattr in linux and osx, we need to query
        // them anyway and return empty results if we get EPERM
```

```
    match res {
        Ok(v) => v,
        Err(err) => {
            if err.raw_os_error() == Some(EPERM) {
                Vec::new()
            } else {
                return Err(err);
            }
        }
    }
  };

  let uservec = unsafe {
    let res = allocate_loop(|buf|
 {
        let (ptr, len) = slice_parts(buf);
        cvt(extattr_list_func(
            path.as_ptr(),
            EXTATTR_NAMESPACE_USER,
            ptr,
            len,
        ))
    });
    match res {
        Ok(v) => v,
        Err(err) => return Err(err),
    }
  };

  Ok(XAttrs {
    system_attrs: sysvec.into_boxed_slice(),
    user_attrs: uservec.into_boxed_slice(),
    offset: 0,
  })
}
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CharIndices implementation of the Rust standard library at revision
ab32548539ec38a939c1b58599249f3b54130026
(https://github.com/rust-lang/rust/blob/ab32548539ec38a939c1b58599249f3b54130026/library/core/src/str/iter.rs).

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//! This file contains the BSD APIs available in Haiku. It corresponds to the
//! header files in `headers/compatibility/bsd`.
//!
//! Note that Haiku's BSD compatibility is a combination of system APIs and

```
//! utility libraries. There should only be system APIs in `libc`. When you are
//! trying to determine whether something should be included in this file, the
//! best indicator is whether it also exists in the BSD-specific definitions in
//! this libc crate.

use crate::prelude::*;

// stringlist.h (utility library)
// Note: this is kept because it was previously introduced
pub type StringList = _stringlist;

s! {
  // stringlist.h (utility library)
  // Note: this is kept because it was previously introduced
  pub struct _stringlist {
      pub sl_str: *mut *mut c_char,
      pub sl_max: size_t,
      pub sl_cur: size_t,
  }

  // sys/event.h
  pub struct kevent {
      pub ident: crate::uintptr_t,
      pub filter: c_short,
      pub flags: c_ushort,

  pub fflags: c_uint,
      pub data: i64,
      pub udata: *mut c_void,
      pub ext: [u64; 4],
  }

  // sys/link_elf.h
  pub struct dl_phdr_info {
      pub dlpi_addr: crate::Elf_Addr,
      pub dlpi_name: *const c_char,
      pub dlpi_phdr: *const crate::Elf_Phdr,
      pub dlpi_phnum: crate::Elf_Half,
  }
}

// sys/event.h
pub const EVFILT_READ: i16 = -1;
pub const EVFILT_WRITE: i16 = -2;
pub const EVFILT_PROC: i16 = -5;
pub const EV_ADD: u16 = 0x0001;
pub const EV_DELETE: u16 = 0x0002;
pub const EV_ONESHOT: u16 = 0x0010;
```

```
pub const EV_CLEAR: u16 = 0x0020;
pub const EV_EOF: u16 = 0x8000;
pub const EV_ERROR: u16 = 0x4000;
pub const NOTE_EXIT: u32 = 0x80000000;

// sys/ioccom.h
pub const IOC_VOID: c_ulong = 0x20000000;
pub const IOC_OUT: c_ulong = 0x40000000;
pub const IOC_IN: c_ulong = 0x80000000;
pub const IOC_INOUT: c_ulong = IOC_IN | IOC_OUT;
pub const IOC_DIRMASK: c_ulong = 0xe0000000;

#[link(name = "bsd")]
extern "C" {
  // stdlib.h
  pub fn daemon(nochdir:
 c_int, noclose: c_int) -> c_int;
  pub fn getprogname() -> *const c_char;
  pub fn setprogname(progname: *const c_char);
  pub fn arc4random() -> u32;
  pub fn arc4random_uniform(upper_bound: u32) -> u32;
  pub fn arc4random_buf(buf: *mut c_void, n: size_t);
  pub fn mkstemps(template: *mut c_char, suffixlen: c_int) -> c_int;
  pub fn strtonum(
      nptr: *const c_char,
      minval: c_longlong,
      maxval: c_longlong,
      errstr: *mut *const c_char,
  ) -> c_longlong;

  // pty.h
  pub fn openpty(
      amaster: *mut c_int,
      aslave: *mut c_int,
      name: *mut c_char,
      termp: *mut crate::termios,
      winp: *mut crate::winsize,
  ) -> c_int;
  pub fn login_tty(_fd: c_int) -> c_int;
  pub fn forkpty(
      amaster: *mut c_int,
      name: *mut c_char,
      termp: *mut crate::termios,
      winp: *mut crate::winsize,
  ) -> crate::pid_t;

  // string.h
  pub fn strsep(string: *mut *mut c_char, delimiters:
```

```
*const c_char) -> *mut c_char;
  pub fn explicit_bzero(buf: *mut c_void, len: size_t);

  // stringlist.h (utility library)
  // Note: this is kept because it was previously introduced
  pub fn sl_init() -> *mut StringList;
  pub fn sl_add(sl: *mut StringList, n: *mut c_char) -> c_int;
  pub fn sl_free(sl: *mut StringList, i: c_int);
  pub fn sl_find(sl: *mut StringList, n: *mut c_char) -> *mut c_char;

  // sys/event.h
  pub fn kqueue() -> c_int;
  pub fn kevent(
      kq: c_int,
      changelist: *const kevent,
      nchanges: c_int,
      eventlist: *mut kevent,
      nevents: c_int,
      timeout: *const crate::timespec,
  ) -> c_int;

  // sys/link_elf.h
  pub fn dl_iterate_phdr(
      callback: Option<
          unsafe extern "C" fn(info: *mut dl_phdr_info, size: usize, data: *mut c_void) -> c_int,
      >,
      data: *mut c_void,
  ) -> c_int;

  // sys/time.h
  pub fn lutimes(file: *const c_char, times: *const crate::timeval)
-> c_int;

  // sys/uov.h
  pub fn preadv(
      fd: c_int,
      iov: *const crate::iovec,
      iovcnt: c_int,
      offset: crate::off_t,
  ) -> ssize_t;
  pub fn pwritev(
      fd: c_int,
      iov: *const crate::iovec,
      iovcnt: c_int,
      offset: crate::off_t,
  ) -> ssize_t;

  // sys/wait.h
```

```
  pub fn wait4(
      pid: crate::pid_t,
      status: *mut c_int,
      options: c_int,
      rusage: *mut crate::rusage,
  ) -> crate::pid_t;
}
```
==========

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"#
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Lizenzvertrag

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DURCH DIE AUSBUNG EINES DURCH DIESEN LIZENZVERTRAG GEWHRTEN RECHTS AN DEM SCHUTZGEGENSTAND ERKLREN SIE SICH MIT DEN LIZENZBEDINGUNGEN RECHTSVERBINDLICH EINVERSTANDEN. DER LIZENZGEBER RUMT IHNEN DIE HIER BESCHRIEBENEN RECHTE UNTER DER VORAUSSETZUNGEIN, DASS SIE SICH MIT DIESEN VERTRAGSBEDINGUNGEN EINVERSTANDEN ERKLREN.

1. Definitionen

a. Unter einer Bearbeitung wird eine bersetzung oder andere Bearbeitung des Werkes verstanden, die Ihre persnliche geistige Schpfung  ist. Eine freie Benutzung des Werkes wird nicht als Bearbeitung angesehen.

b. Unter den Lizenzelementen werden die folgenden Lizenzcharakteristika verstanden, die vom Lizenzgeber ausgewhlt und  in der Bezeichnung  der Lizenz genannt werden: Namensnennung, Nicht-kommerziell, Weitergabe unter gleichen Bedingungen.

c. Unter dem Lizenzgeber wird die natrliche oder juristische Person verstanden, die den Schutzgegenstand unter den Bedingungen dieser Lizenz anbietet.

d. Unter einem Sammelwerk wird eine Sammlung von Werken, Daten oder anderen unabhngigen Elementen verstanden, die aufgrund der Auswahl oder Anordnung der Elemente eine persnliche geistige Schpfung ist. Darunter fallen auch solche Sammelwerke, deren Elemente
systematisch oder methodisch angeordnet und einzeln mit Hilfe elektronischer Mittel oder auf andere Weise zugnglich sind (Datenbankwerke). Ein Sammelwerk wird im Zusammenhang mit dieser Lizenz nicht als Bearbeitung (wie oben beschrieben) angesehen.

e. Mit SIE und Ihnen ist die natrliche oder juristische Person gemeint, die die durch diese Lizenz gewhrten Nutzungsrechte ausbt und die zuvor die Bedingungen dieser Lizenz im Hinblick auf das Werk nicht verletzt hat, oder die die ausdrckliche Erlaubnis des Lizenzgebers erhalten hat, die durch diese Lizenz gewhrten Nutzungsrechte trotz einer vorherigen Verletzung auszuben.

f. Unter dem Schutzgegenstandwird das Werk oder Sammelwerk oder das Schutzobjekt eines verwandten Schutzrechts, das Ihnen unter den Bedingungen dieser Lizenz angeboten wird, verstanden

g. Unter dem Urheber wird die natrliche Person verstanden, die das Werk geschaffen hat.

h. Unter einem verwandten Schutzrecht wird das Recht an einem anderen
urheberrechtlichen Schutzgegenstand als einem Werk verstanden, zum Beispiel einer wissenschaftlichen Ausgabe, einem nachgelassenen Werk, einem Lichtbild, einer Datenbank, einem Tontrger, einer Funksendung, einem Laufbild oder einer Darbietung eines ausbenden Knstlers.

i. Unter dem Werk wird eine persnliche geistige Schpfung verstanden, die Ihnen unter den Bedingungen dieser Lizenz angeboten wird.

2. Schranken des Urheberrechts. Diese Lizenz lsst smtliche Befugnisse unberhrt, die sich aus den Schranken des Urheberrechts,aus dem Erschpfungsgrundsatz oder anderen Beschrnkungen der Ausschlielichkeitsrechte des Rechtsinhabers ergeben.

3. Lizenzierung. Unter den Bedingungen dieses Lizenzvertrages rumt Ihnen der Lizenzgeber ein lizenzgebhrenfreies, rumlich und zeitlich (fr die Dauer des Urheberrechts oder verwandten Schutzrechts) unbeschrnktes einfaches Nutzungsrecht ein, den Schutzgegenstand in der folgenden Art und Weise zu nutzen:

a. den Schutzgegenstand in krperlicher Form
zu verwerten, insbesondere zu vervielfltigen, zu verbreiten und auszustellen;

b. den Schutzgegenstand in unkrperlicher Form ffentlich wiederzugeben, insbesondere vorzutragen, aufzufhren und vorzufhren, ffentlich zugnglich zu machen, zu senden, durch Bild- und Tontrger wiederzugeben sowie Funksendungen und ffentliche Zugnglichmachungen wiederzugeben;

c. den Schutzgegenstand auf Bild- oder Tontrger aufzunehmen, Lichtbilder davon herzustellen, weiterzusenden und in dem in a. und b. genannten Umfang zu verwerten;

d. den Schutzgegenstand zu bearbeiten oder in anderer Weise umzugestalten und die Bearbeitungen zu

verffentlichen und in dem in a. bis c. genannten Umfang zu verwerten;

Die genannten Nutzungsrechte knnen fr alle bekannten Nutzungsarten ausgebt werden. Die genannten Nutzungsrechte beinhalten das Recht, solche Vernderungen an dem Werk vorzunehmen, die technisch erforderlich sind, um die Nutzungsrechte fr alle Nutzungsarten wahrzunehmen. Insbesondere sind davon die Anpassung an andere Medien und auf andere Dateiformate umfasst.

4. Beschrnkungen. Die Einrumung der Nutzungsrechte gem Ziffer 3 erfolgt ausdrcklich nur unter den folgenden Bedingungen:

a. Sie drfen den Schutzgegenstand ausschlielich unter den Bedingungen dieser Lizenz vervielfltigen, verbreiten oder ffentlich wiedergeben, und Sie mssen stets eine Kopie oder die vollstndige Internetadresse in Form des Uniform-Resource-Identifier (URI) dieser Lizenz beifgen, wenn Sie den Schutzgegenstandvervielfltigen, verbreiten oder ffentlich wiedergeben. Sie drfen keine Vertragsbedingungen anbieten oder fordern, die die Bedingungen dieser Lizenz oder die durch sie gewhrten Rechte ndern oder beschrnken. Sie drfen den Schutzgegenstand nicht unterlizenzieren. Sie mssen alle Hinweise unverndert lassen, die auf diese Lizenz und den Haftungsausschluss hinweisen. Sie drfen den Schutzgegenstand mit keinen technischen Schutzmanahmen versehen, die den Zugang oder den Gebrauch des Schutzgegenstandes in einer Weise kontrollieren, die mit den Bedingungen dieser Lizenz im Widerspruch stehen. Die genannten Beschrnkungen gelten auch fr den Fall, dass der Schutzgegenstand einen Bestandteil eines Sammelwerkes bildet; sie verlangen aber nicht, dass das Sammelwerk insgesamt zum Gegenstand dieser Lizenz gemacht wird. Wenn Sie ein Sammelwerk erstellen, mssen Sie - soweit dies praktikabel ist - auf die Mitteilung eines Lizenzgebers oder Urhebers hin aus dem Sammelwerk jeglichen Hinweis auf diesen Lizenzgeber oder diesen Urheber entfernen. Wenn Sie den Schutzgegenstand bearbeiten, mssen Sie - soweit dies praktikabel ist- auf die Aufforderung eines Rechtsinhabers hin von der Bearbeitung jeglichen Hinweis auf diesen Rechtsinhaber entfernen.

b. Sie drfen eine Bearbeitung ausschlielich unter den Bedingungen dieser Lizenz, einer spteren Version dieser Lizenz mit denselben Lizenzelementen wie diese Lizenz oder einer Creative Commons iCommons Lizenz, die dieselben Lizenzelemente wie diese Lizenz enthlt (z.B. Namensnennung - Nicht-kommerziell - Weitergabe unter gleichen Bedingungen 2.0 Japan), vervielfltigen, verbreiten oder ffentlich wiedergeben. Sie mssen stets eine Kopie oder die Internetadresse in Form des Uniform-Resource-Identifier (URI) dieser Lizenz oder einer anderen Lizenz der im vorhergehenden Satz beschriebenen Art beifgen, wenn Sie die Bearbeitung vervielfltigen, verbreiten oder ffentlich wiedergeben. Sie drfen keine Vertragsbedingungen anbieten oder fordern, die die Bedingungen dieser Lizenz oder die durch sie gewhrten Rechte ndern oder beschrnken, und Sie mssen alle Hinweise unverndert lassen, die auf diese Lizenz und den Haftungsausschluss hinweisen. Sie drfen eine Bearbeitung nicht mit technischen Schutzmanahmen versehen, die den Zugang oder den Gebrauch der Bearbeitung in einer Weise kontrollieren, die mit den Bedingungen dieser Lizenz im Widerspruch stehen. Die genannten Beschrnkungen gelten auch fr eine Bearbeitung als Bestandteil eines Sammelwerkes; sie erfordern aber nicht, dass das Sammelwerk insgesamt zum Gegenstand dieser Lizenz gemacht wird.

c. Sie drfen die in Ziffer 3 gewhrten Nutzungsrechte in keiner Weise verwenden, die hauptschlich auf einen geschftlichen Vorteil oder eine vertraglich geschuldete geldwerte Vergtung abzielt oder darauf gerichtet ist. Erhalten Sie im Zusammenhang mit der Einrumung der Nutzungsrechte ebenfalls einen Schutzgegenstand, ohne dass eine vertragliche Verpflichtung hierzu besteht, so wird dies nicht als geschftlicher Vorteil oder vertraglich geschuldete geldwerte Vergtung angesehen, wenn keine Zahlung oder geldwerte Vergtung in Verbindung mit dem Austausch der Schutzgegenstnde geleistet wird (z.B. File-Sharing).

d. Wenn Sie den Schutzgegenstand oder eine Bearbeitung oder ein Sammelwerk vervielfltigen, verbreiten oder ffentlich wiedergeben, mssen Sie alle Urhebervermerke fr den Schutzgegenstand unverndert lassen und die Urheberschaft oder Rechtsinhaberschaft in einer der von Ihnen vorgenommenen Nutzung angemessenen Form anerkennen, indem Sie den Namen (oder das Pseudonym, falls ein solches verwendet wird) des Urhebers oder Rechteinhabers nennen, wenn dieser angegeben ist. Dies gilt auch fr den Titel des Schutzgegenstandes, wenn dieser angeben ist, sowie - in einem vernnftigerweise durchfhrbaren Umfang - fr die mit dem Schutzgegenstand zu verbindende Internetadresse in Form des Uniform-Resource-Identifier (URI), wie sie der Lizenzgeber angegeben hat, sofern dies geschehen ist, es sei denn, diese Internetadresse verweist nicht auf den Urhebervermerk oder die Lizenzinformationen zu dem Schutzgegenstand. Bei einer Bearbeitung ist ein Hinweis darauf aufzufhren, in welcher Form der Schutzgegenstand in die Bearbeitung eingegangen ist (z.B. Franzsische bersetzung des ... (Werk) durch ... (Urheber) oder Das Drehbuch beruht auf dem Werk des ... (Urheber)). Ein solcher Hinweis kann in jeder angemessenen Weise erfolgen, wobei jedoch bei einer Bearbeitung, einer Datenbank oder einem Sammelwerk der Hinweis zumindest an gleicher Stelle und in ebenso auffllliger Weise zu erfolgen hat wie vergleichbare Hinweise auf andere Rechtsinhaber.

e. Obwohl die gemss Ziffer 3 gewhrten Nutzungsrechte in umfassender Weise ausgebt werden drfen, findet diese Erlaubnis ihre gesetzliche Grenze in den Persnlichkeitsrechten der Urheber und ausbenden Knstler, deren berechtigte geistige und persnliche Interessen bzw. deren Ansehen oder Ruf nicht dadurch gefhrdet werden drfen, dass ein Schutzgegenstand ber das gesetzlich zulssige Ma hinaus beeintrchtigt wird.

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6. Haftung. ber die in Ziffer 5 genannte Gewhrleistung hinaus haftet Ihnen der Lizenzgeber nur fr Vorsatz und grobe Fahrlssigkeit.

7. Vertragsende

a. Dieser Lizenzvertrag und die durch ihn eingerumten Nutzungsrechte enden automatisch bei jeder Verletzung der Vertragsbedingungen durch Sie. Fr natrliche und juristische Personen, die von Ihnen eine Bearbeitung, eine Datenbank oder ein Sammelwerk unter diesen Lizenzbedingungen erhalten haben, gilt die Lizenz jedoch weiter, vorausgesetzt, diese natrlichen oder juristischen Personen erfllen smtliche Vertragsbedingungen. Die Ziffern 1, 2, 5, 6, 7 und 8 gelten bei einer Vertragsbeendigung fort.

b. Unter den oben genannten Bedingungen erfolgt die Lizenz auf unbegrenzte Zeit (fr die Dauer des Schutzrechts). Dennoch behlt sich der Lizenzgeber das Recht vor, den Schutzgegenstand unter anderen Lizenzbedingungen zu nutzen oder die eigene Weitergabe des Schutzgegenstandes jederzeit zu beenden, vorausgesetzt, dass solche Handlungen nicht dem Widerruf dieser Lizenz dienen (oder jeder anderen Lizenzierung, die auf Grundlage dieser Lizenz erfolgt ist oder erfolgen muss) und diese Lizenz wirksam bleibt, bis Sie unter den oben genannten Voraussetzungen endet.

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a. Jedes Mal, wenn Sie den Schutzgegenstand vervielfltigen, verbreiten oder ffentlich wiedergeben, bietet der Lizenzgeber dem Erwerber eine Lizenz fr den Schutzgegenstand unter denselben Vertragsbedingungen an, unter denen er Ihnen die Lizenz eingerumt hat.

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c. Sollte eine Bestimmung dieses Lizenzvertrages unwirksam sein, so wird die Wirksamkeit der brigen Lizenzbestimmungen dadurch nicht berhrt, und an die Stelle der unwirksamen Bestimmung tritt eine Ersatzregelung, die dem mit der unwirksamen Bestimmung angestrebten Zweck am nchsten kommt.

d. Nichts soll dahingehend ausgelegt werden, dass auf eine Bestimmung dieses Lizenzvertrages verzichtet oder einer Vertragsverletzung zugestimmt wird, so lange ein solcher Verzicht oder eine solche Zustimmung nicht schriftlich vorliegen und von der verzichtenden oder zustimmenden Vertragspartei unterschrieben sind

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f. Auf diesen Lizenzvertrag findet das Recht der Bundesrepublik Deutschland Anwendung.

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at your option.
//! `ioctl` opcode behavior for BSD platforms.

```
use super::{Direction, Opcode};

pub(super) const fn compose_opcode(
   dir: Direction,
   group: Opcode,
   num: Opcode,
   size: Opcode,
) -> Opcode {
   let dir = match dir {
       Direction::None => NONE,
       Direction::Read => READ,
       Direction::Write => WRITE,
       Direction::ReadWrite => READ | WRITE,
   };

   dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}

// `IOC_VOID`
pub const NONE: Opcode = 0x2000_0000;
// `IOC_OUT` (out is from the perspective of the kernel)
pub const READ: Opcode = 0x4000_0000;
// `IOC_IN` (in is from the perspective of the kernel)
pub const WRITE: Opcode = 0x8000_0000;
pub const IOCPARAM_MASK: Opcode = 0x1FFF;
```
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```
//! `ioctl` opcode behavior for BSD platforms.

use super::{Direction, RawOpcode};

pub(super) const fn compose_opcode(
  dir: Direction,
  group: RawOpcode,
  num: RawOpcode,
  size: RawOpcode,
) -> RawOpcode {
  let dir = match dir {
    Direction::None => NONE,
    Direction::Read => READ,
    Direction::Write => WRITE,
    Direction::ReadWrite => READ | WRITE,
  };

  dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}

// `IOC_VOID`
```

pub const NONE: RawOpcode = 0x2000_0000;
// `IOC_OUT` (out is from the perspective of the kernel)
pub const READ: RawOpcode = 0x4000_0000;
// `IOC_IN` (in is from the perspective of the kernel)
pub const WRITE: RawOpcode = 0x8000_0000;
pub const IOCPARAM_MASK: RawOpcode = 0x1FFF;
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By Shawn Hargreaves, 18 October 1998.

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c. L'Acceptant ne peut exercer aucun des droits confrs par l'article 3 avec l'intention ou l'objectif d'obtenir un profit commercial ou une compensation financire personnelle. L'change de l'Oeuvre avec d'autres Oeuvres protges par le droit de la proprit littraire et artistique par le partage lectronique de fichiers, ou par tout autre moyen, n'est pas considr comme un change avec l'intention ou l'objectif d'un profit commercial ou d'une compensation financire personnelle, dans la mesure o aucun paiement ou compensation financire n'intervient en relation avec l'change d'Oeuvres protges.

d. Si l'Acceptant
reproduit, distribue, reprsente ou communique au public, y compris par voie numrique, l'Oeuvre ou toute Oeuvre dite Drive ou toute Oeuvre dite Collective, il doit conserver intactes toutes les informations sur le rgime des droits et en attribuer la paternit l'Auteur Original, de manire raisonnable au regard au mdium ou au moyen utilis. Il doit communiquer le nom de l'Auteur Original ou son ventuel pseudonyme s'il est indiqu ; le titre de l'Oeuvre Originale s'il est indiqu ; dans la mesure du possible, l'adresse Internet ou Identifiant Uniforme de Ressource (URI), s'il existe, spcifi par l'Offrant comme associ l'Oeuvre, moins que cette adresse ne renvoie pas aux informations lgales (paternit

et conditions d'utilisation de l'Oeuvre). Dans le cas d'une Oeuvre dite Drive, il doit indiquer les lments identifiant l'utilisation l'Oeuvre dans l'Oeuvre dite Drive par exemple  Traduction anglaise de l'Oeuvre par l'Auteur Original  ou Scnario bas sur l'Oeuvre par l'Auteur Original .
Ces obligations d'attribution de paternit doivent tre excutes de manire raisonnable. Cependant, dans le cas d'une Oeuvre dite Drive ou d'une Oeuvre dite Collective, ces informations doivent, au minimum, apparatre  la place et de manire aussi visible que celles  laquelle apparaissent les informations de mme nature.

e. Dans le cas o une utilisation de l'Oeuvre serait soumise  un rgime lgal de gestion collective obligatoire, l'Offrant se rserve le droit exclusif de collecter ces redevances par l'intermdiaire de la socit de perception et de rpartition des droits comptente. Sont notamment concerns la radiodiffusion et la communication dans un lieu public de phonogrammes publis  des fins de commerce, certains cas de retransmission par cble et satellite, la copie prive d'Oeuvres fixes sur phonogrammes ou vidogrammes, la reproduction par reprographie.

5. Garantie et exonration de responsabilit

a. En mettant l'Oeuvre  la disposition du public selon les termes de ce Contrat, l'Offrant dclare de bonne foi qu' sa connaissance et dans les limites d'une enqute raisonnable :

i. L'Offrant a obtenu tous les droits sur l'Oeuvre ncessaires pour pouvoir autoriser l'exercice des droits accords par le prsent Contrat, et permettre la jouissance paisible et l'exercice licite de ces droits, ceci sans que l'Acceptant n'ait aucune obligation de verser de rmunration ou tout autre paiement ou droits, dans la limite des mcanismes de gestion collective obligatoire applicables dcrits  l'article 4(e);

ii. L'Oeuvre n'est constitutive ni d'une violation des droits de tiers, notamment du droit de la proprit littraire et artistique, du droit des marques, du droit de l'information, du droit civil ou de tout autre droit, ni de diffamation, de violation de la vie prive ou de tout autre prjudice dlictuel  l'gard de toute tierce partie.

b. A l'exception des situations expressment mentionnes dans le prsent Contrat ou dans un autre accord crit, ou exiges par la loi applicable,
l'Oeuvre est mise  disposition en l'tat sans garantie d'aucune sorte, qu'elle soit expresse ou tacite, y compris  l'gard du contenu ou de l'exactitude de l'Oeuvre.

6. Limitation de responsabilit. A l'exception des garanties d'ordre public imposes par la loi applicable et des rparations imposes par le rgime de la responsabilit vis--vis d'un tiers en raison de la violation des garanties prvues par l'article 5 du prsent contrat, l'Offrant ne sera en aucun cas tenu responsable vis--vis de l'Acceptant, sur la base d'aucune thorie lgale ni en raison d'aucun prjudice direct, indirect, matriel ou moral, rsultant de l'excution du prsent Contrat ou de l'utilisation de l'Oeuvre, y compris dans l'hypothse o l'Offrant avait connaissance de la possible existence d'un tel prjudice.

7. Rsiliation

a. Tout manquement aux termes du contrat par l'Acceptant entrane la rsiliation automatique du Contrat et la fin des droits qui en dcoulent. Cependant, le contrat conserve ses effets envers les personnes
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b. Dans les limites indiques ci-dessus, le prsent Contrat s'applique pendant toute la dure de protection de l'Oeuvre selon le droit applicable. Nanmoins, l'Offrant se rserve  tout moment le droit d'exploiter l'Oeuvre sous des conditions contractuelles diffrentes, ou d'en cesser la diffusion; cependant, le recours  cette option ne doit pas conduire  retirer les effets du prsent Contrat (ou de tout contrat qui a t ou doit tre accord selon les termes de ce Contrat), et ce Contrat continuera  s'appliquer dans tous ses effets jusqu' ce que sa rsiliation intervienne dans les conditions dcrites ci-dessus.

8. Divers

a. A chaque reproduction ou communication au public par voie numrique de l'Oeuvre ou d'une Oeuvre dite Collective par l'Acceptant, l'Offrant propose au bnficiaire une offre de mise  disposition de l'Oeuvre dans des termes et conditions identiques  ceux accords  la partie Acceptante dans le prsent Contrat.

b. A chaque reproduction ou communication au public par voie numrique d'une Oeuvre dite Drive par l'Acceptant, l'Offrant propose au bnficiaire une offre de mise  disposition du bnficiaire de l'Oeuvre originale dans des termes et conditions identiques  ceux accords  la partie Acceptante dans le prsent Contrat.

c. La nullit ou l'inapplicabilit d'une quelconque disposition de ce Contrat au regard de la loi applicable n'affecte pas celle des autres dispositions qui resteront pleinement valides et applicables. Sans action additionnelle par les parties  cet accord, lesdites dispositions devront tre interprtes dans la mesure minimum ncessaire  leur validit et leur applicabilit.

d. Aucune limite, renonciation ou modification des termes ou dispositions du prsent Contrat ne pourra tre accepte sans le consentement crit et sign de la partie comptente.

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Version 2.1, February 1999

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d. Bearbeitungen des Schutzgegenstandes zu verffentlichen, ffentlich wiederzugeben und zu verbreiten.

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b. Vorbehaltlich der oben genannten Bedingungen gilt diese Lizenz unbefristet bis der rechtliche Schutz fr den Schutzgegenstand ausluft. Davon abgesehen behlt der Lizenzgeber das Recht, den Schutzgegenstand unter anderen Lizenzbedingungen anzubieten oder die eigene Weitergabe des Schutzgegenstandes jederzeit einzustellen, solange die Ausbung dieses
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a. 'Verzamelwerk' een werk waarin het Werk, in zijn geheel en in ongewijzigde vorm, samen met een of meer andere werken, die elk een afzonderlijk en zelfstandig werk vormen, tot een geheel is samengevoegd. Voorbeelden van een verzamelwerk zijn een tijdschrift, een bloemlezing of een encyclopedie. Een Verzamelwerk zal voor de toepassing van deze Licentie niet als een Afgeleid werk (als hieronder omschreven) worden beschouwd.

b. 'Afgeleid werk' een werk dat is gebaseerd op het Werk of op het Werk en andere reeds bestaande werken. Voorbeelden van een Afgeleid werk zijn
een vertaling, een muziekschikking (arrangement), een toneelbewerking, een literaire bewerking, een verfilming, een geluidsopname, een kunstreproductie, een verkorte versie, een samenvatting of enig andere bewerking van het Werk, met dien verstande dat een Verzamelwerk voor de toepassing van deze Licentie niet als een Afgeleid werk zal

worden beschouwd.

Indien het Werk een muziekwerk betreft, zal de synchronisatie van de tijdslijnen van het Werk en een bewegend beeld ('synching') voor de toepassing van deze Licentie als een Afgeleid Werk worden beschouwd.

c. 'Licentiegever' de natuurlijke persoon/personen of rechtspersoon/rechtspersonen die het Werk volgens de voorwaarden van deze Licentie aanbiedt/aanbieden.

d. 'Maker' de natuurlijke persoon/personen of rechtspersoon/personen die het oorspronkelijke werk gemaakt heeft/hebben. Voor de toepassing van deze Licentie wordt onder de Maker mede verstaan de uitvoerende kunstenaar, film- en fonogramproducent en omroeporganisaties
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e. 'Werk' het auteursrechtelijk beschermde werk dat volgens de voorwaarden van deze Licentie wordt aangeboden. Voor de toepassing van deze Licentie wordt onder het Werk mede verstaan het fonogram, de eerste vastlegging van een film en het (omroep)programma in de zin van de Wet op de naburige rechten en de databank in de zin van de Databankenwet, voor zover dit fonogram, deze eerste vastlegging van een film, dit (omroep)programma en deze databank beschermd wordt krachtens de toepasselijke wet in de jurisdictie van de Gebruiker.

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d. het verspreiden van exemplaren van Afgeleide werken, het in het openbaar te tonen, op- en uitvoeren en het on-line beschikbaar stellen van Afgeleide werken;

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b. Indien de Gebruiker het Werk, Afgeleide Werken of Verzamelwerken verspreidt, in het openbaar toont, op- of uitvoert of on-line beschikbaar stelt, dient de Gebruiker, tenzij er sprake is van een verzoek als vermeld in lid 4(a), alle auteursrechtvermeldingen met betrekking tot het Werk te laten staan. Tevens dient de Gebruiker, op een wijze die redelijk is in verhouding tot het gebruikte medium, de naam te vermelden van (i) de Maker (of zijn/haar pseudoniem indien van toepassing) indien deze wordt vermeld; en/of (ii) van (een) andere partij(en) (b.v. sponsor, uitgeverij, tijdschrift)
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```
/// The datatype used for the ioctl number
#[doc(hidden)]
#[cfg(not(solarish))]
pub type ioctl_num_type = ::libc::c_ulong;

#[doc(hidden)]
#[cfg(solarish)]
pub type ioctl_num_type = ::libc::c_int;

/// The datatype used for the 3rd argument
#[doc(hidden)]
pub type ioctl_param_type = ::libc::c_int;

mod consts {
  use crate::sys::ioctl::ioctl_num_type;
  #[doc(hidden)]
  pub const VOID: ioctl_num_type = 0x2000_0000;
  #[doc(hidden)]
  pub const OUT: ioctl_num_type = 0x4000_0000;
  #[doc(hidden)]
  #[allow(overflowing_literals)]
  pub const IN: ioctl_num_type = 0x8000_0000;
  #[doc(hidden)]
  pub const INOUT: ioctl_num_type = IN | OUT;
  #[doc(hidden)]
  pub const IOCPARM_MASK: ioctl_num_type = 0x1fff;
}

pub use self::consts::*;

#[macro_export]
#[doc(hidden)]
macro_rules! ioc {
  ($inout:expr, $group:expr, $num:expr, $len:expr) => {
    $inout
      | (($len as $crate::sys::ioctl::ioctl_num_type
        & $crate::sys::ioctl::IOCPARM_MASK)

        << 16)
      | (($group as $crate::sys::ioctl::ioctl_num_type) << 8)
      | ($num as $crate::sys::ioctl::ioctl_num_type)
  };
}
```

```
/// Generate an ioctl request code for a command that passes no data.
///
/// This is equivalent to the `_IO()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_none!()` directly.
///
/// # Example
///
/// ```
/// # #[macro_use] extern crate nix;
/// const KVMIO: u8 = 0xAE;
/// ioctl_write_int_bad!(kvm_create_vm, request_code_none!(KVMIO, 0x03));
/// # fn main() {}
/// ```
#[macro_export(local_inner_macros)]
macro_rules! request_code_none {
  ($g:expr, $n:expr) => {
    ioc!($crate::sys::ioctl::VOID, $g, $n, 0)
  };
}

/// Generate an ioctl request code for a command that passes an integer
///
/// This is equivalent to the `_IOWINT()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the
 `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write_int!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write_int {
  ($g:expr, $n:expr) => {
    ioc!(
      $crate::sys::ioctl::VOID,
      $g,
      $n,
      ::std::mem::size_of::<$crate::libc::c_int>()
    )
  };
}

/// Generate an ioctl request code for a command that reads.
///
/// This is equivalent to the `_IOR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_read!()` directly.
```

```
///
/// The read/write direction is relative to userland, so this
/// command would be userland is reading and the kernel is
/// writing.
#[macro_export(local_inner_macros)]
macro_rules! request_code_read {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::OUT, $g, $n, $len)
   };
}

/// Generate an ioctl request code for a command that writes.
///
///
 This is equivalent to the `_IOW()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is writing and the kernel is
/// reading.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::IN, $g, $n, $len)
   };
}

/// Generate an ioctl request code for a command that reads and writes.
///
/// This is equivalent to the `_IOWR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_readwrite!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_readwrite {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::INOUT, $g, $n, $len)

 };
}
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d. Die oben unter 4.a) bis c) genannten Einschrnkungen gelten nicht fr solche Teile des Schutzgegenstandes, die allein deshalb unter den Schutzgegenstandsbegriff fallen, weil sie als Datenbanken oder Zusammenstellungen von Daten einen immaterialgterrechtlichen Schutz eigener Art genieen.

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dass Sie eine Nutzung des Schutzgegenstandes fr andere als die in Abschnitt 4.b) als nicht-kommerziell definierten Zwecke vornehmen.

f. Persnlichkeitsrechte bleiben - soweit sie bestehen - von dieser Lizenz unberhrt.

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```
use crate::errno::Errno;
use crate::sys::signal::Signal;
use crate::unistd::Pid;
use crate::Result;
use cfg_if::cfg_if;
use libc::{self, c_int};
use std::ptr;

pub type RequestType = c_int;

cfg_if! {
  if #[cfg(any(freebsdlike, apple_targets, target_os = "openbsd"))] {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_char;
  } else {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_void;
  }
```

```
}

libc_enum! {
  #[repr(i32)]
  /// Ptrace Request enum defining the action to be taken.
  #[non_exhaustive]
  pub enum Request {
    PT_TRACE_ME,
    PT_READ_I,
    PT_READ_D,
    #[cfg(apple_targets)]
    PT_READ_U,
    PT_WRITE_I,
    PT_WRITE_D,
    #[cfg(apple_targets)]
    PT_WRITE_U,
    PT_CONTINUE,
    PT_KILL,
    #[cfg(any(any(freebsdlike, apple_targets),
          all(target_os = "openbsd", target_arch = "x86_64"),
          all(target_os = "netbsd", any(target_arch = "x86_64",
                                target_arch = "powerpc"))))]
    PT_STEP,
    PT_ATTACH,
    PT_DETACH,
    #[cfg(apple_targets)]
    PT_SIGEXC,
    #[cfg(apple_targets)]
    PT_THUPDATE,
    #[cfg(apple_targets)]
    PT_ATTACHEXC
  }
}

unsafe fn ptrace_other(
  request: Request,
  pid: Pid,
  addr: AddressType,
  data: c_int,
) -> Result<c_int> {
  unsafe {
    Errno::result(libc::ptrace(
      request as RequestType,
      libc::pid_t::from(pid),
      addr,
      data,
    ))
    .map(|_| 0)
```

```
    }
}

/// Sets the process as traceable, as with `ptrace(PT_TRACEME, ...)`
///
/// Indicates that this process is to be traced by its parent.
/// This is the only ptrace request to be issued by the tracee.
pub fn traceme() -> Result<()> {
    unsafe {
        ptrace_other(Request::PT_TRACE_ME, Pid::from_raw(0), ptr::null_mut(), 0)
            .map(drop)
    }
}

/// Attach to a running
 process, as with `ptrace(PT_ATTACH, ...)`
///
/// Attaches to the process specified by `pid`, making it a tracee of the calling process.
pub fn attach(pid: Pid) -> Result<()> {
    unsafe {
        ptrace_other(Request::PT_ATTACH, pid, ptr::null_mut(), 0).map(drop)
    }
}

/// Detaches the current running process, as with `ptrace(PT_DETACH, ...)`
///
/// Detaches from the process specified by `pid` allowing it to run freely, optionally delivering a
/// signal specified by `sig`.
pub fn detach<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
    let data = match sig.into() {
        Some(s) => s as c_int,
        None => 0,
    };
    unsafe {
        ptrace_other(Request::PT_DETACH, pid, ptr::null_mut(), data).map(drop)
    }
}

/// Restart the stopped tracee process, as with `ptrace(PTRACE_CONT, ...)`
///
/// Continues the execution of the process with PID `pid`, optionally
/// delivering a signal specified by `sig`.
pub fn cont<T: Into<Option<Signal>>>(pid: Pid, sig: T)
 -> Result<()> {
    let data = match sig.into() {
        Some(s) => s as c_int,
        None => 0,
    };
```

```
  unsafe {
      // Ignore the useless return value
      ptrace_other(Request::PT_CONTINUE, pid, 1 as AddressType, data)
          .map(drop)
  }
}

/// Issues a kill request as with `ptrace(PT_KILL, ...)`
///
/// This request is equivalent to `ptrace(PT_CONTINUE, ..., SIGKILL);`
pub fn kill(pid: Pid) -> Result<()> {
  unsafe {
      ptrace_other(Request::PT_KILL, pid, 0 as AddressType, 0).map(drop)
  }
}

/// Move the stopped tracee process forward by a single step as with
/// `ptrace(PT_STEP, ...)`
///
/// Advances the execution of the process with PID `pid` by a single step optionally delivering a
/// signal specified by `sig`.
///
/// # Example
/// ```rust
/// use nix::sys::ptrace::step;
/// use nix::unistd::Pid;
/// use nix::sys::signal::Signal;
/// use nix::sys::wait::*;
/// // If a process changes state to the stopped state because of a SIGUSR1
/// // signal,
 this will step the process forward and forward the user
/// // signal to the stopped process
/// match waitpid(Pid::from_raw(-1), None) {
///     Ok(WaitStatus::Stopped(pid, Signal::SIGUSR1)) => {
///         let _ = step(pid, Signal::SIGUSR1);
///     }
///     _ => {},
/// }
/// ```
#[cfg(any(
  any(freebsdlike, apple_targets),
  all(target_os = "openbsd", target_arch = "x86_64"),
  all(
      target_os = "netbsd",
      any(target_arch = "x86_64", target_arch = "powerpc")
  )
))]
pub fn step<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
```

```
  let data = match sig.into() {
      Some(s) => s as c_int,
      None => 0,
  };
  unsafe {
      ptrace_other(Request::PT_STEP, pid, ptr::null_mut(), data).map(drop)
  }
}

/// Reads a word from a processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn read(pid: Pid, addr: AddressType)
 -> Result<c_int> {
  unsafe {
      // Traditionally there was a difference between reading data or
      // instruction memory but not in modern systems.
      ptrace_other(Request::PT_READ_D, pid, addr, 0)
  }
}

/// Writes a word into the processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn write(pid: Pid, addr: AddressType, data: c_int) -> Result<()> {
  unsafe { ptrace_other(Request::PT_WRITE_D, pid, addr, data).map(drop) }
}
```

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"#
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# 1.2286 serde_yaml 0.9.34+deprecated

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# 1.2288 regex 1.11.2

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# 1.2290 nix 0.30.1

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```
/// The datatype used for the ioctl number
#[doc(hidden)]
#[cfg(not(solarish))]
pub type ioctl_num_type = ::libc::c_ulong;

#[doc(hidden)]
#[cfg(solarish)]
pub type ioctl_num_type = ::libc::c_int;

/// The datatype used for the 3rd argument
#[doc(hidden)]
pub type ioctl_param_type = ::libc::c_int;

mod consts {
  use crate::sys::ioctl::ioctl_num_type;
  #[doc(hidden)]
  pub const VOID: ioctl_num_type = 0x2000_0000;
  #[doc(hidden)]
  pub const OUT: ioctl_num_type = 0x4000_0000;
  #[doc(hidden)]
  #[allow(overflowing_literals)]
  pub const IN: ioctl_num_type = 0x8000_0000;
  #[doc(hidden)]
  pub const INOUT: ioctl_num_type = IN | OUT;
  #[doc(hidden)]
  pub const IOCPARM_MASK: ioctl_num_type = 0x1fff;
}

pub use self::consts::*;

#[macro_export]
#[doc(hidden)]
macro_rules! ioc {
  ($inout:expr, $group:expr, $num:expr, $len:expr) => {
    $inout
      | (($len as $crate::sys::ioctl::ioctl_num_type
        & $crate::sys::ioctl::IOCPARM_MASK)

       << 16)
      | (($group as $crate::sys::ioctl::ioctl_num_type) << 8)
      | ($num as $crate::sys::ioctl::ioctl_num_type)
  };
}
```

```
/// Generate an ioctl request code for a command that passes no data.
///
/// This is equivalent to the `_IO()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_none!()` directly.
///
/// # Example
///
/// ```
/// # #[macro_use] extern crate nix;
/// const KVMIO: u8 = 0xAE;
/// ioctl_write_int_bad!(kvm_create_vm, request_code_none!(KVMIO, 0x03));
/// # fn main() {}
/// ```
#[macro_export(local_inner_macros)]
macro_rules! request_code_none {
  ($g:expr, $n:expr) => {
      ioc!($crate::sys::ioctl::VOID, $g, $n, 0)
  };
}

/// Generate an ioctl request code for a command that passes an integer
///
/// This is equivalent to the `_IOWINT()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the
 `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write_int!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write_int {
  ($g:expr, $n:expr) => {
      ioc!(
          $crate::sys::ioctl::VOID,
          $g,
          $n,
          ::std::mem::size_of::<$crate::libc::c_int>()
      )
  };
}

/// Generate an ioctl request code for a command that reads.
///
/// This is equivalent to the `_IOR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_read!()` directly.
///
```

```
/// The read/write direction is relative to userland, so this
/// command would be userland is reading and the kernel is
/// writing.
#[macro_export(local_inner_macros)]
macro_rules! request_code_read {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::OUT, $g, $n, $len)
   };
}

/// Generate an ioctl request code for a command that writes.
///
///
 This is equivalent to the `_IOW()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is writing and the kernel is
/// reading.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::IN, $g, $n, $len)
   };
}

/// Generate an ioctl request code for a command that reads and writes.
///
/// This is equivalent to the `_IOWR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_readwrite!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_readwrite {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::INOUT, $g, $n, $len)

 };
}
use crate::errno::Errno;
use crate::sys::signal::Signal;
use crate::unistd::Pid;
use crate::Result;
use cfg_if::cfg_if;
use libc::{self, c_int};
use std::ptr;
```

```
pub type RequestType = c_int;

cfg_if! {
  if #[cfg(any(freebsdlike, apple_targets, target_os = "openbsd"))] {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_char;
  } else {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_void;
  }
}

libc_enum! {
  #[repr(i32)]
  /// Ptrace Request enum defining the action to be taken.
  #[non_exhaustive]
  pub enum Request {
    PT_TRACE_ME,
    PT_READ_I,
    PT_READ_D,
    #[cfg(apple_targets)]
    PT_READ_U,
    PT_WRITE_I,
    PT_WRITE_D,
    #[cfg(apple_targets)]
    PT_WRITE_U,
    PT_CONTINUE,
    PT_KILL,
    #[cfg(any(any(freebsdlike, apple_targets),
          all(target_os = "openbsd", target_arch = "x86_64"),
          all(target_os = "netbsd", any(target_arch = "x86_64",
                              target_arch = "powerpc"))))]
    PT_STEP,
    PT_ATTACH,
    PT_DETACH,
    #[cfg(apple_targets)]
    PT_SIGEXC,
    #[cfg(apple_targets)]
    PT_THUPDATE,
    #[cfg(apple_targets)]
    PT_ATTACHEXC
  }
}

unsafe fn ptrace_other(
  request: Request,
  pid: Pid,
```

```
    addr: AddressType,
    data: c_int,
) -> Result<c_int> {
    unsafe {
        Errno::result(libc::ptrace(
            request as RequestType,
            libc::pid_t::from(pid),
            addr,
            data,
        ))
        .map(|_| 0)
    }
}

/// Sets the process as traceable, as with `ptrace(PT_TRACEME, ...)`
///
/// Indicates that this process is to be traced by its parent.
/// This is the only ptrace request to be issued by the tracee.
pub fn traceme() -> Result<()> {
    unsafe {
        ptrace_other(Request::PT_TRACE_ME, Pid::from_raw(0), ptr::null_mut(), 0)
            .map(drop)
    }
}

/// Attach to a running
 process, as with `ptrace(PT_ATTACH, ...)`
///
/// Attaches to the process specified by `pid`, making it a tracee of the calling process.
pub fn attach(pid: Pid) -> Result<()> {
    unsafe {
        ptrace_other(Request::PT_ATTACH, pid, ptr::null_mut(), 0).map(drop)
    }
}

/// Detaches the current running process, as with `ptrace(PT_DETACH, ...)`
///
/// Detaches from the process specified by `pid` allowing it to run freely, optionally delivering a
/// signal specified by `sig`.
pub fn detach<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
    let data = match sig.into() {
        Some(s) => s as c_int,
        None => 0,
    };
    unsafe {
        ptrace_other(Request::PT_DETACH, pid, ptr::null_mut(), data).map(drop)
    }
}
```

```
/// Restart the stopped tracee process, as with `ptrace(PTRACE_CONT, ...)`
///
/// Continues the execution of the process with PID `pid`, optionally
/// delivering a signal specified by `sig`.
pub fn cont<T: Into<Option<Signal>>>(pid: Pid, sig: T)
 -> Result<()> {
   let data = match sig.into() {
       Some(s) => s as c_int,
       None => 0,
   };
   unsafe {
       // Ignore the useless return value
       ptrace_other(Request::PT_CONTINUE, pid, 1 as AddressType, data)
           .map(drop)
   }
}

/// Issues a kill request as with `ptrace(PT_KILL, ...)`
///
/// This request is equivalent to `ptrace(PT_CONTINUE, ..., SIGKILL);`
pub fn kill(pid: Pid) -> Result<()> {
   unsafe {
       ptrace_other(Request::PT_KILL, pid, 0 as AddressType, 0).map(drop)
   }
}

/// Move the stopped tracee process forward by a single step as with
/// `ptrace(PT_STEP, ...)`
///
/// Advances the execution of the process with PID `pid` by a single step optionally delivering a
/// signal specified by `sig`.
///
/// # Example
/// ```rust
/// use nix::sys::ptrace::step;
/// use nix::unistd::Pid;
/// use nix::sys::signal::Signal;
/// use nix::sys::wait::*;
/// // If a process changes state to the stopped state because of a SIGUSR1
/// // signal,
 this will step the process forward and forward the user
/// // signal to the stopped process
/// match waitpid(Pid::from_raw(-1), None) {
///     Ok(WaitStatus::Stopped(pid, Signal::SIGUSR1)) => {
///         let _ = step(pid, Signal::SIGUSR1);
///     }
///     _ => {},
```

```
/// }
/// ```
#[cfg(any(
   any(freebsdlike, apple_targets),
   all(target_os = "openbsd", target_arch = "x86_64"),
   all(
      target_os = "netbsd",
      any(target_arch = "x86_64", target_arch = "powerpc")
   )
))]
pub fn step<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
   let data = match sig.into() {
      Some(s) => s as c_int,
      None => 0,
   };
   unsafe {
      ptrace_other(Request::PT_STEP, pid, ptr::null_mut(), data).map(drop)
   }
}

/// Reads a word from a processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn read(pid: Pid, addr: AddressType)
 -> Result<c_int> {
   unsafe {
      // Traditionally there was a difference between reading data or
      // instruction memory but not in modern systems.
      ptrace_other(Request::PT_READ_D, pid, addr, 0)
   }
}

/// Writes a word into the processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn write(pid: Pid, addr: AddressType, data: c_int) -> Result<()> {
   unsafe { ptrace_other(Request::PT_WRITE_D, pid, addr, data).map(drop) }
}
```

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# 1.2291 atomic-waker 1.1.2

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==========

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* /compression-core-0-4-29-tar-gz/compression-core-0.4.29/README.md

# 1.2293 h2 0.4.12

## 1.2293.1 Available under license :

```
//! FreeBSD and NetBSD xattr support.

use libc::{c_int, c_void, size_t, EPERM};
use std::ffi::{CString, OsStr, OsString};
use std::io;
use std::mem;
use std::os::unix::ffi::{OsStrExt, OsStringExt};
use std::os::unix::io::{AsRawFd, BorrowedFd};
use std::path::Path;
use std::ptr;

use libc::{
  extattr_delete_fd, extattr_delete_file, extattr_delete_link, extattr_get_fd, extattr_get_file,
  extattr_get_link, extattr_list_fd, extattr_list_file, extattr_list_link, extattr_set_fd,
  extattr_set_file, extattr_set_link, EXTATTR_NAMESPACE_SYSTEM, EXTATTR_NAMESPACE_USER,
};

use crate::util::allocate_loop;

pub const ENOATTR: i32 = libc::ENOATTR;
```

```
pub const ERANGE: i32 = libc::ERANGE;

const EXTATTR_NAMESPACE_USER_STRING: &str = "user";
const EXTATTR_NAMESPACE_SYSTEM_STRING: &str = "system";
const EXTATTR_NAMESPACE_NAMES: [&str; 3] = [
  "empty",
  EXTATTR_NAMESPACE_USER_STRING,
  EXTATTR_NAMESPACE_SYSTEM_STRING,
];

fn path_to_c(path: &Path) -> io::Result<CString> {
  match CString::new(path.as_os_str().as_bytes())
 {
      Ok(name) => Ok(name),
      Err(_) => Err(io::Error::new(io::ErrorKind::NotFound, "file not found")),
  }
}

#[inline]
fn slice_parts(buf: &mut [u8]) -> (*mut c_void, size_t) {
  if buf.is_empty() {
      (ptr::null_mut(), 0)
  } else {
      (buf.as_mut_ptr().cast(), buf.len() as size_t)
  }
}

/// An iterator over a set of extended attributes names.
#[derive(Default)]
pub struct XAttrs {
  user_attrs: Box<[u8]>,
  system_attrs: Box<[u8]>,
  offset: usize,
}

impl Clone for XAttrs {
  fn clone(&self) -> Self {
      XAttrs {
          user_attrs: Vec::from(&*self.user_attrs).into_boxed_slice(),
          system_attrs: Vec::from(&*self.system_attrs).into_boxed_slice(),
          offset: self.offset,
      }
  }

  fn clone_from(&mut self, other: &XAttrs) {
      self.offset = other.offset;

      let mut data = mem::replace(&mut self.user_attrs, Box::new([])).into_vec();
```

```
        data.extend(other.user_attrs.iter().cloned());
         self.user_attrs = data.into_boxed_slice();

        data = mem::replace(&mut self.system_attrs, Box::new([])).into_vec();
        data.extend(other.system_attrs.iter().cloned());
        self.system_attrs = data.into_boxed_slice();
    }
}

impl Iterator for XAttrs {
    type Item = OsString;
    fn next(&mut self) -> Option<OsString> {
        if self.user_attrs.is_empty() && self.system_attrs.is_empty() {
            return None;
        }

        if self.offset == self.user_attrs.len() + self.system_attrs.len() {
            return None;
        }

        let data = if self.offset < self.system_attrs.len() {
            &self.system_attrs[self.offset..]
        } else {
            &self.user_attrs[self.offset - self.system_attrs.len()..]
        };

        let siz = data[0] as usize;

        self.offset += siz + 1;
        if self.offset < self.system_attrs.len() {
            Some(prefix_namespace(
                OsStr::from_bytes(&data[1..siz
 + 1]),
                EXTATTR_NAMESPACE_SYSTEM,
            ))
        } else {
            Some(prefix_namespace(
                OsStr::from_bytes(&data[1..siz + 1]),
                EXTATTR_NAMESPACE_USER,
            ))
        }
    }

    fn size_hint(&self) -> (usize, Option<usize>) {
        if self.user_attrs.len() + self.system_attrs.len() == self.offset {
            (0, Some(0))
        } else {
            (1, None)
```

```
        }
    }
}

// This could use libc::extattr_string_to_namespace, but it's awkward because
// that requires nul-terminated strings, which Rust's std is loathe to provide.
fn name_to_ns(name: &OsStr) -> io::Result<(c_int, CString)> {
    let mut groups = name.as_bytes().splitn(2, |&b| b == b'.').take(2);
    let nsname = match groups.next() {
        Some(s) => s,
        None => {
            return Err(io::Error::new(
                io::ErrorKind::InvalidInput,
                "couldn't find namespace",
            ))
        }
    };

    let propname
  = match groups.next() {
        Some(s) => s,
        None => {
            return Err(io::Error::new(
                io::ErrorKind::InvalidInput,
                "couldn't find attribute",
            ))
        }
    };

    let ns_int = match EXTATTR_NAMESPACE_NAMES
        .iter()
        .position(|&s| s.as_bytes() == nsname)
    {
        Some(i) => i,
        None => {
            return Err(io::Error::new(
                io::ErrorKind::InvalidInput,
                "no matching namespace",
            ))
        }
    };

    Ok((ns_int as c_int, CString::new(propname)?))
}

fn prefix_namespace(attr: &OsStr, ns: c_int) -> OsString {
    let nsname = EXTATTR_NAMESPACE_NAMES[ns as usize];
    let mut v = Vec::with_capacity(nsname.as_bytes().len() + attr.as_bytes().len() + 1);
```

```
  v.extend(nsname.as_bytes());
  v.extend(".".as_bytes());
  v.extend(attr.as_bytes());
  OsString::from_vec(v)
}

fn cvt(res: libc::ssize_t) -> io::Result<usize> {
  if res < 0 {
      Err(io::Error::last_os_error())
   } else {
      Ok(res as usize)
  }
}

pub fn get_fd(fd: BorrowedFd<'_>, name: &OsStr) -> io::Result<Vec<u8>> {
  let (ns, name) = name_to_ns(name)?;
  unsafe {
      allocate_loop(|buf| {
          let (ptr, len) = slice_parts(buf);
          cvt(extattr_get_fd(fd.as_raw_fd(), ns, name.as_ptr(), ptr, len))
      })
  }
}

pub fn set_fd(fd: BorrowedFd<'_>, name: &OsStr, value: &[u8]) -> io::Result<()> {
  let (ns, name) = name_to_ns(name)?;
  let ret = unsafe {
      extattr_set_fd(
          fd.as_raw_fd(),
          ns,
          name.as_ptr(),
          value.as_ptr() as *const c_void,
          value.len() as size_t,
      )
  };
  if ret == -1 {
      Err(io::Error::last_os_error())
  } else {
      Ok(())
  }
}

pub fn remove_fd(fd: BorrowedFd<'_>, name: &OsStr) -> io::Result<()> {
  let (ns, name) = name_to_ns(name)?;
  let ret = unsafe { extattr_delete_fd(fd.as_raw_fd(), ns, name.as_ptr()) };

 if ret != 0 {
      Err(io::Error::last_os_error())
```

```
  } else {
    Ok(())
  }
}

pub fn list_fd(fd: BorrowedFd<'_>) -> io::Result<XAttrs> {
  let sysvec = unsafe {
    let res = allocate_loop(|buf| {
      let (ptr, len) = slice_parts(buf);
      cvt(extattr_list_fd(
        fd.as_raw_fd(),
        EXTATTR_NAMESPACE_SYSTEM,
        ptr,
        len,
      ))
    });
    // On FreeBSD, system attributes require root privileges to view. However,
    // to mimic the behavior of listxattr in linux and osx, we need to query
    // them anyway and return empty results if we get EPERM
    match res {
      Ok(v) => v,
      Err(err) => {
        if err.raw_os_error() == Some(EPERM) {
          Vec::new()
        } else {
          return Err(err);
        }
      }
    }
  };

  let uservec = unsafe {
    let res = allocate_loop(|buf|
 {
      let (ptr, len) = slice_parts(buf);
      cvt(extattr_list_fd(
        fd.as_raw_fd(),
        EXTATTR_NAMESPACE_USER,
        ptr,
        len,
      ))
    });
    match res {
      Ok(v) => v,
      Err(err) => return Err(err),
    }
  };
```

```
    Ok(XAttrs {
        system_attrs: sysvec.into_boxed_slice(),
        user_attrs: uservec.into_boxed_slice(),
        offset: 0,
    })
}

pub fn get_path(path: &Path, name: &OsStr, deref: bool) -> io::Result<Vec<u8>> {
    let (ns, name) = name_to_ns(name)?;
    let path = path_to_c(path)?;
    let extattr_get_func = if deref {
        extattr_get_file
    } else {
        extattr_get_link
    };
    unsafe {
        allocate_loop(|buf| {
            let (ptr, len) = slice_parts(buf);
            cvt(extattr_get_func(path.as_ptr(), ns, name.as_ptr(), ptr, len))
        })
    }
}

pub fn set_path(path: &Path, name: &OsStr, value: &[u8], deref: bool) -> io::Result<()>
 {
    let (ns, name) = name_to_ns(name)?;
    let path = path_to_c(path)?;
    let extattr_set_func = if deref {
        extattr_set_file
    } else {
        extattr_set_link
    };
    let ret = unsafe {
        extattr_set_func(
            path.as_ptr(),
            ns,
            name.as_ptr(),
            value.as_ptr() as *const c_void,
            value.len() as size_t,
        )
    };
    if ret == -1 {
        Err(io::Error::last_os_error())
    } else {
        Ok(())
    }
}
```

```
pub fn remove_path(path: &Path, name: &OsStr, deref: bool) -> io::Result<()> {
  let (ns, name) = name_to_ns(name)?;
  let path = path_to_c(path)?;
  let extattr_delete_func = if deref {
     extattr_delete_file
  } else {
     extattr_delete_link
  };
  let ret = unsafe { extattr_delete_func(path.as_ptr(), ns, name.as_ptr()) };
  if ret != 0 {
     Err(io::Error::last_os_error())
  } else {
     Ok(())
  }
}

pub fn list_path(path: &Path, deref: bool) -> io::Result<XAttrs>
 {
  let path = path_to_c(path)?;
  let extattr_list_func = if deref {
     extattr_list_file
  } else {
     extattr_list_link
  };
  let sysvec = unsafe {
     let res = allocate_loop(|buf| {
        let (ptr, len) = slice_parts(buf);
        cvt(extattr_list_func(
           path.as_ptr(),
           EXTATTR_NAMESPACE_SYSTEM,
           ptr,
           len,
        ))
     });
     // On FreeBSD, system attributes require root privileges to view. However,
     // to mimic the behavior of listxattr in linux and osx, we need to query
     // them anyway and return empty results if we get EPERM
     match res {
        Ok(v) => v,
        Err(err) => {
           if err.raw_os_error() == Some(EPERM) {
              Vec::new()
           } else {
              return Err(err);
           }
        }
     }
  };
```

```
  let uservec = unsafe {
      let res = allocate_loop(|buf|
 {
          let (ptr, len) = slice_parts(buf);
          cvt(extattr_list_func(
              path.as_ptr(),
              EXTATTR_NAMESPACE_USER,
              ptr,
              len,
          ))
      });
      match res {
          Ok(v) => v,
          Err(err) => return Err(err),
      }
  };

  Ok(XAttrs {
      system_attrs: sysvec.into_boxed_slice(),
      user_attrs: uservec.into_boxed_slice(),
      offset: 0,
  })
}
```

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The implementation for Utf8CharIndices was adapted from the
CharIndices implementation of the Rust standard library at revision
ab32548539ec38a939c1b58599249f3b54130026
(https://github.com/rust-lang/rust/blob/ab32548539ec38a939c1b58599249f3b54130026/library/core/src/str/iter.rs).

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//! This file contains the BSD APIs available in Haiku. It corresponds to the
//! header files in `headers/compatibility/bsd`.
//!
//! Note that Haiku's BSD compatibility is a combination of system APIs and
//! utility libraries. There should only be system APIs in `libc`. When you are
//! trying to determine whether something should be included in this file, the
//! best indicator is whether it also exists in the BSD-specific definitions in
//! this libc crate.

```
use crate::prelude::*;

// stringlist.h (utility library)
// Note: this is kept because it was previously introduced
pub type StringList = _stringlist;

s! {
  // stringlist.h (utility library)
  // Note: this is kept because it was previously introduced
  pub struct _stringlist {
      pub sl_str: *mut *mut c_char,
      pub sl_max: size_t,
      pub sl_cur: size_t,
  }

  // sys/event.h
  pub struct kevent {
      pub ident: crate::uintptr_t,
      pub filter: c_short,
      pub flags: c_ushort,

  pub fflags: c_uint,
      pub data: i64,
      pub udata: *mut c_void,
      pub ext: [u64; 4],
  }

  // sys/link_elf.h
  pub struct dl_phdr_info {
      pub dlpi_addr: crate::Elf_Addr,
      pub dlpi_name: *const c_char,
      pub dlpi_phdr: *const crate::Elf_Phdr,
      pub dlpi_phnum: crate::Elf_Half,
  }
}

// sys/event.h
pub const EVFILT_READ: i16 = -1;
pub const EVFILT_WRITE: i16 = -2;
pub const EVFILT_PROC: i16 = -5;
pub const EV_ADD: u16 = 0x0001;
pub const EV_DELETE: u16 = 0x0002;
pub const EV_ONESHOT: u16 = 0x0010;
pub const EV_CLEAR: u16 = 0x0020;
pub const EV_EOF: u16 = 0x8000;
pub const EV_ERROR: u16 = 0x4000;
pub const NOTE_EXIT: u32 = 0x80000000;
```

```
// sys/ioccom.h
pub const IOC_VOID: c_ulong = 0x20000000;
pub const IOC_OUT: c_ulong = 0x40000000;
pub const IOC_IN: c_ulong = 0x80000000;
pub const IOC_INOUT: c_ulong = IOC_IN | IOC_OUT;
pub const IOC_DIRMASK: c_ulong = 0xe0000000;

#[link(name = "bsd")]
extern "C" {
  // stdlib.h
  pub fn daemon(nochdir:
 c_int, noclose: c_int) -> c_int;
  pub fn getprogname() -> *const c_char;
  pub fn setprogname(progname: *const c_char);
  pub fn arc4random() -> u32;
  pub fn arc4random_uniform(upper_bound: u32) -> u32;
  pub fn arc4random_buf(buf: *mut c_void, n: size_t);
  pub fn mkstemps(template: *mut c_char, suffixlen: c_int) -> c_int;
  pub fn strtonum(
      nptr: *const c_char,
      minval: c_longlong,
      maxval: c_longlong,
      errstr: *mut *const c_char,
  ) -> c_longlong;

  // pty.h
  pub fn openpty(
      amaster: *mut c_int,
      aslave: *mut c_int,
      name: *mut c_char,
      termp: *mut crate::termios,
      winp: *mut crate::winsize,
  ) -> c_int;
  pub fn login_tty(_fd: c_int) -> c_int;
  pub fn forkpty(
      amaster: *mut c_int,
      name: *mut c_char,
      termp: *mut crate::termios,
      winp: *mut crate::winsize,
  ) -> crate::pid_t;

  // string.h
  pub fn strsep(string: *mut *mut c_char, delimiters:
 *const c_char) -> *mut c_char;
  pub fn explicit_bzero(buf: *mut c_void, len: size_t);

  // stringlist.h (utility library)
  // Note: this is kept because it was previously introduced
```

```
pub fn sl_init() -> *mut StringList;
pub fn sl_add(sl: *mut StringList, n: *mut c_char) -> c_int;
pub fn sl_free(sl: *mut StringList, i: c_int);
pub fn sl_find(sl: *mut StringList, n: *mut c_char) -> *mut c_char;

// sys/event.h
pub fn kqueue() -> c_int;
pub fn kevent(
    kq: c_int,
    changelist: *const kevent,
    nchanges: c_int,
    eventlist: *mut kevent,
    nevents: c_int,
    timeout: *const crate::timespec,
) -> c_int;

// sys/link_elf.h
pub fn dl_iterate_phdr(
    callback: Option<
        unsafe extern "C" fn(info: *mut dl_phdr_info, size: usize, data: *mut c_void) -> c_int,
    >,
    data: *mut c_void,
) -> c_int;

// sys/time.h
pub fn lutimes(file: *const c_char, times: *const crate::timeval)
-> c_int;

// sys/uov.h
pub fn preadv(
    fd: c_int,
    iov: *const crate::iovec,
    iovcnt: c_int,
    offset: crate::off_t,
) -> ssize_t;
pub fn pwritev(
    fd: c_int,
    iov: *const crate::iovec,
    iovcnt: c_int,
    offset: crate::off_t,
) -> ssize_t;

// sys/wait.h
pub fn wait4(
    pid: crate::pid_t,
    status: *mut c_int,
    options: c_int,
    rusage: *mut crate::rusage,
```

```
  ) -> crate::pid_t;
}
```
==========

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```
//! `ioctl` opcode behavior for BSD platforms.

use super::{Direction, Opcode};

pub(super) const fn compose_opcode(
   dir: Direction,
   group: Opcode,
   num: Opcode,
   size: Opcode,
) -> Opcode {
   let dir = match dir {
       Direction::None => NONE,
       Direction::Read => READ,
       Direction::Write => WRITE,
       Direction::ReadWrite => READ | WRITE,
   };

   dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}
```

// `IOC_VOID`
pub const NONE: Opcode = 0x2000_0000;
// `IOC_OUT` (out is from the perspective of the kernel)
pub const READ: Opcode = 0x4000_0000;
// `IOC_IN` (in is from the perspective of the kernel)
pub const WRITE: Opcode = 0x8000_0000;
pub const IOCPARAM_MASK: Opcode = 0x1FFF;
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```
//! `ioctl` opcode behavior for BSD platforms.

use super::{Direction, RawOpcode};

pub(super) const fn compose_opcode(
   dir: Direction,
   group: RawOpcode,
   num: RawOpcode,
   size: RawOpcode,
) -> RawOpcode {
   let dir = match dir {
       Direction::None => NONE,
       Direction::Read => READ,
       Direction::Write => WRITE,
       Direction::ReadWrite => READ | WRITE,
   };

   dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}

// `IOC_VOID`
pub const NONE: RawOpcode = 0x2000_0000;
// `IOC_OUT` (out is from the perspective of the kernel)
pub const READ: RawOpcode = 0x4000_0000;
// `IOC_IN` (in is from the perspective of the kernel)
pub const WRITE: RawOpcode = 0x8000_0000;
pub const IOCPARAM_MASK: RawOpcode = 0x1FFF;
```

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Version 1.0 dated 2006-09-05.
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By Shawn Hargreaves, 18 October 1998.

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L'exercice sur l'Oeuvre de tout droit propos par le prsent contrat vaut acceptation de celui-ci. Selon les termes et les obligations du prsent contrat, la partie Offrante propose la partie Acceptante l'exercice de certains droits prsents ci-aprs, et l'Acceptant en approuve les termes et conditions d'utilisation.

1. Dfinitions

a. Oeuvre : oeuvre de l'esprit protgeable par le droit de la proprit littraire et artistique ou toute loi applicable et qui est mise disposition selon les termes du prsent Contrat.

b. Oeuvre dite Collective : une oeuvre dans laquelle l'oeuvre, dans sa forme intgrale et non modifie, est assemble en un ensemble collectif avec d'autres contributions qui constituent en elles-mmes des oeuvres spares et indpendantes. Constituent notamment des Oeuvres dites Collectives les publications priodiques, les anthologies ou les encyclopdies. Aux termes de la prsente autorisation, une oeuvre qui constitue
une Oeuvre dite Collective ne sera pas considre comme une Oeuvre dite Drive (telle que dfinie ci-aprs).

c. Oeuvre dite Drive : une oeuvre cre soit partir de l'Oeuvre seule, soit partir de l'Oeuvre et d'autres oeuvres prexistantes. Constituent notamment des Oeuvres dites Drives les traductions, les arrangements musicaux, les adaptations thtrales, littraires ou cinmatographiques, les enregistrements sonores, les reproductions par un art ou un procd quelconque, les rsums, ou toute autre forme sous laquelle l'Oeuvre puisse tre remanie, modifie, transforme ou adapte, l'exception d'une oeuvre qui constitue une Oeuvre dite Collective. Une Oeuvre dite Collective ne sera pas considre comme une Oeuvre dite Drive aux termes du prsent Contrat. Dans le cas o l'Oeuvre serait une composition musicale ou un enregistrement sonore, la synchronisation de l'oeuvre avec une image anime sera considre comme une Oeuvre dite Drive pour les propos de ce Contrat.

d. Auteur original : la ou les personnes

physiques qui ont cr l'Oeuvre.

e. Offrant : la ou les personne(s) physique(s) ou morale(s) qui proposent la mise disposition de l'Oeuvre selon les termes du prsent Contrat.

f. Acceptant : la personne physique ou morale qui accepte le prsent contrat et exerce des droits sans en avoir viol les termes au pralable ou qui a reu l'autorisation expresse de l'Offrant d'exercer des droits dans le cadre du prsent contrat malgr une prcdente violation de ce contrat.

g. Options du Contrat : les attributs gnriques du Contrat tels qu'ils ont t choisis par l'Offrant et indiqus dans le titre de ce Contrat : Paternit - Pas d'Utilisation Commerciale - Partage Des Conditions Initiales A l'Identique.

2. Exceptions aux droits exclusifs. Aucune disposition de ce contrat n'a pour intention de rduire, limiter ou restreindre les prrogatives issues des exceptions aux droits, de l'puisement des droits ou d'autres limitations aux droits exclusifs des ayants droit selon le droit de la
proprit littraire et artistique ou les autres lois applicables.

3. Autorisation. Soumis aux termes et conditions dfinis dans cette autorisation, et ceci pendant toute la dure de protection de l'Oeuvre par le droit de la proprit littraire et artistique ou le droit applicable, l'Offrant accorde l'Acceptant l'autorisation mondiale d'exercer titre gratuit et non exclusif les droits suivants :

a. reproduire l'Oeuvre, incorporer l'Oeuvre dans une ou plusieurs Oeuvres dites Collectives et reproduire l'Oeuvre telle qu'incorpore dans lesdites Oeuvres dites Collectives;

b. crer et reproduire des Oeuvres dites Drives;

c. distribuer des exemplaires ou enregistrements, prsenter, reprsenter ou communiquer l'Oeuvre au public par tout procd technique, y compris incorpore dans des Oeuvres Collectives;

d. distribuer des exemplaires ou phonogrammes, prsenter, reprsenter ou communiquer au public des Oeuvres dites Drives par tout procd technique;

e. lorsque l'Oeuvre est une base
de donnes, extraire et rutiliser des parties substantielles de l'Oeuvre.

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a. L'Acceptant peut reproduire, distribuer, reprsenter ou communiquer au public l'Oeuvre y compris par voie numrique uniquement selon les termes de ce Contrat. L'Acceptant doit inclure une copie ou l'adresse Internet (Identifiant Uniforme de Ressource) du prsent Contrat toute reproduction

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cre une Oeuvre dite Collective, la demande de tout Offrant, il devra, dans la mesure du possible, retirer de l'Oeuvre dite Collective toute rfrence au dit Offrant, comme demand. Si l'Acceptant cre une Oeuvre dite Collective, la demande de tout Auteur, il devra, dans la mesure du possible, retirer de l'Oeuvre dite Collective toute rfrence au dit Auteur, comme demand. Si l'Acceptant cre une Oeuvre dite Drive, la demande de tout Offrant, il devra, dans la mesure du possible, retirer de l'Oeuvre dite Drive toute rfrence au dit Offrant, comme demand. Si l'Acceptant cre une Oeuvre dite Drive, la demande de tout Auteur, il devra, dans la mesure du possible, retirer de l'Oeuvre dite Drive toute rfrence au dit Auteur, comme demand.

b. L'Acceptant peut reproduire, distribuer, reprsenter ou communiquer au public une Oeuvre dite Drive y compris par voie numrique uniquement sous les termes de ce Contrat, ou d'une version ultrieure de ce Contrat comprenant les mmes Options du Contrat que le
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c. L'Acceptant ne peut exercer aucun des droits confrs par l'article 3 avec l'intention ou l'objectif d'obtenir un profit commercial ou une compensation financire personnelle. L'change de l'Oeuvre avec d'autres Oeuvres protges par le droit de la proprit littraire et artistique par le partage lectronique de fichiers, ou par tout autre moyen, n'est pas considr comme un change avec l'intention ou l'objectif d'un profit commercial ou d'une compensation financire personnelle, dans la mesure o aucun paiement ou compensation financire n'intervient en relation avec l'change d'Oeuvres protges.

d. Si l'Acceptant
reproduit, distribue, reprsente ou communique au public, y compris par voie numrique, l'Oeuvre ou toute Oeuvre dite Drive ou toute Oeuvre dite Collective, il doit conserver intactes toutes les informations sur le rgime des droits et en attribuer la paternit l'Auteur Original, de manire raisonnable au regard au mdium ou au moyen utilis. Il doit communiquer le nom de l'Auteur Original ou son ventuel pseudonyme s'il est indiqu ; le titre de l'Oeuvre Originale s'il est indiqu ; dans la mesure du possible, l'adresse Internet ou Identifiant Uniforme de Ressource (URI), s'il existe, spcifi par l'Offrant comme associ l'Oeuvre, moins que cette adresse ne renvoie pas aux informations lgales (paternit

et conditions d'utilisation de l'Oeuvre). Dans le cas d'une Oeuvre dite Drive, il doit indiquer les lments identifiant l'utilisation l'Oeuvre dans l'Oeuvre dite Drive par exemple  Traduction anglaise de l'Oeuvre par l'Auteur Original  ou Scnario bas sur l'Oeuvre par l'Auteur Original .
Ces obligations d'attribution de paternit doivent tre excutes de manire raisonnable. Cependant, dans le cas d'une Oeuvre dite Drive ou d'une Oeuvre dite Collective, ces informations doivent, au minimum, apparatre  la place et de manire aussi visible que celles  laquelle apparaissent les informations de mme nature.

e. Dans le cas o une utilisation de l'Oeuvre serait soumise  un rgime lgal de gestion collective obligatoire, l'Offrant se rserve le droit exclusif de collecter ces redevances par l'intermdiaire de la socit de perception et de rpartition des droits comptente. Sont notamment concerns la radiodiffusion et la communication dans un lieu public de phonogrammes publis  des fins de commerce, certains cas de retransmission par cble et satellite, la copie prive d'Oeuvres fixes sur phonogrammes ou vidogrammes, la reproduction par reprographie.

5. Garantie et exonration de responsabilit

a. En mettant l'Oeuvre  la disposition du public selon les termes de ce Contrat, l'Offrant dclare de bonne foi qu' sa connaissance et dans les limites d'une enqute raisonnable :

i. L'Offrant a obtenu tous les droits sur l'Oeuvre ncessaires pour pouvoir autoriser l'exercice des droits accords par le prsent Contrat, et permettre la jouissance paisible et l'exercice licite de ces droits, ceci sans que l'Acceptant n'ait aucune obligation de verser de rmunration ou tout autre paiement ou droits, dans la limite des mcanismes de gestion collective obligatoire applicables dcrits  l'article 4(e);

ii. L'Oeuvre n'est constitutive ni d'une violation des droits de tiers, notamment du droit de la proprit littraire et artistique, du droit des marques, du droit de l'information, du droit civil ou de tout autre droit, ni de diffamation, de violation de la vie prive ou de tout autre prjudice dlictuel  l'gard de toute tierce partie.

b. A l'exception des situations expressment mentionnes dans le prsent Contrat ou dans un autre accord crit, ou exiges par la loi applicable,
l'Oeuvre est mise  disposition en l'tat sans garantie d'aucune sorte, qu'elle soit expresse ou tacite, y compris  l'gard du contenu ou de l'exactitude de l'Oeuvre.

6. Limitation de responsabilit. A l'exception des garanties d'ordre public imposes par la loi applicable et des rparations imposes par le rgime de la responsabilit vis--vis d'un tiers en raison de la violation des garanties prvues par l'article 5 du prsent contrat, l'Offrant ne sera en aucun cas tenu responsable vis--vis de l'Acceptant, sur la base d'aucune thorie lgale ni en raison d'aucun prjudice direct, indirect, matriel ou moral, rsultant de l'excution du prsent Contrat ou de l'utilisation de l'Oeuvre, y compris dans l'hypothse o l'Offrant avait connaissance de la possible existence d'un tel prjudice.

7. Rsiliation

a. Tout manquement aux termes du contrat par l'Acceptant entrane la rsiliation automatique du Contrat et la fin des droits qui en dcoulent. Cependant, le contrat conserve ses effets envers les personnes
physiques ou morales qui ont reu de la part de l'Acceptant, en excution du prsent contrat, la mise  disposition d'Oeuvres dites Drives, ou d'Oeuvres dites Collectives, ceci tant qu'elles respectent pleinement leurs obligations. Les sections 1, 2, 5, 6 et 7 du contrat continuent  s'appliquer aprs la rsiliation de celui-ci.

b. Dans les limites indiques ci-dessus, le prsent Contrat s'applique pendant toute la dure de protection de l'Oeuvre selon le droit applicable. Nanmoins, l'Offrant se rserve  tout moment le droit d'exploiter l'Oeuvre sous des conditions contractuelles diffrentes, ou d'en cesser la diffusion; cependant, le recours  cette option ne doit pas conduire  retirer les effets du prsent Contrat (ou de tout contrat qui a t ou doit tre accord selon les termes de ce Contrat), et ce Contrat continuera  s'appliquer dans tous ses effets jusqu' ce que sa rsiliation intervienne dans les conditions dcrites ci-dessus.

8. Divers

a. A chaque reproduction ou communication au public par voie numrique de l'Oeuvre ou d'une Oeuvre dite Collective par l'Acceptant, l'Offrant propose au bnficiaire une offre de mise  disposition de l'Oeuvre dans des termes et conditions identiques  ceux accords  la partie Acceptante dans le prsent Contrat.

b. A chaque reproduction ou communication au public par voie numrique d'une Oeuvre dite Drive par l'Acceptant, l'Offrant propose au bnficiaire une offre de mise  disposition du bnficiaire de l'Oeuvre originale dans des termes et conditions identiques  ceux accords  la partie Acceptante dans le prsent Contrat.

c. La nullit ou l'inapplicabilit d'une quelconque disposition de ce Contrat au regard de la loi applicable n'affecte pas celle des autres dispositions qui resteront pleinement valides et applicables. Sans action additionnelle par les parties  cet accord, lesdites dispositions devront tre interprtes dans la mesure minimum ncessaire  leur validit et leur applicabilit.

d. Aucune limite, renonciation ou modification des termes ou dispositions du prsent Contrat ne pourra tre accepte sans le consentement crit et sign de la partie comptente.

e. Ce Contrat constitue le seul accord entre les parties  propos de l'Oeuvre mise ici  disposition. Il n'existe aucun lment annexe, accord supplmentaire ou mandat portant sur cette Oeuvre en dehors des lments mentionns ici. L'Offrant ne sera tenu par aucune disposition supplmentaire qui pourrait apparatre dans une quelconque communication en provenance de l'Acceptant. Ce Contrat ne peut tre modifi sans l'accord mutuel crit de l'Offrant et de l'Acceptant.

f. Le droit applicable est le droit franais.

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<signature of Ty Coon>, 1 April 1989 Ty Coon, President of Vice

That's all there is to it!

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DE LICENTIEGEVER AANVAARDT GEEN ENKELE AANSPRAKELIJKHEID JEGENS DE GEBRUIKER

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/// The datatype used for the ioctl number
#[doc(hidden)]
#[cfg(not(solarish))]
pub type ioctl_num_type = ::libc::c_ulong;

```
#[doc(hidden)]
#[cfg(solarish)]
pub type ioctl_num_type = ::libc::c_int;

/// The datatype used for the 3rd argument
#[doc(hidden)]
pub type ioctl_param_type = ::libc::c_int;

mod consts {
  use crate::sys::ioctl::ioctl_num_type;
  #[doc(hidden)]
  pub const VOID: ioctl_num_type = 0x2000_0000;
  #[doc(hidden)]
  pub const OUT: ioctl_num_type = 0x4000_0000;
  #[doc(hidden)]
  #[allow(overflowing_literals)]
  pub const IN: ioctl_num_type = 0x8000_0000;
  #[doc(hidden)]
  pub const INOUT: ioctl_num_type = IN | OUT;
  #[doc(hidden)]
  pub const IOCPARM_MASK: ioctl_num_type = 0x1fff;
}

pub use self::consts::*;

#[macro_export]
#[doc(hidden)]
macro_rules! ioc {
  ($inout:expr, $group:expr, $num:expr, $len:expr) => {
    $inout
      | (($len as $crate::sys::ioctl::ioctl_num_type
        & $crate::sys::ioctl::IOCPARM_MASK)

        << 16)
      | (($group as $crate::sys::ioctl::ioctl_num_type) << 8)
      | ($num as $crate::sys::ioctl::ioctl_num_type)
  };
}

/// Generate an ioctl request code for a command that passes no data.
///
/// This is equivalent to the `_IO()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_none!()` directly.
///
/// # Example
///
```

```
/// ```
/// # #[macro_use] extern crate nix;
/// const KVMIO: u8 = 0xAE;
/// ioctl_write_int_bad!(kvm_create_vm, request_code_none!(KVMIO, 0x03));
/// # fn main() {}
/// ```
#[macro_export(local_inner_macros)]
macro_rules! request_code_none {
  ($g:expr, $n:expr) => {
      ioc!($crate::sys::ioctl::VOID, $g, $n, 0)
  };
}

/// Generate an ioctl request code for a command that passes an integer
///
/// This is equivalent to the `_IOWINT()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the
 `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write_int!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write_int {
  ($g:expr, $n:expr) => {
      ioc!(
          $crate::sys::ioctl::VOID,
          $g,
          $n,
          ::std::mem::size_of::<$crate::libc::c_int>()
      )
  };
}

/// Generate an ioctl request code for a command that reads.
///
/// This is equivalent to the `_IOR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_read!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is reading and the kernel is
/// writing.
#[macro_export(local_inner_macros)]
macro_rules! request_code_read {
  ($g:expr, $n:expr, $len:expr) => {
      ioc!($crate::sys::ioctl::OUT, $g, $n, $len)
  };
}
```

```
/// Generate an ioctl request code for a command that writes.
///
///
 This is equivalent to the `_IOW()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is writing and the kernel is
/// reading.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::IN, $g, $n, $len)
   };
}

/// Generate an ioctl request code for a command that reads and writes.
///
/// This is equivalent to the `_IOWR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_readwrite!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_readwrite {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::INOUT, $g, $n, $len)

 };
}
```

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"#
use crate::errno::Errno;
use crate::sys::signal::Signal;
use crate::unistd::Pid;
use crate::Result;
use cfg_if::cfg_if;
use libc::{self, c_int};
use std::ptr;

pub type RequestType = c_int;

```
cfg_if! {
  if #[cfg(any(freebsdlike, apple_targets, target_os = "openbsd"))] {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_char;
  } else {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_void;
  }
}

libc_enum! {
  #[repr(i32)]
  /// Ptrace Request enum defining the action to be taken.
  #[non_exhaustive]
  pub enum Request {
    PT_TRACE_ME,
    PT_READ_I,
    PT_READ_D,
    #[cfg(apple_targets)]
    PT_READ_U,
    PT_WRITE_I,
    PT_WRITE_D,
    #[cfg(apple_targets)]
    PT_WRITE_U,
    PT_CONTINUE,
    PT_KILL,
    #[cfg(any(any(freebsdlike, apple_targets),
          all(target_os = "openbsd", target_arch = "x86_64"),
          all(target_os = "netbsd", any(target_arch = "x86_64",
                              target_arch = "powerpc"))))]
    PT_STEP,
    PT_ATTACH,
    PT_DETACH,
    #[cfg(apple_targets)]
    PT_SIGEXC,
    #[cfg(apple_targets)]
    PT_THUPDATE,
    #[cfg(apple_targets)]
    PT_ATTACHEXC
  }
}

unsafe fn ptrace_other(
  request: Request,
  pid: Pid,
  addr: AddressType,
  data: c_int,
) -> Result<c_int> {
```

```
  unsafe {
      Errno::result(libc::ptrace(
          request as RequestType,
          libc::pid_t::from(pid),
          addr,
          data,
      ))
      .map(|_| 0)
  }
}

/// Sets the process as traceable, as with `ptrace(PT_TRACEME, ...)`
///
/// Indicates that this process is to be traced by its parent.
/// This is the only ptrace request to be issued by the tracee.
pub fn traceme() -> Result<()> {
  unsafe {
      ptrace_other(Request::PT_TRACE_ME, Pid::from_raw(0), ptr::null_mut(), 0)
          .map(drop)
  }
}

/// Attach to a running
 process, as with `ptrace(PT_ATTACH, ...)`
///
/// Attaches to the process specified by `pid`, making it a tracee of the calling process.
pub fn attach(pid: Pid) -> Result<()> {
  unsafe {
      ptrace_other(Request::PT_ATTACH, pid, ptr::null_mut(), 0).map(drop)
  }
}

/// Detaches the current running process, as with `ptrace(PT_DETACH, ...)`
///
/// Detaches from the process specified by `pid` allowing it to run freely, optionally delivering a
/// signal specified by `sig`.
pub fn detach<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
  let data = match sig.into() {
      Some(s) => s as c_int,
      None => 0,
  };
  unsafe {
      ptrace_other(Request::PT_DETACH, pid, ptr::null_mut(), data).map(drop)
  }
}

/// Restart the stopped tracee process, as with `ptrace(PTRACE_CONT, ...)`
///
```

```
/// Continues the execution of the process with PID `pid`, optionally
/// delivering a signal specified by `sig`.
pub fn cont<T: Into<Option<Signal>>>(pid: Pid, sig: T)
 -> Result<()> {
   let data = match sig.into() {
       Some(s) => s as c_int,
       None => 0,
   };
   unsafe {
       // Ignore the useless return value
       ptrace_other(Request::PT_CONTINUE, pid, 1 as AddressType, data)
           .map(drop)
   }
}

/// Issues a kill request as with `ptrace(PT_KILL, ...)`
///
/// This request is equivalent to `ptrace(PT_CONTINUE, ..., SIGKILL);`
pub fn kill(pid: Pid) -> Result<()> {
   unsafe {
       ptrace_other(Request::PT_KILL, pid, 0 as AddressType, 0).map(drop)
   }
}

/// Move the stopped tracee process forward by a single step as with
/// `ptrace(PT_STEP, ...)`
///
/// Advances the execution of the process with PID `pid` by a single step optionally delivering a
/// signal specified by `sig`.
///
/// # Example
/// ```rust
/// use nix::sys::ptrace::step;
/// use nix::unistd::Pid;
/// use nix::sys::signal::Signal;
/// use nix::sys::wait::*;
/// // If a process changes state to the stopped state because of a SIGUSR1
/// // signal,
 this will step the process forward and forward the user
/// // signal to the stopped process
/// match waitpid(Pid::from_raw(-1), None) {
///     Ok(WaitStatus::Stopped(pid, Signal::SIGUSR1)) => {
///         let _ = step(pid, Signal::SIGUSR1);
///     }
///     _ => {},
/// }
/// ```
#[cfg(any(
```

```
  any(freebsdlike, apple_targets),
  all(target_os = "openbsd", target_arch = "x86_64"),
  all(
      target_os = "netbsd",
      any(target_arch = "x86_64", target_arch = "powerpc")
  )
))]
pub fn step<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
  let data = match sig.into() {
      Some(s) => s as c_int,
      None => 0,
  };
  unsafe {
      ptrace_other(Request::PT_STEP, pid, ptr::null_mut(), data).map(drop)
  }
}

/// Reads a word from a processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn read(pid: Pid, addr: AddressType)
 -> Result<c_int> {
  unsafe {
      // Traditionally there was a difference between reading data or
      // instruction memory but not in modern systems.
      ptrace_other(Request::PT_READ_D, pid, addr, 0)
  }
}

/// Writes a word into the processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn write(pid: Pid, addr: AddressType, data: c_int) -> Result<()> {
  unsafe { ptrace_other(Request::PT_WRITE_D, pid, addr, data).map(drop) }
}
```

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# 1.2296 winnow 0.7.13

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# 1.2297 untrusted 0.9.0

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# 1.2299 hashbrown 0.16.0

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```
//! FreeBSD and NetBSD xattr support.

use libc::{c_int, c_void, size_t, EPERM};
use std::ffi::{CString, OsStr, OsString};
use std::io;
use std::mem;
use std::os::unix::ffi::{OsStrExt, OsStringExt};
use std::os::unix::io::{AsRawFd, BorrowedFd};
use std::path::Path;
use std::ptr;

use libc::{
  extattr_delete_fd, extattr_delete_file, extattr_delete_link, extattr_get_fd, extattr_get_file,
  extattr_get_link, extattr_list_fd, extattr_list_file, extattr_list_link, extattr_set_fd,
  extattr_set_file, extattr_set_link, EXTATTR_NAMESPACE_SYSTEM, EXTATTR_NAMESPACE_USER,
};

use crate::util::allocate_loop;

pub const ENOATTR: i32 = libc::ENOATTR;
pub const ERANGE: i32 = libc::ERANGE;

const EXTATTR_NAMESPACE_USER_STRING: &str = "user";
const EXTATTR_NAMESPACE_SYSTEM_STRING: &str = "system";
const EXTATTR_NAMESPACE_NAMES: [&str; 3] = [
  "empty",
  EXTATTR_NAMESPACE_USER_STRING,
  EXTATTR_NAMESPACE_SYSTEM_STRING,
];

fn path_to_c(path: &Path) -> io::Result<CString> {
  match CString::new(path.as_os_str().as_bytes())
 {
      Ok(name) => Ok(name),
      Err(_) => Err(io::Error::new(io::ErrorKind::NotFound, "file not found")),
  }
}

#[inline]
fn slice_parts(buf: &mut [u8]) -> (*mut c_void, size_t) {
  if buf.is_empty() {
      (ptr::null_mut(), 0)
  } else {
      (buf.as_mut_ptr().cast(), buf.len() as size_t)
```

```
    }
}

/// An iterator over a set of extended attributes names.
#[derive(Default)]
pub struct XAttrs {
    user_attrs: Box<[u8]>,
    system_attrs: Box<[u8]>,
    offset: usize,
}

impl Clone for XAttrs {
    fn clone(&self) -> Self {
        XAttrs {
            user_attrs: Vec::from(&*self.user_attrs).into_boxed_slice(),
            system_attrs: Vec::from(&*self.system_attrs).into_boxed_slice(),
            offset: self.offset,
        }
    }

    fn clone_from(&mut self, other: &XAttrs) {
        self.offset = other.offset;

        let mut data = mem::replace(&mut self.user_attrs, Box::new([])).into_vec();
        data.extend(other.user_attrs.iter().cloned());
         self.user_attrs = data.into_boxed_slice();

        data = mem::replace(&mut self.system_attrs, Box::new([])).into_vec();
        data.extend(other.system_attrs.iter().cloned());
        self.system_attrs = data.into_boxed_slice();
    }
}

impl Iterator for XAttrs {
    type Item = OsString;
    fn next(&mut self) -> Option<OsString> {
        if self.user_attrs.is_empty() && self.system_attrs.is_empty() {
            return None;
        }

        if self.offset == self.user_attrs.len() + self.system_attrs.len() {
            return None;
        }

        let data = if self.offset < self.system_attrs.len() {
            &self.system_attrs[self.offset..]
        } else {
            &self.user_attrs[self.offset - self.system_attrs.len()..]
```

```
        };

        let siz = data[0] as usize;

        self.offset += siz + 1;
        if self.offset < self.system_attrs.len() {
            Some(prefix_namespace(
                OsStr::from_bytes(&data[1..siz
 + 1]),
                EXTATTR_NAMESPACE_SYSTEM,
            ))
        } else {
            Some(prefix_namespace(
                OsStr::from_bytes(&data[1..siz + 1]),
                EXTATTR_NAMESPACE_USER,
            ))
        }
    }

    fn size_hint(&self) -> (usize, Option<usize>) {
        if self.user_attrs.len() + self.system_attrs.len() == self.offset {
            (0, Some(0))
        } else {
            (1, None)
        }
    }
}

// This could use libc::extattr_string_to_namespace, but it's awkward because
// that requires nul-terminated strings, which Rust's std is loathe to provide.
fn name_to_ns(name: &OsStr) -> io::Result<(c_int, CString)> {
    let mut groups = name.as_bytes().splitn(2, |&b| b == b'.').take(2);
    let nsname = match groups.next() {
        Some(s) => s,
        None => {
            return Err(io::Error::new(
                io::ErrorKind::InvalidInput,
                "couldn't find namespace",
            ))
        }
    };

    let propname
 = match groups.next() {
        Some(s) => s,
        None => {
            return Err(io::Error::new(
                io::ErrorKind::InvalidInput,
```

```
            "couldn't find attribute",
        ))
    }
};

let ns_int = match EXTATTR_NAMESPACE_NAMES
    .iter()
    .position(|&s| s.as_bytes() == nsname)
{
    Some(i) => i,
    None => {
        return Err(io::Error::new(
            io::ErrorKind::InvalidInput,
            "no matching namespace",
        ))
    }
};

Ok((ns_int as c_int, CString::new(propname)?))
}

fn prefix_namespace(attr: &OsStr, ns: c_int) -> OsString {
  let nsname = EXTATTR_NAMESPACE_NAMES[ns as usize];
  let mut v = Vec::with_capacity(nsname.as_bytes().len() + attr.as_bytes().len() + 1);
  v.extend(nsname.as_bytes());
  v.extend(".".as_bytes());
  v.extend(attr.as_bytes());
  OsString::from_vec(v)
}

fn cvt(res: libc::ssize_t) -> io::Result<usize> {
  if res < 0 {
      Err(io::Error::last_os_error())
   } else {
      Ok(res as usize)
  }
}

pub fn get_fd(fd: BorrowedFd<'_>, name: &OsStr) -> io::Result<Vec<u8>> {
  let (ns, name) = name_to_ns(name)?;
  unsafe {
      allocate_loop(|buf| {
          let (ptr, len) = slice_parts(buf);
          cvt(extattr_get_fd(fd.as_raw_fd(), ns, name.as_ptr(), ptr, len))
      })
  }
}
```

```
pub fn set_fd(fd: BorrowedFd<'_>, name: &OsStr, value: &[u8]) -> io::Result<()> {
  let (ns, name) = name_to_ns(name)?;
  let ret = unsafe {
    extattr_set_fd(
      fd.as_raw_fd(),
      ns,
      name.as_ptr(),
      value.as_ptr() as *const c_void,
      value.len() as size_t,
    )
  };
  if ret == -1 {
    Err(io::Error::last_os_error())
  } else {
    Ok(())
  }
}

pub fn remove_fd(fd: BorrowedFd<'_>, name: &OsStr) -> io::Result<()> {
  let (ns, name) = name_to_ns(name)?;
  let ret = unsafe { extattr_delete_fd(fd.as_raw_fd(), ns, name.as_ptr()) };

 if ret != 0 {
    Err(io::Error::last_os_error())
  } else {
    Ok(())
  }
}

pub fn list_fd(fd: BorrowedFd<'_>) -> io::Result<XAttrs> {
  let sysvec = unsafe {
    let res = allocate_loop(|buf| {
      let (ptr, len) = slice_parts(buf);
      cvt(extattr_list_fd(
        fd.as_raw_fd(),
        EXTATTR_NAMESPACE_SYSTEM,
        ptr,
        len,
      ))
    });
    // On FreeBSD, system attributes require root privileges to view. However,
    // to mimic the behavior of listxattr in linux and osx, we need to query
    // them anyway and return empty results if we get EPERM
    match res {
      Ok(v) => v,
      Err(err) => {
        if err.raw_os_error() == Some(EPERM) {
          Vec::new()
```

```
            } else {
                return Err(err);
            }
        }
    }
  };

  let uservec = unsafe {
    let res = allocate_loop(|buf|
 {
        let (ptr, len) = slice_parts(buf);
        cvt(extattr_list_fd(
            fd.as_raw_fd(),
            EXTATTR_NAMESPACE_USER,
            ptr,
            len,
        ))
    });
    match res {
        Ok(v) => v,
        Err(err) => return Err(err),
    }
  };

  Ok(XAttrs {
    system_attrs: sysvec.into_boxed_slice(),
    user_attrs: uservec.into_boxed_slice(),
    offset: 0,
  })
}

pub fn get_path(path: &Path, name: &OsStr, deref: bool) -> io::Result<Vec<u8>> {
  let (ns, name) = name_to_ns(name)?;
  let path = path_to_c(path)?;
  let extattr_get_func = if deref {
    extattr_get_file
  } else {
    extattr_get_link
  };
  unsafe {
    allocate_loop(|buf| {
        let (ptr, len) = slice_parts(buf);
        cvt(extattr_get_func(path.as_ptr(), ns, name.as_ptr(), ptr, len))
    })
  }
}

pub fn set_path(path: &Path, name: &OsStr, value: &[u8], deref: bool) -> io::Result<()>
```

```
 {
   let (ns, name) = name_to_ns(name)?;
   let path = path_to_c(path)?;
   let extattr_set_func = if deref {
       extattr_set_file
   } else {
       extattr_set_link
   };
   let ret = unsafe {
       extattr_set_func(
           path.as_ptr(),
           ns,
           name.as_ptr(),
           value.as_ptr() as *const c_void,
           value.len() as size_t,
       )
   };
   if ret == -1 {
       Err(io::Error::last_os_error())
   } else {
       Ok(())
   }
}

pub fn remove_path(path: &Path, name: &OsStr, deref: bool) -> io::Result<()> {
   let (ns, name) = name_to_ns(name)?;
   let path = path_to_c(path)?;
   let extattr_delete_func = if deref {
       extattr_delete_file
   } else {
       extattr_delete_link
   };
   let ret = unsafe { extattr_delete_func(path.as_ptr(), ns, name.as_ptr()) };
   if ret != 0 {
       Err(io::Error::last_os_error())
   } else {
       Ok(())
   }
}

pub fn list_path(path: &Path, deref: bool) -> io::Result<XAttrs>
 {
   let path = path_to_c(path)?;
   let extattr_list_func = if deref {
       extattr_list_file
   } else {
       extattr_list_link
   };
```

```
  let sysvec = unsafe {
    let res = allocate_loop(|buf| {
      let (ptr, len) = slice_parts(buf);
      cvt(extattr_list_func(
        path.as_ptr(),
        EXTATTR_NAMESPACE_SYSTEM,
        ptr,
        len,
      ))
    });
    // On FreeBSD, system attributes require root privileges to view. However,
    // to mimic the behavior of listxattr in linux and osx, we need to query
    // them anyway and return empty results if we get EPERM
    match res {
      Ok(v) => v,
      Err(err) => {
        if err.raw_os_error() == Some(EPERM) {
          Vec::new()
        } else {
          return Err(err);
        }
      }
    }
  };

  let uservec = unsafe {
    let res = allocate_loop(|buf|
{
      let (ptr, len) = slice_parts(buf);
      cvt(extattr_list_func(
        path.as_ptr(),
        EXTATTR_NAMESPACE_USER,
        ptr,
        len,
      ))
    });
    match res {
      Ok(v) => v,
      Err(err) => return Err(err),
    }
  };

  Ok(XAttrs {
    system_attrs: sysvec.into_boxed_slice(),
    user_attrs: uservec.into_boxed_slice(),
    offset: 0,
  })
}
```

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CharIndices implementation of the Rust standard library at revision
ab32548539ec38a939c1b58599249f3b54130026
(https://github.com/rust-lang/rust/blob/ab32548539ec38a939c1b58599249f3b54130026/library/core/src/str/iter.rs).

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c. den Schutzgegenstand, allein oder in Sammelwerke aufgenommen, ffentlich zu zeigen und zu verbreiten;

d. Abwandlungen des Schutzgegenstandes zu verffentlichen, ffentlich zu zeigen und zu verbreiten.

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7.
Erlschen

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LPPL Version 1.3c 2008-05-04

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2. If this search is successful, then enquire whether the Work is still maintained.

a. If it is being maintained, then ask the Current Maintainer to update their communication data within one month.

b. If the search is unsuccessful or no action to resume active maintenance is taken by the Current Maintainer, then announce within the pertinent community your intention to take over maintenance. (If the Work is a LaTeX work, this could be done, for example, by posting to comp.text.tex.)

3a. If the Current Maintainer is reachable and agrees to pass maintenance of the Work to you, then this takes effect immediately upon announcement.

b. If the Current Maintainer is not reachable and the Copyright Holder agrees that maintenance of the Work be passed to you, then this takes effect immediately upon announcement.

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```
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//!
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//! best indicator is whether it also exists in the BSD-specific definitions in
//! this libc crate.

use crate::prelude::*;

// stringlist.h (utility library)
// Note: this is kept because it was previously introduced
pub type StringList = _stringlist;

s! {
  // stringlist.h (utility library)
  // Note: this is kept because it was previously introduced
  pub struct _stringlist {
      pub sl_str: *mut *mut c_char,
      pub sl_max: size_t,
      pub sl_cur: size_t,
  }

  // sys/event.h
  pub struct kevent {
      pub ident: crate::uintptr_t,
      pub filter: c_short,
      pub flags: c_ushort,

  pub fflags: c_uint,
      pub data: i64,
      pub udata: *mut c_void,
```

```
        pub ext: [u64; 4],
    }

    // sys/link_elf.h
    pub struct dl_phdr_info {
        pub dlpi_addr: crate::Elf_Addr,
        pub dlpi_name: *const c_char,
        pub dlpi_phdr: *const crate::Elf_Phdr,
        pub dlpi_phnum: crate::Elf_Half,
    }
}

// sys/event.h
pub const EVFILT_READ: i16 = -1;
pub const EVFILT_WRITE: i16 = -2;
pub const EVFILT_PROC: i16 = -5;
pub const EV_ADD: u16 = 0x0001;
pub const EV_DELETE: u16 = 0x0002;
pub const EV_ONESHOT: u16 = 0x0010;
pub const EV_CLEAR: u16 = 0x0020;
pub const EV_EOF: u16 = 0x8000;
pub const EV_ERROR: u16 = 0x4000;
pub const NOTE_EXIT: u32 = 0x80000000;

// sys/ioccom.h
pub const IOC_VOID: c_ulong = 0x20000000;
pub const IOC_OUT: c_ulong = 0x40000000;
pub const IOC_IN: c_ulong = 0x80000000;
pub const IOC_INOUT: c_ulong = IOC_IN | IOC_OUT;
pub const IOC_DIRMASK: c_ulong = 0xe0000000;

#[link(name = "bsd")]
extern "C" {
    // stdlib.h
    pub fn daemon(nochdir:
 c_int, noclose: c_int) -> c_int;
    pub fn getprogname() -> *const c_char;
    pub fn setprogname(progname: *const c_char);
    pub fn arc4random() -> u32;
    pub fn arc4random_uniform(upper_bound: u32) -> u32;
    pub fn arc4random_buf(buf: *mut c_void, n: size_t);
    pub fn mkstemps(template: *mut c_char, suffixlen: c_int) -> c_int;
    pub fn strtonum(
        nptr: *const c_char,
        minval: c_longlong,
        maxval: c_longlong,
        errstr: *mut *const c_char,
    ) -> c_longlong;
```

```
// pty.h
pub fn openpty(
    amaster: *mut c_int,
    aslave: *mut c_int,
    name: *mut c_char,
    termp: *mut crate::termios,
    winp: *mut crate::winsize,
) -> c_int;
pub fn login_tty(_fd: c_int) -> c_int;
pub fn forkpty(
    amaster: *mut c_int,
    name: *mut c_char,
    termp: *mut crate::termios,
    winp: *mut crate::winsize,
) -> crate::pid_t;

// string.h
pub fn strsep(string: *mut *mut c_char, delimiters:
*const c_char) -> *mut c_char;
pub fn explicit_bzero(buf: *mut c_void, len: size_t);

// stringlist.h (utility library)
// Note: this is kept because it was previously introduced
pub fn sl_init() -> *mut StringList;
pub fn sl_add(sl: *mut StringList, n: *mut c_char) -> c_int;
pub fn sl_free(sl: *mut StringList, i: c_int);
pub fn sl_find(sl: *mut StringList, n: *mut c_char) -> *mut c_char;

// sys/event.h
pub fn kqueue() -> c_int;
pub fn kevent(
    kq: c_int,
    changelist: *const kevent,
    nchanges: c_int,
    eventlist: *mut kevent,
    nevents: c_int,
    timeout: *const crate::timespec,
) -> c_int;

// sys/link_elf.h
pub fn dl_iterate_phdr(
    callback: Option<
        unsafe extern "C" fn(info: *mut dl_phdr_info, size: usize, data: *mut c_void) -> c_int,
    >,
    data: *mut c_void,
) -> c_int;
```

```
  // sys/time.h
  pub fn lutimes(file: *const c_char, times: *const crate::timeval)
 -> c_int;

  // sys/uov.h
  pub fn preadv(
      fd: c_int,
      iov: *const crate::iovec,
      iovcnt: c_int,
      offset: crate::off_t,
  ) -> ssize_t;
  pub fn pwritev(
      fd: c_int,
      iov: *const crate::iovec,
      iovcnt: c_int,
      offset: crate::off_t,
  ) -> ssize_t;

  // sys/wait.h
  pub fn wait4(
      pid: crate::pid_t,
      status: *mut c_int,
      options: c_int,
      rusage: *mut crate::rusage,
  ) -> crate::pid_t;
}
================================================================================
```

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DURCH DIE AUSBUNG EINES DURCH DIESEN LIZENZVERTRAG GEWHRTEN RECHTS AN DEM SCHUTZGEGENSTAND ERKLREN SIE SICH MIT DEN LIZENZBEDINGUNGEN RECHTSVERBINDLICH EINVERSTANDEN. DER LIZENZGEBER RUMT IHNEN DIE HIER BESCHRIEBENEN RECHTE UNTER DER VORAUSSETZUNGEIN, DASS SIE SICH MIT DIESEN VERTRAGSBEDINGUNGEN EINVERSTANDEN ERKLREN.

1. Definitionen

a. Unter einer Bearbeitung wird eine bersetzung oder andere Bearbeitung des Werkes verstanden, die Ihre persnliche geistige Schpfung ist. Eine freie Benutzung des Werkes wird nicht als Bearbeitung angesehen.

b. Unter den Lizenzelementen werden die folgenden Lizenzcharakteristika verstanden, die vom Lizenzgeber ausgewhlt und in der Bezeichnung der Lizenz genannt werden: Namensnennung, Nicht-kommerziell, Weitergabe unter gleichen Bedingungen.

c. Unter dem Lizenzgeber wird die natrliche oder juristische Person verstanden, die den Schutzgegenstand unter den Bedingungen dieser Lizenz anbietet.

d. Unter einem Sammelwerk wird eine Sammlung von Werken, Daten oder anderen unabhngigen Elementen verstanden, die aufgrund der Auswahl oder Anordnung der Elemente eine persnliche geistige Schpfung ist. Darunter fallen auch solche Sammelwerke, deren Elemente systematisch oder methodisch angeordnet und einzeln mit Hilfe elektronischer Mittel oder auf andere Weise zugnglich sind (Datenbankwerke). Ein Sammelwerk wird im Zusammenhang mit dieser Lizenz nicht als Bearbeitung (wie oben beschrieben) angesehen.

e. Mit SIE und Ihnen ist die natrliche oder juristische Person gemeint, die die durch diese Lizenz gewhrten Nutzungsrechte ausbt und die zuvor die Bedingungen dieser Lizenz im Hinblick auf das Werk nicht verletzt hat, oder die die ausdrckliche Erlaubnis des Lizenzgebers erhalten hat, die durch diese Lizenz gewhrten Nutzungsrechte trotz einer vorherigen Verletzung auszuben.

f. Unter dem Schutzgegenstandwird das Werk oder Sammelwerk oder das Schutzobjekt eines verwandten Schutzrechts, das Ihnen unter den Bedingungen dieser Lizenz angeboten wird, verstanden

g. Unter dem Urheber wird die natrliche Person verstanden, die das Werk geschaffen hat.

h. Unter einem verwandten Schutzrecht wird das Recht an einem anderen urheberrechtlichen Schutzgegenstand als einem Werk verstanden, zum Beispiel einer wissenschaftlichen Ausgabe, einem nachgelassenen Werk, einem Lichtbild, einer Datenbank, einem Tontrger, einer Funksendung, einem Laufbild oder einer Darbietung eines ausbenden Knstlers.

i. Unter dem Werk wird eine persnliche geistige Schpfung verstanden, die Ihnen unter den Bedingungen dieser Lizenz angeboten wird.

2. Schranken des Urheberrechts. Diese Lizenz lsst smtliche Befugnisse unberhrt, die sich aus den Schranken des Urheberrechts,aus dem Erschpfungsgrundsatz oder anderen Beschrnkungen der Ausschlielichkeitsrechte des Rechtsinhabers ergeben.

3. Lizenzierung. Unter den Bedingungen dieses Lizenzvertrages rumt Ihnen der Lizenzgeber ein lizenzgebhrenfreies, rumlich und zeitlich (fr die Dauer des Urheberrechts oder verwandten Schutzrechts) unbeschrnktes einfaches Nutzungsrecht ein, den Schutzgegenstand in der folgenden Art und Weise zu nutzen:

a. den Schutzgegenstand in krperlicher Form zu verwerten, insbesondere zu vervielfltigen, zu verbreiten und auszustellen;

b. den Schutzgegenstand in unkrperlicher Form ffentlich wiederzugeben, insbesondere vorzutragen, aufzufhren und vorzufhren, ffentlich zugnglich zu machen, zu senden, durch Bild- und Tontrger wiederzugeben sowie Funksendungen und ffentliche Zugnglichmachungen wiederzugeben;

c. den Schutzgegenstand auf Bild- oder Tontrger aufzunehmen, Lichtbilder davon herzustellen, weiterzusenden und in dem in a. und b. genannten Umfang zu verwerten;

d. den Schutzgegenstand zu bearbeiten oder in anderer Weise umzugestalten und die Bearbeitungen zu verffentlichen und in dem in a. bis c. genannten Umfang zu verwerten;

Die genannten Nutzungsrechte knnen fr alle bekannten Nutzungsarten ausgebt werden. Die genannten Nutzungsrechte beinhalten das Recht, solche Vernderungen an dem Werk vorzunehmen, die technisch erforderlich sind, um die Nutzungsrechte fr alle Nutzungsarten wahrzunehmen. Insbesondere sind davon die Anpassung an andere Medien und auf andere Dateiformate umfasst.

4. Beschrnkungen. Die Einrumung der Nutzungsrechte gem Ziffer 3 erfolgt ausdrcklich nur unter den folgenden Bedingungen:

a. Sie drfen den Schutzgegenstand ausschlielich unter den Bedingungen dieser Lizenz vervielfltigen, verbreiten oder ffentlich wiedergeben, und Sie mssen stets eine Kopie oder die vollstndige Internetadresse in Form des Uniform-Resource-Identifier (URI) dieser Lizenz beifgen, wenn Sie den Schutzgegenstandvervielfltigen, verbreiten oder ffentlich wiedergeben. Sie drfen keine Vertragsbedingungen anbieten oder fordern, die die Bedingungen dieser Lizenz oder die durch sie gewhrten Rechte ndern oder beschrnken. Sie drfen den Schutzgegenstand nicht unterlizenzieren. Sie mssen alle Hinweise unverndert lassen, die auf diese Lizenz und den Haftungsausschluss hinweisen. Sie drfen den Schutzgegenstand mit keinen technischen Schutzmanahmen versehen, die den Zugang oder den Gebrauch des Schutzgegenstandes in einer Weise kontrollieren, die mit den Bedingungen dieser Lizenz im Widerspruch stehen. Die genannten Beschrnkungen gelten auch fr den Fall, dass der Schutzgegenstand einen Bestandteil eines Sammelwerkes bildet; sie

verlangen aber nicht, dass das Sammelwerk insgesamt zum Gegenstand dieser Lizenz gemacht wird. Wenn Sie ein Sammelwerk erstellen, mssen Sie - soweit dies praktikabel ist - auf die Mitteilung eines Lizenzgebers oder Urhebers hin aus dem Sammelwerk jeglichen Hinweis auf diesen Lizenzgeber oder diesen Urheber entfernen. Wenn Sie den Schutzgegenstand bearbeiten, mssen Sie - soweit dies praktikabel ist- auf die Aufforderung eines Rechtsinhabers hin von der Bearbeitung jeglichen Hinweis auf diesen Rechtsinhaber entfernen.

b. Sie drfen eine Bearbeitung ausschlielich unter den Bedingungen dieser Lizenz, einer spteren Version dieser Lizenz mit denselben Lizenzelementen wie diese Lizenz oder einer Creative Commons iCommons Lizenz, die dieselben Lizenzelemente wie diese Lizenz
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sie erfordern aber nicht, dass das Sammelwerk insgesamt zum Gegenstand dieser Lizenz gemacht wird.

c. Sie drfen die in Ziffer 3 gewhrten Nutzungsrechte in keiner Weise verwenden, die hauptschlich auf einen geschftlichen Vorteil oder eine vertraglich geschuldete geldwerte Vergtung abzielt oder darauf gerichtet ist. Erhalten Sie im Zusammenhang mit der Einrumung der Nutzungsrechte ebenfalls einen Schutzgegenstand, ohne dass eine vertragliche Verpflichtung hierzu besteht, so wird dies nicht als geschftlicher Vorteil oder vertraglich geschuldete geldwerte Vergtung angesehen, wenn keine Zahlung oder geldwerte Vergtung in Verbindung mit dem Austausch der Schutzgegenstnde geleistet wird (z.B. File-Sharing).

d. Wenn Sie den Schutzgegenstand oder eine Bearbeitung oder ein Sammelwerk vervielfltigen, verbreiten oder ffentlich wiedergeben, mssen Sie alle Urhebervermerke fr den Schutzgegenstand unverndert lassen und die Urheberschaft oder Rechtsinhaberschaft in einer der von Ihnen vorgenommenen
Nutzung angemessenen Form anerkennen, indem Sie den Namen (oder das Pseudonym, falls ein solches verwendet wird) des Urhebers oder Rechteinhabers nennen, wenn dieser angegeben ist. Dies gilt auch fr den Titel des Schutzgegenstandes, wenn dieser angeben ist, sowie - in einem vernnftigerweise durchfhrbaren Umfang - fr die mit dem Schutzgegenstand zu verbindende Internetadresse in Form des Uniform-Resource-Identifier (URI), wie sie der Lizenzgeber angegeben hat, sofern dies geschehen ist, es sei denn, diese Internetadresse verweist nicht auf den Urhebervermerk oder die Lizenzinformationen zu dem Schutzgegenstand. Bei einer Bearbeitung ist ein Hinweis darauf aufzufhren, in welcher Form der Schutzgegenstand in die Bearbeitung eingegangen ist (z.B. Franzsische bersetzung des ... (Werk) durch ... (Urheber) oder Das Drehbuch beruht auf dem Werk des ... (Urheber)). Ein solcher Hinweis kann in jeder angemessenen Weise erfolgen, wobei jedoch bei einer Bearbeitung, einer Datenbank oder einem Sammelwerk der Hinweis zumindest an gleicher Stelle und in ebenso auffllliger Weise zu erfolgen hat wie vergleichbare Hinweise auf andere Rechtsinhaber.

e. Obwohl die gemss Ziffer 3 gewhrten Nutzungsrechte in umfassender Weise ausgebt werden drfen, findet diese Erlaubnis ihre gesetzliche Grenze in den Persnlichkeitsrechten der Urheber und ausbenden Knstler, deren berechtigte geistige und persnliche Interessen bzw. deren Ansehen oder Ruf nicht dadurch gefhrdet werden drfen, dass ein Schutzgegenstand ber das gesetzlich zulssige Ma hinaus beeintrchtigt wird.

5. Gewhrleistung. Sofern dies von den Vertragsparteien nicht anderweitig schriftlich vereinbart,, bietet der Lizenzgeber keine Gewhrleistung fr die erteilten Rechte, auer fr den Fall, dass Mngel arglistig verschwiegen wurden. Fr Mngel anderer Art, insbesondere bei der mangelhaften Lieferung von Verkrperungen des Schutzgegenstandes, richtet sich die Gewhrleistung nach der Regelung, die die Person, die Ihnen den Schutzgegenstand
zur Verfgung stellt, mit Ihnen auerhalb dieser Lizenz vereinbart, oder - wenn eine solche Regelung nicht getroffen wurde - nach den gesetzlichen Vorschriften.

6. Haftung. ber die in Ziffer 5 genannte Gewhrleistung hinaus haftet Ihnen der Lizenzgeber nur fr Vorsatz und grobe Fahrlssigkeit.

7. Vertragsende

a. Dieser Lizenzvertrag und die durch ihn eingerumten Nutzungsrechte enden automatisch bei jeder Verletzung der Vertragsbedingungen durch Sie. Fr natrliche und juristische Personen, die von Ihnen eine Bearbeitung, eine Datenbank oder ein Sammelwerk unter diesen Lizenzbedingungen erhalten haben, gilt die Lizenz jedoch weiter, vorausgesetzt, diese natrlichen oder juristischen Personen erfllen smtliche Vertragsbedingungen. Die Ziffern 1, 2, 5, 6, 7 und 8 gelten bei einer Vertragsbeendigung fort.

b. Unter den oben genannten Bedingungen erfolgt die Lizenz auf unbegrenzte Zeit (fr die Dauer des Schutzrechts). Dennoch behlt sich der Lizenzgeber das Recht vor, den Schutzgegenstand
unter anderen Lizenzbedingungen zu nutzen oder die eigene Weitergabe des Schutzgegenstandes jederzeit zu beenden, vorausgesetzt, dass solche Handlungen nicht dem Widerruf dieser Lizenz dienen (oder jeder anderen Lizenzierung, die auf Grundlage dieser Lizenz erfolgt ist oder erfolgen muss) und diese Lizenz wirksam bleibt, bis Sie unter den oben genannten Voraussetzungen endet.

8. Schlussbestimmungen

a. Jedes Mal, wenn Sie den Schutzgegenstand vervielfltigen, verbreiten oder ffentlich wiedergeben, bietet der Lizenzgeber dem Erwerber eine Lizenz fr den Schutzgegenstand unter denselben Vertragsbedingungen an, unter denen er Ihnen die Lizenz eingerumt hat.

b. Jedes Mal, wenn Sie eine Bearbeitung vervielfltigen, verbreiten oder ffentlich wiedergeben, bietet der Lizenzgeber dem Erwerber eine Lizenz fr den ursprnglichen Schutzgegenstand unter denselben Vertragsbedingungen an, unter denen er Ihnen die Lizenz eingerumt hat.

c. Sollte eine Bestimmung dieses Lizenzvertrages
unwirksam sein, so wird die Wirksamkeit der brigen Lizenzbestimmungen dadurch nicht berhrt, und an die Stelle der unwirksamen Bestimmung tritt eine Ersatzregelung, die dem mit der unwirksamen Bestimmung angestrebten Zweck am nchsten kommt.

d. Nichts soll dahingehend ausgelegt werden, dass auf eine Bestimmung dieses Lizenzvertrages verzichtet oder einer Vertragsverletzung zugestimmt wird, so lange ein solcher Verzicht oder eine solche Zustimmung nicht schriftlich vorliegen und von der verzichtenden oder zustimmenden Vertragspartei unterschrieben sind

e. Dieser Lizenzvertrag stellt die vollstndige Vereinbarung zwischen den Vertragsparteien hinsichtlich des Schutzgegenstandes dar. Es gibt keine weiteren ergnzenden Vereinbarungen oder mndlichen Abreden im Hinblick auf den Schutzgegenstand. Der Lizenzgeber ist an keine zustzlichen Abreden gebunden, die aus irgendeiner

Absprache mit Ihnen entstehen knnten. Der Lizenzvertrag kann nicht ohne eine bereinstimmende schriftliche Vereinbarung zwischen dem Lizenzgeber und Ihnen abgendert werden.

f. Auf diesen Lizenzvertrag findet das Recht der Bundesrepublik Deutschland Anwendung.

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"#
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Lizenz

DER GEGENSTAND DIESER LIZENZ (WIE UNTER "SCHUTZGEGENSTAND" DEFINIERT) WIRD UNTER DEN BEDINGUNGEN DIESER CREATIVE COMMONS PUBLIC LICENSE ("CCPL", "LIZENZ" ODER "LIZENZVERTRAG") ZUR VERFGUNG GESTELLT. DER SCHUTZGEGENSTAND IST DURCH DAS URHEBERRECHT UND/ODER ANDERE GESETZE GESCHTZT. JEDE FORM DER NUTZUNG DES SCHUTZGEGENSTANDES, DIE NICHT AUFGRUND DIESER LIZENZ ODER DURCH GESETZE GESTATTET IST, IST UNZULSSIG.

DURCH DIE AUSBUNG EINES DURCH DIESE LIZENZ GEWHRTEN RECHTS AN DEM SCHUTZGEGENSTAND ERKLREN
SIE SICH MIT DEN LIZENZBEDINGUNGEN RECHTSVERBINDLICH EINVERSTANDEN. SOWEIT DIESE LIZENZ ALS LIZENZVERTRAG ANZUSEHEN IST, GEWHRT IHNEN DER LIZENZGEBER DIE IN DER LIZENZ GENANNTEN RECHTE UNENTGELTLICH UND IM AUSTAUSCH DAFR, DASS SIE DAS GEBUNDENSEIN AN DIE LIZENZBEDINGUNGEN AKZEPTIEREN.

1. Definitionen

a. Der Begriff "Abwandlung" im Sinne dieser Lizenz bezeichnet das Ergebnis jeglicher Art von Vernderung des Schutzgegenstandes, solange die eigenpersnlichen Zge des Schutzgegenstandes darin nicht verblassen und daran eigene Schutzrechte entstehen. Das kann insbesondere eine Bearbeitung, Umgestaltung, nderung, Anpassung, bersetzung oder Heranziehung des Schutzgegenstandes zur Vertonung von Laufbildern sein. Nicht als Abwandlung des Schutzgegenstandes gelten seine Aufnahme in eine Sammlung oder ein Sammelwerk und die freie Benutzung des Schutzgegenstandes.

b. Der Begriff "Sammelwerk" im Sinne dieser Lizenz meint eine Zusammenstellung von literarischen, knstlerischen oder wissenschaftlichen

Inhalten, sofern diese Zusammenstellung aufgrund von Auswahl und Anordnung der darin enthaltenen selbstndigen Elemente eine geistige Schpfung darstellt, unabhngig davon, ob die Elemente systematisch oder methodisch angelegt und dadurch einzeln zugnglich sind oder nicht.

c. "Verbreiten" im Sinne dieser Lizenz bedeutet, den Schutzgegenstand oder Abwandlungen im Original oder in Form von Vervielfltigungsstcken, mithin in krperlich fixierter Form der ffentlichkeit anzubieten oder in Verkehr zu bringen.

d. Unter "Lizenzelementen" werden im Sinne dieser Lizenz die folgenden bergeordneten Lizenzcharakteristika verstanden, die vom Lizenzgeber ausgewhlt wurden und in der Bezeichnung der Lizenz zum Ausdruck kommen: "Namensnennung", "Keine kommerzielle Nutzung", "Weitergabe unter gleichen Bedingungen".

e. Der "Lizenzgeber" im Sinne dieser Lizenz ist diejenige natrliche oder juristische Person oder Gruppe, die den Schutzgegenstand unter den Bedingungen dieser Lizenz anbietet und insoweit als Rechteinhaberin auftritt.

f. "Rechteinhaber" im Sinne dieser Lizenz ist der Urheber des Schutzgegenstandes oder jede andere natrliche oder juristische Person oder Gruppe von Personen, die am Schutzgegenstand ein Immaterialgterrecht erlangt hat, welches die in Abschnitt 3 genannten Handlungen erfasst und bei dem eine Einrumung von Nutzungsrechten oder eine Weiterbertragung an Dritte mglich ist.

g. Der Begriff "Schutzgegenstand" bezeichnet in dieser Lizenz den literarischen, knstlerischen oder wissenschaftlichen Inhalt, der unter den Bedingungen dieser Lizenz angeboten wird. Das kann insbesondere eine persnliche geistige Schpfung jeglicher Art, ein Werk der kleinen Mnze, ein nachgelassenes Werk oder auch ein Lichtbild oder anderes Objekt eines verwandten Schutzrechts sein, unabhngig von der Art seiner Fixierung und unabhngig davon, auf welche Weise jeweils eine Wahrnehmung erfolgen kann, gleichviel ob in analoger oder digitaler Form. Soweit Datenbanken oder Zusammenstellungen von Daten einen immaterialgterrechtlichen Schutz eigener Art genieen, unterfallen auch sie dem Begriff "Schutzgegenstand" im Sinne dieser Lizenz.

h. Mit "Sie" bzw. "Ihnen" ist die natrliche oder juristische Person gemeint, die in dieser Lizenz im Abschnitt 3 genannte Nutzungen des Schutzgegenstandes vornimmt und zuvor in Hinblick auf den Schutzgegenstand nicht gegen Bedingungen dieser Lizenz verstoen oder aber die ausdrckliche Erlaubnis des Lizenzgebers erhalten hat, die durch diese Lizenz gewhrten Nutzungsrechte trotz eines vorherigen Verstoes auszuben.

i. Unter "ffentlich Zeigen" im Sinne dieser Lizenz sind Verffentlichungen und Prsentationen des Schutzgegenstandes zu verstehen, die fr eine Mehrzahl von Mitgliedern der ffentlichkeit bestimmt sind und in unkrperlicher Form mittels ffentlicher Wiedergabe in Form von Vortrag, Auffhrung, Vorfhrung, Darbietung, Sendung, Weitersendung, zeit- und ortsunabhngiger Zugnglichmachung oder in krperlicher Form mittels Ausstellung erfolgen, unabhngig von bestimmten Veranstaltungen und unabhngig von den zum Einsatz kommenden Techniken und Verfahren, einschlielich drahtgebundener oder drahtloser Mittel und Einstellen in das Internet.

j. "Vervielfltigen" im Sinne dieser Lizenz bedeutet, mittels beliebiger Verfahren Vervielfltigungsstcke des Schutzgegenstandes herzustellen, insbesondere durch Ton- oder Bildaufzeichnungen, und umfasst auch den Vorgang, erstmals krperliche Fixierungen des Schutzgegenstandes sowie Vervielfltigungsstcke dieser Fixierungen anzufertigen, sowie die bertragung des Schutzgegenstandes auf einen Bild- oder Tontrger oder auf ein anderes elektronisches Medium, gleichviel ob in digitaler oder analoger Form.

2. Schranken des Immaterialgterrechts. Diese Lizenz ist in keiner Weise darauf gerichtet, Befugnisse zur Nutzung des Schutzgegenstandes zu vermindern, zu beschrnken oder zu vereiteln, die Ihnen aufgrund der Schranken des Urheberrechts oder anderer Rechtsnormen bereits
ohne Weiteres zustehen oder sich aus dem Fehlen eines immaterialgterrechtlichen Schutzes ergeben.

3. Einrumung von Nutzungsrechten. Unter den Bedingungen dieser Lizenz rumt Ihnen der Lizenzgeber - unbeschadet unverzichtbarer Rechte und vorbehaltlich des Abschnitts 4.f) - das vergtungsfreie, rumlich und zeitlich (fr die Dauer des Schutzrechts am Schutzgegenstand) unbeschrnkte einfache Recht ein, den Schutzgegenstand auf die folgenden Arten und Weisen zu nutzen ("unentgeltlich eingerumtes einfaches Nutzungsrecht fr jedermann"):

a. Den Schutzgegenstand in beliebiger Form und Menge zu vervielfltigen, ihn in Sammelwerke zu integrieren und ihn als Teil solcher Sammelwerke zu vervielfltigen;

b. Abwandlungen des Schutzgegenstandes anzufertigen, einschlielich bersetzungen unter Nutzung jedweder Medien, sofern deutlich erkennbar gemacht wird, dass es sich um Abwandlungen handelt;

c. den Schutzgegenstand, allein oder in Sammelwerke aufgenommen, ffentlich zu zeigen und zu
verbreiten;

d. Abwandlungen des Schutzgegenstandes zu verffentlichen, ffentlich zu zeigen und zu verbreiten.

Das vorgenannte Nutzungsrecht wird fr alle bekannten sowie fr alle noch nicht bekannten Nutzungsarten eingerumt. Es beinhaltet auch das Recht, solche nderungen am Schutzgegenstand vorzunehmen, die fr bestimmte nach dieser Lizenz zulssige Nutzungen technisch erforderlich sind. Alle sonstigen Rechte, die ber diesen Abschnitt hinaus nicht ausdrcklich durch den Lizenzgeber eingerumt werden, bleiben diesem allein vorbehalten. Soweit Datenbanken oder Zusammenstellungen von Daten Schutzgegenstand dieser Lizenz oder Teil dessen sind und einen immaterialgterrechtlichen Schutz eigener Art genieen, verzichtet der Lizenzgeber auf smtliche aus diesem Schutz resultierenden Rechte.

4. Bedingungen. Die Einrumung des Nutzungsrechts gem Abschnitt 3 dieser Lizenz erfolgt ausdrcklich nur unter den folgenden Bedingungen:

a. Sie drfen den Schutzgegenstand ausschlielich unter den Bedingungen
dieser Lizenz verbreiten oder ffentlich zeigen. Sie mssen dabei stets eine Kopie dieser Lizenz oder deren vollstndige Internetadresse in Form des Uniform-Resource-Identifier (URI) beifgen. Sie drfen keine Vertrags- oder Nutzungsbedingungen anbieten oder fordern, die die Bedingungen dieser Lizenz oder die durch diese Lizenz gewhrten Rechte beschrnken. Sie drfen den Schutzgegenstand nicht unterlizenzieren. Bei jeder Kopie des Schutzgegenstandes, die Sie verbreiten oder ffentlich zeigen, mssen Sie alle Hinweise unverndert lassen, die auf diese Lizenz und den Haftungsausschluss hinweisen. Wenn Sie den Schutzgegenstand verbreiten oder ffentlich zeigen, drfen Sie (in Bezug auf den Schutzgegenstand) keine technischen Manahmen ergreifen, die den Nutzer des Schutzgegenstandes in der Ausbung der ihm durch diese Lizenz gewhrten Rechte behindern knnen. Dieser Abschnitt 4.a) gilt auch fr den Fall, dass der Schutzgegenstand einen Bestandteil eines Sammelwerkes bildet, was jedoch nicht bedeutet,
dass das Sammelwerk insgesamt dieser Lizenz unterstellt werden muss. Sofern Sie ein Sammelwerk erstellen, mssen Sie auf die Mitteilung eines Lizenzgebers hin aus dem Sammelwerk die in Abschnitt 4.d) aufgezhlten Hinweise entfernen. Wenn Sie eine Abwandlung vornehmen, mssen Sie auf die Mitteilung eines Lizenzgebers hin von der Abwandlung die in Abschnitt 4.d) aufgezhlten Hinweise entfernen.

b. Sie drfen eine Abwandlung ausschlielich unter den Bedingungen

i. dieser Lizenz,

ii. einer spteren Version dieser Lizenz mit denselben Lizenzelementen;

iii. einer rechtsordnungsspezifischen Creative-Commons-Lizenz mit denselben Lizenzelementen ab Version 3.0 aufwrts (z.B. Namensnennung - Keine kommerzielle Nutzung - Weitergabe unter gleichen Bedingungen 3.0 US) oder

iv. der Creative-Commons-Unported-Lizenz mit denselben Lizenzelementen ab Version 3.0 aufwrts

verbreiten oder ffentlich zeigen ("Verwendbare Lizenz").

Sie mssen stets eine
Kopie der verwendbaren Lizenz oder deren vollstndige Internetadresse in Form des Uniform-Resource-Identifier (URI) beifgen, wenn Sie die Abwandlung verbreiten oder ffentlich zeigen. Sie drfen keine Vertrags- oder Nutzungsbedingungen anbieten oder fordern, die die Bedingungen der verwendbaren Lizenz oder die durch sie gewhrten Rechte beschrnken. Bei jeder Abwandlung, die Sie verbreiten oder ffentlich zeigen, mssen Sie alle Hinweise auf die verwendbare Lizenz und den Haftungsausschluss unverndert lassen. Wenn Sie die Abwandlung verbreiten oder ffentlich zeigen, drfen Sie (in Bezug auf die Abwandlung) keine technischen Manahmen ergreifen, die den Nutzer der Abwandlung in der Ausbung der ihm durch die verwendbare Lizenz gewhrten Rechte behindern knnen. Dieser Abschnitt 4.b) gilt auch fr den Fall, dass die Abwandlung einen Bestandteil eines Sammelwerkes bildet, was jedoch nicht bedeutet, dass das Sammelwerk insgesamt der verwendbaren Lizenz unterstellt werden muss.

c. Die Rechteeinrumung
gem Abschnitt 3 gilt nur fr Handlungen, die nicht vorrangig auf einen geschftlichen Vorteil oder eine geldwerte Vergtung gerichtet sind ("nicht-kommerzielle Nutzung", "Non-commercial-Option"). Wird Ihnen in Zusammenhang mit dem Schutzgegenstand dieser Lizenz ein anderer Schutzgegenstand berlassen, ohne dass eine vertragliche Verpflichtung hierzu besteht (etwa im Wege von File-Sharing), so wird dies nicht als auf geschftlichen Vorteil oder geldwerte Vergtung gerichtet angesehen, wenn in Verbindung mit dem Austausch der Schutzgegenstnde tatschlich keine Zahlung oder geldwerte Vergtung geleistet wird.

d. Die Verbreitung und das ffentliche Zeigen des Schutzgegenstandes oder auf ihm aufbauender Abwandlungen oder ihn enthaltender Sammelwerke ist Ihnen nur unter der Bedingung gestattet, dass Sie, vorbehaltlich etwaiger Mitteilungen im Sinne von Abschnitt 4.a), alle dazu gehrenden Rechtevermerke unberhrt lassen. Sie sind verpflichtet, die Rechteinhaberschaft in einer der Nutzung
entsprechenden, angemessenen Form anzuerkennen, indem Sie - soweit bekannt - Folgendes angeben:

i. Den Namen (oder das Pseudonym, falls ein solches verwendet wird) des Rechteinhabers und / oder, falls der Lizenzgeber im Rechtevermerk, in den Nutzungsbedingungen oder auf andere angemessene Weise eine Zuschreibung an Dritte vorgenommen hat (z.B. an eine Stiftung, ein Verlagshaus oder eine Zeitung) ("Zuschreibungsempfnger"), Namen bzw. Bezeichnung dieses oder dieser Dritten;

ii. den Titel des Inhaltes;

iii. in einer praktikablen Form den Uniform-Resource-Identifier (URI, z.B. Internetadresse), den der Lizenzgeber zum Schutzgegenstand angegeben hat, es sei denn, dieser URI verweist nicht auf den Rechtevermerk oder die Lizenzinformationen zum Schutzgegenstand;

iv. und im Falle einer Abwandlung des Schutzgegenstandes in bereinstimmung mit Abschnitt 3.b) einen Hinweis darauf, dass es sich um eine Abwandlung handelt.

Die nach diesem Abschnitt 4.d) erforderlichen Angaben knnen in jeder angemessenen Form gemacht werden; im Falle einer Abwandlung des Schutzgegenstandes oder eines Sammelwerkes mssen diese Angaben das Minimum darstellen und bei gemeinsamer Nennung mehrerer Rechteinhaber dergestalt erfolgen, dass sie zumindest ebenso hervorgehoben sind wie die Hinweise auf die brigen Rechteinhaber. Die Angaben nach diesem Abschnitt drfen Sie ausschlielich zur Angabe der Rechteinhaberschaft in der oben bezeichneten Weise verwenden. Durch die Ausbung Ihrer Rechte aus dieser Lizenz drfen Sie ohne eine vorherige, separat und schriftlich vorliegende Zustimmung des Lizenzgebers und / oder des Zuschreibungsempfngers weder explizit noch implizit irgendeine Verbindung zum Lizenzgeber oder Zuschreibungsempfnger und ebenso wenig eine Untersttzung oder Billigung durch ihn andeuten.

e. Die oben unter 4.a) bis d) genannten Einschrnkungen gelten nicht fr solche Teile des Schutzgegenstandes, die allein deshalb unter den Schutzgegenstandsbegriff fallen, weil sie als Datenbanken oder Zusammenstellungen von Daten einen immaterialgterrechtlichen Schutz eigener Art genieen.

f. Bezglich Vergtung fr die Nutzung des Schutzgegenstandes gilt Folgendes:

i. Unverzichtbare gesetzliche Vergtungsansprche: Soweit unverzichtbare Vergtungsansprche im Gegenzug fr gesetzliche Lizenzen vorgesehen oder Pauschalabgabensysteme (zum Beispiel fr Leermedien) vorhanden sind, behlt sich der Lizenzgeber das ausschlieliche Recht vor, die entsprechende Vergtung einzuziehen fr jede Ausbung eines Rechts aus dieser Lizenz durch Sie.

ii. Vergtung bei Zwangslizenzen: Sofern Zwangslizenzen auerhalb dieser Lizenz vorgesehen sind und zustande kommen, behlt sich der Lizenzgeber das ausschlieliche Recht auf Einziehung der entsprechenden Vergtung fr den Fall vor, dass Sie eine Nutzung des Schutzgegenstandes fr andere als die in Abschnitt 4.c) als nicht-kommerziell definierten Zwecke vornehmen, verzichtet fr alle brigen, lizenzgerechten Flle von Nutzung jedoch auf jegliche Vergtung.

iii. Vergtung in sonstigen Fllen: Bezglich lizenzgerechter Nutzung des Schutzgegenstandes durch Sie, die nicht unter die beiden vorherigen Abschnitte (i) und (ii) fllt, verzichtet der Lizenzgeber auf jegliche Vergtung, unabhngig davon, ob eine Einziehung der Vergtung durch ihn selbst oder nur durch eine Verwertungsgesellschaft mglich wre. Der Lizenzgeber behlt sich jedoch das ausschlieliche Recht auf Einziehung der entsprechenden Vergtung (durch ihn selbst oder eine Verwertungsgesellschaft) fr den Fall vor, dass Sie eine Nutzung des Schutzgegenstandes fr andere als die in Abschnitt 4.c) als nicht-kommerziell definierten Zwecke vornehmen.

g. Persnlichkeitsrechte bleiben - soweit sie bestehen - von dieser Lizenz unberhrt.

5. Gewhrleistung

SOFERN KEINE ANDERS LAUTENDE, SCHRIFTLICHE VEREINBARUNG ZWISCHEN DEM LIZENZGEBER UND IHNEN GESCHLOSSEN WURDE UND SOWEIT MNGEL NICHT ARGLISTIG

VERSCHWIEGEN WURDEN, BIETET DER LIZENZGEBER
DEN SCHUTZGEGENSTAND UND DIE EINRUMUNG VON RECHTEN UNTER AUSSCHLUSS JEGLICHER GEWHRLEISTUNG AN UND BERNIMMT WEDER AUSDRCKLICH NOCH KONKLUDENT GARANTIEN IRGENDEINER ART. DIES UMFASST INSBESONDERE DAS FREISEIN VON SACH- UND RECHTSMNGELN, UNABHNGIG VON DEREN ERKENNBARKEIT FR DEN LIZENZGEBER, DIE VERKEHRSFHIGKEIT DES SCHUTZGEGENSTANDES, SEINE VERWENDBARKEIT FR EINEN BESTIMMTEN ZWECK SOWIE DIE KORREKTHEIT VON BESCHREIBUNGEN. DIESE GEWHRLEISTUNGSBESCHRNKUNG GILT NICHT, SOWEIT MNGEL ZU SCHDEN DER IN ABSCHNITT 6 BEZEICHNETEN ART FHREN UND AUF SEITEN DES LIZENZGEBERS DAS JEWEILS GENANNTE VERSCHULDEN BZW. VERTRETENMSSEN EBENFALLS VORLIEGT.

6. Haftungsbeschrnkung

DER LIZENZGEBER HAFTET IHNEN GEGENBER IN BEZUG AUF SCHDEN AUS DER VERLETZUNG DES LEBENS, DES KRPERS ODER DER GESUNDHEIT NUR, SOFERN IHM WENIGSTENS FAHRLSSIGKEIT VORZUWERFEN IST, FR SONSTIGE SCHDEN NUR BEI GROBER FAHRLSSIGKEIT ODER VORSATZ, UND BERNIMMT DARBER HINAUS KEINERLEI FREIWILLIGE HAFTUNG.

7. Erlschen

a. Diese Lizenz und
die durch sie eingerumten Nutzungsrechte erlschen mit Wirkung fr die Zukunft im Falle eines Verstoes gegen die Lizenzbedingungen durch Sie, ohne dass es dazu der Kenntnis des Lizenzgebers vom Versto oder einer weiteren Handlung einer der Vertragsparteien bedarf. Mit natrlichen oder juristischen Personen, die Abwandlungen des Schutzgegenstandes oder diesen enthaltende Sammelwerke unter den Bedingungen dieser Lizenz von Ihnen erhalten haben, bestehen nachtrglich entstandene Lizenzbeziehungen jedoch solange weiter, wie die genannten Personen sich ihrerseits an smtliche Lizenzbedingungen halten. Darber hinaus gelten die Ziffern 1, 2, 5, 6, 7, und 8 auch nach einem Erlschen dieser Lizenz fort.

b. Vorbehaltlich der oben genannten Bedingungen gilt diese Lizenz unbefristet bis der rechtliche Schutz fr den Schutzgegenstand ausluft. Davon abgesehen behlt der Lizenzgeber das Recht, den Schutzgegenstand unter anderen Lizenzbedingungen anzubieten oder die eigene Weitergabe des Schutzgegenstandes
jederzeit einzustellen, solange die Ausbung dieses Rechts nicht einer Kndigung oder einem Widerruf dieser Lizenz (oder irgendeiner Weiterlizenzierung, die auf Grundlage dieser Lizenz bereits erfolgt ist bzw. zuknftig noch erfolgen muss) dient und diese Lizenz unter Bercksichtigung der oben zum Erlschen genannten Bedingungen vollumfnglich wirksam bleibt.

8. Sonstige Bestimmungen

a. Jedes Mal wenn Sie den Schutzgegenstand fr sich genommen oder als Teil eines Sammelwerkes verbreiten oder ffentlich zeigen, bietet der Lizenzgeber dem Empfnger eine Lizenz zu den gleichen Bedingungen und im gleichen Umfang an, wie Ihnen in Form dieser Lizenz.

b. Jedes Mal wenn Sie eine Abwandlung des Schutzgegenstandes verbreiten oder ffentlich zeigen, bietet der Lizenzgeber dem Empfnger eine Lizenz am ursprnglichen Schutzgegenstand zu den gleichen Bedingungen und im gleichen Umfang an, wie Ihnen in Form dieser Lizenz.

c. Sollte eine Bestimmung dieser Lizenz unwirksam sein, so bleibt

davon die Wirksamkeit der Lizenz im brigen unberhrt.

d. Keine Bestimmung dieser Lizenz soll als abbedungen und kein Versto gegen sie als zulssig gelten, solange die von dem Verzicht oder von dem Versto betroffene Seite nicht schriftlich zugestimmt hat.

e. Diese Lizenz (zusammen mit in ihr ausdrcklich vorgesehenen Erlaubnissen, Mitteilungen und Zustimmungen, soweit diese tatschlich vorliegen) stellt die vollstndige Vereinbarung zwischen dem Lizenzgeber und Ihnen in Bezug auf den Schutzgegenstand dar. Es bestehen keine Abreden, Vereinbarungen oder Erklrungen in Bezug auf den Schutzgegenstand, die in dieser Lizenz nicht genannt sind. Rechtsgeschftliche nderungen des Verhltnisses zwischen dem Lizenzgeber und Ihnen sind nur ber Modifikationen dieser Lizenz mglich. Der Lizenzgeber ist an etwaige zustzliche, einseitig durch Sie bermittelte Bestimmungen nicht gebunden. Diese Lizenz kann nur durch schriftliche Vereinbarung zwischen Ihnen und dem Lizenzgeber modifiziert werden. Derlei Modifikationen wirken ausschlielich zwischen dem Lizenzgeber und Ihnen und wirken sich nicht auf die Dritten gem Ziffern 8.a) und b) angeboteten Lizenzen aus.

f. Sofern zwischen Ihnen und dem Lizenzgeber keine anderweitige Vereinbarung getroffen wurde und soweit Wahlfreiheit besteht, findet auf diesen Lizenzvertrag das Recht der Bundesrepublik Deutschland Anwendung.

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//! `ioctl` opcode behavior for BSD platforms.

use super::{Direction, Opcode};

pub(super) const fn compose_opcode(
   dir: Direction,
   group: Opcode,
   num: Opcode,
   size: Opcode,
) -> Opcode {
   let dir = match dir {
       Direction::None => NONE,
       Direction::Read => READ,
       Direction::Write => WRITE,
       Direction::ReadWrite => READ | WRITE,
   };

   dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}

// `IOC_VOID`
pub const NONE: Opcode = 0x2000_0000;
// `IOC_OUT` (out is from the perspective of the kernel)
pub const READ: Opcode = 0x4000_0000;
// `IOC_IN` (in is from the perspective of the kernel)
pub const WRITE: Opcode = 0x8000_0000;
pub const IOCPARAM_MASK: Opcode = 0x1FFF;
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```
//! `ioctl` opcode behavior for BSD platforms.

use super::{Direction, RawOpcode};

pub(super) const fn compose_opcode(
  dir: Direction,
  group: RawOpcode,
  num: RawOpcode,
  size: RawOpcode,
) -> RawOpcode {
  let dir = match dir {
    Direction::None => NONE,
    Direction::Read => READ,
    Direction::Write => WRITE,
    Direction::ReadWrite => READ | WRITE,
  };

  dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}

// `IOC_VOID`
```

pub const NONE: RawOpcode = 0x2000_0000;
// `IOC_OUT` (out is from the perspective of the kernel)
pub const READ: RawOpcode = 0x4000_0000;
// `IOC_IN` (in is from the perspective of the kernel)
pub const WRITE: RawOpcode = 0x8000_0000;
pub const IOCPARAM_MASK: RawOpcode = 0x1FFF;
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Version 1.0 dated 2006-09-05.
"#
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By Shawn Hargreaves, 18 October 1998.

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Contrat

L'Oeuvre (telle que dfinie ci-dessous) est mise disposition selon les termes du prsent contrat appel Contrat Public Creative Commons (dnomm ici CPCC ou Contrat ). L'Oeuvre est protge par le droit de la proprit littraire et artistique (droit d'auteur, droits voisins, droits des producteurs de bases de donnes) ou toute autre loi applicable. Toute utilisation de l'Oeuvre autrement qu'explicitement autorise
selon ce Contrat ou le droit applicable est interdite.

L'exercice sur l'Oeuvre de tout droit propos par le prsent contrat vaut acceptation de celui-ci. Selon les termes et les obligations du prsent contrat, la partie Offrante propose la partie Acceptante l'exercice de certains droits prsents ci-aprs, et l'Acceptant en approuve les termes et conditions d'utilisation.

1. Dfinitions

a. Oeuvre : oeuvre de l'esprit protgeable par le droit de la proprit littraire et artistique ou toute loi applicable et qui est mise disposition selon les termes du prsent Contrat.

b. Oeuvre dite Collective : une oeuvre dans laquelle l'oeuvre, dans sa forme intgrale et non modifie, est assemble en un ensemble collectif avec d'autres contributions qui constituent en elles-mmes des oeuvres spares et indpendantes. Constituent notamment des Oeuvres dites Collectives les publications priodiques, les anthologies ou les encyclopdies. Aux termes de la prsente autorisation, une oeuvre qui constitue
une Oeuvre dite Collective ne sera pas considre comme une Oeuvre dite Drive (telle que dfinie ci-aprs).

c. Oeuvre dite Drive : une oeuvre cre soit partir de l'Oeuvre seule, soit partir de l'Oeuvre et d'autres oeuvres prexistantes. Constituent notamment des Oeuvres dites Drives les traductions, les arrangements musicaux, les adaptations thtrales, littraires ou cinmatographiques, les enregistrements sonores, les reproductions par un art ou un procd quelconque, les rsums, ou toute autre forme sous laquelle l'Oeuvre puisse tre remanie, modifie, transforme ou adapte, l'exception d'une oeuvre qui constitue une Oeuvre dite Collective. Une Oeuvre dite Collective ne sera pas considre comme une Oeuvre dite Drive aux termes du prsent Contrat. Dans le cas o l'Oeuvre serait une composition musicale ou un enregistrement sonore, la synchronisation de l'oeuvre avec une image anime sera considre comme une Oeuvre dite Drive pour les propos de ce Contrat.

d. Auteur original : la ou les personnes

physiques qui ont cr l'Oeuvre.

e. Offrant : la ou les personne(s) physique(s) ou morale(s) qui proposent la mise disposition de l'Oeuvre selon les termes du prsent Contrat.

f. Acceptant : la personne physique ou morale qui accepte le prsent contrat et exerce des droits sans en avoir viol les termes au pralable ou qui a reu l'autorisation expresse de l'Offrant d'exercer des droits dans le cadre du prsent contrat malgr une prcdente violation de ce contrat.

g. Options du Contrat : les attributs gnriques du Contrat tels qu'ils ont t choisis par l'Offrant et indiqus dans le titre de ce Contrat : Paternit - Pas d'Utilisation Commerciale - Partage Des Conditions Initiales A l'Identique.

2. Exceptions aux droits exclusifs. Aucune disposition de ce contrat n'a pour intention de rduire, limiter ou restreindre les prrogatives issues des exceptions aux droits, de l'puisement des droits ou d'autres limitations aux droits exclusifs des ayants droit selon le droit de la
proprit littraire et artistique ou les autres lois applicables.

3. Autorisation. Soumis aux termes et conditions dfinis dans cette autorisation, et ceci pendant toute la dure de protection de l'Oeuvre par le droit de la proprit littraire et artistique ou le droit applicable, l'Offrant accorde l'Acceptant l'autorisation mondiale d'exercer titre gratuit et non exclusif les droits suivants :

a. reproduire l'Oeuvre, incorporer l'Oeuvre dans une ou plusieurs Oeuvres dites Collectives et reproduire l'Oeuvre telle qu'incorpore dans lesdites Oeuvres dites Collectives;

b. crer et reproduire des Oeuvres dites Drives;

c. distribuer des exemplaires ou enregistrements, prsenter, reprsenter ou communiquer l'Oeuvre au public par tout procd technique, y compris incorpore dans des Oeuvres Collectives;

d. distribuer des exemplaires ou phonogrammes, prsenter, reprsenter ou communiquer au public des Oeuvres dites Drives par tout procd technique;

e. lorsque l'Oeuvre est une base
de donnes, extraire et rutiliser des parties substantielles de l'Oeuvre.

Les droits mentionns ci-dessus peuvent tre exercs sur tous les supports, mdias, procds techniques et formats. Les droits ci-dessus incluent le droit d'effectuer les modifications ncessaires techniquement l'exercice des droits dans d'autres formats et procds techniques. L'exercice de tous les droits qui ne sont pas expressment autoriss par l'Offrant ou dont il n'aurait pas la gestion demeure rserv, notamment les mcanismes de gestion collective obligatoire applicables dcrits l'article 4(e).

4. Restrictions. L'autorisation accorde par l'article 3 est expressment assujettie et limite par le respect des restrictions suivantes :

a. L'Acceptant peut reproduire, distribuer, reprsenter ou communiquer au public l'Oeuvre y compris par voie numrique uniquement selon les termes de ce Contrat. L'Acceptant doit inclure une copie ou l'adresse Internet (Identifiant Uniforme de Ressource) du prsent Contrat toute reproduction

ou enregistrement de l'Oeuvre que l'Acceptant distribue, reprsente ou communique au public y compris par voie numrique. L'Acceptant ne peut pas offrir ou imposer de conditions d'utilisation de l'Oeuvre qui altrent ou restreignent les termes du prsent Contrat ou l'exercice des droits qui y sont accords au bnficiaire. L'Acceptant ne peut pas cder de droits sur l'Oeuvre. L'Acceptant doit conserver intactes toutes les informations qui renvoient ce Contrat et l'exonration de responsabilit. L'Acceptant ne peut pas reproduire, distribuer, reprsenter ou communiquer au public l'Oeuvre, y compris par voie numrique, en utilisant une mesure technique de contrle d'accs ou de contrle d'utilisation qui serait contradictoire avec les termes de cet Accord contractuel. Les mentions ci-dessus s'appliquent l'Oeuvre telle qu'incorpore dans une Oeuvre dite Collective, mais, en dehors de l'Oeuvre en elle-mme, ne soumettent pas l'Oeuvre dite Collective, aux termes du prsent Contrat. Si l'Acceptant
cre une Oeuvre dite Collective, la demande de tout Offrant, il devra, dans la mesure du possible, retirer de l'Oeuvre dite Collective toute rfrence au dit Offrant, comme demand. Si l'Acceptant cre une Oeuvre dite Collective, la demande de tout Auteur, il devra, dans la mesure du possible, retirer de l'Oeuvre dite Collective toute rfrence au dit Auteur, comme demand. Si l'Acceptant cre une Oeuvre dite Drive, la demande de tout Offrant, il devra, dans la mesure du possible, retirer de l'Oeuvre dite Drive toute rfrence au dit Offrant, comme demand. Si l'Acceptant cre une Oeuvre dite Drive, la demande de tout Auteur, il devra, dans la mesure du possible, retirer de l'Oeuvre dite Drive toute rfrence au dit Auteur, comme demand.

b. L'Acceptant peut reproduire, distribuer, reprsenter ou communiquer au public une Oeuvre dite Drive y compris par voie numrique uniquement sous les termes de ce Contrat, ou d'une version ultrieure de ce Contrat comprenant les mmes Options du Contrat que le
prsent Contrat, ou un Contrat Creative Commons iCommons comprenant les mmes Options du Contrat que le prsent Contrat (par exemple Paternit - Pas d'Utilisation Commerciale - Partage Des Conditions Initiales A l'Identique 2.0 Japon). L'Acceptant doit inclure une copie ou l'adresse Internet (Identifiant Uniforme de Ressource) du prsent Contrat, ou d'un autre Contrat tel que dcrit la phrase prcdente, toute reproduction ou enregistrement de l'Oeuvre dite Drive que l'Acceptant distribue, reprsente ou communique au public y compris par voie numrique. L'Acceptant ne peut pas offrir ou imposer de conditions d'utilisation sur l'Oeuvre dite Drive qui altrent ou restreignent les termes du prsent Contrat ou l'exercice des droits qui y sont accords au bnficiaire, et doit conserver intactes toutes les informations qui renvoient ce Contrat et l'avertissement sur les garanties. L'Acceptant ne peut pas reproduire, distribuer, reprsenter ou communiquer au public y compris par voie numrique l'Oeuvre
dite Drive en utilisant une mesure technique de contrle d'accs ou de contrle d'utilisation qui serait contradictoire avec les termes de cet Accord contractuel. Les mentions ci-dessus s'appliquent l'Oeuvre dite Drive telle qu'incorpore dans une Oeuvre dite Collective, mais, en dehors de l'Oeuvre dite Drive en elle-mme, ne soumettent pas l'Oeuvre Collective, aux termes du prsent Contrat.

c. L'Acceptant ne peut exercer aucun des droits confrs par l'article 3 avec l'intention ou l'objectif d'obtenir un profit commercial ou une compensation financire personnelle. L'change de l'Oeuvre avec d'autres Oeuvres protges par le droit de la proprit littraire et artistique par le partage lectronique de fichiers, ou par tout autre moyen, n'est pas considr comme un change avec l'intention ou l'objectif d'un profit commercial ou d'une compensation financire personnelle, dans la mesure o aucun paiement ou compensation financire n'intervient en relation avec l'change d'Oeuvres protges.

d. Si l'Acceptant
reproduit, distribue, reprsente ou communique au public, y compris par voie numrique, l'Oeuvre ou toute Oeuvre dite Drive ou toute Oeuvre dite Collective, il doit conserver intactes toutes les informations sur le rgime des droits et en attribuer la paternit l'Auteur Original, de manire raisonnable au regard au mdium ou au moyen utilis. Il doit communiquer le nom de l'Auteur Original ou son ventuel pseudonyme s'il est indiqu ; le titre de l'Oeuvre Originale s'il est indiqu ; dans la mesure du possible, l'adresse Internet ou Identifiant Uniforme de Ressource (URI), s'il existe, spcifi par l'Offrant comme associ l'Oeuvre, moins que cette adresse ne renvoie pas aux informations lgales (paternit

et conditions d'utilisation de l'Oeuvre). Dans le cas d'une Oeuvre dite Drive, il doit indiquer les lments identifiant l'utilisation l'Oeuvre dans l'Oeuvre dite Drive par exemple  Traduction anglaise de l'Oeuvre par l'Auteur Original  ou Scnario bas sur l'Oeuvre par l'Auteur Original .
Ces obligations d'attribution de paternit doivent tre excutes de manire raisonnable. Cependant, dans le cas d'une Oeuvre dite Drive ou d'une Oeuvre dite Collective, ces informations doivent, au minimum, apparatre  la place et de manire aussi visible que celles  laquelle apparaissent les informations de mme nature.

e. Dans le cas o une utilisation de l'Oeuvre serait soumise  un rgime lgal de gestion collective obligatoire, l'Offrant se rserve le droit exclusif de collecter ces redevances par l'intermdiaire de la socit de perception et de rpartition des droits comptente. Sont notamment concerns la radiodiffusion et la communication dans un lieu public de phonogrammes publis  des fins de commerce, certains cas de retransmission par cble et satellite, la copie prive d'Oeuvres fixes sur phonogrammes ou vidogrammes, la reproduction par reprographie.

5. Garantie et exonration de responsabilit

a. En mettant l'Oeuvre  la disposition du public selon les termes de ce Contrat, l'Offrant dclare de bonne foi qu' sa connaissance et dans les limites d'une enqute raisonnable :

i. L'Offrant a obtenu tous les droits sur l'Oeuvre ncessaires pour pouvoir autoriser l'exercice des droits accords par le prsent Contrat, et permettre la jouissance paisible et l'exercice licite de ces droits, ceci sans que l'Acceptant n'ait aucune obligation de verser de rmunration ou tout autre paiement ou droits, dans la limite des mcanismes de gestion collective obligatoire applicables dcrits  l'article 4(e);

ii. L'Oeuvre n'est constitutive ni d'une violation des droits de tiers, notamment du droit de la proprit littraire et artistique, du droit des marques, du droit de l'information, du droit civil ou de tout autre droit, ni de diffamation, de violation de la vie prive ou de tout autre prjudice dlictuel  l'gard de toute tierce partie.

b. A l'exception des situations expressment mentionnes dans le prsent Contrat ou dans un autre accord crit, ou exiges par la loi applicable,
l'Oeuvre est mise  disposition en l'tat sans garantie d'aucune sorte, qu'elle soit expresse ou tacite, y compris  l'gard du contenu ou de l'exactitude de l'Oeuvre.

6. Limitation de responsabilit. A l'exception des garanties d'ordre public imposes par la loi applicable et des rparations imposes par le rgime de la responsabilit vis--vis d'un tiers en raison de la violation des garanties prvues par l'article 5 du prsent contrat, l'Offrant ne sera en aucun cas tenu responsable vis--vis de l'Acceptant, sur la base d'aucune thorie lgale ni en raison d'aucun prjudice direct, indirect, matriel ou moral, rsultant de l'excution du prsent Contrat ou de l'utilisation de l'Oeuvre, y compris dans l'hypothse o l'Offrant avait connaissance de la possible existence d'un tel prjudice.

7. Rsiliation

a. Tout manquement aux termes du contrat par l'Acceptant entrane la rsiliation automatique du Contrat et la fin des droits qui en dcoulent. Cependant, le contrat conserve ses effets envers les personnes
physiques ou morales qui ont reu de la part de l'Acceptant, en excution du prsent contrat, la mise  disposition d'Oeuvres dites Drives, ou d'Oeuvres dites Collectives, ceci tant qu'elles respectent pleinement leurs obligations. Les sections 1, 2, 5, 6 et 7 du contrat continuent  s'appliquer aprs la rsiliation de celui-ci.

b. Dans les limites indiques ci-dessus, le prsent Contrat s'applique pendant toute la dure de protection de l'Oeuvre selon le droit applicable. Nanmoins, l'Offrant se rserve  tout moment le droit d'exploiter l'Oeuvre sous des conditions contractuelles diffrentes, ou d'en cesser la diffusion; cependant, le recours  cette option ne doit pas conduire  retirer les effets du prsent Contrat (ou de tout contrat qui a t ou doit tre accord selon les termes de ce Contrat), et ce Contrat continuera  s'appliquer dans tous ses effets jusqu' ce que sa rsiliation intervienne dans les conditions dcrites ci-dessus.

8. Divers

a. A chaque reproduction ou communication au public par voie numrique de l'Oeuvre ou d'une Oeuvre dite Collective par l'Acceptant, l'Offrant propose au bnficiaire une offre de mise  disposition de l'Oeuvre dans des termes et conditions identiques  ceux accords  la partie Acceptante dans le prsent Contrat.

b. A chaque reproduction ou communication au public par voie numrique d'une Oeuvre dite Drive par l'Acceptant, l'Offrant propose au bnficiaire une offre de mise  disposition du bnficiaire de l'Oeuvre originale dans des termes et conditions identiques  ceux accords  la partie Acceptante dans le prsent Contrat.

c. La nullit ou l'inapplicabilit d'une quelconque disposition de ce Contrat au regard de la loi applicable n'affecte pas celle des autres dispositions qui resteront pleinement valides et applicables. Sans action additionnelle par les parties  cet accord, lesdites dispositions devront tre interprtes dans la mesure minimum ncessaire  leur validit et leur applicabilit.

d. Aucune limite, renonciation ou modification des termes ou dispositions du prsent Contrat ne pourra tre accepte sans le consentement crit et sign de la partie comptente.

e. Ce Contrat constitue le seul accord entre les parties  propos de l'Oeuvre mise ici  disposition. Il n'existe aucun lment annexe, accord supplmentaire ou mandat portant sur cette Oeuvre en dehors des lments mentionns ici. L'Offrant ne sera tenu par aucune disposition supplmentaire qui pourrait apparatre dans une quelconque communication en provenance de l'Acceptant. Ce Contrat ne peut tre modifi sans l'accord mutuel crit de l'Offrant et de l'Acceptant.

f. Le droit applicable est le droit franais.

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A l'exception des fins limites  informer le public que l'Oeuvre est mise  disposition sous CPCC, aucune des parties n'utilisera la marque  Creative Commons  ou toute autre indication ou logo affrent sans le consentement pralable crit de Creative Commons. Toute utilisation autorise devra tre effectue en conformit avec les lignes directrices de Creative Commons  jour au moment de l'utilisation, telles qu'elles sont disponibles sur son site Internet ou sur simple demande.

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Version 2.1, February 1999

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However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

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December 9, 2010
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This FDK AAC Codec software is intended to be used on a wide variety of Android devices.

AAC's HE-AAC and HE-AAC v2 versions are regarded as today's most efficient general perceptual
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```
/// The datatype used for the ioctl number
#[doc(hidden)]
#[cfg(not(solarish))]
pub type ioctl_num_type = ::libc::c_ulong;

#[doc(hidden)]
#[cfg(solarish)]
pub type ioctl_num_type = ::libc::c_int;

/// The datatype used for the 3rd argument
#[doc(hidden)]
pub type ioctl_param_type = ::libc::c_int;

mod consts {
  use crate::sys::ioctl::ioctl_num_type;
  #[doc(hidden)]
```

```
  pub const VOID: ioctl_num_type = 0x2000_0000;
  #[doc(hidden)]
  pub const OUT: ioctl_num_type = 0x4000_0000;
  #[doc(hidden)]
  #[allow(overflowing_literals)]
  pub const IN: ioctl_num_type = 0x8000_0000;
  #[doc(hidden)]
  pub const INOUT: ioctl_num_type = IN | OUT;
  #[doc(hidden)]
  pub const IOCPARM_MASK: ioctl_num_type = 0x1fff;
}

pub use self::consts::*;

#[macro_export]
#[doc(hidden)]
macro_rules! ioc {
  ($inout:expr, $group:expr, $num:expr, $len:expr) => {
      $inout
          | (($len as $crate::sys::ioctl::ioctl_num_type
              & $crate::sys::ioctl::IOCPARM_MASK)

            << 16)
          | (($group as $crate::sys::ioctl::ioctl_num_type) << 8)
          | ($num as $crate::sys::ioctl::ioctl_num_type)
  };
}

/// Generate an ioctl request code for a command that passes no data.
///
/// This is equivalent to the `_IO()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_none!()` directly.
///
/// # Example
///
/// ```
/// # #[macro_use] extern crate nix;
/// const KVMIO: u8 = 0xAE;
/// ioctl_write_int_bad!(kvm_create_vm, request_code_none!(KVMIO, 0x03));
/// # fn main() {}
/// ```
#[macro_export(local_inner_macros)]
macro_rules! request_code_none {
  ($g:expr, $n:expr) => {
      ioc!($crate::sys::ioctl::VOID, $g, $n, 0)
  };
```

```
}

/// Generate an ioctl request code for a command that passes an integer
///
/// This is equivalent to the `_IOWINT()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the
 `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write_int!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write_int {
   ($g:expr, $n:expr) => {
       ioc!(
           $crate::sys::ioctl::VOID,
           $g,
           $n,
           ::std::mem::size_of::<$crate::libc::c_int>()
       )
   };
}

/// Generate an ioctl request code for a command that reads.
///
/// This is equivalent to the `_IOR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_read!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is reading and the kernel is
/// writing.
#[macro_export(local_inner_macros)]
macro_rules! request_code_read {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::OUT, $g, $n, $len)
   };
}

/// Generate an ioctl request code for a command that writes.
///
///
 This is equivalent to the `_IOW()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is writing and the kernel is
```

```
/// reading.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::IN, $g, $n, $len)
   };
}

/// Generate an ioctl request code for a command that reads and writes.
///
/// This is equivalent to the `_IOWR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_readwrite!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_readwrite {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::INOUT, $g, $n, $len)

 };
}
```

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```
use crate::errno::Errno;
use crate::sys::signal::Signal;
use crate::unistd::Pid;
use crate::Result;
use cfg_if::cfg_if;
use libc::{self, c_int};
use std::ptr;

pub type RequestType = c_int;

cfg_if! {
  if #[cfg(any(freebsdlike, apple_targets, target_os = "openbsd"))] {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_char;
  } else {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_void;
  }
}

libc_enum! {
  #[repr(i32)]
  /// Ptrace Request enum defining the action to be taken.
  #[non_exhaustive]
  pub enum Request {
```

```
        PT_TRACE_ME,
        PT_READ_I,
        PT_READ_D,
        #[cfg(apple_targets)]
        PT_READ_U,
        PT_WRITE_I,
        PT_WRITE_D,
        #[cfg(apple_targets)]
        PT_WRITE_U,
        PT_CONTINUE,
        PT_KILL,
        #[cfg(any(any(freebsdlike, apple_targets),
                all(target_os = "openbsd", target_arch = "x86_64"),
                all(target_os = "netbsd", any(target_arch = "x86_64",
                                    target_arch = "powerpc"))))]
        PT_STEP,
        PT_ATTACH,
        PT_DETACH,
        #[cfg(apple_targets)]
        PT_SIGEXC,
        #[cfg(apple_targets)]
        PT_THUPDATE,
        #[cfg(apple_targets)]
        PT_ATTACHEXC
    }
}

unsafe fn ptrace_other(
    request: Request,
    pid: Pid,
    addr: AddressType,
    data: c_int,
) -> Result<c_int> {
    unsafe {
        Errno::result(libc::ptrace(
            request as RequestType,
            libc::pid_t::from(pid),
            addr,
            data,
        ))
        .map(|_| 0)
    }
}

/// Sets the process as traceable, as with `ptrace(PT_TRACEME, ...)`
///
/// Indicates that this process is to be traced by its parent.
/// This is the only ptrace request to be issued by the tracee.
```

```
pub fn traceme() -> Result<()> {
   unsafe {
       ptrace_other(Request::PT_TRACE_ME, Pid::from_raw(0), ptr::null_mut(), 0)
           .map(drop)
   }
}

/// Attach to a running
 process, as with `ptrace(PT_ATTACH, ...)`
///
/// Attaches to the process specified by `pid`, making it a tracee of the calling process.
pub fn attach(pid: Pid) -> Result<()> {
   unsafe {
       ptrace_other(Request::PT_ATTACH, pid, ptr::null_mut(), 0).map(drop)
   }
}

/// Detaches the current running process, as with `ptrace(PT_DETACH, ...)`
///
/// Detaches from the process specified by `pid` allowing it to run freely, optionally delivering a
/// signal specified by `sig`.
pub fn detach<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
   let data = match sig.into() {
       Some(s) => s as c_int,
       None => 0,
   };
   unsafe {
       ptrace_other(Request::PT_DETACH, pid, ptr::null_mut(), data).map(drop)
   }
}

/// Restart the stopped tracee process, as with `ptrace(PTRACE_CONT, ...)`
///
/// Continues the execution of the process with PID `pid`, optionally
/// delivering a signal specified by `sig`.
pub fn cont<T: Into<Option<Signal>>>(pid: Pid, sig: T)
 -> Result<()> {
   let data = match sig.into() {
       Some(s) => s as c_int,
       None => 0,
   };
   unsafe {
       // Ignore the useless return value
       ptrace_other(Request::PT_CONTINUE, pid, 1 as AddressType, data)
           .map(drop)
   }
}
```

```
/// Issues a kill request as with `ptrace(PT_KILL, ...)`
///
/// This request is equivalent to `ptrace(PT_CONTINUE, ..., SIGKILL);`
pub fn kill(pid: Pid) -> Result<()> {
   unsafe {
       ptrace_other(Request::PT_KILL, pid, 0 as AddressType, 0).map(drop)
   }
}

/// Move the stopped tracee process forward by a single step as with
/// `ptrace(PT_STEP, ...)`
///
/// Advances the execution of the process with PID `pid` by a single step optionally delivering a
/// signal specified by `sig`.
///
/// # Example
/// ```rust
/// use nix::sys::ptrace::step;
/// use nix::unistd::Pid;
/// use nix::sys::signal::Signal;
/// use nix::sys::wait::*;
/// // If a process changes state to the stopped state because of a SIGUSR1
/// // signal,
 this will step the process forward and forward the user
/// // signal to the stopped process
/// match waitpid(Pid::from_raw(-1), None) {
///     Ok(WaitStatus::Stopped(pid, Signal::SIGUSR1)) => {
///         let _ = step(pid, Signal::SIGUSR1);
///     }
///     _ => {},
/// }
/// ```
#[cfg(any(
   any(freebsdlike, apple_targets),
   all(target_os = "openbsd", target_arch = "x86_64"),
   all(
       target_os = "netbsd",
       any(target_arch = "x86_64", target_arch = "powerpc")
   )
))]
pub fn step<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
   let data = match sig.into() {
       Some(s) => s as c_int,
       None => 0,
   };
   unsafe {
       ptrace_other(Request::PT_STEP, pid, ptr::null_mut(), data).map(drop)
   }
```

```
}

/// Reads a word from a processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn read(pid: Pid, addr: AddressType)
 -> Result<c_int> {
   unsafe {
       // Traditionally there was a difference between reading data or
       // instruction memory but not in modern systems.
       ptrace_other(Request::PT_READ_D, pid, addr, 0)
   }
}

/// Writes a word into the processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn write(pid: Pid, addr: AddressType, data: c_int) -> Result<()> {
   unsafe { ptrace_other(Request::PT_WRITE_D, pid, addr, data).map(drop) }
}
```

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# 1.2301 bit-set 0.8.0

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# 1.2302 thread_local 1.1.9

## 1.2302.1 Available under license :

```
//! FreeBSD and NetBSD xattr support.

use libc::{c_int, c_void, size_t, EPERM};
use std::ffi::{CString, OsStr, OsString};
use std::io;
use std::mem;
use std::os::unix::ffi::{OsStrExt, OsStringExt};
```

```
use std::os::unix::io::{AsRawFd, BorrowedFd};
use std::path::Path;
use std::ptr;

use libc::{
   extattr_delete_fd, extattr_delete_file, extattr_delete_link, extattr_get_fd, extattr_get_file,
   extattr_get_link, extattr_list_fd, extattr_list_file, extattr_list_link, extattr_set_fd,
   extattr_set_file, extattr_set_link, EXTATTR_NAMESPACE_SYSTEM, EXTATTR_NAMESPACE_USER,
};

use crate::util::allocate_loop;

pub const ENOATTR: i32 = libc::ENOATTR;
pub const ERANGE: i32 = libc::ERANGE;

const EXTATTR_NAMESPACE_USER_STRING: &str = "user";
const EXTATTR_NAMESPACE_SYSTEM_STRING: &str = "system";
const EXTATTR_NAMESPACE_NAMES: [&str; 3] = [
   "empty",
   EXTATTR_NAMESPACE_USER_STRING,
   EXTATTR_NAMESPACE_SYSTEM_STRING,
];

fn path_to_c(path: &Path) -> io::Result<CString> {
   match CString::new(path.as_os_str().as_bytes())
 {
       Ok(name) => Ok(name),
       Err(_) => Err(io::Error::new(io::ErrorKind::NotFound, "file not found")),
   }
}

#[inline]
fn slice_parts(buf: &mut [u8]) -> (*mut c_void, size_t) {
   if buf.is_empty() {
       (ptr::null_mut(), 0)
   } else {
       (buf.as_mut_ptr().cast(), buf.len() as size_t)
   }
}

/// An iterator over a set of extended attributes names.
#[derive(Default)]
pub struct XAttrs {
   user_attrs: Box<[u8]>,
   system_attrs: Box<[u8]>,
   offset: usize,
}
```

```
impl Clone for XAttrs {
  fn clone(&self) -> Self {
    XAttrs {
      user_attrs: Vec::from(&*self.user_attrs).into_boxed_slice(),
      system_attrs: Vec::from(&*self.system_attrs).into_boxed_slice(),
      offset: self.offset,
    }
  }

  fn clone_from(&mut self, other: &XAttrs) {
    self.offset = other.offset;

    let mut data = mem::replace(&mut self.user_attrs, Box::new([])).into_vec();
    data.extend(other.user_attrs.iter().cloned());
     self.user_attrs = data.into_boxed_slice();

    data = mem::replace(&mut self.system_attrs, Box::new([])).into_vec();
    data.extend(other.system_attrs.iter().cloned());
    self.system_attrs = data.into_boxed_slice();
  }
}

impl Iterator for XAttrs {
  type Item = OsString;
  fn next(&mut self) -> Option<OsString> {
    if self.user_attrs.is_empty() && self.system_attrs.is_empty() {
      return None;
    }

    if self.offset == self.user_attrs.len() + self.system_attrs.len() {
      return None;
    }

    let data = if self.offset < self.system_attrs.len() {
      &self.system_attrs[self.offset..]
    } else {
      &self.user_attrs[self.offset - self.system_attrs.len()..]
    };

    let siz = data[0] as usize;

    self.offset += siz + 1;
    if self.offset < self.system_attrs.len() {
      Some(prefix_namespace(
        OsStr::from_bytes(&data[1..siz
 + 1]),
        EXTATTR_NAMESPACE_SYSTEM,
      ))
```

```
        } else {
            Some(prefix_namespace(
                OsStr::from_bytes(&data[1..siz + 1]),
                EXTATTR_NAMESPACE_USER,
            ))
        }
    }

    fn size_hint(&self) -> (usize, Option<usize>) {
        if self.user_attrs.len() + self.system_attrs.len() == self.offset {
            (0, Some(0))
        } else {
            (1, None)
        }
    }
}

// This could use libc::extattr_string_to_namespace, but it's awkward because
// that requires nul-terminated strings, which Rust's std is loathe to provide.
fn name_to_ns(name: &OsStr) -> io::Result<(c_int, CString)> {
    let mut groups = name.as_bytes().splitn(2, |&b| b == b'.').take(2);
    let nsname = match groups.next() {
        Some(s) => s,
        None => {
            return Err(io::Error::new(
                io::ErrorKind::InvalidInput,
                "couldn't find namespace",
            ))
        }
    };

    let propname
   = match groups.next() {
        Some(s) => s,
        None => {
            return Err(io::Error::new(
                io::ErrorKind::InvalidInput,
                "couldn't find attribute",
            ))
        }
    };

    let ns_int = match EXTATTR_NAMESPACE_NAMES
        .iter()
        .position(|&s| s.as_bytes() == nsname)
    {
        Some(i) => i,
        None => {
```

```
            return Err(io::Error::new(
                io::ErrorKind::InvalidInput,
                "no matching namespace",
            ))
        }
    };

    Ok((ns_int as c_int, CString::new(propname)?))
}

fn prefix_namespace(attr: &OsStr, ns: c_int) -> OsString {
    let nsname = EXTATTR_NAMESPACE_NAMES[ns as usize];
    let mut v = Vec::with_capacity(nsname.as_bytes().len() + attr.as_bytes().len() + 1);
    v.extend(nsname.as_bytes());
    v.extend(".".as_bytes());
    v.extend(attr.as_bytes());
    OsString::from_vec(v)
}

fn cvt(res: libc::ssize_t) -> io::Result<usize> {
    if res < 0 {
        Err(io::Error::last_os_error())
     } else {
        Ok(res as usize)
    }
}

pub fn get_fd(fd: BorrowedFd<'_>, name: &OsStr) -> io::Result<Vec<u8>> {
    let (ns, name) = name_to_ns(name)?;
    unsafe {
        allocate_loop(|buf| {
            let (ptr, len) = slice_parts(buf);
            cvt(extattr_get_fd(fd.as_raw_fd(), ns, name.as_ptr(), ptr, len))
        })
    }
}

pub fn set_fd(fd: BorrowedFd<'_>, name: &OsStr, value: &[u8]) -> io::Result<()> {
    let (ns, name) = name_to_ns(name)?;
    let ret = unsafe {
        extattr_set_fd(
            fd.as_raw_fd(),
            ns,
            name.as_ptr(),
            value.as_ptr() as *const c_void,
            value.len() as size_t,
        )
    };
```

```
  if ret == -1 {
      Err(io::Error::last_os_error())
  } else {
      Ok(())
  }
}

pub fn remove_fd(fd: BorrowedFd<'_>, name: &OsStr) -> io::Result<()> {
  let (ns, name) = name_to_ns(name)?;
  let ret = unsafe { extattr_delete_fd(fd.as_raw_fd(), ns, name.as_ptr()) };

 if ret != 0 {
      Err(io::Error::last_os_error())
  } else {
      Ok(())
  }
}

pub fn list_fd(fd: BorrowedFd<'_>) -> io::Result<XAttrs> {
  let sysvec = unsafe {
      let res = allocate_loop(|buf| {
          let (ptr, len) = slice_parts(buf);
          cvt(extattr_list_fd(
              fd.as_raw_fd(),
              EXTATTR_NAMESPACE_SYSTEM,
              ptr,
              len,
          ))
      });
      // On FreeBSD, system attributes require root privileges to view. However,
      // to mimic the behavior of listxattr in linux and osx, we need to query
      // them anyway and return empty results if we get EPERM
      match res {
          Ok(v) => v,
          Err(err) => {
              if err.raw_os_error() == Some(EPERM) {
                  Vec::new()
              } else {
                  return Err(err);
              }
          }
      }
  };

  let uservec = unsafe {
      let res = allocate_loop(|buf|
 {
          let (ptr, len) = slice_parts(buf);
```

```
            cvt(extattr_list_fd(
                fd.as_raw_fd(),
                EXTATTR_NAMESPACE_USER,
                ptr,
                len,
            ))
        });
        match res {
            Ok(v) => v,
            Err(err) => return Err(err),
        }
    };

    Ok(XAttrs {
        system_attrs: sysvec.into_boxed_slice(),
        user_attrs: uservec.into_boxed_slice(),
        offset: 0,
    })
}

pub fn get_path(path: &Path, name: &OsStr, deref: bool) -> io::Result<Vec<u8>> {
    let (ns, name) = name_to_ns(name)?;
    let path = path_to_c(path)?;
    let extattr_get_func = if deref {
        extattr_get_file
    } else {
        extattr_get_link
    };
    unsafe {
        allocate_loop(|buf| {
            let (ptr, len) = slice_parts(buf);
            cvt(extattr_get_func(path.as_ptr(), ns, name.as_ptr(), ptr, len))
        })
    }
}

pub fn set_path(path: &Path, name: &OsStr, value: &[u8], deref: bool) -> io::Result<()>
 {
    let (ns, name) = name_to_ns(name)?;
    let path = path_to_c(path)?;
    let extattr_set_func = if deref {
        extattr_set_file
    } else {
        extattr_set_link
    };
    let ret = unsafe {
        extattr_set_func(
            path.as_ptr(),
```

```
            ns,
            name.as_ptr(),
            value.as_ptr() as *const c_void,
            value.len() as size_t,
        )
    };
    if ret == -1 {
        Err(io::Error::last_os_error())
    } else {
        Ok(())
    }
}

pub fn remove_path(path: &Path, name: &OsStr, deref: bool) -> io::Result<()> {
    let (ns, name) = name_to_ns(name)?;
    let path = path_to_c(path)?;
    let extattr_delete_func = if deref {
        extattr_delete_file
    } else {
        extattr_delete_link
    };
    let ret = unsafe { extattr_delete_func(path.as_ptr(), ns, name.as_ptr()) };
    if ret != 0 {
        Err(io::Error::last_os_error())
    } else {
        Ok(())
    }
}

pub fn list_path(path: &Path, deref: bool) -> io::Result<XAttrs>
 {
    let path = path_to_c(path)?;
    let extattr_list_func = if deref {
        extattr_list_file
    } else {
        extattr_list_link
    };
    let sysvec = unsafe {
        let res = allocate_loop(|buf| {
            let (ptr, len) = slice_parts(buf);
            cvt(extattr_list_func(
                path.as_ptr(),
                EXTATTR_NAMESPACE_SYSTEM,
                ptr,
                len,
            ))
        });
        // On FreeBSD, system attributes require root privileges to view. However,
```

```
        // to mimic the behavior of listxattr in linux and osx, we need to query
        // them anyway and return empty results if we get EPERM
        match res {
            Ok(v) => v,
            Err(err) => {
                if err.raw_os_error() == Some(EPERM) {
                    Vec::new()
                } else {
                    return Err(err);
                }
            }
        }
    };

    let uservec = unsafe {
        let res = allocate_loop(|buf|
   {
            let (ptr, len) = slice_parts(buf);
            cvt(extattr_list_func(
                path.as_ptr(),
                EXTATTR_NAMESPACE_USER,
                ptr,
                len,
            ))
        });
        match res {
            Ok(v) => v,
            Err(err) => return Err(err),
        }
    };

    Ok(XAttrs {
        system_attrs: sysvec.into_boxed_slice(),
        user_attrs: uservec.into_boxed_slice(),
        offset: 0,
    })
}
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The implementation for Utf8CharIndices was adapted from the
CharIndices implementation of the Rust standard library at revision
ab32548539ec38a939c1b58599249f3b54130026
(https://github.com/rust-lang/rust/blob/ab32548539ec38a939c1b58599249f3b54130026/library/core/src/str/iter.rs).

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DURCH DIE AUSBUNG EINES DURCH DIESE LIZENZ GEWHRTEN RECHTS AN DEM SCHUTZGEGENSTAND ERKLREN SIE SICH MIT DEN LIZENZBEDINGUNGEN RECHTSVERBINDLICH EINVERSTANDEN. SOWEIT DIESE LIZENZ ALS LIZENZVERTRAG ANZUSEHEN IST, GEWHRT IHNEN DER LIZENZGEBER DIE IN DER LIZENZ GENANNTEN RECHTE UNENTGELTLICH UND IM AUSTAUSCH DAFR, DASS SIE DAS GEBUNDENSEIN AN DIE LIZENZBEDINGUNGEN AKZEPTIEREN.

1. Definitionen

a. Der Begriff "Abwandlung" im Sinne dieser Lizenz bezeichnet das Ergebnis jeglicher Art von Vernderung des

Schutzgegenstandes, solange die eigenpersnlichen Zge des Schutzgegenstandes darin nicht verblassen und daran eigene Schutzrechte entstehen. Das kann insbesondere eine Bearbeitung, Umgestaltung, nderung, Anpassung, bersetzung oder Heranziehung des Schutzgegenstandes zur Vertonung von Laufbildern sein. Nicht als Abwandlung des Schutzgegenstandes gelten seine Aufnahme in eine Sammlung oder ein Sammelwerk und die freie Benutzung des Schutzgegenstandes.

b. Der Begriff "Sammelwerk" im Sinne dieser Lizenz meint eine Zusammenstellung von literarischen, knstlerischen oder wissenschaftlichen Inhalten, sofern
diese Zusammenstellung aufgrund von Auswahl und Anordnung der darin enthaltenen selbstndigen Elemente eine geistige Schpfung darstellt, unabhngig davon, ob die Elemente systematisch oder methodisch angelegt und dadurch einzeln zugnglich sind oder nicht.

c. "Verbreiten" im Sinne dieser Lizenz bedeutet, den Schutzgegenstand oder Abwandlungen im Original oder in Form von Vervielfltigungsstcken, mithin in krperlich fixierter Form der ffentlichkeit anzubieten oder in Verkehr zu bringen.

d. Unter "Lizenzelementen" werden im Sinne dieser Lizenz die folgenden bergeordneten Lizenzcharakteristika verstanden, die vom Lizenzgeber ausgewhlt wurden und in der Bezeichnung der Lizenz zum Ausdruck kommen: "Namensnennung", "Weitergabe unter gleichen Bedingungen".

e. Der "*Lizenzgeber*" im Sinne dieser Lizenz ist diejenige natrliche oder juristische Person oder Gruppe, die den Schutzgegenstand unter den Bedingungen dieser Lizenz anbietet und insoweit als Rechteinhaberin auftritt.

f. "Rechteinhaber" im Sinne dieser Lizenz ist der Urheber des Schutzgegenstandes oder jede andere natrliche oder juristische Person oder Gruppe von Personen, die am Schutzgegenstand ein Immaterialgterrecht erlangt hat, welches die in Abschnitt 3 genannten Handlungen erfasst und bei dem eine Einrumung von Nutzungsrechten oder eine Weiterbertragung an Dritte mglich ist.

g. Der Begriff "Schutzgegenstand" bezeichnet in dieser Lizenz den literarischen, knstlerischen oder wissenschaftlichen Inhalt, der unter den Bedingungen dieser Lizenz angeboten wird. Das kann insbesondere eine persnliche geistige Schpfung jeglicher Art, ein Werk der kleinen Mnze, ein nachgelassenes Werk oder auch ein Lichtbild oder anderes Objekt eines verwandten Schutzrechts sein, unabhngig von der Art seiner Fixierung und unabhngig davon, auf welche Weise jeweils eine Wahrnehmung erfolgen kann, gleichviel ob in analoger oder digitaler Form. Soweit Datenbanken oder Zusammenstellungen von Daten einen immaterialgterrechtlichen
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h. Mit "Sie" bzw. "Ihnen" ist die natrliche oder juristische Person gemeint, die in dieser Lizenz im Abschnitt 3 genannte Nutzungen des Schutzgegenstandes vornimmt und zuvor in Hinblick auf den Schutzgegenstand nicht gegen Bedingungen dieser Lizenz verstoen oder aber die ausdrckliche Erlaubnis des Lizenzgebers erhalten hat, die durch diese Lizenz gewhrten Nutzungsrechte trotz eines vorherigen Verstoes auszuben.

i. Unter "ffentlich Zeigen" im Sinne dieser Lizenz sind Verffentlichungen und Prsentationen des Schutzgegenstandes zu verstehen, die fr eine Mehrzahl von Mitgliedern der ffentlichkeit bestimmt sind und in unkrperlicher Form mittels ffentlicher Wiedergabe in Form von Vortrag, Auffhrung, Vorfhrung, Darbietung, Sendung, Weitersendung, zeit- und ortsunabhngiger Zugnglichmachung oder in krperlicher Form mittels Ausstellung erfolgen, unabhngig von bestimmten

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j. "Vervielfltigen" im Sinne dieser Lizenz bedeutet, mittels beliebiger Verfahren Vervielfltigungsstcke des Schutzgegenstandes herzustellen, insbesondere durch Ton- oder Bildaufzeichnungen, und umfasst auch den Vorgang, erstmals krperliche Fixierungen des Schutzgegenstandes sowie Vervielfltigungsstcke dieser Fixierungen anzufertigen, sowie die bertragung des Schutzgegenstandes auf einen Bild- oder Tontrger oder auf ein anderes elektronisches Medium, gleichviel ob in digitaler oder analoger Form.

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i. enthlt Bestimmungen, welche die gleichen Ziele verfolgen, die gleiche Bedeutung haben und die gleichen Wirkungen erzeugen wie die Lizenzelemente der vorliegenden Lizenz; und

ii. erlaubt ausdrcklich das Lizenzieren von ihr unterstellten Abwandlungen unter vorliegender Lizenz, unter einer anderen rechtsordnungsspezifisch angepassten Creative-Commons-Lizenz mit denselben Lizenzelementen, wie sie die vorliegende Lizenz aufweist, oder unter der entsprechenden Creative-Commons-Unported-Lizenz.

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a. Den Schutzgegenstand in beliebiger Form und Menge zu vervielfltigen, ihn in Sammelwerke zu integrieren und ihn als Teil solcher Sammelwerke zu vervielfltigen;

b. Abwandlungen des Schutzgegenstandes anzufertigen, einschlielich bersetzungen unter Nutzung jedweder Medien, sofern deutlich erkennbar gemacht wird, dass es sich um Abwandlungen handelt;

c. den Schutzgegenstand, allein oder in Sammelwerke aufgenommen, ffentlich zu zeigen und zu verbreiten;

d. Abwandlungen des Schutzgegenstandes zu verffentlichen, ffentlich zu zeigen und zu verbreiten.

e. Bezglich Vergtung fr die Nutzung des Schutzgegenstandes gilt Folgendes:

i. Unverzichtbare gesetzliche Vergtungsansprche: Soweit unverzichtbare Vergtungsansprche im Gegenzug fr gesetzliche Lizenzen vorgesehen oder Pauschalabgabensysteme (zum Beispiel fr Leermedien) vorhanden sind, behlt

sich der Lizenzgeber das ausschlieliche Recht vor, die entsprechende Vergtung einzuziehen fr jede Ausbung eines Rechts aus dieser Lizenz durch Sie.

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Das vorgenannte
Nutzungsrecht wird fr alle bekannten sowie fr alle noch nicht bekannten Nutzungsarten eingerumt. Es beinhaltet auch das Recht, solche nderungen am Schutzgegenstand vorzunehmen, die fr bestimmte nach dieser Lizenz zulssige Nutzungen technisch erforderlich sind. Alle sonstigen Rechte, die ber diesen Abschnitt hinaus nicht ausdrcklich durch den Lizenzgeber eingerumt werden, bleiben diesem allein vorbehalten. Soweit Datenbanken oder Zusammenstellungen von Daten Schutzgegenstand dieser Lizenz oder Teil dessen sind und einen immaterialgterrechtlichen Schutz eigener Art genieen, verzichtet der Lizenzgeber auf smtliche aus diesem Schutz resultierenden Rechte.

4. Bedingungen. Die Einrumung des Nutzungsrechts gem Abschnitt 3 dieser Lizenz erfolgt ausdrcklich nur unter den folgenden Bedingungen:

a. Sie drfen den Schutzgegenstand ausschlielich unter den Bedingungen dieser Lizenz verbreiten oder ffentlich zeigen. Sie mssen dabei stets eine Kopie dieser Lizenz oder deren vollstndige Internetadresse
in Form des Uniform-Resource-Identifier (URI) beifgen. Sie drfen keine Vertrags- oder Nutzungsbedingungen anbieten oder fordern, die die Bedingungen dieser Lizenz oder die durch diese Lizenz gewhrten Rechte beschrnken. Sie drfen den Schutzgegenstand nicht unterlizenzieren. Bei jeder Kopie des Schutzgegenstandes, die Sie verbreiten oder ffentlich zeigen, mssen Sie alle Hinweise unverndert lassen, die auf diese Lizenz und den Haftungsausschluss hinweisen. Wenn Sie den Schutzgegenstand verbreiten oder ffentlich zeigen, drfen Sie (in Bezug auf den Schutzgegenstand) keine technischen Manahmen ergreifen, die den Nutzer des Schutzgegenstandes in der Ausbung der ihm durch diese Lizenz gewhrten Rechte behindern knnen. Dieser Abschnitt 4.a) gilt auch fr den Fall, dass der Schutzgegenstand einen Bestandteil eines Sammelwerkes bildet, was jedoch nicht bedeutet, dass das Sammelwerk insgesamt dieser Lizenz unterstellt werden muss. Sofern Sie ein Sammelwerk erstellen, mssen Sie auf die Mitteilung
eines Lizenzgebers hin aus dem Sammelwerk die in Abschnitt 4.c) aufgezhlten Hinweise entfernen. Wenn Sie eine Abwandlung vornehmen, mssen Sie auf die Mitteilung eines Lizenzgebers hin von der Abwandlung die in Abschnitt 4.c) aufgezhlten Hinweise entfernen.

b. Sie drfen eine Abwandlung ausschlielich unter den Bedingungen

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ii. einer spteren Version dieser Lizenz mit denselben Lizenzelementen,

iii. einer rechtsordnungsspezifischen Creative-Commons-Lizenz mit denselben Lizenzelementen ab Version 3.0 aufwrts (z.B. Namensnennung - Weitergabe unter gleichen Bedingungen 3.0 US),

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c. Die Verbreitung und das ffentliche Zeigen des Schutzgegenstandes oder auf ihm aufbauender Abwandlungen oder ihn enthaltender Sammelwerke ist Ihnen nur unter der Bedingung gestattet, dass Sie, vorbehaltlich etwaiger Mitteilungen im Sinne von Abschnitt 4.a), alle dazu gehrenden Rechtevermerke unberhrt lassen. Sie sind verpflichtet, die Rechteinhaberschaft in einer der Nutzung entsprechenden, angemessenen Form anzuerkennen, indem Sie - soweit bekannt - Folgendes angeben:

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iii. in einer praktikablen Form den Uniform-Resource-Identifier (URI, z.B. Internetadresse), den der Lizenzgeber zum Schutzgegenstand angegeben hat, es sei denn, dieser URI verweist nicht auf den Rechtevermerk oder die Lizenzinformationen zum Schutzgegenstand;

iv. und im Falle einer Abwandlung des Schutzgegenstandes in bereinstimmung mit Abschnitt 3.b) einen Hinweis darauf, dass es sich um eine Abwandlung handelt.

Die nach diesem Abschnitt 4.c) erforderlichen Angaben knnen in jeder angemessenen Form gemacht werden; im Falle einer Abwandlung des Schutzgegenstandes oder eines Sammelwerkes mssen diese Angaben das Minimum darstellen und bei gemeinsamer Nennung mehrerer Rechteinhaber dergestalt erfolgen, dass sie zumindest ebenso hervorgehoben sind wie die Hinweise auf die brigen Rechteinhaber. Die Angaben nach diesem Abschnitt
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d. Die oben unter 4.a) bis c) genannten Einschrnkungen gelten nicht fr solche Teile des Schutzgegenstandes, die allein deshalb unter den Schutzgegenstandsbegriff fallen, weil sie als Datenbanken oder Zusammenstellungen von Daten einen immaterialgterrechtlichen Schutz eigener Art genieen.

e. Persnlichkeitsrechte bleiben - soweit sie bestehen - von dieser Lizenz unberhrt.

5. Gewhrleistung

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6. Haftungsbeschrnkung

DER LIZENZGEBER HAFTET IHNEN GEGENBER IN BEZUG AUF SCHDEN AUS DER VERLETZUNG DES LEBENS, DES KRPERS ODER DER GESUNDHEIT NUR, SOFERN IHM WENIGSTENS FAHRLSSIGKEIT VORZUWERFEN IST, FR SONSTIGE SCHDEN NUR BEI GROBER FAHRLSSIGKEIT ODER VORSATZ, UND BERNIMMT DARBER HINAUS KEINERLEI FREIWILLIGE HAFTUNG.

7.
Erlschen

a. Diese Lizenz und die durch sie eingerumten Nutzungsrechte erlschen mit Wirkung fr die Zukunft im Falle eines Verstoes gegen die Lizenzbedingungen durch Sie, ohne dass es dazu der Kenntnis des Lizenzgebers vom Versto oder einer weiteren Handlung einer der Vertragsparteien bedarf. Mit natrlichen oder juristischen Personen, die Abwandlungen des Schutzgegenstandes oder diesen enthaltende Sammelwerke unter den Bedingungen dieser Lizenz von Ihnen erhalten haben, bestehen nachtrglich entstandene Lizenzbeziehungen jedoch solange weiter, wie die genannten Personen sich ihrerseits an smtliche Lizenzbedingungen halten. Darber hinaus gelten die Ziffern 1, 2, 5, 6, 7, und 8 auch nach einem Erlschen dieser Lizenz fort.

b. Vorbehaltlich der oben genannten Bedingungen gilt diese Lizenz unbefristet bis der rechtliche Schutz fr den Schutzgegenstand ausluft. Davon abgesehen behlt der Lizenzgeber das Recht, den Schutzgegenstand unter anderen Lizenzbedingungen anzubieten oder die
eigene Weitergabe des Schutzgegenstandes jederzeit einzustellen, solange die Ausbung dieses Rechts nicht einer Kndigung oder einem Widerruf dieser Lizenz (oder irgendeiner Weiterlizenzierung, die auf Grundlage dieser Lizenz

bereits erfolgt ist bzw. zuknftig noch erfolgen muss) dient und diese Lizenz unter Bercksichtigung der oben zum Erlschen genannten Bedingungen vollumfnglich wirksam bleibt.

8. Sonstige Bestimmungen

a. Jedes Mal wenn Sie den Schutzgegenstand fr sich genommen oder als Teil eines Sammelwerkes verbreiten oder ffentlich zeigen, bietet der Lizenzgeber dem Empfnger eine Lizenz zu den gleichen Bedingungen und im gleichen Umfang an, wie Ihnen in Form dieser Lizenz.

b. Jedes Mal wenn Sie eine Abwandlung des Schutzgegenstandes verbreiten oder ffentlich zeigen, bietet der Lizenzgeber dem Empfnger eine Lizenz am ursprnglichen Schutzgegenstand zu den gleichen Bedingungen und im gleichen Umfang an, wie Ihnen in Form dieser Lizenz.

c. Sollte eine Bestimmung dieser
Lizenz unwirksam sein, so bleibt davon die Wirksamkeit der Lizenz im brigen unberhrt.

d. Keine Bestimmung dieser Lizenz soll als abbedungen und kein Versto gegen sie als zulssig gelten, solange die von dem Verzicht oder von dem Versto betroffene Seite nicht schriftlich zugestimmt hat.

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"#

```
//! This file contains the BSD APIs available in Haiku. It corresponds to the
//! header files in `headers/compatibility/bsd`.
//!
//! Note that Haiku's BSD compatibility is a combination of system APIs and
//! utility libraries. There should only be system APIs in `libc`. When you are
//! trying to determine whether something should be included in this file, the
//! best indicator is whether it also exists in the BSD-specific definitions in
//! this libc crate.

use crate::prelude::*;

// stringlist.h (utility library)
// Note: this is kept because it was previously introduced
pub type StringList = _stringlist;
```

```
s! {
  // stringlist.h (utility library)
  // Note: this is kept because it was previously introduced
  pub struct _stringlist {
      pub sl_str: *mut *mut c_char,
      pub sl_max: size_t,
      pub sl_cur: size_t,
  }

  // sys/event.h
  pub struct kevent {
      pub ident: crate::uintptr_t,
      pub filter: c_short,
      pub flags: c_ushort,

  pub fflags: c_uint,
      pub data: i64,
      pub udata: *mut c_void,
      pub ext: [u64; 4],
  }

  // sys/link_elf.h
  pub struct dl_phdr_info {
      pub dlpi_addr: crate::Elf_Addr,
      pub dlpi_name: *const c_char,
      pub dlpi_phdr: *const crate::Elf_Phdr,
      pub dlpi_phnum: crate::Elf_Half,
  }
}

// sys/event.h
pub const EVFILT_READ: i16 = -1;
pub const EVFILT_WRITE: i16 = -2;
pub const EVFILT_PROC: i16 = -5;
pub const EV_ADD: u16 = 0x0001;
pub const EV_DELETE: u16 = 0x0002;
pub const EV_ONESHOT: u16 = 0x0010;
pub const EV_CLEAR: u16 = 0x0020;
pub const EV_EOF: u16 = 0x8000;
pub const EV_ERROR: u16 = 0x4000;
pub const NOTE_EXIT: u32 = 0x80000000;

// sys/ioccom.h
pub const IOC_VOID: c_ulong = 0x20000000;
pub const IOC_OUT: c_ulong = 0x40000000;
pub const IOC_IN: c_ulong = 0x80000000;
pub const IOC_INOUT: c_ulong = IOC_IN | IOC_OUT;
```

```
pub const IOC_DIRMASK: c_ulong = 0xe0000000;

#[link(name = "bsd")]
extern "C" {
  // stdlib.h
  pub fn daemon(nochdir:
 c_int, noclose: c_int) -> c_int;
  pub fn getprogname() -> *const c_char;
  pub fn setprogname(progname: *const c_char);
  pub fn arc4random() -> u32;
  pub fn arc4random_uniform(upper_bound: u32) -> u32;
  pub fn arc4random_buf(buf: *mut c_void, n: size_t);
  pub fn mkstemps(template: *mut c_char, suffixlen: c_int) -> c_int;
  pub fn strtonum(
      nptr: *const c_char,
      minval: c_longlong,
      maxval: c_longlong,
      errstr: *mut *const c_char,
  ) -> c_longlong;

  // pty.h
  pub fn openpty(
      amaster: *mut c_int,
      aslave: *mut c_int,
      name: *mut c_char,
      termp: *mut crate::termios,
      winp: *mut crate::winsize,
  ) -> c_int;
  pub fn login_tty(_fd: c_int) -> c_int;
  pub fn forkpty(
      amaster: *mut c_int,
      name: *mut c_char,
      termp: *mut crate::termios,
      winp: *mut crate::winsize,
  ) -> crate::pid_t;

  // string.h
  pub fn strsep(string: *mut *mut c_char, delimiters:
*const c_char) -> *mut c_char;
  pub fn explicit_bzero(buf: *mut c_void, len: size_t);

  // stringlist.h (utility library)
  // Note: this is kept because it was previously introduced
  pub fn sl_init() -> *mut StringList;
  pub fn sl_add(sl: *mut StringList, n: *mut c_char) -> c_int;
  pub fn sl_free(sl: *mut StringList, i: c_int);
  pub fn sl_find(sl: *mut StringList, n: *mut c_char) -> *mut c_char;
```

```
  // sys/event.h
  pub fn kqueue() -> c_int;
  pub fn kevent(
      kq: c_int,
      changelist: *const kevent,
      nchanges: c_int,
      eventlist: *mut kevent,
      nevents: c_int,
      timeout: *const crate::timespec,
  ) -> c_int;

  // sys/link_elf.h
  pub fn dl_iterate_phdr(
      callback: Option<
          unsafe extern "C" fn(info: *mut dl_phdr_info, size: usize, data: *mut c_void) -> c_int,
      >,
      data: *mut c_void,
  ) -> c_int;

  // sys/time.h
  pub fn lutimes(file: *const c_char, times: *const crate::timeval)
-> c_int;

  // sys/uov.h
  pub fn preadv(
      fd: c_int,
      iov: *const crate::iovec,
      iovcnt: c_int,
      offset: crate::off_t,
  ) -> ssize_t;
  pub fn pwritev(
      fd: c_int,
      iov: *const crate::iovec,
      iovcnt: c_int,
      offset: crate::off_t,
  ) -> ssize_t;

  // sys/wait.h
  pub fn wait4(
      pid: crate::pid_t,
      status: *mut c_int,
      options: c_int,
      rusage: *mut crate::rusage,
  ) -> crate::pid_t;
}
================================================================================
```

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Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

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Lizenzvertrag

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DURCH DIE AUSBUNG EINES DURCH DIESEN LIZENZVERTRAG GEWHRTEN RECHTS AN DEM SCHUTZGEGENSTAND ERKLREN SIE SICH MIT DEN LIZENZBEDINGUNGEN RECHTSVERBINDLICH EINVERSTANDEN. DER LIZENZGEBER RUMT IHNEN DIE HIER BESCHRIEBENEN RECHTE UNTER DER VORAUSSETZUNGEIN, DASS SIE SICH MIT DIESEN VERTRAGSBEDINGUNGEN EINVERSTANDEN ERKLREN.

1. Definitionen

a. Unter einer Bearbeitung wird eine bersetzung oder andere Bearbeitung des Werkes verstanden, die Ihre persnliche geistige Schpfung  ist. Eine freie Benutzung des Werkes wird nicht als Bearbeitung angesehen.

b. Unter den Lizenzelementen werden die folgenden Lizenzcharakteristika verstanden, die vom Lizenzgeber ausgewhlt und in der Bezeichnung der Lizenz genannt werden: Namensnennung, Nicht-kommerziell, Weitergabe unter gleichen Bedingungen.

c. Unter dem Lizenzgeber wird die natrliche oder juristische Person verstanden, die den Schutzgegenstand unter den Bedingungen dieser Lizenz anbietet.

d. Unter einem Sammelwerk wird eine Sammlung von Werken, Daten oder anderen unabhngigen Elementen verstanden, die aufgrund der Auswahl oder Anordnung der Elemente eine persnliche geistige Schpfung ist. Darunter fallen auch solche Sammelwerke, deren Elemente systematisch oder methodisch angeordnet und einzeln mit Hilfe elektronischer Mittel oder auf andere Weise zugnglich sind (Datenbankwerke). Ein Sammelwerk wird im Zusammenhang mit dieser Lizenz nicht als Bearbeitung (wie oben beschrieben) angesehen.

e. Mit SIE und Ihnen ist die natrliche oder juristische Person gemeint, die die durch diese Lizenz gewhrten Nutzungsrechte ausbt und die zuvor die Bedingungen dieser Lizenz im Hinblick auf das Werk nicht verletzt hat, oder die die ausdrckliche Erlaubnis des Lizenzgebers erhalten hat, die durch diese Lizenz gewhrten Nutzungsrechte trotz einer vorherigen Verletzung auszuben.

f. Unter dem Schutzgegenstandwird das Werk oder Sammelwerk oder das Schutzobjekt eines verwandten Schutzrechts, das Ihnen unter den Bedingungen dieser Lizenz angeboten wird, verstanden

g. Unter dem Urheber wird die natrliche Person verstanden, die das Werk geschaffen hat.

h. Unter einem verwandten Schutzrecht wird das Recht an einem anderen urheberrechtlichen Schutzgegenstand als einem Werk verstanden, zum Beispiel einer wissenschaftlichen Ausgabe, einem nachgelassenen Werk, einem Lichtbild, einer Datenbank, einem Tontrger, einer Funksendung, einem Laufbild oder einer Darbietung eines ausbenden Knstlers.

i. Unter dem Werk wird eine persnliche geistige Schpfung verstanden, die Ihnen unter den Bedingungen dieser Lizenz angeboten wird.

2. Schranken des Urheberrechts. Diese Lizenz lsst smtliche Befugnisse unberhrt, die sich aus den Schranken des Urheberrechts,aus dem Erschpfungsgrundsatz oder anderen Beschrnkungen der Ausschlielichkeitsrechte des Rechtsinhabers ergeben.

3. Lizenzierung. Unter den Bedingungen dieses Lizenzvertrages rumt Ihnen der Lizenzgeber ein lizenzgebhrenfreies, rumlich und zeitlich (fr die Dauer des Urheberrechts oder verwandten Schutzrechts) unbeschrnktes einfaches Nutzungsrecht ein, den Schutzgegenstand in der folgenden Art und Weise zu nutzen:

a. den Schutzgegenstand in krperlicher Form zu verwerten, insbesondere zu vervielfltigen, zu verbreiten und auszustellen;

b. den Schutzgegenstand in unkrperlicher Form ffentlich wiederzugeben, insbesondere vorzutragen, aufzufhren und vorzufhren, ffentlich zugnglich zu machen, zu senden, durch Bild- und Tontrger wiederzugeben sowie Funksendungen und ffentliche Zugnglichmachungen wiederzugeben;

c. den Schutzgegenstand auf Bild- oder Tontrger aufzunehmen, Lichtbilder davon herzustellen, weiterzusenden

und in dem in a. und b. genannten Umfang zu verwerten;

d. den Schutzgegenstand zu bearbeiten oder in anderer Weise umzugestalten und die Bearbeitungen zu verffentlichen und in dem in a. bis c. genannten Umfang zu verwerten;

Die genannten Nutzungsrechte knnen fr alle bekannten Nutzungsarten ausgebt werden. Die genannten Nutzungsrechte beinhalten das Recht, solche Vernderungen an dem Werk vorzunehmen, die technisch erforderlich sind, um die Nutzungsrechte fr alle Nutzungsarten wahrzunehmen. Insbesondere sind davon die Anpassung an andere Medien und auf andere Dateiformate umfasst.

4. Beschrnkungen. Die Einrumung der Nutzungsrechte gem Ziffer 3 erfolgt ausdrcklich nur unter den folgenden Bedingungen:

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b. Sie drfen eine Bearbeitung ausschlielich unter den Bedingungen dieser Lizenz, einer spteren Version dieser Lizenz mit denselben Lizenzelementen wie diese Lizenz oder einer Creative Commons iCommons Lizenz, die dieselben Lizenzelemente wie diese Lizenz enthlt (z.B. Namensnennung - Nicht-kommerziell - Weitergabe unter gleichen Bedingungen 2.0 Japan), vervielfltigen, verbreiten oder ffentlich wiedergeben. Sie mssen stets eine Kopie oder die Internetadresse in Form des Uniform-Resource-Identifier (URI) dieser Lizenz oder einer anderen Lizenz der im vorhergehenden Satz beschriebenen Art beifgen, wenn Sie die Bearbeitung vervielfltigen, verbreiten oder ffentlich wiedergeben. Sie drfen keine Vertragsbedingungen anbieten oder fordern, die die Bedingungen dieser Lizenz oder die durch sie gewhrten Rechte ndern oder beschrnken, und Sie mssen alle Hinweise unverndert lassen, die auf diese Lizenz und den Haftungsausschluss hinweisen. Sie drfen eine Bearbeitung nicht mit technischen Schutzmanahmen versehen, die den Zugang oder den Gebrauch der Bearbeitung in einer Weise kontrollieren, die mit den Bedingungen dieser Lizenz im Widerspruch stehen. Die genannten Beschrnkungen gelten auch fr eine Bearbeitung als Bestandteil eines Sammelwerkes; sie erfordern aber nicht, dass das Sammelwerk insgesamt zum Gegenstand dieser Lizenz gemacht wird.

c. Sie drfen die in Ziffer 3 gewhrten Nutzungsrechte in keiner Weise verwenden, die hauptschlich auf einen geschftlichen Vorteil oder eine vertraglich geschuldete geldwerte Vergtung abzielt oder darauf gerichtet ist. Erhalten Sie im Zusammenhang mit der Einrumung der Nutzungsrechte ebenfalls einen Schutzgegenstand, ohne dass eine vertragliche Verpflichtung hierzu besteht, so wird dies nicht als geschftlicher Vorteil oder vertraglich geschuldete

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d. Wenn Sie den Schutzgegenstand oder eine Bearbeitung oder ein Sammelwerk vervielfltigen, verbreiten oder ffentlich wiedergeben, mssen Sie alle Urhebervermerke fr den Schutzgegenstand unverndert lassen und die Urheberschaft oder Rechtsinhaberschaft in einer der von Ihnen vorgenommenen Nutzung angemessenen Form anerkennen, indem Sie den Namen (oder das Pseudonym, falls ein solches verwendet wird) des Urhebers oder Rechteinhabers nennen, wenn dieser angegeben ist. Dies gilt auch fr den Titel des Schutzgegenstandes, wenn dieser angeben ist, sowie - in einem vernnftigerweise durchfhrbaren Umfang - fr die mit dem Schutzgegenstand zu verbindende Internetadresse in Form des Uniform-Resource-Identifier (URI), wie sie der Lizenzgeber angegeben hat, sofern dies geschehen ist, es sei denn, diese Internetadresse verweist nicht auf den Urhebervermerk oder die Lizenzinformationen zu dem Schutzgegenstand. Bei einer Bearbeitung ist ein Hinweis darauf aufzufhren, in welcher Form der Schutzgegenstand in die Bearbeitung eingegangen ist (z.B. Franzsische bersetzung des ... (Werk) durch ... (Urheber) oder Das Drehbuch beruht auf dem Werk des ... (Urheber)). Ein solcher Hinweis kann in jeder angemessenen Weise erfolgen, wobei jedoch bei einer Bearbeitung, einer Datenbank oder einem Sammelwerk der Hinweis zumindest an gleicher Stelle und in ebenso auffliger Weise zu erfolgen hat wie vergleichbare Hinweise auf andere Rechtsinhaber.

e. Obwohl die gemss Ziffer 3 gewhrten Nutzungsrechte in umfassender Weise ausgebt werden drfen, findet diese Erlaubnis ihre gesetzliche Grenze in den Persnlichkeitsrechten der Urheber und ausbenden Knstler, deren berechtigte geistige und persnliche Interessen bzw. deren Ansehen oder Ruf nicht dadurch gefhrdet werden drfen, dass ein Schutzgegenstand ber das gesetzlich zulssige Ma hinaus beeintrchtigt wird.

5. Gewhrleistung. Sofern dies von den Vertragsparteien nicht anderweitig schriftlich vereinbart,, bietet der Lizenzgeber keine Gewhrleistung fr die erteilten Rechte, auer fr den Fall, dass Mngel arglistig verschwiegen wurden. Fr Mngel anderer Art, insbesondere bei der mangelhaften Lieferung von Verkrperungen des Schutzgegenstandes, richtet sich die Gewhrleistung nach der Regelung, die die Person, die Ihnen den Schutzgegenstand zur Verfgung stellt, mit Ihnen auerhalb dieser Lizenz vereinbart, oder - wenn eine solche Regelung nicht getroffen wurde - nach den gesetzlichen Vorschriften.

6. Haftung. ber die in Ziffer 5 genannte Gewhrleistung hinaus haftet Ihnen der Lizenzgeber nur fr Vorsatz und grobe Fahrlssigkeit.

7. Vertragsende

a. Dieser Lizenzvertrag und die durch ihn eingerumten Nutzungsrechte enden automatisch bei jeder Verletzung der Vertragsbedingungen durch Sie. Fr natrliche und juristische Personen, die von Ihnen eine Bearbeitung, eine Datenbank oder ein Sammelwerk unter diesen Lizenzbedingungen erhalten haben, gilt die Lizenz jedoch weiter, vorausgesetzt, diese natrlichen oder juristischen Personen erfllen smtliche Vertragsbedingungen. Die Ziffern 1, 2, 5, 6, 7 und 8 gelten bei einer Vertragsbeendigung fort.

b. Unter den oben genannten Bedingungen erfolgt die Lizenz auf unbegrenzte Zeit (fr die Dauer des Schutzrechts). Dennoch behlt sich der Lizenzgeber das Recht vor, den Schutzgegenstand unter anderen Lizenzbedingungen zu nutzen oder die eigene Weitergabe des Schutzgegenstandes jederzeit zu beenden, vorausgesetzt, dass solche Handlungen nicht dem Widerruf dieser Lizenz dienen (oder jeder anderen Lizenzierung, die auf Grundlage dieser Lizenz erfolgt ist oder erfolgen muss) und diese Lizenz wirksam bleibt, bis Sie unter den oben genannten Voraussetzungen endet.

8. Schlussbestimmungen

a. Jedes Mal, wenn Sie den Schutzgegenstand vervielfltigen, verbreiten oder ffentlich wiedergeben, bietet der Lizenzgeber dem Erwerber eine Lizenz fr den Schutzgegenstand unter denselben Vertragsbedingungen an, unter denen er Ihnen die Lizenz eingerumt hat.

b. Jedes Mal, wenn Sie eine Bearbeitung vervielfltigen, verbreiten oder ffentlich wiedergeben, bietet der Lizenzgeber dem Erwerber eine Lizenz fr den ursprnglichen Schutzgegenstand unter denselben Vertragsbedingungen an, unter denen er Ihnen die Lizenz eingerumt hat.

c. Sollte eine Bestimmung dieses Lizenzvertrages unwirksam sein, so wird die Wirksamkeit der brigen Lizenzbestimmungen dadurch nicht berhrt, und an die Stelle der unwirksamen Bestimmung tritt eine Ersatzregelung, die dem mit der unwirksamen Bestimmung angestrebten Zweck am nchsten kommt.

d. Nichts soll dahingehend ausgelegt werden, dass auf eine Bestimmung dieses Lizenzvertrages verzichtet oder einer Vertragsverletzung zugestimmt wird, so lange ein solcher Verzicht oder eine solche Zustimmung nicht schriftlich vorliegen und von der verzichtenden oder zustimmenden Vertragspartei unterschrieben sind

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f. Auf diesen Lizenzvertrag findet das Recht der Bundesrepublik Deutschland Anwendung.

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e. Der "Lizenzgeber" im Sinne dieser Lizenz ist diejenige natrliche oder juristische Person oder Gruppe, die den

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b. Abwandlungen des Schutzgegenstandes anzufertigen, einschlielich bersetzungen unter Nutzung jedweder Medien, sofern deutlich erkennbar gemacht wird, dass es sich um Abwandlungen handelt;

c. den Schutzgegenstand, allein oder in Sammelwerke aufgenommen, ffentlich zu zeigen und zu verbreiten;

d. Abwandlungen des Schutzgegenstandes zu verffentlichen, ffentlich zu zeigen und zu verbreiten.

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b. Sie drfen eine Abwandlung ausschlielich unter den Bedingungen

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ii. den Titel des Inhaltes;

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Die nach diesem Abschnitt
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fallen, weil sie als Datenbanken oder Zusammenstellungen von Daten einen immaterialgterrechtlichen Schutz eigener Art genieen.

f. Bezglich Vergtung fr die Nutzung des Schutzgegenstandes gilt Folgendes:

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g. Persnlichkeitsrechte bleiben - soweit sie bestehen - von dieser Lizenz unberhrt.

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b. Vorbehaltlich der oben genannten Bedingungen gilt diese Lizenz unbefristet bis der rechtliche Schutz fr den Schutzgegenstand ausluft. Davon abgesehen behlt der Lizenzgeber das Recht, den Schutzgegenstand unter anderen Lizenzbedingungen anzubieten oder die eigene Weitergabe des Schutzgegenstandes
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c. Sollte eine Bestimmung dieser Lizenz unwirksam sein, so bleibt
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```
//! `ioctl` opcode behavior for BSD platforms.

use super::{Direction, Opcode};

pub(super) const fn compose_opcode(
   dir: Direction,
   group: Opcode,
   num: Opcode,
   size: Opcode,
) -> Opcode {
   let dir = match dir {
      Direction::None => NONE,
      Direction::Read => READ,
      Direction::Write => WRITE,
      Direction::ReadWrite => READ | WRITE,
   };

   dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}

// `IOC_VOID`
pub const NONE: Opcode = 0x2000_0000;
// `IOC_OUT` (out is from the perspective of the kernel)
pub const READ: Opcode = 0x4000_0000;
// `IOC_IN` (in is from the perspective of the kernel)
pub const WRITE: Opcode = 0x8000_0000;
pub const IOCPARAM_MASK: Opcode = 0x1FFF;
```

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```
//! `ioctl` opcode behavior for BSD platforms.

use super::{Direction, RawOpcode};

pub(super) const fn compose_opcode(
    dir: Direction,
    group: RawOpcode,
    num: RawOpcode,
    size: RawOpcode,
```

```
) -> RawOpcode {
  let dir = match dir {
      Direction::None => NONE,
      Direction::Read => READ,
      Direction::Write => WRITE,
      Direction::ReadWrite => READ | WRITE,
  };

  dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}

// `IOC_VOID`
pub const NONE: RawOpcode = 0x2000_0000;
// `IOC_OUT` (out is from the perspective of the kernel)
pub const READ: RawOpcode = 0x4000_0000;
// `IOC_IN` (in is from the perspective of the kernel)
pub const WRITE: RawOpcode = 0x8000_0000;
pub const IOCPARAM_MASK: RawOpcode = 0x1FFF;
```

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By Shawn Hargreaves, 18 October 1998.

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a. En mettant l'Oeuvre  la disposition du public selon les termes de ce Contrat, l'Offrant
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ii. L'Oeuvre n'est constitutive ni d'une violation des droits de tiers, notamment du droit de la proprit littraire et artistique, du droit des marques, du droit de l'information, du droit civil ou de tout autre droit, ni de diffamation, de

violation de la vie prive ou de tout autre prjudice dlictuel  l'gard de toute tierce partie.

b. A l'exception des situations expressment mentionnes dans le prsent Contrat ou dans un autre accord crit, ou exiges par la loi applicable,
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c. Den Schutzgegenstand, allein oder in Sammelwerke aufgenommen, ffentlich wiederzugeben und zu verbreiten; und

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b. Sie drfen eine Bearbeitung ausschlielich unter den Bedingungen

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Version 3, 29 June 2007

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DE LICENTIEGEVER VERLEENT DE GEBRUIKER DE IN DEZE LICENTIE OMSCHREVEN RECHTEN MET INACHTNEMING VAN DE DESBETREFFENDE VOORWAARDEN.

1. Definities

a. 'Verzamelwerk' een werk waarin het Werk, in zijn geheel en in ongewijzigde vorm, samen met een of meer andere werken, die elk een afzonderlijk en zelfstandig werk vormen, tot een geheel is samengevoegd. Voorbeelden van een verzamelwerk zijn een tijdschrift, een bloemlezing of een encyclopedie. Een Verzamelwerk zal voor de toepassing van deze Licentie niet als een Afgeleid werk (als hieronder omschreven) worden beschouwd.

b. 'Afgeleid werk' een werk dat is gebaseerd op het Werk of op het Werk en andere reeds bestaande werken. Voorbeelden van een Afgeleid werk zijn
een vertaling, een muziekschikking (arrangement), een toneelbewerking, een literaire bewerking, een verfilming, een geluidsopname, een kunstreproductie, een verkorte versie, een samenvatting of enig andere bewerking van het Werk, met dien verstande dat een Verzamelwerk voor de toepassing van deze Licentie niet als een Afgeleid werk zal worden beschouwd.

Indien het Werk een muziekwerk betreft, zal de synchronisatie van de tijdslijnen van het Werk en een bewegend beeld ('synching') voor de toepassing van deze Licentie als een Afgeleid Werk worden beschouwd.

c. 'Licentiegever' de natuurlijke persoon/personen of rechtspersoon/rechtspersonen die het Werk volgens de voorwaarden van deze Licentie aanbiedt/aanbieden.

d. 'Maker' de natuurlijke persoon/personen of rechtspersoon/personen die het oorspronkelijke werk gemaakt heeft/hebben. Voor de toepassing van deze Licentie wordt onder de Maker mede verstaan de uitvoerende kunstenaar, film- en fonogramproducent en omroeporganisaties
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e. 'Werk' het auteursrechtelijk beschermde werk dat volgens de voorwaarden van deze Licentie wordt aangeboden. Voor de toepassing van deze Licentie wordt onder het Werk mede verstaan het fonogram, de eerste vastlegging van een film en het (omroep)programma in de zin van de Wet op de naburige rechten en de databank in de zin van de Databankenwet, voor zover dit fonogram, deze eerste vastlegging van een film, dit (omroep)programma en deze databank beschermd wordt krachtens de toepasselijke wet in de jurisdictie van de Gebruiker.

f. 'Gebruiker' de natuurlijke persoon of rechtspersoon die rechten ingevolge deze Licentie uitoefent en die de voorwaarden van deze Licentie met betrekking tot het Werk niet eerder geschonden heeft, of die van de Licentiegever uitdrukkelijke toestemming gekregen heeft om rechten ingevolge deze Licentie uit te oefenen ondanks een eerdere schending.

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c. het verspreiden van exemplaren van het Werk, het in het openbaar tonen, op- en uitvoeren en het on-line beschikbaar stellen van het Werk, afzonderlijk en als deel van een Verzamelwerk;

d. het verspreiden van exemplaren van Afgeleide werken, het in het openbaar te tonen, op- en uitvoeren en het on-line beschikbaar stellen van Afgeleide werken;

e. het opvragen en hergebruiken van het Werk;

f. Volledigheidshalve dient te worden vermeld dat:

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4. Beperkingen. De in artikel 3 verleende Licentie is uitdrukkelijk gebonden aan de volgende beperkingen:

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b. Indien de Gebruiker het Werk, Afgeleide Werken of Verzamelwerken verspreidt, in het openbaar toont, op- of uitvoert of on-line beschikbaar stelt, dient de Gebruiker, tenzij er sprake is van een verzoek als vermeld in lid 4(a), alle auteursrechtvermeldingen met betrekking tot het Werk te laten staan. Tevens dient de Gebruiker, op een wijze die redelijk is in verhouding tot het gebruikte medium, de naam te vermelden van (i) de Maker (of zijn/haar pseudoniem indien van toepassing) indien deze wordt vermeld; en/of (ii) van (een) andere partij(en) (b.v. sponsor, uitgeverij, tijdschrift)

indien de naamsvermelding van deze partij(en) ("Naamsvermeldingsgerechtigden") in de auteursrechtvermelding of algemene voorwaarden van de Licentiegever of op een andere redelijke wijze verplicht is gesteld door de Maker en/of de Licentiegever; de titel van het Werk indien deze wordt vermeld; voorzover redelijkerwijs toepasbaar de Uniform Resource Identifier, indien aanwezig, waarvan de Licentiegever heeft aangegeven dat deze bij het Werk hoort, tenzij de URI niet verwijst naar de auteursrechtvermeldingen of de licentie-informatie betreffende het Werk; in overeenstemming met artikel 3(b) in geval van een Afgeleid werk, door te verwijzen naar het gebruik van het Werk in het Afgeleide werk (bijvoorbeeld: 'De Franse vertaling van het Werk van de Maker' of 'Scenario gebaseerd op het Werk van de Maker'). De Gebruiker dient op redelijke wijze aan de in dit artikel genoemde vereisten te voldoen; echter, met dien verstande dat, in geval van een Afgeleid werk of een Verzamelwerk, de naamsvermeldingen in ieder geval geplaatst dienen te worden, indien er een naamsvermelding van alle makers van het Afgeleide werk of het Verzamelwerk geplaatst wordt dan als deel van die naamsvermeldingen, en op een wijze die in ieder geval even duidelijk is als de naamsvermeldingen van de overige makers.

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c. Volledigheidshalve dient te worden vermeld, dat de hierboven vermelde beperkingen (lid 4(a) en lid 4(b)) niet van toepassing zijn op die onderdelen van het Werk die geacht worden te vallen onder de definitie van het 'Werk' zoals vermeld in deze Licentie uitsluitend omdat zij voldoen aan de criteria van het sui generis databankenrecht krachtens het nationale recht ter implementatie van de Europese Databankenrichtlijn.

d. De in artikel 3 verleende rechten moeten worden uitgeoefend met inachtneming van het morele recht van de Maker (en/of de uitvoerende kunstenaar) om zich te verzetten tegen elke misvorming, verminking of andere aantasting van het werk, welke nadeel zou kunnen toebrengen aan de eer of de naam van de Maker (en/of de uitvoerende kunstenaar) of aan zijn waarde in deze hoedanigheid, indien en voor zover de Maker (en/of de uitvoerende kunstenaar) op grond van een op hem van toepassing zijnde wettelijke bepaling geen afstand kan doen van dat morele recht.

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/// The datatype used for the ioctl number
#[doc(hidden)]
#[cfg(not(solarish))]
pub type ioctl_num_type = ::libc::c_ulong;

```
#[doc(hidden)]
#[cfg(solarish)]
pub type ioctl_num_type = ::libc::c_int;

/// The datatype used for the 3rd argument
#[doc(hidden)]
pub type ioctl_param_type = ::libc::c_int;

mod consts {
  use crate::sys::ioctl::ioctl_num_type;
  #[doc(hidden)]
  pub const VOID: ioctl_num_type = 0x2000_0000;
  #[doc(hidden)]
  pub const OUT: ioctl_num_type = 0x4000_0000;
  #[doc(hidden)]
  #[allow(overflowing_literals)]
  pub const IN: ioctl_num_type = 0x8000_0000;
  #[doc(hidden)]
  pub const INOUT: ioctl_num_type = IN | OUT;
  #[doc(hidden)]
  pub const IOCPARM_MASK: ioctl_num_type = 0x1fff;
}

pub use self::consts::*;

#[macro_export]
#[doc(hidden)]
macro_rules! ioc {
  ($inout:expr, $group:expr, $num:expr, $len:expr) => {
    $inout
      | (($len as $crate::sys::ioctl::ioctl_num_type
        & $crate::sys::ioctl::IOCPARM_MASK)

        << 16)
      | (($group as $crate::sys::ioctl::ioctl_num_type) << 8)
      | ($num as $crate::sys::ioctl::ioctl_num_type)
  };
}

/// Generate an ioctl request code for a command that passes no data.
///
/// This is equivalent to the `_IO()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_none!()` directly.
///
/// # Example
///
```

```
/// ```
/// # #[macro_use] extern crate nix;
/// const KVMIO: u8 = 0xAE;
/// ioctl_write_int_bad!(kvm_create_vm, request_code_none!(KVMIO, 0x03));
/// # fn main() {}
/// ```
#[macro_export(local_inner_macros)]
macro_rules! request_code_none {
  ($g:expr, $n:expr) => {
      ioc!($crate::sys::ioctl::VOID, $g, $n, 0)
  };
}

/// Generate an ioctl request code for a command that passes an integer
///
/// This is equivalent to the `_IOWINT()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the
 `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write_int!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write_int {
  ($g:expr, $n:expr) => {
      ioc!(
          $crate::sys::ioctl::VOID,
          $g,
          $n,
          ::std::mem::size_of::<$crate::libc::c_int>()
      )
  };
}

/// Generate an ioctl request code for a command that reads.
///
/// This is equivalent to the `_IOR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_read!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is reading and the kernel is
/// writing.
#[macro_export(local_inner_macros)]
macro_rules! request_code_read {
  ($g:expr, $n:expr, $len:expr) => {
      ioc!($crate::sys::ioctl::OUT, $g, $n, $len)
  };
}
```

```
/// Generate an ioctl request code for a command that writes.
///
///
 This is equivalent to the `_IOW()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is writing and the kernel is
/// reading.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::IN, $g, $n, $len)
   };
}

/// Generate an ioctl request code for a command that reads and writes.
///
/// This is equivalent to the `_IOWR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_readwrite!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_readwrite {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::INOUT, $g, $n, $len)

 };
}
```

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"#
use crate::errno::Errno;
use crate::sys::signal::Signal;
use crate::unistd::Pid;
use crate::Result;
use cfg_if::cfg_if;
use libc::{self, c_int};
use std::ptr;

pub type RequestType = c_int;

```
cfg_if! {
  if #[cfg(any(freebsdlike, apple_targets, target_os = "openbsd"))] {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_char;
  } else {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_void;
  }
}

libc_enum! {
  #[repr(i32)]
  /// Ptrace Request enum defining the action to be taken.
  #[non_exhaustive]
  pub enum Request {
    PT_TRACE_ME,
    PT_READ_I,
    PT_READ_D,
    #[cfg(apple_targets)]
    PT_READ_U,
    PT_WRITE_I,
    PT_WRITE_D,
    #[cfg(apple_targets)]
    PT_WRITE_U,
    PT_CONTINUE,
    PT_KILL,
    #[cfg(any(any(freebsdlike, apple_targets),
          all(target_os = "openbsd", target_arch = "x86_64"),
          all(target_os = "netbsd", any(target_arch = "x86_64",
                              target_arch = "powerpc"))))]
    PT_STEP,
    PT_ATTACH,
    PT_DETACH,
    #[cfg(apple_targets)]
    PT_SIGEXC,
    #[cfg(apple_targets)]
    PT_THUPDATE,
    #[cfg(apple_targets)]
    PT_ATTACHEXC
  }
}

unsafe fn ptrace_other(
  request: Request,
  pid: Pid,
  addr: AddressType,
  data: c_int,
) -> Result<c_int> {
```

```
  unsafe {
      Errno::result(libc::ptrace(
          request as RequestType,
          libc::pid_t::from(pid),
          addr,
          data,
      ))
      .map(|_| 0)
  }
}

/// Sets the process as traceable, as with `ptrace(PT_TRACEME, ...)`
///
/// Indicates that this process is to be traced by its parent.
/// This is the only ptrace request to be issued by the tracee.
pub fn traceme() -> Result<()> {
  unsafe {
      ptrace_other(Request::PT_TRACE_ME, Pid::from_raw(0), ptr::null_mut(), 0)
          .map(drop)
  }
}

/// Attach to a running
 process, as with `ptrace(PT_ATTACH, ...)`
///
/// Attaches to the process specified by `pid`, making it a tracee of the calling process.
pub fn attach(pid: Pid) -> Result<()> {
  unsafe {
      ptrace_other(Request::PT_ATTACH, pid, ptr::null_mut(), 0).map(drop)
  }
}

/// Detaches the current running process, as with `ptrace(PT_DETACH, ...)`
///
/// Detaches from the process specified by `pid` allowing it to run freely, optionally delivering a
/// signal specified by `sig`.
pub fn detach<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
  let data = match sig.into() {
      Some(s) => s as c_int,
      None => 0,
  };
  unsafe {
      ptrace_other(Request::PT_DETACH, pid, ptr::null_mut(), data).map(drop)
  }
}

/// Restart the stopped tracee process, as with `ptrace(PTRACE_CONT, ...)`
///
```

```
/// Continues the execution of the process with PID `pid`, optionally
/// delivering a signal specified by `sig`.
pub fn cont<T: Into<Option<Signal>>>(pid: Pid, sig: T)
 -> Result<()> {
   let data = match sig.into() {
       Some(s) => s as c_int,
       None => 0,
   };
   unsafe {
       // Ignore the useless return value
       ptrace_other(Request::PT_CONTINUE, pid, 1 as AddressType, data)
           .map(drop)
   }
}

/// Issues a kill request as with `ptrace(PT_KILL, ...)`
///
/// This request is equivalent to `ptrace(PT_CONTINUE, ..., SIGKILL);`
pub fn kill(pid: Pid) -> Result<()> {
   unsafe {
       ptrace_other(Request::PT_KILL, pid, 0 as AddressType, 0).map(drop)
   }
}

/// Move the stopped tracee process forward by a single step as with
/// `ptrace(PT_STEP, ...)`
///
/// Advances the execution of the process with PID `pid` by a single step optionally delivering a
/// signal specified by `sig`.
///
/// # Example
/// ```rust
/// use nix::sys::ptrace::step;
/// use nix::unistd::Pid;
/// use nix::sys::signal::Signal;
/// use nix::sys::wait::*;
/// // If a process changes state to the stopped state because of a SIGUSR1
/// // signal,
 this will step the process forward and forward the user
/// // signal to the stopped process
/// match waitpid(Pid::from_raw(-1), None) {
///     Ok(WaitStatus::Stopped(pid, Signal::SIGUSR1)) => {
///         let _ = step(pid, Signal::SIGUSR1);
///     }
///     _ => {},
/// }
/// ```
#[cfg(any(
```

```
  any(freebsdlike, apple_targets),
  all(target_os = "openbsd", target_arch = "x86_64"),
  all(
      target_os = "netbsd",
      any(target_arch = "x86_64", target_arch = "powerpc")
  )
))]
pub fn step<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
  let data = match sig.into() {
      Some(s) => s as c_int,
      None => 0,
  };
  unsafe {
      ptrace_other(Request::PT_STEP, pid, ptr::null_mut(), data).map(drop)
  }
}

/// Reads a word from a processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn read(pid: Pid, addr: AddressType)
 -> Result<c_int> {
  unsafe {
      // Traditionally there was a difference between reading data or
      // instruction memory but not in modern systems.
      ptrace_other(Request::PT_READ_D, pid, addr, 0)
  }
}

/// Writes a word into the processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn write(pid: Pid, addr: AddressType, data: c_int) -> Result<()> {
  unsafe { ptrace_other(Request::PT_WRITE_D, pid, addr, data).map(drop) }
}
```

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Version 1.0 dated 2006-09-05.
"#
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Version 1.1 - 26 February 2007

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# 1.2304 semver 1.0.26

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# 1.2306 httparse 1.10.1

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# 1.2307 rand 0.9.2

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# 1.2314 bitvec 1.0.1

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# 1.2316 slab 0.4.9

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```
#![cfg(all(
   feature = "with-system-locale",
   unix,
   any(
      target_os = "dragonfly",
      target_os = "freebsd",
      target_os = "ios",
      target_os = "macos",
      target_os = "openbsd",
      target_os = "netbsd"
   )
))]

use libc::{c_char, c_int, c_void};

use crate::error::Error;
use crate::system_locale::nix::{Encoding, Lconv, StaticCString, UTF_8};
```

```
extern "C" {
   fn localeconv_l(locale: *const c_void) -> *const libc::lconv;
   fn nl_langinfo_l(item: libc::nl_item, locale: *const c_void) -> *const c_char;
   fn querylocale(mask: c_int, locale: *const c_void) -> *const c_char;
}

pub(crate) fn get_encoding(locale: *const c_void) -> Result<Encoding, Error> {
   let encoding_ptr = unsafe { nl_langinfo_l(libc::CODESET, locale) };
   let encoding_static_c_string = StaticCString::new(encoding_ptr, *UTF_8, "nl_langinfo_l")?;
   let encoding_string = encoding_static_c_string.to_string()?;
   let encoding = Encoding::from_bytes(encoding_string.as_bytes())?;
    Ok(encoding)
}

pub(crate) fn get_lconv(locale: *const c_void, encoding: Encoding) -> Result<Lconv, Error> {
   let lconv_ptr = unsafe { localeconv_l(locale) };
   if lconv_ptr.is_null() {
      return Err(Error::system_invalid_return(
         "localeconv_l",
         "localeconv_l unexpectedly returned a null pointer.",
      ));
   }
   let lconv: &libc::lconv = unsafe { lconv_ptr.as_ref() }.unwrap();
   let lconv = Lconv::new(lconv, encoding)?;
   Ok(lconv)
}

pub(crate) fn get_name(locale: *const c_void, encoding: Encoding) -> Result<String, Error> {
   let mask = libc::LC_CTYPE_MASK | libc::LC_MONETARY_MASK | libc::LC_NUMERIC_MASK;
   let name_ptr = unsafe { querylocale(mask, locale) };
   let name_static_c_string = StaticCString::new(name_ptr, encoding, "querylocale")?;
   let name = name_static_c_string.to_string()?;
   Ok(name)
}
```

# 1.2325 lz4_flex 0.11.5

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# 1.2328 classmate 1.7.1

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Other developers who have contributed code are:

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# 1.2329 jaxb-core 4.0.6

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# 1.2340 anstream 0.6.13

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testng (6.14.2)

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wagon-http-lightweight (3.0.0)

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*
 Project: https://maven.apache.org/wagon/
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  https://mvnrepository.com/artifact/org.apache.maven.wagon/wagon-http-lightweight/3.0.0

xz for java (1.8)

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# 1.2343 email_address 0.2.9

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# 1.2344 num-rational 0.4.2

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# 1.2345 socket2 0.5.10

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# 1.2347 signal-hook-registry 1.4.1

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# 1.2348 signal-hook 0.3.17

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# 1.2349 snap 1.1.1

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# 1.2350 async-channel 2.3.1

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# 1.2353 httpdate 1.0.3

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# 1.2358 hyper-timeout 0.4.1

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# 1.2359 tonic 0.11.0

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# 1.2360 regex 1.12.2

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# 1.2363 futures-timer 3.0.3

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# 1.2364 jiter 0.11.1

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# 1.2369 mio 1.0.1

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# 1.2370 async-graphql 7.0.17

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# 1.2371 pydantic 2.12.4

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# 1.2372 event-listener 5.3.1

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name: license

```
on:
 pull_request:
   types: [opened, synchronize, reopened]
 push:
   branches:
     - main

jobs:
 check-license:
   name: Check License
```

```
  runs-on: ubuntu-latest
  timeout-minutes: 3

  steps:
    - uses: actions/checkout@v3
    - name: Check License Header
      uses: apache/skywalking-eyes@v0.3.0
```

# 1.2374 netlink-packet-utils 0.5.2

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```
name: license

on:
 pull_request:
   types: [opened, synchronize, reopened]
 push:
   branches:
     - main

jobs:
```

```
check-license:
  name: Check License
  runs-on: ubuntu-latest
  timeout-minutes: 3

  steps:
    - uses: actions/checkout@v3
    - name: Check License Header
      uses: apache/skywalking-eyes@v0.3.0
```

# 1.2375 axum 0.6.20

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# 1.2376 async-io 1.13.0

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# 1.2377 matchit 0.7.3

## 1.2377.1 Available under license :

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```
Package: MatchIt
Version: 4.7.2
Title: Nonparametric Preprocessing for Parametric Causal Inference
Description: Selects matched samples of the original treated and
   control groups with similar covariate distributions -- can be
   used to match exactly on covariates, to match on propensity
   scores, or perform a variety of other matching procedures.  The
   package also implements a series of recommendations offered in
   Ho, Imai, King, and Stuart (2007) <DOI:10.1093/pan/mpl013>. (The
   'gurobi' package, which is not on CRAN, is optional and comes with
   an installation of the Gurobi Optimizer, available at
   <https://www.gurobi.com>.)
Authors@R: c(
 person("Daniel", "Ho", email = "daniel.e.ho@gmail.com", role = c("aut"),
        comment = c(ORCID = "0000-0002-2195-5469")),
 person("Kosuke", "Imai", email = "imai@harvard.edu", role = c("aut"),
        comment = c(ORCID = "0000-0002-2748-1022")),
  person("Gary", "King", email = "king@harvard.edu", role = c("aut"),
        comment = c(ORCID = "0000-0002-5327-7631")),
 person("Elizabeth", "Stuart", email = "estuart@jhu.edu", role = c("aut"),
        comment = c(ORCID = "0000-0002-9042-8611")),
 person("Alex", "Whitworth", email = "whitworth.alex@gmail.com", role = c("ctb")),
 person("Noah", "Greifer", role = c("cre", "aut"),
        email = "noah.greifer@gmail.com",
        comment = c(ORCID="0000-0003-3067-7154"))
 )
Depends:
   R (>= 3.6.0)
Imports:
   backports (>= 1.1.9),
   chk (>= 0.10.0),
   rlang (>= 1.1.0),
   Rcpp,
   utils,
```

```
  stats,
  graphics,
  grDevices
Suggests:
  optmatch (>= 0.10.6),
  Matching,
  rgenoud,
  quickmatch (>= 0.2.1),
  nnet,
  rpart,
  mgcv,
  CBPS (>= 0.17),
  dbarts (>= 0.9-28),
  randomForest (>= 4.7-1),
  glmnet (>= 4.0),
  gbm (>= 2.1.7),
  cobalt (>= 4.2.3),
  boot,
  marginaleffects (>= 0.25.0),
  sandwich (>= 2.5-1),
  survival,
  RcppProgress
 (>= 0.4.2),
  highs,
  Rglpk,
  Rsymphony,
  gurobi,
  knitr,
  rmarkdown,
  testthat (>= 3.0.0)
LinkingTo:
  Rcpp,
  RcppProgress
Encoding: UTF-8
LazyData: true
License: GPL (>=2)
URL: https://kosukeimai.github.io/MatchIt/, https://github.com/kosukeimai/MatchIt
BugReports: https://github.com/kosukeimai/MatchIt/issues
VignetteBuilder: knitr
Roxygen: list(markdown = TRUE)
RoxygenNote: 7.3.2
Config/testthat/edition: 3
```

Found in path(s):
* /matchit-master-zip/MatchIt-master/DESCRIPTION
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/opt/cola/permits/2739917146_1765389360.6692486/0/matchit-master-zip/MatchIt-master/vignettes/matching-

methods.Rmd---

Found in path(s):
* </style></svg>
No license file was found, but licenses were detected in source scan.

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/opt/cola/permits/2739917146_1765389360.6692486/0/matchit-master-zip/MatchIt-master/man/method_cardinality.Rd% Generated by roxygen2: do not edit by hand
/opt/cola/permits/2739917146_1765389360.6692486/0/matchit-master-zip/MatchIt-master/pkgdown/favicon/favicon.svg<svg xmlns="http://www.w3.org/2000/svg" version="1.1" xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:svgjs="http://svgjs.dev/svgjs" width="3000" height="3000" viewBox="0 0 3000 3000"><image width="3000" height="3000" href="
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G5zOnRpZmY9Imh0dHA6Ly9ucy5hZG9iZS5jb20vdGlmZi8xLjAvIiB4bWxuczpleGlmPSJodHRwOi8vbnMuYW
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MDUtMDRUMTI6MTI6MzEtMDQ6MDAiIHN0RXZ0OnNvZnR3YXJlQWdlbnQ9IkFkb2JlIFBob3Rvc2hvcCAy
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# 1.2378 async-fs 1.6.0

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# 1.2379 event-listener 2.5.3

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# 1.2380 piper 0.2.1

# 1.2381 polling 2.8.0

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# 1.2383 async-lock 2.8.0

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# 1.2388 cookie 0.18.1

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# 1.2396 rustls 0.21.12

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# 1.2397 hyper-tls 0.6.0

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# 1.2413 crossterm 0.29.0

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# 1.2414 cosmiconfig-typescript-loader 6.2.0

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# 1.2417 grpc-gateway 2.26.3

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package copyright

import (
 "bytes"
 "internal/testenv"
 "io"
 "io/fs"
 "os"
 "path/filepath"
 "testing"
)

var copyright = []byte("Copyright")

var permitted = [][]byte{
 []byte("// Code generated by "),
 []byte("// Code generated from "),
 []byte("// Created by cgo -cdefs"),
 []byte("// DO NOT EDIT\n// generated by:"),
 []byte("// Empty assembly file"),
 []byte("// Generated using cgo"),
 []byte("// Original source:\n//\thttp://www.zorinaq.com/papers/md5-amd64.html"), // public domain crypto/md5
 []byte("// created by cgo -cdefs"),
 []byte("// go run mkasm.go"),
 []byte("// mkerrors"),
 []byte("// mksys"),
 []byte("// run\n// Code generated by"), // cmd/compile/internal/test/constFold_test.go
}

func TestCopyright(t *testing.T) {
 buf := make([]byte, 2048)
 filepath.WalkDir(filepath.Join(testenv.GOROOT(t), "src"), func(path string,
 d fs.DirEntry, err error) error {
  if d.IsDir() && (d.Name() == "testdata" || d.Name() == "vendor") {
```

```
  return filepath.SkipDir
 }
 switch filepath.Ext(d.Name()) {
 default:
  return nil
 case ".s", ".go":
  // check
 }

 f, err := os.Open(path)
 if err != nil {
  t.Error(err)
  return nil
 }
 defer f.Close()
 n, err := f.Read(buf)
 if err != nil && err != io.EOF {
  t.Error(err)
  return nil
 }
 b := buf[:n]
 if bytes.Contains(b, copyright) {
  return nil
 }
 for _, ok := range permitted {
  if bytes.HasPrefix(b, ok) {
   return nil
  }
 }
 t.Errorf("%s: missing copyright notice", path)
 return nil
})
}
```

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# 1.2422 bare-url 2.3.2

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# 1.2425 toml 0.9.8

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# 1.2427 walkdir 2.4.0

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# 1.2430 headers 0.3.9

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# 1.2432 async-stream 0.3.6

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# 1.2433 jackson-dataformat-yaml 2.20.1

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Jackson is a high-performance, Free/Open Source JSON processing library.
It was originally written by Tatu Saloranta (tatu.saloranta@iki.fi), and has
been in development since 2007.
It is currently developed by a community of developers.

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# 1.2434 gax-go 2.15.0

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# 1.2435 quartz 2.5.1

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<?xml version="1.0" encoding="UTF-8"?>

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* /quartz-2-5-1-sources-jar/META-INF/maven/org.quartz-scheduler/quartz/pom.xml
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/opt/cola/permits/2749216359_1763005515.0384607/0/quartz-2-5-1-sources-jar/org/quartz/Calendar.java
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# 1.2436 brotli-decompressor 5.0.0

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# 1.2437 toml_writer 1.0.4

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# 1.2438 mdlayher-ethtool 0.5.0

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# 1.2439 wifi 0.6.0

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# 1.2441 go-genproto 0.34.0

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# 1.2443 pydantic-settings 2.12.0

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# 1.2446 bson 2.15.0

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# 1.2447 aws-sdk-sts 1.73.0

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# 1.2448 domain 0.11.0

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# 1.2450 metrics-tracing-context 0.17.0

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# 1.2451 aws-sdk-ssooidc 1.65.0

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# 1.2461 aes 0.8.3

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# 1.2462 zstd-safe 6.0.6

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# 1.2463 nom 8.0.0

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# 1.2475 stream-cancel 0.8.2

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# 1.2476 nom-language 0.1.0

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cmd/krb5/kproplog/kproplog.c
cmd/krb5/slave/kpropd_rpc.c
lib/gss_mechs/mech_krb5/et/kdb5_err.c
lib/gss_mechs/mech_spnego/mech/gssapiP_spnego.h
lib/gss_mechs/mech_spnego/mech/spnego_mech.c
lib/krb5/kadm5/kadm_host_srv_names.c
lib/krb5/kdb/kdb_convert.c
lib/krb5/kdb/kdb_hdr.h
lib/krb5/kdb/kdb_log.c
lib/krb5/kdb/kdb_log.h
lib/libgss/g_accept_sec_context.c
lib/libgss/g_acquire_cred.c
lib/libgss/g_canon_name.c
lib/libgss/g_compare_name.c
lib/libgss/g_context_time.c
lib/libgss/g_delete_sec_context.c
lib/libgss/g_dsp_name.c
lib/libgss/g_dsp_status.c
lib/libgss/g_dup_name.c
lib/libgss/g_exp_sec_context.c

lib/libgss/g_export_name.c
lib/libgss/g_glue.c
lib/libgss/g_imp_name.c
lib/libgss/g_imp_sec_context.c
lib/libgss/g_init_sec_context.c
lib/libgss/g_initialize.c
lib/libgss/g_inquire_context.c
lib/libgss/g_inquire_cred.c
lib/libgss/g_inquire_names.c
lib/libgss/g_process_context.c
lib/libgss/g_rel_buffer.c
lib/libgss/g_rel_cred.c
lib/libgss/g_rel_name.c
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lib/libgss/g_unseal.c
lib/libgss/g_userok.c
lib/libgss/g_utils.c
lib/libgss/g_verify.c
lib/libgss/gssd_pname_to_uid.c
uts/common/gssapi/include/gssapi_err_generic.h
uts/common/gssapi/include/mechglueP.h

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lib/gssapi/mechglue/g_accept_sec_context.c
lib/gssapi/mechglue/g_acquire_cred.c
lib/gssapi/mechglue/g_canon_name.c
lib/gssapi/mechglue/g_compare_name.c
lib/gssapi/mechglue/g_context_time.c
lib/gssapi/mechglue/g_delete_sec_context.c
lib/gssapi/mechglue/g_dsp_name.c
lib/gssapi/mechglue/g_dsp_status.c
lib/gssapi/mechglue/g_dup_name.c
lib/gssapi/mechglue/g_exp_sec_context.c
lib/gssapi/mechglue/g_export_name.c
lib/gssapi/mechglue/g_glue.c
lib/gssapi/mechglue/g_imp_name.c
lib/gssapi/mechglue/g_imp_sec_context.c
lib/gssapi/mechglue/g_init_sec_context.c
lib/gssapi/mechglue/g_initialize.c
lib/gssapi/mechglue/g_inquire_context.c
lib/gssapi/mechglue/g_inquire_cred.c
lib/gssapi/mechglue/g_inquire_names.c
lib/gssapi/mechglue/g_process_context.c
lib/gssapi/mechglue/g_rel_buffer.c
lib/gssapi/mechglue/g_rel_cred.c
lib/gssapi/mechglue/g_rel_name.c

lib/gssapi/mechglue/g_rel_oid_set.c
lib/gssapi/mechglue/g_seal.c
lib/gssapi/mechglue/g_sign.c
lib/gssapi/mechglue/g_store_cred.c
lib/gssapi/mechglue/g_unseal.c
lib/gssapi/mechglue/g_userok.c
lib/gssapi/mechglue/g_utils.c
lib/gssapi/mechglue/g_verify.c
lib/gssapi/mechglue/gssd_pname_to_uid.c
lib/gssapi/mechglue/mglueP.h
lib/gssapi/mechglue/oid_ops.c
lib/gssapi/spnego/gssapiP_spnego.h
lib/gssapi/spnego/spnego_mech.c

and the initial implementation of incremental propagation, including
the following new or changed files:

include/iprop_hdr.h
kadmin/server/ipropd_svc.c
lib/kdb/iprop.x
lib/kdb/kdb_convert.c
lib/kdb/kdb_log.c
lib/kdb/kdb_log.h
lib/krb5/error_tables/kdb5_err.et
kprop/kpropd_rpc.c
kprop/kproplog.c

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# 1.2486 termcolor 1.3.0

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# 1.2488 lru 0.12.5

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# 1.2489 pulsar 6.3.1

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# 1.2494 amq-protocol-tcp 7.2.1

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# 1.2495 aws-sdk-sso 1.64.0

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# Contributions to the urllib3 project

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## Contributors

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* victor.vde <http://code.google.com/u/victor.vde/>
 * HTTPS patch (which inspired HTTPSConnectionPool)

* erikcederstrand <http://code.google.com/u/erikcederstrand/>
 * NTLM-authenticated HTTPSConnectionPool
 * Basic-authenticated HTTPSConnectionPool (merged into make_headers)

* niphlod <niphlod@gmail.com>
 * Client-verified SSL certificates for HTTPSConnectionPool
 * Response gzip and deflate encoding support
 * Better unicode support for filepost using StringIO buffers

* btoconnor <brian@btoconnor.net>
 * Non-multipart encoding for POST requests

* p.dobrogost <http://code.google.com/u/@WBRSRlBZDhBFXQB6/>
 * Code review, PEP8 compliance, benchmark fix

* kennethreitz <me@kennethreitz.com>
 * Bugfixes, suggestions, Requests integration

* georgemarshall <https://github.com/georgemarshall>
 * Bugfixes, Improvements and Test
 coverage

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 * Python 3 support

* brandon-rhodes <http://rhodesmill.org/brandon>
 * Design review, bugfixes, test coverage.

* studer <theo.studer@gmail.com>
 * IPv6 url support and test coverage

* Shivaram Lingamneni <slingamn@cs.stanford.edu>
 * Support for explicitly closing pooled connections

* hartator <hartator@gmail.com>
 * Corrected multipart behavior for params

* Thomas Weischuh <thomas@t-8ch.de>
 * Support for TLS SNI
 * API unification of ssl_version/cert_reqs
 * SSL fingerprint and alternative hostname verification
 * Bugfixes in testsuite

* Sune Kirkeby <mig@ibofobi.dk>
 * Optional SNI-support for Python 2 via PyOpenSSL.

* Marc Schlaich <marc.schlaich@gmail.com>
 * Various bugfixes and test improvements.

* Bryce Boe <bbzbryce@gmail.com>
 * Correct six.moves conflict
 * Fixed pickle support of some exceptions

* Boris Figovsky <boris.figovsky@ravellosystems.com>
 * Allowed to skip SSL hostname verification

* Cory Benfield
 <https://lukasa.co.uk/about/>
 * Stream method for Response objects.
 * Return native strings in header values.
 * Generate 'Host' header when using proxies.

* Jason Robinson <jaywink@basshero.org>
 * Add missing WrappedSocket.fileno method in PyOpenSSL

* Audrius Butkevicius <audrius.butkevicius@elastichosts.com>
 * Fixed a race condition

* Stanislav Vitkovskiy <stas.vitkovsky@gmail.com>
 * Added HTTPS (CONNECT) proxy support

* Stephen Holsapple <sholsapp@gmail.com>
 * Added abstraction for granular control of request fields

* Martin von Gagern <Martin.vGagern@gmx.net>

* Support for non-ASCII header parameters

* Kevin Burke <kev@inburke.com> and Pavel Kirichenko <juanych@yandex-team.ru>
* Support for separate connect and request timeouts

* Peter Waller <p@pwaller.net>
* HTTPResponse.tell() for determining amount received over the wire

* Nipunn Koorapati <nipunn1313@gmail.com>
* Ignore default ports when comparing hosts for equality

* Danilo @dbrgn <https://dbrgn.ch/>
* Disabled TLS compression by default on Python 3.2+
* Disabled TLS compression in pyopenssl contrib module
* Configurable cipher suites in pyopenssl contrib module

* Roman Bogorodskiy <roman.bogorodskiy@ericsson.com>
* Account retries on proxy errors

* Nicolas Delaby <nicolas.delaby@ezeep.com>
* Use the platform-specific CA certificate locations

* Josh Schneier <https://github.com/jschneier>
* HTTPHeaderDict and associated tests and docs
* Bugfixes, docs, test coverage

* Tahia Khan <http://tahia.tk/>
* Added Timeout examples in docs

* Arthur Grunseid <https://grunseid.com>
* source_address support and tests (with https://github.com/bui)

* Ian Cordasco <graffatcolmingov@gmail.com>
* PEP8 Compliance and Linting
* Add ability to pass socket options to an HTTP Connection

* Erik Tollerud <erik.tollerud@gmail.com>
* Support for standard library io module.

* Krishna Prasad <kprasad.iitd@gmail.com>
* Google App Engine documentation

* Aaron Meurer
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* Added Url.url, which unparses a Url

* Evgeny Kapun <abacabadabacaba@gmail.com>
* Bugfixes

* Benjamen Meyer <bm_witness@yahoo.com>
 * Security Warning Documentation update for proper capture

* Shivan Sornarajah <github@sornars.com>
 * Support for using ConnectionPool and PoolManager as context managers.

* Alex Gaynor <alex.gaynor@gmail.com>
 * Updates to the default SSL configuration

* Tomas Tomecek <ttomecek@redhat.com>
 * Implemented generator for getting chunks from chunked responses.

* tlynn <https://github.com/tlynn>
 * Respect the warning preferences at import.

* David D. Riddle <ddriddle@illinois.edu>
 * IPv6 bugfixes in testsuite

* Thea Flowers <magicalgirl@google.com>
 * App Engine environment tests.
 * Documentation re-write.

* John Krauss <https://github.com/talos>
 * Clues to debugging problems with `cryptography` dependency in docs

* Disassem <https://github.com/Disassem>
 * Fix pool-default headers not applying for url-encoded
 requests like GET.

* James Atherfold <jlatherfold@hotmail.com>
 * Bugfixes relating to cleanup of connections during errors.

* Christian Pedersen <https://github.com/chripede>
 * IPv6 HTTPS proxy bugfix

* Jordan Moldow <https://github.com/jmoldow>
 * Fix low-level exceptions leaking from ``HTTPResponse.stream()``.
 * Bugfix for ``ConnectionPool.urlopen(release_conn=False)``.
 * Creation of ``HTTPConnectionPool.ResponseCls``.

* Predrag Gruevski <https://github.com/obi1kenobi>
 * Made cert digest comparison use a constant-time algorithm.

* Adam Talsma <https://github.com/a-tal>
 * Bugfix to ca_cert file paths.

* Evan Meagher <https://evanmeagher.net>

* Bugfix related to `memoryview` usage in PyOpenSSL adapter

* John Vandenberg <jayvdb@gmail.com>
* Python 2.6 fixes; pyflakes and pep8 compliance

* Andy Caldwell <andy.m.caldwell@googlemail.com>
* Bugfix related to reusing connections in indeterminate states.

* Ville Skytt <ville.skytta@iki.fi>
* Logging efficiency
improvements, spelling fixes, Travis config.

* Shige Takeda <smtakeda@gmail.com>
* Started Recipes documentation and added a recipe about handling concatenated gzip data in HTTP response

* Jess Shapiro <jesse@jesseshapiro.net>
* Various character-encoding fixes/tweaks
* Disabling IPv6 DNS when IPv6 connections not supported

* David Foster <http://dafoster.net/>
* Ensure order of request and response headers are preserved.

* Jeremy Cline <jeremy@jcline.org>
* Added connection pool keys by scheme

* Aviv Palivoda <palaviv@gmail.com>
* History list to Retry object.
* HTTPResponse contains the last Retry object.

* Nate Prewitt <nate.prewitt@gmail.com>
* Ensure timeouts are not booleans and greater than zero.
* Fixed infinite loop in ``stream`` when amt=None.
* Added length_remaining to determine remaining data to be read.
* Added enforce_content_length to raise exception when incorrect content-length received.

* Seth Michael Larson <sethmichaellarson@protonmail.com>
* Created selectors backport that supports PEP 475.

* Alexandre Dias <alex.dias@smarkets.com>
* Don't retry on timeout if method not in whitelist

* Moinuddin Quadri <moin18@gmail.com>
* Lazily load idna package

* Tom White <s6yg1ez3@mail2tor.com>
* Made SOCKS handler differentiate socks5h from socks5 and socks4a from socks4.

* Tim Burke <tim.burke@gmail.com>

* Stop buffering entire deflate-encoded responses.

* Tuukka Mustonen <tuukka.mustonen@gmail.com>
* Add counter for status_forcelist retries.

* Erik Rose <erik@mozilla.com>
* Bugfix to pyopenssl vendoring

* Wolfgang Richter <wolfgang.richter@gmail.com>
* Bugfix related to loading full certificate chains with PyOpenSSL backend.

* Mike Miller <github@mikeage.net>
* Logging improvements to include the HTTP(S) port when opening a new connection

* Ioannis Tziakos <mail@itziakos.gr>
* Fix ``util.selectors._fileobj_to_fd`` to accept ``long``.
* Update appveyor tox setup to use the 64bit python.

* Akamai
(through Jess Shapiro) <jshapiro@akamai.com>
* Ongoing maintenance; 2017-2018

* Dominique Leuenberger <dimstar@opensuse.org>
* Minor fixes in the test suite

* Will Bond <will@wbond.net>
* Add Python 2.6 support to ``contrib.securetransport``

* Aleksei Alekseev <alekseev.yeskela@gmail.com>
* using auth info for socks proxy

* Chris Wilcox <git@crwilcox.com>
* Improve contribution guide
* Add ``HTTPResponse.geturl`` method to provide ``urllib2.urlopen().geturl()`` behavior

* Bruce Merry <https://www.brucemerry.org.za>
* Fix leaking exceptions when system calls are interrupted with zero timeout

* Hugo van Kemenade <https://github.com/hugovk>
* Drop support for EOL Python 2.6

* Tim Bell <https://github.com/timb07>
* Bugfix for responses with Content-Type: message/* logging warnings

* Justin Bramley <https://github.com/jbramleycl>
* Add ability to handle multiple Content-Encodings

* Katsuhiko YOSHIDA <https://github.com/kyoshidajp>

* Remove Authorization header
regardless of case when redirecting to cross-site

* James Meickle <https://permadeath.com/>
* Improve handling of Retry-After header

* Chris Jerdonek <chris.jerdonek@gmail.com>
* Remove a spurious TypeError from the exception chain inside
HTTPConnectionPool._make_request(), also for BaseExceptions.

* Jorge Lopez Silva <https://github.com/jalopezsilva>
* Added support for forwarding requests through HTTPS proxies.

* Benno Rice <benno@jeamland.net>
* Allow cadata parameter to be passed to underlying ``SSLContext.load_verify_locations()``.

* Keiichi Kobayashi <abok.1k@gmail.com>
* Rename VerifiedHTTPSConnection to HTTPSConnection

* Himanshu Garg <garg_himanshu@outlook.com>
* DOC & LICENSE Update

* Hod Bin Noon <bin.noon.hod@gmail.com>
* Test improvements

* Chris Olufson <tycarac@gmail.com>
* Fix for connection not being released on HTTP redirect and response not preloaded

* [Bastiaan Bakker] <https://github.com/bastiaanb>
* Support for logging session keys
via environment variable ``SSLKEYLOGFILE`` (Python 3.8+)

* [Ezzeri Esa] <https://github.com/savarin>
* Ports and extends on types from typeshed

* [Your name or handle] <[email or website]>
* [Brief summary of your changes]

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# 1.2501 unzip 6.0-59.el9

## 1.2501.1 Available under license :

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note regarding this option is in the executable's startup banner. The sole exception to this condition is redistribution of a standard UnZipSFX binary (including SFXWiz) as part of a self-extracting archive; that is permitted without inclusion of this license, as long as the normal SFX banner has not been removed from the binary or disabled.

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---

This is the Info-ZIP file COPYING (for UnZip), last updated 17 Jul 2000.

---

FIRST NOTE:
This file contains some details about the copyright history of contributions to the UnZip project.
Additionally, it summarises some exceptions to the general BSD-like copyright found in LICENSE that covers our generic code and most of the system specific ports.
Please read LICENSE first to find out what is allowed to do with Info-ZIP's UnZip code.

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

There are currently two explicit copyrights on portions of UnZip
code (at least, of which Info-ZIP is aware):
Jim Luther's Mac OS File Manager interface code; and Christopher Evans'
MacBinaryIII coding code (for the MacOS port).. These copyrights
are discussed in more detail below.

All remaining
code is now (starting with UnZip version 5.41) covered
by the new Info-ZIP license. For details, please read the acompaning
file LICENSE. The terms and conditions in this license supersede the
copyright conditions of the contributions by Igor Mandrichenko
(vms/vms.c), Greg Roelofs (zipinfo.c, new version of unshrink.c),
Mike White (Windows DLL code in "windll/*"), Steve P. Miller (Pocket
UnZip GUI "wince/*"), and Mark Adler (inflate/explode decompresseion
core routines, previously put into the public domain). All these
Info-ZIP contributors (or "primary" authors) have permitted us to
replace their copyright notes by the Info-ZIP License.

Frequently Asked Questions regarding (re)distribution of Zip and UnZip
are near the end of this file.

There are no known patents on any of the code in UnZip. Unisys
claims a patent on LZW encoding and on LZW decoding _in an apparatus
that performs LZW encoding_, but the patent appears to exempt a stand-
alone decoder (as in UnZip's unshrink.c). Unisys has publicly claimed
otherwise, but the issue has never been tested in court. Since this
point is unclear, unshrinking is not enabled by default. It is the
responsibility of the user to make his or her peace with Unisys and
its licensing requirements. (unshrink.c may be removed from future
releases altogether.)

---

The original unzip source code has been extensively modified and
almost entirely rewritten (changes include random zipfile access
rather than sequential; replacement of unimplode() with explode();
replacement of old unshrink() with new (unrelated) unshrink(); re-
placement of output routines; addition of inflate(), wildcards,
filename-mapping, text translation, ...; etc.). As far as we can
tell, only the core code of the unreduce method remained substantially
similar to Mr. Smith's original source. As of UnZip
5.42, the complete
core code is now covered by the Info-ZIP Licence. Therefore, support
for the reduce method has been removed.
The drop of the reduce method should only affect some test archives,
reducing was never used in any publically distributed Zip program.
For pathologic cases where support for reduced archive entries is
needed, the unreduce code copyrighted by Samuel H. Smith is available

as a separate distribution (the restricted copyright of this code is
cited below in the "historical" section).

The following copyright applies to the Mac OS File Manager interface code
(macos/source/macstuff.[ch]), distributed with UnZip 5.4 and later:

```
  * MoreFiles
  *
  * A collection of File Manager and related routines
  *
  * by Jim Luther (Apple Macintosh Developer Technical Support Emeritus)
  * with significant code contributions by Nitin Ganatra
  * (Apple Macintosh Developer Technical Support Emeritus)
  * Copyright  1992-1998
Apple Computer, Inc.
  * Portions copyright  1995 Jim Luther
  * All rights reserved.
  * The Package "More Files" is distributed under the following
  * license terms:
  *
  *         "You may incorporate this sample code into your
  *          applications without restriction, though the
  *          sample code has been provided "AS IS" and the
  *          responsibility for its operation is 100% yours.
  *          However, what you are not permitted to do is to
  *          redistribute the source as "DSC Sample Code" after
  *          having made changes. If you're going to
  *          redistribute the source, we require that you make
  *          it clear in the source that the code was descended
  *          from Apple Sample Code, but that you've made
  *          changes."
```

The usage terms of this copyright note are compatible with the
Info-ZIP license, they do not add further restrictions.

The following
copyright applies to the Mac OS "macbin3" decoding code
(extra field compatibility with ZipIt):

```
  *  MacBinaryIII.h
  *
  *  Copyright 1997 Christopher Evans (cevans@poppybank.com)
  *
  *  Basic encoding and decoding of Macintosh files to the
  *  MacBinary III spec.
  * ---------------------------------------------------------------------
  * This source is copyrighted by Christopher Evans (cevans@poppybank.com)
```

```
  * (available at ftp://ftp.lazerware.com/MacBinaryIII_src_C.sit
  * homepage of Leonard Rosenthol  leonardr@netcom.com)
```

This copyright note does not contain any usage terms.  So, we assume that this code is freely reusable until we are proved wrong...

---

The remaining copyright notes have been superseeded by the new Info-ZIP license, with explicit permission from the respective original authors.  They are cited here for historical reasons, only:

The following copyright applies to the full-featured unreduce.c (now distributed separately):

```
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  *
  * Do not distribute modified versions without my permission.
  * Do not remove or alter this notice or any other copyright notice.
  * If you use this in your own program you must distribute source code.
  * Do not use any of this in a commercial product.
```

Regarding the first stipulation, Mr. Smith was tracked down in southern California some years back [Samuel H. Smith, The Tool Shop; as of mid-May 1994, (213) 851-9969 (voice), (213) 887-2127(?) (subscription BBS), 71150.2731@compuserve.com]:

"He says that he thought that whoever contacted him understood that he has no objection to the Info-ZIP group's inclusion of his code. His primary concern is that it remain freely distributable, he said."

Despite the fact that our "normal" code has been entirely rewritten and by default no longer contains any of Mr. Smith's code, Info-ZIP remains indebted and grateful to him.  We hope he finds our contributions as useful as we have his.

Note that the third and fourth stipulations still apply to any company that wishes to incorporate the unreduce code into its products; if you wish to do so, you must contact Mr. Smith directly regarding licensing.

---

The following copyright applied to most of the VMS code in vms.c, distributed with UnZip version 4.2 and later:

```
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  * Permission is granted to any individual or institution to use, copy,
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  * are included unmodified and that this copyright notice is retained.
```

---

The following copyright applied to the new version of unshrink.c, distributed with UnZip version 5.2 and later:

```
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  * Frequently Asked Questions section below, plus one additional
  * condition:  namely, that my name not be removed from the source
  * code.  (Other names may, of course, be added as modifications
  * are made.)  Corporate legal staff (like at IBM :-) ) who have
  * problems understanding this can contact me through Zip-Bugs...
```

---

The following copyright applied to the Windows DLL code (windll/*), distributed with UnZip version 5.2 and later:

```
  * Copyright (c) 1996 Mike White.
  * Permission is granted to any individual or institution to use,
  * copy, or redistribute this software so long as all of the original
  * files are included, that it is not sold for profit, and that this
  * copyright notice is retained.
```

---

The following copyright applied to the Windows CE GUI port, ``Pocket UnZip," distributed with UnZip version 5.3 and later:

```
  * All the source files for Pocket UnZip, except for components
  * written by the Info-ZIP group, are copyrighted 1997 by Steve P.
  * Miller.  The product "Pocket UnZip" itself is property of the
  * author and cannot be altered in any way without written consent
  * from Steve P. Miller.
```

---

The remaining code was written by many people associated with the Info-ZIP group, with large contributions from (but not limited to): Greg Roelofs (overall program logic, ZipInfo, unshrink, filename

mapping/portability, etc.), Mark Adler (inflate, explode, funzip),
Kai Uwe Rommel (OS/2), John Bush and Paul Kienitz (Amiga), Antoine
Verheijen (Macintosh), Hunter Goatley (more VMS), Mike White (Windows
DLLs), Christian Spieler (overall logic, optimization, VMS, etc.) and
others. See the file CONTRIBS in the source distribution for a much
more complete list of contributors.
The decompression core code for the deflate method (inflate.[ch],
explode.c) was originally written by Mark Adler who submitted it
as public domain code.

---

# 1.2502 jsp 3.1

## 1.2502.1 Available under license :

No license file was found, but licenses were detected in source scan.

/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/HttpJspPage.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/JspApplicationContext.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/JspContext.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/JspEngineInfo.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/JspException.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/JspFactory.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/JspPage.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/JspTagException.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/JspWriter.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/LocalStrings.properties#
Licensed to the Apache Software Foundation (ASF) under one or more
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/LocalStrings_de.properties# Licensed to the Apache Software Foundation (ASF) under one or more
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/LocalStrings_es.properties# Licensed to the Apache Software Foundation (ASF) under one or more
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/LocalStrings_fr.properties# Licensed to the Apache Software Foundation (ASF) under one or more

/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/LocalStrings_ja.properties#
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/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/LocalStrings_ko.properties# Licensed to the Apache Software Foundation (ASF) under one or more
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/LocalStrings_zh_CN.properties# Licensed to the Apache Software Foundation (ASF) under one or more
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/PageContext.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/SkipPageException.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/el/ELException.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/el/ELParseException.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/el/Expression.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/el/ExpressionEvaluator.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/el/FunctionMapper.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/el/ImplicitObjectELResolver.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/el/ImportELResolver.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/el/NotFoundELResolver.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/el/ScopedAttributeELResolver.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/el/VariableResolver.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/resources/jspxml.dtd<!--
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/resources/jspxml.xsd<?xml
 version ="1.0"?>
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/BodyContent.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/BodyTag.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/BodyTagSupport.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/DynamicAttributes.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/FunctionInfo.java/*

/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/IterationTag.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/JspFragment.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/JspIdConsumer.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/JspTag.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/PageData.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/SimpleTag.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/SimpleTagSupport.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/Tag.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/TagAdapter.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/TagAttributeInfo.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/TagData.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/TagExtraInfo.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/TagFileInfo.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/TagInfo.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/TagLibraryInfo.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/TagLibraryValidator.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/TagSupport.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/TagVariableInfo.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/TryCatchFinally.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/ValidationMessage.java/*
/opt/cola/permits/2761851181_1763039720.6068666/0/tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/tagext/VariableInfo.java/*

Found
 in path(s):
*

No license file was found, but licenses were detected in source scan.

/*
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* contributor license agreements.  See the NOTICE file distributed with
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* The ASF licenses this file to You under the Apache License, Version 2.0
* (the "License"); you may not use this file except in compliance with
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*
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* WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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* limitations under the License.
*/

Found in path(s):
* /tomcat-jsp-api-10-1-7-sources-jar/jakarta/servlet/jsp/ErrorData.java

# 1.2503 klauspost-compress 1.17.9

## 1.2503.1 Available under license :

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```
# This is the official list of people who can contribute
# (and typically have contributed) code to the Snappy-Go repository.
# The AUTHORS file lists the copyright holders; this file
# lists people.  For example, Google employees are listed here
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#
# The submission process automatically checks to make sure
# that people submitting code are listed in this file (by email address).
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# Names should be added to this file only after verifying that
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#     http://code.google.com/legal/individual-cla-v1.0.html
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#
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Manifest-Version: 1.0
Created-By: Apache Maven Bundle Plugin 5.1.9
Build-Jdk-Spec: 21
Specification-Title: Logback Core Module
Specification-Version: 1.5
Specification-Vendor: QOS.ch
Implementation-Title: Logback Core Module
Implementation-Version: 1.5.21
Implementation-Vendor: QOS.ch
Bundle-Description: logback-core module
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Bundle-ManifestVersion: 2
Bundle-Name: Logback Core Module
Bundle-SymbolicName: ch.qos.logback.core
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Export-Package: ch.qos.logback.core;version="1.5.21";uses:="ch.qos.logba
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regex,java.util.stream,java.util.zip,javax.naming,javax.naming.spi,java
x.net,javax.net.ssl,javax.xml.parsers,org.fusesource.jansi;resolution:=
optional;version="[2.4,3)"
Multi-Release: true
Originally-Created-By: Apache Maven Bundle Plugin 5.1.9
Require-Capability: osgi.ee;filter:="(&(osgi.ee=JavaSE)(version=11))"
Tool: Bnd-6.3.1.202206071316

Found in path(s):
* /logback-core-1-5-21-jar/META-INF/MANIFEST.MF
No license file was found, but licenses were detected in source scan.

/opt/cola/permits/2764117884_1768818444.9739974/0/logback-core-1-5-21-
jar/ch/qos/logback/core/rolling/FixedWindowRollingPolicy.class afterLastSlash
/opt/cola/permits/2764117884_1768818444.9739974/0/logback-core-1-5-21-
jar/ch/qos/logback/core/rolling/SizeAndTimeBasedFileNamingAndTriggeringPolicy.class afterLastSlash
/opt/cola/permits/2764117884_1768818444.9739974/0/logback-core-1-5-21-
jar/ch/qos/logback/core/rolling/TimeBasedRollingPolicy.class afterLastSlash

Found in path(s):
* clientsLock
No license file was found, but licenses were detected in source scan.

/opt/cola/permits/2764117884_1768818444.9739974/0/logback-core-1-5-21-
jar/ch/qos/logback/core/net/server/ConcurrentServerRunner.class
/opt/cola/permits/2764117884_1768818444.9739974/0/logback-core-1-5-21-
jar/ch/qos/logback/core/rolling/helper/FileFilterUtil.class afterLastSlash
/opt/cola/permits/2764117884_1768818444.9739974/0/logback-core-1-5-21-
jar/ch/qos/logback/core/rolling/helper/SizeAndTimeBasedArchiveRemover.class afterLastSlash

Found in path(s):
*

# 1.2505 rust_decimal 1.39.0

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# 1.2506 types-yargs 16.0.11

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# 1.2507 click 8.3.1

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```{literalinclude} ../LICENSE.txt
---
language: text
---
```

# 1.2508 form-data 4.0.5

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@c ispell-local-pdict: "ispell-dict"
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```
name: FastAPI People Contributors

on:
 schedule:
   - cron: "0 3 1 * *"
 workflow_dispatch:
   inputs:
     debug_enabled:
       description: "Run the build with tmate debugging enabled (https://github.com/marketplace/actions/debugging-with-tmate)"
       required: false
       default: "false"

env:
 UV_SYSTEM_PYTHON: 1

jobs:
 job:
   if: github.repository_owner == 'fastapi'
   runs-on: ubuntu-latest
   permissions:
     contents: write
   steps:
     - name: Dump GitHub context
       env:
         GITHUB_CONTEXT: ${{ toJson(github) }}
       run: echo "$GITHUB_CONTEXT"
     - uses: actions/checkout@v5
     - name: Set up Python
       uses: actions/setup-python@v6
       with:
         python-version: "3.11"
     - name: Setup uv
       uses: astral-sh/setup-uv@v7
       with:
         version: "0.4.15"
         enable-cache: true
         cache-dependency-glob: |
           requirements**.txt
           pyproject.toml
     - name: Install Dependencies
```

```
        run: uv pip install -r requirements-github-actions.txt
      # Allow debugging with tmate
      - name: Setup tmate session
        uses: mxschmitt/action-tmate@v3
        if: ${{ github.event_name == 'workflow_dispatch' && github.event.inputs.debug_enabled == 'true' }}
        with:
          limit-access-to-actor: true
        env:
          GITHUB_TOKEN: ${{ secrets.FASTAPI_PR_TOKEN }}
      - name: FastAPI People Contributors
        run: python ./scripts/contributors.py
        env:
          GITHUB_TOKEN: ${{ secrets.FASTAPI_PR_TOKEN }}
tiangolo:
 login: tiangolo
 count: 794
 avatarUrl:
https://avatars.githubusercontent.com/u/1326112?u=cb5d06e73a9e1998141b1641aa88e443c6717651&v=4
 url: https://github.com/tiangolo
dependabot:
 login: dependabot
 count: 126
 avatarUrl: https://avatars.githubusercontent.com/in/29110?v=4
 url: https://github.com/apps/dependabot
alejsdev:
 login: alejsdev
 count: 52
 avatarUrl:
https://avatars.githubusercontent.com/u/90076947?u=447d12a1b347f466b35378bee4c7104cc9b2c571&v=4
 url: https://github.com/alejsdev
pre-commit-ci:
 login: pre-commit-ci
 count: 49
 avatarUrl: https://avatars.githubusercontent.com/in/68672?v=4
 url: https://github.com/apps/pre-commit-ci
github-actions:
 login: github-actions
 count: 26
 avatarUrl: https://avatars.githubusercontent.com/in/15368?v=4
 url: https://github.com/apps/github-actions
Kludex:
 login: Kludex
 count: 25
 avatarUrl:
https://avatars.githubusercontent.com/u/7353520?u=df8a3f06ba8f55ae1967a3e2d5ed882903a4e330&v=4
 url: https://github.com/Kludex
dmontagu:
```

login: dmontagu
count: 17
avatarUrl:
https://avatars.githubusercontent.com/u/35119617?u=540f30c937a6450812628b9592a1dfe91bbe148e&v=4
url: https://github.com/dmontagu
YuriiMotov:
login: YuriiMotov
count: 15
avatarUrl:
https://avatars.githubusercontent.com/u/109919500?u=b9b13d598dddfab529a52d264df80a900bfe7060&v=4
url: https://github.com/YuriiMotov
nilslindemann:
login: nilslindemann
count: 14
avatarUrl:
https://avatars.githubusercontent.com/u/6892179?u=1dca6a22195d6cd1ab20737c0e19a4c55d639472&v=4
url: https://github.com/nilslindemann
euri10:
login: euri10
count: 13
avatarUrl:
https://avatars.githubusercontent.com/u/1104190?u=321a2e953e6645a7d09b732786c7a8061e0f8a8b&v=4
url: https://github.com/euri10
svlandeg:
login: svlandeg
count: 13
avatarUrl:
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kantandane:
login: kantandane
count: 13
avatarUrl:
https://avatars.githubusercontent.com/u/3978368?u=cccc199291f991a73b1ebba5abc735a948e0bd16&v=4
url: https://github.com/kantandane
zhaohan-dong:
login: zhaohan-dong
count: 11
avatarUrl:
https://avatars.githubusercontent.com/u/65422392?u=8260f8781f50248410ebfa4c9bf70e143fe5c9f2&v=4
url: https://github.com/zhaohan-dong
mariacamilagl:
login: mariacamilagl
count: 9
avatarUrl:
https://avatars.githubusercontent.com/u/11489395?u=4adb6986bf3debfc2b8216ae701f2bd47d73da7d&v=4
url: https://github.com/mariacamilagl
handabaldeep:

login: handabaldeep
count: 9
avatarUrl:
https://avatars.githubusercontent.com/u/12239103?u=6c39ef15d14c6d5211f5dd775cc4842f8d7f2f3a&v=4
url: https://github.com/handabaldeep
vishnuvskvkl:
login: vishnuvskvkl
count: 8
avatarUrl:
https://avatars.githubusercontent.com/u/84698110?u=8af5de0520dd4fa195f53c2850a26f57c0f6bc64&v=4
url: https://github.com/vishnuvskvkl
alissadb:
login: alissadb
count: 6
avatarUrl:
https://avatars.githubusercontent.com/u/96190409?u=be42d85938c241be781505a5a872575be28b2906&v=4
url: https://github.com/alissadb
alv2017:
login: alv2017
count: 6
avatarUrl: https://avatars.githubusercontent.com/u/31544722?v=4
url: https://github.com/alv2017
wshayes:
login: wshayes
count: 5
avatarUrl: https://avatars.githubusercontent.com/u/365303?u=07ca03c5ee811eb0920e633cc3c3db73dbec1aa5&v=4
url: https://github.com/wshayes
samuelcolvin:
login: samuelcolvin
count: 5
avatarUrl:
https://avatars.githubusercontent.com/u/4039449?u=42eb3b833047c8c4b4f647a031eaef148c16d93f&v=4
url: https://github.com/samuelcolvin
waynerv:
login: waynerv
count: 5
avatarUrl:
https://avatars.githubusercontent.com/u/39515546?u=ec35139777597cdbbbddda29bf8b9d4396b429a9&v=4
url: https://github.com/waynerv
krishnamadhavan:
login: krishnamadhavan
count: 5
avatarUrl:
https://avatars.githubusercontent.com/u/31798870?u=950693b28f3ae01105fd545c046e46ca3d31ab06&v=4
url: https://github.com/krishnamadhavan
jekirl:
login: jekirl
count: 4

avatarUrl:
https://avatars.githubusercontent.com/u/2546697?u=a027452387d85bd4a14834e19d716c99255fb3b7&v=4
url: https://github.com/jekirl
hitrust:
login: hitrust
count: 4
avatarUrl:
https://avatars.githubusercontent.com/u/3360631?u=5fa1f475ad784d64eb9666bdd43cc4d285dcc773&v=4
url: https://github.com/hitrust
ShahriyarR:
login: ShahriyarR
count: 4
avatarUrl:
https://avatars.githubusercontent.com/u/3852029?u=631b2ae59360ab380c524b32bc3d245aff1165af&v=4
url: https://github.com/ShahriyarR
adriangb:
login: adriangb
count: 4
avatarUrl:
https://avatars.githubusercontent.com/u/1755071?u=612704256e38d6ac9cbed24f10e4b6ac2da74ecb&v=4
url: https://github.com/adriangb
iudeen:
login: iudeen
count: 4
avatarUrl:
https://avatars.githubusercontent.com/u/10519440?u=f09cdd745e5bf16138f29b42732dd57c7f02bee1&v=4
url: https://github.com/iudeen
musicinmybrain:
login: musicinmybrain
count: 4
avatarUrl:
https://avatars.githubusercontent.com/u/6898909?u=9010312053e7141383b9bdf538036c7f37fbaba0&v=4
url: https://github.com/musicinmybrain
philipokiokio:
login: philipokiokio
count: 4
avatarUrl:
https://avatars.githubusercontent.com/u/55271518?u=d30994d339aaaf1f6bf1b8fc810132016fbd4fdc&v=4
url: https://github.com/philipokiokio
AlexWendland:
login: AlexWendland
count: 4
avatarUrl:
https://avatars.githubusercontent.com/u/3949212?u=c4c0c615e0ea33d00bfe16b779cf6ebc0f58071c&v=4
url: https://github.com/AlexWendland
divums:
login: divums
count: 3

avatarUrl: https://avatars.githubusercontent.com/u/1397556?v=4
url: https://github.com/divums
prostomarkeloff:
login: prostomarkeloff
count: 3
avatarUrl:
https://avatars.githubusercontent.com/u/28061158?u=6918e39a1224194ba636e897461a02a20126d7ad&v=4
url: https://github.com/prostomarkeloff
frankie567:
login: frankie567
count: 3
avatarUrl:
https://avatars.githubusercontent.com/u/1144727?u=f3e79acfe4ed207e15c2145161a8a9759925fcd2&v=4
url: https://github.com/frankie567
nsidnev:
login: nsidnev
count: 3
avatarUrl:
https://avatars.githubusercontent.com/u/22559461?u=a9cc3238217e21dc8796a1a500f01b722adb082c&v=4
url: https://github.com/nsidnev
pawamoy:
login: pawamoy
count: 3
avatarUrl:
https://avatars.githubusercontent.com/u/3999221?u=b030e4c89df2f3a36bc4710b925bdeb6745c9856&v=4
url: https://github.com/pawamoy
patrickmckenna:
login: patrickmckenna
count: 3
avatarUrl:
https://avatars.githubusercontent.com/u/3589536?u=53aef07250d226d35e526768e26891964907b41a&v=4
url: https://github.com/patrickmckenna
hukkin:
login: hukkin
count: 3
avatarUrl:
https://avatars.githubusercontent.com/u/3275109?u=77bb83759127965eacbfe67e2ca983066e964fde&v=4
url: https://github.com/hukkin
marcosmmb:
login: marcosmmb
count: 3
avatarUrl:
https://avatars.githubusercontent.com/u/6181089?u=03c50eec631857d84df5232890780d00a3f76903&v=4
url: https://github.com/marcosmmb
Serrones:
login: Serrones
count: 3
avatarUrl:

https://avatars.githubusercontent.com/u/22691749?u=4795b880e13ca33a73e52fc0ef7dc9c60c8fce47&v=4
  url: https://github.com/Serrones
uriyyo:
 login: uriyyo
 count: 3
 avatarUrl:
https://avatars.githubusercontent.com/u/32038156?u=c26ca9b821fcf6499b84db75f553d4980bf8d023&v=4
 url: https://github.com/uriyyo
andrew222651:
 login: andrew222651
 count: 3
 avatarUrl: https://avatars.githubusercontent.com/u/889657?u=d70187989940b085bcbfa3bedad8dbc5f3ab1fe7&v=4
 url: https://github.com/andrew222651
rkbeatss:
 login: rkbeatss
 count: 3
 avatarUrl: https://avatars.githubusercontent.com/u/23391143?u=56ab6bff50be950fa8cae5cf736f2ae66e319ff3&v=4
 url: https://github.com/rkbeatss
asheux:
 login: asheux
 count: 3
 avatarUrl:
https://avatars.githubusercontent.com/u/22955146?u=4553ebf5b5a7c7fe031a46182083aa224faba2e1&v=4
 url: https://github.com/asheux
blkst8:
 login: blkst8
 count: 3
 avatarUrl:
https://avatars.githubusercontent.com/u/49960770?u=7d8a6d5f0a75a5e9a865a2527edfd48895ea27ae&v=4
 url:
 https://github.com/blkst8
ghandic:
 login: ghandic
 count: 3
 avatarUrl:
https://avatars.githubusercontent.com/u/23500353?u=e2e1d736f924d9be81e8bfc565b6d8836ba99773&v=4
 url: https://github.com/ghandic
TeoZosa:
 login: TeoZosa
 count: 3
 avatarUrl:
https://avatars.githubusercontent.com/u/13070236?u=96fdae85800ef85dcfcc4b5f8281dc8778c8cb7d&v=4
 url: https://github.com/TeoZosa
graingert:
 login: graingert
 count: 3
 avatarUrl: https://avatars.githubusercontent.com/u/413772?v=4
 url: https://github.com/graingert

jaystone776:
 login: jaystone776
 count: 3
 avatarUrl:
https://avatars.githubusercontent.com/u/11191137?u=299205a95e9b6817a43144a48b643346a5aac5cc&v=4
 url: https://github.com/jaystone776
zanieb:
 login: zanieb
 count: 3
 avatarUrl: https://avatars.githubusercontent.com/u/2586601?u=e5c86f7ff3b859e7e183187ac2b17fd6ee32b3ab&v=4
 url: https://github.com/zanieb
MicaelJarniac:
 login: MicaelJarniac
 count: 3
 avatarUrl:
https://avatars.githubusercontent.com/u/19514231?u=158c91874ea98d6e9e6f0c6db37ee2ce60c55ff2&v=4
  url: https://github.com/MicaelJarniac
papb:
 login: papb
 count: 3
 avatarUrl:
https://avatars.githubusercontent.com/u/20914054?u=890511fae7ea90d887e2a65ce44a1775abba38d5&v=4
 url: https://github.com/papb
tamird:
 login: tamird
 count: 3
 avatarUrl: https://avatars.githubusercontent.com/u/1535036?v=4
 url: https://github.com/tamird
Nimitha-jagadeesha:
 login: Nimitha-jagadeesha
 count: 3
 avatarUrl: https://avatars.githubusercontent.com/u/58389915?v=4
 url: https://github.com/Nimitha-jagadeesha
lucaromagnoli:
 login: lucaromagnoli
 count: 3
 avatarUrl:
https://avatars.githubusercontent.com/u/38782977?u=15df02e806a2293af40ac619fba11dbe3c0c4fd4&v=4
 url: https://github.com/lucaromagnoli
salmantec:
 login: salmantec
 count: 3
 avatarUrl:
https://avatars.githubusercontent.com/u/41512228?u=443551b893ff2425c59d5d021644f098cf7c68d5&v=4
 url: https://github.com/salmantec
OCE1960:
 login: OCE1960
 count: 3

avatarUrl:
https://avatars.githubusercontent.com/u/45076670?u=0e9a44712b92ffa89ddfbaa83c112f3f8e1d68e2&v=4
url: https://github.com/OCE1960
hamidrasti:
login: hamidrasti
count: 3
avatarUrl: https://avatars.githubusercontent.com/u/43915620?v=4
url: https://github.com/hamidrasti
valentinDruzhinin:
login: valentinDruzhinin
count: 3
avatarUrl:
https://avatars.githubusercontent.com/u/12831905?u=aae1ebc675c91e8fa582df4fcc4fc4128106344d&v=4
url: https://github.com/valentinDruzhinin
kkinder:
login: kkinder
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/1115018?u=c5e90284a9f5c5049eae1bb029e3655c7dc913ed&v=4
url: https://github.com/kkinder
kabirkhan:
login: kabirkhan
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/13891834?u=e0eabf792376443ac853e7dca6f550db4166fe35&v=4
url: https://github.com/kabirkhan
zamiramir:
login: zamiramir
count: 2
avatarUrl: https://avatars.githubusercontent.com/u/40475662?v=4
url: https://github.com/zamiramir
trim21:
login: trim21
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/13553903?u=3cadf0f02095c9621aa29df6875f53a80ca4fbfb&v=4
url: https://github.com/trim21
koxudaxi:
login: koxudaxi
count: 2
avatarUrl: https://avatars.githubusercontent.com/u/630670?u=507d8577b4b3670546b449c4c2ccbc5af40d72f7&v=4
url: https://github.com/koxudaxi
pablogamboa:
login: pablogamboa
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/12892536?u=326a57059ee0c40c4eb1b38413957236841c631b&v=4
url: https://github.com/pablogamboa

dconathan:
 login: dconathan
 count: 2
 avatarUrl: https://avatars.githubusercontent.com/u/15098095?v=4
 url: https://github.com/dconathan
Jamim:
 login: Jamim
 count: 2
 avatarUrl:
https://avatars.githubusercontent.com/u/5607572?u=9ce0b6a6d1a5124e28b3c04d8d26827ca328713a&v=4
 url: https://github.com/Jamim
svalouch:
 login: svalouch
 count: 2
 avatarUrl: https://avatars.githubusercontent.com/u/54674660?v=4
 url: https://github.com/svalouch
marier-nico:
  login: marier-nico
 count: 2
 avatarUrl:
https://avatars.githubusercontent.com/u/30477068?u=c7df6af853c8f4163d1517814f3e9a0715c82713&v=4
 url: https://github.com/marier-nico
Dustyposa:
 login: Dustyposa
 count: 2
 avatarUrl:
https://avatars.githubusercontent.com/u/27180793?u=5cf2877f50b3eb2bc55086089a78a36f07042889&v=4
 url: https://github.com/Dustyposa
aviramha:
 login: aviramha
 count: 2
 avatarUrl:
https://avatars.githubusercontent.com/u/41201924?u=ce5d3ea7037c2e6b3f82eff87e2217d4fb63214b&v=4
 url: https://github.com/aviramha
iwpnd:
 login: iwpnd
 count: 2
 avatarUrl: https://avatars.githubusercontent.com/u/6152183?u=ec59396e9437fff488791c5ecdf6d23f1f1ebf3a&v=4
 url: https://github.com/iwpnd
raphaelauv:
 login: raphaelauv
 count: 2
 avatarUrl:
https://avatars.githubusercontent.com/u/10202690?u=e6f86f5c0c3026a15d6b51792fa3e532b12f1371&v=4
 url: https://github.com/raphaelauv
windson:
 login: windson
 count: 2

avatarUrl:
https://avatars.githubusercontent.com/u/1826682?u=8b28dcd716c46289f191f8828e01d74edd058bef&v=4
url: https://github.com/windson
sm-Fifteen:
login: sm-Fifteen
count: 2
avatarUrl: https://avatars.githubusercontent.com/u/516999?u=437c0c5038558c67e887ccd863c1ba0f846c03da&v=4
url: https://github.com/sm-Fifteen
sattosan:
login: sattosan
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/20574756?u=b0d8474d2938189c6954423ae8d81d91013f80a8&v=4
url: https://github.com/sattosan
michaeloliverx:
login: michaeloliverx
count: 2
avatarUrl: https://avatars.githubusercontent.com/u/55017335?u=efb0cb6e261ff64d862fafb91ee80fc2e1f8a2ed&v=4
url: https://github.com/michaeloliverx
voegtlel:
login: voegtlel
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/5764745?u=db8df3d70d427928ab6d7dbfc395a4a7109c1d1b&v=4
url: https://github.com/voegtlel
HarshaLaxman:
login: HarshaLaxman
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/19939186?u=a112f38b0f6b4d4402dc8b51978b5a0b2e5c5970&v=4
url: https://github.com/HarshaLaxman
RunningIkkyu:
login: RunningIkkyu
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/31848542?u=494ecc298e3f26197495bb357ad0f57cfd5f7a32&v=4
url: https://github.com/RunningIkkyu
cassiobotaro:
login: cassiobotaro
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/3127847?u=a08022b191ddbd0a6159b2981d9d878b6d5bb71f&v=4
url: https://github.com/cassiobotaro
chenl:
login: chenl
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/1677651?u=c618508eaad6d596cea36c8ea784b424288f6857&v=4

 url: https://github.com/chenl
retnikt:
 login: retnikt
 count: 2
 avatarUrl: https://avatars.githubusercontent.com/u/24581770?v=4
 url: https://github.com/retnikt
yankeexe:
 login: yankeexe
 count: 2
 avatarUrl:
https://avatars.githubusercontent.com/u/13623913?u=f970e66421775a8d3cdab89c0c752eaead186f6d&v=4
 url: https://github.com/yankeexe
patrickkwang:
 login: patrickkwang
 count: 2
 avatarUrl:
https://avatars.githubusercontent.com/u/1263870?u=4bf74020e15be490f19ef8322a76eec882220b96&v=4
  url: https://github.com/patrickkwang
victorphoenix3:
 login: victorphoenix3
 count: 2
 avatarUrl:
https://avatars.githubusercontent.com/u/48182195?u=e4875bd088623cb4ddeb7be194ec54b453aff035&v=4
 url: https://github.com/victorphoenix3
davidefiocco:
 login: davidefiocco
 count: 2
 avatarUrl: https://avatars.githubusercontent.com/u/4547987?v=4
 url: https://github.com/davidefiocco
adriencaccia:
 login: adriencaccia
 count: 2
 avatarUrl:
https://avatars.githubusercontent.com/u/19605940?u=9a59081f46bfc9d839886a49d5092cf572879049&v=4
 url: https://github.com/adriencaccia
jamescurtin:
 login: jamescurtin
 count: 2
 avatarUrl:
https://avatars.githubusercontent.com/u/10189269?u=0b491fc600ca51f41cf1d95b49fa32a3eba1de57&v=4
 url: https://github.com/jamescurtin
jmriebold:
 login: jmriebold
 count: 2
 avatarUrl: https://avatars.githubusercontent.com/u/6983392?u=4efdc97bf2422dcc7e9ff65b9ff80087c8eb2a20&v=4
  url: https://github.com/jmriebold
nukopy:
 login: nukopy

count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/42367320?u=6061be0bd060506f6d564a8df3ae73fab048cdfe&v=4
url: https://github.com/nukopy
imba-tjd:
login: imba-tjd
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/24759802?u=01e901a4fe004b4b126549d3ff1c4000fe3720b5&v=4
url: https://github.com/imba-tjd
johnthagen:
login: johnthagen
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/10340167?u=47147fc4e4db1f573bee3fe428deeacb3197bc5f&v=4
url: https://github.com/johnthagen
paxcodes:
login: paxcodes
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/13646646?u=e7429cc7ab11211ef762f4cd3efea7db6d9ef036&v=4
url: https://github.com/paxcodes
kaustubhgupta:
login: kaustubhgupta
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/43691873?u=8dd738718ac7ffad4ef31e86b5d780a1141c695d&v=4
url: https://github.com/kaustubhgupta
kinuax:
login: kinuax
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/13321374?u=22dc9873d6d9f2c7e4fc44c6480c3505efb1531f&v=4
url: https://github.com/kinuax
wakabame:
login: wakabame
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/35513518?u=41ef6b0a55076e5c540620d68fb006e386c2ddb0&v=4
url: https://github.com/wakabame
nzig:
login: nzig
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/7372858?u=e769add36ed73c778cdb136eb10bf96b1e119671&v=4
url: https://github.com/nzig
yezz123:
login: yezz123

count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/52716203?u=21b53ce4115062b1e20cb513e64ca0000c2ef127&v=4
url: https://github.com/yezz123
softwarebloat:
login: softwarebloat
count: 2
avatarUrl: https://avatars.githubusercontent.com/u/16540684?v=4
url: https://github.com/softwarebloat
Lancetnik:
login: Lancetnik
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/44573917?u=6eaa0cdd35259fba40a76b82e4903440cba03fa9&v=4
url:
https://github.com/Lancetnik
joakimnordling:
login: joakimnordling
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/6637576?u=df5d99db9b899b399effd429f4358baaa6f7199c&v=4
url: https://github.com/joakimnordling
yogabonito:
login: yogabonito
count: 2
avatarUrl: https://avatars.githubusercontent.com/u/7026269?v=4
url: https://github.com/yogabonito
s111d:
login: s111d
count: 2
avatarUrl: https://avatars.githubusercontent.com/u/4954856?v=4
url: https://github.com/s111d
estebanx64:
login: estebanx64
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/10840422?u=1900887aeed268699e5ea6f3fb7db614f7b77cd3&v=4
url: https://github.com/estebanx64
ndimares:
login: ndimares
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/6267663?u=cfb27efde7a7212be8142abb6c058a1aeadb41b1&v=4
url: https://github.com/ndimares
rabinlamadong:
login: rabinlamadong
count: 2
avatarUrl: https://avatars.githubusercontent.com/u/170439781?v=4

url:
https://github.com/rabinlamadong
AyushSinghal1794:
login: AyushSinghal1794
count: 2
avatarUrl: https://avatars.githubusercontent.com/u/89984761?v=4
url: https://github.com/AyushSinghal1794
gsheni:
login: gsheni
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/8726321?u=ee3bd9ff6320f4715d1dd9671a3d55cccb65b984&v=4
url: https://github.com/gsheni
chailandau:
login: chailandau
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/112015853?u=2e6aaf2b1647db43834aabeae8d8282b4ec01873&v=4
url: https://github.com/chailandau
DanielKusyDev:
login: DanielKusyDev
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/36250676?u=2ea6114ff751fc48b55f231987a0e2582c6b1bd2&v=4
url: https://github.com/DanielKusyDev
DanielYang59:
login: DanielYang59
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/80093591?u=63873f701c7c74aac83c906800a1dddc0bc8c92f&v=4
url: https://github.com/DanielYang59
blueswen:
login: blueswen
count: 2
avatarUrl:
https://avatars.githubusercontent.com/u/1564148?u=6d6b8cc8f2b5cef715e68d6175154a8a94d518ee&v=4
url: https://github.com/blueswen
Taoup:
login: Taoup
count: 2
avatarUrl: https://avatars.githubusercontent.com/u/22348542?v=4
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%define pkidir %{_sysconfdir}/pki

Found in path(s):

* /ca-certificates-2025.2.80_v9.0.305-91.el9.src.rpm-cosi-expand-archive-xKpJBFPS/ca-certificates.spec
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/opt/cola/permits/2771616477_1764765399.2345111/0/ca-certificates-2025.2.80_v9.0.305-91.el9.src.rpm-cosi-expand-archive-xKpJBFPS/ca-legacy.8.txt////
/opt/cola/permits/2771616477_1764765399.2345111/0/ca-certificates-2025.2.80_v9.0.305-91.el9.src.rpm-cosi-expand-archive-xKpJBFPS/certdata.txt#
/opt/cola/permits/2771616477_1764765399.2345111/0/ca-certificates-2025.2.80_v9.0.305-91.el9.src.rpm-cosi-expand-archive-xKpJBFPS/certdata2pem.py#!/usr/bin/python
/opt/cola/permits/2771616477_1764765399.2345111/0/ca-certificates-2025.2.80_v9.0.305-91.el9.src.rpm-cosi-expand-archive-xKpJBFPS/nssckbi.h/* This Source Code Form is subject to the terms of the Mozilla Public
/opt/cola/permits/2771616477_1764765399.2345111/0/ca-certificates-2025.2.80_v9.0.305-91.el9.src.rpm-cosi-expand-archive-xKpJBFPS/update-ca-trust.8.txt////

Found in path(s):
*

# 1.2521 pcre 8.45-r7

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Email local part: Philip.Hazel
Email domain: gmail.com

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Yoyodyne, Inc., hereby disclaims all copyright interest in the
library
`Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

That's all there is to it!

# 1.2524 polkit 0.117-14.el9

## 1.2524.1 Available under license :

```
; 7zAsm.asm -- ASM macros
; 2018-02-03 : Igor Pavlov : Public domain

MY_ASM_START macro
 ifdef x64
   .code
 else
   .386
   .model flat
   _TEXT$00 SEGMENT PARA PUBLIC 'CODE'
 endif
endm

MY_PROC macro name:req, numParams:req
 align 16
 proc_numParams = numParams
 ifdef x64
   proc_name equ name
 else
   proc_name equ @CatStr(@,name,@, %numParams * 4)
 endif
 proc_name PROC
endm

MY_ENDP macro
 ifdef x64
   ret
 else
   if proc_numParams LT 3
     ret
   else
     ret (proc_numParams - 2) * 4
   endif
 endif
 proc_name ENDP
endm

ifdef x64
 REG_SIZE equ 8
```

```
 REG_LOGAR_SIZE equ 3
else
 REG_SIZE equ 4
 REG_LOGAR_SIZE equ 2
endif

 x0 equ EAX
 x1 equ ECX
 x2 equ EDX
 x3 equ EBX
 x4 equ ESP
 x5 equ EBP
 x6 equ ESI
 x7 equ EDI

 x0_W equ AX
 x1_W equ CX
 x2_W equ DX
 x3_W equ BX

 x5_W equ BP
 x6_W equ SI
 x7_W equ DI

 x0_L equ AL
 x1_L equ CL
 x2_L equ DL
 x3_L equ BL

 x0_H equ AH
 x1_H equ CH
 x2_H equ DH
 x3_H equ BH

ifdef x64
 x5_L
 equ BPL
 x6_L equ SIL
 x7_L equ DIL

 r0 equ RAX
 r1 equ RCX
 r2 equ RDX
 r3 equ RBX
 r4 equ RSP
 r5 equ RBP
 r6 equ RSI
 r7 equ RDI
```

```
 x8 equ r8d
 x9 equ r9d
 x10 equ r10d
 x11 equ r11d
 x12 equ r12d
 x13 equ r13d
 x14 equ r14d
 x15 equ r15d
else
 r0 equ x0
 r1 equ x1
 r2 equ x2
 r3 equ x3
 r4 equ x4
 r5 equ x5
 r6 equ x6
 r7 equ x7
endif

MY_PUSH_4_REGS macro
   push    r3
   push    r5
   push    r6
   push    r7
endm

MY_POP_4_REGS macro
   pop     r7
   pop     r6
   pop     r5
   pop     r3
endm


ifdef x64

; for WIN64-x64 ABI:

REG_PARAM_0 equ r1
REG_PARAM_1 equ r2
REG_PARAM_2 equ r8
REG_PARAM_3 equ r9

MY_PUSH_PRESERVED_REGS macro
   MY_PUSH_4_REGS
   push    r12
   push    r13
   push    r14
```

```
  push    r15
endm


MY_POP_PRESERVED_REGS macro
  pop     r15
  pop     r14
  pop     r13
  pop     r12
  MY_POP_4_REGS
endm

endif
// UniqBlocks.h

#ifndef __UNIQ_BLOCKS_H
#define __UNIQ_BLOCKS_H

#include "../../Common/MyTypes.h"
#include "../../Common/MyBuffer.h"
#include "../../Common/MyVector.h"

struct CUniqBlocks
{
 CObjectVector<CByteBuffer> Bufs;
 CUIntVector Sorted;
 CUIntVector BufIndexToSortedIndex;

 unsigned AddUniq(const Byte *data, size_t size);
 UInt64 GetTotalSizeInBytes() const;
 void GetReverseMap();

 bool IsOnlyEmpty() const
 {
  return (Bufs.Size() == 0 || Bufs.Size() == 1 && Bufs[0].Size() == 0);
 }
};

#endif
```

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```
// Windows/Control/Dialog.h

#ifndef __WINDOWS_CONTROL_DIALOG_H
#define __WINDOWS_CONTROL_DIALOG_H

#include "../Window.h"

namespace NWindows {
namespace NControl {

class CDialog: public CWindow
{
public:
 CDialog(HWND wnd = NULL): CWindow(wnd){};
 virtual ~CDialog() {};
```

```
HWND GetItem(int itemID) const
  { return GetDlgItem(_window, itemID); }

bool EnableItem(int itemID, bool enable) const
  { return BOOLToBool(::EnableWindow(GetItem(itemID), BoolToBOOL(enable))); }

bool ShowItem(int itemID, int cmdShow) const
  { return BOOLToBool(::ShowWindow(GetItem(itemID), cmdShow)); }

bool ShowItem_Bool(int itemID, bool show) const
  { return ShowItem(itemID, show ? SW_SHOW: SW_HIDE); }

bool HideItem(int itemID) const { return ShowItem(itemID, SW_HIDE); }

bool SetItemText(int itemID, LPCTSTR s)
  { return BOOLToBool(SetDlgItemText(_window, itemID, s)); }

#ifndef _UNICODE
bool SetItemText(int itemID, LPCWSTR s)
{
  CWindow window(GetItem(itemID));
  return
window.SetText(s);
}
#endif

UINT GetItemText(int itemID, LPTSTR string, int maxCount)
  { return GetDlgItemText(_window, itemID, string, maxCount); }
#ifndef _UNICODE
/*
bool GetItemText(int itemID, LPWSTR string, int maxCount)
{
  CWindow window(GetItem(itemID));
  return window.GetText(string, maxCount);
}
*/
#endif

bool SetItemInt(int itemID, UINT value, bool isSigned)
  { return BOOLToBool(SetDlgItemInt(_window, itemID, value, BoolToBOOL(isSigned))); }
bool GetItemInt(int itemID, bool isSigned, UINT &value)
{
  BOOL result;
  value = GetDlgItemInt(_window, itemID, &result, BoolToBOOL(isSigned));
  return BOOLToBool(result);
}
```

```
HWND GetNextGroupItem(HWND control, bool previous)
  { return GetNextDlgGroupItem(_window, control, BoolToBOOL(previous)); }
HWND GetNextTabItem(HWND control, bool previous)
  { return GetNextDlgTabItem(_window, control, BoolToBOOL(previous)); }

bool MapRect(LPRECT rect)
  { return BOOLToBool(MapDialogRect(_window,
rect)); }

bool IsMessage(LPMSG message)
  { return BOOLToBool(IsDialogMessage(_window, message)); }

LRESULT SendItemMessage(int itemID, UINT message, WPARAM wParam, LPARAM lParam)
  { return SendDlgItemMessage(_window, itemID, message, wParam, lParam); }

bool CheckButton(int buttonID, UINT checkState)
  { return BOOLToBool(CheckDlgButton(_window, buttonID, checkState)); }
bool CheckButton(int buttonID, bool checkState)
  { return CheckButton(buttonID, UINT(checkState ? BST_CHECKED : BST_UNCHECKED)); }

UINT IsButtonChecked(int buttonID) const
  { return IsDlgButtonChecked(_window, buttonID); }
bool IsButtonCheckedBool(int buttonID) const
  { return (IsButtonChecked(buttonID) == BST_CHECKED); }

bool CheckRadioButton(int firstButtonID, int lastButtonID, int checkButtonID)
  { return BOOLToBool(::CheckRadioButton(_window, firstButtonID, lastButtonID, checkButtonID)); }

virtual bool OnMessage(UINT message, WPARAM wParam, LPARAM lParam);
virtual
bool OnInit() { return true; }
virtual bool OnCommand(WPARAM wParam, LPARAM lParam);
virtual bool OnCommand(int code, int itemID, LPARAM lParam);
virtual bool OnSize(WPARAM /* wParam */, int /* xSize */, int /* ySize */) { return false; }

/*
#ifdef UNDER_CE
virtual void OnHelp(void *) { OnHelp(); }
#else
virtual void OnHelp(LPHELPINFO) { OnHelp(); }
#endif
*/
virtual void OnHelp() {};

virtual bool OnButtonClicked(int buttonID, HWND buttonHWND);
virtual void OnOK() {};
virtual void OnCancel() {};
virtual void OnClose() {}
```

```
 virtual bool OnNotify(UINT /* controlID */, LPNMHDR /* lParam */) { return false; }
 virtual bool OnTimer(WPARAM /* timerID */, LPARAM /* callback */) { return false; }

 LONG_PTR SetMsgResult(LONG_PTR newLongPtr )
   { return SetLongPtr(DWLP_MSGRESULT, newLongPtr); }
 LONG_PTR GetMsgResult() const
   { return GetLongPtr(DWLP_MSGRESULT); }

 bool GetMargins(int margin, int &x, int &y);
 int Units_To_Pixels_X(int units);
 bool
 GetItemSizes(int id, int &x, int &y);
 void GetClientRectOfItem(int id, RECT &rect);
 bool MoveItem(int id, int x, int y, int width, int height, bool repaint = true);

 void NormalizeSize(bool fullNormalize = false);
 void NormalizePosition();
};

class CModelessDialog: public CDialog
{
public:
 bool Create(LPCTSTR templateName, HWND parentWindow);
 bool Create(UINT resID, HWND parentWindow) { return Create(MAKEINTRESOURCEW(resID),
parentWindow); }
 #ifndef _UNICODE
 bool Create(LPCWSTR templateName, HWND parentWindow);
 #endif
 virtual void OnOK() { Destroy(); }
 virtual void OnCancel() { Destroy(); }
 virtual void OnClose() { Destroy(); }
};

class CModalDialog: public CDialog
{
public:
 INT_PTR Create(LPCTSTR templateName, HWND parentWindow);
 INT_PTR Create(UINT resID, HWND parentWindow) { return Create(MAKEINTRESOURCEW(resID),
parentWindow); }
 #ifndef _UNICODE
 INT_PTR Create(LPCWSTR templateName, HWND parentWindow);
 #endif

 bool End(INT_PTR result) { return
 BOOLToBool(::EndDialog(_window, result)); }
 virtual void OnOK() { End(IDOK); }
 virtual void OnCancel() { End(IDCANCEL); }
 virtual void OnClose() { End(IDCLOSE); }
```

```
};

class CDialogChildControl: public NWindows::CWindow
{
 int m_ID;
public:
 void Init(const NWindows::NControl::CDialog &parentDialog, int id)
 {
   m_ID = id;
   Attach(parentDialog.GetItem(id));
 }
};

bool IsDialogSizeOK(int xSize, int ySize);

}}

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With One div Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-017-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element that contains a div element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
  {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-017.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
```

```
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   &lt;div&gt;Paragraph 1&lt;/div&gt;
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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 WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

```
// XzEncoder.h

#ifndef __XZ_ENCODER_H
#define __XZ_ENCODER_H

#include "../../../C/XzEnc.h"

#include "../../Common/MyCom.h"

#include "../ICoder.h"

namespace NCompress {
namespace NXz {


class CEncoder:
 public ICompressCoder,
 public ICompressSetCoderProperties,
 public ICompressSetCoderPropertiesOpt,
 public CMyUnknownImp
{
 CXzEncHandle _encoder;
public:
 CXzProps xzProps;

 MY_UNKNOWN_IMP3(
    ICompressCoder,
    ICompressSetCoderProperties,
    ICompressSetCoderPropertiesOpt)

 void InitCoderProps();
 HRESULT SetCheckSize(UInt32 checkSizeInBytes);
 HRESULT SetCoderProp(PROPID propID, const PROPVARIANT &prop);
```

```
 STDMETHOD(Code)(ISequentialInStream *inStream, ISequentialOutStream *outStream,
    const UInt64 *inSize, const UInt64 *outSize, ICompressProgressInfo *progress);
 STDMETHOD(SetCoderProperties)(const PROPID *propIDs, const PROPVARIANT *props, UInt32 numProps);
 STDMETHOD(SetCoderPropertiesOpt)(const PROPID *propIDs, const PROPVARIANT *props, UInt32
 numProps);

 CEncoder();
 virtual ~CEncoder();
};

}}

#endif
#define IDI_ICON  1

#define IDS_EXTRACTION_ERROR_TITLE       7
#define IDS_EXTRACTION_ERROR_MESSAGE     8
#define IDS_CANNOT_CREATE_FOLDER      3003
#define IDS_PROGRESS_EXTRACTING       3300
#define IDS_MIN_OS_TITLE              70
#define IDS_MIN_OS_TEXT               71
```

Snappy framing format description
Last revised: 2013-10-25

This format decribes a framing format for Snappy, allowing compressing to files or streams that can then more easily be decompressed without having to hold the entire stream in memory. It also provides data checksums to help verify integrity. It does not provide metadata checksums, so it does not protect against e.g. all forms of truncations.

Implementation of the framing format is optional for Snappy compressors and decompressor; it is not part of the Snappy core specification.

1. General structure

The file consists solely of chunks, lying back-to-back with no padding in between. Each chunk consists first a single byte of chunk identifier, then a three-byte little-endian length of the chunk in bytes (from 0 to 16777215, inclusive), and then the data if any. The four bytes of chunk header is not counted in the data length.

The different chunk types are listed below. The first chunk must always be the stream identifier chunk
 (see section 4.1, below). The stream
ends when the file ends -- there is no explicit end-of-file marker.

2. File type identification

The following identifiers for this format are recommended where appropriate. However, note that none have been registered officially, so this is only to be taken as a guideline. We use "Snappy framed" to distinguish between this format and raw Snappy data.

File extension: .sz
MIME type: application/x-snappy-framed
HTTP Content-Encoding: x-snappy-framed

3. Checksum format

Some chunks have data protected by a checksum (the ones that do will say so explicitly). The checksums are always masked CRC-32Cs.

A description of CRC-32C can be found in RFC 3720, section 12.1, with examples in section B.4.

Checksums are not stored directly, but masked, as checksumming data and then its own checksum can be problematic. The masking is the same as used in Apache Hadoop: Rotate the checksum by 15 bits, then add the constant 0xa282ead8
(using wraparound as normal for unsigned integers). This is equivalent to the following C code:

```
uint32_t mask_checksum(uint32_t x) {
  return ((x >> 15) | (x << 17)) + 0xa282ead8;
}
```

Note that the masking is reversible.

The checksum is always stored as a four bytes long integer, in little-endian.

4. Chunk types

The currently supported chunk types are described below. The list may be extended in the future.

4.1. Stream identifier (chunk type 0xff)

The stream identifier is always the first element in the stream.
It is exactly six bytes long and contains "sNaPpY" in ASCII. This means that a valid Snappy framed stream always starts with the bytes

0xff 0x06 0x00 0x00 0x73 0x4e 0x61 0x50 0x70 0x59

The stream identifier chunk can come multiple times in the stream besides the first; if such a chunk shows up, it should simply be ignored, assuming it has the right length and contents. This allows for easy concatenation of compressed files without the need for re-framing.

4.2.
Compressed data (chunk type 0x00)

Compressed data chunks contain a normal Snappy compressed bitstream; see the compressed format specification. The compressed data is preceded by the CRC-32C (see section 3) of the _uncompressed_ data.

Note that the data portion of the chunk, i.e., the compressed contents, can be at most 16777211 bytes (2^24 - 1, minus the checksum). However, we place an additional restriction that the uncompressed data in a chunk must be no longer than 65536 bytes. This allows consumers to easily use small fixed-size buffers.

4.3. Uncompressed data (chunk type 0x01)

Uncompressed data chunks allow a compressor to send uncompressed, raw data; this is useful if, for instance, uncompressible or near-incompressible data is detected, and faster decompression is desired.

As in the compressed chunks, the data is preceded by its own masked CRC-32C (see section 3).

An uncompressed data chunk, like compressed data chunks, should contain no more than 65536 data bytes, so
the maximum legal chunk length with the
checksum is 65540.

4.4. Padding (chunk type 0xfe)

Padding chunks allow a compressor to increase the size of the data stream so that it complies with external demands, e.g. that the total number of bytes is a multiple of some value.

All bytes of the padding chunk, except the chunk byte itself and the length, should be zero, but decompressors must not try to interpret or verify the padding data in any way.

4.5. Reserved unskippable chunks (chunk types 0x02-0x7f)

These are reserved for future expansion. A decoder that sees such a chunk should immediately return an error, as it must assume it cannot decode the stream correctly.

Future versions of this specification may define meanings for these chunks.

4.6. Reserved skippable chunks (chunk types 0x80-0xfd)

These are also reserved for future expansion, but unlike the chunks described in 4.5, a decoder seeing these must skip them and continue decoding.

Future versions of this specification
may define meanings for these chunks.

```
C_OBJS = $(C_OBJS) \
 $O\XzCrc64.obj
!IF "$(CPU)" == "IA64" || "$(CPU)" == "MIPS" || "$(CPU)" == "ARM" || "$(CPU)" == "ARM64"
C_OBJS = $(C_OBJS) \
!ELSE
ASM_OBJS = $(ASM_OBJS) \
!ENDIF
 $O\XzCrc64Opt.obj
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With One div Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element that contains a div element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size:
 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   &lt;div&gt;Paragraph 1&lt;/div&gt;
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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```
#define IDD_PROGRESS  97

#define IDC_PROGRESS1  100
// ComTry.h

#ifndef __COM_TRY_H
#define __COM_TRY_H

#include "MyWindows.h"
// #include "Exception.h"
// #include "NewHandler.h"

#define COM_TRY_BEGIN try {
#define COM_TRY_END } catch(...) { return E_OUTOFMEMORY; }

/*
#define COM_TRY_END } \
 catch(const CNewException &) { return E_OUTOFMEMORY; } \
 catch(...) { return HRESULT_FROM_WIN32(ERROR_NOACCESS); } \
*/
 // catch(const CSystemException &e) { return e.ErrorCode; }
 // catch(...) { return E_FAIL; }

#endif
```

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```
/* ATK -  Accessibility Toolkit
* Copyright 2001 Sun Microsystems Inc.
*
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* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_RELATION_SET_H__
#define __ATK_RELATION_SET_H__

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

#include <glib-object.h>
#include <atk/atkobject.h>
#include
 <atk/atkrelation.h>

#define ATK_TYPE_RELATION_SET                    (atk_relation_set_get_type ())
#define ATK_RELATION_SET(obj)                    (G_TYPE_CHECK_INSTANCE_CAST ((obj),
```

```
ATK_TYPE_RELATION_SET, AtkRelationSet))
#define ATK_RELATION_SET_CLASS(klass)           (G_TYPE_CHECK_CLASS_CAST ((klass),
ATK_TYPE_RELATION_SET, AtkRelationSetClass))
#define ATK_IS_RELATION_SET(obj)                (G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_RELATION_SET))
#define ATK_IS_RELATION_SET_CLASS(klass)        (G_TYPE_CHECK_CLASS_TYPE ((klass),
ATK_TYPE_RELATION_SET))
#define ATK_RELATION_SET_GET_CLASS(obj)         (G_TYPE_INSTANCE_GET_CLASS ((obj),
ATK_TYPE_RELATION_SET, AtkRelationSetClass))

typedef struct _AtkRelationSetClass       AtkRelationSetClass;


struct _AtkRelationSet
{
 GObject parent;

 GPtrArray *relations;
};

struct _AtkRelationSetClass
{
 GObjectClass parent;

 AtkFunction pad1;
 AtkFunction pad2;
};

GType atk_relation_set_get_type (void);

AtkRelationSet*
 atk_relation_set_new                  (void);
gboolean        atk_relation_set_contains            (AtkRelationSet  *set,
                                        AtkRelationType relationship);
void            atk_relation_set_remove              (AtkRelationSet  *set,
                                        AtkRelation     *relation);
void            atk_relation_set_add                 (AtkRelationSet  *set,
                                        AtkRelation     *relation);
gint            atk_relation_set_get_n_relations     (AtkRelationSet  *set);
AtkRelation*    atk_relation_set_get_relation        (AtkRelationSet  *set,
                                        gint            i);
AtkRelation*    atk_relation_set_get_relation_by_type (AtkRelationSet  *set,
                                        AtkRelationType relationship);
void            atk_relation_set_add_relation_by_type (AtkRelationSet  *set,
                                         AtkRelationType relationship,
                                        AtkObject       *target);

#ifdef __cplusplus
```

```
}
#endif /* __cplusplus */


#endif /* __ATK_RELATION_SET_H__ */
```

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```
/* XzCrc64.h -- CRC64 calculation
2013-01-18 : Igor Pavlov : Public domain */

#ifndef __XZ_CRC64_H
#define __XZ_CRC64_H

#include <stddef.h>

#include "7zTypes.h"

EXTERN_C_BEGIN

extern UInt64 g_Crc64Table[];

void MY_FAST_CALL Crc64GenerateTable(void);

#define CRC64_INIT_VAL UINT64_CONST(0xFFFFFFFFFFFFFFFF)
#define CRC64_GET_DIGEST(crc) ((crc) ^ CRC64_INIT_VAL)
```

```
#define CRC64_UPDATE_BYTE(crc, b) (g_Crc64Table[((crc) ^ (b)) & 0xFF] ^ ((crc) >> 8))

UInt64 MY_FAST_CALL Crc64Update(UInt64 crc, const void *data, size_t size);
UInt64 MY_FAST_CALL Crc64Calc(const void *data, size_t size);

EXTERN_C_END

#endif
```

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```
// MyUnknown.h

#ifndef __MY_UNKNOWN_H
#define __MY_UNKNOWN_H

#include "MyWindows.h"

/*
#ifdef _WIN32
#include <basetyps.h>
#include <unknwn.h>
#else
#include "MyWindows.h"
#endif
```

```
*/

#endif
// Bench.h

#ifndef __7ZIP_BENCH_H
#define __7ZIP_BENCH_H

#include "../../../Windows/System.h"

#include "../../Common/CreateCoder.h"
#include "../../UI/Common/Property.h"

struct CBenchInfo
{
 UInt64 GlobalTime;
 UInt64 GlobalFreq;
 UInt64 UserTime;
 UInt64 UserFreq;
 UInt64 UnpackSize;
 UInt64 PackSize;
 UInt64 NumIterations;

 CBenchInfo(): NumIterations(0) {}
 UInt64 GetUsage() const;
 UInt64 GetRatingPerUsage(UInt64 rating) const;
 UInt64 GetSpeed(UInt64 numCommands) const;
};

struct IBenchCallback
{
 virtual HRESULT SetFreq(bool showFreq, UInt64 cpuFreq) = 0;
 virtual HRESULT SetEncodeResult(const CBenchInfo &info, bool final) = 0;
 virtual HRESULT SetDecodeResult(const CBenchInfo &info, bool final) = 0;
};

UInt64 GetCompressRating(UInt32 dictSize, UInt64 elapsedTime, UInt64 freq, UInt64 size);
UInt64 GetDecompressRating(UInt64 elapsedTime, UInt64 freq, UInt64 outSize, UInt64 inSize, UInt64
numIterations);

const unsigned kBenchMinDicLogSize = 18;

UInt64 GetBenchMemoryUsage(UInt32
 numThreads, UInt32 dictionary, bool totalBench = false);

struct IBenchPrintCallback
{
 virtual void Print(const char *s) = 0;
```

```
 virtual void NewLine() = 0;
 virtual HRESULT CheckBreak() = 0;
};

/*
struct IBenchFreqCallback
{
 virtual void AddCpuFreq(UInt64 freq) = 0;
};
*/

HRESULT Bench(
  DECL_EXTERNAL_CODECS_LOC_VARS
  IBenchPrintCallback *printCallback,
  IBenchCallback *benchCallback,
  // IBenchFreqCallback *freqCallback,
  const CObjectVector<CProperty> &props,
  UInt32 numIterations,
  bool multiDict
  );

AString GetProcessThreadsInfo(const NWindows::NSystem::CProcessAffinity &ti);

void GetSysInfo(AString &s1, AString &s2);
void GetCpuName(AString &s);
void GetCpuFeatures(AString &s);


#endif
```

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```
// Common/NewHandler.h

#ifndef __COMMON_NEW_HANDLER_H
#define __COMMON_NEW_HANDLER_H

/*
NewHandler.h and NewHandler.cpp allows to solve problem with compilers that
don't throw exception in operator new().

This file must be included before any code that uses operators new() or delete()
and you must compile and link "NewHandler.cpp", if you use some old MSVC compiler.

The operator new() in some MSVC versions doesn't throw exception std::bad_alloc.
MSVC 6.0 (_MSC_VER == 1200) doesn't throw exception.
The code produced by some another MSVC compilers also can be linked
to library that doesn't throw exception.
We suppose that code compiled with VS2015+ (_MSC_VER >= 1900) throws exception std::bad_alloc.
For older _MSC_VER versions we redefine operator new() and operator delete().
Our version of operator new() throws CNewException() exception on failure.

It's still allowed to use redefined version of operator new() from "NewHandler.cpp"
with any compiler. 7-Zip's code can work with std::bad_alloc
 and CNewException() exceptions.
But if you use some additional code (outside of 7-Zip's code), you must check
that redefined version of operator new() is not problem for your code.
*/

#include <stddef.h>

#ifdef _WIN32
// We can compile my_new and my_delete with _fastcall
/*
void * my_new(size_t size);
void my_delete(void *p) throw();
// void * my_Realloc(void *p, size_t newSize, size_t oldSize);
*/
#endif


#if defined(_MSC_VER) && (_MSC_VER < 1900)
 // If you want to use default operator new(), you can disable the following line
 #define _7ZIP_REDEFINE_OPERATOR_NEW
#endif
```

```
#ifdef _7ZIP_REDEFINE_OPERATOR_NEW

// std::bad_alloc can require additional DLL dependency.
// So we don't define CNewException as std::bad_alloc here.

class CNewException {};

void *
#ifdef _MSC_VER
__cdecl
#endif
operator new(size_t size);

void
#ifdef _MSC_VER
__cdecl
#endif
operator delete(void *p) throw();

#else

#include <new>

#define CNewException std::bad_alloc

#endif

/*
#ifdef _WIN32
void
 *
#ifdef _MSC_VER
__cdecl
#endif
operator new[](size_t size);

void
#ifdef _MSC_VER
__cdecl
#endif
operator delete[](void *p) throw();
#endif
*/

#endif
```

shutilwhich contains code from Python 3.3 and uses the same license:

A. HISTORY OF THE SOFTWARE

==========

Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual
Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.2 | 2.1.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
| 2.2.1 | 2.2 | 2002 | PSF | yes |
| 2.2.2 | 2.2.1 | 2002 | PSF | yes |
| 2.2.3 | 2.2.2 | 2003 | PSF | yes |
| 2.3 | 2.2.2 | 2002-2003 | PSF | yes |
| 2.3.1 | 2.3 | 2002-2003 | PSF | yes |
| 2.3.2 | 2.3.1 | 2002-2003 | PSF | yes |

| | | | | |
|---|---|---|---|---|
| 2.3.3 | 2.3.2 | 2002-2003 | PSF | yes |
| 2.3.4 | 2.3.3 | 2004 | PSF | yes |
| 2.3.5 | 2.3.4 | 2005 | PSF | yes |
| 2.4 | 2.3 | 2004 | PSF | yes |
| 2.4.1 | 2.4 | 2005 | PSF | yes |
| 2.4.2 | 2.4.1 | 2005 | PSF | yes |
| 2.4.3 | 2.4.2 | 2006 | PSF | yes |
| 2.4.4 | 2.4.3 | 2006 | PSF | yes |
| 2.5 | 2.4 | 2006 | PSF | yes |
| 2.5.1 | 2.5 | 2007 | PSF | yes |
| 2.5.2 | 2.5.1 | 2008 | PSF | yes |
| 2.5.3 | 2.5.2 | 2008 | PSF | yes |
| 2.6 | 2.5 | 2008 | PSF | yes |
| 2.6.1 | 2.6 | 2008 | PSF | yes |
| 2.6.2 | 2.6.1 | 2009 | PSF | yes |
| 2.6.3 | 2.6.2 | 2009 | PSF | yes |
| 2.6.4 | 2.6.3 | 2009 | PSF | yes |
| 2.6.5 | 2.6.4 | 2010 | PSF | yes |
| 3.0 | 2.6 | 2008 | PSF | yes |
| 3.0.1 | 3.0 | 2009 | PSF | yes |
| 3.1 | 3.0.1 | 2009 | PSF | yes |
| 3.1.1 | 3.1 | 2009 | PSF | yes |
| 3.1.2 | 3.1.1 | 2010 | PSF | yes |
| 3.1.3 | 3.1.2 | 2010 | PSF | yes |
| 3.1.4 | 3.1.3 | 2011 | PSF | yes |
| 3.2 | 3.1 | 2011 | PSF | yes |
| 3.2.1 | 3.2 | 2011 | PSF | yes |
| 3.2.2 | 3.2.1 | 2011 | PSF | yes |
| 3.2.3 | 3.2.2 | 2012 | PSF | yes |
| 3.3.0 | 3.2 | 2012 | PSF | yes |

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// Windows/SecurityUtils.h

```
#ifndef __WINDOWS_SECURITY_UTILS_H
#define __WINDOWS_SECURITY_UTILS_H

#include <NTSecAPI.h>

#include "Defs.h"

namespace NWindows {
namespace NSecurity {

class CAccessToken
{
 HANDLE _handle;
public:
 CAccessToken(): _handle(NULL) {};
 ~CAccessToken() { Close(); }
 bool Close()
 {
  if (_handle == NULL)
    return true;
  bool res = BOOLToBool(::CloseHandle(_handle));
  if (res)
    _handle = NULL;
  return res;
 }

 bool OpenProcessToken(HANDLE processHandle, DWORD desiredAccess)
 {
  Close();
  return BOOLToBool(::OpenProcessToken(processHandle, desiredAccess, &_handle));
```

```
 }

 /*
 bool OpenThreadToken(HANDLE threadHandle, DWORD desiredAccess, bool openAsSelf)
 {
   Close();
   return BOOLToBool(::OpenTreadToken(threadHandle, desiredAccess, BoolToBOOL(anOpenAsSelf),
&_handle));
 }
 */

 bool AdjustPrivileges(bool disableAllPrivileges, PTOKEN_PRIVILEGES newState,
     DWORD bufferLength, PTOKEN_PRIVILEGES previousState, PDWORD
 returnLength)
   { return BOOLToBool(::AdjustTokenPrivileges(_handle, BoolToBOOL(disableAllPrivileges),
     newState, bufferLength, previousState, returnLength)); }

 bool AdjustPrivileges(bool disableAllPrivileges, PTOKEN_PRIVILEGES newState)
   { return AdjustPrivileges(disableAllPrivileges, newState, 0, NULL, NULL); }

 bool AdjustPrivileges(PTOKEN_PRIVILEGES newState)
   { return AdjustPrivileges(false, newState); }

};

#ifndef _UNICODE
typedef NTSTATUS (NTAPI *LsaOpenPolicyP)(PLSA_UNICODE_STRING SystemName,
   PLSA_OBJECT_ATTRIBUTES ObjectAttributes, ACCESS_MASK DesiredAccess, PLSA_HANDLE
PolicyHandle);
typedef NTSTATUS (NTAPI *LsaCloseP)(LSA_HANDLE ObjectHandle);
typedef NTSTATUS (NTAPI *LsaAddAccountRightsP)(LSA_HANDLE PolicyHandle,
   PSID AccountSid, PLSA_UNICODE_STRING UserRights, ULONG CountOfRights );
#define MY_STATUS_NOT_IMPLEMENTED          ((NTSTATUS)0xC0000002L)
#endif

struct CPolicy
{
protected:
 LSA_HANDLE _handle;
 #ifndef _UNICODE
 HMODULE hModule;
  #endif
public:
 operator LSA_HANDLE() const { return _handle; }
 CPolicy(): _handle(NULL)
 {
   #ifndef _UNICODE
   hModule = GetModuleHandle(TEXT("Advapi32.dll"));
```

```
  #endif
};
~CPolicy() { Close(); }

NTSTATUS Open(PLSA_UNICODE_STRING systemName, PLSA_OBJECT_ATTRIBUTES objectAttributes,
    ACCESS_MASK desiredAccess)
{
  #ifndef _UNICODE
  if (hModule == NULL)
    return MY_STATUS_NOT_IMPLEMENTED;
  LsaOpenPolicyP lsaOpenPolicy = (LsaOpenPolicyP)GetProcAddress(hModule, "LsaOpenPolicy");
  if (lsaOpenPolicy == NULL)
    return MY_STATUS_NOT_IMPLEMENTED;
  #endif

  Close();
  return
    #ifdef _UNICODE
    ::LsaOpenPolicy
    #else
    lsaOpenPolicy
    #endif
    (systemName, objectAttributes, desiredAccess, &_handle);
}

NTSTATUS Close()
{
  if (_handle == NULL)
    return 0;

  #ifndef _UNICODE
  if (hModule == NULL)
    return MY_STATUS_NOT_IMPLEMENTED;
  LsaCloseP lsaClose = (LsaCloseP)GetProcAddress(hModule,
"LsaClose");
  if (lsaClose == NULL)
    return MY_STATUS_NOT_IMPLEMENTED;
  #endif

  NTSTATUS res =
    #ifdef _UNICODE
    ::LsaClose
    #else
    lsaClose
    #endif
    (_handle);
  _handle = NULL;
  return res;
```

```
 }

 NTSTATUS EnumerateAccountsWithUserRight(PLSA_UNICODE_STRING userRights,
     PLSA_ENUMERATION_INFORMATION *enumerationBuffer, PULONG countReturned)
   { return LsaEnumerateAccountsWithUserRight(_handle, userRights, (void **)enumerationBuffer,
countReturned); }

 NTSTATUS EnumerateAccountRights(PSID sid, PLSA_UNICODE_STRING* userRights, PULONG
countOfRights)
   { return ::LsaEnumerateAccountRights(_handle, sid, userRights, countOfRights); }

 NTSTATUS LookupSids(ULONG count, PSID* sids,
     PLSA_REFERENCED_DOMAIN_LIST* referencedDomains, PLSA_TRANSLATED_NAME* names)
   { return LsaLookupSids(_handle, count, sids, referencedDomains, names); }

 NTSTATUS AddAccountRights(PSID accountSid, PLSA_UNICODE_STRING userRights, ULONG
countOfRights)
  {
   #ifndef _UNICODE
   if (hModule == NULL)
     return MY_STATUS_NOT_IMPLEMENTED;
   LsaAddAccountRightsP lsaAddAccountRights = (LsaAddAccountRightsP)GetProcAddress(hModule,
"LsaAddAccountRights");
   if (lsaAddAccountRights == NULL)
     return MY_STATUS_NOT_IMPLEMENTED;
   #endif

   return
     #ifdef _UNICODE
     ::LsaAddAccountRights
     #else
     lsaAddAccountRights
     #endif
     (_handle, accountSid, userRights, countOfRights);
 }
 NTSTATUS AddAccountRights(PSID accountSid, PLSA_UNICODE_STRING userRights)
   { return AddAccountRights(accountSid, userRights, 1); }

 NTSTATUS RemoveAccountRights(PSID accountSid, bool allRights, PLSA_UNICODE_STRING userRights,
ULONG countOfRights)
   { return LsaRemoveAccountRights(_handle, accountSid, (BOOLEAN)(allRights ? TRUE : FALSE), userRights,
countOfRights); }
};

bool AddLockMemoryPrivilege();

}}
```

```
#endif
// ExtractCallback.h

#ifndef __EXTRACT_CALLBACK_H
#define __EXTRACT_CALLBACK_H

#include "../../../../C/Alloc.h"

#include "../../../Common/MyCom.h"
#include "../../../Common/StringConvert.h"

#ifndef _SFX
#include "../Agent/IFolderArchive.h"
#endif

#include "../Common/ArchiveExtractCallback.h"
#include "../Common/ArchiveOpenCallback.h"

#ifndef _NO_CRYPTO
#include "../../IPassword.h"
#endif

#ifndef _SFX
#include "IFolder.h"
#endif

#include "ProgressDialog2.h"

#ifdef LANG
#include "LangUtils.h"
#endif

#ifndef _SFX

class CGrowBuf
{
 Byte *_items;
 size_t _size;

 CLASS_NO_COPY(CGrowBuf);

public:
 bool ReAlloc_KeepData(size_t newSize, size_t keepSize)
 {
   void *buf = MyAlloc(newSize);
   if (!buf)
     return false;
   if (keepSize != 0)
```

```
    memcpy(buf, _items, keepSize);
  MyFree(_items);
  _items = (Byte *)buf;
  _size = newSize;
  return true;
 }

 CGrowBuf(): _items(0), _size(0) {}
 ~CGrowBuf() { MyFree(_items); }

 operator Byte *() { return _items; }
  operator const Byte *() const { return _items; }
 size_t Size() const { return _size; }
};

struct CVirtFile
{
 CGrowBuf Data;

 UInt64 Size; // real size
 UInt64 ExpectedSize; // the size from props request. 0 if unknown

 UString Name;

 bool CTimeDefined;
 bool ATimeDefined;
 bool MTimeDefined;
 bool AttribDefined;

 bool IsDir;
 bool IsAltStream;

 DWORD Attrib;

 FILETIME CTime;
 FILETIME ATime;
 FILETIME MTime;

 CVirtFile():
  CTimeDefined(false),
  ATimeDefined(false),
  MTimeDefined(false),
  AttribDefined(false),
  IsDir(false),
  IsAltStream(false) {}
};

class CVirtFileSystem:
```

```
 public ISequentialOutStream,
 public CMyUnknownImp
{
 UInt64 _totalAllocSize;

 size_t _pos;
 unsigned _numFlushed;
 bool _fileIsOpen;
 bool _fileMode;
 COutFileStream *_outFileStreamSpec;
 CMyComPtr<ISequentialOutStream> _outFileStream;
public:
 CObjectVector<CVirtFile> Files;
 UInt64 MaxTotalAllocSize;
 FString DirPrefix;

 CVirtFile &AddNewFile()
  {
   if (!Files.IsEmpty())
   {
     MaxTotalAllocSize -= Files.Back().Data.Size();
   }
   return Files.AddNew();
 }
 HRESULT CloseMemFile()
 {
   if (_fileMode)
   {
     return FlushToDisk(true);
   }
   CVirtFile &file = Files.Back();
   if (file.Data.Size() != file.Size)
   {
     file.Data.ReAlloc_KeepData((size_t)file.Size, (size_t)file.Size);
   }
   return S_OK;
 }

 bool IsStreamInMem() const
 {
   if (_fileMode)
     return false;
   if (Files.Size() < 1 || /* Files[0].IsAltStream || */ Files[0].IsDir)
     return false;
   return true;
 }

 size_t GetMemStreamWrittenSize() const { return _pos; }
```

```
 CVirtFileSystem(): _outFileStreamSpec(NULL), MaxTotalAllocSize((UInt64)0 - 1) {}

 void Init()
 {
   _totalAllocSize = 0;
   _fileMode = false;
   _pos = 0;
   _numFlushed = 0;
   _fileIsOpen = false;
 }

 HRESULT CloseFile(const FString &path);
 HRESULT FlushToDisk(bool closeLast);
 size_t GetPos() const { return _pos; }

 MY_UNKNOWN_IMP
  STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
};

#endif

class CExtractCallbackImp:
 public IExtractCallbackUI, // it includes IFolderArchiveExtractCallback
 public IOpenCallbackUI,
 public IFolderArchiveExtractCallback2,
 #ifndef _SFX
 public IFolderOperationsExtractCallback,
 public IFolderExtractToStreamCallback,
 public ICompressProgressInfo,
 #endif
 #ifndef _NO_CRYPTO
 public ICryptoGetTextPassword,
 #endif
 public CMyUnknownImp
{
 HRESULT MessageError(const char *message, const FString &path);
 void Add_ArchiveName_Error();
public:
 MY_QUERYINTERFACE_BEGIN2(IFolderArchiveExtractCallback)
 MY_QUERYINTERFACE_ENTRY(IFolderArchiveExtractCallback2)
 #ifndef _SFX
 MY_QUERYINTERFACE_ENTRY(IFolderOperationsExtractCallback)
 MY_QUERYINTERFACE_ENTRY(IFolderExtractToStreamCallback)
 MY_QUERYINTERFACE_ENTRY(ICompressProgressInfo)
 #endif
 #ifndef _NO_CRYPTO
 MY_QUERYINTERFACE_ENTRY(ICryptoGetTextPassword)
```

```
#endif
MY_QUERYINTERFACE_END
 MY_ADDREF_RELEASE

INTERFACE_IProgress(;)
INTERFACE_IOpenCallbackUI(;)
INTERFACE_IFolderArchiveExtractCallback(;)
INTERFACE_IFolderArchiveExtractCallback2(;)
// STDMETHOD(SetTotalFiles)(UInt64 total);
// STDMETHOD(SetCompletedFiles)(const UInt64 *value);

INTERFACE_IExtractCallbackUI(;)

#ifndef _SFX
// IFolderOperationsExtractCallback
STDMETHOD(AskWrite)(
    const wchar_t *srcPath,
    Int32 srcIsFolder,
    const FILETIME *srcTime,
    const UInt64 *srcSize,
    const wchar_t *destPathRequest,
    BSTR *destPathResult,
    Int32 *writeAnswer);
STDMETHOD(ShowMessage)(const wchar_t *message);
STDMETHOD(SetCurrentFilePath)(const wchar_t *filePath);
STDMETHOD(SetNumFiles)(UInt64 numFiles);
INTERFACE_IFolderExtractToStreamCallback(;)
STDMETHOD(SetRatioInfo)(const UInt64 *inSize, const UInt64 *outSize);
#endif

// ICryptoGetTextPassword
#ifndef _NO_CRYPTO
STDMETHOD(CryptoGetTextPassword)(BSTR *password);
#endif

private:
UString
_currentArchivePath;
bool _needWriteArchivePath;

UString _currentFilePath;
bool _isFolder;

bool _isAltStream;
UInt64 _curSize;
bool _curSizeDefined;
UString _filePath;
// bool _extractMode;
```

```
// bool _testMode;
bool _newVirtFileWasAdded;
bool _needUpdateStat;


HRESULT SetCurrentFilePath2(const wchar_t *filePath);
void AddError_Message(LPCWSTR message);

#ifndef _SFX
bool _hashStreamWasUsed;
COutStreamWithHash *_hashStreamSpec;
CMyComPtr<ISequentialOutStream> _hashStream;
IHashCalc *_hashCalc; // it's for stat in Test operation
#endif

public:

#ifndef _SFX
CVirtFileSystem *VirtFileSystemSpec;
CMyComPtr<ISequentialOutStream> VirtFileSystem;
#endif

bool ProcessAltStreams;

bool StreamMode;

CProgressDialog *ProgressDialog;
#ifndef _SFX
UInt64 NumFolders;
UInt64 NumFiles;
bool NeedAddFile;
#endif
UInt32 NumArchiveErrors;
bool ThereAreMessageErrors;
NExtract::NOverwriteMode::EEnum OverwriteMode;

#ifndef _NO_CRYPTO
bool
PasswordIsDefined;
bool PasswordWasAsked;
UString Password;
#endif


UString _lang_Extracting;
UString _lang_Testing;
UString _lang_Skipping;
UString _lang_Empty;
```

```
 bool _totalFilesDefined;
 bool _totalBytesDefined;
 bool MultiArcMode;

 CExtractCallbackImp():
  #ifndef _NO_CRYPTO
  PasswordIsDefined(false),
  PasswordWasAsked(false),
  #endif
  OverwriteMode(NExtract::NOverwriteMode::kAsk),
  StreamMode(false),
  ProcessAltStreams(true),

  _totalFilesDefined(false),
  _totalBytesDefined(false),
  MultiArcMode(false)

  #ifndef _SFX
  , _hashCalc(NULL)
  #endif
  {}

 ~CExtractCallbackImp();
 void Init();

 #ifndef _SFX
 void SetHashCalc(IHashCalc *hashCalc) { _hashCalc = hashCalc; }

 void SetHashMethods(IHashCalc *hash)
 {
  if (!hash)
    return;
  _hashStreamSpec = new COutStreamWithHash;
  _hashStream = _hashStreamSpec;
  _hashStreamSpec->_hash = hash;
 }
 #endif

 bool IsOK() const { return NumArchiveErrors
 == 0 && !ThereAreMessageErrors; }
};

#endif
/* Lzma2DecMt.h -- LZMA2 Decoder Multi-thread
2018-02-17 : Igor Pavlov : Public domain */

#ifndef __LZMA2_DEC_MT_H
```

```
#define __LZMA2_DEC_MT_H

#include "7zTypes.h"

EXTERN_C_BEGIN

typedef struct
{
 size_t inBufSize_ST;
 size_t outStep_ST;

 #ifndef _7ZIP_ST
 unsigned numThreads;
 size_t inBufSize_MT;
 size_t outBlockMax;
 size_t inBlockMax;
 #endif
} CLzma2DecMtProps;

/* init to single-thread mode */
void Lzma2DecMtProps_Init(CLzma2DecMtProps *p);


/* ---------- CLzma2DecMtHandle Interface ---------- */

/* Lzma2DecMt_ * functions can return the following exit codes:
SRes:
 SZ_OK           - OK
 SZ_ERROR_MEM    - Memory allocation error
 SZ_ERROR_PARAM  - Incorrect paramater in props
 SZ_ERROR_WRITE  - ISeqOutStream write callback error
 // SZ_ERROR_OUTPUT_EOF - output buffer overflow - version with (Byte *) output
 SZ_ERROR_PROGRESS - some break from progress callback
 SZ_ERROR_THREAD - error in multithreading functions (only for Mt version)
*/

typedef void * CLzma2DecMtHandle;

CLzma2DecMtHandle
 Lzma2DecMt_Create(ISzAllocPtr alloc, ISzAllocPtr allocMid);
void Lzma2DecMt_Destroy(CLzma2DecMtHandle p);

SRes Lzma2DecMt_Decode(CLzma2DecMtHandle p,
   Byte prop,
   const CLzma2DecMtProps *props,
   ISeqOutStream *outStream,
   const UInt64 *outDataSize, // NULL means undefined
   int finishMode,           // 0 - partial unpacking is allowed, 1 - if lzma2 stream must be finished
```

```
  // Byte *outBuf, size_t *outBufSize,
  ISeqInStream *inStream,
  // const Byte *inData, size_t inDataSize,

  // out variables:
  UInt64 *inProcessed,
  int *isMT,  /* out: (*isMT == 0), if single thread decoding was used */

  // UInt64 *outProcessed,
  ICompressProgress *progress);


/* ---------- Read from CLzma2DecMtHandle Interface ---------- */

SRes Lzma2DecMt_Init(CLzma2DecMtHandle pp,
  Byte prop,
  const CLzma2DecMtProps *props,
  const UInt64 *outDataSize, int finishMode,
  ISeqInStream *inStream);

SRes Lzma2DecMt_Read(CLzma2DecMtHandle
 pp,
  Byte *data, size_t *outSize,
  UInt64 *inStreamProcessed);


EXTERN_C_END

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With dir Attribute in div Element in text Element 2</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element that contains a div element with rtl as
the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
```

```
  }
  pre {
   font-size: 12px;
  }
  .test {
   font-family: "WOFF Test CFF Reference";
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
</head>
<body>
 <p>Test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
 <div class="test">P</div>
 <p>The XML contained in the Extended Metadata Block is below.</p>
 <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   &lt;div dir="rtl"&gt;Paragraph 1&lt;/div&gt;
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
 </pre>
</body>
</html>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With Nested div Elements in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-022-ref.xht" />
  <meta name="assert" content="The license element contains a text element that contains nested div elements." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
 {
   font-family: "WOFF Test";
   src: url("support/metadatadisplay-schema-license-022.woff2") format("woff2");
```

```
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   &lt;div&gt;
    div 1 start
    &lt;div&gt;
     div 2 start
     &lt;div&gt;
      div 3
     &lt;/div&gt;
     div 2 end
    &lt;/div&gt;
    div 1 end
   &lt;/div&gt;
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

Paul Hsieh OLD BSD license

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```
// MethodId.h

#ifndef __7Z_METHOD_ID_H
#define __7Z_METHOD_ID_H

#include "../../Common/MyTypes.h"

typedef UInt64 CMethodId;

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With Two span Elements in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-028-ref.xht" />
  <meta name="assert" content="The license element contains a text element that contains two span elements." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
```

```
 {
   font-family: "WOFF Test";
   src: url("support/metadatadisplay-schema-license-028.woff2") format("woff2");
  }
  body {
   font-size: 20px;
  }
  pre {
   font-size: 12px;
  }
  .test {
   font-family: "WOFF Test", "WOFF Test CFF Fallback";
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
</head>
<body>
 <p>Test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
 <div class="test">P</div>
 <p>The XML contained in the Extended Metadata Block is below.</p>
 <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   Text with &lt;span&gt;span 1&lt;/span&gt; and &lt;span&gt;span 2&lt;/span&gt;.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
 </pre>
</body>
</html>
```

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---

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diff --git a/c:/Users/mhowell/Downloads/lzma1805/CPP/7zip/Bundles/SFXSetup/SFXSetup.dsp b/other-licenses/7zstub/src/CPP/7zip/Bundles/SFXSetup/SFXSetup.dsp
index b1d740e..61cb260 100644
--- a/c:/Users/mhowell/Downloads/lzma1805/CPP/7zip/Bundles/SFXSetup/SFXSetup.dsp
+++ b/other-licenses/7zstub/src/CPP/7zip/Bundles/SFXSetup/SFXSetup.dsp
@@ -54,7 +54,7 @@ BSC32=bscmake.exe
# ADD BSC32 /nologo
LINK32=link.exe

```
# ADD BASE LINK32 kernel32.lib user32.lib gdi32.lib winspool.lib comdlg32.lib advapi32.lib shell32.lib ole32.lib
oleaut32.lib uuid.lib odbc32.lib odbccp32.lib /nologo /subsystem:windows /machine:I386
-# ADD LINK32 comctl32.lib kernel32.lib user32.lib gdi32.lib winspool.lib comdlg32.lib advapi32.lib shell32.lib
ole32.lib oleaut32.lib uuid.lib odbc32.lib odbccp32.lib /nologo /subsystem:windows /machine:I386
/out:"C:\Util\7zS.sfx" /opt:NOWIN98
+# ADD LINK32 kernel32.lib user32.lib gdi32.lib winspool.lib comdlg32.lib advapi32.lib shell32.lib ole32.lib
oleaut32.lib uuid.lib odbc32.lib odbccp32.lib
 delayimp.lib /nologo /subsystem:windows /machine:I386 /out:"Release\7zS.sfx" /opt:NOWIN98
/delayload:user32.dll /delayload:shell32.dll /delayload:oleaut32.dll
# SUBTRACT LINK32 /pdb:none

!ELSEIF  "$(CFG)" == "SFXSetup - Win32 Debug"
@@ -81,7 +81,7 @@ BSC32=bscmake.exe
# ADD BSC32 /nologo
LINK32=link.exe
# ADD BASE LINK32 kernel32.lib user32.lib gdi32.lib winspool.lib comdlg32.lib advapi32.lib shell32.lib ole32.lib
oleaut32.lib uuid.lib odbc32.lib odbccp32.lib /nologo /subsystem:windows /debug /machine:I386 /pdbtype:sept
-# ADD LINK32 kernel32.lib user32.lib gdi32.lib winspool.lib comdlg32.lib advapi32.lib shell32.lib ole32.lib
oleaut32.lib uuid.lib odbc32.lib odbccp32.lib comctl32.lib /nologo /subsystem:windows /debug /machine:I386
/out:"C:\UTIL\7zSfxS.exe" /pdbtype:sept
+# ADD LINK32 kernel32.lib user32.lib gdi32.lib winspool.lib comdlg32.lib advapi32.lib shell32.lib ole32.lib
oleaut32.lib uuid.lib odbc32.lib odbccp32.lib delayimp.lib /nologo /subsystem:windows /debug
 /machine:I386 /out:"Debug\7zSfxS.exe" /pdbtype:sept /delayload:user32.dll /delayload:shell32.dll
/delayload:oleaut32.dll

!ELSEIF  "$(CFG)" == "SFXSetup - Win32 ReleaseD"

@@ -107,9 +107,9 @@ BSC32=bscmake.exe
# ADD BASE BSC32 /nologo
# ADD BSC32 /nologo
LINK32=link.exe
-# ADD BASE LINK32 comctl32.lib kernel32.lib user32.lib gdi32.lib winspool.lib comdlg32.lib advapi32.lib
shell32.lib ole32.lib oleaut32.lib uuid.lib odbc32.lib odbccp32.lib /nologo /subsystem:windows /machine:I386
/out:"C:\UTIL\7zWinSR.exe"
+# ADD BASE LINK32 kernel32.lib user32.lib gdi32.lib winspool.lib comdlg32.lib advapi32.lib shell32.lib
ole32.lib oleaut32.lib uuid.lib odbc32.lib odbccp32.lib /nologo /subsystem:windows /machine:I386
/out:"C:\UTIL\7zWinSR.exe"
# SUBTRACT BASE LINK32 /debug /nodefaultlib
-# ADD LINK32 comctl32.lib kernel32.lib user32.lib gdi32.lib winspool.lib comdlg32.lib advapi32.lib shell32.lib
ole32.lib oleaut32.lib uuid.lib odbc32.lib odbccp32.lib /nologo /subsystem:windows /machine:I386
 /out:"C:\Util\7zSD.sfx" /opt:NOWIN98
+# ADD LINK32 kernel32.lib user32.lib gdi32.lib winspool.lib comdlg32.lib advapi32.lib shell32.lib ole32.lib
oleaut32.lib uuid.lib odbc32.lib odbccp32.lib delayimp.lib /nologo /subsystem:windows /machine:I386
/out:"ReleaseD\7zSD.sfx" /opt:NOWIN98 /delayload:user32.dll /delayload:shell32.dll /delayload:oleaut32.dll
# SUBTRACT LINK32 /pdb:none

!ENDIF
diff --git a/c:/Users/mhowell/Downloads/lzma1805/CPP/7zip/Bundles/SFXSetup/SfxSetup.cpp b/other-
```

```
licenses/7zstub/src/CPP/7zip/Bundles/SFXSetup/SfxSetup.cpp
index 1705a8d..e3a3bb2 100644
--- a/c:/Users/mhowell/Downloads/lzma1805/CPP/7zip/Bundles/SFXSetup/SfxSetup.cpp
+++ b/other-licenses/7zstub/src/CPP/7zip/Bundles/SFXSetup/SfxSetup.cpp
@@ -125,6 +125,179 @@ static void ShowErrorMessageSpec(const UString &name)
  ShowErrorMessage(NULL, message);
}

+/* BEGIN Mozilla customizations */
+
+static char const *
+FindStrInBuf(char const * buf, size_t bufLen, char const * str)
+{
+  size_t index = 0;
+
 while (index < bufLen) {
+    char const * result = strstr(buf + index, str);
+    if (result) {
+      return result;
+    }
+    while ((buf[index] != '\0') && (index < bufLen)) {
+      index++;
+    }
+    index++;
+  }
+  return NULL;
+}
+
+static bool
+ReadPostSigningDataFromView(char const * view, DWORD size, AString& data)
+{
+  // Find the offset and length of the certificate table,
+  // so we know the valid range to look for the token.
+  if (size < (0x3c + sizeof(UInt32))) {
+    return false;
+  }
+  UInt32 PEHeaderOffset = *(UInt32*)(view + 0x3c);
+  UInt32 optionalHeaderOffset = PEHeaderOffset + 24;
+  UInt32 certDirEntryOffset = 0;
+  if (size < (optionalHeaderOffset + sizeof(UInt16))) {
+    return false;
+  }
+  UInt16 magic = *(UInt16*)(view + optionalHeaderOffset);
+  if (magic == 0x010b) {
+    // 32-bit executable
+    certDirEntryOffset = optionalHeaderOffset + 128;
+  } else if (magic == 0x020b) {
+    // 64-bit executable; certain header fields are wider
```

```
+    certDirEntryOffset
 = optionalHeaderOffset + 144;
+  } else {
+    // Unknown executable
+    return false;
+  }
+  if (size < certDirEntryOffset + 8) {
+    return false;
+  }
+  UInt32 certTableOffset = *(UInt32*)(view + certDirEntryOffset);
+  UInt32 certTableLen = *(UInt32*)(view + certDirEntryOffset + sizeof(UInt32));
+  if (certTableOffset == 0 || certTableLen == 0 ||
+      size < (certTableOffset + certTableLen)) {
+    return false;
+  }
+
+  char const token[] = "__MOZCUSTOM__:";
+  // We're searching for a string inside a binary blob,
+  // so a normal strstr that bails on the first NUL won't work.
+  char const * tokenPos = FindStrInBuf(view + certTableOffset,
+                                       certTableLen, token);
+  if (tokenPos) {
+    size_t tokenLen = (sizeof(token) / sizeof(token[0])) - 1;
+    data = AString(tokenPos + tokenLen);
+    return true;
+  }
+  return false;
+}
+
+static bool
+ReadPostSigningData(UString exePath, AString& data)
+{
+  bool retval = false;
+
  HANDLE exeFile = CreateFileW(exePath, GENERIC_READ, FILE_SHARE_READ, NULL,
+                               OPEN_EXISTING, FILE_ATTRIBUTE_NORMAL, NULL);
+  if (exeFile != INVALID_HANDLE_VALUE) {
+    HANDLE mapping = CreateFileMapping(exeFile, NULL, PAGE_READONLY, 0, 0, NULL);
+    if (mapping != INVALID_HANDLE_VALUE) {
+      // MSDN claims the return value on failure is NULL,
+      // but I've also seen it returned on success, so double-check.
+      if (mapping || GetLastError() == ERROR_SUCCESS) {
+        char * view = (char*)MapViewOfFile(mapping, FILE_MAP_READ, 0, 0, 0);
+        if (view) {
+          DWORD fileSize = GetFileSize(exeFile, NULL);
+          retval = ReadPostSigningDataFromView(view, fileSize, data);
+        }
+        CloseHandle(mapping);
```

```
+      }
+    }
+    CloseHandle(exeFile);
+  }
+  return retval;
+}
+
+// Delayed load libraries are loaded when the first symbol is used.
+// The following ensures that we load the delayed loaded libraries from the
+//
 system directory.
+struct AutoLoadSystemDependencies
+{
+  AutoLoadSystemDependencies()
+  {
+    HMODULE module = ::GetModuleHandleW(L"kernel32.dll");
+    if (module) {
+      // SetDefaultDllDirectories is always available on Windows 8 and above. It
+      // is also available on Windows Vista, Windows Server 2008, and
+      // Windows 7 when MS KB2533623 has been applied.
+      typedef BOOL (WINAPI *SetDefaultDllDirectoriesType)(DWORD);
+      SetDefaultDllDirectoriesType setDefaultDllDirectories =
+        (SetDefaultDllDirectoriesType) GetProcAddress(module, "SetDefaultDllDirectories");
+      if (setDefaultDllDirectories) {
+        setDefaultDllDirectories(0x0800 /* LOAD_LIBRARY_SEARCH_SYSTEM32 */ );
+        return;
+      }
+    }
+
+    static LPCWSTR delayDLLs[] = { L"uxtheme.dll", L"userenv.dll",
+                                   L"setupapi.dll", L"apphelp.dll",
+                                   L"propsys.dll", L"dwmapi.dll",
+                                   L"cryptbase.dll",
 L"oleacc.dll",
+                                   L"clbcatq.dll" };
+    WCHAR systemDirectory[MAX_PATH + 1] = { L'\0' };
+    // If GetSystemDirectory fails we accept that we'll load the DLLs from the
+    // normal search path.
+    GetSystemDirectoryW(systemDirectory, MAX_PATH + 1);
+    size_t systemDirLen = wcslen(systemDirectory);
+
+    // Make the system directory path terminate with a slash
+    if (systemDirectory[systemDirLen - 1] != L'\\' && systemDirLen) {
+      systemDirectory[systemDirLen] = L'\\';
+      ++systemDirLen;
+      // No need to re-NULL terminate
+    }
+
```

```
+    // For each known DLL ensure it is loaded from the system32 directory
+    for (size_t i = 0; i < sizeof(delayDLLs) / sizeof(delayDLLs[0]); ++i) {
+      size_t fileLen = wcslen(delayDLLs[i]);
+      wcsncpy(systemDirectory + systemDirLen, delayDLLs[i],
+      MAX_PATH - systemDirLen);
+      if (systemDirLen + fileLen <= MAX_PATH) {
+        systemDirectory[systemDirLen + fileLen] = L'\0';
+
     } else {
+        systemDirectory[MAX_PATH] = L'\0';
+      }
+      LPCWSTR fullModulePath = systemDirectory; // just for code readability
+      LoadLibraryW(fullModulePath);
+    }
+  }
+} loadDLLs;
+
+BOOL
+RemoveCurrentDirFromSearchPath()
+{
+  // kernel32.dll is in the knownDLL list so it is safe to load without a full path
+  HMODULE kernel32 = LoadLibraryW(L"kernel32.dll");
+  if (!kernel32) {
+    return FALSE;
+  }
+
+  typedef BOOL (WINAPI *SetDllDirectoryType)(LPCWSTR);
+  SetDllDirectoryType SetDllDirectoryFn =
+    (SetDllDirectoryType)GetProcAddress(kernel32, "SetDllDirectoryW");
+  if (!SetDllDirectoryFn) {
+    FreeLibrary(kernel32);
+    return FALSE;
+  }
+
+  // If this call fails we can't do much about it, so ignore it.
+  // It is unlikely to fail and this is just a precaution anyway.
+  SetDllDirectoryFn(L"");
+  FreeLibrary(kernel32);
+  return TRUE;
+}
+
+/* END Mozilla customizations */
+
int APIENTRY WinMain(HINSTANCE hInstance, HINSTANCE /* hPrevInstance
 */,
   #ifdef UNDER_CE
   LPWSTR
@@ -133,13 +306,35 @@ int APIENTRY WinMain(HINSTANCE hInstance, HINSTANCE /* hPrevInstance */,
```

```
   #endif
   /* lpCmdLine */,int /* nCmdShow */)
{
+  /* BEGIN Mozilla customizations */
+  // Disable current directory from being in the search path.
+  // This call does not help with implicitly loaded DLLs.
+  if (!RemoveCurrentDirFromSearchPath()) {
+    WCHAR minOSTitle[512] = { '\0' };
+    WCHAR minOSText[512] = { '\0' };
+    LoadStringW(NULL, IDS_MIN_OS_TITLE, minOSTitle,
+                sizeof(minOSTitle) / sizeof(minOSTitle[0]));
+    LoadStringW(NULL, IDS_MIN_OS_TEXT, minOSText,
+                sizeof(minOSText) / sizeof(minOSText[0]));
+    MessageBoxW(NULL, minOSText, minOSTitle, MB_OK | MB_ICONERROR);
+    return 1;
+  }
+  /* END Mozilla customizations */
+
  g_hInstance = (HINSTANCE)hInstance;

  NT_CHECK

-  #ifdef _WIN32
-  LoadSecurityDlls();
-  #endif
+  // BEGIN Mozilla customizations
+  // Our AutoLoadSystemDependencies
 (see above) does the same job as the
+  // LoadSecurityDlls function, but slightly better because it runs as a static
+  // initializer, and it doesn't include LOAD_LIBRARY_SEARCH_USER_DIRS in
+  // the search path, which partially defeats the purpose of calling
+  // SetDefaultDllDirectories at all.
+  //#ifdef _WIN32
+  //LoadSecurityDlls();
+  //#endif
+  // END Mozilla customizations

  // InitCommonControls();

@@ -172,6 +367,18 @@ int APIENTRY WinMain(HINSTANCE hInstance, HINSTANCE /* hPrevInstance */,
  UString dirPrefix ("." STRING_PATH_SEPARATOR);
  UString appLaunched;
  bool showProgress = true;
+
+  /* BEGIN Mozilla customizations */
+  bool extractOnly = false;
+  if (switches.IsPrefixedBy_NoCase(L"/extractdir=")) {
+    assumeYes = true;
```

```
+    showProgress = false;
+    extractOnly = true;
+  } else if (!switches.IsEmpty()) {
+    showProgress = false;
+  }
+  /* END Mozilla customizations */
+
  if (!config.IsEmpty())
  {
    CObjectVector<CTextConfigPair>
 pairs;
@@ -204,7 +411,8 @@ int APIENTRY WinMain(HINSTANCE hInstance, HINSTANCE /* hPrevInstance */,
  }

  CTempDir tempDir;
-  if (!tempDir.Create(kTempDirPrefix))
+  /* Mozilla customizations - Added !extractOnly */
+  if (!extractOnly && !tempDir.Create(kTempDirPrefix))
  {
    if (!assumeYes)
      ShowErrorMessage(L"Can not create temp folder archive");
@@ -222,7 +430,9 @@ int APIENTRY WinMain(HINSTANCE hInstance, HINSTANCE /* hPrevInstance */,
    }
  }

-  const FString tempDirPath = tempDir.GetPath();
+  /* BEGIN Mozilla customizations - added extractOnly  parameter support */
+  const FString tempDirPath = extractOnly ? switches.Ptr(12) : GetUnicodeString(tempDir.GetPath());
+  /* END Mozilla customizations */
  // tempDirPath = L"M:\\1\\"; // to test low disk space
  {
    bool isCorrupt = false;
@@ -250,6 +460,28 @@ int APIENTRY WinMain(HINSTANCE hInstance, HINSTANCE /* hPrevInstance */,
    }
  }

+  /* BEGIN Mozilla customizations */
+  // Retrieve and store
 any data added to this file after signing.
+  {
+    AString postSigningData;
+    if (ReadPostSigningData(fullPath, postSigningData)) {
+      FString postSigningDataFilePath(tempDirPath);
+      NFile::NName::NormalizeDirPathPrefix(postSigningDataFilePath);
+      postSigningDataFilePath += L"postSigningData";
+
+      NFile::NIO::COutFile postSigningDataFile;
+      postSigningDataFile.Create(postSigningDataFilePath, true);
```

```
+
+      UInt32 written = 0;
+      postSigningDataFile.Write(postSigningData, postSigningData.Len(), written);
+    }
+  }
+
+  if (extractOnly) {
+    return 0;
+  }
+  /* END Mozilla customizations */
+
  #ifndef UNDER_CE
  CCurrentDirRestorer currentDirRestorer;
  if (!SetCurrentDir(tempDirPath))
diff --git a/c:/Users/mhowell/Downloads/lzma1805/CPP/7zip/Bundles/SFXSetup/resource.h b/other-licenses/7zstub/src/CPP/7zip/Bundles/SFXSetup/resource.h
index 533197e..975d779 100644
--- a/c:/Users/mhowell/Downloads/lzma1805/CPP/7zip/Bundles/SFXSetup/resource.h
+++
 b/other-licenses/7zstub/src/CPP/7zip/Bundles/SFXSetup/resource.h
@@ -4,3 +4,5 @@
#define IDS_EXTRACTION_ERROR_MESSAGE     8
#define IDS_CANNOT_CREATE_FOLDER      3003
#define IDS_PROGRESS_EXTRACTING       3300
+#define IDS_MIN_OS_TITLE              70
+#define IDS_MIN_OS_TEXT               71
diff --git a/c:/Users/mhowell/Downloads/lzma1805/CPP/7zip/Bundles/SFXSetup/resource.rc b/other-licenses/7zstub/src/CPP/7zip/Bundles/SFXSetup/resource.rc
index 9e88fd4..9fda0d0 100644
--- a/c:/Users/mhowell/Downloads/lzma1805/CPP/7zip/Bundles/SFXSetup/resource.rc
+++ b/other-licenses/7zstub/src/CPP/7zip/Bundles/SFXSetup/resource.rc
@@ -11,6 +11,8 @@ BEGIN
  IDS_EXTRACTION_ERROR_MESSAGE  "File is corrupt"
  IDS_CANNOT_CREATE_FOLDER  "Cannot create folder '{0}'"
  IDS_PROGRESS_EXTRACTING  "Extracting"
+  IDS_MIN_OS_TITLE  "Setup Error"
+  IDS_MIN_OS_TEXT  "Microsoft Windows 7 or newer is required."
END

#include "../../UI/FileManager/ProgressDialog.rc"
diff --git a/c:/Users/mhowell/Downloads/lzma1805/CPP/7zip/UI/FileManager/ProgressDialog.cpp
 b/other-licenses/7zstub/src/CPP/7zip/UI/FileManager/ProgressDialog.cpp
index 27d42b2..9b61369 100644
--- a/c:/Users/mhowell/Downloads/lzma1805/CPP/7zip/UI/FileManager/ProgressDialog.cpp
+++ b/other-licenses/7zstub/src/CPP/7zip/UI/FileManager/ProgressDialog.cpp
@@ -165,7 +165,8 @@ bool CProgressDialog::OnButtonClicked(int buttonID, HWND buttonHWND)
     bool paused = Sync.GetPaused();
     Sync.SetPaused(true);
```

```
     _inCancelMessageBox = true;
-     int res = ::MessageBoxW(*this, L"Are you sure you want to cancel?", _title, MB_YESNOCANCEL);
+     // Mozilla Customization - Removed redundant cancel button from dialog.
+     int res = ::MessageBoxW(*this, L"Are you sure you want to cancel?", _title, MB_YESNO);
     _inCancelMessageBox = false;
     Sync.SetPaused(paused);
     if (res == IDCANCEL || res == IDNO)
```

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THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT
(INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE
OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Content in license Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
```

```
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains content." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size:
 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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// IProgress.h

#ifndef __IPROGRESS_H
#define __IPROGRESS_H

#include "../Common/MyTypes.h"

#include "IDecl.h"

#define INTERFACE_IProgress(x) \
 STDMETHOD(SetTotal)(UInt64 total) x; \
 STDMETHOD(SetCompleted)(const UInt64 *completeValue) x; \

DECL_INTERFACE(IProgress, 0, 5)
{
 INTERFACE_IProgress(PURE)
};

#endif
/* ATK -  Accessibility Toolkit
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* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_RELATION_H__
#define __ATK_RELATION_H__

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

#include <glib-object.h>
#include <atk/atkrelationtype.h>
```

```
/*
* An
 AtkRelation describes a relation between the object and one or more
* other objects. The actual relations that an object has with other objects
* are defined as an AtkRelationSet, which is a set of AtkRelations.
*/

#define ATK_TYPE_RELATION                    (atk_relation_get_type ())
#define ATK_RELATION(obj)                    (G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_RELATION, AtkRelation))
#define ATK_RELATION_CLASS(klass)            (G_TYPE_CHECK_CLASS_CAST ((klass),
ATK_TYPE_RELATION, AtkRelationClass))
#define ATK_IS_RELATION(obj)                 (G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_RELATION))
#define ATK_IS_RELATION_CLASS(klass)         (G_TYPE_CHECK_CLASS_TYPE ((klass),
ATK_TYPE_RELATION))
#define ATK_RELATION_GET_CLASS(obj)          (G_TYPE_INSTANCE_GET_CLASS ((obj),
ATK_TYPE_RELATION, AtkRelationClass))

typedef struct _AtkRelation          AtkRelation;
typedef struct _AtkRelationClass     AtkRelationClass;

struct _AtkRelation
{
  GObject parent;

 GPtrArray       *target;
 AtkRelationType relationship;
};

struct _AtkRelationClass
{
 GObjectClass parent;
};

GType atk_relation_get_type (void);

AtkRelationType       atk_relation_type_register      (const gchar     *name);
G_CONST_RETURN gchar* atk_relation_type_get_name      (AtkRelationType type);
AtkRelationType       atk_relation_type_for_name      (const gchar     *name);

/*
* Create a new relation for the specified key and the specified list
* of targets.
*/
AtkRelation*          atk_relation_new                (AtkObject       **targets,
                                                       gint            n_targets,
```

```
                                        AtkRelationType relationship);
/*
* Returns the type of a relation.
*/
AtkRelationType       atk_relation_get_relation_type  (AtkRelation     *relation);
/*
* Returns the target list of a relation.
*/
GPtrArray*            atk_relation_get_target         (AtkRelation
    *relation);
void                  atk_relation_add_target         (AtkRelation     *relation,
                                        AtkObject       *target);


#ifdef __cplusplus
}
#endif /* __cplusplus */

#endif /* __ATK_RELATION_H__ */
// PropertyName.h

#ifndef __PROPERTY_NAME_H
#define __PROPERTY_NAME_H

#include "../../../Common/MyString.h"

UString GetNameOfProperty(PROPID propID, const wchar_t *name);

#endif
```

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// Update.h

#ifndef __COMMON_UPDATE_H
#define __COMMON_UPDATE_H

#include "../../../Common/Wildcard.h"

#include "ArchiveOpenCallback.h"
#include "LoadCodecs.h"
#include "OpenArchive.h"
#include "Property.h"

```
#include "UpdateAction.h"
#include "UpdateCallback.h"

#include "DirItem.h"

enum EArcNameMode
{
 k_ArcNameMode_Smart,
 k_ArcNameMode_Exact,
 k_ArcNameMode_Add,
};

struct CArchivePath
{
 UString OriginalPath;

 UString Prefix;   // path(folder) prefix including slash
 UString Name; // base name
 UString BaseExtension; // archive type extension or "exe" extension
 UString VolExtension;  // archive type extension for volumes

 bool Temp;
 FString TempPrefix;  // path(folder) for temp location
 FString TempPostfix;

 CArchivePath(): Temp(false) {};

 void ParseFromPath(const UString &path, EArcNameMode mode);
 UString GetPathWithoutExt() const { return Prefix + Name; }
 UString GetFinalPath() const;
 UString GetFinalVolPath() const;
 FString GetTempPath() const;
};

struct
 CUpdateArchiveCommand
{
 UString UserArchivePath;
 CArchivePath ArchivePath;
 NUpdateArchive::CActionSet ActionSet;
};

struct CCompressionMethodMode
{
 bool Type_Defined;
 COpenType Type;
 CObjectVector<CProperty> Properties;
```

```
 CCompressionMethodMode(): Type_Defined(false) {}
};

namespace NRecursedType { enum EEnum
{
 kRecursed,
 kWildcardOnlyRecursed,
 kNonRecursed
};}

struct CRenamePair
{
 UString OldName;
 UString NewName;
 bool WildcardParsing;
 NRecursedType::EEnum RecursedType;

 CRenamePair(): WildcardParsing(true), RecursedType(NRecursedType::kNonRecursed) {}

 bool Prepare();
 bool GetNewPath(bool isFolder, const UString &src, UString &dest) const;
};

struct CUpdateOptions
{
 CCompressionMethodMode MethodMode;

 CObjectVector<CUpdateArchiveCommand> Commands;
 bool UpdateArchiveItself;
 CArchivePath ArchivePath;
 EArcNameMode ArcNameMode;

 bool SfxMode;
 FString SfxModule;

 bool OpenShareForWrite;
 bool StopAfterOpenError;

 bool
 StdInMode;
 UString StdInFileName;
 bool StdOutMode;

 bool EMailMode;
 bool EMailRemoveAfter;
 UString EMailAddress;

 FString WorkingDir;
```

```
 NWildcard::ECensorPathMode PathMode;
 UString AddPathPrefix;

 CBoolPair NtSecurity;
 CBoolPair AltStreams;
 CBoolPair HardLinks;
 CBoolPair SymLinks;

 bool DeleteAfterCompressing;

 bool SetArcMTime;

 CObjectVector<CRenamePair> RenamePairs;

 bool InitFormatIndex(const CCodecs *codecs, const CObjectVector<COpenType> &types, const UString
&arcPath);
 bool SetArcPath(const CCodecs *codecs, const UString &arcPath);

 CUpdateOptions():
   UpdateArchiveItself(true),
   SfxMode(false),
   StdInMode(false),
   StdOutMode(false),
   EMailMode(false),
   EMailRemoveAfter(false),
   OpenShareForWrite(false),
   StopAfterOpenError(false),
   ArcNameMode(k_ArcNameMode_Smart),
   PathMode(NWildcard::k_RelatPath),

   DeleteAfterCompressing(false),
   SetArcMTime(false)

     {};

 void SetActionCommand_Add()
 {
   Commands.Clear();
    CUpdateArchiveCommand c;
   c.ActionSet = NUpdateArchive::k_ActionSet_Add;
   Commands.Add(c);
 }

 CRecordVector<UInt64> VolumesSizes;
};

struct CUpdateErrorInfo
{
```

```
 DWORD SystemError;
 AString Message;
 FStringVector FileNames;

 bool ThereIsError() const { return SystemError != 0 || !Message.IsEmpty() || !FileNames.IsEmpty(); }
 HRESULT Get_HRESULT_Error() const { return SystemError == 0 ? E_FAIL :
HRESULT_FROM_WIN32(SystemError); }
 void SetFromLastError(const char *message);
 HRESULT SetFromLastError(const char *message, const FString &fileName);

 CUpdateErrorInfo(): SystemError(0) {};
};

struct CFinishArchiveStat
{
 UInt64 OutArcFileSize;

 CFinishArchiveStat(): OutArcFileSize(0) {}
};

#define INTERFACE_IUpdateCallbackUI2(x) \
 INTERFACE_IUpdateCallbackUI(x) \
 INTERFACE_IDirItemsCallback(x) \
 virtual HRESULT OpenResult(const CCodecs *codecs, const CArchiveLink &arcLink, const wchar_t *name,
HRESULT result) x; \
 virtual HRESULT StartScanning()
 x; \
 virtual HRESULT FinishScanning(const CDirItemsStat &st) x; \
 virtual HRESULT StartOpenArchive(const wchar_t *name) x; \
 virtual HRESULT StartArchive(const wchar_t *name, bool updating) x; \
 virtual HRESULT FinishArchive(const CFinishArchiveStat &st) x; \
 virtual HRESULT DeletingAfterArchiving(const FString &path, bool isDir) x; \
 virtual HRESULT FinishDeletingAfterArchiving() x; \

struct IUpdateCallbackUI2: public IUpdateCallbackUI, public IDirItemsCallback
{
 INTERFACE_IUpdateCallbackUI2(=0)
};

HRESULT UpdateArchive(
  CCodecs *codecs,
  const CObjectVector<COpenType> &types,
  const UString &cmdArcPath2,
  NWildcard::CCensor &censor,
  CUpdateOptions &options,
  CUpdateErrorInfo &errorInfo,
  IOpenCallbackUI *openCallback,
  IUpdateCallbackUI2 *callback,
```

```
   bool needSetPath);

#endif
UNRECOGNIZED LICENSE; MD5 sum: f5e251c82aafa4e7fd60ccbca2c731ea
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Content in copyright Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-010-ref.xht" />
  <meta name="assert" content="The copyright element contains content." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF
 Test";
    src: url("support/metadatadisplay-schema-copyright-010.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
/* ATK -  Accessibility Toolkit
* Copyright 2001 Sun Microsystems Inc.
*
```

```
* This library is free software; you can redistribute it and/or
* modify it under the terms of the GNU Library General Public
* License as published by the Free Software Foundation; either
* version 2 of the License, or (at your option) any later version.
*
* This library is distributed in the hope that it will be useful,
* but WITHOUT ANY WARRANTY; without even the implied warranty of
* MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the GNU
* Library General Public License for more details.
*
* You should have received a copy of the GNU Library General Public
* License along with this library; if not, write to the
* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_HYPERLINK_IMPL_H__
#define __ATK_HYPERLINK_IMPL_H__

#include <atk/atkobject.h>
#include <atk/atkhyperlink.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

/*
 * The AtkHyperlinkImpl interface should be supported by objects
* exposed within the hierarchy as children of an AtkHypertext container
* which correspond to "links" or embedded content within the text.
* HTML anchors are not, for instance, normally exposed this way,
* but embedded images and components which appear inline in the
* content of a text object are. The AtkHyperlinkIface interface
* allows a means of determining which children are hyperlinks in this
* sense of the word, and for obtaining their corresponding AtkHyperlink
* object, from which the embedding range, URI, etc. can be obtained.
*
* To some extent this interface exists because, for historical
* reasons, AtkHyperlink was defined as an object type, not an interface.
* Thus, in order to interact with AtkObjects via AtkHyperlink semantics,
* a new interface was required.
*/

#define ATK_TYPE_HYPERLINK_IMPL          (atk_hyperlink_impl_get_type ())
#define ATK_IS_HYPERLINK_IMPL(obj)       G_TYPE_CHECK_INSTANCE_TYPE
 ((obj), ATK_TYPE_HYPERLINK_IMPL)
#define ATK_HYPERLINK_IMPL(obj)          G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_HYPERLINK_IMPL, AtkHyperlinkImpl)
```

```
#define ATK_HYPERLINK_IMPL_GET_IFACE(obj)   G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_HYPERLINK_IMPL, AtkHyperlinkImplIface)

#ifndef _TYPEDEF_ATK_HYPERLINK_IMPL_
#define _TYPEDEF_ATK_HYPERLINK_IMPL__
typedef struct _AtkHyperlinkImpl AtkHyperlinkImpl;
#endif
typedef struct _AtkHyperlinkImplIface AtkHyperlinkImplIface;

struct _AtkHyperlinkImplIface
{
 GTypeInterface parent;

 AtkHyperlink*  (* get_hyperlink) (AtkHyperlinkImpl *impl);

 AtkFunction pad1;
};

GType           atk_hyperlink_impl_get_type (void);

AtkHyperlink    *atk_hyperlink_impl_get_hyperlink (AtkHyperlinkImpl *obj);

#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_HYPERLINK_IMPL_H__ */
```

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```
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strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With Nested div Elements in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-018-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element that contains nested div elements." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
```

```
    src: url("support/metadatadisplay-schema-copyright-018.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   &lt;div&gt;Paragraph 1&lt;/div&gt;
   &lt;div&gt;Paragraph 2&lt;/div&gt;
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
// Unicode support by Jim Park -- 08/23/2007
// Jim Park: Should probably turn this into a nice class for C++ programs.

#pragma once
#include <windows.h>
#include <tchar.h>
// only include this file from one place in your DLL.
// (it is all static, if you use it in two places it will fail)

#define EXDLL_INIT()          {  \
       g_stringsize=string_size; \
       g_stacktop=stacktop;      \
       g_variables=variables; }

// For page showing plug-ins
```

```
#define WM_NOTIFY_OUTER_NEXT (WM_USER+0x8)
#define WM_NOTIFY_CUSTOM_READY (WM_USER+0xd)

/* Jim Park: This char is compared as an int value and therefore
  it's fine as an ASCII.  Do not need to change to wchar_t since
  it will get the same integer value. */
#define NOTIFY_BYE_BYE _T('x')

typedef struct _stack_t {
 struct _stack_t *next;
 TCHAR text[1]; // this should be the length of string_size
} stack_t;

static unsigned int g_stringsize;
static stack_t **g_stacktop;
static TCHAR *g_variables;



enum
{
INST_0,        // $0
INST_1,
        // $1
INST_2,        // $2
INST_3,        // $3
INST_4,        // $4
INST_5,        // $5
INST_6,        // $6
INST_7,        // $7
INST_8,        // $8
INST_9,        // $9
INST_R0,       // $R0
INST_R1,       // $R1
INST_R2,       // $R2
INST_R3,       // $R3
INST_R4,       // $R4
INST_R5,       // $R5
INST_R6,       // $R6
INST_R7,       // $R7
INST_R8,       // $R8
INST_R9,       // $R9
INST_CMDLINE,   // $CMDLINE
INST_INSTDIR,   // $INSTDIR
INST_OUTDIR,    // $OUTDIR
INST_EXEDIR,    // $EXEDIR
INST_LANG,      // $LANGUAGE
__INST_LAST
};
```

```
typedef struct {
 int autoclose;
 int all_user_var;
 int exec_error;
 int abort;
 int exec_reboot;
 int reboot_called;
 int XXX_cur_insttype; // deprecated
 int XXX_insttype_changed; // deprecated
 int silent;
 int instdir_error;
 int rtl;
 int errlvl;
 int alter_reg_view;
} exec_flags_type;

typedef struct {
 exec_flags_type *exec_flags;
 int (__stdcall *ExecuteCodeSegment)(int, HWND);
 void (__stdcall
 *validate_filename)(TCHAR *);
} extra_parameters;

static int    __stdcall popstring(TCHAR *str); // 0 on success, 1 on empty stack
static void   __stdcall pushstring(const TCHAR *str);
static char * __stdcall getuservariable(const int varnum);
static void   __stdcall setuservariable(const int varnum, const TCHAR *var);

#ifdef _UNICODE
#define PopStringW(x) popstring(x)
#define PushStringW(x) pushstring(x)
#define SetUserVariableW(x,y) setuservariable(x,y)

static int  __stdcall PopStringA(char* ansiStr);
static void __stdcall PushStringA(const char* ansiStr);
static void __stdcall GetUserVariableW(const int varnum, wchar_t* wideStr);
static void __stdcall GetUserVariableA(const int varnum, char* ansiStr);
static void __stdcall SetUserVariableA(const int varnum, const char* ansiStr);

#else
// ANSI defs

#define PopStringA(x) popstring(x)
#define PushStringA(x) pushstring(x)
#define SetUserVariableA(x,y) setuservariable(x,y)

static int  __stdcall PopStringW(wchar_t* wideStr);
```

```
static
 void __stdcall PushStringW(wchar_t* wideStr);
static void __stdcall GetUserVariableW(const int varnum, wchar_t* wideStr);
static void __stdcall GetUserVariableA(const int varnum, char* ansiStr);
static void __stdcall SetUserVariableW(const int varnum, const wchar_t* wideStr);

#endif

static BOOL __stdcall IsUnicode(void)
static TCHAR* __stdcall AllocString();
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With class Attribute in span Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element that contains a span element with
&quot;class1 class2 class3&quot; as the value for the class attribute." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
```

<copyright>
<text>
Text with <span class="class1 class2 class3">span</span>.
</text>
</copyright>
</metadata>
</pre>
</body>
</html>
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OR OTHERWISE, ARISING FROM,
OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
SOFTWARE.
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
<title>WOFF Test: Valid license Element With One No Language Tagged text Element</title>
<link rel="author" title="Tal Leming" href="http://typesupply.com" />
<link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
<link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
<link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
<link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
<meta name="assert" content="The license element matches the schema. It contains one text element that does not have a language tag." />
<style type="text/css"><![CDATA[
@import url("support/test-fonts.css");

```
  body {
   font-size:
 20px;
  }
  pre {
   font-size: 12px;
  }
  .test {
   font-family: "WOFF Test CFF Reference";
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts" id="License ID"&gt;
  &lt;text&gt;
   License without language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
/* 7zCrc.h -- CRC32 calculation
2013-01-18 : Igor Pavlov : Public domain */

#ifndef __7Z_CRC_H
#define __7Z_CRC_H

#include "7zTypes.h"

EXTERN_C_BEGIN

extern UInt32 g_CrcTable[];

/* Call CrcGenerateTable one time before other CRC functions */
void MY_FAST_CALL CrcGenerateTable(void);

#define CRC_INIT_VAL 0xFFFFFFFF
#define CRC_GET_DIGEST(crc) ((crc) ^ CRC_INIT_VAL)
```

```
#define CRC_UPDATE_BYTE(crc, b) (g_CrcTable[((crc) ^ (b)) & 0xFF] ^ ((crc) >> 8))

UInt32 MY_FAST_CALL CrcUpdate(UInt32 crc, const void *data, size_t size);
UInt32 MY_FAST_CALL CrcCalc(const void *data, size_t size);

EXTERN_C_END

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With dir Attribute in div Element in text Element 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element that contains a div element with ltr as
the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
```

```
  &lt;div dir="ltr"&gt;Paragraph 1&lt;/div&gt;
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
/* Precomp.h -- StdAfx
2013-06-16 : Igor Pavlov : Public domain */

#ifndef __7Z_PRECOMP_H
#define __7Z_PRECOMP_H

#include "../../Compiler.h"
#include "../../7zTypes.h"

#endif
// InStreamWithCRC.h

#ifndef __IN_STREAM_WITH_CRC_H
#define __IN_STREAM_WITH_CRC_H

#include "../../../../C/7zCrc.h"

#include "../../../Common/MyCom.h"

#include "../../IStream.h"

class CSequentialInStreamWithCRC:
 public ISequentialInStream,
 public CMyUnknownImp
{
public:
 MY_UNKNOWN_IMP

 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
private:
 CMyComPtr<ISequentialInStream> _stream;
 UInt64 _size;
 UInt32 _crc;
 bool _wasFinished;
public:
 void SetStream(ISequentialInStream *stream) { _stream = stream;  }
 void Init()
 {
   _size = 0;
   _wasFinished = false;
   _crc = CRC_INIT_VAL;
```

```
 }
 void ReleaseStream() { _stream.Release(); }
 UInt32 GetCRC() const { return CRC_GET_DIGEST(_crc); }
 UInt64 GetSize() const { return _size; }
 bool WasFinished() const { return _wasFinished; }
};

class CInStreamWithCRC:
 public IInStream,
 public CMyUnknownImp
{
public:
 MY_UNKNOWN_IMP1(IInStream)

 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
  STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition);
private:
 CMyComPtr<IInStream> _stream;
 UInt64 _size;
 UInt32 _crc;
 // bool _wasFinished;
public:
 void SetStream(IInStream *stream) { _stream = stream;  }
 void Init()
 {
   _size = 0;
   // _wasFinished = false;
   _crc = CRC_INIT_VAL;
 }
 void ReleaseStream() { _stream.Release(); }
 UInt32 GetCRC() const { return CRC_GET_DIGEST(_crc); }
 UInt64 GetSize() const { return _size; }
 // bool WasFinished() const { return _wasFinished; }
};

#endif
#define MY_VER_MAJOR 18
#define MY_VER_MINOR 05
#define MY_VER_BUILD 0
#define MY_VERSION_NUMBERS "18.05"
#define MY_VERSION MY_VERSION_NUMBERS

#ifdef MY_CPU_NAME
 #define MY_VERSION_CPU MY_VERSION " (" MY_CPU_NAME ")"
#else
 #define MY_VERSION_CPU MY_VERSION
#endif
```

```
#define MY_DATE "2018-04-30"
#undef MY_COPYRIGHT
#undef MY_VERSION_COPYRIGHT_DATE
#define MY_AUTHOR_NAME "Igor Pavlov"
#define MY_COPYRIGHT_PD "Igor Pavlov : Public domain"
#define MY_COPYRIGHT_CR "Copyright (c) 1999-2018 Igor Pavlov"

#ifdef USE_COPYRIGHT_CR
 #define MY_COPYRIGHT MY_COPYRIGHT_CR
#else
 #define MY_COPYRIGHT MY_COPYRIGHT_PD
#endif

#define MY_COPYRIGHT_DATE MY_COPYRIGHT " : " MY_DATE
#define MY_VERSION_COPYRIGHT_DATE MY_VERSION_CPU " : " MY_COPYRIGHT " : " MY_DATE
```

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```
// Windows/FileIO.h

#ifndef __WINDOWS_FILE_IO_H
#define __WINDOWS_FILE_IO_H

#include "../Common/MyWindows.h"

#if defined(_WIN32) && !defined(UNDER_CE)
#include <winioctl.h>
#endif

#include "../Common/MyString.h"
#include "../Common/MyBuffer.h"

#include "Defs.h"

#define _my_IO_REPARSE_TAG_MOUNT_POINT  (0xA0000003L)
#define _my_IO_REPARSE_TAG_SYMLINK      (0xA000000CL)

#define _my_SYMLINK_FLAG_RELATIVE 1

#define my_FSCTL_SET_REPARSE_POINT  CTL_CODE(FILE_DEVICE_FILE_SYSTEM, 41,
METHOD_BUFFERED, FILE_SPECIAL_ACCESS) // REPARSE_DATA_BUFFER
#define my_FSCTL_GET_REPARSE_POINT  CTL_CODE(FILE_DEVICE_FILE_SYSTEM, 42,
METHOD_BUFFERED, FILE_ANY_ACCESS)     // REPARSE_DATA_BUFFER

namespace NWindows {
namespace NFile {

#if defined(_WIN32) && !defined(UNDER_CE)
bool FillLinkData(CByteBuffer &dest, const wchar_t *path, bool isSymLink);
#endif

struct CReparseShortInfo
{
 unsigned Offset;
```

```
 unsigned Size;

 bool Parse(const Byte *p, size_t size);
};

struct CReparseAttr
{
 UInt32 Tag;
 UInt32
 Flags;
 UString SubsName;
 UString PrintName;

 CReparseAttr(): Tag(0), Flags(0) {}

 // Parse()
 // returns true and (errorCode = 0), if (correct MOUNT_POINT or SYMLINK)
 // returns false and (errorCode = ERROR_REPARSE_TAG_MISMATCH), if not (MOUNT_POINT or
SYMLINK)
 bool Parse(const Byte *p, size_t size, DWORD &errorCode);

 bool IsMountPoint() const { return Tag == _my_IO_REPARSE_TAG_MOUNT_POINT; } // it's Junction
 bool IsSymLink() const { return Tag == _my_IO_REPARSE_TAG_SYMLINK; }
 bool IsRelative() const { return Flags == _my_SYMLINK_FLAG_RELATIVE; }
 // bool IsVolume() const;

 bool IsOkNamePair() const;
 UString GetPath() const;
};

namespace NIO {

bool GetReparseData(CFSTR path, CByteBuffer &reparseData, BY_HANDLE_FILE_INFORMATION *fileInfo =
NULL);
bool SetReparseData(CFSTR path, bool isDir, const void *data, DWORD size);

class CFileBase
{
protected:
 HANDLE _handle;

 bool Create(CFSTR path, DWORD desiredAccess,
    DWORD shareMode, DWORD creationDisposition,
 DWORD flagsAndAttributes);

public:

 bool DeviceIoControl(DWORD controlCode, LPVOID inBuffer, DWORD inSize,
```

```
    LPVOID outBuffer, DWORD outSize, LPDWORD bytesReturned, LPOVERLAPPED overlapped = NULL)
const
 {
  return BOOLToBool(::DeviceIoControl(_handle, controlCode, inBuffer, inSize,
      outBuffer, outSize, bytesReturned, overlapped));
 }

 bool DeviceIoControlOut(DWORD controlCode, LPVOID outBuffer, DWORD outSize, LPDWORD
bytesReturned) const
 {
  return DeviceIoControl(controlCode, NULL, 0, outBuffer, outSize, bytesReturned);
 }

 bool DeviceIoControlOut(DWORD controlCode, LPVOID outBuffer, DWORD outSize) const
 {
  DWORD bytesReturned;
  return DeviceIoControlOut(controlCode, outBuffer, outSize, &bytesReturned);
 }

public:
 #ifdef SUPPORT_DEVICE_FILE
 bool IsDeviceFile;
 bool SizeDefined;
 UInt64 Size; // it can be larger than real available size
 #endif

 CFileBase(): _handle(INVALID_HANDLE_VALUE) {};
 ~CFileBase() { Close(); }

 bool Close()
 throw();

 bool GetPosition(UInt64 &position) const throw();
 bool GetLength(UInt64 &length) const throw();

 bool Seek(Int64 distanceToMove, DWORD moveMethod, UInt64 &newPosition) const throw();
 bool Seek(UInt64 position, UInt64 &newPosition) const throw();
 bool SeekToBegin() const throw();
 bool SeekToEnd(UInt64 &newPosition) const throw();

 bool GetFileInformation(BY_HANDLE_FILE_INFORMATION *info) const
  { return BOOLToBool(GetFileInformationByHandle(_handle, info)); }

 static bool GetFileInformation(CFSTR path, BY_HANDLE_FILE_INFORMATION *info)
 {
  NIO::CFileBase file;
  if (!file.Create(path, 0, FILE_SHARE_READ, OPEN_EXISTING, FILE_FLAG_BACKUP_SEMANTICS))
    return false;
```

```
  return file.GetFileInformation(info);
 }
};

#ifndef UNDER_CE
#define IOCTL_CDROM_BASE  FILE_DEVICE_CD_ROM
#define IOCTL_CDROM_GET_DRIVE_GEOMETRY  CTL_CODE(IOCTL_CDROM_BASE, 0x0013,
METHOD_BUFFERED, FILE_READ_ACCESS)
// #define IOCTL_CDROM_MEDIA_REMOVAL  CTL_CODE(IOCTL_CDROM_BASE,
 0x0201, METHOD_BUFFERED, FILE_READ_ACCESS)

// IOCTL_DISK_GET_DRIVE_GEOMETRY_EX works since WinXP
#define my_IOCTL_DISK_GET_DRIVE_GEOMETRY_EX  CTL_CODE(IOCTL_DISK_BASE, 0x0028,
METHOD_BUFFERED, FILE_ANY_ACCESS)

struct my_DISK_GEOMETRY_EX
{
 DISK_GEOMETRY Geometry;
 LARGE_INTEGER DiskSize;
 BYTE Data[1];
};
#endif

class CInFile: public CFileBase
{
 #ifdef SUPPORT_DEVICE_FILE

 #ifndef UNDER_CE

 bool GetGeometry(DISK_GEOMETRY *res) const
   { return DeviceIoControlOut(IOCTL_DISK_GET_DRIVE_GEOMETRY, res, sizeof(*res)); }

 bool GetGeometryEx(my_DISK_GEOMETRY_EX *res) const
   { return DeviceIoControlOut(my_IOCTL_DISK_GET_DRIVE_GEOMETRY_EX, res, sizeof(*res)); }

 bool GetCdRomGeometry(DISK_GEOMETRY *res) const
   { return DeviceIoControlOut(IOCTL_CDROM_GET_DRIVE_GEOMETRY, res, sizeof(*res)); }

 bool GetPartitionInfo(PARTITION_INFORMATION *res)
   { return DeviceIoControlOut(IOCTL_DISK_GET_PARTITION_INFO, LPVOID(res), sizeof(*res)); }

 #endif

 void CorrectDeviceSize();
  void CalcDeviceSize(CFSTR name);

 #endif
```

```
public:
 bool Open(CFSTR fileName, DWORD shareMode, DWORD creationDisposition, DWORD flagsAndAttributes);
 bool OpenShared(CFSTR fileName, bool shareForWrite);
 bool Open(CFSTR fileName);

 #ifndef UNDER_CE

 bool OpenReparse(CFSTR fileName)
 {
  // 17.02 fix: to support Windows XP compatibility junctions:
  //   we use Create() with (desiredAccess = 0) instead of Open() with GENERIC_READ
  return
      Create(fileName, 0,
      // Open(fileName,
      FILE_SHARE_READ, OPEN_EXISTING,
      FILE_FLAG_OPEN_REPARSE_POINT | FILE_FLAG_BACKUP_SEMANTICS);
 }

 #endif

 bool Read1(void *data, UInt32 size, UInt32 &processedSize) throw();
 bool ReadPart(void *data, UInt32 size, UInt32 &processedSize) throw();
 bool Read(void *data, UInt32 size, UInt32 &processedSize) throw();
};

class COutFile: public CFileBase
{
public:
 bool Open(CFSTR fileName, DWORD shareMode, DWORD creationDisposition, DWORD flagsAndAttributes);
  bool Open(CFSTR fileName, DWORD creationDisposition);
 bool Create(CFSTR fileName, bool createAlways);
 bool CreateAlways(CFSTR fileName, DWORD flagsAndAttributes);

 bool SetTime(const FILETIME *cTime, const FILETIME *aTime, const FILETIME *mTime) throw();
 bool SetMTime(const FILETIME *mTime) throw();
 bool WritePart(const void *data, UInt32 size, UInt32 &processedSize) throw();
 bool Write(const void *data, UInt32 size, UInt32 &processedSize) throw();
 bool SetEndOfFile() throw();
 bool SetLength(UInt64 length) throw();
};

}}}

#endif
```

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<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With dir Attribute in span Element in text Element 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-027-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element that contains a span element with ltr as the value for the dir attribute."
 />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-027.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  Test passes if the word PASS appears below.
  The Extended Metadata Block is valid and may be displayed to the user upon request.
  P
  The XML contained in the Extended Metadata Block is below.
  <pre>
<?xml version="1.0" encoding="UTF-8"?>
<metadata version="1.0">
 <copyright>
  <text>
   Text with <span dir="ltr">span</span>.
  </text>
 </copyright>

```
&lt;/metadata&gt;
  </pre>
 </body>
</html>
// Windows/Control/ToolBar.h

#ifndef __WINDOWS_CONTROL_TOOLBAR_H
#define __WINDOWS_CONTROL_TOOLBAR_H

#include "../Window.h"

namespace NWindows {
namespace NControl {

class CToolBar: public NWindows::CWindow
{
public:
 void AutoSize() { SendMsg(TB_AUTOSIZE, 0, 0); }
 DWORD GetButtonSize() { return (DWORD)SendMsg(TB_GETBUTTONSIZE, 0, 0); }

 bool GetMaxSize(LPSIZE size)
 #ifdef UNDER_CE
 {
  // maybe it must be fixed for more than 1 buttons
  DWORD val = GetButtonSize();
  size->cx = LOWORD(val);
  size->cy = HIWORD(val);
  return true;
 }
 #else
 {
  return LRESULTToBool(SendMsg(TB_GETMAXSIZE, 0, (LPARAM)size));
 }
 #endif

 bool EnableButton(UINT buttonID, bool enable) { return LRESULTToBool(SendMsg(TB_ENABLEBUTTON,
buttonID, MAKELONG(BoolToBOOL(enable), 0))); }
 void ButtonStructSize() { SendMsg(TB_BUTTONSTRUCTSIZE, sizeof(TBBUTTON)); }
 HIMAGELIST SetImageList(UINT listIndex, HIMAGELIST imageList) { return
HIMAGELIST(SendMsg(TB_SETIMAGELIST, listIndex,
 (LPARAM)imageList)); }
 bool AddButton(UINT numButtons, LPTBBUTTON buttons) { return
LRESULTToBool(SendMsg(TB_ADDBUTTONS, numButtons, (LPARAM)buttons)); }
 #ifndef _UNICODE
 bool AddButtonW(UINT numButtons, LPTBBUTTON buttons) { return
LRESULTToBool(SendMsg(TB_ADDBUTTONSW, numButtons, (LPARAM)buttons)); }
 #endif
};
```

}}

#endif
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// Lzma2Decoder.h

#ifndef __LZMA2_DECODER_H
#define __LZMA2_DECODER_H

#include "../../../C/Lzma2DecMt.h"

#include "../Common/CWrappers.h"

namespace NCompress {
namespace NLzma2 {

class CDecoder:
 public ICompressCoder,
 public ICompressSetDecoderProperties2,
 public ICompressSetFinishMode,
 public ICompressGetInStreamProcessedSize,
 public ICompressSetBufSize,

 #ifndef NO_READ_FROM_CODER
 public ICompressSetInStream,
 public ICompressSetOutStreamSize,
 public ISequentialInStream,
 #endif

 #ifndef _7ZIP_ST
 public ICompressSetCoderMt,
 public ICompressSetMemLimit,
 #endif

 public CMyUnknownImp
{
 CLzma2DecMtHandle _dec;
 UInt64 _inProcessed;
 Byte _prop;
 int _finishMode;
 UInt32 _inBufSize;
 UInt32 _outStep;

public:
 MY_QUERYINTERFACE_BEGIN2(ICompressCoder)
 MY_QUERYINTERFACE_ENTRY(ICompressSetDecoderProperties2)
 MY_QUERYINTERFACE_ENTRY(ICompressSetFinishMode)
 MY_QUERYINTERFACE_ENTRY(ICompressGetInStreamProcessedSize)
 MY_QUERYINTERFACE_ENTRY(ICompressSetBufSize)
```

```
 #ifndef NO_READ_FROM_CODER
 MY_QUERYINTERFACE_ENTRY(ICompressSetInStream)
 MY_QUERYINTERFACE_ENTRY(ICompressSetOutStreamSize)
 MY_QUERYINTERFACE_ENTRY(ISequentialInStream)
 #endif

 #ifndef _7ZIP_ST
 MY_QUERYINTERFACE_ENTRY(ICompressSetCoderMt)
 MY_QUERYINTERFACE_ENTRY(ICompressSetMemLimit)
 #endif

 MY_QUERYINTERFACE_END
 MY_ADDREF_RELEASE

 STDMETHOD(Code)(ISequentialInStream *inStream, ISequentialOutStream *outStream,
    const UInt64 *inSize, const UInt64 *outSize, ICompressProgressInfo *progress);
 STDMETHOD(SetDecoderProperties2)(const Byte *data, UInt32 size);
 STDMETHOD(SetFinishMode)(UInt32 finishMode);
 STDMETHOD(GetInStreamProcessedSize)(UInt64 *value);
 STDMETHOD(SetInBufSize)(UInt32 streamIndex, UInt32 size);
 STDMETHOD(SetOutBufSize)(UInt32 streamIndex, UInt32 size);

 #ifndef _7ZIP_ST
private:
 int _tryMt;
 UInt32 _numThreads;
 UInt64 _memUsage;
public:
 STDMETHOD(SetNumberOfThreads)(UInt32 numThreads);
 STDMETHOD(SetMemLimit)(UInt64
 memUsage);
 #endif

 #ifndef NO_READ_FROM_CODER
private:
 CMyComPtr<ISequentialInStream> _inStream;
 CSeqInStreamWrap _inWrap;
public:
 STDMETHOD(SetOutStreamSize)(const UInt64 *outSize);
 STDMETHOD(SetInStream)(ISequentialInStream *inStream);
 STDMETHOD(ReleaseInStream)();
 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 #endif

 CDecoder();
 virtual ~CDecoder();
};
```

}}

#endif
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7z Format description (4.59)
---

This file contains description of 7z archive format.
7z archive can contain files compressed with any method.
See "Methods.txt" for description for defined compressing methods.

Format structure Overview
---

Some fields can be optional.

Archive structure
~~~~~~~~~~~~~~~~~~
SignatureHeader
[PackedStreams]
[PackedStreamsForHeaders]
[
 Header
 or
 {
   Packed Header
   HeaderInfo
 }
]

Header structure
~~~~~~~~~~~~~~~~~
{
 ArchiveProperties
 AdditionalStreams
 {
   PackInfo
   {
     PackPos
     NumPackStreams
     Sizes[NumPackStreams]
     CRCs[NumPackStreams]
   }
   CodersInfo
   {
     NumFolders
     Folders[NumFolders]
     {
       NumCoders

```
      CodersInfo[NumCoders]
      {
        ID
        NumInStreams;
        NumOutStreams;
        PropertiesSize
        Properties[PropertiesSize]
      }
      NumBindPairs
      BindPairsInfo[NumBindPairs]
       {
        InIndex;
        OutIndex;
      }
      PackedIndices
    }
    UnPackSize[Folders][Folders.NumOutstreams]
    CRCs[NumFolders]
  }
  SubStreamsInfo
  {
    NumUnPackStreamsInFolders[NumFolders];
    UnPackSizes[]
    CRCs[]
  }
}
MainStreamsInfo
{
  (Same as in AdditionalStreams)
}
FilesInfo
{
  NumFiles
  Properties[]
  {
    ID
    Size
    Data
  }
}
}
```

HeaderInfo structure
~~~~~~~~~~~~~~~~~~~~~

```
{
 (Same as in AdditionalStreams)
}
```
~~~~~~~~~~~~~~~~~~~~~

Notes about Notation and encoding
---

7z uses little endian encoding.

7z archive format has optional headers that are marked as
[]
Header
[]

REAL_UINT64 means real UINT64.

UINT64 means real UINT64 encoded with the following scheme:

```
 Size of encoding sequence depends from first byte:
 First_Byte  Extra_Bytes        Value
 (binary)
 0xxxxxxx               : ( xxxxxxx           )
 10xxxxxx    BYTE y[1]  : (  xxxxxx << (8 * 1)) + y
 110xxxxx
   BYTE y[2]  : (   xxxxx << (8 * 2)) + y
 ...
 1111110x    BYTE y[6]  : (       x << (8 * 6)) + y
 11111110    BYTE y[7]  :                     y
 11111111    BYTE y[8]  :                     y
```

Property IDs
---

0x00 = kEnd

0x01 = kHeader

0x02 = kArchiveProperties

0x03 = kAdditionalStreamsInfo
0x04 = kMainStreamsInfo
0x05 = kFilesInfo

0x06 = kPackInfo
0x07 = kUnPackInfo
0x08 = kSubStreamsInfo

0x09 = kSize

0x0A = kCRC

0x0B = kFolder

0x0C = kCodersUnPackSize
0x0D = kNumUnPackStream

0x0E = kEmptyStream
0x0F = kEmptyFile
0x10 = kAnti

0x11 = kName
0x12 = kCTime
0x13 = kATime
0x14 = kMTime
0x15 = kWinAttributes
0x16 = kComment

0x17 = kEncodedHeader

0x18 = kStartPos
0x19 = kDummy

7z format headers
---

SignatureHeader
~~~~~~~~~~~~~~~

```
 BYTE kSignature[6] = {'7', 'z', 0xBC, 0xAF, 0x27, 0x1C};

 ArchiveVersion
 {
   BYTE Major;   // now = 0
   BYTE Minor;   // now = 2
 };

 UINT32 StartHeaderCRC;

 StartHeader
 {
   REAL_UINT64
 NextHeaderOffset
   REAL_UINT64 NextHeaderSize
   UINT32 NextHeaderCRC
 }
```
~~~~~~~~~~~~~~~

.....

ArchiveProperties
~~~~~~~~~~~~~~~~~
BYTE NID::kArchiveProperties (0x02)
for (;;)
{
 BYTE PropertyType;
 if (aType == 0)
   break;
 UINT64 PropertySize;
 BYTE PropertyData[PropertySize];
}

Digests (NumStreams)
~~~~~~~~~~~~~~~~~~~~
 BYTE AllAreDefined
 if (AllAreDefined == 0)
 {
   for(NumStreams)
     BIT Defined
 }
 UINT32 CRCs[NumDefined]

PackInfo
~~~~~~~~~~~~
 BYTE NID::kPackInfo  (0x06)
 UINT64 PackPos
 UINT64 NumPackStreams

 []
 BYTE NID::kSize    (0x09)
 UINT64 PackSizes[NumPackStreams]
 []

 []
 BYTE NID::kCRC      (0x0A)
 PackStreamDigests[NumPackStreams]
 []

 BYTE NID::kEnd

Folder
~~~~~~

```
UINT64 NumCoders;
for (NumCoders)
{
  BYTE
  {
    0:3 CodecIdSize
    4:  Is Complex Coder
    5:  There Are Attributes
    6:  Reserved
    7:  There are more alternative methods. (Not used anymore, must be 0).
  }
  BYTE
CodecId[CodecIdSize]
  if (Is Complex Coder)
  {
    UINT64 NumInStreams;
    UINT64 NumOutStreams;
  }
  if (There Are Attributes)
  {
    UINT64 PropertiesSize
    BYTE Properties[PropertiesSize]
  }
}

NumBindPairs = NumOutStreamsTotal - 1;

for (NumBindPairs)
{
  UINT64 InIndex;
  UINT64 OutIndex;
}

NumPackedStreams = NumInStreamsTotal - NumBindPairs;
if (NumPackedStreams > 1)
  for(NumPackedStreams)
  {
    UINT64 Index;
  };
```

Coders Info
~~~~~~~~~~~~

BYTE NID::kUnPackInfo  (0x07)
~~~~~~~~~~~~

```
BYTE NID::kFolder  (0x0B)
UINT64 NumFolders
BYTE External
switch(External)
{
  case 0:
    Folders[NumFolders]
  case 1:
    UINT64 DataStreamIndex
}


BYTE ID::kCodersUnPackSize  (0x0C)
for(Folders)
  for(Folder.NumOutStreams)
   UINT64 UnPackSize;


[]
BYTE NID::kCRC   (0x0A)
UnPackDigests[NumFolders]
[]



BYTE NID::kEnd
```

SubStreams Info
~~~~~~~~~~~~~~

```
BYTE NID::kSubStreamsInfo; (0x08)

[]
BYTE NID::kNumUnPackStream;
(0x0D)
UINT64 NumUnPackStreamsInFolders[NumFolders];
[]


[]
BYTE NID::kSize  (0x09)
UINT64 UnPackSizes[]
[]


[]
```
~~~~~~~~~~~~~~

```
BYTE NID::kCRC  (0x0A)
Digests[Number of streams with unknown CRC]
[]


BYTE NID::kEnd
```

Streams Info
~~~~~~~~~~~~~

```
[]
PackInfo
[]


[]
CodersInfo
[]


[]
SubStreamsInfo
[]

BYTE NID::kEnd
```

FilesInfo
~~~~~~~~~~

```
BYTE NID::kFilesInfo;  (0x05)
UINT64 NumFiles

for (;;)
{
  BYTE PropertyType;
  if (aType == 0)
    break;

  UINT64 Size;

  switch(PropertyType)
  {
    kEmptyStream:   (0x0E)
      for(NumFiles)
        BIT IsEmptyStream

    kEmptyFile:     (0x0F)
```

```
  for(EmptyStreams)
    BIT IsEmptyFile

kAnti:          (0x10)
  for(EmptyStreams)
    BIT IsAntiFile

case kCTime: (0x12)
case kATime: (0x13)
case kMTime: (0x14)
  BYTE AllAreDefined
  if (AllAreDefined == 0)
  {
    for(NumFiles)
      BIT TimeDefined
   }
  BYTE External;
  if(External != 0)
    UINT64 DataIndex
  []
  for(Definded Items)
    UINT64 Time
  []

kNames:     (0x11)
  BYTE External;
  if(External != 0)
    UINT64 DataIndex
  []
  for(Files)
  {
    wchar_t Names[NameSize];
    wchar_t 0;
  }
  []

kAttributes:  (0x15)
  BYTE AllAreDefined
  if (AllAreDefined == 0)
  {
    for(NumFiles)
      BIT AttributesAreDefined
  }
  BYTE External;
  if(External != 0)
    UINT64 DataIndex
  []
  for(Definded Attributes)
```

```
        UINT32 Attributes
      []
   }
 }
```

Header
~~~~~~~

```
 BYTE NID::kHeader (0x01)

 []
 ArchiveProperties
 []

 []
 BYTE NID::kAdditionalStreamsInfo; (0x03)
 StreamsInfo
 []

 []
 BYTE NID::kMainStreamsInfo;    (0x04)
 StreamsInfo
 []

 []
 FilesInfo
 []

 BYTE NID::kEnd
```

HeaderInfo
~~~~~~~~~~~

```
  []
 BYTE NID::kEncodedHeader; (0x17)
 StreamsInfo for Encoded Header
 []
```

---
End of document
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from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.

```
%
% Source: eehyph.tex (2004-04-13)
% Author: Een Saar <saar at aai dot ee>
%
% The above mentioned file should become obsolete,
% and the author of the original file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%               and helped with testing, suggestions and bug reports
% - Norbert Preining, who tested & integrated patterns
 into TeX Live
%
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% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
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% please try to follow some guidelines if possible:
%
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% - the only "allowed"
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% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
```

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% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
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%
% For more unformation see
%
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%
%----------
%
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% version 2003/12/01 or later.
%
% This work has the LPPL maintenance status "author-maintained".
% This work consists of this file only (eehyph.tex).
%
% The patterns were generated long ago by applying patgen to
% an Estonian dictionary; a few patterns were added later manually
% to prohibit aa-bits type cases.
% Declare the special characters
%
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%
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% Author: Dorjgotov Batmunkh <bataak at gmail.com>
%
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%
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% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%  and helped with testing, suggestions and bug reports
% - Norbert Preining, who tested
 & integrated patterns into TeX Live
%
% However, the "copyright/copyleft" owner of patterns remains the original author.
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%  If you're the original author of patterns or taking over a new revolution,
%  plese remove all of the TUG comments & credits that we added here -
%  you are the Queen / the King, we are only the servants.
%
% If you want to change this file, rather than uploading directly to CTAN,
% we would be grateful if you could send it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%

```
% Before a new "pattern-revolution" starts,
% please try to follow some guidelines if possible:
%
% - \lccode is *forbidden*, and I really mean it
% - all the patterns should be in
 UTF-8
% - the only "allowed" TeX commands in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
%-------------------------------------------------------------------------------
%
%% mnhyphn.tex v1.2 2008/03/23 (2010/04/03)
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% version 2005/12/01 or later.
%
% Special thanks to: Jim Hefferon and Robin Fairbairns
%
% There are few basic rules in mongolian
%
% 1. If there is a consonant then it can use hyphen before it.
%    And if there're two consonants then it can use hyphen before second consonant.
%    Are there three consonants then it can put hyphen before third consonant,
%    also are there four consonants then it can use hyphen before fourth consonant.
% 2. In the case of hardsign or softsign, it's possible to hyphen after these signs.
%    For instance, -, -
% 3. However one vowel can be belong to a syllable, it's not possible to use hyphen.
```

%
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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With class Attribute in span Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-030-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element that contains a span element with
&quot;class1 class2 class3&quot; as
 the value for the class attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-030.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
```

```
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
</head>
<body>
 <p>Test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
 <div class="test">P</div>
 <p>The XML contained in the Extended Metadata Block is below.</p>
 <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   Text with &lt;span class="class1 class2 class3"&gt;span&lt;/span&gt;.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
 </pre>
</body>
</html>
```

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---
SIL OPEN FONT LICENSE Version 1.1 - 26 February 2007
---

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!IF "$(CPU)" == "AMD64"
CFLAGS_C_SPEC = -D_LZMA_DEC_OPT

```
ASM_OBJS = $(ASM_OBJS) \
 $O\LzmaDecOpt.obj
!ENDIF
// Common/StringConvert.h

#ifndef __COMMON_STRING_CONVERT_H
#define __COMMON_STRING_CONVERT_H

#include "MyString.h"
#include "MyWindows.h"

UString MultiByteToUnicodeString(const AString &src, UINT codePage = CP_ACP);
UString MultiByteToUnicodeString(const char *src, UINT codePage = CP_ACP);

// optimized versions that work faster for ASCII strings
void MultiByteToUnicodeString2(UString &dest, const AString &src, UINT codePage = CP_ACP);
// void UnicodeStringToMultiByte2(AString &dest, const UString &s, UINT codePage, char defaultChar, bool
&defaultCharWasUsed);
void UnicodeStringToMultiByte2(AString &dest, const UString &src, UINT codePage);

AString UnicodeStringToMultiByte(const UString &src, UINT codePage, char defaultChar, bool
&defaultCharWasUsed);
AString UnicodeStringToMultiByte(const UString &src, UINT codePage = CP_ACP);

inline const wchar_t* GetUnicodeString(const wchar_t *u)  { return u; }
inline const UString& GetUnicodeString(const UString &u)  { return u; }

inline UString
 GetUnicodeString(const AString &a)  { return MultiByteToUnicodeString(a); }
inline UString GetUnicodeString(const char *a)     { return MultiByteToUnicodeString(a); }

inline UString GetUnicodeString(const AString &a, UINT codePage)
 { return MultiByteToUnicodeString(a, codePage); }
inline UString GetUnicodeString(const char *a, UINT codePage)
 { return MultiByteToUnicodeString(a, codePage); }

inline const wchar_t* GetUnicodeString(const wchar_t *u, UINT) { return u; }
inline const UString& GetUnicodeString(const UString &u, UINT) { return u; }

inline const char*    GetAnsiString(const char    *a) { return a; }
inline const AString& GetAnsiString(const AString &a) { return a; }

inline AString GetAnsiString(const wchar_t *u) { return UnicodeStringToMultiByte(UString(u)); }
inline AString GetAnsiString(const UString &u) { return UnicodeStringToMultiByte(u); }

/*
inline const char* GetOemString(const char* oem)
 { return oem; }
```

```
inline const AString& GetOemString(const AString
 &oem)
 { return oem; }
*/
const char* GetOemString(const char* oem);
const AString& GetOemString(const AString &oem);
inline AString GetOemString(const UString &u)
 { return UnicodeStringToMultiByte(u, CP_OEMCP); }

#ifdef _UNICODE
 inline const wchar_t* GetSystemString(const wchar_t *u) { return u;}
 inline const UString& GetSystemString(const UString &u) { return u;}
 inline const wchar_t* GetSystemString(const wchar_t *u, UINT /* codePage */) { return u;}
 inline const UString& GetSystemString(const UString &u, UINT /* codePage */) { return u;}

 inline UString GetSystemString(const AString &a, UINT codePage) { return MultiByteToUnicodeString(a,
codePage); }
 inline UString GetSystemString(const char    *a, UINT codePage) { return MultiByteToUnicodeString(a,
codePage); }
 inline UString GetSystemString(const AString &a) { return MultiByteToUnicodeString(a); }
 inline UString GetSystemString(const char    *a) { return MultiByteToUnicodeString(a); }
#else
 inline const char*
    GetSystemString(const char    *a) { return a; }
 inline const AString& GetSystemString(const AString &a) { return a; }
 inline const char*    GetSystemString(const char    *a, UINT) { return a; }
 inline const AString& GetSystemString(const AString &a, UINT) { return a; }

 inline AString GetSystemString(const wchar_t *u) { return UnicodeStringToMultiByte(UString(u)); }
 inline AString GetSystemString(const UString &u) { return UnicodeStringToMultiByte(u); }
 inline AString GetSystemString(const UString &u, UINT codePage) { return UnicodeStringToMultiByte(u,
codePage); }



 /*
 inline AString GetSystemString(const wchar_t *u)
 {
   UString s;
   s = u;
   return UnicodeStringToMultiByte(s);
 }
 */

#endif

#ifndef UNDER_CE
AString SystemStringToOemString(const CSysString &src);
```

```
#endif

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With Mixed text Element Language Tags 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element matches the schema. One text element does not have a
language tag. One text element has a language tag." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   Copyright without language.
  &lt;/text&gt;
  &lt;text xml:lang="en"&gt;
   Copyright with "en" language.
  &lt;/text&gt;
```

```
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
// Windows/Control/ComboBox.h

#ifndef __WINDOWS_CONTROL_COMBOBOX_H
#define __WINDOWS_CONTROL_COMBOBOX_H

#include "../../Common/MyWindows.h"

#include <commctrl.h>

#include "../Window.h"

namespace NWindows {
namespace NControl {

class CComboBox: public CWindow
{
public:
 void ResetContent() { SendMsg(CB_RESETCONTENT, 0, 0); }
 LRESULT AddString(LPCTSTR s) { return SendMsg(CB_ADDSTRING, 0, (LPARAM)s); }
 #ifndef _UNICODE
 LRESULT AddString(LPCWSTR s);
 #endif
 LRESULT SetCurSel(int index) { return SendMsg(CB_SETCURSEL, index, 0); }
 int GetCurSel() { return (int)SendMsg(CB_GETCURSEL, 0, 0); }
 int GetCount() { return (int)SendMsg(CB_GETCOUNT, 0, 0); }

 LRESULT GetLBTextLen(int index) { return SendMsg(CB_GETLBTEXTLEN, index, 0); }
 LRESULT GetLBText(int index, LPTSTR s) { return SendMsg(CB_GETLBTEXT, index, (LPARAM)s); }
 LRESULT GetLBText(int index, CSysString &s);
 #ifndef _UNICODE
 LRESULT GetLBText(int index, UString &s);
 #endif

 LRESULT SetItemData(int index,
 LPARAM lParam) { return SendMsg(CB_SETITEMDATA, index, lParam); }
 LRESULT GetItemData(int index) { return SendMsg(CB_GETITEMDATA, index, 0); }

 LRESULT GetItemData_of_CurSel() { return GetItemData(GetCurSel()); }

 void ShowDropDown(bool show = true) { SendMsg(CB_SHOWDROPDOWN, show ? TRUE : FALSE, 0);  }
};

#ifndef UNDER_CE
```

```
class CComboBoxEx: public CComboBox
{
public:
 bool SetUnicodeFormat(bool fUnicode) { return LRESULTToBool(SendMsg(CBEM_SETUNICODEFORMAT,
BOOLToBool(fUnicode), 0)); }

 LRESULT DeleteItem(int index) { return SendMsg(CBEM_DELETEITEM, index, 0); }
 LRESULT InsertItem(COMBOBOXEXITEM *item) { return SendMsg(CBEM_INSERTITEM, 0,
(LPARAM)item); }
 #ifndef _UNICODE
 LRESULT InsertItem(COMBOBOXEXITEMW *item) { return SendMsg(CBEM_INSERTITEMW, 0,
(LPARAM)item); }
 #endif

 LRESULT SetItem(COMBOBOXEXITEM *item) { return SendMsg(CBEM_SETITEM, 0, (LPARAM)item); }
 DWORD SetExtendedStyle(DWORD exMask, DWORD exStyle) { return
(DWORD)SendMsg(CBEM_SETEXTENDEDSTYLE, exMask,
 exStyle); }
 HWND GetEditControl() { return (HWND)SendMsg(CBEM_GETEDITCONTROL, 0, 0); }
 HIMAGELIST SetImageList(HIMAGELIST imageList) { return
(HIMAGELIST)SendMsg(CBEM_SETIMAGELIST, 0, (LPARAM)imageList); }
};

#endif

}}

#endif
```

UNRECOGNIZED LICENSE; MD5 sum: 59a9b86800cec32b0da02b15f30af7ef

```
// CoderMixer2.h

#ifndef __CODER_MIXER2_H
#define __CODER_MIXER2_H

#include "../../../Common/MyCom.h"
#include "../../../Common/MyVector.h"

#include "../../ICoder.h"

#include "../../Common/CreateCoder.h"

#ifdef _7ZIP_ST
 #define USE_MIXER_ST
#else
 #define USE_MIXER_MT
 #ifndef _SFX
   #define USE_MIXER_ST
```

```
 #endif
#endif

#ifdef USE_MIXER_MT
#include "../../Common/StreamBinder.h"
#include "../../Common/VirtThread.h"
#endif



#ifdef USE_MIXER_ST

class CSequentialInStreamCalcSize:
 public ISequentialInStream,
 public CMyUnknownImp
{
public:
 MY_UNKNOWN_IMP1(ISequentialInStream)

 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
private:
 CMyComPtr<ISequentialInStream> _stream;
 UInt64 _size;
 bool _wasFinished;
public:
 void SetStream(ISequentialInStream *stream) { _stream = stream;  }
 void Init()
 {
   _size = 0;
   _wasFinished = false;
 }
 void ReleaseStream() { _stream.Release(); }
 UInt64 GetSize() const { return _size; }
 bool WasFinished()
 const { return _wasFinished; }
};


class COutStreamCalcSize:
 public ISequentialOutStream,
 public IOutStreamFinish,
 public CMyUnknownImp
{
 CMyComPtr<ISequentialOutStream> _stream;
 UInt64 _size;
public:
 MY_UNKNOWN_IMP2(ISequentialOutStream, IOutStreamFinish)
```

```
 STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(OutStreamFinish)();

 void SetStream(ISequentialOutStream *stream) { _stream = stream; }
 void ReleaseStream() { _stream.Release(); }
 void Init() { _size = 0; }
 UInt64 GetSize() const { return _size; }
};

#endif



namespace NCoderMixer2 {

struct CBond
{
 UInt32 PackIndex;
 UInt32 UnpackIndex;

 UInt32 Get_InIndex(bool encodeMode) const { return encodeMode ? UnpackIndex : PackIndex; }
 UInt32 Get_OutIndex(bool encodeMode) const { return encodeMode ? PackIndex : UnpackIndex; }
};


struct CCoderStreamsInfo
{
 UInt32 NumStreams;
};


struct CBindInfo
{
 CRecordVector<CCoderStreamsInfo> Coders;
 CRecordVector<CBond>
 Bonds;
 CRecordVector<UInt32> PackStreams;
 unsigned UnpackCoder;

 unsigned GetNum_Bonds_and_PackStreams() const { return Bonds.Size() + PackStreams.Size(); }

 int FindBond_for_PackStream(UInt32 packStream) const
 {
   FOR_VECTOR (i, Bonds)
     if (Bonds[i].PackIndex == packStream)
       return i;
   return -1;
 }
```

```
int FindBond_for_UnpackStream(UInt32 unpackStream) const
{
  FOR_VECTOR (i, Bonds)
    if (Bonds[i].UnpackIndex == unpackStream)
      return i;
  return -1;
}

bool SetUnpackCoder()
{
  bool isOk = false;
  FOR_VECTOR(i, Coders)
  {
    if (FindBond_for_UnpackStream(i) < 0)
    {
      if (isOk)
        return false;
      UnpackCoder = i;
      isOk = true;
    }
  }
  return isOk;
}

bool IsStream_in_PackStreams(UInt32 streamIndex) const
{
  return FindStream_in_PackStreams(streamIndex) >= 0;
}

int FindStream_in_PackStreams(UInt32 streamIndex) const
{
  FOR_VECTOR(i, PackStreams)
    if (PackStreams[i]
== streamIndex)
      return i;
  return -1;
}


// that function is used before Maps is calculated

UInt32 GetStream_for_Coder(UInt32 coderIndex) const
{
  UInt32 streamIndex = 0;
  for (UInt32 i = 0; i < coderIndex; i++)
    streamIndex += Coders[i].NumStreams;
  return streamIndex;
```

```
 }

 // ---------- Maps Section ----------

 CRecordVector<UInt32> Coder_to_Stream;
 CRecordVector<UInt32> Stream_to_Coder;

 void ClearMaps();
 bool CalcMapsAndCheck();

 // ---------- End of Maps Section ----------

 void Clear()
 {
   Coders.Clear();
   Bonds.Clear();
   PackStreams.Clear();

   ClearMaps();
 }

 void GetCoder_for_Stream(UInt32 streamIndex, UInt32 &coderIndex, UInt32 &coderStreamIndex) const
 {
   coderIndex = Stream_to_Coder[streamIndex];
   coderStreamIndex = streamIndex - Coder_to_Stream[coderIndex];
 }
};



class CCoder
{
 CLASS_NO_COPY(CCoder);
public:
 CMyComPtr<ICompressCoder> Coder;
 CMyComPtr<ICompressCoder2> Coder2;
  UInt32 NumStreams;

 UInt64 UnpackSize;
 const UInt64 *UnpackSizePointer;

 CRecordVector<UInt64> PackSizes;
 CRecordVector<const UInt64 *> PackSizePointers;

 bool Finish;

 CCoder(): Finish(false) {}
```

```
 void SetCoderInfo(const UInt64 *unpackSize, const UInt64 * const *packSizes, bool finish);

 HRESULT CheckDataAfterEnd(bool &dataAfterEnd_Error /* , bool &InternalPackSizeError */) const;

 IUnknown *GetUnknown() const
 {
   return Coder ? (IUnknown *)Coder : (IUnknown *)Coder2;
 }

 HRESULT QueryInterface(REFGUID iid, void** pp) const
 {
   return GetUnknown()->QueryInterface(iid, pp);
 }
};



class CMixer
{
 bool Is_PackSize_Correct_for_Stream(UInt32 streamIndex);

protected:
 CBindInfo _bi;

 int FindBond_for_Stream(bool forInputStream, UInt32 streamIndex) const
 {
   if (EncodeMode == forInputStream)
     return _bi.FindBond_for_UnpackStream(streamIndex);
   else
     return _bi.FindBond_for_PackStream(streamIndex);
 }

 CBoolVector IsFilter_Vector;
 CBoolVector
 IsExternal_Vector;
 bool EncodeMode;
public:
 unsigned MainCoderIndex;

 // bool InternalPackSizeError;

 CMixer(bool encodeMode):
     EncodeMode(encodeMode),
     MainCoderIndex(0)
     // , InternalPackSizeError(false)
     {}

 /*
```

```
Sequence of calling:

    SetBindInfo();
    for each coder
      AddCoder();
    SelectMainCoder();

    for each file
    {
      ReInit()
      for each coder
        SetCoderInfo();
      Code();
    }
*/

virtual HRESULT SetBindInfo(const CBindInfo &bindInfo)
{
  _bi = bindInfo;
  IsFilter_Vector.Clear();
  MainCoderIndex = 0;
  return S_OK;
}

virtual void AddCoder(const CCreatedCoder &cod) = 0;
virtual CCoder &GetCoder(unsigned index) = 0;
virtual void SelectMainCoder(bool useFirst) = 0;
virtual void ReInit() = 0;
virtual void SetCoderInfo(unsigned coderIndex, const UInt64 *unpackSize, const UInt64 * const *packSizes, bool
finish) = 0;
virtual HRESULT Code(
    ISequentialInStream
* const *inStreams,
    ISequentialOutStream * const *outStreams,
    ICompressProgressInfo *progress,
    bool &dataAfterEnd_Error) = 0;
virtual UInt64 GetBondStreamSize(unsigned bondIndex) const = 0;

bool Is_UnpackSize_Correct_for_Coder(UInt32 coderIndex);
bool Is_PackSize_Correct_for_Coder(UInt32 coderIndex);
bool IsThere_ExternalCoder_in_PackTree(UInt32 coderIndex);
};



#ifdef USE_MIXER_ST
```

```
struct CCoderST: public CCoder
{
 bool CanRead;
 bool CanWrite;

 CCoderST(): CanRead(false), CanWrite(false) {}
};


struct CStBinderStream
{
 CSequentialInStreamCalcSize *InStreamSpec;
 COutStreamCalcSize *OutStreamSpec;
 CMyComPtr<IUnknown> StreamRef;

 CStBinderStream(): InStreamSpec(NULL), OutStreamSpec(NULL) {}
};


class CMixerST:
 public IUnknown,
 public CMixer,
 public CMyUnknownImp
{
 HRESULT GetInStream2(ISequentialInStream * const *inStreams, /* const UInt64 * const *inSizes, */
    UInt32 outStreamIndex, ISequentialInStream **inStreamRes);

 HRESULT GetInStream(ISequentialInStream * const *inStreams, /* const UInt64 * const *inSizes, */
    UInt32 inStreamIndex, ISequentialInStream **inStreamRes);
 HRESULT GetOutStream(ISequentialOutStream * const *outStreams, /* const UInt64 * const *outSizes, */
    UInt32 outStreamIndex, ISequentialOutStream **outStreamRes);

 HRESULT FinishStream(UInt32 streamIndex);
 HRESULT FinishCoder(UInt32 coderIndex);

public:
 CObjectVector<CCoderST> _coders;

 CObjectVector<CStBinderStream> _binderStreams;

 MY_UNKNOWN_IMP

 CMixerST(bool encodeMode);
 ~CMixerST();

 virtual void AddCoder(const CCreatedCoder &cod);
 virtual CCoder &GetCoder(unsigned index);
 virtual void SelectMainCoder(bool useFirst);
```

```
 virtual void ReInit();
 virtual void SetCoderInfo(unsigned coderIndex, const UInt64 *unpackSize, const UInt64 * const *packSizes, bool
finish)
   { _coders[coderIndex].SetCoderInfo(unpackSize, packSizes, finish); }
 virtual HRESULT Code(
     ISequentialInStream * const *inStreams,
      ISequentialOutStream * const *outStreams,
     ICompressProgressInfo *progress,
     bool &dataAfterEnd_Error);
 virtual UInt64 GetBondStreamSize(unsigned bondIndex) const;

 HRESULT GetMainUnpackStream(
     ISequentialInStream * const *inStreams,
     ISequentialInStream **inStreamRes);
};

#endif




#ifdef USE_MIXER_MT

class CCoderMT: public CCoder, public CVirtThread
{
 CLASS_NO_COPY(CCoderMT)
 CRecordVector<ISequentialInStream*> InStreamPointers;
 CRecordVector<ISequentialOutStream*> OutStreamPointers;

private:
 void Execute();
public:
 bool EncodeMode;
 HRESULT Result;
 CObjectVector< CMyComPtr<ISequentialInStream> > InStreams;
 CObjectVector< CMyComPtr<ISequentialOutStream> > OutStreams;

 void Release()
 {
   InStreamPointers.Clear();
   OutStreamPointers.Clear();
   unsigned i;
   for (i = 0; i < InStreams.Size(); i++)
     InStreams[i].Release();
   for (i = 0; i < OutStreams.Size(); i++)
     OutStreams[i].Release();
 }
```

```
 class CReleaser
  {
   CLASS_NO_COPY(CReleaser)
   CCoderMT &_c;
 public:
   CReleaser(CCoderMT &c): _c(c) {}
   ~CReleaser() { _c.Release(); }
 };

 CCoderMT(): EncodeMode(false) {}
 ~CCoderMT() { CVirtThread::WaitThreadFinish(); }

 void Code(ICompressProgressInfo *progress);
};


class CMixerMT:
 public IUnknown,
 public CMixer,
 public CMyUnknownImp
{
 CObjectVector<CStreamBinder> _streamBinders;

 HRESULT Init(ISequentialInStream * const *inStreams, ISequentialOutStream * const *outStreams);
 HRESULT ReturnIfError(HRESULT code);

public:
 CObjectVector<CCoderMT> _coders;

 MY_UNKNOWN_IMP

 virtual HRESULT SetBindInfo(const CBindInfo &bindInfo);
 virtual void AddCoder(const CCreatedCoder &cod);
 virtual CCoder &GetCoder(unsigned index);
 virtual void SelectMainCoder(bool useFirst);
 virtual void ReInit();
 virtual void SetCoderInfo(unsigned coderIndex, const UInt64 *unpackSize, const UInt64 * const *packSizes, bool
finish)
   { _coders[coderIndex].SetCoderInfo(unpackSize,
 packSizes, finish); }
 virtual HRESULT Code(
     ISequentialInStream * const *inStreams,
     ISequentialOutStream * const *outStreams,
     ICompressProgressInfo *progress,
     bool &dataAfterEnd_Error);
 virtual UInt64 GetBondStreamSize(unsigned bondIndex) const;

 CMixerMT(bool encodeMode): CMixer(encodeMode) {}
```

```
};

#endif

}

#endif
// StreamObjects.h

#ifndef __STREAM_OBJECTS_H
#define __STREAM_OBJECTS_H

#include "../../Common/MyBuffer.h"
#include "../../Common/MyCom.h"
#include "../../Common/MyVector.h"

#include "../IStream.h"

class CBufferInStream:
 public IInStream,
 public CMyUnknownImp
{
 UInt64 _pos;
public:
 CByteBuffer Buf;
 void Init() { _pos = 0; }

 MY_UNKNOWN_IMP2(ISequentialInStream, IInStream)

 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition);
};

struct CReferenceBuf:
 public IUnknown,
 public CMyUnknownImp
{
 CByteBuffer Buf;
 MY_UNKNOWN_IMP
};

class CBufInStream:
 public IInStream,
 public CMyUnknownImp
{
 const Byte *_data;
 UInt64 _pos;
 size_t _size;
```

```
 CMyComPtr<IUnknown> _ref;
public:
 void Init(const Byte *data, size_t size, IUnknown *ref = 0)
 {
   _data = data;
   _size = size;
   _pos = 0;
   _ref = ref;
 }
 void Init(CReferenceBuf *ref) { Init(ref->Buf, ref->Buf.Size(), ref);
 }

 MY_UNKNOWN_IMP2(ISequentialInStream, IInStream)
 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition);
};

void Create_BufInStream_WithReference(const void *data, size_t size, IUnknown *ref, ISequentialInStream
**stream);
void Create_BufInStream_WithNewBuffer(const void *data, size_t size, ISequentialInStream **stream);
inline void Create_BufInStream_WithNewBuffer(const CByteBuffer &buf, ISequentialInStream **stream)
 { Create_BufInStream_WithNewBuffer(buf, buf.Size(), stream); }

class CByteDynBuffer
{
 size_t _capacity;
 Byte *_buf;
public:
 CByteDynBuffer(): _capacity(0), _buf(0) {};
 // there is no copy constructor. So don't copy this object.
 ~CByteDynBuffer() { Free(); }
 void Free() throw();
 size_t GetCapacity() const { return _capacity; }
 operator Byte*() const { return _buf; }
 operator const Byte*() const { return _buf; }
 bool EnsureCapacity(size_t capacity) throw();
};

class
 CDynBufSeqOutStream:
 public ISequentialOutStream,
 public CMyUnknownImp
{
 CByteDynBuffer _buffer;
 size_t _size;
public:
 CDynBufSeqOutStream(): _size(0) {}
 void Init() { _size = 0;  }
```

```
 size_t GetSize() const { return _size; }
 const Byte *GetBuffer() const { return _buffer; }
 void CopyToBuffer(CByteBuffer &dest) const;
 Byte *GetBufPtrForWriting(size_t addSize);
 void UpdateSize(size_t addSize) { _size += addSize; }

 MY_UNKNOWN_IMP1(ISequentialOutStream)
 STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
};

class CBufPtrSeqOutStream:
 public ISequentialOutStream,
 public CMyUnknownImp
{
 Byte *_buffer;
 size_t _size;
 size_t _pos;
public:
 void Init(Byte *buffer, size_t size)
 {
   _buffer = buffer;
   _pos = 0;
   _size = size;
 }
 size_t GetPos() const { return _pos; }

 MY_UNKNOWN_IMP1(ISequentialOutStream)
 STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
};

class CSequentialOutStreamSizeCount:
  public ISequentialOutStream,
 public CMyUnknownImp
{
 CMyComPtr<ISequentialOutStream> _stream;
 UInt64 _size;
public:
 void SetStream(ISequentialOutStream *stream) { _stream = stream; }
 void Init() { _size = 0; }
 UInt64 GetSize() const { return _size; }

 MY_UNKNOWN_IMP1(ISequentialOutStream)
 STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
};

class CCachedInStream:
 public IInStream,
 public CMyUnknownImp
```

```
{
 UInt64 *_tags;
 Byte *_data;
 size_t _dataSize;
 unsigned _blockSizeLog;
 unsigned _numBlocksLog;
 UInt64 _size;
 UInt64 _pos;
protected:
 virtual HRESULT ReadBlock(UInt64 blockIndex, Byte *dest, size_t blockSize) = 0;
public:
 CCachedInStream(): _tags(0), _data(0) {}
 virtual ~CCachedInStream() { Free(); } // the destructor must be virtual (release calls it) !!!
 void Free() throw();
 bool Alloc(unsigned blockSizeLog, unsigned numBlocksLog) throw();
 void Init(UInt64 size) throw();

 MY_UNKNOWN_IMP2(ISequentialInStream, IInStream)
  STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition);
};

#endif
```

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7-Zip method IDs for 7z and xz archives

---

Version: 17.01

Date: 2017-05-27

Each compression or crypto method in 7z is associated with unique binary value (ID).
The length of ID in bytes is arbitrary but it can not exceed 63 bits (8 bytes).

xz and 7z formats use same ID map.

If you want to add some new ID, you have two ways:
1) Write request for allocating IDs to 7-Zip developers.
2) Generate 8-bytes ID:

3F ZZ ZZ ZZ ZZ ZZ MM MM

3F - Prefix for random IDs (1 byte)
ZZ ZZ ZZ ZZ ZZ - Developer ID (5 bytes). Use real random bytes.

MM MM - Method ID (2 bytes)

You can notify 7-Zip developers about your Developer ID / Method ID.

Note: Use new ID, if old codec can not decode data encoded with new version.

List of defined IDs
---

00 - Copy

03 - Delta
04 - BCJ (x86)
05 - PPC (big-endian)
06 - IA64
07 - ARM (little-endian)
08 - ARMT (little-endian)
09 -
SPARC

21 - LZMA2

02.. - Common
03 [Swap]
- 2 Swap2
- 4 Swap4

03.. - 7z
01 -
01 - LZMA

03 - [Branch Codecs]
  01 - [x86 Codecs]
    03  - BCJ
    1B  - BCJ2 (4 packed streams)
  02 -
    05 - PPC (big-endian)
  03 -
    01 - Alpha
  04 -
    01 - IA64
  05 -
    01 - ARM (little-endian)
  06 -
    05 - M68 (big-endian)
  07 -
    01 - ARMT (little-endian)
  08 -
    05 - SPARC

04 -
  01 - PPMD

7F -
  01 - experimental method.

04.. - Misc codecs

00 - Reserved

01 - [Zip]
  00 - Copy (not used. Use {00} instead)
  01 - Shrink
  06 - Implode
  08 - Deflate
  09 - Deflate64
  0A - Imploding
  0C - BZip2 (not used. Use {040202} instead)
  0E - LZMA (LZMA-zip)
  5F - xz
  60 - Jpeg
  61 - WavPack
  62 - PPMd (PPMd-zip)
  63 - wzAES

02 -
  02 - BZip2

03 - [Rar]
01 - Rar1
02 - Rar2
03 - Rar3
05 - Rar5

04 - [Arj]
01 - Arj(1,2,3)
02 - Arj4

05 - [Z]

06 - [Lzh]

07 - Reserved for 7z

08 - [Cab]

09 - [NSIS]
01 - DeflateNSIS
02 - BZip2NSIS

F7 - External codecs (that are not included to 7-Zip)

0x xx - reserved

10 xx - reserved (LZHAM)
01 - LZHAM

11 xx - reserved (Tino Reichardt)
01 - ZSTD
02 - BROTLI
04 - LZ4
05 - LZ5
06 - LIZARD

06.. - Crypto

F0 - Ciphers without hashing algo

01 - [AES]
0x - AES-128
4x - AES-192
8x - AES-256
Cx - AES

x0 - ECB

x1 - CBC
x2 - CFB
x3 - OFB
x4 - CTR

F1 - Combine Ciphers

01 - [Zip]
01 - ZipCrypto (Main Zip crypto algo)

03 - [RAR]
02 -
03 - Rar29AES (AES-128 + modified SHA-1)

07 - [7z]
01 - 7zAES (AES-256 + SHA-256)

---
End of document
// ParseProperties.h

#ifndef __PARSE_PROPERTIES_H
#define __PARSE_PROPERTIES_H

#endif
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```
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<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With class Attribute in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element with &quot;class1 class2 class3&quot; as the value for the class attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text class="class 1 class2 class3"&gt;
   Copyright without language.
```

</text>
</copyright>
</metadata>
</pre>
</body>
</html>

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LZMA compression
---
Version: 9.35

This file describes LZMA encoding and decoding functions written in C language.

LZMA is an improved version of famous LZ77 compression algorithm.
It was improved in way of maximum increasing of compression ratio,
keeping high decompression speed and low memory requirements for
decompressing.

Note: you can read also LZMA Specification (lzma-specification.txt from LZMA SDK)

Also you can look source code for LZMA encoding and decoding:
C/Util/Lzma/LzmaUtil.c

LZMA compressed file format
---

| Offset | Size | Description |
|---|---|---|
| 0 | 1 | Special LZMA properties (lc,lp, pb in encoded form) |
| 1 | 4 | Dictionary size (little endian) |
| 5 | 8 | Uncompressed size (little endian). -1 means unknown size |
| 13 | | Compressed data |

ANSI-C LZMA Decoder
~~~~~~~~~~~~~~~~~~~~

Please note that interfaces for ANSI-C code were changed in LZMA SDK 4.58.
If you want to use old interfaces you can download previous version of LZMA SDK
from
sourceforge.net site.

To use ANSI-C LZMA Decoder you need the following files:
1) LzmaDec.h + LzmaDec.c + 7zTypes.h + Precomp.h + Compiler.h

Look example code:
~~~~~~~~~~~~~~~~~~~~

C/Util/Lzma/LzmaUtil.c

Memory requirements for LZMA decoding
---

Stack usage of LZMA decoding function for local variables is not
larger than 200-400 bytes.

LZMA Decoder uses dictionary buffer and internal state structure.
Internal state structure consumes
 state_size = (4 + (1.5 << (lc + lp))) KB
by default (lc=3, lp=0), state_size = 16 KB.

How To decompress data
---

LZMA Decoder (ANSI-C version) now supports 2 interfaces:
1) Single-call Decompressing
2) Multi-call State Decompressing (zlib-like interface)

You must use external allocator:
Example:
```
void *SzAlloc(void *p, size_t size) { p = p; return malloc(size); }
void SzFree(void *p, void *address) { p = p; free(address); }
ISzAlloc alloc = { SzAlloc, SzFree };
```

You can use p = p; operator to disable compiler
 warnings.

Single-call Decompressing
---
When to use: RAM->RAM decompressing
Compile files: LzmaDec.h + LzmaDec.c + 7zTypes.h
Compile defines: no defines
Memory Requirements:
 - Input buffer: compressed size
 - Output buffer: uncompressed size
 - LZMA Internal Structures: state_size (16 KB for default settings)

Interface:
```
 int LzmaDecode(Byte *dest, SizeT *destLen, const Byte *src, SizeT *srcLen,
     const Byte *propData, unsigned propSize, ELzmaFinishMode finishMode,
     ELzmaStatus *status, ISzAlloc *alloc);
```
 In:
   dest     - output data

```
  destLen  - output data size
  src      - input data
  srcLen   - input data size
  propData - LZMA properties  (5 bytes)
  propSize - size of propData buffer (5 bytes)
  finishMode - It has meaning only if the decoding reaches output limit (*destLen).
      LZMA_FINISH_ANY - Decode just destLen bytes.
      LZMA_FINISH_END - Stream must be finished after (*destLen).

    You can use LZMA_FINISH_END, when you know that
                    current output buffer covers last bytes of stream.
  alloc    - Memory allocator.

Out:
  destLen  - processed output size
  srcLen   - processed input size

Output:
  SZ_OK
    status:
      LZMA_STATUS_FINISHED_WITH_MARK
      LZMA_STATUS_NOT_FINISHED
      LZMA_STATUS_MAYBE_FINISHED_WITHOUT_MARK
  SZ_ERROR_DATA - Data error
  SZ_ERROR_MEM  - Memory allocation error
  SZ_ERROR_UNSUPPORTED - Unsupported properties
  SZ_ERROR_INPUT_EOF - It needs more bytes in input buffer (src).

If LZMA decoder sees end_marker before reaching output limit, it returns OK result,
and output value of destLen will be less than output buffer size limit.

You can use multiple checks to test data integrity after full decompression:
  1) Check Result and "status" variable.
  2) Check that output(destLen) = uncompressedSize, if you know real uncompressedSize.
  3) Check that output(srcLen)
= compressedSize, if you know real compressedSize.
    You must use correct finish mode in that case. */


Multi-call State Decompressing (zlib-like interface)
----------------------------------------------------

When to use: file->file decompressing
Compile files: LzmaDec.h + LzmaDec.c + 7zTypes.h

Memory Requirements:
- Buffer for input stream: any size (for example, 16 KB)
- Buffer for output stream: any size (for example, 16 KB)
```

- LZMA Internal Structures: state_size (16 KB for default settings)
- LZMA dictionary (dictionary size is encoded in LZMA properties header)

1) read LZMA properties (5 bytes) and uncompressed size (8 bytes, little-endian) to header:

```
  unsigned char header[LZMA_PROPS_SIZE + 8];
  ReadFile(inFile, header, sizeof(header)
```

2) Allocate CLzmaDec structures (state + dictionary) using LZMA properties

```
 CLzmaDec state;
 LzmaDec_Constr(&state);
 res = LzmaDec_Allocate(&state, header, LZMA_PROPS_SIZE, &g_Alloc);
 if (res != SZ_OK)
   return res;
```

3)
Init LzmaDec structure before any new LZMA stream. And call LzmaDec_DecodeToBuf in loop

```
 LzmaDec_Init(&state);
 for (;;)
 {
   ...
   int res = LzmaDec_DecodeToBuf(CLzmaDec *p, Byte *dest, SizeT *destLen,
       const Byte *src, SizeT *srcLen, ELzmaFinishMode finishMode);
   ...
 }
```

4) Free all allocated structures

```
 LzmaDec_Free(&state, &g_Alloc);
```

Look example code:
C/Util/Lzma/LzmaUtil.c

How To compress data
---

Compile files:
7zTypes.h
Threads.h
LzmaEnc.h
LzmaEnc.c
LzFind.h
LzFind.c
LzFindMt.h
LzFindMt.c
LzHash.h

Memory Requirements:
 - (dictSize * 11.5 + 6 MB) + state_size

Lzma Encoder can use two memory allocators:
1) alloc - for small arrays.
2) allocBig - for big arrays.

For example, you can use Large RAM Pages (2 MB) in allocBig allocator for
better compression speed. Note that Windows has bad implementation for
Large RAM Pages.
It's OK to use same allocator for alloc and allocBig.

Single-call Compression with
 callbacks
---

Look example code:
 C/Util/Lzma/LzmaUtil.c

When to use: file->file compressing

1) you must implement callback structures for interfaces:
ISeqInStream
ISeqOutStream
ICompressProgress
ISzAlloc

```
static void *SzAlloc(void *p, size_t size) { p = p; return MyAlloc(size); }
static void SzFree(void *p, void *address) {  p = p; MyFree(address); }
static ISzAlloc g_Alloc = { SzAlloc, SzFree };

 CFileSeqInStream inStream;
 CFileSeqOutStream outStream;

 inStream.funcTable.Read = MyRead;
 inStream.file = inFile;
 outStream.funcTable.Write = MyWrite;
 outStream.file = outFile;
```

2) Create CLzmaEncHandle object;

```
 CLzmaEncHandle enc;

 enc = LzmaEnc_Create(&g_Alloc);
 if (enc == 0)
```

```
  return SZ_ERROR_MEM;
```

3) initialize CLzmaEncProps properties;

```
LzmaEncProps_Init(&props);
```

Then you can change some properties in that structure.

4) Send LZMA properties to LZMA Encoder

```
res = LzmaEnc_SetProps(enc, &props);
```

5) Write encoded properties
to header

```
  Byte header[LZMA_PROPS_SIZE + 8];
  size_t headerSize = LZMA_PROPS_SIZE;
  UInt64 fileSize;
  int i;

  res = LzmaEnc_WriteProperties(enc, header, &headerSize);
  fileSize = MyGetFileLength(inFile);
  for (i = 0; i < 8; i++)
    header[headerSize++] = (Byte)(fileSize >> (8 * i));
  MyWriteFileAndCheck(outFile, header, headerSize)
```

6) Call encoding function:

```
    res = LzmaEnc_Encode(enc, &outStream.funcTable, &inStream.funcTable,
      NULL, &g_Alloc, &g_Alloc);
```

7) Destroy LZMA Encoder Object

```
LzmaEnc_Destroy(enc, &g_Alloc, &g_Alloc);
```

If callback function return some error code, LzmaEnc_Encode also returns that code
or it can return the code like SZ_ERROR_READ, SZ_ERROR_WRITE or SZ_ERROR_PROGRESS.

Single-call RAM->RAM Compression
---

Single-call RAM->RAM Compression is similar to Compression with callbacks,
but you provide pointers to buffers instead of pointers to stream callbacks:

```
SRes LzmaEncode(Byte *dest,
 SizeT *destLen, const Byte *src, SizeT srcLen,
  const CLzmaEncProps *props, Byte *propsEncoded, SizeT *propsSize, int writeEndMark,
```

```
  ICompressProgress *progress, ISzAlloc *alloc, ISzAlloc *allocBig);
```

Return code:

```
 SZ_OK              - OK
 SZ_ERROR_MEM       - Memory allocation error
 SZ_ERROR_PARAM     - Incorrect paramater
 SZ_ERROR_OUTPUT_EOF - output buffer overflow
 SZ_ERROR_THREAD    - errors in multithreading functions (only for Mt version)
```

Defines
---

_LZMA_SIZE_OPT - Enable some optimizations in LZMA Decoder to get smaller executable code.

_LZMA_PROB32 - It can increase the speed on some 32-bit CPUs, but memory usage for
some structures will be doubled in that case.

_LZMA_UINT32_IS_ULONG - Define it if int is 16-bit on your compiler and long is 32-bit.

_LZMA_NO_SYSTEM_SIZE_T - Define it if you don't want to use size_t type.

_7ZIP_PPMD_SUPPPORT - Define it if you don't want to support PPMD method in AMSI-C .7z decoder.

C++
LZMA Encoder/Decoder
~~~~~~~~~~~~~~~~~~~~~~~~~
C++ LZMA code use COM-like interfaces. So if you want to use it,
you can study basics of COM/OLE.
C++ LZMA code is just wrapper over ANSI-C code.

C++ Notes
~~~~~~~~~~~~~~~~~~~~~~~~~
If you use some C++ code folders in 7-Zip (for example, C++ code for .7z handling),
you must check that you correctly work with "new" operator.
7-Zip can be compiled with MSVC 6.0 that doesn't throw "exception" from "new" operator.
So 7-Zip uses "CPP\Common\NewHandler.cpp" that redefines "new" operator:

```
operator new(size_t size)
{
 void *p = ::malloc(size);
 if (p == 0)
   throw CNewException();
 return p;
}
```

If you use MSCV that throws exception for "new" operator, you can compile without
"NewHandler.cpp". So standard exception will be used. Actually some code of
7-Zip catches any exception in internal code and converts it to HRESULT code.
So you don't need to catch CNewException, if you call COM interfaces of 7-Zip.

---

http://www.7-zip.org
http://www.7-zip.org/sdk.html
http://www.7-zip.org/support.html
#define IDD_PASSWORD 3800
#define IDT_PASSWORD_ENTER 3801
#define IDX_PASSWORD_SHOW 3803

#define IDE_PASSWORD_PASSWORD 120
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OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR
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DEALINGS IN THE SOFTWARE.
// Windows/Control/Edit.h

#ifndef __WINDOWS_CONTROL_EDIT_H
#define __WINDOWS_CONTROL_EDIT_H

#include "../Window.h"

```
namespace NWindows {
namespace NControl {

class CEdit: public CWindow
{
public:
 void SetPasswordChar(WPARAM c) { SendMsg(EM_SETPASSWORDCHAR, c); }
};

}}

#endif
```

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% ----------------------------------------------------------------
% VERSION: 0.9 (October 2010)
```

```
%
% AUTHORS:  Tilla Fick and Chris Swanepoel
%          hyphen at rekenaar dot net
% ----------------------------------------------------------------
%
% Define lefthyphenmin to one and righthyphenmin to two
% (although righthyphenmin could technically be made one,
%  in allmost all cases a value of two gives better results):
% \lefthyphenmin=1 \righthyphenmin=2
%
% ----------------------------------------------------------------
```

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```
/* ATK -  Accessibility Toolkit
* Copyright 2002 Sun Microsystems Inc.
*
* This library is free software; you can redistribute it and/or
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* License along with this library; if not, write to the
* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#if defined(ATK_DISABLE_SINGLE_INCLUDES) && !defined (__ATK_H_INSIDE__) && !defined
(ATK_COMPILATION)
#error "Only <atk/atk.h> can be included directly."
#endif

#ifndef __ATK_RELATION_TYPE_H__
#define
 __ATK_RELATION_TYPE_H__

#include <glib.h>

G_BEGIN_DECLS

/**
*AtkRelationType:
*@ATK_RELATION_NULL: Not used, represens "no relationship" or an error condition.
*@ATK_RELATION_CONTROLLED_BY: Indicates an object controlled by one or more target objects.
```

*@ATK_RELATION_CONTROLLER_FOR: Indicates an object is an controller for one or more target objects.
*@ATK_RELATION_LABEL_FOR: Indicates an object is a label for one or more target objects.
*@ATK_RELATION_LABELLED_BY: Indicates an object is labelled by one or more target objects.
*@ATK_RELATION_MEMBER_OF: Indicates an object is a member of a group of one or more target objects.
*@ATK_RELATION_NODE_CHILD_OF: Indicates an object is a cell in a treetable which is displayed because a cell in the same column is expanded and identifies that cell.
*@ATK_RELATION_FLOWS_TO: Indicates that the object has content that flows logically to another
* AtkObject in a sequential way, (for instance text-flow).
*@ATK_RELATION_FLOWS_FROM:
Indicates that the object has content that flows logically from
* another AtkObject in a sequential way, (for instance text-flow).
*@ATK_RELATION_SUBWINDOW_OF: Indicates a subwindow attached to a component but otherwise has no connection in the UI heirarchy to that component.
*@ATK_RELATION_EMBEDS: Indicates that the object visually embeds
* another object's content, i.e. this object's content flows around
* another's content.
*@ATK_RELATION_EMBEDDED_BY: Reciprocal of %ATK_RELATION_EMBEDS, indicates that
* this object's content is visualy embedded in another object.
*@ATK_RELATION_POPUP_FOR: Indicates that an object is a popup for another object.
*@ATK_RELATION_PARENT_WINDOW_OF: Indicates that an object is a parent window of another object.
*@ATK_RELATION_DESCRIBED_BY: Reciprocal of %ATK_RELATION_DESCRIPTION_FOR. Indicates that one
* or more target objects provide descriptive information about this object. This relation
* type is most appropriate for
information that is not essential as its presentation may
* be user-configurable and/or limited to an on-demand mechanism such as an assistive
* technology command. For brief, essential information such as can be found in a widget's
* on-screen label, use %ATK_RELATION_LABELLED_BY. For an on-screen error message, use
* %ATK_RELATION_ERROR_MESSAGE. For lengthy extended descriptive information contained in
* an on-screen object, consider using %ATK_RELATION_DETAILS as assistive technologies may
* provide a means for the user to navigate to objects containing detailed descriptions so
* that their content can be more closely reviewed.
*@ATK_RELATION_DESCRIPTION_FOR: Reciprocal of %ATK_RELATION_DESCRIBED_BY. Indicates that this
* object provides descriptive information about the target object(s). See also
* %ATK_RELATION_DETAILS_FOR and %ATK_RELATION_ERROR_FOR.
*@ATK_RELATION_NODE_PARENT_OF: Indicates an object is a cell in a treetable and is expanded to display other cells in the
same column.
*@ATK_RELATION_DETAILS: Reciprocal of %ATK_RELATION_DETAILS_FOR. Indicates that this object
* has a detailed or extended description, the contents of which can be found in the target
* object(s). This relation type is most appropriate for information that is sufficiently
* lengthy as to make navigation to the container of that information desirable. For less
* verbose information suitable for announcement only, see %ATK_RELATION_DESCRIBED_BY. If
* the detailed information describes an error condition, %ATK_RELATION_ERROR_FOR should be
* used instead. @Since: ATK-2.26.
*@ATK_RELATION_DETAILS_FOR: Reciprocal of %ATK_RELATION_DETAILS. Indicates that this object
* provides a detailed or extended description about the target object(s). See also

```
* %ATK_RELATION_DESCRIPTION_FOR and %ATK_RELATION_ERROR_FOR. @Since: ATK-2.26.
*@ATK_RELATION_ERROR_MESSAGE: Reciprocal of %ATK_RELATION_ERROR_FOR. Indicates that this
object
* has one or more errors, the nature of which is
 described in the contents of the target
* object(s). Objects that have this relation type should also contain %ATK_STATE_INVALID_ENTRY
* in their #AtkStateSet. @Since: ATK-2.26.
*@ATK_RELATION_ERROR_FOR: Reciprocal of %ATK_RELATION_ERROR_MESSAGE. Indicates that this
object
* contains an error message describing an invalid condition in the target object(s). @Since:
* ATK_2.26.
*@ATK_RELATION_LAST_DEFINED: Not used, this value indicates the end of the enumeration.
*
*Describes the type of the relation
**/
typedef enum
{
 ATK_RELATION_NULL = 0,
 ATK_RELATION_CONTROLLED_BY,
 ATK_RELATION_CONTROLLER_FOR,
 ATK_RELATION_LABEL_FOR,
 ATK_RELATION_LABELLED_BY,
 ATK_RELATION_MEMBER_OF,
 ATK_RELATION_NODE_CHILD_OF,
 ATK_RELATION_FLOWS_TO,
 ATK_RELATION_FLOWS_FROM,
 ATK_RELATION_SUBWINDOW_OF,
 ATK_RELATION_EMBEDS,
 ATK_RELATION_EMBEDDED_BY,
 ATK_RELATION_POPUP_FOR,
 ATK_RELATION_PARENT_WINDOW_OF,
 ATK_RELATION_DESCRIBED_BY,
 ATK_RELATION_DESCRIPTION_FOR,
 ATK_RELATION_NODE_PARENT_OF,
  ATK_RELATION_DETAILS,
 ATK_RELATION_DETAILS_FOR,
 ATK_RELATION_ERROR_MESSAGE,
 ATK_RELATION_ERROR_FOR,
 ATK_RELATION_LAST_DEFINED
} AtkRelationType;

G_END_DECLS

#endif /* __ATK_RELATION_TYPE_H__ */
// OutBuffer.h

#ifndef __OUT_BUFFER_H
#define __OUT_BUFFER_H
```

```
#include "../IStream.h"
#include "../../Common/MyCom.h"
#include "../../Common/MyException.h"

#ifndef _NO_EXCEPTIONS
struct COutBufferException: public CSystemException
{
 COutBufferException(HRESULT errorCode): CSystemException(errorCode) {}
};
#endif

class COutBuffer
{
protected:
 Byte *_buf;
 UInt32 _pos;
 UInt32 _limitPos;
 UInt32 _streamPos;
 UInt32 _bufSize;
 ISequentialOutStream *_stream;
 UInt64 _processedSize;
 Byte  *_buf2;
 bool _overDict;

 HRESULT FlushPart() throw();
public:
 #ifdef _NO_EXCEPTIONS
 HRESULT ErrorCode;
 #endif

 COutBuffer(): _buf(0), _pos(0), _stream(0), _buf2(0) {}
 ~COutBuffer() { Free(); }

 bool Create(UInt32 bufSize) throw();
 void Free() throw();

 void SetMemStream(Byte *buf) { _buf2 = buf; }
 void SetStream(ISequentialOutStream *stream) { _stream = stream; }
 void Init() throw();
 HRESULT Flush() throw();
 void FlushWithCheck();

 void WriteByte(Byte b)
 {

  UInt32 pos = _pos;
  _buf[pos] = b;
```

```
  pos++;
  _pos = pos;
  if (pos == _limitPos)
    FlushWithCheck();
 }
 void WriteBytes(const void *data, size_t size)
 {
  for (size_t i = 0; i < size; i++)
    WriteByte(((const Byte *)data)[i]);
 }

 UInt64 GetProcessedSize() const throw();
};

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Content in license Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-013-ref.xht" />
  <meta name="assert" content="The license element contains content." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src:
 url("support/metadatadisplay-schema-license-013.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
```

```
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

## A. HISTORY OF THE SOFTWARE

contextlib2 is a derivative of the contextlib module distributed by the PSF as part of the Python standard library. According, it is itself redistributed under the PSF license (reproduced in full below). As the contextlib module was added only in Python 2.5, the licenses for earlier Python versions are not applicable and have not been included.

Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team.
In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases that included the contextlib module.

| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 2.5 | 2.4 | 2006 | PSF | yes |

| | | | | |
|---|---|---|---|---|
| 2.5.1 | 2.5 | 2007 | PSF | yes |
| 2.5.2 | 2.5.1 | 2008 | PSF | yes |
| 2.5.3 | 2.5.2 | 2008 | PSF | yes |
| 2.6 | 2.5 | 2008 | PSF | yes |
| 2.6.1 | 2.6 | 2008 | PSF | yes |
| 2.6.2 | 2.6.1 | 2009 | PSF | yes |
| 2.6.3 | 2.6.2 | 2009 | PSF | yes |
| 2.6.4 | 2.6.3 | 2009 | PSF | yes |
| 2.6.5 | 2.6.4 | 2010 | PSF | yes |
| 3.0 | 2.6 | 2008 | PSF | yes |
| 3.0.1 | 3.0 | 2009 | PSF | yes |
| 3.1 | 3.0.1 | 2009 | PSF | yes |
| 3.1.1 | 3.1 | 2009 | PSF | yes |
| 3.1.2 | 3.1.1 | 2010 | PSF | yes |
| 3.1.3 | 3.1.2 | 2010 | PSF | yes |
| 3.1.4 | 3.1.3 | 2011 | PSF | yes |
| 3.2 | 3.1 | 2011 | PSF | yes |
| 3.2.1 | 3.2 | 2011 | PSF | yes |
| 3.2.2 | 3.2.1 | 2011 | PSF | yes |
| 3.3 | 3.2 | 2012 | PSF | yes |

Footnotes:

(1) GPL-compatible doesn't mean that we're distributing Python under the GPL. All Python licenses, unlike the GPL, let you distribute a modified version without making your changes open source. The GPL-compatible licenses make it possible to combine Python with other software that is released under the GPL; the others don't.

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```
// ArchiveOpenCallback.h

#ifndef __ARCHIVE_OPEN_CALLBACK_H
#define __ARCHIVE_OPEN_CALLBACK_H

#include "../../../Common/MyCom.h"
```

```
#include "../../../Windows/FileFind.h"

#ifndef _NO_CRYPTO
#include "../../IPassword.h"
#endif
#include "../../Archive/IArchive.h"

#ifdef _NO_CRYPTO

#define INTERFACE_IOpenCallbackUI_Crypto(x)

#else

#define INTERFACE_IOpenCallbackUI_Crypto(x) \
 virtual HRESULT Open_CryptoGetTextPassword(BSTR *password) x; \
 /* virtual HRESULT Open_GetPasswordIfAny(bool &passwordIsDefined, UString &password) x; */ \
 /* virtual bool Open_WasPasswordAsked() x; */ \
 /* virtual void Open_Clear_PasswordWasAsked_Flag() x; */  \

#endif

#define INTERFACE_IOpenCallbackUI(x) \
 virtual HRESULT Open_CheckBreak() x; \
 virtual HRESULT Open_SetTotal(const UInt64 *files, const UInt64 *bytes) x; \
 virtual HRESULT Open_SetCompleted(const UInt64 *files, const UInt64 *bytes) x; \
 virtual HRESULT Open_Finished() x; \
 INTERFACE_IOpenCallbackUI_Crypto(x)

struct IOpenCallbackUI
{
  INTERFACE_IOpenCallbackUI(=0)
};

class COpenCallbackImp:
 public IArchiveOpenCallback,
 public IArchiveOpenVolumeCallback,
 public IArchiveOpenSetSubArchiveName,
 #ifndef _NO_CRYPTO
 public ICryptoGetTextPassword,
 #endif
 public CMyUnknownImp
{
public:
 MY_QUERYINTERFACE_BEGIN2(IArchiveOpenVolumeCallback)
 MY_QUERYINTERFACE_ENTRY(IArchiveOpenSetSubArchiveName)
 #ifndef _NO_CRYPTO
 MY_QUERYINTERFACE_ENTRY(ICryptoGetTextPassword)
 #endif
```

```
 MY_QUERYINTERFACE_END
 MY_ADDREF_RELEASE

 INTERFACE_IArchiveOpenCallback(;)
 INTERFACE_IArchiveOpenVolumeCallback(;)

 #ifndef _NO_CRYPTO
 STDMETHOD(CryptoGetTextPassword)(BSTR *password);
 #endif

 STDMETHOD(SetSubArchiveName(const wchar_t *name))
 {
   _subArchiveMode = true;
   _subArchiveName = name;
   // TotalSize = 0;
   return S_OK;
 }

private:
 FString _folderPrefix;
 NWindows::NFile::NFind::CFileInfo _fileInfo;
 bool _subArchiveMode;
 UString _subArchiveName;

public:
 UStringVector FileNames;
 CBoolVector
 FileNames_WasUsed;
 CRecordVector<UInt64> FileSizes;

 bool PasswordWasAsked;

 IOpenCallbackUI *Callback;
 CMyComPtr<IArchiveOpenCallback> ReOpenCallback;
 // UInt64 TotalSize;

 COpenCallbackImp(): Callback(NULL), _subArchiveMode(false) {}

 void Init(const FString &folderPrefix, const FString &fileName)
 {
   _folderPrefix = folderPrefix;
   if (!_fileInfo.Find(_folderPrefix + fileName))
     throw 20121118;
   FileNames.Clear();
   FileNames_WasUsed.Clear();
   FileSizes.Clear();
   _subArchiveMode = false;
   // TotalSize = 0;
```

```
  PasswordWasAsked = false;
 }

 bool SetSecondFileInfo(CFSTR newName)
 {
  return _fileInfo.Find(newName) && !_fileInfo.IsDir();
 }
};

#endif
```

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LaTeX Project Public License (LPPL) as part of the hyph-utf8 package.

This Source Code Form is subject to the terms of the Mozilla Public
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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

At the time this file was first modified, a complete, unmodified copy of
the LPPL Work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

Portions of this file were originally made available under the following license
(copied verbatim from hyph-sl.lic.txt in the original work):

Slovenian hyphenation patterns

(more info about the licence to be added later)

```
% This file is part of hyph-utf8 package and resulted
 from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% Source: slhyph.tex (2007-01-29)
% Author: Matja Vreko <matjaz at mg-soft.si>
%
% The above mentioned file should become obsolete,
% and the author of the original file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
```

```
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%               and helped with testing, suggestions and bug reports
% - Norbert Preining, who tested & integrated
 patterns into TeX Live
%
% However, the "copyright/copyleft" owner of patterns remains the original author.
%
% The copyright statement of this file is thus:
%
%    Do with this file whatever needs to be done in future for the sake of
%    "a better world" as long as you respect the copyright of original file.
%    If you're the original author of patterns or taking over a new revolution,
%    plese remove all of the TUG comments & credits that we added here -
%    you are the Queen / the King, we are only the servants.
%
% If you want to change this file, rather than uploading directly to CTAN,
% we would be grateful if you could send it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
% Before a new "pattern-revolution" starts,
% please try to follow some guidelines if possible:
%
% - \lccode is *forbidden*, and I really mean it
% - all the patterns should be in UTF-8
% - the only
 "allowed" TeX commands in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
%-----------------------------------------------------------------------------
```

```
%
% This is `slhyph.tex' as of 15. 4. 97.
%
% Copyright (C) 1990 Matja Vreko, TeXCeX (SLO)
%             [slovenian hyphenation patterns]
%
% This program can be redistributed and/or modified under the terms
% of the LaTeX Project Public License Distributed from CTAN
% archives in directory macros/latex/base/lppl.txt;
 either
% version 1 of the License, or any later version.
%
% This file contains slovene hyphen patterns with
%
% Generation of hyphen patterns for TeX
%
%         Matja Vreko, TeXCeH (SLO), 1990
%   Email: matjaz@mg-soft.si
%
% Changes:
%  1990       First version of `hyphen.si' (Matja Vreko, TeXCeX)
%
% Some cosmetic changes done later on, but none of these apply any more;
% the patterns are still the same as they were originally:
%
%  1994-05-17 Use of code page 852 in patterns (Leon lajpah)
%  1995-04-06 Release of `sihyph21.tex'
%  1995-06-20 Added \slovenehyphenmins
%            Release of `sihyph22.tex'
%  1997-15-04 Some changes concerning "c, "s, "z and ...
%            Release of `sihyph23.tex'
%  2007-01-20 `sihyph23.tex' renamed to `slhyph.tex'
%            (sl is the proper language code for Slovenian)
%
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With Nested span Elements in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-026-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element that contains nested span elements."
```

```
/>
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-026.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   &lt;span&gt;
    span 1 start
    &lt;span&gt;
     span 2 start
     &lt;span&gt;
      span 3
     &lt;/span&gt;
     span 2 end
    &lt;/span&gt;
    span 1 end
   &lt;/span&gt;
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With Two div Elements in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element that contains two div elements." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size:
 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   &lt;div&gt;Paragraph 1&lt;/div&gt;
   &lt;div&gt;Paragraph 2&lt;/div&gt;
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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```
// Property.h

#ifndef __7Z_PROPERTY_H
#define __7Z_PROPERTY_H

#include "../../../Common/MyString.h"

struct CProperty
{
 UString Name;
 UString Value;
};

#endif
```

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With dir Attribute in span Element in text Element 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
```

```
  <meta name="assert" content="The copyright element contains a text element that contains a span element with ltr
as the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   Text with &lt;span dir="ltr"&gt;span&lt;/span&gt;.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```


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```
// UserInputUtils.h

#ifndef __USER_INPUT_UTILS_H
#define __USER_INPUT_UTILS_H

#include "../../../Common/StdOutStream.h"

namespace NUserAnswerMode {

enum EEnum
{
 kYes,
 kNo,
 kYesAll,
 kNoAll,
 kAutoRenameAll,
 kQuit,
 kEof,
 kError
};
}

NUserAnswerMode::EEnum ScanUserYesNoAllQuit(CStdOutStream *outStream);
// bool GetPassword(CStdOutStream *outStream, UString &psw);
HRESULT GetPassword_HRESULT(CStdOutStream *outStream, UString &psw);

#endif
```

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```
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strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With dir Attribute in div Element in text Element 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
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  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-023-ref.xht" />
  <meta name="assert" content="The license element contains a text element that contains a div element with ltr as
the value for the dir attribute." />
  <style
 type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-023.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
```

```
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
</head>
<body>
 <p>Test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
 <div class="test">P</div>
 <p>The XML contained in the Extended Metadata Block is below.</p>
 <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   &lt;div dir="ltr"&gt;Paragraph 1&lt;/div&gt;
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
 </pre>
</body>
</html>
```

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```
CODE32

EXPORT |CrcUpdateT4@16|

AREA |.text|, CODE, ARM

MACRO
CRC32_STEP_1

ldrb    r4, [r1], #1
subs    r2, r2, #1
eor     r4, r4, r0
and     r4, r4, #0xFF
```

```
 ldr     r4, [r3, +r4, lsl #2]
 eor     r0, r4, r0, lsr #8

 MEND


 MACRO
 CRC32_STEP_4 $STREAM_WORD

 eor     r7, r7, r8
 eor     r7, r7, r9
 eor     r0, r0, r7
 eor     r0, r0, $STREAM_WORD
 ldr     $STREAM_WORD, [r1], #4

 and     r7, r0, #0xFF
 and     r8, r0, #0xFF00
 and     r9, r0, #0xFF0000
 and     r0, r0, #0xFF000000

 ldr     r7, [r6, +r7, lsl #2]
 ldr     r8, [r5, +r8, lsr #6]
 ldr     r9, [r4, +r9, lsr #14]
 ldr     r0, [r3, +r0, lsr #22]

 MEND


|CrcUpdateT4@16| PROC

 stmdb   sp!, {r4-r11, lr}
 cmp     r2, #0
 beq     |$fin|

|$v1|
 tst     r1, #7
 beq     |$v2|
 CRC32_STEP_1
 bne     |$v1|

|$v2|
 cmp     r2, #16
 blo     |$v3|

 ldr     r10, [r1], #4
 ldr     r11, [r1], #4

 add     r4, r3, #0x400
```

```
 add     r5, r3, #0x800
 add     r6, r3, #0xC00

 mov     r7, #0
 mov     r8, #0
 mov     r9, #0

 sub
    r2, r2, #16

|$loop|
 ; pld     [r1, #0x40]

 CRC32_STEP_4 r10
 CRC32_STEP_4 r11

 subs    r2, r2, #8
 bhs     |$loop|

 sub     r1, r1, #8
 add     r2, r2, #16

 eor     r7, r7, r8
 eor     r7, r7, r9
 eor     r0, r0, r7

|$v3|
 cmp     r2, #0
 beq     |$fin|

|$v4|
 CRC32_STEP_1
 bne     |$v4|

|$fin|
 ldmia   sp!, {r4-r11, pc}

|CrcUpdateT4@16| ENDP

 END
```

This directory contains the LZMA SDK code used in building the self-extracting Windows installer.

The src/ directory contains an almost-unmodified copy of the 7-zip source code version 18.05, as downloaded from https://www.7-zip.org/a/lzma1805.7z (linked from https://www.7-zip.org/sdk.html) on August 30, 2018. As stated in DOC/lzma-sdk.txt and on the web page, this code is in the public domain. A few modifications have been made to this copy of the source code. Those

modifications are contained in mozilla_customizations.diff, which should be found in the same directory as this file.

The firefox/ directory contains several things:

* SFXSetup.sln and SFXSetup.vcxproj
  These are Visual Studio 2017 conversions of the Visual C++ 6 workspace and project files from the src/CPP/7zip/Bundles/SFXSetup/ directory, with some changes and additions to support AArch64 and to include our resources.
* 7zSD.arm64.manifest and 7zSD.win32.manifest
  We need to add a manifest file to the binary for several reasons, and one isn't supplied with the source package (Visual C++ 6 doesn't support them), so we've written our own.
* setup.ico
  The icon group used for the installer package.
* resource.rc
  The resource script containing the above manifest and icon references, as well as other resources we need. This is derived from the supplied SFXSetup resource.rc, but heavily customized.
* 7zSD.ARM64.sfx
  AArch64 binary built using all the above files. Checking this into the tree in compiled binary form means that packaging the installer does not require having a compiler toolchain configured (which is the case for artifact builds). To compile your own version of this file, open SFXSetup.sln and build the ReleaseD configuration.
* 7zSD.Win32.sfx
  32-bit x86 binary built using some of the above files, but through a different build procedure that uses Visual C++ 6 in order to maintain compatibility with legacy Windows platforms (Firefox doesn't run on these platforms, but at least we can display a helpful error message). The exact procedure that generated this file was:
  1) Install Microsoft Visual C++ 6 Professional or Enterprise edition (the Standard edition does not include the optimizing compiler, so it should not be used). You'll likely want a virtual machine running Windows XP, because running VC6 under more modern Windows versions is tricky.
  2) Install an appropriate Windows SDK version. The Windows XP Service Pack 2 SDK is known to work well, but that particular version appears to only be available from archive.org:
https://web.archive.org/web/20080209175723/http://www.microsoft.com:80/msdownload/platformsdk/sdkupdate/XPSP2FULLInstall.htm
  3) Run the tool included with the SDK that configures Visual C++ to use it.
  4) If using a fresh copy of the LZMA SDK sources, apply the patch in mozilla_customizations.diff. The copy in the Firefox source tree already has these changes applied.
  5) Open the workspace file at src\CPP\7zip\Bundles\SFXSetup\SFXSetup.dsw and build it using the "SFXSetup - Win32 ReleaseD" configuration. The output

executable should be at the path ReleaseD\7zSD.sfx relative to SFXSetup.dsw.
6) Use Resource Hacker (available from http://angusj.com/resourcehacker/) to
replace the existing icon on 7zSD.sfx and to add the manifest as a new
resource. Also edit the version info resource to replace CompanyName and
LegalCopyright with "Mozilla" (or appropriate vendor name) and
FileDescription and ProductName with "Firefox" (or appropriate product name).
Be sure to recompile the resources using the green "play" button in the
toolbar (or by pressing F5) before saving the file.
In the future this file may be replaced with one built in the same manner as
the AArch64 version using a modern toolchain, if the loss of platform support
is deemed acceptable.
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<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
<title>WOFF Test: Valid copyright Element With dir Attribute in span Element in text Element 2</title>
<link rel="author" title="Tal Leming" href="http://typesupply.com" />
<link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
<link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
<link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
<link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
<meta name="assert" content="The copyright element contains a text element that contains a span element with rtl as the value for the dir attribute." />
<style type="text/css"><![CDATA[
@import url("support/test-fonts.css");
body
{
font-size: 20px;
}
pre {
font-size: 12px;
}
.test {
font-family: "WOFF Test CFF Reference";
font-size: 200px;
margin-top: 50px;
}

```
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   Text with &lt;span dir="rtl"&gt;span&lt;/span&gt;.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
/* Delta.h -- Delta converter
2013-01-18 : Igor Pavlov : Public domain */

#ifndef __DELTA_H
#define __DELTA_H

#include "7zTypes.h"

EXTERN_C_BEGIN

#define DELTA_STATE_SIZE 256

void Delta_Init(Byte *state);
void Delta_Encode(Byte *state, unsigned delta, Byte *data, SizeT size);
void Delta_Decode(Byte *state, unsigned delta, Byte *data, SizeT size);

EXTERN_C_END

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: No text Element in license Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
```

```
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element does not contain a text child element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family:
 "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts" id="License ID" /&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
// Common.h

#ifndef __COMMON_COMMON_H
#define __COMMON_COMMON_H

/*
This file is included to all cpp files in 7-Zip.
Each folder contains StdAfx.h file that includes "Common.h".
So 7-Zip includes "Common.h" in both modes:
 with precompiled StdAfx.h
and
 without precompiled StdAfx.h

If you use 7-Zip code, you must include "Common.h" before other h files of 7-zip.
If you don't need some things that are used in 7-Zip,
you can change this h file or h files included in this file.
```

```
*/

// compiler pragmas to disable some warnings
#include "../../C/Compiler.h"

// it's <windows.h> or code that defines windows things, if it's not _WIN32
#include "MyWindows.h"

// NewHandler.h and NewHandler.cpp redefine operator new() to throw exceptions, if compiled with old MSVC
compilers
#include "NewHandler.h"



#define ARRAY_SIZE(a) (sizeof(a) / sizeof((a)[0]))


/* There is BUG in MSVC 6.0 compiler for operator new[]:
  It doesn't check overflow, when it calculates size in bytes for allocated array.
   So we can use MY_ARRAY_NEW macro instead of new[] operator. */

#if defined(_MSC_VER) && (_MSC_VER == 1200) && !defined(_WIN64)
 #define MY_ARRAY_NEW(p, T, size) p = new T[(size > (unsigned)0xFFFFFFFF / sizeof(T)) ?
(unsigned)0xFFFFFFFF / sizeof(T) : size];
#else
 #define MY_ARRAY_NEW(p, T, size) p = new T[size];
#endif

#endif
```

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* https://github.com/adamjstewart
* https://github.com/xavfernandez
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liteFirewall is based on nsisFirewall.

nsisFirewall -- Small NSIS plugin for simple tasks with Windows Firewall
Web site: http://wiz0u.free.fr/prog/nsisFirewall

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```
 source distribution.
// ICoder.h

#ifndef __ICODER_H
#define __ICODER_H

#include "IStream.h"

#define CODER_INTERFACE(i, x) DECL_INTERFACE(i, 4, x)

CODER_INTERFACE(ICompressProgressInfo, 0x04)
{
 STDMETHOD(SetRatioInfo)(const UInt64 *inSize, const UInt64 *outSize) PURE;

 /* (inSize) can be NULL, if unknown
    (outSize) can be NULL, if unknown

 returns:
   S_OK
   E_ABORT  : Break by user
   another error codes
 */
};

CODER_INTERFACE(ICompressCoder, 0x05)
{
 STDMETHOD(Code)(ISequentialInStream *inStream, ISequentialOutStream *outStream,
     const UInt64 *inSize, const UInt64 *outSize,
     ICompressProgressInfo *progress) PURE;
};

CODER_INTERFACE(ICompressCoder2, 0x18)
{
 STDMETHOD(Code)(ISequentialInStream * const *inStreams, const UInt64 * const *inSizes, UInt32
numInStreams,
     ISequentialOutStream * const *outStreams, const UInt64 * const *outSizes, UInt32 numOutStreams,
     ICompressProgressInfo *progress) PURE;
};

/*
 ICompressCoder::Code
 ICompressCoder2::Code

 returns:
    S_OK     : OK
   S_FALSE  : data error (for decoders)
   E_OUTOFMEMORY : memory allocation error
   E_NOTIMPL : unsupported encoding method (for decoders)
```

```
  another error code : some error. For example, it can be error code received from inStream or outStream function.

Parameters:
  (inStream != NULL)
  (outStream != NULL)

  if (inSize != NULL)
  {
    Encoders in 7-Zip ignore (inSize).
    Decoder can use (*inSize) to check that stream was decoded correctly.
    Some decoder in 7-Zip check it, if (full_decoding mode was set via ICompressSetFinishMode)
  }

  If it's required to limit the reading from input stream (inStream), it can
    be done with ISequentialInStream implementation.

  if (outSize != NULL)
  {
    Encoders in 7-Zip ignore (outSize).
    Decoder unpacks no more than (*outSize) bytes.
  }

  (progress == NULL) is allowed.


Decoding with Code() function
-----------------------------

You can request some interfaces
before decoding
 - ICompressSetDecoderProperties2
 - ICompressSetFinishMode

If you need to decode full stream:
{
  1) try to set full_decoding mode with ICompressSetFinishMode::SetFinishMode(1);
  2) call the Code() function with specified (inSize) and (outSize), if these sizes are known.
}

If you need to decode only part of stream:
{
  1) try to set partial_decoding mode with ICompressSetFinishMode::SetFinishMode(0);
  2) Call the Code() function with specified (inSize = NULL) and specified (outSize).
}

Encoding with Code() function
-----------------------------
```

```
 You can request some interfaces :
 - ICompressSetCoderProperties   - use it before encoding to set properties
 - ICompressWriteCoderProperties - use it before or after encoding to request encoded properties.

 ICompressCoder2 is used when (numInStreams != 1 || numOutStreams != 1)
    The rules are similar to ICompressCoder rules
*/


namespace NCoderPropID
{
 enum EEnum
 {

  kDefaultProp = 0,
  kDictionarySize,    // VT_UI4
  kUsedMemorySize,    // VT_UI4
  kOrder,             // VT_UI4
  kBlockSize,         // VT_UI4 or VT_UI8
  kPosStateBits,      // VT_UI4
  kLitContextBits,    // VT_UI4
  kLitPosBits,        // VT_UI4
  kNumFastBytes,      // VT_UI4
  kMatchFinder,       // VT_BSTR
  kMatchFinderCycles, // VT_UI4
  kNumPasses,         // VT_UI4
  kAlgorithm,         // VT_UI4
  kNumThreads,        // VT_UI4
  kEndMarker,         // VT_BOOL
  kLevel,             // VT_UI4
  kReduceSize,        // VT_UI8 : it's estimated size of largest data stream that will be compressed
                      //   encoder can use this value to reduce dictionary size and allocate data buffers

  kExpectedDataSize,  // VT_UI8 : for ICompressSetCoderPropertiesOpt :
                      //   it's estimated size of current data stream
                      //   real data size can differ from that size
                      //   encoder
 can use this value to optimize encoder initialization

  kBlockSize2,        // VT_UI4 or VT_UI8
  kCheckSize,         // VT_UI4 : size of digest in bytes
  kFilter,            // VT_BSTR
  kMemUse             // VT_UI8
 };
}

CODER_INTERFACE(ICompressSetCoderPropertiesOpt, 0x1F)
{
```

```
 STDMETHOD(SetCoderPropertiesOpt)(const PROPID *propIDs, const PROPVARIANT *props, UInt32
numProps) PURE;
};

CODER_INTERFACE(ICompressSetCoderProperties, 0x20)
{
 STDMETHOD(SetCoderProperties)(const PROPID *propIDs, const PROPVARIANT *props, UInt32 numProps)
PURE;
};

/*
CODER_INTERFACE(ICompressSetCoderProperties, 0x21)
{
 STDMETHOD(SetDecoderProperties)(ISequentialInStream *inStream) PURE;
};
*/

CODER_INTERFACE(ICompressSetDecoderProperties2, 0x22)
{
 /* returns:
   S_OK
   E_NOTIMP      : unsupported properties
   E_INVALIDARG  : incorrect (or unsupported) properties
   E_OUTOFMEMORY : memory allocation error
 */
 STDMETHOD(SetDecoderProperties2)(const Byte *data, UInt32 size) PURE;
};

CODER_INTERFACE(ICompressWriteCoderProperties,
 0x23)
{
 STDMETHOD(WriteCoderProperties)(ISequentialOutStream *outStream) PURE;
};

CODER_INTERFACE(ICompressGetInStreamProcessedSize, 0x24)
{
 STDMETHOD(GetInStreamProcessedSize)(UInt64 *value) PURE;
};

CODER_INTERFACE(ICompressSetCoderMt, 0x25)
{
 STDMETHOD(SetNumberOfThreads)(UInt32 numThreads) PURE;
};

CODER_INTERFACE(ICompressSetFinishMode, 0x26)
{
 STDMETHOD(SetFinishMode)(UInt32 finishMode) PURE;
```

```
 /* finishMode:
   0 : partial decoding is allowed. It's default mode for ICompressCoder::Code(), if (outSize) is defined.
   1 : full decoding. The stream must be finished at the end of decoding. */
};

CODER_INTERFACE(ICompressGetInStreamProcessedSize2, 0x27)
{
 STDMETHOD(GetInStreamProcessedSize2)(UInt32 streamIndex, UInt64 *value) PURE;
};

CODER_INTERFACE(ICompressSetMemLimit, 0x28)
{
 STDMETHOD(SetMemLimit)(UInt64 memUsage) PURE;
};



CODER_INTERFACE(ICompressGetSubStreamSize, 0x30)
{
 STDMETHOD(GetSubStreamSize)(UInt64
 subStream, UInt64 *value) PURE;

 /* returns:
   S_OK     : (*value) contains the size or estimated size (can be incorrect size)
   S_FALSE  : size is undefined
   E_NOTIMP : the feature is not implemented

 Let's (read_size) is size of data that was already read by ISequentialInStream::Read().
 The caller should call GetSubStreamSize() after each Read() and check sizes:
   if (start_of_subStream + *value < read_size)
   {
     // (*value) is correct, and it's allowed to call GetSubStreamSize() for next subStream:
     start_of_subStream += *value;
     subStream++;
   }
 */
};

CODER_INTERFACE(ICompressSetInStream, 0x31)
{
 STDMETHOD(SetInStream)(ISequentialInStream *inStream) PURE;
 STDMETHOD(ReleaseInStream)() PURE;
};

CODER_INTERFACE(ICompressSetOutStream, 0x32)
{
 STDMETHOD(SetOutStream)(ISequentialOutStream *outStream) PURE;
 STDMETHOD(ReleaseOutStream)() PURE;
```

```
};

/*
CODER_INTERFACE(ICompressSetInStreamSize, 0x33)
{
 STDMETHOD(SetInStreamSize)(const UInt64
 *inSize) PURE;
};
*/

CODER_INTERFACE(ICompressSetOutStreamSize, 0x34)
{
 STDMETHOD(SetOutStreamSize)(const UInt64 *outSize) PURE;

 /* That function initializes decoder structures.
    Call this function only for stream version of decoder.
      if (outSize == NULL), then output size is unknown
      if (outSize != NULL), then the decoder must stop decoding after (*outSize) bytes. */
};

CODER_INTERFACE(ICompressSetBufSize, 0x35)
{
 STDMETHOD(SetInBufSize)(UInt32 streamIndex, UInt32 size) PURE;
 STDMETHOD(SetOutBufSize)(UInt32 streamIndex, UInt32 size) PURE;
};

CODER_INTERFACE(ICompressInitEncoder, 0x36)
{
 STDMETHOD(InitEncoder)() PURE;

 /* That function initializes encoder structures.
    Call this function only for stream version of encoder. */
};

CODER_INTERFACE(ICompressSetInStream2, 0x37)
{
 STDMETHOD(SetInStream2)(UInt32 streamIndex, ISequentialInStream *inStream) PURE;
 STDMETHOD(ReleaseInStream2)(UInt32 streamIndex) PURE;
};

/*
CODER_INTERFACE(ICompressSetOutStream2,
 0x38)
{
 STDMETHOD(SetOutStream2)(UInt32 streamIndex, ISequentialOutStream *outStream) PURE;
 STDMETHOD(ReleaseOutStream2)(UInt32 streamIndex) PURE;
};
```

```
CODER_INTERFACE(ICompressSetInStreamSize2, 0x39)
{
 STDMETHOD(SetInStreamSize2)(UInt32 streamIndex, const UInt64 *inSize) PURE;
};
*/


/*
 ICompressFilter
 Filter() converts as most as possible bytes
   returns: (outSize):
     if (outSize <= size) : Filter have converted outSize bytes
     if (outSize >  size) : Filter have not converted anything.
        and it needs at least outSize bytes to convert one block
        (it's for crypto block algorithms).
*/

#define INTERFACE_ICompressFilter(x) \
 STDMETHOD(Init)() x; \
 STDMETHOD_(UInt32, Filter)(Byte *data, UInt32 size) x; \

CODER_INTERFACE(ICompressFilter, 0x40)
{
 INTERFACE_ICompressFilter(PURE);
};


CODER_INTERFACE(ICompressCodecsInfo, 0x60)
{
 STDMETHOD(GetNumMethods)(UInt32 *numMethods) PURE;
 STDMETHOD(GetProperty)(UInt32 index, PROPID propID,
 PROPVARIANT *value) PURE;
 STDMETHOD(CreateDecoder)(UInt32 index, const GUID *iid, void **coder) PURE;
 STDMETHOD(CreateEncoder)(UInt32 index, const GUID *iid, void **coder) PURE;
};

CODER_INTERFACE(ISetCompressCodecsInfo, 0x61)
{
 STDMETHOD(SetCompressCodecsInfo)(ICompressCodecsInfo *compressCodecsInfo) PURE;
};

CODER_INTERFACE(ICryptoProperties, 0x80)
{
 STDMETHOD(SetKey)(const Byte *data, UInt32 size) PURE;
 STDMETHOD(SetInitVector)(const Byte *data, UInt32 size) PURE;
};

/*
```

```
CODER_INTERFACE(ICryptoResetSalt, 0x88)
{
 STDMETHOD(ResetSalt)() PURE;
};
*/

CODER_INTERFACE(ICryptoResetInitVector, 0x8C)
{
 STDMETHOD(ResetInitVector)() PURE;

 /* Call ResetInitVector() only for encoding.
    Call ResetInitVector() before encoding and before WriteCoderProperties().
    Crypto encoder can create random IV in that function. */
};

CODER_INTERFACE(ICryptoSetPassword, 0x90)
{
 STDMETHOD(CryptoSetPassword)(const Byte *data, UInt32 size) PURE;
};

CODER_INTERFACE(ICryptoSetCRC,
 0xA0)
{
 STDMETHOD(CryptoSetCRC)(UInt32 crc) PURE;
};


namespace NMethodPropID
{
 enum EEnum
 {
   kID,
   kName,
   kDecoder,
   kEncoder,
   kPackStreams,
   kUnpackStreams,
   kDescription,
   kDecoderIsAssigned,
   kEncoderIsAssigned,
   kDigestSize
 };
}


#define INTERFACE_IHasher(x) \
 STDMETHOD_(void, Init)() throw() x; \
 STDMETHOD_(void, Update)(const void *data, UInt32 size) throw() x; \
```

```
 STDMETHOD_(void, Final)(Byte *digest) throw() x; \
 STDMETHOD_(UInt32, GetDigestSize)() throw() x; \

CODER_INTERFACE(IHasher, 0xC0)
{
 INTERFACE_IHasher(PURE)
};

CODER_INTERFACE(IHashers, 0xC1)
{
 STDMETHOD_(UInt32, GetNumHashers)() PURE;
 STDMETHOD(GetHasherProp)(UInt32 index, PROPID propID, PROPVARIANT *value) PURE;
 STDMETHOD(CreateHasher)(UInt32 index, IHasher **hasher) PURE;
};

extern "C"
{
 typedef HRESULT (WINAPI *Func_GetNumberOfMethods)(UInt32 *numMethods);
 typedef HRESULT (WINAPI *Func_GetMethodProperty)(UInt32 index, PROPID propID, PROPVARIANT
*value);
  typedef HRESULT (WINAPI *Func_CreateDecoder)(UInt32 index, const GUID *iid, void **outObject);
 typedef HRESULT (WINAPI *Func_CreateEncoder)(UInt32 index, const GUID *iid, void **outObject);

 typedef HRESULT (WINAPI *Func_GetHashers)(IHashers **hashers);

 typedef HRESULT (WINAPI *Func_SetCodecs)(ICompressCodecsInfo *compressCodecsInfo);
}

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With One Language Tagged (using lang) text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-003-ref.xht" />
  <meta name="assert" content="The copyright element matches the schema. It contains one text element that has a
language tag using the lang tag instead
 of xml:lang." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
```

```
   font-family: "WOFF Test";
   src: url("support/metadatadisplay-schema-copyright-003.woff2") format("woff2");
  }
  body {
   font-size: 20px;
  }
  pre {
   font-size: 12px;
  }
  .test {
   font-family: "WOFF Test", "WOFF Test CFF Fallback";
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
</head>
<body>
 <p>Test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
 <div class="test">P</div>
 <p>The XML contained in the Extended Metadata Block is below.</p>
 <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text lang="en"&gt;
   Copyright with "en" language.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
 </pre>
</body>
</html>
```

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Jean-loup Gailly Mark Adler
jloup@gzip.org madler@alumni.caltech.edu

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With dir Attribute in text Element 2</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-015-ref.xht" />
  <meta name="assert" content="The license element contains a text element with rtl as the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
```

```
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-015.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text dir="rtl"&gt;
   License without language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

UNRECOGNIZED LICENSE; MD5 sum: 14fe18eabf460ef792731acced133573

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OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR
IN CONNECTION WITH THE
 SOFTWARE OR THE USE OR OTHER
DEALINGS IN THE SOFTWARE.

```
#ifndef _EXDLL_H_
#define _EXDLL_H_

// only include this file from one place in your DLL.
// (it is all static, if you use it in two places it will fail)

#define EXDLL_INIT()          {  \
       g_stringsize=string_size; \
       g_stacktop=stacktop;      \
       g_variables=variables; }

// For page showing plug-ins
#define WM_NOTIFY_OUTER_NEXT (WM_USER+0x8)
#define WM_NOTIFY_CUSTOM_READY (WM_USER+0xd)
#define NOTIFY_BYE_BYE 'x'

typedef struct _stack_t {
 struct _stack_t *next;
 TCHAR text[1]; // this should be the length of string_size
} stack_t;


static unsigned int g_stringsize;
static stack_t **g_stacktop;
static TCHAR *g_variables;

static int __stdcall popstring(TCHAR *str); // 0 on success, 1 on empty stack
static void __stdcall pushstring(const TCHAR *str);

enum
{
INST_0,        // $0
INST_1,        // $1
INST_2,        // $2
INST_3,        // $3
INST_4,        // $4
```

```
INST_5,         // $5
INST_6,         // $6
INST_7,         // $7
INST_8,         // $8
INST_9,
        // $9
INST_R0,        // $R0
INST_R1,        // $R1
INST_R2,        // $R2
INST_R3,        // $R3
INST_R4,        // $R4
INST_R5,        // $R5
INST_R6,        // $R6
INST_R7,        // $R7
INST_R8,        // $R8
INST_R9,        // $R9
INST_CMDLINE,   // $CMDLINE
INST_INSTDIR,   // $INSTDIR
INST_OUTDIR,    // $OUTDIR
INST_EXEDIR,    // $EXEDIR
INST_LANG,      // $LANGUAGE
__INST_LAST
};


// utility functions (not required but often useful)
static int __stdcall popstring(TCHAR *str)
{
 stack_t *th;
 if (!g_stacktop || !*g_stacktop) return 1;
 th=(*g_stacktop);
 lstrcpy(str,th->text);
 *g_stacktop = th->next;
 GlobalFree((HGLOBAL)th);
 return 0;
}

static void __stdcall pushstring(const TCHAR *str)
{
 stack_t *th;
 if (!g_stacktop) return;
 th=(stack_t*)GlobalAlloc(GPTR,sizeof(stack_t)+g_stringsize*sizeof(TCHAR));
 lstrcpyn(th->text,str,g_stringsize);
 th->next=*g_stacktop;
 *g_stacktop=th;
}

static TCHAR * __stdcall getuservariable(int varnum)
```

```
{
 if (varnum < 0
 || varnum >= __INST_LAST) return NULL;
 return g_variables+varnum*g_stringsize;
}

static void __stdcall setuservariable(int varnum, const TCHAR *var)
{
 if (var != NULL && varnum >= 0 && varnum < __INST_LAST)
  lstrcpy(g_variables + varnum*g_stringsize, var);
}



#endif//_EXDLL_H_
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With Two div Elements in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-021-ref.xht" />
  <meta name="assert" content="The license element contains a text element that contains two div elements." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
  {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-021.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
```

```
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   &lt;div&gt;Paragraph 1&lt;/div&gt;
   &lt;div&gt;Paragraph 2&lt;/div&gt;
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

---
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UNRECOGNIZED LICENSE; MD5 sum: 8f372a90f4e00a78383c6ad5d02cb08a
MSFT Ae! d,X Lx@

,h<
<ph4"@H@< !@ !4"
`@l4"d8x@X !8"hX4"|"@04"#`@PL !%l4" |&`@(4"
'`@L4"`)x@P04"`*@T !
-4"- @ $4"-8@
04"X/`XP@40 P8`x|X|Fe0FFsoJ2fL.{ |jB^Z,;HGMwA~
C -XWy6JDdy>ByyHOND^PRNdlH9RW0L
JD;!f|Vx$m@UcU6x2FOJpMwf0 @0-stdole2.tlbWWW
HTH
d
P d 4D
8xxT
<P

H$p0P
(,
]NetFwTypeLib8INetFwRemoteAdminSettingsWWWd8jNET_FW_IP_VERSION_WWd0XNET_FW_IP_VERSION_V4d0XNET_FW_IP_VERSION_V6d0ZFNET_FW_IP_VERSION_ANYWWWd0NET_FW_IP_VERSION_MAXWWW 4IpVersionWWW
89FNET_FW_SCOPE_WWW0]NET_FW_SCOPE_ALL0,\NET_FW_SCOPE_LOCAL_SUBNETWWW0NET_FW_SCOPE_CUSTOMW0>NET_FW_SCOPE_MAX0ScopeWWWRemoteAddressesW)remoteAddrsWEnabledW,
8 INetFwIcmpSettingsWW,#AllowOutboundDestinationUnreachableWallowWWW,
o'AllowRedirectWWW,AllowInboundEchoRequestW,iAllowOutboundTimeExceededWWW,nAllowOutboundParameterProblemWWW,PAllowOutboundSourceQuenchWWW,0AllowInboundRouterRequestWWW,AllowInboundTimestampRequest,AllowInboundMaskRequestW,AllowOutboundPacketTooBigWWW8INetFwOpenPortWWName
8NET_FW_IP_PROTOCOL_W0z8NET_FW_IP_PROTOCOL_TCPWW`0=NET_FW_IP_PROTOCOL_UDPWW
]Protocol
KipProtocolWWPort

gportNumberWWaBuiltInWX8|pINetFwOpenPortsWX@0vCountWWWXrAddWXRemoveWWXzItemopenPortX
$xA_NewEnumjnewEnumW
8INetFwServiceWWW
8NET_FW_SERVICE_TYPE_ 0HNET_FW_SERVICE_FILE_AND_PRINTWWW
09NET_FW_SERVICE_UPNPW 0jNET_FW_SERVICE_REMOTE_DESKTOPWWW
0NET_FW_SERVICE_NONEW 0wNET_FW_SERVICE_TYPE_MAXWType
hCustomizedWW"rGloballyOpenPortsWWW
.openPortsWWW88,&INetFwServicesWWsvcTypeWD]serviceW8INetFwAuthorizedApplicationWProcessImageFi
leNameh
imageFileNameWWWL8NINetFwAuthorizedApplicationstappW
8INetFwProfileWWW8kNET_FW_PROFILE_TYPE_X0hNET_FW_PROFILE_DOMAINWWW0ONET_FW_PR
OFILE_STANDARDW0NET_FW_PROFILE_CURRENTWW0ENET_FW_PROFILE_TYPE_MAXWEFirewallE
nabledWfExceptionsNotAllowed\
KynotAllowedWWvNotificationsDisabledWWWdisabled,UnicastResponsesToMulticastBroadcastDisabled\Remote
AdminSettingsWpIcmpSettingsServices)AuthorizedApplicationsWW8
9appsx8INetFwPolicyxCurrentProfileWWprofileWx2GetProfileByType@;4profileTypeW
8INetFwMgrWWW~LocalPolicyWCurrentProfileTypeWWRestoreDefaultsW`
ZEIsPortAllowedWWWlocalAddressallowedWt
RrestrictedWWIsIcmpTypeAllowedWWW@l8INetFwMgrPrivate@{GetScratchPolicy
<7policyKeyNameWWW
CscratchPolicyWWWd@@@@@0@HP
@

@hXx@,L 08xHP@ $LD
$ D!$$LD
$(D!$,LD
$0D!$4LD(
$8D!$HlP4444@@@@`(<P4444@@@@8`(<$LD(H
$ D!$$LD(H
$(D!$,LD(H
$0D!$4LD(H
$8D!$<LD (H
$ @D!$
DLD(H
$HD!
$LLD
(H
$
PD!$TLD(H
$XD!$\LD(H
$`D!$dLD(H
$hD!

\\xx@@hh$Hl Dh@d$LD
$ D!$$LD
$(D!$,LD8\
$0D!0$4LD@
$8D!$<LD

$ @D!$
DLD
$HD!
$LLD
(
$
PD!$TLD(
HHtt$Hl Dh(44@@$$LD@
$ L Pt0$T 0\<(t D0\X
$,LD`<
($Hx$LD
$ LDpH
$$LD(X
$(LD
$,D!$0LD
$4D!$8LD
$<D!$ @LD
(
$
DD! $HTD
HXp$Hl Dhd44444@@@@@$(<Px$LD@
0 d Dh
$$LD`<
($T$LD
$ D!$$LD 4
$(D!$,LD
$0D!$4LD
$8D!$<LD
$ @D!$
DLD(
$HD!
$Hl Dh$LD@
$ L x$$D 40(d D4x
$,LD`<
($Hl$LDH
$ LD(
$$D!$(LD(
$,D!$0LD(
$4D!$8LD(
$<D!$ @TD
$
DTD
8
$HTD
$LTDP
$
PTD
(

HTTpp 8 pP d $Hl DhP4444@@@@0(<T$TD@
0 d D @
  $ $TDX,

$ LD
$4 l( 4
0\`
`
T,
H`
`
,
D
d

$H`000d D8XT
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With Mixed text Element Language Tags 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element matches the schema. One text element does not have a language tag. One text element has a language tag." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>

```
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts" id="License ID"&gt;
  &lt;text&gt;
   License without language.
  &lt;/text&gt;
  &lt;text xml:lang="en"&gt;
   License with "en" language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
<!-- DO NOT EDIT! Generated by `%(generating_script_filename)s --spec %(spec_directory)s/` -->
```

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OUT
 OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
SOFTWARE.

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Child Element in copyright Element text Element</title>
```

```
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element with an unknown child element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size:
 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
// Windows/Handle.h

#ifndef __WINDOWS_HANDLE_H
#define __WINDOWS_HANDLE_H

namespace NWindows {

class CHandle
{
protected:
 HANDLE _handle;
public:
 operator HANDLE() { return _handle; }
 CHandle(): _handle(NULL) {}
 ~CHandle() { Close(); }
 bool IsCreated() const { return (_handle != NULL); }
 bool Close()
 {
  if (_handle == NULL)
```

```
    return true;
  if (!::CloseHandle(_handle))
    return false;
  _handle = NULL;
  return true;
 }
 void Attach(HANDLE handle) { _handle = handle; }
 HANDLE Detach()
 {
  HANDLE handle = _handle;
  _handle = NULL;
  return handle;
 }
};

}

#endif
/* ATK -  Accessibility Toolkit
* Copyright 2001 Sun Microsystems Inc.
*
* This library is free software; you can redistribute it and/or
* modify it under the terms of the GNU Library General Public
* License as published by the Free Software Foundation; either
* version 2 of the License, or (at your option) any later version.
*
* This library is distributed in the hope that it will be useful,
* but WITHOUT ANY WARRANTY; without even the implied warranty of
* MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the GNU
* Library General Public License for more details.
*
* You should have received a copy of the GNU Library General Public
* License along with this library; if not, write to the
* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_ACTION_H__
#define __ATK_ACTION_H__

#include <atk/atkobject.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

/*
* The interface AtkAction should be supported
```

```
 by any object that can
* perform one or more actions. The interface provides the standard
* mechanism for an assistive technology to determine what those actions
* are as well as tell the object to perform them. Any object that can
* be manipulated should support this interface.
*/


#define ATK_TYPE_ACTION                 (atk_action_get_type ())
#define ATK_IS_ACTION(obj)              G_TYPE_CHECK_INSTANCE_TYPE ((obj), ATK_TYPE_ACTION)
#define ATK_ACTION(obj)                 G_TYPE_CHECK_INSTANCE_CAST ((obj), ATK_TYPE_ACTION,
AtkAction)
#define ATK_ACTION_GET_IFACE(obj)       (G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_ACTION, AtkActionIface))

#ifndef _TYPEDEF_ATK_ACTION_
#define _TYPEDEF_ATK_ACTION_
typedef struct _AtkAction AtkAction;
#endif
typedef struct _AtkActionIface AtkActionIface;

struct _AtkActionIface
{
 GTypeInterface parent;

 gboolean               (*do_action)        (AtkAction        *action,

          gint            i);
 gint                   (*get_n_actions)    (AtkAction        *action);
 G_CONST_RETURN gchar*   (*get_description)   (AtkAction        *action,
                                gint            i);
 G_CONST_RETURN gchar*   (*get_name)         (AtkAction        *action,
                                gint            i);
 G_CONST_RETURN gchar*   (*get_keybinding)    (AtkAction        *action,
                                gint            i);
 gboolean               (*set_description)   (AtkAction        *action,
                                gint            i,
                                const gchar       *desc);
 G_CONST_RETURN gchar*   (*get_localized_name)(AtkAction        *action,
     gint            i);
 AtkFunction            pad2;
};

GType atk_action_get_type (void);

/*
* These are the function which would be called by an application
```

```
 with
* the argument being a AtkObject object cast to (AtkAction).
*
* The function will just check that * the corresponding
* function pointer is not NULL and will call it.
*
* The "real" implementation of the function for accessible will be
* provided in a support library
*/

gboolean   atk_action_do_action              (AtkAction        *action,
                                              gint             i);
gint   atk_action_get_n_actions           (AtkAction *action);
G_CONST_RETURN gchar* atk_action_get_description  (AtkAction        *action,
                                              gint             i);
G_CONST_RETURN gchar* atk_action_get_name        (AtkAction        *action,
                                              gint             i);
G_CONST_RETURN gchar* atk_action_get_keybinding   (AtkAction        *action,
                                              gint             i);
gboolean             atk_action_set_description  (AtkAction
        *action,
                                              gint             i,
                                              const gchar      *desc);

/* NEW in ATK 1.1: */

G_CONST_RETURN gchar* atk_action_get_localized_name (AtkAction      *action,
          gint           i);

/*
* Additional GObject properties exported by AtkAction:
*    "accessible_action"
*       (an accessible action, or the list of actions, has changed)
*/

#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_ACTION_H__ */
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With Mixed text Element Language Tags 2</title>
```

```
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element matches the schema. Two text elements have a language tags."
/>
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size:
 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts" id="License ID"&gt;
  &lt;text xml:lang="en"&gt;
   License with "en" language.
  &lt;/text&gt;
  &lt;text xml:lang="fr"&gt;
   License with "fr" language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

UNRECOGNIZED LICENSE; MD5 sum: bfaf70067bcf4d1a274778b4f891d0a2

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OF CONTRACT, TORT OR OTHERWISE,
ARISING FROM, OUT OF OR
IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER
DEALINGS IN THE SOFTWARE.

```
#include "resourceGui.h"

#define IDR_MENUBAR1      70
#define IDM_MENU          71
#define IDR_ACCELERATOR1  72

#define IDB_ADD      100
#define IDB_EXTRACT  101
#define IDB_TEST     102
#define IDB_COPY     103
#define IDB_MOVE     104
#define IDB_DELETE   105
#define IDB_INFO     106

#define IDB_ADD2     150
#define IDB_EXTRACT2 151
#define IDB_TEST2    152
#define IDB_COPY2    153
#define IDB_MOVE2    154
#define IDB_DELETE2  155
#define IDB_INFO2    156

#define IDM_HASH_ALL          101
#define IDM_CRC32             102
#define IDM_CRC64             103
```

```
#define IDM_SHA1                104
#define IDM_SHA256              105

#define IDM_OPEN                540
#define IDM_OPEN_INSIDE         541
#define IDM_OPEN_OUTSIDE        542
#define IDM_FILE_VIEW           543
#define IDM_FILE_EDIT           544
#define IDM_RENAME              545
#define IDM_COPY_TO             546
#define IDM_MOVE_TO             547
#define IDM_DELETE              548
#define IDM_SPLIT
            549
#define IDM_COMBINE             550
#define IDM_PROPERTIES          551
#define IDM_COMMENT             552
#define IDM_CRC                 553
#define IDM_DIFF                554
#define IDM_CREATE_FOLDER       555
#define IDM_CREATE_FILE         556
// #define IDM_EXIT             557
#define IDM_LINK                558
#define IDM_ALT_STREAMS         559

#define IDM_OPEN_INSIDE_ONE     590
#define IDM_OPEN_INSIDE_PARSER  591

#define IDM_SELECT_ALL          600
#define IDM_DESELECT_ALL        601
#define IDM_INVERT_SELECTION    602
#define IDM_SELECT              603
#define IDM_DESELECT            604
#define IDM_SELECT_BY_TYPE      605
#define IDM_DESELECT_BY_TYPE    606

#define IDM_VIEW_LARGE_ICONS    700
#define IDM_VIEW_SMALL_ICONS    701
#define IDM_VIEW_LIST           702
#define IDM_VIEW_DETAILS        703

#define IDM_VIEW_ARANGE_BY_NAME  710
#define IDM_VIEW_ARANGE_BY_TYPE  711
#define IDM_VIEW_ARANGE_BY_DATE  712
#define IDM_VIEW_ARANGE_BY_SIZE
  713

#define IDM_VIEW_ARANGE_NO_SORT  730
```

```
#define IDM_VIEW_FLAT_VIEW       731
#define IDM_VIEW_TWO_PANELS      732
#define IDM_VIEW_TOOLBARS        733
#define IDM_OPEN_ROOT_FOLDER     734
#define IDM_OPEN_PARENT_FOLDER   735
#define IDM_FOLDERS_HISTORY      736
#define IDM_VIEW_REFRESH         737
#define IDM_VIEW_AUTO_REFRESH    738
// #define IDM_VIEW_SHOW_DELETED    739
// #define IDM_VIEW_SHOW_STREAMS    740

#define IDM_VIEW_ARCHIVE_TOOLBAR           750
#define IDM_VIEW_STANDARD_TOOLBAR          751
#define IDM_VIEW_TOOLBARS_LARGE_BUTTONS     752
#define IDM_VIEW_TOOLBARS_SHOW_BUTTONS_TEXT 753

#define IDM_VIEW_TIME           761

#define IDS_BOOKMARK            801

#define IDM_OPTIONS             900
#define IDM_BENCHMARK           901
#define IDM_BENCHMARK2          902

#define IDM_HELP_CONTENTS       960
#define IDM_ABOUT               961

#define IDS_OPTIONS             2100

#define IDS_N_SELECTED_ITEMS           3002

#define IDS_FILE_EXIST
            3008
#define IDS_WANT_UPDATE_MODIFIED_FILE   3009
#define IDS_CANNOT_UPDATE_FILE          3010
#define IDS_CANNOT_START_EDITOR         3011
#define IDS_VIRUS                       3012
#define IDS_MESSAGE_UNSUPPORTED_OPERATION_FOR_LONG_PATH_FOLDER  3013
#define IDS_SELECT_ONE_FILE             3014
#define IDS_SELECT_FILES                3015
#define IDS_TOO_MANY_ITEMS              3016

#define IDS_COPY                        6000
#define IDS_MOVE                        6001
#define IDS_COPY_TO                     6002
#define IDS_MOVE_TO                     6003
#define IDS_COPYING                     6004
#define IDS_MOVING                      6005
```

```
#define IDS_RENAMING                    6006

#define IDS_OPERATION_IS_NOT_SUPPORTED  6008
#define IDS_ERROR_RENAMING              6009
#define IDS_CONFIRM_FILE_COPY           6010
#define IDS_WANT_TO_COPY_FILES          6011

#define IDS_CONFIRM_FILE_DELETE         6100
#define IDS_CONFIRM_FOLDER_DELETE
  6101
#define IDS_CONFIRM_ITEMS_DELETE        6102
#define IDS_WANT_TO_DELETE_FILE         6103
#define IDS_WANT_TO_DELETE_FOLDER       6104
#define IDS_WANT_TO_DELETE_ITEMS        6105
#define IDS_DELETING                    6106
#define IDS_ERROR_DELETING              6107
#define IDS_ERROR_LONG_PATH_TO_RECYCLE  6108

#define IDS_CREATE_FOLDER               6300
#define IDS_CREATE_FILE                 6301
#define IDS_CREATE_FOLDER_NAME          6302
#define IDS_CREATE_FILE_NAME            6303
#define IDS_CREATE_FOLDER_DEFAULT_NAME  6304
#define IDS_CREATE_FILE_DEFAULT_NAME    6305
#define IDS_CREATE_FOLDER_ERROR         6306
#define IDS_CREATE_FILE_ERROR           6307

#define IDS_COMMENT                     6400
#define IDS_COMMENT2                    6401
#define IDS_SELECT                      6402
#define IDS_DESELECT                    6403
#define IDS_SELECT_MASK                 6404

#define IDS_PROPERTIES                  6600
#define IDS_FOLDERS_HISTORY             6601

#define
 IDS_COMPUTER                   7100
#define IDS_NETWORK                     7101
#define IDS_DOCUMENTS                   7102
#define IDS_SYSTEM                      7103

#define IDS_ADD                         7200
#define IDS_EXTRACT                     7201
#define IDS_TEST                        7202
#define IDS_BUTTON_COPY                 7203
#define IDS_BUTTON_MOVE                 7204
#define IDS_BUTTON_DELETE               7205
```

```
#define IDS_BUTTON_INFO                 7206

#define IDS_SPLITTING                   7303
#define IDS_SPLIT_CONFIRM_TITLE         7304
#define IDS_SPLIT_CONFIRM_MESSAGE       7305
#define IDS_SPLIT_VOL_MUST_BE_SMALLER   7306

#define IDS_COMBINE                     7400
#define IDS_COMBINE_TO                  7401
#define IDS_COMBINING                   7402
#define IDS_COMBINE_SELECT_ONE_FILE     7403
#define IDS_COMBINE_CANT_DETECT_SPLIT_FILE 7404
#define IDS_COMBINE_CANT_FIND_MORE_THAN_ONE_PART 7405
// Windows/Control/Window2.h

#ifndef __WINDOWS_CONTROL_WINDOW2_H
#define __WINDOWS_CONTROL_WINDOW2_H

#include "../Window.h"

namespace NWindows {
namespace NControl {

class CWindow2: public CWindow
{
 LRESULT DefProc(UINT message, WPARAM wParam, LPARAM lParam);
public:
 CWindow2(HWND newWindow = NULL): CWindow(newWindow){};
 virtual ~CWindow2() {};

 bool CreateEx(DWORD exStyle, LPCTSTR className, LPCTSTR windowName,
    DWORD style, int x, int y, int width, int height,
    HWND parentWindow, HMENU idOrHMenu, HINSTANCE instance);

 #ifndef _UNICODE
 bool CreateEx(DWORD exStyle, LPCWSTR className, LPCWSTR windowName,
    DWORD style, int x, int y, int width, int height,
    HWND parentWindow, HMENU idOrHMenu, HINSTANCE instance);
 #endif

 virtual LRESULT OnMessage(UINT message, WPARAM wParam, LPARAM lParam);
 virtual bool OnCreate(CREATESTRUCT * /* createStruct */) { return true; }
 // virtual LRESULT OnCommand(WPARAM wParam, LPARAM lParam);
 virtual bool OnCommand(WPARAM
 wParam, LPARAM lParam, LRESULT &result);
 virtual bool OnCommand(int code, int itemID, LPARAM lParam, LRESULT &result);
 virtual bool OnSize(WPARAM /* wParam */, int /* xSize */, int /* ySize */) { return false; }
 virtual bool OnNotify(UINT /* controlID */, LPNMHDR /* lParam */, LRESULT & /* result */) { return false; }
```

```
 virtual void OnDestroy() { PostQuitMessage(0); }
 virtual void OnClose() { Destroy(); }
 /*
 virtual LRESULT  OnHelp(LPHELPINFO helpInfo) { OnHelp(); }
 virtual LRESULT  OnHelp() {};
 virtual bool OnButtonClicked(int buttonID, HWND buttonHWND);
 virtual void OnOK() {};
 virtual void OnCancel() {};
 */

 LONG_PTR SetMsgResult(LONG_PTR newLongPtr) { return SetLongPtr(DWLP_MSGRESULT, newLongPtr); }
 LONG_PTR GetMsgResult() const { return GetLongPtr(DWLP_MSGRESULT); }
};

}}

#endif
// ConsoleClose.h

#ifndef __CONSOLE_CLOSE_H
#define __CONSOLE_CLOSE_H

namespace NConsoleClose {

extern unsigned g_BreakCounter;

inline bool TestBreakSignal()
{
 #ifdef UNDER_CE
 return false;
 #else
 return (g_BreakCounter != 0);
 #endif
}

class CCtrlHandlerSetter
{
public:
 CCtrlHandlerSetter();
 virtual ~CCtrlHandlerSetter();
};

class CCtrlBreakException
{};

// void CheckCtrlBreak();

}
```

```
#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: More Than One copyright Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-006-ref.xht" />
  <meta name="assert" content="The copyright element occurs more than once." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family:
 "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-006.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
// ExtractingFilePath.h

#ifndef __EXTRACTING_FILE_PATH_H
#define __EXTRACTING_FILE_PATH_H
```

```
#include "../../../Common/MyString.h"

#ifdef _WIN32
void Correct_AltStream_Name(UString &s);
#endif

// replaces unsuported characters, and replaces "." , ".." and "" to "[]"
UString Get_Correct_FsFile_Name(const UString &name);

/*
 Correct_FsPath() corrects path parts to prepare it for File System operations.
 It also corrects empty path parts like "\\\\":
   - frontal empty path parts : it removes them or changes them to "_"
   - another empty path parts : it removes them
 if (absIsAllowed && path is absolute)  : it removes empty path parts after start absolute path prefix marker
 else
 {
   if (!keepAndReplaceEmptyPrefixes) : it removes empty path parts
   if ( keepAndReplaceEmptyPrefixes) : it changes each empty frontal path part to "_"
 }
*/
void Correct_FsPath(bool absIsAllowed, bool keepAndReplaceEmptyPrefixes, UStringVector &parts, bool isDir);

UString MakePathFromParts(const
 UStringVector &parts);

#endif
```

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// MyWindowsNew.h

#ifndef __MY_WINDOWS_NEW_H
#define __MY_WINDOWS_NEW_H

```
#ifdef _MSC_VER

#include <ShObjIdl.h>

#ifndef __ITaskbarList3_INTERFACE_DEFINED__
#define __ITaskbarList3_INTERFACE_DEFINED__

typedef enum THUMBBUTTONFLAGS
{
 THBF_ENABLED = 0,
 THBF_DISABLED = 0x1,
 THBF_DISMISSONCLICK = 0x2,
 THBF_NOBACKGROUND = 0x4,
 THBF_HIDDEN = 0x8,
 THBF_NONINTERACTIVE = 0x10
} THUMBBUTTONFLAGS;

typedef enum THUMBBUTTONMASK
{
 THB_BITMAP = 0x1,
 THB_ICON = 0x2,
 THB_TOOLTIP = 0x4,
 THB_FLAGS = 0x8
} THUMBBUTTONMASK;

// #include <pshpack8.h>

typedef struct THUMBBUTTON
{
 THUMBBUTTONMASK dwMask;
 UINT iId;
 UINT iBitmap;
 HICON hIcon;
 WCHAR szTip[260];
 THUMBBUTTONFLAGS dwFlags;
} THUMBBUTTON;

typedef struct THUMBBUTTON *LPTHUMBBUTTON;

typedef enum TBPFLAG
{
 TBPF_NOPROGRESS = 0,
 TBPF_INDETERMINATE = 0x1,
 TBPF_NORMAL = 0x2,
 TBPF_ERROR = 0x4,
 TBPF_PAUSED = 0x8
} TBPFLAG;
```

```
DEFINE_GUID(IID_ITaskbarList3, 0xEA1AFB91, 0x9E28, 0x4B86, 0x90, 0xE9, 0x9E, 0x9F, 0x8A,
 0x5E, 0xEF, 0xAF);

struct ITaskbarList3: public ITaskbarList2
{
 STDMETHOD(SetProgressValue)(HWND hwnd, ULONGLONG ullCompleted, ULONGLONG ullTotal) = 0;
 STDMETHOD(SetProgressState)(HWND hwnd, TBPFLAG tbpFlags) = 0;
 STDMETHOD(RegisterTab)(HWND hwndTab, HWND hwndMDI) = 0;
 STDMETHOD(UnregisterTab)(HWND hwndTab) = 0;
 STDMETHOD(SetTabOrder)(HWND hwndTab, HWND hwndInsertBefore) = 0;
 STDMETHOD(SetTabActive)(HWND hwndTab, HWND hwndMDI, DWORD dwReserved) = 0;
 STDMETHOD(ThumbBarAddButtons)(HWND hwnd, UINT cButtons, LPTHUMBBUTTON pButton) = 0;
 STDMETHOD(ThumbBarUpdateButtons)(HWND hwnd, UINT cButtons, LPTHUMBBUTTON pButton) = 0;
 STDMETHOD(ThumbBarSetImageList)(HWND hwnd, HIMAGELIST himl) = 0;
 STDMETHOD(SetOverlayIcon)(HWND hwnd, HICON hIcon, LPCWSTR pszDescription) = 0;
 STDMETHOD(SetThumbnailTooltip)(HWND hwnd, LPCWSTR pszTip) = 0;
 STDMETHOD(SetThumbnailClip)(HWND hwnd, RECT *prcClip) = 0;
};

#endif

#endif

#endif
```

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```
#define IDS_PROGRESS_COMPRESSING  3301
#define IDS_ARCHIVES_COLON        3907
```

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 is `hyph-sh-{latn,cyrl}.tex' version 2.02 as of Jun 22, 2008.
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%             [hyphen patterns for Serbocroatian language]
%
%%% ====================================================================
%%%  @TeX-hyphen-file{
%%%     author         = "Dejan Muhamedagi\'c",
%%%     version        = "2.02",
%%%     date           = "22 June 2008",
%%%     filename       = "hyph-sh-{latn,cyrl}.tex",
%%%     email          = "dejan@hello-penguin.com",
%%%     codetable      = "UTF-8",
%%%     keywords       = "TeX, hyphen, serbocroatian, {latinic,cyrillic}",
%%%     supported      = "yes",
%%%     abstract       = "Serbocroatian hyphenation patterns",
%%%     docstring      = "This file contains the hyphenation patterns
%%%                      for the Serbocroatian language and the
%%%                      {latinic,cyrillic} alphabet."
%%%  }
%%% ====================================================================
%
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%
% NB:
% It is allowed to leave one character at the end of the row.
% If you find that awkward these patterns will work well with
% \lefthyphenmin=2.
% \lefthyphenmin=1 \righthyphenmin=2
%
```

% Osnovni skup paterna dobijen je na osnovu fonolo\v skih osobina
% srpskohrvatskog jezika.  Pravila i preporuke sam preuzeo iz:
%
% M. Pe\v sikan, J. Jerkovi\'c, M. Pi\v zurica:
% Pravopis srpskoga jezika
% Matica srpska, Novi Sad, 1995.
%
% U drugom delu se nalaze izuzeci od fonolo\v skih pravila bazirani
% na boljem psiholo\v skom prelomu re\v ci. Izradjen je kori\v s\'cenjem
% slede\'cih re\v cnika:
%
% Re\v cnik srpskohrvatskoga knji\v zevnog jezika
%
 Matica srpska, Matica hrvatska, Novi Sad, Zagreb, 1967-1976.
%
% Milan Vujaklija: Leksikon stranih re\v ci i izraza
% Prosveta, Beograd, 1992.
%
% ----------
%
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```
// 7zSpecStream.h

#ifndef __7Z_SPEC_STREAM_H
#define __7Z_SPEC_STREAM_H

#include "../../../Common/MyCom.h"

#include "../../ICoder.h"

class CSequentialInStreamSizeCount2:
 public ISequentialInStream,
 public ICompressGetSubStreamSize,
 public CMyUnknownImp
{
 CMyComPtr<ISequentialInStream> _stream;
 CMyComPtr<ICompressGetSubStreamSize> _getSubStreamSize;
 UInt64 _size;
public:
 void Init(ISequentialInStream *stream)
 {
   _size = 0;
   _getSubStreamSize.Release();
   _stream = stream;
   _stream.QueryInterface(IID_ICompressGetSubStreamSize, &_getSubStreamSize);
 }
 UInt64 GetSize() const { return _size; }

 MY_UNKNOWN_IMP2(ISequentialInStream, ICompressGetSubStreamSize)

 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);

 STDMETHOD(GetSubStreamSize)(UInt64 subStream, UInt64 *value);
};
```

#endif
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```
<?xml version="1.0" encoding="utf-8"?>
<Project DefaultTargets="Build" ToolsVersion="15.0"
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     <Configuration>Debug</Configuration>
     <Platform>ARM64</Platform>
   </ProjectConfiguration>
   <ProjectConfiguration Include="Debug|Win32">
     <Configuration>Debug</Configuration>
     <Platform>Win32</Platform>
   </ProjectConfiguration>
   <ProjectConfiguration Include="ReleaseD|ARM64">
     <Configuration>ReleaseD</Configuration>
     <Platform>ARM64</Platform>
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     <Platform>Win32</Platform>
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   <SccLocalPath />
   <ProjectGuid>{B348342A-1787-4311-B120-EDAE3018868F}</ProjectGuid>
   <WindowsTargetPlatformVersion>10.0</WindowsTargetPlatformVersion>
```

```
  </PropertyGroup>
 <Import Project="$(VCTargetsPath)\Microsoft.Cpp.Default.props" />
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'" Label="Configuration">
   <ConfigurationType>Application</ConfigurationType>
   <PlatformToolset>v142</PlatformToolset>
   <UseOfMfc>false</UseOfMfc>
   <CharacterSet>Unicode</CharacterSet>
 </PropertyGroup>
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   <PlatformToolset>v142</PlatformToolset>
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   <CharacterSet>Unicode</CharacterSet>
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   <PlatformToolset>v142</PlatformToolset>
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   <CharacterSet>Unicode</CharacterSet>
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   <PlatformToolset>v142</PlatformToolset>
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   <CharacterSet>Unicode</CharacterSet>
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 </ImportGroup>
 <ImportGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'" Label="PropertySheets">
   <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform" />
   <Import Project="$(VCTargetsPath)Microsoft.Cpp.UpgradeFromVC60.props" />
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   <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')"
 Label="LocalAppDataPlatform" />
   <Import Project="$(VCTargetsPath)Microsoft.Cpp.UpgradeFromVC60.props" />
 </ImportGroup>
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   <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform" />
   <Import Project="$(VCTargetsPath)Microsoft.Cpp.UpgradeFromVC60.props" />
 </ImportGroup>
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   <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform" />
```

```
  <Import Project="$(VCTargetsPath)Microsoft.Cpp.UpgradeFromVC60.props" />
 </ImportGroup>
 <PropertyGroup Label="UserMacros" />
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='ReleaseD|Win32'">
   <OutDir>$(SolutionDir)$(Platform)\$(Configuration)\</OutDir>
  <IntDir>$(SolutionDir)$(Platform)\$(Configuration)\</IntDir>
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  <TargetName>7zSD.$(Platform)</TargetName>
  <GenerateManifest>false</GenerateManifest>
  <TargetExt>.sfx</TargetExt>
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  <TargetExt>.sfx</TargetExt>
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    <InlineFunctionExpansion>Default</InlineFunctionExpansion>
    <StringPooling>true</StringPooling>
    <Optimization>MinSpace</Optimization>
    <SuppressStartupBanner>true</SuppressStartupBanner>
    <WarningLevel>Level4</WarningLevel>
    <TreatWarningAsError>true</TreatWarningAsError>
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```

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    <PrecompiledHeaderFile>StdAfx.h</PrecompiledHeaderFile>
    <ObjectFileName>$(IntDir)</ObjectFileName>
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    <CallingConvention>StdCall</CallingConvention>
    <DebugInformationFormat>None</DebugInformationFormat>
    <FavorSizeOrSpeed>Size</FavorSizeOrSpeed>
    <WholeProgramOptimization>true</WholeProgramOptimization>
  </ClCompile>
  <Midl>
    <SuppressStartupBanner>true</SuppressStartupBanner>
    <PreprocessorDefinitions>NDEBUG;%(PreprocessorDefinitions)</PreprocessorDefinitions>
    <TypeLibraryName>.\ReleaseD\SFXSetup.tlb</TypeLibraryName>
    <MkTypLibCompatible>true</MkTypLibCompatible>
     <TargetEnvironment>Win32</TargetEnvironment>
  </Midl>
  <ResourceCompile>
    <Culture>0x0409</Culture>
    <PreprocessorDefinitions>NDEBUG;%(PreprocessorDefinitions)</PreprocessorDefinitions>
  </ResourceCompile>
  <Bscmake>
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<AdditionalDependencies>odbc32.lib;odbccp32.lib;delayimp.lib;%(AdditionalDependencies)</AdditionalDependencies>
    <ProfileGuidedDatabase />
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  </Link>
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```

```
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```

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    <PrecompiledHeader Condition="'$(Configuration)|$(Platform)'=='Debug|ARM64'">
    </PrecompiledHeader>
  </ClCompile>
  <ClCompile Include="..\src\C\Lzma2Dec.c">
```

```
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  <PrecompiledHeader Condition="'$(Configuration)|$(Platform)'=='Debug|ARM64'">
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  </PrecompiledHeader>
  <PrecompiledHeader Condition="'$(Configuration)|$(Platform)'=='Debug|ARM64'">
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```

```
  </ClCompile>
  <ClCompile Include="..\src\CPP\Common\CommandLineParser.cpp" />
  <ClCompile
Include="..\src\CPP\Common\CRC.cpp" />
  <ClCompile Include="..\src\CPP\Common\IntToString.cpp" />
  <ClCompile Include="..\src\CPP\Common\MyString.cpp" />
  <ClCompile Include="..\src\CPP\Common\MyVector.cpp" />
  <ClCompile Include="..\src\CPP\Common\NewHandler.cpp" />
  <ClCompile Include="..\src\CPP\Common\StringConvert.cpp" />
  <ClCompile Include="..\src\CPP\Common\TextConfig.cpp" />
  <ClCompile Include="..\src\CPP\Common\UTFConvert.cpp" />
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  <ClCompile Include="..\src\CPP\Windows\Control\Dialog.cpp" />
  <ClCompile Include="..\src\CPP\Windows\DLL.cpp" />
  <ClCompile Include="..\src\CPP\Windows\ErrorMsg.cpp" />
  <ClCompile Include="..\src\CPP\Windows\FileDir.cpp" />
  <ClCompile Include="..\src\CPP\Windows\FileFind.cpp" />
  <ClCompile Include="..\src\CPP\Windows\FileIO.cpp" />
  <ClCompile Include="..\src\CPP\Windows\FileName.cpp" />
  <ClCompile Include="..\src\CPP\Windows\PropVariant.cpp"
/>
  <ClCompile Include="..\src\CPP\Windows\ResourceString.cpp" />
  <ClCompile Include="..\src\CPP\Windows\Synchronization.cpp" />
  <ClCompile Include="..\src\CPP\Windows\System.cpp" />
  <ClCompile Include="..\src\CPP\Windows\Window.cpp" />
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  <ClCompile Include="..\src\CPP\7zip\Archive\7z\7zHandler.cpp" />
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  <ClCompile Include="..\src\CPP\7zip\Common\CreateCoder.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Common\CWrappers.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Common\FileStreams.cpp"
/>
  <ClCompile Include="..\src\CPP\7zip\Common\FilterCoder.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Common\InBuffer.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Common\LimitedStreams.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Common\OutBuffer.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Common\ProgressUtils.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Common\PropId.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Common\StreamBinder.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Common\StreamObjects.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Common\StreamUtils.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Common\VirtThread.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Compress\Bcj2Coder.cpp" />
```

```
  <ClCompile Include="..\src\CPP\7zip\Compress\Bcj2Register.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Compress\BcjCoder.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Compress\BcjRegister.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Compress\BranchMisc.cpp"
/>
  <ClCompile Include="..\src\CPP\7zip\Compress\BranchRegister.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Compress\CopyCoder.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Compress\CopyRegister.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Compress\DeltaFilter.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Compress\Lzma2Decoder.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Compress\Lzma2Register.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Compress\LzmaDecoder.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Compress\LzmaRegister.cpp" />
  <ClCompile Include="..\src\CPP\7zip\UI\Common\ArchiveOpenCallback.cpp" />
  <ClCompile Include="..\src\CPP\7zip\UI\Common\DefaultName.cpp" />
  <ClCompile Include="..\src\CPP\7zip\UI\Common\LoadCodecs.cpp" />
  <ClCompile Include="..\src\CPP\7zip\UI\Common\OpenArchive.cpp" />
  <ClCompile Include="..\src\CPP\7zip\UI\Explorer\MyMessages.cpp" />
  <ClCompile Include="..\src\CPP\7zip\UI\FileManager\FormatUtils.cpp"
/>
  <ClCompile Include="..\src\CPP\7zip\UI\FileManager\ProgressDialog.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Bundles\SFXSetup\ExtractCallbackSfx.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Bundles\SFXSetup\ExtractEngine.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Bundles\SFXSetup\SfxSetup.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Bundles\SFXSetup\StdAfx.cpp">
    <PrecompiledHeader
Condition="'$(Configuration)|$(Platform)'=='ReleaseD|Win32'">Create</PrecompiledHeader>
    <PrecompiledHeader
Condition="'$(Configuration)|$(Platform)'=='ReleaseD|ARM64'">Create</PrecompiledHeader>
    <PrecompiledHeaderFile
Condition="'$(Configuration)|$(Platform)'=='ReleaseD|Win32'">StdAfx.h</PrecompiledHeaderFile>
    <PrecompiledHeaderFile
Condition="'$(Configuration)|$(Platform)'=='ReleaseD|ARM64'">StdAfx.h</PrecompiledHeaderFile>
    <PrecompiledHeader
Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'">Create</PrecompiledHeader>

  <PrecompiledHeader Condition="'$(Configuration)|$(Platform)'=='Debug|ARM64'">Create</PrecompiledHeader>
    <PrecompiledHeaderFile
Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'">StdAfx.h</PrecompiledHeaderFile>
    <PrecompiledHeaderFile
Condition="'$(Configuration)|$(Platform)'=='Debug|ARM64'">StdAfx.h</PrecompiledHeaderFile>
  </ClCompile>
 </ItemGroup>
 <ItemGroup>
  <ClInclude Include="..\src\C\7zCrc.h" />
  <ClInclude Include="..\src\C\Alloc.h" />
  <ClInclude Include="..\src\C\Bcj2.h" />
  <ClInclude Include="..\src\C\Bra.h" />
```

```
  <ClInclude Include="..\src\C\CpuArch.h" />
  <ClInclude Include="..\src\C\Delta.h" />
  <ClInclude Include="..\src\C\DllSecur.h" />
  <ClInclude Include="..\src\C\Lzma2Dec.h" />
  <ClInclude Include="..\src\C\Lzma2DecMt.h" />
  <ClInclude Include="..\src\C\LzmaDec.h" />
  <ClInclude Include="..\src\C\MtDec.h" />
  <ClInclude Include="..\src\C\Threads.h" />
  <ClInclude Include="..\src\CPP\Common\CommandLineParser.h"
/>
  <ClInclude Include="..\src\CPP\Common\IntToString.h" />
  <ClInclude Include="..\src\CPP\Common\MyString.h" />
  <ClInclude Include="..\src\CPP\Common\MyVector.h" />
  <ClInclude Include="..\src\CPP\Common\NewHandler.h" />
  <ClInclude Include="..\src\CPP\Common\StringConvert.h" />
  <ClInclude Include="..\src\CPP\Common\TextConfig.h" />
  <ClInclude Include="..\src\CPP\Common\UTFConvert.h" />
  <ClInclude Include="..\src\CPP\Common\Wildcard.h" />
  <ClInclude Include="..\src\CPP\Windows\Control\Dialog.h" />
  <ClInclude Include="..\src\CPP\Windows\DLL.h" />
  <ClInclude Include="..\src\CPP\Windows\ErrorMsg.h" />
  <ClInclude Include="..\src\CPP\Windows\FileDir.h" />
  <ClInclude Include="..\src\CPP\Windows\FileFind.h" />
  <ClInclude Include="..\src\CPP\Windows\FileIO.h" />
  <ClInclude Include="..\src\CPP\Windows\FileName.h" />
  <ClInclude Include="..\src\CPP\Windows\PropVariant.h" />
  <ClInclude Include="..\src\CPP\Windows\ResourceString.h"
/>
  <ClInclude Include="..\src\CPP\Windows\Synchronization.h" />
  <ClInclude Include="..\src\CPP\Windows\System.h" />
  <ClInclude Include="..\src\CPP\Windows\Window.h" />
  <ClInclude Include="..\src\CPP\7zip\Archive\7z\7zDecode.h" />
  <ClInclude Include="..\src\CPP\7zip\Archive\7z\7zHandler.h" />
  <ClInclude Include="..\src\CPP\7zip\Archive\7z\7zHeader.h" />
  <ClInclude Include="..\src\CPP\7zip\Archive\7z\7zIn.h" />
  <ClInclude Include="..\src\CPP\7zip\Archive\7z\7zItem.h" />
  <ClInclude Include="..\src\CPP\7zip\Archive\Common\CoderMixer2.h" />
  <ClInclude Include="..\src\CPP\7zip\Archive\Common\ItemNameUtils.h" />
  <ClInclude Include="..\src\CPP\7zip\Archive\Common\OutStreamWithCRC.h" />
  <ClInclude Include="..\src\CPP\7zip\Common\CreateCoder.h" />
  <ClInclude Include="..\src\CPP\7zip\Common\CWrappers.h" />
  <ClInclude Include="..\src\CPP\7zip\Common\FileStreams.h" />
  <ClInclude Include="..\src\CPP\7zip\Common\FilterCoder.h" />

<ClInclude Include="..\src\CPP\7zip\Common\InBuffer.h" />
  <ClInclude Include="..\src\CPP\7zip\Common\LimitedStreams.h" />
  <ClInclude Include="..\src\CPP\7zip\Common\OutBuffer.h" />
  <ClInclude Include="..\src\CPP\7zip\Common\ProgressUtils.h" />
```

```
  <ClInclude Include="..\src\CPP\7zip\Common\StreamBinder.h" />
  <ClInclude Include="..\src\CPP\7zip\Common\StreamObjects.h" />
  <ClInclude Include="..\src\CPP\7zip\Common\StreamUtils.h" />
  <ClInclude Include="..\src\CPP\7zip\Common\VirtThread.h" />
  <ClInclude Include="..\src\CPP\7zip\Compress\BranchMisc.h" />
  <ClInclude Include="..\src\CPP\7zip\Compress\Lzma2Decoder.h" />
  <ClInclude Include="..\src\CPP\7zip\UI\Common\ArchiveOpenCallback.h" />
  <ClInclude Include="..\src\CPP\7zip\UI\Common\DefaultName.h" />
  <ClInclude Include="..\src\CPP\7zip\UI\Common\ExtractMode.h" />
  <ClInclude Include="..\src\CPP\7zip\UI\Common\LoadCodecs.h" />
  <ClInclude Include="..\src\CPP\7zip\UI\Common\OpenArchive.h" />
   <ClInclude Include="..\src\CPP\7zip\UI\Explorer\MyMessages.h" />
  <ClInclude Include="..\src\CPP\7zip\UI\FileManager\FormatUtils.h" />
  <ClInclude Include="..\src\CPP\7zip\UI\FileManager\LangUtils.h" />
  <ClInclude Include="..\src\CPP\7zip\UI\FileManager\ProgressDialog.h" />
  <ClInclude Include="..\src\CPP\7zip\Bundles\SFXSetup\ExtractCallbackSfx.h" />
  <ClInclude Include="..\src\CPP\7zip\Bundles\SFXSetup\ExtractEngine.h" />
  <ClInclude Include="..\src\CPP\7zip\Bundles\SFXSetup\StdAfx.h" />
 </ItemGroup>
 <Import Project="$(VCTargetsPath)\Microsoft.Cpp.targets" />
 <ImportGroup Label="ExtensionTargets">
 </ImportGroup>
</Project>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With class Attribute in div Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element that contains a div element with
&quot;class1 class2 class3&quot; as the value for the class attribute." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
```

```
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   &lt;div class="class1 class2 class3"&gt;Paragraph 1&lt;/div&gt;
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
// UpdatePair.h

#ifndef __UPDATE_PAIR_H
#define __UPDATE_PAIR_H

#include "DirItem.h"
#include "UpdateAction.h"

#include "../../Archive/IArchive.h"

struct CUpdatePair
{
 NUpdateArchive::NPairState::EEnum State;
 int ArcIndex;
 int DirIndex;
 int HostIndex; // >= 0 for alt streams only, contains index of host pair

 CUpdatePair(): ArcIndex(-1), DirIndex(-1), HostIndex(-1) {}
};

void GetUpdatePairInfoList(
   const CDirItems &dirItems,
   const CObjectVector<CArcItem> &arcItems,
   NFileTimeType::EEnum fileTimeType,
   CRecordVector<CUpdatePair> &updatePairs);
```

#endif
License information for hyph_ia.dic:

This file is based on the TeX hyphenation patterns distributed under the
LaTeX Project Public License (LPPL) as part of the hyph-utf8 package.

This Source Code Form is subject to the terms of the Mozilla Public
License, v. 2.0. If a copy of the MPL was not distributed with this
file, You can obtain one at http://mozilla.org/MPL/2.0/.

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

At the time this file was first modified, a complete, unmodified copy of
the LPPL Work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

Portions of this file were originally made available under the following license
(copied verbatim from hyph-ia.lic.txt in the original work):

Hyphenation patterns for Interlingua

(more info about the licence to be added later)

% This file is part of hyph-utf8 package
 and resulted from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% Source: iahyphen.tex (2005-06-28)
% Author: Peter Kleiweg <p.c.j.kleiweg at rug.nl>
%
% The above mentioned file should become obsolete,
% and the author of the original file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%  and helped with testing, suggestions and bug reports
% - Norbert Preining, who tested

```
 & integrated patterns into TeX Live
%
% However, the "copyright/copyleft" owner of patterns remains the original author.
%
% The copyright statement of this file is thus:
%
%    Do with this file whatever needs to be done in future for the sake of
%    "a better world" as long as you respect the copyright of original file.
%    If you're the original author of patterns or taking over a new revolution,
%    plese remove all of the TUG comments & credits that we added here -
%    you are the Queen / the King, we are only the servants.
%
% If you want to change this file, rather than uploading directly to CTAN,
% we would be grateful if you could send it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
% Before a new "pattern-revolution" starts,
% please try to follow some guidelines if possible:
%
% - \lccode is *forbidden*, and I really mean it
% - all the patterns should be in UTF-8
%
 - the only "allowed" TeX commands in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
%-----------------------------------------------------------------------------
%
% File: iahyphen.tex
% TeX hyphenation patterns for Interlingua.
% Version 0.2b. Released 3 July 2001.
% version 0.2c  Released 28 June 2005 (added LPPL header)
% Created by Peter Kleiweg, p.c.j.kleiweg at rug.nl
% About Interlingua: http://www.interlingua.com/
%
```

```
% \iffalse meta-comment
%
% Copyright
 1989-2005 Peter Kleiweg.  All rights reserved.
%
% This file is distributed as part of the Babel system.
% ---------------------------------------------------
%
% It may be distributed and/or modified under the
% conditions of the LaTeX Project Public License, either version 1.3
% of this license or (at your option) any later version.
% The latest version of this license is in
%   http://www.latex-project.org/lppl.txt
% and version 1.3 or later is part of all distributions of LaTeX
% version 2003/12/01 or later.
%
% This work has the LPPL maintenance status "maintained".
%
% The Current Maintainer of this work is Peter Kleiweg.
%
% The list of all files belonging to the Babel system is
% given in the file `manifest.bbl. See also `legal.bbl' for additional
% information.
%
% \fi
UNRECOGNIZED LICENSE; MD5 sum: 81811405e2360d0019cdba9cf804776d
/* CpuArch.h -- CPU specific code
2017-09-04 : Igor Pavlov : Public domain */

#ifndef __CPU_ARCH_H
#define __CPU_ARCH_H

#include "7zTypes.h"

EXTERN_C_BEGIN

/*
MY_CPU_LE means that CPU is LITTLE ENDIAN.
MY_CPU_BE means that CPU is BIG ENDIAN.
If MY_CPU_LE and MY_CPU_BE are not defined, we don't know about ENDIANNESS of platform.

MY_CPU_LE_UNALIGN means that CPU is LITTLE ENDIAN and CPU supports unaligned memory accesses.
*/

#if  defined(_M_X64) \
 || defined(_M_AMD64) \
 || defined(__x86_64__) \
 || defined(__AMD64__) \
```

```
 || defined(__amd64__)
 #define MY_CPU_AMD64
 #ifdef __ILP32__
   #define MY_CPU_NAME "x32"
 #else
   #define MY_CPU_NAME "x64"
 #endif
 #define MY_CPU_64BIT
#endif


#if  defined(_M_IX86) \
 || defined(__i386__)
 #define MY_CPU_X86
 #define MY_CPU_NAME "x86"
 #define MY_CPU_32BIT
#endif


#if  defined(_M_ARM64) \
 || defined(__AARCH64EL__) \
 || defined(__AARCH64EB__) \
 || defined(__aarch64__)
 #define MY_CPU_ARM64
 #define MY_CPU_NAME "arm64"
  #define MY_CPU_64BIT
#endif


#if  defined(_M_ARM) \
 || defined(_M_ARM_NT) \
 || defined(_M_ARMT) \
 || defined(__arm__) \
 || defined(__thumb__) \
 || defined(__ARMEL__) \
 || defined(__ARMEB__) \
 || defined(__THUMBEL__) \
 || defined(__THUMBEB__)
 #define MY_CPU_ARM
 #define MY_CPU_NAME "arm"
 #define MY_CPU_32BIT
#endif


#if  defined(_M_IA64) \
 || defined(__ia64__)
 #define MY_CPU_IA64
 #define MY_CPU_NAME "ia64"
```

```
 #define MY_CPU_64BIT
#endif


#if  defined(__mips64) \
 || defined(__mips64__) \
 || (defined(__mips) && (__mips == 64 || __mips == 4 || __mips == 3))
 #define MY_CPU_NAME "mips64"
 #define MY_CPU_64BIT
#elif defined(__mips__)
 #define MY_CPU_NAME "mips"
 /* #define MY_CPU_32BIT */
#endif


#if  defined(__ppc64__) \
 || defined(__powerpc64__)
 #ifdef __ILP32__
   #define MY_CPU_NAME "ppc64-32"
 #else
   #define MY_CPU_NAME "ppc64"
 #endif
 #define MY_CPU_64BIT
#elif defined(__ppc__) \
 || defined(__powerpc__)
 #define MY_CPU_NAME "ppc"
  #define MY_CPU_32BIT
#endif


#if  defined(__sparc64__)
 #define MY_CPU_NAME "sparc64"
 #define MY_CPU_64BIT
#elif defined(__sparc__)
 #define MY_CPU_NAME "sparc"
 /* #define MY_CPU_32BIT */
#endif


#if defined(MY_CPU_X86) || defined(MY_CPU_AMD64)
#define MY_CPU_X86_OR_AMD64
#endif


#ifdef _WIN32

 #ifdef MY_CPU_ARM
 #define MY_CPU_ARM_LE
```

```
 #endif

 #ifdef MY_CPU_ARM64
 #define MY_CPU_ARM64_LE
 #endif

 #ifdef _M_IA64
 #define MY_CPU_IA64_LE
 #endif

#endif


#if defined(MY_CPU_X86_OR_AMD64) \
   || defined(MY_CPU_ARM_LE) \
   || defined(MY_CPU_ARM64_LE) \
   || defined(MY_CPU_IA64_LE) \
   || defined(__LITTLE_ENDIAN__) \
   || defined(__ARMEL__) \
   || defined(__THUMBEL__) \
   || defined(__AARCH64EL__) \
   || defined(__MIPSEL__) \
   || defined(__MIPSEL) \
   || defined(_MIPSEL) \
   || defined(__BFIN__) \
   || (defined(__BYTE_ORDER__) && (__BYTE_ORDER__ == __ORDER_LITTLE_ENDIAN__))
 #define MY_CPU_LE
#endif

#if defined(__BIG_ENDIAN__) \
   || defined(__ARMEB__)
 \
   || defined(__THUMBEB__) \
   || defined(__AARCH64EB__) \
   || defined(__MIPSEB__) \
   || defined(__MIPSEB) \
   || defined(_MIPSEB) \
   || defined(__m68k__) \
   || defined(__s390__) \
   || defined(__s390x__) \
   || defined(__zarch__) \
   || (defined(__BYTE_ORDER__) && (__BYTE_ORDER__ == __ORDER_BIG_ENDIAN__))
 #define MY_CPU_BE
#endif


#if defined(MY_CPU_LE) && defined(MY_CPU_BE)
 #error Stop_Compiling_Bad_Endian
```

```
#endif


#if defined(MY_CPU_32BIT) && defined(MY_CPU_64BIT)
 #error Stop_Compiling_Bad_32_64_BIT
#endif


#ifndef MY_CPU_NAME
 #ifdef MY_CPU_LE
   #define MY_CPU_NAME "LE"
 #elif defined(MY_CPU_BE)
   #define MY_CPU_NAME "BE"
 #else
   /*
   #define MY_CPU_NAME ""
   */
 #endif
#endif





#ifdef MY_CPU_LE
 #if defined(MY_CPU_X86_OR_AMD64) \
     || defined(MY_CPU_ARM64) \
     || defined(__ARM_FEATURE_UNALIGNED)
   #define MY_CPU_LE_UNALIGN
 #endif
#endif


#ifdef MY_CPU_LE_UNALIGN

#define GetUi16(p) (*(const UInt16 *)(const
 void *)(p))
#define GetUi32(p) (*(const UInt32 *)(const void *)(p))
#define GetUi64(p) (*(const UInt64 *)(const void *)(p))

#define SetUi16(p, v) { *(UInt16 *)(p) = (v); }
#define SetUi32(p, v) { *(UInt32 *)(p) = (v); }
#define SetUi64(p, v) { *(UInt64 *)(p) = (v); }

#else

#define GetUi16(p) ( (UInt16) ( \
          ((const Byte *)(p))[0] | \
```

```
   ((UInt16)((const Byte *)(p))[1] << 8) ))

#define GetUi32(p) ( \
          ((const Byte *)(p))[0]        | \
   ((UInt32)((const Byte *)(p))[1] <<  8) | \
   ((UInt32)((const Byte *)(p))[2] << 16) | \
   ((UInt32)((const Byte *)(p))[3] << 24))

#define GetUi64(p) (GetUi32(p) | ((UInt64)GetUi32(((const Byte *)(p)) + 4) << 32))

#define SetUi16(p, v) { Byte *_ppp_ = (Byte *)(p); UInt32 _vvv_ = (v); \
   _ppp_[0] = (Byte)_vvv_; \
   _ppp_[1] = (Byte)(_vvv_ >> 8); }

#define SetUi32(p, v) { Byte *_ppp_ = (Byte *)(p); UInt32 _vvv_ = (v); \
   _ppp_[0] = (Byte)_vvv_; \
   _ppp_[1] = (Byte)(_vvv_ >> 8); \
   _ppp_[2] = (Byte)(_vvv_
 >> 16); \
   _ppp_[3] = (Byte)(_vvv_ >> 24); }

#define SetUi64(p, v) { Byte *_ppp2_ = (Byte *)(p); UInt64 _vvv2_ = (v); \
   SetUi32(_ppp2_    , (UInt32)_vvv2_); \
   SetUi32(_ppp2_ + 4, (UInt32)(_vvv2_ >> 32)); }

#endif

#ifdef __has_builtin
 #define MY__has_builtin(x) __has_builtin(x)
#else
 #define MY__has_builtin(x) 0
#endif

#if defined(MY_CPU_LE_UNALIGN) && /* defined(_WIN64) && */ (_MSC_VER >= 1300)

/* Note: we use bswap instruction, that is unsupported in 386 cpu */

#include <stdlib.h>

#pragma intrinsic(_byteswap_ushort)
#pragma intrinsic(_byteswap_ulong)
#pragma intrinsic(_byteswap_uint64)

/* #define GetBe16(p) _byteswap_ushort(*(const UInt16 *)(const Byte *)(p)) */
#define GetBe32(p) _byteswap_ulong(*(const UInt32 *)(const Byte *)(p))
#define GetBe64(p) _byteswap_uint64(*(const UInt64 *)(const Byte *)(p))

#define SetBe32(p, v) (*(UInt32 *)(void *)(p)) = _byteswap_ulong(v)
```

```
#elif defined(MY_CPU_LE_UNALIGN) && ( \
      (defined(__GNUC__) && (__GNUC__ > 4 || (__GNUC__
 == 4 && __GNUC_MINOR__ >= 3))) \
   || (defined(__clang__) && MY__has_builtin(__builtin_bswap16)) )

/* #define GetBe16(p) __builtin_bswap16(*(const UInt16 *)(const Byte *)(p)) */
#define GetBe32(p) __builtin_bswap32(*(const UInt32 *)(const Byte *)(p))
#define GetBe64(p) __builtin_bswap64(*(const UInt64 *)(const Byte *)(p))

#define SetBe32(p, v) (*(UInt32 *)(void *)(p)) = __builtin_bswap32(v)

#else

#define GetBe32(p) ( \
   ((UInt32)((const Byte *)(p))[0] << 24) | \
   ((UInt32)((const Byte *)(p))[1] << 16) | \
   ((UInt32)((const Byte *)(p))[2] <<  8) | \
           ((const Byte *)(p))[3] )

#define GetBe64(p) (((UInt64)GetBe32(p) << 32) | GetBe32(((const Byte *)(p)) + 4))

#define SetBe32(p, v) { Byte *_ppp_ = (Byte *)(p); UInt32 _vvv_ = (v); \
   _ppp_[0] = (Byte)(_vvv_ >> 24); \
   _ppp_[1] = (Byte)(_vvv_ >> 16); \
   _ppp_[2] = (Byte)(_vvv_ >> 8); \
   _ppp_[3] = (Byte)_vvv_; }

#endif


#ifndef GetBe16

#define GetBe16(p) ( (UInt16) ( \
   ((UInt16)((const Byte
 *)(p))[0] << 8) | \
           ((const Byte *)(p))[1] ))

#endif



#ifdef MY_CPU_X86_OR_AMD64

typedef struct
{
 UInt32 maxFunc;
 UInt32 vendor[3];
```

```
 UInt32 ver;
 UInt32 b;
 UInt32 c;
 UInt32 d;
} Cx86cpuid;

enum
{
 CPU_FIRM_INTEL,
 CPU_FIRM_AMD,
 CPU_FIRM_VIA
};

void MyCPUID(UInt32 function, UInt32 *a, UInt32 *b, UInt32 *c, UInt32 *d);

Bool x86cpuid_CheckAndRead(Cx86cpuid *p);
int x86cpuid_GetFirm(const Cx86cpuid *p);

#define x86cpuid_GetFamily(ver) (((ver >> 16) & 0xFF0) | ((ver >> 8) & 0xF))
#define x86cpuid_GetModel(ver)  (((ver >> 12) &  0xF0) | ((ver >> 4) & 0xF))
#define x86cpuid_GetStepping(ver) (ver & 0xF)

Bool CPU_Is_InOrder();
Bool CPU_Is_Aes_Supported();

#endif

EXTERN_C_END

#endif
```

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 IN THE SOFTWARE.

```
# MY_STATIC_LINK=1
PROG = LZMAc.exe

CFLAGS = $(CFLAGS) \

LIB_OBJS = \
 $O\LzmaUtil.obj \

C_OBJS = \
 $O\Alloc.obj \
 $O\LzFind.obj \
 $O\LzFindMt.obj \
 $O\LzmaDec.obj \
 $O\LzmaEnc.obj \
 $O\7zFile.obj \
 $O\7zStream.obj \
 $O\Threads.obj \

OBJS = \
 $(LIB_OBJS) \
 $(C_OBJS) \

!include "../../../CPP/Build.mak"

$(LIB_OBJS): $(*B).c
 $(COMPL_O2)
$(C_OBJS): ../../$(*B).c
 $(COMPL_O2)
/* MtDec.h -- Multi-thread Decoder
2018-03-02 : Igor Pavlov : Public domain */

#ifndef __MT_DEC_H
#define __MT_DEC_H

#include "7zTypes.h"
```

```
#ifndef _7ZIP_ST
#include "Threads.h"
#endif

EXTERN_C_BEGIN

#ifndef _7ZIP_ST

#ifndef _7ZIP_ST
 #define MTDEC__THREADS_MAX 32
#else
 #define MTDEC__THREADS_MAX 1
#endif


typedef struct
{
 ICompressProgress *progress;
 SRes res;
 UInt64 totalInSize;
 UInt64 totalOutSize;
 CCriticalSection cs;
} CMtProgress;

void MtProgress_Init(CMtProgress *p, ICompressProgress *progress);
SRes MtProgress_Progress_ST(CMtProgress *p);
SRes MtProgress_ProgressAdd(CMtProgress *p, UInt64 inSize, UInt64 outSize);
SRes MtProgress_GetError(CMtProgress *p);
void MtProgress_SetError(CMtProgress *p, SRes res);

struct _CMtDec;

typedef struct
{
 struct _CMtDec *mtDec;
 unsigned index;
 void *inBuf;

 size_t inDataSize_Start; // size of input data in start block
 UInt64 inDataSize;       // total size of input data in all blocks

 CThread thread;
 CAutoResetEvent
 canRead;
 CAutoResetEvent canWrite;
 void  *allocaPtr;
} CMtDecThread;
```

```
void MtDecThread_FreeInBufs(CMtDecThread *t);


typedef enum
{
 MTDEC_PARSE_CONTINUE, // continue this block with more input data
 MTDEC_PARSE_OVERFLOW, // MT buffers overflow, need switch to single-thread
 MTDEC_PARSE_NEW,      // new block
 MTDEC_PARSE_END       // end of block threading. But we still can return to threading after
Write(&needContinue)
} EMtDecParseState;

typedef struct
{
 // in
 int startCall;
 const Byte *src;
 size_t srcSize;
    // in  : (srcSize == 0) is allowed
    // out : it's allowed to return less that actually was used ?
 int srcFinished;

 // out
 EMtDecParseState state;
 Bool canCreateNewThread;
 UInt64 outPos; // check it (size_t)
} CMtDecCallbackInfo;


typedef struct
{
 void (*Parse)(void *p, unsigned coderIndex, CMtDecCallbackInfo *ci);

 // PreCode() and Code():
 // (SRes_return_result != SZ_OK) means stop decoding, no need another blocks
 SRes (*PreCode)(void
 *p, unsigned coderIndex);
 SRes (*Code)(void *p, unsigned coderIndex,
    const Byte *src, size_t srcSize, int srcFinished,
    UInt64 *inCodePos, UInt64 *outCodePos, int *stop);
 // stop - means stop another Code calls


 /* Write() must be called, if Parse() was called
    set (needWrite) if
    {
      && (was not interrupted by progress)
      && (was not interrupted in previous block)
```

```
    }

  out:
    if (*needContinue), decoder still need to continue decoding with new iteration,
      even after MTDEC_PARSE_END
    if (*canRecode), we didn't flush current block data, so we still can decode current block later.
 */
 SRes (*Write)(void *p, unsigned coderIndex,
    Bool needWriteToStream,
    const Byte *src, size_t srcSize,
    // int srcFinished,
    Bool *needContinue,
    Bool *canRecode);
} IMtDecCallback;



typedef struct _CMtDec
{
 /* input variables */

 size_t inBufSize;        /* size of input block */
 unsigned numThreadsMax;
  // size_t inBlockMax;
 unsigned numThreadsMax_2;

 ISeqInStream *inStream;
 // const Byte *inData;
 // size_t inDataSize;

 ICompressProgress *progress;
 ISzAllocPtr alloc;

 IMtDecCallback *mtCallback;
 void *mtCallbackObject;


 /* internal variables */

 size_t allocatedBufsSize;

 Bool exitThread;
 WRes exitThreadWRes;

 UInt64 blockIndex;
 Bool isAllocError;
 Bool overflow;
 SRes threadingErrorSRes;
```

```
 Bool needContinue;

 // CAutoResetEvent finishedEvent;

 SRes readRes;
 SRes codeRes;

 Bool wasInterrupted;

 unsigned numStartedThreads_Limit;
 unsigned numStartedThreads;

 Byte *crossBlock;
 size_t crossStart;
 size_t crossEnd;
 UInt64 readProcessed;
 Bool readWasFinished;
 UInt64 inProcessed;

 unsigned filledThreadStart;
 unsigned numFilledThreads;

 #ifndef _7ZIP_ST
 Bool needInterrupt;
 UInt64 interruptIndex;
 CMtProgress mtProgress;
 CMtDecThread threads[MTDEC__THREADS_MAX];
 #endif
} CMtDec;


void MtDec_Construct(CMtDec
 *p);
void MtDec_Destruct(CMtDec *p);

/*
MtDec_Code() returns:
 SZ_OK - in most cases
 MY_SRes_HRESULT_FROM_WRes(WRes_error) - in case of unexpected error in threading function
*/

SRes MtDec_Code(CMtDec *p);
Byte *MtDec_GetCrossBuff(CMtDec *p);

int MtDec_PrepareRead(CMtDec *p);
const Byte *MtDec_Read(CMtDec *p, size_t *inLim);
```

```
#endif

EXTERN_C_END

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With One No Language Tagged text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-001-ref.xht" />
  <meta name="assert" content="The copyright element matches the schema. It contains one text element that does not have a language tag." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-001.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
```

```
 &lt;copyright&gt;
  &lt;text&gt;
   Copyright without language.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
// Windows/TimeUtils.h

#ifndef __WINDOWS_TIME_UTILS_H
#define __WINDOWS_TIME_UTILS_H

#include "../Common/MyTypes.h"
#include "../Common/MyWindows.h"

namespace NWindows {
namespace NTime {

bool DosTimeToFileTime(UInt32 dosTime, FILETIME &fileTime) throw();
bool FileTimeToDosTime(const FILETIME &fileTime, UInt32 &dosTime) throw();

// UInt32 Unix Time : for dates 1970-2106
UInt64 UnixTimeToFileTime64(UInt32 unixTime) throw();
void UnixTimeToFileTime(UInt32 unixTime, FILETIME &fileTime) throw();

// Int64 Unix Time : negative values for dates before 1970
UInt64 UnixTime64ToFileTime64(Int64 unixTime) throw();
bool UnixTime64ToFileTime(Int64 unixTime, FILETIME &fileTime) throw();

bool FileTimeToUnixTime(const FILETIME &fileTime, UInt32 &unixTime) throw();
Int64 FileTimeToUnixTime64(const FILETIME &ft) throw();

bool GetSecondsSince1601(unsigned year, unsigned month, unsigned day,
 unsigned hour, unsigned min, unsigned sec, UInt64 &resSeconds) throw();
void GetCurUtcFileTime(FILETIME &ft)
 throw();

}}

#endif
// PropIDUtils.h

#ifndef __PROPID_UTILS_H
#define __PROPID_UTILS_H

#include "../../../Common/MyString.h"
```

```
// provide at least 64 bytes for buffer including zero-end
void ConvertPropertyToShortString2(char *dest, const PROPVARIANT &propVariant, PROPID propID, int level
= 0) throw();
void ConvertPropertyToString2(UString &dest, const PROPVARIANT &propVariant, PROPID propID, int level =
0);

bool ConvertNtReparseToString(const Byte *data, UInt32 size, UString &s);
void ConvertNtSecureToString(const Byte *data, UInt32 size, AString &s);
bool CheckNtSecure(const Byte *data, UInt32 size) throw();;

void ConvertWinAttribToString(char *s, UInt32 wa) throw();

#endif
```

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# here.  Please keep the list sorted by first names.

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/* Xz.h - Xz interface
2018-02-28 : Igor Pavlov : Public domain */

#ifndef __XZ_H
#define __XZ_H

#include "Sha256.h"

EXTERN_C_BEGIN

#define XZ_ID_Subblock 1
#define XZ_ID_Delta 3
#define XZ_ID_X86 4
#define XZ_ID_PPC 5
#define XZ_ID_IA64 6
#define XZ_ID_ARM 7
#define XZ_ID_ARMT 8
#define XZ_ID_SPARC 9
#define XZ_ID_LZMA2 0x21

unsigned Xz_ReadVarInt(const Byte *p, size_t maxSize, UInt64 *value);
unsigned Xz_WriteVarInt(Byte *buf, UInt64 v);

/* ---------- xz block ---------- */

#define XZ_BLOCK_HEADER_SIZE_MAX 1024

#define XZ_NUM_FILTERS_MAX 4
#define XZ_BF_NUM_FILTERS_MASK 3
#define XZ_BF_PACK_SIZE (1 << 6)
#define XZ_BF_UNPACK_SIZE (1 << 7)

#define XZ_FILTER_PROPS_SIZE_MAX 20

typedef struct
{
 UInt64 id;
 UInt32 propsSize;
```

```
 Byte props[XZ_FILTER_PROPS_SIZE_MAX];
} CXzFilter;

typedef struct
{
 UInt64 packSize;
 UInt64 unpackSize;
 Byte flags;
 CXzFilter filters[XZ_NUM_FILTERS_MAX];
} CXzBlock;

#define XzBlock_GetNumFilters(p) (((p)->flags & XZ_BF_NUM_FILTERS_MASK) + 1)
#define
 XzBlock_HasPackSize(p)   (((p)->flags & XZ_BF_PACK_SIZE) != 0)
#define XzBlock_HasUnpackSize(p) (((p)->flags & XZ_BF_UNPACK_SIZE) != 0)
#define XzBlock_HasUnsupportedFlags(p) (((p)->flags & ~(XZ_BF_NUM_FILTERS_MASK |
XZ_BF_PACK_SIZE | XZ_BF_UNPACK_SIZE)) != 0)

SRes XzBlock_Parse(CXzBlock *p, const Byte *header);
SRes XzBlock_ReadHeader(CXzBlock *p, ISeqInStream *inStream, Bool *isIndex, UInt32 *headerSizeRes);

/* ---------- xz stream ---------- */

#define XZ_SIG_SIZE 6
#define XZ_FOOTER_SIG_SIZE 2

extern const Byte XZ_SIG[XZ_SIG_SIZE];

/*
extern const Byte XZ_FOOTER_SIG[XZ_FOOTER_SIG_SIZE];
*/

#define XZ_FOOTER_SIG_0 'Y'
#define XZ_FOOTER_SIG_1 'Z'

#define XZ_STREAM_FLAGS_SIZE 2
#define XZ_STREAM_CRC_SIZE 4

#define XZ_STREAM_HEADER_SIZE (XZ_SIG_SIZE + XZ_STREAM_FLAGS_SIZE +
XZ_STREAM_CRC_SIZE)
#define XZ_STREAM_FOOTER_SIZE (XZ_FOOTER_SIG_SIZE + XZ_STREAM_FLAGS_SIZE +
XZ_STREAM_CRC_SIZE + 4)

#define XZ_CHECK_MASK 0xF
#define XZ_CHECK_NO 0
#define XZ_CHECK_CRC32 1
#define
```

```
 XZ_CHECK_CRC64 4
#define XZ_CHECK_SHA256 10

typedef struct
{
 unsigned mode;
 UInt32 crc;
 UInt64 crc64;
 CSha256 sha;
} CXzCheck;

void XzCheck_Init(CXzCheck *p, unsigned mode);
void XzCheck_Update(CXzCheck *p, const void *data, size_t size);
int XzCheck_Final(CXzCheck *p, Byte *digest);

typedef UInt16 CXzStreamFlags;

#define XzFlags_IsSupported(f) ((f) <= XZ_CHECK_MASK)
#define XzFlags_GetCheckType(f) ((f) & XZ_CHECK_MASK)
#define XzFlags_HasDataCrc32(f) (Xz_GetCheckType(f) == XZ_CHECK_CRC32)
unsigned XzFlags_GetCheckSize(CXzStreamFlags f);

SRes Xz_ParseHeader(CXzStreamFlags *p, const Byte *buf);
SRes Xz_ReadHeader(CXzStreamFlags *p, ISeqInStream *inStream);

typedef struct
{
 UInt64 unpackSize;
 UInt64 totalSize;
} CXzBlockSizes;

typedef struct
{
 CXzStreamFlags flags;
 size_t numBlocks;
 CXzBlockSizes *blocks;
 UInt64 startOffset;
} CXzStream;

void Xz_Construct(CXzStream *p);
void Xz_Free(CXzStream *p, ISzAllocPtr alloc);

#define XZ_SIZE_OVERFLOW ((UInt64)(Int64)-1)

UInt64
 Xz_GetUnpackSize(const CXzStream *p);
UInt64 Xz_GetPackSize(const CXzStream *p);
```

```
typedef struct
{
 size_t num;
 size_t numAllocated;
 CXzStream *streams;
} CXzs;

void Xzs_Construct(CXzs *p);
void Xzs_Free(CXzs *p, ISzAllocPtr alloc);
SRes Xzs_ReadBackward(CXzs *p, ILookInStream *inStream, Int64 *startOffset, ICompressProgress *progress,
ISzAllocPtr alloc);

UInt64 Xzs_GetNumBlocks(const CXzs *p);
UInt64 Xzs_GetUnpackSize(const CXzs *p);


// ECoderStatus values are identical to ELzmaStatus values of LZMA2 decoder

typedef enum
{
 CODER_STATUS_NOT_SPECIFIED,              /* use main error code instead */
 CODER_STATUS_FINISHED_WITH_MARK,         /* stream was finished with end mark. */
 CODER_STATUS_NOT_FINISHED,               /* stream was not finished */
 CODER_STATUS_NEEDS_MORE_INPUT            /* you must provide more input bytes */
} ECoderStatus;


// ECoderFinishMode values are identical to ELzmaFinishMode

typedef enum
{
 CODER_FINISH_ANY,   /* finish at
 any point */
 CODER_FINISH_END    /* block must be finished at the end */
} ECoderFinishMode;


typedef struct _IStateCoder
{
 void *p;
 void (*Free)(void *p, ISzAllocPtr alloc);
 SRes (*SetProps)(void *p, const Byte *props, size_t propSize, ISzAllocPtr alloc);
 void (*Init)(void *p);
 SRes (*Code2)(void *p, Byte *dest, SizeT *destLen, const Byte *src, SizeT *srcLen,
    int srcWasFinished, ECoderFinishMode finishMode,
    // int *wasFinished,
    ECoderStatus *status);
 SizeT (*Filter)(void *p, Byte *data, SizeT size);
```

```
} IStateCoder;



#define MIXCODER_NUM_FILTERS_MAX 4

typedef struct
{
 ISzAllocPtr alloc;
 Byte *buf;
 unsigned numCoders;

 Byte *outBuf;
 size_t outBufSize;
 size_t outWritten; // is equal to lzmaDecoder.dicPos (in outBuf mode)
 Bool wasFinished;
 SRes res;
 ECoderStatus status;
 // Bool SingleBufMode;

 int finished[MIXCODER_NUM_FILTERS_MAX - 1];
 size_t pos[MIXCODER_NUM_FILTERS_MAX - 1];
 size_t size[MIXCODER_NUM_FILTERS_MAX - 1];
 UInt64
 ids[MIXCODER_NUM_FILTERS_MAX];
 SRes results[MIXCODER_NUM_FILTERS_MAX];
 IStateCoder coders[MIXCODER_NUM_FILTERS_MAX];
} CMixCoder;


typedef enum
{
 XZ_STATE_STREAM_HEADER,
 XZ_STATE_STREAM_INDEX,
 XZ_STATE_STREAM_INDEX_CRC,
 XZ_STATE_STREAM_FOOTER,
 XZ_STATE_STREAM_PADDING,
 XZ_STATE_BLOCK_HEADER,
 XZ_STATE_BLOCK,
 XZ_STATE_BLOCK_FOOTER
} EXzState;


typedef struct
{
 EXzState state;
 UInt32 pos;
 unsigned alignPos;
```

```
 unsigned indexPreSize;

 CXzStreamFlags streamFlags;

 UInt32 blockHeaderSize;
 UInt64 packSize;
 UInt64 unpackSize;

 UInt64 numBlocks; // number of finished blocks in current stream
 UInt64 indexSize;
 UInt64 indexPos;
 UInt64 padSize;

 UInt64 numStartedStreams;
 UInt64 numFinishedStreams;
 UInt64 numTotalBlocks;

 UInt32 crc;
 CMixCoder decoder;
 CXzBlock block;
 CXzCheck check;
 CSha256 sha;

 Bool parseMode;
 Bool headerParsedOk;
 Bool decodeToStreamSignature;
 unsigned decodeOnlyOneBlock;

 Byte *outBuf;
 size_t outBufSize;
  size_t outDataWritten; // the size of data in (outBuf) that were fully unpacked

 Byte shaDigest[SHA256_DIGEST_SIZE];
 Byte buf[XZ_BLOCK_HEADER_SIZE_MAX];
} CXzUnpacker;

/* alloc : aligned for cache line allocation is better */
void XzUnpacker_Construct(CXzUnpacker *p, ISzAllocPtr alloc);
void XzUnpacker_Init(CXzUnpacker *p);
void XzUnpacker_SetOutBuf(CXzUnpacker *p, Byte *outBuf, size_t outBufSize);
void XzUnpacker_Free(CXzUnpacker *p);

/*
 XzUnpacker
 The sequence for decoding functions:
 {
   XzUnpacker_Construct()
   [Decoding_Calls]
```

```
  XzUnpacker_Free()
 }

 [Decoding_Calls]

 There are 3 types of interfaces for [Decoding_Calls] calls:

 Interface-1 : Partial output buffers:
  {
    XzUnpacker_Init()
    for()
      XzUnpacker_Code();
  }

 Interface-2 : Direct output buffer:
  Use it, if you know exact size of decoded data, and you need
  whole xz unpacked data in one output buffer.
  xz unpacker doesn't allocate additional buffer for lzma2
 dictionary in that mode.
  {
    XzUnpacker_Init()
    XzUnpacker_SetOutBufMode(); // to set output buffer and size
    for()
      XzUnpacker_Code(); // (dest = NULL) in XzUnpacker_Code()
  }

 Interface-3 : Direct output buffer : One call full decoding
  It unpacks whole input buffer to output buffer in one call.
  It uses Interface-2 internally.
  {
    XzUnpacker_CodeFull()
  }
*/

/*
finishMode:
 It has meaning only if the decoding reaches output limit (*destLen).
 CODER_FINISH_ANY - use smallest number of input bytes
 CODER_FINISH_END - read EndOfStream marker after decoding

Returns:
 SZ_OK
  status:
    CODER_STATUS_NOT_FINISHED,
    CODER_STATUS_NEEDS_MORE_INPUT - maybe there are more xz streams,
                                    call XzUnpacker_IsStreamWasFinished to check that current stream was finished
 SZ_ERROR_MEM  - Memory allocation error
 SZ_ERROR_DATA - Data error
```

```
 SZ_ERROR_UNSUPPORTED - Unsupported method or method properties
  SZ_ERROR_CRC  - CRC error
 // SZ_ERROR_INPUT_EOF - It needs more bytes in input buffer (src).

 SZ_ERROR_NO_ARCHIVE - the error with xz Stream Header with one of the following reasons:
    - xz Stream Signature failure
    - CRC32 of xz Stream Header is failed
    - The size of Stream padding is not multiple of four bytes.
   It's possible to get that error, if xz stream was finished and the stream
   contains some another data. In that case you can call XzUnpacker_GetExtraSize()
   function to get real size of xz stream.
*/


SRes XzUnpacker_Code(CXzUnpacker *p, Byte *dest, SizeT *destLen,
   const Byte *src, SizeT *srcLen, int srcFinished,
   ECoderFinishMode finishMode, ECoderStatus *status);

SRes XzUnpacker_CodeFull(CXzUnpacker *p, Byte *dest, SizeT *destLen,
   const Byte *src, SizeT *srcLen,
   ECoderFinishMode finishMode, ECoderStatus *status);

Bool XzUnpacker_IsStreamWasFinished(const CXzUnpacker *p);

/*
XzUnpacker_GetExtraSize() returns then number of uncofirmed
 bytes,
if it's in (XZ_STATE_STREAM_HEADER) state or in (XZ_STATE_STREAM_PADDING) state.
These bytes can be some bytes after xz archive, or
it can be start of new xz stream.

Call XzUnpacker_GetExtraSize() after XzUnpacker_Code() function to detect real size of
xz stream in two cases, if XzUnpacker_Code() returns:
 res == SZ_OK && status == CODER_STATUS_NEEDS_MORE_INPUT
 res == SZ_ERROR_NO_ARCHIVE
*/

UInt64 XzUnpacker_GetExtraSize(const CXzUnpacker *p);


/*
 for random block decoding:
   XzUnpacker_Init();
   set CXzUnpacker::streamFlags
   XzUnpacker_PrepareToRandomBlockDecoding()
   loop
   {
     XzUnpacker_Code()
```

```
    XzUnpacker_IsBlockFinished()
  }
*/

void XzUnpacker_PrepareToRandomBlockDecoding(CXzUnpacker *p);
Bool XzUnpacker_IsBlockFinished(const CXzUnpacker *p);

#define XzUnpacker_GetPackSizeForIndex(p) ((p)->packSize + (p)->blockHeaderSize +
XzFlags_GetCheckSize((p)->streamFlags))



/* ---------- Multi Threading Decoding ---------- */


typedef struct
{
  size_t inBufSize_ST;
 size_t outStep_ST;
 Bool ignoreErrors;

 #ifndef _7ZIP_ST
 unsigned numThreads;
 size_t inBufSize_MT;
 size_t memUseMax;
 #endif
} CXzDecMtProps;

void XzDecMtProps_Init(CXzDecMtProps *p);


typedef void * CXzDecMtHandle;

/*
 alloc    : XzDecMt uses CAlignOffsetAlloc for addresses allocated by (alloc).
 allocMid : for big allocations, aligned allocation is better
*/

CXzDecMtHandle XzDecMt_Create(ISzAllocPtr alloc, ISzAllocPtr allocMid);
void XzDecMt_Destroy(CXzDecMtHandle p);


typedef struct
{
 Byte UnpackSize_Defined;
 Byte NumStreams_Defined;
 Byte NumBlocks_Defined;
```

```
 Byte DataAfterEnd;
 Byte DecodingTruncated; // Decoding was Truncated, we need only partial output data

 UInt64 InSize;  // pack size processed
 UInt64 OutSize;

 UInt64 NumStreams;
 UInt64 NumBlocks;

 SRes DecodeRes;
 SRes ReadRes;
 SRes ProgressRes;
 SRes CombinedRes;
 SRes CombinedRes_Type;

} CXzStatInfo;

void XzStatInfo_Clear(CXzStatInfo *p);

/*
XzDecMt_Decode()
SRes:
  SZ_OK               - OK
 SZ_ERROR_MEM        - Memory allocation error
 SZ_ERROR_NO_ARCHIVE - is not xz archive
 SZ_ERROR_ARCHIVE    - Headers error
 SZ_ERROR_DATA       - Data Error
 SZ_ERROR_CRC        - CRC Error
 SZ_ERROR_INPUT_EOF  - it needs more input data
 SZ_ERROR_WRITE      - ISeqOutStream error
 (SZ_ERROR_READ)     - ISeqInStream errors
 (SZ_ERROR_PROGRESS) - ICompressProgress errors
 // SZ_ERROR_THREAD     - error in multi-threading functions
 MY_SRes_HRESULT_FROM_WRes(WRes_error) - error in multi-threading function
*/

SRes XzDecMt_Decode(CXzDecMtHandle p,
   const CXzDecMtProps *props,
   const UInt64 *outDataSize, // NULL means undefined
   int finishMode,            // 0 - partial unpacking is allowed, 1 - xz stream(s) must be finished
   ISeqOutStream *outStream,
   // Byte *outBuf, size_t *outBufSize,
   ISeqInStream *inStream,
   // const Byte *inData, size_t inDataSize,
   CXzStatInfo *stat,
   int *isMT,                 // 0 means
 that ST (Single-Thread) version was used
   ICompressProgress *progress);
```

```
EXTERN_C_END

#endif
// DefaultName.h

#ifndef __DEFAULT_NAME_H
#define __DEFAULT_NAME_H

#include "../../../Common/MyString.h"

UString GetDefaultName2(const UString &fileName,
  const UString &extension, const UString &addSubExtension);

#endif
```

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```
/* 7zAlloc.h -- Allocation functions
2017-04-03 : Igor Pavlov : Public domain */

#ifndef __7Z_ALLOC_H
#define __7Z_ALLOC_H

#include "7zTypes.h"

EXTERN_C_BEGIN

void *SzAlloc(ISzAllocPtr p, size_t size);
```

```
void SzFree(ISzAllocPtr p, void *address);

void *SzAllocTemp(ISzAllocPtr p, size_t size);
void SzFreeTemp(ISzAllocPtr p, void *address);

EXTERN_C_END

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With One div Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-020-ref.xht" />
  <meta name="assert" content="The license element contains a text element that contains a div element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
 {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-020.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
```

```
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   &lt;div&gt;Paragraph 1&lt;/div&gt;
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
// Common/AutoPtr.h

#ifndef __COMMON_AUTOPTR_H
#define __COMMON_AUTOPTR_H

template<class T> class CMyAutoPtr
{
 T *_p;
public:
 CMyAutoPtr(T *p = 0) : _p(p) {}
 CMyAutoPtr(CMyAutoPtr<T>& p): _p(p.release()) {}
 CMyAutoPtr<T>& operator=(CMyAutoPtr<T>& p)
 {
  reset(p.release());
  return (*this);
 }
 ~CMyAutoPtr() { delete _p; }
 T& operator*() const { return *_p; }
 // T* operator->() const { return (&**this); }
 T* get() const { return _p; }
 T* release()
 {
  T *tmp = _p;
  _p = 0;
  return tmp;
 }
 void reset(T* p = 0)
 {
  if (p != _p)
   delete _p;
  _p = p;
 }
};

#endif
```

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<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With class Attribute in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element with &quot;class1 class2 class3&quot; as the value for the class attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
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  <pre>
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&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text class="class1 class2 class3"&gt;
   License without language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
```

</body>
</html>
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```
// UpdateProduce.h

#ifndef __UPDATE_PRODUCE_H
#define __UPDATE_PRODUCE_H

#include "UpdatePair.h"

struct CUpdatePair2
{
 bool NewData;
 bool NewProps;
 bool UseArcProps; // if (UseArcProps && NewProps), we want to change only some properties.
 bool IsAnti; // if (!IsAnti) we use other ways to detect Anti status
```

```
 int DirIndex;
 int ArcIndex;
 int NewNameIndex;

 bool IsMainRenameItem;

 void SetAs_NoChangeArcItem(int arcIndex)
 {
   NewData = NewProps = false;
   UseArcProps = true;
   IsAnti = false;
   ArcIndex = arcIndex;
 }

 bool ExistOnDisk() const { return DirIndex != -1; }
 bool ExistInArchive() const { return ArcIndex != -1; }

 CUpdatePair2():
     NewData(false),
     NewProps(false),
     UseArcProps(false),
     IsAnti(false),
     DirIndex(-1),
     ArcIndex(-1),
     NewNameIndex(-1),
     IsMainRenameItem(false)
     {}
};

struct IUpdateProduceCallback
{
 virtual HRESULT ShowDeleteFile(unsigned arcIndex) = 0;
};

void UpdateProduce(
   const
 CRecordVector<CUpdatePair> &updatePairs,
   const NUpdateArchive::CActionSet &actionSet,
   CRecordVector<CUpdatePair2> &operationChain,
   IUpdateProduceCallback *callback);

#endif
```

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```
// Windows/Control/PropertyPage.h

#ifndef __WINDOWS_CONTROL_PROPERTYPAGE_H
#define __WINDOWS_CONTROL_PROPERTYPAGE_H

#include "../../Common/MyWindows.h"

#include <prsht.h>

#include "Dialog.h"

namespace NWindows {
namespace NControl {

INT_PTR APIENTRY ProperyPageProcedure(HWND dialogHWND, UINT message, WPARAM wParam,
LPARAM lParam);

class CPropertyPage: public CDialog
{
public:
 CPropertyPage(HWND window = NULL): CDialog(window){};

 void Changed() { PropSheet_Changed(GetParent(), (HWND)*this); }
 void UnChanged() { PropSheet_UnChanged(GetParent(), (HWND)*this); }

 virtual bool OnNotify(UINT controlID, LPNMHDR lParam);

 virtual bool OnKillActive() { return false; } // false = OK
 virtual bool OnKillActive(const PSHNOTIFY *) { return OnKillActive(); }
 virtual LONG OnSetActive() { return false; } // false = OK
 virtual LONG OnSetActive(const PSHNOTIFY *) { return OnSetActive(); }
 virtual LONG OnApply() { return PSNRET_NOERROR; }
 virtual LONG OnApply(const PSHNOTIFY *)
 { return OnApply(); }
 virtual void OnNotifyHelp() {}
 virtual void OnNotifyHelp(const PSHNOTIFY *) { OnNotifyHelp(); }
 virtual void OnReset() {}
```

```
 virtual void OnReset(const PSHNOTIFY *) { OnReset(); }
};

struct CPageInfo
{
 CPropertyPage *Page;
 UString Title;
 UINT ID;
};

INT_PTR MyPropertySheet(const CObjectVector<CPageInfo> &pagesInfo, HWND hwndParent, const UString
&title);

}}

#endif
```

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```
// UpdateAction.h

#ifndef __UPDATE_ACTION_H
#define __UPDATE_ACTION_H

namespace NUpdateArchive {
```

```
namespace NPairState
{
  const unsigned kNumValues = 7;
  enum EEnum
  {
    kNotMasked = 0,
    kOnlyInArchive,
    kOnlyOnDisk,
    kNewInArchive,
    kOldInArchive,
    kSameFiles,
    kUnknowNewerFiles
  };
}

namespace NPairAction
{
  enum EEnum
  {
    kIgnore = 0,
    kCopy,
    kCompress,
    kCompressAsAnti
  };
}

struct CActionSet
{
  NPairAction::EEnum StateActions[NPairState::kNumValues];

  bool IsEqualTo(const CActionSet &a) const
  {
    for (unsigned i = 0; i < NPairState::kNumValues; i++)
      if (StateActions[i] != a.StateActions[i])
        return false;
    return true;
  }

  bool NeedScanning() const
  {
    unsigned i;
    for (i = 0; i < NPairState::kNumValues; i++)
      if (StateActions[i] == NPairAction::kCompress)
        return true;
    for (i = 1; i < NPairState::kNumValues;
i++)
      if (StateActions[i] != NPairAction::kIgnore)
```

```
        return true;
    return false;
  }
};

extern const CActionSet k_ActionSet_Add;
extern const CActionSet k_ActionSet_Update;
extern const CActionSet k_ActionSet_Fresh;
extern const CActionSet k_ActionSet_Sync;
extern const CActionSet k_ActionSet_Delete;
}

#endif
```

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* National Alliance for Medical Image Computing (NAMIC) is funded by the
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```
// List.h

#ifndef __LIST_H
#define __LIST_H

#include "../../../Common/Wildcard.h"

#include "../Common/LoadCodecs.h"

HRESULT ListArchives(CCodecs *codecs,
  const CObjectVector<COpenType> &types,
  const CIntVector &excludedFormats,
  bool stdInMode,
  UStringVector &archivePaths, UStringVector &archivePathsFull,
  bool processAltStreams, bool showAltStreams,
  const NWildcard::CCensorNode &wildcardCensor,
  bool enableHeaders, bool techMode,
  #ifndef _NO_CRYPTO
  bool &passwordEnabled, UString &password,
  #endif
  #ifndef _SFX
  const CObjectVector<CProperty> *props,
  #endif
  UInt64 &errors,
  UInt64 &numWarnings);

#endif
// Windows/CommonDialog.h

#ifndef __WINDOWS_COMMON_DIALOG_H
```

```
#define __WINDOWS_COMMON_DIALOG_H

#include "../Common/MyString.h"

namespace NWindows {

bool MyGetOpenFileName(HWND hwnd, LPCWSTR title,
  LPCWSTR initialDir,  // can be NULL, so dir prefix in filePath will be used
  LPCWSTR filePath,    // full path
  LPCWSTR filterDescription,  // like "All files (*.*)"
  LPCWSTR filter,             // like "*.exe"
  UString &resPath
  #ifdef UNDER_CE
  , bool openFolder = false
  #endif
);

}

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Child Element in license Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains an unknown child element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family:
 "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
```

```
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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```
// PropID.h

#ifndef __7ZIP_PROP_ID_H
#define __7ZIP_PROP_ID_H

#include "../Common/MyTypes.h"

enum
{
 kpidNoProperty = 0,
 kpidMainSubfile,
 kpidHandlerItemIndex,
 kpidPath,
 kpidName,
 kpidExtension,
 kpidIsDir,
 kpidSize,
 kpidPackSize,
 kpidAttrib,
 kpidCTime,
 kpidATime,
 kpidMTime,
 kpidSolid,
 kpidCommented,
 kpidEncrypted,
 kpidSplitBefore,
 kpidSplitAfter,
 kpidDictionarySize,
 kpidCRC,
 kpidType,
 kpidIsAnti,
 kpidMethod,
```

kpidHostOS,
kpidFileSystem,
kpidUser,
kpidGroup,
kpidBlock,
kpidComment,
kpidPosition,
kpidPrefix,
kpidNumSubDirs,
kpidNumSubFiles,
kpidUnpackVer,
kpidVolume,
kpidIsVolume,
kpidOffset,
kpidLinks,
kpidNumBlocks,
kpidNumVolumes,
kpidTimeType,
kpidBit64,
kpidBigEndian,
kpidCpu,
kpidPhySize,
kpidHeadersSize,
kpidChecksum,
kpidCharacts,
kpidVa,
kpidId,
kpidShortName,
kpidCreatorApp,
kpidSectorSize,
kpidPosixAttrib,
kpidSymLink,
kpidError,
kpidTotalSize,
kpidFreeSpace,
kpidClusterSize,
kpidVolumeName,
kpidLocalName,
kpidProvider,
kpidNtSecure,
kpidIsAltStream,
kpidIsAux,
kpidIsDeleted,
kpidIsTree,
kpidSha1,
kpidSha256,
kpidErrorType,
kpidNumErrors,

```
 kpidErrorFlags,
 kpidWarningFlags,
 kpidWarning,
 kpidNumStreams,
 kpidNumAltStreams,
 kpidAltStreamsSize,
 kpidVirtualSize,
 kpidUnpackSize,
 kpidTotalPhySize,
 kpidVolumeIndex,
 kpidSubType,
 kpidShortComment,
 kpidCodePage,
 kpidIsNotArcType,
 kpidPhySizeCantBeDetected,
 kpidZerosTailIsAllowed,
 kpidTailSize,
 kpidEmbeddedStubSize,
 kpidNtReparse,
 kpidHardLink,
 kpidINode,
 kpidStreamId,
 kpidReadOnly,
 kpidOutName,
 kpidCopyLink,

 kpid_NUM_DEFINED,

 kpidUserDefined = 0x10000
};

extern const Byte k7z_PROPID_To_VARTYPE[kpid_NUM_DEFINED]; // VARTYPE

const UInt32 kpv_ErrorFlags_IsNotArc              = 1 << 0;
const UInt32 kpv_ErrorFlags_HeadersError          = 1 << 1;
const UInt32 kpv_ErrorFlags_EncryptedHeadersError = 1 << 2;
const UInt32 kpv_ErrorFlags_UnavailableStart
     = 1 << 3;
const UInt32 kpv_ErrorFlags_UnconfirmedStart      = 1 << 4;
const UInt32 kpv_ErrorFlags_UnexpectedEnd         = 1 << 5;
const UInt32 kpv_ErrorFlags_DataAfterEnd          = 1 << 6;
const UInt32 kpv_ErrorFlags_UnsupportedMethod     = 1 << 7;
const UInt32 kpv_ErrorFlags_UnsupportedFeature    = 1 << 8;
const UInt32 kpv_ErrorFlags_DataError             = 1 << 9;
const UInt32 kpv_ErrorFlags_CrcError              = 1 << 10;
// const UInt32 kpv_ErrorFlags_Unsupported          = 1 << 11;

#endif
```

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// HandlerOut.h

#ifndef __HANDLER_OUT_H

```
#define __HANDLER_OUT_H

#include "../../../Windows/System.h"

#include "../../Common/MethodProps.h"

namespace NArchive {

bool ParseSizeString(const wchar_t *name, const PROPVARIANT &prop, UInt64 percentsBase, UInt64 &res);

class CCommonMethodProps
{
protected:
 void InitCommon()
 {
  #ifndef _7ZIP_ST
  _numProcessors = _numThreads = NWindows::NSystem::GetNumberOfProcessors();
  #endif

  UInt64 memAvail = (UInt64)(sizeof(size_t)) << 28;
  _memAvail = memAvail;
  _memUsage = memAvail;
  if (NWindows::NSystem::GetRamSize(memAvail))
  {
    _memAvail = memAvail;
    _memUsage = memAvail / 32 * 17;
  }
 }

public:
 #ifndef _7ZIP_ST
 UInt32 _numThreads;
 UInt32 _numProcessors;
 #endif

 UInt64 _memUsage;
 UInt64 _memAvail;

 bool SetCommonProperty(const UString &name, const PROPVARIANT &value, HRESULT &hres);

 CCommonMethodProps() { InitCommon(); }
};


#ifndef EXTRACT_ONLY

class CMultiMethodProps: public CCommonMethodProps
{
```

```
  UInt32 _level;
 int _analysisLevel;

 void InitMulti();
public:
 UInt32 _crcSize;
 CObjectVector<COneMethodInfo> _methods;
 COneMethodInfo _filterMethod;
 bool _autoFilter;


 void SetGlobalLevelTo(COneMethodInfo &oneMethodInfo) const;

 #ifndef _7ZIP_ST
 static void SetMethodThreadsTo(COneMethodInfo &oneMethodInfo, UInt32 numThreads);
 #endif


 unsigned GetNumEmptyMethods() const
 {
   unsigned i;
   for (i = 0; i < _methods.Size(); i++)
     if (!_methods[i].IsEmpty())
       break;
   return i;
 }

 int GetLevel() const { return _level == (UInt32)(Int32)-1 ? 5 : (int)_level; }
 int GetAnalysisLevel() const { return _analysisLevel; }

 void Init();
 CMultiMethodProps() { InitMulti(); }

 HRESULT SetProperty(const wchar_t *name, const PROPVARIANT &value);
};


class CSingleMethodProps: public COneMethodInfo, public CCommonMethodProps
{
 UInt32 _level;

 void InitSingle()
 {
   _level = (UInt32)(Int32)-1;
 }

public:
 void Init();
```

```
 CSingleMethodProps()
 { InitSingle(); }

 int GetLevel() const { return _level == (UInt32)(Int32)-1 ? 5 : (int)_level; }
 HRESULT SetProperties(const wchar_t * const *names, const PROPVARIANT *values, UInt32 numProps);
};

#endif

}

#endif
```

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```
#include <exdisp.h>
#include <mshtmhst.h>

#include <vector>
#include <string>

class WebBrowser final :
   /* public IUnknown, */
   /* public IOleWindow, */
   public IOleInPlaceSite,
   public IOleClientSite,
   public IDropTarget,
   public IStorage,
   public IDocHostUIHandler,
   public IDocHostShowUI,
   public IDispatch {
public:
 ////////////////////////////////////////////////////////////////////////////
 // Our own methods
 ////////////////////////////////////////////////////////////////////////////
 WebBrowser(HWND hWndParent);
 ~WebBrowser();

 WebBrowser(const WebBrowser&) = delete;
 WebBrowser& operator=(const WebBrowser&) = delete;

 void Shutdown();

 bool IsInitialized();

 HRESULT ActiveObjectTranslateAccelerator(bool tab, LPMSG lpmsg);
 void SetRect(const
 RECT& _rc);
 void Resize(DWORD width, DWORD height);
 void Navigate(wchar_t* szUrl);

 using CustomFunction = void (*)(void* context, VARIANT parameter,
```

```
                                VARIANT* retVal);
  void AddCustomFunction(wchar_t* name, CustomFunction function, void* arg);

  ////////////////////////////////////////////////////////////////////////////
  // Data members
  ////////////////////////////////////////////////////////////////////////////
 private:
  IOleObject* mOleObject = nullptr;
  IOleInPlaceObject* mOleInPlaceObject = nullptr;
  IOleInPlaceActiveObject* mOleInPlaceActiveObject = nullptr;
  IWebBrowser2* mWebBrowser2 = nullptr;

  LONG mComRefCount = 0;

  RECT mRect = {0, 0, 0, 0};

  HWND mHwndParent = nullptr;

  struct CustomFunctionRecord {
    std::wstring mName;
    CustomFunction mFunction;
    void* mArg;
  };
  std::vector<CustomFunctionRecord> mCustomFunctions;

  ////////////////////////////////////////////////////////////////////////////
   // COM interface methods
  ////////////////////////////////////////////////////////////////////////////
 public:
  // IUnknown
  HRESULT STDMETHODCALLTYPE QueryInterface(REFIID riid,
                                    void** ppvObject) override;
  ULONG STDMETHODCALLTYPE AddRef() override;
  ULONG STDMETHODCALLTYPE Release() override;

  // IOleWindow
  HRESULT STDMETHODCALLTYPE
  GetWindow(__RPC__deref_out_opt HWND* phwnd) override;
  HRESULT STDMETHODCALLTYPE ContextSensitiveHelp(BOOL fEnterMode) override;

  // IOleInPlaceSite
  HRESULT STDMETHODCALLTYPE CanInPlaceActivate() override;
  HRESULT STDMETHODCALLTYPE OnInPlaceActivate() override;
  HRESULT STDMETHODCALLTYPE OnUIActivate() override;
  HRESULT STDMETHODCALLTYPE GetWindowContext(
      __RPC__deref_out_opt IOleInPlaceFrame** ppFrame,
      __RPC__deref_out_opt IOleInPlaceUIWindow** ppDoc,
      __RPC__out LPRECT lprcPosRect, __RPC__out LPRECT lprcClipRect,
```

```
    __RPC__inout LPOLEINPLACEFRAMEINFO lpFrameInfo)
override;
HRESULT STDMETHODCALLTYPE Scroll(SIZE scrollExtant) override;
HRESULT STDMETHODCALLTYPE OnUIDeactivate(BOOL fUndoable) override;
HRESULT STDMETHODCALLTYPE OnInPlaceDeactivate() override;
HRESULT STDMETHODCALLTYPE DiscardUndoState() override;
HRESULT STDMETHODCALLTYPE DeactivateAndUndo() override;
HRESULT STDMETHODCALLTYPE
OnPosRectChange(__RPC__in LPCRECT lprcPosRect) override;

// IOleClientSite
HRESULT STDMETHODCALLTYPE SaveObject() override;
HRESULT STDMETHODCALLTYPE
GetMoniker(DWORD dwAssign, DWORD dwWhichMoniker,
          __RPC__deref_out_opt IMoniker** ppmk) override;
HRESULT STDMETHODCALLTYPE
GetContainer(__RPC__deref_out_opt IOleContainer** ppContainer) override;
HRESULT STDMETHODCALLTYPE ShowObject() override;
HRESULT STDMETHODCALLTYPE OnShowWindow(BOOL fShow) override;
HRESULT STDMETHODCALLTYPE RequestNewObjectLayout() override;

// IDropTarget
HRESULT STDMETHODCALLTYPE DragEnter(__RPC__in_opt IDataObject* pDataObj,

                        DWORD grfKeyState, POINTL pt,
                              __RPC__inout DWORD* pdwEffect) override;
HRESULT STDMETHODCALLTYPE DragOver(DWORD grfKeyState, POINTL pt,
                             __RPC__inout DWORD* pdwEffect) override;
HRESULT STDMETHODCALLTYPE DragLeave() override;
HRESULT STDMETHODCALLTYPE Drop(__RPC__in_opt IDataObject* pDataObj,
                         DWORD grfKeyState, POINTL pt,
                         __RPC__inout DWORD* pdwEffect) override;

// IStorage
HRESULT STDMETHODCALLTYPE CreateStream(
    __RPC__in_string const OLECHAR* pwcsName, DWORD grfMode, DWORD reserved1,
    DWORD reserved2, __RPC__deref_out_opt IStream** ppstm) override;
HRESULT STDMETHODCALLTYPE OpenStream(const OLECHAR* pwcsName, void* reserved1,
                              DWORD grfMode, DWORD reserved2,
                              IStream** ppstm) override;
HRESULT STDMETHODCALLTYPE CreateStorage(
     __RPC__in_string const OLECHAR* pwcsName, DWORD grfMode, DWORD reserved1,
    DWORD reserved2, __RPC__deref_out_opt IStorage** ppstg) override;
HRESULT STDMETHODCALLTYPE
OpenStorage(__RPC__in_opt_string const OLECHAR* pwcsName,
          __RPC__in_opt IStorage* pstgPriority, DWORD grfMode,
          __RPC__deref_opt_in_opt SNB snbExclude, DWORD reserved,
          __RPC__deref_out_opt IStorage** ppstg) override;
```

```
HRESULT STDMETHODCALLTYPE CopyTo(DWORD ciidExclude, const IID* rgiidExclude,
                        __RPC__in_opt SNB snbExclude,
                        IStorage* pstgDest) override;
HRESULT STDMETHODCALLTYPE MoveElementTo(
   __RPC__in_string const OLECHAR* pwcsName,
   __RPC__in_opt IStorage* pstgDest,
   __RPC__in_string const OLECHAR* pwcsNewName, DWORD grfFlags) override;
HRESULT STDMETHODCALLTYPE Commit(DWORD grfCommitFlags) override;
HRESULT STDMETHODCALLTYPE Revert(void) override;
HRESULT STDMETHODCALLTYPE
EnumElements(DWORD reserved1, void* reserved2,
                            DWORD reserved3,
                            IEnumSTATSTG** ppenum) override;
HRESULT STDMETHODCALLTYPE
DestroyElement(__RPC__in_string const OLECHAR* pwcsName) override;
HRESULT STDMETHODCALLTYPE
RenameElement(__RPC__in_string const OLECHAR* pwcsOldName,
           __RPC__in_string const OLECHAR* pwcsNewName) override;
HRESULT STDMETHODCALLTYPE
SetElementTimes(__RPC__in_opt_string const OLECHAR* pwcsName,
            __RPC__in_opt const FILETIME* pctime,
            __RPC__in_opt const FILETIME* patime,
            __RPC__in_opt const FILETIME* pmtime) override;
HRESULT STDMETHODCALLTYPE SetClass(__RPC__in REFCLSID clsid) override;
HRESULT STDMETHODCALLTYPE SetStateBits(DWORD grfStateBits,
                            DWORD grfMask) override;
HRESULT STDMETHODCALLTYPE Stat(__RPC__out STATSTG* pstatstg,

           DWORD grfStatFlag) override;

// IDocHostUIHandler
HRESULT STDMETHODCALLTYPE ShowContextMenu(
   _In_ DWORD dwID, _In_ POINT* ppt, _In_ IUnknown* pcmdtReserved,
   _In_ IDispatch* pdispReserved) override;
HRESULT STDMETHODCALLTYPE GetHostInfo(_Inout_ DOCHOSTUIINFO* pInfo) override;
HRESULT STDMETHODCALLTYPE ShowUI(_In_ DWORD dwID,
                        _In_ IOleInPlaceActiveObject* pActiveObject,
                        _In_ IOleCommandTarget* pCommandTarget,
                        _In_ IOleInPlaceFrame* pFrame,
                        _In_ IOleInPlaceUIWindow* pDoc) override;
HRESULT STDMETHODCALLTYPE HideUI() override;
HRESULT STDMETHODCALLTYPE UpdateUI() override;
HRESULT STDMETHODCALLTYPE EnableModeless(BOOL fEnable) override;
HRESULT STDMETHODCALLTYPE OnDocWindowActivate(BOOL fActivate) override;
HRESULT STDMETHODCALLTYPE OnFrameWindowActivate(BOOL fActivate) override;
HRESULT STDMETHODCALLTYPE
ResizeBorder(_In_ LPCRECT prcBorder,
                            _In_ IOleInPlaceUIWindow* pUIWindow,
```

```
                                _In_ BOOL fRameWindow) override;
HRESULT STDMETHODCALLTYPE TranslateAccelerator(LPMSG lpMsg,
                                const GUID* pguidCmdGroup,
                                DWORD nCmdID) override;
HRESULT STDMETHODCALLTYPE GetOptionKeyPath(_Out_ LPOLESTR* pchKey,
                                DWORD dw) override;
HRESULT STDMETHODCALLTYPE
GetDropTarget(_In_ IDropTarget* pDropTarget,
            _Outptr_ IDropTarget** ppDropTarget) override;
HRESULT STDMETHODCALLTYPE
GetExternal(_Outptr_result_maybenull_ IDispatch** ppDispatch) override;
HRESULT STDMETHODCALLTYPE TranslateUrl(DWORD dwTranslate,
                                _In_ LPWSTR pchURLIn,
                                _Outptr_ LPWSTR* ppchURLOut) override;
HRESULT STDMETHODCALLTYPE
 FilterDataObject(_In_ IDataObject* pDO,
              _Outptr_result_maybenull_ IDataObject** ppDORet) override;

// IDocHostShowUI
HRESULT STDMETHODCALLTYPE ShowMessage(
    /* [in] */ HWND hwnd,
    /* [annotation][in] */
    _In_ LPOLESTR lpstrText,
    /* [annotation][in] */
    _In_ LPOLESTR lpstrCaption,
    /* [in] */ DWORD dwType,
    /* [annotation][in] */
    _In_ LPOLESTR lpstrHelpFile,
    /* [in] */ DWORD dwHelpContext,
    /* [out] */ LRESULT* plResult) override;
HRESULT STDMETHODCALLTYPE ShowHelp(
    /* [in] */ HWND hwnd,
    /* [annotation][in] */
    _In_ LPOLESTR pszHelpFile,
    /* [in] */ UINT uCommand,
    /* [in] */ DWORD dwData,
    /* [in] */ POINT ptMouse,
    /* [out] */ IDispatch* pDispatchObjectHit) override;

// IDispatch
HRESULT STDMETHODCALLTYPE GetTypeInfoCount(
    /* [out] */ __RPC__out UINT* pctinfo) override;
HRESULT STDMETHODCALLTYPE GetTypeInfo(
    /* [in] */ UINT iTInfo,
    /* [in]
*/ LCID lcid,
    /* [out] */ __RPC__deref_out_opt ITypeInfo** ppTInfo) override;
HRESULT STDMETHODCALLTYPE GetIDsOfNames(
```

```
    /* [in] */ __RPC__in REFIID riid,
    /* [size_is][in] */ __RPC__in_ecount_full(cNames) LPOLESTR* rgszNames,
    /* [range][in] */ __RPC__in_range(0, 16384) UINT cNames,
    /* [in] */ LCID lcid,
    /* [size_is][out] */ __RPC__out_ecount_full(cNames) DISPID* rgDispId)
    override;
 /* [local] */ HRESULT STDMETHODCALLTYPE Invoke(
    /* [annotation][in] */
    _In_ DISPID dispIdMember,
    /* [annotation][in] */
    _In_ REFIID riid,
    /* [annotation][in] */
    _In_ LCID lcid,
    /* [annotation][in] */
    _In_ WORD wFlags,
    /* [annotation][out][in] */
    _In_ DISPPARAMS* pDispParams,
    /* [annotation][out] */
    _Out_opt_ VARIANT* pVarResult,
    /* [annotation][out] */
    _Out_opt_ EXCEPINFO* pExcepInfo,
    /* [annotation][out] */
    _Out_opt_ UINT* puArgErr) override;
};
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: No text Element in copyright Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-007-ref.xht" />
  <meta name="assert" content="The copyright element does not contain a text child element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
  {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-007.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
```

```
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Child Element in license Element text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element with an unknown child element." />
```

```
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size:
 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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file, You can obtain one at http://mozilla.org/MPL/2.0/.

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At the time this file was first modified, a complete, unmodified copy of
the LPPL Work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

Portions of this file were originally made available under the following license
(copied verbatim from hyph-it.lic.txt in the original work):

Italian hyphenation patterns

(more info about the licence to be added later)

% hyph-it.tex

```
%
% Italian hyphenation patterns
%
%
 This file is part of the hyph-utf8 package.
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
%-----------------------------------------------------------------------------
%
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% and version 1.3 or later is part of all distributions
% of LaTeX version 2003/12/01 or later.
%
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%
% This Current Maintainer of this work is Claudio Beccari
% e-mail:  claudio dot beccari at gmail dot com
%
% This work consists of the single file hyph-it.tex.
%
% \versionnumber{4.8i}   \versiondate{2011/08/16}
%
% These hyphenation patterns for the Italian language are supposed to comply
% with the Recommendation UNI 6461 on hyphenation
 issued by the Italian
% Standards Institution (Ente Nazionale di Unificazione UNI).  No guarantee
% or declaration of fitness to any particular purpose is given and any
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%
% ChangeLog:
% - 2011-08-16 - Change the licence from GNU LGPL into LPPL v1.3.
% - 2010-05-24 - Fix for Italian patterns for proper hyphenation of -ich and Ljubljana.
% - 2008-06-09 - Import of original ithyph.tex into hyph-utf8 package.
% - 2008-03-08 - (last change in ithyph.tex)
%
<?xml version="1.0" encoding="utf-8"?>
<Project DefaultTargets="Build" ToolsVersion="15.0"
xmlns="http://schemas.microsoft.com/developer/msbuild/2003">
 <ItemGroup Label="ProjectConfigurations">
   <ProjectConfiguration Include="Debug|Win32">
```

```
    <Configuration>Debug</Configuration>
    <Platform>Win32</Platform>
  </ProjectConfiguration>
  <ProjectConfiguration Include="Release|Win32">
    <Configuration>Release</Configuration>
    <Platform>Win32</Platform>
  </ProjectConfiguration>
</ItemGroup>
<PropertyGroup Label="Globals">
  <SccProjectName />
  <SccLocalPath />
  <ProjectGuid>{EF903B79-AD97-45E0-BC6E-4FF846D6A2ED}</ProjectGuid>
  <WindowsTargetPlatformVersion>10.0</WindowsTargetPlatformVersion>
</PropertyGroup>
<Import Project="$(VCTargetsPath)\Microsoft.Cpp.Default.props" />
<PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'" Label="Configuration">
  <ConfigurationType>DynamicLibrary</ConfigurationType>
  <PlatformToolset>v142</PlatformToolset>
   <UseOfMfc>false</UseOfMfc>
  <CharacterSet>Unicode</CharacterSet>
  <SpectreMitigation>false</SpectreMitigation>
</PropertyGroup>
<PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'" Label="Configuration">
  <ConfigurationType>DynamicLibrary</ConfigurationType>
  <PlatformToolset>v142</PlatformToolset>
  <UseOfMfc>false</UseOfMfc>
  <CharacterSet>Unicode</CharacterSet>
  <WholeProgramOptimization>true</WholeProgramOptimization>
  <SpectreMitigation>false</SpectreMitigation>
</PropertyGroup>
<Import Project="$(VCTargetsPath)\Microsoft.Cpp.props" />
<ImportGroup Label="ExtensionSettings">
</ImportGroup>
<ImportGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'" Label="PropertySheets">
  <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform" />
  <Import Project="$(VCTargetsPath)Microsoft.Cpp.UpgradeFromVC60.props"
/>
</ImportGroup>
<ImportGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'" Label="PropertySheets">
  <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform" />
  <Import Project="$(VCTargetsPath)Microsoft.Cpp.UpgradeFromVC60.props" />
</ImportGroup>
<PropertyGroup Label="UserMacros" />
<PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'">
  <OutDir>.\Release\</OutDir>
  <IntDir>.\Release\</IntDir>
```

```
  <LinkIncremental>false</LinkIncremental>
 </PropertyGroup>
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'">
  <OutDir>.\Debug\</OutDir>
  <IntDir>.\Debug\</IntDir>
  <LinkIncremental>true</LinkIncremental>
 </PropertyGroup>
 <ItemDefinitionGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'">
  <ClCompile>
    <RuntimeLibrary>MultiThreaded</RuntimeLibrary>
     <StringPooling>true</StringPooling>
    <Optimization>MinSpace</Optimization>
    <SuppressStartupBanner>true</SuppressStartupBanner>
    <WarningLevel>Level3</WarningLevel>
<PreprocessorDefinitions>WIN32;NDEBUG;_WINDOWS;_USRDLL;%(PreprocessorDefinitions)</PreprocessorD
efinitions>
    <FavorSizeOrSpeed>Size</FavorSizeOrSpeed>
    <DebugInformationFormat>None</DebugInformationFormat>
    <ExceptionHandling>false</ExceptionHandling>
    <BufferSecurityCheck>false</BufferSecurityCheck>
    <RuntimeTypeInfo>false</RuntimeTypeInfo>
    <IntrinsicFunctions>true</IntrinsicFunctions>
  </ClCompile>
  <Midl>
    <SuppressStartupBanner>true</SuppressStartupBanner>
    <PreprocessorDefinitions>NDEBUG;%(PreprocessorDefinitions)</PreprocessorDefinitions>
    <TypeLibraryName>.\Release\WebBrowser.tlb</TypeLibraryName>
    <MkTypLibCompatible>true</MkTypLibCompatible>
    <TargetEnvironment>Win32</TargetEnvironment>
  </Midl>
   <ResourceCompile>
    <Culture>0x080a</Culture>
    <PreprocessorDefinitions>NDEBUG;%(PreprocessorDefinitions)</PreprocessorDefinitions>
  </ResourceCompile>
  <Bscmake>
    <SuppressStartupBanner>true</SuppressStartupBanner>
    <OutputFile>.\Release\WebBrowser.bsc</OutputFile>
  </Bscmake>
  <Link>
    <SuppressStartupBanner>true</SuppressStartupBanner>
    <LinkDLL>true</LinkDLL>
    <SubSystem>Windows</SubSystem>
    <OutputFile>.\Release\WebBrowser.dll</OutputFile>
    <ImportLibrary>.\Release\WebBrowser.lib</ImportLibrary>
<AdditionalDependencies>odbc32.lib;odbccp32.lib;urlmon.lib;%(AdditionalDependencies)</AdditionalDependenci
es>
    <GenerateDebugInformation>false</GenerateDebugInformation>
    <OptimizeReferences>true</OptimizeReferences>
```

```
    <LinkTimeCodeGeneration>UseLinkTimeCodeGeneration</LinkTimeCodeGeneration>
    <EnableCOMDATFolding>true</EnableCOMDATFolding>
    <EntryPointSymbol>
    </EntryPointSymbol>
  </Link>
 </ItemDefinitionGroup>
  <ItemDefinitionGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'">
  <ClCompile>
    <RuntimeLibrary>MultiThreadedDebug</RuntimeLibrary>
    <InlineFunctionExpansion>Default</InlineFunctionExpansion>
    <Optimization>Disabled</Optimization>
    <SuppressStartupBanner>true</SuppressStartupBanner>
    <WarningLevel>Level3</WarningLevel>
    <DebugInformationFormat>EditAndContinue</DebugInformationFormat>
<PreprocessorDefinitions>WIN32;_DEBUG;_WINDOWS;_USRDLL;%(PreprocessorDefinitions)</PreprocessorD
efinitions>
    <BasicRuntimeChecks>EnableFastChecks</BasicRuntimeChecks>
    <ExceptionHandling>false</ExceptionHandling>
    <LanguageStandard>Default</LanguageStandard>
  </ClCompile>
  <Midl>
    <SuppressStartupBanner>true</SuppressStartupBanner>
    <PreprocessorDefinitions>_DEBUG;%(PreprocessorDefinitions)</PreprocessorDefinitions>
    <TypeLibraryName>.\Debug\WebBrowser.tlb</TypeLibraryName>
    <MkTypLibCompatible>true</MkTypLibCompatible>
     <TargetEnvironment>Win32</TargetEnvironment>
  </Midl>
  <ResourceCompile>
    <Culture>0x080a</Culture>
    <PreprocessorDefinitions>_DEBUG;%(PreprocessorDefinitions)</PreprocessorDefinitions>
  </ResourceCompile>
  <Bscmake>
    <SuppressStartupBanner>true</SuppressStartupBanner>
    <OutputFile>.\Debug\WebBrowser.bsc</OutputFile>
  </Bscmake>
  <Link>
    <SuppressStartupBanner>true</SuppressStartupBanner>
    <LinkDLL>true</LinkDLL>
    <GenerateDebugInformation>true</GenerateDebugInformation>
    <SubSystem>Windows</SubSystem>
    <OutputFile>.\Debug\WebBrowser.dll</OutputFile>
    <ImportLibrary>.\Debug\WebBrowser.lib</ImportLibrary>
<AdditionalDependencies>odbc32.lib;odbccp32.lib;urlmon.lib;%(AdditionalDependencies)</AdditionalDependenci
es>
    <OptimizeReferences>false</OptimizeReferences>
    <ImageHasSafeExceptionHandlers>false</ImageHasSafeExceptionHandlers>
  </Link>
 </ItemDefinitionGroup>
```

```
 <ItemGroup>
    <ClCompile Include="CustomFunctions.cpp" />
   <ClCompile Include="exdll.cpp" />
   <ClCompile Include="main.cpp" />
   <ClCompile Include="Timers.cpp" />
   <ClCompile Include="WebBrowser.cpp" />
 </ItemGroup>
 <ItemGroup>
   <ClInclude Include="exdll.h" />
   <ClInclude Include="resource.h" />
   <ClInclude Include="WebBrowser.h" />
 </ItemGroup>
 <ItemGroup>
   <ResourceCompile Include="resource.rc" />
 </ItemGroup>
 <Import Project="$(VCTargetsPath)\Microsoft.Cpp.targets" />
 <ImportGroup Label="ExtensionTargets">
 </ImportGroup>
</Project>
```

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```
// Common/String.h

#ifndef __COMMON_STRING_H
#define __COMMON_STRING_H

#include <string.h>
```

```
#ifndef _WIN32
#include <wctype.h>
#include <wchar.h>
#endif

#include "MyWindows.h"
#include "MyTypes.h"
#include "MyVector.h"


#ifdef _MSC_VER
 #ifdef _NATIVE_WCHAR_T_DEFINED
   #define MY_NATIVE_WCHAR_T_DEFINED
 #endif
#else
   #define MY_NATIVE_WCHAR_T_DEFINED
#endif

/*
 native support for wchar_t:
_MSC_VER == 1600 : /Zc:wchar_t is not supported
_MSC_VER == 1310 (VS2003)
? _MSC_VER == 1400 (VS2005) : wchar_t <- unsigned short
            /Zc:wchar_t  : wchar_t <- __wchar_t, _WCHAR_T_DEFINED and _NATIVE_WCHAR_T_DEFINED
_MSC_VER > 1400 (VS2008+)
            /Zc:wchar_t[-]
            /Zc:wchar_t is on by default
*/

#ifdef _WIN32
#define IS_PATH_SEPAR(c) ((c) == '\\' || (c) == '/')
#else
#define IS_PATH_SEPAR(c) ((c) == CHAR_PATH_SEPARATOR)
#endif

inline bool IsPathSepar(char    c) { return IS_PATH_SEPAR(c); }
inline bool IsPathSepar(wchar_t c) { return IS_PATH_SEPAR(c); }

inline
 unsigned MyStringLen(const char *s)
{
 unsigned i;
 for (i = 0; s[i] != 0; i++);
 return i;
}

inline void MyStringCopy(char *dest, const char *src)
{
```

```
 while ((*dest++ = *src++) != 0);
}

inline char *MyStpCpy(char *dest, const char *src)
{
 for (;;)
 {
   char c = *src;
   *dest = c;
   if (c == 0)
     return dest;
   src++;
   dest++;
 }
}

inline unsigned MyStringLen(const wchar_t *s)
{
 unsigned i;
 for (i = 0; s[i] != 0; i++);
 return i;
}

inline void MyStringCopy(wchar_t *dest, const wchar_t *src)
{
 while ((*dest++ = *src++) != 0);
}

inline void MyStringCat(wchar_t *dest, const wchar_t *src)
{
 MyStringCopy(dest + MyStringLen(dest), src);
}


/*
inline wchar_t *MyWcpCpy(wchar_t *dest, const wchar_t *src)
{
 for (;;)
 {
   wchar_t c = *src;
   *dest = c;
   if (c == 0)
     return dest;
   src++;
   dest++;
 }
}
*/
```

```
int FindCharPosInString(const char *s, char c) throw();
int FindCharPosInString(const wchar_t *s, wchar_t c) throw();

#ifdef _WIN32
  #ifndef _UNICODE
   #define STRING_UNICODE_THROW
 #endif
#endif

#ifndef STRING_UNICODE_THROW
 #define STRING_UNICODE_THROW throw()
#endif


inline char MyCharUpper_Ascii(char c)
{
 if (c >= 'a' && c <= 'z')
   return (char)((unsigned char)c - 0x20);
 return c;
}

/*
inline wchar_t MyCharUpper_Ascii(wchar_t c)
{
 if (c >= 'a' && c <= 'z')
   return (wchar_t)(c - 0x20);
 return c;
}
*/

inline char MyCharLower_Ascii(char c)
{
 if (c >= 'A' && c <= 'Z')
   return (char)((unsigned char)c + 0x20);
 return c;
}

inline wchar_t MyCharLower_Ascii(wchar_t c)
{
 if (c >= 'A' && c <= 'Z')
   return (wchar_t)(c + 0x20);
 return c;
}

wchar_t MyCharUpper_WIN(wchar_t c) throw();

inline wchar_t MyCharUpper(wchar_t c) throw()
```

```
{
 if (c < 'a') return c;
 if (c <= 'z') return (wchar_t)(c - 0x20);
 if (c <= 0x7F) return c;
 #ifdef _WIN32
   #ifdef _UNICODE
     return (wchar_t)(unsigned)(UINT_PTR)CharUpperW((LPWSTR)(UINT_PTR)(unsigned)c);
   #else
     return (wchar_t)MyCharUpper_WIN(c);
    #endif
 #else
   return (wchar_t)towupper(c);
 #endif
}

/*
wchar_t MyCharLower_WIN(wchar_t c) throw();

inline wchar_t MyCharLower(wchar_t c) throw()
{
 if (c < 'A') return c;
 if (c <= 'Z') return (wchar_t)(c + 0x20);
 if (c <= 0x7F) return c;
 #ifdef _WIN32
   #ifdef _UNICODE
     return (wchar_t)(unsigned)(UINT_PTR)CharLowerW((LPWSTR)(UINT_PTR)(unsigned)c);
   #else
     return (wchar_t)MyCharLower_WIN(c);
   #endif
 #else
   return (wchar_t)tolower(c);
 #endif
}
*/

// char *MyStringUpper(char *s) throw();
// char *MyStringLower(char *s) throw();

// void MyStringUpper_Ascii(char *s) throw();
// void MyStringUpper_Ascii(wchar_t *s) throw();
void MyStringLower_Ascii(char *s) throw();
void MyStringLower_Ascii(wchar_t *s) throw();
// wchar_t *MyStringUpper(wchar_t *s) STRING_UNICODE_THROW;
// wchar_t *MyStringLower(wchar_t *s) STRING_UNICODE_THROW;

bool StringsAreEqualNoCase(const wchar_t *s1, const wchar_t *s2) throw();

bool IsString1PrefixedByString2(const
```

```
 char *s1, const char *s2) throw();
bool IsString1PrefixedByString2(const wchar_t *s1, const wchar_t *s2) throw();
bool IsString1PrefixedByString2(const wchar_t *s1, const char *s2) throw();
bool IsString1PrefixedByString2_NoCase_Ascii(const wchar_t *u, const char *a) throw();
bool IsString1PrefixedByString2_NoCase(const wchar_t *s1, const wchar_t *s2) throw();

#define MyStringCompare(s1, s2) wcscmp(s1, s2)
int MyStringCompareNoCase(const wchar_t *s1, const wchar_t *s2) throw();
// int MyStringCompareNoCase_N(const wchar_t *s1, const wchar_t *s2, unsigned num) throw();

// ---------- ASCII ----------
// char values in ASCII strings must be less then 128
bool StringsAreEqual_Ascii(const wchar_t *u, const char *a) throw();
bool StringsAreEqualNoCase_Ascii(const char *s1, const char *s2) throw();
bool StringsAreEqualNoCase_Ascii(const wchar_t *s1, const char *s2) throw();
bool StringsAreEqualNoCase_Ascii(const wchar_t *s1, const wchar_t *s2) throw();

#define MY_STRING_DELETE(_p_)
 delete []_p_;
// #define MY_STRING_DELETE(_p_) my_delete(_p_);


#define FORBID_STRING_OPS_2(cls, t) \
 void Find(t) const; \
 void Find(t, unsigned startIndex) const; \
 void ReverseFind(t) const; \
 void InsertAtFront(t); \
 void RemoveChar(t); \
 void Replace(t, t); \

#define FORBID_STRING_OPS(cls, t) \
 explicit cls(t); \
 explicit cls(const t *); \
 cls &operator=(t); \
 cls &operator=(const t *); \
 cls &operator+=(t); \
 cls &operator+=(const t *); \
 FORBID_STRING_OPS_2(cls, t); \

/*
 cls &operator+(t); \
 cls &operator+(const t *); \
*/

#define FORBID_STRING_OPS_AString(t) FORBID_STRING_OPS(AString, t)
#define FORBID_STRING_OPS_UString(t) FORBID_STRING_OPS(UString, t)
#define FORBID_STRING_OPS_UString2(t) FORBID_STRING_OPS(UString2, t)
```

```
class AString
{
 char *_chars;
 unsigned _len;
 unsigned _limit;

 void MoveItems(unsigned dest, unsigned src)
 {
   memmove(_chars + dest, _chars + src, (size_t)(_len - src + 1) * sizeof(char));
 }

 void InsertSpace(unsigned
 &index, unsigned size);

 void ReAlloc(unsigned newLimit);
 void ReAlloc2(unsigned newLimit);
 void SetStartLen(unsigned len);
 void Grow_1();
 void Grow(unsigned n);

 AString(unsigned num, const char *s);
 AString(unsigned num, const AString &s);
 AString(const AString &s, char c); // it's for String + char
 AString(const char *s1, unsigned num1, const char *s2, unsigned num2);

 friend AString operator+(const AString &s, char c) { return AString(s, c); } ;
 // friend AString operator+(char c, const AString &s); // is not supported

 friend AString operator+(const AString &s1, const AString &s2);
 friend AString operator+(const AString &s1, const char    *s2);
 friend AString operator+(const char    *s1, const AString &s2);

 // ---------- forbidden functions ----------

 #ifdef MY_NATIVE_WCHAR_T_DEFINED
 FORBID_STRING_OPS_AString(wchar_t)
 #endif

 FORBID_STRING_OPS_AString(signed char)
 FORBID_STRING_OPS_AString(unsigned char)
 FORBID_STRING_OPS_AString(short)
  FORBID_STRING_OPS_AString(unsigned short)
 FORBID_STRING_OPS_AString(int)
 FORBID_STRING_OPS_AString(unsigned)
 FORBID_STRING_OPS_AString(long)
 FORBID_STRING_OPS_AString(unsigned long)

public:
```

```
explicit AString();
explicit AString(char c);
explicit AString(const char *s);
AString(const AString &s);
~AString() { MY_STRING_DELETE(_chars); }

unsigned Len() const { return _len; }
bool IsEmpty() const { return _len == 0; }
void Empty() { _len = 0; _chars[0] = 0; }

operator const char *() const { return _chars; }
const char *Ptr() const { return _chars; }
const char *Ptr(unsigned pos) const { return _chars + pos; }
const char *RightPtr(unsigned num) const { return _chars + _len - num; }
char Back() const { return _chars[(size_t)_len - 1]; }

void ReplaceOneCharAtPos(unsigned pos, char c) { _chars[pos] = c; }

/* GetBuf(minLen): provides the buffer that can store
   at least (minLen) characters and additional null terminator.
   9.35:
GetBuf doesn't preserve old characters and terminator */
char *GetBuf(unsigned minLen)
{
  if (minLen > _limit)
    ReAlloc2(minLen);
  return _chars;
}
char *GetBuf_SetEnd(unsigned minLen)
{
  if (minLen > _limit)
    ReAlloc2(minLen);
  char *chars = _chars;
  chars[minLen] = 0;
  _len = minLen;
  return chars;
}

void ReleaseBuf_SetLen(unsigned newLen) { _len = newLen; }
void ReleaseBuf_SetEnd(unsigned newLen) { _len = newLen; _chars[newLen] = 0; }
void ReleaseBuf_CalcLen(unsigned maxLen)
{
  char *chars = _chars;
  chars[maxLen] = 0;
  _len = MyStringLen(chars);
}

AString &operator=(char c);
```

```
AString &operator=(const char *s);
AString &operator=(const AString &s);
void SetFromWStr_if_Ascii(const wchar_t *s);
// void SetFromBstr_if_Ascii(BSTR s);

AString &operator+=(char c)
{
  if (_limit == _len)
    Grow_1();
  unsigned len = _len;
  char *chars = _chars;
  chars[len++] = c;
  chars[len] = 0;
  _len = len;
   return *this;
}

void Add_Space();
void Add_Space_if_NotEmpty();
void Add_OptSpaced(const char *s);
void Add_LF();
void Add_PathSepar() { operator+=(CHAR_PATH_SEPARATOR); }

AString &operator+=(const char *s);
AString &operator+=(const AString &s);

void Add_UInt32(UInt32 v);

void SetFrom(const char *s, unsigned len); // no check
void SetFrom_CalcLen(const char *s, unsigned len);

AString Mid(unsigned startIndex, unsigned count) const { return AString(count, _chars + startIndex); }
AString Left(unsigned count) const { return AString(count, *this); }

// void MakeUpper() { MyStringUpper(_chars); }
// void MakeLower() { MyStringLower(_chars); }
void MakeLower_Ascii() { MyStringLower_Ascii(_chars); }


bool IsEqualTo(const char *s) const { return strcmp(_chars, s) == 0; }
bool IsEqualTo_Ascii_NoCase(const char *s) const { return StringsAreEqualNoCase_Ascii(_chars, s); }
// int Compare(const char *s) const { return MyStringCompare(_chars, s); }
 // int Compare(const AString &s) const { return MyStringCompare(_chars, s._chars); }
// int CompareNoCase(const char *s) const { return MyStringCompareNoCase(_chars, s); }
// int CompareNoCase(const AString &s) const { return MyStringCompareNoCase(_chars, s._chars); }
bool IsPrefixedBy(const char *s) const { return IsString1PrefixedByString2(_chars, s); }
bool IsPrefixedBy_Ascii_NoCase(const char *s) const throw();
```

```
bool IsAscii() const
{
  unsigned len = Len();
  const char *s = _chars;
  for (unsigned i = 0; i < len; i++)
    if ((unsigned char)s[i] >= 0x80)
      return false;
  return true;
}
int Find(char c) const { return FindCharPosInString(_chars, c); }
int Find(char c, unsigned startIndex) const
{
  int pos = FindCharPosInString(_chars + startIndex, c);
  return pos < 0 ? -1 : (int)startIndex + pos;
}

int ReverseFind(char c) const throw();
int ReverseFind_Dot() const throw() { return ReverseFind('.'); }
int ReverseFind_PathSepar()
const throw();

int Find(const char *s) const { return Find(s, 0); }
int Find(const char *s, unsigned startIndex) const throw();

void TrimLeft() throw();
void TrimRight() throw();
void Trim()
{
  TrimRight();
  TrimLeft();
}

void InsertAtFront(char c);
// void Insert(unsigned index, char c);
void Insert(unsigned index, const char *s);
void Insert(unsigned index, const AString &s);

void RemoveChar(char ch) throw();

void Replace(char oldChar, char newChar) throw();
void Replace(const AString &oldString, const AString &newString);

void Delete(unsigned index) throw();
void Delete(unsigned index, unsigned count) throw();
void DeleteFrontal(unsigned num) throw();
void DeleteBack() { _chars[--_len] = 0; }
void DeleteFrom(unsigned index)
{
```

```
  if (index < _len)
  {
    _len = index;
    _chars[index] = 0;
  }
 }
};

bool operator<(const AString &s1, const AString &s2);
bool operator>(const AString &s1, const AString &s2);

/*
bool
 operator==(const AString &s1, const AString &s2);
bool operator==(const AString &s1, const char    *s2);
bool operator==(const char    *s1, const AString &s2);

bool operator!=(const AString &s1, const AString &s2);
bool operator!=(const AString &s1, const char    *s2);
bool operator!=(const char    *s1, const AString &s2);
*/

inline bool operator==(const AString &s1, const AString &s2) { return s1.Len() == s2.Len() && strcmp(s1, s2) ==
0; }
inline bool operator==(const AString &s1, const char    *s2) { return strcmp(s1, s2) == 0; }
inline bool operator==(const char    *s1, const AString &s2) { return strcmp(s1, s2) == 0; }

inline bool operator!=(const AString &s1, const AString &s2) { return s1.Len() != s2.Len() || strcmp(s1, s2) != 0; }
inline bool operator!=(const AString &s1, const char    *s2) { return strcmp(s1, s2) != 0; }
inline bool operator!=(const char    *s1, const AString &s2) { return strcmp(s1, s2) != 0; }

// ---------- forbidden functions ----------

void operator==(char
 c1, const AString &s2);
void operator==(const AString &s1, char c2);

void operator+(char c, const AString &s); // this function can be OK, but we don't use it

void operator+(const AString &s, int c);
void operator+(const AString &s, unsigned c);
void operator+(int c, const AString &s);
void operator+(unsigned c, const AString &s);
void operator-(const AString &s, int c);
void operator-(const AString &s, unsigned c);


class UString
```

```
{
wchar_t *_chars;
unsigned _len;
unsigned _limit;

void MoveItems(unsigned dest, unsigned src)
{
  memmove(_chars + dest, _chars + src, (size_t)(_len - src + 1) * sizeof(wchar_t));
}

void InsertSpace(unsigned index, unsigned size);

void ReAlloc(unsigned newLimit);
void ReAlloc2(unsigned newLimit);
void SetStartLen(unsigned len);
void Grow_1();
void Grow(unsigned n);

UString(unsigned num, const wchar_t *s); // for Mid
UString(unsigned num, const UString &s); // for Left
UString(const UString &s, wchar_t c); //
it's for String + char
UString(const wchar_t *s1, unsigned num1, const wchar_t *s2, unsigned num2);

friend UString operator+(const UString &s, wchar_t c) { return UString(s, c); } ;
// friend UString operator+(wchar_t c, const UString &s); // is not supported

friend UString operator+(const UString &s1, const UString &s2);
friend UString operator+(const UString &s1, const wchar_t *s2);
friend UString operator+(const wchar_t *s1, const UString &s2);

// ---------- forbidden functions ----------

FORBID_STRING_OPS_UString(signed char)
FORBID_STRING_OPS_UString(unsigned char)
FORBID_STRING_OPS_UString(short)

#ifdef MY_NATIVE_WCHAR_T_DEFINED
FORBID_STRING_OPS_UString(unsigned short)
#endif

FORBID_STRING_OPS_UString(int)
FORBID_STRING_OPS_UString(unsigned)
FORBID_STRING_OPS_UString(long)
FORBID_STRING_OPS_UString(unsigned long)

FORBID_STRING_OPS_2(UString, char)
```

```
public:
 UString();
 explicit UString(wchar_t c);
 explicit UString(char c);
 explicit
 UString(const char *s);
 // UString(const AString &s);
 UString(const wchar_t *s);
 UString(const UString &s);
 ~UString() { MY_STRING_DELETE(_chars); }

 unsigned Len() const { return _len; }
 bool IsEmpty() const { return _len == 0; }
 void Empty() { _len = 0; _chars[0] = 0; }

 operator const wchar_t *() const { return _chars; }
 const wchar_t *Ptr() const { return _chars; }
 const wchar_t *Ptr(unsigned pos) const { return _chars + pos; }
 const wchar_t *RightPtr(unsigned num) const { return _chars + _len - num; }
 wchar_t Back() const { return _chars[(size_t)_len - 1]; }

 void ReplaceOneCharAtPos(unsigned pos, wchar_t c) { _chars[pos] = c; }

 wchar_t *GetBuf() { return _chars; }

 wchar_t *GetBuf(unsigned minLen)
 {
  if (minLen > _limit)
    ReAlloc2(minLen);
  return _chars;
 }
 wchar_t *GetBuf_SetEnd(unsigned minLen)
 {
  if (minLen > _limit)
    ReAlloc2(minLen);
  wchar_t *chars = _chars;
  chars[minLen] = 0;
  _len = minLen;
  return
 chars;
 }

 void ReleaseBuf_SetLen(unsigned newLen) { _len = newLen; }
 void ReleaseBuf_SetEnd(unsigned newLen) { _len = newLen; _chars[newLen] = 0; }
 void ReleaseBuf_CalcLen(unsigned maxLen)
 {
  wchar_t *chars = _chars;
  chars[maxLen] = 0;
```

```
  _len = MyStringLen(chars);
}

UString &operator=(wchar_t c);
UString &operator=(char c) { return (*this)=((wchar_t)(unsigned char)c); }
UString &operator=(const wchar_t *s);
UString &operator=(const UString &s);
void SetFrom(const wchar_t *s, unsigned len); // no check
void SetFromBstr(BSTR s);
UString &operator=(const char *s);
UString &operator=(const AString &s) { return operator=(s.Ptr()); }

UString &operator+=(wchar_t c)
{
  if (_limit == _len)
    Grow_1();
  unsigned len = _len;
  wchar_t *chars = _chars;
  chars[len++] = c;
  chars[len] = 0;
  _len = len;
  return *this;
}

UString &operator+=(char c) { return (*this)+=((wchar_t)(unsigned char)c); }

void Add_Space();
void Add_Space_if_NotEmpty();
 void Add_LF();
void Add_PathSepar() { operator+=(WCHAR_PATH_SEPARATOR); }

UString &operator+=(const wchar_t *s);
UString &operator+=(const UString &s);
UString &operator+=(const char *s);
UString &operator+=(const AString &s) { return operator+=(s.Ptr()); }

void Add_UInt32(UInt32 v);

UString Mid(unsigned startIndex, unsigned count) const { return UString(count, _chars + startIndex); }
UString Left(unsigned count) const { return UString(count, *this); }

// void MakeUpper() { MyStringUpper(_chars); }
// void MakeUpper() { MyStringUpper_Ascii(_chars); }
// void MakeUpper_Ascii() { MyStringUpper_Ascii(_chars); }
void MakeLower_Ascii() { MyStringLower_Ascii(_chars); }

bool IsEqualTo(const char *s) const { return StringsAreEqual_Ascii(_chars, s); }
bool IsEqualTo_NoCase(const wchar_t *s) const { return StringsAreEqualNoCase(_chars, s); }
```

```
bool IsEqualTo_Ascii_NoCase(const char *s) const { return StringsAreEqualNoCase_Ascii(_chars, s);
}
int Compare(const wchar_t *s) const { return wcscmp(_chars, s); }
// int Compare(const UString &s) const { return MyStringCompare(_chars, s._chars); }
// int CompareNoCase(const wchar_t *s) const { return MyStringCompareNoCase(_chars, s); }
// int CompareNoCase(const UString &s) const { return MyStringCompareNoCase(_chars, s._chars); }
bool IsPrefixedBy(const wchar_t *s) const { return IsString1PrefixedByString2(_chars, s); }
bool IsPrefixedBy_NoCase(const wchar_t *s) const { return IsString1PrefixedByString2_NoCase(_chars, s); }
bool IsPrefixedBy_Ascii_NoCase(const char *s) const throw();

bool IsAscii() const
{
  unsigned len = Len();
  const wchar_t *s = _chars;
  for (unsigned i = 0; i < len; i++)
    if (s[i] >= 0x80)
      return false;
  return true;
}
int Find(wchar_t c) const { return FindCharPosInString(_chars, c); }
int Find(wchar_t c, unsigned startIndex) const
{
  int pos = FindCharPosInString(_chars + startIndex, c);
  return
pos < 0 ? -1 : (int)startIndex + pos;
}

int ReverseFind(wchar_t c) const throw();
int ReverseFind_Dot() const throw() { return ReverseFind(L'.'); }
int ReverseFind_PathSepar() const throw();

int Find(const wchar_t *s) const { return Find(s, 0); }
int Find(const wchar_t *s, unsigned startIndex) const throw();

void TrimLeft() throw();
void TrimRight() throw();
void Trim()
{
  TrimRight();
  TrimLeft();
}

void InsertAtFront(wchar_t c);
// void Insert(unsigned index, wchar_t c);
void Insert(unsigned index, const wchar_t *s);
void Insert(unsigned index, const UString &s);

void RemoveChar(wchar_t ch) throw();
```

```
 void Replace(wchar_t oldChar, wchar_t newChar) throw();
 void Replace(const UString &oldString, const UString &newString);

 void Delete(unsigned index) throw();
 void Delete(unsigned index, unsigned count) throw();
 void DeleteFrontal(unsigned num) throw();
 void DeleteBack() { _chars[--_len] = 0; }
 void DeleteFrom(unsigned index)
  {
  if (index < _len)
  {
    _len = index;
    _chars[index] = 0;
  }
 }
};

bool operator<(const UString &s1, const UString &s2);
bool operator>(const UString &s1, const UString &s2);

inline bool operator==(const UString &s1, const UString &s2) { return s1.Len() == s2.Len() && wcscmp(s1, s2) ==
0; }
inline bool operator==(const UString &s1, const wchar_t *s2) { return wcscmp(s1, s2) == 0; }
inline bool operator==(const wchar_t *s1, const UString &s2) { return wcscmp(s1, s2) == 0; }

inline bool operator!=(const UString &s1, const UString &s2) { return s1.Len() != s2.Len() || wcscmp(s1, s2) != 0; }
inline bool operator!=(const UString &s1, const wchar_t *s2) { return wcscmp(s1, s2) != 0; }
inline bool operator!=(const wchar_t *s1, const UString &s2) { return wcscmp(s1, s2) != 0; }


// ---------- forbidden functions ----------

void operator==(wchar_t c1, const UString &s2);
void operator==(const UString &s1, wchar_t c2);

void operator+(wchar_t c, const UString &s); // this
 function can be OK, but we don't use it

void operator+(const AString &s1, const UString &s2);
void operator+(const UString &s1, const AString &s2);

void operator+(const UString &s1, const char *s2);
void operator+(const char *s1, const UString &s2);

void operator+(const UString &s, char c);
void operator+(const UString &s, unsigned char c);
void operator+(char c, const UString &s);
```

```
void operator+(unsigned char c, const UString &s);
void operator-(const UString &s1, wchar_t c);

#ifdef _WIN32
// can we forbid these functions, if wchar_t is 32-bit ?
void operator+(const UString &s, int c);
void operator+(const UString &s, unsigned c);
void operator+(int c, const UString &s);
void operator+(unsigned c, const UString &s);
void operator-(const UString &s1, int c);
void operator-(const UString &s1, unsigned c);
#endif
```

```
class UString2
{
 wchar_t *_chars;
 unsigned _len;

 void ReAlloc2(unsigned newLimit);
 void SetStartLen(unsigned len);

 // ---------- forbidden functions ----------

 FORBID_STRING_OPS_UString2(char)
 FORBID_STRING_OPS_UString2(signed char)
 FORBID_STRING_OPS_UString2(unsigned char)
 FORBID_STRING_OPS_UString2(short)

 UString2 &operator=(wchar_t c);
 UString2(wchar_t c);

public:
 UString2(): _chars(NULL), _len(0) {}
 UString2(const wchar_t *s);
 UString2(const UString2 &s);
 ~UString2() { if (_chars) MY_STRING_DELETE(_chars); }

 unsigned Len() const { return _len; }
 bool IsEmpty() const { return _len == 0; }
 // void Empty() { _len = 0; _chars[0] = 0; }

 // operator const wchar_t *() const { return _chars; }
```

```
 const wchar_t *GetRawPtr() const { return _chars; }

 int Compare(const wchar_t *s) const { return wcscmp(_chars, s); }

 wchar_t *GetBuf(unsigned minLen)
 {
   if (!_chars || minLen > _len)
     ReAlloc2(minLen);
   return _chars;
 }
 void ReleaseBuf_SetLen(unsigned newLen) { _len = newLen; }

 UString2 &operator=(const wchar_t *s);
 UString2 &operator=(const UString2 &s);
 void SetFromAscii(const char
 *s);
};

bool operator==(const UString2 &s1, const UString2 &s2);
bool operator==(const UString2 &s1, const wchar_t *s2);
bool operator==(const wchar_t *s1, const UString2 &s2);

inline bool operator!=(const UString2 &s1, const UString2 &s2) { return !(s1 == s2); }
inline bool operator!=(const UString2 &s1, const wchar_t *s2) { return !(s1 == s2); }
inline bool operator!=(const wchar_t *s1, const UString2 &s2) { return !(s1 == s2); }


// ---------- forbidden functions ----------

void operator==(wchar_t c1, const UString2 &s2);
void operator==(const UString2 &s1, wchar_t c2);
bool operator<(const UString2 &s1, const UString2 &s2);
bool operator>(const UString2 &s1, const UString2 &s2);

void operator+(const UString2 &s1, const UString2 &s2);
void operator+(const UString2 &s1, const wchar_t *s2);
void operator+(const wchar_t *s1, const UString2 &s2);
void operator+(wchar_t c, const UString2 &s);
void operator+(const UString2 &s, wchar_t c);
void operator+(const UString2 &s, char c);
void
 operator+(const UString2 &s, unsigned char c);
void operator+(char c, const UString2 &s);
void operator+(unsigned char c, const UString2 &s);
void operator-(const UString2 &s1, wchar_t c);
```

```
typedef CObjectVector<AString> AStringVector;
typedef CObjectVector<UString> UStringVector;

#ifdef _UNICODE
 typedef UString CSysString;
#else
 typedef AString CSysString;
#endif

typedef CObjectVector<CSysString> CSysStringVector;


// ---------- FString ----------

#ifdef _WIN32
 #define USE_UNICODE_FSTRING
#endif

#ifdef USE_UNICODE_FSTRING

 #define __FTEXT(quote) L##quote

 typedef wchar_t FChar;
 typedef UString FString;

 #define fs2us(_x_) (_x_)
 #define us2fs(_x_) (_x_)
 FString fas2fs(const char *s);
 FString fas2fs(const AString &s);
 AString fs2fas(const FChar *s);

#else

 #define __FTEXT(quote) quote

 typedef char FChar;
 typedef AString FString;

 UString fs2us(const FChar *s);
 UString fs2us(const FString &s);
 FString us2fs(const wchar_t *s);
 #define
 fas2fs(_x_) (_x_)
 #define fs2fas(_x_) (_x_)
```

```
#endif

#define FTEXT(quote) __FTEXT(quote)

#define FCHAR_PATH_SEPARATOR FTEXT(CHAR_PATH_SEPARATOR)
#define FSTRING_PATH_SEPARATOR FTEXT(STRING_PATH_SEPARATOR)

// #define FCHAR_ANY_MASK FTEXT('*')
// #define FSTRING_ANY_MASK FTEXT("*")

typedef const FChar *CFSTR;

typedef CObjectVector<FString> FStringVector;

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With dir Attribute in div Element in text Element 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element that contains a div element with ltr as
the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
```

```
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   &lt;div dir="ltr"&gt;Paragraph 1&lt;/div&gt;
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
// StdAfx.h

#ifndef __STDAFX_H
#define __STDAFX_H

#include "../../../Common/Common.h"

#endif
/* ATK -  Accessibility Toolkit
* Copyright 2001 Sun Microsystems Inc.
*
* This library is free software; you can redistribute it and/or
* modify it under the terms of the GNU Library General Public
* License as published by the Free Software Foundation; either
* version 2 of the License, or (at your option) any later version.
*
* This library is distributed in the hope that it will be useful,
* but WITHOUT ANY WARRANTY; without even the implied warranty of
* MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the GNU
* Library General Public License for more details.
*
* You should have received a copy of the GNU Library General Public
* License along with this library; if not, write to the
* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_HYPERLINK_H__
#define __ATK_HYPERLINK_H__

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */
```

```
#include <atk/atkaction.h>

/*
* AtkHyperlink encapsulates a link
 or set of links in a hypertext document.
*
* It implements the AtkAction interface.
*/

/**
*AtkHyperlinkStateFlags
*@ATK_HYPERLINK_IS_INLINE: Link is inline
*
*Describes the type of link
**/
typedef enum
{
 ATK_HYPERLINK_IS_INLINE = 1 << 0
} AtkHyperlinkStateFlags;

#define ATK_TYPE_HYPERLINK                    (atk_hyperlink_get_type ())
#define ATK_HYPERLINK(obj)                    (G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_HYPERLINK, AtkHyperlink))
#define ATK_HYPERLINK_CLASS(klass)            (G_TYPE_CHECK_CLASS_CAST ((klass),
ATK_TYPE_HYPERLINK, AtkHyperlinkClass))
#define ATK_IS_HYPERLINK(obj)                 (G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_HYPERLINK))
#define ATK_IS_HYPERLINK_CLASS(klass)         (G_TYPE_CHECK_CLASS_TYPE ((klass),
ATK_TYPE_HYPERLINK))
#define ATK_HYPERLINK_GET_CLASS(obj)          (G_TYPE_INSTANCE_GET_CLASS ((obj),
ATK_TYPE_HYPERLINK, AtkHyperlinkClass))

typedef struct _AtkHyperlink                  AtkHyperlink;
typedef
 struct _AtkHyperlinkClass                AtkHyperlinkClass;

struct _AtkHyperlink
{
 GObject parent;
};

struct _AtkHyperlinkClass
{
 GObjectClass parent;

 gchar*          (* get_uri)          (AtkHyperlink     *link_,
                                       gint             i);
 AtkObject*      (* get_object)       (AtkHyperlink     *link_,
```

```
                                gint            i);
 gint           (* get_end_index)      (AtkHyperlink     *link_);
 gint           (* get_start_index)    (AtkHyperlink     *link_);
 gboolean       (* is_valid)           (AtkHyperlink     *link_);
 gint           (* get_n_anchors)    (AtkHyperlink     *link_);
 guint          (* link_state)    (AtkHyperlink     *link_);
 gboolean       (* is_selected_link)    (AtkHyperlink     *link_);

 /* Signals */
 void           ( *link_activated)      (AtkHyperlink     *link_);
 AtkFunction      pad1;
};

GType           atk_hyperlink_get_type
          (void);

gchar*          atk_hyperlink_get_uri           (AtkHyperlink     *link_,
                                        gint            i);

AtkObject*      atk_hyperlink_get_object        (AtkHyperlink     *link_,
                                        gint            i);

gint            atk_hyperlink_get_end_index       (AtkHyperlink     *link_);

gint            atk_hyperlink_get_start_index     (AtkHyperlink     *link_);

gboolean        atk_hyperlink_is_valid            (AtkHyperlink     *link_);

gboolean        atk_hyperlink_is_inline           (AtkHyperlink     *link_);

gint   atk_hyperlink_get_n_anchors       (AtkHyperlink     *link_);
gboolean        atk_hyperlink_is_selected_link     (AtkHyperlink     *link_);


#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_HYPERLINK_H__ */
# -*- Mode: python; indent-tabs-mode: nil; tab-width: 40 -*-
# vim: set filetype=python:
# This Source Code Form is subject to the terms of the Mozilla Public
# License, v. 2.0. If a copy of the MPL was not distributed with this
# file, You can obtain one at http://mozilla.org/MPL/2.0/.

HOST_SOURCES += [
   'bsdiff.c',
```

```
]

HostProgram('mbsdiff')

if CONFIG['HOST_OS_ARCH'] == 'WINNT':
  HOST_OS_LIBS += [
    'ws2_32',
  ]
  USE_STATIC_LIBS = True

LOCAL_INCLUDES += [
  '/toolkit/mozapps/update/updater',
  '/toolkit/mozapps/update/updater/bspatch',
]
```

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THE SOFTWARE OR THE USE OR OTHER
DEALINGS IN THE SOFTWARE.

```
// CreateCoder.h

#ifndef __CREATE_CODER_H
#define __CREATE_CODER_H

#include "../../Common/MyCom.h"
#include "../../Common/MyString.h"

#include "../ICoder.h"

#include "MethodId.h"

/*
 if EXTERNAL_CODECS is not defined, the code supports only codecs that
    are statically linked at compile-time and link-time.
```

```
 if EXTERNAL_CODECS is defined, the code supports also codecs from another
    executable modules, that can be linked dynamically at run-time:
      - EXE module can use codecs from external DLL files.
      - DLL module can use codecs from external EXE and DLL files.

    CExternalCodecs contains information about codecs and interfaces to create them.

 The order of codecs:
   1) Internal codecs
   2) External codecs
*/

#ifdef EXTERNAL_CODECS

struct CCodecInfoEx
{
 CMethodId Id;
 AString Name;
 UInt32 NumStreams;
 bool EncoderIsAssigned;
 bool DecoderIsAssigned;

 CCodecInfoEx(): EncoderIsAssigned(false), DecoderIsAssigned(false) {}
};

struct
 CHasherInfoEx
{
 CMethodId Id;
 AString Name;
};

#define PUBLIC_ISetCompressCodecsInfo public ISetCompressCodecsInfo,
#define QUERY_ENTRY_ISetCompressCodecsInfo
MY_QUERYINTERFACE_ENTRY(ISetCompressCodecsInfo)
#define DECL_ISetCompressCodecsInfo STDMETHOD(SetCompressCodecsInfo)(ICompressCodecsInfo
*compressCodecsInfo);
#define IMPL_ISetCompressCodecsInfo2(x) \
STDMETHODIMP x::SetCompressCodecsInfo(ICompressCodecsInfo *compressCodecsInfo) { \
 COM_TRY_BEGIN __externalCodecs.GetCodecs = compressCodecsInfo;  return __externalCodecs.Load();
COM_TRY_END }
#define IMPL_ISetCompressCodecsInfo IMPL_ISetCompressCodecsInfo2(CHandler)

struct CExternalCodecs
{
 CMyComPtr<ICompressCodecsInfo> GetCodecs;
 CMyComPtr<IHashers> GetHashers;
```

```
 CObjectVector<CCodecInfoEx> Codecs;
 CObjectVector<CHasherInfoEx> Hashers;

 bool IsSet() const { return GetCodecs != NULL || GetHashers != NULL; }

 HRESULT Load();

 void ClearAndRelease()
 {
   Hashers.Clear();
   Codecs.Clear();
   GetHashers.Release();
    GetCodecs.Release();
 }

 ~CExternalCodecs()
 {
   GetHashers.Release();
   GetCodecs.Release();
 }
};

extern CExternalCodecs g_ExternalCodecs;

#define EXTERNAL_CODECS_VARS2   (__externalCodecs.IsSet() ? &__externalCodecs : &g_ExternalCodecs)
#define EXTERNAL_CODECS_VARS2_L (&__externalCodecs)
#define EXTERNAL_CODECS_VARS2_G (&g_ExternalCodecs)

#define DECL_EXTERNAL_CODECS_VARS CExternalCodecs __externalCodecs;

#define EXTERNAL_CODECS_VARS   EXTERNAL_CODECS_VARS2,
#define EXTERNAL_CODECS_VARS_L EXTERNAL_CODECS_VARS2_L,
#define EXTERNAL_CODECS_VARS_G EXTERNAL_CODECS_VARS2_G,

#define DECL_EXTERNAL_CODECS_LOC_VARS2 const CExternalCodecs *__externalCodecs
#define EXTERNAL_CODECS_LOC_VARS2 __externalCodecs

#define DECL_EXTERNAL_CODECS_LOC_VARS DECL_EXTERNAL_CODECS_LOC_VARS2,
#define EXTERNAL_CODECS_LOC_VARS EXTERNAL_CODECS_LOC_VARS2,

#else

#define PUBLIC_ISetCompressCodecsInfo
#define QUERY_ENTRY_ISetCompressCodecsInfo
#define DECL_ISetCompressCodecsInfo
#define IMPL_ISetCompressCodecsInfo
#define
```

```
 EXTERNAL_CODECS_VARS2
#define DECL_EXTERNAL_CODECS_VARS
#define EXTERNAL_CODECS_VARS
#define EXTERNAL_CODECS_VARS_L
#define EXTERNAL_CODECS_VARS_G
#define DECL_EXTERNAL_CODECS_LOC_VARS2
#define EXTERNAL_CODECS_LOC_VARS2
#define DECL_EXTERNAL_CODECS_LOC_VARS
#define EXTERNAL_CODECS_LOC_VARS

#endif

int FindMethod_Index(
  DECL_EXTERNAL_CODECS_LOC_VARS
  const AString &name,
  bool encode,
  CMethodId &methodId,
  UInt32 &numStreams);

bool FindMethod(
  DECL_EXTERNAL_CODECS_LOC_VARS
  CMethodId methodId,
  AString &name);

bool FindHashMethod(
  DECL_EXTERNAL_CODECS_LOC_VARS
  const AString &name,
  CMethodId &methodId);

void GetHashMethods(
  DECL_EXTERNAL_CODECS_LOC_VARS
  CRecordVector<CMethodId> &methods);


struct CCreatedCoder
{
 CMyComPtr<ICompressCoder> Coder;
 CMyComPtr<ICompressCoder2> Coder2;

 bool IsExternal;
 bool IsFilter; // = true, if Coder was created from filter
 UInt32 NumStreams;

 // CCreatedCoder():
 IsExternal(false), IsFilter(false), NumStreams(1) {}
};
```

```
HRESULT CreateCoder_Index(
  DECL_EXTERNAL_CODECS_LOC_VARS
  unsigned codecIndex, bool encode,
  CMyComPtr<ICompressFilter> &filter,
  CCreatedCoder &cod);

HRESULT CreateCoder_Index(
  DECL_EXTERNAL_CODECS_LOC_VARS
  unsigned index, bool encode,
  CCreatedCoder &cod);

HRESULT CreateCoder_Id(
  DECL_EXTERNAL_CODECS_LOC_VARS
  CMethodId methodId, bool encode,
  CMyComPtr<ICompressFilter> &filter,
  CCreatedCoder &cod);

HRESULT CreateCoder_Id(
  DECL_EXTERNAL_CODECS_LOC_VARS
  CMethodId methodId, bool encode,
  CCreatedCoder &cod);

HRESULT CreateCoder_Id(
  DECL_EXTERNAL_CODECS_LOC_VARS
  CMethodId methodId, bool encode,
  CMyComPtr<ICompressCoder> &coder);

HRESULT CreateFilter(
  DECL_EXTERNAL_CODECS_LOC_VARS
  CMethodId methodId, bool encode,
  CMyComPtr<ICompressFilter> &filter);

HRESULT CreateHasher(
  DECL_EXTERNAL_CODECS_LOC_VARS
  CMethodId methodId,
  AString &name,
   CMyComPtr<IHasher> &hasher);

#endif
```

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```
/*****************************************************************
*
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*
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*
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* or modification of this software and in all copies of the supporting
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*
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* WARRANTY.  IN PARTICULAR, NEITHER THE AUTHOR NOR LUCENT MAKES ANY
* REPRESENTATION OR WARRANTY OF ANY KIND CONCERNING THE MERCHANTABILITY
* OF THIS SOFTWARE OR ITS FITNESS FOR ANY PARTICULAR PURPOSE.
*
*****************************************************************/
// Common/MyTypes.h

#ifndef __COMMON_MY_TYPES_H
#define __COMMON_MY_TYPES_H

#include "../../C/7zTypes.h"

typedef int HRes;
```

```
struct CBoolPair
{
 bool Val;
 bool Def;

 CBoolPair(): Val(false), Def(false) {}

 void Init()
 {
   Val = false;
   Def = false;
 }

 void SetTrueTrue()
 {
   Val = true;
   Def = true;
 }
};

#define CLASS_NO_COPY(cls) \
 private: \
 cls(const cls &); \
 cls &operator=(const cls &);

#endif
```

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UNRECOGNIZED LICENSE; MD5 sum: 7326e262da7e223516bc77ef7e900d68

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With class Attribute in div Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element that contains a div element with &quot;class1 class2 class3&quot; as the value for the class attribute." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
```

```
  &lt;div class="class1 class2 class3"&gt;Paragraph 1&lt;/div&gt;
 &lt;/text&gt;
&lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
// Extract.h

#ifndef __EXTRACT_H
#define __EXTRACT_H

#include "../../../Windows/FileFind.h"

#include "../../Archive/IArchive.h"

#include "ArchiveExtractCallback.h"
#include "ArchiveOpenCallback.h"
#include "ExtractMode.h"
#include "Property.h"

#include "../Common/LoadCodecs.h"

struct CExtractOptionsBase
{
 CBoolPair ElimDup;

 bool PathMode_Force;
 bool OverwriteMode_Force;
 NExtract::NPathMode::EEnum PathMode;
 NExtract::NOverwriteMode::EEnum OverwriteMode;

 FString OutputDir;
 CExtractNtOptions NtOptions;

 CExtractOptionsBase():
    PathMode_Force(false),
    OverwriteMode_Force(false),
    PathMode(NExtract::NPathMode::kFullPaths),
    OverwriteMode(NExtract::NOverwriteMode::kAsk)
    {}
};

struct CExtractOptions: public CExtractOptionsBase
{
 bool StdInMode;
 bool StdOutMode;
 bool YesToAll;
```

```
 bool TestMode;

 // bool ShowDialog;
 // bool PasswordEnabled;
 // UString Password;
 #ifndef _SFX
 CObjectVector<CProperty> Properties;
 #endif

 #ifdef
 EXTERNAL_CODECS
 CCodecs *Codecs;
 #endif

 CExtractOptions():
    TestMode(false),
    StdInMode(false),
    StdOutMode(false),
    YesToAll(false)
    {}
};

struct CDecompressStat
{
 UInt64 NumArchives;
 UInt64 UnpackSize;
 UInt64 AltStreams_UnpackSize;
 UInt64 PackSize;
 UInt64 NumFolders;
 UInt64 NumFiles;
 UInt64 NumAltStreams;

 void Clear()
 {
   NumArchives = UnpackSize = AltStreams_UnpackSize = PackSize = NumFolders = NumFiles = NumAltStreams
= 0;
 }
};

HRESULT Extract(
   CCodecs *codecs,
   const CObjectVector<COpenType> &types,
   const CIntVector &excludedFormats,
   UStringVector &archivePaths, UStringVector &archivePathsFull,
   const NWildcard::CCensorNode &wildcardCensor,
   const CExtractOptions &options,
   IOpenCallbackUI *openCallback,
   IExtractCallbackUI *extractCallback,
```

```
  #ifndef _SFX
  IHashCalc *hash,
  #endif
  UString &errorMessage,
  CDecompressStat &st);

#endif
// FileStreams.h

#ifndef __FILE_STREAMS_H
#define __FILE_STREAMS_H

#ifdef _WIN32
#define USE_WIN_FILE
#endif

#include "../../Common/MyString.h"

#ifdef USE_WIN_FILE
#include "../../Windows/FileIO.h"
#else
#include "../../Common/C_FileIO.h"
#endif

#include "../../Common/MyCom.h"

#include "../IStream.h"

#ifdef _WIN32
typedef UINT_PTR My_UINT_PTR;
#else
typedef UINT My_UINT_PTR;
#endif

struct IInFileStream_Callback
{
 virtual HRESULT InFileStream_On_Error(My_UINT_PTR val, DWORD error) = 0;
 virtual void InFileStream_On_Destroy(My_UINT_PTR val) = 0;
};

class CInFileStream:
 public IInStream,
 public IStreamGetSize,
 #ifdef USE_WIN_FILE
 public IStreamGetProps,
 public IStreamGetProps2,
 #endif
 public CMyUnknownImp
```

```
{
public:
 #ifdef USE_WIN_FILE
 NWindows::NFile::NIO::CInFile File;

 #ifdef SUPPORT_DEVICE_FILE
 UInt64 VirtPos;
 UInt64 PhyPos;
 UInt64 BufStartPos;
 Byte *Buf;
 UInt32 BufSize;
 #endif

 #else
 NC::NFile::NIO::CInFile File;
 #endif

 bool SupportHardLinks;

  IInFileStream_Callback *Callback;
 My_UINT_PTR CallbackRef;

 virtual ~CInFileStream();

 CInFileStream();

 bool Open(CFSTR fileName)
 {
   return File.Open(fileName);
 }

 bool OpenShared(CFSTR fileName, bool shareForWrite)
 {
   return File.OpenShared(fileName, shareForWrite);
 }

 MY_QUERYINTERFACE_BEGIN2(IInStream)
 MY_QUERYINTERFACE_ENTRY(IStreamGetSize)
 #ifdef USE_WIN_FILE
 MY_QUERYINTERFACE_ENTRY(IStreamGetProps)
 MY_QUERYINTERFACE_ENTRY(IStreamGetProps2)
 #endif
 MY_QUERYINTERFACE_END
 MY_ADDREF_RELEASE

 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition);
```

```
 STDMETHOD(GetSize)(UInt64 *size);
 #ifdef USE_WIN_FILE
 STDMETHOD(GetProps)(UInt64 *size, FILETIME *cTime, FILETIME *aTime, FILETIME *mTime, UInt32
*attrib);
 STDMETHOD(GetProps2)(CStreamFileProps *props);
 #endif
};

class CStdInFileStream:
 public ISequentialInStream,
 public CMyUnknownImp
{
public:
  MY_UNKNOWN_IMP

 virtual ~CStdInFileStream() {}
 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
};

class COutFileStream:
 public IOutStream,
 public CMyUnknownImp
{
public:
 #ifdef USE_WIN_FILE
 NWindows::NFile::NIO::COutFile File;
 #else
 NC::NFile::NIO::COutFile File;
 #endif
 virtual ~COutFileStream() {}
 bool Create(CFSTR fileName, bool createAlways)
 {
   ProcessedSize = 0;
   return File.Create(fileName, createAlways);
 }
 bool Open(CFSTR fileName, DWORD creationDisposition)
 {
   ProcessedSize = 0;
   return File.Open(fileName, creationDisposition);
 }

 HRESULT Close();

 UInt64 ProcessedSize;

 #ifdef USE_WIN_FILE
 bool SetTime(const FILETIME *cTime, const FILETIME *aTime, const FILETIME *mTime)
 {
```

```
  return File.SetTime(cTime, aTime, mTime);
 }
 bool SetMTime(const FILETIME *mTime) {  return File.SetMTime(mTime); }
 #endif


 MY_UNKNOWN_IMP1(IOutStream)

 STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
  STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition);
 STDMETHOD(SetSize)(UInt64 newSize);

 HRESULT GetSize(UInt64 *size);
};

class CStdOutFileStream:
 public ISequentialOutStream,
 public CMyUnknownImp
{
 UInt64 _size;
public:
 MY_UNKNOWN_IMP

 UInt64 GetSize() const { return _size; }
 CStdOutFileStream(): _size(0) {}
 virtual ~CStdOutFileStream() {}
 STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
};

#endif
```

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```
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SOFTWARE.
// ExtractCallbackSfx.h

#ifndef __EXTRACT_CALLBACK_SFX_H
#define __EXTRACT_CALLBACK_SFX_H

#include "resource.h"

#include "../../../Windows/ResourceString.h"

#include "../../Archive/IArchive.h"

#include "../../Common/FileStreams.h"
#include "../../ICoder.h"

#include "../../UI/FileManager/LangUtils.h"

#ifndef _NO_PROGRESS
#include "../../UI/FileManager/ProgressDialog.h"
#endif
#include "../../UI/Common/ArchiveOpenCallback.h"

class CExtractCallbackImp:
 public IArchiveExtractCallback,
 public IOpenCallbackUI,
 public CMyUnknownImp
{
public:

 MY_UNKNOWN_IMP

 INTERFACE_IArchiveExtractCallback(;)
 INTERFACE_IOpenCallbackUI(;)

private:
 CMyComPtr<IInArchive> _archiveHandler;
 FString _directoryPath;
 UString _filePath;
 FString _diskFilePath;

 bool _extractMode;
 struct CProcessedFileInfo
 {
   FILETIME MTime;
   bool IsDir;
   UInt32 Attributes;
 } _processedFileInfo;
```

```
 COutFileStream *_outFileStreamSpec;
 CMyComPtr<ISequentialOutStream> _outFileStream;

 UString
 _itemDefaultName;
 FILETIME _defaultMTime;
 UInt32 _defaultAttributes;

 void CreateComplexDirectory(const UStringVector &dirPathParts);
public:
 #ifndef _NO_PROGRESS
 CProgressDialog ProgressDialog;
 #endif

 bool _isCorrupt;
 UString _message;

 void Init(IInArchive *archiveHandler,
   const FString &directoryPath,
   const UString &itemDefaultName,
   const FILETIME &defaultMTime,
   UInt32 defaultAttributes);

 #ifndef _NO_PROGRESS
 HRESULT StartProgressDialog(const UString &title, NWindows::CThread &thread)
 {
   ProgressDialog.Create(title, thread, 0);
   {
     ProgressDialog.SetText(LangString(IDS_PROGRESS_EXTRACTING));
   }

   ProgressDialog.Show(SW_SHOWNORMAL);
   return S_OK;
 }
 virtual ~CExtractCallbackImp() { ProgressDialog.Destroy(); }
 #endif

};

#endif
```

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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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Swedish hyphenation patterns (Jan Michael Rynning, 1994-03-03)

(more info about the licence to be added later)

```
% This file is
 part of hyph-utf8 package and resulted from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% Source: sehyph.tex (2003-09-08)
% Author: Jan Michael Rynning
%
% The above mentioned file should become obsolete,
% and the author of the original file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%             and helped with testing, suggestions and bug reports
% - Norbert Preining, who tested
 & integrated patterns into TeX Live
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```

```
%    plese remove all of the TUG comments & credits that we added here -
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%
% If you want to change this file, rather than uploading directly to CTAN,
% we would be grateful if you could send it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
% Before a new "pattern-revolution" starts,
% please try to follow some guidelines if possible:
%
% - \lccode is *forbidden*, and I really mean it
% - all the patterns should be in
 UTF-8
% - the only "allowed" TeX commands in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
%-----------------------------------------------------------------------------
%
% Swedish hyphenation patterns.
%
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% is in http://www.latex-project.org/lppl.txt and version 1.2 or later is
% part of all distributions of LaTeX version 1999/12/01 or later.
%
% Last update: 1994-03-03 (March 3, 1994).
% Revision history:
% 1991-01-08: First version available for anonymous FTP.
% 1991-08-08: Changed \aa to \aa0 at end of line, to stop TeX from
%             concatenating the patterns.
% 1991-09-03: Cleaned up lots of inconsistencies in the dictionary.
```

```
%           As a consequence, the patterns shrunk a lot.  Also
%           added some 4000 one-syllable words, some of which were
%           hyphenated by the old patterns, and some 1500 compound
%           words, about half of which were incorrectly hyphenated
%           by the old patterns.
% 1991-11-01: Added another some 6200 compound words, all of which were
%           incorrectly hyphenated by the old patterns.
% 1991-11-13: Added another some 6500 compound words, all of which were
%           incorrectly hyphenated
 by the old patterns.
% 1992-01-30: Changed macros to ^^, for use with LaTeX and dc fonts.
% 1994-03-03: The hyphenated dictionary now contains about 118,000 words.
%           The hyphenation now works much better for compound words.
%           Patgen parameters: 1 2 20, 2 1 8, 1 4 7, 3 2 1, 1 10000 4.
%
% This file contains Swedish hyphenation patterns for TeX.  It assumes
% that you have fonts with the Swedish letters in the positions where
% they occur in ISO Latin 1 (ISO 8859/1):
% Letter:   \AA  \"A  \"O  \'E  \aa  \"a  \"o  \'e
% Position: "C5  "C4  "D6  "C9  "E5  "E4  "F6  "E9
%
% Load this file into initex after plain.tex (or lplain.tex, splain.tex,
% or whatever).
%
% The patterns were generated in such a way that they will hyphenate
% correctly if \lefthyphenmin>=1 and \righthyphenmin>=2.
%
% These hyphenation patterns work quite well for simple words, but not
% quite as well for compound words.  I'm working on improving the quality,
% by adding more words.  If
 you know any Swedish words which are not
% correctly hypheneted using these patterns, or if you have questions or
% comments, please contact me:
%
% Jan Michael Rynning <jmr@incolumitas.se>
% ----------------------------------------------------------------------
%
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With dir Attribute in span Element in text Element 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element that contains a span element with ltr as the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   Text with &lt;span dir="ltr"&gt;span&lt;/span&gt;.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
```

```
</html>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With Nested div Elements in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element that contains nested div elements." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size:
 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   &lt;div&gt;
    div 1 start
    &lt;div&gt;
     div 2 start
     &lt;div&gt;
      div 3
     &lt;/div&gt;
     div 2 end
```

</div>
div 1 end
</div>
</text>
</license>
</metadata>
</pre>
</body>
</html>

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Version 3, 29 June 2007

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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

At the time this file was first modified, a complete, unmodified copy of
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http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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German hyphenation patterns (reformed orthography)

(more info about the licence to be added later)

% dehyphn-x-2011-06-01.pat

\message{German
 Hyphenation Patterns (Reformed Orthography, 2006) `dehyphn-x' 2011-06-01 (WL)}

% TeX-Trennmuster fr die reformierte (2006) deutsche Rechtschreibung
%
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% archives in directory macros/latex/base/lppl.txt; either
% version 1 of the License, or any later version.
%
%
% The word list is available from
%
%   http://repo.or.cz/w/wortliste.git?a=commit;h=2d246449f5c4f570f4d735d3ad091f6ad70f6972
%
% The used patgen parameters are
%
%   1 1 | 2 5 | 1 1 1
%   2 2 | 2 5 | 1 2 1
%   3 3 | 2 6 | 1 1 1
%   4 4 | 2 6 | 1 4 1
%   5 5 | 2 7 | 1 1 1
%   6 6 | 2 7 | 1 6 1
%   7 7 | 2 13 | 1 4 1
%   8 8 | 2 13 | 1 8 1
<?xml version="1.0" encoding="utf-8"?>
<Project DefaultTargets="Build" xmlns="http://schemas.microsoft.com/developer/msbuild/2003">
 <ItemGroup Label="ProjectConfigurations">
  <ProjectConfiguration Include="Debug|Win32">
   <Configuration>Debug</Configuration>

```
    <Platform>Win32</Platform>
  </ProjectConfiguration>
  <ProjectConfiguration Include="Release|Win32">
    <Configuration>Release</Configuration>
    <Platform>Win32</Platform>
  </ProjectConfiguration>
</ItemGroup>
<ItemGroup>
  <ClCompile Include="InetBgDL.cpp" />
</ItemGroup>
<ItemGroup>
  <ClInclude Include="InetBgDL.h" />
</ItemGroup>
<PropertyGroup Label="Globals">
  <VCProjectVersion>16.0</VCProjectVersion>
  <ProjectGuid>{B9B76BC4-5C6C-4808-AC23-2C10126CDFC0}</ProjectGuid>
  <Keyword>Win32Proj</Keyword>
  <RootNamespace>InetBgDl</RootNamespace>
  <WindowsTargetPlatformVersion>10.0</WindowsTargetPlatformVersion>
</PropertyGroup>
<Import Project="$(VCTargetsPath)\Microsoft.Cpp.Default.props"
/>
<PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'" Label="Configuration">
  <ConfigurationType>DynamicLibrary</ConfigurationType>
  <UseDebugLibraries>true</UseDebugLibraries>
  <PlatformToolset>v142</PlatformToolset>
  <CharacterSet>Unicode</CharacterSet>
</PropertyGroup>
<PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'" Label="Configuration">
  <ConfigurationType>DynamicLibrary</ConfigurationType>
  <UseDebugLibraries>false</UseDebugLibraries>
  <PlatformToolset>v142</PlatformToolset>
  <WholeProgramOptimization>true</WholeProgramOptimization>
  <CharacterSet>Unicode</CharacterSet>
</PropertyGroup>
<Import Project="$(VCTargetsPath)\Microsoft.Cpp.props" />
<ImportGroup Label="ExtensionSettings">
</ImportGroup>
<ImportGroup Label="Shared">
</ImportGroup>
<ImportGroup Label="PropertySheets" Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'">
  <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform" />
</ImportGroup>
<ImportGroup Label="PropertySheets" Condition="'$(Configuration)|$(Platform)'=='Release|Win32'">
  <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform" />
</ImportGroup>
```

```
 <PropertyGroup Label="UserMacros" />
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'">
   <LinkIncremental>true</LinkIncremental>
 </PropertyGroup>
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'">
   <LinkIncremental>false</LinkIncremental>
 </PropertyGroup>
 <ItemDefinitionGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'">
   <ClCompile>
     <PrecompiledHeader>NotUsing</PrecompiledHeader>
     <WarningLevel>Level3</WarningLevel>
     <Optimization>Disabled</Optimization>
      <SDLCheck>false</SDLCheck>
<PreprocessorDefinitions>WINVER=0x601;_WIN32_WINNT=0x601;WIN32;_DEBUG;INETBGDL_EXPORTS;
_WINDOWS;_USRDLL;%(PreprocessorDefinitions)</PreprocessorDefinitions>
     <ConformanceMode>true</ConformanceMode>
     <PrecompiledHeaderFile>pch.h</PrecompiledHeaderFile>
     <ExceptionHandling>false</ExceptionHandling>
   </ClCompile>
   <Link>
     <SubSystem>Console</SubSystem>
     <GenerateDebugInformation>true</GenerateDebugInformation>
     <EnableUAC>false</EnableUAC>
     <AdditionalDependencies>wininet.lib;%(AdditionalDependencies)</AdditionalDependencies>
     <LinkTimeCodeGeneration>UseLinkTimeCodeGeneration</LinkTimeCodeGeneration>
     <ImageHasSafeExceptionHandlers>false</ImageHasSafeExceptionHandlers>
   </Link>
 </ItemDefinitionGroup>
 <ItemDefinitionGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'">
   <ClCompile>
     <PrecompiledHeader>NotUsing</PrecompiledHeader>
     <WarningLevel>Level3</WarningLevel>
      <Optimization>MinSpace</Optimization>
     <FunctionLevelLinking>true</FunctionLevelLinking>
     <IntrinsicFunctions>true</IntrinsicFunctions>
     <SDLCheck>false</SDLCheck>
<PreprocessorDefinitions>WINVER=0x601;_WIN32_WINNT=0x601;WIN32;NDEBUG;INETBGDL_EXPORTS;
_WINDOWS;_USRDLL;%(PreprocessorDefinitions)</PreprocessorDefinitions>
     <ExceptionHandling>false</ExceptionHandling>
     <RuntimeLibrary>MultiThreaded</RuntimeLibrary>
     <OmitDefaultLibName>true</OmitDefaultLibName>
     <BufferSecurityCheck>false</BufferSecurityCheck>
     <FavorSizeOrSpeed>Size</FavorSizeOrSpeed>
   </ClCompile>
   <Link>
     <SubSystem>Console</SubSystem>
     <EnableCOMDATFolding>true</EnableCOMDATFolding>
     <OptimizeReferences>true</OptimizeReferences>
```

```
    <GenerateDebugInformation>false</GenerateDebugInformation>
    <EnableUAC>false</EnableUAC>
    <AdditionalDependencies>wininet.lib;%(AdditionalDependencies)</AdditionalDependencies>
    <LinkTimeCodeGeneration>UseLinkTimeCodeGeneration</LinkTimeCodeGeneration>
     <ImageHasSafeExceptionHandlers>false</ImageHasSafeExceptionHandlers>
    <EntryPointSymbol>DllMain</EntryPointSymbol>
  </Link>
 </ItemDefinitionGroup>
 <Import Project="$(VCTargetsPath)\Microsoft.Cpp.targets" />
 <ImportGroup Label="ExtensionTargets">
 </ImportGroup>
</Project>
```

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```
// Lzma2Encoder.h

#ifndef __LZMA2_ENCODER_H
#define __LZMA2_ENCODER_H

#include "../../../C/Lzma2Enc.h"

#include "../../Common/MyCom.h"
```

```
#include "../ICoder.h"

namespace NCompress {
namespace NLzma2 {

class CEncoder:
 public ICompressCoder,
 public ICompressSetCoderProperties,
 public ICompressWriteCoderProperties,
 public ICompressSetCoderPropertiesOpt,
 public CMyUnknownImp
{
 CLzma2EncHandle _encoder;
public:
 MY_UNKNOWN_IMP4(
    ICompressCoder,
    ICompressSetCoderProperties,
    ICompressWriteCoderProperties,
    ICompressSetCoderPropertiesOpt)

 STDMETHOD(Code)(ISequentialInStream *inStream, ISequentialOutStream *outStream,
    const UInt64 *inSize, const UInt64 *outSize, ICompressProgressInfo *progress);
 STDMETHOD(SetCoderProperties)(const PROPID *propIDs, const PROPVARIANT *props, UInt32 numProps);
 STDMETHOD(WriteCoderProperties)(ISequentialOutStream *outStream);
 STDMETHOD(SetCoderPropertiesOpt)(const PROPID *propIDs, const PROPVARIANT *props, UInt32
 numProps);

 CEncoder();
 virtual ~CEncoder();
};

}}

#endif
PROG = 7zxr.dll
DEF_FILE = ../../Archive/Archive2.def
CFLAGS = $(CFLAGS) \
 -DEXTRACT_ONLY \
 -D_NO_CRYPTO

COMMON_OBJS = \
 $O\CRC.obj \
 $O\CrcReg.obj \
 $O\IntToString.obj \
 $O\NewHandler.obj \
 $O\MyString.obj \
 $O\StringConvert.obj \
 $O\StringToInt.obj \
```

```
 $O\MyVector.obj \
 $O\Wildcard.obj \

WIN_OBJS = \
 $O\PropVariant.obj \
 $O\Synchronization.obj \
 $O\System.obj \

7ZIP_COMMON_OBJS = \
 $O\CreateCoder.obj \
 $O\CWrappers.obj \
 $O\InBuffer.obj \
 $O\FilterCoder.obj \
 $O\LimitedStreams.obj \
 $O\MethodId.obj \
 $O\MethodProps.obj \
 $O\OutBuffer.obj \
 $O\ProgressUtils.obj \
 $O\PropId.obj \
 $O\StreamBinder.obj \
 $O\StreamObjects.obj \
 $O\StreamUtils.obj \
 $O\VirtThread.obj \

AR_OBJS = \
 $O\ArchiveExports.obj \
 $O\DllExports2.obj \

AR_COMMON_OBJS = \
 $O\CoderMixer2.obj \
 $O\HandlerOut.obj \
 $O\ItemNameUtils.obj \
 $O\OutStreamWithCRC.obj \
 $O\ParseProperties.obj \


7Z_OBJS = \
 $O\7zCompressionMode.obj \
 $O\7zDecode.obj \
  $O\7zExtract.obj \
 $O\7zHandler.obj \
 $O\7zHeader.obj \
 $O\7zIn.obj \
 $O\7zProperties.obj \
 $O\7zRegister.obj \


COMPRESS_OBJS = \
```

```
 $O\CodecExports.obj \
 $O\Bcj2Coder.obj \
 $O\Bcj2Register.obj \
 $O\BcjCoder.obj \
 $O\BcjRegister.obj \
 $O\BranchMisc.obj \
 $O\BranchRegister.obj \
 $O\ByteSwap.obj \
 $O\CopyCoder.obj \
 $O\CopyRegister.obj \
 $O\DeltaFilter.obj \
 $O\Lzma2Decoder.obj \
 $O\Lzma2Register.obj \
 $O\LzmaDecoder.obj \
 $O\LzmaRegister.obj \

C_OBJS = \
 $O\Alloc.obj \
 $O\Bcj2.obj \
 $O\Bra.obj \
 $O\Bra86.obj \
 $O\BraIA64.obj \
 $O\CpuArch.obj \
 $O\Delta.obj \
 $O\Lzma2Dec.obj \
 $O\Lzma2DecMt.obj \
 $O\LzmaDec.obj \
 $O\MtDec.obj \
 $O\Threads.obj \

!include "../../Crc.mak"
!include "../../LzmaDec.mak"

!include "../../7zip.mak"
// MethodProps.h

#ifndef __7Z_METHOD_PROPS_H
#define __7Z_METHOD_PROPS_H

#include "../../Common/MyString.h"
#include "../../Common/Defs.h"

#include "../../Windows/Defs.h"

#include "../../Windows/PropVariant.h"

#include "../ICoder.h"
```

```
bool StringToBool(const wchar_t *s, bool &res);
HRESULT PROPVARIANT_to_bool(const PROPVARIANT &prop, bool &dest);
unsigned ParseStringToUInt32(const UString &srcString, UInt32 &number);
HRESULT ParsePropToUInt32(const UString &name, const PROPVARIANT &prop, UInt32 &resValue);

HRESULT ParseMtProp(const UString &name, const PROPVARIANT &prop, UInt32 defaultNumThreads, UInt32
&numThreads);

struct CProp
{
 PROPID Id;
 bool IsOptional;
 NWindows::NCOM::CPropVariant Value;
 CProp(): IsOptional(false) {}
};

struct CProps
{
 CObjectVector<CProp> Props;

 void Clear() { Props.Clear(); }

 bool AreThereNonOptionalProps() const
 {
  FOR_VECTOR (i, Props)
    if (!Props[i].IsOptional)
      return true;
  return false;
 }

 void AddProp32(PROPID
 propid, UInt32 val);

 void AddPropBool(PROPID propid, bool val);

 void AddProp_Ascii(PROPID propid, const char *s)
 {
  CProp &prop = Props.AddNew();
  prop.IsOptional = true;
  prop.Id = propid;
  prop.Value = s;
 }

 HRESULT SetCoderProps(ICompressSetCoderProperties *scp, const UInt64 *dataSizeReduce) const;
};

class CMethodProps: public CProps
{
```

```
 HRESULT SetParam(const UString &name, const UString &value);
public:
 int GetLevel() const;
 int Get_NumThreads() const
 {
   int i = FindProp(NCoderPropID::kNumThreads);
   if (i >= 0)
     if (Props[i].Value.vt == VT_UI4)
       return (int)Props[i].Value.ulVal;
   return -1;
 }

 bool Get_DicSize(UInt32 &res) const
 {
   res = 0;
   int i = FindProp(NCoderPropID::kDictionarySize);
   if (i >= 0)
     if (Props[i].Value.vt == VT_UI4)
     {
       res = Props[i].Value.ulVal;
       return true;
     }
   return false;
 }

 int FindProp(PROPID id) const;

 UInt32 Get_Lzma_Algo() const
 {
   int
 i = FindProp(NCoderPropID::kAlgorithm);
   if (i >= 0)
     if (Props[i].Value.vt == VT_UI4)
       return Props[i].Value.ulVal;
   return GetLevel() >= 5 ? 1 : 0;
 }

 UInt32 Get_Lzma_DicSize() const
 {
   int i = FindProp(NCoderPropID::kDictionarySize);
   if (i >= 0)
     if (Props[i].Value.vt == VT_UI4)
       return Props[i].Value.ulVal;
   int level = GetLevel();
   return level <= 5 ? (1 << (level * 2 + 14)) : (level == 6 ? (1 << 25) : (1 << 26));
 }

 bool Get_Lzma_Eos() const
```

```
{
  int i = FindProp(NCoderPropID::kEndMarker);
  if (i >= 0)
  {
    const NWindows::NCOM::CPropVariant &val = Props[i].Value;
    if (val.vt == VT_BOOL)
      return VARIANT_BOOLToBool(val.boolVal);
  }
  return false;
}

bool Are_Lzma_Model_Props_Defined() const
{
  if (FindProp(NCoderPropID::kPosStateBits) >= 0) return true;
  if (FindProp(NCoderPropID::kLitContextBits) >= 0) return true;
  if (FindProp(NCoderPropID::kLitPosBits) >= 0) return true;
  return
false;
}

UInt32 Get_Lzma_NumThreads() const
{
  if (Get_Lzma_Algo() == 0)
    return 1;
  int numThreads = Get_NumThreads();
  if (numThreads >= 0)
    return numThreads < 2 ? 1 : 2;
  return 2;
}

int Get_Xz_NumThreads(UInt32 &lzmaThreads) const
{
  lzmaThreads = 1;
  int numThreads = Get_NumThreads();
  if (numThreads >= 0 && numThreads <= 1)
    return 1;
  if (Get_Lzma_Algo() != 0)
    lzmaThreads = 2;
  return numThreads;
}

UInt64 GetProp_BlockSize(PROPID id) const
{
  int i = FindProp(id);
  if (i >= 0)
  {
    const NWindows::NCOM::CPropVariant &val = Props[i].Value;
    if (val.vt == VT_UI4) { return val.ulVal; }
```

```
    if (val.vt == VT_UI8) { return val.uhVal.QuadPart; }
  }
  return 0;
}

UInt64 Get_Xz_BlockSize() const
{
  {
    UInt64 blockSize1 = GetProp_BlockSize(NCoderPropID::kBlockSize);
    UInt64 blockSize2 = GetProp_BlockSize(NCoderPropID::kBlockSize2);
    UInt64 minSize = MyMin(blockSize1,
blockSize2);
    if (minSize != 0)
      return minSize;
    UInt64 maxSize = MyMax(blockSize1, blockSize2);
    if (maxSize != 0)
      return maxSize;
  }
  const UInt32 kMinSize = (UInt32)1 << 20;
  const UInt32 kMaxSize = (UInt32)1 << 28;
  UInt32 dictSize = Get_Lzma_DicSize();
  UInt64 blockSize = (UInt64)dictSize << 2;
  if (blockSize < kMinSize) blockSize = kMinSize;
  if (blockSize > kMaxSize) blockSize = kMaxSize;
  if (blockSize < dictSize) blockSize = dictSize;
  blockSize += (kMinSize - 1);
  blockSize &= ~(UInt64)(kMinSize - 1);
  return blockSize;
}


UInt32 Get_BZip2_NumThreads(bool &fixedNumber) const
{
  fixedNumber = false;
  int numThreads = Get_NumThreads();
  if (numThreads >= 0)
  {
    fixedNumber = true;
    if (numThreads < 1) return 1;
    const unsigned kNumBZip2ThreadsMax = 64;
    if (numThreads > kNumBZip2ThreadsMax) return kNumBZip2ThreadsMax;
    return numThreads;
  }
  return 1;
}

UInt32
```

```
Get_BZip2_BlockSize() const
{
  int i = FindProp(NCoderPropID::kDictionarySize);
  if (i >= 0)
    if (Props[i].Value.vt == VT_UI4)
    {
      UInt32 blockSize = Props[i].Value.ulVal;
      const UInt32 kDicSizeMin = 100000;
      const UInt32 kDicSizeMax = 900000;
      if (blockSize < kDicSizeMin) blockSize = kDicSizeMin;
      if (blockSize > kDicSizeMax) blockSize = kDicSizeMax;
      return blockSize;
    }
  int level = GetLevel();
  return 100000 * (level >= 5 ? 9 : (level >= 1 ? level * 2 - 1: 1));
}

UInt32 Get_Ppmd_MemSize() const
{
  int i = FindProp(NCoderPropID::kUsedMemorySize);
  if (i >= 0)
    if (Props[i].Value.vt == VT_UI4)
      return Props[i].Value.ulVal;
  int level = GetLevel();
  return level >= 9 ? (192 << 20) : ((UInt32)1 << (level + 19));
}

void AddProp_Level(UInt32 level)
{
  AddProp32(NCoderPropID::kLevel, level);
}

void AddProp_NumThreads(UInt32 numThreads)
{
  AddProp32(NCoderPropID::kNumThreads,
numThreads);
}

void AddProp_EndMarker_if_NotFound(bool eos)
{
  if (FindProp(NCoderPropID::kEndMarker) < 0)
    AddPropBool(NCoderPropID::kEndMarker, eos);
}

HRESULT ParseParamsFromString(const UString &srcString);
HRESULT ParseParamsFromPROPVARIANT(const UString &realName, const PROPVARIANT &value);
};
```

```
class COneMethodInfo: public CMethodProps
{
public:
 AString MethodName;
 UString PropsString;

 void Clear()
 {
   CMethodProps::Clear();
   MethodName.Empty();
   PropsString.Empty();
 }
 bool IsEmpty() const { return MethodName.IsEmpty() && Props.IsEmpty(); }
 HRESULT ParseMethodFromPROPVARIANT(const UString &realName, const PROPVARIANT &value);
 HRESULT ParseMethodFromString(const UString &s);
};

#endif
// StdAfx.h

#ifndef __STDAFX_H
#define __STDAFX_H

#include "../../../Common/Common.h"

#include <commctrl.h>
#include <ShlObj.h>

// #define printf(x) NO_PRINTF_(x)
// #define sprintf(x) NO_SPRINTF_(x)

#endif
```

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USE OR OTHER
DEALINGS IN THE SOFTWARE.

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: More Than One copyright Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element occurs more than once." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF
 Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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```
/* 7zBuf.h -- Byte Buffer
2017-04-03 : Igor Pavlov : Public domain */

#ifndef __7Z_BUF_H
#define __7Z_BUF_H

#include "7zTypes.h"

EXTERN_C_BEGIN

typedef struct
{
 Byte *data;
 size_t size;
} CBuf;

void Buf_Init(CBuf *p);
int Buf_Create(CBuf *p, size_t size, ISzAllocPtr alloc);
void Buf_Free(CBuf *p, ISzAllocPtr alloc);

typedef struct
{
 Byte *data;
 size_t size;
```

```
 size_t pos;
} CDynBuf;

void DynBuf_Construct(CDynBuf *p);
void DynBuf_SeekToBeg(CDynBuf *p);
int DynBuf_Write(CDynBuf *p, const Byte *buf, size_t size, ISzAllocPtr alloc);
void DynBuf_Free(CDynBuf *p, ISzAllocPtr alloc);

EXTERN_C_END

#endif
// Common/MyBuffer.h

#ifndef __COMMON_MY_BUFFER_H
#define __COMMON_MY_BUFFER_H

#include "Defs.h"

/* 7-Zip now uses CBuffer only as CByteBuffer.
  So there is no need to use MY_ARRAY_NEW macro in CBuffer code. */

template <class T> class CBuffer
{
 T *_items;
 size_t _size;

public:
 void Free()
 {
   if (_items)
   {
     delete []_items;
     _items = 0;
   }
   _size = 0;
 }

 CBuffer(): _items(0), _size(0) {};
 CBuffer(size_t size): _items(0), _size(0) { _items = new T[size]; _size = size; }
 CBuffer(const CBuffer &buffer): _items(0), _size(0)
 {
   size_t size = buffer._size;
   if (size != 0)
   {
     _items = new T[size];
     memcpy(_items, buffer._items, size * sizeof(T));
     _size = size;
   }
```

```
}

~CBuffer() { delete []_items; }

operator       T *()       { return _items; }
operator const T *() const { return _items; }
size_t Size() const { return _size; }

void Alloc(size_t size)
{
  if (size != _size)
  {
    Free();
    if
(size != 0)
    {
      _items = new T[size];
      _size = size;
    }
  }
}

void AllocAtLeast(size_t size)
{
  if (size > _size)
  {
    Free();
    _items = new T[size];
    _size = size;
  }
}

void CopyFrom(const T *data, size_t size)
{
  Alloc(size);
  if (size != 0)
    memcpy(_items, data, size * sizeof(T));
}

void ChangeSize_KeepData(size_t newSize, size_t keepSize)
{
  if (newSize == _size)
    return;
  T *newBuffer = NULL;
  if (newSize != 0)
  {
    newBuffer = new T[newSize];
    if (keepSize > _size)
```

```
      keepSize = _size;
    if (keepSize != 0)
      memcpy(newBuffer, _items, MyMin(keepSize, newSize) * sizeof(T));
  }
  delete []_items;
  _items = newBuffer;
  _size = newSize;
}

CBuffer& operator=(const CBuffer &buffer)
{
  if (&buffer != this)
    CopyFrom(buffer, buffer._size);
  return *this;
}
};

template <class T>
bool operator==(const CBuffer<T>& b1, const CBuffer<T>& b2)
{
  size_t size1 = b1.Size();
 if (size1 != b2.Size())
   return false;
 if (size1 == 0)
   return true;
 return memcmp(b1, b2, size1 * sizeof(T)) == 0;
}

template <class T>
bool operator!=(const CBuffer<T>& b1, const CBuffer<T>& b2)
{
 size_t size1 = b1.Size();
 if (size1 != b2.Size())
   return true;
 if (size1 == 0)
   return false;
 return memcmp(b1, b2, size1 * sizeof(T)) != 0;
}


// typedef CBuffer<char> CCharBuffer;
// typedef CBuffer<wchar_t> CWCharBuffer;
typedef CBuffer<unsigned char> CByteBuffer;


template <class T> class CObjArray
{
protected:
```

```
 T *_items;
private:
 // we disable copy
 CObjArray(const CObjArray &buffer);
 void operator=(const CObjArray &buffer);
public:
 void Free()
 {
   delete []_items;
   _items = 0;
 }
 CObjArray(size_t size): _items(0)
 {
   if (size != 0)
   {
     MY_ARRAY_NEW(_items, T, size)
     // _items = new T[size];
   }
 }
 CObjArray(): _items(0) {};
 ~CObjArray() { delete []_items; }

 operator       T *()
       { return _items; }
 operator const T *() const { return _items; }

 void Alloc(size_t newSize)
 {
   delete []_items;
   _items = 0;
   MY_ARRAY_NEW(_items, T, newSize)
   // _items = new T[newSize];
 }
};

typedef CObjArray<unsigned char> CByteArr;
typedef CObjArray<bool> CBoolArr;
typedef CObjArray<int> CIntArr;
typedef CObjArray<unsigned> CUIntArr;


template <class T> class CObjArray2
{
 T *_items;
 unsigned _size;

 // we disable copy
 CObjArray2(const CObjArray2 &buffer);
```

```
 void operator=(const CObjArray2 &buffer);
public:

 void Free()
 {
   delete []_items;
   _items = 0;
   _size = 0;
 }
 CObjArray2(): _items(0), _size(0) {};
 /*
 CObjArray2(const CObjArray2 &buffer): _items(0), _size(0)
 {
   size_t newSize = buffer._size;
   if (newSize != 0)
   {
     T *newBuffer = new T[newSize];;
     _items = newBuffer;
     _size = newSize;
     const T *src = buffer;
     for (size_t i = 0; i < newSize; i++)
       newBuffer[i] = src[i];

 }
 }
 */
 /*
 CObjArray2(size_t size): _items(0), _size(0)
 {
   if (size != 0)
   {
     _items = new T[size];
     _size = size;
   }
 }
 */

 ~CObjArray2() { delete []_items; }

 operator       T *()       { return _items; }
 operator const T *() const { return _items; }

 unsigned Size() const { return (unsigned)_size; }
 bool IsEmpty() const { return _size == 0; }

 // SetSize doesn't keep old items. It allocates new array if size is not equal
 void SetSize(unsigned size)
 {
```

```
  if (size == _size)
    return;
  T *newBuffer = NULL;
  if (size != 0)
  {
    MY_ARRAY_NEW(newBuffer, T, size)
    // newBuffer = new T[size];
  }
  delete []_items;
  _items = newBuffer;
  _size = size;
}

/*
CObjArray2& operator=(const CObjArray2 &buffer)
{
  Free();
  size_t newSize = buffer._size;
  if (newSize != 0)
  {
    T *newBuffer = new T[newSize];;
    _items = newBuffer;
    _size = newSize;
    const T *src = buffer;
    for
(size_t i = 0; i < newSize; i++)
      newBuffer[i] = src[i];
  }
  return *this;
}
*/
};

#endif
```

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```
// ProgressDialog.h

#ifndef __PROGRESS_DIALOG_H
#define __PROGRESS_DIALOG_H

#include "../../../Windows/Synchronization.h"
#include "../../../Windows/Thread.h"

#include "../../../Windows/Control/Dialog.h"
#include "../../../Windows/Control/ProgressBar.h"

#include "ProgressDialogRes.h"

class CProgressSync
{
 NWindows::NSynchronization::CCriticalSection _cs;
 bool _stopped;
 bool _paused;
 UInt64 _total;
 UInt64 _completed;
public:
 CProgressSync(): _stopped(false), _paused(false), _total(1), _completed(0) {}

 HRESULT ProcessStopAndPause();
 bool GetStopped()
 {
  NWindows::NSynchronization::CCriticalSectionLock lock(_cs);
  return _stopped;
 }
 void SetStopped(bool value)
 {
  NWindows::NSynchronization::CCriticalSectionLock lock(_cs);
  _stopped = value;
 }
 bool GetPaused()
 {
  NWindows::NSynchronization::CCriticalSectionLock lock(_cs);
  return _paused;
 }
 void SetPaused(bool value)
 {
```

```
  NWindows::NSynchronization::CCriticalSectionLock lock(_cs);
   _paused = value;
 }
 void SetProgress(UInt64 total, UInt64 completed)
 {
  NWindows::NSynchronization::CCriticalSectionLock lock(_cs);
  _total = total;
  _completed = completed;
 }
 void SetPos(UInt64 completed)
 {
  NWindows::NSynchronization::CCriticalSectionLock lock(_cs);
  _completed = completed;
 }
 void GetProgress(UInt64 &total, UInt64 &completed)
 {
  NWindows::NSynchronization::CCriticalSectionLock lock(_cs);
  total = _total;
  completed = _completed;
 }
};

class CU64ToI32Converter
{
 UInt64 _numShiftBits;
public:
 void Init(UInt64 range)
 {
  // Windows CE doesn't like big number here.
  for (_numShiftBits = 0; range > (1 << 15); _numShiftBits++)
    range >>= 1;
 }
 int Count(UInt64 value) { return int(value >> _numShiftBits); }
};

class CProgressDialog: public NWindows::NControl::CModalDialog
{
private:
 UINT_PTR _timer;

 UString _title;
 CU64ToI32Converter _converter;
 UInt64 _peviousPos;
 UInt64 _range;
 NWindows::NControl::CProgressBar
 m_ProgressBar;

 int _prevPercentValue;
```

```
 bool _wasCreated;
 bool _needClose;
 bool _inCancelMessageBox;
 bool _externalCloseMessageWasReceived;

 bool OnTimer(WPARAM timerID, LPARAM callback);
 void SetRange(UInt64 range);
 void SetPos(UInt64 pos);
 virtual bool OnInit();
 virtual void OnCancel();
 virtual void OnOK();
 NWindows::NSynchronization::CManualResetEvent _dialogCreatedEvent;
 #ifndef _SFX
 void AddToTitle(LPCWSTR string);
 #endif
 bool OnButtonClicked(int buttonID, HWND buttonHWND);

 void WaitCreating() { _dialogCreatedEvent.Lock(); }
 void CheckNeedClose();
 bool OnExternalCloseMessage();
public:
 CProgressSync Sync;
 int IconID;

 #ifndef _SFX
 HWND MainWindow;
 UString MainTitle;
 UString MainAddTitle;
 ~CProgressDialog();
 #endif

 CProgressDialog(): _timer(0)
  #ifndef _SFX
  ,MainWindow(0)
  #endif
 {
  IconID = -1;
  _wasCreated = false;
  _needClose = false;
  _inCancelMessageBox = false;
  _externalCloseMessageWasReceived
 = false;

  if (_dialogCreatedEvent.Create() != S_OK)
    throw 1334987;
 }
```

```
 INT_PTR Create(const UString &title, NWindows::CThread &thread, HWND wndParent = 0)
 {
   _title = title;
   INT_PTR res = CModalDialog::Create(IDD_PROGRESS, wndParent);
   thread.Wait();
   return res;
 }

 enum
 {
   kCloseMessage = WM_APP + 1
 };

 virtual bool OnMessage(UINT message, WPARAM wParam, LPARAM lParam);

 void ProcessWasFinished()
 {
   WaitCreating();
   if (_wasCreated)
     PostMsg(kCloseMessage);
   else
     _needClose = true;
 };
};


class CProgressCloser
{
 CProgressDialog *_p;
public:
 CProgressCloser(CProgressDialog &p) : _p(&p) {}
 ~CProgressCloser() { _p->ProcessWasFinished(); }
};

#endif
```

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```
/* ATK - Accessibility Toolkit
* Copyright 2001 Sun Microsystems Inc.
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* License along with this library; if not, write to the
* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_GOBJECT_ACCESSIBLE_H__
#define __ATK_GOBJECT_ACCESSIBLE_H__

#include <atk/atk.h>


#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

/*
* The AtkGObjectAccessible
 class is provided as a basis for implementing
* accessibility support for objects which are not GTK+ widgets
*/
#define ATK_TYPE_GOBJECT_ACCESSIBLE           (atk_gobject_accessible_get_type ())
#define ATK_GOBJECT_ACCESSIBLE(obj)           (G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_GOBJECT_ACCESSIBLE, AtkGObjectAccessible))
#define ATK_GOBJECT_ACCESSIBLE_CLASS(klass)    (G_TYPE_CHECK_CLASS_CAST ((klass),
ATK_TYPE_GOBJECT_ACCESSIBLE, AtkGObjectAccessibleClass))
```

```
#define ATK_IS_GOBJECT_ACCESSIBLE(obj)        (G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_GOBJECT_ACCESSIBLE))
#define ATK_IS_GOBJECT_ACCESSIBLE_CLASS(klass) (G_TYPE_CHECK_CLASS_TYPE ((klass),
ATK_TYPE_GOBJECT_ACCESSIBLE))
#define ATK_GOBJECT_ACCESSIBLE_GET_CLASS(obj)  (G_TYPE_INSTANCE_GET_CLASS ((obj),
ATK_TYPE_GOBJECT_ACCESSIBLE, AtkGObjectAccessibleClass))

typedef struct _AtkGObjectAccessible              AtkGObjectAccessible;
typedef struct _AtkGObjectAccessibleClass         AtkGObjectAccessibleClass;

struct
 _AtkGObjectAccessible
{
 AtkObject parent;
};

GType atk_gobject_accessible_get_type (void);

struct _AtkGObjectAccessibleClass
{
 AtkObjectClass parent_class;

 AtkFunction pad1;
 AtkFunction pad2;
};

AtkObject *atk_gobject_accessible_for_object      (GObject          *obj);
GObject   *atk_gobject_accessible_get_object      (AtkGObjectAccessible *obj);

#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_GOBJECT_ACCESSIBLE_H__ */
/* ATK -  Accessibility Toolkit
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```

```
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* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_NO_OP_OBJECT_H__
#define __ATK_NO_OP_OBJECT_H__

G_BEGIN_DECLS

#define ATK_TYPE_NO_OP_OBJECT                (atk_no_op_object_get_type ())
#define ATK_NO_OP_OBJECT(obj)
            (G_TYPE_CHECK_INSTANCE_CAST ((obj), ATK_TYPE_NO_OP_OBJECT, AtkNoOpObject))
#define ATK_NO_OP_OBJECT_CLASS(klass)        (G_TYPE_CHECK_CLASS_CAST ((klass),
ATK_TYPE_NO_OP_OBJECT, AtkNoOpObjectClass))
#define ATK_IS_NO_OP_OBJECT(obj)             (G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_NO_OP_OBJECT))
#define ATK_IS_NO_OP_OBJECT_CLASS(klass)     (G_TYPE_CHECK_CLASS_TYPE ((klass),
ATK_TYPE_NO_OP_OBJECT))
#define ATK_NO_OP_OBJECT_GET_CLASS(obj)      (G_TYPE_INSTANCE_GET_CLASS ((obj),
ATK_TYPE_NO_OP_OBJECT, AtkNoOpObjectClass))

typedef struct _AtkNoOpObject                AtkNoOpObject;
typedef struct _AtkNoOpObjectClass           AtkNoOpObjectClass;

struct _AtkNoOpObject
{
 AtkObject     parent;
};

GType atk_no_op_object_get_type (void);

struct _AtkNoOpObjectClass
{
 AtkObjectClass parent_class;
};

AtkObject *atk_no_op_object_new (GObject  *obj);

G_END_DECLS

#endif /* __ATK_NO_OP_OBJECT_H__ */
```

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```
// MyLinux.h

#ifndef __MY_LIN_LINUX_H
#define __MY_LIN_LINUX_H

#define MY_LIN_S_IFMT  00170000
#define MY_LIN_S_IFSOCK 0140000
#define MY_LIN_S_IFLNK  0120000
#define MY_LIN_S_IFREG  0100000
#define MY_LIN_S_IFBLK  0060000
#define MY_LIN_S_IFDIR  0040000
#define MY_LIN_S_IFCHR  0020000
#define MY_LIN_S_IFIFO  0010000

#define MY_LIN_S_ISLNK(m)   (((m) & MY_LIN_S_IFMT) == MY_LIN_S_IFLNK)
#define MY_LIN_S_ISREG(m)   (((m) & MY_LIN_S_IFMT) == MY_LIN_S_IFREG)
#define MY_LIN_S_ISDIR(m)   (((m) & MY_LIN_S_IFMT) == MY_LIN_S_IFDIR)
#define MY_LIN_S_ISCHR(m)   (((m) & MY_LIN_S_IFMT) == MY_LIN_S_IFCHR)
#define MY_LIN_S_ISBLK(m)   (((m) & MY_LIN_S_IFMT) == MY_LIN_S_IFBLK)
#define MY_LIN_S_ISFIFO(m)  (((m) & MY_LIN_S_IFMT) == MY_LIN_S_IFIFO)
#define MY_LIN_S_ISSOCK(m)  (((m) & MY_LIN_S_IFMT) == MY_LIN_S_IFSOCK)

#define MY_LIN_S_ISUID 0004000
#define MY_LIN_S_ISGID 0002000
#define MY_LIN_S_ISVTX 0001000

#define MY_LIN_S_IRWXU 00700
#define MY_LIN_S_IRUSR 00400
#define MY_LIN_S_IWUSR 00200
#define
 MY_LIN_S_IXUSR 00100

#define MY_LIN_S_IRWXG 00070
#define MY_LIN_S_IRGRP 00040
#define MY_LIN_S_IWGRP 00020
#define MY_LIN_S_IXGRP 00010

#define MY_LIN_S_IRWXO 00007
#define MY_LIN_S_IROTH 00004
#define MY_LIN_S_IWOTH 00002
#define MY_LIN_S_IXOTH 00001

#endif
```

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Version 2, June 1991

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<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
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  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
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  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
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   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size:
 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  Test passes if the word PASS appears below.
  The Extended Metadata Block is valid and may be displayed to the user upon request.
  P
  The XML contained in the Extended Metadata Block is below.
  <pre>
<?xml version="1.0" encoding="UTF-8"?>
<metadata version="1.0">
 <copyright>
  <text>
   Text with <span>span</span>.
  </text>
 </copyright>
</metadata>
  </pre>
 </body>
</html>
MZ@ !L!This program cannot be run in DOS mode.

$+NsEsEsElNsEooKsElOsElAsEb{sEsDsEo{sEUNsEsEsE+uCsERichsEPEL@Z.Xf[p@@P
p$.textWX `.rdata*p,\@@.data0"@.sxdata@.rsrc@@.reloc@B
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FfT$fAfdA@F^_A2QV3uFFFNNE N EM^d
_AW2QVuEtj+v Ev=MYYNM^d
S\$Vt$W~h&@7jV2tWY_tVY^[n`A1S]VW3M9{Sf8-GM9}}vREEE3:tF<u;u~CN;wHFt}uEEE;ErU}
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h${AK+MH9M}
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WNEEM;HrM_^[d
MW
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AAD$uAVAuAAuAu2US39]VWv/}u?uf>u'EvHtC;]r3_^[]W@D$HT$Vt$h At$NVF^D$L$@jX6`A-Qh
YM3;EtMd
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Y3^X{ASl$Al$l$UV3W
r!Sj
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r,jj
uS.0jj
uD5FS,Uws0Gt D5N'_^[Vj^tF$
s07Nu^USVEUWj_jYp+tjGY$uEUjYL+E
UF0rF7Ou_^[]T$D$|s-ARPSV:t
t^F+^[Vf1f;tft
@@f0+^^fftf=Ar f=Zw fAAT$V1Bt)fFFfAr fZw <A|<Z ff;u2^Vff;1u t BAA2^^SVFB:t!A|Z <A|<Z
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D$HP$AT$Vq+;^vD$HPVj&fF Y^Vt$3W8t@<0uPbV@t
@B_^Vt$Wv5@Au_^US]VW3;tG<u;~vGP6E#EYY~~S@t
@B_^[]S\$V;t>W{;~vGUP6Y.Y~]~_@At@A^[VL$W3fftf=sDGAA;~vGSPS6qYY~[3~6vL$0@AA;r$0_^j
VF;FuFT$d@F^ytSVt$3W8tC<3uSGV@t
@B__^[VW|$wF@AuG_F^UVMUEPq^UVW};~rF@s>D?SP)FY@tEffBBAAMu6*Y~[_^]EhAPE)3&US]V@rE
hAPE)3&DWPf'6Y>Y^_^[]VW|$&D?PY~~_^AD$HPVj&OfFf Y^S\$V3f93WtF@@f8uVNv
f2f0@@BBIu_^[UQSVW}3?]tF<>uV=3vf9fABB;rf$pE_^[Vt$WvF6@t
ffAAFFHu_^US]V3f93WtF@@f8u;wvD6PO7ElEYYwNwv
f2f0@@BBIu_^[]S\$V;uCW{;~vD?UP6Y.Y~]W~v
f9f8@@AAJu_^[SVW|$;~vD?P6YY~tL$vff@@AAJuf$x~_^[UQS]V3;WtF<u;wvD6PC7E`EYYw3v]ffABB;rf$p
w_^[UupAYuEhAEEP#]t$pAYUQSVW3GfV;t}pAPPRQPuEupAtZEhAPEtNw#;GvPEV6PQRVjuuEhAPEtN<#G
f$A_^[H`A9"eVWMueM0EPIuYM_^d
\`A!eVRM.ue}uYM^d
UEPj_u]USVW3G
M V;PP|pAPPRQPuEu#pAEhAPEtN"e}t}teE;GvPVEEu#PEu#PuQRuju}u}U
uEhAPEtN!G$_^[t
VW3f1f0r+f9w%=w0+;wAA3t
_^USVWUte3f3f0rUf9wOwAr }w6jj
Ru> E0j3+^;wr9}w MCC33EtE_^[UV.t%juujuuuxpA3^]VtPtpAu2^^UQEVP1ppAupAt2
jjjuq3EP^UQEVuEEPu1lpAupAt2
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$38D$@Pt$UQlA9EvEEjPeuu1dpAMUUVuW&EePuuMttM)Mt2_^]1`pAUQQEVPuutE;EuE;Et2^Vu3^WVYWjq
AtS3f1fABB;v[_^Vt$f&^Vt$^UVEfffHQPqAFu{AhAEEP^]UVaMfff8Fu{AhAEEP^]Vf>t
fD$fF^Vf>t
fD$F^Vf>t
fD$FD$F^3%}/;t+~~! ~~QqA|~@uQffQfQfQQ3f9u3VVqAL$%}/|~% ~~QVqA^|~@ujQVpA3Vf>u3^}f

F^UVuu}%=u{AhAEEP4f
F^]3V3A r^APQXpAP\pAU,MtMtEPTpAEU`Vh{Ah{AfE@HpAPLpAt+MQt!ME;Mwr9EsEMN"EE
PPpAE;ErEf^@t5@t)tWtt
jX;t3jXjXj
XjX!ttIt6ItIt03@tItt
|@@jXWD$a?@AUEV#EWu3UE#Eu3MFRQP8WFj
Z_^]D$@@A3AAAUSVW};MrEF]SuRPQFEFN_V^[u3jZ]D$}@@A3AAAVW|$NtWFt3
f~V_^A@s
A@AAs
A@AUQQS39AVWUMv5A}7tFtEVuC;Ar_^[ENNHMFQd$=ASUVWv(A7VPuD$D$;Ar2_^][YFEFEVW|$gg G;
AsH4AtFt2~tL$PF~Pu 6O,FG_3^SVt$t$}3t$Vk^[SV5A3Wv0AZ;\$uZ;\$utRu@;r_^[p`AQVuFetPQ6MtVPM^d
UQSVWU3WA;v6A1^;]u^;]t
B;rMP v_^3[tPQVW|$tWPtPQ>_^3@d|A@T|A@D|AHHHHH
,|A@|A@|A@{AUVuW}&jhAWuEtjhwAWztjh`wAWfu
EP:jhPwAWHu
EPjh@wAW*uEP#@3@_^]D$@@L$IAu
tjP3VD$tVY^`AQVu,|AF|AF|AF{ANEtv PNM^d
UEVuPuNu*MtUt3.pANt
Pv u@~
%
^]U9EsEVMjQPujDpAPhpAEtMupAmu3
^]t3pAu@~
%
U}r1EPEuHuuRUtM
MJ]D$t$HU4EPEp@pAtmVutWjjjuDM3V_E^tMMHEtMMHEtMMHEtM3pAU4EPEp@pASVW3jSSuM3juSSu
EVF^M3^FE^V8XtEjXF EF$EF(EF,EF0EF4EF8EF<_^3[pA_%UEVuPuNuUVVut^]U}r1EPEuHuucUtM
MJ]UEVpEPjjj(u@:uu;tEPuuWt2%@^UVut&}jXv99EsEMjQPujDpAPdpAMUQQt^]l$l$rl$ul$l$Tl$Wl$l$6l$9V
WfftCf=+uf~t6}Au&f>-uf~t}At'2_^t3ttWfyI|%W3UQV1WUE+_^UQfVf=uyu"MB'fuqtU;tW
EM3^UQyu/f8tU7u28EtEjX@M3f8tW
ubG
L$t$H@%S\$Vt$W~hJ@7jVtWY_tVY^[oUVF;FrEhAPE:MW9<QNNF_^]`A"
(S]VW33;FQM9~}vM4vG;~r3;t>
EfEfEEsMEE36EMP8eMuEuuPQMMM_^[d
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3ffHHV6YN^tjAHx ;T$tH}Vj}jfxu@ vj
X^`Au4SMMVW&3;4|A]uf]f]]]EtMU+;f]f]]fEf=uutf=uEUt{uMXu~;tNf=uU;u1uM
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UQVW9UE+V_^UQVWUYM+vSY;[;u-@sx s
jZR`jX3 RP3UfJfAr fZw bt+ttIIu'jj
jZj Yj+^;sPW_^SVW3|AuC}Ar_^[UQff;t?fuf=u.jqMf-fuUuuMfu
QMV2vv
tu2aA(S3VWM]]]MU]39]v]EM<MEEUPEMEPEPu;u7+u] FY;uYrMM3M_^[d
uMYYM} aASVWUM3~3;]tAv3fXf=:uMEPEef PMC;rMEPuaY_M^[d
SVWf=|W6IDx0N3vff0rf9vG@@;rW6xL$PK_^[DaA4SVu3WMF;t`}f9uMM5M]*EUPEJMEPEPuuyYY};}Wk4|
A]f]f]]EEztUH;t%fEPuWMEPMM_^[d
XaAVWff=u0N@s^j XsP3RP 3;f=u0MveMMfuhYWM_^d
laA5SVWCc{f: EuMF3;M|;us
Eufp9MvEf8s'A@@;Mru7uMY}3,uYWE{DpPWM_^[d

aApVuW~tzAu
uVo?uf>tW/MveMEPuYM_^d
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VWjvY3;tHfHfH
H3V_^UQSVuWU>&t+;sURPuSQMM+uu3_^[UVuEuPu;u^]UVuEuPu+E%@^]USVW}t-
;sURPSVQ]+}u9Eu@3_^[]D$Vt$H+H;v;v3vWP|$P
9A;r_pD$t03^UVuWF~+;}v}t0~tNWuQ~tUNWF~Et8_+E^%@]Vt$W|$~tT$NWFD$t8_3^U
EPEPEPEPXpAP8pAt(MUSV33W}u33_^[<pAjh'jPwV9FV6FVffVjF8V<^<pA333SUl$VWjY+SEU!+C8_^S<EU
][U8SVuNH3;9^Pu3EWPN]]FH8Xt7EN(V,SPEMN0UV4PMNPUURP5EN0V4SPEMN(UV,PMNPUURP;t NHW
_^[VV0pAD$VF4pA^VWV0pA~V4pA_^U
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U
AUEAEAEAEEAEAEAMEyUMnEjEXueEMMueEuuuuuuRPuuRPfuuRPqqq1t$t$UQQEUEEMEEEueEuuuuuuR
P-AAAU9EsEA38t3MO3-QPQPjjRPjYfuuuuu uRPkRP*]SUVWjXj_3p;vBr@ r _^][USVWuujvu$u
jvu,u(SWuuuuRP_^[](aA~$SVW;Ms
@r3;P29}uJ}KeMEGEEvM)MUA;MMrEEG3
uuq9~tjq;YtxxxA3P-utU9u-j;YtxxxA3Pj`u

H`@x}F};tPvM}EURhwAPE9}t#MEEP}uW;t
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V#WiiQ#iPF_Q^VW|$Nt9>uf&cfFt
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jAX;rME;EvM}EwEMjXH#EmMx;}EwjXH#Em;r
ME}@EE+;vE0+EvA@KuM1F;uEEG_^[VjHXH#^Vt$jhAt$&u
D$@3@^D$@@Vt$NFut
VY3^#HdVt$NFut<VdY3^aAB0SVW3~_(_($_,]]]FE;tPvMEURhpvAPj;YtXAE]E;EtPQEE;]]]V4j
RPQ;Et:EE;tPQE];tPQEM;tPQEXEVTjRPQ;Et:EE;tPQE];tPQEM;tPQE9^,]]w 9^(;t4G W$+EUUu=vP;EG
EG$EV(N,9Eu9MuEE]t8^ttu9^,tE]MHHMXH9^t[6FPQN?;E=;EPHXNFQSSuPR;E7UUAuE8]t 9EKIO
_$G(_,E]E;F,twE;F(fF;t PQ^F;t PQ^EE;tPQE];tPQEM;tPQ3M_^[d
EE;tPQE];tPQEM;tPQEEE;tPQE];tPQEM;tPQEEE;tPQE];tPQEM;tPQEIEE;tPQE];tPQEM;tPQ@
SVt$Wt!;sPSWQ;wt+u_^[@bAHSVWj3Y;tXAE];EtPQU]]MEE;t;P1M7]EURhvAPE9]u9Xj;YtX@A3;EEtPQE]|_(
_0_,_4EURhvAPEE;tovPQ;Et\EE;tPQEE;tPQEE;tPQE];tPQEM;tPQE
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QEE;tPQEE;tPQE];tPQEM;tPQE]EURh`vAPEE;VdjRPQ;Et~EE;tPQEE;tPQEE;tPQEE;tPQE];tPQEM;tPQ
EE;EtPQE];]V4j
RPQ;EtmEE;tPQEE;tPQEE;tPQEE;tPQE];tPQEM;tPQEnEVTjRPQ;EtmEE;tPQEE;tPQEE;tPQE];tPQEM;t
PQE9^,]]~w 9^(s;t4G(W,+EUUu=vP;EG(EG,EPE]HMPXIEEt
8^uu3jXAE9tl;Pp`EPQE2Mh;E)ELEQMQSuuPR;EE8Xt@;[G(_,G0_4E]E;F,wE;F(MgEM_EMEUMEIME=ME1E
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EE;tPQEE;tPQEE;tPQEE;tPQE];tPQEM;tPQEEE;tPQEE;tPQEE;tPQEE;tPQE];tPQEM;tPQ@EE;tPQEE;tPQEE;tP
QEE;tPQE];tPQEM;tPQEEE;tPQEE;tPQEE;tPQEE;tPQE];tPQEM;tPQE<EE;tPQEE;tPQEE;tPQEE;tPQE];tPQMM
jXS\$Vt'W~hp@7hVtWY_tVY^[bAQVuE
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IUVvvYY#A^QSUVW38\$jYu;w28\$u:t39SjVWL$(T$

L$SD$UPQ_^][YQSUVWGv3UjQPG3QjRP1`UjUWjYx_^][YS\$Vt$W~hrq@7j
VtWY_tVY^[S\$Vt$W~h<s@7j8VItWUY_tV=Y^[bAQVuF(etPQM^d
cAS3VW]]hM]-u30@;r=s)ucEPEUE;]3E]<0UDUf;u0E} rE}rMCSM_^[d
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U VuMu:EP^D$AhD$ApD$At3VNXPub8D$tZW|$w$w
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uuSjdRPuj3XRPSVuuRPjZQjZu$u uu;_^[ D$VWL$
jh@BQPRPd_^UQSVWjjduMuEjUYruuSW1MRP_^[U@SKXP8EVuWKv4v0v,v(v$v
vvv6s{`EUtKX5ASdKXj}YuuuuSuEUuuu<EC8PChstKXeUspUEPuus|U_^3[IX`VWV38t@<0uT$+~W_^V3W8t
@<0uT$+~.V_^UHVWf g EPTpAU/hAhA,pAPLpAtMQU_^8cASVWAPjMYePMufYfu ~Jt%f= u ~!thAvhAF
RP?hAhF"RP%~NjXjEX3T;u9Ut#}u~@thAjvhAvm~thAV,~thAV
hAFv3;tjP7hA3%uWVM_^[d
U$EVM#3u}EUSj
Y3#EKu6j
YEM#u"j
YEG#3uj
YETRMPXMEP}[tuMuMu^Vfu
Rh A^
R^UeVM;MsuUEP^LcA9,VMf Lt1MReUMHEPIMuYhA=Ath$AM^d
U8SV3sW EPEPEPU}uK}swEMuMue3}UEPEPEPEKuj_FOuE}|}OUj(EPj)_^[UQSVW3]}tuF|_^[`cAVWf
3W(pAt0<AMWj!ePMuoYGArM_^d
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}uEE'}}AvMMEsM:E;E|%EMDMPE;Es
ME$TM(tg9}tEMAAt"hAuYYEt98tu4tU4EFE.u*uuEEYAYucuEWYY}uTDY@cPhAU3'EjZWPmU9Uj^us'"EjZ
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3MjX;EPp}38pt@pup:@pp
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VW|$j'|fxu @2_^Vj|fxu@^jLX^3I^UQQEVuUUM&Fwr= =s
}u =3rw=r}t!}tRPjujYaV^cdAQV3uFFNENEM^d
dAWSVWMu
l3PEP,];p}
@j_9lt
W8]}utN}uE9]u@;u }Wj
;v;vuEuMu9]E}]VM\#M$`HM \FQpPE{;E\9u 9^\E)E(jSxNhHHFiFHPj F(SPjFXSP$9]]v}ELPLP2uEu5;E
LM;9uE9$LEpEEE;ErEE;EMDU;H;] tU
E 9]] NPEFEFE FDP uP!;EEE;Er\EM];tjFuVE\/LEqM];tju%ELLM];tj@M M];tj]tC9]E]E]uuiu3PE(uSpRPF(FV,E
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PAME MtAHu9]uFM$HPMH8HX<}v
EViP%@F0B;+EE;E}v9]vEEMuu;]]OEPM]]]]G(EG,;EvPU]U]IuM$UjRP;E]E9]]E]?uEi9]uwM(ua}aMuWQM$F(
FV,HPMH8HX<1tP$pAM];tjt1H(N(@,F, <;jX}Fvg39]vrEEE9]u ;ujY3UiPD0xPPH#@x0d;E
G;}rS;;EE;EE}](9]E}E9]v/EEE0\E0;tE(MuEMu9](tLtP$pAM];tj7](tP$pAM];tj] u;lOEP-
]]]]w,w(Su6ME;UvPU]U]Iuu$MSQP;t"tP$pAM];tju5MjQPt;P$pAM];tj<M nM_^[d
$Vj
e|fxu@^^V%uj|
3A^jX^Vj|fxu@^3^D$@@dAQQSVueWF0e$2E@@uEtPFHHrMe3d
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tjU}jXwr9EseEuuuuuj3X]eA|QVW}WueGPNNWEM_^d
VW|$WGNP9NW_^Q$pA
T$3333333333333333333333333333333333333333333333333333333333333333333IUQQSVWUj
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9^uNUOxNO|OQWu2vuPEPuu`=@u`u
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@]]M3]u;t3QM/u
E;EEUE;EtuuSh3uuWVRPSuRPEjU^uu]`d]]}E;k8PYE;Eth<s@h@pWj8V83;Eu]uMk8uu~(MuE2;9]?MQhwAWE
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;u[EE89}rR@uYlEE;tPQuY]MMM1MY3;hE,;u
B8;rOUMEPj0]MEKuUMEub;Et"uEY;EtPQuE;u$uEY;EtPQ@m]URhwAPE9]t$M EPuu]K;t EE'u$UMuuuu;E;Et-
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0UPSMV33WU3\u@r39]]w9]v|uU;t3%uP;u\VPuuVPMQVPVP@w<33;v3L;rE;t;u]E;Erw;}r3_^[jXUVuF0$[vF(N
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PRPV_^sAI@@;v|VhAHpAthAPLpAu3^VjX^ZfASVW3u>~~E}X;t?;wPY^;}vQjY}Et#EMHOPO3Fe<FE9]rM_^
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pAqt$qAYYqj
pAYYA%@UQQEjRQ3MEAE3@t|A@A@A@|A@|A@|A@|AH
H$H0H4H5H6PPHTPXH@|A@lA@\A@LA@8A@$A@A@AHDH,H(HlHdT$D$SVWA3uD$_^H [AH 3
wA3uD$_^H [AH 3vA3u D$4H_
H A^H 3[vA3u D$H_
H A^H 3[vA3u D$H_
H A^H 3[vA3u D$H_
H A^H 3[vA3uD$tpH_
H A^H 3[vA3uD$tBH_
H A^H 3[wA3u/D$tH_
H A^H 3[3_
H A^H 3[_^@[D$H AH L$A HA u
tjP3VD$t V<~^jhfAdPd%Vt$|AFlAF\AFLAF8AF$AFAFA@AN\D$^N$tVPL$^d
D$L$HH3D$L$H@3VN$t
FXVT;t('NXFTF$u^NXNT3^D$T$Vt$h@APNXe_uNF1^w"$@3W@@I@@@@@@T$S3;Y8:A6Y<tA8RQ<YH
YLY0\V[D$3H(H,HHL$QH3D$L$A,3D$L$P4@8A3,SUVWF$F5vF@ND^tD$,L$0\$D$~HV(N,F,;u,L$u$L$@P
FTPF$F(PQRD$FpNPnt+;v+D$ F6T$(t4F8NH^L~H+N<3;rw;rF4T$(tD$
F(N,+^$L$$L$QL$$QL$,QPN\TT$^(N@V0T$$D$ ^(N@FDNtFD+//o8^6ot^Ln<~H;rw n8;rD$D$\$
ujutbl$tYT$tuLT$(D$;rFD$Vl+QL$H`NtVp;uFt^t\$D$uKD$\$D$HJV@l$,ND|$0+~HL$8L$4T$4WQPRuxD$
ufD$u6F4t!F6tV8NHFH8;u?NP;u5D$_^][,L$ttN4tuD$_^][,_^][,Vt$F$u
W^T$NFRPQD$L$T$PQRu+N4t$T$tN@2W9;_u
Rq;t^Vt$W|$tVPtPQ_3^Vt$tPQ3^D$3;tSUVt$WT$Ft1Fn,N
^0+l$(;rw;rFtD$l$(\$$T$(~F;u.D$(u&FV8WRVRPQD$(F+T$L$ L$RT$$QRVN@PD$4Pl$8TL$T$
NND$NF$F$N(N(L$$N,F0D$,+tD$uBt9_^][D$(_^][l$l$vl$vl$l$Fl$Fl$Vl$l$l$&l$l$l$l$l$l$l$l$l$Vl$VjhfAdPd
%Vt$F{AF|AFAF@AD$AFAFAFAF1FuD$hAPD$L$^d
T$D$SVWA3uD$_^H[AH3 wA3uD$_^H[AH3wA3uD$tpH_
HA^H3[vA3uD$tBH_
HA^H3[wA3u/D$tH_
HA^H3[3_
HA^H3[_^@[D$HAHL$AHAu
tjP3VD$t Vs^AAAAAAAIth8A@A u.f8L$Q
RQH,%Wv3uf8L$PQ0@A43f8@$@D$P3L$3T$B3L$A$3T$B3L$A3T$B3L$A3T$B3L$A,3Wm@@@@@@@
@@@@@@@@@@ff=arf=zwf=HuGff=arf=zwf=Cuz3f0|mkfyudL$f=BuJff=arf=zwf=Tu-3f0|
fyuT$38L$SUVWUl$X3v?\$Pt$TtD$Pu7f>u93f9NL$8G;rD$LT$H'Wz_^][8_^]W[8S\$v<Ul$Vt$W|$?uf>uFNPQ
MWKu_^]3[3[L$D$PT$ID$@uT$L$RT$~D$<L$VPzL$LQL$,"{L$t$XVFzT$h8A#h@AVt$PD$PT$8NT$
D$$VFD$^uD$,u
D$uy<l$l$l$l$fl$fl$fl$6l$6l$6jhfAdPd%QhnD$D$tL$d
L$3d
jhgAdPd%Qj nD$D$tL$d
L$3d
Ayu3Q5Q"Yu3jhQjpAthjQpAu3RRYu3jhRjpAthjRpA;s3tPKtHt
BP+YD$UV0W3l$s_^3]D$SZ\$/;sI
tB;r+++;vA3JABBBL$,|$$t-+twtD@uGf+t0CuK3|$$t+\$3l$BJ$JB
l$G[vT$3_2^]T$_2^]Q$X3$PX3R!$$YSVL$333D$D$\$L$T$D$L$ T$D$$L$T$(D$^[VstC
et5FPNQVR3lFPNQVRVS^3^SVWy3PA39zuZ;Yu;Yt@$r_^[

D$PL$QT$RT$3D$PL$QT$RT$L$V%WL$'t7Ht#HuruJsE_^
ru*r
rut&t't5t6t_3^ W~D~@|$~t~<_V4t9~<tCF4~<F439F4_A+A)Q)Q)QQ~u-
~\u'~t#NFVL+H;v)FLNuFY+VF<V+F4$tIN8$PF\u$tFF+F;FDw+VN<V+N4$uYVNF@+NQ+F4RPIN4N@^yt3A
<A4+9AD@yuA+A9ADr V^V~u6N<V4+9NDAt"N@W~+~+WPRV@V4_^3VQ4QQ$hlA0 AHfAq`% 3 3% 3 3%
3 3% 3 3Bh^VWGV$~F$uV4GF4_^SVWv-|$V$G3^$8^u
V4G^4_^3[r
rL$TUl$V@T$*^D\$ P
VHn 3_nTuX3;lrw;hvh;tI
=vuF,@vFTvFTvFTFT~~PFX^tV$<;t9`t>\$ Cn$`;t3F$;tNXV(]_^[3V$C~n$u
V4Cn4]_^3[Wy$ITt3_ATQ$I,AW<t3_UVF4FFFFF\FtcFn+F+;sV+W~D;wt +_;sF
;vnV^]UVN$FTW<N,At3NT~$t3FV4FFFF\FFn+F+;sV~D+;wt +;sV
;v_nF^]W|$3tVd$4;w3+4@;r^_~SWu:`~$+FP3%t;w3+A;r)F)F)F~uF+F9FDuN9NuF^+N+;sV~D+;wt +;sV
;v_^N[T$L$SD$Ul$L$Vt$(+|$,W|$4t$,D$(L$0;+;#+D$$D$:+uU:EuND$;t$+}T$ T$
::uFG;u|$4;sI7O|$4;t|$4L$+L$|$0__^][$D$$SL$L$,UVpW|$,t$3+\$t$
t$9t$@D$0L$8L$@;|$<;#\$<+L$4,L$+l$$;r:uWF;t$t/:u'F;t$t
,+):EuFE;t$uD$0l$$9t$HsL$DO1yt$HL$D;t$te:sL$]t$t$ \$L$\$Ul$t$ |$,+|$@#L$D$D_^][ UD$_UD$^][ D$
SUVt$0HWD$(33+L$|$\$l$9\$<IL$<;D$8;#L$8+t$0<L$,+;rt$,:0uE@;D$$t4+I.:u#@F;D$$uD$OT$_^]
[;D$$tt$,:0sL$\$|$l$L$l$|$|$\$D$(+|$<t
t$4)D$_^][SVNsFFF;Fu^3[BV$W~j8F0SPFPFPF(PPFPFFF+;FuA_^[VFT$D$s!FFF;Fu3^N$SUW>W3T`G3#F,V
T$+l$l$,3;V+ :{L$G;t(:u@;u\$+JS;uMV0FRVPF(RPFRT$,PQ:FFF;Fu
_][^L$\$PF0RVPFRV(PRVPRT$8FFF+;Fu_][^VFT$D$s!FFF;Fu3^A3D`QSUL$IW|`N33F$#~,l$ +T$$+T$T$
T$$T$33;^s+ :
uL${y;t$;ns+ :
u\$MLL$tz,
\$$;t\$$:u@;u+T$D;uEF0VPFRV(PRVPRT$4QQFFF;Fu7_][^sPD$F0RVPFRV(PRVPRT$<+\$FFF;Fu_][^VFT$D
$s!FFF;Fu3^A3D`QL$IL`SU3W~3F$#N,+\$ l$$+l$l$
<l$$L$33;Vs+:uD$jh8;t$;^s+:uD$STtjT$$T$;t\$$:uG;u+L$|;u5VF(L$FFF;Fu[_][^T$sD$F0QNPFQN(PQNPD$4Q
PR+|$FFF;Fu_][^SUVWI~r8A
V$NF0NPFQN(PQNPQW^F^;Fu{+u_^][QSUVWT$InrRAI3D`~$^3#N,%F0NPFQN(PQNPQUFFF;FuL$u_^][YS
UVWT$IFD$rrA3D`QIL`^33#N,F$V0FNRV(PQNRT$$PQRRFFF;Fu8L$^_^][QSUVWT$I~rXAy3D`IL`3~3#N,F
$<VF(,FFF;FuL$u_^][YP@B@@B0@yuB`@B@IHuB`@B@@uB@B@Bp@B@@W39~t2NFH~~~uNuNuNXu
F0P4pAFHN ~,>vN$6uN0Q0pAF,_~W~HtX~uR~,FtF0P4pAF,SN uNt;~HtN$GtN
u;~HuF[_V~Wt*~FtNtNtNLt~(tF0P$pAF(N-tN%tNtN tN$
t_^>uN0SutNF(tuNtuNtuWN
tuWN$3tuD$T$PNFsu3S\$t:UVt$W|$+$D,+,nBKu_^][|$tIS\$UVt$W|$AAi3)3#D$+,A.BL$
u_^][|$tVS\$UVt$W|$$i3i3i3#D$+,A.BL$
u_^][|$tRS\$UVt$W|$A)3i3i3#D$+,A.BL$ u_^][QSUV
$I<D$
r@Rrx$044
xIt<-
0pA_\SXP.+.54pA)/)SXPH~qF=v$+FPXF,NTV$@Pl$^+^D$E]FH;r@+vN,V`RVTSEPF$QVtQKM^LqT$Dpq^][
YS +UW|$$3T$l$\$G;w
/_][3;99,tN@p,40pD~p<Sp@ol$(XQ4pApHTpLoXR0pATpH
@@T$W;RT<Iu_][+T$;rD$+@;sD$ +;sT$;T$L$IL$t}L$<@+THP$OQ PQUPQL$0SxL$+P|$$ECL$;L$t+L$+;
u3\$l$;/_][V,WuXP0pAT?~W=v
+Q),uXR4pAT_^3(PT8<@DHLA,ATAXA<A@ADAHALAPVW(/F,'G_^W|$v3_3D$D$D$UV$WN@3plNDl~4~
8uNLHl_NPG6m~t8pt{,urT4tXP4pATHlDk;pt LGkHl;pu,NHk _^]3D$SUxW{ @r_][Vt$ uDt0CL$T$D$V

QRP#u^_][S(h@uSs,h@x@t ^_][^_]3[SVWx33^^aN ^ANW$VGTFO`N$W(G OHWOW
G0_$^[Vq,^Vw,WGtOH?GG@GWOO@G^rW+O RWIG
@GWG;GuG_SYUVqW9/GI$3%4;r%+::D$u+N_p^][D$_^][QSYUVqT$Q$W9O3G3%4\$;r?+D=:u3+HD$HL=:O
u_^][YD$;r+9:u+Np_^][YAVWy4I|ytSUhE>^:ZMu][A_^SUVFNW;T8Vu/FHNrRV+V
F(UF+_^][VN+SF(UK+\Xu+F_^][QSU-
0pAVWT$$F;F39~0t.ND^t~0~8~4gNHgN@YgNDgN\Q4pA^tNL~XgNPfV\R^XFtN+?FF@FVNN@FrV+N
RV+F FFN^)\$NDF&_^][YQSU-
0pAVWT$$F;F39~0t.ND^t~0~8~4fNHfN@YfNDfN\Q4pA^tNL~XfNPeV\R^XFtN+?FF@FVNN@FrV+N RV+F
FFHNr@N$3NV%F^)\$NDF_^][YQSUV3WT$]F;F9n0t.ND^tn0n8n4keNHceN@;eNDdN\Q4pA^tNLnXeNPdV\R
0pA^XFtN+?FF@FVNN@FrV+N
RV+F FFHNr8H@n$3L~3N%3F^)\$NDF_^][Y@B
@B@B@VxFHtCHt&~@u@tA(@Bp@^tP@A(@@B@@^t@A(B@@B`@^sVt$FAVAVAVA VA
FAFAFA
F3^QS\$VWs_^[YD$U(~]_^[Yh(AL$ L$QjjPRL$0QP&T$uuPD$D$Pj3]_^[YPSVWL$$|$
\$D$+'D$hL$lD$$L$(s_^[P\$d3N|$pNN N
N3NU^N
D$ltMt-D$lu]_^[PL$dSQPeL$ljT$tRjD$|33L$tL$hL$pDD$;T$T$$D$L$pT$T$D$ ~&H;u!|$htu
D$ly3tD$lD$dh(Ah(AjjL$0QVRL$@QSPNT$8_t%u6D$;D$tv|$tD$t|$hD$D$p@D$p;D$DD$|$hD$tL$$t
L$lD$]_^[PLT$PJ0B@L$J8D$B4SL$4JD$0B<UjVD$DJW:JNL$4J+D$PBD$8B(D$(BL$J,D$B
R$l$Dt$X|$TL$LD$0\$(#\$$\$]=st$>Ft$;1+|$(f]u|$Lt.L$uL$8\$4\L$(#\$PL$T[4NL$D$(rl$+L$Ns}El$;s+f~+++fN
3=s}El$;s+f<3+++f3C3=s}El$;s+f<3+++f3C3=s}El$;s+f<3+++f3C3=s}El$;s+f<3+++f3C3=s}El$;s+f<3+++f3C3=
s}El$;s+f<3+++f3C,.=s|$G|$;s)+f<.t$|$4>Ft$+++|$4f.t$M>Ft$L$
+\$,L$L$;#l$8+L$4,)Ns|$?D$;s#+fN+++fN|$ #<~|$?l$$=sl$mD$;s+|$3L$ f/,+++l$f}l|$$#\$
|$$<^|$?=s\$D$;s+|$3L$ f+++\$f;l-|$$#\$ |$$<^|$?=s\$D$;s+|$3L$ f+++\$f;l-|$$#\$ |$$<^|$?=s\$D$;s+|$3L$
f+++\$f;l-|$$#\$ |$$<^|$?=s\$D$;s+|$3L$ f+++\$f;l-|$$#\$ |$$<^|$?=s\$D$;s+|$3L$ f+++\$f;l-
|$$#~4~=s|$G|$;s*+f>t$|$4L->Ft$
+++|$4ft$L->Ft$
+f]L$LM ++=st$>Ft$;s%+L$ftM |$+++fL} t}8=sL$ D$;+|$ft}8]sL$ D$;sR+t$f]L$,l$4;#\$8D$(++.Ft$L$=
+++f]+++ft}8L}P=st$Ft$;s+L$<ft}Py+++fL}PL}h=st$Ft$;s+L$@ft}h+++t$@fL}hL$Ht$Ht$<t$@t$,t$<L$,>L$=s
L$AL$;#+|$$f4~~sL$AL$;s+fN+++f~
3=s|$?D$;s+f<3+++f3C<1=s\$D$;s+f1+++f<1A+++f>~=sL$AL$;+|$$f^t~~sL$AL$;s+fN+++f~
3=s|$?D$;s+f<3+++f3C<1=s\$D$;s+f1+++f<1A+++f~
$I
3=s|$?D$;s+f3+++f3Kr|$L$0prAt)=s|$G|$;s+fy+++fql$64=s}El$;s+f<+++f4C4=s}El$;s+f<+++f4C4=s}El$;s+f<++
+f4C4=s}El$;s+f<+++f4C4<=s]El$;s+f+++f<F@+IFI|$Dw=s\$D$;s +|$Dfw+++\$DfsIu+l$=s
}E+tw#Iu|$DOl$=s]El$;s+f_+++fOO=smD$;s+f,O+++fOO=sl$mD$;s+f,O+++fOO=sl$mD$;s+f,O+++fOL$@|$L$
HL$<L$@L$,L$<NL$,
L$L$LuL$(;\$0L$d|$+;r;|$,#t$8L$(+t$,+\$0\$8+;w\$4,+)|$.ME;ul$4./FG;t$8u3Iu|$L$;L$dsSL$;L$hsIt$Xl$Dl$4D$
`T$_^]P[LL$`y_^][Lt$0L$`|$=sGQ$T$A
D$(QT$,A(D$<y_Q0T$<qDA4D$D^Q8T$]A<Q@3[LQS^DtbsZNFUn0L$+W~;s~,uV+V(;wVV,N(+^Dt;#T$+:8
@Iu_F][YUl$VW$~,u'V(FN++;v<u ~$sBl$UWVu,9F,uF9F(rF,.9^s9ns ~Dr3_^]_^]SUVWL$(o@W
w$GL$OD$K#_(+HL$
D$s&D$(;D$r_^]3[@D$(D$;~D$,D$u(t=OuO_*OH#G(i\$sa$D$<HsD$(;D$K@D$(;s++L rO_0;sG3+Il$D$
#DED$sD$(;D$(@D$(D$;s
3|$ ++L rD$D$(s
;D$bD$_^][|$Lo ++L$L$(s;L$-AL$(D$;sD$ D$D++Do8D$s;L$9AL$(D$;sg|$ xD$(s;D$@D$(;s
;D$W_^][|$(++LhPL$s;|$%G|$(L$;s?Dhh++s;|$G|$(;s++|$L$(D$
s;L$)AL$(D$(;s_3D$^o++s;D$N@D$(;s_l$++D$s;D$@D$({;s++|?D$;sD$(+|$

0rD$(ol$\}sD$(;D$n@D$(;s++|?@r@IL$sL$yD|$s;@+K#+IuL$D$(D$L$L$is"D$9D$(D$(8@D$(;s++L$u3AALA
(A,ADD$SUD$$VWT$\$9nDt.$NLsD$ @T1PFLD$ D$$Ku\$FLt
~P^NQVRFSVT~DN$F FLvLN~tfF<F8F4F0F@FDT$9nDu)~$T$,_^]3[I\$L$3D$9Nr/FDu
9F$=|$(HVD$D$~Lupru
|$ D;,|$ W63|$t
|$ \$P~yFL$$+)D$|$ 3s;sT$ *L7PGEr~Lrt%VPR|$t \$FPFPuyF+P;+;D$$+(l$
)l$FL~D{D$,_^]3[L$,_^]3[T$,_^][SFPWP$GD$0L$8^L_^]3[D$$(D$,_^]3[L$,_^][_^][(D$,SUVL$@W9|$$3T$08
T$(9N9Nu~F+D$4;v
L$|$,D$D$HD$,|$L\$@l$$3~D\$l$L$;v"FLsT0PFLCAMu\$L$l$FLt~Pt
sFQNRVSNT~DF$F FLvRNVt f|$LF<F8F4F0F@FDT$~Du%~$$\$l$F3L$ ;D$r.FDu 9N$=9L$,;;D$ L$ FLufr
ul+$S|$
t ^\$UL$F+D$)D$L$3sI;l$s+T7PGEr~Lrt%FPP|$ t
\$FPFPIF+P;+;+l$l$)l$FL~D|$L`XMUNPSQCl$nL.T$Ll$D$L3L$D$DD$4L$@)L$$~Nl$0+WQU*CD$H)|$48l$0
ut9\$(tT$(3q_^][(_^]3[(VFWWWGFG_^|$sBVrrr=sAr ^ ^AQ3D$VPL$ludS\$WVt;~Ht0Ul$ EFE?F]t
F~HL$_N3[^_[^D$VPL$D$UVW|$t;nHt*GFT-Ft$
FnHS\$@r?_]^@r,#;sVt;nt=GFFu
VG[_]F^L$^[_n3]^hSUVt$|.3WL$$s_^][h$D$$D$$R$PL$3;uq$T$.$UPL$4L$hL$DL$H$VT$0QL$$\$8D$hT$,u
}up$T$A_^][h3Q$QA0A4A,A AAAAAAQ(V0yx0u*
L63JPP3;H4rFw;P0v?P0W;v;vAvP_x}@x}@x}@x}3Hx}3J@Px^}39HHx }@
x$uP39HP$x,}xtxuH,SVWfItVWS?Gr_^[8SVW|$L$bt$T$L$D$==`D$$s=vC039D$
D$(utD$,}}D$4T$03|$8_^3[8_^[8D$T$~0u*V N$W~+W;tF0 ~(N NV,_SVVW~
:F3Fr;uF_F^[NF@~F;FuhVVt1$F@F;Fu=~F~Fu_^[SUl$V7L$AAD$##+GAW%+#T$fs
r7^][SUV7D$L$#L$T$J3l$T$#*D$##+GAW%+#T$fs
2i7^][VW$3q$=rd$A=sNu+r_^3S$W3s[SUV3#\$k33#r^][QUl$V3WD$TEL$L$##+CGS%+#L$l$fDMs
T$L$D$u_3^]YL$SUVW/|$+wW+fs'AY|$rF+wW+fsL$D$PQ/p_^][l$+fs
D$l$CD$##+GEW%#L$+fCs
@El$D$CD$##+GEW#L$%+L$fKs
T$DUCl$D$##+GEW%+#L$fKs
w7_^][U3VLC3k%3DsL$,t$5,Dr^]L$S\$UWi@DDPD$PKFT$,
RQVL$,T$l$D$D;vFK3IN3sT$L$C;\$r_][SVFF4F(FH L$u^[W@ ;~0t_^[Un(vVH9+D 4)];t:u@;u_^+[WyTu,|$y
5HH_HVyluH^_y+3HH^_SUVD$W{,x00,*+t5 O +u) O Bt O D$)L$y_^][hSUl$tV3uu9u4uD$ PD$M U$L$T$
](\$$s^][hv
\$$MEHHt$0t$L$xt$4W$<T/8+T<XT$|:uCP:Qu;;vp+:1\$(uBF;rt$L$8T<h;Thvt$4|$8D<hFt$rT$4|hM0|$D;r#MEW
U4W_^][ht$ ;r1L$$D MFE4EV_^][h+L$X
L$s$8L$|ts_^][hfU,$uL],#f(@#EHMPt$(@<ArD$L$|WHT$|Hdt$(MHD3fJPMH]<HD$<D$|t$@8D$uGM
]THH;DsD3PfJL$ D$D;rL$D$sP_^][hT$XL$\4T$`<8L$d@L*$@H s3D$thr^|$(E,\$W4iD$@y|$)0;QsQ3q9fQN
sD$@D$r\$hrC;\$ E,E<H|$<3L$||$D;H v$;H wL$|D$(i4D$(*0T$(L D$ Crs9/,GL$|D$ ;PsP3X0fP;H u
L$|;L$$tD$(|$DC JD$9D$i|$D$8PD$P;E0\.,+u40((uA|$lA|$*0ft+|$u2"*(s
AxA|$(4($sPuHT$XP@L$\T$`D$dJT$\PuHT$XP*T$`TDT$XD$dL$XHT$\PT$dL$`D$XL$\T$`4D$df(8<@MU$
XD$|+D$XT$,D$@ELL$$A#D$0D$<EHD$,$D$$K#EHL$|@EPP\$
D$(T$DrD$RHt|$@D$4T$DJ3D$4HD$4sL$$L$$;Ds(D3LPfJD$(T$<U}<T$|5HD$,HD$TL$H8T$usLrPtafJwWD
$<E
}THH;Dw%D33LPfJD$(u(+D$t$4;vD$4}0t$,;v|$,|$(S8T$I@CT$@:B0K:J$G;vt$|;vB+:uF@;rt$|D$lA$A#MLE
E5D$DH|$DHU<UTH|$HT$D$$;s..$t$D+|$|$D N@ut$|iNy;*$*$s
rBfBD$|L$|D$@\$
+DXD$<:S:Ps|$,;vT$ H+
:uFA;rL$T$D$D;s +)$T$ H@uT$0D$\$|RL$0D$HiL$LyL$DD$$D$|)0T$$;QsQ3yfQO suFD$@M0T$4F;v;s
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E<HHFH^HT$L$$L$(L$;s%/$+T$I O@uT$(iJyD$$)$T$(;sD$|FQfqAL$|AL$|WT$PL$,;v&3;H v;H wH
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F|$DrsD$<L$|;OsONOB3fOL$@F;)H \$ M0+T$4H;v;s+\$T\$T:uGB;rN+|$@Y$L$
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J@uT$@iJyD$|;)$)$sQT$(fAQD$,D$,;D$8tU|$DD$@(L =D$(T$((,HL$<L$0D$$\$P FtD$@D$;D$D$U_^][hT$8E
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rtFUV4U_][_][SF,UFW~X+N`Vd+fsFX(V,V<V<+fsFXF,xASj$RFXN,~X\~Xd$3!+N`Vd+f3!sFXC@rI~`VdsFXT
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u=Y@AMAMAM(AME#$?MNPAMMAuYAtMMAZMMMA6M@A"MMMGhAMAMAMkAuYAM}MuMmMe
M]MU@ArMAM9M1ANMMM
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9PAM8xAwEPYAWEPhYA7zdF.vfR@*r\L<V.|dD2(
DsA,sA sAsAsAsAsAsAsArArArArArArArArArArArArArArA
+F86SOSIEOSMTMFPBLPLCMCFBDAXMMH?Write errorRead errorCan not allocate memoryUsage: lzma
<command> [inputFile] [outputFile] [<switches>...]

<command>
e : Encode file
d : Decode file
b : Benchmark
<switches>
-a{N} : set compression mode : [0, 1] : default

= 1 (max)
-d{N}  : set dictionary size : [12, 30] : default = 24 (16 MiB)
-fb{N} : set number of fast bytes : [5, 273] : default = 128
-mc{N} : set number of cycles for match finder
-lc{N} : set number of literal context bits : [0, 8] : default = 3
-lp{N} : set number of literal pos bits : [0, 4] : default = 0
-pb{N} : set number of pos bits : [0, 4] : default = 2
-mf{M} : set match finder: [hc4, bt2, bt3, bt4] : default = bt4
-mt{N} : set number of CPU threads
-eos  : write end of stream marker
-si  : read data from stdin
-so  : write data to stdout
i#@'i#@'i#@'i#@'5i#@'4i#@'1i#@'&i#@'%i#@'$i#@'#i#@'"'i#@' i#@'i#@'i#@'i#@' i#@'i#@'i#@'i#@'i#@' ->
MiBUnknown Error
ERROR: File closing errorOutput size: incorrect uncompressed size in headerDecoding errorSetDecoderProperties errorIncorrect size of processed dataEncoding errorincorrect encoder properties"@@b@@Can not use stdin in this modeDecode errorincorrect processed sizeUnpack size is too bigdata errorEncode
errorCan not readFile is too bigInput size:  can not open output file @@!@G@G@H@ !@Can not get file lengthcan not open input fileJ!@@y @hH@!@J!@@y @NE@ @eBenchmark errorbmmtBT4xdUnsupported Windows versionError code = )
(
LZMA 18.05 (x86) : Igor Pavlov : Public domain : 2018-04-30

Incorrect commandError code = 0xUnunsupported parameter

Break signaled
zA--Too long switch:Incorrect switch postfix:Too short switch:Multiple instances for switch:Unknown switch:`*@p{ACRC32t+@~+@+@)@*@3+@@+@*@)*@H*@Z*@ZAZAZAZA{Aout of memorykernel32.dllGlobalMemoryStatusExI@
I@I@F@H@H@H@+F@H@H@H@F@C@MD@ZD@D@E@vD@ZAZAZA

IDEFASTFAILRDWRFSGSBASEVIRT_FIRMWAREL2ATARM_NEONARM_VFP_32XSAVECHANNELSC
MP8XCHG16CMPXCHG16BSSE3NXSSE_DAZSSE2PAERDTSC3DNOWSSEALPHA_BYTEPPC_MOVEME
M_64BITMMXCMPXCHGFP_EMUFP_ERRATAARM32_ON_WIN64ARM64NEUTRALIA32_ON_WIN64x64
MSILALPHA64IA64ARMSHXPPCALPHAMIPSx86
|
BLAKE2spSHA1SHA256CRC64CRC32:8CRC32:4CRC32:1AES256CBC:2AES256CBC:1BCJDelta:4PPMD:x5P
PMD:x1BZip2:x7BZip2:x5:mt2BZip2:x5BZip2:x1Deflate64:x5Deflate:x7Deflate:x5Deflate:x1LZMA:x5:mt2LZM
A:x5:mt1LZMA:x1J!@@b@V@J!@@b@U@ub@b@b@+V@ : / kernel32.dllGetNativeSystemInfo- gran: page:
cpus: act:. K
(LP)Tot:Avr:x5CPUKiB/s%EffecE/URatingR/UUsageSpeedDictMethodDecompressingCompressingusage:Benchm
ark threads: Dictionary reduced to: hashAvg:Size8crc32CRCLZMACPU hardware threads:size: -CPU Freq: -
Windows*freq=freqtimefile size =fileJ!@@b@W@, # LP MB ?RAM
]u@wu@x@RtlGetVersionntdll.dllSetConsoleCtrlHandler fails@@%@3@@@@@P@`@p@@
@0@@@@@@@@@@@@@`@@@@@@`@p@@@@ @@@0@ @ZAZAZAZAZAZAZAZA@
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xAdAdAdAdAeA&eA4eABeAPeA^eA AxeAeA AeAeAeA PAeAeA AeAeAeAeAeAfA
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err_adjust_fdivj__p__commodeo__p__fmode__set_app_type_controlfpGetVersionExWiGetLastErrorkMultiByteTo
WideCharWideCharToMultiBytePCreateFileW.CloseHandle[GetFileSizeSetFilePointerReadFileWriteFileSetEndOf
FileGetProcessAffinityMask:GetCurrentProcessGetSystemInfoGlobalMemoryStatusGetProcAddresszGetModuleHa
ndleWGetStdHandleZGetFileInformationByHandleGetTickCountGetProcessTimesGLeaveCriticalSectionEnterCriti
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llocxVirtualFreeWaitForSingleObjectJCreateEventWSetEventResetEventfCreateSemaphoreWReleaseSemaphoreIni
tializeCriticalSectionKERNEL32.dll)@e+@@A.PADA.PAXA.HA.?AVCNewException@@@A.?AVtype_info@
@n0 H`4VS_VERSION_INFO?StringFileInfo040904b08CompanyNameIgor
Pavlov2FileDescriptionLZMA,FileVersion18.05*InternalNamelzmal$LegalCopyrightCopyright (c) 1999-2018 Igor
Pavlov: OriginalFilenamelzma.exe,ProductName7-Zip0ProductVersion18.05DVarFileInfo$Translation
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p_0000>1R1112E2f2s222222H3g3}333F4456a66.7Y7w778*888899993:a::::::k;>?0hX22R5_5w555556t667"7788
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m5t555=666l788=9Z9::5;;4<9<< =*?A??P80122"334m4667e78888;<A==>>O??`
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8~888D94;;;<<=========>>$>?>e>j>q>>#?8]000]112234=4h467:`;<;==>>>??TZ000000001
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```
// FormatUtils.h

#ifndef __FORMAT_UTILS_H
#define __FORMAT_UTILS_H
```

```
#include "../../../Common/MyTypes.h"
#include "../../../Common/MyString.h"

UString NumberToString(UInt64 number);

UString MyFormatNew(const UString &format, const UString &argument);
UString MyFormatNew(UINT resourceID, const UString &argument);

#endif
```

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```
// InOutTempBuffer.h

#ifndef __IN_OUT_TEMP_BUFFER_H
#define __IN_OUT_TEMP_BUFFER_H

#include "../../Common/MyCom.h"
#include "../../Windows/FileDir.h"

#include "../IStream.h"

class CInOutTempBuffer
{
 NWindows::NFile::NDir::CTempFile _tempFile;
 NWindows::NFile::NIO::COutFile _outFile;
 Byte *_buf;
 size_t _bufPos;
 UInt64 _size;
 UInt32 _crc;
 bool _tempFileCreated;

 bool WriteToFile(const void *data, UInt32 size);
public:
 CInOutTempBuffer();
 ~CInOutTempBuffer();
 void Create();

 void InitWriting();
 bool Write(const void *data, UInt32 size);

 HRESULT WriteToStream(ISequentialOutStream *stream);
 UInt64 GetDataSize() const { return _size; }
};

/*
class CSequentialOutTempBufferImp:
 public ISequentialOutStream,
 public CMyUnknownImp
{
 CInOutTempBuffer *_buf;
public:
 void Init(CInOutTempBuffer *buffer)  { _buf = buffer; }
 MY_UNKNOWN_IMP

 STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
};
```

*/

#endif
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```
// RegisterArc.h

#ifndef __REGISTER_ARC_H
#define __REGISTER_ARC_H

#include "../Archive/IArchive.h"

struct CArcInfo
{
 UInt16 Flags;
 Byte Id;
 Byte SignatureSize;
 UInt16 SignatureOffset;

 const Byte *Signature;
 const char *Name;
 const char *Ext;
 const char *AddExt;

 Func_CreateInArchive CreateInArchive;
 Func_CreateOutArchive CreateOutArchive;
 Func_IsArc IsArc;

 bool IsMultiSignature() const { return (Flags & NArcInfoFlags::kMultiSignature) != 0; }
};

void RegisterArc(const CArcInfo *arcInfo) throw();


#define IMP_CreateArcIn_2(c) \
 static IInArchive *CreateArc() { return new c; }

#define IMP_CreateArcIn IMP_CreateArcIn_2(CHandler())

#ifdef EXTRACT_ONLY
 #define IMP_CreateArcOut
 #define CreateArcOut NULL
#else
 #define IMP_CreateArcOut static IOutArchive *CreateArcOut() { return new CHandler(); }
#endif

#define REGISTER_ARC_V(n, e, ae, id, sigSize, sig, offs, flags, crIn, crOut, isArc) \
 static const CArcInfo g_ArcInfo = { flags, id, sigSize, offs,
 sig, n, e, ae, crIn, crOut, isArc } ; \

#define REGISTER_ARC_R(n, e, ae, id, sigSize, sig, offs, flags, crIn, crOut, isArc) \
 REGISTER_ARC_V(n, e, ae, id, sigSize, sig, offs, flags, crIn, crOut, isArc) \
 struct CRegisterArc { CRegisterArc() { RegisterArc(&g_ArcInfo); }}; \
```

```
 static CRegisterArc g_RegisterArc;


#define REGISTER_ARC_I_CLS(cls, n, e, ae, id, sig, offs, flags, isArc) \
 IMP_CreateArcIn_2(cls) \
 REGISTER_ARC_R(n, e, ae, id, ARRAY_SIZE(sig), sig, offs, flags, CreateArc, NULL, isArc)

#define REGISTER_ARC_I_CLS_NO_SIG(cls, n, e, ae, id, offs, flags, isArc) \
 IMP_CreateArcIn_2(cls) \
 REGISTER_ARC_R(n, e, ae, id, 0, NULL, offs, flags, CreateArc, NULL, isArc)

#define REGISTER_ARC_I(n, e, ae, id, sig, offs, flags, isArc) \
 REGISTER_ARC_I_CLS(CHandler(), n, e, ae, id, sig, offs, flags, isArc)

#define REGISTER_ARC_I_NO_SIG(n, e, ae, id, offs, flags, isArc) \
 REGISTER_ARC_I_CLS_NO_SIG(CHandler(), n, e, ae, id, offs, flags, isArc)


#define REGISTER_ARC_IO(n, e,
 ae, id, sig, offs, flags, isArc) \
 IMP_CreateArcIn \
 IMP_CreateArcOut \
 REGISTER_ARC_R(n, e, ae, id, ARRAY_SIZE(sig), sig, offs, flags, CreateArc, CreateArcOut, isArc)

#define REGISTER_ARC_IO_DECREMENT_SIG(n, e, ae, id, sig, offs, flags, isArc) \
 IMP_CreateArcIn \
 IMP_CreateArcOut \
 REGISTER_ARC_V(n, e, ae, id, ARRAY_SIZE(sig), sig, offs, flags, CreateArc, CreateArcOut, isArc) \
 struct CRegisterArcDecSig { CRegisterArcDecSig() { sig[0]--; RegisterArc(&g_ArcInfo); }}; \
 static CRegisterArcDecSig g_RegisterArc;

#endif
/* ATK - Accessibility Toolkit
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```

```
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_REGISTRY_H__
#define __ATK_REGISTRY_H__

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

#include <glib-object.h>
#include "atkobjectfactory.h"

#define ATK_TYPE_REGISTRY
            (atk_registry_get_type ())
#define ATK_REGISTRY(obj)            (G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_REGISTRY, AtkRegistry))
#define ATK_REGISTRY_CLASS(klass)      (G_TYPE_CHECK_CLASS_CAST ((klass),
ATK_TYPE_REGISTRY, AtkRegistryClass))
#define ATK_IS_REGISTRY(obj)          (G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_REGISTRY))
#define ATK_IS_REGISTRY_CLASS(klass)    (G_TYPE_CHECK_CLASS_TYPE ((klass),
ATK_TYPE_REGISTRY))
#define ATK_REGISTRY_GET_CLASS(obj)     (G_TYPE_INSTANCE_GET_CLASS ((obj),
ATK_TYPE_REGISTRY, AtkRegistryClass))

struct _AtkRegistry
{
 GObject    parent;
 GHashTable *factory_type_registry;
 GHashTable *factory_singleton_cache;
};

struct _AtkRegistryClass
{
 GObjectClass    parent_class;
};

typedef struct _AtkRegistry            AtkRegistry;
typedef struct _AtkRegistryClass       AtkRegistryClass;


GType           atk_registry_get_type        (void);
void            atk_registry_set_factory_type (AtkRegistry
 *registry,
                                    GType type,
                                    GType factory_type);
GType           atk_registry_get_factory_type (AtkRegistry *registry,
```

```
      GType type);
AtkObjectFactory* atk_registry_get_factory      (AtkRegistry *registry,
                                                 GType type);

AtkRegistry*      atk_get_default_registry      (void);

#ifdef __cplusplus
}
#endif /* __cplusplus */

#endif /* __ATK_REGISTRY_H__ */
```

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<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->

```
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With One Language Tagged text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element matches the schema. It contains one text element that has a
language tag." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre
 {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts" id="License ID"&gt;
  &lt;text xml:lang="en"&gt;
   License with "en" language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
// Windows/Window.h

#ifndef __WINDOWS_WINDOW_H
#define __WINDOWS_WINDOW_H
```

```
#include "../Common/MyWindows.h"
#include "../Common/MyString.h"

#include "Defs.h"

#ifndef UNDER_CE

#define MY__WM_CHANGEUISTATE  0x0127
#define MY__WM_UPDATEUISTATE  0x0128
#define MY__WM_QUERYUISTATE   0x0129

// LOWORD(wParam) values in WM_*UISTATE
#define MY__UIS_SET         1
#define MY__UIS_CLEAR       2
#define MY__UIS_INITIALIZE  3

// HIWORD(wParam) values in WM_*UISTATE
#define MY__UISF_HIDEFOCUS  0x1
#define MY__UISF_HIDEACCEL  0x2
#define MY__UISF_ACTIVE     0x4

#endif

namespace NWindows {

inline ATOM MyRegisterClass(CONST WNDCLASS *wndClass)
 { return ::RegisterClass(wndClass); }

#ifndef _UNICODE
ATOM MyRegisterClass(CONST WNDCLASSW *wndClass);
#endif

#ifdef _UNICODE
inline bool MySetWindowText(HWND wnd, LPCWSTR s) { return BOOLToBool(::SetWindowText(wnd, s)); }
#else
bool MySetWindowText(HWND wnd, LPCWSTR s);
#endif


#ifdef UNDER_CE
#define GWLP_USERDATA GWL_USERDATA
#define GWLP_WNDPROC
 GWL_WNDPROC
#define BTNS_BUTTON TBSTYLE_BUTTON
#define WC_COMBOBOXW L"ComboBox"
#define DWLP_MSGRESULT DWL_MSGRESULT
#endif
```

```
class CWindow
{
private:
  // bool ModifyStyleBase(int styleOffset, DWORD remove, DWORD add, UINT flags);
protected:
 HWND _window;
public:
 CWindow(HWND newWindow = NULL): _window(newWindow){};
 CWindow& operator=(HWND newWindow)
 {
   _window = newWindow;
   return *this;
 }
 operator HWND() const { return _window; }
 void Attach(HWND newWindow) { _window = newWindow; }
 HWND Detach()
 {
   HWND window = _window;
   _window = NULL;
   return window;
 }

 bool Foreground() { return BOOLToBool(::SetForegroundWindow(_window)); }

 HWND GetParent() const { return ::GetParent(_window); }
 bool GetWindowRect(LPRECT rect) const { return BOOLToBool(::GetWindowRect(_window,rect)); }
 #ifndef UNDER_CE
 bool IsZoomed() const { return BOOLToBool(::IsZoomed(_window)); }
 #endif
 bool ClientToScreen(LPPOINT point) const { return BOOLToBool(::ClientToScreen(_window,
 point)); }
 bool ScreenToClient(LPPOINT point) const { return BOOLToBool(::ScreenToClient(_window, point)); }

 bool CreateEx(DWORD exStyle, LPCTSTR className,
     LPCTSTR windowName, DWORD style,
     int x, int y, int width, int height,
     HWND parentWindow, HMENU idOrHMenu,
     HINSTANCE instance, LPVOID createParam)
 {
   _window = ::CreateWindowEx(exStyle, className, windowName,
     style, x, y, width, height, parentWindow,
     idOrHMenu, instance, createParam);
   return (_window != NULL);
 }

 bool Create(LPCTSTR className,
     LPCTSTR windowName, DWORD style,
```

```
    int x, int y, int width, int height,
    HWND parentWindow, HMENU idOrHMenu,
    HINSTANCE instance, LPVOID createParam)
{
  _window = ::CreateWindow(className, windowName,
    style, x, y, width, height, parentWindow,
    idOrHMenu, instance, createParam);
  return (_window != NULL);
}

#ifndef _UNICODE
bool Create(LPCWSTR className,
    LPCWSTR windowName,
DWORD style,
    int x, int y, int width, int height,
    HWND parentWindow, HMENU idOrHMenu,
    HINSTANCE instance, LPVOID createParam);
bool CreateEx(DWORD exStyle, LPCWSTR className,
    LPCWSTR windowName, DWORD style,
    int x, int y, int width, int height,
    HWND parentWindow, HMENU idOrHMenu,
    HINSTANCE instance, LPVOID createParam);
#endif


bool Destroy()
{
  if (_window == NULL)
    return true;
  bool result = BOOLToBool(::DestroyWindow(_window));
  if (result)
    _window = NULL;
  return result;
}
bool IsWindow() {  return BOOLToBool(::IsWindow(_window)); }
bool Move(int x, int y, int width, int height, bool repaint = true)
  { return BOOLToBool(::MoveWindow(_window, x, y, width, height, BoolToBOOL(repaint))); }

bool ChangeSubWindowSizeX(HWND hwnd, int xSize)
{
  RECT rect;
  ::GetWindowRect(hwnd, &rect);
  POINT p1;
  p1.x = rect.left;
  p1.y = rect.top;
  ScreenToClient(&p1);
  return BOOLToBool(::MoveWindow(hwnd,
```

```
p1.x, p1.y, xSize, rect.bottom - rect.top, TRUE));
}

void ScreenToClient(RECT *rect)
{
  POINT p1, p2;
  p1.x = rect->left;
  p1.y = rect->top;
  p2.x = rect->right;
  p2.y = rect->bottom;
  ScreenToClient(&p1);
  ScreenToClient(&p2);

  rect->left = p1.x;
  rect->top = p1.y;
  rect->right = p2.x;
  rect->bottom = p2.y;
}

bool GetClientRect(LPRECT rect) { return BOOLToBool(::GetClientRect(_window, rect)); }
bool Show(int cmdShow) { return BOOLToBool(::ShowWindow(_window, cmdShow)); }
bool Show_Bool(bool show) { return Show(show ? SW_SHOW: SW_HIDE); }

#ifndef UNDER_CE
bool SetPlacement(CONST WINDOWPLACEMENT *placement) { return
BOOLToBool(::SetWindowPlacement(_window, placement)); }
bool GetPlacement(WINDOWPLACEMENT *placement) { return
BOOLToBool(::GetWindowPlacement(_window, placement)); }
#endif
bool Update() { return BOOLToBool(::UpdateWindow(_window)); }
bool InvalidateRect(LPCRECT rect, bool backgroundErase = true)

{ return BOOLToBool(::InvalidateRect(_window, rect, BoolToBOOL(backgroundErase))); }
void SetRedraw(bool redraw = true) { SendMsg(WM_SETREDRAW, BoolToBOOL(redraw), 0); }

LONG_PTR SetStyle(LONG_PTR style) { return SetLongPtr(GWL_STYLE, style); }
LONG_PTR GetStyle() const { return GetLongPtr(GWL_STYLE); }
// bool MyIsMaximized() const { return ((GetStyle() & WS_MAXIMIZE) != 0); }

LONG_PTR SetLong(int index, LONG newLongPtr) { return ::SetWindowLong(_window, index, newLongPtr); }
LONG_PTR GetLong(int index) const { return ::GetWindowLong(_window, index); }
LONG_PTR SetUserDataLong(LONG newLongPtr) { return SetLong(GWLP_USERDATA, newLongPtr); }
LONG_PTR GetUserDataLong() const { return GetLong(GWLP_USERDATA); }


#ifdef UNDER_CE

LONG_PTR SetLongPtr(int index, LONG_PTR newLongPtr) { return SetLong(index, newLongPtr); }
```

```
LONG_PTR GetLongPtr(int index) const { return GetLong(index); }

LONG_PTR SetUserDataLongPtr(LONG_PTR newLongPtr) { return SetUserDataLong(newLongPtr);
}
LONG_PTR GetUserDataLongPtr() const { return GetUserDataLong(); }

#else

LONG_PTR SetLongPtr(int index, LONG_PTR newLongPtr)
  { return ::SetWindowLongPtr(_window, index,
        #ifndef _WIN64
        (LONG)
        #endif
        newLongPtr); }
#ifndef _UNICODE
LONG_PTR SetLongPtrW(int index, LONG_PTR newLongPtr)
  { return ::SetWindowLongPtrW(_window, index,
        #ifndef _WIN64
        (LONG)
        #endif
        newLongPtr); }
#endif

LONG_PTR GetLongPtr(int index) const { return ::GetWindowLongPtr(_window, index); }
LONG_PTR SetUserDataLongPtr(LONG_PTR newLongPtr) { return SetLongPtr(GWLP_USERDATA,
newLongPtr); }
LONG_PTR GetUserDataLongPtr() const { return GetLongPtr(GWLP_USERDATA); }

#endif

/*
bool ModifyStyle(HWND hWnd, DWORD remove, DWORD add, UINT flags = 0)
  {  return ModifyStyleBase(GWL_STYLE, remove, add, flags); }
bool ModifyStyleEx(HWND hWnd, DWORD remove, DWORD add, UINT flags = 0)
  { return ModifyStyleBase(GWL_EXSTYLE,
remove, add, flags); }
*/

HWND SetFocus() { return ::SetFocus(_window); }

LRESULT SendMsg(UINT message, WPARAM wParam = 0, LPARAM lParam = 0)
  { return ::SendMessage(_window, message, wParam, lParam); }
#ifndef _UNICODE
LRESULT SendMsgW(UINT message, WPARAM wParam = 0, LPARAM lParam = 0)
  { return ::SendMessageW(_window, message, wParam, lParam); }
#endif

bool PostMsg(UINT message, WPARAM wParam = 0, LPARAM lParam = 0)
```

```
  { return BOOLToBool(::PostMessage(_window, message, wParam, lParam)); }
#ifndef _UNICODE
bool PostMsgW(UINT message, WPARAM wParam = 0, LPARAM lParam = 0)
  { return BOOLToBool(::PostMessageW(_window, message, wParam, lParam)); }
#endif

bool SetText(LPCTSTR s) { return BOOLToBool(::SetWindowText(_window, s)); }
#ifndef _UNICODE
bool SetText(LPCWSTR s) { return MySetWindowText(_window, s); }
#endif

int GetTextLength() const
  { return GetWindowTextLength(_window); }
UINT GetText(LPTSTR string, int
maxCount) const
  { return GetWindowText(_window, string, maxCount); }
bool GetText(CSysString &s);
#ifndef _UNICODE
/*
UINT GetText(LPWSTR string, int maxCount) const
  { return GetWindowTextW(_window, string, maxCount); }
*/
bool GetText(UString &s);
#endif

bool Enable(bool enable)
  { return BOOLToBool(::EnableWindow(_window, BoolToBOOL(enable))); }

bool IsEnabled()
  { return BOOLToBool(::IsWindowEnabled(_window)); }

#ifndef UNDER_CE
HMENU GetSystemMenu(bool revert)
  { return ::GetSystemMenu(_window, BoolToBOOL(revert)); }
#endif

UINT_PTR SetTimer(UINT_PTR idEvent, UINT elapse, TIMERPROC timerFunc = 0)
  { return ::SetTimer(_window, idEvent, elapse, timerFunc); }
bool KillTimer(UINT_PTR idEvent)
  {return BOOLToBool(::KillTimer(_window, idEvent)); }

HICON SetIcon(WPARAM sizeType, HICON icon) { return (HICON)SendMsg(WM_SETICON, sizeType,
(LPARAM)icon); }
};

#define RECT_SIZE_X(r) ((r).right - (r).left)
#define RECT_SIZE_Y(r) ((r).bottom
```

```
 - (r).top)

inline bool IsKeyDown(int virtKey) { return (::GetKeyState(virtKey) & 0x8000) != 0; }

}

#endif
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With Mixed text Element Language Tags 2</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-008-ref.xht" />
  <meta name="assert" content="The license element matches the schema. Two text elements have a language tags." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
  {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-008.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
```

The XML contained in the Extended Metadata Block is below.
<pre>
<?xml version="1.0" encoding="UTF-8"?>
<metadata version="1.0">
 <license url="http://w3c.org/Fonts" id="License ID">
  <text xml:lang="en">
   License with "en" language.
  </text>
  <text xml:lang="fr">
   License with "fr" language.
  </text>
 </license>
</metadata>
</pre>
</body>
</html>

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SOFTWARE.
Requests includes some vendorized python libraries to ease installation.

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==========

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LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM,
OUT OF OR IN CONNECTION WITH THE
SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
SOFTWARE.
use errno::Errno;
use libc::{self, c_int};
use std::ptr;
use sys::signal::Signal;

```
use unistd::Pid;
use Result;

pub type RequestType = c_int;

cfg_if! {
  if #[cfg(any(target_os = "dragonfly",
               target_os = "freebsd",
               target_os = "macos",
               target_os = "openbsd"))] {
     #[doc(hidden)]
     pub type AddressType = *mut ::libc::c_char;
  } else {
     #[doc(hidden)]
     pub type AddressType = *mut ::libc::c_void;
  }
}

libc_enum! {
  #[repr(i32)]
  /// Ptrace Request enum defining the action to be taken.
  pub enum Request {
     PT_TRACE_ME,
     PT_READ_I,
     PT_READ_D,
     #[cfg(target_os = "macos")]
     PT_READ_U,
     PT_WRITE_I,
     PT_WRITE_D,
     #[cfg(target_os = "macos")]
     PT_WRITE_U,
     PT_CONTINUE,
     PT_KILL,
     #[cfg(any(any(target_os = "dragonfly",
                 target_os = "freebsd",
                 target_os = "macos"),
                 all(target_os
 = "openbsd", target_arch = "x86_64"),
                 all(target_os = "netbsd", any(target_arch = "x86_64",
                                    target_arch = "powerpc"))))]
     PT_STEP,
     PT_ATTACH,
     PT_DETACH,
     #[cfg(target_os = "macos")]
     PT_SIGEXC,
     #[cfg(target_os = "macos")]
     PT_THUPDATE,
     #[cfg(target_os = "macos")]
```

```
        PT_ATTACHEXC
    }
}

unsafe fn ptrace_other(
    request: Request,
    pid: Pid,
    addr: AddressType,
    data: c_int,
) -> Result<c_int> {
    Errno::result(libc::ptrace(
        request as RequestType,
        libc::pid_t::from(pid),
        addr,
        data,
    )).map(|_| 0)
}

/// Sets the process as traceable, as with `ptrace(PT_TRACEME, ...)`
///
/// Indicates that this process is to be traced by its parent.
/// This is the only ptrace request to be issued by the tracee.
pub fn traceme() -> Result<()> {
    unsafe { ptrace_other(Request::PT_TRACE_ME, Pid::from_raw(0), ptr::null_mut(),
 0).map(drop) }
}

/// Attach to a running process, as with `ptrace(PT_ATTACH, ...)`
///
/// Attaches to the process specified in pid, making it a tracee of the calling process.
pub fn attach(pid: Pid) -> Result<()> {
    unsafe { ptrace_other(Request::PT_ATTACH, pid, ptr::null_mut(), 0).map(drop) }
}

/// Detaches the current running process, as with `ptrace(PT_DETACH, ...)`
///
/// Detaches from the process specified in pid allowing it to run freely
pub fn detach(pid: Pid) -> Result<()> {
    unsafe { ptrace_other(Request::PT_DETACH, pid, ptr::null_mut(), 0).map(drop) }
}

/// Restart the stopped tracee process, as with `ptrace(PTRACE_CONT, ...)`
///
/// Continues the execution of the process with PID `pid`, optionally
/// delivering a signal specified by `sig`.
pub fn cont<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
    let data = match sig.into() {
        Some(s) => s as c_int,
```

```
        None => 0,
    };
    unsafe {
        // Ignore the useless return
 value
        ptrace_other(Request::PT_CONTINUE, pid, 1 as AddressType, data).map(drop)
    }
}

/// Issues a kill request as with `ptrace(PT_KILL, ...)`
///
/// This request is equivalent to `ptrace(PT_CONTINUE, ..., SIGKILL);`
pub fn kill(pid: Pid) -> Result<()> {
    unsafe {
        ptrace_other(Request::PT_KILL, pid, 0 as AddressType, 0).map(drop)
    }
}

/// Move the stopped tracee process forward by a single step as with
/// `ptrace(PT_STEP, ...)`
///
/// Advances the execution of the process with PID `pid` by a single step optionally delivering a
/// signal specified by `sig`.
///
/// # Example
/// ```rust
/// extern crate nix;
/// use nix::sys::ptrace::step;
/// use nix::unistd::Pid;
/// use nix::sys::signal::Signal;
/// use nix::sys::wait::*;
/// fn main() {
///     // If a process changes state to the stopped state because of a SIGUSR1
///     // signal, this will step the process forward and forward the user
///     // signal to the stopped process
///     match waitpid(Pid::from_raw(-1),
 None) {
///         Ok(WaitStatus::Stopped(pid, Signal::SIGUSR1)) => {
///             let _ = step(pid, Signal::SIGUSR1);
///         }
///         _ => {},
///     }
/// }
/// ```
#[cfg(
    any(
        any(target_os = "dragonfly", target_os = "freebsd", target_os = "macos"),
        all(target_os = "openbsd", target_arch = "x86_64"),
```

```
        all(target_os = "netbsd",
            any(target_arch = "x86_64", target_arch = "powerpc")
        )
    )
)]
pub fn step<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
    let data = match sig.into() {
        Some(s) => s as c_int,
        None => 0,
    };
    unsafe { ptrace_other(Request::PT_STEP, pid, ptr::null_mut(), data).map(drop) }
}

/// Reads a word from a processes memory at the given address
pub fn read(pid: Pid, addr: AddressType) -> Result<c_int> {
    unsafe {
        // Traditionally there was a difference between reading data or
        // instruction memory but not in modern systems.
        ptrace_other(Request::PT_READ_D,
 pid, addr, 0)
    }
}

/// Writes a word into the processes memory at the given address
pub fn write(pid: Pid, addr: AddressType, data: c_int) -> Result<()> {
    unsafe { ptrace_other(Request::PT_WRITE_D, pid, addr, data).map(drop) }
}
// Windows/Thread.h

#ifndef __WINDOWS_THREAD_H
#define __WINDOWS_THREAD_H

#include "../../C/Threads.h"

#include "Defs.h"

namespace NWindows {

class CThread
{
 ::CThread thread;
public:
 CThread() { Thread_Construct(&thread); }
 ~CThread() { Close(); }
 bool IsCreated() { return Thread_WasCreated(&thread) != 0; }
 WRes Close()  { return Thread_Close(&thread); }
 WRes Create(THREAD_FUNC_RET_TYPE (THREAD_FUNC_CALL_TYPE *startAddress)(void *), LPVOID
parameter)
```

```
  { return Thread_Create(&thread, startAddress, parameter); }
 WRes Wait() { return Thread_Wait(&thread); }

 #ifdef _WIN32
 operator HANDLE() { return thread; }
 void Attach(HANDLE handle) { thread = handle; }
 HANDLE Detach() { HANDLE h = thread; thread = NULL; return h; }
 DWORD Resume() { return ::ResumeThread(thread); }
 DWORD Suspend() { return ::SuspendThread(thread); }
 bool Terminate(DWORD exitCode) { return BOOLToBool(::TerminateThread(thread, exitCode)); }
 int GetPriority() { return ::GetThreadPriority(thread);
 }
 bool SetPriority(int priority) { return BOOLToBool(::SetThreadPriority(thread, priority)); }
 #endif
};

}

#endif
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according to those terms.
// StreamBinder.h

#ifndef __STREAM_BINDER_H
#define __STREAM_BINDER_H

#include "../../Windows/Synchronization.h"

#include "../IStream.h"

/*
We don't use probably UNSAFE version:
reader thread:
   _canWrite_Event.Set();
   _readingWasClosed = true
   _canWrite_Event.Set();
writer thread:
   _canWrite_Event.Wait()
    if (_readingWasClosed)
Can second call of _canWrite_Event.Set() be executed without memory barrier, if event is already set?
*/

class CStreamBinder
```

```
{
 NWindows::NSynchronization::CAutoResetEvent _canWrite_Event;
 NWindows::NSynchronization::CManualResetEvent _canRead_Event;
 NWindows::NSynchronization::CManualResetEvent _readingWasClosed_Event;

 // bool _readingWasClosed;
 bool _readingWasClosed2;
 // bool WritingWasCut;
 bool _waitWrite;
 UInt32 _bufSize;
 const void *_buf;
public:
 UInt64 ProcessedSize;

 WRes CreateEvents();
 void CreateStreams(ISequentialInStream **inStream, ISequentialOutStream **outStream);

 void ReInit();

 HRESULT Read(void
 *data, UInt32 size, UInt32 *processedSize);
 HRESULT Write(const void *data, UInt32 size, UInt32 *processedSize);

 void CloseRead()
 {
   _readingWasClosed_Event.Set();
   // _readingWasClosed = true;
   // _canWrite_Event.Set();
 }

 void CloseWrite()
 {
   _buf = NULL;
   _bufSize = 0;
   _canRead_Event.Set();
 }
};

#endif
```

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file, You can obtain one at http://mozilla.org/MPL/2.0/.

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
```

```
  <title>WOFF Test: Unknown Child Element in copyright Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains an unknown child element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test
  {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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*
*/
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At the time this file was first modified, a complete, unmodified copy of
the LPPL Work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

and the original Lithuanian TeX package (from which this was derived) was available from:
http://www.vtex.lt/tex/distfiles/littex-20081028.tar.gz

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(copied verbatim from hyph-lt.lic.txt in
 the original work):

Lithuanian hyphenation patterns

(more info about the licence to be added later)

% This file is part of hyph-utf8 package and resulted from

% semi-manual conversions of hyphenation patterns into UTF-8
% in October 2008 by Mojca & Arthur.
%
% Source available on:
% - http://www.vtex.lt/tex/littex/index.html
%
% Authors:
%
% First version in LT encoding (modified T1):
% - Vytas Statuleviius <vytas at vtex.lt>
% - Yannis Haralambous
%  (Vilnius, March 4, 1992)
% Conversion into Latin 7 and aditional support files (babel, fonts):
% - Sigitas Tolusis <sigitas at vtex.lt>
%  (2002-11-20)
% Adaptation for hyph-utf8:
% - Mojca & Arthur (see below), October 2008
%
% The copyright statement of this file is:
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%  "a better world" as long as you respect the copyright of original file.
%
% If you want to change this file, rather than uploading directly to CTAN,
% we would be grateful if you could send
 it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
% For more unformation see
%
%  http://tug.org/tex-hyphen
%
%----------
%
% A note about lefthyphenmin/righthyphenmin (by Sigitas, February 2009):
%
% At the moment the lefthyphenmin & righthyphenmin are both set to 2.
% The Lithuanian patterns were build earlier then the latest grammatical rules
% took place in 1997. At that time it was forbidden to leave one character at boundary.
% One may change it to one now, but from typographical point of view there is no need to do
% any changes. Even more, changing lefthyphen and righthyphen to 1 requires
% to review and maybe rebuild the patterns file.
%
%----------
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DEALINGS IN THE SOFTWARE.

```
// ExtractDialog.h

#ifndef __EXTRACT_DIALOG_H
#define __EXTRACT_DIALOG_H

#include "ExtractDialogRes.h"

#include "../../../Windows/Control/ComboBox.h"
#include "../../../Windows/Control/Edit.h"

#include "../Common/ExtractMode.h"

#include "../FileManager/DialogSize.h"

#ifndef NO_REGISTRY
#include "../Common/ZipRegistry.h"
#endif

namespace NExtractionDialog
{
 /*
 namespace NFilesMode
 {
   enum EEnum
   {
     kSelected,
     kAll,
```

```
    kSpecified
   };
 }
 */
}

class CExtractDialog: public NWindows::NControl::CModalDialog
{
 #ifdef NO_REGISTRY
 NWindows::NControl::CDialogChildControl _path;
 #else
 NWindows::NControl::CComboBox _path;
 #endif

 #ifndef _SFX
 NWindows::NControl::CEdit _pathName;
 NWindows::NControl::CEdit _passwordControl;
 NWindows::NControl::CComboBox _pathMode;
 NWindows::NControl::CComboBox _overwriteMode;
 #endif

 #ifndef _SFX
 // int GetFilesMode() const;
 void UpdatePasswordControl();
 #endif

 void OnButtonSetPath();

 void CheckButton_TwoBools(UINT
 id, const CBoolPair &b1, const CBoolPair &b2);
 void GetButton_Bools(UINT id, CBoolPair &b1, CBoolPair &b2);
 virtual bool OnInit();
 virtual bool OnButtonClicked(int buttonID, HWND buttonHWND);
 virtual void OnOK();

 #ifndef NO_REGISTRY

 virtual void OnHelp();

 NExtract::CInfo _info;

 #endif

 bool IsShowPasswordChecked() const { return IsButtonCheckedBool(IDX_PASSWORD_SHOW); }
public:
 // bool _enableSelectedFilesButton;
 // bool _enableFilesButton;
 // NExtractionDialog::NFilesMode::EEnum FilesMode;
```

```
 UString DirPath;
 UString ArcPath;

 #ifndef _SFX
 UString Password;
 #endif
 bool PathMode_Force;
 bool OverwriteMode_Force;
 NExtract::NPathMode::EEnum PathMode;
 NExtract::NOverwriteMode::EEnum OverwriteMode;

 #ifndef _SFX
 // CBoolPair AltStreams;
 CBoolPair NtSecurity;
 #endif

 CBoolPair ElimDup;

 INT_PTR Create(HWND aWndParent = 0)
 {
   #ifdef _SFX
   BIG_DIALOG_SIZE(240, 64);
   #else
   BIG_DIALOG_SIZE(300,
 160);
   #endif
   return CModalDialog::Create(SIZED_DIALOG(IDD_EXTRACT), aWndParent);
 }

 CExtractDialog():
   PathMode_Force(false),
   OverwriteMode_Force(false)
 {
   ElimDup.Val = true;
 }

};

#endif
//
// Copyright (C) Anders Kjersem. Licensed under the zlib/libpng license
//

#ifdef UNICODE
# ifndef _UNICODE
#    define _UNICODE
#  endif
```

```
#endif

#define _WIN32_WINNT 0x0400
#include <windows.h>
#include <tchar.h>
#include <wininet.h>

#if defined(_DEBUG) || 0
#  define PLUGIN_DEBUG 1
void MYTRACE(LPCTSTR fmt, ...)
{
 va_list argptr;
 va_start(argptr, fmt);
 TCHAR buffer[2048] = { _T('\0') };
 wvsprintf(buffer, fmt, argptr);
 buffer[(sizeof(buffer)/sizeof(*buffer)) - 1] = _T('\0');
 OutputDebugString(buffer);
 va_end(argptr);
}
#else
void MYTRACE(...) { }
#endif
#  define TRACE MYTRACE

#ifndef ASSERT
#  define ASSERT(x)
#endif

#define NSISPIEXPORTFUNC EXTERN_C void __declspec(dllexport) __cdecl

namespace NSIS {

#define NSISCALL __stdcall
typedef struct _xparams_t {
 LPVOID xx1;//exec_flags_type *exec_flags;
 int (NSISCALL *ExecuteCodeSegment)(int, HWND);
 void (NSISCALL *validate_filename)(TCHAR*);
 int (NSISCALL *RegisterPluginCallback)(HMODULE,LPVOID);
} xparams_t;
typedef
 struct _stack_t {
 struct _stack_t *next;
 TCHAR text[1];
} stack_t;

} // namespace NSIS

enum NSPIM
```

```
{
 NSPIM_UNLOAD,
 NSPIM_GUIUNLOAD,
};
```

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At the time this file was first modified, a complete, unmodified copy of
the LPPL Work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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(copied verbatim from hyph-cy.lic.txt in the original work):

Welsh hyphenation patterns

(more info about the licence to be added later)

```
%% hyph-cy.tex, Welsh hyphenation patterns
%% Copyright
 1996 Yannis Haralambous
%%     <yannis dat haralambous at telecom-bretagne dot eu>
%
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% of this license or (at your option) any later version.
% The latest version of this license is in
%   http://www.latex-project.org/lppl.txt
%
% This work has the LPPL maintenance status `maintained'.
%
% The Current Maintainer of this work (patterns) is Yannis Haralambous.
%
% This work consists of the file hyph-cy.tex and is part of hyph-utf8
% maintained by tex-hyphen team which also contains derived files.
%
% For more unformation see
%
```

```
%    http://tug.org/tex-hyphen
%
% CHANGES:
% - 1996 - last change to patterns
% - 2008 - inclusion into hyph-utf8 and file rename (cyhyph.tex -> hyph-cy.tex)
% - June 2011 - added LPPL licence
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Invalid copyright Element With dir Attribute in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element with INVALID as the value for the
dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size:
 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
PROG = 7zcl.exe
MY_CONSOLE = 1

CURRENT_OBJS = \
 $O\Client7z.obj \
```

```
COMMON_OBJS = \
 $O\IntToString.obj \
 $O\NewHandler.obj \
 $O\MyString.obj \
 $O\StringConvert.obj \
 $O\StringToInt.obj \
 $O\MyVector.obj \
 $O\Wildcard.obj \

WIN_OBJS = \
 $O\DLL.obj \
 $O\FileDir.obj \
 $O\FileFind.obj \
 $O\FileIO.obj \
 $O\FileName.obj \
 $O\PropVariant.obj \
 $O\PropVariantConv.obj \

7ZIP_COMMON_OBJS = \
 $O\FileStreams.obj \

!include "../../7zip.mak"
// 7zDecode.h

#ifndef __7Z_DECODE_H
#define __7Z_DECODE_H

#include "../Common/CoderMixer2.h"

#include "7zIn.h"

namespace NArchive {
namespace N7z {

struct CBindInfoEx: public NCoderMixer2::CBindInfo
{
 CRecordVector<CMethodId> CoderMethodIDs;

 void Clear()
 {
   CBindInfo::Clear();
   CoderMethodIDs.Clear();
 }
};

class CDecoder
{
```

```
 bool _bindInfoPrev_Defined;
 CBindInfoEx _bindInfoPrev;

 bool _useMixerMT;

 #ifdef USE_MIXER_ST
   NCoderMixer2::CMixerST *_mixerST;
 #endif

 #ifdef USE_MIXER_MT
   NCoderMixer2::CMixerMT *_mixerMT;
 #endif

 NCoderMixer2::CMixer *_mixer;
 CMyComPtr<IUnknown> _mixerRef;

public:

 CDecoder(bool useMixerMT);

 HRESULT Decode(
     DECL_EXTERNAL_CODECS_LOC_VARS
     IInStream *inStream,
     UInt64 startPos,
     const CFolders &folders, unsigned folderIndex,
     const UInt64 *unpackSize // if (!unpackSize), then full folder is required
                              // if (unpackSize), then only *unpackSize bytes from
 folder are required

     , ISequentialOutStream *outStream
     , ICompressProgressInfo *compressProgress

     , ISequentialInStream **inStreamMainRes
     , bool &dataAfterEnd_Error

     _7Z_DECODER_CRYPRO_VARS_DECL

     #if !defined(_7ZIP_ST)
     , bool mtMode, UInt32 numThreads, UInt64 memUsage
     #endif
     );
};

}}

#endif
PROG = 7zS.sfx
MY_FIXED = 1
```

```
CFLAGS = $(CFLAGS) \
 -DNO_REGISTRY \
 -DEXTRACT_ONLY \
 -DNO_READ_FROM_CODER \
 -D_SFX \
 -D_NO_CRYPTO \

CURRENT_OBJS = \
 $O\SfxSetup.obj \
 $O\ExtractCallbackSfx.obj \
 $O\ExtractEngine.obj \

COMMON_OBJS = \
 $O\CommandLineParser.obj \
 $O\CRC.obj \
 $O\IntToString.obj \
 $O\NewHandler.obj \
 $O\MyString.obj \
 $O\StringConvert.obj \
 $O\TextConfig.obj \
 $O\UTFConvert.obj \
 $O\MyVector.obj \
 $O\Wildcard.obj \

WIN_OBJS = \
 $O\DLL.obj \
 $O\ErrorMsg.obj \
 $O\FileDir.obj \
 $O\FileFind.obj \
 $O\FileIO.obj \
 $O\FileName.obj \
 $O\PropVariant.obj \
 $O\ResourceString.obj \
 $O\Synchronization.obj \
 $O\System.obj \
 $O\Window.obj \

WIN_CTRL_OBJS = \
 $O\Dialog.obj \

7ZIP_COMMON_OBJS = \
 $O\CreateCoder.obj \
 $O\CWrappers.obj \
 $O\FileStreams.obj \
 $O\InBuffer.obj \
 $O\FilterCoder.obj \
 $O\LimitedStreams.obj \
```

```
 $O\OutBuffer.obj \
 $O\ProgressUtils.obj \
 $O\PropId.obj \
 $O\StreamBinder.obj \
 $O\StreamObjects.obj
 \
 $O\StreamUtils.obj \
 $O\VirtThread.obj \

UI_COMMON_OBJS = \
 $O\ArchiveOpenCallback.obj \
 $O\DefaultName.obj \
 $O\LoadCodecs.obj \
 $O\OpenArchive.obj \

EXPLORER_OBJS = \
 $O\MyMessages.obj \

FM_OBJS = \
 $O\FormatUtils.obj \
 $O\ProgressDialog.obj \

AR_COMMON_OBJS = \
 $O\CoderMixer2.obj \
 $O\ItemNameUtils.obj \
 $O\OutStreamWithCRC.obj \

7Z_OBJS = \
 $O\7zDecode.obj \
 $O\7zExtract.obj \
 $O\7zHandler.obj \
 $O\7zIn.obj \
 $O\7zRegister.obj \

COMPRESS_OBJS = \
 $O\Bcj2Coder.obj \
 $O\Bcj2Register.obj \
 $O\BcjCoder.obj \
 $O\BcjRegister.obj \
 $O\BranchMisc.obj \
 $O\BranchRegister.obj \
 $O\CopyCoder.obj \
 $O\CopyRegister.obj \
 $O\DeltaFilter.obj \
 $O\Lzma2Decoder.obj \
 $O\Lzma2Register.obj \
 $O\LzmaDecoder.obj \
 $O\LzmaRegister.obj \
```

```
C_OBJS = \
 $O\Alloc.obj \
 $O\Bcj2.obj \
 $O\Bra.obj \
 $O\Bra86.obj \
 $O\BraIA64.obj \
 $O\CpuArch.obj \
 $O\Delta.obj \
 $O\DllSecur.obj \
 $O\Lzma2Dec.obj \
 $O\Lzma2DecMt.obj
 \
 $O\LzmaDec.obj \
 $O\MtDec.obj \
 $O\Threads.obj \

!include "../../Crc.mak"
!include "../../LzmaDec.mak"

!include "../../7zip.mak"
// FilterCoder.h

#ifndef __FILTER_CODER_H
#define __FILTER_CODER_H

#include "../../../C/Alloc.h"

#include "../../Common/MyCom.h"
#include "../ICoder.h"

#ifndef _NO_CRYPTO
#include "../IPassword.h"
#endif

#define MY_QUERYINTERFACE_ENTRY_AG(i, sub0, sub) else if (iid == IID_ ## i) \
 { if (!sub) RINOK(sub0->QueryInterface(IID_ ## i, (void **)&sub)) \
   *outObject = (void *)(i *)this; }


struct CAlignedMidBuffer
{
 #ifdef _WIN32

 Byte *_buf;

 CAlignedMidBuffer(): _buf(NULL) {}
 ~CAlignedMidBuffer() { ::MidFree(_buf); }
```

```
 void AllocAlignedMask(size_t size, size_t)
 {
  ::MidFree(_buf);
  _buf = (Byte *)::MidAlloc(size);
 }

 #else

 Byte *_bufBase;
 Byte *_buf;

 CAlignedMidBuffer(): _bufBase(NULL), _buf(NULL) {}
 ~CAlignedMidBuffer() { ::MidFree(_bufBase); }

 void AllocAlignedMask(size_t size, size_t alignMask)
 {
  ::MidFree(_bufBase);
  _buf = NULL;
  _bufBase = (Byte *)::MidAlloc(size + alignMask);

  if (_bufBase)
  {
    // _buf =
 (Byte *)(((uintptr_t)_bufBase + alignMask) & ~(uintptr_t)alignMask);
      _buf = (Byte *)(((ptrdiff_t)_bufBase + alignMask) & ~(ptrdiff_t)alignMask);
  }
 }

 #endif
};

class CFilterCoder:
 public ICompressCoder,

 public ICompressSetOutStreamSize,
 public ICompressInitEncoder,

 public ICompressSetInStream,
 public ISequentialInStream,

 public ICompressSetOutStream,
 public ISequentialOutStream,
 public IOutStreamFinish,

 public ICompressSetBufSize,

 #ifndef _NO_CRYPTO
```

```
public ICryptoSetPassword,
public ICryptoProperties,
#endif

#ifndef EXTRACT_ONLY
public ICompressSetCoderProperties,
public ICompressWriteCoderProperties,
// public ICryptoResetSalt,
public ICryptoResetInitVector,
#endif

public ICompressSetDecoderProperties2,
public CMyUnknownImp,
public CAlignedMidBuffer
{
UInt32 _bufSize;
UInt32 _inBufSize;
UInt32 _outBufSize;

bool _encodeMode;
bool _outSizeIsDefined;
UInt64 _outSize;
UInt64 _nowPos64;

CMyComPtr<ISequentialInStream>
_inStream;
CMyComPtr<ISequentialOutStream> _outStream;
UInt32 _bufPos;
UInt32 _convPos;    // current pos in buffer for converted data
UInt32 _convSize;   // size of converted data starting from _convPos

void InitSpecVars()
{
  _bufPos = 0;
  _convPos = 0;
  _convSize = 0;

  _outSizeIsDefined = false;
  _outSize = 0;
  _nowPos64 = 0;
}

HRESULT Alloc();
HRESULT Init_and_Alloc();
HRESULT Flush2();

#ifndef _NO_CRYPTO
CMyComPtr<ICryptoSetPassword> _SetPassword;
```

```
CMyComPtr<ICryptoProperties> _CryptoProperties;
#endif

#ifndef EXTRACT_ONLY
CMyComPtr<ICompressSetCoderProperties> _SetCoderProperties;
CMyComPtr<ICompressWriteCoderProperties> _WriteCoderProperties;
// CMyComPtr<ICryptoResetSalt> _CryptoResetSalt;
CMyComPtr<ICryptoResetInitVector> _CryptoResetInitVector;
#endif

CMyComPtr<ICompressSetDecoderProperties2> _SetDecoderProperties2;

public:
CMyComPtr<ICompressFilter> Filter;

CFilterCoder(bool encodeMode);
 ~CFilterCoder();

class C_InStream_Releaser
{
public:
  CFilterCoder *FilterCoder;
  C_InStream_Releaser(): FilterCoder(NULL) {}
  ~C_InStream_Releaser() { if (FilterCoder) FilterCoder->ReleaseInStream(); }
};

class C_OutStream_Releaser
{
public:
  CFilterCoder *FilterCoder;
  C_OutStream_Releaser(): FilterCoder(NULL) {}
  ~C_OutStream_Releaser() { if (FilterCoder) FilterCoder->ReleaseOutStream(); }
};

class C_Filter_Releaser
{
public:
  CFilterCoder *FilterCoder;
  C_Filter_Releaser(): FilterCoder(NULL) {}
  ~C_Filter_Releaser() { if (FilterCoder) FilterCoder->Filter.Release(); }
};


MY_QUERYINTERFACE_BEGIN2(ICompressCoder)

  MY_QUERYINTERFACE_ENTRY(ICompressSetOutStreamSize)
  MY_QUERYINTERFACE_ENTRY(ICompressInitEncoder)
```

```
  MY_QUERYINTERFACE_ENTRY(ICompressSetInStream)
  MY_QUERYINTERFACE_ENTRY(ISequentialInStream)

  MY_QUERYINTERFACE_ENTRY(ICompressSetOutStream)
  MY_QUERYINTERFACE_ENTRY(ISequentialOutStream)
   MY_QUERYINTERFACE_ENTRY(IOutStreamFinish)

  MY_QUERYINTERFACE_ENTRY(ICompressSetBufSize)

  #ifndef _NO_CRYPTO
  MY_QUERYINTERFACE_ENTRY_AG(ICryptoSetPassword, Filter, _SetPassword)
  MY_QUERYINTERFACE_ENTRY_AG(ICryptoProperties, Filter, _CryptoProperties)
  #endif

  #ifndef EXTRACT_ONLY
  MY_QUERYINTERFACE_ENTRY_AG(ICompressSetCoderProperties, Filter, _SetCoderProperties)
  MY_QUERYINTERFACE_ENTRY_AG(ICompressWriteCoderProperties, Filter, _WriteCoderProperties)
  // MY_QUERYINTERFACE_ENTRY_AG(ICryptoResetSalt, Filter, _CryptoResetSalt)
  MY_QUERYINTERFACE_ENTRY_AG(ICryptoResetInitVector, Filter, _CryptoResetInitVector)
  #endif

  MY_QUERYINTERFACE_ENTRY_AG(ICompressSetDecoderProperties2, Filter, _SetDecoderProperties2)
MY_QUERYINTERFACE_END
MY_ADDREF_RELEASE


STDMETHOD(Code)(ISequentialInStream *inStream, ISequentialOutStream *outStream,
    const UInt64 *inSize, const UInt64 *outSize, ICompressProgressInfo *progress);


STDMETHOD(SetOutStreamSize)(const UInt64 *outSize);
STDMETHOD(InitEncoder)();

STDMETHOD(SetInStream)(ISequentialInStream *inStream);
STDMETHOD(ReleaseInStream)();
STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);

STDMETHOD(SetOutStream)(ISequentialOutStream *outStream);
STDMETHOD(ReleaseOutStream)();
STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
STDMETHOD(OutStreamFinish)();

STDMETHOD(SetInBufSize)(UInt32 streamIndex, UInt32 size);
STDMETHOD(SetOutBufSize)(UInt32 streamIndex, UInt32 size);

#ifndef _NO_CRYPTO
STDMETHOD(CryptoSetPassword)(const Byte *data, UInt32 size);
```

```
 STDMETHOD(SetKey)(const Byte *data, UInt32 size);
 STDMETHOD(SetInitVector)(const Byte *data, UInt32 size);
 #endif

 #ifndef EXTRACT_ONLY
 STDMETHOD(SetCoderProperties)(const PROPID *propIDs,
    const PROPVARIANT *properties, UInt32 numProperties);
 STDMETHOD(WriteCoderProperties)(ISequentialOutStream *outStream);
 // STDMETHOD(ResetSalt)();
  STDMETHOD(ResetInitVector)();
 #endif

 STDMETHOD(SetDecoderProperties2)(const Byte *data, UInt32 size);



 HRESULT Init_NoSubFilterInit();
};

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element matches the schema." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size:
 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
```

```
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts" id="License ID"&gt;
  &lt;text&gt;
   License without language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With dir Attribute in div Element in text Element 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-020-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element that contains a div element with ltr as
the value for the dir attribute."
 />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-020.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
```

```
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   &lt;div dir="ltr"&gt;Paragraph 1&lt;/div&gt;
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

```
// Windows/FileDir.h

#ifndef __WINDOWS_FILE_DIR_H
#define __WINDOWS_FILE_DIR_H

#include "../Common/MyString.h"

#include "FileIO.h"

namespace NWindows {
namespace NFile {
namespace NDir {

bool GetWindowsDir(FString &path);
bool GetSystemDir(FString &path);

bool SetDirTime(CFSTR path, const FILETIME *cTime, const FILETIME *aTime, const FILETIME *mTime);


bool SetFileAttrib(CFSTR path, DWORD attrib);

/*
 Some programs store posix attributes in high 16 bits of windows attributes field.
 Also some programs use additional flag markers: 0x8000 or 0x4000.
 SetFileAttrib_PosixHighDetect() tries to detect posix field, and it extracts only attribute
 bits that are related to current system only.
*/

bool SetFileAttrib_PosixHighDetect(CFSTR path, DWORD attrib);


bool MyMoveFile(CFSTR existFileName, CFSTR newFileName);

#ifndef UNDER_CE
bool MyCreateHardLink(CFSTR newFileName, CFSTR existFileName);
#endif

bool RemoveDir(CFSTR path);
bool CreateDir(CFSTR path);

/* CreateComplexDir returns
 true, if directory can contain files after the call (two cases):
   1) the directory already exists (network shares and drive paths are supported)
   2) the directory was created
```

```
 path can be WITH or WITHOUT trailing path separator. */

bool CreateComplexDir(CFSTR path);

bool DeleteFileAlways(CFSTR name);
bool RemoveDirWithSubItems(const FString &path);

bool MyGetFullPathName(CFSTR path, FString &resFullPath);
bool GetFullPathAndSplit(CFSTR path, FString &resDirPrefix, FString &resFileName);
bool GetOnlyDirPrefix(CFSTR path, FString &resDirPrefix);

#ifndef UNDER_CE

bool SetCurrentDir(CFSTR path);
bool GetCurrentDir(FString &resultPath);

#endif

bool MyGetTempPath(FString &resultPath);

class CTempFile
{
 bool _mustBeDeleted;
 FString _path;
 void DisableDeleting() { _mustBeDeleted = false; }
public:
 CTempFile(): _mustBeDeleted(false) {}
 ~CTempFile() { Remove(); }
 const FString &GetPath() const { return _path; }
 bool Create(CFSTR pathPrefix, NIO::COutFile *outFile);
 // pathPrefix is not folder prefix
 bool CreateRandomInTempFolder(CFSTR namePrefix, NIO::COutFile *outFile);
 bool Remove();
 bool MoveTo(CFSTR name, bool deleteDestBefore);
};

class CTempDir
{
 bool _mustBeDeleted;
 FString _path;
public:
 CTempDir(): _mustBeDeleted(false) {}
 ~CTempDir() { Remove();  }
 const FString &GetPath() const { return _path; }
 void DisableDeleting() { _mustBeDeleted = false; }
 bool Create(CFSTR namePrefix) ;
 bool Remove();
};
```

```
#if !defined(UNDER_CE)
class CCurrentDirRestorer
{
 FString _path;
public:
 bool NeedRestore;

 CCurrentDirRestorer(): NeedRestore(true)
 {
   GetCurrentDir(_path);
 }
 ~CCurrentDirRestorer()
 {
   if (!NeedRestore)
     return;
   FString s;
   if (GetCurrentDir(s))
     if (s != _path)
       SetCurrentDir(_path);
 }
};
#endif

}}}

#endif
```

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```
/*  LzmaEnc.h -- LZMA Encoder
2017-07-27 : Igor Pavlov : Public domain */

#ifndef __LZMA_ENC_H
#define __LZMA_ENC_H

#include "7zTypes.h"

EXTERN_C_BEGIN

#define LZMA_PROPS_SIZE 5

typedef struct _CLzmaEncProps
{
 int level;       /* 0 <= level <= 9 */
 UInt32 dictSize; /* (1 << 12) <= dictSize <= (1 << 27) for 32-bit version
                  (1 << 12) <= dictSize <= (3 << 29) for 64-bit version
                  default = (1 << 24) */
 int lc;          /* 0 <= lc <= 8, default = 3 */
 int lp;          /* 0 <= lp <= 4, default = 0 */
 int pb;          /* 0 <= pb <= 4, default = 2 */
 int algo;        /* 0 - fast, 1 - normal, default = 1 */
 int fb;          /* 5 <= fb <= 273, default = 32 */
 int btMode;      /* 0 - hashChain Mode, 1 - binTree mode - normal, default = 1 */
 int numHashBytes; /* 2, 3 or 4, default = 4 */
 UInt32 mc;       /* 1 <= mc <= (1 << 30), default = 32 */
 unsigned writeEndMark;  /* 0 - do not write EOPM, 1 - write EOPM, default = 0 */
 int
 numThreads;  /* 1 or 2, default = 2 */

 UInt64 reduceSize; /* estimated size of data that will be compressed. default = (UInt64)(Int64)-1.
                    Encoder uses this value to reduce dictionary size */
} CLzmaEncProps;

void LzmaEncProps_Init(CLzmaEncProps *p);
void LzmaEncProps_Normalize(CLzmaEncProps *p);
UInt32 LzmaEncProps_GetDictSize(const CLzmaEncProps *props2);
```

```
/* ---------- CLzmaEncHandle Interface ---------- */

/* LzmaEnc* functions can return the following exit codes:
SRes:
 SZ_OK           - OK
 SZ_ERROR_MEM    - Memory allocation error
 SZ_ERROR_PARAM  - Incorrect paramater in props
 SZ_ERROR_WRITE  - ISeqOutStream write callback error
 SZ_ERROR_OUTPUT_EOF - output buffer overflow - version with (Byte *) output
 SZ_ERROR_PROGRESS - some break from progress callback
 SZ_ERROR_THREAD - error in multithreading functions (only for Mt version)
*/

typedef void * CLzmaEncHandle;

CLzmaEncHandle LzmaEnc_Create(ISzAllocPtr alloc);
void LzmaEnc_Destroy(CLzmaEncHandle
 p, ISzAllocPtr alloc, ISzAllocPtr allocBig);

SRes LzmaEnc_SetProps(CLzmaEncHandle p, const CLzmaEncProps *props);
void LzmaEnc_SetDataSize(CLzmaEncHandle p, UInt64 expectedDataSiize);
SRes LzmaEnc_WriteProperties(CLzmaEncHandle p, Byte *properties, SizeT *size);
unsigned LzmaEnc_IsWriteEndMark(CLzmaEncHandle p);

SRes LzmaEnc_Encode(CLzmaEncHandle p, ISeqOutStream *outStream, ISeqInStream *inStream,
   ICompressProgress *progress, ISzAllocPtr alloc, ISzAllocPtr allocBig);
SRes LzmaEnc_MemEncode(CLzmaEncHandle p, Byte *dest, SizeT *destLen, const Byte *src, SizeT srcLen,
   int writeEndMark, ICompressProgress *progress, ISzAllocPtr alloc, ISzAllocPtr allocBig);


/* ---------- One Call Interface ---------- */

SRes LzmaEncode(Byte *dest, SizeT *destLen, const Byte *src, SizeT srcLen,
   const CLzmaEncProps *props, Byte *propsEncoded, SizeT *propsSize, int writeEndMark,
   ICompressProgress *progress, ISzAllocPtr alloc, ISzAllocPtr allocBig);

EXTERN_C_END

#endif
```

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```
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// OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
//
// A light-weight compression algorithm.  It is designed for speed of
// compression and decompression, rather than for the utmost in space
// savings.
//
// For getting better compression ratios when you are compressing data
// with long repeated sequences or compressing data that is similar to
// other data, while still compressing fast, you might look at first
// using BMDiff and then compressing the output of BMDiff with
// Snappy.

#ifndef THIRD_PARTY_SNAPPY_SNAPPY_H__
#define
 THIRD_PARTY_SNAPPY_SNAPPY_H__

#include <stddef.h>
#include <string>

#include "snappy-stubs-public.h"

namespace snappy {
 class Source;
 class Sink;
```

```
// ------------------------------------------------------------------------
// Generic compression/decompression routines.
// ------------------------------------------------------------------------

// Compress the bytes read from "*source" and append to "*sink". Return the
// number of bytes written.
size_t Compress(Source* source, Sink* sink);

// Find the uncompressed length of the given stream, as given by the header.
// Note that the true length could deviate from this; the stream could e.g.
// be truncated.
//
// Also note that this leaves "*source" in a state that is unsuitable for
// further operations, such as RawUncompress(). You will need to rewind
// or recreate the source yourself before attempting any further calls.
bool GetUncompressedLength(Source* source, uint32*
result);

// ------------------------------------------------------------------------
// Higher-level string based routines (should be sufficient for most users)
// ------------------------------------------------------------------------

// Sets "*output" to the compressed version of "input[0,input_length-1]".
// Original contents of *output are lost.
//
// REQUIRES: "input[]" is not an alias of "*output".
size_t Compress(const char* input, size_t input_length, string* output);

// Decompresses "compressed[0,compressed_length-1]" to "*uncompressed".
// Original contents of "*uncompressed" are lost.
//
// REQUIRES: "compressed[]" is not an alias of "*uncompressed".
//
// returns false if the message is corrupted and could not be decompressed
bool Uncompress(const char* compressed, size_t compressed_length,
                string* uncompressed);

// Decompresses "compressed" to "*uncompressed".
//
// returns false if the message is corrupted and
could not be decompressed
bool Uncompress(Source* compressed, Sink* uncompressed);

// This routine uncompresses as much of the "compressed" as possible
// into sink.  It returns the number of valid bytes added to sink
// (extra invalid bytes may have been added due to errors; the caller
// should ignore those). The emitted data typically has length
// GetUncompressedLength(), but may be shorter if an error is
```

```
// encountered.
size_t UncompressAsMuchAsPossible(Source* compressed, Sink* uncompressed);

// ------------------------------------------------------------------------
// Lower-level character array based routines.  May be useful for
// efficiency reasons in certain circumstances.
// ------------------------------------------------------------------------

// REQUIRES: "compressed" must point to an area of memory that is at
// least "MaxCompressedLength(input_length)" bytes in length.
//
// Takes the data stored in "input[0..input_length]" and stores
 // it in the array pointed to by "compressed".
//
// "*compressed_length" is set to the length of the compressed output.
//
// Example:
//    char* output = new char[snappy::MaxCompressedLength(input_length)];
//    size_t output_length;
//    RawCompress(input, input_length, output, &output_length);
//    ... Process(output, output_length) ...
//    delete [] output;
void RawCompress(const char* input,
                 size_t input_length,
                 char* compressed,
                 size_t* compressed_length);

// Given data in "compressed[0..compressed_length-1]" generated by
// calling the Snappy::Compress routine, this routine
// stores the uncompressed data to
//    uncompressed[0..GetUncompressedLength(compressed)-1]
// returns false if the message is corrupted and could not be decrypted
bool RawUncompress(const char* compressed, size_t compressed_length,
                   char* uncompressed);

// Given data from the byte
source 'compressed' generated by calling
// the Snappy::Compress routine, this routine stores the uncompressed
// data to
//    uncompressed[0..GetUncompressedLength(compressed,compressed_length)-1]
// returns false if the message is corrupted and could not be decrypted
bool RawUncompress(Source* compressed, char* uncompressed);

// Given data in "compressed[0..compressed_length-1]" generated by
// calling the Snappy::Compress routine, this routine
// stores the uncompressed data to the iovec "iov". The number of physical
// buffers in "iov" is given by iov_cnt and their cumulative size
// must be at least GetUncompressedLength(compressed). The individual buffers
```

```
// in "iov" must not overlap with each other.
//
// returns false if the message is corrupted and could not be decrypted
bool RawUncompressToIOVec(const char* compressed, size_t compressed_length,
                          const struct iovec* iov, size_t iov_cnt);

// Given data from the byte source
'compressed' generated by calling
// the Snappy::Compress routine, this routine stores the uncompressed
// data to the iovec "iov". The number of physical
// buffers in "iov" is given by iov_cnt and their cumulative size
// must be at least GetUncompressedLength(compressed). The individual buffers
// in "iov" must not overlap with each other.
//
// returns false if the message is corrupted and could not be decrypted
bool RawUncompressToIOVec(Source* compressed, const struct iovec* iov,
                          size_t iov_cnt);

// Returns the maximal size of the compressed representation of
// input data that is "source_bytes" bytes in length;
size_t MaxCompressedLength(size_t source_bytes);

// REQUIRES: "compressed[]" was produced by RawCompress() or Compress()
// Returns true and stores the length of the uncompressed data in
// *result normally.  Returns false on parsing error.
// This operation takes O(1) time.
bool GetUncompressedLength(const
char* compressed, size_t compressed_length,
                           size_t* result);

// Returns true iff the contents of "compressed[]" can be uncompressed
// successfully.  Does not return the uncompressed data.  Takes
// time proportional to compressed_length, but is usually at least
// a factor of four faster than actual decompression.
bool IsValidCompressedBuffer(const char* compressed,
                             size_t compressed_length);

// Returns true iff the contents of "compressed" can be uncompressed
// successfully.  Does not return the uncompressed data.  Takes
// time proportional to *compressed length, but is usually at least
// a factor of four faster than actual decompression.
// On success, consumes all of *compressed.  On failure, consumes an
// unspecified prefix of *compressed.
bool IsValidCompressed(Source* compressed);

// The size of a compression block. Note that many parts of the compression
// code assumes that kBlockSize
```

```
 <= 65536; in particular, the hash table
 // can only store 16-bit offsets, and EmitCopy() also assumes the offset
 // is 65535 bytes or less. Note also that if you change this, it will
 // affect the framing format (see framing_format.txt).
 //
 // Note that there might be older data around that is compressed with larger
 // block sizes, so the decompression code should not rely on the
 // non-existence of long backreferences.
 static const int kBlockLog = 16;
 static const size_t kBlockSize = 1 << kBlockLog;

 static const int kMaxHashTableBits = 14;
 static const size_t kMaxHashTableSize = 1 << kMaxHashTableBits;
}  // end namespace snappy

#endif  // THIRD_PARTY_SNAPPY_SNAPPY_H__
// FilePathAutoRename.h

#ifndef __FILE_PATH_AUTO_RENAME_H
#define __FILE_PATH_AUTO_RENAME_H

#include "../../Common/MyString.h"

bool AutoRenamePath(FString &fullProcessedPath);

#endif
// GUI/ExtractGUI.h

#ifndef __EXTRACT_GUI_H
#define __EXTRACT_GUI_H

#include "../Common/Extract.h"

#include "../FileManager/ExtractCallback.h"

/*
 RESULT can be S_OK, even if there are errors!!!
 if RESULT == S_OK, check extractCallback->IsOK() after ExtractGUI().

 RESULT = E_ABORT - user break.
 RESULT != E_ABORT:
 {
  messageWasDisplayed = true  - message was displayed already.
  messageWasDisplayed = false - there was some internal error, so you must show error message.
 }
*/

HRESULT ExtractGUI(
```

```
  CCodecs *codecs,
  const CObjectVector<COpenType> &formatIndices,
  const CIntVector &excludedFormatIndices,
  UStringVector &archivePaths,
  UStringVector &archivePathsFull,
  const NWildcard::CCensorNode &wildcardCensor,
  CExtractOptions &options,
  #ifndef _SFX
  CHashBundle *hb,
  #endif
  bool showDialog,
  bool &messageWasDisplayed,
  CExtractCallbackImp *extractCallback,
  HWND hwndParent = NULL);

#endif
// Windows/FileFind.h

#ifndef __WINDOWS_FILE_FIND_H
#define __WINDOWS_FILE_FIND_H

#include "../Common/MyString.h"
#include "Defs.h"

namespace NWindows {
namespace NFile {
namespace NFind {

namespace NAttributes
{
 inline bool IsReadOnly(DWORD attrib) { return (attrib & FILE_ATTRIBUTE_READONLY) != 0; }
 inline bool IsHidden(DWORD attrib) { return (attrib & FILE_ATTRIBUTE_HIDDEN) != 0; }
 inline bool IsSystem(DWORD attrib) { return (attrib & FILE_ATTRIBUTE_SYSTEM) != 0; }
 inline bool IsDir(DWORD attrib) { return (attrib & FILE_ATTRIBUTE_DIRECTORY) != 0; }
 inline bool IsArchived(DWORD attrib) { return (attrib & FILE_ATTRIBUTE_ARCHIVE) != 0; }
 inline bool IsCompressed(DWORD attrib) { return (attrib & FILE_ATTRIBUTE_COMPRESSED) != 0; }
 inline bool IsEncrypted(DWORD attrib) { return (attrib & FILE_ATTRIBUTE_ENCRYPTED) != 0; }
}

class CFileInfoBase
{
 bool MatchesMask(UINT32 mask) const { return ((Attrib & mask) != 0); }
public:
 UInt64 Size;
 FILETIME CTime;
 FILETIME ATime;
  FILETIME MTime;
 DWORD Attrib;
```

```
 bool IsAltStream;
 bool IsDevice;

 /*
 #ifdef UNDER_CE
 DWORD ObjectID;
 #else
 UINT32 ReparseTag;
 #endif
 */

 CFileInfoBase() { ClearBase(); }
 void ClearBase() throw();

 void SetAsDir() { Attrib = FILE_ATTRIBUTE_DIRECTORY; }

 bool IsArchived() const { return MatchesMask(FILE_ATTRIBUTE_ARCHIVE); }
 bool IsCompressed() const { return MatchesMask(FILE_ATTRIBUTE_COMPRESSED); }
 bool IsDir() const { return MatchesMask(FILE_ATTRIBUTE_DIRECTORY); }
 bool IsEncrypted() const { return MatchesMask(FILE_ATTRIBUTE_ENCRYPTED); }
 bool IsHidden() const { return MatchesMask(FILE_ATTRIBUTE_HIDDEN); }
 bool IsNormal() const { return MatchesMask(FILE_ATTRIBUTE_NORMAL); }
 bool IsOffline() const { return MatchesMask(FILE_ATTRIBUTE_OFFLINE); }
 bool IsReadOnly() const { return MatchesMask(FILE_ATTRIBUTE_READONLY); }
 bool HasReparsePoint() const { return MatchesMask(FILE_ATTRIBUTE_REPARSE_POINT); }
 bool IsSparse() const { return MatchesMask(FILE_ATTRIBUTE_SPARSE_FILE);
 }
 bool IsSystem() const { return MatchesMask(FILE_ATTRIBUTE_SYSTEM); }
 bool IsTemporary() const { return MatchesMask(FILE_ATTRIBUTE_TEMPORARY); }
};

struct CFileInfo: public CFileInfoBase
{
 FString Name;
 #if defined(_WIN32) && !defined(UNDER_CE)
 // FString ShortName;
 #endif

 bool IsDots() const throw();
 bool Find(CFSTR path);
};

class CFindFileBase
{
protected:
 HANDLE _handle;
public:
 bool IsHandleAllocated() const { return _handle != INVALID_HANDLE_VALUE; }
```

```
 CFindFileBase(): _handle(INVALID_HANDLE_VALUE) {}
 ~CFindFileBase() { Close(); }
 bool Close() throw();
};

class CFindFile: public CFindFileBase
{
public:
 bool FindFirst(CFSTR wildcard, CFileInfo &fileInfo);
 bool FindNext(CFileInfo &fileInfo);
};

#if defined(_WIN32) && !defined(UNDER_CE)

struct CStreamInfo
{
 UString Name;
 UInt64 Size;

 UString GetReducedName() const; // returns ":Name"
 // UString GetReducedName2() const; // returns "Name"
 bool IsMainStream()
 const throw();
};

class CFindStream: public CFindFileBase
{
public:
 bool FindFirst(CFSTR filePath, CStreamInfo &streamInfo);
 bool FindNext(CStreamInfo &streamInfo);
};

class CStreamEnumerator
{
 CFindStream _find;
 FString _filePath;

 bool NextAny(CFileInfo &fileInfo);
public:
 CStreamEnumerator(const FString &filePath): _filePath(filePath) {}
 bool Next(CStreamInfo &streamInfo, bool &found);
};

#endif

bool DoesFileExist(CFSTR name);
bool DoesDirExist(CFSTR name);
bool DoesFileOrDirExist(CFSTR name);
```

```
DWORD GetFileAttrib(CFSTR path);

class CEnumerator
{
 CFindFile _findFile;
 FString _wildcard;

 bool NextAny(CFileInfo &fileInfo);
public:
 void SetDirPrefix(const FString &dirPrefix);
 bool Next(CFileInfo &fileInfo);
 bool Next(CFileInfo &fileInfo, bool &found);
};

class CFindChangeNotification
{
 HANDLE _handle;
public:
 operator HANDLE () { return _handle; }
 bool IsHandleAllocated() const { return _handle != INVALID_HANDLE_VALUE && _handle != 0; }
 CFindChangeNotification():
 _handle(INVALID_HANDLE_VALUE) {}
 ~CFindChangeNotification() { Close(); }
 bool Close() throw();
 HANDLE FindFirst(CFSTR pathName, bool watchSubtree, DWORD notifyFilter);
 bool FindNext() { return BOOLToBool(::FindNextChangeNotification(_handle)); }
};

#ifndef UNDER_CE
bool MyGetLogicalDriveStrings(CObjectVector<FString> &driveStrings);
#endif

}}}

#endif
// Common/CommandLineParser.h

#ifndef __COMMON_COMMAND_LINE_PARSER_H
#define __COMMON_COMMAND_LINE_PARSER_H

#include "MyString.h"

namespace NCommandLineParser {

bool SplitCommandLine(const UString &src, UString &dest1, UString &dest2);
void SplitCommandLine(const UString &s, UStringVector &parts);
```

```
namespace NSwitchType
{
 enum EEnum
 {
   kSimple,
   kMinus,
   kString,
   kChar
 };
}

struct CSwitchForm
{
 const char *Key;
 Byte Type;
 bool Multi;
 Byte MinLen;
 // int MaxLen;
 const char *PostCharSet;
};

struct CSwitchResult
{
 bool ThereIs;
 bool WithMinus;
 int PostCharIndex;
 UStringVector PostStrings;

 CSwitchResult(): ThereIs(false) {};
};

class CParser
{
 CSwitchResult *_switches;

 bool ParseString(const UString &s, const CSwitchForm *switchForms, unsigned numSwitches);
public:
 UStringVector NonSwitchStrings;
 int StopSwitchIndex;  // NonSwitchStrings[StopSwitchIndex+] are after "--"
 AString ErrorMessage;
 UString ErrorLine;

 CParser();
  ~CParser();
 bool ParseStrings(const CSwitchForm *switchForms, unsigned numSwitches, const UStringVector
&commandStrings);
 const CSwitchResult& operator[](unsigned index) const { return _switches[index]; }
};
```

```
}

#endif
#define IDD_EXTRACT     3400
#define IDD_EXTRACT_2  13400

#define IDC_EXTRACT_PATH            100
#define IDB_EXTRACT_SET_PATH        101
#define IDC_EXTRACT_PATH_MODE       102
#define IDC_EXTRACT_OVERWRITE_MODE   103

#define IDE_EXTRACT_PASSWORD        120

#define IDE_EXTRACT_NAME            130
#define IDX_EXTRACT_NAME_ENABLE     131


#define IDT_EXTRACT_EXTRACT_TO      3401
#define IDT_EXTRACT_PATH_MODE       3410
#define IDT_EXTRACT_OVERWRITE_MODE  3420

#define IDX_EXTRACT_ELIM_DUP        3430
#define IDX_EXTRACT_NT_SECUR        3431
// #define IDX_EXTRACT_ALT_STREAMS     3432

#define IDX_PASSWORD_SHOW           3803
#define IDG_PASSWORD                3807
// Common/StringToInt.h

#ifndef __COMMON_STRING_TO_INT_H
#define __COMMON_STRING_TO_INT_H

#include "MyTypes.h"

UInt32 ConvertStringToUInt32(const char *s, const char **end) throw();
UInt64 ConvertStringToUInt64(const char *s, const char **end) throw();
UInt32 ConvertStringToUInt32(const wchar_t *s, const wchar_t **end) throw();
UInt64 ConvertStringToUInt64(const wchar_t *s, const wchar_t **end) throw();

Int32 ConvertStringToInt32(const wchar_t *s, const wchar_t **end) throw();

UInt32 ConvertOctStringToUInt32(const char *s, const char **end) throw();
UInt64 ConvertOctStringToUInt64(const char *s, const char **end) throw();

UInt32 ConvertHexStringToUInt32(const char *s, const char **end) throw();
UInt64 ConvertHexStringToUInt64(const char *s, const char **end) throw();
```

#endif
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```
// OverwriteDialog.h

#ifndef __OVERWRITE_DIALOG_H
#define __OVERWRITE_DIALOG_H

#include "../../../Windows/Control/Dialog.h"

#include "DialogSize.h"
#include "OverwriteDialogRes.h"

namespace NOverwriteDialog
{
 struct CFileInfo
 {
   bool SizeIsDefined;
   bool TimeIsDefined;
   UInt64 Size;
   FILETIME Time;
   UString Name;

   void SetTime(const FILETIME *t)
   {
     if (t == 0)
       TimeIsDefined = false;
     else
     {
       TimeIsDefined = true;
       Time = *t;
     }
   }
   void SetSize(const UInt64 *size)
   {
     if (size == 0)
       SizeIsDefined = false;
```

```
    else
    {
      SizeIsDefined = true;
      Size = *size;
    }
  }
 };
}

class COverwriteDialog: public NWindows::NControl::CModalDialog
{
 bool _isBig;

 void SetFileInfoControl(int textID, int iconID, const NOverwriteDialog::CFileInfo &fileInfo);
 virtual bool OnInit();
 bool OnButtonClicked(int buttonID, HWND buttonHWND);
 void ReduceString(UString &s);

public:
  INT_PTR Create(HWND parent = 0)
 {
   BIG_DIALOG_SIZE(280, 200);
   #ifdef UNDER_CE
   _isBig = isBig;
   #else
   _isBig = true;
   #endif
   return CModalDialog::Create(SIZED_DIALOG(IDD_OVERWRITE), parent);
 }

 NOverwriteDialog::CFileInfo OldFileInfo;
 NOverwriteDialog::CFileInfo NewFileInfo;
};

#endif
```

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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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%
% Source: icehyph.tex (2004-03-08)
% Author: Jorgen Pind <jorgen at lexis.hi.is>
%
% The above mentioned file should become obsolete,
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%
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% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%  and helped with testing, suggestions and bug reports
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%
% Before a new "pattern-revolution" starts,
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%
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%   and if you really cannot do without, also \input and \message
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%   and no \lefthyphenmin and \righthyphenmin,
%
   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
%-----------------------------------------------------------------------------
%
% The Icelandic Plain TeX hyphenation tables
% as of Nov 2 1988.
% Jorgen Pind, Institute of Lexicography, Univ. of Iceland
% jorgen@lexis.hi.is (Internet)
%
% Mar 2 2004: Uploaded a new version to CTAN, with a clarified license
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%
// ArchiveName.h

```
#ifndef __ARCHIVE_NAME_H
#define __ARCHIVE_NAME_H

#include "../../../Common/MyString.h"

#include "../../../Windows/FileFind.h"

UString CreateArchiveName(const UString &path, bool fromPrev, bool keepName);
UString CreateArchiveName(const NWindows::NFile::NFind::CFileInfo &fileInfo, bool keepName);

#endif
```

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//
// CityHash Version 1, by Geoff Pike and Jyrki Alakuijala
//
// This file provides a few functions for hashing strings. On x86-64
// hardware in 2011, CityHash64() is faster than other high-quality
// hash functions, such as Murmur.  This is largely due to higher
// instruction-level parallelism.  CityHash64() and CityHash128() also perform
// well on hash-quality tests.
//
// CityHash128() is optimized for relatively long strings and returns
// a 128-bit hash.  For strings more than about 2000 bytes it can be
// faster than CityHash64().
//
// Functions in the CityHash family are not suitable for cryptography.
//
// WARNING: This code has not been tested on big-endian platforms!
// It is known to work well on little-endian platforms that have a small penalty
// for unaligned reads, such as current Intel and AMD moderate-to-high-end CPUs.
//
// By the way, for some hash functions,
given strings a and b, the hash
// of a+b is easily derived from the hashes of a and b.  This property
// doesn't hold for any hash functions in this file.
```

```
#ifndef CITY_HASH_H_
#define CITY_HASH_H_

#include <stdlib.h>  // for size_t.
#include <stdint.h>

typedef uint8_t uint8;
typedef uint32_t uint32;
typedef uint64_t uint64;

#ifdef __cplusplus

#include <utility>
typedef std::pair<uint64, uint64> uint128;
inline uint64 Uint128Low64(const uint128& x) { return x.first; }
inline uint64 Uint128High64(const uint128& x) { return x.second; }

extern "C" {
#endif

// Hash function for a byte array.
uint64 CityHash64(const char *buf, size_t len);

// Hash function for a byte array.  For convenience, a 64-bit seed is also
// hashed into the result.
uint64 CityHash64WithSeed(const char *buf, size_t len, uint64 seed);

// Hash function for a byte array.  For convenience, two seeds are also
// hashed into the result.
uint64 CityHash64WithSeeds(const char *buf, size_t len,

          uint64 seed0, uint64 seed1);

#ifdef __cplusplus
}
// Hash function for a byte array.
uint128 CityHash128(const char *s, size_t len);

// Hash function for a byte array.  For convenience, a 128-bit seed is also
// hashed into the result.
uint128 CityHash128WithSeed(const char *s, size_t len, uint128 seed);

// Hash 128 input bits down to 64 bits of output.
// This is intended to be a reasonably good hash function.
inline uint64 Hash128to64(const uint128& x) {
 // Murmur-inspired hashing.
 const uint64 kMul = 0x9ddfea08eb382d69;
 uint64 a = (Uint128Low64(x) ^ Uint128High64(x)) * kMul;
```

```
 a ^= (a >> 47);
 uint64 b = (Uint128High64(x) ^ a) * kMul;
 b ^= (b >> 47);
 b *= kMul;
 return b;
}
#endif

#endif  // CITY_HASH_H_
PROG = 7zCon.sfx
MY_CONSOLE = 1
MY_FIXED = 1

CFLAGS = $(CFLAGS) \
 -DEXTRACT_ONLY \
 -DNO_READ_FROM_CODER \
 -D_SFX \
 -D_CONSOLE \

CURRENT_OBJS = \
 $O\SfxCon.obj \

CONSOLE_OBJS = \
 $O\ConsoleClose.obj \
 $O\ExtractCallbackConsole.obj \
 $O\List.obj \
 $O\MainAr.obj \
 $O\OpenCallbackConsole.obj \
 $O\PercentPrinter.obj \
 $O\UserInputUtils.obj \

COMMON_OBJS = \
 $O\CommandLineParser.obj \
 $O\CRC.obj \
 $O\IntToString.obj \
 $O\MyString.obj \
 $O\MyVector.obj \
 $O\NewHandler.obj \
 $O\StdInStream.obj \
 $O\StdOutStream.obj \
 $O\StringConvert.obj \
 $O\Wildcard.obj \
 $O\UTFConvert.obj \

WIN_OBJS = \
 $O\DLL.obj \
 $O\ErrorMsg.obj \
 $O\FileDir.obj \
```

```
 $O\FileFind.obj \
 $O\FileIO.obj \
 $O\FileName.obj \
 $O\PropVariant.obj \
 $O\PropVariantConv.obj \
 $O\Synchronization.obj \
 $O\System.obj \

7ZIP_COMMON_OBJS = \
 $O\CreateCoder.obj \
 $O\CWrappers.obj \
 $O\FilePathAutoRename.obj \
 $O\FileStreams.obj \
 $O\InBuffer.obj \
 $O\FilterCoder.obj
 \
 $O\LimitedStreams.obj \
 $O\OutBuffer.obj \
 $O\ProgressUtils.obj \
 $O\PropId.obj \
 $O\StreamBinder.obj \
 $O\StreamObjects.obj \
 $O\StreamUtils.obj \
 $O\VirtThread.obj \

UI_COMMON_OBJS = \
 $O\ArchiveExtractCallback.obj \
 $O\ArchiveOpenCallback.obj \
 $O\DefaultName.obj \
 $O\LoadCodecs.obj \
 $O\Extract.obj \
 $O\ExtractingFilePath.obj \
 $O\OpenArchive.obj \
 $O\PropIDUtils.obj \

AR_OBJS = \
 $O\SplitHandler.obj \

AR_COMMON_OBJS = \
 $O\CoderMixer2.obj \
 $O\ItemNameUtils.obj \
 $O\MultiStream.obj \
 $O\OutStreamWithCRC.obj \


7Z_OBJS = \
 $O\7zDecode.obj \
 $O\7zExtract.obj \
```

```
 $O\7zHandler.obj \
 $O\7zIn.obj \
 $O\7zRegister.obj \

COMPRESS_OBJS = \
 $O\Bcj2Coder.obj \
 $O\Bcj2Register.obj \
 $O\BcjCoder.obj \
 $O\BcjRegister.obj \
 $O\BranchMisc.obj \
 $O\BranchRegister.obj \
 $O\CopyCoder.obj \
 $O\CopyRegister.obj \
 $O\DeltaFilter.obj \
 $O\Lzma2Decoder.obj \
 $O\Lzma2Register.obj \
 $O\LzmaDecoder.obj \
 $O\LzmaRegister.obj
 \
 $O\PpmdDecoder.obj \
 $O\PpmdRegister.obj \

CRYPTO_OBJS = \
 $O\7zAes.obj \
 $O\7zAesRegister.obj \
 $O\MyAes.obj \

C_OBJS = \
 $O\Alloc.obj \
 $O\Bcj2.obj \
 $O\Bra.obj \
 $O\Bra86.obj \
 $O\BraIA64.obj \
 $O\CpuArch.obj \
 $O\Delta.obj \
 $O\DllSecur.obj \
 $O\Lzma2Dec.obj \
 $O\Lzma2DecMt.obj \
 $O\LzmaDec.obj \
 $O\MtDec.obj \
 $O\Ppmd7.obj \
 $O\Ppmd7Dec.obj \
 $O\Sha256.obj \
 $O\Threads.obj \

!include "../../Aes.mak"
!include "../../Crc.mak"
!include "../../LzmaDec.mak"
```

!include "../../7zip.mak"

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Please be apprised of the following Legal Notices:

A) The U.S. District Court for the Eastern District of Virginia has
ruled that the Netscape Navigator code does not infringe Wang's U.S.
Patent No. 4,751,669 ("the '669 Patent") because: 1) HTML is not
Videotex as defined by the '669 patent; 2) web servers are not central
suppliers; and 3) Navigator does not "connect," as defined by the '669
Patent, to web servers on the Internet. Wang may appeal this decision to
the Federal Circuit. Wang contended that its Patent disclosing a
"Videotex" system, is infringed by the following functionality in the
Netscape Navigator code: 1) the animated logo and status line indicators
--See Claims 1,8 and 9; 2) the "File Save As" function --See Claims
23-27; 3) Bookmarks and Rename Bookmarks in the Properties window --See
Claims 20-22; 4) storing HTML, GIF, and JPEG files and adding filename
extensions --See Claim 38

B) Intermind owns pending U.S. patent applications on communications
systems which employ
metadata ("channel objects") to define a control
structure for information transfer. The Netscape code does not infringe
as released; however, modifications which utilize channel objects as
described by Intermind should be considered carefully. The following is
a statement from Intermind: "Intermind's claims fundamentally involve
the use of a control structure to automate communications. ...The
essence of Intermind's top claim is that two devices sender and receiver
have persistent storage, communicate over a network, and exchange a
control structure including metadata which describes: 1) what
information is to be updated, 2) when to update this information, and 3)
how to transfer the updated information. In addition, at least the

receiving device must be able to process the metadata in order to
perform the update determination and transfer. Any digital
communications system which incorporates all of these elements will be
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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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the LPPL Work was available from:
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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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Dutch hyphenation patterns

(more info about the licence to be added later)

```
% This file is part of hyph-utf8 package and resulted
 from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% Source: nehyph96.tex (yyyy-mm-dd)
% Author: Piet Tutelaers
%
% The above mentioned file should become obsolete,
% and the author of the original file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%               and helped with testing, suggestions and bug reports
% - Norbert Preining, who tested & integrated patterns into TeX Live
%
%
 However, the "copyright/copyleft" owner of patterns remains the original author.
%
% The copyright statement of this file is thus:
%
%    Do with this file whatever needs to be done in future for the sake of
%    "a better world" as long as you respect the copyright of original file.
%    If you're the original author of patterns or taking over a new revolution,
%    plese remove all of the TUG comments & credits that we added here -
%    you are the Queen / the King, we are only the servants.
%
% If you want to change this file, rather than uploading directly to CTAN,
% we would be grateful if you could send it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
% Before a new "pattern-revolution" starts,
% please try to follow some guidelines if possible:
%
% - \lccode is *forbidden*, and I really mean it
% - all the patterns should be in UTF-8
```

```
% - the only "allowed" TeX commands
 in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
%-------------------------------------------------------------------------------
%
% PURPOSE: 8-bit hyphenation patterns for TeX based upon the new Dutch
%          spelling, officially since 1 August 1996. These patterns follow
%          the new hyphenation rules in the `Woordenlijst Nederlandse
%          Taal, SDU Uitgevers, Den Haag 1995' (the so called `Groene
%          Boekje') described in section 5.2 (Het
 afbreekteken).
%
%          The main differences with our earlier patterns based upon the
%          CELEX dictionary are:
%           (1) provide 8-bit patterns based upon the T1 character encoding
%               (the encoding for DC/EC compatible TeX fonts)
%           (2) don't hyphenate if this results in a syllable of one letter
%               before or after the hyphen (hence hyphens in a-drenaline,
%               studi-o, mensa-pen and vide-oachtig are invalid)
%           (3) handle words derived from other languages (`bastaard
%               woorden') according to the new rules
%
%          Like the CELEX patterns these patterns don't hyphenate:
%           (4) in a changing syllable (menuutje can not be hyphenated as
%               menu-tje)
%           (5) in words that have different hyphenations according to
%               there meaning (buur-tje/buurt-je)
%
% COPYRIGHT (C) 1996: Piet Tutelaers
%
% ---------------------------------------------------------------
%
 IMPORTANT NOTICE:
%
```

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% of the LaTeX Project Public License Distributed from CTAN
% archives in directory macros/latex/base/lppl.txt; either
% version 1 of the License, or any later version.
% ----------
% VERSION: 1.1 (November 1996) Copyright changed March 2000
%
% AUTHOR:  Piet Tutelaers P.T.H.Tutelaers@tue.nl
%
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```
// Windows/Control/ReBar.h

#ifndef __WINDOWS_CONTROL_REBAR_H
#define __WINDOWS_CONTROL_REBAR_H

#include "../Window.h"

namespace NWindows {
namespace NControl {

class CReBar: public NWindows::CWindow
{
public:
 bool SetBarInfo(LPREBARINFO barInfo)
   { return LRESULTToBool(SendMsg(RB_SETBARINFO, 0, (LPARAM)barInfo)); }
 bool InsertBand(int index, LPREBARBANDINFO bandInfo)
   { return LRESULTToBool(SendMsg(RB_INSERTBAND, index, (LPARAM)bandInfo)); }
```

```
 bool SetBandInfo(unsigned index, LPREBARBANDINFO bandInfo)
   { return LRESULTToBool(SendMsg(RB_SETBANDINFO, index, (LPARAM)bandInfo)); }
 void MaximizeBand(unsigned index, bool ideal)
   { SendMsg(RB_MAXIMIZEBAND, index, BoolToBOOL(ideal)); }
 bool SizeToRect(LPRECT rect)
   { return LRESULTToBool(SendMsg(RB_SIZETORECT, 0, (LPARAM)rect)); }
 UINT GetHeight()
   { return (UINT)SendMsg(RB_GETBARHEIGHT); }
 UINT GetBandCount()
   { return (UINT)SendMsg(RB_GETBANDCOUNT); }
 bool DeleteBand(UINT index)
   { return LRESULTToBool(SendMsg(RB_DELETEBAND,
 index)); }
};

}}

#endif
```

PngSuite
---

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```
// OpenCallbackConsole.h

#ifndef __OPEN_CALLBACK_CONSOLE_H
#define __OPEN_CALLBACK_CONSOLE_H

#include "../../../Common/StdOutStream.h"

#include "../Common/ArchiveOpenCallback.h"

#include "PercentPrinter.h"

class COpenCallbackConsole: public IOpenCallbackUI
{
protected:
 CPercentPrinter _percent;

 CStdOutStream *_so;
 CStdOutStream *_se;

 bool _totalFilesDefined;
 // bool _totalBytesDefined;
 // UInt64 _totalFiles;
```

```
 UInt64 _totalBytes;

 bool NeedPercents() const { return _percent._so != NULL; }

public:

 bool MultiArcMode;

 void ClosePercents()
 {
   if (NeedPercents())
     _percent.ClosePrint(true);
 }

 COpenCallbackConsole():
     _totalFilesDefined(false),
     // _totalBytesDefined(false),
     _totalBytes(0),
     MultiArcMode(false)

     #ifndef _NO_CRYPTO
     , PasswordIsDefined(false)
     // , PasswordWasAsked(false)
     #endif

     {}

 void Init(CStdOutStream *outStream, CStdOutStream *errorStream, CStdOutStream *percentStream)
  {
   _so = outStream;
   _se = errorStream;
   _percent._so = percentStream;
 }

 INTERFACE_IOpenCallbackUI(;)

 #ifndef _NO_CRYPTO
 bool PasswordIsDefined;
 // bool PasswordWasAsked;
 UString Password;
 #endif
};

#endif
!<arch>
/               1516160955  0     0     0       270       `
R$$
```

__C__Users_Peter_Code_winapi_rs_i686_lib_libwinapi_oemlicense_a_iname__head_C__Users_Peter_Code_winapi_rs_i686_lib_libwinapi_oemlicense_a_RemoveDemoAppLicense@4__imp__RemoveDemoAppLicense@4_AddDemoAppLicense@8__imp__AddDemoAppLicense@8doxebt.o/ 1516160955 0 0 100666 628 `
L.text
0`.data@0.bss0.idata$4@0.idata$5@0.idata$7@0OEMLicense.dll.filegfake.text.data.bss.idata$4.idata$5.idata$7J__C__Users_Peter_Code_winapi_rs_i686_lib_libwinapi_oemlicense_a_inamedoxebh.o/ 1516160955 0 0 100666 741 `
L6.text 0`.data@0.bss0.idata$2@0.idata$5@0.idata$4@0
.filegfakehnamefthunk.text.data.bss.idata$2.idata$4.idata$5I__head_C__Users_Peter_Code_winapi_rs_i686_lib_libwinapi_oemlicense_a__C__Users_Peter_Code_winapi_rs_i686_lib_libwinapi_oemlicense_a_iname
doxebs00001.o/ 1516160955 0 0 100666 691 `
L
.text,X 0`.data@0.bss0.idata$74b0.idata$58l0.idata$4<v0.idata$6@ %RemoveDemoAppLicense
.text.data.bss.idata$7.idata$5.idata$4.idata$6:_RemoveDemoAppLicense@4__imp__RemoveDemoAppLicense@4__head_C__Users_Peter_Code_winapi_rs_i686_lib_libwinapi_oemlicense_a
doxebs00000.o/
1516160955 0 0 100666 681 `
L|
.text,T 0`.data@0.bss0.idata$74^0.idata$58h0.idata$4<r0.idata$6@ %AddDemoAppLicense
.text.data.bss.idata$7.idata$5.idata$4.idata$64y_AddDemoAppLicense@8__imp__AddDemoAppLicense@8__head_C__Users_Peter_Code_winapi_rs_i686_lib_libwinapi_oemlicense_a

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With Two span Elements in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element that contains two span elements." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size:
 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
```

```
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
    Text with &lt;span&gt;span 1&lt;/span&gt; and &lt;span&gt;span 2&lt;/span&gt;.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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```
// DialogSize.h

#ifndef __DIALOG_SIZE_H
#define __DIALOG_SIZE_H

#include "../../../Windows/Control/Dialog.h"

#ifdef UNDER_CE
#define BIG_DIALOG_SIZE(x, y) bool isBig = NWindows::NControl::IsDialogSizeOK(x, y);
#define SIZED_DIALOG(big) (isBig ? big : big ## _2)
#else
#define BIG_DIALOG_SIZE(x, y)
#define SIZED_DIALOG(big) big
#endif

#endif
```

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```
// IArchive.h

#ifndef __IARCHIVE_H
#define __IARCHIVE_H

#include "../IProgress.h"
#include "../IStream.h"
#include "../PropID.h"

#define ARCHIVE_INTERFACE_SUB(i, base, x) DECL_INTERFACE_SUB(i, base, 6, x)
#define ARCHIVE_INTERFACE(i, x) ARCHIVE_INTERFACE_SUB(i, IUnknown, x)

namespace NFileTimeType
{
 enum EEnum
 {
   kWindows,
   kUnix,
   kDOS
 };
}

namespace NArcInfoFlags
{
 const UInt32 kKeepName        = 1 << 0;  // keep name of file in archive name
 const UInt32 kAltStreams      = 1 << 1;  // the handler supports alt streams
 const UInt32 kNtSecure        = 1 << 2;  // the handler supports NT security
 const UInt32 kFindSignature   = 1 << 3;  // the handler can find start of archive
 const UInt32 kMultiSignature  = 1 << 4;  // there are several signatures
 const UInt32 kUseGlobalOffset = 1 << 5;  // the seek position of stream must be set as global offset
 const UInt32 kStartOpen       = 1 << 6;  // call handler for each start position
 const UInt32 kPureStartOpen
   = 1 << 7;  // call handler only for start of file
 const UInt32 kBackwardOpen    = 1 << 8;  // archive can be open backward
 const UInt32 kPreArc          = 1 << 9;  // such archive can be stored before real archive (like SFX stub)
 const UInt32 kSymLinks        = 1 << 10; // the handler supports symbolic links
 const UInt32 kHardLinks       = 1 << 11; // the handler supports hard links
}

namespace NArchive
{
 namespace NHandlerPropID
 {
   enum
   {
     kName = 0,        // VT_BSTR
     kClassID,         // binary GUID in VT_BSTR
     kExtension,       // VT_BSTR
```

```
    kAddExtension,    // VT_BSTR
    kUpdate,          // VT_BOOL
    kKeepName,        // VT_BOOL
    kSignature,       // binary in VT_BSTR
    kMultiSignature,  // binary in VT_BSTR
    kSignatureOffset, // VT_UI4
    kAltStreams,      // VT_BOOL
    kNtSecure,        // VT_BOOL
    kFlags            // VT_UI4
    // kVersion          // VT_UI4 ((VER_MAJOR << 8) | VER_MINOR)
  };
}

 namespace NExtract
{
  namespace NAskMode
  {
    enum
    {
      kExtract = 0,
      kTest,
      kSkip
    };
  }

  namespace NOperationResult
  {
    enum
    {
      kOK = 0,
      kUnsupportedMethod,
      kDataError,
      kCRCError,
      kUnavailable,
      kUnexpectedEnd,
      kDataAfterEnd,
      kIsNotArc,
      kHeadersError,
      kWrongPassword
    };
  }
}

namespace NEventIndexType
{
  enum
  {
    kNoIndex = 0,
```

```
    kInArcIndex,
    kBlockIndex,
    kOutArcIndex
  };
 }

 namespace NUpdate
 {
  namespace NOperationResult
  {
    enum
    {
      kOK = 0
      , // kError
    };
  }
 }
}

#define INTERFACE_IArchiveOpenCallback(x) \
 STDMETHOD(SetTotal)(const UInt64 *files, const UInt64 *bytes) x; \
 STDMETHOD(SetCompleted)(const UInt64 *files, const UInt64 *bytes) x; \

ARCHIVE_INTERFACE(IArchiveOpenCallback, 0x10)
{
 INTERFACE_IArchiveOpenCallback(PURE);
};

/*
IArchiveExtractCallback::

7-Zip
 doesn't call IArchiveExtractCallback functions
 GetStream()
 PrepareOperation()
 SetOperationResult()
from different threads simultaneously.
But 7-Zip can call functions for IProgress or ICompressProgressInfo functions
from another threads simultaneously with calls for IArchiveExtractCallback interface.

IArchiveExtractCallback::GetStream()
 UInt32 index - index of item in Archive
 Int32 askExtractMode  (Extract::NAskMode)
  if (askMode != NExtract::NAskMode::kExtract)
  {
    then the callee can not real stream: (*inStream == NULL)
  }
```

```
 Out:
    (*inStream == NULL) - for directories
    (*inStream == NULL) - if link (hard link or symbolic link) was created
    if (*inStream == NULL && askMode == NExtract::NAskMode::kExtract)
    {
      then the caller must skip extracting of that file.
    }

 returns:
   S_OK     : OK
   S_FALSE  : data error (for decoders)

if (IProgress::SetTotal() was called)
{
 IProgress::SetCompleted(completeValue)
 uses
   packSize   - for some stream formats (xz, gz, bz2, lzma, z, ppmd).
   unpackSize - for another formats.
}
else
{
 IProgress::SetCompleted(completeValue) uses packSize.
}

SetOperationResult()
 7-Zip calls SetOperationResult at the end of extracting,
 so the callee can close the file, set attributes, timestamps and security information.

 Int32 opRes (NExtract::NOperationResult)
*/

#define INTERFACE_IArchiveExtractCallback(x) \
 INTERFACE_IProgress(x) \
 STDMETHOD(GetStream)(UInt32 index, ISequentialOutStream **outStream, Int32 askExtractMode) x; \
 STDMETHOD(PrepareOperation)(Int32 askExtractMode) x; \
 STDMETHOD(SetOperationResult)(Int32 opRes) x; \

ARCHIVE_INTERFACE_SUB(IArchiveExtractCallback, IProgress, 0x20)
{
 INTERFACE_IArchiveExtractCallback(PURE)
};



/*
IArchiveExtractCallbackMessage can be requested from IArchiveExtractCallback object
 by Extract() or UpdateItems() functions to report about extracting errors
ReportExtractResult()
```

```
 UInt32
 indexType (NEventIndexType)
 UInt32 index
 Int32 opRes (NExtract::NOperationResult)
*/

#define INTERFACE_IArchiveExtractCallbackMessage(x) \
 STDMETHOD(ReportExtractResult)(UInt32 indexType, UInt32 index, Int32 opRes) x; \

ARCHIVE_INTERFACE_SUB(IArchiveExtractCallbackMessage, IProgress, 0x21)
{
 INTERFACE_IArchiveExtractCallbackMessage(PURE)
};


#define INTERFACE_IArchiveOpenVolumeCallback(x) \
 STDMETHOD(GetProperty)(PROPID propID, PROPVARIANT *value) x; \
 STDMETHOD(GetStream)(const wchar_t *name, IInStream **inStream) x; \

ARCHIVE_INTERFACE(IArchiveOpenVolumeCallback, 0x30)
{
 INTERFACE_IArchiveOpenVolumeCallback(PURE);
};


ARCHIVE_INTERFACE(IInArchiveGetStream, 0x40)
{
 STDMETHOD(GetStream)(UInt32 index, ISequentialInStream **stream) PURE;
};


ARCHIVE_INTERFACE(IArchiveOpenSetSubArchiveName, 0x50)
{
 STDMETHOD(SetSubArchiveName)(const wchar_t *name) PURE;
};


/*
IInArchive::Open
   stream
     if (kUseGlobalOffset), stream current position can be non 0.
     if
 (!kUseGlobalOffset), stream current position is 0.
   if (maxCheckStartPosition == NULL), the handler can try to search archive start in stream
   if (*maxCheckStartPosition == 0), the handler must check only current position as archive start

IInArchive::Extract:
 indices must be sorted
```

```
 numItems = (UInt32)(Int32)-1 = 0xFFFFFFFF means "all files"
 testMode != 0 means "test files without writing to outStream"

IInArchive::GetArchiveProperty:
 kpidOffset  - start offset of archive.
     VT_EMPTY : means offset = 0.
     VT_UI4, VT_UI8, VT_I8 : result offset; negative values is allowed
 kpidPhySize - size of archive. VT_EMPTY means unknown size.
   kpidPhySize is allowed to be larger than file size. In that case it must show
   supposed size.

 kpidIsDeleted:
 kpidIsAltStream:
 kpidIsAux:
 kpidINode:
   must return VARIANT_TRUE (VT_BOOL), if archive can support that property in GetProperty.


Notes:
 Don't call IInArchive functions for same IInArchive object from different
 threads simultaneously.
 Some IInArchive handlers will work incorrectly in that case.
*/

#ifdef _MSC_VER
 #define MY_NO_THROW_DECL_ONLY throw()
#else
 #define MY_NO_THROW_DECL_ONLY
#endif

#define INTERFACE_IInArchive(x) \
 STDMETHOD(Open)(IInStream *stream, const UInt64 *maxCheckStartPosition, IArchiveOpenCallback
*openCallback) MY_NO_THROW_DECL_ONLY x; \
 STDMETHOD(Close)() MY_NO_THROW_DECL_ONLY x; \
 STDMETHOD(GetNumberOfItems)(UInt32 *numItems) MY_NO_THROW_DECL_ONLY x; \
 STDMETHOD(GetProperty)(UInt32 index, PROPID propID, PROPVARIANT *value)
MY_NO_THROW_DECL_ONLY x; \
 STDMETHOD(Extract)(const UInt32* indices, UInt32 numItems, Int32 testMode, IArchiveExtractCallback
*extractCallback) MY_NO_THROW_DECL_ONLY x; \
 STDMETHOD(GetArchiveProperty)(PROPID propID, PROPVARIANT *value)
MY_NO_THROW_DECL_ONLY x; \
 STDMETHOD(GetNumberOfProperties)(UInt32 *numProps) MY_NO_THROW_DECL_ONLY x; \
 STDMETHOD(GetPropertyInfo)(UInt32 index, BSTR *name, PROPID *propID, VARTYPE *varType)
 MY_NO_THROW_DECL_ONLY x; \
 STDMETHOD(GetNumberOfArchiveProperties)(UInt32 *numProps) MY_NO_THROW_DECL_ONLY x; \
 STDMETHOD(GetArchivePropertyInfo)(UInt32 index, BSTR *name, PROPID *propID, VARTYPE *varType)
MY_NO_THROW_DECL_ONLY x; \
```

```
ARCHIVE_INTERFACE(IInArchive, 0x60)
{
 INTERFACE_IInArchive(PURE)
};

namespace NParentType
{
 enum
 {
   kDir = 0,
   kAltStream
 };
};

namespace NPropDataType
{
 const UInt32 kMask_ZeroEnd   = 1 << 4;
 // const UInt32 kMask_BigEndian = 1 << 5;
 const UInt32 kMask_Utf       = 1 << 6;
 const UInt32 kMask_Utf8  = kMask_Utf | 0;
 const UInt32 kMask_Utf16 = kMask_Utf | 1;
 // const UInt32 kMask_Utf32 = kMask_Utf | 2;

 const UInt32 kNotDefined = 0;
 const UInt32 kRaw = 1;

 const UInt32 kUtf8z  = kMask_Utf8  | kMask_ZeroEnd;
 const UInt32 kUtf16z = kMask_Utf16 | kMask_ZeroEnd;
};

// UTF string (pointer to wchar_t) with zero end and little-endian.
#define PROP_DATA_TYPE_wchar_t_PTR_Z_LE ((NPropDataType::kMask_Utf |
NPropDataType::kMask_ZeroEnd)
 + (sizeof(wchar_t) >> 1))

/*
GetRawProp:
 Result:
   S_OK - even if property is not set
*/

#define INTERFACE_IArchiveGetRawProps(x) \
 STDMETHOD(GetParent)(UInt32 index, UInt32 *parent, UInt32 *parentType) x; \
 STDMETHOD(GetRawProp)(UInt32 index, PROPID propID, const void **data, UInt32 *dataSize, UInt32
*propType) x; \
 STDMETHOD(GetNumRawProps)(UInt32 *numProps) x; \
 STDMETHOD(GetRawPropInfo)(UInt32 index, BSTR *name, PROPID *propID) x;
```

```
ARCHIVE_INTERFACE(IArchiveGetRawProps, 0x70)
{
 INTERFACE_IArchiveGetRawProps(PURE)
};

#define INTERFACE_IArchiveGetRootProps(x) \
 STDMETHOD(GetRootProp)(PROPID propID, PROPVARIANT *value) x; \
 STDMETHOD(GetRootRawProp)(PROPID propID, const void **data, UInt32 *dataSize, UInt32 *propType) x; \

ARCHIVE_INTERFACE(IArchiveGetRootProps, 0x71)
{
 INTERFACE_IArchiveGetRootProps(PURE)
};

ARCHIVE_INTERFACE(IArchiveOpenSeq, 0x61)
{
 STDMETHOD(OpenSeq)(ISequentialInStream *stream) PURE;
};

/*
 OpenForSize
 Result:
   S_FALSE -
 is not archive
   ? - DATA error
*/

/*
const UInt32 kOpenFlags_RealPhySize = 1 << 0;
const UInt32 kOpenFlags_NoSeek = 1 << 1;
// const UInt32 kOpenFlags_BeforeExtract = 1 << 2;
*/

/*
Flags:
  0 - opens archive with IInStream, if IInStream interface is supported
    - if phySize is not available, it doesn't try to make full parse to get phySize
  kOpenFlags_NoSeek -  ArcOpen2 function doesn't use IInStream interface, even if it's available
  kOpenFlags_RealPhySize - the handler will try to get PhySize, even if it requires full decompression for file

 if handler is not allowed to use IInStream and the flag kOpenFlags_RealPhySize is not specified,
 the handler can return S_OK, but it doesn't check even Signature.
 So next Extract can be called for that sequential stream.
*/

/*
ARCHIVE_INTERFACE(IArchiveOpen2, 0x62)
{
```

```
 STDMETHOD(ArcOpen2)(ISequentialInStream *stream, UInt32 flags, IArchiveOpenCallback *openCallback)
PURE;
};
*/

// ---------- UPDATE ----------

/*
GetUpdateItemInfo
 outs:
*newData  *newProps
  0       0     - Copy data and properties from archive
  0       1     - Copy data from archive, request new properties
  1       0     - that combination is unused now
  1       1     - Request new data and new properties. It can be used even for folders

 indexInArchive = -1 if there is no item in archive, or if it doesn't matter.


GetStream out:
 Result:
   S_OK:
     (*inStream == NULL) - only for directories
                         - the bug was fixed in 9.33: (*Stream == NULL) was in case of anti-file
     (*inStream != NULL) - for any file, even for empty file or anti-file
   S_FALSE - skip that file (don't add item to archive) - (client code can't open stream of that file by some reason)
     (*inStream == NULL)

The order of calling for hard links:
 - GetStream()
 - GetProperty(kpidHardLink)

SetOperationResult()
 Int32 opRes (NExtract::NOperationResult::kOK)
*/

#define INTERFACE_IArchiveUpdateCallback(x) \
 INTERFACE_IProgress(x);
 \
 STDMETHOD(GetUpdateItemInfo)(UInt32 index, Int32 *newData, Int32 *newProps, UInt32 *indexInArchive) x;
\
 STDMETHOD(GetProperty)(UInt32 index, PROPID propID, PROPVARIANT *value) x; \
 STDMETHOD(GetStream)(UInt32 index, ISequentialInStream **inStream) x; \
 STDMETHOD(SetOperationResult)(Int32 operationResult) x; \

ARCHIVE_INTERFACE_SUB(IArchiveUpdateCallback, IProgress, 0x80)
{
 INTERFACE_IArchiveUpdateCallback(PURE);
```

```
};

#define INTERFACE_IArchiveUpdateCallback2(x) \
 INTERFACE_IArchiveUpdateCallback(x) \
 STDMETHOD(GetVolumeSize)(UInt32 index, UInt64 *size) x; \
 STDMETHOD(GetVolumeStream)(UInt32 index, ISequentialOutStream **volumeStream) x; \

ARCHIVE_INTERFACE_SUB(IArchiveUpdateCallback2, IArchiveUpdateCallback, 0x82)
{
 INTERFACE_IArchiveUpdateCallback2(PURE);
};

namespace NUpdateNotifyOp
{
 enum
 {
   kAdd = 0,
   kUpdate,
   kAnalyze,
   kReplicate,
   kRepack,
   kSkip,
   kDelete,
   kHeader

   // kNumDefined
 };
};

/*
IArchiveUpdateCallbackFile::ReportOperation
  UInt32 indexType (NEventIndexType)
 UInt32 index
 UInt32 notifyOp (NUpdateNotifyOp)
*/

#define INTERFACE_IArchiveUpdateCallbackFile(x) \
 STDMETHOD(GetStream2)(UInt32 index, ISequentialInStream **inStream, UInt32 notifyOp) x; \
 STDMETHOD(ReportOperation)(UInt32 indexType, UInt32 index, UInt32 notifyOp) x; \

ARCHIVE_INTERFACE(IArchiveUpdateCallbackFile, 0x83)
{
 INTERFACE_IArchiveUpdateCallbackFile(PURE);
};


/*
UpdateItems()
```

```
-------------

 outStream: output stream. (the handler) MUST support the case when
   Seek position in outStream is not ZERO.
   but the caller calls with empty outStream and seek position is ZERO??

 archives with stub:

 If archive is open and the handler and (Offset > 0), then the handler
 knows about stub size.
 UpdateItems():
 1) the handler MUST copy that stub to outStream
 2) the caller MUST NOT copy the stub to outStream, if
    "rsfx" property is set with SetProperties

 the handler must support the
 case where
   ISequentialOutStream *outStream
*/


#define INTERFACE_IOutArchive(x) \
 STDMETHOD(UpdateItems)(ISequentialOutStream *outStream, UInt32 numItems, IArchiveUpdateCallback
*updateCallback) x; \
 STDMETHOD(GetFileTimeType)(UInt32 *type) x;

ARCHIVE_INTERFACE(IOutArchive, 0xA0)
{
 INTERFACE_IOutArchive(PURE)
};


/*
ISetProperties::SetProperties()
 PROPVARIANT values[i].vt:
   VT_EMPTY
   VT_BOOL
   VT_UI4   - if 32-bit number
   VT_UI8   - if 64-bit number
   VT_BSTR
*/

ARCHIVE_INTERFACE(ISetProperties, 0x03)
{
 STDMETHOD(SetProperties)(const wchar_t * const *names, const PROPVARIANT *values, UInt32 numProps)
PURE;
};
```

```
ARCHIVE_INTERFACE(IArchiveKeepModeForNextOpen, 0x04)
{
 STDMETHOD(KeepModeForNextOpen)() PURE;
};

/* Exe handler: the handler for executable format (PE, ELF, Mach-O).
  SFX archive: executable stub + some tail data.
    before 9.31: exe handler didn't parse SFX archives as executable format.
    for 9.31+: exe handler parses SFX archives as executable
 format, only if AllowTail(1) was called */

ARCHIVE_INTERFACE(IArchiveAllowTail, 0x05)
{
 STDMETHOD(AllowTail)(Int32 allowTail) PURE;
};


#define IMP_IInArchive_GetProp(k) \
 (UInt32 index, BSTR *name, PROPID *propID, VARTYPE *varType) \
   { if (index >= ARRAY_SIZE(k)) return E_INVALIDARG; \
   *propID = k[index]; *varType = k7z_PROPID_To_VARTYPE[(unsigned)*propID];  *name = 0; return S_OK; } \


struct CStatProp
{
 const char *Name;
 UInt32 PropID;
 VARTYPE vt;
};

namespace NWindows {
namespace NCOM {
// PropVariant.cpp
BSTR AllocBstrFromAscii(const char *s) throw();
}}

#define IMP_IInArchive_GetProp_WITH_NAME(k) \
 (UInt32 index, BSTR *name, PROPID *propID, VARTYPE *varType) \
   { if (index >= ARRAY_SIZE(k)) return E_INVALIDARG; \
   const CStatProp &prop = k[index]; \
   *propID = (PROPID)prop.PropID; *varType = prop.vt; \
   *name = NWindows::NCOM::AllocBstrFromAscii(prop.Name); return S_OK; } \

#define IMP_IInArchive_Props \
 STDMETHODIMP CHandler::GetNumberOfProperties(UInt32
 *numProps) \
   { *numProps = ARRAY_SIZE(kProps); return S_OK; } \
 STDMETHODIMP CHandler::GetPropertyInfo IMP_IInArchive_GetProp(kProps)
```

```
#define IMP_IInArchive_Props_WITH_NAME \
 STDMETHODIMP CHandler::GetNumberOfProperties(UInt32 *numProps) \
   { *numProps = ARRAY_SIZE(kProps); return S_OK; } \
 STDMETHODIMP CHandler::GetPropertyInfo IMP_IInArchive_GetProp_WITH_NAME(kProps)


#define IMP_IInArchive_ArcProps \
 STDMETHODIMP CHandler::GetNumberOfArchiveProperties(UInt32 *numProps) \
   { *numProps = ARRAY_SIZE(kArcProps); return S_OK; } \
 STDMETHODIMP CHandler::GetArchivePropertyInfo IMP_IInArchive_GetProp(kArcProps)

#define IMP_IInArchive_ArcProps_WITH_NAME \
 STDMETHODIMP CHandler::GetNumberOfArchiveProperties(UInt32 *numProps) \
   { *numProps = ARRAY_SIZE(kArcProps); return S_OK; } \
 STDMETHODIMP CHandler::GetArchivePropertyInfo IMP_IInArchive_GetProp_WITH_NAME(kArcProps)

#define IMP_IInArchive_ArcProps_NO_Table \
 STDMETHODIMP CHandler::GetNumberOfArchiveProperties(UInt32
 *numProps) \
   { *numProps = 0; return S_OK; } \
 STDMETHODIMP CHandler::GetArchivePropertyInfo(UInt32, BSTR *, PROPID *, VARTYPE *) \
   { return E_NOTIMPL; } \

#define IMP_IInArchive_ArcProps_NO \
 IMP_IInArchive_ArcProps_NO_Table \
 STDMETHODIMP CHandler::GetArchiveProperty(PROPID, PROPVARIANT *value) \
   { value->vt = VT_EMPTY; return S_OK; }



#define k_IsArc_Res_NO   0
#define k_IsArc_Res_YES  1
#define k_IsArc_Res_NEED_MORE 2
// #define k_IsArc_Res_YES_LOW_PROB 3

#define API_FUNC_IsArc EXTERN_C UInt32 WINAPI
#define API_FUNC_static_IsArc extern "C" { static UInt32 WINAPI

extern "C"
{
 typedef HRESULT (WINAPI *Func_CreateObject)(const GUID *clsID, const GUID *iid, void **outObject);

 typedef UInt32 (WINAPI *Func_IsArc)(const Byte *p, size_t size);
 typedef HRESULT (WINAPI *Func_GetIsArc)(UInt32 formatIndex, Func_IsArc *isArc);

 typedef HRESULT (WINAPI *Func_GetNumberOfFormats)(UInt32 *numFormats);
 typedef HRESULT (WINAPI *Func_GetHandlerProperty)(PROPID
```

```
 propID, PROPVARIANT *value);
 typedef HRESULT (WINAPI *Func_GetHandlerProperty2)(UInt32 index, PROPID propID, PROPVARIANT
*value);

 typedef HRESULT (WINAPI *Func_SetCaseSensitive)(Int32 caseSensitive);
 typedef HRESULT (WINAPI *Func_SetLargePageMode)();

 typedef IOutArchive * (*Func_CreateOutArchive)();
 typedef IInArchive * (*Func_CreateInArchive)();
}

#endif
```

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```
# -*- Mode: python; indent-tabs-mode: nil; tab-width: 40 -*-
# vim: set filetype=python:
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# License, v. 2.0. If a copy of the MPL was not distributed with this
# file, You can obtain one at http://mozilla.org/MPL/2.0/.

with Files("**"):
   BUG_COMPONENT = ("Core", "DOM: Core & HTML")

EXPORTS.mozilla.dom += [
   'Permissions.h',
   'PermissionStatus.h',
]

UNIFIED_SOURCES += [
   'PermissionObserver.cpp',
   'Permissions.cpp',
   'PermissionStatus.cpp',
   'PermissionUtils.cpp',
]

MOCHITEST_MANIFESTS += ['tests/mochitest.ini']

FINAL_LIBRARY = 'xul'

include('/ipc/chromium/chromium-config.mozbuild')
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With class Attribute in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
```

```
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-017-ref.xht" />
  <meta name="assert" content="The license element contains a text element with &quot;class1 class2 class3&quot;
as the value for the class attribute." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-017.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text class="class1 class2 class3"&gt;
   License without language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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At the time this file was first modified, a complete, unmodified copy of
the LPPL Work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

Portions of this file were originally made available under the following license
(copied verbatim from hyph-uk.lic.txt in the original work):

Ukrainian hyphenation patterns

(more info about the licence to be added later)

% This file is part of hyph-utf8 package and resulted
from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.

```
%
% Source: TODO:WRITEME (yyyy-mm-dd)
% Author: Maksym Polyakov <polyama at auburn.edu>, <mpoliak at i.com.ua>
%
% The above mentioned file should become obsolete,
% and the author of the original file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%             and helped with testing, suggestions and bug reports
% - Norbert Preining,
 who tested & integrated patterns into TeX Live
%
% However, the "copyright/copyleft" owner of patterns remains the original author.
%
% The copyright statement of this file is thus:
%
%    Do with this file whatever needs to be done in future for the sake of
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%    If you're the original author of patterns or taking over a new revolution,
%    plese remove all of the TUG comments & credits that we added here -
%    you are the Queen / the King, we are only the servants.
%
% If you want to change this file, rather than uploading directly to CTAN,
% we would be grateful if you could send it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
% Before a new "pattern-revolution" starts,
% please try to follow some guidelines if possible:
%
% - \lccode is *forbidden*, and I really mean it
% - all the patterns
 should be in UTF-8
% - the only "allowed" TeX commands in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
```

% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
%
% For more unformation see
%
%  http://tug.org/tex-hyphen
%
%----------
%
% Ukrainian hyphenation patterns in LCY (cp866nav) encoding.
% Copyright 1998-2001 Maksym Polyakov.
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% Please, send bug reports via e-mail:
%  polyama@auburn.edu
%
  mpoliak@i.com.ua
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<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With Nested span Elements in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />

```
 <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
 <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
 <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
 <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
 <meta name="assert" content="The license element contains a text element that contains nested span elements." />
 <style type="text/css"><![CDATA[
  @import url("support/test-fonts.css");
  body {
   font-size: 20px;
  }
  pre
 {
   font-size: 12px;
  }
  .test {
   font-family: "WOFF Test CFF Reference";
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
</head>
<body>
 <p>Test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
 <div class="test">P</div>
 <p>The XML contained in the Extended Metadata Block is below.</p>
 <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   &lt;span&gt;
    span 1 start
    &lt;span&gt;
     span 2 start
     &lt;span&gt;
      span 3
     &lt;/span&gt;
     span 2 end
    &lt;/span&gt;
    span 1 end
   &lt;/span&gt;
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
 </pre>
</body>
</html>
```

UNRECOGNIZED LICENSE; MD5 sum: c21fb78d6f5b19f1aa0413ea2527e1fb
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*/
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With Nested span Elements in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element that contains nested span elements."
/>
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre
 {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
```

<?xml version="1.0" encoding="UTF-8"?>
<metadata version="1.0">
 <copyright>
  <text>
    <span>
     span 1 start
     <span>
      span 2 start
      <span>
       span 3
      </span>
      span 2 end
     </span>
     span 1 end
    </span>
  </text>
 </copyright>
</metadata>
  </pre>
 </body>
</html>
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```
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<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With dir Attribute in text Element 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-011-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element with ltr as the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-011.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text dir="ltr"&gt;
   Copyright without language.
  &lt;/text&gt;
```

```
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
// Windows/DLL.h

#ifndef __WINDOWS_DLL_H
#define __WINDOWS_DLL_H

#include "../Common/MyString.h"

namespace NWindows {
namespace NDLL {

#ifdef UNDER_CE
#define My_GetProcAddress(module, procName) ::GetProcAddressA(module, procName)
#else
#define My_GetProcAddress(module, procName) ::GetProcAddress(module, procName)
#endif

/* Win32: Don't call CLibrary::Free() and FreeLibrary() from another
   FreeLibrary() code: detaching code in DLL entry-point or in
   destructors of global objects in DLL module. */

class CLibrary
{
 HMODULE _module;

 // CLASS_NO_COPY(CLibrary);
public:
 CLibrary(): _module(NULL) {};
 ~CLibrary() { Free(); }

 operator HMODULE() const { return _module; }
 HMODULE* operator&() { return &_module; }
 bool IsLoaded() const { return (_module != NULL); }

 void Attach(HMODULE m)
 {
   Free();
   _module = m;
 }
 HMODULE Detach()
 {
   HMODULE m = _module;
   _module = NULL;
   return m;
```

```
 }

 bool Free() throw();
 bool LoadEx(CFSTR path, DWORD flags
 = LOAD_LIBRARY_AS_DATAFILE) throw();
 bool Load(CFSTR path) throw();
 FARPROC GetProc(LPCSTR procName) const { return My_GetProcAddress(_module, procName); }
};

bool MyGetModuleFileName(FString &path);

FString GetModuleDirPrefix();

}}

#endif
// DirItem.h

#ifndef __DIR_ITEM_H
#define __DIR_ITEM_H

#include "../../../Common/MyString.h"

#include "../../../Windows/FileFind.h"

#include "../../Common/UniqBlocks.h"

#include "../../Archive/IArchive.h"

struct CDirItemsStat
{
 UInt64 NumDirs;
 UInt64 NumFiles;
 UInt64 NumAltStreams;
 UInt64 FilesSize;
 UInt64 AltStreamsSize;

 UInt64 NumErrors;

 // UInt64 Get_NumItems() const { return NumDirs + NumFiles + NumAltStreams; }
 UInt64 Get_NumDataItems() const { return NumFiles + NumAltStreams; }
 UInt64 GetTotalBytes() const { return FilesSize + AltStreamsSize; }

 bool IsEmpty() const { return
        0 == NumDirs
      && 0 == NumFiles
      && 0 == NumAltStreams
      && 0 == FilesSize
```

```
      && 0 == AltStreamsSize
      && 0 == NumErrors; }

 CDirItemsStat():
    NumDirs(0),
    NumFiles(0),
    NumAltStreams(0),
    FilesSize(0),
    AltStreamsSize(0),
    NumErrors(0)
  {}
};


struct CDirItemsStat2: public CDirItemsStat
{
 UInt64 Anti_NumDirs;
  UInt64 Anti_NumFiles;
 UInt64 Anti_NumAltStreams;

 // UInt64 Get_NumItems() const { return Anti_NumDirs + Anti_NumFiles + Anti_NumAltStreams +
CDirItemsStat::Get_NumItems(); }
 UInt64 Get_NumDataItems2() const { return Anti_NumFiles + Anti_NumAltStreams +
CDirItemsStat::Get_NumDataItems(); }

 bool IsEmpty() const { return CDirItemsStat::IsEmpty()
      && 0 == Anti_NumDirs
      && 0 == Anti_NumFiles
      && 0 == Anti_NumAltStreams; }

 CDirItemsStat2():
    Anti_NumDirs(0),
    Anti_NumFiles(0),
    Anti_NumAltStreams(0)
  {}
};



#define INTERFACE_IDirItemsCallback(x) \
 virtual HRESULT ScanError(const FString &path, DWORD systemError) x; \
 virtual HRESULT ScanProgress(const CDirItemsStat &st, const FString &path, bool isDir) x; \

struct IDirItemsCallback
{
 INTERFACE_IDirItemsCallback(=0)
};
```

```
struct CDirItem
{
 UInt64 Size;
 FILETIME CTime;
 FILETIME ATime;
 FILETIME MTime;
 UString Name;

 #if defined(_WIN32) && !defined(UNDER_CE)
  // UString ShortName;
 CByteBuffer ReparseData;
 CByteBuffer ReparseData2; // fixed (reduced) absolute links

 bool AreReparseData() const { return ReparseData.Size() != 0 || ReparseData2.Size() != 0; }
 #endif

 UInt32 Attrib;
 int PhyParent;
 int LogParent;
 int SecureIndex;

 bool IsAltStream;

 CDirItem(): PhyParent(-1), LogParent(-1), SecureIndex(-1), IsAltStream(false) {}
 bool IsDir() const { return (Attrib & FILE_ATTRIBUTE_DIRECTORY) != 0 ; }
};

class CDirItems
{
 UStringVector Prefixes;
 CIntVector PhyParents;
 CIntVector LogParents;

 UString GetPrefixesPath(const CIntVector &parents, int index, const UString &name) const;

 HRESULT EnumerateDir(int phyParent, int logParent, const FString &phyPrefix);

public:
 CObjectVector<CDirItem> Items;

 bool SymLinks;

 bool ScanAltStreams;

 CDirItemsStat Stat;

 #ifndef UNDER_CE
 HRESULT SetLinkInfo(CDirItem &dirItem, const NWindows::NFile::NFind::CFileInfo &fi,
```

```
    const FString &phyPrefix);
#endif


 #if defined(_WIN32) && !defined(UNDER_CE)

CUniqBlocks SecureBlocks;
CByteBuffer TempSecureBuf;
bool _saclEnabled;
bool ReadSecure;

HRESULT AddSecurityItem(const FString &path, int &secureIndex);

#endif

IDirItemsCallback *Callback;

CDirItems();

void AddDirFileInfo(int phyParent, int logParent, int secureIndex,
    const NWindows::NFile::NFind::CFileInfo &fi);

HRESULT AddError(const FString &path, DWORD errorCode);
HRESULT AddError(const FString &path);

HRESULT ScanProgress(const FString &path);

// unsigned GetNumFolders() const { return Prefixes.Size(); }
FString GetPhyPath(unsigned index) const;
UString GetLogPath(unsigned index) const;

unsigned AddPrefix(int phyParent, int logParent, const UString &prefix);
void DeleteLastPrefix();

HRESULT EnumerateItems2(
  const FString &phyPrefix,
  const UString &logPrefix,
  const FStringVector &filePaths,
  FStringVector *requestedPaths);

#if defined(_WIN32) && !defined(UNDER_CE)
 void FillFixedReparse();
#endif

void ReserveDown();
};

struct CArcItem
```

```
{
 UInt64 Size;
 FILETIME MTime;
 UString Name;
 bool IsDir;
 bool IsAltStream;
 bool SizeDefined;
 bool MTimeDefined;
 bool Censored;
 UInt32 IndexInServer;
 int TimeType;

 CArcItem(): IsDir(false), IsAltStream(false), SizeDefined(false), MTimeDefined(false), Censored(false),
TimeType(-1) {}
};

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With dir Attribute in text Element 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-014-ref.xht" />
  <meta name="assert" content="The license element contains a text element with ltr as the value for the dir
attribute." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-014.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
```

```
   margin-top: 50px;
  }
 ]]></style>
</head>
<body>
 <p>Test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
 <div class="test">P</div>
 <p>The XML contained in the Extended Metadata Block is below.</p>
 <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text dir="ltr"&gt;
   License without language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
 </pre>
</body>
</html>
/* ATK -  Accessibility Toolkit
* Copyright 2001 Sun Microsystems Inc.
*
* This library is free software; you can redistribute it and/or
* modify it under the terms of the GNU Library General Public
* License as published by the Free Software Foundation; either
* version 2 of the License, or (at your option) any later version.
*
* This library is distributed in the hope that it will be useful,
* but WITHOUT ANY WARRANTY; without even the implied warranty of
* MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the GNU
* Library General Public License for more details.
*
* You should have received a copy of the GNU Library General Public
* License along with this library; if not, write to the
* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_TABLE_H__
#define __ATK_TABLE_H__

#include <atk/atkobject.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */
```

```
/*
* AtkTable describes a user-interface component
 that presents data in
* two-dimensional table format.
*/


#define ATK_TYPE_TABLE                  (atk_table_get_type ())
#define ATK_IS_TABLE(obj)               G_TYPE_CHECK_INSTANCE_TYPE ((obj), ATK_TYPE_TABLE)
#define ATK_TABLE(obj)                  G_TYPE_CHECK_INSTANCE_CAST ((obj), ATK_TYPE_TABLE,
AtkTable)
#define ATK_TABLE_GET_IFACE(obj)        (G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_TABLE, AtkTableIface))

#ifndef _TYPEDEF_ATK_TABLE_
#define _TYPEDEF_ATK_TABLE_
typedef struct _AtkTable AtkTable;
#endif
typedef struct _AtkTableIface AtkTableIface;

struct _AtkTableIface
{
 GTypeInterface parent;

 AtkObject*      (* ref_at)                (AtkTable     *table,
                                  gint        row,
                                  gint        column);
 gint            (* get_index_at)          (AtkTable     *table,
                                  gint        row,

                                gint        column);
 gint            (* get_column_at_index)   (AtkTable     *table,
                                  gint        index_);
 gint            (* get_row_at_index)      (AtkTable     *table,
                                  gint        index_);
 gint            (* get_n_columns)         (AtkTable     *table);
 gint            (* get_n_rows)            (AtkTable     *table);
 gint            (* get_column_extent_at)  (AtkTable     *table,
                                  gint        row,
                                  gint        column);
 gint            (* get_row_extent_at)     (AtkTable     *table,
                                  gint        row,
                                  gint        column);
 AtkObject*
                (* get_caption)           (AtkTable
     *table);
 G_CONST_RETURN gchar*
```

```
                (* get_column_description)   (AtkTable      *table,
                                    gint         column);
AtkObject*        (* get_column_header)       (AtkTable      *table,
      gint  column);
G_CONST_RETURN gchar*
                (* get_row_description)      (AtkTable      *table,
                                    gint         row);
AtkObject*        (* get_row_header)          (AtkTable      *table,
      gint  row);
AtkObject*        (* get_summary)             (AtkTable      *table);
void              (* set_caption)             (AtkTable      *table,
                                    AtkObject     *caption);
void              (* set_column_description)   (AtkTable      *table,
                                    gint         column,
                                    const gchar   *description);
void
(* set_column_header)       (AtkTable      *table,
                                    gint         column,
                                    AtkObject     *header);
void              (* set_row_description)      (AtkTable      *table,
                                    gint         row,
                                    const gchar   *description);
void              (* set_row_header)          (AtkTable      *table,
                                    gint         row,
                                    AtkObject     *header);
void              (* set_summary)             (AtkTable      *table,
                                    AtkObject     *accessible);
gint              (* get_selected_columns)    (AtkTable      *table,
                                    gint         **selected);
gint              (* get_selected_rows)       (AtkTable      *table,
                                     gint         **selected);
gboolean          (* is_column_selected)      (AtkTable      *table,
                                    gint         column);
gboolean          (* is_row_selected)         (AtkTable      *table,
                                    gint         row);
gboolean          (* is_selected)             (AtkTable      *table,
                                    gint         row,
                                    gint         column);
gboolean          (* add_row_selection)       (AtkTable      *table,
                                    gint         row);
gboolean          (* remove_row_selection)    (AtkTable      *table,
                                    gint         row);
gboolean          (* add_column_selection)    (AtkTable      *table,
                                    gint
  column);
gboolean          (* remove_column_selection)  (AtkTable      *table,
                                    gint         column);
```

```
/*
 * signal handlers
 */
void            (* row_inserted)            (AtkTable      *table,
                                             gint          row,
                                             gint          num_inserted);
void            (* column_inserted)         (AtkTable      *table,
                                             gint          column,
                                             gint          num_inserted);
void            (* row_deleted)             (AtkTable      *table,
                                             gint          row,
                                             gint          num_deleted);
void            (* column_deleted)          (AtkTable      *table,
                                             gint          column,

                                             gint          num_deleted);
void            (* row_reordered)           (AtkTable      *table);
void            (* column_reordered)        (AtkTable      *table);
void            (* model_changed)           (AtkTable      *table);

AtkFunction     pad1;
AtkFunction     pad2;
AtkFunction     pad3;
AtkFunction     pad4;
};

GType atk_table_get_type (void);

AtkObject*      atk_table_ref_at            (AtkTable      *table,
                                             gint          row,
                                             gint          column);
gint            atk_table_get_index_at      (AtkTable      *table,
                                             gint          row,
                                             gint          column);
gint            atk_table_get_column_at_index  (AtkTable      *table,

    gint        index_);
gint            atk_table_get_row_at_index     (AtkTable      *table,
                                             gint          index_);
gint            atk_table_get_n_columns     (AtkTable      *table);
gint            atk_table_get_n_rows        (AtkTable      *table);
gint            atk_table_get_column_extent_at (AtkTable      *table,
                                             gint          row,
                                             gint          column);
gint            atk_table_get_row_extent_at    (AtkTable      *table,
                                             gint          row,
                                             gint          column);
AtkObject*
```

```
            atk_table_get_caption         (AtkTable        *table);
G_CONST_RETURN gchar*
            atk_table_get_column_description (AtkTable        *table,

             gint            column);
AtkObject*       atk_table_get_column_header    (AtkTable        *table,
      gint     column);
G_CONST_RETURN gchar*
            atk_table_get_row_description  (AtkTable        *table,
                                    gint            row);
AtkObject*       atk_table_get_row_header       (AtkTable        *table,
      gint     row);
AtkObject*       atk_table_get_summary          (AtkTable        *table);
void            atk_table_set_caption          (AtkTable        *table,
                                    AtkObject       *caption);
void            atk_table_set_column_description
                                   (AtkTable        *table,
                                    gint            column,
                                    const gchar     *description);
void            atk_table_set_column_header    (AtkTable        *table,
                                     gint            column,
                                    AtkObject       *header);
void            atk_table_set_row_description  (AtkTable        *table,
                                    gint            row,
                                    const gchar     *description);
void            atk_table_set_row_header       (AtkTable        *table,
                                    gint            row,
                                    AtkObject       *header);
void            atk_table_set_summary          (AtkTable        *table,
                                    AtkObject       *accessible);
gint            atk_table_get_selected_columns (AtkTable        *table,
                                    gint            **selected);
gint            atk_table_get_selected_rows    (AtkTable        *table,

                                 gint            **selected);
gboolean        atk_table_is_column_selected   (AtkTable        *table,
                                    gint            column);
gboolean        atk_table_is_row_selected      (AtkTable        *table,
                                    gint            row);
gboolean        atk_table_is_selected          (AtkTable        *table,
                                    gint            row,
                                    gint            column);
gboolean        atk_table_add_row_selection    (AtkTable        *table,
                                    gint            row);
gboolean        atk_table_remove_row_selection (AtkTable        *table,
                                    gint            row);
gboolean        atk_table_add_column_selection (AtkTable        *table,
```

```
            gint            column);
gboolean        atk_table_remove_column_selection
                                    (AtkTable        *table,
                                     gint            column);

#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_TABLE_H__ */
// InBuffer.h

#ifndef __IN_BUFFER_H
#define __IN_BUFFER_H

#include "../../Common/MyException.h"
#include "../IStream.h"

#ifndef _NO_EXCEPTIONS
struct CInBufferException: public CSystemException
{
 CInBufferException(HRESULT errorCode): CSystemException(errorCode) {}
};
#endif

class CInBufferBase
{
protected:
 Byte *_buf;
 Byte *_bufLim;
 Byte *_bufBase;

 ISequentialInStream *_stream;
 UInt64 _processedSize;
 size_t _bufSize; // actually it's number of Bytes for next read. The buf can be larger
                  // only up to 32-bits values now are supported!
 bool _wasFinished;

 bool ReadBlock();
 bool ReadByte_FromNewBlock(Byte &b);
 Byte ReadByte_FromNewBlock();

public:
 #ifdef _NO_EXCEPTIONS
 HRESULT ErrorCode;
 #endif
 UInt32 NumExtraBytes;
```

```
CInBufferBase() throw();

UInt64 GetStreamSize() const { return _processedSize + (_buf - _bufBase); }
UInt64 GetProcessedSize() const { return _processedSize + NumExtraBytes + (_buf - _bufBase); }
bool WasFinished()
const { return _wasFinished; }

void SetStream(ISequentialInStream *stream) { _stream = stream; }

void SetBuf(Byte *buf, size_t bufSize, size_t end, size_t pos)
{
  _bufBase = buf;
  _bufSize = bufSize;
  _processedSize = 0;
  _buf = buf + pos;
  _bufLim = buf + end;
  _wasFinished = false;
  #ifdef _NO_EXCEPTIONS
  ErrorCode = S_OK;
  #endif
  NumExtraBytes = 0;
}

void Init() throw();

MY_FORCE_INLINE
bool ReadByte(Byte &b)
{
  if (_buf >= _bufLim)
    return ReadByte_FromNewBlock(b);
  b = *_buf++;
  return true;
}

MY_FORCE_INLINE
Byte ReadByte()
{
  if (_buf >= _bufLim)
    return ReadByte_FromNewBlock();
  return *_buf++;
}

size_t ReadBytes(Byte *buf, size_t size);
size_t Skip(size_t size);
};

class CInBuffer: public CInBufferBase
```

```
{
public:
 ~CInBuffer() { Free(); }
 bool Create(size_t bufSize) throw(); // only up to 32-bits values now are supported!
 void Free() throw();
};

#endif
```

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```
// MyCom.h

#ifndef __MY_COM_H
#define __MY_COM_H

#include "MyWindows.h"

#ifndef RINOK
#define RINOK(x) { HRESULT __result_ = (x); if (__result_ != S_OK) return __result_; }
#endif

template <class T>
class CMyComPtr
{
 T* _p;
public:
 CMyComPtr(): _p(NULL) {}
 CMyComPtr(T* p) throw() { if ((_p = p) != NULL) p->AddRef(); }
 CMyComPtr(const CMyComPtr<T>& lp) throw() { if ((_p = lp._p) != NULL) _p->AddRef(); }
 ~CMyComPtr() { if (_p) _p->Release(); }
 void Release() { if (_p) { _p->Release(); _p = NULL; } }
 operator T*() const {  return (T*)_p;  }
 // T& operator*() const {  return *_p; }
 T** operator&() { return &_p; }
 T* operator->() const { return _p; }
 T* operator=(T* p)
 {
  if (p)
    p->AddRef();
  if (_p)
    _p->Release();
  _p = p;
  return p;
 }
 T* operator=(const CMyComPtr<T>& lp) { return (*this = lp._p); }
 bool operator!() const { return (_p == NULL); }
 // bool operator==(T* pT) const {  return _p == pT; }
 void Attach(T* p2)
 {
  Release();
   _p = p2;
 }
 T* Detach()
 {
  T* pt = _p;
  _p = NULL;
  return pt;
 }
```

```
 #ifdef _WIN32
 HRESULT CoCreateInstance(REFCLSID rclsid, REFIID iid, LPUNKNOWN pUnkOuter = NULL, DWORD
dwClsContext = CLSCTX_ALL)
 {
   return ::CoCreateInstance(rclsid, pUnkOuter, dwClsContext, iid, (void**)&_p);
 }
 #endif
 /*
 HRESULT CoCreateInstance(LPCOLESTR szProgID, LPUNKNOWN pUnkOuter = NULL, DWORD
dwClsContext = CLSCTX_ALL)
 {
   CLSID clsid;
   HRESULT hr = CLSIDFromProgID(szProgID, &clsid);
   ATLASSERT(_p == NULL);
   if (SUCCEEDED(hr))
     hr = ::CoCreateInstance(clsid, pUnkOuter, dwClsContext, __uuidof(T), (void**)&_p);
   return hr;
 }
 */
 template <class Q>
 HRESULT QueryInterface(REFGUID iid, Q** pp) const throw()
 {
   return _p->QueryInterface(iid, (void**)pp);
 }
};

//////////////////////////////////////////////////////////////////////

inline HRESULT StringToBstr(LPCOLESTR src, BSTR *bstr)
{
 *bstr = ::SysAllocString(src);
 return (*bstr) ? S_OK : E_OUTOFMEMORY;
}

class
 CMyComBSTR
{
 BSTR m_str;

public:
 CMyComBSTR(): m_str(NULL) {}
 ~CMyComBSTR() { ::SysFreeString(m_str); }
 BSTR* operator&() { return &m_str; }
 operator LPCOLESTR() const { return m_str; }
 // operator bool() const { return m_str != NULL; }
 // bool operator!() const { return m_str == NULL; }
private:
 // operator BSTR() const { return m_str; }
```

```
CMyComBSTR(LPCOLESTR src) { m_str = ::SysAllocString(src); }
// CMyComBSTR(int nSize) { m_str = ::SysAllocStringLen(NULL, nSize); }
// CMyComBSTR(int nSize, LPCOLESTR sz) { m_str = ::SysAllocStringLen(sz, nSize);  }
CMyComBSTR(const CMyComBSTR& src) { m_str = src.MyCopy(); }

/*
CMyComBSTR(REFGUID src)
{
  LPOLESTR szGuid;
  StringFromCLSID(src, &szGuid);
  m_str = ::SysAllocString(szGuid);
  CoTaskMemFree(szGuid);
}
*/

CMyComBSTR& operator=(const CMyComBSTR& src)
{
  if (m_str != src.m_str)
  {
    if (m_str)
      ::SysFreeString(m_str);
    m_str = src.MyCopy();
  }

 return *this;
}

CMyComBSTR& operator=(LPCOLESTR src)
{
  ::SysFreeString(m_str);
  m_str = ::SysAllocString(src);
  return *this;
}

unsigned Len() const { return ::SysStringLen(m_str); }

BSTR MyCopy() const
{
  // We don't support Byte BSTRs here
  return ::SysAllocStringLen(m_str, ::SysStringLen(m_str));
  /*
  UINT byteLen = ::SysStringByteLen(m_str);
  BSTR res = ::SysAllocStringByteLen(NULL, byteLen);
  if (res && byteLen != 0 && m_str)
    memcpy(res, m_str, byteLen);
  return res;
  */
```

```
 }

 /*
 void Attach(BSTR src) { m_str = src; }
 BSTR Detach()
 {
   BSTR s = m_str;
   m_str = NULL;
   return s;
 }
 */

 void Empty()
 {
   ::SysFreeString(m_str);
   m_str = NULL;
 }
};



/*
 If CMyUnknownImp doesn't use virtual destructor, the code size is smaller.
 But if some class_1 derived from CMyUnknownImp
   uses MY_ADDREF_RELEASE and IUnknown::Release()
   and some another class_2 is derived from class_1,
   then class_1
 must use virtual destructor:
     virtual ~class_1();
   In that case, class_1::Release() calls correct destructor of class_2.

 Also you can use virtual ~CMyUnknownImp(), if you want to disable warning
   "class has virtual functions, but destructor is not virtual".
*/

class CMyUnknownImp
{
public:
 ULONG __m_RefCount;
 CMyUnknownImp(): __m_RefCount(0) {}

 // virtual
 ~CMyUnknownImp() {}
};



#define MY_QUERYINTERFACE_BEGIN STDMETHOD(QueryInterface) \
```

```
(REFGUID iid, void **outObject) throw() { *outObject = NULL;

#define MY_QUERYINTERFACE_ENTRY(i) else if (iid == IID_ ## i) \
   { *outObject = (void *)(i *)this; }

#define MY_QUERYINTERFACE_ENTRY_UNKNOWN(i) if (iid == IID_IUnknown) \
   { *outObject = (void *)(IUnknown *)(i *)this; }

#define MY_QUERYINTERFACE_BEGIN2(i) MY_QUERYINTERFACE_BEGIN \
   MY_QUERYINTERFACE_ENTRY_UNKNOWN(i) \
   MY_QUERYINTERFACE_ENTRY(i)

#define MY_QUERYINTERFACE_END else return E_NOINTERFACE; ++__m_RefCount; /* AddRef(); */ return
S_OK; }

#define
 MY_ADDREF_RELEASE \
STDMETHOD_(ULONG, AddRef)() throw() { return ++__m_RefCount; } \
STDMETHOD_(ULONG, Release)() { if (--__m_RefCount != 0)  \
 return __m_RefCount; delete this; return 0; }

#define MY_UNKNOWN_IMP_SPEC(i) \
 MY_QUERYINTERFACE_BEGIN \
 i \
 MY_QUERYINTERFACE_END \
 MY_ADDREF_RELEASE


#define MY_UNKNOWN_IMP MY_QUERYINTERFACE_BEGIN \
 MY_QUERYINTERFACE_ENTRY_UNKNOWN(IUnknown) \
 MY_QUERYINTERFACE_END \
 MY_ADDREF_RELEASE

#define MY_UNKNOWN_IMP1(i) MY_UNKNOWN_IMP_SPEC( \
 MY_QUERYINTERFACE_ENTRY_UNKNOWN(i) \
 MY_QUERYINTERFACE_ENTRY(i) \
 )

#define MY_UNKNOWN_IMP2(i1, i2) MY_UNKNOWN_IMP_SPEC( \
 MY_QUERYINTERFACE_ENTRY_UNKNOWN(i1) \
 MY_QUERYINTERFACE_ENTRY(i1) \
 MY_QUERYINTERFACE_ENTRY(i2) \
 )

#define MY_UNKNOWN_IMP3(i1, i2, i3) MY_UNKNOWN_IMP_SPEC( \
 MY_QUERYINTERFACE_ENTRY_UNKNOWN(i1) \
 MY_QUERYINTERFACE_ENTRY(i1) \
 MY_QUERYINTERFACE_ENTRY(i2) \
```

```
 MY_QUERYINTERFACE_ENTRY(i3) \
 )

#define MY_UNKNOWN_IMP4(i1, i2, i3, i4) MY_UNKNOWN_IMP_SPEC(
 \
 MY_QUERYINTERFACE_ENTRY_UNKNOWN(i1) \
 MY_QUERYINTERFACE_ENTRY(i1) \
 MY_QUERYINTERFACE_ENTRY(i2) \
 MY_QUERYINTERFACE_ENTRY(i3) \
 MY_QUERYINTERFACE_ENTRY(i4) \
 )

#define MY_UNKNOWN_IMP5(i1, i2, i3, i4, i5) MY_UNKNOWN_IMP_SPEC( \
 MY_QUERYINTERFACE_ENTRY_UNKNOWN(i1) \
 MY_QUERYINTERFACE_ENTRY(i1) \
 MY_QUERYINTERFACE_ENTRY(i2) \
 MY_QUERYINTERFACE_ENTRY(i3) \
 MY_QUERYINTERFACE_ENTRY(i4) \
 MY_QUERYINTERFACE_ENTRY(i5) \
 )

#define MY_UNKNOWN_IMP6(i1, i2, i3, i4, i5, i6) MY_UNKNOWN_IMP_SPEC( \
 MY_QUERYINTERFACE_ENTRY_UNKNOWN(i1) \
 MY_QUERYINTERFACE_ENTRY(i1) \
 MY_QUERYINTERFACE_ENTRY(i2) \
 MY_QUERYINTERFACE_ENTRY(i3) \
 MY_QUERYINTERFACE_ENTRY(i4) \
 MY_QUERYINTERFACE_ENTRY(i5) \
 MY_QUERYINTERFACE_ENTRY(i6) \
 )

#define MY_UNKNOWN_IMP7(i1, i2, i3, i4, i5, i6, i7) MY_UNKNOWN_IMP_SPEC( \
 MY_QUERYINTERFACE_ENTRY_UNKNOWN(i1) \
 MY_QUERYINTERFACE_ENTRY(i1) \
 MY_QUERYINTERFACE_ENTRY(i2) \
 MY_QUERYINTERFACE_ENTRY(i3) \
 MY_QUERYINTERFACE_ENTRY(i4)
 \
 MY_QUERYINTERFACE_ENTRY(i5) \
 MY_QUERYINTERFACE_ENTRY(i6) \
 MY_QUERYINTERFACE_ENTRY(i7) \
 )

const HRESULT k_My_HRESULT_WritingWasCut = 0x20000010;

#endif
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Content in copyright Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains content." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF
 Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
```

```
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With Two span Elements in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-025-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element that contains two span elements." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-025.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
```

<copyright>
<text>
Text with <span>span 1</span> and <span>span 2</span>.
</text>
</copyright>
</metadata>
</pre>
</body>
</html>
# Contributions to the urllib3 project

## Creator & Maintainer

* Andrey Petrov <andrey.petrov@shazow.net>

## Contributors

In chronological order:

* victor.vde <http://code.google.com/u/victor.vde/>
 * HTTPS patch (which inspired HTTPSConnectionPool)

* erikcederstrand <http://code.google.com/u/erikcederstrand/>
 * NTLM-authenticated HTTPSConnectionPool
 * Basic-authenticated HTTPSConnectionPool (merged into make_headers)

* niphlod <niphlod@gmail.com>
 * Client-verified SSL certificates for HTTPSConnectionPool
 * Response gzip and deflate encoding support
 * Better unicode support for filepost using StringIO buffers

* btoconnor <brian@btoconnor.net>
 * Non-multipart encoding for POST requests

* p.dobrogost <http://code.google.com/u/@WBRSRlBZDhBFXQB6/>
 * Code review, PEP8 compliance, benchmark fix

* kennethreitz <me@kennethreitz.com>
 * Bugfixes, suggestions, Requests integration

* georgemarshall <https://github.com/georgemarshall>
 * Bugfixes, Improvements and Test
 coverage

* Thomas Kluyver <thomas@kluyver.me.uk>
 * Python 3 support

* brandon-rhodes <http://rhodesmill.org/brandon>
 * Design review, bugfixes, test coverage.

* studer <theo.studer@gmail.com>
 * IPv6 url support and test coverage

* Shivaram Lingamneni <slingamn@cs.stanford.edu>
 * Support for explicitly closing pooled connections

* hartator <hartator@gmail.com>
 * Corrected multipart behavior for params

* Thomas Weischuh <thomas@t-8ch.de>
 * Support for TLS SNI
 * API unification of ssl_version/cert_reqs
 * SSL fingerprint and alternative hostname verification
 * Bugfixes in testsuite

* Sune Kirkeby <mig@ibofobi.dk>
 * Optional SNI-support for Python 2 via PyOpenSSL.

* Marc Schlaich <marc.schlaich@gmail.com>
 * Various bugfixes and test improvements.

* Bryce Boe <bbzbryce@gmail.com>
 * Correct six.moves conflict
 * Fixed pickle support of some exceptions

* Boris Figovsky <boris.figovsky@ravellosystems.com>
 * Allowed to skip SSL hostname verification

* Cory Benfield
 <https://lukasa.co.uk/about/>
 * Stream method for Response objects.
 * Return native strings in header values.
 * Generate 'Host' header when using proxies.

* Jason Robinson <jaywink@basshero.org>
 * Add missing WrappedSocket.fileno method in PyOpenSSL

* Audrius Butkevicius <audrius.butkevicius@elastichosts.com>
 * Fixed a race condition

* Stanislav Vitkovskiy <stas.vitkovsky@gmail.com>
 * Added HTTPS (CONNECT) proxy support

* Stephen Holsapple <sholsapp@gmail.com>
 * Added abstraction for granular control of request fields

* Martin von Gagern <Martin.vGagern@gmx.net>
 * Support for non-ASCII header parameters

* Kevin Burke <kev@inburke.com> and Pavel Kirichenko <juanych@yandex-team.ru>
 * Support for separate connect and request timeouts

* Peter Waller <p@pwaller.net>
 * HTTPResponse.tell() for determining amount received over the wire

* Nipunn Koorapati <nipunn1313@gmail.com>
 * Ignore default ports when comparing hosts for equality

* Danilo @dbrgn <https://dbrgn.ch/>
  * Disabled TLS compression by default on Python 3.2+
 * Disabled TLS compression in pyopenssl contrib module
 * Configurable cipher suites in pyopenssl contrib module

* Roman Bogorodskiy <roman.bogorodskiy@ericsson.com>
 * Account retries on proxy errors

* Nicolas Delaby <nicolas.delaby@ezeep.com>
 * Use the platform-specific CA certificate locations

* Josh Schneier <https://github.com/jschneier>
 * HTTPHeaderDict and associated tests and docs
 * Bugfixes, docs, test coverage

* Tahia Khan <http://tahia.tk/>
 * Added Timeout examples in docs

* Arthur Grunseid <https://grunseid.com>
 * source_address support and tests (with https://github.com/bui)

* Ian Cordasco <graffatcolmingov@gmail.com>
 * PEP8 Compliance and Linting
 * Add ability to pass socket options to an HTTP Connection

* Erik Tollerud <erik.tollerud@gmail.com>
 * Support for standard library io module.

* Krishna Prasad <kprasad.iitd@gmail.com>
 * Google App Engine documentation

* Aaron Meurer
 <asmeurer@gmail.com>
 * Added Url.url, which unparses a Url

* Evgeny Kapun <abacabadabacaba@gmail.com>
 * Bugfixes

* Benjamen Meyer <bm_witness@yahoo.com>
 * Security Warning Documentation update for proper capture

* Shivan Sornarajah <github@sornars.com>
 * Support for using ConnectionPool and PoolManager as context managers.

* Alex Gaynor <alex.gaynor@gmail.com>
 * Updates to the default SSL configuration

* Tomas Tomecek <ttomecek@redhat.com>
 * Implemented generator for getting chunks from chunked responses.

* tlynn <https://github.com/tlynn>
 * Respect the warning preferences at import.

* David D. Riddle <ddriddle@illinois.edu>
 * IPv6 bugfixes in testsuite

* Thea Flowers <magicalgirl@google.com>
 * App Engine environment tests.
 * Documentation re-write.

* John Krauss <https://github.com/talos>
 * Clues to debugging problems with `cryptography` dependency in docs

* Disassem <https://github.com/Disassem>
 * Fix pool-default headers not applying for url-encoded
 requests like GET.

* James Atherfold <jlatherfold@hotmail.com>
 * Bugfixes relating to cleanup of connections during errors.

* Christian Pedersen <https://github.com/chripede>
 * IPv6 HTTPS proxy bugfix

* Jordan Moldow <https://github.com/jmoldow>
 * Fix low-level exceptions leaking from ``HTTPResponse.stream()``.
 * Bugfix for ``ConnectionPool.urlopen(release_conn=False)``.
 * Creation of ``HTTPConnectionPool.ResponseCls``.

* Predrag Gruevski <https://github.com/obi1kenobi>
 * Made cert digest comparison use a constant-time algorithm.

* Adam Talsma <https://github.com/a-tal>
 * Bugfix to ca_cert file paths.

* Evan Meagher <https://evanmeagher.net>
 * Bugfix related to `memoryview` usage in PyOpenSSL adapter

* John Vandenberg <jayvdb@gmail.com>
 * Python 2.6 fixes; pyflakes and pep8 compliance

* Andy Caldwell <andy.m.caldwell@googlemail.com>
 * Bugfix related to reusing connections in indeterminate states.

* Ville Skytt <ville.skytta@iki.fi>
 * Logging efficiency
 improvements, spelling fixes, Travis config.

* Shige Takeda <smtakeda@gmail.com>
 * Started Recipes documentation and added a recipe about handling concatenated gzip data in HTTP response

* Jess Shapiro <jesse@jesseshapiro.net>
 * Various character-encoding fixes/tweaks
 * Disabling IPv6 DNS when IPv6 connections not supported

* David Foster <http://dafoster.net/>
 * Ensure order of request and response headers are preserved.

* Jeremy Cline <jeremy@jcline.org>
 * Added connection pool keys by scheme

* Aviv Palivoda <palaviv@gmail.com>
 * History list to Retry object.
 * HTTPResponse contains the last Retry object.

* Nate Prewitt <nate.prewitt@gmail.com>
 * Ensure timeouts are not booleans and greater than zero.
 * Fixed infinite loop in ``stream`` when amt=None.
 * Added length_remaining to determine remaining data to be read.
 * Added enforce_content_length to raise exception when incorrect content-length received.

* Seth Michael Larson <sethmichaellarson@protonmail.com>
  * Created selectors backport that supports PEP 475.

* Alexandre Dias <alex.dias@smarkets.com>
 * Don't retry on timeout if method not in whitelist

* Moinuddin Quadri <moin18@gmail.com>
 * Lazily load idna package

* Tom White <s6yg1ez3@mail2tor.com>
 * Made SOCKS handler differentiate socks5h from socks5 and socks4a from socks4.

* Tim Burke <tim.burke@gmail.com>
 * Stop buffering entire deflate-encoded responses.

* Tuukka Mustonen <tuukka.mustonen@gmail.com>
 * Add counter for status_forcelist retries.

* Erik Rose <erik@mozilla.com>
 * Bugfix to pyopenssl vendoring

* Wolfgang Richter <wolfgang.richter@gmail.com>
 * Bugfix related to loading full certificate chains with PyOpenSSL backend.

* Mike Miller <github@mikeage.net>
 * Logging improvements to include the HTTP(S) port when opening a new connection

* Ioannis Tziakos <mail@itziakos.gr>
 * Fix ``util.selectors._fileobj_to_fd`` to accept ``long``.
 * Update appveyor tox setup to use the 64bit python.

* Akamai
 (through Jess Shapiro) <jshapiro@akamai.com>
 * Ongoing maintenance; 2017-2018

* Dominique Leuenberger <dimstar@opensuse.org>
 * Minor fixes in the test suite

* Will Bond <will@wbond.net>
 * Add Python 2.6 support to ``contrib.securetransport``

* Aleksei Alekseev <alekseev.yeskela@gmail.com>
 * using auth info for socks proxy

* Chris Wilcox <git@crwilcox.com>
 * Improve contribution guide
 * Add ``HTTPResponse.geturl`` method to provide ``urllib2.urlopen().geturl()`` behavior

* Bruce Merry <https://www.brucemerry.org.za>
 * Fix leaking exceptions when system calls are interrupted with zero timeout

* Hugo van Kemenade <https://github.com/hugovk>
 * Drop support for EOL Python 2.6

* Tim Bell <https://github.com/timb07>
 * Bugfix for responses with Content-Type: message/* logging warnings

* Justin Bramley <https://github.com/jbramleycl>
 * Add ability to handle multiple Content-Encodings

```
* Katsuhiko YOSHIDA <https://github.com/kyoshidajp>
 * Remove Authorization header
 regardless of case when redirecting to cross-site

* James Meickle <https://permadeath.com/>
 * Improve handling of Retry-After header

* Chris Jerdonek <chris.jerdonek@gmail.com>
 * Remove a spurious TypeError from the exception chain inside
   HTTPConnectionPool._make_request(), also for BaseExceptions.

* Jorge Lopez Silva <https://github.com/jalopezsilva>
 * Added support for forwarding requests through HTTPS proxies.

* Benno Rice <benno@jeamland.net>
 * Allow cadata parameter to be passed to underlying ``SSLContext.load_verify_locations()``.

* Keiichi Kobayashi <abok.1k@gmail.com>
 * Rename VerifiedHTTPSConnection to HTTPSConnection

* Himanshu Garg <garg_himanshu@outlook.com>
 * DOC & LICENSE Update

* Hod Bin Noon <bin.noon.hod@gmail.com>
 * Test improvements

* Chris Olufson <tycarac@gmail.com>
 * Fix for connection not being released on HTTP redirect and response not preloaded

* [Your name or handle] <[email or website]>
 * [Brief summary of your changes]
// WorkDir.h

#ifndef __WORK_DIR_H
#define __WORK_DIR_H

#include "../../../Windows/FileDir.h"

#include "../../Common/FileStreams.h"

#include "ZipRegistry.h"

FString GetWorkDir(const NWorkDir::CInfo &workDirInfo, const FString &path, FString &fileName);

class CWorkDirTempFile
{
 FString _originalPath;
```

```
 NWindows::NFile::NDir::CTempFile _tempFile;
 COutFileStream *_outStreamSpec;
public:
 CMyComPtr<IOutStream> OutStream;

 HRESULT CreateTempFile(const FString &originalPath);
 HRESULT MoveToOriginal(bool deleteOriginal);
};

#endif
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Invalid license Element With dir Attribute in span Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element that contains a span element with
INVALID as the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
```

```
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With Two div Elements in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-019-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element that contains two div elements." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
```

```
  @font-face
 {
   font-family: "WOFF Test";
   src: url("support/metadatadisplay-schema-copyright-019.woff2") format("woff2");
  }
  body {
   font-size: 20px;
  }
  pre {
   font-size: 12px;
  }
  .test {
   font-family: "WOFF Test", "WOFF Test CFF Fallback";
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   &lt;div&gt;
    div 1 start
    &lt;div&gt;
     div 2 start
     &lt;div&gt;
      div 3
     &lt;/div&gt;
     div 2 end
    &lt;/div&gt;
    div 1 end
   &lt;/div&gt;
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
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file AUTHORS).
```

```
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according to those terms.
/* Threads.h -- multithreading library
2017-06-18 : Igor Pavlov : Public domain */

#ifndef __7Z_THREADS_H
#define __7Z_THREADS_H

#ifdef _WIN32
#include <windows.h>
#endif

#include "7zTypes.h"

EXTERN_C_BEGIN

WRes HandlePtr_Close(HANDLE *h);
WRes Handle_WaitObject(HANDLE h);

typedef HANDLE CThread;
#define Thread_Construct(p) *(p) = NULL
#define Thread_WasCreated(p) (*(p) != NULL)
#define Thread_Close(p) HandlePtr_Close(p)
#define Thread_Wait(p) Handle_WaitObject(*(p))

typedef
#ifdef UNDER_CE
 DWORD
#else
 unsigned
#endif
 THREAD_FUNC_RET_TYPE;

#define THREAD_FUNC_CALL_TYPE MY_STD_CALL
#define THREAD_FUNC_DECL THREAD_FUNC_RET_TYPE THREAD_FUNC_CALL_TYPE
typedef THREAD_FUNC_RET_TYPE (THREAD_FUNC_CALL_TYPE * THREAD_FUNC_TYPE)(void *);
WRes Thread_Create(CThread *p, THREAD_FUNC_TYPE func, LPVOID param);

typedef HANDLE CEvent;
typedef CEvent CAutoResetEvent;
typedef CEvent CManualResetEvent;
#define Event_Construct(p) *(p) = NULL
#define Event_IsCreated(p) (*(p) != NULL)
#define Event_Close(p)
```

```
 HandlePtr_Close(p)
#define Event_Wait(p) Handle_WaitObject(*(p))
WRes Event_Set(CEvent *p);
WRes Event_Reset(CEvent *p);
WRes ManualResetEvent_Create(CManualResetEvent *p, int signaled);
WRes ManualResetEvent_CreateNotSignaled(CManualResetEvent *p);
WRes AutoResetEvent_Create(CAutoResetEvent *p, int signaled);
WRes AutoResetEvent_CreateNotSignaled(CAutoResetEvent *p);

typedef HANDLE CSemaphore;
#define Semaphore_Construct(p) *(p) = NULL
#define Semaphore_IsCreated(p) (*(p) != NULL)
#define Semaphore_Close(p) HandlePtr_Close(p)
#define Semaphore_Wait(p) Handle_WaitObject(*(p))
WRes Semaphore_Create(CSemaphore *p, UInt32 initCount, UInt32 maxCount);
WRes Semaphore_ReleaseN(CSemaphore *p, UInt32 num);
WRes Semaphore_Release1(CSemaphore *p);

typedef CRITICAL_SECTION CCriticalSection;
WRes CriticalSection_Init(CCriticalSection *p);
#define CriticalSection_Delete(p) DeleteCriticalSection(p)
#define CriticalSection_Enter(p) EnterCriticalSection(p)
#define CriticalSection_Leave(p)
 LeaveCriticalSection(p)

EXTERN_C_END

#endif
```

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$O\7zCrc.obj
!IF "$(CPU)" == "IA64" || "$(CPU)" == "MIPS" || "$(CPU)" == "ARM" || "$(CPU)" == "ARM64"
C_OBJS = $(C_OBJS) \
!ELSE
ASM_OBJS = $(ASM_OBJS) \
!ENDIF
$O\7zCrcOpt.obj
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```
/* Lzma2Dec.h -- LZMA2 Decoder
2018-02-19 : Igor Pavlov : Public domain */

#ifndef __LZMA2_DEC_H
#define __LZMA2_DEC_H

#include "LzmaDec.h"

EXTERN_C_BEGIN

/* ---------- State Interface ---------- */

typedef struct
{
 unsigned state;
 Byte control;
 Byte needInitLevel;
 Byte isExtraMode;
 Byte _pad_;
 UInt32 packSize;
 UInt32 unpackSize;
 CLzmaDec decoder;
} CLzma2Dec;

#define Lzma2Dec_Construct(p) LzmaDec_Construct(&(p)->decoder)
#define Lzma2Dec_FreeProbs(p, alloc) LzmaDec_FreeProbs(&(p)->decoder, alloc)
#define Lzma2Dec_Free(p, alloc) LzmaDec_Free(&(p)->decoder, alloc)

SRes Lzma2Dec_AllocateProbs(CLzma2Dec *p, Byte prop, ISzAllocPtr alloc);
SRes Lzma2Dec_Allocate(CLzma2Dec *p, Byte prop, ISzAllocPtr alloc);
void Lzma2Dec_Init(CLzma2Dec *p);

/*
finishMode:
 It has meaning only if the decoding reaches output limit (*destLen or dicLimit).
```

```
 LZMA_FINISH_ANY - use smallest number of input bytes
 LZMA_FINISH_END - read EndOfStream marker after decoding

Returns:
 SZ_OK

   status:
     LZMA_STATUS_FINISHED_WITH_MARK
     LZMA_STATUS_NOT_FINISHED
     LZMA_STATUS_NEEDS_MORE_INPUT
 SZ_ERROR_DATA - Data error
*/

SRes Lzma2Dec_DecodeToDic(CLzma2Dec *p, SizeT dicLimit,
   const Byte *src, SizeT *srcLen, ELzmaFinishMode finishMode, ELzmaStatus *status);

SRes Lzma2Dec_DecodeToBuf(CLzma2Dec *p, Byte *dest, SizeT *destLen,
   const Byte *src, SizeT *srcLen, ELzmaFinishMode finishMode, ELzmaStatus *status);


/* ---------- LZMA2 block and chunk parsing ---------- */

/*
Lzma2Dec_Parse() parses compressed data stream up to next independent block or next chunk data.
It can return LZMA_STATUS_* code or LZMA2_PARSE_STATUS_* code:
 - LZMA2_PARSE_STATUS_NEW_BLOCK - there is new block, and 1 additional byte (control byte of next block
header) was read from input.
 - LZMA2_PARSE_STATUS_NEW_CHUNK - there is new chunk, and only lzma2 header of new chunk was read.
                                CLzma2Dec::unpackSize contains unpack size of that chunk
*/

typedef
 enum
{
/*
 LZMA_STATUS_NOT_SPECIFIED               // data error
 LZMA_STATUS_FINISHED_WITH_MARK
 LZMA_STATUS_NOT_FINISHED                //
 LZMA_STATUS_NEEDS_MORE_INPUT
 LZMA_STATUS_MAYBE_FINISHED_WITHOUT_MARK   // unused
*/
 LZMA2_PARSE_STATUS_NEW_BLOCK = LZMA_STATUS_MAYBE_FINISHED_WITHOUT_MARK + 1,
 LZMA2_PARSE_STATUS_NEW_CHUNK
} ELzma2ParseStatus;

ELzma2ParseStatus Lzma2Dec_Parse(CLzma2Dec *p,
   SizeT outSize,   // output size
   const Byte *src, SizeT *srcLen,
```

```
  int checkFinishBlock   // set (checkFinishBlock = 1), if it must read full input data, if decoder.dicPos reaches
blockMax position.
  );

/*
LZMA2 parser doesn't decode LZMA chunks, so we must read
 full input LZMA chunk to decode some part of LZMA chunk.

Lzma2Dec_GetUnpackExtra() returns the value that shows
  max possible number of output bytes that can be output by decoder
  at current input positon.
*/

#define Lzma2Dec_GetUnpackExtra(p) ((p)->isExtraMode ? (p)->unpackSize : 0);


/* ----------
 One Call Interface ---------- */

/*
finishMode:
 It has meaning only if the decoding reaches output limit (*destLen).
 LZMA_FINISH_ANY - use smallest number of input bytes
 LZMA_FINISH_END - read EndOfStream marker after decoding

Returns:
 SZ_OK
   status:
     LZMA_STATUS_FINISHED_WITH_MARK
     LZMA_STATUS_NOT_FINISHED
 SZ_ERROR_DATA - Data error
 SZ_ERROR_MEM  - Memory allocation error
 SZ_ERROR_UNSUPPORTED - Unsupported properties
 SZ_ERROR_INPUT_EOF - It needs more bytes in input buffer (src).
*/

SRes Lzma2Decode(Byte *dest, SizeT *destLen, const Byte *src, SizeT *srcLen,
  Byte prop, ELzmaFinishMode finishMode, ELzmaStatus *status, ISzAllocPtr alloc);

EXTERN_C_END

#endif
```

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Polish hyphenation patterns

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% This file is part of hyph-utf8 package and resulted from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% Source: plhyph.tex (1995-06-26)
% Author: Hanna Koodziejska, Bogusaw Jackowski, Marek Ryko
%
% The above mentioned file should become obsolete,
% and the author of the original
file should preferaby modify this file instead.
%

```
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%               and helped with testing, suggestions and bug reports
% - Norbert Preining, who tested & integrated patterns into TeX Live
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% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
% Before a new "pattern-revolution" starts,
% please try to follow some guidelines if possible:
%
% - \lccode is *forbidden*, and I really mean it
% - all the patterns should be in UTF-8
% - the only "allowed" TeX commands in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin
 and \righthyphenmin,
%   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
%
% For more unformation see
```

```
%
%    http://tug.org/tex-hyphen
%
%-------------------------------------------------------------------------------
%
% This is PLHYPH.TeX - the Polish hyphenation patterns
%          version 3.0a, Wednesday, May 17th, 1995
% to be used for the inclusion of Polish hyphenation patterns in any format,
% not necessarily in the MeX or LaMeX ones. The patterns are exactly
% the same as in the version 3.0 being the part of the MeX package,
% only the surrounding of the \pattern command is changed. The authors
% claim the upward compatibility, i.e., the version 3.0a can also be used
% with the MeX or LaMeX formats.

% The history of development of the Polish hyphenation patterns:
%
%
 The first version of the patterns was developed
% by Hanna Koodziejska (1987).
%
% The adaptation to the LeX format (see below) and extensive modification
% were done by Bogusaw Jackowski & Marek Ryko (1987--1989).
%
% The hyphenation rules were further improved and adapted to the
% TeX 3.x requirements by Hanna Koodziejska (1991).
%
% Lone-standing version (3.0a) of patterns was prepared (under pressure
% from LaTeX users) by Bogusaw Jackowski and Marek Ryko, following
% Mariusz Olko's suggestions, 1995.

% The LeX format mentioned above was the first version of the adaptation
% of TeX to the Polish language. The next version is called MeX.
```

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```
PROG = lzma
CXX = g++
LIB =
RM = rm -f
CFLAGS = -c -O2 -Wall -D_7ZIP_ST

OBJS = \
 LzmaUtil.o \
 Alloc.o \
 LzFind.o \
 LzmaDec.o \
 LzmaEnc.o \
 7zFile.o \
 7zStream.o \


all: $(PROG)

$(PROG): $(OBJS)
 $(CXX) -o $(PROG) $(LDFLAGS) $(OBJS) $(LIB) $(LIB2)

LzmaUtil.o: LzmaUtil.c
 $(CXX) $(CFLAGS) LzmaUtil.c

Alloc.o: ../../Alloc.c
 $(CXX) $(CFLAGS) ../../Alloc.c

LzFind.o: ../../LzFind.c
 $(CXX) $(CFLAGS) ../../LzFind.c

LzmaDec.o: ../../LzmaDec.c
 $(CXX) $(CFLAGS) ../../LzmaDec.c
```

```
LzmaEnc.o: ../../LzmaEnc.c
 $(CXX) $(CFLAGS) ../../LzmaEnc.c

7zFile.o: ../../7zFile.c
 $(CXX) $(CFLAGS) ../../7zFile.c

7zStream.o: ../../7zStream.c
 $(CXX) $(CFLAGS) ../../7zStream.c

clean:
 -$(RM) $(PROG) $(OBJS)
// The image files in this folder are trademarks of Google and Apple.
// Google and Apple's trademark policies govern their use.
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Attribute in license Element text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-018-ref.xht" />
  <meta name="assert" content="The license element contains a text element with an unknown attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
 {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-018.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
```

```
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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```
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```
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<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Invalid copyright Element With dir Attribute in span Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element that contains a span element with INVALID as the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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```
# -*- Mode: python; indent-tabs-mode: nil; tab-width: 40 -*-
# vim: set filetype=python:
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# file, You can obtain one at http://mozilla.org/MPL/2.0/.

with Files('**'):
  BUG_COMPONENT = ('Core', 'General')

with Files('7zstub/**'):
  BUG_COMPONENT = ('Firefox', 'Installer')

with Files('atk-1.0/**'):
  BUG_COMPONENT = ('Core', 'Disability Access APIs')

with Files('bsdiff/**'):
  BUG_COMPONENT = ('Core', 'XPCOM')

with Files('ia2/**'):
  BUG_COMPONENT = ('Core', 'Disability Access APIs')

with Files('nsis/**'):
  BUG_COMPONENT = ('Firefox', 'Installer')

with Files('ply/**'):
  BUG_COMPONENT = ('Core', 'JavaScript Engine')

with Files('snappy/**'):
  BUG_COMPONENT = ('Core', 'XPCOM')
```

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```
// StdAfx.h

#ifndef __STDAFX_H
#define __STDAFX_H

#include "../../../Common/Common.h"

#include <commctrl.h>

// #define printf(x) NO_PRINTF_(x)
// #define sprintf(x) NO_SPRINTF_(x)

#endif
```

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```
// Windows/Control/Static.h

#ifndef __WINDOWS_CONTROL_STATIC_H
#define __WINDOWS_CONTROL_STATIC_H

#include "../Window.h"

namespace NWindows {
namespace NControl {

class CStatic: public CWindow
{
public:
 HANDLE SetImage(WPARAM imageType, HANDLE handle) { return (HANDLE)SendMsg(STM_SETIMAGE,
imageType, (LPARAM)handle); }
 HANDLE GetImage(WPARAM imageType) { return (HANDLE)SendMsg(STM_GETIMAGE, imageType, 0); }

 #ifdef UNDER_CE
 HICON SetIcon(HICON icon) { return (HICON)SetImage(IMAGE_ICON, icon); }
 HICON GetIcon() { return (HICON)GetImage(IMAGE_ICON); }
 #else
 HICON SetIcon(HICON icon) { return (HICON)SendMsg(STM_SETICON, (WPARAM)icon, 0); }
 HICON GetIcon() { return (HICON)SendMsg(STM_GETICON, 0, 0); }
 #endif
};

}}

#endif
```

```
// HashGUI.h

#ifndef __HASH_GUI_H
#define __HASH_GUI_H

#include "../Common/HashCalc.h"
#include "../Common/Property.h"

HRESULT HashCalcGUI(
  DECL_EXTERNAL_CODECS_LOC_VARS
  const NWildcard::CCensor &censor,
  const CHashOptions &options,
  bool &messageWasDisplayed);

typedef CObjectVector<CProperty> CPropNameValPairs;

void AddValuePair(CPropNameValPairs &pairs, UINT resourceID, UInt64 value);
void AddSizeValue(UString &s, UInt64 value);
void AddSizeValuePair(CPropNameValPairs &pairs, UINT resourceID, UInt64 value);

void AddHashBundleRes(CPropNameValPairs &s, const CHashBundle &hb, const UString &firstFileName);
void AddHashBundleRes(UString &s, const CHashBundle &hb, const UString &firstFileName);

void ShowHashResults(const CPropNameValPairs &propPairs, HWND hwnd);
void ShowHashResults(const CHashBundle &hb, const UString &firstFileName, HWND hwnd);

#endif
```

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```
// Windows/System.h

#ifndef __WINDOWS_SYSTEM_H
#define __WINDOWS_SYSTEM_H

#include "../Common/MyTypes.h"
```

```
namespace NWindows {
namespace NSystem {

UInt32 CountAffinity(DWORD_PTR mask);

struct CProcessAffinity
{
 // UInt32 numProcessThreads;
 // UInt32 numSysThreads;
 DWORD_PTR processAffinityMask;
 DWORD_PTR systemAffinityMask;

 void InitST()
 {
   // numProcessThreads = 1;
   // numSysThreads = 1;
   processAffinityMask = 1;
   systemAffinityMask = 1;
 }

 UInt32 GetNumProcessThreads() const { return CountAffinity(processAffinityMask); }
 UInt32 GetNumSystemThreads() const { return CountAffinity(systemAffinityMask); }

 BOOL Get();
};

UInt32 GetNumberOfProcessors();

bool GetRamSize(UInt64 &size); // returns false, if unknown ram size

}}

#endif
/* ATK -  Accessibility Toolkit
* Copyright 2001 Sun Microsystems Inc.
*
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```

```
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* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_COMPONENT_H__
#define __ATK_COMPONENT_H__

#include <atk/atkobject.h>
#include <atk/atkutil.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

/**
*AtkScrollType:
 *@ATK_SCROLL_TOP_LEFT: Scroll the object vertically and horizontally to the top
*left corner of the window.
*@ATK_SCROLL_BOTTOM_RIGHT: Scroll the object vertically and horizontally to the
*bottom right corner of the window.
*@ATK_SCROLL_TOP_EDGE: Scroll the object vertically to the top edge of the
window.
*@ATK_SCROLL_BOTTOM_EDGE: Scroll the object vertically to the bottom edge of
*the window.
*@ATK_SCROLL_LEFT_EDGE: Scroll the object vertically and horizontally to the
*left edge of the window.
*@ATK_SCROLL_RIGHT_EDGE: Scroll the object vertically and horizontally to the
*right edge of the window.
*@ATK_SCROLL_ANYWHERE: Scroll the object vertically and horizontally so that
*as much as possible of the object becomes visible. The exact placement is
*determined by the application.
*
* Specifies where an object should be placed on the screen when using scroll_to.
**/
typedef enum {
 ATK_SCROLL_TOP_LEFT,
 ATK_SCROLL_BOTTOM_RIGHT,
 ATK_SCROLL_TOP_EDGE,
 ATK_SCROLL_BOTTOM_EDGE,
  ATK_SCROLL_LEFT_EDGE,
 ATK_SCROLL_RIGHT_EDGE,
 ATK_SCROLL_ANYWHERE
} AtkScrollType;

/*
* The AtkComponent interface should be supported by any object that is
* rendered on the screen. The interface provides the standard mechanism
* for an assistive technology to determine and set the graphical
```

```
* representation of an object.
*/

#define ATK_TYPE_COMPONENT                  (atk_component_get_type ())
#define ATK_IS_COMPONENT(obj)               G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_COMPONENT)
#define ATK_COMPONENT(obj)                  G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_COMPONENT, AtkComponent)
#define ATK_COMPONENT_GET_IFACE(obj)        (G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_COMPONENT, AtkComponentIface))

#ifndef _TYPEDEF_ATK_COMPONENT_
#define _TYPEDEF_ATK_COMPONENT_
typedef struct _AtkComponent AtkComponent;
#endif
typedef struct _AtkComponentIface  AtkComponentIface;

typedef void (*AtkFocusHandler) (AtkObject*, gboolean);

typedef
 struct _AtkRectangle       AtkRectangle;

struct _AtkRectangle
{
 gint x;
 gint y;
 gint width;
 gint height;
};

GType atk_rectangle_get_type (void);

#define ATK_TYPE_RECTANGLE (atk_rectangle_get_type ())
struct _AtkComponentIface
{
 GTypeInterface parent;

 guint          (* add_focus_handler)  (AtkComponent          *component,
                                AtkFocusHandler        handler);

 gboolean       (* contains)          (AtkComponent          *component,
                                gint                 x,
                                gint                 y,
                                AtkCoordType          coord_type);

 AtkObject*    (* ref_accessible_at_point)  (AtkComponent     *component,
                                gint                 x,
                                gint                 y,
```

```
                                AtkCoordType          coord_type);
void
        (* get_extents)        (AtkComponent         *component,
                                gint                  *x,
                                gint                  *y,
                                gint                  *width,
                                gint                  *height,
                                AtkCoordType          coord_type);
void                    (* get_position)    (AtkComponent   *component,
                                    gint          *x,
                                    gint          *y,
                                    AtkCoordType   coord_type);
void                    (* get_size)                (AtkComponent   *component,
                                        gint          *width,
                                        gint          *height);
gboolean                (* grab_focus)
            (AtkComponent   *component);
void                    (* remove_focus_handler)     (AtkComponent  *component,
                                        guint        handler_id);
gboolean                (* set_extents)     (AtkComponent   *component,
                                    gint          x,
                                    gint          y,
                                    gint          width,
                                    gint          height,
                                    AtkCoordType   coord_type);
gboolean                (* set_position)    (AtkComponent   *component,
                                    gint          x,
                                    gint          y,
                                    AtkCoordType   coord_type);
gboolean                (* set_size)        (AtkComponent   *component,
                                    gint          width,
                                    gint          height);

AtkLayer                (* get_layer)       (AtkComponent   *component);
gint                    (* get_mdi_zorder)   (AtkComponent   *component);

/*
 * signal handlers
 */
void                    (* bounds_changed)   (AtkComponent   *component,
                                    AtkRectangle   *bounds);
gdouble                 (* get_alpha)       (AtkComponent   *component);

/*
 * Scrolls this object so it becomes visible on the screen.
 * Since ATK 2.30
 */
gboolean                (*scroll_to)        (AtkComponent   *component,
```

```
                                AtkScrollType   type);

 gboolean              (*scroll_to_point)    (AtkComponent   *component,
                                AtkCoordType    coords,

          gint           x,
                                gint           y);
};

GType atk_component_get_type (void);

/* convenience functions */

guint              atk_component_add_focus_handler      (AtkComponent    *component,
                                        AtkFocusHandler handler);
gboolean            atk_component_contains              (AtkComponent    *component,
                                        gint           x,
                                        gint           y,
                                        AtkCoordType    coord_type);
AtkObject*           atk_component_ref_accessible_at_point(AtkComponent    *component,
                                        gint           x,
                                        gint           y,
                                        AtkCoordType    coord_type);
void
               atk_component_get_extents           (AtkComponent    *component,
                                        gint           *x,
                                        gint           *y,
                                        gint           *width,
                                        gint           *height,
                                        AtkCoordType    coord_type);
void                atk_component_get_position          (AtkComponent    *component,
                                        gint           *x,
                                        gint           *y,
                                        AtkCoordType    coord_type);
void                atk_component_get_size              (AtkComponent    *component,

   gint           *width,
                                        gint           *height);
AtkLayer            atk_component_get_layer             (AtkComponent    *component);
gint               atk_component_get_mdi_zorder         (AtkComponent    *component);
gboolean            atk_component_grab_focus            (AtkComponent    *component);
void                atk_component_remove_focus_handler   (AtkComponent    *component,
                                        guint          handler_id);
gboolean            atk_component_set_extents           (AtkComponent    *component,
                                        gint           x,
                                        gint           y,
                                        gint           width,
                                        gint           height,
```

```
                    AtkCoordType    coord_type);
gboolean            atk_component_set_position          (AtkComponent    *component,
                                        gint            x,
                                        gint            y,
                                        AtkCoordType    coord_type);
gboolean            atk_component_set_size              (AtkComponent    *component,
                                        gint            width,
                                        gint            height);
gdouble             atk_component_get_alpha             (AtkComponent    *component);
gboolean            atk_component_scroll_to             (AtkComponent    *component,
                                        AtkScrollType   type);

gboolean            atk_component_scroll_to_point       (AtkComponent    *component,

                                        AtkCoordType    coords,
                                        gint            x,
                                        gint            y);

#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_COMPONENT_H__ */
```

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```
// RegisterCodec.h

#ifndef __REGISTER_CODEC_H
#define __REGISTER_CODEC_H

#include "../Common/MethodId.h"

#include "../ICoder.h"

typedef void * (*CreateCodecP)();

struct CCodecInfo
{
 CreateCodecP CreateDecoder;
 CreateCodecP CreateEncoder;
 CMethodId Id;
 const char *Name;
 UInt32 NumStreams;
 bool IsFilter;
};

void RegisterCodec(const CCodecInfo *codecInfo) throw();


#define REGISTER_CODEC_CREATE_2(name, cls, i) static void *name() { return (void *)(i *)(new cls); }
#define REGISTER_CODEC_CREATE(name, cls) REGISTER_CODEC_CREATE_2(name, cls, ICompressCoder)

#define REGISTER_CODEC_NAME(x) CRegisterCodec ## x
#define REGISTER_CODEC_VAR static const CCodecInfo g_CodecInfo =

#define REGISTER_CODEC(x) struct REGISTER_CODEC_NAME(x) { \
  REGISTER_CODEC_NAME(x)() { RegisterCodec(&g_CodecInfo); }}; \
  static REGISTER_CODEC_NAME(x) g_RegisterCodec;
```

```
#define REGISTER_CODECS_NAME(x) CRegisterCodecs ## x
#define REGISTER_CODECS_VAR static const CCodecInfo g_CodecsInfo[] =

#define
 REGISTER_CODECS(x) struct REGISTER_CODECS_NAME(x) { \
   REGISTER_CODECS_NAME(x)() { for (unsigned i = 0; i < ARRAY_SIZE(g_CodecsInfo); i++) \
   RegisterCodec(&g_CodecsInfo[i]); }}; \
   static REGISTER_CODECS_NAME(x) g_RegisterCodecs;


#define REGISTER_CODEC_2(x, crDec, crEnc, id, name) \
   REGISTER_CODEC_VAR \
   { crDec, crEnc, id, name, 1, false }; \
   REGISTER_CODEC(x)


#ifdef EXTRACT_ONLY
 #define REGISTER_CODEC_E(x, clsDec, clsEnc, id, name) \
   REGISTER_CODEC_CREATE(CreateDec, clsDec) \
   REGISTER_CODEC_2(x, CreateDec, NULL, id, name)
#else
 #define REGISTER_CODEC_E(x, clsDec, clsEnc, id, name) \
   REGISTER_CODEC_CREATE(CreateDec, clsDec) \
   REGISTER_CODEC_CREATE(CreateEnc, clsEnc) \
   REGISTER_CODEC_2(x, CreateDec, CreateEnc, id, name)
#endif



#define REGISTER_FILTER_CREATE(name, cls) REGISTER_CODEC_CREATE_2(name, cls, ICompressFilter)

#define REGISTER_FILTER_ITEM(crDec, crEnc, id, name) \
   { crDec, crEnc, id, name, 1, true }

#define REGISTER_FILTER(x,
 crDec, crEnc, id, name) \
   REGISTER_CODEC_VAR \
   REGISTER_FILTER_ITEM(crDec, crEnc, id, name); \
   REGISTER_CODEC(x)

#ifdef EXTRACT_ONLY
 #define REGISTER_FILTER_E(x, clsDec, clsEnc, id, name) \
   REGISTER_FILTER_CREATE(CreateDec, clsDec) \
   REGISTER_FILTER(x, CreateDec, NULL, id, name)
#else
 #define REGISTER_FILTER_E(x, clsDec, clsEnc, id, name) \
   REGISTER_FILTER_CREATE(CreateDec, clsDec) \
   REGISTER_FILTER_CREATE(CreateEnc, clsEnc) \
```

```
   REGISTER_FILTER(x, CreateDec, CreateEnc, id, name)
#endif



struct CHasherInfo
{
 IHasher * (*CreateHasher)();
 CMethodId Id;
 const char *Name;
 UInt32 DigestSize;
};

void RegisterHasher(const CHasherInfo *hasher) throw();

#define REGISTER_HASHER_NAME(x) CRegHasher_ ## x

#define REGISTER_HASHER(cls, id, name, size) \
   STDMETHODIMP_(UInt32) cls::GetDigestSize() throw() { return size; } \
   static IHasher *CreateHasherSpec() { return new cls(); } \
   static const CHasherInfo g_HasherInfo = { CreateHasherSpec,
 id, name, size }; \
   struct REGISTER_HASHER_NAME(cls) { REGISTER_HASHER_NAME(cls)() {
RegisterHasher(&g_HasherInfo); }}; \
   static REGISTER_HASHER_NAME(cls) g_RegisterHasher;

#endif
// Archive/Common/ItemNameUtils.h

#ifndef __ARCHIVE_ITEM_NAME_UTILS_H
#define __ARCHIVE_ITEM_NAME_UTILS_H

#include "../../../Common/MyString.h"

namespace NArchive {
namespace NItemName {

void ReplaceSlashes_OsToUnix(UString &name);

UString GetOsPath(const UString &name);
UString GetOsPath_Remove_TailSlash(const UString &name);

void ReplaceToOsSlashes_Remove_TailSlash(UString &name);

bool HasTailSlash(const AString &name, UINT codePage);

#ifdef _WIN32
 inline UString WinPathToOsPath(const UString &name)  { return name; }
```

```
#else
 UString WinPathToOsPath(const UString &name);
#endif

}}

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With class Attribute in span Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element that contains a span element with
&quot;class1 class2 class3&quot; as the value for the class attribute." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   Text with &lt;span class="class1 class2 class3"&gt;span&lt;/span&gt;.
```

</text>
</license>
</metadata>
</pre>
</body>
</html>
#define IDD_COMBO 98

#define IDT_COMBO 100
#define IDC_COMBO 101
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CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
<title>WOFF Test: Invalid copyright Element With dir Attribute in text Element</title>
<link rel="author" title="Tal Leming" href="http://typesupply.com" />
<link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
<link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
<link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
<link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
<link rel="match" href="metadatadisplay-schema-copyright-013-ref.xht" />
<meta name="assert" content="The copyright element contains a text element with INVALID as the value for the dir attribute." />
<style type="text/css"><![CDATA[
@import

```
 url("support/test-fonts.css");
  @font-face {
   font-family: "WOFF Test";
   src: url("support/metadatadisplay-schema-copyright-013.woff2") format("woff2");
  }
  body {
   font-size: 20px;
  }
  pre {
   font-size: 12px;
  }
  .test {
   font-family: "WOFF Test", "WOFF Test CFF Fallback";
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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```
// Common/Exception.h

#ifndef __COMMON_EXCEPTION_H
#define __COMMON_EXCEPTION_H

#include "MyWindows.h"

struct CSystemException
{
 HRESULT ErrorCode;
 CSystemException(HRESULT errorCode): ErrorCode(errorCode) {}
};

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element Without id Attribute</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-003-ref.xht" />
  <meta name="assert" content="The license element does not have an id attribute but it still matches the schema." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
  {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-003.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
```

```
   margin-top: 50px;
  }
 ]]></style>
</head>
<body>
 <p>Test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
 <div class="test">P</div>
 <p>The XML contained in the Extended Metadata Block is below.</p>
 <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   License without language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
 </pre>
</body>
</html>
```

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POSSIBILITY OF SUCH DAMAGE.

```
// CWrappers.h

#ifndef __C_WRAPPERS_H
#define __C_WRAPPERS_H

#include "../ICoder.h"
#include "../../Common/MyCom.h"

SRes HRESULT_To_SRes(HRESULT res, SRes defaultRes) throw();
HRESULT SResToHRESULT(SRes res) throw();

struct CCompressProgressWrap
{
 ICompressProgress vt;
 ICompressProgressInfo *Progress;
 HRESULT Res;

 void Init(ICompressProgressInfo *progress) throw();
};


struct CSeqInStreamWrap
{
 ISeqInStream vt;
 ISequentialInStream *Stream;
 HRESULT Res;
 UInt64 Processed;

 void Init(ISequentialInStream *stream) throw();
};


struct CSeekInStreamWrap
{
 ISeekInStream vt;
 IInStream *Stream;
 HRESULT Res;

 void Init(IInStream *stream) throw();
};


struct CSeqOutStreamWrap
{
 ISeqOutStream vt;
 ISequentialOutStream *Stream;
 HRESULT Res;
 UInt64 Processed;
```

```
 void Init(ISequentialOutStream *stream) throw();
};


struct CByteInBufWrap
{
 IByteIn vt;
 const Byte *Cur;
 const Byte *Lim;
 Byte *Buf;
 UInt32 Size;
 ISequentialInStream *Stream;
 UInt64
 Processed;
 bool Extra;
 HRESULT Res;

 CByteInBufWrap();
 ~CByteInBufWrap() { Free(); }
 void Free() throw();
 bool Alloc(UInt32 size) throw();
 void Init()
 {
  Lim = Cur = Buf;
  Processed = 0;
  Extra = false;
  Res = S_OK;
 }
 UInt64 GetProcessed() const { return Processed + (Cur - Buf); }
 Byte ReadByteFromNewBlock() throw();
 Byte ReadByte()
 {
  if (Cur != Lim)
    return *Cur++;
  return ReadByteFromNewBlock();
 }
};


struct CByteOutBufWrap
{
 IByteOut vt;
 Byte *Cur;
 const Byte *Lim;
 Byte *Buf;
 size_t Size;
 ISequentialOutStream *Stream;
```

```
 UInt64 Processed;
 HRESULT Res;

 CByteOutBufWrap() throw();
 ~CByteOutBufWrap() { Free(); }
 void Free() throw();
 bool Alloc(size_t size) throw();
 void Init()
 {
   Cur = Buf;
   Lim = Buf + Size;
   Processed = 0;
   Res = S_OK;
 }
 UInt64 GetProcessed() const { return Processed + (Cur - Buf); }
 HRESULT Flush() throw();
 void WriteByte(Byte b)
 {
   *Cur++ = b;
   if (Cur
 == Lim)
     Flush();
 }
};

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With One span Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element that contains a span element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size:
 12px;
   }
```

```
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   Text with &lt;span&gt;span&lt;/span&gt;.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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==========
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==========

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```
// DummyOutStream.h

#ifndef __DUMMY_OUT_STREAM_H
#define __DUMMY_OUT_STREAM_H

#include "../../../Common/MyCom.h"

#include "../../IStream.h"

class CDummyOutStream:
 public ISequentialOutStream,
 public CMyUnknownImp
{
 CMyComPtr<ISequentialOutStream> _stream;
 UInt64 _size;
public:
 void SetStream(ISequentialOutStream *outStream) { _stream = outStream; }
 void ReleaseStream() { _stream.Release(); }
```

```
 void Init() { _size = 0; }
 MY_UNKNOWN_IMP
 STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
 UInt64 GetSize() const { return _size; }
};

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Child Element in copyright Element text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-016-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element with an unknown child element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
 {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-016.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

```
/* -*- Mode: C++; tab-width: 8; indent-tabs-mode: nil; c-basic-offset: 2 -*- */
/* vim: set ts=8 sts=2 et sw=2 tw=80: */
/* This Source Code Form is subject to the terms of the Mozilla Public
* License, v. 2.0. If a copy of the MPL was not distributed with this file,
* You can obtain one at http://mozilla.org/MPL/2.0/. */

#ifndef mozilla_dom_PermissionObserver_h_
#define mozilla_dom_PermissionObserver_h_

#include "mozilla/dom/PermissionsBinding.h"

#include "nsIObserver.h"
#include "nsIPrincipal.h"
#include "nsTArray.h"
#include "nsWeakReference.h"

namespace mozilla {
namespace dom {

class PermissionStatus;

// Singleton that watches for perm-changed notifications in order to notify
// PermissionStatus objects.
class PermissionObserver final : public nsIObserver,
                                 public nsSupportsWeakReference {
public:
 NS_DECL_ISUPPORTS
 NS_DECL_NSIOBSERVER

 static already_AddRefed<PermissionObserver> GetInstance();

 void AddSink(PermissionStatus* aObs);
  void RemoveSink(PermissionStatus* aObs);

private:
 PermissionObserver();
 virtual ~PermissionObserver();

 void Notify(PermissionName aName, nsIPrincipal& aPrincipal);

 nsTArray<PermissionStatus*> mSinks;
};

}  // namespace dom
}  // namespace mozilla

#endif
```

```
// HashCalc.h

#ifndef __HASH_CALC_H
#define __HASH_CALC_H

#include "../../../Common/Wildcard.h"

#include "../../Common/CreateCoder.h"
#include "../../Common/MethodProps.h"

#include "DirItem.h"

const unsigned k_HashCalc_DigestSize_Max = 64;

const unsigned k_HashCalc_NumGroups = 4;

enum
{
 k_HashCalc_Index_Current,
 k_HashCalc_Index_DataSum,
 k_HashCalc_Index_NamesSum,
 k_HashCalc_Index_StreamsSum
};

struct CHasherState
{
 CMyComPtr<IHasher> Hasher;
 AString Name;
 UInt32 DigestSize;
 Byte Digests[k_HashCalc_NumGroups][k_HashCalc_DigestSize_Max];
};

struct IHashCalc
{
 virtual void InitForNewFile() = 0;
 virtual void Update(const void *data, UInt32 size) = 0;
 virtual void SetSize(UInt64 size) = 0;
 virtual void Final(bool isDir, bool isAltStream, const UString &path) = 0;
};

struct CHashBundle: public IHashCalc
{
 CObjectVector<CHasherState> Hashers;

 UInt64 NumDirs;
 UInt64 NumFiles;
 UInt64 NumAltStreams;
 UInt64 FilesSize;
```

```
 UInt64 AltStreamsSize;
 UInt64
 NumErrors;

 UInt64 CurSize;

 HRESULT SetMethods(DECL_EXTERNAL_CODECS_LOC_VARS const UStringVector &methods);

 void Init()
 {
   NumDirs = NumFiles = NumAltStreams = FilesSize = AltStreamsSize = NumErrors = 0;
 }

 void InitForNewFile();
 void Update(const void *data, UInt32 size);
 void SetSize(UInt64 size);
 void Final(bool isDir, bool isAltStream, const UString &path);
};

#define INTERFACE_IHashCallbackUI(x) \
 INTERFACE_IDirItemsCallback(x) \
 virtual HRESULT StartScanning() x; \
 virtual HRESULT FinishScanning(const CDirItemsStat &st) x; \
 virtual HRESULT SetNumFiles(UInt64 numFiles) x; \
 virtual HRESULT SetTotal(UInt64 size) x; \
 virtual HRESULT SetCompleted(const UInt64 *completeValue) x; \
 virtual HRESULT CheckBreak() x; \
 virtual HRESULT BeforeFirstFile(const CHashBundle &hb) x; \
 virtual HRESULT GetStream(const wchar_t *name, bool isFolder) x; \
 virtual HRESULT OpenFileError(const FString &path, DWORD systemError) x; \
 virtual HRESULT SetOperationResult(UInt64
 fileSize, const CHashBundle &hb, bool showHash) x; \
 virtual HRESULT AfterLastFile(const CHashBundle &hb) x; \

struct IHashCallbackUI: public IDirItemsCallback
{
 INTERFACE_IHashCallbackUI(=0)
};

struct CHashOptions
{
 UStringVector Methods;
 bool OpenShareForWrite;
 bool StdInMode;
 bool AltStreamsMode;
 NWildcard::ECensorPathMode PathMode;

 CHashOptions(): StdInMode(false), OpenShareForWrite(false), AltStreamsMode(false),
```

```
PathMode(NWildcard::k_RelatPath) {};
};

HRESULT HashCalc(
  DECL_EXTERNAL_CODECS_LOC_VARS
  const NWildcard::CCensor &censor,
  const CHashOptions &options,
  AString &errorInfo,
  IHashCallbackUI *callback);

void AddHashHexToString(char *dest, const Byte *data, UInt32 size);

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Child Element in license Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-012-ref.xht" />
  <meta name="assert" content="The license element contains an unknown child element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
  {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-012.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
```

```
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
// Windows/COM.h

#ifndef __WINDOWS_COM_H
#define __WINDOWS_COM_H

#include "../Common/MyString.h"

namespace NWindows {
namespace NCOM {

#ifdef _WIN32

class CComInitializer
{
public:
 CComInitializer()
 {
  #ifdef UNDER_CE
  CoInitializeEx(NULL, COINIT_MULTITHREADED);
  #else
  // it's single thread. Do we need multithread?
  CoInitialize(NULL);
  #endif
 };
 ~CComInitializer() { CoUninitialize(); }
};

class CStgMedium
{
 STGMEDIUM _object;
public:
 bool _mustBeReleased;
 CStgMedium(): _mustBeReleased(false) {}
 ~CStgMedium() { Free(); }
 void Free()
 {
  if (_mustBeReleased)
    ReleaseStgMedium(&_object);
  _mustBeReleased = false;
 }
 const STGMEDIUM* operator->() const { return &_object;}
 STGMEDIUM* operator->() { return &_object;}
```

```
 STGMEDIUM* operator&() { return &_object; }
};

#endif

/*
//////////////////////////////////
// GUID <--> String Conversions
UString GUIDToStringW(REFGUID guid);
AString GUIDToStringA(REFGUID guid);
#ifdef UNICODE
  #define GUIDToString GUIDToStringW
#else
 #define GUIDToString GUIDToStringA
#endif

HRESULT StringToGUIDW(const wchar_t *string, GUID &classID);
HRESULT StringToGUIDA(const char *string, GUID &classID);
#ifdef UNICODE
 #define StringToGUID StringToGUIDW
#else
 #define StringToGUID StringToGUIDA
#endif
*/

}}

#endif
/*
* Copyright 2011 Martin Gieseking <martin.gieseking@uos.de>.
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* OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
*
* Plain C interface (a wrapper around the C++ implementation).
*/

#ifndef THIRD_PARTY_SNAPPY_OPENSOURCE_SNAPPY_C_H_
#define THIRD_PARTY_SNAPPY_OPENSOURCE_SNAPPY_C_H_

#ifdef __cplusplus
extern "C" {
#endif

#include <stddef.h>

/*
* Return values; see the documentation for each function to know
* what each can return.
*/
typedef enum {
 SNAPPY_OK = 0,
 SNAPPY_INVALID_INPUT = 1,
 SNAPPY_BUFFER_TOO_SMALL = 2
} snappy_status;

/*
 * Takes the data stored in "input[0..input_length-1]" and stores
* it in the array pointed to by "compressed".
*
* <compressed_length> signals the space available in "compressed".
* If it is not at least equal to "snappy_max_compressed_length(input_length)",
* SNAPPY_BUFFER_TOO_SMALL is returned. After successful compression,
* <compressed_length> contains the true length of the compressed output,
* and SNAPPY_OK is returned.
*
* Example:
*   size_t output_length = snappy_max_compressed_length(input_length);
*   char* output = (char*)malloc(output_length);
*   if (snappy_compress(input, input_length, output, &output_length)
*       == SNAPPY_OK) {
*     ... Process(output, output_length) ...
```

```
*   }
*   free(output);
*/
snappy_status snappy_compress(const char* input,
                              size_t input_length,
                              char* compressed,
                              size_t* compressed_length);

/*
* Given data in "compressed[0..compressed_length-1]"
 generated by
* calling the snappy_compress routine, this routine stores
* the uncompressed data to
*   uncompressed[0..uncompressed_length-1].
* Returns failure (a value not equal to SNAPPY_OK) if the message
* is corrupted and could not be decrypted.
*
* <uncompressed_length> signals the space available in "uncompressed".
* If it is not at least equal to the value returned by
* snappy_uncompressed_length for this stream, SNAPPY_BUFFER_TOO_SMALL
* is returned. After successful decompression, <uncompressed_length>
* contains the true length of the decompressed output.
*
* Example:
*   size_t output_length;
*   if (snappy_uncompressed_length(input, input_length, &output_length)
*       != SNAPPY_OK) {
*     ... fail ...
*   }
*   char* output = (char*)malloc(output_length);
*   if (snappy_uncompress(input, input_length, output, &output_length)
*       == SNAPPY_OK) {
*     ... Process(output, output_length) ...
*   }
*   free(output);
*/
snappy_status
 snappy_uncompress(const char* compressed,
                   size_t compressed_length,
                   char* uncompressed,
                   size_t* uncompressed_length);

/*
* Returns the maximal size of the compressed representation of
* input data that is "source_length" bytes in length.
*/
size_t snappy_max_compressed_length(size_t source_length);
```

```
/*
* REQUIRES: "compressed[]" was produced by snappy_compress()
* Returns SNAPPY_OK and stores the length of the uncompressed data in
* *result normally. Returns SNAPPY_INVALID_INPUT on parsing error.
* This operation takes O(1) time.
*/
snappy_status snappy_uncompressed_length(const char* compressed,
                                         size_t compressed_length,
                                         size_t* result);

/*
* Check if the contents of "compressed[]" can be uncompressed successfully.
* Does not return the uncompressed data; if so, returns SNAPPY_OK,
* or if not,
 returns SNAPPY_INVALID_INPUT.
* Takes time proportional to compressed_length, but is usually at least a
* factor of four faster than actual decompression.
*/
snappy_status snappy_validate_compressed_buffer(const char* compressed,
                                                size_t compressed_length);

#ifdef __cplusplus
}  // extern "C"
#endif

#endif  /* THIRD_PARTY_SNAPPY_OPENSOURCE_SNAPPY_C_H_ */
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With dir Attribute in div Element in text Element 2</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element that contains a div element with rtl as
the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
```

```
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   &lt;div dir="rtl"&gt;Paragraph 1&lt;/div&gt;
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION
OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR

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 WITH THE SOFTWARE OR THE USE OR OTHER
DEALINGS IN THE SOFTWARE.

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With class Attribute in div Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-023-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element that contains a div element with &quot;class1 class2 class3&quot; as the
 value for the class attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-023.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
```

```
  &lt;div class="class1 class2 class3"&gt;Paragraph 1&lt;/div&gt;
 &lt;/text&gt;
&lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
// HashCon.h

#ifndef __HASH_CON_H
#define __HASH_CON_H

#include "../Common/HashCalc.h"

#include "UpdateCallbackConsole.h"

class CHashCallbackConsole: public IHashCallbackUI, public CCallbackConsoleBase
{
 UString _fileName;
 AString _s;

 void AddSpacesBeforeName()
 {
   _s.Add_Space();
   _s.Add_Space();
 }

 void PrintSeparatorLine(const CObjectVector<CHasherState> &hashers);
 void PrintResultLine(UInt64 fileSize,
     const CObjectVector<CHasherState> &hashers, unsigned digestIndex, bool showHash);
 void PrintProperty(const char *name, UInt64 value);

public:
 bool PrintNameInPercents;

 bool PrintHeaders;

 bool PrintSize;
 bool PrintName;

 CHashCallbackConsole():
     PrintNameInPercents(true),
     PrintHeaders(false),
     PrintSize(true),
     PrintName(true)
   {}

 ~CHashCallbackConsole() { }
```

```
 INTERFACE_IHashCallbackUI(;)
};

void PrintHashStat(CStdOutStream &so, const CHashBundle &hb);

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With One No Language Tagged text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-004-ref.xht" />
  <meta name="assert" content="The license element matches the schema. It contains one text element that does not
have a language tag." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-004.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
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  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
```

<?xml version="1.0" encoding="UTF-8"?>
<metadata version="1.0">
 <license url="http://w3c.org/Fonts" id="License ID">
  <text>
   License without language.
  </text>
 </license>
</metadata>
  </pre>
 </body>
</html>
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A. HISTORY OF THE SOFTWARE
==========

Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |

| | | | | |
|---|---|---|---|---|
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
| 2.2 and above | | | | |
| 2.1.1 | 2001-now | | PSF | yes |

Footnotes:

(1) GPL-compatible doesn't mean that we're distributing Python under the GPL. All Python licenses, unlike the GPL, let you distribute a modified version without making your changes open source. The GPL-compatible licenses make it possible to combine Python with other software that is released under the GPL; the others don't.

(2) According to Richard Stallman, 1.6.1 is not GPL-compatible, because its license has a choice of law clause. According to CNRI, however, Stallman's lawyer has told CNRI's lawyer that 1.6.1 is "not incompatible" with the GPL.

Thanks to the many outside volunteers who have worked under Guido's direction to make these releases possible.

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
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 <head>
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  <title>WOFF Test: Valid license Element Without url Attribute</title>
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  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
```

```
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
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&lt;metadata version="1.0"&gt;
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  &lt;text&gt;
   License without language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
/* ATK -  Accessibility Toolkit
* Copyright 2001 Sun Microsystems Inc.
*
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* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_IMAGE_H__
#define __ATK_IMAGE_H__

#include <atk/atkobject.h>
#include <atk/atkutil.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

/*
* The AtkImage interface
 should be supported by any object that has an
* associated image. This interface provides the standard mechanism for
* an assistive technology to get descriptive information about images.
*/

#define ATK_TYPE_IMAGE                  (atk_image_get_type ())
#define ATK_IS_IMAGE(obj)               G_TYPE_CHECK_INSTANCE_TYPE ((obj), ATK_TYPE_IMAGE)
#define ATK_IMAGE(obj)                  G_TYPE_CHECK_INSTANCE_CAST ((obj), ATK_TYPE_IMAGE,
AtkImage)
#define ATK_IMAGE_GET_IFACE(obj)        (G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_IMAGE, AtkImageIface))

#ifndef _TYPEDEF_ATK_IMAGE_
#define _TYPEDEF_ATK_IMAGE_
typedef struct _AtkImage AtkImage;
#endif
typedef struct _AtkImageIface AtkImageIface;

struct _AtkImageIface
{
 GTypeInterface parent;
 void          ( *get_image_position)    (AtkImage   *image,
                                          gint                *x,
                    gint                *y,
                              AtkCoordType
        coord_type);
 G_CONST_RETURN gchar* ( *get_image_description) (AtkImage             *image);
 void                ( *get_image_size)       (AtkImage             *image,
```

```
                                    gint                *width,
                                    gint                *height);
 gboolean             ( *set_image_description) (AtkImage             *image,
                                    const gchar          *description);
 G_CONST_RETURN gchar* ( *get_image_locale)      (AtkImage             *image);

 AtkFunction          pad1;

};

GType  atk_image_get_type            (void);

G_CONST_RETURN gchar* atk_image_get_image_description (AtkImage   *image);

void     atk_image_get_image_size       (AtkImage          *image,
                                gint              *width,
                                gint              *height);

gboolean atk_image_set_image_description
 (AtkImage          *image,
                                const gchar       *description);
void     atk_image_get_image_position    (AtkImage      *image,
                                gint              *x,
      gint             *y,
        AtkCoordType      coord_type);

G_CONST_RETURN gchar* atk_image_get_image_locale (AtkImage   *image);

#ifdef __cplusplus
}
#endif /* __cplusplus */
#endif /* __ATK_IMAGE_H__ */
// ExtractEngine.h

#ifndef __EXTRACT_ENGINE_H
#define __EXTRACT_ENGINE_H

#include "../../UI/Common/LoadCodecs.h"

HRESULT ExtractArchive(CCodecs *codecs, const FString &fileName, const FString &destFolder,
   bool showProgress, bool &isCorrupt, UString &errorMessage);

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
```

```
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With One Language Tagged text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
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  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-005-ref.xht" />
  <meta name="assert" content="The license element matches the schema. It contains one text element that has a
language tag." />
  <style type="text/css"><![CDATA[
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 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-005.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
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   }
  ]]></style>
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  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts" id="License ID"&gt;
  &lt;text xml:lang="en"&gt;
   License with "en" language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With dir Attribute in span Element in text Element 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-030-ref.xht" />
  <meta name="assert" content="The license element contains a text element that contains a span element with ltr as the value for the dir attribute."
 />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-030.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   Text with &lt;span dir="ltr"&gt;span&lt;/span&gt;.
  &lt;/text&gt;
 &lt;/license&gt;
```

</metadata>
</pre>
</body>
</html>
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<?xml version="1.0" encoding="utf-8"?>
<Project DefaultTargets="Build" ToolsVersion="15.0"
xmlns="http://schemas.microsoft.com/developer/msbuild/2003">
<ItemGroup Label="ProjectConfigurations">
<ProjectConfiguration Include="Release|Win32">
<Configuration>Release</Configuration>

```
    <Platform>Win32</Platform>
  </ProjectConfiguration>
</ItemGroup>
<PropertyGroup Label="Globals">
  <VCProjectVersion>15.0</VCProjectVersion>
  <ProjectGuid>{5058AAED-D02A-4F86-B011-31516AB5CD63}</ProjectGuid>
  <Keyword>Win32Proj</Keyword>
  <RootNamespace>BitsUtils</RootNamespace>
  <WindowsTargetPlatformVersion>10.0.15063.0</WindowsTargetPlatformVersion>
</PropertyGroup>
<Import Project="$(VCTargetsPath)\Microsoft.Cpp.Default.props" />
<PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'" Label="Configuration">
  <ConfigurationType>DynamicLibrary</ConfigurationType>
  <UseDebugLibraries>false</UseDebugLibraries>
  <PlatformToolset>v141</PlatformToolset>
   <WholeProgramOptimization>true</WholeProgramOptimization>
  <CharacterSet>Unicode</CharacterSet>
</PropertyGroup>
<Import Project="$(VCTargetsPath)\Microsoft.Cpp.props" />
<ImportGroup Label="ExtensionSettings">
</ImportGroup>
<ImportGroup Label="Shared">
</ImportGroup>
<ImportGroup Label="PropertySheets" Condition="'$(Configuration)|$(Platform)'=='Release|Win32'">
  <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform" />
</ImportGroup>
<PropertyGroup Label="UserMacros" />
<PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'" />
<ItemDefinitionGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'">
  <ClCompile>
    <PrecompiledHeader>NotUsing</PrecompiledHeader>
    <WarningLevel>Level3</WarningLevel>
    <Optimization>MaxSpeed</Optimization>
    <FunctionLevelLinking>true</FunctionLevelLinking>
     <IntrinsicFunctions>true</IntrinsicFunctions>
    <SDLCheck>false</SDLCheck>
<PreprocessorDefinitions>WINVER=0x601;_WIN32_WINNT=0x601;WIN32;NDEBUG;CANCELBITSJOBS_E
XPORTS;_WINDOWS;_USRDLL;%(PreprocessorDefinitions)</PreprocessorDefinitions>
    <RuntimeLibrary>MultiThreaded</RuntimeLibrary>
    <BufferSecurityCheck>false</BufferSecurityCheck>
    <OmitDefaultLibName>true</OmitDefaultLibName>
    <ExceptionHandling>false</ExceptionHandling>
  </ClCompile>
  <Link>
    <SubSystem>Windows</SubSystem>
    <EnableCOMDATFolding>true</EnableCOMDATFolding>
    <OptimizeReferences>true</OptimizeReferences>
```

```
    <GenerateDebugInformation>false</GenerateDebugInformation>
    <EntryPointSymbol>DllMain</EntryPointSymbol>
  </Link>
 </ItemDefinitionGroup>
 <ItemGroup>
  <ClCompile Include="BitsUtils.cpp" />
 </ItemGroup>
 <Import Project="$(VCTargetsPath)\Microsoft.Cpp.targets" />
 <ImportGroup Label="ExtensionTargets">
 </ImportGroup>
</Project>
/* MtCoder.h -- Multi-thread Coder
2018-02-21 : Igor Pavlov : Public domain */

#ifndef __MT_CODER_H
#define __MT_CODER_H

#include "MtDec.h"

EXTERN_C_BEGIN

/*
 if (    defined MTCODER__USE_WRITE_THREAD) : main thread writes all data blocks to output stream
 if (not defined MTCODER__USE_WRITE_THREAD) : any coder thread can write data blocks to output stream
*/
/* #define MTCODER__USE_WRITE_THREAD */

#ifndef _7ZIP_ST
 #define MTCODER__GET_NUM_BLOCKS_FROM_THREADS(numThreads) ((numThreads) + (numThreads) /
8 + 1)
 #define MTCODER__THREADS_MAX 64
 #define MTCODER__BLOCKS_MAX
(MTCODER__GET_NUM_BLOCKS_FROM_THREADS(MTCODER__THREADS_MAX) + 3)
#else
 #define MTCODER__THREADS_MAX 1
 #define MTCODER__BLOCKS_MAX 1
#endif


#ifndef _7ZIP_ST


typedef struct
{
 ICompressProgress vt;
 CMtProgress *mtProgress;
 UInt64 inSize;
 UInt64 outSize;
```

```
} CMtProgressThunk;

void MtProgressThunk_CreateVTable(CMtProgressThunk *p);

#define MtProgressThunk_Init(p) { (p)->inSize = 0; (p)->outSize =
 0; }


struct _CMtCoder;


typedef struct
{
 struct _CMtCoder *mtCoder;
 unsigned index;
 int stop;
 Byte *inBuf;

 CAutoResetEvent startEvent;
 CThread thread;
} CMtCoderThread;


typedef struct
{
 SRes (*Code)(void *p, unsigned coderIndex, unsigned outBufIndex,
     const Byte *src, size_t srcSize, int finished);
 SRes (*Write)(void *p, unsigned outBufIndex);
} IMtCoderCallback2;


typedef struct
{
 SRes res;
 unsigned bufIndex;
 Bool finished;
} CMtCoderBlock;


typedef struct _CMtCoder
{
 /* input variables */

 size_t blockSize;        /* size of input block */
 unsigned numThreadsMax;
 UInt64 expectedDataSize;

 ISeqInStream *inStream;
```

```
const Byte *inData;
size_t inDataSize;

ICompressProgress *progress;
ISzAllocPtr allocBig;

IMtCoderCallback2 *mtCallback;
void *mtCallbackObject;


/* internal variables */

size_t allocatedBufsSize;

CAutoResetEvent readEvent;
CSemaphore blocksSemaphore;

Bool stopReading;
SRes readRes;

#ifdef MTCODER__USE_WRITE_THREAD
   CAutoResetEvent writeEvents[MTCODER__BLOCKS_MAX];
#else
  CAutoResetEvent finishedEvent;
  SRes writeRes;
  unsigned writeIndex;
  Byte ReadyBlocks[MTCODER__BLOCKS_MAX];
  LONG numFinishedThreads;
#endif

unsigned numStartedThreadsLimit;
unsigned numStartedThreads;

unsigned numBlocksMax;
unsigned blockIndex;
UInt64 readProcessed;

CCriticalSection cs;

unsigned freeBlockHead;
unsigned freeBlockList[MTCODER__BLOCKS_MAX];

CMtProgress mtProgress;
CMtCoderBlock blocks[MTCODER__BLOCKS_MAX];
CMtCoderThread threads[MTCODER__THREADS_MAX];
} CMtCoder;
```

```
void MtCoder_Construct(CMtCoder *p);
void MtCoder_Destruct(CMtCoder *p);
SRes MtCoder_Code(CMtCoder *p);


#endif


EXTERN_C_END

#endif
```

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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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German hyphenation patterns (traditional orthography)

(more info about the licence to be added later)

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\message{German
Hyphenation Patterns (Traditional Orthography) `dehypht-x' 2011-06-01 (WL)}

% TeX-Trennmuster fr die traditionelle deutsche Rechtschreibung
%
%
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% version 1 of the License, or any later version.
%
%
% The word list is available from
%
%  http://repo.or.cz/w/wortliste.git?a=commit;h=2d246449f5c4f570f4d735d3ad091f6ad70f6972
%
% The used patgen parameters are
%
%  1 1 | 2 5 | 1 1 1
%  2 2 | 2 5 | 1 2 1
%  3 3 | 2 6 | 1 1 1
%  4 4 | 2 6 | 1 4 1
%  5 5 | 2 7 | 1 1 1
%  6 6 | 2 7 | 1 6 1
%  7 7 | 2 13 | 1 4 1
%  8 8 | 2 13 | 1 8 1

A. HISTORY OF THE SOFTWARE
==========

Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
| 2.2 and above | | | | |
| 2.1.1 | | 2001-now | PSF | yes |

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Thanks to the many outside volunteers who have worked under Guido's direction to make these releases possible.

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// 7z/Handler.h

#ifndef __7Z_HANDLER_H

```
#define __7Z_HANDLER_H

#include "../../ICoder.h"
#include "../IArchive.h"

#include "../../Common/CreateCoder.h"

#ifndef __7Z_SET_PROPERTIES

#ifdef EXTRACT_ONLY
 #if !defined(_7ZIP_ST) && !defined(_SFX)
   #define __7Z_SET_PROPERTIES
 #endif
#else
 #define __7Z_SET_PROPERTIES
#endif

#endif

// #ifdef __7Z_SET_PROPERTIES
#include "../Common/HandlerOut.h"
// #endif

#include "7zCompressionMode.h"
#include "7zIn.h"

namespace NArchive {
namespace N7z {


#ifndef EXTRACT_ONLY

class COutHandler: public CMultiMethodProps
{
 HRESULT SetSolidFromString(const UString &s);
 HRESULT SetSolidFromPROPVARIANT(const PROPVARIANT &value);
public:
 UInt64 _numSolidFiles;
 UInt64 _numSolidBytes;
 bool _numSolidBytesDefined;
 bool _solidExtension;
 bool _useTypeSorting;

 bool _compressHeaders;
 bool _encryptHeadersSpecified;
 bool _encryptHeaders;
 // bool _useParents; 9.26
```

```
 CBoolPair Write_CTime;
 CBoolPair Write_ATime;
 CBoolPair Write_MTime;
  CBoolPair Write_Attrib;

 bool _useMultiThreadMixer;

 bool _removeSfxBlock;

 // bool _volumeMode;

 void InitSolidFiles() { _numSolidFiles = (UInt64)(Int64)(-1); }
 void InitSolidSize()  { _numSolidBytes = (UInt64)(Int64)(-1); }
 void InitSolid()
 {
   InitSolidFiles();
   InitSolidSize();
   _solidExtension = false;
   _numSolidBytesDefined = false;
 }

 void InitProps7z();
 void InitProps();

 COutHandler() { InitProps7z(); }

 HRESULT SetProperty(const wchar_t *name, const PROPVARIANT &value);
};

#endif

class CHandler:
 public IInArchive,
 public IArchiveGetRawProps,

 #ifdef __7Z_SET_PROPERTIES
 public ISetProperties,
 #endif

 #ifndef EXTRACT_ONLY
 public IOutArchive,
 #endif

 PUBLIC_ISetCompressCodecsInfo

 public CMyUnknownImp,

 #ifndef EXTRACT_ONLY
```

```
  public COutHandler
#else
  public CCommonMethodProps
#endif
{
public:
 MY_QUERYINTERFACE_BEGIN2(IInArchive)
 MY_QUERYINTERFACE_ENTRY(IArchiveGetRawProps)
 #ifdef __7Z_SET_PROPERTIES
  MY_QUERYINTERFACE_ENTRY(ISetProperties)
 #endif
 #ifndef EXTRACT_ONLY
 MY_QUERYINTERFACE_ENTRY(IOutArchive)
 #endif
 QUERY_ENTRY_ISetCompressCodecsInfo
 MY_QUERYINTERFACE_END
 MY_ADDREF_RELEASE

 INTERFACE_IInArchive(;)
 INTERFACE_IArchiveGetRawProps(;)

 #ifdef __7Z_SET_PROPERTIES
 STDMETHOD(SetProperties)(const wchar_t * const *names, const PROPVARIANT *values, UInt32 numProps);
 #endif

 #ifndef EXTRACT_ONLY
 INTERFACE_IOutArchive(;)
 #endif

 DECL_ISetCompressCodecsInfo

 CHandler();

private:
 CMyComPtr<IInStream> _inStream;
 NArchive::N7z::CDbEx _db;

 #ifndef _NO_CRYPTO
 bool _isEncrypted;
 bool _passwordIsDefined;
 UString _password;
 #endif

 #ifdef EXTRACT_ONLY

 #ifdef __7Z_SET_PROPERTIES
 bool _useMultiThreadMixer;
 #endif
```

```
UInt32 _crcSize;

#else

CRecordVector<CBond2> _bonds;

HRESULT PropsMethod_To_FullMethod(CMethodFull &dest, const COneMethodInfo &m);
HRESULT SetHeaderMethod(CCompressionMethodMode &headerMethod);
 HRESULT SetMainMethod(CCompressionMethodMode &method
   #ifndef _7ZIP_ST
   , UInt32 numThreads
   #endif
   );


#endif

bool IsFolderEncrypted(CNum folderIndex) const;
#ifndef _SFX

CRecordVector<UInt64> _fileInfoPopIDs;
void FillPopIDs();
void AddMethodName(AString &s, UInt64 id);
HRESULT SetMethodToProp(CNum folderIndex, PROPVARIANT *prop) const;

#endif

DECL_EXTERNAL_CODECS_VARS
};

}}

#endif
```

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```
// Common/Wildcard.h

#ifndef __COMMON_WILDCARD_H
#define __COMMON_WILDCARD_H

#include "MyString.h"

int CompareFileNames(const wchar_t *s1, const wchar_t *s2) STRING_UNICODE_THROW;
#ifndef USE_UNICODE_FSTRING
 int CompareFileNames(const char *s1, const char *s2);
#endif

bool IsPath1PrefixedByPath2(const wchar_t *s1, const wchar_t *s2);

void SplitPathToParts(const UString &path, UStringVector &pathParts);
void SplitPathToParts_2(const UString &path, UString &dirPrefix, UString &name);
void SplitPathToParts_Smart(const UString &path, UString &dirPrefix, UString &name); // ignores dir delimiter at
the end of (path)

UString ExtractDirPrefixFromPath(const UString &path);
UString ExtractFileNameFromPath(const UString &path);

bool DoesNameContainWildcard(const UString &path);
bool DoesWildcardMatchName(const UString &mask, const UString &name);

namespace NWildcard {

#ifdef _WIN32
// returns true, if name is like "a:", "c:", ...
bool IsDriveColonName(const wchar_t *s);
unsigned GetNumPrefixParts_if_DrivePath(UStringVector
```

```
 &pathParts);
#endif

struct CItem
{
 UStringVector PathParts;
 bool Recursive;
 bool ForFile;
 bool ForDir;
 bool WildcardMatching;

 #ifdef _WIN32
 bool IsDriveItem() const
 {
   return PathParts.Size() == 1 && !ForFile && ForDir && IsDriveColonName(PathParts[0]);
 }
 #endif

 // CItem(): WildcardMatching(true) {}

 bool AreAllAllowed() const;
 bool CheckPath(const UStringVector &pathParts, bool isFile) const;
};

class CCensorNode
{
 CCensorNode *Parent;

 bool CheckPathCurrent(bool include, const UStringVector &pathParts, bool isFile) const;
 void AddItemSimple(bool include, CItem &item);
public:
 bool CheckPathVect(const UStringVector &pathParts, bool isFile, bool &include) const;

 CCensorNode(): Parent(0) { };
 CCensorNode(const UString &name, CCensorNode *parent): Name(name), Parent(parent) { };

 UString Name; // WIN32 doesn't support wildcards in file names
 CObjectVector<CCensorNode> SubNodes;
 CObjectVector<CItem>
 IncludeItems;
 CObjectVector<CItem> ExcludeItems;

 bool AreAllAllowed() const;

 int FindSubNode(const UString &path) const;

 void AddItem(bool include, CItem &item, int ignoreWildcardIndex = -1);
 void AddItem(bool include, const UString &path, bool recursive, bool forFile, bool forDir, bool
```

```
wildcardMatching);
 void AddItem2(bool include, const UString &path, bool recursive, bool wildcardMatching);

 bool NeedCheckSubDirs() const;
 bool AreThereIncludeItems() const;

 // bool CheckPath2(bool isAltStream, const UString &path, bool isFile, bool &include) const;
 // bool CheckPath(bool isAltStream, const UString &path, bool isFile) const;

 bool CheckPathToRoot(bool include, UStringVector &pathParts, bool isFile) const;
 // bool CheckPathToRoot(const UString &path, bool isFile, bool include) const;
 void ExtendExclude(const CCensorNode &fromNodes);
};

struct CPair
{
 UString Prefix;
 CCensorNode Head;

 CPair(const UString &prefix): Prefix(prefix) { };
};

enum ECensorPathMode
{
  k_RelatPath,  // absolute prefix as Prefix, remain path in Tree
 k_FullPath,   // drive prefix as Prefix, remain path in Tree
 k_AbsPath     // full path in Tree
};

struct CCensorPath
{
 UString Path;
 bool Include;
 bool Recursive;
 bool WildcardMatching;

 CCensorPath():
   Include(true),
   Recursive(false),
   WildcardMatching(true)
   {}
};

class CCensor
{
 int FindPrefix(const UString &prefix) const;
public:
 CObjectVector<CPair> Pairs;
```

```
 CObjectVector<NWildcard::CCensorPath> CensorPaths;

 bool AllAreRelative() const
   { return (Pairs.Size() == 1 && Pairs.Front().Prefix.IsEmpty()); }

 void AddItem(ECensorPathMode pathMode, bool include, const UString &path, bool recursive, bool
wildcardMatching);
 // bool CheckPath(bool isAltStream, const UString &path, bool isFile) const;
 void ExtendExclude();

 void AddPathsToCensor(NWildcard::ECensorPathMode censorPathMode);
 void AddPreItem(bool include, const UString &path, bool recursive, bool
 wildcardMatching);
 void AddPreItem(const UString &path)
 {
   AddPreItem(true, path, false, false);
 }
 void AddPreItem_Wildcard()
 {
   AddPreItem(true, UString("*"), false, true);
 }
};



}

#endif
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// Author: sesse@google.com (Steinar H. Gunderson)
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//
// Various type stubs for the open-source version of Snappy.
//
// This file cannot include config.h, as it is included from snappy.h,
// which is a public header. Instead, snappy-stubs-public.h is generated by
// from snappy-stubs-public.h.in at configure time.

#ifndef THIRD_PARTY_SNAPPY_OPENSOURCE_SNAPPY_STUBS_PUBLIC_H_
#define THIRD_PARTY_SNAPPY_OPENSOURCE_SNAPPY_STUBS_PUBLIC_H_

#include
 <stdint.h>

#if defined IS_BIG_ENDIAN || defined __BIG_ENDIAN__
#define WORDS_BIGENDIAN
#endif

#define SNAPPY_MAJOR 1
#define SNAPPY_MINOR 1
#define SNAPPY_PATCHLEVEL 3
#define SNAPPY_VERSION \
   ((SNAPPY_MAJOR << 16) | (SNAPPY_MINOR << 8) | SNAPPY_PATCHLEVEL)

#include <string>

namespace snappy {

typedef int8_t int8;
typedef uint8_t uint8;
typedef int16_t int16;
typedef uint16_t uint16;
typedef int32_t int32;
typedef uint32_t uint32;
typedef int64_t int64;
typedef uint64_t uint64;

typedef std::string string;

#ifndef DISALLOW_COPY_AND_ASSIGN
```

```
#define DISALLOW_COPY_AND_ASSIGN(TypeName) \
 TypeName(const TypeName&);              \
 void operator=(const TypeName&)
#endif

struct iovec {
 void* iov_base;
 size_t iov_len;
};

#if defined(_WIN32) || defined(_WIN64)
#if defined(_WIN64)
typedef __int64 LONG_PTR;
#else
typedef long LONG_PTR;
#endif
typedef LONG_PTR SSIZE_T;
typedef SSIZE_T ssize_t;
#endif

}  // namespace snappy

#endif  // THIRD_PARTY_SNAPPY_OPENSOURCE_SNAPPY_STUBS_PUBLIC_H_
// Windows/Registry.h

#ifndef __WINDOWS_REGISTRY_H
#define __WINDOWS_REGISTRY_H

#include "../Common/MyBuffer.h"
#include "../Common/MyString.h"

namespace NWindows {
namespace NRegistry {

LONG SetValue(HKEY parentKey, LPCTSTR keyName, LPCTSTR valueName, LPCTSTR value);

class CKey
{
 HKEY _object;
public:
 CKey(): _object(NULL) {}
 ~CKey() { Close(); }

 operator HKEY() const { return _object; }
 void Attach(HKEY key) { _object = key; }
 HKEY Detach()
 {
   HKEY key = _object;
```

```
  _object = NULL;
  return key;
}

LONG Create(HKEY parentKey, LPCTSTR keyName,
    LPTSTR keyClass = REG_NONE, DWORD options = REG_OPTION_NON_VOLATILE,
    REGSAM accessMask = KEY_ALL_ACCESS,
    LPSECURITY_ATTRIBUTES securityAttributes = NULL,
    LPDWORD disposition = NULL) throw();
LONG Open(HKEY parentKey, LPCTSTR keyName, REGSAM accessMask = KEY_ALL_ACCESS) throw();

LONG Close() throw();

LONG DeleteSubKey(LPCTSTR subKeyName) throw();
LONG RecurseDeleteKey(LPCTSTR subKeyName)
throw();

LONG DeleteValue(LPCTSTR name) throw();
#ifndef _UNICODE
LONG DeleteValue(LPCWSTR name);
#endif

LONG SetValue(LPCTSTR valueName, UInt32 value) throw();
LONG SetValue(LPCTSTR valueName, bool value) throw();
LONG SetValue(LPCTSTR valueName, LPCTSTR value) throw();
// LONG SetValue(LPCTSTR valueName, const CSysString &value);
#ifndef _UNICODE
LONG SetValue(LPCWSTR name, LPCWSTR value);
// LONG SetValue(LPCWSTR name, const UString &value);
#endif

LONG SetValue(LPCTSTR name, const void *value, UInt32 size) throw();

LONG SetValue_Strings(LPCTSTR valueName, const UStringVector &strings);
LONG GetValue_Strings(LPCTSTR valueName, UStringVector &strings);

LONG SetKeyValue(LPCTSTR keyName, LPCTSTR valueName, LPCTSTR value) throw();

LONG QueryValue(LPCTSTR name, UInt32 &value) throw();
LONG QueryValue(LPCTSTR name, bool &value) throw();
LONG QueryValue(LPCTSTR name, LPTSTR value, UInt32 &dataSize) throw();
LONG QueryValue(LPCTSTR name, CSysString
&value);

LONG GetValue_IfOk(LPCTSTR name, UInt32 &value) throw();
LONG GetValue_IfOk(LPCTSTR name, bool &value) throw();

#ifndef _UNICODE
```

```
 LONG QueryValue(LPCWSTR name, LPWSTR value, UInt32 &dataSize);
 LONG QueryValue(LPCWSTR name, UString &value);
 #endif

 LONG QueryValue(LPCTSTR name, void *value, UInt32 &dataSize) throw();
 LONG QueryValue(LPCTSTR name, CByteBuffer &value, UInt32 &dataSize);

 LONG EnumKeys(CSysStringVector &keyNames);
};

}}

#endif
#define IDS_MEM_ERROR                    3000

#define IDS_CANNOT_CREATE_FOLDER        3003
#define IDS_UPDATE_NOT_SUPPORTED        3004
#define IDS_CANT_OPEN_ARCHIVE           3005
#define IDS_CANT_OPEN_ENCRYPTED_ARCHIVE 3006
#define IDS_UNSUPPORTED_ARCHIVE_TYPE    3007

#define IDS_CANT_OPEN_AS_TYPE           3017
#define IDS_IS_OPEN_AS_TYPE             3018
#define IDS_IS_OPEN_WITH_OFFSET         3019

#define IDS_PROGRESS_EXTRACTING         3300

#define IDS_PROGRESS_SKIPPING           3325

#define IDS_EXTRACT_SET_FOLDER          3402

#define IDS_EXTRACT_PATHS_FULL          3411
#define IDS_EXTRACT_PATHS_NO            3412
#define IDS_EXTRACT_PATHS_ABS           3413
#define IDS_PATH_MODE_RELAT             3414

#define IDS_EXTRACT_OVERWRITE_ASK             3421
#define IDS_EXTRACT_OVERWRITE_WITHOUT_PROMPT  3422
#define IDS_EXTRACT_OVERWRITE_SKIP_EXISTING   3423
#define IDS_EXTRACT_OVERWRITE_RENAME          3424
#define IDS_EXTRACT_OVERWRITE_RENAME_EXISTING 3425

#define IDS_EXTRACT_MESSAGE_UNSUPPORTED_METHOD
   3700
#define IDS_EXTRACT_MESSAGE_DATA_ERROR            3701
#define IDS_EXTRACT_MESSAGE_CRC_ERROR             3702
#define IDS_EXTRACT_MESSAGE_DATA_ERROR_ENCRYPTED  3703
#define IDS_EXTRACT_MESSAGE_CRC_ERROR_ENCRYPTED   3704
```

```
#define IDS_EXTRACT_MSG_WRONG_PSW_GUESS      3710
// #define IDS_EXTRACT_MSG_ENCRYPTED           3711

#define IDS_EXTRACT_MSG_UNSUPPORTED_METHOD   3721
#define IDS_EXTRACT_MSG_DATA_ERROR           3722
#define IDS_EXTRACT_MSG_CRC_ERROR            3723
#define IDS_EXTRACT_MSG_UNAVAILABLE_DATA     3724
#define IDS_EXTRACT_MSG_UEXPECTED_END        3725
#define IDS_EXTRACT_MSG_DATA_AFTER_END       3726
#define IDS_EXTRACT_MSG_IS_NOT_ARC           3727
#define IDS_EXTRACT_MSG_HEADERS_ERROR        3728
#define IDS_EXTRACT_MSG_WRONG_PSW_CLAIM      3729

#define IDS_OPEN_MSG_UNAVAILABLE_START       3763
#define IDS_OPEN_MSG_UNCONFIRMED_START       3764
#define IDS_OPEN_MSG_UNSUPPORTED_FEATURE     3768
/* DllSecur.h -- DLL loading for security
2016-06-08 : Igor Pavlov : Public domain */

#ifndef __DLL_SECUR_H
#define __DLL_SECUR_H

#include "7zTypes.h"

EXTERN_C_BEGIN

#ifdef _WIN32

void LoadSecurityDlls();

#endif

EXTERN_C_END

#endif
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LZMA specification (DRAFT version)
---

Author: Igor Pavlov
Date: 2015-06-14

This specification defines the format of LZMA compressed data and lzma file format.

Notation
---

We use the syntax of C++ programming language.
We use the following types in C++ code:

```
unsigned - unsigned integer, at least 16 bits in size
int      - signed integer, at least 16 bits in size
UInt64   - 64-bit unsigned integer
UInt32   - 32-bit unsigned integer
UInt16   - 16-bit unsigned integer
Byte     - 8-bit unsigned integer
bool     - boolean type with two possible values: false, true
```

lzma file format
==========

The lzma file contains the raw LZMA stream and the header with related properties.

The files in that format use ".lzma" extension.

The lzma file format layout:

Offset Size Description

```
 0     1   LZMA model properties (lc, lp, pb) in encoded form
 1     4   Dictionary size (32-bit unsigned integer, little-endian)
 5     8   Uncompressed
 size (64-bit unsigned integer, little-endian)
13         Compressed data (LZMA stream)
```

LZMA properties:

```
   name  Range          Description

     lc  [0, 8]         the number of "literal context" bits
     lp  [0, 4]         the number of "literal pos" bits
     pb  [0, 4]         the number of "pos" bits
dictSize  [0, 2^32 - 1]  the dictionary size
```

The following code encodes LZMA properties:

```
void EncodeProperties(Byte *properties)
{
 properties[0] = (Byte)((pb * 5 + lp) * 9 + lc);
 Set_UInt32_LittleEndian(properties + 1, dictSize);
}
```

If the value of dictionary size in properties is smaller than (1 << 12),
the LZMA decoder must set the dictionary size variable to (1 << 12).

```
#define LZMA_DIC_MIN (1 << 12)

 unsigned lc, pb, lp;
 UInt32 dictSize;
 UInt32 dictSizeInProperties;

 void DecodeProperties(const Byte *properties)
 {
   unsigned d = properties[0];
   if (d >= (9 * 5 * 5))
     throw "Incorrect LZMA properties";
   lc = d % 9;
   d /= 9;
   pb = d / 5;
    lp = d % 5;
   dictSizeInProperties = 0;
   for (int i = 0; i < 4; i++)
```

```
    dictSizeInProperties |= (UInt32)properties[i + 1] << (8 * i);
  dictSize = dictSizeInProperties;
  if (dictSize < LZMA_DIC_MIN)
    dictSize = LZMA_DIC_MIN;
}
```

If "Uncompressed size" field contains ones in all 64 bits, it means that uncompressed size is unknown and there is the "end marker" in stream, that indicates the end of decoding point.
In opposite case, if the value from "Uncompressed size" field is not equal to ((2^64) - 1), the LZMA stream decoding must be finished after specified number of bytes (Uncompressed size) is decoded. And if there is the "end marker", the LZMA decoder must read that marker also.

The new scheme to encode LZMA properties
---

If LZMA compression is used for some another format, it's recommended to use a new improved scheme to encode LZMA properties. That new scheme was used in xz format that uses the LZMA2 compression algorithm.
The
LZMA2 is a new compression algorithm that is based on the LZMA algorithm.

The dictionary size in LZMA2 is encoded with just one byte and LZMA2 supports only reduced set of dictionary sizes:
(2 << 11), (3 << 11),
(2 << 12), (3 << 12),
...
(2 << 30), (3 << 30),
(2 << 31) - 1

The dictionary size can be extracted from encoded value with the following code:

```
dictSize = (p == 40) ? 0xFFFFFFFF : (((UInt32)2 | ((p) & 1)) << ((p) / 2 + 11));
```

Also there is additional limitation (lc + lp <= 4) in LZMA2 for values of "lc" and "lp" properties:

```
if (lc + lp > 4)
  throw "Unsupported properties: (lc + lp) > 4";
```

There are some advantages for LZMA decoder with such (lc + lp) value limitation. It reduces the maximum size of tables allocated by decoder.
And it reduces the complexity of initialization procedure, that can be important to keep high speed of decoding of big number of small LZMA streams.

It's recommended to use that limitation (lc + lp <= 4) for any new format

that
uses LZMA compression. Note that the combinations of "lc" and "lp" parameters, where (lc + lp > 4), can provide significant improvement in compression ratio only in some rare cases.

The LZMA properties can be encoded into two bytes in new scheme:

| Offset | Size | Description |
|---|---|---|
| 0 | 1 | The dictionary size encoded with LZMA2 scheme |
| 1 | 1 | LZMA model properties (lc, lp, pb) in encoded form |

## The RAM usage

The RAM usage for LZMA decoder is determined by the following parts:

1) The Sliding Window (from 4 KiB to 4 GiB).
2) The probability model counter arrays (arrays of 16-bit variables).
3) Some additional state variables (about 10 variables of 32-bit integers).

### The RAM usage for Sliding Window

There are two main scenarios of decoding:

1) The decoding of full stream to one RAM buffer.

If we decode full LZMA stream to one output buffer in RAM, the decoder can use that output buffer as sliding window. So the decoder doesn't

need additional buffer allocated for sliding window.

2) The decoding to some external storage.

If we decode LZMA stream to external storage, the decoder must allocate the buffer for sliding window. The size of that buffer must be equal or larger than the value of dictionary size from properties of LZMA stream.

In this specification we describe the code for decoding to some external storage. The optimized version of code for decoding of full stream to one output RAM buffer can require some minor changes in code.

### The RAM usage for the probability model counters

The size of the probability model counter arrays is calculated with the following formula:

size_of_prob_arrays = 1846 + 768 * (1 << (lp + lc))

Each probability model counter is 11-bit unsigned integer.
If we use 16-bit integer variables (2-byte integers) for these probability model counters, the RAM usage required by probability model counter arrays can be
estimated with the following formula:

RAM = 4 KiB + 1.5 KiB * (1 << (lp + lc))

For example, for default LZMA parameters (lp = 0 and lc = 3), the RAM usage is

RAM_lc3_lp0 = 4 KiB + 1.5 KiB * 8 = 16 KiB

The maximum RAM state usage is required for decoding the stream with lp = 4 and lc = 8:

RAM_lc8_lp4 = 4 KiB + 1.5 KiB * 4096 = 6148 KiB

If the decoder uses LZMA2's limited property condition (lc + lp <= 4), the RAM usage will be not larger than

RAM_lc_lp_4 = 4 KiB + 1.5 KiB * 16 = 28 KiB

## The RAM usage for encoder

There are many variants for LZMA encoding code.
These variants have different values for memory consumption.
Note that memory consumption for LZMA Encoder can not be smaller than memory consumption of LZMA Decoder for same stream.

The RAM usage required by modern effective implementation of LZMA Encoder can be estimated with the following formula:

Encoder_RAM_Usage = 4 MiB + 11 * dictionarySize.

But there are some modes of the
encoder that require less memory.

# LZMA Decoding

The LZMA compression algorithm uses LZ-based compression with Sliding Window
and Range Encoding as entropy coding method.

Sliding Window
---

LZMA uses Sliding Window compression similar to LZ77 algorithm.

LZMA stream must be decoded to the sequence that consists
of MATCHES and LITERALS:

- a LITERAL is a 8-bit character (one byte).
  The decoder just puts that LITERAL to the uncompressed stream.

- a MATCH is a pair of two numbers (DISTANCE-LENGTH pair).
  The decoder takes one byte exactly "DISTANCE" characters behind
  current position in the uncompressed stream and puts it to
  uncompressed stream. The decoder must repeat it "LENGTH" times.

The "DISTANCE" can not be larger than dictionary size.
And the "DISTANCE" can not be larger than the number of bytes in
the uncompressed stream that were decoded before that match.

In this specification we use cyclic buffer to implement Sliding Window
for
 LZMA decoder:

```
class COutWindow
{
 Byte *Buf;
 UInt32 Pos;
 UInt32 Size;
 bool IsFull;

public:
 unsigned TotalPos;
 COutStream OutStream;

 COutWindow(): Buf(NULL) {}
 ~COutWindow() { delete []Buf; }

 void Create(UInt32 dictSize)
 {
   Buf = new Byte[dictSize];
   Pos = 0;
   Size = dictSize;
```

```
  IsFull = false;
  TotalPos = 0;
 }

 void PutByte(Byte b)
 {
  TotalPos++;
  Buf[Pos++] = b;
  if (Pos == Size)
  {
    Pos = 0;
    IsFull = true;
  }
  OutStream.WriteByte(b);
 }

 Byte GetByte(UInt32 dist) const
 {
  return Buf[dist <= Pos ? Pos - dist : Size - dist + Pos];
 }

 void CopyMatch(UInt32 dist, unsigned len)
 {
  for (; len > 0; len--)
    PutByte(GetByte(dist));
 }

 bool CheckDistance(UInt32 dist) const
 {
  return dist <= Pos || IsFull;
 }

 bool IsEmpty() const
 {
  return Pos == 0 && !IsFull;
 }
};
```

In another implementation it's possible to use one buffer that contains
Sliding Window and the whole data
 stream after uncompressing.

Range Decoder
---

LZMA algorithm uses Range Encoding (1) as entropy coding method.

LZMA stream contains just one very big number in big-endian encoding.
LZMA decoder uses the Range Decoder to extract a sequence of binary
symbols from that big number.

The state of the Range Decoder:

```
struct CRangeDecoder
{
 UInt32 Range;
 UInt32 Code;
 InputStream *InStream;

 bool Corrupted;
}
```

The notes about UInt32 type for the "Range" and "Code" variables:

It's possible to use 64-bit (unsigned or signed) integer type
for the "Range" and the "Code" variables instead of 32-bit unsigned,
but some additional code must be used to truncate the values to
low 32-bits after some operations.

If the programming language does not support 32-bit unsigned integer type
(like in case of JAVA language), it's possible to use 32-bit signed integer,
but some code must be changed. For example, it's required to change the code
that uses comparison operations
for UInt32 variables in this specification.

The Range Decoder can be in some states that can be treated as
"Corruption" in LZMA stream. The Range Decoder uses the variable "Corrupted":

(Corrupted == false), if the Range Decoder has not detected any corruption.
(Corrupted == true), if the Range Decoder has detected some corruption.

The reference LZMA Decoder ignores the value of the "Corrupted" variable.
So it continues to decode the stream, even if the corruption can be detected
in the Range Decoder. To provide the full compatibility with output of the
reference LZMA Decoder, another LZMA Decoder implementations must also
ignore the value of the "Corrupted" variable.

The LZMA Encoder is required to create only such LZMA streams, that will not
lead the Range Decoder to states, where the "Corrupted" variable is set to true.

The Range Decoder reads first 5 bytes from input stream to initialize
the state:

```
bool CRangeDecoder::Init()
```

```
{
 Corrupted = false;
 Range = 0xFFFFFFFF;
  Code = 0;

 Byte b = InStream->ReadByte();

 for (int i = 0; i < 4; i++)
   Code = (Code << 8) | InStream->ReadByte();

 if (b != 0 || Code == Range)
   Corrupted = true;
 return b == 0;
}
```

The LZMA Encoder always writes ZERO in initial byte of compressed stream. That scheme allows to simplify the code of the Range Encoder in the LZMA Encoder. If initial byte is not equal to ZERO, the LZMA Decoder must stop decoding and report error.

After the last bit of data was decoded by Range Decoder, the value of the "Code" variable must be equal to 0. The LZMA Decoder must check it by calling the IsFinishedOK() function:

```
 bool IsFinishedOK() const { return Code == 0; }
```

If there is corruption in data stream, there is big probability that the "Code" value will be not equal to 0 in the Finish() function. So that check in the IsFinishedOK() function provides very good feature for corruption detection.

The value of the "Range" variable before each bit decoding can not be smaller

than ((UInt32)1 << 24). The Normalize() function keeps the "Range" value in described range.

```
#define kTopValue ((UInt32)1 << 24)

void CRangeDecoder::Normalize()
{
 if (Range < kTopValue)
 {
   Range <<= 8;
   Code = (Code << 8) | InStream->ReadByte();
 }
}
```

Notes: if the size of the "Code" variable is larger than 32 bits, it's

required to keep only low 32 bits of the "Code" variable after the change in Normalize() function.

If the LZMA Stream is not corrupted, the value of the "Code" variable is always smaller than value of the "Range" variable.
But the Range Decoder ignores some types of corruptions, so the value of the "Code" variable can be equal or larger than value of the "Range" variable for some "Corrupted" archives.

LZMA uses Range Encoding only with binary symbols of two types:
1) binary symbols with fixed and equal probabilities (direct bits)
2) binary symbols with predicted probabilities

The DecodeDirectBits() function decodes the sequence of direct bits:

```
UInt32
 CRangeDecoder::DecodeDirectBits(unsigned numBits)
{
 UInt32 res = 0;
 do
 {
   Range >>= 1;
   Code -= Range;
   UInt32 t = 0 - ((UInt32)Code >> 31);
   Code += Range & t;

   if (Code == Range)
     Corrupted = true;

   Normalize();
   res <<= 1;
   res += t + 1;
 }
 while (--numBits);
 return res;
}
```

The Bit Decoding with Probability Model
---

The task of Bit Probability Model is to estimate probabilities of binary symbols. And then it provides the Range Decoder with that information.
The better prediction provides better compression ratio.
The Bit Probability Model uses statistical data of previous decoded symbols.

That estimated probability is presented as 11-bit unsigned integer value
that represents the probability of symbol "0".

```
#define kNumBitModelTotalBits 11
```

Mathematical probabilities can be presented with the following formulas:

```
   probability(symbol_0) = prob / 2048.
   probability(symbol_1) =
  1 - Probability(symbol_0) =
                    =  1 - prob / 2048 =
                    =  (2048 - prob) / 2048
```

where the "prob" variable contains 11-bit integer probability counter.

It's recommended to use 16-bit unsigned integer type, to store these 11-bit
probability values:

```
typedef UInt16 CProb;
```

Each probability value must be initialized with value ((1 << 11) / 2),
that represents the state, where probabilities of symbols 0 and 1
are equal to 0.5:

```
#define PROB_INIT_VAL ((1 << kNumBitModelTotalBits) / 2)
```

The INIT_PROBS macro is used to initialize the array of CProb variables:

```
#define INIT_PROBS(p) \
{ for (unsigned i = 0; i < sizeof(p) / sizeof(p[0]); i++) p[i] = PROB_INIT_VAL; }
```

The DecodeBit() function decodes one bit.
The LZMA decoder provides the pointer to CProb variable that contains
information about estimated probability for symbol 0 and the Range Decoder
updates that CProb variable after decoding. The Range Decoder increases
estimated probability
 of the symbol that was decoded:

```
#define kNumMoveBits 5

unsigned CRangeDecoder::DecodeBit(CProb *prob)
{
 unsigned v = *prob;
 UInt32 bound = (Range >> kNumBitModelTotalBits) * v;
 unsigned symbol;
 if (Code < bound)
 {
   v += ((1 << kNumBitModelTotalBits) - v) >> kNumMoveBits;
   Range = bound;
```

```
  symbol = 0;
 }
 else
 {
  v -= v >> kNumMoveBits;
  Code -= bound;
  Range -= bound;
  symbol = 1;
 }
 *prob = (CProb)v;
 Normalize();
 return symbol;
}
```

The Binary Tree of bit model counters
---

LZMA uses a tree of Bit model variables to decode symbol that needs
several bits for storing. There are two versions of such trees in LZMA:
 1) the tree that decodes bits from high bit to low bit (the normal scheme).
 2) the tree that decodes bits from low bit to high bit (the reverse scheme).

Each binary tree structure supports different size of decoded symbol
(the size of binary sequence that contains value of symbol).
If that size
 of decoded symbol is "NumBits" bits, the tree structure
uses the array of (2 << NumBits) counters of CProb type.
But only ((2 << NumBits) - 1) items are used by encoder and decoder.
The first item (the item with index equal to 0) in array is unused.
That scheme with unused array's item allows to simplify the code.

```
unsigned BitTreeReverseDecode(CProb *probs, unsigned numBits, CRangeDecoder *rc)
{
 unsigned m = 1;
 unsigned symbol = 0;
 for (unsigned i = 0; i < numBits; i++)
 {
  unsigned bit = rc->DecodeBit(&probs[m]);
  m <<= 1;
  m += bit;
  symbol |= (bit << i);
 }
 return symbol;
}

template <unsigned NumBits>
class CBitTreeDecoder
```

```
{
 CProb Probs[(unsigned)1 << NumBits];

public:

 void Init()
 {
   INIT_PROBS(Probs);
 }

 unsigned Decode(CRangeDecoder *rc)
 {
   unsigned m = 1;
   for (unsigned i = 0; i < NumBits; i++)
     m = (m << 1) + rc->DecodeBit(&Probs[m]);
   return m - ((unsigned)1 << NumBits);
 }

 unsigned ReverseDecode(CRangeDecoder *rc)
  {
   return BitTreeReverseDecode(Probs, NumBits, rc);
 }
};
```

LZ part of LZMA
---

LZ part of LZMA describes details about the decoding of MATCHES and LITERALS.

The Literal Decoding
---

The LZMA Decoder uses (1 << (lc + lp)) tables with CProb values, where
each table contains 0x300 CProb values:

```
 CProb *LitProbs;

 void CreateLiterals()
 {
   LitProbs = new CProb[(UInt32)0x300 << (lc + lp)];
 }

 void InitLiterals()
 {
   UInt32 num = (UInt32)0x300 << (lc + lp);
   for (UInt32 i = 0; i < num; i++)
```

```
    LitProbs[i] = PROB_INIT_VAL;
 }
```

To select the table for decoding it uses the context that consists of
(lc) high bits from previous literal and (lp) low bits from value that
represents current position in outputStream.

If (State > 7), the Literal Decoder also uses "matchByte" that represents
the byte in OutputStream at position the is the DISTANCE bytes before
current position, where the DISTANCE is the distance in DISTANCE-LENGTH
 pair
of latest decoded match.

The following code decodes one literal and puts it to Sliding Window buffer:

```
 void DecodeLiteral(unsigned state, UInt32 rep0)
 {
   unsigned prevByte = 0;
   if (!OutWindow.IsEmpty())
     prevByte = OutWindow.GetByte(1);

   unsigned symbol = 1;
   unsigned litState = ((OutWindow.TotalPos & ((1 << lp) - 1)) << lc) + (prevByte >> (8 - lc));
   CProb *probs = &LitProbs[(UInt32)0x300 * litState];

   if (state >= 7)
   {
     unsigned matchByte = OutWindow.GetByte(rep0 + 1);
     do
     {
       unsigned matchBit = (matchByte >> 7) & 1;
       matchByte <<= 1;
       unsigned bit = RangeDec.DecodeBit(&probs[((1 + matchBit) << 8) + symbol]);
       symbol = (symbol << 1) | bit;
       if (matchBit != bit)
         break;
     }
     while (symbol < 0x100);
   }
   while (symbol < 0x100)
     symbol = (symbol << 1) | RangeDec.DecodeBit(&probs[symbol]);
   OutWindow.PutByte((Byte)(symbol - 0x100));
 }
```

The match length decoding
---

The
match length decoder returns normalized (zero-based value)
length of match. That value can be converted to real length of the match
with the following code:

```
#define kMatchMinLen 2

  matchLen = len + kMatchMinLen;
```

The match length decoder can return the values from 0 to 271.
And the corresponded real match length values can be in the range
from 2 to 273.

The following scheme is used for the match length encoding:

| Binary encoding sequence | Binary Tree structure | Zero-based match length (binary + decimal): |
|---|---|---|
| 0 xxx | LowCoder[posState] | xxx |
| 1 0 yyy | MidCoder[posState] | yyy + 8 |
| 1 1 zzzzzzzz | HighCoder | zzzzzzzz + 16 |

LZMA uses bit model variable "Choice" to decode the first selection bit.

If the first selection bit is equal to 0, the decoder uses binary tree
LowCoder[posState] to decode 3-bit zero-based match length (xxx).

If the first selection
bit is equal to 1, the decoder uses bit model
variable "Choice2" to decode the second selection bit.

If the second selection bit is equal to 0, the decoder uses binary tree
MidCoder[posState] to decode 3-bit "yyy" value, and zero-based match
length is equal to (yyy + 8).

If the second selection bit is equal to 1, the decoder uses binary tree
HighCoder to decode 8-bit "zzzzzzzz" value, and zero-based
match length is equal to (zzzzzzzz + 16).

LZMA uses "posState" value as context to select the binary tree
from LowCoder and MidCoder binary tree arrays:

```
  unsigned posState = OutWindow.TotalPos & ((1 << pb) - 1);
```

The full code of the length decoder:

```
class CLenDecoder
{
```

```
 CProb Choice;
 CProb Choice2;
 CBitTreeDecoder<3> LowCoder[1 << kNumPosBitsMax];
 CBitTreeDecoder<3> MidCoder[1 << kNumPosBitsMax];
 CBitTreeDecoder<8> HighCoder;

public:

 void Init()
 {
   Choice = PROB_INIT_VAL;
   Choice2 = PROB_INIT_VAL;
   HighCoder.Init();
   for (unsigned
 i = 0; i < (1 << kNumPosBitsMax); i++)
   {
     LowCoder[i].Init();
     MidCoder[i].Init();
   }
 }

 unsigned Decode(CRangeDecoder *rc, unsigned posState)
 {
   if (rc->DecodeBit(&Choice) == 0)
     return LowCoder[posState].Decode(rc);
   if (rc->DecodeBit(&Choice2) == 0)
     return 8 + MidCoder[posState].Decode(rc);
   return 16 + HighCoder.Decode(rc);
 }
};
```

The LZMA decoder uses two instances of CLenDecoder class.
The first instance is for the matches of "Simple Match" type,
and the second instance is for the matches of "Rep Match" type:

```
 CLenDecoder LenDecoder;
 CLenDecoder RepLenDecoder;
```

The match distance decoding
---

LZMA supports dictionary sizes up to 4 GiB minus 1.
The value of match distance (decoded by distance decoder) can be
from 1 to 2^32. But the distance value that is equal to 2^32 is used to
indicate the "End of stream" marker. So real largest match distance
that is used for LZ-window match is (2^32 - 1).

LZMA uses
normalized match length (zero-based length)
to calculate the context state "lenState" do decode the distance value:

```
#define kNumLenToPosStates 4

  unsigned lenState = len;
  if (lenState > kNumLenToPosStates - 1)
    lenState = kNumLenToPosStates - 1;
```

The distance decoder returns the "dist" value that is zero-based value
of match distance. The real match distance can be calculated with the
following code:

```
matchDistance = dist + 1;
```

The state of the distance decoder and the initialization code:

```
#define kEndPosModelIndex 14
#define kNumFullDistances (1 << (kEndPosModelIndex >> 1))
#define kNumAlignBits 4

CBitTreeDecoder<6> PosSlotDecoder[kNumLenToPosStates];
CProb PosDecoders[1 + kNumFullDistances - kEndPosModelIndex];
CBitTreeDecoder<kNumAlignBits> AlignDecoder;

void InitDist()
{
  for (unsigned i = 0; i < kNumLenToPosStates; i++)
    PosSlotDecoder[i].Init();
  AlignDecoder.Init();
  INIT_PROBS(PosDecoders);
}
```

At first stage the distance
decoder decodes 6-bit "posSlot" value with bit
tree decoder from PosSlotDecoder array. It's possible to get 2^6=64 different
"posSlot" values.

```
  unsigned posSlot = PosSlotDecoder[lenState].Decode(&RangeDec);
```

The encoding scheme for distance value is shown in the following table:

posSlot (decimal) /
zero-based distance (binary)
0 0
1 1
2 10

```
3    11

4    10 x
5    11 x
6    10 xx
7    11 xx
8    10 xxx
9    11 xxx
10    10 xxxx
11    11 xxxx
12    10 xxxxx
13    11 xxxxx

14    10 yy zzzz
15    11 yy zzzz
16    10 yyy zzzz
17    11 yyy zzzz
...
62    10 yyyyyyyyyyyyyyyyyyyyyyyyy zzzz
63    11 yyyyyyyyyyyyyyyyyyyyyyyyy zzzz
```

where
"x ... x" means the sequence of binary symbols encoded with binary tree and "Reverse" scheme. It uses separated binary tree for each posSlot from 4 to 13.
"y" means direct bit encoded with range coder.
"zzzz" means the sequence of four binary symbols encoded with binary tree with "Reverse" scheme, where one common binary tree "AlignDecoder" is used for all posSlot values.

If (posSlot < 4), the "dist" value is equal to posSlot value.

If (posSlot >= 4), the decoder uses "posSlot" value to calculate the value of the high bits of "dist" value and the number of the low bits.

If (4 <= posSlot < kEndPosModelIndex), the decoder uses bit tree decoders. (one separated bit tree decoder per one posSlot value) and "Reverse" scheme. In this implementation we use one CProb array "PosDecoders" that contains all CProb variables for all these bit decoders.

if (posSlot >= kEndPosModelIndex), the middle bits are decoded as direct bits from RangeDecoder and the low 4 bits are decoded with a bit tree decoder "AlignDecoder" with "Reverse" scheme.

The code to decode zero-based match distance:

```
unsigned DecodeDistance(unsigned len)
{
```

```
  unsigned lenState = len;
  if (lenState > kNumLenToPosStates - 1)
    lenState = kNumLenToPosStates - 1;

  unsigned posSlot
 = PosSlotDecoder[lenState].Decode(&RangeDec);
  if (posSlot < 4)
    return posSlot;

  unsigned numDirectBits = (unsigned)((posSlot >> 1) - 1);
  UInt32 dist = ((2 | (posSlot & 1)) << numDirectBits);
  if (posSlot < kEndPosModelIndex)
    dist += BitTreeReverseDecode(PosDecoders + dist - posSlot, numDirectBits, &RangeDec);
  else
  {
    dist += RangeDec.DecodeDirectBits(numDirectBits - kNumAlignBits) << kNumAlignBits;
    dist += AlignDecoder.ReverseDecode(&RangeDec);
  }
  return dist;
 }
```

LZMA Decoding modes
---

There are 2 types of LZMA streams:

1) The stream with "End of stream" marker.
2) The stream without "End of stream" marker.

And the LZMA Decoder supports 3 modes of decoding:

1) The unpack size is undefined. The LZMA decoder stops decoding after
  getting "End of stream" marker.
  The input variables for that case:

    markerIsMandatory = true
    unpackSizeDefined = false
    unpackSize contains any value

2)
 The unpack size is defined and LZMA decoder supports both variants,
  where the stream can contain "End of stream" marker or the stream is
  finished without "End of stream" marker. The LZMA decoder must detect
  any of these situations.
  The input variables for that case:

```
    markerIsMandatory = false
    unpackSizeDefined = true
    unpackSize contains unpack size

3) The unpack size is defined and the LZMA stream must contain
  "End of stream" marker
  The input variables for that case:

    markerIsMandatory = true
    unpackSizeDefined = true
    unpackSize contains unpack size
```

The main loop of decoder
---

The main loop of LZMA decoder:

```
Initialize the LZMA state.
loop
{
 // begin of loop
 Check "end of stream" conditions.
 Decode Type of MATCH / LITERAL.
   If it's LITERAL, decode LITERAL value and put the LITERAL to Window.
   If it's MATCH, decode the length of match and the match distance.
       Check error
 conditions, check end of stream conditions and copy
       the sequence of match bytes from sliding window to current position
       in window.
 Go to begin of loop
}
```

The reference implementation of LZMA decoder uses "unpackSize" variable to keep the number of remaining bytes in output stream. So it reduces "unpackSize" value after each decoded LITERAL or MATCH.

The following code contains the "end of stream" condition check at the start of the loop:

```
   if (unpackSizeDefined && unpackSize == 0 && !markerIsMandatory)
     if (RangeDec.IsFinishedOK())
       return LZMA_RES_FINISHED_WITHOUT_MARKER;
```

LZMA uses three types of matches:

1) "Simple Match" - the match with distance value encoded with bit models.

2) "Rep Match" - the match that uses the distance from distance history table.

3) "Short Rep Match" - the match of single byte length, that uses the latest distance from distance history table.

The LZMA decoder
keeps the history of latest 4 match distances that were used
by decoder. That set of 4 variables contains zero-based match distances and
these variables are initialized with zero values:

```
UInt32 rep0 = 0, rep1 = 0, rep2 = 0, rep3 = 0;
```

The LZMA decoder uses binary model variables to select type of MATCH or LITERAL:

```
#define kNumStates 12
#define kNumPosBitsMax 4

CProb IsMatch[kNumStates << kNumPosBitsMax];
CProb IsRep[kNumStates];
CProb IsRepG0[kNumStates];
CProb IsRepG1[kNumStates];
CProb IsRepG2[kNumStates];
CProb IsRep0Long[kNumStates << kNumPosBitsMax];
```

The decoder uses "state" variable value to select exact variable
from "IsRep", "IsRepG0", "IsRepG1" and "IsRepG2" arrays.
The "state" variable can get the value from 0 to 11.
Initial value for "state" variable is zero:

```
unsigned state = 0;
```

The "state" variable is updated after each LITERAL or MATCH with one of the
following functions:

```
unsigned UpdateState_Literal(unsigned state)
{
 if (state < 4) return 0;
  else if (state < 10) return state - 3;
 else return state - 6;
}
unsigned UpdateState_Match   (unsigned state) { return state < 7 ? 7 : 10; }
unsigned UpdateState_Rep     (unsigned state) { return state < 7 ? 8 : 11; }
unsigned UpdateState_ShortRep(unsigned state) { return state < 7 ? 9 : 11; }
```

The decoder calculates "state2" variable value to select exact variable from
"IsMatch" and "IsRep0Long" arrays:

```
unsigned posState = OutWindow.TotalPos & ((1 << pb) - 1);
unsigned state2 = (state << kNumPosBitsMax) + posState;
```

The decoder uses the following code flow scheme to select exact
type of LITERAL or MATCH:

```
IsMatch[state2] decode
 0 - the Literal
 1 - the Match
   IsRep[state] decode
     0 - Simple Match
     1 - Rep Match
       IsRepG0[state] decode
         0 - the distance is rep0
           IsRep0Long[state2] decode
             0 - Short Rep Match
             1 - Rep Match 0
         1 -
           IsRepG1[state] decode
             0 - Rep Match 1

         1 -
               IsRepG2[state] decode
                 0 - Rep Match 2
                 1 - Rep Match 3
```

LITERAL symbol
---
If the value "0" was decoded with IsMatch[state2] decoding, we have "LITERAL" type.

At first the LZMA decoder must check that it doesn't exceed
specified uncompressed size:

```
if (unpackSizeDefined && unpackSize == 0)
  return LZMA_RES_ERROR;
```

Then it decodes literal value and puts it to sliding window:

```
DecodeLiteral(state, rep0);
```

Then the decoder must update the "state" value and "unpackSize" value;

```
state = UpdateState_Literal(state);
unpackSize--;
```

Then the decoder must go to the begin of main loop to decode next Match or Literal.

Simple Match
---

If the value "1" was decoded with IsMatch[state2] decoding,
we have the "Simple Match" type.

The distance history table is updated with the following scheme:

```
rep3 = rep2;
rep2 = rep1;
rep1 = rep0;
```

The zero-based length is decoded
with "LenDecoder":

```
len = LenDecoder.Decode(&RangeDec, posState);
```

The state is update with UpdateState_Match function:

```
state = UpdateState_Match(state);
```

and the new "rep0" value is decoded with DecodeDistance:

```
rep0 = DecodeDistance(len);
```

That "rep0" will be used as zero-based distance for current match.

If the value of "rep0" is equal to 0xFFFFFFFF, it means that we have
"End of stream" marker, so we can stop decoding and check finishing
condition in Range Decoder:

```
if (rep0 == 0xFFFFFFFF)
  return RangeDec.IsFinishedOK() ?
      LZMA_RES_FINISHED_WITH_MARKER :
      LZMA_RES_ERROR;
```

If uncompressed size is defined, LZMA decoder must check that it doesn't
exceed that specified uncompressed size:

```
if (unpackSizeDefined && unpackSize == 0)
  return LZMA_RES_ERROR;
```

Also the decoder must check that "rep0" value is not larger than dictionary size
and is not larger than the number of already decoded bytes:

```
if (rep0
```

```
 >= dictSize || !OutWindow.CheckDistance(rep0))
      return LZMA_RES_ERROR;
```

Then the decoder must copy match bytes as described in
"The match symbols copying" section.

Rep Match
---

If the LZMA decoder has decoded the value "1" with IsRep[state] variable,
we have "Rep Match" type.

At first the LZMA decoder must check that it doesn't exceed
specified uncompressed size:

```
    if (unpackSizeDefined && unpackSize == 0)
      return LZMA_RES_ERROR;
```

Also the decoder must return error, if the LZ window is empty:

```
    if (OutWindow.IsEmpty())
      return LZMA_RES_ERROR;
```

If the match type is "Rep Match", the decoder uses one of the 4 variables of
distance history table to get the value of distance for current match.
And there are 4 corresponding ways of decoding flow.

The decoder updates the distance history with the following scheme
depending from type of match:

```
- "Rep Match 0" or "Short Rep Match":
    ; LZMA doesn't update the distance history

- "Rep Match
 1":
    UInt32 dist = rep1;
    rep1 = rep0;
    rep0 = dist;

- "Rep Match 2":
    UInt32 dist = rep2;
    rep2 = rep1;
    rep1 = rep0;
    rep0 = dist;

- "Rep Match 3":
    UInt32 dist = rep3;
```

```
rep3 = rep2;
rep2 = rep1;
rep1 = rep0;
rep0 = dist;
```

Then the decoder decodes exact subtype of "Rep Match" using "IsRepG0", "IsRep0Long", "IsRepG1", "IsRepG2".

If the subtype is "Short Rep Match", the decoder updates the state, puts the one byte from window to current position in window and goes to next MATCH/LITERAL symbol (the begin of main loop):

```
    state = UpdateState_ShortRep(state);
    OutWindow.PutByte(OutWindow.GetByte(rep0 + 1));
    unpackSize--;
    continue;
```

In other cases (Rep Match 0/1/2/3), it decodes the zero-based length of match with "RepLenDecoder" decoder:

```
len = RepLenDecoder.Decode(&RangeDec, posState);
```

Then it updates the state:

```
state = UpdateState_Rep(state);
```

Then the decoder must copy
match bytes as described in
"The Match symbols copying" section.

The match symbols copying
---

If we have the match (Simple Match or Rep Match 0/1/2/3), the decoder must copy the sequence of bytes with calculated match distance and match length. If uncompressed size is defined, LZMA decoder must check that it doesn't exceed that specified uncompressed size:

```
len += kMatchMinLen;
bool isError = false;
if (unpackSizeDefined && unpackSize < len)
{
  len = (unsigned)unpackSize;
  isError = true;
}
OutWindow.CopyMatch(rep0 + 1, len);
unpackSize -= len;
```

```
  if (isError)
    return LZMA_RES_ERROR;
```

Then the decoder must go to the begin of main loop to decode next MATCH or LITERAL.

NOTES
---

This specification doesn't describe the variant of decoder implementation
that supports partial decoding. Such partial decoding case can require some
changes in "end of stream" condition checks code. Also such code
can use additional
 status codes, returned by decoder.

This specification uses C++ code with templates to simplify describing.
The optimized version of LZMA decoder doesn't need templates.
Such optimized version can use just two arrays of CProb variables:
 1) The dynamic array of CProb variables allocated for the Literal Decoder.
 2) The one common array that contains all other CProb variables.

References:

1. G. N. N. Martin, Range encoding: an algorithm for removing redundancy
  from a digitized message, Video & Data Recording Conference,
  Southampton, UK, July 24-27, 1979.

```
// Windows/FileMapping.h

#ifndef __WINDOWS_FILEMAPPING_H
#define __WINDOWS_FILEMAPPING_H

#include "../Common/MyTypes.h"

#include "Handle.h"

namespace NWindows {

class CFileMapping: public CHandle
{
public:
 WRes Create(DWORD protect, UInt64 maxSize, LPCTSTR name)
 {
   _handle = ::CreateFileMapping(INVALID_HANDLE_VALUE, NULL, protect, (DWORD)(maxSize >> 32),
(DWORD)maxSize, name);
   return ::GetLastError();
 }
```

```
 WRes Open(DWORD
    #ifndef UNDER_CE
    desiredAccess
    #endif
    , LPCTSTR name)
 {
  #ifdef UNDER_CE
  WRes res = Create(PAGE_READONLY, 0, name);
  if (res == ERROR_ALREADY_EXISTS)
    return 0;
  Close();
  if (res == 0)
    res = ERROR_FILE_NOT_FOUND;
  return res;
  #else
  _handle = ::OpenFileMapping(desiredAccess, FALSE, name);
  if (_handle != 0)
    return 0;
  return ::GetLastError();
  #endif
 }

 LPVOID Map(DWORD desiredAccess, UInt64 fileOffset, SIZE_T numberOfBytesToMap)
 {
  return ::MapViewOfFile(_handle,
 desiredAccess, (DWORD)(fileOffset >> 32), (DWORD)fileOffset, numberOfBytesToMap);
 }

 #ifndef UNDER_CE
 LPVOID Map(DWORD desiredAccess, UInt64 fileOffset, SIZE_T numberOfBytesToMap, LPVOID baseAddress)
 {
  return ::MapViewOfFileEx(_handle, desiredAccess, (DWORD)(fileOffset >> 32), (DWORD)fileOffset,
numberOfBytesToMap, baseAddress);
 }
 #endif
};

class CFileUnmapper
{
 const void *_data;
public:
 CFileUnmapper(const void *data) : _data(data) {}
 ~CFileUnmapper() { ::UnmapViewOfFile(_data); }
};

}
```

#endif
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% Original file name was nbhyph.tex

% TeX hyphenation patterns for Norwegian Bokmal
%
% Version 2007-02-10

```
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% exceptions, for words that needs to be hyphenated differently for
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%
% Please send bugs or suggestions to karl@huftis.org.
%

\input hyph-no.tex

\hyphenation{
at-ten-de
be-tre
}
```

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```
PROG = 7zS2con.sfx
MY_FIXED = 1
CFLAGS = $(CFLAGS) -D_CONSOLE

C_OBJS = \
 $O\7zAlloc.obj \
 $O\7zArcIn.obj \
 $O\7zBuf.obj \
 $O\7zBuf2.obj \
 $O\7zCrc.obj \
 $O\7zCrcOpt.obj \
 $O\7zFile.obj \
```

```
 $O\7zDec.obj \
 $O\7zStream.obj \
 $O\Bcj2.obj \
 $O\Bra.obj \
 $O\Bra86.obj \
 $O\BraIA64.obj \
 $O\CpuArch.obj \
 $O\Delta.obj \
 $O\DllSecur.obj \
 $O\Lzma2Dec.obj \
 $O\LzmaDec.obj \

7Z_OBJS = \
 $O\SfxSetup.obj \

OBJS = \
 $(7Z_OBJS) \
 $(C_OBJS) \
 $O\resource.res

!include "../../../CPP/Build.mak"

$(7Z_OBJS): $(*B).c
 $(COMPL_O1)
$(C_OBJS): ../../$(*B).c
 $(COMPL_O1)
```

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This packge contains a modified version of ca-bundle.crt:

ca-bundle.crt -- Bundle of CA Root Certificates

Certificate data from Mozilla as of: Thu Nov  3 19:04:19 2011#
This is a bundle of X.509 certificates of public Certificate Authorities
(CA). These were automatically extracted from Mozilla's root certificates
file (certdata.txt).  This file can be found in the mozilla source tree:
http://mxr.mozilla.org/mozilla/source/security/nss/lib/ckfw/builtins/certdata.txt?raw=1#
It contains the certificates in PEM format and therefore
can be directly used with curl / libcurl / php_curl, or with
an Apache+mod_ssl webserver for SSL client authentication.
Just configure this file as the SSLCACertificateFile.#

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@(#) $RCSfile: certdata.txt,v $
 $Revision: 1.80 $ $Date: 2011/11/03 15:11:58 $
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With One Language Tagged text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element matches the schema. It contains one text element that has a language tag." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre
 {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;

```
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
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  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text xml:lang="en"&gt;
   Copyright with "en" language.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
// Windows/Synchronization.h

#ifndef __WINDOWS_SYNCHRONIZATION_H
#define __WINDOWS_SYNCHRONIZATION_H

#include "../../C/Threads.h"

#include "Defs.h"

#ifdef _WIN32
#include "Handle.h"
#endif

namespace NWindows {
namespace NSynchronization {

class CBaseEvent
{
protected:
 ::CEvent _object;
public:
 bool IsCreated() { return Event_IsCreated(&_object) != 0; }
 operator HANDLE() { return _object; }
 CBaseEvent() { Event_Construct(&_object); }
 ~CBaseEvent() { Close(); }
 WRes Close() { return Event_Close(&_object); }
 #ifdef _WIN32
```

```
 WRes Create(bool manualReset, bool initiallyOwn, LPCTSTR name = NULL, LPSECURITY_ATTRIBUTES sa =
NULL)
 {
   _object = ::CreateEvent(sa, BoolToBOOL(manualReset), BoolToBOOL(initiallyOwn), name);
   if (name == NULL && _object != 0)
     return 0;
   return ::GetLastError();
 }
 WRes Open(DWORD desiredAccess, bool inheritHandle, LPCTSTR name)
 {
   _object = ::OpenEvent(desiredAccess, BoolToBOOL(inheritHandle), name);
   if (_object != 0)

     return 0;
   return ::GetLastError();
 }
 #endif

 WRes Set() { return Event_Set(&_object); }
 // bool Pulse() { return BOOLToBool(::PulseEvent(_handle)); }
 WRes Reset() { return Event_Reset(&_object); }
 WRes Lock() { return Event_Wait(&_object); }
};

class CManualResetEvent: public CBaseEvent
{
public:
 WRes Create(bool initiallyOwn = false)
 {
   return ManualResetEvent_Create(&_object, initiallyOwn ? 1: 0);
 }
 WRes CreateIfNotCreated()
 {
   if (IsCreated())
     return 0;
   return ManualResetEvent_CreateNotSignaled(&_object);
 }
 #ifdef _WIN32
 WRes CreateWithName(bool initiallyOwn, LPCTSTR name)
 {
   return CBaseEvent::Create(true, initiallyOwn, name);
 }
 #endif
};

class CAutoResetEvent: public CBaseEvent
{
public:
```

```
 WRes Create()
 {
   return AutoResetEvent_CreateNotSignaled(&_object);
 }
 WRes CreateIfNotCreated()
 {
   if (IsCreated())
     return 0;
   return AutoResetEvent_CreateNotSignaled(&_object);
 }
};

#ifdef _WIN32
class CObject:
 public CHandle
{
public:
 WRes Lock(DWORD timeoutInterval = INFINITE)
   { return (::WaitForSingleObject(_handle, timeoutInterval) == WAIT_OBJECT_0 ? 0 : ::GetLastError()); }
};
class CMutex: public CObject
{
public:
 WRes Create(bool initiallyOwn, LPCTSTR name = NULL, LPSECURITY_ATTRIBUTES sa = NULL)
 {
   _handle = ::CreateMutex(sa, BoolToBOOL(initiallyOwn), name);
   if (name == NULL && _handle != 0)
     return 0;
   return ::GetLastError();
 }
 #ifndef UNDER_CE
 WRes Open(DWORD desiredAccess, bool inheritHandle, LPCTSTR name)
 {
   _handle = ::OpenMutex(desiredAccess, BoolToBOOL(inheritHandle), name);
   if (_handle != 0)
     return 0;
   return ::GetLastError();
 }
 #endif
 WRes Release()
 {
   return ::ReleaseMutex(_handle) ? 0 : ::GetLastError();
 }
};
class CMutexLock
{
 CMutex *_object;
public:
```

```
 CMutexLock(CMutex &object): _object(&object) { _object->Lock(); }
 ~CMutexLock() { _object->Release(); }
};
#endif

class CSemaphore
{
 ::CSemaphore _object;
public:
  CSemaphore() { Semaphore_Construct(&_object); }
 ~CSemaphore() { Close(); }
 WRes Close() {  return Semaphore_Close(&_object); }
 operator HANDLE() { return _object; }
 WRes Create(UInt32 initiallyCount, UInt32 maxCount)
 {
   return Semaphore_Create(&_object, initiallyCount, maxCount);
 }
 WRes Release() { return Semaphore_Release1(&_object); }
 WRes Release(UInt32 releaseCount) { return Semaphore_ReleaseN(&_object, releaseCount); }
 WRes Lock() { return Semaphore_Wait(&_object); }
};

class CCriticalSection
{
 ::CCriticalSection _object;
public:
 CCriticalSection() { CriticalSection_Init(&_object); }
 ~CCriticalSection() { CriticalSection_Delete(&_object); }
 void Enter() { CriticalSection_Enter(&_object); }
 void Leave() { CriticalSection_Leave(&_object); }
};

class CCriticalSectionLock
{
 CCriticalSection *_object;
 void Unlock()  { _object->Leave(); }
public:
 CCriticalSectionLock(CCriticalSection &object): _object(&object) {_object->Enter(); }
  ~CCriticalSectionLock() { Unlock(); }
};

}}

#endif
```

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Jean-Marc Valin, Timothy B. Terriberry,
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```
/* 7z.h -- 7z interface
2017-04-03 : Igor Pavlov : Public domain */

#ifndef __7Z_H
#define __7Z_H

#include "7zTypes.h"
```

```
EXTERN_C_BEGIN

#define k7zStartHeaderSize 0x20
#define k7zSignatureSize 6

extern const Byte k7zSignature[k7zSignatureSize];

typedef struct
{
 const Byte *Data;
 size_t Size;
} CSzData;

/* CSzCoderInfo & CSzFolder support only default methods */

typedef struct
{
 size_t PropsOffset;
 UInt32 MethodID;
 Byte NumStreams;
 Byte PropsSize;
} CSzCoderInfo;

typedef struct
{
 UInt32 InIndex;
 UInt32 OutIndex;
} CSzBond;

#define SZ_NUM_CODERS_IN_FOLDER_MAX 4
#define SZ_NUM_BONDS_IN_FOLDER_MAX 3
#define SZ_NUM_PACK_STREAMS_IN_FOLDER_MAX 4

typedef struct
{
 UInt32 NumCoders;
 UInt32 NumBonds;
 UInt32 NumPackStreams;
 UInt32 UnpackStream;
 UInt32 PackStreams[SZ_NUM_PACK_STREAMS_IN_FOLDER_MAX];
 CSzBond Bonds[SZ_NUM_BONDS_IN_FOLDER_MAX];
 CSzCoderInfo Coders[SZ_NUM_CODERS_IN_FOLDER_MAX];
} CSzFolder;


SRes SzGetNextFolderItem(CSzFolder *f, CSzData *sd);
```

```
typedef
 struct
{
 UInt32 Low;
 UInt32 High;
} CNtfsFileTime;

typedef struct
{
 Byte *Defs; /* MSB 0 bit numbering */
 UInt32 *Vals;
} CSzBitUi32s;

typedef struct
{
 Byte *Defs; /* MSB 0 bit numbering */
 // UInt64 *Vals;
 CNtfsFileTime *Vals;
} CSzBitUi64s;

#define SzBitArray_Check(p, i) (((p)[(i) >> 3] & (0x80 >> ((i) & 7))) != 0)

#define SzBitWithVals_Check(p, i) ((p)->Defs && ((p)->Defs[(i) >> 3] & (0x80 >> ((i) & 7))) != 0)

typedef struct
{
 UInt32 NumPackStreams;
 UInt32 NumFolders;

 UInt64 *PackPositions;          // NumPackStreams + 1
 CSzBitUi32s FolderCRCs;         // NumFolders

 size_t *FoCodersOffsets;        // NumFolders + 1
 UInt32 *FoStartPackStreamIndex; // NumFolders + 1
 UInt32 *FoToCoderUnpackSizes;   // NumFolders + 1
 Byte *FoToMainUnpackSizeIndex;  // NumFolders
 UInt64 *CoderUnpackSizes;       // for all coders in all folders

 Byte *CodersData;
} CSzAr;

UInt64 SzAr_GetFolderUnpackSize(const CSzAr *p, UInt32 folderIndex);

SRes SzAr_DecodeFolder(const
 CSzAr *p, UInt32 folderIndex,
   ILookInStream *stream, UInt64 startPos,
   Byte *outBuffer, size_t outSize,
   ISzAllocPtr allocMain);
```

```
typedef struct
{
 CSzAr db;

 UInt64 startPosAfterHeader;
 UInt64 dataPos;

 UInt32 NumFiles;

 UInt64 *UnpackPositions;  // NumFiles + 1
 // Byte *IsEmptyFiles;
 Byte *IsDirs;
 CSzBitUi32s CRCs;

 CSzBitUi32s Attribs;
 // CSzBitUi32s Parents;
 CSzBitUi64s MTime;
 CSzBitUi64s CTime;

 UInt32 *FolderToFile;   // NumFolders + 1
 UInt32 *FileToFolder;   // NumFiles

 size_t *FileNameOffsets; /* in 2-byte steps */
 Byte *FileNames;  /* UTF-16-LE */
} CSzArEx;

#define SzArEx_IsDir(p, i) (SzBitArray_Check((p)->IsDirs, i))

#define SzArEx_GetFileSize(p, i) ((p)->UnpackPositions[(i) + 1] - (p)->UnpackPositions[i])

void SzArEx_Init(CSzArEx *p);
void SzArEx_Free(CSzArEx *p, ISzAllocPtr alloc);
UInt64 SzArEx_GetFolderStreamPos(const CSzArEx *p, UInt32 folderIndex, UInt32 indexInFolder);
int SzArEx_GetFolderFullPackSize(const CSzArEx
 *p, UInt32 folderIndex, UInt64 *resSize);

/*
if dest == NULL, the return value specifies the required size of the buffer,
 in 16-bit characters, including the null-terminating character.
if dest != NULL, the return value specifies the number of 16-bit characters that
 are written to the dest, including the null-terminating character. */

size_t SzArEx_GetFileNameUtf16(const CSzArEx *p, size_t fileIndex, UInt16 *dest);

/*
size_t SzArEx_GetFullNameLen(const CSzArEx *p, size_t fileIndex);
UInt16 *SzArEx_GetFullNameUtf16_Back(const CSzArEx *p, size_t fileIndex, UInt16 *dest);
```

```
*/



/*
 SzArEx_Extract extracts file from archive

 *outBuffer must be 0 before first call for each new archive.

 Extracting cache:
   If you need to decompress more than one file, you can send
   these values from previous call:
     *blockIndex,
     *outBuffer,
     *outBufferSize
   You can consider "*outBuffer" as cache of solid block. If your archive is solid,
   it will increase decompression
 speed.

   If you use external function, you can declare these 3 cache variables
   (blockIndex, outBuffer, outBufferSize) as static in that external function.

   Free *outBuffer and set *outBuffer to 0, if you want to flush cache.
*/

SRes SzArEx_Extract(
   const CSzArEx *db,
   ILookInStream *inStream,
   UInt32 fileIndex,         /* index of file */
   UInt32 *blockIndex,       /* index of solid block */
   Byte **outBuffer,         /* pointer to pointer to output buffer (allocated with allocMain) */
   size_t *outBufferSize,    /* buffer size for output buffer */
   size_t *offset,           /* offset of stream for required file in *outBuffer */
   size_t *outSizeProcessed, /* size of file in *outBuffer */
   ISzAllocPtr allocMain,
   ISzAllocPtr allocTemp);


/*
SzArEx_Open Errors:
SZ_ERROR_NO_ARCHIVE
SZ_ERROR_ARCHIVE
SZ_ERROR_UNSUPPORTED
SZ_ERROR_MEM
SZ_ERROR_CRC
SZ_ERROR_INPUT_EOF
SZ_ERROR_FAIL
*/
```

```
SRes SzArEx_Open(CSzArEx *p, ILookInStream *inStream,
   ISzAllocPtr allocMain, ISzAllocPtr allocTemp);

EXTERN_C_END

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With class Attribute in div Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-026-ref.xht" />
  <meta name="assert" content="The license element contains a text element that contains a div element with
&quot;class1 class2 class3&quot; as the value
 for the class attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-026.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
```

<?xml version="1.0" encoding="UTF-8"?>
<metadata version="1.0">
 <license url="http://w3c.org/Fonts">
  <text>
   <div class="class1 class2 class3">Paragraph 1</div>
  </text>
 </license>
</metadata>
  </pre>
 </body>
</html>
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http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

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%
%  http://repo.or.cz/w/wortliste.git?a=commit;h=2d246449f5c4f570f4d735d3ad091f6ad70f6972
%
% The used patgen parameters are
%
%  1 1 | 2 5 | 1 1 1
%  2 2 | 2 5 | 1 2 1
%  3 3 | 2 6 | 1 1 1
%  4 4 | 2 6 | 1 4 1
%  5 5 | 2 7 | 1 1 1
%  6 6 | 2 7 | 1 6 1
%  7 7 | 2 13 | 1 4 1
%  8 8 | 2 13 | 1 8 1

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~~~~
```
// ZipRegistry.h

#ifndef __ZIP_REGISTRY_H
#define __ZIP_REGISTRY_H

#include "../../../Common/MyTypes.h"
#include "../../../Common/MyString.h"

#include "ExtractMode.h"

namespace NExtract
{
 struct CInfo
 {
   NPathMode::EEnum PathMode;
   NOverwriteMode::EEnum OverwriteMode;
   bool PathMode_Force;
   bool OverwriteMode_Force;

   CBoolPair SplitDest;
   CBoolPair ElimDup;
   // CBoolPair AltStreams;
   CBoolPair NtSecurity;
   CBoolPair ShowPassword;

   UStringVector Paths;

   void Save() const;
   void Load();
 };

 void Save_ShowPassword(bool showPassword);
```
~~~~

```
 bool Read_ShowPassword();
}

namespace NCompression
{
 struct CFormatOptions
 {
  UInt32 Level;
  UInt32 Dictionary;
  UInt32 Order;
  UInt32 BlockLogSize;
  UInt32 NumThreads;

  CSysString FormatID;
  UString Method;
  UString Options;
  UString EncryptionMethod;

  void Reset_BlockLogSize()
  {
   BlockLogSize = (UInt32)(Int32)-1;
  }

  void ResetForLevelChange()
   {
   BlockLogSize = NumThreads = Level = Dictionary = Order = (UInt32)(Int32)-1;
   Method.Empty();
   // Options.Empty();
   // EncryptionMethod.Empty();
  }
  CFormatOptions() { ResetForLevelChange(); }
 };

 struct CInfo
 {
  UInt32 Level;
  bool ShowPassword;
  bool EncryptHeaders;
  UString ArcType;
  UStringVector ArcPaths;

  CObjectVector<CFormatOptions> Formats;

  CBoolPair NtSecurity;
  CBoolPair AltStreams;
  CBoolPair HardLinks;
  CBoolPair SymLinks;
```

```
  void Save() const;
  void Load();
 };
}

namespace NWorkDir
{
 namespace NMode
 {
  enum EEnum
  {
   kSystem,
   kCurrent,
   kSpecified
  };
 }
 struct CInfo
 {
  NMode::EEnum Mode;
  FString Path;
  bool ForRemovableOnly;

  void SetForRemovableOnlyDefault() { ForRemovableOnly = true; }
  void SetDefault()
  {
   Mode = NMode::kSystem;
   Path.Empty();
   SetForRemovableOnlyDefault();
  }

  void Save() const;
  void Load();

 };
}


struct CContextMenuInfo
{
 CBoolPair Cascaded;
 CBoolPair MenuIcons;
 CBoolPair ElimDup;

 bool Flags_Def;
 UInt32 Flags;

 void Save() const;
 void Load();
```

```
};

#endif
CONSOLE_OBJS = \
 $O\BenchCon.obj \
 $O\ConsoleClose.obj \
 $O\ExtractCallbackConsole.obj \
 $O\HashCon.obj \
 $O\List.obj \
 $O\Main.obj \
 $O\MainAr.obj \
 $O\OpenCallbackConsole.obj \
 $O\PercentPrinter.obj \
 $O\UpdateCallbackConsole.obj \
 $O\UserInputUtils.obj \

UI_COMMON_OBJS = \
 $O\ArchiveCommandLine.obj \
 $O\ArchiveExtractCallback.obj \
 $O\ArchiveOpenCallback.obj \
 $O\Bench.obj \
 $O\DefaultName.obj \
 $O\EnumDirItems.obj \
 $O\Extract.obj \
 $O\ExtractingFilePath.obj \
 $O\HashCalc.obj \
 $O\LoadCodecs.obj \
 $O\OpenArchive.obj \
 $O\PropIDUtils.obj \
 $O\SetProperties.obj \
 $O\SortUtils.obj \
 $O\TempFiles.obj \
 $O\Update.obj \
 $O\UpdateAction.obj \
 $O\UpdateCallback.obj \
 $O\UpdatePair.obj \
 $O\UpdateProduce.obj \

#
```

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loadtest is based on League Gothic, from League of Moveable Type. All fonts
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http://www.theleagueofmoveabletype.com/league-gothic

http://scripts.sil.org/OFL
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
<title>WOFF Test: Unknown Child Element in copyright Element</title>
<link rel="author" title="Tal Leming" href="http://typesupply.com" />
<link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
<link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
<link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
<link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
<link rel="match" href="metadatadisplay-schema-copyright-009-ref.xht" />
<meta name="assert" content="The copyright element contains an unknown child element." />
<style type="text/css"><![CDATA[
@import url("support/test-fonts.css");
@font-face
{
font-family: "WOFF Test";
src: url("support/metadatadisplay-schema-copyright-009.woff2") format("woff2");
}
body {
font-size: 20px;
}
pre {
font-size: 12px;

```
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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```
LIBS = $(LIBS) oleaut32.lib ole32.lib

!IFNDEF MY_NO_UNICODE
CFLAGS = $(CFLAGS) -DUNICODE -D_UNICODE
!ENDIF

# CFLAGS = $(CFLAGS) -FAsc -Fa$O/Asm/

!IFNDEF O
!IFDEF CPU
O=$(CPU)
```

```
!ELSE
O=O
!ENDIF
!ENDIF

!IF "$(CPU)" == "AMD64"
MY_ML = ml64 -Dx64 -WX
!ELSEIF "$(CPU)" == "ARM"
MY_ML = armasm -WX
!ELSE
MY_ML = ml -WX
!ENDIF


!IFDEF UNDER_CE
RFLAGS = $(RFLAGS) -dUNDER_CE
!IFDEF MY_CONSOLE
LFLAGS = $(LFLAGS) /ENTRY:mainACRTStartup
!ENDIF
!ELSE
!IFNDEF NEW_COMPILER
LFLAGS = $(LFLAGS) -OPT:NOWIN98
!ENDIF
!IF "$(CPU)" != "ARM" && "$(CPU)" != "ARM64"
CFLAGS = $(CFLAGS) -Gr
!ENDIF
LIBS = $(LIBS) user32.lib advapi32.lib shell32.lib
!ENDIF

!IF "$(CPU)" == "ARM"
COMPL_ASM = $(MY_ML) $** $O/$(*B).obj
!ELSE
COMPL_ASM = $(MY_ML) -c -Fo$O/ $**
!ENDIF

CFLAGS = $(CFLAGS) -nologo -c -Fo$O/ -W4 -WX -EHsc -Gy -GR- -GF

!IFDEF MY_STATIC_LINK
!IFNDEF MY_SINGLE_THREAD
CFLAGS = $(CFLAGS) -MT
!ENDIF
!ELSE
CFLAGS = $(CFLAGS) -MD
!ENDIF

!IFDEF NEW_COMPILER
CFLAGS = $(CFLAGS) -GS- -Zc:forScope -Zc:wchar_t
!IFNDEF
```

```
 UNDER_CE
CFLAGS = $(CFLAGS) -MP2
!IFNDEF CPU
# CFLAGS = $(CFLAGS) -arch:IA32
!ENDIF
!ENDIF
!ELSE
CFLAGS = $(CFLAGS)
!ENDIF

!IF "$(CPU)" == "AMD64"
CFLAGS_O1 = $(CFLAGS) -O1
!ELSE
CFLAGS_O1 = $(CFLAGS) -O1
!ENDIF
CFLAGS_O2 = $(CFLAGS) -O2

LFLAGS = $(LFLAGS) -nologo -OPT:REF -OPT:ICF

!IFNDEF UNDER_CE
LFLAGS = $(LFLAGS) /LARGEADDRESSAWARE
!ENDIF

!IFDEF DEF_FILE
LFLAGS = $(LFLAGS) -DLL -DEF:$(DEF_FILE)
!ELSE
!IF defined(MY_FIXED) && "$(CPU)" != "ARM" && "$(CPU)" != "ARM64"
LFLAGS = $(LFLAGS) /FIXED
!ELSE
LFLAGS = $(LFLAGS) /FIXED:NO
!ENDIF
# /BASE:0x400000
!ENDIF


# !IF "$(CPU)" == "AMD64"

!IFDEF SUB_SYS_VER

MY_SUB_SYS_VER=5.02

!IFDEF MY_CONSOLE
LFLAGS = $(LFLAGS) /SUBSYSTEM:console,$(MY_SUB_SYS_VER)
!ELSE
LFLAGS = $(LFLAGS) /SUBSYSTEM:windows,$(MY_SUB_SYS_VER)
!ENDIF

!ENDIF
```

```
PROGPATH = $O\$(PROG)

COMPL_O1   = $(CC) $(CFLAGS_O1) $**
COMPL_O2   = $(CC) $(CFLAGS_O2) $**
COMPL_PCH  = $(CC) $(CFLAGS_O1) -Yc"StdAfx.h" -Fp$O/a.pch $**
COMPL      = $(CC) $(CFLAGS_O1) -Yu"StdAfx.h" -Fp$O/a.pch
 $**

COMPLB    = $(CC) $(CFLAGS_O1) -Yu"StdAfx.h" -Fp$O/a.pch $<
# COMPLB_O2 = $(CC) $(CFLAGS_O2) -Yu"StdAfx.h" -Fp$O/a.pch $<
COMPLB_O2 = $(CC) $(CFLAGS_O2) $<

CFLAGS_C_ALL = $(CFLAGS_O2) $(CFLAGS_C_SPEC)
CCOMPL_PCH  = $(CC) $(CFLAGS_C_ALL) -Yc"Precomp.h" -Fp$O/a.pch $**
CCOMPL_USE  = $(CC) $(CFLAGS_C_ALL) -Yu"Precomp.h" -Fp$O/a.pch $**
CCOMPL      = $(CC) $(CFLAGS_C_ALL) $**
CCOMPLB     = $(CC) $(CFLAGS_C_ALL) $<


all: $(PROGPATH)

clean:
 -del /Q $(PROGPATH) $O\*.exe $O\*.dll $O\*.obj $O\*.lib $O\*.exp $O\*.res $O\*.pch $O\*.asm

$O:
 if not exist "$O" mkdir "$O"
$O/Asm:
 if not exist "$O/Asm" mkdir "$O/Asm"

$(PROGPATH): $O $O/Asm $(OBJS) $(DEF_FILE)
 link $(LFLAGS) -out:$(PROGPATH) $(OBJS) $(LIBS)

!IFNDEF NO_DEFAULT_RES
$O\resource.res: $(*B).rc
 rc $(RFLAGS) -fo$@ $**
!ENDIF
$O\StdAfx.obj: $(*B).cpp
 $(COMPL_PCH)
```

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```
/* XzEnc.h -- Xz Encode
2017-06-27 : Igor Pavlov : Public domain */

#ifndef __XZ_ENC_H
#define __XZ_ENC_H

#include "Lzma2Enc.h"

#include "Xz.h"

EXTERN_C_BEGIN


#define XZ_PROPS__BLOCK_SIZE__AUTO   LZMA2_ENC_PROPS__BLOCK_SIZE__AUTO
#define XZ_PROPS__BLOCK_SIZE__SOLID  LZMA2_ENC_PROPS__BLOCK_SIZE__SOLID
```

```
typedef struct
{
 UInt32 id;
 UInt32 delta;
 UInt32 ip;
 int ipDefined;
} CXzFilterProps;

void XzFilterProps_Init(CXzFilterProps *p);


typedef struct
{
 CLzma2EncProps lzma2Props;
 CXzFilterProps filterProps;
 unsigned checkId;
 UInt64 blockSize;
 int numBlockThreads_Reduced;
 int numBlockThreads_Max;
 int numTotalThreads;
 int forceWriteSizesInHeader;
 UInt64 reduceSize;
} CXzProps;

void XzProps_Init(CXzProps *p);


typedef void * CXzEncHandle;

CXzEncHandle XzEnc_Create(ISzAllocPtr alloc, ISzAllocPtr allocBig);
void XzEnc_Destroy(CXzEncHandle p);
SRes XzEnc_SetProps(CXzEncHandle p, const CXzProps *props);
void XzEnc_SetDataSize(CXzEncHandle p, UInt64 expectedDataSiize);
SRes
 XzEnc_Encode(CXzEncHandle p, ISeqOutStream *outStream, ISeqInStream *inStream, ICompressProgress
*progress);

SRes Xz_Encode(ISeqOutStream *outStream, ISeqInStream *inStream,
   const CXzProps *props, ICompressProgress *progress);

SRes Xz_EncodeEmpty(ISeqOutStream *outStream);

EXTERN_C_END

#endif
/* LzFind.h -- Match finder for LZ algorithms
2017-06-10 : Igor Pavlov : Public domain */
```

```
#ifndef __LZ_FIND_H
#define __LZ_FIND_H

#include "7zTypes.h"

EXTERN_C_BEGIN

typedef UInt32 CLzRef;

typedef struct _CMatchFinder
{
 Byte *buffer;
 UInt32 pos;
 UInt32 posLimit;
 UInt32 streamPos;
 UInt32 lenLimit;

 UInt32 cyclicBufferPos;
 UInt32 cyclicBufferSize; /* it must be = (historySize + 1) */

 Byte streamEndWasReached;
 Byte btMode;
 Byte bigHash;
 Byte directInput;

 UInt32 matchMaxLen;
 CLzRef *hash;
 CLzRef *son;
 UInt32 hashMask;
 UInt32 cutValue;

 Byte *bufferBase;
 ISeqInStream *stream;

 UInt32 blockSize;
 UInt32 keepSizeBefore;
 UInt32 keepSizeAfter;

 UInt32 numHashBytes;
 size_t directInputRem;
 UInt32 historySize;
 UInt32 fixedHashSize;
 UInt32 hashSizeSum;
 SRes result;
 UInt32 crc[256];
 size_t numRefs;

 UInt64 expectedDataSize;
```

```
} CMatchFinder;

#define Inline_MatchFinder_GetPointerToCurrentPos(p) ((p)->buffer)

#define Inline_MatchFinder_GetNumAvailableBytes(p)
 ((p)->streamPos - (p)->pos)

#define Inline_MatchFinder_IsFinishedOK(p) \
   ((p)->streamEndWasReached \
       && (p)->streamPos == (p)->pos \
       && (!(p)->directInput || (p)->directInputRem == 0))

int MatchFinder_NeedMove(CMatchFinder *p);
Byte *MatchFinder_GetPointerToCurrentPos(CMatchFinder *p);
void MatchFinder_MoveBlock(CMatchFinder *p);
void MatchFinder_ReadIfRequired(CMatchFinder *p);

void MatchFinder_Construct(CMatchFinder *p);

/* Conditions:
    historySize <= 3 GB
    keepAddBufferBefore + matchMaxLen + keepAddBufferAfter < 511MB
*/
int MatchFinder_Create(CMatchFinder *p, UInt32 historySize,
   UInt32 keepAddBufferBefore, UInt32 matchMaxLen, UInt32 keepAddBufferAfter,
   ISzAllocPtr alloc);
void MatchFinder_Free(CMatchFinder *p, ISzAllocPtr alloc);
void MatchFinder_Normalize3(UInt32 subValue, CLzRef *items, size_t numItems);
void MatchFinder_ReduceOffsets(CMatchFinder *p, UInt32 subValue);

UInt32 * GetMatchesSpec1(UInt32 lenLimit,
 UInt32 curMatch, UInt32 pos, const Byte *buffer, CLzRef *son,
   UInt32 _cyclicBufferPos, UInt32 _cyclicBufferSize, UInt32 _cutValue,
   UInt32 *distances, UInt32 maxLen);

/*
Conditions:
 Mf_GetNumAvailableBytes_Func must be called before each Mf_GetMatchLen_Func.
 Mf_GetPointerToCurrentPos_Func's result must be used only before any other function
*/

typedef void (*Mf_Init_Func)(void *object);
typedef UInt32 (*Mf_GetNumAvailableBytes_Func)(void *object);
typedef const Byte * (*Mf_GetPointerToCurrentPos_Func)(void *object);
typedef UInt32 (*Mf_GetMatches_Func)(void *object, UInt32 *distances);
typedef void (*Mf_Skip_Func)(void *object, UInt32);

typedef struct _IMatchFinder
```

```
{
 Mf_Init_Func Init;
 Mf_GetNumAvailableBytes_Func GetNumAvailableBytes;
 Mf_GetPointerToCurrentPos_Func GetPointerToCurrentPos;
 Mf_GetMatches_Func GetMatches;
 Mf_Skip_Func Skip;
} IMatchFinder;

void MatchFinder_CreateVTable(CMatchFinder *p, IMatchFinder *vTable);

void MatchFinder_Init_LowHash(CMatchFinder
 *p);
void MatchFinder_Init_HighHash(CMatchFinder *p);
void MatchFinder_Init_3(CMatchFinder *p, int readData);
void MatchFinder_Init(CMatchFinder *p);

UInt32 Bt3Zip_MatchFinder_GetMatches(CMatchFinder *p, UInt32 *distances);
UInt32 Hc3Zip_MatchFinder_GetMatches(CMatchFinder *p, UInt32 *distances);

void Bt3Zip_MatchFinder_Skip(CMatchFinder *p, UInt32 num);
void Hc3Zip_MatchFinder_Skip(CMatchFinder *p, UInt32 num);

EXTERN_C_END

#endif
```

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{23170F69-40C1-278A-0000-00yy00xx0000}

00 IProgress.h

05 IProgress
// 050002 IProgress2

01 IFolderArchive.h

// 05 IArchiveFolder // old
// 06 IInFolderArchive // old
07 IFileExtractCallback.h::IFolderArchiveExtractCallback
08 IFileExtractCallback.h::IFolderArchiveExtractCallback2
// 0A IOutFolderArchive
0B IFolderArchiveUpdateCallback
0C Agent.h::IArchiveFolderInternal
0D IArchiveFolder
0E IInFolderArchive
0F IOutFolderArchive
10 IFolderArchiveUpdateCallback2
11 IFolderScanProgress

20 IFileExtractCallback.h::IGetProp
30 IFileExtractCallback.h::IFolderExtractToStreamCallback

03 IStream.h

01 ISequentialInStream
02 ISequentialOutStream
03 IInStream
04 IOutStream
06 IStreamGetSize
07 IOutStreamFinish
08 IStreamGetProps
09 IStreamGetProps2

04 ICoder.h

04 ICompressProgressInfo
05 ICompressCoder
18 ICompressCoder2
1F ICompressSetCoderPropertiesOpt
20 ICompressSetCoderProperties
21 ICompressSetDecoderProperties

```
//
 22  ICompressSetDecoderProperties2
 23  ICompressWriteCoderProperties
 24  ICompressGetInStreamProcessedSize
 25  ICompressSetCoderMt
 26  ICompressSetFinishMode
 27  ICompressGetInStreamProcessedSize2
 28  ICompressSetMemLimit

 30  ICompressGetSubStreamSize
 31  ICompressSetInStream
 32  ICompressSetOutStream
//  33  ICompressSetInStreamSize
 34  ICompressSetOutStreamSize
 35  ICompressSetBufSize
 36  ICompressInitEncoder
 37  ICompressSetInStream2
//  38  ICompressSetOutStream2
//  39  SetInStreamSize2
//  3A  SetOutStreamSize2

 40  ICompressFilter
 60  ICompressCodecsInfo
 61  ISetCompressCodecsInfo
 80  ICryptoProperties
 88  ICryptoResetSalt
 8C  ICryptoResetInitVector
 90  ICryptoSetPassword
 A0  ICryptoSetCRC
 C0  IHasher
 C1  IHashers


05 IPassword.h

 10 ICryptoGetTextPassword
 11 ICryptoGetTextPassword2


06 IArchive.h

 03  ISetProperties
 04  IArchiveKeepModeForNextOpen
 05  IArchiveAllowTail

 10  IArchiveOpenCallback

 20  IArchiveExtractCallback
```

21 IArchiveExtractCallbackMessage

30 IArchiveOpenVolumeCallback
40 IInArchiveGetStream
50 IArchiveOpenSetSubArchiveName
60 IInArchive
61 IArchiveOpenSeq
70 IArchiveGetRawProps
71 IArchiveGetRootProps

80 IArchiveUpdateCallback
82 IArchiveUpdateCallback2
83 IArchiveUpdateCallbackFile

A0 IOutArchive

08 IFolder.h

00 IFolderFolder
01 IEnumProperties
02 IFolderGetTypeID
03 IFolderGetPath
04 IFolderWasChanged
05 // IFolderReload
06 // IFolderOperations old
07 IFolderGetSystemIconIndex
08 IFolderGetItemFullSize
09 IFolderClone
0A IFolderSetFlatMode
0B IFolderOperationsExtractCallback
0C //
0D //
0E IFolderProperties
0F
10 IFolderArcProps
11 IGetFolderArcProps
12 // IFolderOperations
13 IFolderOperations
14 IFolderCalcItemFullSize
15 IFolderCompare
16 IFolderGetItemName
17 IFolderAltStreams

09 IFolder.h :: FOLDER_MANAGER_INTERFACE

00 - 04 // old IFolderManager
05 IFolderManager

// 0A PluginInterface.h
00 IInitContextMenu
01 IPluginOptionsCallback
02 IPluginOptions

Handler GUIDs:

{23170F69-40C1-278A-1000-000110xx0000}

01 Zip
02 BZip2
03 Rar
04 Arj
05 Z
06 Lzh
07 7z
08 Cab
09 Nsis
0A lzma
0B lzma86
0C xz
0D ppmd

C6 COFF
C7 Ext
C8 VMDK
C9 VDI
CA Qcow
CB GPT
CC Rar5
CD IHex
CE Hxs
CF TE
D0 UEFIc
D1 UEFIs
D2 SquashFS
D3 CramFS
D4 APM
D5 Mslz
D6 Flv
D7 Swf
D8 Swfc
D9 Ntfs

DA Fat
DB Mbr
DC Vhd
DD Pe
DE Elf
DF Mach-O
E0 Udf
E1 Xar
E2 Mub
E3 Hfs
E4 Dmg
E5 Compound
E6 Wim
E7 Iso
E8
E9 Chm
EA Split
EB Rpm
EC Deb
ED Cpio
EE Tar
EF GZip

{23170F69-40C1-278A-1000-000100020000} ContextMenu.h::CZipContextMenu

// {23170F69-40C1-278A-1000-000100030000} // CAgentArchiveHandler
// {23170F69-40C1-278B- old codecs clsids
// {23170F69-40C1-278D-1000-000100020000} OptionsDialog.h::CLSID_CSevenZipOptions

{23170F69-40C1-2790-id} Codec Decoders
{23170F69-40C1-2791-id}
Codec Encoders
{23170F69-40C1-2792-id} Hashers
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
<title>WOFF Test: Valid copyright Element With One span Element in text Element</title>
<link rel="author" title="Tal Leming" href="http://typesupply.com" />
<link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
<link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
<link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
<link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
<link rel="match" href="metadatadisplay-schema-copyright-024-ref.xht" />
<meta name="assert" content="The copyright element contains a text element that contains a span element." />
<style type="text/css"><![CDATA[

```
  @import url("support/test-fonts.css");
  @font-face
 {
   font-family: "WOFF Test";
   src: url("support/metadatadisplay-schema-copyright-024.woff2") format("woff2");
  }
  body {
   font-size: 20px;
  }
  pre {
   font-size: 12px;
  }
  .test {
   font-family: "WOFF Test", "WOFF Test CFF Fallback";
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   Text with &lt;span&gt;span&lt;/span&gt;.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

At the time this file was first modified, a complete, unmodified copy of

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http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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% This is the file hyph-gl.tex, version 2.4
% Hyphenation
 patterns for Galician, written in the utf8 encoding.
%
% Generated with the mkpattern utility (v. 1.2), on 2010/04/23
% The original source file were glpatter-utf8.tex
% This is a generated file
%
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%
% For bug reports and comments:
%
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%
% Note that there is no 'j' nor 'y' in Galician
ISC
// IPassword.h

#ifndef __IPASSWORD_H
#define __IPASSWORD_H

#include "../Common/MyTypes.h"
#include "../Common/MyUnknown.h"

#include "IDecl.h"

#define PASSWORD_INTERFACE(i, x) DECL_INTERFACE(i, 5, x)

PASSWORD_INTERFACE(ICryptoGetTextPassword, 0x10)
{
 STDMETHOD(CryptoGetTextPassword)(BSTR *password) PURE;
};

```
PASSWORD_INTERFACE(ICryptoGetTextPassword2, 0x11)
{
 STDMETHOD(CryptoGetTextPassword2)(Int32 *passwordIsDefined, BSTR *password) PURE;
};

#endif
```

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```
// StdAfx.h

#ifndef __STDAFX_H
#define __STDAFX_H

#include "../Common/Common.h"

#endif
```

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---

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*
*
* NOTE: A special thanks and credit goes to Geoff Kuenning
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* under a BSD style license. For more information on ispell
* and affix
 compression in general, please see:
* http://www.cs.ucla.edu/ficus-members/geoff/ispell.html
* (the home page for ispell)
*
```

```
* An almost complete rewrite  of MySpell for use by
* the Mozilla project has been developed by David Einstein
* (Deinst@world.std.com).  David and I are now
* working on parallel development tracks to help
* our respective projects (Mozilla and OpenOffice.org
* and we will maintain full affix file and dictionary
* file compatibility and work on merging our versions
* of MySpell back into a single tree. David has been
* a significant help in improving MySpell.
*
* Special thanks also go to La'szlo' Ne'meth
* <nemethl@gyorsposta.hu> who is the author of the
* Hungarian dictionary and who developed and contributed
* the code to support compound words in MySpell
* and fixed numerous problems with the encoding
* case conversion tables.
*
*/
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Invalid license Element With dir Attribute in div Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-025-ref.xht" />
  <meta name="assert" content="The license element contains a text element that contains a div element with INVALID as the value for the dir attribute."
 />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
```

```
    src: url("support/metadatadisplay-schema-license-025.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
// Compress/CopyCoder.h

#ifndef __COMPRESS_COPY_CODER_H
#define __COMPRESS_COPY_CODER_H

#include "../../Common/MyCom.h"

#include "../ICoder.h"

namespace NCompress {

class CCopyCoder:
 public ICompressCoder,
 public ICompressSetInStream,
 public ISequentialInStream,
 public ICompressSetFinishMode,
 public ICompressGetInStreamProcessedSize,
 public CMyUnknownImp
{
 Byte *_buf;
 CMyComPtr<ISequentialInStream> _inStream;
public:
 UInt64 TotalSize;

 CCopyCoder(): _buf(0), TotalSize(0) {};
 ~CCopyCoder();
```

```
 MY_UNKNOWN_IMP5(
    ICompressCoder,
    ICompressSetInStream,
    ISequentialInStream,
    ICompressSetFinishMode,
    ICompressGetInStreamProcessedSize)

 STDMETHOD(Code)(ISequentialInStream *inStream, ISequentialOutStream *outStream,
    const UInt64 *inSize, const UInt64 *outSize, ICompressProgressInfo *progress);
 STDMETHOD(SetInStream)(ISequentialInStream *inStream);
 STDMETHOD(ReleaseInStream)();
 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
  STDMETHOD(SetFinishMode)(UInt32 finishMode);
 STDMETHOD(GetInStreamProcessedSize)(UInt64 *value);
};

HRESULT CopyStream(ISequentialInStream *inStream, ISequentialOutStream *outStream,
ICompressProgressInfo *progress);
HRESULT CopyStream_ExactSize(ISequentialInStream *inStream, ISequentialOutStream *outStream, UInt64
size, ICompressProgressInfo *progress);

}

#endif
```

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```
/* -*- Mode: C++; tab-width: 8; indent-tabs-mode: nil; c-basic-offset: 2 -*- */
/* vim: set ts=8 sts=2 et sw=2 tw=80: */
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* You can obtain one at http://mozilla.org/MPL/2.0/. */

#ifndef mozilla_dom_PermissionUtils_h_
#define mozilla_dom_PermissionUtils_h_

#include "mozilla/dom/PermissionsBinding.h"
#include "mozilla/dom/PermissionStatusBinding.h"
#include "mozilla/Maybe.h"

namespace mozilla {
namespace dom {

const nsLiteralCString& PermissionNameToType(PermissionName aName);
Maybe<PermissionName> TypeToPermissionName(const nsACString& aType);

PermissionState ActionToPermissionState(uint32_t aAction);

}  // namespace dom
```

```
}  // namespace mozilla

#endif
// 7zIn.h

#ifndef __7Z_IN_H
#define __7Z_IN_H

#include "../../../Common/MyCom.h"

#include "../../../Windows/PropVariant.h"

#include "../../IPassword.h"
#include "../../IStream.h"

#include "../../Common/CreateCoder.h"
#include "../../Common/InBuffer.h"

#include "7zItem.h"

namespace NArchive {
namespace N7z {

/*
 We don't need to init isEncrypted and passwordIsDefined
 We must upgrade them only */

#ifdef _NO_CRYPTO
#define _7Z_DECODER_CRYPRO_VARS_DECL
#define _7Z_DECODER_CRYPRO_VARS
#else
#define _7Z_DECODER_CRYPRO_VARS_DECL , ICryptoGetTextPassword *getTextPassword, bool
&isEncrypted, bool &passwordIsDefined, UString &password
#define _7Z_DECODER_CRYPRO_VARS , getTextPassword, isEncrypted, passwordIsDefined, password
#endif

struct CParsedMethods
{
 Byte Lzma2Prop;
 UInt32 LzmaDic;
 CRecordVector<UInt64> IDs;

 CParsedMethods(): Lzma2Prop(0), LzmaDic(0) {}
};

struct CFolderEx: public CFolder
{
 unsigned UnpackCoder;
```

```
};

struct CFolders
{
 CNum NumPackStreams;
 CNum NumFolders;

  CObjArray<UInt64> PackPositions; // NumPackStreams + 1
 // CUInt32DefVector PackCRCs; // we don't use PackCRCs now

 CUInt32DefVector FolderCRCs;            // NumFolders
 CObjArray<CNum> NumUnpackStreamsVector;  // NumFolders

 CObjArray<UInt64> CoderUnpackSizes;      // including unpack sizes of bond coders
 CObjArray<CNum> FoToCoderUnpackSizes;    // NumFolders + 1
 CObjArray<CNum> FoStartPackStreamIndex;  // NumFolders + 1
 CObjArray<Byte> FoToMainUnpackSizeIndex; // NumFolders

 CObjArray<size_t> FoCodersDataOffset;    // NumFolders + 1
 CByteBuffer CodersData;

 CParsedMethods ParsedMethods;

 void ParseFolderInfo(unsigned folderIndex, CFolder &folder) const;
 void ParseFolderEx(unsigned folderIndex, CFolderEx &folder) const
 {
  ParseFolderInfo(folderIndex, folder);
  folder.UnpackCoder = FoToMainUnpackSizeIndex[folderIndex];
 }

 unsigned GetNumFolderUnpackSizes(unsigned folderIndex) const
 {
  return (unsigned)(FoToCoderUnpackSizes[folderIndex
 + 1] - FoToCoderUnpackSizes[folderIndex]);
 }

 UInt64 GetFolderUnpackSize(unsigned folderIndex) const
 {
  return CoderUnpackSizes[FoToCoderUnpackSizes[folderIndex] + FoToMainUnpackSizeIndex[folderIndex]];
 }

 UInt64 GetStreamPackSize(unsigned index) const
 {
  return PackPositions[index + 1] - PackPositions[index];
 }

 CFolders(): NumPackStreams(0), NumFolders(0) {}
```

```
 void Clear()
 {
   NumPackStreams = 0;
   PackPositions.Free();
   // PackCRCs.Clear();

   NumFolders = 0;
   FolderCRCs.Clear();
   NumUnpackStreamsVector.Free();
   CoderUnpackSizes.Free();
   FoToCoderUnpackSizes.Free();
   FoStartPackStreamIndex.Free();
   FoToMainUnpackSizeIndex.Free();
   FoCodersDataOffset.Free();
   CodersData.Free();
 }
};

struct CDatabase: public CFolders
{
 CRecordVector<CFileItem> Files;

 CUInt64DefVector CTime;
 CUInt64DefVector ATime;
 CUInt64DefVector MTime;
 CUInt64DefVector StartPos;
 CUInt32DefVector Attrib;
 CBoolVector IsAnti;
 /*
 CBoolVector
 IsAux;
 CByteBuffer SecureBuf;
 CRecordVector<UInt32> SecureIDs;
 */

 CByteBuffer NamesBuf;
 CObjArray<size_t> NameOffsets; // numFiles + 1, offsets of utf-16 symbols

 /*
 void ClearSecure()
 {
   SecureBuf.Free();
   SecureIDs.Clear();
 }
 */

 void Clear()
 {
```

```
  CFolders::Clear();
  // ClearSecure();

  NamesBuf.Free();
  NameOffsets.Free();

  Files.Clear();
  CTime.Clear();
  ATime.Clear();
  MTime.Clear();
  StartPos.Clear();
  Attrib.Clear();
  IsAnti.Clear();
  // IsAux.Clear();
 }

 bool IsSolid() const
 {
  for (CNum i = 0; i < NumFolders; i++)
    if (NumUnpackStreamsVector[i] > 1)
      return true;
  return false;
 }
 bool IsItemAnti(unsigned index) const { return (index < IsAnti.Size() && IsAnti[index]); }
 // bool IsItemAux(unsigned index) const { return (index < IsAux.Size() && IsAux[index]); }

 /*
 const void* GetName(unsigned index) const
 {
  if (!NameOffsets || !NamesBuf)
    return NULL;
  return
 (void *)((const Byte *)NamesBuf + NameOffsets[index] * 2);
 };
 */
 void GetPath(unsigned index, UString &path) const;
 HRESULT GetPath_Prop(unsigned index, PROPVARIANT *path) const throw();
};

struct CInArchiveInfo
{
 CArchiveVersion Version;
 UInt64 StartPosition;
 UInt64 StartPositionAfterHeader;
 UInt64 DataStartPosition;
 UInt64 DataStartPosition2;
 CRecordVector<UInt64> FileInfoPopIDs;
```

```
 void Clear()
 {
   StartPosition = 0;
   StartPositionAfterHeader = 0;
   DataStartPosition = 0;
   DataStartPosition2 = 0;
   FileInfoPopIDs.Clear();
 }
};

struct CDbEx: public CDatabase
{
 CInArchiveInfo ArcInfo;

 CObjArray<CNum> FolderStartFileIndex;
 CObjArray<CNum> FileIndexToFolderIndexMap;

 UInt64 HeadersSize;
 UInt64 PhySize;

 /*
 CRecordVector<size_t> SecureOffsets;
 bool IsTree;
 bool ThereAreAltStreams;
 */

 bool IsArc;
 bool PhySizeWasConfirmed;

 bool ThereIsHeaderError;
 bool UnexpectedEnd;
 // bool UnsupportedVersion;

 bool StartHeaderWasRecovered;
  bool UnsupportedFeatureWarning;
 bool UnsupportedFeatureError;

 /*
 void ClearSecureEx()
 {
   ClearSecure();
   SecureOffsets.Clear();
 }
 */

 void Clear()
 {
   IsArc = false;
```

```
  PhySizeWasConfirmed = false;

  ThereIsHeaderError = false;
  UnexpectedEnd = false;
  // UnsupportedVersion = false;

  StartHeaderWasRecovered = false;
  UnsupportedFeatureError = false;
  UnsupportedFeatureWarning = false;

  /*
  IsTree = false;
  ThereAreAltStreams = false;
  */

  CDatabase::Clear();

  // SecureOffsets.Clear();
  ArcInfo.Clear();
  FolderStartFileIndex.Free();
  FileIndexToFolderIndexMap.Free();

  HeadersSize = 0;
  PhySize = 0;
}

void FillLinks();

UInt64 GetFolderStreamPos(CNum folderIndex, unsigned indexInFolder) const
{
  return ArcInfo.DataStartPosition +
      PackPositions[FoStartPackStreamIndex[folderIndex] + indexInFolder];
}

UInt64 GetFolderFullPackSize(CNum folderIndex) const
{
   return
    PackPositions[FoStartPackStreamIndex[folderIndex + 1]] -
    PackPositions[FoStartPackStreamIndex[folderIndex]];
}

UInt64 GetFolderPackStreamSize(CNum folderIndex, unsigned streamIndex) const
{
  size_t i = FoStartPackStreamIndex[folderIndex] + streamIndex;
  return PackPositions[i + 1] - PackPositions[i];
}

UInt64 GetFilePackSize(CNum fileIndex) const
```

```
 {
   CNum folderIndex = FileIndexToFolderIndexMap[fileIndex];
   if (folderIndex != kNumNoIndex)
     if (FolderStartFileIndex[folderIndex] == fileIndex)
       return GetFolderFullPackSize(folderIndex);
   return 0;
 }
};

const unsigned kNumBufLevelsMax = 4;

struct CInByte2
{
 const Byte *_buffer;
public:
 size_t _size;
 size_t _pos;

 size_t GetRem() const { return _size - _pos; }
 const Byte *GetPtr() const { return _buffer + _pos; }
 void Init(const Byte *buffer, size_t size)
 {
   _buffer = buffer;
   _size = size;
   _pos = 0;
 }
 Byte ReadByte();
 void ReadBytes(Byte *data,
 size_t size);
 void SkipDataNoCheck(UInt64 size) { _pos += (size_t)size; }
 void SkipData(UInt64 size);

 void SkipData();
 void SkipRem() { _pos = _size; }
 UInt64 ReadNumber();
 CNum ReadNum();
 UInt32 ReadUInt32();
 UInt64 ReadUInt64();

 void ParseFolder(CFolder &folder);
};

class CStreamSwitch;

const UInt32 kHeaderSize = 32;

class CInArchive
{
```

```
friend class CStreamSwitch;

CMyComPtr<IInStream> _stream;

unsigned _numInByteBufs;
CInByte2 _inByteVector[kNumBufLevelsMax];

CInByte2 *_inByteBack;
bool ThereIsHeaderError;

UInt64 _arhiveBeginStreamPosition;
UInt64 _fileEndPosition;

Byte _header[kHeaderSize];

UInt64 HeadersSize;

bool _useMixerMT;

void AddByteStream(const Byte *buffer, size_t size);

void DeleteByteStream(bool needUpdatePos)
{
  _numInByteBufs--;
  if (_numInByteBufs > 0)
  {
    _inByteBack = &_inByteVector[_numInByteBufs - 1];
    if (needUpdatePos)
      _inByteBack->_pos += _inByteVector[_numInByteBufs]._pos;
   }
}

HRESULT FindAndReadSignature(IInStream *stream, const UInt64 *searchHeaderSizeLimit);

void ReadBytes(Byte *data, size_t size) { _inByteBack->ReadBytes(data, size); }
Byte ReadByte() { return _inByteBack->ReadByte(); }
UInt64 ReadNumber() { return _inByteBack->ReadNumber(); }
CNum ReadNum() { return _inByteBack->ReadNum(); }
UInt64 ReadID() { return _inByteBack->ReadNumber(); }
UInt32 ReadUInt32() { return _inByteBack->ReadUInt32(); }
UInt64 ReadUInt64() { return _inByteBack->ReadUInt64(); }
void SkipData(UInt64 size) { _inByteBack->SkipData(size); }
void SkipData() { _inByteBack->SkipData(); }
void WaitId(UInt64 id);

void Read_UInt32_Vector(CUInt32DefVector &v);

void ReadArchiveProperties(CInArchiveInfo &archiveInfo);
```

```
  void ReadHashDigests(unsigned numItems, CUInt32DefVector &crcs);

  void ReadPackInfo(CFolders &f);

  void ReadUnpackInfo(
     const CObjectVector<CByteBuffer> *dataVector,
     CFolders &folders);

  void ReadSubStreamsInfo(
      CFolders &folders,
     CRecordVector<UInt64> &unpackSizes,
     CUInt32DefVector &digests);

  void ReadStreamsInfo(
     const CObjectVector<CByteBuffer> *dataVector,
     UInt64 &dataOffset,
     CFolders &folders,
     CRecordVector<UInt64> &unpackSizes,
     CUInt32DefVector &digests);

  void ReadBoolVector(unsigned numItems, CBoolVector &v);
  void ReadBoolVector2(unsigned numItems, CBoolVector &v);
  void ReadUInt64DefVector(const CObjectVector<CByteBuffer> &dataVector,
     CUInt64DefVector &v, unsigned numItems);
  HRESULT ReadAndDecodePackedStreams(
     DECL_EXTERNAL_CODECS_LOC_VARS
     UInt64 baseOffset, UInt64 &dataOffset,
     CObjectVector<CByteBuffer> &dataVector
     _7Z_DECODER_CRYPRO_VARS_DECL
     );
  HRESULT ReadHeader(
     DECL_EXTERNAL_CODECS_LOC_VARS
     CDbEx &db
     _7Z_DECODER_CRYPRO_VARS_DECL
     );
  HRESULT ReadDatabase2(
     DECL_EXTERNAL_CODECS_LOC_VARS
     CDbEx &db
     _7Z_DECODER_CRYPRO_VARS_DECL
     );
 public:
   CInArchive(bool useMixerMT):
     _numInByteBufs(0),
     _useMixerMT(useMixerMT)
     {}

  HRESULT Open(IInStream *stream, const UInt64 *searchHeaderSizeLimit); // S_FALSE means is not archive
  void Close();
```

```
 HRESULT ReadDatabase(
    DECL_EXTERNAL_CODECS_LOC_VARS
    CDbEx &db
    _7Z_DECODER_CRYPRO_VARS_DECL
    );
};

}}

#endif
// Common/ListFileUtils.h

#ifndef __COMMON_LIST_FILE_UTILS_H
#define __COMMON_LIST_FILE_UTILS_H

#include "MyString.h"
#include "MyTypes.h"

#define MY__CP_UTF16   1200
#define MY__CP_UTF16BE 1201

bool ReadNamesFromListFile(CFSTR fileName, UStringVector &strings, UINT codePage = CP_OEMCP);

#endif
```

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strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Attribute in license Element text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element with an unknown attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size:
```

```
 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
/* Alloc.h -- Memory allocation functions
2018-02-19 : Igor Pavlov : Public domain */

#ifndef __COMMON_ALLOC_H
#define __COMMON_ALLOC_H

#include "7zTypes.h"

EXTERN_C_BEGIN

void *MyAlloc(size_t size);
void MyFree(void *address);

#ifdef _WIN32

void SetLargePageSize();

void *MidAlloc(size_t size);
void MidFree(void *address);
void *BigAlloc(size_t size);
void BigFree(void *address);

#else

#define MidAlloc(size) MyAlloc(size)
#define MidFree(address) MyFree(address)
#define BigAlloc(size) MyAlloc(size)
#define BigFree(address) MyFree(address)

#endif

extern const ISzAlloc g_Alloc;
```

```
extern const ISzAlloc g_BigAlloc;
extern const ISzAlloc g_MidAlloc;
extern const ISzAlloc g_AlignedAlloc;


typedef struct
{
 ISzAlloc vt;
 ISzAllocPtr baseAlloc;
 unsigned numAlignBits; /* ((1 << numAlignBits) >= sizeof(void *)) */
 size_t offset;         /* (offset == (k * sizeof(void *)) && offset < (1 << numAlignBits) */
} CAlignOffsetAlloc;

void AlignOffsetAlloc_CreateVTable(CAlignOffsetAlloc *p);


EXTERN_C_END

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Attribute in license Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains an unknown attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family:
 "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
```

```
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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django-dotenv-rw

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```
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#ifndef __PASSWORD_DIALOG_H
#define __PASSWORD_DIALOG_H

#include "../../../Windows/Control/Dialog.h"
#include "../../../Windows/Control/Edit.h"

#include "PasswordDialogRes.h"

class CPasswordDialog: public NWindows::NControl::CModalDialog
{
 NWindows::NControl::CEdit _passwordEdit;

 virtual void OnOK();
 virtual bool OnInit();
 virtual bool OnButtonClicked(int buttonID, HWND buttonHWND);
 void SetTextSpec();
 void ReadControls();
public:
 UString Password;
 bool ShowPassword;

 CPasswordDialog(): ShowPassword(false) {}
 INT_PTR Create(HWND parentWindow = 0) { return CModalDialog::Create(IDD_PASSWORD, parentWindow);
```

```
}
};

#endif
```

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```
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PROG = 7zDec
CXX = gcc
LIB =
RM = rm -f
CFLAGS = -c -O2 -Wall

OBJS = 7zMain.o 7zAlloc.o 7zArcIn.o 7zBuf.o 7zBuf2.o 7zCrc.o 7zCrcOpt.o 7zDec.o CpuArch.o Delta.o
LzmaDec.o Lzma2Dec.o Bra.o Bra86.o BraIA64.o Bcj2.o Ppmd7.o Ppmd7Dec.o 7zFile.o 7zStream.o

all: $(PROG)

$(PROG): $(OBJS)
 $(CXX) -o $(PROG) $(LDFLAGS) $(OBJS) $(LIB)

7zMain.o: 7zMain.c
 $(CXX) $(CFLAGS) 7zMain.c

7zAlloc.o: ../../7zAlloc.c
 $(CXX) $(CFLAGS) ../../7zAlloc.c

7zArcIn.o: ../../7zArcIn.c
 $(CXX) $(CFLAGS) ../../7zArcIn.c

7zBuf.o: ../../7zBuf.c
 $(CXX) $(CFLAGS) ../../7zBuf.c

7zBuf2.o: ../../7zBuf2.c
 $(CXX) $(CFLAGS) ../../7zBuf2.c

7zCrc.o: ../../7zCrc.c
 $(CXX) $(CFLAGS) ../../7zCrc.c

7zCrcOpt.o: ../../7zCrc.c
 $(CXX) $(CFLAGS) ../../7zCrcOpt.c

7zDec.o: ../../7zDec.c
 $(CXX) $(CFLAGS) -D_7ZIP_PPMD_SUPPPORT ../../7zDec.c

CpuArch.o: ../../CpuArch.c
 $(CXX) $(CFLAGS) ../../CpuArch.c

Delta.o: ../../Delta.c
 $(CXX) $(CFLAGS) ../../Delta.c
```

```
LzmaDec.o: ../../LzmaDec.c
 $(CXX) $(CFLAGS) ../../LzmaDec.c

Lzma2Dec.o:
 ../../Lzma2Dec.c
 $(CXX) $(CFLAGS) ../../Lzma2Dec.c

Bra.o: ../../Bra.c
 $(CXX) $(CFLAGS) ../../Bra.c

Bra86.o: ../../Bra86.c
 $(CXX) $(CFLAGS) ../../Bra86.c

BraIA64.o: ../../BraIA64.c
 $(CXX) $(CFLAGS) ../../BraIA64.c

Bcj2.o: ../../Bcj2.c
 $(CXX) $(CFLAGS) ../../Bcj2.c

Ppmd7.o: ../../Ppmd7.c
 $(CXX) $(CFLAGS) ../../Ppmd7.c

Ppmd7Dec.o: ../../Ppmd7Dec.c
 $(CXX) $(CFLAGS) ../../Ppmd7Dec.c

7zFile.o: ../../7zFile.c
 $(CXX) $(CFLAGS) ../../7zFile.c

7zStream.o: ../../7zStream.c
 $(CXX) $(CFLAGS) ../../7zStream.c

clean:
 -$(RM) $(PROG) $(OBJS)
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Attribute in copyright Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains an unknown attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
```

```
  body {
   font-size: 20px;
  }
  pre {
   font-size: 12px;
  }
  .test {
   font-family:
 "WOFF Test CFF Reference";
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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```
/* RotateDefs.h -- Rotate functions
2015-03-25 : Igor Pavlov : Public domain */

#ifndef __ROTATE_DEFS_H
#define __ROTATE_DEFS_H

#ifdef _MSC_VER

#include <stdlib.h>

/* don't use _rotl with MINGW. It can insert slow call to function. */

/* #if (_MSC_VER >= 1200) */
#pragma intrinsic(_rotl)
#pragma intrinsic(_rotr)
/* #endif */

#define rotlFixed(x, n) _rotl((x), (n))
#define rotrFixed(x, n) _rotr((x), (n))

#else

/* new compilers can translate these macros to fast commands. */

#define rotlFixed(x, n) (((x) << (n)) | ((x) >> (32 - (n))))
#define rotrFixed(x, n) (((x) >> (n)) | ((x) << (32 - (n))))

#endif

#endif
#define IDI_ICON  1

#define IDS_MESSAGE_NO_ERRORS          3001

#define IDS_PROGRESS_TESTING           3302
#define IDS_OPENNING                   3303
#define IDS_SCANNING                   3304

#define IDS_CHECKSUM_CALCULATING       7500
#define IDS_CHECKSUM_INFORMATION       7501
#define IDS_CHECKSUM_CRC_DATA          7502
```

```
#define IDS_CHECKSUM_CRC_DATA_NAMES     7503
#define IDS_CHECKSUM_CRC_STREAMS_NAMES  7504

#define IDS_INCORRECT_VOLUME_SIZE       7307
/* ATK -  Accessibility Toolkit
* Copyright 2001 Sun Microsystems Inc.
*
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*
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* License along with this library; if not, write to the
* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_H__
#define __ATK_H__

#define __ATK_H_INSIDE__

// XXX this is a Mozilla hack to avoid using atkversion.h which needs to be run
// through m4, and we don't want to deal
 with that.  Fortunately we don't need
// any of the fancyness in that header to deal with compile time version
// detection.
#define ATK_AVAILABLE_IN_2_12 extern

#include <atk/atkobject.h>
#include <atk/atkaction.h>
#include <atk/atkcomponent.h>
#include <atk/atkdocument.h>
#include <atk/atkeditabletext.h>
#include <atk/atkgobjectaccessible.h>
#include <atk/atkhyperlink.h>
#include <atk/atkhyperlinkimpl.h>
#include <atk/atkhypertext.h>
#include <atk/atkimage.h>
#include <atk/atknoopobject.h>
#include <atk/atknoopobjectfactory.h>
#include <atk/atkobjectfactory.h>
```

```
#include <atk/atkplug.h>
#include <atk/atkregistry.h>
#include <atk/atkrelation.h>
#include <atk/atkrelationset.h>
#include <atk/atkrelationtype.h>
#include <atk/atkselection.h>
#include <atk/atksocket.h>
#include <atk/atkstate.h>
#include <atk/atkstateset.h>
#include <atk/atkstreamablecontent.h>
#include <atk/atktable.h>
#include <atk/atktablecell.h>
#include <atk/atktext.h>
#include <atk/atkutil.h>
#include <atk/atkvalue.h>

#undef
 __ATK_H_INSIDE__

#endif /* __ATK_H__ */
```

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HISTORY of the LZMA SDK

---

18.05 2018-04-30

---

- The speed for LZMA/LZMA2 compressing was increased

by 8% for fastest/fast compression levels and
by 3% for normal/maximum compression levels.
- Previous versions of 7-Zip could work incorrectly in "Large memory pages" mode in
Windows 10 because of some BUG with "Large Pages" in Windows 10.
Now 7-Zip doesn't use "Large Pages" on Windows 10 up to revision 1709 (16299).
- The BUG was fixed in Lzma2Enc.c
Lzma2Enc_Encode2() function worked incorretly,
if (inStream == NULL) and the number of block threads is more than 1.

18.03 beta 2018-03-04
---
- Asm\x86\LzmaDecOpt.asm: new optimized LZMA decoder written in asm
for x64 with about 30% higher speed than main version of LZMA decoder written in C.
- The speed for single-thread LZMA/LZMA2 decoder written in C was increased by 3%.
- 7-Zip now can use multi-threading for 7z/LZMA2 decoding,
if there are multiple independent data chunks in LZMA2 stream.
- 7-Zip now can use multi-threading for xz decoding,
if there are multiple blocks in xz stream.

18.01 2019-01-28
---
- The BUG in 17.01 - 18.00 beta was fixed:
XzDec.c : random block unpacking and XzUnpacker_IsBlockFinished()
didn't work correctly for xz archives without checksum (CRC).

18.00 beta 2019-01-10
---
- The BUG in xz encoder was fixed:
There was memory leak of 16 KB for each file compressed with
xz compression method, if additional filter was used.

17.01 beta 2017-08-28
---
- Minor speed optimization for LZMA2 (xz and 7z) multi-threading compression.
7-Zip now uses additional memory buffers for multi-block LZMA2 compression.
CPU utilization was slightly improved.
- 7-zip now creates multi-block xz archives by default. Block size can be
specified with -ms[Size]{m|g} switch.
- xz decoder now can unpack random
block from multi-block xz archives.
- 7-Zip command line: @listfile now doesn't work after -- switch.
Use -i@listfile before -- switch instead.
- The BUGs were fixed:
7-Zip 17.00 beta crashed for commands that write anti-item to 7z archive.

17.00 beta  2017-04-29
---
- NewHandler.h / NewHandler.cpp:
  now it redefines operator new() only for old MSVC compilers (_MSC_VER < 1900).
- C/7zTypes.h : the names of variables in interface structures were changed (vt).
- Some bugs were fixed. 7-Zip could crash in some cases.
- Some internal changes in code.

16.04  2016-10-04
---
- The bug was fixed in DllSecur.c.

16.03  2016-09-28
---
- SFX modules now use some protection against DLL preloading attack.
- Some bugs in 7z code were fixed.

16.02  2016-05-21
---
- The BUG in 16.00 - 16.01 was fixed:
 Split Handler (SplitHandler.cpp) returned incorrect
 total size value
 (kpidSize) for split archives.

16.01  2016-05-19
---
- Some internal changes to reduce the number of compiler warnings.

16.00  2016-05-10
---
- Some bugs were fixed.

15.12  2015-11-19
---
- The BUG in C version of 7z decoder was fixed:
 7zDec.c : SzDecodeLzma2()
 7z decoder could mistakenly report about decoding error for some 7z archives
 that use LZMA2 compression method.
 The probability to get that mistaken decoding error report was about
 one error per 16384 solid blocks for solid blocks larger than 16 KB (compressed size).

- The BUG (in 9.26-15.11) in C version of 7z decoder was fixed:
 7zArcIn.c : SzReadHeader2()
 7z decoder worked incorrectly for 7z archives that contain
 empty solid blocks, that can be placed to 7z archive, if some file is
 unavailable for reading during archive creation.

15.09 beta  2015-10-16
---
- The BUG in LZMA / LZMA2
 encoding code was fixed.
 The BUG in LzFind.c::MatchFinder_ReadBlock() function.
 If input data size is larger than (4 GiB - dictionary_size),
 the following code worked incorrectly:
 - LZMA : LzmaEnc_MemEncode(), LzmaEncode() : LZMA encoding functions
   for compressing from memory to memory.
   That BUG is not related to LZMA encoder version that works via streams.
 - LZMA2 : multi-threaded version of LZMA2 encoder worked incorrectly, if
   default value of chunk size (CLzma2EncProps::blockSize) is changed
   to value larger than (4 GiB - dictionary_size).

9.38 beta  2015-01-03
---
- The BUG in 9.31-9.37 was fixed:
 IArchiveGetRawProps interface was disabled for 7z archives.
- The BUG in 9.26-9.36 was fixed:
 Some code in CPP\7zip\Archive\7z\ worked correctly only under Windows.

9.36 beta  2014-12-26
---
- The BUG in command line version was fixed:
 7-Zip created temporary archive in current folder during
 update archive
 operation, if -w{Path} switch was not specified.
 The fixed 7-Zip creates temporary archive in folder that contains updated archive.
- The BUG in 9.33-9.35 was fixed:
 7-Zip silently ignored file reading errors during 7z or gz archive creation,
 and the created archive contained only part of file that was read before error.
 The fixed 7-Zip stops archive creation and it reports about error.

9.35 beta  2014-12-07
---
- 7zr.exe now support AES encryption.
- SFX mudules were added to LZMA SDK
- Some bugs were fixed.

9.21 beta 2011-04-11
---
- New class FString for file names at file systems.
- Speed optimization in CRC code for big-endian CPUs.
- The BUG in Lzma2Dec.c was fixed:
  Lzma2Decode function didn't work.

9.18 beta 2010-11-02
---
- New small SFX module for installers (SfxSetup).

9.12 beta 2010-03-24
---
- The BUG in LZMA SDK 9.* was fixed:
 LZMA2 codec didn't work,
 if more than 10 threads were used (or more than 20 threads in some modes).

9.11 beta 2010-03-15
---
- PPMd compression method support

9.09 2009-12-12
---
- The bug was fixed:
  Utf16_To_Utf8 funstions in UTFConvert.cpp and 7zMain.c
  incorrectly converted surrogate characters (the code >= 0x10000) to UTF-8.
- Some bugs were fixed

9.06 2009-08-17
---
- Some changes in ANSI-C 7z Decoder interfaces.

9.04 2009-05-30
---
- LZMA2 compression method support
- xz format support

4.65 2009-02-03
---

- Some minor fixes

4.63 2008-12-31
---
- Some minor fixes

4.61 beta 2008-11-23
---
- The bug in ANSI-C LZMA Decoder was fixed:
  If encoded stream was corrupted, decoder could access memory
  outside of allocated range.
- Some changes
 in ANSI-C 7z Decoder interfaces.
- LZMA SDK is placed in the public domain.

4.60 beta 2008-08-19
---
- Some minor fixes.

4.59 beta 2008-08-13
---
- The bug was fixed:
  LZMA Encoder in fast compression mode could access memory outside of
  allocated range in some rare cases.

4.58 beta 2008-05-05
---
- ANSI-C LZMA Decoder was rewritten for speed optimizations.
- ANSI-C LZMA Encoder was included to LZMA SDK.
- C++ LZMA code now is just wrapper over ANSI-C code.

4.57 2007-12-12
---
- Speed optimizations in ++ LZMA Decoder.
- Small changes for more compatibility with some C/C++ compilers.

4.49 beta 2007-07-05
---
- .7z ANSI-C Decoder:
  - now it supports BCJ and BCJ2 filters
  - now it supports files larger than 4 GB.

- now it supports "Last Write Time" field for files.
- C++ code for .7z archives compressing/decompressing from
7-zip
was included to LZMA SDK.

4.43 2006-06-04
---
- Small changes for more compatibility with some C/C++ compilers.

4.42 2006-05-15
---
- Small changes in .h files in ANSI-C version.

4.39 beta 2006-04-14
---
- The bug in versions 4.33b:4.38b was fixed:
C++ version of LZMA encoder could not correctly compress
files larger than 2 GB with HC4 match finder (-mfhc4).

4.37 beta 2005-04-06
---
- Fixes in C++ code: code could no be compiled if _NO_EXCEPTIONS was defined.

4.35 beta 2005-03-02
---
- The bug was fixed in C++ version of LZMA Decoder:
If encoded stream was corrupted, decoder could access memory
outside of allocated range.

4.34 beta 2006-02-27
---
- Compressing speed and memory requirements for compressing were increased
- LZMA now can use only these match finders: HC4, BT2,
BT3, BT4

4.32 2005-12-09
---
- Java version of LZMA SDK was included

4.30 2005-11-20

---
- Compression ratio was improved in -a2 mode
- Speed optimizations for compressing in -a2 mode
- -fb switch now supports values up to 273
- The bug in 7z_C (7zIn.c) was fixed:
 It used Alloc/Free functions from different memory pools.
 So if program used two memory pools, it worked incorrectly.
- 7z_C: .7z format supporting was improved
- LZMA# SDK (C#.NET version) was included

4.27 (Updated) 2005-09-21
---
- Some GUIDs/interfaces in C++ were changed.
IStream.h:
  ISequentialInStream::Read now works as old ReadPart
  ISequentialOutStream::Write now works as old WritePart

4.27 2005-08-07
---
- The bug in LzmaDecodeSize.c was fixed:
  if _LZMA_IN_CB and _LZMA_OUT_READ were defined,
  decompressing worked incorrectly.

4.26 2005-08-05
---
-
 Fixes in 7z_C code and LzmaTest.c:
 previous versions could work incorrectly,
 if malloc(0) returns 0

4.23 2005-06-29
---
- Small fixes in C++ code

4.22 2005-06-10
---
- Small fixes

4.21 2005-06-08
---
- Interfaces for ANSI-C LZMA Decoder (LzmaDecode.c) were changed
- New additional version of ANSI-C LZMA Decoder with zlib-like interface:

- LzmaStateDecode.h
- LzmaStateDecode.c
- LzmaStateTest.c

- ANSI-C LZMA Decoder now can decompress files larger than 4 GB

4.17 2005-04-18
---
- New example for RAM->RAM compressing/decompressing:
 LZMA + BCJ (filter for x86 code):
  - LzmaRam.h
  - LzmaRam.cpp
  - LzmaRamDecode.h
  - LzmaRamDecode.c
  - -f86 switch for lzma.exe

4.16 2005-03-29
---
- The bug was fixed in LzmaDecode.c (ANSI-C LZMA Decoder):
  If _LZMA_OUT_READ was defined, and if encoded
 stream was corrupted,
  decoder could access memory outside of allocated range.
- Speed optimization of ANSI-C LZMA Decoder (now it's about 20% faster).
 Old version of LZMA Decoder now is in file LzmaDecodeSize.c.
 LzmaDecodeSize.c can provide slightly smaller code than LzmaDecode.c
- Small speed optimization in LZMA C++ code
- filter for SPARC's code was added
- Simplified version of .7z ANSI-C Decoder was included

4.06 2004-09-05
---
- The bug in v4.05 was fixed:
  LZMA-Encoder didn't release output stream in some cases.

4.05 2004-08-25
---
- Source code of filters for x86, IA-64, ARM, ARM-Thumb
 and PowerPC code was included to SDK
- Some internal minor changes

4.04 2004-07-28
---
- More compatibility with some C++ compilers

4.03 2004-06-18
---
- "Benchmark" command was added. It measures compressing
 and decompressing speed and shows
 rating values.
 Also it checks hardware errors.

4.02 2004-06-10
---
- C++ LZMA Encoder/Decoder code now is more portable
 and it can be compiled by GCC on Linux.

4.01 2004-02-15
---
- Some detection of data corruption was enabled.

```
LzmaDecode.c / RangeDecoderReadByte
.....
{
  rd->ExtraBytes = 1;
  return 0xFF;
}
```

4.00 2004-02-13
---
- Original version of LZMA SDK

HISTORY of the LZMA
---
 2001-2008: Improvements to LZMA compressing/decompressing code,
 keeping compatibility with original LZMA format
 1996-2001: Development of LZMA compression format

 Some milestones:

 2001-08-30: LZMA compression was added to 7-Zip
 1999-01-02: First version of 7-Zip was released

End of document

```
// LockedStream.h

#ifndef __LOCKED_STREAM_H
```

#define __LOCKED_STREAM_H

#endif

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// BcjCoder.h

```
#ifndef __COMPRESS_BCJ_CODER_H
#define __COMPRESS_BCJ_CODER_H

#include "../../../C/Bra.h"

#include "../../Common/MyCom.h"

#include "../ICoder.h"

namespace NCompress {
```

```
namespace NBcj {

class CCoder:
 public ICompressFilter,
 public CMyUnknownImp
{
 UInt32 _bufferPos;
 UInt32 _prevMask;
 int _encode;
public:
 MY_UNKNOWN_IMP1(ICompressFilter);
 INTERFACE_ICompressFilter(;)

 CCoder(int encode): _bufferPos(0), _encode(encode) { x86_Convert_Init(_prevMask); }
};

}}

#endif
```

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SUCH DAMAGE.

```
// 7zUpdate.h

#ifndef __7Z_UPDATE_H
#define __7Z_UPDATE_H

#include "../IArchive.h"

// #include "../../Common/UniqBlocks.h"

#include "7zCompressionMode.h"
#include "7zIn.h"
#include "7zOut.h"

namespace NArchive {
namespace N7z {

/*
struct CTreeFolder
{
 UString Name;
 int Parent;
 CIntVector SubFolders;
 int UpdateItemIndex;
 int SortIndex;
 int SortIndexEnd;
```

```
 CTreeFolder(): UpdateItemIndex(-1) {}
};
*/

struct CUpdateItem
{
 int IndexInArchive;
 int IndexInClient;

 UInt64 CTime;
 UInt64 ATime;
 UInt64 MTime;

 UInt64 Size;
 UString Name;
 /*
 bool IsAltStream;
 int ParentFolderIndex;
 int TreeFolderIndex;
 */

 // that code is not used in 9.26
 // int ParentSortIndex;
 // int ParentSortIndexEnd;

 UInt32 Attrib;

 bool NewData;
 bool NewProps;

 bool IsAnti;
 bool IsDir;

 bool AttribDefined;
 bool CTimeDefined;
 bool ATimeDefined;
 bool MTimeDefined;

 // int SecureIndex; // 0 means (no_security)

 bool HasStream() const { return !IsDir && !IsAnti
 && Size != 0; }
 // bool HasStream() const { return !IsDir && !IsAnti /* && Size != 0 */; } // for test purposes

 CUpdateItem():
    // ParentSortIndex(-1),
    // IsAltStream(false),
    IsAnti(false),
```

```
    IsDir(false),
    AttribDefined(false),
    CTimeDefined(false),
    ATimeDefined(false),
    MTimeDefined(false)
    // SecureIndex(0)
    {}
 void SetDirStatusFromAttrib() { IsDir = ((Attrib & FILE_ATTRIBUTE_DIRECTORY) != 0); }

 // unsigned GetExtensionPos() const;
 // UString GetExtension() const;
};

struct CUpdateOptions
{
 const CCompressionMethodMode *Method;
 const CCompressionMethodMode *HeaderMethod;
 bool UseFilters; // use additional filters for some files
 bool MaxFilter;  // use BCJ2 filter instead of BCJ
 int AnalysisLevel;

 CHeaderOptions HeaderOptions;

 UInt64 NumSolidFiles;
 UInt64 NumSolidBytes;
 bool SolidExtension;

 bool UseTypeSorting;

 bool RemoveSfxBlock;
 bool MultiThreadMixer;

 CUpdateOptions():

 Method(NULL),
    HeaderMethod(NULL),
    UseFilters(false),
    MaxFilter(false),
    AnalysisLevel(-1),
    NumSolidFiles((UInt64)(Int64)(-1)),
    NumSolidBytes((UInt64)(Int64)(-1)),
    SolidExtension(false),
    UseTypeSorting(true),
    RemoveSfxBlock(false),
    MultiThreadMixer(true)
   {}
};
```

```
HRESULT Update(
  DECL_EXTERNAL_CODECS_LOC_VARS
  IInStream *inStream,
  const CDbEx *db,
  const CObjectVector<CUpdateItem> &updateItems,
  // const CObjectVector<CTreeFolder> &treeFolders, // treeFolders[0] is root
  // const CUniqBlocks &secureBlocks,
  COutArchive &archive,
  CArchiveDatabaseOut &newDatabase,
  ISequentialOutStream *seqOutStream,
  IArchiveUpdateCallback *updateCallback,
  const CUpdateOptions &options
  #ifndef _NO_CRYPTO
  , ICryptoGetTextPassword *getDecoderPassword
  #endif
  );
}}

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With Nested div Elements in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element that contains nested div elements." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre
 {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
```

```
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   &lt;div&gt;Paragraph 1&lt;/div&gt;
   &lt;div&gt;Paragraph 2&lt;/div&gt;
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
C_OBJS = $(C_OBJS) \
 $O\Aes.obj

!IF "$(CPU)" != "IA64" && "$(CPU)" != "MIPS" && "$(CPU)" != "ARM" && "$(CPU)" != "ARM64"
ASM_OBJS = $(ASM_OBJS) \
 $O\AesOpt.obj
!ENDIF
```

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```
/* Bra.h -- Branch converters for executables
2013-01-18 : Igor Pavlov : Public domain */

#ifndef __BRA_H
#define __BRA_H

#include "7zTypes.h"

EXTERN_C_BEGIN

/*
These functions convert relative addresses to absolute addresses
in CALL instructions to increase the compression ratio.

 In:
   data     - data buffer
   size     - size of data
   ip       - current virtual Instruction Pinter (IP) value
   state    - state variable for x86 converter
   encoding - 0 (for decoding), 1 (for encoding)

 Out:
   state    - state variable for x86 converter

 Returns:
   The number of processed bytes. If you call these functions with multiple calls,
   you must start next call with first byte after block of processed bytes.

 Type   Endian  Alignment  LookAhead

 x86    little      1          4
 ARMT   little      2          2
 ARM    little      4          0
 PPC    big         4          0
 SPARC  big         4          0
 IA64   little     16          0

 size must
 be >= Alignment + LookAhead, if it's not last block.
 If (size < Alignment + LookAhead), converter returns 0.
```

Example:

```
  UInt32 ip = 0;
  for ()
  {
    ; size must be >= Alignment + LookAhead, if it's not last block
    SizeT processed = Convert(data, size, ip, 1);
    data += processed;
    size -= processed;
    ip += processed;
  }
*/

#define x86_Convert_Init(state) { state = 0; }
SizeT x86_Convert(Byte *data, SizeT size, UInt32 ip, UInt32 *state, int encoding);
SizeT ARM_Convert(Byte *data, SizeT size, UInt32 ip, int encoding);
SizeT ARMT_Convert(Byte *data, SizeT size, UInt32 ip, int encoding);
SizeT PPC_Convert(Byte *data, SizeT size, UInt32 ip, int encoding);
SizeT SPARC_Convert(Byte *data, SizeT size, UInt32 ip, int encoding);
SizeT IA64_Convert(Byte *data, SizeT size, UInt32 ip, int encoding);

EXTERN_C_END

#endif
```

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```
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//
// Various stubs for the open-source version of Snappy.

#ifndef THIRD_PARTY_SNAPPY_OPENSOURCE_SNAPPY_STUBS_INTERNAL_H_
#define THIRD_PARTY_SNAPPY_OPENSOURCE_SNAPPY_STUBS_INTERNAL_H_

#ifdef HAVE_CONFIG_H
#include "config.h"
#endif

#include <string>

#include <assert.h>
#include <stdlib.h>
#include <string.h>

#ifdef HAVE_SYS_MMAN_H
#include <sys/mman.h>
#endif

#include "snappy-stubs-public.h"

#if defined(__x86_64__)

// Enable 64-bit optimized
 versions of some routines.
#define ARCH_K8 1

#endif

// Needed by OS X, among others.
#ifndef MAP_ANONYMOUS
#define MAP_ANONYMOUS MAP_ANON
#endif

// Pull in std::min, std::ostream, and the likes. This is safe because this
// header file is never used from any public header files.
using namespace std;

// The size of an array, if known at compile-time.
// Will give unexpected results if used on a pointer.
// We undefine it first, since some compilers already have a definition.
#ifdef ARRAYSIZE
#undef ARRAYSIZE
```

```
#endif
#define ARRAYSIZE(a) (sizeof(a) / sizeof(*(a)))

// Static prediction hints.
#ifdef HAVE_BUILTIN_EXPECT
#define PREDICT_FALSE(x) (__builtin_expect(x, 0))
#define PREDICT_TRUE(x) (__builtin_expect(!!(x), 1))
#else
#define PREDICT_FALSE(x) x
#define PREDICT_TRUE(x) x
#endif

// This is only used for recomputing the tag byte table used during
// decompression; for simplicity we just remove it from the open-source
// version (anyone who wants to regenerate it can just do
 the call
// themselves within main()).
#define DEFINE_bool(flag_name, default_value, description) \
 bool FLAGS_ ## flag_name = default_value
#define DECLARE_bool(flag_name) \
 extern bool FLAGS_ ## flag_name

namespace snappy {

static const uint32 kuint32max = static_cast<uint32>(0xFFFFFFFF);
static const int64 kint64max = static_cast<int64>(0x7FFFFFFFFFFFFFFFLL);

// Potentially unaligned loads and stores.

// x86 and PowerPC can simply do these loads and stores native.

#if defined(__i386__) || defined(__x86_64__) || defined(__powerpc__)

#define UNALIGNED_LOAD16(_p) (*reinterpret_cast<const uint16 *>(_p))
#define UNALIGNED_LOAD32(_p) (*reinterpret_cast<const uint32 *>(_p))
#define UNALIGNED_LOAD64(_p) (*reinterpret_cast<const uint64 *>(_p))

#define UNALIGNED_STORE16(_p, _val) (*reinterpret_cast<uint16 *>(_p) = (_val))
#define UNALIGNED_STORE32(_p, _val) (*reinterpret_cast<uint32 *>(_p) = (_val))
#define UNALIGNED_STORE64(_p, _val) (*reinterpret_cast<uint64 *>(_p) = (_val))

//
 ARMv7 and newer support native unaligned accesses, but only of 16-bit
// and 32-bit values (not 64-bit); older versions either raise a fatal signal,
// do an unaligned read and rotate the words around a bit, or do the reads very
// slowly (trip through kernel mode). There's no simple #define that says just
// ARMv7 or higher, so we have to filter away all ARMv5 and ARMv6
// sub-architectures.
```

```
//
// This is a mess, but there's not much we can do about it.
//
// To further complicate matters, only LDR instructions (single reads) are
// allowed to be unaligned, not LDRD (two reads) or LDM (many reads). Unless we
// explicitly tell the compiler that these accesses can be unaligned, it can and
// will combine accesses. On armcc, the way to signal this is done by accessing
// through the type (uint32 __packed *), but GCC has no such attribute
// (it ignores __attribute__((packed)) on individual variables). However,
// we can tell it that a _struct_ is unaligned, which has the same effect,
//
 so we do that.

#elif defined(__arm__) && \
    !defined(__ARM_ARCH_4__) && \
    !defined(__ARM_ARCH_4T__) && \
    !defined(__ARM_ARCH_5__) && \
    !defined(__ARM_ARCH_5T__) && \
    !defined(__ARM_ARCH_5TE__) && \
    !defined(__ARM_ARCH_5TEJ__) && \
    !defined(__ARM_ARCH_6__) && \
    !defined(__ARM_ARCH_6J__) && \
    !defined(__ARM_ARCH_6K__) && \
    !defined(__ARM_ARCH_6Z__) && \
    !defined(__ARM_ARCH_6ZK__) && \
    !defined(__ARM_ARCH_6T2__)

#if __GNUC__
#define ATTRIBUTE_PACKED __attribute__((__packed__))
#else
#define ATTRIBUTE_PACKED
#endif

namespace base {
namespace internal {

struct Unaligned16Struct {
 uint16 value;
 uint8 dummy;  // To make the size non-power-of-two.
} ATTRIBUTE_PACKED;

struct Unaligned32Struct {
 uint32 value;
 uint8 dummy;  // To make the size non-power-of-two.
} ATTRIBUTE_PACKED;

}  // namespace internal
}  // namespace base
```

```
#define UNALIGNED_LOAD16(_p) \
   ((reinterpret_cast<const ::snappy::base::internal::Unaligned16Struct
 *>(_p))->value)
#define UNALIGNED_LOAD32(_p) \
   ((reinterpret_cast<const ::snappy::base::internal::Unaligned32Struct *>(_p))->value)

#define UNALIGNED_STORE16(_p, _val) \
   ((reinterpret_cast< ::snappy::base::internal::Unaligned16Struct *>(_p))->value = \
        (_val))
#define UNALIGNED_STORE32(_p, _val) \
   ((reinterpret_cast< ::snappy::base::internal::Unaligned32Struct *>(_p))->value = \
        (_val))

// TODO(user): NEON supports unaligned 64-bit loads and stores.
// See if that would be more efficient on platforms supporting it,
// at least for copies.

inline uint64 UNALIGNED_LOAD64(const void *p) {
 uint64 t;
 memcpy(&t, p, sizeof t);
 return t;
}

inline void UNALIGNED_STORE64(void *p, uint64 v) {
 memcpy(p, &v, sizeof v);
}

#else

// These functions are provided for architectures that don't support
// unaligned loads and stores.

inline uint16 UNALIGNED_LOAD16(const void *p) {
 uint16 t;
 memcpy(&t, p, sizeof t);
 return t;
}

inline uint32
 UNALIGNED_LOAD32(const void *p) {
 uint32 t;
 memcpy(&t, p, sizeof t);
 return t;
}

inline uint64 UNALIGNED_LOAD64(const void *p) {
 uint64 t;
```

```
 memcpy(&t, p, sizeof t);
 return t;
}

inline void UNALIGNED_STORE16(void *p, uint16 v) {
 memcpy(p, &v, sizeof v);
}

inline void UNALIGNED_STORE32(void *p, uint32 v) {
 memcpy(p, &v, sizeof v);
}

inline void UNALIGNED_STORE64(void *p, uint64 v) {
 memcpy(p, &v, sizeof v);
}

#endif

// This can be more efficient than UNALIGNED_LOAD64 + UNALIGNED_STORE64
// on some platforms, in particular ARM.
inline void UnalignedCopy64(const void *src, void *dst) {
 if (sizeof(void *) == 8) {
   UNALIGNED_STORE64(dst, UNALIGNED_LOAD64(src));
 } else {
   const char *src_char = reinterpret_cast<const char *>(src);
   char *dst_char = reinterpret_cast<char *>(dst);

   UNALIGNED_STORE32(dst_char, UNALIGNED_LOAD32(src_char));
   UNALIGNED_STORE32(dst_char + 4, UNALIGNED_LOAD32(src_char + 4));
 }
}

// The following guarantees declaration
 of the byte swap functions.
#ifdef WORDS_BIGENDIAN

#ifdef HAVE_SYS_BYTEORDER_H
#include <sys/byteorder.h>
#endif

#ifdef HAVE_SYS_ENDIAN_H
#include <sys/endian.h>
#endif

#ifdef _MSC_VER
#include <stdlib.h>
#define bswap_16(x) _byteswap_ushort(x)
#define bswap_32(x) _byteswap_ulong(x)
```

```
#define bswap_64(x) _byteswap_uint64(x)

#elif defined(__APPLE__)
// Mac OS X / Darwin features
#include <libkern/OSByteOrder.h>
#define bswap_16(x) OSSwapInt16(x)
#define bswap_32(x) OSSwapInt32(x)
#define bswap_64(x) OSSwapInt64(x)

#elif defined(HAVE_BYTESWAP_H)
#include <byteswap.h>

#elif defined(bswap32)
// FreeBSD defines bswap{16,32,64} in <sys/endian.h> (already #included).
#define bswap_16(x) bswap16(x)
#define bswap_32(x) bswap32(x)
#define bswap_64(x) bswap64(x)

#elif defined(BSWAP_64)
// Solaris 10 defines BSWAP_{16,32,64} in <sys/byteorder.h> (already #included).
#define bswap_16(x) BSWAP_16(x)
#define bswap_32(x) BSWAP_32(x)
#define bswap_64(x) BSWAP_64(x)

#else

inline uint16 bswap_16(uint16
 x) {
 return (x << 8) | (x >> 8);
}

inline uint32 bswap_32(uint32 x) {
 x = ((x & 0xff00ff00UL) >> 8) | ((x & 0x00ff00ffUL) << 8);
 return (x >> 16) | (x << 16);
}

inline uint64 bswap_64(uint64 x) {
 x = ((x & 0xff00ff00ff00ff00ULL) >> 8) | ((x & 0x00ff00ff00ff00ffULL) << 8);
 x = ((x & 0xffff0000ffff0000ULL) >> 16) | ((x & 0x0000ffff0000ffffULL) << 16);
 return (x >> 32) | (x << 32);
}

#endif

#endif  // WORDS_BIGENDIAN

// Convert to little-endian storage, opposite of network format.
// Convert x from host to little endian: x = LittleEndian.FromHost(x);
```

```
// convert x from little endian to host: x = LittleEndian.ToHost(x);
//
//  Store values into unaligned memory converting to little endian order:
//    LittleEndian.Store16(p, x);
//
//  Load unaligned values stored in little endian converting to host order:
//    x = LittleEndian.Load16(p);
class LittleEndian {
public:
 // Conversion functions.
#ifdef WORDS_BIGENDIAN

 static uint16 FromHost16(uint16 x) { return bswap_16(x);
 }
 static uint16 ToHost16(uint16 x) { return bswap_16(x); }

 static uint32 FromHost32(uint32 x) { return bswap_32(x); }
 static uint32 ToHost32(uint32 x) { return bswap_32(x); }

 static bool IsLittleEndian() { return false; }

#else  // !defined(WORDS_BIGENDIAN)

 static uint16 FromHost16(uint16 x) { return x; }
 static uint16 ToHost16(uint16 x) { return x; }

 static uint32 FromHost32(uint32 x) { return x; }
 static uint32 ToHost32(uint32 x) { return x; }

 static bool IsLittleEndian() { return true; }

#endif  // !defined(WORDS_BIGENDIAN)

 // Functions to do unaligned loads and stores in little-endian order.
 static uint16 Load16(const void *p) {
   return ToHost16(UNALIGNED_LOAD16(p));
 }

 static void Store16(void *p, uint16 v) {
   UNALIGNED_STORE16(p, FromHost16(v));
 }

 static uint32 Load32(const void *p) {
   return ToHost32(UNALIGNED_LOAD32(p));
 }

 static void Store32(void *p, uint32 v) {
   UNALIGNED_STORE32(p, FromHost32(v));
```

```
 }
};

//
 Some bit-manipulation functions.
class Bits {
public:
 // Return floor(log2(n)) for positive integer n.  Returns -1 iff n == 0.
 static int Log2Floor(uint32 n);

 // Return the first set least / most significant bit, 0-indexed.  Returns an
 // undefined value if n == 0.  FindLSBSetNonZero() is similar to ffs() except
 // that it's 0-indexed.
 static int FindLSBSetNonZero(uint32 n);
 static int FindLSBSetNonZero64(uint64 n);

private:
 DISALLOW_COPY_AND_ASSIGN(Bits);
};

#ifdef HAVE_BUILTIN_CTZ

inline int Bits::Log2Floor(uint32 n) {
 return n == 0 ? -1 : 31 ^ __builtin_clz(n);
}

inline int Bits::FindLSBSetNonZero(uint32 n) {
 return __builtin_ctz(n);
}

inline int Bits::FindLSBSetNonZero64(uint64 n) {
 return __builtin_ctzll(n);
}

#else  // Portable versions.

inline int Bits::Log2Floor(uint32 n) {
 if (n == 0)
   return -1;
 int log = 0;
 uint32 value = n;
 for (int i = 4; i >= 0; --i) {
   int shift = (1 << i);
   uint32 x = value >> shift;
   if (x != 0) {

     value = x;
     log += shift;
```

```
  }
 }
 assert(value == 1);
 return log;
}

inline int Bits::FindLSBSetNonZero(uint32 n) {
 int rc = 31;
 for (int i = 4, shift = 1 << 4; i >= 0; --i) {
  const uint32 x = n << shift;
  if (x != 0) {
    n = x;
    rc -= shift;
  }
  shift >>= 1;
 }
 return rc;
}

// FindLSBSetNonZero64() is defined in terms of FindLSBSetNonZero().
inline int Bits::FindLSBSetNonZero64(uint64 n) {
 const uint32 bottombits = static_cast<uint32>(n);
 if (bottombits == 0) {
  // Bottom bits are zero, so scan in top bits
  return 32 + FindLSBSetNonZero(static_cast<uint32>(n >> 32));
 } else {
  return FindLSBSetNonZero(bottombits);
 }
}

#endif  // End portable versions.

// Variable-length integer encoding.
class Varint {
public:
 // Maximum lengths of varint encoding of uint32.
 static const int kMax32 = 5;

 // Attempts to parse a varint32 from a prefix of the bytes in [ptr,limit-1].
 // Never reads a character at or beyond limit.  If
 a valid/terminated varint32
 // was found in the range, stores it in *OUTPUT and returns a pointer just
 // past the last byte of the varint32. Else returns NULL.  On success,
 // "result <= limit".
 static const char* Parse32WithLimit(const char* ptr, const char* limit,
                                     uint32* OUTPUT);

 // REQUIRES   "ptr" points to a buffer of length sufficient to hold "v".
```

```
 // EFFECTS    Encodes "v" into "ptr" and returns a pointer to the
 //            byte just past the last encoded byte.
 static char* Encode32(char* ptr, uint32 v);

 // EFFECTS    Appends the varint representation of "value" to "*s".
 static void Append32(string* s, uint32 value);
};

inline const char* Varint::Parse32WithLimit(const char* p,
                                            const char* l,
                                            uint32* OUTPUT) {
 const unsigned char* ptr = reinterpret_cast<const unsigned char*>(p);
 const unsigned char* limit = reinterpret_cast<const
 unsigned char*>(l);
 uint32 b, result;
 if (ptr >= limit) return NULL;
 b = *(ptr++); result = b & 127;          if (b < 128) goto done;
 if (ptr >= limit) return NULL;
 b = *(ptr++); result |= (b & 127) <<  7; if (b < 128) goto done;
 if (ptr >= limit) return NULL;
 b = *(ptr++); result |= (b & 127) << 14; if (b < 128) goto done;
 if (ptr >= limit) return NULL;
 b = *(ptr++); result |= (b & 127) << 21; if (b < 128) goto done;
 if (ptr >= limit) return NULL;
 b = *(ptr++); result |= (b & 127) << 28; if (b < 16) goto done;
 return NULL;       // Value is too long to be a varint32
done:
 *OUTPUT = result;
 return reinterpret_cast<const char*>(ptr);
}

inline char* Varint::Encode32(char* sptr, uint32 v) {
 // Operate on characters as unsigneds
 unsigned char* ptr = reinterpret_cast<unsigned char*>(sptr);
 static const int B = 128;
 if (v < (1<<7)) {
   *(ptr++) = v;
 } else if (v < (1<<14)) {
   *(ptr++) = v | B;
   *(ptr++) = v>>7;
 } else if (v < (1<<21)) {
    *(ptr++) = v | B;
   *(ptr++) = (v>>7) | B;
   *(ptr++) = v>>14;
 } else if (v < (1<<28)) {
   *(ptr++) = v | B;
   *(ptr++) = (v>>7) | B;
   *(ptr++) = (v>>14) | B;
```

```
  *(ptr++) = v>>21;
 } else {
  *(ptr++) = v | B;
  *(ptr++) = (v>>7) | B;
  *(ptr++) = (v>>14) | B;
  *(ptr++) = (v>>21) | B;
  *(ptr++) = v>>28;
 }
 return reinterpret_cast<char*>(ptr);
}

// If you know the internal layout of the std::string in use, you can
// replace this function with one that resizes the string without
// filling the new space with zeros (if applicable) --
// it will be non-portable but faster.
inline void STLStringResizeUninitialized(string* s, size_t new_size) {
 s->resize(new_size);
}

// Return a mutable char* pointing to a string's internal buffer,
// which may not be null-terminated. Writing through this pointer will
// modify the string.
//
// string_as_array(&str)[i] is valid for 0 <= i < str.size() until the
// next call to a string method that invalidates iterators.
//
//
 As of 2006-04, there is no standard-blessed way of getting a
// mutable reference to a string's internal buffer. However, issue 530
// (http://www.open-std.org/JTC1/SC22/WG21/docs/lwg-defects.html#530)
// proposes this as the method. It will officially be part of the standard
// for C++0x. This should already work on all current implementations.
inline char* string_as_array(string* str) {
 return str->empty() ? NULL : &*str->begin();
}

}  // namespace snappy

#endif  // THIRD_PARTY_SNAPPY_OPENSOURCE_SNAPPY_STUBS_INTERNAL_H_
```

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OTHER DEALINGS IN THE SOFTWARE.
UNRECOGNIZED LICENSE; MD5 sum: be54d9d6a12c4311ca9d096c642772bc
!<arch>
/ 1516160780 0 0 0 260 `
H&&

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/* vim: set ts=8 sts=2 et sw=2 tw=80: */
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#ifndef mozilla_dom_PermissionStatus_h_
#define mozilla_dom_PermissionStatus_h_

```
#include "mozilla/dom/PermissionsBinding.h"
#include "mozilla/dom/PermissionStatusBinding.h"
#include "mozilla/DOMEventTargetHelper.h"

namespace mozilla {
namespace dom {

class PermissionObserver;

class PermissionStatus final : public DOMEventTargetHelper {
 friend class PermissionObserver;

public:
 static already_AddRefed<PermissionStatus> Create(nsPIDOMWindowInner* aWindow,
                                                  PermissionName aName,
                                                  ErrorResult& aRv);

 JSObject* WrapObject(JSContext* aCx,
                      JS::Handle<JSObject*>
 aGivenProto) override;

 PermissionState State() const { return mState; }

 IMPL_EVENT_HANDLER(change)

 void DisconnectFromOwner() override;

private:
 ~PermissionStatus();

 PermissionStatus(nsPIDOMWindowInner* aWindow, PermissionName aName);

 nsresult Init();

 nsresult UpdateState();

 already_AddRefed<nsIPrincipal> GetPrincipal() const;

 void PermissionChanged();

 PermissionName mName;
 PermissionState mState;

 RefPtr<PermissionObserver> mObserver;
};

}  // namespace dom
}  // namespace mozilla
```

```
#endif  // mozilla_dom_permissionstatus_h_
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With One No Language Tagged text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element matches the schema. It contains one text element that does not have a language tag." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size:
 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   Copyright without language.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
```

</html>
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2DContext and <canvas> test suite

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```
// Windows/Control/Trackbar.h

#ifndef __WINDOWS_CONTROL_TRACKBAR_H
#define __WINDOWS_CONTROL_TRACKBAR_H

#include "../Window.h"

namespace NWindows {
namespace NControl {

class CTrackbar: public CWindow
{
public:
 void SetRange(int minimum, int maximum, bool redraw = true)
   { SendMsg(TBM_SETRANGE, BoolToBOOL(redraw), MAKELONG(minimum, maximum)); }
 void SetPos(int pos, bool redraw = true)
   { SendMsg(TBM_SETPOS, BoolToBOOL(redraw), pos); }
 void SetTicFreq(int freq)
   { SendMsg(TBM_SETTICFREQ, freq); }

 int GetPos()
```

```
   { return (int)SendMsg(TBM_GETPOS); }
};

}}

#endif
```

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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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Portuguese hyphenation patterns

(more info about the licence to be added later)

% This file is part of hyph-utf8 package and
resulted from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% Source: pthyph.tex (1994-10-13 - date on CTAN) or (1996-07-21 - date in file) - no idea
% Author: Pedro J. de Rezende <rezende at dcc.unicamp.br>, J.Joao Dias Almeida <jj at di.uminho.pt>
%
% The above mentioned file should become obsolete,
% and the author of the original file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines

```
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%
            and helped with testing, suggestions and bug reports
% - Norbert Preining, who tested & integrated patterns into TeX Live
%
% However, the "copyright/copyleft" owner of patterns remains the original author.
%
% The copyright statement of this file is thus:
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%    If you're the original author of patterns or taking over a new revolution,
%    plese remove all of the TUG comments & credits that we added here -
%    you are the Queen / the King, we are only the servants.
%
% If you want to change this file, rather than uploading directly to CTAN,
% we would be grateful if you could send it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
% Before a new "pattern-revolution" starts,
% please try to follow some guidelines if
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%
% - \lccode is *forbidden*, and I really mean it
% - all the patterns should be in UTF-8
% - the only "allowed" TeX commands in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
```

%----------
%
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```
// ArchiveCommandLine.h

#ifndef __ARCHIVE_COMMAND_LINE_H
#define __ARCHIVE_COMMAND_LINE_H

#include "../../../Common/CommandLineParser.h"
#include "../../../Common/Wildcard.h"

#include "EnumDirItems.h"

#include "Extract.h"
#include "HashCalc.h"
#include "Update.h"

typedef CMessagePathException CArcCmdLineException;

namespace NCommandType { enum EEnum
{
 kAdd = 0,
 kUpdate,
 kDelete,
 kTest,
 kExtract,
 kExtractFull,
 kList,
 kBenchmark,
 kInfo,
 kHash,
 kRename
};}

struct CArcCommand
{
 NCommandType::EEnum CommandType;

 bool IsFromExtractGroup() const;
 bool IsFromUpdateGroup() const;
 bool IsTestCommand() const { return CommandType == NCommandType::kTest; }
 NExtract::NPathMode::EEnum GetPathMode() const;
};

enum
{
 k_OutStream_disabled = 0,
 k_OutStream_stdout = 1,
 k_OutStream_stderr = 2
```

```
};

struct CArcCmdLineOptions
{
 bool HelpMode;

 // bool LargePages;
 bool CaseSensitiveChange;
 bool CaseSensitive;

 bool IsInTerminal;
 bool IsStdOutTerminal;
 bool
 IsStdErrTerminal;
 bool StdInMode;
 bool StdOutMode;
 bool EnableHeaders;

 bool YesToAll;
 bool ShowDialog;
 NWildcard::CCensor Censor;

 CArcCommand Command;
 UString ArchiveName;

 #ifndef _NO_CRYPTO
 bool PasswordEnabled;
 UString Password;
 #endif

 bool TechMode;
 bool ShowTime;

 UStringVector HashMethods;

 bool AppendName;
 // UStringVector ArchivePathsSorted;
 // UStringVector ArchivePathsFullSorted;
 NWildcard::CCensor arcCensor;
 UString ArcName_for_StdInMode;

 CObjectVector<CProperty> Properties;

 CExtractOptionsBase ExtractOptions;

 CBoolPair NtSecurity;
 CBoolPair AltStreams;
 CBoolPair HardLinks;
```

```
 CBoolPair SymLinks;

 CUpdateOptions UpdateOptions;
 CHashOptions HashOptions;
 UString ArcType;
 UStringVector ExcludedArcTypes;

 unsigned Number_for_Out;
 unsigned Number_for_Errors;
 unsigned Number_for_Percents;
 unsigned LogLevel;

 // bool IsOutAllowed() const { return Number_for_Out != k_OutStream_disabled; }

 // Benchmark
  UInt32 NumIterations;

 CArcCmdLineOptions():
    // LargePages(false),
    CaseSensitiveChange(false),
    CaseSensitive(false),

    StdInMode(false),
    StdOutMode(false),

    Number_for_Out(k_OutStream_stdout),
    Number_for_Errors(k_OutStream_stderr),
    Number_for_Percents(k_OutStream_stdout),

    LogLevel(0)
 {
 };
};

class CArcCmdLineParser
{
 NCommandLineParser::CParser parser;
public:
 void Parse1(const UStringVector &commandStrings, CArcCmdLineOptions &options);
 void Parse2(CArcCmdLineOptions &options);
};

#endif
```

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<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With dir Attribute in span Element in text Element 2</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
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  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element that contains a span element with rtl as the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
```

```
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
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&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   Text with &lt;span dir="rtl"&gt;span&lt;/span&gt;.
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 </body>
</html>
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```

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* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_HYPERTEXT_H__
#define __ATK_HYPERTEXT_H__

#include <atk/atkobject.h>
#include <atk/atkhyperlink.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

/*
* The
 AtkHypertext interface provides standard  mechanisms for manipulating
* hyperlinks.
*/

#define ATK_TYPE_HYPERTEXT                  (atk_hypertext_get_type ())
#define ATK_IS_HYPERTEXT(obj)               G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_HYPERTEXT)
#define ATK_HYPERTEXT(obj)                  G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_HYPERTEXT, AtkHypertext)
#define ATK_HYPERTEXT_GET_IFACE(obj)        (G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_HYPERTEXT, AtkHypertextIface))

#ifndef _TYPEDEF_ATK_HYPERTEXT_
#define _TYPEDEF_ATK_HYPERTEXT_
typedef struct _AtkHypertext AtkHypertext;
#endif
typedef struct _AtkHypertextIface AtkHypertextIface;

struct _AtkHypertextIface
{
 GTypeInterface parent;
```

```
 AtkHyperlink*(* get_link)                (AtkHypertext       *hypertext,
                                  gint              link_index);
 gint        (* get_n_links)             (AtkHypertext       *hypertext);
 gint        (* get_link_index)
      (AtkHypertext       *hypertext,
                                  gint              char_index);

 /*
  * signal handlers
  */
 void         (* link_selected)           (AtkHypertext       *hypertext,
                                  gint              link_index);

 AtkFunction pad1;
 AtkFunction pad2;
 AtkFunction pad3;
};
GType atk_hypertext_get_type (void);

AtkHyperlink* atk_hypertext_get_link       (AtkHypertext *hypertext,
                                  gint          link_index);
gint         atk_hypertext_get_n_links    (AtkHypertext *hypertext);
gint         atk_hypertext_get_link_index (AtkHypertext *hypertext,
                                  gint          char_index);


#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_HYPERTEXT_H__ */
UNRECOGNIZED LICENSE; MD5 sum: d0403ac59c8441c2a1f7c97eb61591aa
// Common/MyInitGuid.h

#ifndef __COMMON_MY_INITGUID_H
#define __COMMON_MY_INITGUID_H

/*
This file must be included only to one C++ file in project before
declarations of COM interfaces with DEFINE_GUID macro.

Each GUID must be initialized exactly once in project.
There are two different versions of the DEFINE_GUID macro in guiddef.h (MyGuidDef.h):
 - if INITGUID is not defined:  DEFINE_GUID declares an external reference to the symbol name.
 - if INITGUID is     defined:  DEFINE_GUID initializes the symbol name to the value of the GUID.
```

```
Also we need IID_IUnknown that is initialized in some file for linking:
 MSVC:  by default the linker uses some lib file that contains IID_IUnknown
 MinGW: add -luuid switch for linker
 WinCE: we define IID_IUnknown in this file
 Other: we define IID_IUnknown in this file
*/

#ifdef _WIN32

#ifdef UNDER_CE
#include <basetyps.h>
#endif

#include <initguid.h>

#ifdef UNDER_CE
DEFINE_GUID(IID_IUnknown,
0x00000000, 0x0000, 0x0000, 0xC0, 0x00, 0x00,
 0x00, 0x00, 0x00, 0x00, 0x46);
#endif

#else

#define INITGUID
#include "MyGuidDef.h"
DEFINE_GUID(IID_IUnknown,
0x00000000, 0x0000, 0x0000, 0xC0, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x46);

#endif


#endif
wOF2OTTO4 @`
.`f6$ Q
NB3T}1"a5tC::BU1QEX%->+g~Fm*vYP8_*y5{h'5IGVl
t;g"XBD4N7.lGGwSO({crQ5*X!"cIH1$l1\#8j~!0-
.T/bBP&.*?SBPZpOAD6x7ogG~I~.9.tY1Cdy-
vtXK\8S34Slt-q6($oPsKHu3p mZ8^|E_)=+wQhjy5J.ZM/gP2mm
<D6\9%XK52S4@e$K}%lN$ >W#cw)~_;ddtm nI@r ~y!rG[(/}X!=_9M?x{O8ys{
+4qAZ5pL
*u@uT(]8E$^0ZP~q{`u%4$Q4sB]p?Jak(3i![}fsgK@ft9!G,KdikhMm4iI!#zVetl-wnuL@x5x)MiP^:620k;{i6tDf s$-
lF^%OU+m01;VA[?r<4B6_
~>l)$*
8E{
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```
/* Aes.h -- AES encryption / decryption
2013-01-18 : Igor Pavlov : Public domain */

#ifndef __AES_H
#define __AES_H

#include "7zTypes.h"

EXTERN_C_BEGIN

#define AES_BLOCK_SIZE 16

/* Call AesGenTables one time before other AES functions */
void AesGenTables(void);

/* UInt32 pointers must be 16-byte aligned */

/* 16-byte (4 * 32-bit words) blocks: 1 (IV) + 1 (keyMode) + 15 (AES-256 roundKeys) */
#define AES_NUM_IVMRK_WORDS ((1 + 1 + 15) * 4)

/* aes - 16-byte aligned pointer to keyMode+roundKeys sequence */
/* keySize = 16 or 24 or 32 (bytes) */
typedef void (MY_FAST_CALL *AES_SET_KEY_FUNC)(UInt32 *aes, const Byte *key, unsigned keySize);
void MY_FAST_CALL Aes_SetKey_Enc(UInt32 *aes, const Byte *key, unsigned keySize);
void MY_FAST_CALL Aes_SetKey_Dec(UInt32 *aes, const Byte *key, unsigned keySize);

/* ivAes - 16-byte aligned pointer to iv+keyMode+roundKeys sequence: UInt32[AES_NUM_IVMRK_WORDS] */
void AesCbc_Init(UInt32 *ivAes, const Byte *iv); /* iv size is AES_BLOCK_SIZE */
/* data
 - 16-byte aligned pointer to data */
/* numBlocks - the number of 16-byte blocks in data array */
typedef void (MY_FAST_CALL *AES_CODE_FUNC)(UInt32 *ivAes, Byte *data, size_t numBlocks);
extern AES_CODE_FUNC g_AesCbc_Encode;
extern AES_CODE_FUNC g_AesCbc_Decode;
extern AES_CODE_FUNC g_AesCtr_Code;

EXTERN_C_END

#endif
```

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```
// Windows/MemoryLock.h

#ifndef __WINDOWS_MEMORY_LOCK_H
#define __WINDOWS_MEMORY_LOCK_H

#include "../Common/MyWindows.h"

namespace NWindows {
namespace NSecurity {

#ifndef UNDER_CE

bool EnablePrivilege(LPCTSTR privilegeName, bool enable = true);

inline bool EnablePrivilege_LockMemory(bool enable = true)
{
 return EnablePrivilege(SE_LOCK_MEMORY_NAME, enable);
}

inline void EnablePrivilege_SymLink()
{
 /* Probably we do not to set any Privilege for junction points.
    But we need them for Symbolic links */
 NSecurity::EnablePrivilege(SE_RESTORE_NAME);

 /* Probably we need only SE_RESTORE_NAME, but there is also
    SE_CREATE_SYMBOLIC_LINK_NAME. So we set it also. Do we need it? */

 NSecurity::EnablePrivilege(TEXT("SeCreateSymbolicLinkPrivilege")); //
SE_CREATE_SYMBOLIC_LINK_NAME

 // Do we need to set SE_BACKUP_NAME ?
}

unsigned Get_LargePages_RiskLevel();

#endif
```

```
}}

#endif
PROG = 7z.exe
MY_CONSOLE = 1
CFLAGS = $(CFLAGS)  \
 -DEXTERNAL_CODECS \

!IFNDEF UNDER_CE
CFLAGS = $(CFLAGS) -DWIN_LONG_PATH -D_7ZIP_LARGE_PAGES -DSUPPORT_DEVICE_FILE
!ENDIF

COMMON_OBJS = \
 $O\CommandLineParser.obj \
 $O\CRC.obj \
 $O\IntToString.obj \
 $O\ListFileUtils.obj \
 $O\NewHandler.obj \
 $O\StdInStream.obj \
 $O\StdOutStream.obj \
 $O\MyString.obj \
 $O\StringConvert.obj \
 $O\StringToInt.obj \
 $O\UTFConvert.obj \
 $O\MyVector.obj \
 $O\Wildcard.obj \

WIN_OBJS = \
 $O\DLL.obj \
 $O\ErrorMsg.obj \
 $O\FileDir.obj \
 $O\FileFind.obj \
 $O\FileIO.obj \
 $O\FileLink.obj \
 $O\FileName.obj \
 $O\FileSystem.obj \
 $O\MemoryLock.obj \
 $O\PropVariant.obj \
 $O\PropVariantConv.obj \
 $O\Registry.obj \
 $O\System.obj \
 $O\TimeUtils.obj \

7ZIP_COMMON_OBJS = \
 $O\CreateCoder.obj \
 $O\FilePathAutoRename.obj \
 $O\FileStreams.obj \
 $O\FilterCoder.obj \
```

```
 $O\LimitedStreams.obj \
 $O\MethodProps.obj \
 $O\ProgressUtils.obj \
 $O\PropId.obj \
 $O\StreamObjects.obj
 \
 $O\StreamUtils.obj \
 $O\UniqBlocks.obj \

AR_COMMON_OBJS = \
 $O\OutStreamWithCRC.obj \

COMPRESS_OBJS = \
 $O\CopyCoder.obj \

C_OBJS = \
 $O\Alloc.obj \
 $O\CpuArch.obj \
 $O\Sort.obj \
 $O\Threads.obj \

!include "../../Crc.mak"
!include "Console.mak"

!include "../../7zip.mak"
#define IDI_ICON  1
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With Mixed text Element Language Tags 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-007-ref.xht" />
  <meta name="assert" content="The license element matches the schema. One text element does not have a language
tag. One text element has a language tag." />
  <style
 type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-007.woff2") format("woff2");
   }
```

```
  body {
   font-size: 20px;
  }
  pre {
   font-size: 12px;
  }
  .test {
   font-family: "WOFF Test", "WOFF Test CFF Fallback";
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
</head>
<body>
 <p>Test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
 <div class="test">P</div>
 <p>The XML contained in the Extended Metadata Block is below.</p>
 <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts" id="License ID"&gt;
  &lt;text&gt;
   License without language.
  &lt;/text&gt;
  &lt;text xml:lang="en"&gt;
   License with "en" language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
 </pre>
</body>
</html>
```

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*/

```
#ifndef __ATK_VALUE_H__
#define __ATK_VALUE_H__

#include <atk/atkobject.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

/*
* The AtkValue interface should be supported
 by any object that
* supports a numerical value (e.g., a scroll bar). This interface
* provides the standard mechanism for an assistive technology to
* determine and set the numerical value as well as get the minimum
* and maximum values.
*/

#define ATK_TYPE_VALUE                  (atk_value_get_type ())
#define ATK_IS_VALUE(obj)               G_TYPE_CHECK_INSTANCE_TYPE ((obj), ATK_TYPE_VALUE)
#define ATK_VALUE(obj)                  G_TYPE_CHECK_INSTANCE_CAST ((obj), ATK_TYPE_VALUE,
AtkValue)
#define ATK_VALUE_GET_IFACE(obj)        (G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_VALUE, AtkValueIface))

#ifndef _TYPEDEF_ATK_VALUE_
#define _TYPEDEF_ATK_VALUE__
typedef struct _AtkValue AtkValue;
#endif
typedef struct _AtkValueIface AtkValueIface;

struct _AtkValueIface
{
 GTypeInterface parent;

 void     (* get_current_value) (AtkValue     *obj,
                                 GValue       *value);
 void     (* get_maximum_value) (AtkValue     *obj,

                         GValue       *value);
 void     (* get_minimum_value) (AtkValue     *obj,
                                 GValue       *value);
 gboolean (* set_current_value) (AtkValue     *obj,
                                 const GValue *value);
 void     (* get_minimum_increment) (AtkValue   *obj,
          GValue     *value);
 AtkFunction pad1;
```

```
};

GType           atk_value_get_type (void);

void      atk_value_get_current_value (AtkValue     *obj,
                                       GValue       *value);


void     atk_value_get_maximum_value  (AtkValue     *obj,
                                       GValue       *value);

void     atk_value_get_minimum_value  (AtkValue     *obj,
                                       GValue       *value);

gboolean atk_value_set_current_value  (AtkValue     *obj,
                                       const GValue *value);

void     atk_value_get_minimum_increment  (AtkValue     *obj,
        GValue       *value);

/*
* Additional
 GObject properties exported by GaccessibleValue:
*    "accessible_value"
*       (the accessible value has changed)
*/


#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_VALUE_H__ */
PROG = 7zS2.sfx
MY_FIXED = 1

C_OBJS = \
 $O\7zAlloc.obj \
 $O\7zArcIn.obj \
 $O\7zBuf.obj \
 $O\7zBuf2.obj \
 $O\7zCrc.obj \
 $O\7zCrcOpt.obj \
 $O\7zFile.obj \
 $O\7zDec.obj \
 $O\7zStream.obj \
 $O\Bcj2.obj \
```

```
 $O\Bra.obj \
 $O\Bra86.obj \
 $O\BraIA64.obj \
 $O\CpuArch.obj \
 $O\Delta.obj \
 $O\DllSecur.obj \
 $O\Lzma2Dec.obj \
 $O\LzmaDec.obj \

7Z_OBJS = \
 $O\SfxSetup.obj \

OBJS = \
 $(7Z_OBJS) \
 $(C_OBJS) \
 $O\resource.res

!include "../../../CPP/Build.mak"

$(7Z_OBJS): $(*B).c
 $(COMPL_O1)
$(C_OBJS): ../../$(*B).c
 $(COMPL_O1)
```

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file, You can obtain one at http://mozilla.org/MPL/2.0/.

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

At the time this file was first modified, a complete, unmodified copy of
the LPPL Work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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(copied verbatim from hyph-hr.lic.txt in the original work):

Croatian hyphenation patterns

(more info about the licence to be added later)

%

```
% Hyphenation patterns for Croatian language
%
%
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% version 1 of the License, or any later version.
%
% Changes:
% - The first version was realised in late 1994.
% - Second, much more improved version was realised in the beginning of 1996.
%   (Date of the last change: 19.03.1996).
% - In summer 2008 the patterns have been incorporated into hyph-utf8
%   and renamed from hrhyph.tex to hyph-hr.tex.
% - LPPL licence added on 06.06.2011.
%
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element Without url Attribute</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-002-ref.xht" />
  <meta name="assert" content="The license element does not have a url attribute but it still matches the schema." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
  {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-002.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
```

```
   margin-top: 50px;
  }
 ]]></style>
</head>
<body>
 <p>Test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
 <div class="test">P</div>
 <p>The XML contained in the Extended Metadata Block is below.</p>
 <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license id="License ID"&gt;
  &lt;text&gt;
   License without language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
 </pre>
</body>
</html>
```

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compatible to the above two licenses.

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```
// 7zFolderInStream.h

#ifndef __7Z_FOLDER_IN_STREAM_H
#define __7Z_FOLDER_IN_STREAM_H

#include "../../../../C/7zCrc.h"

#include "../../../Common/MyCom.h"
#include "../../../Common/MyVector.h"

#include "../../ICoder.h"
#include "../IArchive.h"

namespace NArchive {
namespace N7z {

class CFolderInStream:
 public ISequentialInStream,
 public ICompressGetSubStreamSize,
 public CMyUnknownImp
{
 CMyComPtr<ISequentialInStream> _stream;
 UInt64 _pos;
 UInt32 _crc;
 bool _size_Defined;
 UInt64 _size;

 const UInt32 *_indexes;
 unsigned _numFiles;
 unsigned _index;

 CMyComPtr<IArchiveUpdateCallback> _updateCallback;

 HRESULT OpenStream();
 void AddFileInfo(bool isProcessed);
```

```
public:
 CRecordVector<bool> Processed;
 CRecordVector<UInt32> CRCs;
 CRecordVector<UInt64> Sizes;

 MY_UNKNOWN_IMP2(ISequentialInStream, ICompressGetSubStreamSize)
 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(GetSubStreamSize)(UInt64 subStream, UInt64 *value);

 void
 Init(IArchiveUpdateCallback *updateCallback, const UInt32 *indexes, unsigned numFiles);

 bool WasFinished() const { return _index == _numFiles; }

 UInt64 GetFullSize() const
 {
   UInt64 size = 0;
   FOR_VECTOR (i, Sizes)
     size += Sizes[i];
   return size;
 }
};

}}

#endif
```

MZ@ !L!This program cannot be run in DOS mode.

$I>[
_5E
_5E
_5EPhE_5E
_4E_5E*XE_5E*IE_5E*ME_5ERich
_5EPELu[DG @P d@ T.text `.rdata @@.data00
@.rsrc@@@=$0@uh0@ @$0@D$-8#$0@UE-VHlEHtHHt3Vu@ @V< @I3f}D 0@y 0@(= 0@r
0@(0@3;tP8 @ 0@Vh@u40@5,0@4 @;(0@EPhu0 @P, @EPuL @jVVuuV5(0@$ @j5(0@  @S]W=( @h @S50
@h @hSPht @jSPhd @jSPhT @jSPjjS=  @PjhSPjjhSH @jS_[3^VW @h @ @5 @3WWh1@WjiW,0@PD @W
@_^"!!! "."P"`"n"""""!>"CancelNext >< BackNSIS versionNSIS User Interface - TestingRichEd32.dllll!! \!! |!"  d!"
"!!!
"."P"`"n"""""!>"ExitProcessGetModuleHandleWULoadLibraryWKERNEL32.dllCOMCTL32.dll@SendMessage
WSetWindowTextWShowWindowSetWindowPos1ScreenToClienttGetWindowRectGetDlgItemVCreateDialogPara
mWDestroyWindowPostQuitMessageEndDialogDialogBoxParamWUSER32.dll)CreateBrushIndirectGDI32.dllfhgj
ki0 HX@DHMS Shell Dlg 2@,@
@@@@@H
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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Invalid license Element With dir Attribute in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-016-ref.xht" />
  <meta name="assert" content="The license element contains a text element with INVALID as the value for the dir
attribute." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-016.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
```

```
   margin-top: 50px;
  }
 ]]></style>
</head>
<body>
 <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
 <div class="test">P</div>
</body>
</html>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
 <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
 <title>WOFF Test: Valid copyright Element With Two div Elements in text Element</title>
 <link rel="author" title="Tal Leming" href="http://typesupply.com" />
 <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
 <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
 <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
 <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
 <meta name="assert" content="The copyright element contains a text element that contains two div elements." />
 <style type="text/css"><![CDATA[
  @import url("support/test-fonts.css");
  body {
   font-size: 20px;
  }
  pre {
   font-size:
12px;
  }
  .test {
   font-family: "WOFF Test CFF Reference";
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
</head>
<body>
 <p>Test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
 <div class="test">P</div>
 <p>The XML contained in the Extended Metadata Block is below.</p>
 <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
```

<copyright>
<text>
<div>
div 1 start
<div>
div 2 start
<div>
div 3
</div>
div 2 end
</div>
div 1 end
</div>
</text>
</copyright>
</metadata>
</pre>
</body>
</html>

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```
// 7zAes.h

#ifndef __CRYPTO_7Z_AES_H
#define __CRYPTO_7Z_AES_H

#include "../../Common/MyBuffer.h"
#include "../../Common/MyCom.h"
#include "../../Common/MyVector.h"

#include "../ICoder.h"
#include "../IPassword.h"

namespace NCrypto {
namespace N7z {
```

```
const unsigned kKeySize = 32;
const unsigned kSaltSizeMax = 16;
const unsigned kIvSizeMax = 16; // AES_BLOCK_SIZE;

class CKeyInfo
{
public:
 unsigned NumCyclesPower;
 unsigned SaltSize;
 Byte Salt[kSaltSizeMax];
 CByteBuffer Password;
 Byte Key[kKeySize];

 bool IsEqualTo(const CKeyInfo &a) const;
 void CalcKey();

 CKeyInfo() { ClearProps(); }
 void ClearProps()
 {
   NumCyclesPower = 0;
   SaltSize = 0;
   for (unsigned i = 0; i < sizeof(Salt); i++)
     Salt[i] = 0;
 }
};

class CKeyInfoCache
{
 unsigned Size;
 CObjectVector<CKeyInfo> Keys;
public:
 CKeyInfoCache(unsigned size): Size(size) {}
 bool GetKey(CKeyInfo &key);
 void Add(const CKeyInfo &key);
 void FindAndAdd(const CKeyInfo &key);
};

class CBase
{
 CKeyInfoCache
 _cachedKeys;
protected:
 CKeyInfo _key;
 Byte _iv[kIvSizeMax];
 unsigned _ivSize;

 void PrepareKey();
```

```
 CBase();
};

class CBaseCoder:
 public ICompressFilter,
 public ICryptoSetPassword,
 public CMyUnknownImp,
 public CBase
{
protected:
 CMyComPtr<ICompressFilter> _aesFilter;

public:
 INTERFACE_ICompressFilter(;)

 STDMETHOD(CryptoSetPassword)(const Byte *data, UInt32 size);
};

#ifndef EXTRACT_ONLY

class CEncoder:
 public CBaseCoder,
 public ICompressWriteCoderProperties,
 // public ICryptoResetSalt,
 public ICryptoResetInitVector
{
public:
 MY_UNKNOWN_IMP4(
    ICompressFilter,
    ICryptoSetPassword,
    ICompressWriteCoderProperties,
    // ICryptoResetSalt,
    ICryptoResetInitVector)
 STDMETHOD(WriteCoderProperties)(ISequentialOutStream *outStream);
 // STDMETHOD(ResetSalt)();
 STDMETHOD(ResetInitVector)();
 CEncoder();
};

#endif

class CDecoder:
 public CBaseCoder,
 public ICompressSetDecoderProperties2
{
public:
 MY_UNKNOWN_IMP3(
```

```
    ICompressFilter,
    ICryptoSetPassword,
    ICompressSetDecoderProperties2)
 STDMETHOD(SetDecoderProperties2)(const Byte *data, UInt32 size);
 CDecoder();
};

}}

#endif
/*
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Distributed under the Boost Software License, Version 1.0.
(See accompanying file LICENSE_1_0.txt or copy at
http://www.boost.org/LICENSE_1_0.txt)
*/

#ifndef MSGPACK_PREDEF_OS_BSD_H
#define MSGPACK_PREDEF_OS_BSD_H

/* Special case: OSX will define BSD predefs if the sys/param.h
* header is included. We can guard against that, but only if we
* detect OSX first. Hence we will force include OSX detection
* before doing any BSD detection.
*/
#include <msgpack/predef/os/macos.h>

#include <msgpack/predef/version_number.h>
#include <msgpack/predef/make.h>

/*`
[heading `MSGPACK_OS_BSD`]

[@http://en.wikipedia.org/wiki/Berkeley_Software_Distribution BSD] operating system.

BSD has various branch operating systems possible and each detected
individually. This detects the following variations and sets a specific
version number macro to match:

* `MSGPACK_OS_BSD_DRAGONFLY` [@http://en.wikipedia.org/wiki/DragonFly_BSD DragonFly BSD]
* `MSGPACK_OS_BSD_FREE` [@http://en.wikipedia.org/wiki/Freebsd
 FreeBSD]
* `MSGPACK_OS_BSD_BSDI` [@http://en.wikipedia.org/wiki/BSD/OS BSDi BSD/OS]
* `MSGPACK_OS_BSD_NET` [@http://en.wikipedia.org/wiki/Netbsd NetBSD]
* `MSGPACK_OS_BSD_OPEN` [@http://en.wikipedia.org/wiki/Openbsd OpenBSD]

[note The general `MSGPACK_OS_BSD` is set in all cases to indicate some form
of BSD. If the above variants is detected the corresponding macro is also set.]
```

```
[table
  [[__predef_symbol__] [__predef_version__]]

  [[`BSD`] [__predef_detection__]]
  [[`_SYSTYPE_BSD`] [__predef_detection__]]

  [[`BSD4_2`] [4.2.0]]
  [[`BSD4_3`] [4.3.0]]
  [[`BSD4_4`] [4.4.0]]
  [[`BSD`] [V.R.0]]
  ]
*/

#include <msgpack/predef/os/bsd/bsdi.h>
#include <msgpack/predef/os/bsd/dragonfly.h>
#include <msgpack/predef/os/bsd/free.h>
#include <msgpack/predef/os/bsd/open.h>
#include <msgpack/predef/os/bsd/net.h>

#ifndef MSGPACK_OS_BSD
#define MSGPACK_OS_BSD MSGPACK_VERSION_NUMBER_NOT_AVAILABLE
#endif

#if !defined(MSGPACK_PREDEF_DETAIL_OS_DETECTED)
 && ( \
  defined(BSD) || \
  defined(_SYSTYPE_BSD) \
  )
#   undef MSGPACK_OS_BSD
#   include <sys/param.h>
#   if !defined(MSGPACK_OS_BSD) && defined(BSD4_4)
#       define MSGPACK_OS_BSD MSGPACK_VERSION_NUMBER(4,4,0)
#   endif
#   if !defined(MSGPACK_OS_BSD) && defined(BSD4_3)
#       define MSGPACK_OS_BSD MSGPACK_VERSION_NUMBER(4,3,0)
#   endif
#   if !defined(MSGPACK_OS_BSD) && defined(BSD4_2)
#       define MSGPACK_OS_BSD MSGPACK_VERSION_NUMBER(4,2,0)
#   endif
#   if !defined(MSGPACK_OS_BSD) && defined(BSD)
#       define MSGPACK_OS_BSD MSGPACK_PREDEF_MAKE_10_VVRR(BSD)
#   endif
#   if !defined(MSGPACK_OS_BSD)
#       define MSGPACK_OS_BSD MSGPACK_VERSION_NUMBER_AVAILABLE
#   endif
#endif
```

```
#if MSGPACK_OS_BSD
#   define MSGPACK_OS_BSD_AVAILABLE
#   include <msgpack/predef/detail/os_detected.h>
#endif

#define MSGPACK_OS_BSD_NAME "BSD"

#else

#include <msgpack/predef/os/bsd/bsdi.h>
#include <msgpack/predef/os/bsd/dragonfly.h>
#include <msgpack/predef/os/bsd/free.h>
#include
 <msgpack/predef/os/bsd/open.h>
#include <msgpack/predef/os/bsd/net.h>

#endif

#include <msgpack/predef/detail/test.h>
MSGPACK_PREDEF_DECLARE_TEST(MSGPACK_OS_BSD,MSGPACK_OS_BSD_NAME)
```

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```
// Common/StdOutStream.h

#ifndef __COMMON_STD_OUT_STREAM_H
#define __COMMON_STD_OUT_STREAM_H

#include <stdio.h>

#include "MyString.h"
#include "MyTypes.h"

class CStdOutStream
{
 FILE *_stream;
 bool _streamIsOpen;
public:
 bool IsTerminalMode;
```

```
CStdOutStream(): _stream(0), _streamIsOpen(false), IsTerminalMode(false) {};
CStdOutStream(FILE *stream): _stream(stream), _streamIsOpen(false) {};
~CStdOutStream() { Close(); }

// void AttachStdStream(FILE *stream) { _stream  = stream; _streamIsOpen = false; }
// bool IsDefined() const { return _stream  != NULL; }

operator FILE *() { return _stream; }
bool Open(const char *fileName) throw();
bool Close() throw();
bool Flush() throw();

CStdOutStream & operator<<(CStdOutStream & (* func)(CStdOutStream  &))
{
  (*func)(*this);
  return *this;
}

CStdOutStream & operator<<(const char *s) throw()
{
  fputs(s, _stream);
  return *this;
}

CStdOutStream & operator<<(char c) throw()
{
  fputc((unsigned
char)c, _stream);
  return *this;
}

CStdOutStream & operator<<(Int32 number) throw();
CStdOutStream & operator<<(Int64 number) throw();
CStdOutStream & operator<<(UInt32 number) throw();
CStdOutStream & operator<<(UInt64 number) throw();

CStdOutStream & operator<<(const wchar_t *s);
void PrintUString(const UString &s, AString &temp);

void Normalize_UString__LF_Allowed(UString &s);
void Normalize_UString(UString &s);

void NormalizePrint_UString(const UString &s, UString &tempU, AString &tempA);
void NormalizePrint_UString(const UString &s);
void NormalizePrint_wstr(const wchar_t *s);
};
```

```
CStdOutStream & endl(CStdOutStream & outStream) throw();

extern CStdOutStream g_StdOut;
extern CStdOutStream g_StdErr;

void StdOut_Convert_UString_to_AString(const UString &s, AString &temp);

#endif
```

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```
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* License along with this library; if not, write to the
* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#if defined(ATK_DISABLE_SINGLE_INCLUDES) && !defined (__ATK_H_INSIDE__) && !defined
(ATK_COMPILATION)
#error "Only <atk/atk.h> can be included directly."
#endif

#ifndef __ATK_PLUG_H__
#define
 __ATK_PLUG_H__

G_BEGIN_DECLS

#define ATK_TYPE_PLUG              (atk_plug_get_type ())
#define ATK_PLUG(obj)              (G_TYPE_CHECK_INSTANCE_CAST ((obj), ATK_TYPE_PLUG, AtkPlug))
#define ATK_IS_PLUG(obj)           (G_TYPE_CHECK_INSTANCE_TYPE ((obj), ATK_TYPE_PLUG))
#define ATK_PLUG_CLASS(klass)      (G_TYPE_CHECK_CLASS_CAST ((klass), ATK_TYPE_PLUG,
AtkPlugClass))
#define ATK_IS_PLUG_CLASS(klass)   (G_TYPE_CHECK_CLASS_TYPE ((klass), ATK_TYPE_PLUG))
#define ATK_PLUG_GET_CLASS(obj)    (G_TYPE_INSTANCE_GET_CLASS ((obj), ATK_TYPE_PLUG,
AtkPlugClass))

typedef struct _AtkPlug         AtkPlug;
typedef struct _AtkPlugClass    AtkPlugClass;

struct _AtkPlug
{
 AtkObject parent;
};

GType atk_plug_get_type (void);

struct _AtkPlugClass
```

```
{
 AtkObjectClass parent_class;

 /* to be subscribed to by atk-bridge */

 /*< protected >*/
 gchar* (* get_object_id) (AtkPlug* obj);
};

AtkObject*    atk_plug_new     (void);
gchar*        atk_plug_get_id  (AtkPlug* plug);

G_END_DECLS

#endif
 /* __ATK_PLUG_H__ */
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With class Attribute in span Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-033-ref.xht" />
  <meta name="assert" content="The license element contains a text element that contains a span element with &quot;class1 class2 class3&quot; as the value
 for the class attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-033.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
```

```
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   Text with &lt;span class="class1 class2 class3"&gt;span&lt;/span&gt;.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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```
// Windows/FileName.h

#ifndef __WINDOWS_FILE_NAME_H
#define __WINDOWS_FILE_NAME_H

#include "../Common/MyString.h"
```

```
namespace NWindows {
namespace NFile {
namespace NName {

int FindSepar(const wchar_t *s) throw();
#ifndef USE_UNICODE_FSTRING
int FindSepar(const FChar *s) throw();
#endif

void NormalizeDirPathPrefix(FString &dirPath); // ensures that it ended with '\\', if dirPath is not epmty
void NormalizeDirPathPrefix(UString &dirPath);

bool IsDrivePath(const wchar_t *s) throw();  // first 3 chars are drive chars like "a:\\"

bool IsAltPathPrefix(CFSTR s) throw(); /* name: */

#if defined(_WIN32) && !defined(UNDER_CE)

extern const char * const kSuperPathPrefix; /* \\?\ */
const unsigned kDevicePathPrefixSize = 4;
const unsigned kSuperPathPrefixSize = 4;
const unsigned kSuperUncPathPrefixSize = kSuperPathPrefixSize + 4;

bool IsDevicePath(CFSTR s) throw();   /* \\.\ */
bool IsSuperUncPath(CFSTR s) throw(); /* \\?\UNC\ */
bool IsNetworkPath(CFSTR s) throw();  /* \\?\UNC\ or \\SERVER
 */

/* GetNetworkServerPrefixSize() returns size of server prefix:
   \\?\UNC\SERVER\
   \\SERVER\
 in another cases it returns 0
*/

unsigned GetNetworkServerPrefixSize(CFSTR s) throw();

bool IsNetworkShareRootPath(CFSTR s) throw();  /* \\?\UNC\SERVER\share or \\SERVER\share or with slash */

bool IsDrivePath_SuperAllowed(CFSTR s) throw();  // first chars are drive chars like "a:\" or "\\?\a:\"
bool IsDriveRootPath_SuperAllowed(CFSTR s) throw();  // exact drive root path "a:\" or "\\?\a:\"

bool IsDrivePath2(const wchar_t *s) throw(); // first 2 chars are drive chars like "a:"
// bool IsDriveName2(const wchar_t *s) throw(); // is drive name like "a:"
bool IsSuperPath(const wchar_t *s) throw();
bool IsSuperOrDevicePath(const wchar_t *s) throw();

#ifndef USE_UNICODE_FSTRING
```

```
bool IsDrivePath2(CFSTR s) throw(); // first 2 chars are drive chars like "a:"
// bool IsDriveName2(CFSTR s) throw(); // is drive name like "a:"
bool IsDrivePath(CFSTR s) throw();
bool IsSuperPath(CFSTR s) throw();
bool
 IsSuperOrDevicePath(CFSTR s) throw();

/* GetRootPrefixSize() returns size of ROOT PREFIX for cases:
   \
   \\.\
   C:\
   \\?\C:\
   \\?\UNC\SERVER\Shared\
   \\SERVER\Shared\
 in another cases it returns 0
*/

unsigned GetRootPrefixSize(CFSTR s) throw();

#endif

int FindAltStreamColon(CFSTR path) throw();

#endif // _WIN32

bool IsAbsolutePath(const wchar_t *s) throw();
unsigned GetRootPrefixSize(const wchar_t *s) throw();

#ifdef WIN_LONG_PATH

const int kSuperPathType_UseOnlyMain = 0;
const int kSuperPathType_UseOnlySuper = 1;
const int kSuperPathType_UseMainAndSuper = 2;

int GetUseSuperPathType(CFSTR s) throw();
bool GetSuperPath(CFSTR path, UString &superPath, bool onlyIfNew);
bool GetSuperPaths(CFSTR s1, CFSTR s2, UString &d1, UString &d2, bool onlyIfNew);

#define USE_MAIN_PATH (__useSuperPathType != kSuperPathType_UseOnlySuper)
#define USE_MAIN_PATH_2 (__useSuperPathType1 != kSuperPathType_UseOnlySuper &&
__useSuperPathType2 != kSuperPathType_UseOnlySuper)

#define
 USE_SUPER_PATH (__useSuperPathType != kSuperPathType_UseOnlyMain)
#define USE_SUPER_PATH_2 (__useSuperPathType1 != kSuperPathType_UseOnlyMain || __useSuperPathType2
!= kSuperPathType_UseOnlyMain)

#define IF_USE_MAIN_PATH int __useSuperPathType = GetUseSuperPathType(path); if (USE_MAIN_PATH)
```

```
#define IF_USE_MAIN_PATH_2(x1, x2) \
  int __useSuperPathType1 = GetUseSuperPathType(x1); \
  int __useSuperPathType2 = GetUseSuperPathType(x2); \
  if (USE_MAIN_PATH_2)

#else

#define IF_USE_MAIN_PATH
#define IF_USE_MAIN_PATH_2(x1, x2)

#endif // WIN_LONG_PATH

bool GetFullPath(CFSTR dirPrefix, CFSTR path, FString &fullPath);
bool GetFullPath(CFSTR path, FString &fullPath);

}}}

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Attribute in copyright Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-008-ref.xht" />
  <meta name="assert" content="The copyright element contains an unknown attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
  {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-008.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
```

```
   margin-top: 50px;
  }
 ]]></style>
</head>
<body>
 <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
 <div class="test">P</div>
</body>
</html>
```

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```
MY_STATIC_LINK=1
SLIB = sLZMA.lib
PROG = LZMA.dll
SLIBPATH = $O\$(SLIB)

DEF_FILE = LzmaLib.def
CFLAGS = $(CFLAGS) \

LIB_OBJS = \
 $O\LzmaLibExports.obj \

C_OBJS = \
 $O\Alloc.obj \
 $O\LzFind.obj \
 $O\LzFindMt.obj \
 $O\LzmaDec.obj \
 $O\LzmaEnc.obj \
 $O\LzmaLib.obj \
 $O\Threads.obj \

OBJS = \
 $(LIB_OBJS) \
 $(C_OBJS) \
 $O\resource.res

!include "../../../CPP/Build.mak"

$(SLIBPATH): $O $(OBJS)
 lib -out:$(SLIBPATH) $(OBJS) $(LIBS)

$(LIB_OBJS): $(*B).c
 $(COMPL_O2)
```

```
$(C_OBJS): ../../$(*B).c
 $(COMPL_O2)
// Windows/PropVariant.h

#ifndef __WINDOWS_PROP_VARIANT_H
#define __WINDOWS_PROP_VARIANT_H

#include "../Common/MyTypes.h"
#include "../Common/MyWindows.h"
#include "../Common/MyString.h"

namespace NWindows {
namespace NCOM {

BSTR AllocBstrFromAscii(const char *s) throw();

HRESULT PropVariant_Clear(PROPVARIANT *p) throw();

HRESULT PropVarEm_Alloc_Bstr(PROPVARIANT *p, unsigned numChars) throw();
HRESULT PropVarEm_Set_Str(PROPVARIANT *p, const char *s) throw();

inline void PropVarEm_Set_UInt32(PROPVARIANT *p, UInt32 v) throw()
{
 p->vt = VT_UI4;
 p->ulVal = v;
}

inline void PropVarEm_Set_UInt64(PROPVARIANT *p, UInt64 v) throw()
{
 p->vt = VT_UI8;
 p->uhVal.QuadPart = v;
}

inline void PropVarEm_Set_FileTime64(PROPVARIANT *p, UInt64 v) throw()
{
 p->vt = VT_FILETIME;
 p->filetime.dwLowDateTime = (DWORD)v;
 p->filetime.dwHighDateTime = (DWORD)(v >> 32);
}

inline void PropVarEm_Set_Bool(PROPVARIANT *p, bool b) throw()
{
 p->vt = VT_BOOL;
 p->boolVal = (b ? VARIANT_TRUE : VARIANT_FALSE);
}


class
```

```
 CPropVariant : public tagPROPVARIANT
{
public:
 CPropVariant()
 {
   vt = VT_EMPTY;
   wReserved1 = 0;
   // wReserved2 = 0;
   // wReserved3 = 0;
   // uhVal.QuadPart = 0;
   bstrVal = 0;
 }
 ~CPropVariant() throw() { Clear(); }
 CPropVariant(const PROPVARIANT &varSrc);
 CPropVariant(const CPropVariant &varSrc);
 CPropVariant(BSTR bstrSrc);
 CPropVariant(LPCOLESTR lpszSrc);
 CPropVariant(bool bSrc) { vt = VT_BOOL; wReserved1 = 0; boolVal = (bSrc ? VARIANT_TRUE :
VARIANT_FALSE); }
 CPropVariant(Byte value) { vt = VT_UI1; wReserved1 = 0; bVal = value; }

private:
 CPropVariant(Int16 value); // { vt = VT_I2; wReserved1 = 0; iVal = value; }
 CPropVariant(Int32 value); // { vt = VT_I4; wReserved1 = 0; lVal = value; }

public:
 CPropVariant(UInt32 value) { vt = VT_UI4; wReserved1 = 0; ulVal = value; }
 CPropVariant(UInt64 value) { vt = VT_UI8; wReserved1 = 0; uhVal.QuadPart = value; }
 CPropVariant(Int64 value) { vt = VT_I8; wReserved1 = 0; hVal.QuadPart
 = value; }
 CPropVariant(const FILETIME &value) { vt = VT_FILETIME; wReserved1 = 0; filetime = value; }

 CPropVariant& operator=(const CPropVariant &varSrc);
 CPropVariant& operator=(const PROPVARIANT &varSrc);
 CPropVariant& operator=(BSTR bstrSrc);
 CPropVariant& operator=(LPCOLESTR lpszSrc);
 CPropVariant& operator=(const UString &s);
 CPropVariant& operator=(const UString2 &s);
 CPropVariant& operator=(const char *s);
 CPropVariant& operator=(const AString &s)
   { return (*this)=(const char *)s; }

 CPropVariant& operator=(bool bSrc) throw();
 CPropVariant& operator=(Byte value) throw();

private:
 CPropVariant& operator=(Int16 value) throw();
```

```
public:
 CPropVariant& operator=(Int32 value) throw();
 CPropVariant& operator=(UInt32 value) throw();
 CPropVariant& operator=(UInt64 value) throw();
 CPropVariant& operator=(Int64 value) throw();
 CPropVariant& operator=(const FILETIME &value) throw();

 BSTR AllocBstr(unsigned numChars);

 HRESULT Clear()
 throw();
 HRESULT Copy(const PROPVARIANT *pSrc) throw();
 HRESULT Attach(PROPVARIANT *pSrc) throw();
 HRESULT Detach(PROPVARIANT *pDest) throw();

 HRESULT InternalClear() throw();
 void InternalCopy(const PROPVARIANT *pSrc);

 int Compare(const CPropVariant &a) throw();
};

}}

#endif
// VirtThread.h

#ifndef __VIRT_THREAD_H
#define __VIRT_THREAD_H

#include "../../Windows/Synchronization.h"
#include "../../Windows/Thread.h"

struct CVirtThread
{
 NWindows::NSynchronization::CAutoResetEvent StartEvent;
 NWindows::NSynchronization::CAutoResetEvent FinishedEvent;
 NWindows::CThread Thread;
 bool Exit;

 ~CVirtThread() { WaitThreadFinish(); }
 void WaitThreadFinish(); // call it in destructor of child class !
 WRes Create();
 void Start();
 virtual void Execute() = 0;
 void WaitExecuteFinish() { FinishedEvent.Lock(); }
};

#endif
```

A. HISTORY OF THE SOFTWARE
==========

Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.2 | 2.1.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
| 2.2.1 | 2.2 | 2002 | PSF | yes |
| 2.2.2 | 2.2.1 | 2002 | PSF | yes |
| 2.2.3 | 2.2.2 | 2003 | PSF | yes |
| 2.3 | 2.2.2 | 2002-2003 | PSF | yes |
| 2.3.1 | 2.3 | 2002-2003 | PSF | yes |

| | | | | |
|---|---|---|---|---|
| 2.3.2 | 2.3.1 | 2002-2003 | PSF | yes |
| 2.3.3 | 2.3.2 | 2002-2003 | PSF | yes |
| 2.3.4 | 2.3.3 | 2004 | PSF | yes |
| 2.3.5 | 2.3.4 | 2005 | PSF | yes |
| 2.4 | 2.3 | 2004 | PSF | yes |
| 2.4.1 | 2.4 | 2005 | PSF | yes |
| 2.4.2 | 2.4.1 | 2005 | PSF | yes |
| 2.4.3 | 2.4.2 | 2006 | PSF | yes |
| 2.4.4 | 2.4.3 | 2006 | PSF | yes |
| 2.5 | 2.4 | 2006 | PSF | yes |
| 2.5.1 | 2.5 | 2007 | PSF | yes |
| 2.5.2 | 2.5.1 | 2008 | PSF | yes |
| 2.5.3 | 2.5.2 | 2008 | PSF | yes |
| 2.6 | 2.5 | 2008 | PSF | yes |
| 2.6.1 | 2.6 | 2008 | PSF | yes |
| 2.6.2 | 2.6.1 | 2009 | PSF | yes |
| 2.6.3 | 2.6.2 | 2009 | PSF | yes |
| 2.6.4 | 2.6.3 | 2009 | PSF | yes |
| 2.6.5 | 2.6.4 | 2010 | PSF | yes |
| 3.0 | 2.6 | 2008 | PSF | yes |
| 3.0.1 | 3.0 | 2009 | PSF | yes |
| 3.1 | 3.0.1 | 2009 | PSF | yes |
| 3.1.1 | 3.1 | 2009 | PSF | yes |
| 3.1.2 | 3.1 | 2010 | PSF | yes |
| 3.2 | 3.1 | 2010 | PSF | yes |

Footnotes:

(1) GPL-compatible doesn't mean that we're distributing Python under the GPL. All Python licenses, unlike the GPL, let you distribute a
modified version without making your changes open source. The GPL-compatible licenses make it possible to combine Python with other software that is released under the GPL; the others don't.

(2) According to Richard Stallman, 1.6.1 is not GPL-compatible, because its license has a choice of law clause. According to CNRI, however, Stallman's lawyer has told CNRI's lawyer that 1.6.1 is "not incompatible" with the GPL.

Thanks to the many outside volunteers who have worked under Guido's direction to make these releases possible.

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With One Language Tagged (using lang) text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element matches the schema. It contains one text element that has a language tag using the lang tag instead of xml:lang." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
```

<copyright>
<text lang="en">
Copyright with "en" language.
</text>
</copyright>
</metadata>
</pre>
</body>
</html>
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```
OBJS = \
 $O\StdAfx.obj \
 $(CURRENT_OBJS) \
 $(COMMON_OBJS) \
 $(WIN_OBJS) \
 $(WIN_CTRL_OBJS) \
 $(7ZIP_COMMON_OBJS) \
 $(AR_OBJS) \
 $(AR_COMMON_OBJS) \
 $(UI_COMMON_OBJS) \
 $(AGENT_OBJS) \
 $(CONSOLE_OBJS) \
 $(EXPLORER_OBJS) \
 $(FM_OBJS) \
 $(GUI_OBJS) \
 $(7Z_OBJS) \
 $(CAB_OBJS) \
 $(CHM_OBJS) \
 $(COM_OBJS) \
 $(ISO_OBJS) \
 $(NSIS_OBJS) \
 $(RAR_OBJS) \
 $(TAR_OBJS) \
 $(UDF_OBJS) \
 $(WIM_OBJS) \
 $(ZIP_OBJS) \
 $(COMPRESS_OBJS) \
 $(CRYPTO_OBJS) \
 $(C_OBJS) \
 $(ASM_OBJS) \
 $O\resource.res \

!include "../../../Build.mak"

# MAK_SINGLE_FILE = 1

!IFDEF MAK_SINGLE_FILE
```

```
!IFDEF CURRENT_OBJS
$(CURRENT_OBJS): ./$(*B).cpp
 $(COMPL)
!ENDIF


!IFDEF COMMON_OBJS
$(COMMON_OBJS): ../../../Common/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF WIN_OBJS
$(WIN_OBJS): ../../../Windows/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF WIN_CTRL_OBJS
$(WIN_CTRL_OBJS): ../../../Windows/Control/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF 7ZIP_COMMON_OBJS
$(7ZIP_COMMON_OBJS): ../../Common/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF
 AR_OBJS
$(AR_OBJS): ../../Archive/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF AR_COMMON_OBJS
$(AR_COMMON_OBJS): ../../Archive/Common/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF 7Z_OBJS
$(7Z_OBJS): ../../Archive/7z/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF CAB_OBJS
$(CAB_OBJS): ../../Archive/Cab/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF CHM_OBJS
```

```
$(CHM_OBJS): ../../Archive/Chm/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF COM_OBJS
$(COM_OBJS): ../../Archive/Com/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF ISO_OBJS
$(ISO_OBJS): ../../Archive/Iso/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF NSIS_OBJS
$(NSIS_OBJS): ../../Archive/Nsis/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF RAR_OBJS
$(RAR_OBJS): ../../Archive/Rar/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF TAR_OBJS
$(TAR_OBJS): ../../Archive/Tar/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF UDF_OBJS
$(UDF_OBJS): ../../Archive/Udf/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF WIM_OBJS
$(WIM_OBJS): ../../Archive/Wim/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF ZIP_OBJS
$(ZIP_OBJS): ../../Archive/Zip/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF
 COMPRESS_OBJS
$(COMPRESS_OBJS): ../../Compress/$(*B).cpp
 $(COMPL_O2)
```

```
!ENDIF

!IFDEF CRYPTO_OBJS
$(CRYPTO_OBJS): ../../Crypto/$(*B).cpp
 $(COMPL_O2)
!ENDIF

!IFDEF UI_COMMON_OBJS
$(UI_COMMON_OBJS): ../../UI/Common/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF AGENT_OBJS
$(AGENT_OBJS): ../../UI/Agent/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF CONSOLE_OBJS
$(CONSOLE_OBJS): ../../UI/Console/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF EXPLORER_OBJS
$(EXPLORER_OBJS): ../../UI/Explorer/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF FM_OBJS
$(FM_OBJS): ../../UI/FileManager/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF GUI_OBJS
$(GUI_OBJS): ../../UI/GUI/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF C_OBJS
$(C_OBJS): ../../../../C/$(*B).c
 $(COMPL_O2)
!ENDIF


!ELSE

{.}.cpp{$O}.obj::
 $(COMPLB)
{../../../Common}.cpp{$O}.obj::
```

```
 $(COMPLB)
{../../../Windows}.cpp{$O}.obj::
 $(COMPLB)
{../../../Windows/Control}.cpp{$O}.obj::
 $(COMPLB)
{../../Common}.cpp{$O}.obj::
 $(COMPLB)

{../../UI/Common}.cpp{$O}.obj::
 $(COMPLB)
{../../UI/Agent}.cpp{$O}.obj::
 $(COMPLB)
{../../UI/Console}.cpp{$O}.obj::
 $(COMPLB)
{../../UI/Explorer}.cpp{$O}.obj::
 $(COMPLB)
{../../UI/FileManager}.cpp{$O}.obj::
 $(COMPLB)
{../../UI/GUI}.cpp{$O}.obj::
 $(COMPLB)


{../../Archive}.cpp{$O}.obj::
 $(COMPLB)
{../../Archive/Common}.cpp{$O}.obj::
 $(COMPLB)

{../../Archive/7z}.cpp{$O}.obj::
 $(COMPLB)
{../../Archive/Cab}.cpp{$O}.obj::
 $(COMPLB)
{../../Archive/Chm}.cpp{$O}.obj::
 $(COMPLB)
{../../Archive/Com}.cpp{$O}.obj::
 $(COMPLB)
{../../Archive/Iso}.cpp{$O}.obj::
 $(COMPLB)
{../../Archive/Nsis}.cpp{$O}.obj::
 $(COMPLB)
{../../Archive/Rar}.cpp{$O}.obj::
 $(COMPLB)
{../../Archive/Tar}.cpp{$O}.obj::
 $(COMPLB)
{../../Archive/Udf}.cpp{$O}.obj::
 $(COMPLB)
{../../Archive/Wim}.cpp{$O}.obj::
 $(COMPLB)
{../../Archive/Zip}.cpp{$O}.obj::
```

```
 $(COMPLB)

{../../Compress}.cpp{$O}.obj::
 $(COMPLB_O2)
{../../Crypto}.cpp{$O}.obj::
 $(COMPLB_O2)
{../../../../C}.c{$O}.obj::
 $(CCOMPLB)

!ENDIF

!include
 "Asm.mak"
```

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 WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
SOFTWARE.

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With dir Attribute in span Element in text Element 2</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-028-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element that contains a span element with rtl
as the value for the dir attribute."
```

```
 />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-028.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   Text with &lt;span dir="rtl"&gt;span&lt;/span&gt;.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
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// OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
//
// Internals shared between the Snappy implementation and its unittest.

#ifndef THIRD_PARTY_SNAPPY_SNAPPY_INTERNAL_H_
#define THIRD_PARTY_SNAPPY_SNAPPY_INTERNAL_H_

#include "snappy-stubs-internal.h"

namespace snappy {
namespace internal {

class WorkingMemory {
public:
 WorkingMemory() : large_table_(NULL) { }
 ~WorkingMemory() { delete[] large_table_; }

 // Allocates and clears a hash table using memory in "*this",
 // stores the number
 of buckets in "*table_size" and returns a pointer to
 // the base of the hash table.
 uint16* GetHashTable(size_t input_size, int* table_size);

private:
 uint16 small_table_[1<<10];    // 2KB
 uint16* large_table_;          // Allocated only when needed

 DISALLOW_COPY_AND_ASSIGN(WorkingMemory);
};

// Flat array compression that does not emit the "uncompressed length"
// prefix. Compresses "input" string to the "*op" buffer.
```

```
//
// REQUIRES: "input_length <= kBlockSize"
// REQUIRES: "op" points to an array of memory that is at least
// "MaxCompressedLength(input_length)" in size.
// REQUIRES: All elements in "table[0..table_size-1]" are initialized to zero.
// REQUIRES: "table_size" is a power of two
//
// Returns an "end" pointer into "op" buffer.
// "end - op" is the compressed size of "input".
char* CompressFragment(const char* input,
                       size_t input_length,
                       char* op,
                       uint16* table,

 const int table_size);

// Return the largest n such that
//
//   s1[0,n-1] == s2[0,n-1]
//   and n <= (s2_limit - s2).
//
// Does not read *s2_limit or beyond.
// Does not read *(s1 + (s2_limit - s2)) or beyond.
// Requires that s2_limit >= s2.
//
// Separate implementation for x86_64, for speed.  Uses the fact that
// x86_64 is little endian.
#if defined(ARCH_K8)
static inline int FindMatchLength(const char* s1,
                                  const char* s2,
                                  const char* s2_limit) {
 assert(s2_limit >= s2);
 int matched = 0;

 // Find out how long the match is. We loop over the data 64 bits at a
 // time until we find a 64-bit block that doesn't match; then we find
 // the first non-matching bit and use that to calculate the total
 // length of the match.
 while (PREDICT_TRUE(s2 <= s2_limit - 8)) {
   if (UNALIGNED_LOAD64(s2) == UNALIGNED_LOAD64(s1 + matched)) {
     s2 += 8;
     matched += 8;
   } else {
     // On current (mid-2008)
 Opteron models there is a 3% more
     // efficient code sequence to find the first non-matching byte.
     // However, what follows is ~10% better on Intel Core 2 and newer,
     // and we expect AMD's bsf instruction to improve.
```

```
    uint64 x = UNALIGNED_LOAD64(s2) ^ UNALIGNED_LOAD64(s1 + matched);
    int matching_bits = Bits::FindLSBSetNonZero64(x);
    matched += matching_bits >> 3;
    return matched;
  }
 }
 while (PREDICT_TRUE(s2 < s2_limit)) {
  if (s1[matched] == *s2) {
    ++s2;
    ++matched;
  } else {
    return matched;
  }
 }
 return matched;
}
#else
static inline int FindMatchLength(const char* s1,
                                  const char* s2,
                                  const char* s2_limit) {
 // Implementation based on the x86-64 version, above.
 assert(s2_limit >= s2);
 int matched = 0;

 while (s2 <= s2_limit - 4 &&
       UNALIGNED_LOAD32(s2) == UNALIGNED_LOAD32(s1 + matched)) {
  s2 += 4;
  matched += 4;
 }
 if (LittleEndian::IsLittleEndian()
 && s2 <= s2_limit - 4) {
  uint32 x = UNALIGNED_LOAD32(s2) ^ UNALIGNED_LOAD32(s1 + matched);
  int matching_bits = Bits::FindLSBSetNonZero(x);
  matched += matching_bits >> 3;
 } else {
  while ((s2 < s2_limit) && (s1[matched] == *s2)) {
    ++s2;
    ++matched;
  }
 }
 return matched;
}
#endif

// Lookup tables for decompression code.  Give --snappy_dump_decompression_table
// to the unit test to recompute char_table.

enum {
```

```
 LITERAL = 0,
 COPY_1_BYTE_OFFSET = 1,  // 3 bit length + 3 bits of offset in opcode
 COPY_2_BYTE_OFFSET = 2,
 COPY_4_BYTE_OFFSET = 3
};
static const int kMaximumTagLength = 5;  // COPY_4_BYTE_OFFSET plus the actual offset.

// Mapping from i in range [0,4] to a mask to extract the bottom 8*i bits
static const uint32 wordmask[] = {
 0u, 0xffu, 0xffffu, 0xffffffu, 0xffffffffu
};

// Data stored per entry in lookup table:
//      Range   Bits-used       Description
//      ------------------------------------
//
      1..64   0..7            Literal/copy length encoded in opcode byte
//      0..7    8..10           Copy offset encoded in opcode byte / 256
//      0..4    11..13          Extra bytes after opcode
//
// We use eight bits for the length even though 7 would have sufficed
// because of efficiency reasons:
//      (1) Extracting a byte is faster than a bit-field
//      (2) It properly aligns copy offset so we do not need a <<8
static const uint16 char_table[256] = {
 0x0001, 0x0804, 0x1001, 0x2001, 0x0002, 0x0805, 0x1002, 0x2002,
 0x0003, 0x0806, 0x1003, 0x2003, 0x0004, 0x0807, 0x1004, 0x2004,
 0x0005, 0x0808, 0x1005, 0x2005, 0x0006, 0x0809, 0x1006, 0x2006,
 0x0007, 0x080a, 0x1007, 0x2007, 0x0008, 0x080b, 0x1008, 0x2008,
 0x0009, 0x0904, 0x1009, 0x2009, 0x000a, 0x0905, 0x100a, 0x200a,
 0x000b, 0x0906, 0x100b, 0x200b, 0x000c, 0x0907, 0x100c, 0x200c,
 0x000d, 0x0908, 0x100d, 0x200d, 0x000e, 0x0909, 0x100e, 0x200e,
 0x000f, 0x090a, 0x100f, 0x200f, 0x0010, 0x090b, 0x1010, 0x2010,
  0x0011, 0x0a04, 0x1011, 0x2011, 0x0012, 0x0a05, 0x1012, 0x2012,
 0x0013, 0x0a06, 0x1013, 0x2013, 0x0014, 0x0a07, 0x1014, 0x2014,
 0x0015, 0x0a08, 0x1015, 0x2015, 0x0016, 0x0a09, 0x1016, 0x2016,
 0x0017, 0x0a0a, 0x1017, 0x2017, 0x0018, 0x0a0b, 0x1018, 0x2018,
 0x0019, 0x0b04, 0x1019, 0x2019, 0x001a, 0x0b05, 0x101a, 0x201a,
 0x001b, 0x0b06, 0x101b, 0x201b, 0x001c, 0x0b07, 0x101c, 0x201c,
 0x001d, 0x0b08, 0x101d, 0x201d, 0x001e, 0x0b09, 0x101e, 0x201e,
 0x001f, 0x0b0a, 0x101f, 0x201f, 0x0020, 0x0b0b, 0x1020, 0x2020,
 0x0021, 0x0c04, 0x1021, 0x2021, 0x0022, 0x0c05, 0x1022, 0x2022,
 0x0023, 0x0c06, 0x1023, 0x2023, 0x0024, 0x0c07, 0x1024, 0x2024,
 0x0025, 0x0c08, 0x1025, 0x2025, 0x0026, 0x0c09, 0x1026, 0x2026,
 0x0027, 0x0c0a, 0x1027, 0x2027, 0x0028, 0x0c0b, 0x1028, 0x2028,
 0x0029, 0x0d04, 0x1029, 0x2029, 0x002a, 0x0d05, 0x102a, 0x202a,
 0x002b, 0x0d06, 0x102b, 0x202b, 0x002c, 0x0d07, 0x102c, 0x202c,
 0x002d, 0x0d08, 0x102d, 0x202d, 0x002e, 0x0d09, 0x102e, 0x202e,
```

```
 0x002f,
 0x0d0a, 0x102f, 0x202f, 0x0030, 0x0d0b, 0x1030, 0x2030,
 0x0031, 0x0e04, 0x1031, 0x2031, 0x0032, 0x0e05, 0x1032, 0x2032,
 0x0033, 0x0e06, 0x1033, 0x2033, 0x0034, 0x0e07, 0x1034, 0x2034,
 0x0035, 0x0e08, 0x1035, 0x2035, 0x0036, 0x0e09, 0x1036, 0x2036,
 0x0037, 0x0e0a, 0x1037, 0x2037, 0x0038, 0x0e0b, 0x1038, 0x2038,
 0x0039, 0x0f04, 0x1039, 0x2039, 0x003a, 0x0f05, 0x103a, 0x203a,
 0x003b, 0x0f06, 0x103b, 0x203b, 0x003c, 0x0f07, 0x103c, 0x203c,
 0x0801, 0x0f08, 0x103d, 0x203d, 0x1001, 0x0f09, 0x103e, 0x203e,
 0x1801, 0x0f0a, 0x103f, 0x203f, 0x2001, 0x0f0b, 0x1040, 0x2040
};

}  // end namespace internal
}  // end namespace snappy

#endif  // THIRD_PARTY_SNAPPY_SNAPPY_INTERNAL_H_
// 7zItem.h

#ifndef __7Z_ITEM_H
#define __7Z_ITEM_H

#include "../../../Common/MyBuffer.h"
#include "../../../Common/MyString.h"

#include "../../Common/MethodId.h"

#include "7zHeader.h"

namespace NArchive {
namespace N7z {

typedef UInt32 CNum;
const CNum kNumMax     = 0x7FFFFFFF;
const CNum kNumNoIndex = 0xFFFFFFFF;

struct CCoderInfo
{
 CMethodId MethodID;
 CByteBuffer Props;
 UInt32 NumStreams;

 bool IsSimpleCoder() const { return NumStreams == 1; }
};


struct CBond
{
 UInt32 PackIndex;
```

```
 UInt32 UnpackIndex;
};


struct CFolder
{
 CLASS_NO_COPY(CFolder)
public:
 CObjArray2<CCoderInfo> Coders;
 CObjArray2<CBond> Bonds;
 CObjArray2<UInt32> PackStreams;

 CFolder() {}

 bool IsDecodingSupported() const { return Coders.Size() <= 32; }

 int Find_in_PackStreams(UInt32 packStream) const
 {
  FOR_VECTOR(i, PackStreams)
    if (PackStreams[i] == packStream)
      return i;
  return -1;
 }

 int FindBond_for_PackStream(UInt32 packStream) const
 {
  FOR_VECTOR(i,
 Bonds)
    if (Bonds[i].PackIndex == packStream)
      return i;
  return -1;
 }

 /*
 int FindBond_for_UnpackStream(UInt32 unpackStream) const
 {
  FOR_VECTOR(i, Bonds)
    if (Bonds[i].UnpackIndex == unpackStream)
      return i;
  return -1;
 }

 int FindOutCoder() const
 {
  for (int i = (int)Coders.Size() - 1; i >= 0; i--)
    if (FindBond_for_UnpackStream(i) < 0)
      return i;
  return -1;
```

```
 }
 */

 bool IsEncrypted() const
 {
   FOR_VECTOR(i, Coders)
     if (Coders[i].MethodID == k_AES)
       return true;
   return false;
 }
};


struct CUInt32DefVector
{
 CBoolVector Defs;
 CRecordVector<UInt32> Vals;

 void ClearAndSetSize(unsigned newSize)
 {
   Defs.ClearAndSetSize(newSize);
   Vals.ClearAndSetSize(newSize);
 }

 void Clear()
 {
   Defs.Clear();
   Vals.Clear();
 }

 void ReserveDown()
 {
   Defs.ReserveDown();
   Vals.ReserveDown();
 }

 bool GetItem(unsigned index, UInt32 &value) const
 {
   if (index < Defs.Size()
 && Defs[index])
   {
     value = Vals[index];
     return true;
   }
   value = 0;
   return false;
 }
```

```
 bool ValidAndDefined(unsigned i) const { return i < Defs.Size() && Defs[i]; }

 bool CheckSize(unsigned size) const { return Defs.Size() == size || Defs.Size() == 0; }

 void SetItem(unsigned index, bool defined, UInt32 value);
};


struct CUInt64DefVector
{
 CBoolVector Defs;
 CRecordVector<UInt64> Vals;

 void Clear()
 {
   Defs.Clear();
   Vals.Clear();
 }

 void ReserveDown()
 {
   Defs.ReserveDown();
   Vals.ReserveDown();
 }

 bool GetItem(unsigned index, UInt64 &value) const
 {
   if (index < Defs.Size() && Defs[index])
   {
     value = Vals[index];
     return true;
   }
   value = 0;
   return false;
 }

 bool CheckSize(unsigned size) const { return Defs.Size() == size || Defs.Size() == 0; }

 void SetItem(unsigned index, bool defined, UInt64 value);
};


struct CFileItem
{
 UInt64 Size;
 UInt32 Crc;
 /*
 int Parent;
```

```
 bool IsAltStream;
 */
 bool HasStream; // Test it !!! it means that there is
                 // stream in some folder. It can be empty stream
 bool IsDir;
 bool CrcDefined;

 /*
 void Clear()
 {
   HasStream = true;
   IsDir = false;
   CrcDefined = false;
 }

 CFileItem():
   // Parent(-1),
   // IsAltStream(false),
   HasStream(true),
   IsDir(false),
   CrcDefined(false),
     {}
 */
};

}}

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With class Attribute in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-014-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element with &quot;class1 class2
class3&quot; as the value for the class attribute." />
  <style
 type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
```

```
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-014.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text class="class 1 class2 class3"&gt;
   Copyright without language.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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* dl/sp/api/omxSP.h

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Version 3, 29 June 2007

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// SysIconUtils.h

#ifndef __SYS_ICON_UTILS_H
#define __SYS_ICON_UTILS_H

#include "../../../Common/MyWindows.h"

#include <commctrl.h>

#include "../../../Common/MyString.h"

struct CExtIconPair
{
 UString Ext;
 int IconIndex;
 // UString TypeName;

 // int Compare(const CExtIconPair &a) const { return MyStringCompareNoCase(Ext, a.Ext); }
};

struct CAttribIconPair
{
 DWORD Attrib;
 int IconIndex;
 // UString TypeName;

 // int Compare(const CAttribIconPair &a) const { return Ext.Compare(a.Ext); }
};

class CExtToIconMap
{
public:
 CRecordVector<CAttribIconPair> _attribMap;
 CObjectVector<CExtIconPair> _extMap;
 int SplitIconIndex;
 int SplitIconIndex_Defined;

 CExtToIconMap(): SplitIconIndex_Defined(false) {}
```

```
 void Clear()
 {
   SplitIconIndex_Defined = false;
   _extMap.Clear();
   _attribMap.Clear();
 }
 int GetIconIndex(DWORD attrib, const wchar_t *fileName /* , UString *typeName */);
 // int GetIconIndex(DWORD attrib, const UString &fileName);
};

DWORD_PTR
 GetRealIconIndex(CFSTR path, DWORD attrib, int &iconIndex);
int GetIconIndexForCSIDL(int csidl);

inline HIMAGELIST GetSysImageList(bool smallIcons)
{
 SHFILEINFO shellInfo;
 return (HIMAGELIST)SHGetFileInfo(TEXT(""),
     FILE_ATTRIBUTE_NORMAL | FILE_ATTRIBUTE_DIRECTORY,
     &shellInfo, sizeof(shellInfo),
     SHGFI_USEFILEATTRIBUTES | SHGFI_SYSICONINDEX | (smallIcons ? SHGFI_SMALLICON :
SHGFI_ICON));
}

#endif
```

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```
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* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#if defined(ATK_DISABLE_SINGLE_INCLUDES) && !defined (__ATK_H_INSIDE__) && !defined
(ATK_COMPILATION)
#error "Only <atk/atk.h> can be included directly."
#endif

#ifndef __ATK_TABLE_CELL_H__
#define
 __ATK_TABLE_CELL_H__

#include <atk/atkobject.h>

G_BEGIN_DECLS

#define ATK_TYPE_TABLE_CELL                    (atk_table_cell_get_type ())
#define ATK_IS_TABLE_CELL(obj)                 G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_TABLE_CELL)
#define ATK_TABLE_CELL(obj)                    G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_TABLE_CELL, AtkTableCell)
#define ATK_TABLE_CELL_GET_IFACE(obj)          (G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_TABLE_CELL, AtkTableCellIface))

#ifndef _TYPEDEF_ATK_TABLE_CELL_
#define _TYPEDEF_ATK_TABLE_CELL_
typedef struct _AtkTableCell AtkTableCell;
#endif
typedef struct _AtkTableCellIface AtkTableCellIface;

/**
* AtkTableCellIface:
```

```
* @get_column_span: virtual function that returns the number of
* columns occupied by this cell accessible. @Since: 2.12
* @get_column_header_cells: virtual function that returns the column
* headers as an array of cell accessibles. @Since: 2.12
* @get_position: virtual function that retrieves the tabular
 position
* of this cell. @Since: 2.12
* @get_row_span: virtual function that returns the number of rows
* occupied by this cell. @Since: 2.12
* @get_row_header_cells: virtual function that returns the row
* headers as an array of cell accessibles. @Since: 2.12
* @get_row_column_span: virtual function that get the row an column
* indexes and span of this cell. @Since: 2.12
* @get_table: virtual function that returns a reference to the
* accessible of the containing table. @Since: 2.12
*/
struct _AtkTableCellIface
{
 GTypeInterface parent;

 gint         (*get_column_span)        (AtkTableCell *cell);
 GPtrArray *   (*get_column_header_cells) (AtkTableCell *cell);
 gboolean      (*get_position)           (AtkTableCell *cell,
                                gint        *row,
                                gint        *column);
 gint         (*get_row_span)           (AtkTableCell *cell);
 GPtrArray *   (*get_row_header_cells)    (AtkTableCell
 *cell);
 gboolean      (*get_row_column_span)    (AtkTableCell *cell,
                                gint        *row,
                                gint        *column,
                                gint        *row_span,
                                gint        *column_span);
 AtkObject *   (*get_table)              (AtkTableCell *cell);
};

ATK_AVAILABLE_IN_2_12
GType atk_table_cell_get_type (void);

ATK_AVAILABLE_IN_2_12
gint       atk_table_cell_get_column_span        (AtkTableCell *cell);
ATK_AVAILABLE_IN_2_12
GPtrArray * atk_table_cell_get_column_header_cells (AtkTableCell *cell);
ATK_AVAILABLE_IN_2_12
gboolean    atk_table_cell_get_position           (AtkTableCell *cell,
                                    gint        *row,
                                    gint        *column);
ATK_AVAILABLE_IN_2_12
```

```
gint        atk_table_cell_get_row_span           (AtkTableCell *cell);
ATK_AVAILABLE_IN_2_12
GPtrArray
 * atk_table_cell_get_row_header_cells    (AtkTableCell *cell);
ATK_AVAILABLE_IN_2_12
gboolean    atk_table_cell_get_row_column_span     (AtkTableCell *cell,
                                        gint        *row,
                                        gint        *column,
                                        gint        *row_span,
                                        gint        *column_span);
ATK_AVAILABLE_IN_2_12
AtkObject * atk_table_cell_get_table              (AtkTableCell *cell);

G_END_DECLS

#endif /* __ATK_TABLE_CELL_H__ */
```

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```
// ExitCode.h

#ifndef __EXIT_CODE_H
#define __EXIT_CODE_H

namespace NExitCode {

enum EEnum {

 kSuccess       = 0,     // Successful operation
 kWarning       = 1,     // Non fatal error(s) occurred
 kFatalError    = 2,     // A fatal error occurred
```

```
 // kCRCError      = 3,     // A CRC error occurred when unpacking
 // kLockedArchive = 4,     // Attempt to modify an archive previously locked
 // kWriteError    = 5,     // Write to disk error
 // kOpenError     = 6,     // Open file error
 kUserError     = 7,     // Command line option error
 kMemoryError   = 8,     // Not enough memory for operation
 // kCreateFileError = 9,     // Create file error

 kUserBreak     = 255   // User stopped the process

};

}

#endif
// Windows/Shell.h

#ifndef __WINDOWS_SHELL_H
#define __WINDOWS_SHELL_H

#include <windows.h>
#include <shlobj.h>

#include "../Common/MyString.h"

#include "Defs.h"

namespace NWindows{
namespace NShell{

//////////////////////////
// CItemIDList
#ifndef UNDER_CE

class CItemIDList
{
 LPITEMIDLIST m_Object;
public:
 CItemIDList(): m_Object(NULL) {}
 // CItemIDList(LPCITEMIDLIST itemIDList);
 // CItemIDList(const CItemIDList& itemIDList);
 ~CItemIDList() { Free(); }
 void Free();
 void Attach(LPITEMIDLIST object)
 {
   Free();
   m_Object = object;
 }
```

```
 LPITEMIDLIST Detach()
 {
   LPITEMIDLIST object = m_Object;
   m_Object = NULL;
   return object;
 }
 operator LPITEMIDLIST() { return m_Object;}
 operator LPCITEMIDLIST() const { return m_Object;}
 LPITEMIDLIST* operator&() { return &m_Object; }
 LPITEMIDLIST operator->() { return m_Object; }

 // CItemIDList& operator=(LPCITEMIDLIST object);
 // CItemIDList& operator=(const CItemIDList &object);
};

/////////////////////////////
//
 CDrop

class CDrop
{
 HDROP m_Object;
 bool m_MustBeFinished;
 bool m_Assigned;
 void Free();
public:
 CDrop(bool mustBeFinished) : m_MustBeFinished(mustBeFinished), m_Assigned(false) {}
 ~CDrop() { Free(); }

 void Attach(HDROP object);
 operator HDROP() { return m_Object;}
 bool QueryPoint(LPPOINT point)
   { return BOOLToBool(::DragQueryPoint(m_Object, point)); }
 void Finish() {  ::DragFinish(m_Object); }
 UINT QueryFile(UINT fileIndex, LPTSTR fileName, UINT fileNameSize)
   { return ::DragQueryFile(m_Object, fileIndex, fileName, fileNameSize); }
 #ifndef _UNICODE
 UINT QueryFile(UINT fileIndex, LPWSTR fileName, UINT fileNameSize)
   { return ::DragQueryFileW(m_Object, fileIndex, fileName, fileNameSize); }
 #endif
 UINT QueryCountOfFiles();
 UString QueryFileName(UINT fileIndex);
 void QueryFileNames(UStringVector &fileNames);
};

#endif

/////////////////////////////
```

// Functions

bool GetPathFromIDList(LPCITEMIDLIST itemIDList, CSysString &path);
bool
 BrowseForFolder(LPBROWSEINFO lpbi, CSysString &resultPath);
bool BrowseForFolder(HWND owner, LPCTSTR title, LPCTSTR initialFolder, CSysString &resultPath);

#ifndef _UNICODE
bool GetPathFromIDList(LPCITEMIDLIST itemIDList, UString &path);
bool BrowseForFolder(LPBROWSEINFO lpbi, UString &resultPath);
bool BrowseForFolder(HWND owner, LPCWSTR title, LPCWSTR initialFolder, UString &resultPath);
#endif
}}

#endif
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AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER
LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM,
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SOFTWARE.
#define IDD_BROWSE  95

#define IDL_BROWSE  100
#define IDT_BROWSE_FOLDER  101
#define IDE_BROWSE_PATH  102
#define IDC_BROWSE_FILTER  103

#define IDB_BROWSE_PARENT  110
#define IDB_BROWSE_CREATE_DIR 112
UNRECOGNIZED LICENSE; MD5 sum: da74366be03654a82ada482e4331754b

```
// Windows/ResourceString.h

#ifndef __WINDOWS_RESOURCE_STRING_H
#define __WINDOWS_RESOURCE_STRING_H

#include "../Common/MyString.h"

namespace NWindows {

UString MyLoadString(UINT resourceID);
void MyLoadString(HINSTANCE hInstance, UINT resourceID, UString &dest);
void MyLoadString(UINT resourceID, UString &dest);

}

#endif
```

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<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Child Element in license Element text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />

```
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-019-ref.xht" />
  <meta name="assert" content="The license element contains a text element with an unknown child element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
 {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-019.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
// IDecl.h

#ifndef __IDECL_H
#define __IDECL_H

#include "../Common/MyUnknown.h"

#define k_7zip_GUID_Data1 0x23170F69
#define k_7zip_GUID_Data2 0x40C1

#define k_7zip_GUID_Data3_Common  0x278A

#define k_7zip_GUID_Data3_Decoder 0x2790
#define k_7zip_GUID_Data3_Encoder 0x2791
#define k_7zip_GUID_Data3_Hasher  0x2792
```

```
#define DECL_INTERFACE_SUB(i, base, groupId, subId) \
 DEFINE_GUID(IID_ ## i, \
   k_7zip_GUID_Data1, \
   k_7zip_GUID_Data2, \
   k_7zip_GUID_Data3_Common, \
   0, 0, 0, (groupId), 0, (subId), 0, 0); \
 struct i: public base

#define DECL_INTERFACE(i, groupId, subId) DECL_INTERFACE_SUB(i, IUnknown, groupId, subId)

#endif
```

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Software.

```
// TempFiles.h

#ifndef __TEMP_FILES_H
#define __TEMP_FILES_H

#include "../../../Common/MyString.h"

class CTempFiles
{
 void Clear();
public:
 FStringVector Paths;
 ~CTempFiles() { Clear(); }
};
```

```
#endif
/* Precomp.h -- StdAfx
2013-11-12 : Igor Pavlov : Public domain */

#ifndef __7Z_PRECOMP_H
#define __7Z_PRECOMP_H

#include "Compiler.h"
/* #include "7zTypes.h" */

#endif
```

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```
// 7zOut.h

#ifndef __7Z_OUT_H
#define __7Z_OUT_H

#include "7zCompressionMode.h"
#include "7zEncode.h"
#include "7zHeader.h"
#include "7zItem.h"
```

```
#include "../../Common/OutBuffer.h"
#include "../../Common/StreamUtils.h"

namespace NArchive {
namespace N7z {

class CWriteBufferLoc
{
 Byte *_data;
 size_t _size;
 size_t _pos;
public:
 CWriteBufferLoc(): _size(0), _pos(0) {}
 void Init(Byte *data, size_t size)
 {
   _data = data;
   _size = size;
   _pos = 0;
 }
 void WriteBytes(const void *data, size_t size)
 {
   if (size == 0)
     return;
   if (size > _size - _pos)
     throw 1;
   memcpy(_data + _pos, data, size);
   _pos += size;
 }
 void WriteByte(Byte b)
 {
   if (_size == _pos)
     throw 1;
   _data[_pos++] = b;
 }
 size_t GetPos() const { return _pos; }
};


struct CHeaderOptions
{
 bool CompressMainHeader;
 /*
 bool WriteCTime;
 bool WriteATime;
 bool WriteMTime;
 */

 CHeaderOptions():
```

```
    CompressMainHeader(true)
    /*
    , WriteCTime(false)
     , WriteATime(false)
    , WriteMTime(true)
    */
    {}
};


struct CFileItem2
{
 UInt64 CTime;
 UInt64 ATime;
 UInt64 MTime;
 UInt64 StartPos;
 UInt32 Attrib;

 bool CTimeDefined;
 bool ATimeDefined;
 bool MTimeDefined;
 bool StartPosDefined;
 bool AttribDefined;
 bool IsAnti;
 // bool IsAux;

 /*
 void Init()
 {
  CTimeDefined = false;
  ATimeDefined = false;
  MTimeDefined = false;
  StartPosDefined = false;
  AttribDefined = false;
  IsAnti = false;
  // IsAux = false;
 }
 */
};


struct COutFolders
{
 CUInt32DefVector FolderUnpackCRCs; // Now we use it for headers only.

 CRecordVector<CNum> NumUnpackStreamsVector;
 CRecordVector<UInt64> CoderUnpackSizes; // including unpack sizes of bond coders
```

```
 void OutFoldersClear()
 {
   FolderUnpackCRCs.Clear();
   NumUnpackStreamsVector.Clear();
   CoderUnpackSizes.Clear();
 }

 void OutFoldersReserveDown()
 {
   FolderUnpackCRCs.ReserveDown();
   NumUnpackStreamsVector.ReserveDown();
    CoderUnpackSizes.ReserveDown();
 }
};


struct CArchiveDatabaseOut: public COutFolders
{
 CRecordVector<UInt64> PackSizes;
 CUInt32DefVector PackCRCs;
 CObjectVector<CFolder> Folders;

 CRecordVector<CFileItem> Files;
 UStringVector Names;
 CUInt64DefVector CTime;
 CUInt64DefVector ATime;
 CUInt64DefVector MTime;
 CUInt64DefVector StartPos;
 CUInt32DefVector Attrib;
 CBoolVector IsAnti;

 /*
 CBoolVector IsAux;

 CByteBuffer SecureBuf;
 CRecordVector<UInt32> SecureSizes;
 CRecordVector<UInt32> SecureIDs;

 void ClearSecure()
 {
   SecureBuf.Free();
   SecureSizes.Clear();
   SecureIDs.Clear();
 }
 */

 void Clear()
 {
```

```
  OutFoldersClear();

  PackSizes.Clear();
  PackCRCs.Clear();
  Folders.Clear();

  Files.Clear();
  Names.Clear();
  CTime.Clear();
  ATime.Clear();
  MTime.Clear();
  StartPos.Clear();
  Attrib.Clear();
  IsAnti.Clear();

  /*
  IsAux.Clear();
  ClearSecure();
  */
}

void ReserveDown()
{
   OutFoldersReserveDown();

  PackSizes.ReserveDown();
  PackCRCs.ReserveDown();
  Folders.ReserveDown();

  Files.ReserveDown();
  Names.ReserveDown();
  CTime.ReserveDown();
  ATime.ReserveDown();
  MTime.ReserveDown();
  StartPos.ReserveDown();
  Attrib.ReserveDown();
  IsAnti.ReserveDown();

  /*
  IsAux.ReserveDown();
  */
}

bool IsEmpty() const
{
  return (
    PackSizes.IsEmpty() &&
    NumUnpackStreamsVector.IsEmpty() &&
```

```
    Folders.IsEmpty() &&
    Files.IsEmpty());
  }

  bool CheckNumFiles() const
  {
    unsigned size = Files.Size();
    return (
          CTime.CheckSize(size)
        && ATime.CheckSize(size)
        && MTime.CheckSize(size)
        && StartPos.CheckSize(size)
        && Attrib.CheckSize(size)
        && (size == IsAnti.Size() || IsAnti.Size() == 0));
  }

  bool IsItemAnti(unsigned index) const { return (index < IsAnti.Size() && IsAnti[index]); }
  // bool IsItemAux(unsigned index) const { return (index <
  IsAux.Size() && IsAux[index]); }

  void SetItem_Anti(unsigned index, bool isAnti)
  {
    while (index >= IsAnti.Size())
      IsAnti.Add(false);
    IsAnti[index] = isAnti;
  }
  /*
  void SetItem_Aux(unsigned index, bool isAux)
  {
    while (index >= IsAux.Size())
      IsAux.Add(false);
    IsAux[index] = isAux;
  }
  */

  void AddFile(const CFileItem &file, const CFileItem2 &file2, const UString &name);
};


class COutArchive
{
  UInt64 _prefixHeaderPos;

  HRESULT WriteDirect(const void *data, UInt32 size) { return WriteStream(SeqStream, data, size); }

  UInt64 GetPos() const;
  void WriteBytes(const void *data, size_t size);
  void WriteBytes(const CByteBuffer &data) { WriteBytes(data, data.Size()); }
```

```
void WriteByte(Byte b);
void WriteUInt32(UInt32 value);
void WriteUInt64(UInt64 value);
void WriteNumber(UInt64 value);
void WriteID(UInt64 value) { WriteNumber(value); }

void WriteFolder(const CFolder &folder);
HRESULT WriteFileHeader(const CFileItem &itemInfo);
 void WriteBoolVector(const CBoolVector &boolVector);
void WritePropBoolVector(Byte id, const CBoolVector &boolVector);

void WriteHashDigests(const CUInt32DefVector &digests);

void WritePackInfo(
   UInt64 dataOffset,
   const CRecordVector<UInt64> &packSizes,
   const CUInt32DefVector &packCRCs);

void WriteUnpackInfo(
   const CObjectVector<CFolder> &folders,
   const COutFolders &outFolders);

void WriteSubStreamsInfo(
   const CObjectVector<CFolder> &folders,
   const COutFolders &outFolders,
   const CRecordVector<UInt64> &unpackSizes,
   const CUInt32DefVector &digests);

void SkipToAligned(unsigned pos, unsigned alignShifts);
void WriteAlignedBools(const CBoolVector &v, unsigned numDefined, Byte type, unsigned itemSizeShifts);
void WriteUInt64DefVector(const CUInt64DefVector &v, Byte type);

HRESULT EncodeStream(
   DECL_EXTERNAL_CODECS_LOC_VARS
   CEncoder &encoder, const CByteBuffer &data,
   CRecordVector<UInt64> &packSizes,
CObjectVector<CFolder> &folders, COutFolders &outFolders);
void WriteHeader(
   const CArchiveDatabaseOut &db,
   // const CHeaderOptions &headerOptions,
   UInt64 &headerOffset);

bool _countMode;
bool _writeToStream;
size_t _countSize;
UInt32 _crc;
COutBuffer _outByte;
CWriteBufferLoc _outByte2;
```

```
 #ifdef _7Z_VOL
 bool _endMarker;
 #endif

 bool _useAlign;

 HRESULT WriteSignature();
 #ifdef _7Z_VOL
 HRESULT WriteFinishSignature();
 #endif
 HRESULT WriteStartHeader(const CStartHeader &h);
 #ifdef _7Z_VOL
 HRESULT WriteFinishHeader(const CFinishHeader &h);
 #endif
 CMyComPtr<IOutStream> Stream;
public:

 COutArchive() { _outByte.Create(1 << 16); }
 CMyComPtr<ISequentialOutStream> SeqStream;
 HRESULT Create(ISequentialOutStream *stream, bool endMarker);
 void Close();
 HRESULT SkipPrefixArchiveHeader();
 HRESULT WriteDatabase(
    DECL_EXTERNAL_CODECS_LOC_VARS
    const CArchiveDatabaseOut &db,
    const CCompressionMethodMode *options,
     const CHeaderOptions &headerOptions);

 #ifdef _7Z_VOL
 static UInt32 GetVolHeadersSize(UInt64 dataSize, int nameLength = 0, bool props = false);
 static UInt64 GetVolPureSize(UInt64 volSize, int nameLength = 0, bool props = false);
 #endif

};

}}

#endif
/*
* tchar.h
*
* This file is a part of NSIS.
*
* Copyright (C) 1999-2007 Nullsoft and Contributors
*
* This software is provided 'as-is', without any express or implied
* warranty.
```

```
*
* For Unicode support by Jim Park -- 08/30/2007
*/

// Jim Park: Only those we use are listed here.

#pragma once

#ifdef _UNICODE

#ifndef _T
#define __T(x)   L ## x
#define _T(x)    __T(x)
#define _TEXT(x) __T(x)
#endif
typedef wchar_t TCHAR;
typedef wchar_t _TUCHAR;

// program
#define _tmain      wmain
#define _tWinMain   wWinMain
#define _tenviron   _wenviron
#define __targv     __wargv

// printfs
#define _ftprintf   fwprintf
#define _sntprintf  _snwprintf
#define _stprintf   _swprintf
#define _tprintf    wprintf
#define _vftprintf  vfwprintf
#define _vsntprintf _vsnwprintf
#define _vstprintf  _vswprintf

// scanfs
#define _tscanf     wscanf
#define _stscanf    swscanf

// string manipulations
#define _tcscat     wcscat
#define _tcschr     wcschr
#define _tcsclen    wcslen
#define _tcscpy
    wcscpy
#define _tcsdup     _wcsdup
#define _tcslen     wcslen
#define _tcsnccpy   wcsncpy
#define _tcsncpy    wcsncpy
#define _tcsrchr    wcsrchr
```

```
#define _tcsstr     wcsstr
#define _tcstok     wcstok

// string comparisons
#define _tcscmp     wcscmp
#define _tcsicmp    _wcsicmp
#define _tcsncicmp  _wcsnicmp
#define _tcsncmp    wcsncmp
#define _tcsnicmp   _wcsnicmp

// upper / lower
#define _tcslwr     _wcslwr
#define _tcsupr     _wcsupr
#define _totlower   towlower
#define _totupper   towupper

// conversions to numbers
#define _tcstoi64   _wcstoi64
#define _tcstol     wcstol
#define _tcstoul    wcstoul
#define _tstof      _wtof
#define _tstoi      _wtoi
#define _tstoi64    _wtoi64
#define _ttoi       _wtoi
#define _ttoi64     _wtoi64
#define _ttol       _wtol

// conversion from numbers to strings
#define _itot       _itow
#define _ltot       _ltow
#define _i64tot     _i64tow
#define _ui64tot    _ui64tow

// file manipulations
#define _tfopen     _wfopen
#define _topen      _wopen
#define
 _tremove    _wremove
#define _tunlink    _wunlink

// reading and writing to i/o
#define _fgettc     fgetwc
#define _fgetts     fgetws
#define _fputts     fputws
#define _gettchar   getwchar

// directory
#define _tchdir     _wchdir
```

```
// environment
#define _tgetenv    _wgetenv
#define _tsystem    _wsystem

// time
#define _tcsftime   wcsftime

#else // ANSI

#ifndef _T
#define _T(x)    x
#define _TEXT(x) x
#endif
typedef char            TCHAR;
typedef unsigned char   _TUCHAR;

// program
#define _tmain      main
#define _tWinMain   WinMain
#define _tenviron   environ
#define __targv     __argv

// printfs
#define _ftprintf   fprintf
#define _sntprintf  _snprintf
#define _stprintf   sprintf
#define _tprintf    printf
#define _vftprintf  vfprintf
#define _vsntprintf _vsnprintf
#define _vstprintf  vsprintf

// scanfs
#define _tscanf     scanf
#define _stscanf    sscanf

// string manipulations
#define _tcscat     strcat
#define _tcschr     strchr
#define _tcsclen    strlen
#define
 _tcscnlen   strnlen
#define _tcscpy     strcpy
#define _tcsdup     _strdup
#define _tcslen     strlen
#define _tcsnccpy   strncpy
#define _tcsrchr    strrchr
#define _tcsstr     strstr
```

```
#define _tcstok     strtok

// string comparisons
#define _tcscmp     strcmp
#define _tcsicmp    _stricmp
#define _tcsncmp    strncmp
#define _tcsncicmp  _strnicmp
#define _tcsnicmp   _strnicmp

// upper / lower
#define _tcslwr     _strlwr
#define _tcsupr     _strupr

#define _totupper   toupper
#define _totlower   tolower

// conversions to numbers
#define _tcstol     strtol
#define _tcstoul    strtoul
#define _tstof      atof
#define _tstoi      atoi
#define _tstoi64    _atoi64
#define _tstoi64    _atoi64
#define _ttoi       atoi
#define _ttoi64     _atoi64
#define _ttol       atol

// conversion from numbers to strings
#define _i64tot     _i64toa
#define _itot       _itoa
#define _ltot       _ltoa
#define _ui64tot    _ui64toa

// file manipulations
#define _tfopen     fopen
#define _topen      _open
#define
 _tremove    remove
#define _tunlink    _unlink

// reading and writing to i/o
#define _fgettc     fgetc
#define _fgetts     fgets
#define _fputts     fputs
#define _gettchar   getchar

// directory
#define _tchdir     _chdir
```

```
// environment
#define _tgetenv    getenv
#define _tsystem    system

// time
#define _tcsftime   strftime

#endif

// is functions (the same in Unicode / ANSI)
#define _istgraph   isgraph
#define _istascii   __isascii
// LzmaEncoder.h

#ifndef __LZMA_ENCODER_H
#define __LZMA_ENCODER_H

#include "../../../C/LzmaEnc.h"

#include "../../Common/MyCom.h"

#include "../ICoder.h"

namespace NCompress {
namespace NLzma {

class CEncoder:
 public ICompressCoder,
 public ICompressSetCoderProperties,
 public ICompressWriteCoderProperties,
 public ICompressSetCoderPropertiesOpt,
 public CMyUnknownImp
{
 CLzmaEncHandle _encoder;
 UInt64 _inputProcessed;
public:
 MY_UNKNOWN_IMP4(
    ICompressCoder,
    ICompressSetCoderProperties,
    ICompressWriteCoderProperties,
    ICompressSetCoderPropertiesOpt)

 STDMETHOD(Code)(ISequentialInStream *inStream, ISequentialOutStream *outStream,
    const UInt64 *inSize, const UInt64 *outSize, ICompressProgressInfo *progress);
 STDMETHOD(SetCoderProperties)(const PROPID *propIDs, const PROPVARIANT *props, UInt32 numProps);
 STDMETHOD(WriteCoderProperties)(ISequentialOutStream *outStream);
 STDMETHOD(SetCoderPropertiesOpt)(const PROPID *propIDs, const PROPVARIANT
```

```
 *props, UInt32 numProps);

 CEncoder();
 virtual ~CEncoder();

 UInt64 GetInputProcessedSize() const { return _inputProcessed; }
 bool IsWriteEndMark() const { return LzmaEnc_IsWriteEndMark(_encoder) != 0; }
};

}}

#endif
// Common/UTFConvert.h

#ifndef __COMMON_UTF_CONVERT_H
#define __COMMON_UTF_CONVERT_H

#include "MyString.h"

bool CheckUTF8(const char *src, bool allowReduced = false) throw();
bool ConvertUTF8ToUnicode(const AString &utfString, UString &resultString);
void ConvertUnicodeToUTF8(const UString &unicodeString, AString &resultString);

#endif
```

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```
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* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_STATE_H__
#define __ATK_STATE_H__

#include <glib-object.h>

G_BEGIN_DECLS

/**
*AtkStateType:
*@ATK_STATE_INVALID: Indicates an invalid state - probably an error condition.
 *@ATK_STATE_ACTIVE: Indicates a window is currently the active window, or an object is the active
subelement within a container or table. ATK_STATE_ACTIVE should not be used for objects which have
ATK_STATE_FOCUSABLE or ATK_STATE_SELECTABLE: Those objects should use
ATK_STATE_FOCUSED and ATK_STATE_SELECTED respectively. ATK_STATE_ACTIVE is a means to
indicate that an object which is not focusable and not selectable is the currently-active item within its parent
container.
*@ATK_STATE_ARMED: Indicates that the object is 'armed', i.e. will be activated by if a pointer button-release
event occurs within its bounds.  Buttons often enter this state when a pointer click occurs within their bounds, as a
precursor to activation. ATK_STATE_ARMED has been deprecated since ATK-2.16 and should not be used in
newly-written code.
*@ATK_STATE_BUSY:  Indicates the current object is busy, i.e. onscreen representation is in the process of
changing, or the object is temporarily unavailable for
 interaction due to activity already in progress.  This state may be used by implementors of Document to indicate
that content loading is underway.  It also may indicate other 'pending' conditions; clients may wish to interrogate this
object when the ATK_STATE_BUSY flag is removed.
*@ATK_STATE_CHECKED: Indicates this object is currently checked, for instance a checkbox is 'non-empty'.
*@ATK_STATE_DEFUNCT: Indicates that this object no longer has a valid backing widget (for instance, if its
peer object has been destroyed)
*@ATK_STATE_EDITABLE: Indicates that this object can contain text, and that the
```

* user can change the textual contents of this object by editing those contents
* directly. For an object which is expected to be editable due to its type, but
* which cannot be edited due to the application or platform preventing the user
* from doing so, that object's #AtkStateSet should lack ATK_STATE_EDITABLE and
* should contain ATK_STATE_READ_ONLY.
*@ATK_STATE_ENABLED: Indicates
that this object is enabled, i.e. that it currently reflects some application state. Objects that are "greyed out" may lack this state, and may lack the STATE_SENSITIVE if direct user interaction cannot cause them to acquire STATE_ENABLED. See also: ATK_STATE_SENSITIVE
*@ATK_STATE_EXPANDABLE: Indicates this object allows progressive disclosure of its children
*@ATK_STATE_EXPANDED: Indicates this object its expanded - see ATK_STATE_EXPANDABLE above
*@ATK_STATE_FOCUSABLE: Indicates this object can accept keyboard focus, which means all events resulting from typing on the keyboard will normally be passed to it when it has focus
*@ATK_STATE_FOCUSED: Indicates this object currently has the keyboard focus
*@ATK_STATE_HORIZONTAL: Indicates the orientation of this object is horizontal; used, for instance, by objects of ATK_ROLE_SCROLL_BAR. For objects where vertical/horizontal orientation is especially meaningful.
*@ATK_STATE_ICONIFIED: Indicates this object is minimized and is
represented only by an icon
*@ATK_STATE_MODAL: Indicates something must be done with this object before the user can interact with an object in a different window
*@ATK_STATE_MULTI_LINE: Indicates this (text) object can contain multiple lines of text
*@ATK_STATE_MULTISELECTABLE: Indicates this object allows more than one of its children to be selected at the same time, or in the case of text objects, that the object supports non-contiguous text selections.
*@ATK_STATE_OPAQUE: Indicates this object paints every pixel within its rectangular region.
*@ATK_STATE_PRESSED: Indicates this object is currently pressed.
*@ATK_STATE_RESIZABLE: Indicates the size of this object is not fixed
*@ATK_STATE_SELECTABLE: Indicates this object is the child of an object that allows its children to be selected and that this child is one of those children that can be selected
*@ATK_STATE_SELECTED: Indicates this object is the child of an object that allows its children to be selected and that this child
is one of those children that has been selected
*@ATK_STATE_SENSITIVE: Indicates this object is sensitive, e.g. to user interaction.
* STATE_SENSITIVE usually accompanies STATE_ENABLED for user-actionable controls,
* but may be found in the absence of STATE_ENABLED if the current visible state of the
* control is "disconnected" from the application state. In such cases, direct user interaction
* can often result in the object gaining STATE_SENSITIVE, for instance if a user makes
* an explicit selection using an object whose current state is ambiguous or undefined.
* @see STATE_ENABLED, STATE_INDETERMINATE.
*@ATK_STATE_SHOWING: Indicates this object, the object's parent, the object's parent's parent, and so on,
* are all 'shown' to the end-user, i.e. subject to "exposure" if blocking or obscuring objects do not interpose
* between this object and the top of the window stack.
*@ATK_STATE_SINGLE_LINE: Indicates this (text) object can contain only a single line of text
*@ATK_STATE_STALE: Indicates that the information returned for this object may no longer be
* synchronized with the application state. This is implied if the object has STATE_TRANSIENT,
* and can also occur towards the end of the object peer's lifecycle. It can also be used to indicate that
* the index associated with this object has changed since the user accessed the object (in lieu of
* "index-in-parent-changed" events).
*@ATK_STATE_TRANSIENT: Indicates this object is transient, i.e. a snapshot which may not emit events when

its
* state changes.  Data from objects with ATK_STATE_TRANSIENT should not be cached, since there may be no
* notification given when the cached data becomes obsolete.
*@ATK_STATE_VERTICAL: Indicates the orientation of this object is vertical
*@ATK_STATE_VISIBLE: Indicates this object is visible, e.g. has been explicitly marked for exposure to the user.
* @note: STATE_VISIBLE is no guarantee that the object is actually unobscured on the screen, only
 * that it is 'potentially' visible, barring obstruction, being scrolled or clipped out of the
* field of view, or having an ancestor container that has not yet made visible.
* A widget is potentially onscreen if it has both STATE_VISIBLE and STATE_SHOWING.
* The absence of STATE_VISIBLE and STATE_SHOWING is semantically equivalent to saying
* that an object is 'hidden'.  See also STATE_TRUNCATED, which applies if a VISIBLE and SHOWING object
* lies within a viewport which means that its contents are clipped, e.g. a truncated spreadsheet cell or
* an image within a scrolling viewport.  Mostly useful for screen-review and magnification algorithms.
*@ATK_STATE_MANAGES_DESCENDANTS: Indicates that "active-descendant-changed" event
* is sent when children become 'active' (i.e. are selected or navigated to onscreen).
* Used to prevent need to enumerate all children in very large containers, like tables.
* The presence of STATE_MANAGES_DESCENDANTS is an indication to the client.
 * that the children should not, and need not, be enumerated by the client.
* Objects implementing this state are expected to provide relevant state
* notifications to listening clients, for instance notifications of visibility
* changes and activation of their contained child objects, without the client
* having previously requested references to those children.
*@ATK_STATE_INDETERMINATE: Indicates that the value, or some other quantifiable
* property, of this AtkObject cannot be fully determined. In the case of a large
* data set in which the total number of items in that set is unknown (e.g. 1 of
* 999+), implementors should expose the currently-known set size (999) along
* with this state. In the case of a check box, this state should be used to
* indicate that the check box is a tri-state check box which is currently
* neither checked nor unchecked.
*@ATK_STATE_TRUNCATED: Indicates that an object is truncated, e.g. a text value in a speradsheet cell.
*@ATK_STATE_REQUIRED:
 Indicates that explicit user interaction with an object is required by the user interface, e.g. a required field in a "web-form" interface.
*@ATK_STATE_INVALID_ENTRY: Indicates that the object has encountered an error condition due to failure of input validation. For instance, a form control may acquire this state in response to invalid or malformed user input.
*@ATK_STATE_SUPPORTS_AUTOCOMPLETION:  Indicates that the object in question implements some form of typeahead or
* pre-selection behavior whereby entering the first character of one or more sub-elements
* causes those elements to scroll into view or become selected.  Subsequent character input
* may narrow the selection further as long as one or more sub-elements match the string.
* This state is normally only useful and encountered on objects that implement Selection.
* In some cases the typeahead behavior may result in full or partial completion of
* the data in the input field, in which case these input events
 may trigger text-changed
* events from the AtkText interface.  This state supplants @ATK_ROLE_AUTOCOMPLETE.
*@ATK_STATE_SELECTABLE_TEXT:Indicates that the object in question supports text selection. It should only be exposed on objects which implement the Text interface, in order to distinguish this state from @ATK_STATE_SELECTABLE, which infers that the object in question is a selectable child of an object which

```
implements Selection. While similar, text selection and subelement selection are distinct operations.
*@ATK_STATE_DEFAULT: Indicates that the object is the "default" active component, i.e. the object which is
activated by an end-user press of the "Enter" or "Return" key.  Typically a "close" or "submit" button.
*@ATK_STATE_ANIMATED: Indicates that the object changes its appearance dynamically as an inherent part of
its presentation.  This state may come and go if an object is only temporarily animated on the way to a 'final'
onscreen presentation.
* @note some applications,
 notably content viewers, may not be able to detect
* all kinds of animated content.  Therefore the absence of this state should not
* be taken as definitive evidence that the object's visual representation is
* static; this state is advisory.
*@ATK_STATE_VISITED: Indicates that the object (typically a hyperlink) has already been 'activated', and/or its
backing data has already been downloaded, rendered, or otherwise "visited".
*@ATK_STATE_CHECKABLE: Indicates this object has the potential to be
*  checked, such as a checkbox or toggle-able table cell. @Since:
*  ATK-2.12
*@ATK_STATE_HAS_POPUP: Indicates that the object has a popup context
* menu or sub-level menu which may or may not be showing. This means
* that activation renders conditional content.  Note that ordinary
* tooltips are not considered popups in this context. @Since: ATK-2.12
*@ATK_STATE_HAS_TOOLTIP: Indicates this object has a tooltip. @Since: ATK-2.16
*@ATK_STATE_READ_ONLY: Indicates that a widget which
 is ENABLED and SENSITIVE
* has a value which can be read, but not modified, by the user. Note that this
* state should only be applied to widget types whose value is normally directly
* user modifiable, such as check boxes, radio buttons, spin buttons, text input
* fields, and combo boxes, as a means to convey that the expected interaction
* with that widget is not possible. When the expected interaction with a
* widget does not include modification by the user, as is the case with
* labels and containers, ATK_STATE_READ_ONLY should not be applied. See also
* ATK_STATE_EDITABLE. @Since: ATK-2-16
*@ATK_STATE_LAST_DEFINED: Not a valid state, used for finding end of enumeration
*
*The possible types of states of an object
**/
typedef enum
{
 ATK_STATE_INVALID,
 ATK_STATE_ACTIVE,
 ATK_STATE_ARMED,
 ATK_STATE_BUSY,
 ATK_STATE_CHECKED,
 ATK_STATE_DEFUNCT,
 ATK_STATE_EDITABLE,
 ATK_STATE_ENABLED,
 ATK_STATE_EXPANDABLE,
 ATK_STATE_EXPANDED,
 ATK_STATE_FOCUSABLE,
```

```
 ATK_STATE_FOCUSED,
  ATK_STATE_HORIZONTAL,
 ATK_STATE_ICONIFIED,
 ATK_STATE_MODAL,
 ATK_STATE_MULTI_LINE,
 ATK_STATE_MULTISELECTABLE,
 ATK_STATE_OPAQUE,
 ATK_STATE_PRESSED,
 ATK_STATE_RESIZABLE,
 ATK_STATE_SELECTABLE,
 ATK_STATE_SELECTED,
 ATK_STATE_SENSITIVE,
 ATK_STATE_SHOWING,
 ATK_STATE_SINGLE_LINE,
 ATK_STATE_STALE,
 ATK_STATE_TRANSIENT,
 ATK_STATE_VERTICAL,
 ATK_STATE_VISIBLE,
 ATK_STATE_MANAGES_DESCENDANTS,
 ATK_STATE_INDETERMINATE,
 ATK_STATE_TRUNCATED,
 ATK_STATE_REQUIRED,
 ATK_STATE_INVALID_ENTRY,
 ATK_STATE_SUPPORTS_AUTOCOMPLETION,
 ATK_STATE_SELECTABLE_TEXT,
 ATK_STATE_DEFAULT,
 ATK_STATE_ANIMATED,
 ATK_STATE_VISITED,
 ATK_STATE_CHECKABLE,
 ATK_STATE_HAS_POPUP,
 ATK_STATE_HAS_TOOLTIP,
 ATK_STATE_READ_ONLY,
 ATK_STATE_LAST_DEFINED
} AtkStateType;

typedef guint64      AtkState;

AtkStateType atk_state_type_register           (const gchar *name);

const gchar*          atk_state_type_get_name   (AtkStateType type);
AtkStateType          atk_state_type_for_name
   (const gchar  *name);

G_END_DECLS

#endif /* __ATK_STATE_H__ */
; AesOpt.asm -- Intel's AES.
; 2009-12-12 : Igor Pavlov : Public domain
```

```
include 7zAsm.asm

MY_ASM_START

ifndef x64
  .xmm
endif

ifdef x64
  num     equ r8
else
  num     equ [r4 + REG_SIZE * 4]
endif

rD equ r2
rN equ r0

MY_PROLOG macro reg:req
  ifdef x64
  movdqa  [r4 + 8], xmm6
  movdqa  [r4 + 8 + 16], xmm7
  endif

  push    r3
  push    r5
  push    r6

  mov     rN, num
  mov     x6, [r1 + 16]
  shl     x6, 5

  movdqa  reg, [r1]
  add     r1, 32
endm

MY_EPILOG macro
  pop     r6
  pop     r5
  pop     r3

  ifdef x64
  movdqa  xmm6, [r4 + 8]
  movdqa  xmm7, [r4 + 8 + 16]
  endif

  MY_ENDP
endm
```

```
ways equ 4
ways16 equ (ways * 16)

OP_W macro op, op2
  i = 0
  rept ways
  op @CatStr(xmm,%i), op2
  i = i + 1
  endm
endm

LOAD_OP macro op:req, offs:req
  op      xmm0, [r1 + r3 offs]
endm

LOAD_OP_W macro op:req, offs:req
  movdqa  xmm7, [r1 + r3 offs]
  OP_W    op, xmm7
endm


; ---------- AES-CBC Decode ----------

CBC_DEC_UPDATE
 macro reg, offs
  pxor    reg, xmm6
  movdqa  xmm6, [rD + offs]
  movdqa  [rD + offs], reg
endm

DECODE macro op:req
  op      aesdec, +16
 @@:
  op      aesdec, +0
  op      aesdec, -16
  sub     x3, 32
  jnz     @B
  op      aesdeclast, +0
endm

MY_PROC AesCbc_Decode_Intel, 3
  MY_PROLOG xmm6

  sub     x6, 32

  jmp     check2
```

```
 align 16
 nextBlocks2:
   mov     x3, x6
   OP_W    movdqa, [rD + i * 16]
   LOAD_OP_W  pxor, +32
   DECODE  LOAD_OP_W
   OP_W    CBC_DEC_UPDATE, i * 16
   add     rD, ways16
 check2:
   sub     rN, ways
   jnc     nextBlocks2

   add     rN, ways
   jmp     check

 nextBlock:
   mov     x3, x6
   movdqa  xmm1, [rD]
   LOAD_OP movdqa, +32
   pxor    xmm0, xmm1
   DECODE  LOAD_OP
   pxor    xmm0, xmm6
   movdqa  [rD], xmm0
   movdqa  xmm6, xmm1
   add     rD, 16
 check:
   sub     rN, 1
   jnc     nextBlock

   movdqa  [r1 - 32], xmm6
   MY_EPILOG


; ---------- AES-CBC Encode ----------

ENCODE
 macro op:req
   op      aesenc, -16
 @@:
   op      aesenc, +0
   op      aesenc, +16
   add     r3, 32
   jnz     @B
   op      aesenclast, +0
endm

MY_PROC AesCbc_Encode_Intel, 3
   MY_PROLOG xmm0
```

```
  add     r1, r6
  neg     r6
  add     r6, 32

  jmp     check_e

 align 16
 nextBlock_e:
  mov     r3, r6
  pxor    xmm0, [rD]
  pxor    xmm0, [r1 + r3 - 32]
  ENCODE  LOAD_OP
  movdqa  [rD], xmm0
  add     rD, 16
 check_e:
  sub     rN, 1
  jnc     nextBlock_e

  movdqa  [r1 + r6 - 64], xmm0
  MY_EPILOG


; ---------- AES-CTR ----------

XOR_UPD_1 macro reg, offs
  pxor    reg, [rD + offs]
endm

XOR_UPD_2 macro reg, offs
  movdqa  [rD + offs], reg
endm

MY_PROC AesCtr_Code_Intel, 3
  MY_PROLOG xmm6

  mov     r5, r4
  shr     r5, 4
  dec     r5
  shl     r5, 4

  mov     DWORD PTR [r5], 1
  mov     DWORD PTR [r5 + 4], 0
  mov     DWORD PTR [r5 + 8], 0
  mov     DWORD PTR [r5 + 12], 0

  add     r1, r6
  neg     r6
```

```
   add     r6, 32

  jmp     check2_c

 align 16
 nextBlocks2_c:
  movdqa  xmm7, [r5]

  i = 0
  rept ways
  paddq   xmm6, xmm7
  movdqa  @CatStr(xmm,%i), xmm6
  i = i + 1
  endm

  mov     r3, r6
  LOAD_OP_W  pxor, -32
  ENCODE  LOAD_OP_W
  OP_W    XOR_UPD_1, i * 16
  OP_W    XOR_UPD_2, i * 16
  add     rD, ways16
 check2_c:
  sub     rN, ways
  jnc     nextBlocks2_c

  add     rN, ways
  jmp     check_c

 nextBlock_c:
  paddq   xmm6, [r5]
  mov     r3, r6
  movdqa  xmm0, [r1 + r3 - 32]
  pxor    xmm0, xmm6
  ENCODE  LOAD_OP
  XOR_UPD_1 xmm0, 0
  XOR_UPD_2 xmm0, 0
  add     rD, 16
 check_c:
  sub     rN, 1
  jnc     nextBlock_c

  movdqa  [r1 + r6 - 64], xmm6
  MY_EPILOG

end
```

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License information for hyph_fr.dic:

This file is based on the TeX hyphenation patterns distributed as part of the
hyph-utf8 package, and retains the same copyright and licensing conditions (below).

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

At the time this file was first modified, a complete, unmodified copy of
the original work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

Portions of this file were originally made available under the following license
(copied verbatim from hyph-fr.lic.txt in the original work):

French hyphenation patterns (V2.12, 2002/12/11)

(more info about the licence to be added later)

% This file is part of hyph-utf8 package and resulted from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% Source: frhyph.tex <2006-10-20>
% Author: R. Bastian, D. Flipo,
B. Gaulle <cesure-l at gutenberg.eu.org>
%
% The above mentioned file should become obsolete,
% and the author of the original file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,

```
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%             and helped with testing, suggestions and bug reports
% - Norbert Preining, who tested & integrated patterns into TeX Live
%
% However, the "copyright/copyleft" owner of patterns remains the original author.
%
% The copyright
 statement of this file is thus:
%
%    Do with this file whatever needs to be done in future for the sake of
%    "a better world" as long as you respect the copyright of original file.
%    If you're the original author of patterns or taking over a new revolution,
%    plese remove all of the TUG comments & credits that we added here -
%    you are the Queen / the King, we are only the servants.
%
% If you want to change this file, rather than uploading directly to CTAN,
% we would be grateful if you could send it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
% Before a new "pattern-revolution" starts,
% please try to follow some guidelines if possible:
%
% - \lccode is *forbidden*, and I really mean it
% - all the patterns should be in UTF-8
% - the only "allowed" TeX commands in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and
 \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
%
% For more unformation see
%
```

```
%    http://tug.org/tex-hyphen
%
%-----------------------------------------------------------------------------
%
% French hyphenation patterns
%%%
```

```
% by Bernd Raichle 1996/08/28 (using ideas from `ghyph31.tex'
% as of 1994-02-13 maintained by Bernd Raichle).
% (An adaption for the old MLTeX 2.x exists but can not be
% tested in lack of an executable.)
%
% ----------------------------------------------------------------
%
// Bcj2Coder.h

#ifndef __COMPRESS_BCJ2_CODER_H
#define __COMPRESS_BCJ2_CODER_H

#include "../../../C/Bcj2.h"

#include "../../Common/MyCom.h"

#include "../ICoder.h"

namespace NCompress {
namespace NBcj2 {

class CBaseCoder
{
protected:
 Byte *_bufs[BCJ2_NUM_STREAMS + 1];
 UInt32 _bufsCurSizes[BCJ2_NUM_STREAMS + 1];
 UInt32 _bufsNewSizes[BCJ2_NUM_STREAMS + 1];

 HRESULT Alloc(bool allocForOrig = true);
public:
 CBaseCoder();
 ~CBaseCoder();
};


#ifndef EXTRACT_ONLY

class CEncoder:
 public ICompressCoder2,
 public ICompressSetCoderProperties,
 public ICompressSetBufSize,
 public CMyUnknownImp,
 public CBaseCoder
{
 UInt32 _relatLim;

 HRESULT CodeReal(ISequentialInStream * const *inStreams, const UInt64 * const *inSizes, UInt32
numInStreams,
```

```
    ISequentialOutStream * const *outStreams, const UInt64 * const *outSizes, UInt32 numOutStreams,
    ICompressProgressInfo *progress);

public:
 MY_UNKNOWN_IMP3(ICompressCoder2, ICompressSetCoderProperties, ICompressSetBufSize)

  STDMETHOD(Code)(ISequentialInStream * const *inStreams, const UInt64 * const *inSizes, UInt32
numInStreams,
    ISequentialOutStream * const *outStreams, const UInt64 * const *outSizes, UInt32 numOutStreams,
    ICompressProgressInfo *progress);

 STDMETHOD(SetCoderProperties)(const PROPID *propIDs, const PROPVARIANT *props, UInt32 numProps);

 STDMETHOD(SetInBufSize)(UInt32 streamIndex, UInt32 size);
 STDMETHOD(SetOutBufSize)(UInt32 streamIndex, UInt32 size);

 CEncoder();
 ~CEncoder();
};

#endif

class CDecoder:
 public ICompressCoder2,
 public ICompressSetFinishMode,
 public ICompressGetInStreamProcessedSize2,
 public ICompressSetInStream2,
 public ISequentialInStream,
 public ICompressSetOutStreamSize,
 public ICompressSetBufSize,
 public CMyUnknownImp,
 public CBaseCoder
{
 unsigned _extraReadSizes[BCJ2_NUM_STREAMS];
 UInt64 _inStreamsProcessed[BCJ2_NUM_STREAMS];
 HRESULT _readRes[BCJ2_NUM_STREAMS];
 CMyComPtr<ISequentialInStream> _inStreams[BCJ2_NUM_STREAMS];

  bool _finishMode;
 bool _outSizeDefined;
 UInt64 _outSize;
 UInt64 _outSize_Processed;
 CBcj2Dec dec;

 void InitCommon();
 // HRESULT ReadSpec();

public:
```

```
 MY_UNKNOWN_IMP7(
   ICompressCoder2,
   ICompressSetFinishMode,
   ICompressGetInStreamProcessedSize2,
   ICompressSetInStream2,
   ISequentialInStream,
   ICompressSetOutStreamSize,
   ICompressSetBufSize
   );

 STDMETHOD(Code)(ISequentialInStream * const *inStreams, const UInt64 * const *inSizes, UInt32
numInStreams,
     ISequentialOutStream * const *outStreams, const UInt64 * const *outSizes, UInt32 numOutStreams,
     ICompressProgressInfo *progress);

 STDMETHOD(SetFinishMode)(UInt32 finishMode);
 STDMETHOD(GetInStreamProcessedSize2)(UInt32 streamIndex, UInt64 *value);

 STDMETHOD(SetInStream2)(UInt32 streamIndex, ISequentialInStream *inStream);
 STDMETHOD(ReleaseInStream2)(UInt32 streamIndex);

 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);

 STDMETHOD(SetOutStreamSize)(const
 UInt64 *outSize);

 STDMETHOD(SetInBufSize)(UInt32 streamIndex, UInt32 size);
 STDMETHOD(SetOutBufSize)(UInt32 streamIndex, UInt32 size);

 CDecoder();
};

}}

#endif
// PercentPrinter.h

#ifndef __PERCENT_PRINTER_H
#define __PERCENT_PRINTER_H

#include "../../../Common/StdOutStream.h"

struct CPercentPrinterState
{
 UInt64 Completed;
 UInt64 Total;

 UInt64 Files;
```

```
 AString Command;
 UString FileName;

 void ClearCurState();

 CPercentPrinterState():
     Completed(0),
     Total((UInt64)(Int64)-1),
     Files(0)
   {}
};

class CPercentPrinter: public CPercentPrinterState
{
 UInt32 _tickStep;
 DWORD _prevTick;

 AString _s;

 AString _printedString;
 AString _temp;
 UString _tempU;

 CPercentPrinterState _printedState;
 AString _printedPercents;

 void GetPercents();

public:
 CStdOutStream *_so;

 bool NeedFlush;
 unsigned MaxLen;

 CPercentPrinter(UInt32 tickStep = 200):
     _tickStep(tickStep),
     _prevTick(0),
     NeedFlush(true),
     MaxLen(80 - 1)
 {}

 ~CPercentPrinter();

 void ClosePrint(bool needFlush);
 void Print();
};
```

```
#endif
// MultiStream.h

#ifndef __MULTI_STREAM_H
#define __MULTI_STREAM_H

#include "../../../Common/MyCom.h"
#include "../../../Common/MyVector.h"

#include "../../IStream.h"

class CMultiStream:
 public IInStream,
 public CMyUnknownImp
{
 UInt64 _pos;
 UInt64 _totalLength;
 unsigned _streamIndex;

public:

 struct CSubStreamInfo
 {
  CMyComPtr<IInStream> Stream;
  UInt64 Size;
  UInt64 GlobalOffset;
  UInt64 LocalPos;

  CSubStreamInfo(): Size(0), GlobalOffset(0), LocalPos(0) {}
 };

 CObjectVector<CSubStreamInfo> Streams;

 HRESULT Init()
 {
  UInt64 total = 0;
  FOR_VECTOR (i, Streams)
  {
   CSubStreamInfo &s = Streams[i];
   s.GlobalOffset = total;
   total += Streams[i].Size;
   RINOK(s.Stream->Seek(0, STREAM_SEEK_CUR, &s.LocalPos));
  }
  _totalLength = total;
  _pos = 0;
  _streamIndex = 0;
  return S_OK;
 }
```

```
 MY_UNKNOWN_IMP1(IInStream)

 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(Seek)(Int64 offset,
 UInt32 seekOrigin, UInt64 *newPosition);
};

/*
class COutMultiStream:
 public IOutStream,
 public CMyUnknownImp
{
 unsigned _streamIndex; // required stream
 UInt64 _offsetPos; // offset from start of _streamIndex index
 UInt64 _absPos;
 UInt64 _length;

 struct CSubStreamInfo
 {
   CMyComPtr<ISequentialOutStream> Stream;
   UInt64 Size;
   UInt64 Pos;
};
 CObjectVector<CSubStreamInfo> Streams;
public:
 CMyComPtr<IArchiveUpdateCallback2> VolumeCallback;
 void Init()
 {
   _streamIndex = 0;
   _offsetPos = 0;
   _absPos = 0;
   _length = 0;
 }

 MY_UNKNOWN_IMP1(IOutStream)

 STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition);
};
*/

#endif
// Common/MyVector.h

#ifndef __COMMON_MY_VECTOR_H
#define __COMMON_MY_VECTOR_H
```

```
#include <string.h>

template <class T>
class CRecordVector
{
 T *_items;
 unsigned _size;
 unsigned _capacity;

 void MoveItems(unsigned destIndex, unsigned srcIndex)
 {
   memmove(_items + destIndex, _items + srcIndex, (size_t)(_size - srcIndex) * sizeof(T));
 }

 void ReserveOnePosition()
 {
   if (_size == _capacity)
   {
     unsigned newCapacity = _capacity + (_capacity >> 2) + 1;
     T *p;
     MY_ARRAY_NEW(p, T, newCapacity);
     // p = new T[newCapacity];
     if (_size != 0)
       memcpy(p, _items, (size_t)_size * sizeof(T));
     delete []_items;
     _items = p;
     _capacity = newCapacity;
   }
 }

public:

 CRecordVector(): _items(0), _size(0), _capacity(0) {}

 CRecordVector(const CRecordVector &v): _items(0), _size(0), _capacity(0)
 {
   unsigned size = v.Size();
   if (size != 0)
   {
     _items = new T[size];
     _size = size;
     _capacity = size;
      memcpy(_items, v._items, (size_t)size * sizeof(T));
   }
 }

 unsigned Size() const { return _size; }
 bool IsEmpty() const { return _size == 0; }
```

```
void ConstructReserve(unsigned size)
{
  if (size != 0)
  {
    MY_ARRAY_NEW(_items, T, size)
    // _items = new T[size];
    _capacity = size;
  }
}

void Reserve(unsigned newCapacity)
{
  if (newCapacity > _capacity)
  {
    T *p;
    MY_ARRAY_NEW(p, T, newCapacity);
    // p = new T[newCapacity];
    if (_size != 0)
      memcpy(p, _items, (size_t)_size * sizeof(T));
    delete []_items;
    _items = p;
    _capacity = newCapacity;
  }
}

void ClearAndReserve(unsigned newCapacity)
{
  Clear();
  if (newCapacity > _capacity)
  {
    delete []_items;
    _items = NULL;
    _capacity = 0;
    MY_ARRAY_NEW(_items, T, newCapacity)
    // _items = new T[newCapacity];
    _capacity = newCapacity;
  }
}

void ClearAndSetSize(unsigned newSize)
{
  ClearAndReserve(newSize);
   _size = newSize;
}

void ChangeSize_KeepData(unsigned newSize)
{
```

```
  if (newSize > _capacity)
  {
    T *p;
    MY_ARRAY_NEW(p, T, newSize)
    // p = new T[newSize];
    if (_size != 0)
      memcpy(p, _items, (size_t)_size * sizeof(T));
    delete []_items;
    _items = p;
    _capacity = newSize;
  }
  _size = newSize;
}

void ReserveDown()
{
  if (_size == _capacity)
    return;
  T *p = NULL;
  if (_size != 0)
  {
    p = new T[_size];
    memcpy(p, _items, (size_t)_size * sizeof(T));
  }
  delete []_items;
  _items = p;
  _capacity = _size;
}

~CRecordVector() { delete []_items; }

void ClearAndFree()
{
  delete []_items;
  _items = NULL;
  _size = 0;
  _capacity = 0;
}

void Clear() { _size = 0; }

void DeleteBack() { _size--; }

void DeleteFrom(unsigned index)
{
  // if (index <= _size)
    _size = index;
}
```

```
void DeleteFrontal(unsigned num)
{
  if (num
!= 0)
  {
    MoveItems(0, num);
    _size -= num;
  }
}

void Delete(unsigned index)
{
  MoveItems(index, index + 1);
  _size -= 1;
}

/*
void Delete(unsigned index, unsigned num)
{
  if (num > 0)
  {
    MoveItems(index, index + num);
    _size -= num;
  }
}
*/

CRecordVector& operator=(const CRecordVector &v)
{
  if (&v == this)
    return *this;
  unsigned size = v.Size();
  if (size > _capacity)
  {
    delete []_items;
    _capacity = 0;
    _size = 0;
    _items = NULL;
    _items = new T[size];
    _capacity = size;
  }
  _size = size;
  if (size != 0)
    memcpy(_items, v._items, (size_t)size * sizeof(T));
  return *this;
}
```

```
CRecordVector& operator+=(const CRecordVector &v)
{
  unsigned size = v.Size();
  Reserve(_size + size);
  if (size != 0)
    memcpy(_items + _size, v._items, (size_t)size * sizeof(T));
  _size += size;
  return *this;
}

unsigned Add(const T item)
{

ReserveOnePosition();
  _items[_size] = item;
  return _size++;
}

void AddInReserved(const T item)
{
  _items[_size++] = item;
}

void Insert(unsigned index, const T item)
{
  ReserveOnePosition();
  MoveItems(index + 1, index);
  _items[index] = item;
  _size++;
}

void MoveToFront(unsigned index)
{
  if (index != 0)
  {
    T temp = _items[index];
    memmove(_items + 1, _items, (size_t)index * sizeof(T));
    _items[0] = temp;
  }
}

const T& operator[](unsigned index) const { return _items[index]; }
      T& operator[](unsigned index)       { return _items[index]; }
const T& Front() const { return _items[0]; }
      T& Front()       { return _items[0]; }
const T& Back() const  { return _items[(size_t)_size - 1]; }
      T& Back()        { return _items[(size_t)_size - 1]; }
```

```
/*
void Swap(unsigned i, unsigned j)
{
  T temp = _items[i];
  _items[i] = _items[j];
  _items[j] = temp;
}
*/

int FindInSorted(const
T item, unsigned left, unsigned right) const
{
  while (left != right)
  {
    unsigned mid = (left + right) / 2;
    const T midVal = (*this)[mid];
    if (item == midVal)
      return mid;
    if (item < midVal)
      right = mid;
    else
      left = mid + 1;
  }
  return -1;
}

int FindInSorted2(const T &item, unsigned left, unsigned right) const
{
  while (left != right)
  {
    unsigned mid = (left + right) / 2;
    const T& midVal = (*this)[mid];
    int comp = item.Compare(midVal);
    if (comp == 0)
      return mid;
    if (comp < 0)
      right = mid;
    else
      left = mid + 1;
  }
  return -1;
}

int FindInSorted(const T item) const
{
  return FindInSorted(item, 0, _size);
}
```

```
int FindInSorted2(const T &item) const
{
  return FindInSorted2(item, 0, _size);
}

unsigned AddToUniqueSorted(const T item)
{
  unsigned left = 0, right = _size;
  while (left != right)
  {
    unsigned mid
= (left + right) / 2;
    const T midVal = (*this)[mid];
    if (item == midVal)
      return mid;
    if (item < midVal)
      right = mid;
    else
      left = mid + 1;
  }
  Insert(right, item);
  return right;
}

unsigned AddToUniqueSorted2(const T &item)
{
  unsigned left = 0, right = _size;
  while (left != right)
  {
    unsigned mid = (left + right) / 2;
    const T& midVal = (*this)[mid];
    int comp = item.Compare(midVal);
    if (comp == 0)
      return mid;
    if (comp < 0)
      right = mid;
    else
      left = mid + 1;
  }
  Insert(right, item);
  return right;
}

static void SortRefDown(T* p, unsigned k, unsigned size, int (*compare)(const T*, const T*, void *), void *param)
{
  T temp = p[k];
  for (;;)
  {
```

```
    unsigned s = (k << 1);
    if (s > size)
      break;
    if (s < size && compare(p + s + 1, p + s, param) > 0)
      s++;
    if (compare(&temp, p + s, param) >= 0)
      break;
     p[k] = p[s];
    k = s;
  }
  p[k] = temp;
}

void Sort(int (*compare)(const T*, const T*, void *), void *param)
{
  unsigned size = _size;
  if (size <= 1)
    return;
  T* p = (&Front()) - 1;
  {
    unsigned i = size >> 1;
    do
      SortRefDown(p, i, size, compare, param);
    while (--i != 0);
  }
  do
  {
    T temp = p[size];
    p[size--] = p[1];
    p[1] = temp;
    SortRefDown(p, 1, size, compare, param);
  }
  while (size > 1);
}

static void SortRefDown2(T* p, unsigned k, unsigned size)
{
  T temp = p[k];
  for (;;)
  {
    unsigned s = (k << 1);
    if (s > size)
      break;
    if (s < size && p[(size_t)s + 1].Compare(p[s]) > 0)
      s++;
    if (temp.Compare(p[s]) >= 0)
      break;
    p[k] = p[s];
```

```
    k = s;
  }
  p[k] = temp;
}

void Sort2()
{
  unsigned size = _size;
  if (size <= 1)
    return;
  T* p = (&Front()) - 1;
  {
    unsigned i = size >> 1;

  do
      SortRefDown2(p, i, size);
    while (--i != 0);
  }
  do
  {
    T temp = p[size];
    p[size--] = p[1];
    p[1] = temp;
    SortRefDown2(p, 1, size);
  }
  while (size > 1);
}
};

typedef CRecordVector<int> CIntVector;
typedef CRecordVector<unsigned int> CUIntVector;
typedef CRecordVector<bool> CBoolVector;
typedef CRecordVector<unsigned char> CByteVector;
typedef CRecordVector<void *> CPointerVector;

template <class T>
class CObjectVector
{
 CPointerVector _v;
public:
 unsigned Size() const { return _v.Size(); }
 bool IsEmpty() const { return _v.IsEmpty(); }
 void ReserveDown() { _v.ReserveDown(); }
 // void Reserve(unsigned newCapacity) { _v.Reserve(newCapacity); }
 void ClearAndReserve(unsigned newCapacity) { Clear(); _v.ClearAndReserve(newCapacity); }

 CObjectVector() {};
 CObjectVector(const CObjectVector &v)
```

```
{
  unsigned size = v.Size();
  _v.ConstructReserve(size);
  for (unsigned i = 0; i < size; i++)
    _v.AddInReserved(new
T(v[i]));
}
CObjectVector& operator=(const CObjectVector &v)
{
  if (&v == this)
    return *this;
  Clear();
  unsigned size = v.Size();
  _v.Reserve(size);
  for (unsigned i = 0; i < size; i++)
    _v.AddInReserved(new T(v[i]));
  return *this;
}

CObjectVector& operator+=(const CObjectVector &v)
{
  unsigned size = v.Size();
  _v.Reserve(Size() + size);
  for (unsigned i = 0; i < size; i++)
    _v.AddInReserved(new T(v[i]));
  return *this;
}

const T& operator[](unsigned index) const { return *((T *)_v[index]); }
      T& operator[](unsigned index)       { return *((T *)_v[index]); }
const T& Front() const { return operator[](0); }
      T& Front()       { return operator[](0); }
const T& Back() const  { return *(T *)_v.Back(); }
      T& Back()        { return *(T *)_v.Back(); }

void MoveToFront(unsigned index) { _v.MoveToFront(index); }

unsigned Add(const T& item) { return _v.Add(new T(item)); }

void AddInReserved(const
T& item) { _v.AddInReserved(new T(item)); }

T& AddNew()
{
  T *p = new T;
  _v.Add(p);
  return *p;
}
```

```
T& AddNewInReserved()
{
  T *p = new T;
  _v.AddInReserved(p);
  return *p;
}

void Insert(unsigned index, const T& item) { _v.Insert(index, new T(item)); }

T& InsertNew(unsigned index)
{
  T *p = new T;
  _v.Insert(index, p);
  return *p;
}

~CObjectVector()
{
  for (unsigned i = _v.Size(); i != 0;)
    delete (T *)_v[--i];
}

void ClearAndFree()
{
  Clear();
  _v.ClearAndFree();
}

void Clear()
{
  for (unsigned i = _v.Size(); i != 0;)
    delete (T *)_v[--i];
  _v.Clear();
}

void DeleteFrom(unsigned index)
{
  unsigned size = _v.Size();
  for (unsigned i = index; i < size; i++)
    delete (T *)_v[i];
  _v.DeleteFrom(index);
}

void DeleteFrontal(unsigned num)
{
  for (unsigned i = 0; i < num; i++)
    delete (T *)_v[i];
```

```
  _v.DeleteFrontal(num);
}

void DeleteBack()
 {
  delete (T *)_v.Back();
  _v.DeleteBack();
}

void Delete(unsigned index)
{
  delete (T *)_v[index];
  _v.Delete(index);
}

/*
void Delete(unsigned index, unsigned num)
{
  for (unsigned i = 0; i < num; i++)
    delete (T *)_v[index + i];
  _v.Delete(index, num);
}
*/

/*
int Find(const T& item) const
{
  unsigned size = Size();
  for (unsigned i = 0; i < size; i++)
    if (item == (*this)[i])
      return i;
  return -1;
}
*/

int FindInSorted(const T& item) const
{
  unsigned left = 0, right = Size();
  while (left != right)
  {
    unsigned mid = (left + right) / 2;
    const T& midVal = (*this)[mid];
    int comp = item.Compare(midVal);
    if (comp == 0)
      return mid;
    if (comp < 0)
      right = mid;
    else
```

```
      left = mid + 1;
  }
  return -1;
}

unsigned AddToUniqueSorted(const T& item)
{
  unsigned left = 0, right = Size();
  while (left != right)
  {

 unsigned mid = (left + right) / 2;
    const T& midVal = (*this)[mid];
    int comp = item.Compare(midVal);
    if (comp == 0)
      return mid;
    if (comp < 0)
      right = mid;
    else
      left = mid + 1;
  }
  Insert(right, item);
  return right;
}

/*
unsigned AddToSorted(const T& item)
{
  unsigned left = 0, right = Size();
  while (left != right)
  {
    unsigned mid = (left + right) / 2;
    const T& midVal = (*this)[mid];
    int comp = item.Compare(midVal);
    if (comp == 0)
    {
      right = mid + 1;
      break;
    }
    if (comp < 0)
      right = mid;
    else
      left = mid + 1;
  }
  Insert(right, item);
  return right;
}
*/
```

```
 void Sort(int (*compare)(void *const *, void *const *, void *), void *param)
   { _v.Sort(compare, param); }

 static int CompareObjectItems(void *const *a1, void *const *a2, void * /* param */)
   { return (*(*((const T **)a1))).Compare(*(*((const T **)a2))); }

  void Sort() { _v.Sort(CompareObjectItems, 0); }
};

#define FOR_VECTOR(_i_, _v_) for (unsigned _i_ = 0; _i_ < (_v_).Size(); _i_++)

#endif
```

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Norwegian Nynorsk hyphenation patterns

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```
% Adapted to the new pattern-loading scheme.
% Original file name was nnhyph.tex

% TeX hyphenation patterns for Norwegian Nynorsk
%
% Version 2007-02-10
%
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% It uses the Norwegian hyphenation patterns from nohyphbx.tex,
```

```
% created by Rune Kleveland and Ole Michael Selberg. Please see
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%
% The patterns in nohyphbx are based on both Norwegian Bokmal
% and Norwegian Nynorsk, and works about equally well for both
% languages. This file, nnhyph.tex, contains only a few hyphenation
% exceptions, for words that needs to be hyphenated differently for
% the two languages.
%
% Please send bugs or suggestions to karl@huftis.org.
%

\input hyph-no.tex

\hyphenation{
att-en-de
bet-re
}
```

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* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_DOCUMENT_H__
#define __ATK_DOCUMENT_H__

#include <atk/atkobject.h>
#include <atk/atkutil.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

/*
* The AtkDocument
 interface should be supported by any object that is a container
* for 'document content' as opposed to a collection of user interface elements.
*
*/

#define ATK_TYPE_DOCUMENT                    (atk_document_get_type ())
#define ATK_IS_DOCUMENT(obj)                 G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_DOCUMENT)
#define ATK_DOCUMENT(obj)                    G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_DOCUMENT, AtkDocument)
#define ATK_DOCUMENT_GET_IFACE(obj)          (G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_DOCUMENT, AtkDocumentIface))

#ifndef _TYPEDEF_ATK_DOCUMENT_
#define _TYPEDEF_ATK_DOCUMENT_
typedef struct _AtkDocument AtkDocument;
#endif
typedef struct _AtkDocumentIface AtkDocumentIface;

struct _AtkDocumentIface
{
 GTypeInterface parent;
 G_CONST_RETURN gchar* ( *get_document_type) (AtkDocument             *document);
 gpointer             ( *get_document)      (AtkDocument             *document);

 G_CONST_RETURN gchar* ( *get_document_locale) (AtkDocument
            *document);
 AtkAttributeSet *     ( *get_document_attributes) (AtkDocument        *document);
```

```
 G_CONST_RETURN gchar* ( *get_document_attribute_value) (AtkDocument   *document,
                                        const gchar   *attribute_name);
 gboolean             ( *set_document_attribute) (AtkDocument        *document,
                                      const gchar        *attribute_name,
                                      const gchar        *attribute_value);
 AtkFunction pad1;
 AtkFunction pad2;
 AtkFunction pad3;
 AtkFunction pad4;
};

GType  atk_document_get_type            (void);

G_CONST_RETURN gchar* atk_document_get_document_type (AtkDocument   *document);
gpointer atk_document_get_document (AtkDocument   *document);
G_CONST_RETURN gchar* atk_document_get_locale (AtkDocument *document);
AtkAttributeSet*      atk_document_get_attributes (AtkDocument *document);
G_CONST_RETURN gchar* atk_document_get_attribute_value
 (AtkDocument *document,
                                        const gchar *attribute_name);
gboolean             atk_document_set_attribute_value (AtkDocument *document,
                                        const gchar *attribute_name,
                                        const gchar *attribute_value);
#ifdef __cplusplus
}
#endif /* __cplusplus */
#endif /* __ATK_DOCUMENT_H__ */
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With One div Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element that contains a div element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size:
 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
```

```
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   &lt;div&gt;Paragraph 1&lt;/div&gt;
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
// SetProperties.h

#ifndef __SETPROPERTIES_H
#define __SETPROPERTIES_H

#include "Property.h"

HRESULT SetProperties(IUnknown *unknown, const CObjectVector<CProperty> &properties);

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With dir Attribute in text Element 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element with ltr as the value for the dir
attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
```

```
  pre
 {
   font-size: 12px;
  }
  .test {
   font-family: "WOFF Test CFF Reference";
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text dir="ltr"&gt;
   License without language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With Mixed text Element Language Tags 2</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-005-ref.xht" />
  <meta name="assert" content="The copyright element matches the schema. Two text elements have a language
tags." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
```

```
   src: url("support/metadatadisplay-schema-copyright-005.woff2") format("woff2");
  }
  body {
   font-size: 20px;
  }
  pre {
   font-size: 12px;
  }
  .test {
   font-family: "WOFF Test", "WOFF Test CFF Fallback";
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
</head>
<body>
 <p>Test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
 <div class="test">P</div>
 <p>The XML contained in the Extended Metadata Block is below.</p>
 <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text xml:lang="en"&gt;
   Copyright with "en" language.
  &lt;/text&gt;
  &lt;text xml:lang="fr"&gt;
   Copyright with "fr" language.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
 </pre>
</body>
</html>
/*
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*/
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* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_OBJECT_FACTORY_H__
#define __ATK_OBJECT_FACTORY_H__

#include <glib-object.h>
#include <atk/atkobject.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

#define
 ATK_TYPE_OBJECT_FACTORY                    (atk_object_factory_get_type ())
#define ATK_OBJECT_FACTORY(obj)                    (G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_OBJECT_FACTORY, AtkObjectFactory))
#define ATK_OBJECT_FACTORY_CLASS(klass)            (G_TYPE_CHECK_CLASS_CAST ((klass),
ATK_TYPE_OBJECT_FACTORY, AtkObjectFactoryClass))
#define ATK_IS_OBJECT_FACTORY(obj)                 (G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_OBJECT_FACTORY))
#define ATK_IS_OBJECT_FACTORY_CLASS(klass)         (G_TYPE_CHECK_CLASS_TYPE ((klass),
ATK_TYPE_OBJECT_FACTORY))
#define ATK_OBJECT_FACTORY_GET_CLASS(obj)          (G_TYPE_INSTANCE_GET_CLASS ((obj),
ATK_TYPE_OBJECT_FACTORY, AtkObjectFactoryClass))

typedef struct _AtkObjectFactory               AtkObjectFactory;
typedef struct _AtkObjectFactoryClass          AtkObjectFactoryClass;

struct _AtkObjectFactory
{
 GObject parent;
};

struct _AtkObjectFactoryClass
{
```

```
 GObjectClass parent_class;

 AtkObject* (* create_accessible) (GObject
        *obj);
 void      (* invalidate)       (AtkObjectFactory *factory);
 GType     (* get_accessible_type)    (void);

 AtkFunction pad1;
 AtkFunction pad2;
};

GType atk_object_factory_get_type(void);

AtkObject* atk_object_factory_create_accessible (AtkObjectFactory *factory, GObject *obj);
void      atk_object_factory_invalidate (AtkObjectFactory *factory);
GType     atk_object_factory_get_accessible_type (AtkObjectFactory *factory);
#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __GTK_OBJECT_FACTORY_H__ */
```

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```
 cd $(@D)
 $(MAKE) -nologo $(TARGETS)
 cd ..
// Windows/Control/ListView.h

#ifndef __WINDOWS_CONTROL_LISTVIEW_H
#define __WINDOWS_CONTROL_LISTVIEW_H

#include "../../Common/MyWindows.h"

#include <commctrl.h>
```

```
#include "../Window.h"

namespace NWindows {
namespace NControl {

class CListView: public NWindows::CWindow
{
public:
 bool CreateEx(DWORD exStyle, DWORD style,
     int x, int y, int width, int height,
     HWND parentWindow, HMENU idOrHMenu,
     HINSTANCE instance, LPVOID createParam);

 void SetUnicodeFormat()
 {
  #ifndef UNDER_CE
  ListView_SetUnicodeFormat(_window, TRUE);
  #endif
 }

 bool DeleteAllItems() { return BOOLToBool(ListView_DeleteAllItems(_window)); }
 bool DeleteColumn(int columnIndex) { return BOOLToBool(ListView_DeleteColumn(_window, columnIndex)); }

 int InsertColumn(int columnIndex, const LVCOLUMN *columnInfo) { return ListView_InsertColumn(_window,
columnIndex, columnInfo); }
 int InsertColumn(int columnIndex, LPCTSTR text, int width);
 bool SetColumnOrderArray(int count, const
 int *columns) { return BOOLToBool(ListView_SetColumnOrderArray(_window, count, columns)); }

 /*
 int GetNumColumns()
 {
  HWND header = ListView_GetHeader(_window);
  if (!header)
    return -1;
  return Header_GetItemCount(header);
 }
 */

 int InsertItem(const LVITEM* item) { return ListView_InsertItem(_window, item); }
 int InsertItem(int index, LPCTSTR text);
 bool SetItem(const LVITEM* item) { return BOOLToBool(ListView_SetItem(_window, item)); }
 int SetSubItem(int index, int subIndex, LPCTSTR text);

 #ifndef _UNICODE

 int InsertColumn(int columnIndex, const LVCOLUMNW *columnInfo) { return
```

```
(int)SendMsg(LVM_INSERTCOLUMNW, (WPARAM)columnIndex, (LPARAM)columnInfo); }
 int InsertColumn(int columnIndex, LPCWSTR text, int width);
 int InsertItem(const LV_ITEMW* item) { return (int)SendMsg(LVM_INSERTITEMW, 0, (LPARAM)item); }
 int InsertItem(int index, LPCWSTR text);
 bool SetItem(const LV_ITEMW* item) { return BOOLToBool((BOOL)SendMsg(LVM_SETITEMW, 0,
(LPARAM)item));
 }
 int SetSubItem(int index, int subIndex, LPCWSTR text);

 #endif

 bool DeleteItem(int itemIndex) { return BOOLToBool(ListView_DeleteItem(_window, itemIndex)); }

 UINT GetSelectedCount() const { return ListView_GetSelectedCount(_window); }
 int GetItemCount() const { return ListView_GetItemCount(_window); }

 INT GetSelectionMark() const { return ListView_GetSelectionMark(_window); }

 void SetItemCount(int numItems) { ListView_SetItemCount(_window, numItems); }
 void SetItemCountEx(int numItems, DWORD flags) {  ListView_SetItemCountEx(_window, numItems, flags); }

 int GetNextItem(int startIndex, UINT flags) const { return ListView_GetNextItem(_window, startIndex, flags); }
 int GetNextSelectedItem(int startIndex) const { return GetNextItem(startIndex, LVNI_SELECTED); }
 int GetFocusedItem() const { return GetNextItem(-1, LVNI_FOCUSED); }

 bool GetItem(LVITEM* item) const { return BOOLToBool(ListView_GetItem(_window, item)); }
 bool GetItemParam(int itemIndex,
 LPARAM &param) const;
 void GetItemText(int itemIndex, int subItemIndex, LPTSTR text, int textSizeMax) const
   { ListView_GetItemText(_window, itemIndex, subItemIndex, text, textSizeMax); }
 bool SortItems(PFNLVCOMPARE compareFunction, LPARAM dataParam)
   { return BOOLToBool(ListView_SortItems(_window, compareFunction, dataParam)); }

 void SetItemState(int index, UINT state, UINT mask) { ListView_SetItemState(_window, index, state, mask); }
 void SetItemState_Selected(int index, bool select) { SetItemState(index, select ? LVIS_SELECTED : 0,
LVIS_SELECTED); }
 void SetItemState_Selected(int index) { SetItemState(index, LVIS_SELECTED, LVIS_SELECTED); }
 void SelectAll() { SetItemState_Selected(-1); }
 void SetItemState_FocusedSelected(int index) { SetItemState(index, LVIS_FOCUSED | LVIS_SELECTED,
LVIS_FOCUSED | LVIS_SELECTED); }
 UINT GetItemState(int index, UINT mask) const { return ListView_GetItemState(_window, index, mask); }
 bool IsItemSelected(int index) const { return
 GetItemState(index, LVIS_SELECTED) == LVIS_SELECTED; }

 bool GetColumn(int columnIndex, LVCOLUMN* columnInfo) const
   { return BOOLToBool(ListView_GetColumn(_window, columnIndex, columnInfo)); }

 HIMAGELIST SetImageList(HIMAGELIST imageList, int imageListType)
```

```
  { return ListView_SetImageList(_window, imageList, imageListType); }

 // version 4.70: NT5 | (NT4 + ie3) | w98 | (w95 + ie3)
 DWORD GetExtendedListViewStyle() { return ListView_GetExtendedListViewStyle(_window); }
 void SetExtendedListViewStyle(DWORD exStyle) { ListView_SetExtendedListViewStyle(_window, exStyle); }
 void SetExtendedListViewStyle(DWORD exMask, DWORD exStyle) {
ListView_SetExtendedListViewStyleEx(_window, exMask, exStyle); }

 void SetCheckState(UINT index, bool checkState) { ListView_SetCheckState(_window, index,
BoolToBOOL(checkState)); }
 bool GetCheckState(UINT index) { return BOOLToBool(ListView_GetCheckState(_window, index)); }

 bool EnsureVisible(int index, bool partialOK) { return BOOLToBool(ListView_EnsureVisible(_window,
 index, BoolToBOOL(partialOK))); }

 bool GetItemRect(int index, RECT *rect, int code) { return BOOLToBool(ListView_GetItemRect(_window, index,
rect, code)); }

 HWND GetEditControl() { return ListView_GetEditControl(_window) ; }
 HWND EditLabel(int itemIndex) { return ListView_EditLabel(_window, itemIndex) ; }

 bool RedrawItems(int firstIndex, int lastIndex) { return BOOLToBool(ListView_RedrawItems(_window,
firstIndex, lastIndex)); }
 bool RedrawAllItems()
 {
   if (GetItemCount() > 0)
     return RedrawItems(0, GetItemCount() - 1);
   return true;
 }
 bool RedrawItem(int index) { return RedrawItems(index, index); }

 int HitTest(LPLVHITTESTINFO info) { return ListView_HitTest(_window, info); }
 COLORREF GetBkColor() { return ListView_GetBkColor(_window); }
 bool SetColumnWidth(int iCol, int cx) { return BOOLToBool(ListView_SetColumnWidth(_window, iCol, cx)); }
 bool SetColumnWidthAuto(int iCol) { return SetColumnWidth(iCol, LVSCW_AUTOSIZE);
 }
};

class CListView2: public CListView
{
 WNDPROC _origWindowProc;
public:
 void SetWindowProc();
 virtual LRESULT OnMessage(UINT message, WPARAM wParam, LPARAM lParam);
};

/*
class CListView3: public CListView2
```

```
{
public:
 virtual LRESULT OnMessage(UINT message, WPARAM wParam, LPARAM lParam);
};
*/

}}

#endif
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Invalid copyright Element With dir Attribute in div Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element that contains a div element with
INVALID as the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
```

```
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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```
//{{NO_DEPENDENCIES}}
// Microsoft Visual C++ generated include file.
// Used by ServicesHelper.rc

// Next default values for new objects
//
#ifdef APSTUDIO_INVOKED
#ifndef APSTUDIO_READONLY_SYMBOLS
#define _APS_NEXT_RESOURCE_VALUE        101
#define _APS_NEXT_COMMAND_VALUE         40001
```

```
#define _APS_NEXT_CONTROL_VALUE         1001
#define _APS_NEXT_SYMED_VALUE           101
#endif
#endif
// Common/Defs.h

#ifndef __COMMON_DEFS_H
#define __COMMON_DEFS_H

template <class T> inline T MyMin(T a, T b) { return a < b ? a : b; }
template <class T> inline T MyMax(T a, T b) { return a > b ? a : b; }

template <class T> inline int MyCompare(T a, T b)
 { return a == b ? 0 : (a < b ? -1 : 1); }

inline int BoolToInt(bool v) { return (v ? 1 : 0); }
inline bool IntToBool(int v) { return (v != 0); }

#endif
/* ATK -  Accessibility Toolkit
* Copyright 2001 Sun Microsystems Inc.
*
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* modify it under the terms of the GNU Library General Public
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* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_STREAMABLE_CONTENT_H__
#define __ATK_STREAMABLE_CONTENT_H__

#include <atk/atkobject.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

#define ATK_TYPE_STREAMABLE_CONTENT
```

```
        (atk_streamable_content_get_type ())
#define ATK_IS_STREAMABLE_CONTENT(obj)       G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_STREAMABLE_CONTENT)
#define ATK_STREAMABLE_CONTENT(obj)          G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_STREAMABLE_CONTENT, AtkStreamableContent)
#define ATK_STREAMABLE_CONTENT_GET_IFACE(obj) (G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_STREAMABLE_CONTENT, AtkStreamableContentIface))

#ifndef _TYPEDEF_ATK_STREAMABLE_CONTENT
#define _TYPEDEF_ATK_STREAMABLE_CONTENT
typedef struct _AtkStreamableContent AtkStreamableContent;
#endif
typedef struct _AtkStreamableContentIface AtkStreamableContentIface;

struct _AtkStreamableContentIface
{
 GTypeInterface parent;

 /*
  * Get the number of mime types supported by this object
  */
 gint                    (* get_n_mime_types)  (AtkStreamableContent     *streamable);
 /*
  * Gets the specified mime type supported by this object.
  * The mime types are 0-based so the first mime
 type is
  * at index 0, the second at index 1 and so on.  The mime-type
  * at index 0 should be considered the "default" data type for the stream.
  *
  * This assumes that the strings for the mime types are stored in the
  * AtkStreamableContent. Alternatively the G_CONST_RETURN could be removed
  * and the caller would be responsible for calling g_free() on the
  * returned value.
  */
 G_CONST_RETURN gchar*     (* get_mime_type)     (AtkStreamableContent     *streamable,
                                        gint                    i);
 /*
  * One possible implementation for this method is that it constructs the
  * content appropriate for the mime type and then creates a temporary
  * file containing the content, opens the file and then calls
  * g_io_channel_unix_new_fd().
  */
 GIOChannel*               (* get_stream)       (AtkStreamableContent     *streamable,
                                        const gchar             *mime_type);

/*
 * Returns a string representing a URI in IETF standard format
* (see http://www.ietf.org/rfc/rfc2396.txt) from which the object's content
```

```
* may be streamed in the specified mime-type.
* If mime_type is NULL, the URI for the default (and possibly only) mime-type is
* returned.
*
* returns NULL if the mime-type is not supported, or if no URI can be
* constructed.  Note that it is possible for get_uri to return NULL but for
* get_stream to work nonetheless, since not all GIOChannels connect to URIs.
*/
   G_CONST_RETURN  gchar*  (* get_uri)          (AtkStreamableContent     *streamable,
                                                const gchar              *mime_type);


 AtkFunction              pad1;
 AtkFunction              pad2;
 AtkFunction              pad3;
};
GType                atk_streamable_content_get_type (void);

gint                 atk_streamable_content_get_n_mime_types (AtkStreamableContent     *streamable);


G_CONST_RETURN gchar*  atk_streamable_content_get_mime_type    (AtkStreamableContent     *streamable,
                                                gint                     i);
GIOChannel*            atk_streamable_content_get_stream       (AtkStreamableContent     *streamable,
                                                const gchar              *mime_type);

gchar*               atk_streamable_content_get_uri          (AtkStreamableContent     *streamable,
                                                const gchar              *mime_type);


#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_STREAMABLE_CONTENT_H__ */
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Attribute in copyright Element text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
```

```
  <link rel="match" href="metadatadisplay-schema-copyright-015-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element with an unknown attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
 {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-015.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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```
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/* This Source Code Form is subject to the terms of the Mozilla Public
* License, v. 2.0. If a copy of the MPL was not distributed with this
* file, You can obtain one at http://mozilla.org/MPL/2.0/. */

#ifndef WINVER
#define WINVER 0x0600
#endif

#ifndef _WIN32_WINNT
#define _WIN32_WINNT 0x0600
#endif

#ifndef _WIN32_WINDOWS
#define _WIN32_WINDOWS 0x0410
#endif

#ifndef _WIN32_IE
#define _WIN32_IE 0x0700
#endif

#ifndef WIN32_LEAN_AND_MEAN
#define WIN32_LEAN_AND_MEAN
#endif
#include <windows.h>

#ifdef CITYHASH_EXPORTS
#define CITYHASH_API __declspec(dllexport)
#else
#define CITYHASH_API __declspec(dllimport)
#endif
```

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 OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

```
// Common/TextConfig.h

#ifndef __COMMON_TEXT_CONFIG_H
#define __COMMON_TEXT_CONFIG_H

#include "MyString.h"

struct CTextConfigPair
{
 UString ID;
 UString String;
};

bool GetTextConfig(const AString &text, CObjectVector<CTextConfigPair> &pairs);

int FindTextConfigItem(const CObjectVector<CTextConfigPair> &pairs, const char *id) throw();
UString GetTextConfigValue(const CObjectVector<CTextConfigPair> &pairs, const char *id);

#endif
// OpenArchive.h

#ifndef __OPEN_ARCHIVE_H
#define __OPEN_ARCHIVE_H

#include "../../../Windows/PropVariant.h"

#include "ArchiveOpenCallback.h"
#include "LoadCodecs.h"
#include "Property.h"

#ifndef _SFX

#define SUPPORT_ALT_STREAMS
```

```
#endif

HRESULT Archive_GetItemBoolProp(IInArchive *arc, UInt32 index, PROPID propID, bool &result) throw();
HRESULT Archive_IsItem_Dir(IInArchive *arc, UInt32 index, bool &result) throw();
HRESULT Archive_IsItem_Aux(IInArchive *arc, UInt32 index, bool &result) throw();
HRESULT Archive_IsItem_AltStream(IInArchive *arc, UInt32 index, bool &result) throw();
HRESULT Archive_IsItem_Deleted(IInArchive *arc, UInt32 index, bool &deleted) throw();

#ifdef SUPPORT_ALT_STREAMS
int FindAltStreamColon_in_Path(const wchar_t *path);
#endif

/*
struct COptionalOpenProperties
{
 UString FormatName;
 CObjectVector<CProperty> Props;
};
*/

#ifdef _SFX
#define OPEN_PROPS_DECL
#else
#define OPEN_PROPS_DECL const CObjectVector<CProperty> *props;
// #define OPEN_PROPS_DECL ,
 const CObjectVector<COptionalOpenProperties> *props
#endif

struct COpenSpecFlags
{
 // bool CanReturnFull;
 bool CanReturnFrontal;
 bool CanReturnTail;
 bool CanReturnMid;

 bool CanReturn_NonStart() const { return CanReturnTail || CanReturnMid; }

 COpenSpecFlags():
   // CanReturnFull(true),
   CanReturnFrontal(false),
   CanReturnTail(false),
   CanReturnMid(false)
   {}
};

struct COpenType
{
 int FormatIndex;
```

```
COpenSpecFlags SpecForcedType;
COpenSpecFlags SpecMainType;
COpenSpecFlags SpecWrongExt;
COpenSpecFlags SpecUnknownExt;

bool Recursive;

bool CanReturnArc;
bool CanReturnParser;
bool EachPos;

// bool SkipSfxStub;
// bool ExeAsUnknown;

bool ZerosTailIsAllowed;

bool MaxStartOffset_Defined;
UInt64 MaxStartOffset;

const COpenSpecFlags &GetSpec(bool isForced, bool isMain, bool isUnknown) const
{
  return isForced ? SpecForcedType : (isMain ? SpecMainType : (isUnknown ? SpecUnknownExt :
SpecWrongExt));
}

COpenType():
    FormatIndex(-1),
     Recursive(true),
    EachPos(false),
    CanReturnArc(true),
    CanReturnParser(false),
    // SkipSfxStub(true),
    // ExeAsUnknown(true),
    ZerosTailIsAllowed(false),
    MaxStartOffset_Defined(false),
    MaxStartOffset(0)
{
  SpecForcedType.CanReturnFrontal = true;
  SpecForcedType.CanReturnTail = true;
  SpecForcedType.CanReturnMid = true;

  SpecMainType.CanReturnFrontal = true;

  SpecUnknownExt.CanReturnTail = true; // for sfx
  SpecUnknownExt.CanReturnMid = true;
  SpecUnknownExt.CanReturnFrontal = true; // for alt streams of sfx with pad
```

```
  // ZerosTailIsAllowed = true;
 }
};

struct COpenOptions
{
 CCodecs *codecs;
 COpenType openType;
 const CObjectVector<COpenType> *types;
 const CIntVector *excludedFormats;

 IInStream *stream;
 ISequentialInStream *seqStream;
 IArchiveOpenCallback *callback;
 COpenCallbackImp *callbackSpec;
 OPEN_PROPS_DECL
 // bool openOnlySpecifiedByExtension,

 bool stdInMode;
 UString
 filePath;

 COpenOptions():
    codecs(NULL),
    types(NULL),
    excludedFormats(NULL),
    stream(NULL),
    seqStream(NULL),
    callback(NULL),
    callbackSpec(NULL),
    stdInMode(false)
   {}

};

UInt32 GetOpenArcErrorFlags(const NWindows::NCOM::CPropVariant &prop, bool *isDefinedProp = NULL);

struct CArcErrorInfo
{
 bool ThereIsTail;
 bool UnexpecedEnd;
 bool IgnoreTail; // all are zeros
 // bool NonZerosTail;
 bool ErrorFlags_Defined;
 UInt32 ErrorFlags;
 UInt32 WarningFlags;
 int ErrorFormatIndex; // - 1 means no Error.
                       // if FormatIndex == ErrorFormatIndex, the archive is open with offset
```

```
UInt64 TailSize;

/* if CArc is Open OK with some format:
     - ErrorFormatIndex shows error format index, if extension is incorrect
     - other variables show message and warnings of archive that is open */

UString ErrorMessage;
UString WarningMessage;

// call IsArc_After_NonOpen only if Open returns S_FALSE

bool IsArc_After_NonOpen() const
{
  return (ErrorFlags_Defined && (ErrorFlags & kpv_ErrorFlags_IsNotArc) == 0);
}


CArcErrorInfo():
    ThereIsTail(false),
    UnexpecedEnd(false),
    IgnoreTail(false),
    // NonZerosTail(false),
    ErrorFlags_Defined(false),
    ErrorFlags(0),
    WarningFlags(0),
    ErrorFormatIndex(-1),
    TailSize(0)
  {}

void ClearErrors();

void ClearErrors_Full()
{
  ErrorFormatIndex = -1;
  ClearErrors();
}

bool IsThereErrorOrWarning() const
{
  return ErrorFlags != 0
      || WarningFlags != 0
      || NeedTailWarning()
      || UnexpecedEnd
      || !ErrorMessage.IsEmpty()
      || !WarningMessage.IsEmpty();
}

bool AreThereErrors() const { return ErrorFlags != 0 || UnexpecedEnd; }
```

```
 bool AreThereWarnings() const { return WarningFlags != 0 || NeedTailWarning(); }

 bool NeedTailWarning() const { return !IgnoreTail && ThereIsTail; }

 UInt32 GetWarningFlags() const
 {
   UInt32 a = WarningFlags;
    if (NeedTailWarning() && (ErrorFlags & kpv_ErrorFlags_DataAfterEnd) == 0)
     a |= kpv_ErrorFlags_DataAfterEnd;
   return a;
 }

 UInt32 GetErrorFlags() const
 {
   UInt32 a = ErrorFlags;
   if (UnexpecedEnd)
     a |= kpv_ErrorFlags_UnexpectedEnd;
   return a;
 }
};

struct CReadArcItem
{
 UString Path;            // Path from root (including alt stream name, if alt stream)
 UStringVector PathParts; // without altStream name, path from root or from _baseParentFolder, if
_use_baseParentFolder_mode

 #ifdef SUPPORT_ALT_STREAMS
 UString MainPath;
            /* MainPath = Path for non-AltStream,
               MainPath = Path of parent, if there is parent for AltStream. */
 UString AltStreamName;
 bool IsAltStream;
 bool WriteToAltStreamIfColon;
 #endif

 bool IsDir;
 bool MainIsDir;
 UInt32 ParentIndex; // use it, if IsAltStream

 #ifndef _SFX
 bool _use_baseParentFolder_mode;
 int _baseParentFolder;
 #endif

 CReadArcItem()
 {
   #ifdef
```

```
 SUPPORT_ALT_STREAMS
  WriteToAltStreamIfColon = false;
  #endif

  #ifndef _SFX
  _use_baseParentFolder_mode = false;
  _baseParentFolder = -1;
  #endif
 }
};

class CArc
{
 HRESULT PrepareToOpen(const COpenOptions &op, unsigned formatIndex, CMyComPtr<IInArchive>
&archive);
 HRESULT CheckZerosTail(const COpenOptions &op, UInt64 offset);
 HRESULT OpenStream2(const COpenOptions &options);

 #ifndef _SFX
 // parts.Back() can contain alt stream name "nams:AltName"
 HRESULT GetItemPathToParent(UInt32 index, UInt32 parent, UStringVector &parts) const;
 #endif

public:
 CMyComPtr<IInArchive> Archive;
 CMyComPtr<IInStream> InStream;
        // we use InStream in 2 cases (ArcStreamOffset != 0):
        // 1) if we use additional cache stream
        // 2) we reopen sfx archive with CTailInStream

 CMyComPtr<IArchiveGetRawProps> GetRawProps;
 CMyComPtr<IArchiveGetRootProps> GetRootProps;

 CArcErrorInfo ErrorInfo; // for OK archives
 CArcErrorInfo NonOpen_ErrorInfo;
 // ErrorInfo for mainArchive (false OPEN)

 UString Path;
 UString filePath;
 UString DefaultName;
 int FormatIndex; // - 1 means Parser.
 int SubfileIndex;
 FILETIME MTime;
 bool MTimeDefined;

 Int64 Offset; // it's offset of start of archive inside stream that is open by Archive Handler
 UInt64 PhySize;
 // UInt64 OkPhySize;
```

```
bool PhySizeDefined;
// bool OkPhySize_Defined;
UInt64 FileSize;
UInt64 AvailPhySize; // PhySize, but it's reduced if exceed end of file
// bool offsetDefined;

UInt64 GetEstmatedPhySize() const { return PhySizeDefined ? PhySize : FileSize; }

UInt64 ArcStreamOffset; // offset of stream that is open by Archive Handler
Int64 GetGlobalOffset() const { return ArcStreamOffset + Offset; } // it's global offset of archive

// AString ErrorFlagsText;

bool IsParseArc;

bool IsTree;
bool IsReadOnly;

bool Ask_Deleted;
bool Ask_AltStream;
bool Ask_Aux;
bool Ask_INode;

bool IgnoreSplit; // don't try split handler

//
void Set_ErrorFlagsText();

CArc():
  MTimeDefined(false),
  IsTree(false),
  IsReadOnly(false),
  Ask_Deleted(false),
  Ask_AltStream(false),
  Ask_Aux(false),
  Ask_INode(false),
  IgnoreSplit(false)
  {}

HRESULT ReadBasicProps(IInArchive *archive, UInt64 startPos, HRESULT openRes);

// ~CArc();

HRESULT Close()
{
  InStream.Release();
  return Archive->Close();
}
```

```
 HRESULT GetItemPath(UInt32 index, UString &result) const;
 HRESULT GetDefaultItemPath(UInt32 index, UString &result) const;

 // GetItemPath2 adds [DELETED] dir prefix for deleted items.
 HRESULT GetItemPath2(UInt32 index, UString &result) const;

 HRESULT GetItem(UInt32 index, CReadArcItem &item) const;

 HRESULT GetItemSize(UInt32 index, UInt64 &size, bool &defined) const;
 HRESULT GetItemMTime(UInt32 index, FILETIME &ft, bool &defined) const;
 HRESULT IsItemAnti(UInt32 index, bool &result) const
   { return Archive_GetItemBoolProp(Archive, index, kpidIsAnti, result); }


  HRESULT OpenStream(const COpenOptions &options);
 HRESULT OpenStreamOrFile(COpenOptions &options);

 HRESULT ReOpen(const COpenOptions &options);

 HRESULT CreateNewTailStream(CMyComPtr<IInStream> &stream);
};

struct CArchiveLink
{
 CObjectVector<CArc> Arcs;
 UStringVector VolumePaths;
 UInt64 VolumesSize;
 bool IsOpen;

 bool PasswordWasAsked;
 // UString Password;

 // int NonOpenErrorFormatIndex; // - 1 means no Error.
 UString NonOpen_ArcPath;

 CArcErrorInfo NonOpen_ErrorInfo;

 // UString ErrorsText;
 // void Set_ErrorsText();

 CArchiveLink():
    VolumesSize(0),
    IsOpen(false),
    PasswordWasAsked(false)
    {}

 void KeepModeForNextOpen();
```

```
 HRESULT Close();
 void Release();
 ~CArchiveLink() { Release(); }

 const CArc *GetArc() const { return &Arcs.Back(); }
 IInArchive *GetArchive() const { return Arcs.Back().Archive; }
 IArchiveGetRawProps *GetArchiveGetRawProps() const { return Arcs.Back().GetRawProps; }
 IArchiveGetRootProps *GetArchiveGetRootProps()
 const { return Arcs.Back().GetRootProps; }

 HRESULT Open(COpenOptions &options);
 HRESULT Open2(COpenOptions &options, IOpenCallbackUI *callbackUI);
 HRESULT Open3(COpenOptions &options, IOpenCallbackUI *callbackUI);

 HRESULT Open_Strict(COpenOptions &options, IOpenCallbackUI *callbackUI)
 {
   HRESULT result = Open3(options, callbackUI);
   if (result == S_OK && NonOpen_ErrorInfo.ErrorFormatIndex >= 0)
     result = S_FALSE;
   return result;
 }

 HRESULT ReOpen(COpenOptions &options);
};

bool ParseOpenTypes(CCodecs &codecs, const UString &s, CObjectVector<COpenType> &types);


struct CDirPathSortPair
{
 unsigned Len;
 unsigned Index;

 void SetNumSlashes(const FChar *s);

 int Compare(const CDirPathSortPair &a) const
 {
   // We need sorting order where parent items will be after child items
   if (Len < a.Len) return 1;
   if (Len > a.Len) return -1;
   if (Index < a.Index) return -1;
   if (Index > a.Index) return 1;
   return 0;
 }
};

#endif
```

```
/* -*- Mode: C++; tab-width: 4; indent-tabs-mode: nil; c-basic-offset: 2 -*- */
/* This Source Code Form is subject to the terms of the Mozilla Public
* License, v. 2.0. If a copy of the MPL was not distributed with this
* file, You can obtain one at http://mozilla.org/MPL/2.0/. */

#ifndef mozilla_Permission_h
#define mozilla_Permission_h

#include "nsIPermission.h"
#include "nsCOMPtr.h"
#include "nsString.h"

namespace mozilla {

////////////////////////////////////////////////////////////////////////////////

class Permission : public nsIPermission {
public:
 // nsISupports
 NS_DECL_ISUPPORTS
 NS_DECL_NSIPERMISSION

 static already_AddRefed<Permission> Create(
     nsIPrincipal* aPrincipal, const nsACString& aType, uint32_t aCapability,
     uint32_t aExpireType, int64_t aExpireTime, int64_t aModificationTime);

 // This method creates a new nsIPrincipal with a stripped OriginAttributes (no
 // userContextId) and a content principal equal to the origin of 'aPrincipal'.
 static
 already_AddRefed<nsIPrincipal> ClonePrincipalForPermission(
     nsIPrincipal* aPrincipal);

protected:
 Permission(nsIPrincipal* aPrincipal, const nsACString& aType,
            uint32_t aCapability, uint32_t aExpireType, int64_t aExpireTime,
            int64_t aModificationTime);

 virtual ~Permission() = default;

 nsCOMPtr<nsIPrincipal> mPrincipal;
 nsCString mType;
 uint32_t mCapability;
 uint32_t mExpireType;
 int64_t mExpireTime;
 int64_t mModificationTime;
};

}  // namespace mozilla
```

```
#endif  // mozilla_Permission_h
// MyWindows.h

#ifndef __MY_WINDOWS_H
#define __MY_WINDOWS_H

#ifdef _WIN32

#include <windows.h>

#ifdef UNDER_CE
 #undef VARIANT_TRUE
 #define VARIANT_TRUE ((VARIANT_BOOL)-1)
#endif

#else

#include <stddef.h> // for wchar_t
#include <string.h>
// #include <stdint.h> // for uintptr_t

#include "MyGuidDef.h"

#define WINAPI

typedef char CHAR;
typedef unsigned char UCHAR;

#undef BYTE
typedef unsigned char BYTE;

typedef short SHORT;
typedef unsigned short USHORT;

#undef WORD
typedef unsigned short WORD;
typedef short VARIANT_BOOL;

typedef int INT;
typedef Int32 INT32;
typedef unsigned int UINT;
typedef UInt32 UINT32;
typedef INT32 LONG;   // LONG, ULONG and DWORD must be 32-bit
typedef UINT32 ULONG;

#undef DWORD
typedef UINT32 DWORD;
```

```
typedef long BOOL;

#ifndef FALSE
 #define FALSE 0
 #define TRUE 1
#endif

// typedef size_t ULONG_PTR;
typedef size_t DWORD_PTR;
// typedef uintptr_t UINT_PTR;
// typedef ptrdiff_t UINT_PTR;

typedef Int64 LONGLONG;
typedef UInt64 ULONGLONG;

typedef
 struct _LARGE_INTEGER { LONGLONG QuadPart; } LARGE_INTEGER;
typedef struct _ULARGE_INTEGER { ULONGLONG QuadPart; } ULARGE_INTEGER;

typedef const CHAR *LPCSTR;
typedef CHAR TCHAR;
typedef const TCHAR *LPCTSTR;
typedef wchar_t WCHAR;
typedef WCHAR OLECHAR;
typedef const WCHAR *LPCWSTR;
typedef OLECHAR *BSTR;
typedef const OLECHAR *LPCOLESTR;
typedef OLECHAR *LPOLESTR;

typedef struct _FILETIME
{
 DWORD dwLowDateTime;
 DWORD dwHighDateTime;
} FILETIME;

#define HRESULT LONG
#define FAILED(Status) ((HRESULT)(Status)<0)
typedef ULONG PROPID;
typedef LONG SCODE;

#define ERROR_NEGATIVE_SEEK 131L

#define S_OK    ((HRESULT)0x00000000L)
#define S_FALSE ((HRESULT)0x00000001L)
#define E_NOTIMPL ((HRESULT)0x80004001L)
#define E_NOINTERFACE ((HRESULT)0x80004002L)
#define E_ABORT ((HRESULT)0x80004004L)
```

```
#define E_FAIL ((HRESULT)0x80004005L)
#define STG_E_INVALIDFUNCTION ((HRESULT)0x80030001L)
#define E_OUTOFMEMORY ((HRESULT)0x8007000EL)
#define E_INVALIDARG ((HRESULT)0x80070057L)

#ifdef _MSC_VER
#define
 STDMETHODCALLTYPE __stdcall
#else
#define STDMETHODCALLTYPE
#endif

#define STDMETHOD_(t, f) virtual t STDMETHODCALLTYPE f
#define STDMETHOD(f) STDMETHOD_(HRESULT, f)
#define STDMETHODIMP_(type) type STDMETHODCALLTYPE
#define STDMETHODIMP STDMETHODIMP_(HRESULT)

#define PURE = 0

#define MIDL_INTERFACE(x) struct

#ifdef __cplusplus

DEFINE_GUID(IID_IUnknown,
0x00000000, 0x0000, 0x0000, 0xC0, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x46);
struct IUnknown
{
 STDMETHOD(QueryInterface) (REFIID iid, void **outObject) PURE;
 STDMETHOD_(ULONG, AddRef)() PURE;
 STDMETHOD_(ULONG, Release)() PURE;
 #ifndef _WIN32
 virtual ~IUnknown() {}
 #endif
};

typedef IUnknown *LPUNKNOWN;

#endif

#define VARIANT_TRUE ((VARIANT_BOOL)-1)
#define VARIANT_FALSE ((VARIANT_BOOL)0)

enum VARENUM
{
 VT_EMPTY = 0,
 VT_NULL = 1,
 VT_I2 = 2,
 VT_I4 = 3,
```

```
 VT_R4 = 4,
 VT_R8 = 5,
 VT_CY = 6,
 VT_DATE = 7,
 VT_BSTR = 8,
 VT_DISPATCH = 9,
 VT_ERROR = 10,
 VT_BOOL = 11,
 VT_VARIANT = 12,
 VT_UNKNOWN
 = 13,
 VT_DECIMAL = 14,
 VT_I1 = 16,
 VT_UI1 = 17,
 VT_UI2 = 18,
 VT_UI4 = 19,
 VT_I8 = 20,
 VT_UI8 = 21,
 VT_INT = 22,
 VT_UINT = 23,
 VT_VOID = 24,
 VT_HRESULT = 25,
 VT_FILETIME = 64
};

typedef unsigned short VARTYPE;
typedef WORD PROPVAR_PAD1;
typedef WORD PROPVAR_PAD2;
typedef WORD PROPVAR_PAD3;

typedef struct tagPROPVARIANT
{
 VARTYPE vt;
 PROPVAR_PAD1 wReserved1;
 PROPVAR_PAD2 wReserved2;
 PROPVAR_PAD3 wReserved3;
 union
 {
  CHAR cVal;
  UCHAR bVal;
  SHORT iVal;
  USHORT uiVal;
  LONG lVal;
  ULONG ulVal;
  INT intVal;
  UINT uintVal;
  LARGE_INTEGER hVal;
  ULARGE_INTEGER uhVal;
```

```
   VARIANT_BOOL boolVal;
   SCODE scode;
   FILETIME filetime;
   BSTR bstrVal;
 };
} PROPVARIANT;

typedef PROPVARIANT tagVARIANT;
typedef tagVARIANT VARIANT;
typedef VARIANT VARIANTARG;

MY_EXTERN_C HRESULT VariantClear(VARIANTARG *prop);
MY_EXTERN_C HRESULT VariantCopy(VARIANTARG *dest, const VARIANTARG *src);

typedef struct tagSTATPROPSTG
{
 LPOLESTR
 lpwstrName;
 PROPID propid;
 VARTYPE vt;
} STATPROPSTG;

MY_EXTERN_C BSTR SysAllocStringByteLen(LPCSTR psz, UINT len);
MY_EXTERN_C BSTR SysAllocStringLen(const OLECHAR *sz, UINT len);
MY_EXTERN_C BSTR SysAllocString(const OLECHAR *sz);
MY_EXTERN_C void SysFreeString(BSTR bstr);
MY_EXTERN_C UINT SysStringByteLen(BSTR bstr);
MY_EXTERN_C UINT SysStringLen(BSTR bstr);

MY_EXTERN_C DWORD GetLastError();
MY_EXTERN_C LONG CompareFileTime(const FILETIME* ft1, const FILETIME* ft2);

#define CP_ACP    0
#define CP_OEMCP  1
#define CP_UTF8   65001

typedef enum tagSTREAM_SEEK
{
 STREAM_SEEK_SET = 0,
 STREAM_SEEK_CUR = 1,
 STREAM_SEEK_END = 2
} STREAM_SEEK;

#endif
#endif
```

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At the time this file was first modified, a complete, unmodified copy of
the LPPL Work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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Spanish hyphenation patterns

(more info about the licence to be added later)

% DIVISI'ON DE PALABRAS
% ~~~~~~~~~~~~~~~~~~~~
%
 hyph-es.tex 4.6
% This files corresponds to eshyph.tex 4.6.
%
% (c) Javier Bezos 1993 1997.
% (c) Javier Bezos and CervanTeX 2001-2010
% Some parts, (c) by Francesc Carmona
% Licence: LPPL
%
% For further info, bug reports and comments:
%
%  http://www.tex-tipografia.com/spanish_hyphen.html
%
% I would like to thanks Francesc Carmona for his permission
% to steal parts of his work without restrictions.
%
% 2010-05-18
%
% _____________________________________________________________
% Javier Bezos  | http://www.cervantex.es/
% .....................................................
% TeX y tipografia  | http://www.tex-tipografia.com/
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->

```
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element Without id Attribute</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element does not have an id attribute but it still matches the schema." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size:
 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   License without language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

```
/* ATK -  Accessibility Toolkit
* Copyright 2001 Sun Microsystems Inc.
*
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* Library General Public License for more details.
*
* You should have received a copy of the GNU Library General Public
* License along with this library; if not, write to the
* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_STATE_SET_H__
#define __ATK_STATE_SET_H__

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

#include <glib-object.h>
#include <atk/atkobject.h>
#include <atk/atkstate.h>

#define
 ATK_TYPE_STATE_SET                    (atk_state_set_get_type ())
#define ATK_STATE_SET(obj)                    (G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_STATE_SET, AtkStateSet))
#define ATK_STATE_SET_CLASS(klass)              (G_TYPE_CHECK_CLASS_CAST ((klass),
ATK_TYPE_STATE_SET, AtkStateSetClass))
```

```
#define ATK_IS_STATE_SET(obj)                    (G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_STATE_SET))
#define ATK_IS_STATE_SET_CLASS(klass)            (G_TYPE_CHECK_CLASS_TYPE ((klass),
ATK_TYPE_STATE_SET))
#define ATK_STATE_SET_GET_CLASS(obj)             (G_TYPE_INSTANCE_GET_CLASS ((obj),
ATK_TYPE_STATE_SET, AtkStateSetClass))

typedef struct _AtkStateSetClass       AtkStateSetClass;


struct _AtkStateSet
{
 GObject parent;

};

struct _AtkStateSetClass
{
 GObjectClass parent;
};

GType atk_state_set_get_type (void);

AtkStateSet*    atk_state_set_new              (void);
gboolean        atk_state_set_is_empty         (AtkStateSet  *set);
gboolean
       atk_state_set_add_state        (AtkStateSet  *set,
                                       AtkStateType type);
void            atk_state_set_add_states       (AtkStateSet  *set,
                                       AtkStateType *types,
                                       gint         n_types);
void            atk_state_set_clear_states     (AtkStateSet  *set);
gboolean        atk_state_set_contains_state   (AtkStateSet  *set,
                                       AtkStateType type);
gboolean        atk_state_set_contains_states  (AtkStateSet  *set,
                                       AtkStateType *types,
                                       gint         n_types);
gboolean        atk_state_set_remove_state     (AtkStateSet  *set,
                                       AtkStateType type);
AtkStateSet*    atk_state_set_and_sets         (AtkStateSet  *set,

            AtkStateSet  *compare_set);
AtkStateSet*    atk_state_set_or_sets          (AtkStateSet  *set,
                                       AtkStateSet  *compare_set);
AtkStateSet*    atk_state_set_xor_sets         (AtkStateSet  *set,
                                       AtkStateSet  *compare_set);

#ifdef __cplusplus
```

```
}
#endif /* __cplusplus */


#endif /* __ATK_STATE_SET_H__ */
```

7-Zip for installers 9.38
---

7-Zip is a file archiver for Windows NT/2000/2003/2008/XP/Vista/7/8/10.

7-Zip for installers is part of LZMA SDK.
LZMA SDK is written and placed in the public domain by Igor Pavlov.

It's allowed to join 7-Zip SFX module with another software.
It's allowed to change resources of 7-Zip's SFX modules.

HOW to use
---

7zr.exe is reduced version of 7za.exe of 7-Zip.
7zr.exe supports only format with these codecs: LZMA, LZMA2, BCJ, BCJ2, ARM, Copy.

Example of compressing command for installation packages:

```
7zr a archive.7z files
```

7zSD.sfx is SFX module for installers. 7zSD.sfx uses msvcrt.dll.

SFX modules for installers allow to create installation program.
Such module extracts archive to temp folder and then runs specified program and removes
temp files after program finishing. Self-extract archive for installers must be created
as joining 3 files: SFX_Module, Installer_Config, 7z_Archive.
Installer_Config is optional file.
You can use the following command to create installer
self-extract archive:

```
copy /b 7zSD.sfx + config.txt + archive.7z archive.exe
```

The smallest installation package size can be achieved, if installation files was
uncompressed before including to 7z archive.

-y switch for installer module (at runtime) specifies quiet mode for extracting.

Installer Config file format
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Config file contains commands for Installer. File begins from string
;!@Install@!UTF-8! and ends with ;!@InstallEnd@!. File must be written
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

in UTF-8 encoding. File contains string pairs:

ID_String="Value"

ID_String Description

Title Title for messages
BeginPrompt Begin Prompt message
Progress Value can be "yes" or "no". Default value is "yes".
RunProgram Command for executing. Default value is "setup.exe".
Substring %%T will be replaced with path to temporary
folder, where files were extracted

Directory Directory prefix for "RunProgram". Default value is ".\\"
ExecuteFile Name of file for executing
ExecuteParameters Parameters for "ExecuteFile"

You can omit any string pair.

There are two ways to run program: RunProgram and ExecuteFile.
Use RunProgram, if you want to run some program from .7z archive.
Use ExecuteFile, if you want to open some document from .7z archive or
if you want to execute some command from Windows.

If you use RunProgram and if you specify empty directory prefix: Directory="",
the system searches for the executable file in the following sequence:

1. The directory from which the application (installer) loaded.
2. The temporary folder, where files were extracted.
3. The Windows system directory.

Config file Examples
~~~~~~~~~~~~~~~~~~~~

```
;!@Install@!UTF-8!
Title="7-Zip 4.00"
BeginPrompt="Do you want to install the 7-Zip 4.00?"
RunProgram="setup.exe"
;!@InstallEnd@!
```

```
;!@Install@!UTF-8!
Title="7-Zip 4.00"
BeginPrompt="Do
```
~~~~~~~~~~~~~~~~~~~~

```
 you want to install the 7-Zip 4.00?"
ExecuteFile="7zip.msi"
;!@InstallEnd@!



;!@Install@!UTF-8!
Title="7-Zip 4.01 Update"
BeginPrompt="Do you want to install the 7-Zip 4.01 Update?"
ExecuteFile="msiexec.exe"
ExecuteParameters="/i 7zip.msi REINSTALL=ALL REINSTALLMODE=vomus"
;!@InstallEnd@!
```

Small SFX modules for installers
---

7zS2.sfx  - small SFX module (GUI version)
7zS2con.sfx  - small SFX module (Console version)

Small SFX modules support this codecs: LZMA, LZMA2, BCJ, BCJ2, ARM, COPY

Small SFX module is similar to common SFX module for installers.
The difference (what's new in small version):
- Smaller size (30 KB vs 100 KB)
- C source code instead of ++
- No installer Configuration file
- No extracting progress window
- It decompresses solid 7z blocks (it can be whole 7z archive) to RAM.
  So user that calls SFX installer must have free RAM of size of largest
  solid 7z block (size of 7z archive at simplest case).

How to use
---

copy
 /b 7zS2.sfx + archive.7z sfx.exe

When you run installer sfx module (sfx.exe)
1) It creates "7zNNNNNNNN" temp folder in system temp folder.
2) It extracts .7z archive to that folder
3) It executes one file from "7zNNNNNNNN" temp folder.
4) It removes "7zNNNNNNNN" temp folder

You can send parameters to installer, and installer will transfer them to extracted .exe file.

Small SFX uses 3 levels of priorities to select file to execute:

1) Files in root folder have higher priority than files in subfolders.
2) File extension priorities (from high to low priority order):
bat, cmd, exe, inf, msi, cab (under Windows CE), html, htm
3) File name priorities (from high to low priority order):
setup, install, run, start

Windows CE (ARM) version of 7zS2.sfx is included to 7-Zip for Windows Mobile package.

Examples
---

1) To create compressed console 7-Zip:

```
7zr a c.7z 7z.exe 7z.dll -mx
copy /b 7zS2con.sfx + c.7z 7zCompr.exe
7zCompr.exe b -md22
```

2) To create
compressed GUI 7-Zip:

```
7zr a g.7z 7zg.exe 7z.dll -mx
copy /b 7zS2.sfx + g.7z 7zgCompr.exe
7zgCompr.exe b -md22
```

3) To open some file:

```
7zr a h.7z readme.txt -mx
copy /b 7zS2.sfx + h.7z 7zTxt.exe
7zTxt.exe
```

```
// ExtractMode.h

#ifndef __EXTRACT_MODE_H
#define __EXTRACT_MODE_H

namespace NExtract {

namespace NPathMode
{
 enum EEnum
 {
   kFullPaths,
   kCurPaths,
   kNoPaths,
   kAbsPaths,
```

```
   kNoPathsAlt // alt streams must be extracted without name of base file
 };
}

namespace NOverwriteMode
{
 enum EEnum
 {
   kAsk,
   kOverwrite,
   kSkip,
   kRename,
   kRenameExisting
 };
}

}

#endif
```

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```
// Windows/Control/CommandBar.h

#ifndef __WINDOWS_CONTROL_COMMANDBAR_H
#define __WINDOWS_CONTROL_COMMANDBAR_H

#ifdef UNDER_CE

#include "../../Common/MyWindows.h"

#include <commctrl.h>

#include "../Window.h"

namespace NWindows {
namespace NControl {

class CCommandBar: public NWindows::CWindow
{
public:
 bool Create(HINSTANCE hInst, HWND hwndParent, int idCmdBar)
 {
   _window = ::CommandBar_Create(hInst, hwndParent, idCmdBar);
   return (_window != NULL);
 }

 // Macros
 // void Destroy() { CommandBar_Destroy(_window); }
 // bool AddButtons(UINT numButtons, LPTBBUTTON buttons) { return
BOOLToBool(SendMsg(TB_ADDBUTTONS, (WPARAM)numButtons, (LPARAM)buttons)); }
 bool InsertButton(int iButton, LPTBBUTTON button) { return BOOLToBool(SendMsg(TB_INSERTBUTTON,
(WPARAM)iButton, (LPARAM)button)); }
 BOOL AddToolTips(UINT numToolTips, LPTSTR toolTips) { return
```

```
BOOLToBool(SendMsg(TB_SETTOOLTIPS, (WPARAM)numToolTips, (LPARAM)toolTips)); }
 void AutoSize() { SendMsg(TB_AUTOSIZE,
 0, 0); }

 bool AddAdornments(DWORD dwFlags) { return BOOLToBool(::CommandBar_AddAdornments(_window,
dwFlags, 0)); }
 int AddBitmap(HINSTANCE hInst, int idBitmap, int iNumImages, int iImageWidth, int iImageHeight) { return
::CommandBar_AddBitmap(_window, hInst, idBitmap, iNumImages, iImageWidth, iImageHeight); }
 bool DrawMenuBar(WORD iButton) { return BOOLToBool(::CommandBar_DrawMenuBar(_window, iButton));
}
 HMENU GetMenu(WORD iButton) { return ::CommandBar_GetMenu(_window, iButton); }
 int Height() { return CommandBar_Height(_window); }
 HWND InsertComboBox(HINSTANCE hInst, int iWidth, UINT dwStyle, WORD idComboBox, WORD iButton)
{ return ::CommandBar_InsertComboBox(_window, hInst, iWidth, dwStyle, idComboBox, iButton); }
 bool InsertMenubar(HINSTANCE hInst, WORD idMenu, WORD iButton) { return
BOOLToBool(::CommandBar_InsertMenubar(_window, hInst, idMenu, iButton)); }
 bool InsertMenubarEx(HINSTANCE hInst, LPTSTR pszMenu, WORD iButton) { return
BOOLToBool(::CommandBar_InsertMenubarEx(_window,
 hInst, pszMenu, iButton)); }
 bool Show(bool cmdShow) { return BOOLToBool(::CommandBar_Show(_window, BoolToBOOL(cmdShow))); }


 // CE 4.0
 void AlignAdornments() { CommandBar_AlignAdornments(_window); }
};

}}

#endif

#endif
```

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```
// Windows/Control/ImageList.h

#ifndef __WINDOWS_CONTROL_IMAGE_LIST_H
#define __WINDOWS_CONTROL_IMAGE_LIST_H

#include <commctrl.h>

#include "../Defs.h"

namespace NWindows {
namespace NControl {

class CImageList
{
 HIMAGELIST m_Object;
public:
 operator HIMAGELIST() const {return m_Object; }
 CImageList(): m_Object(NULL) {}
 bool Attach(HIMAGELIST imageList)
 {
  if (imageList == NULL)
    return false;
  m_Object = imageList;
  return true;
 }

 HIMAGELIST Detach()
 {
  HIMAGELIST imageList = m_Object;
  m_Object = NULL;
  return imageList;
 }

 bool Create(int width, int height, UINT flags, int initialNumber, int grow)
 {
  HIMAGELIST a = ImageList_Create(width, height, flags,
    initialNumber, grow);
  if (a == NULL)
    return false;
  return Attach(a);
 }

 bool Destroy() // DeleteImageList() in MFC
 {
  if (m_Object == NULL)
```

```
    return false;
  return BOOLToBool(ImageList_Destroy(Detach()));
 }

 ~CImageList()
  { Destroy();
 }

 int GetImageCount() const
  { return ImageList_GetImageCount(m_Object); }

 bool GetImageInfo(int index, IMAGEINFO* imageInfo) const
  { return BOOLToBool(ImageList_GetImageInfo(m_Object, index, imageInfo)); }

 int Add(HBITMAP hbmImage, HBITMAP hbmMask = 0)
  { return ImageList_Add(m_Object, hbmImage, hbmMask); }
 int AddMasked(HBITMAP hbmImage, COLORREF mask)
  { return ImageList_AddMasked(m_Object, hbmImage, mask); }
 int AddIcon(HICON icon)
  { return ImageList_AddIcon(m_Object, icon); }
 int Replace(int index, HICON icon)
  { return ImageList_ReplaceIcon(m_Object, index, icon); }

 // If index is -1, the function removes all images.
 bool Remove(int index)
  { return BOOLToBool(ImageList_Remove(m_Object, index)); }
 bool RemoveAll()
  { return BOOLToBool(ImageList_RemoveAll(m_Object)); }

 HICON ExtractIcon(int index)
  { return ImageList_ExtractIcon(NULL, m_Object, index); }
 HICON GetIcon(int index, UINT flags)
  { return ImageList_GetIcon(m_Object,
 index, flags); }

 bool GetIconSize(int &width, int &height) const
  { return BOOLToBool(ImageList_GetIconSize(m_Object, &width, &height)); }
 bool SetIconSize(int width, int height)
  { return BOOLToBool(ImageList_SetIconSize(m_Object, width, height)); }
};

}}

#endif
```

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#ifndef mozilla_dom_Permissions_h_
#define mozilla_dom_Permissions_h_

```
#include "nsISupports.h"
#include "nsPIDOMWindow.h"
#include "nsWrapperCache.h"

namespace mozilla {

class ErrorResult;

namespace dom {

class Promise;

class Permissions final : public nsISupports, public nsWrapperCache {
public:
 NS_DECL_CYCLE_COLLECTING_ISUPPORTS
 NS_DECL_CYCLE_COLLECTION_SCRIPT_HOLDER_CLASS(Permissions)

 explicit Permissions(nsPIDOMWindowInner* aWindow);

 nsPIDOMWindowInner* GetParentObject() const { return mWindow; }

 JSObject* WrapObject(JSContext* aCx,
                      JS::Handle<JSObject*> aGivenProto) override;

 already_AddRefed<Promise> Query(JSContext*
 aCx,
                                 JS::Handle<JSObject*> aPermission,
                                 ErrorResult& aRv);

 static nsresult RemovePermission(nsIPrincipal* aPrincipal,
                                  const nsACString& aPermissionType);

 already_AddRefed<Promise> Revoke(JSContext* aCx,
                                  JS::Handle<JSObject*> aPermission,
                                  ErrorResult& aRv);

private:
 ~Permissions();

 nsCOMPtr<nsPIDOMWindowInner> mWindow;
};

}  // namespace dom
}  // namespace mozilla

#endif  // mozilla_dom_permissions_h_
// Common/IntToString.h
```

```
#ifndef __COMMON_INT_TO_STRING_H
#define __COMMON_INT_TO_STRING_H

#include "MyTypes.h"

void ConvertUInt32ToString(UInt32 value, char *s) throw();
void ConvertUInt64ToString(UInt64 value, char *s) throw();

void ConvertUInt32ToString(UInt32 value, wchar_t *s) throw();
void ConvertUInt64ToString(UInt64 value, wchar_t *s) throw();

void ConvertUInt64ToOct(UInt64 value, char *s) throw();

void ConvertUInt32ToHex(UInt32 value, char *s) throw();
void ConvertUInt64ToHex(UInt64 value, char *s) throw();
void ConvertUInt32ToHex8Digits(UInt32 value, char *s) throw();
// void ConvertUInt32ToHex8Digits(UInt32 value, wchar_t *s) throw();

void ConvertInt64ToString(Int64 value, char *s) throw();
void ConvertInt64ToString(Int64 value, wchar_t *s) throw();

// use RawLeGuid only for RAW bytes that contain stored GUID as Little-endian.
char *RawLeGuidToString(const Byte *guid, char *s) throw();
char *RawLeGuidToString_Braced(const Byte *guid, char *s) throw();

#endif
```

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```
// LzmaDecoder.h

#ifndef __LZMA_DECODER_H
#define __LZMA_DECODER_H

// #include "../../../C/Alloc.h"
#include "../../../C/LzmaDec.h"

#include "../../Common/MyCom.h"
#include "../ICoder.h"

namespace NCompress {
namespace NLzma {

class CDecoder:
 public ICompressCoder,
 public ICompressSetDecoderProperties2,
 public ICompressSetFinishMode,
 public ICompressGetInStreamProcessedSize,
 public ICompressSetBufSize,
 #ifndef NO_READ_FROM_CODER
 public ICompressSetInStream,
 public ICompressSetOutStreamSize,
 public ISequentialInStream,
 #endif
 public CMyUnknownImp
{
 Byte *_inBuf;
 UInt32 _inPos;
 UInt32 _inLim;

 ELzmaStatus _lzmaStatus;

public:
 bool FinishStream; // set it before decoding, if you need to decode full LZMA stream

private:
 bool _propsWereSet;
 bool _outSizeDefined;
 UInt64 _outSize;
 UInt64 _inProcessed;
 UInt64 _outProcessed;

 UInt32 _outStep;
 UInt32 _inBufSize;
 UInt32 _inBufSizeNew;

 // CAlignOffsetAlloc _alloc;
```

```
 CLzmaDec _state;

 HRESULT
 CreateInputBuffer();
 HRESULT CodeSpec(ISequentialInStream *inStream, ISequentialOutStream *outStream, ICompressProgressInfo
*progress);
 void SetOutStreamSizeResume(const UInt64 *outSize);

public:
 MY_QUERYINTERFACE_BEGIN2(ICompressCoder)
 MY_QUERYINTERFACE_ENTRY(ICompressSetDecoderProperties2)
 MY_QUERYINTERFACE_ENTRY(ICompressSetFinishMode)
 MY_QUERYINTERFACE_ENTRY(ICompressGetInStreamProcessedSize)
 MY_QUERYINTERFACE_ENTRY(ICompressSetBufSize)
 #ifndef NO_READ_FROM_CODER
 MY_QUERYINTERFACE_ENTRY(ICompressSetInStream)
 MY_QUERYINTERFACE_ENTRY(ICompressSetOutStreamSize)
 MY_QUERYINTERFACE_ENTRY(ISequentialInStream)
 #endif
 MY_QUERYINTERFACE_END
 MY_ADDREF_RELEASE

 STDMETHOD(Code)(ISequentialInStream *inStream, ISequentialOutStream *outStream,
    const UInt64 *inSize, const UInt64 *outSize, ICompressProgressInfo *progress);
 STDMETHOD(SetDecoderProperties2)(const Byte *data, UInt32 size);
 STDMETHOD(SetFinishMode)(UInt32 finishMode);
 STDMETHOD(GetInStreamProcessedSize)(UInt64
 *value);
 STDMETHOD(SetOutStreamSize)(const UInt64 *outSize);
 STDMETHOD(SetInBufSize)(UInt32 streamIndex, UInt32 size);
 STDMETHOD(SetOutBufSize)(UInt32 streamIndex, UInt32 size);

 #ifndef NO_READ_FROM_CODER

private:
 CMyComPtr<ISequentialInStream> _inStream;
public:

 STDMETHOD(SetInStream)(ISequentialInStream *inStream);
 STDMETHOD(ReleaseInStream)();
 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);

 HRESULT CodeResume(ISequentialOutStream *outStream, const UInt64 *outSize, ICompressProgressInfo
*progress);
 HRESULT ReadFromInputStream(void *data, UInt32 size, UInt32 *processedSize);

 #endif
```

```
 UInt64 GetInputProcessedSize() const { return _inProcessed; }

 CDecoder();
 virtual ~CDecoder();

 UInt64 GetOutputProcessedSize() const { return _outProcessed; }

 bool NeedsMoreInput() const { return _lzmaStatus == LZMA_STATUS_NEEDS_MORE_INPUT; }

 bool CheckFinishStatus(bool withEndMark) const
 {
   return _lzmaStatus == (withEndMark
 ?
      LZMA_STATUS_FINISHED_WITH_MARK :
      LZMA_STATUS_MAYBE_FINISHED_WITHOUT_MARK);
 }
};

}}

#endif
/* ATK -  Accessibility Toolkit
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* Boston, MA 02111-1307, USA.
*/

#if defined(ATK_DISABLE_SINGLE_INCLUDES) && !defined (__ATK_H_INSIDE__) && !defined
(ATK_COMPILATION)
#error "Only <atk/atk.h> can be included directly."
#endif

#ifndef __ATK_SOCKET_H__
#define
```

```
 __ATK_SOCKET_H__

G_BEGIN_DECLS

#define ATK_TYPE_SOCKET              (atk_socket_get_type ())
#define ATK_SOCKET(obj)              (G_TYPE_CHECK_INSTANCE_CAST ((obj), ATK_TYPE_SOCKET,
AtkSocket))
#define ATK_IS_SOCKET(obj)           (G_TYPE_CHECK_INSTANCE_TYPE ((obj), ATK_TYPE_SOCKET))
#define ATK_SOCKET_CLASS(klass)      (G_TYPE_CHECK_CLASS_CAST ((klass), ATK_TYPE_SOCKET,
AtkSocketClass))
#define ATK_IS_SOCKET_CLASS(klass)   (G_TYPE_CHECK_CLASS_TYPE ((klass), ATK_TYPE_SOCKET))
#define ATK_SOCKET_GET_CLASS(obj)    (G_TYPE_INSTANCE_GET_CLASS ((obj),
ATK_TYPE_SOCKET, AtkSocketClass))

typedef struct _AtkSocket        AtkSocket;
typedef struct _AtkSocketClass   AtkSocketClass;

struct _AtkSocket
{
 AtkObject parent;

 /*< private >*/
 gchar* embedded_plug_id;
};

GType atk_socket_get_type (void);

struct _AtkSocketClass
{
 AtkObjectClass parent_class;

 /* to be subscribed to by atk-bridge */

 /*< protected >*/
 void (* embed) (AtkSocket *obj, gchar* plug_id);
};

AtkObject*
   atk_socket_new          (void);
void         atk_socket_embed        (AtkSocket* obj, gchar* plug_id);
gboolean     atk_socket_is_occupied  (AtkSocket* obj);

G_END_DECLS

#endif /* __ATK_SOCKET_H__ */
```

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```
#define IDD_OVERWRITE     3500
#define IDD_OVERWRITE_2  13500

#define IDT_OVERWRITE_HEADER          3501
#define IDT_OVERWRITE_QUESTION_BEGIN  3502
#define IDT_OVERWRITE_QUESTION_END    3503
#define IDS_FILE_SIZE                 3504

#define IDB_AUTO_RENAME               3505
#define IDB_YES_TO_ALL                440
#define IDB_NO_TO_ALL                 441

#define IDI_OVERWRITE_OLD_FILE            100
#define IDI_OVERWRITE_NEW_FILE            101

#define IDT_OVERWRITE_OLD_FILE_SIZE_TIME   102
#define IDT_OVERWRITE_NEW_FILE_SIZE_TIME   103
CFLAGS = $(CFLAGS) -D_7ZIP_PPMD_SUPPPORT

PROG = 7zDec.exe

C_OBJS = \
 $O\7zAlloc.obj \
 $O\7zBuf.obj \
 $O\7zCrc.obj \
 $O\7zCrcOpt.obj \
 $O\7zFile.obj \
 $O\7zDec.obj \
 $O\7zArcIn.obj \
 $O\7zStream.obj \
 $O\Bcj2.obj \
 $O\Bra.obj \
```

```
 $O\Bra86.obj \
 $O\BraIA64.obj \
 $O\CpuArch.obj \
 $O\Delta.obj \
 $O\Lzma2Dec.obj \
 $O\LzmaDec.obj \
 $O\Ppmd7.obj \
 $O\Ppmd7Dec.obj \

7Z_OBJS = \
 $O\7zMain.obj \

OBJS = \
 $O\Precomp.obj \
 $(7Z_OBJS) \
 $(C_OBJS) \

!include "../../../CPP/Build.mak"

$(7Z_OBJS): $(*B).c
 $(CCOMPL_USE)
$(C_OBJS): ../../$(*B).c
 $(CCOMPL_USE)
$O\Precomp.obj: Precomp.c
 $(CCOMPL_PCH)
```

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// LimitedStreams.h

```
#ifndef __LIMITED_STREAMS_H
#define __LIMITED_STREAMS_H

#include "../../Common/MyBuffer.h"
#include "../../Common/MyCom.h"
#include "../../Common/MyVector.h"
#include "../IStream.h"

class CLimitedSequentialInStream:
 public ISequentialInStream,
 public CMyUnknownImp
{
 CMyComPtr<ISequentialInStream> _stream;
 UInt64 _size;
 UInt64 _pos;
 bool _wasFinished;
public:
 void SetStream(ISequentialInStream *stream) { _stream = stream; }
 void ReleaseStream() { _stream.Release(); }
 void Init(UInt64 streamSize)
 {
   _size = streamSize;
   _pos = 0;
   _wasFinished = false;
 }

 MY_UNKNOWN_IMP1(ISequentialInStream)

 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 UInt64 GetSize() const { return _pos; }
 UInt64 GetRem() const { return _size - _pos; }
 bool WasFinished() const { return _wasFinished; }
};

class CLimitedInStream:
 public IInStream,
 public CMyUnknownImp
{
 CMyComPtr<IInStream> _stream;
 UInt64 _virtPos;
 UInt64 _physPos;
  UInt64 _size;
 UInt64 _startOffset;

 HRESULT SeekToPhys() { return _stream->Seek(_physPos, STREAM_SEEK_SET, NULL); }
public:
 void SetStream(IInStream *stream) { _stream = stream; }
 HRESULT InitAndSeek(UInt64 startOffset, UInt64 size)
```

```
 {
   _startOffset = startOffset;
   _physPos = startOffset;
   _virtPos = 0;
   _size = size;
   return SeekToPhys();
 }

 MY_UNKNOWN_IMP2(ISequentialInStream, IInStream)

 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition);

 HRESULT SeekToStart() { return Seek(0, STREAM_SEEK_SET, NULL); }
};

HRESULT CreateLimitedInStream(IInStream *inStream, UInt64 pos, UInt64 size, ISequentialInStream
**resStream);

class CClusterInStream:
 public IInStream,
 public CMyUnknownImp
{
 UInt64 _virtPos;
 UInt64 _physPos;
 UInt32 _curRem;
public:
 unsigned BlockSizeLog;
 UInt64 Size;
 CMyComPtr<IInStream> Stream;
 CRecordVector<UInt32> Vector;
 UInt64
 StartOffset;

 HRESULT SeekToPhys() { return Stream->Seek(_physPos, STREAM_SEEK_SET, NULL); }

 HRESULT InitAndSeek()
 {
   _curRem = 0;
   _virtPos = 0;
   _physPos = StartOffset;
   if (Vector.Size() > 0)
   {
     _physPos = StartOffset + (Vector[0] << BlockSizeLog);
     return SeekToPhys();
   }
   return S_OK;
 }
```

```
 MY_UNKNOWN_IMP2(ISequentialInStream, IInStream)

 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition);
};

struct CSeekExtent
{
 UInt64 Phy;
 UInt64 Virt;
};

class CExtentsStream:
 public IInStream,
 public CMyUnknownImp
{
 UInt64 _phyPos;
 UInt64 _virtPos;
 bool _needStartSeek;

 HRESULT SeekToPhys() { return Stream->Seek(_phyPos, STREAM_SEEK_SET, NULL); }

public:
 CMyComPtr<IInStream> Stream;
 CRecordVector<CSeekExtent> Extents;

 MY_UNKNOWN_IMP2(ISequentialInStream, IInStream)
 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(Seek)(Int64
 offset, UInt32 seekOrigin, UInt64 *newPosition);
 void ReleaseStream() { Stream.Release(); }

 void Init()
 {
   _virtPos = 0;
   _phyPos = 0;
   _needStartSeek = true;
 }
};

class CLimitedSequentialOutStream:
 public ISequentialOutStream,
 public CMyUnknownImp
{
 CMyComPtr<ISequentialOutStream> _stream;
 UInt64 _size;
 bool _overflow;
```

```
 bool _overflowIsAllowed;
public:
 MY_UNKNOWN_IMP1(ISequentialOutStream)
 STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
 void SetStream(ISequentialOutStream *stream) { _stream = stream; }
 void ReleaseStream() { _stream.Release(); }
 void Init(UInt64 size, bool overflowIsAllowed = false)
 {
   _size = size;
   _overflow = false;
   _overflowIsAllowed = overflowIsAllowed;
 }
 bool IsFinishedOK() const { return (_size == 0 && !_overflow); }
 UInt64 GetRem() const { return _size; }
};


class CTailInStream:
 public IInStream,
 public CMyUnknownImp
{
 UInt64 _virtPos;
public:
 CMyComPtr<IInStream>
 Stream;
 UInt64 Offset;

 void Init()
 {
   _virtPos = 0;
 }

 MY_UNKNOWN_IMP2(ISequentialInStream, IInStream)

 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition);

 HRESULT SeekToStart() { return Stream->Seek(Offset, STREAM_SEEK_SET, NULL); }
};

class CLimitedCachedInStream:
 public IInStream,
 public CMyUnknownImp
{
 CMyComPtr<IInStream> _stream;
 UInt64 _virtPos;
 UInt64 _physPos;
 UInt64 _size;
```

```
 UInt64 _startOffset;

 const Byte *_cache;
 size_t _cacheSize;
 size_t _cachePhyPos;


 HRESULT SeekToPhys() { return _stream->Seek(_physPos, STREAM_SEEK_SET, NULL); }
public:
 CByteBuffer Buffer;

 void SetStream(IInStream *stream) { _stream = stream; }
 void SetCache(size_t cacheSize, size_t cachePos)
 {
   _cache = Buffer;
   _cacheSize = cacheSize;
   _cachePhyPos = cachePos;
 }

 HRESULT InitAndSeek(UInt64 startOffset, UInt64 size)
 {
   _startOffset = startOffset;
    _physPos = startOffset;
   _virtPos = 0;
   _size = size;
   return SeekToPhys();
 }

 MY_UNKNOWN_IMP2(ISequentialInStream, IInStream)

 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition);

 HRESULT SeekToStart() { return Seek(0, STREAM_SEEK_SET, NULL); }
};

class CTailOutStream:
 public IOutStream,
 public CMyUnknownImp
{
 UInt64 _virtPos;
 UInt64 _virtSize;
public:
 CMyComPtr<IOutStream> Stream;
 UInt64 Offset;

 virtual ~CTailOutStream() {}
```

```
MY_UNKNOWN_IMP2(ISequentialOutStream, IOutStream)

void Init()
{
  _virtPos = 0;
  _virtSize = 0;
}

STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition);
STDMETHOD(SetSize)(UInt64 newSize);
};

#endif
```

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```
; LzmaDecOpt.asm -- ASM version of LzmaDec_DecodeReal_3() function
; 2018-02-06: Igor Pavlov : Public domain
;
; 3 - is the code compatibility version of LzmaDec_DecodeReal_*()
; function for check at link time.
; That code is tightly coupled with LzmaDec_TryDummy()
; and with another functions in LzmaDec.c file.
; CLzmaDec structure, (probs) array layout, input and output of
; LzmaDec_DecodeReal_*() must be equal in both versions (C / ASM).

ifndef x64
; x64=1
; .err <x64_IS_REQUIRED>
endif
```

```
include 7zAsm.asm

MY_ASM_START

_TEXT$LZMADECOPT SEGMENT ALIGN(64) 'CODE'

MY_ALIGN macro num:req
      align  num
endm

MY_ALIGN_16 macro
      MY_ALIGN 16
endm

MY_ALIGN_32 macro
      MY_ALIGN 32
endm

MY_ALIGN_64 macro
      MY_ALIGN 64
endm


; _LZMA_SIZE_OPT  equ 1

; _LZMA_PROB32 equ 1

ifdef _LZMA_PROB32
      PSHIFT  equ 2
      PLOAD macro dest, mem
            mov     dest, dword ptr [mem]
      endm
      PSTORE  macro src, mem
            mov     dword ptr [mem],
 src
      endm
else
      PSHIFT  equ 1
      PLOAD macro dest, mem
            movzx   dest, word ptr [mem]
      endm
      PSTORE macro src, mem
            mov     word ptr [mem], @CatStr(src, _W)
      endm
endif

PMULT          equ (1 SHL PSHIFT)
PMULT_HALF      equ (1 SHL (PSHIFT - 1))
```

```
PMULT_2         equ (1 SHL (PSHIFT + 1))


;       x0      range
;       x1      pbPos / (prob) TREE
;       x2      probBranch / prm (MATCHED) / pbPos / cnt
;       x3      sym
;====== r4 ===  RSP
;       x5      cod
;       x6      t1 NORM_CALC / probs_state / dist
;       x7      t0 NORM_CALC / prob2 IF_BIT_1
;       x8      state
;       x9      match (MATCHED) / sym2 / dist2 / lpMask_reg
;       x10     kBitModelTotal_reg
;       r11     probs
;       x12     offs (MATCHED) / dic / len_temp
;       x13     processedPos
;       x14     bit (MATCHED) / dicPos
;       r15     buf


cod     equ x5
cod_L   equ x5_L
range   equ x0
state   equ x8
state_R equ r8
buf     equ r15
processedPos
 equ x13
kBitModelTotal_reg equ x10

probBranch   equ x2
probBranch_R equ r2
probBranch_W equ x2_W

pbPos   equ x1
pbPos_R equ r1

cnt     equ x2
cnt_R   equ r2

lpMask_reg equ x9
dicPos  equ r14

sym     equ x3
sym_R   equ r3
sym_L   equ x3_L
```

```
probs   equ r11
dic     equ r12

t0      equ x7
t0_W    equ x7_W
t0_R    equ r7

prob2   equ t0
prob2_W equ t0_W

t1      equ x6
t1_R    equ r6

probs_state     equ t1
probs_state_R   equ t1_R

prm     equ r2
match   equ x9
match_R equ r9
offs    equ x12
offs_R  equ r12
bit     equ x14
bit_R   equ r14

sym2    equ x9
sym2_R  equ r9

len_temp equ x12

dist    equ sym
dist2   equ x9



kNumBitModelTotalBits   equ 11
kBitModelTotal          equ (1 SHL kNumBitModelTotalBits)
kNumMoveBits            equ 5
kBitModelOffset         equ ((1 SHL kNumMoveBits) - 1)
kTopValue               equ (1 SHL 24)

NORM_2 macro
      ; movzx   t0, BYTE PTR [buf]
      shl     cod, 8
      mov     cod_L, BYTE PTR [buf]
      shl     range, 8

     ; or      cod, t0
      inc     buf
```

```
endm


NORM macro
      cmp     range, kTopValue
      jae     SHORT @F
      NORM_2
@@:
endm


; ---------- Branch MACROS ----------

UPDATE_0 macro probsArray:req, probOffset:req, probDisp:req
      mov     prob2, kBitModelTotal_reg
      sub     prob2, probBranch
      shr     prob2, kNumMoveBits
      add     probBranch, prob2
      PSTORE  probBranch, probOffset * 1 + probsArray + probDisp * PMULT
endm


UPDATE_1 macro probsArray:req, probOffset:req, probDisp:req
      sub     prob2, range
      sub     cod, range
      mov     range, prob2
      mov     prob2, probBranch
      shr     probBranch, kNumMoveBits
      sub     prob2, probBranch
      PSTORE  prob2, probOffset * 1 + probsArray + probDisp * PMULT
endm


CMP_COD macro probsArray:req, probOffset:req, probDisp:req
      PLOAD   probBranch, probOffset * 1 + probsArray + probDisp * PMULT
      NORM
      mov     prob2, range
      shr     range,
 kNumBitModelTotalBits
      imul    range, probBranch
      cmp     cod, range
endm


IF_BIT_1_NOUP macro probsArray:req, probOffset:req, probDisp:req, toLabel:req
      CMP_COD probsArray, probOffset, probDisp
      jae     toLabel
endm
```

```
IF_BIT_1 macro probsArray:req, probOffset:req, probDisp:req, toLabel:req
      IF_BIT_1_NOUP probsArray, probOffset, probDisp, toLabel
      UPDATE_0 probsArray, probOffset, probDisp
endm


IF_BIT_0_NOUP macro probsArray:req, probOffset:req, probDisp:req, toLabel:req
      CMP_COD probsArray, probOffset, probDisp
      jb      toLabel
endm


; ---------- CMOV MACROS ----------

NORM_CALC macro prob:req
      NORM
      mov     t0, range
      shr     range, kNumBitModelTotalBits
      imul    range, prob
      sub     t0, range
      mov     t1, cod
      sub     cod, range
endm


PUP macro prob:req, probPtr:req
      sub     t0, prob
     ; only sar works for both 16/32 bit prob modes
      sar     t0, kNumMoveBits
       add     t0, prob
      PSTORE  t0, probPtr
endm


PUP_SUB macro prob:req, probPtr:req, symSub:req
      sbb     sym, symSub
      PUP prob, probPtr
endm


PUP_COD macro prob:req, probPtr:req, symSub:req
      mov     t0, kBitModelOffset
      cmovb   cod, t1
      mov     t1, sym
      cmovb   t0, kBitModelTotal_reg
      PUP_SUB prob, probPtr, symSub
```

```
endm


BIT_0 macro prob:req, probNext:req
      PLOAD   prob, probs + 1 * PMULT
      PLOAD   probNext, probs + 1 * PMULT_2

      NORM_CALC prob

      cmovae  range, t0
      PLOAD   t0, probs + 1 * PMULT_2 + PMULT
      cmovae  probNext, t0
      mov     t0, kBitModelOffset
      cmovb   cod, t1
      cmovb   t0, kBitModelTotal_reg
      mov     sym, 2
      PUP_SUB prob, probs + 1 * PMULT, 0 - 1
endm


BIT_1 macro prob:req, probNext:req
      PLOAD   probNext, probs + sym_R * PMULT_2
      add     sym, sym

      NORM_CALC prob

      cmovae  range, t0

      PLOAD   t0, probs + sym_R * PMULT + PMULT
      cmovae  probNext, t0
      PUP_COD prob, probs + t1_R * PMULT_HALF, 0 - 1
endm


BIT_2 macro prob:req, symSub:req
      add     sym, sym

      NORM_CALC prob

      cmovae  range, t0
      PUP_COD prob, probs + t1_R * PMULT_HALF, symSub
endm


; ---------- MATCHED LITERAL ----------

LITM_0 macro
      mov     offs, 256 * PMULT
```

```
        shl     match, (PSHIFT + 1)
        mov     bit, offs
        and     bit, match
        PLOAD   x1, probs + 256 * PMULT + bit_R * 1 + 1 * PMULT
        lea     prm, [probs + 256 * PMULT + bit_R * 1 + 1 * PMULT]
        ; lea     prm, [probs + 256 * PMULT + 1 * PMULT]
        ; add     prm, bit_R
        xor     offs, bit
        add     match, match

        NORM_CALC x1

        cmovae  offs, bit
        mov     bit, match
        cmovae  range, t0
        mov     t0, kBitModelOffset
        cmovb   cod, t1
        cmovb   t0, kBitModelTotal_reg
        mov     sym, 0

 PUP_SUB x1, prm, -2-1
endm


LITM macro
        and     bit, offs
        lea     prm, [probs + offs_R * 1]
        add     prm, bit_R
        PLOAD   x1, prm + sym_R * PMULT
        xor     offs, bit
        add     sym, sym
        add     match, match

        NORM_CALC x1

        cmovae  offs, bit
        mov     bit, match
        cmovae  range, t0
        PUP_COD x1, prm + t1_R * PMULT_HALF, - 1
endm


LITM_2 macro
        and     bit, offs
        lea     prm, [probs + offs_R * 1]
        add     prm, bit_R
        PLOAD   x1, prm + sym_R * PMULT
        add     sym, sym
```

```
        NORM_CALC x1

        cmovae  range, t0
        PUP_COD x1, prm + t1_R * PMULT_HALF, 256 - 1
endm


; ---------- REVERSE BITS ----------

REV_0 macro prob:req, probNext:req
        ; PLOAD   prob, probs + 1 * PMULT
        ; lea     sym2_R, [probs + 2 * PMULT]
        ; PLOAD   probNext, probs + 2 * PMULT
        PLOAD   probNext, sym2_R

        NORM_CALC prob

        cmovae  range, t0
        PLOAD
    t0, probs + 3 * PMULT
        cmovae  probNext, t0
        cmovb   cod, t1
        mov     t0, kBitModelOffset
        cmovb   t0, kBitModelTotal_reg
        lea     t1_R, [probs + 3 * PMULT]
        cmovae  sym2_R, t1_R
        PUP prob, probs + 1 * PMULT
endm


REV_1 macro prob:req, probNext:req, step:req
        add     sym2_R, step * PMULT
        PLOAD   probNext, sym2_R

        NORM_CALC prob

        cmovae  range, t0
        PLOAD   t0, sym2_R + step * PMULT
        cmovae  probNext, t0
        cmovb   cod, t1
        mov     t0, kBitModelOffset
        cmovb   t0, kBitModelTotal_reg
        lea     t1_R, [sym2_R + step * PMULT]
        cmovae  sym2_R, t1_R
        PUP prob, t1_R - step * PMULT_2
endm
```

```
REV_2 macro prob:req, step:req
      sub     sym2_R, probs
      shr     sym2, PSHIFT
      or      sym, sym2

      NORM_CALC prob

      cmovae  range, t0
      lea     t0, [sym - step]
      cmovb   sym, t0
      cmovb   cod, t1
      mov     t0, kBitModelOffset
       cmovb   t0, kBitModelTotal_reg
      PUP prob, probs + sym2_R * PMULT
endm


REV_1_VAR macro prob:req
      PLOAD   prob, sym_R
      mov     probs, sym_R
      add     sym_R, sym2_R

      NORM_CALC prob

      cmovae  range, t0
      lea     t0_R, [sym_R + sym2_R]
      cmovae  sym_R, t0_R
      mov     t0, kBitModelOffset
      cmovb   cod, t1
      ; mov     t1, kBitModelTotal
      ; cmovb   t0, t1
      cmovb   t0, kBitModelTotal_reg
      add     sym2, sym2
      PUP prob, probs
endm




LIT_PROBS macro lpMaskParam:req
      ; prob += (UInt32)3 * ((((processedPos << 8) + dic[(dicPos == 0 ? dicBufSize : dicPos) - 1]) & lpMask) << lc);
      mov     t0, processedPos
      shl     t0, 8
      add     sym, t0
      and     sym, lpMaskParam
      add     probs_state_R, pbPos_R
      mov     x1, LOC lc2
```

```
        lea     sym, dword ptr[sym_R + 2 * sym_R]
        add     probs, Literal * PMULT
        shl     sym, x1_L
        add
      probs, sym_R
        UPDATE_0 probs_state_R, 0, IsMatch
        inc     processedPos
endm



kNumPosBitsMax          equ 4
kNumPosStatesMax        equ (1 SHL kNumPosBitsMax)

kLenNumLowBits          equ 3
kLenNumLowSymbols       equ (1 SHL kLenNumLowBits)
kLenNumHighBits         equ 8
kLenNumHighSymbols      equ (1 SHL kLenNumHighBits)
kNumLenProbs            equ (2 * kLenNumLowSymbols * kNumPosStatesMax + kLenNumHighSymbols)

LenLow                  equ 0
LenChoice               equ LenLow
LenChoice2              equ (LenLow + kLenNumLowSymbols)
LenHigh                 equ (LenLow + 2 * kLenNumLowSymbols * kNumPosStatesMax)

kNumStates              equ 12
kNumStates2             equ 16
kNumLitStates           equ 7

kStartPosModelIndex     equ 4
kEndPosModelIndex       equ 14
kNumFullDistances       equ (1 SHL (kEndPosModelIndex SHR 1))

kNumPosSlotBits         equ 6
kNumLenToPosStates      equ 4

kNumAlignBits           equ 4
kAlignTableSize         equ (1 SHL kNumAlignBits)

kMatchMinLen
          equ 2
kMatchSpecLenStart      equ (kMatchMinLen + kLenNumLowSymbols * 2 + kLenNumHighSymbols)

kStartOffset    equ 1664
SpecPos         equ (-kStartOffset)
IsRep0Long      equ (SpecPos + kNumFullDistances)
RepLenCoder     equ (IsRep0Long + (kNumStates2 SHL kNumPosBitsMax))
LenCoder        equ (RepLenCoder + kNumLenProbs)
```

```
IsMatch         equ (LenCoder + kNumLenProbs)
kAlign          equ (IsMatch + (kNumStates2 SHL kNumPosBitsMax))
IsRep           equ (kAlign + kAlignTableSize)
IsRepG0         equ (IsRep + kNumStates)
IsRepG1         equ (IsRepG0 + kNumStates)
IsRepG2         equ (IsRepG1 + kNumStates)
PosSlot         equ (IsRepG2 + kNumStates)
Literal         equ (PosSlot + (kNumLenToPosStates SHL kNumPosSlotBits))
NUM_BASE_PROBS  equ (Literal + kStartOffset)

if kAlign ne 0
 .err <Stop_Compiling_Bad_LZMA_kAlign>
endif

if NUM_BASE_PROBS ne 1984
 .err <Stop_Compiling_Bad_LZMA_PROBS>
endif


PTR_FIELD equ dq ?

CLzmaDec_Asm struct
      lc      db ?
      lp
     db ?
      pb      db ?
      _pad_   db ?
      dicSize dd ?

      probs_Spec      PTR_FIELD
      probs_1664      PTR_FIELD
      dic_Spec        PTR_FIELD
      dicBufSize      PTR_FIELD
      dicPos_Spec     PTR_FIELD
      buf_Spec        PTR_FIELD

      range_Spec      dd ?
      code_Spec       dd ?
      processedPos_Spec  dd ?
      checkDicSize    dd ?
      rep0    dd ?
      rep1    dd ?
      rep2    dd ?
      rep3    dd ?
      state_Spec      dd ?
      remainLen dd ?
CLzmaDec_Asm ends
```

```
CLzmaDec_Asm_Loc struct
    OLD_RSP    PTR_FIELD
    lzmaPtr    PTR_FIELD
    _pad0_     PTR_FIELD
    _pad1_     PTR_FIELD
    _pad2_     PTR_FIELD
    dicBufSize PTR_FIELD
    probs_Spec PTR_FIELD
    dic_Spec   PTR_FIELD

    limit      PTR_FIELD
    bufLimit   PTR_FIELD
    lc2        dd ?
    lpMask     dd ?
    pbMask     dd ?
    checkDicSize   dd ?

    _pad_      dd ?
     remainLen dd ?
    dicPos_Spec     PTR_FIELD
    rep0       dd ?
    rep1       dd ?
    rep2       dd ?
    rep3       dd ?
CLzmaDec_Asm_Loc ends


GLOB_2  equ [sym_R].CLzmaDec_Asm.
GLOB    equ [r1].CLzmaDec_Asm.
LOC_0   equ [r0].CLzmaDec_Asm_Loc.
LOC     equ [RSP].CLzmaDec_Asm_Loc.


COPY_VAR macro name
    mov     t0, GLOB_2 name
    mov     LOC_0 name, t0
endm


RESTORE_VAR macro name
    mov     t0, LOC name
    mov     GLOB name, t0
endm



IsMatchBranch_Pre macro reg
```

```
        ; prob = probs + IsMatch + (state << kNumPosBitsMax) + posState;
        mov     pbPos, LOC pbMask
        and     pbPos, processedPos
        shl     pbPos, (kLenNumLowBits + 1 + PSHIFT)
        lea     probs_state_R, [probs + state_R]
endm


IsMatchBranch macro reg
        IsMatchBranch_Pre
        IF_BIT_1 probs_state_R, pbPos_R, IsMatch, IsMatch_label
endm


CheckLimits macro reg
        cmp     buf, LOC bufLimit
        jae     fin_OK
        cmp     dicPos,
 LOC limit
        jae     fin_OK
endm



; RSP is (16x + 8) bytes aligned in WIN64-x64
; LocalSize equ ((((SIZEOF CLzmaDec_Asm_Loc) + 7) / 16 * 16) + 8)

PARAM_lzma      equ REG_PARAM_0
PARAM_limit     equ REG_PARAM_1
PARAM_bufLimit  equ REG_PARAM_2

; MY_ALIGN_64
MY_PROC LzmaDec_DecodeReal_3, 3
MY_PUSH_PRESERVED_REGS

        lea     r0, [RSP - (SIZEOF CLzmaDec_Asm_Loc)]
        and     r0, -128
        mov     r5, RSP
        mov     RSP, r0
        mov     LOC_0 Old_RSP, r5
        mov     LOC_0 lzmaPtr, PARAM_lzma

        mov     LOC_0 remainLen, 0  ; remainLen must be ZERO

        mov     LOC_0 bufLimit, PARAM_bufLimit
        mov     sym_R, PARAM_lzma  ;  CLzmaDec_Asm_Loc pointer for GLOB_2
        mov     dic, GLOB_2 dic_Spec
        add     PARAM_limit, dic
```

```
mov     LOC_0 limit, PARAM_limit

COPY_VAR(rep0)
COPY_VAR(rep1)
COPY_VAR(rep2)
COPY_VAR(rep3)

mov     dicPos, GLOB_2 dicPos_Spec
add     dicPos, dic
 mov     LOC_0 dicPos_Spec, dicPos
mov     LOC_0 dic_Spec, dic

mov     x1_L, GLOB_2 pb
mov     t0, 1
shl     t0, x1_L
dec     t0
mov     LOC_0 pbMask, t0

; unsigned pbMask = ((unsigned)1 << (p->prop.pb)) - 1;
; unsigned lc = p->prop.lc;
; unsigned lpMask = ((unsigned)0x100 << p->prop.lp) - ((unsigned)0x100 >> lc);

mov     x1_L, GLOB_2 lc
mov     x2, 100h
mov     t0, x2
shr     x2, x1_L
; inc     x1
add     x1_L, PSHIFT
mov     LOC_0 lc2, x1
mov     x1_L, GLOB_2 lp
shl     t0, x1_L
sub     t0, x2
mov     LOC_0 lpMask, t0
mov     lpMask_reg, t0

; mov     probs, GLOB_2 probs_Spec
; add     probs, kStartOffset SHL PSHIFT
mov     probs, GLOB_2 probs_1664
mov     LOC_0 probs_Spec, probs

mov     t0_R, GLOB_2 dicBufSize
mov     LOC_0 dicBufSize, t0_R

mov     x1, GLOB_2 checkDicSize
mov     LOC_0 checkDicSize, x1

mov     processedPos, GLOB_2 processedPos_Spec
```

```
        mov     state, GLOB_2 state_Spec
        shl     state, PSHIFT

        mov     buf,   GLOB_2 buf_Spec
        mov     range, GLOB_2 range_Spec
        mov     cod,   GLOB_2 code_Spec
        mov     kBitModelTotal_reg, kBitModelTotal
        xor     sym, sym

        ; if (processedPos != 0 || checkDicSize != 0)
        or      x1, processedPos
        jz      @f

        add     t0_R, dic
        cmp     dicPos, dic
        cmovnz  t0_R, dicPos
        movzx   sym, byte ptr[t0_R - 1]

@@:
        IsMatchBranch_Pre
        cmp     state, 4 * PMULT
        jb      lit_end
        cmp     state, kNumLitStates * PMULT
        jb      lit_matched_end
        jmp     lz_end




; ---------- LITERAL ----------
MY_ALIGN_64
lit_start:
        xor     state, state
lit_start_2:
        LIT_PROBS lpMask_reg

    ifdef _LZMA_SIZE_OPT

         PLOAD   x1, probs + 1 * PMULT
        mov     sym, 1
MY_ALIGN_16
lit_loop:
        BIT_1   x1, x2
        mov     x1, x2
        cmp     sym, 127
        jbe     lit_loop

    else
```

```
        BIT_0   x1, x2
        BIT_1   x2, x1
        BIT_1   x1, x2
        BIT_1   x2, x1
        BIT_1   x1, x2
        BIT_1   x2, x1
        BIT_1   x1, x2

    endif

        BIT_2   x2, 256 - 1

        ; mov     dic, LOC dic_Spec
        mov     probs, LOC probs_Spec
        IsMatchBranch_Pre
        mov     byte ptr[dicPos], sym_L
        inc     dicPos

        CheckLimits
lit_end:
        IF_BIT_0_NOUP probs_state_R, pbPos_R, IsMatch, lit_start

        ; jmp     IsMatch_label

; ---------- MATCHES ----------
; MY_ALIGN_32
IsMatch_label:
        UPDATE_1 probs_state_R, pbPos_R, IsMatch
        IF_BIT_1 probs_state_R, 0, IsRep, IsRep_label

        add     probs, LenCoder * PMULT
        add     state, kNumStates * PMULT

;
 ---------- LEN DECODE ----------
len_decode:
        mov     len_temp, 8 - 1 - kMatchMinLen
        IF_BIT_0_NOUP probs, 0, 0, len_mid_0
        UPDATE_1 probs, 0, 0
        add     probs, (1 SHL (kLenNumLowBits + PSHIFT))
        mov     len_temp, -1 - kMatchMinLen
        IF_BIT_0_NOUP probs, 0, 0, len_mid_0
        UPDATE_1 probs, 0, 0
        add     probs, LenHigh * PMULT - (1 SHL (kLenNumLowBits + PSHIFT))
        mov     sym, 1
        PLOAD   x1, probs + 1 * PMULT
```

```
MY_ALIGN_32
len8_loop:
      BIT_1   x1, x2
      mov     x1, x2
      cmp     sym, 64
      jb      len8_loop

      mov     len_temp, (kLenNumHighSymbols - kLenNumLowSymbols * 2) - 1 - kMatchMinLen
      jmp     len_mid_2

MY_ALIGN_32
len_mid_0:
      UPDATE_0 probs, 0, 0
      add     probs, pbPos_R
      BIT_0   x2, x1
len_mid_2:
      BIT_1   x1, x2
      BIT_2   x2, len_temp
      mov     probs, LOC probs_Spec
      cmp     state, kNumStates * PMULT
      jb      copy_match


; ---------- DECODE DISTANCE ----------
      ; probs + PosSlot + ((len < kNumLenToPosStates ? len : kNumLenToPosStates - 1) << kNumPosSlotBits);

      mov     t0, 3 + kMatchMinLen
      cmp     sym, 3 + kMatchMinLen
      cmovb   t0, sym
      add     probs, PosSlot * PMULT - (kMatchMinLen SHL (kNumPosSlotBits + PSHIFT))
      shl     t0, (kNumPosSlotBits + PSHIFT)
      add     probs, t0_R

      ; sym = Len
      ; mov     LOC remainLen, sym
      mov     len_temp, sym

  ifdef _LZMA_SIZE_OPT

      PLOAD   x1, probs + 1 * PMULT
      mov     sym, 1
MY_ALIGN_16
slot_loop:
      BIT_1   x1, x2
      mov     x1, x2
      cmp     sym, 32
      jb      slot_loop
```

```
  else

      BIT_0   x1, x2
      BIT_1   x2, x1
      BIT_1   x1, x2
      BIT_1   x2, x1
      BIT_1   x1, x2

  endif

      mov     x1, sym
      BIT_2   x2, 64-1

      and     sym, 3
      mov     probs, LOC
 probs_Spec
      cmp     x1, 32 + kEndPosModelIndex / 2
      jb      short_dist

      ;  unsigned numDirectBits = (unsigned)(((distance >> 1) - 1));
      sub     x1, (32 + 1 + kNumAlignBits)
      ;  distance = (2 | (distance & 1));
      or      sym, 2
      PLOAD   x2, probs + 1 * PMULT
      shl     sym, kNumAlignBits + 1
      lea     sym2_R, [probs + 2 * PMULT]

      jmp     direct_norm
      ; lea     t1, [sym_R + (1 SHL kNumAlignBits)]
      ; cmp     range, kTopValue
      ; jb      direct_norm

; ---------- DIRECT DISTANCE ----------
MY_ALIGN_32
direct_loop:
      shr     range, 1
      mov     t0, cod
      sub     cod, range
      cmovs   cod, t0
      cmovns  sym, t1

      comment ~
      sub     cod, range
      mov     x2, cod
      sar     x2, 31
      lea     sym, dword ptr [r2 + sym_R * 2 + 1]
      and     x2, range
      add     cod, x2
```

```
        ~
        dec     x1
        je      direct_end

         add     sym, sym
direct_norm:
        lea     t1, [sym_R + (1 SHL kNumAlignBits)]
        cmp     range, kTopValue
        jae     near ptr direct_loop
        ; we align for 32 here with "near ptr" command above
        NORM_2
        jmp     direct_loop

MY_ALIGN_32
direct_end:
        ;  prob =  + kAlign;
        ;  distance <<= kNumAlignBits;
        REV_0   x2, x1
        REV_1   x1, x2, 2
        REV_1   x2, x1, 4
        REV_2   x1, 8

decode_dist_end:

        ; if (distance >= (checkDicSize == 0 ? processedPos: checkDicSize))

        mov     t0, LOC checkDicSize
        test    t0, t0
        cmove   t0, processedPos
        cmp     sym, t0
        jae     end_of_payload

        ; rep3 = rep2;
        ; rep2 = rep1;
        ; rep1 = rep0;
        ; rep0 = distance + 1;

        inc     sym
        mov     t0, LOC rep0
        mov     t1, LOC rep1
        mov     x1, LOC rep2
        mov     LOC rep0, sym
        ; mov     sym, LOC remainLen
        mov
      sym, len_temp
        mov     LOC rep1, t0
        mov     LOC rep2, t1
        mov     LOC rep3, x1
```

```
        ; state = (state < kNumStates + kNumLitStates) ? kNumLitStates : kNumLitStates + 3;
        cmp     state, (kNumStates + kNumLitStates) * PMULT
        mov     state, kNumLitStates * PMULT
        mov     t0, (kNumLitStates + 3) * PMULT
        cmovae  state, t0


; ---------- COPY MATCH ----------
copy_match:

        ; len += kMatchMinLen;
        ; add     sym, kMatchMinLen

        ; if ((rem = limit - dicPos) == 0)
        ; {
        ;   p->dicPos = dicPos;
        ;   return SZ_ERROR_DATA;
        ; }
        mov     cnt_R, LOC limit
        sub     cnt_R, dicPos
        jz      fin_ERROR

        ; curLen = ((rem < len) ? (unsigned)rem : len);
        cmp     cnt_R, sym_R
        ; cmovae  cnt_R, sym_R ; 64-bit
        cmovae  cnt, sym ; 32-bit

        mov     dic, LOC dic_Spec
        mov     x1, LOC rep0

        mov     t0_R, dicPos
        add
    dicPos, cnt_R
        ; processedPos += curLen;
        add     processedPos, cnt
        ; len -= curLen;
        sub     sym, cnt
        mov     LOC remainLen, sym

        sub     t0_R, dic

        ; pos = dicPos - rep0 + (dicPos < rep0 ? dicBufSize : 0);
        sub     t0_R, r1
        jae     @f

        mov     r1, LOC dicBufSize
        add     t0_R, r1
```

```
        sub     r1, t0_R
        cmp     cnt_R, r1
        ja      copy_match_cross
@@:
        ; if (curLen <= dicBufSize - pos)

; ---------- COPY MATCH FAST ----------
        ; Byte *dest = dic + dicPos;
        ; mov     r1, dic
        ; ptrdiff_t src = (ptrdiff_t)pos - (ptrdiff_t)dicPos;
        ; sub   t0_R, dicPos
        ; dicPos += curLen;

        ; const Byte *lim = dest + curLen;
        add     t0_R, dic
        movzx   sym, byte ptr[t0_R]
        add     t0_R, cnt_R
        neg     cnt_R
        ; lea     r1, [dicPos - 1]
copy_common:
        dec     dicPos
        ; cmp   LOC rep0, 1
        ; je
 rep0Label

        ; t0_R - src_lim
        ; r1 - dest_lim - 1
        ; cnt_R - (-cnt)

        IsMatchBranch_Pre
        inc     cnt_R
        jz      copy_end
MY_ALIGN_16
@@:
        mov     byte ptr[cnt_R * 1 + dicPos], sym_L
        movzx   sym, byte ptr[cnt_R * 1 + t0_R]
        inc     cnt_R
        jnz     @b

copy_end:
lz_end_match:
        mov     byte ptr[dicPos], sym_L
        inc     dicPos

        ; IsMatchBranch_Pre
        CheckLimits
lz_end:
        IF_BIT_1_NOUP probs_state_R, pbPos_R, IsMatch, IsMatch_label
```

```
; ---------- LITERAL MATCHED ----------

      LIT_PROBS LOC lpMask

      ; matchByte = dic[dicPos - rep0 + (dicPos < rep0 ? dicBufSize : 0)];
      mov     x1, LOC rep0
      ; mov     dic, LOC dic_Spec
      mov     LOC dicPos_Spec, dicPos

      ; state -= (state < 10) ? 3 : 6;
      lea     t0, [state_R - 6 * PMULT]
      sub     state, 3 * PMULT
      cmp     state, 7 * PMULT
      cmovae  state, t0

      sub     dicPos, dic
      sub     dicPos, r1
      jae     @f
      add     dicPos, LOC dicBufSize
@@:
      comment ~
      xor     t0, t0
      sub     dicPos, r1
      cmovb   t0_R, LOC dicBufSize
      ~

      movzx   match, byte ptr[dic + dicPos * 1]

  ifdef _LZMA_SIZE_OPT

      mov     offs, 256 * PMULT
      shl     match, (PSHIFT + 1)
      mov     bit, match
      mov     sym, 1
MY_ALIGN_16
litm_loop:
      LITM
      cmp     sym, 256
      jb      litm_loop
      sub     sym, 256

  else

      LITM_0
      LITM
```

```
        LITM
        LITM
        LITM
        LITM
        LITM
        LITM_2

    endif

        mov     probs, LOC probs_Spec
        IsMatchBranch_Pre
        ; mov     dic, LOC dic_Spec
        mov     dicPos, LOC dicPos_Spec
        mov     byte ptr[dicPos], sym_L
        inc     dicPos

        CheckLimits
lit_matched_end:
        IF_BIT_1_NOUP probs_state_R,
 pbPos_R, IsMatch, IsMatch_label
        ; IsMatchBranch
        mov     lpMask_reg, LOC lpMask
        sub     state, 3 * PMULT
        jmp     lit_start_2



; ---------- REP 0 LITERAL ----------
MY_ALIGN_32
IsRep0Short_label:
        UPDATE_0 probs_state_R, pbPos_R, IsRep0Long

        ; dic[dicPos] = dic[dicPos - rep0 + (dicPos < rep0 ? dicBufSize : 0)];
        mov     dic, LOC dic_Spec
        mov     t0_R, dicPos
        mov     probBranch, LOC rep0
        sub     t0_R, dic

        sub     probs, RepLenCoder * PMULT
        inc     processedPos
        ; state = state < kNumLitStates ? 9 : 11;
        or      state, 1 * PMULT
        IsMatchBranch_Pre

        sub     t0_R, probBranch_R
        jae     @f
        add     t0_R, LOC dicBufSize
@@:
```

```
        movzx   sym, byte ptr[dic + t0_R * 1]
        jmp     lz_end_match


MY_ALIGN_32
IsRep_label:
        UPDATE_1 probs_state_R, 0, IsRep

        ; The (checkDicSize == 0 && processedPos ==
 0) case was checked before in LzmaDec.c with kBadRepCode.
        ; So we don't check it here.

        ; mov     t0, processedPos
        ; or      t0, LOC checkDicSize
        ; jz      fin_ERROR_2

        ; state = state < kNumLitStates ? 8 : 11;
        cmp     state, kNumLitStates * PMULT
        mov     state, 8 * PMULT
        mov     probBranch, 11 * PMULT
        cmovae  state, probBranch

        ; prob = probs + RepLenCoder;
        add     probs, RepLenCoder * PMULT

        IF_BIT_1 probs_state_R, 0, IsRepG0, IsRepG0_label
        IF_BIT_0_NOUP probs_state_R, pbPos_R, IsRep0Long, IsRep0Short_label
        UPDATE_1 probs_state_R, pbPos_R, IsRep0Long
        jmp     len_decode

MY_ALIGN_32
IsRepG0_label:
        UPDATE_1 probs_state_R, 0, IsRepG0
        mov     dist2, LOC rep0
        mov     dist, LOC rep1
        mov     LOC rep1, dist2

        IF_BIT_1 probs_state_R, 0, IsRepG1, IsRepG1_label
        mov     LOC rep0, dist
        jmp     len_decode

; MY_ALIGN_32
IsRepG1_label:
        UPDATE_1 probs_state_R, 0, IsRepG1
        mov     dist2, LOC rep2
        mov     LOC rep2, dist

        IF_BIT_1 probs_state_R, 0, IsRepG2, IsRepG2_label
```

```
        mov     LOC rep0, dist2
        jmp     len_decode

; MY_ALIGN_32
IsRepG2_label:
        UPDATE_1 probs_state_R, 0, IsRepG2
        mov     dist, LOC rep3
        mov     LOC rep3, dist2
        mov     LOC rep0, dist
        jmp     len_decode



; ---------- SPEC SHORT DISTANCE ----------

MY_ALIGN_32
short_dist:
        sub     x1, 32 + 1
        jbe     decode_dist_end
        or      sym, 2
        shl     sym, x1_L
        lea     sym_R, [probs + sym_R * PMULT + SpecPos * PMULT + 1 * PMULT]
        mov     sym2, PMULT ; step
MY_ALIGN_32
spec_loop:
        REV_1_VAR x2
        dec     x1
        jnz     spec_loop

        mov     probs, LOC probs_Spec
        sub     sym, sym2
        sub     sym, SpecPos * PMULT
        sub     sym_R, probs
        shr
      sym, PSHIFT

        jmp     decode_dist_end


; ---------- COPY MATCH CROSS ----------
copy_match_cross:
        ; t0_R - src pos
        ; r1 - len to dicBufSize
        ; cnt_R - total copy len

        mov     t1_R, t0_R          ; srcPos
        mov     t0_R, dic
        mov     r1, LOC dicBufSize   ;
```

```
        neg     cnt_R
@@:
        movzx   sym, byte ptr[t1_R * 1 + t0_R]
        inc     t1_R
        mov     byte ptr[cnt_R * 1 + dicPos], sym_L
        inc     cnt_R
        cmp     t1_R, r1
        jne     @b

        movzx   sym, byte ptr[t0_R]
        sub     t0_R, cnt_R
        jmp     copy_common




fin_ERROR:
        mov     LOC remainLen, len_temp
; fin_ERROR_2:
        mov     sym, 1
        jmp     fin

end_of_payload:
        cmp     sym, 0FFFFFFFFh ; -1
        jne     fin_ERROR

        mov     LOC remainLen, kMatchSpecLenStart
        sub     state, kNumStates * PMULT

fin_OK:
        xor     sym, sym

fin:
        NORM

        mov     r1, LOC lzmaPtr

        sub     dicPos, LOC dic_Spec
        mov     GLOB dicPos_Spec, dicPos
        mov     GLOB buf_Spec, buf
        mov     GLOB range_Spec, range
        mov     GLOB code_Spec, cod
        shr     state, PSHIFT
        mov     GLOB state_Spec, state
        mov     GLOB processedPos_Spec, processedPos

        RESTORE_VAR(remainLen)
        RESTORE_VAR(rep0)
```

```
        RESTORE_VAR(rep1)
        RESTORE_VAR(rep2)
        RESTORE_VAR(rep3)

        mov     x0, sym

        mov     RSP, LOC Old_RSP

MY_POP_PRESERVED_REGS
MY_ENDP

_TEXT$LZMADECOPT ENDS

end
// LangUtils.h

#ifndef __LANG_UTILS_H
#define __LANG_UTILS_H

#include "../../../Windows/ResourceString.h"

#ifdef LANG

extern UString g_LangID;

struct CIDLangPair
{
 UInt32 ControlID;
 UInt32 LangID;
};

void ReloadLang();
void LoadLangOneTime();
FString GetLangDirPrefix();

void LangSetDlgItemText(HWND dialog, UInt32 controlID, UInt32 langID);
void LangSetDlgItems(HWND dialog, const UInt32 *ids, unsigned numItems);
void LangSetDlgItems_Colon(HWND dialog, const UInt32 *ids, unsigned numItems);
void LangSetWindowText(HWND window, UInt32 langID);

UString LangString(UInt32 langID);
void AddLangString(UString &s, UInt32 langID);
void LangString(UInt32 langID, UString &dest);
void LangString_OnlyFromLangFile(UInt32 langID, UString &dest);

#else

inline UString LangString(UInt32 langID) { return NWindows::MyLoadString(langID); }
```

```
inline void LangString(UInt32 langID, UString &dest) { NWindows::MyLoadString(langID, dest); }
inline void AddLangString(UString &s, UInt32 langID) { s += NWindows::MyLoadString(langID);
 }

#endif

#endif
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<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With Mixed text Element Language Tags 2</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element matches the schema. Two text elements have a language
tags." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
```

```
  }
  pre
 {
   font-size: 12px;
  }
  .test {
   font-family: "WOFF Test CFF Reference";
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text xml:lang="en"&gt;
   Copyright with "en" language.
  &lt;/text&gt;
  &lt;text xml:lang="fr"&gt;
   Copyright with "fr" language.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

UNRECOGNIZED LICENSE; MD5 sum: dce8e29443c864364a35d6cc733a58d3

```
// ComboDialog.h

#ifndef __COMBO_DIALOG_H
#define __COMBO_DIALOG_H

#include "../../../Windows/Control/ComboBox.h"
#include "../../../Windows/Control/Dialog.h"

#include "ComboDialogRes.h"

class CComboDialog: public NWindows::NControl::CModalDialog
{
 NWindows::NControl::CComboBox _comboBox;
 virtual void OnOK();
 virtual bool OnInit();
```

```
 virtual bool OnSize(WPARAM wParam, int xSize, int ySize);
public:
 // bool Sorted;
 UString Title;
 UString Static;
 UString Value;
 UStringVector Strings;

 // CComboDialog(): Sorted(false) {};
 INT_PTR Create(HWND parentWindow = 0) { return CModalDialog::Create(IDD_COMBO, parentWindow); }
};

#endif
## -*-makefile-*-
## Copyright (C) 2016 and later: Unicode, Inc. and others.
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## BSD-specific setup (FreeBSD, OpenBSD, NetBSD, *BSD)
## Copyright (c) 1999-2013, International Business Machines Corporation and
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## Commands to generate dependency files
GEN_DEPS.c= $(CC) -E -MM $(DEFS) $(CPPFLAGS)
GEN_DEPS.cc= $(CXX) -E -MM $(DEFS) $(CPPFLAGS)

## Flags for position independent code
SHAREDLIBCFLAGS = -fPIC
SHAREDLIBCXXFLAGS = -fPIC
SHAREDLIBCPPFLAGS = -DPIC

## Additional flags when building libraries and with threads
THREADSCPPFLAGS = -D_REENTRANT
LIBCPPFLAGS =

## Compiler switch to embed a runtime search path
LD_RPATH=
LD_RPATH_PRE= -Wl,-rpath,

## Compiler switch to embed a library name
LD_SONAME = -Wl,-soname -Wl,$(notdir $(MIDDLE_SO_TARGET))

## Shared library options
LD_SOOPTIONS= -Wl,-Bsymbolic

## Shared object suffix
SO = so
## Non-shared intermediate object suffix
STATIC_O = ao
```

```
## Compilation
 rules
%.$(STATIC_O): $(srcdir)/%.c
 $(COMPILE.c) $(STATICCPPFLAGS) $(STATICCFLAGS) -o $@ $<
%.o: $(srcdir)/%.c
 $(COMPILE.c) $(DYNAMICCPPFLAGS) $(DYNAMICCFLAGS) -o $@ $<

%.$(STATIC_O): $(srcdir)/%.cpp
 $(COMPILE.cc) $(STATICCPPFLAGS) $(STATICCXXFLAGS) -o $@ $<
%.o: $(srcdir)/%.cpp
 $(COMPILE.cc) $(DYNAMICCPPFLAGS) $(DYNAMICCXXFLAGS) -o $@ $<


## Dependency rules
%.d: $(srcdir)/%.c
 @echo "generating dependency information for $<"
 @$(SHELL) -ec '$(GEN_DEPS.c) $< \
  | sed '\"s/\($*\)\.o[ :]*/\1.o $@ : /g'\" > $@; \
  [ -s $@ ] || rm -f $@'

%.d: $(srcdir)/%.cpp
 @echo "generating dependency information for $<"
 @$(SHELL) -ec '$(GEN_DEPS.cc) $< \
  | sed '\"s/\($*\)\.o[ :]*/\1.o $@ : /g'\" > $@; \
  [ -s $@ ] || rm -f $@'

## Versioned libraries rules

%.$(SO).$(SO_TARGET_VERSION_MAJOR): %.$(SO).$(SO_TARGET_VERSION)
 $(RM) $@ && ln -s ${<F} $@
%.$(SO): %.$(SO).$(SO_TARGET_VERSION_MAJOR)
 $(RM) $@ && ln -s ${*F}.$(SO).$(SO_TARGET_VERSION) $@

##  Bind internal references

# LDflags that pkgdata will use
BIR_LDFLAGS= -Wl,-Bsymbolic

# Dependencies [i.e. map files] for the final library
BIR_DEPS=

## Remove shared library 's'
STATIC_PREFIX_WHEN_USED =
STATIC_PREFIX =

## End BSD-specific setup
```

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// StreamUtils.h

```
#ifndef __STREAM_UTILS_H
#define __STREAM_UTILS_H

#include "../IStream.h"

HRESULT ReadStream(ISequentialInStream *stream, void *data, size_t *size) throw();
HRESULT ReadStream_FALSE(ISequentialInStream *stream, void *data, size_t size) throw();
HRESULT ReadStream_FAIL(ISequentialInStream *stream, void *data, size_t size) throw();
HRESULT WriteStream(ISequentialOutStream *stream, const void *data, size_t size) throw();

#endif
```

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```
/* Sha256.h -- SHA-256 Hash
2013-01-18 : Igor Pavlov : Public domain */

#ifndef __CRYPTO_SHA256_H
#define __CRYPTO_SHA256_H

#include "7zTypes.h"

EXTERN_C_BEGIN

#define SHA256_DIGEST_SIZE 32

typedef struct
{
 UInt32 state[8];
 UInt64 count;
 Byte buffer[64];
} CSha256;

void Sha256_Init(CSha256 *p);
void Sha256_Update(CSha256 *p, const Byte *data, size_t size);
void Sha256_Final(CSha256 *p, Byte *digest);

EXTERN_C_END

#endif
```

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```
// XzDecoder.h

#ifndef __XZ_DECODER_H
#define __XZ_DECODER_H

#include "../../../C/Xz.h"

#include "../../Common/MyCom.h"

#include "../ICoder.h"

namespace NCompress {
namespace NXz {
```

```
struct CDecoder
{
 CXzDecMtHandle xz;
 int _tryMt;
 UInt32 _numThreads;
 UInt64 _memUsage;

 SRes MainDecodeSRes; // it's not HRESULT
 bool MainDecodeSRes_wasUsed;
 CXzStatInfo Stat;

 CDecoder():
    xz(NULL),
    _tryMt(True),
    _numThreads(1),
    _memUsage((UInt64)(sizeof(size_t)) << 28),
    MainDecodeSRes(SZ_OK),
    MainDecodeSRes_wasUsed(false)
   {}

 ~CDecoder()
 {
   if (xz)
    XzDecMt_Destroy(xz);
 }

 /* Decode() can return ERROR code only if there is progress or stream error.
    Decode() returns S_OK in case of xz decoding error, but DecodeRes and CStatInfo contain error information */
 HRESULT Decode(ISequentialInStream *seqInStream, ISequentialOutStream *outStream,
    const UInt64 *outSizeLimit, bool finishStream, ICompressProgressInfo *compressProgress);
};


class
 CComDecoder:
 public ICompressCoder,
 public ICompressSetFinishMode,
 public ICompressGetInStreamProcessedSize,

 #ifndef _7ZIP_ST
 public ICompressSetCoderMt,
 public ICompressSetMemLimit,
 #endif

 public CMyUnknownImp,
 public CDecoder
 {
 bool _finishStream;
```

```
public:
 MY_QUERYINTERFACE_BEGIN2(ICompressCoder)

 MY_QUERYINTERFACE_ENTRY(ICompressSetFinishMode)
 MY_QUERYINTERFACE_ENTRY(ICompressGetInStreamProcessedSize)

 #ifndef _7ZIP_ST
 MY_QUERYINTERFACE_ENTRY(ICompressSetCoderMt)
 MY_QUERYINTERFACE_ENTRY(ICompressSetMemLimit)
 #endif

 MY_QUERYINTERFACE_END
 MY_ADDREF_RELEASE

 STDMETHOD(Code)(ISequentialInStream *inStream, ISequentialOutStream *outStream,
    const UInt64 *inSize, const UInt64 *outSize, ICompressProgressInfo *progress);
 STDMETHOD(SetFinishMode)(UInt32 finishMode);
 STDMETHOD(GetInStreamProcessedSize)(UInt64 *value);

 #ifndef _7ZIP_ST
 STDMETHOD(SetNumberOfThreads)(UInt32 numThreads);
 STDMETHOD(SetMemLimit)(UInt64 memUsage);
  #endif

 CComDecoder(): _finishStream(false) {}
};

}}

#endif
// Crypto/MyAes.h

#ifndef __CRYPTO_MY_AES_H
#define __CRYPTO_MY_AES_H

#include "../../../C/Aes.h"

#include "../../Common/MyCom.h"

#include "../ICoder.h"

namespace NCrypto {

class CAesCbcCoder:
 public ICompressFilter,
 public ICryptoProperties,
 public ICompressSetCoderProperties,
```

```
 public CMyUnknownImp
{
 AES_CODE_FUNC _codeFunc;
 unsigned _offset;
 unsigned _keySize;
 bool _keyIsSet;
 bool _encodeMode;
 UInt32 _aes[AES_NUM_IVMRK_WORDS + 3];
 Byte _iv[AES_BLOCK_SIZE];

 bool SetFunctions(UInt32 algo);

public:
 CAesCbcCoder(bool encodeMode, unsigned keySize);

 virtual ~CAesCbcCoder() {};   // we need virtual destructor for derived classes

 MY_UNKNOWN_IMP3(ICompressFilter, ICryptoProperties, ICompressSetCoderProperties)

 INTERFACE_ICompressFilter(;)

 STDMETHOD(SetKey)(const Byte *data, UInt32 size);
 STDMETHOD(SetInitVector)(const Byte *data, UInt32 size);

 STDMETHOD(SetCoderProperties)(const PROPID *propIDs, const PROPVARIANT *props, UInt32 numProps);
};

struct
 CAesCbcEncoder: public CAesCbcCoder
{
 CAesCbcEncoder(unsigned keySize = 0): CAesCbcCoder(true, keySize) {}
};

struct CAesCbcDecoder: public CAesCbcCoder
{
 CAesCbcDecoder(unsigned keySize = 0): CAesCbcCoder(false, keySize) {}
};

}

#endif
// Common/Lang.h

#ifndef __COMMON_LANG_H
#define __COMMON_LANG_H

#include "MyString.h"
```

```
class CLang
{
 wchar_t *_text;
 CRecordVector<UInt32> _ids;
 CRecordVector<UInt32> _offsets;

 bool OpenFromString(const AString &s);
public:
 CLang(): _text(0) {}
 ~CLang() { Clear(); }
 bool Open(CFSTR fileName, const char *id);
 void Clear() throw();
 const wchar_t *Get(UInt32 id) const throw();
};

#endif
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With dir Attribute in text Element 2</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element with rtl as the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre
 {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
```

```
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text dir="rtl"&gt;
   Copyright without language.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
/* LzFindMt.h -- multithreaded Match finder for LZ algorithms
2017-04-03 : Igor Pavlov : Public domain */

#ifndef __LZ_FIND_MT_H
#define __LZ_FIND_MT_H

#include "LzFind.h"
#include "Threads.h"

EXTERN_C_BEGIN

#define kMtHashBlockSize (1 << 13)
#define kMtHashNumBlocks (1 << 3)
#define kMtHashNumBlocksMask (kMtHashNumBlocks - 1)

#define kMtBtBlockSize (1 << 14)
#define kMtBtNumBlocks (1 << 6)
#define kMtBtNumBlocksMask (kMtBtNumBlocks - 1)

typedef struct _CMtSync
{
 Bool wasCreated;
 Bool needStart;
 Bool exit;
 Bool stopWriting;

 CThread thread;
 CAutoResetEvent canStart;
 CAutoResetEvent wasStarted;
 CAutoResetEvent wasStopped;
 CSemaphore freeSemaphore;
 CSemaphore filledSemaphore;
 Bool csWasInitialized;
 Bool csWasEntered;
 CCriticalSection cs;
```

```
 UInt32 numProcessedBlocks;
} CMtSync;

typedef UInt32 * (*Mf_Mix_Matches)(void *p, UInt32 matchMinPos, UInt32 *distances);

/* kMtCacheLineDummy must be >= size_of_CPU_cache_line */
#define kMtCacheLineDummy 128

typedef
 void (*Mf_GetHeads)(const Byte *buffer, UInt32 pos,
 UInt32 *hash, UInt32 hashMask, UInt32 *heads, UInt32 numHeads, const UInt32 *crc);

typedef struct _CMatchFinderMt
{
 /* LZ */
 const Byte *pointerToCurPos;
 UInt32 *btBuf;
 UInt32 btBufPos;
 UInt32 btBufPosLimit;
 UInt32 lzPos;
 UInt32 btNumAvailBytes;

 UInt32 *hash;
 UInt32 fixedHashSize;
 UInt32 historySize;
 const UInt32 *crc;

 Mf_Mix_Matches MixMatchesFunc;

 /* LZ + BT */
 CMtSync btSync;
 Byte btDummy[kMtCacheLineDummy];

 /* BT */
 UInt32 *hashBuf;
 UInt32 hashBufPos;
 UInt32 hashBufPosLimit;
 UInt32 hashNumAvail;

 CLzRef *son;
 UInt32 matchMaxLen;
 UInt32 numHashBytes;
 UInt32 pos;
 const Byte *buffer;
 UInt32 cyclicBufferPos;
 UInt32 cyclicBufferSize; /* it must be historySize + 1 */
 UInt32 cutValue;
```

```
 /* BT + Hash */
 CMtSync hashSync;
 /* Byte hashDummy[kMtCacheLineDummy]; */

 /* Hash */
 Mf_GetHeads GetHeadsFunc;
 CMatchFinder *MatchFinder;
} CMatchFinderMt;

void MatchFinderMt_Construct(CMatchFinderMt
 *p);
void MatchFinderMt_Destruct(CMatchFinderMt *p, ISzAllocPtr alloc);
SRes MatchFinderMt_Create(CMatchFinderMt *p, UInt32 historySize, UInt32 keepAddBufferBefore,
   UInt32 matchMaxLen, UInt32 keepAddBufferAfter, ISzAllocPtr alloc);
void MatchFinderMt_CreateVTable(CMatchFinderMt *p, IMatchFinder *vTable);
void MatchFinderMt_ReleaseStream(CMatchFinderMt *p);

EXTERN_C_END

#endif
```

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OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE
OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

```
// BranchMisc.h

#ifndef __COMPRESS_BRANCH_MISC_H
#define __COMPRESS_BRANCH_MISC_H

#include "../../Common/MyCom.h"

#include "../ICoder.h"

EXTERN_C_BEGIN

typedef SizeT (*Func_Bra)(Byte *data, SizeT size, UInt32 ip, int encoding);

EXTERN_C_END

namespace NCompress {
namespace NBranch {

class CCoder:
 public ICompressFilter,
 public CMyUnknownImp
{
 UInt32 _bufferPos;
 int _encode;
 Func_Bra BraFunc;
public:
 MY_UNKNOWN_IMP1(ICompressFilter);
 INTERFACE_ICompressFilter(;)

 CCoder(Func_Bra bra, int encode):  _bufferPos(0), _encode(encode), BraFunc(bra) {}
};

}}

#endif
# Files that don't get a copyright, or which are taken from elsewhere.
#
# All lines in this file are patterns, including the comment lines; this
# means that e.g. `FTL.TXT' matches all files that have this string in
# the file name (including the path relative to the current directory,
# always starting with `./').
#
# Don't put empty lines into this file!
#
.gitignore
#
builds/unix/pkg.m4
#
```

docs/FTL.TXT
docs/GPLv2.TXT
#
include/freetype/internal/fthash.h
#
src/base/fthash.c
src/base/md5.c
src/base/md5.h
#
src/bdf/bdf.c
src/bdf/bdf.h
src/bdf/bdfdrivr.c
src/bdf/bdfdrivr.h
src/bdf/bdferror.h
src/bdf/bdflib.c
src/bdf/module.mk
src/bdf/README
src/bdf/rules.mk
#
src/pcf/module.mk
src/pcf/pcf.c
src/pcf/pcf.h
src/pcf/pcfdrivr.c
src/pcf/pcfdrivr.h
src/pcf/pcferror.h
src/pcf/pcfread.c
src/pcf/pcfread.h
src/pcf/pcfutil.c
src/pcf/pcfutil.h
src/pcf/README
src/pcf/rules.mk
#
src/gzip/adler32.c
src/gzip/infblock.c
src/gzip/infblock.h
src/gzip/infcodes.c
src/gzip/infcodes.h
src/gzip/inffixed.h
src/gzip/inflate.c
src/gzip/inftrees.c
src/gzip/inftrees.h
src/gzip/infutil.c
src/gzip/infutil.h
src/gzip/zconf.h
src/gzip/zlib.h
src/gzip/zutil.c
src/gzip/zutil.h
#

```
src/tools/apinames.c
src/tools/ftrandom/ftrandom.c
#
#
 EOF
// 7zCompressionMode.h

#ifndef __7Z_COMPRESSION_MODE_H
#define __7Z_COMPRESSION_MODE_H

#include "../../Common/MethodId.h"
#include "../../Common/MethodProps.h"

namespace NArchive {
namespace N7z {

struct CMethodFull: public CMethodProps
{
 CMethodId Id;
 UInt32 NumStreams;
 int CodecIndex;

 CMethodFull(): CodecIndex(-1) {}
 bool IsSimpleCoder() const { return NumStreams == 1; }
};

struct CBond2
{
 UInt32 OutCoder;
 UInt32 OutStream;
 UInt32 InCoder;
};

struct CCompressionMethodMode
{
 /*
   if (Bonds.Empty()), then default bonds must be created
   if (Filter_was_Inserted)
   {
     Methods[0] is filter method
     Bonds don't contain bonds for filter (these bonds must be created)
   }
 */

 CObjectVector<CMethodFull> Methods;
 CRecordVector<CBond2> Bonds;

 bool IsThereBond_to_Coder(unsigned coderIndex) const
```

```
{
  FOR_VECTOR(i, Bonds)
    if (Bonds[i].InCoder == coderIndex)
      return true;
  return false;
}

bool DefaultMethod_was_Inserted;
bool
Filter_was_Inserted;

#ifndef _7ZIP_ST
UInt32 NumThreads;
bool MultiThreadMixer;
#endif

bool PasswordIsDefined;
UString Password;

bool IsEmpty() const { return (Methods.IsEmpty() && !PasswordIsDefined); }
CCompressionMethodMode():
    DefaultMethod_was_Inserted(false),
    Filter_was_Inserted(false),
    PasswordIsDefined(false)
    #ifndef _7ZIP_ST
    , NumThreads(1)
    , MultiThreadMixer(true)
    #endif
 {}
};

}}

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Invalid copyright Element With dir Attribute in span Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-029-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element that contains a span element with
```

```
INVALID as the value for the
 dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-029.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

At the time this file was first modified, a complete, unmodified copy of
the LPPL Work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

Portions of this file were originally made available under the following license
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Latin hyphenation patterns

(more info about the licence to be added later)

% This file is part of hyph-utf8 package and resulted
from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% Source: lahyph.tex (2007-09-03)
% Author: Claudio Beccari <claudio.beccari at polito.it>
%
% The above mentioned file should become obsolete,
% and the author of the original file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer

```
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%             and helped with testing, suggestions and bug reports
% - Norbert Preining, who tested & integrated
 patterns into TeX Live
%
% However, the "copyright/copyleft" owner of patterns remains the original author.
%
% The copyright statement of this file is thus:
%
%    Do with this file whatever needs to be done in future for the sake of
%    "a better world" as long as you respect the copyright of original file.
%    If you're the original author of patterns or taking over a new revolution,
%    plese remove all of the TUG comments & credits that we added here -
%    you are the Queen / the King, we are only the servants.
%
% If you want to change this file, rather than uploading directly to CTAN,
% we would be grateful if you could send it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
% Before a new "pattern-revolution" starts,
% please try to follow some guidelines if possible:
%
% - \lccode is *forbidden*, and I really mean it
% - all the patterns should be in UTF-8
%
 - the only "allowed" TeX commands in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
%-----------------------------------------------------------------------------
%
%                ********** lahyph.tex **************
```

```
%
% Copyright 1999- 2001 Claudio Beccari
%               [latin hyphenation patterns]
%
% ----------------------------------------------------------------
% IMPORTANT NOTICE:
%
% This program can be redistributed and/or modified under the terms
%
 of the LaTeX Project Public License Distributed from CTAN
% archives in directory macros/latex/base/lppl.txt; either
% version 1 of the License, or any later version.
% ----------------------------------------------------------------
%
% Patterns for the latin language mainly in modern spelling
% (u when u is needed and v when v is needed); medieval spelling
% with the ligatures \ae and \oe  and the (uncial) lowercase `v'
% written as a `u' is also supported; apparently there is no conflict
% between the patterns of modern  Latin and those of medieval Latin.
%
% Support for font encoding T1 with a 256-character set.
%
% Prepared by  Claudio Beccari
%            Politecnico di Torino
%            Torino, Italy
%            e-mail beccari@polito.it
%
% 1999/03/10 Integration of `lahyph7.tex' and `lahyph8.tex' into
% one file `lahyph.tex' supporting fonts in OT1 and T1 encoding by
% Bernd Raichle using the macro code from `dehypht.tex' (this code
% is Copyright 1993,1994,1998,1999
 Bernd Raichle/DANTE e.V.).
%
% 2010/05/31 Removal of OT1 support
% 2010/06/01 Removal of pattern 2'2 (probably a leftover from Italian)
%
% \versionnumber{3.2}   \versiondate{2010/06/01}
%
% Information after \endinput.
%
%%%
```

```
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: More Than One license Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-009-ref.xht" />
  <meta name="assert" content="The license element occurs more than once." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF
 Test";
    src: url("support/metadatadisplay-schema-license-009.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
// XzHandler.h

#ifndef __XZ_HANDLER_H
#define __XZ_HANDLER_H

namespace NArchive {
namespace NXz {

}}
```

#endif
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OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
SOFTWARE.
// ArchiveExtractCallback.h

```
#ifndef __ARCHIVE_EXTRACT_CALLBACK_H
#define __ARCHIVE_EXTRACT_CALLBACK_H

#include "../../../Common/MyCom.h"
#include "../../../Common/Wildcard.h"

#include "../../IPassword.h"

#include "../../Common/FileStreams.h"
#include "../../Common/ProgressUtils.h"

#include "../../Archive/IArchive.h"

#include "ExtractMode.h"
#include "IFileExtractCallback.h"
#include "OpenArchive.h"

#include "HashCalc.h"

#ifndef _SFX

class COutStreamWithHash:
```

```
 public ISequentialOutStream,
 public CMyUnknownImp
{
 CMyComPtr<ISequentialOutStream> _stream;
 UInt64 _size;
 bool _calculate;
public:
 IHashCalc *_hash;

 MY_UNKNOWN_IMP
 STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
 void SetStream(ISequentialOutStream *stream) { _stream = stream; }
 void ReleaseStream() { _stream.Release(); }
 void Init(bool calculate = true)
 {
   InitCRC();
   _size = 0;
   _calculate = calculate;
 }
 void EnableCalc(bool calculate) { _calculate = calculate;
 }
 void InitCRC() { _hash->InitForNewFile(); }
 UInt64 GetSize() const { return _size; }
};

#endif

struct CExtractNtOptions
{
 CBoolPair NtSecurity;
 CBoolPair SymLinks;
 CBoolPair HardLinks;
 CBoolPair AltStreams;
 bool ReplaceColonForAltStream;
 bool WriteToAltStreamIfColon;

 bool PreAllocateOutFile;

 CExtractNtOptions():
     ReplaceColonForAltStream(false),
     WriteToAltStreamIfColon(false)
 {
   SymLinks.Val = true;
   HardLinks.Val = true;
   AltStreams.Val = true;

   PreAllocateOutFile =
     #ifdef _WIN32
```

```
      true;
    #else
      false;
    #endif
 }
};

#ifndef _SFX

class CGetProp:
 public IGetProp,
 public CMyUnknownImp
{
public:
 const CArc *Arc;
 UInt32 IndexInArc;
 // UString Name; // relative path

 MY_UNKNOWN_IMP1(IGetProp)
 INTERFACE_IGetProp(;)
};

#endif

#ifndef _SFX
#ifndef UNDER_CE

#define SUPPORT_LINKS

#endif
#endif


#ifdef SUPPORT_LINKS

struct CHardLinkNode
{
 UInt64 StreamId;
 UInt64 INode;

 int Compare(const
 CHardLinkNode &a) const;
};

class CHardLinks
{
public:
 CRecordVector<CHardLinkNode> IDs;
```

```
 CObjectVector<FString> Links;

 void Clear()
 {
   IDs.Clear();
   Links.Clear();
 }

 void PrepareLinks()
 {
   while (Links.Size() < IDs.Size())
     Links.AddNew();
 }
};

#endif

#ifdef SUPPORT_ALT_STREAMS

struct CIndexToPathPair
{
 UInt32 Index;
 FString Path;

 CIndexToPathPair(UInt32 index): Index(index) {}
 CIndexToPathPair(UInt32 index, const FString &path): Index(index), Path(path) {}

 int Compare(const CIndexToPathPair &pair) const
 {
   return MyCompare(Index, pair.Index);
 }
};

#endif



struct CDirPathTime
{
 FILETIME CTime;
 FILETIME ATime;
 FILETIME MTime;

 bool CTimeDefined;
 bool ATimeDefined;
 bool MTimeDefined;

 FString Path;
```

```
 bool SetDirTime();
};



class CArchiveExtractCallback:
 public IArchiveExtractCallback,
 public IArchiveExtractCallbackMessage,
 public ICryptoGetTextPassword,
 public ICompressProgressInfo,
 public CMyUnknownImp
{
  const CArc *_arc;
 CExtractNtOptions _ntOptions;

 const NWildcard::CCensorNode *_wildcardCensor; // we need wildcard for single pass mode (stdin)
 CMyComPtr<IFolderArchiveExtractCallback> _extractCallback2;
 CMyComPtr<ICompressProgressInfo> _compressProgress;
 CMyComPtr<ICryptoGetTextPassword> _cryptoGetTextPassword;
 CMyComPtr<IArchiveExtractCallbackMessage> _callbackMessage;
 CMyComPtr<IFolderArchiveExtractCallback2> _folderArchiveExtractCallback2;

 FString _dirPathPrefix;
 FString _dirPathPrefix_Full;
 NExtract::NPathMode::EEnum _pathMode;
 NExtract::NOverwriteMode::EEnum _overwriteMode;
 bool _keepAndReplaceEmptyDirPrefixes; // replace them to "_";

 #ifndef _SFX

 CMyComPtr<IFolderExtractToStreamCallback> ExtractToStreamCallback;
 CGetProp *GetProp_Spec;
 CMyComPtr<IGetProp> GetProp;

 #endif

 CReadArcItem _item;
 FString _diskFilePath;
 UInt64 _position;
 bool _isSplit;

 bool _extractMode;

 bool WriteCTime;
 bool WriteATime;
 bool WriteMTime;
```

```
 bool _encrypted;

struct CProcessedFileInfo
{
  FILETIME CTime;
  FILETIME ATime;
  FILETIME MTime;
  UInt32 Attrib;

  bool CTimeDefined;
  bool ATimeDefined;
  bool MTimeDefined;
  bool AttribDefined;
} _fi;

UInt32 _index;
UInt64 _curSize;
bool _curSizeDefined;
bool _fileLengthWasSet;
COutFileStream *_outFileStreamSpec;
CMyComPtr<ISequentialOutStream> _outFileStream;

#ifndef _SFX

COutStreamWithHash *_hashStreamSpec;
CMyComPtr<ISequentialOutStream> _hashStream;
bool _hashStreamWasUsed;

#endif

bool _removePartsForAltStreams;
UStringVector _removePathParts;

#ifndef _SFX
bool _use_baseParentFolder_mode;
UInt32 _baseParentFolder;
#endif

bool _stdOutMode;
bool _testMode;
bool _multiArchives;

CMyComPtr<ICompressProgressInfo> _localProgress;
UInt64 _packTotal;

UInt64 _progressTotal;
bool _progressTotal_Defined;
```

```
CObjectVector<CDirPathTime> _extractedFolders;

#if defined(_WIN32) && !defined(UNDER_CE)
&& !defined(_SFX)
bool _saclEnabled;
#endif

void CreateComplexDirectory(const UStringVector &dirPathParts, FString &fullPath);
HRESULT GetTime(UInt32 index, PROPID propID, FILETIME &filetime, bool &filetimeIsDefined);
HRESULT GetUnpackSize();

HRESULT SendMessageError(const char *message, const FString &path);
HRESULT SendMessageError_with_LastError(const char *message, const FString &path);
HRESULT SendMessageError2(const char *message, const FString &path1, const FString &path2);

public:

CLocalProgress *LocalProgressSpec;

UInt64 NumFolders;
UInt64 NumFiles;
UInt64 NumAltStreams;
UInt64 UnpackSize;
UInt64 AltStreams_UnpackSize;

MY_UNKNOWN_IMP3(IArchiveExtractCallbackMessage, ICryptoGetTextPassword, ICompressProgressInfo)

INTERFACE_IArchiveExtractCallback(;)
INTERFACE_IArchiveExtractCallbackMessage(;)

STDMETHOD(SetRatioInfo)(const UInt64 *inSize, const UInt64 *outSize);

STDMETHOD(CryptoGetTextPassword)(BSTR *password);

CArchiveExtractCallback();

 void InitForMulti(bool multiArchives,
    NExtract::NPathMode::EEnum pathMode,
    NExtract::NOverwriteMode::EEnum overwriteMode,
    bool keepAndReplaceEmptyDirPrefixes)
{
  _multiArchives = multiArchives;
  _pathMode = pathMode;
  _overwriteMode = overwriteMode;
  _keepAndReplaceEmptyDirPrefixes = keepAndReplaceEmptyDirPrefixes;
  NumFolders = NumFiles = NumAltStreams = UnpackSize = AltStreams_UnpackSize = 0;
}
```

```
#ifndef _SFX

void SetHashMethods(IHashCalc *hash)
{
  if (!hash)
    return;
  _hashStreamSpec = new COutStreamWithHash;
  _hashStream = _hashStreamSpec;
  _hashStreamSpec->_hash = hash;
}

#endif

void Init(
    const CExtractNtOptions &ntOptions,
    const NWildcard::CCensorNode *wildcardCensor,
    const CArc *arc,
    IFolderArchiveExtractCallback *extractCallback2,
    bool stdOutMode, bool testMode,
    const FString &directoryPath,
    const UStringVector &removePathParts, bool removePartsForAltStreams,
     UInt64 packSize);


#ifdef SUPPORT_LINKS

private:
CHardLinks _hardLinks;
UString linkPath;

// FString _CopyFile_Path;
// HRESULT MyCopyFile(ISequentialOutStream *outStream);

public:
// call PrepareHardLinks() after Init()
HRESULT PrepareHardLinks(const CRecordVector<UInt32> *realIndices);  // NULL means all items

#endif


#ifdef SUPPORT_ALT_STREAMS
CObjectVector<CIndexToPathPair> _renamedFiles;
#endif

// call it after Init()

#ifndef _SFX
void SetBaseParentFolderIndex(UInt32 indexInArc)
```

```
 {
   _baseParentFolder = indexInArc;
   _use_baseParentFolder_mode = true;
 }
 #endif

 HRESULT CloseArc();

private:
 void ClearExtractedDirsInfo()
 {
   _extractedFolders.Clear();
 }

 HRESULT CloseFile();
 HRESULT SetDirsTimes();
};


struct CArchiveExtractCallback_Closer
{
 CArchiveExtractCallback *_ref;

 CArchiveExtractCallback_Closer(CArchiveExtractCallback *ref): _ref(ref) {}

 HRESULT Close()
 {
   HRESULT res = S_OK;
    if (_ref)
   {
     res = _ref->CloseArc();
     _ref = NULL;
   }
   return res;
 }

 ~CArchiveExtractCallback_Closer()
 {
   Close();
 }
};


bool CensorNode_CheckPath(const NWildcard::CCensorNode &node, const CReadArcItem &item);

#endif
```

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```
; XzCrc64Opt.asm -- CRC64 calculation : optimized version
; 2011-06-28 : Igor Pavlov : Public domain

include 7zAsm.asm

MY_ASM_START

ifdef x64

  rD   equ  r9
  rN   equ  r10

  num_VAR     equ  r8
  table_VAR   equ  r9

  SRCDAT  equ  rN + rD

CRC_XOR macro dest:req, src:req, t:req
  xor     dest, QWORD PTR [r5 + src * 8 + 0800h * t]
endm

CRC1b macro
  movzx   x6, BYTE PTR [rD]
  inc     rD
  movzx   x3, x0_L
  xor     x6, x3
  shr     r0, 8
  CRC_XOR r0, r6, 0
  dec     rN
endm
```

```
MY_PROLOG macro crc_end:req
  MY_PUSH_4_REGS

  mov     r0, r1
  mov     rN, num_VAR
  mov     r5, table_VAR
  mov     rD, r2
  test    rN, rN
  jz      crc_end
 @@:
  test    rD, 3
  jz      @F
  CRC1b
  jnz     @B
 @@:
  cmp     rN, 8
  jb      crc_end
  add     rN, rD
  mov     num_VAR, rN
  sub     rN, 4
  and     rN, NOT 3
  sub     rD, rN
  mov     x1, [SRCDAT]
  xor     r0, r1
  add     rN, 4
endm

MY_EPILOG macro crc_end:req
   sub     rN, 4
  mov     x1, [SRCDAT]
  xor     r0, r1
  mov     rD, rN
  mov     rN, num_VAR
  sub     rN, rD
 crc_end:
  test    rN, rN
  jz      @F
  CRC1b
  jmp     crc_end
 @@:
  MY_POP_4_REGS
endm

MY_PROC XzCrc64UpdateT4, 4
  MY_PROLOG crc_end_4
  align 16
 main_loop_4:
  mov     x1, [SRCDAT]
```

```
   movzx   x2, x0_L
   movzx   x3, x0_H
   shr     r0, 16
   movzx   x6, x0_L
   movzx   x7, x0_H
   shr     r0, 16
   CRC_XOR r1, r2, 3
   CRC_XOR r0, r3, 2
   CRC_XOR r1, r6, 1
   CRC_XOR r0, r7, 0
   xor     r0, r1

   add     rD, 4
   jnz     main_loop_4

   MY_EPILOG crc_end_4
MY_ENDP

else

   rD   equ  r1
   rN   equ  r7

   crc_val     equ (REG_SIZE * 5)
   crc_table   equ (8 + crc_val)
   table_VAR   equ [r4 + crc_table]
   num_VAR     equ table_VAR


   SRCDAT  equ  rN + rD

CRC macro op0:req, op1:req, dest0:req, dest1:req, src:req, t:req
   op0     dest0, DWORD PTR [r5 + src * 8 + 0800h * t]
   op1     dest1, DWORD PTR [r5 + src
 * 8 + 0800h * t + 4]
endm

CRC_XOR macro dest0:req, dest1:req, src:req, t:req
   CRC xor, xor, dest0, dest1, src, t
endm


CRC1b macro
   movzx   x6, BYTE PTR [rD]
   inc     rD
   movzx   x3, x0_L
   xor     x6, x3
   shrd    r0, r2, 8
```

```
  shr     r2, 8
  CRC_XOR r0, r2, r6, 0
  dec     rN
endm

MY_PROLOG macro crc_end:req
  MY_PUSH_4_REGS

  mov     rN, r2

  mov     x0, [r4 + crc_val]
  mov     x2, [r4 + crc_val + 4]
  mov     r5, table_VAR
  test    rN, rN
  jz      crc_end
@@:
  test    rD, 3
  jz      @F
  CRC1b
  jnz     @B
@@:
  cmp     rN, 8
  jb      crc_end
  add     rN, rD

  mov     num_VAR, rN

  sub     rN, 4
  and     rN, NOT 3
  sub     rD, rN
  xor     r0, [SRCDAT]
  add     rN, 4
endm

MY_EPILOG macro crc_end:req
  sub     rN, 4
  xor     r0, [SRCDAT]

  mov     rD, rN
  mov     rN, num_VAR
  sub     rN, rD
crc_end:
  test    rN, rN
  jz      @F
  CRC1b
  jmp     crc_end
@@:
  MY_POP_4_REGS
```

```
endm

MY_PROC
 XzCrc64UpdateT4, 5
   MY_PROLOG crc_end_4
   movzx   x6, x0_L
   align 16
 main_loop_4:
   mov     r3, [SRCDAT]
   xor     r3, r2

   CRC xor, mov, r3, r2, r6, 3
   movzx   x6, x0_H
   shr     r0, 16
   CRC_XOR r3, r2, r6, 2

   movzx   x6, x0_L
   movzx   x0, x0_H
   CRC_XOR r3, r2, r6, 1
   CRC_XOR r3, r2, r0, 0
   movzx   x6, x3_L
   mov     r0, r3

   add     rD, 4
   jnz     main_loop_4

   MY_EPILOG crc_end_4
MY_ENDP

endif

end
// 7z/7zHeader.h

#ifndef __7Z_HEADER_H
#define __7Z_HEADER_H

#include "../../../Common/MyTypes.h"

namespace NArchive {
namespace N7z {

const unsigned kSignatureSize = 6;
extern Byte kSignature[kSignatureSize];

// #define _7Z_VOL
// 7z-MultiVolume is not finished yet.
// It can work already, but I still do not like some
```

```
// things of that new multivolume format.
// So please keep it commented.

#ifdef _7Z_VOL
extern Byte kFinishSignature[kSignatureSize];
#endif

struct CArchiveVersion
{
 Byte Major;
 Byte Minor;
};

const Byte kMajorVersion = 0;

struct CStartHeader
{
 UInt64 NextHeaderOffset;
 UInt64 NextHeaderSize;
 UInt32 NextHeaderCRC;
};

const UInt32 kStartHeaderSize = 20;

#ifdef _7Z_VOL
struct CFinishHeader: public CStartHeader
{
 UInt64 ArchiveStartOffset;  // data offset from end if that struct
 UInt64 AdditionalStartBlockSize; // start  signature & start header size
};

const UInt32 kFinishHeaderSize = kStartHeaderSize + 16;
#endif

namespace NID
{
 enum EEnum
 {
    kEnd,

   kHeader,

   kArchiveProperties,

   kAdditionalStreamsInfo,
   kMainStreamsInfo,
   kFilesInfo,
```

```
  kPackInfo,
  kUnpackInfo,
  kSubStreamsInfo,

  kSize,
  kCRC,

  kFolder,

  kCodersUnpackSize,
  kNumUnpackStream,

  kEmptyStream,
  kEmptyFile,
  kAnti,

  kName,
  kCTime,
  kATime,
  kMTime,
  kWinAttrib,
  kComment,

  kEncodedHeader,

  kStartPos,
  kDummy

  // kNtSecure,
  // kParent,
  // kIsAux
 };
}


const UInt32 k_Copy = 0;
const UInt32 k_Delta = 3;

const UInt32 k_LZMA2 = 0x21;

const UInt32 k_SWAP2 = 0x20302;
const UInt32 k_SWAP4 = 0x20304;

const UInt32 k_LZMA  = 0x30101;
const UInt32 k_PPMD  = 0x30401;

const UInt32 k_Deflate = 0x40108;
const UInt32 k_BZip2   = 0x40202;
```

```
const UInt32 k_BCJ   = 0x3030103;
const UInt32 k_BCJ2  = 0x303011B;
const UInt32 k_PPC   = 0x3030205;
const UInt32 k_IA64  = 0x3030401;
const UInt32 k_ARM   = 0x3030501;
const UInt32 k_ARMT  = 0x3030701;
const UInt32 k_SPARC = 0x3030805;

const
 UInt32 k_AES   = 0x6F10701;


static inline bool IsFilterMethod(UInt64 m)
{
 if (m > (UInt64)0xFFFFFFFF)
   return false;
 switch ((UInt32)m)
 {
   case k_Delta:
   case k_BCJ:
   case k_BCJ2:
   case k_PPC:
   case k_IA64:
   case k_ARM:
   case k_ARMT:
   case k_SPARC:
   case k_SWAP2:
   case k_SWAP4:
     return true;
 }
 return false;
}

}}

#endif
```

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```
// Windows/Defs.h

#ifndef __WINDOWS_DEFS_H
#define __WINDOWS_DEFS_H

#include "../Common/MyWindows.h"

#ifdef _WIN32
inline bool LRESULTToBool(LRESULT v) { return (v != FALSE); }
inline bool BOOLToBool(BOOL v) { return (v != FALSE); }
inline BOOL BoolToBOOL(bool v) { return (v ? TRUE: FALSE); }
#endif

inline VARIANT_BOOL BoolToVARIANT_BOOL(bool v) { return (v ? VARIANT_TRUE: VARIANT_FALSE);
}
inline bool VARIANT_BOOLToBool(VARIANT_BOOL v) { return (v != VARIANT_FALSE); }

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Invalid license Element With dir Attribute in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
```

```
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element with INVALID as the value for the dir
attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre
 {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With dir Attribute in text Element 2</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-012-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element with rtl as the value for the dir
attribute." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
```

```
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-012.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text dir="rtl"&gt;
   Copyright without language.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
#define IDD_PROGRESS       97
#define IDD_PROGRESS_2  10097

#define IDS_CLOSE                 408
#define IDS_CONTINUE              411

#define IDB_PROGRESS_BACKGROUND    444
#define IDS_PROGRESS_FOREGROUND    445
#define IDB_PAUSE                 446
#define IDS_PROGRESS_PAUSED        447
#define IDS_PROGRESS_ASK_CANCEL    448

#define IDT_PROGRESS_PACKED       1008
#define IDT_PROGRESS_FILES        1032
```

```
#define IDT_PROGRESS_ELAPSED      3900
#define IDT_PROGRESS_REMAINING    3901
#define IDT_PROGRESS_TOTAL        3902
#define IDT_PROGRESS_SPEED        3903
#define IDT_PROGRESS_PROCESSED    3904
#define IDT_PROGRESS_RATIO        3905
#define IDT_PROGRESS_ERRORS       3906

#define IDC_PROGRESS1             100
#define IDL_PROGRESS_MESSAGES     101
#define IDT_PROGRESS_FILE_NAME    102
#define IDT_PROGRESS_STATUS       103

#define IDT_PROGRESS_PACKED_VAL   110
#define IDT_PROGRESS_FILES_VAL    111

#define IDT_PROGRESS_ELAPSED_VAL   120
#define IDT_PROGRESS_REMAINING_VAL 121
#define
 IDT_PROGRESS_TOTAL_VAL     122
#define IDT_PROGRESS_SPEED_VAL     123
#define IDT_PROGRESS_PROCESSED_VAL 124
#define IDT_PROGRESS_RATIO_VAL     125
#define IDT_PROGRESS_ERRORS_VAL    126


#ifdef UNDER_CE
#define MY_PROGRESS_VAL_UNITS  44
#else
#define MY_PROGRESS_VAL_UNITS  76
#endif
#define MY_PROGRESS_LABEL_UNITS_MIN   60
#define MY_PROGRESS_LABEL_UNITS_START 90
#define MY_PROGRESS_PAD_UNITS  4
// Common/StdInStream.h

#ifndef __COMMON_STD_IN_STREAM_H
#define __COMMON_STD_IN_STREAM_H

#include <stdio.h>

#include "MyString.h"
#include "MyTypes.h"

class CStdInStream
{
 FILE *_stream;
 bool _streamIsOpen;
```

```
public:
 CStdInStream(): _stream(0), _streamIsOpen(false) {};
 CStdInStream(FILE *stream): _stream(stream), _streamIsOpen(false) {};
 ~CStdInStream() { Close(); }

 bool Open(LPCTSTR fileName) throw();
 bool Close() throw();

 // returns:
 //   false, if ZERO character in stream
 //   true, if EOF or '\n'
 bool ScanAStringUntilNewLine(AString &s);
 bool ScanUStringUntilNewLine(UString &s);
 // bool ReadToString(AString &resultString);

 bool Eof() const throw() { return (feof(_stream) != 0); }
 bool Error() const throw() { return (ferror(_stream) != 0); }

 int GetChar();
};

extern CStdInStream g_StdIn;

#endif
```

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```
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// License, v. 2.0.If a copy of the MPL was not distributed with this
// file, You can obtain one at http://mozilla.org/MPL/2.0/.

#define IDD_DIALOG1 101
/* ATK -  Accessibility Toolkit
* Copyright 2001 Sun Microsystems Inc.
*
* This library is free software; you can redistribute it and/or
* modify it under the terms of the GNU Library General Public
* License as published by the Free Software Foundation; either
* version 2 of the License, or (at your option) any later version.
*
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*
* You should have received a copy of the GNU Library General Public
* License along with this library; if not, write to the
* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/
```

```
#ifndef __ATK_UTIL_H__
#define __ATK_UTIL_H__

#include <atk/atkobject.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

#define ATK_TYPE_UTIL                 (atk_util_get_type
 ())
#define ATK_IS_UTIL(obj)              G_TYPE_CHECK_INSTANCE_TYPE ((obj), ATK_TYPE_UTIL)
#define ATK_UTIL(obj)                 G_TYPE_CHECK_INSTANCE_CAST ((obj), ATK_TYPE_UTIL, AtkUtil)
#define ATK_UTIL_CLASS(klass)                 (G_TYPE_CHECK_CLASS_CAST ((klass), ATK_TYPE_UTIL,
AtkUtilClass))
#define ATK_IS_UTIL_CLASS(klass)              (G_TYPE_CHECK_CLASS_TYPE ((klass), ATK_TYPE_UTIL))
#define ATK_UTIL_GET_CLASS(obj)               (G_TYPE_INSTANCE_GET_CLASS ((obj),
ATK_TYPE_UTIL, AtkUtilClass))


#ifndef _TYPEDEF_ATK_UTIL_
#define _TYPEDEF_ATK_UTIL_
typedef struct _AtkUtil      AtkUtil;
typedef struct _AtkUtilClass AtkUtilClass;
typedef struct _AtkKeyEventStruct AtkKeyEventStruct;
#endif

/**
* AtkEventListener:
* @obj: An #AtkObject instance for whom the callback will be called when
* the specified event (e.g. 'focus:') takes place.
*
* A function which is called when an object emits a matching event,
* as used in #atk_add_focus_tracker.
* Currently
 the only events for which object-specific handlers are
* supported are events of type "focus:".  Most clients of ATK will prefer to
* attach signal handlers for the various ATK signals instead.
*
* @see: atk_add_focus_tracker.
**/
typedef void  (*AtkEventListener) (AtkObject* obj);
/**
* AtkEventListenerInit:
*
* An #AtkEventListenerInit function is a special function that is
* called in order to initialize the per-object event registration system
```

```
* used by #AtkEventListener, if any preparation is required.
*
* @see: atk_focus_tracker_init.
**/
typedef void  (*AtkEventListenerInit) (void);
/**
* AtkKeySnoopFunc:
* @event: an AtkKeyEventStruct containing information about the key event for which
* notification is being given.
* @func_data: a block of data which will be passed to the event listener, on notification.
*
* An #AtkKeySnoopFunc is a type of callback which is called whenever a key event occurs,
* if registered via atk_add_key_event_listener.  It allows
 for pre-emptive
* interception of key events via the return code as described below.
*
* Returns: TRUE (nonzero) if the event emission should be stopped and the event
* discarded without being passed to the normal GUI recipient; FALSE (zero) if the
* event dispatch to the client application should proceed as normal.
*
* @see: atk_add_key_event_listener.
**/
typedef gint  (*AtkKeySnoopFunc)  (AtkKeyEventStruct *event,
      gpointer func_data);

/**
* AtkKeyEventStruct:
* @type: An AtkKeyEventType, generally one of ATK_KEY_EVENT_PRESS or ATK_KEY_EVENT_RELEASE
* @state: A bitmask representing the state of the modifier keys immediately after the event takes place.
* The meaning of the bits is currently defined to match the bitmask used by GDK in
* GdkEventType.state, see
* http://developer.gnome.org/doc/API/2.0/gdk/gdk-Event-Structures.html#GdkEventKey
* @keyval: A guint representing a keysym value corresponding to those used by GDK and X11: see
* /usr/X11/include/keysymdef.h.
 * @length: The length of member #string.
* @string: A string containing one of the following: either a string approximating the text that would
* result from this keypress, if the key is a control or graphic character, or a symbolic name for this keypress.
* Alphanumeric and printable keys will have the symbolic key name in this string member, for instance "A". "0",
* "semicolon", "aacute".  Keypad keys have the prefix "KP".
* @keycode: The raw hardware code that generated the key event.  This field is raraly useful.
* @timestamp: A timestamp in milliseconds indicating when the event occurred.
* These timestamps are relative to a starting point which should be considered arbitrary,
* and only used to compare the dispatch times of events to one another.
*
* Encapsulates information about a key event.
**/
struct _AtkKeyEventStruct {
 gint type;
```

```
 guint state;
 guint keyval;
 gint length;
 gchar *string;
 guint16 keycode;
 guint32 timestamp;
};

/**
 *AtkKeyEventType:
*@ATK_KEY_EVENT_PRESS: specifies a key press event
*@ATK_KEY_EVENT_RELEASE: specifies a key release event
*@ATK_KEY_EVENT_LAST_DEFINED: Not a valid value; specifies end of enumeration
*
*Specifies the type of a keyboard evemt.
**/
typedef enum
{
 ATK_KEY_EVENT_PRESS,
 ATK_KEY_EVENT_RELEASE,
 ATK_KEY_EVENT_LAST_DEFINED
} AtkKeyEventType;

struct _AtkUtil
{
 GObject parent;
};

struct _AtkUtilClass
{
  GObjectClass parent;
  guint        (* add_global_event_listener)    (GSignalEmissionHook listener,
        const gchar        *event_type);
  void         (* remove_global_event_listener) (guint              listener_id);
  guint (* add_key_event_listener)   (AtkKeySnoopFunc     listener,
        gpointer data);
  void         (* remove_key_event_listener)    (guint              listener_id);
  AtkObject*   (* get_root)                     (void);
  G_CONST_RETURN gchar* (* get_toolkit_name)    (void);
  G_CONST_RETURN gchar* (* get_toolkit_version)
 (void);
};
GType atk_util_get_type (void);

/**
*AtkCoordType:
*@ATK_XY_SCREEN: specifies xy coordinates relative to the screen
*@ATK_XY_WINDOW: specifies xy coordinates relative to the widget's
```

```
* top-level window
*@ATK_XY_PARENT: specifies xy coordinates relative to the widget's
* immediate parent.
*
*Specifies how xy coordinates are to be interpreted. Used by functions such
*as atk_component_get_position() and atk_text_get_character_extents()
**/
typedef enum {
 ATK_XY_SCREEN,
 ATK_XY_WINDOW,
 ATK_XY_PARENT
}AtkCoordType;

/*
* Adds the specified function to the list of functions to be called
* when an object receives focus.
*/
guint    atk_add_focus_tracker     (AtkEventListener      focus_tracker);

/*
* Removes the specified focus tracker from the list of function
* to be called when any object receives focus
*/
void     atk_remove_focus_tracker  (guint                tracker_id);

/*
* atk_focus_tracker_init:
* @init: An #AtkEventListenerInit function to be
 called
* prior to any focus-tracking requests.
*
* Specifies the function to be called for focus tracker initialization.
* removal. This function should be called by an implementation of the
* ATK interface if any specific work needs to be done to enable
* focus tracking.
*/
void     atk_focus_tracker_init    (AtkEventListenerInit  init);

/*
* Cause the focus tracker functions which have been specified to be
* executed for the object.
*/
void     atk_focus_tracker_notify  (AtkObject            *object);

/*
* Adds the specified function to the list of functions to be called
* when an event of type event_type occurs.
*/
```

```
guint atk_add_global_event_listener (GSignalEmissionHook listener,
          const gchar        *event_type);

/*
* Removes the specified event listener
*/
void atk_remove_global_event_listener (guint listener_id);

/*
* Adds the specified function to the list of functions to be called
* when an keyboard event occurs.
*/
guint atk_add_key_event_listener
 (AtkKeySnoopFunc listener, gpointer data);

/*
* Removes the specified event listener
*/
void atk_remove_key_event_listener (guint listener_id);

/*
* Returns the root accessible container for the current application.
*/
AtkObject* atk_get_root(void);

AtkObject* atk_get_focus_object (void);

/*
* Returns name string for the GUI toolkit.
*/
G_CONST_RETURN gchar *atk_get_toolkit_name (void);

/*
* Returns version string for the GUI toolkit.
*/
G_CONST_RETURN gchar *atk_get_toolkit_version (void);

#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_UTIL_H__ */
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
```

```
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Attribute in license Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-011-ref.xht" />
  <meta name="assert" content="The license element contains an unknown attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family:
 "WOFF Test";
    src: url("support/metadatadisplay-schema-license-011.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: More Than One license Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
```

```
  <meta name="assert" content="The license element occurs more than once." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test
 CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
// BenchCon.h

#ifndef __BENCH_CON_H
#define __BENCH_CON_H

#include <stdio.h>

#include "../../Common/CreateCoder.h"
#include "../../UI/Common/Property.h"

HRESULT BenchCon(DECL_EXTERNAL_CODECS_LOC_VARS
   const CObjectVector<CProperty> &props, UInt32 numIterations, FILE *f);

#endif
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```

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```
// 7zEncode.h

#ifndef __7Z_ENCODE_H
#define __7Z_ENCODE_H

#include "7zCompressionMode.h"

#include "../Common/CoderMixer2.h"

#include "7zItem.h"

namespace NArchive {
namespace N7z {

class CMtEncMultiProgress:
 public ICompressProgressInfo,
 public CMyUnknownImp
{
 CMyComPtr<ICompressProgressInfo> _progress;
 #ifndef _7ZIP_ST
 NWindows::NSynchronization::CCriticalSection CriticalSection;
 #endif

public:
 UInt64 OutSize;

 CMtEncMultiProgress(): OutSize(0) {}

 void Init(ICompressProgressInfo *progress);

 void AddOutSize(UInt64 addOutSize)
 {
  #ifndef _7ZIP_ST
  NWindows::NSynchronization::CCriticalSectionLock lock(CriticalSection);
  #endif
  OutSize += addOutSize;
 }

 MY_UNKNOWN_IMP1(ICompressProgressInfo)
```

```
 STDMETHOD(SetRatioInfo)(const UInt64 *inSize, const UInt64 *outSize);
};

class CEncoder
{
 #ifdef USE_MIXER_ST
   NCoderMixer2::CMixerST *_mixerST;
 #endif
 #ifdef USE_MIXER_MT
   NCoderMixer2::CMixerMT *_mixerMT;
 #endif

 NCoderMixer2::CMixer
 *_mixer;
 CMyComPtr<IUnknown> _mixerRef;

 CCompressionMethodMode _options;
 NCoderMixer2::CBindInfo _bindInfo;
 CRecordVector<CMethodId> _decompressionMethods;

 CRecordVector<UInt32> _SrcIn_to_DestOut;
 CRecordVector<UInt32> _SrcOut_to_DestIn;
 // CRecordVector<UInt32> _DestIn_to_SrcOut;
 CRecordVector<UInt32> _DestOut_to_SrcIn;

 void InitBindConv();
 void SetFolder(CFolder &folder);

 HRESULT CreateMixerCoder(DECL_EXTERNAL_CODECS_LOC_VARS
     const UInt64 *inSizeForReduce);

 bool _constructed;
public:

 CEncoder(const CCompressionMethodMode &options);
 ~CEncoder();
 HRESULT EncoderConstr();
 HRESULT Encode(
     DECL_EXTERNAL_CODECS_LOC_VARS
     ISequentialInStream *inStream,
     // const UInt64 *inStreamSize,
     const UInt64 *inSizeForReduce,
     CFolder &folderItem,
     CRecordVector<UInt64> &coderUnpackSizes,
     UInt64 &unpackSize,
     ISequentialOutStream *outStream,
     CRecordVector<UInt64> &packSizes,
     ICompressProgressInfo *compressProgress);
```

```
};

}}

#endif
```

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```
/* Sort.h -- Sort functions
2014-04-05 : Igor Pavlov : Public domain */

#ifndef __7Z_SORT_H
#define __7Z_SORT_H

#include "7zTypes.h"

EXTERN_C_BEGIN

void HeapSort(UInt32 *p, size_t size);
void HeapSort64(UInt64 *p, size_t size);
```

/* void HeapSortRef(UInt32 *p, UInt32 *vals, size_t size); */

EXTERN_C_END

#endif
http://scripts.sil.org/cms/scripts/page.php?site_id=nrsi&item_id=Gentium_download

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```
// Common/MyGuidDef.h

#ifndef GUID_DEFINED
#define GUID_DEFINED

#include "MyTypes.h"

typedef struct {
 UInt32 Data1;
 UInt16 Data2;
 UInt16 Data3;
 unsigned char Data4[8];
} GUID;

#ifdef __cplusplus
#define REFGUID const GUID &
#else
#define REFGUID const GUID *
#endif

#define REFCLSID REFGUID
#define REFIID REFGUID

#ifdef __cplusplus
inline int operator==(REFGUID g1, REFGUID g2)
{
 for (int i = 0; i < (int)sizeof(g1); i++)
   if (((unsigned char *)&g1)[i] != ((unsigned char *)&g2)[i])
     return 0;
 return 1;
}
```

```
inline int operator!=(REFGUID g1, REFGUID g2) { return !(g1 == g2); }
#endif

#ifdef __cplusplus
 #define MY_EXTERN_C extern "C"
#else
 #define MY_EXTERN_C extern
#endif

#endif


#ifdef DEFINE_GUID
#undef DEFINE_GUID
#endif

#ifdef INITGUID
 #define DEFINE_GUID(name, l, w1, w2, b1, b2, b3, b4, b5, b6, b7, b8) \
   MY_EXTERN_C const GUID name = { l, w1, w2, { b1, b2, b3, b4, b5, b6, b7, b8 } }
#else
 #define DEFINE_GUID(name, l, w1, w2, b1, b2, b3, b4, b5, b6,
 b7, b8) \
   MY_EXTERN_C const GUID name
#endif
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With dir Attribute in div Element in text Element 2</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-024-ref.xht" />
  <meta name="assert" content="The license element contains a text element that contains a div element with rtl as the value for the dir attribute." />
  <style
 type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-024.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
```

```
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   &lt;div dir="rtl"&gt;Paragraph 1&lt;/div&gt;
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
// Common/C_FileIO.h

#ifndef __COMMON_C_FILEIO_H
#define __COMMON_C_FILEIO_H

#include <stdio.h>
#include <sys/types.h>

#include "MyTypes.h"
#include "MyWindows.h"

#ifdef _WIN32
#ifdef _MSC_VER
typedef size_t ssize_t;
#endif
#endif

namespace NC {
namespace NFile {
namespace NIO {

class CFileBase
{
protected:
 int _handle;
 bool OpenBinary(const char *name, int flags);
public:
 CFileBase(): _handle(-1) {};
 ~CFileBase() { Close(); }
 bool Close();
 bool GetLength(UInt64 &length) const;
 off_t Seek(off_t distanceToMove, int moveMethod) const;
};

class CInFile: public CFileBase
{
public:
 bool Open(const char *name);
```

```
 bool OpenShared(const char *name, bool shareForWrite);
 ssize_t Read(void *data, size_t size);
};

class COutFile: public CFileBase
{
public:
 bool Create(const char *name, bool createAlways);
 bool Open(const char *name, DWORD creationDisposition);
 ssize_t Write(const void *data, size_t size);
};

}}}

#endif
/* LzmaLib.h -- LZMA library interface
2013-01-18 : Igor Pavlov : Public domain */

#ifndef __LZMA_LIB_H
#define __LZMA_LIB_H

#include "7zTypes.h"

EXTERN_C_BEGIN

#define MY_STDAPI int MY_STD_CALL

#define LZMA_PROPS_SIZE 5

/*
RAM requirements for LZMA:
 for compression:   (dictSize * 11.5 + 6 MB) + state_size
 for decompression: dictSize + state_size
   state_size = (4 + (1.5 << (lc + lp))) KB
   by default (lc=3, lp=0), state_size = 16 KB.

LZMA properties (5 bytes) format
   Offset Size  Description
     0     1    lc, lp and pb in encoded form.
     1     4    dictSize (little endian).
*/

/*
LzmaCompress
------------

outPropsSize -
    In:  the pointer to the size of outProps buffer; *outPropsSize = LZMA_PROPS_SIZE = 5.
```

Out: the pointer to the size of written properties in outProps buffer; *outPropsSize = LZMA_PROPS_SIZE = 5.

LZMA Encoder will use defult values for any parameter, if it is
-1 for any from: level, loc, lp, pb, fb, numThreads
0 for dictSize

level - compression level: 0 <= level <= 9;

| level | dictSize | algo | fb |
|---|---|---|---|
| 0: | 16 KB | 0 | 32 |
| 1: | 64 KB | 0 | 32 |
| 2: | 256 KB | 0 | 32 |
| 3: | 1 MB | 0 | 32 |
| 4: | 4 MB | 0 | 32 |
| 5: | 16 MB | 1 | 32 |
| 6: | 32 MB | 1 | 32 |
| 7+: | 64 MB | 1 | 64 |

The default value for "level" is 5.

algo = 0 means fast method
algo = 1 means normal method

dictSize - The dictionary size in bytes. The maximum value is
128 MB = (1 << 27) bytes for 32-bit version
1 GB = (1 << 30) bytes for 64-bit version
The default value is 16 MB = (1 << 24) bytes.
It's recommended to use the dictionary that is larger than 4 KB and
that can be calculated as (1 << N) or (3 << N) sizes.

lc - The number of literal context bits (high bits of previous literal).
It can be in the range from 0 to 8. The default value is 3.
Sometimes lc=4 gives the gain for big files.

lp - The number of literal pos bits (low bits of current position for literals).
It can be in the range from 0 to 4. The default value is 0.
The lp switch is intended for periodical data when the period is equal to 2^lp.
For example, for 32-bit (4 bytes) periodical data you can use lp=2. Often it's
better to set lc=0, if you change lp switch.

pb - The number of pos bits (low bits of current position).
It can be in the range from 0 to 4. The default value is 2.
The pb switch is intended for periodical data when the period is equal 2^pb.

fb - Word size (the number of fast bytes).
It can be in the range from 5 to 273. The default value is 32.
Usually, a big number gives a little bit better compression ratio and
slower compression process.

```
numThreads - The number of thereads. 1 or 2. The default value is 2.
    Fast mode (algo = 0) can use only 1 thread.

Out:
 destLen  - processed output size
Returns:
 SZ_OK               - OK
 SZ_ERROR_MEM        - Memory allocation error
 SZ_ERROR_PARAM      - Incorrect paramater
  SZ_ERROR_OUTPUT_EOF - output buffer overflow
 SZ_ERROR_THREAD     - errors in multithreading functions (only for Mt version)
*/

MY_STDAPI LzmaCompress(unsigned char *dest, size_t *destLen, const unsigned char *src, size_t srcLen,
 unsigned char *outProps, size_t *outPropsSize, /* *outPropsSize must be = 5 */
 int level,      /* 0 <= level <= 9, default = 5 */
 unsigned dictSize,  /* default = (1 << 24) */
 int lc,        /* 0 <= lc <= 8, default = 3  */
 int lp,        /* 0 <= lp <= 4, default = 0  */
 int pb,        /* 0 <= pb <= 4, default = 2  */
 int fb,        /* 5 <= fb <= 273, default = 32 */
 int numThreads /* 1 or 2, default = 2 */
 );

/*
LzmaUncompress
--------------
In:
 dest     - output data
 destLen  - output data size
 src      - input data
 srcLen   - input data size
Out:
 destLen  - processed output size
 srcLen   - processed input size
Returns:
 SZ_OK               - OK
 SZ_ERROR_DATA       - Data error
 SZ_ERROR_MEM        - Memory allocation
 arror
 SZ_ERROR_UNSUPPORTED - Unsupported properties
 SZ_ERROR_INPUT_EOF   - it needs more bytes in input buffer (src)
*/

MY_STDAPI LzmaUncompress(unsigned char *dest, size_t *destLen, const unsigned char *src, SizeT *srcLen,
 const unsigned char *props, size_t propsSize);
```

```
EXTERN_C_END

#endif

/* Generated data (by glib-mkenums) */

#ifndef __ATK_ENUM_TYPES_H__
#define __ATK_ENUM_TYPES_H__

#include <glib-object.h>

G_BEGIN_DECLS
/* enumerations from "atkhyperlink.h" */
GType atk_hyperlink_state_flags_get_type (void);
#define ATK_TYPE_HYPERLINK_STATE_FLAGS (atk_hyperlink_state_flags_get_type())
/* enumerations from "atkobject.h" */
GType atk_role_get_type (void);
#define ATK_TYPE_ROLE (atk_role_get_type())
GType atk_layer_get_type (void);
#define ATK_TYPE_LAYER (atk_layer_get_type())
/* enumerations from "atkrelationtype.h" */
GType atk_relation_type_get_type (void);
#define ATK_TYPE_RELATION_TYPE (atk_relation_type_get_type())
/* enumerations from "atkstate.h" */
GType atk_state_type_get_type (void);
#define ATK_TYPE_STATE_TYPE (atk_state_type_get_type())
/* enumerations from "atktext.h" */
GType atk_text_attribute_get_type (void);
#define ATK_TYPE_TEXT_ATTRIBUTE (atk_text_attribute_get_type())
GType atk_text_boundary_get_type (void);
#define ATK_TYPE_TEXT_BOUNDARY (atk_text_boundary_get_type())
GType
 atk_text_clip_type_get_type (void);
#define ATK_TYPE_TEXT_CLIP_TYPE (atk_text_clip_type_get_type())
/* enumerations from "atkutil.h" */
GType atk_key_event_type_get_type (void);
#define ATK_TYPE_KEY_EVENT_TYPE (atk_key_event_type_get_type())
GType atk_coord_type_get_type (void);
#define ATK_TYPE_COORD_TYPE (atk_coord_type_get_type())
G_END_DECLS

#endif /* __ATK_ENUM_TYPES_H__ */

/* Generated data ends here */
```

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```
// LoadCodecs.h

#ifndef __LOAD_CODECS_H
#define __LOAD_CODECS_H

/*
Client application uses LoadCodecs.* to load plugins to
CCodecs object, that contains 3 lists of plugins:
 1) Formats - internal and external archive handlers
 2) Codecs  - external codecs
 3) Hashers - external hashers

EXTERNAL_CODECS
---------------

 if EXTERNAL_CODECS is defined, then the code tries to load external
 plugins from DLL files (shared libraries).

 There are two types of executables in 7-Zip:

 1) Executable that uses external plugins must be compiled
    with EXTERNAL_CODECS defined:
     - 7z.exe, 7zG.exe, 7zFM.exe

    Note: EXTERNAL_CODECS is used also in CPP/7zip/Common/CreateCoder.h
          that code is used in plugin module (7z.dll).

 2) Standalone modules are compiled without EXTERNAL_CODECS:
   - SFX modules: 7z.sfx, 7zCon.sfx
   - standalone versions of console 7-Zip: 7za.exe, 7zr.exe
```

```
 if EXTERNAL_CODECS is defined, CCodecs class implements interfaces:
   - ICompressCodecsInfo
 : for Codecs
   - IHashers            : for Hashers

 The client application can send CCodecs object to each plugin module.
 And plugin module can use ICompressCodecsInfo or IHashers interface to access
 another plugins.

 There are 2 ways to send (ICompressCodecsInfo * compressCodecsInfo) to plugin
   1) for old versions:
       a) request ISetCompressCodecsInfo from created archive handler.
       b) call ISetCompressCodecsInfo::SetCompressCodecsInfo(compressCodecsInfo)
   2) for new versions:
       a) request "SetCodecs" function from DLL file
       b) call SetCodecs(compressCodecsInfo) function from DLL file
*/

#include "../../../Common/MyBuffer.h"
#include "../../../Common/MyCom.h"
#include "../../../Common/MyString.h"
#include "../../../Common/ComTry.h"

#ifdef EXTERNAL_CODECS
#include "../../../Windows/DLL.h"
#endif

#include "../../ICoder.h"

#include "../../Archive/IArchive.h"


#ifdef EXTERNAL_CODECS

struct CDllCodecInfo
{
 unsigned LibIndex;
  UInt32 CodecIndex;
 bool EncoderIsAssigned;
 bool DecoderIsAssigned;
 CLSID Encoder;
 CLSID Decoder;
};

struct CDllHasherInfo
{
 unsigned LibIndex;
```

```
 UInt32 HasherIndex;
};

#endif

struct CArcExtInfo
{
 UString Ext;
 UString AddExt;

 CArcExtInfo() {}
 CArcExtInfo(const UString &ext): Ext(ext) {}
 CArcExtInfo(const UString &ext, const UString &addExt): Ext(ext), AddExt(addExt) {}
};


struct CArcInfoEx
{
 UInt32 Flags;

 Func_CreateInArchive CreateInArchive;
 Func_IsArc IsArcFunc;

 UString Name;
 CObjectVector<CArcExtInfo> Exts;

 #ifndef _SFX
   Func_CreateOutArchive CreateOutArchive;
   bool UpdateEnabled;
   bool NewInterface;
   // UInt32 Version;
   UInt32 SignatureOffset;
   CObjectVector<CByteBuffer> Signatures;
   #ifdef NEW_FOLDER_INTERFACE
     UStringVector AssociateExts;
   #endif
 #endif

 #ifdef EXTERNAL_CODECS
   int LibIndex;
   UInt32 FormatIndex;
   CLSID ClassID;
 #endif

 bool Flags_KeepName() const { return (Flags & NArcInfoFlags::kKeepName)
 != 0; }
 bool Flags_FindSignature() const { return (Flags & NArcInfoFlags::kFindSignature) != 0; }
```

```
bool Flags_AltStreams() const { return (Flags & NArcInfoFlags::kAltStreams) != 0; }
bool Flags_NtSecure() const { return (Flags & NArcInfoFlags::kNtSecure) != 0; }
bool Flags_SymLinks() const { return (Flags & NArcInfoFlags::kSymLinks) != 0; }
bool Flags_HardLinks() const { return (Flags & NArcInfoFlags::kHardLinks) != 0; }

bool Flags_UseGlobalOffset() const { return (Flags & NArcInfoFlags::kUseGlobalOffset) != 0; }
bool Flags_StartOpen() const { return (Flags & NArcInfoFlags::kStartOpen) != 0; }
bool Flags_BackwardOpen() const { return (Flags & NArcInfoFlags::kBackwardOpen) != 0; }
bool Flags_PreArc() const { return (Flags & NArcInfoFlags::kPreArc) != 0; }
bool Flags_PureStartOpen() const { return (Flags & NArcInfoFlags::kPureStartOpen) != 0; }

UString GetMainExt() const
{
  if (Exts.IsEmpty())
    return UString();
  return Exts[0].Ext;
 }
int FindExtension(const UString &ext) const;

/*
UString GetAllExtensions() const
{
  UString s;
  for (int i = 0; i < Exts.Size(); i++)
  {
    if (i > 0)
      s += ' ';
    s += Exts[i].Ext;
  }
  return s;
}
*/

void AddExts(const UString &ext, const UString &addExt);

bool IsSplit() const { return StringsAreEqualNoCase_Ascii(Name, "Split"); }
// bool IsRar() const { return StringsAreEqualNoCase_Ascii(Name, "Rar"); }

CArcInfoEx():
    Flags(0),
    CreateInArchive(NULL),
    IsArcFunc(NULL)
    #ifndef _SFX
    , CreateOutArchive(NULL)
    , UpdateEnabled(false)
    , NewInterface(false)
    // , Version(0)
    , SignatureOffset(0)
```

```
    #endif
    #ifdef EXTERNAL_CODECS
    , LibIndex(-1)
    #endif
 {}
};

#ifdef NEW_FOLDER_INTERFACE

struct CCodecIcons
{
 struct CIconPair
 {
   UString Ext;
   int IconIndex;
 };
 CObjectVector<CIconPair> IconPairs;

 void LoadIcons(HMODULE m);
 bool FindIconIndex(const
 UString &ext, int &iconIndex) const;
};

#endif

#ifdef EXTERNAL_CODECS

struct CCodecLib
 #ifdef NEW_FOLDER_INTERFACE
   : public CCodecIcons
 #endif
{
 NWindows::NDLL::CLibrary Lib;
 FString Path;

 Func_CreateObject CreateObject;
 Func_GetMethodProperty GetMethodProperty;
 Func_CreateDecoder CreateDecoder;
 Func_CreateEncoder CreateEncoder;
 Func_SetCodecs SetCodecs;

 CMyComPtr<IHashers> ComHashers;

 #ifdef NEW_FOLDER_INTERFACE
 void LoadIcons() { CCodecIcons::LoadIcons((HMODULE)Lib); }
 #endif

 CCodecLib():
```

```
    CreateObject(NULL),
    GetMethodProperty(NULL),
    CreateDecoder(NULL),
    CreateEncoder(NULL),
    SetCodecs(NULL)
    {}
};

#endif


class CCodecs:
 #ifdef EXTERNAL_CODECS
   public ICompressCodecsInfo,
   public IHashers,
 #else
   public IUnknown,
 #endif
 public CMyUnknownImp
{
 CLASS_NO_COPY(CCodecs);
public:
 #ifdef EXTERNAL_CODECS

 CObjectVector<CCodecLib> Libs;
 FString MainDll_ErrorPath;

 void CloseLibs();

  class CReleaser
 {
   CLASS_NO_COPY(CReleaser);

   /* CCodecsReleaser object releases CCodecs links.
        1) CCodecs is COM object that is deleted when all links to that object will be released/
        2) CCodecs::Libs[i] can hold (ICompressCodecsInfo *) link to CCodecs object itself.
      To break that reference loop, we must close all CCodecs::Libs in CCodecsReleaser desttructor. */

   CCodecs *_codecs;

   public:
   CReleaser(): _codecs(NULL) {}
   void Set(CCodecs *codecs) { _codecs = codecs; }
   ~CReleaser() { if (_codecs) _codecs->CloseLibs(); }
 };

 bool NeedSetLibCodecs; // = false, if we don't need to set codecs for archive handler via ISetCompressCodecsInfo
```

```
HRESULT LoadCodecs();
HRESULT LoadFormats();
HRESULT LoadDll(const FString &path, bool needCheckDll, bool *loadedOK = NULL);
HRESULT LoadDllsFromFolder(const FString &folderPrefix);

HRESULT CreateArchiveHandler(const CArcInfoEx &ai, bool outHandler, void **archive) const
{

  return Libs[ai.LibIndex].CreateObject(&ai.ClassID, outHandler ? &IID_IOutArchive : &IID_IInArchive, (void
**)archive);
}

#endif

#ifdef NEW_FOLDER_INTERFACE
CCodecIcons InternalIcons;
#endif

CObjectVector<CArcInfoEx> Formats;

#ifdef EXTERNAL_CODECS
CRecordVector<CDllCodecInfo> Codecs;
CRecordVector<CDllHasherInfo> Hashers;
#endif

bool CaseSensitiveChange;
bool CaseSensitive;

CCodecs():
   #ifdef EXTERNAL_CODECS
   NeedSetLibCodecs(true),
   #endif
   CaseSensitiveChange(false),
   CaseSensitive(false)
   {}

~CCodecs()
{
  // OutputDebugStringA("~CCodecs");
}

const wchar_t *GetFormatNamePtr(int formatIndex) const
{
  return formatIndex < 0 ? L"#" : (const wchar_t *)Formats[formatIndex].Name;
}

HRESULT Load();
```

```
#ifndef _SFX
int FindFormatForArchiveName(const UString &arcPath) const;
int FindFormatForExtension(const UString &ext) const;
int FindFormatForArchiveType(const UString &arcType) const;
bool
FindFormatForArchiveType(const UString &arcType, CIntVector &formatIndices) const;
#endif

#ifdef EXTERNAL_CODECS

MY_UNKNOWN_IMP2(ICompressCodecsInfo, IHashers)

STDMETHOD(GetNumMethods)(UInt32 *numMethods);
STDMETHOD(GetProperty)(UInt32 index, PROPID propID, PROPVARIANT *value);
STDMETHOD(CreateDecoder)(UInt32 index, const GUID *iid, void **coder);
STDMETHOD(CreateEncoder)(UInt32 index, const GUID *iid, void **coder);

STDMETHOD_(UInt32, GetNumHashers)();
STDMETHOD(GetHasherProp)(UInt32 index, PROPID propID, PROPVARIANT *value);
STDMETHOD(CreateHasher)(UInt32 index, IHasher **hasher);

#else

MY_UNKNOWN_IMP

#endif // EXTERNAL_CODECS


#ifdef EXTERNAL_CODECS

int GetCodec_LibIndex(UInt32 index) const;
bool GetCodec_DecoderIsAssigned(UInt32 index) const;
bool GetCodec_EncoderIsAssigned(UInt32 index) const;
UInt32 GetCodec_NumStreams(UInt32 index);
HRESULT GetCodec_Id(UInt32 index, UInt64 &id);
AString GetCodec_Name(UInt32 index);

int GetHasherLibIndex(UInt32
index);
UInt64 GetHasherId(UInt32 index);
AString GetHasherName(UInt32 index);
UInt32 GetHasherDigestSize(UInt32 index);

#endif

HRESULT CreateInArchive(unsigned formatIndex, CMyComPtr<IInArchive> &archive) const
{
  const CArcInfoEx &ai = Formats[formatIndex];
```

```
  #ifdef EXTERNAL_CODECS
  if (ai.LibIndex < 0)
  #endif
  {
    COM_TRY_BEGIN
    archive = ai.CreateInArchive();
    return S_OK;
    COM_TRY_END
  }
  #ifdef EXTERNAL_CODECS
  return CreateArchiveHandler(ai, false, (void **)&archive);
  #endif
}

#ifndef _SFX

HRESULT CreateOutArchive(unsigned formatIndex, CMyComPtr<IOutArchive> &archive) const
{
  const CArcInfoEx &ai = Formats[formatIndex];
  #ifdef EXTERNAL_CODECS
  if (ai.LibIndex < 0)
  #endif
  {
    COM_TRY_BEGIN
    archive = ai.CreateOutArchive();
    return S_OK;
    COM_TRY_END
  }

  #ifdef EXTERNAL_CODECS
  return CreateArchiveHandler(ai, true, (void **)&archive);
   #endif
}

int FindOutFormatFromName(const UString &name) const
{
  FOR_VECTOR (i, Formats)
  {
    const CArcInfoEx &arc = Formats[i];
    if (!arc.UpdateEnabled)
      continue;
    if (arc.Name.IsEqualTo_NoCase(name))
      return i;
  }
  return -1;
}

#endif // _SFX
```

```
};

#ifdef EXTERNAL_CODECS
 #define CREATE_CODECS_OBJECT \
   CCodecs *codecs = new CCodecs; \
   CExternalCodecs __externalCodecs; \
   __externalCodecs.GetCodecs = codecs; \
   __externalCodecs.GetHashers = codecs; \
   CCodecs::CReleaser codecsReleaser; \
   codecsReleaser.Set(codecs);
#else
 #define CREATE_CODECS_OBJECT \
   CCodecs *codecs = new CCodecs; \
   CMyComPtr<IUnknown> __codecsRef = codecs;
#endif

#endif
// ExtractCallbackConsole.h

#ifndef __EXTRACT_CALLBACK_CONSOLE_H
#define __EXTRACT_CALLBACK_CONSOLE_H

#include "../../../Common/StdOutStream.h"

#include "../../IPassword.h"

#include "../../Archive/IArchive.h"

#include "../Common/ArchiveExtractCallback.h"

#include "PercentPrinter.h"

#include "OpenCallbackConsole.h"

class CExtractScanConsole: public IDirItemsCallback
{
 CStdOutStream *_so;
 CStdOutStream *_se;
 CPercentPrinter _percent;

 bool NeedPercents() const { return _percent._so != NULL; }

 void ClosePercentsAndFlush()
 {
   if (NeedPercents())
     _percent.ClosePrint(true);
   if (_so)
     _so->Flush();
```

```
 }

public:
 void Init(CStdOutStream *outStream, CStdOutStream *errorStream, CStdOutStream *percentStream)
 {
   _so = outStream;
   _se = errorStream;
   _percent._so = percentStream;
 }

 void SetWindowWidth(unsigned width) { _percent.MaxLen = width - 1; }

 void StartScanning();

 INTERFACE_IDirItemsCallback(;)

 void CloseScanning()
 {

  if (NeedPercents())
     _percent.ClosePrint(true);
 }

 void PrintStat(const CDirItemsStat &st);
};




class CExtractCallbackConsole:
 public IExtractCallbackUI,
 // public IArchiveExtractCallbackMessage,
 public IFolderArchiveExtractCallback2,
 #ifndef _NO_CRYPTO
 public ICryptoGetTextPassword,
 #endif
 public COpenCallbackConsole,
 public CMyUnknownImp
{
 AString _tempA;
 UString _tempU;

 UString _currentName;

 void ClosePercents_for_so()
 {
   if (NeedPercents() && _so == _percent._so)
     _percent.ClosePrint(false);
```

```
}

void ClosePercentsAndFlush()
{
  if (NeedPercents())
    _percent.ClosePrint(true);
  if (_so)
    _so->Flush();
}

public:
MY_QUERYINTERFACE_BEGIN2(IFolderArchiveExtractCallback)
// MY_QUERYINTERFACE_ENTRY(IArchiveExtractCallbackMessage)
MY_QUERYINTERFACE_ENTRY(IFolderArchiveExtractCallback2)
#ifndef _NO_CRYPTO
MY_QUERYINTERFACE_ENTRY(ICryptoGetTextPassword)
#endif
MY_QUERYINTERFACE_END
MY_ADDREF_RELEASE

STDMETHOD(SetTotal)(UInt64
total);
STDMETHOD(SetCompleted)(const UInt64 *completeValue);

INTERFACE_IFolderArchiveExtractCallback(;)

INTERFACE_IExtractCallbackUI(;)
// INTERFACE_IArchiveExtractCallbackMessage(;)
INTERFACE_IFolderArchiveExtractCallback2(;)

#ifndef _NO_CRYPTO

STDMETHOD(CryptoGetTextPassword)(BSTR *password);

#endif

UInt64 NumTryArcs;

bool ThereIsError_in_Current;
bool ThereIsWarning_in_Current;

UInt64 NumOkArcs;
UInt64 NumCantOpenArcs;
UInt64 NumArcsWithError;
UInt64 NumArcsWithWarnings;

UInt64 NumOpenArcErrors;
UInt64 NumOpenArcWarnings;
```

```
 UInt64 NumFileErrors;
 UInt64 NumFileErrors_in_Current;

 bool NeedFlush;
 unsigned PercentsNameLevel;
 unsigned LogLevel;

 CExtractCallbackConsole():
    NeedFlush(false),
    PercentsNameLevel(1),
    LogLevel(0)
    {}

 void SetWindowWidth(unsigned width) { _percent.MaxLen = width - 1; }

 void Init(CStdOutStream *outStream, CStdOutStream *errorStream, CStdOutStream *percentStream)
  {
  COpenCallbackConsole::Init(outStream, errorStream, percentStream);

  NumTryArcs = 0;

  ThereIsError_in_Current = false;
  ThereIsWarning_in_Current = false;

  NumOkArcs = 0;
  NumCantOpenArcs = 0;
  NumArcsWithError = 0;
  NumArcsWithWarnings = 0;

  NumOpenArcErrors = 0;
  NumOpenArcWarnings = 0;

  NumFileErrors = 0;
  NumFileErrors_in_Current = 0;
 }
};

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With Two span Elements in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
```

```
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element that contains two span elements." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size:
 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
    Text with &lt;span&gt;span 1&lt;/span&gt; and &lt;span&gt;span 2&lt;/span&gt;.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

At the time this file was first modified, a complete, unmodified copy of
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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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%
% -----> Finnish hyphenation patterns for MLPCTeX <------

```
%
%  + January 1986: first release by Kauko Saarinen,
%    Computing Centre, University of Jyvaskyla, Finland
%
%  + January 1988: completely rewritten by Kauko Saarinen.
%    The new patterns make much less mistakes with foreign
%    and compound words. The article "Automatic Hyphenation
%    of Finnish" by Professor Fred Karlsson is also referred
%
%  + 8th March 1989 (vers. 2.2): some vowel
 triples added by
%    Kauko Saarinen based on Fred Karlsson's ideas
%
%  + 9th January 1995: added \uccode and \lccode by Thomas Esser
%
%  + 24th May 2004: changelog reformatted for disambiguation and
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```
// ProgressUtils.h

#ifndef __PROGRESS_UTILS_H
#define __PROGRESS_UTILS_H

#include "../../Common/MyCom.h"

#include "../ICoder.h"
#include "../IProgress.h"

class CLocalProgress:
 public ICompressProgressInfo,
 public CMyUnknownImp
{
 CMyComPtr<IProgress> _progress;
 CMyComPtr<ICompressProgressInfo> _ratioProgress;
 bool _inSizeIsMain;
public:
 UInt64 ProgressOffset;
 UInt64 InSize;
 UInt64 OutSize;
 bool SendRatio;
```

```
 bool SendProgress;

 CLocalProgress();

 void Init(IProgress *progress, bool inSizeIsMain);
 HRESULT SetCur();

 MY_UNKNOWN_IMP1(ICompressProgressInfo)

 STDMETHOD(SetRatioInfo)(const UInt64 *inSize, const UInt64 *outSize);
};

#endif
// StdAfx.h

#ifndef __STDAFX_H
#define __STDAFX_H

#include "../../Common/Common.h"

#endif
// Windows/Control/StatusBar.h

#ifndef __WINDOWS_CONTROL_STATUSBAR_H
#define __WINDOWS_CONTROL_STATUSBAR_H

#include "../Window.h"

namespace NWindows {
namespace NControl {

class CStatusBar: public NWindows::CWindow
{
public:
 bool Create(LONG style, LPCTSTR text, HWND hwndParent, UINT id)
   { return (_window = ::CreateStatusWindow(style, text, hwndParent, id)) != 0; }
 bool SetText(LPCTSTR text)
   { return CWindow::SetText(text); }
 bool SetText(unsigned index, LPCTSTR text, UINT type)
   { return LRESULTToBool(SendMsg(SB_SETTEXT, index | type, (LPARAM)text)); }
 bool SetText(unsigned index, LPCTSTR text)
   { return SetText(index, text, 0); }

 #ifndef _UNICODE
 bool Create(LONG style, LPCWSTR text, HWND hwndParent, UINT id)
   { return (_window = ::CreateStatusWindowW(style, text, hwndParent, id)) != 0; }
 bool SetText(LPCWSTR text)
   { return CWindow::SetText(text); }
```

```
 bool SetText(unsigned index, LPCWSTR text, UINT type)
   { return LRESULTToBool(SendMsg(SB_SETTEXTW,
 index | type, (LPARAM)text)); }
 bool SetText(unsigned index, LPCWSTR text)
   { return SetText(index, text, 0); }
 #endif

 bool SetParts(unsigned numParts, const int *edgePostions)
   { return LRESULTToBool(SendMsg(SB_SETPARTS, numParts, (LPARAM)edgePostions)); }
 void Simple(bool simple)
   { SendMsg(SB_SIMPLE, BoolToBOOL(simple), 0); }
};

}}

#endif
```

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```
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strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Invalid license Element With dir Attribute in span Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
```

```
  <link rel="match" href="metadatadisplay-schema-license-032-ref.xht" />
  <meta name="assert" content="The license element contains a text element that contains a span element with
INVALID as the value for the dir attribute."
 />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-032.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
// SortUtils.h

#ifndef __SORT_UTLS_H
#define __SORT_UTLS_H

#include "../../../Common/MyString.h"

void SortFileNames(const UStringVector &strings, CUIntVector &indices);

#endif
```

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// EnumDirItems.h

```
#ifndef __ENUM_DIR_ITEMS_H
#define __ENUM_DIR_ITEMS_H

#include "../../../Common/Wildcard.h"

#include "../../../Windows/FileFind.h"

#include "DirItem.h"
```

```
void AddDirFileInfo(int phyParent, int logParent, int secureIndex,
  const NWindows::NFile::NFind::CFileInfo &fi, CObjectVector<CDirItem> &dirItems);

HRESULT EnumerateItems(
  const NWildcard::CCensor &censor,
  NWildcard::ECensorPathMode pathMode,
  const UString &addPathPrefix,
  CDirItems &dirItems);


struct CMessagePathException: public UString
{
 CMessagePathException(const char *a, const wchar_t *u = NULL);
};


HRESULT EnumerateDirItemsAndSort(
  NWildcard::CCensor &censor,
  NWildcard::ECensorPathMode pathMode,
  const UString &addPathPrefix,
  UStringVector &sortedPaths,
  UStringVector &sortedFullPaths,
  CDirItemsStat &st,
  IDirItemsCallback *callback);

#ifdef _WIN32
void ConvertToLongNames(NWildcard::CCensor &censor);
#endif

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With dir Attribute in div Element in text Element 2</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-021-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element that contains a div element with rtl as
the value for the dir attribute."
 />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
```

```
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-021.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   &lt;div dir="rtl"&gt;Paragraph 1&lt;/div&gt;
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
// OutStreamWithCRC.h

#ifndef __OUT_STREAM_WITH_CRC_H
#define __OUT_STREAM_WITH_CRC_H

#include "../../../../C/7zCrc.h"

#include "../../../Common/MyCom.h"

#include "../../IStream.h"

class COutStreamWithCRC:
 public ISequentialOutStream,
 public CMyUnknownImp
```

```
{
 CMyComPtr<ISequentialOutStream> _stream;
 UInt64 _size;
 UInt32 _crc;
 bool _calculate;
public:
 MY_UNKNOWN_IMP
 STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
 void SetStream(ISequentialOutStream *stream) { _stream = stream; }
 void ReleaseStream() { _stream.Release(); }
 void Init(bool calculate = true)
 {
   _size = 0;
   _calculate = calculate;
   _crc = CRC_INIT_VAL;
 }
 void EnableCalc(bool calculate) { _calculate = calculate; }
 void InitCRC() { _crc = CRC_INIT_VAL; }
 UInt64 GetSize() const { return _size; }
 UInt32 GetCRC() const { return CRC_GET_DIGEST(_crc); }
};

#endif
// Windows/Control/ProgressBar.h

#ifndef __WINDOWS_CONTROL_PROGRESSBAR_H
#define __WINDOWS_CONTROL_PROGRESSBAR_H

#include "../../Common/MyWindows.h"

#include <commctrl.h>

#include "../Window.h"

namespace NWindows {
namespace NControl {

class CProgressBar: public CWindow
{
public:
 LRESULT SetPos(int pos) { return SendMsg(PBM_SETPOS, pos, 0); }
 LRESULT DeltaPos(int increment) { return SendMsg(PBM_DELTAPOS, increment, 0); }
 UINT GetPos() { return (UINT)SendMsg(PBM_GETPOS, 0, 0); }
 LRESULT SetRange(unsigned short minValue, unsigned short maxValue) { return SendMsg(PBM_SETRANGE,
0, MAKELPARAM(minValue, maxValue)); }
 DWORD SetRange32(int minValue, int maxValue) { return (DWORD)SendMsg(PBM_SETRANGE32, minValue,
maxValue); }
 int SetStep(int step) { return (int)SendMsg(PBM_SETSTEP, step, 0); }
```

```
 LRESULT StepIt() { return SendMsg(PBM_STEPIT, 0, 0); }
 INT GetRange(bool minValue, PPBRANGE range) { return (INT)SendMsg(PBM_GETRANGE,
BoolToBOOL(minValue), (LPARAM)range); }

 #ifndef
 UNDER_CE
 COLORREF SetBarColor(COLORREF color) { return (COLORREF)SendMsg(PBM_SETBARCOLOR, 0, color);
}
 COLORREF SetBackgroundColor(COLORREF color) { return (COLORREF)SendMsg(PBM_SETBKCOLOR, 0,
color); }
 #endif
};

}}

#endif
```

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```
PROG = lzma
CXX = g++ -O2
# -Wall -Werror -Wno-delete-non-virtual-dtor
CXX_C = gcc -O2 -Wall -Werror

ifdef SystemDrive
IS_MINGW = 1
endif

ifdef IS_MINGW

RM = del
```

```
CFLAGS = -c
LIB2 = -loleaut32 -luuid
LDFLAGS = -s

FILE_IO =FileIO
FILE_IO_2 =Windows/$(FILE_IO)

MT_FILES = \
 LzFindMt.o \
 Threads.o \

else

RM = rm -f
CFLAGS = -c -D_7ZIP_ST

FILE_IO =C_FileIO
FILE_IO_2 =Common/$(FILE_IO)


endif


OBJS = \
 $(MT_FILES) \
 $(FILE_IO).o \
 LzmaAlone.o \
 Bench.o \
 BenchCon.o \
 ConsoleClose.o \
 LzmaDecoder.o \
 LzmaEncoder.o \
 LzmaRegister.o \
 CreateCoder.o \
 CWrappers.o \
 FileStreams.o \
 FilterCoder.o \
 MethodProps.o \
 StreamUtils.o \
 CommandLineParser.o \
 CRC.o \
 CrcReg.o \
 IntToString.o \
 MyString.o \
 MyVector.o \
 MyWindows.o \
 StringConvert.o \
 StringToInt.o \
```

```
 PropVariant.o \
 System.o \
 7zCrc.o \
 7zCrcOpt.o \
 Alloc.o \
 Bra86.o \
 CpuArch.o \
 LzFind.o \
 LzmaDec.o \
 LzmaEnc.o \
 Lzma86Dec.o \
 Lzma86Enc.o \


all: $(PROG)

$(PROG):
 $(OBJS)
 $(CXX) -o $(PROG) $(LDFLAGS) $(OBJS) $(LIB2)

LzmaAlone.o: LzmaAlone.cpp
 $(CXX) $(CFLAGS) LzmaAlone.cpp

Bench.o: ../../UI/Common/Bench.cpp
 $(CXX) $(CFLAGS) ../../UI/Common/Bench.cpp

BenchCon.o: ../../UI/Console/BenchCon.cpp
 $(CXX) $(CFLAGS) ../../UI/Console/BenchCon.cpp

ConsoleClose.o: ../../UI/Console/ConsoleClose.cpp
 $(CXX) $(CFLAGS) ../../UI/Console/ConsoleClose.cpp

LzmaDecoder.o: ../../Compress/LzmaDecoder.cpp
 $(CXX) $(CFLAGS) ../../Compress/LzmaDecoder.cpp

LzmaEncoder.o: ../../Compress/LzmaEncoder.cpp
 $(CXX) $(CFLAGS) ../../Compress/LzmaEncoder.cpp

LzmaRegister.o: ../../Compress/LzmaRegister.cpp
 $(CXX) $(CFLAGS) ../../Compress/LzmaRegister.cpp

CreateCoder.o: ../../Common/CreateCoder.cpp
 $(CXX) $(CFLAGS) ../../Common/CreateCoder.cpp

CWrappers.o: ../../Common/CWrappers.cpp
 $(CXX) $(CFLAGS) ../../Common/CWrappers.cpp

FileStreams.o: ../../Common/FileStreams.cpp
```

```
 $(CXX) $(CFLAGS) ../../Common/FileStreams.cpp

FilterCoder.o: ../../Common/FilterCoder.cpp
 $(CXX)
 $(CFLAGS) ../../Common/FilterCoder.cpp

MethodProps.o: ../../Common/MethodProps.cpp
 $(CXX) $(CFLAGS) ../../Common/MethodProps.cpp

StreamUtils.o: ../../Common/StreamUtils.cpp
 $(CXX) $(CFLAGS) ../../Common/StreamUtils.cpp

$(FILE_IO).o: ../../../$(FILE_IO_2).cpp
 $(CXX) $(CFLAGS) ../../../$(FILE_IO_2).cpp


CommandLineParser.o: ../../../Common/CommandLineParser.cpp
 $(CXX) $(CFLAGS) ../../../Common/CommandLineParser.cpp

CRC.o: ../../../Common/CRC.cpp
 $(CXX) $(CFLAGS) ../../../Common/CRC.cpp

CrcReg.o: ../../../Common/CrcReg.cpp
 $(CXX) $(CFLAGS) ../../../Common/CrcReg.cpp

IntToString.o: ../../../Common/IntToString.cpp
 $(CXX) $(CFLAGS) ../../../Common/IntToString.cpp

MyString.o: ../../../Common/MyString.cpp
 $(CXX) $(CFLAGS) ../../../Common/MyString.cpp

MyVector.o: ../../../Common/MyVector.cpp
 $(CXX) $(CFLAGS) ../../../Common/MyVector.cpp

MyWindows.o: ../../../Common/MyWindows.cpp
 $(CXX) $(CFLAGS) ../../../Common/MyWindows.cpp

StringConvert.o: ../../../Common/StringConvert.cpp
 $(CXX)
 $(CFLAGS) ../../../Common/StringConvert.cpp

StringToInt.o: ../../../Common/StringToInt.cpp
 $(CXX) $(CFLAGS) ../../../Common/StringToInt.cpp

PropVariant.o: ../../../Windows/PropVariant.cpp
 $(CXX) $(CFLAGS) ../../../Windows/PropVariant.cpp

System.o: ../../../Windows/System.cpp
```

```
 $(CXX) $(CFLAGS) ../../../Windows/System.cpp

7zCrc.o: ../../../../C/7zCrc.c
 $(CXX_C) $(CFLAGS) ../../../../C/7zCrc.c

7zCrcOpt.o: ../../../../C/7zCrcOpt.c
 $(CXX_C) $(CFLAGS) ../../../../C/7zCrcOpt.c

Alloc.o: ../../../../C/Alloc.c
 $(CXX_C) $(CFLAGS) ../../../../C/Alloc.c

Bra86.o: ../../../../C/Bra86.c
 $(CXX_C) $(CFLAGS) ../../../../C/Bra86.c

CpuArch.o: ../../../../C/CpuArch.c
 $(CXX_C) $(CFLAGS) ../../../../C/CpuArch.c

LzFind.o: ../../../../C/LzFind.c
 $(CXX_C) $(CFLAGS) ../../../../C/LzFind.c

ifdef MT_FILES
LzFindMt.o: ../../../../C/LzFindMt.c
 $(CXX_C) $(CFLAGS) ../../../../C/LzFindMt.c

Threads.o: ../../../../C/Threads.c
 $(CXX_C) $(CFLAGS) ../../../../C/Threads.c
endif

LzmaDec.o:
 ../../../../C/LzmaDec.c
 $(CXX_C) $(CFLAGS) ../../../../C/LzmaDec.c

LzmaEnc.o: ../../../../C/LzmaEnc.c
 $(CXX_C) $(CFLAGS) ../../../../C/LzmaEnc.c

Lzma86Dec.o: ../../../../C/Lzma86Dec.c
 $(CXX_C) $(CFLAGS) ../../../../C/Lzma86Dec.c

Lzma86Enc.o: ../../../../C/Lzma86Enc.c
 $(CXX_C) $(CFLAGS) ../../../../C/Lzma86Enc.c

clean:
 -$(RM) $(PROG) $(OBJS)
```

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```
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* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_NO_OP_OBJECT_FACTORY_H__
#define __ATK_NO_OP_OBJECT_FACTORY_H__

#include <atk/atkobjectfactory.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

#define ATK_TYPE_NO_OP_OBJECT_FACTORY
        (atk_no_op_object_factory_get_type ())
#define ATK_NO_OP_OBJECT_FACTORY(obj)        (G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_NO_OP_OBJECT_FACTORY, AtkNoOpObjectFactory))
```

```
#define ATK_NO_OP_OBJECT_FACTORY_CLASS(klass)      (G_TYPE_CHECK_CLASS_CAST ((klass),
ATK_TYPE_NO_OP_OBJECT_FACTORY, AtkNoOpObjectFactoryClass))
#define ATK_IS_NO_OP_OBJECT_FACTORY(obj)           (G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_NO_OP_OBJECT_FACTORY))
#define ATK_IS_NO_OP_OBJECT_FACTORY_CLASS(klass)    (G_TYPE_CHECK_CLASS_TYPE ((klass),
ATK_TYPE_NO_OP_OBJECT_FACTORY))
#define ATK_NO_OP_OBJECT_FACTORY_GET_CLASS(obj)     (G_TYPE_INSTANCE_GET_CLASS ( (obj),
ATK_TYPE_NO_OP_OBJECT_FACTORY, AtkNoOpObjectFactoryClass))

typedef struct _AtkNoOpObjectFactory                AtkNoOpObjectFactory;
typedef struct _AtkNoOpObjectFactoryClass           AtkNoOpObjectFactoryClass;

struct _AtkNoOpObjectFactory
{
 AtkObjectFactory parent;
};

struct _AtkNoOpObjectFactoryClass
{
  AtkObjectFactoryClass parent_class;
};

GType atk_no_op_object_factory_get_type(void);

AtkObjectFactory *atk_no_op_object_factory_new(void);

#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_NO_OP_OBJECT_FACTORY_H__ */
// PpmdEncoder.h

#ifndef __COMPRESS_PPMD_ENCODER_H
#define __COMPRESS_PPMD_ENCODER_H

#include "../../../C/Ppmd7.h"

#include "../../Common/MyCom.h"

#include "../ICoder.h"

#include "../Common/CWrappers.h"

namespace NCompress {
namespace NPpmd {
```

```
struct CEncProps
{
 UInt32 MemSize;
 UInt32 ReduceSize;
 int Order;

 CEncProps()
 {
   MemSize = (UInt32)(Int32)-1;
   ReduceSize = (UInt32)(Int32)-1;
   Order = -1;
 }
 void Normalize(int level);
};

class CEncoder :
 public ICompressCoder,
 public ICompressSetCoderProperties,
 public ICompressWriteCoderProperties,
 public CMyUnknownImp
{
 Byte *_inBuf;
 CByteOutBufWrap _outStream;
 CPpmd7z_RangeEnc _rangeEnc;
 CPpmd7 _ppmd;
 CEncProps _props;
public:
 MY_UNKNOWN_IMP3(
     ICompressCoder,
     ICompressSetCoderProperties,
     ICompressWriteCoderProperties)
 STDMETHOD(Code)(ISequentialInStream *inStream, ISequentialOutStream *outStream,
     const UInt64 *inSize, const UInt64 *outSize, ICompressProgressInfo *progress);
  STDMETHOD(SetCoderProperties)(const PROPID *propIDs, const PROPVARIANT *props, UInt32 numProps);
 STDMETHOD(WriteCoderProperties)(ISequentialOutStream *outStream);
 CEncoder();
 ~CEncoder();
};

}}

#endif
```

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==========

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*/

#ifndef __ATK_EDITABLE_TEXT_H__
#define __ATK_EDITABLE_TEXT_H__

#include <atk/atkobject.h>
#include <atk/atktext.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

/*
 * AtkEditableText is used to support access in an "accessibility" context
* to editing features of editable text widgets.
*/

#define ATK_TYPE_EDITABLE_TEXT                  (atk_editable_text_get_type ())
#define ATK_IS_EDITABLE_TEXT(obj)               G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_EDITABLE_TEXT)
#define ATK_EDITABLE_TEXT(obj)                  G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_EDITABLE_TEXT, AtkEditableText)
#define ATK_EDITABLE_TEXT_GET_IFACE(obj)        (G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_EDITABLE_TEXT, AtkEditableTextIface))

#ifndef _TYPEDEF_ATK_EDITABLE_TEXT_
#define _TYPEDEF_ATK_EDITABLE_TEXT_
typedef struct _AtkEditableText AtkEditableText;
#endif
typedef struct _AtkEditableTextIface AtkEditableTextIface;

struct _AtkEditableTextIface
{
 GTypeInterface parent_interface;

 gboolean (* set_run_attributes) (AtkEditableText  *text,
                                  AtkAttributeSet  *attrib_set,
                                  gint
   start_offset,
      gint      end_offset);
 void   (* set_text_contents)    (AtkEditableText  *text,
                                  const gchar      *string);
 void   (* insert_text)          (AtkEditableText  *text,
                                  const gchar      *string,
```

```
                        gint            length,
                        gint            *position);
 void   (* copy_text)          (AtkEditableText  *text,
                        gint            start_pos,
                        gint            end_pos);
 void   (* cut_text)           (AtkEditableText  *text,
                        gint            start_pos,
                        gint            end_pos);
 void   (* delete_text)        (AtkEditableText  *text,
                        gint            start_pos,
                        gint            end_pos);
 void   (* paste_text)
   (AtkEditableText  *text,
                        gint            position);

 AtkFunction                    pad1;
 AtkFunction                    pad2;
};
GType atk_editable_text_get_type (void);


gboolean atk_editable_text_set_run_attributes (AtkEditableText          *text,
                                AtkAttributeSet  *attrib_set,
                                gint            start_offset,
          gint        end_offset);
void atk_editable_text_set_text_contents    (AtkEditableText  *text,
                                const gchar      *string);
void atk_editable_text_insert_text          (AtkEditableText  *text,
                                const gchar      *string,
                                gint            length,
                                gint            *position);
void atk_editable_text_copy_text            (AtkEditableText  *text,

                        gint            start_pos,
                                gint            end_pos);
void atk_editable_text_cut_text             (AtkEditableText  *text,
                                gint            start_pos,
                                gint            end_pos);
void atk_editable_text_delete_text          (AtkEditableText  *text,
                                gint            start_pos,
                                gint            end_pos);
void atk_editable_text_paste_text           (AtkEditableText  *text,
                                gint            position);

#ifdef __cplusplus
}
#endif /* __cplusplus */
```

```
#endif /* __ATK_EDITABLE_TEXT_H__ */
// IStream.h

#ifndef __ISTREAM_H
#define __ISTREAM_H

#include "../Common/MyTypes.h"
#include "../Common/MyWindows.h"

#include "IDecl.h"

#define STREAM_INTERFACE_SUB(i, base, x) DECL_INTERFACE_SUB(i, base, 3, x)
#define STREAM_INTERFACE(i, x) STREAM_INTERFACE_SUB(i, IUnknown, x)

STREAM_INTERFACE(ISequentialInStream, 0x01)
{
 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize) PURE;

 /*
 The requirement for caller: (processedSize != NULL).
 The callee can allow (processedSize == NULL) for compatibility reasons.

 if (size == 0), this function returns S_OK and (*processedSize) is set to 0.

 if (size != 0)
 {
   Partial read is allowed: (*processedSize <= avail_size && *processedSize <= size),
     where (avail_size) is the size of remaining bytes in stream.
   If (avail_size != 0), this function must read at least 1 byte: (*processedSize > 0).
   You must call Read() in loop, if you need to read exact amount of data.
 }

 If seek pointer before Read()
 call was changed to position past the end of stream:
   if (seek_pointer >= stream_size), this function returns S_OK and (*processedSize) is set to 0.

 ERROR CASES:
   If the function returns error code, then (*processedSize) is size of
   data written to (data) buffer (it can be data before error or data with errors).
   The recommended way for callee to work with reading errors:
     1) write part of data before error to (data) buffer and return S_OK.
     2) return error code for further calls of Read().
 */
};

STREAM_INTERFACE(ISequentialOutStream, 0x02)
{
```

```
 STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize) PURE;

 /*
 The requirement for caller: (processedSize != NULL).
 The callee can allow (processedSize == NULL) for compatibility reasons.

 if (size != 0)
 {
   Partial write is allowed: (*processedSize <= size),
   but this function must write at least 1 byte: (*processedSize > 0).
   You must call Write() in loop, if you need to write
 exact amount of data.
 }

 ERROR CASES:
   If the function returns error code, then (*processedSize) is size of
   data written from (data) buffer.
 */
};

#ifdef __HRESULT_FROM_WIN32
#define HRESULT_WIN32_ERROR_NEGATIVE_SEEK
__HRESULT_FROM_WIN32(ERROR_NEGATIVE_SEEK)
#else
#define HRESULT_WIN32_ERROR_NEGATIVE_SEEK
HRESULT_FROM_WIN32(ERROR_NEGATIVE_SEEK)
#endif

/*  Seek() Function
 If you seek before the beginning of the stream, Seek() function returns error code:
     Recommended error code is __HRESULT_FROM_WIN32(ERROR_NEGATIVE_SEEK).
     or STG_E_INVALIDFUNCTION

 It is allowed to seek past the end of the stream.


 if Seek() returns error, then the value of *newPosition is undefined.
*/

STREAM_INTERFACE_SUB(IInStream, ISequentialInStream, 0x03)
{
 STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition) PURE;
};

STREAM_INTERFACE_SUB(IOutStream, ISequentialOutStream, 0x04)
{
 STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition) PURE;
```

```
  STDMETHOD(SetSize)(UInt64 newSize) PURE;
};

STREAM_INTERFACE(IStreamGetSize, 0x06)
{
 STDMETHOD(GetSize)(UInt64 *size) PURE;
};

STREAM_INTERFACE(IOutStreamFinish, 0x07)
{
 STDMETHOD(OutStreamFinish)() PURE;
};


STREAM_INTERFACE(IStreamGetProps, 0x08)
{
 STDMETHOD(GetProps)(UInt64 *size, FILETIME *cTime, FILETIME *aTime, FILETIME *mTime, UInt32
*attrib) PURE;
};

struct CStreamFileProps
{
 UInt64 Size;
 UInt64 VolID;
 UInt64 FileID_Low;
 UInt64 FileID_High;
 UInt32 NumLinks;
 UInt32 Attrib;
 FILETIME CTime;
 FILETIME ATime;
 FILETIME MTime;
};

STREAM_INTERFACE(IStreamGetProps2, 0x09)
{
 STDMETHOD(GetProps2)(CStreamFileProps *props) PURE;
};

#endif
```

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```
/* Lzma86.h -- LZMA + x86 (BCJ) Filter
2013-01-18 : Igor Pavlov : Public domain */

#ifndef __LZMA86_H
#define __LZMA86_H

#include "7zTypes.h"

EXTERN_C_BEGIN

#define LZMA86_SIZE_OFFSET (1 + 5)
#define LZMA86_HEADER_SIZE (LZMA86_SIZE_OFFSET + 8)

/*
It's an example for LZMA + x86 Filter use.
You can use .lzma86 extension, if you write that stream to file.
.lzma86 header adds one additional byte to standard .lzma header.
.lzma86 header (14 bytes):
 Offset Size  Description
```

```
  0     1    = 0 - no filter, pure LZMA
             = 1 - x86 filter + LZMA
  1     1    lc, lp and pb in encoded form
  2     4    dictSize (little endian)
  6     8    uncompressed size (little endian)


Lzma86_Encode
-------------
level - compression level: 0 <= level <= 9, the default value for "level" is 5.

dictSize - The dictionary size in bytes. The maximum value is
       128 MB = (1 << 27) bytes for 32-bit version
         1 GB = (1 << 30) bytes for 64-bit version
    The default value is 16
 MB = (1 << 24) bytes, for level = 5.
    It's recommended to use the dictionary that is larger than 4 KB and
    that can be calculated as (1 << N) or (3 << N) sizes.
    For better compression ratio dictSize must be >= inSize.

filterMode:
   SZ_FILTER_NO   - no Filter
   SZ_FILTER_YES  - x86 Filter
   SZ_FILTER_AUTO - it tries both alternatives to select best.
            Encoder will use 2 or 3 passes:
            2 passes when FILTER_NO provides better compression.
            3 passes when FILTER_YES provides better compression.

Lzma86Encode allocates Data with MyAlloc functions.
RAM Requirements for compressing:
 RamSize = dictionarySize * 11.5 + 6MB + FilterBlockSize
     filterMode     FilterBlockSize
    SZ_FILTER_NO         0
    SZ_FILTER_YES      inSize
    SZ_FILTER_AUTO     inSize


Return code:
 SZ_OK               - OK
 SZ_ERROR_MEM        - Memory allocation error
 SZ_ERROR_PARAM      - Incorrect paramater
 SZ_ERROR_OUTPUT_EOF - output buffer overflow
  SZ_ERROR_THREAD     - errors in multithreading functions (only for Mt version)
*/

enum ESzFilterMode
{
 SZ_FILTER_NO,
```

```
 SZ_FILTER_YES,
 SZ_FILTER_AUTO
};

SRes Lzma86_Encode(Byte *dest, size_t *destLen, const Byte *src, size_t srcLen,
   int level, UInt32 dictSize, int filterMode);


/*
Lzma86_GetUnpackSize:
 In:
   src      - input data
   srcLen   - input data size
 Out:
   unpackSize - size of uncompressed stream
 Return code:
   SZ_OK               - OK
   SZ_ERROR_INPUT_EOF  - Error in headers
*/

SRes Lzma86_GetUnpackSize(const Byte *src, SizeT srcLen, UInt64 *unpackSize);

/*
Lzma86_Decode:
 In:
   dest     - output data
   destLen  - output data size
   src      - input data
   srcLen   - input data size
 Out:
   destLen  - processed output size
   srcLen   - processed input size
 Return code:
   SZ_OK           - OK
   SZ_ERROR_DATA  - Data error
   SZ_ERROR_MEM   - Memory allocation error
   SZ_ERROR_UNSUPPORTED - unsupported file
   SZ_ERROR_INPUT_EOF
 - it needs more bytes in input buffer
*/

SRes Lzma86_Decode(Byte *dest, SizeT *destLen, const Byte *src, SizeT *srcLen);

EXTERN_C_END

#endif
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licensing conditions attached to this codebase, including copies of the
```

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Firefox name or logo.

```
//{{NO_DEPENDENCIES}}
// Microsoft Visual C++ generated include file.
// Used by ApplicationID.rc

// Next default values for new objects
//
#ifdef APSTUDIO_INVOKED
#ifndef APSTUDIO_READONLY_SYMBOLS
#define _APS_NEXT_RESOURCE_VALUE        101
#define _APS_NEXT_COMMAND_VALUE         40001
#define _APS_NEXT_CONTROL_VALUE         1001
#define _APS_NEXT_SYMED_VALUE           101
#endif
#endif
/* Copyright (c) 2008-2009, Google Inc.
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* modification, are permitted provided that the following conditions are
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*
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* (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE
* OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
*
* ---
* Author: Kostya Serebryany
*/
```

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Invalid copyright Element With dir Attribute in div Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-022-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element that contains a div element with INVALID as the value for the dir
 attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-022.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test fails.</p>
  <div class="test">P</div>
 </body>
</html>
PROG = 7zra.dll
DEF_FILE = ../../Archive/Archive2.def
CFLAGS = $(CFLAGS) \
 -D_NO_CRYPTO

COMMON_OBJS = \
```

```
 $O\CRC.obj \
 $O\CrcReg.obj \
 $O\IntToString.obj \
 $O\NewHandler.obj \
 $O\MyString.obj \
 $O\StringConvert.obj \
 $O\StringToInt.obj \
 $O\MyVector.obj \
 $O\Wildcard.obj \

WIN_OBJS = \
 $O\FileDir.obj \
 $O\FileFind.obj \
 $O\FileIO.obj \
 $O\FileName.obj \
 $O\PropVariant.obj \
 $O\Synchronization.obj \
 $O\System.obj \

7ZIP_COMMON_OBJS = \
 $O\CreateCoder.obj \
 $O\CWrappers.obj \
 $O\InBuffer.obj \
 $O\InOutTempBuffer.obj \
 $O\FilterCoder.obj \
 $O\LimitedStreams.obj \
 $O\MethodId.obj \
 $O\MethodProps.obj \
 $O\OutBuffer.obj \
 $O\ProgressUtils.obj \
 $O\PropId.obj \
 $O\StreamBinder.obj \
 $O\StreamObjects.obj \
 $O\StreamUtils.obj \
 $O\UniqBlocks.obj \
 $O\VirtThread.obj \

AR_OBJS = \
 $O\ArchiveExports.obj \
 $O\DllExports2.obj \

AR_COMMON_OBJS = \
 $O\CoderMixer2.obj \
 $O\HandlerOut.obj \
 $O\InStreamWithCRC.obj \
 $O\ItemNameUtils.obj
 \
 $O\OutStreamWithCRC.obj \
```

```
 $O\ParseProperties.obj \


7Z_OBJS = \
 $O\7zCompressionMode.obj \
 $O\7zDecode.obj \
 $O\7zEncode.obj \
 $O\7zExtract.obj \
 $O\7zFolderInStream.obj \
 $O\7zHandler.obj \
 $O\7zHandlerOut.obj \
 $O\7zHeader.obj \
 $O\7zIn.obj \
 $O\7zOut.obj \
 $O\7zProperties.obj \
 $O\7zSpecStream.obj \
 $O\7zUpdate.obj \
 $O\7zRegister.obj \


COMPRESS_OBJS = \
 $O\CodecExports.obj \
 $O\Bcj2Coder.obj \
 $O\Bcj2Register.obj \
 $O\BcjCoder.obj \
 $O\BcjRegister.obj \
 $O\BranchMisc.obj \
 $O\BranchRegister.obj \
 $O\ByteSwap.obj \
 $O\CopyCoder.obj \
 $O\CopyRegister.obj \
 $O\DeltaFilter.obj \
 $O\Lzma2Decoder.obj \
 $O\Lzma2Encoder.obj \
 $O\Lzma2Register.obj \
 $O\LzmaDecoder.obj \
 $O\LzmaEncoder.obj \
 $O\LzmaRegister.obj \

C_OBJS = \
 $O\Alloc.obj \
 $O\Bcj2.obj \
 $O\Bcj2Enc.obj \
 $O\Bra.obj \
 $O\Bra86.obj \
 $O\BraIA64.obj \
 $O\CpuArch.obj \
 $O\Delta.obj \
```

```
 $O\LzFind.obj \
 $O\LzFindMt.obj \
 $O\Lzma2Dec.obj
 \
 $O\Lzma2DecMt.obj \
 $O\Lzma2Enc.obj \
 $O\LzmaDec.obj \
 $O\LzmaEnc.obj \
 $O\MtCoder.obj \
 $O\MtDec.obj \
 $O\Threads.obj \

!include "../../Crc.mak"
!include "../../LzmaDec.mak"

!include "../../7zip.mak"
```

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the LPPL Work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

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(copied verbatim from hyph-ca.lic.txt in the original work):

Catalan hyphenation patterns

(more info about the licence to be added later)

```
% This file is part of hyph-utf8 package and resulted
 from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% Source: cahyph.tex (2003-09-08)
% Author: Gonal Badenes <g.badenes at ieee.org>
%
% The above mentioned file should become obsolete,
% and the author of the original file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%               and helped with testing, suggestions and bug reports
% - Norbert Preining, who tested & integrated
 patterns into TeX Live
%
% However, the "copyright/copyleft" owner of patterns remains the original author.
%
% The copyright statement of this file is thus:
%
%    Do with this file whatever needs to be done in future for the sake of
%    "a better world" as long as you respect the copyright of original file.
%    If you're the original author of patterns or taking over a new revolution,
%    plese remove all of the TUG comments & credits that we added here -
%    you are the Queen / the King, we are only the servants.
%
% If you want to change this file, rather than uploading directly to CTAN,
% we would be grateful if you could send it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
% Before a new "pattern-revolution" starts,
% please try to follow some guidelines if possible:
%
% - \lccode is *forbidden*, and I really mean it
```

```
% - all the patterns should be in UTF-8
% - the only
 "allowed" TeX commands in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
%-----------------------------------------------------------------------------
%
% Hyphenation patterns for Catalan.
% This is version 1.11
% Compiled by Gonal Badenes and Francina Turon,
%       December 1991-January 1995.
%
% Copyright (C) 1991-2003 Gonal Badenes
%
% ---------------------------------------------------------------
% IMPORTANT NOTICE:
%
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% of the LaTeX Project Public License Distributed from CTAN
% archives in directory macros/latex/base/lppl.txt; either
% version 1 of the License, or any later version.
% ---------------------------------------------------------------
%
%%% ====================================================================
%%%  @TeX-hyphen-file{
%%%     author          = "Gonal Badenes",
%%%     version         = "1.11",
%%%     date            = "15 July 2003",
%%%     time            = "15:08:12 CET",
%%%     filename        = "cahyph.tex",
%%%     email           = "g.badenes@ieee.org",
%%%     codetable       = "UTF-8",
%%%     keywords        = "TeX, hyphen, catalan",
%%%     supported       = "yes",
```

```
%%%     abstract        = "Catalan hyphenation patterns",
%%%     docstring       = "This file contains the hyphenation patterns
%%%                     for the catalan language",
%%%  }
%%% ====================================================================
%
%
 NOTICE: Version 1.11 is identical to version 1.10 (issued on January 17,
%        1995) except for the updated copyright notice above.
%
% The macros used were created for ghyph31.tex by Bernd Raichle (see the
% German hyphenation pattern files for further details)
%
% This patterns have been created using standard, conservative
% hyphenation rules for catalan. The results have refined running them
% through patgen. In that way, the number of hits has been increased.
%
% These rules produce no wrong patterns (Results checked against the
% ``Diccionari Ortogr\`afic i de Pron\'uncia", Enciclop\`edia
% Catalana. The percentage of valid hyphen misses is lower than 1%
%
% Some of the patterns below represent combinations that never
% happen in Catalan. We have tried to keep them to a minimum.
%
% *** IMPORTANT ***
% \lefthyphenmin and \righthyphenmin should be set to 2 and 2
% respectively. If you set them below these values incorrect breaks
% will happen (specially at the beginning of
 foreign words and words
% which begin with some prefixes).
% *** IMPORTANT ***
%
% Please report any problem you might have to the authors!!!
%
%%%
```

file, You can obtain one at http://mozilla.org/MPL/2.0/.

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http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

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Turkish hyphenation patterns

(more info about the licence to be added later)

% hyph-tr.tex
%
% Turkish hyphenation patterns
%
%
 This file is auto-generated from source/generic/hyph-utf8/languages/tr/generate_patterns_tr.rb that is part of hyph-utf8.
% Please don't modify this file; modify the generating script instead.
%
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%
% Credits:
% - algorithm developed by P. A. MacKay for the Ottoman Texts Project in 1987
% - rules adapted for modern Turkish by H. Turgut Uyar <uyar at itu.edu.tr>
% - initiative to improve Turkish patterns by S. Ekin Kocabas <kocabas at stanford.edu>
% - script written by Mojca Miklavec <mojca.miklavec.lists at gmail.com> in June 2008
%
% See also:
% - http://www.ctan.org/tex-archive/language/turkish/hyphen/turk_hyf.c
% - http://www.tug.org/TUGboat/Articles/tb09-1/tb20mackay.pdf
%
%
 Differences with Ottoman patterns:
% - adapted for the use on modern TeX engines, using UTF-8 charactes
% - only letters for Modern Turkish +  (the first one often needed, the other two don't hurt)

% - (if needed, support for Ottoman Turkish might be provided separately under language code 'ota')
%
% Changes:
% - 2008-06-25/27/28 - create this file by adapting Ottoman rules for modern Turkish
% - 2011-08-10 - add LPPL licence with permission of Pierre A. MacKay
%
# This file contains a list of people who've made non-trivial
# contribution to the Google C++ Mocking Framework project.  People
# who commit code to the project are encouraged to add their names
# here.  Please keep the list sorted by first names.

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```
<?xml version="1.0" encoding="utf-8"?>
<Project DefaultTargets="Build" ToolsVersion="15.0"
xmlns="http://schemas.microsoft.com/developer/msbuild/2003">
 <ItemGroup Label="ProjectConfigurations">
  <ProjectConfiguration Include="Debug|Win32">
    <Configuration>Debug</Configuration>
    <Platform>Win32</Platform>
  </ProjectConfiguration>
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    <Platform>x64</Platform>
  </ProjectConfiguration>
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  <ProjectGuid>{B5DBA89B-37EE-425C-A375-4E04E69731FA}</ProjectGuid>
  <Keyword>Win32Proj</Keyword>
   <RootNamespace>ExecInExplorer</RootNamespace>
  <WindowsTargetPlatformVersion>10.0.15063.0</WindowsTargetPlatformVersion>
 </PropertyGroup>
 <Import Project="$(VCTargetsPath)\Microsoft.Cpp.Default.props" />
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'" Label="Configuration">
  <ConfigurationType>DynamicLibrary</ConfigurationType>
  <UseDebugLibraries>true</UseDebugLibraries>
  <PlatformToolset>v141</PlatformToolset>
  <CharacterSet>Unicode</CharacterSet>
 </PropertyGroup>
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'" Label="Configuration">
  <ConfigurationType>DynamicLibrary</ConfigurationType>
  <UseDebugLibraries>false</UseDebugLibraries>
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  <WholeProgramOptimization>true</WholeProgramOptimization>
  <CharacterSet>Unicode</CharacterSet>
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  <UseDebugLibraries>true</UseDebugLibraries>
  <PlatformToolset>v141</PlatformToolset>
  <CharacterSet>Unicode</CharacterSet>
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   <CharacterSet>Unicode</CharacterSet>
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 <ImportGroup Label="ExtensionSettings">
 </ImportGroup>
 <ImportGroup Label="Shared">
 </ImportGroup>
 <ImportGroup Label="PropertySheets" Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'">
   <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
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 />
 </ImportGroup>
 <ImportGroup Label="PropertySheets" Condition="'$(Configuration)|$(Platform)'=='Release|Win32'">
   <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform" />
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   <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform" />
 </ImportGroup>
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   <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform" />
 </ImportGroup>
 <PropertyGroup Label="UserMacros" />
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 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Release|x64'">
   <LinkIncremental>false</LinkIncremental>
 </PropertyGroup>
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   <ClCompile>
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     <WarningLevel>Level3</WarningLevel>
     <Optimization>Disabled</Optimization>
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    <SDLCheck>false</SDLCheck>
<PreprocessorDefinitions>WIN32;_DEBUG;EXECINEXPLORER_EXPORTS;_WINDOWS;_USRDLL;%(Prepro
cessorDefinitions)</PreprocessorDefinitions>
    <RuntimeLibrary>MultiThreadedDebug</RuntimeLibrary>
    <OmitDefaultLibName>true</OmitDefaultLibName>
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    <BasicRuntimeChecks>Default</BasicRuntimeChecks>
  </ClCompile>
  <Link>
    <SubSystem>Windows</SubSystem>
    <GenerateDebugInformation>true</GenerateDebugInformation>
    <EntryPointSymbol>DllMain</EntryPointSymbol>
    <LinkTimeCodeGeneration>Default</LinkTimeCodeGeneration>
  </Link>
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efinitions)</PreprocessorDefinitions>
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    <BufferSecurityCheck>false</BufferSecurityCheck>
    <BasicRuntimeChecks>Default</BasicRuntimeChecks>
   </ClCompile>
  <Link>
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    <EntryPointSymbol>DllMain</EntryPointSymbol>
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  <ClCompile>
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    <WarningLevel>Level3</WarningLevel>
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    <FunctionLevelLinking>true</FunctionLevelLinking>
    <IntrinsicFunctions>true</IntrinsicFunctions>
    <SDLCheck>false</SDLCheck>
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cessorDefinitions)</PreprocessorDefinitions>
    <RuntimeLibrary>MultiThreaded</RuntimeLibrary>
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```

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  </ClCompile>
  <Link>
    <SubSystem>Windows</SubSystem>
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    <OptimizeReferences>true</OptimizeReferences>
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    <EntryPointSymbol>DllMain</EntryPointSymbol>
    <LinkTimeCodeGeneration>Default</LinkTimeCodeGeneration>
  </Link>
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    <PrecompiledHeader>NotUsing</PrecompiledHeader>
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    <SDLCheck>false</SDLCheck>
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efinitions)</PreprocessorDefinitions>
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     <OmitDefaultLibName>true</OmitDefaultLibName>
    <BufferSecurityCheck>false</BufferSecurityCheck>
    <WholeProgramOptimization>false</WholeProgramOptimization>
  </ClCompile>
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    <SubSystem>Windows</SubSystem>
    <EnableCOMDATFolding>true</EnableCOMDATFolding>
    <OptimizeReferences>true</OptimizeReferences>
    <GenerateDebugInformation>false</GenerateDebugInformation>
    <EntryPointSymbol>DllMain</EntryPointSymbol>
    <LinkTimeCodeGeneration>Default</LinkTimeCodeGeneration>
  </Link>
 </ItemDefinitionGroup>
 <ItemGroup>
  <ClCompile Include="ExecInExplorer.cpp" />
 </ItemGroup>
 <Import Project="$(VCTargetsPath)\Microsoft.Cpp.targets" />
 <ImportGroup Label="ExtensionTargets">
 </ImportGroup>
</Project>
```

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must

be optional: if the application does not supply it, the square root function must still compute square roots.)

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

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under the terms of Sections 1 and 2 above on a
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compelled to copy the source along with the object code.

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linked with it, is called a "work that uses the Library". Such a
work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library
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License.
Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library. The
threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small inline
functions (ten lines or less in length), then the use of the object
file is unrestricted, regardless of whether it is legally a derivative
work. (Executables containing this object code plus portions of the
Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may
distribute the object code for the work under the terms of Section 6.
Any executables
containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or
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d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

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major
components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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the terms of the
Sections above.

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<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

That's all there is to it!
/* Bcj2.h -- BCJ2 Converter for x86 code
2014-11-10 : Igor Pavlov : Public domain */

```
#ifndef __BCJ2_H
#define __BCJ2_H

#include "7zTypes.h"

EXTERN_C_BEGIN

#define BCJ2_NUM_STREAMS 4

enum
{
 BCJ2_STREAM_MAIN,
 BCJ2_STREAM_CALL,
 BCJ2_STREAM_JUMP,
 BCJ2_STREAM_RC
};

enum
{
 BCJ2_DEC_STATE_ORIG_0 = BCJ2_NUM_STREAMS,
 BCJ2_DEC_STATE_ORIG_1,
 BCJ2_DEC_STATE_ORIG_2,
 BCJ2_DEC_STATE_ORIG_3,

 BCJ2_DEC_STATE_ORIG,
 BCJ2_DEC_STATE_OK
};

enum
{
 BCJ2_ENC_STATE_ORIG = BCJ2_NUM_STREAMS,
 BCJ2_ENC_STATE_OK
};


#define BCJ2_IS_32BIT_STREAM(s) ((s) == BCJ2_STREAM_CALL || (s) == BCJ2_STREAM_JUMP)

/*
CBcj2Dec / CBcj2Enc
bufs sizes:
 BUF_SIZE(n) = lims[n] - bufs[n]
bufs sizes for BCJ2_STREAM_CALL and BCJ2_STREAM_JUMP must be mutliply of 4:
   (BUF_SIZE(BCJ2_STREAM_CALL) & 3) == 0
   (BUF_SIZE(BCJ2_STREAM_JUMP) & 3) == 0
*/

/*
```

```
CBcj2Dec:
dest is allowed to overlap with bufs[BCJ2_STREAM_MAIN], with the following conditions:
 bufs[BCJ2_STREAM_MAIN] >= dest &&
 bufs[BCJ2_STREAM_MAIN]
 - dest >= tempReserv +
       BUF_SIZE(BCJ2_STREAM_CALL) +
       BUF_SIZE(BCJ2_STREAM_JUMP)
    tempReserv = 0 : for first call of Bcj2Dec_Decode
    tempReserv = 4 : for any other calls of Bcj2Dec_Decode
 overlap with offset = 1 is not allowed
*/

typedef struct
{
 const Byte *bufs[BCJ2_NUM_STREAMS];
 const Byte *lims[BCJ2_NUM_STREAMS];
 Byte *dest;
 const Byte *destLim;

 unsigned state; /* BCJ2_STREAM_MAIN has more priority than BCJ2_STATE_ORIG */

 UInt32 ip;
 Byte temp[4];
 UInt32 range;
 UInt32 code;
 UInt16 probs[2 + 256];
} CBcj2Dec;

void Bcj2Dec_Init(CBcj2Dec *p);

/* Returns: SZ_OK or SZ_ERROR_DATA */
SRes Bcj2Dec_Decode(CBcj2Dec *p);

#define Bcj2Dec_IsFinished(_p_) ((_p_)->code == 0)



typedef enum
{
 BCJ2_ENC_FINISH_MODE_CONTINUE,
 BCJ2_ENC_FINISH_MODE_END_BLOCK,
 BCJ2_ENC_FINISH_MODE_END_STREAM
} EBcj2Enc_FinishMode;

typedef struct
{
 Byte *bufs[BCJ2_NUM_STREAMS];
 const Byte *lims[BCJ2_NUM_STREAMS];
```

```
 const Byte *src;
 const Byte *srcLim;


 unsigned state;
 EBcj2Enc_FinishMode finishMode;

 Byte prevByte;

 Byte cache;
 UInt32 range;
 UInt64 low;
 UInt64 cacheSize;

 UInt32 ip;

 /* 32-bit ralative offset in JUMP/CALL commands is
      - (mod 4 GB)   in 32-bit mode
      - signed Int32 in 64-bit mode
    We use (mod 4 GB) check for fileSize.
    Use fileSize up to 2 GB, if you want to support 32-bit and 64-bit code conversion. */
 UInt32 fileIp;
 UInt32 fileSize;    /* (fileSize <= ((UInt32)1 << 31)), 0 means no_limit */
 UInt32 relatLimit;  /* (relatLimit <= ((UInt32)1 << 31)), 0 means desable_conversion */

 UInt32 tempTarget;
 unsigned tempPos;
 Byte temp[4 * 2];

 unsigned flushPos;

 UInt16 probs[2 + 256];
} CBcj2Enc;

void Bcj2Enc_Init(CBcj2Enc *p);
void Bcj2Enc_Encode(CBcj2Enc *p);

#define Bcj2Enc_Get_InputData_Size(p) ((SizeT)((p)->srcLim - (p)->src) + (p)->tempPos)
#define Bcj2Enc_IsFinished(p) ((p)->flushPos == 5)


#define BCJ2_RELAT_LIMIT_NUM_BITS 26
#define BCJ2_RELAT_LIMIT ((UInt32)1 <<
 BCJ2_RELAT_LIMIT_NUM_BITS)

/* limit for CBcj2Enc::fileSize variable */
#define BCJ2_FileSize_MAX ((UInt32)1 << 31)
```

```
EXTERN_C_END

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Attribute in copyright Element text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element with an unknown attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size:
 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
/* ATK -  Accessibility Toolkit
* Copyright 2001 Sun Microsystems Inc.
*
* This library is free software; you can redistribute it and/or
* modify it under the terms of the GNU Library General Public
* License as published by the Free Software Foundation; either
* version 2 of the License, or (at your option) any later version.
*
* This library is distributed in the hope that it will be useful,
```

```
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*
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* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_OBJECT_H__
#define __ATK_OBJECT_H__

#include <glib-object.h>
#include <atk/atkstate.h>
#include <atk/atkrelationtype.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus
 */

/*
* AtkObject represents the minimum information all accessible objects
* return. This information includes accessible name, accessible
* description, role and state of the object, as well information about
* its parent and children. It is also possible to obtain more specific
* accessibility information about a component if it supports one or more
* of the following interfaces:
*/

/**
*AtkRole:
*@ATK_ROLE_INVALID: Invalid role
*@ATK_ROLE_ACCEL_LABEL: A label which represents an accelerator
*@ATK_ROLE_ALERT: An object which is an alert to the user. Assistive
*Technologies typically respond to ATK_ROLE_ALERT by reading the entire
*onscreen contents of containers advertising this role.  Should be used for
*warning dialogs, etc.
*@ATK_ROLE_ANIMATION: An object which is an animated image
*@ATK_ROLE_ARROW: An arrow in one of the four cardinal directions
*@ATK_ROLE_CALENDAR:  An object that displays a calendar and allows the user to
*select a date
*@ATK_ROLE_CANVAS:
 An object that can be drawn into and is used to trap events
*@ATK_ROLE_CHECK_BOX: A choice that can be checked or unchecked and provides a
*separate indicator for the current state
*@ATK_ROLE_CHECK_MENU_ITEM: A menu item with a check box
```

*@ATK_ROLE_COLOR_CHOOSER: A specialized dialog that lets the user choose a
*color
*@ATK_ROLE_COLUMN_HEADER: The header for a column of data
*@ATK_ROLE_COMBO_BOX: A collapsible list of choices the user can select from
*@ATK_ROLE_DATE_EDITOR: An object whose purpose is to allow a user to edit a
*date
*@ATK_ROLE_DESKTOP_ICON: An inconifed internal frame within a DESKTOP_PANE
*@ATK_ROLE_DESKTOP_FRAME: A pane that supports internal frames and iconified
*versions of those internal frames
*@ATK_ROLE_DIAL: An object whose purpose is to allow a user to set a value
*@ATK_ROLE_DIALOG: A top level window with title bar and a border
*@ATK_ROLE_DIRECTORY_PANE: A pane that allows the user to navigate through and
*select the contents of a directory
*@ATK_ROLE_DRAWING_AREA: An object used for drawing custom user interface
*elements
*@ATK_ROLE_FILE_CHOOSER: A specialized dialog that lets the user choose a file
*@ATK_ROLE_FILLER: A object that fills up space in a user interface
*@ATK_ROLE_FONT_CHOOSER: A specialized dialog that lets the user choose a font
*@ATK_ROLE_FRAME: A top level window with a title bar, border, menubar, etc.
*@ATK_ROLE_GLASS_PANE: A pane that is guaranteed to be painted on top of all
*panes beneath it
*@ATK_ROLE_HTML_CONTAINER: A document container for HTML, whose children
*represent the document content
*@ATK_ROLE_ICON: A small fixed size picture, typically used to decorate
*components
*@ATK_ROLE_IMAGE: An object whose primary purpose is to display an image
*@ATK_ROLE_INTERNAL_FRAME: A frame-like object that is clipped by a desktop
*pane
*@ATK_ROLE_LABEL: An object used to present an icon or short string in an
*interface
*@ATK_ROLE_LAYERED_PANE: A specialized pane that allows its children
to be
*drawn in layers, providing a form of stacking order
*@ATK_ROLE_LIST: An object that presents a list of objects to the user and
*allows the user to select one or more of them
*@ATK_ROLE_LIST_ITEM: An object that represents an element of a list
*@ATK_ROLE_MENU: An object usually found inside a menu bar that contains a list
*of actions the user can choose from
*@ATK_ROLE_MENU_BAR: An object usually drawn at the top of the primary dialog
*box of an application that contains a list of menus the user can choose from
*@ATK_ROLE_MENU_ITEM: An object usually contained in a menu that presents an
*action the user can choose
*@ATK_ROLE_OPTION_PANE: A specialized pane whose primary use is inside a DIALOG
*@ATK_ROLE_PAGE_TAB: An object that is a child of a page tab list
*@ATK_ROLE_PAGE_TAB_LIST: An object that presents a series of panels (or page
*tabs), one at a time, through some mechanism provided by the object
*@ATK_ROLE_PANEL: A generic container that is often used to

group objects
*@ATK_ROLE_PASSWORD_TEXT: A text object uses for passwords, or other places
*where the text content is not shown visibly to the user
*@ATK_ROLE_POPUP_MENU: A temporary window that is usually used to offer the
*user a list of choices, and then hides when the user selects one of those
*choices
*@ATK_ROLE_PROGRESS_BAR: An object used to indicate how much of a task has been
*completed
*@ATK_ROLE_PUSH_BUTTON: An object the user can manipulate to tell the
*application to do something
*@ATK_ROLE_RADIO_BUTTON: A specialized check box that will cause other radio
*buttons in the same group to become unchecked when this one is checked
*@ATK_ROLE_RADIO_MENU_ITEM: A check menu item which belongs to a group. At each
*instant exactly one of the radio menu items from a group is selected
*@ATK_ROLE_ROOT_PANE: A specialized pane that has a glass pane and a layered
*pane as its children
*@ATK_ROLE_ROW_HEADER: The header for a row of data
*@ATK_ROLE_SCROLL_BAR: An object usually
used to allow a user to incrementally
*view a large amount of data.
*@ATK_ROLE_SCROLL_PANE: An object that allows a user to incrementally view a
*large amount of information
*@ATK_ROLE_SEPARATOR: An object usually contained in a menu to provide a
*visible and logical separation of the contents in a menu
*@ATK_ROLE_SLIDER: An object that allows the user to select from a bounded
*range
*@ATK_ROLE_SPLIT_PANE: A specialized panel that presents two other panels at
*the same time
*@ATK_ROLE_SPIN_BUTTON: An object used to get an integer or floating point
*number from the user
*@ATK_ROLE_STATUSBAR: An object which reports messages of minor importance to
*the user
*@ATK_ROLE_TABLE: An object used to represent information in terms of rows and
*columns
*@ATK_ROLE_TABLE_CELL: A cell in a table
*@ATK_ROLE_TABLE_COLUMN_HEADER: The header for a column of a table
*@ATK_ROLE_TABLE_ROW_HEADER: The header for a row of a table
*@ATK_ROLE_TEAR_OFF_MENU_ITEM: A menu item used to tear
off and reattach its
*menu
*@ATK_ROLE_TERMINAL: An object that represents an accessible terminal.  @Since:
*ATK-0.6
*@ATK_ROLE_TEXT: An interactive widget that supports multiple lines of text and
* optionally accepts user input, but whose purpose is not to solicit user
*input. Thus ATK_ROLE_TEXT is appropriate for the text view in a plain text
*editor but inappropriate for an input field in a dialog box or web form. For
*widgets whose purpose is to solicit input from the user, see ATK_ROLE_ENTRY
*and ATK_ROLE_PASSWORD_TEXT. For generic objects which display a brief amount

*of textual information, see ATK_ROLE_STATIC.
*@ATK_ROLE_TOGGLE_BUTTON: A specialized push button that can be checked or
*unchecked, but does not provide a separate indicator for the current state
*@ATK_ROLE_TOOL_BAR: A bar or palette usually composed of push buttons or
*toggle buttons
*@ATK_ROLE_TOOL_TIP: An object that provides information about another object
*@ATK_ROLE_TREE: An object used to represent
hierarchical information to the
*user
*@ATK_ROLE_TREE_TABLE: An object capable of expanding and collapsing rows as
*well as showing multiple columns of data. @Since: ATK-0.7
*@ATK_ROLE_UNKNOWN: The object contains some Accessible information, but its
*role is not known
*@ATK_ROLE_VIEWPORT: An object usually used in a scroll pane
*@ATK_ROLE_WINDOW: A top level window with no title or border.
*@ATK_ROLE_HEADER: An object that serves as a document header. @Since:
*ATK-1.1.1
*@ATK_ROLE_FOOTER: An object that serves as a document footer. @Since:
*ATK-1.1.1
*@ATK_ROLE_PARAGRAPH: An object which is contains a paragraph of text content.
*@Since: ATK-1.1.1
*@ATK_ROLE_RULER: An object which describes margins and tab stops, etc. for
*text objects which it controls (should have CONTROLLER_FOR relation to such).
*@Since: ATK-1.1.1
*@ATK_ROLE_APPLICATION: The object is an application object, which may contain
*@ATK_ROLE_FRAME objects or other types of accessibles. The root
accessible of
*any application's ATK hierarchy should have ATK_ROLE_APPLICATION. @Since:
*ATK-1.1.4
*@ATK_ROLE_AUTOCOMPLETE: The object is a dialog or list containing items for
*insertion into an entry widget, for instance a list of words for completion of
*a text entry. @Since: ATK-1.3
*@ATK_ROLE_EDITBAR: The object is an editable text object in a toolbar. @Since:
*ATK-1.5
*@ATK_ROLE_EMBEDDED: The object is an embedded container within a document or
*panel. This role is a grouping "hint" indicating that the contained objects
*share a context. @Since: ATK-1.7.2
*@ATK_ROLE_ENTRY: The object is a component whose textual content may be
*entered or modified by the user, provided @ATK_STATE_EDITABLE is present.
*@Since: ATK-1.11
*@ATK_ROLE_CHART: The object is a graphical depiction of quantitative data. It
*may contain multiple subelements whose attributes and/or description may be
*queried to obtain both the quantitative data and information about how the
*data is
being presented. The LABELLED_BY relation is particularly important in
*interpreting objects of this type, as is the accessible-description property.
*@Since: ATK-1.11
*@ATK_ROLE_CAPTION: The object contains descriptive information, usually

*textual, about another user interface element such as a table, chart, or
*image.  @Since: ATK-1.11
*@ATK_ROLE_DOCUMENT_FRAME: The object is a visual frame or container which
*contains a view of document content. Document frames may occur within another
*Document instance, in which case the second document may be said to be
*embedded in the containing instance. HTML frames are often
*ROLE_DOCUMENT_FRAME. Either this object, or a singleton descendant, should
*implement the Document interface.  @Since: ATK-1.11
*@ATK_ROLE_HEADING: The object serves as a heading for content which follows it
*in a document. The 'heading level' of the heading, if availabe, may be
*obtained by querying the object's attributes.
*@ATK_ROLE_PAGE: The object is
 a containing instance which encapsulates a page
*of information. @ATK_ROLE_PAGE is used in documents and content which support
*a paginated navigation model.  @Since: ATK-1.11
*@ATK_ROLE_SECTION: The object is a containing instance of document content
*which constitutes a particular 'logical' section of the document. The type of
*content within a section, and the nature of the section division itself, may
*be obtained by querying the object's attributes. Sections may be nested.
*@Since: ATK-1.11
*@ATK_ROLE_REDUNDANT_OBJECT: The object is redundant with another object in the
*hierarchy, and is exposed for purely technical reasons.  Objects of this role
*should normally be ignored by clients. @Since: ATK-1.11
*@ATK_ROLE_FORM: The object is a container for form controls, for instance as
*part of a web form or user-input form within a document.  This role is
*primarily a tag/convenience for clients when navigating complex documents, it
*is not expected that ordinary GUI containers
 will always have ATK_ROLE_FORM.
*@Since: ATK-1.12.0
*@ATK_ROLE_LINK: The object is a hypertext anchor, i.e. a "link" in a
* hypertext document.  Such objects are distinct from 'inline'
* content which may also use the Hypertext/Hyperlink interfaces
* to indicate the range/location within a text object where
* an inline or embedded object lies.  @Since: ATK-1.12.1
*@ATK_ROLE_INPUT_METHOD_WINDOW: The object is a window or similar viewport
* which is used to allow composition or input of a 'complex character',
* in other words it is an "input method window." @Since: ATK-1.12.1
*@ATK_ROLE_TABLE_ROW: A row in a table.  @Since: ATK-2.1.0
*@ATK_ROLE_TREE_ITEM: An object that represents an element of a tree.  @Since:
*ATK-2.1.0
*@ATK_ROLE_DOCUMENT_SPREADSHEET: A document frame which contains a spreadsheet.
*@Since: ATK-2.1.0
*@ATK_ROLE_DOCUMENT_PRESENTATION: A document frame which contains a
*presentation or slide content.  @Since: ATK-2.1.0
*@ATK_ROLE_DOCUMENT_TEXT: A
 document frame which contains textual content, such
*as found in a word processing application.  @Since: ATK-2.1.0
*@ATK_ROLE_DOCUMENT_WEB: A document frame which contains HTML or other markup

*suitable for display in a web browser.  @Since: ATK-2.1.0
*@ATK_ROLE_DOCUMENT_EMAIL: A document frame which contains email content to be
*displayed or composed either in plain text or HTML.  @Since: ATK-2.1.0
*@ATK_ROLE_COMMENT: An object found within a document and designed to present a
*comment, note, or other annotation. In some cases, this object might not be
*visible until activated.  @Since: ATK-2.1.0
*@ATK_ROLE_LIST_BOX: A non-collapsible list of choices the user can select
*from. @Since: ATK-2.1.0
*@ATK_ROLE_GROUPING: A group of related widgets. This group typically has a
*label. @Since: ATK-2.1.0
*@ATK_ROLE_IMAGE_MAP: An image map object. Usually a graphic with multiple
*hotspots, where each hotspot can be activated resulting in the loading of
*another document or section
 of a document. @Since: ATK-2.1.0
*@ATK_ROLE_NOTIFICATION: A transitory object designed to present a message to
*the user, typically at the desktop level rather than inside a particular
*application.  @Since: ATK-2.1.0
*@ATK_ROLE_INFO_BAR: An object designed to present a message to the user within
*an existing window. @Since: ATK-2.1.0
*@ATK_ROLE_LEVEL_BAR: A bar that serves as a level indicator to, for instance,
*show the strength of a password or the state of a battery.  @Since: ATK-2.7.3
*@ATK_ROLE_TITLE_BAR: A bar that serves as the title of a window or a
* dialog. @Since: ATK-2.12
*@ATK_ROLE_BLOCK_QUOTE: An object which contains a text section
* that is quoted from another source. @Since: ATK-2.12
*@ATK_ROLE_AUDIO: An object which represents an audio element. @Since: ATK-2.12
*@ATK_ROLE_VIDEO: An object which represents a video element. @Since: ATK-2.12
*@ATK_ROLE_DEFINITION: A definition of a term or concept. @Since: ATK-2.12
*@ATK_ROLE_ARTICLE: A section of a page
 that consists of a
* composition that forms an independent part of a document, page, or
* site. Examples: A blog entry, a news story, a forum post. @Since:
* ATK-2.12
*@ATK_ROLE_LANDMARK: A region of a web page intended as a
* navigational landmark. This is designed to allow Assistive
* Technologies to provide quick navigation among key regions within a
* document. @Since: ATK-2.12
*@ATK_ROLE_LOG: A text widget or container holding log content, such
* as chat history and error logs. In this role there is a
* relationship between the arrival of new items in the log and the
* reading order. The log contains a meaningful sequence and new
* information is added only to the end of the log, not at arbitrary
* points. @Since: ATK-2.12
*@ATK_ROLE_MARQUEE: A container where non-essential information
* changes frequently. Common usages of marquee include stock tickers
* and ad banners. The primary difference between a marquee and a log
* is that logs usually have a meaningful

order or sequence of
* important content changes. @Since: ATK-2.12
*@ATK_ROLE_MATH: A text widget or container that holds a mathematical
* expression. @Since: ATK-2.12
*@ATK_ROLE_RATING: A widget whose purpose is to display a rating,
* such as the number of stars associated with a song in a media
* player. Objects of this role should also implement
* AtkValue. @Since: ATK-2.12
*@ATK_ROLE_TIMER: An object containing a numerical counter which
* indicates an amount of elapsed time from a start point, or the time
* remaining until an end point. @Since: ATK-2.12
*@ATK_ROLE_DESCRIPTION_LIST: An object that represents a list of
* term-value groups. A term-value group represents a individual
* description and consist of one or more names
* (ATK_ROLE_DESCRIPTION_TERM) followed by one or more values
* (ATK_ROLE_DESCRIPTION_VALUE). For each list, there should not be
* more than one group with the same term name. @Since: ATK-2.12
*@ATK_ROLE_DESCRIPTION_TERM: An object that represents
the term, or
* name, part of a term-description group in a description
* list. @Since: ATK-2.12
*@ATK_ROLE_DESCRIPTION_VALUE: An object that represents the
* description, definition or value of a term-description group in a
* description list. The values within a group are alternatives,
* meaning that you can have several ATK_ROLE_DESCRIPTION_VALUE for a
* given ATK_ROLE_DESCRIPTION_TERM. @Since: ATK-2.12
*@ATK_ROLE_STATIC: A generic non-container object whose purpose is to display a
* brief amount of information to the user and whose role is known by the
* implementor but lacks semantic value for the user. Examples in which
* ATK_ROLE_STATIC is appropriate include the message displayed in a message box
* and an image used as an alternative means to display text. ATK_ROLE_STATIC
* should not be applied to widgets which are traditionally interactive, objects
* which display a significant amount of content, or any object which has an
* accessible relation pointing to another
object. Implementors should expose
*the displayed information through the accessible name of the object. If doing
*so seems inappropriate, it may indicate that a different role should be used.
*For labels which describe another widget, see ATK_ROLE_LABEL. For text views,
*see ATK_ROLE_TEXT. For generic containers, see ATK_ROLE_PANEL. For objects
*whose role is not known by the implementor, see ATK_ROLE_UNKNOWN. @Since:
*ATK-2.16.
*@ATK_ROLE_MATH_FRACTION: An object that represents a mathematical fraction.
* @Since: ATK-2.16.
*@ATK_ROLE_MATH_ROOT: An object that represents a mathematical expression
* displayed with a radical. @Since: ATK-2.16.
*@ATK_ROLE_SUBSCRIPT: An object that contains text that is displayed as a
* subscript. @Since: ATK-2.16.
*@ATK_ROLE_SUPERSCRIPT: An object that contains text that is displayed as a

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* superscript. @Since: ATK-2.16.
*@ATK_ROLE_FOOTNOTE: An object that contains the text of a footnote. @Since:
*ATK-2.26.
*@ATK_ROLE_CONTENT_DELETION:
 Content previously deleted or proposed to be
* deleted, e.g. in revision history or a content view providing suggestions
* from reviewers. (Since: 2.34)
*@ATK_ROLE_CONTENT_INSERTION: Content previously inserted or proposed to be
* inserted, e.g. in revision history or a content view providing suggestions
* from reviewers. (Since: 2.34)
*@ATK_ROLE_MARK: A run of content that is marked or highlighted, such as for
* reference purposes, or to call it out as having a special purpose. If the
* marked content has an associated section in the document elaborating on the
* reason for the mark, then %ATK_RELATION_DETAILS should be used on the mark
* to point to that associated section. In addition, the reciprocal relation
* %ATK_RELATION_DETAILS_FOR should be used on the associated content section
* to point back to the mark. (Since: 2.36)
*@ATK_ROLE_SUGGESTION: A container for content that is called out as a proposed
* change from the current version of the document, such as
 by a reviewer of the
* content. This role should include either %ATK_ROLE_CONTENT_DELETION and/or
* %ATK_ROLE_CONTENT_INSERTION children, in any order, to indicate what the
* actual change is. (Since: 2.36)
*@ATK_ROLE_LAST_DEFINED: not a valid role, used for finding end of the
*enumeration
*
* Describes the role of an object
*
* These are the built-in enumerated roles that UI components can have in
* ATK.  Other roles may be added at runtime, so an AtkRole >=
* ATK_ROLE_LAST_DEFINED is not necessarily an error.
**/
typedef enum {
 ATK_ROLE_INVALID = 0,
 ATK_ROLE_ACCEL_LABEL, /*<nick=accelerator-label>*/
 ATK_ROLE_ALERT,
 ATK_ROLE_ANIMATION,
 ATK_ROLE_ARROW,
 ATK_ROLE_CALENDAR,
 ATK_ROLE_CANVAS,
 ATK_ROLE_CHECK_BOX,
 ATK_ROLE_CHECK_MENU_ITEM,
 ATK_ROLE_COLOR_CHOOSER,
 ATK_ROLE_COLUMN_HEADER,
 ATK_ROLE_COMBO_BOX,
 ATK_ROLE_DATE_EDITOR,
 ATK_ROLE_DESKTOP_ICON,
 ATK_ROLE_DESKTOP_FRAME,
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ATK_ROLE_DIAL,
ATK_ROLE_DIALOG,
ATK_ROLE_DIRECTORY_PANE,
ATK_ROLE_DRAWING_AREA,
ATK_ROLE_FILE_CHOOSER,
ATK_ROLE_FILLER,
ATK_ROLE_FONT_CHOOSER,
ATK_ROLE_FRAME,
ATK_ROLE_GLASS_PANE,
ATK_ROLE_HTML_CONTAINER,
ATK_ROLE_ICON,
ATK_ROLE_IMAGE,
ATK_ROLE_INTERNAL_FRAME,
ATK_ROLE_LABEL,
ATK_ROLE_LAYERED_PANE,
ATK_ROLE_LIST,
ATK_ROLE_LIST_ITEM,
ATK_ROLE_MENU,
ATK_ROLE_MENU_BAR,
ATK_ROLE_MENU_ITEM,
ATK_ROLE_OPTION_PANE,
ATK_ROLE_PAGE_TAB,
ATK_ROLE_PAGE_TAB_LIST,
ATK_ROLE_PANEL,
ATK_ROLE_PASSWORD_TEXT,
ATK_ROLE_POPUP_MENU,
ATK_ROLE_PROGRESS_BAR,
ATK_ROLE_PUSH_BUTTON,
ATK_ROLE_RADIO_BUTTON,
ATK_ROLE_RADIO_MENU_ITEM,
ATK_ROLE_ROOT_PANE,
ATK_ROLE_ROW_HEADER,
ATK_ROLE_SCROLL_BAR,
ATK_ROLE_SCROLL_PANE,
ATK_ROLE_SEPARATOR,
ATK_ROLE_SLIDER,
ATK_ROLE_SPLIT_PANE,
ATK_ROLE_SPIN_BUTTON,
ATK_ROLE_STATUSBAR,
ATK_ROLE_TABLE,
ATK_ROLE_TABLE_CELL,
ATK_ROLE_TABLE_COLUMN_HEADER,
ATK_ROLE_TABLE_ROW_HEADER,
ATK_ROLE_TEAR_OFF_MENU_ITEM,
ATK_ROLE_TERMINAL,
ATK_ROLE_TEXT,
ATK_ROLE_TOGGLE_BUTTON,
ATK_ROLE_TOOL_BAR,

ATK_ROLE_TOOL_TIP,
ATK_ROLE_TREE,
ATK_ROLE_TREE_TABLE,
ATK_ROLE_UNKNOWN,
ATK_ROLE_VIEWPORT,
ATK_ROLE_WINDOW,
ATK_ROLE_HEADER,
ATK_ROLE_FOOTER,
ATK_ROLE_PARAGRAPH,
ATK_ROLE_RULER,
ATK_ROLE_APPLICATION,
ATK_ROLE_AUTOCOMPLETE,
ATK_ROLE_EDITBAR,
ATK_ROLE_EMBEDDED,
ATK_ROLE_ENTRY,
ATK_ROLE_CHART,
ATK_ROLE_CAPTION,
ATK_ROLE_DOCUMENT_FRAME,
ATK_ROLE_HEADING,
ATK_ROLE_PAGE,
ATK_ROLE_SECTION,
ATK_ROLE_REDUNDANT_OBJECT,
ATK_ROLE_FORM,
ATK_ROLE_LINK,
ATK_ROLE_INPUT_METHOD_WINDOW,
ATK_ROLE_TABLE_ROW,
ATK_ROLE_TREE_ITEM,
ATK_ROLE_DOCUMENT_SPREADSHEET,
ATK_ROLE_DOCUMENT_PRESENTATION,
ATK_ROLE_DOCUMENT_TEXT,
ATK_ROLE_DOCUMENT_WEB,
ATK_ROLE_DOCUMENT_EMAIL,
ATK_ROLE_COMMENT,
ATK_ROLE_LIST_BOX,
ATK_ROLE_GROUPING,
ATK_ROLE_IMAGE_MAP,
ATK_ROLE_NOTIFICATION,
ATK_ROLE_INFO_BAR,
ATK_ROLE_LEVEL_BAR,
ATK_ROLE_TITLE_BAR,
ATK_ROLE_BLOCK_QUOTE,
ATK_ROLE_AUDIO,
ATK_ROLE_VIDEO,
ATK_ROLE_DEFINITION,
ATK_ROLE_ARTICLE,
ATK_ROLE_LANDMARK,
ATK_ROLE_LOG,
ATK_ROLE_MARQUEE,

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 ATK_ROLE_MATH,
 ATK_ROLE_RATING,
 ATK_ROLE_TIMER,
 ATK_ROLE_DESCRIPTION_LIST,
 ATK_ROLE_DESCRIPTION_TERM,
 ATK_ROLE_DESCRIPTION_VALUE,
 ATK_ROLE_STATIC,
 ATK_ROLE_MATH_FRACTION,
 ATK_ROLE_MATH_ROOT,
 ATK_ROLE_SUBSCRIPT,
 ATK_ROLE_SUPERSCRIPT,
 ATK_ROLE_FOOTNOTE,
 ATK_ROLE_CONTENT_DELETION,
 ATK_ROLE_CONTENT_INSERTION,
 ATK_ROLE_MARK,
 ATK_ROLE_SUGGESTION,
 ATK_ROLE_LAST_DEFINED
} AtkRole;

AtkRole atk_role_register(const gchar* name);

/**
*AtkLayer:
*@ATK_LAYER_INVALID: The object does not have a layer
*@ATK_LAYER_BACKGROUND: This layer is reserved for the desktop background
*@ATK_LAYER_CANVAS: This layer is used for Canvas components
*@ATK_LAYER_WIDGET: This layer is normally used for components
*@ATK_LAYER_MDI: This layer is used for layered components
*@ATK_LAYER_POPUP: This layer is used for popup components, such as menus
*@ATK_LAYER_OVERLAY: This layer is reserved for future use.
*@ATK_LAYER_WINDOW:
 This layer is used for toplevel windows.
*
* Describes the layer of a component
*
* These enumerated "layer values" are used when determining which UI
* rendering layer a component is drawn into, which can help in making
* determinations of when components occlude one another.
**/
typedef enum {
 ATK_LAYER_INVALID,
 ATK_LAYER_BACKGROUND,
 ATK_LAYER_CANVAS,
 ATK_LAYER_WIDGET,
 ATK_LAYER_MDI,
 ATK_LAYER_POPUP,
 ATK_LAYER_OVERLAY,
 ATK_LAYER_WINDOW
```

```
} AtkLayer;

/**
* AtkAttributeSet:
*
* This is a singly-linked list (a #GSList) of #AtkAttribute. It is
* used by atk_text_get_run_attributes(), atk_text_get_default_attributes()
* and atk_editable_text_set_run_attributes()
**/
typedef GSList AtkAttributeSet;

/**
* AtkAttribute:
* @name: The attribute name. Call atk_text_attr_get_name()
* @value: the value of the attribute, represented as a string.
* Call atk_text_attr_get_value() for those which are strings.
* For values which are numbers, the string representation
 of the number
* is in value.
*
* A string name/value pair representing a text attribute.
**/
typedef struct _AtkAttribute AtkAttribute;

struct _AtkAttribute {
 gchar* name;
 gchar* value;
};

#define ATK_TYPE_OBJECT (atk_object_get_type())
#define ATK_OBJECT(obj) \
 (G_TYPE_CHECK_INSTANCE_CAST((obj), ATK_TYPE_OBJECT, AtkObject))
#define ATK_OBJECT_CLASS(klass) \
 (G_TYPE_CHECK_CLASS_CAST((klass), ATK_TYPE_OBJECT, AtkObjectClass))
#define ATK_IS_OBJECT(obj) (G_TYPE_CHECK_INSTANCE_TYPE((obj), ATK_TYPE_OBJECT))
#define ATK_IS_OBJECT_CLASS(klass) \
 (G_TYPE_CHECK_CLASS_TYPE((klass), ATK_TYPE_OBJECT))
#define ATK_OBJECT_GET_CLASS(obj) \
 (G_TYPE_INSTANCE_GET_CLASS((obj), ATK_TYPE_OBJECT, AtkObjectClass))

#define ATK_TYPE_IMPLEMENTOR (atk_implementor_get_type())
#define ATK_IS_IMPLEMENTOR(obj) \
 G_TYPE_CHECK_INSTANCE_TYPE((obj), ATK_TYPE_IMPLEMENTOR)
#define ATK_IMPLEMENTOR(obj) \
 G_TYPE_CHECK_INSTANCE_CAST((obj), ATK_TYPE_IMPLEMENTOR, AtkImplementor)
#define ATK_IMPLEMENTOR_GET_IFACE(obj)
                    \
 (G_TYPE_INSTANCE_GET_INTERFACE((obj), ATK_TYPE_IMPLEMENTOR, \
```

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                        AtkImplementorIface))

typedef struct _AtkImplementor AtkImplementor; /* dummy typedef */
typedef struct _AtkImplementorIface AtkImplementorIface;

typedef struct _AtkObject AtkObject;
typedef struct _AtkObjectClass AtkObjectClass;
typedef struct _AtkRelationSet AtkRelationSet;
typedef struct _AtkStateSet AtkStateSet;

/**
* AtkPropertyValues:
* @property_name: The name of the ATK property which is being presented or
*which has been changed.
* @old_value: The old property value, NULL; in some contexts this value is
*undefined (see note below).
* @new_value: The new value of the named property.
*
* @note: For most properties the old_value field of AtkPropertyValues will
* not contain a valid value.
*
* Currently, the only property for which old_value is used is
* accessible-state; for instance if there is a focus state the
* property
 change handler will be called for the object which lost the focus
* with the old_value containing an AtkState value corresponding to focused
* and the property change handler will be called for the object which
* received the focus with the new_value containing an AtkState value
* corresponding to focused.
*
**/
struct _AtkPropertyValues {
 const gchar* property_name;
 GValue old_value;
 GValue new_value;
};

typedef struct _AtkPropertyValues AtkPropertyValues;

typedef gboolean (*AtkFunction)(gpointer data);
/*
* For most properties the old_value field of AtkPropertyValues will
* not contain a valid value.
*
* Currently, the only property for which old_value is used is
* accessible-state; for instance if there is a focus state the
* property change handler will be called for the object which lost the focus
* with the old_value containing an AtkState value corresponding to focused
```

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* and the property change handler will be called for the object which
* received the focus
 with the new_value containing an AtkState value
* corresponding to focused.
*/
typedef void (*AtkPropertyChangeHandler)(AtkObject*, AtkPropertyValues*);

struct _AtkObject {
 GObject parent;

 gchar* description;
 gchar* name;
 AtkObject* accessible_parent;
 AtkRole role;
 AtkRelationSet* relation_set;
 AtkLayer layer;
};

struct _AtkObjectClass {
 GObjectClass parent;

 /*
  * Gets the accessible name of the object
  */
 G_CONST_RETURN gchar* (*get_name)(AtkObject* accessible);
 /*
  * Gets the accessible description of the object
  */
 G_CONST_RETURN gchar* (*get_description)(AtkObject* accessible);
 /*
  * Gets the accessible parent of the object
  */
 AtkObject* (*get_parent)(AtkObject* accessible);

 /*
  * Gets the number of accessible children of the object
  */
 gint (*get_n_children)(AtkObject* accessible);
 /*
  * Returns a reference to the specified accessible child of the object.
  * The accessible children are 0-based so the first accessible
 child is
  * at index 0, the second at index 1 and so on.
  */
 AtkObject* (*ref_child)(AtkObject* accessible, gint i);
 /*
  * Gets the 0-based index of this object in its parent; returns -1 if the
  * object does not have an accessible parent.
```

```
 */
gint (*get_index_in_parent)(AtkObject* accessible);
/*
 * Gets the RelationSet associated with the object
 */
AtkRelationSet* (*ref_relation_set)(AtkObject* accessible);
/*
 * Gets the role of the object
 */
AtkRole (*get_role)(AtkObject* accessible);
AtkLayer (*get_layer)(AtkObject* accessible);
gint (*get_mdi_zorder)(AtkObject* accessible);
/*
 * Gets the state set of the object
 */
AtkStateSet* (*ref_state_set)(AtkObject* accessible);
/*
 * Sets the accessible name of the object
 */
void (*set_name)(AtkObject* accessible, const gchar* name);
/*
 * Sets the accessible description of the object
 */
void (*set_description)(AtkObject* accessible, const gchar* description);
/*
 * Sets
the accessible parent of the object
 */
void (*set_parent)(AtkObject* accessible, AtkObject* parent);
/*
 * Sets the accessible role of the object
 */
void (*set_role)(AtkObject* accessible, AtkRole role);
/*
 * Specifies a function to be called when a property changes value
 */
guint (*connect_property_change_handler)(AtkObject* accessible,
                                         AtkPropertyChangeHandler* handler);
/*
 * Removes a property change handler which was specified using
 * connect_property_change_handler
 */
void (*remove_property_change_handler)(AtkObject* accessible,
                                       guint handler_id);
void (*initialize)(AtkObject* accessible, gpointer data);
/*
 * The signal handler which is executed when there is a change in the
 * children of the object
```

```
 */
 void (*children_changed)(AtkObject* accessible, guint change_index,
                          gpointer changed_child);
 /*
  * The signal handler
 which is executed  when there is a focus event
  * for an object.
  */
 void (*focus_event)(AtkObject* accessible, gboolean focus_in);
 /*
  * The signal handler which is executed  when there is a property_change
  * signal for an object.
  */
 void (*property_change)(AtkObject* accessible, AtkPropertyValues* values);
 /*
  * The signal handler which is executed  when there is a state_change
  * signal for an object.
  */
 void (*state_change)(AtkObject* accessible, const gchar* name,
                      gboolean state_set);
 /*
  * The signal handler which is executed when there is a change in the
  * visible data for an object
  */
 void (*visible_data_changed)(AtkObject* accessible);

 /*
  * The signal handler which is executed when there is a change in the
  * 'active' child or children of the object, for instance when
  * interior focus changes in a table or list.  This signal should be emitted
  * by objects whose state includes ATK_STATE_MANAGES_DESCENDANTS.
   */
 void (*active_descendant_changed)(AtkObject* accessible, gpointer* child);

 /*
  * Gets a list of properties applied to this object as a whole, as an
  * #AtkAttributeSet consisting of name-value pairs. Since ATK 1.12
  */
 AtkAttributeSet* (*get_attributes)(AtkObject* accessible);

 const gchar* (*get_object_locale)(AtkObject* accessible);

 AtkFunction pad1;
};

GType atk_object_get_type(void);

struct _AtkImplementorIface {
```

```
 GTypeInterface parent;

 AtkObject* (*ref_accessible)(AtkImplementor* implementor);
};
GType atk_implementor_get_type(void);

/*
* This method uses the ref_accessible method in AtkImplementorIface,
* if the object's class implements AtkImplementorIface.
* Otherwise it returns %NULL.
*
* IMPORTANT:
* Note also that because this method may return flyweight objects,
* it increments the returned AtkObject's reference count.
* Therefore it is the responsibility of the calling
* program to unreference the object when no longer needed.
 * (c.f. gtk_widget_get_accessible() where this is not the case).
*/
AtkObject* atk_implementor_ref_accessible(AtkImplementor* implementor);

/*
* Properties directly supported by AtkObject
*/

G_CONST_RETURN gchar* atk_object_get_name(AtkObject* accessible);
G_CONST_RETURN gchar* atk_object_get_description(AtkObject* accessible);
AtkObject* atk_object_get_parent(AtkObject* accessible);
gint atk_object_get_n_accessible_children(AtkObject* accessible);
AtkObject* atk_object_ref_accessible_child(AtkObject* accessible, gint i);
AtkRelationSet* atk_object_ref_relation_set(AtkObject* accessible);
AtkRole atk_object_get_role(AtkObject* accessible);
AtkLayer atk_object_get_layer(AtkObject* accessible);
gint atk_object_get_mdi_zorder(AtkObject* accessible);
AtkAttributeSet* atk_object_get_attributes(AtkObject* accessible);
AtkStateSet* atk_object_ref_state_set(AtkObject* accessible);
gint atk_object_get_index_in_parent(AtkObject* accessible);
void atk_object_set_name(AtkObject* accessible,
 const gchar* name);
void atk_object_set_description(AtkObject* accessible,
                                const gchar* description);
void atk_object_set_parent(AtkObject* accessible, AtkObject* parent);
void atk_object_set_role(AtkObject* accessible, AtkRole role);

guint atk_object_connect_property_change_handler(
   AtkObject* accessible, AtkPropertyChangeHandler* handler);
void atk_object_remove_property_change_handler(AtkObject* accessible,
                                               guint handler_id);
```

```
void atk_object_notify_state_change(AtkObject* accessible, AtkState state,
                                    gboolean value);
void atk_object_initialize(AtkObject* accessible, gpointer data);

G_CONST_RETURN gchar* atk_role_get_name(AtkRole role);
AtkRole atk_role_for_name(const gchar* name);

/* NEW in 1.1: convenience API */
gboolean atk_object_add_relationship(AtkObject* object,
                                     AtkRelationType relationship,

                AtkObject* target);
gboolean atk_object_remove_relationship(AtkObject* object,
                                        AtkRelationType relationship,
                                        AtkObject* target);
G_CONST_RETURN gchar* atk_role_get_localized_name(AtkRole role);

/* */

/*
* Note: the properties which are registered with the GType
*   property registry, for type ATK_TYPE_OBJECT, are as follows:
*
*   "accessible-name"
*   "accessible-description"
*   "accessible-parent"
*   "accessible-role"
*   "accessible-value"
*   "accessible-component-layer"
*   "accessible-component-zorder"
*   "accessible-table-caption"
*   "accessible-table-column-description"
*   "accessible-table-column-header"
*   "accessible-table-row-description"
*   "accessible-table-row-header"
*   "accessible-table-summary"
*   "accessible-model"
*
* accessibility property change listeners should use the
*   normal GObject property interfaces and "property-change"
*   signal
 handler semantics to interpret the property change
*   information relayed from AtkObject.
*   (AtkObject instances will connect to the "notify"
*   signal in their host objects, and relay the signals when appropriate).
*/

/* For other signals, see related interfaces
```

```
*
*    AtkActionIface,
*    AtkComponentIface,
*    AtkHypertextIface,
*    AtkImageIface,
*    AtkSelectionIface,
*    AtkTableIface,
*    AtkTextIface,
*    AtkValueIface.
*
*  The usage model for obtaining these interface instances is:
*    ATK_<interfacename>_GET_IFACE(GObject *accessible),
*    where accessible, though specified as a GObject, is
*    the AtkObject instance being queried.
*  More usually, the interface will be used via a cast to the
*    interface's corresponding "type":
*
*    AtkText textImpl = ATK_TEXT(accessible);
*    if (textImpl)
*      {
*        cpos = atk_text_get_caret_position(textImpl);
*      }
*
*  If it's known in advance that accessible implements AtkTextIface,
 *    this is shortened to:
*
*    cpos = atk_text_get_caret_position (ATK_TEXT (accessible));
*/

#ifdef __cplusplus
}
#endif /* __cplusplus */

#endif /* __ATK_OBJECT_H__ */
/* 7zTypes.h -- Basic types
2017-07-17 : Igor Pavlov : Public domain */

#ifndef __7Z_TYPES_H
#define __7Z_TYPES_H

#ifdef _WIN32
/* #include <windows.h> */
#endif

#include <stddef.h>

#ifndef EXTERN_C_BEGIN
#ifdef __cplusplus
```

```
#define EXTERN_C_BEGIN extern "C" {
#define EXTERN_C_END }
#else
#define EXTERN_C_BEGIN
#define EXTERN_C_END
#endif
#endif

EXTERN_C_BEGIN

#define SZ_OK 0

#define SZ_ERROR_DATA 1
#define SZ_ERROR_MEM 2
#define SZ_ERROR_CRC 3
#define SZ_ERROR_UNSUPPORTED 4
#define SZ_ERROR_PARAM 5
#define SZ_ERROR_INPUT_EOF 6
#define SZ_ERROR_OUTPUT_EOF 7
#define SZ_ERROR_READ 8
#define SZ_ERROR_WRITE 9
#define SZ_ERROR_PROGRESS 10
#define SZ_ERROR_FAIL 11
#define SZ_ERROR_THREAD 12

#define SZ_ERROR_ARCHIVE 16
#define SZ_ERROR_NO_ARCHIVE 17

typedef int SRes;


#ifdef _WIN32

/* typedef DWORD WRes; */
typedef unsigned WRes;
#define MY_SRes_HRESULT_FROM_WRes(x) HRESULT_FROM_WIN32(x)

#else

typedef int WRes;
#define MY__FACILITY_WIN32 7
#define MY__FACILITY__WRes MY__FACILITY_WIN32
#define
 MY_SRes_HRESULT_FROM_WRes(x) ((HRESULT)(x) <= 0 ? ((HRESULT)(x)) : ((HRESULT) (((x) &
0x0000FFFF) | (MY__FACILITY__WRes << 16) | 0x80000000)))

#endif
```

```
#ifndef RINOK
#define RINOK(x) { int __result__ = (x); if (__result__ != 0) return __result__; }
#endif

typedef unsigned char Byte;
typedef short Int16;
typedef unsigned short UInt16;

#ifdef _LZMA_UINT32_IS_ULONG
typedef long Int32;
typedef unsigned long UInt32;
#else
typedef int Int32;
typedef unsigned int UInt32;
#endif

#ifdef _SZ_NO_INT_64

/* define _SZ_NO_INT_64, if your compiler doesn't support 64-bit integers.
  NOTES: Some code will work incorrectly in that case! */

typedef long Int64;
typedef unsigned long UInt64;

#else

#if defined(_MSC_VER) || defined(__BORLANDC__)
typedef __int64 Int64;
typedef unsigned __int64 UInt64;
#define UINT64_CONST(n) n
#else
typedef long long int Int64;
typedef unsigned long long int UInt64;
#define UINT64_CONST(n) n ## ULL
#endif

#endif

#ifdef _LZMA_NO_SYSTEM_SIZE_T
typedef UInt32
 SizeT;
#else
typedef size_t SizeT;
#endif

typedef int Bool;
#define True 1
```

```
#define False 0


#ifdef _WIN32
#define MY_STD_CALL __stdcall
#else
#define MY_STD_CALL
#endif

#ifdef _MSC_VER

#if _MSC_VER >= 1300
#define MY_NO_INLINE __declspec(noinline)
#else
#define MY_NO_INLINE
#endif

#define MY_FORCE_INLINE __forceinline

#define MY_CDECL __cdecl
#define MY_FAST_CALL __fastcall

#else

#define MY_NO_INLINE
#define MY_FORCE_INLINE
#define MY_CDECL
#define MY_FAST_CALL

/* inline keyword : for C++ / C99 */

/* GCC, clang: */
/*
#if defined (__GNUC__) && (__GNUC__ >= 4)
#define MY_FORCE_INLINE __attribute__((always_inline))
#define MY_NO_INLINE __attribute__((noinline))
#endif
*/

#endif


/* The following interfaces use first parameter as pointer to structure */

typedef struct IByteIn IByteIn;
struct IByteIn
{
 Byte (*Read)(const IByteIn *p); /* reads one byte, returns 0 in case of EOF or error */
```

```
};
#define IByteIn_Read(p) (p)->Read(p)


typedef struct IByteOut IByteOut;
struct
 IByteOut
{
 void (*Write)(const IByteOut *p, Byte b);
};
#define IByteOut_Write(p, b) (p)->Write(p, b)


typedef struct ISeqInStream ISeqInStream;
struct ISeqInStream
{
 SRes (*Read)(const ISeqInStream *p, void *buf, size_t *size);
   /* if (input(*size) != 0 && output(*size) == 0) means end_of_stream.
      (output(*size) < input(*size)) is allowed */
};
#define ISeqInStream_Read(p, buf, size) (p)->Read(p, buf, size)

/* it can return SZ_ERROR_INPUT_EOF */
SRes SeqInStream_Read(const ISeqInStream *stream, void *buf, size_t size);
SRes SeqInStream_Read2(const ISeqInStream *stream, void *buf, size_t size, SRes errorType);
SRes SeqInStream_ReadByte(const ISeqInStream *stream, Byte *buf);


typedef struct ISeqOutStream ISeqOutStream;
struct ISeqOutStream
{
 size_t (*Write)(const ISeqOutStream *p, const void *buf, size_t size);
   /* Returns: result - the number of actually written bytes.
      (result < size) means error */
};
#define ISeqOutStream_Write(p, buf, size) (p)->Write(p,
 buf, size)

typedef enum
{
 SZ_SEEK_SET = 0,
 SZ_SEEK_CUR = 1,
 SZ_SEEK_END = 2
} ESzSeek;


typedef struct ISeekInStream ISeekInStream;
struct ISeekInStream
```

```
{
 SRes (*Read)(const ISeekInStream *p, void *buf, size_t *size);  /* same as ISeqInStream::Read */
 SRes (*Seek)(const ISeekInStream *p, Int64 *pos, ESzSeek origin);
};
#define ISeekInStream_Read(p, buf, size)   (p)->Read(p, buf, size)
#define ISeekInStream_Seek(p, pos, origin) (p)->Seek(p, pos, origin)


typedef struct ILookInStream ILookInStream;
struct ILookInStream
{
 SRes (*Look)(const ILookInStream *p, const void **buf, size_t *size);
   /* if (input(*size) != 0 && output(*size) == 0) means end_of_stream.
      (output(*size) > input(*size)) is not allowed
      (output(*size) < input(*size)) is allowed */
 SRes (*Skip)(const ILookInStream *p, size_t offset);
   /* offset must be <= output(*size) of Look */

 SRes (*Read)(const ILookInStream *p, void *buf, size_t *size);
   /* reads directly (without buffer).
 It's same as ISeqInStream::Read */
 SRes (*Seek)(const ILookInStream *p, Int64 *pos, ESzSeek origin);
};

#define ILookInStream_Look(p, buf, size)   (p)->Look(p, buf, size)
#define ILookInStream_Skip(p, offset)      (p)->Skip(p, offset)
#define ILookInStream_Read(p, buf, size)   (p)->Read(p, buf, size)
#define ILookInStream_Seek(p, pos, origin) (p)->Seek(p, pos, origin)


SRes LookInStream_LookRead(const ILookInStream *stream, void *buf, size_t *size);
SRes LookInStream_SeekTo(const ILookInStream *stream, UInt64 offset);

/* reads via ILookInStream::Read */
SRes LookInStream_Read2(const ILookInStream *stream, void *buf, size_t size, SRes errorType);
SRes LookInStream_Read(const ILookInStream *stream, void *buf, size_t size);



typedef struct
{
 ILookInStream vt;
 const ISeekInStream *realStream;

 size_t pos;
 size_t size; /* it's data size */

 /* the following variables must be set outside */
```

```
 Byte *buf;
 size_t bufSize;
} CLookToRead2;

void LookToRead2_CreateVTable(CLookToRead2
 *p, int lookahead);

#define LookToRead2_Init(p) { (p)->pos = (p)->size = 0; }


typedef struct
{
 ISeqInStream vt;
 const ILookInStream *realStream;
} CSecToLook;

void SecToLook_CreateVTable(CSecToLook *p);



typedef struct
{
 ISeqInStream vt;
 const ILookInStream *realStream;
} CSecToRead;

void SecToRead_CreateVTable(CSecToRead *p);


typedef struct ICompressProgress ICompressProgress;

struct ICompressProgress
{
 SRes (*Progress)(const ICompressProgress *p, UInt64 inSize, UInt64 outSize);
   /* Returns: result. (result != SZ_OK) means break.
      Value (UInt64)(Int64)-1 for size means unknown value. */
};
#define ICompressProgress_Progress(p, inSize, outSize) (p)->Progress(p, inSize, outSize)



typedef struct ISzAlloc ISzAlloc;
typedef const ISzAlloc * ISzAllocPtr;

struct ISzAlloc
{
 void *(*Alloc)(ISzAllocPtr p, size_t size);
 void (*Free)(ISzAllocPtr p, void *address); /* address can be 0 */
```

```
};

#define ISzAlloc_Alloc(p, size) (p)->Alloc(p, size)
#define ISzAlloc_Free(p,
 a) (p)->Free(p, a)

/* deprecated */
#define IAlloc_Alloc(p, size) ISzAlloc_Alloc(p, size)
#define IAlloc_Free(p, a) ISzAlloc_Free(p, a)





#ifndef MY_offsetof
 #ifdef offsetof
   #define MY_offsetof(type, m) offsetof(type, m)
   /*
   #define MY_offsetof(type, m) FIELD_OFFSET(type, m)
   */
 #else
   #define MY_offsetof(type, m) ((size_t)&(((type *)0)->m))
 #endif
#endif



#ifndef MY_container_of

/*
#define MY_container_of(ptr, type, m) container_of(ptr, type, m)
#define MY_container_of(ptr, type, m) CONTAINING_RECORD(ptr, type, m)
#define MY_container_of(ptr, type, m) ((type *)((char *)(ptr) - offsetof(type, m)))
#define MY_container_of(ptr, type, m) (&((type *)0)->m == (ptr), ((type *)(((char *)(ptr)) - MY_offsetof(type,
m))))
*/

/*
 GCC shows warning: "perhaps the 'offsetof' macro was used incorrectly"
   GCC 3.4.4 : classes with constructor
   GCC 4.8.1 : classes with non-public variable members"
*/

#define MY_container_of(ptr, type, m) ((type *)((char
 *)(1 ? (ptr) : &((type *)0)->m) - MY_offsetof(type, m)))


#endif
```

```
#define CONTAINER_FROM_VTBL_SIMPLE(ptr, type, m) ((type *)(ptr))

/*
#define CONTAINER_FROM_VTBL(ptr, type, m) CONTAINER_FROM_VTBL_SIMPLE(ptr, type, m)
*/
#define CONTAINER_FROM_VTBL(ptr, type, m) MY_container_of(ptr, type, m)

#define CONTAINER_FROM_VTBL_CLS(ptr, type, m) CONTAINER_FROM_VTBL_SIMPLE(ptr, type, m)
/*
#define CONTAINER_FROM_VTBL_CLS(ptr, type, m) CONTAINER_FROM_VTBL(ptr, type, m)
*/



#ifdef _WIN32

#define CHAR_PATH_SEPARATOR '\\'
#define WCHAR_PATH_SEPARATOR L'\\'
#define STRING_PATH_SEPARATOR "\\"
#define WSTRING_PATH_SEPARATOR L"\\"

#else

#define CHAR_PATH_SEPARATOR '/'
#define WCHAR_PATH_SEPARATOR L'/'
#define STRING_PATH_SEPARATOR "/"
#define WSTRING_PATH_SEPARATOR L"/"

#endif

EXTERN_C_END

#endif
```

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```
#define USE_COPYRIGHT_CR
#include "../../C/7zVersion.h"
<Project DefaultTargets="Build" xmlns="http://schemas.microsoft.com/developer/msbuild/2003">
 <PropertyGroup>
  <Configuration Condition=" '$(Configuration)' == '' ">Debug</Configuration>
  <Platform Condition=" '$(Platform)' == '' ">AnyCPU</Platform>
  <ProductVersion>8.0.50727</ProductVersion>
  <SchemaVersion>2.0</SchemaVersion>
  <ProjectGuid>{CE33DF18-F9C8-4D6F-9057-DBB4DB96E973}</ProjectGuid>
  <OutputType>Exe</OutputType>
  <RootNamespace>LzmaAlone</RootNamespace>
  <AssemblyName>Lzma#</AssemblyName>
  <WarningLevel>4</WarningLevel>
 </PropertyGroup>
 <PropertyGroup Condition=" '$(Configuration)|$(Platform)' == 'Debug|AnyCPU' ">
  <DebugSymbols>true</DebugSymbols>
  <DebugType>full</DebugType>
  <Optimize>false</Optimize>
  <OutputPath>.\bin\Debug\</OutputPath>
  <DefineConstants>DEBUG;TRACE</DefineConstants>
 </PropertyGroup>
 <PropertyGroup Condition=" '$(Configuration)|$(Platform)' == 'Release|AnyCPU' ">
  <DebugSymbols>false</DebugSymbols>
   <Optimize>true</Optimize>
  <OutputPath>.\bin\Release\</OutputPath>
  <DefineConstants>TRACE</DefineConstants>
  <PlatformTarget>AnyCPU</PlatformTarget>
 </PropertyGroup>
 <ItemGroup>
  <Reference Include="System" />
  <Reference Include="System.Data" />
  <Reference Include="System.Xml" />
 </ItemGroup>
 <ItemGroup>
  <Compile Include="..\..\Common\CommandLineParser.cs">
```

```
  <Link>Common\CommandLineParser.cs</Link>
</Compile>
<Compile Include="..\..\Common\CRC.cs">
  <Link>Common\CRC.cs</Link>
</Compile>
<Compile Include="..\..\ICoder.cs">
  <Link>ICoder.cs</Link>
</Compile>
<Compile Include="..\LZ\IMatchFinder.cs">
  <Link>LZ\IMatchFinder.cs</Link>
</Compile>
<Compile Include="..\LZ\LzBinTree.cs">
  <Link>LZ\LzBinTree.cs</Link>
</Compile>
<Compile Include="..\LZ\LzInWindow.cs">
  <Link>LZ\LzInWindow.cs</Link>
</Compile>
<Compile Include="..\LZ\LzOutWindow.cs">
  <Link>LZ\LzOutWindow.cs</Link>
 </Compile>
<Compile Include="..\LZMA\LzmaBase.cs">
  <Link>LZMA\LzmaBase.cs</Link>
</Compile>
<Compile Include="..\LZMA\LzmaDecoder.cs">
  <Link>LZMA\LzmaDecoder.cs</Link>
</Compile>
<Compile Include="..\LZMA\LzmaEncoder.cs">
  <Link>LZMA\LzmaEncoder.cs</Link>
</Compile>
<Compile Include="..\RangeCoder\RangeCoder.cs">
  <Link>RangeCoder\RangeCoder.cs</Link>
</Compile>
<Compile Include="..\RangeCoder\RangeCoderBit.cs">
  <Link>RangeCoder\RangeCoderBit.cs</Link>
</Compile>
<Compile Include="..\RangeCoder\RangeCoderBitTree.cs">
  <Link>RangeCoder\RangeCoderBitTree.cs</Link>
</Compile>
<Compile Include="LzmaAlone.cs">
  <SubType>Code</SubType>
</Compile>
<Compile Include="LzmaBench.cs">
  <SubType>Code</SubType>
</Compile>
<Compile Include="Properties\AssemblyInfo.cs" />
<Compile Include="Properties\Settings.cs">
  <AutoGen>True</AutoGen>
  <DependentUpon>Settings.settings</DependentUpon>
```

```
    </Compile>
   <None Include="Properties\Settings.settings">
     <Generator>SettingsSingleFileGenerator</Generator>
     <LastGenOutput>Settings.cs</LastGenOutput>
   </None>
   <AppDesigner Include="Properties\" />
 </ItemGroup>
 <Import Project="$(MSBuildBinPath)\Microsoft.CSHARP.Targets" />
</Project>
```

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POSSIBILITY OF SUCH DAMAGE.

```
// Windows/ErrorMsg.h

#ifndef __WINDOWS_ERROR_MSG_H
#define __WINDOWS_ERROR_MSG_H

#include "../Common/MyString.h"

namespace NWindows {
namespace NError {

UString MyFormatMessage(DWORD errorCode);

}}

#endif
```

<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With dir Attribute in text Element 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element with ltr as the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre
 {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  Test passes if the word PASS appears below.
  The Extended Metadata Block is valid and may be displayed to the user upon request.
  P
  The XML contained in the Extended Metadata Block is below.
  <pre>
<?xml version="1.0" encoding="UTF-8"?>
<metadata version="1.0">
 <copyright>
  <text dir="ltr">
   Copyright without language.
  </text>
 </copyright>
</metadata>
  </pre>
 </body>
</html>

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WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">

```
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With dir Attribute in span Element in text Element 2</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-031-ref.xht" />
  <meta name="assert" content="The license element contains a text element that contains a span element with rtl as
the value for the dir attribute."
 />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-031.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   Text with &lt;span dir="rtl"&gt;span&lt;/span&gt;.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

```
// MyMessages.h

#ifndef __MY_MESSAGES_H
#define __MY_MESSAGES_H

#include "../../../Common/MyString.h"

void ShowErrorMessage(HWND window, LPCWSTR message);
inline void ShowErrorMessage(LPCWSTR message) { ShowErrorMessage(0, message); }

void ShowErrorMessageHwndRes(HWND window, UInt32 langID);
void ShowErrorMessageRes(UInt32 langID);

void ShowLastErrorMessage(HWND window = 0);

#endif
# -*- Mode: python; indent-tabs-mode: nil; tab-width: 40 -*-
# vim: set filetype=python:
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EXPORTS.snappy += [
  'snappy-stubs-public.h',
  'src/snappy-c.h',
  'src/snappy.h',
]

UNIFIED_SOURCES += [
  'src/snappy-c.cc',
  'src/snappy-sinksource.cc',
  'src/snappy-stubs-internal.cc',
  'src/snappy.cc',
]

# We allow warnings for third-party code that can be updated from upstream.
AllowCompilerWarnings()

FINAL_LIBRARY = 'xul'

# Suppress warnings in third-party code.
if CONFIG['CC_TYPE'] in ('clang', 'gcc'):
  CXXFLAGS += [
    '-Wno-sign-compare',
    '-Wno-unused-function'
  ]

if CONFIG['TARGET_ENDIANNESS'] == 'big':
```

DEFINES['IS_BIG_ENDIAN'] = 1

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==========

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<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-001-ref.xht" />
  <meta name="assert" content="The license element matches the schema." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src:
 url("support/metadatadisplay-schema-license-001.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
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    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts" id="License ID"&gt;
```

<text>
License without language.
</text>
</license>
</metadata>
</pre>
</body>
</html>
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<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
<title>WOFF Test: Valid license Element With One Language Tagged (using lang) text Element</title>
<link rel="author" title="Tal Leming" href="http://typesupply.com" />
<link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
<link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
<link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
<link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
<link rel="match" href="metadatadisplay-schema-license-006-ref.xht" />
<meta name="assert" content="The license element matches the schema. It contains one text element that has a language tag using the lang tag instead of
xml:lang." />
<style type="text/css"><![CDATA[
@import url("support/test-fonts.css");

```
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-006.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts" id="License ID"&gt;
  &lt;text lang="en"&gt;
   License with "en" language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
PROG = lzma.exe
MY_CONSOLE = 1
CFLAGS = $(CFLAGS)

CURRENT_OBJS = \
 $O\LzmaAlone.obj \

COMPRESS_OBJS = \
 $O\LzmaDecoder.obj \
 $O\LzmaEncoder.obj \
 $O\LzmaRegister.obj \

COMMON_OBJS = \
 $O\CommandLineParser.obj \
```

```
 $O\CRC.obj \
 $O\CrcReg.obj \
 $O\IntToString.obj \
 $O\MyString.obj \
 $O\NewHandler.obj \
 $O\StringConvert.obj \
 $O\StringToInt.obj \
 $O\MyVector.obj

WIN_OBJS = \
 $O\FileIO.obj \
 $O\PropVariant.obj \
 $O\System.obj

7ZIP_COMMON_OBJS = \
 $O\CWrappers.obj \
 $O\CreateCoder.obj \
 $O\FileStreams.obj \
 $O\FilterCoder.obj \
 $O\MethodProps.obj \
 $O\OutBuffer.obj \
 $O\StreamUtils.obj \

UI_COMMON_OBJS = \
 $O\Bench.obj \

CONSOLE_OBJS = \
 $O\ConsoleClose.obj \
 $O\BenchCon.obj \

C_OBJS = \
 $O\Alloc.obj \
 $O\Bra86.obj \
 $O\CpuArch.obj \
 $O\LzFind.obj \
 $O\LzFindMt.obj \
 $O\Lzma86Dec.obj \
 $O\Lzma86Enc.obj \
 $O\LzmaDec.obj \
 $O\LzmaEnc.obj \
 $O\Threads.obj \

!include "../../Crc.mak"

!include "../../7zip.mak"
/* Lzma2Enc.h -- LZMA2 Encoder
2017-07-27 : Igor Pavlov : Public domain */
```

```
#ifndef __LZMA2_ENC_H
#define __LZMA2_ENC_H

#include "LzmaEnc.h"

EXTERN_C_BEGIN

#define LZMA2_ENC_PROPS__BLOCK_SIZE__AUTO 0
#define LZMA2_ENC_PROPS__BLOCK_SIZE__SOLID ((UInt64)(Int64)-1)

typedef struct
{
 CLzmaEncProps lzmaProps;
 UInt64 blockSize;
 int numBlockThreads_Reduced;
 int numBlockThreads_Max;
 int numTotalThreads;
} CLzma2EncProps;

void Lzma2EncProps_Init(CLzma2EncProps *p);
void Lzma2EncProps_Normalize(CLzma2EncProps *p);

/* ---------- CLzmaEnc2Handle Interface ---------- */

/* Lzma2Enc_* functions can return the following exit codes:
SRes:
 SZ_OK           - OK
 SZ_ERROR_MEM    - Memory allocation error
 SZ_ERROR_PARAM  - Incorrect paramater in props
 SZ_ERROR_WRITE  - ISeqOutStream write callback error
 SZ_ERROR_OUTPUT_EOF - output buffer overflow - version with (Byte *) output
 SZ_ERROR_PROGRESS - some break from progress callback
 SZ_ERROR_THREAD - error in multithreading functions
 (only for Mt version)
*/

typedef void * CLzma2EncHandle;

CLzma2EncHandle Lzma2Enc_Create(ISzAllocPtr alloc, ISzAllocPtr allocBig);
void Lzma2Enc_Destroy(CLzma2EncHandle p);
SRes Lzma2Enc_SetProps(CLzma2EncHandle p, const CLzma2EncProps *props);
void Lzma2Enc_SetDataSize(CLzma2EncHandle p, UInt64 expectedDataSiize);
Byte Lzma2Enc_WriteProperties(CLzma2EncHandle p);
SRes Lzma2Enc_Encode2(CLzma2EncHandle p,
   ISeqOutStream *outStream,
   Byte *outBuf, size_t *outBufSize,
   ISeqInStream *inStream,
   const Byte *inData, size_t inDataSize,
```

```
  ICompressProgress *progress);

EXTERN_C_END

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With Mixed text Element Language Tags 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-004-ref.xht" />
  <meta name="assert" content="The copyright element matches the schema. One text element does not have a
language tag. One text element has a language tag." />
  <style
 type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-004.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
```

<copyright>
<text>
Copyright without language.
</text>
<text xml:lang="en">
Copyright with "en" language.
</text>
</copyright>
</metadata>
</pre>
</body>
</html>
This package is a modified version of cpython's ipaddress module.
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---

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```
#define IDS_PROP_PATH            1003
#define IDS_PROP_NAME            1004
#define IDS_PROP_EXTENSION       1005
#define IDS_PROP_IS_FOLDER       1006
#define IDS_PROP_SIZE            1007
#define IDS_PROP_PACKED_SIZE     1008
#define IDS_PROP_ATTRIBUTES      1009
#define IDS_PROP_CTIME           1010
#define IDS_PROP_ATIME           1011
#define IDS_PROP_MTIME           1012
#define IDS_PROP_SOLID           1013
#define IDS_PROP_C0MMENTED       1014
#define IDS_PROP_ENCRYPTED       1015
#define IDS_PROP_SPLIT_BEFORE    1016
#define IDS_PROP_SPLIT_AFTER     1017
#define IDS_PROP_DICTIONARY_SIZE 1018
#define IDS_PROP_CRC             1019
#define IDS_PROP_FILE_TYPE       1020
#define IDS_PROP_ANTI            1021
#define IDS_PROP_METHOD          1022
#define IDS_PROP_HOST_OS         1023
#define IDS_PROP_FILE_SYSTEM     1024
#define IDS_PROP_USER            1025
#define IDS_PROP_GROUP           1026
#define IDS_PROP_BLOCK           1027
#define IDS_PROP_COMMENT
        1028
#define IDS_PROP_POSITION        1029
#define IDS_PROP_PREFIX          1030
#define IDS_PROP_FOLDERS         1031
```

```
#define IDS_PROP_FILES          1032
#define IDS_PROP_VERSION        1033
#define IDS_PROP_VOLUME         1034
#define IDS_PROP_IS_VOLUME      1035
#define IDS_PROP_OFFSET         1036
#define IDS_PROP_LINKS          1037
#define IDS_PROP_NUM_BLOCKS     1038
#define IDS_PROP_NUM_VOLUMES    1039

#define IDS_PROP_BIT64          1041
#define IDS_PROP_BIG_ENDIAN     1042
#define IDS_PROP_CPU            1043
#define IDS_PROP_PHY_SIZE       1044
#define IDS_PROP_HEADERS_SIZE   1045
#define IDS_PROP_CHECKSUM       1046
#define IDS_PROP_CHARACTS       1047
#define IDS_PROP_VA             1048
#define IDS_PROP_ID             1049
#define IDS_PROP_SHORT_NAME     1050
#define IDS_PROP_CREATOR_APP    1051
#define IDS_PROP_SECTOR_SIZE    1052
#define IDS_PROP_POSIX_ATTRIB   1053
#define IDS_PROP_SYM_LINK       1054
#define IDS_PROP_ERROR
        1055
#define IDS_PROP_TOTAL_SIZE     1056
#define IDS_PROP_FREE_SPACE     1057
#define IDS_PROP_CLUSTER_SIZE   1058
#define IDS_PROP_VOLUME_NAME    1059
#define IDS_PROP_LOCAL_NAME     1060
#define IDS_PROP_PROVIDER       1061
#define IDS_PROP_NT_SECURITY    1062
#define IDS_PROP_ALT_STREAM     1063
#define IDS_PROP_AUX            1064
#define IDS_PROP_DELETED        1065
#define IDS_PROP_IS_TREE        1066
#define IDS_PROP_SHA1           1067
#define IDS_PROP_SHA256         1068
#define IDS_PROP_ERROR_TYPE     1069
#define IDS_PROP_NUM_ERRORS     1070
#define IDS_PROP_ERROR_FLAGS    1071
#define IDS_PROP_WARNING_FLAGS  1072
#define IDS_PROP_WARNING        1073
#define IDS_PROP_NUM_STREAMS    1074
#define IDS_PROP_NUM_ALT_STREAMS  1075
#define IDS_PROP_ALT_STREAMS_SIZE 1076
#define IDS_PROP_VIRTUAL_SIZE   1077
#define IDS_PROP_UNPACK_SIZE    1078
```

```
#define IDS_PROP_TOTAL_PHY_SIZE   1079
#define IDS_PROP_VOLUME_INDEX
 1080
#define IDS_PROP_SUBTYPE         1081
#define IDS_PROP_SHORT_COMMENT    1082
#define IDS_PROP_CODE_PAGE        1083
#define IDS_PROP_IS_NOT_ARC_TYPE  1084
#define IDS_PROP_PHY_SIZE_CANT_BE_DETECTED 1085
#define IDS_PROP_ZEROS_TAIL_IS_ALLOWED 1086
#define IDS_PROP_TAIL_SIZE        1087
#define IDS_PROP_EMB_STUB_SIZE    1088
#define IDS_PROP_NT_REPARSE       1089
#define IDS_PROP_HARD_LINK        1090
#define IDS_PROP_INODE            1091
#define IDS_PROP_STREAM_ID        1092
#define IDS_PROP_READ_ONLY        1093
#define IDS_PROP_OUT_NAME         1094
#define IDS_PROP_COPY_LINK        1095
```

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```
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strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: No text Element in copyright Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element does not contain a text child element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family:
 "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
```

```
  <div class="test">P</div>
 </body>
</html>
// RandGen.h

#ifndef __CRYPTO_RAND_GEN_H
#define __CRYPTO_RAND_GEN_H

#include "../../../C/Sha256.h"

class CRandomGenerator
{
 Byte _buff[SHA256_DIGEST_SIZE];
 bool _needInit;

 void Init();
public:
 CRandomGenerator(): _needInit(true) {};
 void Generate(Byte *data, unsigned size);
};

extern CRandomGenerator g_RandomGenerator;

#endif
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With One Language Tagged (using lang) text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element matches the schema. It contains one text element that has a
language tag using the lang tag instead of xml:lang." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
```

```
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts" id="License ID"&gt;
  &lt;text lang="en"&gt;
   License with "en" language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
/* ATK - The Accessibility Toolkit for GTK+
* Copyright 2001 Sun Microsystems Inc.
*
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* modify it under the terms of the GNU Library General Public
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* Library General Public License for more details.
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* License along with this library; if not, write to the
* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/


#ifndef __ATK_TEXT_H__
#define __ATK_TEXT_H__

#include <glib-object.h>
#include <atk/atkobject.h>
#include <atk/atkutil.h>

#ifdef __cplusplus
extern "C" {
```

```
#endif /*
 __cplusplus */

/**
*AtkTextAttribute
*@ATK_TEXT_ATTR_INVALID: Invalid attribute
*@ATK_TEXT_ATTR_LEFT_MARGIN: The pixel width of the left margin
*@ATK_TEXT_ATTR_RIGHT_MARGIN: The pixel width of the right margin
*@ATK_TEXT_ATTR_INDENT: The number of pixels that the text is indented
*@ATK_TEXT_ATTR_INVISIBLE: Either "true" or "false" indicating whether text is visible or not
*@ATK_TEXT_ATTR_EDITABLE: Either "true" or "false" indicating whether text is editable or not
*@ATK_TEXT_ATTR_PIXELS_ABOVE_LINES: Pixels of blank space to leave above each newline-terminated
line.
*@ATK_TEXT_ATTR_PIXELS_BELOW_LINES: Pixels of blank space to leave below each newline-terminated
line.
*@ATK_TEXT_ATTR_PIXELS_INSIDE_WRAP: Pixels of blank space to leave between wrapped lines inside the
same newline-terminated line (paragraph).
*@ATK_TEXT_ATTR_BG_FULL_HEIGHT: "true" or "false" whether to make the background color for each
character the height of the highest font used on the current line, or the
 height of the font used for the current character.
*@ATK_TEXT_ATTR_RISE: Number of pixels that the characters are risen above the baseline
*@ATK_TEXT_ATTR_UNDERLINE: "none", "single", "double" or "low"
*@ATK_TEXT_ATTR_STRIKETHROUGH: "true" or "false" whether the text is strikethrough
*@ATK_TEXT_ATTR_SIZE: The size of the characters.
*@ATK_TEXT_ATTR_SCALE: The scale of the characters. The value is a string representation of a double
*@ATK_TEXT_ATTR_WEIGHT: The weight of the characters.
*@ATK_TEXT_ATTR_LANGUAGE: The language used
*@ATK_TEXT_ATTR_FAMILY_NAME: The font family name
*@ATK_TEXT_ATTR_BG_COLOR: The background color. The value is an RGB value of the format
"%u,%u,%u"
*@ATK_TEXT_ATTR_FG_COLOR:The foreground color. The value is an RGB value of the format "%u,%u,%u"
*@ATK_TEXT_ATTR_BG_STIPPLE: "true" if a #GdkBitmap is set for stippling the background color.
*@ATK_TEXT_ATTR_FG_STIPPLE: "true" if a #GdkBitmap is set for stippling the foreground color.
*@ATK_TEXT_ATTR_WRAP_MODE:
 The wrap mode of the text, if any. Values are "none", "char" or "word"
*@ATK_TEXT_ATTR_DIRECTION: The direction of the text, if set. Values are "none", "ltr" or "rtl"
*@ATK_TEXT_ATTR_JUSTIFICATION: The justification of the text, if set. Values are "left", "right", "center" or
"fill"
*@ATK_TEXT_ATTR_STRETCH: The stretch of the text, if set. Values are "ultra_condensed",
"extra_condensed", "condensed", "semi_condensed", "normal", "semi_expanded", "expanded", "extra_expanded" or
"ultra_expanded"
*@ATK_TEXT_ATTR_VARIANT: The capitalization variant of the text, if set. Values are "normal" or
"small_caps"
*@ATK_TEXT_ATTR_STYLE: The slant style of the text, if set. Values are "normal", "oblique" or "italic"
*@ATK_TEXT_ATTR_LAST_DEFINED: not a valid text attribute, used for finding end of enumeration
*
* Describes the text attributes supported
**/
```

```
typedef enum
{
 ATK_TEXT_ATTR_INVALID = 0,
 ATK_TEXT_ATTR_LEFT_MARGIN,
 ATK_TEXT_ATTR_RIGHT_MARGIN,
 ATK_TEXT_ATTR_INDENT,
  ATK_TEXT_ATTR_INVISIBLE,
 ATK_TEXT_ATTR_EDITABLE,
 ATK_TEXT_ATTR_PIXELS_ABOVE_LINES,
 ATK_TEXT_ATTR_PIXELS_BELOW_LINES,
 ATK_TEXT_ATTR_PIXELS_INSIDE_WRAP,
 ATK_TEXT_ATTR_BG_FULL_HEIGHT,
 ATK_TEXT_ATTR_RISE,
 ATK_TEXT_ATTR_UNDERLINE,
 ATK_TEXT_ATTR_STRIKETHROUGH,
 ATK_TEXT_ATTR_SIZE,
 ATK_TEXT_ATTR_SCALE,
 ATK_TEXT_ATTR_WEIGHT,
 ATK_TEXT_ATTR_LANGUAGE,
 ATK_TEXT_ATTR_FAMILY_NAME,
 ATK_TEXT_ATTR_BG_COLOR,
 ATK_TEXT_ATTR_FG_COLOR,
 ATK_TEXT_ATTR_BG_STIPPLE,
 ATK_TEXT_ATTR_FG_STIPPLE,
 ATK_TEXT_ATTR_WRAP_MODE,
 ATK_TEXT_ATTR_DIRECTION,
 ATK_TEXT_ATTR_JUSTIFICATION,
 ATK_TEXT_ATTR_STRETCH,
 ATK_TEXT_ATTR_VARIANT,
 ATK_TEXT_ATTR_STYLE,
 ATK_TEXT_ATTR_LAST_DEFINED
} AtkTextAttribute;

AtkTextAttribute        atk_text_attribute_register   (const gchar *name);


#define ATK_TYPE_TEXT                  (atk_text_get_type ())
#define ATK_IS_TEXT(obj)               G_TYPE_CHECK_INSTANCE_TYPE ((obj), ATK_TYPE_TEXT)
#define ATK_TEXT(obj)                  G_TYPE_CHECK_INSTANCE_CAST
 ((obj), ATK_TYPE_TEXT, AtkText)
#define ATK_TEXT_GET_IFACE(obj)        (G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_TEXT, AtkTextIface))

#ifndef _TYPEDEF_ATK_TEXT_
#define _TYPEDEF_ATK_TEXT_
typedef struct _AtkText AtkText;
#endif
typedef struct _AtkTextIface AtkTextIface;
```

```
/**
*AtkTextBoundary:
*@ATK_TEXT_BOUNDARY_CHAR: Boundary is the boundary between characters
* (including non-printing characters)
*@ATK_TEXT_BOUNDARY_WORD_START: Boundary is the start (i.e. first character) of a word.
*@ATK_TEXT_BOUNDARY_WORD_END: Boundary is the end (i.e. last character) of a word.
*@ATK_TEXT_BOUNDARY_SENTENCE_START: Boundary is the first character in a sentence.
*@ATK_TEXT_BOUNDARY_SENTENCE_END: Boundary is the last (terminal) character in a sentence;
* in languages which use "sentence stop" punctuation such as English, the boundary is thus the
* '.', '?', or similar terminal punctuation character.
*@ATK_TEXT_BOUNDARY_LINE_START: Boundary is the initial character
 of the content or a
* character immediately following a newline, linefeed, or return character.
*@ATK_TEXT_BOUNDARY_LINE_END: Boundary is the linefeed, or return character.
*
*Text boundary types used for specifying boundaries for regions of text
**/
typedef enum {
 ATK_TEXT_BOUNDARY_CHAR,
 ATK_TEXT_BOUNDARY_WORD_START,
 ATK_TEXT_BOUNDARY_WORD_END,
 ATK_TEXT_BOUNDARY_SENTENCE_START,
 ATK_TEXT_BOUNDARY_SENTENCE_END,
 ATK_TEXT_BOUNDARY_LINE_START,
 ATK_TEXT_BOUNDARY_LINE_END
} AtkTextBoundary;

/**
*AtkTextGranularity:
*@ATK_TEXT_GRANULARITY_CHAR: Granularity is defined by the boundaries between characters
* (including non-printing characters)
*@ATK_TEXT_GRANULARITY_WORD: Granularity is defined by the boundaries of a word,
* starting at the beginning of the current word and finishing at the beginning of
* the following one, if present.
*@ATK_TEXT_GRANULARITY_SENTENCE: Granularity is defined by the boundaries of a sentence,
* starting at the beginning of the current
 sentence and finishing at the beginning of
* the following one, if present.
*@ATK_TEXT_GRANULARITY_LINE: Granularity is defined by the boundaries of a line,
* starting at the beginning of the current line and finishing at the beginning of
* the following one, if present.
*@ATK_TEXT_GRANULARITY_PARAGRAPH: Granularity is defined by the boundaries of a paragraph,
* starting at the beginning of the current paragraph and finishing at the beginning of
* the following one, if present.
*
* Text granularity types used for specifying the granularity of the region of
* text we are interested in.
```

```
**/
typedef enum {
 ATK_TEXT_GRANULARITY_CHAR,
 ATK_TEXT_GRANULARITY_WORD,
 ATK_TEXT_GRANULARITY_SENTENCE,
 ATK_TEXT_GRANULARITY_LINE,
 ATK_TEXT_GRANULARITY_PARAGRAPH
} AtkTextGranularity;

/**
* AtkTextRectangle:
* @x: The horizontal coordinate of a rectangle
* @y: The vertical coordinate of a rectangle
* @width: The width of a rectangle
* @height: The height of a rectangle
*
* A
 structure used to store a rectangle used by AtkText.
**/

typedef struct _AtkTextRectangle AtkTextRectangle;

struct _AtkTextRectangle {
 gint x;
 gint y;
 gint width;
 gint height;
};

/**
* AtkTextRange:
* @bounds: A rectangle giving the bounds of the text range
* @start_offset: The start offset of a AtkTextRange
* @end_offset: The end offset of a AtkTextRange
* @content: The text in the text range
*
* A structure used to describe a text range.
**/
typedef struct _AtkTextRange AtkTextRange;

struct _AtkTextRange {
 AtkTextRectangle bounds;
 gint start_offset;
 gint end_offset;
 gchar* content;
};

/**
```

```
*AtkTextClipType
*@ATK_TEXT_CLIP_NONE: No clipping to be done
*@ATK_TEXT_CLIP_MIN: Text clipped by min coordinate is omitted
*@ATK_TEXT_CLIP_MAX: Text clipped by max coordinate is omitted
*@ATK_TEXT_CLIP_BOTH: Only text fully within mix/max bound is retained
*
*Describes the type of clipping required.
**/
typedef enum {
  ATK_TEXT_CLIP_NONE,
  ATK_TEXT_CLIP_MIN,
   ATK_TEXT_CLIP_MAX,
  ATK_TEXT_CLIP_BOTH
} AtkTextClipType;

struct _AtkTextIface
{
 GTypeInterface parent;

 gchar*        (* get_text)                    (AtkText         *text,
                                        gint            start_offset,
                                        gint            end_offset);
 gchar*        (* get_text_after_offset)       (AtkText         *text,
                                        gint            offset,
                                        AtkTextBoundary  boundary_type,
        gint            *start_offset,
        gint            *end_offset);
 gchar*        (* get_text_at_offset)          (AtkText         *text,
                                        gint            offset,
                                        AtkTextBoundary  boundary_type,
        gint            *start_offset,
        gint            *end_offset);
 gunichar
     (* get_character_at_offset)     (AtkText         *text,
                                        gint            offset);
 gchar*        (* get_text_before_offset)      (AtkText         *text,
                                        gint            offset,
                                        AtkTextBoundary  boundary_type,
        gint            *start_offset,
        gint            *end_offset);
 gint          (* get_caret_offset)            (AtkText         *text);
 AtkAttributeSet* (* get_run_attributes)        (AtkText     *text,
        gint        offset,
        gint            *start_offset,
        gint       *end_offset);
 AtkAttributeSet* (* get_default_attributes)     (AtkText     *text);
 void          (* get_character_extents)       (AtkText         *text,
                                        gint            offset,
```

```
                                        gint            *x,
                                        gint            *y,
                                        gint            *width,
                                        gint            *height,
                                        AtkCoordType    coords);
gint        (* get_character_count)     (AtkText        *text);
gint        (* get_offset_at_point)     (AtkText        *text,
                                        gint            x,
                                        gint            y,
                                        AtkCoordType    coords);
gint   (* get_n_selections)   (AtkText        *text);
gchar*      (* get_selection)       (AtkText        *text,
        gint    selection_num,
        gint    *start_offset,
        gint    *end_offset);
gboolean    (* add_selection)   (AtkText        *text,
        gint    start_offset,

  gint    end_offset);
gboolean    (* remove_selection)   (AtkText        *text,
        gint        selection_num);
gboolean    (* set_selection)   (AtkText        *text,
        gint    selection_num,
        gint    start_offset,
        gint    end_offset);
gboolean    (* set_caret_offset)        (AtkText        *text,
                                        gint            offset);

/*
 * signal handlers
 */
void   (* text_changed)             (AtkText        *text,
                                        gint            position,
                                        gint            length);
void        (* text_caret_moved)        (AtkText        *text,
                                        gint            location);
void        (* text_selection_changed)      (AtkText        *text);

void        (* text_attributes_changed)     (AtkText
     *text);


void        (* get_range_extents)       (AtkText        *text,
                                        gint            start_offset,
                                        gint            end_offset,
                                        AtkCoordType    coord_type,
                                        AtkTextRectangle *rect);
```

```
AtkTextRange** (* get_bounded_ranges)        (AtkText        *text,
                                    AtkTextRectangle *rect,
                                    AtkCoordType     coord_type,
                                    AtkTextClipType  x_clip_type,
                                    AtkTextClipType  y_clip_type);

gchar*        (* get_string_at_offset)        (AtkText          *text,
                                    gint             offset,

        AtkTextGranularity granularity,
                                    gint             *start_offset,
                                    gint             *end_offset);
/*
 * Scrolls this text range so it becomes visible on the screen.
 *
 * scroll_substring_to lets the implementation compute an appropriate target
 * position on the screen, with type used as a positioning hint.
 *
 * scroll_substring_to_point lets the client specify a precise target position
 * on the screen.
 *
 * Since ATK 2.32
 */
gboolean      (* scroll_substring_to)        (AtkText        *text,
                                    gint            start_offset,
                                    gint            end_offset,
                                    AtkScrollType    type);
gboolean      (* scroll_substring_to_point)    (AtkText        *text,

       gint            start_offset,
                                    gint            end_offset,
                                    AtkCoordType     coords,
                                    gint            x,
                                    gint            y);
};

GType           atk_text_get_type (void);


/*
* Additional AtkObject properties used by AtkText:
*    "accessible_text" (accessible text has changed)
*    "accessible_caret" (accessible text cursor position changed:
*                        editable text only)
*/

gchar*       atk_text_get_text                        (AtkText        *text,
                                        gint            start_offset,
```

```
                                        gint            end_offset);
gunichar      atk_text_get_character_at_offset          (AtkText         *text,

                gint            offset);
gchar*        atk_text_get_text_after_offset            (AtkText         *text,
                                        gint            offset,
                                        AtkTextBoundary  boundary_type,
        gint            *start_offset,
        gint            *end_offset);
gchar*        atk_text_get_text_at_offset               (AtkText         *text,
                                        gint            offset,
                                        AtkTextBoundary  boundary_type,
        gint            *start_offset,
        gint            *end_offset);
gchar*        atk_text_get_text_before_offset           (AtkText         *text,
                                        gint            offset,
                                        AtkTextBoundary  boundary_type,
        gint
          *start_offset,
        gint            *end_offset);
gchar*        atk_text_get_string_at_offset             (AtkText         *text,
                                        gint            offset,
                                        AtkTextGranularity granularity,
                                        gint            *start_offset,
                                        gint            *end_offset);
gint          atk_text_get_caret_offset                 (AtkText         *text);
void          atk_text_get_character_extents            (AtkText         *text,
                                        gint            offset,
                                        gint            *x,
                                        gint            *y,
                                        gint
  *width,
                                        gint            *height,
                                        AtkCoordType    coords);
AtkAttributeSet* atk_text_get_run_attributes            (AtkText    *text,
              gint       offset,
              gint            *start_offset,
              gint       *end_offset);
AtkAttributeSet* atk_text_get_default_attributes        (AtkText    *text);
gint          atk_text_get_character_count              (AtkText         *text);
gint          atk_text_get_offset_at_point              (AtkText         *text,
                                        gint            x,
                                        gint            y,
                                        AtkCoordType    coords);
gint          atk_text_get_n_selections    (AtkText         *text);
gchar*        atk_text_get_selection    (AtkText
    *text,
        gint      selection_num,
```

```
        gint            *start_offset,
        gint            *end_offset);
gboolean     atk_text_add_selection                  (AtkText         *text,
        gint            start_offset,
        gint            end_offset);
gboolean     atk_text_remove_selection               (AtkText         *text,
        gint     selection_num);
gboolean     atk_text_set_selection                  (AtkText         *text,
        gint     selection_num,
        gint            start_offset,
        gint            end_offset);
gboolean     atk_text_set_caret_offset               (AtkText         *text,
                                        gint            offset);
void         atk_text_get_range_extents              (AtkText         *text,

                                        gint            start_offset,

           gint            end_offset,
                                        AtkCoordType     coord_type,
                                        AtkTextRectangle *rect);
AtkTextRange**  atk_text_get_bounded_ranges          (AtkText         *text,
                                        AtkTextRectangle *rect,
                                        AtkCoordType     coord_type,
                                        AtkTextClipType  x_clip_type,
                                        AtkTextClipType  y_clip_type);
void         atk_text_free_ranges                    (AtkTextRange     **ranges);
void        atk_attribute_set_free                   (AtkAttributeSet  *attrib_set);
G_CONST_RETURN gchar*  atk_text_attribute_get_name       (AtkTextAttribute attr);
AtkTextAttribute       atk_text_attribute_for_name       (const gchar      *name);
G_CONST_RETURN
 gchar*  atk_text_attribute_get_value       (AtkTextAttribute attr,
                                        gint            index_);

gboolean     atk_text_scroll_substring_to            (AtkText         *text,
                                        gint            start_offset,
                                        gint            end_offset,
                                        AtkScrollType    type);

gboolean     atk_text_scroll_substring_to_point      (AtkText         *text,
                                        gint            start_offset,
                                        gint            end_offset,
                                        AtkCoordType     coords,
                                        gint            x,
                                        gint
  y);

#ifdef __cplusplus
}
```

```
#endif /* __cplusplus */


#endif /* __ATK_TEXT_H__ */
/* 7zFile.h -- File IO
2017-04-03 : Igor Pavlov : Public domain */

#ifndef __7Z_FILE_H
#define __7Z_FILE_H

#ifdef _WIN32
#define USE_WINDOWS_FILE
#endif

#ifdef USE_WINDOWS_FILE
#include <windows.h>
#else
#include <stdio.h>
#endif

#include "7zTypes.h"

EXTERN_C_BEGIN

/* ---------- File ---------- */

typedef struct
{
 #ifdef USE_WINDOWS_FILE
 HANDLE handle;
 #else
 FILE *file;
 #endif
} CSzFile;

void File_Construct(CSzFile *p);
#if !defined(UNDER_CE) || !defined(USE_WINDOWS_FILE)
WRes InFile_Open(CSzFile *p, const char *name);
WRes OutFile_Open(CSzFile *p, const char *name);
#endif
#ifdef USE_WINDOWS_FILE
WRes InFile_OpenW(CSzFile *p, const WCHAR *name);
WRes OutFile_OpenW(CSzFile *p, const WCHAR *name);
#endif
WRes File_Close(CSzFile *p);

/* reads max(*size, remain file's size) bytes */
WRes File_Read(CSzFile *p, void *data, size_t *size);
```

```
/* writes *size bytes */
WRes File_Write(CSzFile *p, const void *data, size_t *size);

WRes File_Seek(CSzFile *p, Int64 *pos, ESzSeek origin);
WRes
 File_GetLength(CSzFile *p, UInt64 *length);


/* ---------- FileInStream ---------- */

typedef struct
{
 ISeqInStream vt;
 CSzFile file;
} CFileSeqInStream;

void FileSeqInStream_CreateVTable(CFileSeqInStream *p);


typedef struct
{
 ISeekInStream vt;
 CSzFile file;
} CFileInStream;

void FileInStream_CreateVTable(CFileInStream *p);


typedef struct
{
 ISeqOutStream vt;
 CSzFile file;
} CFileOutStream;

void FileOutStream_CreateVTable(CFileOutStream *p);

EXTERN_C_END

#endif
// PpmdDecoder.h
// 2009-03-11 : Igor Pavlov : Public domain

#ifndef __COMPRESS_PPMD_DECODER_H
#define __COMPRESS_PPMD_DECODER_H

#include "../../../C/Ppmd7.h"
```

```
#include "../../Common/MyCom.h"

#include "../Common/CWrappers.h"

#include "../ICoder.h"

namespace NCompress {
namespace NPpmd {

class CDecoder :
 public ICompressCoder,
 public ICompressSetDecoderProperties2,
 public ICompressGetInStreamProcessedSize,
 #ifndef NO_READ_FROM_CODER
 public ICompressSetInStream,
 public ICompressSetOutStreamSize,
 public ISequentialInStream,
 #endif
 public CMyUnknownImp
{
 Byte *_outBuf;
 CPpmd7z_RangeDec _rangeDec;
 CByteInBufWrap _inStream;
 CPpmd7 _ppmd;

 Byte _order;
 bool _outSizeDefined;
 int _status;
 UInt64 _outSize;
 UInt64 _processedSize;

 HRESULT CodeSpec(Byte *memStream, UInt32 size);

public:

 #ifndef NO_READ_FROM_CODER
 CMyComPtr<ISequentialInStream> InSeqStream;
 #endif

 MY_QUERYINTERFACE_BEGIN2(ICompressCoder)
 MY_QUERYINTERFACE_ENTRY(ICompressSetDecoderProperties2)
  // MY_QUERYINTERFACE_ENTRY(ICompressSetFinishMode)
 MY_QUERYINTERFACE_ENTRY(ICompressGetInStreamProcessedSize)
 #ifndef NO_READ_FROM_CODER
 MY_QUERYINTERFACE_ENTRY(ICompressSetInStream)
 MY_QUERYINTERFACE_ENTRY(ICompressSetOutStreamSize)
 MY_QUERYINTERFACE_ENTRY(ISequentialInStream)
 #endif
```

```
 MY_QUERYINTERFACE_END
 MY_ADDREF_RELEASE


 STDMETHOD(Code)(ISequentialInStream *inStream, ISequentialOutStream *outStream,
    const UInt64 *inSize, const UInt64 *outSize, ICompressProgressInfo *progress);
 STDMETHOD(SetDecoderProperties2)(const Byte *data, UInt32 size);
 STDMETHOD(GetInStreamProcessedSize)(UInt64 *value);

 STDMETHOD(SetOutStreamSize)(const UInt64 *outSize);

 #ifndef NO_READ_FROM_CODER
 STDMETHOD(SetInStream)(ISequentialInStream *inStream);
 STDMETHOD(ReleaseInStream)();
 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 #endif

 CDecoder(): _outBuf(NULL), _outSizeDefined(false)
 {
   Ppmd7z_RangeDec_CreateVTable(&_rangeDec);
    _rangeDec.Stream = &_inStream.vt;
   Ppmd7_Construct(&_ppmd);
 }

 ~CDecoder();
};

}}

#endif
/* Compiler.h
2017-04-03 : Igor Pavlov : Public domain */

#ifndef __7Z_COMPILER_H
#define __7Z_COMPILER_H

#ifdef _MSC_VER

 #ifdef UNDER_CE
   #define RPC_NO_WINDOWS_H
   /* #pragma warning(disable : 4115) // '_RPC_ASYNC_STATE' : named type definition in parentheses */
   #pragma warning(disable : 4201) // nonstandard extension used : nameless struct/union
   #pragma warning(disable : 4214) // nonstandard extension used : bit field types other than int
 #endif

 #if _MSC_VER >= 1300
   #pragma warning(disable : 4996) // This function or variable may be unsafe
 #else
```

```
  #pragma warning(disable : 4511) // copy constructor could not be generated
  #pragma warning(disable : 4512) // assignment operator could not be generated
  #pragma warning(disable : 4514) // unreferenced inline function has been removed
  #pragma warning(disable : 4702) // unreachable code
  #pragma warning(disable : 4710) // not inlined
  #pragma warning(disable : 4714) // function marked as __forceinline
 not inlined
  #pragma warning(disable : 4786) // identifier was truncated to '255' characters in the debug information
 #endif

#endif

#define UNUSED_VAR(x) (void)x;
/* #define UNUSED_VAR(x) x=x; */

#endif
// UpdateCallbackConsole.h

#ifndef __UPDATE_CALLBACK_CONSOLE_H
#define __UPDATE_CALLBACK_CONSOLE_H

#include "../../../Common/StdOutStream.h"

#include "../Common/Update.h"

#include "PercentPrinter.h"

struct CErrorPathCodes
{
 FStringVector Paths;
 CRecordVector<DWORD> Codes;

 void AddError(const FString &path, DWORD systemError)
 {
  Paths.Add(path);
  Codes.Add(systemError);
 }
 void Clear()
 {
  Paths.Clear();
  Codes.Clear();
 }
};

class CCallbackConsoleBase
{
protected:
 CPercentPrinter _percent;
```

```
  CStdOutStream *_so;
  CStdOutStream *_se;

  void CommonError(const FString &path, DWORD systemError, bool isWarning);

  HRESULT ScanError_Base(const FString &path, DWORD systemError);
  HRESULT OpenFileError_Base(const FString &name, DWORD systemError);
  HRESULT ReadingFileError_Base(const FString &name, DWORD systemError);

 public:
  bool NeedPercents() const { return _percent._so != NULL; };

  bool StdOutMode;

  bool NeedFlush;
  unsigned PercentsNameLevel;
   unsigned LogLevel;

  AString _tempA;
  UString _tempU;

  CCallbackConsoleBase():
      StdOutMode(false),
      NeedFlush(false),
      PercentsNameLevel(1),
      LogLevel(0)
      {}

  void SetWindowWidth(unsigned width) { _percent.MaxLen = width - 1; }

  void Init(CStdOutStream *outStream, CStdOutStream *errorStream, CStdOutStream *percentStream)
  {
    FailedFiles.Clear();

    _so = outStream;
    _se = errorStream;
    _percent._so = percentStream;
  }

  void ClosePercents2()
  {
    if (NeedPercents())
      _percent.ClosePrint(true);
  }

  void ClosePercents_for_so()
  {
```

```
  if (NeedPercents() && _so == _percent._so)
    _percent.ClosePrint(false);
 }


 CErrorPathCodes FailedFiles;
 CErrorPathCodes ScanErrors;

 HRESULT PrintProgress(const wchar_t *name, const char *command, bool showInLog);

};

class CUpdateCallbackConsole: public IUpdateCallbackUI2, public CCallbackConsoleBase
{
 // void PrintPropPair(const char *name, const wchar_t *val);

public:
 #ifndef
 _NO_CRYPTO
 bool PasswordIsDefined;
 UString Password;
 bool AskPassword;
 #endif

 bool DeleteMessageWasShown;

 CUpdateCallbackConsole()
    : DeleteMessageWasShown(false)
    #ifndef _NO_CRYPTO
    , PasswordIsDefined(false)
    , AskPassword(false)
    #endif
    {}

 /*
 void Init(CStdOutStream *outStream)
 {
  CCallbackConsoleBase::Init(outStream);
 }
 */
 // ~CUpdateCallbackConsole() { if (NeedPercents()) _percent.ClosePrint(); }
 INTERFACE_IUpdateCallbackUI2(;)
};

#endif
// UpdateCallback.h

#ifndef __UPDATE_CALLBACK_H
```

```
#define __UPDATE_CALLBACK_H

#include "../../../Common/MyCom.h"

#include "../../Common/FileStreams.h"

#include "../../IPassword.h"
#include "../../ICoder.h"

#include "../Common/UpdatePair.h"
#include "../Common/UpdateProduce.h"

#include "OpenArchive.h"

struct CArcToDoStat
{
 CDirItemsStat2 NewData;
 CDirItemsStat2 OldData;
 CDirItemsStat2 DeleteData;

 UInt64 Get_NumDataItems_Total() const
 {
   return NewData.Get_NumDataItems2() + OldData.Get_NumDataItems2();
 }
};

#define INTERFACE_IUpdateCallbackUI(x) \
 virtual HRESULT WriteSfx(const wchar_t *name, UInt64 size) x; \
 virtual HRESULT SetTotal(UInt64 size) x; \
 virtual HRESULT SetCompleted(const UInt64 *completeValue) x; \
 virtual HRESULT SetRatioInfo(const UInt64 *inSize, const UInt64 *outSize) x; \
 virtual HRESULT CheckBreak() x; \
 /* virtual HRESULT Finalize() x; */ \
 virtual HRESULT SetNumItems(const CArcToDoStat &stat) x; \
 virtual HRESULT GetStream(const
 wchar_t *name, bool isDir, bool isAnti, UInt32 mode) x; \
 virtual HRESULT OpenFileError(const FString &path, DWORD systemError) x; \
 virtual HRESULT ReadingFileError(const FString &path, DWORD systemError) x; \
 virtual HRESULT SetOperationResult(Int32 opRes) x; \
 virtual HRESULT ReportExtractResult(Int32 opRes, Int32 isEncrypted, const wchar_t *name) x; \
 virtual HRESULT ReportUpdateOpeartion(UInt32 op, const wchar_t *name, bool isDir) x; \
 /* virtual HRESULT SetPassword(const UString &password) x; */ \
 virtual HRESULT CryptoGetTextPassword2(Int32 *passwordIsDefined, BSTR *password) x; \
 virtual HRESULT CryptoGetTextPassword(BSTR *password) x; \
 virtual HRESULT ShowDeleteFile(const wchar_t *name, bool isDir) x; \
 /* virtual HRESULT CloseProgress() { return S_OK; } */

struct IUpdateCallbackUI
```

```
{
 INTERFACE_IUpdateCallbackUI(=0)
};

struct CKeyKeyValPair
{
 UInt64 Key1;
 UInt64 Key2;
 unsigned Value;

 int Compare(const CKeyKeyValPair &a) const
 {
   if (Key1
 < a.Key1) return -1;
   if (Key1 > a.Key1) return 1;
   return MyCompare(Key2, a.Key2);
 }
};


class CArchiveUpdateCallback:
 public IArchiveUpdateCallback2,
 public IArchiveUpdateCallbackFile,
 public IArchiveExtractCallbackMessage,
 public IArchiveGetRawProps,
 public IArchiveGetRootProps,
 public ICryptoGetTextPassword2,
 public ICryptoGetTextPassword,
 public ICompressProgressInfo,
 public IInFileStream_Callback,
 public CMyUnknownImp
{
 #if defined(_WIN32) && !defined(UNDER_CE)
 bool _saclEnabled;
 #endif
 CRecordVector<CKeyKeyValPair> _map;

 UInt32 _hardIndex_From;
 UInt32 _hardIndex_To;

public:
 MY_QUERYINTERFACE_BEGIN2(IArchiveUpdateCallback2)
   MY_QUERYINTERFACE_ENTRY(IArchiveUpdateCallbackFile)
   MY_QUERYINTERFACE_ENTRY(IArchiveExtractCallbackMessage)
   MY_QUERYINTERFACE_ENTRY(IArchiveGetRawProps)
   MY_QUERYINTERFACE_ENTRY(IArchiveGetRootProps)
   MY_QUERYINTERFACE_ENTRY(ICryptoGetTextPassword2)
   MY_QUERYINTERFACE_ENTRY(ICryptoGetTextPassword)
```

```
  MY_QUERYINTERFACE_ENTRY(ICompressProgressInfo)
MY_QUERYINTERFACE_END
MY_ADDREF_RELEASE


STDMETHOD(SetRatioInfo)(const UInt64 *inSize, const UInt64 *outSize);

INTERFACE_IArchiveUpdateCallback2(;)
INTERFACE_IArchiveUpdateCallbackFile(;)
INTERFACE_IArchiveExtractCallbackMessage(;)
INTERFACE_IArchiveGetRawProps(;)
INTERFACE_IArchiveGetRootProps(;)

STDMETHOD(CryptoGetTextPassword2)(Int32 *passwordIsDefined, BSTR *password);
STDMETHOD(CryptoGetTextPassword)(BSTR *password);

CRecordVector<UInt32> _openFiles_Indexes;
FStringVector _openFiles_Paths;

bool AreAllFilesClosed() const { return _openFiles_Indexes.IsEmpty(); }
virtual HRESULT InFileStream_On_Error(UINT_PTR val, DWORD error);
virtual void InFileStream_On_Destroy(UINT_PTR val);

CRecordVector<UInt64> VolumesSizes;
FString VolName;
FString VolExt;

IUpdateCallbackUI *Callback;

const CDirItems *DirItems;
const CDirItem *ParentDirItem;

const CArc *Arc;
CMyComPtr<IInArchive> Archive;
 const CObjectVector<CArcItem> *ArcItems;
const CRecordVector<CUpdatePair2> *UpdatePairs;
const UStringVector *NewNames;
int CommentIndex;
const UString *Comment;

bool ShareForWrite;
bool StopAfterOpenError;
bool StdInMode;

bool KeepOriginalItemNames;
bool StoreNtSecurity;
bool StoreHardLinks;
bool StoreSymLinks;
```

```
 Byte *ProcessedItemsStatuses;


 CArchiveUpdateCallback();

 bool IsDir(const CUpdatePair2 &up) const
 {
   if (up.DirIndex >= 0)
     return DirItems->Items[up.DirIndex].IsDir();
   else if (up.ArcIndex >= 0)
     return (*ArcItems)[up.ArcIndex].IsDir;
   return false;
 }
};

#endif
```

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http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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Danish hyphenation patterns

(more info about the licence to be added later)

% This file is part of hyph-utf8 package and resulted
 from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% Source: dkcommon.tex (yyyy-mm-dd), dkspecial.tex (yyyy-mm-dd)
% Author: Frank Jensen <frank.jensen at hugin.com>
%

```
% The above mentioned file should become obsolete,
% and the author of the original file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%               and helped with testing, suggestions and bug reports
% - Norbert
 Preining, who tested & integrated patterns into TeX Live
%
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%    If you're the original author of patterns or taking over a new revolution,
%    plese remove all of the TUG comments & credits that we added here -
%    you are the Queen / the King, we are only the servants.
%
% If you want to change this file, rather than uploading directly to CTAN,
% we would be grateful if you could send it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
% Before a new "pattern-revolution" starts,
% please try to follow some guidelines if possible:
%
% - \lccode is *forbidden*, and I really mean it
% - all the patterns
 should be in UTF-8
% - the only "allowed" TeX commands in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
```

```
% at least a chance to read your patterns.
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
%-----------------------------------------------------------------------------
%
% This file contains the hyphenation patterns for Danish.
%
%% Copyright 1994 Frank Jensen (Frank.Jensen@hugin.com)
%
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% and version 1.3 or later is part of all distributions of LaTeX
% version 2003/12/01 or later.
%
% Changes:
% - 2011-01-11 - remove support for OT1 encoding
%
// Windows/NtCheck.h

#ifndef __WINDOWS_NT_CHECK_H
#define __WINDOWS_NT_CHECK_H

#ifdef _WIN32

#include "../Common/MyWindows.h"

#if !defined(_WIN64) && !defined(UNDER_CE)
static inline bool IsItWindowsNT()
{
 OSVERSIONINFO vi;
 vi.dwOSVersionInfoSize = sizeof(vi);
 return (::GetVersionEx(&vi) && vi.dwPlatformId == VER_PLATFORM_WIN32_NT);
}
#endif

#ifndef _UNICODE
 #if defined(_WIN64) || defined(UNDER_CE)
   bool g_IsNT = true;
   #define SET_IS_NT
 #else
   bool g_IsNT = false;
```

```
  #define SET_IS_NT g_IsNT = IsItWindowsNT();
 #endif
 #define NT_CHECK_ACTION
 // #define NT_CHECK_ACTION { NT_CHECK_FAIL_ACTION }
#else
 #if !defined(_WIN64) && !defined(UNDER_CE)
  #define NT_CHECK_ACTION if (!IsItWindowsNT()) { NT_CHECK_FAIL_ACTION }
 #else
  #define NT_CHECK_ACTION
 #endif
 #define SET_IS_NT
#endif

#define NT_CHECK  NT_CHECK_ACTION SET_IS_NT

#else

#define NT_CHECK

#endif

#endif
```

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```
// Unicode support added by Jim Park -- 07/27/2007
// Unicode support requires that all plugins take TCHARs instead as well. This
// means existing plugins will not work for the Unicode version of NSIS unless
// recompiled.  You have been warned.
```

```
#ifndef _EXDLL_H_
#define _EXDLL_H_

#include <windows.h>
#include "tchar.h"

#if defined(__GNUC__)
#define UNUSED __attribute__((unused))
#else
#define UNUSED
#endif

// only include this file from one place in your DLL.
// (it is all static, if you use it in two places it will fail)

#define EXDLL_INIT()          {  \
      g_stringsize=string_size; \
      g_stacktop=stacktop;      \
      g_variables=variables; }

// For page showing plug-ins
#define WM_NOTIFY_OUTER_NEXT (WM_USER+0x8)
#define WM_NOTIFY_CUSTOM_READY (WM_USER+0xd)

/* Jim Park: This char is compared as an int value and therefore
  it's fine as an ASCII.  Do not need to change to wchar_t since
  it will get the same integer value. */
#define NOTIFY_BYE_BYE _T('x')

typedef
 struct _stack_t {
 struct _stack_t *next;
 TCHAR text[1]; // this should be the length of string_size
} stack_t;


static unsigned int g_stringsize;
static stack_t **g_stacktop;
static TCHAR *g_variables;

static int __stdcall popstring(TCHAR *str) UNUSED; // 0 on success, 1 on empty stack
static void __stdcall pushstring(const TCHAR *str) UNUSED;
static TCHAR * __stdcall getuservariable(const int varnum) UNUSED;
static void __stdcall setuservariable(const int varnum, const TCHAR *var) UNUSED;

enum
{
```

```
INST_0,        // $0
INST_1,        // $1
INST_2,        // $2
INST_3,        // $3
INST_4,        // $4
INST_5,        // $5
INST_6,        // $6
INST_7,        // $7
INST_8,        // $8
INST_9,        // $9
INST_R0,       // $R0
INST_R1,       // $R1
INST_R2,       // $R2
INST_R3,       // $R3
INST_R4,       // $R4
INST_R5,       // $R5
INST_R6,       // $R6
INST_R7,       // $R7
INST_R8,       // $R8
INST_R9,       // $R9
INST_CMDLINE,   // $CMDLINE
INST_INSTDIR,
   // $INSTDIR
INST_OUTDIR,    // $OUTDIR
INST_EXEDIR,    // $EXEDIR
INST_LANG,      // $LANGUAGE
__INST_LAST
};

typedef struct {
 int autoclose;
 int all_user_var;
 int exec_error;
 int abort;
 int exec_reboot;
 int reboot_called;
 int XXX_cur_insttype; // deprecated
 int XXX_insttype_changed; // deprecated
 int silent;
 int instdir_error;
 int rtl;
 int errlvl;
 int alter_reg_view;
 int status_update;
} exec_flags_type;

typedef struct {
 exec_flags_type *exec_flags;
```

```
 int (__stdcall *ExecuteCodeSegment)(int, HWND);
 void (__stdcall *validate_filename)(TCHAR *);
} extra_parameters;

// utility functions (not required but often useful)
static int __stdcall popstring(TCHAR *str)
{
 stack_t *th;
 if (!g_stacktop || !*g_stacktop) return 1;
 th=(*g_stacktop);
 lstrcpy(str,th->text);
 *g_stacktop = th->next;
 GlobalFree((HGLOBAL)th);
 return 0;
}

static void __stdcall pushstring(const TCHAR *str)
{
 stack_t *th;
 if (!g_stacktop) return;
 th=(stack_t*)GlobalAlloc(GPTR,(sizeof(stack_t)+(g_stringsize)*sizeof(TCHAR)));
  lstrcpyn(th->text,str,g_stringsize);
 th->next=*g_stacktop;
 *g_stacktop=th;
}

static TCHAR * __stdcall getuservariable(const int varnum)
{
 if (varnum < 0 || varnum >= __INST_LAST) return NULL;
 return g_variables+varnum*g_stringsize;
}

static void __stdcall setuservariable(const int varnum, const TCHAR *var)
{
 if (var != NULL && varnum >= 0 && varnum < __INST_LAST)
  lstrcpy(g_variables + varnum*g_stringsize, var);
}

#ifdef _UNICODE
#define PopStringW(x) popstring(x)
#define PushStringW(x) pushstring(x)
#define SetUserVariableW(x,y) setuservariable(x,y)

static int __stdcall PopStringA(char* ansiStr)
{
  wchar_t* wideStr = (wchar_t*) GlobalAlloc(GPTR, g_stringsize*sizeof(wchar_t));
  int rval = popstring(wideStr);
  WideCharToMultiByte(CP_ACP, 0, wideStr, -1, ansiStr, g_stringsize, NULL, NULL);
```

```
  GlobalFree((HGLOBAL)wideStr);
  return rval;
}

static void __stdcall PushStringA(const char* ansiStr)
{
  wchar_t*
 wideStr = (wchar_t*) GlobalAlloc(GPTR, g_stringsize*sizeof(wchar_t));
  MultiByteToWideChar(CP_ACP, 0, ansiStr, -1, wideStr, g_stringsize);
  pushstring(wideStr);
  GlobalFree((HGLOBAL)wideStr);
  return;
}

static void __stdcall GetUserVariableW(const int varnum, wchar_t* wideStr)
{
  lstrcpyW(wideStr, getuservariable(varnum));
}

static void __stdcall GetUserVariableA(const int varnum, char* ansiStr)
{
  wchar_t* wideStr = getuservariable(varnum);
  WideCharToMultiByte(CP_ACP, 0, wideStr, -1, ansiStr, g_stringsize, NULL, NULL);
}

static void __stdcall SetUserVariableA(const int varnum, const char* ansiStr)
{
  if (ansiStr != NULL && varnum >= 0 && varnum < __INST_LAST)
  {
    wchar_t* wideStr = g_variables + varnum * g_stringsize;
    MultiByteToWideChar(CP_ACP, 0, ansiStr, -1, wideStr, g_stringsize);
  }
}

#else
// ANSI defs

#define PopStringA(x) popstring(x)
#define PushStringA(x) pushstring(x)
#define SetUserVariableA(x,y) setuservariable(x,y)

static int __stdcall
 PopStringW(wchar_t* wideStr)
{
  char* ansiStr = (char*) GlobalAlloc(GPTR, g_stringsize);
  int rval = popstring(ansiStr);
  MultiByteToWideChar(CP_ACP, 0, ansiStr, -1, wideStr, g_stringsize);
  GlobalFree((HGLOBAL)ansiStr);
```

```
  return rval;
}

static void __stdcall PushStringW(wchar_t* wideStr)
{
  char* ansiStr = (char*) GlobalAlloc(GPTR, g_stringsize);
  WideCharToMultiByte(CP_ACP, 0, wideStr, -1, ansiStr, g_stringsize, NULL, NULL);
  pushstring(ansiStr);
  GlobalFree((HGLOBAL)ansiStr);
}

static void __stdcall GetUserVariableW(const int varnum, wchar_t* wideStr)
{
  char* ansiStr = getuservariable(varnum);
  MultiByteToWideChar(CP_ACP, 0, ansiStr, -1, wideStr, g_stringsize);
}

static void __stdcall GetUserVariableA(const int varnum, char* ansiStr)
{
  lstrcpyA(ansiStr, getuservariable(varnum));
}

static void __stdcall SetUserVariableW(const int varnum, const wchar_t* wideStr)
{
  if (wideStr != NULL && varnum >= 0 && varnum < __INST_LAST)
  {
    char* ansiStr
 = g_variables + varnum * g_stringsize;
    WideCharToMultiByte(CP_ACP, 0, wideStr, -1, ansiStr, g_stringsize, NULL, NULL);
  }
}
#endif

static BOOL __stdcall IsUnicode(void)
{
#ifdef _UNICODE
  return TRUE;
#else
  return FALSE;
#endif
}

#endif//_EXDLL_H_
MZ@ !L!This program cannot be run in DOS mode.

$j!OEOEOEDEOEEEOEDAEOEKEOENEOE-EEOERichOEPEL@Z.*@@<\x.text `.rdata~@@.dataX
@.reloc@BTSUV3Wh@l$l$HR$h;u@8_^]3[T}@_^][T
|@$lx@L$
```

VL$XL$tD$D$Tth@c_^][TL$lm3$JL$$3T$;$u$D$l$$$$>$;qL$TT$QR$$&;|$F~l$<l$(l$0d@:utP:Vuu3;\$<$3;D$
Ll$4l$P$3T$DT$8(L$<"l$;D$$u;t
9T$0<j$HD$H;v%T$3
63t$HU
D$t$V$HD$<$($`@:utP:Vuu3;u \$(\@:utP:Vuu3;X@:utP:Vuu3;u \$0]@D3$RT$($
$Dt,+llUV/$ tL$t$$T$x2
$L$xL$|$$f$$L$x{T@q$eT@[$DOP@EL$D$@D$$L@D$(@@u4@GD$D$$tL@CT$TD$RL$<PT$LQD$\RL$
DPT$`QRW$$PDD$D$(WD$D$f8t7f8/u$D$0tL$f|f\FD$f>uD$$tL$RT$L$,`L$8D$4L$@L$DT$@RL$0T$@D$8;
$ 33t(t$$t$dT$dDD$h$(t(t$,L$\TT$`L$\utD$,VjQP$@L$,G
uZ$t'(t"$t%T$PR(@$G;i*D$ @@@D$T$4L$T$ |$3T$3T$$^$L$T$ L$t
;u@_^]3[Tu@_^][Tu@_^][Tu@_^][T$DRP3t$D_^][Tl@ PQp@jQ@t3% @VL$L$j$u
L$x@L$^QSUV3Wf9utFf8u\vdfu
_^][Yt0L$T$QL$RSPVUjQD$3_@t;s_^]3[Y_^][YVW9~r_^x@ahx@_^$SUVt$4W|$<T$3jj
WV~0jj
WD VCuT$+~ LKMEu_]^][$SUT$Q
VD$D$!D$$D$&3W3VhRP\$0D$1\$2\$4\$6\$7\$9\$;Sjj<WVjj<WVD$,5jj<WVjj<WVD$(jjWVxjjWVD$$k93:A
Y+uiTqsmuR+0<Bag+uiu!3du
uD$!3;r
+E3\,
;sL$jkU-FF-WT$F T$:^T$^F_^][SVW33
0T4FuT$ +~U0000]T4NCu_^[V03
^0Q@vV@c\^u .tDD$@$.P.P %.P.Hu3Rh@Rd@YAVWFu_^L$t
~_^_3^VPF^h@@P@@VW3@@
3IuF@@r@@@@3@@Qr@@H@@@5D@2Iu5@@_^SVt$W|$v!t333OAwrIU333D$\$333Mu]v333AOu_^[QS
Vt$W|$v!t333OAwUT$Q3T$3D$3\$33T$33\$3%3%3T$33JT$t]v333AOu_^[Yj D$VjhQ%jjPR@^t3
@D$VjhQ%jjPR@^t3 @jVtP@u @^3^SUVW|$7tY@@wUL$jQPSRD$(@L$+t
tv @_^][_^]3[SUVW|$7tY@@wUL$jQPSRD$(@L$+t
tv @_^][_^]3[SVWV \$AD$D$t"HtHt_^W[ 3PD$PSQ@L$u
@uL$D$33F3_^[0"@AP"@D$PCD$P#SUVWF^(\$L+T$L$L$,K(D$V L$83:;$3;;$T$
3R$D$$D$(D$,$UQ$P$QNRPFVQN$L$LR\$
D$D$UD$HD$uD$uBFt;t#$$N;tD$D$_^][_^][pSUV3WT$\$$l$(l$,l$ l$
;l$;$$DmL<\8
L$$3|$9D$$D$4D$8<L4l$<l44sD3;|$@;8$u!$D|,=(3;r
;$$$+|$|$ t$$|Ll$+$Q$P5nCu$;|$;$UWb=u,$L$$PQVt$ R3S UW/!uE$L$$PQVt$ R3S UW$$=$L$$PQVt$ R3S
UWC=$XphxD$+3;r;j$$AuI$$$USj4$$WVS:T$(L$,|$
$;D$D$@D$PD$DD$TCD$HD$XCD$LD$\$D$`L$@D$d5L$@5QL$@q;q@rD$x\D$`L$d;LD$h@$$6u5{
'$?D$3WVB$?K =wdtS=t0=t=jj<djj9UL$jQjD$;9jj8*=t=uxjj:
jjY8\$$l$El$;q3_^][p$_^][p$_^][p$_^][p$_^][p$K|$KD$*@SU33VW\$D$4l$l$l$
l$,l$0l$$l$(=y3+@"
L$Tie$8KPL$X6fu_^][KL$TefL$<,uL$L$PL$<t9l$,tD$0;t|}$4K3;v*$0KT$<L$Tu9l$,u;|F;r\$;tD$0;t56D$L$
|$$t$(+$$K;u;$(Ku9l$Lt$8KL$T4e_^][K_^][KQVWNF;t
AN_^YFu\V~+NT$NFN FQN FD$PD$?FD$~Nt
G~_^YF_2^YlS$3RPL$\$$\$b;:$$UVL$(WL$D$(B$$;$$wrs$$$R$;$\$0L$D$$QT$jR$PL$(AT$$++$uZD$t9$;L$
0uut9u;\$0t*$Qu3#$D$0;ut$L$`_^][lW3|$4|$,t_$PL$;;$$SUL$<VL$
T$D;$$;|$D$wrs\$$D$PT$;L$|$HT$L$L$R$D$jPQL$0;T$L$++L$u@|$t!u;|$Ht*$Qu3X$D$H;ut$L$0_^][_D$D$S
UVWwD$L$ D$w
r=sD$D$T$PuOL$tQt$T$|$t$ +|$t$
Suwrw3_^][_^][wtt!t3t3SV;rxwsN84tg;u9^u\FuUFuN^3[ui8^Lu?9^u:Fu39^u.9^ u)F$u"vHwt5t0t(t

^[ttu^3[uNDtNPt~`u~du~u~u~u9^uFuN;u~
{N$p~(f9^,]9F0T~4J^3[yuIrt3VWVWVG_^V83F8F@F<FDFHFlFpFtFxFLFPFTFXF\F`FdFh^3AAAAAAAA
A$A(VWWDVWHVWlVWpVWtVWxVOL OTO\Od _^ VWWVOWVWVWVW VW$VW(V_^(SUVW3T$
l$|$D$4}}}};T$ ;yp;|$]8\$0n>MnGL$>:D$(&;339T$(vPL$(L$(r3L$(GMI>nL$(ur \$0L$CCC
tET$$D$$T$$C}|$$mL$|$3S|$Q tPT$(D$(J6D$(N;=|$4+C N+ND$L$ @;D$\$0l$|$Z;s
_^][(]+L$$Mv"3|$(l$L$$|$v"3|$0l$L$$|$D$T$j ?+EL$;L(D(} ?T$ ;spL<0D<0udD$@;D$rL$$l$|$3v\0t@;rE;u
_^][(u43v
L(t@;r;u
_^][(_EU^]3[(3vFD$\$$hT$4Nu>D$4L$;sL(uEG;D(rT$
l$_U^]3[(_^][(AVu
^D$uT$ABHA3^T$Eu8D$wL$r
^wr
^3^SUVWFu
_^][.PVMEL$.uD$%W_^]3[u
_^][J3V]E@u?3G_^][u
_^][J@VP3D$ G\$L$tZFHF@L$D$%0nOT$B@OT$r_^\$]3[T$L$\$D$%H#3mGG_^]3[_^\$][ASVq
I$3^[TD$S\$VWPSt
_^[SUVWL$3jT$0t$|$0|$4V;jj T$L#;L$DD$Jt_^][D$`L$,T$0t$X\$P|$Tl$\D$D$
t$<H0P4L$Pk;D$Lt_^][3;u;t_^][u_^]3[;8r;. ;r;L$T$4T$8jT$8QL$,D$0T$4D$8;w; ;w;L$0
;w;l$WSV!$\$<WL$(u_^][T$$S!L$$;D$L$(D$$L$
T$L$D$|$D$L$4JL$daD$T$dWRH4P0QRD$DjPT$4L$dtL$4Q0L$$FL$8D$4L$(L$
T$L$D$$D$Qu/|$u#D$u$WQL$UT$(L$$_^][_^][_^][3S@@@:u
@r[3[D$(SUVt$HWPL$D$QL$HPjjQT$D|$D$HT$|$FT$u_^][(3v|$<FC;rF3v4|$<3;u~;uzL$PQthFC;rF3vH|$<T$
D$RPu1L$PWQL$RT$PQRUu
FC;r3_^][(_^][(S\$
UVW|$03L$oooooo+T$k7;D$uJ9l$uD;D$4\$P;T$;D$\$u:9l$u4L$4T$(D$$QL$$RPQ0;ugT$;uXD$u-
9l$u'Wd;u;T$u;t_^][SD$D$u_^]3[_^][SUVWt$ TL$ Fu_^][333D$ v@L$Q|T$L$D$;rVw;rPD$
F;rD$T$H|nu_D$L$tO
u&u"D$u7_^][*uT$t_^][3_^][T$Vu.T$F3;L$rw;v
^+F3^SVWT$uE3D$L$;u;t%t*|u$T$mt_^[_^3[_^[SUVWNu
_^][Y^Au)};v
_^][9V+VN;v
_^][+_N3^][QS33VD$t)WuFL$|$KJu_^[YSUVWt$8l$D3;T$;L$$;v_^][MF;u_^][HF@T$'u
VD$T$NT$
I;D$ $;r_^][$T$DL$D$$;Eu_^][L$;Eu_^][T$;Eu_^][T$;E
u_^][T$D$3;D$4\$<\$,L$0D$T$4L$D+3QL$|$T$(;gl$(;g@^;|$
L$]T$IL$B,;2+L$T$D$HtIT$HL$T$TL$D$H@9|$TL$l$(T$ T$t9T$XL$<D$XL$;T$l$(+L$T$D$ @;D$ D$ ;u
9|$HL$];O@*v3|$\v3$3v{|$T$@L$D$@;L\D\T$@L$LD$@l$(;F;r|$+tG3vA\$T$LL$>D$L;ZL\D\JF;rl$(3vt@;rD
$ ;t$0L$Dl$<T$,\$ A,AA 0D$(;T$,
+;D$Fl$<;t$0l$D$t$8UD$,\$D$4U+D$<Uu3@E(u_^][t$4$t$8D$'t'D$t_^][VL$T$L$mD$,umE$\$,3vE$L$F;rT$LL
$D$LL$Ptp
u@u<T$EWPL$vud1E$u_^][L$su1T$LL$bt_^][D$8L$T$P3_^][S\$Ul$VWGSUuSU
_^][D$SUVWE^u_^][xE}@Eu\;v_^][L$L$u_^][uME+_ME^]3[L$D$(u_^][t+D+_^]3[SUVW\$uTL$
QC;ID$3vrtF\$;r`\$+\$-L$$L$ Au_^][@;r\$T$;_^S]3[_^][SUVqWL$3T$$l$$l$(l$t$l$;D$$T$(
;D$03l$HvqT$ t$ ;tT$D2D$u#L$Atut$D$E;rD$0t$P+3H'
u;tJ u;tAt;;T$$;_^][_^][l$0Mu$L$t$ItT$(+D$$t$t$ ]uu9u5UT$uxU+T$$E|u_T$(D$$tO
u"uUu6M+E<uT$$-uD$$T$(u3_^][SUVW}ut8tANGt(@ut/NG
t@r;w+Ju}u_^]3[_^][HUVWT$D$t$OuD$\S\$dL$SPD$dT$ QRT$ PAt$

Ou[t_^]HL$_^]AHSUV3WT$t$`t$dt$ht$lt$Xt$\t$Tt$P;
D$ug9t$uaT$<; D$<L$@t+; T$<;t_^][T$i;
D$9t$$$U4E0$WQ$RPjQ$n$$$.t_^][T$D$$ueL$u]$L$P}8VQ$WPQh@U0E4WWT$_D$L$u_^]3[c3;YT$|$|$$|$0
|$D|;;D$T$E@;!L$D$T$HT$LC|$H3;r;L$SL$C7$V@HC@L$u O|$
8T$<y$D$<;a$T<T$ D$ DD$EtNT$ u3,Ex3L$ $EtL$PQMxD$]D$ S+SFT$0RT$
DT$L$0D$$D$DT$$D$DPm}TUT$VW(GC7HC@u@T$(W$D$(;$T$4DD$8L$4T$VW_$$VM\RT$$PS
5$$VMdRT$$PS+CT$3A_^][L$T$$D$P+;:T$,T$D$t+T$t_^][E33|$(|$
|$,|$4|$|$|$<\$\$\$D$Elu_^][E@u.EpM@EDu5_^][U@Epu_^][U@uBEHU@MLV]D$ltUD$hK@\$lHL$D$ht*6U
@EHu_^][L$TD$<YD$3>T$\$$u*UHL$FD$ULL$D$T$EDL$L$LEPD$0tetMD$Dt&L$(L$(uT$D$(T$D$,MpID
$,uy;}Ul4L$XD$4tT$4L$XD$4D$,u8L$L$L$;L$w
9D$sG|$ Ep<D$0tD$,HD$,|$ tMl\$p}DD|$+|$H|$|$L|$H$|$L;w$;L$;D$w;|$4uMEtFt.MD$ UPD$T$
D$D$ @D$ D$u
D$<t&t!D$$MPL$D$$D$
L$D$ @D$ {T$xL$`L$xT$D$|T$T$;T$w
9L$D$u
D$<t&t!D$$MPL$D$$D$
L$T$D$F;T$tMHT$FMLT$EDL$T$TD$,uTEl4E;s/D$Xt?T$4L$Xpu3D$4u&MlG4E;rD$XD$_^][O@O@P@N
@P@P@P@P@SVWu
W_^3[t$Su_^[Gu_^[BQ;vVt$q+q3^SVt$3W|$u_^[r;\u3\u+t'f8t f8u+^Ot;u_^[+_^[D$
S\$UVWPWt$`Cu_^][HC@L$$uKL$=T$yD$L$,;r_^][L$(T,T$uNwO?3v|9tIT$;rUUVT$+T$0L$0Gu_^][FL$@;rD
$$u D$+C3_^][S\$
Ul$VL$,WFpT$D$<u/t$$L$4QT$ D$(:_^]3[ L$$9tT$ 9:3;u;t_^][ D$ L$$8L$4QT$$D$(t(L$4L$$u_D$D$^][
D$$T$8RV<F8SQL$RPQ.D$\$,FDTT$Vl+<;FDT+L$0;L$(;v_^][ FLt5tL$$ |VP;tD$D$_^][ AtVW|$4D+tIxqv+f<
f9Nu_^T$D$T$jT$D$QS\$VWt"D$P\$VuD$t+u3_^[D$_^[D$jP[@u@\@A\@A\@A]@S\$VW3NV+u%9t!NT$FF
F RVD$L$N9vNV_^[SV3WNV|$+u#9tFFF ;vNVWN9vNV_^[AA3SUWkC+uD$KP_][T$
;vVsK^_K]3[3AAD$IPQ3WA( A,A3A4A8y<_QA4SUVWwiA(
t7q4uA8u2AQ;t3Q83@AFQ8A4uQ8;u_^][Y_^]A(3[YA44A(r,w'A Q$;Q(T,Q(B@Q(A
vA(<3A4=s#Qq;tA4A83BA8QQ+kq y$+;v
d<Q3ut+ttF@;tF@;tu+;!uY3Xy \$Y,@FQ3Y,y ut$
3y43fDq<i8;sQ4+fTq<++y4+i8fDq<A( Y33@4D;33&VF3V4q Q,Q,Q$++reA3q F_^]A(3[Y_^]A(3[YPyi,Y +_i,^Y
A(]Q33[Yy(7A0vA1vFA2vFA32A
Q(A4=s#Qq;tA4A83BA8Q_^]3[YSVt$W|$t,;sT8Xux+x;s(8Xux++x_^+[SUVWl$L:T$tr;33PX#r3XP+3XPXXP;wj
33PX#r3XP+3X+PXXP+_^][SUVW|$L$;sqHuPu33pXP3Xt+++HPXXX+_^][SUVW|$;@uHt
u8Hr33pXP3X\$t+++@PXXXm+_^][UWL$3T$9s
_3]L$SVD$L$4*;stF;r+++;vE33NYuT3F3F3FL$)L$$t-
+twtL1AuEb+t0BuL$$J3t+T$3^FD$N^^[vT$3:_]T$:_]UWl$s
_3]D$SV3+|$t$D$
K3Cl(E$<uk3eEpu[EL$$L$ t+p#uC{t$l$|$;<^[_]USVM333EE]MUEMUEMUE^[]VStC
Et5FNPVQR3|FNPVQRVc^3^UQMX3EPX3R!EE]SVqW3@9ruzY;u :Y;t@@r_^[
L$VW2L$%L$qt3HtHuUrPuFrI_3^ r<u2r5
t0_3^ r#ut&t't5t
6t_3^ _^ W@3_Vt$v+@Nu^SUVWWL$33$v)$3v;sT4T4@F;r;r;u3T4+PxT$+Vh_^][T$V-
uD$T$PjN%^<(vu%BJBJ33AAAzSUl$VWL$,EE |$D$|$D$^(;uL$(tBt=M;D$ AM@D$ L$;WYIM++N;D$$D$r
D$Nunu3jNRD$$;vD$$|$ PN]D$$|$ ]~+~uBRNBD$$N;vL$$D$,L$PD$$T$(QRPN}T$$L$ L$
}N+NN(+^+^u;D$,uuuuuL$, AD$,_
^][T$,_^]3[D$,_^]3[L$,_^]3[T$,_^]3[t_^]3[QST$w=$l@D$2:QAu[Yu"<uA[Y<wyu
[Y:ArQA[YQ3d$[QYAA$BQ$[Y3t$[QYYA$@[BQY|$oVW
98_gfffT$t$Q^YQ[Yk@l@1l@Ql@bl@l@S\$VWxPPH,PuHx(+;wH,H(_^H([3AD;ALt

A(A,AD9D$tADjASUVW|$ L$(T$7ED=t$\$v"ELsT(PULBCULBNut$EL3;tUPs_^]3[33eQMSER3UTE
}LE$ED=v?ME}tf3E<E8E4E0}@}D\$T$`ED=XT$}3;L$r/uM$RL$$\D$L$}Lugr
uD%V6L$t aT$P]HL$ E+9+9t$3s;t$sD/PGFr}Lrt$WUP2L$t T$EPPEuTE+P;
+;D$ +D$+ELD$ED=E$_^][L$(_^]3[T$(_^]3[}PD$L$ EL_^]D$[3L$(_^][D$
T$(_^]3[D$(_^][_^][L$(_^]3[QWyDtlsdASUiY0Vq+t$;sQ,uQ+Q(;wQQ,Q(+yDQ(t|$;#+@N*T(u^]A[_YSUVW|$F
,u'~(FN++;vu ~$sB|$WLu@F,u
FN(;rF,9^s9~s~Ds_^][3_^][XT$HSUVJ0B@L$,J8L$DJD$B43D$@B<
D$HJKJWzL$<J,+jD$\BD$8B(D$,Bt$`r$D$B
T$P|$@\$dl$(L$TD$4L$,T$#L$ 3=\$$f_sT$3BT$T$;+L$$fOL$,uL$Tt-
ul$<L$83T)L$,L$\#L$`R<Wl$,L$El$,r+L$3fOs\$3C\$\$;s+fW+++fO,
3=f/s3C\$;s+f/+++f/E3=f/s3C\$;s+f/+++f/E3=f/s3C\$;s+f/+++f/E3=f/s3C\$;s+f/+++f/E3=f/s3C\$;s+f/+++f/E3=f/s3
C\$;s+f/+++f/E3=f/s3C\$;s\$+f/++\$+f/MhL$
+T$0L$L$(;#l$<+T$83*3L$fOs\$3C\$\$;s'+fOT$+++fOT$l$L$ l$#l$ o3=T$$f*s3C\$;s(+l$$fUT$l$
T$3+++T$$f*T$TT$l$L$ l$#l$ o3=T$$f*s3C\$;s(+l$$fUT$l$ T$3+++T$$f*T$TT$l$L$ l$#l$
o3=T$$f*s3C\$;s(+l$$fUT$l$ T$3+++T$$f*T$TT$l$L$ l$#l$ o3=T$$f*s3C\$;s(+l$$fUT$l$
T$3+++T$$f*T$TT$l$L$ l$#l$ o3=T$$f*s3C\$;s(+l$$fUT$l$ T$3+++T$$f*T$TT$l$L$ l$#l$
o3=T$$f*s3C\$;s$+l$$fUT$l$ 3+++T$$f*T$Tl$#<o3=f/s3C\$;s+f+++Lf/|$8T$(:BT$(,+++\$$f_3fLW
=sT$3BT$T$;s%+T$f\W +++fLW 3fLW8=sT$3BT$;+L$f\O8\$$3f_sT$3BT$;s]+\$L$$fOL$0|$<;#+L$8El$(
T)l$,El$,L$
++l$+T$$fWl$+++fLo83fLoP=sT$3BT$;s+L$DfToP|+++fLoP3fLoh=sT$3BT$;s+L$HfToh+++T$HfLohL$LT$L
T$DT$HT$0L$0T$DL$3=fsl$3UEl$;/+L$
f<O3fOs\$3C\$\$;s+fW+++fO, 3=f/s3C\$;s+f/+++f/E3=f/s3C\$;s+f/++M+f/+++f3fO=s\$3C\$\$;!+L$
fo|O3fOs3C\$;s+fW+++fO, 3=f/s3C\$;s+f/+++f/E3=f/s3C\$;s+f/+++f/M+++T$fO, 3=f/s
3B;s+f/+++f/MrT$T$L$4r|$@A3=fys\$3C\$\$;s+fQ+++fy,3=f<)s3C\$;s+f)+++f<)E3=f<)s3C\$;s+f)+++f<)E3=f<)s
3C\$;s+f)+++f<)E3=f<)s3C\$;s+f)+++f<)E3=f<)s3C\$;s+f)++]+f<)@oIL$$Cl$@3=f]sl$3MAL$L$$;s
+|$@f_+++l$@f]IL$$u+=s|$3BT$+_#Iul$@3f}=sL$3AL$;s+fM+++f}3=fL}L$$sL$3AL$L$$;s+fT}+++fL}3=fL
}L$$sL$3AL$L$$;s+fT}+++fL}3=fL}L$$sL$3AL$L$$;s+fT}+++fL}L$HT$DL$LL$0L$DL$T$HST$0
L$L$TuL$,;\$4l$X|$(+;rT$0;+#L$<\$4+T$,T$,T$<+;T$8w!+*|$(\$$|$$B;u\$<GA;u3Mu|$(\$L$(T$X;sY;\$lsSl$(\$
d|$@L$L$4D$PT$(_^P][XL$Py_^][X|$4=sT$3
BT$L$PQT$(A D$,QT$0A(D$DQ0T$HyDA4D$Lq$Q8T$_^A<]Q@3[XT$L$SHT$ PT$X(Uh@Vp
Wx$#\$L$)3T$$fSs)T$\$,;r_^]3[3BT$;wL$H,T$uH(tFhuhP33L**HH(J#T$Lm
T$x@sc3fJs(D$l$,;Vl$3E@D$;s++L Xh0;sH3@+3D$ #)l$$3f,Bs%D$T$,;3T$@D$;sD$$3++L sD$ D$ XT$++3fLj
s)D$\$,;r_^]3[3@D$;sD$$D$ f\$++3fDj8D$
s#;\$,r_^]3[3C\$;szD$$l$3fBs&;l$,r_^]3[3MEl$;=s;l$,r_^]3[_^][++3fDjPs#;\$,r_^]3[3C\$;sJ++3fLjhs#;\$,r_^]3[3C\
$;s++D$$l$3fs$;l$,r_^]3[3MEl$;sT$D$,S3T$v++3fCs$;l$,r_^]3[3MEl$;sT$lST$T$++T$D$3fD]s%L$T$,;3T$AL$
;s++\D$;r+D$$MrD$T$k3fD]s;T$,3
B;s++\@r@T$IL$sD$XL$Il$,s;3B+H#+IuL$T$L$D$\$3fKs;T$,s63B;s++D$HD$t_^]T$3[T$sT$,D$;r_^]3[D$
_^][VVPF^D$Vs ^33fVF3V=sA<D$r ^t$W 98_gfffT$t$Q3^QD$VPL$<u#L$T$Q(uT$D$F3^VWJFt;~Ht2S\$?F[u
_^
~HF_3^V3WB03rFD
nANuLH@&rAA=3@r=sNuAq@=r30_^VV0P3F(F0^VWF0t9~(t/S\$FD8F0[u_^~(_^VV%f@^3SUVW&3FDN0
N(F<n,<~8+@+F@F4FFrn+3F$F GF8FhffAF4F3F4FBN3ACr
l$L$T$\$@j33f@+fJu@rD$T$@=D$T$r3L
XfHNuBr_^][fQfQU)VWfU%+ftz3;S3f},X3;<S3Rf+;q[x_fH3+T$f0^
]L$_^]VNAAfPA:AvWy$~G<|_vB^zSVWfvffyfr_^[SUVWHF;L$:|$ fRfT$$tP/;+ff{uT$
3fT$$fQHfzHn+33HL$l$fK\$l$3H+l$HP:l$vM\$ fRfT$$Q*+fRfST$;tT$!Y:wT$ \$fT$$fQK\$zH@f
C8t+f
ff=uPT$D$ D$!fY*wED$!3D.mPhL$

F_^fX][M%@;tT$PQPB+D$fy_BF^][D$V2^QUl$VWL$33DmT/m;D$thtRSil$F+h)hihll$Ml$uT$Ri[_^]YRP4_^]
YV0^D$SV3WLH|$3D>H+I3T0m3L7H;tO3L7H+IHPW_^[Q3V3fBfrQ^u;A<vA$SUV33FWfXfHH\$sWztNf?uG
<
 sAG:O8t Q:uAQ:riA<ss
AfGFu6-
Fu=_^][$N_^][$NV<N<F@AN<;T$$r_^][$tI;w"3u_^][$D$FHFu*N>F<3;\$$+F<ND$.~33fMW~3fE++D$A;L$0D
$3f\$
33L.mT.n;L$(tlQL$,9Gl$D$l$+h)hihll$Ml$uD$(T$PL$,D$OfOWL$,,;,A;E#,;D$,Hf[3W)+fIfKGHsH@xl$f@;\$
fNf
f
n3Eil$0,I;s%,;E;D)D$ff4I,I;C;E;@Lf\$ L$fW[,JT$$FT$CUMf;\$^_^][$Vt^3WDHy84@A4+;_w0^Q4^SUVWF,ut
_^][d}&t8u=G&uN@^<3D.Hn,+@M;n,v+_N@^][_^]3[
UW_^][T$SUVW3C,ft+HtPBffquE&rD$fD$T$BC4K8;tfL$;tY33fJIftf8u3s+px~p@FI3fJftf8tRL$;u|$T$;tuG3fwD
$v nj%,Mu33LmT+H;tM3D+H+@NVUL$|$;u_^][SYUV3\$fs3fC3W9L$u \$GtXT\$f?tO8tY:uO33fAfY;uG
Eu
VL$L$ffu WT$VGL$8t
X:u3H3fOH++;w;UUUUB3D$\L$A8Q4;tpq8"t3U
3t/fD$VMfL$~fJt_^]3[_^][SV33NQ3fH;V NV fHFPPVz|v^[VqF<VA @AA ^VfHFPPFx|vwN$N
^VNFFt3^WNN%OFu_^0@AP@A@AV33Aq^AVD$QA+Q^V~sENN%NF=NsNV%FFF^VqWQ;s3A_^++Qqi_^
SUVWl$f8'x3fPU3W;s,R3U~D$D$_^]%[3Ff3_I;wIt?3_;v3GP+U~L$D$_^]%[3fY;F331F3fA+PUD$ PPPPPPP
Iu3D3fH3HDuV33330NP23P@3f32X&F ^ <V3fUfu? +fFT$SD$_^]%[3 +f%
@D$ VPPPPPPP Iu3HFD3f\$NANI3f;tA3f33+33XL#+;uT$RT$T$\$D$T$;rRL$;+QSD$fL$fP3O
Du7_^][$3$Q;wU3J;vm3EP+S|$G<s!OOuf'GWnED$D$_^]%[_^][SVD$uL$D$3D$A\$T$D$ud$D$r;T$wr;D$vN3
^[SD$uL$D$3D$3P\$T$D$ud$d$r;T$wr;D$v+D$T$+D$T$[@s
 s333D$L$L$u D$SD$d$D$[Q=L$r-=s+@P@s s333Ujh@h@dPd% SVWeej0@Y
L@
P@8@
,@@@
(@D@T@=@uh@H@Yh@h@$@EEP5 @EPEPEPP@h@h@MT@Muuui0EPX@E
MPQYYeu`@%\@%L@hhYY3%4@%<@^RF8*|l\H<,@@CRC errorcan not allocate memorydecoder doesn't
support this archive
Everything is Ok
can not write output filecan not close output filecan not open output fileExtracting Testing / xetlcan not open
input fileincorrect commandUsage: 7zDec <command> <archive_name>

<Commands>
 e: Extract files from archive (without using directory names)
 l: List contents of archive
 t: Test integrity of archive
 x: eXtract files with full paths

7z Decoder 18.05 (x86) : Igor Pavlov : Public domain : 2018-04-30



ERROR: 7z'GenuineIntelAuthenticAMDCentaurHauls
<?YHdZ2fQ`@@0Xp^RF8*|l\H<,Zfputs_iobmalloc^freeMSVCRT.dll_exitH_XcptFilterIexitd__p___initenvX__ge
tmainargs_initterm__setusermatherr_adjust_fdivj__p__commodeo__p__fmode__set_app_type_except_handler3_co

ntrolfpSetFileAttributesWSetFileTimeiGetLastErrorHCreateDirectoryWWideCharToMultiByteMCreateFileAPCreateFileW.CloseHandleReadFileWriteFileSetFilePointerKERNEL32.dllt
0/0K0c0o00a1223@334"4M4`4i445;6a6h6o6667#7q7|7777b888;<<<3=?=U=|==========??
$010]0g000>1`111"2)2590u;|;;@>P$66666666;;;;;`66;<<====S11?? ?D325555555555556
666'646F6K6P6[6{666666x0|033

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```
// ProgressDialog2.h

#ifndef __PROGRESS_DIALOG_2_H
#define __PROGRESS_DIALOG_2_H

#include "../../../Common/MyCom.h"

#include "../../../Windows/ErrorMsg.h"
#include "../../../Windows/Synchronization.h"
#include "../../../Windows/Thread.h"

#include "../../../Windows/Control/Dialog.h"
#include "../../../Windows/Control/ListView.h"
#include "../../../Windows/Control/ProgressBar.h"

#include "MyWindowsNew.h"

struct CProgressMessageBoxPair
{
 UString Title;
 UString Message;
};

struct CProgressFinalMessage
{
```

```
 CProgressMessageBoxPair ErrorMessage;
 CProgressMessageBoxPair OkMessage;

 bool ThereIsMessage() const { return !ErrorMessage.Message.IsEmpty() || !OkMessage.Message.IsEmpty(); }
};

class CProgressSync
{
 bool _stopped;
 bool _paused;

public:
 bool _bytesProgressMode;
 UInt64 _totalBytes;
 UInt64 _completedBytes;
 UInt64 _totalFiles;
 UInt64 _curFiles;
 UInt64 _inSize;
 UInt64 _outSize;

 UString _titleFileName;
 UString _status;
 UString _filePath;
 bool _isDir;

  UStringVector Messages;
 CProgressFinalMessage FinalMessage;

 NWindows::NSynchronization::CCriticalSection _cs;

 CProgressSync();

 bool Get_Stopped()
 {
   NWindows::NSynchronization::CCriticalSectionLock lock(_cs);
   return _stopped;
 }
 void Set_Stopped(bool val)
 {
   NWindows::NSynchronization::CCriticalSectionLock lock(_cs);
   _stopped = val;
 }

 bool Get_Paused();
 void Set_Paused(bool val)
 {
   NWindows::NSynchronization::CCriticalSectionLock lock(_cs);
   _paused = val;
```

```
 }

 void Set_BytesProgressMode(bool bytesProgressMode)
 {
   NWindows::NSynchronization::CCriticalSectionLock lock(_cs);
   _bytesProgressMode = bytesProgressMode;
 }

 HRESULT CheckStop();
 HRESULT ScanProgress(UInt64 numFiles, UInt64 totalSize, const FString &fileName, bool isDir = false);

 HRESULT Set_NumFilesTotal(UInt64 val);
 void Set_NumBytesTotal(UInt64 val);
 void Set_NumFilesCur(UInt64 val);
 HRESULT Set_NumBytesCur(const UInt64 *val);
 HRESULT Set_NumBytesCur(UInt64
 val);
 void Set_Ratio(const UInt64 *inSize, const UInt64 *outSize);

 void Set_TitleFileName(const UString &fileName);
 void Set_Status(const UString &s);
 HRESULT Set_Status2(const UString &s, const wchar_t *path, bool isDir = false);
 void Set_FilePath(const wchar_t *path, bool isDir = false);

 void AddError_Message(const wchar_t *message);
 void AddError_Message_Name(const wchar_t *message, const wchar_t *name);
 void AddError_Code_Name(DWORD systemError, const wchar_t *name);

 bool ThereIsMessage() const { return !Messages.IsEmpty() || FinalMessage.ThereIsMessage(); }
};

class CProgressDialog: public NWindows::NControl::CModalDialog
{
 UString _titleFileName;
 UString _filePath;
 UString _status;
 bool _isDir;

 UString _background_String;
 UString _backgrounded_String;
 UString _foreground_String;
 UString _pause_String;
 UString _continue_String;
 UString _paused_String;

 int _buttonSizeX;
 int _buttonSizeY;
```

```
UINT_PTR _timer;

UString
_title;

class CU64ToI32Converter
{
  unsigned _numShiftBits;
  UInt64 _range;
public:
  CU64ToI32Converter(): _numShiftBits(0), _range(1) {}
  void Init(UInt64 range)
  {
    _range = range;
    // Windows CE doesn't like big number for ProgressBar.
    for (_numShiftBits = 0; range >= ((UInt32)1 << 15); _numShiftBits++)
      range >>= 1;
  }
  int Count(UInt64 val)
  {
    int res = (int)(val >> _numShiftBits);
    if (val == _range)
      res++;
    return res;
  }
};

CU64ToI32Converter _progressConv;
UInt64 _progressBar_Pos;
UInt64 _progressBar_Range;

NWindows::NControl::CProgressBar m_ProgressBar;
NWindows::NControl::CListView _messageList;

int _numMessages;

#ifdef __ITaskbarList3_INTERFACE_DEFINED__
CMyComPtr<ITaskbarList3> _taskbarList;
#endif
HWND _hwndForTaskbar;

UInt32 _prevTime;
UInt64 _elapsedTime;

UInt64 _prevPercentValue;
UInt64 _prevElapsedSec;
UInt64 _prevRemainingSec;
```

```
UInt64 _totalBytes_Prev;
 UInt64 _processed_Prev;
UInt64 _packed_Prev;
UInt64 _ratio_Prev;
UString _filesStr_Prev;

unsigned _prevSpeed_MoveBits;
UInt64 _prevSpeed;

bool _foreground;

unsigned _numReduceSymbols;

bool _wasCreated;
bool _needClose;

unsigned _numPostedMessages;
UInt32 _numAutoSizeMessages;

bool _errorsWereDisplayed;

bool _waitCloseByCancelButton;
bool _cancelWasPressed;

bool _inCancelMessageBox;
bool _externalCloseMessageWasReceived;


#ifdef __ITaskbarList3_INTERFACE_DEFINED__
void SetTaskbarProgressState(TBPFLAG tbpFlags)
{
  if (_taskbarList && _hwndForTaskbar)
    _taskbarList->SetProgressState(_hwndForTaskbar, tbpFlags);
}
#endif
void SetTaskbarProgressState();

void UpdateStatInfo(bool showAll);
bool OnTimer(WPARAM timerID, LPARAM callback);
void SetProgressRange(UInt64 range);
void SetProgressPos(UInt64 pos);
virtual bool OnInit();
virtual bool OnSize(WPARAM wParam, int xSize, int ySize);
virtual void OnCancel();
 virtual void OnOK();
NWindows::NSynchronization::CManualResetEvent _createDialogEvent;
NWindows::NSynchronization::CManualResetEvent _dialogCreatedEvent;
#ifndef _SFX
```

```
void AddToTitle(LPCWSTR string);
#endif

void SetPauseText();
void SetPriorityText();
void OnPauseButton();
void OnPriorityButton();
bool OnButtonClicked(int buttonID, HWND buttonHWND);
bool OnMessage(UINT message, WPARAM wParam, LPARAM lParam);

void SetTitleText();
void ShowSize(int id, UInt64 val, UInt64 &prev);

void UpdateMessagesDialog();

void AddMessageDirect(LPCWSTR message, bool needNumber);
void AddMessage(LPCWSTR message);

bool OnExternalCloseMessage();
void EnableErrorsControls(bool enable);

void ShowAfterMessages(HWND wndParent);

void CheckNeedClose();
public:
CProgressSync Sync;
bool CompressingMode;
bool WaitMode;
bool ShowCompressionInfo;
bool MessagesDisplayed; // = true if user pressed OK on all messages or there are no messages.
int IconID;

 HWND MainWindow;
#ifndef _SFX
UString MainTitle;
UString MainAddTitle;
~CProgressDialog();
#endif

CProgressDialog();
void WaitCreating()
{
  _createDialogEvent.Set();
  _dialogCreatedEvent.Lock();
}

INT_PTR Create(const UString &title, NWindows::CThread &thread, HWND wndParent = 0);
```

```
 /* how it works:
    1) the working thread calls ProcessWasFinished()
       that sends kCloseMessage message to CProgressDialog (GUI) thread
    2) CProgressDialog (GUI) thread receives kCloseMessage message and
       calls ProcessWasFinished_GuiVirt();
       So we can implement ProcessWasFinished_GuiVirt() and show special
       results window in GUI thread with CProgressDialog as parent window
 */

 void ProcessWasFinished();
 virtual void ProcessWasFinished_GuiVirt() {}
};


class CProgressCloser
{
 CProgressDialog *_p;
public:
 CProgressCloser(CProgressDialog &p) : _p(&p) {}
 ~CProgressCloser() { _p->ProcessWasFinished(); }
};


class CProgressThreadVirt:
 public CProgressDialog
{
protected:
 FStringVector ErrorPaths;
 CProgressFinalMessage FinalMessage;

 // error if any of HRESULT, ErrorMessage, ErrorPath
 virtual HRESULT ProcessVirt() = 0;
public:
 HRESULT Result;
 bool ThreadFinishedOK; // if there is no fatal exception

 void Process();
 void AddErrorPath(const FString &path) { ErrorPaths.Add(path); }

 HRESULT Create(const UString &title, HWND parentWindow = 0);
 CProgressThreadVirt(): Result(E_FAIL), ThreadFinishedOK(false) {}

 CProgressMessageBoxPair &GetMessagePair(bool isError) { return isError ? FinalMessage.ErrorMessage :
FinalMessage.OkMessage; }
 };

UString HResultToMessage(HRESULT errorCode);
```

```
/*
how it works:

client code inherits CProgressThreadVirt and calls
CProgressThreadVirt::Create()
{
 it creates new thread that calls CProgressThreadVirt::Process();
 it creates modal progress dialog window with ProgressDialog.Create()
}

CProgressThreadVirt::Process()
{
 {
   ProcessVirt(); // virtual function that
 must implement real work
 }
 if (exceptions) or FinalMessage.ErrorMessage.Message
 {
   set message to ProgressDialog.Sync.FinalMessage.ErrorMessage.Message
 }
 else if (FinalMessage.OkMessage.Message)
 {
   set message to ProgressDialog.Sync.FinalMessage.OkMessage
 }

 PostMsg(kCloseMessage);
}


CProgressDialog::OnExternalCloseMessage()
{
 if (ProgressDialog.Sync.FinalMessage)
 {
   WorkWasFinishedVirt();
   Show (ProgressDialog.Sync.FinalMessage)
   MessagesDisplayed = true;
 }
}

*/

#endif
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PROG = 7zr.exe
MY_CONSOLE = 1
CFLAGS = $(CFLAGS) -DPROG_VARIANT_R

!IFNDEF UNDER_CE
CFLAGS = $(CFLAGS) -DWIN_LONG_PATH -D_7ZIP_LARGE_PAGES -DSUPPORT_DEVICE_FILE
!ENDIF

COMMON_OBJS = \
 $O\CommandLineParser.obj \
 $O\CRC.obj \
 $O\CrcReg.obj \
 $O\IntToString.obj \
 $O\ListFileUtils.obj \
 $O\NewHandler.obj \
 $O\StdInStream.obj \
 $O\StdOutStream.obj \
 $O\MyString.obj \
 $O\Sha256Reg.obj \
 $O\StringConvert.obj \
 $O\StringToInt.obj \
 $O\UTFConvert.obj \
 $O\MyVector.obj \
 $O\Wildcard.obj \
 $O\XzCrc64Init.obj \
```

```
 $O\XzCrc64Reg.obj \

WIN_OBJS = \
 $O\DLL.obj \
 $O\ErrorMsg.obj \
 $O\FileDir.obj \
 $O\FileFind.obj \
 $O\FileIO.obj \
 $O\FileLink.obj \
 $O\FileName.obj \
 $O\FileSystem.obj \
 $O\MemoryLock.obj \
 $O\PropVariant.obj \
 $O\PropVariantConv.obj \
 $O\Synchronization.obj \
 $O\System.obj \
 $O\TimeUtils.obj \

7ZIP_COMMON_OBJS = \
 $O\CreateCoder.obj \
 $O\CWrappers.obj \
 $O\FilePathAutoRename.obj \
 $O\FileStreams.obj \
 $O\InBuffer.obj
 \
 $O\InOutTempBuffer.obj \
 $O\FilterCoder.obj \
 $O\LimitedStreams.obj \
 $O\MethodId.obj \
 $O\MethodProps.obj \
 $O\OffsetStream.obj \
 $O\OutBuffer.obj \
 $O\ProgressUtils.obj \
 $O\PropId.obj \
 $O\StreamBinder.obj \
 $O\StreamObjects.obj \
 $O\StreamUtils.obj \
 $O\UniqBlocks.obj \
 $O\VirtThread.obj \

AR_OBJS = \
 $O\LzmaHandler.obj \
 $O\SplitHandler.obj \
 $O\XzHandler.obj \

AR_COMMON_OBJS = \
 $O\CoderMixer2.obj \
 $O\DummyOutStream.obj \
```

```
 $O\HandlerOut.obj \
 $O\InStreamWithCRC.obj \
 $O\ItemNameUtils.obj \
 $O\MultiStream.obj \
 $O\OutStreamWithCRC.obj \
 $O\ParseProperties.obj \


7Z_OBJS = \
 $O\7zCompressionMode.obj \
 $O\7zDecode.obj \
 $O\7zEncode.obj \
 $O\7zExtract.obj \
 $O\7zFolderInStream.obj \
 $O\7zHandler.obj \
 $O\7zHandlerOut.obj \
 $O\7zHeader.obj \
 $O\7zIn.obj \
 $O\7zOut.obj \
 $O\7zProperties.obj \
 $O\7zRegister.obj \
 $O\7zSpecStream.obj \
 $O\7zUpdate.obj \

COMPRESS_OBJS = \
 $O\Bcj2Coder.obj \
 $O\Bcj2Register.obj
 \
 $O\BcjCoder.obj \
 $O\BcjRegister.obj \
 $O\BranchMisc.obj \
 $O\BranchRegister.obj \
 $O\ByteSwap.obj \
 $O\CopyCoder.obj \
 $O\CopyRegister.obj \
 $O\DeltaFilter.obj \
 $O\Lzma2Decoder.obj \
 $O\Lzma2Encoder.obj \
 $O\Lzma2Register.obj \
 $O\LzmaDecoder.obj \
 $O\LzmaEncoder.obj \
 $O\LzmaRegister.obj \
 $O\XzDecoder.obj \
 $O\XzEncoder.obj \

CRYPTO_OBJS = \
 $O\7zAes.obj \
 $O\7zAesRegister.obj \
```

```
 $O\MyAes.obj \
 $O\MyAesReg.obj \
 $O\RandGen.obj \

C_OBJS = \
 $O\7zStream.obj \
 $O\Alloc.obj \
 $O\Bcj2.obj \
 $O\Bcj2Enc.obj \
 $O\Bra.obj \
 $O\Bra86.obj \
 $O\BraIA64.obj \
 $O\CpuArch.obj \
 $O\Delta.obj \
 $O\LzFind.obj \
 $O\LzFindMt.obj \
 $O\Lzma2Dec.obj \
 $O\Lzma2DecMt.obj \
 $O\Lzma2Enc.obj \
 $O\LzmaDec.obj \
 $O\LzmaEnc.obj \
 $O\MtCoder.obj \
 $O\MtDec.obj \
 $O\Sha256.obj \
 $O\Sort.obj \
 $O\Threads.obj \
 $O\Xz.obj \
 $O\XzDec.obj \
 $O\XzEnc.obj \
 $O\XzIn.obj \

!include "../../UI/Console/Console.mak"

!include
 "../../Aes.mak"
!include "../../Crc.mak"
!include "../../Crc64.mak"
!include "../../LzmaDec.mak"

!include "../../7zip.mak"
```

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#ifndef _EXDLL_H_
#define _EXDLL_H_

#include <windows.h>
#include <tchar.h>

#define PLUGINFUNCTION(name)                                    \
 extern "C" void __declspec(dllexport)                          \
    name(HWND hWndParent, int string_size, TCHAR* variables, \
        stack_t** stacktop, extra_parameters* extra)

#define EXDLL_INIT()                                    \
 {                                                      \
   g_stringsize = string_size;                          \
   g_stacktop = stacktop;                               \
   g_executeCodeSegment = extra->ExecuteCodeSegment; \
   g_hwndParent = hWndParent;                           \
 }

#define WM_NOTIFY_OUTER_NEXT (WM_USER + 0x8)
#define WM_NOTIFY_CUSTOM_READY (WM_USER + 0xd)

typedef struct _stack_t {
 struct
 _stack_t* next;
 TCHAR text[1];  // the real length of this buffer should be string_size
} stack_t;
```

```
extern unsigned int g_stringsize;
extern stack_t** g_stacktop;
extern int(__stdcall* g_executeCodeSegment)(int pos, HWND hwndProgress);
extern HWND g_hwndParent;
extern HINSTANCE gHInst;

typedef struct {
 int autoclose;
 int all_user_var;
 int exec_error;
 int abort;
 int exec_reboot;
 int reboot_called;
 int XXX_cur_insttype;      // deprecated
 int XXX_insttype_changed;  // deprecated
 int silent;
 int instdir_error;
 int rtl;
 int errlvl;
} exec_flags;

// NSIS Plug-In Callback Messages
enum NSPIM {
 NSPIM_UNLOAD,     // This is the last message a plugin gets, do final cleanup
 NSPIM_GUIUNLOAD,  // Called after .onGUIEnd
};

typedef UINT_PTR (*NSISPLUGINCALLBACK)(enum NSPIM);

typedef struct {
 exec_flags* exec_flags;
 int(__stdcall* ExecuteCodeSegment)(int pos, HWND hwndProgress);
 void(__stdcall* validate_filename)(LPWSTR);
 int(__stdcall* RegisterPluginCallback)(
     HMODULE,
    NSISPLUGINCALLBACK);  // returns 0 on success, 1 if already
                          // registered and < 0 on errors
} extra_parameters;

int popstring(TCHAR* str);
void pushstring(const TCHAR* str);

UINT_PTR __cdecl NSISPluginCallback(NSPIM msg);

#endif  //_EXDLL_H_
```

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/* Ppmd7.h -- PPMdH compression codec
2017-04-03 : Igor Pavlov : Public domain
This code is based on PPMd var.H (2001): Dmitry Shkarin : Public domain */

/* This code supports virtual RangeDecoder and includes the implementation of RangeCoder from 7z, instead of RangeCoder from original PPMd var.H.

```
If you need the compatibility with original PPMd var.H, you can use external RangeDecoder */

#ifndef __PPMD7_H
#define __PPMD7_H

#include "Ppmd.h"

EXTERN_C_BEGIN

#define PPMD7_MIN_ORDER 2
#define PPMD7_MAX_ORDER 64

#define PPMD7_MIN_MEM_SIZE (1 << 11)
#define PPMD7_MAX_MEM_SIZE (0xFFFFFFFF - 12 * 3)

struct CPpmd7_Context_;

typedef
 #ifdef PPMD_32BIT
   struct CPpmd7_Context_ *
 #else
   UInt32
 #endif
 CPpmd7_Context_Ref;

typedef struct CPpmd7_Context_
{
 UInt16 NumStats;
 UInt16 SummFreq;
 CPpmd_State_Ref Stats;
 CPpmd7_Context_Ref Suffix;
} CPpmd7_Context;

#define Ppmd7Context_OneState(p) ((CPpmd_State *)&(p)->SummFreq)

typedef struct
{
 CPpmd7_Context *MinContext, *MaxContext;
  CPpmd_State *FoundState;
 unsigned OrderFall, InitEsc, PrevSuccess, MaxOrder, HiBitsFlag;
 Int32 RunLength, InitRL; /* must be 32-bit at least */

 UInt32 Size;
 UInt32 GlueCount;
 Byte *Base, *LoUnit, *HiUnit, *Text, *UnitsStart;
 UInt32 AlignOffset;

 Byte Indx2Units[PPMD_NUM_INDEXES];
```

```
 Byte Units2Indx[128];
 CPpmd_Void_Ref FreeList[PPMD_NUM_INDEXES];
 Byte NS2Indx[256], NS2BSIndx[256], HB2Flag[256];
 CPpmd_See DummySee, See[25][16];
 UInt16 BinSumm[128][64];
} CPpmd7;

void Ppmd7_Construct(CPpmd7 *p);
Bool Ppmd7_Alloc(CPpmd7 *p, UInt32 size, ISzAllocPtr alloc);
void Ppmd7_Free(CPpmd7 *p, ISzAllocPtr alloc);
void Ppmd7_Init(CPpmd7 *p, unsigned maxOrder);
#define Ppmd7_WasAllocated(p) ((p)->Base != NULL)


/* ---------- Internal Functions ---------- */

extern const Byte PPMD7_kExpEscape[16];

#ifdef PPMD_32BIT
 #define Ppmd7_GetPtr(p, ptr) (ptr)
 #define Ppmd7_GetContext(p, ptr) (ptr)
 #define Ppmd7_GetStats(p, ctx) ((ctx)->Stats)
#else
 #define Ppmd7_GetPtr(p,
 offs) ((void *)((p)->Base + (offs)))
 #define Ppmd7_GetContext(p, offs) ((CPpmd7_Context *)Ppmd7_GetPtr((p), (offs)))
 #define Ppmd7_GetStats(p, ctx) ((CPpmd_State *)Ppmd7_GetPtr((p), ((ctx)->Stats)))
#endif

void Ppmd7_Update1(CPpmd7 *p);
void Ppmd7_Update1_0(CPpmd7 *p);
void Ppmd7_Update2(CPpmd7 *p);
void Ppmd7_UpdateBin(CPpmd7 *p);

#define Ppmd7_GetBinSumm(p) \
   &p->BinSumm[(size_t)(unsigned)Ppmd7Context_OneState(p->MinContext)->Freq - 1][p->PrevSuccess + \
   p->NS2BSIndx[(size_t)Ppmd7_GetContext(p, p->MinContext->Suffix)->NumStats - 1] + \
   (p->HiBitsFlag = p->HB2Flag[p->FoundState->Symbol]) + \
   2 * p->HB2Flag[(unsigned)Ppmd7Context_OneState(p->MinContext)->Symbol] + \
   ((p->RunLength >> 26) & 0x20)]

CPpmd_See *Ppmd7_MakeEscFreq(CPpmd7 *p, unsigned numMasked, UInt32 *scale);


/* ---------- Decode ---------- */

typedef struct IPpmd7_RangeDec IPpmd7_RangeDec;
```

```
struct IPpmd7_RangeDec
{
 UInt32 (*GetThreshold)(const IPpmd7_RangeDec *p, UInt32 total);
 void
 (*Decode)(const IPpmd7_RangeDec *p, UInt32 start, UInt32 size);
 UInt32 (*DecodeBit)(const IPpmd7_RangeDec *p, UInt32 size0);
};

typedef struct
{
 IPpmd7_RangeDec vt;
 UInt32 Range;
 UInt32 Code;
 IByteIn *Stream;
} CPpmd7z_RangeDec;

void Ppmd7z_RangeDec_CreateVTable(CPpmd7z_RangeDec *p);
Bool Ppmd7z_RangeDec_Init(CPpmd7z_RangeDec *p);
#define Ppmd7z_RangeDec_IsFinishedOK(p) ((p)->Code == 0)

int Ppmd7_DecodeSymbol(CPpmd7 *p, const IPpmd7_RangeDec *rc);


/* ---------- Encode ---------- */

typedef struct
{
 UInt64 Low;
 UInt32 Range;
 Byte Cache;
 UInt64 CacheSize;
 IByteOut *Stream;
} CPpmd7z_RangeEnc;

void Ppmd7z_RangeEnc_Init(CPpmd7z_RangeEnc *p);
void Ppmd7z_RangeEnc_FlushData(CPpmd7z_RangeEnc *p);

void Ppmd7_EncodeSymbol(CPpmd7 *p, CPpmd7z_RangeEnc *rc, int symbol);

EXTERN_C_END

#endif
```

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//
// Various stubs for the unit tests for the open-source version of Snappy.

#ifndef THIRD_PARTY_SNAPPY_OPENSOURCE_SNAPPY_TEST_H_
#define THIRD_PARTY_SNAPPY_OPENSOURCE_SNAPPY_TEST_H_

#include <iostream>
#include <string>

#include "snappy-stubs-internal.h"

#include <stdio.h>
#include <stdarg.h>

#ifdef HAVE_SYS_MMAN_H
#include <sys/mman.h>
#endif

#ifdef HAVE_SYS_RESOURCE_H
#include <sys/resource.h>
#endif

#ifdef HAVE_SYS_TIME_H
#include <sys/time.h>
#endif

#ifdef
 HAVE_WINDOWS_H
#include <windows.h>
#endif

#include <string>

#ifdef HAVE_GTEST

#include <gtest/gtest.h>
#undef TYPED_TEST
#define TYPED_TEST TEST
#define INIT_GTEST(argc, argv) ::testing::InitGoogleTest(argc, *argv)

#else

// Stubs for if the user doesn't have Google Test installed.
```

```
#define TEST(test_case, test_subcase) \
 void Test_ ## test_case ## _ ## test_subcase()
#define INIT_GTEST(argc, argv)

#define TYPED_TEST TEST
#define EXPECT_EQ CHECK_EQ
#define EXPECT_NE CHECK_NE
#define EXPECT_FALSE(cond) CHECK(!(cond))

#endif

#ifdef HAVE_GFLAGS

#include <gflags/gflags.h>

// This is tricky; both gflags and Google Test want to look at the command line
// arguments. Google Test seems to be the most happy with unknown arguments,
// though, so we call it first and hope for the best.
#define InitGoogle(argv0, argc, argv, remove_flags) \
 INIT_GTEST(argc, argv); \
 google::ParseCommandLineFlags(argc, argv, remove_flags);

#else

// If we don't have the gflags
 package installed, these can only be
// changed at compile time.
#define DEFINE_int32(flag_name, default_value, description) \
 static int FLAGS_ ## flag_name = default_value;

#define InitGoogle(argv0, argc, argv, remove_flags) \
 INIT_GTEST(argc, argv)

#endif

#ifdef HAVE_LIBZ
#include "zlib.h"
#endif

#ifdef HAVE_LIBLZO2
#include "lzo/lzo1x.h"
#endif

#ifdef HAVE_LIBLZF
extern "C" {
#include "lzf.h"
}
#endif
```

```
#ifdef HAVE_LIBFASTLZ
#include "fastlz.h"
#endif

#ifdef HAVE_LIBQUICKLZ
#include "quicklz.h"
#endif

namespace {

namespace File {
 void Init() { }
}  // namespace File

namespace file {
 int Defaults() { return 0; }

 class DummyStatus {
  public:
   void CheckSuccess() { }
 };

 DummyStatus GetContents(const string& filename, string* data, int unused) {
   FILE* fp = fopen(filename.c_str(), "rb");
   if (fp == NULL) {
     perror(filename.c_str());
     exit(1);
   }

   data->clear();
   while (!feof(fp)) {
     char buf[4096];
     size_t ret = fread(buf,
 1, 4096, fp);
     if (ret == 0 && ferror(fp)) {
       perror("fread");
       exit(1);
     }
     data->append(string(buf, ret));
   }

   fclose(fp);

   return DummyStatus();
 }

 DummyStatus SetContents(const string& filename,
```

```
                    const string& str,
                    int unused) {
  FILE* fp = fopen(filename.c_str(), "wb");
  if (fp == NULL) {
    perror(filename.c_str());
    exit(1);
  }

  int ret = fwrite(str.data(), str.size(), 1, fp);
  if (ret != 1) {
    perror("fwrite");
    exit(1);
  }

  fclose(fp);

  return DummyStatus();
 }
}  // namespace file

}  // namespace

namespace snappy {

#define FLAGS_test_random_seed 301
typedef string TypeParam;

void Test_CorruptedTest_VerifyCorrupted();
void Test_Snappy_SimpleTests();
void Test_Snappy_MaxBlowup();
void Test_Snappy_RandomData();
void Test_Snappy_FourByteOffset();
void Test_SnappyCorruption_TruncatedVarint();
void Test_SnappyCorruption_UnterminatedVarint();
void
 Test_SnappyCorruption_OverflowingVarint();
void Test_Snappy_ReadPastEndOfBuffer();
void Test_Snappy_FindMatchLength();
void Test_Snappy_FindMatchLengthRandom();

string ReadTestDataFile(const string& base, size_t size_limit);

string ReadTestDataFile(const string& base);

// A sprintf() variant that returns a std::string.
// Not safe for general use due to truncation issues.
string StringPrintf(const char* format, ...);
```

```
// A simple, non-cryptographically-secure random generator.
class ACMRandom {
public:
 explicit ACMRandom(uint32 seed) : seed_(seed) {}

 int32 Next();

 int32 Uniform(int32 n) {
   return Next() % n;
 }
 uint8 Rand8() {
   return static_cast<uint8>((Next() >> 1) & 0x000000ff);
 }
 bool OneIn(int X) { return Uniform(X) == 0; }

 // Skewed: pick "base" uniformly from range [0,max_log] and then
 // return "base" random bits.  The effect is to pick a number in the
 // range [0,2^max_log-1] with bias towards smaller numbers.
 int32 Skewed(int max_log);

 private:
 static const uint32 M = 2147483647L;   // 2^31-1
 uint32 seed_;
};

inline int32 ACMRandom::Next() {
 static const uint64 A = 16807;  // bits 14, 8, 7, 5, 2, 1, 0
 // We are computing
 //       seed_ = (seed_ * A) % M,    where M = 2^31-1
 //
 // seed_ must not be zero or M, or else all subsequent computed values
 // will be zero or M respectively.  For all other values, seed_ will end
 // up cycling through every number in [1,M-1]
 uint64 product = seed_ * A;

 // Compute (product % M) using the fact that ((x << 31) % M) == x.
 seed_ = (product >> 31) + (product & M);
 // The first reduction may overflow by 1 bit, so we may need to repeat.
 // mod == M is not possible; using > allows the faster sign-bit-based test.
 if (seed_ > M) {
   seed_ -= M;
 }
 return seed_;
}

inline int32 ACMRandom::Skewed(int max_log) {
 const int32 base = (Next() - 1) % (max_log+1);
 return (Next() - 1) & ((1u << base)-1);
```

```
}

// A wall-time clock. This stub is not super-accurate,
 nor resistant to the
// system time changing.
class CycleTimer {
public:
 CycleTimer() : real_time_us_(0) {}

 void Start() {
#ifdef WIN32
   QueryPerformanceCounter(&start_);
#else
   gettimeofday(&start_, NULL);
#endif
 }

 void Stop() {
#ifdef WIN32
   LARGE_INTEGER stop;
   LARGE_INTEGER frequency;
   QueryPerformanceCounter(&stop);
   QueryPerformanceFrequency(&frequency);

   double elapsed = static_cast<double>(stop.QuadPart - start_.QuadPart) /
       frequency.QuadPart;
   real_time_us_ += elapsed * 1e6 + 0.5;
#else
   struct timeval stop;
   gettimeofday(&stop, NULL);

   real_time_us_ += 1000000 * (stop.tv_sec - start_.tv_sec);
   real_time_us_ += (stop.tv_usec - start_.tv_usec);
#endif
 }

 double Get() {
   return real_time_us_ * 1e-6;
 }

private:
 int64 real_time_us_;
#ifdef WIN32
 LARGE_INTEGER start_;
#else
 struct timeval start_;
#endif
};
```

```
// Minimalistic microbenchmark framework.

typedef void (*BenchmarkFunction)(int, int);

class
 Benchmark {
public:
 Benchmark(const string& name, BenchmarkFunction function) :
     name_(name), function_(function) {}

 Benchmark* DenseRange(int start, int stop) {
   start_ = start;
   stop_ = stop;
   return this;
 }

 void Run();

private:
 const string name_;
 const BenchmarkFunction function_;
 int start_, stop_;
};
#define BENCHMARK(benchmark_name) \
 Benchmark* Benchmark_ ## benchmark_name = \
        (new Benchmark(#benchmark_name, benchmark_name))

extern Benchmark* Benchmark_BM_UFlat;
extern Benchmark* Benchmark_BM_UIOVec;
extern Benchmark* Benchmark_BM_UValidate;
extern Benchmark* Benchmark_BM_ZFlat;

void ResetBenchmarkTiming();
void StartBenchmarkTiming();
void StopBenchmarkTiming();
void SetBenchmarkLabel(const string& str);
void SetBenchmarkBytesProcessed(int64 bytes);

#ifdef HAVE_LIBZ

// Object-oriented wrapper around zlib.
class ZLib {
public:
 ZLib();
 ~ZLib();

 // Wipe a ZLib object to a virgin state.  This differs from Reset()
```

```
// in
that it also breaks any state.
void Reinit();

// Call this to make a zlib buffer as good as new.  Here's the only
// case where they differ:
//    CompressChunk(a); CompressChunk(b); CompressChunkDone();   vs
//    CompressChunk(a); Reset(); CompressChunk(b); CompressChunkDone();
// You'll want to use Reset(), then, when you interrupt a compress
// (or uncompress) in the middle of a chunk and want to start over.
void Reset();

// According to the zlib manual, when you Compress, the destination
// buffer must have size at least src + .1%*src + 12.  This function
// helps you calculate that.  Augment this to account for a potential
// gzip header and footer, plus a few bytes of slack.
static int MinCompressbufSize(int uncompress_size) {
  return uncompress_size + uncompress_size/1000 + 40;
}

// Compresses the source buffer into the destination buffer.
// sourceLen is the byte length of the source buffer.
// Upon entry, destLen is the total size of
the destination buffer,
// which must be of size at least MinCompressbufSize(sourceLen).
// Upon exit, destLen is the actual size of the compressed buffer.
//
// This function can be used to compress a whole file at once if the
// input file is mmap'ed.
//
// Returns Z_OK if success, Z_MEM_ERROR if there was not
// enough memory, Z_BUF_ERROR if there was not enough room in the
// output buffer. Note that if the output buffer is exactly the same
// size as the compressed result, we still return Z_BUF_ERROR.
// (check CL#1936076)
int Compress(Bytef *dest, uLongf *destLen,
             const Bytef *source, uLong sourceLen);

// Uncompresses the source buffer into the destination buffer.
// The destination buffer must be long enough to hold the entire
// decompressed contents.
//
// Returns Z_OK on success, otherwise, it returns a zlib error code.
int Uncompress(Bytef *dest, uLongf *destLen,
               const Bytef *source, uLong sourceLen);

//
```

```
Uncompress data one chunk at a time -- ie you can call this
// more than once.  To get this to work you need to call per-chunk
// and "done" routines.
//
// Returns Z_OK if success, Z_MEM_ERROR if there was not
// enough memory, Z_BUF_ERROR if there was not enough room in the
// output buffer.

int UncompressAtMost(Bytef *dest, uLongf *destLen,
                     const Bytef *source, uLong *sourceLen);

// Checks gzip footer information, as needed.  Mostly this just
// makes sure the checksums match.  Whenever you call this, it
// will assume the last 8 bytes from the previous UncompressChunk
// call are the footer.  Returns true iff everything looks ok.
bool UncompressChunkDone();

private:
int InflateInit();       // sets up the zlib inflate structure
int DeflateInit();       // sets up the zlib deflate structure

// These init the zlib data structures for compressing/uncompressing
int CompressInit(Bytef *dest, uLongf *destLen,

 const Bytef *source, uLong *sourceLen);
int UncompressInit(Bytef *dest, uLongf *destLen,
                   const Bytef *source, uLong *sourceLen);
// Initialization method to be called if we hit an error while
// uncompressing. On hitting an error, call this method before
// returning the error.
void UncompressErrorInit();

// Helper function for Compress
int CompressChunkOrAll(Bytef *dest, uLongf *destLen,
                       const Bytef *source, uLong sourceLen,
                       int flush_mode);
int CompressAtMostOrAll(Bytef *dest, uLongf *destLen,
                        const Bytef *source, uLong *sourceLen,
                        int flush_mode);

// Likewise for UncompressAndUncompressChunk
int UncompressChunkOrAll(Bytef *dest, uLongf *destLen,
                         const Bytef *source, uLong sourceLen,
                         int flush_mode);

int UncompressAtMostOrAll(Bytef *dest, uLongf *destLen,
                          const
```

```
 Bytef *source, uLong *sourceLen,
                        int flush_mode);

 // Initialization method to be called if we hit an error while
 // compressing. On hitting an error, call this method before
 // returning the error.
 void CompressErrorInit();

 int compression_level_;   // compression level
 int window_bits_;         // log base 2 of the window size used in compression
 int mem_level_;           // specifies the amount of memory to be used by
                        // compressor (1-9)
 z_stream comp_stream_;    // Zlib stream data structure
 bool comp_init_;          // True if we have initialized comp_stream_
 z_stream uncomp_stream_;  // Zlib stream data structure
 bool uncomp_init_;        // True if we have initialized uncomp_stream_

 // These are used only with chunked compression.
 bool first_chunk_;       // true if we need to emit headers with this chunk
};

#endif  // HAVE_LIBZ

}  // namespace snappy

DECLARE_bool(run_microbenchmarks);

static
 void RunSpecifiedBenchmarks() {
 if (!FLAGS_run_microbenchmarks) {
   return;
 }

 fprintf(stderr, "Running microbenchmarks.\n");
#ifndef NDEBUG
 fprintf(stderr, "WARNING: Compiled with assertions enabled, will be slow.\n");
#endif
#ifndef __OPTIMIZE__
 fprintf(stderr, "WARNING: Compiled without optimization, will be slow.\n");
#endif
 fprintf(stderr, "Benchmark            Time(ns)    CPU(ns) Iterations\n");
 fprintf(stderr, "---------------------------------------------------\n");

 snappy::Benchmark_BM_UFlat->Run();
 snappy::Benchmark_BM_UIOVec->Run();
 snappy::Benchmark_BM_UValidate->Run();
 snappy::Benchmark_BM_ZFlat->Run();
```

```
 fprintf(stderr, "\n");
}

#ifndef HAVE_GTEST

static inline int RUN_ALL_TESTS() {
 fprintf(stderr, "Running correctness tests.\n");
 snappy::Test_CorruptedTest_VerifyCorrupted();
 snappy::Test_Snappy_SimpleTests();
 snappy::Test_Snappy_MaxBlowup();
 snappy::Test_Snappy_RandomData();
 snappy::Test_Snappy_FourByteOffset();
 snappy::Test_SnappyCorruption_TruncatedVarint();
  snappy::Test_SnappyCorruption_UnterminatedVarint();
 snappy::Test_SnappyCorruption_OverflowingVarint();
 snappy::Test_Snappy_ReadPastEndOfBuffer();
 snappy::Test_Snappy_FindMatchLength();
 snappy::Test_Snappy_FindMatchLengthRandom();
 fprintf(stderr, "All tests passed.\n");

 return 0;
}

#endif  // HAVE_GTEST

// For main().
namespace snappy {

static void CompressFile(const char* fname);
static void UncompressFile(const char* fname);
static void MeasureFile(const char* fname);

// Logging.

#define LOG(level) LogMessage()
#define VLOG(level) true ? (void)0 : \
   snappy::LogMessageVoidify() & snappy::LogMessage()

class LogMessage {
public:
 LogMessage() { }
 ~LogMessage() {
   cerr << endl;
 }

 LogMessage& operator<<(const std::string& msg) {
   cerr << msg;
   return *this;
```

```
 }
 LogMessage& operator<<(int x) {
   cerr << x;
   return *this;
 }
};

// Asserts, both versions activated in debug mode only,
// and ones that are
 always active.

#define CRASH_UNLESS(condition) \
   PREDICT_TRUE(condition) ? (void)0 : \
   snappy::LogMessageVoidify() & snappy::LogMessageCrash()

#ifdef _MSC_VER
// ~LogMessageCrash calls abort() and therefore never exits. This is by design
// so temporarily disable warning C4722.
#pragma warning(push)
#pragma warning(disable:4722)
#endif

class LogMessageCrash : public LogMessage {
public:
 LogMessageCrash() { }
 ~LogMessageCrash() {
   cerr << endl;
   abort();
 }
};

#ifdef _MSC_VER
#pragma warning(pop)
#endif

// This class is used to explicitly ignore values in the conditional
// logging macros.  This avoids compiler warnings like "value computed
// is not used" and "statement has no effect".

class LogMessageVoidify {
public:
 LogMessageVoidify() { }
 // This has to be an operator with a precedence lower than << but
 // higher than ?:
 void operator&(const LogMessage&) { }
};

#define CHECK(cond) CRASH_UNLESS(cond)
```

```
#define CHECK_LE(a, b) CRASH_UNLESS((a) <= (b))
#define
 CHECK_GE(a, b) CRASH_UNLESS((a) >= (b))
#define CHECK_EQ(a, b) CRASH_UNLESS((a) == (b))
#define CHECK_NE(a, b) CRASH_UNLESS((a) != (b))
#define CHECK_LT(a, b) CRASH_UNLESS((a) < (b))
#define CHECK_GT(a, b) CRASH_UNLESS((a) > (b))
#define CHECK_OK(cond) (cond).CheckSuccess()

}  // namespace

using snappy::CompressFile;
using snappy::UncompressFile;
using snappy::MeasureFile;

#endif  // THIRD_PARTY_SNAPPY_OPENSOURCE_SNAPPY_TEST_H_
```

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replaced with your own identifying information. (Don't include
the brackets!) The
text should be enclosed in the appropriate
comment syntax for the file format. We also recommend that a
file or class name and description of purpose be included on the
same "printed page" as the copyright notice for easier
identification within third-party archives.

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distributed under the License is distributed on an "AS IS" BASIS,
WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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limitations under the License.
---
license:
  description: License Check
  include:
    - .
  exclude:
    # These paths need to be triaged.
    - build/pgo/js-input
    # License not super clear
    - browser/branding/
    # Trademark
    - browser/components/pocket/content/panels/
    - browser/extensions/pdfjs/content/web/images/
    # We probably want a specific license

```
    - browser/extensions/webcompat/injections/
    # Different license
    - build/pgo/blueprint/print.css
    # Different license
    - build/pgo/blueprint/screen.css
    # Empty files
    - config/external/nspr/_pl_bld.h
    - config/external/nspr/_pr_bld.h
    # Unknown origin
    - gfx/2d/MMIHelpers.h
    # might not work with license
    - gradle.properties
    # might not work with license
    - gradle/wrapper/gradle-wrapper.properties
    - mobile/android/components/extensions
    - mobile/android/geckoview/src/main/AndroidManifest.xml
     - mobile/android/geckoview/src/main/res/drawable/ic_generic_file.xml
    - mobile/android/geckoview_example/src/main
    # might not work with license
    - mobile/android/gradle/dotgradle-offline/gradle.properties
    # might not work with license
    - mobile/android/gradle/dotgradle-online/gradle.properties
    # Almost empty file
    - modules/libpref/greprefs.js
    - parser/html/java/named-character-references.html
    - python/mozlint/test/files/
    # By design
    - python/mozrelease/mozrelease
    - security/mac/hardenedruntime/browser.developer.entitlements.xml
    - security/mac/hardenedruntime/browser.production.entitlements.xml
    - security/mac/hardenedruntime/developer.entitlements.xml
    - security/mac/hardenedruntime/plugin-container.developer.entitlements.xml
    - security/mac/hardenedruntime/plugin-container.production.entitlements.xml
    - security/mac/hardenedruntime/production.entitlements.xml
     - servo/components/hashglobe/src/alloc.rs
    - servo/components/hashglobe/src/shim.rs
    - toolkit/components/reputationservice/chromium/chrome/common/safe_browsing/csd.pb.cc
    - toolkit/components/reputationservice/chromium/chrome/common/safe_browsing/csd.pb.h
    - toolkit/mozapps/update/updater/crctable.h
    - tools/lint/eslint/eslint-plugin-mozilla/lib/configs
    # By design
    - tools/lint/test/
extensions:
    - .c
    - .cc
    - .cpp
    - .css
    - .dtd
```

```
      - .ftl
      - .h
      - .html
      - .js
      - .jsm
      - .jsx
      - .m
      - .mm
      - .properties
      - .py
      - .rs
      - .svg
      - .xhtml
      - .xml
      - .xul
  support-files:
      - 'tools/lint/license/**'
  type: external
  payload: license:lint
  find-dotfiles: true
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: No text Element in license Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-010-ref.xht" />
  <meta name="assert" content="The license element does not contain a text child element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family:
 "WOFF Test";
    src: url("support/metadatadisplay-schema-license-010.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
```

```
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts" id="License ID" /&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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```
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limitations under the License.
// Common/DynamicBuffer.h

#ifndef __COMMON_DYNAMIC_BUFFER_H
#define __COMMON_DYNAMIC_BUFFER_H

template <class T> class CDynamicBuffer
{
 T *_items;
 size_t _size;
 size_t _pos;

 CDynamicBuffer(const CDynamicBuffer &buffer);
 void operator=(const CDynamicBuffer &buffer);

 void Grow(size_t size)
 {
  size_t delta = _size >= 64 ? _size : 64;
  if (delta < size)
    delta = size;
  size_t newCap = _size + delta;
  if (newCap < delta)
  {
    newCap = _size + size;
    if (newCap < size)
      throw 20120116;
  }

  T *newBuffer = new T[newCap];
  if (_pos != 0)
    memcpy(newBuffer, _items, _pos * sizeof(T));
  delete []_items;
  _items = newBuffer;
  _size = newCap;
 }

public:
 CDynamicBuffer(): _items(0), _size(0), _pos(0) {}
 // operator T *() { return _items; }
 operator const T *() const { return _items; }
 ~CDynamicBuffer() { delete []_items; }

 T *GetCurPtrAndGrow(size_t addSize)
```

```
 {
   size_t rem = _size - _pos;
   if (rem < addSize)
      Grow(addSize - rem);
   T *res = _items + _pos;
   _pos += addSize;
   return res;
 }

 void AddData(const T *data, size_t size)
 {
   memcpy(GetCurPtrAndGrow(size), data, size * sizeof(T));
 }

 const size_t GetPos() const { return _pos; }

 // void Empty() { _pos = 0; }
};

typedef CDynamicBuffer<unsigned char> CByteDynamicBuffer;

#endif
```

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IN
THE SOFTWARE.
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">

```
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With Nested span Elements in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-029-ref.xht" />
  <meta name="assert" content="The license element contains a text element that contains nested span elements." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-029.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
    &lt;span&gt;
     span 1 start
     &lt;span&gt;
      span 2 start
      &lt;span&gt;
       span 3
```

```
      &lt;/span&gt;
      span 2 end
     &lt;/span&gt;
     span 1 end
    &lt;/span&gt;
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
/* ATK -  Accessibility Toolkit
* Copyright 2001 Sun Microsystems Inc.
*
* This library is free software; you can redistribute it and/or
* modify it under the terms of the GNU Library General Public
* License as published by the Free Software Foundation; either
* version 2 of the License, or (at your option) any later version.
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*
* You should have received a copy of the GNU Library General Public
* License along with this library; if not, write to the
* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_SELECTION_H__
#define __ATK_SELECTION_H__

#include <atk/atkobject.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

/*
* This AtkSelection interface provides
 the standard mechanism for an
* assistive technology to determine what the current selected children are,
* as well as modify the selection set. Any object that has children that
* can be selected should support the AtkSelection interface.
*/

#define ATK_TYPE_SELECTION                    (atk_selection_get_type ())
```

```
#define ATK_IS_SELECTION(obj)                G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_SELECTION)
#define ATK_SELECTION(obj)                   G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_SELECTION, AtkSelection)
#define ATK_SELECTION_GET_IFACE(obj)         (G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_SELECTION, AtkSelectionIface))

#ifndef _TYPEDEF_ATK_SELECTION_
#define _TYPEDEF_ATK_SELECTION_
typedef struct _AtkSelection AtkSelection;
#endif
typedef struct _AtkSelectionIface AtkSelectionIface;

struct _AtkSelectionIface
{
 GTypeInterface parent;

 gboolean     (* add_selection)       (AtkSelection   *selection,

                  gint          i);
 gboolean     (* clear_selection)     (AtkSelection   *selection);
 AtkObject*   (* ref_selection)       (AtkSelection   *selection,
                                gint          i);
 gint        (* get_selection_count)  (AtkSelection   *selection);
 gboolean     (* is_child_selected)   (AtkSelection   *selection,
                                gint          i);
 gboolean     (* remove_selection)    (AtkSelection   *selection,
                                gint          i);
 gboolean     (* select_all_selection) (AtkSelection   *selection);

 /* signal handlers */

 void        (*selection_changed)     (AtkSelection   *selection);

 AtkFunction  pad1;
 AtkFunction  pad2;
};

GType atk_selection_get_type (void);

gboolean     atk_selection_add_selection       (AtkSelection   *selection,
                                    gint          i);

gboolean     atk_selection_clear_selection
     (AtkSelection   *selection);

AtkObject*   atk_selection_ref_selection       (AtkSelection   *selection,
                                    gint          i);
```

```
gint        atk_selection_get_selection_count  (AtkSelection   *selection);

gboolean    atk_selection_is_child_selected    (AtkSelection   *selection,
                                                gint           i);

gboolean    atk_selection_remove_selection     (AtkSelection   *selection,
                                                gint           i);

gboolean    atk_selection_select_all_selection (AtkSelection   *selection);

#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_SELECTION_H__ */
```

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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

At the time this file was first modified, a complete, unmodified copy of
the LPPL Work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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Esperanto hyphenation patterns

(more info about the licence to be added later)

% This file is part of hyph-utf8 package and resulted
 from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% See http://tug.org/tex-hyphen and other files in the package
%
% However, this file does not comply with rules of other patterns
% as it still uses TeX macros, and a dedicated converter would be needed
% to convert patterns into OponOffice-friendly form for example.
%
% But it should work OK with both 8-bit engines (TeX, pdfTeX, ...)
% as well as with native UTF-8 ones (XeTeX, LuaTeX, ...)
%
%-----------------------------------------------------------------------------
%
% \message{Esperanto Hyphenation Patterns `eohyph', 1999-08-10}
%
% Copyright (C) 1999 Sergei B. Pokrovsky <pok@iis.nsk.su>
%
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% version 1 of the License, or any later version.
%
% More documentation can be found near the end of this file.
%

```
\begingroup
%
 Makrooj por la finaoj:
\def\adj#1{#1a. #1aj. #1ajn. #1an. #1e.}
\edef\nom#1{\adj{#1} #1o. #1oj. #1ojn. #1on.}
\def\ver#1{#1as. #1i. #1is. #1os. #1u. #1us.}
%
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Invalid license Element With dir Attribute in div Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element that contains a div element with
INVALID as the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
                         Apache License
                    Version 2.0, January 2004
                 http://www.apache.org/licenses/
```

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```
PROG = 7z.sfx
MY_FIXED = 1

CFLAGS = $(CFLAGS) \
 -DNO_REGISTRY \
 -DEXTRACT_ONLY \
 -DNO_READ_FROM_CODER \
 -D_SFX \

!IFDEF UNDER_CE
LIBS = $(LIBS) ceshell.lib Commctrl.lib
!ELSE
```

```
LIBS = $(LIBS) comctl32.lib comdlg32.lib
!ENDIF

CURRENT_OBJS = \
 $O\SfxWin.obj \

GUI_OBJS = \
 $O\ExtractDialog.obj \
 $O\ExtractGUI.obj \

COMMON_OBJS = \
 $O\CRC.obj \
 $O\CommandLineParser.obj \
 $O\IntToString.obj \
 $O\NewHandler.obj \
 $O\MyString.obj \
 $O\StringConvert.obj \
 $O\MyVector.obj \
 $O\Wildcard.obj \

WIN_OBJS = \
 $O\CommonDialog.obj \
 $O\DLL.obj \
 $O\ErrorMsg.obj \
 $O\FileDir.obj \
 $O\FileFind.obj \
 $O\FileIO.obj \
 $O\FileName.obj \
 $O\PropVariant.obj \
 $O\PropVariantConv.obj \
 $O\ResourceString.obj \
 $O\Shell.obj \
 $O\Synchronization.obj \
 $O\System.obj \
 $O\Window.obj \

WIN_CTRL_OBJS = \
 $O\ComboBox.obj \
 $O\Dialog.obj \
 $O\ListView.obj \

7ZIP_COMMON_OBJS = \
 $O\CreateCoder.obj \
 $O\CWrappers.obj \
 $O\FilePathAutoRename.obj \
  $O\FileStreams.obj \
 $O\InBuffer.obj \
 $O\FilterCoder.obj \
```

```
 $O\LimitedStreams.obj \
 $O\OutBuffer.obj \
 $O\ProgressUtils.obj \
 $O\PropId.obj \
 $O\StreamBinder.obj \
 $O\StreamObjects.obj \
 $O\StreamUtils.obj \
 $O\VirtThread.obj \

UI_COMMON_OBJS = \
 $O\ArchiveExtractCallback.obj \
 $O\ArchiveOpenCallback.obj \
 $O\DefaultName.obj \
 $O\Extract.obj \
 $O\ExtractingFilePath.obj \
 $O\LoadCodecs.obj \
 $O\OpenArchive.obj \

EXPLORER_OBJS = \
 $O\MyMessages.obj \

FM_OBJS = \
 $O\BrowseDialog.obj \
 $O\ComboDialog.obj \
 $O\ExtractCallback.obj \
 $O\FormatUtils.obj \
 $O\OverwriteDialog.obj \
 $O\PasswordDialog.obj \
 $O\ProgressDialog2.obj \
 $O\PropertyName.obj \
 $O\SysIconUtils.obj \

AR_OBJS = \
 $O\SplitHandler.obj \

AR_COMMON_OBJS = \
 $O\CoderMixer2.obj \
 $O\ItemNameUtils.obj \
 $O\MultiStream.obj \
 $O\OutStreamWithCRC.obj \

7Z_OBJS = \
 $O\7zDecode.obj \
 $O\7zExtract.obj \
 $O\7zHandler.obj \
 $O\7zIn.obj \
 $O\7zRegister.obj \
```

```
COMPRESS_OBJS
 = \
 $O\Bcj2Coder.obj \
 $O\Bcj2Register.obj \
 $O\BcjCoder.obj \
 $O\BcjRegister.obj \
 $O\BranchMisc.obj \
 $O\BranchRegister.obj \
 $O\CopyCoder.obj \
 $O\CopyRegister.obj \
 $O\DeltaFilter.obj \
 $O\Lzma2Decoder.obj \
 $O\Lzma2Register.obj \
 $O\LzmaDecoder.obj \
 $O\LzmaRegister.obj \
 $O\PpmdDecoder.obj \
 $O\PpmdRegister.obj \

CRYPTO_OBJS = \
 $O\7zAes.obj \
 $O\7zAesRegister.obj \
 $O\MyAes.obj \

C_OBJS = \
 $O\Alloc.obj \
 $O\Bcj2.obj \
 $O\Bra.obj \
 $O\Bra86.obj \
 $O\BraIA64.obj \
 $O\CpuArch.obj \
 $O\Delta.obj \
 $O\DllSecur.obj \
 $O\Lzma2Dec.obj \
 $O\Lzma2DecMt.obj \
 $O\LzmaDec.obj \
 $O\MtDec.obj \
 $O\Ppmd7.obj \
 $O\Ppmd7Dec.obj \
 $O\Sha256.obj \
 $O\Threads.obj \

!include "../../Aes.mak"
!include "../../Crc.mak"
!include "../../LzmaDec.mak"

!include "../../7zip.mak"
```

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```
/// The datatype used for the ioctl number
#[doc(hidden)]
pub type ioctl_num_type = ::libc::c_ulong;
/// The datatype used for the 3rd argument
#[doc(hidden)]
pub type ioctl_param_type = ::libc::c_int;

mod consts {
  use ::sys::ioctl::ioctl_num_type;
  #[doc(hidden)]
  pub const VOID: ioctl_num_type = 0x2000_0000;
  #[doc(hidden)]
  pub const OUT: ioctl_num_type = 0x4000_0000;
  #[doc(hidden)]
  pub const IN: ioctl_num_type = 0x8000_0000;
  #[doc(hidden)]
  pub const INOUT: ioctl_num_type = (IN|OUT);
  #[doc(hidden)]
  pub const IOCPARM_MASK: ioctl_num_type = 0x1fff;
}

pub use self::consts::*;

#[macro_export]
#[doc(hidden)]
macro_rules! ioc {
  ($inout:expr, $group:expr, $num:expr, $len:expr) => (
    $inout | (($len as $crate::sys::ioctl::ioctl_num_type & $crate::sys::ioctl::IOCPARM_MASK) << 16) | (($group
as $crate::sys::ioctl::ioctl_num_type) << 8) | ($num as $crate::sys::ioctl::ioctl_num_type)
  )
}

/// Generate an ioctl request code for a command that
 passes no data.
///
/// This is equivalent to the `_IO()` macro exposed by the C ioctl API.
```

```
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_none!()` directly.
///
/// # Example
///
/// ```
/// # #[macro_use] extern crate nix;
/// const KVMIO: u8 = 0xAE;
/// ioctl_write_int_bad!(kvm_create_vm, request_code_none!(KVMIO, 0x03));
/// # fn main() {}
/// ```
#[macro_export]
macro_rules! request_code_none {
   ($g:expr, $n:expr) => (ioc!($crate::sys::ioctl::VOID, $g, $n, 0))
}

/// Generate an ioctl request code for a command that passes an integer
///
/// This is equivalent to the `_IOWINT()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write_int!()` directly.
#[macro_export]
macro_rules! request_code_write_int {
   ($g:expr, $n:expr) => (ioc!($crate::sys::ioctl::VOID, $g, $n, ::std::mem::size_of::<$crate::libc::c_int>()))
}

///
 Generate an ioctl request code for a command that reads.
///
/// This is equivalent to the `_IOR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_read!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is reading and the kernel is
/// writing.
#[macro_export]
macro_rules! request_code_read {
   ($g:expr, $n:expr, $len:expr) => (ioc!($crate::sys::ioctl::OUT, $g, $n, $len))
}

/// Generate an ioctl request code for a command that writes.
///
/// This is equivalent to the `_IOW()` macro exposed by the C ioctl API.
///
```

```
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is writing and the kernel is
/// reading.
#[macro_export]
macro_rules!
 request_code_write {
   ($g:expr, $n:expr, $len:expr) => (ioc!($crate::sys::ioctl::IN, $g, $n, $len))
}

/// Generate an ioctl request code for a command that reads and writes.
///
/// This is equivalent to the `_IOWR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_readwrite!()` directly.
#[macro_export]
macro_rules! request_code_readwrite {
   ($g:expr, $n:expr, $len:expr) => (ioc!($crate::sys::ioctl::INOUT, $g, $n, $len))
}
!IFDEF ASM_OBJS
!IF "$(CPU)" == "ARM"
$(ASM_OBJS): ../../../../Asm/Arm/$(*B).asm
 $(COMPL_ASM)
!ELSEIF "$(CPU)" != "IA64" && "$(CPU)" != "MIPS" && "$(CPU)" != "ARM64"
$(ASM_OBJS): ../../../../Asm/x86/$(*B).asm
 $(COMPL_ASM)
!ENDIF
!ENDIF
```

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Coverage.py was originally written by Gareth Rees, and since 2004 has been
extended and maintained by Ned Batchelder.

Other contributions, including writing code, updating docs, and submitting
useful bug reports, have been made by:

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Adi Roiban
Agbonze O. Jeremiah
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Stephen Finucane
Steve Leonard
Steve Peak
S. Y. Lee
Ted Wexler
Thijs
Triemstra
Titus Brown
Ville Skytt

Yury Selivanov
Zac Hatfield-Dodds
Zooko Wilcox-O'Hearn


```
<?xml version="1.0" encoding="utf-8"?>
<Project DefaultTargets="Build" ToolsVersion="15.0"
xmlns="http://schemas.microsoft.com/developer/msbuild/2003">
 <ItemGroup Label="ProjectConfigurations">
  <ProjectConfiguration Include="Debug|Win32">
   <Configuration>Debug</Configuration>
   <Platform>Win32</Platform>
  </ProjectConfiguration>
  <ProjectConfiguration Include="Release|Win32">
   <Configuration>Release</Configuration>
   <Platform>Win32</Platform>
  </ProjectConfiguration>
  <ProjectConfiguration Include="Debug|x64">
   <Configuration>Debug</Configuration>
   <Platform>x64</Platform>
  </ProjectConfiguration>
  <ProjectConfiguration Include="Release|x64">
   <Configuration>Release</Configuration>
   <Platform>x64</Platform>
  </ProjectConfiguration>
 </ItemGroup>
 <PropertyGroup Label="Globals">
  <VCProjectVersion>15.0</VCProjectVersion>
  <ProjectGuid>{83D56BCB-B9D1-44AB-BC96-9EA8A645CB0D}</ProjectGuid>
  <Keyword>Win32Proj</Keyword>
   <RootNamespace>CertCheck</RootNamespace>
  <WindowsTargetPlatformVersion>10.0.15063.0</WindowsTargetPlatformVersion>
 </PropertyGroup>
 <Import Project="$(VCTargetsPath)\Microsoft.Cpp.Default.props" />
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'" Label="Configuration">
  <ConfigurationType>DynamicLibrary</ConfigurationType>
  <UseDebugLibraries>true</UseDebugLibraries>
  <PlatformToolset>v141</PlatformToolset>
  <CharacterSet>Unicode</CharacterSet>
 </PropertyGroup>
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'" Label="Configuration">
  <ConfigurationType>DynamicLibrary</ConfigurationType>
  <UseDebugLibraries>false</UseDebugLibraries>
  <PlatformToolset>v141</PlatformToolset>
  <WholeProgramOptimization>true</WholeProgramOptimization>
  <CharacterSet>Unicode</CharacterSet>
 </PropertyGroup>
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Debug|x64'" Label="Configuration">
  <ConfigurationType>DynamicLibrary</ConfigurationType>
```

```
    <UseDebugLibraries>true</UseDebugLibraries>
   <PlatformToolset>v141</PlatformToolset>
   <CharacterSet>Unicode</CharacterSet>
  </PropertyGroup>
  <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Release|x64'" Label="Configuration">
   <ConfigurationType>DynamicLibrary</ConfigurationType>
   <UseDebugLibraries>false</UseDebugLibraries>
   <PlatformToolset>v141</PlatformToolset>
   <WholeProgramOptimization>true</WholeProgramOptimization>
   <CharacterSet>Unicode</CharacterSet>
  </PropertyGroup>
  <Import Project="$(VCTargetsPath)\Microsoft.Cpp.props" />
  <ImportGroup Label="ExtensionSettings">
  </ImportGroup>
  <ImportGroup Label="Shared">
  </ImportGroup>
  <ImportGroup Label="PropertySheets" Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'">
   <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform"
 />
  </ImportGroup>
  <ImportGroup Label="PropertySheets" Condition="'$(Configuration)|$(Platform)'=='Release|Win32'">
   <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform" />
  </ImportGroup>
  <ImportGroup Label="PropertySheets" Condition="'$(Configuration)|$(Platform)'=='Debug|x64'">
   <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform" />
  </ImportGroup>
  <ImportGroup Label="PropertySheets" Condition="'$(Configuration)|$(Platform)'=='Release|x64'">
   <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform" />
  </ImportGroup>
  <PropertyGroup Label="UserMacros" />
  <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'"
 />
  <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Debug|x64'" />
  <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'">
   <LinkIncremental>false</LinkIncremental>
  </PropertyGroup>
  <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Release|x64'">
   <LinkIncremental>false</LinkIncremental>
  </PropertyGroup>
  <ItemDefinitionGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'">
   <ClCompile>
    <PrecompiledHeader>NotUsing</PrecompiledHeader>
    <WarningLevel>Level3</WarningLevel>
    <Optimization>Disabled</Optimization>
```

```
    <SDLCheck>false</SDLCheck>
<PreprocessorDefinitions>WIN32;_DEBUG;CERTCHECK_EXPORTS;_WINDOWS;_USRDLL;%(Preprocessor
Definitions)</PreprocessorDefinitions>
    <RuntimeLibrary>MultiThreadedDebug</RuntimeLibrary>
    <BufferSecurityCheck>false</BufferSecurityCheck>
    <BasicRuntimeChecks>Default</BasicRuntimeChecks>
  </ClCompile>
  <Link>
    <SubSystem>Windows</SubSystem>
     <GenerateDebugInformation>true</GenerateDebugInformation>
    <EntryPointSymbol>DllMain</EntryPointSymbol>
    <LinkTimeCodeGeneration>Default</LinkTimeCodeGeneration>
  </Link>
 </ItemDefinitionGroup>
 <ItemDefinitionGroup Condition="'$(Configuration)|$(Platform)'=='Debug|x64'">
  <ClCompile>
    <PrecompiledHeader>NotUsing</PrecompiledHeader>
    <WarningLevel>Level3</WarningLevel>
    <Optimization>Disabled</Optimization>
    <SDLCheck>false</SDLCheck>
<PreprocessorDefinitions>_DEBUG;CERTCHECK_EXPORTS;_WINDOWS;_USRDLL;%(PreprocessorDefinitio
ns)</PreprocessorDefinitions>
    <RuntimeLibrary>MultiThreadedDebug</RuntimeLibrary>
    <BufferSecurityCheck>false</BufferSecurityCheck>
    <BasicRuntimeChecks>Default</BasicRuntimeChecks>
  </ClCompile>
  <Link>
    <SubSystem>Windows</SubSystem>
    <GenerateDebugInformation>true</GenerateDebugInformation>
    <EntryPointSymbol>DllMain</EntryPointSymbol>
    <LinkTimeCodeGeneration>Default</LinkTimeCodeGeneration>
   </Link>
 </ItemDefinitionGroup>
 <ItemDefinitionGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'">
  <ClCompile>
    <PrecompiledHeader>NotUsing</PrecompiledHeader>
    <WarningLevel>Level3</WarningLevel>
    <Optimization>MaxSpeed</Optimization>
    <FunctionLevelLinking>true</FunctionLevelLinking>
    <IntrinsicFunctions>true</IntrinsicFunctions>
    <SDLCheck>false</SDLCheck>
<PreprocessorDefinitions>WIN32;NDEBUG;CERTCHECK_EXPORTS;_WINDOWS;_USRDLL;%(Preprocessor
Definitions)</PreprocessorDefinitions>
    <RuntimeLibrary>MultiThreaded</RuntimeLibrary>
    <OmitDefaultLibName>true</OmitDefaultLibName>
    <BufferSecurityCheck>false</BufferSecurityCheck>
    <WholeProgramOptimization>false</WholeProgramOptimization>
  </ClCompile>
```

```
  <Link>
    <SubSystem>Windows</SubSystem>
    <EnableCOMDATFolding>true</EnableCOMDATFolding>
    <OptimizeReferences>true</OptimizeReferences>

 <EntryPointSymbol>DllMain</EntryPointSymbol>
    <LinkTimeCodeGeneration>Default</LinkTimeCodeGeneration>
    <GenerateDebugInformation>false</GenerateDebugInformation>
  </Link>
 </ItemDefinitionGroup>
 <ItemDefinitionGroup Condition="'$(Configuration)|$(Platform)'=='Release|x64'">
  <ClCompile>
    <PrecompiledHeader>NotUsing</PrecompiledHeader>
    <WarningLevel>Level3</WarningLevel>
    <Optimization>MaxSpeed</Optimization>
    <FunctionLevelLinking>true</FunctionLevelLinking>
    <IntrinsicFunctions>true</IntrinsicFunctions>
    <SDLCheck>false</SDLCheck>
<PreprocessorDefinitions>NDEBUG;CERTCHECK_EXPORTS;_WINDOWS;_USRDLL;%(PreprocessorDefinitio
ns)</PreprocessorDefinitions>
    <RuntimeLibrary>MultiThreaded</RuntimeLibrary>
    <OmitDefaultLibName>true</OmitDefaultLibName>
    <BufferSecurityCheck>false</BufferSecurityCheck>
    <WholeProgramOptimization>false</WholeProgramOptimization>
  </ClCompile>
  <Link>
    <SubSystem>Windows</SubSystem>
     <EnableCOMDATFolding>true</EnableCOMDATFolding>
    <OptimizeReferences>true</OptimizeReferences>
    <EntryPointSymbol>DllMain</EntryPointSymbol>
    <LinkTimeCodeGeneration>Default</LinkTimeCodeGeneration>
    <GenerateDebugInformation>false</GenerateDebugInformation>
  </Link>
 </ItemDefinitionGroup>
 <ItemGroup>
  <ClCompile Include="CertCheck.cpp" />
 </ItemGroup>
 <Import Project="$(VCTargetsPath)\Microsoft.Cpp.targets" />
 <ImportGroup Label="ExtensionTargets">
 </ImportGroup>
</Project>
```

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```
// Windows/FileSystem.h

#ifndef __WINDOWS_FILE_SYSTEM_H
#define __WINDOWS_FILE_SYSTEM_H

#include "../Common/MyString.h"
#include "../Common/MyTypes.h"

namespace NWindows {
namespace NFile {
namespace NSystem {
```

```
bool MyGetVolumeInformation(
  CFSTR rootPath  ,
  UString &volumeName,
  LPDWORD volumeSerialNumber,
  LPDWORD maximumComponentLength,
  LPDWORD fileSystemFlags,
  UString &fileSystemName);

UINT MyGetDriveType(CFSTR pathName);

bool MyGetDiskFreeSpace(CFSTR rootPath, UInt64 &clusterSize, UInt64 &totalSize, UInt64 &freeSize);

}}}

#endif
```

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(more info about the licence to be added later)

```
% This file is part of hyph-utf8
 package and resulted from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% Source: sorhyph.tex (1997-05-07)
% Author: E. Werner
%
% The above mentioned file should become obsolete,
```

```
% and the author of the original file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
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%
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% we would be grateful if you could send it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
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% please try to follow some guidelines if possible:
%
% - \lccode is *forbidden*, and I really mean it
% - all the patterns should be in UTF-8
% - the only "allowed"
 TeX commands in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
```

```
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
%-----------------------------------------------------------------------------
%
% Copyright 1997 by E.Werner
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% conditions of the LaTeX Project Public License, either version 1.3a
% of this license or (at your option) any later version.
% The latest version of this license is in
%   http://www.latex-project.org/lppl.txt
% and version 1.3 or
 later is part of all distributions of LaTeX
% version 2005/12/01 or later.
% \message{Hyphenation patterns for Upper Sorbian, E. Werner}
% \message{Completely new revision 1997, March 22}
%
%  - ccaron
%  - cacute
%  - ecaron
%  - lslash
%  - nacute
%  - oacute
%  - rcaron
%  - scaron
%  - zcaron
%  - zacute
%
```

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http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

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% This file is part of hyph-utf8 package and resulted
 from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% Source: TODO:WRITEME (2003-03-10)
% Author: Alexander I. Lebedev <swan at scon155.phys.msu.su>
%
% The above mentioned file should become obsolete,
% and the author of the original file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%  and helped with testing, suggestions and bug reports
% - Norbert Preining, who tested
 & integrated patterns into TeX Live
%
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%
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%  plese remove all of the TUG comments & credits that we added here -
%  you are the Queen / the King, we are only the servants.
%
% If you want to change this file, rather than uploading directly to CTAN,
% we would be grateful if you could send it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
% Before a new "pattern-revolution" starts,
% please try to follow some guidelines if possible:

```
%
% - \lccode is *forbidden*, and I really mean it
% - all the patterns should be in
 UTF-8
% - the only "allowed" TeX commands in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
%-----------------------------------------------------------------------------
%
% Russian hyphenation patterns, version 2003/03/10
% Copyright 1999-2003 Alexander I. Lebedev <swan@scon155.phys.msu.su>
%
% This program may be distributed and/or modified under the conditions
% of the LaTeX Project Public License, either version 1.2 or any later
% version.
%
% Patterns were
 generated with patgen from a 990,000-word list and then
% manually corrected.
%
% The program consists of the files ruhyphal.tex, cyryoal.tex and two
% document files README.ruhyphal and hyphen.rules.  The file cyryoal.tex
% can be regenerated using mkcyryo script (a part of ruhyphen package)
% and the latest release of rus-ispell dictionaries
% <ftp://scon155.phys.msu.su/pub/russian/ispell/>.
```

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specific language governing permissions and limitations under the License.
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With dir Attribute in text Element 2</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element with rtl as the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre
 {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  Test passes if the word PASS appears below.
  The Extended Metadata Block is valid and may be displayed to the user upon request.
  P
  The XML contained in the Extended Metadata Block is below.
  <pre>
<?xml version="1.0" encoding="UTF-8"?>
<metadata version="1.0">
 <license url="http://w3c.org/Fonts">
  <text dir="rtl">
   License without language.
  </text>
 </license>
</metadata>
  </pre>
 </body>

```
</html>
// IFileExtractCallback.h

#ifndef __I_FILE_EXTRACT_CALLBACK_H
#define __I_FILE_EXTRACT_CALLBACK_H

#include "../../../Common/MyString.h"

#include "../../IDecl.h"

#include "LoadCodecs.h"
#include "OpenArchive.h"

namespace NOverwriteAnswer
{
 enum EEnum
 {
   kYes,
   kYesToAll,
   kNo,
   kNoToAll,
   kAutoRename,
   kCancel
 };
}


/* ---------- IFolderArchiveExtractCallback ----------
is implemented by
 Console/ExtractCallbackConsole.h  CExtractCallbackConsole
 FileManager/ExtractCallback.h     CExtractCallbackImp
 FAR/ExtractEngine.cpp             CExtractCallBackImp: (QueryInterface is not supported)

IID_IFolderArchiveExtractCallback is requested by:
 - Agent/ArchiveFolder.cpp
     CAgentFolder::CopyTo(..., IFolderOperationsExtractCallback *callback)
     is sent to IArchiveFolder::Extract()

 - FileManager/PanelCopy.cpp
     CPanel::CopyTo(), if (options->testMode)
     is sent to IArchiveFolder::Extract()

IFolderArchiveExtractCallback is used by Common/ArchiveExtractCallback.cpp
*/

#define
 INTERFACE_IFolderArchiveExtractCallback(x) \
 STDMETHOD(AskOverwrite)( \
```

```
    const wchar_t *existName, const FILETIME *existTime, const UInt64 *existSize, \
    const wchar_t *newName, const FILETIME *newTime, const UInt64 *newSize, \
    Int32 *answer) x; \
 STDMETHOD(PrepareOperation)(const wchar_t *name, Int32 isFolder, Int32 askExtractMode, const UInt64
*position) x; \
 STDMETHOD(MessageError)(const wchar_t *message) x; \
 STDMETHOD(SetOperationResult)(Int32 opRes, Int32 encrypted) x; \

DECL_INTERFACE_SUB(IFolderArchiveExtractCallback, IProgress, 0x01, 0x07)
{
 INTERFACE_IFolderArchiveExtractCallback(PURE)
};

#define INTERFACE_IFolderArchiveExtractCallback2(x) \
 STDMETHOD(ReportExtractResult)(Int32 opRes, Int32 encrypted, const wchar_t *name) x; \

DECL_INTERFACE_SUB(IFolderArchiveExtractCallback2, IUnknown, 0x01, 0x08)
{
 INTERFACE_IFolderArchiveExtractCallback2(PURE)
};

/* ---------- IExtractCallbackUI ----------
is implemented
 by
 Console/ExtractCallbackConsole.h  CExtractCallbackConsole
 FileManager/ExtractCallback.h     CExtractCallbackImp
*/

#ifdef _NO_CRYPTO
 #define INTERFACE_IExtractCallbackUI_Crypto(x)
#else
 #define INTERFACE_IExtractCallbackUI_Crypto(x) \
 virtual HRESULT SetPassword(const UString &password) x;
#endif

#define INTERFACE_IExtractCallbackUI(x) \
 virtual HRESULT BeforeOpen(const wchar_t *name, bool testMode) x; \
 virtual HRESULT OpenResult(const CCodecs *codecs, const CArchiveLink &arcLink, const wchar_t *name,
HRESULT result) x; \
 virtual HRESULT ThereAreNoFiles() x; \
 virtual HRESULT ExtractResult(HRESULT result) x; \
 INTERFACE_IExtractCallbackUI_Crypto(x)

struct IExtractCallbackUI: IFolderArchiveExtractCallback
{
 INTERFACE_IExtractCallbackUI(PURE)
};
```

```
#define INTERFACE_IGetProp(x) \
 STDMETHOD(GetProp)(PROPID propID, PROPVARIANT *value) x; \

DECL_INTERFACE_SUB(IGetProp, IUnknown, 0x01, 0x20)
{
 INTERFACE_IGetProp(PURE)
};

#define INTERFACE_IFolderExtractToStreamCallback(x)
 \
 STDMETHOD(UseExtractToStream)(Int32 *res) x; \
 STDMETHOD(GetStream7)(const wchar_t *name, Int32 isDir, ISequentialOutStream **outStream, Int32
askExtractMode, IGetProp *getProp) x; \
 STDMETHOD(PrepareOperation7)(Int32 askExtractMode) x; \
 STDMETHOD(SetOperationResult7)(Int32 resultEOperationResult, Int32 encrypted) x; \

DECL_INTERFACE_SUB(IFolderExtractToStreamCallback, IUnknown, 0x01, 0x30)
{
 INTERFACE_IFolderExtractToStreamCallback(PURE)
};


#endif
```

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```
/* Ppmd.h -- PPMD codec common code
2017-04-03 : Igor Pavlov : Public domain
```

```
This code is based on PPMd var.H (2001): Dmitry Shkarin : Public domain */

#ifndef __PPMD_H
#define __PPMD_H

#include "CpuArch.h"

EXTERN_C_BEGIN

#ifdef MY_CPU_32BIT
 #define PPMD_32BIT
#endif

#define PPMD_INT_BITS 7
#define PPMD_PERIOD_BITS 7
#define PPMD_BIN_SCALE (1 << (PPMD_INT_BITS + PPMD_PERIOD_BITS))

#define PPMD_GET_MEAN_SPEC(summ, shift, round) (((summ) + (1 << ((shift) - (round)))) >> (shift))
#define PPMD_GET_MEAN(summ) PPMD_GET_MEAN_SPEC((summ), PPMD_PERIOD_BITS, 2)
#define PPMD_UPDATE_PROB_0(prob) ((prob) + (1 << PPMD_INT_BITS) - PPMD_GET_MEAN(prob))
#define PPMD_UPDATE_PROB_1(prob) ((prob) - PPMD_GET_MEAN(prob))

#define PPMD_N1 4
#define PPMD_N2 4
#define PPMD_N3 4
#define PPMD_N4 ((128 + 3 - 1 * PPMD_N1 - 2 * PPMD_N2 - 3 * PPMD_N3) / 4)
#define PPMD_NUM_INDEXES (PPMD_N1 + PPMD_N2 + PPMD_N3 + PPMD_N4)

#pragma pack(push, 1)
/* Most compilers works OK here even without #pragma pack(push, 1),
 but some GCC compilers need it. */

/* SEE-contexts for PPM-contexts with masked symbols */
typedef struct
{
 UInt16 Summ; /* Freq */
 Byte Shift;  /* Speed of Freq change; low Shift is for fast change */
 Byte Count;  /* Count to next change of Shift */
} CPpmd_See;

#define Ppmd_See_Update(p)  if ((p)->Shift < PPMD_PERIOD_BITS && --(p)->Count == 0) \
   { (p)->Summ <<= 1; (p)->Count = (Byte)(3 << (p)->Shift++); }

typedef struct
{
 Byte Symbol;
 Byte Freq;
 UInt16 SuccessorLow;
```

```
 UInt16 SuccessorHigh;
} CPpmd_State;

#pragma pack(pop)

typedef
 #ifdef PPMD_32BIT
   CPpmd_State *
 #else
   UInt32
 #endif
 CPpmd_State_Ref;

typedef
 #ifdef PPMD_32BIT
   void *
 #else
   UInt32
 #endif
 CPpmd_Void_Ref;

typedef
 #ifdef PPMD_32BIT
   Byte *
 #else
   UInt32
 #endif
 CPpmd_Byte_Ref;

#define PPMD_SetAllBitsIn256Bytes(p) \
 { size_t z; for (z = 0; z < 256 / sizeof(p[0]); z += 8) { \
 p[z+7] = p[z+6] = p[z+5] = p[z+4] = p[z+3] = p[z+2] = p[z+1] = p[z+0] = ~(size_t)0;
 }}

EXTERN_C_END

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With One Language Tagged text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
```

```
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-002-ref.xht" />
  <meta name="assert" content="The copyright element matches the schema. It contains one text element that has a
language tag." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-002.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text xml:lang="en"&gt;
   Copyright with "en" language.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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fields of use.

This reference implementation is originally derived from the On2 VP3
Codec Software, and the Theora video format is essentially compatible
with the VP3 video format, consisting of a backward-compatible superset.

```
/* LzmaDec.h -- LZMA Decoder
2018-04-21 : Igor Pavlov : Public domain */

#ifndef __LZMA_DEC_H
#define __LZMA_DEC_H

#include "7zTypes.h"

EXTERN_C_BEGIN

/* #define _LZMA_PROB32 */
/* _LZMA_PROB32 can increase the speed on some CPUs,
  but memory usage for CLzmaDec::probs will be doubled in that case */

typedef
#ifdef _LZMA_PROB32
 UInt32
#else
 UInt16
#endif
 CLzmaProb;


/* ---------- LZMA Properties ---------- */

#define LZMA_PROPS_SIZE 5

typedef struct _CLzmaProps
{
 Byte lc;
 Byte lp;
 Byte pb;
 Byte _pad_;
 UInt32 dicSize;
} CLzmaProps;

/* LzmaProps_Decode - decodes properties
```

```
Returns:
 SZ_OK
 SZ_ERROR_UNSUPPORTED - Unsupported properties
*/

SRes LzmaProps_Decode(CLzmaProps *p, const Byte *data, unsigned size);


/* ---------- LZMA Decoder state ---------- */

/* LZMA_REQUIRED_INPUT_MAX = number of required input bytes for worst case.
  Num bits = log2((2^11 / 31) ^ 22) + 26 < 134 + 26 = 160; */

#define LZMA_REQUIRED_INPUT_MAX 20

typedef struct
{
 /* Don't change
 this structure. ASM code can use it. */
 CLzmaProps prop;
 CLzmaProb *probs;
 CLzmaProb *probs_1664;
 Byte *dic;
 SizeT dicBufSize;
 SizeT dicPos;
 const Byte *buf;
 UInt32 range;
 UInt32 code;
 UInt32 processedPos;
 UInt32 checkDicSize;
 UInt32 reps[4];
 UInt32 state;
 UInt32 remainLen;

 UInt32 numProbs;
 unsigned tempBufSize;
 Byte tempBuf[LZMA_REQUIRED_INPUT_MAX];
} CLzmaDec;

#define LzmaDec_Construct(p) { (p)->dic = NULL; (p)->probs = NULL; }

void LzmaDec_Init(CLzmaDec *p);

/* There are two types of LZMA streams:
   - Stream with end mark. That end mark adds about 6 bytes to compressed size.
   - Stream without end mark. You must know exact uncompressed size to decompress such stream. */

typedef enum
```

```
{
 LZMA_FINISH_ANY,   /* finish at any point */
 LZMA_FINISH_END    /* block must be finished at the end */
} ELzmaFinishMode;

/* ELzmaFinishMode has meaning only if the decoding reaches output limit !!!

  You must use LZMA_FINISH_END, when you know that
 current output buffer
  covers last bytes of block. In other cases you must use LZMA_FINISH_ANY.

  If LZMA decoder sees end marker before reaching output limit, it returns SZ_OK,
  and output value of destLen will be less than output buffer size limit.
  You can check status result also.

  You can use multiple checks to test data integrity after full decompression:
    1) Check Result and "status" variable.
    2) Check that output(destLen) = uncompressedSize, if you know real uncompressedSize.
    3) Check that output(srcLen) = compressedSize, if you know real compressedSize.
       You must use correct finish mode in that case. */

typedef enum
{
 LZMA_STATUS_NOT_SPECIFIED,              /* use main error code instead */
 LZMA_STATUS_FINISHED_WITH_MARK,          /* stream was finished with end mark. */
 LZMA_STATUS_NOT_FINISHED,               /* stream was not finished */
 LZMA_STATUS_NEEDS_MORE_INPUT,            /* you must provide more input bytes */
 LZMA_STATUS_MAYBE_FINISHED_WITHOUT_MARK
  /* there is probability that stream was finished without end mark */
} ELzmaStatus;

/* ELzmaStatus is used only as output value for function call */


/* ---------- Interfaces ---------- */

/* There are 3 levels of interfaces:
    1) Dictionary Interface
    2) Buffer Interface
    3) One Call Interface
  You can select any of these interfaces, but don't mix functions from different
  groups for same object. */


/* There are two variants to allocate state for Dictionary Interface:
    1) LzmaDec_Allocate / LzmaDec_Free
    2) LzmaDec_AllocateProbs / LzmaDec_FreeProbs
  You can use variant 2, if you set dictionary buffer manually.
```

```
  For Buffer Interface you must always use variant 1.

LzmaDec_Allocate* can return:
 SZ_OK
 SZ_ERROR_MEM         - Memory allocation error
 SZ_ERROR_UNSUPPORTED - Unsupported properties
*/

SRes LzmaDec_AllocateProbs(CLzmaDec *p, const Byte *props, unsigned propsSize, ISzAllocPtr alloc);
void LzmaDec_FreeProbs(CLzmaDec
 *p, ISzAllocPtr alloc);

SRes LzmaDec_Allocate(CLzmaDec *p, const Byte *props, unsigned propsSize, ISzAllocPtr alloc);
void LzmaDec_Free(CLzmaDec *p, ISzAllocPtr alloc);

/* ---------- Dictionary Interface ---------- */

/* You can use it, if you want to eliminate the overhead for data copying from
  dictionary to some other external buffer.
  You must work with CLzmaDec variables directly in this interface.

  STEPS:
    LzmaDec_Construct()
    LzmaDec_Allocate()
    for (each new stream)
    {
      LzmaDec_Init()
      while (it needs more decompression)
      {
        LzmaDec_DecodeToDic()
        use data from CLzmaDec::dic and update CLzmaDec::dicPos
      }
    }
    LzmaDec_Free()
*/

/* LzmaDec_DecodeToDic

  The decoding to internal dictionary buffer (CLzmaDec::dic).
  You must manually update CLzmaDec::dicPos, if it reaches CLzmaDec::dicBufSize !!!

finishMode:
 It has meaning only if the decoding reaches output limit (dicLimit).
 LZMA_FINISH_ANY
 - Decode just dicLimit bytes.
 LZMA_FINISH_END - Stream must be finished after dicLimit.

Returns:
```

```
 SZ_OK
   status:
     LZMA_STATUS_FINISHED_WITH_MARK
     LZMA_STATUS_NOT_FINISHED
     LZMA_STATUS_NEEDS_MORE_INPUT
     LZMA_STATUS_MAYBE_FINISHED_WITHOUT_MARK
 SZ_ERROR_DATA - Data error
*/

SRes LzmaDec_DecodeToDic(CLzmaDec *p, SizeT dicLimit,
   const Byte *src, SizeT *srcLen, ELzmaFinishMode finishMode, ELzmaStatus *status);


/* ---------- Buffer Interface ---------- */

/* It's zlib-like interface.
  See LzmaDec_DecodeToDic description for information about STEPS and return results,
  but you must use LzmaDec_DecodeToBuf instead of LzmaDec_DecodeToDic and you don't need
  to work with CLzmaDec variables manually.

finishMode:
 It has meaning only if the decoding reaches output limit (*destLen).
 LZMA_FINISH_ANY - Decode just destLen bytes.
 LZMA_FINISH_END - Stream must be finished after (*destLen).
*/

SRes LzmaDec_DecodeToBuf(CLzmaDec *p, Byte *dest, SizeT *destLen,
    const Byte *src, SizeT *srcLen, ELzmaFinishMode finishMode, ELzmaStatus *status);


/* ---------- One Call Interface ---------- */

/* LzmaDecode

finishMode:
 It has meaning only if the decoding reaches output limit (*destLen).
 LZMA_FINISH_ANY - Decode just destLen bytes.
 LZMA_FINISH_END - Stream must be finished after (*destLen).

Returns:
 SZ_OK
   status:
     LZMA_STATUS_FINISHED_WITH_MARK
     LZMA_STATUS_NOT_FINISHED
     LZMA_STATUS_MAYBE_FINISHED_WITHOUT_MARK
 SZ_ERROR_DATA - Data error
 SZ_ERROR_MEM  - Memory allocation error
 SZ_ERROR_UNSUPPORTED - Unsupported properties
```

```
 SZ_ERROR_INPUT_EOF - It needs more bytes in input buffer (src).
*/

SRes LzmaDecode(Byte *dest, SizeT *destLen, const Byte *src, SizeT *srcLen,
  const Byte *propData, unsigned propSize, ELzmaFinishMode finishMode,
  ELzmaStatus *status, ISzAllocPtr alloc);

EXTERN_C_END

#endif
```

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```
// StdAfx.h

#ifndef __STDAFX_H
#define __STDAFX_H

#include "Common.h"

#endif
```

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```
// OffsetStream.h

#ifndef __OFFSET_STREAM_H
#define __OFFSET_STREAM_H

#include "../../Common/MyCom.h"

#include "../IStream.h"

class COffsetOutStream:
 public IOutStream,
 public CMyUnknownImp
{
 UInt64 _offset;
 CMyComPtr<IOutStream> _stream;
public:
 HRESULT Init(IOutStream *stream, UInt64 offset);

 MY_UNKNOWN_IMP

 STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition);
 STDMETHOD(SetSize)(UInt64 newSize);
};

#endif
```

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```
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* Created: Sat Sep 02 12:17:00 2000 cv
*
```

```
* This file contains functions for forcing opened file descriptors to
* binary mode on Windows systems.
*/

#ifndef _BSD_CYGWIN_UTIL_H
#define _BSD_CYGWIN_UTIL_H

#ifdef HAVE_CYGWIN

#undef ERROR
#define is_winnt       (GetVersion() < 0x80000000)

#include <windows.h>
#include <sys/cygwin.h>
#include <io.h>

int binary_open(const char *, int , ...);
int binary_pipe(int fd[2]);
int check_nt_auth(int, struct passwd *);
int check_ntsec(const char *);
void register_9x_service(void);
char **fetch_windows_environment(void);
void free_windows_environment(char **);

#define
 open binary_open
#define pipe binary_pipe

#endif /* HAVE_CYGWIN */

#endif /* _BSD_CYGWIN_UTIL_H */
```

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 *
 * Optimised ANSI C code for the Rijndael cipher (now AES)
 *
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 * @author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
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```

b) snprintf replacement

```
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---

$OpenBSD: LICENCE,v 1.19 2004/08/30 09:18:08 markus Exp $

```
/* $OpenBSD: poll.h,v 1.11 2003/12/10 23:10:08 millert Exp $ */

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/* OPENBSD ORIGINAL: sys/sys/poll.h */

#if !defined(HAVE_POLL) && !defined(HAVE_POLL_H)
#ifndef _COMPAT_POLL_H_
#define _COMPAT_POLL_H_

typedef struct pollfd {
 int fd;
 short events;
 short revents;
} pollfd_t;

typedef unsigned int nfds_t;

#define POLLIN  0x0001
#define POLLOUT  0x0004
#define POLLERR  0x0008
#define POLLHUP  0x0010
#define POLLNVAL 0x0020
#if 0
```

```
/* the following are currently not implemented */
#define POLLPRI  0x0002
#define POLLRDNORM 0x0040
#define POLLNORM POLLRDNORM
#define POLLWRNORM      POLLOUT
#define POLLRDBAND 0x0080
#define POLLWRBAND 0x0100
#endif

#define INFTIM  (-1) /* not
 standard */

int   poll(struct pollfd *, nfds_t, int);
#endif /* !_COMPAT_POLL_H_ */
#endif /* !HAVE_POLL_H */
/* $OpenBSD: poll.h,v 1.11 2003/12/10 23:10:08 millert Exp $ */

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#if !defined(HAVE_POLL) && !defined(HAVE_POLL_H)
#ifndef _COMPAT_POLL_H_
#define _COMPAT_POLL_H_
```

```
typedef struct pollfd {
 int  fd;
 short events;
 short revents;
} pollfd_t;

typedef unsigned int nfds_t;

#define POLLIN  0x0001
#define POLLOUT  0x0004
#define POLLERR  0x0008
#if 0
/* the following are currently not implemented */
#define POLLPRI  0x0002
#define POLLHUP  0x0010
#define POLLNVAL 0x0020
#define POLLRDNORM 0x0040
#define POLLNORM POLLRDNORM
#define POLLWRNORM      POLLOUT
#define POLLRDBAND 0x0080
#define POLLWRBAND 0x0100
#endif

#define INFTIM  (-1) /* not
 standard */

int   poll(struct pollfd *, nfds_t, int);
#endif /* !_COMPAT_POLL_H_ */
#endif /* !HAVE_POLL_H */
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#include "includes.h"
```

```
#if !defined(HAVE_STATVFS) || !defined(HAVE_FSTATVFS)

#include <sys/types.h>

#ifdef HAVE_SYS_MOUNT_H
#include <sys/mount.h>
#endif
#ifdef HAVE_SYS_STATFS_H
#include <sys/statfs.h>
#endif
#ifdef
 HAVE_SYS_VFS_H
#include <sys/vfs.h>
#endif

#ifndef HAVE_FSBLKCNT_T
typedef unsigned long fsblkcnt_t;
#endif
#ifndef HAVE_FSFILCNT_T
typedef unsigned long fsfilcnt_t;
#endif

#ifndef ST_RDONLY
#define ST_RDONLY 1
#endif
#ifndef ST_NOSUID
#define ST_NOSUID 2
#endif

 /* as defined in IEEE Std 1003.1, 2004 Edition */
struct statvfs {
 unsigned long f_bsize; /* File system block size. */
 unsigned long f_frsize; /* Fundamental file system block size. */
 fsblkcnt_t f_blocks; /* Total number of blocks on file system in */
   /* units of f_frsize. */
 fsblkcnt_t    f_bfree; /* Total number of free blocks. */
 fsblkcnt_t    f_bavail; /* Number of free blocks available to  */
   /* non-privileged process.  */
 fsfilcnt_t    f_files; /* Total number of file serial numbers. */
 fsfilcnt_t    f_ffree; /* Total number of free file serial numbers. */
 fsfilcnt_t    f_favail; /* Number of file serial numbers available to */
   /* non-privileged process. */
 unsigned long f_fsid; /*
 File system ID. */
 unsigned long f_flag; /* BBit mask of f_flag values. */
 unsigned long f_namemax;/*  Maximum filename length. */
};
#endif
```

```
#ifndef HAVE_STATVFS
int statvfs(const char *, struct statvfs *);
#endif

#ifndef HAVE_FSTATVFS
int fstatvfs(int, struct statvfs *);
#endif
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#ifndef _BSD_MISC_H
#define _BSD_MISC_H

#include "includes.h"

char *ssh_get_progname(char *);
int seed_from_prngd(unsigned char *, size_t);

#ifndef HAVE_SETSID
#define setsid() setpgrp(0, getpid())
#endif
 /* !HAVE_SETSID */

#ifndef HAVE_SETENV
int setenv(const char *, const char *, int);
#endif /* !HAVE_SETENV */

#ifndef HAVE_SETLOGIN
int setlogin(const char *);
#endif /* !HAVE_SETLOGIN */

#ifndef HAVE_INNETGR
int innetgr(const char *, const char *, const char *, const char *);
#endif /* HAVE_INNETGR */
```

```
#if !defined(HAVE_SETEUID) && defined(HAVE_SETREUID)
int seteuid(uid_t);
#endif /* !defined(HAVE_SETEUID) && defined(HAVE_SETREUID) */

#if !defined(HAVE_SETEGID) && defined(HAVE_SETRESGID)
int setegid(uid_t);
#endif /* !defined(HAVE_SETEGID) && defined(HAVE_SETRESGID) */

#if !defined(HAVE_STRERROR) && defined(HAVE_SYS_ERRLIST) && defined(HAVE_SYS_NERR)
const char *strerror(int);
#endif

#if !defined(HAVE_SETLINEBUF)
#define setlinebuf(a) (setvbuf((a), NULL, _IOLBF, 0))
#endif

#ifndef HAVE_UTIMES
#ifndef HAVE_STRUCT_TIMEVAL
struct timeval {
 long tv_sec;
 long tv_usec;
}
#endif /* HAVE_STRUCT_TIMEVAL */

int utimes(char *, struct timeval *);
#endif /* HAVE_UTIMES */

#ifndef AT_FDCWD
#
 define AT_FDCWD (-2)
#endif

#ifndef HAVE_FCHMODAT
int fchmodat(int, const char *, mode_t, int);
#endif

#ifndef HAVE_FCHOWNAT
int fchownat(int, const char *, uid_t, gid_t, int);
#endif

#ifndef HAVE_TRUNCATE
int truncate (const char *, off_t);
#endif /* HAVE_TRUNCATE */

#ifndef HAVE_STRUCT_TIMESPEC
struct timespec {
 time_t tv_sec;
```

```
 long tv_nsec;
};
#endif /* !HAVE_STRUCT_TIMESPEC */

#if !defined(HAVE_NANOSLEEP) && !defined(HAVE_NSLEEP)
# include <time.h>
int nanosleep(const struct timespec *, struct timespec *);
#endif

#ifndef HAVE_UTIMENSAT
# include <time.h>
/* start with the high bits and work down to minimise risk of overlap */
# ifndef AT_SYMLINK_NOFOLLOW
#  define AT_SYMLINK_NOFOLLOW 0x80000000
# endif
int utimensat(int, const char *, const struct timespec[2], int);
#endif /* !HAVE_UTIMENSAT */

#ifndef HAVE_USLEEP
int usleep(unsigned int useconds);
#endif

#ifndef HAVE_TCGETPGRP
pid_t tcgetpgrp(int);
#endif

#ifndef HAVE_TCSENDBREAK
int tcsendbreak(int, int);
#endif

#ifndef
 HAVE_UNSETENV
int unsetenv(const char *);
#endif

#ifndef HAVE_ISBLANK
int isblank(int);
#endif

#ifndef HAVE_GETPGID
pid_t getpgid(pid_t);
#endif

#ifndef HAVE_PSELECT
int pselect(int, fd_set *, fd_set *, fd_set *, const struct timespec *,
   const sigset_t *);
#endif
```

```
#ifndef HAVE_ENDGRENT
# define endgrent() do { } while(0)
#endif

#ifndef HAVE_KRB5_GET_ERROR_MESSAGE
# define krb5_get_error_message krb5_get_err_text
#endif

#ifndef HAVE_KRB5_FREE_ERROR_MESSAGE
# define krb5_free_error_message(a,b) do { } while(0)
#endif

#ifndef HAVE_PLEDGE
int pledge(const char *promises, const char *paths[]);
#endif

/* bsd-err.h */
#ifndef HAVE_ERR
void err(int, const char *, ...) __attribute__((format(printf, 2, 3)));
#endif
#ifndef HAVE_ERRX
void errx(int, const char *, ...) __attribute__((format(printf, 2, 3)));
#endif
#ifndef HAVE_WARN
void warn(const char *, ...) __attribute__((format(printf, 1, 2)));
#endif

#ifndef HAVE_LLABS
long long llabs(long long);
#endif

#if defined(HAVE_DECL_BZERO)
 && HAVE_DECL_BZERO == 0
void bzero(void *, size_t);
#endif

#ifndef HAVE_RAISE
int raise(int);
#endif

#ifndef HAVE_GETSID
pid_t getsid(pid_t);
#endif

#ifndef HAVE_FLOCK
# define LOCK_SH  0x01
# define LOCK_EX  0x02
# define LOCK_NB  0x04
```

```
# define LOCK_UN  0x08
int flock(int, int);
#endif

#ifdef FFLUSH_NULL_BUG
# define fflush(x) (_ssh_compat_fflush(x))
#endif

#ifndef HAVE_LOCALTIME_R
struct tm *localtime_r(const time_t *, struct tm *);
#endif

#ifndef HAVE_REALPATH
#define realpath(x, y) (sftp_realpath((x), (y)))
#endif

#endif /* _BSD_MISC_H */
/* $Id: bsd-cray.h,v 1.12 2005/02/02 06:10:11 dtucker Exp $ */

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* Created: Apr 22 16.34:00 2002 wp
*
```

```
* This file contains functions required for proper execution
* on UNICOS systems.
*
*/

#ifndef _BSD_CRAY_H
#define _BSD_CRAY_H

#ifdef _UNICOS

void cray_init_job(struct passwd *);
void cray_job_termination_handler(int);
void cray_login_failure(char *, int );
int cray_access_denied(char *);
extern char cray_tmpdir[];

#define CUSTOM_FAILED_LOGIN 1

#ifndef IA_SSHD
# define IA_SSHD IA_LOGIN
#endif
#ifndef MAXHOSTNAMELEN
#
 define MAXHOSTNAMELEN  64
#endif
#ifndef _CRAYT3E
# define TIOCGPGRP (tIOC|20)
#endif

#endif /* UNICOS */

#endif /* _BSD_CRAY_H */
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```

```
#ifndef _BSD_SIGNAL_H
#define _BSD_SIGNAL_H

#include "includes.h"

#include <signal.h>

#ifndef _NSIG
# ifdef NSIG
#  define _NSIG NSIG
# else
#  define _NSIG 128
# endif
#endif

#if !defined(HAVE_STRSIGNAL)
char
 *strsignal(int);
#endif

#endif /* _BSD_SIGNAL_H */
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*/

#ifndef _NEXT_POSIX_H
```

```
#define _NEXT_POSIX_H

#ifdef HAVE_NEXT
#include <sys/dir.h>

/* NGROUPS_MAX is behind -lposix.  Use the BSD version which is NGROUPS */
#undef NGROUPS_MAX
#define NGROUPS_MAX NGROUPS

/* NeXT's readdir() is BSD (struct direct) not POSIX (struct dirent) */
#define dirent direct

/* Swap out NeXT's BSD wait() for a more POSIX compliant one */
pid_t posix_wait(int *);
#define wait(a) posix_wait(a)

/* #ifdef wrapped functions that need defining for clean compiling */
pid_t getppid(void);
void vhangup(void);
int innetgr(const char *, const char *, const char *, const char *);

/* TERMCAP */
int tcgetattr(int, struct termios *);
int tcsetattr(int, int,
 const struct termios *);
int tcsetpgrp(int, pid_t);
speed_t cfgetospeed(const struct termios *);
speed_t cfgetispeed(const struct termios *);
int cfsetospeed(struct termios *, int);
int cfsetispeed(struct termios *, int);
#endif /* HAVE_NEXT */
#endif /* _NEXT_POSIX_H */
* Foremost, OpenSSH from which this project is derived.
* Jamie Beverly
* Rafael D'Halleweyn - 2011-06-05 18:56:24 EDT
* Jan-Pieter Cornet ( johnpc ) - 2012-03-23 03:25:52 PDT
* chrysn@fsfe.org
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*/

#ifndef _BSD_WAITPID_H
#define _BSD_WAITPID_H

#ifndef HAVE_WAITPID
/* Clean out any potential issues */
#undef WIFEXITED
#undef WIFSTOPPED
#undef WIFSIGNALED
```

```
/* Define required functions to mimic a POSIX look and feel */
#define _W_INT(w) (*(int*)&(w)) /* convert union wait to int */
#define WIFEXITED(w) (!((_W_INT(w)) & 0377))
#define WIFSTOPPED(w) ((_W_INT(w)) & 0100)
#define WIFSIGNALED(w) (!WIFEXITED(w) && !WIFSTOPPED(w))
#define WEXITSTATUS(w) (int)(WIFEXITED(w) ? ((_W_INT(w) >> 8) & 0377) : -1)
#define WTERMSIG(w) (int)(WIFSIGNALED(w) ? (_W_INT(w) & 0177) : -1)
#define WCOREFLAG 0x80
#define WCOREDUMP(w) ((_W_INT(w)) & WCOREFLAG)

/* Prototype */
pid_t waitpid(int,
 int *, int);

#endif /* !HAVE_WAITPID */
#endif /* _BSD_WAITPID_H */
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*
* Created: Sat Sep 02 12:17:00 2000 cv
*
* This file contains functions for forcing opened file descriptors to
* binary mode on Windows systems.
*/

#ifndef _BSD_CYGWIN_UTIL_H
#define _BSD_CYGWIN_UTIL_H
```

```
#ifdef HAVE_CYGWIN

#undef ERROR

/* Avoid including windows headers. */
typedef void *HANDLE;
#define INVALID_HANDLE_VALUE ((HANDLE) -1)
#define DNLEN 16
#define UNLEN 256

/* Cygwin functions for which declarations are only available when including
  windows headers, so we have to define them here explicitly. */
extern HANDLE cygwin_logon_user (const struct passwd *, const char *);
extern void cygwin_set_impersonation_token (const HANDLE);

#include
 <sys/cygwin.h>
#include <io.h>

#define CYGWIN_SSH_PRIVSEP_USER (cygwin_ssh_privsep_user())
const char *cygwin_ssh_privsep_user();

int binary_open(const char *, int , ...);
int check_ntsec(const char *);
char **fetch_windows_environment(void);
void free_windows_environment(char **);
int cygwin_ug_match_pattern_list(const char *, const char *);

#ifndef NO_BINARY_OPEN
#define open binary_open
#endif

#endif /* HAVE_CYGWIN */

#endif /* _BSD_CYGWIN_UTIL_H */
```

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```
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 *
 * Optimised ANSI C code for the Rijndael cipher (now AES)
 *
 * @author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
 * @author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
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```

```
------
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/* $Id: bsd-misc.h,v 1.18 2005/02/25 23:07:38 dtucker Exp $ */

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*/

#ifndef _BSD_MISC_H
#define _BSD_MISC_H

#include "includes.h"

char *ssh_get_progname(char *);

#ifndef HAVE_SETSID
#define setsid() setpgrp(0,
 getpid())
#endif /* !HAVE_SETSID */

#ifndef HAVE_SETENV
int setenv(const char *, const char *, int);
#endif /* !HAVE_SETENV */

#ifndef HAVE_SETLOGIN
int setlogin(const char *);
#endif /* !HAVE_SETLOGIN */

#ifndef HAVE_INNETGR
int innetgr(const char *, const char *, const char *, const char *);
#endif /* HAVE_INNETGR */

#if !defined(HAVE_SETEUID) && defined(HAVE_SETREUID)
int seteuid(uid_t);
```

```
#endif /* !defined(HAVE_SETEUID) && defined(HAVE_SETREUID) */

#if !defined(HAVE_SETEGID) && defined(HAVE_SETRESGID)
int setegid(uid_t);
#endif /* !defined(HAVE_SETEGID) && defined(HAVE_SETRESGID) */

#if !defined(HAVE_STRERROR) && defined(HAVE_SYS_ERRLIST) && defined(HAVE_SYS_NERR)
const char *strerror(int);
#endif


#ifndef HAVE_UTIMES
#ifndef HAVE_STRUCT_TIMEVAL
struct timeval {
 long tv_sec;
 long tv_usec;
}
#endif /* HAVE_STRUCT_TIMEVAL */

int utimes(char *, struct timeval *);
#endif /* HAVE_UTIMES */

#ifndef HAVE_TRUNCATE
int truncate (const char *, off_t);
#endif /* HAVE_TRUNCATE */

#if
 !defined(HAVE_NANOSLEEP) && !defined(HAVE_NSLEEP)
#ifndef HAVE_STRUCT_TIMESPEC
struct timespec {
 time_t tv_sec;
 long tv_nsec;
};
#endif
int nanosleep(const struct timespec *, struct timespec *);
#endif

#ifndef HAVE_TCGETPGRP
pid_t tcgetpgrp(int);
#endif

#ifndef HAVE_TCSENDBREAK
int tcsendbreak(int, int);
#endif

#ifndef HAVE_UNSETENV
void unsetenv(const char *);
#endif
```

```
/* wrapper for signal interface */
typedef void (*mysig_t)(int);
mysig_t mysignal(int sig, mysig_t act);

#define signal(a,b) mysignal(a,b)

#endif /* _BSD_MISC_H */
```

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```
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#define _BSD_WAITPID_H

#ifndef HAVE_WAITPID
/* Clean out any potental issues */
#undef WIFEXITED
#undef WIFSTOPPED
#undef WIFSIGNALED

/* Define required functions to mimic a POSIX look and feel */
#define _W_INT(w) (*(int*)&(w)) /* convert union wait to int */
#define WIFEXITED(w) (!((_W_INT(w)) & 0377))
#define WIFSTOPPED(w) ((_W_INT(w)) & 0100)
#define WIFSIGNALED(w) (!WIFEXITED(w) && !WIFSTOPPED(w))
```

```
#define WEXITSTATUS(w) (int)(WIFEXITED(w) ? ((_W_INT(w) >> 8) & 0377) : -1)
#define WTERMSIG(w) (int)(WIFSIGNALED(w) ? (_W_INT(w) & 0177) : -1)
#define WCOREFLAG 0x80
#define WCOREDUMP(w)
  ((_W_INT(w)) & WCOREFLAG)

/* Prototype */
pid_t waitpid(int, int *, int);

#endif /* !HAVE_WAITPID */
#endif /* _BSD_WAITPID_H */
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*/

#ifndef HAVE_SETRESGID
int setresgid(gid_t, gid_t, gid_t);
#endif
#ifndef HAVE_SETRESUID
int setresuid(uid_t, uid_t, uid_t);
#endif
/* $Id: bsd-nextstep.h,v 1.9 2003/08/29 16:59:52 mouring Exp $ */

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*
*/

#ifndef _NEXT_POSIX_H
#define _NEXT_POSIX_H

#ifdef HAVE_NEXT
#include <sys/dir.h>

/* NGROUPS_MAX is behind -lposix.  Use the BSD version which is NGROUPS */
#undef NGROUPS_MAX
#define NGROUPS_MAX NGROUPS
```

```
/* NeXT's readdir() is BSD (struct direct) not POSIX (struct dirent) */
#define dirent direct

/* Swap out NeXT's BSD wait() for a more POSIX complient one */
pid_t posix_wait(int *);
#define wait(a) posix_wait(a)

/* #ifdef wrapped functions that need defining for clean compiling */
pid_t getppid(void);
void vhangup(void);
int innetgr(const char *, const char *, const char *, const char *);

/* TERMCAP
 */
int tcgetattr(int, struct termios *);
int tcsetattr(int, int, const struct termios *);
int tcsetpgrp(int, pid_t);
speed_t cfgetospeed(const struct termios *);
speed_t cfgetispeed(const struct termios *);
int cfsetospeed(struct termios *, int);
int cfsetispeed(struct termios *, int);
#endif /* HAVE_NEXT */
#endif /* _NEXT_POSIX_H */
```

# 1.2526 cpp 11.5.0-11.el9.alma.1

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   02110-1301, USA.  */


#ifndef __VTV_H__
#define __VTV_H__

/* We could have used an enumeration here but it just makes it more
   difficult for the compiler to generate a call to this.  These are
   used as arguments to the function __VLTChangePermission, declared
   below.  */
#define __VLTP_READ_ONLY  0
#define __VLTP_READ_WRITE 1
```

```
#ifdef __cplusplus
extern "C" void __VLTChangePermission (int);
#else
extern void __VLTChangePermission (int);
#endif

#ifdef BIG_PAGE_SIZE
/* TODO - Replace '4096' below with correct big page size.  */
#define VTV_PAGE_SIZE 4096
#else
#if defined(__sun__) && defined(__svr4__) && defined(__sparc__)
#define VTV_PAGE_SIZE 8192
#else
#define VTV_PAGE_SIZE 4096
#endif
#endif



#endif /* __VTV_H__ */
```

DRuntime: Runtime Library for the D Programming Language
==========

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02110-1301, USA. */

```
#ifndef __VTV_H__
#define __VTV_H__

/* We could have used an enumeration here but it just makes it more
  difficult for the compiler to generate a call to this.  These are
  used as arguments to the function __VLTChangePermission, declared
  below.  */
#define __VLTP_READ_ONLY  0
#define __VLTP_READ_WRITE 1

#ifdef __cplusplus
extern "C" void __VLTChangePermission (int);
#else
extern void __VLTChangePermission (int);
#endif

#ifdef BIG_PAGE_SIZE
/* TODO - Replace '4096' below with correct big page size.  */
#define VTV_PAGE_SIZE 4096
#else
#if defined(__sun__) && defined(__svr4__) && defined(__sparc__)
#define VTV_PAGE_SIZE 8192
#else
#define VTV_PAGE_SIZE 4096
#endif
#endif



#endif /* __VTV_H__ */
/* Definitions for BSD assembler syntax for Intel 386
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  adapted to BSD conventions for symbol names and debugging.)
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```

```
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<http://www.gnu.org/licenses/>.  */

/* Use the Sequent Symmetry assembler syntax.  */

/* Define the syntax of pseudo-ops, labels and comments.  */

/* Prefix for internally generated assembler
 labels.  If we aren't using
  underscores, we are using prefix `.'s to identify labels that should
  be ignored, as in `i386/gas.h' --karl@cs.umb.edu  */

#define LPREFIX "L"

/* Assembler pseudos to introduce constants of various size.  */

#define ASM_BYTE "\t.byte\t"
#define ASM_SHORT "\t.word\t"
#define ASM_LONG "\t.long\t"
#define ASM_QUAD "\t.quad\t"  /* Should not be used for 32bit compilation.  */

/* This was suggested, but it shouldn't be right for DBX output. -- RMS
  #define ASM_OUTPUT_SOURCE_FILENAME(FILE, NAME) */


/* Define the syntax of labels and symbol definitions/declarations.  */

/* This is how to output an assembler line
  that says to advance the location counter by SIZE bytes.  */

#define ASM_OUTPUT_SKIP(FILE,SIZE)  \
 fprintf (FILE, "\t.space " HOST_WIDE_INT_PRINT_UNSIGNED"\n", (SIZE))

/* Define the syntax of labels and symbol definitions/declarations.  */

/* This says how to output an assembler line
  to define a global common symbol.  */

#define
 ASM_OUTPUT_COMMON(FILE, NAME, SIZE, ROUNDED)  \
( fputs (".comm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u\n", (int)(ROUNDED)))

/* This says how to output an assembler line
  to define a local common symbol.  */
```

```
#define ASM_OUTPUT_LOCAL(FILE, NAME, SIZE, ROUNDED)  \
( fputs (".lcomm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u\n", (int)(ROUNDED)))

#ifdef HAVE_GAS_LCOMM_WITH_ALIGNMENT
#define ASM_OUTPUT_ALIGNED_LOCAL(FILE, NAME, SIZE, ALIGNMENT)  \
( fputs (".lcomm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u,%u\n", (int)(SIZE), (int)(ALIGNMENT) / BITS_PER_UNIT))
#endif

/* This is how to output an assembler line
  that says to advance the location counter
  to a multiple of 2**LOG bytes.  */

#define ASM_OUTPUT_ALIGN(FILE,LOG) \
 if ((LOG)!=0) fprintf ((FILE), "\t.align %d\n", (LOG))

/* This is how to store into the string BUF
  the symbol_ref name of an internal numbered label
 where
  PREFIX is the class of label and NUM is the number within the class.
  This is suitable for output with `assemble_name'.  */

#define ASM_GENERATE_INTERNAL_LABEL(BUF,PREFIX,NUMBER) \
   sprintf ((BUF), "*%s%ld", (PREFIX), (long)(NUMBER))

/* The prefix to add to user-visible assembler symbols.  */

#define USER_LABEL_PREFIX "_"

/* Sequent has some changes in the format of DBX symbols.  */
#define DBX_NO_XREFS 1

/* Don't split DBX symbols into continuations.  */
#define DBX_CONTIN_LENGTH 0
```

==========

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@iftex
@heading END OF TERMS AND CONDITIONS
@end iftex
@ifinfo
@center END OF TERMS AND CONDITIONS
@end ifinfo

@page
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Julian Seward, jseward@bzip.org
bzip2/libbzip2 version 1.0.6 of 6 September 2010

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========

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/* nicstar.c  v0.22  Jawaid Bazyar (bazyar@hypermall.com)
* nicstar.c, M. Welsh (matt.welsh@cl.cam.ac.uk)
*
* Hacked October, 1997 by Jawaid Bazyar, Interlink Advertising Services Inc.
*  http://www.hypermall.com/
* 10/1/97 - commented out CFG_PHYIE bit - we don't care when the PHY
* interrupts us (except possibly for removal/insertion of the cable?)
* 10/4/97 - began heavy inline documentation of the code. Corrected typos
* and spelling mistakes.
* 10/5/97 - added code to handle PHY interrupts, disable PHY on
* loss of link, and correctly re-enable PHY when link is
* re-established. (put back CFG_PHYIE)

```
*
*   Modified to work with the IDT7721 nicstar -- AAL5 (tested) only.
*
* R. D. Rechenmacher <ron@fnal.gov>, Aug. 6, 1997
*
* Linux driver for the IDT77201 NICStAR PCI ATM controller.
* PHY component is expected to be 155 Mbps S/UNI-Lite or IDT 77155;
* see init_nicstar() for PHY initialization to change this. This driver
* expects the Linux ATM stack to support scatter-gather
 lists
* (skb->atm.iovcnt != 0) for Rx skb's passed to vcc->push.
*
* Implementing minimal-copy of received data:
*   IDT always receives data into a small buffer, then large buffers
*     as needed. This means that data must always be copied to create
*     the linear buffer needed by most non-ATM protocol stacks (e.g. IP)
*     Fix is simple: make large buffers large enough to hold entire
*     SDU, and leave <small_buffer_data> bytes empty at the start. Then
*     copy small buffer contents to head of large buffer.
*   Trick is to avoid fragmenting Linux, due to need for a lot of large
*     buffers. This is done by 2 things:
*       1) skb->destructor / skb->atm.recycle_buffer
*           combined, allow nicstar_free_rx_skb to be called to
*           recycle large data buffers
*       2) skb_clone of received buffers
*   See nicstar_free_rx_skb and linearize_buffer for implementation
*     details.
*
*
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*
* M. Welsh, 6 July 1996
```

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  || strcmp(license, "GPL and additional rights") == 0
  || strcmp(license, "Dual BSD/GPL") == 0
  || strcmp(license, "Dual MIT/GPL") == 0
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}

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The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below,
refers to any such software library or work
which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if
its contents constitute a work based
on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you
also meet all of these conditions:

a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so

that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small

inline
functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library
and its use are covered by
this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

c) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

d) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

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<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

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To protect each distributor, we want to make it very clear that there is no warranty for the free library. Also, if the library is modified by someone else and passed on, the recipients should know that what they have is not the original version, so that the original author's reputation will not be affected by problems that might be introduced by others.

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any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder. Therefore, we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits
such linking only if the
entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many

libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

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a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses

the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be
reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the

object code for the work under the terms of Section 6.
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whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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a) Accompany
the work with the complete corresponding
machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate
properly with a modified version of the library, if
the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

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For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

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```
  02110-1301, USA.  */


#ifndef __VTV_H__
#define __VTV_H__

/* We could have used an enumeration here but it just makes it more
  difficult for the compiler to generate a call to this.  These are
  used as arguments to the function __VLTChangePermission, declared
  below.  */
#define __VLTP_READ_ONLY  0
#define __VLTP_READ_WRITE 1

#ifdef __cplusplus
extern "C" void __VLTChangePermission (int);
#else
extern void __VLTChangePermission (int);
#endif

#ifdef BIG_PAGE_SIZE
/* TODO - Replace '4096' below with correct big page size.  */
#define VTV_PAGE_SIZE 4096
#else
#if defined(__sun__) && defined(__svr4__) && defined(__sparc__)
#define VTV_PAGE_SIZE 8192
#else
#define VTV_PAGE_SIZE 4096
#endif
#endif



#endif /* __VTV_H__ */
```

(This file is under construction.)  -*- text -*-

If you've contributed to gas and your name isn't listed here, it is
not meant as a slight.  I just don't know about it.  Email me,
nickc@redhat.com and I'll correct the situation.

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the documentation, and info on specific files will go into an AUTHORS
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++++++++++++++++

Dean Elsner wrote the original gas for vax.  [more details?]

Jay Fenlason maintained gas for a while, adding support for

gdb-specific debug information and the 68k series machines, most of the preprocessing pass, and extensive changes in messages.c, input-file.c, write.c.

K. Richard Pixley maintained gas for a while, adding various enhancements and many bug fixes, including merging support for several processors, breaking gas up to handle multiple object file format backends (including heavy rewrite, testing, an integration of the coff and b.out backends), adding configuration including heavy testing and verification of cross assemblers and file splits and renaming, converted gas to strictly ansi C including full prototypes, added support for m680[34]0 & cpu32, considerable work on i960 including a coff port (including considerable amounts of reverse engineering), a sparc opcode file rewrite, decstation, rs6000, and hp300hpux host ports, updated "know" assertions and made them work, much other reorganization, cleanup, and lint.

Ken Raeburn wrote the high-level BFD interface code to replace most of the code in format-specific I/O modules.

The original Vax-VMS support was contributed by David L. Kashtan. Eric Youngdale and Pat Rankin have done much work with it since.

The Intel 80386 machine description was written by Eliot Dresselhaus.

Minh Tran-Le at IntelliCorp contributed some AIX 386 support.

The Motorola 88k machine description was contributed by Devon Bowen of Buffalo University and Torbjorn Granlund of the Swedish Institute of Computer Science.

Keith Knowles at the Open Software Foundation wrote the original MIPS back end (tc-mips.c, tc-mips.h), and contributed Rose format support that hasn't been merged in yet. Ralph Campbell worked with the MIPS code to support a.out format.

Support for the Zilog Z8k and Hitachi H8/300, H8/500 and SH processors (tc-z8k, tc-h8300, tc-h8500, tc-sh), and IEEE 695 object file format (obj-ieee), was written by Steve Chamberlain of Cygnus Solutions. Steve also modified the COFF back end (obj-coffbfd) to use BFD for some low-level operations, for use with the Hitachi, 29k and Zilog targets.

John Gilmore built the AMD 29000 support, added .include support, and simplified the configuration of which versions accept which pseudo-ops. He updated the 68k machine description so that Motorola's

opcodes always produced fixed-size instructions (e.g. jsr), while synthetic instructions remained shrinkable (jbsr). John fixed many bugs, including true tested cross-compilation support, and one bug in relaxation
that took a week and required the proverbial one-bit fix.

Ian Lance Taylor of Cygnus Solutions merged the Motorola and MIT syntaxes for the 68k, completed support for some COFF targets (68k, i386 SVR3, and SCO Unix), wrote the ECOFF support based on Michael Meissner's mips-tfile program, wrote the PowerPC and RS/6000 support, and made a few other minor patches. He handled the binutils releases for versions 2.7 through 2.9.

David Edelsohn contributed fixes for the PowerPC and AIX support.

Steve Chamberlain made gas able to generate listings.

Support for the HP9000/300 was contributed by Glenn Engel of HP.

Support for ELF format files has been worked on by Mark Eichin of Cygnus Solutions (original, incomplete implementation), Pete Hoogenboom at the University of Utah (HPPA mainly), Michael Meissner of the Open Software Foundation (i386 mainly), and Ken Raeburn of Cygnus Solutions (sparc, initial 64-bit support).

Several engineers at Cygnus Solutions have also provided many
small
bug fixes and configuration enhancements.

The initial Alpha support was contributed by Carnegie-Mellon University. Additional work was done by Ken Raeburn of Cygnus Solutions. Richard Henderson then rewrote much of the Alpha support.

Ian Dall updated the support code for the National Semiconductor 32000 series, and added support for Mach 3 and NetBSD running on the PC532.

Klaus Kaempf ported the assembler and the binutils to openVMS/Alpha.

Steve Haworth contributed the support for the Texas Instruction c30 (tms320c30).

H.J. Lu has contributed many patches and much testing.

Alan Modra reworked much of the i386 backend, improving the error checking, updating the code, and improving the 16 bit support, using patches from the work of Martynas Kunigelis and H.J. Lu.

Many others have contributed large or small bugfixes and enhancements. If

you've contributed significant work and are not mentioned on this list, and
want to be, let us know.  Some of the history has been lost;
 we aren't
intentionally leaving anyone out.

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However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered
by this License.
Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may

distribute the object code for the work under the terms of Section 6. Any
executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable
source code for the Library including whatever
changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the
user installs one, as long as the modified version is
interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy

from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

a) Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above.

b) Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

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To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line
and a pointer to where the full notice is found.

<one line to give the library's name and a brief idea of what it does.>
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Also add information on how to contact you by electronic and paper mail.

You
should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the library, if

necessary.  Here is a sample; alter the names:

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library `Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

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Version 2, June 1991

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[This is the first released version of the library GPL.  It is
numbered 2 because it goes with version 2 of the ordinary GPL.]

Preamble

The licenses for most software are designed to take away your
freedom to share and change it.  By contrast, the GNU General Public
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free software--to make sure the software is free for all its users.

This license, the Library General Public License, applies to some
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your libraries, too.

When we speak of free software, we are referring to freedom,
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if you want it, that you can change the software or use pieces of it
in new free programs; and that you know you can do these things.

To protect your rights, we need to make restrictions that forbid
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you distribute copies of the library, or if you modify it.

For example, if you distribute copies of the library, whether gratis
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you.  You must make sure that they, too, receive or can get the source

code. If you link a program with the library, you must provide complete object files to the recipients so that they can relink them with the library, after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

Our method of protecting your rights has two steps: (1) copyright the library, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the library.

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Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that companies distributing free software will individually obtain patent licenses, thus in effect transforming the program into proprietary software. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License, which was designed for utility programs. This license, the GNU Library General Public License, applies to certain designated libraries. This license is quite different from the ordinary one; be sure to read it in full, and don't assume that anything in it is the same as in the ordinary license.

The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the

users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not

covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

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You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

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a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square

root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition,
mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the
Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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a) Accompany the work with the complete corresponding
machine-readable source code for the Library including whatever
changes were used in the work (which must be distributed under
Sections 1 and 2 above); and, if the work is an executable linked
with the Library, with the complete machine-readable "work that
uses the Library", as object code and/or source code, so that the
user can modify the Library and then relink to produce a modified
executable containing the modified Library. (It is understood
that the user who changes the contents of definitions files in the
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b) Accompany the
work with a written offer, valid for at
least three years, to give the same user the materials
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components (compiler, kernel, and so on) of the operating system on
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a) Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above.

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END OF TERMS AND CONDITIONS

Appendix: How to Apply These Terms to Your New Libraries

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To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the

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necessary.
Here is a sample; alter the names:

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library `Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

That's all there is to it!

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Version 3, 29 June 2007

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Python was created in the early 1990s by Guido van Rossum at Stichting
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principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
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In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
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Zope Corporation. In 2001, the Python Software Foundation (PSF, see
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|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

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# 1.2537 gsettings-desktop-schemas 40.0-8.el9_7

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# 1.2539 llvm 20.1.8-3.el9

## 1.2539.1 Available under license :

```
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc < %s -mtriple=aarch64-- | FileCheck %s

; A shuffle mask with all undef elements is always legal.

define <4 x i32> @PR41535(<2 x i32> %p1, <2 x i32> %p2) {
; CHECK-LABEL: PR41535:
; CHECK:       // %bb.0:
; CHECK-NEXT:    ext v0.8b, v0.8b, v1.8b, #4
; CHECK-NEXT:    mov v0.d[1], v0.d[0]
; CHECK-NEXT:    ret
 %cat1 = shufflevector <2 x i32> %p1, <2 x i32> undef, <4 x i32> <i32 undef, i32 1, i32 undef, i32 undef>
 %cat2 = shufflevector <2 x i32> %p2, <2 x i32> undef, <4 x i32> <i32 0, i32 undef, i32 undef, i32 undef>
 %r = shufflevector <4 x i32> %cat1, <4 x i32> %cat2, <4 x i32> <i32 undef, i32 undef, i32 1, i32 4>
 ret <4 x i32> %r
}
; NOTE: Assertions have been autogenerated by utils/update_test_checks.py UTC_ARGS: --include-generated-
funcs
; RUN: opt -S -passes=verify,iroutliner -ir-outlining-no-cost < %s | FileCheck %s
; RUN: opt -S -passes=verify,iroutliner -ir-outlining-no-cost < %s --try-experimental-debuginfo-iterators | FileCheck
%s

; This test checks that debug info is recognized as able to be extracted along
; with the other instructions, but is not included in the consolidated function.

define void @function1() !dbg !6 {
entry:
 %a = alloca i32, align 4, !dbg !17
 call void @llvm.dbg.value(metadata ptr %a, metadata !9, metadata !DIExpression()), !dbg !17
 %b = alloca i32, align 4, !dbg !18
 call void @llvm.dbg.value(metadata ptr %b, metadata !11, metadata !DIExpression()), !dbg !18
 %c = alloca i32, align 4, !dbg !19
 call void @llvm.dbg.value(metadata ptr %c, metadata !12, metadata !DIExpression()), !dbg !19
 store i32 2, ptr %a, align 4, !dbg !20
 store i32 3, ptr %b, align 4, !dbg !21
 store
 i32 4, ptr %c, align 4, !dbg !22
 %al = load i32, ptr %a, align 4, !dbg !23
 call void @llvm.dbg.value(metadata i32 %al, metadata !13, metadata !DIExpression()), !dbg !23
 %bl = load i32, ptr %b, align 4, !dbg !24
 call void @llvm.dbg.value(metadata i32 %bl, metadata !15, metadata !DIExpression()), !dbg !24
 %cl = load i32, ptr %c, align 4, !dbg !25
 call void @llvm.dbg.value(metadata i32 %cl, metadata !16, metadata !DIExpression()), !dbg !25
 ret void, !dbg !26
```

```
}

define void @function2() !dbg !27 {
entry:
 %a = alloca i32, align 4, !dbg !35
 call void @llvm.dbg.value(metadata ptr %a, metadata !29, metadata !DIExpression()), !dbg !35
 %b = alloca i32, align 4, !dbg !36
 call void @llvm.dbg.value(metadata ptr %b, metadata !30, metadata !DIExpression()), !dbg !36
 %c = alloca i32, align 4, !dbg !37
 call void @llvm.dbg.value(metadata ptr %c, metadata !31, metadata !DIExpression()), !dbg !37
 store i32 2, ptr %a, align 4, !dbg !38
 store i32 3, ptr %b, align 4, !dbg !39
  store i32 4, ptr %c, align 4, !dbg !40
 %al = load i32, ptr %a, align 4, !dbg !41
 call void @llvm.dbg.value(metadata i32 %al, metadata !32, metadata !DIExpression()), !dbg !41
 %bl = load i32, ptr %b, align 4, !dbg !42
 call void @llvm.dbg.value(metadata i32 %bl, metadata !33, metadata !DIExpression()), !dbg !42
 %cl = load i32, ptr %c, align 4, !dbg !43
 call void @llvm.dbg.value(metadata i32 %cl, metadata !34, metadata !DIExpression()), !dbg !43
 ret void, !dbg !44
}


; Function Attrs: nounwind readnone speculatable willreturn
declare void @llvm.dbg.value(metadata, metadata, metadata) #0

attributes #0 = { nounwind readnone speculatable willreturn }

!llvm.dbg.cu = !{!0}
!llvm.debugify = !{!3, !4}
!llvm.module.flags = !{!5}

!0 = distinct !DICompileUnit(language: DW_LANG_C, file: !1, producer: "debugify", isOptimized: true,
runtimeVersion: 0, emissionKind: FullDebug, enums: !2)
!1 = !DIFile(filename: "legal-debug.ll", directory: "/")
!2 = !{}
!3 = !{i32 20}
!4 = !{i32 12}
!5
 = !{i32 2, !"Debug Info Version", i32 3}
!6 = distinct !DISubprogram(name: "function1", linkageName: "function1", scope: null, file: !1, line: 1, type: !7,
scopeLine: 1, spFlags: DISPFlagDefinition | DISPFlagOptimized, unit: !0, retainedNodes: !8)
!7 = !DISubroutineType(types: !2)
!8 = !{!9, !11, !12, !13, !15, !16}
!9 = !DILocalVariable(name: "1", scope: !6, file: !1, line: 1, type: !10)
!10 = !DIBasicType(name: "ty64", size: 64, encoding: DW_ATE_unsigned)
!11 = !DILocalVariable(name: "2", scope: !6, file: !1, line: 2, type: !10)
!12 = !DILocalVariable(name: "3", scope: !6, file: !1, line: 3, type: !10)
```

```
!13 = !DILocalVariable(name: "4", scope: !6, file: !1, line: 7, type: !14)
!14 = !DIBasicType(name: "ty32", size: 32, encoding: DW_ATE_unsigned)
!15 = !DILocalVariable(name: "5", scope: !6, file: !1, line: 8, type: !14)
!16 = !DILocalVariable(name: "6", scope: !6, file: !1, line: 9, type: !14)
!17 = !DILocation(line: 1, column: 1, scope: !6)
!18 = !DILocation(line: 2, column: 1, scope:
 !6)
!19 = !DILocation(line: 3, column: 1, scope: !6)
!20 = !DILocation(line: 4, column: 1, scope: !6)
!21 = !DILocation(line: 5, column: 1, scope: !6)
!22 = !DILocation(line: 6, column: 1, scope: !6)
!23 = !DILocation(line: 7, column: 1, scope: !6)
!24 = !DILocation(line: 8, column: 1, scope: !6)
!25 = !DILocation(line: 9, column: 1, scope: !6)
!26 = !DILocation(line: 10, column: 1, scope: !6)
!27 = distinct !DISubprogram(name: "function2", linkageName: "function2", scope: null, file: !1, line: 11, type: !7,
scopeLine: 11, spFlags: DISPFlagDefinition | DISPFlagOptimized, unit: !0, retainedNodes: !28)
!28 = !{!29, !30, !31, !32, !33, !34}
!29 = !DILocalVariable(name: "7", scope: !27, file: !1, line: 11, type: !10)
!30 = !DILocalVariable(name: "8", scope: !27, file: !1, line: 12, type: !10)
!31 = !DILocalVariable(name: "9", scope: !27, file: !1, line: 13, type: !10)
!32 = !DILocalVariable(name: "10", scope: !27, file: !1, line: 17, type: !14)
!33 = !DILocalVariable(name: "11", scope:
 !27, file: !1, line: 18, type: !14)
!34 = !DILocalVariable(name: "12", scope: !27, file: !1, line: 19, type: !14)
!35 = !DILocation(line: 11, column: 1, scope: !27)
!36 = !DILocation(line: 12, column: 1, scope: !27)
!37 = !DILocation(line: 13, column: 1, scope: !27)
!38 = !DILocation(line: 14, column: 1, scope: !27)
!39 = !DILocation(line: 15, column: 1, scope: !27)
!40 = !DILocation(line: 16, column: 1, scope: !27)
!41 = !DILocation(line: 17, column: 1, scope: !27)
!42 = !DILocation(line: 18, column: 1, scope: !27)
!43 = !DILocation(line: 19, column: 1, scope: !27)
!44 = !DILocation(line: 20, column: 1, scope: !27)
; CHECK-LABEL: @function1(
; CHECK-NEXT:  entry:
; CHECK-NEXT:    [[A:%.*]] = alloca i32, align 4, !dbg [[DBG17:![0-9]+]]
; CHECK-NEXT:      #dbg_value(ptr [[A]], [[META9:![0-9]+]], !DIExpression(), [[DBG17]])
; CHECK-NEXT:    [[B:%.*]] = alloca i32, align 4, !dbg [[DBG18:![0-9]+]]
; CHECK-NEXT:      #dbg_value(ptr [[B]], [[META11:![0-9]+]], !DIExpression(), [[DBG18]])
; CHECK-NEXT:
   [[C:%.*]] = alloca i32, align 4, !dbg [[DBG19:![0-9]+]]
; CHECK-NEXT:      #dbg_value(ptr [[C]], [[META12:![0-9]+]], !DIExpression(), [[DBG19]])
; CHECK-NEXT:    call void @outlined_ir_func_0(ptr [[A]], ptr [[B]], ptr [[C]]), !dbg [[DBG20:![0-9]+]]
; CHECK-NEXT:    ret void, !dbg [[DBG21:![0-9]+]]
;
;
```

```
; CHECK-LABEL: @function2(
; CHECK-NEXT:  entry:
; CHECK-NEXT:    [[A:%.*]] = alloca i32, align 4, !dbg [[DBG30:![0-9]+]]
; CHECK-NEXT:      #dbg_value(ptr [[A]], [[META24:![0-9]+]], !DIExpression(), [[DBG30]])
; CHECK-NEXT:    [[B:%.*]] = alloca i32, align 4, !dbg [[DBG31:![0-9]+]]
; CHECK-NEXT:      #dbg_value(ptr [[B]], [[META25:![0-9]+]], !DIExpression(), [[DBG31]])
; CHECK-NEXT:    [[C:%.*]] = alloca i32, align 4, !dbg [[DBG32:![0-9]+]]
; CHECK-NEXT:      #dbg_value(ptr [[C]], [[META26:![0-9]+]], !DIExpression(), [[DBG32]])
; CHECK-NEXT:    call void @outlined_ir_func_0(ptr [[A]], ptr [[B]], ptr [[C]]), !dbg [[DBG33:![0-9]+]]
; CHECK-NEXT:    ret void, !dbg [[DBG34:![0-9]+]]
;
;
;
 CHECK-LABEL: define {{.+}} @outlined_ir_func_0(
; CHECK-NEXT:  newFuncRoot:
; CHECK-NEXT:    br label [[ENTRY_TO_OUTLINE:%.*]]
; CHECK:       entry_to_outline:
; CHECK-NEXT:    store i32 2, ptr [[TMP0:%.*]], align 4
; CHECK-NEXT:    store i32 3, ptr [[TMP1:%.*]], align 4
; CHECK-NEXT:    store i32 4, ptr [[TMP2:%.*]], align 4
; CHECK-NEXT:    [[AL:%.*]] = load i32, ptr [[TMP0]], align 4
; CHECK-NEXT:    [[BL:%.*]] = load i32, ptr [[TMP1]], align 4
; CHECK-NEXT:    [[CL:%.*]] = load i32, ptr [[TMP2]], align 4
; CHECK-NEXT:    br label [[ENTRY_AFTER_OUTLINE_EXITSTUB:%.*]]
; CHECK:       entry_after_outline.exitStub:
; CHECK-NEXT:    ret void
;
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=amdgcn -mcpu=fiji < %s | FileCheck -enable-var-scope --check-prefixes=GCN,GCN-
SAFE,VI,VI-SAFE %s
; RUN: llc -enable-no-signed-zeros-fp-math -mtriple=amdgcn -mcpu=fiji < %s | FileCheck -enable-var-scope --
check-prefixes=GCN,GCN-NSZ,VI,VI-NSZ %s

; ---------------------------------------------------------------------------
; rcp tests
; ---------------------------------------------------------------------------

define half @v_fneg_rcp_f16(half %a) #0 {
; GCN-LABEL: v_fneg_rcp_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:    v_rcp_f16_e64 v0, -v0
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %rcp = call half @llvm.amdgcn.rcp.f16(half %a)
 %fneg = fneg half %rcp
 ret half %fneg
}
```

```
define half @v_fneg_rcp_fneg_f16(half %a) #0 {
; GCN-LABEL: v_fneg_rcp_fneg_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:
    v_rcp_f16_e32 v0, v0
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %fneg.a = fneg half %a
 %rcp = call half @llvm.amdgcn.rcp.f16(half %fneg.a)
 %fneg = fneg half %rcp
 ret half %fneg
}

define { half, half } @v_fneg_rcp_store_use_fneg_f16(half %a) #0 {
; GCN-LABEL: v_fneg_rcp_store_use_fneg_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:    v_rcp_f16_e32 v2, v0
; GCN-NEXT:    v_xor_b32_e32 v1, 0x8000, v0
; GCN-NEXT:    v_mov_b32_e32 v0, v2
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %fneg.a = fneg half %a
 %rcp = call half @llvm.amdgcn.rcp.f16(half %fneg.a)
 %fneg = fneg half %rcp
 %insert.0 = insertvalue { half, half } poison, half %fneg, 0
 %insert.1 = insertvalue { half, half } %insert.0, half %fneg.a, 1
 ret { half, half } %insert.1
}

define { half, half } @v_fneg_rcp_multi_use_fneg_f16(half %a, half %c) #0 {
; GCN-LABEL: v_fneg_rcp_multi_use_fneg_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:
    v_rcp_f16_e32 v2, v0
; GCN-NEXT:    v_mul_f16_e64 v1, -v0, v1
; GCN-NEXT:    v_mov_b32_e32 v0, v2
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %fneg.a = fneg half %a
 %rcp = call half @llvm.amdgcn.rcp.f16(half %fneg.a)
 %fneg = fneg half %rcp
 %use1 = fmul half %fneg.a, %c
 %insert.0 = insertvalue { half, half } poison, half %fneg, 0
 %insert.1 = insertvalue { half, half } %insert.0, half %use1, 1
 ret { half, half } %insert.1
}

; ------------------------------------------------------------------------------
```

```
; sin tests
; ---------------------------------------------------------------------------

define half @v_fneg_amdgcn_sin_f16(half %a) #0 {
; GCN-LABEL: v_fneg_amdgcn_sin_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:    v_sin_f16_e64 v0, -v0
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %sin = call half @llvm.amdgcn.sin.f16(half %a)
 %fneg = fneg half %sin
 ret half %fneg
}

; ---------------------------------------------------------------------------
;
 vintrp tests
; ---------------------------------------------------------------------------

define { float, float } @v_fneg_interp_p1_f16(float %a, float %b) #0 {
; GCN-LABEL: v_fneg_interp_p1_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:    v_mul_f32_e64 v1, v0, -v1
; GCN-NEXT:    s_mov_b32 m0, 0
; GCN-NEXT:    s_setreg_imm32_b32 hwreg(HW_REG_MODE, 2, 2), 3
; GCN-NEXT:    v_interp_p1ll_f16 v0, v1, attr0.x
; GCN-NEXT:    v_interp_p1ll_f16 v1, v1, attr0.y
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %mul = fmul float %a, %b
 %fneg = fneg float %mul
 %intrp0 = call float @llvm.amdgcn.interp.p1.f16(float %fneg, i32 0, i32 0, i1 false, i32 0)
 %intrp1 = call float @llvm.amdgcn.interp.p1.f16(float %fneg, i32 1, i32 0, i1 false, i32 0)
 %insert.0 = insertvalue { float, float } poison, float %intrp0, 0
 %insert.1 = insertvalue { float, float } %insert.0, float %intrp1, 1
 ret { float, float } %insert.1
}

define
 { half, half } @v_fneg_interp_p2_f16(float %a, float %b) #0 {
; GCN-LABEL: v_fneg_interp_p2_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:    v_mul_f32_e64 v1, v0, -v1
; GCN-NEXT:    v_mov_b32_e32 v2, 4.0
; GCN-NEXT:    s_mov_b32 m0, 0
; GCN-NEXT:    s_setreg_imm32_b32 hwreg(HW_REG_MODE, 2, 2), 3
; GCN-NEXT:    v_interp_p2_f16 v0, v1, attr0.x, v2
```

```
; GCN-NEXT:    v_interp_p2_f16 v1, v1, attr0.y, v2
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %mul = fmul float %a, %b
 %fneg = fneg float %mul
 %intrp0 = call half @llvm.amdgcn.interp.p2.f16(float 4.0, float %fneg, i32 0, i32 0, i1 false, i32 0)
 %intrp1 = call half @llvm.amdgcn.interp.p2.f16(float 4.0, float %fneg, i32 1, i32 0, i1 false, i32 0)
 %insert.0 = insertvalue { half, half } poison, half %intrp0, 0
 %insert.1 = insertvalue { half, half } %insert.0, half %intrp1, 1
 ret { half, half } %insert.1
}

; ------------------------------------------------------------------------------
;
 arithmetic.fence tests
; ------------------------------------------------------------------------------

; FIXME: Legalization/promote is broken
define half @v_fneg_arithmetic_fence_f16(half %a) #0 {
; GCN-LABEL: v_fneg_arithmetic_fence_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    ;ARITH_FENCE
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:    v_xor_b32_e32 v0, 0x8000, v0
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %fence = call half @llvm.arithmetic.fence.f16(half %a)
 %fneg = fneg half %fence
 ret half %fneg
}

define half @v_fneg_arithmetic_fence_fmul_f16(half %a, half %b) #0 {
; GCN-LABEL: v_fneg_arithmetic_fence_fmul_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:    v_mul_f16_e32 v0, v0, v1
; GCN-NEXT:    ;ARITH_FENCE
; GCN-NEXT:    v_xor_b32_e32 v0, 0x8000, v0
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %mul = fmul half %a, %b
 %fence = call half @llvm.arithmetic.fence.f16(half %mul)
 %fneg = fneg half %fence
 ret half
 %fneg
}

declare half @llvm.amdgcn.rcp.f16(half) #1
declare half @llvm.amdgcn.sin.f16(half) #1
declare half @llvm.arithmetic.fence.f16(half) #1
declare float @llvm.amdgcn.interp.p1.f16(float, i32, i32, i1, i32) #0
```

declare half @llvm.amdgcn.interp.p2.f16(float, float, i32, i32, i1, i32) #0

attributes #0 = { nounwind "denormal-fp-math-f32"="preserve-sign,preserve-sign" }
attributes #1 = { nounwind readnone }
attributes #2 = { nounwind "unsafe-fp-math"="true" }
attributes #3 = { nounwind "no-signed-zeros-fp-math"="true" }
attributes #4 = { nounwind "amdgpu-ieee"="false" "denormal-fp-math-f32"="preserve-sign,preserve-sign" }
;; NOTE: These prefixes are unused and the list is autogenerated. Do not add tests below this line:
; GCN-NSZ: {{.*}}
; GCN-SAFE: {{.*}}
; VI: {{.*}}
; VI-NSZ: {{.*}}
; VI-SAFE: {{.*}}
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; RUN: opt -passes=consthoist -S -o - %s | FileCheck %s
target datalayout = "e-m:e-p:32:32-i64:64-v128:64:128-a:0:32-n32-S64"
target triple = "thumbv6m-none--musleabi"

; Check that for i8 type, the maximum legal offset is 31.
; Also check that an constant used as value to be stored rather than
; pointer in a store instruction is hoisted.
; CHECK: foo_i8

```
; CHECK-DAG:  %[[C1:const[0-9]?]] = bitcast i32 805874720 to i32
; CHECK-DAG:  %[[C2:const[0-9]?]] = bitcast i32 805874688 to i32
; CHECK-DAG:  %[[C3:const[0-9]?]] = bitcast i32 805873720 to i32
; CHECK-DAG:  %[[C4:const[0-9]?]] = bitcast i32 805873688 to i32
; CHECK:  %0 = inttoptr i32 %[[C2]] to ptr
; CHECK-NEXT:  %1 = load volatile i8, ptr %0
; CHECK-NEXT:  %[[M1:const_mat[0-9]?]] = add i32 %[[C2]], 4
; CHECK-NEXT:  %2 = inttoptr i32 %[[M1]] to ptr
; CHECK-NEXT:  %3 = load volatile i8, ptr %2
; CHECK-NEXT:  %[[M2:const_mat[0-9]?]] = add i32 %[[C2]], 31
; CHECK-NEXT:  %4 = inttoptr i32 %[[M2]] to ptr
; CHECK-NEXT:  %5 = load volatile
 i8, ptr %4
; CHECK-NEXT:  %6 = inttoptr i32 %[[C1]] to ptr
; CHECK-NEXT:  %7 = load volatile i8, ptr %6
; CHECK-NEXT:  %[[M3:const_mat[0-9]?]] = add i32 %[[C1]], 7
; CHECK-NEXT:  %8 = inttoptr i32 %[[M3]] to ptr
; CHECK-NEXT:  %9 = load volatile i8, ptr %8
; CHECK-NEXT:  %10 = inttoptr i32 %[[C4]] to ptr
; CHECK-NEXT:  store i8 %9, ptr %10
; CHECK-NEXT:  %[[M4:const_mat[0-9]?]] = add i32 %[[C4]], 31
; CHECK-NEXT:  %11 = inttoptr i32 %[[M4]] to ptr
; CHECK-NEXT:  store i8 %7, ptr %11
; CHECK-NEXT:  %12 = inttoptr i32 %[[C3]] to ptr
; CHECK-NEXT:  store i8 %5, ptr %12
; CHECK-NEXT:  %[[M5:const_mat[0-9]?]] = add i32 %[[C3]], 7
; CHECK-NEXT:  %13 = inttoptr i32 %[[M5]] to ptr
; CHECK-NEXT:  store i8 %3, ptr %13
; CHECK-NEXT:  %[[M6:const_mat[0-9]?]] = add i32 %[[C1]], 80
; CHECK-NEXT:  %14 = inttoptr i32 %[[M6]] to ptr
; CHECK-NEXT:  store ptr %14, ptr @goo

@goo = global ptr undef

define void @foo_i8() {
entry:
 %0 = load volatile i8, ptr inttoptr (i32 805874688 to ptr)
 %1 = load volatile
 i8, ptr inttoptr (i32 805874692 to ptr)
 %2 = load volatile i8, ptr inttoptr (i32 805874719 to ptr)
 %3 = load volatile i8, ptr inttoptr (i32 805874720 to ptr)
 %4 = load volatile i8, ptr inttoptr (i32 805874727 to ptr)
 store i8 %4, ptr inttoptr(i32 805873688 to ptr)
 store i8 %3, ptr inttoptr(i32 805873719 to ptr)
 store i8 %2, ptr inttoptr(i32 805873720 to ptr)
 store i8 %1, ptr inttoptr(i32 805873727 to ptr)
 store ptr inttoptr(i32 805874800 to ptr), ptr @goo
 ret void
```

```
}

; Check that for i16 type, the maximum legal offset is 62.
; CHECK: foo_i16
; CHECK-DAG: %[[C1:const[0-9]?]] = bitcast i32 805874752 to i32
; CHECK-DAG: %[[C2:const[0-9]?]] = bitcast i32 805874688 to i32
; CHECK: %0 = inttoptr i32 %[[C2]] to ptr
; CHECK-NEXT: %1 = load volatile i16, ptr %0, align 2
; CHECK-NEXT: %[[M1:const_mat[0-9]?]] = add i32 %[[C2]], 4
; CHECK-NEXT: %2 = inttoptr i32 %[[M1]] to ptr
; CHECK-NEXT: %3 = load volatile i16, ptr %2, align 2
; CHECK-NEXT: %[[M2:const_mat[0-9]?]] = add
 i32 %[[C2]], 32
; CHECK-NEXT: %4 = inttoptr i32 %[[M2]] to ptr
; CHECK-NEXT: %5 = load volatile i16, ptr %4, align 2
; CHECK-NEXT: %[[M3:const_mat[0-9]?]] = add i32 %[[C2]], 62
; CHECK-NEXT: %6 = inttoptr i32 %[[M3]] to ptr
; CHECK-NEXT: %7 = load volatile i16, ptr %6, align 2
; CHECK-NEXT: %8 = inttoptr i32 %[[C1]] to ptr
; CHECK-NEXT: %9 = load volatile i16, ptr %8, align 2
; CHECK-NEXT: %[[M4:const_mat[0-9]?]] = add i32 %[[C1]], 22
; CHECK-NEXT: %10 = inttoptr i32 %[[M4]] to ptr
; CHECK-NEXT: %11 = load volatile i16, ptr %10, align 2

define void @foo_i16() {
entry:
 %0 = load volatile i16, ptr inttoptr (i32 805874688 to ptr), align 2
 %1 = load volatile i16, ptr inttoptr (i32 805874692 to ptr), align 2
 %2 = load volatile i16, ptr inttoptr (i32 805874720 to ptr), align 2
 %3 = load volatile i16, ptr inttoptr (i32 805874750 to ptr), align 2
 %4 = load volatile i16, ptr inttoptr (i32 805874752 to ptr), align 2
 %5 = load volatile i16, ptr inttoptr (i32 805874774 to ptr), align
 2
 ret void
}

; Check that for i32 type, the maximum legal offset is 124.
; CHECK: foo_i32
; CHECK-DAG:  %[[C1:const[0-9]?]] = bitcast i32 805874816 to i32
; CHECK-DAG:  %[[C2:const[0-9]?]] = bitcast i32 805874688 to i32
; CHECK:  %0 = inttoptr i32 %[[C2]] to ptr
; CHECK-NEXT:  %1 = load volatile i32, ptr %0, align 4
; CHECK-NEXT:  %[[M1:const_mat[0-9]?]] = add i32 %[[C2]], 4
; CHECK-NEXT:  %2 = inttoptr i32 %[[M1]] to ptr
; CHECK-NEXT:  %3 = load volatile i32, ptr %2, align 4
; CHECK-NEXT:  %[[M2:const_mat[0-9]?]] = add i32 %[[C2]], 124
; CHECK-NEXT:  %4 = inttoptr i32 %[[M2]] to ptr
; CHECK-NEXT:  %5 = load volatile i32, ptr %4, align 4
```

```
; CHECK-NEXT:  %6 = inttoptr i32 %[[C1]] to ptr
; CHECK-NEXT:  %7 = load volatile i32, ptr %6, align 4
; CHECK-NEXT:  %[[M3:const_mat[0-9]?]] = add i32 %[[C1]], 8
; CHECK-NEXT:  %8 = inttoptr i32 %[[M3]] to ptr
; CHECK-NEXT:  %9 = load volatile i32, ptr %8, align 4
; CHECK-NEXT:  %[[M4:const_mat[0-9]?]] = add i32 %[[C1]], 12
; CHECK-NEXT:  %10 = inttoptr
 i32 %[[M4]] to ptr
; CHECK-NEXT:  %11 = load volatile i32, ptr %10, align 4

define void @foo_i32() {
entry:
 %0 = load volatile i32, ptr inttoptr (i32 805874688 to ptr), align 4
 %1 = load volatile i32, ptr inttoptr (i32 805874692 to ptr), align 4
 %2 = load volatile i32, ptr inttoptr (i32 805874812 to ptr), align 4
 %3 = load volatile i32, ptr inttoptr (i32 805874816 to ptr), align 4
 %4 = load volatile i32, ptr inttoptr (i32 805874824 to ptr), align 4
 %5 = load volatile i32, ptr inttoptr (i32 805874828 to ptr), align 4
 ret void
}
```

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```
; RUN: opt %s -passes=inline -S | FileCheck %s

define internal void @innerSmall() "min-legal-vector-width"="128" {
 ret void
}

define internal void @innerLarge() "min-legal-vector-width"="512" {
 ret void
}

define internal void @innerNoAttribute() {
 ret void
}

; We should not add an attribute during inlining. No attribute means unknown.
; Inlining doesn't change the fact that we don't know anything about this
; function.
define void @outerNoAttribute() {
 call void @innerLarge()
 ret void
}

define void @outerConflictingAttributeSmall() "min-legal-vector-width"="128" {
 call void @innerLarge()
 ret void
}

define void @outerConflictingAttributeLarge() "min-legal-vector-width"="512" {
 call void @innerSmall()
 ret void
}

; We should remove the attribute after inlining since the callee's
; vector width requirements are unknown.
define void @outerAttribute() "min-legal-vector-width"="128" {
 call void @innerNoAttribute()
 ret void
}

; CHECK: define void @outerNoAttribute()
 {
; CHECK: define void @outerConflictingAttributeSmall() #0
; CHECK: define void @outerConflictingAttributeLarge() #0
; CHECK: define void @outerAttribute() {
; CHECK: attributes #0 = { "min-legal-vector-width"="512" }
; RUN: opt -mtriple=aarch64-linux-gnu -mattr=+sve -passes=scalarize-masked-mem-intrin -S < %s | FileCheck %s

; Testing that masked scatters operating on scalable vectors that are
```

```
; packed in SVE registers are not scalarized.

; CHECK-LABEL: @masked_scatter_nxv4i32(
; CHECK: call void @llvm.masked.scatter.nxv4i32
define void @masked_scatter_nxv4i32(<vscale x 4 x i32> %data, <vscale x 4 x ptr> %ptrs, <vscale x 4 x i1>
%masks) {
 call void @llvm.masked.scatter.nxv4i32(<vscale x 4 x i32> %data, <vscale x 4 x ptr> %ptrs, i32 0, <vscale x 4 x
i1> %masks)
 ret void
}

; Testing that masked scatters operating on scalable vectors of FP
; data that is packed in SVE registers are not scalarized.

; CHECK-LABEL: @masked_scatter_nxv2f64(
; CHECK: call void @llvm.masked.scatter.nxv2f64
define void @masked_scatter_nxv2f64(<vscale x 2 x double> %data, <vscale x 2 x ptr> %ptrs, <vscale x 2 x i1>
%masks) {
 call void @llvm.masked.scatter.nxv2f64(<vscale x 2 x double> %data, <vscale x 2 x ptr> %ptrs,
 i32 0, <vscale x 2 x i1> %masks)
 ret void
}

; Testing that masked scatters operating on scalable vectors of FP
; data that is unpacked in SVE registers are not scalarized.

; CHECK-LABEL: @masked_scatter_nxv2f16(
; CHECK: call void @llvm.masked.scatter.nxv2f16
define void @masked_scatter_nxv2f16(<vscale x 2 x half> %data, <vscale x 2 x ptr> %ptrs, <vscale x 2 x i1>
%masks) {
 call void @llvm.masked.scatter.nxv2f16(<vscale x 2 x half> %data, <vscale x 2 x ptr> %ptrs, i32 0, <vscale x 2 x
i1> %masks)
 ret void
}

; Testing that masked scatters operating on 64-bit fixed vectors are
; scalarized because NEON doesn't have support for masked scatter
; instructions.

; CHECK-LABEL: @masked_scatter_v2f32(
; CHECK-NOT: @llvm.masked.scatter.v2f32(
define void @masked_scatter_v2f32(<2 x float> %data, <2 x ptr> %ptrs, <2 x i1> %masks) {
 call void @llvm.masked.scatter.v2f32(<2 x float> %data, <2 x ptr> %ptrs, i32 0, <2 x i1> %masks)
 ret void
}

; Testing that masked scatters operating on 128-bit
```

```
 fixed vectors are
; scalarized because NEON doesn't have support for masked scatter
; instructions and because we are not targeting fixed width SVE.

; CHECK-LABEL: @masked_scatter_v4i32(
; CHECK-NOT: @llvm.masked.scatter.v4i32(
define void @masked_scatter_v4i32(<4 x i32> %data, <4 x ptr> %ptrs, <4 x i1> %masks) {
 call void @llvm.masked.scatter.v4i32(<4 x i32> %data, <4 x ptr> %ptrs, i32 0, <4 x i1> %masks)
 ret void
}

declare void @llvm.masked.scatter.nxv4i32(<vscale x 4 x i32> %data, <vscale x 4 x ptr> %ptrs, i32 %align,
<vscale x 4 x i1> %masks)
declare void @llvm.masked.scatter.nxv2f64(<vscale x 2 x double> %data, <vscale x 2 x ptr> %ptrs, i32 %align,
<vscale x 2 x i1> %masks)
declare void @llvm.masked.scatter.nxv2f16(<vscale x 2 x half> %data, <vscale x 2 x ptr> %ptrs, i32 %align,
<vscale x 2 x i1> %masks)
declare void @llvm.masked.scatter.v2f32(<2 x float> %data, <2 x ptr> %ptrs, i32 %align, <2 x i1> %masks)
declare void @llvm.masked.scatter.v4i32(<4 x i32> %data, <4 x
 ptr> %ptrs, i32 %align, <4 x i1> %masks)
; RUN: opt < %s -passes=argpromotion -S | FileCheck %s

; CHECK-LABEL: define i32 @foo() #0 {
; CHECK-NEXT:      %.val = load <32 x half>, ptr poison, align 4
; CHECK-NEXT:      call void @bar(<32 x half> %.val)
; CHECK-NEXT:      ret i32 0
; CHECK-NEXT:    }

; CHECK-LABEL: define internal void @bar(<32 x half> %.0.val) #0 {
; CHECK-NEXT:      ret void
; CHECK-NEXT:    }

; CHECK:    attributes #0 = { uwtable "min-legal-vector-width"="512" }

define i32 @foo() #0 {
 call void @bar(ptr poison)
 ret i32 0
}

define internal void @bar(ptr) #0 {
 %2 = load <32 x half>, ptr %0, align 4
 ret void
}

attributes #0 = { uwtable "min-legal-vector-width"="0" }
; RUN: llc -mtriple=hexagon -hexagon-hvx-widen=32 < %s | FileCheck %s

; Truncating a type-to-be-widenened to a legal type (v8i8).
```

```
; Check that this compiles successfully.
; CHECK-LABEL: f0:
; CHECK: dealloc_return

target datalayout = "e-m:e-p:32:32:32-a:0-n16:32-i64:64:64-i32:32:32-i16:16:16-i1:8:8-f32:32:32-f64:64:64-
v32:32:32-v64:64:64-v512:512:512-v1024:1024:1024-v2048:2048:2048"
target triple = "hexagon"

define dllexport void @f0(ptr %a0) local_unnamed_addr #0 {
b0:
 %v0 = load i8, ptr undef, align 1
 %v1 = zext i8 %v0 to i16
 %v2 = add i16 0, %v1
 %v3 = icmp sgt i16 %v2, 1
 %v4 = select i1 %v3, i16 %v2, i16 1
 %v5 = udiv i16 -32768, %v4
 %v6 = zext i16 %v5 to i32
 %v7 = insertelement <8 x i32> undef, i32 %v6, i32 0
 %v8 = shufflevector <8 x i32> %v7, <8 x i32> undef, <8 x i32> zeroinitializer
 %v9 = load <8 x i16>, ptr undef, align 2
 %v10 = sext <8 x i16> %v9 to <8 x i32>
 %v11 = mul nsw <8 x i32> %v8, %v10
 %v12 = add nsw <8 x i32> %v11, <i32 16384, i32 16384, i32
 16384, i32 16384, i32 16384, i32 16384, i32 16384, i32 16384>
 %v13 = lshr <8 x i32> %v12, <i32 15, i32 15, i32 15, i32 15, i32 15, i32 15, i32 15, i32 15>
 %v14 = trunc <8 x i32> %v13 to <8 x i8>
 %v15 = getelementptr inbounds i8, ptr %a0, i32 undef
 store <8 x i8> %v14, ptr %v15, align 1
 ret void
}

attributes #0 = { "target-features"="+hvx,+hvx-length128b" }
//===-- ObjectContainerBSDArchive.h ----------------------------*- C++ -*-===//
//
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//
//===----------------------------------------------------------------------===//

#ifndef
LLDB_SOURCE_PLUGINS_OBJECTCONTAINER_BSD_ARCHIVE_OBJECTCONTAINERBSDARCHIVE_H
#define
LLDB_SOURCE_PLUGINS_OBJECTCONTAINER_BSD_ARCHIVE_OBJECTCONTAINERBSDARCHIVE_H

#include "lldb/Core/UniqueCStringMap.h"
#include "lldb/Symbol/ObjectContainer.h"
#include "lldb/Utility/ArchSpec.h"
```

```
#include "lldb/Utility/ConstString.h"
#include "lldb/Utility/FileSpec.h"

#include "llvm/Object/Archive.h"
#include "llvm/Support/Chrono.h"
#include "llvm/Support/Path.h"

#include <map>
#include <memory>
#include <mutex>

enum class ArchiveType { Invalid, Archive, ThinArchive };

class ObjectContainerBSDArchive : public lldb_private::ObjectContainer
 {
public:
 ObjectContainerBSDArchive(const lldb::ModuleSP &module_sp,
                           lldb::DataBufferSP &data_sp,
                           lldb::offset_t data_offset,
                           const lldb_private::FileSpec *file,
                           lldb::offset_t offset, lldb::offset_t length,
                           ArchiveType archive_type);

 ~ObjectContainerBSDArchive() override;

 // Static Functions
 static void Initialize();

 static void Terminate();

 static llvm::StringRef GetPluginNameStatic() { return "bsd-archive"; }

 static llvm::StringRef GetPluginDescriptionStatic() {
   return "BSD Archive object container reader.";
 }

 static lldb_private::ObjectContainer *
 CreateInstance(const lldb::ModuleSP &module_sp, lldb::DataBufferSP &data_sp,
                lldb::offset_t data_offset, const lldb_private::FileSpec *file,
                lldb::offset_t offset, lldb::offset_t length);

 static size_t GetModuleSpecifications(const
 lldb_private::FileSpec &file,
                                       lldb::DataBufferSP &data_sp,
                                       lldb::offset_t data_offset,
                                       lldb::offset_t file_offset,
                                       lldb::offset_t length,
                                       lldb_private::ModuleSpecList &specs);
```

```
 static ArchiveType MagicBytesMatch(const lldb_private::DataExtractor &data);

 // Member Functions
 bool ParseHeader() override;

 size_t GetNumObjects() const override {
   if (m_archive_sp)
     return m_archive_sp->GetNumObjects();
   return 0;
 }

 lldb::ObjectFileSP GetObjectFile(const lldb_private::FileSpec *file) override;

 // PluginInterface protocol
 llvm::StringRef GetPluginName() override { return GetPluginNameStatic(); }

protected:
 struct Object {
   Object();

   void Clear();

   lldb::offset_t ExtractFromThin(const lldb_private::DataExtractor &data,

       lldb::offset_t offset,
                              llvm::StringRef stringTable);

   lldb::offset_t Extract(const lldb_private::DataExtractor &data,
                          lldb::offset_t offset);
   /// Object name in the archive.
   lldb_private::ConstString ar_name;

   /// Object modification time in the archive.
   uint32_t modification_time = 0;

   /// Object size in bytes in the archive.
   uint32_t size = 0;

   /// File offset in bytes from the beginning of the file of the object data.
   lldb::offset_t file_offset = 0;

   /// Length of the object data.
   lldb::offset_t file_size = 0;

   void Dump() const;
 };
```

```
class Archive {
public:
  typedef std::shared_ptr<Archive> shared_ptr;
  typedef std::multimap<lldb_private::FileSpec, shared_ptr> Map;

  Archive(const lldb_private::ArchSpec &arch,
          const llvm::sys::TimePoint<> &mod_time, lldb::offset_t file_offset,
          lldb_private::DataExtractor &data, ArchiveType archive_type);

   ~Archive();

  static Map &GetArchiveCache();

  static std::recursive_mutex &GetArchiveCacheMutex();

  static Archive::shared_ptr FindCachedArchive(
      const lldb_private::FileSpec &file, const lldb_private::ArchSpec &arch,
      const llvm::sys::TimePoint<> &mod_time, lldb::offset_t file_offset);

  static Archive::shared_ptr ParseAndCacheArchiveForFile(
      const lldb_private::FileSpec &file, const lldb_private::ArchSpec &arch,
      const llvm::sys::TimePoint<> &mod_time, lldb::offset_t file_offset,
      lldb_private::DataExtractor &data, ArchiveType archive_type);

  size_t GetNumObjects() const { return m_objects.size(); }

  const Object *GetObjectAtIndex(size_t idx) {
    if (idx < m_objects.size())
      return &m_objects[idx];
    return nullptr;
  }

  size_t ParseObjects();

  Object *FindObject(lldb_private::ConstString object_name,
                     const llvm::sys::TimePoint<> &object_mod_time);

  lldb::offset_t
GetFileOffset() const { return m_file_offset; }

  const llvm::sys::TimePoint<> &GetModificationTime() {
    return m_modification_time;
  }

  const lldb_private::ArchSpec &GetArchitecture() const { return m_arch; }

  void SetArchitecture(const lldb_private::ArchSpec &arch) { m_arch = arch; }
```

```
  bool HasNoExternalReferences() const;

  lldb_private::DataExtractor &GetData() { return m_data; }

  ArchiveType GetArchiveType() { return m_archive_type; }

 protected:
  typedef lldb_private::UniqueCStringMap<uint32_t> ObjectNameToIndexMap;
  // Member Variables
  lldb_private::ArchSpec m_arch;
  llvm::sys::TimePoint<> m_modification_time;
  lldb::offset_t m_file_offset;
  std::vector<Object> m_objects;
  ObjectNameToIndexMap m_object_name_to_index_map;
  lldb_private::DataExtractor m_data; ///< The data for this object container
                                      ///so we don't lose data if the .a files
                                      ///gets
 modified
  ArchiveType m_archive_type;
 };

 void SetArchive(Archive::shared_ptr &archive_sp);

 Archive::shared_ptr m_archive_sp;

 ArchiveType m_archive_type;
};

#endif //
LLDB_SOURCE_PLUGINS_OBJECTCONTAINER_BSD_ARCHIVE_OBJECTCONTAINERBSDARCHIVE_H
! RUN: %python %S/../test_errors.py %s %flang -fopenmp -Werror -pedantic
! OpenMP Version 5.0
! 2.19.4.4 firstprivate Clause
! 2.19.4.5 lastprivate Clause
! 2.19.6.1 copyin Clause
! 2.19.6.2 copyprivate Clause
! If the list item is a polymorphic variable with the allocatable attribute,
! the behavior is unspecified.

subroutine firstprivate()
 class(*), allocatable, save :: x

 !PORTABILITY: If a polymorphic variable with allocatable attribute 'x' is in FIRSTPRIVATE clause, the behavior
is unspecified
 !$omp parallel firstprivate(x)
  call sub()
 !$omp end parallel
```

```
end

subroutine lastprivate()
 class(*), allocatable, save :: x

 !PORTABILITY: If a polymorphic variable with allocatable attribute 'x' is in LASTPRIVATE clause, the behavior
is unspecified
 !$omp do lastprivate(x)
 do i = 1, 10
   call sub()
 enddo
 !$omp end do

end

subroutine copyin()
 class(*), allocatable, save :: x
 !$omp threadprivate(x)

 !PORTABILITY: If a polymorphic variable with allocatable attribute
 'x' is in COPYIN clause, the behavior is unspecified
 !$omp parallel copyin(x)
   call sub()
 !$omp end parallel

end

subroutine copyprivate()
 class(*), allocatable, save :: x
 !$omp threadprivate(x)

 !$omp single
   call sub()
 !PORTABILITY: If a polymorphic variable with allocatable attribute 'x' is in COPYPRIVATE clause, the behavior
is unspecified
 !$omp end single copyprivate(x)

end
```

==========
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```
static_library("BSD-Archive") {
 output_name = "lldbPluginObjectContainerBSDArchive"
 configs += [ "//llvm/utils/gn/build:lldb_code" ]
 deps = [
   "//lldb/source/Core",
   "//lldb/source/Host",
   "//lldb/source/Symbol",
   "//llvm/lib/Support",
 ]
 sources = [ "ObjectContainerBSDArchive.cpp" ]
}
; RUN: opt -mtriple=aarch64-linux-gnu -mattr=+sve -passes=scalarize-masked-mem-intrin -S < %s | FileCheck %s

; Testing that masked gathers operating on scalable vectors that are
; packed in SVE registers are not scalarized.

; CHECK-LABEL: @masked_gather_nxv4i32(
; CHECK: call <vscale x 4 x i32> @llvm.masked.gather.nxv4i32
define <vscale x 4 x i32> @masked_gather_nxv4i32(<vscale x 4 x ptr> %ld, <vscale x 4 x i1> %masks, <vscale x 4
x i32> %passthru) {
```

```
 %res = call <vscale x 4 x i32> @llvm.masked.gather.nxv4i32(<vscale x 4 x ptr> %ld, i32 0, <vscale x 4 x i1>
%masks, <vscale x 4 x i32> %passthru)
 ret <vscale x 4 x i32> %res
}

; Testing that masked gathers operating on scalable vectors of FP data
; that is packed in SVE registers are not scalarized.

; CHECK-LABEL: @masked_gather_nxv2f64(
; CHECK: call <vscale x 2 x double> @llvm.masked.gather.nxv2f64
define <vscale x 2 x double> @masked_gather_nxv2f64(<vscale x 2 x ptr> %ld, <vscale x 2 x i1> %masks, <vscale
x 2 x double> %passthru)
 {
 %res = call <vscale x 2 x double> @llvm.masked.gather.nxv2f64(<vscale x 2 x ptr> %ld, i32 0, <vscale x 2 x i1>
%masks, <vscale x 2 x double> %passthru)
 ret <vscale x 2 x double> %res
}

; Testing that masked gathers operating on scalable vectors of FP data
; that is unpacked in SVE registers are not scalarized.

; CHECK-LABEL: @masked_gather_nxv2f16(
; CHECK: call <vscale x 2 x half> @llvm.masked.gather.nxv2f16
define <vscale x 2 x half> @masked_gather_nxv2f16(<vscale x 2 x ptr> %ld, <vscale x 2 x i1> %masks, <vscale x
2 x half> %passthru) {
 %res = call <vscale x 2 x half> @llvm.masked.gather.nxv2f16(<vscale x 2 x ptr> %ld, i32 0, <vscale x 2 x i1>
%masks, <vscale x 2 x half> %passthru)
 ret <vscale x 2 x half> %res
}

; Testing that masked gathers operating on 64-bit fixed vectors are
; scalarized because NEON doesn't have support for masked gather
; instructions.

; CHECK-LABEL: @masked_gather_v2f32(
; CHECK-NOT: @llvm.masked.gather.v2f32(
define <2 x float> @masked_gather_v2f32(<2
 x ptr> %ld, <2 x i1> %masks, <2 x float> %passthru) {
 %res = call <2 x float> @llvm.masked.gather.v2f32(<2 x ptr> %ld, i32 0, <2 x i1> %masks, <2 x float> %passthru)
 ret <2 x float> %res
}

; Testing that masked gathers operating on 128-bit fixed vectors are
; scalarized because NEON doesn't have support for masked gather
; instructions and because we are not targeting fixed width SVE.

; CHECK-LABEL: @masked_gather_v4i32(
; CHECK-NOT: @llvm.masked.gather.v4i32(
```

```
define <4 x i32> @masked_gather_v4i32(<4 x ptr> %ld, <4 x i1> %masks, <4 x i32> %passthru) {
 %res = call <4 x i32> @llvm.masked.gather.v4i32(<4 x ptr> %ld, i32 0, <4 x i1> %masks, <4 x i32> %passthru)
 ret <4 x i32> %res
}

declare <vscale x 4 x i32> @llvm.masked.gather.nxv4i32(<vscale x 4 x ptr> %ptrs, i32 %align, <vscale x 4 x i1>
%masks, <vscale x 4 x i32> %passthru)
declare <vscale x 2 x double> @llvm.masked.gather.nxv2f64(<vscale x 2 x ptr> %ptrs, i32 %align, <vscale x 2 x
i1> %masks, <vscale x 2 x double>
 %passthru)
declare <vscale x 2 x half> @llvm.masked.gather.nxv2f16(<vscale x 2 x ptr> %ptrs, i32 %align, <vscale x 2 x i1>
%masks, <vscale x 2 x half> %passthru)
declare <2 x float> @llvm.masked.gather.v2f32(<2 x ptr> %ptrs, i32 %align, <2 x i1> %masks, <2 x float>
%passthru)
declare <4 x i32> @llvm.masked.gather.v4i32(<4 x ptr> %ptrs, i32 %align, <4 x i1> %masks, <4 x i32> %passthru)
# RUN: llc -O0 -mtriple=m68k -start-after=prologepilog -verify-machineinstrs %s -o - | FileCheck %s

name: is-pcrel-register-operand-legal
body:             |
 bb.0.entry:
   ; CHECK: move.l  (0,%pc,%a0), (%a1)
   ; CHECK: move.l  (%a0), (0,%pc,%a1)

   MOV32jk $a1,  0, $a0, implicit-def $ccr
   MOV32kj 0,  $a1, $a0, implicit-def $ccr
```


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file.
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mcpu=skylake-avx512 -mattr=prefer-256-bit | FileCheck %s --check-prefixes=CHECK,CHECK-SKX
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mcpu=skylake-avx512 -mattr=prefer-256-bit,avx512vbmi | FileCheck %s --check-prefixes=CHECK,CHECK-SKX,CHECK-SKX-VBMI
; Make sure CPUs default to prefer-256-bit. avx512vnni isn't interesting as it just adds an isel peephole for vpmaddwd+vpaddd
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mcpu=skylake-avx512 | FileCheck %s --check-prefixes=CHECK,CHECK-AVX512
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mattr=-avx512vnni -mcpu=cascadelake | FileCheck %s --check-prefixes=CHECK,CHECK-AVX512
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mattr=-avx512vnni -mcpu=cooperlake | FileCheck %s --check-prefixes=CHECK,CHECK-AVX512
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mcpu=cannonlake | FileCheck %s --check-prefixes=CHECK,CHECK-VBMI,CHECK-VBMI1
;

```
 RUN: llc < %s -mtriple=x86_64-unknown-unknown -mattr=-avx512vnni -mcpu=icelake-client | FileCheck %s --
check-prefixes=CHECK,CHECK-VBMI,CHECK-GFNI
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mattr=-avx512vnni -mcpu=icelake-server | FileCheck %s --
check-prefixes=CHECK,CHECK-VBMI,CHECK-GFNI
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mattr=-avx512vnni -mcpu=tigerlake | FileCheck %s --check-
prefixes=CHECK,CHECK-VBMI,CHECK-GFNI

; This file primarily contains tests for specific places in X86ISelLowering.cpp that needed be made aware of the
legalizer not allowing 512-bit vectors due to prefer-256-bit even though AVX512 is enabled.

define dso_local void @add256(ptr %a, ptr %b, ptr %c) "min-legal-vector-width"="256" {
; CHECK-LABEL: add256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT:    vpaddd 32(%rsi), %ymm1, %ymm1
; CHECK-NEXT:    vpaddd (%rsi), %ymm0, %ymm0
; CHECK-NEXT:    vmovdqa
 %ymm0, (%rdx)
; CHECK-NEXT:    vmovdqa %ymm1, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %d = load <16 x i32>, ptr %a
 %e = load <16 x i32>, ptr %b
 %f = add <16 x i32> %d, %e
 store <16 x i32> %f, ptr %c
 ret void
}

define dso_local void @add512(ptr %a, ptr %b, ptr %c) "min-legal-vector-width"="512" {
; CHECK-LABEL: add512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa64 (%rdi), %zmm0
; CHECK-NEXT:    vpaddd (%rsi), %zmm0, %zmm0
; CHECK-NEXT:    vmovdqa64 %zmm0, (%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %d = load <16 x i32>, ptr %a
 %e = load <16 x i32>, ptr %b
 %f = add <16 x i32> %d, %e
 store <16 x i32> %f, ptr %c
 ret void
}

define dso_local void @avg_v64i8_256(ptr %a, ptr %b) "min-legal-vector-width"="256" {
; CHECK-LABEL: avg_v64i8_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
```

```
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT:    vpavgb (%rsi), %ymm0, %ymm0
; CHECK-NEXT:    vpavgb 32(%rsi), %ymm1, %ymm1
;
 CHECK-NEXT:    vmovdqu %ymm1, (%rax)
; CHECK-NEXT:    vmovdqu %ymm0, (%rax)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %1 = load <64 x i8>, ptr %a
 %2 = load <64 x i8>, ptr %b
 %3 = zext <64 x i8> %1 to <64 x i32>
 %4 = zext <64 x i8> %2 to <64 x i32>
 %5 = add nuw nsw <64 x i32> %3, <i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32
1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1>
 %6 = add nuw nsw <64 x i32> %5, %4
 %7 = lshr <64 x i32> %6, <i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
 i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32
1>
 %8 = trunc <64 x i32> %7 to <64 x i8>
 store <64 x i8> %8, ptr undef, align 4
 ret void
}


define dso_local void @avg_v64i8_512(ptr %a, ptr %b) "min-legal-vector-width"="512" {
; CHECK-LABEL: avg_v64i8_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa64 (%rdi), %zmm0
; CHECK-NEXT:    vpavgb (%rsi), %zmm0, %zmm0
; CHECK-NEXT:    vmovdqu64 %zmm0, (%rax)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %1 = load <64 x i8>, ptr %a
 %2 = load <64 x i8>, ptr %b
 %3 = zext <64 x i8> %1 to <64 x i32>
 %4 = zext <64 x i8> %2 to <64 x i32>
 %5 = add nuw nsw <64 x i32> %3, <i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
 i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32
1, i32 1, i32 1, i32 1, i32 1, i32 1>
 %6 = add nuw nsw <64 x i32> %5, %4
 %7 = lshr <64 x i32> %6, <i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32
```

```
1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1>
 %8 = trunc <64 x i32> %7 to <64 x i8>
 store <64 x i8> %8, ptr undef, align 4
 ret void
}

define dso_local void @pmaddwd_32_256(ptr %APtr, ptr %BPtr, ptr %CPtr) "min-legal-vector-width"="256"
 {
; CHECK-LABEL: pmaddwd_32_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT:    vpmaddwd 32(%rsi), %ymm1, %ymm1
; CHECK-NEXT:    vpmaddwd (%rsi), %ymm0, %ymm0
; CHECK-NEXT:    vmovdqa %ymm0, (%rdx)
; CHECK-NEXT:    vmovdqa %ymm1, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
  %A = load <32 x i16>, ptr %APtr
  %B = load <32 x i16>, ptr %BPtr
  %a = sext <32 x i16> %A to <32 x i32>
  %b = sext <32 x i16> %B to <32 x i32>
  %m = mul nsw <32 x i32> %a, %b
  %odd = shufflevector <32 x i32> %m, <32 x i32> undef, <16 x i32> <i32 0, i32 2, i32 4, i32 6, i32 8, i32 10, i32
12, i32 14, i32 16, i32 18, i32 20, i32 22, i32 24, i32 26, i32 28, i32 30>
  %even = shufflevector <32 x i32> %m, <32 x i32> undef, <16 x i32> <i32 1, i32 3, i32 5, i32 7, i32 9, i32 11, i32
13, i32 15, i32 17, i32 19, i32 21, i32 23, i32 25, i32 27, i32 29, i32 31>
  %ret = add <16 x i32> %odd, %even
  store <16 x i32> %ret,
 ptr %CPtr
  ret void
}

define dso_local void @pmaddwd_32_512(ptr %APtr, ptr %BPtr, ptr %CPtr) "min-legal-vector-width"="512" {
; CHECK-LABEL: pmaddwd_32_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa64 (%rdi), %zmm0
; CHECK-NEXT:    vpmaddwd (%rsi), %zmm0, %zmm0
; CHECK-NEXT:    vmovdqa64 %zmm0, (%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
  %A = load <32 x i16>, ptr %APtr
  %B = load <32 x i16>, ptr %BPtr
  %a = sext <32 x i16> %A to <32 x i32>
  %b = sext <32 x i16> %B to <32 x i32>
  %m = mul nsw <32 x i32> %a, %b
  %odd = shufflevector <32 x i32> %m, <32 x i32> undef, <16 x i32> <i32 0, i32 2, i32 4, i32 6, i32 8, i32 10, i32
```

```
12, i32 14, i32 16, i32 18, i32 20, i32 22, i32 24, i32 26, i32 28, i32 30>
  %even = shufflevector <32 x i32> %m, <32 x i32> undef, <16 x i32> <i32 1, i32 3, i32 5, i32 7, i32 9, i32 11, i32
13, i32 15, i32 17, i32 19, i32 21, i32 23, i32 25, i32 27, i32 29, i32 31>
  %ret = add <16 x i32> %odd, %even
  store <16 x i32> %ret, ptr
 %CPtr
  ret void
}

define dso_local void @psubus_64i8_max_256(ptr %xptr, ptr %yptr, ptr %zptr) "min-legal-vector-width"="256" {
; CHECK-LABEL: psubus_64i8_max_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT:    vpsubusb 32(%rsi), %ymm1, %ymm1
; CHECK-NEXT:    vpsubusb (%rsi), %ymm0, %ymm0
; CHECK-NEXT:    vmovdqa %ymm0, (%rdx)
; CHECK-NEXT:    vmovdqa %ymm1, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %x = load <64 x i8>, ptr %xptr
 %y = load <64 x i8>, ptr %yptr
 %cmp = icmp ult <64 x i8> %x, %y
 %max = select <64 x i1> %cmp, <64 x i8> %y, <64 x i8> %x
 %res = sub <64 x i8> %max, %y
 store <64 x i8> %res, ptr %zptr
 ret void
}

define dso_local void @psubus_64i8_max_512(ptr %xptr, ptr %yptr, ptr %zptr) "min-legal-vector-width"="512" {
; CHECK-LABEL: psubus_64i8_max_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa64 (%rdi), %zmm0
; CHECK-NEXT:    vpsubusb (%rsi), %zmm0, %zmm0
; CHECK-NEXT:
    vmovdqa64 %zmm0, (%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %x = load <64 x i8>, ptr %xptr
 %y = load <64 x i8>, ptr %yptr
 %cmp = icmp ult <64 x i8> %x, %y
 %max = select <64 x i1> %cmp, <64 x i8> %y, <64 x i8> %x
 %res = sub <64 x i8> %max, %y
 store <64 x i8> %res, ptr %zptr
 ret void
}

define dso_local i32 @_Z9test_charPcS_i_256(ptr nocapture readonly, ptr nocapture readonly, i32) "min-legal-
```

```
vector-width"="256" {
; CHECK-SKX-LABEL: _Z9test_charPcS_i_256:
; CHECK-SKX:       # %bb.0: # %entry
; CHECK-SKX-NEXT:    movl %edx, %eax
; CHECK-SKX-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-SKX-NEXT:    xorl %ecx, %ecx
; CHECK-SKX-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-SKX-NEXT:    vpxor %xmm2, %xmm2, %xmm2
; CHECK-SKX-NEXT:    .p2align 4
; CHECK-SKX-NEXT:  .LBB8_1: # %vector.body
; CHECK-SKX-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-SKX-NEXT:    vpmovsxbw 16(%rdi,%rcx), %ymm3
; CHECK-SKX-NEXT:    vpmovsxbw (%rdi,%rcx), %ymm4
; CHECK-SKX-NEXT:
   vpmovsxbw 16(%rsi,%rcx), %ymm5
; CHECK-SKX-NEXT:    vpmaddwd %ymm3, %ymm5, %ymm3
; CHECK-SKX-NEXT:    vpaddd %ymm2, %ymm3, %ymm2
; CHECK-SKX-NEXT:    vpmovsxbw (%rsi,%rcx), %ymm3
; CHECK-SKX-NEXT:    vpmaddwd %ymm4, %ymm3, %ymm3
; CHECK-SKX-NEXT:    vpaddd %ymm1, %ymm3, %ymm1
; CHECK-SKX-NEXT:    addq $32, %rcx
; CHECK-SKX-NEXT:    cmpq %rcx, %rax
; CHECK-SKX-NEXT:    jne .LBB8_1
; CHECK-SKX-NEXT:  # %bb.2: # %middle.block
; CHECK-SKX-NEXT:    vpaddd %ymm0, %ymm1, %ymm1
; CHECK-SKX-NEXT:    vpaddd %ymm0, %ymm2, %ymm0
; CHECK-SKX-NEXT:    vpaddd %ymm0, %ymm1, %ymm0
; CHECK-SKX-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vpsrlq $32, %xmm0, %xmm1
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vmovd %xmm0, %eax
; CHECK-SKX-NEXT:    vzeroupper
; CHECK-SKX-NEXT:    retq
;
; CHECK-AVX512-LABEL: _Z9test_charPcS_i_256:
;
 CHECK-AVX512:       # %bb.0: # %entry
; CHECK-AVX512-NEXT:    movl %edx, %eax
; CHECK-AVX512-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    xorl %ecx, %ecx
; CHECK-AVX512-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-AVX512-NEXT:    vpxor %xmm2, %xmm2, %xmm2
; CHECK-AVX512-NEXT:    .p2align 4
; CHECK-AVX512-NEXT:  .LBB8_1: # %vector.body
; CHECK-AVX512-NEXT:    # =>This Inner Loop Header: Depth=1
```

```
; CHECK-AVX512-NEXT:    vpmovsxbw 16(%rdi,%rcx), %ymm3
; CHECK-AVX512-NEXT:    vpmovsxbw (%rdi,%rcx), %ymm4
; CHECK-AVX512-NEXT:    vpmovsxbw 16(%rsi,%rcx), %ymm5
; CHECK-AVX512-NEXT:    vpmaddwd %ymm3, %ymm5, %ymm3
; CHECK-AVX512-NEXT:    vpaddd %ymm2, %ymm3, %ymm2
; CHECK-AVX512-NEXT:    vpmovsxbw (%rsi,%rcx), %ymm3
; CHECK-AVX512-NEXT:    vpmaddwd %ymm4, %ymm3, %ymm3
; CHECK-AVX512-NEXT:    vpaddd %ymm1, %ymm3, %ymm1
; CHECK-AVX512-NEXT:    addq $32, %rcx
; CHECK-AVX512-NEXT:    cmpq %rcx, %rax
; CHECK-AVX512-NEXT:    jne .LBB8_1
; CHECK-AVX512-NEXT:  # %bb.2:
 # %middle.block
; CHECK-AVX512-NEXT:    vpaddd %ymm0, %ymm1, %ymm1
; CHECK-AVX512-NEXT:    vpaddd %ymm0, %ymm2, %ymm0
; CHECK-AVX512-NEXT:    vpaddd %ymm0, %ymm1, %ymm0
; CHECK-AVX512-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vpsrlq $32, %xmm0, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vmovd %xmm0, %eax
; CHECK-AVX512-NEXT:    vzeroupper
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI-LABEL: _Z9test_charPcS_i_256:
; CHECK-VBMI:       # %bb.0: # %entry
; CHECK-VBMI-NEXT:    movl %edx, %eax
; CHECK-VBMI-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    xorl %ecx, %ecx
; CHECK-VBMI-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-VBMI-NEXT:    vpxor %xmm2, %xmm2, %xmm2
; CHECK-VBMI-NEXT:    .p2align 4
; CHECK-VBMI-NEXT:  .LBB8_1: # %vector.body
; CHECK-VBMI-NEXT:    # =>This
 Inner Loop Header: Depth=1
; CHECK-VBMI-NEXT:    vpmovsxbw 16(%rdi,%rcx), %ymm3
; CHECK-VBMI-NEXT:    vpmovsxbw (%rdi,%rcx), %ymm4
; CHECK-VBMI-NEXT:    vpmovsxbw 16(%rsi,%rcx), %ymm5
; CHECK-VBMI-NEXT:    vpmaddwd %ymm3, %ymm5, %ymm3
; CHECK-VBMI-NEXT:    vpaddd %ymm2, %ymm3, %ymm2
; CHECK-VBMI-NEXT:    vpmovsxbw (%rsi,%rcx), %ymm3
; CHECK-VBMI-NEXT:    vpmaddwd %ymm4, %ymm3, %ymm3
; CHECK-VBMI-NEXT:    vpaddd %ymm1, %ymm3, %ymm1
; CHECK-VBMI-NEXT:    addq $32, %rcx
; CHECK-VBMI-NEXT:    cmpq %rcx, %rax
; CHECK-VBMI-NEXT:    jne .LBB8_1
```

```
; CHECK-VBMI-NEXT:  # %bb.2: # %middle.block
; CHECK-VBMI-NEXT:    vpaddd %ymm0, %ymm1, %ymm1
; CHECK-VBMI-NEXT:    vpaddd %ymm0, %ymm2, %ymm0
; CHECK-VBMI-NEXT:    vpaddd %ymm0, %ymm1, %ymm0
; CHECK-VBMI-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[1,1,1,1]
;
 CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vmovd %xmm0, %eax
; CHECK-VBMI-NEXT:    vzeroupper
; CHECK-VBMI-NEXT:    retq
entry:
 %3 = zext i32 %2 to i64
 br label %vector.body

vector.body:
 %index = phi i64 [ %index.next, %vector.body ], [ 0, %entry ]
 %vec.phi = phi <32 x i32> [ %11, %vector.body ], [ zeroinitializer, %entry ]
 %4 = getelementptr inbounds i8, ptr %0, i64 %index
 %5 = bitcast ptr %4 to ptr
 %wide.load = load <32 x i8>, ptr %5, align 1
 %6 = sext <32 x i8> %wide.load to <32 x i32>
 %7 = getelementptr inbounds i8, ptr %1, i64 %index
 %8 = bitcast ptr %7 to ptr
 %wide.load14 = load <32 x i8>, ptr %8, align 1
 %9 = sext <32 x i8> %wide.load14 to <32 x i32>
 %10 = mul nsw <32 x i32> %9, %6
 %11 = add nsw <32 x i32> %10, %vec.phi
 %index.next = add i64 %index, 32
 %12 = icmp eq i64 %index.next, %3
 br i1 %12, label %middle.block, label %vector.body

middle.block:
 %rdx.shuf1 = shufflevector <32 x i32> %11, <32 x i32>
 undef, <32 x i32> <i32 16, i32 17, i32 18, i32 19, i32 20, i32 21, i32 22, i32 23, i32 24, i32 25, i32 26, i32 27, i32
28, i32 29, i32 30, i32 31, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx1 = add <32 x i32> %11, %rdx.shuf1
 %rdx.shuf = shufflevector <32 x i32> %bin.rdx1, <32 x i32> undef, <32 x i32> <i32 8, i32 9, i32 10, i32 11, i32
12, i32 13, i32 14, i32 15, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx = add <32 x i32> %bin.rdx1, %rdx.shuf
 %rdx.shuf15 = shufflevector <32 x i32> %bin.rdx, <32 x i32> undef, <32 x i32> <i32 4, i32 5, i32 6, i32 7, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
```

```
 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef>
 %bin.rdx32 = add <32 x i32> %bin.rdx, %rdx.shuf15
 %rdx.shuf17 = shufflevector <32 x i32> %bin.rdx32, <32 x i32> undef, <32 x i32> <i32 2, i32 3, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx18 = add <32 x i32> %bin.rdx32, %rdx.shuf17
 %rdx.shuf19 = shufflevector <32 x i32> %bin.rdx18, <32 x i32> undef, <32 x i32> <i32 1, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx20 = add <32 x i32> %bin.rdx18, %rdx.shuf19
 %13 = extractelement <32 x i32> %bin.rdx20, i32 0
 ret i32 %13
}

define dso_local i32 @_Z9test_charPcS_i_512(ptr nocapture readonly, ptr nocapture readonly, i32) "min-legal-
vector-width"="512" {
; CHECK-SKX-LABEL: _Z9test_charPcS_i_512:
; CHECK-SKX:       # %bb.0: # %entry
; CHECK-SKX-NEXT:    movl %edx, %eax
; CHECK-SKX-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-SKX-NEXT:    xorl %ecx, %ecx
; CHECK-SKX-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-SKX-NEXT:    .p2align 4
; CHECK-SKX-NEXT:  .LBB9_1: # %vector.body
; CHECK-SKX-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-SKX-NEXT:    vpmovsxbw (%rdi,%rcx), %zmm2
; CHECK-SKX-NEXT:    vpmovsxbw (%rsi,%rcx), %zmm3
; CHECK-SKX-NEXT:    vpmaddwd %zmm2, %zmm3, %zmm2
; CHECK-SKX-NEXT:
    vpaddd %zmm1, %zmm2, %zmm1
; CHECK-SKX-NEXT:    addq $32, %rcx
; CHECK-SKX-NEXT:    cmpq %rcx, %rax
; CHECK-SKX-NEXT:    jne .LBB9_1
; CHECK-SKX-NEXT:  # %bb.2: # %middle.block
; CHECK-SKX-NEXT:    vpaddd %zmm0, %zmm1, %zmm0
; CHECK-SKX-NEXT:    vextracti64x4 $1, %zmm0, %ymm1
; CHECK-SKX-NEXT:    vpaddd %zmm1, %zmm0, %zmm0
; CHECK-SKX-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vpsrlq $32, %xmm0, %xmm1
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vmovd %xmm0, %eax
```

```
; CHECK-SKX-NEXT:    vzeroupper
; CHECK-SKX-NEXT:    retq
;
; CHECK-AVX512-LABEL: _Z9test_charPcS_i_512:
; CHECK-AVX512:       # %bb.0: # %entry
; CHECK-AVX512-NEXT:    movl %edx, %eax
; CHECK-AVX512-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    xorl %ecx, %ecx
; CHECK-AVX512-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-AVX512-NEXT:
   .p2align 4
; CHECK-AVX512-NEXT:  .LBB9_1: # %vector.body
; CHECK-AVX512-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-AVX512-NEXT:    vpmovsxbw (%rdi,%rcx), %zmm2
; CHECK-AVX512-NEXT:    vpmovsxbw (%rsi,%rcx), %zmm3
; CHECK-AVX512-NEXT:    vpmaddwd %zmm2, %zmm3, %zmm2
; CHECK-AVX512-NEXT:    vpaddd %zmm1, %zmm2, %zmm1
; CHECK-AVX512-NEXT:    addq $32, %rcx
; CHECK-AVX512-NEXT:    cmpq %rcx, %rax
; CHECK-AVX512-NEXT:    jne .LBB9_1
; CHECK-AVX512-NEXT:  # %bb.2: # %middle.block
; CHECK-AVX512-NEXT:    vpaddd %zmm0, %zmm1, %zmm0
; CHECK-AVX512-NEXT:    vextracti64x4 $1, %zmm0, %ymm1
; CHECK-AVX512-NEXT:    vpaddd %zmm1, %zmm0, %zmm0
; CHECK-AVX512-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vpsrlq $32, %xmm0, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:
   vmovd %xmm0, %eax
; CHECK-AVX512-NEXT:    vzeroupper
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI-LABEL: _Z9test_charPcS_i_512:
; CHECK-VBMI:       # %bb.0: # %entry
; CHECK-VBMI-NEXT:    movl %edx, %eax
; CHECK-VBMI-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    xorl %ecx, %ecx
; CHECK-VBMI-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-VBMI-NEXT:    .p2align 4
; CHECK-VBMI-NEXT:  .LBB9_1: # %vector.body
; CHECK-VBMI-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-VBMI-NEXT:    vpmovsxbw (%rdi,%rcx), %zmm2
; CHECK-VBMI-NEXT:    vpmovsxbw (%rsi,%rcx), %zmm3
; CHECK-VBMI-NEXT:    vpmaddwd %zmm2, %zmm3, %zmm2
; CHECK-VBMI-NEXT:    vpaddd %zmm1, %zmm2, %zmm1
```

```
; CHECK-VBMI-NEXT:    addq $32, %rcx
; CHECK-VBMI-NEXT:    cmpq %rcx, %rax
; CHECK-VBMI-NEXT:    jne .LBB9_1
; CHECK-VBMI-NEXT:  # %bb.2: # %middle.block
; CHECK-VBMI-NEXT:    vpaddd %zmm0, %zmm1, %zmm0
; CHECK-VBMI-NEXT:    vextracti64x4 $1, %zmm0, %ymm1
; CHECK-VBMI-NEXT:    vpaddd %zmm1, %zmm0, %zmm0
; CHECK-VBMI-NEXT:
   vextracti128 $1, %ymm0, %xmm1
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[1,1,1,1]
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vmovd %xmm0, %eax
; CHECK-VBMI-NEXT:    vzeroupper
; CHECK-VBMI-NEXT:    retq
entry:
 %3 = zext i32 %2 to i64
 br label %vector.body

vector.body:
 %index = phi i64 [ %index.next, %vector.body ], [ 0, %entry ]
 %vec.phi = phi <32 x i32> [ %11, %vector.body ], [ zeroinitializer, %entry ]
 %4 = getelementptr inbounds i8, ptr %0, i64 %index
 %5 = bitcast ptr %4 to ptr
 %wide.load = load <32 x i8>, ptr %5, align 1
 %6 = sext <32 x i8> %wide.load to <32 x i32>
 %7 = getelementptr inbounds i8, ptr %1, i64 %index
 %8 = bitcast ptr %7 to ptr
 %wide.load14 = load <32 x i8>, ptr %8, align 1
 %9 = sext <32 x i8> %wide.load14 to <32 x i32>
 %10 = mul nsw <32 x i32>
 %9, %6
 %11 = add nsw <32 x i32> %10, %vec.phi
 %index.next = add i64 %index, 32
 %12 = icmp eq i64 %index.next, %3
 br i1 %12, label %middle.block, label %vector.body

middle.block:
 %rdx.shuf1 = shufflevector <32 x i32> %11, <32 x i32> undef, <32 x i32> <i32 16, i32 17, i32 18, i32 19, i32 20,
i32 21, i32 22, i32 23, i32 24, i32 25, i32 26, i32 27, i32 28, i32 29, i32 30, i32 31, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef>
 %bin.rdx1 = add <32 x i32> %11, %rdx.shuf1
 %rdx.shuf = shufflevector <32 x i32> %bin.rdx1, <32 x i32> undef, <32 x i32> <i32 8, i32 9, i32 10, i32 11, i32
12, i32 13, i32 14, i32 15, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
```

```
i32 undef, i32 undef, i32 undef, i32
 undef, i32 undef>
 %bin.rdx = add <32 x i32> %bin.rdx1, %rdx.shuf
 %rdx.shuf15 = shufflevector <32 x i32> %bin.rdx, <32 x i32> undef, <32 x i32> <i32 4, i32 5, i32 6, i32 7, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx32 = add <32 x i32> %bin.rdx, %rdx.shuf15
 %rdx.shuf17 = shufflevector <32 x i32> %bin.rdx32, <32 x i32> undef, <32 x i32> <i32 2, i32 3, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx18 = add <32 x i32> %bin.rdx32,
 %rdx.shuf17
 %rdx.shuf19 = shufflevector <32 x i32> %bin.rdx18, <32 x i32> undef, <32 x i32> <i32 1, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx20 = add <32 x i32> %bin.rdx18, %rdx.shuf19
 %13 = extractelement <32 x i32> %bin.rdx20, i32 0
 ret i32 %13
}

@a = dso_local global [1024 x i8] zeroinitializer, align 16
@b = dso_local global [1024 x i8] zeroinitializer, align 16

define dso_local i32 @sad_16i8_256() "min-legal-vector-width"="256" {
; CHECK-SKX-LABEL: sad_16i8_256:
; CHECK-SKX:       # %bb.0: # %entry
; CHECK-SKX-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-SKX-NEXT:    movq $-1024, %rax # imm = 0xFC00
; CHECK-SKX-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-SKX-NEXT:
    .p2align 4
; CHECK-SKX-NEXT:  .LBB10_1: # %vector.body
; CHECK-SKX-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-SKX-NEXT:    vmovdqu a+1024(%rax), %xmm2
; CHECK-SKX-NEXT:    vpsadbw b+1024(%rax), %xmm2, %xmm2
; CHECK-SKX-NEXT:    vpaddd %ymm1, %ymm2, %ymm1
; CHECK-SKX-NEXT:    addq $4, %rax
; CHECK-SKX-NEXT:    jne .LBB10_1
; CHECK-SKX-NEXT:  # %bb.2: # %middle.block
; CHECK-SKX-NEXT:    vpaddd %ymm0, %ymm1, %ymm0
; CHECK-SKX-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vpsrlq $32, %xmm0, %xmm1
```

```
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vmovd %xmm0, %eax
; CHECK-SKX-NEXT:    vzeroupper
; CHECK-SKX-NEXT:    retq
;
; CHECK-AVX512-LABEL: sad_16i8_256:
; CHECK-AVX512:       # %bb.0: # %entry
; CHECK-AVX512-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    movq $-1024, %rax # imm
 = 0xFC00
; CHECK-AVX512-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-AVX512-NEXT:    .p2align 4
; CHECK-AVX512-NEXT:  .LBB10_1: # %vector.body
; CHECK-AVX512-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-AVX512-NEXT:    vmovdqu a+1024(%rax), %xmm2
; CHECK-AVX512-NEXT:    vpsadbw b+1024(%rax), %xmm2, %xmm2
; CHECK-AVX512-NEXT:    vpaddd %ymm1, %ymm2, %ymm1
; CHECK-AVX512-NEXT:    addq $4, %rax
; CHECK-AVX512-NEXT:    jne .LBB10_1
; CHECK-AVX512-NEXT:  # %bb.2: # %middle.block
; CHECK-AVX512-NEXT:    vpaddd %ymm0, %ymm1, %ymm0
; CHECK-AVX512-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vpsrlq $32, %xmm0, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vmovd %xmm0, %eax
; CHECK-AVX512-NEXT:    vzeroupper
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI-LABEL: sad_16i8_256:
;
 CHECK-VBMI:       # %bb.0: # %entry
; CHECK-VBMI-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    movq $-1024, %rax # imm = 0xFC00
; CHECK-VBMI-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-VBMI-NEXT:    .p2align 4
; CHECK-VBMI-NEXT:  .LBB10_1: # %vector.body
; CHECK-VBMI-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-VBMI-NEXT:    vmovdqu a+1024(%rax), %xmm2
; CHECK-VBMI-NEXT:    vpsadbw b+1024(%rax), %xmm2, %xmm2
; CHECK-VBMI-NEXT:    vpaddd %ymm1, %ymm2, %ymm1
; CHECK-VBMI-NEXT:    addq $4, %rax
; CHECK-VBMI-NEXT:    jne .LBB10_1
; CHECK-VBMI-NEXT:  # %bb.2: # %middle.block
; CHECK-VBMI-NEXT:    vpaddd %ymm0, %ymm1, %ymm0
; CHECK-VBMI-NEXT:    vextracti128 $1, %ymm0, %xmm1
```

```
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[1,1,1,1]
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vmovd %xmm0, %eax
;
 CHECK-VBMI-NEXT:    vzeroupper
; CHECK-VBMI-NEXT:    retq
entry:
 br label %vector.body

vector.body:
 %index = phi i64 [ 0, %entry ], [ %index.next, %vector.body ]
 %vec.phi = phi <16 x i32> [ zeroinitializer, %entry ], [ %10, %vector.body ]
 %0 = getelementptr inbounds [1024 x i8], ptr @a, i64 0, i64 %index
 %1 = bitcast ptr %0 to ptr
 %wide.load = load <16 x i8>, ptr %1, align 4
 %2 = zext <16 x i8> %wide.load to <16 x i32>
 %3 = getelementptr inbounds [1024 x i8], ptr @b, i64 0, i64 %index
 %4 = bitcast ptr %3 to ptr
 %wide.load1 = load <16 x i8>, ptr %4, align 4
 %5 = zext <16 x i8> %wide.load1 to <16 x i32>
 %6 = sub nsw <16 x i32> %2, %5
 %7 = icmp sgt <16 x i32> %6, <i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -
1, i32 -1, i32 -1, i32 -1, i32 -1>
 %8 = sub nsw <16 x i32> zeroinitializer, %6
 %9 = select <16 x i1> %7, <16 x i32> %6, <16 x i32> %8
 %10 = add nsw <16 x i32> %9, %vec.phi
 %index.next = add i64 %index,
 4
 %11 = icmp eq i64 %index.next, 1024
 br i1 %11, label %middle.block, label %vector.body

middle.block:
 %rdx.shuf = shufflevector <16 x i32> %10, <16 x i32> undef, <16 x i32> <i32 8, i32 9, i32 10, i32 11, i32 12, i32
13, i32 14, i32 15, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx = add <16 x i32> %10, %rdx.shuf
 %rdx.shuf2 = shufflevector <16 x i32> %bin.rdx, <16 x i32> undef, <16 x i32> <i32 4, i32 5, i32 6, i32 7, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef>
 %bin.rdx2 = add <16 x i32> %bin.rdx, %rdx.shuf2
 %rdx.shuf3 = shufflevector <16 x i32> %bin.rdx2, <16 x i32> undef, <16 x i32> <i32 2, i32 3, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef>
 %bin.rdx3 = add <16 x i32> %bin.rdx2, %rdx.shuf3
 %rdx.shuf4 = shufflevector
```

```
 <16 x i32> %bin.rdx3, <16 x i32> undef, <16 x i32> <i32 1, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx4 = add <16 x i32> %bin.rdx3, %rdx.shuf4
 %12 = extractelement <16 x i32> %bin.rdx4, i32 0
 ret i32 %12
}

define dso_local i32 @sad_16i8_512() "min-legal-vector-width"="512" {
; CHECK-SKX-LABEL: sad_16i8_512:
; CHECK-SKX:       # %bb.0: # %entry
; CHECK-SKX-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-SKX-NEXT:    movq $-1024, %rax # imm = 0xFC00
; CHECK-SKX-NEXT:    .p2align 4
; CHECK-SKX-NEXT:  .LBB11_1: # %vector.body
; CHECK-SKX-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-SKX-NEXT:    vmovdqu a+1024(%rax), %xmm1
; CHECK-SKX-NEXT:    vpsadbw b+1024(%rax), %xmm1, %xmm1
; CHECK-SKX-NEXT:    vpaddd %zmm0, %zmm1, %zmm0
; CHECK-SKX-NEXT:    addq $4, %rax
; CHECK-SKX-NEXT:    jne .LBB11_1
; CHECK-SKX-NEXT:  # %bb.2: # %middle.block
; CHECK-SKX-NEXT:
    vextracti64x4 $1, %zmm0, %ymm1
; CHECK-SKX-NEXT:    vpaddd %zmm1, %zmm0, %zmm0
; CHECK-SKX-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vpsrlq $32, %xmm0, %xmm1
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vmovd %xmm0, %eax
; CHECK-SKX-NEXT:    vzeroupper
; CHECK-SKX-NEXT:    retq
;
; CHECK-AVX512-LABEL: sad_16i8_512:
; CHECK-AVX512:       # %bb.0: # %entry
; CHECK-AVX512-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    movq $-1024, %rax # imm = 0xFC00
; CHECK-AVX512-NEXT:    .p2align 4
; CHECK-AVX512-NEXT:  .LBB11_1: # %vector.body
; CHECK-AVX512-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-AVX512-NEXT:    vmovdqu a+1024(%rax), %xmm1
; CHECK-AVX512-NEXT:    vpsadbw b+1024(%rax), %xmm1, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %zmm0, %zmm1, %zmm0
; CHECK-AVX512-NEXT:    addq $4,
 %rax
; CHECK-AVX512-NEXT:    jne .LBB11_1
; CHECK-AVX512-NEXT:  # %bb.2: # %middle.block
```

```
; CHECK-AVX512-NEXT:    vextracti64x4 $1, %zmm0, %ymm1
; CHECK-AVX512-NEXT:    vpaddd %zmm1, %zmm0, %zmm0
; CHECK-AVX512-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vpsrlq $32, %xmm0, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vmovd %xmm0, %eax
; CHECK-AVX512-NEXT:    vzeroupper
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI-LABEL: sad_16i8_512:
; CHECK-VBMI:       # %bb.0: # %entry
; CHECK-VBMI-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    movq $-1024, %rax # imm = 0xFC00
; CHECK-VBMI-NEXT:    .p2align 4
; CHECK-VBMI-NEXT:  .LBB11_1: # %vector.body
; CHECK-VBMI-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-VBMI-NEXT:    vmovdqu a+1024(%rax), %xmm1
; CHECK-VBMI-NEXT:
   vpsadbw b+1024(%rax), %xmm1, %xmm1
; CHECK-VBMI-NEXT:    vpaddd %zmm0, %zmm1, %zmm0
; CHECK-VBMI-NEXT:    addq $4, %rax
; CHECK-VBMI-NEXT:    jne .LBB11_1
; CHECK-VBMI-NEXT:  # %bb.2: # %middle.block
; CHECK-VBMI-NEXT:    vextracti64x4 $1, %zmm0, %ymm1
; CHECK-VBMI-NEXT:    vpaddd %zmm1, %zmm0, %zmm0
; CHECK-VBMI-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[1,1,1,1]
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vmovd %xmm0, %eax
; CHECK-VBMI-NEXT:    vzeroupper
; CHECK-VBMI-NEXT:    retq
entry:
 br label %vector.body

vector.body:
 %index = phi i64 [ 0, %entry ], [ %index.next, %vector.body ]
 %vec.phi = phi <16 x i32> [ zeroinitializer, %entry ], [ %10, %vector.body ]
 %0 = getelementptr inbounds [1024 x i8], ptr @a, i64 0, i64 %index
 %1 = bitcast ptr
 %0 to ptr
 %wide.load = load <16 x i8>, ptr %1, align 4
 %2 = zext <16 x i8> %wide.load to <16 x i32>
```

```
 %3 = getelementptr inbounds [1024 x i8], ptr @b, i64 0, i64 %index
 %4 = bitcast ptr %3 to ptr
 %wide.load1 = load <16 x i8>, ptr %4, align 4
 %5 = zext <16 x i8> %wide.load1 to <16 x i32>
 %6 = sub nsw <16 x i32> %2, %5
 %7 = icmp sgt <16 x i32> %6, <i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -
1, i32 -1, i32 -1, i32 -1, i32 -1>
 %8 = sub nsw <16 x i32> zeroinitializer, %6
 %9 = select <16 x i1> %7, <16 x i32> %6, <16 x i32> %8
 %10 = add nsw <16 x i32> %9, %vec.phi
 %index.next = add i64 %index, 4
 %11 = icmp eq i64 %index.next, 1024
 br i1 %11, label %middle.block, label %vector.body

middle.block:
 %rdx.shuf = shufflevector <16 x i32> %10, <16 x i32> undef, <16 x i32> <i32 8, i32 9, i32 10, i32 11, i32 12, i32
13, i32 14, i32 15, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
  %bin.rdx = add <16 x i32> %10, %rdx.shuf
 %rdx.shuf2 = shufflevector <16 x i32> %bin.rdx, <16 x i32> undef, <16 x i32> <i32 4, i32 5, i32 6, i32 7, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef>
 %bin.rdx2 = add <16 x i32> %bin.rdx, %rdx.shuf2
 %rdx.shuf3 = shufflevector <16 x i32> %bin.rdx2, <16 x i32> undef, <16 x i32> <i32 2, i32 3, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef>
 %bin.rdx3 = add <16 x i32> %bin.rdx2, %rdx.shuf3
 %rdx.shuf4 = shufflevector <16 x i32> %bin.rdx3, <16 x i32> undef, <16 x i32> <i32 1, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef>
 %bin.rdx4 = add <16 x i32> %bin.rdx3, %rdx.shuf4
 %12 = extractelement <16 x i32> %bin.rdx4, i32 0
 ret i32 %12
}

define
 dso_local void @sbto16f32_256(<16 x i16> %a, ptr %res) "min-legal-vector-width"="256" {
; CHECK-LABEL: sbto16f32_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovw2m %ymm0, %k0
; CHECK-NEXT:    kshiftrw $8, %k0, %k1
; CHECK-NEXT:    vpmovm2d %k1, %ymm0
; CHECK-NEXT:    vcvtdq2ps %ymm0, %ymm0
; CHECK-NEXT:    vpmovm2d %k0, %ymm1
; CHECK-NEXT:    vcvtdq2ps %ymm1, %ymm1
; CHECK-NEXT:    vmovaps %ymm1, (%rdi)
; CHECK-NEXT:    vmovaps %ymm0, 32(%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
```

```
 %mask = icmp slt <16 x i16> %a, zeroinitializer
 %1 = sitofp <16 x i1> %mask to <16 x float>
 store <16 x float> %1, ptr %res
 ret void
}

define dso_local void @sbto16f32_512(<16 x i16> %a, ptr %res) "min-legal-vector-width"="512" {
; CHECK-LABEL: sbto16f32_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovw2m %ymm0, %k0
; CHECK-NEXT:    vpmovm2d %k0, %zmm0
; CHECK-NEXT:    vcvtdq2ps %zmm0, %zmm0
; CHECK-NEXT:    vmovaps %zmm0, (%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:
    retq
 %mask = icmp slt <16 x i16> %a, zeroinitializer
 %1 = sitofp <16 x i1> %mask to <16 x float>
 store <16 x float> %1, ptr %res
 ret void
}

define dso_local void @sbto16f64_256(<16 x i16> %a, ptr %res)  "min-legal-vector-width"="256" {
; CHECK-LABEL: sbto16f64_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovw2m %ymm0, %k0
; CHECK-NEXT:    kshiftrw $8, %k0, %k1
; CHECK-NEXT:    vpmovm2d %k1, %ymm0
; CHECK-NEXT:    vcvtdq2pd %xmm0, %ymm1
; CHECK-NEXT:    vextracti128 $1, %ymm0, %xmm0
; CHECK-NEXT:    vcvtdq2pd %xmm0, %ymm0
; CHECK-NEXT:    vpmovm2d %k0, %ymm2
; CHECK-NEXT:    vcvtdq2pd %xmm2, %ymm3
; CHECK-NEXT:    vextracti128 $1, %ymm2, %xmm2
; CHECK-NEXT:    vcvtdq2pd %xmm2, %ymm2
; CHECK-NEXT:    vmovaps %ymm2, 32(%rdi)
; CHECK-NEXT:    vmovaps %ymm3, (%rdi)
; CHECK-NEXT:    vmovaps %ymm0, 96(%rdi)
; CHECK-NEXT:    vmovaps %ymm1, 64(%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %mask = icmp slt <16 x i16> %a, zeroinitializer
 %1 = sitofp <16 x i1> %mask
 to <16 x double>
 store <16 x double> %1, ptr %res
 ret void
}
```

```
define dso_local void @sbto16f64_512(<16 x i16> %a, ptr %res)  "min-legal-vector-width"="512" {
; CHECK-LABEL: sbto16f64_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovw2m %ymm0, %k0
; CHECK-NEXT:    vpmovm2d %k0, %zmm0
; CHECK-NEXT:    vcvtdq2pd %ymm0, %zmm1
; CHECK-NEXT:    vextracti64x4 $1, %zmm0, %ymm0
; CHECK-NEXT:    vcvtdq2pd %ymm0, %zmm0
; CHECK-NEXT:    vmovaps %zmm0, 64(%rdi)
; CHECK-NEXT:    vmovaps %zmm1, (%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %mask = icmp slt <16 x i16> %a, zeroinitializer
 %1 = sitofp <16 x i1> %mask to <16 x double>
 store <16 x double> %1, ptr %res
 ret void
}

define dso_local void @ubto16f32_256(<16 x i16> %a, ptr %res) "min-legal-vector-width"="256" {
; CHECK-LABEL: ubto16f32_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovw2m %ymm0, %k0
; CHECK-NEXT:    kshiftrw $8, %k0, %k1
; CHECK-NEXT:    vpmovm2d %k1, %ymm0
; CHECK-NEXT:    vpsrld $31, %ymm0, %ymm0
;
 CHECK-NEXT:    vcvtdq2ps %ymm0, %ymm0
; CHECK-NEXT:    vpmovm2d %k0, %ymm1
; CHECK-NEXT:    vpsrld $31, %ymm1, %ymm1
; CHECK-NEXT:    vcvtdq2ps %ymm1, %ymm1
; CHECK-NEXT:    vmovaps %ymm1, (%rdi)
; CHECK-NEXT:    vmovaps %ymm0, 32(%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %mask = icmp slt <16 x i16> %a, zeroinitializer
 %1 = uitofp <16 x i1> %mask to <16 x float>
 store <16 x float> %1, ptr %res
 ret void
}

define dso_local void @ubto16f32_512(<16 x i16> %a, ptr %res) "min-legal-vector-width"="512" {
; CHECK-LABEL: ubto16f32_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovw2m %ymm0, %k0
; CHECK-NEXT:    vpmovm2d %k0, %zmm0
; CHECK-NEXT:    vpsrld $31, %zmm0, %zmm0
; CHECK-NEXT:    vcvtdq2ps %zmm0, %zmm0
; CHECK-NEXT:    vmovaps %zmm0, (%rdi)
```

```
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %mask = icmp slt <16 x i16> %a, zeroinitializer
 %1 = uitofp <16 x i1> %mask to <16 x float>
 store <16 x float> %1, ptr %res
 ret void
}

define dso_local void @ubto16f64_256(<16
 x i16> %a, ptr %res) "min-legal-vector-width"="256" {
; CHECK-LABEL: ubto16f64_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovw2m %ymm0, %k0
; CHECK-NEXT:    kshiftrw $8, %k0, %k1
; CHECK-NEXT:    vpmovm2d %k1, %ymm0
; CHECK-NEXT:    vpsrld $31, %ymm0, %ymm0
; CHECK-NEXT:    vcvtdq2pd %xmm0, %ymm1
; CHECK-NEXT:    vextracti128 $1, %ymm0, %xmm0
; CHECK-NEXT:    vcvtdq2pd %xmm0, %ymm0
; CHECK-NEXT:    vpmovm2d %k0, %ymm2
; CHECK-NEXT:    vpsrld $31, %ymm2, %ymm2
; CHECK-NEXT:    vcvtdq2pd %xmm2, %ymm3
; CHECK-NEXT:    vextracti128 $1, %ymm2, %xmm2
; CHECK-NEXT:    vcvtdq2pd %xmm2, %ymm2
; CHECK-NEXT:    vmovaps %ymm2, 32(%rdi)
; CHECK-NEXT:    vmovaps %ymm3, (%rdi)
; CHECK-NEXT:    vmovaps %ymm0, 96(%rdi)
; CHECK-NEXT:    vmovaps %ymm1, 64(%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %mask = icmp slt <16 x i16> %a, zeroinitializer
 %1 = uitofp <16 x i1> %mask to <16 x double>
 store <16 x double> %1, ptr %res
 ret void
}

define dso_local void @ubto16f64_512(<16
 x i16> %a, ptr %res) "min-legal-vector-width"="512" {
; CHECK-LABEL: ubto16f64_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovw2m %ymm0, %k0
; CHECK-NEXT:    vpmovm2d %k0, %zmm0
; CHECK-NEXT:    vpsrld $31, %zmm0, %zmm0
; CHECK-NEXT:    vcvtdq2pd %ymm0, %zmm1
; CHECK-NEXT:    vextracti64x4 $1, %zmm0, %ymm0
; CHECK-NEXT:    vcvtdq2pd %ymm0, %zmm0
; CHECK-NEXT:    vmovaps %zmm0, 64(%rdi)
; CHECK-NEXT:    vmovaps %zmm1, (%rdi)
```

```
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %mask = icmp slt <16 x i16> %a, zeroinitializer
 %1 = uitofp <16 x i1> %mask to <16 x double>
 store <16 x double> %1, ptr %res
 ret void
}

define <16 x i16> @test_16f32toub_256(ptr %ptr, <16 x i16> %passthru) "min-legal-vector-width"="256" {
; CHECK-LABEL: test_16f32toub_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vcvttps2dq (%rdi), %ymm1
; CHECK-NEXT:    vpslld $31, %ymm1, %ymm1
; CHECK-NEXT:    vpmovd2m %ymm1, %k0
; CHECK-NEXT:    vcvttps2dq 32(%rdi), %ymm1
; CHECK-NEXT:    vpslld $31, %ymm1, %ymm1
;
 CHECK-NEXT:    vpmovd2m %ymm1, %k1
; CHECK-NEXT:    kunpckbw %k0, %k1, %k1
; CHECK-NEXT:    vmovdqu16 %ymm0, %ymm0 {%k1} {z}
; CHECK-NEXT:    retq
 %a = load <16 x float>, ptr %ptr
 %mask = fptoui <16 x float> %a to <16 x i1>
 %select = select <16 x i1> %mask, <16 x i16> %passthru, <16 x i16> zeroinitializer
 ret <16 x i16> %select
}

define <16 x i16> @test_16f32toub_512(ptr %ptr, <16 x i16> %passthru) "min-legal-vector-width"="512" {
; CHECK-LABEL: test_16f32toub_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vcvttps2dq (%rdi), %zmm1
; CHECK-NEXT:    vpslld $31, %zmm1, %zmm1
; CHECK-NEXT:    vpmovd2m %zmm1, %k1
; CHECK-NEXT:    vmovdqu16 %ymm0, %ymm0 {%k1} {z}
; CHECK-NEXT:    retq
 %a = load <16 x float>, ptr %ptr
 %mask = fptoui <16 x float> %a to <16 x i1>
 %select = select <16 x i1> %mask, <16 x i16> %passthru, <16 x i16> zeroinitializer
 ret <16 x i16> %select
}

define <16 x i16> @test_16f32tosb_256(ptr %ptr, <16 x i16> %passthru) "min-legal-vector-width"="256" {
;
 CHECK-LABEL: test_16f32tosb_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vcvttps2dq (%rdi), %ymm1
; CHECK-NEXT:    vpmovd2m %ymm1, %k0
; CHECK-NEXT:    vcvttps2dq 32(%rdi), %ymm1
```

```
; CHECK-NEXT:    vpmovd2m %ymm1, %k1
; CHECK-NEXT:    kunpckbw %k0, %k1, %k1
; CHECK-NEXT:    vmovdqu16 %ymm0, %ymm0 {%k1} {z}
; CHECK-NEXT:    retq
 %a = load <16 x float>, ptr %ptr
 %mask = fptosi <16 x float> %a to <16 x i1>
 %select = select <16 x i1> %mask, <16 x i16> %passthru, <16 x i16> zeroinitializer
 ret <16 x i16> %select
}

define <16 x i16> @test_16f32tosb_512(ptr %ptr, <16 x i16> %passthru) "min-legal-vector-width"="512" {
; CHECK-LABEL: test_16f32tosb_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vcvttps2dq (%rdi), %zmm1
; CHECK-NEXT:    vpmovd2m %zmm1, %k1
; CHECK-NEXT:    vmovdqu16 %ymm0, %ymm0 {%k1} {z}
; CHECK-NEXT:    retq
 %a = load <16 x float>, ptr %ptr
 %mask = fptosi <16 x float> %a to <16 x i1>
 %select = select <16 x i1> %mask, <16 x i16> %passthru, <16 x i16> zeroinitializer
  ret <16 x i16> %select
}

define dso_local void @mul256(ptr %a, ptr %b, ptr %c) "min-legal-vector-width"="256" {
; CHECK-SKX-VBMI-LABEL: mul256:
; CHECK-SKX-VBMI:       # %bb.0:
; CHECK-SKX-VBMI-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-SKX-VBMI-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-SKX-VBMI-NEXT:    vmovdqa (%rsi), %ymm2
; CHECK-SKX-VBMI-NEXT:    vmovdqa 32(%rsi), %ymm3
; CHECK-SKX-VBMI-NEXT:    vpbroadcastw {{.*#+}} ymm4 =
[255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255]
; CHECK-SKX-VBMI-NEXT:    vpandn %ymm3, %ymm4, %ymm5
; CHECK-SKX-VBMI-NEXT:    vpmaddubsw %ymm5, %ymm1, %ymm5
; CHECK-SKX-VBMI-NEXT:    vpand %ymm4, %ymm3, %ymm3
; CHECK-SKX-VBMI-NEXT:    vpmaddubsw %ymm3, %ymm1, %ymm1
; CHECK-SKX-VBMI-NEXT:    vmovdqa {{.*#+}} ymm3 =
[0,32,2,34,4,36,6,38,8,40,10,42,12,44,14,46,16,48,18,50,20,52,22,54,24,56,26,58,28,60,30,62]
; CHECK-SKX-VBMI-NEXT:    vpermt2b %ymm5, %ymm3, %ymm1
; CHECK-SKX-VBMI-NEXT:    vpandn %ymm2, %ymm4, %ymm5
; CHECK-SKX-VBMI-NEXT:    vpmaddubsw
 %ymm5, %ymm0, %ymm5
; CHECK-SKX-VBMI-NEXT:    vpand %ymm4, %ymm2, %ymm2
; CHECK-SKX-VBMI-NEXT:    vpmaddubsw %ymm2, %ymm0, %ymm0
; CHECK-SKX-VBMI-NEXT:    vpermt2b %ymm5, %ymm3, %ymm0
; CHECK-SKX-VBMI-NEXT:    vmovdqa %ymm0, (%rdx)
; CHECK-SKX-VBMI-NEXT:    vmovdqa %ymm1, 32(%rdx)
; CHECK-SKX-VBMI-NEXT:    vzeroupper
```

```
; CHECK-SKX-VBMI-NEXT:    retq
;
; CHECK-AVX512-LABEL: mul256:
; CHECK-AVX512:       # %bb.0:
; CHECK-AVX512-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-AVX512-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-AVX512-NEXT:    vmovdqa (%rsi), %ymm2
; CHECK-AVX512-NEXT:    vmovdqa 32(%rsi), %ymm3
; CHECK-AVX512-NEXT:    vpbroadcastw {{.*#+}} ymm4 =
[255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255]
; CHECK-AVX512-NEXT:    vpand %ymm4, %ymm3, %ymm5
; CHECK-AVX512-NEXT:    vpmaddubsw %ymm5, %ymm1, %ymm5
; CHECK-AVX512-NEXT:    vpandn %ymm3, %ymm4, %ymm3
; CHECK-AVX512-NEXT:    vpmaddubsw %ymm3, %ymm1, %ymm1
; CHECK-AVX512-NEXT:    vpsllw $8, %ymm1, %ymm1
; CHECK-AVX512-NEXT:
   vpternlogq {{.*#+}} ymm1 = ymm1 | (ymm5 & ymm4)
; CHECK-AVX512-NEXT:    vpand %ymm4, %ymm2, %ymm3
; CHECK-AVX512-NEXT:    vpmaddubsw %ymm3, %ymm0, %ymm3
; CHECK-AVX512-NEXT:    vpandn %ymm2, %ymm4, %ymm2
; CHECK-AVX512-NEXT:    vpmaddubsw %ymm2, %ymm0, %ymm0
; CHECK-AVX512-NEXT:    vpsllw $8, %ymm0, %ymm0
; CHECK-AVX512-NEXT:    vpternlogq {{.*#+}} ymm0 = ymm0 | (ymm3 & ymm4)
; CHECK-AVX512-NEXT:    vmovdqa %ymm0, (%rdx)
; CHECK-AVX512-NEXT:    vmovdqa %ymm1, 32(%rdx)
; CHECK-AVX512-NEXT:    vzeroupper
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI-LABEL: mul256:
; CHECK-VBMI:       # %bb.0:
; CHECK-VBMI-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-VBMI-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-VBMI-NEXT:    vmovdqa (%rsi), %ymm2
; CHECK-VBMI-NEXT:    vmovdqa 32(%rsi), %ymm3
; CHECK-VBMI-NEXT:    vpbroadcastw {{.*#+}} ymm4 =
[255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255]
; CHECK-VBMI-NEXT:    vpandn %ymm3, %ymm4, %ymm5
; CHECK-VBMI-NEXT:    vpmaddubsw %ymm5, %ymm1, %ymm5
;
 CHECK-VBMI-NEXT:    vpand %ymm4, %ymm3, %ymm3
; CHECK-VBMI-NEXT:    vpmaddubsw %ymm3, %ymm1, %ymm1
; CHECK-VBMI-NEXT:    vmovdqa {{.*#+}} ymm3 =
[0,32,2,34,4,36,6,38,8,40,10,42,12,44,14,46,16,48,18,50,20,52,22,54,24,56,26,58,28,60,30,62]
; CHECK-VBMI-NEXT:    vpermt2b %ymm5, %ymm3, %ymm1
; CHECK-VBMI-NEXT:    vpandn %ymm2, %ymm4, %ymm5
; CHECK-VBMI-NEXT:    vpmaddubsw %ymm5, %ymm0, %ymm5
; CHECK-VBMI-NEXT:    vpand %ymm4, %ymm2, %ymm2
; CHECK-VBMI-NEXT:    vpmaddubsw %ymm2, %ymm0, %ymm0
```

```
; CHECK-VBMI-NEXT:    vpermt2b %ymm5, %ymm3, %ymm0
; CHECK-VBMI-NEXT:    vmovdqa %ymm0, (%rdx)
; CHECK-VBMI-NEXT:    vmovdqa %ymm1, 32(%rdx)
; CHECK-VBMI-NEXT:    vzeroupper
; CHECK-VBMI-NEXT:    retq
 %d = load <64 x i8>, ptr %a
 %e = load <64 x i8>, ptr %b
 %f = mul <64 x i8> %d, %e
 store <64 x i8> %f, ptr %c
 ret void
}

define dso_local void @mul512(ptr %a, ptr %b, ptr %c) "min-legal-vector-width"="512" {
; CHECK-SKX-VBMI-LABEL: mul512:
; CHECK-SKX-VBMI:       # %bb.0:
; CHECK-SKX-VBMI-NEXT:
    vmovdqa64 (%rdi), %zmm0
; CHECK-SKX-VBMI-NEXT:    vmovdqa64 (%rsi), %zmm1
; CHECK-SKX-VBMI-NEXT:    vpbroadcastw {{.*#+}} zmm2 =
[255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,2
55,255,255,255,255,255]
; CHECK-SKX-VBMI-NEXT:    vpandnq %zmm1, %zmm2, %zmm3
; CHECK-SKX-VBMI-NEXT:    vpmaddubsw %zmm3, %zmm0, %zmm3
; CHECK-SKX-VBMI-NEXT:    vpandq %zmm2, %zmm1, %zmm1
; CHECK-SKX-VBMI-NEXT:    vpmaddubsw %zmm1, %zmm0, %zmm0
; CHECK-SKX-VBMI-NEXT:    vmovdqa64 {{.*#+}} zmm1 =
[0,64,2,66,4,68,6,70,8,72,10,74,12,76,14,78,16,80,18,82,20,84,22,86,24,88,26,90,28,92,30,94,32,96,34,98,36,100,3
8,102,40,104,42,106,44,108,46,110,48,112,50,114,52,116,54,118,56,120,58,122,60,124,62,126]
; CHECK-SKX-VBMI-NEXT:    vpermi2b %zmm3, %zmm0, %zmm1
; CHECK-SKX-VBMI-NEXT:    vmovdqa64 %zmm1, (%rdx)
; CHECK-SKX-VBMI-NEXT:    vzeroupper
; CHECK-SKX-VBMI-NEXT:    retq
;
; CHECK-AVX512-LABEL: mul512:
; CHECK-AVX512:       # %bb.0:
; CHECK-AVX512-NEXT:
    vmovdqa64 (%rdi), %zmm0
; CHECK-AVX512-NEXT:    vmovdqa64 (%rsi), %zmm1
; CHECK-AVX512-NEXT:    vpbroadcastw {{.*#+}} zmm2 =
[255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,2
55,255,255,255,255,255]
; CHECK-AVX512-NEXT:    vpandq %zmm2, %zmm1, %zmm3
; CHECK-AVX512-NEXT:    vpmaddubsw %zmm3, %zmm0, %zmm3
; CHECK-AVX512-NEXT:    vpandnq %zmm1, %zmm2, %zmm1
; CHECK-AVX512-NEXT:    vpmaddubsw %zmm1, %zmm0, %zmm0
; CHECK-AVX512-NEXT:    vpsllw $8, %zmm0, %zmm0
; CHECK-AVX512-NEXT:    vpternlogq {{.*#+}} zmm0 = zmm0 | (zmm3 & zmm2)
; CHECK-AVX512-NEXT:    vmovdqa64 %zmm0, (%rdx)
```

```
; CHECK-AVX512-NEXT:    vzeroupper
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI-LABEL: mul512:
; CHECK-VBMI:       # %bb.0:
; CHECK-VBMI-NEXT:    vmovdqa64 (%rdi), %zmm0
; CHECK-VBMI-NEXT:    vmovdqa64 (%rsi), %zmm1
; CHECK-VBMI-NEXT:    vpbroadcastw {{.*#+}} zmm2 =
[255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,2
55,255,255,255,255,255]
;
 CHECK-VBMI-NEXT:    vpandnq %zmm1, %zmm2, %zmm3
; CHECK-VBMI-NEXT:    vpmaddubsw %zmm3, %zmm0, %zmm3
; CHECK-VBMI-NEXT:    vpandq %zmm2, %zmm1, %zmm1
; CHECK-VBMI-NEXT:    vpmaddubsw %zmm1, %zmm0, %zmm0
; CHECK-VBMI-NEXT:    vmovdqa64 {{.*#+}} zmm1 =
[0,64,2,66,4,68,6,70,8,72,10,74,12,76,14,78,16,80,18,82,20,84,22,86,24,88,26,90,28,92,30,94,32,96,34,98,36,100,3
8,102,40,104,42,106,44,108,46,110,48,112,50,114,52,116,54,118,56,120,58,122,60,124,62,126]
; CHECK-VBMI-NEXT:    vpermi2b %zmm3, %zmm0, %zmm1
; CHECK-VBMI-NEXT:    vmovdqa64 %zmm1, (%rdx)
; CHECK-VBMI-NEXT:    vzeroupper
; CHECK-VBMI-NEXT:    retq
 %d = load <64 x i8>, ptr %a
 %e = load <64 x i8>, ptr %b
 %f = mul <64 x i8> %d, %e
 store <64 x i8> %f, ptr %c
 ret void
}

; This threw an assertion at one point.
define <4 x i32> @mload_v4i32(<4 x i32> %trigger, ptr %addr, <4 x i32> %dst) "min-legal-vector-width"="256" {
; CHECK-LABEL: mload_v4i32:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vptestnmd
 %xmm0, %xmm0, %k1
; CHECK-NEXT:    vpblendmd (%rdi), %xmm1, %xmm0 {%k1}
; CHECK-NEXT:    retq
 %mask = icmp eq <4 x i32> %trigger, zeroinitializer
 %res = call <4 x i32> @llvm.masked.load.v4i32.p0(ptr %addr, i32 4, <4 x i1> %mask, <4 x i32> %dst)
 ret <4 x i32> %res
}
declare <4 x i32> @llvm.masked.load.v4i32.p0(ptr, i32, <4 x i1>, <4 x i32>)

define <16 x i32> @trunc_v16i64_v16i32(ptr %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v16i64_v16i32:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm1
```

```
; CHECK-NEXT:    vmovdqa 64(%rdi), %ymm2
; CHECK-NEXT:    vmovdqa 96(%rdi), %ymm3
; CHECK-NEXT:    vpmovqd %ymm0, %xmm0
; CHECK-NEXT:    vpmovqd %ymm1, %xmm1
; CHECK-NEXT:    vinserti128 $1, %xmm1, %ymm0, %ymm0
; CHECK-NEXT:    vpmovqd %ymm2, %xmm1
; CHECK-NEXT:    vpmovqd %ymm3, %xmm2
; CHECK-NEXT:    vinserti128 $1, %xmm2, %ymm1, %ymm1
; CHECK-NEXT:    retq
 %a = load <16 x i64>, ptr %x
 %b = trunc <16 x i64>
 %a to <16 x i32>
 ret <16 x i32> %b
}

define <16 x i8> @trunc_v16i64_v16i8(ptr %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v16i64_v16i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT:    vmovdqa 64(%rdi), %ymm2
; CHECK-NEXT:    vmovdqa 96(%rdi), %ymm3
; CHECK-NEXT:    vpmovqb %ymm3, %xmm3
; CHECK-NEXT:    vpmovqb %ymm2, %xmm2
; CHECK-NEXT:    vpunpckldq {{.*#+}} xmm2 = xmm2[0],xmm3[0],xmm2[1],xmm3[1]
; CHECK-NEXT:    vpmovqb %ymm1, %xmm1
; CHECK-NEXT:    vpmovqb %ymm0, %xmm0
; CHECK-NEXT:    vpunpckldq {{.*#+}} xmm0 = xmm0[0],xmm1[0],xmm0[1],xmm1[1]
; CHECK-NEXT:    vpunpcklqdq {{.*#+}} xmm0 = xmm0[0],xmm2[0]
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %a = load <16 x i64>, ptr %x
 %b = trunc <16 x i64> %a to <16 x i8>
 ret <16 x i8> %b
}

define <16 x i8> @trunc_v16i32_v16i8(ptr %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v16i32_v16i8:
; CHECK:       # %bb.0:
;
 CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT:    vpmovdb %ymm1, %xmm1
; CHECK-NEXT:    vpmovdb %ymm0, %xmm0
; CHECK-NEXT:    vpunpcklqdq {{.*#+}} xmm0 = xmm0[0],xmm1[0]
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %a = load <16 x i32>, ptr %x
```

```
 %b = trunc <16 x i32> %a to <16 x i8>
 ret <16 x i8> %b
}

define <8 x i8> @trunc_v8i64_v8i8(ptr %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v8i64_v8i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT:    vpmovqb %ymm1, %xmm1
; CHECK-NEXT:    vpmovqb %ymm0, %xmm0
; CHECK-NEXT:    vpunpckldq {{.*#+}} xmm0 = xmm0[0],xmm1[0],xmm0[1],xmm1[1]
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %a = load <8 x i64>, ptr %x
 %b = trunc <8 x i64> %a to <8 x i8>
 ret <8 x i8> %b
}

define <8 x i16> @trunc_v8i64_v8i16(ptr %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v8i64_v8i16:
; CHECK:
       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT:    vpmovqw %ymm1, %xmm1
; CHECK-NEXT:    vpmovqw %ymm0, %xmm0
; CHECK-NEXT:    vpunpcklqdq {{.*#+}} xmm0 = xmm0[0],xmm1[0]
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %a = load <8 x i64>, ptr %x
 %b = trunc <8 x i64> %a to <8 x i16>
 ret <8 x i16> %b
}

define <8 x i32> @trunc_v8i64_v8i32_zeroes(ptr %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v8i64_v8i32_zeroes:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpsrlq $48, 32(%rdi), %ymm0
; CHECK-NEXT:    vpsrlq $48, (%rdi), %ymm1
; CHECK-NEXT:    vpackusdw %ymm0, %ymm1, %ymm0
; CHECK-NEXT:    vpermq {{.*#+}} ymm0 = ymm0[0,2,1,3]
; CHECK-NEXT:    retq
 %a = load <8 x i64>, ptr %x
 %b = lshr <8 x i64> %a, <i64 48, i64 48, i64 48, i64 48, i64 48, i64 48, i64 48, i64 48>
 %c = trunc <8 x i64> %b to <8 x i32>
 ret <8 x i32> %c
}
```

```
define <16 x i16> @trunc_v16i32_v16i16_zeroes(ptr %x) nounwind "min-legal-vector-width"="256"
 {
; CHECK-LABEL: trunc_v16i32_v16i16_zeroes:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm1
; CHECK-NEXT:    vpmovsxbw {{.*#+}} ymm0 = [1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31]
; CHECK-NEXT:    vpermi2w 32(%rdi), %ymm1, %ymm0
; CHECK-NEXT:    retq
 %a = load <16 x i32>, ptr %x
 %b = lshr <16 x i32> %a, <i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32
16, i32 16, i32 16, i32 16, i32 16>
 %c = trunc <16 x i32> %b to <16 x i16>
 ret <16 x i16> %c
}

define <32 x i8> @trunc_v32i16_v32i8_zeroes(ptr %x) nounwind "min-legal-vector-width"="256" {
; CHECK-SKX-VBMI-LABEL: trunc_v32i16_v32i8_zeroes:
; CHECK-SKX-VBMI:       # %bb.0:
; CHECK-SKX-VBMI-NEXT:    vmovdqa (%rdi), %ymm1
; CHECK-SKX-VBMI-NEXT:    vmovdqa {{.*#+}} ymm0 =
[1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61,63]
; CHECK-SKX-VBMI-NEXT:    vpermi2b 32(%rdi), %ymm1, %ymm0
; CHECK-SKX-VBMI-NEXT:    retq
;
;
 CHECK-AVX512-LABEL: trunc_v32i16_v32i8_zeroes:
; CHECK-AVX512:       # %bb.0:
; CHECK-AVX512-NEXT:    vpsrlw $8, 32(%rdi), %ymm0
; CHECK-AVX512-NEXT:    vpsrlw $8, (%rdi), %ymm1
; CHECK-AVX512-NEXT:    vpackuswb %ymm0, %ymm1, %ymm0
; CHECK-AVX512-NEXT:    vpermq {{.*#+}} ymm0 = ymm0[0,2,1,3]
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI-LABEL: trunc_v32i16_v32i8_zeroes:
; CHECK-VBMI:       # %bb.0:
; CHECK-VBMI-NEXT:    vmovdqa (%rdi), %ymm1
; CHECK-VBMI-NEXT:    vmovdqa {{.*#+}} ymm0 =
[1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61,63]
; CHECK-VBMI-NEXT:    vpermi2b 32(%rdi), %ymm1, %ymm0
; CHECK-VBMI-NEXT:    retq
 %a = load <32 x i16>, ptr %x
 %b = lshr <32 x i16> %a, <i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8,
i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8>
 %c = trunc <32 x i16> %b to <32 x i8>
 ret <32
 x i8> %c
}
```

```
define <8 x i32> @trunc_v8i64_v8i32_sign(ptr %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v8i64_v8i32_sign:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpsraq $48, 32(%rdi), %ymm0
; CHECK-NEXT:    vpsraq $48, (%rdi), %ymm1
; CHECK-NEXT:    vpackssdw %ymm0, %ymm1, %ymm0
; CHECK-NEXT:    vpermq {{.*#+}} ymm0 = ymm0[0,2,1,3]
; CHECK-NEXT:    retq
 %a = load <8 x i64>, ptr %x
 %b = ashr <8 x i64> %a, <i64 48, i64 48, i64 48, i64 48, i64 48, i64 48, i64 48, i64 48>
 %c = trunc <8 x i64> %b to <8 x i32>
 ret <8 x i32> %c
}

define <16 x i16> @trunc_v16i32_v16i16_sign(ptr %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v16i32_v16i16_sign:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm1
; CHECK-NEXT:    vpmovsxbw {{.*#+}} ymm0 = [1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31]
; CHECK-NEXT:    vpermi2w 32(%rdi), %ymm1, %ymm0
; CHECK-NEXT:    retq
 %a = load <16 x i32>, ptr %x
 %b = ashr <16 x i32> %a, <i32 16, i32 16, i32 16,
 i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16>
 %c = trunc <16 x i32> %b to <16 x i16>
 ret <16 x i16> %c
}

define <32 x i8> @trunc_v32i16_v32i8_sign(ptr %x) nounwind "min-legal-vector-width"="256" {
; CHECK-SKX-VBMI-LABEL: trunc_v32i16_v32i8_sign:
; CHECK-SKX-VBMI:       # %bb.0:
; CHECK-SKX-VBMI-NEXT:    vmovdqa (%rdi), %ymm1
; CHECK-SKX-VBMI-NEXT:    vmovdqa {{.*#+}} ymm0 =
[1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61,63]
; CHECK-SKX-VBMI-NEXT:    vpermi2b 32(%rdi), %ymm1, %ymm0
; CHECK-SKX-VBMI-NEXT:    retq
;
; CHECK-AVX512-LABEL: trunc_v32i16_v32i8_sign:
; CHECK-AVX512:       # %bb.0:
; CHECK-AVX512-NEXT:    vpsrlw $8, 32(%rdi), %ymm0
; CHECK-AVX512-NEXT:    vpsrlw $8, (%rdi), %ymm1
; CHECK-AVX512-NEXT:    vpackuswb %ymm0, %ymm1, %ymm0
; CHECK-AVX512-NEXT:    vpermq {{.*#+}} ymm0 = ymm0[0,2,1,3]
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI-LABEL: trunc_v32i16_v32i8_sign:
; CHECK-VBMI:
```

```
        # %bb.0:
; CHECK-VBMI-NEXT:    vmovdqa (%rdi), %ymm1
; CHECK-VBMI-NEXT:    vmovdqa {{.*#+}} ymm0 =
[1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61,63]
; CHECK-VBMI-NEXT:    vpermi2b 32(%rdi), %ymm1, %ymm0
; CHECK-VBMI-NEXT:    retq
 %a = load <32 x i16>, ptr %x
 %b = ashr <32 x i16> %a, <i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8,
i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8>
 %c = trunc <32 x i16> %b to <32 x i8>
 ret <32 x i8> %c
}

define dso_local void @zext_v16i8_v16i64(<16 x i8> %x, ptr %y) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: zext_v16i8_v16i64:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovzxbw {{.*#+}} ymm1 =
xmm0[0],zero,xmm0[1],zero,xmm0[2],zero,xmm0[3],zero,xmm0[4],zero,xmm0[5],zero,xmm0[6],zero,xmm0[7],zer
o,xmm0[8],zero,xmm0[9],zero,xmm0[10],zero,xmm0[11],zero,xmm0[12],zero,xmm0[13],zero,xmm0[14],zero,xm
m0[15],zero
;
 CHECK-NEXT:    vpshufd {{.*#+}} xmm2 = xmm1[2,3,2,3]
; CHECK-NEXT:    vpmovzxwq {{.*#+}} ymm2 =
xmm2[0],zero,zero,zero,xmm2[1],zero,zero,zero,xmm2[2],zero,zero,zero,xmm2[3],zero,zero,zero
; CHECK-NEXT:    vextracti128 $1, %ymm1, %xmm1
; CHECK-NEXT:    vpshufd {{.*#+}} xmm3 = xmm1[2,3,2,3]
; CHECK-NEXT:    vpmovzxwq {{.*#+}} ymm3 =
xmm3[0],zero,zero,zero,xmm3[1],zero,zero,zero,xmm3[2],zero,zero,zero,xmm3[3],zero,zero,zero
; CHECK-NEXT:    vpmovzxwq {{.*#+}} ymm1 =
xmm1[0],zero,zero,zero,xmm1[1],zero,zero,zero,xmm1[2],zero,zero,zero,xmm1[3],zero,zero,zero
; CHECK-NEXT:    vpmovzxbq {{.*#+}} ymm0 =
xmm0[0],zero,zero,zero,zero,zero,zero,zero,xmm0[1],zero,zero,zero,zero,zero,zero,zero,xmm0[2],zero,zero,zero,zer
o,zero,zero,zero,xmm0[3],zero,zero,zero,zero,zero,zero,zero
; CHECK-NEXT:    vmovdqa %ymm0, (%rdi)
; CHECK-NEXT:    vmovdqa %ymm1, 64(%rdi)
; CHECK-NEXT:    vmovdqa %ymm3, 96(%rdi)
; CHECK-NEXT:    vmovdqa %ymm2, 32(%rdi)
; CHECK-NEXT:
    vzeroupper
; CHECK-NEXT:    retq
 %a = zext <16 x i8> %x to <16 x i64>
 store <16 x i64> %a, ptr %y
 ret void
}

define dso_local void @sext_v16i8_v16i64(<16 x i8> %x, ptr %y) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: sext_v16i8_v16i64:
; CHECK:       # %bb.0:
```

```
; CHECK-NEXT:    vpmovsxbw %xmm0, %ymm1
; CHECK-NEXT:    vpshufd {{.*#+}} xmm2 = xmm1[2,3,2,3]
; CHECK-NEXT:    vpmovsxwq %xmm2, %ymm2
; CHECK-NEXT:    vextracti128 $1, %ymm1, %xmm1
; CHECK-NEXT:    vpshufd {{.*#+}} xmm3 = xmm1[2,3,2,3]
; CHECK-NEXT:    vpmovsxwq %xmm3, %ymm3
; CHECK-NEXT:    vpmovsxwq %xmm1, %ymm1
; CHECK-NEXT:    vpmovsxbq %xmm0, %ymm0
; CHECK-NEXT:    vmovdqa %ymm0, (%rdi)
; CHECK-NEXT:    vmovdqa %ymm1, 64(%rdi)
; CHECK-NEXT:    vmovdqa %ymm3, 96(%rdi)
; CHECK-NEXT:    vmovdqa %ymm2, 32(%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %a = sext <16 x i8> %x to <16 x i64>
 store <16 x i64> %a, ptr %y
 ret void
}

define dso_local void @vselect_split_v8i16_setcc(<8 x i16> %s,
 <8 x i16> %t, ptr %p, ptr %q, ptr %r) "min-legal-vector-width"="256" {
; CHECK-LABEL: vselect_split_v8i16_setcc:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rsi), %ymm2
; CHECK-NEXT:    vmovdqa 32(%rsi), %ymm3
; CHECK-NEXT:    vpcmpeqw %xmm1, %xmm0, %k1
; CHECK-NEXT:    kshiftrb $4, %k1, %k2
; CHECK-NEXT:    vmovdqa64 32(%rdi), %ymm3 {%k2}
; CHECK-NEXT:    vmovdqa64 (%rdi), %ymm2 {%k1}
; CHECK-NEXT:    vmovdqa %ymm2, (%rdx)
; CHECK-NEXT:    vmovdqa %ymm3, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %x = load <8 x i64>, ptr %p
 %y = load <8 x i64>, ptr %q
 %a = icmp eq <8 x i16> %s, %t
 %b = select <8 x i1> %a, <8 x i64> %x, <8 x i64> %y
 store <8 x i64> %b, ptr %r
 ret void
}

define dso_local void @vselect_split_v8i32_setcc(<8 x i32> %s, <8 x i32> %t, ptr %p, ptr %q, ptr %r) "min-legal-
vector-width"="256" {
; CHECK-LABEL: vselect_split_v8i32_setcc:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rsi), %ymm2
; CHECK-NEXT:    vmovdqa 32(%rsi), %ymm3
; CHECK-NEXT:
```

```
    vpcmpeqd %ymm1, %ymm0, %k1
; CHECK-NEXT:    kshiftrb $4, %k1, %k2
; CHECK-NEXT:    vmovdqa64 32(%rdi), %ymm3 {%k2}
; CHECK-NEXT:    vmovdqa64 (%rdi), %ymm2 {%k1}
; CHECK-NEXT:    vmovdqa %ymm2, (%rdx)
; CHECK-NEXT:    vmovdqa %ymm3, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %x = load <8 x i64>, ptr %p
 %y = load <8 x i64>, ptr %q
 %a = icmp eq <8 x i32> %s, %t
 %b = select <8 x i1> %a, <8 x i64> %x, <8 x i64> %y
 store <8 x i64> %b, ptr %r
 ret void
}

define dso_local void @vselect_split_v16i8_setcc(<16 x i8> %s, <16 x i8> %t, ptr %p, ptr %q, ptr %r) "min-legal-vector-width"="256" {
; CHECK-LABEL: vselect_split_v16i8_setcc:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rsi), %ymm2
; CHECK-NEXT:    vmovdqa 32(%rsi), %ymm3
; CHECK-NEXT:    vpcmpeqb %xmm1, %xmm0, %k1
; CHECK-NEXT:    kshiftrw $8, %k1, %k2
; CHECK-NEXT:    vmovdqa32 32(%rdi), %ymm3 {%k2}
; CHECK-NEXT:    vmovdqa32 (%rdi), %ymm2 {%k1}
; CHECK-NEXT:    vmovdqa %ymm2, (%rdx)
; CHECK-NEXT:
    vmovdqa %ymm3, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %x = load <16 x i32>, ptr %p
 %y = load <16 x i32>, ptr %q
 %a = icmp eq <16 x i8> %s, %t
 %b = select <16 x i1> %a, <16 x i32> %x, <16 x i32> %y
 store <16 x i32> %b, ptr %r
 ret void
}

define dso_local void @vselect_split_v16i16_setcc(<16 x i16> %s, <16 x i16> %t, ptr %p, ptr %q, ptr %r) "min-legal-vector-width"="256" {
; CHECK-LABEL: vselect_split_v16i16_setcc:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rsi), %ymm2
; CHECK-NEXT:    vmovdqa 32(%rsi), %ymm3
; CHECK-NEXT:    vpcmpeqw %ymm1, %ymm0, %k1
; CHECK-NEXT:    kshiftrw $8, %k1, %k2
; CHECK-NEXT:    vmovdqa32 32(%rdi), %ymm3 {%k2}
```

```
; CHECK-NEXT:    vmovdqa32 (%rdi), %ymm2 {%k1}
; CHECK-NEXT:    vmovdqa %ymm2, (%rdx)
; CHECK-NEXT:    vmovdqa %ymm3, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %x = load <16 x i32>, ptr %p
 %y = load <16 x i32>, ptr %q
 %a = icmp eq <16 x i16> %s, %t
 %b = select <16 x i1> %a, <16 x
 i32> %x, <16 x i32> %y
 store <16 x i32> %b, ptr %r
 ret void
}

define <16 x i8> @trunc_packus_v16i32_v16i8(ptr %p) "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_packus_v16i32_v16i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vpackusdw 32(%rdi), %ymm0, %ymm0
; CHECK-NEXT:    vpermq {{.*#+}} ymm0 = ymm0[0,2,1,3]
; CHECK-NEXT:    vpmovuswb %ymm0, %xmm0
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %a = load <16 x i32>, ptr %p
 %b = icmp slt <16 x i32> %a, <i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32
255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255>
 %c = select <16 x i1> %b, <16 x i32> %a, <16 x i32> <i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32
255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255>
 %d = icmp sgt <16 x i32> %c, zeroinitializer
 %e = select <16 x i1> %d, <16 x i32> %c, <16 x i32> zeroinitializer
 %f = trunc <16 x i32> %e
 to <16 x i8>
 ret <16 x i8> %f
}

define dso_local void @trunc_packus_v16i32_v16i8_store(ptr %p, ptr %q) "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_packus_v16i32_v16i8_store:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vpackusdw 32(%rdi), %ymm0, %ymm0
; CHECK-NEXT:    vpermq {{.*#+}} ymm0 = ymm0[0,2,1,3]
; CHECK-NEXT:    vpmovuswb %ymm0, (%rsi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %a = load <16 x i32>, ptr %p
 %b = icmp slt <16 x i32> %a, <i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32
255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255>
 %c = select <16 x i1> %b, <16 x i32> %a, <16 x i32> <i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32
```

```
255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255>
 %d = icmp sgt <16 x i32> %c, zeroinitializer
 %e = select <16 x i1> %d, <16 x i32> %c, <16 x i32> zeroinitializer
 %f = trunc <16 x i32> %e to <16
 x i8>
 store <16 x i8> %f, ptr %q
 ret void
}

define <64 x i1> @v64i1_argument_return(<64 x i1> %x) "min-legal-vector-width"="256" {
; CHECK-LABEL: v64i1_argument_return:
; CHECK:       # %bb.0:
; CHECK-NEXT:    retq
 ret <64 x i1> %x
}

define dso_local void @v64i1_shuffle(ptr %x, ptr %y) "min-legal-vector-width"="256" {
; CHECK-LABEL: v64i1_shuffle:
; CHECK:       # %bb.0: # %entry
; CHECK-NEXT:    vmovdqa (%rdi), %ymm1
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm0
; CHECK-NEXT:    vptestnmb %ymm1, %ymm1, %k0
; CHECK-NEXT:    kshiftrd $1, %k0, %k1
; CHECK-NEXT:    kshiftlq $63, %k0, %k2
; CHECK-NEXT:    kshiftrq $62, %k2, %k2
; CHECK-NEXT:    kshiftlq $63, %k1, %k1
; CHECK-NEXT:    kshiftrq $63, %k1, %k1
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-5, %rax
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $3, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $61, %k2, %k2
; CHECK-NEXT:    korq %k2,
 %k1, %k1
; CHECK-NEXT:    movq $-9, %rax
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $2, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $60, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-17, %rax
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $5, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
```

```
; CHECK-NEXT:    kshiftrq $59, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-33, %rax
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $4, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $58, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-65, %rax
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $7, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $57, %k2,
 %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-129, %rax
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $6, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $56, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-257, %rax # imm = 0xFEFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $9, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $55, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-513, %rax # imm = 0xFDFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $8, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $54, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-1025, %rax # imm = 0xFBFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $11,
 %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $53, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-2049, %rax # imm = 0xF7FF
; CHECK-NEXT:    kmovq %rax, %k2
```

```
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $10, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $52, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-4097, %rax # imm = 0xEFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $13, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $51, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-8193, %rax # imm = 0xDFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $12, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $50, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-16385, %rax # imm = 0xBFFF
;
 CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $15, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $49, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-32769, %rax # imm = 0xFFFF7FFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $14, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $48, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-65537, %rax # imm = 0xFFFEFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $17, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $47, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-131073, %rax # imm = 0xFFFDFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $16, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
;
```

```
CHECK-NEXT:    kshiftrq $46, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-262145, %rax # imm = 0xFFFBFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $19, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $45, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-524289, %rax # imm = 0xFFF7FFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $18, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $44, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-1048577, %rax # imm = 0xFFEFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $21, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $43, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-2097153, %rax # imm = 0xFFDFFFFF
; CHECK-NEXT:    kmovq
%rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $20, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $42, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-4194305, %rax # imm = 0xFFBFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $23, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $41, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-8388609, %rax # imm = 0xFF7FFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $22, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $40, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-16777217, %rax # imm = 0xFEFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
```

```
; CHECK-NEXT:    kshiftrd $25, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq
 $39, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-33554433, %rax # imm = 0xFDFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $24, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $38, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-67108865, %rax # imm = 0xFBFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $27, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $37, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-134217729, %rax # imm = 0xF7FFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $26, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $36, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-268435457, %rax # imm = 0xEFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
;
 CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $29, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $35, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-536870913, %rax # imm = 0xDFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $28, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $34, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-1073741825, %rax # imm = 0xBFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $31, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $33, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
```

```
; CHECK-NEXT:    movabsq $-2147483649, %rax # imm = 0xFFFFFFFF7FFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k2
; CHECK-NEXT:    vptestnmb %ymm0, %ymm0, %k1
; CHECK-NEXT:    kshiftrd $30, %k0, %k0
; CHECK-NEXT:
   kshiftlq $63, %k0, %k0
; CHECK-NEXT:    kshiftrq $32, %k0, %k0
; CHECK-NEXT:    korq %k0, %k2, %k0
; CHECK-NEXT:    movabsq $-4294967297, %rax # imm = 0xFFFFFFFEFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $1, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $31, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-8589934593, %rax # imm = 0xFFFFFFFDFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftlq $63, %k1, %k2
; CHECK-NEXT:    kshiftrq $30, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-17179869185, %rax # imm = 0xFFFFFFFBFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $3, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $29, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-34359738369, %rax
 # imm = 0xFFFFFFF7FFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $2, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $28, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-68719476737, %rax # imm = 0xFFFFFFEFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $5, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $27, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-137438953473, %rax # imm = 0xFFFFFFDFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $4, %k1, %k2
```

```
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $26, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-274877906945, %rax # imm = 0xFFFFFFBFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:
   kshiftrd $7, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $25, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-549755813889, %rax # imm = 0xFFFFFF7FFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $6, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $24, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-1099511627777, %rax # imm = 0xFFFFFEFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $9, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $23, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-2199023255553, %rax # imm = 0xFFFFFDFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $8, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $22, %k2,
 %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-4398046511105, %rax # imm = 0xFFFFFBFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $11, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $21, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-8796093022209, %rax # imm = 0xFFFFF7FFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $10, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $20, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-17592186044417, %rax # imm = 0xFFFFEFFFFFFFFFFF
```

```
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $13, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $19, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-35184372088833, %rax # imm = 0xFFFFDFFFFFFFFFFF
;
 CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $12, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $18, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-70368744177665, %rax # imm = 0xFFFFBFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $15, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $17, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-140737488355329, %rax # imm = 0xFFFF7FFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $14, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $16, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-281474976710657, %rax # imm = 0xFFFEFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:
   kshiftrd $17, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $15, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-562949953421313, %rax # imm = 0xFFFDFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $16, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $14, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-1125899906842625, %rax # imm = 0xFFFBFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $19, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
```

```
; CHECK-NEXT:    kshiftrq $13, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-2251799813685249, %rax # imm = 0xFFF7FFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $18, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq
 $12, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-4503599627370497, %rax # imm = 0xFFEFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $21, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $11, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-9007199254740993, %rax # imm = 0xFFDFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $20, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $10, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-18014398509481985, %rax # imm = 0xFFBFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $23, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $9, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-36028797018963969,
 %rax # imm = 0xFF7FFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $22, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $8, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-72057594037927937, %rax # imm = 0xFEFFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $25, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $7, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-144115188075855873, %rax # imm = 0xFDFFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
```

```
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $24, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $6, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-288230376151711745, %rax # imm = 0xFBFFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:
   kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $27, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $5, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-576460752303423489, %rax # imm = 0xF7FFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $26, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $4, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-1152921504606846977, %rax # imm = 0xEFFFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $29, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $3, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-2305843009213693953, %rax # imm = 0xDFFFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $28, %k1, %k2
; CHECK-NEXT:    kshiftlq
 $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $2, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-4611686018427387905, %rax # imm = 0xBFFFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $31, %k1, %k2
; CHECK-NEXT:    kshiftlq $62, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $30, %k1, %k1
; CHECK-NEXT:    kshiftlq $1, %k0, %k0
; CHECK-NEXT:    kshiftrq $1, %k0, %k0
; CHECK-NEXT:    kshiftlq $63, %k1, %k1
; CHECK-NEXT:    korq %k1, %k0, %k1
; CHECK-NEXT:    vmovdqu8 %ymm1, (%rsi) {%k1}
; CHECK-NEXT:    kshiftrq $32, %k1, %k1
```

```
; CHECK-NEXT:    vmovdqu8 %ymm0, 32(%rsi) {%k1}
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
entry:
 %a = load <64 x i8>, ptr %x
 %b = icmp eq <64 x i8> %a, zeroinitializer
 %shuf = shufflevector <64 x i1> %b, <64 x i1> undef, <64 x i32> <i32 1, i32 0, i32 3, i32 2, i32 5, i32 4, i32 7, i32
6, i32 9, i32 8, i32 11, i32 10, i32 13, i32 12, i32 15, i32
 14, i32 17, i32 16, i32 19, i32 18, i32 21, i32 20, i32 23, i32 22, i32 25, i32 24, i32 27, i32 26, i32 29, i32 28, i32
31, i32 30, i32 33, i32 32, i32 35, i32 34, i32 37, i32 36, i32 39, i32 38, i32 41, i32 40, i32 43, i32 42, i32 45, i32 44,
i32 47, i32 46, i32 49, i32 48, i32 51, i32 50, i32 53, i32 52, i32 55, i32 54, i32 57, i32 56, i32 59, i32 58, i32 61, i32
60, i32 63, i32 62>
 call void @llvm.masked.store.v64i8.p0(<64 x i8> %a, ptr %y, i32 1, <64 x i1> %shuf)
 ret void
}
declare void @llvm.masked.store.v64i8.p0(<64 x i8>, ptr, i32, <64 x i1>)

@mem64_dst = dso_local global i64 0, align 8
@mem64_src = dso_local global i64 0, align 8
define dso_local i32 @v64i1_inline_asm() "min-legal-vector-width"="256" {
; CHECK-LABEL: v64i1_inline_asm:
; CHECK:       # %bb.0:
; CHECK-NEXT:    kmovq mem64_src(%rip), %k0
; CHECK-NEXT:    #APP
; CHECK-NEXT:    #NO_APP
; CHECK-NEXT:    kmovq %k0, mem64_dst(%rip)
; CHECK-NEXT:    movl -{{[0-9]+}}(%rsp), %eax
; CHECK-NEXT:    retq
 %1 = alloca i32,
 align 4
 %2 = load i64, ptr @mem64_src, align 8
 %3 = call i64 asm "", "=k,k,~{dirflag},~{fpsr},~{flags}"(i64 %2)
 store i64 %3, ptr @mem64_dst, align 8
 %4 = load i32, ptr %1, align 4
 ret i32 %4
}

define dso_local void @cmp_v8i64_sext(ptr %xptr, ptr %yptr, ptr %zptr) "min-legal-vector-width"="256" {
; CHECK-LABEL: cmp_v8i64_sext:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rsi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rsi), %ymm1
; CHECK-NEXT:    vpcmpgtq 32(%rdi), %ymm1, %ymm1
; CHECK-NEXT:    vpcmpgtq (%rdi), %ymm0, %ymm0
; CHECK-NEXT:    vmovdqa %ymm0, (%rdx)
; CHECK-NEXT:    vmovdqa %ymm1, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
```

```
 %x = load <8 x i64>, ptr %xptr
 %y = load <8 x i64>, ptr %yptr
 %cmp = icmp slt <8 x i64> %x, %y
 %ext = sext <8 x i1> %cmp to <8 x i64>
 store <8 x i64> %ext, ptr %zptr
 ret void
}

define dso_local void @cmp_v8i64_zext(ptr %xptr, ptr %yptr, ptr %zptr) "min-legal-vector-width"="256" {
; CHECK-LABEL: cmp_v8i64_zext:
;
 CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rsi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rsi), %ymm1
; CHECK-NEXT:    vpcmpgtq 32(%rdi), %ymm1, %ymm1
; CHECK-NEXT:    vpcmpgtq (%rdi), %ymm0, %ymm0
; CHECK-NEXT:    vpsrlq $63, %ymm1, %ymm1
; CHECK-NEXT:    vpsrlq $63, %ymm0, %ymm0
; CHECK-NEXT:    vmovdqa %ymm0, (%rdx)
; CHECK-NEXT:    vmovdqa %ymm1, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %x = load <8 x i64>, ptr %xptr
 %y = load <8 x i64>, ptr %yptr
 %cmp = icmp slt <8 x i64> %x, %y
 %ext = zext <8 x i1> %cmp to <8 x i64>
 store <8 x i64> %ext, ptr %zptr
 ret void
}

define <16 x i8> @var_rotate_v16i8(<16 x i8> %a, <16 x i8> %b) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: var_rotate_v16i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpandd {{\.?LCPI[0-9]+_[0-9]+}}(%rip){1to4}, %xmm1, %xmm1
; CHECK-NEXT:    vpxor %xmm2, %xmm2, %xmm2
; CHECK-NEXT:    vpunpckhbw {{.*#+}} xmm2 =
xmm1[8],xmm2[8],xmm1[9],xmm2[9],xmm1[10],xmm2[10],xmm1[11],xmm2[11],xmm1[12],xmm2[12],xmm1[13
],xmm2[13],xmm1[14],xmm2[14],xmm1[15],xmm2[15]
;
 CHECK-NEXT:    vpunpckhbw {{.*#+}} xmm3 = xmm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15]
; CHECK-NEXT:    vpsllvw %xmm2, %xmm3, %xmm2
; CHECK-NEXT:    vpsrlw $8, %xmm2, %xmm2
; CHECK-NEXT:    vpunpcklbw {{.*#+}} xmm0 = xmm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7]
; CHECK-NEXT:    vpmovzxbw {{.*#+}} xmm1 =
xmm1[0],zero,xmm1[1],zero,xmm1[2],zero,xmm1[3],zero,xmm1[4],zero,xmm1[5],zero,xmm1[6],zero,xmm1[7],zer
o
; CHECK-NEXT:    vpsllvw %xmm1, %xmm0, %xmm0
; CHECK-NEXT:    vpsrlw $8, %xmm0, %xmm0
```

```
; CHECK-NEXT:    vpackuswb %xmm2, %xmm0, %xmm0
; CHECK-NEXT:    retq
 %b8 = sub <16 x i8> <i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8>, %b
 %shl = shl <16 x i8> %a, %b
 %lshr = lshr <16 x i8> %a, %b8
 %or = or <16 x i8> %shl, %lshr
 ret <16 x i8> %or
}

define <32 x i8> @var_rotate_v32i8(<32 x i8> %a, <32 x i8> %b) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: var_rotate_v32i8:
;
 CHECK:       # %bb.0:
; CHECK-NEXT:    vpandd {{\.?LCPI[0-9]+_[0-9]+}}(%rip){1to8}, %ymm1, %ymm1
; CHECK-NEXT:    vpxor %xmm2, %xmm2, %xmm2
; CHECK-NEXT:    vpunpckhbw {{.*#+}} ymm3 =
ymm1[8],ymm2[8],ymm1[9],ymm2[9],ymm1[10],ymm2[10],ymm1[11],ymm2[11],ymm1[12],ymm2[12],ymm1[13
],ymm2[13],ymm1[14],ymm2[14],ymm1[15],ymm2[15],ymm1[24],ymm2[24],ymm1[25],ymm2[25],ymm1[26],ym
m2[26],ymm1[27],ymm2[27],ymm1[28],ymm2[28],ymm1[29],ymm2[29],ymm1[30],ymm2[30],ymm1[31],ymm2[
31]
; CHECK-NEXT:    vpunpckhbw {{.*#+}} ymm4 =
ymm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-NEXT:    vpsllvw %ymm3, %ymm4, %ymm3
; CHECK-NEXT:    vpsrlw $8, %ymm3, %ymm3
; CHECK-NEXT:    vpunpcklbw {{.*#+}} ymm1 =
ymm1[0],ymm2[0],ymm1[1],ymm2[1],ymm1[2],ymm2[2],ymm1[3],ymm2[3],ymm1[4],ymm2[4],ymm1[5],ymm2[
5],ymm1[6],ymm2[6],ymm1[7],ymm2[7],ymm1[16],ymm2[16],ymm1[17],ymm2[17],ymm1[18],ymm2[18],ymm1[
19],ymm2[19],ymm1[20],ymm2[20],ymm1[21],ymm2[21],ymm1[22],ymm2[22],ymm1[23],ymm2[23]
;
 CHECK-NEXT:    vpunpcklbw {{.*#+}} ymm0 =
ymm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-NEXT:    vpsllvw %ymm1, %ymm0, %ymm0
; CHECK-NEXT:    vpsrlw $8, %ymm0, %ymm0
; CHECK-NEXT:    vpackuswb %ymm3, %ymm0, %ymm0
; CHECK-NEXT:    retq
 %b8 = sub <32 x i8> <i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8
8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8>, %b
 %shl = shl <32 x i8> %a, %b
 %lshr = lshr <32 x i8> %a, %b8
 %or = or <32 x i8> %shl, %lshr
 ret <32 x i8> %or
}

define <32 x i8> @splatvar_rotate_v32i8(<32 x i8> %a, <32 x i8> %b) nounwind "min-legal-vector-width"="256"
{
; CHECK-LABEL: splatvar_rotate_v32i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpunpckhbw {{.*#+}} ymm2 =
```

```
ymm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-NEXT:    vpand {{\.?LCPI[0-9]+_[0-9]+}}(%rip),
 %xmm1, %xmm1
; CHECK-NEXT:    vpsllw %xmm1, %ymm2, %ymm2
; CHECK-NEXT:    vpsrlw $8, %ymm2, %ymm2
; CHECK-NEXT:    vpunpcklbw {{.*#+}} ymm0 =
ymm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-NEXT:    vpsllw %xmm1, %ymm0, %ymm0
; CHECK-NEXT:    vpsrlw $8, %ymm0, %ymm0
; CHECK-NEXT:    vpackuswb %ymm2, %ymm0, %ymm0
; CHECK-NEXT:    retq
 %splat = shufflevector <32 x i8> %b, <32 x i8> undef, <32 x i32> zeroinitializer
 %splat8 = sub <32 x i8> <i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8
8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8>, %splat
 %shl = shl <32 x i8> %a, %splat
 %lshr = lshr <32 x i8> %a, %splat8
 %or = or <32 x i8> %shl, %lshr
 ret <32 x i8> %or
}

define <32 x i8> @constant_rotate_v32i8(<32 x i8> %a) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: constant_rotate_v32i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:
   vpunpckhbw {{.*#+}} ymm1 =
ymm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-NEXT:    vpsllvw {{\.?LCPI[0-9]+_[0-9]+}}(%rip), %ymm1, %ymm1
; CHECK-NEXT:    vpsrlw $8, %ymm1, %ymm1
; CHECK-NEXT:    vpunpcklbw {{.*#+}} ymm0 =
ymm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-NEXT:    vpsllvw {{\.?LCPI[0-9]+_[0-9]+}}(%rip), %ymm0, %ymm0
; CHECK-NEXT:    vpsrlw $8, %ymm0, %ymm0
; CHECK-NEXT:    vpackuswb %ymm1, %ymm0, %ymm0
; CHECK-NEXT:    retq
 %shl = shl <32 x i8> %a, <i8 0, i8 1, i8 2, i8 3, i8 4, i8 5, i8 6, i8 7, i8 8, i8 7, i8 6, i8 5, i8 4, i8 3, i8 2, i8 1, i8 0, i8
1, i8 2, i8 3, i8 4, i8 5, i8 6, i8 7, i8 8, i8 7, i8 6, i8 5, i8 4, i8 3, i8 2, i8 1>
 %lshr = lshr <32 x i8> %a, <i8 8, i8 7, i8 6, i8 5, i8 4, i8 3, i8 2, i8 1, i8 0, i8 1, i8 2, i8 3, i8 4, i8 5, i8 6, i8 7, i8 8,
i8 7, i8 6, i8 5, i8 4, i8 3, i8 2, i8 1, i8 0, i8 1, i8 2, i8 3, i8 4, i8 5, i8 6, i8 7>
  %or = or <32 x i8> %shl, %lshr
 ret <32 x i8> %or
}

define <32 x i8> @splatconstant_rotate_v32i8(<32 x i8> %a) nounwind "min-legal-vector-width"="256" {
; CHECK-SKX-LABEL: splatconstant_rotate_v32i8:
; CHECK-SKX:       # %bb.0:
; CHECK-SKX-NEXT:    vpsllw $4, %ymm0, %ymm1
; CHECK-SKX-NEXT:    vpsrlw $4, %ymm0, %ymm0
; CHECK-SKX-NEXT:    vpternlogd {{.*#+}} ymm0 = ymm0 ^ (mem & (ymm0 ^ ymm1))
```

```
; CHECK-SKX-NEXT:    retq
;
; CHECK-AVX512-LABEL: splatconstant_rotate_v32i8:
; CHECK-AVX512:       # %bb.0:
; CHECK-AVX512-NEXT:    vpsllw $4, %ymm0, %ymm1
; CHECK-AVX512-NEXT:    vpsrlw $4, %ymm0, %ymm0
; CHECK-AVX512-NEXT:    vpternlogd {{.*#+}} ymm0 = ymm0 ^ (mem & (ymm0 ^ ymm1))
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI1-LABEL: splatconstant_rotate_v32i8:
; CHECK-VBMI1:       # %bb.0:
; CHECK-VBMI1-NEXT:    vpsllw $4, %ymm0, %ymm1
; CHECK-VBMI1-NEXT:    vpsrlw $4, %ymm0, %ymm0
; CHECK-VBMI1-NEXT:    vpternlogd {{.*#+}} ymm0 = ymm0 ^ (mem & (ymm0 ^ ymm1))
; CHECK-VBMI1-NEXT:    retq
;
; CHECK-GFNI-LABEL:
 splatconstant_rotate_v32i8:
; CHECK-GFNI:       # %bb.0:
; CHECK-GFNI-NEXT:    vgf2p8affineqb $0, {{\.?LCPI[0-9]+_[0-9]+}}(%rip){1to4}, %ymm0, %ymm0
; CHECK-GFNI-NEXT:    retq
 %shl = shl <32 x i8> %a, <i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8
4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4>
 %lshr = lshr <32 x i8> %a, <i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4,
i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4>
 %or = or <32 x i8> %shl, %lshr
 ret <32 x i8> %or
}

define <32 x i8> @splatconstant_rotate_mask_v32i8(<32 x i8> %a) nounwind "min-legal-vector-width"="256" {
; CHECK-SKX-LABEL: splatconstant_rotate_mask_v32i8:
; CHECK-SKX:       # %bb.0:
; CHECK-SKX-NEXT:    vpsllw $4, %ymm0, %ymm1
; CHECK-SKX-NEXT:    vpsrlw $4, %ymm0, %ymm0
; CHECK-SKX-NEXT:    vpternlogd {{.*#+}}
 ymm0 = ymm0 ^ (mem & (ymm0 ^ ymm1))
; CHECK-SKX-NEXT:    vpandd {{\.?LCPI[0-9]+_[0-9]+}}(%rip){1to8}, %ymm0, %ymm0
; CHECK-SKX-NEXT:    retq
;
; CHECK-AVX512-LABEL: splatconstant_rotate_mask_v32i8:
; CHECK-AVX512:       # %bb.0:
; CHECK-AVX512-NEXT:    vpsllw $4, %ymm0, %ymm1
; CHECK-AVX512-NEXT:    vpsrlw $4, %ymm0, %ymm0
; CHECK-AVX512-NEXT:    vpternlogd {{.*#+}} ymm0 = ymm0 ^ (mem & (ymm0 ^ ymm1))
; CHECK-AVX512-NEXT:    vpandd {{\.?LCPI[0-9]+_[0-9]+}}(%rip){1to8}, %ymm0, %ymm0
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI1-LABEL: splatconstant_rotate_mask_v32i8:
```

```
; CHECK-VBMI1:       # %bb.0:
; CHECK-VBMI1-NEXT:    vpsllw $4, %ymm0, %ymm1
; CHECK-VBMI1-NEXT:    vpsrlw $4, %ymm0, %ymm0
; CHECK-VBMI1-NEXT:    vpternlogd {{.*#+}} ymm0 = ymm0 ^ (mem & (ymm0 ^ ymm1))
; CHECK-VBMI1-NEXT:    vpandd {{\.?LCPI[0-9]+_[0-9]+}}(%rip){1to8}, %ymm0, %ymm0
; CHECK-VBMI1-NEXT:    retq
;
; CHECK-GFNI-LABEL: splatconstant_rotate_mask_v32i8:
; CHECK-GFNI:       # %bb.0:
; CHECK-GFNI-NEXT:    vgf2p8affineqb
 $0, {{\.?LCPI[0-9]+_[0-9]+}}(%rip){1to4}, %ymm0, %ymm0
; CHECK-GFNI-NEXT:    vpandd {{\.?LCPI[0-9]+_[0-9]+}}(%rip){1to8}, %ymm0, %ymm0
; CHECK-GFNI-NEXT:    retq
 %shl = shl <32 x i8> %a, <i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8
4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4>
 %lshr = lshr <32 x i8> %a, <i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4,
i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4>
 %rmask = and <32 x i8> %lshr, <i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55,
i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8
55>
 %lmask = and <32 x i8> %shl, <i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33,
i8 33,
 i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33>
 %or = or <32 x i8> %lmask, %rmask
 ret <32 x i8> %or
}
; RUN: llc -mtriple=hexagon < %s
; REQUIRES: asserts

; The two loads based on %struct.0, loading two different data types
; cause LSR to assume type "void" for the memory type. This would then
; cause an assert in isLegalAddressingMode. Make sure we no longer crash.

target triple = "hexagon"

%struct.0 = type { ptr, i8, %union.anon.0 }
%union.anon.0 = type { ptr }

define hidden fastcc void @fred() unnamed_addr #0 {
entry:
 br i1 undef, label %while.end, label %while.body.lr.ph

while.body.lr.ph:                                 ; preds = %entry
 br label %while.body

while.body:                                       ; preds = %exit.2, %while.body.lr.ph
 %lsr.iv = phi ptr [ %cgep22, %exit.2 ], [ undef, %while.body.lr.ph ]
 switch i32 undef, label %exit [
```

```
  i32 1, label %sw.bb.i
  i32 2, label %sw.bb3.i
 ]

sw.bb.i:                                          ; preds = %while.body
 unreachable

sw.bb3.i:                                         ; preds = %while.body
 unreachable

exit:
                                                  ; preds = %while.body
 switch i32 undef, label %exit.2 [
  i32 1, label %sw.bb.i17
  i32 2, label %sw.bb3.i20
 ]

sw.bb.i17:                                        ; preds = %.exit
 %0 = load i32, ptr %lsr.iv, align 4
 unreachable

sw.bb3.i20:                                       ; preds = %exit
 %1 = load ptr, ptr %lsr.iv, align 4
 unreachable

exit.2:                                           ; preds = %exit
 %cgep22 = getelementptr %struct.0, ptr %lsr.iv, i32 1
 br label %while.body

while.end:                                        ; preds = %entry
 ret void
}

attributes #0 = { nounwind optsize "target-cpu"="hexagonv55" }
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc < %s -mtriple=x86_64-linux-android -mattr=+mmx -enable-legalize-types-checking | FileCheck %s
;
; D31946
; Check that we dont end up with the ""LLVM ERROR: Cannot select" error.
; Additionally ensure that the output code actually put fp128 values in SSE registers.

declare fp128 @llvm.fabs.f128(fp128)
declare fp128 @llvm.copysign.f128(fp128, fp128)

define fp128 @TestSelect(fp128 %a, fp128 %b) {
; CHECK-LABEL: TestSelect:
; CHECK:       # %bb.0:
; CHECK-NEXT:    pushq %rbx
```

```
; CHECK-NEXT:    .cfi_def_cfa_offset 16
; CHECK-NEXT:    subq $32, %rsp
; CHECK-NEXT:    .cfi_def_cfa_offset 48
; CHECK-NEXT:    .cfi_offset %rbx, -16
; CHECK-NEXT:    movaps %xmm1, {{[-0-9]+}}(%r{{[sb]}}p) # 16-byte Spill
; CHECK-NEXT:    movaps %xmm0, (%rsp) # 16-byte Spill
; CHECK-NEXT:    callq __gttf2@PLT
; CHECK-NEXT:    movl %eax, %ebx
; CHECK-NEXT:    movaps (%rsp), %xmm0 # 16-byte Reload
; CHECK-NEXT:    movaps {{[-0-9]+}}(%r{{[sb]}}p),
 %xmm1 # 16-byte Reload
; CHECK-NEXT:    callq __subtf3@PLT
; CHECK-NEXT:    testl %ebx, %ebx
; CHECK-NEXT:    jg .LBB0_2
; CHECK-NEXT:  # %bb.1:
; CHECK-NEXT:    xorps %xmm0, %xmm0
; CHECK-NEXT:  .LBB0_2:
; CHECK-NEXT:    addq $32, %rsp
; CHECK-NEXT:    .cfi_def_cfa_offset 16
; CHECK-NEXT:    popq %rbx
; CHECK-NEXT:    .cfi_def_cfa_offset 8
; CHECK-NEXT:    retq
 %cmp = fcmp ogt fp128 %a, %b
 %sub = fsub fp128 %a, %b
 %res = select i1 %cmp, fp128 %sub, fp128 0xL00000000000000000000000000000000
 ret fp128 %res
}

define fp128 @TestFabs(fp128 %a) {
; CHECK-LABEL: TestFabs:
; CHECK:       # %bb.0:
; CHECK-NEXT:    andps {{\.?LCPI[0-9]+_[0-9]+}}(%rip), %xmm0
; CHECK-NEXT:    retq
 %res = call fp128 @llvm.fabs.f128(fp128 %a)
 ret fp128 %res
}

define fp128 @TestCopysign(fp128 %a, fp128 %b) {
; CHECK-LABEL: TestCopysign:
; CHECK:       # %bb.0:
; CHECK-NEXT:    andps {{\.?LCPI[0-9]+_[0-9]+}}(%rip), %xmm1
; CHECK-NEXT:    andps {{\.?LCPI[0-9]+_[0-9]+}}(%rip), %xmm0
; CHECK-NEXT:
    orps %xmm1, %xmm0
; CHECK-NEXT:    retq
 %res = call fp128 @llvm.copysign.f128(fp128 %a, fp128 %b)
 ret fp128 %res
}
```

```
define fp128 @TestFneg(fp128 %a) {
; CHECK-LABEL: TestFneg:
; CHECK:       # %bb.0:
; CHECK-NEXT:    pushq %rax
; CHECK-NEXT:    .cfi_def_cfa_offset 16
; CHECK-NEXT:    movaps %xmm0, %xmm1
; CHECK-NEXT:    callq __multf3@PLT
; CHECK-NEXT:    xorps {{\.?LCPI[0-9]+_[0-9]+}}(%rip), %xmm0
; CHECK-NEXT:    popq %rax
; CHECK-NEXT:    .cfi_def_cfa_offset 8
; CHECK-NEXT:    retq
 %mul = fmul fp128 %a, %a
 %res = fsub fp128 0xL00000000000000008000000000000000, %mul
 ret fp128 %res
}
```

---

clang-tidy CERT Files

---

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; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=amdgcn -mcpu=fiji < %s | FileCheck -check-prefixes=VI %s

; FIXME: This one should fold to rcp
define half @select_fneg_posk_src_rcp_f16(i32 %c, half %x, half %y) {
; VI-LABEL: select_fneg_posk_src_rcp_f16:
; VI:       ; %bb.0:
; VI-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; VI-NEXT:    v_rcp_f16_e64 v1, -v1
; VI-NEXT:    v_mov_b32_e32 v2, 0x4000
; VI-NEXT:    v_cmp_eq_u32_e32 vcc, 0, v0
; VI-NEXT:    v_cndmask_b32_e32 v0, v2, v1, vcc
; VI-NEXT:    s_setpc_b64 s[30:31]
 %cmp = icmp eq i32 %c, 0
 %rcp = call half @llvm.amdgcn.rcp.f16(half %x)
 %fneg = fneg half %rcp
 %select = select i1 %cmp, half %fneg, half 2.0
 ret half %select
}

declare half @llvm.amdgcn.rcp.f16(half) #0

attributes #0 = { nocallback nofree nosync nounwind speculatable willreturn memory(none) }
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; NOTE: Assertions have been autogenerated by utils/update_test_checks.py UTC_ARGS: --include-generated-funcs
; RUN: opt -S -passes=verify,iroutliner -ir-outlining-no-cost < %s | FileCheck %s

; This test checks that we do outline indirect calls when it is not specified
; that we should not.

declare void @f1(ptr, ptr);

```
declare void @f2(ptr, ptr);

define void @function1(ptr %func) {
entry:
 %a = alloca i32, align 4
 %b = alloca i32, align 4
 %c = alloca i32, align 4
 store i32 2, ptr %a, align 4
 store i32 3, ptr %b, align 4
 store i32 4, ptr %c, align 4
 call void %func()
 %al = load i32, ptr %a
 %bl = load i32, ptr %b
 %cl = load i32, ptr %c
 ret void
}

define void @function2(ptr %func) {
entry:
 %a = alloca i32, align 4
 %b = alloca i32, align 4
 %c = alloca i32, align 4
 store i32 2, ptr %a, align 4
 store i32 3, ptr %b, align 4
 store i32 4, ptr %c, align 4
 call void %func()
 %al = load i32, ptr %a
 %bl = load i32, ptr %b
 %cl = load i32, ptr %c
 ret void
}
;
 CHECK-LABEL: @function1(
; CHECK-NEXT:  entry:
; CHECK-NEXT:    [[A:%.*]] = alloca i32, align 4
; CHECK-NEXT:    [[B:%.*]] = alloca i32, align 4
; CHECK-NEXT:    [[C:%.*]] = alloca i32, align 4
; CHECK-NEXT:    call void @outlined_ir_func_0(ptr [[A]], ptr [[B]], ptr [[C]], ptr [[FUNC:%.*]])
; CHECK-NEXT:    ret void
;
;
; CHECK-LABEL: @function2(
; CHECK-NEXT:  entry:
; CHECK-NEXT:    [[A:%.*]] = alloca i32, align 4
; CHECK-NEXT:    [[B:%.*]] = alloca i32, align 4
; CHECK-NEXT:    [[C:%.*]] = alloca i32, align 4
; CHECK-NEXT:    call void @outlined_ir_func_0(ptr [[A]], ptr [[B]], ptr [[C]], ptr [[FUNC:%.*]])
; CHECK-NEXT:    ret void
```

```
;
;
; CHECK-LABEL: define internal void  @outlined_ir_func_0(
; CHECK-NEXT:  newFuncRoot:
; CHECK-NEXT:    br label [[ENTRY_TO_OUTLINE:%.*]]
; CHECK:       entry_to_outline:
; CHECK-NEXT:    store i32 2, ptr [[TMP0:%.*]], align 4
; CHECK-NEXT:    store i32 3, ptr [[TMP1:%.*]], align 4
; CHECK-NEXT:    store i32 4, ptr [[TMP2:%.*]], align 4
; CHECK-NEXT:
    call void [[TMP3:%.*]]()
; CHECK-NEXT:    [[AL:%.*]] = load i32, ptr [[TMP0]], align 4
; CHECK-NEXT:    [[BL:%.*]] = load i32, ptr [[TMP1]], align 4
; CHECK-NEXT:    [[CL:%.*]] = load i32, ptr [[TMP2]], align 4
; CHECK-NEXT:    br label [[ENTRY_AFTER_OUTLINE_EXITSTUB:%.*]]
; CHECK:       entry_after_outline.exitStub:
; CHECK-NEXT:    ret void
;
; RUN: llc < %s -mtriple=s390x-linux-gnu -mcpu=zEC12 -verify-machineinstrs | FileCheck %s
;
; Test that early if conversion produces LOCR with operands of the right
; register classes.

define void @autogen_SD4739(ptr) {
; CHECK-NOT: Expected a GR32Bit register, but got a GRX32Bit register
BB:
 %L34 = load i8, ptr %0
 %Cmp56 = icmp sgt i8 undef, %L34
 br label %CF246

CF246:                                            ; preds = %CF246, %BB
 %Sl163 = select i1 %Cmp56, i8 %L34, i8 undef
 br i1 undef, label %CF246, label %CF248

CF248:                                            ; preds = %CF248, %CF246
 store i8 %Sl163, ptr %0
 br label %CF248
}
; NOTE: Assertions have been autogenerated by utils/update_test_checks.py UTC_ARGS: --function-signature --
check-attributes --check-globals
; RUN: opt -aa-pipeline=basic-aa -passes=attributor -attributor-manifest-internal  -attributor-annotate-decl-cs -S <
%s | FileCheck %s --check-prefixes=CHECK,TUNIT
; RUN: opt -aa-pipeline=basic-aa -passes=attributor-cgscc -attributor-manifest-internal  -attributor-annotate-decl-cs -
S < %s | FileCheck %s --check-prefixes=CHECK,CGSCC
; Test that we only promote arguments when the caller/callee have compatible
; function attrubtes.

target triple = "x86_64-unknown-linux-gnu"
```

```
; This should promote
define internal fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr %arg, ptr
readonly %arg1) #0 {
;
; CHECK: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512
; CHECK-SAME:
 (ptr noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[ARG:%.*]], <8 x i64>
[[TMP0:%.*]]) #[[ATTR0:[0-9]+]] {
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[ARG1_PRIV:%.*]] = alloca <8 x i64>, align 64
; CHECK-NEXT:    store <8 x i64> [[TMP0]], ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]], align 64
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr %arg) #0 {
;
; TUNIT: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; TUNIT-LABEL: define {{[^@]+}}@avx512_legal512_prefer512_call_avx512_legal512_prefer512
; TUNIT-SAME: (ptr nocapture nofree writeonly [[ARG:%.*]]) #[[ATTR0]] {
; TUNIT-NEXT:  bb:
; TUNIT-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align
 32
; TUNIT-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 32
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5:[0-9]+]]
; TUNIT-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; TUNIT-NEXT:    call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TMP2]], <8 x i64> [[TMP0]])
#[[ATTR6:[0-9]+]]
; TUNIT-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 64
; TUNIT-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; TUNIT-NEXT:    ret void
;
; CGSCC: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CGSCC-LABEL: define {{[^@]+}}@avx512_legal512_prefer512_call_avx512_legal512_prefer512
; CGSCC-SAME: (ptr nocapture nofree noundef nonnull
```

```
 writeonly align 2 dereferenceable(64) [[ARG:%.*]]) #[[ATTR0]] {
; CGSCC-NEXT:  bb:
; CGSCC-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 64
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5:[0-9]+]]
; CGSCC-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; CGSCC-NEXT:    call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TMP2]], <8 x i64> [[TMP0]])
#[[ATTR6:[0-9]+]]
; CGSCC-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 64
; CGSCC-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CGSCC-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp,
 i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr %arg, ptr
readonly %arg1) #1 {
;
; CHECK: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64)
[[ARG:%.*]], <8 x i64> [[TMP0:%.*]]) #[[ATTR1:[0-9]+]] {
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[ARG1_PRIV:%.*]] = alloca <8 x i64>, align 64
; CHECK-NEXT:    store <8 x i64> [[TMP0]], ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:
    store <8 x i64> [[TMP]], ptr [[ARG]], align 64
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}
```

```
define void @avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr %arg) #1 {
;
; TUNIT: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; TUNIT-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal512_prefer256
; TUNIT-SAME: (ptr nocapture nofree writeonly [[ARG:%.*]]) #[[ATTR1]] {
; TUNIT-NEXT:  bb:
; TUNIT-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 32
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; TUNIT-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; TUNIT-NEXT:    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr
 noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TMP2]], <8 x i64> [[TMP0]])
#[[ATTR6]]
; TUNIT-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 64
; TUNIT-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; TUNIT-NEXT:    ret void
;
; CGSCC: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CGSCC-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal512_prefer256
; CGSCC-SAME: (ptr nocapture nofree noundef nonnull writeonly align 2 dereferenceable(64) [[ARG:%.*]])
#[[ATTR1]] {
; CGSCC-NEXT:  bb:
; CGSCC-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 64
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
;
 CGSCC-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; CGSCC-NEXT:    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TMP2]], <8 x i64> [[TMP0]])
#[[ATTR6]]
; CGSCC-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 64
; CGSCC-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CGSCC-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}
```

```
; This should promote
define internal fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr %arg, ptr
readonly %arg1) #1 {
;
; CHECK: Function Attrs:
 inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem: readwrite) uwtable
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64)
[[ARG:%.*]], <8 x i64> [[TMP0:%.*]]) #[[ATTR1]] {
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[ARG1_PRIV:%.*]] = alloca <8 x i64>, align 64
; CHECK-NEXT:    store <8 x i64> [[TMP0]], ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]], align 64
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr %arg) #0 {
;
; TUNIT: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; TUNIT-LABEL: define {{[^@]+}}@avx512_legal512_prefer512_call_avx512_legal512_prefer256
;
 TUNIT-SAME: (ptr nocapture nofree writeonly [[ARG:%.*]]) #[[ATTR0]] {
; TUNIT-NEXT:  bb:
; TUNIT-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 32
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; TUNIT-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; TUNIT-NEXT:    call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TMP2]], <8 x i64> [[TMP0]])
#[[ATTR6]]
; TUNIT-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 64
; TUNIT-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; TUNIT-NEXT:    ret void
;
; CGSCC: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind
 willreturn memory(argmem: readwrite) uwtable
; CGSCC-LABEL: define {{[^@]+}}@avx512_legal512_prefer512_call_avx512_legal512_prefer256
; CGSCC-SAME: (ptr nocapture nofree noundef nonnull writeonly align 2 dereferenceable(64) [[ARG:%.*]])
#[[ATTR0]] {
; CGSCC-NEXT:  bb:
```

```
; CGSCC-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 64
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; CGSCC-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; CGSCC-NEXT:    call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TMP2]], <8 x i64> [[TMP0]])
#[[ATTR6]]
; CGSCC-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 64
; CGSCC-NEXT:    store <8 x i64> [[TMP4]], ptr
 [[ARG]], align 2
; CGSCC-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr %arg, ptr
readonly %arg1) #0 {
;
; CHECK: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512
; CHECK-SAME: (ptr noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64)
[[ARG:%.*]], <8 x i64> [[TMP0:%.*]]) #[[ATTR0]] {
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[ARG1_PRIV:%.*]] = alloca <8 x i64>,
 align 64
; CHECK-NEXT:    store <8 x i64> [[TMP0]], ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]], align 64
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr %arg) #1 {
;
```

```
; TUNIT: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; TUNIT-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal512_prefer512
; TUNIT-SAME: (ptr nocapture nofree writeonly [[ARG:%.*]]) #[[ATTR1]] {
; TUNIT-NEXT:  bb:
; TUNIT-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 32
dereferenceable(64) [[TMP]], i8 noundef 0,
 i64 noundef 32, i1 noundef false) #[[ATTR5]]
; TUNIT-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; TUNIT-NEXT:    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TMP2]], <8 x i64> [[TMP0]])
#[[ATTR6]]
; TUNIT-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 64
; TUNIT-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; TUNIT-NEXT:    ret void
;
; CGSCC: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CGSCC-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal512_prefer512
; CGSCC-SAME: (ptr nocapture nofree noundef nonnull writeonly align 2 dereferenceable(64) [[ARG:%.*]])
#[[ATTR1]] {
; CGSCC-NEXT:  bb:
; CGSCC-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    call void @llvm.memset.p0.i64(ptr
 noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TMP]], i8 noundef 0, i64
noundef 32, i1 noundef false) #[[ATTR5]]
; CGSCC-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; CGSCC-NEXT:    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TMP2]], <8 x i64> [[TMP0]])
#[[ATTR6]]
; CGSCC-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 64
; CGSCC-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CGSCC-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should
```

```
 not promote
define internal fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr %arg, ptr
readonly %arg1) #1 {
;
; CHECK: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64)
[[ARG:%.*]], ptr noalias nocapture nofree noundef nonnull readonly align 64 dereferenceable(64) [[ARG1:%.*]])
#[[ATTR1]] {
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1]], align 64
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]], align 64
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr %arg) #2 {
;
; TUNIT: Function Attrs: inlinehint mustprogress nofree norecurse
 nosync nounwind willreturn memory(argmem: readwrite) uwtable
; TUNIT-LABEL: define {{[^@]+}}@avx512_legal256_prefer256_call_avx512_legal512_prefer256
; TUNIT-SAME: (ptr nocapture nofree writeonly [[ARG:%.*]]) #[[ATTR2:[0-9]+]] {
; TUNIT-NEXT:  bb:
; TUNIT-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 32
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; TUNIT-NEXT:    call fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TMP2]], ptr noalias nocapture
nofree noundef nonnull readonly align 64 dereferenceable(64) [[TMP]]) #[[ATTR6]]
; TUNIT-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 64
; TUNIT-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align
 2
; TUNIT-NEXT:    ret void
;
; CGSCC: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CGSCC-LABEL: define {{[^@]+}}@avx512_legal256_prefer256_call_avx512_legal512_prefer256
; CGSCC-SAME: (ptr nocapture nofree noundef nonnull writeonly align 2 dereferenceable(64) [[ARG:%.*]])
#[[ATTR2:[0-9]+]] {
; CGSCC-NEXT:  bb:
; CGSCC-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
```

```
; CGSCC-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 64
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; CGSCC-NEXT:    call fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TMP2]], ptr noalias nocapture
nofree noundef nonnull readonly align 64 dereferenceable(64) [[TMP]]) #[[ATTR6]]
;
 CGSCC-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 64
; CGSCC-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CGSCC-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should not promote
define internal fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %arg, ptr
readonly %arg1) #2 {
;
; CHECK: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256
; CHECK-SAME: (ptr noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64)
 [[ARG:%.*]], ptr noalias nocapture nofree noundef nonnull readonly align 64 dereferenceable(64) [[ARG1:%.*]])
#[[ATTR2:[0-9]+]] {
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1]], align 64
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]], align 64
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %arg) #1 {
;
; TUNIT: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; TUNIT-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal256_prefer256
; TUNIT-SAME: (ptr nocapture nofree writeonly [[ARG:%.*]]) #[[ATTR1]] {
; TUNIT-NEXT:  bb:
```

```
; TUNIT-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull
 writeonly align 32 dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; TUNIT-NEXT:    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TMP2]], ptr noalias nocapture
nofree noundef nonnull readonly align 64 dereferenceable(64) [[TMP]]) #[[ATTR6]]
; TUNIT-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 64
; TUNIT-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; TUNIT-NEXT:    ret void
;
; CGSCC: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CGSCC-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal256_prefer256
; CGSCC-SAME: (ptr nocapture nofree noundef nonnull writeonly align 2 dereferenceable(64) [[ARG:%.*]])
#[[ATTR1]] {
; CGSCC-NEXT:  bb:
; CGSCC-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    [[TMP2:%.*]]
 = alloca <8 x i64>, align 32
; CGSCC-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 64
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; CGSCC-NEXT:    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TMP2]], ptr noalias nocapture
nofree noundef nonnull readonly align 64 dereferenceable(64) [[TMP]]) #[[ATTR6]]
; CGSCC-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 64
; CGSCC-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CGSCC-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store
 <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr %arg, ptr readonly
%arg1) #3 {
;
; CHECK: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CHECK-LABEL: define {{[^@]+}}@callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256
; CHECK-SAME: (ptr noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64)
```

```
[[ARG:%.*]], <8 x i64> [[TMP0:%.*]]) #[[ATTR3:[0-9]+]] {
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[ARG1_PRIV:%.*]] = alloca <8 x i64>, align 64
; CHECK-NEXT:    store <8 x i64> [[TMP0]], ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]], align 64
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr
 %arg) #4 {
;
; TUNIT: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; TUNIT-LABEL: define {{[^@]+}}@avx2_legal256_prefer256_call_avx2_legal512_prefer256
; TUNIT-SAME: (ptr nocapture nofree writeonly [[ARG:%.*]]) #[[ATTR3]] {
; TUNIT-NEXT:  bb:
; TUNIT-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 32
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; TUNIT-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; TUNIT-NEXT:    call fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr noalias
nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TMP2]], <8 x i64> [[TMP0]])
#[[ATTR6]]
; TUNIT-NEXT:    [[TMP4:%.*]]
 = load <8 x i64>, ptr [[TMP2]], align 64
; TUNIT-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; TUNIT-NEXT:    ret void
;
; CGSCC: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CGSCC-LABEL: define {{[^@]+}}@avx2_legal256_prefer256_call_avx2_legal512_prefer256
; CGSCC-SAME: (ptr nocapture nofree noundef nonnull writeonly align 2 dereferenceable(64) [[ARG:%.*]])
#[[ATTR3]] {
; CGSCC-NEXT:  bb:
; CGSCC-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 64
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; CGSCC-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; CGSCC-NEXT:    call fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr noalias
nocapture nofree noundef
```

```
 nonnull writeonly align 64 dereferenceable(64) [[TMP2]], <8 x i64> [[TMP0]]) #[[ATTR6]]
; CGSCC-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 64
; CGSCC-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CGSCC-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr %arg, ptr readonly
%arg1) #4 {
;
; CHECK: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CHECK-LABEL: define {{[^@]+}}@callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256
; CHECK-SAME: (ptr noalias
 nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[ARG:%.*]], <8 x i64> [[TMP0:%.*]])
#[[ATTR3]] {
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[ARG1_PRIV:%.*]] = alloca <8 x i64>, align 64
; CHECK-NEXT:    store <8 x i64> [[TMP0]], ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]], align 64
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr %arg) #3 {
;
; TUNIT: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; TUNIT-LABEL: define {{[^@]+}}@avx2_legal512_prefer256_call_avx2_legal256_prefer256
; TUNIT-SAME: (ptr nocapture nofree writeonly [[ARG:%.*]]) #[[ATTR3]] {
; TUNIT-NEXT:  bb:
; TUNIT-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    [[TMP2:%.*]]
```

```
 = alloca <8 x i64>, align 32
; TUNIT-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 32
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; TUNIT-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; TUNIT-NEXT:    call fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr noalias
nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TMP2]], <8 x i64> [[TMP0]])
#[[ATTR6]]
; TUNIT-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 64
; TUNIT-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; TUNIT-NEXT:    ret void
;
; CGSCC: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CGSCC-LABEL: define {{[^@]+}}@avx2_legal512_prefer256_call_avx2_legal256_prefer256
; CGSCC-SAME: (ptr nocapture nofree noundef nonnull writeonly align 2 dereferenceable(64) [[ARG:%.*]])
 #[[ATTR3]] {
; CGSCC-NEXT:  bb:
; CGSCC-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 64
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; CGSCC-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; CGSCC-NEXT:    call fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr noalias
nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TMP2]], <8 x i64> [[TMP0]])
#[[ATTR6]]
; CGSCC-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 64
; CGSCC-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CGSCC-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr
 %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; Function Attrs: argmemonly nounwind
declare void @llvm.memset.p0.i64(ptr nocapture writeonly, i8, i64, i1) #5

attributes #0 = { inlinehint norecurse nounwind uwtable "target-features"="+avx512vl" "min-legal-vector-
width"="512" "prefer-vector-width"="512" }
attributes #1 = { inlinehint norecurse nounwind uwtable "target-features"="+avx512vl" "min-legal-vector-
width"="512" "prefer-vector-width"="256" }
attributes #2 = { inlinehint norecurse nounwind uwtable "target-features"="+avx512vl" "min-legal-vector-
```

```
width"="256" "prefer-vector-width"="256" }
attributes #3 = { inlinehint norecurse nounwind uwtable "target-features"="+avx2" "min-legal-vector-width"="512"
"prefer-vector-width"="256" }
attributes #4 = { inlinehint norecurse nounwind uwtable "target-features"="+avx2" "min-legal-vector-width"="256"
"prefer-vector-width"="256" }
attributes
 #5 = { argmemonly nounwind }
;.
; TUNIT: attributes #[[ATTR0]] = { inlinehint mustprogress nofree norecurse nosync nounwind willreturn
memory(argmem: readwrite) uwtable "min-legal-vector-width"="512" "prefer-vector-width"="512" "target-
features"="+avx512vl" }
; TUNIT: attributes #[[ATTR1]] = { inlinehint mustprogress nofree norecurse nosync nounwind willreturn
memory(argmem: readwrite) uwtable "min-legal-vector-width"="512" "prefer-vector-width"="256" "target-
features"="+avx512vl" }
; TUNIT: attributes #[[ATTR2]] = { inlinehint mustprogress nofree norecurse nosync nounwind willreturn
memory(argmem: readwrite) uwtable "min-legal-vector-width"="256" "prefer-vector-width"="256" "target-
features"="+avx512vl" }
; TUNIT: attributes #[[ATTR3]] = { inlinehint mustprogress nofree norecurse nosync nounwind willreturn
memory(argmem: readwrite) uwtable "min-legal-vector-width"="512" "prefer-vector-width"="256" "target-
features"="+avx2" }
; TUNIT: attributes #[[ATTR4:[0-9]+]] = { nocallback
 nofree nounwind willreturn memory(argmem: write) }
; TUNIT: attributes #[[ATTR5]] = { nofree willreturn memory(write) }
; TUNIT: attributes #[[ATTR6]] = { nofree nosync nounwind willreturn }
;.
; CGSCC: attributes #[[ATTR0]] = { inlinehint mustprogress nofree norecurse nosync nounwind willreturn
memory(argmem: readwrite) uwtable "min-legal-vector-width"="512" "prefer-vector-width"="512" "target-
features"="+avx512vl" }
; CGSCC: attributes #[[ATTR1]] = { inlinehint mustprogress nofree norecurse nosync nounwind willreturn
memory(argmem: readwrite) uwtable "min-legal-vector-width"="512" "prefer-vector-width"="256" "target-
features"="+avx512vl" }
; CGSCC: attributes #[[ATTR2]] = { inlinehint mustprogress nofree norecurse nosync nounwind willreturn
memory(argmem: readwrite) uwtable "min-legal-vector-width"="256" "prefer-vector-width"="256" "target-
features"="+avx512vl" }
; CGSCC: attributes #[[ATTR3]] = { inlinehint mustprogress nofree norecurse nosync nounwind willreturn
memory(argmem:
 readwrite) uwtable "min-legal-vector-width"="512" "prefer-vector-width"="256" "target-features"="+avx2" }
; CGSCC: attributes #[[ATTR4:[0-9]+]] = { nocallback nofree nounwind willreturn memory(argmem: write) }
; CGSCC: attributes #[[ATTR5]] = { nofree willreturn memory(write) }
; CGSCC: attributes #[[ATTR6]] = { nofree nounwind willreturn }
;.
; RUN: llc -O3 -mtriple=powerpc-unknown-linux-gnu -mcpu=e500 -mattr=spe < %s | FileCheck %s

; PowerPC SPE is a rare in-tree target that has the FP_TO_SINT node marked
; as Legal.

; Verify that fptosi(42.1) isn't simplified when the rounding mode is
; unknown.
```

```
; Verify that no gross errors happen.
; CHECK-LABEL: @f20
; COMMON: cfdctsiz
define i32 @f20(double %a) strictfp {
entry:
 %result = call i32 @llvm.experimental.constrained.fptosi.i32.f64(double 42.1,
                                    metadata !"fpexcept.strict")
                                    strictfp
 ret i32 %result
}

@llvm.fp.env = thread_local global i8 zeroinitializer, section "llvm.metadata"
declare i32 @llvm.experimental.constrained.fptosi.i32.f64(double, metadata)
```

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```
; NOTE: Assertions have been autogenerated by utils/update_analyze_test_checks.py
; RUN: opt < %s  -passes="print<cost-model>" 2>&1 -disable-output -mtriple=x86_64-apple-macosx10.8.0 -mattr=+avx2 | FileCheck %s --check-prefixes=VEC256,AVX
; RUN: opt < %s  -passes="print<cost-model>" 2>&1 -disable-output -mtriple=x86_64-apple-macosx10.8.0 -mattr=+avx512vl,+prefer-256-bit | FileCheck %s --check-prefixes=VEC256,AVX512VL256
; RUN: opt < %s  -passes="print<cost-model>" 2>&1 -disable-output -mtriple=x86_64-apple-macosx10.8.0 -mattr=+avx512vl,-prefer-256-bit | FileCheck %s --check-prefixes=AVX512VL512
; RUN: opt < %s  -passes="print<cost-model>" 2>&1 -disable-output -mtriple=x86_64-apple-macosx10.8.0 -mattr=+avx512vl,+avx512bw,+avx512dq,+prefer-256-bit | FileCheck %s --check-prefixes=VEC256,SKX256
; RUN: opt < %s  -passes="print<cost-model>" 2>&1 -disable-output -mtriple=x86_64-apple-macosx10.8.0 -mattr=+avx512vl,+avx512bw,+avx512dq,-prefer-256-bit | FileCheck %s --check-prefixes=SKX512

define
```

```
 void @zext256() "min-legal-vector-width"="256" {
; AVX-LABEL: 'zext256'
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %A = zext <8 x i16> undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %B = zext <8 x i32> undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %C = zext <16 x i8> undef to <16 x i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %D = zext <16 x i16> undef to <16 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %E = zext <32 x i8> undef to <32 x i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL256-LABEL: 'zext256'
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %A = zext <8 x i16> undef to
<8 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %B = zext <8 x i32> undef to
<8 x i64>
; AVX512VL256-NEXT:  Cost
 Model: Found an estimated cost of 2 for instruction: %C = zext <16 x i8> undef to <16 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %D = zext <16 x i16> undef to
<16 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %E = zext <32 x i8> undef to
<32 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL512-LABEL: 'zext256'
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = zext <8 x i16> undef to
<8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = zext <8 x i32> undef to
<8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = zext <16 x i8> undef to
<16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = zext <16 x i16> undef to
<16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction:
 %E = zext <32 x i8> undef to <32 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX256-LABEL: 'zext256'
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %A = zext <8 x i16> undef to <8 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %B = zext <8 x i32> undef to <8 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %C = zext <16 x i8> undef to <16 x
i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %D = zext <16 x i16> undef to <16 x
i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %E = zext <32 x i8> undef to <32 x
i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
```

```
;
; SKX512-LABEL: 'zext256'
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = zext <8 x i16> undef to <8 x
i64>
; SKX512-NEXT:  Cost Model: Found an estimated
 cost of 1 for instruction: %B = zext <8 x i32> undef to <8 x i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = zext <16 x i8> undef to <16 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = zext <16 x i16> undef to <16 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %E = zext <32 x i8> undef to <32 x
i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
 %A = zext <8 x i16> undef to <8 x i64>
 %B = zext <8 x i32> undef to <8 x i64>
 %C = zext <16 x i8> undef to <16 x i32>
 %D = zext <16 x i16> undef to <16 x i32>
 %E = zext <32 x i8> undef to <32 x i16>
 ret void
}

define void @zext512() "min-legal-vector-width"="512" {
; AVX-LABEL: 'zext512'
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %A = zext <8 x i16> undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %B = zext <8 x i32>
 undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %C = zext <16 x i8> undef to <16 x i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %D = zext <16 x i16> undef to <16 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %E = zext <32 x i8> undef to <32 x i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL256-LABEL: 'zext512'
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = zext <8 x i16> undef to
<8 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = zext <8 x i32> undef to
<8 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = zext <16 x i8> undef to
<16 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = zext <16 x i16> undef to
<16 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost
 of 3 for instruction: %E = zext <32 x i8> undef to <32 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL512-LABEL: 'zext512'
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = zext <8 x i16> undef to
```

```
<8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = zext <8 x i32> undef to
<8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = zext <16 x i8> undef to
<16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = zext <16 x i16> undef to
<16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %E = zext <32 x i8> undef to
<32 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX256-LABEL: 'zext512'
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = zext <8 x i16> undef to <8
 x i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = zext <8 x i32> undef to <8 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = zext <16 x i8> undef to <16 x
i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = zext <16 x i16> undef to <16 x
i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %E = zext <32 x i8> undef to <32 x
i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX512-LABEL: 'zext512'
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = zext <8 x i16> undef to <8 x
i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = zext <8 x i32> undef to <8 x
i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = zext <16 x i8> undef to <16 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = zext <16
 x i16> undef to <16 x i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %E = zext <32 x i8> undef to <32 x
i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
 %A = zext <8 x i16> undef to <8 x i64>
 %B = zext <8 x i32> undef to <8 x i64>
 %C = zext <16 x i8> undef to <16 x i32>
 %D = zext <16 x i16> undef to <16 x i32>
 %E = zext <32 x i8> undef to <32 x i16>
 ret void
}

define void @sext256() "min-legal-vector-width"="256" {
; AVX-LABEL: 'sext256'
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %A = sext <8 x i8> undef to <8 x i64>
```

```
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %B = sext <8 x i16> undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %C = sext <8 x i32> undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %D = sext <16 x i8> undef to <16 x i32>
; AVX-NEXT:  Cost Model: Found
 an estimated cost of 3 for instruction: %E = sext <16 x i16> undef to <16 x i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %F = sext <32 x i8> undef to <32 x i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL256-LABEL: 'sext256'
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %A = sext <8 x i8> undef to <8
x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %B = sext <8 x i16> undef to
<8 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %C = sext <8 x i32> undef to
<8 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %D = sext <16 x i8> undef to
<16 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %E = sext <16 x i16> undef to
<16 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %F = sext <32 x i8> undef
 to <32 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL512-LABEL: 'sext256'
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = sext <8 x i8> undef to <8
x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = sext <8 x i16> undef to
<8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = sext <8 x i32> undef to
<8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = sext <16 x i8> undef to
<16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %E = sext <16 x i16> undef to
<16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %F = sext <32 x i8> undef to
<32 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX256-LABEL: 'sext256'
; SKX256-NEXT:  Cost Model: Found an
 estimated cost of 2 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %B = sext <8 x i16> undef to <8 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %C = sext <8 x i32> undef to <8 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %D = sext <16 x i8> undef to <16 x
i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %E = sext <16 x i16> undef to <16 x
```

```
i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %F = sext <32 x i8> undef to <32 x
i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX512-LABEL: 'sext256'
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = sext <8 x i16> undef to <8 x
i64>
; SKX512-NEXT:  Cost
 Model: Found an estimated cost of 1 for instruction: %C = sext <8 x i32> undef to <8 x i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = sext <16 x i8> undef to <16 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %E = sext <16 x i16> undef to <16 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %F = sext <32 x i8> undef to <32 x
i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
 %A = sext <8 x i8> undef to <8 x i64>
 %B = sext <8 x i16> undef to <8 x i64>
 %C = sext <8 x i32> undef to <8 x i64>
 %D = sext <16 x i8> undef to <16 x i32>
 %E = sext <16 x i16> undef to <16 x i32>
 %F = sext <32 x i8> undef to <32 x i16>
 ret void
}

define void @sext512() "min-legal-vector-width"="512" {
; AVX-LABEL: 'sext512'
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found
 an estimated cost of 4 for instruction: %B = sext <8 x i16> undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %C = sext <8 x i32> undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %D = sext <16 x i8> undef to <16 x i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %E = sext <16 x i16> undef to <16 x i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %F = sext <32 x i8> undef to <32 x i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL256-LABEL: 'sext512'
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = sext <8 x i8> undef to <8
x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = sext <8 x i16> undef to
<8 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = sext <8 x i32> undef to
<8 x i64>
; AVX512VL256-NEXT:
```

```
  Cost Model: Found an estimated cost of 1 for instruction: %D = sext <16 x i8> undef to <16 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %E = sext <16 x i16> undef to
<16 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %F = sext <32 x i8> undef to
<32 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL512-LABEL: 'sext512'
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = sext <8 x i8> undef to <8
x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = sext <8 x i16> undef to
<8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = sext <8 x i32> undef to
<8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = sext <16 x i8> undef to
<16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost
 of 1 for instruction: %E = sext <16 x i16> undef to <16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %F = sext <32 x i8> undef to
<32 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX256-LABEL: 'sext512'
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = sext <8 x i16> undef to <8 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = sext <8 x i32> undef to <8 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = sext <16 x i8> undef to <16 x
i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %E = sext <16 x i16> undef to <16 x
i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %F = sext <32 x i8> undef to <32 x
i16>
; SKX256-NEXT:  Cost
 Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX512-LABEL: 'sext512'
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = sext <8 x i16> undef to <8 x
i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = sext <8 x i32> undef to <8 x
i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = sext <16 x i8> undef to <16 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %E = sext <16 x i16> undef to <16 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %F = sext <32 x i8> undef to <32 x
```

```
i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
 %A = sext <8 x i8> undef to <8 x i64>
 %B = sext <8 x i16> undef to <8 x i64>
 %C = sext <8 x i32> undef to <8 x i64>
 %D = sext <16 x i8>
 undef to <16 x i32>
 %E = sext <16 x i16> undef to <16 x i32>
 %F = sext <32 x i8> undef to <32 x i16>
 ret void
}

define void @trunc256() "min-legal-vector-width"="256" {
; VEC256-LABEL: 'trunc256'
; VEC256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %A = trunc <8 x i64> undef to <8 x
i32>
; VEC256-NEXT:  Cost Model: Found an estimated cost of 10 for instruction: %B = trunc <8 x i64> undef to <8 x
i16>
; VEC256-NEXT:  Cost Model: Found an estimated cost of 8 for instruction: %C = trunc <8 x i64> undef to <8 x
i8>
; VEC256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %D = trunc <16 x i32> undef to <16 x
i16>
; VEC256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %E = trunc <16 x i32> undef to <16 x
i8>
; VEC256-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %F = trunc <32 x i16> undef to <32 x
i8>
; VEC256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL512-LABEL: 'trunc256'
;
 AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = trunc <8 x i64> undef to
<8 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %B = trunc <8 x i64> undef to
<8 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %C = trunc <8 x i64> undef to
<8 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %D = trunc <16 x i32> undef
to <16 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %E = trunc <16 x i32> undef to
<16 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 8 for instruction: %F = trunc <32 x i16> undef to
<32 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX512-LABEL: 'trunc256'
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = trunc <8 x i64> undef to <8 x
i32>
```

```
; SKX512-NEXT:  Cost Model: Found an estimated
 cost of 2 for instruction: %B = trunc <8 x i64> undef to <8 x i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %C = trunc <8 x i64> undef to <8 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %D = trunc <16 x i32> undef to <16 x
i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %E = trunc <16 x i32> undef to <16 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %F = trunc <32 x i16> undef to <32 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
 %A = trunc <8 x i64> undef to <8 x i32>
 %B = trunc <8 x i64> undef to <8 x i16>
 %C = trunc <8 x i64> undef to <8 x i8>
 %D = trunc <16 x i32> undef to <16 x i16>
 %E = trunc <16 x i32> undef to <16 x i8>
 %F = trunc <32 x i16> undef to <32 x i8>
 ret void
}

define i32 @zext256_vXi1() "min-legal-vector-width"="256" {
; AVX-LABEL: 'zext256_vXi1'
; AVX-NEXT:  Cost Model: Found
 an estimated cost of 1 for instruction: %V2i64 = zext <2 x i1> undef to <2 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V4i64 = zext <4 x i1> undef to <4 x
i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V8i64 = zext <8 x i1> undef to <8 x
i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i32 = zext <2 x i1> undef to <2 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i32 = zext <4 x i1> undef to <4 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V8i32 = zext <8 x i1> undef to <8 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V16i32 = zext <16 x i1> undef to <16 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i16 = zext <2 x i1> undef to <2 x
i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i16 = zext <4 x i1> undef to <4 x
i16>
; AVX-NEXT:
  Cost Model: Found an estimated cost of 1 for instruction: %V8i16 = zext <8 x i1> undef to <8 x i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i16 = zext <16 x i1> undef to <16 x
i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V32i16 = zext <32 x i1> undef to <32 x
i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i8 = zext <2 x i1> undef to <2 x i8>
```

```
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i8 = zext <4 x i1> undef to <4 x i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i8 = zext <8 x i1> undef to <8 x i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i8 = zext <16 x i1> undef to <16 x
i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V32i8 = zext <32 x i1> undef to <32 x
i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V64i8 = zext <64 x i1> undef
 to <64 x i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; AVX512VL256-LABEL: 'zext256_vXi1'
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i64 = zext <2 x i1> undef
to <2 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i64 = zext <4 x i1> undef
to <4 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %V8i64 = zext <8 x i1> undef
to <8 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i32 = zext <2 x i1> undef
to <2 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i32 = zext <4 x i1> undef
to <4 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = zext <8 x i1> undef
to <8 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V16i32 = zext <16 x i1>
undef to <16 x i32>
; AVX512VL256-NEXT:
  Cost Model: Found an estimated cost of 5 for instruction: %V2i16 = zext <2 x i1> undef to <2 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %V4i16 = zext <4 x i1> undef
to <4 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %V8i16 = zext <8 x i1> undef
to <8 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 12 for instruction: %V16i16 = zext <16 x i1>
undef to <16 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 24 for instruction: %V32i16 = zext <32 x i1>
undef to <32 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 6 for instruction: %V2i8 = zext <2 x i1> undef to
<2 x i8>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 6 for instruction: %V4i8 = zext <4 x i1> undef to
<4 x i8>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 6 for instruction: %V8i8 = zext <8 x i1> undef to
<8 x i8>
; AVX512VL256-NEXT:  Cost Model: Found an estimated
 cost of 12 for instruction: %V16i8 = zext <16 x i1> undef to <16 x i8>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 25 for instruction: %V32i8 = zext <32 x i1>
undef to <32 x i8>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 50 for instruction: %V64i8 = zext <64 x i1>
undef to <64 x i8>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
```

```
;
; AVX512VL512-LABEL: 'zext256_vXi1'
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i64 = zext <2 x i1> undef
to <2 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i64 = zext <4 x i1> undef
to <4 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i64 = zext <8 x i1> undef
to <8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i32 = zext <2 x i1> undef
to <2 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of
 2 for instruction: %V4i32 = zext <4 x i1> undef to <4 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = zext <8 x i1> undef
to <8 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i32 = zext <16 x i1>
undef to <16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V2i16 = zext <2 x i1> undef
to <2 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V4i16 = zext <4 x i1> undef
to <4 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V8i16 = zext <8 x i1> undef
to <8 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V16i16 = zext <16 x i1>
undef to <16 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 9 for instruction: %V32i16 = zext <32 x i1>
undef to <32 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V2i8
 = zext <2 x i1> undef to <2 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V4i8 = zext <4 x i1> undef to
<4 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V8i8 = zext <8 x i1> undef to
<8 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V16i8 = zext <16 x i1> undef
to <16 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 9 for instruction: %V32i8 = zext <32 x i1> undef
to <32 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 19 for instruction: %V64i8 = zext <64 x i1>
undef to <64 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; SKX256-LABEL: 'zext256_vXi1'
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i64 = zext <2 x i1> undef to <2 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i64 = zext <4 x i1> undef to <4 x
i64>
;
 SKX256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V8i64 = zext <8 x i1> undef to <8 x
i64>
```

; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i32 = zext <2 x i1> undef to <2 x i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i32 = zext <4 x i1> undef to <4 x i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = zext <8 x i1> undef to <8 x i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V16i32 = zext <16 x i1> undef to <16 x i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i16 = zext <2 x i1> undef to <2 x i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i16 = zext <4 x i1> undef to <4 x i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i16 = zext <8 x i1> undef to <8 x i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction:
 %V16i16 = zext <16 x i1> undef to <16 x i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V32i16 = zext <32 x i1> undef to <32 x i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i8 = zext <2 x i1> undef to <2 x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i8 = zext <4 x i1> undef to <4 x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i8 = zext <8 x i1> undef to <8 x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i8 = zext <16 x i1> undef to <16 x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V32i8 = zext <32 x i1> undef to <32 x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V64i8 = zext <64 x i1> undef to <64 x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; SKX512-LABEL: 'zext256_vXi1'
; SKX512-NEXT:  Cost
 Model: Found an estimated cost of 2 for instruction: %V2i64 = zext <2 x i1> undef to <2 x i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i64 = zext <4 x i1> undef to <4 x i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i64 = zext <8 x i1> undef to <8 x i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i32 = zext <2 x i1> undef to <2 x i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i32 = zext <4 x i1> undef to <4 x i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = zext <8 x i1> undef to <8 x i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i32 = zext <16 x i1> undef to <16 x i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i16 = zext <2 x i1> undef to <2 x

```
i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i16 = zext
 <4 x i1> undef to <4 x i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i16 = zext <8 x i1> undef to <8 x
i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i16 = zext <16 x i1> undef to
<16 x i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V32i16 = zext <32 x i1> undef to
<32 x i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i8 = zext <2 x i1> undef to <2 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i8 = zext <4 x i1> undef to <4 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i8 = zext <8 x i1> undef to <8 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i8 = zext <16 x i1> undef to <16
x i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V32i8 = zext <32 x i1> undef to <32
x i8>
; SKX512-NEXT:  Cost Model: Found an estimated
 cost of 2 for instruction: %V64i8 = zext <64 x i1> undef to <64 x i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
 %V2i64 = zext <2 x i1> undef to <2 x i64>
 %V4i64 = zext <4 x i1> undef to <4 x i64>
 %V8i64 = zext <8 x i1> undef to <8 x i64>

 %V2i32 = zext <2 x i1> undef to <2 x i32>
 %V4i32 = zext <4 x i1> undef to <4 x i32>
 %V8i32 = zext <8 x i1> undef to <8 x i32>
 %V16i32 = zext <16 x i1> undef to <16 x i32>

 %V2i16 = zext <2 x i1> undef to <2 x i16>
 %V4i16 = zext <4 x i1> undef to <4 x i16>
 %V8i16 = zext <8 x i1> undef to <8 x i16>
 %V16i16 = zext <16 x i1> undef to <16 x i16>
 %V32i16 = zext <32 x i1> undef to <32 x i16>

 %V2i8 = zext <2 x i1> undef to <2 x i8>
 %V4i8 = zext <4 x i1> undef to <4 x i8>
 %V8i8 = zext <8 x i1> undef to <8 x i8>
 %V16i8 = zext <16 x i1> undef to <16 x i8>
 %V32i8 = zext <32 x i1> undef to <32 x i8>
 %V64i8 = zext <64 x i1> undef to <64 x i8>

 ret i32 undef
}
```

```
define i32 @sext256_vXi1()
 "min-legal-vector-width"="256" {
; AVX-LABEL: 'sext256_vXi1'
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I64 = sext i1 undef to i64
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i64 = sext <2 x i1> undef to <2 x
i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V4i64 = sext <4 x i1> undef to <4 x
i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V8i64 = sext <8 x i1> undef to <8 x
i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I32 = sext i1 undef to i32
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i32 = sext <2 x i1> undef to <2 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i32 = sext <4 x i1> undef to <4 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V8i32 = sext <8 x i1> undef to <8 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost
 of 4 for instruction: %V16i32 = sext <16 x i1> undef to <16 x i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I16 = sext i1 undef to i16
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i16 = sext <2 x i1> undef to <2 x
i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i16 = sext <4 x i1> undef to <4 x
i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i16 = sext <8 x i1> undef to <8 x
i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i16 = sext <16 x i1> undef to <16 x
i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V32i16 = sext <32 x i1> undef to <32 x
i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I8 = sext i1 undef to i8
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i8 = sext <2 x i1> undef to <2 x i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for
 instruction: %V4i8 = sext <4 x i1> undef to <4 x i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i8 = sext <8 x i1> undef to <8 x i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i8 = sext <16 x i1> undef to <16 x
i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V32i8 = sext <32 x i1> undef to <32 x
i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V64i8 = sext <64 x i1> undef to <64 x
i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; AVX512VL256-LABEL: 'sext256_vXi1'
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I64 = sext i1 undef to i64
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i64 = sext <2 x i1> undef
to <2 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i64 = sext <4 x i1> undef
```

to <4 x i64>
; AVX512VL256-NEXT:
  Cost Model: Found an estimated cost of 3 for instruction: %V8i64 = sext <8 x i1> undef to <8 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I32 = sext i1 undef to i32
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i32 = sext <2 x i1> undef to <2 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i32 = sext <4 x i1> undef to <4 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i32 = sext <8 x i1> undef to <8 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i32 = sext <16 x i1> undef to <16 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I16 = sext i1 undef to i16
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V2i16 = sext <2 x i1> undef to <2 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction:
 %V4i16 = sext <4 x i1> undef to <4 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V8i16 = sext <8 x i1> undef to <8 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 10 for instruction: %V16i16 = sext <16 x i1> undef to <16 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 20 for instruction: %V32i16 = sext <32 x i1> undef to <32 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I8 = sext i1 undef to i8
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %V2i8 = sext <2 x i1> undef to <2 x i8>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %V4i8 = sext <4 x i1> undef to <4 x i8>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %V8i8 = sext <8 x i1> undef to <8 x i8>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 10 for instruction: %V16i8 = sext <16 x i1> undef to <16 x i8>
;
 AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 21 for instruction: %V32i8 = sext <32 x i1> undef to <32 x i8>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 42 for instruction: %V64i8 = sext <64 x i1> undef to <64 x i8>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; AVX512VL512-LABEL: 'sext256_vXi1'
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I64 = sext i1 undef to i64
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i64 = sext <2 x i1> undef to <2 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i64 = sext <4 x i1> undef to <4 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i64 = sext <8 x i1> undef to <8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I32 = sext i1 undef to i32

```
; AVX512VL512-NEXT:  Cost Model: Found an estimated
 cost of 1 for instruction: %V2i32 = sext <2 x i1> undef to <2 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i32 = sext <4 x i1> undef
to <4 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i32 = sext <8 x i1> undef
to <8 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i32 = sext <16 x i1>
undef to <16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I16 = sext i1 undef to i16
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V2i16 = sext <2 x i1> undef
to <2 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V4i16 = sext <4 x i1> undef
to <4 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V8i16 = sext <8 x i1> undef
to <8 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V16i16 =
 sext <16 x i1> undef to <16 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 7 for instruction: %V32i16 = sext <32 x i1>
undef to <32 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I8 = sext i1 undef to i8
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V2i8 = sext <2 x i1> undef to
<2 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V4i8 = sext <4 x i1> undef to
<4 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V8i8 = sext <8 x i1> undef to
<8 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V16i8 = sext <16 x i1> undef
to <16 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 7 for instruction: %V32i8 = sext <32 x i1> undef
to <32 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 15 for instruction: %V64i8 = sext <64 x i1>
undef to <64 x i8>
; AVX512VL512-NEXT:
  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; SKX256-LABEL: 'sext256_vXi1'
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I64 = sext i1 undef to i64
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i64 = sext <2 x i1> undef to <2 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i64 = sext <4 x i1> undef to <4 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i64 = sext <8 x i1> undef to <8 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I32 = sext i1 undef to i32
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i32 = sext <2 x i1> undef to <2 x
i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i32 = sext <4 x i1> undef to <4 x
i32>
```

```
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i32 = sext <8 x i1> undef
 to <8 x i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i32 = sext <16 x i1> undef to
<16 x i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I16 = sext i1 undef to i16
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i16 = sext <2 x i1> undef to <2 x
i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i16 = sext <4 x i1> undef to <4 x
i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i16 = sext <8 x i1> undef to <8 x
i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i16 = sext <16 x i1> undef to
<16 x i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V32i16 = sext <32 x i1> undef to
<32 x i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I8 = sext i1 undef to i8
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i8
 = sext <2 x i1> undef to <2 x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i8 = sext <4 x i1> undef to <4 x
i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i8 = sext <8 x i1> undef to <8 x
i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i8 = sext <16 x i1> undef to <16
x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V32i8 = sext <32 x i1> undef to <32
x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V64i8 = sext <64 x i1> undef to <64
x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; SKX512-LABEL: 'sext256_vXi1'
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I64 = sext i1 undef to i64
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i64 = sext <2 x i1> undef to <2 x
i64>
; SKX512-NEXT:  Cost Model: Found an estimated
 cost of 1 for instruction: %V4i64 = sext <4 x i1> undef to <4 x i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i64 = sext <8 x i1> undef to <8 x
i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I32 = sext i1 undef to i32
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i32 = sext <2 x i1> undef to <2 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i32 = sext <4 x i1> undef to <4 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i32 = sext <8 x i1> undef to <8 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i32 = sext <16 x i1> undef to
<16 x i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I16 = sext i1 undef to i16
```

```
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i16 = sext <2 x i1> undef to <2 x
i16>
; SKX512-NEXT:  Cost Model:
 Found an estimated cost of 1 for instruction: %V4i16 = sext <4 x i1> undef to <4 x i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i16 = sext <8 x i1> undef to <8 x
i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i16 = sext <16 x i1> undef to
<16 x i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V32i16 = sext <32 x i1> undef to
<32 x i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I8 = sext i1 undef to i8
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i8 = sext <2 x i1> undef to <2 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i8 = sext <4 x i1> undef to <4 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i8 = sext <8 x i1> undef to <8 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i8 = sext <16 x i1> undef to <16
x i8>
;
 SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V32i8 = sext <32 x i1> undef to <32
x i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V64i8 = sext <64 x i1> undef to <64
x i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
 %I64 = sext i1 undef to i64
 %V2i64 = sext <2 x i1> undef to <2 x i64>
 %V4i64 = sext <4 x i1> undef to <4 x i64>
 %V8i64 = sext <8 x i1> undef to <8 x i64>

 %I32 = sext i1 undef to i32
 %V2i32 = sext <2 x i1> undef to <2 x i32>
 %V4i32 = sext <4 x i1> undef to <4 x i32>
 %V8i32 = sext <8 x i1> undef to <8 x i32>
 %V16i32 = sext <16 x i1> undef to <16 x i32>

 %I16 = sext i1 undef to i16
 %V2i16 = sext <2 x i1> undef to <2 x i16>
 %V4i16 = sext <4 x i1> undef to <4 x i16>
 %V8i16 = sext <8 x i1> undef to <8 x i16>
 %V16i16 = sext <16 x i1> undef to <16 x i16>
 %V32i16 = sext <32 x i1> undef to <32 x i16>

 %I8 = sext i1 undef to i8
 %V2i8 = sext <2
 x i1> undef to <2 x i8>
 %V4i8 = sext <4 x i1> undef to <4 x i8>
```

```
 %V8i8 = sext <8 x i1> undef to <8 x i8>
 %V16i8 = sext <16 x i1> undef to <16 x i8>
 %V32i8 = sext <32 x i1> undef to <32 x i8>
 %V64i8 = sext <64 x i1> undef to <64 x i8>

 ret i32 undef
}

define i32 @trunc_vXi1() "min-legal-vector-width"="256" {
; AVX-LABEL: 'trunc_vXi1'
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V2i64 = trunc <2 x i64> undef to <2 x
i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V4i64 = trunc <4 x i64> undef to <4 x
i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 9 for instruction: %V8i64 = trunc <8 x i64> undef to <8 x
i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 11 for instruction: %V16i64 = trunc <16 x i64> undef to
<16 x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i64 = trunc <32 x i64> undef to <32
x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V64i64
 = trunc <64 x i64> undef to <64 x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i32 = trunc <2 x i32> undef to <2 x
i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V4i32 = trunc <4 x i32> undef to <4 x
i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = trunc <8 x i32> undef to <8 x
i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 8 for instruction: %V16i32 = trunc <16 x i32> undef to <16
x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i32 = trunc <32 x i32> undef to <32
x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V64i32 = trunc <64 x i32> undef to <64
x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i16 = trunc <2 x i16> undef to <2 x
i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i16 = trunc <4 x i16> undef to <4 x
i1>
; AVX-NEXT:  Cost Model: Found an estimated
 cost of 0 for instruction: %V8i16 = trunc <8 x i16> undef to <8 x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V16i16 = trunc <16 x i16> undef to <16
x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i16 = trunc <32 x i16> undef to <32
x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V64i16 = trunc <64 x i16> undef to <64
x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i8 = trunc <2 x i8> undef to <2 x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i8 = trunc <4 x i8> undef to <4 x i1>
```

; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i8 = trunc <8 x i8> undef to <8 x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V16i8 = trunc <16 x i8> undef to <16 x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i8 = trunc <32 x i8> undef to <32 x i1>
; AVX-NEXT:
  Cost Model: Found an estimated cost of 0 for instruction: %V64i8 = trunc <64 x i8> undef to <64 x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; AVX512VL256-LABEL: 'trunc_vXi1'
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i64 = trunc <2 x i64> undef to <2 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i64 = trunc <4 x i64> undef to <4 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 9 for instruction: %V8i64 = trunc <8 x i64> undef to <8 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 11 for instruction: %V16i64 = trunc <16 x i64> undef to <16 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i64 = trunc <32 x i64> undef to <32 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V64i64 = trunc <64 x i64> undef to <64 x i1>
; AVX512VL256-NEXT:  Cost Model:
 Found an estimated cost of 2 for instruction: %V2i32 = trunc <2 x i32> undef to <2 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i32 = trunc <4 x i32> undef to <4 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = trunc <8 x i32> undef to <8 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V16i32 = trunc <16 x i32> undef to <16 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 8 for instruction: %V32i32 = trunc <32 x i32> undef to <32 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 16 for instruction: %V64i32 = trunc <64 x i32> undef to <64 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V2i16 = trunc <2 x i16> undef to <2 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V4i16 = trunc <4 x i16> undef to <4 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an
 estimated cost of 3 for instruction: %V8i16 = trunc <8 x i16> undef to <8 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 8 for instruction: %V16i16 = trunc <16 x i16> undef to <16 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 16 for instruction: %V32i16 = trunc <32 x i16> undef to <32 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 32 for instruction: %V64i16 = trunc <64 x i16> undef to <64 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V2i8 = trunc <2 x i8> undef to <2 x i1>

; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V4i8 = trunc <4 x i8> undef to <4 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V8i8 = trunc <8 x i8> undef to <8 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 8 for instruction: %V16i8 = trunc <16 x i8> undef to <16 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of
 0 for instruction: %V32i8 = trunc <32 x i8> undef to <32 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V64i8 = trunc <64 x i8> undef to <64 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; AVX512VL512-LABEL: 'trunc_vXi1'
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i64 = trunc <2 x i64> undef to <2 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i64 = trunc <4 x i64> undef to <4 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i64 = trunc <8 x i64> undef to <8 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 11 for instruction: %V16i64 = trunc <16 x i64> undef to <16 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i64 = trunc <32 x i64> undef to <32 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction:
 %V64i64 = trunc <64 x i64> undef to <64 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i32 = trunc <2 x i32> undef to <2 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i32 = trunc <4 x i32> undef to <4 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = trunc <8 x i32> undef to <8 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i32 = trunc <16 x i32> undef to <16 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V32i32 = trunc <32 x i32> undef to <32 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 8 for instruction: %V64i32 = trunc <64 x i32> undef to <64 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V2i16 = trunc <2 x i16> undef to <2 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction:
 %V4i16 = trunc <4 x i16> undef to <4 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V8i16 = trunc <8 x i16> undef to <8 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V16i16 = trunc <16 x i16> undef to <16 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i16 = trunc <32 x i16> undef to <32 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V64i16 = trunc <64 x i16>

```
undef to <64 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V2i8 = trunc <2 x i8> undef
to <2 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V4i8 = trunc <4 x i8> undef
to <4 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V8i8 = trunc <8 x i8> undef
to <8 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V16i8 = trunc <16 x
 i8> undef to <16 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i8 = trunc <32 x i8>
undef to <32 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V64i8 = trunc <64 x i8>
undef to <64 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; SKX256-LABEL: 'trunc_vXi1'
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i64 = trunc <2 x i64> undef to <2
x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i64 = trunc <4 x i64> undef to <4
x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 9 for instruction: %V8i64 = trunc <8 x i64> undef to <8
x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 11 for instruction: %V16i64 = trunc <16 x i64> undef to
<16 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i64 = trunc <32 x i64> undef to
<32 x i1>
; SKX256-NEXT:
  Cost Model: Found an estimated cost of 0 for instruction: %V64i64 = trunc <64 x i64> undef to <64 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i32 = trunc <2 x i32> undef to <2
x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i32 = trunc <4 x i32> undef to <4
x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = trunc <8 x i32> undef to <8
x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V16i32 = trunc <16 x i32> undef to
<16 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i32 = trunc <32 x i32> undef to
<32 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V64i32 = trunc <64 x i32> undef to
<64 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i16 = trunc <2 x i16> undef to <2
x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction:
 %V4i16 = trunc <4 x i16> undef to <4 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i16 = trunc <8 x i16> undef to <8
x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i16 = trunc <16 x i16> undef to
<16 x i1>
```

; SKX256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V32i16 = trunc <32 x i16> undef to <32 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 8 for instruction: %V64i16 = trunc <64 x i16> undef to <64 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i8 = trunc <2 x i8> undef to <2 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i8 = trunc <4 x i8> undef to <4 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i8 = trunc <8 x i8> undef to <8 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i8 = trunc <16 x i8> undef to <16 x i1>
; SKX256-NEXT:
  Cost Model: Found an estimated cost of 2 for instruction: %V32i8 = trunc <32 x i8> undef to <32 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V64i8 = trunc <64 x i8> undef to <64 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; SKX512-LABEL: 'trunc_vXi1'
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i64 = trunc <2 x i64> undef to <2 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i64 = trunc <4 x i64> undef to <4 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i64 = trunc <8 x i64> undef to <8 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 11 for instruction: %V16i64 = trunc <16 x i64> undef to <16 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i64 = trunc <32 x i64> undef to <32 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction:
 %V64i64 = trunc <64 x i64> undef to <64 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i32 = trunc <2 x i32> undef to <2 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i32 = trunc <4 x i32> undef to <4 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = trunc <8 x i32> undef to <8 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i32 = trunc <16 x i32> undef to <16 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i32 = trunc <32 x i32> undef to <32 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V64i32 = trunc <64 x i32> undef to <64 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i16 = trunc <2 x i16> undef to <2 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i16 = trunc <4 x i16> undef to <4 x i1>
;

```
 SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i16 = trunc <8 x i16> undef to <8
x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i16 = trunc <16 x i16> undef to
<16 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V32i16 = trunc <32 x i16> undef to
<32 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V64i16 = trunc <64 x i16> undef to
<64 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i8 = trunc <2 x i8> undef to <2 x
i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i8 = trunc <4 x i8> undef to <4 x
i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i8 = trunc <8 x i8> undef to <8 x
i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i8 = trunc <16 x i8> undef to
<16 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for
 instruction: %V32i8 = trunc <32 x i8> undef to <32 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V64i8 = trunc <64 x i8> undef to
<64 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
 %V2i64 = trunc <2 x i64> undef to <2 x i1>
 %V4i64 = trunc <4 x i64> undef to <4 x i1>
 %V8i64 = trunc <8 x i64> undef to <8 x i1>
 %V16i64 = trunc <16 x i64> undef to <16 x i1>
 %V32i64 = trunc <32 x i64> undef to <32 x i1>
 %V64i64 = trunc <64 x i64> undef to <64 x i1>

 %V2i32 = trunc <2 x i32> undef to <2 x i1>
 %V4i32 = trunc <4 x i32> undef to <4 x i1>
 %V8i32 = trunc <8 x i32> undef to <8 x i1>
 %V16i32 = trunc <16 x i32> undef to <16 x i1>
 %V32i32 = trunc <32 x i32> undef to <32 x i1>
 %V64i32 = trunc <64 x i32> undef to <64 x i1>

 %V2i16 = trunc <2 x i16> undef to <2 x i1>
 %V4i16 = trunc <4 x i16> undef to <4 x i1>
 %V8i16 = trunc <8 x i16> undef to <8 x i1>
 %V16i16 = trunc <16 x i16> undef to
 <16 x i1>
 %V32i16 = trunc <32 x i16> undef to <32 x i1>
 %V64i16 = trunc <64 x i16> undef to <64 x i1>

 %V2i8 = trunc <2 x i8> undef to <2 x i1>
 %V4i8 = trunc <4 x i8> undef to <4 x i1>
 %V8i8 = trunc <8 x i8> undef to <8 x i1>
 %V16i8 = trunc <16 x i8> undef to <16 x i1>
```

```
 %V32i8 = trunc <32 x i8> undef to <32 x i1>
 %V64i8 = trunc <64 x i8> undef to <64 x i1>

 ret i32 undef
}
```

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add_lldb_library(lldbPluginObjectContainerBSDArchive PLUGIN
ObjectContainerBSDArchive.cpp

LINK_LIBS
lldbCore

```
  lldbHost
  lldbSymbol
 LINK_COMPONENTS
  Support
 )
```

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```
; NOTE: Assertions have been autogenerated by utils/update_test_checks.py UTC_ARGS: --function-signature --
scrub-attributes
; RUN: opt -S -passes=argpromotion < %s | FileCheck %s
; Test that we only promote arguments when the caller/callee have compatible
; function attrubtes.

target triple = "x86_64-unknown-linux-gnu"

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr %arg, ptr
readonly %arg1) #0 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512
; CHECK-SAME: (ptr [[ARG:%.*]], <8 x i64> [[ARG1_VAL:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    store <8 x i64> [[ARG1_VAL]], ptr [[ARG]]
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr %arg) #0 {
; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer512_call_avx512_legal512_prefer512
; CHECK-SAME:
 (ptr [[ARG:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
```

```
; CHECK-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    call void @llvm.memset.p0.i64(ptr align 32 [[TMP]], i8 0, i64 32, i1 false)
; CHECK-NEXT:    [[TMP_VAL:%.*]] = load <8 x i64>, ptr [[TMP]]
; CHECK-NEXT:    call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr
[[TMP2]], <8 x i64> [[TMP_VAL]])
; CHECK-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 32
; CHECK-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CHECK-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define
 internal fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr %arg, ptr readonly
%arg1) #1 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]], <8 x i64> [[ARG1_VAL:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    store <8 x i64> [[ARG1_VAL]], ptr [[ARG]]
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr %arg) #1 {
; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    call void @llvm.memset.p0.i64(ptr align 32 [[TMP]], i8 0, i64 32, i1 false)
; CHECK-NEXT:    [[TMP_VAL:%.*]] = load <8 x i64>, ptr [[TMP]]
; CHECK-NEXT:    call fastcc
 void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr [[TMP2]], <8 x i64>
[[TMP_VAL]])
; CHECK-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 32
; CHECK-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
```

```
; CHECK-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr %arg, ptr
readonly %arg1) #1 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]], <8 x i64> [[ARG1_VAL:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    store <8 x i64> [[ARG1_VAL]],
 ptr [[ARG]]
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr %arg) #0 {
; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer512_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    call void @llvm.memset.p0.i64(ptr align 32 [[TMP]], i8 0, i64 32, i1 false)
; CHECK-NEXT:    [[TMP_VAL:%.*]] = load <8 x i64>, ptr [[TMP]]
; CHECK-NEXT:    call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr
[[TMP2]], <8 x i64> [[TMP_VAL]])
; CHECK-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 32
; CHECK-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CHECK-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align
 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr %tmp2, ptr %tmp)
```

```
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr %arg, ptr
readonly %arg1) #0 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512
; CHECK-SAME: (ptr [[ARG:%.*]], <8 x i64> [[ARG1_VAL:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    store <8 x i64> [[ARG1_VAL]], ptr [[ARG]]
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr %arg) #1 {
; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal512_prefer512
; CHECK-SAME: (ptr [[ARG:%.*]])
; CHECK-NEXT:
  bb:
; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    call void @llvm.memset.p0.i64(ptr align 32 [[TMP]], i8 0, i64 32, i1 false)
; CHECK-NEXT:    [[TMP_VAL:%.*]] = load <8 x i64>, ptr [[TMP]]
; CHECK-NEXT:    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr
[[TMP2]], <8 x i64> [[TMP_VAL]])
; CHECK-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 32
; CHECK-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CHECK-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should not promote
define internal fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr
```

```
 %arg, ptr readonly %arg1) #1 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]], ptr readonly [[ARG1:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1]]
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]]
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr %arg) #2 {
; CHECK-LABEL: define {{[^@]+}}@avx512_legal256_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    call void @llvm.memset.p0.i64(ptr align 32 [[TMP]], i8 0, i64 32, i1 false)
; CHECK-NEXT:    call fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr
 [[TMP2]], ptr [[TMP]])
; CHECK-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 32
; CHECK-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CHECK-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should not promote
define internal fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %arg, ptr
readonly %arg1) #2 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]], ptr readonly [[ARG1:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1]]
; CHECK-NEXT:    store <8 x i64>
 [[TMP]], ptr [[ARG]]
; CHECK-NEXT:    ret void
;
```

```
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %arg) #1 {
; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal256_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    call void @llvm.memset.p0.i64(ptr align 32 [[TMP]], i8 0, i64 32, i1 false)
; CHECK-NEXT:    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr
[[TMP2]], ptr [[TMP]])
; CHECK-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 32
; CHECK-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CHECK-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64
 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr %arg, ptr readonly
%arg1) #3 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]], <8 x i64> [[ARG1_VAL:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    store <8 x i64> [[ARG1_VAL]], ptr [[ARG]]
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr %arg) #4 {
; CHECK-LABEL: define {{[^@]+}}@avx2_legal256_prefer256_call_avx2_legal512_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]])
```

```
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:
   [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    call void @llvm.memset.p0.i64(ptr align 32 [[TMP]], i8 0, i64 32, i1 false)
; CHECK-NEXT:    [[TMP_VAL:%.*]] = load <8 x i64>, ptr [[TMP]]
; CHECK-NEXT:    call fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr
[[TMP2]], <8 x i64> [[TMP_VAL]])
; CHECK-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 32
; CHECK-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CHECK-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr %arg, ptr readonly
%arg1) #4 {
;
 CHECK-LABEL: define {{[^@]+}}@callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]], <8 x i64> [[ARG1_VAL:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    store <8 x i64> [[ARG1_VAL]], ptr [[ARG]]
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr %arg) #3 {
; CHECK-LABEL: define {{[^@]+}}@avx2_legal512_prefer256_call_avx2_legal256_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    call void @llvm.memset.p0.i64(ptr align 32 [[TMP]], i8 0, i64 32, i1 false)
; CHECK-NEXT:    [[TMP_VAL:%.*]] = load <8 x i64>, ptr [[TMP]]
; CHECK-NEXT:    call fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr
[[TMP2]], <8 x i64> [[TMP_VAL]])
```

```
; CHECK-NEXT:    [[TMP4:%.*]] = load
 <8 x i64>, ptr [[TMP2]], align 32
; CHECK-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CHECK-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; If the arguments are scalar, its ok to promote.
define internal i32 @scalar_callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr %X, ptr %Y)
#2 {
; CHECK-LABEL: define
{{[^@]+}}@scalar_callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (i32 [[X_VAL:%.*]], i32 [[Y_VAL:%.*]])
; CHECK-NEXT:    [[C:%.*]] = add i32 [[X_VAL]], [[Y_VAL]]
; CHECK-NEXT:    ret i32 [[C]]
;
 %A = load i32, ptr %X
 %B = load i32, ptr %Y
 %C = add i32 %A, %B
 ret i32 %C
}

define i32 @scalar_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr
 %B) #2 {
; CHECK-LABEL: define {{[^@]+}}@scalar_avx512_legal256_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr [[B:%.*]])
; CHECK-NEXT:    [[A:%.*]] = alloca i32
; CHECK-NEXT:    store i32 1, ptr [[A]]
; CHECK-NEXT:    [[A_VAL:%.*]] = load i32, ptr [[A]]
; CHECK-NEXT:    [[B_VAL:%.*]] = load i32, ptr [[B]]
; CHECK-NEXT:    [[C:%.*]] = call i32
@scalar_callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(i32 [[A_VAL]], i32 [[B_VAL]])
; CHECK-NEXT:    ret i32 [[C]]
;
 %A = alloca i32
 store i32 1, ptr %A
 %C = call i32 @scalar_callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr %A, ptr %B)
 ret i32 %C
}
```

```
; If the arguments are scalar, its ok to promote.
define internal i32 @scalar_callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %X, ptr %Y)
#2 {
; CHECK-LABEL: define
{{[^@]+}}@scalar_callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256
; CHECK-SAME: (i32 [[X_VAL:%.*]],
 i32 [[Y_VAL:%.*]])
; CHECK-NEXT:    [[C:%.*]] = add i32 [[X_VAL]], [[Y_VAL]]
; CHECK-NEXT:    ret i32 [[C]]
;
 %A = load i32, ptr %X
 %B = load i32, ptr %Y
 %C = add i32 %A, %B
 ret i32 %C
}

define i32 @scalar_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %B) #2 {
; CHECK-LABEL: define {{[^@]+}}@scalar_avx512_legal512_prefer256_call_avx512_legal256_prefer256
; CHECK-SAME: (ptr [[B:%.*]])
; CHECK-NEXT:    [[A:%.*]] = alloca i32
; CHECK-NEXT:    store i32 1, ptr [[A]]
; CHECK-NEXT:    [[A_VAL:%.*]] = load i32, ptr [[A]]
; CHECK-NEXT:    [[B_VAL:%.*]] = load i32, ptr [[B]]
; CHECK-NEXT:    [[C:%.*]] = call i32
@scalar_callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(i32 [[A_VAL]], i32 [[B_VAL]])
; CHECK-NEXT:    ret i32 [[C]]
;
 %A = alloca i32
 store i32 1, ptr %A
 %C = call i32 @scalar_callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %A, ptr %B)
 ret i32 %C
}

; Function Attrs: argmemonly nounwind
declare void @llvm.memset.p0.i64(ptr
 nocapture writeonly, i8, i64, i1) #5

attributes #0 = { inlinehint norecurse nounwind uwtable "target-features"="+avx512vl" "min-legal-vector-
width"="512" "prefer-vector-width"="512" }
attributes #1 = { inlinehint norecurse nounwind uwtable "target-features"="+avx512vl" "min-legal-vector-
width"="512" "prefer-vector-width"="256" }
attributes #2 = { inlinehint norecurse nounwind uwtable "target-features"="+avx512vl" "min-legal-vector-
width"="256" "prefer-vector-width"="256" }
attributes #3 = { inlinehint norecurse nounwind uwtable "target-features"="+avx2" "min-legal-vector-width"="512"
"prefer-vector-width"="256" }
attributes #4 = { inlinehint norecurse nounwind uwtable "target-features"="+avx2" "min-legal-vector-width"="256"
"prefer-vector-width"="256" }
attributes #5 = { argmemonly nounwind }
```

# 1.2540 libsoup 2.72.0-12.el9_7.1

## 1.2540.1 Available under license :

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```
/* nicstar.c  v0.22  Jawaid Bazyar (bazyar@hypermall.com)
* nicstar.c, M. Welsh (matt.welsh@cl.cam.ac.uk)
*
* Hacked October, 1997 by Jawaid Bazyar, Interlink Advertising Services Inc.
*  http://www.hypermall.com/
* 10/1/97 - commented out CFG_PHYIE bit - we don't care when the PHY
* interrupts us (except possibly for removal/insertion of the cable?)
* 10/4/97 - began heavy inline documentation of the code. Corrected typos
* and spelling mistakes.
* 10/5/97 - added code to handle PHY interrupts, disable PHY on
* loss of link, and correctly re-enable PHY when link is
* re-established. (put back CFG_PHYIE)
*
*   Modified to work with the IDT7721 nicstar -- AAL5 (tested) only.
*
* R. D. Rechenmacher <ron@fnal.gov>, Aug. 6, 1997
*
* Linux driver for the IDT77201 NICStAR PCI ATM controller.
* PHY component is expected to be 155 Mbps S/UNI-Lite or IDT 77155;
* see init_nicstar() for PHY initialization to change this. This driver
* expects the Linux ATM stack to support scatter-gather
 lists
* (skb->atm.iovcnt != 0) for Rx skb's passed to vcc->push.
*
```

```
* Implementing minimal-copy of received data:
*   IDT always receives data into a small buffer, then large buffers
*     as needed. This means that data must always be copied to create
*     the linear buffer needed by most non-ATM protocol stacks (e.g. IP)
*     Fix is simple: make large buffers large enough to hold entire
*     SDU, and leave <small_buffer_data> bytes empty at the start. Then
*     copy small buffer contents to head of large buffer.
*   Trick is to avoid fragmenting Linux, due to need for a lot of large
*     buffers. This is done by 2 things:
*       1) skb->destructor / skb->atm.recycle_buffer
*            combined, allow nicstar_free_rx_skb to be called to
*            recycle large data buffers
*       2) skb_clone of received buffers
*   See nicstar_free_rx_skb and linearize_buffer for implementation
*     details.
*
*
*
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*
* M. Welsh, 6 July 1996
*
*
*/
```

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# Purpose: This test checks SPDX-License-Identifier: tags in all source files against redhat/LICENSES.

load test-lib.bash

SPEC=$BATS_TEST_DIRNAME/../kernel.spec.template

ERRMSG="ERROR: The kernel RPM spec file License: field does not match the licenses available in the source
tree.
Fedora, Centos Stream, and RHEL require that the RPM License field match the licenses in the source tree.  See
https://docs.fedoraproject.org/en-US/legal/license-approval/ for further information.
A list of licenses can be generated by executing the redhat/scripts/license/kspdx.py utility.  New licenses can
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_verify_one_license_tag()
 {
 if [[ $(grep -c '^License:' $SPEC) != "1" ]]; then
    echo "ERROR: The specfile is supposed to have exactly one License: tag!"
    return 1
 fi
}

_verify_spdx_licenses() {
 spec_licenses=`mktemp`
 source_licenses=`mktemp`
 grep '^License:' $SPEC | sed 's,License[[:space:]]*:[[:space:]]*,,' | sed 's, AND ,\n,g' | sed 's,^(\(.*\))$,\1,' | sort -u >
$spec_licenses

 if ! $BATS_TEST_DIRNAME/../scripts/kspdx-tool/kspdx.py $BATS_TEST_DIRNAME/../../ > $source_licenses;
then
    echo "ERROR: Failed to gather SPDX-License-Identifier: information from source files!"
    return 1
 fi
 sort -o $source_licenses $source_licenses
 if ! diff -u $spec_licenses $source_licenses; then
     echo $ERRMSG
     ret=1
 else
```

```
    ret=0
 fi
 rm -f $spec_licenses $source_licenses
 return $ret
}

@test "Verify SPDX-License-Identifier tags" {
 if ! test -x $BATS_TEST_DIRNAME/../scripts/kspdx-tool/kspdx.py ;
 then
    skip "kspdx-tool is missing"
 fi

 run _verify_one_license_tag
 check_status

 _verify_spdx_licenses
 check_status
}
```


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#define __LICENSE_H

static inline int license_is_gpl_compatible(const char *license)
{
 return (strcmp(license, "GPL") == 0
  || strcmp(license, "GPL v2") == 0
  || strcmp(license, "GPL and additional rights") == 0
  || strcmp(license, "Dual BSD/GPL") == 0
  || strcmp(license, "Dual MIT/GPL") == 0
  || strcmp(license, "Dual MPL/GPL") == 0);
}

#endif
```

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  source tree and is licensed under either **BSD-2-Clause** or **GPL-2.0-only**,

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* The src/basic/linux/wireguard.h header is copied from the Linux kernel
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- src/basic/linux/batman_adv.h
- src/basic/sparse-endian.h
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```

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```
/* nicstar.c  v0.22  Jawaid Bazyar (bazyar@hypermall.com)
* nicstar.c, M. Welsh (matt.welsh@cl.cam.ac.uk)
*
* Hacked October, 1997 by Jawaid Bazyar, Interlink Advertising Services Inc.
*  http://www.hypermall.com/
* 10/1/97 - commented out CFG_PHYIE bit - we don't care when the PHY
* interrupts us (except possibly for removal/insertion of the cable?)
* 10/4/97 - began heavy inline documentation of the code. Corrected typos
* and spelling mistakes.
* 10/5/97 - added code to handle PHY interrupts, disable PHY on
* loss of link, and correctly re-enable PHY when link is
* re-established. (put back CFG_PHYIE)
*
*   Modified to work with the IDT7721 nicstar -- AAL5 (tested) only.
*
* R. D. Rechenmacher <ron@fnal.gov>, Aug. 6, 1997
*
* Linux driver for the IDT77201 NICStAR PCI ATM controller.
* PHY component is expected to be 155 Mbps S/UNI-Lite or IDT 77155;
* see init_nicstar() for PHY initialization to change this. This driver
* expects the Linux ATM stack to support scatter-gather
 lists
* (skb->atm.iovcnt != 0) for Rx skb's passed to vcc->push.
*
* Implementing minimal-copy of received data:
*   IDT always receives data into a small buffer, then large buffers
*     as needed. This means that data must always be copied to create
*     the linear buffer needed by most non-ATM protocol stacks (e.g. IP)
```

```
*     Fix is simple: make large buffers large enough to hold entire
*     SDU, and leave <small_buffer_data> bytes empty at the start. Then
*     copy small buffer contents to head of large buffer.
*   Trick is to avoid fragmenting Linux, due to need for a lot of large
*     buffers. This is done by 2 things:
*       1) skb->destructor / skb->atm.recycle_buffer
*           combined, allow nicstar_free_rx_skb to be called to
*           recycle large data buffers
*       2) skb_clone of received buffers
*   See nicstar_free_rx_skb and linearize_buffer for implementation
*     details.
*
*
*
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*
* M. Welsh, 6 July 1996
*
*
*/
```

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```

```
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# Purpose: This test checks SPDX-License-Identifier: tags in all source files against redhat/LICENSES.

load test-lib.bash

SPEC=$BATS_TEST_DIRNAME/../kernel.spec.template

ERRMSG="ERROR: The kernel RPM spec file License: field does not match the licenses available in the source
tree.
Fedora, Centos Stream, and RHEL require that the RPM License field match the licenses in the source tree.  See
https://docs.fedoraproject.org/en-US/legal/license-approval/ for further information.
A list of licenses can be generated by executing the redhat/scripts/license/kspdx.py utility.  New licenses can
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_verify_one_license_tag()
 {
 if [[ $(grep -c '^License:' $SPEC) != "1" ]]; then
    echo "ERROR: The specfile is supposed to have exactly one License: tag!"
    return 1
 fi
}

_verify_spdx_licenses() {
 spec_licenses=`mktemp`
 source_licenses=`mktemp`
 grep '^License:' $SPEC | sed 's,License[[:space:]]*:[[:space:]]*,,' | sed 's, AND ,\n,g' | sed 's,^(\(.*\))$,\1,' | sort -u >
$spec_licenses

 if ! $BATS_TEST_DIRNAME/../scripts/kspdx-tool/kspdx.py $BATS_TEST_DIRNAME/../../ > $source_licenses;
then
    echo "ERROR: Failed to gather SPDX-License-Identifier: information from source files!"
    return 1
 fi
 sort -o $source_licenses $source_licenses
 if ! diff -u $spec_licenses $source_licenses; then
     echo $ERRMSG
     ret=1
 else
     ret=0
 fi
 rm -f $spec_licenses $source_licenses
 return $ret
```

```
}

@test "Verify SPDX-License-Identifier tags" {
 if ! test -x $BATS_TEST_DIRNAME/../scripts/kspdx-tool/kspdx.py ;
 then
    skip "kspdx-tool is missing"
 fi

 run _verify_one_license_tag
 check_status

 _verify_spdx_licenses
 check_status
}
```

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#define __LICENSE_H

static inline int license_is_gpl_compatible(const char *license)
{
 return (strcmp(license, "GPL") == 0
  || strcmp(license, "GPL v2") == 0
  || strcmp(license, "GPL and additional rights") == 0
  || strcmp(license, "Dual BSD/GPL") == 0
  || strcmp(license, "Dual MIT/GPL") == 0
  || strcmp(license, "Dual MPL/GPL") == 0);
}

#endif
```

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```
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# 1.2576 policycoreutils 3.6-3.el9

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# 1.2579 iputils 20210202-15.el9_7

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The following list of people, sorted by last name, have contributed code or patches to this implementation of sudo since I began maintaining it in 1993. This list is known to be incomplete--if you believe you should be listed, please send a note to sudo@sudo.ws.

Ackeret, Matt
Adler, Mark
Allbery, Russ
Anderson, Jamie
Andrew, Nick
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Barron, Danny
Bates, Tom
Behan, Zdenk
Bellis, Ray
Benali, Elias
Beverly, Jamie
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Bos, Sander
Bostley, P.J.
Bowes, Keith
Boyce, Keith Garry
Brantley, Michael
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Gerraty, Simon J.
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Peterson, Toby
Petten, Diego Elio
Pickett, Joel
Plotnick, Alex
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Reid, Steve
Richards, Matt
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Rouillard, John P.
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Sato, Yuichi
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Webb, Kirk
Wetzel, Timm
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Wilk, Jakub
Winiger, Gary
Wood, David
Zacarias, Gustavo
Zolnowsky, John

The following people have worked to translate sudo into other languages as part of the Translation Project, see https://translationproject.org for more details.

Albuquerque, Pedro

Blttermann, Mario
Bogusz, Jakub
Buo-ren, Lin
Casagrande, Milo
Castro, Felipe
Cho, Seong-ho
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Gnomovision version 69, Copyright (C) year name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
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`Gnomovision' (which makes passes at compilers) written by James Hacker.

<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice

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# 1.2584 mesa 25.0.7-3.el9_7.alma.1

## 1.2584.1 Available under license :

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```
  Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
  This is free software, and you are welcome to redistribute it
  under certain conditions; type `show c' for details.

The hypothetical commands `show w' and `show c' should show the appropriate
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school, if any, to sign a "copyright disclaimer" for the program, if
necessary.  Here is a sample; alter the names:

 Yoyodyne, Inc., hereby disclaims all copyright interest in the program
 `Gnomovision' (which makes passes at compilers) written by James Hacker.

  <signature of Ty Coon>, 1 April 1989
 Ty Coon, President of Vice

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consider it more useful to permit linking proprietary applications with the
library.  If this is what you want to do, use the GNU Library General
Public License instead of this License.
/*
* Copyright  2020 Google LLC
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*/

#include "common/freedreno_dev_info.h"

struct testcase {
  enum pipe_format format;

  int array_size; /* Size for array textures, or 0 otherwise. */
  bool is_3d;

  /* Partially filled layout of input parameters and expected results. */
  struct {
    uint32_t tile_mode : 2;
    bool tile_all : 1;
    bool ubwc : 1;
    uint32_t width0, height0, depth0;
    uint32_t nr_samples;
    struct {
      uint32_t offset;
      uint32_t pitch;
      uint32_t size0;
```

```
    } slices[FDL_MAX_MIP_LEVELS];
    struct {
      uint32_t offset;
      uint32_t pitch;
    } ubwc_slices[FDL_MAX_MIP_LEVELS];
  } layout;
};

bool fdl_test_layout(const struct testcase *testcase, const struct fd_dev_id *dev_id);
```

Subject: RE: Question about Mesa MLAA license
From: Jorge Jimenez <iryoku@gmail.com>
Date: 01/08/2013 12:50 PM
To: Tom Callaway <tcallawa@redhat.com>
CC: "jorge@iryoku.com" <jorge@iryoku.com>

Yes to both questions.

Thanks,
Jorge

From: Tom Callaway <tcallawa@redhat.com>
Sent: January 8, 2013 6:49 PM
To: Jorge Jimenez <iryoku@gmail.com>
CC: jorge@iryoku.com
Subject: Re: Question about Mesa MLAA license

On 01/08/2013 12:39 PM, Jorge Jimenez wrote:
> Hi Tom,
>
> What we meant with that is that we made an exception for clause 2.
> Instead of clause 2, in the case of the Mesa project, you have to name
> the technique Jimenez's MLAA in the config options of Mesa. We did that
> just to allow them to solve license issues. This exception should be for
> the Mesa project, and any project using Mesa, like Fedora.
>
> We want to widespread usage of our MLAA, so we want to avoid any kind of
> license complications. Hope current one is good for Fedora, if not
> please tell, and we'll see what
 we can do!

Okay, a few more questions:

* If Fedora decides to simply reproduce the quoted statement:
"Uses Jimenez's MLAA. Copyright (C) 2010 by Jorge Jimenez, Belen Masia,
Jose I. Echevarria, Fernando Navarro and Diego Gutierrez."

Specifically, if this is done as part of documentation included with

Mesa, is that sufficient to meet clause 2 even if the Mesa config option
is not set as described in your exception?

* Currently, the Mesa config option for MLAA says: "Morphological
anti-aliasing based on Jimenez\' MLAA. 0 to disable, 8 for default
quality". Is this in compliance with your exception?

Thanks again,

~tom

==
Fedora Project

Subject: RE: Question about Mesa MLAA license
From: Jorge Jimenez <iryoku@gmail.com>
Date: 01/08/2013 12:39 PM
To: "jorge@iryoku.com" <jorge@iryoku.com>, Tom Callaway <tcallawa@redhat.com>

Hi Tom,

What we meant with that is that we made an exception for clause 2.
Instead of clause 2, in the case of the Mesa project, you have to name
the technique
Jimenez's MLAA in the config options of Mesa. We did that
just to allow them to solve license issues. This exception should be for
the Mesa project, and any project using Mesa, like Fedora.

We want to widespread usage of our MLAA, so we want to avoid any kind of
license complications. Hope current one is good for Fedora, if not
please tell, and we'll see what we can do!

Cheers,
Jorge

From: Tom Callaway <tcallawa@redhat.com>
Sent: January 8, 2013 6:30 PM
To: jorge@iryoku.com
Subject: Question about Mesa MLAA license

Jorge,

Thanks for all of your fantastic graphics work! I have been auditing
Fedora (a popular distribution of Linux) for license compliance and I
came across your MLAA code in Mesa.

The license says:

```
*    2. Redistributions in binary form must reproduce the following
statement:
*
*       "Uses Jimenez's MLAA. Copyright (C) 2010 by Jorge Jimenez, Belen Masia,
*        Jose I. Echevarria, Fernando Navarro and Diego Gutierrez."
*
*       Only for use in the
 Mesa project, this point 2 is filled by naming the
*       technique Jimenez's MLAA in the Mesa config options.
```

That wording is unclear. When you say "Only for use in the Mesa project...", it seems like you could either be saying:

- This code may only be used as part of Mesa.

OR

- In Mesa, you can comply with clause 2 by simply selecting "Jimenez's MLAA" in the Mesa config options.

*****

If the first item is true, then we may have to remove the MLAA code from Fedora's copy of Mesa. However, looking at the license on your SMAA code, I do not believe it to be the case. Please let me know either way!

Thanks in advance,

Tom Callaway
Fedora Legal

==
Fedora Project

```
/*
* Copyright  2019 Google, Inc.
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*/

#ifndef FREEDRENO_LAYOUT_H_
#define FREEDRENO_LAYOUT_H_

#include <stdbool.h>
#include <stdint.h>

#include "util/format/u_format.h"
#include "util/u_debug.h"
#include "util/u_math.h"
```

```
#include "common/freedreno_common.h"
#include "common/freedreno_dev_info.h"

BEGINC;

/* Shared freedreno mipmap layout helper
*
* It does *not* attempt to track surface transitions, in particular
* about UBWC state.  Possibly it should, but
*  (a) I'm not sure if in all cases we can transparently do in-
*      place transitions (ie. a5xx textures with interleaved
*      meta and pixel data
*  (b) Even if we can, we probably can't assume that we have
*      figured out yet how to do in-place transition for every
*      generation.
*/

/* Texture Layout on a3xx:
* -----------------------
*
* Each mipmap-level contains all of it's layers (ie. all cubmap
* faces, all 1d/2d array elements, etc).  The texture sampler is
* programmed
 with the start address of each mipmap level, and hw
* derives the layer offset within the level.
*
*
* Texture Layout on a4xx+:
* -----------------------
*
* For cubemap and 2d array, each layer contains all of it's mipmap
* levels (layer_first layout).
*
* 3d textures are laid out as on a3xx.
*
* In either case, the slice represents the per-miplevel information,
* but in layer_first layout it only includes the first layer, and
* an additional offset of (rsc->layer_size * layer) must be added.
*
*
* UBWC Color Compressions (a5xx+):
* --------------------------------
*
* Color compression is only supported for tiled layouts.  In general
* the meta "flag" buffer (ie. what holds the compression state for
* each block) can be separate from the color data, except for textures
* on a5xx where it needs to be interleaved with layers/levels of a
* texture.
```

```
*/

#define FDL_MAX_MIP_LEVELS 15

struct fdl_slice {
  uint32_t offset; /* offset of first layer in slice
 */
  uint32_t size0;  /* size of first layer in slice */
};

/* parameters for explicit (imported) layout */
struct fdl_explicit_layout {
  uint32_t offset;
  uint32_t pitch;
};

/**
* Metadata shared between vk and gallium driver for interop.
*
* NOTE: EXT_external_objects requires app to check device and driver
* UUIDs to ensure that the vk and gl driver are compatible.  So for
* now we don't need any additional versioning of the metadata.
*/
struct fdl_metadata {
  uint64_t modifier;
};

/**
* Encapsulates the layout of a resource, including position of given 2d
* surface (layer, level) within.  Or rather all the information needed
* to derive this.
*/
struct fdl_layout {
  struct fdl_slice slices[FDL_MAX_MIP_LEVELS];
  struct fdl_slice ubwc_slices[FDL_MAX_MIP_LEVELS];
  uint32_t pitch0;
  uint32_t ubwc_width0;
  uint64_t layer_size;
  uint64_t ubwc_layer_size; /* in bytes */
  bool ubwc : 1;
  bool layer_first : 1; /* see above description */
  bool tile_all
 : 1;
  bool is_mutable : 1;

  /* Note that for tiled textures, beyond a certain mipmap level (ie.
   * when width is less than block size) things switch to linear.  In
   * general you should not directly look at fdl_layout::tile_mode,
```

```
   * but instead use fdl_surface::tile_mode which will correctly take
   * this into account.
   */
  uint32_t tile_mode : 2;
  /* Bytes per pixel (where a "pixel" is a single row of a block in the case
   * of compression), including each sample in the case of multisample
   * layouts.
   */
  uint8_t cpp;

  /**
   * Left shift necessary to multiply by cpp.  Invalid for NPOT cpp, please
   * use fdl_cpp_shift() to sanity check you aren't hitting that case.
   */
  uint8_t cpp_shift;

  uint32_t width0, height0, depth0;
  uint32_t mip_levels;
  uint32_t nr_samples;
  enum pipe_format format;

  uint64_t size;       /* Size of the whole image, in bytes. */
  uint32_t base_align; /* Alignment of the base address, in bytes. */

 uint8_t pitchalign;  /* log2(pitchalign) */
};

static inline uint32_t
fdl_cpp_shift(const struct fdl_layout *layout)
{
  assert(util_is_power_of_two_or_zero(layout->cpp));
  return layout->cpp_shift;
}

static inline uint32_t
fdl_pitch(const struct fdl_layout *layout, unsigned level)
{
  return align(u_minify(layout->pitch0, level), 1 << layout->pitchalign);
}

#define RGB_TILE_WIDTH_ALIGNMENT  64
#define RGB_TILE_HEIGHT_ALIGNMENT 16
#define UBWC_PLANE_SIZE_ALIGNMENT 4096

static inline uint32_t
fdl_ubwc_pitch(const struct fdl_layout *layout, unsigned level)
{
  if (!layout->ubwc)
```

```
    return 0;
  return align(u_minify(layout->ubwc_width0, level), RGB_TILE_WIDTH_ALIGNMENT);
}

static inline uint32_t
fdl_layer_stride(const struct fdl_layout *layout, unsigned level)
{
  if (layout->layer_first)
    return layout->layer_size;
  else
    return layout->slices[level].size0;
}

/* a2xx is special and needs PoT alignment for mipmaps: */
static inline uint32_t
fdl2_pitch(const struct
 fdl_layout *layout, unsigned level)
{
  uint32_t pitch = fdl_pitch(layout, level);
  if (level)
    pitch = util_next_power_of_two(pitch);
  return pitch;
}

static inline uint32_t
fdl2_pitch_pixels(const struct fdl_layout *layout, unsigned level)
{
  return fdl2_pitch(layout, level) >> fdl_cpp_shift(layout);
}

static inline uint32_t
fdl_surface_offset(const struct fdl_layout *layout, unsigned level,
                   unsigned layer)
{
  const struct fdl_slice *slice = &layout->slices[level];
  return slice->offset + fdl_layer_stride(layout, level) * layer;
}

static inline uint32_t
fdl_ubwc_offset(const struct fdl_layout *layout, unsigned level, unsigned layer)
{
  const struct fdl_slice *slice = &layout->ubwc_slices[level];
  return slice->offset + layer * layout->ubwc_layer_size;
}

/* Minimum layout width to enable UBWC. */
#define FDL_MIN_UBWC_WIDTH 16
```

```
static inline bool
fdl_level_linear(const struct fdl_layout *layout, int level)
{
  if (layout->tile_all)

 return false;

  unsigned w = u_minify(layout->width0, level);
  if (w < FDL_MIN_UBWC_WIDTH)
     return true;

  return false;
}

static inline uint32_t
fdl_tile_mode(const struct fdl_layout *layout, int level)
{
  if (layout->tile_mode && fdl_level_linear(layout, level))
     return 0; /* linear */
  else
     return layout->tile_mode;
}

static inline bool
fdl_ubwc_enabled(const struct fdl_layout *layout, int level)
{
  return layout->ubwc && !fdl_level_linear(layout, level);
}

const char *fdl_tile_mode_desc(const struct fdl_layout *layout, int level);

void fdl_layout_buffer(struct fdl_layout *layout, uint32_t size);

void fdl5_layout(struct fdl_layout *layout, enum pipe_format format,
              uint32_t nr_samples, uint32_t width0, uint32_t height0,
              uint32_t depth0, uint32_t mip_levels, uint32_t array_size,
              bool is_3d);

bool fdl6_layout(struct fdl_layout *layout, const struct fd_dev_info *info,
              enum pipe_format format,
 uint32_t nr_samples, uint32_t width0,
              uint32_t height0, uint32_t depth0, uint32_t mip_levels,
              uint32_t array_size, bool is_3d, bool is_mutable,
              bool force_ubwc,
              struct fdl_explicit_layout *plane_layout);

static inline void
fdl_set_pitchalign(struct fdl_layout *layout, unsigned pitchalign)
```

```
{
  uint32_t nblocksx = util_format_get_nblocksx(layout->format, layout->width0);
  layout->pitchalign = pitchalign;
  layout->pitch0 = align(nblocksx * layout->cpp, 1 << pitchalign);
}

void fdl_dump_layout(struct fdl_layout *layout);

void fdl6_get_ubwc_blockwidth(const struct fdl_layout *layout,
                              uint32_t *blockwidth, uint32_t *blockheight);

enum fdl_view_type {
  FDL_VIEW_TYPE_1D = 0,
  FDL_VIEW_TYPE_2D = 1,
  FDL_VIEW_TYPE_CUBE = 2,
  FDL_VIEW_TYPE_3D = 3,
  FDL_VIEW_TYPE_BUFFER = 4,
};

enum fdl_chroma_location {
  FDL_CHROMA_LOCATION_COSITED_EVEN = 0,
  FDL_CHROMA_LOCATION_MIDPOINT
 = 1,
};

struct fdl_view_args {
  uint32_t chip;
  uint64_t iova;
  uint32_t base_miplevel;
  uint32_t level_count;
  uint32_t base_array_layer;
  uint32_t layer_count;
  float min_lod_clamp;
  unsigned char swiz[4];
  enum pipe_format format;
  enum fdl_view_type type;
  enum fdl_chroma_location chroma_offsets[2];
};

#define FDL6_TEX_CONST_DWORDS 16

struct fdl6_view {
  uint64_t base_addr;
  uint64_t ubwc_addr;
  uint32_t layer_size;
  uint32_t ubwc_layer_size;

  uint32_t offset;
```

```
  uint32_t width, height;
  bool need_y2_align;

  bool ubwc_enabled;
  bool is_mutable;
  uint8_t color_swap;

  enum pipe_format format;

  uint32_t descriptor[FDL6_TEX_CONST_DWORDS];

  /* Descriptor for use as a storage image as opposed to a sampled image.
   * This has a few differences for cube maps (e.g. type).
   */
  uint32_t storage_descriptor[FDL6_TEX_CONST_DWORDS];

  uint32_t pitch;

  /* pre-filled register values */
  uint32_t FLAG_BUFFER_PITCH;

  uint32_t
 RB_MRT_BUF_INFO;
  uint32_t SP_FS_MRT_REG;

  uint32_t SP_PS_2D_SRC_INFO;
  uint32_t SP_PS_2D_SRC_SIZE;

  uint32_t RB_2D_DST_INFO;

  uint32_t RB_BLIT_DST_INFO;

  uint32_t GRAS_LRZ_DEPTH_VIEW;
};

void
fdl6_view_init(struct fdl6_view *view, const struct fdl_layout **layouts,
             const struct fdl_view_args *args, bool has_z24uint_s8uint);
void
fdl6_buffer_view_init(uint32_t *descriptor, enum pipe_format format,
                    const uint8_t *swiz, uint64_t iova, uint32_t size);

void
fdl6_format_swiz(enum pipe_format format, bool has_z24uint_s8uint,
               unsigned char *format_swiz);

enum fdl_macrotile_mode {
```

```
  FDL_MACROTILE_4_CHANNEL,
  FDL_MACROTILE_8_CHANNEL,
  /* Used internally by turnip */
  FDL_MACROTILE_INVALID = ~0,
};

/* Parameters that affect UBWC swizzling. Note that because we don't handle
* compression, this isn't a complete set of knobs. See the documentation in
* fd6_tiled_memcpy.c for a description of each one.
*/
struct fdl_ubwc_config
 {
  unsigned highest_bank_bit;
  unsigned bank_swizzle_levels;
  enum fdl_macrotile_mode macrotile_mode;
};

void
fdl6_memcpy_linear_to_tiled(uint32_t x_start, uint32_t y_start,
                        uint32_t width, uint32_t height,
                        char *dst, const char *src,
                        const struct fdl_layout *dst_layout,
                        unsigned dst_miplevel,
                        uint32_t src_pitch,
                        const struct fdl_ubwc_config *config);

void
fdl6_memcpy_tiled_to_linear(uint32_t x_start, uint32_t y_start,
                        uint32_t width, uint32_t height,
                        char *dst, const char *src,
                        const struct fdl_layout *src_layout,
                        unsigned src_miplevel,
                        uint32_t dst_pitch,
                        const struct fdl_ubwc_config *config);

ENDC;

#endif /* FREEDRENO_LAYOUT_H_ */
```

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The screenshot-layer directory was created from using mesa-overlay as a template, then adding portions of the screenshotting layer from LunarG's VulkanTools repository: https://github.com/LunarG/VulkanTools/tree/main

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*/

#ifndef FREEDRENO_LRZ_LAYOUT_H_
#define FREEDRENO_LRZ_LAYOUT_H_

#include <stdint.h>

#include "freedreno_layout.h"

BEGINC;

struct fdl_lrz_layout {
  uint32_t lrz_offset;
  uint32_t lrz_pitch;
  uint32_t lrz_height;
  uint32_t lrz_layer_size;
  uint32_t lrz_fc_offset;
  uint32_t lrz_fc_size;
  uint32_t lrz_total_size;
};

void
fdl5_lrz_layout_init(struct fdl_lrz_layout *lrz_layout, uint32_t width,
                     uint32_t height, uint32_t nr_samples);
ENDC;

#ifdef __cplusplus
#include "common/freedreno_lrz.h"

template <chip CHIP>
static void
fdl6_lrz_layout_init(struct fdl_lrz_layout *lrz_layout,
                     struct fdl_layout *layout,
                     const struct fd_dev_info *dev_info, uint32_t lrz_offset,
                     uint32_t array_layers)
{
  unsigned width = layout->width0;
  unsigned height = layout->height0;

  /* LRZ buffer is super-sampled */
  switch (layout->nr_samples)
  {
  case 8:
```

```
   height *= 2;
   FALLTHROUGH;
 case 4:
   width *= 2;
   FALLTHROUGH;
 case 2:
   height *= 2;
   break;
 default:
   break;
 }

 unsigned lrz_pitch = align(DIV_ROUND_UP(width, 8), 32);
 unsigned lrz_height = align(DIV_ROUND_UP(height, 8), 32);

 lrz_layout->lrz_offset = lrz_offset;
 lrz_layout->lrz_height = lrz_height;
 lrz_layout->lrz_pitch = lrz_pitch;
 lrz_layout->lrz_layer_size = lrz_pitch * lrz_height * sizeof(uint16_t);

 unsigned nblocksx = DIV_ROUND_UP(DIV_ROUND_UP(width, 8), 16);
 unsigned nblocksy = DIV_ROUND_UP(DIV_ROUND_UP(height, 8), 4);

 /* Fast-clear buffer is 1bit/block */
 lrz_layout->lrz_fc_size =
   DIV_ROUND_UP(nblocksx * nblocksy, 8) * array_layers;

 /* Fast-clear buffer cannot be larger than 512 bytes on A6XX and 1024 bytes
  * on A7XX (HW limitation) */
 if (!dev_info->a6xx.enable_lrz_fast_clear ||
     lrz_layout->lrz_fc_size > fd_lrzfc_layout<CHIP>::FC_SIZE) {
   lrz_layout->lrz_fc_size
= 0;
 }

 uint32_t lrz_size = lrz_layout->lrz_layer_size * array_layers;
 if (dev_info->a6xx.enable_lrz_fast_clear ||
     dev_info->a6xx.has_lrz_dir_tracking) {
   lrz_layout->lrz_fc_offset =
       lrz_layout->lrz_offset + lrz_size;
   lrz_size += sizeof(fd_lrzfc_layout<CHIP>);
 }

 lrz_layout->lrz_total_size = lrz_size;

 uint32_t lrz_clear_height = lrz_layout->lrz_height * array_layers;
 if (((lrz_clear_height - 1) >> 14) > 0) {
   /* For simplicity bail out if LRZ cannot be cleared in one go. */
```

```
    lrz_layout->lrz_height = 0;
    lrz_layout->lrz_total_size = 0;
  }
}
#endif

#endif
```

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  limitations under the License.
project('bar', 'c', license: 'Apache-2.0')

executable('bar', 'bar.c')

license = meson.project_license()[0]
if license != 'Apache-2.0'
   error('The license should be Apache-2.0, but it is: ' + license)
endif
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libfreedreno_layout = static_library(
 'freedreno_layout',
 [
   'fd5_layout.c',
   'fd6_format_table.c',
   'fd6_layout.c',
   'fd6_tiled_memcpy.cc',
   'fd6_view.c',
   'freedreno_layout.c',
   'freedreno_lrz_layout.c',
   freedreno_xml_header_files,
 ],
 include_directories : [inc_freedreno, inc_include, inc_src],
 c_args : [no_override_init_args],
 gnu_symbol_visibility : 'hidden',
```

```
 dependencies : [idep_nir_headers, idep_mesautil, idep_libfreedreno_common],
 build_by_default : false,
)

foreach major : ['5', '6']
 test(
   'fd' + major + '_layout',
   executable(
     'fd' + major + '_layout',
     [
       'fd_layout_test.c',
       'fd' + major + '_layout_test.c',
       freedreno_xml_header_files,
     ],
     link_with: libfreedreno_layout,
     dependencies : [idep_mesautil, idep_libfreedreno_common],
     include_directories: [
       inc_include,
       inc_src,
       inc_freedreno],
    ),
   suite : ['freedreno'],
 )
endforeach
/*
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*/

#ifndef FD6_FORMAT_TABLE_H
#define FD6_FORMAT_TABLE_H

#include "util/format/u_format.h"
#include "util/u_math.h"

#include "common/freedreno_common.h"

#include "adreno_pm4.xml.h"
#include "adreno_common.xml.h"
#include "a6xx.xml.h"

BEGINC;

static inline enum a6xx_tex_swiz
```

```
fdl6_swiz(unsigned char swiz)
{
  STATIC_ASSERT((unsigned) A6XX_TEX_X == (unsigned) PIPE_SWIZZLE_X);
  STATIC_ASSERT((unsigned) A6XX_TEX_Y == (unsigned) PIPE_SWIZZLE_Y);
  STATIC_ASSERT((unsigned) A6XX_TEX_Z == (unsigned) PIPE_SWIZZLE_Z);
  STATIC_ASSERT((unsigned) A6XX_TEX_W == (unsigned) PIPE_SWIZZLE_W);
  STATIC_ASSERT((unsigned) A6XX_TEX_ZERO == (unsigned) PIPE_SWIZZLE_0);
  STATIC_ASSERT((unsigned) A6XX_TEX_ONE == (unsigned) PIPE_SWIZZLE_1);
  return (enum a6xx_tex_swiz) swiz;
}

enum a6xx_depth_format fd6_pipe2depth(enum
 pipe_format format);

enum a6xx_format fd6_vertex_format(enum pipe_format format) ATTRIBUTE_CONST;
enum a3xx_color_swap fd6_vertex_swap(enum pipe_format format) ATTRIBUTE_CONST;
enum a6xx_format fd6_texture_format(enum pipe_format format,
                                    enum a6xx_tile_mode tile_mode,
                                    bool is_mutable) ATTRIBUTE_CONST;
enum a3xx_color_swap fd6_texture_swap(enum pipe_format format,
                                      enum a6xx_tile_mode tile_mode,
                                      bool is_mutable) ATTRIBUTE_CONST;
enum a6xx_format fd6_color_format(enum pipe_format format,
                                  enum a6xx_tile_mode tile_mode) ATTRIBUTE_CONST;
enum a3xx_color_swap fd6_color_swap(enum pipe_format format,
                                    enum a6xx_tile_mode tile_mode,
                                    bool is_mutable) ATTRIBUTE_CONST;

ENDC;

#endif /* FD6_FORMAT_TABLE_H */
```

# 1.2585 lshw B.02.20-2.el9

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# 1.2593 talloc 2.4.3-1.el9

## 1.2593.1 Available under license :

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Version 3, 29 June 2007

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# 1.2595 at 3.1.23-13.el9_7

## 1.2595.1 Available under license :

This is the Debian GNU/Linux prepackaged version of the deferred
execution scheduler called at.

This package was debianized by its author Thomas Koenig
<ig25@rz.uni-karlsruhe.de>, taken over and re-packaged first by Martin
Schulze <joey@debian.org> and then by Siggy Brentrup <bsb@winnegan.de>,
and then taken over by Ryan Murray <rmurray@debian.org>.

In August 2009 the upstream development and Debian packaging were taken over
by Ansgar Burchardt <ansgar@debian.org> and Cyril Brulebois <kibi@debian.org>.

In August 2015 the upstream development and Debian packaging were
taken over by Jose M Calhariz <jose@calhariz.com>

This may be considered the experimental upstream source, and since there
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parsetime.pl:

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# 1.2608 helm 3.19.2

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```
// Copyright (c) 2023 Yandex LLC. All rights reserved.
// Author: Dmitry Novikov <novikoff@yandex-team.ru>

package main

import (
 "bytes"
 "context"
 "crypto/tls"
 "flag"
 "fmt"
 "io"
 "log"
 "net/http"
 "strings"
 "time"

 "github.com/yandex-cloud/go-genproto/yandex/cloud/marketplace/licensemanager/v1"
 ycsdk "github.com/yandex-cloud/go-sdk"
)

func main() {
 var licenseInstanceID string
 var period time.Duration
 var apiEndpoint string
 var insecureSkipVerify bool
```

```
 flag.StringVar(&licenseInstanceID, "license-instance-id", "", "license instance id")
 flag.DurationVar(&period, "period", time.Minute, "check period")
 flag.StringVar(&apiEndpoint, "endpoint", "", "api endpoint")
 flag.BoolVar(&insecureSkipVerify, "insecure-skip-verify", false, "do not check certificate")
 flag.Parse()
 log.Println("LicenseInstanceID:", licenseInstanceID)
 computeInstanceID, err := getInstanceID()
 if err != nil {
  log.Fatal(err.Error())
 }
 log.Println("ComputeInstanceID:", computeInstanceID)

 cfg := ycsdk.Config{
  Credentials:
 ycsdk.InstanceServiceAccount(),
  Endpoint:    apiEndpoint,
 }
 if insecureSkipVerify {
  cfg.TLSConfig = &tls.Config{
   InsecureSkipVerify: true,
  }
 }
 ctx := context.Background()
 sdk, err := ycsdk.Build(ctx, cfg)
 if err != nil {
  log.Fatal("SDK init error: " + err.Error())
 }
 inst, err := sdk.Marketplace().LicenseManager().Instance().Get(ctx,
&licensemanager.GetInstanceRequest{InstanceId: licenseInstanceID})
 if err != nil {
  log.Fatal("Instance get error: " + err.Error())
 }
 log.Println("Working with instance ", inst.GetId()+" "+inst.GetDescription())
 buf := &bytes.Buffer{}
 for {
  err := checkLicense(ctx, sdk, licenseInstanceID, computeInstanceID)
  buf.Reset()
  fmt.Fprint(buf, time.Now(), ": ")
  fmt.Fprint(buf, "check result for LicenseInstanceID="+licenseInstanceID+" and ResourceID="+computeInstanceID)
  if err == nil {
   fmt.Fprintln(buf, " is OK")
  } else {
   fmt.Fprintln(buf, " is ERROR:\n ", err.Error())
  }
  log.Println(buf.String())
  time.Sleep(period)
 }
}
```

```
func
 checkLicense(ctx context.Context, sdk *ycsdk.SDK, licenseInstanceID string, resourceID string) error {
 op, err := sdk.WrapOperation(sdk.Marketplace().LicenseManager().Lock().Ensure(ctx,
&licensemanager.EnsureLockRequest{
  InstanceId: licenseInstanceID,
  ResourceId: resourceID, // Use compute instance id as resource ID
 }))
 if err != nil {
  return err
 }
 log.Println("OperationID:", op.Id())
 err = op.Wait(ctx)
 if err != nil {
  return err
 }
 if opErr := op.Error(); opErr != nil {
  return opErr
 }
 resp, err := op.Response()
 if err != nil {
  return err
 }
 lock := resp.(*licensemanager.Lock)
 log.Println("LockID:", lock.GetId())
 log.Println("Start:", lock.GetStartTime().AsTime())
 log.Println("End:", lock.GetEndTime().AsTime())
 return err
}

func getInstanceID() (string, error) {
 req, err := http.NewRequest("GET",
  "http://169.254.169.254/computeMetadata/v1/instance/id", nil)
 if err != nil {
  return "", err
 }
 req.Header.Set("Metadata-Flavor",
 "Google")
 req.Header.Set("Connection", "close")
 resp, err := http.DefaultClient.Do(req)
 if err != nil {
  return "", err
 }
 defer resp.Body.Close()
 if resp.StatusCode != 200 {
  return "", fmt.Errorf("status code 200 != %v (%v)", resp.StatusCode, resp.Status)
 }
 respBytes, err := io.ReadAll(resp.Body)
```

```
 if err != nil {
  return "", err
 }
 return strings.TrimSpace(string(respBytes)), nil
}
```

# 1.2611 microsoft-authentication-library-for-go 1.6.0

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# 1.2612 helmfile-helmfile 1.2.2

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# 1.2613 helm 4.0.1

## 1.2613.1 Available under license :

```
{{- if .Values.jobs.volumePermissions.enabled }}
apiVersion: batch/v1
kind: Job
metadata:
 name: {{ template "erpnext.fullname" . }}-vol-fix-{{ now | date "20060102150405" }}
 labels:
   {{- include "erpnext.labels" . | nindent 4 }}
spec:
 backoffLimit: {{ .Values.jobs.volumePermissions.backoffLimit }}
 template:
   spec:
   {{- with .Values.imagePullSecrets }}
     imagePullSecrets:
       {{- toYaml . | nindent 8 }}
   {{- end }}
     serviceAccountName: {{ template "erpnext.serviceAccountName" $ }}
     securityContext:
       {{- toYaml $.Values.podSecurityContext | nindent 8 }}
     containers:
     - name: frappe-bench-ownership
       image: {{ .Values.worker.image.repository }}:{{ .Values.worker.image.tag }}
       imagePullPolicy: {{ .Values.worker.image.pullPolicy }}
       command: ['sh', '-c']
       args:
         - >
           chown -R \
             "{{ default 1000 .Values.securityContext.runAsUser }}:{{ default 1000 .Values.securityContext.runAsUser
 }}" \
             /home/frappe/frappe-bench
       resources:
```

```
          {{- toYaml .Values.jobs.volumePermissions.resources | nindent 10 }}
        securityContext:
          # run as root to set ownership
          runAsUser: 0
        volumeMounts:
          - name: sites-dir
            mountPath: /home/frappe/frappe-bench/sites
          - name: logs
            mountPath: /home/frappe/frappe-bench/logs
      restartPolicy: Never
      volumes:
        - name: sites-dir
          {{- if .Values.persistence.worker.enabled }}
          persistentVolumeClaim:
            {{- if .Values.persistence.worker.existingClaim }}
            claimName: {{ .Values.persistence.worker.existingClaim }}
            {{- else }}
            claimName: {{ template "erpnext.fullname" . }}
            {{- end }}
            readOnly: false
          {{- else }}
          emptyDir: {}
          {{- end }}
        - name: logs
          {{- if .Values.persistence.logs.enabled }}
          persistentVolumeClaim:
             {{- if .Values.persistence.logs.existingClaim }}
            claimName: {{ .Values.persistence.logs.existingClaim }}
            {{- else }}
            claimName: {{ template "erpnext.fullname" . }}-logs
            {{- end }}
            readOnly: false
          {{- else }}
          emptyDir: {}
          {{- end }}
      {{- with .Values.jobs.volumePermissions.nodeSelector }}
      nodeSelector:
        {{- toYaml . | nindent 8 }}
      {{- end }}
      {{- with .Values.jobs.volumePermissions.affinity }}
      affinity:
        {{- toYaml . | nindent 8 }}
      {{- end }}
      {{- with .Values.jobs.volumePermissions.tolerations }}
      tolerations:
        {{- toYaml . | nindent 8 }}
      {{- end }}
    {{- end }}
```

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# 1.2614 oci-go-sdk 65.95.2

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// Code generated. DO NOT EDIT.

// Java Management Service Fleets API
//
// The APIs for the Fleet Management (https://docs.oracle.com/en-us/iaas/jms/doc/fleet-management.html) feature of Java Management Service to monitor and manage the usage of Java in your enterprise. Use these APIs to manage fleets, configure managed instances to report to fleets, and gain insights into the Java workloads running on these instances by carrying out basic and advanced features.
//

```
package jms

import (
 "strings"
)

// LicenseTypeEnum Enum with underlying type: string
```

```
type LicenseTypeEnum string

// Set of constants representing the allowable values for LicenseTypeEnum
const
 (
 LicenseTypeOtn        LicenseTypeEnum = "OTN"
 LicenseTypeNftc       LicenseTypeEnum = "NFTC"
 LicenseTypeRestricted LicenseTypeEnum = "RESTRICTED"
)

var mappingLicenseTypeEnum = map[string]LicenseTypeEnum{
 "OTN":        LicenseTypeOtn,
 "NFTC":       LicenseTypeNftc,
 "RESTRICTED": LicenseTypeRestricted,
}

var mappingLicenseTypeEnumLowerCase = map[string]LicenseTypeEnum{
 "otn":        LicenseTypeOtn,
 "nftc":       LicenseTypeNftc,
 "restricted": LicenseTypeRestricted,
}

// GetLicenseTypeEnumValues Enumerates the set of values for LicenseTypeEnum
func GetLicenseTypeEnumValues() []LicenseTypeEnum {
 values := make([]LicenseTypeEnum, 0)
 for _, v := range mappingLicenseTypeEnum {
  values = append(values, v)
 }
 return values
}

// GetLicenseTypeEnumStringValues Enumerates the set of values in String for LicenseTypeEnum
func GetLicenseTypeEnumStringValues() []string {
 return []string{
  "OTN",
  "NFTC",
  "RESTRICTED",
 }
}

// GetMappingLicenseTypeEnum performs case Insensitive
 comparison on enum value and return the desired enum
func GetMappingLicenseTypeEnum(val string) (LicenseTypeEnum, bool) {
 enum, ok := mappingLicenseTypeEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}
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```

```
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// Code generated. DO NOT EDIT.

// Stack Monitoring API
//
// Stack Monitoring API.
//

package stackmonitoring

import (
 "strings"
)

// LicenseTypeEnum Enum with underlying type: string
type LicenseTypeEnum string

// Set of constants representing the allowable values for LicenseTypeEnum
const (
 LicenseTypeStandardEdition                    LicenseTypeEnum = "STANDARD_EDITION"
 LicenseTypeEnterpriseEdition                  LicenseTypeEnum = "ENTERPRISE_EDITION"
 LicenseTypeEnterpriseEditionForGpuInfrastructure LicenseTypeEnum =
"ENTERPRISE_EDITION_FOR_GPU_INFRASTRUCTURE"
)

var mappingLicenseTypeEnum = map[string]LicenseTypeEnum{
 "STANDARD_EDITION":
                        LicenseTypeStandardEdition,
 "ENTERPRISE_EDITION":                    LicenseTypeEnterpriseEdition,
 "ENTERPRISE_EDITION_FOR_GPU_INFRASTRUCTURE":
LicenseTypeEnterpriseEditionForGpuInfrastructure,
}

var mappingLicenseTypeEnumLowerCase = map[string]LicenseTypeEnum{
 "standard_edition":                    LicenseTypeStandardEdition,
 "enterprise_edition":                  LicenseTypeEnterpriseEdition,
 "enterprise_edition_for_gpu_infrastructure": LicenseTypeEnterpriseEditionForGpuInfrastructure,
}

// GetLicenseTypeEnumValues Enumerates the set of values for LicenseTypeEnum
func GetLicenseTypeEnumValues() []LicenseTypeEnum {
 values := make([]LicenseTypeEnum, 0)
 for _, v := range mappingLicenseTypeEnum {
  values = append(values, v)
 }
 return values
}
```

```
// GetLicenseTypeEnumStringValues Enumerates the set of values in String for LicenseTypeEnum
func GetLicenseTypeEnumStringValues() []string {
 return []string{
  "STANDARD_EDITION",
  "ENTERPRISE_EDITION",
  "ENTERPRISE_EDITION_FOR_GPU_INFRASTRUCTURE",
 }
}

//
 GetMappingLicenseTypeEnum performs case Insensitive comparison on enum value and return the desired enum
func GetMappingLicenseTypeEnum(val string) (LicenseTypeEnum, bool) {
 enum, ok := mappingLicenseTypeEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}
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// Code generated. DO NOT EDIT.

// License Manager API
//
// Use the License Manager API to manage product licenses and license records. For more information, see License
Manager Overview (https://docs.oracle.com/iaas/Content/LicenseManager/Concepts/licensemanageroverview.htm).
//

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// LicenseMetric Overview of product license and resources usage.
type LicenseMetric struct {

 // Total number of product licenses in a particular compartment.
 TotalProductLicenseCount *int `mandatory:"true" json:"totalProductLicenseCount"`

 // Total number of BYOL instances in a particular
 compartment.
 TotalByolInstanceCount *int `mandatory:"true" json:"totalByolInstanceCount"`

 // Total number of License Included (LI) instances in a particular compartment.
 TotalLicenseIncludedInstanceCount *int `mandatory:"true" json:"totalLicenseIncludedInstanceCount"`
```

```
 // Total number of license records that will expire within 90 days in a particular compartment.
 LicenseRecordExpiringSoonCount *int `mandatory:"true" json:"licenseRecordExpiringSoonCount"`
}

func (m LicenseMetric) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m LicenseMetric) ValidateEnumValue() (bool, error) {
 errMessage := []string{}

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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// License Manager API
//
// Use the License Manager API to manage product licenses and license records. For more information, see License
Manager Overview (https://docs.oracle.com/iaas/Content/LicenseManager/Concepts/licensemanageroverview.htm).
//

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// ProductLicenseConsumerCollection Collection of resources which have consumed licenses.
type ProductLicenseConsumerCollection struct {

 // Collection of product license consumers.
 Items []ProductLicenseConsumerSummary `mandatory:"true" json:"items"`
}

func (m ProductLicenseConsumerCollection)
```

```
 String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m ProductLicenseConsumerCollection) ValidateEnumValue() (bool, error) {
 errMessage := []string{}

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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// Code generated. DO NOT EDIT.

// License Manager API
//
// Use the License Manager API to manage product licenses and license records. For more information, see License
Manager Overview (https://docs.oracle.com/iaas/Content/LicenseManager/Concepts/licensemanageroverview.htm).
//

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// ProductLicenseSummary The product license summary.
type ProductLicenseSummary struct {

 // The product license OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm).
 Id *string `mandatory:"true" json:"id"`

 // The compartment OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm)
 where the product license is created.
 CompartmentId *string `mandatory:"true" json:"compartmentId"`

 // The current product license status.
 Status StatusEnum `mandatory:"true" json:"status"`
```

```
// The product license unit.
LicenseUnit LicenseUnitEnum `mandatory:"true" json:"licenseUnit"`

// Specifies whether the vendor is Oracle or a third party.
IsVendorOracle *bool `mandatory:"true" json:"isVendorOracle"`

// License record name
DisplayName *string `mandatory:"true" json:"displayName"`

// Status description for the current product license status.
StatusDescription *string `mandatory:"false" json:"statusDescription"`

// The current product license state.
LifecycleState LifeCycleStateEnum `mandatory:"false" json:"lifecycleState,omitempty"`

// The total number of licenses available for the product license, calculated by adding up all the license counts for
active license records associated with the product license.
TotalActiveLicenseUnitCount
*int `mandatory:"false" json:"totalActiveLicenseUnitCount"`

// The number of license units consumed. Updated after each allocation run.
TotalLicenseUnitsConsumed *float64 `mandatory:"false" json:"totalLicenseUnitsConsumed"`

// The number of license records associated with the product license.
TotalLicenseRecordCount *int `mandatory:"false" json:"totalLicenseRecordCount"`

// The number of active license records associated with the product license.
ActiveLicenseRecordCount *int `mandatory:"false" json:"activeLicenseRecordCount"`

// Specifies whether or not the product license is oversubscribed.
IsOverSubscribed *bool `mandatory:"false" json:"isOverSubscribed"`

// Specifies if the license unit count is unlimited.
IsUnlimited *bool `mandatory:"false" json:"isUnlimited"`

// The vendor of the ProductLicense
VendorName *string `mandatory:"false" json:"vendorName"`

// The time the product license was created. An RFC 3339 (https://tools.ietf.org/html/rfc3339)-formatted
datetime string.
TimeCreated *common.SDKTime `mandatory:"false" json:"timeCreated"`

// The time the product license was updated. An RFC 3339 (https://tools.ietf.org/html/rfc3339)-formatted datetime
string.
TimeUpdated *common.SDKTime `mandatory:"false" json:"timeUpdated"`

// The images associated with the product license.
Images []ImageResponse `mandatory:"false" json:"images"`
```

```
 // Simple key-value pair that is applied without any predefined name, type, or scope. Exists for cross-compatibility
only.
 // Example: `{"bar-key": "value"}`
 FreeformTags map[string]string `mandatory:"false" json:"freeformTags"`

 // Defined tags for this resource. Each key is predefined and scoped to a namespace.
 // Example: `{"foo-namespace": {"bar-key": "value"}}`
 DefinedTags map[string]map[string]interface{} `mandatory:"false" json:"definedTags"`

 // Usage of system tag keys. These predefined keys are scoped to namespaces.
 // Example: `{"orcl-cloud": {"free-tier-retained": "true"}}`
 SystemTags
 map[string]map[string]interface{} `mandatory:"false" json:"systemTags"`
}

func (m ProductLicenseSummary) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m ProductLicenseSummary) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if _, ok := GetMappingStatusEnum(string(m.Status)); !ok && m.Status != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for Status: %s. Supported values are: %s.",
m.Status, strings.Join(GetStatusEnumStringValues(), ",")))
 }
 if _, ok := GetMappingLicenseUnitEnum(string(m.LicenseUnit)); !ok && m.LicenseUnit != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LicenseUnit: %s. Supported values are:
%s.", m.LicenseUnit, strings.Join(GetLicenseUnitEnumStringValues(),
 ",")))
 }

 if _, ok := GetMappingLifeCycleStateEnum(string(m.LifecycleState)); !ok && m.LifecycleState != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LifecycleState: %s. Supported values
are: %s.", m.LifecycleState, strings.Join(GetLifeCycleStateEnumStringValues(), ",")))
 }
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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```

```
// Code generated. DO NOT EDIT.

// Java Management Service Download API
//
// The APIs for the <a href="https://docs.oracle.com/en-us/iaas/jms/doc/java-download.html">Java Download</a>
feature of Java Management Service.
//

package jmsjavadownloads

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// JavaLicenseAcceptanceRecordCollection Contains a list of JavaLicenseAcceptanceRecordSummary objects.
type JavaLicenseAcceptanceRecordCollection struct {

 // List of JavaLicenseAcceptanceRecords.
 Items []JavaLicenseAcceptanceRecordSummary `mandatory:"true" json:"items"`
}

func (m JavaLicenseAcceptanceRecordCollection) String() string {
 return
 common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m JavaLicenseAcceptanceRecordCollection) ValidateEnumValue() (bool, error) {
 errMessage := []string{}

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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// Code generated. DO NOT EDIT.

// Java Management Service Download API
//
// The APIs for the <a href="https://docs.oracle.com/en-us/iaas/jms/doc/java-download.html">Java Download</a>
```

```
feature of Java Management Service.
//

package jmsjavadownloads

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// UpdateJavaLicenseAcceptanceRecordDetails The attributes for updating a Java license acceptance record.
type UpdateJavaLicenseAcceptanceRecordDetails struct {

 // Status of license acceptance.
 LicenseAcceptanceStatus LicenseAcceptanceStatusEnum `mandatory:"true" json:"licenseAcceptanceStatus"`

 // Simple key-value pair that is applied
 without any predefined name, type, or scope. Exists for cross-compatibility only.
 // Example: `{"bar-key": "value"}`. (See Managing Tags and Tag Namespaces
(https://docs.oracle.com/iaas/Content/Tagging/Concepts/understandingfreeformtags.htm).)
 FreeformTags map[string]string `mandatory:"false" json:"freeformTags"`

 // Defined tags for this resource. Each key is predefined and scoped to a namespace.
 // Example: `{"foo-namespace": {"bar-key": "value"}}`. (See Understanding Free-form Tags
(https://docs.oracle.com/iaas/Content/Tagging/Tasks/managingtagsandtagnamespaces.htm)).
 DefinedTags map[string]map[string]interface{} `mandatory:"false" json:"definedTags"`
}

func (m UpdateJavaLicenseAcceptanceRecordDetails) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m UpdateJavaLicenseAcceptanceRecordDetails)
 ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if _, ok := GetMappingLicenseAcceptanceStatusEnum(string(m.LicenseAcceptanceStatus)); !ok &&
m.LicenseAcceptanceStatus != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LicenseAcceptanceStatus: %s.
Supported values are: %s.", m.LicenseAcceptanceStatus,
strings.Join(GetLicenseAcceptanceStatusEnumStringValues(), ",")))
 }

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
```

```
 }
 return false, nil
}
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// Code generated. DO NOT EDIT.

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
)

// DeleteProductLicenseRequest wrapper for the DeleteProductLicense operation
//
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-
examples/latest/licensemanager/DeleteProductLicense.go.html to see an example of how to use
DeleteProductLicenseRequest.
type DeleteProductLicenseRequest struct {

 // Unique product license identifier.
 ProductLicenseId *string `mandatory:"true" contributesTo:"path" name:"productLicenseId"`

 // The unique Oracle-assigned identifier for the request. If you need to contact
 Oracle about a
 // particular request, please provide the request ID.
 OpcRequestId *string `mandatory:"false" contributesTo:"header" name:"opc-request-id"`

 // For optimistic concurrency control. In the PUT or DELETE call for a resource, set the `if-match`
 // parameter to the value of the etag from a previous GET or POST response for that resource.  The resource
 // will be updated or deleted only if the etag you provide matches the resource's current etag value.
 IfMatch *string `mandatory:"false" contributesTo:"header" name:"if-match"`

 // Metadata about the request. This information will not be transmitted to the service, but
 // represents information that the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}

func (request DeleteProductLicenseRequest) String() string {
 return common.PointerString(request)
}
```

```
// HTTPRequest implements the OCIRequest interface
func (request DeleteProductLicenseRequest) HTTPRequest(method, path string, binaryRequestBody
 *common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request, error) {

 _, err := request.ValidateEnumValue()
 if err != nil {
  return http.Request{}, err
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method, path, request,
extraHeaders)
}

// BinaryRequestBody implements the OCIRequest interface
func (request DeleteProductLicenseRequest) BinaryRequestBody() (*common.OCIReadSeekCloser, bool) {

 return nil, false

}

// RetryPolicy implements the OCIRetryableRequest interface. This retrieves the specified retry policy.
func (request DeleteProductLicenseRequest) RetryPolicy() *common.RetryPolicy {
 return request.RequestMetadata.RetryPolicy
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (request DeleteProductLicenseRequest) ValidateEnumValue() (bool, error) {
 errMessage
 := []string{}
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// DeleteProductLicenseResponse wrapper for the DeleteProductLicense operation
type DeleteProductLicenseResponse struct {

 // The underlying http response
 RawResponse *http.Response

 // Unique Oracle-assigned identifier for the asynchronous request. You can use this to query the status of the
asynchronous operation.
 OpcWorkRequestId *string `presentIn:"header" name:"opc-work-request-id"`

 // Unique Oracle-assigned identifier for the request. If you need to contact
```

```
 // Oracle about a particular request, please provide the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`

 // Location of the resource.
 Location *string `presentIn:"header" name:"location"`
}

func (response DeleteProductLicenseResponse) String() string {
 return common.PointerString(response)
}

// HTTPResponse implements the OCIResponse interface
func (response DeleteProductLicenseResponse)
 HTTPResponse() *http.Response {
 return response.RawResponse
}
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// Java Management Service Download API
//
// The APIs for the <a href="https://docs.oracle.com/en-us/iaas/jms/doc/java-download.html">Java Download</a>
feature of Java Management Service.
//

package jmsjavadownloads

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// JavaLicenseSummary Summary of a license type for Java.
type JavaLicenseSummary struct {

 // Commonly used name for the license type.
 DisplayName *string `mandatory:"true" json:"displayName"`

 // License Type
 LicenseType LicenseTypeEnum `mandatory:"true" json:"licenseType"`

 // Publicly accessible license URL containing the detailed
 terms and conditions.
 LicenseUrl *string `mandatory:"true" json:"licenseUrl"`
```

```
}

func (m JavaLicenseSummary) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m JavaLicenseSummary) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if _, ok := GetMappingLicenseTypeEnum(string(m.LicenseType)); !ok && m.LicenseType != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LicenseType: %s. Supported values are:
%s.", m.LicenseType, strings.Join(GetLicenseTypeEnumStringValues(), ",")))
 }

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
2.0. You may choose either license.
// Code generated. DO NOT EDIT.

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
)

// ListLicenseRecordsRequest wrapper for the ListLicenseRecords operation
//
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-examples/latest/licensemanager/ListLicenseRecords.go.html
to see an example of how to use ListLicenseRecordsRequest.
type ListLicenseRecordsRequest struct {

 // Unique product license identifier.
 ProductLicenseId *string `mandatory:"true" contributesTo:"query" name:"productLicenseId"`

 // The maximum number of items to return.
```

```
 Limit *int `mandatory:"false" contributesTo:"query"
 name:"limit"`

 // A token representing the position at which to start retrieving results. This must come from the `opc-next-page`
header field of a previous response.
 Page *string `mandatory:"false" contributesTo:"query" name:"page"`

 // The unique Oracle-assigned identifier for the request. If you need to contact Oracle about a
 // particular request, please provide the request ID.
 OpcRequestId *string `mandatory:"false" contributesTo:"header" name:"opc-request-id"`

 // The sort order to use, whether `ASC` or `DESC`.
 SortOrder ListLicenseRecordsSortOrderEnum `mandatory:"false" contributesTo:"query" name:"sortOrder"
omitEmpty:"true"`

 // Specifies the attribute with which to sort the rules.
 // Default: `expirationDate`
 // * **expirationDate:** Sorts by expiration date of the license record.
 SortBy ListLicenseRecordsSortByEnum `mandatory:"false" contributesTo:"query" name:"sortBy"
omitEmpty:"true"`

 // Metadata about the request. This information will not be transmitted
 to the service, but
 // represents information that the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}

func (request ListLicenseRecordsRequest) String() string {
 return common.PointerString(request)
}

// HTTPRequest implements the OCIRequest interface
func (request ListLicenseRecordsRequest) HTTPRequest(method, path string, binaryRequestBody
*common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request, error) {

 _, err := request.ValidateEnumValue()
 if err != nil {
  return http.Request{}, err
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method, path, request,
extraHeaders)
}

// BinaryRequestBody implements the OCIRequest interface
func (request ListLicenseRecordsRequest) BinaryRequestBody() (*common.OCIReadSeekCloser, bool) {

 return nil, false
```

```
}

// RetryPolicy implements the OCIRetryableRequest interface. This retrieves the specified retry policy.
func (request ListLicenseRecordsRequest) RetryPolicy()
 *common.RetryPolicy {
 return request.RequestMetadata.RetryPolicy
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (request ListLicenseRecordsRequest) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if _, ok := GetMappingListLicenseRecordsSortOrderEnum(string(request.SortOrder)); !ok && request.SortOrder !=
"" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for SortOrder: %s. Supported values are:
%s.", request.SortOrder, strings.Join(GetListLicenseRecordsSortOrderEnumStringValues(), ",")))
 }
 if _, ok := GetMappingListLicenseRecordsSortByEnum(string(request.SortBy)); !ok && request.SortBy != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for SortBy: %s. Supported values are: %s.",
request.SortBy, strings.Join(GetListLicenseRecordsSortByEnumStringValues(),
 ",")))
 }
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// ListLicenseRecordsResponse wrapper for the ListLicenseRecords operation
type ListLicenseRecordsResponse struct {

 // The underlying http response
 RawResponse *http.Response

 // A list of LicenseRecordCollection instances
 LicenseRecordCollection `presentIn:"body"`

 // Unique Oracle-assigned identifier for the request. If you need to contact
 // Oracle about a particular request, please provide the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`

 // For pagination of a list of items. When paging through a list, if this header appears in the response,
 // then a partial list might have been returned. Include this value as the `page` parameter for the
 // subsequent GET request to get the next batch of items.
 OpcNextPage *string `presentIn:"header" name:"opc-next-page"`
}
```

```
func (response ListLicenseRecordsResponse) String() string
 {
 return common.PointerString(response)
}

// HTTPResponse implements the OCIResponse interface
func (response ListLicenseRecordsResponse) HTTPResponse() *http.Response {
 return response.RawResponse
}

// ListLicenseRecordsSortOrderEnum Enum with underlying type: string
type ListLicenseRecordsSortOrderEnum string

// Set of constants representing the allowable values for ListLicenseRecordsSortOrderEnum
const (
 ListLicenseRecordsSortOrderAsc  ListLicenseRecordsSortOrderEnum = "ASC"
 ListLicenseRecordsSortOrderDesc ListLicenseRecordsSortOrderEnum = "DESC"
)

var mappingListLicenseRecordsSortOrderEnum = map[string]ListLicenseRecordsSortOrderEnum{
 "ASC":  ListLicenseRecordsSortOrderAsc,
 "DESC": ListLicenseRecordsSortOrderDesc,
}

var mappingListLicenseRecordsSortOrderEnumLowerCase = map[string]ListLicenseRecordsSortOrderEnum{
 "asc":  ListLicenseRecordsSortOrderAsc,
 "desc": ListLicenseRecordsSortOrderDesc,
}

// GetListLicenseRecordsSortOrderEnumValues Enumerates the set of values
 for ListLicenseRecordsSortOrderEnum
func GetListLicenseRecordsSortOrderEnumValues() []ListLicenseRecordsSortOrderEnum {
 values := make([]ListLicenseRecordsSortOrderEnum, 0)
 for _, v := range mappingListLicenseRecordsSortOrderEnum {
  values = append(values, v)
 }
 return values
}

// GetListLicenseRecordsSortOrderEnumStringValues Enumerates the set of values in String for
ListLicenseRecordsSortOrderEnum
func GetListLicenseRecordsSortOrderEnumStringValues() []string {
 return []string{
  "ASC",
  "DESC",
 }
}
```

```
// GetMappingListLicenseRecordsSortOrderEnum performs case Insensitive comparison on enum value and return
the desired enum
func GetMappingListLicenseRecordsSortOrderEnum(val string) (ListLicenseRecordsSortOrderEnum, bool) {
 enum, ok := mappingListLicenseRecordsSortOrderEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}

// ListLicenseRecordsSortByEnum Enum with underlying type: string
type ListLicenseRecordsSortByEnum string

// Set of constants representing the allowable
 values for ListLicenseRecordsSortByEnum
const (
 ListLicenseRecordsSortByExpirationdate ListLicenseRecordsSortByEnum = "expirationDate"
)

var mappingListLicenseRecordsSortByEnum = map[string]ListLicenseRecordsSortByEnum{
 "expirationDate": ListLicenseRecordsSortByExpirationdate,
}

var mappingListLicenseRecordsSortByEnumLowerCase = map[string]ListLicenseRecordsSortByEnum{
 "expirationdate": ListLicenseRecordsSortByExpirationdate,
}

// GetListLicenseRecordsSortByEnumValues Enumerates the set of values for ListLicenseRecordsSortByEnum
func GetListLicenseRecordsSortByEnumValues() []ListLicenseRecordsSortByEnum {
 values := make([]ListLicenseRecordsSortByEnum, 0)
 for _, v := range mappingListLicenseRecordsSortByEnum {
  values = append(values, v)
 }
 return values
}

// GetListLicenseRecordsSortByEnumStringValues Enumerates the set of values in String for
ListLicenseRecordsSortByEnum
func GetListLicenseRecordsSortByEnumStringValues() []string {
 return []string{
  "expirationDate",
 }
}

//
 GetMappingListLicenseRecordsSortByEnum performs case Insensitive comparison on enum value and return the
desired enum
func GetMappingListLicenseRecordsSortByEnum(val string) (ListLicenseRecordsSortByEnum, bool) {
 enum, ok := mappingListLicenseRecordsSortByEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}
```

```
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
2.0. You may choose either license.
// Code generated. DO NOT EDIT.

package jmsjavadownloads

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
)

// ListJavaLicensesRequest wrapper for the ListJavaLicenses operation
//
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-examples/latest/jmsjavadownloads/ListJavaLicenses.go.html
to see an example of how to use ListJavaLicensesRequest.
type ListJavaLicensesRequest struct {

 // Unique Java license type.
 LicenseType ListJavaLicensesLicenseTypeEnum `mandatory:"false" contributesTo:"query" name:"licenseType"
omitEmpty:"true"`

 // A filter to return only resources that match the display name.
 DisplayName
 *string `mandatory:"false" contributesTo:"query" name:"displayName"`

 // The maximum number of items to return.
 Limit *int `mandatory:"false" contributesTo:"query" name:"limit"`

 // The page token representing the page at which to start retrieving results. The token is usually retrieved from a
previous list call.
 Page *string `mandatory:"false" contributesTo:"query" name:"page"`

 // The sort order, either 'asc' or 'desc'.
 SortOrder ListJavaLicensesSortOrderEnum `mandatory:"false" contributesTo:"query" name:"sortOrder"
omitEmpty:"true"`

 // The field to sort by. If no value is specified, _licenseType_ is the default.
 SortBy ListJavaLicensesSortByEnum `mandatory:"false" contributesTo:"query" name:"sortBy" omitEmpty:"true"`

 // The client request ID for tracing.
 OpcRequestId *string `mandatory:"false" contributesTo:"header" name:"opc-request-id"`
```

```
 // Metadata about the request. This information will not be transmitted to the service, but
 // represents information that
 the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}

func (request ListJavaLicensesRequest) String() string {
 return common.PointerString(request)
}

// HTTPRequest implements the OCIRequest interface
func (request ListJavaLicensesRequest) HTTPRequest(method, path string, binaryRequestBody
*common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request, error) {

 _, err := request.ValidateEnumValue()
 if err != nil {
  return http.Request{}, err
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method, path, request,
extraHeaders)
}

// BinaryRequestBody implements the OCIRequest interface
func (request ListJavaLicensesRequest) BinaryRequestBody() (*common.OCIReadSeekCloser, bool) {

 return nil, false

}

// RetryPolicy implements the OCIRetryableRequest interface. This retrieves the specified retry policy.
func (request ListJavaLicensesRequest) RetryPolicy() *common.RetryPolicy {
 return request.RequestMetadata.RetryPolicy
}

//
 ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (request ListJavaLicensesRequest) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if _, ok := GetMappingListJavaLicensesLicenseTypeEnum(string(request.LicenseType)); !ok &&
request.LicenseType != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LicenseType: %s. Supported values are:
%s.", request.LicenseType, strings.Join(GetListJavaLicensesLicenseTypeEnumStringValues(), ",")))
 }
 if _, ok := GetMappingListJavaLicensesSortOrderEnum(string(request.SortOrder)); !ok && request.SortOrder != ""
{
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for SortOrder: %s. Supported values are:
```

```
%s.", request.SortOrder, strings.Join(GetListJavaLicensesSortOrderEnumStringValues(), ",")))
 }
 if _, ok := GetMappingListJavaLicensesSortByEnum(string(request.SortBy));
 !ok && request.SortBy != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for SortBy: %s. Supported values are: %s.",
request.SortBy, strings.Join(GetListJavaLicensesSortByEnumStringValues(), ",")))
 }
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// ListJavaLicensesResponse wrapper for the ListJavaLicenses operation
type ListJavaLicensesResponse struct {

 // The underlying http response
 RawResponse *http.Response

 // A list of JavaLicenseCollection instances
 JavaLicenseCollection `presentIn:"body"`

 // Unique Oracle-assigned identifier for the request. If you need to contact
 // Oracle about a particular request, provide the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`

 // For list pagination. When this header appears in the response, additional pages of results remain.
 // Include this value as the `page` parameter
 for the subsequent GET request to get the next batch of items.
 // For important details about how pagination works, see List Pagination
(https://docs.oracle.com/iaas/Content/API/Concepts/usingapi.htm#nine).
 OpcNextPage *string `presentIn:"header" name:"opc-next-page"`
}

func (response ListJavaLicensesResponse) String() string {
 return common.PointerString(response)
}

// HTTPResponse implements the OCIResponse interface
func (response ListJavaLicensesResponse) HTTPResponse() *http.Response {
 return response.RawResponse
}

// ListJavaLicensesLicenseTypeEnum Enum with underlying type: string
type ListJavaLicensesLicenseTypeEnum string

// Set of constants representing the allowable values for ListJavaLicensesLicenseTypeEnum
const (
```

```
 ListJavaLicensesLicenseTypeOtn        ListJavaLicensesLicenseTypeEnum = "OTN"
 ListJavaLicensesLicenseTypeNftc       ListJavaLicensesLicenseTypeEnum = "NFTC"
 ListJavaLicensesLicenseTypeRestricted ListJavaLicensesLicenseTypeEnum = "RESTRICTED"
)

var
 mappingListJavaLicensesLicenseTypeEnum = map[string]ListJavaLicensesLicenseTypeEnum{
 "OTN":        ListJavaLicensesLicenseTypeOtn,
 "NFTC":       ListJavaLicensesLicenseTypeNftc,
 "RESTRICTED": ListJavaLicensesLicenseTypeRestricted,
}

var mappingListJavaLicensesLicenseTypeEnumLowerCase = map[string]ListJavaLicensesLicenseTypeEnum{
 "otn":        ListJavaLicensesLicenseTypeOtn,
 "nftc":       ListJavaLicensesLicenseTypeNftc,
 "restricted": ListJavaLicensesLicenseTypeRestricted,
}

// GetListJavaLicensesLicenseTypeEnumValues Enumerates the set of values for
ListJavaLicensesLicenseTypeEnum
func GetListJavaLicensesLicenseTypeEnumValues() []ListJavaLicensesLicenseTypeEnum {
 values := make([]ListJavaLicensesLicenseTypeEnum, 0)
 for _, v := range mappingListJavaLicensesLicenseTypeEnum {
  values = append(values, v)
 }
 return values
}

// GetListJavaLicensesLicenseTypeEnumStringValues Enumerates the set of values in String for
ListJavaLicensesLicenseTypeEnum
func GetListJavaLicensesLicenseTypeEnumStringValues()
 []string {
 return []string{
  "OTN",
  "NFTC",
  "RESTRICTED",
 }
}

// GetMappingListJavaLicensesLicenseTypeEnum performs case Insensitive comparison on enum value and return
the desired enum
func GetMappingListJavaLicensesLicenseTypeEnum(val string) (ListJavaLicensesLicenseTypeEnum, bool) {
 enum, ok := mappingListJavaLicensesLicenseTypeEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}

// ListJavaLicensesSortOrderEnum Enum with underlying type: string
type ListJavaLicensesSortOrderEnum string
```

```
// Set of constants representing the allowable values for ListJavaLicensesSortOrderEnum
const (
 ListJavaLicensesSortOrderAsc  ListJavaLicensesSortOrderEnum = "ASC"
 ListJavaLicensesSortOrderDesc ListJavaLicensesSortOrderEnum = "DESC"
)

var mappingListJavaLicensesSortOrderEnum = map[string]ListJavaLicensesSortOrderEnum{
 "ASC":  ListJavaLicensesSortOrderAsc,
 "DESC": ListJavaLicensesSortOrderDesc,
}

var mappingListJavaLicensesSortOrderEnumLowerCase = map[string]ListJavaLicensesSortOrderEnum{
 "asc":
  ListJavaLicensesSortOrderAsc,
 "desc": ListJavaLicensesSortOrderDesc,
}

// GetListJavaLicensesSortOrderEnumValues Enumerates the set of values for ListJavaLicensesSortOrderEnum
func GetListJavaLicensesSortOrderEnumValues() []ListJavaLicensesSortOrderEnum {
 values := make([]ListJavaLicensesSortOrderEnum, 0)
 for _, v := range mappingListJavaLicensesSortOrderEnum {
  values = append(values, v)
 }
 return values
}

// GetListJavaLicensesSortOrderEnumStringValues Enumerates the set of values in String for
ListJavaLicensesSortOrderEnum
func GetListJavaLicensesSortOrderEnumStringValues() []string {
 return []string{
  "ASC",
  "DESC",
 }
}

// GetMappingListJavaLicensesSortOrderEnum performs case Insensitive comparison on enum value and return the
desired enum
func GetMappingListJavaLicensesSortOrderEnum(val string) (ListJavaLicensesSortOrderEnum, bool) {
 enum, ok := mappingListJavaLicensesSortOrderEnumLowerCase[strings.ToLower(val)]
 return enum,
 ok
}

// ListJavaLicensesSortByEnum Enum with underlying type: string
type ListJavaLicensesSortByEnum string

// Set of constants representing the allowable values for ListJavaLicensesSortByEnum
```

```
const (
 ListJavaLicensesSortByLicensetype ListJavaLicensesSortByEnum = "licenseType"
 ListJavaLicensesSortByDisplayname ListJavaLicensesSortByEnum = "displayName"
)

var mappingListJavaLicensesSortByEnum = map[string]ListJavaLicensesSortByEnum{
 "licenseType": ListJavaLicensesSortByLicensetype,
 "displayName": ListJavaLicensesSortByDisplayname,
}

var mappingListJavaLicensesSortByEnumLowerCase = map[string]ListJavaLicensesSortByEnum{
 "licensetype": ListJavaLicensesSortByLicensetype,
 "displayname": ListJavaLicensesSortByDisplayname,
}

// GetListJavaLicensesSortByEnumValues Enumerates the set of values for ListJavaLicensesSortByEnum
func GetListJavaLicensesSortByEnumValues() []ListJavaLicensesSortByEnum {
 values := make([]ListJavaLicensesSortByEnum, 0)
 for _, v := range mappingListJavaLicensesSortByEnum
 {
  values = append(values, v)
 }
 return values
}

// GetListJavaLicensesSortByEnumStringValues Enumerates the set of values in String for
ListJavaLicensesSortByEnum
func GetListJavaLicensesSortByEnumStringValues() []string {
 return []string{
  "licenseType",
  "displayName",
 }
}

// GetMappingListJavaLicensesSortByEnum performs case Insensitive comparison on enum value and return the
desired enum
func GetMappingListJavaLicensesSortByEnum(val string) (ListJavaLicensesSortByEnum, bool) {
 enum, ok := mappingListJavaLicensesSortByEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
2.0. You may choose either license.
// Code generated. DO NOT EDIT.

// Java Management Service Download API
//
```

```
// The APIs for the <a href="https://docs.oracle.com/en-us/iaas/jms/doc/java-download.html">Java Download</a>
feature of Java Management Service.
//

package jmsjavadownloads

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// JavaLicenseAcceptanceRecord User acceptance record for a Java license.
type JavaLicenseAcceptanceRecord struct {

 // The unique identifier for the acceptance record.
 Id *string `mandatory:"true" json:"id"`

 // Status of license acceptance.
 LicenseAcceptanceStatus LicenseAcceptanceStatusEnum `mandatory:"true" json:"licenseAcceptanceStatus"`

 //
 The tenancy OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm) of the user accepting
the license.
 CompartmentId *string `mandatory:"true" json:"compartmentId"`

 // License type associated with the acceptance.
 LicenseType LicenseTypeEnum `mandatory:"true" json:"licenseType"`

 CreatedBy *Principal `mandatory:"true" json:"createdBy"`

 // The date and time of license acceptance (formatted according to RFC3339
(https://datatracker.ietf.org/doc/html/rfc3339)).
 TimeAccepted *common.SDKTime `mandatory:"true" json:"timeAccepted"`

 LastUpdatedBy *Principal `mandatory:"false" json:"lastUpdatedBy"`

 // The date and time of last update (formatted according to RFC3339 (https://datatracker.ietf.org/doc/html/rfc3339)).
 TimeLastUpdated *common.SDKTime `mandatory:"false" json:"timeLastUpdated"`

 // The current state of the JavaLicenseAcceptanceRecord.
 LifecycleState LifecycleStateEnum `mandatory:"false" json:"lifecycleState,omitempty"`

 // Simple key-value
 pair that is applied without any predefined name, type, or scope. Exists for cross-compatibility only.
 // Example: `{"bar-key": "value"}`. (See Managing Tags and Tag Namespaces
(https://docs.oracle.com/iaas/Content/Tagging/Concepts/understandingfreeformtags.htm).)
 FreeformTags map[string]string `mandatory:"false" json:"freeformTags"`
```

```
 // Defined tags for this resource. Each key is predefined and scoped to a namespace.
 // Example: `{"foo-namespace": {"bar-key": "value"}}`. (See Understanding Free-form Tags
(https://docs.oracle.com/iaas/Content/Tagging/Tasks/managingtagsandtagnamespaces.htm)).
 DefinedTags map[string]map[string]interface{} `mandatory:"false" json:"definedTags"`

 // System tags for this resource. Each key is predefined and scoped to a namespace.
 // For more information, see Resource Tags
(https://docs.oracle.com/iaas/Content/General/Concepts/resourcetags.htm).
 // System tags can be viewed by users, but can only be created by the system.
 // Example: `{"orcl-cloud":
 {"free-tier-retained": "true"}}`
 SystemTags map[string]map[string]interface{} `mandatory:"false" json:"systemTags"`
}

func (m JavaLicenseAcceptanceRecord) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m JavaLicenseAcceptanceRecord) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if _, ok := GetMappingLicenseAcceptanceStatusEnum(string(m.LicenseAcceptanceStatus)); !ok &&
m.LicenseAcceptanceStatus != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LicenseAcceptanceStatus: %s.
Supported values are: %s.", m.LicenseAcceptanceStatus,
strings.Join(GetLicenseAcceptanceStatusEnumStringValues(), ",")))
 }
 if _, ok := GetMappingLicenseTypeEnum(string(m.LicenseType)); !ok && m.LicenseType != "" {
  errMessage = append(errMessage,
 fmt.Sprintf("unsupported enum value for LicenseType: %s. Supported values are: %s.", m.LicenseType,
strings.Join(GetLicenseTypeEnumStringValues(), ",")))
 }

 if _, ok := GetMappingLifecycleStateEnum(string(m.LifecycleState)); !ok && m.LifecycleState != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LifecycleState: %s. Supported values
are: %s.", m.LifecycleState, strings.Join(GetLifecycleStateEnumStringValues(), ",")))
 }
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
// Copyright (c) 2016, 2018, 2025, Oracle and/or its affiliates.  All rights reserved.
// This software is dual-licensed to you under the Universal Permissive License (UPL) 1.0 as shown at
https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
```

```
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// Code generated. DO NOT EDIT.

package jmsjavadownloads

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
)

// GetJavaLicenseAcceptanceRecordRequest wrapper for the GetJavaLicenseAcceptanceRecord operation
//
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-
examples/latest/jmsjavadownloads/GetJavaLicenseAcceptanceRecord.go.html to see an example of how to use
GetJavaLicenseAcceptanceRecordRequest.
type GetJavaLicenseAcceptanceRecordRequest struct {

 // Unique Java license acceptance record identifier.
 JavaLicenseAcceptanceRecordId *string `mandatory:"true" contributesTo:"path"
name:"javaLicenseAcceptanceRecordId"`

 //
 The client request ID for tracing.
 OpcRequestId *string `mandatory:"false" contributesTo:"header" name:"opc-request-id"`

 // Metadata about the request. This information will not be transmitted to the service, but
 // represents information that the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}

func (request GetJavaLicenseAcceptanceRecordRequest) String() string {
 return common.PointerString(request)
}

// HTTPRequest implements the OCIRequest interface
func (request GetJavaLicenseAcceptanceRecordRequest) HTTPRequest(method, path string, binaryRequestBody
*common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request, error) {

 _, err := request.ValidateEnumValue()
 if err != nil {
  return http.Request{}, err
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method, path, request,
extraHeaders)
```

```
}

// BinaryRequestBody implements the OCIRequest interface
func (request GetJavaLicenseAcceptanceRecordRequest)
 BinaryRequestBody() (*common.OCIReadSeekCloser, bool) {

 return nil, false

}

// RetryPolicy implements the OCIRetryableRequest interface. This retrieves the specified retry policy.
func (request GetJavaLicenseAcceptanceRecordRequest) RetryPolicy() *common.RetryPolicy {
 return request.RequestMetadata.RetryPolicy
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (request GetJavaLicenseAcceptanceRecordRequest) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// GetJavaLicenseAcceptanceRecordResponse wrapper for the GetJavaLicenseAcceptanceRecord operation
type GetJavaLicenseAcceptanceRecordResponse struct {

 // The underlying http response
 RawResponse *http.Response

 // The JavaLicenseAcceptanceRecord
 instance
 JavaLicenseAcceptanceRecord `presentIn:"body"`

 // Unique Oracle-assigned identifier for the request. If you need to contact
 // Oracle about a particular request, provide the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`

 // For optimistic concurrency control. See `if-match`.
 Etag *string `presentIn:"header" name:"etag"`
}

func (response GetJavaLicenseAcceptanceRecordResponse) String() string {
 return common.PointerString(response)
}
```

```
// HTTPResponse implements the OCIResponse interface
func (response GetJavaLicenseAcceptanceRecordResponse) HTTPResponse() *http.Response {
 return response.RawResponse
}
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// Java Management Service Download API
//
// The APIs for the <a href="https://docs.oracle.com/en-us/iaas/jms/doc/java-download.html">Java Download</a>
feature of Java Management Service.
//

package jmsjavadownloads

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// JavaLicense Details about a license type for Java.
type JavaLicense struct {

 // Commonly used name for the license type.
 DisplayName *string `mandatory:"true" json:"displayName"`

 // License Type
 LicenseType LicenseTypeEnum `mandatory:"true" json:"licenseType"`

 // Publicly accessible license URL containing the detailed terms and conditions.
 LicenseUrl
 *string `mandatory:"true" json:"licenseUrl"`
}

func (m JavaLicense) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m JavaLicense) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if _, ok := GetMappingLicenseTypeEnum(string(m.LicenseType)); !ok && m.LicenseType != "" {
```

```
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LicenseType: %s. Supported values are: %s.", m.LicenseType, strings.Join(GetLicenseTypeEnumStringValues(), ",")))
 }

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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// Code generated. DO NOT EDIT.

package jmsjavadownloads

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
)

// ListJavaLicenseAcceptanceRecordsRequest wrapper for the ListJavaLicenseAcceptanceRecords operation
//
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-examples/latest/jmsjavadownloads/ListJavaLicenseAcceptanceRecords.go.html to see an example of how to use ListJavaLicenseAcceptanceRecordsRequest.
type ListJavaLicenseAcceptanceRecordsRequest struct {

 // The OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm) of the tenancy.
 CompartmentId *string `mandatory:"true"
 contributesTo:"query" name:"compartmentId"`

 // A filter to return only resources that match the user principal detail.
 // The search string can be any of the property values from the Principal object.
 // This object is used as a response datatype for the `createdBy` and `lastUpdatedBy` fields in applicable resource.
 SearchByUser *string `mandatory:"false" contributesTo:"query" name:"searchByUser"`

 // Unique Java license acceptance record identifier.
 Id *string `mandatory:"false" contributesTo:"query" name:"id"`

 // Unique Java license type.
 LicenseType ListJavaLicenseAcceptanceRecordsLicenseTypeEnum `mandatory:"false" contributesTo:"query" name:"licenseType" omitEmpty:"true"`
```

```
 // The status of license acceptance.
 Status ListJavaLicenseAcceptanceRecordsStatusEnum `mandatory:"false" contributesTo:"query" name:"status"
omitEmpty:"true"`

 // The maximum number of items to return.
 Limit *int `mandatory:"false" contributesTo:"query" name:"limit"`

 // The page token representing
 the page at which to start retrieving results. The token is usually retrieved from a previous list call.
 Page *string `mandatory:"false" contributesTo:"query" name:"page"`

 // The sort order, either 'asc' or 'desc'.
 SortOrder ListJavaLicenseAcceptanceRecordsSortOrderEnum `mandatory:"false" contributesTo:"query"
name:"sortOrder" omitEmpty:"true"`

 // The field to sort by. If no value is specified, _timeAccepted_ is the default.
 SortBy ListJavaLicenseAcceptanceRecordsSortByEnum `mandatory:"false" contributesTo:"query" name:"sortBy"
omitEmpty:"true"`

 // The client request ID for tracing.
 OpcRequestId *string `mandatory:"false" contributesTo:"header" name:"opc-request-id"`

 // Metadata about the request. This information will not be transmitted to the service, but
 // represents information that the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}

func (request ListJavaLicenseAcceptanceRecordsRequest) String() string {
 return common.PointerString(request)
}

//
 HTTPRequest implements the OCIRequest interface
func (request ListJavaLicenseAcceptanceRecordsRequest) HTTPRequest(method, path string, binaryRequestBody
*common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request, error) {

 _, err := request.ValidateEnumValue()
 if err != nil {
  return http.Request{}, err
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method, path, request,
extraHeaders)
}

// BinaryRequestBody implements the OCIRequest interface
func (request ListJavaLicenseAcceptanceRecordsRequest) BinaryRequestBody() (*common.OCIReadSeekCloser,
bool) {
```

```
 return nil, false

}

// RetryPolicy implements the OCIRetryableRequest interface. This retrieves the specified retry policy.
func (request ListJavaLicenseAcceptanceRecordsRequest) RetryPolicy() *common.RetryPolicy {
 return request.RequestMetadata.RetryPolicy
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called
 during constructing API request process
// Not recommended for calling this function directly
func (request ListJavaLicenseAcceptanceRecordsRequest) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if _, ok := GetMappingListJavaLicenseAcceptanceRecordsLicenseTypeEnum(string(request.LicenseType)); !ok &&
request.LicenseType != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LicenseType: %s. Supported values are:
%s.", request.LicenseType, strings.Join(GetListJavaLicenseAcceptanceRecordsLicenseTypeEnumStringValues(),
",")))
 }
 if _, ok := GetMappingListJavaLicenseAcceptanceRecordsStatusEnum(string(request.Status)); !ok &&
request.Status != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for Status: %s. Supported values are: %s.",
request.Status, strings.Join(GetListJavaLicenseAcceptanceRecordsStatusEnumStringValues(), ",")))
 }
 if _, ok := GetMappingListJavaLicenseAcceptanceRecordsSortOrderEnum(string(request.SortOrder));
 !ok && request.SortOrder != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for SortOrder: %s. Supported values are:
%s.", request.SortOrder, strings.Join(GetListJavaLicenseAcceptanceRecordsSortOrderEnumStringValues(), ",")))
 }
 if _, ok := GetMappingListJavaLicenseAcceptanceRecordsSortByEnum(string(request.SortBy)); !ok &&
request.SortBy != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for SortBy: %s. Supported values are: %s.",
request.SortBy, strings.Join(GetListJavaLicenseAcceptanceRecordsSortByEnumStringValues(), ",")))
 }
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// ListJavaLicenseAcceptanceRecordsResponse wrapper for the ListJavaLicenseAcceptanceRecords operation
type ListJavaLicenseAcceptanceRecordsResponse struct {

 // The underlying http response
 RawResponse *http.Response
```

```
 // A list of JavaLicenseAcceptanceRecordCollection instances
 JavaLicenseAcceptanceRecordCollection
 `presentIn:"body"`

 // Unique Oracle-assigned identifier for the request. If you need to contact
 // Oracle about a particular request, provide the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`

 // For list pagination. When this header appears in the response, additional pages of results remain.
 // Include this value as the `page` parameter for the subsequent GET request to get the next batch of items.
 // For important details about how pagination works, see List Pagination
(https://docs.oracle.com/iaas/Content/API/Concepts/usingapi.htm#nine).
 OpcNextPage *string `presentIn:"header" name:"opc-next-page"`
}

func (response ListJavaLicenseAcceptanceRecordsResponse) String() string {
 return common.PointerString(response)
}

// HTTPResponse implements the OCIResponse interface
func (response ListJavaLicenseAcceptanceRecordsResponse) HTTPResponse() *http.Response {
 return response.RawResponse
}

// ListJavaLicenseAcceptanceRecordsLicenseTypeEnum
 Enum with underlying type: string
type ListJavaLicenseAcceptanceRecordsLicenseTypeEnum string

// Set of constants representing the allowable values for ListJavaLicenseAcceptanceRecordsLicenseTypeEnum
const (
 ListJavaLicenseAcceptanceRecordsLicenseTypeOtn        ListJavaLicenseAcceptanceRecordsLicenseTypeEnum =
"OTN"
 ListJavaLicenseAcceptanceRecordsLicenseTypeNftc       ListJavaLicenseAcceptanceRecordsLicenseTypeEnum =
"NFTC"
 ListJavaLicenseAcceptanceRecordsLicenseTypeRestricted ListJavaLicenseAcceptanceRecordsLicenseTypeEnum =
"RESTRICTED"
)

var mappingListJavaLicenseAcceptanceRecordsLicenseTypeEnum =
map[string]ListJavaLicenseAcceptanceRecordsLicenseTypeEnum{
 "OTN":        ListJavaLicenseAcceptanceRecordsLicenseTypeOtn,
 "NFTC":       ListJavaLicenseAcceptanceRecordsLicenseTypeNftc,
 "RESTRICTED": ListJavaLicenseAcceptanceRecordsLicenseTypeRestricted,
}

var mappingListJavaLicenseAcceptanceRecordsLicenseTypeEnumLowerCase =
map[string]ListJavaLicenseAcceptanceRecordsLicenseTypeEnum{
```

```
 "otn":
        ListJavaLicenseAcceptanceRecordsLicenseTypeOtn,
 "nftc":       ListJavaLicenseAcceptanceRecordsLicenseTypeNftc,
 "restricted": ListJavaLicenseAcceptanceRecordsLicenseTypeRestricted,
}

// GetListJavaLicenseAcceptanceRecordsLicenseTypeEnumValues Enumerates the set of values for
ListJavaLicenseAcceptanceRecordsLicenseTypeEnum
func GetListJavaLicenseAcceptanceRecordsLicenseTypeEnumValues()
[]ListJavaLicenseAcceptanceRecordsLicenseTypeEnum {
 values := make([]ListJavaLicenseAcceptanceRecordsLicenseTypeEnum, 0)
 for _, v := range mappingListJavaLicenseAcceptanceRecordsLicenseTypeEnum {
  values = append(values, v)
 }
 return values
}

// GetListJavaLicenseAcceptanceRecordsLicenseTypeEnumStringValues Enumerates the set of values in String for
ListJavaLicenseAcceptanceRecordsLicenseTypeEnum
func GetListJavaLicenseAcceptanceRecordsLicenseTypeEnumStringValues() []string {
 return []string{
  "OTN",
  "NFTC",
  "RESTRICTED",
 }
}

// GetMappingListJavaLicenseAcceptanceRecordsLicenseTypeEnum
 performs case Insensitive comparison on enum value and return the desired enum
func GetMappingListJavaLicenseAcceptanceRecordsLicenseTypeEnum(val string)
(ListJavaLicenseAcceptanceRecordsLicenseTypeEnum, bool) {
 enum, ok := mappingListJavaLicenseAcceptanceRecordsLicenseTypeEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}

// ListJavaLicenseAcceptanceRecordsStatusEnum Enum with underlying type: string
type ListJavaLicenseAcceptanceRecordsStatusEnum string

// Set of constants representing the allowable values for ListJavaLicenseAcceptanceRecordsStatusEnum
const (
 ListJavaLicenseAcceptanceRecordsStatusAccepted ListJavaLicenseAcceptanceRecordsStatusEnum =
"ACCEPTED"
 ListJavaLicenseAcceptanceRecordsStatusRevoked  ListJavaLicenseAcceptanceRecordsStatusEnum = "REVOKED"
)

var mappingListJavaLicenseAcceptanceRecordsStatusEnum =
map[string]ListJavaLicenseAcceptanceRecordsStatusEnum{
 "ACCEPTED": ListJavaLicenseAcceptanceRecordsStatusAccepted,
```

```
 "REVOKED":
  ListJavaLicenseAcceptanceRecordsStatusRevoked,
}

var mappingListJavaLicenseAcceptanceRecordsStatusEnumLowerCase =
map[string]ListJavaLicenseAcceptanceRecordsStatusEnum{
 "accepted": ListJavaLicenseAcceptanceRecordsStatusAccepted,
 "revoked":  ListJavaLicenseAcceptanceRecordsStatusRevoked,
}

// GetListJavaLicenseAcceptanceRecordsStatusEnumValues Enumerates the set of values for
ListJavaLicenseAcceptanceRecordsStatusEnum
func GetListJavaLicenseAcceptanceRecordsStatusEnumValues() []ListJavaLicenseAcceptanceRecordsStatusEnum
{
 values := make([]ListJavaLicenseAcceptanceRecordsStatusEnum, 0)
 for _, v := range mappingListJavaLicenseAcceptanceRecordsStatusEnum {
  values = append(values, v)
 }
 return values
}

// GetListJavaLicenseAcceptanceRecordsStatusEnumStringValues Enumerates the set of values in String for
ListJavaLicenseAcceptanceRecordsStatusEnum
func GetListJavaLicenseAcceptanceRecordsStatusEnumStringValues() []string {
 return []string{
  "ACCEPTED",
  "REVOKED",
 }
}

//
 GetMappingListJavaLicenseAcceptanceRecordsStatusEnum performs case Insensitive comparison on enum value
and return the desired enum
func GetMappingListJavaLicenseAcceptanceRecordsStatusEnum(val string)
(ListJavaLicenseAcceptanceRecordsStatusEnum, bool) {
 enum, ok := mappingListJavaLicenseAcceptanceRecordsStatusEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}

// ListJavaLicenseAcceptanceRecordsSortOrderEnum Enum with underlying type: string
type ListJavaLicenseAcceptanceRecordsSortOrderEnum string

// Set of constants representing the allowable values for ListJavaLicenseAcceptanceRecordsSortOrderEnum
const (
 ListJavaLicenseAcceptanceRecordsSortOrderAsc  ListJavaLicenseAcceptanceRecordsSortOrderEnum = "ASC"
 ListJavaLicenseAcceptanceRecordsSortOrderDesc ListJavaLicenseAcceptanceRecordsSortOrderEnum = "DESC"
)
```

```
var mappingListJavaLicenseAcceptanceRecordsSortOrderEnum =
map[string]ListJavaLicenseAcceptanceRecordsSortOrderEnum{
 "ASC":  ListJavaLicenseAcceptanceRecordsSortOrderAsc,
 "DESC":
 ListJavaLicenseAcceptanceRecordsSortOrderDesc,
}

var mappingListJavaLicenseAcceptanceRecordsSortOrderEnumLowerCase =
map[string]ListJavaLicenseAcceptanceRecordsSortOrderEnum{
 "asc":  ListJavaLicenseAcceptanceRecordsSortOrderAsc,
 "desc": ListJavaLicenseAcceptanceRecordsSortOrderDesc,
}

// GetListJavaLicenseAcceptanceRecordsSortOrderEnumValues Enumerates the set of values for
ListJavaLicenseAcceptanceRecordsSortOrderEnum
func GetListJavaLicenseAcceptanceRecordsSortOrderEnumValues()
[]ListJavaLicenseAcceptanceRecordsSortOrderEnum {
 values := make([]ListJavaLicenseAcceptanceRecordsSortOrderEnum, 0)
 for _, v := range mappingListJavaLicenseAcceptanceRecordsSortOrderEnum {
  values = append(values, v)
 }
 return values
}

// GetListJavaLicenseAcceptanceRecordsSortOrderEnumStringValues Enumerates the set of values in String for
ListJavaLicenseAcceptanceRecordsSortOrderEnum
func GetListJavaLicenseAcceptanceRecordsSortOrderEnumStringValues() []string {
 return []string{
  "ASC",
  "DESC",
 }
}

//
 GetMappingListJavaLicenseAcceptanceRecordsSortOrderEnum performs case Insensitive comparison on enum
value and return the desired enum
func GetMappingListJavaLicenseAcceptanceRecordsSortOrderEnum(val string)
(ListJavaLicenseAcceptanceRecordsSortOrderEnum, bool) {
 enum, ok := mappingListJavaLicenseAcceptanceRecordsSortOrderEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}

// ListJavaLicenseAcceptanceRecordsSortByEnum Enum with underlying type: string
type ListJavaLicenseAcceptanceRecordsSortByEnum string

// Set of constants representing the allowable values for ListJavaLicenseAcceptanceRecordsSortByEnum
const (
 ListJavaLicenseAcceptanceRecordsSortByTimeaccepted          ListJavaLicenseAcceptanceRecordsSortByEnum =
```

```
"timeAccepted"
 ListJavaLicenseAcceptanceRecordsSortByTimelastupdated        ListJavaLicenseAcceptanceRecordsSortByEnum =
"timeLastUpdated"
 ListJavaLicenseAcceptanceRecordsSortByLicenseacceptancestatus
ListJavaLicenseAcceptanceRecordsSortByEnum
 = "licenseAcceptanceStatus"
)

var mappingListJavaLicenseAcceptanceRecordsSortByEnum =
map[string]ListJavaLicenseAcceptanceRecordsSortByEnum{
 "timeAccepted":            ListJavaLicenseAcceptanceRecordsSortByTimeaccepted,
 "timeLastUpdated":         ListJavaLicenseAcceptanceRecordsSortByTimelastupdated,
 "licenseAcceptanceStatus": ListJavaLicenseAcceptanceRecordsSortByLicenseacceptancestatus,
}

var mappingListJavaLicenseAcceptanceRecordsSortByEnumLowerCase =
map[string]ListJavaLicenseAcceptanceRecordsSortByEnum{
 "timeaccepted":            ListJavaLicenseAcceptanceRecordsSortByTimeaccepted,
 "timelastupdated":         ListJavaLicenseAcceptanceRecordsSortByTimelastupdated,
 "licenseacceptancestatus": ListJavaLicenseAcceptanceRecordsSortByLicenseacceptancestatus,
}

// GetListJavaLicenseAcceptanceRecordsSortByEnumValues Enumerates the set of values for
ListJavaLicenseAcceptanceRecordsSortByEnum
func GetListJavaLicenseAcceptanceRecordsSortByEnumValues()
[]ListJavaLicenseAcceptanceRecordsSortByEnum
 {
 values := make([]ListJavaLicenseAcceptanceRecordsSortByEnum, 0)
 for _, v := range mappingListJavaLicenseAcceptanceRecordsSortByEnum {
  values = append(values, v)
 }
 return values
}

// GetListJavaLicenseAcceptanceRecordsSortByEnumStringValues Enumerates the set of values in String for
ListJavaLicenseAcceptanceRecordsSortByEnum
func GetListJavaLicenseAcceptanceRecordsSortByEnumStringValues() []string {
 return []string{
  "timeAccepted",
  "timeLastUpdated",
  "licenseAcceptanceStatus",
 }
}

// GetMappingListJavaLicenseAcceptanceRecordsSortByEnum performs case Insensitive comparison on enum
value and return the desired enum
func GetMappingListJavaLicenseAcceptanceRecordsSortByEnum(val string)
(ListJavaLicenseAcceptanceRecordsSortByEnum, bool) {
```

```
 enum, ok := mappingListJavaLicenseAcceptanceRecordsSortByEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}
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2.0. You may choose either license.
// Code generated. DO NOT EDIT.

// Identity and Access Management Service API
//
// Use the Identity and Access Management Service API to manage users, groups, identity domains, compartments,
policies, tagging, and limits. For information about managing users, groups, compartments, and policies, see Identity
and Access Management (without identity domains)
(https://docs.oracle.com/iaas/Content/Identity/Concepts/overview.htm). For information about tagging and service
limits, see Tagging (https://docs.oracle.com/iaas/Content/Tagging/Concepts/taggingoverview.htm) and Service
Limits (https://docs.oracle.com/iaas/Content/General/Concepts/servicelimits.htm). For
 information about creating, modifying, and deleting identity domains, see Identity and Access Management (with
identity domains) (https://docs.oracle.com/iaas/Content/Identity/home.htm).
//

package identity

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// ChangeTasDomainLicenseTypeDetails (For tenancies that support identity domains) Update the identity domain
license type.
type ChangeTasDomainLicenseTypeDetails struct {

 // The license type of the identity domain.
 LicenseType *string `mandatory:"false" json:"licenseType"`
}

func (m ChangeTasDomainLicenseTypeDetails) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m ChangeTasDomainLicenseTypeDetails) ValidateEnumValue() (bool, error) {
 errMessage := []string{}

 if len(errMessage) > 0 {
```

```
 return
true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
return false, nil
}
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// Oracle Cloud VMware Solution API
//
// Use the Oracle Cloud VMware API to create SDDCs and manage ESXi hosts and software.
// For more information, see Oracle Cloud VMware Solution
(https://docs.oracle.com/iaas/Content/VMware/Concepts/ocvsoverview.htm).
//

package ocvp

import (
 "strings"
)

// HcxLicenseStatusEnum Enum with underlying type: string
type HcxLicenseStatusEnum string

// Set of constants representing the allowable values for HcxLicenseStatusEnum
const (
 HcxLicenseStatusAvailable   HcxLicenseStatusEnum = "AVAILABLE"
 HcxLicenseStatusConsumed    HcxLicenseStatusEnum = "CONSUMED"
 HcxLicenseStatusDeactivated HcxLicenseStatusEnum
 = "DEACTIVATED"
 HcxLicenseStatusDeleted     HcxLicenseStatusEnum = "DELETED"
)

var mappingHcxLicenseStatusEnum = map[string]HcxLicenseStatusEnum{
 "AVAILABLE":   HcxLicenseStatusAvailable,
 "CONSUMED":    HcxLicenseStatusConsumed,
 "DEACTIVATED": HcxLicenseStatusDeactivated,
 "DELETED":     HcxLicenseStatusDeleted,
}

var mappingHcxLicenseStatusEnumLowerCase = map[string]HcxLicenseStatusEnum{
 "available":   HcxLicenseStatusAvailable,
 "consumed":    HcxLicenseStatusConsumed,
 "deactivated": HcxLicenseStatusDeactivated,
 "deleted":     HcxLicenseStatusDeleted,
```

```
}

// GetHcxLicenseStatusEnumValues Enumerates the set of values for HcxLicenseStatusEnum
func GetHcxLicenseStatusEnumValues() []HcxLicenseStatusEnum {
 values := make([]HcxLicenseStatusEnum, 0)
 for _, v := range mappingHcxLicenseStatusEnum {
  values = append(values, v)
 }
 return values
}

// GetHcxLicenseStatusEnumStringValues Enumerates the set of values in String for HcxLicenseStatusEnum
func GetHcxLicenseStatusEnumStringValues()
 []string {
 return []string{
  "AVAILABLE",
  "CONSUMED",
  "DEACTIVATED",
  "DELETED",
 }
}

// GetMappingHcxLicenseStatusEnum performs case Insensitive comparison on enum value and return the desired
enum
func GetMappingHcxLicenseStatusEnum(val string) (HcxLicenseStatusEnum, bool) {
 enum, ok := mappingHcxLicenseStatusEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}
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// Code generated. DO NOT EDIT.

// Java Management Service Download API
//
// The APIs for the <a href="https://docs.oracle.com/en-us/iaas/jms/doc/java-download.html">Java Download</a>
feature of Java Management Service.
//

package jmsjavadownloads

import (
 "strings"
)

// LicenseAcceptanceSortByEnum Enum with underlying type: string
type LicenseAcceptanceSortByEnum string
```

```
// Set of constants representing the allowable values for LicenseAcceptanceSortByEnum
const (
 LicenseAcceptanceSortByTimeAccepted            LicenseAcceptanceSortByEnum = "timeAccepted"
 LicenseAcceptanceSortByTimeLastUpdated         LicenseAcceptanceSortByEnum = "timeLastUpdated"
 LicenseAcceptanceSortByLicenseAcceptanceStatus
 LicenseAcceptanceSortByEnum = "licenseAcceptanceStatus"
)

var mappingLicenseAcceptanceSortByEnum = map[string]LicenseAcceptanceSortByEnum{
 "timeAccepted":            LicenseAcceptanceSortByTimeAccepted,
 "timeLastUpdated":         LicenseAcceptanceSortByTimeLastUpdated,
 "licenseAcceptanceStatus": LicenseAcceptanceSortByLicenseAcceptanceStatus,
}

var mappingLicenseAcceptanceSortByEnumLowerCase = map[string]LicenseAcceptanceSortByEnum{
 "timeaccepted":            LicenseAcceptanceSortByTimeAccepted,
 "timelastupdated":         LicenseAcceptanceSortByTimeLastUpdated,
 "licenseacceptancestatus": LicenseAcceptanceSortByLicenseAcceptanceStatus,
}

// GetLicenseAcceptanceSortByEnumValues Enumerates the set of values for LicenseAcceptanceSortByEnum
func GetLicenseAcceptanceSortByEnumValues() []LicenseAcceptanceSortByEnum {
 values := make([]LicenseAcceptanceSortByEnum, 0)
 for _, v := range mappingLicenseAcceptanceSortByEnum {
  values = append(values,
 v)
 }
 return values
}

// GetLicenseAcceptanceSortByEnumStringValues Enumerates the set of values in String for
LicenseAcceptanceSortByEnum
func GetLicenseAcceptanceSortByEnumStringValues() []string {
 return []string{
  "timeAccepted",
  "timeLastUpdated",
  "licenseAcceptanceStatus",
 }
}

// GetMappingLicenseAcceptanceSortByEnum performs case Insensitive comparison on enum value and return the
desired enum
func GetMappingLicenseAcceptanceSortByEnum(val string) (LicenseAcceptanceSortByEnum, bool) {
 enum, ok := mappingLicenseAcceptanceSortByEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}
```

```
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
2.0. You may choose either license.
// Code generated. DO NOT EDIT.

// Stack Monitoring API
//
// Stack Monitoring API.
//

package stackmonitoring

import (
 "encoding/json"
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// LicenseEnterpriseExtensibilityConfigSummary Summary of a LICENSE_ENTERPRISE_EXTENSIBILITY
configuration.
type LicenseEnterpriseExtensibilityConfigSummary struct {

 // Unique identifier that is immutable on creation.
 Id *string `mandatory:"true" json:"id"`

 // Compartment Identifier.
 CompartmentId *string `mandatory:"true" json:"compartmentId"`

 // True if enterprise extensibility is enabled, false if it is not enabled.
 IsEnabled *bool `mandatory:"true"
 json:"isEnabled"`

 // Config Identifier, can be renamed.
 DisplayName *string `mandatory:"false" json:"displayName"`

 // The time the the configuration was created. An RFC3339 formatted datetime string.
 TimeCreated *common.SDKTime `mandatory:"false" json:"timeCreated"`

 // The time the configuration was updated.
 TimeUpdated *common.SDKTime `mandatory:"false" json:"timeUpdated"`

 // Simple key-value pair that is applied without any predefined name, type or scope. Exists for cross-compatibility
only.
 // Example: `{"bar-key": "value"}`
 FreeformTags map[string]string `mandatory:"false" json:"freeformTags"`
```

```
 // Defined tags for this resource. Each key is predefined and scoped to a namespace.
 // Example: `{"foo-namespace": {"bar-key": "value"}}`
 DefinedTags map[string]map[string]interface{} `mandatory:"false" json:"definedTags"`

 // Usage of system tag keys. These predefined keys are scoped to namespaces.
 // Example: `{"orcl-cloud": {"free-tier-retained": "true"}}`
 SystemTags
 map[string]map[string]interface{} `mandatory:"false" json:"systemTags"`

 // The current state of the configuration.
 LifecycleState ConfigLifecycleStateEnum `mandatory:"true" json:"lifecycleState"`
}

// GetId returns Id
func (m LicenseEnterpriseExtensibilityConfigSummary) GetId() *string {
 return m.Id
}

// GetCompartmentId returns CompartmentId
func (m LicenseEnterpriseExtensibilityConfigSummary) GetCompartmentId() *string {
 return m.CompartmentId
}

// GetDisplayName returns DisplayName
func (m LicenseEnterpriseExtensibilityConfigSummary) GetDisplayName() *string {
 return m.DisplayName
}

// GetTimeCreated returns TimeCreated
func (m LicenseEnterpriseExtensibilityConfigSummary) GetTimeCreated() *common.SDKTime {
 return m.TimeCreated
}

// GetTimeUpdated returns TimeUpdated
func (m LicenseEnterpriseExtensibilityConfigSummary) GetTimeUpdated() *common.SDKTime {
 return m.TimeUpdated
}

// GetLifecycleState returns LifecycleState
func (m LicenseEnterpriseExtensibilityConfigSummary)
 GetLifecycleState() ConfigLifecycleStateEnum {
 return m.LifecycleState
}

// GetFreeformTags returns FreeformTags
func (m LicenseEnterpriseExtensibilityConfigSummary) GetFreeformTags() map[string]string {
 return m.FreeformTags
}
```

```
// GetDefinedTags returns DefinedTags
func (m LicenseEnterpriseExtensibilityConfigSummary) GetDefinedTags() map[string]map[string]interface{} {
 return m.DefinedTags
}

// GetSystemTags returns SystemTags
func (m LicenseEnterpriseExtensibilityConfigSummary) GetSystemTags() map[string]map[string]interface{} {
 return m.SystemTags
}

func (m LicenseEnterpriseExtensibilityConfigSummary) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m LicenseEnterpriseExtensibilityConfigSummary) ValidateEnumValue() (bool, error) {
 errMessage := []string{}

 if
 _, ok := GetMappingConfigLifecycleStateEnum(string(m.LifecycleState)); !ok && m.LifecycleState != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LifecycleState: %s. Supported values
are: %s.", m.LifecycleState, strings.Join(GetConfigLifecycleStateEnumStringValues(), ",")))
 }
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// MarshalJSON marshals to json representation
func (m LicenseEnterpriseExtensibilityConfigSummary) MarshalJSON() (buff []byte, e error) {
 type MarshalTypeLicenseEnterpriseExtensibilityConfigSummary LicenseEnterpriseExtensibilityConfigSummary
 s := struct {
  DiscriminatorParam string `json:"configType"`
  MarshalTypeLicenseEnterpriseExtensibilityConfigSummary
 }{
  "LICENSE_ENTERPRISE_EXTENSIBILITY",
  (MarshalTypeLicenseEnterpriseExtensibilityConfigSummary)(m),
 }

 return json.Marshal(&s)
}
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```

```
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// Code generated. DO NOT EDIT.

// Stack Monitoring API
//
// Stack Monitoring API.
//

package stackmonitoring

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// ManageLicenseDetails License information for a given resource.
type ManageLicenseDetails struct {

 // License edition of the monitored resource.
 License LicenseTypeEnum `mandatory:"true" json:"license"`
}

func (m ManageLicenseDetails) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this
 function directly
func (m ManageLicenseDetails) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if _, ok := GetMappingLicenseTypeEnum(string(m.License)); !ok && m.License != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for License: %s. Supported values are:
%s.", m.License, strings.Join(GetLicenseTypeEnumStringValues(), ",")))
 }

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
2.0. You may choose either license.
// Code generated. DO NOT EDIT.
```

```
// License Manager API
//
// Use the License Manager API to manage product licenses and license records. For more information, see License
Manager Overview (https://docs.oracle.com/iaas/Content/LicenseManager/Concepts/licensemanageroverview.htm).
//

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// LicenseRecordCollection The license record summary collection.
type LicenseRecordCollection struct {

 // The license record summary collection.
 Items []LicenseRecordSummary `mandatory:"true" json:"items"`
}

func (m LicenseRecordCollection) String() string {
 return common.PointerString(m)
}

//
 ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m LicenseRecordCollection) ValidateEnumValue() (bool, error) {
 errMessage := []string{}

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
2.0. You may choose either license.
// Code generated. DO NOT EDIT.

// Java Management Service Download API
//
// The APIs for the <a href="https://docs.oracle.com/en-us/iaas/jms/doc/java-download.html">Java Download</a>
feature of Java Management Service.
```

```
//

package jmsjavadownloads

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// JavaLicenseAcceptanceRecordSummary User acceptance record summary for a Java license.
type JavaLicenseAcceptanceRecordSummary struct {

 // The unique identifier for the acceptance record.
 Id *string `mandatory:"true" json:"id"`

 // Status of license acceptance.
 LicenseAcceptanceStatus LicenseAcceptanceStatusEnum `mandatory:"true" json:"licenseAcceptanceStatus"`

 //
 The tenancy OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm) of the user accepting
the license.
 CompartmentId *string `mandatory:"true" json:"compartmentId"`

 // License type associated with the acceptance.
 LicenseType LicenseTypeEnum `mandatory:"true" json:"licenseType"`

 CreatedBy *Principal `mandatory:"true" json:"createdBy"`

 // The date and time of license acceptance (formatted according to RFC3339
(https://datatracker.ietf.org/doc/html/rfc3339)).
 TimeAccepted *common.SDKTime `mandatory:"true" json:"timeAccepted"`

 LastUpdatedBy *Principal `mandatory:"false" json:"lastUpdatedBy"`

 // The date and time of last update (formatted according to RFC3339 (https://datatracker.ietf.org/doc/html/rfc3339)).
 TimeLastUpdated *common.SDKTime `mandatory:"false" json:"timeLastUpdated"`

 // The current state of the JavaLicenseAcceptanceRecord.
 LifecycleState LifecycleStateEnum `mandatory:"false" json:"lifecycleState,omitempty"`

 //
 Simple key-value pair that is applied without any predefined name, type, or scope. Exists for cross-compatibility
only.
 // Example: `{"bar-key": "value"}`. (See Managing Tags and Tag Namespaces
(https://docs.oracle.com/iaas/Content/Tagging/Concepts/understandingfreeformtags.htm).)
 FreeformTags map[string]string `mandatory:"false" json:"freeformTags"`
```

```
 // Defined tags for this resource. Each key is predefined and scoped to a namespace.
 // Example: `{"foo-namespace": {"bar-key": "value"}}`. (See Understanding Free-form Tags
(https://docs.oracle.com/iaas/Content/Tagging/Tasks/managingtagsandtagnamespaces.htm)).
 DefinedTags map[string]map[string]interface{} `mandatory:"false" json:"definedTags"`

 // System tags for this resource. Each key is predefined and scoped to a namespace.
 // For more information, see Resource Tags
(https://docs.oracle.com/iaas/Content/General/Concepts/resourcetags.htm).
 // System tags can be viewed by users, but can only be created by the system.
 //
 Example: `{"orcl-cloud": {"free-tier-retained": "true"}}`
 SystemTags map[string]map[string]interface{} `mandatory:"false" json:"systemTags"`
}

func (m JavaLicenseAcceptanceRecordSummary) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m JavaLicenseAcceptanceRecordSummary) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if _, ok := GetMappingLicenseAcceptanceStatusEnum(string(m.LicenseAcceptanceStatus)); !ok &&
m.LicenseAcceptanceStatus != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LicenseAcceptanceStatus: %s.
Supported values are: %s.", m.LicenseAcceptanceStatus,
strings.Join(GetLicenseAcceptanceStatusEnumStringValues(), ",")))
 }
 if _, ok := GetMappingLicenseTypeEnum(string(m.LicenseType)); !ok && m.LicenseType != ""
 {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LicenseType: %s. Supported values are:
%s.", m.LicenseType, strings.Join(GetLicenseTypeEnumStringValues(), ",")))
 }

 if _, ok := GetMappingLifecycleStateEnum(string(m.LifecycleState)); !ok && m.LifecycleState != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LifecycleState: %s. Supported values
are: %s.", m.LifecycleState, strings.Join(GetLifecycleStateEnumStringValues(), ",")))
 }
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
2.0. You may choose either license.
```

```
// Code generated. DO NOT EDIT.

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
)

// ListProductLicensesRequest wrapper for the ListProductLicenses operation
//
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-examples/latest/licensemanager/ListProductLicenses.go.html
to see an example of how to use ListProductLicensesRequest.
type ListProductLicensesRequest struct {

 // The compartment OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm) used for the
license record, product license, and configuration.
 CompartmentId *string `mandatory:"true" contributesTo:"query"
 name:"compartmentId"`

 // The maximum number of items to return.
 Limit *int `mandatory:"false" contributesTo:"query" name:"limit"`

 // A token representing the position at which to start retrieving results. This must come from the `opc-next-page`
header field of a previous response.
 Page *string `mandatory:"false" contributesTo:"query" name:"page"`

 // The unique Oracle-assigned identifier for the request. If you need to contact Oracle about a
 // particular request, please provide the request ID.
 OpcRequestId *string `mandatory:"false" contributesTo:"header" name:"opc-request-id"`

 // Indicates if the given compartment is the root compartment.
 IsCompartmentIdInSubtree *bool `mandatory:"false" contributesTo:"query" name:"isCompartmentIdInSubtree"`

 // The sort order to use, whether `ASC` or `DESC`.
 SortOrder ListProductLicensesSortOrderEnum `mandatory:"false" contributesTo:"query" name:"sortOrder"
omitEmpty:"true"`

 // Specifies the attribute with which to sort
 the rules.
 // Default: `totalLicenseUnitsConsumed`
 // * **totalLicenseUnitsConsumed:** Sorts by totalLicenseUnitsConsumed of ProductLicense.
 SortBy ListProductLicensesSortByEnum `mandatory:"false" contributesTo:"query" name:"sortBy"
omitEmpty:"true"`
```

```
 // Metadata about the request. This information will not be transmitted to the service, but
 // represents information that the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}

func (request ListProductLicensesRequest) String() string {
 return common.PointerString(request)
}

// HTTPRequest implements the OCIRequest interface
func (request ListProductLicensesRequest) HTTPRequest(method, path string, binaryRequestBody
*common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request, error) {

 _, err := request.ValidateEnumValue()
 if err != nil {
  return http.Request{}, err
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method, path, request,
extraHeaders)
}

// BinaryRequestBody
 implements the OCIRequest interface
func (request ListProductLicensesRequest) BinaryRequestBody() (*common.OCIReadSeekCloser, bool) {

 return nil, false

}

// RetryPolicy implements the OCIRetryableRequest interface. This retrieves the specified retry policy.
func (request ListProductLicensesRequest) RetryPolicy() *common.RetryPolicy {
 return request.RequestMetadata.RetryPolicy
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (request ListProductLicensesRequest) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if _, ok := GetMappingListProductLicensesSortOrderEnum(string(request.SortOrder)); !ok && request.SortOrder !=
"" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for SortOrder: %s. Supported values are:
%s.", request.SortOrder, strings.Join(GetListProductLicensesSortOrderEnumStringValues(),
 ",")))
 }
 if _, ok := GetMappingListProductLicensesSortByEnum(string(request.SortBy)); !ok && request.SortBy != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for SortBy: %s. Supported values are: %s.",
```

```
request.SortBy, strings.Join(GetListProductLicensesSortByEnumStringValues(), ",")))
 }
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// ListProductLicensesResponse wrapper for the ListProductLicenses operation
type ListProductLicensesResponse struct {

 // The underlying http response
 RawResponse *http.Response

 // A list of ProductLicenseCollection instances
 ProductLicenseCollection `presentIn:"body"`

 // Unique Oracle-assigned identifier for the request. If you need to contact
 // Oracle about a particular request, please provide the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`

 // For pagination of a list of items. When paging
 through a list, if this header appears in the response,
 // then a partial list might have been returned. Include this value as the `page` parameter for the
 // subsequent GET request to get the next batch of items.
 OpcNextPage *string `presentIn:"header" name:"opc-next-page"`
}

func (response ListProductLicensesResponse) String() string {
 return common.PointerString(response)
}

// HTTPResponse implements the OCIResponse interface
func (response ListProductLicensesResponse) HTTPResponse() *http.Response {
 return response.RawResponse
}

// ListProductLicensesSortOrderEnum Enum with underlying type: string
type ListProductLicensesSortOrderEnum string

// Set of constants representing the allowable values for ListProductLicensesSortOrderEnum
const (
 ListProductLicensesSortOrderAsc  ListProductLicensesSortOrderEnum = "ASC"
 ListProductLicensesSortOrderDesc ListProductLicensesSortOrderEnum = "DESC"
)

var mappingListProductLicensesSortOrderEnum = map[string]ListProductLicensesSortOrderEnum{
 "ASC":
```

```
  ListProductLicensesSortOrderAsc,
 "DESC": ListProductLicensesSortOrderDesc,
}

var mappingListProductLicensesSortOrderEnumLowerCase = map[string]ListProductLicensesSortOrderEnum{
 "asc":  ListProductLicensesSortOrderAsc,
 "desc": ListProductLicensesSortOrderDesc,
}

// GetListProductLicensesSortOrderEnumValues Enumerates the set of values for
ListProductLicensesSortOrderEnum
func GetListProductLicensesSortOrderEnumValues() []ListProductLicensesSortOrderEnum {
 values := make([]ListProductLicensesSortOrderEnum, 0)
 for _, v := range mappingListProductLicensesSortOrderEnum {
  values = append(values, v)
 }
 return values
}

// GetListProductLicensesSortOrderEnumStringValues Enumerates the set of values in String for
ListProductLicensesSortOrderEnum
func GetListProductLicensesSortOrderEnumStringValues() []string {
 return []string{
  "ASC",
  "DESC",
 }
}

// GetMappingListProductLicensesSortOrderEnum performs case Insensitive comparison on enum value and return
the desired
 enum
func GetMappingListProductLicensesSortOrderEnum(val string) (ListProductLicensesSortOrderEnum, bool) {
 enum, ok := mappingListProductLicensesSortOrderEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}

// ListProductLicensesSortByEnum Enum with underlying type: string
type ListProductLicensesSortByEnum string

// Set of constants representing the allowable values for ListProductLicensesSortByEnum
const (
 ListProductLicensesSortByTotallicenseunitsconsumed ListProductLicensesSortByEnum =
"totalLicenseUnitsConsumed"
)

var mappingListProductLicensesSortByEnum = map[string]ListProductLicensesSortByEnum{
 "totalLicenseUnitsConsumed": ListProductLicensesSortByTotallicenseunitsconsumed,
}
```

```
var mappingListProductLicensesSortByEnumLowerCase = map[string]ListProductLicensesSortByEnum{
 "totallicenseunitsconsumed": ListProductLicensesSortByTotallicenseunitsconsumed,
}

// GetListProductLicensesSortByEnumValues Enumerates the set of values for ListProductLicensesSortByEnum
func GetListProductLicensesSortByEnumValues()
 []ListProductLicensesSortByEnum {
 values := make([]ListProductLicensesSortByEnum, 0)
 for _, v := range mappingListProductLicensesSortByEnum {
  values = append(values, v)
 }
 return values
}

// GetListProductLicensesSortByEnumStringValues Enumerates the set of values in String for
ListProductLicensesSortByEnum
func GetListProductLicensesSortByEnumStringValues() []string {
 return []string{
  "totalLicenseUnitsConsumed",
 }
}

// GetMappingListProductLicensesSortByEnum performs case Insensitive comparison on enum value and return the
desired enum
func GetMappingListProductLicensesSortByEnum(val string) (ListProductLicensesSortByEnum, bool) {
 enum, ok := mappingListProductLicensesSortByEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}
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// Oracle Cloud VMware Solution API
//
// Use the Oracle Cloud VMware API to create SDDCs and manage ESXi hosts and software.
// For more information, see Oracle Cloud VMware Solution
(https://docs.oracle.com/iaas/Content/VMware/Concepts/ocvsoverview.htm).
//

package ocvp

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
```

```
)

// VsphereLicense License for vSphere upgrade.
type VsphereLicense struct {

 // vSphere license type.
 LicenseType *string `mandatory:"true" json:"licenseType"`

 // vSphere license key value.
 LicenseKey *string `mandatory:"true" json:"licenseKey"`
}

func (m VsphereLicense) String()
 string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m VsphereLicense) ValidateEnumValue() (bool, error) {
 errMessage := []string{}

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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2.0. You may choose either license.
// Code generated. DO NOT EDIT.

// Java Management Service Download API
//
// The APIs for the <a href="https://docs.oracle.com/en-us/iaas/jms/doc/java-download.html">Java Download</a>
feature of Java Management Service.
//

package jmsjavadownloads

import (
 "strings"
)

// LicenseTypeEnum Enum with underlying type: string
type LicenseTypeEnum string
```

```
// Set of constants representing the allowable values for LicenseTypeEnum
const (
 LicenseTypeOtn        LicenseTypeEnum = "OTN"
 LicenseTypeNftc       LicenseTypeEnum = "NFTC"
 LicenseTypeRestricted LicenseTypeEnum = "RESTRICTED"
)

var mappingLicenseTypeEnum = map[string]LicenseTypeEnum{
 "OTN":        LicenseTypeOtn,
 "NFTC":
       LicenseTypeNftc,
 "RESTRICTED": LicenseTypeRestricted,
}

var mappingLicenseTypeEnumLowerCase = map[string]LicenseTypeEnum{
 "otn":        LicenseTypeOtn,
 "nftc":       LicenseTypeNftc,
 "restricted": LicenseTypeRestricted,
}

// GetLicenseTypeEnumValues Enumerates the set of values for LicenseTypeEnum
func GetLicenseTypeEnumValues() []LicenseTypeEnum {
 values := make([]LicenseTypeEnum, 0)
 for _, v := range mappingLicenseTypeEnum {
  values = append(values, v)
 }
 return values
}

// GetLicenseTypeEnumStringValues Enumerates the set of values in String for LicenseTypeEnum
func GetLicenseTypeEnumStringValues() []string {
 return []string{
  "OTN",
  "NFTC",
  "RESTRICTED",
 }
}

// GetMappingLicenseTypeEnum performs case Insensitive comparison on enum value and return the desired enum
func GetMappingLicenseTypeEnum(val string) (LicenseTypeEnum, bool) {
 enum, ok := mappingLicenseTypeEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}
```

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```
// Code generated. DO NOT EDIT.

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
)

// GetLicenseMetricRequest wrapper for the GetLicenseMetric operation
//
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-examples/latest/licensemanager/GetLicenseMetric.go.html
to see an example of how to use GetLicenseMetricRequest.
type GetLicenseMetricRequest struct {

 // The compartment OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm) used for the
license record, product license, and configuration.
 CompartmentId *string `mandatory:"true" contributesTo:"query" name:"compartmentId"`

 //
 The unique Oracle-assigned identifier for the request. If you need to contact Oracle about a
 // particular request, please provide the request ID.
 OpcRequestId *string `mandatory:"false" contributesTo:"header" name:"opc-request-id"`

 // Indicates if the given compartment is the root compartment.
 IsCompartmentIdInSubtree *bool `mandatory:"false" contributesTo:"query" name:"isCompartmentIdInSubtree"`

 // Metadata about the request. This information will not be transmitted to the service, but
 // represents information that the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}

func (request GetLicenseMetricRequest) String() string {
 return common.PointerString(request)
}

// HTTPRequest implements the OCIRequest interface
func (request GetLicenseMetricRequest) HTTPRequest(method, path string, binaryRequestBody
*common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request, error) {

 _, err := request.ValidateEnumValue()
 if
 err != nil {
  return http.Request{}, err
```

```
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method, path, request,
extraHeaders)
}

// BinaryRequestBody implements the OCIRequest interface
func (request GetLicenseMetricRequest) BinaryRequestBody() (*common.OCIReadSeekCloser, bool) {

 return nil, false

}

// RetryPolicy implements the OCIRetryableRequest interface. This retrieves the specified retry policy.
func (request GetLicenseMetricRequest) RetryPolicy() *common.RetryPolicy {
 return request.RequestMetadata.RetryPolicy
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (request GetLicenseMetricRequest) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// GetLicenseMetricResponse
 wrapper for the GetLicenseMetric operation
type GetLicenseMetricResponse struct {

 // The underlying http response
 RawResponse *http.Response

 // The LicenseMetric instance
 LicenseMetric `presentIn:"body"`

 // For optimistic concurrency control. See `if-match`.
 Etag *string `presentIn:"header" name:"etag"`

 // Unique Oracle-assigned identifier for the request. If you need to contact
 // Oracle about a particular request, please provide the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`
}

func (response GetLicenseMetricResponse) String() string {
 return common.PointerString(response)
```

```
}

// HTTPResponse implements the OCIResponse interface
func (response GetLicenseMetricResponse) HTTPResponse() *http.Response {
 return response.RawResponse
}
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2.0. You may choose either license.
// Code generated. DO NOT EDIT.

package jmsjavadownloads

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
)

// CreateJavaLicenseAcceptanceRecordRequest wrapper for the CreateJavaLicenseAcceptanceRecord operation
//
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-
examples/latest/jmsjavadownloads/CreateJavaLicenseAcceptanceRecord.go.html to see an example of how to use
CreateJavaLicenseAcceptanceRecordRequest.
type CreateJavaLicenseAcceptanceRecordRequest struct {

 // Details for the new JavaLicenseAcceptanceRecord.
 CreateJavaLicenseAcceptanceRecordDetails `contributesTo:"body"`

 // A token that uniquely
 identifies a request so it can be retried in case of a timeout or
 // server error without risk of executing that same action again. Retry tokens expire after 24
 // hours, but can be invalidated before then due to conflicting operations. For example, if a resource
 // has been deleted and purged from the system, then a retry of the original creation request
 // might be rejected.
 OpcRetryToken *string `mandatory:"false" contributesTo:"header" name:"opc-retry-token"`

 // The client request ID for tracing.
 OpcRequestId *string `mandatory:"false" contributesTo:"header" name:"opc-request-id"`

 // Metadata about the request. This information will not be transmitted to the service, but
 // represents information that the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}
```

```
func (request CreateJavaLicenseAcceptanceRecordRequest) String() string {
 return common.PointerString(request)
}

// HTTPRequest implements the OCIRequest interface
func (request
 CreateJavaLicenseAcceptanceRecordRequest) HTTPRequest(method, path string, binaryRequestBody
*common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request, error) {

 _, err := request.ValidateEnumValue()
 if err != nil {
  return http.Request{}, err
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method, path, request,
extraHeaders)
}

// BinaryRequestBody implements the OCIRequest interface
func (request CreateJavaLicenseAcceptanceRecordRequest) BinaryRequestBody() (*common.OCIReadSeekCloser,
bool) {

 return nil, false

}

// RetryPolicy implements the OCIRetryableRequest interface. This retrieves the specified retry policy.
func (request CreateJavaLicenseAcceptanceRecordRequest) RetryPolicy() *common.RetryPolicy {
 return request.RequestMetadata.RetryPolicy
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this
 function directly
func (request CreateJavaLicenseAcceptanceRecordRequest) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// CreateJavaLicenseAcceptanceRecordResponse wrapper for the CreateJavaLicenseAcceptanceRecord operation
type CreateJavaLicenseAcceptanceRecordResponse struct {

 // The underlying http response
 RawResponse *http.Response
```

```
 // The JavaLicenseAcceptanceRecord instance
 JavaLicenseAcceptanceRecord `presentIn:"body"`

 // Unique Oracle-assigned identifier for the request. If you need to contact
 // Oracle about a particular request, provide the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`

 // For optimistic concurrency control. See `if-match`.
 Etag *string `presentIn:"header" name:"etag"`
}

func (response CreateJavaLicenseAcceptanceRecordResponse) String() string {
 return common.PointerString(response)
}

// HTTPResponse
 implements the OCIResponse interface
func (response CreateJavaLicenseAcceptanceRecordResponse) HTTPResponse() *http.Response {
 return response.RawResponse
}
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
2.0. You may choose either license.
// Code generated. DO NOT EDIT.

package jmsjavadownloads

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
)

// DeleteJavaLicenseAcceptanceRecordRequest wrapper for the DeleteJavaLicenseAcceptanceRecord operation
//
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-
examples/latest/jmsjavadownloads/DeleteJavaLicenseAcceptanceRecord.go.html to see an example of how to use
DeleteJavaLicenseAcceptanceRecordRequest.
type DeleteJavaLicenseAcceptanceRecordRequest struct {

 // Unique Java license acceptance record identifier.
 JavaLicenseAcceptanceRecordId *string `mandatory:"true" contributesTo:"path"
name:"javaLicenseAcceptanceRecordId"`
```

```
 //
 For optimistic concurrency control. In the PUT or DELETE call
 // for a resource, set the `if-match` parameter to the value of the
 // ETag from a previous GET or POST response for that resource.
 // The resource will be updated or deleted only if the ETag you
 // provide matches the resource's current ETag value.
 IfMatch *string `mandatory:"false" contributesTo:"header" name:"if-match"`

 // The client request ID for tracing.
 OpcRequestId *string `mandatory:"false" contributesTo:"header" name:"opc-request-id"`

 // Metadata about the request. This information will not be transmitted to the service, but
 // represents information that the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}

func (request DeleteJavaLicenseAcceptanceRecordRequest) String() string {
 return common.PointerString(request)
}

// HTTPRequest implements the OCIRequest interface
func (request DeleteJavaLicenseAcceptanceRecordRequest) HTTPRequest(method,
 path string, binaryRequestBody *common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request,
error) {

 _, err := request.ValidateEnumValue()
 if err != nil {
  return http.Request{}, err
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method, path, request,
extraHeaders)
}

// BinaryRequestBody implements the OCIRequest interface
func (request DeleteJavaLicenseAcceptanceRecordRequest) BinaryRequestBody() (*common.OCIReadSeekCloser,
bool) {

 return nil, false

}

// RetryPolicy implements the OCIRetryableRequest interface. This retrieves the specified retry policy.
func (request DeleteJavaLicenseAcceptanceRecordRequest) RetryPolicy() *common.RetryPolicy {
 return request.RequestMetadata.RetryPolicy
}

// ValidateEnumValue returns an error when providing an unsupported enum value
```

```
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (request DeleteJavaLicenseAcceptanceRecordRequest)
 ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// DeleteJavaLicenseAcceptanceRecordResponse wrapper for the DeleteJavaLicenseAcceptanceRecord operation
type DeleteJavaLicenseAcceptanceRecordResponse struct {

 // The underlying http response
 RawResponse *http.Response

 // Unique Oracle-assigned identifier for the request. If you need to contact
 // Oracle about a particular request, provide the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`
}

func (response DeleteJavaLicenseAcceptanceRecordResponse) String() string {
 return common.PointerString(response)
}

// HTTPResponse implements the OCIResponse interface
func (response DeleteJavaLicenseAcceptanceRecordResponse) HTTPResponse() *http.Response {
 return response.RawResponse
}
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
2.0. You may choose either license.
// Code generated. DO NOT EDIT.

// Document Understanding API
//
// Document AI helps customers perform various analysis on their documents. If a customer has lots of documents,
they can process them in batch using asynchronous API endpoints.
//

package aidocument

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
```

```
)

// DrivingLicenseKvModelSubTypeDetails Driving licence KV model sub type details
type DrivingLicenseKvModelSubTypeDetails struct {

 // Sub type model based on the model type.
 // The allowed values are:
 // - `PRE_TRAINED_KEY_VALUE_EXTRACTION`
 // - `PRE_TRAINED_DOCUMENT_ELEMENTS_EXTRACTION`
 ModelType DrivingLicenseKvModelSubTypeDetailsModelTypeEnum
 `mandatory:"true" json:"modelType"`

 // The model sub type for KEY_VALUE_EXTRACTION
 // The allowed values are:
 // - `RECEIPT`
 // - `INVOICE`
 // - `PASSPORT`
 // - `DRIVER_LICENSE`
 // - `HEALTH_INSURANCE_ID`
 ModelSubType DrivingLicenseKvModelSubTypeDetailsModelSubTypeEnum `mandatory:"true"
json:"modelSubType"`
}

func (m DrivingLicenseKvModelSubTypeDetails) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m DrivingLicenseKvModelSubTypeDetails) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if _, ok := GetMappingDrivingLicenseKvModelSubTypeDetailsModelTypeEnum(string(m.ModelType)); !ok &&
m.ModelType != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for ModelType: %s. Supported values are:
%s.", m.ModelType,
 strings.Join(GetDrivingLicenseKvModelSubTypeDetailsModelTypeEnumStringValues(), ",")))
 }
 if _, ok := GetMappingDrivingLicenseKvModelSubTypeDetailsModelSubTypeEnum(string(m.ModelSubType));
!ok && m.ModelSubType != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for ModelSubType: %s. Supported values
are: %s.", m.ModelSubType,
strings.Join(GetDrivingLicenseKvModelSubTypeDetailsModelSubTypeEnumStringValues(), ",")))
 }

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
```

```
 return false, nil
}

// DrivingLicenseKvModelSubTypeDetailsModelTypeEnum Enum with underlying type: string
type DrivingLicenseKvModelSubTypeDetailsModelTypeEnum string

// Set of constants representing the allowable values for DrivingLicenseKvModelSubTypeDetailsModelTypeEnum
const (
 DrivingLicenseKvModelSubTypeDetailsModelTypeKeyValueExtraction
DrivingLicenseKvModelSubTypeDetailsModelTypeEnum = "PRE_TRAINED_KEY_VALUE_EXTRACTION"
 DrivingLicenseKvModelSubTypeDetailsModelTypeDocumentElementsExtraction
 DrivingLicenseKvModelSubTypeDetailsModelTypeEnum =
"PRE_TRAINED_DOCUMENT_ELEMENTS_EXTRACTION"
)

var mappingDrivingLicenseKvModelSubTypeDetailsModelTypeEnum =
map[string]DrivingLicenseKvModelSubTypeDetailsModelTypeEnum{
 "PRE_TRAINED_KEY_VALUE_EXTRACTION":
DrivingLicenseKvModelSubTypeDetailsModelTypeKeyValueExtraction,
 "PRE_TRAINED_DOCUMENT_ELEMENTS_EXTRACTION":
DrivingLicenseKvModelSubTypeDetailsModelTypeDocumentElementsExtraction,
}

var mappingDrivingLicenseKvModelSubTypeDetailsModelTypeEnumLowerCase =
map[string]DrivingLicenseKvModelSubTypeDetailsModelTypeEnum{
 "pre_trained_key_value_extraction":        DrivingLicenseKvModelSubTypeDetailsModelTypeKeyValueExtraction,
 "pre_trained_document_elements_extraction":
DrivingLicenseKvModelSubTypeDetailsModelTypeDocumentElementsExtraction,
}

// GetDrivingLicenseKvModelSubTypeDetailsModelTypeEnumValues Enumerates the set of values for
DrivingLicenseKvModelSubTypeDetailsModelTypeEnum
func
 GetDrivingLicenseKvModelSubTypeDetailsModelTypeEnumValues()
[]DrivingLicenseKvModelSubTypeDetailsModelTypeEnum {
 values := make([]DrivingLicenseKvModelSubTypeDetailsModelTypeEnum, 0)
 for _, v := range mappingDrivingLicenseKvModelSubTypeDetailsModelTypeEnum {
  values = append(values, v)
 }
 return values
}

// GetDrivingLicenseKvModelSubTypeDetailsModelTypeEnumStringValues Enumerates the set of values in String
for DrivingLicenseKvModelSubTypeDetailsModelTypeEnum
func GetDrivingLicenseKvModelSubTypeDetailsModelTypeEnumStringValues() []string {
 return []string{
  "PRE_TRAINED_KEY_VALUE_EXTRACTION",
  "PRE_TRAINED_DOCUMENT_ELEMENTS_EXTRACTION",
```

```
 }
}

// GetMappingDrivingLicenseKvModelSubTypeDetailsModelTypeEnum performs case Insensitive comparison on
enum value and return the desired enum
func GetMappingDrivingLicenseKvModelSubTypeDetailsModelTypeEnum(val string)
(DrivingLicenseKvModelSubTypeDetailsModelTypeEnum, bool) {
 enum, ok := mappingDrivingLicenseKvModelSubTypeDetailsModelTypeEnumLowerCase[strings.ToLower(val)]
 return
 enum, ok
}

// DrivingLicenseKvModelSubTypeDetailsModelSubTypeEnum Enum with underlying type: string
type DrivingLicenseKvModelSubTypeDetailsModelSubTypeEnum string

// Set of constants representing the allowable values for
DrivingLicenseKvModelSubTypeDetailsModelSubTypeEnum
const (
 DrivingLicenseKvModelSubTypeDetailsModelSubTypeReceipt
DrivingLicenseKvModelSubTypeDetailsModelSubTypeEnum = "RECEIPT"
 DrivingLicenseKvModelSubTypeDetailsModelSubTypeInvoice
DrivingLicenseKvModelSubTypeDetailsModelSubTypeEnum = "INVOICE"
 DrivingLicenseKvModelSubTypeDetailsModelSubTypePassport
DrivingLicenseKvModelSubTypeDetailsModelSubTypeEnum = "PASSPORT"
 DrivingLicenseKvModelSubTypeDetailsModelSubTypeDriverLicense
DrivingLicenseKvModelSubTypeDetailsModelSubTypeEnum = "DRIVER_LICENSE"
 DrivingLicenseKvModelSubTypeDetailsModelSubTypeHealthInsuranceId
DrivingLicenseKvModelSubTypeDetailsModelSubTypeEnum = "HEALTH_INSURANCE_ID"
)

var
 mappingDrivingLicenseKvModelSubTypeDetailsModelSubTypeEnum =
map[string]DrivingLicenseKvModelSubTypeDetailsModelSubTypeEnum{
 "RECEIPT":            DrivingLicenseKvModelSubTypeDetailsModelSubTypeReceipt,
 "INVOICE":            DrivingLicenseKvModelSubTypeDetailsModelSubTypeInvoice,
 "PASSPORT":           DrivingLicenseKvModelSubTypeDetailsModelSubTypePassport,
 "DRIVER_LICENSE":     DrivingLicenseKvModelSubTypeDetailsModelSubTypeDriverLicense,
 "HEALTH_INSURANCE_ID": DrivingLicenseKvModelSubTypeDetailsModelSubTypeHealthInsuranceId,
}

var mappingDrivingLicenseKvModelSubTypeDetailsModelSubTypeEnumLowerCase =
map[string]DrivingLicenseKvModelSubTypeDetailsModelSubTypeEnum{
 "receipt":            DrivingLicenseKvModelSubTypeDetailsModelSubTypeReceipt,
 "invoice":            DrivingLicenseKvModelSubTypeDetailsModelSubTypeInvoice,
 "passport":           DrivingLicenseKvModelSubTypeDetailsModelSubTypePassport,
 "driver_license":     DrivingLicenseKvModelSubTypeDetailsModelSubTypeDriverLicense,
 "health_insurance_id":
```

```
 DrivingLicenseKvModelSubTypeDetailsModelSubTypeHealthInsuranceId,
}

// GetDrivingLicenseKvModelSubTypeDetailsModelSubTypeEnumValues Enumerates the set of values for
DrivingLicenseKvModelSubTypeDetailsModelSubTypeEnum
func GetDrivingLicenseKvModelSubTypeDetailsModelSubTypeEnumValues()
[]DrivingLicenseKvModelSubTypeDetailsModelSubTypeEnum {
 values := make([]DrivingLicenseKvModelSubTypeDetailsModelSubTypeEnum, 0)
 for _, v := range mappingDrivingLicenseKvModelSubTypeDetailsModelSubTypeEnum {
  values = append(values, v)
 }
 return values
}

// GetDrivingLicenseKvModelSubTypeDetailsModelSubTypeEnumStringValues Enumerates the set of values in
String for DrivingLicenseKvModelSubTypeDetailsModelSubTypeEnum
func GetDrivingLicenseKvModelSubTypeDetailsModelSubTypeEnumStringValues() []string {
 return []string{
  "RECEIPT",
  "INVOICE",
  "PASSPORT",
  "DRIVER_LICENSE",
  "HEALTH_INSURANCE_ID",
 }
}

// GetMappingDrivingLicenseKvModelSubTypeDetailsModelSubTypeEnum
 performs case Insensitive comparison on enum value and return the desired enum
func GetMappingDrivingLicenseKvModelSubTypeDetailsModelSubTypeEnum(val string)
(DrivingLicenseKvModelSubTypeDetailsModelSubTypeEnum, bool) {
 enum, ok :=
mappingDrivingLicenseKvModelSubTypeDetailsModelSubTypeEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
2.0. You may choose either license.
// Code generated. DO NOT EDIT.

// License Manager API
//
// Use the License Manager API to manage product licenses and license records. For more information, see License
Manager Overview (https://docs.oracle.com/iaas/Content/LicenseManager/Concepts/licensemanageroverview.htm).
//

package licensemanager
```

```
import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// CreateLicenseRecordDetails The details about the new license record.
type CreateLicenseRecordDetails struct {

 // License record name.
 DisplayName *string `mandatory:"true" json:"displayName"`

 // Specifies if the license record term is perpertual.
 IsPerpetual *bool `mandatory:"true"
 json:"isPerpetual"`

 // Specifies if the license count is unlimited.
 IsUnlimited *bool `mandatory:"true" json:"isUnlimited"`

 // The license record end date in RFC 3339 (https://tools.ietf.org/html/rfc3339)
 // date format.
 // Example: `2018-09-12`
 ExpirationDate *common.SDKTime `mandatory:"false" json:"expirationDate"`

 // The license record support end date in RFC 3339 (https://tools.ietf.org/html/rfc3339)
 // date format.
 // Example: `2018-09-12`
 SupportEndDate *common.SDKTime `mandatory:"false" json:"supportEndDate"`

 // The number of license units added by a user in a license record.
 // Default 1
 LicenseCount *int `mandatory:"false" json:"licenseCount"`

 // The license record product ID.
 ProductId *string `mandatory:"false" json:"productId"`

 // Simple key-value pair that is applied without any predefined name, type, or scope. Exists for cross-compatibility
only.
 // Example: `{"bar-key": "value"}`
 FreeformTags map[string]string `mandatory:"false" json:"freeformTags"`

 //
 Defined tags for this resource. Each key is predefined and scoped to a namespace.
 // Example: `{"foo-namespace": {"bar-key": "value"}}`
 DefinedTags map[string]map[string]interface{} `mandatory:"false" json:"definedTags"`
}

func (m CreateLicenseRecordDetails) String() string {
```

```
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m CreateLicenseRecordDetails) ValidateEnumValue() (bool, error) {
 errMessage := []string{}

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
2.0. You may choose either license.
// Code generated. DO NOT EDIT.

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
)

// CreateProductLicenseRequest wrapper for the CreateProductLicense operation
//
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-
examples/latest/licensemanager/CreateProductLicense.go.html to see an example of how to use
CreateProductLicenseRequest.
type CreateProductLicenseRequest struct {

 // Details for creating a new product license.
 CreateProductLicenseDetails `contributesTo:"body"`

 // The unique Oracle-assigned identifier for the request. If you need to contact Oracle about a
 // particular
 request, please provide the request ID.
 OpcRequestId *string `mandatory:"false" contributesTo:"header" name:"opc-request-id"`

 // A token that uniquely identifies a request so it can be retried in case of a timeout or server error without
 // risk of executing that same action again. Retry tokens expire after 24 hours, but can be invalidated before
```

```
 // then due to conflicting operations (for example, if a resource has been deleted and purged from the system,
 // then a retry of the original creation request might be rejected).
 OpcRetryToken *string `mandatory:"false" contributesTo:"header" name:"opc-retry-token"`

 // Metadata about the request. This information will not be transmitted to the service, but
 // represents information that the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}

func (request CreateProductLicenseRequest) String() string {
 return common.PointerString(request)
}

// HTTPRequest implements the OCIRequest interface
func
 (request CreateProductLicenseRequest) HTTPRequest(method, path string, binaryRequestBody
*common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request, error) {

 _, err := request.ValidateEnumValue()
 if err != nil {
  return http.Request{}, err
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method, path, request,
extraHeaders)
}

// BinaryRequestBody implements the OCIRequest interface
func (request CreateProductLicenseRequest) BinaryRequestBody() (*common.OCIReadSeekCloser, bool) {

 return nil, false

}

// RetryPolicy implements the OCIRetryableRequest interface. This retrieves the specified retry policy.
func (request CreateProductLicenseRequest) RetryPolicy() *common.RetryPolicy {
 return request.RequestMetadata.RetryPolicy
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (request
 CreateProductLicenseRequest) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
```

```
}

// CreateProductLicenseResponse wrapper for the CreateProductLicense operation
type CreateProductLicenseResponse struct {

 // The underlying http response
 RawResponse *http.Response

 // The ProductLicense instance
 ProductLicense `presentIn:"body"`

 // For optimistic concurrency control. See `if-match`.
 Etag *string `presentIn:"header" name:"etag"`

 // Unique Oracle-assigned identifier for the asynchronous request. You can use this to query the status of the
asynchronous operation.
 OpcWorkRequestId *string `presentIn:"header" name:"opc-work-request-id"`

 // Unique Oracle-assigned identifier for the request. If you need to contact
 // Oracle about a particular request, please provide the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`

 // Location of
 the resource.
 Location *string `presentIn:"header" name:"location"`
}

func (response CreateProductLicenseResponse) String() string {
 return common.PointerString(response)
}

// HTTPResponse implements the OCIResponse interface
func (response CreateProductLicenseResponse) HTTPResponse() *http.Response {
 return response.RawResponse
}
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
2.0. You may choose either license.
// Code generated. DO NOT EDIT.

// Identity and Access Management Data Plane API
//
// APIs for managing identity data plane services. For example, use this API to create a scoped-access security
token. To manage identity domains (for example, creating or deleting an identity domain) or to manage resources
(for example, users and groups) within the default identity domain, see IAM API
(https://docs.oracle.com/iaas/api/#/en/identity/).
//
```

```
package identitydataplane

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// Permission The representation of Permission
type Permission struct {

 // The name of the permission.
 P *string `mandatory:"true"
 json:"p"`
}

func (m Permission) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m Permission) ValidateEnumValue() (bool, error) {
 errMessage := []string{}

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
2.0. You may choose either license.
// Code generated. DO NOT EDIT.

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
)

// UpdateLicenseRecordRequest wrapper for the UpdateLicenseRecord operation
```

```
//
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-
examples/latest/licensemanager/UpdateLicenseRecord.go.html to see an example of how to use
UpdateLicenseRecordRequest.
type UpdateLicenseRecordRequest struct {

 // Unique license record identifier.
 LicenseRecordId *string `mandatory:"true" contributesTo:"path" name:"licenseRecordId"`

 // Details to update a license record entity.
 UpdateLicenseRecordDetails `contributesTo:"body"`

 //
 For optimistic concurrency control. In the PUT or DELETE call for a resource, set the `if-match`
 // parameter to the value of the etag from a previous GET or POST response for that resource.  The resource
 // will be updated or deleted only if the etag you provide matches the resource's current etag value.
 IfMatch *string `mandatory:"false" contributesTo:"header" name:"if-match"`

 // The unique Oracle-assigned identifier for the request. If you need to contact Oracle about a
 // particular request, please provide the request ID.
 OpcRequestId *string `mandatory:"false" contributesTo:"header" name:"opc-request-id"`

 // Metadata about the request. This information will not be transmitted to the service, but
 // represents information that the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}

func (request UpdateLicenseRecordRequest) String() string {
 return common.PointerString(request)
}

// HTTPRequest implements the OCIRequest
 interface
func (request UpdateLicenseRecordRequest) HTTPRequest(method, path string, binaryRequestBody
*common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request, error) {

 _, err := request.ValidateEnumValue()
 if err != nil {
  return http.Request{}, err
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method, path, request,
extraHeaders)
}

// BinaryRequestBody implements the OCIRequest interface
func (request UpdateLicenseRecordRequest) BinaryRequestBody() (*common.OCIReadSeekCloser, bool) {
```

```
 return nil, false

}

// RetryPolicy implements the OCIRetryableRequest interface. This retrieves the specified retry policy.
func (request UpdateLicenseRecordRequest) RetryPolicy() *common.RetryPolicy {
 return request.RequestMetadata.RetryPolicy
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func
 (request UpdateLicenseRecordRequest) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// UpdateLicenseRecordResponse wrapper for the UpdateLicenseRecord operation
type UpdateLicenseRecordResponse struct {

 // The underlying http response
 RawResponse *http.Response

 // The LicenseRecord instance
 LicenseRecord `presentIn:"body"`

 // For optimistic concurrency control. See `if-match`.
 Etag *string `presentIn:"header" name:"etag"`

 // Unique Oracle-assigned identifier for the request. If you need to contact
 // Oracle about a particular request, please provide the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`
}

func (response UpdateLicenseRecordResponse) String() string {
 return common.PointerString(response)
}

// HTTPResponse implements the OCIResponse interface
func (response UpdateLicenseRecordResponse) HTTPResponse() *http.Response
 {
 return response.RawResponse
}
```

```
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2.0. You may choose either license.
// Code generated. DO NOT EDIT.

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
)

// ListProductLicenseConsumersRequest wrapper for the ListProductLicenseConsumers operation
//
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-
examples/latest/licensemanager/ListProductLicenseConsumers.go.html to see an example of how to use
ListProductLicenseConsumersRequest.
type ListProductLicenseConsumersRequest struct {

 // Unique product license identifier.
 ProductLicenseId *string `mandatory:"true" contributesTo:"query" name:"productLicenseId"`

 // The compartment OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm)
 used for the license record, product license, and configuration.
 CompartmentId *string `mandatory:"true" contributesTo:"query" name:"compartmentId"`

 // The maximum number of items to return.
 Limit *int `mandatory:"false" contributesTo:"query" name:"limit"`

 // A token representing the position at which to start retrieving results. This must come from the `opc-next-page`
header field of a previous response.
 Page *string `mandatory:"false" contributesTo:"query" name:"page"`

 // The unique Oracle-assigned identifier for the request. If you need to contact Oracle about a
 // particular request, please provide the request ID.
 OpcRequestId *string `mandatory:"false" contributesTo:"header" name:"opc-request-id"`

 // Indicates if the given compartment is the root compartment.
 IsCompartmentIdInSubtree *bool `mandatory:"false" contributesTo:"query" name:"isCompartmentIdInSubtree"`

 // The sort order to use, whether `ASC` or `DESC`.
 SortOrder
```

```
 ListProductLicenseConsumersSortOrderEnum `mandatory:"false" contributesTo:"query" name:"sortOrder"
omitEmpty:"true"`

 // Specifies the attribute with which to sort the rules.
 // Default: `licenseUnitsRequired`
 // * **licenseUnitsRequired:** Sorts by licenseUnitsRequired of the Resource.
 SortBy ListProductLicenseConsumersSortByEnum `mandatory:"false" contributesTo:"query" name:"sortBy"
omitEmpty:"true"`

 // Metadata about the request. This information will not be transmitted to the service, but
 // represents information that the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}

func (request ListProductLicenseConsumersRequest) String() string {
 return common.PointerString(request)
}

// HTTPRequest implements the OCIRequest interface
func (request ListProductLicenseConsumersRequest) HTTPRequest(method, path string, binaryRequestBody
*common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request, error) {

 _, err := request.ValidateEnumValue()
 if
 err != nil {
  return http.Request{}, err
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method, path, request,
extraHeaders)
}

// BinaryRequestBody implements the OCIRequest interface
func (request ListProductLicenseConsumersRequest) BinaryRequestBody() (*common.OCIReadSeekCloser, bool)
{

 return nil, false

}

// RetryPolicy implements the OCIRetryableRequest interface. This retrieves the specified retry policy.
func (request ListProductLicenseConsumersRequest) RetryPolicy() *common.RetryPolicy {
 return request.RequestMetadata.RetryPolicy
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (request ListProductLicenseConsumersRequest) ValidateEnumValue() (bool, error) {
```

```
 errMessage := []string{}
 if _, ok := GetMappingListProductLicenseConsumersSortOrderEnum(string(request.SortOrder));
 !ok && request.SortOrder != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for SortOrder: %s. Supported values are:
%s.", request.SortOrder, strings.Join(GetListProductLicenseConsumersSortOrderEnumStringValues(), ",")))
 }
 if _, ok := GetMappingListProductLicenseConsumersSortByEnum(string(request.SortBy)); !ok && request.SortBy
!= "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for SortBy: %s. Supported values are: %s.",
request.SortBy, strings.Join(GetListProductLicenseConsumersSortByEnumStringValues(), ",")))
 }
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// ListProductLicenseConsumersResponse wrapper for the ListProductLicenseConsumers operation
type ListProductLicenseConsumersResponse struct {

 // The underlying http response
 RawResponse *http.Response

 // A list of ProductLicenseConsumerCollection instances
 ProductLicenseConsumerCollection `presentIn:"body"`

 //
 Unique Oracle-assigned identifier for the request. If you need to contact
 // Oracle about a particular request, please provide the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`

 // For pagination of a list of items. When paging through a list, if this header appears in the response,
 // then a partial list might have been returned. Include this value as the `page` parameter for the
 // subsequent GET request to get the next batch of items.
 OpcNextPage *string `presentIn:"header" name:"opc-next-page"`
}

func (response ListProductLicenseConsumersResponse) String() string {
 return common.PointerString(response)
}

// HTTPResponse implements the OCIResponse interface
func (response ListProductLicenseConsumersResponse) HTTPResponse() *http.Response {
 return response.RawResponse
}

// ListProductLicenseConsumersSortOrderEnum Enum with underlying type: string
type ListProductLicenseConsumersSortOrderEnum string
```

```
// Set of constants representing
 the allowable values for ListProductLicenseConsumersSortOrderEnum
const (
 ListProductLicenseConsumersSortOrderAsc  ListProductLicenseConsumersSortOrderEnum = "ASC"
 ListProductLicenseConsumersSortOrderDesc ListProductLicenseConsumersSortOrderEnum = "DESC"
)

var mappingListProductLicenseConsumersSortOrderEnum =
map[string]ListProductLicenseConsumersSortOrderEnum{
 "ASC":  ListProductLicenseConsumersSortOrderAsc,
 "DESC": ListProductLicenseConsumersSortOrderDesc,
}

var mappingListProductLicenseConsumersSortOrderEnumLowerCase =
map[string]ListProductLicenseConsumersSortOrderEnum{
 "asc":  ListProductLicenseConsumersSortOrderAsc,
 "desc": ListProductLicenseConsumersSortOrderDesc,
}

// GetListProductLicenseConsumersSortOrderEnumValues Enumerates the set of values for
ListProductLicenseConsumersSortOrderEnum
func GetListProductLicenseConsumersSortOrderEnumValues() []ListProductLicenseConsumersSortOrderEnum {
 values := make([]ListProductLicenseConsumersSortOrderEnum, 0)
 for _,
 v := range mappingListProductLicenseConsumersSortOrderEnum {
  values = append(values, v)
 }
 return values
}

// GetListProductLicenseConsumersSortOrderEnumStringValues Enumerates the set of values in String for
ListProductLicenseConsumersSortOrderEnum
func GetListProductLicenseConsumersSortOrderEnumStringValues() []string {
 return []string{
  "ASC",
  "DESC",
 }
}

// GetMappingListProductLicenseConsumersSortOrderEnum performs case Insensitive comparison on enum value
and return the desired enum
func GetMappingListProductLicenseConsumersSortOrderEnum(val string)
(ListProductLicenseConsumersSortOrderEnum, bool) {
 enum, ok := mappingListProductLicenseConsumersSortOrderEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}
```

```
// ListProductLicenseConsumersSortByEnum Enum with underlying type: string
type ListProductLicenseConsumersSortByEnum string

// Set of constants representing the allowable values for ListProductLicenseConsumersSortByEnum
const (
 ListProductLicenseConsumersSortByLicenseunitsrequired
 ListProductLicenseConsumersSortByEnum = "licenseUnitsRequired"
)

var mappingListProductLicenseConsumersSortByEnum = map[string]ListProductLicenseConsumersSortByEnum{
 "licenseUnitsRequired": ListProductLicenseConsumersSortByLicenseunitsrequired,
}

var mappingListProductLicenseConsumersSortByEnumLowerCase =
map[string]ListProductLicenseConsumersSortByEnum{
 "licenseunitsrequired": ListProductLicenseConsumersSortByLicenseunitsrequired,
}

// GetListProductLicenseConsumersSortByEnumValues Enumerates the set of values for
ListProductLicenseConsumersSortByEnum
func GetListProductLicenseConsumersSortByEnumValues() []ListProductLicenseConsumersSortByEnum {
 values := make([]ListProductLicenseConsumersSortByEnum, 0)
 for _, v := range mappingListProductLicenseConsumersSortByEnum {
  values = append(values, v)
 }
 return values
}

// GetListProductLicenseConsumersSortByEnumStringValues Enumerates the set of values in String for
ListProductLicenseConsumersSortByEnum
func
 GetListProductLicenseConsumersSortByEnumStringValues() []string {
 return []string{
  "licenseUnitsRequired",
 }
}

// GetMappingListProductLicenseConsumersSortByEnum performs case Insensitive comparison on enum value and
return the desired enum
func GetMappingListProductLicenseConsumersSortByEnum(val string)
(ListProductLicenseConsumersSortByEnum, bool) {
 enum, ok := mappingListProductLicenseConsumersSortByEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}
```
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
2.0. You may choose either license.

```
// Code generated. DO NOT EDIT.

// License Manager API
//
// Use the License Manager API to manage product licenses and license records. For more information, see License
Manager Overview (https://docs.oracle.com/iaas/Content/LicenseManager/Concepts/licensemanageroverview.htm).
//

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// LicenseRecord License record summary.
type LicenseRecord struct {

 // The license record OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm).
 Id *string `mandatory:"true" json:"id"`

 // The license record display name. Avoid entering confidential information.
 DisplayName
 *string `mandatory:"true" json:"displayName"`

 // Specifies if the license count is unlimited.
 IsUnlimited *bool `mandatory:"true" json:"isUnlimited"`

 // Specifies if the license record term is perpertual.
 IsPerpetual *bool `mandatory:"true" json:"isPerpetual"`

 // The current license record state.
 LifecycleState LifeCycleStateEnum `mandatory:"true" json:"lifecycleState"`

 // The product license OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm) with which the
license record is associated.
 ProductLicenseId *string `mandatory:"false" json:"productLicenseId"`

 // The compartment OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm) where the
license record is created.
 CompartmentId *string `mandatory:"false" json:"compartmentId"`

 // The license record product ID.
 ProductId *string `mandatory:"false" json:"productId"`

 // The number of license units added by the user for the given license record.
 // Default
```

```
 1
 LicenseCount *int `mandatory:"false" json:"licenseCount"`

 // The license record end date in RFC 3339 (https://tools.ietf.org/html/rfc3339)
 // date format.
 // Example: `2018-09-12`
 ExpirationDate *common.SDKTime `mandatory:"false" json:"expirationDate"`

 // The license record support end date in RFC 3339 (https://tools.ietf.org/html/rfc3339)
 // date format.
 // Example: `2018-09-12`
 SupportEndDate *common.SDKTime `mandatory:"false" json:"supportEndDate"`

 // The time the license record was created. An RFC 3339 (https://tools.ietf.org/html/rfc3339)-formatted datetime
string.
 TimeCreated *common.SDKTime `mandatory:"false" json:"timeCreated"`

 // The time the license record was updated. An RFC 3339 (https://tools.ietf.org/html/rfc3339)-formatted datetime
string.
 TimeUpdated *common.SDKTime `mandatory:"false" json:"timeUpdated"`

 // The product license unit.
 LicenseUnit LicenseUnitEnum `mandatory:"false" json:"licenseUnit,omitempty"`

 // The product license name with which
 the license record is associated.
 ProductLicense *string `mandatory:"false" json:"productLicense"`

 // Simple key-value pair that is applied without any predefined name, type, or scope. Exists for cross-compatibility
only.
 // Example: `{"bar-key": "value"}`
 FreeformTags map[string]string `mandatory:"false" json:"freeformTags"`

 // Defined tags for this resource. Each key is predefined and scoped to a namespace.
 // Example: `{"foo-namespace": {"bar-key": "value"}}`
 DefinedTags map[string]map[string]interface{} `mandatory:"false" json:"definedTags"`

 // Usage of system tag keys. These predefined keys are scoped to namespaces.
 // Example: `{"orcl-cloud": {"free-tier-retained": "true"}}`
 SystemTags map[string]map[string]interface{} `mandatory:"false" json:"systemTags"`
}

func (m LicenseRecord) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API
```

```
 request process
// Not recommended for calling this function directly
func (m LicenseRecord) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if _, ok := GetMappingLifeCycleStateEnum(string(m.LifecycleState)); !ok && m.LifecycleState != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LifecycleState: %s. Supported values
are: %s.", m.LifecycleState, strings.Join(GetLifeCycleStateEnumStringValues(), ",")))
 }

 if _, ok := GetMappingLicenseUnitEnum(string(m.LicenseUnit)); !ok && m.LicenseUnit != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LicenseUnit: %s. Supported values are:
%s.", m.LicenseUnit, strings.Join(GetLicenseUnitEnumStringValues(), ",")))
 }
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
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// Code generated. DO NOT EDIT.

// License Manager API
//
// Use the License Manager API to manage product licenses and license records. For more information, see License
Manager Overview (https://docs.oracle.com/iaas/Content/LicenseManager/Concepts/licensemanageroverview.htm).
//

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// ProductLicense The product license details.
type ProductLicense struct {

 // The product license OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm).
 Id *string `mandatory:"true" json:"id"`

 // The compartment OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm)
 where the product license is created.
 CompartmentId *string `mandatory:"true" json:"compartmentId"`
```

```
// The current product license status.
Status StatusEnum `mandatory:"true" json:"status"`

// The product license unit.
LicenseUnit LicenseUnitEnum `mandatory:"true" json:"licenseUnit"`

// Specifies whether the vendor is Oracle or a third party.
IsVendorOracle *bool `mandatory:"true" json:"isVendorOracle"`

// License record name
DisplayName *string `mandatory:"true" json:"displayName"`

// Status description for the current product license status.
StatusDescription *string `mandatory:"false" json:"statusDescription"`

// The total number of licenses available for the product license, calculated by adding up all the license counts for
active license records associated with the product license.
TotalActiveLicenseUnitCount *int `mandatory:"false" json:"totalActiveLicenseUnitCount"`

// The current product license state.
LifecycleState LifeCycleStateEnum
`mandatory:"false" json:"lifecycleState,omitempty"`

// The number of license units consumed. Updated after each allocation run.
TotalLicenseUnitsConsumed *float64 `mandatory:"false" json:"totalLicenseUnitsConsumed"`

// The number of license records associated with the product license.
TotalLicenseRecordCount *int `mandatory:"false" json:"totalLicenseRecordCount"`

// The number of active license records associated with the product license.
ActiveLicenseRecordCount *int `mandatory:"false" json:"activeLicenseRecordCount"`

// Specifies whether or not the product license is oversubscribed.
IsOverSubscribed *bool `mandatory:"false" json:"isOverSubscribed"`

// Specifies if the license unit count is unlimited.
IsUnlimited *bool `mandatory:"false" json:"isUnlimited"`

// The vendor of the ProductLicense
VendorName *string `mandatory:"false" json:"vendorName"`

// The time the product license was created. An RFC 3339 (https://tools.ietf.org/html/rfc3339)-formatted
datetime string.
TimeCreated *common.SDKTime `mandatory:"false" json:"timeCreated"`

// The time the product license was updated. An RFC 3339 (https://tools.ietf.org/html/rfc3339)-formatted datetime
string.
TimeUpdated *common.SDKTime `mandatory:"false" json:"timeUpdated"`
```

```
 // The images associated with the product license.
 Images []ImageResponse `mandatory:"false" json:"images"`

 // Simple key-value pair that is applied without any predefined name, type, or scope. Exists for cross-compatibility
only.
 // Example: `{"bar-key": "value"}`
 FreeformTags map[string]string `mandatory:"false" json:"freeformTags"`

 // Defined tags for this resource. Each key is predefined and scoped to a namespace.
 // Example: `{"foo-namespace": {"bar-key": "value"}}`
 DefinedTags map[string]map[string]interface{} `mandatory:"false" json:"definedTags"`

 // Usage of system tag keys. These predefined keys are scoped to namespaces.
 // Example: `{"orcl-cloud": {"free-tier-retained": "true"}}`
 SystemTags
 map[string]map[string]interface{} `mandatory:"false" json:"systemTags"`
}

func (m ProductLicense) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m ProductLicense) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if _, ok := GetMappingStatusEnum(string(m.Status)); !ok && m.Status != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for Status: %s. Supported values are: %s.",
m.Status, strings.Join(GetStatusEnumStringValues(), ",")))
 }
 if _, ok := GetMappingLicenseUnitEnum(string(m.LicenseUnit)); !ok && m.LicenseUnit != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LicenseUnit: %s. Supported values are:
%s.", m.LicenseUnit, strings.Join(GetLicenseUnitEnumStringValues(), ",")))
 }

 if _, ok := GetMappingLifeCycleStateEnum(string(m.LifecycleState));
 !ok && m.LifecycleState != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LifecycleState: %s. Supported values
are: %s.", m.LifecycleState, strings.Join(GetLifeCycleStateEnumStringValues(), ",")))
 }
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
```

```
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// License Manager API
//
// Use the License Manager API to manage product licenses and license records. For more information, see License
Manager Overview (https://docs.oracle.com/iaas/Content/LicenseManager/Concepts/licensemanageroverview.htm).
//

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// TopUtilizedProductLicenseSummary A summary of the top utilized product licenses.
type TopUtilizedProductLicenseSummary struct {

 // The product license OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm).
 ProductLicenseId *string `mandatory:"true" json:"productLicenseId"`

 //
 The product type.
 ProductType *string `mandatory:"true" json:"productType"`

 // The product license unit.
 UnitType LicenseUnitEnum `mandatory:"true" json:"unitType"`

 // Number of license units consumed.
 TotalUnitsConsumed *float64 `mandatory:"true" json:"totalUnitsConsumed"`

 // Total number of license units in the product license provided by the user.
 TotalLicenseUnitCount *int `mandatory:"true" json:"totalLicenseUnitCount"`

 // Specifies if the license unit count is unlimited.
 IsUnlimited *bool `mandatory:"true" json:"isUnlimited"`

 // The current product license status.
 Status StatusEnum `mandatory:"true" json:"status"`
}

func (m TopUtilizedProductLicenseSummary) String() string {
 return common.PointerString(m)
```

```
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m TopUtilizedProductLicenseSummary)
 ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if _, ok := GetMappingLicenseUnitEnum(string(m.UnitType)); !ok && m.UnitType != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for UnitType: %s. Supported values are:
%s.", m.UnitType, strings.Join(GetLicenseUnitEnumStringValues(), ",")))
 }
 if _, ok := GetMappingStatusEnum(string(m.Status)); !ok && m.Status != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for Status: %s. Supported values are: %s.",
m.Status, strings.Join(GetStatusEnumStringValues(), ",")))
 }

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
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// Code generated. DO NOT EDIT.

// Java Management Service Download API
//
// The APIs for the <a href="https://docs.oracle.com/en-us/iaas/jms/doc/java-download.html">Java Download</a>
feature of Java Management Service.
//

package jmsjavadownloads

import (
 "strings"
)

// LicenseSortByEnum Enum with underlying type: string
type LicenseSortByEnum string

// Set of constants representing the allowable values for LicenseSortByEnum
const (
 LicenseSortByLicenseType LicenseSortByEnum = "licenseType"
 LicenseSortByDisplayName LicenseSortByEnum = "displayName"
)
```

```
var mappingLicenseSortByEnum = map[string]LicenseSortByEnum{
 "licenseType": LicenseSortByLicenseType,
 "displayName":
 LicenseSortByDisplayName,
}

var mappingLicenseSortByEnumLowerCase = map[string]LicenseSortByEnum{
 "licensetype": LicenseSortByLicenseType,
 "displayname": LicenseSortByDisplayName,
}

// GetLicenseSortByEnumValues Enumerates the set of values for LicenseSortByEnum
func GetLicenseSortByEnumValues() []LicenseSortByEnum {
 values := make([]LicenseSortByEnum, 0)
 for _, v := range mappingLicenseSortByEnum {
  values = append(values, v)
 }
 return values
}

// GetLicenseSortByEnumStringValues Enumerates the set of values in String for LicenseSortByEnum
func GetLicenseSortByEnumStringValues() []string {
 return []string{
  "licenseType",
  "displayName",
 }
}

// GetMappingLicenseSortByEnum performs case Insensitive comparison on enum value and return the desired
enum
func GetMappingLicenseSortByEnum(val string) (LicenseSortByEnum, bool) {
 enum, ok := mappingLicenseSortByEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
2.0. You may choose either license.
// Code generated. DO NOT EDIT.

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
```

```
)

// UpdateProductLicenseRequest wrapper for the UpdateProductLicense operation
//
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-
examples/latest/licensemanager/UpdateProductLicense.go.html to see an example of how to use
UpdateProductLicenseRequest.
type UpdateProductLicenseRequest struct {

 // Unique product license identifier.
 ProductLicenseId *string `mandatory:"true" contributesTo:"path" name:"productLicenseId"`

 // The list of images that needs to be updated.
 UpdateProductLicenseDetails
 `contributesTo:"body"`

 // For optimistic concurrency control. In the PUT or DELETE call for a resource, set the `if-match`
 // parameter to the value of the etag from a previous GET or POST response for that resource.  The resource
 // will be updated or deleted only if the etag you provide matches the resource's current etag value.
 IfMatch *string `mandatory:"false" contributesTo:"header" name:"if-match"`

 // The unique Oracle-assigned identifier for the request. If you need to contact Oracle about a
 // particular request, please provide the request ID.
 OpcRequestId *string `mandatory:"false" contributesTo:"header" name:"opc-request-id"`

 // Metadata about the request. This information will not be transmitted to the service, but
 // represents information that the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}

func (request UpdateProductLicenseRequest) String() string {
 return common.PointerString(request)
}

// HTTPRequest implements the
 OCIRequest interface
func (request UpdateProductLicenseRequest) HTTPRequest(method, path string, binaryRequestBody
*common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request, error) {

 _, err := request.ValidateEnumValue()
 if err != nil {
  return http.Request{}, err
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method, path, request,
extraHeaders)
}
```

```
// BinaryRequestBody implements the OCIRequest interface
func (request UpdateProductLicenseRequest) BinaryRequestBody() (*common.OCIReadSeekCloser, bool) {

 return nil, false

}

// RetryPolicy implements the OCIRetryableRequest interface. This retrieves the specified retry policy.
func (request UpdateProductLicenseRequest) RetryPolicy() *common.RetryPolicy {
 return request.RequestMetadata.RetryPolicy
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function
 directly
func (request UpdateProductLicenseRequest) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// UpdateProductLicenseResponse wrapper for the UpdateProductLicense operation
type UpdateProductLicenseResponse struct {

 // The underlying http response
 RawResponse *http.Response

 // The ProductLicense instance
 ProductLicense `presentIn:"body"`

 // For optimistic concurrency control. See `if-match`.
 Etag *string `presentIn:"header" name:"etag"`

 // Unique Oracle-assigned identifier for the request. If you need to contact
 // Oracle about a particular request, please provide the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`
}

func (response UpdateProductLicenseResponse) String() string {
 return common.PointerString(response)
}

// HTTPResponse implements the OCIResponse interface
func (response UpdateProductLicenseResponse)
```

```
 HTTPResponse() *http.Response {
 return response.RawResponse
}
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
2.0. You may choose either license.
// Code generated. DO NOT EDIT.

package jmsjavadownloads

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
)

// GetJavaLicenseRequest wrapper for the GetJavaLicense operation
//
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-examples/latest/jmsjavadownloads/GetJavaLicense.go.html
to see an example of how to use GetJavaLicenseRequest.
type GetJavaLicenseRequest struct {

 // Unique Java license type.
 LicenseType GetJavaLicenseLicenseTypeEnum `mandatory:"true" contributesTo:"path" name:"licenseType"`

 // The client request ID for tracing.
 OpcRequestId *string `mandatory:"false" contributesTo:"header"
 name:"opc-request-id"`

 // Metadata about the request. This information will not be transmitted to the service, but
 // represents information that the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}

func (request GetJavaLicenseRequest) String() string {
 return common.PointerString(request)
}

// HTTPRequest implements the OCIRequest interface
func (request GetJavaLicenseRequest) HTTPRequest(method, path string, binaryRequestBody
*common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request, error) {

 _, err := request.ValidateEnumValue()
 if err != nil {
```

```
  return http.Request{}, err
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method, path, request,
extraHeaders)
}

// BinaryRequestBody implements the OCIRequest interface
func (request GetJavaLicenseRequest) BinaryRequestBody() (*common.OCIReadSeekCloser, bool) {

 return nil, false

}

// RetryPolicy implements the OCIRetryableRequest interface. This retrieves
 the specified retry policy.
func (request GetJavaLicenseRequest) RetryPolicy() *common.RetryPolicy {
 return request.RequestMetadata.RetryPolicy
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (request GetJavaLicenseRequest) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if _, ok := GetMappingGetJavaLicenseLicenseTypeEnum(string(request.LicenseType)); !ok &&
request.LicenseType != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LicenseType: %s. Supported values are:
%s.", request.LicenseType, strings.Join(GetGetJavaLicenseLicenseTypeEnumStringValues(), ",")))
 }
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// GetJavaLicenseResponse wrapper for the GetJavaLicense operation
type GetJavaLicenseResponse struct
 {

 // The underlying http response
 RawResponse *http.Response

 // The JavaLicense instance
 JavaLicense `presentIn:"body"`

 // Unique Oracle-assigned identifier for the request. If you need to contact
 // Oracle about a particular request, provide the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`
```

```
}

func (response GetJavaLicenseResponse) String() string {
 return common.PointerString(response)
}

// HTTPResponse implements the OCIResponse interface
func (response GetJavaLicenseResponse) HTTPResponse() *http.Response {
 return response.RawResponse
}

// GetJavaLicenseLicenseTypeEnum Enum with underlying type: string
type GetJavaLicenseLicenseTypeEnum string

// Set of constants representing the allowable values for GetJavaLicenseLicenseTypeEnum
const (
 GetJavaLicenseLicenseTypeOtn        GetJavaLicenseLicenseTypeEnum = "OTN"
 GetJavaLicenseLicenseTypeNftc       GetJavaLicenseLicenseTypeEnum = "NFTC"
 GetJavaLicenseLicenseTypeRestricted GetJavaLicenseLicenseTypeEnum
 = "RESTRICTED"
)

var mappingGetJavaLicenseLicenseTypeEnum = map[string]GetJavaLicenseLicenseTypeEnum{
 "OTN":        GetJavaLicenseLicenseTypeOtn,
 "NFTC":       GetJavaLicenseLicenseTypeNftc,
 "RESTRICTED": GetJavaLicenseLicenseTypeRestricted,
}

var mappingGetJavaLicenseLicenseTypeEnumLowerCase = map[string]GetJavaLicenseLicenseTypeEnum{
 "otn":        GetJavaLicenseLicenseTypeOtn,
 "nftc":       GetJavaLicenseLicenseTypeNftc,
 "restricted": GetJavaLicenseLicenseTypeRestricted,
}

// GetGetJavaLicenseLicenseTypeEnumValues Enumerates the set of values for GetJavaLicenseLicenseTypeEnum
func GetGetJavaLicenseLicenseTypeEnumValues() []GetJavaLicenseLicenseTypeEnum {
 values := make([]GetJavaLicenseLicenseTypeEnum, 0)
 for _, v := range mappingGetJavaLicenseLicenseTypeEnum {
  values = append(values, v)
 }
 return values
}

// GetGetJavaLicenseLicenseTypeEnumStringValues Enumerates the set of values in String for
GetJavaLicenseLicenseTypeEnum
func GetGetJavaLicenseLicenseTypeEnumStringValues()
 []string {
 return []string{
```

```
  "OTN",
  "NFTC",
  "RESTRICTED",
 }
}

// GetMappingGetJavaLicenseLicenseTypeEnum performs case Insensitive comparison on enum value and return
the desired enum
func GetMappingGetJavaLicenseLicenseTypeEnum(val string) (GetJavaLicenseLicenseTypeEnum, bool) {
 enum, ok := mappingGetJavaLicenseLicenseTypeEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}
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// Code generated. DO NOT EDIT.

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
)

// ListTopUtilizedProductLicensesRequest wrapper for the ListTopUtilizedProductLicenses operation
//
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-
examples/latest/licensemanager/ListTopUtilizedProductLicenses.go.html to see an example of how to use
ListTopUtilizedProductLicensesRequest.
type ListTopUtilizedProductLicensesRequest struct {

 // The compartment OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm) used for the
license record, product license, and configuration.
 CompartmentId
 *string `mandatory:"true" contributesTo:"query" name:"compartmentId"`

 // The maximum number of items to return.
 Limit *int `mandatory:"false" contributesTo:"query" name:"limit"`

 // A token representing the position at which to start retrieving results. This must come from the `opc-next-page`
header field of a previous response.
 Page *string `mandatory:"false" contributesTo:"query" name:"page"`
```

```
 // The unique Oracle-assigned identifier for the request. If you need to contact Oracle about a
 // particular request, please provide the request ID.
 OpcRequestId *string `mandatory:"false" contributesTo:"header" name:"opc-request-id"`

 // Indicates if the given compartment is the root compartment.
 IsCompartmentIdInSubtree *bool `mandatory:"false" contributesTo:"query" name:"isCompartmentIdInSubtree"`

 // The sort order to use, whether `ASC` or `DESC`.
 SortOrder ListTopUtilizedProductLicensesSortOrderEnum `mandatory:"false" contributesTo:"query"
name:"sortOrder"
 omitEmpty:"true"`

 // Specifies the attribute with which to sort the rules.
 // Default: `totalLicenseUnitsConsumed`
 // * **totalLicenseUnitsConsumed:** Sorts by totalLicenseUnitsConsumed of ProductLicense.
 SortBy ListTopUtilizedProductLicensesSortByEnum `mandatory:"false" contributesTo:"query" name:"sortBy"
omitEmpty:"true"`

 // Metadata about the request. This information will not be transmitted to the service, but
 // represents information that the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}

func (request ListTopUtilizedProductLicensesRequest) String() string {
 return common.PointerString(request)
}

// HTTPRequest implements the OCIRequest interface
func (request ListTopUtilizedProductLicensesRequest) HTTPRequest(method, path string, binaryRequestBody
*common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request, error) {

 _, err := request.ValidateEnumValue()
 if err != nil {
  return http.Request{}, err
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method,
 path, request, extraHeaders)
}

// BinaryRequestBody implements the OCIRequest interface
func (request ListTopUtilizedProductLicensesRequest) BinaryRequestBody() (*common.OCIReadSeekCloser,
bool) {

 return nil, false

}

// RetryPolicy implements the OCIRetryableRequest interface. This retrieves the specified retry policy.
```

```
func (request ListTopUtilizedProductLicensesRequest) RetryPolicy() *common.RetryPolicy {
 return request.RequestMetadata.RetryPolicy
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (request ListTopUtilizedProductLicensesRequest) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if _, ok := GetMappingListTopUtilizedProductLicensesSortOrderEnum(string(request.SortOrder)); !ok &&
request.SortOrder != "" {
  errMessage = append(errMessage,
 fmt.Sprintf("unsupported enum value for SortOrder: %s. Supported values are: %s.", request.SortOrder,
strings.Join(GetListTopUtilizedProductLicensesSortOrderEnumStringValues(), ",")))
 }
 if _, ok := GetMappingListTopUtilizedProductLicensesSortByEnum(string(request.SortBy)); !ok &&
request.SortBy != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for SortBy: %s. Supported values are: %s.",
request.SortBy, strings.Join(GetListTopUtilizedProductLicensesSortByEnumStringValues(), ",")))
 }
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// ListTopUtilizedProductLicensesResponse wrapper for the ListTopUtilizedProductLicenses operation
type ListTopUtilizedProductLicensesResponse struct {

 // The underlying http response
 RawResponse *http.Response

 // A list of TopUtilizedProductLicenseCollection instances
 TopUtilizedProductLicenseCollection `presentIn:"body"`

 // Unique Oracle-assigned identifier
 for the request. If you need to contact
 // Oracle about a particular request, please provide the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`

 // For pagination of a list of items. When paging through a list, if this header appears in the response,
 // then a partial list might have been returned. Include this value as the `page` parameter for the
 // subsequent GET request to get the next batch of items.
 OpcNextPage *string `presentIn:"header" name:"opc-next-page"`
}

func (response ListTopUtilizedProductLicensesResponse) String() string {
 return common.PointerString(response)
```

```
}

// HTTPResponse implements the OCIResponse interface
func (response ListTopUtilizedProductLicensesResponse) HTTPResponse() *http.Response {
 return response.RawResponse
}

// ListTopUtilizedProductLicensesSortOrderEnum Enum with underlying type: string
type ListTopUtilizedProductLicensesSortOrderEnum string

// Set of constants representing the allowable values for ListTopUtilizedProductLicensesSortOrderEnum
const
 (
 ListTopUtilizedProductLicensesSortOrderAsc  ListTopUtilizedProductLicensesSortOrderEnum = "ASC"
 ListTopUtilizedProductLicensesSortOrderDesc ListTopUtilizedProductLicensesSortOrderEnum = "DESC"
)

var mappingListTopUtilizedProductLicensesSortOrderEnum =
map[string]ListTopUtilizedProductLicensesSortOrderEnum{
 "ASC":  ListTopUtilizedProductLicensesSortOrderAsc,
 "DESC": ListTopUtilizedProductLicensesSortOrderDesc,
}

var mappingListTopUtilizedProductLicensesSortOrderEnumLowerCase =
map[string]ListTopUtilizedProductLicensesSortOrderEnum{
 "asc":  ListTopUtilizedProductLicensesSortOrderAsc,
 "desc": ListTopUtilizedProductLicensesSortOrderDesc,
}

// GetListTopUtilizedProductLicensesSortOrderEnumValues Enumerates the set of values for
ListTopUtilizedProductLicensesSortOrderEnum
func GetListTopUtilizedProductLicensesSortOrderEnumValues() []ListTopUtilizedProductLicensesSortOrderEnum
{
 values := make([]ListTopUtilizedProductLicensesSortOrderEnum,
 0)
 for _, v := range mappingListTopUtilizedProductLicensesSortOrderEnum {
  values = append(values, v)
 }
 return values
}

// GetListTopUtilizedProductLicensesSortOrderEnumStringValues Enumerates the set of values in String for
ListTopUtilizedProductLicensesSortOrderEnum
func GetListTopUtilizedProductLicensesSortOrderEnumStringValues() []string {
 return []string{
  "ASC",
  "DESC",
 }
```

```
}

// GetMappingListTopUtilizedProductLicensesSortOrderEnum performs case Insensitive comparison on enum value
and return the desired enum
func GetMappingListTopUtilizedProductLicensesSortOrderEnum(val string)
(ListTopUtilizedProductLicensesSortOrderEnum, bool) {
 enum, ok := mappingListTopUtilizedProductLicensesSortOrderEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}

// ListTopUtilizedProductLicensesSortByEnum Enum with underlying type: string
type ListTopUtilizedProductLicensesSortByEnum string

// Set of constants representing the allowable values for ListTopUtilizedProductLicensesSortByEnum
const
 (
 ListTopUtilizedProductLicensesSortByTotallicenseunitsconsumed ListTopUtilizedProductLicensesSortByEnum =
"totalLicenseUnitsConsumed"
)

var mappingListTopUtilizedProductLicensesSortByEnum =
map[string]ListTopUtilizedProductLicensesSortByEnum{
 "totalLicenseUnitsConsumed": ListTopUtilizedProductLicensesSortByTotallicenseunitsconsumed,
}

var mappingListTopUtilizedProductLicensesSortByEnumLowerCase =
map[string]ListTopUtilizedProductLicensesSortByEnum{
 "totallicenseunitsconsumed": ListTopUtilizedProductLicensesSortByTotallicenseunitsconsumed,
}

// GetListTopUtilizedProductLicensesSortByEnumValues Enumerates the set of values for
ListTopUtilizedProductLicensesSortByEnum
func GetListTopUtilizedProductLicensesSortByEnumValues() []ListTopUtilizedProductLicensesSortByEnum {
 values := make([]ListTopUtilizedProductLicensesSortByEnum, 0)
 for _, v := range mappingListTopUtilizedProductLicensesSortByEnum {
  values = append(values, v)
 }
 return values
}

// GetListTopUtilizedProductLicensesSortByEnumStringValues
 Enumerates the set of values in String for ListTopUtilizedProductLicensesSortByEnum
func GetListTopUtilizedProductLicensesSortByEnumStringValues() []string {
 return []string{
  "totalLicenseUnitsConsumed",
 }
}
```

```
// GetMappingListTopUtilizedProductLicensesSortByEnum performs case Insensitive comparison on enum value
and return the desired enum
func GetMappingListTopUtilizedProductLicensesSortByEnum(val string)
(ListTopUtilizedProductLicensesSortByEnum, bool) {
 enum, ok := mappingListTopUtilizedProductLicensesSortByEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}
```

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// Code generated. DO NOT EDIT.

// GoldenGate API
//
// Use the Oracle Cloud Infrastructure GoldenGate APIs to perform data replication operations.
//

package goldengate

import (
 "strings"
)

// LicenseModelEnum Enum with underlying type: string
type LicenseModelEnum string

// Set of constants representing the allowable values for LicenseModelEnum
const (
 LicenseModelLicenseIncluded     LicenseModelEnum = "LICENSE_INCLUDED"
 LicenseModelBringYourOwnLicense LicenseModelEnum = "BRING_YOUR_OWN_LICENSE"
)
```

```
var mappingLicenseModelEnum = map[string]LicenseModelEnum{
 "LICENSE_INCLUDED":       LicenseModelLicenseIncluded,
 "BRING_YOUR_OWN_LICENSE": LicenseModelBringYourOwnLicense,
}

var
 mappingLicenseModelEnumLowerCase = map[string]LicenseModelEnum{
 "license_included":       LicenseModelLicenseIncluded,
 "bring_your_own_license": LicenseModelBringYourOwnLicense,
}

// GetLicenseModelEnumValues Enumerates the set of values for LicenseModelEnum
func GetLicenseModelEnumValues() []LicenseModelEnum {
 values := make([]LicenseModelEnum, 0)
 for _, v := range mappingLicenseModelEnum {
  values = append(values, v)
 }
 return values
}

// GetLicenseModelEnumStringValues Enumerates the set of values in String for LicenseModelEnum
func GetLicenseModelEnumStringValues() []string {
 return []string{
  "LICENSE_INCLUDED",
  "BRING_YOUR_OWN_LICENSE",
 }
}

// GetMappingLicenseModelEnum performs case Insensitive comparison on enum value and return the desired
enum
func GetMappingLicenseModelEnum(val string) (LicenseModelEnum, bool) {
 enum, ok := mappingLicenseModelEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}
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// Code generated. DO NOT EDIT.

// License Manager API
//
// Use the License Manager API to manage product licenses and license records. For more information, see License
Manager Overview (https://docs.oracle.com/iaas/Content/LicenseManager/Concepts/licensemanageroverview.htm).
//

package licensemanager
```

```
import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// UpdateLicenseRecordDetails The details about updates in the license record.
type UpdateLicenseRecordDetails struct {

 // License record name.
 DisplayName *string `mandatory:"true" json:"displayName"`

 // Specifies if the license record term is perpertual.
 IsPerpetual *bool `mandatory:"true"
 json:"isPerpetual"`

 // Specifies if the license count is unlimited.
 IsUnlimited *bool `mandatory:"true" json:"isUnlimited"`

 // The license record end date in RFC 3339 (https://tools.ietf.org/html/rfc3339)
 // date format.
 // Example: `2018-09-12`
 ExpirationDate *common.SDKTime `mandatory:"false" json:"expirationDate"`

 // The license record support end date in RFC 3339 (https://tools.ietf.org/html/rfc3339)
 // date format.
 // Example: `2018-09-12`
 SupportEndDate *common.SDKTime `mandatory:"false" json:"supportEndDate"`

 // The number of license units added by a user in a license record.
 // Default 1
 LicenseCount *int `mandatory:"false" json:"licenseCount"`

 // The license record product ID.
 ProductId *string `mandatory:"false" json:"productId"`

 // Simple key-value pair that is applied without any predefined name, type, or scope. Exists for cross-compatibility
only.
 // Example: `{"bar-key": "value"}`
 FreeformTags map[string]string `mandatory:"false" json:"freeformTags"`

 //
 Defined tags for this resource. Each key is predefined and scoped to a namespace.
 // Example: `{"foo-namespace": {"bar-key": "value"}}`
 DefinedTags map[string]map[string]interface{} `mandatory:"false" json:"definedTags"`
}

func (m UpdateLicenseRecordDetails) String() string {
```

```
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m UpdateLicenseRecordDetails) ValidateEnumValue() (bool, error) {
 errMessage := []string{}

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
```

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// Code generated. DO NOT EDIT.

```
package identity

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
)

// ChangeDomainLicenseTypeRequest wrapper for the ChangeDomainLicenseType operation
//
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-examples/latest/identity/ChangeDomainLicenseType.go.html to see an example of how to use ChangeDomainLicenseTypeRequest.
type ChangeDomainLicenseTypeRequest struct {

 // The OCID of the identity domain.
 DomainId *string `mandatory:"true" contributesTo:"path" name:"domainId"`

 // The request object for an update to the license type of the identity domain.
 ChangeDomainLicenseTypeDetails
 `contributesTo:"body"`

 // Unique Oracle-assigned identifier for the request. If you need to contact Oracle about a
 // particular request, please provide the request ID.
 OpcRequestId *string `mandatory:"false" contributesTo:"header" name:"opc-request-id"`
```

```
 // A token that uniquely identifies a request so it can be retried in case of a timeout or
 // server error without risk of executing that same action again. Retry tokens expire after 24
 // hours, but can be invalidated before then due to conflicting operations (e.g., if a resource
 // has been deleted and purged from the system, then a retry of the original creation request
 // may be rejected).
 OpcRetryToken *string `mandatory:"false" contributesTo:"header" name:"opc-retry-token"`

 // For optimistic concurrency control. In the PUT or DELETE call for a resource, set the `if-match`
 // parameter to the value of the etag from a previous GET or POST response for that resource.  The resource
 // will be updated
 or deleted only if the etag you provide matches the resource's current etag value.
 IfMatch *string `mandatory:"false" contributesTo:"header" name:"if-match"`

 // Metadata about the request. This information will not be transmitted to the service, but
 // represents information that the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}

func (request ChangeDomainLicenseTypeRequest) String() string {
 return common.PointerString(request)
}

// HTTPRequest implements the OCIRequest interface
func (request ChangeDomainLicenseTypeRequest) HTTPRequest(method, path string, binaryRequestBody
*common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request, error) {

 _, err := request.ValidateEnumValue()
 if err != nil {
  return http.Request{}, err
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method, path, request,
extraHeaders)
}

// BinaryRequestBody implements the OCIRequest interface
func (request ChangeDomainLicenseTypeRequest)
 BinaryRequestBody() (*common.OCIReadSeekCloser, bool) {

 return nil, false

}

// RetryPolicy implements the OCIRetryableRequest interface. This retrieves the specified retry policy.
func (request ChangeDomainLicenseTypeRequest) RetryPolicy() *common.RetryPolicy {
 return request.RequestMetadata.RetryPolicy
}
```

```
// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (request ChangeDomainLicenseTypeRequest) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// ChangeDomainLicenseTypeResponse wrapper for the ChangeDomainLicenseType operation
type ChangeDomainLicenseTypeResponse struct {

 // The underlying http response
 RawResponse *http.Response

 // Unique Oracle-assigned identifier for the request.
 If you need to contact Oracle about a
 // particular request, please provide the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`

 // The OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm) of the work request.
 OpcWorkRequestId *string `presentIn:"header" name:"opc-work-request-id"`
}

func (response ChangeDomainLicenseTypeResponse) String() string {
 return common.PointerString(response)
}

// HTTPResponse implements the OCIResponse interface
func (response ChangeDomainLicenseTypeResponse) HTTPResponse() *http.Response {
 return response.RawResponse
}
```

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// Code generated. DO NOT EDIT.

```
package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
)
```

```
// GetProductLicenseRequest wrapper for the GetProductLicense operation
//
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-examples/latest/licensemanager/GetProductLicense.go.html
to see an example of how to use GetProductLicenseRequest.
type GetProductLicenseRequest struct {

 // Unique product license identifier.
 ProductLicenseId *string `mandatory:"true" contributesTo:"path" name:"productLicenseId"`

 // The unique Oracle-assigned identifier for the request. If you need to contact Oracle about
 a
 // particular request, please provide the request ID.
 OpcRequestId *string `mandatory:"false" contributesTo:"header" name:"opc-request-id"`

 // Metadata about the request. This information will not be transmitted to the service, but
 // represents information that the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}

func (request GetProductLicenseRequest) String() string {
 return common.PointerString(request)
}

// HTTPRequest implements the OCIRequest interface
func (request GetProductLicenseRequest) HTTPRequest(method, path string, binaryRequestBody
*common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request, error) {

 _, err := request.ValidateEnumValue()
 if err != nil {
  return http.Request{}, err
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method, path, request,
extraHeaders)
}

// BinaryRequestBody implements the OCIRequest interface
func (request GetProductLicenseRequest) BinaryRequestBody()
 (*common.OCIReadSeekCloser, bool) {

 return nil, false

}

// RetryPolicy implements the OCIRetryableRequest interface. This retrieves the specified retry policy.
func (request GetProductLicenseRequest) RetryPolicy() *common.RetryPolicy {
```

```
 return request.RequestMetadata.RetryPolicy
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (request GetProductLicenseRequest) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// GetProductLicenseResponse wrapper for the GetProductLicense operation
type GetProductLicenseResponse struct {

 // The underlying http response
 RawResponse *http.Response

 // The ProductLicense instance
 ProductLicense `presentIn:"body"`

 // For optimistic concurrency control. See `if-match`.
 Etag
 *string `presentIn:"header" name:"etag"`

 // Unique Oracle-assigned identifier for the request. If you need to contact
 // Oracle about a particular request, please provide the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`
}

func (response GetProductLicenseResponse) String() string {
 return common.PointerString(response)
}

// HTTPResponse implements the OCIResponse interface
func (response GetProductLicenseResponse) HTTPResponse() *http.Response {
 return response.RawResponse
}
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2.0. You may choose either license.
// Code generated. DO NOT EDIT.

// License Manager API
//
```

```
// Use the License Manager API to manage product licenses and license records. For more information, see License
Manager Overview (https://docs.oracle.com/iaas/Content/LicenseManager/Concepts/licensemanageroverview.htm).
//

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// CreateProductLicenseDetails Details for creating a new product license.
type CreateProductLicenseDetails struct {

 // The compartment OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm) where product
licenses are created.
 CompartmentId *string `mandatory:"true"
 json:"compartmentId"`

 // Specifies if the product license vendor is Oracle or a third party.
 IsVendorOracle *bool `mandatory:"true" json:"isVendorOracle"`

 // Name of the product license.
 DisplayName *string `mandatory:"true" json:"displayName"`

 // The product license unit.
 LicenseUnit LicenseUnitEnum `mandatory:"true" json:"licenseUnit"`

 // The product license vendor name, for example: Microsoft, RHEL, and so on.
 VendorName *string `mandatory:"false" json:"vendorName"`

 // The image details associated with the product license.
 Images []ImageDetails `mandatory:"false" json:"images"`

 // Simple key-value pair that is applied without any predefined name, type, or scope. Exists for cross-compatibility
only.
 // Example: `{"bar-key": "value"}`
 FreeformTags map[string]string `mandatory:"false" json:"freeformTags"`

 // Defined tags for this resource. Each key is predefined and scoped to a namespace.
 // Example: `{"foo-namespace": {"bar-key": "value"}}`
 DefinedTags map[string]map[string]interface{}
 `mandatory:"false" json:"definedTags"`
}

func (m CreateProductLicenseDetails) String() string {
 return common.PointerString(m)
```

```
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m CreateProductLicenseDetails) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if _, ok := GetMappingLicenseUnitEnum(string(m.LicenseUnit)); !ok && m.LicenseUnit != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LicenseUnit: %s. Supported values are:
%s.", m.LicenseUnit, strings.Join(GetLicenseUnitEnumStringValues(), ",")))
 }

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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2.0. You may choose either license.
// Code generated. DO NOT EDIT.

// Analytics API
//
// Analytics API.
//

package analytics

import (
 "strings"
)

// LicenseTypeEnum Enum with underlying type: string
type LicenseTypeEnum string

// Set of constants representing the allowable values for LicenseTypeEnum
const (
 LicenseTypeLicenseIncluded     LicenseTypeEnum = "LICENSE_INCLUDED"
 LicenseTypeBringYourOwnLicense LicenseTypeEnum = "BRING_YOUR_OWN_LICENSE"
)

var mappingLicenseTypeEnum = map[string]LicenseTypeEnum{
 "LICENSE_INCLUDED":       LicenseTypeLicenseIncluded,
 "BRING_YOUR_OWN_LICENSE": LicenseTypeBringYourOwnLicense,
}
```

```
var mappingLicenseTypeEnumLowerCase = map[string]LicenseTypeEnum{
 "license_included":
      LicenseTypeLicenseIncluded,
 "bring_your_own_license": LicenseTypeBringYourOwnLicense,
}

// GetLicenseTypeEnumValues Enumerates the set of values for LicenseTypeEnum
func GetLicenseTypeEnumValues() []LicenseTypeEnum {
 values := make([]LicenseTypeEnum, 0)
 for _, v := range mappingLicenseTypeEnum {
  values = append(values, v)
 }
 return values
}

// GetLicenseTypeEnumStringValues Enumerates the set of values in String for LicenseTypeEnum
func GetLicenseTypeEnumStringValues() []string {
 return []string{
  "LICENSE_INCLUDED",
  "BRING_YOUR_OWN_LICENSE",
 }
}

// GetMappingLicenseTypeEnum performs case Insensitive comparison on enum value and return the desired enum
func GetMappingLicenseTypeEnum(val string) (LicenseTypeEnum, bool) {
 enum, ok := mappingLicenseTypeEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
2.0. You may choose either license.
// Code generated. DO NOT EDIT.

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
)

// DeleteLicenseRecordRequest wrapper for the DeleteLicenseRecord operation
//
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-
```

```
examples/latest/licensemanager/DeleteLicenseRecord.go.html to see an example of how to use
DeleteLicenseRecordRequest.
type DeleteLicenseRecordRequest struct {

 // Unique license record identifier.
 LicenseRecordId *string `mandatory:"true" contributesTo:"path" name:"licenseRecordId"`

 // The unique Oracle-assigned identifier for the request. If you need to contact Oracle
 about a
 // particular request, please provide the request ID.
 OpcRequestId *string `mandatory:"false" contributesTo:"header" name:"opc-request-id"`

 // For optimistic concurrency control. In the PUT or DELETE call for a resource, set the `if-match`
 // parameter to the value of the etag from a previous GET or POST response for that resource.  The resource
 // will be updated or deleted only if the etag you provide matches the resource's current etag value.
 IfMatch *string `mandatory:"false" contributesTo:"header" name:"if-match"`

 // Metadata about the request. This information will not be transmitted to the service, but
 // represents information that the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}

func (request DeleteLicenseRecordRequest) String() string {
 return common.PointerString(request)
}

// HTTPRequest implements the OCIRequest interface
func (request DeleteLicenseRecordRequest) HTTPRequest(method, path string, binaryRequestBody
 *common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request, error) {

 _, err := request.ValidateEnumValue()
 if err != nil {
  return http.Request{}, err
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method, path, request,
extraHeaders)
}

// BinaryRequestBody implements the OCIRequest interface
func (request DeleteLicenseRecordRequest) BinaryRequestBody() (*common.OCIReadSeekCloser, bool) {

 return nil, false

}

// RetryPolicy implements the OCIRetryableRequest interface. This retrieves the specified retry policy.
func (request DeleteLicenseRecordRequest) RetryPolicy() *common.RetryPolicy {
 return request.RequestMetadata.RetryPolicy
```

```
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (request DeleteLicenseRecordRequest) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if
 len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// DeleteLicenseRecordResponse wrapper for the DeleteLicenseRecord operation
type DeleteLicenseRecordResponse struct {

 // The underlying http response
 RawResponse *http.Response

 // Unique Oracle-assigned identifier for the asynchronous request. You can use this to query the status of the
asynchronous operation.
 OpcWorkRequestId *string `presentIn:"header" name:"opc-work-request-id"`

 // Unique Oracle-assigned identifier for the request. If you need to contact
 // Oracle about a particular request, please provide the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`

 // Location of the resource.
 Location *string `presentIn:"header" name:"location"`
}

func (response DeleteLicenseRecordResponse) String() string {
 return common.PointerString(response)
}

// HTTPResponse implements the OCIResponse interface
func (response DeleteLicenseRecordResponse)
 HTTPResponse() *http.Response {
 return response.RawResponse
}
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2.0. You may choose either license.
// Code generated. DO NOT EDIT.

// License Manager API
```

```
//
// Use the License Manager API to manage product licenses and license records. For more information, see License
Manager Overview (https://docs.oracle.com/iaas/Content/LicenseManager/Concepts/licensemanageroverview.htm).
//

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// ProductLicenseConsumerSummary Details of a resource that is consuming a particular product license.
type ProductLicenseConsumerSummary struct {

 // The OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm) of the resource.
 ResourceId *string `mandatory:"true"
 json:"resourceId"`

 // The display name of the resource.
 ResourceName *string `mandatory:"true" json:"resourceName"`

 // The resource product name.
 ProductName *string `mandatory:"true" json:"productName"`

 // The OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm) of the compartment that
contains the resource.
 ResourceCompartmentId *string `mandatory:"true" json:"resourceCompartmentId"`

 // The display name of the compartment that contains the resource.
 ResourceCompartmentName *string `mandatory:"true" json:"resourceCompartmentName"`

 // The unit type for the resource.
 ResourceUnitType ResourceUnitEnum `mandatory:"true" json:"resourceUnitType"`

 // Number of units of the resource
 ResourceUnitCount *float64 `mandatory:"true" json:"resourceUnitCount"`

 // The product license unit.
 LicenseUnitType LicenseUnitEnum `mandatory:"true" json:"licenseUnitType"`

 // Number of license units consumed by the resource.
 LicenseUnitsConsumed *float64 `mandatory:"true"
 json:"licenseUnitsConsumed"`

 // Specifies if the base license is available.
 IsBaseLicenseAvailable *bool `mandatory:"true" json:"isBaseLicenseAvailable"`
```

```
 // Specifies if all options are available.
 AreAllOptionsAvailable *bool `mandatory:"true" json:"areAllOptionsAvailable"`

 // Collection of missing product licenses.
 MissingProducts []Product `mandatory:"true" json:"missingProducts"`
}

func (m ProductLicenseConsumerSummary) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m ProductLicenseConsumerSummary) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if _, ok := GetMappingResourceUnitEnum(string(m.ResourceUnitType)); !ok && m.ResourceUnitType != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for ResourceUnitType:
 %s. Supported values are: %s.", m.ResourceUnitType, strings.Join(GetResourceUnitEnumStringValues(), ",")))
 }
 if _, ok := GetMappingLicenseUnitEnum(string(m.LicenseUnitType)); !ok && m.LicenseUnitType != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LicenseUnitType: %s. Supported values
are: %s.", m.LicenseUnitType, strings.Join(GetLicenseUnitEnumStringValues(), ",")))
 }

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
2.0. You may choose either license.
// Code generated. DO NOT EDIT.

// License Manager API
//
// Use the License Manager API to manage product licenses and license records. For more information, see License
Manager Overview (https://docs.oracle.com/iaas/Content/LicenseManager/Concepts/licensemanageroverview.htm).
//

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
```

```
 "strings"
)

// LicenseRecordSummary The license record summary.
type LicenseRecordSummary struct {

 // The license record OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm).
 Id *string `mandatory:"true" json:"id"`

 // License record display name. Avoid entering confidential
 information.
 DisplayName *string `mandatory:"true" json:"displayName"`

 // Specifies if the license count is unlimited.
 IsUnlimited *bool `mandatory:"true" json:"isUnlimited"`

 // Specifies if the license record term is perpertual.
 IsPerpetual *bool `mandatory:"true" json:"isPerpetual"`

 // The product license OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm) with which the
license record is associated.
 ProductLicenseId *string `mandatory:"false" json:"productLicenseId"`

 // The compartment OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm) where the
license record is created.
 CompartmentId *string `mandatory:"false" json:"compartmentId"`

 // The license record product ID.
 ProductId *string `mandatory:"false" json:"productId"`

 // The number of license record units added by the user for the given license record.
 // Default 1
 LicenseCount *int `mandatory:"false" json:"licenseCount"`

 // The license record end date
 in RFC 3339 (https://tools.ietf.org/html/rfc3339) format.
 // date format.
 // Example: `2018-09-12`
 ExpirationDate *common.SDKTime `mandatory:"false" json:"expirationDate"`

 // The license record support end date in RFC 3339 (https://tools.ietf.org/html/rfc3339) format.
 // date format.
 // Example: `2018-09-12`
 SupportEndDate *common.SDKTime `mandatory:"false" json:"supportEndDate"`

 // The time the license record was created. An RFC 3339 (https://tools.ietf.org/html/rfc3339)-formatted datetime
string.
 TimeCreated *common.SDKTime `mandatory:"false" json:"timeCreated"`
```

```
 // The time the license record was updated. An RFC 3339 (https://tools.ietf.org/html/rfc3339)-formatted datetime
string.
 TimeUpdated *common.SDKTime `mandatory:"false" json:"timeUpdated"`

 // The current license record state.
 LifecycleState LifeCycleStateEnum `mandatory:"false" json:"lifecycleState,omitempty"`

 // The product license unit.
 LicenseUnit LicenseUnitEnum `mandatory:"false" json:"licenseUnit,omitempty"`

 //
 The product license name with which the license record is associated.
 ProductLicense *string `mandatory:"false" json:"productLicense"`

 // Simple key-value pair that is applied without any predefined name, type, or scope. Exists for cross-compatibility
only.
 // Example: `{"bar-key": "value"}`
 FreeformTags map[string]string `mandatory:"false" json:"freeformTags"`

 // Defined tags for this resource. Each key is predefined and scoped to a namespace.
 // Example: `{"foo-namespace": {"bar-key": "value"}}`
 DefinedTags map[string]map[string]interface{} `mandatory:"false" json:"definedTags"`

 // Usage of system tag keys. These predefined keys are scoped to namespaces.
 // Example: `{"orcl-cloud": {"free-tier-retained": "true"}}`
 SystemTags map[string]map[string]interface{} `mandatory:"false" json:"systemTags"`
}

func (m LicenseRecordSummary) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
//
 This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m LicenseRecordSummary) ValidateEnumValue() (bool, error) {
 errMessage := []string{}

 if _, ok := GetMappingLifeCycleStateEnum(string(m.LifecycleState)); !ok && m.LifecycleState != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LifecycleState: %s. Supported values
are: %s.", m.LifecycleState, strings.Join(GetLifeCycleStateEnumStringValues(), ",")))
 }
 if _, ok := GetMappingLicenseUnitEnum(string(m.LicenseUnit)); !ok && m.LicenseUnit != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LicenseUnit: %s. Supported values are:
%s.", m.LicenseUnit, strings.Join(GetLicenseUnitEnumStringValues(), ",")))
 }
```

```
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
2.0. You may choose either license.
// Code generated. DO NOT EDIT.

// Stack Monitoring API
//
// Stack Monitoring API.
//

package stackmonitoring

import (
 "encoding/json"
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// UpdateLicenseAutoAssignConfigDetails Change the details of a LICENSE_AUTO_ASSIGN configuration.
type UpdateLicenseAutoAssignConfigDetails struct {

 // The display name of the configuration.
 DisplayName *string `mandatory:"false" json:"displayName"`

 // Simple key-value pair that is applied without any predefined name, type or scope. Exists for cross-compatibility
only.
 // Example: `{"bar-key": "value"}`
 FreeformTags map[string]string `mandatory:"false"
 json:"freeformTags"`

 // Defined tags for this resource. Each key is predefined and scoped to a namespace.
 // Example: `{"foo-namespace": {"bar-key": "value"}}`
 DefinedTags map[string]map[string]interface{} `mandatory:"false" json:"definedTags"`

 // License edition.
 License LicenseTypeEnum `mandatory:"false" json:"license,omitempty"`
}

// GetDisplayName returns DisplayName
func (m UpdateLicenseAutoAssignConfigDetails) GetDisplayName() *string {
 return m.DisplayName
```

```
}

// GetFreeformTags returns FreeformTags
func (m UpdateLicenseAutoAssignConfigDetails) GetFreeformTags() map[string]string {
 return m.FreeformTags
}

// GetDefinedTags returns DefinedTags
func (m UpdateLicenseAutoAssignConfigDetails) GetDefinedTags() map[string]map[string]interface{} {
 return m.DefinedTags
}

func (m UpdateLicenseAutoAssignConfigDetails) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called
 during constructing API request process
// Not recommended for calling this function directly
func (m UpdateLicenseAutoAssignConfigDetails) ValidateEnumValue() (bool, error) {
 errMessage := []string{}

 if _, ok := GetMappingLicenseTypeEnum(string(m.License)); !ok && m.License != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for License: %s. Supported values are:
%s.", m.License, strings.Join(GetLicenseTypeEnumStringValues(), ",")))
 }
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// MarshalJSON marshals to json representation
func (m UpdateLicenseAutoAssignConfigDetails) MarshalJSON() (buff []byte, e error) {
 type MarshalTypeUpdateLicenseAutoAssignConfigDetails UpdateLicenseAutoAssignConfigDetails
 s := struct {
  DiscriminatorParam string `json:"configType"`
  MarshalTypeUpdateLicenseAutoAssignConfigDetails
 }{
  "LICENSE_AUTO_ASSIGN",
  (MarshalTypeUpdateLicenseAutoAssignConfigDetails)(m),
 }

 return
 json.Marshal(&s)
}
```

```
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
2.0. You may choose either license.
// Code generated. DO NOT EDIT.

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
)

// CreateLicenseRecordRequest wrapper for the CreateLicenseRecord operation
//
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-
examples/latest/licensemanager/CreateLicenseRecord.go.html to see an example of how to use
CreateLicenseRecordRequest.
type CreateLicenseRecordRequest struct {

 // Details needed to create a new license record.
 CreateLicenseRecordDetails `contributesTo:"body"`

 // Unique product license identifier.
 ProductLicenseId *string `mandatory:"true" contributesTo:"query" name:"productLicenseId"`

 //
 The unique Oracle-assigned identifier for the request. If you need to contact Oracle about a
 // particular request, please provide the request ID.
 OpcRequestId *string `mandatory:"false" contributesTo:"header" name:"opc-request-id"`

 // A token that uniquely identifies a request so it can be retried in case of a timeout or server error without
 // risk of executing that same action again. Retry tokens expire after 24 hours, but can be invalidated before
 // then due to conflicting operations (for example, if a resource has been deleted and purged from the system,
 // then a retry of the original creation request might be rejected).
 OpcRetryToken *string `mandatory:"false" contributesTo:"header" name:"opc-retry-token"`

 // Metadata about the request. This information will not be transmitted to the service, but
 // represents information that the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}

func (request CreateLicenseRecordRequest)
```

```
 String() string {
 return common.PointerString(request)
}

// HTTPRequest implements the OCIRequest interface
func (request CreateLicenseRecordRequest) HTTPRequest(method, path string, binaryRequestBody
*common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request, error) {

 _, err := request.ValidateEnumValue()
 if err != nil {
  return http.Request{}, err
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method, path, request,
extraHeaders)
}

// BinaryRequestBody implements the OCIRequest interface
func (request CreateLicenseRecordRequest) BinaryRequestBody() (*common.OCIReadSeekCloser, bool) {

 return nil, false

}

// RetryPolicy implements the OCIRetryableRequest interface. This retrieves the specified retry policy.
func (request CreateLicenseRecordRequest) RetryPolicy() *common.RetryPolicy {
 return request.RequestMetadata.RetryPolicy
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function
 is being called during constructing API request process
// Not recommended for calling this function directly
func (request CreateLicenseRecordRequest) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// CreateLicenseRecordResponse wrapper for the CreateLicenseRecord operation
type CreateLicenseRecordResponse struct {

 // The underlying http response
 RawResponse *http.Response

 // The LicenseRecord instance
 LicenseRecord `presentIn:"body"`
```

```
 // For optimistic concurrency control. See `if-match`.
 Etag *string `presentIn:"header" name:"etag"`

 // Unique Oracle-assigned identifier for the asynchronous request. You can use this to query the status of the
asynchronous operation.
 OpcWorkRequestId *string `presentIn:"header" name:"opc-work-request-id"`

 // Unique Oracle-assigned identifier for the request. If you need to contact
 // Oracle about a particular request,
 please provide the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`

 // Location of the resource.
 Location *string `presentIn:"header" name:"location"`
}

func (response CreateLicenseRecordResponse) String() string {
 return common.PointerString(response)
}

// HTTPResponse implements the OCIResponse interface
func (response CreateLicenseRecordResponse) HTTPResponse() *http.Response {
 return response.RawResponse
}
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// Code generated. DO NOT EDIT.

// Oracle Cloud VMware Solution API
//
// Use the Oracle Cloud VMware API to create SDDCs and manage ESXi hosts and software.
// For more information, see Oracle Cloud VMware Solution
(https://docs.oracle.com/iaas/Content/VMware/Concepts/ocvsoverview.htm).
//

package ocvp

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// HcxLicenseSummary HCX on-premise license information summary.
type HcxLicenseSummary struct {
```

```
 // HCX on-premise license key value.
 ActivationKey *string `mandatory:"true" json:"activationKey"`

 // status of HCX on-premise license.
 Status HcxLicenseStatusEnum `mandatory:"true" json:"status"`

 //
 Name of the system that consumed the HCX on-premise license
 SystemName *string `mandatory:"false" json:"systemName"`
}

func (m HcxLicenseSummary) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m HcxLicenseSummary) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if _, ok := GetMappingHcxLicenseStatusEnum(string(m.Status)); !ok && m.Status != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for Status: %s. Supported values are: %s.",
m.Status, strings.Join(GetHcxLicenseStatusEnumStringValues(), ",")))
 }

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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// Code generated. DO NOT EDIT.

package ocvp

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
)

// RefreshHcxLicenseStatusRequest wrapper for the RefreshHcxLicenseStatus operation
//
```

```
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-examples/latest/ocvp/RefreshHcxLicenseStatus.go.html to
see an example of how to use RefreshHcxLicenseStatusRequest.
type RefreshHcxLicenseStatusRequest struct {

 // The OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm) of the SDDC.
 SddcId *string `mandatory:"true" contributesTo:"path" name:"sddcId"`

 // A token that uniquely identifies a request
 so it can be retried in case of a timeout or
 // server error without risk of executing that same action again. Retry tokens expire after 24
 // hours, but can be invalidated before then due to conflicting operations (for example, if a resource
 // has been deleted and purged from the system, then a retry of the original creation request
 // may be rejected).
 OpcRetryToken *string `mandatory:"false" contributesTo:"header" name:"opc-retry-token"`

 // For optimistic concurrency control. In the PUT or DELETE call
 // for a resource, set the `if-match` parameter to the value of the
 // etag from a previous GET or POST response for that resource.
 // The resource will be updated or deleted only if the etag you
 // provide matches the resource's current etag value.
 IfMatch *string `mandatory:"false" contributesTo:"header" name:"if-match"`

 // Unique identifier for the request. If you need to contact Oracle about a particular
 // request, please provide the request ID.
 OpcRequestId
 *string `mandatory:"false" contributesTo:"header" name:"opc-request-id"`

 // Metadata about the request. This information will not be transmitted to the service, but
 // represents information that the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}

func (request RefreshHcxLicenseStatusRequest) String() string {
 return common.PointerString(request)
}

// HTTPRequest implements the OCIRequest interface
func (request RefreshHcxLicenseStatusRequest) HTTPRequest(method, path string, binaryRequestBody
*common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request, error) {

 _, err := request.ValidateEnumValue()
 if err != nil {
  return http.Request{}, err
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method, path, request,
extraHeaders)
```

```
}

// BinaryRequestBody implements the OCIRequest interface
func (request RefreshHcxLicenseStatusRequest) BinaryRequestBody() (*common.OCIReadSeekCloser, bool) {

 return nil, false

}

//
 RetryPolicy implements the OCIRetryableRequest interface. This retrieves the specified retry policy.
func (request RefreshHcxLicenseStatusRequest) RetryPolicy() *common.RetryPolicy {
 return request.RequestMetadata.RetryPolicy
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (request RefreshHcxLicenseStatusRequest) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// RefreshHcxLicenseStatusResponse wrapper for the RefreshHcxLicenseStatus operation
type RefreshHcxLicenseStatusResponse struct {

 // The underlying http response
 RawResponse *http.Response

 // Unique Oracle-assigned identifier for the asynchronous request. You can use this to query status of the
asynchronous operation.
 OpcWorkRequestId
 *string `presentIn:"header" name:"opc-work-request-id"`

 // Unique Oracle-assigned identifier for the request. If you need to contact
 // Oracle about a particular request, please provide the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`
}

func (response RefreshHcxLicenseStatusResponse) String() string {
 return common.PointerString(response)
}

// HTTPResponse implements the OCIResponse interface
func (response RefreshHcxLicenseStatusResponse) HTTPResponse() *http.Response {
```

```
 return response.RawResponse
}
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
2.0. You may choose either license.
// Code generated. DO NOT EDIT.

// Identity and Access Management Service API
//
// Use the Identity and Access Management Service API to manage users, groups, identity domains, compartments,
policies, tagging, and limits. For information about managing users, groups, compartments, and policies, see Identity
and Access Management (without identity domains)
(https://docs.oracle.com/iaas/Content/Identity/Concepts/overview.htm). For information about tagging and service
limits, see Tagging (https://docs.oracle.com/iaas/Content/Tagging/Concepts/taggingoverview.htm) and Service
Limits (https://docs.oracle.com/iaas/Content/General/Concepts/servicelimits.htm). For
 information about creating, modifying, and deleting identity domains, see Identity and Access Management (with
identity domains) (https://docs.oracle.com/iaas/Content/Identity/home.htm).
//

package identity

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// AllowedDomainLicenseTypeSummary (For tenancies that support identity domains) The
'AllowedDomainLicenseTypeSummary' object contains information about the license type of the identity domain.
type AllowedDomainLicenseTypeSummary struct {

 // The license type name.
 // Example: "Oracle Apps Premium"
 Name *string `mandatory:"true" json:"name"`

 // The license type identifier.
 // Example: "oracle-apps-premium"
 LicenseType *string `mandatory:"true" json:"licenseType"`

 // The license type description.
 Description *string `mandatory:"true" json:"description"`
}

func (m AllowedDomainLicenseTypeSummary) String() string {
 return common.PointerString(m)
}
```

```
// ValidateEnumValue returns an error when providing
 an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m AllowedDomainLicenseTypeSummary) ValidateEnumValue() (bool, error) {
 errMessage := []string{}

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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2.0. You may choose either license.
// Code generated. DO NOT EDIT.

// Identity and Access Management Service API
//
// Use the Identity and Access Management Service API to manage users, groups, identity domains, compartments,
policies, tagging, and limits. For information about managing users, groups, compartments, and policies, see Identity
and Access Management (without identity domains)
(https://docs.oracle.com/iaas/Content/Identity/Concepts/overview.htm). For information about tagging and service
limits, see Tagging (https://docs.oracle.com/iaas/Content/Tagging/Concepts/taggingoverview.htm) and Service
Limits (https://docs.oracle.com/iaas/Content/General/Concepts/servicelimits.htm). For
 information about creating, modifying, and deleting identity domains, see Identity and Access Management (with
identity domains) (https://docs.oracle.com/iaas/Content/Identity/home.htm).
//

package identity

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// ChangeDomainLicenseTypeDetails (For tenancies that support identity domains) Details for updating the license
type of the identity domain.
type ChangeDomainLicenseTypeDetails struct {

 // The license type of the identity domain.
 LicenseType *string `mandatory:"false" json:"licenseType"`
}

func (m ChangeDomainLicenseTypeDetails) String() string {
 return common.PointerString(m)
```

```
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m ChangeDomainLicenseTypeDetails) ValidateEnumValue() (bool, error) {
 errMessage := []string{}

 if len(errMessage)
 > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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2.0. You may choose either license.
// Code generated. DO NOT EDIT.

// Stack Monitoring API
//
// Stack Monitoring API.
//

package stackmonitoring

import (
 "encoding/json"
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// LicenseAutoAssignConfigDetails A configuration of the LICENSE_AUTO_ASSIGN type, consists of an
enumeration value which
// indicates which license should be assigned by default to new resources.
type LicenseAutoAssignConfigDetails struct {

 // The Unique Oracle ID (OCID) that is immutable on creation.
 Id *string `mandatory:"true" json:"id"`

 // The OCID of the compartment containing the configuration.
 CompartmentId *string `mandatory:"true" json:"compartmentId"`

 //
 A user-friendly name. Does not have to be unique, and it's changeable. Avoid entering confidential information.
 DisplayName *string `mandatory:"false" json:"displayName"`
```

```
 // The time the configuration was created. An RFC3339 formatted datetime string.
 TimeCreated *common.SDKTime `mandatory:"false" json:"timeCreated"`

 // The time the Config was updated.
 TimeUpdated *common.SDKTime `mandatory:"false" json:"timeUpdated"`

 // Simple key-value pair that is applied without any predefined name, type or scope. Exists for cross-compatibility
only.
 // Example: `{"bar-key": "value"}`
 FreeformTags map[string]string `mandatory:"false" json:"freeformTags"`

 // Defined tags for this resource. Each key is predefined and scoped to a namespace.
 // Example: `{"foo-namespace": {"bar-key": "value"}}`
 DefinedTags map[string]map[string]interface{} `mandatory:"false" json:"definedTags"`

 // Usage of system tag keys. These predefined keys are scoped to namespaces.
 // Example: `{"orcl-cloud":
 {"free-tier-retained": "true"}}`
 SystemTags map[string]map[string]interface{} `mandatory:"false" json:"systemTags"`

 // The current state of the configuration.
 LifecycleState ConfigLifecycleStateEnum `mandatory:"true" json:"lifecycleState"`

 // License edition.
 License LicenseTypeEnum `mandatory:"true" json:"license"`
}

// GetId returns Id
func (m LicenseAutoAssignConfigDetails) GetId() *string {
 return m.Id
}

// GetCompartmentId returns CompartmentId
func (m LicenseAutoAssignConfigDetails) GetCompartmentId() *string {
 return m.CompartmentId
}

// GetDisplayName returns DisplayName
func (m LicenseAutoAssignConfigDetails) GetDisplayName() *string {
 return m.DisplayName
}

// GetTimeCreated returns TimeCreated
func (m LicenseAutoAssignConfigDetails) GetTimeCreated() *common.SDKTime {
 return m.TimeCreated
}
```

```
// GetTimeUpdated returns TimeUpdated
func (m LicenseAutoAssignConfigDetails) GetTimeUpdated() *common.SDKTime {
 return m.TimeUpdated
}

// GetLifecycleState returns
 LifecycleState
func (m LicenseAutoAssignConfigDetails) GetLifecycleState() ConfigLifecycleStateEnum {
 return m.LifecycleState
}

// GetFreeformTags returns FreeformTags
func (m LicenseAutoAssignConfigDetails) GetFreeformTags() map[string]string {
 return m.FreeformTags
}

// GetDefinedTags returns DefinedTags
func (m LicenseAutoAssignConfigDetails) GetDefinedTags() map[string]map[string]interface{} {
 return m.DefinedTags
}

// GetSystemTags returns SystemTags
func (m LicenseAutoAssignConfigDetails) GetSystemTags() map[string]map[string]interface{} {
 return m.SystemTags
}

func (m LicenseAutoAssignConfigDetails) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m LicenseAutoAssignConfigDetails) ValidateEnumValue() (bool, error) {
 errMessage := []string{}

 if _, ok
 := GetMappingConfigLifecycleStateEnum(string(m.LifecycleState)); !ok && m.LifecycleState != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LifecycleState: %s. Supported values
are: %s.", m.LifecycleState, strings.Join(GetConfigLifecycleStateEnumStringValues(), ",")))
 }
 if _, ok := GetMappingLicenseTypeEnum(string(m.License)); !ok && m.License != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for License: %s. Supported values are:
%s.", m.License, strings.Join(GetLicenseTypeEnumStringValues(), ",")))
 }
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
```

```
 return false, nil
}

// MarshalJSON marshals to json representation
func (m LicenseAutoAssignConfigDetails) MarshalJSON() (buff []byte, e error) {
 type MarshalTypeLicenseAutoAssignConfigDetails LicenseAutoAssignConfigDetails
 s := struct {
  DiscriminatorParam string `json:"configType"`
  MarshalTypeLicenseAutoAssignConfigDetails
 }{
  "LICENSE_AUTO_ASSIGN",
  (MarshalTypeLicenseAutoAssignConfigDetails)(m),
 }

 return
 json.Marshal(&s)
}
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
2.0. You may choose either license.
// Code generated. DO NOT EDIT.

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
)

// BulkUploadLicenseRecordsRequest wrapper for the BulkUploadLicenseRecords operation
//
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-
examples/latest/licensemanager/BulkUploadLicenseRecords.go.html to see an example of how to use
BulkUploadLicenseRecordsRequest.
type BulkUploadLicenseRecordsRequest struct {

 // Details required for the bulk upload of product licenses and license records.
 BulkUploadLicenseRecordsDetails `contributesTo:"body"`

 // The unique Oracle-assigned identifier for the
 request. If you need to contact Oracle about a
 // particular request, please provide the request ID.
 OpcRequestId *string `mandatory:"false" contributesTo:"header" name:"opc-request-id"`
```

```
 // Metadata about the request. This information will not be transmitted to the service, but
 // represents information that the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}

func (request BulkUploadLicenseRecordsRequest) String() string {
 return common.PointerString(request)
}

// HTTPRequest implements the OCIRequest interface
func (request BulkUploadLicenseRecordsRequest) HTTPRequest(method, path string, binaryRequestBody
*common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request, error) {

 _, err := request.ValidateEnumValue()
 if err != nil {
  return http.Request{}, err
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method, path, request,
extraHeaders)
}

// BinaryRequestBody implements the OCIRequest interface
func
 (request BulkUploadLicenseRecordsRequest) BinaryRequestBody() (*common.OCIReadSeekCloser, bool) {

 return nil, false

}

// RetryPolicy implements the OCIRetryableRequest interface. This retrieves the specified retry policy.
func (request BulkUploadLicenseRecordsRequest) RetryPolicy() *common.RetryPolicy {
 return request.RequestMetadata.RetryPolicy
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (request BulkUploadLicenseRecordsRequest) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// BulkUploadLicenseRecordsResponse wrapper for the BulkUploadLicenseRecords operation
type BulkUploadLicenseRecordsResponse struct {
```

```
 // The underlying http response
 RawResponse *http.Response

 // The BulkUploadResponse
 instance
 BulkUploadResponse `presentIn:"body"`

 // Unique Oracle-assigned identifier for the request. If you need to contact
 // Oracle about a particular request, please provide the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`
}

func (response BulkUploadLicenseRecordsResponse) String() string {
 return common.PointerString(response)
}

// HTTPResponse implements the OCIResponse interface
func (response BulkUploadLicenseRecordsResponse) HTTPResponse() *http.Response {
 return response.RawResponse
}
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
2.0. You may choose either license.
// Code generated. DO NOT EDIT.

// Stack Monitoring API
//
// Stack Monitoring API.
//

package stackmonitoring

import (
 "encoding/json"
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// CreateLicenseAutoAssignConfigDetails The details of a LICENSE_AUTO_ASSIGN configuration.
type CreateLicenseAutoAssignConfigDetails struct {

 // Compartment in which the configuration is created.
 CompartmentId *string `mandatory:"true" json:"compartmentId"`

 // The display name of the configuration.
```

```
 DisplayName *string `mandatory:"false" json:"displayName"`

 // Simple key-value pair that is applied without any predefined name, type or scope. Exists for
 cross-compatibility only.
 // Example: `{"bar-key": "value"}`
 FreeformTags map[string]string `mandatory:"false" json:"freeformTags"`

 // Defined tags for this resource. Each key is predefined and scoped to a namespace.
 // Example: `{"foo-namespace": {"bar-key": "value"}}`
 DefinedTags map[string]map[string]interface{} `mandatory:"false" json:"definedTags"`

 // License edition.
 License LicenseTypeEnum `mandatory:"true" json:"license"`
}

// GetDisplayName returns DisplayName
func (m CreateLicenseAutoAssignConfigDetails) GetDisplayName() *string {
 return m.DisplayName
}

// GetCompartmentId returns CompartmentId
func (m CreateLicenseAutoAssignConfigDetails) GetCompartmentId() *string {
 return m.CompartmentId
}

// GetFreeformTags returns FreeformTags
func (m CreateLicenseAutoAssignConfigDetails) GetFreeformTags() map[string]string {
 return m.FreeformTags
}

// GetDefinedTags returns DefinedTags
func (m CreateLicenseAutoAssignConfigDetails) GetDefinedTags() map[string]map[string]interface{}
 {
 return m.DefinedTags
}

func (m CreateLicenseAutoAssignConfigDetails) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m CreateLicenseAutoAssignConfigDetails) ValidateEnumValue() (bool, error) {
 errMessage := []string{}

 if _, ok := GetMappingLicenseTypeEnum(string(m.License)); !ok && m.License != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for License: %s. Supported values are:
```

```
%s.", m.License, strings.Join(GetLicenseTypeEnumStringValues(), ",")))
 }
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// MarshalJSON marshals to json representation
func (m CreateLicenseAutoAssignConfigDetails) MarshalJSON() (buff []byte, e error) {
 type MarshalTypeCreateLicenseAutoAssignConfigDetails
 CreateLicenseAutoAssignConfigDetails
 s := struct {
  DiscriminatorParam string `json:"configType"`
  MarshalTypeCreateLicenseAutoAssignConfigDetails
 }{
  "LICENSE_AUTO_ASSIGN",
  (MarshalTypeCreateLicenseAutoAssignConfigDetails)(m),
 }

 return json.Marshal(&s)
}
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2.0. You may choose either license.
// Code generated. DO NOT EDIT.

// Stack Monitoring API
//
// Stack Monitoring API.
//

package stackmonitoring

import (
 "encoding/json"
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// CreateLicenseEnterpriseExtensibilityConfigDetails The details of a LICENSE_ENTERPRISE_EXTENSIBILITY
configuration.
type CreateLicenseEnterpriseExtensibilityConfigDetails struct {

 // Compartment in which the configuration is created.
 CompartmentId *string `mandatory:"true" json:"compartmentId"`
```

```
 // True if enterprise extensibility is enabled, false if it is not enabled.
 IsEnabled *bool `mandatory:"true" json:"isEnabled"`

 // The display name of the configuration.
 DisplayName
 *string `mandatory:"false" json:"displayName"`

 // Simple key-value pair that is applied without any predefined name, type or scope. Exists for cross-compatibility
only.
 // Example: `{"bar-key": "value"}`
 FreeformTags map[string]string `mandatory:"false" json:"freeformTags"`

 // Defined tags for this resource. Each key is predefined and scoped to a namespace.
 // Example: `{"foo-namespace": {"bar-key": "value"}}`
 DefinedTags map[string]map[string]interface{} `mandatory:"false" json:"definedTags"`
}

// GetDisplayName returns DisplayName
func (m CreateLicenseEnterpriseExtensibilityConfigDetails) GetDisplayName() *string {
 return m.DisplayName
}

// GetCompartmentId returns CompartmentId
func (m CreateLicenseEnterpriseExtensibilityConfigDetails) GetCompartmentId() *string {
 return m.CompartmentId
}

// GetFreeformTags returns FreeformTags
func (m CreateLicenseEnterpriseExtensibilityConfigDetails) GetFreeformTags() map[string]string {
 return m.FreeformTags
}

//
 GetDefinedTags returns DefinedTags
func (m CreateLicenseEnterpriseExtensibilityConfigDetails) GetDefinedTags() map[string]map[string]interface{} {
 return m.DefinedTags
}

func (m CreateLicenseEnterpriseExtensibilityConfigDetails) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m CreateLicenseEnterpriseExtensibilityConfigDetails) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
```

```
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// MarshalJSON marshals to json representation
func (m CreateLicenseEnterpriseExtensibilityConfigDetails) MarshalJSON() (buff []byte, e error) {
 type MarshalTypeCreateLicenseEnterpriseExtensibilityConfigDetails
CreateLicenseEnterpriseExtensibilityConfigDetails
 s := struct
 {
  DiscriminatorParam string `json:"configType"`
  MarshalTypeCreateLicenseEnterpriseExtensibilityConfigDetails
 }{
  "LICENSE_ENTERPRISE_EXTENSIBILITY",
  (MarshalTypeCreateLicenseEnterpriseExtensibilityConfigDetails)(m),
 }

 return json.Marshal(&s)
}
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// Code generated. DO NOT EDIT.

// License Manager API
//
// Use the License Manager API to manage product licenses and license records. For more information, see License
Manager Overview (https://docs.oracle.com/iaas/Content/LicenseManager/Concepts/licensemanageroverview.htm).
//

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// TopUtilizedProductLicenseCollection A collection of top utilized product licenses.
type TopUtilizedProductLicenseCollection struct {

 // Collection of top utilized product licenses.
 Items []TopUtilizedProductLicenseSummary `mandatory:"true" json:"items"`
}
```

```
func (m TopUtilizedProductLicenseCollection)
 String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m TopUtilizedProductLicenseCollection) ValidateEnumValue() (bool, error) {
 errMessage := []string{}

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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// Code generated. DO NOT EDIT.

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
)

// GetLicenseRecordRequest wrapper for the GetLicenseRecord operation
//
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-examples/latest/licensemanager/GetLicenseRecord.go.html
to see an example of how to use GetLicenseRecordRequest.
type GetLicenseRecordRequest struct {

 // Unique license record identifier.
 LicenseRecordId *string `mandatory:"true" contributesTo:"path" name:"licenseRecordId"`

 // The unique Oracle-assigned identifier for the request. If you need to contact Oracle about a
 //
 particular request, please provide the request ID.
 OpcRequestId *string `mandatory:"false" contributesTo:"header" name:"opc-request-id"`
```

```
 // Metadata about the request. This information will not be transmitted to the service, but
 // represents information that the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}

func (request GetLicenseRecordRequest) String() string {
 return common.PointerString(request)
}

// HTTPRequest implements the OCIRequest interface
func (request GetLicenseRecordRequest) HTTPRequest(method, path string, binaryRequestBody
*common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request, error) {

 _, err := request.ValidateEnumValue()
 if err != nil {
  return http.Request{}, err
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method, path, request,
extraHeaders)
}

// BinaryRequestBody implements the OCIRequest interface
func (request GetLicenseRecordRequest) BinaryRequestBody() (*common.OCIReadSeekCloser,
 bool) {

 return nil, false

}

// RetryPolicy implements the OCIRetryableRequest interface. This retrieves the specified retry policy.
func (request GetLicenseRecordRequest) RetryPolicy() *common.RetryPolicy {
 return request.RequestMetadata.RetryPolicy
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (request GetLicenseRecordRequest) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// GetLicenseRecordResponse wrapper for the GetLicenseRecord operation
type GetLicenseRecordResponse struct {
```

```
 // The underlying http response
 RawResponse *http.Response

 // The LicenseRecord instance
 LicenseRecord `presentIn:"body"`

 // For optimistic concurrency control. See `if-match`.
 Etag *string
 `presentIn:"header" name:"etag"`

 // Unique Oracle-assigned identifier for the request. If you need to contact
 // Oracle about a particular request, please provide the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`
}

func (response GetLicenseRecordResponse) String() string {
 return common.PointerString(response)
}

// HTTPResponse implements the OCIResponse interface
func (response GetLicenseRecordResponse) HTTPResponse() *http.Response {
 return response.RawResponse
}
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// License Manager API
//
// Use the License Manager API to manage product licenses and license records. For more information, see License
Manager Overview (https://docs.oracle.com/iaas/Content/LicenseManager/Concepts/licensemanageroverview.htm).
//

package licensemanager

import (
 "strings"
)

// LicenseUnitEnum Enum with underlying type: string
type LicenseUnitEnum string

// Set of constants representing the allowable values for LicenseUnitEnum
const (
 LicenseUnitOcpu          LicenseUnitEnum = "OCPU"
 LicenseUnitNamedUserPlus LicenseUnitEnum = "NAMED_USER_PLUS"
```

```
 LicenseUnitProcessors    LicenseUnitEnum = "PROCESSORS"
)

var
 mappingLicenseUnitEnum = map[string]LicenseUnitEnum{
 "OCPU":           LicenseUnitOcpu,
 "NAMED_USER_PLUS": LicenseUnitNamedUserPlus,
 "PROCESSORS":      LicenseUnitProcessors,
}

var mappingLicenseUnitEnumLowerCase = map[string]LicenseUnitEnum{
 "ocpu":           LicenseUnitOcpu,
 "named_user_plus": LicenseUnitNamedUserPlus,
 "processors":      LicenseUnitProcessors,
}

// GetLicenseUnitEnumValues Enumerates the set of values for LicenseUnitEnum
func GetLicenseUnitEnumValues() []LicenseUnitEnum {
 values := make([]LicenseUnitEnum, 0)
 for _, v := range mappingLicenseUnitEnum {
  values = append(values, v)
 }
 return values
}

// GetLicenseUnitEnumStringValues Enumerates the set of values in String for LicenseUnitEnum
func GetLicenseUnitEnumStringValues() []string {
 return []string{
  "OCPU",
  "NAMED_USER_PLUS",
  "PROCESSORS",
 }
}

// GetMappingLicenseUnitEnum performs case Insensitive comparison on enum value and return the desired enum
func GetMappingLicenseUnitEnum(val string)
 (LicenseUnitEnum, bool) {
 enum, ok := mappingLicenseUnitEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}
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// Code generated. DO NOT EDIT.

// License Manager API
//
```

```
// Use the License Manager API to manage product licenses and license records. For more information, see License
Manager Overview (https://docs.oracle.com/iaas/Content/LicenseManager/Concepts/licensemanageroverview.htm).
//

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// BulkUploadLicenseRecordsDetails Details required for bulk uploading of license records.
type BulkUploadLicenseRecordsDetails struct {

 // The compartment OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm) where license
records are created.
 CompartmentId *string
 `mandatory:"true" json:"compartmentId"`

 // Name of the file that is being uploaded.
 FileName *string `mandatory:"true" json:"fileName"`

 // The file to be uploaded.
 FileContent *string `mandatory:"true" json:"fileContent"`
}

func (m BulkUploadLicenseRecordsDetails) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m BulkUploadLicenseRecordsDetails) ValidateEnumValue() (bool, error) {
 errMessage := []string{}

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
2.0. You may choose either license.
// Code generated. DO NOT EDIT.
```

```
package stackmonitoring

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
)

// ManageLicenseRequest wrapper for the ManageLicense operation
//
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-examples/latest/stackmonitoring/ManageLicense.go.html to
see an example of how to use ManageLicenseRequest.
type ManageLicenseRequest struct {

 // The OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm) of monitored resource.
 MonitoredResourceId *string `mandatory:"true" contributesTo:"path" name:"monitoredResourceId"`

 // New license information.
 ManageLicenseDetails
 `contributesTo:"body"`

 // A token that uniquely identifies a request so it can be retried in case of a timeout or
 // server error without risk of executing that same action again. Retry tokens expire after 24
 // hours, but can be invalidated before then due to conflicting operations. For example, if a resource
 // has been deleted and purged from the system, then a retry of the original creation request
 // might be rejected.
 OpcRetryToken *string `mandatory:"false" contributesTo:"header" name:"opc-retry-token"`

 // Unique Oracle-assigned identifier for the request. If you need to contact Oracle about a
 // particular request, please provide the request ID.
 OpcRequestId *string `mandatory:"false" contributesTo:"header" name:"opc-request-id"`

 // For optimistic concurrency control. In the PUT or DELETE call
 // for a resource, set the `if-match` parameter to the value of the
 // etag from a previous GET or POST response for that resource.
 // The resource will be
 updated or deleted only if the etag you
 // provide matches the resource's current etag value.
 IfMatch *string `mandatory:"false" contributesTo:"header" name:"if-match"`

 // Metadata about the request. This information will not be transmitted to the service, but
 // represents information that the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}
```

```
func (request ManageLicenseRequest) String() string {
 return common.PointerString(request)
}

// HTTPRequest implements the OCIRequest interface
func (request ManageLicenseRequest) HTTPRequest(method, path string, binaryRequestBody
*common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request, error) {

 _, err := request.ValidateEnumValue()
 if err != nil {
  return http.Request{}, err
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method, path, request,
extraHeaders)
}

// BinaryRequestBody implements the OCIRequest interface
func (request ManageLicenseRequest) BinaryRequestBody()
 (*common.OCIReadSeekCloser, bool) {

 return nil, false

}

// RetryPolicy implements the OCIRetryableRequest interface. This retrieves the specified retry policy.
func (request ManageLicenseRequest) RetryPolicy() *common.RetryPolicy {
 return request.RequestMetadata.RetryPolicy
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (request ManageLicenseRequest) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// ManageLicenseResponse wrapper for the ManageLicense operation
type ManageLicenseResponse struct {

 // The underlying http response
 RawResponse *http.Response

 // Unique Oracle-assigned identifier for the request. If you need to contact
```

```
 // Oracle about a particular request, please provide
 the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`
}

func (response ManageLicenseResponse) String() string {
 return common.PointerString(response)
}

// HTTPResponse implements the OCIResponse interface
func (response ManageLicenseResponse) HTTPResponse() *http.Response {
 return response.RawResponse
}
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// Java Management Service Download API
//
// The APIs for the <a href="https://docs.oracle.com/en-us/iaas/jms/doc/java-download.html">Java Download</a>
feature of Java Management Service.
//

package jmsjavadownloads

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// CreateJavaLicenseAcceptanceRecordDetails The attributes to create a new JavaLicenseAcceptanceRecord.
type CreateJavaLicenseAcceptanceRecordDetails struct {

 // The tenancy OCID (https://docs.oracle.com/iaas/Content/General/Concepts/identifiers.htm) of the user accepting
the license.
 CompartmentId *string `mandatory:"true" json:"compartmentId"`

 //
 License type for the Java version.
 LicenseType LicenseTypeEnum `mandatory:"true" json:"licenseType"`

 // Status of license acceptance.
 LicenseAcceptanceStatus LicenseAcceptanceStatusEnum `mandatory:"true" json:"licenseAcceptanceStatus"`

 // Simple key-value pair that is applied without any predefined name, type, or scope. Exists for cross-compatibility
```

```
only.
 // Example: `{"bar-key": "value"}`. (See Managing Tags and Tag Namespaces
(https://docs.oracle.com/iaas/Content/Tagging/Concepts/understandingfreeformtags.htm).)
 FreeformTags map[string]string `mandatory:"false" json:"freeformTags"`

 // Defined tags for this resource. Each key is predefined and scoped to a namespace.
 // Example: `{"foo-namespace": {"bar-key": "value"}}`. (See Understanding Free-form Tags
(https://docs.oracle.com/iaas/Content/Tagging/Tasks/managingtagsandtagnamespaces.htm)).
 DefinedTags map[string]map[string]interface{} `mandatory:"false" json:"definedTags"`
}

func (m CreateJavaLicenseAcceptanceRecordDetails)
 String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m CreateJavaLicenseAcceptanceRecordDetails) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if _, ok := GetMappingLicenseTypeEnum(string(m.LicenseType)); !ok && m.LicenseType != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LicenseType: %s. Supported values are:
%s.", m.LicenseType, strings.Join(GetLicenseTypeEnumStringValues(), ",")))
 }
 if _, ok := GetMappingLicenseAcceptanceStatusEnum(string(m.LicenseAcceptanceStatus)); !ok &&
m.LicenseAcceptanceStatus != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LicenseAcceptanceStatus: %s.
Supported values are: %s.", m.LicenseAcceptanceStatus,
strings.Join(GetLicenseAcceptanceStatusEnumStringValues(),
 ",")))
 }

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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2.0. You may choose either license.
// Code generated. DO NOT EDIT.

// License Manager API
//
// Use the License Manager API to manage product licenses and license records. For more information, see License
Manager Overview (https://docs.oracle.com/iaas/Content/LicenseManager/Concepts/licensemanageroverview.htm).
```

```
//

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// UpdateProductLicenseDetails Updates the product license object (only allows image updates).
type UpdateProductLicenseDetails struct {

 // The image details associated with the product license.
 Images []ImageDetails `mandatory:"true" json:"images"`

 // Simple key-value pair that is
 applied without any predefined name, type, or scope. Exists for cross-compatibility only.
 // Example: `{"bar-key": "value"}`
 FreeformTags map[string]string `mandatory:"false" json:"freeformTags"`

 // Defined tags for this resource. Each key is predefined and scoped to a namespace.
 // Example: `{"foo-namespace": {"bar-key": "value"}}`
 DefinedTags map[string]map[string]interface{} `mandatory:"false" json:"definedTags"`
}

func (m UpdateProductLicenseDetails) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m UpdateProductLicenseDetails) ValidateEnumValue() (bool, error) {
 errMessage := []string{}

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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// Code generated. DO NOT EDIT.

// Access Governance APIs
```

```
//
// Use the Oracle Access Governance API to create, view, and manage GovernanceInstances.
//

package accessgovernancecp

import (
 "strings"
)

// LicenseTypeEnum Enum with underlying type: string
type LicenseTypeEnum string

// Set of constants representing the allowable values for LicenseTypeEnum
const (
 LicenseTypeNewLicense          LicenseTypeEnum = "NEW_LICENSE"
 LicenseTypeBringYourOwnLicense LicenseTypeEnum = "BRING_YOUR_OWN_LICENSE"
 LicenseTypeAgOracleWorkloads   LicenseTypeEnum = "AG_ORACLE_WORKLOADS"
 LicenseTypeAgOci               LicenseTypeEnum = "AG_OCI"
)

var mappingLicenseTypeEnum
 = map[string]LicenseTypeEnum{
 "NEW_LICENSE":            LicenseTypeNewLicense,
 "BRING_YOUR_OWN_LICENSE": LicenseTypeBringYourOwnLicense,
 "AG_ORACLE_WORKLOADS":    LicenseTypeAgOracleWorkloads,
 "AG_OCI":                 LicenseTypeAgOci,
}

var mappingLicenseTypeEnumLowerCase = map[string]LicenseTypeEnum{
 "new_license":            LicenseTypeNewLicense,
 "bring_your_own_license": LicenseTypeBringYourOwnLicense,
 "ag_oracle_workloads":    LicenseTypeAgOracleWorkloads,
 "ag_oci":                 LicenseTypeAgOci,
}

// GetLicenseTypeEnumValues Enumerates the set of values for LicenseTypeEnum
func GetLicenseTypeEnumValues() []LicenseTypeEnum {
 values := make([]LicenseTypeEnum, 0)
 for _, v := range mappingLicenseTypeEnum {
  values = append(values, v)
 }
 return values
}

// GetLicenseTypeEnumStringValues Enumerates the set of values in String for LicenseTypeEnum
func GetLicenseTypeEnumStringValues() []string {
 return []string{
```

```
  "NEW_LICENSE",
  "BRING_YOUR_OWN_LICENSE",
  "AG_ORACLE_WORKLOADS",
  "AG_OCI",
 }
}

//
 GetMappingLicenseTypeEnum performs case Insensitive comparison on enum value and return the desired enum
func GetMappingLicenseTypeEnum(val string) (LicenseTypeEnum, bool) {
 enum, ok := mappingLicenseTypeEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}
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// Code generated. DO NOT EDIT.

// Oracle Content Management API
//
// Oracle Content Management is a cloud-based content hub to drive omni-channel content management and
accelerate experience delivery
//

package oce

import (
 "strings"
)

// LicenseTypeEnum Enum with underlying type: string
type LicenseTypeEnum string

// Set of constants representing the allowable values for LicenseTypeEnum
const (
 LicenseTypeNew     LicenseTypeEnum = "NEW"
 LicenseTypeByol    LicenseTypeEnum = "BYOL"
 LicenseTypePremium LicenseTypeEnum = "PREMIUM"
 LicenseTypeStarter LicenseTypeEnum = "STARTER"
)

var mappingLicenseTypeEnum = map[string]LicenseTypeEnum{
 "NEW":     LicenseTypeNew,
 "BYOL":
    LicenseTypeByol,
 "PREMIUM": LicenseTypePremium,
 "STARTER": LicenseTypeStarter,
```

```
}

var mappingLicenseTypeEnumLowerCase = map[string]LicenseTypeEnum{
 "new":     LicenseTypeNew,
 "byol":    LicenseTypeByol,
 "premium": LicenseTypePremium,
 "starter": LicenseTypeStarter,
}

// GetLicenseTypeEnumValues Enumerates the set of values for LicenseTypeEnum
func GetLicenseTypeEnumValues() []LicenseTypeEnum {
 values := make([]LicenseTypeEnum, 0)
 for _, v := range mappingLicenseTypeEnum {
  values = append(values, v)
 }
 return values
}

// GetLicenseTypeEnumStringValues Enumerates the set of values in String for LicenseTypeEnum
func GetLicenseTypeEnumStringValues() []string {
 return []string{
  "NEW",
  "BYOL",
  "PREMIUM",
  "STARTER",
 }
}

// GetMappingLicenseTypeEnum performs case Insensitive comparison on enum value and return the desired enum
func GetMappingLicenseTypeEnum(val string) (LicenseTypeEnum, bool) {
 enum, ok := mappingLicenseTypeEnumLowerCase[strings.ToLower(val)]
 return
 enum, ok
}
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// Code generated. DO NOT EDIT.

package identity

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
)
```

```
// ListAllowedDomainLicenseTypesRequest wrapper for the ListAllowedDomainLicenseTypes operation
//
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-
examples/latest/identity/ListAllowedDomainLicenseTypes.go.html to see an example of how to use
ListAllowedDomainLicenseTypesRequest.
type ListAllowedDomainLicenseTypesRequest struct {

 // The license type of the identity domain.
 CurrentLicenseTypeName *string `mandatory:"false" contributesTo:"query" name:"currentLicenseTypeName"`

 // Unique Oracle-assigned
 identifier for the request. If you need to contact Oracle about a
 // particular request, please provide the request ID.
 OpcRequestId *string `mandatory:"false" contributesTo:"header" name:"opc-request-id"`

 // Metadata about the request. This information will not be transmitted to the service, but
 // represents information that the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}

func (request ListAllowedDomainLicenseTypesRequest) String() string {
 return common.PointerString(request)
}

// HTTPRequest implements the OCIRequest interface
func (request ListAllowedDomainLicenseTypesRequest) HTTPRequest(method, path string, binaryRequestBody
*common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request, error) {

 _, err := request.ValidateEnumValue()
 if err != nil {
  return http.Request{}, err
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method, path, request,
extraHeaders)
}

// BinaryRequestBody implements
 the OCIRequest interface
func (request ListAllowedDomainLicenseTypesRequest) BinaryRequestBody() (*common.OCIReadSeekCloser,
bool) {

 return nil, false

}
```

```
// RetryPolicy implements the OCIRetryableRequest interface. This retrieves the specified retry policy.
func (request ListAllowedDomainLicenseTypesRequest) RetryPolicy() *common.RetryPolicy {
 return request.RequestMetadata.RetryPolicy
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (request ListAllowedDomainLicenseTypesRequest) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// ListAllowedDomainLicenseTypesResponse wrapper for the ListAllowedDomainLicenseTypes operation
type ListAllowedDomainLicenseTypesResponse struct {

 // The underlying http
 response
 RawResponse *http.Response

 // The []AllowedDomainLicenseTypeSummary instance
 Items []AllowedDomainLicenseTypeSummary `presentIn:"body"`

 // Unique Oracle-assigned identifier for the request. If you need to contact Oracle about a
 // particular request, please provide the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`

 // For pagination of a list of items. When paging through a list, if this header appears in the response,
 // then a partial list might have been returned. Include this value as the `page` parameter for the
 // subsequent GET request to get the next batch of items.
 OpcNextPage *string `presentIn:"header" name:"opc-next-page"`
}

func (response ListAllowedDomainLicenseTypesResponse) String() string {
 return common.PointerString(response)
}

// HTTPResponse implements the OCIResponse interface
func (response ListAllowedDomainLicenseTypesResponse) HTTPResponse() *http.Response {
 return response.RawResponse
}
```

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```
// Code generated. DO NOT EDIT.

// Marketplace Service API
//
// Use the Marketplace API to manage applications in Oracle Cloud Infrastructure Marketplace. For more
information, see Overview of Marketplace
(https://docs.oracle.com/iaas/Content/Marketplace/Concepts/marketoverview.htm)
//

package marketplace

import (
 "encoding/json"
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// Eula A base object for all types of end user license agreements.
type Eula interface {
}

type eula struct {
 JsonData []byte
 EulaType string `json:"eulaType"`
}

// UnmarshalJSON unmarshals json
func (m *eula) UnmarshalJSON(data []byte) error {
 m.JsonData = data
 type
 Unmarshalereula eula
 s := struct {
  Model Unmarshalereula
 }{}
 err := json.Unmarshal(data, &s.Model)
 if err != nil {
  return err
 }
 m.EulaType = s.Model.EulaType

 return err
}

// UnmarshalPolymorphicJSON unmarshals polymorphic json
func (m *eula) UnmarshalPolymorphicJSON(data []byte) (interface{}, error) {

 if data == nil || string(data) == "null" {
```

```
 return nil, nil
}

var err error
switch m.EulaType {
case "TEXT":
 mm := TextBasedEula{}
 err = json.Unmarshal(data, &mm)
 return mm, err
default:
 common.Logf("Received unsupported enum value for Eula: %s.", m.EulaType)
 return *m, nil
}
}

func (m eula) String() string {
return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m eula) ValidateEnumValue() (bool, error) {
errMessage := []string{}

if len(errMessage) > 0 {
 return
true, fmt.Errorf(strings.Join(errMessage, "\n"))
}
return false, nil
}
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2.0. You may choose either license.
// Code generated. DO NOT EDIT.

// Java Management Service Download API
//
// The APIs for the <a href="https://docs.oracle.com/en-us/iaas/jms/doc/java-download.html">Java Download</a>
feature of Java Management Service.
//

package jmsjavadownloads

import (
"fmt"
"github.com/oracle/oci-go-sdk/v65/common"
```

```
 "strings"
)

// JavaLicenseCollection Collection of the Java license summary objects.
type JavaLicenseCollection struct {

 // A list of JavaLicenseSummary objects.
 Items []JavaLicenseSummary `mandatory:"true" json:"items"`
}

func (m JavaLicenseCollection) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when
 providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m JavaLicenseCollection) ValidateEnumValue() (bool, error) {
 errMessage := []string{}

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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// Code generated. DO NOT EDIT.

package jmsjavadownloads

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "net/http"
 "strings"
)

// UpdateJavaLicenseAcceptanceRecordRequest wrapper for the UpdateJavaLicenseAcceptanceRecord operation
//
// # See also
//
// Click https://docs.oracle.com/en-us/iaas/tools/go-sdk-
examples/latest/jmsjavadownloads/UpdateJavaLicenseAcceptanceRecord.go.html to see an example of how to use
UpdateJavaLicenseAcceptanceRecordRequest.
```

```
type UpdateJavaLicenseAcceptanceRecordRequest struct {

 // Unique Java license acceptance record identifier.
 JavaLicenseAcceptanceRecordId *string `mandatory:"true" contributesTo:"path"
name:"javaLicenseAcceptanceRecordId"`

 //
 Attributes for updating the JavaLicenseAcceptanceRecord.
 UpdateJavaLicenseAcceptanceRecordDetails `contributesTo:"body"`

 // For optimistic concurrency control. In the PUT or DELETE call
 // for a resource, set the `if-match` parameter to the value of the
 // ETag from a previous GET or POST response for that resource.
 // The resource will be updated or deleted only if the ETag you
 // provide matches the resource's current ETag value.
 IfMatch *string `mandatory:"false" contributesTo:"header" name:"if-match"`

 // The client request ID for tracing.
 OpcRequestId *string `mandatory:"false" contributesTo:"header" name:"opc-request-id"`

 // Metadata about the request. This information will not be transmitted to the service, but
 // represents information that the SDK will consume to drive retry behavior.
 RequestMetadata common.RequestMetadata
}

func (request UpdateJavaLicenseAcceptanceRecordRequest) String() string {
 return common.PointerString(request)
}

//
 HTTPRequest implements the OCIRequest interface
func (request UpdateJavaLicenseAcceptanceRecordRequest) HTTPRequest(method, path string,
binaryRequestBody *common.OCIReadSeekCloser, extraHeaders map[string]string) (http.Request, error) {

 _, err := request.ValidateEnumValue()
 if err != nil {
  return http.Request{}, err
 }
 return common.MakeDefaultHTTPRequestWithTaggedStructAndExtraHeaders(method, path, request,
extraHeaders)
}

// BinaryRequestBody implements the OCIRequest interface
func (request UpdateJavaLicenseAcceptanceRecordRequest) BinaryRequestBody()
(*common.OCIReadSeekCloser, bool) {

 return nil, false
```

```
}

// RetryPolicy implements the OCIRetryableRequest interface. This retrieves the specified retry policy.
func (request UpdateJavaLicenseAcceptanceRecordRequest) RetryPolicy() *common.RetryPolicy {
 return request.RequestMetadata.RetryPolicy
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called
 during constructing API request process
// Not recommended for calling this function directly
func (request UpdateJavaLicenseAcceptanceRecordRequest) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// UpdateJavaLicenseAcceptanceRecordResponse wrapper for the UpdateJavaLicenseAcceptanceRecord operation
type UpdateJavaLicenseAcceptanceRecordResponse struct {

 // The underlying http response
 RawResponse *http.Response

 // The JavaLicenseAcceptanceRecord instance
 JavaLicenseAcceptanceRecord `presentIn:"body"`

 // Unique Oracle-assigned identifier for the request. If you need to contact
 // Oracle about a particular request, provide the request ID.
 OpcRequestId *string `presentIn:"header" name:"opc-request-id"`

 // For optimistic concurrency control. See `if-match`.
 Etag *string `presentIn:"header" name:"etag"`
}

func (response UpdateJavaLicenseAcceptanceRecordResponse)
 String() string {
 return common.PointerString(response)
}

// HTTPResponse implements the OCIResponse interface
func (response UpdateJavaLicenseAcceptanceRecordResponse) HTTPResponse() *http.Response {
 return response.RawResponse
}
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https://oss.oracle.com/licenses/upl or Apache License 2.0 as shown at http://www.apache.org/licenses/LICENSE-
```

```
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// Code generated. DO NOT EDIT.

// License Manager API
//
// Use the License Manager API to manage product licenses and license records. For more information, see License
Manager Overview (https://docs.oracle.com/iaas/Content/LicenseManager/Concepts/licensemanageroverview.htm).
//

package licensemanager

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// ProductLicenseCollection The product license summary collection.
type ProductLicenseCollection struct {

 // The product license summary collection.
 Items []ProductLicenseSummary `mandatory:"true" json:"items"`
}

func (m ProductLicenseCollection) String() string {
 return common.PointerString(m)
}

//
 ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m ProductLicenseCollection) ValidateEnumValue() (bool, error) {
 errMessage := []string{}

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}
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2.0. You may choose either license.
// Code generated. DO NOT EDIT.

// Java Management Service Download API
//
```

```
// The APIs for the <a href="https://docs.oracle.com/en-us/iaas/jms/doc/java-download.html">Java Download</a>
feature of Java Management Service.
//

package jmsjavadownloads

import (
 "strings"
)

// LicenseAcceptanceStatusEnum Enum with underlying type: string
type LicenseAcceptanceStatusEnum string

// Set of constants representing the allowable values for LicenseAcceptanceStatusEnum
const (
 LicenseAcceptanceStatusAccepted LicenseAcceptanceStatusEnum = "ACCEPTED"
 LicenseAcceptanceStatusRevoked  LicenseAcceptanceStatusEnum = "REVOKED"
)

var mappingLicenseAcceptanceStatusEnum = map[string]LicenseAcceptanceStatusEnum{
 "ACCEPTED":
 LicenseAcceptanceStatusAccepted,
 "REVOKED":  LicenseAcceptanceStatusRevoked,
}

var mappingLicenseAcceptanceStatusEnumLowerCase = map[string]LicenseAcceptanceStatusEnum{
 "accepted": LicenseAcceptanceStatusAccepted,
 "revoked":  LicenseAcceptanceStatusRevoked,
}

// GetLicenseAcceptanceStatusEnumValues Enumerates the set of values for LicenseAcceptanceStatusEnum
func GetLicenseAcceptanceStatusEnumValues() []LicenseAcceptanceStatusEnum {
 values := make([]LicenseAcceptanceStatusEnum, 0)
 for _, v := range mappingLicenseAcceptanceStatusEnum {
  values = append(values, v)
 }
 return values
}

// GetLicenseAcceptanceStatusEnumStringValues Enumerates the set of values in String for
LicenseAcceptanceStatusEnum
func GetLicenseAcceptanceStatusEnumStringValues() []string {
 return []string{
  "ACCEPTED",
  "REVOKED",
 }
}
```

```
// GetMappingLicenseAcceptanceStatusEnum performs case Insensitive comparison on enum value and return the
desired enum
func
 GetMappingLicenseAcceptanceStatusEnum(val string) (LicenseAcceptanceStatusEnum, bool) {
 enum, ok := mappingLicenseAcceptanceStatusEnumLowerCase[strings.ToLower(val)]
 return enum, ok
}
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2.0. You may choose either license.
// Code generated. DO NOT EDIT.

// Stack Monitoring API
//
// Stack Monitoring API.
//

package stackmonitoring

import (
 "encoding/json"
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// LicenseEnterpriseExtensibilityConfigDetails A configuration of the LICENSE_ENTERPRISE_EXTENSIBILITY
type, consists of a boolean which determines
// whether enterprise extensibility is enabled.
type LicenseEnterpriseExtensibilityConfigDetails struct {

 // The Unique Oracle ID (OCID) that is immutable on creation.
 Id *string `mandatory:"true" json:"id"`

 // The OCID of the compartment containing the configuration.
 CompartmentId *string `mandatory:"true"
 json:"compartmentId"`

 // True if enterprise extensibility is enabled, false if it is not enabled.
 IsEnabled *bool `mandatory:"true" json:"isEnabled"`

 // A user-friendly name. Does not have to be unique, and it's changeable. Avoid entering confidential information.
 DisplayName *string `mandatory:"false" json:"displayName"`

 // The time the configuration was created. An RFC3339 formatted datetime string.
 TimeCreated *common.SDKTime `mandatory:"false" json:"timeCreated"`
```

```
 // The time the Config was updated.
 TimeUpdated *common.SDKTime `mandatory:"false" json:"timeUpdated"`

 // Simple key-value pair that is applied without any predefined name, type or scope. Exists for cross-compatibility
only.
 // Example: `{"bar-key": "value"}`
 FreeformTags map[string]string `mandatory:"false" json:"freeformTags"`

 // Defined tags for this resource. Each key is predefined and scoped to a namespace.
 // Example: `{"foo-namespace": {"bar-key": "value"}}`
 DefinedTags map[string]map[string]interface{}
 `mandatory:"false" json:"definedTags"`

 // Usage of system tag keys. These predefined keys are scoped to namespaces.
 // Example: `{"orcl-cloud": {"free-tier-retained": "true"}}`
 SystemTags map[string]map[string]interface{} `mandatory:"false" json:"systemTags"`

 // The current state of the configuration.
 LifecycleState ConfigLifecycleStateEnum `mandatory:"true" json:"lifecycleState"`
}

// GetId returns Id
func (m LicenseEnterpriseExtensibilityConfigDetails) GetId() *string {
 return m.Id
}

// GetCompartmentId returns CompartmentId
func (m LicenseEnterpriseExtensibilityConfigDetails) GetCompartmentId() *string {
 return m.CompartmentId
}

// GetDisplayName returns DisplayName
func (m LicenseEnterpriseExtensibilityConfigDetails) GetDisplayName() *string {
 return m.DisplayName
}

// GetTimeCreated returns TimeCreated
func (m LicenseEnterpriseExtensibilityConfigDetails) GetTimeCreated() *common.SDKTime {
 return m.TimeCreated
}

// GetTimeUpdated returns TimeUpdated
func (m
 LicenseEnterpriseExtensibilityConfigDetails) GetTimeUpdated() *common.SDKTime {
 return m.TimeUpdated
}

// GetLifecycleState returns LifecycleState
```

```
func (m LicenseEnterpriseExtensibilityConfigDetails) GetLifecycleState() ConfigLifecycleStateEnum {
 return m.LifecycleState
}

// GetFreeformTags returns FreeformTags
func (m LicenseEnterpriseExtensibilityConfigDetails) GetFreeformTags() map[string]string {
 return m.FreeformTags
}

// GetDefinedTags returns DefinedTags
func (m LicenseEnterpriseExtensibilityConfigDetails) GetDefinedTags() map[string]map[string]interface{} {
 return m.DefinedTags
}

// GetSystemTags returns SystemTags
func (m LicenseEnterpriseExtensibilityConfigDetails) GetSystemTags() map[string]map[string]interface{} {
 return m.SystemTags
}

func (m LicenseEnterpriseExtensibilityConfigDetails) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing
 API request process
// Not recommended for calling this function directly
func (m LicenseEnterpriseExtensibilityConfigDetails) ValidateEnumValue() (bool, error) {
 errMessage := []string{}

 if _, ok := GetMappingConfigLifecycleStateEnum(string(m.LifecycleState)); !ok && m.LifecycleState != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LifecycleState: %s. Supported values
are: %s.", m.LifecycleState, strings.Join(GetConfigLifecycleStateEnumStringValues(), ",")))
 }
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// MarshalJSON marshals to json representation
func (m LicenseEnterpriseExtensibilityConfigDetails) MarshalJSON() (buff []byte, e error) {
 type MarshalTypeLicenseEnterpriseExtensibilityConfigDetails LicenseEnterpriseExtensibilityConfigDetails
 s := struct {
  DiscriminatorParam string `json:"configType"`
  MarshalTypeLicenseEnterpriseExtensibilityConfigDetails
 }{
  "LICENSE_ENTERPRISE_EXTENSIBILITY",
```

```
 (MarshalTypeLicenseEnterpriseExtensibilityConfigDetails)(m),
 }

 return
 json.Marshal(&s)
}
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// Code generated. DO NOT EDIT.

// Stack Monitoring API
//
// Stack Monitoring API.
//

package stackmonitoring

import (
 "encoding/json"
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// LicenseAutoAssignConfigSummary Summary of a LICENSE_AUTO_ASSIGN configuration.
type LicenseAutoAssignConfigSummary struct {

 // Unique identifier that is immutable on creation.
 Id *string `mandatory:"true" json:"id"`

 // Compartment Identifier.
 CompartmentId *string `mandatory:"true" json:"compartmentId"`

 // Config Identifier, can be renamed.
 DisplayName *string `mandatory:"false" json:"displayName"`

 // The time the the configuration was created.
 An RFC3339 formatted datetime string.
 TimeCreated *common.SDKTime `mandatory:"false" json:"timeCreated"`

 // The time the configuration was updated.
 TimeUpdated *common.SDKTime `mandatory:"false" json:"timeUpdated"`

 // Simple key-value pair that is applied without any predefined name, type or scope. Exists for cross-compatibility
only.
 // Example: `{"bar-key": "value"}`
```

```
 FreeformTags map[string]string `mandatory:"false" json:"freeformTags"`

 // Defined tags for this resource. Each key is predefined and scoped to a namespace.
 // Example: `{"foo-namespace": {"bar-key": "value"}}`
 DefinedTags map[string]map[string]interface{} `mandatory:"false" json:"definedTags"`

 // Usage of system tag keys. These predefined keys are scoped to namespaces.
 // Example: `{"orcl-cloud": {"free-tier-retained": "true"}}`
 SystemTags map[string]map[string]interface{} `mandatory:"false" json:"systemTags"`

 // The current state of the configuration.
 LifecycleState ConfigLifecycleStateEnum `mandatory:"true"
 json:"lifecycleState"`

 // License edition.
 License LicenseTypeEnum `mandatory:"true" json:"license"`
}

// GetId returns Id
func (m LicenseAutoAssignConfigSummary) GetId() *string {
 return m.Id
}

// GetCompartmentId returns CompartmentId
func (m LicenseAutoAssignConfigSummary) GetCompartmentId() *string {
 return m.CompartmentId
}

// GetDisplayName returns DisplayName
func (m LicenseAutoAssignConfigSummary) GetDisplayName() *string {
 return m.DisplayName
}

// GetTimeCreated returns TimeCreated
func (m LicenseAutoAssignConfigSummary) GetTimeCreated() *common.SDKTime {
 return m.TimeCreated
}

// GetTimeUpdated returns TimeUpdated
func (m LicenseAutoAssignConfigSummary) GetTimeUpdated() *common.SDKTime {
 return m.TimeUpdated
}

// GetLifecycleState returns LifecycleState
func (m LicenseAutoAssignConfigSummary) GetLifecycleState() ConfigLifecycleStateEnum {
 return m.LifecycleState
}
```

```
// GetFreeformTags returns FreeformTags
func (m LicenseAutoAssignConfigSummary) GetFreeformTags()
 map[string]string {
 return m.FreeformTags
}

// GetDefinedTags returns DefinedTags
func (m LicenseAutoAssignConfigSummary) GetDefinedTags() map[string]map[string]interface{} {
 return m.DefinedTags
}

// GetSystemTags returns SystemTags
func (m LicenseAutoAssignConfigSummary) GetSystemTags() map[string]map[string]interface{} {
 return m.SystemTags
}

func (m LicenseAutoAssignConfigSummary) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m LicenseAutoAssignConfigSummary) ValidateEnumValue() (bool, error) {
 errMessage := []string{}

 if _, ok := GetMappingConfigLifecycleStateEnum(string(m.LifecycleState)); !ok && m.LifecycleState != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LifecycleState: %s. Supported values
are: %s.", m.LifecycleState,
 strings.Join(GetConfigLifecycleStateEnumStringValues(), ",")))
 }
 if _, ok := GetMappingLicenseTypeEnum(string(m.License)); !ok && m.License != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for License: %s. Supported values are:
%s.", m.License, strings.Join(GetLicenseTypeEnumStringValues(), ",")))
 }
 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// MarshalJSON marshals to json representation
func (m LicenseAutoAssignConfigSummary) MarshalJSON() (buff []byte, e error) {
 type MarshalTypeLicenseAutoAssignConfigSummary LicenseAutoAssignConfigSummary
 s := struct {
  DiscriminatorParam string `json:"configType"`
  MarshalTypeLicenseAutoAssignConfigSummary
 }{
```

```
  "LICENSE_AUTO_ASSIGN",
  (MarshalTypeLicenseAutoAssignConfigSummary)(m),
 }

 return json.Marshal(&s)
}
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2.0. You may choose either license.
// Code generated. DO NOT EDIT.

// Java Management Service Fleets API
//
// The APIs for the Fleet Management (https://docs.oracle.com/en-us/iaas/jms/doc/fleet-management.html) feature
of Java Management Service to monitor and manage the usage of Java in your enterprise. Use these APIs to manage
fleets, configure managed instances to report to fleets, and gain insights into the Java workloads running on these
instances by carrying out basic and advanced features.
//

package jms

import (
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// JavaLicense Information about a license type for Java.
type JavaLicense struct {

 // Commonly used name
 for the license type.
 DisplayName *string `mandatory:"true" json:"displayName"`

 // License Type
 LicenseType LicenseTypeEnum `mandatory:"true" json:"licenseType"`

 // Publicly accessible license URL containing the detailed terms and conditions.
 LicenseUrl *string `mandatory:"true" json:"licenseUrl"`
}

func (m JavaLicense) String() string {
 return common.PointerString(m)
}

// ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
```

```
// Not recommended for calling this function directly
func (m JavaLicense) ValidateEnumValue() (bool, error) {
 errMessage := []string{}
 if _, ok := GetMappingLicenseTypeEnum(string(m.LicenseType)); !ok && m.LicenseType != "" {
  errMessage = append(errMessage, fmt.Sprintf("unsupported enum value for LicenseType: %s. Supported values are: %s.", m.LicenseType, strings.Join(GetLicenseTypeEnumStringValues(), ",")))
 }

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage,
 "\n"))
 }
 return false, nil
}
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// Stack Monitoring API
//
// Stack Monitoring API.
//

package stackmonitoring

import (
 "encoding/json"
 "fmt"
 "github.com/oracle/oci-go-sdk/v65/common"
 "strings"
)

// UpdateLicenseEnterpriseExtensibilityConfigDetails Change the details of a LICENSE_ENTERPRISE_EXTENSIBILITY configuration.
type UpdateLicenseEnterpriseExtensibilityConfigDetails struct {

 // The display name of the configuration.
 DisplayName *string `mandatory:"false" json:"displayName"`

 // Simple key-value pair that is applied without any predefined name, type or scope. Exists for cross-compatibility only.
 // Example: `{"bar-key": "value"}`
 FreeformTags
 map[string]string `mandatory:"false" json:"freeformTags"`

 // Defined tags for this resource. Each key is predefined and scoped to a namespace.
```

```
 // Example: `{"foo-namespace": {"bar-key": "value"}}`
 DefinedTags map[string]map[string]interface{} `mandatory:"false" json:"definedTags"`

 // True if enterprise extensibility is enabled, false if it is not enabled.
 IsEnabled *bool `mandatory:"false" json:"isEnabled"`
}

// GetDisplayName returns DisplayName
func (m UpdateLicenseEnterpriseExtensibilityConfigDetails) GetDisplayName() *string {
 return m.DisplayName
}

// GetFreeformTags returns FreeformTags
func (m UpdateLicenseEnterpriseExtensibilityConfigDetails) GetFreeformTags() map[string]string {
 return m.FreeformTags
}

// GetDefinedTags returns DefinedTags
func (m UpdateLicenseEnterpriseExtensibilityConfigDetails) GetDefinedTags() map[string]map[string]interface{}
{
 return m.DefinedTags
}

func (m UpdateLicenseEnterpriseExtensibilityConfigDetails) String() string {
 return common.PointerString(m)
}

//
 ValidateEnumValue returns an error when providing an unsupported enum value
// This function is being called during constructing API request process
// Not recommended for calling this function directly
func (m UpdateLicenseEnterpriseExtensibilityConfigDetails) ValidateEnumValue() (bool, error) {
 errMessage := []string{}

 if len(errMessage) > 0 {
  return true, fmt.Errorf(strings.Join(errMessage, "\n"))
 }
 return false, nil
}

// MarshalJSON marshals to json representation
func (m UpdateLicenseEnterpriseExtensibilityConfigDetails) MarshalJSON() (buff []byte, e error) {
 type MarshalTypeUpdateLicenseEnterpriseExtensibilityConfigDetails
UpdateLicenseEnterpriseExtensibilityConfigDetails
 s := struct {
  DiscriminatorParam string `json:"configType"`
  MarshalTypeUpdateLicenseEnterpriseExtensibilityConfigDetails
 }{
```

```
 "LICENSE_ENTERPRISE_EXTENSIBILITY",
 (MarshalTypeUpdateLicenseEnterpriseExtensibilityConfigDetails)(m),
 }

 return json.Marshal(&s)
}
```

# 1.2615 libxml2 2.9.13-14.el9_7

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# 1.2616 expat 2.5.0-5.el9_7.1

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# 1.2618 golang 1.25.5

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package copyright

import (
 "bytes"
 "internal/testenv"
 "io"
 "io/fs"
 "os"
 "path/filepath"
 "testing"
)

var copyright = []byte("Copyright")

var permitted = [][]byte{
 []byte("// Code generated by "),
 []byte("// Code generated from "),
 []byte("// Created by cgo -cdefs"),
 []byte("// DO NOT EDIT\n// generated by:"),
 []byte("// Empty assembly file"),
 []byte("// Generated using cgo"),
 []byte("// Original source:\n//\thttp://www.zorinaq.com/papers/md5-amd64.html"), // public domain crypto/md5
 []byte("// created by cgo -cdefs"),
 []byte("// go run mkasm.go"),
 []byte("// mkerrors"),
 []byte("// mksys"),
 []byte("// run\n// Code generated by"), // cmd/compile/internal/test/constFold_test.go
}

func TestCopyright(t *testing.T) {
 buf := make([]byte, 2048)
 filepath.WalkDir(filepath.Join(testenv.GOROOT(t), "src"), func(path string,
 d fs.DirEntry, err error) error {
  if d.IsDir() && (d.Name() == "testdata" || d.Name() == "vendor") {
   return filepath.SkipDir
```

```
  }
  switch filepath.Ext(d.Name()) {
  default:
   return nil
  case ".s", ".go":
   // check
  }

  f, err := os.Open(path)
  if err != nil {
   t.Error(err)
   return nil
  }
  defer f.Close()
  n, err := f.Read(buf)
  if err != nil && err != io.EOF {
   t.Error(err)
   return nil
  }
  b := buf[:n]
  if bytes.Contains(b, copyright) {
   return nil
  }
  for _, ok := range permitted {
   if bytes.HasPrefix(b, ok) {
    return nil
   }
  }
  t.Errorf("%s: missing copyright notice", path)
  return nil
 })
}
```

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# 1.2631 libp2p-go-libp2p-kbucket 0.7.0

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# 1.2632 kubernetes-kube-proxy 0.0.0

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# 1.2633 etcd-etcdutl 3.5.18

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# 1.2634 libp2p-go-libp2p-kad-dht 0.31.0

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# 1.2635 lukechampine.com-blake3 1.4.0

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# 1.2638 rancher-dynamiclistener 0.7.0

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# 1.2644 spegel-org-spegel 1.0.18

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# 1.2647 hickory-proto 0.24.4

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# 1.2648 hickory-resolver 0.24.4

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# 1.2650 jackson-databind 3.0.2

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It was originally written by Tatu Saloranta (tatu.saloranta@iki.fi), and has
been in development since 2007.
It is currently developed by a community of developers.

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# 1.2661 event-listener-strategy 0.5.2

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package spec

// License information for the exposed API.
//
// For more information: http://goo.gl/8us55a#licenseObject
type License struct {
 Name string `json:"name,omitempty"`
 URL  string `json:"url,omitempty"`
}
```

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Go support for Protocol Buffers - Google's data interchange format

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localtime.go, localtime_test.go:

Originals:
https://raw.githubusercontent.com/googleapis/google-cloud-go/ed46f5086358513cf8c25f8e3f022cb838a49d66/civil/civil.go
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Changes:
* Renamed files from civil* to localtime*.
* Package changed from civil to toml.

* 'Local' prefix added to all structs.

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==========
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# 1.2672 mikefarah-yq 4.50.1

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# 1.2673 goccy-go-yaml 1.19.0

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```
x:
- x x
{
 "x": [
   "x x"
 ]
}
```

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```
x:
- x
  x
```

# 1.2674 toml 1.5.0

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# 1.2675 wolfi-base 1-r7

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package:
name: libart-lgpl
version: 2.3.21
epoch: 3
description: A library for high-performance 2D graphics
copyright:
- license: LGPL-2.0-or-later

var-transforms:
- from: ${{package.version}}
match: ^(\d+)\.(\d+)\.(\d+)$
replace: LIBART_LGPL_${1}_${2}_$3
to: tag-name

environment:
contents:

```
  packages:
    - autoconf
    - automake
    - build-base
    - busybox
    - ca-certificates-bundle
    - libtool

pipeline:
 - uses: git-checkout
   with:
     repository: https://gitlab.gnome.org/Archive/libart_lgpl
     tag: ${{vars.tag-name}}
     expected-commit: 7119bfe163a5a5325405acb7eab1b16152e8032a

 - runs: autoreconf -vif

 - uses: autoconf/configure
   with:
     opts: |
       --disable-static

 - uses: autoconf/make

 - uses: autoconf/make-install

 - uses: strip

subpackages:
 - name: libart-lgpl-dev
   pipeline:
     - uses: split/dev
   dependencies:
     runtime:
       - libart-lgpl
   description: libart-lgpl dev
    test:
     pipeline:
       - runs: |
           libart2-config --version
       - uses: test/pkgconf
       - uses: test/tw/ldd-check

update:
 enabled: true
 release-monitor:
   identifier: 21864
```

```
test:
 pipeline:
  - uses: test/tw/ldd-check
```

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```
package:
 name: py3-license-expression
 version: "30.4.4"
 epoch: 1
 description: license-expression is a comprehensive utility library to parse, compare, simplify and normalize license
expressions (such as SPDX license expressions) using boolean logic.
 copyright:
   - license: Apache-2.0
 dependencies:
   provider-priority: 0

vars:
 pypi-package: license-expression
 import: license_expression

data:
 - name: py-versions
   items:
     3.10: '310'
     3.11: '311'
     3.12: '312'
     3.13: '313'

environment:
 contents:
   packages:
```

```
    - py3-supported-build-base

pipeline:
 - uses: git-checkout
   with:
     repository: https://github.com/nexB/license-expression
     tag: v${{package.version}}
     expected-commit: a3c00c09986bcca1240afd5b1844b56de3f581c1

subpackages:
 - range: py-versions
   name: py${{range.key}}-${{vars.pypi-package}}
   description: python${{range.key}} version of ${{vars.pypi-package}}
   dependencies:
     provider-priority: ${{range.value}}
      provides:
       - ${{package.name}}
       - py3-${{vars.pypi-package}}
     runtime:
       - py${{range.key}}-boolean.py
   pipeline:
     - uses: py/pip-build-install
       with:
         python: python${{range.key}}
     - uses: strip
   test:
     pipeline:
       - uses: python/import
         with:
           python: python${{range.key}}
           imports: |
             import ${{vars.import}}

 - name: py3-supported-${{vars.pypi-package}}
   description: meta package providing ${{vars.pypi-package}} for supported python versions.
   dependencies:
     runtime:
       - py3.10-${{vars.pypi-package}}
       - py3.11-${{vars.pypi-package}}
       - py3.12-${{vars.pypi-package}}
       - py3.13-${{vars.pypi-package}}
   test:
     pipeline:
       - uses: test/metapackage

test:
 pipeline:
   - uses: python/import
```

```
    with:
      imports: |
        import ${{vars.import}}

update:
 enabled: true
 github:
   identifier: nexB/license-expression
    strip-prefix: v
package:
 name: go-licenses
 version: "2.0.1"
 epoch: 2 # CVE-2025-61729
 description: A lightweight tool to report on the licenses used by a Go package and its dependencies. Highlight!
Versioned external URL to licenses can be found at the same time.
 copyright:
   - license: Apache-2.0

pipeline:
 - uses: git-checkout
   with:
     repository: https://github.com/google/go-licenses
     tag: v${{package.version}}
     expected-commit: 3e084b0caf710f7bfead967567539214f598c0a2

 - uses: go/build
   with:
     modroot: .
     packages: .
     output: go-licenses

update:
 enabled: true
 github:
   identifier: google/go-licenses
   strip-prefix: v

test:
 pipeline:
   # AUTOGENERATED
   - runs: |
       go-licenses --help
issuer: https://accounts.google.com

# staging-enforce: ci-license-checka7daalc99klekq@staging-enforce-cd1e.iam.gserviceaccount.com
(111508570611001124410)
# prod-images: TODO
subject_pattern: "(111508570611001124410)"
```

permissions:
 checks: write
 pull_requests: write # need to comment on PRs

# 1.2676 goautoneg 0.0.0-20191010083416-a7dc8b61c822

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# 1.2677 stdr 1.2.2

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# 1.2678 google-go-cmp 0.7.0

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# 1.2679 klauspost-compress 1.18.0

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# 1.2682 jaraco-functools 4.4.0

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# 1.2683 procfs 0.15.1

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procfs provides functions to retrieve system, kernel and process
metrics from the pseudo-filesystem proc.

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# 1.2684 fastq 1.20.1

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# 1.2685 fancy-regex 0.17.0

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# 1.2686 clang 18.1.8

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```
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc < %s -mtriple=aarch64-- | FileCheck %s

; A shuffle mask with all undef elements is always legal.

define <4 x i32> @PR41535(<2 x i32> %p1, <2 x i32> %p2) {
; CHECK-LABEL: PR41535:
; CHECK:       // %bb.0:
; CHECK-NEXT:    ext v0.8b, v0.8b, v1.8b, #4
; CHECK-NEXT:    mov v0.d[1], v0.d[0]
; CHECK-NEXT:    ret
 %cat1 = shufflevector <2 x i32> %p1, <2 x i32> undef, <4 x i32> <i32 undef, i32 1, i32 undef, i32 undef>
 %cat2 = shufflevector <2 x i32> %p2, <2 x i32> undef, <4 x i32> <i32 0, i32 undef, i32 undef, i32 undef>
 %r = shufflevector <4 x i32> %cat1, <4 x i32> %cat2, <4 x i32> <i32 undef, i32 undef, i32 1, i32 4>
 ret <4 x i32> %r
}
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=amdgcn -mcpu=fiji < %s | FileCheck -enable-var-scope --check-prefixes=GCN,GCN-
SAFE,VI,VI-SAFE %s
; RUN: llc -enable-no-signed-zeros-fp-math -mtriple=amdgcn -mcpu=fiji < %s | FileCheck -enable-var-scope --
check-prefixes=GCN,GCN-NSZ,VI,VI-NSZ %s

; ------------------------------------------------------------------------------
; rcp tests
```

```
; ---------------------------------------------------------------------------

define half @v_fneg_rcp_f16(half %a) #0 {
; GCN-LABEL: v_fneg_rcp_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:    v_rcp_f16_e64 v0, -v0
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %rcp = call half @llvm.amdgcn.rcp.f16(half %a)
 %fneg = fneg half %rcp
 ret half %fneg
}

define half @v_fneg_rcp_fneg_f16(half %a) #0 {
; GCN-LABEL: v_fneg_rcp_fneg_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:
    v_rcp_f16_e32 v0, v0
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %fneg.a = fneg half %a
 %rcp = call half @llvm.amdgcn.rcp.f16(half %fneg.a)
 %fneg = fneg half %rcp
 ret half %fneg
}

define { half, half } @v_fneg_rcp_store_use_fneg_f16(half %a) #0 {
; GCN-LABEL: v_fneg_rcp_store_use_fneg_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:    v_rcp_f16_e32 v2, v0
; GCN-NEXT:    v_xor_b32_e32 v1, 0x8000, v0
; GCN-NEXT:    v_mov_b32_e32 v0, v2
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %fneg.a = fneg half %a
 %rcp = call half @llvm.amdgcn.rcp.f16(half %fneg.a)
 %fneg = fneg half %rcp
 %insert.0 = insertvalue { half, half } poison, half %fneg, 0
 %insert.1 = insertvalue { half, half } %insert.0, half %fneg.a, 1
 ret { half, half } %insert.1
}

define { half, half } @v_fneg_rcp_multi_use_fneg_f16(half %a, half %c) #0 {
; GCN-LABEL: v_fneg_rcp_multi_use_fneg_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:
```

```
   v_rcp_f16_e32 v2, v0
; GCN-NEXT:    v_mul_f16_e64 v1, -v0, v1
; GCN-NEXT:    v_mov_b32_e32 v0, v2
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %fneg.a = fneg half %a
 %rcp = call half @llvm.amdgcn.rcp.f16(half %fneg.a)
 %fneg = fneg half %rcp
 %use1 = fmul half %fneg.a, %c
 %insert.0 = insertvalue { half, half } poison, half %fneg, 0
 %insert.1 = insertvalue { half, half } %insert.0, half %use1, 1
 ret { half, half } %insert.1
}

; ---------------------------------------------------------------------------
; sin tests
; ---------------------------------------------------------------------------

define half @v_fneg_amdgcn_sin_f16(half %a) #0 {
; GCN-LABEL: v_fneg_amdgcn_sin_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:    v_sin_f16_e64 v0, -v0
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %sin = call half @llvm.amdgcn.sin.f16(half %a)
 %fneg = fneg half %sin
 ret half %fneg
}

; ---------------------------------------------------------------------------
;
 vintrp tests
; ---------------------------------------------------------------------------

define { float, float } @v_fneg_interp_p1_f16(float %a, float %b) #0 {
; GCN-LABEL: v_fneg_interp_p1_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:    v_mul_f32_e64 v1, v0, -v1
; GCN-NEXT:    s_mov_b32 m0, 0
; GCN-NEXT:    s_setreg_imm32_b32 hwreg(HW_REG_MODE, 2, 2), 3
; GCN-NEXT:    v_interp_p1ll_f16 v0, v1, attr0.x
; GCN-NEXT:    v_interp_p1ll_f16 v1, v1, attr0.y
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %mul = fmul float %a, %b
 %fneg = fneg float %mul
 %intrp0 = call float @llvm.amdgcn.interp.p1.f16(float %fneg, i32 0, i32 0, i1 false, i32 0)
 %intrp1 = call float @llvm.amdgcn.interp.p1.f16(float %fneg, i32 1, i32 0, i1 false, i32 0)
 %insert.0 = insertvalue { float, float } poison, float %intrp0, 0
```

```
 %insert.1 = insertvalue { float, float } %insert.0, float %intrp1, 1
 ret { float, float } %insert.1
}

define
 { half, half } @v_fneg_interp_p2_f16(float %a, float %b) #0 {
; GCN-LABEL: v_fneg_interp_p2_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:    v_mul_f32_e64 v1, v0, -v1
; GCN-NEXT:    v_mov_b32_e32 v2, 4.0
; GCN-NEXT:    s_mov_b32 m0, 0
; GCN-NEXT:    s_setreg_imm32_b32 hwreg(HW_REG_MODE, 2, 2), 3
; GCN-NEXT:    v_interp_p2_f16 v0, v1, attr0.x, v2
; GCN-NEXT:    v_interp_p2_f16 v1, v1, attr0.y, v2
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %mul = fmul float %a, %b
 %fneg = fneg float %mul
 %intrp0 = call half @llvm.amdgcn.interp.p2.f16(float 4.0, float %fneg, i32 0, i32 0, i1 false, i32 0)
 %intrp1 = call half @llvm.amdgcn.interp.p2.f16(float 4.0, float %fneg, i32 1, i32 0, i1 false, i32 0)
 %insert.0 = insertvalue { half, half } poison, half %intrp0, 0
 %insert.1 = insertvalue { half, half } %insert.0, half %intrp1, 1
 ret { half, half } %insert.1
}

; ------------------------------------------------------------------------------
;
 arithmetic.fence tests
; ------------------------------------------------------------------------------

; FIXME: Legalization/promote is broken
define half @v_fneg_arithmetic_fence_f16(half %a) #0 {
; GCN-LABEL: v_fneg_arithmetic_fence_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    ;ARITH_FENCE
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:    v_xor_b32_e32 v0, 0x8000, v0
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %fence = call half @llvm.arithmetic.fence.f16(half %a)
 %fneg = fneg half %fence
 ret half %fneg
}

define half @v_fneg_arithmetic_fence_fmul_f16(half %a, half %b) #0 {
; GCN-LABEL: v_fneg_arithmetic_fence_fmul_f16:
; GCN:       ; %bb.0:
; GCN-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; GCN-NEXT:    v_mul_f16_e32 v0, v0, v1
```

```
; GCN-NEXT:    ;ARITH_FENCE
; GCN-NEXT:    v_xor_b32_e32 v0, 0x8000, v0
; GCN-NEXT:    s_setpc_b64 s[30:31]
 %mul = fmul half %a, %b
 %fence = call half @llvm.arithmetic.fence.f16(half %mul)
 %fneg = fneg half %fence
 ret half
 %fneg
}

declare half @llvm.amdgcn.rcp.f16(half) #1
declare half @llvm.amdgcn.sin.f16(half) #1
declare half @llvm.arithmetic.fence.f16(half) #1
declare float @llvm.amdgcn.interp.p1.f16(float, i32, i32, i1, i32) #0
declare half @llvm.amdgcn.interp.p2.f16(float, float, i32, i32, i1, i32) #0

attributes #0 = { nounwind "denormal-fp-math-f32"="preserve-sign,preserve-sign" }
attributes #1 = { nounwind readnone }
attributes #2 = { nounwind "unsafe-fp-math"="true" }
attributes #3 = { nounwind "no-signed-zeros-fp-math"="true" }
attributes #4 = { nounwind "amdgpu-ieee"="false" "denormal-fp-math-f32"="preserve-sign,preserve-sign" }
;; NOTE: These prefixes are unused and the list is autogenerated. Do not add tests below this line:
; GCN-NSZ: {{.*}}
; GCN-SAFE: {{.*}}
; VI: {{.*}}
; VI-NSZ: {{.*}}
; VI-SAFE: {{.*}}
; NOTE: Assertions have been autogenerated by utils/update_test_checks.py UTC_ARGS: --function-signature --
check-attributes --check-globals
; RUN: opt -aa-pipeline=basic-aa -passes=attributor -attributor-manifest-internal  -attributor-annotate-decl-cs -S <
%s | FileCheck %s --check-prefixes=CHECK,TUNIT
; RUN: opt -aa-pipeline=basic-aa -passes=attributor-cgscc -attributor-manifest-internal  -attributor-annotate-decl-cs -
S < %s | FileCheck %s --check-prefixes=CHECK,CGSCC
; Test that we only promote arguments when the caller/callee have compatible
; function attrubtes.

target triple = "x86_64-unknown-linux-gnu"

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr %arg, ptr
readonly %arg1) #0 {
;
; CHECK: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512
; CHECK-SAME:
 (ptr noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[ARG:%.*]], <8 x i64>
[[TMP0:%.*]]) #[[ATTR0:[0-9]+]] {
```

```
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[ARG1_PRIV:%.*]] = alloca <8 x i64>, align 64
; CHECK-NEXT:    store <8 x i64> [[TMP0]], ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]], align 64
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr %arg) #0 {
;
; TUNIT: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; TUNIT-LABEL: define {{[^@]+}}@avx512_legal512_prefer512_call_avx512_legal512_prefer512
; TUNIT-SAME: (ptr nocapture nofree writeonly [[ARG:%.*]]) #[[ATTR0]] {
; TUNIT-NEXT:  bb:
; TUNIT-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align
 32
; TUNIT-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 32
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5:[0-9]+]]
; TUNIT-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; TUNIT-NEXT:    call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], <8 x i64>
[[TMP0]]) #[[ATTR6:[0-9]+]]
; TUNIT-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; TUNIT-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; TUNIT-NEXT:    ret void
;
; CGSCC: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CGSCC-LABEL: define {{[^@]+}}@avx512_legal512_prefer512_call_avx512_legal512_prefer512
; CGSCC-SAME: (ptr nocapture
 nofree noundef nonnull writeonly align 2 dereferenceable(64) [[ARG:%.*]]) #[[ATTR0]] {
; CGSCC-NEXT:  bb:
; CGSCC-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 64
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5:[0-9]+]]
; CGSCC-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; CGSCC-NEXT:    call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], <8 x i64>
[[TMP0]]) #[[ATTR6:[0-9]+]]
; CGSCC-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
```

```
; CGSCC-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; CGSCC-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void
 @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr %arg, ptr
readonly %arg1) #1 {
;
; CHECK: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64)
[[ARG:%.*]], <8 x i64> [[TMP0:%.*]]) #[[ATTR1:[0-9]+]] {
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[ARG1_PRIV:%.*]] = alloca <8 x i64>, align 64
; CHECK-NEXT:    store <8 x i64> [[TMP0]], ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x
 i64>, ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]], align 64
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr %arg) #1 {
;
; TUNIT: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; TUNIT-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal512_prefer256
; TUNIT-SAME: (ptr nocapture nofree writeonly [[ARG:%.*]]) #[[ATTR1]] {
; TUNIT-NEXT:  bb:
; TUNIT-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 32
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
```

```
; TUNIT-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; TUNIT-NEXT:
    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr noalias nocapture
nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], <8 x i64> [[TMP0]]) #[[ATTR6]]
; TUNIT-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; TUNIT-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; TUNIT-NEXT:    ret void
;
; CGSCC: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CGSCC-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal512_prefer256
; CGSCC-SAME: (ptr nocapture nofree noundef nonnull writeonly align 2 dereferenceable(64) [[ARG:%.*]])
#[[ATTR1]] {
; CGSCC-NEXT:  bb:
; CGSCC-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 64
dereferenceable(64)
 [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; CGSCC-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; CGSCC-NEXT:    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], <8 x i64>
[[TMP0]]) #[[ATTR6]]
; CGSCC-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; CGSCC-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; CGSCC-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr
 %arg, ptr readonly %arg1) #1 {
;
; CHECK: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64)
[[ARG:%.*]], <8 x i64> [[TMP0:%.*]]) #[[ATTR1]] {
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[ARG1_PRIV:%.*]] = alloca <8 x i64>, align 64
```

```
; CHECK-NEXT:    store <8 x i64> [[TMP0]], ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]], align 64
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr %arg) #0 {
;
; TUNIT: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind
 willreturn memory(argmem: readwrite) uwtable
; TUNIT-LABEL: define {{[^@]+}}@avx512_legal512_prefer512_call_avx512_legal512_prefer256
; TUNIT-SAME: (ptr nocapture nofree writeonly [[ARG:%.*]]) #[[ATTR0]] {
; TUNIT-NEXT:  bb:
; TUNIT-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 32
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; TUNIT-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; TUNIT-NEXT:    call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], <8 x i64>
[[TMP0]]) #[[ATTR6]]
; TUNIT-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; TUNIT-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; TUNIT-NEXT:
   ret void
;
; CGSCC: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CGSCC-LABEL: define {{[^@]+}}@avx512_legal512_prefer512_call_avx512_legal512_prefer256
; CGSCC-SAME: (ptr nocapture nofree noundef nonnull writeonly align 2 dereferenceable(64) [[ARG:%.*]])
#[[ATTR0]] {
; CGSCC-NEXT:  bb:
; CGSCC-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 64
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; CGSCC-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; CGSCC-NEXT:    call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], <8 x i64>
[[TMP0]]) #[[ATTR6]]
; CGSCC-NEXT:
   [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; CGSCC-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
```

```
; CGSCC-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr %arg, ptr
readonly %arg1) #0 {
;
; CHECK: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512
; CHECK-SAME: (ptr noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64)
[[ARG:%.*]],
 <8 x i64> [[TMP0:%.*]]) #[[ATTR0]] {
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[ARG1_PRIV:%.*]] = alloca <8 x i64>, align 64
; CHECK-NEXT:    store <8 x i64> [[TMP0]], ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]], align 64
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr %arg) #1 {
;
; TUNIT: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; TUNIT-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal512_prefer512
; TUNIT-SAME: (ptr nocapture nofree writeonly [[ARG:%.*]]) #[[ATTR1]] {
; TUNIT-NEXT:  bb:
; TUNIT-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    call void @llvm.memset.p0.i64(ptr
 noalias nocapture nofree noundef nonnull writeonly align 32 dereferenceable(64) [[TMP]], i8 noundef 0, i64
noundef 32, i1 noundef false) #[[ATTR5]]
; TUNIT-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
```

```
; TUNIT-NEXT:    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], <8 x i64>
[[TMP0]]) #[[ATTR6]]
; TUNIT-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; TUNIT-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; TUNIT-NEXT:    ret void
;
; CGSCC: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CGSCC-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal512_prefer512
; CGSCC-SAME: (ptr nocapture nofree noundef nonnull writeonly align 2 dereferenceable(64) [[ARG:%.*]])
#[[ATTR1]] {
; CGSCC-NEXT:  bb:
; CGSCC-NEXT:
   [[TMP:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 64
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; CGSCC-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; CGSCC-NEXT:    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], <8 x i64>
[[TMP0]]) #[[ATTR6]]
; CGSCC-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; CGSCC-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; CGSCC-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr
 %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should not promote
define internal fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr %arg, ptr
readonly %arg1) #1 {
;
; CHECK: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64)
[[ARG:%.*]], ptr noalias nocapture nofree noundef nonnull readonly align 64 dereferenceable(64) [[ARG1:%.*]])
#[[ATTR1]] {
; CHECK-NEXT:  bb:
```

```
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1]], align 64
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]], align 64
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
  ret void
}

define void @avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr %arg) #2 {
;
; TUNIT: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; TUNIT-LABEL: define {{[^@]+}}@avx512_legal256_prefer256_call_avx512_legal512_prefer256
; TUNIT-SAME: (ptr nocapture nofree writeonly [[ARG:%.*]]) #[[ATTR2:[0-9]+]] {
; TUNIT-NEXT:  bb:
; TUNIT-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 32
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; TUNIT-NEXT:    call fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], ptr noalias
nocapture nofree noundef nonnull readonly align 64 dereferenceable(64)
 [[TMP]]) #[[ATTR6]]
; TUNIT-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; TUNIT-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; TUNIT-NEXT:    ret void
;
; CGSCC: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CGSCC-LABEL: define {{[^@]+}}@avx512_legal256_prefer256_call_avx512_legal512_prefer256
; CGSCC-SAME: (ptr nocapture nofree noundef nonnull writeonly align 2 dereferenceable(64) [[ARG:%.*]])
#[[ATTR2:[0-9]+]] {
; CGSCC-NEXT:  bb:
; CGSCC-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 64
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; CGSCC-NEXT:    call fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr
noalias
 nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], ptr noalias nocapture
nofree noundef nonnull readonly align 64 dereferenceable(64) [[TMP]]) #[[ATTR6]]
; CGSCC-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; CGSCC-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; CGSCC-NEXT:    ret void
;
bb:
```

```
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should not promote
define internal fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %arg, ptr
readonly %arg1) #2 {
;
; CHECK: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
;
 CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256
; CHECK-SAME: (ptr noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64)
[[ARG:%.*]], ptr noalias nocapture nofree noundef nonnull readonly align 64 dereferenceable(64) [[ARG1:%.*]])
#[[ATTR2:[0-9]+]] {
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1]], align 64
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]], align 64
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %arg) #1 {
;
; TUNIT: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; TUNIT-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal256_prefer256
; TUNIT-SAME: (ptr nocapture nofree writeonly [[ARG:%.*]]) #[[ATTR1]] {
; TUNIT-NEXT:  bb:
; TUNIT-NEXT:
   [[TMP:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 32
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; TUNIT-NEXT:    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], ptr noalias
nocapture nofree noundef nonnull readonly align 64 dereferenceable(64) [[TMP]]) #[[ATTR6]]
; TUNIT-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; TUNIT-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
```

```
; TUNIT-NEXT:    ret void
;
; CGSCC: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CGSCC-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal256_prefer256
;
 CGSCC-SAME: (ptr nocapture nofree noundef nonnull writeonly align 2 dereferenceable(64) [[ARG:%.*]])
#[[ATTR1]] {
; CGSCC-NEXT:  bb:
; CGSCC-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 64
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; CGSCC-NEXT:    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr
noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], ptr noalias
nocapture nofree noundef nonnull readonly align 64 dereferenceable(64) [[TMP]]) #[[ATTR6]]
; CGSCC-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; CGSCC-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; CGSCC-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>,
 align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr %arg, ptr readonly
%arg1) #3 {
;
; CHECK: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CHECK-LABEL: define {{[^@]+}}@callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256
; CHECK-SAME: (ptr noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64)
[[ARG:%.*]], <8 x i64> [[TMP0:%.*]]) #[[ATTR3:[0-9]+]] {
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[ARG1_PRIV:%.*]] = alloca <8 x i64>, align 64
; CHECK-NEXT:    store <8 x i64> [[TMP0]], ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    [[TMP:%.*]]
 = load <8 x i64>, ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]], align 64
; CHECK-NEXT:    ret void
;
```

```
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr %arg) #4 {
;
; TUNIT: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; TUNIT-LABEL: define {{[^@]+}}@avx2_legal256_prefer256_call_avx2_legal512_prefer256
; TUNIT-SAME: (ptr nocapture nofree writeonly [[ARG:%.*]]) #[[ATTR3]] {
; TUNIT-NEXT:  bb:
; TUNIT-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 32
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; TUNIT-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
;
 TUNIT-NEXT:    call fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr noalias
nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], <8 x i64> [[TMP0]])
#[[ATTR6]]
; TUNIT-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; TUNIT-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; TUNIT-NEXT:    ret void
;
; CGSCC: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CGSCC-LABEL: define {{[^@]+}}@avx2_legal256_prefer256_call_avx2_legal512_prefer256
; CGSCC-SAME: (ptr nocapture nofree noundef nonnull writeonly align 2 dereferenceable(64) [[ARG:%.*]])
#[[ATTR3]] {
; CGSCC-NEXT:  bb:
; CGSCC-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 64
dereferenceable(64) [[TMP]],
 i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; CGSCC-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; CGSCC-NEXT:    call fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr noalias
nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], <8 x i64> [[TMP0]])
#[[ATTR6]]
; CGSCC-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; CGSCC-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; CGSCC-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
```

```
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr
 %arg, ptr readonly %arg1) #4 {
;
; CHECK: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
readwrite) uwtable
; CHECK-LABEL: define {{[^@]+}}@callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256
; CHECK-SAME: (ptr noalias nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64)
[[ARG:%.*]], <8 x i64> [[TMP0:%.*]]) #[[ATTR3]] {
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[ARG1_PRIV:%.*]] = alloca <8 x i64>, align 64
; CHECK-NEXT:    store <8 x i64> [[TMP0]], ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1_PRIV]], align 64
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]], align 64
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr %arg) #3 {
;
; TUNIT: Function Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem:
 readwrite) uwtable
; TUNIT-LABEL: define {{[^@]+}}@avx2_legal512_prefer256_call_avx2_legal256_prefer256
; TUNIT-SAME: (ptr nocapture nofree writeonly [[ARG:%.*]]) #[[ATTR3]] {
; TUNIT-NEXT:  bb:
; TUNIT-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; TUNIT-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 32
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; TUNIT-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; TUNIT-NEXT:    call fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr noalias
nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], <8 x i64> [[TMP0]])
#[[ATTR6]]
; TUNIT-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>, ptr [[TRUETMP2]], align 64
; TUNIT-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; TUNIT-NEXT:    ret void
;
```

```
; CGSCC: Function
 Attrs: inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem: readwrite) uwtable
; CGSCC-LABEL: define {{[^@]+}}@avx2_legal512_prefer256_call_avx2_legal256_prefer256
; CGSCC-SAME: (ptr nocapture nofree noundef nonnull writeonly align 2 dereferenceable(64) [[ARG:%.*]])
#[[ATTR3]] {
; CGSCC-NEXT:  bb:
; CGSCC-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    [[TRUETMP2:%.*]] = alloca <8 x i64>, align 32
; CGSCC-NEXT:    call void @llvm.memset.p0.i64(ptr noalias nocapture nofree noundef nonnull writeonly align 64
dereferenceable(64) [[TMP]], i8 noundef 0, i64 noundef 32, i1 noundef false) #[[ATTR5]]
; CGSCC-NEXT:    [[TMP0:%.*]] = load <8 x i64>, ptr [[TMP]], align 64
; CGSCC-NEXT:    call fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr noalias
nocapture nofree noundef nonnull writeonly align 64 dereferenceable(64) [[TRUETMP2]], <8 x i64> [[TMP0]])
#[[ATTR6]]
; CGSCC-NEXT:    [[TRUETMP4:%.*]] = load <8 x i64>,
 ptr [[TRUETMP2]], align 64
; CGSCC-NEXT:    store <8 x i64> [[TRUETMP4]], ptr [[ARG]], align 2
; CGSCC-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; Function Attrs: argmemonly nounwind
declare void @llvm.memset.p0.i64(ptr nocapture writeonly, i8, i64, i1) #5

attributes #0 = { inlinehint norecurse nounwind uwtable "target-features"="+avx512vl" "min-legal-vector-
width"="512" "prefer-vector-width"="512" }
attributes #1 = { inlinehint norecurse nounwind uwtable "target-features"="+avx512vl" "min-legal-vector-
width"="512" "prefer-vector-width"="256" }
attributes #2 = { inlinehint norecurse nounwind uwtable "target-features"="+avx512vl" "min-legal-vector-
width"="256"
 "prefer-vector-width"="256" }
attributes #3 = { inlinehint norecurse nounwind uwtable "target-features"="+avx2" "min-legal-vector-width"="512"
"prefer-vector-width"="256" }
attributes #4 = { inlinehint norecurse nounwind uwtable "target-features"="+avx2" "min-legal-vector-width"="256"
"prefer-vector-width"="256" }
attributes #5 = { argmemonly nounwind }
;.
; TUNIT: attributes #[[ATTR0]] = { inlinehint mustprogress nofree norecurse nosync nounwind willreturn
memory(argmem: readwrite) uwtable "min-legal-vector-width"="512" "prefer-vector-width"="512" "target-
features"="+avx512vl" }
```

```
; TUNIT: attributes #[[ATTR1]] = { inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem: readwrite) uwtable "min-legal-vector-width"="512" "prefer-vector-width"="256" "target-features"="+avx512vl" }
; TUNIT: attributes #[[ATTR2]] = { inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem: readwrite) uwtable "min-legal-vector-width"="256" "prefer-vector-width"="256"
 "target-features"="+avx512vl" }
; TUNIT: attributes #[[ATTR3]] = { inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem: readwrite) uwtable "min-legal-vector-width"="512" "prefer-vector-width"="256" "target-features"="+avx2" }
; TUNIT: attributes #[[ATTR4:[0-9]+]] = { nocallback nofree nounwind willreturn memory(argmem: write) }
; TUNIT: attributes #[[ATTR5]] = { nofree willreturn memory(write) }
; TUNIT: attributes #[[ATTR6]] = { nofree nosync nounwind willreturn }
;.
; CGSCC: attributes #[[ATTR0]] = { inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem: readwrite) uwtable "min-legal-vector-width"="512" "prefer-vector-width"="512" "target-features"="+avx512vl" }
; CGSCC: attributes #[[ATTR1]] = { inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem: readwrite) uwtable "min-legal-vector-width"="512" "prefer-vector-width"="256" "target-features"="+avx512vl" }
; CGSCC: attributes #[[ATTR2]]
 = { inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem: readwrite) uwtable "min-legal-vector-width"="256" "prefer-vector-width"="256" "target-features"="+avx512vl" }
; CGSCC: attributes #[[ATTR3]] = { inlinehint mustprogress nofree norecurse nosync nounwind willreturn memory(argmem: readwrite) uwtable "min-legal-vector-width"="512" "prefer-vector-width"="256" "target-features"="+avx2" }
; CGSCC: attributes #[[ATTR4:[0-9]+]] = { nocallback nofree nounwind willreturn memory(argmem: write) }
; CGSCC: attributes #[[ATTR5]] = { nofree willreturn memory(write) }
; CGSCC: attributes #[[ATTR6]] = { nofree nounwind willreturn }
;.
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefix=RV64I
; RUN: llc -mtriple=riscv64 -mattr=+zbb -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefix=RV64ZBB

declare i32 @llvm.ctlz.i32(i32, i1)

define signext i32 @ctlz_i32(i32 signext %a) nounwind {
; RV64I-LABEL: ctlz_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    beqz a0, .LBB0_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 2
; RV64I-NEXT:    or a0, a0, a1
```

```
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 8
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:
   not a0, a0
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addi a2, a2, 1365
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addi a1, a1, 819
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srliw a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 24
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
; RV64I-NEXT:  .LBB0_2:
; RV64I-NEXT:    li a0, 32
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: ctlz_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    clzw a0, a0
; RV64ZBB-NEXT:    ret
 %1 = call i32 @llvm.ctlz.i32(i32 %a, i1 false)
  ret i32 %1
}

define signext i32 @log2_i32(i32 signext %a) nounwind {
; RV64I-LABEL: log2_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    beqz a0, .LBB1_2
; RV64I-NEXT:  # %bb.1: # %cond.false
```

```
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 8
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addi a2, a2, 1365
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addi a1, a1, 819
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srliw a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:
   srliw a1, a0, 4
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 24
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    j .LBB1_3
; RV64I-NEXT:  .LBB1_2:
; RV64I-NEXT:    li a0, 32
; RV64I-NEXT:  .LBB1_3: # %cond.end
; RV64I-NEXT:    li a1, 31
; RV64I-NEXT:    subw a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: log2_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    clzw a0, a0
; RV64ZBB-NEXT:    li a1, 31
```

```
; RV64ZBB-NEXT:    subw a0, a1, a0
; RV64ZBB-NEXT:    ret
 %1 = call i32 @llvm.ctlz.i32(i32 %a, i1 false)
 %2 = sub i32 31, %1
 ret i32 %2
}

define signext i32 @log2_ceil_i32(i32 signext %a) nounwind {
; RV64I-LABEL: log2_ceil_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra,
 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    sd s0, 0(sp) # 8-byte Folded Spill
; RV64I-NEXT:    addiw a0, a0, -1
; RV64I-NEXT:    li s0, 32
; RV64I-NEXT:    li a1, 32
; RV64I-NEXT:    beqz a0, .LBB2_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 8
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addi a2, a2, 1365
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addi a1, a1, 819
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srliw a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:
  addw a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
```

```
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a1, a0, 24
; RV64I-NEXT:  .LBB2_2: # %cond.end
; RV64I-NEXT:    subw a0, s0, a1
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    ld s0, 0(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: log2_ceil_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    addi a0, a0, -1
; RV64ZBB-NEXT:    clzw a0, a0
; RV64ZBB-NEXT:    li a1, 32
; RV64ZBB-NEXT:    subw a0, a1, a0
; RV64ZBB-NEXT:    ret
 %1 = sub i32 %a, 1
 %2 = call i32 @llvm.ctlz.i32(i32 %1, i1 false)
 %3 = sub i32 32, %2
 ret i32 %3
}

define signext i32 @findLastSet_i32(i32 signext %a) nounwind {
; RV64I-LABEL: findLastSet_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
;
 RV64I-NEXT:    sd s0, 0(sp) # 8-byte Folded Spill
; RV64I-NEXT:    mv s0, a0
; RV64I-NEXT:    srliw a0, a0, 1
; RV64I-NEXT:    or a0, s0, a0
; RV64I-NEXT:    srliw a1, a0, 2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 8
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addi a2, a2, 1365
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
```

```
; RV64I-NEXT:    addi a1, a1, 819
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srliw a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:
  addiw a1, a1, 257
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 24
; RV64I-NEXT:    xori a0, a0, 31
; RV64I-NEXT:    snez a1, s0
; RV64I-NEXT:    addiw a1, a1, -1
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    ld s0, 0(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: findLastSet_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    clzw a1, a0
; RV64ZBB-NEXT:    xori a1, a1, 31
; RV64ZBB-NEXT:    snez a0, a0
; RV64ZBB-NEXT:    addiw a0, a0, -1
; RV64ZBB-NEXT:    or a0, a0, a1
; RV64ZBB-NEXT:    ret
 %1 = call i32 @llvm.ctlz.i32(i32 %a, i1 true)
 %2 = xor i32 31, %1
 %3 = icmp eq i32 %a, 0
 %4 = select i1 %3, i32 -1, i32 %2
 ret i32 %4
}

define i32 @ctlz_lshr_i32(i32 signext %a) {
; RV64I-LABEL: ctlz_lshr_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a0, a0, 1
; RV64I-NEXT:    beqz a0, .LBB4_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    addi sp, sp,
 -16
; RV64I-NEXT:    .cfi_def_cfa_offset 16
```

```
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    .cfi_offset ra, -8
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 8
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addi a2, a2, 1365
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addi a1, a1, 819
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srliw a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    and a0,
 a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 24
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
; RV64I-NEXT:  .LBB4_2:
; RV64I-NEXT:    li a0, 32
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: ctlz_lshr_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    srliw a0, a0, 1
; RV64ZBB-NEXT:    clzw a0, a0
; RV64ZBB-NEXT:    ret
 %1 = lshr i32 %a, 1
 %2 = call i32 @llvm.ctlz.i32(i32 %1, i1 false)
```

```
 ret i32 %2
}

declare i64 @llvm.ctlz.i64(i64, i1)

define i64 @ctlz_i64(i64 %a) nounwind {
; RV64I-LABEL: ctlz_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    beqz a0, .LBB5_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    srli a1, a0, 1
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srli a1, a0, 2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srli a1, a0, 4
; RV64I-NEXT:
   or a0, a0, a1
; RV64I-NEXT:    srli a1, a0, 8
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srli a1, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srli a1, a0, 32
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    srli a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addiw a2, a2, 1365
; RV64I-NEXT:    slli a3, a2, 32
; RV64I-NEXT:    add a2, a2, a3
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    sub a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addiw a1, a1, 819
; RV64I-NEXT:    slli a2, a1, 32
; RV64I-NEXT:    add a1, a1, a2
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srli a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srli a1, a0, 4
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    slli a2, a1, 32
; RV64I-NEXT:    add a1, a1, a2
; RV64I-NEXT:    and a0, a0, a1
```

```
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:
   addiw a1, a1, 257
; RV64I-NEXT:    slli a2, a1, 32
; RV64I-NEXT:    add a1, a1, a2
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srli a0, a0, 56
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
; RV64I-NEXT:  .LBB5_2:
; RV64I-NEXT:    li a0, 64
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: ctlz_i64:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    clz a0, a0
; RV64ZBB-NEXT:    ret
 %1 = call i64 @llvm.ctlz.i64(i64 %a, i1 false)
 ret i64 %1
}

declare i32 @llvm.cttz.i32(i32, i1)

define signext i32 @cttz_i32(i32 signext %a) nounwind {
; RV64I-LABEL: cttz_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    beqz a0, .LBB6_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    negw a1, a0
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 30667
; RV64I-NEXT:    addiw a1, a1, 1329
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 27
;
 RV64I-NEXT:    lui a1, %hi(.LCPI6_0)
; RV64I-NEXT:    addi a1, a1, %lo(.LCPI6_0)
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lbu a0, 0(a0)
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
; RV64I-NEXT:  .LBB6_2:
; RV64I-NEXT:    li a0, 32
; RV64I-NEXT:    ret
```

```
;
; RV64ZBB-LABEL: cttz_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    ctzw a0, a0
; RV64ZBB-NEXT:    ret
 %1 = call i32 @llvm.cttz.i32(i32 %a, i1 false)
 ret i32 %1
}

define signext i32 @cttz_zero_undef_i32(i32 signext %a) nounwind {
; RV64I-LABEL: cttz_zero_undef_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    negw a1, a0
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 30667
; RV64I-NEXT:    addiw a1, a1, 1329
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 27
; RV64I-NEXT:    lui a1, %hi(.LCPI7_0)
; RV64I-NEXT:    addi a1, a1, %lo(.LCPI7_0)
; RV64I-NEXT:
    add a0, a1, a0
; RV64I-NEXT:    lbu a0, 0(a0)
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: cttz_zero_undef_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    ctzw a0, a0
; RV64ZBB-NEXT:    ret
 %1 = call i32 @llvm.cttz.i32(i32 %a, i1 true)
 ret i32 %1
}

define signext i32 @findFirstSet_i32(i32 signext %a) nounwind {
; RV64I-LABEL: findFirstSet_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    sd s0, 0(sp) # 8-byte Folded Spill
; RV64I-NEXT:    mv s0, a0
; RV64I-NEXT:    negw a0, a0
; RV64I-NEXT:    and a0, s0, a0
; RV64I-NEXT:    lui a1, 30667
; RV64I-NEXT:    addiw a1, a1, 1329
```

```
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 27
; RV64I-NEXT:    lui a1, %hi(.LCPI8_0)
; RV64I-NEXT:    addi a1, a1, %lo(.LCPI8_0)
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lbu a0, 0(a0)
; RV64I-NEXT:    snez a1, s0
; RV64I-NEXT:
   addi a1, a1, -1
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    ld s0, 0(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: findFirstSet_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    ctzw a1, a0
; RV64ZBB-NEXT:    snez a0, a0
; RV64ZBB-NEXT:    addiw a0, a0, -1
; RV64ZBB-NEXT:    or a0, a0, a1
; RV64ZBB-NEXT:    ret
 %1 = call i32 @llvm.cttz.i32(i32 %a, i1 true)
 %2 = icmp eq i32 %a, 0
 %3 = select i1 %2, i32 -1, i32 %1
 ret i32 %3
}

define signext i32 @ffs_i32(i32 signext %a) nounwind {
; RV64I-LABEL: ffs_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    sd s0, 0(sp) # 8-byte Folded Spill
; RV64I-NEXT:    mv s0, a0
; RV64I-NEXT:    negw a0, a0
; RV64I-NEXT:    and a0, s0, a0
; RV64I-NEXT:    lui a1, 30667
; RV64I-NEXT:    addiw a1, a1, 1329
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:
   srliw a0, a0, 27
; RV64I-NEXT:    lui a1, %hi(.LCPI9_0)
; RV64I-NEXT:    addi a1, a1, %lo(.LCPI9_0)
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lbu a0, 0(a0)
; RV64I-NEXT:    addi a0, a0, 1
; RV64I-NEXT:    seqz a1, s0
```

```
; RV64I-NEXT:    addi a1, a1, -1
; RV64I-NEXT:    and a0, a1, a0
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    ld s0, 0(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: ffs_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    ctzw a1, a0
; RV64ZBB-NEXT:    addi a1, a1, 1
; RV64ZBB-NEXT:    seqz a0, a0
; RV64ZBB-NEXT:    addi a0, a0, -1
; RV64ZBB-NEXT:    and a0, a0, a1
; RV64ZBB-NEXT:    zext.h a0, a0
; RV64ZBB-NEXT:    ret
 %1 = call i32 @llvm.cttz.i32(i32 %a, i1 true)
 %2 = add i32 %1, 1
 %3 = icmp eq i32 %a, 0
 %4 = select i1 %3, i32 0, i32 %2
 ret i32 %4
}

declare i64 @llvm.cttz.i64(i64, i1)

define i64 @cttz_i64(i64
 %a) nounwind {
; RV64I-LABEL: cttz_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    beqz a0, .LBB10_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    neg a1, a0
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, %hi(.LCPI10_0)
; RV64I-NEXT:    ld a1, %lo(.LCPI10_0)(a1)
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srli a0, a0, 58
; RV64I-NEXT:    lui a1, %hi(.LCPI10_1)
; RV64I-NEXT:    addi a1, a1, %lo(.LCPI10_1)
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lbu a0, 0(a0)
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
```

```
; RV64I-NEXT:  .LBB10_2:
; RV64I-NEXT:    li a0, 64
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: cttz_i64:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    ctz a0, a0
; RV64ZBB-NEXT:    ret
 %1 = call i64 @llvm.cttz.i64(i64 %a, i1 false)
 ret i64 %1
}

declare i32 @llvm.ctpop.i32(i32)

define signext i32 @ctpop_i32(i32
 signext %a) nounwind {
; RV64I-LABEL: ctpop_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addi a2, a2, 1365
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addi a1, a1, 819
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srliw a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 24
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: ctpop_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    cpopw
```

```
 a0, a0
; RV64ZBB-NEXT:    ret
 %1 = call i32 @llvm.ctpop.i32(i32 %a)
 ret i32 %1
}

define signext i32 @ctpop_i32_load(ptr %p) nounwind {
; RV64I-LABEL: ctpop_i32_load:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addi a2, a2, 1365
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addi a1, a1, 819
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srliw a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 24
; RV64I-NEXT:    ld ra, 8(sp)
 # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: ctpop_i32_load:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    lw a0, 0(a0)
; RV64ZBB-NEXT:    cpopw a0, a0
; RV64ZBB-NEXT:    ret
 %a = load i32, ptr %p
 %1 = call i32 @llvm.ctpop.i32(i32 %a)
 ret i32 %1
}

declare i64 @llvm.ctpop.i64(i64)
```

```
define i64 @ctpop_i64(i64 %a) nounwind {
; RV64I-LABEL: ctpop_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    srli a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addiw a2, a2, 1365
; RV64I-NEXT:    slli a3, a2, 32
; RV64I-NEXT:    add a2, a2, a3
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    sub a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addiw a1, a1, 819
; RV64I-NEXT:    slli a2, a1, 32
; RV64I-NEXT:    add a1, a1, a2
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srli a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2,
 a0
; RV64I-NEXT:    srli a1, a0, 4
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    slli a2, a1, 32
; RV64I-NEXT:    add a1, a1, a2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    slli a2, a1, 32
; RV64I-NEXT:    add a1, a1, a2
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srli a0, a0, 56
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: ctpop_i64:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    cpop a0, a0
; RV64ZBB-NEXT:    ret
 %1 = call i64 @llvm.ctpop.i64(i64 %a)
 ret i64 %1
}

define signext i32 @sextb_i32(i32 signext %a) nounwind {
```

```
; RV64I-LABEL: sextb_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 56
; RV64I-NEXT:    srai a0, a0, 56
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: sextb_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    sext.b a0, a0
; RV64ZBB-NEXT:
    ret
 %shl = shl i32 %a, 24
 %shr = ashr exact i32 %shl, 24
 ret i32 %shr
}

define i64 @sextb_i64(i64 %a) nounwind {
; RV64I-LABEL: sextb_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 56
; RV64I-NEXT:    srai a0, a0, 56
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: sextb_i64:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    sext.b a0, a0
; RV64ZBB-NEXT:    ret
 %shl = shl i64 %a, 56
 %shr = ashr exact i64 %shl, 56
 ret i64 %shr
}

define signext i32 @sexth_i32(i32 signext %a) nounwind {
; RV64I-LABEL: sexth_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srai a0, a0, 48
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: sexth_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    sext.h a0, a0
; RV64ZBB-NEXT:    ret
 %shl = shl i32 %a, 16
 %shr = ashr exact i32 %shl, 16
 ret i32 %shr
}
```

```
define i64 @sexth_i64(i64 %a) nounwind {
; RV64I-LABEL: sexth_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srai a0, a0, 48
; RV64I-NEXT:
   ret
;
; RV64ZBB-LABEL: sexth_i64:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    sext.h a0, a0
; RV64ZBB-NEXT:    ret
 %shl = shl i64 %a, 48
 %shr = ashr exact i64 %shl, 48
 ret i64 %shr
}

define signext i32 @min_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: min_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    blt a0, a1, .LBB18_2
; RV64I-NEXT:  # %bb.1:
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:  .LBB18_2:
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: min_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    min a0, a0, a1
; RV64ZBB-NEXT:    ret
 %cmp = icmp slt i32 %a, %b
 %cond = select i1 %cmp, i32 %a, i32 %b
 ret i32 %cond
}

define i64 @min_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: min_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    blt a0, a1, .LBB19_2
; RV64I-NEXT:  # %bb.1:
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:  .LBB19_2:
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: min_i64:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    min a0, a0, a1
; RV64ZBB-NEXT:    ret
```

```
 %cmp = icmp
 slt i64 %a, %b
 %cond = select i1 %cmp, i64 %a, i64 %b
 ret i64 %cond
}

define signext i32 @max_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: max_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    blt a1, a0, .LBB20_2
; RV64I-NEXT:  # %bb.1:
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:  .LBB20_2:
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: max_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    max a0, a0, a1
; RV64ZBB-NEXT:    ret
 %cmp = icmp sgt i32 %a, %b
 %cond = select i1 %cmp, i32 %a, i32 %b
 ret i32 %cond
}

define i64 @max_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: max_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    blt a1, a0, .LBB21_2
; RV64I-NEXT:  # %bb.1:
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:  .LBB21_2:
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: max_i64:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    max a0, a0, a1
; RV64ZBB-NEXT:    ret
 %cmp = icmp sgt i64 %a, %b
 %cond = select i1 %cmp, i64 %a, i64 %b
 ret i64 %cond
}

define signext i32 @minu_i32(i32 signext
 %a, i32 signext %b) nounwind {
; RV64I-LABEL: minu_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    bltu a0, a1, .LBB22_2
; RV64I-NEXT:  # %bb.1:
```

```
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:  .LBB22_2:
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: minu_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    minu a0, a0, a1
; RV64ZBB-NEXT:    ret
 %cmp = icmp ult i32 %a, %b
 %cond = select i1 %cmp, i32 %a, i32 %b
 ret i32 %cond
}

define i64 @minu_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: minu_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    bltu a0, a1, .LBB23_2
; RV64I-NEXT:  # %bb.1:
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:  .LBB23_2:
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: minu_i64:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    minu a0, a0, a1
; RV64ZBB-NEXT:    ret
 %cmp = icmp ult i64 %a, %b
 %cond = select i1 %cmp, i64 %a, i64 %b
 ret i64 %cond
}

define signext i32 @maxu_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: maxu_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    bltu a1,
 a0, .LBB24_2
; RV64I-NEXT:  # %bb.1:
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:  .LBB24_2:
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: maxu_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    maxu a0, a0, a1
; RV64ZBB-NEXT:    ret
 %cmp = icmp ugt i32 %a, %b
 %cond = select i1 %cmp, i32 %a, i32 %b
 ret i32 %cond
```

```
}

define i64 @maxu_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: maxu_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    bltu a1, a0, .LBB25_2
; RV64I-NEXT:  # %bb.1:
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:  .LBB25_2:
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: maxu_i64:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    maxu a0, a0, a1
; RV64ZBB-NEXT:    ret
 %cmp = icmp ugt i64 %a, %b
 %cond = select i1 %cmp, i64 %a, i64 %b
 ret i64 %cond
}

declare i32 @llvm.abs.i32(i32, i1 immarg)

define i32 @abs_i32(i32 %x) {
; RV64I-LABEL: abs_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sraiw a1, a0, 31
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL:
 abs_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    sraiw a1, a0, 31
; RV64ZBB-NEXT:    xor a0, a0, a1
; RV64ZBB-NEXT:    subw a0, a0, a1
; RV64ZBB-NEXT:    ret
 %abs = tail call i32 @llvm.abs.i32(i32 %x, i1 true)
 ret i32 %abs
}

define signext i32 @abs_i32_sext(i32 signext %x) {
; RV64I-LABEL: abs_i32_sext:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sraiw a1, a0, 31
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    ret
```

```
;
; RV64ZBB-LABEL: abs_i32_sext:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    sraiw a1, a0, 31
; RV64ZBB-NEXT:    xor a0, a0, a1
; RV64ZBB-NEXT:    subw a0, a0, a1
; RV64ZBB-NEXT:    ret
 %abs = tail call i32 @llvm.abs.i32(i32 %x, i1 true)
 ret i32 %abs
}

declare i64 @llvm.abs.i64(i64, i1 immarg)

define i64 @abs_i64(i64 %x) {
; RV64I-LABEL: abs_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srai a1, a0, 63
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    sub a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: abs_i64:
; RV64ZBB:
       # %bb.0:
; RV64ZBB-NEXT:    neg a1, a0
; RV64ZBB-NEXT:    max a0, a0, a1
; RV64ZBB-NEXT:    ret
 %abs = tail call i64 @llvm.abs.i64(i64 %x, i1 true)
 ret i64 %abs
}

define i32 @zexth_i32(i32 %a) nounwind {
; RV64I-LABEL: zexth_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srli a0, a0, 48
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: zexth_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    slli a0, a0, 48
; RV64ZBB-NEXT:    srli a0, a0, 48
; RV64ZBB-NEXT:    ret
 %and = and i32 %a, 65535
 ret i32 %and
}

define i64 @zexth_i64(i64 %a) nounwind {
```

```
; RV64I-LABEL: zexth_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srli a0, a0, 48
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: zexth_i64:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    zext.h a0, a0
; RV64ZBB-NEXT:    ret
 %and = and i64 %a, 65535
 ret i64 %and
}

declare i32 @llvm.bswap.i32(i32)

define signext i32 @bswap_i32(i32 signext %a) nounwind {
; RV64I-LABEL: bswap_i32:
;
 RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a1, a0, 8
; RV64I-NEXT:    lui a2, 16
; RV64I-NEXT:    addiw a2, a2, -256
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    srliw a3, a0, 24
; RV64I-NEXT:    or a1, a1, a3
; RV64I-NEXT:    and a2, a0, a2
; RV64I-NEXT:    slliw a2, a2, 8
; RV64I-NEXT:    slliw a0, a0, 24
; RV64I-NEXT:    or a0, a0, a2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: bswap_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    rev8 a0, a0
; RV64ZBB-NEXT:    srai a0, a0, 32
; RV64ZBB-NEXT:    ret
 %1 = tail call i32 @llvm.bswap.i32(i32 %a)
 ret i32 %1
}

; Similar to bswap_i32 but the result is not sign extended.
define void @bswap_i32_nosext(i32 signext %a, ptr %x) nounwind {
; RV64I-LABEL: bswap_i32_nosext:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a2, a0, 8
; RV64I-NEXT:    lui a3, 16
```

```
; RV64I-NEXT:    addi a3, a3, -256
; RV64I-NEXT:    and a2, a2, a3
; RV64I-NEXT:    srliw a4, a0, 24
; RV64I-NEXT:    or a2, a2, a4
; RV64I-NEXT:
  and a3, a0, a3
; RV64I-NEXT:    slli a3, a3, 8
; RV64I-NEXT:    slli a0, a0, 24
; RV64I-NEXT:    or a0, a0, a3
; RV64I-NEXT:    or a0, a0, a2
; RV64I-NEXT:    sw a0, 0(a1)
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: bswap_i32_nosext:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    rev8 a0, a0
; RV64ZBB-NEXT:    srli a0, a0, 32
; RV64ZBB-NEXT:    sw a0, 0(a1)
; RV64ZBB-NEXT:    ret
 %1 = tail call i32 @llvm.bswap.i32(i32 %a)
 store i32 %1, ptr %x
 ret void
}

declare i64 @llvm.bswap.i64(i64)

define i64 @bswap_i64(i64 %a) {
; RV64I-LABEL: bswap_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srli a1, a0, 40
; RV64I-NEXT:    lui a2, 16
; RV64I-NEXT:    addiw a2, a2, -256
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    srli a3, a0, 56
; RV64I-NEXT:    or a1, a1, a3
; RV64I-NEXT:    srli a3, a0, 24
; RV64I-NEXT:    lui a4, 4080
; RV64I-NEXT:    and a3, a3, a4
; RV64I-NEXT:    srli a5, a0, 8
; RV64I-NEXT:    srliw a5, a5, 24
; RV64I-NEXT:    slli a5, a5, 24
; RV64I-NEXT:    or a3, a5, a3
; RV64I-NEXT:
    or a1, a3, a1
; RV64I-NEXT:    and a4, a0, a4
; RV64I-NEXT:    slli a4, a4, 24
; RV64I-NEXT:    srliw a3, a0, 24
; RV64I-NEXT:    slli a3, a3, 32
```

```
; RV64I-NEXT:    or a3, a4, a3
; RV64I-NEXT:    and a2, a0, a2
; RV64I-NEXT:    slli a2, a2, 40
; RV64I-NEXT:    slli a0, a0, 56
; RV64I-NEXT:    or a0, a0, a2
; RV64I-NEXT:    or a0, a0, a3
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: bswap_i64:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    rev8 a0, a0
; RV64ZBB-NEXT:    ret
 %1 = call i64 @llvm.bswap.i64(i64 %a)
 ret i64 %1
}
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefix=RV64I
; RUN: llc -mtriple=riscv64 -mattr=+zbkb -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefix=RV64ZBKB

define signext i32 @pack_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: pack_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srli a0, a0, 48
; RV64I-NEXT:    slliw a1, a1, 16
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: pack_i32:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    packw a0, a0, a1
; RV64ZBKB-NEXT:    ret
 %shl = and i32 %a, 65535
 %shl1 = shl i32 %b, 16
 %or = or i32 %shl1, %shl
 ret i32 %or
}

define signext i32 @pack_i32_2(i16 zeroext %a, i16 zeroext %b) nounwind {
; RV64I-LABEL: pack_i32_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slliw
 a1, a1, 16
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
```

```
;
; RV64ZBKB-LABEL: pack_i32_2:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    packw a0, a0, a1
; RV64ZBKB-NEXT:    ret
 %zexta = zext i16 %a to i32
 %zextb = zext i16 %b to i32
 %shl1 = shl i32 %zextb, 16
 %or = or i32 %shl1, %zexta
 ret i32 %or
}

; Test case where we don't have a sign_extend_inreg after the or.
define signext i32 @pack_i32_3(i16 zeroext %0, i16 zeroext %1, i32 signext %2) {
; RV64I-LABEL: pack_i32_3:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    addw a0, a0, a2
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: pack_i32_3:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    packw a0, a1, a0
; RV64ZBKB-NEXT:    addw a0, a0, a2
; RV64ZBKB-NEXT:    ret
 %4 = zext i16 %0 to i32
 %5 = shl nuw i32 %4, 16
 %6 = zext i16 %1 to i32
 %7 = or i32 %5, %6
 %8 = add i32 %7, %2
 ret i32 %8
}

define i64 @pack_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: pack_i64:
;
 RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: pack_i64:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    pack a0, a0, a1
; RV64ZBKB-NEXT:    ret
```

```
 %shl = and i64 %a, 4294967295
 %shl1 = shl i64 %b, 32
 %or = or i64 %shl1, %shl
 ret i64 %or
}

define i64 @pack_i64_2(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: pack_i64_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: pack_i64_2:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    pack a0, a0, a1
; RV64ZBKB-NEXT:    ret
 %zexta = zext i32 %a to i64
 %zextb = zext i32 %b to i64
 %shl1 = shl i64 %zextb, 32
 %or = or i64 %shl1, %zexta
 ret i64 %or
}

define i64 @pack_i64_3(ptr %0, ptr %1) {
; RV64I-LABEL: pack_i64_3:
; RV64I:       #
 %bb.0:
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    lwu a1, 0(a1)
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: pack_i64_3:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    lw a0, 0(a0)
; RV64ZBKB-NEXT:    lwu a1, 0(a1)
; RV64ZBKB-NEXT:    pack a0, a1, a0
; RV64ZBKB-NEXT:    ret
 %3 = load i32, ptr %0, align 4
 %4 = zext i32 %3 to i64
 %5 = shl i64 %4, 32
 %6 = load i32, ptr %1, align 4
 %7 = zext i32 %6 to i64
 %8 = or i64 %5, %7
```

```
 ret i64 %8
}

define signext i32 @packh_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: packh_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    andi a0, a0, 255
; RV64I-NEXT:    slli a1, a1, 56
; RV64I-NEXT:    srli a1, a1, 48
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: packh_i32:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    packh a0, a0, a1
; RV64ZBKB-NEXT:    ret
 %and = and i32 %a, 255
 %and1 = shl i32 %b, 8
 %shl = and i32 %and1, 65280
 %or = or
 i32 %shl, %and
 ret i32 %or
}

define i32 @packh_i32_2(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: packh_i32_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    andi a0, a0, 255
; RV64I-NEXT:    andi a1, a1, 255
; RV64I-NEXT:    slliw a1, a1, 8
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: packh_i32_2:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    packh a0, a0, a1
; RV64ZBKB-NEXT:    ret
 %and = and i32 %a, 255
 %and1 = and i32 %b, 255
 %shl = shl i32 %and1, 8
 %or = or i32 %shl, %and
 ret i32 %or
}

define i64 @packh_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: packh_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    andi a0, a0, 255
```

```
; RV64I-NEXT:    slli a1, a1, 56
; RV64I-NEXT:    srli a1, a1, 48
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: packh_i64:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    packh a0, a0, a1
; RV64ZBKB-NEXT:    ret
 %and = and i64 %a, 255
 %and1 = shl i64 %b, 8
 %shl = and i64 %and1, 65280
 %or = or i64 %shl,
 %and
 ret i64 %or
}

define i64 @packh_i64_2(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: packh_i64_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    andi a0, a0, 255
; RV64I-NEXT:    andi a1, a1, 255
; RV64I-NEXT:    slli a1, a1, 8
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: packh_i64_2:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    packh a0, a0, a1
; RV64ZBKB-NEXT:    ret
 %and = and i64 %a, 255
 %and1 = and i64 %b, 255
 %shl = shl i64 %and1, 8
 %or = or i64 %shl, %and
 ret i64 %or
}

define zeroext i16 @packh_i16(i8 zeroext %a, i8 zeroext %b) nounwind {
; RV64I-LABEL: packh_i16:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slliw a1, a1, 8
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: packh_i16:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    packh a0, a0, a1
; RV64ZBKB-NEXT:    ret
```

```
 %zext = zext i8 %a to i16
 %zext1 = zext i8 %b to i16
 %shl = shl i16 %zext1, 8
 %or = or i16 %shl, %zext
 ret i16 %or
}

define zeroext i16 @packh_i16_2(i8
 zeroext %0, i8 zeroext %1, i8 zeroext %2) {
; RV64I-LABEL: packh_i16_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    slli a0, a0, 8
; RV64I-NEXT:    or a0, a0, a2
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srli a0, a0, 48
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: packh_i16_2:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    add a0, a1, a0
; RV64ZBKB-NEXT:    packh a0, a2, a0
; RV64ZBKB-NEXT:    ret
 %4 = add i8 %1, %0
 %5 = zext i8 %4 to i16
 %6 = shl i16 %5, 8
 %7 = zext i8 %2 to i16
 %8 = or i16 %6, %7
 ret i16 %8
}

define i64 @pack_i64_allWUsers(i32 signext %0, i32 signext %1, i32 signext %2) {
; RV64I-LABEL: pack_i64_allWUsers:
; RV64I:       # %bb.0:
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    slli a2, a2, 32
; RV64I-NEXT:    srli a2, a2, 32
; RV64I-NEXT:    or a0, a0, a2
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: pack_i64_allWUsers:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    add a0, a1, a0
; RV64ZBKB-NEXT:
    pack a0, a2, a0
; RV64ZBKB-NEXT:    ret
 %4 = add i32 %1, %0
```

```
 %5 = zext i32 %4 to i64
 %6 = shl i64 %5, 32
 %7 = zext i32 %2 to i64
 %8 = or i64 %6, %7
 ret i64 %8
}

define signext i32 @pack_i32_allWUsers(i16 zeroext %0, i16 zeroext %1, i16 zeroext %2) {
; RV64I-LABEL: pack_i32_allWUsers:
; RV64I:       # %bb.0:
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    slliw a0, a0, 16
; RV64I-NEXT:    or a0, a0, a2
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL: pack_i32_allWUsers:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    add a0, a1, a0
; RV64ZBKB-NEXT:    packw a0, a2, a0
; RV64ZBKB-NEXT:    ret
 %4 = add i16 %1, %0
 %5 = zext i16 %4 to i32
 %6 = shl i32 %5, 16
 %7 = zext i16 %2 to i32
 %8 = or i32 %6, %7
 ret i32 %8
}

define i64 @pack_i64_imm() {
; RV64I-LABEL: pack_i64_imm:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 65793
; RV64I-NEXT:    addiw a0, a0, 16
; RV64I-NEXT:    slli a1, a0, 32
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBKB-LABEL:
 pack_i64_imm:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    lui a0, 65793
; RV64ZBKB-NEXT:    addi a0, a0, 16
; RV64ZBKB-NEXT:    pack a0, a0, a0
; RV64ZBKB-NEXT:    ret
 ret i64 1157442765409226768 ; 0x0101010101010101
}
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -verify-machineinstrs < %s \
```

```
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck -check-prefix=RV64I %s

; Check indexed and unindexed, sext, zext and anyext loads

define void @lb(ptr %a, ptr %b) nounwind {
; RV64I-LABEL: lb:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lb a2, 1(a0)
; RV64I-NEXT:    lbu zero, 0(a0)
; RV64I-NEXT:    sw a2, 0(a1)
; RV64I-NEXT:    ret
 %1 = getelementptr i8, ptr %a, i32 1
 %2 = load i8, ptr %1
 %3 = sext i8 %2 to i32
 ; the unused load will produce an anyext for selection
 %4 = load volatile i8, ptr %a
 store i32 %3, ptr %b
 ret void
}

define void @lbu(ptr %a, ptr %b) nounwind {
; RV64I-LABEL: lbu:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lbu a0, 1(a0)
; RV64I-NEXT:    sw a0, 0(a1)
; RV64I-NEXT:    ret
 %1 = getelementptr i8, ptr %a, i32 1
 %2 = load i8, ptr %1
 %3 = zext i8 %2 to i32
 store i32 %3, ptr %b
 ret void
}

define void @lh(ptr
 %a, ptr %b) nounwind {
; RV64I-LABEL: lh:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lh a2, 2(a0)
; RV64I-NEXT:    lh zero, 0(a0)
; RV64I-NEXT:    sw a2, 0(a1)
; RV64I-NEXT:    ret
 %1 = getelementptr i16, ptr %a, i32 1
 %2 = load i16, ptr %1
 %3 = sext i16 %2 to i32
 ; the unused load will produce an anyext for selection
 %4 = load volatile i16, ptr %a
 store i32 %3, ptr %b
 ret void
```

```
}

define void @lhu(ptr %a, ptr %b) nounwind {
; RV64I-LABEL: lhu:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lhu a0, 2(a0)
; RV64I-NEXT:    sw a0, 0(a1)
; RV64I-NEXT:    ret
 %1 = getelementptr i16, ptr %a, i32 1
 %2 = load i16, ptr %1
 %3 = zext i16 %2 to i32
 store i32 %3, ptr %b
 ret void
}

define void @lw(ptr %a, ptr %b) nounwind {
; RV64I-LABEL: lw:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lw a2, 4(a0)
; RV64I-NEXT:    lw zero, 0(a0)
; RV64I-NEXT:    sd a2, 0(a1)
; RV64I-NEXT:    ret
 %1 = getelementptr i32, ptr %a, i64 1
 %2 = load i32, ptr %1
 %3 = sext i32 %2 to i64
 ; the unused load
 will produce an anyext for selection
 %4 = load volatile i32, ptr %a
 store i64 %3, ptr %b
 ret void
}

define void @lwu(ptr %a, ptr %b) nounwind {
; RV64I-LABEL: lwu:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lwu a0, 4(a0)
; RV64I-NEXT:    sd a0, 0(a1)
; RV64I-NEXT:    ret
 %1 = getelementptr i32, ptr %a, i64 1
 %2 = load i32, ptr %1
 %3 = zext i32 %2 to i64
 store i64 %3, ptr %b
 ret void
}
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -riscv-disable-using-constant-pool-for-large-ints -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefixes=RV64I,RV64-NOPOOL
; RUN: llc -mtriple=riscv64 -verify-machineinstrs < %s \
```

```
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefixes=RV64I,RV64I-POOL
; RUN: llc -mtriple=riscv64 -riscv-disable-using-constant-pool-for-large-ints -mattr=+zba \
; RUN:   -riscv-experimental-rv64-legal-i32 -verify-machineinstrs < %s | FileCheck %s -check-prefix=RV64IZBA
; RUN: llc -mtriple=riscv64 -riscv-disable-using-constant-pool-for-large-ints -mattr=+zbb \
; RUN:   -riscv-experimental-rv64-legal-i32 -verify-machineinstrs < %s | FileCheck %s -check-prefix=RV64IZBB
; RUN: llc -mtriple=riscv64 -riscv-disable-using-constant-pool-for-large-ints -mattr=+zbs \
; RUN:   -riscv-experimental-rv64-legal-i32 -verify-machineinstrs < %s | FileCheck
 %s -check-prefix=RV64IZBS
; RUN: llc -mtriple=riscv64 -riscv-disable-using-constant-pool-for-large-ints -mattr=+xtheadbb \
; RUN:   -riscv-experimental-rv64-legal-i32 -verify-machineinstrs < %s | FileCheck %s -check-
prefix=RV64IXTHEADBB

; Materializing constants

; TODO: It would be preferable if anyext constant returns were sign rather
; than zero extended. See PR39092. For now, mark returns as explicitly signext
; (this matches what Clang would generate for equivalent C/C++ anyway).

define signext i32 @zero() nounwind {
; RV64I-LABEL: zero:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, 0
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: zero:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, 0
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: zero:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, 0
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: zero:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a0, 0
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: zero:
; RV64IXTHEADBB:       # %bb.0:
;
 RV64IXTHEADBB-NEXT:    li a0, 0
; RV64IXTHEADBB-NEXT:    ret
 ret i32 0
}

define signext i32 @pos_small() nounwind {
```

```
; RV64I-LABEL: pos_small:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, 2047
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: pos_small:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, 2047
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: pos_small:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, 2047
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: pos_small:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a0, 2047
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: pos_small:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, 2047
; RV64IXTHEADBB-NEXT:    ret
 ret i32 2047
}

define signext i32 @neg_small() nounwind {
; RV64I-LABEL: neg_small:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, -2048
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: neg_small:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, -2048
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL:
 neg_small:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, -2048
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: neg_small:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a0, -2048
; RV64IZBS-NEXT:    ret
```

```
;
; RV64IXTHEADBB-LABEL: neg_small:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, -2048
; RV64IXTHEADBB-NEXT:    ret
 ret i32 -2048
}

define signext i32 @pos_i32() nounwind {
; RV64I-LABEL: pos_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 423811
; RV64I-NEXT:    addiw a0, a0, -1297
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: pos_i32:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 423811
; RV64IZBA-NEXT:    addiw a0, a0, -1297
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: pos_i32:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 423811
; RV64IZBB-NEXT:    addiw a0, a0, -1297
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: pos_i32:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 423811
; RV64IZBS-NEXT:    addiw a0, a0, -1297
; RV64IZBS-NEXT:
    ret
;
; RV64IXTHEADBB-LABEL: pos_i32:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 423811
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1297
; RV64IXTHEADBB-NEXT:    ret
 ret i32 1735928559
}

define signext i32 @neg_i32() nounwind {
; RV64I-LABEL: neg_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 912092
; RV64I-NEXT:    addiw a0, a0, -273
; RV64I-NEXT:    ret
```

```
;
; RV64IZBA-LABEL: neg_i32:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 912092
; RV64IZBA-NEXT:    addiw a0, a0, -273
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: neg_i32:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 912092
; RV64IZBB-NEXT:    addiw a0, a0, -273
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: neg_i32:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 912092
; RV64IZBS-NEXT:    addiw a0, a0, -273
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: neg_i32:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 912092
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -273
;
 RV64IXTHEADBB-NEXT:    ret
 ret i32 -559038737
}

define signext i32 @pos_i32_hi20_only() nounwind {
; RV64I-LABEL: pos_i32_hi20_only:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 16
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: pos_i32_hi20_only:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 16
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: pos_i32_hi20_only:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 16
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: pos_i32_hi20_only:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 16
; RV64IZBS-NEXT:    ret
```

```
;
; RV64IXTHEADBB-LABEL: pos_i32_hi20_only:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 16
; RV64IXTHEADBB-NEXT:    ret
 ret i32 65536 ; 0x10000
}

define signext i32 @neg_i32_hi20_only() nounwind {
; RV64I-LABEL: neg_i32_hi20_only:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 1048560
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: neg_i32_hi20_only:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0,
 1048560
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: neg_i32_hi20_only:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 1048560
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: neg_i32_hi20_only:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 1048560
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: neg_i32_hi20_only:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 1048560
; RV64IXTHEADBB-NEXT:    ret
 ret i32 -65536 ; -0x10000
}

; This can be materialized with ADDI+SLLI, improving compressibility.

define signext i32 @imm_left_shifted_addi() nounwind {
; RV64I-LABEL: imm_left_shifted_addi:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 32
; RV64I-NEXT:    addiw a0, a0, -64
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_left_shifted_addi:
; RV64IZBA:       # %bb.0:
```

```
; RV64IZBA-NEXT:    lui a0, 32
; RV64IZBA-NEXT:    addiw a0, a0, -64
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_left_shifted_addi:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 32
;
 RV64IZBB-NEXT:    addiw a0, a0, -64
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_left_shifted_addi:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 32
; RV64IZBS-NEXT:    addiw a0, a0, -64
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_left_shifted_addi:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 32
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -64
; RV64IXTHEADBB-NEXT:    ret
 ret i32 131008 ; 0x1FFC0
}

; This can be materialized with ADDI+SRLI, improving compressibility.

define signext i32 @imm_right_shifted_addi() nounwind {
; RV64I-LABEL: imm_right_shifted_addi:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 524288
; RV64I-NEXT:    addiw a0, a0, -1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_right_shifted_addi:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 524288
; RV64IZBA-NEXT:    addiw a0, a0, -1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_right_shifted_addi:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 524288
; RV64IZBB-NEXT:
    addiw a0, a0, -1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_right_shifted_addi:
```

```
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 524288
; RV64IZBS-NEXT:    addiw a0, a0, -1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_right_shifted_addi:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 524288
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1
; RV64IXTHEADBB-NEXT:    ret
 ret i32 2147483647 ; 0x7FFFFFFF
}

; This can be materialized with LUI+SRLI, improving compressibility.

define signext i32 @imm_right_shifted_lui() nounwind {
; RV64I-LABEL: imm_right_shifted_lui:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 56
; RV64I-NEXT:    addiw a0, a0, 580
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_right_shifted_lui:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 56
; RV64IZBA-NEXT:    addiw a0, a0, 580
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_right_shifted_lui:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 56
; RV64IZBB-NEXT:
    addiw a0, a0, 580
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_right_shifted_lui:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 56
; RV64IZBS-NEXT:    addiw a0, a0, 580
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_right_shifted_lui:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 56
; RV64IXTHEADBB-NEXT:    addiw a0, a0, 580
; RV64IXTHEADBB-NEXT:    ret
 ret i32 229956 ; 0x38244
}
```

```
define i64 @imm64_1() nounwind {
; RV64I-LABEL: imm64_1:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, 1
; RV64I-NEXT:    slli a0, a0, 31
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm64_1:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, 1
; RV64IZBA-NEXT:    slli a0, a0, 31
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm64_1:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, 1
; RV64IZBB-NEXT:    slli a0, a0, 31
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm64_1:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    bseti a0, zero, 31
; RV64IZBS-NEXT:    ret
;
;
 RV64IXTHEADBB-LABEL: imm64_1:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, 1
; RV64IXTHEADBB-NEXT:    slli a0, a0, 31
; RV64IXTHEADBB-NEXT:    ret
 ret i64 2147483648 ; 0x8000_0000
}

define i64 @imm64_2() nounwind {
; RV64I-LABEL: imm64_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, -1
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm64_2:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, -1
; RV64IZBA-NEXT:    srli a0, a0, 32
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm64_2:
```

```
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, -1
; RV64IZBB-NEXT:    srli a0, a0, 32
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm64_2:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a0, -1
; RV64IZBS-NEXT:    srli a0, a0, 32
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm64_2:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, -1
; RV64IXTHEADBB-NEXT:    srli a0, a0, 32
; RV64IXTHEADBB-NEXT:    ret
 ret i64 4294967295 ;
 0xFFFF_FFFF
}

define i64 @imm64_3() nounwind {
; RV64I-LABEL: imm64_3:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, 1
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm64_3:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, 1
; RV64IZBA-NEXT:    slli a0, a0, 32
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm64_3:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, 1
; RV64IZBB-NEXT:    slli a0, a0, 32
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm64_3:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    bseti a0, zero, 32
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm64_3:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, 1
; RV64IXTHEADBB-NEXT:    slli a0, a0, 32
```

```
; RV64IXTHEADBB-NEXT:    ret
 ret i64 4294967296 ; 0x1_0000_0000
}

define i64 @imm64_4() nounwind {
; RV64I-LABEL: imm64_4:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, -1
; RV64I-NEXT:    slli a0, a0, 63
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm64_4:
; RV64IZBA:
    # %bb.0:
; RV64IZBA-NEXT:    li a0, -1
; RV64IZBA-NEXT:    slli a0, a0, 63
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm64_4:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, -1
; RV64IZBB-NEXT:    slli a0, a0, 63
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm64_4:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    bseti a0, zero, 63
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm64_4:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, -1
; RV64IXTHEADBB-NEXT:    slli a0, a0, 63
; RV64IXTHEADBB-NEXT:    ret
 ret i64 9223372036854775808 ; 0x8000_0000_0000_0000
}

define i64 @imm64_5() nounwind {
; RV64I-LABEL: imm64_5:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, -1
; RV64I-NEXT:    slli a0, a0, 63
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm64_5:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, -1
; RV64IZBA-NEXT:    slli a0, a0, 63
```

```
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm64_5:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, -1
; RV64IZBB-NEXT:
    slli a0, a0, 63
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm64_5:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    bseti a0, zero, 63
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm64_5:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, -1
; RV64IXTHEADBB-NEXT:    slli a0, a0, 63
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -9223372036854775808 ; 0x8000_0000_0000_0000
}

define i64 @imm64_6() nounwind {
; RV64I-LABEL: imm64_6:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 9321
; RV64I-NEXT:    addi a0, a0, -1329
; RV64I-NEXT:    slli a0, a0, 35
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm64_6:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 9321
; RV64IZBA-NEXT:    addi a0, a0, -1329
; RV64IZBA-NEXT:    slli a0, a0, 35
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm64_6:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 9321
; RV64IZBB-NEXT:    addi a0, a0, -1329
; RV64IZBB-NEXT:    slli a0, a0, 35
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm64_6:
;
 RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 9321
```

```
; RV64IZBS-NEXT:    addi a0, a0, -1329
; RV64IZBS-NEXT:    slli a0, a0, 35
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm64_6:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 9321
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1329
; RV64IXTHEADBB-NEXT:    slli a0, a0, 35
; RV64IXTHEADBB-NEXT:    ret
 ret i64 1311768464867721216 ; 0x1234_5678_0000_0000
}

define i64 @imm64_7() nounwind {
; RV64I-LABEL: imm64_7:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, 7
; RV64I-NEXT:    slli a0, a0, 36
; RV64I-NEXT:    addi a0, a0, 11
; RV64I-NEXT:    slli a0, a0, 24
; RV64I-NEXT:    addi a0, a0, 15
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm64_7:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, 7
; RV64IZBA-NEXT:    slli a0, a0, 36
; RV64IZBA-NEXT:    addi a0, a0, 11
; RV64IZBA-NEXT:    slli a0, a0, 24
; RV64IZBA-NEXT:    addi a0, a0, 15
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm64_7:
; RV64IZBB:       #
 %bb.0:
; RV64IZBB-NEXT:    li a0, 7
; RV64IZBB-NEXT:    slli a0, a0, 36
; RV64IZBB-NEXT:    addi a0, a0, 11
; RV64IZBB-NEXT:    slli a0, a0, 24
; RV64IZBB-NEXT:    addi a0, a0, 15
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm64_7:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a0, 7
; RV64IZBS-NEXT:    slli a0, a0, 36
; RV64IZBS-NEXT:    addi a0, a0, 11
; RV64IZBS-NEXT:    slli a0, a0, 24
```

```
; RV64IZBS-NEXT:    addi a0, a0, 15
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm64_7:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, 7
; RV64IXTHEADBB-NEXT:    slli a0, a0, 36
; RV64IXTHEADBB-NEXT:    addi a0, a0, 11
; RV64IXTHEADBB-NEXT:    slli a0, a0, 24
; RV64IXTHEADBB-NEXT:    addi a0, a0, 15
; RV64IXTHEADBB-NEXT:    ret
 ret i64 8070450532432478223 ; 0x7000_0000_0B00_000F
}

; TODO: it can be preferable to put constants that are expensive to materialise
; into the constant pool, especially for -Os.
define i64 @imm64_8() nounwind {
; RV64-NOPOOL-LABEL: imm64_8:
; RV64-NOPOOL:
      # %bb.0:
; RV64-NOPOOL-NEXT:    lui a0, 583
; RV64-NOPOOL-NEXT:    addiw a0, a0, -1875
; RV64-NOPOOL-NEXT:    slli a0, a0, 14
; RV64-NOPOOL-NEXT:    addi a0, a0, -947
; RV64-NOPOOL-NEXT:    slli a0, a0, 12
; RV64-NOPOOL-NEXT:    addi a0, a0, 1511
; RV64-NOPOOL-NEXT:    slli a0, a0, 13
; RV64-NOPOOL-NEXT:    addi a0, a0, -272
; RV64-NOPOOL-NEXT:    ret
;
; RV64I-POOL-LABEL: imm64_8:
; RV64I-POOL:       # %bb.0:
; RV64I-POOL-NEXT:    lui a0, %hi(.LCPI17_0)
; RV64I-POOL-NEXT:    ld a0, %lo(.LCPI17_0)(a0)
; RV64I-POOL-NEXT:    ret
;
; RV64IZBA-LABEL: imm64_8:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 596523
; RV64IZBA-NEXT:    addi a0, a0, 965
; RV64IZBA-NEXT:    slli.uw a0, a0, 13
; RV64IZBA-NEXT:    addi a0, a0, -1347
; RV64IZBA-NEXT:    slli a0, a0, 12
; RV64IZBA-NEXT:    addi a0, a0, -529
; RV64IZBA-NEXT:    slli a0, a0, 4
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm64_8:
```

```
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 583
; RV64IZBB-NEXT:    addiw
 a0, a0, -1875
; RV64IZBB-NEXT:    slli a0, a0, 14
; RV64IZBB-NEXT:    addi a0, a0, -947
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, 1511
; RV64IZBB-NEXT:    slli a0, a0, 13
; RV64IZBB-NEXT:    addi a0, a0, -272
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm64_8:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 583
; RV64IZBS-NEXT:    addiw a0, a0, -1875
; RV64IZBS-NEXT:    slli a0, a0, 14
; RV64IZBS-NEXT:    addi a0, a0, -947
; RV64IZBS-NEXT:    slli a0, a0, 12
; RV64IZBS-NEXT:    addi a0, a0, 1511
; RV64IZBS-NEXT:    slli a0, a0, 13
; RV64IZBS-NEXT:    addi a0, a0, -272
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm64_8:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 583
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1875
; RV64IXTHEADBB-NEXT:    slli a0, a0, 14
; RV64IXTHEADBB-NEXT:    addi a0, a0, -947
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    addi a0, a0, 1511
; RV64IXTHEADBB-NEXT:    slli a0, a0, 13
; RV64IXTHEADBB-NEXT:
   addi a0, a0, -272
; RV64IXTHEADBB-NEXT:    ret
 ret i64 1311768467463790320 ; 0x1234_5678_9ABC_DEF0
}

define i64 @imm64_9() nounwind {
; RV64I-LABEL: imm64_9:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, -1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm64_9:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, -1
```

```
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm64_9:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, -1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm64_9:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a0, -1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm64_9:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, -1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -1
}

; Various cases where extraneous ADDIs can be inserted where a (left shifted)
; LUI suffices.

define i64 @imm_left_shifted_lui_1() nounwind {
; RV64I-LABEL: imm_left_shifted_lui_1:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 262145
; RV64I-NEXT:    slli a0, a0, 1
;
 RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_left_shifted_lui_1:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 262145
; RV64IZBA-NEXT:    slli a0, a0, 1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_left_shifted_lui_1:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 262145
; RV64IZBB-NEXT:    slli a0, a0, 1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_left_shifted_lui_1:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 262145
; RV64IZBS-NEXT:    slli a0, a0, 1
; RV64IZBS-NEXT:    ret
;
```

```
; RV64IXTHEADBB-LABEL: imm_left_shifted_lui_1:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 262145
; RV64IXTHEADBB-NEXT:    slli a0, a0, 1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 2147491840 ; 0x8000_2000
}

define i64 @imm_left_shifted_lui_2() nounwind {
; RV64I-LABEL: imm_left_shifted_lui_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 262145
; RV64I-NEXT:    slli a0, a0, 2
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_left_shifted_lui_2:
; RV64IZBA:
 # %bb.0:
; RV64IZBA-NEXT:    lui a0, 262145
; RV64IZBA-NEXT:    slli a0, a0, 2
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_left_shifted_lui_2:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 262145
; RV64IZBB-NEXT:    slli a0, a0, 2
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_left_shifted_lui_2:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 262145
; RV64IZBS-NEXT:    slli a0, a0, 2
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_left_shifted_lui_2:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 262145
; RV64IXTHEADBB-NEXT:    slli a0, a0, 2
; RV64IXTHEADBB-NEXT:    ret
 ret i64 4294983680 ; 0x1_0000_4000
}

define i64 @imm_left_shifted_lui_3() nounwind {
; RV64I-LABEL: imm_left_shifted_lui_3:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 4097
; RV64I-NEXT:    slli a0, a0, 20
; RV64I-NEXT:    ret
```

```
;
; RV64IZBA-LABEL: imm_left_shifted_lui_3:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 4097
; RV64IZBA-NEXT:    slli a0, a0, 20
;
 RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_left_shifted_lui_3:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 4097
; RV64IZBB-NEXT:    slli a0, a0, 20
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_left_shifted_lui_3:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 4097
; RV64IZBS-NEXT:    slli a0, a0, 20
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_left_shifted_lui_3:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 4097
; RV64IXTHEADBB-NEXT:    slli a0, a0, 20
; RV64IXTHEADBB-NEXT:    ret
 ret i64 17596481011712 ; 0x1001_0000_0000
}

; Various cases where extraneous ADDIs can be inserted where a (right shifted)
; LUI suffices, or where multiple ADDIs can be used instead of a single LUI.

define i64 @imm_right_shifted_lui_1() nounwind {
; RV64I-LABEL: imm_right_shifted_lui_1:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 983056
; RV64I-NEXT:    srli a0, a0, 16
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_right_shifted_lui_1:
; RV64IZBA:
     # %bb.0:
; RV64IZBA-NEXT:    lui a0, 983056
; RV64IZBA-NEXT:    srli a0, a0, 16
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_right_shifted_lui_1:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 983056
```

```
; RV64IZBB-NEXT:    srli a0, a0, 16
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_right_shifted_lui_1:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 983056
; RV64IZBS-NEXT:    srli a0, a0, 16
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_right_shifted_lui_1:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 983056
; RV64IXTHEADBB-NEXT:    srli a0, a0, 16
; RV64IXTHEADBB-NEXT:    ret
 ret i64 281474976706561 ; 0xFFFF_FFFF_F001
}

define i64 @imm_right_shifted_lui_2() nounwind {
; RV64I-LABEL: imm_right_shifted_lui_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 1044481
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    srli a0, a0, 24
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_right_shifted_lui_2:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:
   lui a0, 1044481
; RV64IZBA-NEXT:    slli a0, a0, 12
; RV64IZBA-NEXT:    srli a0, a0, 24
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_right_shifted_lui_2:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 1044481
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    srli a0, a0, 24
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_right_shifted_lui_2:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 1044481
; RV64IZBS-NEXT:    slli a0, a0, 12
; RV64IZBS-NEXT:    srli a0, a0, 24
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_right_shifted_lui_2:
```

```
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 1044481
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    srli a0, a0, 24
; RV64IXTHEADBB-NEXT:    ret
 ret i64 1099511623681 ; 0xFF_FFFF_F001
}

; We can materialize the upper bits with a single (shifted) LUI, but that option
; can be missed due to the lower bits, which aren't just 1s or just 0s.

define i64 @imm_decoupled_lui_addi() nounwind
 {
; RV64I-LABEL: imm_decoupled_lui_addi:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 4097
; RV64I-NEXT:    slli a0, a0, 20
; RV64I-NEXT:    addi a0, a0, -3
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_decoupled_lui_addi:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 4097
; RV64IZBA-NEXT:    slli a0, a0, 20
; RV64IZBA-NEXT:    addi a0, a0, -3
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_decoupled_lui_addi:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 4097
; RV64IZBB-NEXT:    slli a0, a0, 20
; RV64IZBB-NEXT:    addi a0, a0, -3
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_decoupled_lui_addi:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 4097
; RV64IZBS-NEXT:    slli a0, a0, 20
; RV64IZBS-NEXT:    addi a0, a0, -3
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_decoupled_lui_addi:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 4097
; RV64IXTHEADBB-NEXT:    slli a0, a0, 20
; RV64IXTHEADBB-NEXT:    addi a0, a0, -3
; RV64IXTHEADBB-NEXT:
```

```
    ret
 ret i64 17596481011709 ; 0x1000_FFFF_FFFD
}

; This constant can be materialized for RV64 with LUI+SRLI+XORI.

define i64 @imm_end_xori_1() nounwind {
; RV64I-LABEL: imm_end_xori_1:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 983040
; RV64I-NEXT:    srli a0, a0, 3
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_end_xori_1:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 983040
; RV64IZBA-NEXT:    srli a0, a0, 3
; RV64IZBA-NEXT:    not a0, a0
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_end_xori_1:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 983040
; RV64IZBB-NEXT:    srli a0, a0, 3
; RV64IZBB-NEXT:    not a0, a0
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_end_xori_1:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 983040
; RV64IZBS-NEXT:    srli a0, a0, 3
; RV64IZBS-NEXT:    not a0, a0
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_end_xori_1:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:
  lui a0, 983040
; RV64IXTHEADBB-NEXT:    srli a0, a0, 3
; RV64IXTHEADBB-NEXT:    not a0, a0
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -2305843009180139521 ; 0xE000_0000_01FF_FFFF
}

; This constant can be materialized for RV64 with ADDI+SLLI+ADDI+ADDI.

define i64 @imm_end_2addi_1() nounwind {
```

```
; RV64I-LABEL: imm_end_2addi_1:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, -2047
; RV64I-NEXT:    slli a0, a0, 39
; RV64I-NEXT:    addi a0, a0, -2048
; RV64I-NEXT:    addi a0, a0, -1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_end_2addi_1:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, -2047
; RV64IZBA-NEXT:    slli a0, a0, 39
; RV64IZBA-NEXT:    addi a0, a0, -2048
; RV64IZBA-NEXT:    addi a0, a0, -1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_end_2addi_1:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, -2047
; RV64IZBB-NEXT:    slli a0, a0, 39
; RV64IZBB-NEXT:    addi a0, a0, -2048
; RV64IZBB-NEXT:    addi a0, a0, -1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_end_2addi_1:
;
 RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a0, -2047
; RV64IZBS-NEXT:    slli a0, a0, 39
; RV64IZBS-NEXT:    addi a0, a0, -2048
; RV64IZBS-NEXT:    addi a0, a0, -1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_end_2addi_1:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, -2047
; RV64IXTHEADBB-NEXT:    slli a0, a0, 39
; RV64IXTHEADBB-NEXT:    addi a0, a0, -2048
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -1125350151030785 ; 0xFFFC_007F_FFFF_F7FF
}

; This constant can be more efficiently materialized for RV64 if we use two
; registers instead of one.

define i64 @imm_2reg_1() nounwind {
; RV64I-LABEL: imm_2reg_1:
```

```
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 74565
; RV64I-NEXT:    addiw a0, a0, 1656
; RV64I-NEXT:    slli a1, a0, 57
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_2reg_1:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 74565
; RV64IZBA-NEXT:    addiw a0, a0, 1656
; RV64IZBA-NEXT:
   slli a1, a0, 57
; RV64IZBA-NEXT:    add a0, a0, a1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_2reg_1:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 74565
; RV64IZBB-NEXT:    addiw a0, a0, 1656
; RV64IZBB-NEXT:    slli a1, a0, 57
; RV64IZBB-NEXT:    add a0, a0, a1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_2reg_1:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 74565
; RV64IZBS-NEXT:    addiw a0, a0, 1656
; RV64IZBS-NEXT:    slli a1, a0, 57
; RV64IZBS-NEXT:    add a0, a0, a1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_2reg_1:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 74565
; RV64IXTHEADBB-NEXT:    addiw a0, a0, 1656
; RV64IXTHEADBB-NEXT:    slli a1, a0, 57
; RV64IXTHEADBB-NEXT:    add a0, a0, a1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -1152921504301427080 ; 0xF000_0000_1234_5678
}

; FIXME: This should use a single ADDI for the immediate.
define void @imm_store_i16_neg1(ptr %p) nounwind {
; RV64I-LABEL: imm_store_i16_neg1:
;
 RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, -1
```

```
; RV64I-NEXT:    sh a1, 0(a0)
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_store_i16_neg1:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a1, -1
; RV64IZBA-NEXT:    sh a1, 0(a0)
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_store_i16_neg1:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a1, -1
; RV64IZBB-NEXT:    sh a1, 0(a0)
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_store_i16_neg1:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a1, -1
; RV64IZBS-NEXT:    sh a1, 0(a0)
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_store_i16_neg1:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a1, -1
; RV64IXTHEADBB-NEXT:    sh a1, 0(a0)
; RV64IXTHEADBB-NEXT:    ret
 store i16 -1, ptr %p
 ret void
}

; FIXME: This should use a single ADDI for the immediate.
define void @imm_store_i32_neg1(ptr %p) nounwind {
; RV64I-LABEL: imm_store_i32_neg1:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, -1
; RV64I-NEXT:
  sw a1, 0(a0)
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_store_i32_neg1:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a1, -1
; RV64IZBA-NEXT:    sw a1, 0(a0)
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_store_i32_neg1:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a1, -1
```

```
; RV64IZBB-NEXT:    sw a1, 0(a0)
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_store_i32_neg1:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a1, -1
; RV64IZBS-NEXT:    sw a1, 0(a0)
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_store_i32_neg1:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a1, -1
; RV64IXTHEADBB-NEXT:    sw a1, 0(a0)
; RV64IXTHEADBB-NEXT:    ret
 store i32 -1, ptr %p
 ret void
}

define i64 @imm_5372288229() {
; RV64I-LABEL: imm_5372288229:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 160
; RV64I-NEXT:    addiw a0, a0, 437
; RV64I-NEXT:    slli a0, a0, 13
; RV64I-NEXT:    addi a0, a0, -795
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_5372288229:
; RV64IZBA:
      # %bb.0:
; RV64IZBA-NEXT:    lui a0, 655797
; RV64IZBA-NEXT:    slli.uw a0, a0, 1
; RV64IZBA-NEXT:    addi a0, a0, -795
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_5372288229:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 160
; RV64IZBB-NEXT:    addiw a0, a0, 437
; RV64IZBB-NEXT:    slli a0, a0, 13
; RV64IZBB-NEXT:    addi a0, a0, -795
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_5372288229:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 263018
; RV64IZBS-NEXT:    addiw a0, a0, -795
; RV64IZBS-NEXT:    bseti a0, a0, 32
```

```
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_5372288229:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 160
; RV64IXTHEADBB-NEXT:    addiw a0, a0, 437
; RV64IXTHEADBB-NEXT:    slli a0, a0, 13
; RV64IXTHEADBB-NEXT:    addi a0, a0, -795
; RV64IXTHEADBB-NEXT:    ret
 ret i64 5372288229
}

define i64 @imm_neg_5372288229() {
; RV64I-LABEL: imm_neg_5372288229:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 1048416
; RV64I-NEXT:
    addiw a0, a0, -437
; RV64I-NEXT:    slli a0, a0, 13
; RV64I-NEXT:    addi a0, a0, 795
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_5372288229:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 611378
; RV64IZBA-NEXT:    addiw a0, a0, 265
; RV64IZBA-NEXT:    sh1add a0, a0, a0
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_neg_5372288229:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 1048416
; RV64IZBB-NEXT:    addiw a0, a0, -437
; RV64IZBB-NEXT:    slli a0, a0, 13
; RV64IZBB-NEXT:    addi a0, a0, 795
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_5372288229:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 785558
; RV64IZBS-NEXT:    addiw a0, a0, 795
; RV64IZBS-NEXT:    bclri a0, a0, 32
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_neg_5372288229:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 1048416
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -437
```

```
; RV64IXTHEADBB-NEXT:    slli a0, a0, 13
; RV64IXTHEADBB-NEXT:    addi a0, a0,
 795
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -5372288229
}

define i64 @imm_8953813715() {
; RV64I-LABEL: imm_8953813715:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 267
; RV64I-NEXT:    addiw a0, a0, -637
; RV64I-NEXT:    slli a0, a0, 13
; RV64I-NEXT:    addi a0, a0, -1325
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_8953813715:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 437198
; RV64IZBA-NEXT:    addiw a0, a0, -265
; RV64IZBA-NEXT:    sh2add a0, a0, a0
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_8953813715:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 267
; RV64IZBB-NEXT:    addiw a0, a0, -637
; RV64IZBB-NEXT:    slli a0, a0, 13
; RV64IZBB-NEXT:    addi a0, a0, -1325
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_8953813715:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 88838
; RV64IZBS-NEXT:    addiw a0, a0, -1325
; RV64IZBS-NEXT:    bseti a0, a0, 33
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_8953813715:
; RV64IXTHEADBB:       # %bb.0:
;
 RV64IXTHEADBB-NEXT:    lui a0, 267
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -637
; RV64IXTHEADBB-NEXT:    slli a0, a0, 13
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1325
; RV64IXTHEADBB-NEXT:    ret
 ret i64 8953813715
}
```

```
define i64 @imm_neg_8953813715() {
; RV64I-LABEL: imm_neg_8953813715:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 1048309
; RV64I-NEXT:    addiw a0, a0, 637
; RV64I-NEXT:    slli a0, a0, 13
; RV64I-NEXT:    addi a0, a0, 1325
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_8953813715:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 611378
; RV64IZBA-NEXT:    addiw a0, a0, 265
; RV64IZBA-NEXT:    sh2add a0, a0, a0
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_neg_8953813715:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 1048309
; RV64IZBB-NEXT:    addiw a0, a0, 637
; RV64IZBB-NEXT:    slli a0, a0, 13
; RV64IZBB-NEXT:    addi a0, a0, 1325
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_8953813715:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:
   lui a0, 959738
; RV64IZBS-NEXT:    addiw a0, a0, 1325
; RV64IZBS-NEXT:    bclri a0, a0, 33
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_neg_8953813715:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 1048309
; RV64IXTHEADBB-NEXT:    addiw a0, a0, 637
; RV64IXTHEADBB-NEXT:    slli a0, a0, 13
; RV64IXTHEADBB-NEXT:    addi a0, a0, 1325
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -8953813715
}

define i64 @imm_16116864687() {
; RV64I-LABEL: imm_16116864687:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 961
; RV64I-NEXT:    addiw a0, a0, -1475
```

```
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    addi a0, a0, 1711
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_16116864687:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 437198
; RV64IZBA-NEXT:    addiw a0, a0, -265
; RV64IZBA-NEXT:    sh3add a0, a0, a0
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_16116864687:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 961
; RV64IZBB-NEXT:    addiw a0, a0, -1475
; RV64IZBB-NEXT:
   slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, 1711
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_16116864687:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 961
; RV64IZBS-NEXT:    addiw a0, a0, -1475
; RV64IZBS-NEXT:    slli a0, a0, 12
; RV64IZBS-NEXT:    addi a0, a0, 1711
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_16116864687:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 961
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1475
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    addi a0, a0, 1711
; RV64IXTHEADBB-NEXT:    ret
 ret i64 16116864687
}

define i64 @imm_neg_16116864687() {
; RV64I-LABEL: imm_neg_16116864687:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 1047615
; RV64I-NEXT:    addiw a0, a0, 1475
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    addi a0, a0, -1711
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_16116864687:
```

```
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 611378
; RV64IZBA-NEXT:
 addiw a0, a0, 265
; RV64IZBA-NEXT:    sh3add a0, a0, a0
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_neg_16116864687:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 1047615
; RV64IZBB-NEXT:    addiw a0, a0, 1475
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, -1711
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_16116864687:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 1047615
; RV64IZBS-NEXT:    addiw a0, a0, 1475
; RV64IZBS-NEXT:    slli a0, a0, 12
; RV64IZBS-NEXT:    addi a0, a0, -1711
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_neg_16116864687:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 1047615
; RV64IXTHEADBB-NEXT:    addiw a0, a0, 1475
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1711
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -16116864687
}

define i64 @imm_2344336315() {
; RV64I-LABEL: imm_2344336315:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 143087
; RV64I-NEXT:
   slli a0, a0, 2
; RV64I-NEXT:    addi a0, a0, -1093
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_2344336315:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 143087
; RV64IZBA-NEXT:    slli a0, a0, 2
; RV64IZBA-NEXT:    addi a0, a0, -1093
; RV64IZBA-NEXT:    ret
```

```
;
; RV64IZBB-LABEL: imm_2344336315:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 143087
; RV64IZBB-NEXT:    slli a0, a0, 2
; RV64IZBB-NEXT:    addi a0, a0, -1093
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_2344336315:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 143087
; RV64IZBS-NEXT:    slli a0, a0, 2
; RV64IZBS-NEXT:    addi a0, a0, -1093
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_2344336315:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 143087
; RV64IXTHEADBB-NEXT:    slli a0, a0, 2
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1093
; RV64IXTHEADBB-NEXT:    ret
 ret i64 2344336315 ; 0x8bbbbbbb
}

define i64 @imm_70370820078523() {
; RV64-NOPOOL-LABEL: imm_70370820078523:
;
 RV64-NOPOOL:       # %bb.0:
; RV64-NOPOOL-NEXT:    lui a0, 256
; RV64-NOPOOL-NEXT:    addiw a0, a0, 31
; RV64-NOPOOL-NEXT:    slli a0, a0, 12
; RV64-NOPOOL-NEXT:    addi a0, a0, -273
; RV64-NOPOOL-NEXT:    slli a0, a0, 14
; RV64-NOPOOL-NEXT:    addi a0, a0, -1093
; RV64-NOPOOL-NEXT:    ret
;
; RV64I-POOL-LABEL: imm_70370820078523:
; RV64I-POOL:       # %bb.0:
; RV64I-POOL-NEXT:    lui a0, %hi(.LCPI37_0)
; RV64I-POOL-NEXT:    ld a0, %lo(.LCPI37_0)(a0)
; RV64I-POOL-NEXT:    ret
;
; RV64IZBA-LABEL: imm_70370820078523:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 256
; RV64IZBA-NEXT:    addiw a0, a0, 31
; RV64IZBA-NEXT:    slli a0, a0, 12
; RV64IZBA-NEXT:    addi a0, a0, -273
```

```
; RV64IZBA-NEXT:    slli a0, a0, 14
; RV64IZBA-NEXT:    addi a0, a0, -1093
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_70370820078523:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 256
; RV64IZBB-NEXT:    addiw a0, a0, 31
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, -273
;
 RV64IZBB-NEXT:    slli a0, a0, 14
; RV64IZBB-NEXT:    addi a0, a0, -1093
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_70370820078523:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 506812
; RV64IZBS-NEXT:    addiw a0, a0, -1093
; RV64IZBS-NEXT:    bseti a0, a0, 46
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_70370820078523:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 256
; RV64IXTHEADBB-NEXT:    addiw a0, a0, 31
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    addi a0, a0, -273
; RV64IXTHEADBB-NEXT:    slli a0, a0, 14
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1093
; RV64IXTHEADBB-NEXT:    ret
 ret i64 70370820078523 ; 0x40007bbbbbbb
}

define i64 @imm_neg_9223372034778874949() {
; RV64I-LABEL: imm_neg_9223372034778874949:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 506812
; RV64I-NEXT:    addiw a0, a0, -1093
; RV64I-NEXT:    slli a1, a0, 63
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_9223372034778874949:
;
 RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 506812
; RV64IZBA-NEXT:    addiw a0, a0, -1093
```

```
; RV64IZBA-NEXT:    slli a1, a0, 63
; RV64IZBA-NEXT:    add a0, a0, a1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_neg_9223372034778874949:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 506812
; RV64IZBB-NEXT:    addiw a0, a0, -1093
; RV64IZBB-NEXT:    slli a1, a0, 63
; RV64IZBB-NEXT:    add a0, a0, a1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_9223372034778874949:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 506812
; RV64IZBS-NEXT:    addiw a0, a0, -1093
; RV64IZBS-NEXT:    bseti a0, a0, 63
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_neg_9223372034778874949:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 506812
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1093
; RV64IXTHEADBB-NEXT:    slli a1, a0, 63
; RV64IXTHEADBB-NEXT:    add a0, a0, a1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -9223372034778874949 ; 0x800000007bbbbbbb
}

define
 i64 @imm_neg_9223301666034697285() {
; RV64-NOPOOL-LABEL: imm_neg_9223301666034697285:
; RV64-NOPOOL:       # %bb.0:
; RV64-NOPOOL-NEXT:    lui a0, 917505
; RV64-NOPOOL-NEXT:    slli a0, a0, 8
; RV64-NOPOOL-NEXT:    addi a0, a0, 31
; RV64-NOPOOL-NEXT:    slli a0, a0, 12
; RV64-NOPOOL-NEXT:    addi a0, a0, -273
; RV64-NOPOOL-NEXT:    slli a0, a0, 14
; RV64-NOPOOL-NEXT:    addi a0, a0, -1093
; RV64-NOPOOL-NEXT:    ret
;
; RV64I-POOL-LABEL: imm_neg_9223301666034697285:
; RV64I-POOL:       # %bb.0:
; RV64I-POOL-NEXT:    lui a0, %hi(.LCPI39_0)
; RV64I-POOL-NEXT:    ld a0, %lo(.LCPI39_0)(a0)
; RV64I-POOL-NEXT:    ret
;
```

```
; RV64IZBA-LABEL: imm_neg_9223301666034697285:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 917505
; RV64IZBA-NEXT:    slli a0, a0, 8
; RV64IZBA-NEXT:    addi a0, a0, 31
; RV64IZBA-NEXT:    slli a0, a0, 12
; RV64IZBA-NEXT:    addi a0, a0, -273
; RV64IZBA-NEXT:    slli a0, a0, 14
; RV64IZBA-NEXT:    addi a0, a0, -1093
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL:
 imm_neg_9223301666034697285:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 917505
; RV64IZBB-NEXT:    slli a0, a0, 8
; RV64IZBB-NEXT:    addi a0, a0, 31
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, -273
; RV64IZBB-NEXT:    slli a0, a0, 14
; RV64IZBB-NEXT:    addi a0, a0, -1093
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_9223301666034697285:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 506812
; RV64IZBS-NEXT:    addiw a0, a0, -1093
; RV64IZBS-NEXT:    bseti a0, a0, 46
; RV64IZBS-NEXT:    bseti a0, a0, 63
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_neg_9223301666034697285:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 917505
; RV64IXTHEADBB-NEXT:    slli a0, a0, 8
; RV64IXTHEADBB-NEXT:    addi a0, a0, 31
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    addi a0, a0, -273
; RV64IXTHEADBB-NEXT:    slli a0, a0, 14
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1093
; RV64IXTHEADBB-NEXT:    ret
  ret i64 -9223301666034697285 ; 0x800040007bbbbbbb
}

define i64 @imm_neg_2219066437() {
; RV64I-LABEL: imm_neg_2219066437:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 913135
```

```
; RV64I-NEXT:    slli a0, a0, 2
; RV64I-NEXT:    addi a0, a0, -1093
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_2219066437:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 913135
; RV64IZBA-NEXT:    slli a0, a0, 2
; RV64IZBA-NEXT:    addi a0, a0, -1093
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_neg_2219066437:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 913135
; RV64IZBB-NEXT:    slli a0, a0, 2
; RV64IZBB-NEXT:    addi a0, a0, -1093
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_2219066437:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 913135
; RV64IZBS-NEXT:    slli a0, a0, 2
; RV64IZBS-NEXT:    addi a0, a0, -1093
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_neg_2219066437:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 913135
; RV64IXTHEADBB-NEXT:
   slli a0, a0, 2
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1093
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -2219066437 ; 0xffffffff7bbbbbbb
}

define i64 @imm_neg_8798043653189() {
; RV64I-LABEL: imm_neg_8798043653189:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 917475
; RV64I-NEXT:    addiw a0, a0, -273
; RV64I-NEXT:    slli a0, a0, 14
; RV64I-NEXT:    addi a0, a0, -1093
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_8798043653189:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 917475
; RV64IZBA-NEXT:    addiw a0, a0, -273
```

```
; RV64IZBA-NEXT:    slli a0, a0, 14
; RV64IZBA-NEXT:    addi a0, a0, -1093
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_neg_8798043653189:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 917475
; RV64IZBB-NEXT:    addiw a0, a0, -273
; RV64IZBB-NEXT:    slli a0, a0, 14
; RV64IZBB-NEXT:    addi a0, a0, -1093
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_8798043653189:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 572348
; RV64IZBS-NEXT:
    addiw a0, a0, -1093
; RV64IZBS-NEXT:    bclri a0, a0, 43
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_neg_8798043653189:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 917475
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -273
; RV64IXTHEADBB-NEXT:    slli a0, a0, 14
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1093
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -8798043653189 ; 0xfffff7ff8bbbbbbb
}

define i64 @imm_9223372034904144827() {
; RV64I-LABEL: imm_9223372034904144827:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 572348
; RV64I-NEXT:    addiw a0, a0, -1093
; RV64I-NEXT:    slli a1, a0, 63
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_9223372034904144827:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 572348
; RV64IZBA-NEXT:    addiw a0, a0, -1093
; RV64IZBA-NEXT:    slli a1, a0, 63
; RV64IZBA-NEXT:    add a0, a0, a1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_9223372034904144827:
```

```
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:
   lui a0, 572348
; RV64IZBB-NEXT:    addiw a0, a0, -1093
; RV64IZBB-NEXT:    slli a1, a0, 63
; RV64IZBB-NEXT:    add a0, a0, a1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_9223372034904144827:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 572348
; RV64IZBS-NEXT:    addiw a0, a0, -1093
; RV64IZBS-NEXT:    bclri a0, a0, 63
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_9223372034904144827:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 572348
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1093
; RV64IXTHEADBB-NEXT:    slli a1, a0, 63
; RV64IXTHEADBB-NEXT:    add a0, a0, a1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 9223372034904144827 ; 0x7fffffff8bbbbbbb
}

define i64 @imm_neg_9223354442718100411() {
; RV64-NOPOOL-LABEL: imm_neg_9223354442718100411:
; RV64-NOPOOL:       # %bb.0:
; RV64-NOPOOL-NEXT:    lui a0, 524287
; RV64-NOPOOL-NEXT:    slli a0, a0, 6
; RV64-NOPOOL-NEXT:    addi a0, a0, -29
; RV64-NOPOOL-NEXT:    slli a0, a0, 12
; RV64-NOPOOL-NEXT:
   addi a0, a0, -273
; RV64-NOPOOL-NEXT:    slli a0, a0, 14
; RV64-NOPOOL-NEXT:    addi a0, a0, -1093
; RV64-NOPOOL-NEXT:    ret
;
; RV64I-POOL-LABEL: imm_neg_9223354442718100411:
; RV64I-POOL:       # %bb.0:
; RV64I-POOL-NEXT:    lui a0, %hi(.LCPI43_0)
; RV64I-POOL-NEXT:    ld a0, %lo(.LCPI43_0)(a0)
; RV64I-POOL-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_9223354442718100411:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 524287
; RV64IZBA-NEXT:    slli a0, a0, 6
```

```
; RV64IZBA-NEXT:    addi a0, a0, -29
; RV64IZBA-NEXT:    slli a0, a0, 12
; RV64IZBA-NEXT:    addi a0, a0, -273
; RV64IZBA-NEXT:    slli a0, a0, 14
; RV64IZBA-NEXT:    addi a0, a0, -1093
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_neg_9223354442718100411:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 524287
; RV64IZBB-NEXT:    slli a0, a0, 6
; RV64IZBB-NEXT:    addi a0, a0, -29
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, -273
; RV64IZBB-NEXT:    slli a0, a0, 14
; RV64IZBB-NEXT:
   addi a0, a0, -1093
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_9223354442718100411:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 572348
; RV64IZBS-NEXT:    addiw a0, a0, -1093
; RV64IZBS-NEXT:    bclri a0, a0, 44
; RV64IZBS-NEXT:    bclri a0, a0, 63
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_neg_9223354442718100411:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 524287
; RV64IXTHEADBB-NEXT:    slli a0, a0, 6
; RV64IXTHEADBB-NEXT:    addi a0, a0, -29
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    addi a0, a0, -273
; RV64IXTHEADBB-NEXT:    slli a0, a0, 14
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1093
; RV64IXTHEADBB-NEXT:    ret
 ret i64 9223354442718100411 ; 0x7fffefff8bbbbbbb
}

define i64 @imm_2863311530() {
; RV64I-LABEL: imm_2863311530:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 349525
; RV64I-NEXT:    addiw a0, a0, 1365
; RV64I-NEXT:    slli a0, a0, 1
; RV64I-NEXT:    ret
;
```

```
; RV64IZBA-LABEL: imm_2863311530:
; RV64IZBA:
      # %bb.0:
; RV64IZBA-NEXT:    lui a0, 349525
; RV64IZBA-NEXT:    addiw a0, a0, 1365
; RV64IZBA-NEXT:    slli a0, a0, 1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_2863311530:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 349525
; RV64IZBB-NEXT:    addiw a0, a0, 1365
; RV64IZBB-NEXT:    slli a0, a0, 1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_2863311530:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 349525
; RV64IZBS-NEXT:    addiw a0, a0, 1365
; RV64IZBS-NEXT:    slli a0, a0, 1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_2863311530:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 349525
; RV64IXTHEADBB-NEXT:    addiw a0, a0, 1365
; RV64IXTHEADBB-NEXT:    slli a0, a0, 1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 2863311530 ; #0xaaaaaaaa
}

define i64 @imm_neg_2863311530() {
; RV64I-LABEL: imm_neg_2863311530:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 699051
; RV64I-NEXT:    addiw a0, a0, -1365
; RV64I-NEXT:    slli a0,
 a0, 1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_2863311530:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 699051
; RV64IZBA-NEXT:    addiw a0, a0, -1365
; RV64IZBA-NEXT:    slli a0, a0, 1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_neg_2863311530:
```

```
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 699051
; RV64IZBB-NEXT:    addiw a0, a0, -1365
; RV64IZBB-NEXT:    slli a0, a0, 1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_2863311530:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 699051
; RV64IZBS-NEXT:    addiw a0, a0, -1365
; RV64IZBS-NEXT:    slli a0, a0, 1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_neg_2863311530:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 699051
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1365
; RV64IXTHEADBB-NEXT:    slli a0, a0, 1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -2863311530 ; #0xffffffff55555556
}

define i64 @imm_2147486378() {
; RV64I-LABEL: imm_2147486378:
; RV64I:       # %bb.0:
; RV64I-NEXT:
   li a0, 1
; RV64I-NEXT:    slli a0, a0, 31
; RV64I-NEXT:    addi a0, a0, 1365
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_2147486378:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, 1
; RV64IZBA-NEXT:    slli a0, a0, 31
; RV64IZBA-NEXT:    addi a0, a0, 1365
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_2147486378:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, 1
; RV64IZBB-NEXT:    slli a0, a0, 31
; RV64IZBB-NEXT:    addi a0, a0, 1365
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_2147486378:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a0, 1365
```

```
; RV64IZBS-NEXT:    bseti a0, a0, 31
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_2147486378:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, 1
; RV64IXTHEADBB-NEXT:    slli a0, a0, 31
; RV64IXTHEADBB-NEXT:    addi a0, a0, 1365
; RV64IXTHEADBB-NEXT:    ret
 ret i64 2147485013
}

define i64 @imm_neg_2147485013() {
; RV64I-LABEL: imm_neg_2147485013:
; RV64I:       # %bb.0:
; RV64I-NEXT:
 lui a0, 524288
; RV64I-NEXT:    addi a0, a0, -1365
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_2147485013:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 524288
; RV64IZBA-NEXT:    addi a0, a0, -1365
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_neg_2147485013:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 524288
; RV64IZBB-NEXT:    addi a0, a0, -1365
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_2147485013:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 524288
; RV64IZBS-NEXT:    addi a0, a0, -1365
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_neg_2147485013:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 524288
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1365
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -2147485013
}

define i64 @imm_12900924131259() {
; RV64I-LABEL: imm_12900924131259:
```

```
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 188
; RV64I-NEXT:    addiw a0, a0, -1093
; RV64I-NEXT:    slli a0, a0, 24
; RV64I-NEXT:    addi a0,
 a0, 1979
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_12900924131259:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 768955
; RV64IZBA-NEXT:    slli.uw a0, a0, 12
; RV64IZBA-NEXT:    addi a0, a0, 1979
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_12900924131259:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 188
; RV64IZBB-NEXT:    addiw a0, a0, -1093
; RV64IZBB-NEXT:    slli a0, a0, 24
; RV64IZBB-NEXT:    addi a0, a0, 1979
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_12900924131259:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 188
; RV64IZBS-NEXT:    addiw a0, a0, -1093
; RV64IZBS-NEXT:    slli a0, a0, 24
; RV64IZBS-NEXT:    addi a0, a0, 1979
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_12900924131259:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 188
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1093
; RV64IXTHEADBB-NEXT:    slli a0, a0, 24
; RV64IXTHEADBB-NEXT:    addi a0, a0, 1979
; RV64IXTHEADBB-NEXT:    ret
 ret i64 12900924131259
}

define
 i64 @imm_50394234880() {
; RV64I-LABEL: imm_50394234880:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 188
; RV64I-NEXT:    addiw a0, a0, -1093
; RV64I-NEXT:    slli a0, a0, 16
```

```
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_50394234880:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 768955
; RV64IZBA-NEXT:    slli.uw a0, a0, 4
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_50394234880:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 188
; RV64IZBB-NEXT:    addiw a0, a0, -1093
; RV64IZBB-NEXT:    slli a0, a0, 16
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_50394234880:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 188
; RV64IZBS-NEXT:    addiw a0, a0, -1093
; RV64IZBS-NEXT:    slli a0, a0, 16
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_50394234880:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 188
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1093
; RV64IXTHEADBB-NEXT:    slli a0, a0, 16
; RV64IXTHEADBB-NEXT:    ret
 ret
 i64 50394234880
}

define i64 @imm_12900936431479() {
; RV64I-LABEL: imm_12900936431479:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 192239
; RV64I-NEXT:    slli a0, a0, 2
; RV64I-NEXT:    addi a0, a0, -1093
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    addi a0, a0, 1911
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_12900936431479:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 768956
; RV64IZBA-NEXT:    addi a0, a0, -1093
; RV64IZBA-NEXT:    slli.uw a0, a0, 12
; RV64IZBA-NEXT:    addi a0, a0, 1911
```

```
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_12900936431479:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 192239
; RV64IZBB-NEXT:    slli a0, a0, 2
; RV64IZBB-NEXT:    addi a0, a0, -1093
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, 1911
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_12900936431479:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 192239
; RV64IZBS-NEXT:    slli a0, a0, 2
; RV64IZBS-NEXT:    addi a0, a0, -1093
; RV64IZBS-NEXT:
   slli a0, a0, 12
; RV64IZBS-NEXT:    addi a0, a0, 1911
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_12900936431479:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 192239
; RV64IXTHEADBB-NEXT:    slli a0, a0, 2
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1093
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    addi a0, a0, 1911
; RV64IXTHEADBB-NEXT:    ret
 ret i64 12900936431479
}

define i64 @imm_12900918536874() {
; RV64I-LABEL: imm_12900918536874:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 384477
; RV64I-NEXT:    addiw a0, a0, 1365
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    addi a0, a0, 1365
; RV64I-NEXT:    slli a0, a0, 1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_12900918536874:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 768955
; RV64IZBA-NEXT:    addi a0, a0, -1365
; RV64IZBA-NEXT:    slli.uw a0, a0, 12
; RV64IZBA-NEXT:    addi a0, a0, -1366
```

```
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_12900918536874:
;
 RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 384477
; RV64IZBB-NEXT:    addiw a0, a0, 1365
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, 1365
; RV64IZBB-NEXT:    slli a0, a0, 1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_12900918536874:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 384477
; RV64IZBS-NEXT:    addiw a0, a0, 1365
; RV64IZBS-NEXT:    slli a0, a0, 12
; RV64IZBS-NEXT:    addi a0, a0, 1365
; RV64IZBS-NEXT:    slli a0, a0, 1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_12900918536874:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 384477
; RV64IXTHEADBB-NEXT:    addiw a0, a0, 1365
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    addi a0, a0, 1365
; RV64IXTHEADBB-NEXT:    slli a0, a0, 1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 12900918536874
}

define i64 @imm_12900925247761() {
; RV64I-LABEL: imm_12900925247761:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 384478
; RV64I-NEXT:    addiw
 a0, a0, -1911
; RV64I-NEXT:    slli a0, a0, 13
; RV64I-NEXT:    addi a0, a0, -2048
; RV64I-NEXT:    addi a0, a0, -1775
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_12900925247761:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 768955
; RV64IZBA-NEXT:    addi a0, a0, 273
; RV64IZBA-NEXT:    slli.uw a0, a0, 12
```

```
; RV64IZBA-NEXT:    addi a0, a0, 273
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_12900925247761:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 384478
; RV64IZBB-NEXT:    addiw a0, a0, -1911
; RV64IZBB-NEXT:    slli a0, a0, 13
; RV64IZBB-NEXT:    addi a0, a0, -2048
; RV64IZBB-NEXT:    addi a0, a0, -1775
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_12900925247761:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 384478
; RV64IZBS-NEXT:    addiw a0, a0, -1911
; RV64IZBS-NEXT:    slli a0, a0, 13
; RV64IZBS-NEXT:    addi a0, a0, -2048
; RV64IZBS-NEXT:    addi a0, a0, -1775
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_12900925247761:
; RV64IXTHEADBB:
      # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 384478
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1911
; RV64IXTHEADBB-NEXT:    slli a0, a0, 13
; RV64IXTHEADBB-NEXT:    addi a0, a0, -2048
; RV64IXTHEADBB-NEXT:    addi a0, a0, -1775
; RV64IXTHEADBB-NEXT:    ret
 ret i64 12900925247761
}

define i64 @imm_7158272001() {
; RV64I-LABEL: imm_7158272001:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 427
; RV64I-NEXT:    addiw a0, a0, -1367
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    addi a0, a0, 1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_7158272001:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 349525
; RV64IZBA-NEXT:    sh2add a0, a0, a0
; RV64IZBA-NEXT:    addi a0, a0, 1
; RV64IZBA-NEXT:    ret
```

```
;
; RV64IZBB-LABEL: imm_7158272001:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 427
; RV64IZBB-NEXT:    addiw a0, a0, -1367
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, 1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_7158272001:
; RV64IZBS:
    # %bb.0:
; RV64IZBS-NEXT:    lui a0, 427
; RV64IZBS-NEXT:    addiw a0, a0, -1367
; RV64IZBS-NEXT:    slli a0, a0, 12
; RV64IZBS-NEXT:    addi a0, a0, 1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_7158272001:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 427
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1367
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    addi a0, a0, 1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 7158272001 ; 0x0000_0001_aaaa_9001
}

define i64 @imm_12884889601() {
; RV64I-LABEL: imm_12884889601:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 768
; RV64I-NEXT:    addiw a0, a0, -3
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    addi a0, a0, 1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_12884889601:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 349525
; RV64IZBA-NEXT:    sh3add a0, a0, a0
; RV64IZBA-NEXT:    addi a0, a0, 1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_12884889601:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:
```

```
    lui a0, 768
; RV64IZBB-NEXT:    addiw a0, a0, -3
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, 1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_12884889601:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 768
; RV64IZBS-NEXT:    addiw a0, a0, -3
; RV64IZBS-NEXT:    slli a0, a0, 12
; RV64IZBS-NEXT:    addi a0, a0, 1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_12884889601:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 768
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -3
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    addi a0, a0, 1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 12884889601 ; 0x0000_0002_ffff_d001
}

define i64 @imm_neg_3435982847() {
; RV64I-LABEL: imm_neg_3435982847:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 1048371
; RV64I-NEXT:    addiw a0, a0, 817
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    addi a0, a0, 1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_3435982847:
; RV64IZBA:
 # %bb.0:
; RV64IZBA-NEXT:    lui a0, 768955
; RV64IZBA-NEXT:    sh1add a0, a0, a0
; RV64IZBA-NEXT:    addi a0, a0, 1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_neg_3435982847:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 1048371
; RV64IZBB-NEXT:    addiw a0, a0, 817
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, 1
; RV64IZBB-NEXT:    ret
```

```
;
; RV64IZBS-LABEL: imm_neg_3435982847:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 734001
; RV64IZBS-NEXT:    addiw a0, a0, 1
; RV64IZBS-NEXT:    bclri a0, a0, 31
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_neg_3435982847:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 1048371
; RV64IXTHEADBB-NEXT:    addiw a0, a0, 817
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    addi a0, a0, 1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -3435982847 ; 0xffff_ffff_3333_1001
}

define i64 @imm_neg_5726842879() {
; RV64I-LABEL: imm_neg_5726842879:
; RV64I:       # %bb.0:
; RV64I-NEXT:
   lui a0, 1048235
; RV64I-NEXT:    addiw a0, a0, -1419
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    addi a0, a0, 1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_5726842879:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 768945
; RV64IZBA-NEXT:    sh2add a0, a0, a0
; RV64IZBA-NEXT:    addi a0, a0, 1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_neg_5726842879:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 1048235
; RV64IZBB-NEXT:    addiw a0, a0, -1419
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, 1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_5726842879:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 698997
; RV64IZBS-NEXT:    addiw a0, a0, 1
; RV64IZBS-NEXT:    bclri a0, a0, 32
```

```
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm_neg_5726842879:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 1048235
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1419
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:
    addi a0, a0, 1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -5726842879 ; 0xffff_fffe_aaa7_5001
}

define i64 @imm_neg_10307948543() {
; RV64I-LABEL: imm_neg_10307948543:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 1047962
; RV64I-NEXT:    addiw a0, a0, -1645
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    addi a0, a0, 1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm_neg_10307948543:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 768955
; RV64IZBA-NEXT:    sh3add a0, a0, a0
; RV64IZBA-NEXT:    addi a0, a0, 1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm_neg_10307948543:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 1047962
; RV64IZBB-NEXT:    addiw a0, a0, -1645
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    addi a0, a0, 1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm_neg_10307948543:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 629139
; RV64IZBS-NEXT:    addiw a0, a0, 1
; RV64IZBS-NEXT:    bclri a0, a0, 33
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL:
 imm_neg_10307948543:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 1047962
```

```
; RV64IXTHEADBB-NEXT:    addiw a0, a0, -1645
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:    addi a0, a0, 1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -10307948543 ; 0xffff_fffd_9999_3001
}

define i64 @li_rori_1() {
; RV64I-LABEL: li_rori_1:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, -17
; RV64I-NEXT:    slli a0, a0, 43
; RV64I-NEXT:    addi a0, a0, -1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: li_rori_1:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, -17
; RV64IZBA-NEXT:    slli a0, a0, 43
; RV64IZBA-NEXT:    addi a0, a0, -1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: li_rori_1:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, -18
; RV64IZBB-NEXT:    rori a0, a0, 21
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: li_rori_1:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a0, -17
; RV64IZBS-NEXT:    slli a0, a0, 43
; RV64IZBS-NEXT:    addi a0, a0,
 -1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: li_rori_1:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, -18
; RV64IXTHEADBB-NEXT:    th.srri a0, a0, 21
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -149533581377537
}

define i64 @li_rori_2() {
; RV64I-LABEL: li_rori_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, -5
```

```
; RV64I-NEXT:    slli a0, a0, 60
; RV64I-NEXT:    addi a0, a0, -6
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: li_rori_2:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, -5
; RV64IZBA-NEXT:    slli a0, a0, 60
; RV64IZBA-NEXT:    addi a0, a0, -6
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: li_rori_2:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, -86
; RV64IZBB-NEXT:    rori a0, a0, 4
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: li_rori_2:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a0, -5
; RV64IZBS-NEXT:    slli a0, a0, 60
; RV64IZBS-NEXT:    addi a0, a0, -6
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: li_rori_2:
; RV64IXTHEADBB:
  # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, -86
; RV64IXTHEADBB-NEXT:    th.srri a0, a0, 4
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -5764607523034234886
}

define i64 @li_rori_3() {
; RV64I-LABEL: li_rori_3:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, -17
; RV64I-NEXT:    slli a0, a0, 27
; RV64I-NEXT:    addi a0, a0, -1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: li_rori_3:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, -17
; RV64IZBA-NEXT:    slli a0, a0, 27
; RV64IZBA-NEXT:    addi a0, a0, -1
; RV64IZBA-NEXT:    ret
;
```

```
; RV64IZBB-LABEL: li_rori_3:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, -18
; RV64IZBB-NEXT:    rori a0, a0, 37
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: li_rori_3:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    li a0, -17
; RV64IZBS-NEXT:    slli a0, a0, 27
; RV64IZBS-NEXT:    addi a0, a0, -1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: li_rori_3:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, -18
; RV64IXTHEADBB-NEXT:    th.srri a0,
 a0, 37
; RV64IXTHEADBB-NEXT:    ret
 ret i64 -2281701377
}

; This used to assert when compiled with Zba.
define i64 @PR54812() {
; RV64I-LABEL: PR54812:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 1048447
; RV64I-NEXT:    addiw a0, a0, 1407
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: PR54812:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 872917
; RV64IZBA-NEXT:    sh1add a0, a0, a0
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: PR54812:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 1048447
; RV64IZBB-NEXT:    addiw a0, a0, 1407
; RV64IZBB-NEXT:    slli a0, a0, 12
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: PR54812:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 1045887
; RV64IZBS-NEXT:    bclri a0, a0, 31
```

```
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: PR54812:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 1048447
; RV64IXTHEADBB-NEXT:    addiw a0, a0, 1407
; RV64IXTHEADBB-NEXT:    slli a0, a0, 12
; RV64IXTHEADBB-NEXT:
    ret
 ret i64 -2158497792;
}

define signext i32 @pos_2048() nounwind {
; RV64I-LABEL: pos_2048:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, 1
; RV64I-NEXT:    slli a0, a0, 11
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: pos_2048:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    li a0, 1
; RV64IZBA-NEXT:    slli a0, a0, 11
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: pos_2048:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    li a0, 1
; RV64IZBB-NEXT:    slli a0, a0, 11
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: pos_2048:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    bseti a0, zero, 11
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: pos_2048:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    li a0, 1
; RV64IXTHEADBB-NEXT:    slli a0, a0, 11
; RV64IXTHEADBB-NEXT:    ret
 ret i32 2048
}

define i64 @imm64_same_lo_hi() nounwind {
; RV64I-LABEL: imm64_same_lo_hi:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a0, 65793
```

```
; RV64I-NEXT:    addiw a0, a0, 16
; RV64I-NEXT:
   slli a1, a0, 32
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64IZBA-LABEL: imm64_same_lo_hi:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 65793
; RV64IZBA-NEXT:    addiw a0, a0, 16
; RV64IZBA-NEXT:    slli a1, a0, 32
; RV64IZBA-NEXT:    add a0, a0, a1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm64_same_lo_hi:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui a0, 65793
; RV64IZBB-NEXT:    addiw a0, a0, 16
; RV64IZBB-NEXT:    slli a1, a0, 32
; RV64IZBB-NEXT:    add a0, a0, a1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm64_same_lo_hi:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 65793
; RV64IZBS-NEXT:    addiw a0, a0, 16
; RV64IZBS-NEXT:    slli a1, a0, 32
; RV64IZBS-NEXT:    add a0, a0, a1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm64_same_lo_hi:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 65793
; RV64IXTHEADBB-NEXT:    addiw a0, a0, 16
; RV64IXTHEADBB-NEXT:    slli a1, a0, 32
; RV64IXTHEADBB-NEXT:    add a0, a0, a1
;
 RV64IXTHEADBB-NEXT:    ret
 ret i64 1157442765409226768 ; 0x0101010101010101
}

; Same as above with optsize. Make sure we use constant pool on RV64
define i64 @imm64_same_lo_hi_optsize() nounwind optsize {
; RV64-NOPOOL-LABEL: imm64_same_lo_hi_optsize:
; RV64-NOPOOL:       # %bb.0:
; RV64-NOPOOL-NEXT:    lui a0, 65793
; RV64-NOPOOL-NEXT:    addiw a0, a0, 16
; RV64-NOPOOL-NEXT:    slli a1, a0, 32
```

```
; RV64-NOPOOL-NEXT:    add a0, a0, a1
; RV64-NOPOOL-NEXT:    ret
;
; RV64I-POOL-LABEL: imm64_same_lo_hi_optsize:
; RV64I-POOL:       # %bb.0:
; RV64I-POOL-NEXT:    lui a0, %hi(.LCPI64_0)
; RV64I-POOL-NEXT:    ld a0, %lo(.LCPI64_0)(a0)
; RV64I-POOL-NEXT:    ret
;
; RV64IZBA-LABEL: imm64_same_lo_hi_optsize:
; RV64IZBA:       # %bb.0:
; RV64IZBA-NEXT:    lui a0, 65793
; RV64IZBA-NEXT:    addiw a0, a0, 16
; RV64IZBA-NEXT:    slli a1, a0, 32
; RV64IZBA-NEXT:    add a0, a0, a1
; RV64IZBA-NEXT:    ret
;
; RV64IZBB-LABEL: imm64_same_lo_hi_optsize:
; RV64IZBB:       # %bb.0:
; RV64IZBB-NEXT:    lui
 a0, 65793
; RV64IZBB-NEXT:    addiw a0, a0, 16
; RV64IZBB-NEXT:    slli a1, a0, 32
; RV64IZBB-NEXT:    add a0, a0, a1
; RV64IZBB-NEXT:    ret
;
; RV64IZBS-LABEL: imm64_same_lo_hi_optsize:
; RV64IZBS:       # %bb.0:
; RV64IZBS-NEXT:    lui a0, 65793
; RV64IZBS-NEXT:    addiw a0, a0, 16
; RV64IZBS-NEXT:    slli a1, a0, 32
; RV64IZBS-NEXT:    add a0, a0, a1
; RV64IZBS-NEXT:    ret
;
; RV64IXTHEADBB-LABEL: imm64_same_lo_hi_optsize:
; RV64IXTHEADBB:       # %bb.0:
; RV64IXTHEADBB-NEXT:    lui a0, 65793
; RV64IXTHEADBB-NEXT:    addiw a0, a0, 16
; RV64IXTHEADBB-NEXT:    slli a1, a0, 32
; RV64IXTHEADBB-NEXT:    add a0, a0, a1
; RV64IXTHEADBB-NEXT:    ret
 ret i64 1157442765409226768 ; 0x0101010101010101
}
```

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```
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*/
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mcpu=skylake-avx512 -mattr=prefer-256-bit | FileCheck %s
--check-prefixes=CHECK,CHECK-SKX
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mcpu=skylake-avx512 -mattr=prefer-256-bit,avx512vbmi |
FileCheck %s --check-prefixes=CHECK,CHECK-SKX,CHECK-SKX-VBMI
; Make sure CPUs default to prefer-256-bit. avx512vnni isn't interesting as it just adds an isel peephole for
vpmaddwd+vpaddd
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mcpu=skylake-avx512 | FileCheck %s --check-
prefixes=CHECK,CHECK-AVX512
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mattr=-avx512vnni -mcpu=cascadelake | FileCheck %s --
check-prefixes=CHECK,CHECK-AVX512
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mattr=-avx512vnni -mcpu=cooperlake | FileCheck %s --
check-prefixes=CHECK,CHECK-AVX512
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mcpu=cannonlake | FileCheck %s --check-
prefixes=CHECK,CHECK-VBMI
;
 RUN: llc < %s -mtriple=x86_64-unknown-unknown -mattr=-avx512vnni -mcpu=icelake-client | FileCheck %s --
check-prefixes=CHECK,CHECK-VBMI
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mattr=-avx512vnni -mcpu=icelake-server | FileCheck %s --
check-prefixes=CHECK,CHECK-VBMI
; RUN: llc < %s -mtriple=x86_64-unknown-unknown -mattr=-avx512vnni -mcpu=tigerlake | FileCheck %s --check-
prefixes=CHECK,CHECK-VBMI

; This file primarily contains tests for specific places in X86ISelLowering.cpp that needed be made aware of the
legalizer not allowing 512-bit vectors due to prefer-256-bit even though AVX512 is enabled.
```

```
define dso_local void @add256(<16 x i32>* %a, <16 x i32>* %b, <16 x i32>* %c) "min-legal-vector-
width"="256" {
; CHECK-LABEL: add256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT:    vpaddd 32(%rsi), %ymm1, %ymm1
; CHECK-NEXT:    vpaddd (%rsi), %ymm0, %ymm0
; CHECK-NEXT:    vmovdqa %ymm0, (%rdx)
; CHECK-NEXT:
   vmovdqa %ymm1, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %d = load <16 x i32>, <16 x i32>* %a
 %e = load <16 x i32>, <16 x i32>* %b
 %f = add <16 x i32> %d, %e
 store <16 x i32> %f, <16 x i32>* %c
 ret void
}

define dso_local void @add512(<16 x i32>* %a, <16 x i32>* %b, <16 x i32>* %c) "min-legal-vector-
width"="512" {
; CHECK-LABEL: add512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa64 (%rdi), %zmm0
; CHECK-NEXT:    vpaddd (%rsi), %zmm0, %zmm0
; CHECK-NEXT:    vmovdqa64 %zmm0, (%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %d = load <16 x i32>, <16 x i32>* %a
 %e = load <16 x i32>, <16 x i32>* %b
 %f = add <16 x i32> %d, %e
 store <16 x i32> %f, <16 x i32>* %c
 ret void
}

define dso_local void @avg_v64i8_256(<64 x i8>* %a, <64 x i8>* %b) "min-legal-vector-width"="256" {
; CHECK-LABEL: avg_v64i8_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rsi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rsi), %ymm1
; CHECK-NEXT:    vpavgb (%rdi),
 %ymm0, %ymm0
; CHECK-NEXT:    vpavgb 32(%rdi), %ymm1, %ymm1
; CHECK-NEXT:    vmovdqu %ymm1, (%rax)
; CHECK-NEXT:    vmovdqu %ymm0, (%rax)
; CHECK-NEXT:    vzeroupper
```

```
; CHECK-NEXT:    retq
 %1 = load <64 x i8>, <64 x i8>* %a
 %2 = load <64 x i8>, <64 x i8>* %b
 %3 = zext <64 x i8> %1 to <64 x i32>
 %4 = zext <64 x i8> %2 to <64 x i32>
 %5 = add nuw nsw <64 x i32> %3, <i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32
1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1>
 %6 = add nuw nsw <64 x i32> %5, %4
 %7 = lshr <64 x i32> %6, <i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
i32 1, i32
 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32
1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1>
 %8 = trunc <64 x i32> %7 to <64 x i8>
 store <64 x i8> %8, <64 x i8>* undef, align 4
 ret void
}


define dso_local void @avg_v64i8_512(<64 x i8>* %a, <64 x i8>* %b) "min-legal-vector-width"="512" {
; CHECK-LABEL: avg_v64i8_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa64 (%rdi), %zmm0
; CHECK-NEXT:    vpavgb (%rsi), %zmm0, %zmm0
; CHECK-NEXT:    vmovdqu64 %zmm0, (%rax)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %1 = load <64 x i8>, <64 x i8>* %a
 %2 = load <64 x i8>, <64 x i8>* %b
 %3 = zext <64 x i8> %1 to <64 x i32>
 %4 = zext <64 x i8> %2 to <64 x i32>
 %5 = add nuw nsw <64 x i32> %3, <i32 1, i32 1, i32 1, i32 1, i32 1, i32
 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32
1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
i32 1, i32 1, i32 1>
 %6 = add nuw nsw <64 x i32> %5, %4
 %7 = lshr <64 x i32> %6, <i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32
1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1,
i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1, i32 1>
 %8 = trunc <64 x i32> %7 to <64 x i8>
 store <64 x i8> %8, <64 x i8>* undef,
 align 4
 ret void
}
```

```
define dso_local void @pmaddwd_32_256(<32 x i16>* %APtr, <32 x i16>* %BPtr, <16 x i32>* %CPtr) "min-legal-vector-width"="256" {
; CHECK-LABEL: pmaddwd_32_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT:    vpmaddwd 32(%rsi), %ymm1, %ymm1
; CHECK-NEXT:    vpmaddwd (%rsi), %ymm0, %ymm0
; CHECK-NEXT:    vmovdqa %ymm0, (%rdx)
; CHECK-NEXT:    vmovdqa %ymm1, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
  %A = load <32 x i16>, <32 x i16>* %APtr
  %B = load <32 x i16>, <32 x i16>* %BPtr
  %a = sext <32 x i16> %A to <32 x i32>
  %b = sext <32 x i16> %B to <32 x i32>
  %m = mul nsw <32 x i32> %a, %b
  %odd = shufflevector <32 x i32> %m, <32 x i32> undef, <16 x i32> <i32 0, i32 2, i32 4, i32 6, i32 8, i32 10, i32 12, i32 14, i32 16, i32 18, i32 20, i32 22, i32 24, i32 26, i32 28, i32 30>
  %even = shufflevector <32 x i32> %m, <32 x i32> undef, <16 x i32> <i32 1, i32 3, i32 5, i32 7, i32 9, i32 11, i32 13, i32 15, i32 17, i32 19, i32 21, i32 23, i32 25, i32 27, i32 29, i32 31>
  %ret = add <16 x i32> %odd, %even
  store <16 x i32> %ret, <16 x i32>* %CPtr
  ret void
}

define dso_local void @pmaddwd_32_512(<32 x i16>* %APtr, <32 x i16>* %BPtr, <16 x i32>* %CPtr) "min-legal-vector-width"="512" {
; CHECK-LABEL: pmaddwd_32_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa64 (%rdi), %zmm0
; CHECK-NEXT:    vpmaddwd (%rsi), %zmm0, %zmm0
; CHECK-NEXT:    vmovdqa64 %zmm0, (%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
  %A = load <32 x i16>, <32 x i16>* %APtr
  %B = load <32 x i16>, <32 x i16>* %BPtr
  %a = sext <32 x i16> %A to <32 x i32>
  %b = sext <32 x i16> %B to <32 x i32>
  %m = mul nsw <32 x i32> %a, %b
  %odd = shufflevector <32 x i32> %m, <32 x i32> undef, <16 x i32> <i32 0, i32 2, i32 4, i32 6, i32 8, i32 10, i32 12, i32 14, i32 16, i32 18, i32 20, i32 22, i32 24, i32 26, i32 28, i32 30>
  %even = shufflevector <32 x i32> %m, <32 x i32>
 undef, <16 x i32> <i32 1, i32 3, i32 5, i32 7, i32 9, i32 11, i32 13, i32 15, i32 17, i32 19, i32 21, i32 23, i32 25, i32 27, i32 29, i32 31>
  %ret = add <16 x i32> %odd, %even
  store <16 x i32> %ret, <16 x i32>* %CPtr
```

```
  ret void
}

define dso_local void @psubus_64i8_max_256(<64 x i8>* %xptr, <64 x i8>* %yptr, <64 x i8>* %zptr) "min-legal-
vector-width"="256" {
; CHECK-LABEL: psubus_64i8_max_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT:    vpsubusb 32(%rsi), %ymm1, %ymm1
; CHECK-NEXT:    vpsubusb (%rsi), %ymm0, %ymm0
; CHECK-NEXT:    vmovdqa %ymm0, (%rdx)
; CHECK-NEXT:    vmovdqa %ymm1, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %x = load <64 x i8>, <64 x i8>* %xptr
 %y = load <64 x i8>, <64 x i8>* %yptr
 %cmp = icmp ult <64 x i8> %x, %y
 %max = select <64 x i1> %cmp, <64 x i8> %y, <64 x i8> %x
 %res = sub <64 x i8> %max, %y
 store <64 x i8> %res, <64 x i8>* %zptr
 ret void
}

define
 dso_local void @psubus_64i8_max_512(<64 x i8>* %xptr, <64 x i8>* %yptr, <64 x i8>* %zptr) "min-legal-
vector-width"="512" {
; CHECK-LABEL: psubus_64i8_max_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa64 (%rdi), %zmm0
; CHECK-NEXT:    vpsubusb (%rsi), %zmm0, %zmm0
; CHECK-NEXT:    vmovdqa64 %zmm0, (%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %x = load <64 x i8>, <64 x i8>* %xptr
 %y = load <64 x i8>, <64 x i8>* %yptr
 %cmp = icmp ult <64 x i8> %x, %y
 %max = select <64 x i1> %cmp, <64 x i8> %y, <64 x i8> %x
 %res = sub <64 x i8> %max, %y
 store <64 x i8> %res, <64 x i8>* %zptr
 ret void
}

define dso_local i32 @_Z9test_charPcS_i_256(i8* nocapture readonly, i8* nocapture readonly, i32) "min-legal-
vector-width"="256" {
; CHECK-SKX-LABEL: _Z9test_charPcS_i_256:
; CHECK-SKX:       # %bb.0: # %entry
; CHECK-SKX-NEXT:    movl %edx, %eax
```

```
; CHECK-SKX-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-SKX-NEXT:    xorl %ecx, %ecx
; CHECK-SKX-NEXT:    vpxor %xmm1, %xmm1, %xmm1
;
 CHECK-SKX-NEXT:    vpxor %xmm2, %xmm2, %xmm2
; CHECK-SKX-NEXT:    .p2align 4, 0x90
; CHECK-SKX-NEXT:  .LBB8_1: # %vector.body
; CHECK-SKX-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-SKX-NEXT:    vpmovsxbw 16(%rdi,%rcx), %ymm3
; CHECK-SKX-NEXT:    vpmovsxbw (%rdi,%rcx), %ymm4
; CHECK-SKX-NEXT:    vpmovsxbw 16(%rsi,%rcx), %ymm5
; CHECK-SKX-NEXT:    vpmaddwd %ymm3, %ymm5, %ymm3
; CHECK-SKX-NEXT:    vpaddd %ymm2, %ymm3, %ymm2
; CHECK-SKX-NEXT:    vpmovsxbw (%rsi,%rcx), %ymm3
; CHECK-SKX-NEXT:    vpmaddwd %ymm4, %ymm3, %ymm3
; CHECK-SKX-NEXT:    vpaddd %ymm1, %ymm3, %ymm1
; CHECK-SKX-NEXT:    addq $32, %rcx
; CHECK-SKX-NEXT:    cmpq %rcx, %rax
; CHECK-SKX-NEXT:    jne .LBB8_1
; CHECK-SKX-NEXT:  # %bb.2: # %middle.block
; CHECK-SKX-NEXT:    vpaddd %ymm0, %ymm1, %ymm1
; CHECK-SKX-NEXT:    vpaddd %ymm0, %ymm2, %ymm0
; CHECK-SKX-NEXT:    vpaddd %ymm0, %ymm1, %ymm0
; CHECK-SKX-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:
   vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vpsrlq $32, %xmm0, %xmm1
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vmovd %xmm0, %eax
; CHECK-SKX-NEXT:    vzeroupper
; CHECK-SKX-NEXT:    retq
;
; CHECK-AVX512-LABEL: _Z9test_charPcS_i_256:
; CHECK-AVX512:       # %bb.0: # %entry
; CHECK-AVX512-NEXT:    movl %edx, %eax
; CHECK-AVX512-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    xorl %ecx, %ecx
; CHECK-AVX512-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-AVX512-NEXT:    vpxor %xmm2, %xmm2, %xmm2
; CHECK-AVX512-NEXT:    .p2align 4, 0x90
; CHECK-AVX512-NEXT:  .LBB8_1: # %vector.body
; CHECK-AVX512-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-AVX512-NEXT:    vpmovsxbw 16(%rdi,%rcx), %ymm3
; CHECK-AVX512-NEXT:    vpmovsxbw (%rdi,%rcx), %ymm4
; CHECK-AVX512-NEXT:    vpmovsxbw 16(%rsi,%rcx), %ymm5
; CHECK-AVX512-NEXT:    vpmaddwd %ymm3, %ymm5, %ymm3
```

```
; CHECK-AVX512-NEXT:    vpaddd %ymm2, %ymm3,
 %ymm2
; CHECK-AVX512-NEXT:    vpmovsxbw (%rsi,%rcx), %ymm3
; CHECK-AVX512-NEXT:    vpmaddwd %ymm4, %ymm3, %ymm3
; CHECK-AVX512-NEXT:    vpaddd %ymm1, %ymm3, %ymm1
; CHECK-AVX512-NEXT:    addq $32, %rcx
; CHECK-AVX512-NEXT:    cmpq %rcx, %rax
; CHECK-AVX512-NEXT:    jne .LBB8_1
; CHECK-AVX512-NEXT:  # %bb.2: # %middle.block
; CHECK-AVX512-NEXT:    vpaddd %ymm0, %ymm1, %ymm1
; CHECK-AVX512-NEXT:    vpaddd %ymm0, %ymm2, %ymm0
; CHECK-AVX512-NEXT:    vpaddd %ymm0, %ymm1, %ymm0
; CHECK-AVX512-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vpsrlq $32, %xmm0, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vmovd %xmm0, %eax
; CHECK-AVX512-NEXT:    vzeroupper
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI-LABEL: _Z9test_charPcS_i_256:
; CHECK-VBMI:       # %bb.0: # %entry
; CHECK-VBMI-NEXT:
   movl %edx, %eax
; CHECK-VBMI-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    xorl %ecx, %ecx
; CHECK-VBMI-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-VBMI-NEXT:    vpxor %xmm2, %xmm2, %xmm2
; CHECK-VBMI-NEXT:    .p2align 4, 0x90
; CHECK-VBMI-NEXT:  .LBB8_1: # %vector.body
; CHECK-VBMI-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-VBMI-NEXT:    vpmovsxbw 16(%rdi,%rcx), %ymm3
; CHECK-VBMI-NEXT:    vpmovsxbw (%rdi,%rcx), %ymm4
; CHECK-VBMI-NEXT:    vpmovsxbw 16(%rsi,%rcx), %ymm5
; CHECK-VBMI-NEXT:    vpmaddwd %ymm3, %ymm5, %ymm3
; CHECK-VBMI-NEXT:    vpaddd %ymm2, %ymm3, %ymm2
; CHECK-VBMI-NEXT:    vpmovsxbw (%rsi,%rcx), %ymm3
; CHECK-VBMI-NEXT:    vpmaddwd %ymm4, %ymm3, %ymm3
; CHECK-VBMI-NEXT:    vpaddd %ymm1, %ymm3, %ymm1
; CHECK-VBMI-NEXT:    addq $32, %rcx
; CHECK-VBMI-NEXT:    cmpq %rcx, %rax
; CHECK-VBMI-NEXT:    jne .LBB8_1
; CHECK-VBMI-NEXT:  # %bb.2: # %middle.block
; CHECK-VBMI-NEXT:    vpaddd %ymm0, %ymm1, %ymm1
; CHECK-VBMI-NEXT:    vpaddd %ymm0, %ymm2,
```

```
 %ymm0
; CHECK-VBMI-NEXT:    vpaddd %ymm0, %ymm1, %ymm0
; CHECK-VBMI-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[1,1,1,1]
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vmovd %xmm0, %eax
; CHECK-VBMI-NEXT:    vzeroupper
; CHECK-VBMI-NEXT:    retq
entry:
 %3 = zext i32 %2 to i64
 br label %vector.body

vector.body:
 %index = phi i64 [ %index.next, %vector.body ], [ 0, %entry ]
 %vec.phi = phi <32 x i32> [ %11, %vector.body ], [ zeroinitializer, %entry ]
 %4 = getelementptr inbounds i8, i8* %0, i64 %index
 %5 = bitcast i8* %4 to <32 x i8>*
 %wide.load = load <32 x i8>, <32 x i8>* %5, align 1
 %6 = sext <32 x i8> %wide.load to <32 x i32>
 %7 = getelementptr inbounds i8, i8* %1, i64 %index
 %8 = bitcast i8* %7 to <32 x i8>*
 %wide.load14 = load <32 x
 i8>, <32 x i8>* %8, align 1
 %9 = sext <32 x i8> %wide.load14 to <32 x i32>
 %10 = mul nsw <32 x i32> %9, %6
 %11 = add nsw <32 x i32> %10, %vec.phi
 %index.next = add i64 %index, 32
 %12 = icmp eq i64 %index.next, %3
 br i1 %12, label %middle.block, label %vector.body

middle.block:
 %rdx.shuf1 = shufflevector <32 x i32> %11, <32 x i32> undef, <32 x i32> <i32 16, i32 17, i32 18, i32 19, i32 20,
i32 21, i32 22, i32 23, i32 24, i32 25, i32 26, i32 27, i32 28, i32 29, i32 30, i32 31, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef>
 %bin.rdx1 = add <32 x i32> %11, %rdx.shuf1
 %rdx.shuf = shufflevector <32 x i32> %bin.rdx1, <32 x i32> undef, <32 x i32> <i32 8, i32 9, i32 10, i32 11, i32
12, i32 13, i32 14, i32 15, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef,
 i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef>
 %bin.rdx = add <32 x i32> %bin.rdx1, %rdx.shuf
 %rdx.shuf15 = shufflevector <32 x i32> %bin.rdx, <32 x i32> undef, <32 x i32> <i32 4, i32 5, i32 6, i32 7, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
```

```
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx32 = add <32 x i32> %bin.rdx, %rdx.shuf15
 %rdx.shuf17 = shufflevector <32 x i32> %bin.rdx32, <32 x i32> undef, <32 x i32> <i32 2, i32 3, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef,
 i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx18 = add <32 x i32> %bin.rdx32, %rdx.shuf17
 %rdx.shuf19 = shufflevector <32 x i32> %bin.rdx18, <32 x i32> undef, <32 x i32> <i32 1, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx20 = add <32 x i32> %bin.rdx18, %rdx.shuf19
 %13 = extractelement <32 x i32> %bin.rdx20, i32 0
 ret i32 %13
}

define dso_local i32 @_Z9test_charPcS_i_512(i8* nocapture readonly, i8* nocapture readonly, i32) "min-legal-
vector-width"="512" {
; CHECK-SKX-LABEL: _Z9test_charPcS_i_512:
; CHECK-SKX:       # %bb.0: # %entry
; CHECK-SKX-NEXT:    movl %edx, %eax
; CHECK-SKX-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-SKX-NEXT:    xorl %ecx,
 %ecx
; CHECK-SKX-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-SKX-NEXT:    .p2align 4, 0x90
; CHECK-SKX-NEXT:  .LBB9_1: # %vector.body
; CHECK-SKX-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-SKX-NEXT:    vpmovsxbw (%rdi,%rcx), %zmm2
; CHECK-SKX-NEXT:    vpmovsxbw (%rsi,%rcx), %zmm3
; CHECK-SKX-NEXT:    vpmaddwd %zmm2, %zmm3, %zmm2
; CHECK-SKX-NEXT:    vpaddd %zmm1, %zmm2, %zmm1
; CHECK-SKX-NEXT:    addq $32, %rcx
; CHECK-SKX-NEXT:    cmpq %rcx, %rax
; CHECK-SKX-NEXT:    jne .LBB9_1
; CHECK-SKX-NEXT:  # %bb.2: # %middle.block
; CHECK-SKX-NEXT:    vpaddd %zmm0, %zmm1, %zmm0
; CHECK-SKX-NEXT:    vextracti64x4 $1, %zmm0, %ymm1
; CHECK-SKX-NEXT:    vpaddd %zmm1, %zmm0, %zmm0
; CHECK-SKX-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vpsrlq $32, %xmm0, %xmm1
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:
```

```
    vmovd %xmm0, %eax
; CHECK-SKX-NEXT:    vzeroupper
; CHECK-SKX-NEXT:    retq
;
; CHECK-AVX512-LABEL: _Z9test_charPcS_i_512:
; CHECK-AVX512:       # %bb.0: # %entry
; CHECK-AVX512-NEXT:    movl %edx, %eax
; CHECK-AVX512-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    xorl %ecx, %ecx
; CHECK-AVX512-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-AVX512-NEXT:    .p2align 4, 0x90
; CHECK-AVX512-NEXT:  .LBB9_1: # %vector.body
; CHECK-AVX512-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-AVX512-NEXT:    vpmovsxbw (%rdi,%rcx), %zmm2
; CHECK-AVX512-NEXT:    vpmovsxbw (%rsi,%rcx), %zmm3
; CHECK-AVX512-NEXT:    vpmaddwd %zmm2, %zmm3, %zmm2
; CHECK-AVX512-NEXT:    vpaddd %zmm1, %zmm2, %zmm1
; CHECK-AVX512-NEXT:    addq $32, %rcx
; CHECK-AVX512-NEXT:    cmpq %rcx, %rax
; CHECK-AVX512-NEXT:    jne .LBB9_1
; CHECK-AVX512-NEXT:  # %bb.2: # %middle.block
; CHECK-AVX512-NEXT:    vpaddd %zmm0, %zmm1, %zmm0
; CHECK-AVX512-NEXT:    vextracti64x4 $1, %zmm0, %ymm1
; CHECK-AVX512-NEXT:    vpaddd
 %zmm1, %zmm0, %zmm0
; CHECK-AVX512-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vpsrlq $32, %xmm0, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vmovd %xmm0, %eax
; CHECK-AVX512-NEXT:    vzeroupper
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI-LABEL: _Z9test_charPcS_i_512:
; CHECK-VBMI:       # %bb.0: # %entry
; CHECK-VBMI-NEXT:    movl %edx, %eax
; CHECK-VBMI-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    xorl %ecx, %ecx
; CHECK-VBMI-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-VBMI-NEXT:    .p2align 4, 0x90
; CHECK-VBMI-NEXT:  .LBB9_1: # %vector.body
; CHECK-VBMI-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-VBMI-NEXT:    vpmovsxbw (%rdi,%rcx), %zmm2
; CHECK-VBMI-NEXT:    vpmovsxbw (%rsi,%rcx), %zmm3
; CHECK-VBMI-NEXT:    vpmaddwd %zmm2, %zmm3, %zmm2
;
```

```
 CHECK-VBMI-NEXT:    vpaddd %zmm1, %zmm2, %zmm1
; CHECK-VBMI-NEXT:    addq $32, %rcx
; CHECK-VBMI-NEXT:    cmpq %rcx, %rax
; CHECK-VBMI-NEXT:    jne .LBB9_1
; CHECK-VBMI-NEXT:  # %bb.2: # %middle.block
; CHECK-VBMI-NEXT:    vpaddd %zmm0, %zmm1, %zmm0
; CHECK-VBMI-NEXT:    vextracti64x4 $1, %zmm0, %ymm1
; CHECK-VBMI-NEXT:    vpaddd %zmm1, %zmm0, %zmm0
; CHECK-VBMI-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[1,1,1,1]
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vmovd %xmm0, %eax
; CHECK-VBMI-NEXT:    vzeroupper
; CHECK-VBMI-NEXT:    retq
entry:
 %3 = zext i32 %2 to i64
 br label %vector.body

vector.body:
 %index = phi i64 [ %index.next, %vector.body ], [ 0, %entry ]
 %vec.phi = phi <32 x i32> [ %11, %vector.body ], [ zeroinitializer, %entry ]
 %4 = getelementptr
 inbounds i8, i8* %0, i64 %index
 %5 = bitcast i8* %4 to <32 x i8>*
 %wide.load = load <32 x i8>, <32 x i8>* %5, align 1
 %6 = sext <32 x i8> %wide.load to <32 x i32>
 %7 = getelementptr inbounds i8, i8* %1, i64 %index
 %8 = bitcast i8* %7 to <32 x i8>*
 %wide.load14 = load <32 x i8>, <32 x i8>* %8, align 1
 %9 = sext <32 x i8> %wide.load14 to <32 x i32>
 %10 = mul nsw <32 x i32> %9, %6
 %11 = add nsw <32 x i32> %10, %vec.phi
 %index.next = add i64 %index, 32
 %12 = icmp eq i64 %index.next, %3
 br i1 %12, label %middle.block, label %vector.body

middle.block:
 %rdx.shuf1 = shufflevector <32 x i32> %11, <32 x i32> undef, <32 x i32> <i32 16, i32 17, i32 18, i32 19, i32 20,
i32 21, i32 22, i32 23, i32 24, i32 25, i32 26, i32 27, i32 28, i32 29, i32 30, i32 31, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef>
 %bin.rdx1 = add <32 x i32> %11, %rdx.shuf1
  %rdx.shuf = shufflevector <32 x i32> %bin.rdx1, <32 x i32> undef, <32 x i32> <i32 8, i32 9, i32 10, i32 11, i32
12, i32 13, i32 14, i32 15, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
```

```
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx = add <32 x i32> %bin.rdx1, %rdx.shuf
 %rdx.shuf15 = shufflevector <32 x i32> %bin.rdx, <32 x i32> undef, <32 x i32> <i32 4, i32 5, i32 6, i32 7, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx32 = add <32 x i32> %bin.rdx, %rdx.shuf15
 %rdx.shuf17 = shufflevector <32 x i32> %bin.rdx32, <32 x i32> undef,
 <32 x i32> <i32 2, i32 3, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef>
 %bin.rdx18 = add <32 x i32> %bin.rdx32, %rdx.shuf17
 %rdx.shuf19 = shufflevector <32 x i32> %bin.rdx18, <32 x i32> undef, <32 x i32> <i32 1, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx20 = add <32 x i32> %bin.rdx18, %rdx.shuf19
 %13 = extractelement <32 x i32> %bin.rdx20, i32 0
 ret i32 %13
}

@a = dso_local global [1024 x i8]
 zeroinitializer, align 16
@b = dso_local global [1024 x i8] zeroinitializer, align 16

define dso_local i32 @sad_16i8_256() "min-legal-vector-width"="256" {
; CHECK-SKX-LABEL: sad_16i8_256:
; CHECK-SKX:       # %bb.0: # %entry
; CHECK-SKX-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-SKX-NEXT:    movq $-1024, %rax # imm = 0xFC00
; CHECK-SKX-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-SKX-NEXT:    .p2align 4, 0x90
; CHECK-SKX-NEXT:  .LBB10_1: # %vector.body
; CHECK-SKX-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-SKX-NEXT:    vmovdqu a+1024(%rax), %xmm2
; CHECK-SKX-NEXT:    vpsadbw b+1024(%rax), %xmm2, %xmm2
; CHECK-SKX-NEXT:    vpaddd %ymm1, %ymm2, %ymm1
; CHECK-SKX-NEXT:    addq $4, %rax
; CHECK-SKX-NEXT:    jne .LBB10_1
; CHECK-SKX-NEXT:  # %bb.2: # %middle.block
; CHECK-SKX-NEXT:    vpaddd %ymm0, %ymm1, %ymm0
; CHECK-SKX-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-SKX-NEXT:
    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vpsrlq $32, %xmm0, %xmm1
```

```
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vmovd %xmm0, %eax
; CHECK-SKX-NEXT:    vzeroupper
; CHECK-SKX-NEXT:    retq
;
; CHECK-AVX512-LABEL: sad_16i8_256:
; CHECK-AVX512:       # %bb.0: # %entry
; CHECK-AVX512-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    movq $-1024, %rax # imm = 0xFC00
; CHECK-AVX512-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-AVX512-NEXT:    .p2align 4, 0x90
; CHECK-AVX512-NEXT:  .LBB10_1: # %vector.body
; CHECK-AVX512-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-AVX512-NEXT:    vmovdqu a+1024(%rax), %xmm2
; CHECK-AVX512-NEXT:    vpsadbw b+1024(%rax), %xmm2, %xmm2
; CHECK-AVX512-NEXT:    vpaddd %ymm1, %ymm2, %ymm1
; CHECK-AVX512-NEXT:    addq $4, %rax
; CHECK-AVX512-NEXT:    jne .LBB10_1
; CHECK-AVX512-NEXT:  # %bb.2: # %middle.block
; CHECK-AVX512-NEXT:    vpaddd %ymm0, %ymm1, %ymm0
; CHECK-AVX512-NEXT:    vextracti128 $1, %ymm0, %xmm1
;
 CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vpsrlq $32, %xmm0, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vmovd %xmm0, %eax
; CHECK-AVX512-NEXT:    vzeroupper
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI-LABEL: sad_16i8_256:
; CHECK-VBMI:       # %bb.0: # %entry
; CHECK-VBMI-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    movq $-1024, %rax # imm = 0xFC00
; CHECK-VBMI-NEXT:    vpxor %xmm1, %xmm1, %xmm1
; CHECK-VBMI-NEXT:    .p2align 4, 0x90
; CHECK-VBMI-NEXT:  .LBB10_1: # %vector.body
; CHECK-VBMI-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-VBMI-NEXT:    vmovdqu a+1024(%rax), %xmm2
; CHECK-VBMI-NEXT:    vpsadbw b+1024(%rax), %xmm2, %xmm2
; CHECK-VBMI-NEXT:    vpaddd %ymm1, %ymm2, %ymm1
; CHECK-VBMI-NEXT:    addq $4, %rax
; CHECK-VBMI-NEXT:    jne .LBB10_1
; CHECK-VBMI-NEXT:  # %bb.2: # %middle.block
;
 CHECK-VBMI-NEXT:    vpaddd %ymm0, %ymm1, %ymm0
; CHECK-VBMI-NEXT:    vextracti128 $1, %ymm0, %xmm1
```

```
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[1,1,1,1]
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vmovd %xmm0, %eax
; CHECK-VBMI-NEXT:    vzeroupper
; CHECK-VBMI-NEXT:    retq
entry:
 br label %vector.body

vector.body:
 %index = phi i64 [ 0, %entry ], [ %index.next, %vector.body ]
 %vec.phi = phi <16 x i32> [ zeroinitializer, %entry ], [ %10, %vector.body ]
 %0 = getelementptr inbounds [1024 x i8], [1024 x i8]* @a, i64 0, i64 %index
 %1 = bitcast i8* %0 to <16 x i8>*
 %wide.load = load <16 x i8>, <16 x i8>* %1, align 4
 %2 = zext <16 x i8> %wide.load to <16 x i32>
 %3 = getelementptr inbounds [1024 x i8], [1024 x i8]* @b, i64 0, i64 %index
 %4 = bitcast i8* %3 to <16 x i8>*
 %wide.load1
 = load <16 x i8>, <16 x i8>* %4, align 4
 %5 = zext <16 x i8> %wide.load1 to <16 x i32>
 %6 = sub nsw <16 x i32> %2, %5
 %7 = icmp sgt <16 x i32> %6, <i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -
1, i32 -1, i32 -1, i32 -1, i32 -1>
 %8 = sub nsw <16 x i32> zeroinitializer, %6
 %9 = select <16 x i1> %7, <16 x i32> %6, <16 x i32> %8
 %10 = add nsw <16 x i32> %9, %vec.phi
 %index.next = add i64 %index, 4
 %11 = icmp eq i64 %index.next, 1024
 br i1 %11, label %middle.block, label %vector.body

middle.block:
 %rdx.shuf = shufflevector <16 x i32> %10, <16 x i32> undef, <16 x i32> <i32 8, i32 9, i32 10, i32 11, i32 12, i32
13, i32 14, i32 15, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx = add <16 x i32> %10, %rdx.shuf
 %rdx.shuf2 = shufflevector <16 x i32> %bin.rdx, <16 x i32> undef, <16 x i32> <i32 4, i32 5, i32 6, i32 7, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef,
 i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx2 = add <16 x i32> %bin.rdx, %rdx.shuf2
 %rdx.shuf3 = shufflevector <16 x i32> %bin.rdx2, <16 x i32> undef, <16 x i32> <i32 2, i32 3, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef>
 %bin.rdx3 = add <16 x i32> %bin.rdx2, %rdx.shuf3
 %rdx.shuf4 = shufflevector <16 x i32> %bin.rdx3, <16 x i32> undef, <16 x i32> <i32 1, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef>
```

```
 %bin.rdx4 = add <16 x i32> %bin.rdx3, %rdx.shuf4
 %12 = extractelement <16 x i32> %bin.rdx4, i32 0
 ret i32 %12
}

define dso_local i32 @sad_16i8_512() "min-legal-vector-width"="512" {
; CHECK-SKX-LABEL: sad_16i8_512:
; CHECK-SKX:       # %bb.0: # %entry
; CHECK-SKX-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-SKX-NEXT:
    movq $-1024, %rax # imm = 0xFC00
; CHECK-SKX-NEXT:    .p2align 4, 0x90
; CHECK-SKX-NEXT:  .LBB11_1: # %vector.body
; CHECK-SKX-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-SKX-NEXT:    vmovdqu a+1024(%rax), %xmm1
; CHECK-SKX-NEXT:    vpsadbw b+1024(%rax), %xmm1, %xmm1
; CHECK-SKX-NEXT:    vpaddd %zmm0, %zmm1, %zmm0
; CHECK-SKX-NEXT:    addq $4, %rax
; CHECK-SKX-NEXT:    jne .LBB11_1
; CHECK-SKX-NEXT:  # %bb.2: # %middle.block
; CHECK-SKX-NEXT:    vextracti64x4 $1, %zmm0, %ymm1
; CHECK-SKX-NEXT:    vpaddd %zmm1, %zmm0, %zmm0
; CHECK-SKX-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vpsrlq $32, %xmm0, %xmm1
; CHECK-SKX-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-SKX-NEXT:    vmovd %xmm0, %eax
; CHECK-SKX-NEXT:    vzeroupper
; CHECK-SKX-NEXT:    retq
;
; CHECK-AVX512-LABEL: sad_16i8_512:
; CHECK-AVX512:
    # %bb.0: # %entry
; CHECK-AVX512-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    movq $-1024, %rax # imm = 0xFC00
; CHECK-AVX512-NEXT:    .p2align 4, 0x90
; CHECK-AVX512-NEXT:  .LBB11_1: # %vector.body
; CHECK-AVX512-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-AVX512-NEXT:    vmovdqu a+1024(%rax), %xmm1
; CHECK-AVX512-NEXT:    vpsadbw b+1024(%rax), %xmm1, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %zmm0, %zmm1, %zmm0
; CHECK-AVX512-NEXT:    addq $4, %rax
; CHECK-AVX512-NEXT:    jne .LBB11_1
; CHECK-AVX512-NEXT:  # %bb.2: # %middle.block
; CHECK-AVX512-NEXT:    vextracti64x4 $1, %zmm0, %ymm1
; CHECK-AVX512-NEXT:    vpaddd %zmm1, %zmm0, %zmm0
```

```
; CHECK-AVX512-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:    vpsrlq $32, %xmm0, %xmm1
; CHECK-AVX512-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-AVX512-NEXT:
   vmovd %xmm0, %eax
; CHECK-AVX512-NEXT:    vzeroupper
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI-LABEL: sad_16i8_512:
; CHECK-VBMI:       # %bb.0: # %entry
; CHECK-VBMI-NEXT:    vpxor %xmm0, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    movq $-1024, %rax # imm = 0xFC00
; CHECK-VBMI-NEXT:    .p2align 4, 0x90
; CHECK-VBMI-NEXT:  .LBB11_1: # %vector.body
; CHECK-VBMI-NEXT:    # =>This Inner Loop Header: Depth=1
; CHECK-VBMI-NEXT:    vmovdqu a+1024(%rax), %xmm1
; CHECK-VBMI-NEXT:    vpsadbw b+1024(%rax), %xmm1, %xmm1
; CHECK-VBMI-NEXT:    vpaddd %zmm0, %zmm1, %zmm0
; CHECK-VBMI-NEXT:    addq $4, %rax
; CHECK-VBMI-NEXT:    jne .LBB11_1
; CHECK-VBMI-NEXT:  # %bb.2: # %middle.block
; CHECK-VBMI-NEXT:    vextracti64x4 $1, %zmm0, %ymm1
; CHECK-VBMI-NEXT:    vpaddd %zmm1, %zmm0, %zmm0
; CHECK-VBMI-NEXT:    vextracti128 $1, %ymm0, %xmm1
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vpshufd {{.*#+}} xmm1 = xmm0[2,3,2,3]
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:
   vpshufd {{.*#+}} xmm1 = xmm0[1,1,1,1]
; CHECK-VBMI-NEXT:    vpaddd %xmm1, %xmm0, %xmm0
; CHECK-VBMI-NEXT:    vmovd %xmm0, %eax
; CHECK-VBMI-NEXT:    vzeroupper
; CHECK-VBMI-NEXT:    retq
entry:
 br label %vector.body

vector.body:
 %index = phi i64 [ 0, %entry ], [ %index.next, %vector.body ]
 %vec.phi = phi <16 x i32> [ zeroinitializer, %entry ], [ %10, %vector.body ]
 %0 = getelementptr inbounds [1024 x i8], [1024 x i8]* @a, i64 0, i64 %index
 %1 = bitcast i8* %0 to <16 x i8>*
 %wide.load = load <16 x i8>, <16 x i8>* %1, align 4
 %2 = zext <16 x i8> %wide.load to <16 x i32>
 %3 = getelementptr inbounds [1024 x i8], [1024 x i8]* @b, i64 0, i64 %index
 %4 = bitcast i8* %3 to <16 x i8>*
```

```
 %wide.load1 = load <16 x i8>, <16 x i8>* %4, align 4
 %5 = zext <16 x i8> %wide.load1 to <16 x i32>
 %6 = sub nsw <16 x i32> %2, %5
 %7 = icmp sgt <16 x i32> %6, <i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -1, i32 -
1, i32 -1, i32 -1, i32
 -1, i32 -1>
 %8 = sub nsw <16 x i32> zeroinitializer, %6
 %9 = select <16 x i1> %7, <16 x i32> %6, <16 x i32> %8
 %10 = add nsw <16 x i32> %9, %vec.phi
 %index.next = add i64 %index, 4
 %11 = icmp eq i64 %index.next, 1024
 br i1 %11, label %middle.block, label %vector.body

middle.block:
 %rdx.shuf = shufflevector <16 x i32> %10, <16 x i32> undef, <16 x i32> <i32 8, i32 9, i32 10, i32 11, i32 12, i32
13, i32 14, i32 15, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx = add <16 x i32> %10, %rdx.shuf
 %rdx.shuf2 = shufflevector <16 x i32> %bin.rdx, <16 x i32> undef, <16 x i32> <i32 4, i32 5, i32 6, i32 7, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef>
 %bin.rdx2 = add <16 x i32> %bin.rdx, %rdx.shuf2
 %rdx.shuf3 = shufflevector <16 x i32> %bin.rdx2, <16 x i32> undef, <16 x i32> <i32 2, i32 3, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef,
 i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef>
 %bin.rdx3 = add <16 x i32> %bin.rdx2, %rdx.shuf3
 %rdx.shuf4 = shufflevector <16 x i32> %bin.rdx3, <16 x i32> undef, <16 x i32> <i32 1, i32 undef, i32 undef, i32
undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef, i32 undef,
i32 undef, i32 undef>
 %bin.rdx4 = add <16 x i32> %bin.rdx3, %rdx.shuf4
 %12 = extractelement <16 x i32> %bin.rdx4, i32 0
 ret i32 %12
}

define dso_local void @sbto16f32_256(<16 x i16> %a, <16 x float>* %res) "min-legal-vector-width"="256" {
; CHECK-LABEL: sbto16f32_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovw2m %ymm0, %k0
; CHECK-NEXT:    kshiftrw $8, %k0, %k1
; CHECK-NEXT:    vpmovm2d %k1, %ymm0
; CHECK-NEXT:    vcvtdq2ps %ymm0, %ymm0
; CHECK-NEXT:    vpmovm2d %k0, %ymm1
; CHECK-NEXT:    vcvtdq2ps %ymm1, %ymm1
; CHECK-NEXT:    vmovaps %ymm1, (%rdi)
; CHECK-NEXT:    vmovaps %ymm0, 32(%rdi)
; CHECK-NEXT:
    vzeroupper
; CHECK-NEXT:    retq
 %mask = icmp slt <16 x i16> %a, zeroinitializer
```

```
 %1 = sitofp <16 x i1> %mask to <16 x float>
 store <16 x float> %1, <16 x float>* %res
 ret void
}

define dso_local void @sbto16f32_512(<16 x i16> %a, <16 x float>* %res) "min-legal-vector-width"="512" {
; CHECK-LABEL: sbto16f32_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovw2m %ymm0, %k0
; CHECK-NEXT:    vpmovm2d %k0, %zmm0
; CHECK-NEXT:    vcvtdq2ps %zmm0, %zmm0
; CHECK-NEXT:    vmovaps %zmm0, (%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %mask = icmp slt <16 x i16> %a, zeroinitializer
 %1 = sitofp <16 x i1> %mask to <16 x float>
 store <16 x float> %1, <16 x float>* %res
 ret void
}

define dso_local void @sbto16f64_256(<16 x i16> %a, <16 x double>* %res)  "min-legal-vector-width"="256" {
; CHECK-LABEL: sbto16f64_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovw2m %ymm0, %k0
; CHECK-NEXT:    kshiftrw $8, %k0, %k1
; CHECK-NEXT:    vpmovm2d %k1, %ymm0
; CHECK-NEXT:
   vcvtdq2pd %xmm0, %ymm1
; CHECK-NEXT:    vextracti128 $1, %ymm0, %xmm0
; CHECK-NEXT:    vcvtdq2pd %xmm0, %ymm0
; CHECK-NEXT:    vpmovm2d %k0, %ymm2
; CHECK-NEXT:    vcvtdq2pd %xmm2, %ymm3
; CHECK-NEXT:    vextracti128 $1, %ymm2, %xmm2
; CHECK-NEXT:    vcvtdq2pd %xmm2, %ymm2
; CHECK-NEXT:    vmovaps %ymm2, 32(%rdi)
; CHECK-NEXT:    vmovaps %ymm3, (%rdi)
; CHECK-NEXT:    vmovaps %ymm0, 96(%rdi)
; CHECK-NEXT:    vmovaps %ymm1, 64(%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %mask = icmp slt <16 x i16> %a, zeroinitializer
 %1 = sitofp <16 x i1> %mask to <16 x double>
 store <16 x double> %1, <16 x double>* %res
 ret void
}

define dso_local void @sbto16f64_512(<16 x i16> %a, <16 x double>* %res)  "min-legal-vector-width"="512" {
; CHECK-LABEL: sbto16f64_512:
```

```
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovw2m %ymm0, %k0
; CHECK-NEXT:    vpmovm2d %k0, %zmm0
; CHECK-NEXT:    vcvtdq2pd %ymm0, %zmm1
; CHECK-NEXT:    vextracti64x4 $1, %zmm0, %ymm0
; CHECK-NEXT:    vcvtdq2pd
 %ymm0, %zmm0
; CHECK-NEXT:    vmovaps %zmm0, 64(%rdi)
; CHECK-NEXT:    vmovaps %zmm1, (%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %mask = icmp slt <16 x i16> %a, zeroinitializer
 %1 = sitofp <16 x i1> %mask to <16 x double>
 store <16 x double> %1, <16 x double>* %res
 ret void
}

define dso_local void @ubto16f32_256(<16 x i16> %a, <16 x float>* %res) "min-legal-vector-width"="256" {
; CHECK-LABEL: ubto16f32_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovw2m %ymm0, %k0
; CHECK-NEXT:    kshiftrw $8, %k0, %k1
; CHECK-NEXT:    vpmovm2d %k1, %ymm0
; CHECK-NEXT:    vpsrld $31, %ymm0, %ymm0
; CHECK-NEXT:    vcvtdq2ps %ymm0, %ymm0
; CHECK-NEXT:    vpmovm2d %k0, %ymm1
; CHECK-NEXT:    vpsrld $31, %ymm1, %ymm1
; CHECK-NEXT:    vcvtdq2ps %ymm1, %ymm1
; CHECK-NEXT:    vmovaps %ymm1, (%rdi)
; CHECK-NEXT:    vmovaps %ymm0, 32(%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %mask = icmp slt <16 x i16> %a, zeroinitializer
 %1 = uitofp <16 x i1> %mask to <16 x float>
  store <16 x float> %1, <16 x float>* %res
 ret void
}

define dso_local void @ubto16f32_512(<16 x i16> %a, <16 x float>* %res) "min-legal-vector-width"="512" {
; CHECK-LABEL: ubto16f32_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovw2m %ymm0, %k0
; CHECK-NEXT:    vpmovm2d %k0, %zmm0
; CHECK-NEXT:    vpsrld $31, %zmm0, %zmm0
; CHECK-NEXT:    vcvtdq2ps %zmm0, %zmm0
; CHECK-NEXT:    vmovaps %zmm0, (%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
```

```
 %mask = icmp slt <16 x i16> %a, zeroinitializer
 %1 = uitofp <16 x i1> %mask to <16 x float>
 store <16 x float> %1, <16 x float>* %res
 ret void
}

define dso_local void @ubto16f64_256(<16 x i16> %a, <16 x double>* %res) "min-legal-vector-width"="256" {
; CHECK-LABEL: ubto16f64_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovw2m %ymm0, %k0
; CHECK-NEXT:    kshiftrw $8, %k0, %k1
; CHECK-NEXT:    vpmovm2d %k1, %ymm0
; CHECK-NEXT:    vpsrld $31, %ymm0, %ymm0
; CHECK-NEXT:    vcvtdq2pd %xmm0, %ymm1
; CHECK-NEXT:    vextracti128
 $1, %ymm0, %xmm0
; CHECK-NEXT:    vcvtdq2pd %xmm0, %ymm0
; CHECK-NEXT:    vpmovm2d %k0, %ymm2
; CHECK-NEXT:    vpsrld $31, %ymm2, %ymm2
; CHECK-NEXT:    vcvtdq2pd %xmm2, %ymm3
; CHECK-NEXT:    vextracti128 $1, %ymm2, %xmm2
; CHECK-NEXT:    vcvtdq2pd %xmm2, %ymm2
; CHECK-NEXT:    vmovaps %ymm2, 32(%rdi)
; CHECK-NEXT:    vmovaps %ymm3, (%rdi)
; CHECK-NEXT:    vmovaps %ymm0, 96(%rdi)
; CHECK-NEXT:    vmovaps %ymm1, 64(%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %mask = icmp slt <16 x i16> %a, zeroinitializer
 %1 = uitofp <16 x i1> %mask to <16 x double>
 store <16 x double> %1, <16 x double>* %res
 ret void
}

define dso_local void @ubto16f64_512(<16 x i16> %a, <16 x double>* %res) "min-legal-vector-width"="512" {
; CHECK-LABEL: ubto16f64_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovw2m %ymm0, %k0
; CHECK-NEXT:    vpmovm2d %k0, %zmm0
; CHECK-NEXT:    vpsrld $31, %zmm0, %zmm0
; CHECK-NEXT:    vcvtdq2pd %ymm0, %zmm1
; CHECK-NEXT:    vextracti64x4 $1, %zmm0, %ymm0
; CHECK-NEXT:
   vcvtdq2pd %ymm0, %zmm0
; CHECK-NEXT:    vmovaps %zmm0, 64(%rdi)
; CHECK-NEXT:    vmovaps %zmm1, (%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
```

```
 %mask = icmp slt <16 x i16> %a, zeroinitializer
 %1 = uitofp <16 x i1> %mask to <16 x double>
 store <16 x double> %1, <16 x double>* %res
 ret void
}

define <16 x i16> @test_16f32toub_256(<16 x float>* %ptr, <16 x i16> %passthru) "min-legal-vector-
width"="256" {
; CHECK-LABEL: test_16f32toub_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vcvttps2dq (%rdi), %ymm1
; CHECK-NEXT:    vpslld $31, %ymm1, %ymm1
; CHECK-NEXT:    vpmovd2m %ymm1, %k0
; CHECK-NEXT:    vcvttps2dq 32(%rdi), %ymm1
; CHECK-NEXT:    vpslld $31, %ymm1, %ymm1
; CHECK-NEXT:    vpmovd2m %ymm1, %k1
; CHECK-NEXT:    kunpckbw %k0, %k1, %k1
; CHECK-NEXT:    vmovdqu16 %ymm0, %ymm0 {%k1} {z}
; CHECK-NEXT:    retq
 %a = load <16 x float>, <16 x float>* %ptr
 %mask = fptoui <16 x float> %a to <16 x i1>
 %select = select <16 x i1> %mask, <16 x i16> %passthru,
 <16 x i16> zeroinitializer
 ret <16 x i16> %select
}

define <16 x i16> @test_16f32toub_512(<16 x float>* %ptr, <16 x i16> %passthru) "min-legal-vector-
width"="512" {
; CHECK-LABEL: test_16f32toub_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vcvttps2dq (%rdi), %zmm1
; CHECK-NEXT:    vpslld $31, %zmm1, %zmm1
; CHECK-NEXT:    vpmovd2m %zmm1, %k1
; CHECK-NEXT:    vmovdqu16 %ymm0, %ymm0 {%k1} {z}
; CHECK-NEXT:    retq
 %a = load <16 x float>, <16 x float>* %ptr
 %mask = fptoui <16 x float> %a to <16 x i1>
 %select = select <16 x i1> %mask, <16 x i16> %passthru, <16 x i16> zeroinitializer
 ret <16 x i16> %select
}

define <16 x i16> @test_16f32tosb_256(<16 x float>* %ptr, <16 x i16> %passthru) "min-legal-vector-
width"="256" {
; CHECK-LABEL: test_16f32tosb_256:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vcvttps2dq (%rdi), %ymm1
; CHECK-NEXT:    vpmovd2m %ymm1, %k0
; CHECK-NEXT:    vcvttps2dq 32(%rdi), %ymm1
```

```
; CHECK-NEXT:    vpmovd2m %ymm1, %k1
; CHECK-NEXT:    kunpckbw %k0, %k1, %k1
; CHECK-NEXT:
    vmovdqu16 %ymm0, %ymm0 {%k1} {z}
; CHECK-NEXT:    retq
 %a = load <16 x float>, <16 x float>* %ptr
 %mask = fptosi <16 x float> %a to <16 x i1>
 %select = select <16 x i1> %mask, <16 x i16> %passthru, <16 x i16> zeroinitializer
 ret <16 x i16> %select
}

define <16 x i16> @test_16f32tosb_512(<16 x float>* %ptr, <16 x i16> %passthru) "min-legal-vector-
width"="512" {
; CHECK-LABEL: test_16f32tosb_512:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vcvttps2dq (%rdi), %zmm1
; CHECK-NEXT:    vpmovd2m %zmm1, %k1
; CHECK-NEXT:    vmovdqu16 %ymm0, %ymm0 {%k1} {z}
; CHECK-NEXT:    retq
 %a = load <16 x float>, <16 x float>* %ptr
 %mask = fptosi <16 x float> %a to <16 x i1>
 %select = select <16 x i1> %mask, <16 x i16> %passthru, <16 x i16> zeroinitializer
 ret <16 x i16> %select
}

define dso_local void @mul256(<64 x i8>* %a, <64 x i8>* %b, <64 x i8>* %c) "min-legal-vector-width"="256" {
; CHECK-SKX-VBMI-LABEL: mul256:
; CHECK-SKX-VBMI:       # %bb.0:
; CHECK-SKX-VBMI-NEXT:    vmovdqa
 (%rdi), %ymm0
; CHECK-SKX-VBMI-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-SKX-VBMI-NEXT:    vmovdqa (%rsi), %ymm2
; CHECK-SKX-VBMI-NEXT:    vmovdqa 32(%rsi), %ymm3
; CHECK-SKX-VBMI-NEXT:    vpunpckhbw {{.*#+}} ymm4 =
ymm3[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-SKX-VBMI-NEXT:    vpunpckhbw {{.*#+}} ymm5 =
ymm1[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-SKX-VBMI-NEXT:    vpmullw %ymm4, %ymm5, %ymm4
; CHECK-SKX-VBMI-NEXT:    vpunpcklbw {{.*#+}} ymm3 =
ymm3[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-SKX-VBMI-NEXT:    vpunpcklbw {{.*#+}} ymm1 =
ymm1[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-SKX-VBMI-NEXT:    vpmullw %ymm3, %ymm1, %ymm1
; CHECK-SKX-VBMI-NEXT:    vmovdqa {{.*#+}} ymm3 =
[0,2,4,6,8,10,12,14,32,34,36,38,40,42,44,46,16,18,20,22,24,26,28,30,48,50,52,54,56,58,60,62]
;
 CHECK-SKX-VBMI-NEXT:    vpermt2b %ymm4, %ymm3, %ymm1
; CHECK-SKX-VBMI-NEXT:    vpunpckhbw {{.*#+}} ymm4 =
```

```
ymm2[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-SKX-VBMI-NEXT:    vpunpckhbw {{.*#+}} ymm5 =
ymm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-SKX-VBMI-NEXT:    vpmullw %ymm4, %ymm5, %ymm4
; CHECK-SKX-VBMI-NEXT:    vpunpcklbw {{.*#+}} ymm2 =
ymm2[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-SKX-VBMI-NEXT:    vpunpcklbw {{.*#+}} ymm0 =
ymm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-SKX-VBMI-NEXT:    vpmullw %ymm2, %ymm0, %ymm0
; CHECK-SKX-VBMI-NEXT:    vpermt2b %ymm4, %ymm3, %ymm0
; CHECK-SKX-VBMI-NEXT:    vmovdqa %ymm0, (%rdx)
; CHECK-SKX-VBMI-NEXT:    vmovdqa %ymm1, 32(%rdx)
; CHECK-SKX-VBMI-NEXT:    vzeroupper
; CHECK-SKX-VBMI-NEXT:    retq
;
; CHECK-AVX512-LABEL: mul256:
; CHECK-AVX512:
      # %bb.0:
; CHECK-AVX512-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-AVX512-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-AVX512-NEXT:    vmovdqa (%rsi), %ymm2
; CHECK-AVX512-NEXT:    vmovdqa 32(%rsi), %ymm3
; CHECK-AVX512-NEXT:    vpunpckhbw {{.*#+}} ymm4 =
ymm3[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-AVX512-NEXT:    vpunpckhbw {{.*#+}} ymm5 =
ymm1[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-AVX512-NEXT:    vpmullw %ymm4, %ymm5, %ymm4
; CHECK-AVX512-NEXT:    vpbroadcastw {{.*#+}} ymm5 =
[255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255]
; CHECK-AVX512-NEXT:    vpand %ymm5, %ymm4, %ymm4
; CHECK-AVX512-NEXT:    vpunpcklbw {{.*#+}} ymm3 =
ymm3[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-AVX512-NEXT:    vpunpcklbw {{.*#+}} ymm1 =
ymm1[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
;
 CHECK-AVX512-NEXT:    vpmullw %ymm3, %ymm1, %ymm1
; CHECK-AVX512-NEXT:    vpand %ymm5, %ymm1, %ymm1
; CHECK-AVX512-NEXT:    vpackuswb %ymm4, %ymm1, %ymm1
; CHECK-AVX512-NEXT:    vpunpckhbw {{.*#+}} ymm3 =
ymm2[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-AVX512-NEXT:    vpunpckhbw {{.*#+}} ymm4 =
ymm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-AVX512-NEXT:    vpmullw %ymm3, %ymm4, %ymm3
; CHECK-AVX512-NEXT:    vpand %ymm5, %ymm3, %ymm3
; CHECK-AVX512-NEXT:    vpunpcklbw {{.*#+}} ymm2 =
ymm2[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-AVX512-NEXT:    vpunpcklbw {{.*#+}} ymm0 =
ymm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
```

```
; CHECK-AVX512-NEXT:    vpmullw %ymm2, %ymm0, %ymm0
; CHECK-AVX512-NEXT:    vpand %ymm5, %ymm0, %ymm0
; CHECK-AVX512-NEXT:    vpackuswb %ymm3, %ymm0, %ymm0
; CHECK-AVX512-NEXT:
   vmovdqa %ymm0, (%rdx)
; CHECK-AVX512-NEXT:    vmovdqa %ymm1, 32(%rdx)
; CHECK-AVX512-NEXT:    vzeroupper
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI-LABEL: mul256:
; CHECK-VBMI:       # %bb.0:
; CHECK-VBMI-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-VBMI-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-VBMI-NEXT:    vmovdqa (%rsi), %ymm2
; CHECK-VBMI-NEXT:    vmovdqa 32(%rsi), %ymm3
; CHECK-VBMI-NEXT:    vpunpckhbw {{.*#+}} ymm4 =
ymm3[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-VBMI-NEXT:    vpunpckhbw {{.*#+}} ymm5 =
ymm1[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-VBMI-NEXT:    vpmullw %ymm4, %ymm5, %ymm4
; CHECK-VBMI-NEXT:    vpunpcklbw {{.*#+}} ymm3 =
ymm3[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-VBMI-NEXT:    vpunpcklbw {{.*#+}} ymm1 =
ymm1[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
;
 CHECK-VBMI-NEXT:    vpmullw %ymm3, %ymm1, %ymm1
; CHECK-VBMI-NEXT:    vmovdqa {{.*#+}} ymm3 =
[0,2,4,6,8,10,12,14,32,34,36,38,40,42,44,46,16,18,20,22,24,26,28,30,48,50,52,54,56,58,60,62]
; CHECK-VBMI-NEXT:    vpermt2b %ymm4, %ymm3, %ymm1
; CHECK-VBMI-NEXT:    vpunpckhbw {{.*#+}} ymm4 =
ymm2[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-VBMI-NEXT:    vpunpckhbw {{.*#+}} ymm5 =
ymm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-VBMI-NEXT:    vpmullw %ymm4, %ymm5, %ymm4
; CHECK-VBMI-NEXT:    vpunpcklbw {{.*#+}} ymm2 =
ymm2[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-VBMI-NEXT:    vpunpcklbw {{.*#+}} ymm0 =
ymm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-VBMI-NEXT:    vpmullw %ymm2, %ymm0, %ymm0
; CHECK-VBMI-NEXT:    vpermt2b %ymm4, %ymm3, %ymm0
; CHECK-VBMI-NEXT:    vmovdqa %ymm0, (%rdx)
;
 CHECK-VBMI-NEXT:    vmovdqa %ymm1, 32(%rdx)
; CHECK-VBMI-NEXT:    vzeroupper
; CHECK-VBMI-NEXT:    retq
 %d = load <64 x i8>, <64 x i8>* %a
 %e = load <64 x i8>, <64 x i8>* %b
 %f = mul <64 x i8> %d, %e
```

```
 store <64 x i8> %f, <64 x i8>* %c
 ret void
}

define dso_local void @mul512(<64 x i8>* %a, <64 x i8>* %b, <64 x i8>* %c) "min-legal-vector-width"="512" {
; CHECK-SKX-VBMI-LABEL: mul512:
; CHECK-SKX-VBMI:       # %bb.0:
; CHECK-SKX-VBMI-NEXT:    vmovdqa64 (%rdi), %zmm0
; CHECK-SKX-VBMI-NEXT:    vmovdqa64 (%rsi), %zmm1
; CHECK-SKX-VBMI-NEXT:    vpunpckhbw {{.*#+}} zmm2 =
zmm1[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31,40,40,41,41,4
2,42,43,43,44,44,45,45,46,46,47,47,56,56,57,57,58,58,59,59,60,60,61,61,62,62,63,63]
; CHECK-SKX-VBMI-NEXT:    vpunpckhbw {{.*#+}} zmm3 =
zmm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31,40,40,41,41,4
2,42,43,43,44,44,45,45,46,46,47,47,56,56,57,57,58,58,59,59,60,60,61,61,62,62,63,63]
;
 CHECK-SKX-VBMI-NEXT:    vpmullw %zmm2, %zmm3, %zmm2
; CHECK-SKX-VBMI-NEXT:    vpunpcklbw {{.*#+}} zmm1 =
zmm1[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23,32,32,33,33,34,34,35,35,36,3
6,37,37,38,38,39,39,48,48,49,49,50,50,51,51,52,52,53,53,54,54,55,55]
; CHECK-SKX-VBMI-NEXT:    vpunpcklbw {{.*#+}} zmm0 =
zmm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23,32,32,33,33,34,34,35,35,36,3
6,37,37,38,38,39,39,48,48,49,49,50,50,51,51,52,52,53,53,54,54,55,55]
; CHECK-SKX-VBMI-NEXT:    vpmullw %zmm1, %zmm0, %zmm0
; CHECK-SKX-VBMI-NEXT:    vmovdqa64 {{.*#+}} zmm1 =
[0,2,4,6,8,10,12,14,64,66,68,70,72,74,76,78,16,18,20,22,24,26,28,30,80,82,84,86,88,90,92,94,32,34,36,38,40,42,44,
46,96,98,100,102,104,106,108,110,48,50,52,54,56,58,60,62,112,114,116,118,120,122,124,126]
; CHECK-SKX-VBMI-NEXT:    vpermi2b %zmm2, %zmm0, %zmm1
; CHECK-SKX-VBMI-NEXT:    vmovdqa64 %zmm1, (%rdx)
; CHECK-SKX-VBMI-NEXT:    vzeroupper
;
 CHECK-SKX-VBMI-NEXT:    retq
;
; CHECK-AVX512-LABEL: mul512:
; CHECK-AVX512:       # %bb.0:
; CHECK-AVX512-NEXT:    vmovdqa64 (%rdi), %zmm0
; CHECK-AVX512-NEXT:    vmovdqa64 (%rsi), %zmm1
; CHECK-AVX512-NEXT:    vpunpckhbw {{.*#+}} zmm2 =
zmm1[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31,40,40,41,41,4
2,42,43,43,44,44,45,45,46,46,47,47,56,56,57,57,58,58,59,59,60,60,61,61,62,62,63,63]
; CHECK-AVX512-NEXT:    vpunpckhbw {{.*#+}} zmm3 =
zmm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31,40,40,41,41,4
2,42,43,43,44,44,45,45,46,46,47,47,56,56,57,57,58,58,59,59,60,60,61,61,62,62,63,63]
; CHECK-AVX512-NEXT:    vpmullw %zmm2, %zmm3, %zmm2
; CHECK-AVX512-NEXT:    vpbroadcastw {{.*#+}} zmm3 =
[255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,255,2
55,255,255,255,255,255]
; CHECK-AVX512-NEXT:    vpandq %zmm3, %zmm2, %zmm2
```

```
; CHECK-AVX512-NEXT:    vpunpcklbw
 {{.*#+}} zmm1 =
zmm1[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23,32,32,33,33,34,34,35,35,36,3
6,37,37,38,38,39,39,48,48,49,49,50,50,51,51,52,52,53,53,54,54,55,55]
; CHECK-AVX512-NEXT:    vpunpcklbw {{.*#+}} zmm0 =
zmm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23,32,32,33,33,34,34,35,35,36,3
6,37,37,38,38,39,39,48,48,49,49,50,50,51,51,52,52,53,53,54,54,55,55]
; CHECK-AVX512-NEXT:    vpmullw %zmm1, %zmm0, %zmm0
; CHECK-AVX512-NEXT:    vpandq %zmm3, %zmm0, %zmm0
; CHECK-AVX512-NEXT:    vpackuswb %zmm2, %zmm0, %zmm0
; CHECK-AVX512-NEXT:    vmovdqa64 %zmm0, (%rdx)
; CHECK-AVX512-NEXT:    vzeroupper
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI-LABEL: mul512:
; CHECK-VBMI:       # %bb.0:
; CHECK-VBMI-NEXT:    vmovdqa64 (%rdi), %zmm0
; CHECK-VBMI-NEXT:    vmovdqa64 (%rsi), %zmm1
; CHECK-VBMI-NEXT:    vpunpckhbw {{.*#+}} zmm2 =
zmm1[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31,40,40,41,41,4
2,42,43,43,44,44,45,45,46,46,47,47,56,56,57,57,58,58,59,59,60,60,61,61,62,62,63,63]
;
 CHECK-VBMI-NEXT:    vpunpckhbw {{.*#+}} zmm3 =
zmm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31,40,40,41,41,4
2,42,43,43,44,44,45,45,46,46,47,47,56,56,57,57,58,58,59,59,60,60,61,61,62,62,63,63]
; CHECK-VBMI-NEXT:    vpmullw %zmm2, %zmm3, %zmm2
; CHECK-VBMI-NEXT:    vpunpcklbw {{.*#+}} zmm1 =
zmm1[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23,32,32,33,33,34,34,35,35,36,3
6,37,37,38,38,39,39,48,48,49,49,50,50,51,51,52,52,53,53,54,54,55,55]
; CHECK-VBMI-NEXT:    vpunpcklbw {{.*#+}} zmm0 =
zmm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23,32,32,33,33,34,34,35,35,36,3
6,37,37,38,38,39,39,48,48,49,49,50,50,51,51,52,52,53,53,54,54,55,55]
; CHECK-VBMI-NEXT:    vpmullw %zmm1, %zmm0, %zmm0
; CHECK-VBMI-NEXT:    vmovdqa64 {{.*#+}} zmm1 =
[0,2,4,6,8,10,12,14,64,66,68,70,72,74,76,78,16,18,20,22,24,26,28,30,80,82,84,86,88,90,92,94,32,34,36,38,40,42,44,
46,96,98,100,102,104,106,108,110,48,50,52,54,56,58,60,62,112,114,116,118,120,122,124,126]
;
 CHECK-VBMI-NEXT:    vpermi2b %zmm2, %zmm0, %zmm1
; CHECK-VBMI-NEXT:    vmovdqa64 %zmm1, (%rdx)
; CHECK-VBMI-NEXT:    vzeroupper
; CHECK-VBMI-NEXT:    retq
 %d = load <64 x i8>, <64 x i8>* %a
 %e = load <64 x i8>, <64 x i8>* %b
 %f = mul <64 x i8> %d, %e
 store <64 x i8> %f, <64 x i8>* %c
 ret void
}
```

```
; This threw an assertion at one point.
define <4 x i32> @mload_v4i32(<4 x i32> %trigger, <4 x i32>* %addr, <4 x i32> %dst) "min-legal-vector-
width"="256" {
; CHECK-LABEL: mload_v4i32:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vptestnmd %xmm0, %xmm0, %k1
; CHECK-NEXT:    vpblendmd (%rdi), %xmm1, %xmm0 {%k1}
; CHECK-NEXT:    retq
 %mask = icmp eq <4 x i32> %trigger, zeroinitializer
 %res = call <4 x i32> @llvm.masked.load.v4i32.p0v4i32(<4 x i32>* %addr, i32 4, <4 x i1> %mask, <4 x i32>
%dst)
 ret <4 x i32> %res
}
declare <4 x i32>
 @llvm.masked.load.v4i32.p0v4i32(<4 x i32>*, i32, <4 x i1>, <4 x i32>)

define <16 x i32> @trunc_v16i64_v16i32(<16 x i64>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v16i64_v16i32:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT:    vmovdqa 64(%rdi), %ymm2
; CHECK-NEXT:    vmovdqa 96(%rdi), %ymm3
; CHECK-NEXT:    vpmovqd %ymm0, %xmm0
; CHECK-NEXT:    vpmovqd %ymm1, %xmm1
; CHECK-NEXT:    vinserti128 $1, %xmm1, %ymm0, %ymm0
; CHECK-NEXT:    vpmovqd %ymm2, %xmm1
; CHECK-NEXT:    vpmovqd %ymm3, %xmm2
; CHECK-NEXT:    vinserti128 $1, %xmm2, %ymm1, %ymm1
; CHECK-NEXT:    retq
 %a = load <16 x i64>, <16 x i64>* %x
 %b = trunc <16 x i64> %a to <16 x i32>
 ret <16 x i32> %b
}

define <16 x i8> @trunc_v16i64_v16i8(<16 x i64>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v16i64_v16i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rdi),
 %ymm1
; CHECK-NEXT:    vmovdqa 64(%rdi), %ymm2
; CHECK-NEXT:    vmovdqa 96(%rdi), %ymm3
; CHECK-NEXT:    vpmovqb %ymm3, %xmm3
; CHECK-NEXT:    vpmovqb %ymm2, %xmm2
; CHECK-NEXT:    vpunpckldq {{.*#+}} xmm2 = xmm2[0],xmm3[0],xmm2[1],xmm3[1]
; CHECK-NEXT:    vpmovqb %ymm1, %xmm1
; CHECK-NEXT:    vpmovqb %ymm0, %xmm0
```

```
; CHECK-NEXT:    vpunpckldq {{.*#+}} xmm0 = xmm0[0],xmm1[0],xmm0[1],xmm1[1]
; CHECK-NEXT:    vpunpcklqdq {{.*#+}} xmm0 = xmm0[0],xmm2[0]
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %a = load <16 x i64>, <16 x i64>* %x
 %b = trunc <16 x i64> %a to <16 x i8>
 ret <16 x i8> %b
}

define <16 x i8> @trunc_v16i32_v16i8(<16 x i32>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v16i32_v16i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT:    vpmovdb %ymm1, %xmm1
; CHECK-NEXT:    vpmovdb %ymm0, %xmm0
; CHECK-NEXT:    vpunpcklqdq {{.*#+}} xmm0 = xmm0[0],xmm1[0]
; CHECK-NEXT:    vzeroupper
;
 CHECK-NEXT:    retq
 %a = load <16 x i32>, <16 x i32>* %x
 %b = trunc <16 x i32> %a to <16 x i8>
 ret <16 x i8> %b
}

define <8 x i8> @trunc_v8i64_v8i8(<8 x i64>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v8i64_v8i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT:    vpmovqb %ymm1, %xmm1
; CHECK-NEXT:    vpmovqb %ymm0, %xmm0
; CHECK-NEXT:    vpunpckldq {{.*#+}} xmm0 = xmm0[0],xmm1[0],xmm0[1],xmm1[1]
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %a = load <8 x i64>, <8 x i64>* %x
 %b = trunc <8 x i64> %a to <8 x i8>
 ret <8 x i8> %b
}

define <8 x i16> @trunc_v8i64_v8i16(<8 x i64>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v8i64_v8i16:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm1
; CHECK-NEXT:    vpmovqw %ymm1, %xmm1
; CHECK-NEXT:    vpmovqw %ymm0, %xmm0
; CHECK-NEXT:    vpunpcklqdq {{.*#+}} xmm0
```

```
 = xmm0[0],xmm1[0]
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %a = load <8 x i64>, <8 x i64>* %x
 %b = trunc <8 x i64> %a to <8 x i16>
 ret <8 x i16> %b
}

define <8 x i32> @trunc_v8i64_v8i32_zeroes(<8 x i64>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v8i64_v8i32_zeroes:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpsrlq $48, 32(%rdi), %ymm0
; CHECK-NEXT:    vpsrlq $48, (%rdi), %ymm1
; CHECK-NEXT:    vpackusdw %ymm0, %ymm1, %ymm0
; CHECK-NEXT:    vpermq {{.*#+}} ymm0 = ymm0[0,2,1,3]
; CHECK-NEXT:    retq
 %a = load <8 x i64>, <8 x i64>* %x
 %b = lshr <8 x i64> %a, <i64 48, i64 48, i64 48, i64 48, i64 48, i64 48, i64 48, i64 48>
 %c = trunc <8 x i64> %b to <8 x i32>
 ret <8 x i32> %c
}

define <16 x i16> @trunc_v16i32_v16i16_zeroes(<16 x i32>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v16i32_v16i16_zeroes:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm1
; CHECK-NEXT:    vmovdqa {{.*#+}} ymm0 = [1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31]
;
 CHECK-NEXT:    vpermi2w 32(%rdi), %ymm1, %ymm0
; CHECK-NEXT:    retq
 %a = load <16 x i32>, <16 x i32>* %x
 %b = lshr <16 x i32> %a, <i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32
16, i32 16, i32 16, i32 16, i32 16>
 %c = trunc <16 x i32> %b to <16 x i16>
 ret <16 x i16> %c
}

define <32 x i8> @trunc_v32i16_v32i8_zeroes(<32 x i16>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-SKX-VBMI-LABEL: trunc_v32i16_v32i8_zeroes:
; CHECK-SKX-VBMI:       # %bb.0:
; CHECK-SKX-VBMI-NEXT:    vmovdqa (%rdi), %ymm1
; CHECK-SKX-VBMI-NEXT:    vmovdqa {{.*#+}} ymm0 =
[1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61,63]
; CHECK-SKX-VBMI-NEXT:    vpermi2b 32(%rdi), %ymm1, %ymm0
; CHECK-SKX-VBMI-NEXT:    retq
;
; CHECK-AVX512-LABEL: trunc_v32i16_v32i8_zeroes:
; CHECK-AVX512:       # %bb.0:
```

```
; CHECK-AVX512-NEXT:    vpsrlw $8, 32(%rdi), %ymm0
; CHECK-AVX512-NEXT:    vpsrlw $8, (%rdi),
 %ymm1
; CHECK-AVX512-NEXT:    vpackuswb %ymm0, %ymm1, %ymm0
; CHECK-AVX512-NEXT:    vpermq {{.*#+}} ymm0 = ymm0[0,2,1,3]
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI-LABEL: trunc_v32i16_v32i8_zeroes:
; CHECK-VBMI:       # %bb.0:
; CHECK-VBMI-NEXT:    vmovdqa (%rdi), %ymm1
; CHECK-VBMI-NEXT:    vmovdqa {{.*#+}} ymm0 =
[1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61,63]
; CHECK-VBMI-NEXT:    vpermi2b 32(%rdi), %ymm1, %ymm0
; CHECK-VBMI-NEXT:    retq
 %a = load <32 x i16>, <32 x i16>* %x
 %b = lshr <32 x i16> %a, <i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8,
i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8>
 %c = trunc <32 x i16> %b to <32 x i8>
 ret <32 x i8> %c
}

define <8 x i32> @trunc_v8i64_v8i32_sign(<8 x i64>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v8i64_v8i32_sign:
; CHECK:
 # %bb.0:
; CHECK-NEXT:    vpsraq $48, 32(%rdi), %ymm0
; CHECK-NEXT:    vpsraq $48, (%rdi), %ymm1
; CHECK-NEXT:    vpackssdw %ymm0, %ymm1, %ymm0
; CHECK-NEXT:    vpermq {{.*#+}} ymm0 = ymm0[0,2,1,3]
; CHECK-NEXT:    retq
 %a = load <8 x i64>, <8 x i64>* %x
 %b = ashr <8 x i64> %a, <i64 48, i64 48, i64 48, i64 48, i64 48, i64 48, i64 48, i64 48>
 %c = trunc <8 x i64> %b to <8 x i32>
 ret <8 x i32> %c
}

define <16 x i16> @trunc_v16i32_v16i16_sign(<16 x i32>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_v16i32_v16i16_sign:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm1
; CHECK-NEXT:    vmovdqa {{.*#+}} ymm0 = [1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31]
; CHECK-NEXT:    vpermi2w 32(%rdi), %ymm1, %ymm0
; CHECK-NEXT:    retq
 %a = load <16 x i32>, <16 x i32>* %x
 %b = ashr <16 x i32> %a, <i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32 16, i32
16, i32 16, i32 16, i32 16, i32 16>
 %c = trunc <16 x i32> %b to <16
```

```
 x i16>
 ret <16 x i16> %c
}

define <32 x i8> @trunc_v32i16_v32i8_sign(<32 x i16>* %x) nounwind "min-legal-vector-width"="256" {
; CHECK-SKX-VBMI-LABEL: trunc_v32i16_v32i8_sign:
; CHECK-SKX-VBMI:       # %bb.0:
; CHECK-SKX-VBMI-NEXT:    vmovdqa (%rdi), %ymm1
; CHECK-SKX-VBMI-NEXT:    vmovdqa {{.*#+}} ymm0 =
[1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61,63]
; CHECK-SKX-VBMI-NEXT:    vpermi2b 32(%rdi), %ymm1, %ymm0
; CHECK-SKX-VBMI-NEXT:    retq
;
; CHECK-AVX512-LABEL: trunc_v32i16_v32i8_sign:
; CHECK-AVX512:       # %bb.0:
; CHECK-AVX512-NEXT:    vpsrlw $8, 32(%rdi), %ymm0
; CHECK-AVX512-NEXT:    vpsrlw $8, (%rdi), %ymm1
; CHECK-AVX512-NEXT:    vpackuswb %ymm0, %ymm1, %ymm0
; CHECK-AVX512-NEXT:    vpermq {{.*#+}} ymm0 = ymm0[0,2,1,3]
; CHECK-AVX512-NEXT:    retq
;
; CHECK-VBMI-LABEL: trunc_v32i16_v32i8_sign:
; CHECK-VBMI:       # %bb.0:
; CHECK-VBMI-NEXT:    vmovdqa (%rdi), %ymm1
; CHECK-VBMI-NEXT:    vmovdqa {{.*#+}} ymm0 =
[1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61,63]
;
 CHECK-VBMI-NEXT:    vpermi2b 32(%rdi), %ymm1, %ymm0
; CHECK-VBMI-NEXT:    retq
 %a = load <32 x i16>, <32 x i16>* %x
 %b = ashr <32 x i16> %a, <i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8,
i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8, i16 8>
 %c = trunc <32 x i16> %b to <32 x i8>
 ret <32 x i8> %c
}

define dso_local void @zext_v16i8_v16i64(<16 x i8> %x, <16 x i64>* %y) nounwind "min-legal-vector-
width"="256" {
; CHECK-LABEL: zext_v16i8_v16i64:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovzxbw {{.*#+}} ymm1 =
xmm0[0],zero,xmm0[1],zero,xmm0[2],zero,xmm0[3],zero,xmm0[4],zero,xmm0[5],zero,xmm0[6],zero,xmm0[7],zer
o,xmm0[8],zero,xmm0[9],zero,xmm0[10],zero,xmm0[11],zero,xmm0[12],zero,xmm0[13],zero,xmm0[14],zero,xm
m0[15],zero
; CHECK-NEXT:    vpshufd {{.*#+}} xmm2 = xmm1[2,3,2,3]
; CHECK-NEXT:
    vpmovzxwq {{.*#+}} ymm2 =
xmm2[0],zero,zero,zero,xmm2[1],zero,zero,zero,xmm2[2],zero,zero,zero,xmm2[3],zero,zero,zero
```

```
; CHECK-NEXT:    vextracti128 $1, %ymm1, %xmm1
; CHECK-NEXT:    vpshufd {{.*#+}} xmm3 = xmm1[2,3,2,3]
; CHECK-NEXT:    vpmovzxwq {{.*#+}} ymm3 =
xmm3[0],zero,zero,zero,xmm3[1],zero,zero,zero,xmm3[2],zero,zero,zero,xmm3[3],zero,zero,zero
; CHECK-NEXT:    vpmovzxwq {{.*#+}} ymm1 =
xmm1[0],zero,zero,zero,xmm1[1],zero,zero,zero,xmm1[2],zero,zero,zero,xmm1[3],zero,zero,zero
; CHECK-NEXT:    vpmovzxbq {{.*#+}} ymm0 =
xmm0[0],zero,zero,zero,zero,zero,zero,zero,xmm0[1],zero,zero,zero,zero,zero,zero,zero,xmm0[2],zero,zero,zero,zer
o,zero,zero,zero,xmm0[3],zero,zero,zero,zero,zero,zero,zero
; CHECK-NEXT:    vmovdqa %ymm0, (%rdi)
; CHECK-NEXT:    vmovdqa %ymm1, 64(%rdi)
; CHECK-NEXT:    vmovdqa %ymm3, 96(%rdi)
; CHECK-NEXT:    vmovdqa %ymm2, 32(%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %a = zext <16 x i8> %x to <16 x i64>
 store <16 x i64> %a, <16 x i64>*
 %y
 ret void
}

define dso_local void @sext_v16i8_v16i64(<16 x i8> %x, <16 x i64>* %y) nounwind "min-legal-vector-
width"="256" {
; CHECK-LABEL: sext_v16i8_v16i64:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpmovsxbw %xmm0, %ymm1
; CHECK-NEXT:    vpshufd {{.*#+}} xmm2 = xmm1[2,3,2,3]
; CHECK-NEXT:    vpmovsxwq %xmm2, %ymm2
; CHECK-NEXT:    vextracti128 $1, %ymm1, %xmm1
; CHECK-NEXT:    vpshufd {{.*#+}} xmm3 = xmm1[2,3,2,3]
; CHECK-NEXT:    vpmovsxwq %xmm3, %ymm3
; CHECK-NEXT:    vpmovsxwq %xmm1, %ymm1
; CHECK-NEXT:    vpmovsxbq %xmm0, %ymm0
; CHECK-NEXT:    vmovdqa %ymm0, (%rdi)
; CHECK-NEXT:    vmovdqa %ymm1, 64(%rdi)
; CHECK-NEXT:    vmovdqa %ymm3, 96(%rdi)
; CHECK-NEXT:    vmovdqa %ymm2, 32(%rdi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %a = sext <16 x i8> %x to <16 x i64>
 store <16 x i64> %a, <16 x i64>* %y
 ret void
}

define dso_local void @vselect_split_v8i16_setcc(<8 x i16> %s, <8 x i16> %t, <8 x i64>* %p, <8 x i64>* %q, <8
x i64>* %r) "min-legal-vector-width"="256"
 {
; CHECK-LABEL: vselect_split_v8i16_setcc:
```

```
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rsi), %ymm2
; CHECK-NEXT:    vmovdqa 32(%rsi), %ymm3
; CHECK-NEXT:    vpcmpeqw %xmm1, %xmm0, %k1
; CHECK-NEXT:    kshiftrb $4, %k1, %k2
; CHECK-NEXT:    vmovdqa64 32(%rdi), %ymm3 {%k2}
; CHECK-NEXT:    vmovdqa64 (%rdi), %ymm2 {%k1}
; CHECK-NEXT:    vmovdqa %ymm2, (%rdx)
; CHECK-NEXT:    vmovdqa %ymm3, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %x = load <8 x i64>, <8 x i64>* %p
 %y = load <8 x i64>, <8 x i64>* %q
 %a = icmp eq <8 x i16> %s, %t
 %b = select <8 x i1> %a, <8 x i64> %x, <8 x i64> %y
 store <8 x i64> %b, <8 x i64>* %r
 ret void
}

define dso_local void @vselect_split_v8i32_setcc(<8 x i32> %s, <8 x i32> %t, <8 x i64>* %p, <8 x i64>* %q, <8
x i64>* %r) "min-legal-vector-width"="256" {
; CHECK-LABEL: vselect_split_v8i32_setcc:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rsi), %ymm2
; CHECK-NEXT:    vmovdqa 32(%rsi), %ymm3
; CHECK-NEXT:    vpcmpeqd %ymm1,
 %ymm0, %k1
; CHECK-NEXT:    kshiftrb $4, %k1, %k2
; CHECK-NEXT:    vmovdqa64 32(%rdi), %ymm3 {%k2}
; CHECK-NEXT:    vmovdqa64 (%rdi), %ymm2 {%k1}
; CHECK-NEXT:    vmovdqa %ymm2, (%rdx)
; CHECK-NEXT:    vmovdqa %ymm3, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %x = load <8 x i64>, <8 x i64>* %p
 %y = load <8 x i64>, <8 x i64>* %q
 %a = icmp eq <8 x i32> %s, %t
 %b = select <8 x i1> %a, <8 x i64> %x, <8 x i64> %y
 store <8 x i64> %b, <8 x i64>* %r
 ret void
}

define dso_local void @vselect_split_v16i8_setcc(<16 x i8> %s, <16 x i8> %t, <16 x i32>* %p, <16 x i32>* %q,
<16 x i32>* %r) "min-legal-vector-width"="256" {
; CHECK-LABEL: vselect_split_v16i8_setcc:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rsi), %ymm2
; CHECK-NEXT:    vmovdqa 32(%rsi), %ymm3
```

```
; CHECK-NEXT:    vpcmpeqb %xmm1, %xmm0, %k1
; CHECK-NEXT:    kshiftrw $8, %k1, %k2
; CHECK-NEXT:    vmovdqa32 32(%rdi), %ymm3 {%k2}
; CHECK-NEXT:    vmovdqa32 (%rdi), %ymm2 {%k1}
; CHECK-NEXT:    vmovdqa %ymm2,
 (%rdx)
; CHECK-NEXT:    vmovdqa %ymm3, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %x = load <16 x i32>, <16 x i32>* %p
 %y = load <16 x i32>, <16 x i32>* %q
 %a = icmp eq <16 x i8> %s, %t
 %b = select <16 x i1> %a, <16 x i32> %x, <16 x i32> %y
 store <16 x i32> %b, <16 x i32>* %r
 ret void
}

define dso_local void @vselect_split_v16i16_setcc(<16 x i16> %s, <16 x i16> %t, <16 x i32>* %p, <16 x i32>*
%q, <16 x i32>* %r) "min-legal-vector-width"="256" {
; CHECK-LABEL: vselect_split_v16i16_setcc:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rsi), %ymm2
; CHECK-NEXT:    vmovdqa 32(%rsi), %ymm3
; CHECK-NEXT:    vpcmpeqw %ymm1, %ymm0, %k1
; CHECK-NEXT:    kshiftrw $8, %k1, %k2
; CHECK-NEXT:    vmovdqa32 32(%rdi), %ymm3 {%k2}
; CHECK-NEXT:    vmovdqa32 (%rdi), %ymm2 {%k1}
; CHECK-NEXT:    vmovdqa %ymm2, (%rdx)
; CHECK-NEXT:    vmovdqa %ymm3, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %x = load <16 x i32>, <16 x i32>* %p
 %y = load <16 x i32>,
 <16 x i32>* %q
 %a = icmp eq <16 x i16> %s, %t
 %b = select <16 x i1> %a, <16 x i32> %x, <16 x i32> %y
 store <16 x i32> %b, <16 x i32>* %r
 ret void
}

define <16 x i8> @trunc_packus_v16i32_v16i8(<16 x i32>* %p) "min-legal-vector-width"="256" {
; CHECK-LABEL: trunc_packus_v16i32_v16i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vpackusdw 32(%rdi), %ymm0, %ymm0
; CHECK-NEXT:    vpermq {{.*#+}} ymm0 = ymm0[0,2,1,3]
; CHECK-NEXT:    vpmovuswb %ymm0, %xmm0
; CHECK-NEXT:    vzeroupper
```

```
; CHECK-NEXT:    retq
 %a = load <16 x i32>, <16 x i32>* %p
 %b = icmp slt <16 x i32> %a, <i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32
255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255>
 %c = select <16 x i1> %b, <16 x i32> %a, <16 x i32> <i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32
255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255>
 %d = icmp sgt <16 x i32> %c, zeroinitializer
  %e = select <16 x i1> %d, <16 x i32> %c, <16 x i32> zeroinitializer
 %f = trunc <16 x i32> %e to <16 x i8>
 ret <16 x i8> %f
}

define dso_local void @trunc_packus_v16i32_v16i8_store(<16 x i32>* %p, <16 x i8>* %q) "min-legal-vector-
width"="256" {
; CHECK-LABEL: trunc_packus_v16i32_v16i8_store:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rdi), %ymm0
; CHECK-NEXT:    vpackusdw 32(%rdi), %ymm0, %ymm0
; CHECK-NEXT:    vpermq {{.*#+}} ymm0 = ymm0[0,2,1,3]
; CHECK-NEXT:    vpmovuswb %ymm0, (%rsi)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %a = load <16 x i32>, <16 x i32>* %p
 %b = icmp slt <16 x i32> %a, <i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32
255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255>
 %c = select <16 x i1> %b, <16 x i32> %a, <16 x i32> <i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32
255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255, i32 255>
 %d = icmp sgt <16
 x i32> %c, zeroinitializer
 %e = select <16 x i1> %d, <16 x i32> %c, <16 x i32> zeroinitializer
 %f = trunc <16 x i32> %e to <16 x i8>
 store <16 x i8> %f, <16 x i8>* %q
 ret void
}

define <64 x i1> @v64i1_argument_return(<64 x i1> %x) "min-legal-vector-width"="256" {
; CHECK-LABEL: v64i1_argument_return:
; CHECK:       # %bb.0:
; CHECK-NEXT:    retq
 ret <64 x i1> %x
}

define dso_local void @v64i1_shuffle(<64 x i8>* %x, <64 x i8>* %y) "min-legal-vector-width"="256" {
; CHECK-LABEL: v64i1_shuffle:
; CHECK:       # %bb.0: # %entry
; CHECK-NEXT:    vmovdqa (%rdi), %ymm1
; CHECK-NEXT:    vmovdqa 32(%rdi), %ymm0
; CHECK-NEXT:    vptestnmb %ymm1, %ymm1, %k0
```

```
; CHECK-NEXT:    kshiftrd $1, %k0, %k1
; CHECK-NEXT:    kshiftlq $63, %k0, %k2
; CHECK-NEXT:    kshiftrq $62, %k2, %k2
; CHECK-NEXT:    kshiftlq $63, %k1, %k1
; CHECK-NEXT:    kshiftrq $63, %k1, %k1
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-5, %rax
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1,
 %k1
; CHECK-NEXT:    kshiftrd $3, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $61, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-9, %rax
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $2, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $60, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-17, %rax
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $5, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $59, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-33, %rax
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $4, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $58, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-65, %rax
; CHECK-NEXT:    kmovq %rax, %k2
;
 CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $7, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $57, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-129, %rax
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $6, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
```

```
; CHECK-NEXT:    kshiftrq $56, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-257, %rax # imm = 0xFEFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $9, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $55, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-513, %rax # imm = 0xFDFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $8, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $54, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
;
 CHECK-NEXT:    movq $-1025, %rax # imm = 0xFBFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $11, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $53, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-2049, %rax # imm = 0xF7FF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $10, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $52, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-4097, %rax # imm = 0xEFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $13, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $51, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-8193, %rax # imm = 0xDFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $12, %k0, %k2
; CHECK-NEXT:
   kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $50, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-16385, %rax # imm = 0xBFFF
; CHECK-NEXT:    kmovq %rax, %k2
```

```
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $15, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $49, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-32769, %rax # imm = 0xFFFF7FFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $14, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $48, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-65537, %rax # imm = 0xFFFEFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $17, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $47, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-131073, %rax # imm = 0xFFFDFFFF
;
 CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $16, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $46, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-262145, %rax # imm = 0xFFFBFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $19, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $45, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-524289, %rax # imm = 0xFFF7FFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $18, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $44, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-1048577, %rax # imm = 0xFFEFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $21, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:
```

```
    kshiftrq $43, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-2097153, %rax # imm = 0xFFDFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $20, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $42, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-4194305, %rax # imm = 0xFFBFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $23, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $41, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-8388609, %rax # imm = 0xFF7FFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $22, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $40, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-16777217, %rax # imm = 0xFEFFFFFF
; CHECK-NEXT:    kmovq
 %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $25, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $39, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-33554433, %rax # imm = 0xFDFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $24, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $38, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-67108865, %rax # imm = 0xFBFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $27, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $37, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-134217729, %rax # imm = 0xF7FFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
```

```
; CHECK-NEXT:    kshiftrd $26, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq
 $36, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-268435457, %rax # imm = 0xEFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $29, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $35, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-536870913, %rax # imm = 0xDFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $28, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $34, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movq $-1073741825, %rax # imm = 0xBFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k1
; CHECK-NEXT:    kshiftrd $31, %k0, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $33, %k2, %k2
; CHECK-NEXT:    korq %k2, %k1, %k1
; CHECK-NEXT:    movabsq $-2147483649, %rax # imm = 0xFFFFFFFF7FFFFFFF
; CHECK-NEXT:
   kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k1, %k2
; CHECK-NEXT:    vptestnmb %ymm0, %ymm0, %k1
; CHECK-NEXT:    kshiftrd $30, %k0, %k0
; CHECK-NEXT:    kshiftlq $63, %k0, %k0
; CHECK-NEXT:    kshiftrq $32, %k0, %k0
; CHECK-NEXT:    korq %k0, %k2, %k0
; CHECK-NEXT:    movabsq $-4294967297, %rax # imm = 0xFFFFFFFEFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $1, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $31, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-8589934593, %rax # imm = 0xFFFFFFFDFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftlq $63, %k1, %k2
; CHECK-NEXT:    kshiftrq $30, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
```

```
; CHECK-NEXT:    movabsq $-17179869185, %rax # imm = 0xFFFFFFFBFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $3, %k1, %k2
; CHECK-NEXT:
   kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $29, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-34359738369, %rax # imm = 0xFFFFFFF7FFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $2, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $28, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-68719476737, %rax # imm = 0xFFFFFFEFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $5, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $27, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-137438953473, %rax # imm = 0xFFFFFFDFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $4, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $26, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
;
 CHECK-NEXT:    movabsq $-274877906945, %rax # imm = 0xFFFFFFBFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $7, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $25, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-549755813889, %rax # imm = 0xFFFFFF7FFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $6, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $24, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-1099511627777, %rax # imm = 0xFFFFFEFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $9, %k1, %k2
```

```
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $23, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-2199023255553, %rax # imm = 0xFFFFFDFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
;
 CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $8, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $22, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-4398046511105, %rax # imm = 0xFFFFFBFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $11, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $21, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-8796093022209, %rax # imm = 0xFFFFF7FFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $10, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $20, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-17592186044417, %rax # imm = 0xFFFFEFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $13, %k1, %k2
; CHECK-NEXT:    kshiftlq
 $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $19, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-35184372088833, %rax # imm = 0xFFFFDFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $12, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $18, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-70368744177665, %rax # imm = 0xFFFFBFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $15, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $17, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-140737488355329, %rax # imm = 0xFFFF7FFFFFFFFFFF
```

```
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $14, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $16, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:
   movabsq $-281474976710657, %rax # imm = 0xFFFEFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $17, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $15, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-562949953421313, %rax # imm = 0xFFFDFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $16, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $14, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-1125899906842625, %rax # imm = 0xFFFBFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $19, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $13, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-2251799813685249, %rax # imm = 0xFFF7FFFFFFFFFFFF
; CHECK-NEXT:    kmovq
 %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $18, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $12, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-4503599627370497, %rax # imm = 0xFFEFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $21, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $11, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-9007199254740993, %rax # imm = 0xFFDFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $20, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
```

```
; CHECK-NEXT:    kshiftrq $10, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-18014398509481985, %rax # imm = 0xFFBFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $23, %k1, %k2
;
 CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $9, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-36028797018963969, %rax # imm = 0xFF7FFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $22, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $8, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-72057594037927937, %rax # imm = 0xFEFFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $25, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $7, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-144115188075855873, %rax # imm = 0xFDFFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $24, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $6, %k2, %k2
; CHECK-NEXT:
   korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-288230376151711745, %rax # imm = 0xFBFFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $27, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $5, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-576460752303423489, %rax # imm = 0xF7FFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $26, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $4, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-1152921504606846977, %rax # imm = 0xEFFFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
```

```
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $29, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $3, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-2305843009213693953, %rax # imm =
 0xDFFFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $28, %k1, %k2
; CHECK-NEXT:    kshiftlq $63, %k2, %k2
; CHECK-NEXT:    kshiftrq $2, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    movabsq $-4611686018427387905, %rax # imm = 0xBFFFFFFFFFFFFFFF
; CHECK-NEXT:    kmovq %rax, %k2
; CHECK-NEXT:    kandq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $31, %k1, %k2
; CHECK-NEXT:    kshiftlq $62, %k2, %k2
; CHECK-NEXT:    korq %k2, %k0, %k0
; CHECK-NEXT:    kshiftrd $30, %k1, %k1
; CHECK-NEXT:    kshiftlq $1, %k0, %k0
; CHECK-NEXT:    kshiftrq $1, %k0, %k0
; CHECK-NEXT:    kshiftlq $63, %k1, %k1
; CHECK-NEXT:    korq %k1, %k0, %k1
; CHECK-NEXT:    vmovdqu8 %ymm1, (%rsi) {%k1}
; CHECK-NEXT:    kshiftrq $32, %k1, %k1
; CHECK-NEXT:    vmovdqu8 %ymm0, 32(%rsi) {%k1}
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
entry:
 %a = load <64 x i8>, <64 x i8>* %x
 %b = icmp eq <64 x i8> %a, zeroinitializer
 %shuf = shufflevector
 <64 x i1> %b, <64 x i1> undef, <64 x i32> <i32 1, i32 0, i32 3, i32 2, i32 5, i32 4, i32 7, i32 6, i32 9, i32 8, i32 11,
i32 10, i32 13, i32 12, i32 15, i32 14, i32 17, i32 16, i32 19, i32 18, i32 21, i32 20, i32 23, i32 22, i32 25, i32 24, i32
27, i32 26, i32 29, i32 28, i32 31, i32 30, i32 33, i32 32, i32 35, i32 34, i32 37, i32 36, i32 39, i32 38, i32 41, i32 40,
i32 43, i32 42, i32 45, i32 44, i32 47, i32 46, i32 49, i32 48, i32 51, i32 50, i32 53, i32 52, i32 55, i32 54, i32 57, i32
56, i32 59, i32 58, i32 61, i32 60, i32 63, i32 62>
 call void @llvm.masked.store.v64i8.p0v64i8(<64 x i8> %a, <64 x i8>* %y, i32 1, <64 x i1> %shuf)
 ret void
}
declare void @llvm.masked.store.v64i8.p0v64i8(<64 x i8>, <64 x i8>*, i32, <64 x i1>)

@mem64_dst = dso_local global i64 0, align 8
@mem64_src = dso_local global i64 0, align 8
define dso_local i32 @v64i1_inline_asm() "min-legal-vector-width"="256" {
; CHECK-LABEL: v64i1_inline_asm:
; CHECK:       # %bb.0:
```

```
; CHECK-NEXT:    kmovq mem64_src(%rip),
 %k0
; CHECK-NEXT:    #APP
; CHECK-NEXT:    #NO_APP
; CHECK-NEXT:    kmovq %k0, mem64_dst(%rip)
; CHECK-NEXT:    movl -{{[0-9]+}}(%rsp), %eax
; CHECK-NEXT:    retq
 %1 = alloca i32, align 4
 %2 = load i64, i64* @mem64_src, align 8
 %3 = call i64 asm "", "=k,k,~{dirflag},~{fpsr},~{flags}"(i64 %2)
 store i64 %3, i64* @mem64_dst, align 8
 %4 = load i32, i32* %1, align 4
 ret i32 %4
}

define dso_local void @cmp_v8i64_sext(<8 x i64>* %xptr, <8 x i64>* %yptr, <8 x i64>* %zptr) "min-legal-
vector-width"="256" {
; CHECK-LABEL: cmp_v8i64_sext:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rsi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rsi), %ymm1
; CHECK-NEXT:    vpcmpgtq 32(%rdi), %ymm1, %ymm1
; CHECK-NEXT:    vpcmpgtq (%rdi), %ymm0, %ymm0
; CHECK-NEXT:    vmovdqa %ymm0, (%rdx)
; CHECK-NEXT:    vmovdqa %ymm1, 32(%rdx)
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %x = load <8 x i64>, <8 x i64>* %xptr
 %y = load <8 x i64>, <8 x i64>* %yptr
 %cmp = icmp slt <8 x i64> %x, %y
 %ext
 = sext <8 x i1> %cmp to <8 x i64>
 store <8 x i64> %ext, <8 x i64>* %zptr
 ret void
}

define dso_local void @cmp_v8i64_zext(<8 x i64>* %xptr, <8 x i64>* %yptr, <8 x i64>* %zptr) "min-legal-
vector-width"="256" {
; CHECK-LABEL: cmp_v8i64_zext:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vmovdqa (%rsi), %ymm0
; CHECK-NEXT:    vmovdqa 32(%rsi), %ymm1
; CHECK-NEXT:    vpcmpgtq 32(%rdi), %ymm1, %ymm1
; CHECK-NEXT:    vpcmpgtq (%rdi), %ymm0, %ymm0
; CHECK-NEXT:    vpsrlq $63, %ymm1, %ymm1
; CHECK-NEXT:    vpsrlq $63, %ymm0, %ymm0
; CHECK-NEXT:    vmovdqa %ymm0, (%rdx)
; CHECK-NEXT:    vmovdqa %ymm1, 32(%rdx)
```

```
; CHECK-NEXT:    vzeroupper
; CHECK-NEXT:    retq
 %x = load <8 x i64>, <8 x i64>* %xptr
 %y = load <8 x i64>, <8 x i64>* %yptr
 %cmp = icmp slt <8 x i64> %x, %y
 %ext = zext <8 x i1> %cmp to <8 x i64>
 store <8 x i64> %ext, <8 x i64>* %zptr
 ret void
}

define <16 x i8> @var_rotate_v16i8(<16 x i8> %a, <16 x i8> %b) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: var_rotate_v16i8:
;
 CHECK:       # %bb.0:
; CHECK-NEXT:    vpandd {{\.?LCPI[0-9]+_[0-9]+}}(%rip){1to4}, %xmm1, %xmm1
; CHECK-NEXT:    vpxor %xmm2, %xmm2, %xmm2
; CHECK-NEXT:    vpunpckhbw {{.*#+}} xmm2 =
xmm1[8],xmm2[8],xmm1[9],xmm2[9],xmm1[10],xmm2[10],xmm1[11],xmm2[11],xmm1[12],xmm2[12],xmm1[13
],xmm2[13],xmm1[14],xmm2[14],xmm1[15],xmm2[15]
; CHECK-NEXT:    vpunpckhbw {{.*#+}} xmm3 = xmm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15]
; CHECK-NEXT:    vpsllvw %xmm2, %xmm3, %xmm2
; CHECK-NEXT:    vpsrlw $8, %xmm2, %xmm2
; CHECK-NEXT:    vpunpcklbw {{.*#+}} xmm0 = xmm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7]
; CHECK-NEXT:    vpmovzxbw {{.*#+}} xmm1 =
xmm1[0],zero,xmm1[1],zero,xmm1[2],zero,xmm1[3],zero,xmm1[4],zero,xmm1[5],zero,xmm1[6],zero,xmm1[7],zer
o
; CHECK-NEXT:    vpsllvw %xmm1, %xmm0, %xmm0
; CHECK-NEXT:    vpsrlw $8, %xmm0, %xmm0
; CHECK-NEXT:    vpackuswb %xmm2, %xmm0, %xmm0
; CHECK-NEXT:    retq
 %b8 = sub <16 x i8> <i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8,
 i8 8, i8 8, i8 8>, %b
 %shl = shl <16 x i8> %a, %b
 %lshr = lshr <16 x i8> %a, %b8
 %or = or <16 x i8> %shl, %lshr
 ret <16 x i8> %or
}

define <32 x i8> @var_rotate_v32i8(<32 x i8> %a, <32 x i8> %b) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: var_rotate_v32i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpandd {{\.?LCPI[0-9]+_[0-9]+}}(%rip){1to8}, %ymm1, %ymm1
; CHECK-NEXT:    vpxor %xmm2, %xmm2, %xmm2
; CHECK-NEXT:    vpunpckhbw {{.*#+}} ymm3 =
ymm1[8],ymm2[8],ymm1[9],ymm2[9],ymm1[10],ymm2[10],ymm1[11],ymm2[11],ymm1[12],ymm2[12],ymm1[13
],ymm2[13],ymm1[14],ymm2[14],ymm1[15],ymm2[15],ymm1[24],ymm2[24],ymm1[25],ymm2[25],ymm1[26],ym
m2[26],ymm1[27],ymm2[27],ymm1[28],ymm2[28],ymm1[29],ymm2[29],ymm1[30],ymm2[30],ymm1[31],ymm2[
31]
```

```
; CHECK-NEXT:    vpunpckhbw {{.*#+}} ymm4 =
ymm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-NEXT:    vpsllvw %ymm3, %ymm4, %ymm3
; CHECK-NEXT:    vpsrlw $8, %ymm3, %ymm3
; CHECK-NEXT:    vpunpcklbw
 {{.*#+}} ymm1 =
ymm1[0],ymm2[0],ymm1[1],ymm2[1],ymm1[2],ymm2[2],ymm1[3],ymm2[3],ymm1[4],ymm2[4],ymm1[5],ymm2[
5],ymm1[6],ymm2[6],ymm1[7],ymm2[7],ymm1[16],ymm2[16],ymm1[17],ymm2[17],ymm1[18],ymm2[18],ymm1[
19],ymm2[19],ymm1[20],ymm2[20],ymm1[21],ymm2[21],ymm1[22],ymm2[22],ymm1[23],ymm2[23]
; CHECK-NEXT:    vpunpcklbw {{.*#+}} ymm0 =
ymm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-NEXT:    vpsllvw %ymm1, %ymm0, %ymm0
; CHECK-NEXT:    vpsrlw $8, %ymm0, %ymm0
; CHECK-NEXT:    vpackuswb %ymm3, %ymm0, %ymm0
; CHECK-NEXT:    retq
 %b8 = sub <32 x i8> <i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8
8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8>, %b
 %shl = shl <32 x i8> %a, %b
 %lshr = lshr <32 x i8> %a, %b8
 %or = or <32 x i8> %shl, %lshr
 ret <32 x i8> %or
}

define <32 x i8> @splatvar_rotate_v32i8(<32 x i8> %a, <32 x i8> %b) nounwind "min-legal-vector-width"="256"
 {
; CHECK-LABEL: splatvar_rotate_v32i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpunpckhbw {{.*#+}} ymm2 =
ymm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-NEXT:    vpand {{\.?LCPI[0-9]+_[0-9]+}}(%rip), %xmm1, %xmm1
; CHECK-NEXT:    vpsllw %xmm1, %ymm2, %ymm2
; CHECK-NEXT:    vpsrlw $8, %ymm2, %ymm2
; CHECK-NEXT:    vpunpcklbw {{.*#+}} ymm0 =
ymm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-NEXT:    vpsllw %xmm1, %ymm0, %ymm0
; CHECK-NEXT:    vpsrlw $8, %ymm0, %ymm0
; CHECK-NEXT:    vpackuswb %ymm2, %ymm0, %ymm0
; CHECK-NEXT:    retq
 %splat = shufflevector <32 x i8> %b, <32 x i8> undef, <32 x i32> zeroinitializer
 %splat8 = sub <32 x i8> <i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8
8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8, i8 8>, %splat
 %shl = shl <32 x i8>
 %a, %splat
 %lshr = lshr <32 x i8> %a, %splat8
 %or = or <32 x i8> %shl, %lshr
 ret <32 x i8> %or
}
```

```
define <32 x i8> @constant_rotate_v32i8(<32 x i8> %a) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: constant_rotate_v32i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpunpckhbw {{.*#+}} ymm1 =
ymm0[8,8,9,9,10,10,11,11,12,12,13,13,14,14,15,15,24,24,25,25,26,26,27,27,28,28,29,29,30,30,31,31]
; CHECK-NEXT:    vpsllvw {{\.?LCPI[0-9]+_[0-9]+}}(%rip), %ymm1, %ymm1
; CHECK-NEXT:    vpsrlw $8, %ymm1, %ymm1
; CHECK-NEXT:    vpunpcklbw {{.*#+}} ymm0 =
ymm0[0,0,1,1,2,2,3,3,4,4,5,5,6,6,7,7,16,16,17,17,18,18,19,19,20,20,21,21,22,22,23,23]
; CHECK-NEXT:    vpsllvw {{\.?LCPI[0-9]+_[0-9]+}}(%rip), %ymm0, %ymm0
; CHECK-NEXT:    vpsrlw $8, %ymm0, %ymm0
; CHECK-NEXT:    vpackuswb %ymm1, %ymm0, %ymm0
; CHECK-NEXT:    retq
 %shl = shl <32 x i8> %a, <i8 0, i8 1, i8 2, i8 3, i8 4, i8 5, i8 6, i8 7, i8 8, i8 7, i8 6, i8 5, i8 4, i8 3, i8 2, i8 1, i8 0, i8
1, i8 2, i8 3, i8 4, i8 5, i8 6, i8 7, i8
 8, i8 7, i8 6, i8 5, i8 4, i8 3, i8 2, i8 1>
 %lshr = lshr <32 x i8> %a, <i8 8, i8 7, i8 6, i8 5, i8 4, i8 3, i8 2, i8 1, i8 0, i8 1, i8 2, i8 3, i8 4, i8 5, i8 6, i8 7, i8 8,
i8 7, i8 6, i8 5, i8 4, i8 3, i8 2, i8 1, i8 0, i8 1, i8 2, i8 3, i8 4, i8 5, i8 6, i8 7>
 %or = or <32 x i8> %shl, %lshr
 ret <32 x i8> %or
}

define <32 x i8> @splatconstant_rotate_v32i8(<32 x i8> %a) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: splatconstant_rotate_v32i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpsllw $4, %ymm0, %ymm1
; CHECK-NEXT:    vpsrlw $4, %ymm0, %ymm0
; CHECK-NEXT:    vpternlogd $216, {{\.?LCPI[0-9]+_[0-9]+}}(%rip){1to8}, %ymm1, %ymm0
; CHECK-NEXT:    retq
 %shl = shl <32 x i8> %a, <i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8
4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4>
 %lshr = lshr <32 x i8> %a, <i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8
 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4>
 %or = or <32 x i8> %shl, %lshr
 ret <32 x i8> %or
}

define <32 x i8> @splatconstant_rotate_mask_v32i8(<32 x i8> %a) nounwind "min-legal-vector-width"="256" {
; CHECK-LABEL: splatconstant_rotate_mask_v32i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    vpsllw $4, %ymm0, %ymm1
; CHECK-NEXT:    vpsrlw $4, %ymm0, %ymm0
; CHECK-NEXT:    vpternlogd $216, {{\.?LCPI[0-9]+_[0-9]+}}(%rip){1to8}, %ymm1, %ymm0
; CHECK-NEXT:    vpandd {{\.?LCPI[0-9]+_[0-9]+}}(%rip){1to8}, %ymm0, %ymm0
; CHECK-NEXT:    retq
 %shl = shl <32 x i8> %a, <i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8
4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4>
 %lshr = lshr <32 x i8> %a, <i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4,
```

```
i8 4, i8 4, i8 4, i8 4, i8
 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4, i8 4>
 %rmask = and <32 x i8> %lshr, <i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55,
i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8 55, i8
55>
 %lmask = and <32 x i8> %shl, <i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33,
i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8 33, i8
33>
 %or = or <32 x i8> %lmask, %rmask
 ret <32 x i8> %or
}
```

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```
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefixes=CHECK,RV64I
; RUN: llc -mtriple=riscv64 -mattr=+zbs -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefixes=CHECK,RV64ZBS

define signext i32 @bclr_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: bclr_i32:
```

```
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sllw a1, a2, a1
; RV64I-NEXT:    not a1, a1
; RV64I-NEXT:    and a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclr_i32:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    andi a1, a1, 31
; RV64ZBS-NEXT:    bclr a0, a0, a1
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %and = and i32 %b, 31
 %shl = shl nuw i32 1, %and
 %neg = xor i32 %shl, -1
 %and1 = and i32 %neg, %a
 ret i32 %and1
}

define signext i32 @bclr_i32_no_mask(i32 signext %a,
 i32 signext %b) nounwind {
; RV64I-LABEL: bclr_i32_no_mask:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sllw a1, a2, a1
; RV64I-NEXT:    not a1, a1
; RV64I-NEXT:    and a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclr_i32_no_mask:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bclr a0, a0, a1
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %shl = shl i32 1, %b
 %neg = xor i32 %shl, -1
 %and1 = and i32 %neg, %a
 ret i32 %and1
}

define signext i32 @bclr_i32_load(ptr %p, i32 signext %b) nounwind {
; RV64I-LABEL: bclr_i32_load:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sllw a1, a2, a1
; RV64I-NEXT:    not a1, a1
```

```
; RV64I-NEXT:    and a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclr_i32_load:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    lw a0, 0(a0)
; RV64ZBS-NEXT:    bclr a0, a0, a1
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %a = load i32, ptr %p
 %shl = shl i32 1, %b
 %neg
 = xor i32 %shl, -1
 %and1 = and i32 %neg, %a
 ret i32 %and1
}

define i64 @bclr_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: bclr_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sll a1, a2, a1
; RV64I-NEXT:    not a1, a1
; RV64I-NEXT:    and a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclr_i64:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bclr a0, a0, a1
; RV64ZBS-NEXT:    ret
 %and = and i64 %b, 63
 %shl = shl nuw i64 1, %and
 %neg = xor i64 %shl, -1
 %and1 = and i64 %neg, %a
 ret i64 %and1
}

define i64 @bclr_i64_no_mask(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: bclr_i64_no_mask:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sll a1, a2, a1
; RV64I-NEXT:    not a1, a1
; RV64I-NEXT:    and a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclr_i64_no_mask:
; RV64ZBS:       # %bb.0:
```

```
; RV64ZBS-NEXT:    bclr a0, a0, a1
; RV64ZBS-NEXT:    ret
 %shl = shl i64 1, %b
 %neg = xor i64 %shl, -1
 %and1 = and i64 %neg, %a
 ret i64
 %and1
}

define signext i32 @bset_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: bset_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sllw a1, a2, a1
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bset_i32:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    andi a1, a1, 31
; RV64ZBS-NEXT:    bset a0, a0, a1
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %and = and i32 %b, 31
 %shl = shl nuw i32 1, %and
 %or = or i32 %shl, %a
 ret i32 %or
}

define signext i32 @bset_i32_no_mask(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: bset_i32_no_mask:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sllw a1, a2, a1
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bset_i32_no_mask:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bset a0, a0, a1
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %shl = shl i32 1, %b
 %or = or i32 %shl, %a
 ret i32 %or
}

define signext i32
```

```
 @bset_i32_load(ptr %p, i32 signext %b) nounwind {
; RV64I-LABEL: bset_i32_load:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sllw a1, a2, a1
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bset_i32_load:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    lw a0, 0(a0)
; RV64ZBS-NEXT:    bset a0, a0, a1
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %a = load i32, ptr %p
 %shl = shl i32 1, %b
 %or = or i32 %shl, %a
 ret i32 %or
}

; We can use bsetw for 1 << x by setting the first source to zero.
define signext i32 @bset_i32_zero(i32 signext %a) nounwind {
; RV64I-LABEL: bset_i32_zero:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 1
; RV64I-NEXT:    sllw a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bset_i32_zero:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bset a0, zero, a0
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %shl = shl i32 1, %a
 ret i32 %shl
}

define i64 @bset_i64(i64 %a,
 i64 %b) nounwind {
; RV64I-LABEL: bset_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sll a1, a2, a1
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bset_i64:
```

```
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bset a0, a0, a1
; RV64ZBS-NEXT:    ret
 %conv = and i64 %b, 63
 %shl = shl nuw i64 1, %conv
 %or = or i64 %shl, %a
 ret i64 %or
}

define i64 @bset_i64_no_mask(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: bset_i64_no_mask:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sll a1, a2, a1
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bset_i64_no_mask:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bset a0, a0, a1
; RV64ZBS-NEXT:    ret
 %shl = shl i64 1, %b
 %or = or i64 %shl, %a
 ret i64 %or
}

; We can use bsetw for 1 << x by setting the first source to zero.
define signext i64 @bset_i64_zero(i64 signext %a) nounwind {
; RV64I-LABEL: bset_i64_zero:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li
 a1, 1
; RV64I-NEXT:    sll a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bset_i64_zero:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bset a0, zero, a0
; RV64ZBS-NEXT:    ret
 %shl = shl i64 1, %a
 ret i64 %shl
}

define signext i32 @binv_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: binv_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sllw a1, a2, a1
```

```
; RV64I-NEXT:    xor a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binv_i32:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    andi a1, a1, 31
; RV64ZBS-NEXT:    binv a0, a0, a1
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %and = and i32 %b, 31
 %shl = shl nuw i32 1, %and
 %xor = xor i32 %shl, %a
 ret i32 %xor
}

define signext i32 @binv_i32_no_mask(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: binv_i32_no_mask:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sllw a1, a2, a1
; RV64I-NEXT:    xor a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binv_i32_no_mask:
;
 RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    binv a0, a0, a1
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %shl = shl i32 1, %b
 %xor = xor i32 %shl, %a
 ret i32 %xor
}

define signext i32 @binv_i32_load(ptr %p, i32 signext %b) nounwind {
; RV64I-LABEL: binv_i32_load:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sllw a1, a2, a1
; RV64I-NEXT:    xor a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binv_i32_load:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    lw a0, 0(a0)
; RV64ZBS-NEXT:    binv a0, a0, a1
; RV64ZBS-NEXT:    sext.w a0, a0
```

```
; RV64ZBS-NEXT:    ret
 %a = load i32, ptr %p
 %shl = shl i32 1, %b
 %xor = xor i32 %shl, %a
 ret i32 %xor
}

define i64 @binv_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: binv_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sll a1, a2, a1
; RV64I-NEXT:    xor a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binv_i64:
; RV64ZBS:       # %bb.0:
;
 RV64ZBS-NEXT:    binv a0, a0, a1
; RV64ZBS-NEXT:    ret
 %conv = and i64 %b, 63
 %shl = shl nuw i64 1, %conv
 %xor = xor i64 %shl, %a
 ret i64 %xor
}

define i64 @binv_i64_no_mask(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: binv_i64_no_mask:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    sll a1, a2, a1
; RV64I-NEXT:    xor a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binv_i64_no_mask:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    binv a0, a0, a1
; RV64ZBS-NEXT:    ret
 %shl = shl nuw i64 1, %b
 %xor = xor i64 %shl, %a
 ret i64 %xor
}

define signext i32 @bext_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: bext_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srlw a0, a0, a1
; RV64I-NEXT:    andi a0, a0, 1
```

```
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bext_i32:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    andi a1, a1, 31
; RV64ZBS-NEXT:    bext a0, a0, a1
; RV64ZBS-NEXT:    ret
 %and = and i32 %b, 31
 %shr = lshr i32 %a, %and
 %and1 = and i32
 %shr, 1
 ret i32 %and1
}

define signext i32 @bext_i32_no_mask(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: bext_i32_no_mask:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srlw a0, a0, a1
; RV64I-NEXT:    andi a0, a0, 1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bext_i32_no_mask:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bext a0, a0, a1
; RV64ZBS-NEXT:    ret
 %shr = lshr i32 %a, %b
 %and1 = and i32 %shr, 1
 ret i32 %and1
}

; This gets previous converted to (i1 (truncate (srl X, Y)). Make sure we are
; able to use bext.
define void @bext_i32_trunc(i32 signext %0, i32 signext %1) {
; RV64I-LABEL: bext_i32_trunc:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srlw a0, a0, a1
; RV64I-NEXT:    andi a0, a0, 1
; RV64I-NEXT:    beqz a0, .LBB19_2
; RV64I-NEXT:  # %bb.1:
; RV64I-NEXT:    ret
; RV64I-NEXT:  .LBB19_2:
; RV64I-NEXT:    tail bar
;
; RV64ZBS-LABEL: bext_i32_trunc:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bext a0, a0, a1
; RV64ZBS-NEXT:    beqz a0, .LBB19_2
; RV64ZBS-NEXT:
```

```
  # %bb.1:
; RV64ZBS-NEXT:    ret
; RV64ZBS-NEXT:  .LBB19_2:
; RV64ZBS-NEXT:    tail bar
 %3 = shl i32 1, %1
 %4 = and i32 %3, %0
 %5 = icmp eq i32 %4, 0
 br i1 %5, label %6, label %7

6:                                        ; preds = %2
 tail call void @bar()
 br label %7

7:                                        ; preds = %6, %2
 ret void
}

declare void @bar()

define i64 @bext_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: bext_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srl a0, a0, a1
; RV64I-NEXT:    andi a0, a0, 1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bext_i64:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bext a0, a0, a1
; RV64ZBS-NEXT:    ret
 %conv = and i64 %b, 63
 %shr = lshr i64 %a, %conv
 %and1 = and i64 %shr, 1
 ret i64 %and1
}

define i64 @bext_i64_no_mask(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: bext_i64_no_mask:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srl a0, a0, a1
; RV64I-NEXT:    andi a0, a0, 1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL:
 bext_i64_no_mask:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bext a0, a0, a1
; RV64ZBS-NEXT:    ret
```

```
 %shr = lshr i64 %a, %b
 %and1 = and i64 %shr, 1
 ret i64 %and1
}

define signext i32 @bexti_i32(i32 signext %a) nounwind {
; RV64I-LABEL: bexti_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 58
; RV64I-NEXT:    srli a0, a0, 63
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bexti_i32:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bexti a0, a0, 5
; RV64ZBS-NEXT:    ret
 %shr = lshr i32 %a, 5
 %and = and i32 %shr, 1
 ret i32 %and
}

define i64 @bexti_i64(i64 %a) nounwind {
; RV64I-LABEL: bexti_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 58
; RV64I-NEXT:    srli a0, a0, 63
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bexti_i64:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bexti a0, a0, 5
; RV64ZBS-NEXT:    ret
 %shr = lshr i64 %a, 5
 %and = and i64 %shr, 1
 ret i64 %and
}

define signext i32 @bexti_i32_cmp(i32 signext %a) nounwind {
; CHECK-LABEL: bexti_i32_cmp:
;
 CHECK:       # %bb.0:
; CHECK-NEXT:    andi a0, a0, 32
; CHECK-NEXT:    snez a0, a0
; CHECK-NEXT:    ret
 %and = and i32 %a, 32
 %cmp = icmp ne i32 %and, 0
 %zext = zext i1 %cmp to i32
 ret i32 %zext
```

```
}

define i64 @bexti_i64_cmp(i64 %a) nounwind {
; RV64I-LABEL: bexti_i64_cmp:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 58
; RV64I-NEXT:    srli a0, a0, 63
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bexti_i64_cmp:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bexti a0, a0, 5
; RV64ZBS-NEXT:    ret
 %and = and i64 %a, 32
 %cmp = icmp ne i64 %and, 0
 %zext = zext i1 %cmp to i64
 ret i64 %zext
}

define signext i32 @bclri_i32_10(i32 signext %a) nounwind {
; CHECK-LABEL: bclri_i32_10:
; CHECK:       # %bb.0:
; CHECK-NEXT:    andi a0, a0, -1025
; CHECK-NEXT:    ret
 %and = and i32 %a, -1025
 ret i32 %and
}

define signext i32 @bclri_i32_11(i32 signext %a) nounwind {
; RV64I-LABEL: bclri_i32_11:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 1048575
; RV64I-NEXT:    addiw a1,
 a1, 2047
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclri_i32_11:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bclri a0, a0, 11
; RV64ZBS-NEXT:    ret
 %and = and i32 %a, -2049
 ret i32 %and
}

define signext i32 @bclri_i32_30(i32 signext %a) nounwind {
; RV64I-LABEL: bclri_i32_30:
; RV64I:       # %bb.0:
```

```
; RV64I-NEXT:    lui a1, 786432
; RV64I-NEXT:    addiw a1, a1, -1
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclri_i32_30:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bclri a0, a0, 30
; RV64ZBS-NEXT:    ret
 %and = and i32 %a, -1073741825
 ret i32 %and
}

define signext i32 @bclri_i32_31(i32 signext %a) nounwind {
; RV64I-LABEL: bclri_i32_31:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 33
; RV64I-NEXT:    srli a0, a0, 33
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclri_i32_31:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bclri a0, a0, 31
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %and = and i32 %a,
 -2147483649
 ret i32 %and
}

define i64 @bclri_i64_10(i64 %a) nounwind {
; CHECK-LABEL: bclri_i64_10:
; CHECK:       # %bb.0:
; CHECK-NEXT:    andi a0, a0, -1025
; CHECK-NEXT:    ret
 %and = and i64 %a, -1025
 ret i64 %and
}

define i64 @bclri_i64_11(i64 %a) nounwind {
; RV64I-LABEL: bclri_i64_11:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 1048575
; RV64I-NEXT:    addiw a1, a1, 2047
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclri_i64_11:
```

```
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bclri a0, a0, 11
; RV64ZBS-NEXT:    ret
 %and = and i64 %a, -2049
 ret i64 %and
}

define i64 @bclri_i64_30(i64 %a) nounwind {
; RV64I-LABEL: bclri_i64_30:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 786432
; RV64I-NEXT:    addiw a1, a1, -1
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclri_i64_30:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bclri a0, a0, 30
; RV64ZBS-NEXT:    ret
 %and = and i64 %a, -1073741825
 ret i64 %and
}

define
 i64 @bclri_i64_31(i64 %a) nounwind {
; RV64I-LABEL: bclri_i64_31:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 524288
; RV64I-NEXT:    addi a1, a1, -1
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclri_i64_31:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bclri a0, a0, 31
; RV64ZBS-NEXT:    ret
 %and = and i64 %a, -2147483649
 ret i64 %and
}

define i64 @bclri_i64_62(i64 %a) nounwind {
; RV64I-LABEL: bclri_i64_62:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, -1
; RV64I-NEXT:    slli a1, a1, 62
; RV64I-NEXT:    addi a1, a1, -1
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    ret
```

```
;
; RV64ZBS-LABEL: bclri_i64_62:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bclri a0, a0, 62
; RV64ZBS-NEXT:    ret
 %and = and i64 %a, -4611686018427387905
 ret i64 %and
}

define i64 @bclri_i64_63(i64 %a) nounwind {
; RV64I-LABEL: bclri_i64_63:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 1
; RV64I-NEXT:    srli a0, a0, 1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL:
 bclri_i64_63:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bclri a0, a0, 63
; RV64ZBS-NEXT:    ret
 %and = and i64 %a, -9223372036854775809
 ret i64 %and
}

define i64 @bclri_i64_large0(i64 %a) nounwind {
; RV64I-LABEL: bclri_i64_large0:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 1044480
; RV64I-NEXT:    addiw a1, a1, -256
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclri_i64_large0:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    andi a0, a0, -256
; RV64ZBS-NEXT:    bclri a0, a0, 24
; RV64ZBS-NEXT:    ret
 %and = and i64 %a, -16777472
 ret i64 %and
}

define i64 @bclri_i64_large1(i64 %a) nounwind {
; RV64I-LABEL: bclri_i64_large1:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 1044464
; RV64I-NEXT:    addiw a1, a1, -1
; RV64I-NEXT:    and a0, a0, a1
```

```
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bclri_i64_large1:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bclri a0, a0, 16
; RV64ZBS-NEXT:    bclri a0, a0, 24
; RV64ZBS-NEXT:    ret
 %and = and i64 %a,
 -16842753
 ret i64 %and
}

define signext i32 @bseti_i32_10(i32 signext %a) nounwind {
; CHECK-LABEL: bseti_i32_10:
; CHECK:       # %bb.0:
; CHECK-NEXT:    ori a0, a0, 1024
; CHECK-NEXT:    ret
 %or = or i32 %a, 1024
 ret i32 %or
}

define signext i32 @bseti_i32_11(i32 signext %a) nounwind {
; RV64I-LABEL: bseti_i32_11:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 1
; RV64I-NEXT:    slliw a1, a1, 11
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bseti_i32_11:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bseti a0, a0, 11
; RV64ZBS-NEXT:    ret
 %or = or i32 %a, 2048
 ret i32 %or
}

define signext i32 @bseti_i32_30(i32 signext %a) nounwind {
; RV64I-LABEL: bseti_i32_30:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 262144
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bseti_i32_30:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bseti a0, a0, 30
; RV64ZBS-NEXT:    ret
```

```
 %or = or i32 %a, 1073741824
 ret i32 %or
}

define signext i32
 @bseti_i32_31(i32 signext %a) nounwind {
; RV64I-LABEL: bseti_i32_31:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 524288
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bseti_i32_31:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bseti a0, a0, 31
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %or = or i32 %a, 2147483648
 ret i32 %or
}

define i64 @bseti_i64_10(i64 %a) nounwind {
; CHECK-LABEL: bseti_i64_10:
; CHECK:       # %bb.0:
; CHECK-NEXT:    ori a0, a0, 1024
; CHECK-NEXT:    ret
 %or = or i64 %a, 1024
 ret i64 %or
}

define i64 @bseti_i64_11(i64 %a) nounwind {
; RV64I-LABEL: bseti_i64_11:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 1
; RV64I-NEXT:    slli a1, a1, 11
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bseti_i64_11:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bseti a0, a0, 11
; RV64ZBS-NEXT:    ret
 %or = or i64 %a, 2048
 ret i64 %or
}

define i64 @bseti_i64_30(i64 %a) nounwind {
; RV64I-LABEL: bseti_i64_30:
```

```
;
 RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 262144
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bseti_i64_30:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bseti a0, a0, 30
; RV64ZBS-NEXT:    ret
 %or = or i64 %a, 1073741824
 ret i64 %or
}

define i64 @bseti_i64_31(i64 %a) nounwind {
; RV64I-LABEL: bseti_i64_31:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 1
; RV64I-NEXT:    slli a1, a1, 31
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bseti_i64_31:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bseti a0, a0, 31
; RV64ZBS-NEXT:    ret
 %or = or i64 %a, 2147483648
 ret i64 %or
}

define i64 @bseti_i64_62(i64 %a) nounwind {
; RV64I-LABEL: bseti_i64_62:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 1
; RV64I-NEXT:    slli a1, a1, 62
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bseti_i64_62:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bseti a0, a0, 62
; RV64ZBS-NEXT:    ret
 %or = or i64 %a,
 4611686018427387904
 ret i64 %or
}

define i64 @bseti_i64_63(i64 %a) nounwind {
```

```
; RV64I-LABEL: bseti_i64_63:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, -1
; RV64I-NEXT:    slli a1, a1, 63
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bseti_i64_63:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bseti a0, a0, 63
; RV64ZBS-NEXT:    ret
 %or = or i64 %a, 9223372036854775808
 ret i64 %or
}

define signext i32 @binvi_i32_10(i32 signext %a) nounwind {
; CHECK-LABEL: binvi_i32_10:
; CHECK:       # %bb.0:
; CHECK-NEXT:    xori a0, a0, 1024
; CHECK-NEXT:    ret
 %xor = xor i32 %a, 1024
 ret i32 %xor
}

define signext i32 @binvi_i32_11(i32 signext %a) nounwind {
; RV64I-LABEL: binvi_i32_11:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 1
; RV64I-NEXT:    slliw a1, a1, 11
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binvi_i32_11:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    binvi a0, a0, 11
; RV64ZBS-NEXT:    ret
 %xor = xor i32 %a,
 2048
 ret i32 %xor
}

define signext i32 @binvi_i32_30(i32 signext %a) nounwind {
; RV64I-LABEL: binvi_i32_30:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 262144
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    ret
;
```

```
; RV64ZBS-LABEL: binvi_i32_30:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    binvi a0, a0, 30
; RV64ZBS-NEXT:    ret
 %xor = xor i32 %a, 1073741824
 ret i32 %xor
}

define signext i32 @binvi_i32_31(i32 signext %a) nounwind {
; RV64I-LABEL: binvi_i32_31:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 524288
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binvi_i32_31:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    binvi a0, a0, 31
; RV64ZBS-NEXT:    sext.w a0, a0
; RV64ZBS-NEXT:    ret
 %xor = xor i32 %a, 2147483648
 ret i32 %xor
}

define i64 @binvi_i64_10(i64 %a) nounwind {
; CHECK-LABEL: binvi_i64_10:
; CHECK:       # %bb.0:
; CHECK-NEXT:    xori a0, a0, 1024
; CHECK-NEXT:    ret
 %xor = xor i64 %a, 1024
 ret i64 %xor
}

define i64 @binvi_i64_11(i64
 %a) nounwind {
; RV64I-LABEL: binvi_i64_11:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 1
; RV64I-NEXT:    slli a1, a1, 11
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binvi_i64_11:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    binvi a0, a0, 11
; RV64ZBS-NEXT:    ret
 %xor = xor i64 %a, 2048
 ret i64 %xor
```

```
}

define i64 @binvi_i64_30(i64 %a) nounwind {
; RV64I-LABEL: binvi_i64_30:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 262144
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binvi_i64_30:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    binvi a0, a0, 30
; RV64ZBS-NEXT:    ret
 %xor = xor i64 %a, 1073741824
 ret i64 %xor
}

define i64 @binvi_i64_31(i64 %a) nounwind {
; RV64I-LABEL: binvi_i64_31:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 1
; RV64I-NEXT:    slli a1, a1, 31
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binvi_i64_31:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    binvi
 a0, a0, 31
; RV64ZBS-NEXT:    ret
 %xor = xor i64 %a, 2147483648
 ret i64 %xor
}

define i64 @binvi_i64_62(i64 %a) nounwind {
; RV64I-LABEL: binvi_i64_62:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 1
; RV64I-NEXT:    slli a1, a1, 62
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binvi_i64_62:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    binvi a0, a0, 62
; RV64ZBS-NEXT:    ret
 %xor = xor i64 %a, 4611686018427387904
 ret i64 %xor
```

```
}

define i64 @binvi_i64_63(i64 %a) nounwind {
; RV64I-LABEL: binvi_i64_63:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, -1
; RV64I-NEXT:    slli a1, a1, 63
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: binvi_i64_63:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    binvi a0, a0, 63
; RV64ZBS-NEXT:    ret
 %xor = xor i64 %a, 9223372036854775808
 ret i64 %xor
}

define i64 @xor_i64_large(i64 %a) nounwind {
; RV64I-LABEL: xor_i64_large:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 1
; RV64I-NEXT:    slli
 a1, a1, 32
; RV64I-NEXT:    addi a1, a1, 1
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: xor_i64_large:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    binvi a0, a0, 0
; RV64ZBS-NEXT:    binvi a0, a0, 32
; RV64ZBS-NEXT:    ret
 %xor = xor i64 %a, 4294967297
 ret i64 %xor
}

define i64 @xor_i64_4099(i64 %a) nounwind {
; RV64I-LABEL: xor_i64_4099:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 1
; RV64I-NEXT:    addiw a1, a1, 3
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: xor_i64_4099:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    xori a0, a0, 3
```

```
; RV64ZBS-NEXT:    binvi a0, a0, 12
; RV64ZBS-NEXT:    ret
 %xor = xor i64 %a, 4099
 ret i64 %xor
}

define i64 @xor_i64_96(i64 %a) nounwind {
; CHECK-LABEL: xor_i64_96:
; CHECK:       # %bb.0:
; CHECK-NEXT:    xori a0, a0, 96
; CHECK-NEXT:    ret
 %xor = xor i64 %a, 96
 ret i64 %xor
}

define i64 @or_i64_large(i64 %a) nounwind {
; RV64I-LABEL: or_i64_large:
; RV64I:       # %bb.0:
; RV64I-NEXT:
    li a1, 1
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    addi a1, a1, 1
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: or_i64_large:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bseti a0, a0, 0
; RV64ZBS-NEXT:    bseti a0, a0, 32
; RV64ZBS-NEXT:    ret
 %or = or i64 %a, 4294967297
 ret i64 %or
}

define i64 @xor_i64_66901(i64 %a) nounwind {
; RV64I-LABEL: xor_i64_66901:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 16
; RV64I-NEXT:    addiw a1, a1, 1365
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: xor_i64_66901:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    xori a0, a0, 1365
; RV64ZBS-NEXT:    binvi a0, a0, 16
; RV64ZBS-NEXT:    ret
 %xor = xor i64 %a, 66901
```

```
 ret i64 %xor
}

define i64 @or_i64_4099(i64 %a) nounwind {
; RV64I-LABEL: or_i64_4099:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 1
; RV64I-NEXT:    addiw a1, a1, 3
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: or_i64_4099:
; RV64ZBS:
       # %bb.0:
; RV64ZBS-NEXT:    ori a0, a0, 3
; RV64ZBS-NEXT:    bseti a0, a0, 12
; RV64ZBS-NEXT:    ret
 %or = or i64 %a, 4099
 ret i64 %or
}

define i64 @or_i64_96(i64 %a) nounwind {
; CHECK-LABEL: or_i64_96:
; CHECK:       # %bb.0:
; CHECK-NEXT:    ori a0, a0, 96
; CHECK-NEXT:    ret
 %or = or i64 %a, 96
 ret i64 %or
}

define i64 @or_i64_66901(i64 %a) nounwind {
; RV64I-LABEL: or_i64_66901:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 16
; RV64I-NEXT:    addiw a1, a1, 1365
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: or_i64_66901:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    ori a0, a0, 1365
; RV64ZBS-NEXT:    bseti a0, a0, 16
; RV64ZBS-NEXT:    ret
 %or = or i64 %a, 66901
 ret i64 %or
}

define signext i32 @bset_trailing_ones_i32_mask(i32 signext %a) nounwind {
```

```
; RV64I-LABEL: bset_trailing_ones_i32_mask:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, -1
; RV64I-NEXT:    sllw a0, a1, a0
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    ret
;
;
 RV64ZBS-LABEL: bset_trailing_ones_i32_mask:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    andi a0, a0, 31
; RV64ZBS-NEXT:    bset a0, zero, a0
; RV64ZBS-NEXT:    addiw a0, a0, -1
; RV64ZBS-NEXT:    ret
 %and = and i32 %a, 31
 %shift = shl nsw i32 -1, %and
 %not = xor i32 %shift, -1
 ret i32 %not
}

define signext i32 @bset_trailing_ones_i32_no_mask(i32 signext %a) nounwind {
; RV64I-LABEL: bset_trailing_ones_i32_no_mask:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, -1
; RV64I-NEXT:    sllw a0, a1, a0
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bset_trailing_ones_i32_no_mask:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bset a0, zero, a0
; RV64ZBS-NEXT:    addiw a0, a0, -1
; RV64ZBS-NEXT:    ret
 %shift = shl nsw i32 -1, %a
 %not = xor i32 %shift, -1
 ret i32 %not
}

define signext i64 @bset_trailing_ones_i64_mask(i64 signext %a) nounwind {
; RV64I-LABEL: bset_trailing_ones_i64_mask:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, -1
; RV64I-NEXT:    sll
 a0, a1, a0
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bset_trailing_ones_i64_mask:
```

```
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bset a0, zero, a0
; RV64ZBS-NEXT:    addi a0, a0, -1
; RV64ZBS-NEXT:    ret
 %and = and i64 %a, 63
 %shift = shl nsw i64 -1, %and
 %not = xor i64 %shift, -1
 ret i64 %not
}

define signext i64 @bset_trailing_ones_i64_no_mask(i64 signext %a) nounwind {
; RV64I-LABEL: bset_trailing_ones_i64_no_mask:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, -1
; RV64I-NEXT:    sll a0, a1, a0
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    ret
;
; RV64ZBS-LABEL: bset_trailing_ones_i64_no_mask:
; RV64ZBS:       # %bb.0:
; RV64ZBS-NEXT:    bset a0, zero, a0
; RV64ZBS-NEXT:    addi a0, a0, -1
; RV64ZBS-NEXT:    ret
 %shift = shl nsw i64 -1, %a
 %not = xor i64 %shift, -1
 ret i64 %not
}
```

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clang-tidy High-Integrity C++ Files

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```
; RUN: opt -passes=consthoist -S -o - %s | FileCheck %s
target datalayout = "e-m:e-p:32:32-i64:64-v128:64:128-a:0:32-n32-S64"
target triple = "thumbv6m-none--musleabi"

; Check that for i8 type, the maximum legal offset is 31.
; Also check that an constant used as value to be stored rather than
; pointer in a store instruction is hoisted.
; CHECK: foo_i8
; CHECK-DAG:  %[[C1:const[0-9]?]] = bitcast i32 805874720 to i32
; CHECK-DAG:  %[[C2:const[0-9]?]] = bitcast i32 805874688 to i32
; CHECK-DAG:  %[[C3:const[0-9]?]] = bitcast i32 805873720 to i32
; CHECK-DAG:  %[[C4:const[0-9]?]] = bitcast i32 805873688 to i32
; CHECK:  %0 = inttoptr i32 %[[C2]] to ptr
; CHECK-NEXT:  %1 = load volatile i8, ptr %0
; CHECK-NEXT:  %[[M1:const_mat[0-9]?]] = add i32 %[[C2]], 4
; CHECK-NEXT:  %2 = inttoptr i32 %[[M1]] to ptr
; CHECK-NEXT:  %3 = load volatile i8, ptr %2
; CHECK-NEXT:  %[[M2:const_mat[0-9]?]] = add i32 %[[C2]], 31
; CHECK-NEXT:  %4 = inttoptr i32 %[[M2]] to ptr
; CHECK-NEXT:  %5 = load volatile
 i8, ptr %4
; CHECK-NEXT:  %6 = inttoptr i32 %[[C1]] to ptr
; CHECK-NEXT:  %7 = load volatile i8, ptr %6
; CHECK-NEXT:  %[[M3:const_mat[0-9]?]] = add i32 %[[C1]], 7
; CHECK-NEXT:  %8 = inttoptr i32 %[[M3]] to ptr
; CHECK-NEXT:  %9 = load volatile i8, ptr %8
; CHECK-NEXT:  %10 = inttoptr i32 %[[C4]] to ptr
; CHECK-NEXT:  store i8 %9, ptr %10
; CHECK-NEXT:  %[[M4:const_mat[0-9]?]] = add i32 %[[C4]], 31
; CHECK-NEXT:  %11 = inttoptr i32 %[[M4]] to ptr
; CHECK-NEXT:  store i8 %7, ptr %11
; CHECK-NEXT:  %12 = inttoptr i32 %[[C3]] to ptr
; CHECK-NEXT:  store i8 %5, ptr %12
; CHECK-NEXT:  %[[M5:const_mat[0-9]?]] = add i32 %[[C3]], 7
```

```
; CHECK-NEXT:  %13 = inttoptr i32 %[[M5]] to ptr
; CHECK-NEXT:  store i8 %3, ptr %13
; CHECK-NEXT:  %[[M6:const_mat[0-9]?]] = add i32 %[[C1]], 80
; CHECK-NEXT:  %14 = inttoptr i32 %[[M6]] to ptr
; CHECK-NEXT:  store ptr %14, ptr @goo

@goo = global ptr undef

define void @foo_i8() {
entry:
 %0 = load volatile i8, ptr inttoptr (i32 805874688 to ptr)
 %1 = load volatile
 i8, ptr inttoptr (i32 805874692 to ptr)
 %2 = load volatile i8, ptr inttoptr (i32 805874719 to ptr)
 %3 = load volatile i8, ptr inttoptr (i32 805874720 to ptr)
 %4 = load volatile i8, ptr inttoptr (i32 805874727 to ptr)
 store i8 %4, ptr inttoptr(i32 805873688 to ptr)
 store i8 %3, ptr inttoptr(i32 805873719 to ptr)
 store i8 %2, ptr inttoptr(i32 805873720 to ptr)
 store i8 %1, ptr inttoptr(i32 805873727 to ptr)
 store ptr inttoptr(i32 805874800 to ptr), ptr @goo
 ret void
}

; Check that for i16 type, the maximum legal offset is 62.
; CHECK: foo_i16
; CHECK-DAG: %[[C1:const[0-9]?]] = bitcast i32 805874752 to i32
; CHECK-DAG: %[[C2:const[0-9]?]] = bitcast i32 805874688 to i32
; CHECK: %0 = inttoptr i32 %[[C2]] to ptr
; CHECK-NEXT: %1 = load volatile i16, ptr %0, align 2
; CHECK-NEXT: %[[M1:const_mat[0-9]?]] = add i32 %[[C2]], 4
; CHECK-NEXT: %2 = inttoptr i32 %[[M1]] to ptr
; CHECK-NEXT: %3 = load volatile i16, ptr %2, align 2
; CHECK-NEXT: %[[M2:const_mat[0-9]?]] = add
 i32 %[[C2]], 32
; CHECK-NEXT: %4 = inttoptr i32 %[[M2]] to ptr
; CHECK-NEXT: %5 = load volatile i16, ptr %4, align 2
; CHECK-NEXT: %[[M3:const_mat[0-9]?]] = add i32 %[[C2]], 62
; CHECK-NEXT: %6 = inttoptr i32 %[[M3]] to ptr
; CHECK-NEXT: %7 = load volatile i16, ptr %6, align 2
; CHECK-NEXT: %8 = inttoptr i32 %[[C1]] to ptr
; CHECK-NEXT: %9 = load volatile i16, ptr %8, align 2
; CHECK-NEXT: %[[M4:const_mat[0-9]?]] = add i32 %[[C1]], 22
; CHECK-NEXT: %10 = inttoptr i32 %[[M4]] to ptr
; CHECK-NEXT: %11 = load volatile i16, ptr %10, align 2

define void @foo_i16() {
entry:
```

```
 %0 = load volatile i16, ptr inttoptr (i32 805874688 to ptr), align 2
 %1 = load volatile i16, ptr inttoptr (i32 805874692 to ptr), align 2
 %2 = load volatile i16, ptr inttoptr (i32 805874720 to ptr), align 2
 %3 = load volatile i16, ptr inttoptr (i32 805874750 to ptr), align 2
 %4 = load volatile i16, ptr inttoptr (i32 805874752 to ptr), align 2
 %5 = load volatile i16, ptr inttoptr (i32 805874774 to ptr), align
 2
 ret void
}

; Check that for i32 type, the maximum legal offset is 124.
; CHECK: foo_i32
; CHECK-DAG:  %[[C1:const[0-9]?]] = bitcast i32 805874816 to i32
; CHECK-DAG:  %[[C2:const[0-9]?]] = bitcast i32 805874688 to i32
; CHECK:  %0 = inttoptr i32 %[[C2]] to ptr
; CHECK-NEXT:  %1 = load volatile i32, ptr %0, align 4
; CHECK-NEXT:  %[[M1:const_mat[0-9]?]] = add i32 %[[C2]], 4
; CHECK-NEXT:  %2 = inttoptr i32 %[[M1]] to ptr
; CHECK-NEXT:  %3 = load volatile i32, ptr %2, align 4
; CHECK-NEXT:  %[[M2:const_mat[0-9]?]] = add i32 %[[C2]], 124
; CHECK-NEXT:  %4 = inttoptr i32 %[[M2]] to ptr
; CHECK-NEXT:  %5 = load volatile i32, ptr %4, align 4
; CHECK-NEXT:  %6 = inttoptr i32 %[[C1]] to ptr
; CHECK-NEXT:  %7 = load volatile i32, ptr %6, align 4
; CHECK-NEXT:  %[[M3:const_mat[0-9]?]] = add i32 %[[C1]], 8
; CHECK-NEXT:  %8 = inttoptr i32 %[[M3]] to ptr
; CHECK-NEXT:  %9 = load volatile i32, ptr %8, align 4
; CHECK-NEXT:  %[[M4:const_mat[0-9]?]] = add i32 %[[C1]], 12
; CHECK-NEXT:  %10 = inttoptr
 i32 %[[M4]] to ptr
; CHECK-NEXT:  %11 = load volatile i32, ptr %10, align 4

define void @foo_i32() {
entry:
 %0 = load volatile i32, ptr inttoptr (i32 805874688 to ptr), align 4
 %1 = load volatile i32, ptr inttoptr (i32 805874692 to ptr), align 4
 %2 = load volatile i32, ptr inttoptr (i32 805874812 to ptr), align 4
 %3 = load volatile i32, ptr inttoptr (i32 805874816 to ptr), align 4
 %4 = load volatile i32, ptr inttoptr (i32 805874824 to ptr), align 4
 %5 = load volatile i32, ptr inttoptr (i32 805874828 to ptr), align 4
 ret void
}
; RUN: llc -march=hexagon < %s
; REQUIRES: asserts

; The two loads based on %struct.0, loading two different data types
; cause LSR to assume type "void" for the memory type. This would then
; cause an assert in isLegalAddressingMode. Make sure we no longer crash.
```

```
target triple = "hexagon"

%struct.0 = type { ptr, i8, %union.anon.0 }
%union.anon.0 = type { ptr }

define hidden fastcc void @fred() unnamed_addr #0 {
entry:
 br i1 undef, label %while.end, label %while.body.lr.ph

while.body.lr.ph:                                 ; preds = %entry
 br label %while.body

while.body:                                       ; preds = %exit.2, %while.body.lr.ph
 %lsr.iv = phi ptr [ %cgep22, %exit.2 ], [ undef, %while.body.lr.ph ]
 switch i32 undef, label %exit [
   i32 1, label %sw.bb.i
   i32 2, label %sw.bb3.i
 ]

sw.bb.i:                                          ; preds = %while.body
 unreachable

sw.bb3.i:                                         ; preds = %while.body
 unreachable

exit:
                                                  ; preds = %while.body
 switch i32 undef, label %exit.2 [
   i32 1, label %sw.bb.i17
   i32 2, label %sw.bb3.i20
 ]

sw.bb.i17:                                        ; preds = %.exit
 %0 = load i32, ptr %lsr.iv, align 4
 unreachable

sw.bb3.i20:                                       ; preds = %exit
 %1 = load ptr, ptr %lsr.iv, align 4
 unreachable

exit.2:                                           ; preds = %exit
 %cgep22 = getelementptr %struct.0, ptr %lsr.iv, i32 1
 br label %while.body

while.end:                                        ; preds = %entry
 ret void
}
```

```
attributes #0 = { nounwind optsize "target-cpu"="hexagonv55" }
; NOTE: Assertions have been autogenerated by utils/update_test_checks.py UTC_ARGS: --include-generated-funcs
; RUN: opt -S -passes=verify,iroutliner -ir-outlining-no-cost < %s | FileCheck %s
; FIXME: Disabled run-line after running into some turbulence with debuginfo-iterators
; run: opt -S -passes=verify,iroutliner -ir-outlining-no-cost < %s --try-experimental-debuginfo-iterators | FileCheck %s

; This test checks that debug info is recognized as able to be extracted along
; with the other instructions, but is not included in the consolidated function.

define void @function1() !dbg !6 {
entry:
 %a = alloca i32, align 4, !dbg !17
 call void @llvm.dbg.value(metadata ptr %a, metadata !9, metadata !DIExpression()), !dbg !17
 %b = alloca i32, align 4, !dbg !18
 call void @llvm.dbg.value(metadata ptr %b, metadata !11, metadata !DIExpression()), !dbg !18
 %c = alloca i32, align 4, !dbg !19
 call void @llvm.dbg.value(metadata ptr %c, metadata !12, metadata !DIExpression()), !dbg !19

 store i32 2, ptr %a, align 4, !dbg !20
 store i32 3, ptr %b, align 4, !dbg !21
 store i32 4, ptr %c, align 4, !dbg !22
 %al = load i32, ptr %a, align 4, !dbg !23
 call void @llvm.dbg.value(metadata i32 %al, metadata !13, metadata !DIExpression()), !dbg !23
 %bl = load i32, ptr %b, align 4, !dbg !24
 call void @llvm.dbg.value(metadata i32 %bl, metadata !15, metadata !DIExpression()), !dbg !24
 %cl = load i32, ptr %c, align 4, !dbg !25
 call void @llvm.dbg.value(metadata i32 %cl, metadata !16, metadata !DIExpression()), !dbg !25
 ret void, !dbg !26
}

define void @function2() !dbg !27 {
entry:
 %a = alloca i32, align 4, !dbg !35
 call void @llvm.dbg.value(metadata ptr %a, metadata !29, metadata !DIExpression()), !dbg !35
 %b = alloca i32, align 4, !dbg !36
 call void @llvm.dbg.value(metadata ptr %b, metadata !30, metadata !DIExpression()), !dbg !36
 %c = alloca i32, align 4, !dbg !37
 call void @llvm.dbg.value(metadata ptr %c, metadata !31, metadata !DIExpression()), !dbg
 !37
 store i32 2, ptr %a, align 4, !dbg !38
 store i32 3, ptr %b, align 4, !dbg !39
 store i32 4, ptr %c, align 4, !dbg !40
 %al = load i32, ptr %a, align 4, !dbg !41
 call void @llvm.dbg.value(metadata i32 %al, metadata !32, metadata !DIExpression()), !dbg !41
 %bl = load i32, ptr %b, align 4, !dbg !42
```

```
 call void @llvm.dbg.value(metadata i32 %bl, metadata !33, metadata !DIExpression()), !dbg !42
 %cl = load i32, ptr %c, align 4, !dbg !43
 call void @llvm.dbg.value(metadata i32 %cl, metadata !34, metadata !DIExpression()), !dbg !43
 ret void, !dbg !44
}


; Function Attrs: nounwind readnone speculatable willreturn
declare void @llvm.dbg.value(metadata, metadata, metadata) #0

attributes #0 = { nounwind readnone speculatable willreturn }

!llvm.dbg.cu = !{!0}
!llvm.debugify = !{!3, !4}
!llvm.module.flags = !{!5}

!0 = distinct !DICompileUnit(language: DW_LANG_C, file: !1, producer: "debugify", isOptimized: true,
runtimeVersion: 0, emissionKind: FullDebug, enums: !2)
!1 = !DIFile(filename:
 "legal-debug.ll", directory: "/")
!2 = !{}
!3 = !{i32 20}
!4 = !{i32 12}
!5 = !{i32 2, !"Debug Info Version", i32 3}
!6 = distinct !DISubprogram(name: "function1", linkageName: "function1", scope: null, file: !1, line: 1, type: !7,
scopeLine: 1, spFlags: DISPFlagDefinition | DISPFlagOptimized, unit: !0, retainedNodes: !8)
!7 = !DISubroutineType(types: !2)
!8 = !{!9, !11, !12, !13, !15, !16}
!9 = !DILocalVariable(name: "1", scope: !6, file: !1, line: 1, type: !10)
!10 = !DIBasicType(name: "ty64", size: 64, encoding: DW_ATE_unsigned)
!11 = !DILocalVariable(name: "2", scope: !6, file: !1, line: 2, type: !10)
!12 = !DILocalVariable(name: "3", scope: !6, file: !1, line: 3, type: !10)
!13 = !DILocalVariable(name: "4", scope: !6, file: !1, line: 7, type: !14)
!14 = !DIBasicType(name: "ty32", size: 32, encoding: DW_ATE_unsigned)
!15 = !DILocalVariable(name: "5", scope: !6, file: !1, line: 8, type: !14)
!16 = !DILocalVariable(name: "6", scope: !6, file: !1, line: 9, type: !14)
!17
 = !DILocation(line: 1, column: 1, scope: !6)
!18 = !DILocation(line: 2, column: 1, scope: !6)
!19 = !DILocation(line: 3, column: 1, scope: !6)
!20 = !DILocation(line: 4, column: 1, scope: !6)
!21 = !DILocation(line: 5, column: 1, scope: !6)
!22 = !DILocation(line: 6, column: 1, scope: !6)
!23 = !DILocation(line: 7, column: 1, scope: !6)
!24 = !DILocation(line: 8, column: 1, scope: !6)
!25 = !DILocation(line: 9, column: 1, scope: !6)
!26 = !DILocation(line: 10, column: 1, scope: !6)
!27 = distinct !DISubprogram(name: "function2", linkageName: "function2", scope: null, file: !1, line: 11, type: !7,
```

```
scopeLine: 11, spFlags: DISPFlagDefinition | DISPFlagOptimized, unit: !0, retainedNodes: !28)
!28 = !{!29, !30, !31, !32, !33, !34}
!29 = !DILocalVariable(name: "7", scope: !27, file: !1, line: 11, type: !10)
!30 = !DILocalVariable(name: "8", scope: !27, file: !1, line: 12, type: !10)
!31 = !DILocalVariable(name: "9", scope: !27, file: !1, line: 13, type: !10)
!32 = !DILocalVariable(name: "10",
 scope: !27, file: !1, line: 17, type: !14)
!33 = !DILocalVariable(name: "11", scope: !27, file: !1, line: 18, type: !14)
!34 = !DILocalVariable(name: "12", scope: !27, file: !1, line: 19, type: !14)
!35 = !DILocation(line: 11, column: 1, scope: !27)
!36 = !DILocation(line: 12, column: 1, scope: !27)
!37 = !DILocation(line: 13, column: 1, scope: !27)
!38 = !DILocation(line: 14, column: 1, scope: !27)
!39 = !DILocation(line: 15, column: 1, scope: !27)
!40 = !DILocation(line: 16, column: 1, scope: !27)
!41 = !DILocation(line: 17, column: 1, scope: !27)
!42 = !DILocation(line: 18, column: 1, scope: !27)
!43 = !DILocation(line: 19, column: 1, scope: !27)
!44 = !DILocation(line: 20, column: 1, scope: !27)
; CHECK-LABEL: @function1(
; CHECK-NEXT:  entry:
; CHECK-NEXT:    [[A:%.*]] = alloca i32, align 4, !dbg [[DBG17:![0-9]+]]
; CHECK-NEXT:    call void @llvm.dbg.value(metadata ptr [[A]], metadata [[META9:![0-9]+]], metadata
!DIExpression()), !dbg [[DBG17]]
; CHECK-NEXT:    [[B:%.*]] = alloca
 i32, align 4, !dbg [[DBG18:![0-9]+]]
; CHECK-NEXT:    call void @llvm.dbg.value(metadata ptr [[B]], metadata [[META11:![0-9]+]], metadata
!DIExpression()), !dbg [[DBG18]]
; CHECK-NEXT:    [[C:%.*]] = alloca i32, align 4, !dbg [[DBG19:![0-9]+]]
; CHECK-NEXT:    call void @llvm.dbg.value(metadata ptr [[C]], metadata [[META12:![0-9]+]], metadata
!DIExpression()), !dbg [[DBG19]]
; CHECK-NEXT:    call void @outlined_ir_func_0(ptr [[A]], ptr [[B]], ptr [[C]]), !dbg [[DBG20:![0-9]+]]
; CHECK-NEXT:    ret void, !dbg [[DBG21:![0-9]+]]
;
;
; CHECK-LABEL: @function2(
; CHECK-NEXT:  entry:
; CHECK-NEXT:    [[A:%.*]] = alloca i32, align 4, !dbg [[DBG30:![0-9]+]]
; CHECK-NEXT:    call void @llvm.dbg.value(metadata ptr [[A]], metadata [[META24:![0-9]+]], metadata
!DIExpression()), !dbg [[DBG30]]
; CHECK-NEXT:    [[B:%.*]] = alloca i32, align 4, !dbg [[DBG31:![0-9]+]]
; CHECK-NEXT:    call void @llvm.dbg.value(metadata ptr [[B]], metadata [[META25:![0-9]+]], metadata
!DIExpression()), !dbg [[DBG31]]
;
 CHECK-NEXT:    [[C:%.*]] = alloca i32, align 4, !dbg [[DBG32:![0-9]+]]
; CHECK-NEXT:    call void @llvm.dbg.value(metadata ptr [[C]], metadata [[META26:![0-9]+]], metadata
!DIExpression()), !dbg [[DBG32]]
; CHECK-NEXT:    call void @outlined_ir_func_0(ptr [[A]], ptr [[B]], ptr [[C]]), !dbg [[DBG33:![0-9]+]]
```

```
; CHECK-NEXT:    ret void, !dbg [[DBG34:![0-9]+]]
;
;
; CHECK: @outlined_ir_func_0(ptr [[TMP0:%.*]], ptr [[TMP1:%.*]], ptr  [[TMP2:%.*]])
; CHECK:       entry_to_outline:
; CHECK-NEXT:    store i32 2, ptr [[TMP0]], align 4
; CHECK-NEXT:    store i32 3, ptr [[TMP1]], align 4
; CHECK-NEXT:    store i32 4, ptr [[TMP2]], align 4
; CHECK-NEXT:    [[AL:%.*]] = load i32, ptr [[TMP0]], align 4
; CHECK-NEXT:    [[BL:%.*]] = load i32, ptr [[TMP1]], align 4
; CHECK-NEXT:    [[CL:%.*]] = load i32, ptr [[TMP2]], align 4
; CHECK-NEXT:    br label [[ENTRY_AFTER_OUTLINE_EXITSTUB:%.*]]
;
; RUN: opt < %s -passes=argpromotion -S | FileCheck %s

; CHECK-LABEL: define i32 @foo() #0 {
; CHECK-NEXT:      %.val = load <32 x half>, ptr undef, align 4
; CHECK-NEXT:      call void @bar(<32 x half> %.val)
; CHECK-NEXT:      ret i32 0
; CHECK-NEXT:    }

; CHECK-LABEL: define internal void @bar(<32 x half> %.0.val) #0 {
; CHECK-NEXT:      ret void
; CHECK-NEXT:    }

; CHECK:    attributes #0 = { uwtable "min-legal-vector-width"="512" }

define i32 @foo() #0 {
 call void @bar(ptr undef)
 ret i32 0
}

define internal void @bar(ptr) #0 {
 %2 = load <32 x half>, ptr %0, align 4
 ret void
}

attributes #0 = { uwtable "min-legal-vector-width"="0" }
```

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; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -mattr=+m -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefixes=CHECK,RV64I
; RUN: llc -mtriple=riscv64 -mattr=+m,+zba -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-
prefixes=CHECK,RV64ZBA,RV64ZBANOZBB
; RUN: llc -mtriple=riscv64 -mattr=+m,+zba,+zbb -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefixes=CHECK,RV64ZBA,RV64ZBAZBB

define i64 @slliuw(i64 %a) nounwind {
; RV64I-LABEL: slliuw:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 31
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: slliuw:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli.uw a0, a0, 1
; RV64ZBA-NEXT:    ret
 %conv1 = shl i64 %a, 1
 %shl = and i64 %conv1, 8589934590
 ret i64 %shl
}

define i128 @slliuw_2(i32 signext %0, ptr %1) {
; RV64I-LABEL:
 slliuw_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 28
; RV64I-NEXT:    add a1, a1, a0
; RV64I-NEXT:    ld a0, 0(a1)
; RV64I-NEXT:    ld a1, 8(a1)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: slliuw_2:
; RV64ZBA:       # %bb.0:
```

```
; RV64ZBA-NEXT:    slli.uw a0, a0, 4
; RV64ZBA-NEXT:    add a1, a1, a0
; RV64ZBA-NEXT:    ld a0, 0(a1)
; RV64ZBA-NEXT:    ld a1, 8(a1)
; RV64ZBA-NEXT:    ret
 %3 = zext i32 %0 to i64
 %4 = getelementptr inbounds i128, ptr %1, i64 %3
 %5 = load i128, ptr %4
 ret i128 %5
}

define i128 @slliuw_3(i32 signext %0, ptr %1) {
; RV64I-LABEL: slliuw_3:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi a0, a0, 1
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 28
; RV64I-NEXT:    add a1, a1, a0
; RV64I-NEXT:    ld a0, 0(a1)
; RV64I-NEXT:    ld a1, 8(a1)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: slliuw_3:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    addi a0, a0, 1
; RV64ZBA-NEXT:    slli.uw a0, a0, 4
; RV64ZBA-NEXT:
    add a1, a1, a0
; RV64ZBA-NEXT:    ld a0, 0(a1)
; RV64ZBA-NEXT:    ld a1, 8(a1)
; RV64ZBA-NEXT:    ret
 %add = add i32 %0, 1
 %3 = zext i32 %add to i64
 %4 = getelementptr inbounds i128, ptr %1, i64 %3
 %5 = load i128, ptr %4
 ret i128 %5
}

define i64 @adduw(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: adduw:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    srli a1, a1, 32
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: adduw:
; RV64ZBA:       # %bb.0:
```

```
; RV64ZBA-NEXT:    add.uw a0, a1, a0
; RV64ZBA-NEXT:    ret
 %and = and i64 %b, 4294967295
 %add = add i64 %and, %a
 ret i64 %add
}

define signext i8 @adduw_2(i32 signext %0, ptr %1) {
; RV64I-LABEL: adduw_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lb a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: adduw_2:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    add.uw a0, a0, a1
; RV64ZBA-NEXT:
    lb a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = zext i32 %0 to i64
 %4 = getelementptr inbounds i8, ptr %1, i64 %3
 %5 = load i8, ptr %4
 ret i8 %5
}

define signext i8 @adduw_3(i32 signext %0, ptr %1) {
; RV64I-LABEL: adduw_3:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi a0, a0, 1
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lb a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: adduw_3:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    addi a0, a0, 1
; RV64ZBA-NEXT:    add.uw a0, a0, a1
; RV64ZBA-NEXT:    lb a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %add = add i32 %0, 1
 %3 = zext i32 %add to i64
 %4 = getelementptr inbounds i8, ptr %1, i64 %3
 %5 = load i8, ptr %4
```

```
 ret i8 %5
}

define i64 @zextw_i64(i64 %a) nounwind {
; RV64I-LABEL: zextw_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: zextw_i64:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:
    zext.w a0, a0
; RV64ZBA-NEXT:    ret
 %and = and i64 %a, 4294967295
 ret i64 %and
}

; This makes sure targetShrinkDemandedConstant changes the and immmediate to
; allow zext.w or slli+srli.
define i64 @zextw_demandedbits_i64(i64 %0) {
; RV64I-LABEL: zextw_demandedbits_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    ori a0, a0, 1
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: zextw_demandedbits_i64:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    ori a0, a0, 1
; RV64ZBA-NEXT:    zext.w a0, a0
; RV64ZBA-NEXT:    ret
 %2 = and i64 %0, 4294967294
 %3 = or i64 %2, 1
 ret i64 %3
}

define signext i16 @sh1add(i64 %0, ptr %1) {
; RV64I-LABEL: sh1add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 1
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lh a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh1add:
```

```
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh1add a0, a0, a1
; RV64ZBA-NEXT:    lh a0, 0(a0)
; RV64ZBA-NEXT:
    ret
 %3 = getelementptr inbounds i16, ptr %1, i64 %0
 %4 = load i16, ptr %3
 ret i16 %4
}

define signext i32 @sh2add(i64 %0, ptr %1) {
; RV64I-LABEL: sh2add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 2
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh2add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh2add a0, a0, a1
; RV64ZBA-NEXT:    lw a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = getelementptr inbounds i32, ptr %1, i64 %0
 %4 = load i32, ptr %3
 ret i32 %4
}

define i64 @sh3add(i64 %0, ptr %1) {
; RV64I-LABEL: sh3add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 3
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    ld a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh3add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add a0, a0, a1
; RV64ZBA-NEXT:    ld a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = getelementptr inbounds i64, ptr %1, i64 %0
 %4 = load i64, ptr %3
 ret i64 %4
}

define signext i16 @sh1adduw(i32
```

```
 signext %0, ptr %1) {
; RV64I-LABEL: sh1adduw:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 31
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lh a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh1adduw:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh1add.uw a0, a0, a1
; RV64ZBA-NEXT:    lh a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = zext i32 %0 to i64
 %4 = getelementptr inbounds i16, ptr %1, i64 %3
 %5 = load i16, ptr %4
 ret i16 %5
}

define i64 @sh1adduw_2(i64 %0, i64 %1) {
; RV64I-LABEL: sh1adduw_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 31
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh1adduw_2:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh1add.uw a0, a0, a1
; RV64ZBA-NEXT:    ret
 %3 = shl i64 %0, 1
 %4 = and i64 %3, 8589934590
 %5 = add i64 %4, %1
 ret i64 %5
}

define signext i32 @sh2adduw(i32 signext %0, ptr %1) {
; RV64I-LABEL: sh2adduw:
; RV64I:
       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 30
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    ret
;
```

```
; RV64ZBA-LABEL: sh2adduw:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh2add.uw a0, a0, a1
; RV64ZBA-NEXT:    lw a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = zext i32 %0 to i64
 %4 = getelementptr inbounds i32, ptr %1, i64 %3
 %5 = load i32, ptr %4
 ret i32 %5
}

define i64 @sh2adduw_2(i64 %0, i64 %1) {
; RV64I-LABEL: sh2adduw_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 30
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh2adduw_2:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh2add.uw a0, a0, a1
; RV64ZBA-NEXT:    ret
 %3 = shl i64 %0, 2
 %4 = and i64 %3, 17179869180
 %5 = add i64 %4, %1
 ret i64 %5
}

define i64 @sh3adduw(i32 signext %0, ptr %1) {
; RV64I-LABEL: sh3adduw:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:
 srli a0, a0, 29
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    ld a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh3adduw:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add.uw a0, a0, a1
; RV64ZBA-NEXT:    ld a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = zext i32 %0 to i64
 %4 = getelementptr inbounds i64, ptr %1, i64 %3
 %5 = load i64, ptr %4
 ret i64 %5
```

```
}

define i64 @sh3adduw_2(i64 %0, i64 %1) {
; RV64I-LABEL: sh3adduw_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 29
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh3adduw_2:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add.uw a0, a0, a1
; RV64ZBA-NEXT:    ret
 %3 = shl i64 %0, 3
 %4 = and i64 %3, 34359738360
 %5 = add i64 %4, %1
 ret i64 %5
}

; Type legalization inserts a sext_inreg after the first add. That add will be
; selected as sh2add which does not sign extend. SimplifyDemandedBits is unable
; to remove the sext_inreg because it has multiple uses.
 The ashr will use the
; sext_inreg to become sraiw. This leaves the sext_inreg only used by the shl.
; If the shl is selected as sllw, we don't need the sext_inreg.
define i64 @sh2add_extra_sext(i32 %x, i32 %y, i32 %z) {
; RV64I-LABEL: sh2add_extra_sext:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 2
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    sllw a1, a2, a0
; RV64I-NEXT:    sraiw a0, a0, 2
; RV64I-NEXT:    mul a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh2add_extra_sext:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh2add a0, a0, a1
; RV64ZBA-NEXT:    sllw a1, a2, a0
; RV64ZBA-NEXT:    sraiw a0, a0, 2
; RV64ZBA-NEXT:    mul a0, a1, a0
; RV64ZBA-NEXT:    ret
 %a = shl i32 %x, 2
 %b = add i32 %a, %y
 %c = shl i32 %z, %b
 %d = ashr i32 %b, 2
 %e = sext i32 %c to i64
```

```
 %f = sext i32 %d to i64
 %g = mul i64 %e, %f
 ret i64 %g
}

define i64 @addmul6(i64 %a, i64 %b) {
; RV64I-LABEL: addmul6:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 6
; RV64I-NEXT:    mul
 a0, a0, a2
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addmul6:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh1add a0, a0, a0
; RV64ZBA-NEXT:    sh1add a0, a0, a1
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 6
 %d = add i64 %c, %b
 ret i64 %d
}

define i64 @addmul10(i64 %a, i64 %b) {
; RV64I-LABEL: addmul10:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 10
; RV64I-NEXT:    mul a0, a0, a2
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addmul10:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh2add a0, a0, a0
; RV64ZBA-NEXT:    sh1add a0, a0, a1
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 10
 %d = add i64 %c, %b
 ret i64 %d
}

define i64 @addmul12(i64 %a, i64 %b) {
; RV64I-LABEL: addmul12:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 12
; RV64I-NEXT:    mul a0, a0, a2
; RV64I-NEXT:    add a0, a0, a1
```

```
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addmul12:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh1add a0, a0, a0
; RV64ZBA-NEXT:    sh2add
 a0, a0, a1
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 12
 %d = add i64 %c, %b
 ret i64 %d
}

define i64 @addmul18(i64 %a, i64 %b) {
; RV64I-LABEL: addmul18:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 18
; RV64I-NEXT:    mul a0, a0, a2
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addmul18:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add a0, a0, a0
; RV64ZBA-NEXT:    sh1add a0, a0, a1
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 18
 %d = add i64 %c, %b
 ret i64 %d
}

define i64 @addmul20(i64 %a, i64 %b) {
; RV64I-LABEL: addmul20:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 20
; RV64I-NEXT:    mul a0, a0, a2
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addmul20:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh2add a0, a0, a0
; RV64ZBA-NEXT:    sh2add a0, a0, a1
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 20
 %d = add i64 %c, %b
 ret i64 %d
}
```

```
define i64 @addmul24(i64 %a, i64 %b) {
; RV64I-LABEL: addmul24:
; RV64I:
   # %bb.0:
; RV64I-NEXT:    li a2, 24
; RV64I-NEXT:    mul a0, a0, a2
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addmul24:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh1add a0, a0, a0
; RV64ZBA-NEXT:    sh3add a0, a0, a1
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 24
 %d = add i64 %c, %b
 ret i64 %d
}

define i64 @addmul36(i64 %a, i64 %b) {
; RV64I-LABEL: addmul36:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 36
; RV64I-NEXT:    mul a0, a0, a2
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addmul36:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add a0, a0, a0
; RV64ZBA-NEXT:    sh2add a0, a0, a1
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 36
 %d = add i64 %c, %b
 ret i64 %d
}

define i64 @addmul40(i64 %a, i64 %b) {
; RV64I-LABEL: addmul40:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 40
; RV64I-NEXT:    mul a0, a0, a2
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addmul40:
; RV64ZBA:       # %bb.0:
```

```
;
 RV64ZBA-NEXT:    sh2add a0, a0, a0
; RV64ZBA-NEXT:    sh3add a0, a0, a1
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 40
 %d = add i64 %c, %b
 ret i64 %d
}

define i64 @addmul72(i64 %a, i64 %b) {
; RV64I-LABEL: addmul72:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 72
; RV64I-NEXT:    mul a0, a0, a2
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addmul72:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add a0, a0, a0
; RV64ZBA-NEXT:    sh3add a0, a0, a1
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 72
 %d = add i64 %c, %b
 ret i64 %d
}

define i64 @mul96(i64 %a) {
; RV64I-LABEL: mul96:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 96
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul96:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh1add a0, a0, a0
; RV64ZBA-NEXT:    slli a0, a0, 5
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 96
 ret i64 %c
}

define i64 @mul160(i64 %a) {
; RV64I-LABEL: mul160:
; RV64I:       # %bb.0:
; RV64I-NEXT:
```

```
   li a1, 160
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul160:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh2add a0, a0, a0
; RV64ZBA-NEXT:    slli a0, a0, 5
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 160
 ret i64 %c
}

define i64 @mul288(i64 %a) {
; RV64I-LABEL: mul288:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 288
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul288:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add a0, a0, a0
; RV64ZBA-NEXT:    slli a0, a0, 5
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 288
 ret i64 %c
}

define i64 @zext_mul96(i32 signext %a) {
; RV64I-LABEL: zext_mul96:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 3
; RV64I-NEXT:    slli a1, a1, 37
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    mulhu a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: zext_mul96:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli.uw a0, a0, 5
; RV64ZBA-NEXT:    sh1add a0, a0, a0
; RV64ZBA-NEXT:    ret
 %b = zext
 i32 %a to i64
 %c = mul i64 %b, 96
 ret i64 %c
}
```

```
define i64 @zext_mul160(i32 signext %a) {
; RV64I-LABEL: zext_mul160:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 5
; RV64I-NEXT:    slli a1, a1, 37
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    mulhu a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: zext_mul160:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli.uw a0, a0, 5
; RV64ZBA-NEXT:    sh2add a0, a0, a0
; RV64ZBA-NEXT:    ret
 %b = zext i32 %a to i64
 %c = mul i64 %b, 160
 ret i64 %c
}

define i64 @zext_mul288(i32 signext %a) {
; RV64I-LABEL: zext_mul288:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 9
; RV64I-NEXT:    slli a1, a1, 37
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    mulhu a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: zext_mul288:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli.uw a0, a0, 5
; RV64ZBA-NEXT:    sh3add a0, a0, a0
; RV64ZBA-NEXT:    ret
 %b = zext i32 %a to i64
 %c = mul i64 %b, 288
 ret i64 %c
}

; We can't use slli.uw becaues
 the shift amount is more than 31.
; FIXME: The zext.w is unneeded.
define i64 @zext_mul12884901888(i32 signext %a) {
; RV64I-LABEL: zext_mul12884901888:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    li a1, 3
```

```
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: zext_mul12884901888:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    andi a0, a0, -1
; RV64ZBA-NEXT:    sh1add a0, a0, a0
; RV64ZBA-NEXT:    slli a0, a0, 32
; RV64ZBA-NEXT:    ret
 %b = zext i32 %a to i64
 %c = mul i64 %b, 12884901888
 ret i64 %c
}

; We can't use slli.uw becaues the shift amount is more than 31.
; FIXME: The zext.w is unneeded.
define i64 @zext_mul21474836480(i32 signext %a) {
; RV64I-LABEL: zext_mul21474836480:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    li a1, 5
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:
    ret
;
; RV64ZBA-LABEL: zext_mul21474836480:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    andi a0, a0, -1
; RV64ZBA-NEXT:    sh2add a0, a0, a0
; RV64ZBA-NEXT:    slli a0, a0, 32
; RV64ZBA-NEXT:    ret
 %b = zext i32 %a to i64
 %c = mul i64 %b, 21474836480
 ret i64 %c
}

; We can't use slli.uw becaues the shift amount is more than 31.
; FIXME: The zext.w is unneeded.
define i64 @zext_mul38654705664(i32 signext %a) {
; RV64I-LABEL: zext_mul38654705664:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    li a1, 9
; RV64I-NEXT:    slli a1, a1, 32
```

```
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: zext_mul38654705664:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    andi a0, a0, -1
; RV64ZBA-NEXT:    sh3add a0, a0, a0
; RV64ZBA-NEXT:    slli a0, a0, 32
; RV64ZBA-NEXT:    ret
 %b = zext i32 %a to i64
 %c = mul i64 %b, 38654705664
 ret i64 %c
}

define i64 @sh1add_imm(i64 %0) {
; CHECK-LABEL: sh1add_imm:
;
 CHECK:       # %bb.0:
; CHECK-NEXT:    slli a0, a0, 1
; CHECK-NEXT:    addi a0, a0, 5
; CHECK-NEXT:    ret
 %a = shl i64 %0, 1
 %b = add i64 %a, 5
 ret i64 %b
}

define i64 @sh2add_imm(i64 %0) {
; CHECK-LABEL: sh2add_imm:
; CHECK:       # %bb.0:
; CHECK-NEXT:    slli a0, a0, 2
; CHECK-NEXT:    addi a0, a0, -6
; CHECK-NEXT:    ret
 %a = shl i64 %0, 2
 %b = add i64 %a, -6
 ret i64 %b
}

define i64 @sh3add_imm(i64 %0) {
; CHECK-LABEL: sh3add_imm:
; CHECK:       # %bb.0:
; CHECK-NEXT:    slli a0, a0, 3
; CHECK-NEXT:    addi a0, a0, 7
; CHECK-NEXT:    ret
 %a = shl i64 %0, 3
 %b = add i64 %a, 7
 ret i64 %b
}
```

```
define i64 @sh1adduw_imm(i32 signext %0) {
; RV64I-LABEL: sh1adduw_imm:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 31
; RV64I-NEXT:    addi a0, a0, 11
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh1adduw_imm:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli.uw a0, a0, 1
; RV64ZBA-NEXT:    addi a0, a0, 11
; RV64ZBA-NEXT:    ret
 %a =
 zext i32 %0 to i64
 %b = shl i64 %a, 1
 %c = add i64 %b, 11
 ret i64 %c
}

define i64 @sh2adduw_imm(i32 signext %0) {
; RV64I-LABEL: sh2adduw_imm:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 30
; RV64I-NEXT:    addi a0, a0, -12
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh2adduw_imm:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli.uw a0, a0, 2
; RV64ZBA-NEXT:    addi a0, a0, -12
; RV64ZBA-NEXT:    ret
 %a = zext i32 %0 to i64
 %b = shl i64 %a, 2
 %c = add i64 %b, -12
 ret i64 %c
}

define i64 @sh3adduw_imm(i32 signext %0) {
; RV64I-LABEL: sh3adduw_imm:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 29
; RV64I-NEXT:    addi a0, a0, 13
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh3adduw_imm:
```

```
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli.uw a0, a0, 3
; RV64ZBA-NEXT:    addi a0, a0, 13
; RV64ZBA-NEXT:    ret
 %a = zext i32 %0 to i64
 %b = shl i64 %a, 3
 %c = add i64 %b, 13
 ret i64 %c
}

define i64
 @adduw_imm(i32 signext %0) nounwind {
; RV64I-LABEL: adduw_imm:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    addi a0, a0, 5
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: adduw_imm:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    zext.w a0, a0
; RV64ZBA-NEXT:    addi a0, a0, 5
; RV64ZBA-NEXT:    ret
 %a = zext i32 %0 to i64
 %b = add i64 %a, 5
 ret i64 %b
}

define i64 @mul258(i64 %a) {
; CHECK-LABEL: mul258:
; CHECK:       # %bb.0:
; CHECK-NEXT:    li a1, 258
; CHECK-NEXT:    mul a0, a0, a1
; CHECK-NEXT:    ret
 %c = mul i64 %a, 258
 ret i64 %c
}

define i64 @mul260(i64 %a) {
; CHECK-LABEL: mul260:
; CHECK:       # %bb.0:
; CHECK-NEXT:    li a1, 260
; CHECK-NEXT:    mul a0, a0, a1
; CHECK-NEXT:    ret
 %c = mul i64 %a, 260
 ret i64 %c
}
```

```
define i64 @mul264(i64 %a) {
; CHECK-LABEL: mul264:
; CHECK:       # %bb.0:
; CHECK-NEXT:    li a1, 264
; CHECK-NEXT:    mul a0, a0, a1
; CHECK-NEXT:    ret
 %c = mul i64 %a, 264
 ret i64
 %c
}

define i64 @imm_zextw() nounwind {
; RV64I-LABEL: imm_zextw:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a0, 1
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    addi a0, a0, -2
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: imm_zextw:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    li a0, -2
; RV64ZBA-NEXT:    zext.w a0, a0
; RV64ZBA-NEXT:    ret
 ret i64 4294967294 ; -2 in 32 bits.
}

define i64 @mul11(i64 %a) {
; RV64I-LABEL: mul11:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 11
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul11:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh2add a1, a0, a0
; RV64ZBA-NEXT:    sh1add a0, a1, a0
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 11
 ret i64 %c
}

define i64 @mul19(i64 %a) {
; RV64I-LABEL: mul19:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 19
```

```
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul19:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add a1, a0, a0
; RV64ZBA-NEXT:    sh1add a0,
 a1, a0
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 19
 ret i64 %c
}

define i64 @mul13(i64 %a) {
; RV64I-LABEL: mul13:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 13
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul13:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh1add a1, a0, a0
; RV64ZBA-NEXT:    sh2add a0, a1, a0
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 13
 ret i64 %c
}

define i64 @mul21(i64 %a) {
; RV64I-LABEL: mul21:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 21
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul21:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh2add a1, a0, a0
; RV64ZBA-NEXT:    sh2add a0, a1, a0
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 21
 ret i64 %c
}

define i64 @mul37(i64 %a) {
; RV64I-LABEL: mul37:
; RV64I:       # %bb.0:
```

```
; RV64I-NEXT:    li a1, 37
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul37:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add a1, a0, a0
; RV64ZBA-NEXT:
    sh2add a0, a1, a0
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 37
 ret i64 %c
}

define i64 @mul25(i64 %a) {
; RV64I-LABEL: mul25:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 25
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul25:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh1add a1, a0, a0
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 25
 ret i64 %c
}

define i64 @mul41(i64 %a) {
; RV64I-LABEL: mul41:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 41
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul41:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh2add a1, a0, a0
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 41
 ret i64 %c
}

define i64 @mul73(i64 %a) {
; RV64I-LABEL: mul73:
```

```
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 73
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul73:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add
 a1, a0, a0
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 73
 ret i64 %c
}

define i64 @mul27(i64 %a) {
; RV64I-LABEL: mul27:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 27
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul27:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add a0, a0, a0
; RV64ZBA-NEXT:    sh1add a0, a0, a0
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 27
 ret i64 %c
}

define i64 @mul45(i64 %a) {
; RV64I-LABEL: mul45:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 45
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul45:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add a0, a0, a0
; RV64ZBA-NEXT:    sh2add a0, a0, a0
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 45
 ret i64 %c
}

define i64 @mul81(i64 %a) {
```

```
; RV64I-LABEL: mul81:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 81
; RV64I-NEXT:    mul a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul81:
; RV64ZBA:       # %bb.0:
;
 RV64ZBA-NEXT:    sh3add a0, a0, a0
; RV64ZBA-NEXT:    sh3add a0, a0, a0
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 81
 ret i64 %c
}

define i64 @mul4098(i64 %a) {
; RV64I-LABEL: mul4098:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a1, a0, 1
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul4098:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli a1, a0, 12
; RV64ZBA-NEXT:    sh1add a0, a0, a1
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 4098
 ret i64 %c
}

define i64 @mul4100(i64 %a) {
; RV64I-LABEL: mul4100:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a1, a0, 2
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul4100:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli a1, a0, 12
; RV64ZBA-NEXT:    sh2add a0, a0, a1
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 4100
 ret i64 %c
```

```
}

define i64 @mul4104(i64 %a) {
; RV64I-LABEL: mul4104:
; RV64I:       # %bb.0:
; RV64I-NEXT:
   slli a1, a0, 3
; RV64I-NEXT:    slli a0, a0, 12
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: mul4104:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli a1, a0, 12
; RV64ZBA-NEXT:    sh3add a0, a0, a1
; RV64ZBA-NEXT:    ret
 %c = mul i64 %a, 4104
 ret i64 %c
}

define signext i32 @mulw192(i32 signext %a) {
; CHECK-LABEL: mulw192:
; CHECK:       # %bb.0:
; CHECK-NEXT:    li a1, 192
; CHECK-NEXT:    mulw a0, a0, a1
; CHECK-NEXT:    ret
 %c = mul i32 %a, 192
 ret i32 %c
}

define signext i32 @mulw320(i32 signext %a) {
; CHECK-LABEL: mulw320:
; CHECK:       # %bb.0:
; CHECK-NEXT:    li a1, 320
; CHECK-NEXT:    mulw a0, a0, a1
; CHECK-NEXT:    ret
 %c = mul i32 %a, 320
 ret i32 %c
}

define signext i32 @mulw576(i32 signext %a) {
; CHECK-LABEL: mulw576:
; CHECK:       # %bb.0:
; CHECK-NEXT:    li a1, 576
; CHECK-NEXT:    mulw a0, a0, a1
; CHECK-NEXT:    ret
 %c = mul i32 %a, 576
 ret i32 %c
```

```
}

define i64 @add4104(i64 %a) {
; RV64I-LABEL: add4104:
; RV64I:
      # %bb.0:
; RV64I-NEXT:    lui a1, 1
; RV64I-NEXT:    addiw a1, a1, 8
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: add4104:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    li a1, 1026
; RV64ZBA-NEXT:    sh2add a0, a1, a0
; RV64ZBA-NEXT:    ret
 %c = add i64 %a, 4104
 ret i64 %c
}

define i64 @add8208(i64 %a) {
; RV64I-LABEL: add8208:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 2
; RV64I-NEXT:    addiw a1, a1, 16
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: add8208:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    li a1, 1026
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    ret
 %c = add i64 %a, 8208
 ret i64 %c
}

; Make sure we prefer LUI for the 8192 instead of using sh3add.
define signext i32 @add8192_i32(i32 signext %a) {
; CHECK-LABEL: add8192_i32:
; CHECK:       # %bb.0:
; CHECK-NEXT:    lui a1, 2
; CHECK-NEXT:    addw a0, a0, a1
; CHECK-NEXT:    ret
 %c = add i32 %a, 8192
 ret i32 %c
}
```

```
; Make sure we prefer LUI
 for the 8192 instead of using sh3add.
define i64 @add8192(i64 %a) {
; CHECK-LABEL: add8192:
; CHECK:       # %bb.0:
; CHECK-NEXT:    lui a1, 2
; CHECK-NEXT:    add a0, a0, a1
; CHECK-NEXT:    ret
 %c = add i64 %a, 8192
 ret i64 %c
}

define signext i32 @addshl32_5_6(i32 signext %a, i32 signext %b) {
; RV64I-LABEL: addshl32_5_6:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 5
; RV64I-NEXT:    slli a1, a1, 6
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addshl32_5_6:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh1add a0, a1, a0
; RV64ZBA-NEXT:    slliw a0, a0, 5
; RV64ZBA-NEXT:    ret
 %c = shl i32 %a, 5
 %d = shl i32 %b, 6
 %e = add i32 %c, %d
 ret i32 %e
}

define i64 @addshl64_5_6(i64 %a, i64 %b) {
; RV64I-LABEL: addshl64_5_6:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 5
; RV64I-NEXT:    slli a1, a1, 6
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addshl64_5_6:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:
   sh1add a0, a1, a0
; RV64ZBA-NEXT:    slli a0, a0, 5
; RV64ZBA-NEXT:    ret
 %c = shl i64 %a, 5
 %d = shl i64 %b, 6
 %e = add i64 %c, %d
```

```
 ret i64 %e
}

define signext i32 @addshl32_5_7(i32 signext %a, i32 signext %b) {
; RV64I-LABEL: addshl32_5_7:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 5
; RV64I-NEXT:    slli a1, a1, 7
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addshl32_5_7:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh2add a0, a1, a0
; RV64ZBA-NEXT:    slliw a0, a0, 5
; RV64ZBA-NEXT:    ret
 %c = shl i32 %a, 5
 %d = shl i32 %b, 7
 %e = add i32 %c, %d
 ret i32 %e
}

define i64 @addshl64_5_7(i64 %a, i64 %b) {
; RV64I-LABEL: addshl64_5_7:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 5
; RV64I-NEXT:    slli a1, a1, 7
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addshl64_5_7:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh2add a0, a1, a0
; RV64ZBA-NEXT:    slli a0, a0, 5
; RV64ZBA-NEXT:    ret
 %c
 = shl i64 %a, 5
 %d = shl i64 %b, 7
 %e = add i64 %c, %d
 ret i64 %e
}

define signext i32 @addshl32_5_8(i32 signext %a, i32 signext %b) {
; RV64I-LABEL: addshl32_5_8:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 5
; RV64I-NEXT:    slli a1, a1, 8
; RV64I-NEXT:    addw a0, a0, a1
```

```
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addshl32_5_8:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    slliw a0, a0, 5
; RV64ZBA-NEXT:    ret
 %c = shl i32 %a, 5
 %d = shl i32 %b, 8
 %e = add i32 %c, %d
 ret i32 %e
}

define i64 @addshl64_5_8(i64 %a, i64 %b) {
; RV64I-LABEL: addshl64_5_8:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 5
; RV64I-NEXT:    slli a1, a1, 8
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: addshl64_5_8:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    slli a0, a0, 5
; RV64ZBA-NEXT:    ret
 %c = shl i64 %a, 5
 %d = shl i64 %b, 8
 %e = add i64 %c, %d
 ret i64 %e
}

; Make
 sure we use sext.h+slli+srli for Zba+Zbb.
; FIXME: The RV64I and Zba only cases can be done with only 3 shifts.
define zeroext i32 @sext_ashr_zext_i8(i8 %a) nounwind {
; RV64I-LABEL: sext_ashr_zext_i8:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 24
; RV64I-NEXT:    sraiw a0, a0, 31
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    ret
;
; RV64ZBANOZBB-LABEL: sext_ashr_zext_i8:
; RV64ZBANOZBB:       # %bb.0:
; RV64ZBANOZBB-NEXT:    slli a0, a0, 24
; RV64ZBANOZBB-NEXT:    sraiw a0, a0, 31
```

```
; RV64ZBANOZBB-NEXT:    zext.w a0, a0
; RV64ZBANOZBB-NEXT:    ret
;
; RV64ZBAZBB-LABEL: sext_ashr_zext_i8:
; RV64ZBAZBB:       # %bb.0:
; RV64ZBAZBB-NEXT:    sext.b a0, a0
; RV64ZBAZBB-NEXT:    sraiw a0, a0, 9
; RV64ZBAZBB-NEXT:    zext.w a0, a0
; RV64ZBAZBB-NEXT:    ret
 %ext = sext i8 %a to i32
 %1 = ashr i32 %ext, 9
 ret i32 %1
}

; Make sure we use sext.h+slli+srli for Zba+Zbb.
; FIXME: The RV64I and Zba only cases can be done with only 3 shifts.
define
 zeroext i32 @sext_ashr_zext_i16(i16 %a) nounwind {
; RV64I-LABEL: sext_ashr_zext_i16:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 16
; RV64I-NEXT:    sraiw a0, a0, 25
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    ret
;
; RV64ZBANOZBB-LABEL: sext_ashr_zext_i16:
; RV64ZBANOZBB:       # %bb.0:
; RV64ZBANOZBB-NEXT:    slli a0, a0, 16
; RV64ZBANOZBB-NEXT:    sraiw a0, a0, 25
; RV64ZBANOZBB-NEXT:    zext.w a0, a0
; RV64ZBANOZBB-NEXT:    ret
;
; RV64ZBAZBB-LABEL: sext_ashr_zext_i16:
; RV64ZBAZBB:       # %bb.0:
; RV64ZBAZBB-NEXT:    slli a0, a0, 48
; RV64ZBAZBB-NEXT:    srai a0, a0, 57
; RV64ZBAZBB-NEXT:    zext.w a0, a0
; RV64ZBAZBB-NEXT:    ret
 %ext = sext i16 %a to i32
 %1 = ashr i32 %ext, 9
 ret i32 %1
}

; This the IR you get from InstCombine if take the difference of 2 pointers and
; cast is to unsigned before using as an index.
define signext i16 @sh1adduw_ptrdiff(i64 %diff, ptr %baseptr) {
; RV64I-LABEL: sh1adduw_ptrdiff:
```

```
; RV64I:
    # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    slli a2, a2, 33
; RV64I-NEXT:    addi a2, a2, -2
; RV64I-NEXT:    and a0, a0, a2
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lh a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh1adduw_ptrdiff:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srli a0, a0, 1
; RV64ZBA-NEXT:    sh1add.uw a0, a0, a1
; RV64ZBA-NEXT:    lh a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %ptrdiff = lshr exact i64 %diff, 1
 %cast = and i64 %ptrdiff, 4294967295
 %ptr = getelementptr inbounds i16, ptr %baseptr, i64 %cast
 %res = load i16, ptr %ptr
 ret i16 %res
}

define signext i32 @sh2adduw_ptrdiff(i64 %diff, ptr %baseptr) {
; RV64I-LABEL: sh2adduw_ptrdiff:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    slli a2, a2, 34
; RV64I-NEXT:    addi a2, a2, -4
; RV64I-NEXT:    and a0, a0, a2
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh2adduw_ptrdiff:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:
    srli a0, a0, 2
; RV64ZBA-NEXT:    sh2add.uw a0, a0, a1
; RV64ZBA-NEXT:    lw a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %ptrdiff = lshr exact i64 %diff, 2
 %cast = and i64 %ptrdiff, 4294967295
 %ptr = getelementptr inbounds i32, ptr %baseptr, i64 %cast
 %res = load i32, ptr %ptr
 ret i32 %res
}
```

```
define i64 @sh3adduw_ptrdiff(i64 %diff, ptr %baseptr) {
; RV64I-LABEL: sh3adduw_ptrdiff:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    slli a2, a2, 35
; RV64I-NEXT:    addi a2, a2, -8
; RV64I-NEXT:    and a0, a0, a2
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    ld a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: sh3adduw_ptrdiff:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srli a0, a0, 3
; RV64ZBA-NEXT:    sh3add.uw a0, a0, a1
; RV64ZBA-NEXT:    ld a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %ptrdiff = lshr exact i64 %diff, 3
 %cast = and i64 %ptrdiff, 4294967295
 %ptr = getelementptr inbounds i64, ptr %baseptr, i64 %cast
 %res = load i64, ptr %ptr
 ret i64 %res
}

define signext
 i16 @srliw_1_sh1add(ptr %0, i32 signext %1) {
; RV64I-LABEL: srliw_1_sh1add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a1, a1, 1
; RV64I-NEXT:    slli a1, a1, 1
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lh a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srliw_1_sh1add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srliw a1, a1, 1
; RV64ZBA-NEXT:    sh1add a0, a1, a0
; RV64ZBA-NEXT:    lh a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i32 %1, 1
 %4 = zext i32 %3 to i64
 %5 = getelementptr inbounds i16, ptr %0, i64 %4
 %6 = load i16, ptr %5, align 2
 ret i16 %6
}

define i128 @slliuw_ptrdiff(i64 %diff, ptr %baseptr) {
```

```
; RV64I-LABEL: slliuw_ptrdiff:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a2, 1
; RV64I-NEXT:    slli a2, a2, 36
; RV64I-NEXT:    addi a2, a2, -16
; RV64I-NEXT:    and a0, a0, a2
; RV64I-NEXT:    add a1, a1, a0
; RV64I-NEXT:    ld a0, 0(a1)
; RV64I-NEXT:    ld a1, 8(a1)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: slliuw_ptrdiff:
; RV64ZBA:       # %bb.0:
;
 RV64ZBA-NEXT:    srli a0, a0, 4
; RV64ZBA-NEXT:    slli.uw a0, a0, 4
; RV64ZBA-NEXT:    add a1, a1, a0
; RV64ZBA-NEXT:    ld a0, 0(a1)
; RV64ZBA-NEXT:    ld a1, 8(a1)
; RV64ZBA-NEXT:    ret
 %ptrdiff = lshr exact i64 %diff, 4
 %cast = and i64 %ptrdiff, 4294967295
 %ptr = getelementptr inbounds i128, ptr %baseptr, i64 %cast
 %res = load i128, ptr %ptr
 ret i128 %res
}

define signext i32 @srliw_2_sh2add(ptr %0, i32 signext %1) {
; RV64I-LABEL: srliw_2_sh2add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a1, a1, 2
; RV64I-NEXT:    slli a1, a1, 2
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srliw_2_sh2add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srliw a1, a1, 2
; RV64ZBA-NEXT:    sh2add a0, a1, a0
; RV64ZBA-NEXT:    lw a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i32 %1, 2
 %4 = zext i32 %3 to i64
 %5 = getelementptr inbounds i32, ptr %0, i64 %4
 %6 = load i32, ptr %5, align 4
 ret i32 %6
}
```

```
define i64 @srliw_3_sh3add(ptr
 %0, i32 signext %1) {
; RV64I-LABEL: srliw_3_sh3add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a1, a1, 3
; RV64I-NEXT:    slli a1, a1, 3
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ld a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srliw_3_sh3add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srliw a1, a1, 3
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    ld a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i32 %1, 3
 %4 = zext i32 %3 to i64
 %5 = getelementptr inbounds i64, ptr %0, i64 %4
 %6 = load i64, ptr %5, align 8
 ret i64 %6
}

define signext i32 @srliw_1_sh2add(ptr %0, i32 signext %1) {
; RV64I-LABEL: srliw_1_sh2add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a1, a1, 1
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    srli a1, a1, 30
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srliw_1_sh2add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srliw a1, a1, 1
; RV64ZBA-NEXT:    sh2add a0, a1, a0
;
 RV64ZBA-NEXT:    lw a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i32 %1, 1
 %4 = zext i32 %3 to i64
 %5 = getelementptr inbounds i32, ptr %0, i64 %4
 %6 = load i32, ptr %5, align 4
 ret i32 %6
}
```

```
define i64 @srliw_1_sh3add(ptr %0, i32 signext %1) {
; RV64I-LABEL: srliw_1_sh3add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a1, a1, 1
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    srli a1, a1, 29
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ld a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srliw_1_sh3add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srliw a1, a1, 1
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    ld a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i32 %1, 1
 %4 = zext i32 %3 to i64
 %5 = getelementptr inbounds i64, ptr %0, i64 %4
 %6 = load i64, ptr %5, align 8
 ret i64 %6
}

define i64 @srliw_2_sh3add(ptr %0, i32 signext %1) {
; RV64I-LABEL: srliw_2_sh3add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a1, a1, 2
; RV64I-NEXT:    slli a1, a1, 32
;
 RV64I-NEXT:    srli a1, a1, 29
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ld a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srliw_2_sh3add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srliw a1, a1, 2
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    ld a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i32 %1, 2
 %4 = zext i32 %3 to i64
 %5 = getelementptr inbounds i64, ptr %0, i64 %4
 %6 = load i64, ptr %5, align 8
 ret i64 %6
}

define signext i16 @srliw_2_sh1add(ptr %0, i32 signext %1) {
```

```
; RV64I-LABEL: srliw_2_sh1add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a1, a1, 2
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    srli a1, a1, 31
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lh a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srliw_2_sh1add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srliw a1, a1, 2
; RV64ZBA-NEXT:    sh1add a0, a1, a0
; RV64ZBA-NEXT:    lh a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i32 %1, 2
 %4 = zext i32 %3 to i64
 %5 = getelementptr
 inbounds i16, ptr %0, i64 %4
 %6 = load i16, ptr %5, align 2
 ret i16 %6
}


define signext i32 @srliw_3_sh2add(ptr %0, i32 signext %1) {
; RV64I-LABEL: srliw_3_sh2add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a1, a1, 3
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    srli a1, a1, 30
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srliw_3_sh2add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srliw a1, a1, 3
; RV64ZBA-NEXT:    sh2add a0, a1, a0
; RV64ZBA-NEXT:    lw a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i32 %1, 3
 %4 = zext i32 %3 to i64
 %5 = getelementptr inbounds i32, ptr %0, i64 %4
 %6 = load i32, ptr %5, align 4
 ret i32 %6
}

define i64 @srliw_4_sh3add(ptr %0, i32 signext %1) {
```

```
; RV64I-LABEL: srliw_4_sh3add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a1, a1, 4
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    srli a1, a1, 29
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ld a0, 0(a0)
; RV64I-NEXT:
    ret
;
; RV64ZBA-LABEL: srliw_4_sh3add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srliw a1, a1, 4
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    ld a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i32 %1, 4
 %4 = zext i32 %3 to i64
 %5 = getelementptr inbounds i64, ptr %0, i64 %4
 %6 = load i64, ptr %5, align 8
 ret i64 %6
}

define signext i32 @srli_1_sh2add(ptr %0, i64 %1) {
; RV64I-LABEL: srli_1_sh2add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a1, a1, 1
; RV64I-NEXT:    andi a1, a1, -4
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srli_1_sh2add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srli a1, a1, 1
; RV64ZBA-NEXT:    sh2add a0, a1, a0
; RV64ZBA-NEXT:    lw a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i64 %1, 1
 %4 = getelementptr inbounds i32, ptr %0, i64 %3
 %5 = load i32, ptr %4, align 4
 ret i32 %5
}

define i64 @srli_2_sh3add(ptr %0, i64 %1) {
; RV64I-LABEL: srli_2_sh3add:
; RV64I:       # %bb.0:
;
```

```
 RV64I-NEXT:    slli a1, a1, 1
; RV64I-NEXT:    andi a1, a1, -8
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ld a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srli_2_sh3add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srli a1, a1, 2
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    ld a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i64 %1, 2
 %4 = getelementptr inbounds i64, ptr %0, i64 %3
 %5 = load i64, ptr %4, align 8
 ret i64 %5
}

define signext i16 @srli_2_sh1add(ptr %0, i64 %1) {
; RV64I-LABEL: srli_2_sh1add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srli a1, a1, 1
; RV64I-NEXT:    andi a1, a1, -2
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lh a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srli_2_sh1add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srli a1, a1, 2
; RV64ZBA-NEXT:    sh1add a0, a1, a0
; RV64ZBA-NEXT:    lh a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i64 %1, 2
 %4 = getelementptr inbounds i16, ptr %0, i64 %3
 %5 = load i16, ptr %4, align
 2
 ret i16 %5
}

define signext i32 @srli_3_sh2add(ptr %0, i64 %1) {
; RV64I-LABEL: srli_3_sh2add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srli a1, a1, 1
; RV64I-NEXT:    andi a1, a1, -4
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    ret
```

```
;
; RV64ZBA-LABEL: srli_3_sh2add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srli a1, a1, 3
; RV64ZBA-NEXT:    sh2add a0, a1, a0
; RV64ZBA-NEXT:    lw a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = lshr i64 %1, 3
 %4 = getelementptr inbounds i32, ptr %0, i64 %3
 %5 = load i32, ptr %4, align 4
 ret i32 %5
}

define i64 @srli_4_sh3add(ptr %0, i64 %1) {
; RV64I-LABEL: srli_4_sh3add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srli a1, a1, 1
; RV64I-NEXT:    andi a1, a1, -8
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ld a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: srli_4_sh3add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    srli a1, a1, 4
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    ld a0, 0(a0)
; RV64ZBA-NEXT:
   ret
 %3 = lshr i64 %1, 4
 %4 = getelementptr inbounds i64, ptr %0, i64 %3
 %5 = load i64, ptr %4, align 8
 ret i64 %5
}

define signext i16 @shl_2_sh1add(ptr %0, i32 signext %1) {
; RV64I-LABEL: shl_2_sh1add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a1, a1, 2
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    srli a1, a1, 31
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lh a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: shl_2_sh1add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli a1, a1, 2
```

```
; RV64ZBA-NEXT:    zext.w a1, a1
; RV64ZBA-NEXT:    sh1add a0, a1, a0
; RV64ZBA-NEXT:    lh a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = shl i32 %1, 2
 %4 = zext i32 %3 to i64
 %5 = getelementptr inbounds i16, ptr %0, i64 %4
 %6 = load i16, ptr %5, align 2
 ret i16 %6
}

define signext i32 @shl_16_sh2add(ptr %0, i32 signext %1) {
; RV64I-LABEL: shl_16_sh2add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a1, a1, 16
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    srli a1, a1, 30
;
 RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lw a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: shl_16_sh2add:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli a1, a1, 16
; RV64ZBA-NEXT:    zext.w a1, a1
; RV64ZBA-NEXT:    sh2add a0, a1, a0
; RV64ZBA-NEXT:    lw a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = shl i32 %1, 16
 %4 = zext i32 %3 to i64
 %5 = getelementptr inbounds i32, ptr %0, i64 %4
 %6 = load i32, ptr %5, align 4
 ret i32 %6
}

define i64 @shl_31_sh3add(ptr %0, i32 signext %1) {
; RV64I-LABEL: shl_31_sh3add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a1, a1, 31
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    srli a1, a1, 29
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ld a0, 0(a0)
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: shl_31_sh3add:
; RV64ZBA:       # %bb.0:
```

```
; RV64ZBA-NEXT:    slli a1, a1, 31
; RV64ZBA-NEXT:    zext.w a1, a1
; RV64ZBA-NEXT:    sh3add a0, a1, a0
; RV64ZBA-NEXT:    ld a0, 0(a0)
; RV64ZBA-NEXT:    ret
 %3 = shl i32 %1, 31
 %4 = zext i32 %3
 to i64
 %5 = getelementptr inbounds i64, ptr %0, i64 %4
 %6 = load i64, ptr %5, align 8
 ret i64 %6
}

define i64 @pack_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: pack_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: pack_i64:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli a1, a1, 32
; RV64ZBA-NEXT:    add.uw a0, a0, a1
; RV64ZBA-NEXT:    ret
 %shl = and i64 %a, 4294967295
 %shl1 = shl i64 %b, 32
 %or = or i64 %shl1, %shl
 ret i64 %or
}

define i64 @pack_i64_2(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: pack_i64_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: pack_i64_2:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    slli a1, a1, 32
; RV64ZBA-NEXT:    add.uw a0, a0,
 a1
; RV64ZBA-NEXT:    ret
```

```
 %zexta = zext i32 %a to i64
 %zextb = zext i32 %b to i64
 %shl1 = shl i64 %zextb, 32
 %or = or i64 %shl1, %zexta
 ret i64 %or
}

define i64 @pack_i64_3(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: pack_i64_3:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi a0, a0, 1
; RV64I-NEXT:    addi a1, a1, 1
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBA-LABEL: pack_i64_3:
; RV64ZBA:       # %bb.0:
; RV64ZBA-NEXT:    addi a0, a0, 1
; RV64ZBA-NEXT:    addi a1, a1, 1
; RV64ZBA-NEXT:    slli a1, a1, 32
; RV64ZBA-NEXT:    add.uw a0, a0, a1
; RV64ZBA-NEXT:    ret
 %adda = add i32 %a, 1
 %addb = add i32 %b, 1
 %zexta = zext i32 %adda to i64
 %zextb = zext i32 %addb to i64
 %shl1 = shl i64 %zextb, 32
 %or = or i64 %shl1, %zexta
 ret i64 %or
}
```

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```
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -mattr=+zbb -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefix=RV64ZBB

declare i32 @llvm.riscv.orc.b.i32(i32)

define signext i32 @orcb32(i32 signext %a) nounwind {
; RV64ZBB-LABEL: orcb32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    orc.b a0, a0
; RV64ZBB-NEXT:    sext.w a0, a0
; RV64ZBB-NEXT:    ret
 %tmp = call i32 @llvm.riscv.orc.b.i32(i32 %a)
 ret i32 %tmp
}

define zeroext i32 @orcb32_zext(i32 zeroext %a) nounwind {
; RV64ZBB-LABEL: orcb32_zext:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    orc.b a0, a0
; RV64ZBB-NEXT:    ret
 %tmp = call i32 @llvm.riscv.orc.b.i32(i32 %a)
 ret i32 %tmp
}

; Second and+or is redundant with the first, make sure we remove them.
define signext i32 @orcb32_knownbits(i32 signext %a) nounwind {
; RV64ZBB-LABEL: orcb32_knownbits:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    lui a1, 1044480
; RV64ZBB-NEXT:
```

```
   and a0, a0, a1
; RV64ZBB-NEXT:    lui a1, 2048
; RV64ZBB-NEXT:    addi a1, a1, 1
; RV64ZBB-NEXT:    or a0, a0, a1
; RV64ZBB-NEXT:    orc.b a0, a0
; RV64ZBB-NEXT:    sext.w a0, a0
; RV64ZBB-NEXT:    ret
 %tmp = and i32 %a, 4278190080 ; 0xFF000000
 %tmp2 = or i32 %tmp, 8388609 ; 0x800001
 %tmp3 = call i32 @llvm.riscv.orc.b.i32(i32 %tmp2)
 %tmp4 = and i32 %tmp3, 4278190080 ; 0xFF000000
 %tmp5 = or i32 %tmp4, 16711935 ; 0xFF00FF
 ret i32 %tmp5
}

declare i64 @llvm.riscv.orc.b.i64(i64)

define i64 @orcb64(i64 %a) nounwind {
; RV64ZBB-LABEL: orcb64:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    orc.b a0, a0
; RV64ZBB-NEXT:    ret
 %tmp = call i64 @llvm.riscv.orc.b.i64(i64 %a)
 ret i64 %tmp
}

; Second and+or is redundant with the first, make sure we remove them.
define i64 @orcb64_knownbits(i64 %a) nounwind {
; RV64ZBB-LABEL: orcb64_knownbits:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    lui a1, 65535
; RV64ZBB-NEXT:    slli a1, a1, 12
; RV64ZBB-NEXT:    and a0, a0, a1
;
 RV64ZBB-NEXT:    lui a1, 256
; RV64ZBB-NEXT:    addiw a1, a1, 8
; RV64ZBB-NEXT:    slli a2, a1, 42
; RV64ZBB-NEXT:    add a1, a1, a2
; RV64ZBB-NEXT:    or a0, a0, a1
; RV64ZBB-NEXT:    orc.b a0, a0
; RV64ZBB-NEXT:    ret
 %tmp = and i64 %a, 1099494850560 ; 0x000000ffff000000
 %tmp2 = or i64 %tmp, 4611721202800525320 ; 0x4000200000100008
 %tmp3 = call i64 @llvm.riscv.orc.b.i64(i64 %tmp2)
 %tmp4 = and i64 %tmp3, 1099494850560 ; 0x000000ffff000000
 %tmp5 = or i64 %tmp4, 18374966855153418495 ; 0xff00ff0000ff00ff
 ret i64 %tmp5
}
```

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```
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -mattr=+zbc -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefix=RV64ZBC

declare i64 @llvm.riscv.clmulr.i64(i64 %a, i64 %b)

define i64 @clmul64r(i64 %a, i64 %b) nounwind {
; RV64ZBC-LABEL: clmul64r:
; RV64ZBC:       # %bb.0:
; RV64ZBC-NEXT:    clmulr a0, a0, a1
; RV64ZBC-NEXT:    ret
 %tmp = call i64 @llvm.riscv.clmulr.i64(i64 %a, i64 %b)
 ret i64 %tmp
}

declare i32 @llvm.riscv.clmulr.i32(i32 %a, i32 %b)

define signext i32 @clmul32r(i32 signext %a, i32 signext %b) nounwind {
; RV64ZBC-LABEL: clmul32r:
; RV64ZBC:       # %bb.0:
; RV64ZBC-NEXT:    slli a1, a1, 32
; RV64ZBC-NEXT:    slli a0, a0, 32
; RV64ZBC-NEXT:    clmulr a0, a0, a1
; RV64ZBC-NEXT:    srai a0, a0, 32
; RV64ZBC-NEXT:    ret
 %tmp = call i32 @llvm.riscv.clmulr.i32(i32 %a, i32 %b)
 ret i32 %tmp
```

```
}

; FIXME: We could avoid the slli instructions by using clmul+srli+sext.w
 since
; the inputs are zero extended.
define signext i32 @clmul32r_zext(i32 zeroext %a, i32 zeroext %b) nounwind {
; RV64ZBC-LABEL: clmul32r_zext:
; RV64ZBC:       # %bb.0:
; RV64ZBC-NEXT:    slli a1, a1, 32
; RV64ZBC-NEXT:    slli a0, a0, 32
; RV64ZBC-NEXT:    clmulr a0, a0, a1
; RV64ZBC-NEXT:    srai a0, a0, 32
; RV64ZBC-NEXT:    ret
 %tmp = call i32 @llvm.riscv.clmulr.i32(i32 %a, i32 %b)
 ret i32 %tmp
}
; RUN: opt %s -passes=inline -S | FileCheck %s

define internal void @innerSmall() "min-legal-vector-width"="128" {
 ret void
}

define internal void @innerLarge() "min-legal-vector-width"="512" {
 ret void
}

define internal void @innerNoAttribute() {
 ret void
}

; We should not add an attribute during inlining. No attribute means unknown.
; Inlining doesn't change the fact that we don't know anything about this
; function.
define void @outerNoAttribute() {
 call void @innerLarge()
 ret void
}

define void @outerConflictingAttributeSmall() "min-legal-vector-width"="128" {
 call void @innerLarge()
 ret void
}

define void @outerConflictingAttributeLarge() "min-legal-vector-width"="512" {
 call void @innerSmall()
 ret void
}
```

```
; We should remove the attribute after inlining since the callee's
; vector width requirements are unknown.
define void @outerAttribute() "min-legal-vector-width"="128" {
 call void @innerNoAttribute()
 ret void
}

; CHECK: define void @outerNoAttribute()
 {
; CHECK: define void @outerConflictingAttributeSmall() #0
; CHECK: define void @outerConflictingAttributeLarge() #0
; CHECK: define void @outerAttribute() {
; CHECK: attributes #0 = { "min-legal-vector-width"="512" }
; RUN: opt -mtriple=aarch64-linux-gnu -mattr=+sve -passes=scalarize-masked-mem-intrin -S < %s | FileCheck %s

; Testing that masked scatters operating on scalable vectors that are
; packed in SVE registers are not scalarized.

; CHECK-LABEL: @masked_scatter_nxv4i32(
; CHECK: call void @llvm.masked.scatter.nxv4i32
define void @masked_scatter_nxv4i32(<vscale x 4 x i32> %data, <vscale x 4 x ptr> %ptrs, <vscale x 4 x i1>
%masks) {
 call void @llvm.masked.scatter.nxv4i32(<vscale x 4 x i32> %data, <vscale x 4 x ptr> %ptrs, i32 0, <vscale x 4 x
i1> %masks)
 ret void
}

; Testing that masked scatters operating on scalable vectors of FP
; data that is packed in SVE registers are not scalarized.

; CHECK-LABEL: @masked_scatter_nxv2f64(
; CHECK: call void @llvm.masked.scatter.nxv2f64
define void @masked_scatter_nxv2f64(<vscale x 2 x double> %data, <vscale x 2 x ptr> %ptrs, <vscale x 2 x i1>
%masks) {
 call void @llvm.masked.scatter.nxv2f64(<vscale x 2 x double> %data, <vscale x 2 x ptr> %ptrs,
 i32 0, <vscale x 2 x i1> %masks)
 ret void
}

; Testing that masked scatters operating on scalable vectors of FP
; data that is unpacked in SVE registers are not scalarized.

; CHECK-LABEL: @masked_scatter_nxv2f16(
; CHECK: call void @llvm.masked.scatter.nxv2f16
define void @masked_scatter_nxv2f16(<vscale x 2 x half> %data, <vscale x 2 x ptr> %ptrs, <vscale x 2 x i1>
%masks) {
 call void @llvm.masked.scatter.nxv2f16(<vscale x 2 x half> %data, <vscale x 2 x ptr> %ptrs, i32 0, <vscale x 2 x
i1> %masks)
```

```
 ret void
}

; Testing that masked scatters operating on 64-bit fixed vectors are
; scalarized because NEON doesn't have support for masked scatter
; instructions.

; CHECK-LABEL: @masked_scatter_v2f32(
; CHECK-NOT: @llvm.masked.scatter.v2f32(
define void @masked_scatter_v2f32(<2 x float> %data, <2 x ptr> %ptrs, <2 x i1> %masks) {
 call void @llvm.masked.scatter.v2f32(<2 x float> %data, <2 x ptr> %ptrs, i32 0, <2 x i1> %masks)
 ret void
}

; Testing that masked scatters operating on 128-bit
 fixed vectors are
; scalarized because NEON doesn't have support for masked scatter
; instructions and because we are not targeting fixed width SVE.

; CHECK-LABEL: @masked_scatter_v4i32(
; CHECK-NOT: @llvm.masked.scatter.v4i32(
define void @masked_scatter_v4i32(<4 x i32> %data, <4 x ptr> %ptrs, <4 x i1> %masks) {
 call void @llvm.masked.scatter.v4i32(<4 x i32> %data, <4 x ptr> %ptrs, i32 0, <4 x i1> %masks)
 ret void
}

declare void @llvm.masked.scatter.nxv4i32(<vscale x 4 x i32> %data, <vscale x 4 x ptr> %ptrs, i32 %align,
<vscale x 4 x i1> %masks)
declare void @llvm.masked.scatter.nxv2f64(<vscale x 2 x double> %data, <vscale x 2 x ptr> %ptrs, i32 %align,
<vscale x 2 x i1> %masks)
declare void @llvm.masked.scatter.nxv2f16(<vscale x 2 x half> %data, <vscale x 2 x ptr> %ptrs, i32 %align,
<vscale x 2 x i1> %masks)
declare void @llvm.masked.scatter.v2f32(<2 x float> %data, <2 x ptr> %ptrs, i32 %align, <2 x i1> %masks)
declare void @llvm.masked.scatter.v4i32(<4 x i32> %data, <4 x
 ptr> %ptrs, i32 %align, <4 x i1> %masks)
//===-- ObjectContainerBSDArchive.h ----------------------------*- C++ -*-===//
//
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//
//===----------------------------------------------------------------------===//

#ifndef
LLDB_SOURCE_PLUGINS_OBJECTCONTAINER_BSD_ARCHIVE_OBJECTCONTAINERBSDARCHIVE_H
#define
LLDB_SOURCE_PLUGINS_OBJECTCONTAINER_BSD_ARCHIVE_OBJECTCONTAINERBSDARCHIVE_H
```

```
#include "lldb/Core/UniqueCStringMap.h"
#include "lldb/Symbol/ObjectContainer.h"
#include "lldb/Utility/ArchSpec.h"
#include "lldb/Utility/ConstString.h"
#include "lldb/Utility/FileSpec.h"

#include "llvm/Object/Archive.h"
#include "llvm/Support/Chrono.h"
#include "llvm/Support/Path.h"

#include <map>
#include <memory>
#include <mutex>

enum class ArchiveType { Invalid, Archive, ThinArchive };

class ObjectContainerBSDArchive : public lldb_private::ObjectContainer
 {
public:
 ObjectContainerBSDArchive(const lldb::ModuleSP &module_sp,
                           lldb::DataBufferSP &data_sp,
                           lldb::offset_t data_offset,
                           const lldb_private::FileSpec *file,
                           lldb::offset_t offset, lldb::offset_t length,
                           ArchiveType archive_type);

 ~ObjectContainerBSDArchive() override;

 // Static Functions
 static void Initialize();

 static void Terminate();

 static llvm::StringRef GetPluginNameStatic() { return "bsd-archive"; }

 static llvm::StringRef GetPluginDescriptionStatic() {
   return "BSD Archive object container reader.";
 }

 static lldb_private::ObjectContainer *
 CreateInstance(const lldb::ModuleSP &module_sp, lldb::DataBufferSP &data_sp,
                lldb::offset_t data_offset, const lldb_private::FileSpec *file,
                lldb::offset_t offset, lldb::offset_t length);

 static size_t GetModuleSpecifications(const
 lldb_private::FileSpec &file,
                                       lldb::DataBufferSP &data_sp,
                                       lldb::offset_t data_offset,
```

```
                                lldb::offset_t file_offset,
                                lldb::offset_t length,
                                lldb_private::ModuleSpecList &specs);

 static ArchiveType MagicBytesMatch(const lldb_private::DataExtractor &data);

 // Member Functions
 bool ParseHeader() override;

 size_t GetNumObjects() const override {
   if (m_archive_sp)
     return m_archive_sp->GetNumObjects();
   return 0;
 }

 lldb::ObjectFileSP GetObjectFile(const lldb_private::FileSpec *file) override;

 // PluginInterface protocol
 llvm::StringRef GetPluginName() override { return GetPluginNameStatic(); }

protected:
 struct Object {
   Object();

   void Clear();

   lldb::offset_t ExtractFromThin(const lldb_private::DataExtractor &data,

       lldb::offset_t offset,
                               llvm::StringRef stringTable);

   lldb::offset_t Extract(const lldb_private::DataExtractor &data,
                          lldb::offset_t offset);
   /// Object name in the archive.
   lldb_private::ConstString ar_name;

   /// Object modification time in the archive.
   uint32_t modification_time = 0;

   /// Object size in bytes in the archive.
   uint32_t size = 0;

   /// File offset in bytes from the beginning of the file of the object data.
   lldb::offset_t file_offset = 0;

   /// Length of the object data.
   lldb::offset_t file_size = 0;
```

```
  void Dump() const;
};

class Archive {
public:
  typedef std::shared_ptr<Archive> shared_ptr;
  typedef std::multimap<lldb_private::FileSpec, shared_ptr> Map;

  Archive(const lldb_private::ArchSpec &arch,
          const llvm::sys::TimePoint<> &mod_time, lldb::offset_t file_offset,
          lldb_private::DataExtractor &data, ArchiveType archive_type);

   ~Archive();

  static Map &GetArchiveCache();

  static std::recursive_mutex &GetArchiveCacheMutex();

  static Archive::shared_ptr FindCachedArchive(
      const lldb_private::FileSpec &file, const lldb_private::ArchSpec &arch,
      const llvm::sys::TimePoint<> &mod_time, lldb::offset_t file_offset);

  static Archive::shared_ptr ParseAndCacheArchiveForFile(
      const lldb_private::FileSpec &file, const lldb_private::ArchSpec &arch,
      const llvm::sys::TimePoint<> &mod_time, lldb::offset_t file_offset,
      lldb_private::DataExtractor &data, ArchiveType archive_type);

  size_t GetNumObjects() const { return m_objects.size(); }

  const Object *GetObjectAtIndex(size_t idx) {
    if (idx < m_objects.size())
      return &m_objects[idx];
    return nullptr;
  }

  size_t ParseObjects();

  Object *FindObject(lldb_private::ConstString object_name,
                     const llvm::sys::TimePoint<> &object_mod_time);

  lldb::offset_t
GetFileOffset() const { return m_file_offset; }

  const llvm::sys::TimePoint<> &GetModificationTime() {
    return m_modification_time;
  }

  const lldb_private::ArchSpec &GetArchitecture() const { return m_arch; }
```

```
  void SetArchitecture(const lldb_private::ArchSpec &arch) { m_arch = arch; }

  bool HasNoExternalReferences() const;

  lldb_private::DataExtractor &GetData() { return m_data; }

  ArchiveType GetArchiveType() { return m_archive_type; }

 protected:
  typedef lldb_private::UniqueCStringMap<uint32_t> ObjectNameToIndexMap;
  // Member Variables
  lldb_private::ArchSpec m_arch;
  llvm::sys::TimePoint<> m_modification_time;
  lldb::offset_t m_file_offset;
  std::vector<Object> m_objects;
  ObjectNameToIndexMap m_object_name_to_index_map;
  lldb_private::DataExtractor m_data; ///< The data for this object container
                                      ///so we don't lose data if the .a files
                                      ///gets
 modified
  ArchiveType m_archive_type;
 };

 void SetArchive(Archive::shared_ptr &archive_sp);

 Archive::shared_ptr m_archive_sp;

 ArchiveType m_archive_type;
};

#endif //
LLDB_SOURCE_PLUGINS_OBJECTCONTAINER_BSD_ARCHIVE_OBJECTCONTAINERBSDARCHIVE_H
! RUN: %python %S/../test_errors.py %s %flang -fopenmp -Werror -pedantic
! OpenMP Version 5.0
! 2.19.4.4 firstprivate Clause
! 2.19.4.5 lastprivate Clause
! 2.19.6.1 copyin Clause
! 2.19.6.2 copyprivate Clause
! If the list item is a polymorphic variable with the allocatable attribute,
! the behavior is unspecified.

subroutine firstprivate()
 class(*), allocatable, save :: x

 !PORTABILITY: If a polymorphic variable with allocatable attribute 'x' is in FIRSTPRIVATE clause, the behavior
is unspecified
 !$omp parallel firstprivate(x)
```

```
  call sub()
 !$omp end parallel

end

subroutine lastprivate()
 class(*), allocatable, save :: x

 !PORTABILITY: If a polymorphic variable with allocatable attribute 'x' is in LASTPRIVATE clause, the behavior
is unspecified
 !$omp do lastprivate(x)
 do i = 1, 10
  call sub()
 enddo
 !$omp end do

end

subroutine copyin()
 class(*), allocatable, save :: x
 !$omp threadprivate(x)

 !PORTABILITY: If a polymorphic variable with allocatable attribute
 'x' is in COPYIN clause, the behavior is unspecified
 !$omp parallel copyin(x)
  call sub()
 !$omp end parallel

end

subroutine copyprivate()
 class(*), allocatable, save :: x
 !$omp threadprivate(x)

 !$omp single
  call sub()
 !PORTABILITY: If a polymorphic variable with allocatable attribute 'x' is in COPYPRIVATE clause, the behavior
is unspecified
 !$omp end single copyprivate(x)

end
```

==========
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```
static_library("BSD-Archive") {
 output_name = "lldbPluginObjectContainerBSDArchive"
 configs += [ "//llvm/utils/gn/build:lldb_code" ]
 deps = [
   "//lldb/source/Core",
   "//lldb/source/Host",
   "//lldb/source/Symbol",
   "//llvm/lib/Support",
 ]
 sources = [ "ObjectContainerBSDArchive.cpp" ]
}
; RUN: opt -mtriple=aarch64-linux-gnu -mattr=+sve -passes=scalarize-masked-mem-intrin -S < %s | FileCheck %s

; Testing that masked gathers operating on scalable vectors that are
; packed in SVE registers are not scalarized.

; CHECK-LABEL: @masked_gather_nxv4i32(
; CHECK: call <vscale x 4 x i32> @llvm.masked.gather.nxv4i32
```

```
define <vscale x 4 x i32> @masked_gather_nxv4i32(<vscale x 4 x ptr> %ld, <vscale x 4 x i1> %masks, <vscale x 4
x i32> %passthru) {
 %res = call <vscale x 4 x i32> @llvm.masked.gather.nxv4i32(<vscale x 4 x ptr> %ld, i32 0, <vscale x 4 x i1>
%masks, <vscale x 4 x i32> %passthru)
 ret <vscale x 4 x i32> %res
}

; Testing that masked gathers operating on scalable vectors of FP data
; that is packed in SVE registers are not scalarized.

; CHECK-LABEL: @masked_gather_nxv2f64(
; CHECK: call <vscale x 2 x double> @llvm.masked.gather.nxv2f64
define <vscale x 2 x double> @masked_gather_nxv2f64(<vscale x 2 x ptr> %ld, <vscale x 2 x i1> %masks, <vscale
x 2 x double> %passthru)
 {
 %res = call <vscale x 2 x double> @llvm.masked.gather.nxv2f64(<vscale x 2 x ptr> %ld, i32 0, <vscale x 2 x i1>
%masks, <vscale x 2 x double> %passthru)
 ret <vscale x 2 x double> %res
}

; Testing that masked gathers operating on scalable vectors of FP data
; that is unpacked in SVE registers are not scalarized.

; CHECK-LABEL: @masked_gather_nxv2f16(
; CHECK: call <vscale x 2 x half> @llvm.masked.gather.nxv2f16
define <vscale x 2 x half> @masked_gather_nxv2f16(<vscale x 2 x ptr> %ld, <vscale x 2 x i1> %masks, <vscale x
2 x half> %passthru) {
 %res = call <vscale x 2 x half> @llvm.masked.gather.nxv2f16(<vscale x 2 x ptr> %ld, i32 0, <vscale x 2 x i1>
%masks, <vscale x 2 x half> %passthru)
 ret <vscale x 2 x half> %res
}

; Testing that masked gathers operating on 64-bit fixed vectors are
; scalarized because NEON doesn't have support for masked gather
; instructions.

; CHECK-LABEL: @masked_gather_v2f32(
; CHECK-NOT: @llvm.masked.gather.v2f32(
define <2 x float> @masked_gather_v2f32(<2
 x ptr> %ld, <2 x i1> %masks, <2 x float> %passthru) {
 %res = call <2 x float> @llvm.masked.gather.v2f32(<2 x ptr> %ld, i32 0, <2 x i1> %masks, <2 x float> %passthru)
 ret <2 x float> %res
}

; Testing that masked gathers operating on 128-bit fixed vectors are
; scalarized because NEON doesn't have support for masked gather
; instructions and because we are not targeting fixed width SVE.
```

```
; CHECK-LABEL: @masked_gather_v4i32(
; CHECK-NOT: @llvm.masked.gather.v4i32(
define <4 x i32> @masked_gather_v4i32(<4 x ptr> %ld, <4 x i1> %masks, <4 x i32> %passthru) {
 %res = call <4 x i32> @llvm.masked.gather.v4i32(<4 x ptr> %ld, i32 0, <4 x i1> %masks, <4 x i32> %passthru)
 ret <4 x i32> %res
}

declare <vscale x 4 x i32> @llvm.masked.gather.nxv4i32(<vscale x 4 x ptr> %ptrs, i32 %align, <vscale x 4 x i1>
%masks, <vscale x 4 x i32> %passthru)
declare <vscale x 2 x double> @llvm.masked.gather.nxv2f64(<vscale x 2 x ptr> %ptrs, i32 %align, <vscale x 2 x
i1> %masks, <vscale x 2 x double>
 %passthru)
declare <vscale x 2 x half> @llvm.masked.gather.nxv2f16(<vscale x 2 x ptr> %ptrs, i32 %align, <vscale x 2 x i1>
%masks, <vscale x 2 x half> %passthru)
declare <2 x float> @llvm.masked.gather.v2f32(<2 x ptr> %ptrs, i32 %align, <2 x i1> %masks, <2 x float>
%passthru)
declare <4 x i32> @llvm.masked.gather.v4i32(<4 x ptr> %ptrs, i32 %align, <4 x i1> %masks, <4 x i32> %passthru)
# RUN: llc -O0 -mtriple=m68k -start-after=prologepilog -verify-machineinstrs %s -o - | FileCheck %s

name: is-pcrel-register-operand-legal
body:             |
 bb.0.entry:
   ; CHECK: move.l  (0,%pc,%a0), (%a1)
   ; CHECK: move.l  (%a0), (0,%pc,%a1)

   MOV32jk $a1,  0, $a0, implicit-def $ccr
   MOV32kj 0,  $a1, $a0, implicit-def $ccr
```

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; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc < %s -mtriple=x86_64-linux-android -mattr=+mmx -enable-legalize-types-checking | FileCheck %s
;
; D31946
; Check that we dont end up with the ""LLVM ERROR: Cannot select" error.
; Additionally ensure that the output code actually put fp128 values in SSE registers.

```
declare fp128 @llvm.fabs.f128(fp128)
declare fp128 @llvm.copysign.f128(fp128, fp128)

define fp128 @TestSelect(fp128 %a, fp128 %b) {
; CHECK-LABEL: TestSelect:
; CHECK:       # %bb.0:
; CHECK-NEXT:    pushq %rbx
; CHECK-NEXT:    .cfi_def_cfa_offset 16
; CHECK-NEXT:    subq $32, %rsp
; CHECK-NEXT:    .cfi_def_cfa_offset 48
; CHECK-NEXT:    .cfi_offset %rbx, -16
; CHECK-NEXT:    movaps %xmm1, {{[-0-9]+}}(%r{{[sb]}}p) # 16-byte Spill
; CHECK-NEXT:    movaps %xmm0, (%rsp) # 16-byte Spill
; CHECK-NEXT:    callq __gttf2@PLT
; CHECK-NEXT:    movl %eax, %ebx
; CHECK-NEXT:    movaps (%rsp), %xmm0 # 16-byte Reload
; CHECK-NEXT:    movaps {{[-0-9]+}}(%r{{[sb]}}p),
 %xmm1 # 16-byte Reload
; CHECK-NEXT:    callq __subtf3@PLT
; CHECK-NEXT:    testl %ebx, %ebx
; CHECK-NEXT:    jg .LBB0_2
; CHECK-NEXT:  # %bb.1:
; CHECK-NEXT:    xorps %xmm0, %xmm0
; CHECK-NEXT:  .LBB0_2:
; CHECK-NEXT:    addq $32, %rsp
; CHECK-NEXT:    .cfi_def_cfa_offset 16
; CHECK-NEXT:    popq %rbx
; CHECK-NEXT:    .cfi_def_cfa_offset 8
; CHECK-NEXT:    retq
 %cmp = fcmp ogt fp128 %a, %b
 %sub = fsub fp128 %a, %b
 %res = select i1 %cmp, fp128 %sub, fp128 0xL00000000000000000000000000000000
 ret fp128 %res
}

define fp128 @TestFabs(fp128 %a) {
; CHECK-LABEL: TestFabs:
; CHECK:       # %bb.0:
; CHECK-NEXT:    andps {{\.?LCPI[0-9]+_[0-9]+}}(%rip), %xmm0
; CHECK-NEXT:    retq
 %res = call fp128 @llvm.fabs.f128(fp128 %a)
 ret fp128 %res
}

define fp128 @TestCopysign(fp128 %a, fp128 %b) {
; CHECK-LABEL: TestCopysign:
; CHECK:       # %bb.0:
```

```
; CHECK-NEXT:    andps {{\.?LCPI[0-9]+_[0-9]+}}(%rip), %xmm1
; CHECK-NEXT:    andps {{\.?LCPI[0-9]+_[0-9]+}}(%rip), %xmm0
; CHECK-NEXT:
    orps %xmm1, %xmm0
; CHECK-NEXT:    retq
 %res = call fp128 @llvm.copysign.f128(fp128 %a, fp128 %b)
 ret fp128 %res
}

define fp128 @TestFneg(fp128 %a) {
; CHECK-LABEL: TestFneg:
; CHECK:       # %bb.0:
; CHECK-NEXT:    pushq %rax
; CHECK-NEXT:    .cfi_def_cfa_offset 16
; CHECK-NEXT:    movaps %xmm0, %xmm1
; CHECK-NEXT:    callq __multf3@PLT
; CHECK-NEXT:    xorps {{\.?LCPI[0-9]+_[0-9]+}}(%rip), %xmm0
; CHECK-NEXT:    popq %rax
; CHECK-NEXT:    .cfi_def_cfa_offset 8
; CHECK-NEXT:    retq
 %mul = fmul fp128 %a, %a
 %res = fsub fp128 0xL00000000000000008000000000000000, %mul
 ret fp128 %res
}
```

---

clang-tidy CERT Files

---

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```
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -mattr=+zbkb -verify-machineinstrs < %s \
; RUN:   | FileCheck %s -check-prefix=RV64ZBKB

declare i64 @llvm.riscv.brev8.i64(i64)

define i64 @brev8(i64 %a) nounwind {
; RV64ZBKB-LABEL: brev8:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    brev8 a0, a0
; RV64ZBKB-NEXT:    ret
 %val = call i64 @llvm.riscv.brev8.i64(i64 %a)
 ret i64 %val
}

; Test that rev8 is recognized as preserving zero extension.
define zeroext i16 @brev8_knownbits(i16 zeroext %a) nounwind {
; RV64ZBKB-LABEL: brev8_knownbits:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    brev8 a0, a0
; RV64ZBKB-NEXT:    ret
 %zext = zext i16 %a to i64
 %val = call i64 @llvm.riscv.brev8.i64(i64 %zext)
```

```
 %trunc = trunc i64 %val to i16
 ret i16 %trunc
}

declare i64 @llvm.bswap.i64(i64)

define i64 @rev8_i64(i64 %a) {
; RV64ZBKB-LABEL: rev8_i64:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    rev8 a0, a0
; RV64ZBKB-NEXT:    ret
  %1 = call i64 @llvm.bswap.i64(i64 %a)
 ret i64 %1
}

declare i32 @llvm.riscv.brev8.i32(i32)

define signext i32 @brev8_i32(i32 signext %a) nounwind {
; RV64ZBKB-LABEL: brev8_i32:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    brev8 a0, a0
; RV64ZBKB-NEXT:    sext.w a0, a0
; RV64ZBKB-NEXT:    ret
 %val = call i32 @llvm.riscv.brev8.i32(i32 %a)
 ret i32 %val
}

; Test that rev8 is recognized as preserving zero extension.
define zeroext i16 @brev8_i32_knownbits(i16 zeroext %a) nounwind {
; RV64ZBKB-LABEL: brev8_i32_knownbits:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    brev8 a0, a0
; RV64ZBKB-NEXT:    ret
 %zext = zext i16 %a to i32
 %val = call i32 @llvm.riscv.brev8.i32(i32 %zext)
 %trunc = trunc i32 %val to i16
 ret i16 %trunc
}

declare i32 @llvm.bswap.i32(i32)

define signext i32 @rev8_i32(i32 signext %a) {
; RV64ZBKB-LABEL: rev8_i32:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    rev8 a0, a0
; RV64ZBKB-NEXT:    srai a0, a0, 32
; RV64ZBKB-NEXT:    ret
 %1 = call i32 @llvm.bswap.i32(i32
```

```
 %a)
 ret i32 %1
}
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=amdgcn -mcpu=fiji < %s | FileCheck -check-prefixes=VI %s

; FIXME: This one should fold to rcp
define half @select_fneg_posk_src_rcp_f16(i32 %c, half %x, half %y) {
; VI-LABEL: select_fneg_posk_src_rcp_f16:
; VI:       ; %bb.0:
; VI-NEXT:    s_waitcnt vmcnt(0) expcnt(0) lgkmcnt(0)
; VI-NEXT:    v_rcp_f16_e64 v1, -v1
; VI-NEXT:    v_mov_b32_e32 v2, 0x4000
; VI-NEXT:    v_cmp_eq_u32_e32 vcc, 0, v0
; VI-NEXT:    v_cndmask_b32_e32 v0, v2, v1, vcc
; VI-NEXT:    s_setpc_b64 s[30:31]
 %cmp = icmp eq i32 %c, 0
 %rcp = call half @llvm.amdgcn.rcp.f16(half %x)
 %fneg = fneg half %rcp
 %select = select i1 %cmp, half %fneg, half 2.0
 ret half %select
}

declare half @llvm.amdgcn.rcp.f16(half) #0

attributes #0 = { nocallback nofree nosync nounwind speculatable willreturn memory(none) }
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; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefixes=CHECK,RV64I
; RUN: llc -mtriple=riscv64 -mattr=+zbb -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefixes=CHECK,RV64ZBB-ZBKB,RV64ZBB
; RUN: llc -mtriple=riscv64 -mattr=+zbkb -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefixes=CHECK,RV64ZBB-
ZBKB,RV64ZBKB

define signext i32 @andn_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: andn_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    not a1, a1
; RV64I-NEXT:    and a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: andn_i32:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    andn a0, a0, a1
; RV64ZBB-ZBKB-NEXT:    ret
 %neg = xor i32 %b, -1
```

```
 %and = and i32 %neg, %a
 ret i32 %and
}

define i64 @andn_i64(i64 %a, i64
 %b) nounwind {
; RV64I-LABEL: andn_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    not a1, a1
; RV64I-NEXT:    and a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: andn_i64:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    andn a0, a0, a1
; RV64ZBB-ZBKB-NEXT:    ret
 %neg = xor i64 %b, -1
 %and = and i64 %neg, %a
 ret i64 %and
}

define signext i32 @orn_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: orn_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    not a1, a1
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: orn_i32:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    orn a0, a0, a1
; RV64ZBB-ZBKB-NEXT:    ret
 %neg = xor i32 %b, -1
 %or = or i32 %neg, %a
 ret i32 %or
}

define i64 @orn_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: orn_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    not a1, a1
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: orn_i64:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:
```

```
    orn a0, a0, a1
; RV64ZBB-ZBKB-NEXT:    ret
 %neg = xor i64 %b, -1
 %or = or i64 %neg, %a
 ret i64 %or
}

define signext i32 @xnor_i32(i32 signext %a, i32 signext %b) nounwind {
; CHECK-LABEL: xnor_i32:
; CHECK:       # %bb.0:
; CHECK-NEXT:    xor a0, a0, a1
; CHECK-NEXT:    not a0, a0
; CHECK-NEXT:    ret
 %neg = xor i32 %a, -1
 %xor = xor i32 %neg, %b
 ret i32 %xor
}

define i64 @xnor_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: xnor_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: xnor_i64:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    xnor a0, a0, a1
; RV64ZBB-ZBKB-NEXT:    ret
 %neg = xor i64 %a, -1
 %xor = xor i64 %neg, %b
 ret i64 %xor
}

declare i32 @llvm.fshl.i32(i32, i32, i32)

define signext i32 @rol_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: rol_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    andi a2, a1, -1
; RV64I-NEXT:    sllw a1, a0, a1
; RV64I-NEXT:
    negw a2, a2
; RV64I-NEXT:    srlw a0, a0, a2
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: rol_i32:
```

```
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    rolw a0, a0, a1
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = tail call i32 @llvm.fshl.i32(i32 %a, i32 %a, i32 %b)
 ret i32 %1
}

; Similar to rol_i32, but doesn't sign extend the result.
define void @rol_i32_nosext(i32 signext %a, i32 signext %b, ptr %x) nounwind {
; RV64I-LABEL: rol_i32_nosext:
; RV64I:       # %bb.0:
; RV64I-NEXT:    andi a3, a1, -1
; RV64I-NEXT:    sllw a1, a0, a1
; RV64I-NEXT:    negw a3, a3
; RV64I-NEXT:    srlw a0, a0, a3
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    sw a0, 0(a2)
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: rol_i32_nosext:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    rolw a0, a0, a1
; RV64ZBB-ZBKB-NEXT:    sw a0, 0(a2)
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = tail call i32 @llvm.fshl.i32(i32 %a, i32 %a, i32 %b)
 store i32 %1, ptr %x
 ret void
}

define signext
 i32 @rol_i32_neg_constant_rhs(i32 signext %a) nounwind {
; RV64I-LABEL: rol_i32_neg_constant_rhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    andi a1, a0, -1
; RV64I-NEXT:    li a2, -2
; RV64I-NEXT:    sllw a0, a2, a0
; RV64I-NEXT:    negw a1, a1
; RV64I-NEXT:    srlw a1, a2, a1
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: rol_i32_neg_constant_rhs:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    li a1, -2
; RV64ZBB-ZBKB-NEXT:    rolw a0, a1, a0
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = tail call i32 @llvm.fshl.i32(i32 -2, i32 -2, i32 %a)
 ret i32 %1
```

```
}

declare i64 @llvm.fshl.i64(i64, i64, i64)

define i64 @rol_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: rol_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sll a2, a0, a1
; RV64I-NEXT:    negw a1, a1
; RV64I-NEXT:    srl a0, a0, a1
; RV64I-NEXT:    or a0, a2, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: rol_i64:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    rol a0, a0, a1
; RV64ZBB-ZBKB-NEXT:
  ret
 %or = tail call i64 @llvm.fshl.i64(i64 %a, i64 %a, i64 %b)
 ret i64 %or
}

declare i32 @llvm.fshr.i32(i32, i32, i32)

define signext i32 @ror_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: ror_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    andi a2, a1, -1
; RV64I-NEXT:    srlw a1, a0, a1
; RV64I-NEXT:    negw a2, a2
; RV64I-NEXT:    sllw a0, a0, a2
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: ror_i32:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    rorw a0, a0, a1
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = tail call i32 @llvm.fshr.i32(i32 %a, i32 %a, i32 %b)
 ret i32 %1
}

; Similar to ror_i32, but doesn't sign extend the result.
define void @ror_i32_nosext(i32 signext %a, i32 signext %b, ptr %x) nounwind {
; RV64I-LABEL: ror_i32_nosext:
; RV64I:       # %bb.0:
; RV64I-NEXT:    andi a3, a1, -1
; RV64I-NEXT:    srlw a1, a0, a1
```

```
; RV64I-NEXT:    negw a3, a3
; RV64I-NEXT:    sllw a0, a0, a3
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:
  sw a0, 0(a2)
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: ror_i32_nosext:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    rorw a0, a0, a1
; RV64ZBB-ZBKB-NEXT:    sw a0, 0(a2)
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = tail call i32 @llvm.fshr.i32(i32 %a, i32 %a, i32 %b)
 store i32 %1, ptr %x
 ret void
}

define signext i32 @ror_i32_neg_constant_rhs(i32 signext %a) nounwind {
; RV64I-LABEL: ror_i32_neg_constant_rhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    andi a1, a0, -1
; RV64I-NEXT:    li a2, -2
; RV64I-NEXT:    srlw a0, a2, a0
; RV64I-NEXT:    negw a1, a1
; RV64I-NEXT:    sllw a1, a2, a1
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: ror_i32_neg_constant_rhs:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    li a1, -2
; RV64ZBB-ZBKB-NEXT:    rorw a0, a1, a0
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = tail call i32 @llvm.fshr.i32(i32 -2, i32 -2, i32 %a)
 ret i32 %1
}

declare i64 @llvm.fshr.i64(i64, i64, i64)

define i64 @ror_i64(i64 %a, i64 %b) nounwind {
;
 RV64I-LABEL: ror_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srl a2, a0, a1
; RV64I-NEXT:    negw a1, a1
; RV64I-NEXT:    sll a0, a0, a1
; RV64I-NEXT:    or a0, a2, a0
; RV64I-NEXT:    ret
```

```
;
; RV64ZBB-ZBKB-LABEL: ror_i64:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    ror a0, a0, a1
; RV64ZBB-ZBKB-NEXT:    ret
 %or = tail call i64 @llvm.fshr.i64(i64 %a, i64 %a, i64 %b)
 ret i64 %or
}

define signext i32 @rori_i32_fshl(i32 signext %a) nounwind {
; RV64I-LABEL: rori_i32_fshl:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    slliw a0, a0, 31
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: rori_i32_fshl:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    roriw a0, a0, 1
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = tail call i32 @llvm.fshl.i32(i32 %a, i32 %a, i32 31)
 ret i32 %1
}

; Similar to rori_i32_fshl, but doesn't sign extend the result.
define void @rori_i32_fshl_nosext(i32 signext %a, ptr %x) nounwind {
; RV64I-LABEL: rori_i32_fshl_nosext:
;
 RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a2, a0, 1
; RV64I-NEXT:    slli a0, a0, 31
; RV64I-NEXT:    or a0, a0, a2
; RV64I-NEXT:    sw a0, 0(a1)
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: rori_i32_fshl_nosext:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    roriw a0, a0, 1
; RV64ZBB-ZBKB-NEXT:    sw a0, 0(a1)
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = tail call i32 @llvm.fshl.i32(i32 %a, i32 %a, i32 31)
 store i32 %1, ptr %x
 ret void
}

define signext i32 @rori_i32_fshr(i32 signext %a) nounwind {
; RV64I-LABEL: rori_i32_fshr:
```

```
; RV64I:       # %bb.0:
; RV64I-NEXT:    slliw a1, a0, 1
; RV64I-NEXT:    srliw a0, a0, 31
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: rori_i32_fshr:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    roriw a0, a0, 31
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = tail call i32 @llvm.fshr.i32(i32 %a, i32 %a, i32 31)
 ret i32 %1
}

; Similar to rori_i32_fshr, but doesn't sign extend the result.
define void @rori_i32_fshr_nosext(i32
 signext %a, ptr %x) nounwind {
; RV64I-LABEL: rori_i32_fshr_nosext:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a2, a0, 1
; RV64I-NEXT:    srliw a0, a0, 31
; RV64I-NEXT:    or a0, a0, a2
; RV64I-NEXT:    sw a0, 0(a1)
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: rori_i32_fshr_nosext:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    roriw a0, a0, 31
; RV64ZBB-ZBKB-NEXT:    sw a0, 0(a1)
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = tail call i32 @llvm.fshr.i32(i32 %a, i32 %a, i32 31)
 store i32 %1, ptr %x
 ret void
}

; This test is similar to the type legalized version of the fshl/fshr tests, but
; instead of having the same input to both shifts it has different inputs. Make
; sure we don't match it as a roriw.
define signext i32 @not_rori_i32(i32 signext %x, i32 signext %y) nounwind {
; CHECK-LABEL: not_rori_i32:
; CHECK:       # %bb.0:
; CHECK-NEXT:    slliw a0, a0, 31
; CHECK-NEXT:    srliw a1, a1, 1
; CHECK-NEXT:    or a0, a0, a1
; CHECK-NEXT:    ret
 %a = shl
 i32 %x, 31
 %b = lshr i32 %y, 1
```

```
 %c = or i32 %a, %b
 ret i32 %c
}

; This is similar to the type legalized roriw pattern, but the and mask is more
; than 32 bits so the lshr doesn't shift zeroes into the lower 32 bits. Make
; sure we don't match it to roriw.
define i64 @roriw_bug(i64 %x) nounwind {
; CHECK-LABEL: roriw_bug:
; CHECK:       # %bb.0:
; CHECK-NEXT:    slli a1, a0, 31
; CHECK-NEXT:    andi a2, a0, -2
; CHECK-NEXT:    srli a0, a0, 1
; CHECK-NEXT:    or a0, a1, a0
; CHECK-NEXT:    sext.w a0, a0
; CHECK-NEXT:    xor a0, a2, a0
; CHECK-NEXT:    ret
 %a = shl i64 %x, 31
 %b = and i64 %x, 18446744073709551614
 %c = lshr i64 %b, 1
 %d = or i64 %a, %c
 %e = shl i64 %d, 32
 %f = ashr i64 %e, 32
 %g = xor i64 %b, %f ; to increase the use count on %b to disable SimplifyDemandedBits.
 ret i64 %g
}

define i64 @rori_i64_fshl(i64 %a) nounwind {
; RV64I-LABEL: rori_i64_fshl:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srli a1, a0, 1
; RV64I-NEXT:    slli a0, a0, 63
; RV64I-NEXT:
   or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: rori_i64_fshl:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    rori a0, a0, 1
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = tail call i64 @llvm.fshl.i64(i64 %a, i64 %a, i64 63)
 ret i64 %1
}

define i64 @rori_i64_fshr(i64 %a) nounwind {
; RV64I-LABEL: rori_i64_fshr:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a1, a0, 1
```

```
; RV64I-NEXT:    srli a0, a0, 63
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: rori_i64_fshr:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    rori a0, a0, 63
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = tail call i64 @llvm.fshr.i64(i64 %a, i64 %a, i64 63)
 ret i64 %1
}

define signext i32 @not_shl_one_i32(i32 signext %x) {
; RV64I-LABEL: not_shl_one_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 1
; RV64I-NEXT:    sllw a0, a1, a0
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: not_shl_one_i32:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    li a1,
 -2
; RV64ZBB-ZBKB-NEXT:    rolw a0, a1, a0
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = shl i32 1, %x
 %2 = xor i32 %1, -1
 ret i32 %2
}

define i64 @not_shl_one_i64(i64 %x) {
; RV64I-LABEL: not_shl_one_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 1
; RV64I-NEXT:    sll a0, a1, a0
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: not_shl_one_i64:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    li a1, -2
; RV64ZBB-ZBKB-NEXT:    rol a0, a1, a0
; RV64ZBB-ZBKB-NEXT:    ret
 %1 = shl i64 1, %x
 %2 = xor i64 %1, -1
 ret i64 %2
}
```

```
define i8 @srli_i8(i8 %a) nounwind {
; CHECK-LABEL: srli_i8:
; CHECK:       # %bb.0:
; CHECK-NEXT:    slli a0, a0, 56
; CHECK-NEXT:    srli a0, a0, 62
; CHECK-NEXT:    ret
 %1 = lshr i8 %a, 6
 ret i8 %1
}

; We could use sext.b+srai, but slli+srai offers more opportunities for
; comppressed instructions.
define i8 @srai_i8(i8 %a) nounwind {
; RV64I-LABEL: srai_i8:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 24
; RV64I-NEXT:
    sraiw a0, a0, 29
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: srai_i8:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    slli a0, a0, 56
; RV64ZBB-NEXT:    srai a0, a0, 61
; RV64ZBB-NEXT:    ret
;
; RV64ZBKB-LABEL: srai_i8:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    slli a0, a0, 24
; RV64ZBKB-NEXT:    sraiw a0, a0, 29
; RV64ZBKB-NEXT:    ret
 %1 = ashr i8 %a, 5
 ret i8 %1
}

; We could use zext.h+srli, but slli+srli offers more opportunities for
; comppressed instructions.
define i16 @srli_i16(i16 %a) nounwind {
; CHECK-LABEL: srli_i16:
; CHECK:       # %bb.0:
; CHECK-NEXT:    slli a0, a0, 48
; CHECK-NEXT:    srli a0, a0, 54
; CHECK-NEXT:    ret
 %1 = lshr i16 %a, 6
 ret i16 %1
}
```

```
; We could use sext.h+srai, but slli+srai offers more opportunities for
; comppressed instructions.
define i16 @srai_i16(i16 %a) nounwind {
; RV64I-LABEL: srai_i16:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 16
; RV64I-NEXT:    sraiw a0, a0, 25
; RV64I-NEXT:    ret
;
; RV64ZBB-LABEL: srai_i16:
;
 RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    slli a0, a0, 48
; RV64ZBB-NEXT:    srai a0, a0, 57
; RV64ZBB-NEXT:    ret
;
; RV64ZBKB-LABEL: srai_i16:
; RV64ZBKB:       # %bb.0:
; RV64ZBKB-NEXT:    slli a0, a0, 16
; RV64ZBKB-NEXT:    sraiw a0, a0, 25
; RV64ZBKB-NEXT:    ret
 %1 = ashr i16 %a, 9
 ret i16 %1
}

define i1 @andn_seqz_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: andn_seqz_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    seqz a0, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: andn_seqz_i32:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    andn a0, a1, a0
; RV64ZBB-ZBKB-NEXT:    seqz a0, a0
; RV64ZBB-ZBKB-NEXT:    ret
 %and = and i32 %a, %b
 %cmpeq = icmp eq i32 %and, %b
 ret i1 %cmpeq
}

define i1 @andn_seqz_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: andn_seqz_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    xor a0, a0, a1
```

```
; RV64I-NEXT:    seqz a0, a0
; RV64I-NEXT:
    ret
;
; RV64ZBB-ZBKB-LABEL: andn_seqz_i64:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    andn a0, a1, a0
; RV64ZBB-ZBKB-NEXT:    seqz a0, a0
; RV64ZBB-ZBKB-NEXT:    ret
 %and = and i64 %a, %b
 %cmpeq = icmp eq i64 %and, %b
 ret i1 %cmpeq
}

define i1 @andn_snez_i32(i32 signext %a, i32 signext %b) nounwind {
; RV64I-LABEL: andn_snez_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    snez a0, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: andn_snez_i32:
; RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    andn a0, a1, a0
; RV64ZBB-ZBKB-NEXT:    snez a0, a0
; RV64ZBB-ZBKB-NEXT:    ret
 %and = and i32 %a, %b
 %cmpeq = icmp ne i32 %and, %b
 ret i1 %cmpeq
}

define i1 @andn_snez_i64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: andn_snez_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    snez a0, a0
; RV64I-NEXT:    ret
;
; RV64ZBB-ZBKB-LABEL: andn_snez_i64:
;
 RV64ZBB-ZBKB:       # %bb.0:
; RV64ZBB-ZBKB-NEXT:    andn a0, a1, a0
; RV64ZBB-ZBKB-NEXT:    snez a0, a0
; RV64ZBB-ZBKB-NEXT:    ret
 %and = and i64 %a, %b
 %cmpeq = icmp ne i64 %and, %b
```

```
 ret i1 %cmpeq
}
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck -check-prefix=RV64I %s
; RUN: llc -mtriple=riscv64 -mattr=+m -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck -check-prefix=RV64IM %s

define i32 @urem(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: urem:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    srli a1, a1, 32
; RV64I-NEXT:    call __umoddi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: urem:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    remuw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = urem i32 %a, %b
 ret i32 %1
}

define i32 @urem_constant_lhs(i32 %a) nounwind {
;
 RV64I-LABEL: urem_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a1, a0, 32
; RV64I-NEXT:    li a0, 10
; RV64I-NEXT:    call __umoddi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: urem_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    li a1, 10
; RV64IM-NEXT:    remuw a0, a1, a0
```

```
; RV64IM-NEXT:    ret
 %1 = urem i32 10, %a
 ret i32 %1
}

define i32 @srem(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: srem:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    sext.w a0, a0
; RV64I-NEXT:    sext.w a1, a1
; RV64I-NEXT:    call __moddi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: srem:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:
    remw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = srem i32 %a, %b
 ret i32 %1
}

define i32 @srem_pow2(i32 %a) nounwind {
; RV64I-LABEL: srem_pow2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sraiw a1, a0, 31
; RV64I-NEXT:    srliw a1, a1, 29
; RV64I-NEXT:    add a1, a0, a1
; RV64I-NEXT:    andi a1, a1, -8
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: srem_pow2:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    sraiw a1, a0, 31
; RV64IM-NEXT:    srliw a1, a1, 29
; RV64IM-NEXT:    add a1, a0, a1
; RV64IM-NEXT:    andi a1, a1, -8
; RV64IM-NEXT:    subw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = srem i32 %a, 8
 ret i32 %1
}
```

```
define i32 @srem_pow2_2(i32 %a) nounwind {
; RV64I-LABEL: srem_pow2_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sraiw a1, a0, 31
; RV64I-NEXT:    srliw a1, a1, 16
; RV64I-NEXT:    add a1, a0, a1
; RV64I-NEXT:    lui a2, 1048560
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: srem_pow2_2:
; RV64IM:
       # %bb.0:
; RV64IM-NEXT:    sraiw a1, a0, 31
; RV64IM-NEXT:    srliw a1, a1, 16
; RV64IM-NEXT:    add a1, a0, a1
; RV64IM-NEXT:    lui a2, 1048560
; RV64IM-NEXT:    and a1, a1, a2
; RV64IM-NEXT:    subw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = srem i32 %a, 65536
 ret i32 %1
}

define i32 @srem_constant_lhs(i32 %a) nounwind {
; RV64I-LABEL: srem_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    sext.w a1, a0
; RV64I-NEXT:    li a0, -10
; RV64I-NEXT:    call __moddi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: srem_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    li a1, -10
; RV64IM-NEXT:    remw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = srem i32 -10, %a
 ret i32 %1
}

define i64 @urem64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: urem64:
```

```
; RV64I:       # %bb.0:
; RV64I-NEXT:    tail __umoddi3
;
; RV64IM-LABEL:
 urem64:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    remu a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = urem i64 %a, %b
 ret i64 %1
}

define i64 @urem64_constant_lhs(i64 %a) nounwind {
; RV64I-LABEL: urem64_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    mv a1, a0
; RV64I-NEXT:    li a0, 10
; RV64I-NEXT:    tail __umoddi3
;
; RV64IM-LABEL: urem64_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    li a1, 10
; RV64IM-NEXT:    remu a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = urem i64 10, %a
 ret i64 %1
}

define i64 @srem64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: srem64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    tail __moddi3
;
; RV64IM-LABEL: srem64:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    rem a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = srem i64 %a, %b
 ret i64 %1
}

define i64 @srem64_constant_lhs(i64 %a) nounwind {
; RV64I-LABEL: srem64_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    mv a1, a0
; RV64I-NEXT:    li a0, -10
; RV64I-NEXT:    tail __moddi3
;
```

```
; RV64IM-LABEL: srem64_constant_lhs:
;
 RV64IM:       # %bb.0:
; RV64IM-NEXT:    li a1, -10
; RV64IM-NEXT:    rem a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = srem i64 -10, %a
 ret i64 %1
}

define i8 @urem8(i8 %a, i8 %b) nounwind {
; RV64I-LABEL: urem8:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    andi a0, a0, 255
; RV64I-NEXT:    andi a1, a1, 255
; RV64I-NEXT:    call __umoddi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: urem8:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    andi a1, a1, 255
; RV64IM-NEXT:    andi a0, a0, 255
; RV64IM-NEXT:    remuw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = urem i8 %a, %b
 ret i8 %1
}

define i8 @urem8_constant_lhs(i8 %a) nounwind {
; RV64I-LABEL: urem8_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    andi a1, a0, 255
; RV64I-NEXT:
    li a0, 10
; RV64I-NEXT:    call __umoddi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: urem8_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    andi a0, a0, 255
```

```
; RV64IM-NEXT:    li a1, 10
; RV64IM-NEXT:    remuw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = urem i8 10, %a
 ret i8 %1
}


define i8 @srem8(i8 %a, i8 %b) nounwind {
; RV64I-LABEL: srem8:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a1, a1, 24
; RV64I-NEXT:    sraiw a1, a1, 24
; RV64I-NEXT:    slli a0, a0, 24
; RV64I-NEXT:    sraiw a0, a0, 24
; RV64I-NEXT:    call __moddi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: srem8:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a1, a1, 24
; RV64IM-NEXT:    sraiw a1, a1, 24
; RV64IM-NEXT:    slli a0, a0, 24
; RV64IM-NEXT:    sraiw
 a0, a0, 24
; RV64IM-NEXT:    remw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = srem i8 %a, %b
 ret i8 %1
}

define i8 @srem8_constant_lhs(i8 %a) nounwind {
; RV64I-LABEL: srem8_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 24
; RV64I-NEXT:    sraiw a1, a0, 24
; RV64I-NEXT:    li a0, -10
; RV64I-NEXT:    call __moddi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
```

```
; RV64IM-LABEL: srem8_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a0, a0, 24
; RV64IM-NEXT:    sraiw a0, a0, 24
; RV64IM-NEXT:    li a1, -10
; RV64IM-NEXT:    remw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = srem i8 -10, %a
 ret i8 %1
}


define i16 @urem16(i16 %a, i16 %b) nounwind {
; RV64I-LABEL: urem16:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    lui a2, 16
; RV64I-NEXT:
    addiw a2, a2, -1
; RV64I-NEXT:    and a0, a0, a2
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    call __umoddi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: urem16:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    lui a2, 16
; RV64IM-NEXT:    addi a2, a2, -1
; RV64IM-NEXT:    and a1, a1, a2
; RV64IM-NEXT:    and a0, a0, a2
; RV64IM-NEXT:    remuw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = urem i16 %a, %b
 ret i16 %1
}

define i16 @urem16_constant_lhs(i16 %a) nounwind {
; RV64I-LABEL: urem16_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srli a1, a0, 48
; RV64I-NEXT:    li a0, 10
; RV64I-NEXT:    call __umoddi3
```

```
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: urem16_constant_lhs:
; RV64IM:       # %bb.0:
;
 RV64IM-NEXT:    slli a0, a0, 48
; RV64IM-NEXT:    srli a0, a0, 48
; RV64IM-NEXT:    li a1, 10
; RV64IM-NEXT:    remuw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = urem i16 10, %a
 ret i16 %1
}

define i16 @srem16(i16 %a, i16 %b) nounwind {
; RV64I-LABEL: srem16:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a1, a1, 16
; RV64I-NEXT:    sraiw a1, a1, 16
; RV64I-NEXT:    slli a0, a0, 16
; RV64I-NEXT:    sraiw a0, a0, 16
; RV64I-NEXT:    call __moddi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: srem16:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a1, a1, 16
; RV64IM-NEXT:    sraiw a1, a1, 16
; RV64IM-NEXT:    slli a0, a0, 16
; RV64IM-NEXT:    sraiw a0, a0, 16
; RV64IM-NEXT:    remw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = srem i16 %a, %b
 ret i16 %1
}

define i16 @srem16_constant_lhs(i16 %a) nounwind {
; RV64I-LABEL: srem16_constant_lhs:
;
 RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
```

```
; RV64I-NEXT:    slli a0, a0, 16
; RV64I-NEXT:    sraiw a1, a0, 16
; RV64I-NEXT:    li a0, -10
; RV64I-NEXT:    call __moddi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: srem16_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a0, a0, 16
; RV64IM-NEXT:    sraiw a0, a0, 16
; RV64IM-NEXT:    li a1, -10
; RV64IM-NEXT:    remw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = srem i16 -10, %a
 ret i16 %1
}
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=aarch64-apple-ios %s -o - | FileCheck %s

define <16 x double> @test_sitofp_fixed(<16 x i32> %in) {
; CHECK-LABEL: test_sitofp_fixed:
; CHECK:       ; %bb.0:
; CHECK-NEXT:    sshll2.2d v4, v0, #0
; CHECK-NEXT:    sshll.2d v0, v0, #0
; CHECK-NEXT:    sshll2.2d v5, v1, #0
; CHECK-NEXT:    sshll.2d v6, v1, #0
; CHECK-NEXT:    sshll.2d v7, v2, #0
; CHECK-NEXT:    sshll2.2d v16, v2, #0
; CHECK-NEXT:    sshll2.2d v17, v3, #0
; CHECK-NEXT:    sshll.2d v18, v3, #0
; CHECK-NEXT:    scvtf.2d v1, v4, #6
; CHECK-NEXT:    scvtf.2d v0, v0, #6
; CHECK-NEXT:    scvtf.2d v3, v5, #6
; CHECK-NEXT:    scvtf.2d v2, v6, #6
; CHECK-NEXT:    scvtf.2d v4, v7, #6
; CHECK-NEXT:    scvtf.2d v5, v16, #6
; CHECK-NEXT:    scvtf.2d v7, v17, #6
; CHECK-NEXT:    scvtf.2d v6, v18, #6
; CHECK-NEXT:    ret

 %flt = sitofp <16 x i32> %in to <16 x double>
 %res = fdiv <16 x double> %flt, <double 64.0, double 64.0, double 64.0,
 double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double 64.0, double
64.0, double 64.0, double 64.0, double 64.0, double 64.0>
 ret <16 x double> %res
}
```

```
; This one is small enough to satisfy isSimple, but still illegally large.
define <4 x double> @test_sitofp_fixed_shortish(<4 x i64> %in) {
; CHECK-LABEL: test_sitofp_fixed_shortish:
; CHECK:       ; %bb.0:
; CHECK-NEXT:    scvtf.2d v0, v0, #6
; CHECK-NEXT:    scvtf.2d v1, v1, #6
; CHECK-NEXT:    ret


 %flt = sitofp <4 x i64> %in to <4 x double>
 %res = fdiv <4 x double> %flt, <double 64.0, double 64.0, double 64.0, double 64.0>
 ret <4 x double> %res
}
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefix=RV64I

; These tests are each targeted at a particular RISC-V ALU instruction. Most
; other files in this folder exercise LLVM IR instructions that don't directly
; match a RISC-V instruction.

; Register-immediate instructions.

define i32 @addi(i32 %a) nounwind {
; RV64I-LABEL: addi:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addiw a0, a0, 1
; RV64I-NEXT:    ret
 %1 = add i32 %a, 1
 ret i32 %1
}

define i32 @slti(i32 %a) nounwind {
; RV64I-LABEL: slti:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sext.w a0, a0
; RV64I-NEXT:    slti a0, a0, 2
; RV64I-NEXT:    ret
 %1 = icmp slt i32 %a, 2
 %2 = zext i1 %1 to i32
 ret i32 %2
}

define i32 @sltiu(i32 %a) nounwind {
; RV64I-LABEL: sltiu:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sext.w a0, a0
```

```
; RV64I-NEXT:    sltiu a0, a0, 3
; RV64I-NEXT:
    ret
 %1 = icmp ult i32 %a, 3
 %2 = zext i1 %1 to i32
 ret i32 %2
}

define i32 @xori(i32 %a) nounwind {
; RV64I-LABEL: xori:
; RV64I:       # %bb.0:
; RV64I-NEXT:    xori a0, a0, 4
; RV64I-NEXT:    ret
 %1 = xor i32 %a, 4
 ret i32 %1
}

define i32 @ori(i32 %a) nounwind {
; RV64I-LABEL: ori:
; RV64I:       # %bb.0:
; RV64I-NEXT:    ori a0, a0, 5
; RV64I-NEXT:    ret
 %1 = or i32 %a, 5
 ret i32 %1
}

define i32 @andi(i32 %a) nounwind {
; RV64I-LABEL: andi:
; RV64I:       # %bb.0:
; RV64I-NEXT:    andi a0, a0, 6
; RV64I-NEXT:    ret
 %1 = and i32 %a, 6
 ret i32 %1
}

define i32 @slli(i32 %a) nounwind {
; RV64I-LABEL: slli:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slliw a0, a0, 7
; RV64I-NEXT:    ret
 %1 = shl i32 %a, 7
 ret i32 %1
}

define i32 @srli(i32 %a) nounwind {
; RV64I-LABEL: srli:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a0, a0, 8
```

```
; RV64I-NEXT:    ret
 %1 = lshr i32 %a, 8
 ret i32 %1
}

define i32 @srai(i32 %a) nounwind {
; RV64I-LABEL: srai:
; RV64I:
   # %bb.0:
; RV64I-NEXT:    sraiw a0, a0, 9
; RV64I-NEXT:    ret
 %1 = ashr i32 %a, 9
 ret i32 %1
}

; Register-register instructions

define i32 @add(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: add:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    ret
 %1 = add i32 %a, %b
 ret i32 %1
}

define i32 @sub(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: sub:
; RV64I:       # %bb.0:
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    ret
 %1 = sub i32 %a, %b
 ret i32 %1
}

define i32 @sub_negative_constant_lhs(i32 %a) nounwind {
; RV64I-LABEL: sub_negative_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, -2
; RV64I-NEXT:    subw a0, a1, a0
; RV64I-NEXT:    ret
 %1 = sub i32 -2, %a
 ret i32 %1
}

define i32 @sll(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: sll:
; RV64I:       # %bb.0:
```

```
; RV64I-NEXT:    sllw a0, a0, a1
; RV64I-NEXT:    ret
 %1 = shl i32 %a, %b
 ret i32 %1
}

; Make sure we don't emit instructions to zero extend the shift amount to i64.
define
 i32 @sll_shamt_zext(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: sll_shamt_zext:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi a1, a1, 1
; RV64I-NEXT:    sllw a0, a0, a1
; RV64I-NEXT:    ret
 %shamt = add i32 %b, 1
 %1 = shl i32 %a, %shamt
 ret i32 %1
}

define i32 @sll_negative_constant_lhs(i32 %a) nounwind {
; RV64I-LABEL: sll_negative_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, -1
; RV64I-NEXT:    sllw a0, a1, a0
; RV64I-NEXT:    ret
 %1 = shl i32 -1, %a
 ret i32 %1
}

define i32 @slt(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: slt:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sext.w a1, a1
; RV64I-NEXT:    sext.w a0, a0
; RV64I-NEXT:    slt a0, a0, a1
; RV64I-NEXT:    ret
 %1 = icmp slt i32 %a, %b
 %2 = zext i1 %1 to i32
 ret i32 %2
}

define i32 @sltu(i32 %a, i32 %b) nounwind {
;
; RV64I-LABEL: sltu:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sext.w a1, a1
; RV64I-NEXT:    sext.w a0, a0
; RV64I-NEXT:    sltu a0, a0, a1
```

```
; RV64I-NEXT:    ret
 %1 = icmp ult i32 %a,
 %b
 %2 = zext i1 %1 to i32
 ret i32 %2
}

define i32 @xor(i32 %a, i32 %b) nounwind {
;
; RV64I-LABEL: xor:
; RV64I:       # %bb.0:
; RV64I-NEXT:    xor a0, a0, a1
; RV64I-NEXT:    ret
 %1 = xor i32 %a, %b
 ret i32 %1
}

define i32 @srl(i32 %a, i32 %b) nounwind {
;
; RV64I-LABEL: srl:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srlw a0, a0, a1
; RV64I-NEXT:    ret
 %1 = lshr i32 %a, %b
 ret i32 %1
}

; Make sure we don't emit instructions to zero extend the shift amount to i64.
define i32 @srl_shamt_zext(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: srl_shamt_zext:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi a1, a1, 1
; RV64I-NEXT:    srlw a0, a0, a1
; RV64I-NEXT:    ret
 %shamt = add i32 %b, 1
 %1 = lshr i32 %a, %shamt
 ret i32 %1
}

define i32 @srl_negative_constant_lhs(i32 %a) nounwind {
;
; RV64I-LABEL: srl_negative_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, -1
; RV64I-NEXT:    srlw a0, a1, a0
; RV64I-NEXT:    ret
 %1 = lshr i32 -1, %a
 ret i32 %1
```

```
}

define
 i32 @sra(i32 %a, i32 %b) nounwind {
;
; RV64I-LABEL: sra:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sraw a0, a0, a1
; RV64I-NEXT:    ret
 %1 = ashr i32 %a, %b
 ret i32 %1
}

; Make sure we don't emit instructions to zero extend the shift amount to i64.
define i32 @sra_shamt_zext(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: sra_shamt_zext:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi a1, a1, 1
; RV64I-NEXT:    sraw a0, a0, a1
; RV64I-NEXT:    ret
 %shamt = add i32 %b, 1
 %1 = ashr i32 %a, %shamt
 ret i32 %1
}

define i32 @sra_negative_constant_lhs(i32 %a) nounwind {
;
; RV64I-LABEL: sra_negative_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 524288
; RV64I-NEXT:    sraw a0, a1, a0
; RV64I-NEXT:    ret
 %1 = ashr i32 2147483648, %a
 ret i32 %1
}

define i32 @or(i32 %a, i32 %b) nounwind {
;
; RV64I-LABEL: or:
; RV64I:       # %bb.0:
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
 %1 = or i32 %a, %b
 ret i32 %1
}

define i32 @and(i32 %a, i32 %b) nounwind {
;
```

```
; RV64I-LABEL:
 and:
; RV64I:       # %bb.0:
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    ret
 %1 = and i32 %a, %b
 ret i32 %1
}
; NOTE: Assertions have been autogenerated by utils/update_test_checks.py UTC_ARGS: --include-generated-funcs
; RUN: opt -S -passes=verify,iroutliner -ir-outlining-no-cost < %s | FileCheck %s

; This test checks that we do outline indirect calls when it is not specified
; that we should not.

declare void @f1(ptr, ptr);
declare void @f2(ptr, ptr);

define void @function1(ptr %func) {
entry:
 %a = alloca i32, align 4
 %b = alloca i32, align 4
 %c = alloca i32, align 4
 store i32 2, ptr %a, align 4
 store i32 3, ptr %b, align 4
 store i32 4, ptr %c, align 4
 call void %func()
 %al = load i32, ptr %a
 %bl = load i32, ptr %b
 %cl = load i32, ptr %c
 ret void
}

define void @function2(ptr %func) {
entry:
 %a = alloca i32, align 4
 %b = alloca i32, align 4
 %c = alloca i32, align 4
 store i32 2, ptr %a, align 4
 store i32 3, ptr %b, align 4
 store i32 4, ptr %c, align 4
 call void %func()
 %al = load i32, ptr %a
 %bl = load i32, ptr %b
 %cl = load i32, ptr %c
 ret void
}
;
```

```
 CHECK-LABEL: @function1(
; CHECK-NEXT:  entry:
; CHECK-NEXT:    [[A:%.*]] = alloca i32, align 4
; CHECK-NEXT:    [[B:%.*]] = alloca i32, align 4
; CHECK-NEXT:    [[C:%.*]] = alloca i32, align 4
; CHECK-NEXT:    call void @outlined_ir_func_0(ptr [[A]], ptr [[B]], ptr [[C]], ptr [[FUNC:%.*]])
; CHECK-NEXT:    ret void
;
;
; CHECK-LABEL: @function2(
; CHECK-NEXT:  entry:
; CHECK-NEXT:    [[A:%.*]] = alloca i32, align 4
; CHECK-NEXT:    [[B:%.*]] = alloca i32, align 4
; CHECK-NEXT:    [[C:%.*]] = alloca i32, align 4
; CHECK-NEXT:    call void @outlined_ir_func_0(ptr [[A]], ptr [[B]], ptr [[C]], ptr [[FUNC:%.*]])
; CHECK-NEXT:    ret void
;
;
; CHECK-LABEL: define internal void  @outlined_ir_func_0(
; CHECK-NEXT:  newFuncRoot:
; CHECK-NEXT:    br label [[ENTRY_TO_OUTLINE:%.*]]
; CHECK:       entry_to_outline:
; CHECK-NEXT:    store i32 2, ptr [[TMP0:%.*]], align 4
; CHECK-NEXT:    store i32 3, ptr [[TMP1:%.*]], align 4
; CHECK-NEXT:    store i32 4, ptr [[TMP2:%.*]], align 4
; CHECK-NEXT:
   call void [[TMP3:%.*]]()
; CHECK-NEXT:    [[AL:%.*]] = load i32, ptr [[TMP0]], align 4
; CHECK-NEXT:    [[BL:%.*]] = load i32, ptr [[TMP1]], align 4
; CHECK-NEXT:    [[CL:%.*]] = load i32, ptr [[TMP2]], align 4
; CHECK-NEXT:    br label [[ENTRY_AFTER_OUTLINE_EXITSTUB:%.*]]
; CHECK:       entry_after_outline.exitStub:
; CHECK-NEXT:    ret void
;
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefix=RV64I
; RUN: llc -mtriple=riscv64 -mattr=+xtheadbb -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefix=RV64XTHEADBB

declare i32 @llvm.ctlz.i32(i32, i1)

define signext i32 @ctlz_i32(i32 signext %a) nounwind {
; RV64I-LABEL: ctlz_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    beqz a0, .LBB0_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    addi sp, sp, -16
```

```
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 8
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:
   not a0, a0
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addi a2, a2, 1365
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addi a1, a1, 819
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srliw a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 24
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
; RV64I-NEXT:  .LBB0_2:
; RV64I-NEXT:    li a0, 32
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: ctlz_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.extu a0, a0, 31, 0
; RV64XTHEADBB-NEXT:    th.ff1 a0,
 a0
; RV64XTHEADBB-NEXT:    addi a0, a0, -32
; RV64XTHEADBB-NEXT:    ret
 %1 = call i32 @llvm.ctlz.i32(i32 %a, i1 false)
```

```
 ret i32 %1
}

define signext i32 @log2_i32(i32 signext %a) nounwind {
; RV64I-LABEL: log2_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    beqz a0, .LBB1_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 8
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addi a2, a2, 1365
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addi a1, a1, 819
; RV64I-NEXT:
 and a2, a0, a1
; RV64I-NEXT:    srliw a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 24
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    j .LBB1_3
; RV64I-NEXT:  .LBB1_2:
; RV64I-NEXT:    li a0, 32
; RV64I-NEXT:  .LBB1_3: # %cond.end
```

```
; RV64I-NEXT:    li a1, 31
; RV64I-NEXT:    subw a0, a1, a0
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: log2_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.extu a0, a0, 31, 0
; RV64XTHEADBB-NEXT:    th.ff1 a0, a0
; RV64XTHEADBB-NEXT:    addi a0, a0, -32
; RV64XTHEADBB-NEXT:    li a1, 31
; RV64XTHEADBB-NEXT:    subw a0, a1, a0
; RV64XTHEADBB-NEXT:    ret
 %1 = call i32 @llvm.ctlz.i32(i32
 %a, i1 false)
 %2 = sub i32 31, %1
 ret i32 %2
}

define signext i32 @log2_ceil_i32(i32 signext %a) nounwind {
; RV64I-LABEL: log2_ceil_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    sd s0, 0(sp) # 8-byte Folded Spill
; RV64I-NEXT:    addiw a0, a0, -1
; RV64I-NEXT:    li s0, 32
; RV64I-NEXT:    li a1, 32
; RV64I-NEXT:    beqz a0, .LBB2_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 8
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addi a2, a2, 1365
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:
   lui a1, 209715
; RV64I-NEXT:    addi a1, a1, 819
```

```
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srliw a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a1, a0, 24
; RV64I-NEXT:  .LBB2_2: # %cond.end
; RV64I-NEXT:    subw a0, s0, a1
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    ld s0, 0(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: log2_ceil_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    addi a0, a0, -1
; RV64XTHEADBB-NEXT:    slli a0, a0, 32
; RV64XTHEADBB-NEXT:    srli a0, a0, 32
; RV64XTHEADBB-NEXT:    th.ff1 a0, a0
; RV64XTHEADBB-NEXT:    addi a0, a0, -32
; RV64XTHEADBB-NEXT:
   li a1, 32
; RV64XTHEADBB-NEXT:    subw a0, a1, a0
; RV64XTHEADBB-NEXT:    ret
 %1 = sub i32 %a, 1
 %2 = call i32 @llvm.ctlz.i32(i32 %1, i1 false)
 %3 = sub i32 32, %2
 ret i32 %3
}

define signext i32 @findLastSet_i32(i32 signext %a) nounwind {
; RV64I-LABEL: findLastSet_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    sd s0, 0(sp) # 8-byte Folded Spill
; RV64I-NEXT:    mv s0, a0
; RV64I-NEXT:    srliw a0, a0, 1
; RV64I-NEXT:    or a0, s0, a0
; RV64I-NEXT:    srliw a1, a0, 2
; RV64I-NEXT:    or a0, a0, a1
```

```
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 8
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addi a2, a2, 1365
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:
   lui a1, 209715
; RV64I-NEXT:    addi a1, a1, 819
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srliw a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 24
; RV64I-NEXT:    xori a0, a0, 31
; RV64I-NEXT:    snez a1, s0
; RV64I-NEXT:    addiw a1, a1, -1
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    ld s0, 0(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: findLastSet_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.extu a1, a0, 31, 0
; RV64XTHEADBB-NEXT:    th.ff1 a1, a1
; RV64XTHEADBB-NEXT:    addiw a1, a1, -32
; RV64XTHEADBB-NEXT:    xori a1, a1,
 31
; RV64XTHEADBB-NEXT:    snez a0, a0
; RV64XTHEADBB-NEXT:    addiw a0, a0, -1
; RV64XTHEADBB-NEXT:    or a0, a0, a1
; RV64XTHEADBB-NEXT:    ret
```

```
 %1 = call i32 @llvm.ctlz.i32(i32 %a, i1 true)
 %2 = xor i32 31, %1
 %3 = icmp eq i32 %a, 0
 %4 = select i1 %3, i32 -1, i32 %2
 ret i32 %4
}

define i32 @ctlz_lshr_i32(i32 signext %a) {
; RV64I-LABEL: ctlz_lshr_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a0, a0, 1
; RV64I-NEXT:    beqz a0, .LBB4_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    .cfi_def_cfa_offset 16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    .cfi_offset ra, -8
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 8
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srliw a1, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    not
 a0, a0
; RV64I-NEXT:    srliw a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addi a2, a2, 1365
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    subw a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addi a1, a1, 819
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srliw a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srliw a1, a0, 4
; RV64I-NEXT:    addw a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    call __muldi3
```

```
; RV64I-NEXT:    srliw a0, a0, 24
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
; RV64I-NEXT:  .LBB4_2:
; RV64I-NEXT:    li a0, 32
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: ctlz_lshr_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    srliw a0, a0, 1
; RV64XTHEADBB-NEXT:    th.ff1 a0, a0
; RV64XTHEADBB-NEXT:
    addi a0, a0, -32
; RV64XTHEADBB-NEXT:    ret
 %1 = lshr i32 %a, 1
 %2 = call i32 @llvm.ctlz.i32(i32 %1, i1 false)
 ret i32 %2
}

declare i64 @llvm.ctlz.i64(i64, i1)

define i64 @ctlz_i64(i64 %a) nounwind {
; RV64I-LABEL: ctlz_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    beqz a0, .LBB5_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    srli a1, a0, 1
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srli a1, a0, 2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srli a1, a0, 4
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srli a1, a0, 8
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srli a1, a0, 16
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    srli a1, a0, 32
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    not a0, a0
; RV64I-NEXT:    srli a1, a0, 1
; RV64I-NEXT:    lui a2, 349525
; RV64I-NEXT:    addiw a2, a2, 1365
; RV64I-NEXT:    slli a3, a2, 32
; RV64I-NEXT:    add a2, a2,
```

```
 a3
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    sub a0, a0, a1
; RV64I-NEXT:    lui a1, 209715
; RV64I-NEXT:    addiw a1, a1, 819
; RV64I-NEXT:    slli a2, a1, 32
; RV64I-NEXT:    add a1, a1, a2
; RV64I-NEXT:    and a2, a0, a1
; RV64I-NEXT:    srli a0, a0, 2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    add a0, a2, a0
; RV64I-NEXT:    srli a1, a0, 4
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    lui a1, 61681
; RV64I-NEXT:    addiw a1, a1, -241
; RV64I-NEXT:    slli a2, a1, 32
; RV64I-NEXT:    add a1, a1, a2
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 4112
; RV64I-NEXT:    addiw a1, a1, 257
; RV64I-NEXT:    slli a2, a1, 32
; RV64I-NEXT:    add a1, a1, a2
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srli a0, a0, 56
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
; RV64I-NEXT:  .LBB5_2:
; RV64I-NEXT:    li a0, 64
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: ctlz_i64:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:
    th.ff1 a0, a0
; RV64XTHEADBB-NEXT:    ret
 %1 = call i64 @llvm.ctlz.i64(i64 %a, i1 false)
 ret i64 %1
}

declare i32 @llvm.cttz.i32(i32, i1)

define signext i32 @cttz_i32(i32 signext %a) nounwind {
; RV64I-LABEL: cttz_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    beqz a0, .LBB6_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    addi sp, sp, -16
```

```
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    negw a1, a0
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 30667
; RV64I-NEXT:    addiw a1, a1, 1329
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 27
; RV64I-NEXT:    lui a1, %hi(.LCPI6_0)
; RV64I-NEXT:    addi a1, a1, %lo(.LCPI6_0)
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lbu a0, 0(a0)
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
; RV64I-NEXT:  .LBB6_2:
; RV64I-NEXT:    li a0, 32
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: cttz_i32:
; RV64XTHEADBB:       #
 %bb.0:
; RV64XTHEADBB-NEXT:    beqz a0, .LBB6_2
; RV64XTHEADBB-NEXT:  # %bb.1: # %cond.false
; RV64XTHEADBB-NEXT:    addi sp, sp, -16
; RV64XTHEADBB-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64XTHEADBB-NEXT:    negw a1, a0
; RV64XTHEADBB-NEXT:    and a0, a0, a1
; RV64XTHEADBB-NEXT:    lui a1, 30667
; RV64XTHEADBB-NEXT:    addiw a1, a1, 1329
; RV64XTHEADBB-NEXT:    call __muldi3
; RV64XTHEADBB-NEXT:    srliw a0, a0, 27
; RV64XTHEADBB-NEXT:    lui a1, %hi(.LCPI6_0)
; RV64XTHEADBB-NEXT:    addi a1, a1, %lo(.LCPI6_0)
; RV64XTHEADBB-NEXT:    add a0, a1, a0
; RV64XTHEADBB-NEXT:    lbu a0, 0(a0)
; RV64XTHEADBB-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64XTHEADBB-NEXT:    addi sp, sp, 16
; RV64XTHEADBB-NEXT:    ret
; RV64XTHEADBB-NEXT:  .LBB6_2:
; RV64XTHEADBB-NEXT:    li a0, 32
; RV64XTHEADBB-NEXT:    ret
; RV64ZBB-LABEL: cttz_i32:
; RV64ZBB:       # %bb.0:
; RV64ZBB-NEXT:    ctzw a0, a0
; RV64ZBB-NEXT:    ret
 %1 = call i32 @llvm.cttz.i32(i32 %a, i1 false)
 ret i32 %1
}
```

```
define
 signext i32 @cttz_zero_undef_i32(i32 signext %a) nounwind {
; RV64I-LABEL: cttz_zero_undef_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    negw a1, a0
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, 30667
; RV64I-NEXT:    addiw a1, a1, 1329
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 27
; RV64I-NEXT:    lui a1, %hi(.LCPI7_0)
; RV64I-NEXT:    addi a1, a1, %lo(.LCPI7_0)
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lbu a0, 0(a0)
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: cttz_zero_undef_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    addi sp, sp, -16
; RV64XTHEADBB-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64XTHEADBB-NEXT:    negw a1, a0
; RV64XTHEADBB-NEXT:    and a0, a0, a1
; RV64XTHEADBB-NEXT:    lui a1, 30667
; RV64XTHEADBB-NEXT:    addiw a1, a1, 1329
; RV64XTHEADBB-NEXT:
    call __muldi3
; RV64XTHEADBB-NEXT:    srliw a0, a0, 27
; RV64XTHEADBB-NEXT:    lui a1, %hi(.LCPI7_0)
; RV64XTHEADBB-NEXT:    addi a1, a1, %lo(.LCPI7_0)
; RV64XTHEADBB-NEXT:    add a0, a1, a0
; RV64XTHEADBB-NEXT:    lbu a0, 0(a0)
; RV64XTHEADBB-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64XTHEADBB-NEXT:    addi sp, sp, 16
; RV64XTHEADBB-NEXT:    ret
 %1 = call i32 @llvm.cttz.i32(i32 %a, i1 true)
 ret i32 %1
}

define signext i32 @findFirstSet_i32(i32 signext %a) nounwind {
; RV64I-LABEL: findFirstSet_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
```

```
; RV64I-NEXT:    sd s0, 0(sp) # 8-byte Folded Spill
; RV64I-NEXT:    mv s0, a0
; RV64I-NEXT:    negw a0, a0
; RV64I-NEXT:    and a0, s0, a0
; RV64I-NEXT:    lui a1, 30667
; RV64I-NEXT:    addiw a1, a1, 1329
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 27
; RV64I-NEXT:    lui a1, %hi(.LCPI8_0)
; RV64I-NEXT:    addi a1, a1, %lo(.LCPI8_0)
; RV64I-NEXT:
   add a0, a1, a0
; RV64I-NEXT:    lbu a0, 0(a0)
; RV64I-NEXT:    snez a1, s0
; RV64I-NEXT:    addi a1, a1, -1
; RV64I-NEXT:    or a0, a1, a0
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    ld s0, 0(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: findFirstSet_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    addi sp, sp, -16
; RV64XTHEADBB-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64XTHEADBB-NEXT:    sd s0, 0(sp) # 8-byte Folded Spill
; RV64XTHEADBB-NEXT:    mv s0, a0
; RV64XTHEADBB-NEXT:    negw a0, a0
; RV64XTHEADBB-NEXT:    and a0, s0, a0
; RV64XTHEADBB-NEXT:    lui a1, 30667
; RV64XTHEADBB-NEXT:    addiw a1, a1, 1329
; RV64XTHEADBB-NEXT:    call __muldi3
; RV64XTHEADBB-NEXT:    srliw a0, a0, 27
; RV64XTHEADBB-NEXT:    lui a1, %hi(.LCPI8_0)
; RV64XTHEADBB-NEXT:    addi a1, a1, %lo(.LCPI8_0)
; RV64XTHEADBB-NEXT:    add a0, a1, a0
; RV64XTHEADBB-NEXT:    lbu a0, 0(a0)
; RV64XTHEADBB-NEXT:
   snez a1, s0
; RV64XTHEADBB-NEXT:    addi a1, a1, -1
; RV64XTHEADBB-NEXT:    or a0, a1, a0
; RV64XTHEADBB-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64XTHEADBB-NEXT:    ld s0, 0(sp) # 8-byte Folded Reload
; RV64XTHEADBB-NEXT:    addi sp, sp, 16
; RV64XTHEADBB-NEXT:    ret
 %1 = call i32 @llvm.cttz.i32(i32 %a, i1 true)
 %2 = icmp eq i32 %a, 0
 %3 = select i1 %2, i32 -1, i32 %1
```

```
 ret i32 %3
}

define signext i32 @ffs_i32(i32 signext %a) nounwind {
; RV64I-LABEL: ffs_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    sd s0, 0(sp) # 8-byte Folded Spill
; RV64I-NEXT:    mv s0, a0
; RV64I-NEXT:    negw a0, a0
; RV64I-NEXT:    and a0, s0, a0
; RV64I-NEXT:    lui a1, 30667
; RV64I-NEXT:    addiw a1, a1, 1329
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srliw a0, a0, 27
; RV64I-NEXT:    lui a1, %hi(.LCPI9_0)
; RV64I-NEXT:    addi a1, a1, %lo(.LCPI9_0)
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:
   lbu a0, 0(a0)
; RV64I-NEXT:    addi a0, a0, 1
; RV64I-NEXT:    seqz a1, s0
; RV64I-NEXT:    addi a1, a1, -1
; RV64I-NEXT:    and a0, a1, a0
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    ld s0, 0(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: ffs_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    addi sp, sp, -16
; RV64XTHEADBB-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64XTHEADBB-NEXT:    sd s0, 0(sp) # 8-byte Folded Spill
; RV64XTHEADBB-NEXT:    mv s0, a0
; RV64XTHEADBB-NEXT:    negw a0, a0
; RV64XTHEADBB-NEXT:    and a0, s0, a0
; RV64XTHEADBB-NEXT:    lui a1, 30667
; RV64XTHEADBB-NEXT:    addiw a1, a1, 1329
; RV64XTHEADBB-NEXT:    call __muldi3
; RV64XTHEADBB-NEXT:    srliw a0, a0, 27
; RV64XTHEADBB-NEXT:    lui a1, %hi(.LCPI9_0)
; RV64XTHEADBB-NEXT:    addi a1, a1, %lo(.LCPI9_0)
; RV64XTHEADBB-NEXT:    add a0, a1, a0
;
```

```
 RV64XTHEADBB-NEXT:    lbu a0, 0(a0)
; RV64XTHEADBB-NEXT:    addi a0, a0, 1
; RV64XTHEADBB-NEXT:    seqz a1, s0
; RV64XTHEADBB-NEXT:    addi a1, a1, -1
; RV64XTHEADBB-NEXT:    and a0, a1, a0
; RV64XTHEADBB-NEXT:    slli a0, a0, 32
; RV64XTHEADBB-NEXT:    srli a0, a0, 32
; RV64XTHEADBB-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64XTHEADBB-NEXT:    ld s0, 0(sp) # 8-byte Folded Reload
; RV64XTHEADBB-NEXT:    addi sp, sp, 16
; RV64XTHEADBB-NEXT:    ret
 %1 = call i32 @llvm.cttz.i32(i32 %a, i1 true)
 %2 = add i32 %1, 1
 %3 = icmp eq i32 %a, 0
 %4 = select i1 %3, i32 0, i32 %2
 ret i32 %4
}

declare i64 @llvm.cttz.i64(i64, i1)

define i64 @cttz_i64(i64 %a) nounwind {
; RV64I-LABEL: cttz_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    beqz a0, .LBB10_2
; RV64I-NEXT:  # %bb.1: # %cond.false
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    neg a1, a0
; RV64I-NEXT:    and a0, a0, a1
; RV64I-NEXT:    lui a1, %hi(.LCPI10_0)
; RV64I-NEXT:
    ld a1, %lo(.LCPI10_0)(a1)
; RV64I-NEXT:    call __muldi3
; RV64I-NEXT:    srli a0, a0, 58
; RV64I-NEXT:    lui a1, %hi(.LCPI10_1)
; RV64I-NEXT:    addi a1, a1, %lo(.LCPI10_1)
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    lbu a0, 0(a0)
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
; RV64I-NEXT:  .LBB10_2:
; RV64I-NEXT:    li a0, 64
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: cttz_i64:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    beqz a0, .LBB10_2
```

```
; RV64XTHEADBB-NEXT:  # %bb.1: # %cond.false
; RV64XTHEADBB-NEXT:    addi a1, a0, -1
; RV64XTHEADBB-NEXT:    not a0, a0
; RV64XTHEADBB-NEXT:    and a0, a0, a1
; RV64XTHEADBB-NEXT:    th.ff1 a0, a0
; RV64XTHEADBB-NEXT:    li a1, 64
; RV64XTHEADBB-NEXT:    sub a0, a1, a0
; RV64XTHEADBB-NEXT:    ret
; RV64XTHEADBB-NEXT:  .LBB10_2:
; RV64XTHEADBB-NEXT:    li a0, 64
; RV64XTHEADBB-NEXT:    ret
 %1 = call i64 @llvm.cttz.i64(i64 %a, i1 false)
 ret i64 %1
}

define signext
 i32 @sextb_i32(i32 signext %a) nounwind {
; RV64I-LABEL: sextb_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 56
; RV64I-NEXT:    srai a0, a0, 56
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: sextb_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.ext a0, a0, 7, 0
; RV64XTHEADBB-NEXT:    ret
 %shl = shl i32 %a, 24
 %shr = ashr exact i32 %shl, 24
 ret i32 %shr
}

define i64 @sextb_i64(i64 %a) nounwind {
; RV64I-LABEL: sextb_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 56
; RV64I-NEXT:    srai a0, a0, 56
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: sextb_i64:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.ext a0, a0, 7, 0
; RV64XTHEADBB-NEXT:    ret
 %shl = shl i64 %a, 56
 %shr = ashr exact i64 %shl, 56
 ret i64 %shr
}
```

```
define signext i32 @sexth_i32(i32 signext %a) nounwind {
; RV64I-LABEL: sexth_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srai a0, a0, 48
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL:
 sexth_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.ext a0, a0, 15, 0
; RV64XTHEADBB-NEXT:    ret
 %shl = shl i32 %a, 16
 %shr = ashr exact i32 %shl, 16
 ret i32 %shr
}

define signext i32 @no_sexth_i32(i32 signext %a) nounwind {
; RV64I-LABEL: no_sexth_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 17
; RV64I-NEXT:    sraiw a0, a0, 16
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: no_sexth_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    slli a0, a0, 17
; RV64XTHEADBB-NEXT:    sraiw a0, a0, 16
; RV64XTHEADBB-NEXT:    ret
 %shl = shl i32 %a, 17
 %shr = ashr exact i32 %shl, 16
 ret i32 %shr
}

define i64 @sexth_i64(i64 %a) nounwind {
; RV64I-LABEL: sexth_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srai a0, a0, 48
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: sexth_i64:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.ext a0, a0, 15, 0
; RV64XTHEADBB-NEXT:    ret
 %shl = shl i64 %a, 48
 %shr = ashr
```

```
 exact i64 %shl, 48
 ret i64 %shr
}

define i64 @no_sexth_i64(i64 %a) nounwind {
; RV64I-LABEL: no_sexth_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 49
; RV64I-NEXT:    srai a0, a0, 48
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: no_sexth_i64:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    slli a0, a0, 49
; RV64XTHEADBB-NEXT:    srai a0, a0, 48
; RV64XTHEADBB-NEXT:    ret
 %shl = shl i64 %a, 49
 %shr = ashr exact i64 %shl, 48
 ret i64 %shr
}

define i32 @zexth_i32(i32 %a) nounwind {
; RV64I-LABEL: zexth_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srli a0, a0, 48
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: zexth_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.extu a0, a0, 15, 0
; RV64XTHEADBB-NEXT:    ret
 %and = and i32 %a, 65535
 ret i32 %and
}

define i64 @zexth_i64(i64 %a) nounwind {
; RV64I-LABEL: zexth_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srli a0, a0, 48
; RV64I-NEXT:
    ret
;
; RV64XTHEADBB-LABEL: zexth_i64:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.extu a0, a0, 15, 0
; RV64XTHEADBB-NEXT:    ret
```

```
 %and = and i64 %a, 65535
 ret i64 %and
}

define i64 @zext_bf_i64(i64 %a) nounwind {
; RV64I-LABEL: zext_bf_i64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 47
; RV64I-NEXT:    srli a0, a0, 48
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: zext_bf_i64:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.extu a0, a0, 16, 1
; RV64XTHEADBB-NEXT:    ret
 %1 = lshr i64 %a, 1
 %and = and i64 %1, 65535
 ret i64 %and
}

define i64 @zext_i64_srliw(i64 %a) nounwind {
; RV64I-LABEL: zext_i64_srliw:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a0, a0, 16
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: zext_i64_srliw:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    srliw a0, a0, 16
; RV64XTHEADBB-NEXT:    ret
 %1 = lshr i64 %a, 16
 %and = and i64 %1, 65535
 ret i64 %and
}

declare i32 @llvm.bswap.i32(i32)

define signext
 i32 @bswap_i32(i32 signext %a) nounwind {
; RV64I-LABEL: bswap_i32:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a1, a0, 8
; RV64I-NEXT:    lui a2, 16
; RV64I-NEXT:    addiw a2, a2, -256
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    srliw a3, a0, 24
; RV64I-NEXT:    or a1, a1, a3
; RV64I-NEXT:    and a2, a0, a2
```

```
; RV64I-NEXT:    slliw a2, a2, 8
; RV64I-NEXT:    slliw a0, a0, 24
; RV64I-NEXT:    or a0, a0, a2
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: bswap_i32:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.revw a0, a0
; RV64XTHEADBB-NEXT:    ret
 %1 = tail call i32 @llvm.bswap.i32(i32 %a)
 ret i32 %1
}

; Similar to bswap_i32 but the result is not sign extended.
define void @bswap_i32_nosext(i32 signext %a, ptr %x) nounwind {
; RV64I-LABEL: bswap_i32_nosext:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a2, a0, 8
; RV64I-NEXT:    lui a3, 16
; RV64I-NEXT:    addi a3, a3, -256
; RV64I-NEXT:    and a2, a2, a3
; RV64I-NEXT:    srliw
 a4, a0, 24
; RV64I-NEXT:    or a2, a2, a4
; RV64I-NEXT:    and a3, a0, a3
; RV64I-NEXT:    slli a3, a3, 8
; RV64I-NEXT:    slli a0, a0, 24
; RV64I-NEXT:    or a0, a0, a3
; RV64I-NEXT:    or a0, a0, a2
; RV64I-NEXT:    sw a0, 0(a1)
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: bswap_i32_nosext:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.revw a0, a0
; RV64XTHEADBB-NEXT:    sw a0, 0(a1)
; RV64XTHEADBB-NEXT:    ret
 %1 = tail call i32 @llvm.bswap.i32(i32 %a)
 store i32 %1, ptr %x
 ret void
}

declare i64 @llvm.bswap.i64(i64)

define i64 @bswap_i64(i64 %a) {
; RV64I-LABEL: bswap_i64:
; RV64I:       # %bb.0:
```

```
; RV64I-NEXT:    srli a1, a0, 40
; RV64I-NEXT:    lui a2, 16
; RV64I-NEXT:    addiw a2, a2, -256
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    srli a3, a0, 56
; RV64I-NEXT:    or a1, a1, a3
; RV64I-NEXT:    srli a3, a0, 24
; RV64I-NEXT:    lui a4, 4080
; RV64I-NEXT:    and a3, a3, a4
; RV64I-NEXT:    srli a5, a0, 8
; RV64I-NEXT:    srliw a5, a5, 24
; RV64I-NEXT:    slli
 a5, a5, 24
; RV64I-NEXT:    or a3, a5, a3
; RV64I-NEXT:    or a1, a3, a1
; RV64I-NEXT:    and a4, a0, a4
; RV64I-NEXT:    slli a4, a4, 24
; RV64I-NEXT:    srliw a3, a0, 24
; RV64I-NEXT:    slli a3, a3, 32
; RV64I-NEXT:    or a3, a4, a3
; RV64I-NEXT:    and a2, a0, a2
; RV64I-NEXT:    slli a2, a2, 40
; RV64I-NEXT:    slli a0, a0, 56
; RV64I-NEXT:    or a0, a0, a2
; RV64I-NEXT:    or a0, a0, a3
; RV64I-NEXT:    or a0, a0, a1
; RV64I-NEXT:    ret
;
; RV64XTHEADBB-LABEL: bswap_i64:
; RV64XTHEADBB:       # %bb.0:
; RV64XTHEADBB-NEXT:    th.rev a0, a0
; RV64XTHEADBB-NEXT:    ret
 %1 = call i64 @llvm.bswap.i64(i64 %a)
 ret i64 %1
}
; RUN: llc < %s -mtriple=s390x-linux-gnu -mcpu=zEC12 -verify-machineinstrs | FileCheck %s
;
; Test that early if conversion produces LOCR with operands of the right
; register classes.

define void @autogen_SD4739(ptr) {
; CHECK-NOT: Expected a GR32Bit register, but got a GRX32Bit register
BB:
 %L34 = load i8, ptr %0
 %Cmp56 = icmp sgt i8 undef, %L34
 br label %CF246

CF246:                                    ; preds = %CF246, %BB
```

```
 %Sl163 = select i1 %Cmp56, i8 %L34, i8 undef
 br i1 undef, label %CF246, label %CF248

CF248:                                    ; preds = %CF248, %CF246
 store i8 %Sl163, ptr %0
 br label %CF248
}
; RUN: llc -march=hexagon -hexagon-hvx-widen=32 < %s | FileCheck %s

; Truncating a type-to-be-widenened to a legal type (v8i8).
; Check that this compiles successfully.
; CHECK-LABEL: f0:
; CHECK: dealloc_return

target datalayout = "e-m:e-p:32:32:32-a:0-n16:32-i64:64:64-i32:32:32-i16:16:16-i1:8:8-f32:32:32-f64:64:64-
v32:32:32-v64:64:64-v512:512:512-v1024:1024:1024-v2048:2048:2048"
target triple = "hexagon"

define dllexport void @f0(ptr %a0) local_unnamed_addr #0 {
b0:
 %v0 = load i8, ptr undef, align 1
 %v1 = zext i8 %v0 to i16
 %v2 = add i16 0, %v1
 %v3 = icmp sgt i16 %v2, 1
 %v4 = select i1 %v3, i16 %v2, i16 1
 %v5 = udiv i16 -32768, %v4
 %v6 = zext i16 %v5 to i32
 %v7 = insertelement <8 x i32> undef, i32 %v6, i32 0
 %v8 = shufflevector <8 x i32> %v7, <8 x i32> undef, <8 x i32> zeroinitializer
 %v9 = load <8 x i16>, ptr undef, align 2
 %v10 = sext <8 x i16> %v9 to <8 x i32>
 %v11 = mul nsw <8 x i32> %v8, %v10
 %v12 = add nsw <8 x i32> %v11, <i32 16384, i32 16384, i32 16384,
 i32 16384, i32 16384, i32 16384, i32 16384, i32 16384>
 %v13 = lshr <8 x i32> %v12, <i32 15, i32 15, i32 15, i32 15, i32 15, i32 15, i32 15, i32 15>
 %v14 = trunc <8 x i32> %v13 to <8 x i8>
 %v15 = getelementptr inbounds i8, ptr %a0, i32 undef
 store <8 x i8> %v14, ptr %v15, align 1
 ret void
}

attributes #0 = { "target-features"="+hvx,+hvx-length128b" }
; RUN: llc -O3 -mtriple=powerpc-unknown-linux-gnu -mcpu=e500 -mattr=spe < %s | FileCheck %s

; PowerPC SPE is a rare in-tree target that has the FP_TO_SINT node marked
; as Legal.

; Verify that fptosi(42.1) isn't simplified when the rounding mode is
```

```
; unknown.
; Verify that no gross errors happen.
; CHECK-LABEL: @f20
; COMMON: cfdctsiz
define i32 @f20(double %a) strictfp {
entry:
 %result = call i32 @llvm.experimental.constrained.fptosi.i32.f64(double 42.1,
                                    metadata !"fpexcept.strict")
                                    strictfp
 ret i32 %result
}

@llvm.fp.env = thread_local global i8 zeroinitializer, section "llvm.metadata"
declare i32 @llvm.experimental.constrained.fptosi.i32.f64(double, metadata)
```

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```
; NOTE: Assertions have been autogenerated by utils/update_analyze_test_checks.py
; RUN: opt < %s  -passes="print<cost-model>" 2>&1 -disable-output -mtriple=x86_64-apple-macosx10.8.0 -mattr=+avx2 | FileCheck %s --check-prefixes=VEC256,AVX
; RUN: opt < %s  -passes="print<cost-model>" 2>&1 -disable-output -mtriple=x86_64-apple-macosx10.8.0 -mattr=+avx512vl,+prefer-256-bit | FileCheck %s --check-prefixes=VEC256,AVX512VL256
; RUN: opt < %s  -passes="print<cost-model>" 2>&1 -disable-output -mtriple=x86_64-apple-macosx10.8.0 -mattr=+avx512vl,-prefer-256-bit | FileCheck %s --check-prefixes=AVX512VL512
; RUN: opt < %s  -passes="print<cost-model>" 2>&1 -disable-output -mtriple=x86_64-apple-macosx10.8.0 -mattr=+avx512vl,+avx512bw,+avx512dq,+prefer-256-bit | FileCheck %s --check-prefixes=VEC256,SKX256
; RUN: opt < %s  -passes="print<cost-model>" 2>&1 -disable-output -mtriple=x86_64-apple-macosx10.8.0 -mattr=+avx512vl,+avx512bw,+avx512dq,-prefer-256-bit | FileCheck %s --check-prefixes=SKX512
```

```
define
 void @zext256() "min-legal-vector-width"="256" {
; AVX-LABEL: 'zext256'
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %A = zext <8 x i16> undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %B = zext <8 x i32> undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %C = zext <16 x i8> undef to <16 x i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %D = zext <16 x i16> undef to <16 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %E = zext <32 x i8> undef to <32 x i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL256-LABEL: 'zext256'
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %A = zext <8 x i16> undef to
<8 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %B = zext <8 x i32> undef to
<8 x i64>
; AVX512VL256-NEXT:  Cost
 Model: Found an estimated cost of 2 for instruction: %C = zext <16 x i8> undef to <16 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %D = zext <16 x i16> undef to
<16 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %E = zext <32 x i8> undef to
<32 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL512-LABEL: 'zext256'
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = zext <8 x i16> undef to
<8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = zext <8 x i32> undef to
<8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = zext <16 x i8> undef to
<16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = zext <16 x i16> undef to
<16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction:
 %E = zext <32 x i8> undef to <32 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX256-LABEL: 'zext256'
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %A = zext <8 x i16> undef to <8 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %B = zext <8 x i32> undef to <8 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %C = zext <16 x i8> undef to <16 x
i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %D = zext <16 x i16> undef to <16 x
i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %E = zext <32 x i8> undef to <32 x
i16>
```

```
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX512-LABEL: 'zext256'
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = zext <8 x i16> undef to <8 x
i64>
; SKX512-NEXT:  Cost Model: Found an estimated
 cost of 1 for instruction: %B = zext <8 x i32> undef to <8 x i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = zext <16 x i8> undef to <16 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = zext <16 x i16> undef to <16 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %E = zext <32 x i8> undef to <32 x
i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
 %A = zext <8 x i16> undef to <8 x i64>
 %B = zext <8 x i32> undef to <8 x i64>
 %C = zext <16 x i8> undef to <16 x i32>
 %D = zext <16 x i16> undef to <16 x i32>
 %E = zext <32 x i8> undef to <32 x i16>
 ret void
}

define void @zext512() "min-legal-vector-width"="512" {
; AVX-LABEL: 'zext512'
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %A = zext <8 x i16> undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %B = zext <8 x i32>
 undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %C = zext <16 x i8> undef to <16 x i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %D = zext <16 x i16> undef to <16 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %E = zext <32 x i8> undef to <32 x i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL256-LABEL: 'zext512'
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = zext <8 x i16> undef to
<8 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = zext <8 x i32> undef to
<8 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = zext <16 x i8> undef to
<16 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = zext <16 x i16> undef to
<16 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost
 of 3 for instruction: %E = zext <32 x i8> undef to <32 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL512-LABEL: 'zext512'
```

```
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = zext <8 x i16> undef to
<8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = zext <8 x i32> undef to
<8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = zext <16 x i8> undef to
<16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = zext <16 x i16> undef to
<16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %E = zext <32 x i8> undef to
<32 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX256-LABEL: 'zext512'
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = zext <8 x i16> undef to <8
 x i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = zext <8 x i32> undef to <8 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = zext <16 x i8> undef to <16 x
i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = zext <16 x i16> undef to <16 x
i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %E = zext <32 x i8> undef to <32 x
i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX512-LABEL: 'zext512'
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = zext <8 x i16> undef to <8 x
i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = zext <8 x i32> undef to <8 x
i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = zext <16 x i8> undef to <16 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = zext <16
 x i16> undef to <16 x i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %E = zext <32 x i8> undef to <32 x
i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
 %A = zext <8 x i16> undef to <8 x i64>
 %B = zext <8 x i32> undef to <8 x i64>
 %C = zext <16 x i8> undef to <16 x i32>
 %D = zext <16 x i16> undef to <16 x i32>
 %E = zext <32 x i8> undef to <32 x i16>
 ret void
}

define void @sext256() "min-legal-vector-width"="256" {
; AVX-LABEL: 'sext256'
```

```
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %B = sext <8 x i16> undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %C = sext <8 x i32> undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %D = sext <16 x i8> undef to <16 x i32>
; AVX-NEXT:  Cost Model: Found
 an estimated cost of 3 for instruction: %E = sext <16 x i16> undef to <16 x i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %F = sext <32 x i8> undef to <32 x i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL256-LABEL: 'sext256'
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %A = sext <8 x i8> undef to <8
x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %B = sext <8 x i16> undef to
<8 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %C = sext <8 x i32> undef to
<8 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %D = sext <16 x i8> undef to
<16 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %E = sext <16 x i16> undef to
<16 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %F = sext <32 x i8> undef
 to <32 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL512-LABEL: 'sext256'
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = sext <8 x i8> undef to <8
x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = sext <8 x i16> undef to
<8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = sext <8 x i32> undef to
<8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = sext <16 x i8> undef to
<16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %E = sext <16 x i16> undef to
<16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %F = sext <32 x i8> undef to
<32 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX256-LABEL: 'sext256'
; SKX256-NEXT:  Cost Model: Found an
 estimated cost of 2 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %B = sext <8 x i16> undef to <8 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %C = sext <8 x i32> undef to <8 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %D = sext <16 x i8> undef to <16 x
i32>
```

```
; SKX256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %E = sext <16 x i16> undef to <16 x
i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %F = sext <32 x i8> undef to <32 x
i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX512-LABEL: 'sext256'
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = sext <8 x i16> undef to <8 x
i64>
; SKX512-NEXT:  Cost
 Model: Found an estimated cost of 1 for instruction: %C = sext <8 x i32> undef to <8 x i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %D = sext <16 x i8> undef to <16 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %E = sext <16 x i16> undef to <16 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %F = sext <32 x i8> undef to <32 x
i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
 %A = sext <8 x i8> undef to <8 x i64>
 %B = sext <8 x i16> undef to <8 x i64>
 %C = sext <8 x i32> undef to <8 x i64>
 %D = sext <16 x i8> undef to <16 x i32>
 %E = sext <16 x i16> undef to <16 x i32>
 %F = sext <32 x i8> undef to <32 x i16>
 ret void
}

define void @sext512() "min-legal-vector-width"="512" {
; AVX-LABEL: 'sext512'
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found
 an estimated cost of 4 for instruction: %B = sext <8 x i16> undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %C = sext <8 x i32> undef to <8 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %D = sext <16 x i8> undef to <16 x i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %E = sext <16 x i16> undef to <16 x i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %F = sext <32 x i8> undef to <32 x i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL256-LABEL: 'sext512'
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = sext <8 x i8> undef to <8
x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %B = sext <8 x i16> undef to
<8 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %C = sext <8 x i32> undef to
<8 x i64>
; AVX512VL256-NEXT:
```

Cost Model: Found an estimated cost of 1 for instruction: %D = sext <16 x i8> undef to <16 x i32>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %E = sext <16 x i16> undef to <16 x i32>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %F = sext <32 x i8> undef to <32 x i16>
; AVX512VL256-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL512-LABEL: 'sext512'
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %B = sext <8 x i16> undef to <8 x i64>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %C = sext <8 x i32> undef to <8 x i64>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %D = sext <16 x i8> undef to <16 x i32>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost
of 1 for instruction: %E = sext <16 x i16> undef to <16 x i32>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 3 for instruction: %F = sext <32 x i8> undef to <32 x i16>
; AVX512VL512-NEXT: Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX256-LABEL: 'sext512'
; SKX256-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; SKX256-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %B = sext <8 x i16> undef to <8 x i64>
; SKX256-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %C = sext <8 x i32> undef to <8 x i64>
; SKX256-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %D = sext <16 x i8> undef to <16 x i32>
; SKX256-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %E = sext <16 x i16> undef to <16 x i32>
; SKX256-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %F = sext <32 x i8> undef to <32 x i16>
; SKX256-NEXT: Cost
Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX512-LABEL: 'sext512'
; SKX512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %A = sext <8 x i8> undef to <8 x i64>
; SKX512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %B = sext <8 x i16> undef to <8 x i64>
; SKX512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %C = sext <8 x i32> undef to <8 x i64>
; SKX512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %D = sext <16 x i8> undef to <16 x i32>
; SKX512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %E = sext <16 x i16> undef to <16 x i32>
; SKX512-NEXT: Cost Model: Found an estimated cost of 1 for instruction: %F = sext <32 x i8> undef to <32 x

```
i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
 %A = sext <8 x i8> undef to <8 x i64>
 %B = sext <8 x i16> undef to <8 x i64>
 %C = sext <8 x i32> undef to <8 x i64>
 %D = sext <16 x i8>
 undef to <16 x i32>
 %E = sext <16 x i16> undef to <16 x i32>
 %F = sext <32 x i8> undef to <32 x i16>
 ret void
}

define void @trunc256() "min-legal-vector-width"="256" {
; VEC256-LABEL: 'trunc256'
; VEC256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %A = trunc <8 x i64> undef to <8 x
i32>
; VEC256-NEXT:  Cost Model: Found an estimated cost of 10 for instruction: %B = trunc <8 x i64> undef to <8 x
i16>
; VEC256-NEXT:  Cost Model: Found an estimated cost of 8 for instruction: %C = trunc <8 x i64> undef to <8 x
i8>
; VEC256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %D = trunc <16 x i32> undef to <16 x
i16>
; VEC256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %E = trunc <16 x i32> undef to <16 x
i8>
; VEC256-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %F = trunc <32 x i16> undef to <32 x
i8>
; VEC256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; AVX512VL512-LABEL: 'trunc256'
;
 AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = trunc <8 x i64> undef to
<8 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %B = trunc <8 x i64> undef to
<8 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %C = trunc <8 x i64> undef to
<8 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %D = trunc <16 x i32> undef
to <16 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %E = trunc <16 x i32> undef to
<16 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 8 for instruction: %F = trunc <32 x i16> undef to
<32 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
; SKX512-LABEL: 'trunc256'
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %A = trunc <8 x i64> undef to <8 x
i32>
```

```
; SKX512-NEXT:  Cost Model: Found an estimated
 cost of 2 for instruction: %B = trunc <8 x i64> undef to <8 x i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %C = trunc <8 x i64> undef to <8 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %D = trunc <16 x i32> undef to <16 x
i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %E = trunc <16 x i32> undef to <16 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %F = trunc <32 x i16> undef to <32 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret void
;
 %A = trunc <8 x i64> undef to <8 x i32>
 %B = trunc <8 x i64> undef to <8 x i16>
 %C = trunc <8 x i64> undef to <8 x i8>
 %D = trunc <16 x i32> undef to <16 x i16>
 %E = trunc <16 x i32> undef to <16 x i8>
 %F = trunc <32 x i16> undef to <32 x i8>
 ret void
}

define i32 @zext256_vXi1() "min-legal-vector-width"="256" {
; AVX-LABEL: 'zext256_vXi1'
; AVX-NEXT:  Cost Model: Found
 an estimated cost of 1 for instruction: %V2i64 = zext <2 x i1> undef to <2 x i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V4i64 = zext <4 x i1> undef to <4 x
i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V8i64 = zext <8 x i1> undef to <8 x
i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i32 = zext <2 x i1> undef to <2 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i32 = zext <4 x i1> undef to <4 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V8i32 = zext <8 x i1> undef to <8 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V16i32 = zext <16 x i1> undef to <16 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i16 = zext <2 x i1> undef to <2 x
i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i16 = zext <4 x i1> undef to <4 x
i16>
; AVX-NEXT:
  Cost Model: Found an estimated cost of 1 for instruction: %V8i16 = zext <8 x i1> undef to <8 x i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i16 = zext <16 x i1> undef to <16 x
i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V32i16 = zext <32 x i1> undef to <32 x
i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i8 = zext <2 x i1> undef to <2 x i8>
```

```
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i8 = zext <4 x i1> undef to <4 x i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i8 = zext <8 x i1> undef to <8 x i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i8 = zext <16 x i1> undef to <16 x
i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V32i8 = zext <32 x i1> undef to <32 x
i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V64i8 = zext <64 x i1> undef
 to <64 x i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; AVX512VL256-LABEL: 'zext256_vXi1'
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i64 = zext <2 x i1> undef
to <2 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i64 = zext <4 x i1> undef
to <4 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %V8i64 = zext <8 x i1> undef
to <8 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i32 = zext <2 x i1> undef
to <2 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i32 = zext <4 x i1> undef
to <4 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = zext <8 x i1> undef
to <8 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V16i32 = zext <16 x i1>
undef to <16 x i32>
; AVX512VL256-NEXT:
  Cost Model: Found an estimated cost of 5 for instruction: %V2i16 = zext <2 x i1> undef to <2 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %V4i16 = zext <4 x i1> undef
to <4 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %V8i16 = zext <8 x i1> undef
to <8 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 12 for instruction: %V16i16 = zext <16 x i1>
undef to <16 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 24 for instruction: %V32i16 = zext <32 x i1>
undef to <32 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 6 for instruction: %V2i8 = zext <2 x i1> undef to
<2 x i8>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 6 for instruction: %V4i8 = zext <4 x i1> undef to
<4 x i8>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 6 for instruction: %V8i8 = zext <8 x i1> undef to
<8 x i8>
; AVX512VL256-NEXT:  Cost Model: Found an estimated
 cost of 12 for instruction: %V16i8 = zext <16 x i1> undef to <16 x i8>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 25 for instruction: %V32i8 = zext <32 x i1>
undef to <32 x i8>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 50 for instruction: %V64i8 = zext <64 x i1>
undef to <64 x i8>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
```

```
;
; AVX512VL512-LABEL: 'zext256_vXi1'
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i64 = zext <2 x i1> undef
to <2 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i64 = zext <4 x i1> undef
to <4 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i64 = zext <8 x i1> undef
to <8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i32 = zext <2 x i1> undef
to <2 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of
 2 for instruction: %V4i32 = zext <4 x i1> undef to <4 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = zext <8 x i1> undef
to <8 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i32 = zext <16 x i1>
undef to <16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V2i16 = zext <2 x i1> undef
to <2 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V4i16 = zext <4 x i1> undef
to <4 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V8i16 = zext <8 x i1> undef
to <8 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V16i16 = zext <16 x i1>
undef to <16 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 9 for instruction: %V32i16 = zext <32 x i1>
undef to <32 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V2i8
 = zext <2 x i1> undef to <2 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V4i8 = zext <4 x i1> undef to
<4 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V8i8 = zext <8 x i1> undef to
<8 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V16i8 = zext <16 x i1> undef
to <16 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 9 for instruction: %V32i8 = zext <32 x i1> undef
to <32 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 19 for instruction: %V64i8 = zext <64 x i1>
undef to <64 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; SKX256-LABEL: 'zext256_vXi1'
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i64 = zext <2 x i1> undef to <2 x
i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i64 = zext <4 x i1> undef to <4 x
i64>
;
 SKX256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V8i64 = zext <8 x i1> undef to <8 x
i64>
```

; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i32 = zext <2 x i1> undef to <2 x i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i32 = zext <4 x i1> undef to <4 x i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = zext <8 x i1> undef to <8 x i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V16i32 = zext <16 x i1> undef to <16 x i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i16 = zext <2 x i1> undef to <2 x i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i16 = zext <4 x i1> undef to <4 x i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i16 = zext <8 x i1> undef to <8 x i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction:
 %V16i16 = zext <16 x i1> undef to <16 x i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V32i16 = zext <32 x i1> undef to <32 x i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i8 = zext <2 x i1> undef to <2 x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i8 = zext <4 x i1> undef to <4 x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i8 = zext <8 x i1> undef to <8 x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i8 = zext <16 x i1> undef to <16 x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V32i8 = zext <32 x i1> undef to <32 x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V64i8 = zext <64 x i1> undef to <64 x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; SKX512-LABEL: 'zext256_vXi1'
; SKX512-NEXT:  Cost
 Model: Found an estimated cost of 2 for instruction: %V2i64 = zext <2 x i1> undef to <2 x i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i64 = zext <4 x i1> undef to <4 x i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i64 = zext <8 x i1> undef to <8 x i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i32 = zext <2 x i1> undef to <2 x i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i32 = zext <4 x i1> undef to <4 x i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = zext <8 x i1> undef to <8 x i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i32 = zext <16 x i1> undef to <16 x i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i16 = zext <2 x i1> undef to <2 x

```
i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i16 = zext
 <4 x i1> undef to <4 x i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i16 = zext <8 x i1> undef to <8 x
i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i16 = zext <16 x i1> undef to
<16 x i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V32i16 = zext <32 x i1> undef to
<32 x i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i8 = zext <2 x i1> undef to <2 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i8 = zext <4 x i1> undef to <4 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i8 = zext <8 x i1> undef to <8 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i8 = zext <16 x i1> undef to <16
x i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V32i8 = zext <32 x i1> undef to <32
x i8>
; SKX512-NEXT:  Cost Model: Found an estimated
 cost of 2 for instruction: %V64i8 = zext <64 x i1> undef to <64 x i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
 %V2i64 = zext <2 x i1> undef to <2 x i64>
 %V4i64 = zext <4 x i1> undef to <4 x i64>
 %V8i64 = zext <8 x i1> undef to <8 x i64>

 %V2i32 = zext <2 x i1> undef to <2 x i32>
 %V4i32 = zext <4 x i1> undef to <4 x i32>
 %V8i32 = zext <8 x i1> undef to <8 x i32>
 %V16i32 = zext <16 x i1> undef to <16 x i32>

 %V2i16 = zext <2 x i1> undef to <2 x i16>
 %V4i16 = zext <4 x i1> undef to <4 x i16>
 %V8i16 = zext <8 x i1> undef to <8 x i16>
 %V16i16 = zext <16 x i1> undef to <16 x i16>
 %V32i16 = zext <32 x i1> undef to <32 x i16>

 %V2i8 = zext <2 x i1> undef to <2 x i8>
 %V4i8 = zext <4 x i1> undef to <4 x i8>
 %V8i8 = zext <8 x i1> undef to <8 x i8>
 %V16i8 = zext <16 x i1> undef to <16 x i8>
 %V32i8 = zext <32 x i1> undef to <32 x i8>
 %V64i8 = zext <64 x i1> undef to <64 x i8>

 ret i32 undef
}
```

```
define i32 @sext256_vXi1()
 "min-legal-vector-width"="256" {
; AVX-LABEL: 'sext256_vXi1'
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I64 = sext i1 undef to i64
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i64 = sext <2 x i1> undef to <2 x
i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V4i64 = sext <4 x i1> undef to <4 x
i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V8i64 = sext <8 x i1> undef to <8 x
i64>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I32 = sext i1 undef to i32
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i32 = sext <2 x i1> undef to <2 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i32 = sext <4 x i1> undef to <4 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V8i32 = sext <8 x i1> undef to <8 x
i32>
; AVX-NEXT:  Cost Model: Found an estimated cost
 of 4 for instruction: %V16i32 = sext <16 x i1> undef to <16 x i32>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I16 = sext i1 undef to i16
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i16 = sext <2 x i1> undef to <2 x
i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i16 = sext <4 x i1> undef to <4 x
i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i16 = sext <8 x i1> undef to <8 x
i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i16 = sext <16 x i1> undef to <16 x
i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V32i16 = sext <32 x i1> undef to <32 x
i16>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I8 = sext i1 undef to i8
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i8 = sext <2 x i1> undef to <2 x i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for
 instruction: %V4i8 = sext <4 x i1> undef to <4 x i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i8 = sext <8 x i1> undef to <8 x i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i8 = sext <16 x i1> undef to <16 x
i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V32i8 = sext <32 x i1> undef to <32 x
i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V64i8 = sext <64 x i1> undef to <64 x
i8>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; AVX512VL256-LABEL: 'sext256_vXi1'
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I64 = sext i1 undef to i64
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i64 = sext <2 x i1> undef
to <2 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i64 = sext <4 x i1> undef
```

to <4 x i64>
; AVX512VL256-NEXT:
  Cost Model: Found an estimated cost of 3 for instruction: %V8i64 = sext <8 x i1> undef to <8 x i64>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I32 = sext i1 undef to i32
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i32 = sext <2 x i1> undef to <2 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i32 = sext <4 x i1> undef to <4 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i32 = sext <8 x i1> undef to <8 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i32 = sext <16 x i1> undef to <16 x i32>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I16 = sext i1 undef to i16
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V2i16 = sext <2 x i1> undef to <2 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction:
 %V4i16 = sext <4 x i1> undef to <4 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V8i16 = sext <8 x i1> undef to <8 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 10 for instruction: %V16i16 = sext <16 x i1> undef to <16 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 20 for instruction: %V32i16 = sext <32 x i1> undef to <32 x i16>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I8 = sext i1 undef to i8
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %V2i8 = sext <2 x i1> undef to <2 x i8>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %V4i8 = sext <4 x i1> undef to <4 x i8>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 5 for instruction: %V8i8 = sext <8 x i1> undef to <8 x i8>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 10 for instruction: %V16i8 = sext <16 x i1> undef to <16 x i8>
;
 AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 21 for instruction: %V32i8 = sext <32 x i1> undef to <32 x i8>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 42 for instruction: %V64i8 = sext <64 x i1> undef to <64 x i8>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; AVX512VL512-LABEL: 'sext256_vXi1'
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I64 = sext i1 undef to i64
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i64 = sext <2 x i1> undef to <2 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i64 = sext <4 x i1> undef to <4 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i64 = sext <8 x i1> undef to <8 x i64>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I32 = sext i1 undef to i32

; AVX512VL512-NEXT:  Cost Model: Found an estimated
 cost of 1 for instruction: %V2i32 = sext <2 x i1> undef to <2 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i32 = sext <4 x i1> undef to <4 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i32 = sext <8 x i1> undef to <8 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i32 = sext <16 x i1> undef to <16 x i32>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I16 = sext i1 undef to i16
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V2i16 = sext <2 x i1> undef to <2 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V4i16 = sext <4 x i1> undef to <4 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V8i16 = sext <8 x i1> undef to <8 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V16i16 =
 sext <16 x i1> undef to <16 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 7 for instruction: %V32i16 = sext <32 x i1> undef to <32 x i16>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I8 = sext i1 undef to i8
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V2i8 = sext <2 x i1> undef to <2 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V4i8 = sext <4 x i1> undef to <4 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V8i8 = sext <8 x i1> undef to <8 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V16i8 = sext <16 x i1> undef to <16 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 7 for instruction: %V32i8 = sext <32 x i1> undef to <32 x i8>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 15 for instruction: %V64i8 = sext <64 x i1> undef to <64 x i8>
; AVX512VL512-NEXT:
  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; SKX256-LABEL: 'sext256_vXi1'
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I64 = sext i1 undef to i64
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i64 = sext <2 x i1> undef to <2 x i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i64 = sext <4 x i1> undef to <4 x i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i64 = sext <8 x i1> undef to <8 x i64>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I32 = sext i1 undef to i32
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i32 = sext <2 x i1> undef to <2 x i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i32 = sext <4 x i1> undef to <4 x i32>

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; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i32 = sext <8 x i1> undef
 to <8 x i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i32 = sext <16 x i1> undef to
<16 x i32>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I16 = sext i1 undef to i16
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i16 = sext <2 x i1> undef to <2 x
i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i16 = sext <4 x i1> undef to <4 x
i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i16 = sext <8 x i1> undef to <8 x
i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i16 = sext <16 x i1> undef to
<16 x i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V32i16 = sext <32 x i1> undef to
<32 x i16>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I8 = sext i1 undef to i8
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i8
 = sext <2 x i1> undef to <2 x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i8 = sext <4 x i1> undef to <4 x
i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i8 = sext <8 x i1> undef to <8 x
i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i8 = sext <16 x i1> undef to <16
x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V32i8 = sext <32 x i1> undef to <32
x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V64i8 = sext <64 x i1> undef to <64
x i8>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; SKX512-LABEL: 'sext256_vXi1'
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I64 = sext i1 undef to i64
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i64 = sext <2 x i1> undef to <2 x
i64>
; SKX512-NEXT:  Cost Model: Found an estimated
 cost of 1 for instruction: %V4i64 = sext <4 x i1> undef to <4 x i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i64 = sext <8 x i1> undef to <8 x
i64>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I32 = sext i1 undef to i32
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i32 = sext <2 x i1> undef to <2 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i32 = sext <4 x i1> undef to <4 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i32 = sext <8 x i1> undef to <8 x
i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i32 = sext <16 x i1> undef to
<16 x i32>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I16 = sext i1 undef to i16
```

```
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i16 = sext <2 x i1> undef to <2 x
i16>
; SKX512-NEXT:  Cost Model:
 Found an estimated cost of 1 for instruction: %V4i16 = sext <4 x i1> undef to <4 x i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i16 = sext <8 x i1> undef to <8 x
i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i16 = sext <16 x i1> undef to
<16 x i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V32i16 = sext <32 x i1> undef to
<32 x i16>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %I8 = sext i1 undef to i8
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i8 = sext <2 x i1> undef to <2 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i8 = sext <4 x i1> undef to <4 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i8 = sext <8 x i1> undef to <8 x
i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V16i8 = sext <16 x i1> undef to <16
x i8>
;
 SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V32i8 = sext <32 x i1> undef to <32
x i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V64i8 = sext <64 x i1> undef to <64
x i8>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
 %I64 = sext i1 undef to i64
 %V2i64 = sext <2 x i1> undef to <2 x i64>
 %V4i64 = sext <4 x i1> undef to <4 x i64>
 %V8i64 = sext <8 x i1> undef to <8 x i64>

 %I32 = sext i1 undef to i32
 %V2i32 = sext <2 x i1> undef to <2 x i32>
 %V4i32 = sext <4 x i1> undef to <4 x i32>
 %V8i32 = sext <8 x i1> undef to <8 x i32>
 %V16i32 = sext <16 x i1> undef to <16 x i32>

 %I16 = sext i1 undef to i16
 %V2i16 = sext <2 x i1> undef to <2 x i16>
 %V4i16 = sext <4 x i1> undef to <4 x i16>
 %V8i16 = sext <8 x i1> undef to <8 x i16>
 %V16i16 = sext <16 x i1> undef to <16 x i16>
 %V32i16 = sext <32 x i1> undef to <32 x i16>

 %I8 = sext i1 undef to i8
 %V2i8 = sext <2
 x i1> undef to <2 x i8>
 %V4i8 = sext <4 x i1> undef to <4 x i8>
```

```
 %V8i8 = sext <8 x i1> undef to <8 x i8>
 %V16i8 = sext <16 x i1> undef to <16 x i8>
 %V32i8 = sext <32 x i1> undef to <32 x i8>
 %V64i8 = sext <64 x i1> undef to <64 x i8>

 ret i32 undef
}

define i32 @trunc_vXi1() "min-legal-vector-width"="256" {
; AVX-LABEL: 'trunc_vXi1'
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V2i64 = trunc <2 x i64> undef to <2 x
i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V4i64 = trunc <4 x i64> undef to <4 x
i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 9 for instruction: %V8i64 = trunc <8 x i64> undef to <8 x
i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 11 for instruction: %V16i64 = trunc <16 x i64> undef to
<16 x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i64 = trunc <32 x i64> undef to <32
x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V64i64
 = trunc <64 x i64> undef to <64 x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i32 = trunc <2 x i32> undef to <2 x
i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V4i32 = trunc <4 x i32> undef to <4 x
i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = trunc <8 x i32> undef to <8 x
i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 8 for instruction: %V16i32 = trunc <16 x i32> undef to <16
x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i32 = trunc <32 x i32> undef to <32
x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V64i32 = trunc <64 x i32> undef to <64
x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i16 = trunc <2 x i16> undef to <2 x
i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i16 = trunc <4 x i16> undef to <4 x
i1>
; AVX-NEXT:  Cost Model: Found an estimated
 cost of 0 for instruction: %V8i16 = trunc <8 x i16> undef to <8 x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V16i16 = trunc <16 x i16> undef to <16
x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i16 = trunc <32 x i16> undef to <32
x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V64i16 = trunc <64 x i16> undef to <64
x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V2i8 = trunc <2 x i8> undef to <2 x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V4i8 = trunc <4 x i8> undef to <4 x i1>
```

; AVX-NEXT:  Cost Model: Found an estimated cost of 1 for instruction: %V8i8 = trunc <8 x i8> undef to <8 x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V16i8 = trunc <16 x i8> undef to <16 x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i8 = trunc <32 x i8> undef to <32 x i1>
; AVX-NEXT:
  Cost Model: Found an estimated cost of 0 for instruction: %V64i8 = trunc <64 x i8> undef to <64 x i1>
; AVX-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; AVX512VL256-LABEL: 'trunc_vXi1'
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i64 = trunc <2 x i64> undef to <2 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i64 = trunc <4 x i64> undef to <4 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 9 for instruction: %V8i64 = trunc <8 x i64> undef to <8 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 11 for instruction: %V16i64 = trunc <16 x i64> undef to <16 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i64 = trunc <32 x i64> undef to <32 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V64i64 = trunc <64 x i64> undef to <64 x i1>
; AVX512VL256-NEXT:  Cost Model:
 Found an estimated cost of 2 for instruction: %V2i32 = trunc <2 x i32> undef to <2 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i32 = trunc <4 x i32> undef to <4 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = trunc <8 x i32> undef to <8 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V16i32 = trunc <16 x i32> undef to <16 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 8 for instruction: %V32i32 = trunc <32 x i32> undef to <32 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 16 for instruction: %V64i32 = trunc <64 x i32> undef to <64 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V2i16 = trunc <2 x i16> undef to <2 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V4i16 = trunc <4 x i16> undef to <4 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an
 estimated cost of 3 for instruction: %V8i16 = trunc <8 x i16> undef to <8 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 8 for instruction: %V16i16 = trunc <16 x i16> undef to <16 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 16 for instruction: %V32i16 = trunc <32 x i16> undef to <32 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 32 for instruction: %V64i16 = trunc <64 x i16> undef to <64 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V2i8 = trunc <2 x i8> undef to <2 x i1>

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; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V4i8 = trunc <4 x i8> undef
to <4 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V8i8 = trunc <8 x i8> undef
to <8 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 8 for instruction: %V16i8 = trunc <16 x i8>
undef to <16 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of
 0 for instruction: %V32i8 = trunc <32 x i8> undef to <32 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V64i8 = trunc <64 x i8>
undef to <64 x i1>
; AVX512VL256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; AVX512VL512-LABEL: 'trunc_vXi1'
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i64 = trunc <2 x i64>
undef to <2 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i64 = trunc <4 x i64>
undef to <4 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i64 = trunc <8 x i64>
undef to <8 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 11 for instruction: %V16i64 = trunc <16 x i64>
undef to <16 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i64 = trunc <32 x i64>
undef to <32 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction:
 %V64i64 = trunc <64 x i64> undef to <64 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i32 = trunc <2 x i32>
undef to <2 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i32 = trunc <4 x i32>
undef to <4 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = trunc <8 x i32>
undef to <8 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i32 = trunc <16 x i32>
undef to <16 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V32i32 = trunc <32 x i32>
undef to <32 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 8 for instruction: %V64i32 = trunc <64 x i32>
undef to <64 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V2i16 = trunc <2 x i16>
undef to <2 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction:
 %V4i16 = trunc <4 x i16> undef to <4 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V8i16 = trunc <8 x i16>
undef to <8 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V16i16 = trunc <16 x i16>
undef to <16 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i16 = trunc <32 x i16>
undef to <32 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V64i16 = trunc <64 x i16>
```

```
undef to <64 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V2i8 = trunc <2 x i8> undef
to <2 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V4i8 = trunc <4 x i8> undef
to <4 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V8i8 = trunc <8 x i8> undef
to <8 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 3 for instruction: %V16i8 = trunc <16 x
 i8> undef to <16 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i8 = trunc <32 x i8>
undef to <32 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V64i8 = trunc <64 x i8>
undef to <64 x i1>
; AVX512VL512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; SKX256-LABEL: 'trunc_vXi1'
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i64 = trunc <2 x i64> undef to <2
x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i64 = trunc <4 x i64> undef to <4
x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 9 for instruction: %V8i64 = trunc <8 x i64> undef to <8
x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 11 for instruction: %V16i64 = trunc <16 x i64> undef to
<16 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i64 = trunc <32 x i64> undef to
<32 x i1>
; SKX256-NEXT:
  Cost Model: Found an estimated cost of 0 for instruction: %V64i64 = trunc <64 x i64> undef to <64 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i32 = trunc <2 x i32> undef to <2
x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i32 = trunc <4 x i32> undef to <4
x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = trunc <8 x i32> undef to <8
x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V16i32 = trunc <16 x i32> undef to
<16 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i32 = trunc <32 x i32> undef to
<32 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V64i32 = trunc <64 x i32> undef to
<64 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i16 = trunc <2 x i16> undef to <2
x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction:
 %V4i16 = trunc <4 x i16> undef to <4 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i16 = trunc <8 x i16> undef to <8
x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i16 = trunc <16 x i16> undef to
<16 x i1>
```

```
; SKX256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V32i16 = trunc <32 x i16> undef to
<32 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 8 for instruction: %V64i16 = trunc <64 x i16> undef to
<64 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i8 = trunc <2 x i8> undef to <2 x
i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i8 = trunc <4 x i8> undef to <4 x
i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i8 = trunc <8 x i8> undef to <8 x
i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i8 = trunc <16 x i8> undef to
<16 x i1>
; SKX256-NEXT:
  Cost Model: Found an estimated cost of 2 for instruction: %V32i8 = trunc <32 x i8> undef to <32 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V64i8 = trunc <64 x i8> undef to
<64 x i1>
; SKX256-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
; SKX512-LABEL: 'trunc_vXi1'
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i64 = trunc <2 x i64> undef to <2
x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i64 = trunc <4 x i64> undef to <4
x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i64 = trunc <8 x i64> undef to <8
x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 11 for instruction: %V16i64 = trunc <16 x i64> undef to
<16 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i64 = trunc <32 x i64> undef to
<32 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction:
 %V64i64 = trunc <64 x i64> undef to <64 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i32 = trunc <2 x i32> undef to <2
x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i32 = trunc <4 x i32> undef to <4
x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i32 = trunc <8 x i32> undef to <8
x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i32 = trunc <16 x i32> undef to
<16 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V32i32 = trunc <32 x i32> undef to
<32 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: %V64i32 = trunc <64 x i32> undef to
<64 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i16 = trunc <2 x i16> undef to <2
x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i16 = trunc <4 x i16> undef to <4
x i1>
;
```

```
 SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i16 = trunc <8 x i16> undef to <8
x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i16 = trunc <16 x i16> undef to
<16 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V32i16 = trunc <32 x i16> undef to
<32 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 4 for instruction: %V64i16 = trunc <64 x i16> undef to
<64 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V2i8 = trunc <2 x i8> undef to <2 x
i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V4i8 = trunc <4 x i8> undef to <4 x
i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V8i8 = trunc <8 x i8> undef to <8 x
i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V16i8 = trunc <16 x i8> undef to
<16 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for
 instruction: %V32i8 = trunc <32 x i8> undef to <32 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 2 for instruction: %V64i8 = trunc <64 x i8> undef to
<64 x i1>
; SKX512-NEXT:  Cost Model: Found an estimated cost of 0 for instruction: ret i32 undef
;
 %V2i64 = trunc <2 x i64> undef to <2 x i1>
 %V4i64 = trunc <4 x i64> undef to <4 x i1>
 %V8i64 = trunc <8 x i64> undef to <8 x i1>
 %V16i64 = trunc <16 x i64> undef to <16 x i1>
 %V32i64 = trunc <32 x i64> undef to <32 x i1>
 %V64i64 = trunc <64 x i64> undef to <64 x i1>

 %V2i32 = trunc <2 x i32> undef to <2 x i1>
 %V4i32 = trunc <4 x i32> undef to <4 x i1>
 %V8i32 = trunc <8 x i32> undef to <8 x i1>
 %V16i32 = trunc <16 x i32> undef to <16 x i1>
 %V32i32 = trunc <32 x i32> undef to <32 x i1>
 %V64i32 = trunc <64 x i32> undef to <64 x i1>

 %V2i16 = trunc <2 x i16> undef to <2 x i1>
 %V4i16 = trunc <4 x i16> undef to <4 x i1>
 %V8i16 = trunc <8 x i16> undef to <8 x i1>
 %V16i16 = trunc <16 x i16> undef to
 <16 x i1>
 %V32i16 = trunc <32 x i16> undef to <32 x i1>
 %V64i16 = trunc <64 x i16> undef to <64 x i1>

 %V2i8 = trunc <2 x i8> undef to <2 x i1>
 %V4i8 = trunc <4 x i8> undef to <4 x i1>
 %V8i8 = trunc <8 x i8> undef to <8 x i1>
 %V16i8 = trunc <16 x i8> undef to <16 x i1>
```

```
 %V32i8 = trunc <32 x i8> undef to <32 x i1>
 %V64i8 = trunc <64 x i8> undef to <64 x i1>

 ret i32 undef
}
```

==========

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; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -mattr=+m -verify-machineinstrs < %s \
; RUN:  -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefix=RV64

;

```
; Get the actual value of the overflow bit.
;
define zeroext i1 @saddo1.i32(i32 signext %v1, i32 signext %v2, ptr %res) {
; RV64-LABEL: saddo1.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addw a3, a0, a1
; RV64-NEXT:    slt a0, a3, a0
; RV64-NEXT:    slti a1, a1, 0
; RV64-NEXT:    xor a0, a1, a0
; RV64-NEXT:    sw a3, 0(a2)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.sadd.with.overflow.i32(i32 %v1, i32 %v2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

; Test the immediate version.
define zeroext i1 @saddo2.i32(i32 signext %v1, ptr %res) {
; RV64-LABEL: saddo2.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addiw a2, a0, 4
; RV64-NEXT:    slt a0, a2, a0
; RV64-NEXT:
    sw a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.sadd.with.overflow.i32(i32 %v1, i32 4)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

; Test negative immediates.
define zeroext i1 @saddo3.i32(i32 signext %v1, ptr %res) {
; RV64-LABEL: saddo3.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addiw a2, a0, -4
; RV64-NEXT:    slt a0, a2, a0
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    sw a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.sadd.with.overflow.i32(i32 %v1, i32 -4)
 %val = extractvalue {i32, i1} %t, 0
```

```
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

; Test immediates that are too large to be encoded.
define zeroext i1 @saddo4.i32(i32 signext %v1, ptr %res) {
; RV64-LABEL: saddo4.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    lui a2, 4096
; RV64-NEXT:    addi a2, a2, -1
; RV64-NEXT:    addw a2, a0, a2
; RV64-NEXT:    slt
 a0, a2, a0
; RV64-NEXT:    sw a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.sadd.with.overflow.i32(i32 %v1, i32 16777215)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @saddo1.i64(i64 %v1, i64 %v2, ptr %res) {
; RV64-LABEL: saddo1.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    add a3, a0, a1
; RV64-NEXT:    slt a0, a3, a0
; RV64-NEXT:    slti a1, a1, 0
; RV64-NEXT:    xor a0, a1, a0
; RV64-NEXT:    sd a3, 0(a2)
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.sadd.with.overflow.i64(i64 %v1, i64 %v2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @saddo2.i64(i64 %v1, ptr %res) {
; RV64-LABEL: saddo2.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addi a2, a0, 4
; RV64-NEXT:    slt a0, a2, a0
; RV64-NEXT:    sd a2, 0(a1)
; RV64-NEXT:    ret
```

```
entry:
 %t = call {i64, i1}
 @llvm.sadd.with.overflow.i64(i64 %v1, i64 4)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @saddo3.i64(i64 %v1, ptr %res) {
; RV64-LABEL: saddo3.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addi a2, a0, -4
; RV64-NEXT:    slt a0, a2, a0
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    sd a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.sadd.with.overflow.i64(i64 %v1, i64 -4)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @uaddo.i32(i32 signext %v1, i32 signext %v2, ptr %res) {
; RV64-LABEL: uaddo.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addw a1, a0, a1
; RV64-NEXT:    sltu a0, a1, a0
; RV64-NEXT:    sw a1, 0(a2)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.uadd.with.overflow.i32(i32 %v1, i32 %v2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32,
 i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @uaddo.i32.constant(i32 signext %v1, ptr %res) {
; RV64-LABEL: uaddo.i32.constant:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addiw a2, a0, -2
; RV64-NEXT:    sltu a0, a2, a0
; RV64-NEXT:    sw a2, 0(a1)
; RV64-NEXT:    ret
```

```
entry:
 %t = call {i32, i1} @llvm.uadd.with.overflow.i32(i32 %v1, i32 -2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @uaddo.i32.constant_one(i32 signext %v1, ptr %res) {
; RV64-LABEL: uaddo.i32.constant_one:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addiw a2, a0, 1
; RV64-NEXT:    seqz a0, a2
; RV64-NEXT:    sw a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.uadd.with.overflow.i32(i32 %v1, i32 1)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @uaddo.i64(i64 %v1, i64 %v2, ptr
 %res) {
; RV64-LABEL: uaddo.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    add a1, a0, a1
; RV64-NEXT:    sltu a0, a1, a0
; RV64-NEXT:    sd a1, 0(a2)
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.uadd.with.overflow.i64(i64 %v1, i64 %v2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @uaddo.i64.constant_one(i64 %v1, ptr %res) {
; RV64-LABEL: uaddo.i64.constant_one:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addi a2, a0, 1
; RV64-NEXT:    seqz a0, a2
; RV64-NEXT:    sd a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.uadd.with.overflow.i64(i64 %v1, i64 1)
```

```
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @ssubo1.i32(i32 signext %v1, i32 signext %v2, ptr %res) {
; RV64-LABEL: ssubo1.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    sgtz a3, a1
; RV64-NEXT:    subw a1,
 a0, a1
; RV64-NEXT:    slt a0, a1, a0
; RV64-NEXT:    xor a0, a3, a0
; RV64-NEXT:    sw a1, 0(a2)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.ssub.with.overflow.i32(i32 %v1, i32 %v2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @ssubo2.i32(i32 signext %v1, ptr %res) {
; RV64-LABEL: ssubo2.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addiw a2, a0, 4
; RV64-NEXT:    slt a0, a2, a0
; RV64-NEXT:    sw a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.ssub.with.overflow.i32(i32 %v1, i32 -4)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @ssubo.i64(i64 %v1, i64 %v2, ptr %res) {
; RV64-LABEL: ssubo.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    sgtz a3, a1
; RV64-NEXT:    sub a1, a0, a1
; RV64-NEXT:    slt a0, a1, a0
; RV64-NEXT:    xor a0, a3, a0
; RV64-NEXT:    sd a1,
```

```
 0(a2)
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.ssub.with.overflow.i64(i64 %v1, i64 %v2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @usubo.i32(i32 signext %v1, i32 signext %v2, ptr %res) {
; RV64-LABEL: usubo.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    subw a1, a0, a1
; RV64-NEXT:    sltu a0, a0, a1
; RV64-NEXT:    sw a1, 0(a2)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.usub.with.overflow.i32(i32 %v1, i32 %v2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @usubo.i32.constant.rhs(i32 signext %v1, ptr %res) {
; RV64-LABEL: usubo.i32.constant.rhs:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addiw a2, a0, 2
; RV64-NEXT:    sltu a0, a0, a2
; RV64-NEXT:    sw a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.usub.with.overflow.i32(i32 %v1, i32 -2)

 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @usubo.i32.constant.lhs(i32 signext %v1, ptr %res) {
; RV64-LABEL: usubo.i32.constant.lhs:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    li a2, -2
; RV64-NEXT:    subw a2, a2, a0
; RV64-NEXT:    addi a0, a2, 1
; RV64-NEXT:    seqz a0, a0
```

```
; RV64-NEXT:    sw a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.usub.with.overflow.i32(i32 -2, i32 %v1)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @usubo.i64(i64 %v1, i64 %v2, ptr %res) {
; RV64-LABEL: usubo.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    sub a1, a0, a1
; RV64-NEXT:    sltu a0, a0, a1
; RV64-NEXT:    sd a1, 0(a2)
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.usub.with.overflow.i64(i64 %v1, i64 %v2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t,
 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @smulo.i32(i32 signext %v1, i32 signext %v2, ptr %res) {
; RV64-LABEL: smulo.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    mul a1, a0, a1
; RV64-NEXT:    srai a0, a1, 32
; RV64-NEXT:    sraiw a3, a1, 31
; RV64-NEXT:    xor a0, a0, a3
; RV64-NEXT:    snez a0, a0
; RV64-NEXT:    sw a1, 0(a2)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.smul.with.overflow.i32(i32 %v1, i32 %v2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @smulo2.i32(i32 signext %v1, ptr %res) {
; RV64-LABEL: smulo2.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    li a2, 13
```

```
; RV64-NEXT:    mul a2, a0, a2
; RV64-NEXT:    srai a0, a2, 32
; RV64-NEXT:    sraiw a3, a2, 31
; RV64-NEXT:    xor a0, a0, a3
; RV64-NEXT:    snez a0, a0
; RV64-NEXT:    sw a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.smul.with.overflow.i32(i32 %v1, i32
 13)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @smulo.i64(i64 %v1, i64 %v2, ptr %res) {
; RV64-LABEL: smulo.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    mulh a3, a0, a1
; RV64-NEXT:    mul a1, a0, a1
; RV64-NEXT:    srai a0, a1, 63
; RV64-NEXT:    xor a0, a3, a0
; RV64-NEXT:    snez a0, a0
; RV64-NEXT:    sd a1, 0(a2)
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.smul.with.overflow.i64(i64 %v1, i64 %v2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @smulo2.i64(i64 %v1, ptr %res) {
; RV64-LABEL: smulo2.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    li a2, 13
; RV64-NEXT:    mulh a3, a0, a2
; RV64-NEXT:    mul a2, a0, a2
; RV64-NEXT:    srai a0, a2, 63
; RV64-NEXT:    xor a0, a3, a0
; RV64-NEXT:    snez a0, a0
; RV64-NEXT:    sd a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call
```

```
 {i64, i1} @llvm.smul.with.overflow.i64(i64 %v1, i64 13)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @umulo.i32(i32 signext %v1, i32 signext %v2, ptr %res) {
; RV64-LABEL: umulo.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    slli a1, a1, 32
; RV64-NEXT:    slli a0, a0, 32
; RV64-NEXT:    mulhu a1, a0, a1
; RV64-NEXT:    srai a0, a1, 32
; RV64-NEXT:    snez a0, a0
; RV64-NEXT:    sw a1, 0(a2)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.umul.with.overflow.i32(i32 %v1, i32 %v2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @umulo2.i32(i32 signext %v1, ptr %res) {
; RV64-LABEL: umulo2.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    li a2, 13
; RV64-NEXT:    slli a2, a2, 32
; RV64-NEXT:    slli a0, a0, 32
; RV64-NEXT:    mulhu a2, a0, a2
; RV64-NEXT:    srli a0, a2, 32
; RV64-NEXT:
   snez a0, a0
; RV64-NEXT:    sw a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.umul.with.overflow.i32(i32 %v1, i32 13)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 store i32 %val, ptr %res
 ret i1 %obit
}

; Similar to umulo.i32, but storing the overflow and returning the result.
define signext i32 @umulo3.i32(i32 signext %0, i32 signext %1, ptr %2) {
; RV64-LABEL: umulo3.i32:
```

```
; RV64:       # %bb.0:
; RV64-NEXT:    slli a1, a1, 32
; RV64-NEXT:    slli a0, a0, 32
; RV64-NEXT:    mulhu a0, a0, a1
; RV64-NEXT:    srai a1, a0, 32
; RV64-NEXT:    snez a1, a1
; RV64-NEXT:    sext.w a0, a0
; RV64-NEXT:    sw a1, 0(a2)
; RV64-NEXT:    ret
 %4 = tail call { i32, i1 } @llvm.umul.with.overflow.i32(i32 %0, i32 %1)
 %5 = extractvalue { i32, i1 } %4, 1
 %6 = extractvalue { i32, i1 } %4, 0
 %7 = zext i1 %5 to i32
 store i32 %7, ptr %2, align 4
 ret i32 %6
}

define zeroext i1 @umulo.i64(i64 %v1, i64 %v2, ptr %res) {
; RV64-LABEL: umulo.i64:
;
 RV64:       # %bb.0: # %entry
; RV64-NEXT:    mulhu a3, a0, a1
; RV64-NEXT:    snez a3, a3
; RV64-NEXT:    mul a0, a0, a1
; RV64-NEXT:    sd a0, 0(a2)
; RV64-NEXT:    mv a0, a3
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.umul.with.overflow.i64(i64 %v1, i64 %v2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @umulo2.i64(i64 %v1, ptr %res) {
; RV64-LABEL: umulo2.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    li a3, 13
; RV64-NEXT:    mulhu a2, a0, a3
; RV64-NEXT:    snez a2, a2
; RV64-NEXT:    mul a0, a0, a3
; RV64-NEXT:    sd a0, 0(a1)
; RV64-NEXT:    mv a0, a2
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.umul.with.overflow.i64(i64 %v1, i64 13)
 %val = extractvalue {i64, i1} %t, 0
```

```
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}



;
; Check the use of the overflow bit in combination with a select instruction.
;
define i32 @saddo.select.i32(i32
 signext %v1, i32 signext %v2) {
; RV64-LABEL: saddo.select.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addw a2, a0, a1
; RV64-NEXT:    slt a2, a2, a0
; RV64-NEXT:    slti a3, a1, 0
; RV64-NEXT:    bne a3, a2, .LBB28_2
; RV64-NEXT:  # %bb.1: # %entry
; RV64-NEXT:    mv a0, a1
; RV64-NEXT:  .LBB28_2: # %entry
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.sadd.with.overflow.i32(i32 %v1, i32 %v2)
 %obit = extractvalue {i32, i1} %t, 1
 %ret = select i1 %obit, i32 %v1, i32 %v2
 ret i32 %ret
}

define i1 @saddo.not.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: saddo.not.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addw a2, a0, a1
; RV64-NEXT:    slt a0, a2, a0
; RV64-NEXT:    slti a1, a1, 0
; RV64-NEXT:    xor a0, a1, a0
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.sadd.with.overflow.i32(i32 %v1, i32 %v2)
 %obit = extractvalue {i32, i1} %t, 1
 %ret = xor i1 %obit, true
 ret i1 %ret
}

define i64 @saddo.select.i64(i64
 %v1, i64 %v2) {
; RV64-LABEL: saddo.select.i64:
; RV64:       # %bb.0: # %entry
```

```
; RV64-NEXT:    add a2, a0, a1
; RV64-NEXT:    slt a2, a2, a0
; RV64-NEXT:    slti a3, a1, 0
; RV64-NEXT:    bne a3, a2, .LBB30_2
; RV64-NEXT:  # %bb.1: # %entry
; RV64-NEXT:    mv a0, a1
; RV64-NEXT:  .LBB30_2: # %entry
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.sadd.with.overflow.i64(i64 %v1, i64 %v2)
 %obit = extractvalue {i64, i1} %t, 1
 %ret = select i1 %obit, i64 %v1, i64 %v2
 ret i64 %ret
}

define i1 @saddo.not.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: saddo.not.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    add a2, a0, a1
; RV64-NEXT:    slt a0, a2, a0
; RV64-NEXT:    slti a1, a1, 0
; RV64-NEXT:    xor a0, a1, a0
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.sadd.with.overflow.i64(i64 %v1, i64 %v2)
 %obit = extractvalue {i64, i1} %t, 1
 %ret = xor i1 %obit, true
 ret i1 %ret
}

define i32 @uaddo.select.i32(i32 signext %v1,
 i32 signext %v2) {
; RV64-LABEL: uaddo.select.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addw a2, a0, a1
; RV64-NEXT:    bltu a2, a0, .LBB32_2
; RV64-NEXT:  # %bb.1: # %entry
; RV64-NEXT:    mv a0, a1
; RV64-NEXT:  .LBB32_2: # %entry
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.uadd.with.overflow.i32(i32 %v1, i32 %v2)
 %obit = extractvalue {i32, i1} %t, 1
 %ret = select i1 %obit, i32 %v1, i32 %v2
 ret i32 %ret
}
```

```
define i1 @uaddo.not.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: uaddo.not.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addw a1, a0, a1
; RV64-NEXT:    sltu a0, a1, a0
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.uadd.with.overflow.i32(i32 %v1, i32 %v2)
 %obit = extractvalue {i32, i1} %t, 1
 %ret = xor i1 %obit, true
 ret i1 %ret
}

define i64 @uaddo.select.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: uaddo.select.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    add a2, a0, a1
; RV64-NEXT:
 bltu a2, a0, .LBB34_2
; RV64-NEXT:  # %bb.1: # %entry
; RV64-NEXT:    mv a0, a1
; RV64-NEXT:  .LBB34_2: # %entry
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.uadd.with.overflow.i64(i64 %v1, i64 %v2)
 %obit = extractvalue {i64, i1} %t, 1
 %ret = select i1 %obit, i64 %v1, i64 %v2
 ret i64 %ret
}

define i1 @uaddo.not.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: uaddo.not.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    add a1, a0, a1
; RV64-NEXT:    sltu a0, a1, a0
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.uadd.with.overflow.i64(i64 %v1, i64 %v2)
 %obit = extractvalue {i64, i1} %t, 1
 %ret = xor i1 %obit, true
 ret i1 %ret
}

define i32 @ssubo.select.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: ssubo.select.i32:
; RV64:       # %bb.0: # %entry
```

```
; RV64-NEXT:    sgtz a2, a1
; RV64-NEXT:    subw a3, a0, a1
; RV64-NEXT:    slt a3, a3, a0
; RV64-NEXT:    bne a2, a3, .LBB36_2
; RV64-NEXT:  # %bb.1: # %entry
; RV64-NEXT:    mv a0,
 a1
; RV64-NEXT:  .LBB36_2: # %entry
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.ssub.with.overflow.i32(i32 %v1, i32 %v2)
 %obit = extractvalue {i32, i1} %t, 1
 %ret = select i1 %obit, i32 %v1, i32 %v2
 ret i32 %ret
}

define i1 @ssubo.not.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: ssubo.not.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    sgtz a2, a1
; RV64-NEXT:    subw a1, a0, a1
; RV64-NEXT:    slt a0, a1, a0
; RV64-NEXT:    xor a0, a2, a0
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.ssub.with.overflow.i32(i32 %v1, i32 %v2)
 %obit = extractvalue {i32, i1} %t, 1
 %ret = xor i1 %obit, true
 ret i1 %ret
}

define i64 @ssubo.select.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: ssubo.select.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    sgtz a2, a1
; RV64-NEXT:    sub a3, a0, a1
; RV64-NEXT:    slt a3, a3, a0
; RV64-NEXT:    bne a2, a3, .LBB38_2
; RV64-NEXT:  # %bb.1: # %entry
; RV64-NEXT:    mv a0, a1
; RV64-NEXT:
 .LBB38_2: # %entry
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.ssub.with.overflow.i64(i64 %v1, i64 %v2)
 %obit = extractvalue {i64, i1} %t, 1
 %ret = select i1 %obit, i64 %v1, i64 %v2
```

```
 ret i64 %ret
}

define i1 @ssub.not.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: ssub.not.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    sgtz a2, a1
; RV64-NEXT:    sub a1, a0, a1
; RV64-NEXT:    slt a0, a1, a0
; RV64-NEXT:    xor a0, a2, a0
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.ssub.with.overflow.i64(i64 %v1, i64 %v2)
 %obit = extractvalue {i64, i1} %t, 1
 %ret = xor i1 %obit, true
 ret i1 %ret
}

define i32 @usubo.select.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: usubo.select.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    subw a2, a0, a1
; RV64-NEXT:    bltu a0, a2, .LBB40_2
; RV64-NEXT:  # %bb.1: # %entry
; RV64-NEXT:    mv a0, a1
; RV64-NEXT:  .LBB40_2: # %entry
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.usub.with.overflow.i32(i32
 %v1, i32 %v2)
 %obit = extractvalue {i32, i1} %t, 1
 %ret = select i1 %obit, i32 %v1, i32 %v2
 ret i32 %ret
}

define i1 @usubo.not.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: usubo.not.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    subw a1, a0, a1
; RV64-NEXT:    sltu a0, a0, a1
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.usub.with.overflow.i32(i32 %v1, i32 %v2)
 %obit = extractvalue {i32, i1} %t, 1
 %ret = xor i1 %obit, true
 ret i1 %ret
```

```
}

define i64 @usubo.select.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: usubo.select.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    sub a2, a0, a1
; RV64-NEXT:    bltu a0, a2, .LBB42_2
; RV64-NEXT:  # %bb.1: # %entry
; RV64-NEXT:    mv a0, a1
; RV64-NEXT:  .LBB42_2: # %entry
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.usub.with.overflow.i64(i64 %v1, i64 %v2)
 %obit = extractvalue {i64, i1} %t, 1
 %ret = select i1 %obit, i64 %v1, i64 %v2
 ret i64 %ret
}

define
 i1 @usubo.not.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: usubo.not.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    sub a1, a0, a1
; RV64-NEXT:    sltu a0, a0, a1
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.usub.with.overflow.i64(i64 %v1, i64 %v2)
 %obit = extractvalue {i64, i1} %t, 1
 %ret = xor i1 %obit, true
 ret i1 %ret
}

define i32 @smulo.select.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: smulo.select.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    mul a2, a0, a1
; RV64-NEXT:    srai a3, a2, 32
; RV64-NEXT:    sraiw a2, a2, 31
; RV64-NEXT:    bne a3, a2, .LBB44_2
; RV64-NEXT:  # %bb.1: # %entry
; RV64-NEXT:    mv a0, a1
; RV64-NEXT:  .LBB44_2: # %entry
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.smul.with.overflow.i32(i32 %v1, i32 %v2)
 %obit = extractvalue {i32, i1} %t, 1
 %ret = select i1 %obit, i32 %v1, i32 %v2
```

```
 ret i32 %ret
}

define i1 @smulo.not.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL:
 smulo.not.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    mul a0, a0, a1
; RV64-NEXT:    srai a1, a0, 32
; RV64-NEXT:    sraiw a0, a0, 31
; RV64-NEXT:    xor a0, a1, a0
; RV64-NEXT:    snez a0, a0
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.smul.with.overflow.i32(i32 %v1, i32 %v2)
 %obit = extractvalue {i32, i1} %t, 1
 %ret = xor i1 %obit, true
 ret i1 %ret
}

define i64 @smulo.select.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: smulo.select.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    mulh a2, a0, a1
; RV64-NEXT:    mul a3, a0, a1
; RV64-NEXT:    srai a3, a3, 63
; RV64-NEXT:    bne a2, a3, .LBB46_2
; RV64-NEXT:  # %bb.1: # %entry
; RV64-NEXT:    mv a0, a1
; RV64-NEXT:  .LBB46_2: # %entry
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.smul.with.overflow.i64(i64 %v1, i64 %v2)
 %obit = extractvalue {i64, i1} %t, 1
 %ret = select i1 %obit, i64 %v1, i64 %v2
 ret i64 %ret
}

define i1 @smulo.not.i64(i64 %v1, i64 %v2) {
; RV64-LABEL:
 smulo.not.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    mulh a2, a0, a1
; RV64-NEXT:    mul a0, a0, a1
; RV64-NEXT:    srai a0, a0, 63
; RV64-NEXT:    xor a0, a2, a0
; RV64-NEXT:    snez a0, a0
```

```
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.smul.with.overflow.i64(i64 %v1, i64 %v2)
 %obit = extractvalue {i64, i1} %t, 1
 %ret = xor i1 %obit, true
 ret i1 %ret
}

define i32 @umulo.select.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: umulo.select.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    slli a2, a1, 32
; RV64-NEXT:    slli a3, a0, 32
; RV64-NEXT:    mulhu a2, a3, a2
; RV64-NEXT:    srai a2, a2, 32
; RV64-NEXT:    bnez a2, .LBB48_2
; RV64-NEXT:  # %bb.1: # %entry
; RV64-NEXT:    mv a0, a1
; RV64-NEXT:  .LBB48_2: # %entry
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.umul.with.overflow.i32(i32 %v1, i32 %v2)
 %obit = extractvalue {i32, i1} %t, 1
 %ret = select i1 %obit, i32 %v1, i32 %v2
 ret i32 %ret
}

define
 i1 @umulo.not.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: umulo.not.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    slli a1, a1, 32
; RV64-NEXT:    slli a0, a0, 32
; RV64-NEXT:    mulhu a0, a0, a1
; RV64-NEXT:    srai a0, a0, 32
; RV64-NEXT:    snez a0, a0
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.umul.with.overflow.i32(i32 %v1, i32 %v2)
 %obit = extractvalue {i32, i1} %t, 1
 %ret = xor i1 %obit, true
 ret i1 %ret
}

define i64 @umulo.select.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: umulo.select.i64:
```

```
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    mulhu a2, a0, a1
; RV64-NEXT:    bnez a2, .LBB50_2
; RV64-NEXT:  # %bb.1: # %entry
; RV64-NEXT:    mv a0, a1
; RV64-NEXT:  .LBB50_2: # %entry
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.umul.with.overflow.i64(i64 %v1, i64 %v2)
 %obit = extractvalue {i64, i1} %t, 1
 %ret = select i1 %obit, i64 %v1, i64 %v2
 ret i64 %ret
}

define i1 @umulo.not.i64(i64 %v1, i64 %v2)
 {
; RV64-LABEL: umulo.not.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    mulhu a0, a0, a1
; RV64-NEXT:    snez a0, a0
; RV64-NEXT:    xori a0, a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.umul.with.overflow.i64(i64 %v1, i64 %v2)
 %obit = extractvalue {i64, i1} %t, 1
 %ret = xor i1 %obit, true
 ret i1 %ret
}



;
; Check the use of the overflow bit in combination with a branch instruction.
;
define zeroext i1 @saddo.br.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: saddo.br.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addw a2, a0, a1
; RV64-NEXT:    slt a0, a2, a0
; RV64-NEXT:    slti a1, a1, 0
; RV64-NEXT:    beq a1, a0, .LBB52_2
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB52_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.sadd.with.overflow.i32(i32 %v1, i32 %v2)
```

```
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 br i1
 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @saddo.br.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: saddo.br.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    add a2, a0, a1
; RV64-NEXT:    slt a0, a2, a0
; RV64-NEXT:    slti a1, a1, 0
; RV64-NEXT:    beq a1, a0, .LBB53_2
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB53_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.sadd.with.overflow.i64(i64 %v1, i64 %v2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @uaddo.br.i32(i32 %v1, i32 %v2) {
; RV64-LABEL: uaddo.br.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addw a1, a0, a1
; RV64-NEXT:    sext.w a0, a0
; RV64-NEXT:    bgeu a1, a0, .LBB54_2
; RV64-NEXT:  # %bb.1: # %overflow
;
 RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
```

```
; RV64-NEXT:  .LBB54_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.uadd.with.overflow.i32(i32 %v1, i32 %v2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @uaddo.br.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: uaddo.br.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    add a1, a0, a1
; RV64-NEXT:    bgeu a1, a0, .LBB55_2
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB55_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.uadd.with.overflow.i64(i64 %v1, i64 %v2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @ssubo.br.i32(i32
 signext %v1, i32 signext %v2) {
; RV64-LABEL: ssubo.br.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    sgtz a2, a1
; RV64-NEXT:    subw a1, a0, a1
; RV64-NEXT:    slt a0, a1, a0
; RV64-NEXT:    beq a2, a0, .LBB56_2
```

```
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB56_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.ssub.with.overflow.i32(i32 %v1, i32 %v2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @ssubo.br.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: ssubo.br.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    sgtz a2, a1
; RV64-NEXT:    sub a1, a0, a1
; RV64-NEXT:    slt a0, a1, a0
; RV64-NEXT:    beq a2, a0, .LBB57_2
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB57_2: # %continue
;
 RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.ssub.with.overflow.i64(i64 %v1, i64 %v2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @usubo.br.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: usubo.br.i32:
```

```
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    subw a1, a0, a1
; RV64-NEXT:    bgeu a0, a1, .LBB58_2
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB58_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.usub.with.overflow.i32(i32 %v1, i32 %v2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @usubo.br.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: usubo.br.i64:
;
 RV64:       # %bb.0: # %entry
; RV64-NEXT:    sub a1, a0, a1
; RV64-NEXT:    bgeu a0, a1, .LBB59_2
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB59_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.usub.with.overflow.i64(i64 %v1, i64 %v2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @smulo.br.i32(i32 signext %v1, i32 signext %v2) {
```

```
; RV64-LABEL: smulo.br.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    mul a0, a0, a1
; RV64-NEXT:    srai a1, a0, 32
; RV64-NEXT:    sraiw a0, a0, 31
; RV64-NEXT:    beq a1, a0, .LBB60_2
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB60_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i32, i1} @llvm.smul.with.overflow.i32(i32
 %v1, i32 %v2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @smulo.br.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: smulo.br.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    mulh a2, a0, a1
; RV64-NEXT:    mul a0, a0, a1
; RV64-NEXT:    srai a0, a0, 63
; RV64-NEXT:    beq a2, a0, .LBB61_2
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB61_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.smul.with.overflow.i64(i64 %v1, i64 %v2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false
```

```
continue:
 ret i1 true
}

define zeroext i1 @smulo2.br.i64(i64 %v1) {
; RV64-LABEL: smulo2.br.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    li a1, -13
; RV64-NEXT:
  mulh a2, a0, a1
; RV64-NEXT:    mul a0, a0, a1
; RV64-NEXT:    srai a0, a0, 63
; RV64-NEXT:    beq a2, a0, .LBB62_2
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB62_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.smul.with.overflow.i64(i64 %v1, i64 -13)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @umulo.br.i32(i32 signext %v1, i32 signext %v2) {
; RV64-LABEL: umulo.br.i32:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    slli a1, a1, 32
; RV64-NEXT:    slli a0, a0, 32
; RV64-NEXT:    mulhu a0, a0, a1
; RV64-NEXT:    srai a0, a0, 32
; RV64-NEXT:    beqz a0, .LBB63_2
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB63_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call
```

```
 {i32, i1} @llvm.umul.with.overflow.i32(i32 %v1, i32 %v2)
 %val = extractvalue {i32, i1} %t, 0
 %obit = extractvalue {i32, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @umulo.br.i64(i64 %v1, i64 %v2) {
; RV64-LABEL: umulo.br.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    mulhu a0, a0, a1
; RV64-NEXT:    beqz a0, .LBB64_2
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB64_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.umul.with.overflow.i64(i64 %v1, i64 %v2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @umulo2.br.i64(i64 %v1) {
; RV64-LABEL: umulo2.br.i64:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    add a1, a0, a0
; RV64-NEXT:    bgeu a1, a0,
 .LBB65_2
; RV64-NEXT:  # %bb.1: # %overflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:    ret
; RV64-NEXT:  .LBB65_2: # %continue
; RV64-NEXT:    li a0, 1
; RV64-NEXT:    ret
```

```
entry:
 %t = call {i64, i1} @llvm.umul.with.overflow.i64(i64 %v1, i64 2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 br i1 %obit, label %overflow, label %continue

overflow:
 ret i1 false

continue:
 ret i1 true
}

define zeroext i1 @uaddo.i64.constant(i64 %v1, ptr %res) {
; RV64-LABEL: uaddo.i64.constant:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    addi a2, a0, 2
; RV64-NEXT:    sltu a0, a2, a0
; RV64-NEXT:    sd a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.uadd.with.overflow.i64(i64 %v1, i64 2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @uaddo.i64.constant_2048(i64 %v1, ptr %res) {
; RV64-LABEL: uaddo.i64.constant_2048:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:
    addi a2, a0, 2047
; RV64-NEXT:    addi a2, a2, 1
; RV64-NEXT:    sltu a0, a2, a0
; RV64-NEXT:    sd a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.uadd.with.overflow.i64(i64 %v1, i64 2048)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define zeroext i1 @uaddo.i64.constant_2049(i64 %v1, ptr %res) {
; RV64-LABEL: uaddo.i64.constant_2049:
; RV64:       # %bb.0: # %entry
```

```
; RV64-NEXT:    addi a2, a0, 2047
; RV64-NEXT:    addi a2, a2, 2
; RV64-NEXT:    sltu a0, a2, a0
; RV64-NEXT:    sd a2, 0(a1)
; RV64-NEXT:    ret
entry:
 %t = call {i64, i1} @llvm.uadd.with.overflow.i64(i64 %v1, i64 2049)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 store i64 %val, ptr %res
 ret i1 %obit
}

define i64 @uaddo.i64.constant_setcc_on_overflow_flag(ptr %p) {
; RV64-LABEL: uaddo.i64.constant_setcc_on_overflow_flag:
; RV64:       # %bb.0: # %entry
; RV64-NEXT:    ld a1, 0(a0)
;
 RV64-NEXT:    addi a0, a1, 2
; RV64-NEXT:    bltu a0, a1, .LBB69_2
; RV64-NEXT:  # %bb.1: # %IfOverflow
; RV64-NEXT:    li a0, 0
; RV64-NEXT:  .LBB69_2: # %IfNoOverflow
; RV64-NEXT:    ret
entry:
 %v1 = load i64, ptr %p
 %t = call {i64, i1} @llvm.uadd.with.overflow.i64(i64 %v1, i64 2)
 %val = extractvalue {i64, i1} %t, 0
 %obit = extractvalue {i64, i1} %t, 1
 br i1 %obit, label %IfNoOverflow, label %IfOverflow
IfOverflow:
 ret i64 0
IfNoOverflow:
 ret i64 %val
}

declare {i32, i1} @llvm.sadd.with.overflow.i32(i32, i32) nounwind readnone
declare {i64, i1} @llvm.sadd.with.overflow.i64(i64, i64) nounwind readnone
declare {i32, i1} @llvm.uadd.with.overflow.i32(i32, i32) nounwind readnone
declare {i64, i1} @llvm.uadd.with.overflow.i64(i64, i64) nounwind readnone
declare {i32, i1} @llvm.ssub.with.overflow.i32(i32, i32) nounwind readnone
declare {i64, i1} @llvm.ssub.with.overflow.i64(i64, i64) nounwind readnone
declare {i32, i1} @llvm.usub.with.overflow.i32(i32, i32) nounwind readnone
declare
 {i64, i1} @llvm.usub.with.overflow.i64(i64, i64) nounwind readnone
declare {i32, i1} @llvm.smul.with.overflow.i32(i32, i32) nounwind readnone
declare {i64, i1} @llvm.smul.with.overflow.i64(i64, i64) nounwind readnone
declare {i32, i1} @llvm.umul.with.overflow.i32(i32, i32) nounwind readnone
```

declare {i64, i1} @llvm.umul.with.overflow.i64(i64, i64) nounwind readnone
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add_lldb_library(lldbPluginObjectContainerBSDArchive PLUGIN
 ObjectContainerBSDArchive.cpp

 LINK_LIBS
   lldbCore
   lldbHost
   lldbSymbol
 LINK_COMPONENTS
   Support
 )
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck -check-prefix=RV64I %s
; RUN: llc -mtriple=riscv64 -mattr=+m -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck -check-prefix=RV64IM %s

define i32 @udiv(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: udiv:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    slli a1, a1, 32
; RV64I-NEXT:    srli a1, a1, 32
; RV64I-NEXT:    call __udivdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: udiv:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    divuw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = udiv i32 %a, %b
 ret i32 %1
}

define i32 @udiv_constant(i32 %a) nounwind {
; RV64I-LABEL:
 udiv_constant:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
```

```
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a0, a0, 32
; RV64I-NEXT:    li a1, 5
; RV64I-NEXT:    call __udivdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: udiv_constant:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a0, a0, 32
; RV64IM-NEXT:    lui a1, 838861
; RV64IM-NEXT:    addi a1, a1, -819
; RV64IM-NEXT:    slli a1, a1, 32
; RV64IM-NEXT:    mulhu a0, a0, a1
; RV64IM-NEXT:    srli a0, a0, 34
; RV64IM-NEXT:    ret
 %1 = udiv i32 %a, 5
 ret i32 %1
}

define i32 @udiv_pow2(i32 %a) nounwind {
; RV64I-LABEL: udiv_pow2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    srliw a0, a0, 3
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: udiv_pow2:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    srliw a0, a0, 3
; RV64IM-NEXT:    ret
 %1 = udiv i32 %a, 8
 ret i32 %1
}

define i32 @udiv_constant_lhs(i32
 %a) nounwind {
; RV64I-LABEL: udiv_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 32
; RV64I-NEXT:    srli a1, a0, 32
; RV64I-NEXT:    li a0, 10
; RV64I-NEXT:    call __udivdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
```

```
;
; RV64IM-LABEL: udiv_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    li a1, 10
; RV64IM-NEXT:    divuw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = udiv i32 10, %a
 ret i32 %1
}

define i64 @udiv64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: udiv64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    tail __udivdi3
;
; RV64IM-LABEL: udiv64:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    divu a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = udiv i64 %a, %b
 ret i64 %1
}

define i64 @udiv64_constant(i64 %a) nounwind {
; RV64I-LABEL: udiv64_constant:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 5
; RV64I-NEXT:
    tail __udivdi3
;
; RV64IM-LABEL: udiv64_constant:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    lui a1, 838861
; RV64IM-NEXT:    addiw a1, a1, -819
; RV64IM-NEXT:    slli a2, a1, 32
; RV64IM-NEXT:    add a1, a1, a2
; RV64IM-NEXT:    mulhu a0, a0, a1
; RV64IM-NEXT:    srli a0, a0, 2
; RV64IM-NEXT:    ret
 %1 = udiv i64 %a, 5
 ret i64 %1
}

define i64 @udiv64_constant_lhs(i64 %a) nounwind {
; RV64I-LABEL: udiv64_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    mv a1, a0
; RV64I-NEXT:    li a0, 10
```

```
; RV64I-NEXT:    tail __udivdi3
;
; RV64IM-LABEL: udiv64_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    li a1, 10
; RV64IM-NEXT:    divu a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = udiv i64 10, %a
 ret i64 %1
}

define i8 @udiv8(i8 %a, i8 %b) nounwind {
; RV64I-LABEL: udiv8:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    andi a0, a0, 255
; RV64I-NEXT:    andi a1, a1, 255
; RV64I-NEXT:    call
 __udivdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: udiv8:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    andi a1, a1, 255
; RV64IM-NEXT:    andi a0, a0, 255
; RV64IM-NEXT:    divuw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = udiv i8 %a, %b
 ret i8 %1
}

define i8 @udiv8_constant(i8 %a) nounwind {
; RV64I-LABEL: udiv8_constant:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    andi a0, a0, 255
; RV64I-NEXT:    li a1, 5
; RV64I-NEXT:    call __udivdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: udiv8_constant:
; RV64IM:       # %bb.0:
```

```
; RV64IM-NEXT:    andi a0, a0, 255
; RV64IM-NEXT:    li a1, 205
; RV64IM-NEXT:    mul a0, a0, a1
; RV64IM-NEXT:    srliw a0, a0, 10
; RV64IM-NEXT:    ret
 %1 = udiv i8 %a, 5
 ret i8 %1
}

define i8 @udiv8_pow2(i8 %a) nounwind
 {
; RV64I-LABEL: udiv8_pow2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 56
; RV64I-NEXT:    srli a0, a0, 59
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: udiv8_pow2:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a0, a0, 56
; RV64IM-NEXT:    srli a0, a0, 59
; RV64IM-NEXT:    ret
 %1 = udiv i8 %a, 8
 ret i8 %1
}

define i8 @udiv8_constant_lhs(i8 %a) nounwind {
; RV64I-LABEL: udiv8_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    andi a1, a0, 255
; RV64I-NEXT:    li a0, 10
; RV64I-NEXT:    call __udivdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: udiv8_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    andi a0, a0, 255
; RV64IM-NEXT:    li a1, 10
; RV64IM-NEXT:    divuw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = udiv i8 10, %a
 ret i8 %1
}
```

```
define i16 @udiv16(i16 %a, i16 %b) nounwind {
; RV64I-LABEL: udiv16:
;
 RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    lui a2, 16
; RV64I-NEXT:    addiw a2, a2, -1
; RV64I-NEXT:    and a0, a0, a2
; RV64I-NEXT:    and a1, a1, a2
; RV64I-NEXT:    call __udivdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: udiv16:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    lui a2, 16
; RV64IM-NEXT:    addi a2, a2, -1
; RV64IM-NEXT:    and a1, a1, a2
; RV64IM-NEXT:    and a0, a0, a2
; RV64IM-NEXT:    divuw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = udiv i16 %a, %b
 ret i16 %1
}

define i16 @udiv16_constant(i16 %a) nounwind {
; RV64I-LABEL: udiv16_constant:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srli a0, a0, 48
; RV64I-NEXT:    li a1, 5
; RV64I-NEXT:    call __udivdi3
; RV64I-NEXT:    ld ra, 8(sp)
 # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: udiv16_constant:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    lui a1, 52429
; RV64IM-NEXT:    slli a1, a1, 4
; RV64IM-NEXT:    slli a0, a0, 48
; RV64IM-NEXT:    mulhu a0, a0, a1
; RV64IM-NEXT:    srliw a0, a0, 18
```

```
; RV64IM-NEXT:    ret
 %1 = udiv i16 %a, 5
 ret i16 %1
}

define i16 @udiv16_pow2(i16 %a) nounwind {
; RV64I-LABEL: udiv16_pow2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srli a0, a0, 51
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: udiv16_pow2:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a0, a0, 48
; RV64IM-NEXT:    srli a0, a0, 51
; RV64IM-NEXT:    ret
 %1 = udiv i16 %a, 8
 ret i16 %1
}

define i16 @udiv16_constant_lhs(i16 %a) nounwind {
; RV64I-LABEL: udiv16_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 48
; RV64I-NEXT:    srli a1, a0, 48
; RV64I-NEXT:
   li a0, 10
; RV64I-NEXT:    call __udivdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: udiv16_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a0, a0, 48
; RV64IM-NEXT:    srli a0, a0, 48
; RV64IM-NEXT:    li a1, 10
; RV64IM-NEXT:    divuw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = udiv i16 10, %a
 ret i16 %1
}

define i32 @sdiv(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: sdiv:
```

```
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    sext.w a0, a0
; RV64I-NEXT:    sext.w a1, a1
; RV64I-NEXT:    call __divdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    divw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = sdiv i32 %a, %b
 ret i32 %1
}

define i32 @sdiv_constant(i32 %a) nounwind {
; RV64I-LABEL: sdiv_constant:
;
 RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    sext.w a0, a0
; RV64I-NEXT:    li a1, 5
; RV64I-NEXT:    call __divdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv_constant:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    sext.w a0, a0
; RV64IM-NEXT:    lui a1, 419430
; RV64IM-NEXT:    addiw a1, a1, 1639
; RV64IM-NEXT:    mul a0, a0, a1
; RV64IM-NEXT:    srli a1, a0, 63
; RV64IM-NEXT:    srai a0, a0, 33
; RV64IM-NEXT:    addw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = sdiv i32 %a, 5
 ret i32 %1
}

define i32 @sdiv_pow2(i32 %a) nounwind {
; RV64I-LABEL: sdiv_pow2:
; RV64I:       # %bb.0:
```

```
; RV64I-NEXT:    sraiw a1, a0, 31
; RV64I-NEXT:    srliw a1, a1, 29
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    sraiw a0, a0, 3
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv_pow2:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    sraiw a1, a0,
 31
; RV64IM-NEXT:    srliw a1, a1, 29
; RV64IM-NEXT:    add a0, a0, a1
; RV64IM-NEXT:    sraiw a0, a0, 3
; RV64IM-NEXT:    ret
 %1 = sdiv i32 %a, 8
 ret i32 %1
}

define i32 @sdiv_pow2_2(i32 %a) nounwind {
; RV64I-LABEL: sdiv_pow2_2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sraiw a1, a0, 31
; RV64I-NEXT:    srliw a1, a1, 16
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    sraiw a0, a0, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv_pow2_2:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    sraiw a1, a0, 31
; RV64IM-NEXT:    srliw a1, a1, 16
; RV64IM-NEXT:    add a0, a0, a1
; RV64IM-NEXT:    sraiw a0, a0, 16
; RV64IM-NEXT:    ret
 %1 = sdiv i32 %a, 65536
 ret i32 %1
}

define i32 @sdiv_constant_lhs(i32 %a) nounwind {
; RV64I-LABEL: sdiv_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    sext.w a1, a0
; RV64I-NEXT:    li a0, -10
; RV64I-NEXT:    call __divdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded
```

```
 Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    li a1, -10
; RV64IM-NEXT:    divw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = sdiv i32 -10, %a
 ret i32 %1
}

define i64 @sdiv64(i64 %a, i64 %b) nounwind {
; RV64I-LABEL: sdiv64:
; RV64I:       # %bb.0:
; RV64I-NEXT:    tail __divdi3
;
; RV64IM-LABEL: sdiv64:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    div a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = sdiv i64 %a, %b
 ret i64 %1
}

define i64 @sdiv64_constant(i64 %a) nounwind {
; RV64I-LABEL: sdiv64_constant:
; RV64I:       # %bb.0:
; RV64I-NEXT:    li a1, 5
; RV64I-NEXT:    tail __divdi3
;
; RV64IM-LABEL: sdiv64_constant:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    lui a1, %hi(.LCPI21_0)
; RV64IM-NEXT:    ld a1, %lo(.LCPI21_0)(a1)
; RV64IM-NEXT:    mulh a0, a0, a1
; RV64IM-NEXT:    srli a1, a0, 63
; RV64IM-NEXT:    srai a0, a0, 1
; RV64IM-NEXT:    add a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = sdiv i64 %a,
 5
 ret i64 %1
}

define i64 @sdiv64_constant_lhs(i64 %a) nounwind {
; RV64I-LABEL: sdiv64_constant_lhs:
```

```
; RV64I:       # %bb.0:
; RV64I-NEXT:    mv a1, a0
; RV64I-NEXT:    li a0, 10
; RV64I-NEXT:    tail __divdi3
;
; RV64IM-LABEL: sdiv64_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    li a1, 10
; RV64IM-NEXT:    div a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = sdiv i64 10, %a
 ret i64 %1
}

; Although this sdiv has two sexti32 operands, it shouldn't compile to divw on
; RV64M as that wouldn't produce the correct result for e.g. INT_MIN/-1.

define i64 @sdiv64_sext_operands(i32 %a, i32 %b) nounwind {
; RV64I-LABEL: sdiv64_sext_operands:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sext.w a0, a0
; RV64I-NEXT:    sext.w a1, a1
; RV64I-NEXT:    tail __divdi3
;
; RV64IM-LABEL: sdiv64_sext_operands:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    sext.w a0, a0
; RV64IM-NEXT:    sext.w a1, a1
; RV64IM-NEXT:    div a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = sext i32 %a to i64
 %2 = sext i32 %b to
 i64
 %3 = sdiv i64 %1, %2
 ret i64 %3
}

define i8 @sdiv8(i8 %a, i8 %b) nounwind {
; RV64I-LABEL: sdiv8:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a1, a1, 24
; RV64I-NEXT:    sraiw a1, a1, 24
; RV64I-NEXT:    slli a0, a0, 24
; RV64I-NEXT:    sraiw a0, a0, 24
; RV64I-NEXT:    call __divdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
```

```
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv8:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a1, a1, 24
; RV64IM-NEXT:    sraiw a1, a1, 24
; RV64IM-NEXT:    slli a0, a0, 24
; RV64IM-NEXT:    sraiw a0, a0, 24
; RV64IM-NEXT:    divw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = sdiv i8 %a, %b
 ret i8 %1
}

define i8 @sdiv8_constant(i8 %a) nounwind {
; RV64I-LABEL: sdiv8_constant:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 24
; RV64I-NEXT:
    sraiw a0, a0, 24
; RV64I-NEXT:    li a1, 5
; RV64I-NEXT:    call __divdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv8_constant:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a0, a0, 24
; RV64IM-NEXT:    sraiw a0, a0, 24
; RV64IM-NEXT:    li a1, 103
; RV64IM-NEXT:    mul a0, a0, a1
; RV64IM-NEXT:    sraiw a1, a0, 9
; RV64IM-NEXT:    slli a0, a0, 48
; RV64IM-NEXT:    srli a0, a0, 63
; RV64IM-NEXT:    addw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = sdiv i8 %a, 5
 ret i8 %1
}

define i8 @sdiv8_pow2(i8 %a) nounwind {
; RV64I-LABEL: sdiv8_pow2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a1, a0, 24
```

```
; RV64I-NEXT:    sraiw a1, a1, 24
; RV64I-NEXT:    slli a1, a1, 49
; RV64I-NEXT:    srli a1, a1, 61
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    slli a0, a0, 24
; RV64I-NEXT:    sraiw a0, a0, 27
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv8_pow2:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a1, a0,
 24
; RV64IM-NEXT:    sraiw a1, a1, 24
; RV64IM-NEXT:    slli a1, a1, 49
; RV64IM-NEXT:    srli a1, a1, 61
; RV64IM-NEXT:    add a0, a0, a1
; RV64IM-NEXT:    slli a0, a0, 24
; RV64IM-NEXT:    sraiw a0, a0, 27
; RV64IM-NEXT:    ret
 %1 = sdiv i8 %a, 8
 ret i8 %1
}

define i8 @sdiv8_constant_lhs(i8 %a) nounwind {
; RV64I-LABEL: sdiv8_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 24
; RV64I-NEXT:    sraiw a1, a0, 24
; RV64I-NEXT:    li a0, -10
; RV64I-NEXT:    call __divdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv8_constant_lhs:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a0, a0, 24
; RV64IM-NEXT:    sraiw a0, a0, 24
; RV64IM-NEXT:    li a1, -10
; RV64IM-NEXT:    divw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = sdiv i8 -10, %a
 ret i8 %1
}

define i16 @sdiv16(i16 %a, i16 %b) nounwind {
```

```
; RV64I-LABEL:
 sdiv16:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a1, a1, 16
; RV64I-NEXT:    sraiw a1, a1, 16
; RV64I-NEXT:    slli a0, a0, 16
; RV64I-NEXT:    sraiw a0, a0, 16
; RV64I-NEXT:    call __divdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv16:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a1, a1, 16
; RV64IM-NEXT:    sraiw a1, a1, 16
; RV64IM-NEXT:    slli a0, a0, 16
; RV64IM-NEXT:    sraiw a0, a0, 16
; RV64IM-NEXT:    divw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = sdiv i16 %a, %b
 ret i16 %1
}

define i16 @sdiv16_constant(i16 %a) nounwind {
; RV64I-LABEL: sdiv16_constant:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 16
; RV64I-NEXT:    sraiw a0, a0, 16
; RV64I-NEXT:    li a1, 5
; RV64I-NEXT:    call __divdi3
; RV64I-NEXT:
   ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv16_constant:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a0, a0, 16
; RV64IM-NEXT:    sraiw a0, a0, 16
; RV64IM-NEXT:    lui a1, 6
; RV64IM-NEXT:    addi a1, a1, 1639
; RV64IM-NEXT:    mul a0, a0, a1
; RV64IM-NEXT:    srliw a1, a0, 31
```

```
; RV64IM-NEXT:    sraiw a0, a0, 17
; RV64IM-NEXT:    addw a0, a0, a1
; RV64IM-NEXT:    ret
 %1 = sdiv i16 %a, 5
 ret i16 %1
}

define i16 @sdiv16_pow2(i16 %a) nounwind {
; RV64I-LABEL: sdiv16_pow2:
; RV64I:       # %bb.0:
; RV64I-NEXT:    slli a1, a0, 16
; RV64I-NEXT:    sraiw a1, a1, 16
; RV64I-NEXT:    slli a1, a1, 33
; RV64I-NEXT:    srli a1, a1, 61
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    slli a0, a0, 16
; RV64I-NEXT:    sraiw a0, a0, 19
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv16_pow2:
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a1, a0, 16
; RV64IM-NEXT:    sraiw a1, a1, 16
; RV64IM-NEXT:    slli a1, a1, 33
;
 RV64IM-NEXT:    srli a1, a1, 61
; RV64IM-NEXT:    add a0, a0, a1
; RV64IM-NEXT:    slli a0, a0, 16
; RV64IM-NEXT:    sraiw a0, a0, 19
; RV64IM-NEXT:    ret
 %1 = sdiv i16 %a, 8
 ret i16 %1
}

define i16 @sdiv16_constant_lhs(i16 %a) nounwind {
; RV64I-LABEL: sdiv16_constant_lhs:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    slli a0, a0, 16
; RV64I-NEXT:    sraiw a1, a0, 16
; RV64I-NEXT:    li a0, -10
; RV64I-NEXT:    call __divdi3
; RV64I-NEXT:    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
;
; RV64IM-LABEL: sdiv16_constant_lhs:
```

```
; RV64IM:       # %bb.0:
; RV64IM-NEXT:    slli a0, a0, 16
; RV64IM-NEXT:    sraiw a0, a0, 16
; RV64IM-NEXT:    li a1, -10
; RV64IM-NEXT:    divw a0, a1, a0
; RV64IM-NEXT:    ret
 %1 = sdiv i16 -10, %a
 ret i16 %1
}
```

LLVM System Interface Library

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```
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck -check-prefix=RV64I %s

; Check indexed and unindexed, sext, zext and anyext loads

define dso_local i64 @lb(ptr %a) nounwind {
; RV64I-LABEL: lb:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lb a1, 1(a0)
; RV64I-NEXT:    lbu zero, 0(a0)
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:    ret
 %1 = getelementptr i8, ptr %a, i32 1
 %2 = load i8, ptr %1
 %3 = sext i8 %2 to i64
 ; the unused load will produce an anyext for selection
 %4 = load volatile i8, ptr %a
 ret i64 %3
}

define dso_local i64 @lh(ptr %a) nounwind {
; RV64I-LABEL: lh:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lh a1, 4(a0)
; RV64I-NEXT:    lh zero, 0(a0)
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:    ret
 %1 = getelementptr i16, ptr %a, i32 2
```

```
 %2 = load i16, ptr %1
 %3 = sext i16 %2 to i64
 ; the unused load will produce an anyext for selection
  %4 = load volatile i16, ptr %a
 ret i64 %3
}

define dso_local i64 @lw(ptr %a) nounwind {
; RV64I-LABEL: lw:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lw a1, 12(a0)
; RV64I-NEXT:    lw zero, 0(a0)
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:    ret
 %1 = getelementptr i32, ptr %a, i32 3
 %2 = load i32, ptr %1
 %3 = sext i32 %2 to i64
 ; the unused load will produce an anyext for selection
 %4 = load volatile i32, ptr %a
 ret i64 %3
}

define dso_local i64 @lbu(ptr %a) nounwind {
; RV64I-LABEL: lbu:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lbu a1, 4(a0)
; RV64I-NEXT:    lbu a0, 0(a0)
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    ret
 %1 = getelementptr i8, ptr %a, i32 4
 %2 = load i8, ptr %1
 %3 = zext i8 %2 to i64
 %4 = load volatile i8, ptr %a
 %5 = zext i8 %4 to i64
 %6 = add i64 %3, %5
 ret i64 %6
}

define dso_local i64 @lhu(ptr %a) nounwind {
; RV64I-LABEL: lhu:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lhu a1, 10(a0)
; RV64I-NEXT:    lhu a0, 0(a0)
; RV64I-NEXT:
    add a0, a1, a0
; RV64I-NEXT:    ret
 %1 = getelementptr i16, ptr %a, i32 5
 %2 = load i16, ptr %1
```

```
 %3 = zext i16 %2 to i64
 %4 = load volatile i16, ptr %a
 %5 = zext i16 %4 to i64
 %6 = add i64 %3, %5
 ret i64 %6
}

define dso_local i64 @lwu(ptr %a) nounwind {
; RV64I-LABEL: lwu:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lwu a1, 24(a0)
; RV64I-NEXT:    lwu a0, 0(a0)
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    ret
 %1 = getelementptr i32, ptr %a, i32 6
 %2 = load i32, ptr %1
 %3 = zext i32 %2 to i64
 %4 = load volatile i32, ptr %a
 %5 = zext i32 %4 to i64
 %6 = add i64 %3, %5
 ret i64 %6
}

; 64-bit loads and stores

define dso_local i64 @ld(ptr %a) nounwind {
; RV64I-LABEL: ld:
; RV64I:       # %bb.0:
; RV64I-NEXT:    ld a1, 80(a0)
; RV64I-NEXT:    ld zero, 0(a0)
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:    ret
 %1 = getelementptr i64, ptr %a, i32 10
 %2 = load i64, ptr %1
 %3 = load volatile i64, ptr %a
 ret i64 %2
}

define dso_local void @sd(ptr %a, i64 %b)
 nounwind {
; RV64I-LABEL: sd:
; RV64I:       # %bb.0:
; RV64I-NEXT:    sd a1, 0(a0)
; RV64I-NEXT:    sd a1, 88(a0)
; RV64I-NEXT:    ret
 store i64 %b, ptr %a
 %1 = getelementptr i64, ptr %a, i32 11
 store i64 %b, ptr %1
```

```
 ret void
}

; Check load and store to an i1 location
define dso_local i64 @load_sext_zext_anyext_i1(ptr %a) nounwind {
; RV64I-LABEL: load_sext_zext_anyext_i1:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lbu a1, 1(a0)
; RV64I-NEXT:    lbu a2, 2(a0)
; RV64I-NEXT:    lbu zero, 0(a0)
; RV64I-NEXT:    sub a0, a2, a1
; RV64I-NEXT:    ret
 ; sextload i1
 %1 = getelementptr i1, ptr %a, i32 1
 %2 = load i1, ptr %1
 %3 = sext i1 %2 to i64
 ; zextload i1
 %4 = getelementptr i1, ptr %a, i32 2
 %5 = load i1, ptr %4
 %6 = zext i1 %5 to i64
 %7 = add i64 %3, %6
 ; extload i1 (anyext). Produced as the load is unused.
 %8 = load volatile i1, ptr %a
 ret i64 %7
}

define dso_local i16 @load_sext_zext_anyext_i1_i16(ptr %a) nounwind {
; RV64I-LABEL: load_sext_zext_anyext_i1_i16:
;
 RV64I:       # %bb.0:
; RV64I-NEXT:    lbu a1, 1(a0)
; RV64I-NEXT:    lbu a2, 2(a0)
; RV64I-NEXT:    lbu zero, 0(a0)
; RV64I-NEXT:    subw a0, a2, a1
; RV64I-NEXT:    ret
 ; sextload i1
 %1 = getelementptr i1, ptr %a, i32 1
 %2 = load i1, ptr %1
 %3 = sext i1 %2 to i16
 ; zextload i1
 %4 = getelementptr i1, ptr %a, i32 2
 %5 = load i1, ptr %4
 %6 = zext i1 %5 to i16
 %7 = add i16 %3, %6
 ; extload i1 (anyext). Produced as the load is unused.
 %8 = load volatile i1, ptr %a
 ret i16 %7
}
```

```
; Check load and store to a global
@G = dso_local global i64 0

define dso_local i64 @ld_sd_global(i64 %a) nounwind {
; RV64I-LABEL: ld_sd_global:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a2, %hi(G)
; RV64I-NEXT:    ld a1, %lo(G)(a2)
; RV64I-NEXT:    addi a3, a2, %lo(G)
; RV64I-NEXT:    sd a0, %lo(G)(a2)
; RV64I-NEXT:    ld zero, 72(a3)
; RV64I-NEXT:    sd a0, 72(a3)
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:    ret
 %1 = load volatile i64, ptr @G
 store i64 %a, ptr @G
 %2 = getelementptr
 i64, ptr @G, i64 9
 %3 = load volatile i64, ptr %2
 store i64 %a, ptr %2
 ret i64 %1
}

define i64 @lw_near_local(ptr %a)  {
; RV64I-LABEL: lw_near_local:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi a0, a0, 2047
; RV64I-NEXT:    ld a0, 9(a0)
; RV64I-NEXT:    ret
 %1 = getelementptr inbounds i64, ptr %a, i64 257
 %2 = load volatile i64, ptr %1
 ret i64 %2
}

define void @st_near_local(ptr %a, i64 %b)  {
; RV64I-LABEL: st_near_local:
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi a0, a0, 2047
; RV64I-NEXT:    sd a1, 9(a0)
; RV64I-NEXT:    ret
 %1 = getelementptr inbounds i64, ptr %a, i64 257
 store i64 %b, ptr %1
 ret void
}

define i64 @lw_sw_near_local(ptr %a, i64 %b)  {
; RV64I-LABEL: lw_sw_near_local:
```

```
; RV64I:       # %bb.0:
; RV64I-NEXT:    addi a2, a0, 2047
; RV64I-NEXT:    ld a0, 9(a2)
; RV64I-NEXT:    sd a1, 9(a2)
; RV64I-NEXT:    ret
 %1 = getelementptr inbounds i64, ptr %a, i64 257
 %2 = load volatile i64, ptr %1
 store i64 %b, ptr %1
 ret i64 %2
}

define
 i64 @lw_far_local(ptr %a)  {
; RV64I-LABEL: lw_far_local:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 8
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ld a0, -8(a0)
; RV64I-NEXT:    ret
 %1 = getelementptr inbounds i64, ptr %a, i64 4095
 %2 = load volatile i64, ptr %1
 ret i64 %2
}

define void @st_far_local(ptr %a, i64 %b)  {
; RV64I-LABEL: st_far_local:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a2, 8
; RV64I-NEXT:    add a0, a0, a2
; RV64I-NEXT:    sd a1, -8(a0)
; RV64I-NEXT:    ret
 %1 = getelementptr inbounds i64, ptr %a, i64 4095
 store i64 %b, ptr %1
 ret void
}

define i64 @lw_sw_far_local(ptr %a, i64 %b)  {
; RV64I-LABEL: lw_sw_far_local:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a2, 8
; RV64I-NEXT:    add a2, a0, a2
; RV64I-NEXT:    ld a0, -8(a2)
; RV64I-NEXT:    sd a1, -8(a2)
; RV64I-NEXT:    ret
 %1 = getelementptr inbounds i64, ptr %a, i64 4095
 %2 = load volatile i64, ptr %1
 store i64 %b, ptr %1
 ret i64 %2
```

```
}

; Make sure we don't fold the addiw
 into the load offset. The sign extend of the
; addiw is required.
define i64 @lw_really_far_local(ptr %a)  {
; RV64I-LABEL: lw_really_far_local:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a1, 524288
; RV64I-NEXT:    addiw a1, a1, -2048
; RV64I-NEXT:    add a0, a0, a1
; RV64I-NEXT:    ld a0, 0(a0)
; RV64I-NEXT:    ret
 %1 = getelementptr inbounds i64, ptr %a, i64 268435200
 %2 = load volatile i64, ptr %1
 ret i64 %2
}

; Make sure we don't fold the addiw into the store offset. The sign extend of
; the addiw is required.
define void @st_really_far_local(ptr %a, i64 %b)  {
; RV64I-LABEL: st_really_far_local:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a2, 524288
; RV64I-NEXT:    addiw a2, a2, -2048
; RV64I-NEXT:    add a0, a0, a2
; RV64I-NEXT:    sd a1, 0(a0)
; RV64I-NEXT:    ret
 %1 = getelementptr inbounds i64, ptr %a, i64 268435200
 store i64 %b, ptr %1
 ret void
}

; Make sure we don't fold the addiw into the load/store offset. The sign extend
; of the addiw is required.
define
 i64 @lw_sw_really_far_local(ptr %a, i64 %b)  {
; RV64I-LABEL: lw_sw_really_far_local:
; RV64I:       # %bb.0:
; RV64I-NEXT:    lui a2, 524288
; RV64I-NEXT:    addiw a2, a2, -2048
; RV64I-NEXT:    add a2, a0, a2
; RV64I-NEXT:    ld a0, 0(a2)
; RV64I-NEXT:    sd a1, 0(a2)
; RV64I-NEXT:    ret
 %1 = getelementptr inbounds i64, ptr %a, i64 268435200
 %2 = load volatile i64, ptr %1
 store i64 %b, ptr %1
```

```
 ret i64 %2
}

%struct.quux = type { i32, [0 x i8] }

; Make sure we don't remove the addi and fold the C from
; (add (addi FrameIndex, C), X) into the store address.
; FrameIndex cannot be the operand of an ADD. We must keep the ADDI.
define void @addi_fold_crash(i64 %arg) nounwind {
; RV64I-LABEL: addi_fold_crash:
; RV64I:       # %bb.0: # %bb
; RV64I-NEXT:    addi sp, sp, -16
; RV64I-NEXT:    sd ra, 8(sp) # 8-byte Folded Spill
; RV64I-NEXT:    addi a1, sp, 4
; RV64I-NEXT:    add a0, a1, a0
; RV64I-NEXT:    sb zero, 0(a0)
; RV64I-NEXT:    mv a0, a1
; RV64I-NEXT:    call snork
; RV64I-NEXT:
    ld ra, 8(sp) # 8-byte Folded Reload
; RV64I-NEXT:    addi sp, sp, 16
; RV64I-NEXT:    ret
bb:
 %tmp = alloca %struct.quux, align 8
 %tmp1 = getelementptr inbounds %struct.quux, ptr %tmp, i64 0, i32 1
 %tmp2 = getelementptr inbounds %struct.quux, ptr %tmp, i64 0, i32 1, i64 %arg
 store i8 0, ptr %tmp2, align 1
 call void @snork(ptr %tmp1)
 ret void
}

declare void @snork(ptr)
; NOTE: Assertions have been autogenerated by utils/update_test_checks.py UTC_ARGS: --function-signature --
scrub-attributes
; RUN: opt -S -passes=argpromotion < %s | FileCheck %s
; Test that we only promote arguments when the caller/callee have compatible
; function attrubtes.

target triple = "x86_64-unknown-linux-gnu"

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr %arg, ptr
readonly %arg1) #0 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512
; CHECK-SAME: (ptr [[ARG:%.*]], <8 x i64> [[ARG1_VAL:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    store <8 x i64> [[ARG1_VAL]], ptr [[ARG]]
; CHECK-NEXT:    ret void
```

```
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr %arg) #0 {
; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer512_call_avx512_legal512_prefer512
; CHECK-SAME:
 (ptr [[ARG:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    call void @llvm.memset.p0.i64(ptr align 32 [[TMP]], i8 0, i64 32, i1 false)
; CHECK-NEXT:    [[TMP_VAL:%.*]] = load <8 x i64>, ptr [[TMP]]
; CHECK-NEXT:    call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr
[[TMP2]], <8 x i64> [[TMP_VAL]])
; CHECK-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 32
; CHECK-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CHECK-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer512(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define
 internal fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr %arg, ptr readonly
%arg1) #1 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]], <8 x i64> [[ARG1_VAL:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    store <8 x i64> [[ARG1_VAL]], ptr [[ARG]]
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}
```

```
define void @avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr %arg) #1 {
; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    call void @llvm.memset.p0.i64(ptr align 32 [[TMP]], i8 0, i64 32, i1 false)
; CHECK-NEXT:    [[TMP_VAL:%.*]] = load <8 x i64>, ptr [[TMP]]
; CHECK-NEXT:    call fastcc
 void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr [[TMP2]], <8 x i64>
[[TMP_VAL]])
; CHECK-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 32
; CHECK-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CHECK-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr %arg, ptr
readonly %arg1) #1 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]], <8 x i64> [[ARG1_VAL:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    store <8 x i64> [[ARG1_VAL]],
 ptr [[ARG]]
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr %arg) #0 {
; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer512_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    call void @llvm.memset.p0.i64(ptr align 32 [[TMP]], i8 0, i64 32, i1 false)
```

```
; CHECK-NEXT:    [[TMP_VAL:%.*]] = load <8 x i64>, ptr [[TMP]]
; CHECK-NEXT:    call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr
[[TMP2]], <8 x i64> [[TMP_VAL]])
; CHECK-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 32
; CHECK-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CHECK-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align
 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer512_call_avx512_legal512_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr %arg, ptr
readonly %arg1) #0 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512
; CHECK-SAME: (ptr [[ARG:%.*]], <8 x i64> [[ARG1_VAL:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    store <8 x i64> [[ARG1_VAL]], ptr [[ARG]]
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr %arg) #1 {
; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal512_prefer512
; CHECK-SAME: (ptr [[ARG:%.*]])
; CHECK-NEXT:
  bb:
; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    call void @llvm.memset.p0.i64(ptr align 32 [[TMP]], i8 0, i64 32, i1 false)
; CHECK-NEXT:    [[TMP_VAL:%.*]] = load <8 x i64>, ptr [[TMP]]
; CHECK-NEXT:    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr
[[TMP2]], <8 x i64> [[TMP_VAL]])
; CHECK-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 32
; CHECK-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CHECK-NEXT:    ret void
;
```

```
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal512_prefer512(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should not promote
define internal fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr
 %arg, ptr readonly %arg1) #1 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]], ptr readonly [[ARG1:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1]]
; CHECK-NEXT:    store <8 x i64> [[TMP]], ptr [[ARG]]
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr %arg) #2 {
; CHECK-LABEL: define {{[^@]+}}@avx512_legal256_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    call void @llvm.memset.p0.i64(ptr align 32 [[TMP]], i8 0, i64 32, i1 false)
; CHECK-NEXT:    call fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr
 [[TMP2]], ptr [[TMP]])
; CHECK-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 32
; CHECK-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CHECK-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}
```

```
; This should not promote
define internal fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %arg, ptr
readonly %arg1) #2 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]], ptr readonly [[ARG1:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = load <8 x i64>, ptr [[ARG1]]
; CHECK-NEXT:    store <8 x i64>
 [[TMP]], ptr [[ARG]]
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %arg) #1 {
; CHECK-LABEL: define {{[^@]+}}@avx512_legal512_prefer256_call_avx512_legal256_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    call void @llvm.memset.p0.i64(ptr align 32 [[TMP]], i8 0, i64 32, i1 false)
; CHECK-NEXT:    call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr
[[TMP2]], ptr [[TMP]])
; CHECK-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 32
; CHECK-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CHECK-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64
 32, i1 false)
 call fastcc void @callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr %arg, ptr readonly
%arg1) #3 {
; CHECK-LABEL: define {{[^@]+}}@callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]], <8 x i64> [[ARG1_VAL:%.*]])
; CHECK-NEXT:  bb:
```

```
; CHECK-NEXT:    store <8 x i64> [[ARG1_VAL]], ptr [[ARG]]
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
}

define void @avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr %arg) #4 {
; CHECK-LABEL: define {{[^@]+}}@avx2_legal256_prefer256_call_avx2_legal512_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:
    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    call void @llvm.memset.p0.i64(ptr align 32 [[TMP]], i8 0, i64 32, i1 false)
; CHECK-NEXT:    [[TMP_VAL:%.*]] = load <8 x i64>, ptr [[TMP]]
; CHECK-NEXT:    call fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr
[[TMP2]], <8 x i64> [[TMP_VAL]])
; CHECK-NEXT:    [[TMP4:%.*]] = load <8 x i64>, ptr [[TMP2]], align 32
; CHECK-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CHECK-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx2_legal256_prefer256_call_avx2_legal512_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; This should promote
define internal fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr %arg, ptr readonly
%arg1) #4 {
;
 CHECK-LABEL: define {{[^@]+}}@callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]], <8 x i64> [[ARG1_VAL:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    store <8 x i64> [[ARG1_VAL]], ptr [[ARG]]
; CHECK-NEXT:    ret void
;
bb:
 %tmp = load <8 x i64>, ptr %arg1
 store <8 x i64> %tmp, ptr %arg
 ret void
```

```
}

define void @avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr %arg) #3 {
; CHECK-LABEL: define {{[^@]+}}@avx2_legal512_prefer256_call_avx2_legal256_prefer256
; CHECK-SAME: (ptr [[ARG:%.*]])
; CHECK-NEXT:  bb:
; CHECK-NEXT:    [[TMP:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    [[TMP2:%.*]] = alloca <8 x i64>, align 32
; CHECK-NEXT:    call void @llvm.memset.p0.i64(ptr align 32 [[TMP]], i8 0, i64 32, i1 false)
; CHECK-NEXT:    [[TMP_VAL:%.*]] = load <8 x i64>, ptr [[TMP]]
; CHECK-NEXT:    call fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr
[[TMP2]], <8 x i64> [[TMP_VAL]])
; CHECK-NEXT:    [[TMP4:%.*]] = load
 <8 x i64>, ptr [[TMP2]], align 32
; CHECK-NEXT:    store <8 x i64> [[TMP4]], ptr [[ARG]], align 2
; CHECK-NEXT:    ret void
;
bb:
 %tmp = alloca <8 x i64>, align 32
 %tmp2 = alloca <8 x i64>, align 32
 call void @llvm.memset.p0.i64(ptr align 32 %tmp, i8 0, i64 32, i1 false)
 call fastcc void @callee_avx2_legal512_prefer256_call_avx2_legal256_prefer256(ptr %tmp2, ptr %tmp)
 %tmp4 = load <8 x i64>, ptr %tmp2, align 32
 store <8 x i64> %tmp4, ptr %arg, align 2
 ret void
}

; If the arguments are scalar, its ok to promote.
define internal i32 @scalar_callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr %X, ptr %Y)
#2 {
; CHECK-LABEL: define
{{[^@]+}}@scalar_callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (i32 [[X_VAL:%.*]], i32 [[Y_VAL:%.*]])
; CHECK-NEXT:    [[C:%.*]] = add i32 [[X_VAL]], [[Y_VAL]]
; CHECK-NEXT:    ret i32 [[C]]
;
 %A = load i32, ptr %X
 %B = load i32, ptr %Y
 %C = add i32 %A, %B
 ret i32 %C
}

define i32 @scalar_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr
 %B) #2 {
; CHECK-LABEL: define {{[^@]+}}@scalar_avx512_legal256_prefer256_call_avx512_legal512_prefer256
; CHECK-SAME: (ptr [[B:%.*]])
; CHECK-NEXT:    [[A:%.*]] = alloca i32
; CHECK-NEXT:    store i32 1, ptr [[A]]
```

```
; CHECK-NEXT:    [[A_VAL:%.*]] = load i32, ptr [[A]]
; CHECK-NEXT:    [[B_VAL:%.*]] = load i32, ptr [[B]]
; CHECK-NEXT:    [[C:%.*]] = call i32
@scalar_callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(i32 [[A_VAL]], i32 [[B_VAL]])
; CHECK-NEXT:    ret i32 [[C]]
;
 %A = alloca i32
 store i32 1, ptr %A
 %C = call i32 @scalar_callee_avx512_legal256_prefer256_call_avx512_legal512_prefer256(ptr %A, ptr %B)
 ret i32 %C
}

; If the arguments are scalar, its ok to promote.
define internal i32 @scalar_callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %X, ptr %Y)
#2 {
; CHECK-LABEL: define
{{[^@]+}}@scalar_callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256
; CHECK-SAME: (i32 [[X_VAL:%.*]],
 i32 [[Y_VAL:%.*]])
; CHECK-NEXT:    [[C:%.*]] = add i32 [[X_VAL]], [[Y_VAL]]
; CHECK-NEXT:    ret i32 [[C]]
;
 %A = load i32, ptr %X
 %B = load i32, ptr %Y
 %C = add i32 %A, %B
 ret i32 %C
}

define i32 @scalar_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %B) #2 {
; CHECK-LABEL: define {{[^@]+}}@scalar_avx512_legal512_prefer256_call_avx512_legal256_prefer256
; CHECK-SAME: (ptr [[B:%.*]])
; CHECK-NEXT:    [[A:%.*]] = alloca i32
; CHECK-NEXT:    store i32 1, ptr [[A]]
; CHECK-NEXT:    [[A_VAL:%.*]] = load i32, ptr [[A]]
; CHECK-NEXT:    [[B_VAL:%.*]] = load i32, ptr [[B]]
; CHECK-NEXT:    [[C:%.*]] = call i32
@scalar_callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(i32 [[A_VAL]], i32 [[B_VAL]])
; CHECK-NEXT:    ret i32 [[C]]
;
 %A = alloca i32
 store i32 1, ptr %A
 %C = call i32 @scalar_callee_avx512_legal512_prefer256_call_avx512_legal256_prefer256(ptr %A, ptr %B)
 ret i32 %C
}

; Function Attrs: argmemonly nounwind
declare void @llvm.memset.p0.i64(ptr
```

```
 nocapture writeonly, i8, i64, i1) #5

attributes #0 = { inlinehint norecurse nounwind uwtable "target-features"="+avx512vl" "min-legal-vector-
width"="512" "prefer-vector-width"="512" }
attributes #1 = { inlinehint norecurse nounwind uwtable "target-features"="+avx512vl" "min-legal-vector-
width"="512" "prefer-vector-width"="256" }
attributes #2 = { inlinehint norecurse nounwind uwtable "target-features"="+avx512vl" "min-legal-vector-
width"="256" "prefer-vector-width"="256" }
attributes #3 = { inlinehint norecurse nounwind uwtable "target-features"="+avx2" "min-legal-vector-width"="512"
"prefer-vector-width"="256" }
attributes #4 = { inlinehint norecurse nounwind uwtable "target-features"="+avx2" "min-legal-vector-width"="256"
"prefer-vector-width"="256" }
attributes #5 = { argmemonly nounwind }
; NOTE: Assertions have been autogenerated by utils/update_llc_test_checks.py
; RUN: llc -mtriple=riscv64 -mattr=+zbc -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefix=RV64ZBC-ZBKC
; RUN: llc -mtriple=riscv64 -mattr=+zbkc -verify-machineinstrs < %s \
; RUN:   -riscv-experimental-rv64-legal-i32 | FileCheck %s -check-prefix=RV64ZBC-ZBKC

declare i64 @llvm.riscv.clmul.i64(i64 %a, i64 %b)

define i64 @clmul64(i64 %a, i64 %b) nounwind {
; RV64ZBC-ZBKC-LABEL: clmul64:
; RV64ZBC-ZBKC:       # %bb.0:
; RV64ZBC-ZBKC-NEXT:    clmul a0, a0, a1
; RV64ZBC-ZBKC-NEXT:    ret
 %tmp = call i64 @llvm.riscv.clmul.i64(i64 %a, i64 %b)
 ret i64 %tmp
}

declare i64 @llvm.riscv.clmulh.i64(i64 %a, i64 %b)

define i64 @clmul64h(i64 %a, i64 %b) nounwind {
; RV64ZBC-ZBKC-LABEL: clmul64h:
; RV64ZBC-ZBKC:       # %bb.0:
; RV64ZBC-ZBKC-NEXT:    clmulh a0, a0, a1
; RV64ZBC-ZBKC-NEXT:    ret
 %tmp = call i64 @llvm.riscv.clmulh.i64(i64 %a, i64 %b)
 ret i64 %tmp
}

declare
 i32 @llvm.riscv.clmul.i32(i32 %a, i32 %b)

define signext i32 @clmul32(i32 signext %a, i32 signext %b) nounwind {
; RV64ZBC-ZBKC-LABEL: clmul32:
; RV64ZBC-ZBKC:       # %bb.0:
; RV64ZBC-ZBKC-NEXT:    clmul a0, a0, a1
```

```
; RV64ZBC-ZBKC-NEXT:    sext.w a0, a0
; RV64ZBC-ZBKC-NEXT:    ret
 %tmp = call i32 @llvm.riscv.clmul.i32(i32 %a, i32 %b)
 ret i32 %tmp
}

declare i32 @llvm.riscv.clmulh.i32(i32 %a, i32 %b)

define signext i32 @clmul32h(i32 signext %a, i32 signext %b) nounwind {
; RV64ZBC-ZBKC-LABEL: clmul32h:
; RV64ZBC-ZBKC:       # %bb.0:
; RV64ZBC-ZBKC-NEXT:    slli a1, a1, 32
; RV64ZBC-ZBKC-NEXT:    slli a0, a0, 32
; RV64ZBC-ZBKC-NEXT:    clmulh a0, a0, a1
; RV64ZBC-ZBKC-NEXT:    srai a0, a0, 32
; RV64ZBC-ZBKC-NEXT:    ret
 %tmp = call i32 @llvm.riscv.clmulh.i32(i32 %a, i32 %b)
 ret i32 %tmp
}

; FIXME: We could avoid the slli instructions by using clmul+srai since the
; inputs are zero extended.
define signext i32 @clmul32h_zext(i32 zeroext %a, i32 zeroext %b) nounwind {
;
 RV64ZBC-ZBKC-LABEL: clmul32h_zext:
; RV64ZBC-ZBKC:       # %bb.0:
; RV64ZBC-ZBKC-NEXT:    slli a1, a1, 32
; RV64ZBC-ZBKC-NEXT:    slli a0, a0, 32
; RV64ZBC-ZBKC-NEXT:    clmulh a0, a0, a1
; RV64ZBC-ZBKC-NEXT:    srai a0, a0, 32
; RV64ZBC-ZBKC-NEXT:    ret
 %tmp = call i32 @llvm.riscv.clmulh.i32(i32 %a, i32 %b)
 ret i32 %tmp
}
```

# 1.2687 logrus 1.9.3

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# 1.2688 json-java 20131018

# 1.2689 esquery 1.7.0

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# 1.2690 @eslint-community/eslint-utils 4.9.1

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# 1.2691 ws 8.19.0

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# 1.2692 musl 1.2.5-r21

## 1.2692.1 Available under license :

```
# Contributor: Carlo Landmeter <clandmeter@alpinelinux.org>
# Maintainer: Kevin Daudt <kdaudt@alpinelinux.org>
pkgname=spdx-licenses
pkgver=3.27.0
pkgrel=0
pkgdesc="Various data formats for the SPDX License List"
url="https://spdx.org/"
arch="noarch"
options="!check" # no test suite
license="CC-BY-3.0"
source="license-list-data-$pkgver.tar.gz::https://github.com/spdx/license-list-data/archive/v$pkgver.tar.gz"
builddir="$srcdir/license-list-data-$pkgver"
subpackages="$pkgname-list"

_types="html json rdfa rdfnt rdfturtle rdfxml template text"

for type in $_types; do
 subpackages="$subpackages $pkgname-$type:_subpkg"
done

package() {
 mkdir -p "$pkgdir"
}

_subpkg() {
 local type=${subpkgname/$pkgname-/}
 pkgdesc="$pkgdesc ($type)"
 install_if="$pkgname=$pkgver-r$pkgrel"
 mkdir -p "$subpkgdir"/usr/share/spdx
 cp -r "$builddir"/$type "$subpkgdir"/usr/share/spdx/
}

list() {
 pkgdesc="$pkgdesc (licence list)"
 mkdir -p "$subpkgdir"/usr/share/spdx
```

```
 local i; for i in "$builddir"/text/*.txt;
 do
  local license=${i##*/}
  echo ${license%.*} >> "$subpkgdir"/usr/share/spdx/license.lst
 done
}

sha512sums="
16d59c81e331b54b52639826f83408d98144cdaa70eacc3e8ce35dc3b13992e4794cf7515eb9db200efd390a0c0e35ae9
d4706fbe0ca6a8d236189e88870720c  license-list-data-3.27.0.tar.gz
"
# Automatically generated by apkbuild-cpan, template 4
# Contributor: Valery Kartel <valery.kartel@gmail.com>
# Maintainer: Celeste <cielesti@protonmail.com>
maintainer="Celeste <cielesti@protonmail.com>"
pkgname=perl-bsd-resource
pkgver=1.2911
pkgrel=11
#_pkgreal is used by apkbuild-cpan to find modules at MetaCpan
_pkgreal=BSD-Resource
pkgdesc="Perl extension implements the BSD process resource limit functions"
url="https://metacpan.org/release/BSD-Resource/"
arch="all"
license="Artistic-2.0 OR LGPL-2.0"
depends="perl"
makedepends="perl-dev"
subpackages="$pkgname-doc"
source="https://cpan.metacpan.org/authors/id/J/JH/JHI/BSD-Resource-$pkgver.tar.gz"
builddir="$srcdir/$_pkgreal-$pkgver"

build() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 PERL_MM_USE_DEFAULT=1 perl -I. Makefile.PL \
  INSTALLDIRS=vendor \
  NO_PACKLIST=1 \
  NO_PERLLOCAL=1
 make
}

check() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 make test
}

package() {
 make DESTDIR="$pkgdir" install
}
```

```
sha512sums="
d0032d41c7c0468ed1c6d8f57b885f6cb97a5039d754c8cb60b2067daedaf53bd15fb6561a3d0f828df16dfa5417f663b
8065ba65f4fea16dc9262728b3b6b85
  BSD-Resource-1.2911.tar.gz
"
maintainer="Achill Gilgenast <achill@achill.org>"
pkgname=cargo-license
pkgver=0.7.0
pkgrel=1
pkgdesc="Cargo subcommand to see license of dependencies"
url="https://github.com/onur/cargo-license"
arch="all"
license="MIT"
makedepends="cargo cargo-auditable"
source="$pkgname-$pkgver.tar.gz::https://crates.io/api/v1/crates/cargo-license/$pkgver/download"

prepare() {
 default_prepare

 cargo fetch --target="$CTARGET" --locked
}

build() {
 cargo auditable build --release --frozen
}

check() {
 cargo test --frozen
}

package() {
 install -Dm755 target/release/cargo-license -t "$pkgdir"/usr/bin
}

sha512sums="
9b3f0ead35515e85ef4074ebdbdbe5b9ec8bcaec244fabe414e2ed60f90366e8b1692d8bf7ffe4c07d778e60d94bab86bc
0c8be9823232e9c360a38bc65e9c5a  cargo-license-0.7.0.tar.gz
"
#!/sbin/openrc-run

command="/usr/libexec/xdg-permission-store"
supervisor=supervise-daemon
command_args="--replace $command_args"
error_logger="logger -t '${RC_SVCNAME}' -p daemon.error"

depend() {
 need dbus
}
```

```
# Contributor: Maxim Karasev <begs@disroot.org>
# Maintainer: mio <miyopan@e.email>
pkgname=bsd-games
pkgver=3.3
pkgrel=2
pkgdesc="traditional text mode games from BSD"
url="https://bsd-games.sourceforge.io/"
arch="all"
license="BSD-3-Clause"
install="$pkgname.post-install"
makedepends="ncurses-dev coreutils" # configure causes busybox expr error
subpackages="$pkgname-doc"
source="https://sourceforge.net/projects/bsd-games/files/bsd-games-$pkgver.tar.gz
 0001-bsd-games-scores-dir.patch
 "
options="!check" # no tests

build() {
 # some GNU autoconf options are ignored, but it works
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr \
  --sysconfdir=/etc \
  --mandir=/usr/share/man \
  --scoredir=/usr/share/$pkgname
 make
}

package() {
 make DESTDIR="$pkgdir" install
 install -Dm644 LICENSE "$pkgdir"/usr/share/licenses/bsd-games/LICENSE
}

sha512sums="
aaf36d09d4fe68514a5c279063d7e77a9a9a84c447037cba974b29faa07eb80c2aab2379d0699c196b5c27ffe1b2bb2c6
8d3390143e0e62d5e3d210ccfb61294
  bsd-games-3.3.tar.gz
e1def0d4835a877242c4173fae862e278a7858738e0bacacbb045a42bcabec2aa7c72d000bbd2421ce35fe66cdc1f52c0
577b7e278029ca5ed50f7aab22319f6  0001-bsd-games-scores-dir.patch
"
```

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```
# Maintainer: Natanael Copa <ncopa@alpinelinux.org>
pkgname=libart-lgpl
pkgver=2.3.21
pkgrel=8
pkgdesc="A library for high-performance 2D graphics"
url="https://www.levien.com/libart/"
arch="all"
options="!check"  # No test suite.
license="LGPL-2.0-or-later"
subpackages="$pkgname-dev"
source="https://download.gnome.org/sources/libart_lgpl/2.3/libart_lgpl-$pkgver.tar.bz2
 "

builddir="$srcdir"/libart_lgpl-$pkgver

prepare() {
 update_config_sub
 default_prepare
}

build() {
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr
 make
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="8a632a6a4da59e5e8c02ec2f5a57e36d182b325b46513765425e5f171ff9ae326af1b133725beba28f7e7
```

6654309e001aee9bace727b5b4c8589405256a3c020  libart_lgpl-2.3.21.tar.bz2"
mini_sendmail - accept email on behalf of real sendmail

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HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT
LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY
OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF
SUCH DAMAGE.
# Contributor: Patrycja Rosa <alpine@ptrcnull.me>
# Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=bsd-compat-headers
pkgver=0.7.2
pkgrel=6
pkgdesc="BSD compatibility headers (cdefs, queue, tree)"
url="https://gitlab.alpinelinux.org/alpine/aports"
arch="noarch"
license="BSD-2-Clause AND BSD-3-Clause"
source="
 cdefs.h
 queue.h
 tree.h
"
builddir="$srcdir"
options="!check" # just headers

package() {
 mkdir -p "$pkgdir"
 install -Dm644 -t "$pkgdir"/usr/include/sys \
  cdefs.h queue.h tree.h

}
sha512sums="
37c8fc73c7aea7b490f7850927e2bb91d12137c9e59e22c084146d515696dbc7973b5de92f4c987ba080dd2502ba8312
7006442c3f019b6447a620c0cae73178  cdefs.h
2f0d5e6e4dc3350285cf17009265dddcbe12431c111868eea39bc8cb038ab7c1f2acacbb21735c4e9d4a1fd106a8fc0f86
11ea33987d4faba37dde5ce6da0750  queue.h
d9ac210d81feb8ad2655bc80fb065d3fe20ae4417b32b4a1711e6738a4870140005c13373b5d1846ef3ce5ae6da45f2da
cef2092881eded0a2e94f6a07752ef3  tree.h
"
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The X-Spline code was written Carole Blanc (blanc@labri.u-bordeaux.fr) and Christophe Schlick (schlick@labri.u-bordeaux.fr) starting from an initial implementation done by C. Feuille, S. Grosbois, L. Maziere and L. Minihot as a student practice (Universite Bordeaux, France). For additional information about X-splines, see:
"X-Splines: A Spline Model Designed for the End User" by C. Blanc and C. Schlick, Proceedings of SIGGRAPH'95
http://dept-info.labri.u-bordeaux.fr/~schlick/DOC/sig1.html
/* $NetBSD: queue.h,v 1.70 2015/11/02 15:21:23 christos Exp $ */

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*
* @(#)queue.h 8.5 (Berkeley) 8/20/94
*/

#ifndef _SYS_QUEUE_H_
#define _SYS_QUEUE_H_

/*
* This file defines five types of data structures: singly-linked lists,
* lists, simple queues, tail queues, and circular queues.
*
* A singly-linked list is headed by a single forward pointer. The
* elements are singly linked for minimum space and
 pointer manipulation
* overhead at the expense of O(n) removal for arbitrary elements. New
* elements can be added to the list after an existing element or at the
* head of the list.  Elements being removed from the head of the list
* should use the explicit macro for this purpose for optimum
* efficiency. A singly-linked list may only be traversed in the forward
* direction.  Singly-linked lists are ideal for applications with large
* datasets and few or no removals or for implementing a LIFO queue.
*
* A list is headed by a single forward pointer (or an array of forward
* pointers for a hash table header). The elements are doubly linked
* so that an arbitrary element can be removed without a need to
* traverse the list. New elements can be added to the list before
* or after an existing element or at the head of the list. A list
* may only be traversed in the forward direction.
```

```
*
* A simple queue is headed by a pair of pointers, one the head of the
* list and the
 other to the tail of the list. The elements are singly
* linked to save space, so elements can only be removed from the
* head of the list. New elements can be added to the list after
* an existing element, at the head of the list, or at the end of the
* list. A simple queue may only be traversed in the forward direction.
*
* A tail queue is headed by a pair of pointers, one to the head of the
* list and the other to the tail of the list. The elements are doubly
* linked so that an arbitrary element can be removed without a need to
* traverse the list. New elements can be added to the list before or
* after an existing element, at the head of the list, or at the end of
* the list. A tail queue may be traversed in either direction.
*
* A circle queue is headed by a pair of pointers, one to the head of the
* list and the other to the tail of the list. The elements are doubly
* linked so that an arbitrary element can be removed without a need to
* traverse the list. New elements
 can be added to the list before or after
* an existing element, at the head of the list, or at the end of the list.
* A circle queue may be traversed in either direction, but has a more
* complex end of list detection.
*
* For details on the use of these macros, see the queue(3) manual page.
*/

/*
* Include the definition of NULL only on NetBSD because sys/null.h
* is not available elsewhere.  This conditional makes the header
* portable and it can simply be dropped verbatim into any system.
* The caveat is that on other systems some other header
* must provide NULL before the macros can be used.
*/
#ifdef __NetBSD__
#include <sys/null.h>
#endif

#if defined(QUEUEDEBUG)
# if defined(_KERNEL)
#  define QUEUEDEBUG_ABORT(...) panic(__VA_ARGS__)
# else
#  include <err.h>
#  define QUEUEDEBUG_ABORT(...) err(1, __VA_ARGS__)
# endif
#endif
```

```
/*
* Singly-linked List definitions.
*/
#define SLIST_HEAD(name, type)      \
struct name {        \
 struct type *slh_first; /* first
 element */   \
}

#define SLIST_HEAD_INITIALIZER(head)     \
 { NULL }

#define SLIST_ENTRY(type)      \
struct {        \
 struct type *sle_next; /* next element */   \
}

/*
* Singly-linked List access methods.
*/
#define SLIST_FIRST(head) ((head)->slh_first)
#define SLIST_END(head)  NULL
#define SLIST_EMPTY(head) ((head)->slh_first == NULL)
#define SLIST_NEXT(elm, field) ((elm)->field.sle_next)

#define SLIST_FOREACH(var, head, field)     \
 for((var) = (head)->slh_first;     \
     (var) != SLIST_END(head);     \
     (var) = (var)->field.sle_next)

#define SLIST_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = SLIST_FIRST((head));    \
     (var) != SLIST_END(head) &&     \
     ((tvar) = SLIST_NEXT((var), field), 1);   \
     (var) = (tvar))

/*
* Singly-linked List functions.
*/
#define SLIST_INIT(head) do {      \
 (head)->slh_first = SLIST_END(head);    \
} while (/*CONSTCOND*/0)

#define SLIST_INSERT_AFTER(slistelm, elm, field) do {   \
 (elm)->field.sle_next = (slistelm)->field.sle_next;  \
 (slistelm)->field.sle_next
 = (elm);    \
} while (/*CONSTCOND*/0)
```

```
#define SLIST_INSERT_HEAD(head, elm, field) do {   \
 (elm)->field.sle_next = (head)->slh_first;   \
 (head)->slh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE_AFTER(slistelm, field) do {   \
 (slistelm)->field.sle_next =     \
     SLIST_NEXT(SLIST_NEXT((slistelm), field), field);  \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE_HEAD(head, field) do {    \
 (head)->slh_first = (head)->slh_first->field.sle_next;  \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE(head, elm, type, field) do {   \
 if ((head)->slh_first == (elm)) {    \
  SLIST_REMOVE_HEAD((head), field);   \
 }        \
 else {        \
  struct type *curelm = (head)->slh_first;  \
  while(curelm->field.sle_next != (elm))   \
   curelm = curelm->field.sle_next;  \
  curelm->field.sle_next =    \
      curelm->field.sle_next->field.sle_next;  \
 }        \
} while (/*CONSTCOND*/0)


/*
* List definitions.
 */
#define LIST_HEAD(name, type)      \
struct name {        \
 struct type *lh_first; /* first element */   \
}

#define LIST_HEAD_INITIALIZER(head)     \
 { NULL }

#define LIST_ENTRY(type)      \
struct {        \
 struct type *le_next; /* next element */   \
 struct type **le_prev; /* address of previous next element */ \
}

/*
* List access methods.
```

```
*/
#define LIST_FIRST(head)  ((head)->lh_first)
#define LIST_END(head)   NULL
#define LIST_EMPTY(head)  ((head)->lh_first == LIST_END(head))
#define LIST_NEXT(elm, field)  ((elm)->field.le_next)

#define LIST_FOREACH(var, head, field)     \
 for ((var) = ((head)->lh_first);    \
     (var) != LIST_END(head);     \
     (var) = ((var)->field.le_next))

#define LIST_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = LIST_FIRST((head));    \
     (var) != LIST_END(head) &&     \
     ((tvar) = LIST_NEXT((var), field), 1);   \
     (var) = (tvar))

#define LIST_MOVE(head1, head2) do {     \
 LIST_INIT((head2));      \
 if (!LIST_EMPTY((head1)))
 {     \
  (head2)->lh_first = (head1)->lh_first;   \
  LIST_INIT((head1));     \
 }        \
} while (/*CONSTCOND*/0)

/*
* List functions.
*/
#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_LIST_INSERT_HEAD(head, elm, field)   \
 if ((head)->lh_first &&      \
     (head)->lh_first->field.le_prev != &(head)->lh_first) \
  QUEUEDEBUG_ABORT("LIST_INSERT_HEAD %p %s:%d", (head), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_LIST_OP(elm, field)     \
 if ((elm)->field.le_next &&     \
     (elm)->field.le_next->field.le_prev !=   \
     &(elm)->field.le_next)     \
  QUEUEDEBUG_ABORT("LIST_* forw %p %s:%d", (elm),  \
      __FILE__, __LINE__);    \
 if (*(elm)->field.le_prev != (elm))    \
  QUEUEDEBUG_ABORT("LIST_* back %p %s:%d", (elm),  \
      __FILE__, __LINE__);
#define QUEUEDEBUG_LIST_POSTREMOVE(elm, field)    \
 (elm)->field.le_next = (void *)1L;    \
 (elm)->field.le_prev = (void *)1L;
#else
```

```
#define QUEUEDEBUG_LIST_INSERT_HEAD(head, elm, field)
#define QUEUEDEBUG_LIST_OP(elm,
 field)
#define QUEUEDEBUG_LIST_POSTREMOVE(elm, field)
#endif

#define LIST_INIT(head) do {      \
 (head)->lh_first = LIST_END(head);    \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_AFTER(listelm, elm, field) do {   \
 QUEUEDEBUG_LIST_OP((listelm), field)    \
 if (((elm)->field.le_next = (listelm)->field.le_next) !=  \
     LIST_END(head))      \
  (listelm)->field.le_next->field.le_prev =  \
      &(elm)->field.le_next;    \
 (listelm)->field.le_next = (elm);    \
 (elm)->field.le_prev = &(listelm)->field.le_next;  \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_BEFORE(listelm, elm, field) do {   \
 QUEUEDEBUG_LIST_OP((listelm), field)    \
 (elm)->field.le_prev = (listelm)->field.le_prev;  \
 (elm)->field.le_next = (listelm);    \
 *(listelm)->field.le_prev = (elm);    \
 (listelm)->field.le_prev = &(elm)->field.le_next;  \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_HEAD(head, elm, field) do {    \
 QUEUEDEBUG_LIST_INSERT_HEAD((head), (elm), field)  \
 if (((elm)->field.le_next
 = (head)->lh_first) != LIST_END(head))\
  (head)->lh_first->field.le_prev = &(elm)->field.le_next;\
 (head)->lh_first = (elm);     \
 (elm)->field.le_prev = &(head)->lh_first;   \
} while (/*CONSTCOND*/0)

#define LIST_REMOVE(elm, field) do {     \
 QUEUEDEBUG_LIST_OP((elm), field)    \
 if ((elm)->field.le_next != NULL)    \
  (elm)->field.le_next->field.le_prev =    \
      (elm)->field.le_prev;    \
 *(elm)->field.le_prev = (elm)->field.le_next;   \
 QUEUEDEBUG_LIST_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

#define LIST_REPLACE(elm, elm2, field) do {    \
 if (((elm2)->field.le_next = (elm)->field.le_next) != NULL) \
```

```
  (elm2)->field.le_next->field.le_prev =   \
      &(elm2)->field.le_next;    \
 (elm2)->field.le_prev = (elm)->field.le_prev;   \
 *(elm2)->field.le_prev = (elm2);    \
 QUEUEDEBUG_LIST_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

/*
* Simple queue definitions.
*/
#define SIMPLEQ_HEAD(name, type)     \
struct name {        \
 struct
 type *sqh_first; /* first element */   \
 struct type **sqh_last; /* addr of last next element */  \
}

#define SIMPLEQ_HEAD_INITIALIZER(head)     \
 { NULL, &(head).sqh_first }

#define SIMPLEQ_ENTRY(type)      \
struct {        \
 struct type *sqe_next; /* next element */   \
}

/*
* Simple queue access methods.
*/
#define SIMPLEQ_FIRST(head)  ((head)->sqh_first)
#define SIMPLEQ_END(head)  NULL
#define SIMPLEQ_EMPTY(head)  ((head)->sqh_first == SIMPLEQ_END(head))
#define SIMPLEQ_NEXT(elm, field) ((elm)->field.sqe_next)

#define SIMPLEQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->sqh_first);    \
     (var) != SIMPLEQ_END(head);     \
     (var) = ((var)->field.sqe_next))

#define SIMPLEQ_FOREACH_SAFE(var, head, field, next)   \
 for ((var) = ((head)->sqh_first);    \
     (var) != SIMPLEQ_END(head) &&    \
     ((next = ((var)->field.sqe_next)), 1);   \
     (var) = (next))

/*
* Simple queue functions.
*/
#define SIMPLEQ_INIT(head) do {      \
```

```
 (head)->sqh_first = NULL;     \
 (head)->sqh_last
 = &(head)->sqh_first;    \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_HEAD(head, elm, field) do {   \
 if (((elm)->field.sqe_next = (head)->sqh_first) == NULL) \
  (head)->sqh_last = &(elm)->field.sqe_next;  \
 (head)->sqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_TAIL(head, elm, field) do {   \
 (elm)->field.sqe_next = NULL;     \
 *(head)->sqh_last = (elm);     \
 (head)->sqh_last = &(elm)->field.sqe_next;   \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 if (((elm)->field.sqe_next = (listelm)->field.sqe_next) == NULL)\
  (head)->sqh_last = &(elm)->field.sqe_next;  \
 (listelm)->field.sqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE_HEAD(head, field) do {    \
 if (((head)->sqh_first = (head)->sqh_first->field.sqe_next) == NULL) \
  (head)->sqh_last = &(head)->sqh_first;   \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE_AFTER(head, elm, field) do {   \
 if
 (((elm)->field.sqe_next = (elm)->field.sqe_next->field.sqe_next) \
    == NULL)       \
  (head)->sqh_last = &(elm)->field.sqe_next;  \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE(head, elm, type, field) do {   \
 if ((head)->sqh_first == (elm)) {    \
  SIMPLEQ_REMOVE_HEAD((head), field);   \
 } else {       \
  struct type *curelm = (head)->sqh_first;  \
  while (curelm->field.sqe_next != (elm))   \
   curelm = curelm->field.sqe_next;  \
  if ((curelm->field.sqe_next =    \
   curelm->field.sqe_next->field.sqe_next) == NULL) \
      (head)->sqh_last = &(curelm)->field.sqe_next; \
 }        \
} while (/*CONSTCOND*/0)
```

```
#define SIMPLEQ_CONCAT(head1, head2) do {    \
 if (!SIMPLEQ_EMPTY((head2))) {     \
  *(head1)->sqh_last = (head2)->sqh_first;  \
  (head1)->sqh_last = (head2)->sqh_last;  \
  SIMPLEQ_INIT((head2));     \
 }       \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_LAST(head, type, field)     \
 (SIMPLEQ_EMPTY((head)) ?      \
  NULL :      \
        ((struct type
 *)(void *)    \
  ((char *)((head)->sqh_last) - offsetof(struct type, field))))

/*
* Tail queue definitions.
*/
#define _TAILQ_HEAD(name, type, qual)     \
struct name {        \
 qual type *tqh_first;  /* first element */  \
 qual type *qual *tqh_last; /* addr of last next element */ \
}
#define TAILQ_HEAD(name, type) _TAILQ_HEAD(name, struct type,)

#define TAILQ_HEAD_INITIALIZER(head)     \
 { TAILQ_END(head), &(head).tqh_first }

#define _TAILQ_ENTRY(type, qual)     \
struct {        \
 qual type *tqe_next;  /* next element */  \
 qual type *qual *tqe_prev; /* address of previous next element */\
}
#define TAILQ_ENTRY(type) _TAILQ_ENTRY(struct type,)

/*
* Tail queue access methods.
*/
#define TAILQ_FIRST(head)  ((head)->tqh_first)
#define TAILQ_END(head)   (NULL)
#define TAILQ_NEXT(elm, field)  ((elm)->field.tqe_next)
#define TAILQ_LAST(head, headname) \
 (*(((struct headname *)(void *)((head)->tqh_last))->tqh_last))
#define TAILQ_PREV(elm, headname, field) \
 (*(((struct headname
 *)(void *)((elm)->field.tqe_prev))->tqh_last))
#define TAILQ_EMPTY(head)  (TAILQ_FIRST(head) == TAILQ_END(head))
```

```
#define TAILQ_FOREACH(var, head, field)     \
 for ((var) = ((head)->tqh_first);    \
     (var) != TAILQ_END(head);     \
     (var) = ((var)->field.tqe_next))

#define TAILQ_FOREACH_SAFE(var, head, field, next)   \
 for ((var) = ((head)->tqh_first);    \
     (var) != TAILQ_END(head) &&     \
     ((next) = TAILQ_NEXT(var, field), 1); (var) = (next))

#define TAILQ_FOREACH_REVERSE(var, head, headname, field)  \
 for ((var) = TAILQ_LAST((head), headname);   \
     (var) != TAILQ_END(head);     \
     (var) = TAILQ_PREV((var), headname, field))

#define TAILQ_FOREACH_REVERSE_SAFE(var, head, headname, field, prev) \
 for ((var) = TAILQ_LAST((head), headname);   \
     (var) != TAILQ_END(head) &&     \
     ((prev) = TAILQ_PREV((var), headname, field), 1); (var) = (prev))

/*
* Tail queue functions.
*/
#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_TAILQ_INSERT_HEAD(head,
 elm, field)   \
 if ((head)->tqh_first &&     \
     (head)->tqh_first->field.tqe_prev != &(head)->tqh_first) \
  QUEUEDEBUG_ABORT("TAILQ_INSERT_HEAD %p %s:%d", (head), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_INSERT_TAIL(head, elm, field)   \
 if (*(head)->tqh_last != NULL)     \
  QUEUEDEBUG_ABORT("TAILQ_INSERT_TAIL %p %s:%d", (head), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_OP(elm, field)     \
 if ((elm)->field.tqe_next &&     \
     (elm)->field.tqe_next->field.tqe_prev !=   \
     &(elm)->field.tqe_next)     \
  QUEUEDEBUG_ABORT("TAILQ_* forw %p %s:%d", (elm), \
      __FILE__, __LINE__);    \
 if (*(elm)->field.tqe_prev != (elm))    \
  QUEUEDEBUG_ABORT("TAILQ_* back %p %s:%d", (elm), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_PREREMOVE(head, elm, field)   \
 if ((elm)->field.tqe_next == NULL &&    \
     (head)->tqh_last != &(elm)->field.tqe_next)   \
  QUEUEDEBUG_ABORT("TAILQ_PREREMOVE head %p elm %p %s:%d",\
```

```
     (head), (elm), __FILE__,
 __LINE__);
#define QUEUEDEBUG_TAILQ_POSTREMOVE(elm, field)    \
 (elm)->field.tqe_next = (void *)1L;    \
 (elm)->field.tqe_prev = (void *)1L;
#else
#define QUEUEDEBUG_TAILQ_INSERT_HEAD(head, elm, field)
#define QUEUEDEBUG_TAILQ_INSERT_TAIL(head, elm, field)
#define QUEUEDEBUG_TAILQ_OP(elm, field)
#define QUEUEDEBUG_TAILQ_PREREMOVE(head, elm, field)
#define QUEUEDEBUG_TAILQ_POSTREMOVE(elm, field)
#endif

#define TAILQ_INIT(head) do {      \
 (head)->tqh_first = TAILQ_END(head);    \
 (head)->tqh_last = &(head)->tqh_first;    \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_HEAD(head, elm, field) do {   \
 QUEUEDEBUG_TAILQ_INSERT_HEAD((head), (elm), field)  \
 if (((elm)->field.tqe_next = (head)->tqh_first) != TAILQ_END(head))\
  (head)->tqh_first->field.tqe_prev =   \
     &(elm)->field.tqe_next;    \
 else       \
  (head)->tqh_last = &(elm)->field.tqe_next;  \
 (head)->tqh_first = (elm);     \
 (elm)->field.tqe_prev = &(head)->tqh_first;   \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_TAIL(head,
 elm, field) do {   \
 QUEUEDEBUG_TAILQ_INSERT_TAIL((head), (elm), field)  \
 (elm)->field.tqe_next = TAILQ_END(head);   \
 (elm)->field.tqe_prev = (head)->tqh_last;   \
 *(head)->tqh_last = (elm);     \
 (head)->tqh_last = &(elm)->field.tqe_next;   \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 QUEUEDEBUG_TAILQ_OP((listelm), field)    \
 if (((elm)->field.tqe_next = (listelm)->field.tqe_next) !=  \
    TAILQ_END(head))      \
  (elm)->field.tqe_next->field.tqe_prev =   \
     &(elm)->field.tqe_next;    \
 else       \
  (head)->tqh_last = &(elm)->field.tqe_next;  \
 (listelm)->field.tqe_next = (elm);    \
 (elm)->field.tqe_prev = &(listelm)->field.tqe_next;  \
```

```
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_BEFORE(listelm, elm, field) do {   \
 QUEUEDEBUG_TAILQ_OP((listelm), field)    \
 (elm)->field.tqe_prev = (listelm)->field.tqe_prev;  \
 (elm)->field.tqe_next = (listelm);    \
 *(listelm)->field.tqe_prev = (elm);    \
 (listelm)->field.tqe_prev
 = &(elm)->field.tqe_next;  \
} while (/*CONSTCOND*/0)

#define TAILQ_REMOVE(head, elm, field) do {    \
 QUEUEDEBUG_TAILQ_PREREMOVE((head), (elm), field)  \
 QUEUEDEBUG_TAILQ_OP((elm), field)    \
 if (((elm)->field.tqe_next) != TAILQ_END(head))   \
  (elm)->field.tqe_next->field.tqe_prev =   \
     (elm)->field.tqe_prev;    \
 else       \
  (head)->tqh_last = (elm)->field.tqe_prev;  \
 *(elm)->field.tqe_prev = (elm)->field.tqe_next;   \
 QUEUEDEBUG_TAILQ_POSTREMOVE((elm), field);   \
} while (/*CONSTCOND*/0)

#define TAILQ_REPLACE(head, elm, elm2, field) do {   \
      if (((elm2)->field.tqe_next = (elm)->field.tqe_next) !=  \
    TAILQ_END(head))        \
            (elm2)->field.tqe_next->field.tqe_prev =  \
               &(elm2)->field.tqe_next;    \
      else       \
            (head)->tqh_last = &(elm2)->field.tqe_next;  \
      (elm2)->field.tqe_prev = (elm)->field.tqe_prev;   \
      *(elm2)->field.tqe_prev = (elm2);    \
 QUEUEDEBUG_TAILQ_POSTREMOVE((elm),
 field);   \
} while (/*CONSTCOND*/0)

#define TAILQ_CONCAT(head1, head2, field) do {    \
 if (!TAILQ_EMPTY(head2)) {     \
  *(head1)->tqh_last = (head2)->tqh_first;  \
  (head2)->tqh_first->field.tqe_prev = (head1)->tqh_last; \
  (head1)->tqh_last = (head2)->tqh_last;   \
  TAILQ_INIT((head2));     \
 }       \
} while (/*CONSTCOND*/0)

/*
* Singly-linked Tail queue declarations.
*/
```

```
#define STAILQ_HEAD(name, type)      \
struct name {        \
 struct type *stqh_first; /* first element */  \
 struct type **stqh_last; /* addr of last next element */ \
}

#define STAILQ_HEAD_INITIALIZER(head)     \
 { NULL, &(head).stqh_first }

#define STAILQ_ENTRY(type)      \
struct {        \
 struct type *stqe_next; /* next element */   \
}

/*
* Singly-linked Tail queue access methods.
*/
#define STAILQ_FIRST(head) ((head)->stqh_first)
#define STAILQ_END(head) NULL
#define STAILQ_NEXT(elm, field) ((elm)->field.stqe_next)
#define STAILQ_EMPTY(head) (STAILQ_FIRST(head)
 == STAILQ_END(head))

/*
* Singly-linked Tail queue functions.
*/
#define STAILQ_INIT(head) do {      \
 (head)->stqh_first = NULL;     \
 (head)->stqh_last = &(head)->stqh_first;    \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_HEAD(head, elm, field) do {   \
 if (((elm)->field.stqe_next = (head)->stqh_first) == NULL) \
  (head)->stqh_last = &(elm)->field.stqe_next;  \
 (head)->stqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_TAIL(head, elm, field) do {   \
 (elm)->field.stqe_next = NULL;     \
 *(head)->stqh_last = (elm);     \
 (head)->stqh_last = &(elm)->field.stqe_next;   \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 if (((elm)->field.stqe_next = (listelm)->field.stqe_next) == NULL)\
  (head)->stqh_last = &(elm)->field.stqe_next;  \
 (listelm)->field.stqe_next = (elm);    \
} while (/*CONSTCOND*/0)
```

```
#define STAILQ_REMOVE_HEAD(head, field) do {    \
 if (((head)->stqh_first = (head)->stqh_first->field.stqe_next)
 == NULL) \
  (head)->stqh_last = &(head)->stqh_first;   \
} while (/*CONSTCOND*/0)

#define STAILQ_REMOVE(head, elm, type, field) do {   \
 if ((head)->stqh_first == (elm)) {    \
  STAILQ_REMOVE_HEAD((head), field);   \
 } else {       \
  struct type *curelm = (head)->stqh_first;  \
  while (curelm->field.stqe_next != (elm))   \
   curelm = curelm->field.stqe_next;  \
  if ((curelm->field.stqe_next =    \
   curelm->field.stqe_next->field.stqe_next) == NULL) \
       (head)->stqh_last = &(curelm)->field.stqe_next; \
 }        \
} while (/*CONSTCOND*/0)

#define STAILQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->stqh_first);    \
  (var);       \
  (var) = ((var)->field.stqe_next))

#define STAILQ_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = STAILQ_FIRST((head));    \
     (var) && ((tvar) = STAILQ_NEXT((var), field), 1);  \
     (var) = (tvar))

#define STAILQ_CONCAT(head1, head2) do {    \
 if (!STAILQ_EMPTY((head2))) {     \
  *(head1)->stqh_last
 = (head2)->stqh_first;  \
  (head1)->stqh_last = (head2)->stqh_last;  \
  STAILQ_INIT((head2));     \
 }        \
} while (/*CONSTCOND*/0)

#define STAILQ_LAST(head, type, field)     \
 (STAILQ_EMPTY((head)) ?      \
  NULL :       \
        ((struct type *)(void *)    \
  ((char *)((head)->stqh_last) - offsetof(struct type, field))))


#ifndef _KERNEL
/*
```

```
* Circular queue definitions. Do not use. We still keep the macros
* for compatibility but because of pointer aliasing issues their use
* is discouraged!
*/

/*
* __launder_type():  We use this ugly hack to work around the the compiler
* noticing that two types may not alias each other and elide tests in code.
* We hit this in the CIRCLEQ macros when comparing 'struct name *' and
* 'struct type *' (see CIRCLEQ_HEAD()).  Modern compilers (such as GCC
* 4.8) declare these comparisons as always false, causing the code to
* not run as designed.
*
* This hack is only to be used for comparisons and thus can be fully const.
 * Do not use for assignment.
*
* If we ever choose to change the ABI of the CIRCLEQ macros, we could fix
* this by changing the head/tail sentinal values, but see the note above
* this one.
*/
static __inline const void * __launder_type(const void *);
static __inline const void *
__launder_type(const void *__x)
{
 __asm __volatile("" : "+r" (__x));
 return __x;
}

#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_CIRCLEQ_HEAD(head, field)    \
 if ((head)->cqh_first != CIRCLEQ_ENDC(head) &&   \
     (head)->cqh_first->field.cqe_prev != CIRCLEQ_ENDC(head)) \
  QUEUEDEBUG_ABORT("CIRCLEQ head forw %p %s:%d", (head), \
        __FILE__, __LINE__);    \
 if ((head)->cqh_last != CIRCLEQ_ENDC(head) &&   \
     (head)->cqh_last->field.cqe_next != CIRCLEQ_ENDC(head)) \
  QUEUEDEBUG_ABORT("CIRCLEQ head back %p %s:%d", (head), \
        __FILE__, __LINE__);
#define QUEUEDEBUG_CIRCLEQ_ELM(head, elm, field)   \
 if ((elm)->field.cqe_next == CIRCLEQ_ENDC(head)) {  \
  if ((head)->cqh_last != (elm))    \
   QUEUEDEBUG_ABORT("CIRCLEQ
 elm last %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 } else {       \
  if ((elm)->field.cqe_next->field.cqe_prev != (elm)) \
   QUEUEDEBUG_ABORT("CIRCLEQ elm forw %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
```

```
 }       \
 if ((elm)->field.cqe_prev == CIRCLEQ_ENDC(head)) {  \
  if ((head)->cqh_first != (elm))    \
   QUEUEDEBUG_ABORT("CIRCLEQ elm first %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 } else {       \
  if ((elm)->field.cqe_prev->field.cqe_next != (elm)) \
   QUEUEDEBUG_ABORT("CIRCLEQ elm prev %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 }
#define QUEUEDEBUG_CIRCLEQ_POSTREMOVE(elm, field)   \
 (elm)->field.cqe_next = (void *)1L;    \
 (elm)->field.cqe_prev = (void *)1L;
#else
#define QUEUEDEBUG_CIRCLEQ_HEAD(head, field)
#define QUEUEDEBUG_CIRCLEQ_ELM(head, elm, field)
#define QUEUEDEBUG_CIRCLEQ_POSTREMOVE(elm, field)
#endif

#define CIRCLEQ_HEAD(name, type)     \
struct name {        \
 struct type *cqh_first;  /*
 first element */  \
 struct type *cqh_last;  /* last element */  \
}

#define CIRCLEQ_HEAD_INITIALIZER(head)     \
 { CIRCLEQ_END(&head), CIRCLEQ_END(&head) }

#define CIRCLEQ_ENTRY(type)      \
struct {        \
 struct type *cqe_next;  /* next element */  \
 struct type *cqe_prev;  /* previous element */  \
}

/*
* Circular queue functions.
*/
#define CIRCLEQ_INIT(head) do {      \
 (head)->cqh_first = CIRCLEQ_END(head);    \
 (head)->cqh_last = CIRCLEQ_END(head);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (listelm), field)  \
 (elm)->field.cqe_next = (listelm)->field.cqe_next;  \
 (elm)->field.cqe_prev = (listelm);    \
```

```
 if ((listelm)->field.cqe_next == CIRCLEQ_ENDC(head))  \
  (head)->cqh_last = (elm);    \
 else        \
  (listelm)->field.cqe_next->field.cqe_prev = (elm); \
 (listelm)->field.cqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_BEFORE(head,
 listelm, elm, field) do {  \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (listelm), field)  \
 (elm)->field.cqe_next = (listelm);    \
 (elm)->field.cqe_prev = (listelm)->field.cqe_prev;  \
 if ((listelm)->field.cqe_prev == CIRCLEQ_ENDC(head))  \
  (head)->cqh_first = (elm);    \
 else        \
  (listelm)->field.cqe_prev->field.cqe_next = (elm); \
 (listelm)->field.cqe_prev = (elm);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_HEAD(head, elm, field) do {   \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 (elm)->field.cqe_next = (head)->cqh_first;   \
 (elm)->field.cqe_prev = CIRCLEQ_END(head);   \
 if ((head)->cqh_last == CIRCLEQ_ENDC(head))   \
  (head)->cqh_last = (elm);    \
 else        \
  (head)->cqh_first->field.cqe_prev = (elm);  \
 (head)->cqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_TAIL(head, elm, field) do {   \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 (elm)->field.cqe_next
 = CIRCLEQ_END(head);   \
 (elm)->field.cqe_prev = (head)->cqh_last;   \
 if ((head)->cqh_first == CIRCLEQ_ENDC(head))   \
  (head)->cqh_first = (elm);    \
 else        \
  (head)->cqh_last->field.cqe_next = (elm);  \
 (head)->cqh_last = (elm);     \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_REMOVE(head, elm, field) do {    \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (elm), field)   \
 if ((elm)->field.cqe_next == CIRCLEQ_ENDC(head))  \
  (head)->cqh_last = (elm)->field.cqe_prev;  \
```

```
 else       \
  (elm)->field.cqe_next->field.cqe_prev =   \
      (elm)->field.cqe_prev;    \
 if ((elm)->field.cqe_prev == CIRCLEQ_ENDC(head))  \
  (head)->cqh_first = (elm)->field.cqe_next;  \
 else       \
  (elm)->field.cqe_prev->field.cqe_next =   \
      (elm)->field.cqe_next;    \
 QUEUEDEBUG_CIRCLEQ_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->cqh_first);    \
  (var) != CIRCLEQ_ENDC(head);    \
  (var)
 = ((var)->field.cqe_next))

#define CIRCLEQ_FOREACH_REVERSE(var, head, field)   \
 for ((var) = ((head)->cqh_last);    \
  (var) != CIRCLEQ_ENDC(head);    \
  (var) = ((var)->field.cqe_prev))

/*
* Circular queue access methods.
*/
#define CIRCLEQ_FIRST(head)  ((head)->cqh_first)
#define CIRCLEQ_LAST(head)  ((head)->cqh_last)
/* For comparisons */
#define CIRCLEQ_ENDC(head)  (__launder_type(head))
/* For assignments */
#define CIRCLEQ_END(head)  ((void *)(head))
#define CIRCLEQ_NEXT(elm, field) ((elm)->field.cqe_next)
#define CIRCLEQ_PREV(elm, field) ((elm)->field.cqe_prev)
#define CIRCLEQ_EMPTY(head)      \
   (CIRCLEQ_FIRST(head) == CIRCLEQ_ENDC(head))

#define CIRCLEQ_LOOP_NEXT(head, elm, field)    \
 (((elm)->field.cqe_next == CIRCLEQ_ENDC(head))   \
     ? ((head)->cqh_first)     \
     : (elm->field.cqe_next))
#define CIRCLEQ_LOOP_PREV(head, elm, field)    \
 (((elm)->field.cqe_prev == CIRCLEQ_ENDC(head))   \
     ? ((head)->cqh_last)     \
     :
 (elm->field.cqe_prev))
#endif /* !_KERNEL */

#endif /* !_SYS_QUEUE_H_ */
```

```
#ifndef _SYS_CDEFS_H_
#define _SYS_CDEFS_H_

#warning usage of non-standard #include <sys/cdefs.h> is deprecated

#undef __P
#undef __PMT

#define __P(args) args
#define __PMT(args) args

#define __CONCAT(x,y) x ## y
#define __STRING(x) #x

#ifdef  __cplusplus
# define __BEGIN_DECLS extern "C" {
# define __END_DECLS }
#else
# define __BEGIN_DECLS
# define __END_DECLS
#endif

#if defined(__GNUC__) && !defined(__cplusplus)
# define __THROW __attribute__ ((__nothrow__))
# define __NTH(fct) __attribute__ ((__nothrow__)) fct
#else
# define __THROW
# define __NTH(fct)     fct
#endif

#endif /* _SYS_CDEFS_H_ */
# Contributor: Fabian Affolter <fabian@affolter-engineering.ch>
# Maintainer: Fabian Affolter <fabian@affolter-engineering.ch>
pkgname=py3-flake8-copyright
_pkgname=flake8-copyright
pkgver=0.2.4
pkgrel=3
pkgdesc="Extension for flake8 which checks for copyrights"
options="!check" # No testsuite
url="https://github.com/savoirfairelinux/flake8-copyright"
arch="noarch"
license="MIT"
depends="py3-flake8 py3-setuptools"
makedepends="py3-gpep517 py3-wheel"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/${_pkgname:0:1}/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir"/$_pkgname-$pkgver
```

```
replaces="py-flake8-copyright"                # Backwards compatibility
provides="py-flake8-copyright=$pkgver-r$pkgrel" # Backwards compatibility

build() {
 gpep517 build-wheel \
  --wheel-dir .dist \
  --output-fd 3 3>&1 >&2
}

package() {
 gpep517 install-wheel --destdir "$pkgdir" \
  .dist/*.whl
}

sha512sums="
a6ab47e1bb715618f075c51f398e18180404871b3b0faf1c2d30701d5203db6bc23771bf22ffb5bafcd8ee856b9b64237
b316bd503ae7dceed6ca284ccd5a74d
  flake8-copyright-0.2.4.tar.gz
"
```

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```
/* $NetBSD: tree.h,v 1.20 2013/09/14 13:20:45 joerg Exp $ */
/* $OpenBSD: tree.h,v 1.13 2011/07/09 00:19:45 pirofti Exp $ */
/* Modified by Void Linux. */
/*
* Copyright 2002 Niels Provos <provos@citi.umich.edu>
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```

```
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*/

#ifndef _SYS_TREE_H_
#define _SYS_TREE_H_

#ifdef __GNUC__
#define __GNUC_PREREQ__(x, y)      \
 ((__GNUC__ == (x) && __GNUC_MINOR__ >= (y)) ||   \
  (__GNUC__ > (x)))
#else
#define __GNUC_PREREQ__(x, y) 0
#endif

#if __GNUC_PREREQ__(2, 7) || defined(__lint__)
#define _sys_tree_h_unused __attribute__((__unused__))
#else
#define _sys_tree_h_unused /* delete */
#endif

/*
* This file defines data structures for different types of trees:
* splay trees and red-black trees.
*
* A splay tree is a self-organizing
 data structure.  Every operation
* on the tree causes a splay to happen.  The splay moves the requested
* node to the root of the tree and partly rebalances it.
```

```
*
* This has the benefit that request locality causes faster lookups as
* the requested nodes move to the top of the tree.  On the other hand,
* every lookup causes memory writes.
*
* The Balance Theorem bounds the total access time for m operations
* and n inserts on an initially empty tree as O((m + n)lg n).  The
* amortized cost for a sequence of m accesses to a splay tree is O(lg n);
*
* A red-black tree is a binary search tree with the node color as an
* extra attribute.  It fulfills a set of conditions:
* - every search path from the root to a leaf consists of the
*   same number of black nodes,
* - each red node (except for the root) has a black parent,
* - each leaf node is black.
*
* Every operation on a red-black tree is bounded as O(lg n).
* The maximum height of a red-black tree is 2lg (n+1).
 */

#define SPLAY_HEAD(name, type)      \
struct name {        \
 struct type *sph_root; /* root of the tree */   \
}

#define SPLAY_INITIALIZER(root)      \
 { NULL }

#define SPLAY_INIT(root) do {      \
 (root)->sph_root = NULL;     \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ENTRY(type)      \
struct {        \
 struct type *spe_left; /* left element */   \
 struct type *spe_right; /* right element */   \
}

#define SPLAY_LEFT(elm, field)  (elm)->field.spe_left
#define SPLAY_RIGHT(elm, field)  (elm)->field.spe_right
#define SPLAY_ROOT(head)  (head)->sph_root
#define SPLAY_EMPTY(head)  (SPLAY_ROOT(head) == NULL)

/* SPLAY_ROTATE_{LEFT,RIGHT} expect that tmp hold SPLAY_{RIGHT,LEFT} */
#define SPLAY_ROTATE_RIGHT(head, tmp, field) do {   \
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(tmp, field); \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;      \
```

```
} while (/*CONSTCOND*/ 0)

#define SPLAY_ROTATE_LEFT(head, tmp, field) do {   \
 SPLAY_RIGHT((head)->sph_root,
 field) = SPLAY_LEFT(tmp, field); \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;      \
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKLEFT(head, tmp, field) do {    \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;      \
 (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);  \
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKRIGHT(head, tmp, field) do {    \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;      \
 (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field); \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ASSEMBLE(head, node, left, right, field) do {  \
 SPLAY_RIGHT(left, field) = SPLAY_LEFT((head)->sph_root, field); \
 SPLAY_LEFT(right, field) = SPLAY_RIGHT((head)->sph_root, field);\
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(node, field); \
 SPLAY_RIGHT((head)->sph_root, field) = SPLAY_LEFT(node, field); \
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */

#define
 SPLAY_PROTOTYPE(name, type, field, cmp)    \
void name##_SPLAY(struct name *, struct type *);   \
void name##_SPLAY_MINMAX(struct name *, int);    \
struct type *name##_SPLAY_INSERT(struct name *, struct type *);  \
struct type *name##_SPLAY_REMOVE(struct name *, struct type *);  \
        \
/* Finds the node with the same key as elm */    \
static __inline struct type *      \
name##_SPLAY_FIND(struct name *head, struct type *elm)   \
{        \
 if (SPLAY_EMPTY(head))      \
  return(NULL);      \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0)    \
  return (head->sph_root);    \
 return (NULL);       \
}        \
```

```
        \
static __inline _sys_tree_h_unused struct type *   \
name##_SPLAY_NEXT(struct name *head, struct type *elm)   \
{        \
 name##_SPLAY(head, elm);     \
 if (SPLAY_RIGHT(elm, field) != NULL) {    \
  elm = SPLAY_RIGHT(elm, field);    \
  while (SPLAY_LEFT(elm, field) != NULL) {  \
   elm = SPLAY_LEFT(elm, field);   \
  }       \
 }
 else       \
  elm = NULL;      \
 return (elm);       \
}        \
        \
static _sys_tree_h_unused __inline struct type *   \
name##_SPLAY_MIN_MAX(struct name *head, int val)   \
{        \
 name##_SPLAY_MINMAX(head, val);     \
      return (SPLAY_ROOT(head));     \
}

/* Main splay operation.
* Moves node close to the key of elm to top
*/
#define SPLAY_GENERATE(name, type, field, cmp)    \
struct type *       \
name##_SPLAY_INSERT(struct name *head, struct type *elm)  \
{        \
   if (SPLAY_EMPTY(head)) {      \
     SPLAY_LEFT(elm, field) = SPLAY_RIGHT(elm, field) = NULL; \
   } else {       \
     int __comp;       \
     name##_SPLAY(head, elm);     \
     __comp = (cmp)(elm, (head)->sph_root);   \
     if(__comp < 0) {      \
      SPLAY_LEFT(elm, field) = SPLAY_LEFT((head)->sph_root, field);\
      SPLAY_RIGHT(elm, field) = (head)->sph_root;  \
      SPLAY_LEFT((head)->sph_root, field) = NULL;  \
     } else if (__comp > 0) {     \
      SPLAY_RIGHT(elm,
 field) = SPLAY_RIGHT((head)->sph_root, field);\
      SPLAY_LEFT(elm, field) = (head)->sph_root;  \
      SPLAY_RIGHT((head)->sph_root, field) = NULL; \
     } else       \
      return ((head)->sph_root);    \
   }        \
```

```
   (head)->sph_root = (elm);      \
   return (NULL);       \
}         \
         \
struct type *        \
name##_SPLAY_REMOVE(struct name *head, struct type *elm)  \
{         \
 struct type *__tmp;      \
 if (SPLAY_EMPTY(head))      \
  return (NULL);      \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0) {   \
  if (SPLAY_LEFT((head)->sph_root, field) == NULL) { \
   (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field);\
  } else {      \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);\
   name##_SPLAY(head, elm);   \
   SPLAY_RIGHT((head)->sph_root, field) = __tmp; \
  }       \
  return (elm);      \
 }        \
 return (NULL);       \
}         \
         \
void         \
name##_SPLAY(struct
 name *head, struct type *elm)   \
{         \
 struct type __node, *__left, *__right, *__tmp;   \
 int __comp;       \
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
 __left = __right = &__node;     \
\
 while ((__comp = (cmp)(elm, (head)->sph_root)) != 0) {  \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if ((cmp)(elm, __tmp) < 0){   \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKLEFT(head, __right, field);  \
  } else if (__comp > 0) {    \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
```

```
  if (__tmp == NULL)    \
   break;     \
  if ((cmp)(elm, __tmp) > 0){   \
   SPLAY_ROTATE_LEFT(head, __tmp, field); \
   if (SPLAY_RIGHT((head)->sph_root, field) == NULL)\
    break;    \
  }      \
  SPLAY_LINKRIGHT(head, __left, field);  \
 }       \
}        \
SPLAY_ASSEMBLE(head,
&__node, __left, __right, field);  \
}         \
        \
/* Splay with either the minimum or the maximum element   \
* Used to find minimum or maximum element in tree.   \
*/         \
void name##_SPLAY_MINMAX(struct name *head, int __comp) \
{         \
 struct type __node, *__left, *__right, *__tmp;   \
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
 __left = __right = &__node;     \
\
 while (1) {       \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if (__comp < 0){    \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKLEFT(head, __right, field);  \
  } else if (__comp > 0) {    \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if (__comp > 0) {    \
    SPLAY_ROTATE_LEFT(head, __tmp, field); \
    if (SPLAY_RIGHT((head)->sph_root,
 field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKRIGHT(head, __left, field);  \
  }       \
 }        \
```

```
 SPLAY_ASSEMBLE(head, &__node, __left, __right, field);  \
}

#define SPLAY_NEGINF -1
#define SPLAY_INF 1

#define SPLAY_INSERT(name, x, y) name##_SPLAY_INSERT(x, y)
#define SPLAY_REMOVE(name, x, y) name##_SPLAY_REMOVE(x, y)
#define SPLAY_FIND(name, x, y)  name##_SPLAY_FIND(x, y)
#define SPLAY_NEXT(name, x, y)  name##_SPLAY_NEXT(x, y)
#define SPLAY_MIN(name, x)  (SPLAY_EMPTY(x) ? NULL \
    : name##_SPLAY_MIN_MAX(x, SPLAY_NEGINF))
#define SPLAY_MAX(name, x)  (SPLAY_EMPTY(x) ? NULL \
    : name##_SPLAY_MIN_MAX(x, SPLAY_INF))

#define SPLAY_FOREACH(x, name, head)     \
 for ((x) = SPLAY_MIN(name, head);    \
     (x) != NULL;      \
     (x) = SPLAY_NEXT(name, head, x))

/* Macros that define a red-black tree */
#define RB_HEAD(name, type)      \
struct name {        \
 struct type *rbh_root; /* root of the tree */   \
}

#define RB_INITIALIZER(root)      \
 {
 NULL }

#define RB_INIT(root) do {      \
 (root)->rbh_root = NULL;     \
} while (/*CONSTCOND*/ 0)

#define RB_BLACK 0
#define RB_RED  1
#define RB_ENTRY(type)       \
struct {        \
 struct type *rbe_left;  /* left element */  \
 struct type *rbe_right;  /* right element */  \
 struct type *rbe_parent; /* parent element */  \
 int rbe_color;   /* node color */  \
}

#define RB_LEFT(elm, field)  (elm)->field.rbe_left
#define RB_RIGHT(elm, field)  (elm)->field.rbe_right
#define RB_PARENT(elm, field)  (elm)->field.rbe_parent
#define RB_COLOR(elm, field)  (elm)->field.rbe_color
```

```
#define RB_ROOT(head)   (head)->rbh_root
#define RB_EMPTY(head)   (RB_ROOT(head) == NULL)

#define RB_SET(elm, parent, field) do {     \
 RB_PARENT(elm, field) = parent;     \
 RB_LEFT(elm, field) = RB_RIGHT(elm, field) = NULL;  \
 RB_COLOR(elm, field) = RB_RED;     \
} while (/*CONSTCOND*/ 0)

#define RB_SET_BLACKRED(black, red, field) do {    \
 RB_COLOR(black, field) = RB_BLACK;    \
 RB_COLOR(red, field)
 = RB_RED;     \
} while (/*CONSTCOND*/ 0)

#ifndef RB_AUGMENT
#define RB_AUGMENT(x) do {} while (/*CONSTCOND*/ 0)
#endif

#define RB_ROTATE_LEFT(head, elm, tmp, field) do {   \
 (tmp) = RB_RIGHT(elm, field);     \
 if ((RB_RIGHT(elm, field) = RB_LEFT(tmp, field)) != NULL) { \
  RB_PARENT(RB_LEFT(tmp, field), field) = (elm);  \
 }       \
 RB_AUGMENT(elm);      \
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
   RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
  else      \
   RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else       \
  (head)->rbh_root = (tmp);    \
 RB_LEFT(tmp, field) = (elm);     \
 RB_PARENT(elm, field) = (tmp);     \
 RB_AUGMENT(tmp);      \
 if ((RB_PARENT(tmp, field)))     \
  RB_AUGMENT(RB_PARENT(tmp, field));   \
} while (/*CONSTCOND*/ 0)

#define RB_ROTATE_RIGHT(head, elm, tmp, field) do {   \
 (tmp) = RB_LEFT(elm, field);     \
 if ((RB_LEFT(elm, field) = RB_RIGHT(tmp, field))
 != NULL) { \
  RB_PARENT(RB_RIGHT(tmp, field), field) = (elm);  \
 }       \
 RB_AUGMENT(elm);      \
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
```

```
  RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
 else      \
  RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else       \
  (head)->rbh_root = (tmp);    \
 RB_RIGHT(tmp, field) = (elm);     \
 RB_PARENT(elm, field) = (tmp);     \
 RB_AUGMENT(tmp);      \
 if ((RB_PARENT(tmp, field)))     \
  RB_AUGMENT(RB_PARENT(tmp, field));   \
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */
#define RB_PROTOTYPE(name, type, field, cmp)    \
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp,)
#define RB_PROTOTYPE_STATIC(name, type, field, cmp)   \
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_PROTOTYPE_INTERNAL(name, type, field, cmp, attr)  \
attr void name##_RB_INSERT_COLOR(struct name *, struct
 type *);  \
attr void name##_RB_REMOVE_COLOR(struct name *, struct type *, struct type *);\
attr struct type *name##_RB_REMOVE(struct name *, struct type *); \
attr struct type *name##_RB_INSERT(struct name *, struct type *); \
attr struct type *name##_RB_FIND(struct name *, struct type *);  \
attr struct type *name##_RB_NFIND(struct name *, struct type *); \
attr struct type *name##_RB_NEXT(struct type *);   \
attr struct type *name##_RB_PREV(struct type *);   \
attr struct type *name##_RB_MINMAX(struct name *, int);   \
        \

/* Main rb operation.
* Moves node close to the key of elm to top
*/
#define RB_GENERATE(name, type, field, cmp)    \
 RB_GENERATE_INTERNAL(name, type, field, cmp,)
#define RB_GENERATE_STATIC(name, type, field, cmp)   \
 RB_GENERATE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_GENERATE_INTERNAL(name, type, field, cmp, attr)  \
attr void       \
name##_RB_INSERT_COLOR(struct name *head, struct type *elm)  \
{        \
 struct type
 *parent, *gparent, *tmp;    \
 while ((parent = RB_PARENT(elm, field)) != NULL &&  \
     RB_COLOR(parent, field) == RB_RED) {   \
  gparent = RB_PARENT(parent, field);   \
  if (parent == RB_LEFT(gparent, field)) {  \
   tmp = RB_RIGHT(gparent, field);   \
```

```
  if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
   RB_COLOR(tmp, field) = RB_BLACK; \
   RB_SET_BLACKRED(parent, gparent, field);\
   elm = gparent;    \
   continue;    \
  }      \
  if (RB_RIGHT(parent, field) == elm) {  \
   RB_ROTATE_LEFT(head, parent, tmp, field);\
   tmp = parent;    \
   parent = elm;    \
   elm = tmp;    \
  }      \
  RB_SET_BLACKRED(parent, gparent, field); \
  RB_ROTATE_RIGHT(head, gparent, tmp, field); \
 } else {      \
  tmp = RB_LEFT(gparent, field);   \
  if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
   RB_COLOR(tmp, field) = RB_BLACK; \
   RB_SET_BLACKRED(parent, gparent, field);\
   elm = gparent;    \
   continue;    \
  }      \
  if (RB_LEFT(parent, field) == elm)
 {  \
   RB_ROTATE_RIGHT(head, parent, tmp, field);\
   tmp = parent;    \
   parent = elm;    \
   elm = tmp;    \
  }      \
  RB_SET_BLACKRED(parent, gparent, field); \
  RB_ROTATE_LEFT(head, gparent, tmp, field); \
 }       \
 }        \
 RB_COLOR(head->rbh_root, field) = RB_BLACK;   \
}         \
        \
attr void        \
name##_RB_REMOVE_COLOR(struct name *head, struct type *parent, struct type *elm) \
{         \
 struct type *tmp;      \
 while ((elm == NULL || RB_COLOR(elm, field) == RB_BLACK) && \
    elm != RB_ROOT(head)) {     \
  if (RB_LEFT(parent, field) == elm) {   \
  tmp = RB_RIGHT(parent, field);   \
  if (RB_COLOR(tmp, field) == RB_RED) {  \
   RB_SET_BLACKRED(tmp, parent, field); \
   RB_ROTATE_LEFT(head, parent, tmp, field);\
   tmp = RB_RIGHT(parent, field);  \
```

```
  }      \
  if ((RB_LEFT(tmp, field) == NULL ||  \
      RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
      (RB_RIGHT(tmp, field) == NULL ||  \
      RB_COLOR(RB_RIGHT(tmp,
field), field) == RB_BLACK)) {\
   RB_COLOR(tmp, field) = RB_RED;  \
   elm = parent;    \
   parent = RB_PARENT(elm, field);  \
  } else {     \
   if (RB_RIGHT(tmp, field) == NULL || \
       RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK) {\
    struct type *oleft;  \
    if ((oleft = RB_LEFT(tmp, field)) \
        != NULL)   \
     RB_COLOR(oleft, field) = RB_BLACK;\
    RB_COLOR(tmp, field) = RB_RED; \
    RB_ROTATE_RIGHT(head, tmp, oleft, field);\
    tmp = RB_RIGHT(parent, field); \
   }     \
   RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
   RB_COLOR(parent, field) = RB_BLACK; \
   if (RB_RIGHT(tmp, field))  \
    RB_COLOR(RB_RIGHT(tmp, field), field) = RB_BLACK;\
   RB_ROTATE_LEFT(head, parent, tmp, field);\
   elm = RB_ROOT(head);   \
   break;     \
  }      \
 } else {      \
  tmp = RB_LEFT(parent, field);   \
  if (RB_COLOR(tmp, field) == RB_RED) {  \
   RB_SET_BLACKRED(tmp, parent, field); \
   RB_ROTATE_RIGHT(head, parent, tmp, field);\
   tmp
= RB_LEFT(parent, field);  \
  }      \
  if ((RB_LEFT(tmp, field) == NULL ||  \
      RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
      (RB_RIGHT(tmp, field) == NULL ||  \
      RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK)) {\
   RB_COLOR(tmp, field) = RB_RED;  \
   elm = parent;    \
   parent = RB_PARENT(elm, field);  \
  } else {     \
   if (RB_LEFT(tmp, field) == NULL || \
       RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) {\
    struct type *oright;  \
    if ((oright = RB_RIGHT(tmp, field)) \
```

```
        != NULL)   \
      RB_COLOR(oright, field) = RB_BLACK;\
     RB_COLOR(tmp, field) = RB_RED; \
     RB_ROTATE_LEFT(head, tmp, oright, field);\
     tmp = RB_LEFT(parent, field); \
    }     \
    RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
    RB_COLOR(parent, field) = RB_BLACK; \
    if (RB_LEFT(tmp, field))  \
     RB_COLOR(RB_LEFT(tmp, field), field) = RB_BLACK;\
    RB_ROTATE_RIGHT(head, parent, tmp, field);\
    elm = RB_ROOT(head);   \
    break;     \
   }      \
  }       \
 }        \
 if
 (elm)       \
  RB_COLOR(elm, field) = RB_BLACK;   \
}         \
        \
attr struct type *       \
name##_RB_REMOVE(struct name *head, struct type *elm)   \
{         \
 struct type *child, *parent, *old = elm;   \
 int color;       \
 if (RB_LEFT(elm, field) == NULL)    \
  child = RB_RIGHT(elm, field);    \
 else if (RB_RIGHT(elm, field) == NULL)    \
  child = RB_LEFT(elm, field);    \
 else {        \
  struct type *left;     \
  elm = RB_RIGHT(elm, field);    \
  while ((left = RB_LEFT(elm, field)) != NULL)  \
   elm = left;     \
  child = RB_RIGHT(elm, field);    \
  parent = RB_PARENT(elm, field);    \
  color = RB_COLOR(elm, field);    \
  if (child)      \
   RB_PARENT(child, field) = parent;  \
  if (parent) {      \
   if (RB_LEFT(parent, field) == elm)  \
    RB_LEFT(parent, field) = child;  \
   else      \
    RB_RIGHT(parent, field) = child; \
   RB_AUGMENT(parent);    \
  } else       \
   RB_ROOT(head)
```

```
 = child;    \
  if (RB_PARENT(elm, field) == old)   \
   parent = elm;     \
  (elm)->field = (old)->field;    \
  if (RB_PARENT(old, field)) {    \
   if (RB_LEFT(RB_PARENT(old, field), field) == old)\
    RB_LEFT(RB_PARENT(old, field), field) = elm;\
   else      \
    RB_RIGHT(RB_PARENT(old, field), field) = elm;\
   RB_AUGMENT(RB_PARENT(old, field));  \
  } else       \
   RB_ROOT(head) = elm;    \
  RB_PARENT(RB_LEFT(old, field), field) = elm;  \
  if (RB_RIGHT(old, field))    \
   RB_PARENT(RB_RIGHT(old, field), field) = elm; \
  if (parent) {      \
   left = parent;     \
   do {      \
    RB_AUGMENT(left);   \
   } while ((left = RB_PARENT(left, field)) != NULL); \
  }       \
  goto color;      \
 }        \
 parent = RB_PARENT(elm, field);     \
 color = RB_COLOR(elm, field);     \
 if (child)       \
  RB_PARENT(child, field) = parent;   \
 if (parent) {       \
  if (RB_LEFT(parent, field) == elm)   \
   RB_LEFT(parent, field) = child;   \
  else       \
   RB_RIGHT(parent,
 field) = child;  \
  RB_AUGMENT(parent);     \
 } else        \
  RB_ROOT(head) = child;     \
color:         \
 if (color == RB_BLACK)      \
  name##_RB_REMOVE_COLOR(head, parent, child);  \
 return (old);       \
}         \
         \
/* Inserts a node into the RB tree */     \
attr struct type *       \
name##_RB_INSERT(struct name *head, struct type *elm)   \
{         \
 struct type *tmp;      \
 struct type *parent = NULL;     \
```

```
 int comp = 0;       \
 tmp = RB_ROOT(head);      \
 while (tmp) {       \
  parent = tmp;      \
  comp = (cmp)(elm, parent);    \
  if (comp < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else if (comp > 0)     \
   tmp = RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }        \
 RB_SET(elm, parent, field);     \
 if (parent != NULL) {      \
  if (comp < 0)      \
   RB_LEFT(parent, field) = elm;   \
  else       \
   RB_RIGHT(parent, field) = elm;   \
  RB_AUGMENT(parent);     \
 } else        \
  RB_ROOT(head) = elm;     \
 name##_RB_INSERT_COLOR(head,
 elm);    \
 return (NULL);       \
}         \
         \
/* Finds the node with the same key as elm */    \
attr struct type *       \
name##_RB_FIND(struct name *head, struct type *elm)   \
{         \
 struct type *tmp = RB_ROOT(head);    \
 int comp;       \
 while (tmp) {       \
  comp = cmp(elm, tmp);     \
  if (comp < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else if (comp > 0)     \
   tmp = RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }        \
 return (NULL);       \
}         \
         \
/* Finds the first node greater than or equal to the search key */ \
attr struct type *       \
name##_RB_NFIND(struct name *head, struct type *elm)   \
{         \
```

```
 struct type *tmp = RB_ROOT(head);    \
 struct type *res = NULL;     \
 int comp;       \
 while (tmp) {       \
  comp = cmp(elm, tmp);     \
  if (comp < 0) {      \
   res = tmp;     \
   tmp = RB_LEFT(tmp, field);   \
  }       \
  else if (comp > 0)     \
   tmp =
 RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }        \
 return (res);       \
}         \
         \
/* ARGSUSED */        \
attr struct type *       \
name##_RB_NEXT(struct type *elm)     \
{         \
 if (RB_RIGHT(elm, field)) {     \
  elm = RB_RIGHT(elm, field);    \
  while (RB_LEFT(elm, field))    \
   elm = RB_LEFT(elm, field);   \
 } else {       \
  if (RB_PARENT(elm, field) &&    \
      (elm == RB_LEFT(RB_PARENT(elm, field), field))) \
   elm = RB_PARENT(elm, field);   \
  else {       \
   while (RB_PARENT(elm, field) &&   \
       (elm == RB_RIGHT(RB_PARENT(elm, field), field)))\
    elm = RB_PARENT(elm, field);  \
   elm = RB_PARENT(elm, field);   \
  }       \
 }        \
 return (elm);       \
}         \
         \
/* ARGSUSED */        \
attr struct type *       \
name##_RB_PREV(struct type *elm)     \
{         \
 if (RB_LEFT(elm, field)) {     \
  elm = RB_LEFT(elm, field);    \
  while (RB_RIGHT(elm, field))    \
   elm = RB_RIGHT(elm, field);   \
```

```
 }
 else {       \
  if (RB_PARENT(elm, field) &&    \
      (elm == RB_RIGHT(RB_PARENT(elm, field), field))) \
   elm = RB_PARENT(elm, field);   \
  else {       \
   while (RB_PARENT(elm, field) &&   \
       (elm == RB_LEFT(RB_PARENT(elm, field), field)))\
    elm = RB_PARENT(elm, field);  \
   elm = RB_PARENT(elm, field);   \
  }       \
 }        \
 return (elm);       \
}         \
         \
attr struct type *       \
name##_RB_MINMAX(struct name *head, int val)    \
{         \
 struct type *tmp = RB_ROOT(head);    \
 struct type *parent = NULL;     \
 while (tmp) {       \
  parent = tmp;      \
  if (val < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else       \
   tmp = RB_RIGHT(tmp, field);   \
 }        \
 return (parent);      \
}

#define RB_NEGINF -1
#define RB_INF 1

#define RB_INSERT(name, x, y) name##_RB_INSERT(x, y)
#define RB_REMOVE(name, x, y) name##_RB_REMOVE(x, y)
#define RB_FIND(name, x, y) name##_RB_FIND(x, y)
#define RB_NFIND(name, x, y) name##_RB_NFIND(x,
 y)
#define RB_NEXT(name, x, y) name##_RB_NEXT(y)
#define RB_PREV(name, x, y) name##_RB_PREV(y)
#define RB_MIN(name, x)  name##_RB_MINMAX(x, RB_NEGINF)
#define RB_MAX(name, x)  name##_RB_MINMAX(x, RB_INF)

#define RB_FOREACH(x, name, head)     \
 for ((x) = RB_MIN(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_NEXT(x))
```

```
#define RB_FOREACH_FROM(x, name, y)     \
 for ((x) = (y);       \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_SAFE(x, name, head, y)    \
 for ((x) = RB_MIN(name, head);     \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_REVERSE(x, name, head)    \
 for ((x) = RB_MAX(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_PREV(x))

#define RB_FOREACH_REVERSE_FROM(x, name, y)    \
 for ((x) = (y);       \
     ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_REVERSE_SAFE(x, name,
 head, y)   \
 for ((x) = RB_MAX(name, head);     \
     ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
      (x) = (y))

#endif /* _SYS_TREE_H_ */
# Contributor: Wen Heping <wenhepingalpine@sohu.com>
# Maintainer: Wen Heping <wenhepingalpine@sohu.com>
pkgname=perl-software-license
pkgver=0.104007
pkgrel=0
# _pkgreal is used by apkbuild-cpan to find modules at MetaCpan
_pkgreal=Software-License
pkgdesc="packages that provide templated software licenses"
url="https://metacpan.org/release/Software-License/"
arch="noarch"
license="GPL-1.0-or-later OR Artistic-1.0-Perl"
depends="perl perl-data-section perl-text-template"
checkdepends="perl-try-tiny"
subpackages="$pkgname-doc"
source="https://cpan.metacpan.org/authors/id/L/LE/LEONT/Software-License-$pkgver.tar.gz"
builddir="$srcdir/$_pkgreal-$pkgver"

build() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 PERL_MM_USE_DEFAULT=1 perl -I. Makefile.PL \
  INSTALLDIRS=vendor \
```

```
  NO_PACKLIST=1 \
  NO_PERLLOCAL=1
 make
}

check() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 make test
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="
12d75e9583b3013d9b4a282467f1ac80ab6b7f3251926d66591d01404489b528f22adc396dfd4528a0f0ca650f0eed6d
9c959e69eace2169c6ed1cfffe5277e4
  Software-License-0.104007.tar.gz
"
```

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```
# Contributor: Dhruvin Gandhi <contact@dhru.vin>
# Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=py3-license-expression
_pkgname=license_expression
pkgver=30.4.4
pkgrel=0
```

```
pkgdesc="Library to parse, compare, simplify and normalize license expressions"
url="https://github.com/nexB/license-expression"
arch="noarch"
license="Apache-2.0"
depends="python3 py3-boolean.py"
makedepends="py3-setuptools py3-setuptools_scm py3-gpep517 py3-wheel"
checkdepends="py3-pytest py3-pytest-xdist"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/l/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir/$_pkgname-$pkgver"

build() {
 gpep517 build-wheel \
  --wheel-dir .dist \
  --output-fd 3 3>&1 >&2
}

check() {
 python3 -m venv --clear --without-pip --system-site-packages .testenv
 .testenv/bin/python3 -m installer .dist/*.whl
 .testenv/bin/python3 -m pytest
}

package() {
 python3 -m installer -d "$pkgdir" \
  .dist/*.whl
}

sha512sums="
f46dd4cf524b3962115fe26f5545bfdd6767275b482724af51e7ca07da79244969a3bfc5d2fd5b95bc0f19d1b95a26a8f3
ab36c676e56ec302178d7166588066
  license_expression-30.4.4.tar.gz
"
```

# 1.2693 python-dateutil 1:2.9.0.post0-1.el9_7

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---
dateutil - Extensions to the standard Python datetime module.

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# 1.2694 libssh 0.10.4-17.el9_7

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with the library, after making changes to the library and recompiling
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that any
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Version 3, 29 June 2007

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# 1.2710 jaxb-api 2.3.1.1

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- web-common_3_0.xsd
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The original XML Schemas for Java EE Deployment Descriptors:
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- javaee_web_services_1_2.xsd
- javaee_web_services_client_1_2.xsd
- javaee_6.xsd
- javaee_web_services_1_3.xsd
- javaee_web_services_client_1_3.xsd
- jsp_2_2.xsd
- web-app_3_0.xsd
- web-common_3_0.xsd
- web-fragment_3_0.xsd
- javaee_7.xsd
- javaee_web_services_1_4.xsd
- javaee_web_services_client_1_4.xsd
- jsp_2_3.xsd
- web-app_3_1.xsd
- web-common_3_1.xsd
- web-fragment_3_1.xsd
- javaee_8.xsd
- web-app_4_0.xsd
- web-common_4_0.xsd
- web-fragment_4_0.xsd

may be obtained from:
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- javaee_web_services_1_3.xsd
- javaee_web_services_client_1_3.xsd
- jsp_2_2.xsd
- web-app_3_0.xsd
- web-common_3_0.xsd
- web-fragment_3_0.xsd
- javaee_7.xsd
- javaee_web_services_1_4.xsd
- javaee_web_services_client_1_4.xsd
- jsp_2_3.xsd
- web-app_3_1.xsd
- web-common_3_1.xsd

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- jakartaee_11.xsd
- jakarta_web-services_2_0.xsd
- jakarta_web-services_client_2_0.xsd
- jsp_3_0.xsd
- jsp_3_1.xsd
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- web-app_5_0.xsd
- web-app_6_0.xsd
- web-app_6_1.xsd
- web-commonn_5_0.xsd
- web-commonn_6_0.xsd
- web-commonn_6_1.xsd
- web-fragment_5_0.xsd
- web-fragment_6_0.xsd
- web-fragment_6_1.xsd
- web-jsptaglibrary_3_0.xsd
- web-jsptaglibrary_3_1.xsd
- web-jsptaglibrary_4_0.xsd

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org.apache.tomcat.util.json.JSONParser.jj is
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The org.apache.catalina.tribes.membership.cloud package contains derivative
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The original XML Schemas for Java EE Deployment Descriptors:
- javaee_5.xsd
- javaee_web_services_1_2.xsd
- javaee_web_services_client_1_2.xsd
- javaee_6.xsd
- javaee_web_services_1_3.xsd
- javaee_web_services_client_1_3.xsd
- jsp_2_2.xsd
- web-app_3_0.xsd
- web-common_3_0.xsd
- web-fragment_3_0.xsd
- javaee_7.xsd

- javaee_web_services_1_4.xsd
- javaee_web_services_client_1_4.xsd
- jsp_2_3.xsd
- web-app_3_1.xsd
- web-common_3_1.xsd
- web-fragment_3_1.xsd
- javaee_8.xsd
- web-app_4_0.xsd
- web-common_4_0.xsd
- web-fragment_4_0.xsd

may be obtained from:
http://www.oracle.com/webfolder/technetwork/jsc/xml/ns/javaee/index.html

# 1.2713 tomcat-embed-el 11.0.14

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package:
name: libart-lgpl
version: 2.3.21
epoch: 3
description: A library for high-performance 2D graphics
copyright:
- license: LGPL-2.0-or-later

```
var-transforms:
 - from: ${{package.version}}
   match: ^(\d+)\.(\d+)\.(\d+)$
   replace: LIBART_LGPL_${1}_${2}_$3
   to: tag-name

environment:
 contents:
   packages:
     - autoconf
     - automake
     - build-base
     - busybox
     - ca-certificates-bundle
     - libtool

pipeline:
 - uses: git-checkout
   with:
     repository: https://gitlab.gnome.org/Archive/libart_lgpl
     tag: ${{vars.tag-name}}
     expected-commit: 7119bfe163a5a5325405acb7eab1b16152e8032a

 - runs: autoreconf -vif

 - uses: autoconf/configure
   with:
     opts: |
       --disable-static

 - uses: autoconf/make

 - uses: autoconf/make-install

 - uses: strip

subpackages:
 - name: libart-lgpl-dev
   pipeline:
     - uses: split/dev
   dependencies:
     runtime:
       - libart-lgpl
   description: libart-lgpl dev
    test:
     pipeline:
       - runs: |
```

```
        libart2-config --version
      - uses: test/pkgconf
      - uses: test/tw/ldd-check

update:
 enabled: true
 release-monitor:
   identifier: 21864

test:
 pipeline:
   - uses: test/tw/ldd-check
```

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limitations under the License.
package:
name: py3-license-expression
version: "30.4.4"
epoch: 1
description: license-expression is a comprehensive utility library to parse, compare, simplify and normalize license expressions (such as SPDX license expressions) using boolean logic.
copyright:
- license: Apache-2.0
dependencies:
provider-priority: 0

vars:
pypi-package: license-expression
import: license_expression

data:
- name: py-versions

```
  items:
    3.10: '310'
    3.11: '311'
    3.12: '312'
    3.13: '313'

environment:
 contents:
  packages:
    - py3-supported-build-base

pipeline:
 - uses: git-checkout
  with:
    repository: https://github.com/nexB/license-expression
    tag: v${{package.version}}
    expected-commit: a3c00c09986bcca1240afd5b1844b56de3f581c1

subpackages:
 - range: py-versions
  name: py${{range.key}}-${{vars.pypi-package}}
  description: python${{range.key}} version of ${{vars.pypi-package}}
  dependencies:
    provider-priority: ${{range.value}}
     provides:
      - ${{package.name}}
      - py3-${{vars.pypi-package}}
    runtime:
      - py${{range.key}}-boolean.py
  pipeline:
    - uses: py/pip-build-install
      with:
        python: python${{range.key}}
    - uses: strip
  test:
    pipeline:
      - uses: python/import
        with:
          python: python${{range.key}}
          imports: |
            import ${{vars.import}}

 - name: py3-supported-${{vars.pypi-package}}
  description: meta package providing ${{vars.pypi-package}} for supported python versions.
  dependencies:
    runtime:
      - py3.10-${{vars.pypi-package}}
      - py3.11-${{vars.pypi-package}}
```

```
      - py3.12-${{vars.pypi-package}}
      - py3.13-${{vars.pypi-package}}
  test:
    pipeline:
      - uses: test/metapackage

test:
 pipeline:
   - uses: python/import
     with:
       imports: |
         import ${{vars.import}}

update:
 enabled: true
 github:
   identifier: nexB/license-expression
    strip-prefix: v
package:
 name: go-licenses
 version: "2.0.1"
 epoch: 2 # CVE-2025-61729
 description: A lightweight tool to report on the licenses used by a Go package and its dependencies. Highlight!
Versioned external URL to licenses can be found at the same time.
 copyright:
   - license: Apache-2.0

pipeline:
 - uses: git-checkout
   with:
     repository: https://github.com/google/go-licenses
     tag: v${{package.version}}
     expected-commit: 3e084b0caf710f7bfead967567539214f598c0a2

 - uses: go/build
   with:
     modroot: .
     packages: .
     output: go-licenses

update:
 enabled: true
 github:
   identifier: google/go-licenses
   strip-prefix: v

test:
 pipeline:
```

```
  # AUTOGENERATED
  - runs: |
      go-licenses --help
issuer: https://accounts.google.com

# staging-enforce: ci-license-checka7daalc99klekq@staging-enforce-cd1e.iam.gserviceaccount.com
(111508570611001124410)
# prod-images: TODO
subject_pattern: "(111508570611001124410)"

permissions:
 checks: write
 pull_requests: write # need to comment on PRs
```

# 1.2718 golang 1.25.6

## 1.2718.1 Available under license :

```
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package copyright

import (
 "bytes"
 "internal/testenv"
 "io"
 "io/fs"
 "os"
 "path/filepath"
 "testing"
)

var copyright = []byte("Copyright")

var permitted = [][]byte{
 []byte("// Code generated by "),
 []byte("// Code generated from "),
 []byte("// Created by cgo -cdefs"),
 []byte("// DO NOT EDIT\n// generated by:"),
 []byte("// Empty assembly file"),
 []byte("// Generated using cgo"),
 []byte("// Original source:\n//\thttp://www.zorinaq.com/papers/md5-amd64.html"), // public domain crypto/md5
 []byte("// created by cgo -cdefs"),
 []byte("// go run mkasm.go"),
 []byte("// mkerrors"),
 []byte("// mksys"),
```

```
 []byte("// run\n// Code generated by"), // cmd/compile/internal/test/constFold_test.go
}

func TestCopyright(t *testing.T) {
 buf := make([]byte, 2048)
 filepath.WalkDir(filepath.Join(testenv.GOROOT(t), "src"), func(path string,
 d fs.DirEntry, err error) error {
  if d.IsDir() && (d.Name() == "testdata" || d.Name() == "vendor") {
   return filepath.SkipDir
  }
  switch filepath.Ext(d.Name()) {
  default:
   return nil
  case ".s", ".go":
   // check
  }

  f, err := os.Open(path)
  if err != nil {
   t.Error(err)
   return nil
  }
  defer f.Close()
  n, err := f.Read(buf)
  if err != nil && err != io.EOF {
   t.Error(err)
   return nil
  }
  b := buf[:n]
  if bytes.Contains(b, copyright) {
   return nil
  }
  for _, ok := range permitted {
   if bytes.HasPrefix(b, ok) {
    return nil
   }
  }
  t.Errorf("%s: missing copyright notice", path)
  return nil
 })
}
```

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* DNS resolver (dirmngr/dns.c)

dns.c - Recursive, Reentrant DNS Resolver.
---
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* Regular
expression support

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Subsequently modified by:

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1987 James A. Woods ames!jaw
1993 Christopher Seiwald seiwald@vix.com
2000, 2002 Christopher Seiwald <seiwald@perforce.com>
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* /xalan-2-7-2-sources-8-jar/org/apache/xalan/Version.java
No license file was found, but licenses were detected in source scan.

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jar/org/apache/xpath/patterns/NodeTestFilter.java/*
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-
jar/org/apache/xpath/patterns/StepPattern.java/*
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-
jar/org/apache/xpath/patterns/UnionPattern.java/*
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-
jar/org/apache/xpath/patterns/package.html<!--
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-
jar/org/apache/xpath/res/XPATHErrorResources.java/*
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-
jar/org/apache/xpath/res/XPATHErrorResources_ca.java/*
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-
jar/org/apache/xpath/res/XPATHErrorResources_cs.java/*
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-
jar/org/apache/xpath/res/XPATHErrorResources_de.java/*
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-
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jar/org/apache/xpath/res/XPATHErrorResources_es.java/*
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-
jar/org/apache/xpath/res/XPATHErrorResources_fr.java/*
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-
jar/org/apache/xpath/res/XPATHErrorResources_hu.java/*
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-
jar/org/apache/xpath/res/XPATHErrorResources_it.java/*
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-
jar/org/apache/xpath/res/XPATHErrorResources_ja.java/*
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-
jar/org/apache/xpath/res/XPATHErrorResources_ko.java/*
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-
jar/org/apache/xpath/res/XPATHErrorResources_pl.java/*
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-
jar/org/apache/xpath/res/XPATHErrorResources_pt_BR.java/*
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-
jar/org/apache/xpath/res/XPATHErrorResources_ru.java/*
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-

jar/org/apache/xpath/res/XPATHErrorResources_sk.java/*
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-jar/org/apache/xpath/res/XPATHErrorResources_sl.java/*
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-jar/org/apache/xpath/res/XPATHErrorResources_sv.java/*
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-jar/org/apache/xpath/res/XPATHErrorResources_tr.java/*
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-jar/org/apache/xpath/res/XPATHErrorResources_zh.java/*
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-jar/org/apache/xpath/res/XPATHErrorResources_zh_CN.java/*
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-jar/org/apache/xpath/res/XPATHErrorResources_zh_TW.java/*
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-jar/org/apache/xpath/res/XPATHMessages.java/*
/opt/cola/permits/2870266631_1768822077.5859606/0/xalan-2-7-2-sources-8-jar/org/apache/xpath/res/package.html<!--

Found
in path(s):
*

# 1.2725 zlib 1:1.3.dfsg-3.1ubuntu2.1

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Jean-loup Gailly Mark Adler

jloup@gzip.org madler@alumni.caltech.edu

# 1.2726 decode-named-character-reference 1.3.0

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# 1.2727 groupcache 0.0.0-20241129210726-2c02b8208cf8

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# 1.2729 protobuf 1.5.4

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# 1.2730 go-grpc-middleware 1.3.0

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# 1.2733 validate-npm-package-name 7.0.2

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# 1.2740 cmd-shim 8.0.0

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# 1.2750 string-width 4.2.3

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# 1.2754 promzard 3.0.1

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# 1.2773 qrcode-terminal 0.12.0

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# 1.2774 json-parse-even-better-errors 5.0.0

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# 1.2775 promise-all-reject-late 1.0.1

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# 1.2780 proc-log 6.1.0

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# 1.2783 binary-extensions 3.1.0

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# 1.2784 fastjson 1.6.7

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# 1.2785 tar 2:1.34-9.el9_7

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```
/*  Extract the last component (base name) of a file name.

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#ifndef _BASENAME_LGPL_H
#define _BASENAME_LGPL_H

#include <stddef.h>

#ifndef DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif


/*
 Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
```

```
  system root, return the empty string.
  Examples:
          FILENAME      RESULT
          "foo.c"       "foo.c"
          "foo/bar.c"   "bar.c"
          "/foo/bar.c"  "bar.c"
          "foo/bar/"    "bar/"
          "foo/bar//"   "bar//"
          "/"           ""
          "//"          ""
          ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(), defined in <string.h>, does
      not consider trailing slashes to be part of the component:
          FILENAME
      RESULT
          "foo/bar/"    ""
          "foo/bar//"   ""
    * The 'basename' command eliminates trailing slashes and for a root
      produces a non-empty result:
          FILENAME      RESULT
          "foo/bar/"    "bar"
          "foo/bar//"   "bar"
          "/"           "/"
          "//"          "/"
*/
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;


#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
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source code for the Library including whatever
changes were used in the work (which must be distributed under
Sections 1 and 2 above); and, if the work is an executable linked
with the Library, with the complete machine-readable "work that
uses the Library", as object code and/or source code, so that the
user can modify the Library and then relink to produce a modified
executable containing the modified Library. (It is understood
that the user who changes the contents of definitions files in the
Library will not necessarily be able to recompile the application
to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the
Library. A suitable mechanism is one that (1) uses at run time a
copy of the library already present on the user's computer system,
rather than copying library functions into the executable, and (2)
will operate properly with a modified version of the library, if
the user
installs one, as long as the modified version is
interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at
least three years, to give the same user the materials
specified in Subsection 6a, above, for a charge no more
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d) If distribution of the work is made by offering access to copy
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components (compiler, kernel, and so on) of the operating system on
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 library `Frob' (a library for tweaking knobs) written by James Random Hacker.

 <signature of Ty Coon>, 1 April 1990
 Ty Coon, President of Vice

That's all there is to it!
*uganda.txt*    For Vim version 8.2.  Last change: 2020 Jan 08


    VIM REFERENCE MANUAL    by Bram Moolenaar


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encouraged to make a donation for needy children in Uganda.  Please see |kcc|
below or visit the ICCF web site, available at these URLs:

http://iccf-holland.org/
http://www.vim.org/iccf/
http://www.iccf.nl/

You can also sponsor the development of Vim. Vim sponsors can vote for features. See |sponsor|. The money goes to Uganda anyway.

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then this license, or a later version, also applies to your changes. The current maintainer is Bram Moolenaar <Bram@vim.org>. If this changes it will be announced in appropriate places (most likely vim.sf.net, www.vim.org and/or comp.editors). When it is completely impossible to contact the maintainer, the obligation to send him your changes ceases. Once the maintainer has confirmed that he has received your changes they will not have to be sent again.
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c) Provide all the changes, including source code, with every copy of

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- You clearly describe in the distribution how to contact you. This contact information must remain valid for at least three years after last distributing the corresponding modified Vim, or as long as possible.

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4) The contact information as required under 2)a) and 2)d) must not be removed or changed, except that the person himself can make corrections.

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If the number of changes is small (e.g., a modified Makefile) e-mailing a context diff will do. The e-mail address to be used is <maintainer@vim.org>

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=== end of license ===

Note:

- If you are happy with Vim, please express that by reading the rest of this file and consider helping needy children in Uganda.

- If you want to support further Vim development consider becoming a |sponsor|. The money goes to Uganda anyway.

- According to Richard Stallman the Vim license is GNU GPL compatible. A few minor changes have been made since he checked it, but that should not make a difference.

- If you link Vim with a library that goes under the GNU GPL, this limits further distribution to the GNU GPL. Also when you didn't actually change anything in Vim.

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- If you distribute a modified version of Vim, you can include your name and contact information with the "--with-modified-by" configure argument or the MODIFIED_BY define.

==========
Kibaale Children's Centre *kcc* *Kibaale* *charity*

Kibaale Children's Centre (KCC) is located in Kibaale, a small town in the south of Uganda, near Tanzania, in East Africa. The area is known as Rakai District. The population is mostly farmers. Although people are poor, there is enough food. But this district is suffering from AIDS more than any other part of the world. Some say that it started there. Estimations are that 10 to 30% of the Ugandans are infected with HIV. Because parents die, there are many orphans. In this district about 60,000 children have lost one or both parents, out of a population of 350,000. And this is still continuing.

The children need a lot of help. The KCC is working hard to provide the needy with food, medical care and education. Food and medical care to keep them healthy now, and education so that they can take care of themselves in the future. KCC works on a Christian base, but help is given to children of any religion.

The key to solving the problems in this area is education. This has been neglected in the past years with president Idi Amin and the following civil wars. Now that the government is stable again, the children and parents have

to learn how to take care of themselves and how to avoid infections. There is also help for people who are ill and hungry, but the primary goal is to prevent people from getting ill and to teach them how to grow healthy food.

Most of the orphans are living in an extended family. An uncle or older sister is taking care of them. Because these families are big and the income (if any) is low, a child is lucky if it gets healthy food. Clothes, medical care and schooling is beyond its reach. To help these needy children, a sponsorship program was put into place. A child can be financially adopted. For a few dollars a month KCC sees to it that the child gets indispensable items, is healthy, goes to school and KCC takes care of anything else that needs to be done for the child and the family that supports it.

Besides helping the child directly, the environment where the child grows up needs to be improved. KCC helps schools to improve their teaching methods. There is a demonstration school at the centre and teacher trainings are given. Health workers are being trained, hygiene education is carried out and households are stimulated to build a proper latrine. I helped setting up a production site for cement slabs. These are used to build a good latrine. They are sold below cost price.

There is a small clinic at the project, which provides children and their family with medical help. When needed, transport to a hospital is offered. Immunization programs are carried out and help is provided when an epidemic is breaking out (measles and cholera have been a problem).

*donate*

Summer 1994 to summer 1995 I spent a whole year at the centre, working as a volunteer. I have helped to expand the centre and worked in the area of water and sanitation. I learned that the help that the KCC provides really helps. When I came back to Holland, I wanted to continue supporting KCC. To do this I'm raising funds and organizing the sponsorship program. Please consider one of these possibilities:

1. Sponsor a child in primary school: 17 euro a month (or more).
2. Sponsor a child in secondary school: 25 euro a month (or more).
3. Sponsor the clinic: Any amount a month or quarter
4. A one-time donation

Compared with other organizations that do child sponsorship the amounts are very low. This is because the money goes directly to the centre. Less than 5% is used for administration. This is possible because this is a small organization that works with volunteers. If you would like to sponsor a child, you should have the intention to do this for at least one year.

How do you know that the money will be spent right? First of all you have my

personal guarantee as the author of Vim. I trust the people that are working at the centre, I know them personally. Furthermore, the centre has been co-sponsored and inspected by World Vision, Save the Children Fund and is now under the supervision of Pacific Academy Outreach Society. The centre is visited about once a year to check the progress (at our own cost). I have visited the centre myself many times, starting in 1993. The visit reports are on the ICCF web site.

If you have any further questions, send me e-mail: <Bram@vim.org>.

The address of the centre is:
Kibaale Children's Centre
p.o.
box 1658
Masaka, Uganda, East Africa

Sending money: *iccf-donations*

Check the ICCF web site for the latest information! See |iccf| for the URL.

USA: The methods mentioned below can be used.
Sending a check to the Nehemiah Group Outreach Society (NGOS) is no longer possible, unfortunately. We are looking for another way to get you an IRS tax receipt.
For sponsoring a child contact KCF in Canada (see below). US checks can be sent to them to lower banking costs.

Canada: Contact Kibaale Children's Fund (KCF) in Surrey, Canada. They take care of the Canadian sponsors for the children in Kibaale. KCF forwards 100% of the money to the project in Uganda. You can send them a one time donation directly.
Please send me a note so that I know what has been donated because of Vim. Ask KCF for information about sponsorship.
Kibaale Children's Fund c/o Pacific Academy
10238-168 Street
Surrey, B.C. V4N 1Z4
Canada
Phone: 604-581-5353
If
you make a donation to Kibaale Children's Fund (KCF) you will receive a tax receipt which can be submitted with your tax return.

Holland: Transfer to the account of "Stichting ICCF Holland" in Lisse.
This will allow for tax deduction if you live in Holland.
Postbank, nr. 4548774
IBAN: NL95 INGB 0004 5487 74

Germany: It is possible to make donations that allow for a tax return.
Check the ICCF web site for the latest information:
http://iccf-holland.org/germany.html

World: Use a postal money order. That should be possible from any country, mostly from the post office. Use this name (which is in my passport): "Abraham Moolenaar". Use Euro for the currency if possible.

Europe: Use a bank transfer if possible. Your bank should have a form that you can use for this. See "Others" below for the swift code and IBAN number.
Any other method should work. Ask for information about sponsorship.

Credit Card: You can use PayPal to send money with a Credit card. This is
the most widely used Internet based payment system. It's really simple to use. Use this link to find more info:
https://www.paypal.com/en_US/mrb/pal=XAC62PML3GF8Q
The e-mail address for sending the money to is:
Bram@iccf-holland.org
For amounts above 400 Euro ($500) sending a check is preferred.

Others: Transfer to one of these accounts if possible:
Postbank, account 4548774
Swift code: INGB NL 2A
IBAN: NL95 INGB 0004 5487 74
under the name "stichting ICCF Holland", Lisse
If that doesn't work:
Rabobank Lisse, account 3765.05.117
Swift code: RABO NL 2U
under the name "Bram Moolenaar", Lisse
Otherwise, send a check in euro or US dollars to the address below. Minimal amount: $70 (my bank does not accept smaller amounts for foreign check, sorry)

Address to send checks to:
Bram Moolenaar
Finsterruetihof 1
8134 Adliswil
Switzerland

This address is expected to be valid for a long time.

vim:tw=78:ts=8:noet:ft=help:norl:

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# 1.2787 binutils 2.35.2-67.el9_7.1

## 1.2787.1 Available under license :

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Version 2, June 1991

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```
  02110-1301, USA.  */


#ifndef __VTV_H__
#define __VTV_H__

/* We could have used an enumeration here but it just makes it more
  difficult for the compiler to generate a call to this.  These are
  used as arguments to the function __VLTChangePermission, declared
  below.  */
#define __VLTP_READ_ONLY  0
#define __VLTP_READ_WRITE 1

#ifdef __cplusplus
extern "C" void __VLTChangePermission (int);
#else
extern void __VLTChangePermission (int);
#endif

#ifdef BIG_PAGE_SIZE
/* TODO - Replace '4096' below with correct big page size.  */
#define VTV_PAGE_SIZE 4096
#else
#if defined(__sun__) && defined(__svr4__) && defined(__sparc__)
#define VTV_PAGE_SIZE 8192
#else
#define VTV_PAGE_SIZE 4096
#endif
#endif



#endif /* __VTV_H__ */
```

(This file is under construction.)  -*- text -*-

If you've contributed to gas and your name isn't listed here, it is
not meant as a slight.  I just don't know about it.  Email me,
nickc@redhat.com and I'll correct the situation.

This file will eventually be deleted: The general info will go into
the documentation, and info on specific files will go into an AUTHORS
file, as requested by the FSF.

++++++++++++++++

Dean Elsner wrote the original gas for vax.  [more details?]

Jay Fenlason maintained gas for a while, adding support for

gdb-specific debug information and the 68k series machines, most of the preprocessing pass, and extensive changes in messages.c, input-file.c, write.c.

K. Richard Pixley maintained gas for a while, adding various enhancements and many bug fixes, including merging support for several processors, breaking gas up to handle multiple object file format backends (including heavy rewrite, testing, an integration of the coff and b.out backends), adding configuration including heavy testing and verification of cross assemblers and file splits and renaming, converted gas to strictly ansi C including full prototypes, added support for m680[34]0 & cpu32, considerable work on i960 including a coff port (including considerable amounts of reverse engineering), a sparc opcode file rewrite, decstation, rs6000, and hp300hpux host ports, updated "know" assertions and made them work, much other reorganization, cleanup, and lint.

Ken Raeburn wrote the high-level BFD interface code to replace most of the code in format-specific I/O modules.

The original Vax-VMS support was contributed by David L. Kashtan. Eric Youngdale and Pat Rankin have done much work with it since.

The Intel 80386 machine description was written by Eliot Dresselhaus.

Minh Tran-Le at IntelliCorp contributed some AIX 386 support.

The Motorola 88k machine description was contributed by Devon Bowen of Buffalo University and Torbjorn Granlund of the Swedish Institute of Computer Science.

Keith Knowles at the Open Software Foundation wrote the original MIPS back end (tc-mips.c, tc-mips.h), and contributed Rose format support that hasn't been merged in yet. Ralph Campbell worked with the MIPS code to support a.out format.

Support for the Zilog Z8k and Hitachi H8/300, H8/500 and SH processors (tc-z8k, tc-h8300, tc-h8500, tc-sh), and IEEE 695 object file format (obj-ieee), was written by Steve Chamberlain of Cygnus Solutions. Steve also modified the COFF back end (obj-coffbfd) to use BFD for some low-level operations, for use with the Hitachi, 29k and Zilog targets.

John Gilmore built the AMD 29000 support, added .include support, and simplified the configuration of which versions accept which pseudo-ops. He updated the 68k machine description so that Motorola's

opcodes always produced fixed-size instructions (e.g. jsr), while synthetic instructions remained shrinkable (jbsr). John fixed many bugs, including true tested cross-compilation support, and one bug in relaxation
that took a week and required the proverbial one-bit fix.

Ian Lance Taylor of Cygnus Solutions merged the Motorola and MIT syntaxes for the 68k, completed support for some COFF targets (68k, i386 SVR3, and SCO Unix), wrote the ECOFF support based on Michael Meissner's mips-tfile program, wrote the PowerPC and RS/6000 support, and made a few other minor patches. He handled the binutils releases for versions 2.7 through 2.9.

David Edelsohn contributed fixes for the PowerPC and AIX support.

Steve Chamberlain made gas able to generate listings.

Support for the HP9000/300 was contributed by Glenn Engel of HP.

Support for ELF format files has been worked on by Mark Eichin of Cygnus Solutions (original, incomplete implementation), Pete Hoogenboom at the University of Utah (HPPA mainly), Michael Meissner of the Open Software Foundation (i386 mainly), and Ken Raeburn of Cygnus Solutions (sparc, initial 64-bit support).

Several engineers at Cygnus Solutions have also provided many
small
bug fixes and configuration enhancements.

The initial Alpha support was contributed by Carnegie-Mellon University. Additional work was done by Ken Raeburn of Cygnus Solutions. Richard Henderson then rewrote much of the Alpha support.

Ian Dall updated the support code for the National Semiconductor 32000 series, and added support for Mach 3 and NetBSD running on the PC532.

Klaus Kaempf ported the assembler and the binutils to openVMS/Alpha.

Steve Haworth contributed the support for the Texas Instruction c30 (tms320c30).

H.J. Lu has contributed many patches and much testing.

Alan Modra reworked much of the i386 backend, improving the error checking, updating the code, and improving the 16 bit support, using patches from the work of Martynas Kunigelis and H.J. Lu.

Many others have contributed large or small bugfixes and enhancements. If

you've contributed significant work and are not mentioned on this list, and
want to be, let us know.  Some of the history has been lost;
 we aren't
intentionally leaving anyone out.

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necessary.  Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the
library `Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

That's all there is to it!

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Version 2, June 1991

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of this license document, but changing it is not allowed.

[This is the first released version of the library GPL.  It is
numbered 2 because it goes with version 2 of the ordinary GPL.]

Preamble

The licenses for most software are designed to take away your
freedom to share and change it.  By contrast, the GNU General Public
Licenses are intended to guarantee your freedom to share and change
free software--to make sure the software is free for all its users.

This license, the Library General Public License, applies to some
specially designated Free Software Foundation software, and to any
other libraries whose authors decide to use it.  You can use it for
your libraries, too.

When we speak of free software, we are referring to freedom,
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price.  Our General Public Licenses are designed to make sure that you
have the freedom to distribute copies of free software (and charge for
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if you want it, that you can change the software or use pieces of it
in new free programs; and that you know you can do these things.

To protect your rights, we need to make restrictions that forbid
anyone to deny you these rights or to ask you to surrender the rights.
These restrictions translate to certain responsibilities for you if
you distribute copies of the library, or if you modify it.

For example, if you distribute copies of the library, whether gratis
or for a fee, you must give the recipients all the rights that we gave
you.  You must make sure that they, too, receive or can get the source

code. If you link a program with the library, you must provide complete object files to the recipients so that they can relink them with the library, after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

Our method of protecting your rights has two steps: (1) copyright the library, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the library.

Also, for each distributor's protection, we want to make certain that everyone understands that there is no warranty for this free library. If the library is modified by someone else and passed on, we want its recipients to know that what they have is not the original version, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that companies distributing free software will individually obtain patent licenses, thus in effect transforming the program into proprietary software. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License, which was designed for utility programs. This license, the GNU Library General Public License, applies to certain designated libraries. This license is quite different from the ordinary one; be sure to read it in full, and don't assume that anything in it is the same as in the ordinary license.

The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the

users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not

covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent
of the use of the Library in a tool for
writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

a) The modified work must
itself be a software library.

b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this
function must
be optional: if the application does not supply it, the square

root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition,
mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the
Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by

this License. You must supply
a copy of this License. If the work
during execution displays copyright notices, you must include the
copyright notice for the Library among them, as well as a reference
directing the user to the copy of this License. Also, you must do one
of these things:

a) Accompany the work with the complete corresponding
machine-readable source code for the Library including whatever
changes were used in the work (which must be distributed under
Sections 1 and 2 above); and, if the work is an executable linked
with the Library, with the complete machine-readable "work that
uses the Library", as object code and/or source code, so that the
user can modify the Library and then relink to produce a modified
executable containing the modified Library. (It is understood
that the user who changes the contents of definitions files in the
Library will not necessarily be able to recompile the application
to use the modified definitions.)

b) Accompany the
work with a written offer, valid for at
least three years, to give the same user the materials
specified in Subsection 6a, above, for a charge no more
than the cost of performing this distribution.

c) If distribution of the work is made by offering access to copy
from a designated place, offer equivalent access to copy the above
specified materials from the same place.

d) Verify that the user has already received a copy of these
materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the
Library" must include any data and utility programs needed for
reproducing the executable from it. However, as a special exception,
the source code distributed need not include anything that is normally
distributed (in either source or binary form) with the major
components (compiler, kernel, and so on) of the operating system on
which the executable runs, unless that component itself accompanies
the executable.

It may happen that this requirement contradicts the license
restrictions of other proprietary libraries that do not normally
accompany the operating system. Such a contradiction means you cannot
use both them and the Library together in an executable that you
distribute.

7. You may place library facilities that are a work based on the

Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

a) Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above.

b) Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

8. You may not copy, modify, sublicense, link with, or distribute the Library except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense, link with, or distribute the Library is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

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to distribute software through any other system and a licensee cannot impose that choice.

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END OF TERMS AND CONDITIONS

Appendix: How to Apply These Terms to Your New Libraries

If you develop a new library, and you want it to be of the greatest possible use to the public, we recommend making it free software that everyone can redistribute and change. You can do so by permitting redistribution under these terms (or, alternatively, under the terms of the ordinary General Public License).

To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the

"copyright" line and a pointer to where the full notice is found.

<one line to give the library's name and a brief idea of what it does.>
Copyright (C) <year>
<name of author>

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modify it under the terms of the GNU Library General Public
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Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your
school, if any, to sign a "copyright disclaimer" for the library, if
necessary.
Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the
library `Frob' (a library for tweaking knobs) written by James Random Hacker.

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When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for them if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs, and that you know you can do these things.

To protect your rights, we need to prevent others from denying you these rights or asking you to surrender the rights. Therefore, you have certain responsibilities if you distribute copies of the software, or if you modify it: responsibilities to respect the freedom of others.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must pass on to the recipients the same freedoms that you received. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

Developers that use the GNU GPL protect your rights with two steps: (1) assert copyright on the software, and (2) offer you this License giving you legal permission to copy, distribute and/or modify it.

For the developers' and authors' protection, the GPL clearly explains that there is no warranty for this free software. For both users' and authors' sake, the GPL requires that modified versions be marked as changed, so that their problems will not be attributed erroneously to authors of previous versions.

Some devices are designed to deny users access to install or run modified versions of the software inside them, although the manufacturer can do so. This is fundamentally incompatible with the aim of protecting users' freedom to change the software. The systematic pattern of such abuse occurs in the area of products for individuals to use, which is precisely where it is most unacceptable. Therefore, we have designed this version of the GPL to prohibit the practice for those products. If such problems arise substantially in other domains, we stand

ready to extend this provision to those domains in future versions of the GPL, as needed to protect the freedom of users.

Finally, every program is threatened constantly by software patents. States should not allow patents to restrict development and use of software on general-purpose computers, but in those that do, we wish to avoid the special danger that patents applied to a free program could make it effectively proprietary. To prevent this, the GPL assures that patents cannot be used to render the program non-free.

The precise terms and conditions for copying, distribution and modification follow.

TERMS AND CONDITIONS

0. Definitions.

"This License" refers to version 3 of the GNU General Public License.

"Copyright" also means copyright-like laws that apply to other kinds of works, such as semiconductor masks.

"The Program" refers to any copyrightable work licensed under this License. Each licensee is addressed as "you". "Licensees" and "recipients" may be individuals or organizations.

To "modify" a work means to copy from or adapt all or part of the work in a fashion requiring copyright permission, other than the making of an exact copy. The resulting work is called a "modified version" of the earlier work or a work "based on" the earlier work.

A "covered work" means either the unmodified Program or a work based on the Program.

To "propagate" a work means to do anything with it that, without permission, would make you directly or secondarily liable for infringement under applicable copyright law, except executing it on a computer or modifying a private copy. Propagation includes copying, distribution (with or without modification), making available to the public, and in some countries other activities as well.

To "convey" a work means any kind of propagation that enables other parties to make or receive copies. Mere interaction with a user through a computer network, with no transfer of a copy, is not conveying.

An interactive user interface displays "Appropriate Legal Notices"

to the extent that it includes a convenient and prominently visible feature that (1) displays an appropriate copyright notice, and (2) tells the user that there is no warranty for the work (except to the extent that warranties are provided), that licensees may convey the work under this License, and how to view a copy of this License. If the interface presents a list of user commands or options, such as a menu, a prominent item in the list meets this criterion.

1. Source Code.

The "source code" for a work means the preferred form of the work for making modifications to it. "Object code" means any non-source form of a work.

A "Standard Interface" means an interface that either is an official standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.

The "System Libraries" of an executable work include anything, other than the work as a whole, that (a) is included in the normal form of packaging a Major Component, but which is not part of that Major Component, and (b) serves only to enable use of the work with that Major Component, or to implement a Standard Interface for which an implementation is available to the public in source code form. A "Major Component", in this context, means a major essential component (kernel, window system, and so on) of the specific operating system (if any) on which the executable work runs, or a compiler used to produce the work, or an object code interpreter used to run it.

The "Corresponding Source" for a work in object code form means all the source code needed to generate, install, and (for an executable work) run the object code and to modify the work, including scripts to control those activities. However, it does not include the work's System Libraries, or general-purpose tools or generally available free programs which are used unmodified in performing those activities but which are not part of the work. For example, Corresponding Source includes interface definition files associated with source files for the work, and the source code for shared libraries and dynamically linked subprograms that the work is specifically designed to require, such as by intimate data communication or control flow between those subprograms and other parts of the work.

The Corresponding Source need not include anything that users can regenerate automatically from other parts of the Corresponding Source.

The Corresponding Source for a work in source code form is that same work.

2. Basic Permissions.

All rights granted under this License are granted for the term of copyright on the Program, and are irrevocable provided the stated conditions are met. This License explicitly affirms your unlimited permission to run the unmodified Program. The output from running a covered work is covered by this License only if the output, given its content, constitutes a covered work. This License acknowledges your rights of fair use or other equivalent, as provided by copyright law.

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Conveying under any other circumstances is permitted solely under the conditions stated below. Sublicensing is not allowed; section 10 makes it unnecessary.

3. Protecting Users' Legal Rights From Anti-Circumvention Law.

No covered work shall be deemed part of an effective technological measure under any applicable law fulfilling obligations under article 11 of the WIPO copyright treaty adopted on 20 December 1996, or similar laws prohibiting or restricting circumvention of such measures.

When you convey a covered work, you waive any legal power to forbid circumvention of technological measures to the extent such circumvention is effected by exercising rights under this License with respect to the covered work, and you disclaim any intention to limit operation or modification of the work as a means of enforcing, against the work's users, your or third parties' legal rights to forbid circumvention of technological measures.

4. Conveying Verbatim Copies.

You may convey verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately
publish on each copy an appropriate copyright notice;
keep intact all notices stating that this License and any non-permissive terms added in accord with section 7 apply to the code; keep intact all notices of the absence of any warranty; and give all recipients a copy of this License along with the Program.

You may charge any price or no price for each copy that you convey, and you may offer support or warranty protection for a fee.

5. Conveying Modified Source Versions.

You may convey a work based on the Program, or the modifications to produce it from the Program, in the form of source code under the terms of section 4, provided that you also meet all of these conditions:

a) The work must carry prominent notices stating that you modified it, and giving a relevant date.

b) The work must carry prominent notices stating that it is released under this License and any conditions added under section 7. This requirement modifies the requirement in section 4 to "keep intact all notices".

c) You must license the entire work, as a whole, under this License to anyone who comes into possession of a copy. This License will therefore apply, along with any applicable section 7 additional terms, to the whole of the work, and all its parts, regardless of how they are packaged. This License gives no permission to license the work in any other way, but it does not invalidate such permission if you have separately received it.

d) If the work has interactive user interfaces, each must display Appropriate Legal Notices; however, if the Program has interactive interfaces that do not display Appropriate Legal Notices, your work need not make them do so.

A compilation of a covered work with other separate and independent works, which are not by their nature extensions of the covered work, and which are not combined with it such as to form a larger program, in or on a volume of a storage or distribution
medium, is called an
"aggregate" if the compilation and its resulting copyright are not used to limit the access or legal rights of the compilation's users

beyond what the individual works permit. Inclusion of a covered work in an aggregate does not cause this License to apply to the other parts of the aggregate.

6. Conveying Non-Source Forms.

You may convey a covered work in object code form under the terms of sections 4 and 5, provided that you also convey the machine-readable Corresponding Source under the terms of this License, in one of these ways:

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>>> freebsd-base64-4.8
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==========

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>>> freebsd-base64-4.8

base64.c -- routines to encode/decode base64 data
$OpenLDAP: pkg/ldap/libraries/liblutil/base64.c,v 1.15 2006/01/03 22:12:11 kurt Exp $ /
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>>> unicode-5.0

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This option is useful when you wish to copy part of the code of
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4. You may copy and distribute the Library (or a portion or
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it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library
creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the
Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

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b) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

c) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

d) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany

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7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

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# 1.2796 augeas 1.14.1-3.el9

## 1.2796.1 Available under license :

```
/* Extract the last component (base name) of a file name.

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   along with this program.  If not, see <https://www.gnu.org/licenses/>.  */

#ifndef _BASENAME_LGPL_H
#define _BASENAME_LGPL_H

#include <stddef.h>

#ifndef DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif


/*
 Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
          FILENAME      RESULT
          "foo.c"       "foo.c"
          "foo/bar.c"   "bar.c"
          "/foo/bar.c"  "bar.c"
          "foo/bar/"    "bar/"
          "foo/bar//"   "bar//"
          "/"           ""
          "//"          ""
```

```
            ""          ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(), defined in <string.h>, does
      not consider trailing slashes to be part of the component:

 FILENAME      RESULT
            "foo/bar/"    ""
            "foo/bar//"   ""
    * The 'basename' command eliminates trailing slashes and for a root
      produces a non-empty result:
            FILENAME      RESULT
            "foo/bar/"    "bar"
            "foo/bar//"   "bar"
            "/"           "/"
            "//"          "/"
*/
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;


#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
```

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Version 2.1, February 1999

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Library" means either the Library or any derivative work under
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"Source code" for a work means the preferred form of the work for
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its purpose remains meaningful.

(For example, a function in a library to compute square roots has
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In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

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4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

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6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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a)

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For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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# 1.2812 etcd-pkg 3.6.4

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# Features

This document provides an overview of etcd features and general development guidelines for adding and deprecating them. The project maintainers can override these guidelines per the need of the project following the project governance.

## Overview

The etcd features fall into three stages, experimental, stable, and unsafe.

### Experimental

Any new feature is usually added as an experimental feature. An experimental feature is characterized as below:
- Might be buggy due to a lack of user testing. Enabling the feature may not work as expected.
- Disabled by default when added initially.
- Support for such a feature may be dropped at any time without notice
  - Feature-related issues may be given lower priorities.
  - It can be removed in the next minor or major release without following the feature deprecation policy unless it graduates to a stable future.

### Stable

A stable feature is characterized as below:
- Supported as part of the supported releases of etcd.
-

May be enabled by default.
- Discontinuation of support must follow the feature deprecation policy.

### Unsafe

Unsafe features are rare and listed under the `Unsafe feature:` section in the etcd usage documentation. By default, they are disabled. They should be used with caution following documentation. An unsafe feature can be removed in the next minor or major release without following the feature deprecation policy.

## Development Guidelines

### Adding a new feature

Any new enhancements to the etcd are typically added as an experimental feature. The general development requirements are listed below. They can be somewhat flexible depending on the scope of the feature and review discussions and will evolve over time.
- Open an issue
  - It must provide a clear need for the proposed feature.
  - It should list development work items as checkboxes. There must be one work item towards future graduation to a stable future.
  - Label the issue with `type/feature` and `experimental`.
  - Keep the issue open for tracking purposes until a decision is made on graduation.
- Open a Pull Request (PR)
  - Provide unit tests. Integration tests are also recommended as possible.
  - Provide robust e2e test coverage. If the feature being added is complicated or quickly needed, maintainers can decide to go with e2e tests for basic coverage initially and have robust coverage added at a later time before the feature graduation to the stable feature.
  - Provide logs for proper debugging.
  - Provide metrics and benchmarks as needed.
  - The Feature should be disabled by default.
  - Any configuration flags related to the implementation of the feature must be prefixed with `experimental` e.g. `--experimental-feature-name`.
  - Add a CHANGELOG entry.
- At least two maintainers must approve feature requirements and related code changes.

### Graduating an Experimental feature to Stable

It is important that experimental features don't get stuck in that stage.
They should be revisited and moved to the stable stage following the graduation steps as described here.

#### Locate graduation candidate
Decide if an experimental feature is ready for graduation to the stable stage.
- Find the issue that was used to enable the experimental feature initially. One way to find such issues is to search for issues with `type/feature` and `experimental` labels.
- Fix any known open issues against the feature.
- Make sure the feature was enabled for at least one previous release. Check the PR(s) reference from the issue to see when the feature-related code changes were merged.

#### Provide implementation
If an experimental feature is found ready for graduation to the stable stage, open a Pull Request (PR) with the following changes.
- Add robust e2e tests if not already provided.
- Add a new stable feature flag identical to the experimental feature flag but without the `--experimental` prefix.
- Deprecate the experimental feature following the [feature deprecation
 policy](#Deprecating-a-feature).
- Implementation must ensure that both the graduated and deprecated experimental feature flags work as expected. Note that both these flags will co-exist for the timeframe described in the feature deprecation policy.
- Enable the graduated feature by default if needed.

At least two maintainers must approve the work. Patch releases should not be considered for graduation.

### Deprecating a feature

#### Experimental
An experimental feature deprecates when it graduates to the stable stage.
- Add a deprecation message in the documentation of the experimental feature with a recommendation to use a related stable feature. e.g. `DEPRECATED. Use <feature-name> instead.`
- Add a `deprecated` label in the issue that was initially used to enable the experimental feature.

#### Stable
As the project evolves, a stable feature may sometimes need to be deprecated and removed. Such a situation should be handled using the steps below:
- Create an issue for tracking
 purposes.
- Add a deprecation message in the feature usage documentation before a planned release for feature deprecation. e.g. `To be deprecated in <release>.`. If a new feature replaces the `To be deprecated` feature, then also provide a message saying so. e.g. `Use <feature-name> instead.`.
- Deprecate the feature in the planned release with a message as part of the feature usage documentation. e.g. `DEPRECATED`. If a new feature replaces the deprecated feature, then also provide a message saying so. e.g. `DEPRECATED. Use <feature-name> instead.`.
- Add a `deprecated` label in the related issue.

Remove the deprecated feature in the following release. Close any related issue(s). At least two maintainers must approve the work. Patch releases should not be considered for deprecation.
# Set up the local cluster

For testing and development deployments, the quickest and easiest way is to configure a local cluster. For a production deployment, refer to the [clustering][clustering] section.

## Local standalone cluster

### Starting a cluster

Run the following to deploy an etcd cluster as a standalone cluster:

```
```

```
$ ./etcd
...
```

If the `etcd` binary is not present in the current working directory, it might be located either at `$GOPATH/bin/etcd` or at `/usr/local/bin/etcd`. Run the command appropriately.

The running etcd member listens on `localhost:2379` for client requests.

### Interacting with the cluster

Use `etcdctl` to interact with the running cluster:

1. Store an example key-value pair in the cluster:

   ```
   $ ./etcdctl put foo bar
   OK
   ```

   If OK is printed, storing the key-value pair is successful.

2. Retrieve the value of `foo`:

   ```
   $ ./etcdctl get foo
   bar
   ```

   If `bar` is returned, interaction with the etcd
 cluster is working as expected.

## Local multi-member cluster

### Starting a cluster

A `Procfile` at the base of the etcd git repository is provided to easily configure a local multi-member cluster. To start a multi-member cluster, navigate to the root of the etcd source tree and perform the following:

1. Install `goreman` to control Procfile-based applications:

   ```
   $ go install github.com/mattn/goreman@latest
   ```

   The installation will place executables in the $GOPATH/bin. If $GOPATH environment variable is not set, the tool will be installed into the $HOME/go/bin. Make sure that $PATH is set accordingly in your environment.

2. Start a cluster with `goreman` using etcd's stock Procfile:

```
$ goreman -f Procfile start
```

The members start running. They listen on `localhost:2379`, `localhost:22379`, and `localhost:32379` respectively for client requests.

### Interacting with the cluster

Use `etcdctl` to interact with the running cluster:

1. Print the list of members:

```
$ etcdctl --write-out=table --endpoints=localhost:2379 member list
```

The list of etcd members is displayed as follows:

```
+------------------+---------+--------+------------------------+------------------------+
|       ID         | STATUS  |  NAME  |       PEER ADDRS       |      CLIENT ADDRS      |
+------------------+---------+--------+------------------------+------------------------+
| 8211f1d0f64f3269 | started | infra1 | http://127.0.0.1:2380  | http://127.0.0.1:2379  |
| 91bc3c398fb3c146 | started | infra2 | http://127.0.0.1:22380 | http://127.0.0.1:22379 |
| fd422379fda50e48 | started | infra3 | http://127.0.0.1:32380 | http://127.0.0.1:32379 |
+------------------+---------+--------+------------------------+------------------------+
```

2. Store an example key-value pair in the cluster:

```
$ etcdctl put foo bar
OK
```

If OK is printed, storing the key-value pair is successful.

### Testing fault tolerance

To exercise etcd's fault tolerance, kill a member and attempt to retrieve the key.

1. Identify the process name of the member to be stopped.

The `Procfile` lists the properties of the multi-member cluster. For example, consider the member with the process name, `etcd2`.

2. Stop the member:

```
# kill etcd2
$ goreman run stop etcd2
```

3. Store a key:

```
$ etcdctl put key hello
OK
```

4. Retrieve the key that is stored in the previous step:

```
$ etcdctl get key
hello
```

5. Retrieve a key from the stopped member:

```
$ etcdctl --endpoints=localhost:22379 get key
```

The command should display an error caused by connection failure:

```
2017/06/18 23:07:35 grpc: Conn.resetTransport failed to create client transport: connection error: desc = "transport: dial tcp 127.0.0.1:22379: getsockopt: connection refused"; Reconnecting to "localhost:22379"
Error:  grpc:
timed out trying to connect
```

6. Restart the stopped member:

```
$ goreman run restart etcd2
```

7. Get the key from the restarted member:

```
$ etcdctl --endpoints=localhost:22379 get key
hello
```

Restarting the member re-establishs the connection. `etcdctl` will now be able to retrieve the key successfully. To learn more about interacting with etcd, read [interacting with etcd section][interacting].

[clustering]: https://etcd.io/docs/latest/op-guide/clustering/
[interacting]: https://etcd.io/docs/latest/dev-guide/interacting_v3/
# Branch management

## Guide

* New development occurs on the [main branch][main].
* The main branch should always have a green build!
* Backwards-compatible bug fixes should target the main branch and subsequently be ported to stable branches.
* Once the main branch is ready for release, it will be tagged and become the new stable branch.

The etcd team has adopted a *rolling release model* and supports two stable versions of etcd.

### Main branch

The `main` branch is our development branch. All new features land here first.

To try new and experimental features, pull `main` and play with it. Note that `main` may not be stable because new features may introduce bugs.

Before the release of the next stable version, feature PRs will be frozen. A [release manager](./release.md#release-management) will be assigned to the major/minor version and will lead the etcd community in testing, bug-fix, and documentation of the release for one to two weeks.

### Stable branches

All branches with
the prefix `release-` are considered _stable_ branches.

After every minor release ([semver.org](https://semver.org/)), we will have a new stable branch for that release, managed by a [patch release manager](./release.md#release-management). We will keep fixing the backward-compatible bugs for the latest two stable releases. A _patch_ release to each supported release branch, incorporating any bug fixes, will be once every two weeks, given any patches.

[main]: https://github.com/etcd-io/etcd/tree/main
# Issue triage guidelines

## Purpose

Speed up issue management.

The `etcd` issues are listed at <https://github.com/etcd-io/etcd/issues> and are identified with labels. For example, an issue that is identified as a bug will be set to the label `type/bug`.

The etcd project uses labels to indicate common attributes such as `area`, `type`, and `priority` of incoming issues.

New issues will often start without any labels, but typically `etcd` maintainers, reviewers, and members will add labels by following these triage guidelines. The detailed list of labels can be found at <https://github.com/etcd-io/etcd/labels>.

## Scope

This document serves as the primary guidelines for triaging incoming issues in `etcd`.

All contributors are encouraged and welcome to help manage issues which will help reduce the burden on project maintainers, though the work and responsibilities discussed in this document are created with `etcd` project reviewers and members in mind as these individuals will have
 triage access to the etcd project which is a requirement for actions like applying labels or closing issues.

Refer to [etcd community membership](https://github.com/etcd-io/etcd/blob/main/Documentation/contributor-guide/community-membership.md) for guidance on becoming an etcd project member or reviewer.

## Step 1 - Find an issue to triage

To get started you can use the following recommended issue searches to identify issues that are in need of triage:

* [Issues that have no labels](https://github.com/etcd-io/etcd/issues?q=is%3Aissue+is%3Aopen+sort%3Aupdated+no%3Alabel)
* [Issues created recently](https://github.com/etcd-io/etcd/issues?q=is%3Aissue+is%3Aopen+)
* [Issues not assigned but linked pr](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+no%3Aassignee+linked%3Apr)
* [Issues with no comments](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+comments%3A0+)
* [Issues with help wanted](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+label%3A%22help+wanted%22+)

## Step 2 - Check the issue is valid

Before we start adding labels or trying to work out a priority, our first triage step needs to be working out if the issue actually belongs to the etcd project and is not a duplicate.

### Issues that don't belong to etcd

Sometimes issues are reported that belong to other projects that `etcd` use. For example, `grpc` or `golang` issues. Such issues should be addressed by asking the reporter to open issues in the appropriate other projects.

These issues can generally be closed unless a maintainer and issue reporter see a need to keep it open for tracking purposes. If you have triage permissions please close it, alternatively mention the @etcd-io/members group to request a member with triage access to close the issue.

### Duplicate issues

If an issue is a duplicate, add a comment stating so along with a reference for the original issue and if you have triage permissions please close it, alternatively mention the @etcd-io/members group to request a member with triage access close the issue.

## Step 3 - Apply the appropriate type of label

Adding a `type` label to an issue helps create visibility on the health of the project and helps contributors identify potential priorities, i.e. addressing existing bugs or test flakes before implementing new features.

### Support requests

As a general rule, the focus for etcd support is to address common themes in a broad way that helps all users, i.e. through channels like known issues, frequently asked questions, and high-quality documentation. To make the best use of project members time we should avoid providing 1:1 support if a broad approach is available.

Some people mistakenly use our GitHub bug report or feature request templates to file support requests. Usually, they are asking for help operating or configuring some aspect of etcd. Support requests for etcd should instead be raised as [discussions](https://github.com/etcd-io/etcd/discussions).

Common types of support requests are:

1. Questions about configuring or operating existing well-documented etcd features, for example, <https://github.com/etcd-io/etcd/issues/15945>. Note - If an existing feature is not well documented please apply the `area/documentation` label and propose documentation improvements that would prevent future users from stumbling on the problem again.

2. Bug reports or questions about unsupported versions of etcd, for example <https://github.com/etcd-io/etcd/issues/15796>. When responding to these issues please refer to our [supported versions documentation](https://etcd.io/docs/latest/op-guide/versioning) and encourage the reporter to upgrade to a recent patch release of a supported version as soon as possible. We should limit the effort supporting users that do not make the effort to run a supported version of etcd or ensure their version is patched.

3. Bug reports that do not provide a complete list of steps to reproduce the issue and/or contributors are not able to reproduce the issue, for example, <https://github.com/etcd-io/etcd/issues/15740>. We should limit the effort we put into reproducing issues ourselves and motivate users to provide the necessary information to accept the bug report.

4. General questions that are filed using feature request or bug report issue templates, for example, <https://github.com/etcd-io/etcd/issues/15914>. Note - These types of requests may surface good additions to our [frequently asked questions](https://etcd.io/docs/v3.5/faq).

If you identify that an issue is a support request please:

1. Add the `type/support` or `type/question` label.

2. Add the following comment to inform the issue creator that discussions should be used instead and that this issue will be converted to a discussion.

> Thank you for your question, this support issue will be moved to our [Discussion Forums](https://github.com/etcd-io/etcd/discussions).
>
> We are trying to consolidate the channels to which questions for help/support are posted so that we can improve our efficiency in responding to your requests, and make it easier for you to find answers to frequently asked questions and how to address common use cases.
>
> We regularly see messages posted in multiple forums, with the full response thread only in one place or, worse, spread across multiple forums. Also, the large volume of support issues on GitHub is making it difficult for us to use issues to identify real bugs.
>
> Members of the etcd community use Discussion Forums to field support requests. Before posting a new question, please search these for answers to similar questions, and also familiarize yourself with:
>
> 1. [user documentation](https://etcd.io/docs/latest)
> 2. [frequently asked questions](https://etcd.io/docs/v3.5/faq)
>
> Again, thanks for using etcd and raising this question.
>
> The etcd team

3. Finally, click `Convert to discussion` on the right-hand panel, selecting the appropriate discussion category.

### Bug reports

If an issue has been raised as a bug it should already have the `type/bug` label, however, if this is missing for an issue you determine to be a bug please add the label manually.

The next step is to validate if the issue is indeed a bug. If not, add a comment with the findings and close the trivial issue. For non-trivial issues, wait to hear back from the issue reporter and see if there is any objection. If the issue reporter does not reply in 30 days, close the issue.

If the problem can not be reproduced or requires more information, leave a comment for the issue reporter as soon as possible while the issue is fresh for the issue reporter.

### Feature requests

New feature requests should be created via the etcd feature request template and in theory already have the `type/feature` label, however, if this is missing for an issue you determine to be a feature please add the label manually.

### Test flakes

Test flakes are a specific type of bug that the etcd project tracks separately as these are a priority to address. These should be created via the test flake template and in theory already have the `type/flake` label, however, if this is missing for an

issue you determine to be related to a flaking test please add the label manually.

## Step 4 - Define the areas impacted

Adding an `area` label to an issue helps create visibility on which areas of the etcd project require attention and helps contributors find issues to work on relating to their particular skills or knowledge of the etcd codebase.

If an issue crosses multiple domains please add additional `area` labels to reflect that.

Below is a brief summary of the area labels in active use by the etcd project along with any notes on their use:

| Label | Notes |
| --- | --- |
| area/external | Tracking label for issues raised that are external to etcd. |
| area/community | |
| area/raft | |
| area/clientv3 | |
| area/performance | |
| area/security | |
| area/tls | |
| area/auth | |
| area/etcdctl | |
| area/etcdutl | |
| area/contrib | Not to be confused with `area/community` this label is specifically used for issues relating to community-maintained scripts or files in the `contrib/` directory which aren't part of the core etcd project. |
| area/documentation | |
| area/tooling | Generally used in relation to the third party / external utilities or tools that are used in various stages of the etcd build, test, or release process, for example, tooling to create sboms. |
| area/testing | |
| area/robustness-testing | |

## Step 5 - Prioritise the issue

If an issue lacks a priority label it has not been formally prioritized yet.

Adding a `priority` label helps the etcd project understand what is important and should be worked on now, and conversely, what is not as important and is on the project backlog.

|Priority label|What it means|Examples|
|---|---|---|
| `priority/critical-urgent` | Maintainers are responsible for making sure that these issues (in their area) are being actively worked oni.e., drop what you're doing. The stuff is burning. These should be fixed before the next release. | user-visible critical bugs in core features <br> broken builds on tier1 supported platforms <br> tests and critical security issues |
| `priority/important-soon` | Must be staffed and worked on either currently or very soonideally in time for the next release. | |

| `priority/important-longterm` | Important over the long term, but may not be currently staffed and/or may require multiple releases to complete. | |
| `priority/backlog`  | General agreement that this is a nice-to-have, but no one's available to work on it anytime soon. Community contributions would be most welcome in the meantime, though it might take a while to get them reviewed if reviewers are fully occupied with higher-priority issuesfor example, immediately before a release.| |
| `priority/awaiting-more-evidence`
 | Possibly useful, but not yet enough support to actually get it done. | Mostly placeholders for potentially good ideas, so that they don't get completely forgotten, and can be referenced or deduped every time they come up |

## Step 6 - Support new contributors

As part of the `etcd` triage process once the `kind` and `area` have been determined, please consider if the issue would be suitable for a less experienced contributor. The `good first issue` label is a subset of the `help wanted` label, indicating that members have committed to providing extra assistance for new contributors. All `good first issue` items also have the `help wanted` label.

### Help wanted

Items marked with the `help wanted` label need to ensure that they meet these criteria:

* **Low Barrier to Entry** - It should be easy for new contributors.

* **Clear** - The task is agreed upon and does not require further discussions in the community.

* **Goldilocks priority** - The priority
 should not be so high that a core contributor should do it, but not too low that it isnt useful enough for a core contributor to spend time reviewing it, answering questions, helping get it into a release, etc.

### Good first issue

Items marked with `good first issue` are intended for first-time contributors. It indicates that members will keep an eye out for these pull requests and shepherd it through our processes.

New contributors should not be left to find an approver, ping for reviews, decipher test commands, or identify that their build failed due to a flake. It is important to make new contributors feel welcome and valued. We should assure them that they will have an extra level of help with their first contribution.

After a contributor has successfully completed one or two `good first issue` items, they should be ready to move on to `help wanted` items.

* **No Barrier to Entry** - The task is something that a new contributor can tackle without advanced setup or domain knowledge.

*
 **Solution Explained** - The recommended solution is clearly described in the issue.

* **Gives Examples** - Link to examples of similar implementations so new contributors have a reference guide for their changes.

* **Identifies Relevant Code** - The relevant code and tests to be changed should be linked in the issue.

* **Ready to Test** - There should be existing tests that can be modified, or existing test cases fit to be copied. If the area of code doesnt have tests, before labeling the issue, add a test fixture. This prep often makes a great help wanted task!

## Step 7 - Follow up

Once initial triage has been completed, issues need to be re-evaluated over time to ensure they don't become stale incorrectly.

### Track important issues

If an issue is at risk of being closed by the stale bot in the future, but is an important issue for the etcd project, then please apply the `stage/tracked` label and remove any `stale` labels that exist. This will ensure the project does not lose sight of the issue.

### Close incomplete issues

Issues that lack enough information from the issue reporter should be closed if the issue reporter does not provide information in 30 days. Issues can always be re-opened at a later date if new information is provided.

### Check for incomplete work

If an issue owned by a developer has no pull request created in 30 days, contact the issue owner and kindly ask about the status of their work, or to release ownership on the issue if needed.
# PR management

## Purpose

Speed up PR management.

The `etcd` PRs are listed at https://github.com/etcd-io/etcd/pulls
A PR can have various labels, milestones, reviewers, etc. The detailed list of labels can be found at https://github.com/kubernetes/kubernetes/labels

Following are a few example searches on PR for convenience:
* [Open PRS for milestone etcd-v3.6](https://github.com/etcd-io/etcd/pulls?utf8=%E2%9C%93&q=is%3Apr+is%3Aopen+milestone%3Aetcd-v3.6)
* [PRs under investigation](https://github.com/etcd-io/etcd/labels/Investigating)

## Scope

These guidelines serve as a primary document for managing PRs in `etcd`. Everyone is welcome to help manage PRs but the work and responsibilities discussed in this document are created with `etcd` maintainers and active contributors in mind.

## Ensure tests are run

The etcd project use Kubernetes Prow and GitHub Actions to run tests. To ensure all required tests run if a pull request is ready for testing and still has the `needs-ok-to-test`
label then please comment on the pull request `/ok-to-test`.

## Handle inactive PRs
Poke PR owner if review comments are not addressed in 15 days. If the PR owner does not reply in 90 days, update the PR with a new commit if possible. If not, inactive PR should be closed after 180 days.

## Poke reviewer if needed

Reviewers are responsive in a timely fashion, but considering everyone is busy, give them some time after requesting a review if a quick response is not provided. If the response is not provided in 10 days, feel free to contact them via adding a comment in the PR or sending an email or message on Slack.

## Verify important labels are in place

Make sure that appropriate reviewers are added to the PR. Also, make sure that a milestone is identified. If any of these or other important labels are missing, add them. If a correct label cannot be decided, leave a comment for the maintainers to do so as needed.
# Roadmap

etcd uses GitHub milestones to track all tasks in each major or minor release. The `roadmap.md` file only records the
most important tasks for each release. The list is based on the current maintainer capacity that may shift over time. Proposed milestones are what we think we can deliver with the people we have. If we have more support on the important
stuff, we could pick up more items from the backlog. Note that etcd will continue to mainly focus on technical debt over
the next few major or minor releases.

Each item has an assigned priority. Refer to [priority definitions](https://github.com/etcd-io/etcd/blob/main/Documentation/contributor-guide/triage_issues.md#step-5---prioritise-the-issue).

## v3.6.0

For a full list of tasks in `v3.6.0`, please see [milestone etcd-v3.6](https://github.com/etcd-io/etcd/milestone/38).

| Title | Priority | Status | Note |
|---|---|---|---|
| [Support downgrade](https://github.com/etcd-io/etcd/issues/11716) | priority/important-soon | In progress | etcd will support downgrade starting from 3.6.0. But it will also support offline downgrade from 3.5 to 3.4. |
| [StoreV2 deprecation](https://github.com/etcd-io/etcd/issues/12913) | priority/important-soon | In progress | This task will be covered in both 3.6 and 3.7. |

|
| [Release raft 3.6.0](https://github.com/etcd-io/raft/issues/89) | priority/important-soon | Not started | etcd 3.6.0 will depends on raft 3.6.0 |
| [Release bbolt 1.4.0](https://github.com/etcd-io/bbolt/issues/553) | priority/important-soon | Not started | etcd 3.6.0 will depends on bbolt 1.4.0 |
| [Support /livez and /readyz endpoints](https://github.com/etcd-io/etcd/issues/16007) | priority/important-longterm | In progress | It provides clearer APIs, and can also work around the stalled writes issue |
| [Bump gRPC](https://github.com/etcd-io/etcd/issues/16290) | priority/important-longterm | Completed | It isn't guaranteed to be resolved in 3.6, and might be postponed to 3.7 depending on the effort and risk. |
| [Deprecate grpc-gateway or bump it](https://github.com/etcd-io/etcd/issues/14499) | priority/important-longterm | Completed | It isn't guaranteed to be resolved in 3.6, and might be postponed to 3.7 depending on the effort and risk. |
| [bbolt: Add logger into bbolt](https://github.com/etcd-io/bbolt/issues/509) | priority/important-longterm | Completed | It's important to diagnose bbolt issues |
| [bbolt: Add surgery commands](https://github.com/etcd-io/bbolt/issues/370) | priority/important-longterm | Completed | Surgery commands are important for fixing corrupted db files |
| [Evaluate and (Gradulate or deprecate/remove) experimental features](https://github.com/etcd-io/etcd/issues/16292) | priority/backlog | Not started | This task will be covered in both 3.6 and 3.7. |

## v3.7.0

For a full list of tasks in `v3.7.0`, please see [milestone etcd-v3.7](https://github.com/etcd-io/etcd/milestone/39).

| Title | Priority | Note |
|---|---|---|
| [StoreV2 deprecation](https://github.com/etcd-io/etcd/issues/12913) | P0 | Finish the remaining tasks 3.7. |
| [Refactor lease: Lease might be revoked by mistake by old leader](https://github.com/etcd-io/etcd/issues/15247) | P1 | to be investigated & discussed |
| [Integrate raft's new feature (async write) into etcd](https://github.com/etcd-io/etcd/issues/16291) | P1 | It should improve the performance |
| [bbolt: Support customizing the bbolt rebalance threshold](https://github.com/etcd-io/bbolt/issues/422) | P2 | It may get rid of etcd's defragmentation. Both bbolt and etcd need to be changed. |
| [Evaluate and (graduate or deprecate/remove) experimental features](https://github.com/etcd-io/etcd/issues/16292) | P2 | Finish the remaining tasks 3.7. |

## Backlog (future releases)

| Title | Priority | Note |
|---|---|---|
| [Remove the dependency on grpc-go's experimental API](https://github.com/etcd-io/etcd/issues/15145) | | |
| [Protobuf: cleanup both golang/protobuf and gogo/protobuf](https://github.com/etcd-io/etcd/issues/14533) | | |
| [Proposals should include a merkle root](https://github.com/etcd-io/etcd/issues/13839) | | |
| [Add Distributed Tracing using OpenTelemetry](https://github.com/etcd-io/etcd/issues/12460) | | |
| [Support CA rotation](https://github.com/etcd-io/etcd/issues/11555) | | |
| [bbolt: Migrate all commands to cobra style commands](https://github.com/etcd-io/bbolt/issues/472) | | |
| [raft: enhance the configuration change validation](https://github.com/etcd-io/raft/issues/80) | | |

# Release

The guide talks about how to release a new version of etcd.

The procedure includes some manual steps for sanity checking, but it can probably be further scripted. Please keep this document up-to-date if making changes to the release process.

## Release management

The following pool of release candidates manages the release of each etcd major/minor version as well as manages patches
to each stable release branch. They are responsible for communicating the timelines and status of each release and for ensuring the stability of the release branch.

- Benjamin Wang [@ahrtr](https://github.com/ahrtr)
- James Blair [@jmhbnz](https://github.com/jmhbnz)
- Marek Siarkowicz [@serathius](https://github.com/serathius)
- Sahdev Zala [@spzala](https://github.com/spzala)
- Wenjia Zhang [@wenjiaswe](https://github.com/wenjiaswe)

All release version numbers follow the format of [semantic versioning 2.0.0](http://semver.org/).

### Major, minor version release, or its pre-release

- Ensure the relevant [milestone](https://github.com/etcd-io/etcd/milestones) on GitHub is complete. All referenced issues should be closed or moved elsewhere.
- Ensure the latest [upgrade documentation](https://etcd.io/docs/next/upgrades) is available.
- Bump [hardcoded MinClusterVerion in the repository](https://github.com/etcd-io/etcd/blob/v3.4.15/version/version.go#L29), if necessary.
- Add feature capability maps for the new version, if necessary.

### Patch version release

- To request a backport, developers submit cherry-pick PRs targeting the release branch. The commits should not include merge commits. The commits should be restricted to bug fixes and security patches.

- The cherrypick PRs should target the appropriate release branch (`base:release-<major>-<minor>`). The k8s infra cherry pick robot `/cherrypick <branch>` PR chatops command may be used to automatically generate cherrypick PRs.
- The release patch manager reviews the cherrypick PRs. Please discuss carefully what is backported to the patch release. Each patch release should be strictly better than its predecessor.
- The release patch manager will cherry-pick these commits starting from the oldest one into stable branch.

## Write a release note

- Write an introduction for the new release. For example, what major bug we fix, what new features we introduce, or what performance improvement we make.
- Put `[GH XXXX]` at the head of the change line to reference the Pull Request that introduces the change. Moreover, add a link on it to jump to the Pull Request.
- Find PRs with the `release-note` label and explain them in the `NEWS` file, as a straightforward summary of changes for end-users.

## Patch release criteria

The etcd project aims to release a new patch version if any of the following conditions are met:

- Fixed one or more major CVEs (>=7.5).
- Fixed one or more critical bugs.
- Fixed three or more major bugs.
- Fixed five or more minor bugs.

## Release guide

### Prerequisites

There are some prerequisites, which should be done before the release process. These are one-time operations, which don't need to be executed before releasing each version.

1. Generate a GPG key and add it to your GitHub account. Refer to the links on [settings](https://github.com/settings/keys).
2. Ensure you have a Linux machine, on which the git, Golang, and docker have been installed.
   - Ensure the Golang version matches the version defined in `.go-version` file.
   - Ensure non-privileged users can run docker commands, refer to the [Linux postinstall](https://docs.docker.com/engine/install/linux-postinstall/).
   - Ensure there is at least 5GB of free space on your Linux machine.
3. Install gsutil, refer to [gsutil_install](https://cloud.google.com/storage/docs/gsutil_install). When asked about cloud project to use, pick `etcd-development`.
4. Authenticate the image registry, refer to [Authentication methods](https://cloud.google.com/container-registry/docs/advanced-authentication).
   - `gcloud auth login`
   - `gcloud auth configure-docker`
5. Install gh, refer to [GitHub's documentation](https://github.com/cli/cli#installation). Ensure that running `gh auth login` succeeds for the GitHub account you use to contribute to etcd,

and that `gh auth status` has a clean exit and doesn't show any issues.

### Release steps

1. Raise an issue to publish the release plan, e.g. [issues/17350](https://github.com/etcd-io/etcd/issues/17350).
2. Raise a `kubernetes/org` pull request to temporarily elevate permissions for the GitHub release team.
3. Once permissions are elevated, temporarily relax [branch protections](https://github.com/etcd-io/etcd/settings/branches) to allow pushing changes directly to `release-*` branches in GitHub.
4. Verify you can pass the authentication to the image registries,
  - `docker login gcr.io`
  - `docker login quay.io`
    - If the release person doesn't have access to 1password, one of the owners (@ahrtr, @ivanvc, @jmhbnz, @serathius) needs
 to share the password with them per [this guide](https://support.1password.com/share-items/). See rough steps below,
      - [Sign in](https://team-etcd.1password.com/home) to your account on 1password.com.
      - Click `Your Vault Items` on the right side.
      - Select `Password of quay.io`.
      - Click `Share` on the top right, and set expiration as `1 hour` and only available to the release person using his/her email.
      - Click `Copy Link` then send the link to the release person via slack or email.
5. Clone the etcd repository and checkout the target branch,
  - `git clone --branch release-3.X git@github.com:etcd-io/etcd.git`
6. Run the release script under the repository's root directory, replacing `${VERSION}` with a value without the `v` prefix, i.e. `3.5.13`.
  - `DRY_RUN=false ./scripts/release.sh ${VERSION}`
  - **NOTE:** When doing a pre-release (i.e., a version from the main branch, 3.6.0-alpha.2), you will need to explicitly set the branch to main:

  ```
    DRY_RUN=false BRANCH=main ./scripts/release.sh ${VERSION}
    ```

  It generates all release binaries under the directory `/tmp/etcd-release-${VERSION}/etcd/release/` and images. Binaries are pushed to the Google Cloud bucket
  under project `etcd-development`, and images are pushed to `quay.io` and `gcr.io`.
7. Publish the release page on GitHub
  - Open the **draft** release URL shown by the release script
  - Click the pen button at the top right to edit the release
  - Review that it looks correct, reviewing that the bottom checkboxes are checked depending on the
    release version (v3.4 no checkboxes, v3.5 has the set as latest release checkbox checked,
    v3.6 has the set as pre-release checkbox checked)
  - Then, publish the release
8. Announce to the etcd-dev googlegroup

  Follow the format of previous release emails sent to etcd-dev@googlegroups.com, see an example below. After sending out the email, ask one of the mailing list maintainers to approve the

email from the pending list. Additionally, label the release email as `Release`.

```text
Hello,

etcd v3.4.30 is now public!

https://github.com/etcd-io/etcd/releases/tag/v3.4.30

Thanks to everyone who contributed to the release!

etcd team
```

9. Update the changelog to reflect the correct release date.
10. Paste the release link to the issue raised in Step 1 and close the issue.
11. Restore standard branch protection settings and raise a follow-up `kubernetes/org` pull request to return to least privilege permissions.
12. Crease a new stable branch through `git push origin release-${VERSION_MAJOR}.${VERSION_MINOR}` if this is a new major or minor stable release.
13. Re-generate a new password for quay.io if needed (e.g. shared to a contributor who isn't in the release team, and we should rotate the password at least once every 3 months).

#### Release known issues

1. Timeouts pushing binaries - If binaries fail to fully upload to Google Cloud storage, the script must be re-run using the same command. Any artifacts that are already pushed will be overwritten to ensure they are correct. The storage bucket does not use object versioning so incorrect files cannot remain.

2. Timeouts pushing images - It is rare, although possible for connection timeouts to occur when publishing etcd release images to `quay.io` or `gcr.io`. If this occurs, it is known to be safe to rerun the release script command appending the `--no-upload` flag, and image uploads will gracefully resume.

3. GPG vs SSH signing - The release scripts assume that git tags will be signed with a GPG key. Since 2022 GitHub has supported [signing commits and tags using ssh](https://github.blog/changelog/2022-08-23-ssh-commit-verification-now-supported). Until further release script updates are completed you will need to disable this feature in your `~/.gitconfig` and revert to signing via GPG to perform etcd releases.
# Golang modules

The etcd project (since version 3.5) is organized into multiple
[golang modules](https://golang.org/ref/mod) hosted in a [single repository](https://golang.org/ref/mod#vcs-dir).

![modules graph](modules.svg)

There are the following modules:

- **go.etcd.io/etcd/api/v3** - contains API definitions
(like protos & proto-generated libraries) that defines communication protocol

between etcd clients and servers.

- **go.etcd.io/etcd/pkg/v3** - a collection of utility packages used by etcd
without being specific to etcd itself. A package belongs here
only if it could possibly be moved out into its own repository in the future.
Please avoid adding here code that has a lot of dependencies on its own, as
they automatically become dependencies of the client library
(that we want to keep lightweight).

- **go.etcd.io/etcd/client/v3** - client library used to contact etcd over
the network (grpc). Recommended for all new usage of etcd.

- **go.etcd.io/raft/v3**
- implementation of distributed consensus
protocol. Should have no etcd specific code. Hosted in a separate repository:
https://github.com/etcd-io/raft.

- **go.etcd.io/etcd/server/v3** - etcd implementation.
The code in this package is internal to etcd and should not be consumed
by external projects. The package layout and API can change within the minor versions.

- **go.etcd.io/etcd/etcdctl/v3** - a command line tool to access and manage etcd.

- **go.etcd.io/etcd/tests/v3** - a module that contains all integration tests of etcd.
  Notice: All unit tests (fast and not requiring cross-module dependencies)
  should be kept in the local modules of the code under the test.

- **go.etcd.io/bbolt** - implementation of persistent b-tree.
  Hosted in a separate repository: https://github.com/etcd-io/bbolt.

### Operations

1. All etcd modules should be released in the same versions, e.g.
  `go.etcd.io/etcd/client/v3@v3.5.10` must depend on `go.etcd.io/etcd/api/v3@v3.5.10`.

  The consistent updating of versions can be performed using:
  ```shell script
  % DRY_RUN=false TARGET_VERSION="v3.5.10" ./scripts/release_mod.sh update_versions
  ```
2. The released modules should be tagged according to https://golang.org/ref/mod#vcs-version rules,
  i.e. each module should get its own tag.
  The tagging can be performed using:
  ```shell script
  % DRY_RUN=false REMOTE_REPO="origin" ./scripts/release_mod.sh push_mod_tags
  ```

3. All etcd modules should depend on the same versions of underlying dependencies.

This can be verified using:
```shell script
% PASSES="dep" ./test.sh
```

4. The go.mod files must not contain dependencies not being used and must conform to `go mod tidy` format.
This is being verified by:
```
% PASSES="mod_tidy" ./test.sh
```

5. To trigger actions across all modules (e.g. auto-format all files), please use/expand the following script:
```shell script
% ./scripts/fix.sh
```

###
Future

As a North Star, we would like to evaluate etcd modules towards the following model:

![modules graph](modules-future.svg)

This assumes:
- Splitting etcdmigrate/etcdadm out of etcdctl binary.
  Thanks to this etcdctl would become clearly a command-line wrapper around network client API,
  while etcdmigrate/etcdadm would support direct physical operations on the etcd storage files.
- Splitting etcd-proxy out of ./etcd binary, as it contains more experimental code so carries additional risk & dependencies.
- Deprecation of support for v2 protocol.

# Reporting bugs

If any part of the etcd project has bugs or documentation mistakes, please let us know by [opening an issue][etcd-issue]. We treat bugs and mistakes very seriously and believe no issue is too small. Before creating a bug report, please check that an issue reporting the same problem does not already exist.

To make the bug report accurate and easy to understand, please try to create bug reports that are:

- Specific. Include as many details as possible: which version, what environment, what configuration, etc. If the bug is related to running the etcd server, please attach the etcd log (the starting log with the etcd configuration is especially important).

- Reproducible. Include the steps to reproduce the problem. We understand some issues might be hard to reproduce, please include the steps that might lead to the problem. If possible, please attach the affected etcd data dir and stack

trace to the bug report.

- Isolated. Please try to isolate and reproduce the bug with
 minimum dependencies. It would significantly slow down the speed to fix a bug if too many dependencies are involved in a bug report. Debugging external systems that rely on etcd is out of scope, but we are happy to provide guidance in the right direction or help with using etcd itself.

- Unique. Do not duplicate existing bug reports.

- Scoped. One bug per report. Do not follow up with another bug inside one report.

It may be worthwhile to read [Elika Etemads article on filing good bug reports][filing-good-bugs] before creating a bug report.

We might ask for further information to locate a bug. A duplicated bug report will be closed.

## Frequently asked questions

### How to get a stack trace

```` bash
$ kill -QUIT $PID
```

### How to get the etcd version

```` bash
$ etcd --version
```

### How to get etcd configuration and log when it runs as systemd service etcd2.service

```` bash
$ sudo systemctl cat etcd2
$ sudo journalctl -u etcd2
```

Due to an upstream systemd bug, journald
 may miss the last few log lines when its processes exit. If journalctl says etcd stopped without a fatal or panic message, try `sudo journalctl -f -t etcd2` to get the full log.

[etcd-issue]: https://github.com/etcd-io/etcd/issues/new
[filing-good-bugs]: http://fantasai.inkedblade.net/style/talks/filing-good-bugs/
# Community membership

This doc outlines the various responsibilities of contributor roles in etcd.

| Role | Responsibilities | Requirements | Defined by

|
|---|---|---|---|
| Member | Active contributor in the community | Sponsored by 2 reviewers and multiple contributions | etcd GitHub org member |
| Reviewer | Review contributions from other members | History of review and authorship | [OWNERS] file reviewer entry |
| Maintainer | Set direction and priorities for the project | Demonstrated responsibility and excellent technical judgement | [OWNERS] file approver entry |

## New contributors

New contributors should be welcomed to the community by existing members, helped with PR workflow, and directed to relevant documentation and communication channels.

## Established community members

Established community members are expected to demonstrate their adherence to the principles in this document, familiarity with project organization, roles, policies, procedures, conventions, etc., and technical and/or writing ability. Role-specific expectations, responsibilities, and requirements are enumerated below.

## Member

Members are continuously active contributors to the community. They can have issues and PRs assigned to them. Members are expected to remain active contributors to the community.

**Defined by:** Member of the etcd GitHub organization.

### Requirements

- Enabled [two-factor authentication] on their GitHub account
- Have made multiple contributions to the project or community. Contribution may include, but is not limited to:
  - Authoring or reviewing PRs on GitHub. At least one PR must be **merged**.
  - Filing or commenting on issues on GitHub
  - Contributing to community discussions (e.g. meetings, Slack, email discussion forums, Stack Overflow)
- Subscribed to [etcd-dev@googlegroups.com](https://groups.google.com/g/etcd-dev)
- Have read the [contributor guide]
- Sponsored by two active maintainers or reviewers.
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
  - With no objections from other maintainers
- Open a [membership nomination] issue against the `kubernetes/org` repo

  - Ensure your sponsors are @mentioned on the issue
  - Make sure that the list of contributions included is representative of your work on the project.
- Members can be removed by a supermajority of the maintainers or can resign by notifying the maintainers.

### Responsibilities and privileges

- Responsive to issues and PRs assigned to them
- Granted "triage access" to etcd project
- Active owner of code they have contributed (unless ownership is explicitly transferred)
  - Code is well-tested
  - Tests consistently pass
  - Addresses bugs or issues discovered after code is accepted

**Note:** Members who frequently contribute code are expected to proactively perform code reviews and work towards becoming a *reviewer*.

## Reviewers

Reviewers are contributors who have demonstrated greater skill in reviewing the code from other contributors. They are knowledgeable about both the codebase and software engineering principles. Their LGTM counts towards merging a code change into the project. A reviewer is generally on the ladder towards maintainership.

**Defined by:** *reviewers* entry in the [OWNERS] file.

### Requirements

- member for at least 3 months.
- Primary reviewer for at least 5 PRs to the codebase.
- Reviewed or contributed at least 20 substantial PRs to the codebase.
- Knowledgeable about the codebase.
- Sponsored by two active maintainers.
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
  - With no objections from other maintainers
- Reviewers can be removed by a supermajority of the maintainers or can resign by notifying the maintainers.

### Responsibilities and privileges

- Code reviewer status may be a precondition to accepting large code contributions
- Responsible for project quality control via code reviews
  - Focus on code quality and correctness, including testing and factoring
  - May also review for more holistic issues, but not a requirement
- Expected to be responsive to review requests
- Assigned PRs to review related to area of expertise

- Assigned test bugs related to area of expertise
- Granted "triage access" to etcd project

## Maintainers

Maintainers are first and foremost contributors who have shown they
are committed to the long-term success of a project. Maintainership is about building
trust with the current maintainers and being a person that they can
depend on to make decisions in the best interest of the project in a consistent
manner.

**Defined by:** *approvers* entry in the [OWNERS] file.

### Requirements

- Deep understanding of the technical goals and direction of the project
- Deep understanding of the technical domain of the project
- Sustained contributions to design and direction by doing all of:
  - Authoring and reviewing proposals
  - Initiating, contributing, and resolving discussions (emails, GitHub issues, meetings)
  - Identifying subtle or complex issues in the designs and implementation of PRs
- Directly contributed to the project through implementation and/or review
- Sponsored by two active maintainers and elected by supermajority
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
- To become a maintainer send an email with your candidacy to etcd-maintainers-private@googlegroups.com
  - Ensure your sponsors are @mentioned in the email
  - Include a list of contributions representative of your work on the project.
  -
Existing maintainers vote will privately and respond to the email with either acceptance or feedback for suggested improvement.
- With your membership approved you are expected to:
  - Open a PR and add an entry to the [OWNERS] file
  - Subscribe to etcd-maintainers@googlegroups.com and etcd-maintainers-private@googlegroups.com
  - Request to join [etcd-maintainer teams of etcd organization of GitHub](https://github.com/orgs/etcd-io/teams/maintainers-etcd)
  - Request to join the private slack channel for etcd maintainers on [kubernetes slack](http://slack.kubernetes.io/)
  - Request access to etcd-development GCP project where we publish releases
  - Request access to passwords shared between maintainers

### Responsibilities and privileges

- Make and approve technical design decisions
- Set technical direction and priorities
- Define milestones and releases
- Mentor and guide reviewers, and contributors to the project.
- Participate when called upon in the [security disclosure and
release process]
- Ensure the continued health of the project

  - Adequate test coverage to confidently release
  - Tests are passing reliably (i.e. not flaky) and are fixed when they fail
- Ensure a healthy process for discussion and decision-making is in place.
- Work with other maintainers to maintain the project's overall health and success holistically

### Retiring

Life priorities, interests, and passions can change. Maintainers can retire and move to [emeritus maintainers]. If a maintainer needs to step down, they should inform other maintainers and, if possible, help find someone to pick up the related work. At the very least, ensure the related work can be continued. Afterward, they can remove themselves from the list of existing maintainers.

If a maintainer has not been performing their duties for 12 months, they can be removed by other maintainers. In that case, the inactive maintainer will be first notified via an email. If the situation doesn't improve, they will be removed.
If an emeritus maintainer wants to regain an active role, they can do so by renewing their contributions. Active maintainers should welcome such a move. Retiring other maintainers or regaining the status should require the approval of at least two active maintainers.

## Acknowledgements

Contributor roles and responsibilities were written based on [Kubernetes community membership]

[OWNERS]: /OWNERS
[contributor guide]: /CONTRIBUTING.md
[membership nomination]: https://github.com/kubernetes/org/issues/new?assignees=&labels=area%2Fgithub-membership&projects=&template=membership.yml&title=REQUEST%3A+New+membership+for+%3Cyour-GH-handle%3E
[Kubernetes community membership]: https://github.com/kubernetes/community/blob/master/community-membership.md
[emeritus maintainers]: /README.md#etcd-emeritus-maintainers
[security disclosure and release process]: /security/README.md
[two-factor authentication]: https://docs.github.com/en/authentication/securing-your-account-with-two-factor-authentication-2fa/about-two-factor-authentication

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# Logging Conventions

etcd uses the [zap][zap] library for logging application output categorized into *levels*. A log message's level is determined according to these conventions:

* Debug: Everything is still fine, but even common operations may be logged, and less helpful but more quantity of notices. Usually not used in production.
 * Examples:
  * Send a normal message to a remote peer
  * Write a log entry to disk

* Info: Normal, working log information, everything is fine, but helpful notices for auditing or common operations. Should rather not be logged more frequently than once per a few seconds in a normal server's operation.
 * Examples:
  * Startup configuration
  * Start to do a snapshot

* Warning: (Hopefully) Temporary conditions that may cause errors, but may work fine. A replica disappearing (that may reconnect) is a warning.
 * Examples:
  * Failure to send a raft message to a remote peer
  * Failure to receive heartbeat message within the configured election
 timeout

* Error: Data has been lost, a request has failed for a bad reason, or a required resource has been lost.
 * Examples:
  * Failure to allocate disk space for WAL

* Panic: Unrecoverable or unexpected error situation that requires stopping execution.
 * Examples:
  * Failure to create the database

* Fatal: Unrecoverable or unexpected error situation that requires immediate exit. Mostly used in the test.
 * Examples:
  * Failure to find the data directory
  * Failure to run a test function

[zap]: https://github.com/uber-go/zap

# Dependency management

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## Main branch

The dependabot is enabled & [configured](https://github.com/etcd-io/etcd/blob/main/.github/dependabot.yml) to manage dependencies for etcd `main` branch. But dependabot doesn't work well for multi-module repository like `etcd`,
see [dependabot-core/issues/6678](https://github.com/dependabot/dependabot-core/issues/6678).
Usually, human intervention is required
 each time when dependabot automatically opens some PRs to bump dependencies.
Please see the guidance below.

### Dependencies used in workflows

The PRs that automatically bump dependencies (see examples below) used in workflows are fine and can be approved & merged directly as long as all checks are successful.

- [build(deps): bump github/codeql-action from 2.2.11 to 2.2.12](https://github.com/etcd-io/etcd/pull/15736)
- [build(deps): bump actions/checkout from 3.5.0 to 3.5.2](https://github.com/etcd-io/etcd/pull/15735)
- [build(deps): bump ossf/scorecard-action from 2.1.2 to 2.1.3](https://github.com/etcd-io/etcd/pull/15607)

### Bumping order

When multiple etcd modules depend on the same package, please bump the package version for all the modules in the correct order. The rule is simple:
if module A depends on module B, then bump the dependency for module B before module A. If the two modules do not depend on each other, then
it doesn't matter to bump which module first. For
 example, multiple modules depend on `github.com/spf13/cobra`, so we need to bump the dependency
in the following order,

- go.etcd.io/etcd/pkg/v3
- go.etcd.io/etcd/server/v3
- go.etcd.io/etcd/etcdctl/v3
- go.etcd.io/etcd/etcdutl/v3
- go.etcd.io/etcd/tests/v3
- go.etcd.io/etcd/v3

- go.etcd.io/etcd/tools/v3
For more details about etcd Golang modules, please check <https://etcd.io/docs/next/dev-internal/modules>

Note the module `go.etcd.io/etcd/tools/v3` doesn't depend on any other modules, nor by any other modules, so it doesn't matter when to bump dependencies for it.

### Steps to bump a dependency

Use the `github.com/spf13/cobra` as an example, follow the steps below to bump it from 1.6.1 to 1.7.0 for module `go.etcd.io/etcd/etcdctl/v3`,

```bash
cd ${ETCD_ROOT_DIR}/etcdctl
go get github.com/spf13/cobra@v1.7.0
go mod tidy
cd ..
./scripts/fix.sh
```

Execute the same steps for all other modules. When you finish bumping the dependency for all modules, then commit the change,

```bash
git
 add .
git commit --signoff -m "dependency: bump github.com/spf13/cobra from 1.6.1 to 1.7.0"
```

Please close the related PRs which were automatically opened by dependabot.

When you bump multiple dependencies in one PR, it's recommended to create a separate commit for each dependency. But it isn't a must; for example,
you can get all dependencies bumping for the module `go.etcd.io/etcd/tools/v3` included in one commit.

#### Troubleshooting

In an event of bumping the version of protoc, protoc plugins or grpc-gateway, it might change `*.proto` file which can result in the following error:

```bash
[0;31mFAIL: 'genproto' FAILED at Wed Jul 31 07:09:08 UTC 2024
make: *** [Makefile:134: verify-genproto] Error 255
```

To fix the above error, run the following script from the root of etcd repository:

```bash
./scripts/genproto.sh
```

```

### Indirect dependencies

Usually, we don't bump a dependency if all modules just indirectly depend on it, such as `github.com/go-logr/logr`.

If
 an indirect dependency (e.g. `D1`) causes any CVE or bugs that affect etcd, usually the module (e.g. `M1`, not part of etcd, but used by etcd)
which depends on it should bump the dependency (`D1`), and then etcd just needs to bump `M1`. However, if the module (`M1`) somehow doesn't
bump the problematic dependency, then etcd can still bump it (`D1`) directly following the same steps above. But as a long-term solution, etcd should
try to remove the dependency on such module (`M1`) that lack maintenance.

For mixed cases, in which some modules directly while others indirectly depend on a dependency, we have multiple options,

- Bump the dependency for all modules, no matter it's direct or indirect dependency.
- Bump the dependency only for modules that directly depend on it.

We should try to follow the first way, and temporarily fall back to the second one if we run into any issue on the first way. Eventually we
should fix the issue and ensure all modules depend on the same version of the
 dependency.

### Known incompatible dependency updates

#### arduino/setup-protoc

Please refer to [build(deps): bump arduino/setup-protoc from 1.3.0 to 2.0.0](https://github.com/etcd-io/etcd/pull/16016)

### Rotation worksheet

The dependabot scheduling interval is weekly; it means dependabot will automatically raise a bunch of PRs per week.
Usually, human intervention is required each time. We have a [rotation worksheet](https://docs.google.com/spreadsheets/d/1jodHIO7Dk2VWTs1IRnfMFaRktS9IH8XRyifOnPdSY8I/edit#gid=1394774387),
and everyone is welcome to participate; you just need to register your name in the worksheet.

## Stable branches

Usually, we don't proactively bump dependencies for stable releases unless there are any CVEs or bugs that affect etcd.

If we have to do it, then follow the same guidance above. Note that there is no `./scripts/fix.sh` in release-3.4, so no
```

need to
execute it for 3.4.

## Golang versions

The etcd project aims to maintain a development branch that
is on the latest [Go version](https://go.dev/dl), ideally, this will align with the Go version in use for Kubernetes project development. For an example of how to update etcd to a new minor release of Go refer to issue <https://github.com/etcd-io/etcd/issues/16393> and the linked pull requests.

Suggested steps for performing a minor version upgrade for the etcd development branch:

1. Carefully review new Go version release notes and potentially related blog posts for any deprecations, performance impacts, or other considerations.
2. Create a GitHub issue to signal intent to upgrade and invite discussion, for example, <https://github.com/etcd-io/etcd/issues/16393>.
3. Complete the upgrade locally in your development environment by editing `.go-version` and running `make fix`.
4. Run performance benchmarks locally to compare before and after.
5. Raise a pull request for the changes, for example, <https://github.com/etcd-io/etcd/pull/16394>.

Stable etcd release branches will be maintained
to stay on the latest patch release of a supported Go version. Upgrading minor versions will be completed before the minor version in use currently is no longer supported. Refer to the [Go release
policy](https://go.dev/doc/devel/release).

For an example of how to update etcd to a new patch release of Go refer to issue <https://github.com/etcd-io/etcd/issues/16343> and the linked pull requests.

References:

- <https://github.com/kubernetes/sig-release/blob/master/release-engineering/handbooks/go.md>

## Core dependencies mappings

[bbolt](https://github.com/etcd-io/bbolt) and [raft](https://github.com/etcd-io/raft) are two core dependencies of etcd.

Both etcd 3.4.x and 3.5.x depend on bbolt 1.3.x, and etcd 3.6.x (`main` branch) depends on bbolt 1.4.x.

raft is included in the etcd repository for release-3.4 and release-3.5 branches, so etcd 3.4.x and 3.5.x do not depend on any
external raft module. We moved raft into [a separate repository](https://github.com/etcd-io/raft) starting
from 3.6 (`main` branch), and the first raft
release will be v3.6.0, so etcd 3.6.x will depend on raft 3.6.x.

Please see the table below:

| etcd versions | bbolt versions | raft versions |

|---|---|---|
| 3.4.x | v1.3.x | N/A |
| 3.5.x | v1.3.x | N/A |
| 3.6.x | v1.4.x | v3.6.x |

# 1.2813 etcd-server 3.6.4

## 1.2813.1 Available under license :

# Features

This document provides an overview of etcd features and general development guidelines for adding and deprecating them. The project maintainers can override these guidelines per the need of the project following the project governance.

## Overview

The etcd features fall into three stages, experimental, stable, and unsafe.

### Experimental

Any new feature is usually added as an experimental feature. An experimental feature is characterized as below:
- Might be buggy due to a lack of user testing. Enabling the feature may not work as expected.
- Disabled by default when added initially.
- Support for such a feature may be dropped at any time without notice
  - Feature-related issues may be given lower priorities.
  - It can be removed in the next minor or major release without following the feature deprecation policy unless it graduates to a stable future.

### Stable

A stable feature is characterized as below:
- Supported as part of the supported releases of etcd.
-
 May be enabled by default.
- Discontinuation of support must follow the feature deprecation policy.

### Unsafe

Unsafe features are rare and listed under the `Unsafe feature:` section in the etcd usage documentation. By default, they are disabled. They should be used with caution following documentation. An unsafe feature can be removed in the next minor or major release without following the feature deprecation policy.

## Development Guidelines

### Adding a new feature

Any new enhancements to the etcd are typically added as an experimental feature. The general development

requirements are listed below. They can be somewhat flexible depending on the scope of the feature and review discussions and will evolve over time.
- Open an issue
  - It must provide a clear need for the proposed feature.
  - It should list development work items as checkboxes. There must be one work item towards future graduation to a stable future.
  - Label the issue with `type/feature` and `experimental`.
  - Keep the issue open for tracking purposes until a decision is made on graduation.
- Open a Pull Request (PR)
  - Provide unit tests. Integration tests are also recommended as possible.
  - Provide robust e2e test coverage. If the feature being added is complicated or quickly needed, maintainers can decide to go with e2e tests for basic coverage initially and have robust coverage added at a later time before the feature graduation to the stable feature.
  - Provide logs for proper debugging.
  - Provide metrics and benchmarks as needed.
  - The Feature should be disabled by default.
  - Any configuration flags related to the implementation of the feature must be prefixed with `experimental` e.g. `--experimental-feature-name`.
  - Add a CHANGELOG entry.
- At least two maintainers must approve feature requirements and related code changes.

### Graduating an Experimental feature to Stable

It is important that experimental features don't get stuck in that stage.
They should be revisited and moved to the stable stage following the graduation steps as described here.

#### Locate graduation candidate
Decide if an experimental feature is ready for graduation to the stable stage.
- Find the issue that was used to enable the experimental feature initially. One way to find such issues is to search for issues with `type/feature` and `experimental` labels.
- Fix any known open issues against the feature.
- Make sure the feature was enabled for at least one previous release. Check the PR(s) reference from the issue to see when the feature-related code changes were merged.

#### Provide implementation
If an experimental feature is found ready for graduation to the stable stage, open a Pull Request (PR) with the following changes.
- Add robust e2e tests if not already provided.
- Add a new stable feature flag identical to the experimental feature flag but without the `--experimental` prefix.
- Deprecate the experimental feature following the [feature deprecation policy](#Deprecating-a-feature).
- Implementation must ensure that both the graduated and deprecated experimental feature flags work as expected. Note that both these flags will co-exist for the timeframe described in the feature deprecation policy.
- Enable the graduated feature by default if needed.

At least two maintainers must approve the work. Patch releases should not be considered for graduation.

### Deprecating a feature

#### Experimental
An experimental feature deprecates when it graduates to the stable stage.
- Add a deprecation message in the documentation of the experimental feature with a recommendation to use a related stable feature. e.g. `DEPRECATED. Use <feature-name> instead.`
- Add a `deprecated` label in the issue that was initially used to enable the experimental feature.

#### Stable
As the project evolves, a stable feature may sometimes need to be deprecated and removed. Such a situation should be handled using the steps below:
- Create an issue for tracking
 purposes.
- Add a deprecation message in the feature usage documentation before a planned release for feature deprecation. e.g. `To be deprecated in <release>.`. If a new feature replaces the `To be deprecated` feature, then also provide a message saying so. e.g. `Use <feature-name> instead.`.
- Deprecate the feature in the planned release with a message as part of the feature usage documentation. e.g. `DEPRECATED`. If a new feature replaces the deprecated feature, then also provide a message saying so. e.g. `DEPRECATED. Use <feature-name> instead.`.
- Add a `deprecated` label in the related issue.

Remove the deprecated feature in the following release. Close any related issue(s). At least two maintainers must approve the work. Patch releases should not be considered for deprecation.
# Set up the local cluster

For testing and development deployments, the quickest and easiest way is to configure a local cluster. For a production deployment, refer to the [clustering][clustering] section.

## Local standalone cluster

### Starting a cluster

Run the following to deploy an etcd cluster as a standalone cluster:

```
$ ./etcd
...
```

If the `etcd` binary is not present in the current working directory, it might be located either at `$GOPATH/bin/etcd` or at `/usr/local/bin/etcd`. Run the command appropriately.

The running etcd member listens on `localhost:2379` for client requests.

### Interacting with the cluster

Use `etcdctl` to interact with the running cluster:

1. Store an example key-value pair in the cluster:

```
$ ./etcdctl put foo bar
OK
```

If OK is printed, storing the key-value pair is successful.

2. Retrieve the value of `foo`:

```
$ ./etcdctl get foo
bar
```

If `bar` is returned, interaction with the etcd cluster is working as expected.

## Local multi-member cluster

### Starting a cluster

A `Procfile` at the base of the etcd git repository is provided to easily configure a local multi-member cluster. To start a multi-member cluster, navigate to the root of the etcd source tree and perform the following:

1. Install `goreman` to control Procfile-based applications:

```
$ go install github.com/mattn/goreman@latest
```

The installation will place executables in the $GOPATH/bin. If $GOPATH environment variable is not set, the tool will be installed into the $HOME/go/bin. Make sure that $PATH is set accordingly in your environment.

2. Start a cluster with `goreman` using etcd's stock Procfile:

```
$ goreman -f Procfile start
```

The members start running. They listen on `localhost:2379`, `localhost:22379`, and `localhost:32379` respectively for client requests.

### Interacting with the cluster

Use `etcdctl` to interact with the running cluster:

1. Print

the list of members:

```
$ etcdctl --write-out=table --endpoints=localhost:2379 member list
```

The list of etcd members is displayed as follows:

```
+------------------+---------+--------+------------------------+------------------------+
|       ID         | STATUS  |  NAME  |       PEER ADDRS       |      CLIENT ADDRS      |
+------------------+---------+--------+------------------------+------------------------+
| 8211f1d0f64f3269 | started | infra1 | http://127.0.0.1:2380  | http://127.0.0.1:2379  |
| 91bc3c398fb3c146 | started | infra2 | http://127.0.0.1:22380 | http://127.0.0.1:22379 |
| fd422379fda50e48 | started | infra3 | http://127.0.0.1:32380 | http://127.0.0.1:32379 |
+------------------+---------+--------+------------------------+------------------------+
```

2. Store an example key-value pair in the cluster:

```
$ etcdctl put foo bar
OK
```

If OK is printed, storing the key-value pair is successful.

### Testing fault tolerance

To exercise etcd's fault tolerance, kill a member and attempt to retrieve the key.

1. Identify the process name of the member to be stopped.

The `Procfile` lists the properties of the multi-member cluster. For example, consider the member with the process name, `etcd2`.

2. Stop the member:

```
# kill etcd2
$ goreman run stop etcd2
```

3. Store a key:

```
$ etcdctl put key hello
OK
```

```

4.  Retrieve the key that is stored in the previous step:

```
$ etcdctl get key
hello
```

5. Retrieve a key from the stopped member:

```
$ etcdctl --endpoints=localhost:22379 get key
```

The command should display an error caused by connection failure:

```
2017/06/18 23:07:35 grpc: Conn.resetTransport failed to create client transport: connection error: desc =
"transport: dial tcp 127.0.0.1:22379: getsockopt: connection refused"; Reconnecting to "localhost:22379"
Error:  grpc:
timed out trying to connect
```

6. Restart the stopped member:

```
$ goreman run restart etcd2
```

7. Get the key from the restarted member:

```
$ etcdctl --endpoints=localhost:22379 get key
hello
```

Restarting the member re-establishs the connection. `etcdctl` will now be able to retrieve the key successfully. To learn more about interacting with etcd, read [interacting with etcd section][interacting].

[clustering]: https://etcd.io/docs/latest/op-guide/clustering/
[interacting]: https://etcd.io/docs/latest/dev-guide/interacting_v3/
# Branch management

## Guide

* New development occurs on the [main branch][main].
* The main branch should always have a green build!
* Backwards-compatible bug fixes should target the main branch and subsequently be ported to stable branches.
```

* Once the main branch is ready for release, it will be tagged and become the new stable branch.

The etcd team has adopted a *rolling release model* and supports two stable versions of etcd.

### Main branch

The `main` branch is our development branch. All new features land here first.

To try new and experimental features, pull `main` and play with it. Note that `main` may not be stable because new features may introduce bugs.

Before the release of the next stable version, feature PRs will be frozen. A [release manager](./release.md#release-management) will be assigned to the major/minor version and will lead the etcd community in testing, bug-fix, and documentation of the release for one to two weeks.

### Stable branches

All branches with
 the prefix `release-` are considered _stable_ branches.

After every minor release ([semver.org](https://semver.org/)), we will have a new stable branch for that release, managed by a [patch release manager](./release.md#release-management). We will keep fixing the backward-compatible bugs for the latest two stable releases. A _patch_ release to each supported release branch, incorporating any bug fixes, will be once every two weeks, given any patches.

[main]: https://github.com/etcd-io/etcd/tree/main
# Issue triage guidelines

## Purpose

Speed up issue management.

The `etcd` issues are listed at <https://github.com/etcd-io/etcd/issues> and are identified with labels. For example, an issue that is identified as a bug will be set to the label `type/bug`.

The etcd project uses labels to indicate common attributes such as `area`, `type`, and `priority` of incoming issues.

New issues will often start without any labels, but typically `etcd` maintainers, reviewers, and members will add labels by following these triage guidelines. The detailed list of labels can be found at <https://github.com/etcd-io/etcd/labels>.

## Scope

This document serves as the primary guidelines for triaging incoming issues in `etcd`.

All contributors are encouraged and welcome to help manage issues which will help reduce the burden on project maintainers, though the work and responsibilities discussed in this document are created with `etcd` project reviewers and members in mind as these individuals will have

triage access to the etcd project which is a requirement for actions like applying labels or closing issues.

Refer to [etcd community membership](https://github.com/etcd-io/etcd/blob/main/Documentation/contributor-guide/community-membership.md) for guidance on becoming an etcd project member or reviewer.

## Step 1 - Find an issue to triage

To get started you can use the following recommended issue searches to identify issues that are in need of triage:

* [Issues that have no labels](https://github.com/etcd-io/etcd/issues?q=is%3Aissue+is%3Aopen+sort%3Aupdated+no%3Alabel)
* [Issues created recently](https://github.com/etcd-io/etcd/issues?q=is%3Aissue+is%3Aopen+)
* [Issues not assigned but linked pr](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+no%3Aassignee+linked%3Apr)
* [Issues with no comments](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+comments%3A0+)
* [Issues with help wanted](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+label%3A%22help+wanted%22+)

## Step 2 - Check the issue is valid

Before we start adding labels or trying to work out a priority, our first triage step needs to be working out if the issue actually belongs to the etcd project and is not a duplicate.

### Issues that don't belong to etcd

Sometimes issues are reported that belong to other projects that `etcd` use. For example, `grpc` or `golang` issues. Such issues should be addressed by asking the reporter to open issues in the appropriate other projects.

These issues can generally be closed unless a maintainer and issue reporter see a need to keep it open for tracking purposes. If you have triage permissions please close it, alternatively mention the @etcd-io/members group to request a member with triage access to close the issue.

### Duplicate issues

If an issue is a duplicate, add a comment stating so along with a reference for the original issue and if you have triage permissions please close it, alternatively mention the @etcd-io/members group to request a member with triage access close the issue.

## Step 3 - Apply the appropriate type of label

Adding a `type` label to an issue helps create visibility on the health of the project and helps contributors identify potential priorities, i.e. addressing existing bugs or test flakes before implementing new features.

### Support requests

As a general rule, the focus for etcd support is to address common themes in a broad way that helps all users, i.e. through channels like known issues, frequently asked questions, and high-quality documentation. To make the best

use of project members time we should avoid providing 1:1 support if a broad approach is available.

Some people mistakenly use our GitHub bug report or feature request templates to file support requests. Usually, they are asking for help operating or configuring some aspect of etcd. Support requests for etcd should instead be raised as [discussions](https://github.com/etcd-io/etcd/discussions).

Common
types of support requests are:

1. Questions about configuring or operating existing well-documented etcd features, for example, <https://github.com/etcd-io/etcd/issues/15945>. Note - If an existing feature is not well documented please apply the `area/documentation` label and propose documentation improvements that would prevent future users from stumbling on the problem again.

2. Bug reports or questions about unsupported versions of etcd, for example <https://github.com/etcd-io/etcd/issues/15796>. When responding to these issues please refer to our [supported versions documentation](https://etcd.io/docs/latest/op-guide/versioning) and encourage the reporter to upgrade to a recent patch release of a supported version as soon as possible. We should limit the effort supporting users that do not make the effort to run a supported version of etcd or ensure their version is patched.

3. Bug reports that do not provide a complete list of steps to reproduce the issue and/or contributors
are not able to reproduce the issue, for example, <https://github.com/etcd-io/etcd/issues/15740>. We should limit the effort we put into reproducing issues ourselves and motivate users to provide the necessary information to accept the bug report.

4. General questions that are filed using feature request or bug report issue templates, for example, <https://github.com/etcd-io/etcd/issues/15914>. Note - These types of requests may surface good additions to our [frequently asked questions](https://etcd.io/docs/v3.5/faq).

If you identify that an issue is a support request please:

1. Add the `type/support` or `type/question` label.

2. Add the following comment to inform the issue creator that discussions should be used instead and that this issue will be converted to a discussion.

> Thank you for your question, this support issue will be moved to our [Discussion Forums](https://github.com/etcd-io/etcd/discussions).
>
> We are trying to consolidate the channels to which
questions for help/support are posted so that we can improve our efficiency in responding to your requests, and make it easier for you to find answers to frequently asked questions and how to address common use cases.
>
> We regularly see messages posted in multiple forums, with the full response thread only in one place or, worse, spread across multiple forums. Also, the large volume of support issues on GitHub is making it difficult for us to use issues to identify real bugs.
>
> Members of the etcd community use Discussion Forums to field support requests. Before posting a new

question, please search these for answers to similar questions, and also familiarize yourself with:
>
> 1. [user documentation](https://etcd.io/docs/latest)
> 2. [frequently asked questions](https://etcd.io/docs/v3.5/faq)
>
> Again, thanks for using etcd and raising this question.
>
> The etcd team

3. Finally, click `Convert to discussion` on the right-hand panel,
 selecting the appropriate discussion category.

### Bug reports

If an issue has been raised as a bug it should already have the `type/bug` label, however, if this is missing for an issue you determine to be a bug please add the label manually.

The next step is to validate if the issue is indeed a bug. If not, add a comment with the findings and close the trivial issue. For non-trivial issues, wait to hear back from the issue reporter and see if there is any objection. If the issue reporter does not reply in 30 days, close the issue.

If the problem can not be reproduced or requires more information, leave a comment for the issue reporter as soon as possible while the issue is fresh for the issue reporter.

### Feature requests

New feature requests should be created via the etcd feature request template and in theory already have the `type/feature` label, however, if this is missing for an issue you determine to be a feature please add the label manually.

### Test flakes

Test flakes
 are a specific type of bug that the etcd project tracks separately as these are a priority to address. These should be created via the test flake template and in theory already have the `type/flake` label, however, if this is missing for an issue you determine to be related to a flaking test please add the label manually.

## Step 4 - Define the areas impacted

Adding an `area` label to an issue helps create visibility on which areas of the etcd project require attention and helps contributors find issues to work on relating to their particular skills or knowledge of the etcd codebase.

If an issue crosses multiple domains please add additional `area` labels to reflect that.

Below is a brief summary of the area labels in active use by the etcd project along with any notes on their use:

| Label | Notes |
| --- | --- |

| area/external
| Tracking label for issues raised that are external to etcd. |
| area/community | |
| area/raft | |
| area/clientv3 | |
| area/performance | |
| area/security | |
| area/tls | |
| area/auth | |
| area/etcdctl | |
| area/etcdutl | |
| area/contrib | Not to be confused with `area/community` this label is specifically
used for issues relating to community-maintained scripts or files in the `contrib/` directory which aren't part of the core etcd project. |
| area/documentation | |
| area/tooling | Generally used in relation to the third party / external utilities or tools that are used in various stages of the etcd build, test, or release process, for example, tooling to create sboms. |
| area/testing | |
| area/robustness-testing | |

## Step 5 - Prioritise the issue

If an issue lacks a priority label it has not been formally prioritized yet.

Adding a `priority` label helps the etcd project understand what is important and should be worked on now, and conversely, what is not as important and is on the project backlog.

|Priority label|What it means|Examples|
|---|---|---|
| `priority/critical-urgent`
| Maintainers are responsible for making sure that these issues (in their area) are being actively worked oni.e., drop what you're doing. The stuff is burning. These should be fixed before the next release. | user-visible critical bugs in core features <br> broken builds on tier1 supported platforms <br> tests and critical security issues |
| `priority/important-soon` | Must be staffed and worked on either currently or very soonideally in time for the next release. | |
| `priority/important-longterm` | Important over the long term, but may not be currently staffed and/or may require multiple releases to complete. | |
| `priority/backlog` | General agreement that this is a nice-to-have, but no one's available to work on it anytime soon. Community contributions would be most welcome in the meantime, though it might take a while to get them reviewed if reviewers are fully occupied with higher-priority issuesfor example, immediately before a release.| |
| `priority/awaiting-more-evidence`
| Possibly useful, but not yet enough support to actually get it done. | Mostly placeholders for potentially good ideas, so that they don't get completely forgotten, and can be referenced or deduped every time they come up |

## Step 6 - Support new contributors

As part of the `etcd` triage process once the `kind` and `area` have been determined, please consider if the issue would be suitable for a less experienced contributor. The `good first issue` label is a subset of the `help wanted`

label, indicating that members have committed to providing extra assistance for new contributors. All `good first issue` items also have the `help wanted` label.

### Help wanted

Items marked with the `help wanted` label need to ensure that they meet these criteria:

* **Low Barrier to Entry** - It should be easy for new contributors.

* **Clear** - The task is agreed upon and does not require further discussions in the community.

* **Goldilocks priority** - The priority
 should not be so high that a core contributor should do it, but not too low that it isnt useful enough for a core contributor to spend time reviewing it, answering questions, helping get it into a release, etc.

### Good first issue

Items marked with `good first issue` are intended for first-time contributors. It indicates that members will keep an eye out for these pull requests and shepherd it through our processes.

New contributors should not be left to find an approver, ping for reviews, decipher test commands, or identify that their build failed due to a flake. It is important to make new contributors feel welcome and valued. We should assure them that they will have an extra level of help with their first contribution.

After a contributor has successfully completed one or two `good first issue` items, they should be ready to move on to `help wanted` items.

* **No Barrier to Entry** - The task is something that a new contributor can tackle without advanced setup or domain knowledge.

*
 **Solution Explained** - The recommended solution is clearly described in the issue.

* **Gives Examples** - Link to examples of similar implementations so new contributors have a reference guide for their changes.

* **Identifies Relevant Code** - The relevant code and tests to be changed should be linked in the issue.

* **Ready to Test** - There should be existing tests that can be modified, or existing test cases fit to be copied. If the area of code doesnt have tests, before labeling the issue, add a test fixture. This prep often makes a great help wanted task!

## Step 7 - Follow up

Once initial triage has been completed, issues need to be re-evaluated over time to ensure they don't become stale incorrectly.

### Track important issues

If an issue is at risk of being closed by the stale bot in the future, but is an important issue for the etcd project, then please apply the `stage/tracked` label and remove any `stale` labels that exist. This will ensure the project does not lose sight of the issue.

### Close incomplete issues

Issues that lack enough information from the issue reporter should be closed if the issue reporter does not provide information in 30 days. Issues can always be re-opened at a later date if new information is provided.

### Check for incomplete work

If an issue owned by a developer has no pull request created in 30 days, contact the issue owner and kindly ask about the status of their work, or to release ownership on the issue if needed.
# PR management

## Purpose

Speed up PR management.

The `etcd` PRs are listed at https://github.com/etcd-io/etcd/pulls
A PR can have various labels, milestones, reviewers, etc. The detailed list of labels can be found at https://github.com/kubernetes/kubernetes/labels

Following are a few example searches on PR for convenience:
* [Open PRS for milestone etcd-v3.6](https://github.com/etcd-io/etcd/pulls?utf8=%E2%9C%93&q=is%3Apr+is%3Aopen+milestone%3Aetcd-v3.6)
* [PRs under investigation](https://github.com/etcd-io/etcd/labels/Investigating)

## Scope

These guidelines serve as a primary document for managing PRs in `etcd`. Everyone is welcome to help manage PRs but the work and responsibilities discussed in this document are created with `etcd` maintainers and active contributors in mind.

## Ensure tests are run

The etcd project use Kubernetes Prow and GitHub Actions to run tests. To ensure all required tests run if a pull request is ready for testing and still has the `needs-ok-to-test` label then please comment on the pull request `/ok-to-test`.

## Handle inactive PRs
Poke PR owner if review comments are not addressed in 15 days. If the PR owner does not reply in 90 days, update the PR with a new commit if possible. If not, inactive PR should be closed after 180 days.

## Poke reviewer if needed

Reviewers are responsive in a timely fashion, but considering everyone is busy, give them some time after

requesting a review if a quick response is not provided. If the response is not provided in 10 days, feel free to contact them via adding a comment in the PR or sending an email or message on Slack.

## Verify important labels are in place

Make sure that appropriate reviewers are added to the PR. Also, make sure that a milestone is identified. If any of these or other important labels are missing, add them. If a correct label cannot be decided, leave a comment for the maintainers to do so as needed.
# Roadmap

etcd uses GitHub milestones to track all tasks in each major or minor release. The `roadmap.md` file only records the
most important tasks for each release. The list is based on the current maintainer capacity that may shift over time. Proposed milestones are what we think we can deliver with the people we have. If we have more support on the important
stuff, we could pick up more items from the backlog. Note that etcd will continue to mainly focus on technical debt over
the next few major or minor releases.

Each item has an assigned priority. Refer to [priority definitions](https://github.com/etcd-io/etcd/blob/main/Documentation/contributor-guide/triage_issues.md#step-5---prioritise-the-issue).

## v3.6.0

For a full list of tasks in `v3.6.0`, please see [milestone etcd-v3.6](https://github.com/etcd-io/etcd/milestone/38).

| Title | Priority | Status | Note |
|---|---|---|---|
| [Support downgrade](https://github.com/etcd-io/etcd/issues/11716) | priority/important-soon | In progress | etcd will support downgrade starting from 3.6.0. But it will also support offline downgrade from 3.5 to 3.4. |
| [StoreV2 deprecation](https://github.com/etcd-io/etcd/issues/12913) | priority/important-soon | In progress | This task will be covered in both 3.6 and 3.7. |
| [Release raft 3.6.0](https://github.com/etcd-io/raft/issues/89) | priority/important-soon | Not started | etcd 3.6.0 will depends on raft 3.6.0 |
| [Release bbolt 1.4.0](https://github.com/etcd-io/bbolt/issues/553) | priority/important-soon | Not started | etcd 3.6.0 will depends on bbolt 1.4.0 |
| [Support /livez and /readyz endpoints](https://github.com/etcd-io/etcd/issues/16007) | priority/important-longterm | In progress | It provides clearer APIs, and can also work around the stalled writes issue |
| [Bump gRPC](https://github.com/etcd-io/etcd/issues/16290) | priority/important-longterm | Completed | It isn't guaranteed to be resolved in 3.6, and might be postponed to 3.7 depending on the effort and risk. |
| [Deprecate grpc-gateway

or bump it](https://github.com/etcd-io/etcd/issues/14499) | priority/important-longterm | Completed | It isn't guaranteed to be resolved in 3.6, and might be postponed to 3.7 depending on the effort and risk. |
| [bbolt: Add logger into bbolt](https://github.com/etcd-io/bbolt/issues/509) | priority/important-longterm | Completed | It's important to diagnose bbolt issues |
| [bbolt: Add surgery commands](https://github.com/etcd-io/bbolt/issues/370) | priority/important-longterm | Completed | Surgery commands are important for fixing corrupted db files |
| [Evaluate and (Gradulate or deprecate/remove) experimental features](https://github.com/etcd-io/etcd/issues/16292) | priority/backlog | Not started | This task will be covered in both 3.6 and 3.7. |

## v3.7.0

For a full list of tasks in `v3.7.0`, please see [milestone etcd-v3.7](https://github.com/etcd-io/etcd/milestone/39).

| Title | Priority | Note |
|---|---|---|
| [StoreV2 deprecation](https://github.com/etcd-io/etcd/issues/12913) | P0 | Finish the remaining tasks 3.7. |
| [Refactor lease: Lease might be revoked by mistake by old leader](https://github.com/etcd-io/etcd/issues/15247) | P1 | to be investigated & discussed |
| [Integrate raft's new feature (async write) into etcd](https://github.com/etcd-io/etcd/issues/16291) | P1 | It should improve the performance |
| [bbolt: Support customizing the bbolt rebalance threshold](https://github.com/etcd-io/bbolt/issues/422) | P2 | It may get rid of etcd's defragmentation. Both bbolt and etcd need to be changed. |
| [Evaluate and (graduate or deprecate/remove) experimental features](https://github.com/etcd-io/etcd/issues/16292) | P2 | Finish the remaining tasks 3.7. |

## Backlog (future releases)

| Title | Priority | Note |
|---|---|---|
| [Remove the dependency on grpc-go's experimental API](https://github.com/etcd-io/etcd/issues/15145) | | |
| [Protobuf: cleanup both golang/protobuf and gogo/protobuf](https://github.com/etcd-io/etcd/issues/14533) | | |
| [Proposals should include a merkle root](https://github.com/etcd-io/etcd/issues/13839) | | |
| [Add Distributed Tracing using OpenTelemetry](https://github.com/etcd-io/etcd/issues/12460) | | |
| [Support CA rotation](https://github.com/etcd-io/etcd/issues/11555) | | |
| [bbolt: Migrate all commands to cobra style commands](https://github.com/etcd-io/bbolt/issues/472) | | |
| [raft: enhance the configuration change validation](https://github.com/etcd-io/raft/issues/80) | | |

# Release

The guide talks about how to release a new version of etcd.

The procedure includes some manual steps for sanity checking, but it can probably be further scripted. Please keep this document up-to-date if making changes to the release process.

## Release management

The following pool of release candidates manages the release of each etcd major/minor version as well as manages patches
to each stable release branch. They are responsible for communicating the timelines and status of each release and for ensuring the stability of the release branch.

- Benjamin Wang [@ahrtr](https://github.com/ahrtr)
- James Blair [@jmhbnz](https://github.com/jmhbnz)
- Marek Siarkowicz [@serathius](https://github.com/serathius)
- Sahdev Zala [@spzala](https://github.com/spzala)
- Wenjia Zhang [@wenjiaswe](https://github.com/wenjiaswe)

All release version numbers follow the format of [semantic versioning 2.0.0](http://semver.org/).

### Major, minor version release, or its pre-release

- Ensure
 the relevant [milestone](https://github.com/etcd-io/etcd/milestones) on GitHub is complete. All referenced issues should be closed or moved elsewhere.
- Ensure the latest [upgrade documentation](https://etcd.io/docs/next/upgrades) is available.
- Bump [hardcoded MinClusterVerion in the repository](https://github.com/etcd-io/etcd/blob/v3.4.15/version/version.go#L29), if necessary.
- Add feature capability maps for the new version, if necessary.

### Patch version release

- To request a backport, developers submit cherry-pick PRs targeting the release branch. The commits should not include merge commits. The commits should be restricted to bug fixes and security patches.
- The cherrypick PRs should target the appropriate release branch (`base:release-<major>-<minor>`). The k8s infra cherry pick robot `/cherrypick <branch>` PR chatops command may be used to automatically generate cherrypick PRs.
- The release patch manager reviews the cherrypick PRs. Please discuss carefully what is backported
 to the patch release. Each patch release should be strictly better than its predecessor.
- The release patch manager will cherry-pick these commits starting from the oldest one into stable branch.

## Write a release note

- Write an introduction for the new release. For example, what major bug we fix, what new features we introduce, or what performance improvement we make.
- Put `[GH XXXX]` at the head of the change line to reference the Pull Request that introduces the change.

Moreover, add a link on it to jump to the Pull Request.
- Find PRs with the `release-note` label and explain them in the `NEWS` file, as a straightforward summary of changes for end-users.

## Patch release criteria

The etcd project aims to release a new patch version if any of the following conditions are met:

- Fixed one or more major CVEs (>=7.5).
- Fixed one or more critical bugs.
- Fixed three or more major bugs.
- Fixed five or more minor bugs.

## Release guide

### Prerequisites

There are some
 prerequisites, which should be done before the release process. These are one-time operations,
which don't need to be executed before releasing each version.
1. Generate a GPG key and add it to your GitHub account. Refer to the links on
[settings](https://github.com/settings/keys).
2. Ensure you have a Linux machine, on which the git, Golang, and docker have been installed.
   - Ensure the Golang version matches the version defined in `.go-version` file.
   - Ensure non-privileged users can run docker commands, refer to the [Linux
postinstall](https://docs.docker.com/engine/install/linux-postinstall/).
   - Ensure there is at least 5GB of free space on your Linux machine.
3. Install gsutil, refer to [gsutil_install](https://cloud.google.com/storage/docs/gsutil_install). When asked about cloud project to use, pick `etcd-development`.
4. Authenticate the image registry, refer to [Authentication methods](https://cloud.google.com/container-registry/docs/advanced-authentication).
  - `gcloud
 auth login`
  - `gcloud auth configure-docker`
5. Install gh, refer to [GitHub's documentation](https://github.com/cli/cli#installation). Ensure that running
  `gh auth login` succeeds for the GitHub account you use to contribute to etcd,
  and that `gh auth status` has a clean exit and doesn't show any issues.

### Release steps

1. Raise an issue to publish the release plan, e.g. [issues/17350](https://github.com/etcd-io/etcd/issues/17350).
2. Raise a `kubernetes/org` pull request to temporarily elevate permissions for the GitHub release team.
3. Once permissions are elevated, temporarily relax [branch protections](https://github.com/etcd-io/etcd/settings/branches) to allow pushing changes directly to `release-*` branches in GitHub.
4. Verify you can pass the authentication to the image registries,
  - `docker login gcr.io`
  - `docker login quay.io`
    - If the release person doesn't have access to 1password, one of the owners (@ahrtr, @ivanvc, @jmhbnz,

@serathius) needs
 to share the password with them per [this guide](https://support.1password.com/share-items/). See rough steps below,
    - [Sign in](https://team-etcd.1password.com/home) to your account on 1password.com.
    - Click `Your Vault Items` on the right side.
    - Select `Password of quay.io`.
    - Click `Share` on the top right, and set expiration as `1 hour` and only available to the release person using his/her email.
    - Click `Copy Link` then send the link to the release person via slack or email.
5. Clone the etcd repository and checkout the target branch,
  - `git clone --branch release-3.X git@github.com:etcd-io/etcd.git`
6. Run the release script under the repository's root directory, replacing `${VERSION}` with a value without the `v` prefix, i.e. `3.5.13`.
  - `DRY_RUN=false ./scripts/release.sh ${VERSION}`
  - **NOTE:** When doing a pre-release (i.e., a version from the main branch, 3.6.0-alpha.2), you will need to explicitly set the branch to main:

  ```
    DRY_RUN=false BRANCH=main ./scripts/release.sh ${VERSION}
    ```

  It generates all release binaries under the directory `/tmp/etcd-release-${VERSION}/etcd/release/` and images. Binaries are pushed to the Google Cloud bucket
  under project `etcd-development`, and images are pushed to `quay.io` and `gcr.io`.
7. Publish the release page on GitHub
  - Open the **draft** release URL shown by the release script
  - Click the pen button at the top right to edit the release
  - Review that it looks correct, reviewing that the bottom checkboxes are checked depending on the
    release version (v3.4 no checkboxes, v3.5 has the set as latest release checkbox checked,
    v3.6 has the set as pre-release checkbox checked)
  - Then, publish the release
8. Announce to the etcd-dev googlegroup

  Follow the format of previous release emails sent to etcd-dev@googlegroups.com, see an example below. After sending out the email, ask one of the mailing list maintainers to approve the
 email from the pending list. Additionally, label the release email as `Release`.

```text
Hello,

etcd v3.4.30 is now public!

https://github.com/etcd-io/etcd/releases/tag/v3.4.30

Thanks to everyone who contributed to the release!

etcd team
```

9. Update the changelog to reflect the correct release date.
10. Paste the release link to the issue raised in Step 1 and close the issue.
11. Restore standard branch protection settings and raise a follow-up `kubernetes/org` pull request to return to least privilege permissions.
12. Crease a new stable branch through `git push origin release-${VERSION_MAJOR}.${VERSION_MINOR}` if this is a new major or minor stable release.
13. Re-generate a new password for quay.io if needed (e.g. shared to a contributor who isn't in the release team, and we should rotate the password at least once every 3 months).

#### Release known issues

1. Timeouts pushing binaries - If binaries fail to fully upload to Google Cloud storage, the script must be re-run using the same command. Any artifacts that are already pushed will be overwritten to ensure they are correct. The storage bucket does not use object versioning so incorrect files cannot remain.

2. Timeouts pushing images - It is rare, although possible for connection timeouts to occur when publishing etcd release images to `quay.io` or `gcr.io`. If this occurs, it is known to be safe to rerun the release script command appending the `--no-upload` flag, and image uploads will gracefully resume.

3. GPG vs SSH signing - The release scripts assume that git tags will be signed with a GPG key. Since 2022 GitHub has supported [signing commits and tags using ssh](https://github.blog/changelog/2022-08-23-ssh-commit-verification-now-supported). Until further release script updates are completed you will need to disable this feature in your `~/.gitconfig` and revert to signing via GPG to perform etcd releases.
# Golang modules

The etcd project (since version 3.5) is organized into multiple
[golang modules](https://golang.org/ref/mod) hosted in a [single repository](https://golang.org/ref/mod#vcs-dir).

![modules graph](modules.svg)

There are the following modules:

- **go.etcd.io/etcd/api/v3** - contains API definitions
(like protos & proto-generated libraries) that defines communication protocol
between etcd clients and servers.

- **go.etcd.io/etcd/pkg/v3** - a collection of utility packages used by etcd
without being specific to etcd itself. A package belongs here
only if it could possibly be moved out into its own repository in the future.
Please avoid adding here code that has a lot of dependencies on its own, as
they automatically become dependencies of the client library
(that we want to keep lightweight).

- **go.etcd.io/etcd/client/v3** - client library used to contact etcd over
the network (grpc). Recommended for all new usage of etcd.

- **go.etcd.io/raft/v3**

- implementation of distributed consensus
protocol. Should have no etcd specific code. Hosted in a separate repository:
https://github.com/etcd-io/raft.

- **go.etcd.io/etcd/server/v3** - etcd implementation.
The code in this package is internal to etcd and should not be consumed
by external projects. The package layout and API can change within the minor versions.

- **go.etcd.io/etcd/etcdctl/v3** - a command line tool to access and manage etcd.

- **go.etcd.io/etcd/tests/v3** - a module that contains all integration tests of etcd.
  Notice: All unit tests (fast and not requiring cross-module dependencies)
  should be kept in the local modules of the code under the test.

- **go.etcd.io/bbolt** - implementation of persistent b-tree.
  Hosted in a separate repository: https://github.com/etcd-io/bbolt.

### Operations

1. All etcd modules should be released in the same versions, e.g.
  `go.etcd.io/etcd/client/v3@v3.5.10` must depend on `go.etcd.io/etcd/api/v3@v3.5.10`.

  The consistent updating of versions can be performed using:
  ```shell script
  % DRY_RUN=false TARGET_VERSION="v3.5.10" ./scripts/release_mod.sh update_versions
  ```
2. The released modules should be tagged according to https://golang.org/ref/mod#vcs-version rules,
  i.e. each module should get its own tag.
  The tagging can be performed using:
  ```shell script
  % DRY_RUN=false REMOTE_REPO="origin" ./scripts/release_mod.sh push_mod_tags
  ```

3. All etcd modules should depend on the same versions of underlying dependencies.
  This can be verified using:
  ```shell script
  % PASSES="dep" ./test.sh
  ```

4. The go.mod files must not contain dependencies not being used and must
  conform to `go mod tidy` format.
  This is being verified by:
  ```
  % PASSES="mod_tidy" ./test.sh
  ```

5. To trigger actions across all modules (e.g. auto-format all files), please

use/expand the following script:
```shell script
% ./scripts/fix.sh
```

###
Future

As a North Star, we would like to evaluate etcd modules towards the following model:

![modules graph](modules-future.svg)

This assumes:
- Splitting etcdmigrate/etcdadm out of etcdctl binary.
  Thanks to this etcdctl would become clearly a command-line wrapper
  around network client API,
  while etcdmigrate/etcdadm would support direct physical operations on the
  etcd storage files.
- Splitting etcd-proxy out of ./etcd binary, as it contains more experimental code
  so carries additional risk & dependencies.
- Deprecation of support for v2 protocol.

# Reporting bugs

If any part of the etcd project has bugs or documentation mistakes, please let us know by [opening an issue][etcd-issue]. We treat bugs and mistakes very seriously and believe no issue is too small. Before creating a bug report, please check that an issue reporting the same problem does not already exist.

To make the bug report accurate and easy to understand, please try to create bug reports that are:

- Specific. Include as many details as possible: which version, what environment, what configuration, etc. If the bug is related to running the etcd server, please attach the etcd log (the starting log with the etcd configuration is especially important).

- Reproducible. Include the steps to reproduce the problem. We understand some issues might be hard to reproduce, please include the steps that might lead to the problem. If possible, please attach the affected etcd data dir and stack trace to the bug report.

- Isolated. Please try to isolate and reproduce the bug with
  minimum dependencies. It would significantly slow down the speed to fix a bug if too many dependencies are involved in a bug report. Debugging external systems that rely on etcd is out of scope, but we are happy to provide guidance in the right direction or help with using etcd itself.

- Unique. Do not duplicate existing bug reports.

- Scoped. One bug per report. Do not follow up with another bug inside one report.

It may be worthwhile to read [Elika Etemads article on filing good bug reports][filing-good-bugs] before creating a bug report.

We might ask for further information to locate a bug. A duplicated bug report will be closed.

## Frequently asked questions

### How to get a stack trace

```bash
$ kill -QUIT $PID
```

### How to get the etcd version

```bash
$ etcd --version
```

### How to get etcd configuration and log when it runs as systemd service etcd2.service

```bash
$ sudo systemctl cat etcd2
$ sudo journalctl -u etcd2
```

Due to an upstream systemd bug, journald
may miss the last few log lines when its processes exit. If journalctl says etcd stopped without a fatal or panic message, try `sudo journalctl -f -t etcd2` to get the full log.

[etcd-issue]: https://github.com/etcd-io/etcd/issues/new
[filing-good-bugs]: http://fantasai.inkedblade.net/style/talks/filing-good-bugs/
# Community membership

This doc outlines the various responsibilities of contributor roles in etcd.

| Role | Responsibilities | Requirements | Defined by |
|---|---|---|---|
| Member | Active contributor in the community | Sponsored by 2 reviewers and multiple contributions | etcd GitHub org member |
| Reviewer | Review contributions from other members | History of review and authorship | [OWNERS] file reviewer entry |
| Maintainer | Set direction and priorities for the project | Demonstrated responsibility and excellent technical judgement | [OWNERS] file approver entry |

## New contributors

New contributors should be welcomed to the community by existing members,

helped with
PR workflow, and directed to relevant documentation and
communication channels.

## Established community members

Established community members are expected to demonstrate their adherence to the
principles in this document, familiarity with project organization, roles,
policies, procedures, conventions, etc., and technical and/or writing ability.
Role-specific expectations, responsibilities, and requirements are enumerated
below.

## Member

Members are continuously active contributors to the community. They can have
issues and PRs assigned to them. Members are expected to remain active
contributors to the community.

**Defined by:** Member of the etcd GitHub organization.

### Requirements

- Enabled [two-factor authentication] on their GitHub account
- Have made multiple contributions to the project or community. Contribution may include, but is not limited to:
  - Authoring or reviewing PRs on GitHub. At least one PR must be **merged**.
  - Filing or commenting on issues on
GitHub
  - Contributing to community discussions (e.g. meetings, Slack, email discussion
    forums, Stack Overflow)
- Subscribed to [etcd-dev@googlegroups.com](https://groups.google.com/g/etcd-dev)
- Have read the [contributor guide]
- Sponsored by two active maintainers or reviewers.
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
  - With no objections from other maintainers
- Open a [membership nomination] issue against the `kubernetes/org` repo
  - Ensure your sponsors are @mentioned on the issue
  - Make sure that the list of contributions included is representative of your work on the project.
- Members can be removed by a supermajority of the maintainers or can resign by notifying
the maintainers.

### Responsibilities and privileges

- Responsive to issues and PRs assigned to them
- Granted "triage access" to etcd project
- Active owner of code they have contributed (unless ownership is explicitly transferred)
  - Code is well-tested
  - Tests consistently pass
  - Addresses bugs or issues discovered after code is accepted

**Note:** Members who frequently contribute code are expected to proactively perform code reviews and work towards becoming a *reviewer*.

## Reviewers

Reviewers are contributors who have demonstrated greater skill in reviewing the code from other contributors. They are knowledgeable about both the codebase and software engineering principles. Their LGTM counts towards merging a code change into the project. A reviewer is generally on the ladder towards maintainership.

**Defined by:** *reviewers* entry in the [OWNERS] file.

### Requirements

- member for at least 3 months.
- Primary reviewer for at least 5 PRs to the codebase.
- Reviewed or contributed at least 20 substantial PRs to the codebase.
- Knowledgeable about the codebase.
- Sponsored by two active maintainers.
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
  - With no objections from other maintainers
- Reviewers can be removed by a supermajority of the maintainers or can resign by notifying the maintainers.

### Responsibilities and privileges

- Code reviewer status may be a precondition to accepting large code contributions
- Responsible for project quality control via code reviews
  - Focus on code quality and correctness, including testing and factoring
  - May also review for more holistic issues, but not a requirement
- Expected to be responsive to review requests
- Assigned PRs to review related to area of expertise
- Assigned test bugs related to area of expertise
- Granted "triage access" to etcd project

## Maintainers

Maintainers are first and foremost contributors who have shown they are committed to the long-term success of a project. Maintainership is about building trust with the current maintainers and being a person that they can depend on to make decisions in the best interest of the project in a consistent manner.

**Defined by:** *approvers* entry in the [OWNERS] file.

### Requirements

- Deep understanding of the technical goals and direction of the project
- Deep understanding of the technical domain of the project
- Sustained contributions to design and direction by doing all of:
  - Authoring and reviewing proposals
  - Initiating, contributing, and resolving discussions (emails, GitHub issues, meetings)
  - Identifying subtle or complex issues in the designs and implementation of PRs
- Directly contributed to the project through implementation and/or review
- Sponsored by two active maintainers and elected by supermajority
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
- To become a maintainer send an email with your candidacy to etcd-maintainers-private@googlegroups.com
  - Ensure your sponsors are @mentioned in the email
  - Include a list of contributions representative of your work on the project.
  -

Existing maintainers vote will privately and respond to the email with either acceptance or feedback for suggested improvement.

- With your membership approved you are expected to:
- Open a PR and add an entry to the [OWNERS] file
- Subscribe to etcd-maintainers@googlegroups.com and etcd-maintainers-private@googlegroups.com
- Request to join [etcd-maintainer teams of etcd organization of GitHub](https://github.com/orgs/etcd-io/teams/maintainers-etcd)
- Request to join the private slack channel for etcd maintainers on [kubernetes slack](http://slack.kubernetes.io/)
- Request access to etcd-development GCP project where we publish releases
- Request access to passwords shared between maintainers

### Responsibilities and privileges

- Make and approve technical design decisions
- Set technical direction and priorities
- Define milestones and releases
- Mentor and guide reviewers, and contributors to the project.
- Participate when called upon in the [security disclosure and release process]
- Ensure the continued health of the project
  - Adequate test coverage to confidently release
  - Tests are passing reliably (i.e. not flaky) and are fixed when they fail
- Ensure a healthy process for discussion and decision-making is in place.
- Work with other maintainers to maintain the project's overall health and success holistically

### Retiring

Life priorities, interests, and passions can change. Maintainers can retire and move to [emeritus maintainers]. If a maintainer needs to step down, they should inform other maintainers and, if possible, help find someone to pick up the related work. At the very least, ensure the related work can be continued. Afterward, they can remove themselves from the list of existing maintainers.

If a maintainer has not been performing their duties for 12 months,
they can be removed by other maintainers. In that case, the inactive maintainer will
be first notified via an email. If the situation doesn't improve, they will be
removed.
If an emeritus maintainer wants to regain an active role, they can do
so by renewing their contributions. Active maintainers should welcome such a move.
Retiring other maintainers or regaining the status should require the approval
of at least two active maintainers.

## Acknowledgements

Contributor roles and responsibilities were written based on [Kubernetes community membership]

[OWNERS]: /OWNERS
[contributor guide]: /CONTRIBUTING.md
[membership nomination]: https://github.com/kubernetes/org/issues/new?assignees=&labels=area%2Fgithub-membership&projects=&template=membership.yml&title=REQUEST%3A+New+membership+for+%3Cyour-GH-handle%3E
[Kubernetes community membership]: https://github.com/kubernetes/community/blob/master/community-membership.md
[emeritus maintainers]: /README.md#etcd-emeritus-maintainers
[security disclosure and release process]: /security/README.md
[two-factor authentication]: https://docs.github.com/en/authentication/securing-your-account-with-two-factor-authentication-2fa/about-two-factor-authentication

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# Logging Conventions

etcd uses the [zap][zap] library for logging application output categorized into *levels*. A log message's level is determined according to these conventions:

* Debug: Everything is still fine, but even common operations may be logged, and less helpful but more quantity of

notices. Usually not used in production.
 * Examples:
   * Send a normal message to a remote peer
   * Write a log entry to disk

* Info: Normal, working log information, everything is fine, but helpful notices for auditing or common operations. Should rather not be logged more frequently than once per a few seconds in a normal server's operation.
 * Examples:
   * Startup configuration
   * Start to do a snapshot

* Warning: (Hopefully) Temporary conditions that may cause errors, but may work fine. A replica disappearing (that may reconnect) is a warning.
 * Examples:
   * Failure to send a raft message to a remote peer
   * Failure to receive heartbeat message within the configured election
 timeout

* Error: Data has been lost, a request has failed for a bad reason, or a required resource has been lost.
 * Examples:
   * Failure to allocate disk space for WAL

* Panic: Unrecoverable or unexpected error situation that requires stopping execution.
 * Examples:
   * Failure to create the database

* Fatal: Unrecoverable or unexpected error situation that requires immediate exit. Mostly used in the test.
 * Examples:
   * Failure to find the data directory
   * Failure to run a test function

[zap]: https://github.com/uber-go/zap
# Dependency management

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## Main branch

The dependabot is enabled & [configured](https://github.com/etcd-io/etcd/blob/main/.github/dependabot.yml) to manage dependencies for etcd `main` branch. But dependabot doesn't work well for multi-module repository like `etcd`,
see [dependabot-core/issues/6678](https://github.com/dependabot/dependabot-core/issues/6678).
Usually, human intervention is required
each time when dependabot automatically opens some PRs to bump dependencies.
Please see the guidance below.

### Dependencies used in workflows

The PRs that automatically bump dependencies (see examples below) used in workflows are fine and can be approved & merged directly as long as all checks are successful.

- [build(deps): bump github/codeql-action from 2.2.11 to 2.2.12](https://github.com/etcd-io/etcd/pull/15736)
- [build(deps): bump actions/checkout from 3.5.0 to 3.5.2](https://github.com/etcd-io/etcd/pull/15735)
- [build(deps): bump ossf/scorecard-action from 2.1.2 to 2.1.3](https://github.com/etcd-io/etcd/pull/15607)

### Bumping order

When multiple etcd modules depend on the same package, please bump the package version for all the modules in the correct order. The rule is simple:
if module A depends on module B, then bump the dependency for module B before module A. If the two modules do not depend on each other, then
it doesn't matter to bump which module first. For
example, multiple modules depend on `github.com/spf13/cobra`, so we need to bump the dependency
in the following order,

- go.etcd.io/etcd/pkg/v3
- go.etcd.io/etcd/server/v3
- go.etcd.io/etcd/etcdctl/v3
- go.etcd.io/etcd/etcdutl/v3
- go.etcd.io/etcd/tests/v3
- go.etcd.io/etcd/v3
- go.etcd.io/etcd/tools/v3

For more details about etcd Golang modules, please check <https://etcd.io/docs/next/dev-internal/modules>

Note the module `go.etcd.io/etcd/tools/v3` doesn't depend on any other modules, nor by any other modules, so it doesn't matter when to bump dependencies for it.

### Steps to bump a dependency

Use the `github.com/spf13/cobra` as an example, follow the steps below to bump it from 1.6.1 to 1.7.0 for module `go.etcd.io/etcd/etcdctl/v3`,

```bash
cd ${ETCD_ROOT_DIR}/etcdctl
```

```
go get github.com/spf13/cobra@v1.7.0
go mod tidy
cd ..
./scripts/fix.sh
```

Execute the same steps for all other modules. When you finish bumping the dependency for all modules, then commit the change,

```bash
git
 add .
git commit --signoff -m "dependency: bump github.com/spf13/cobra from 1.6.1 to 1.7.0"
```

Please close the related PRs which were automatically opened by dependabot.

When you bump multiple dependencies in one PR, it's recommended to create a separate commit for each dependency. But it isn't a must; for example,
you can get all dependencies bumping for the module `go.etcd.io/etcd/tools/v3` included in one commit.

#### Troubleshooting

In an event of bumping the version of protoc, protoc plugins or grpc-gateway, it might change `*.proto` file which can result in the following error:

```bash
[0;31mFAIL: 'genproto' FAILED at Wed Jul 31 07:09:08 UTC 2024
make: *** [Makefile:134: verify-genproto] Error 255
```

To fix the above error, run the following script from the root of etcd repository:

```bash
./scripts/genproto.sh
```

### Indirect dependencies

Usually, we don't bump a dependency if all modules just indirectly depend on it, such as `github.com/go-logr/logr`.

If
 an indirect dependency (e.g. `D1`) causes any CVE or bugs that affect etcd, usually the module (e.g. `M1`, not part of etcd, but used by etcd)
which depends on it should bump the dependency (`D1`), and then etcd just needs to bump `M1`. However, if the module (`M1`) somehow doesn't
bump the problematic dependency, then etcd can still bump it (`D1`) directly following the same steps above. But as a long-term solution, etcd should

try to remove the dependency on such module (`M1`) that lack maintenance.

For mixed cases, in which some modules directly while others indirectly depend on a dependency, we have multiple options,

- Bump the dependency for all modules, no matter it's direct or indirect dependency.
- Bump the dependency only for modules that directly depend on it.

We should try to follow the first way, and temporarily fall back to the second one if we run into any issue on the first way. Eventually we
should fix the issue and ensure all modules depend on the same version of the
dependency.

### Known incompatible dependency updates

#### arduino/setup-protoc

Please refer to [build(deps): bump arduino/setup-protoc from 1.3.0 to 2.0.0](https://github.com/etcd-io/etcd/pull/16016)

### Rotation worksheet

The dependabot scheduling interval is weekly; it means dependabot will automatically raise a bunch of PRs per week.
Usually, human intervention is required each time. We have a [rotation worksheet](https://docs.google.com/spreadsheets/d/1jodHIO7Dk2VWTs1IRnfMFaRktS9IH8XRyifOnPdSY8I/edit#gid=1394774387),
and everyone is welcome to participate; you just need to register your name in the worksheet.

## Stable branches

Usually, we don't proactively bump dependencies for stable releases unless there are any CVEs or bugs that affect etcd.

If we have to do it, then follow the same guidance above. Note that there is no `./scripts/fix.sh` in release-3.4, so no need to
execute it for 3.4.

## Golang versions

The etcd project aims to maintain a development branch that
is on the latest [Go version](https://go.dev/dl), ideally, this will align with the Go version in use for Kubernetes project development. For an example of how to update etcd to a new minor release of Go refer to issue <https://github.com/etcd-io/etcd/issues/16393> and the linked pull requests.

Suggested steps for performing a minor version upgrade for the etcd development branch:

1. Carefully review new Go version release notes and potentially related blog posts for any deprecations,

performance impacts, or other considerations.
2. Create a GitHub issue to signal intent to upgrade and invite discussion, for example, <https://github.com/etcd-io/etcd/issues/16393>.
3. Complete the upgrade locally in your development environment by editing `.go-version` and running `make fix`.
4. Run performance benchmarks locally to compare before and after.
5. Raise a pull request for the changes, for example, <https://github.com/etcd-io/etcd/pull/16394>.

Stable etcd release branches will be maintained
 to stay on the latest patch release of a supported Go version. Upgrading minor versions will be completed before the minor version in use currently is no longer supported. Refer to the [Go release
policy](https://go.dev/doc/devel/release).

For an example of how to update etcd to a new patch release of Go refer to issue <https://github.com/etcd-io/etcd/issues/16343> and the linked pull requests.

References:

- <https://github.com/kubernetes/sig-release/blob/master/release-engineering/handbooks/go.md>

## Core dependencies mappings

[bbolt](https://github.com/etcd-io/bbolt) and [raft](https://github.com/etcd-io/raft) are two core dependencies of etcd.

Both etcd 3.4.x and 3.5.x depend on bbolt 1.3.x, and etcd 3.6.x (`main` branch) depends on bbolt 1.4.x.

raft is included in the etcd repository for release-3.4 and release-3.5 branches, so etcd 3.4.x and 3.5.x do not depend on any
external raft module. We moved raft into [a separate repository](https://github.com/etcd-io/raft) starting
 from 3.6 (`main` branch), and the first raft
release will be v3.6.0, so etcd 3.6.x will depend on raft 3.6.x.

Please see the table below:

| etcd versions | bbolt versions | raft versions |
|---|---|---|
| 3.4.x | v1.3.x | N/A |
| 3.5.x | v1.3.x | N/A |
| 3.6.x | v1.4.x | v3.6.x |

# 1.2814 libgexi 0.14.3-1.el9

## 1.2814.1 Available under license :

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clang-format
---
We introduced clang-format mandatory usage in July 2020.
If you want git blame
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on your clone

To get the clang-format warnings locally instead at CI time we recommend you
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We are using clang-format 10 on CI. Unfortunately clang-format is not totally
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---

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Relicensing NetworkManager GPL Code as LGPL-2.1+
==========

This NetworkManager project consists of the daemon, client tools, and libnm.
libnm is licensed LGPL-2.1+, while the rest is licensed under GPL-2.0+.

Why Relicensing?
==========

Mixing two licenses in the same source tree is cumbersome:

1) We want to share code internally and reuse it. In particular under "shared/" directory
there are internal static libraries that get linked both into LGPL and GPL code.
That implies that this shared code itself must be LGPL licensed. Being unable to
move code around within our source tree is a painful restriction. Possibly we get
that wrong sometimes, wrongly moving GPL code as LGPL (either directly or by rewriting
it based on GPL code).

2) For example keyfile and ifcfg-rh implementations are GPL licensed as they
are historically part of core. It would be useful to add this functionality
to libnm, so that libnm users can handle the file formats
directly. That is
not possible without relicensing.

3) Maybe one day we would relicense the entire source tree as LGPL-2.1+ to avoid
this issue. This would require agreement from all copyright holders.

Full relicensing (point 3) is a large effort, or maybe even impossible. However sometimes
we may need to evaluate whether small parts can be relicensed (points 2 and 1). This
file keeps track of copyright holders that agree or disapprove to such a license change.

Which Code?
==========

This applies to all GPL-2.0+ code in commit a3e75f329446a93a61ca4c458a7657bd919f4fe6 ([1]) and
all its parent commits.

Since commit a3e75f329446a93a61ca4c458a7657bd919f4fe6 ([1]), the CONTRIBUTING file ([2]) makes
it clear that all new contributions must to be provided under terms of LGPL-2.1+. So this
approval process is only relevant for GPL-2.0+ code from before that. This was also announced on
the mailing list on June 12 2019 ([3]). Note that the announcement was still talking about LGPL-2.0+
but
in the meantime we only request LGPL-2.1+ ([4]).

- [1]
https://gitlab.freedesktop.org/NetworkManager/NetworkManager/commit/a3e75f329446a93a61ca4c458a7657bd919f4fe6
- [2]
https://gitlab.freedesktop.org/NetworkManager/NetworkManager/blob/a3e75f329446a93a61ca4c458a7657bd919f4fe6/CONTRIBUTING#L37
- [3] https://mail.gnome.org/archives/networkmanager-list/2019-June/msg00006.html
- [4]
https://gitlab.freedesktop.org/NetworkManager/NetworkManager/commit/3c36231706a9314f6bf03901dd13923cd32a5457

Consent/Disapproval about What?
==========

Whether the copyright holder agrees to relicense the code in a3e75f329446a93a61ca4c458a7657bd919f4fe6
and its parent commits under terms of LGPL-2.1+.

How to Track Consent/Disapproval?
==========

The consent/disapproval is tracked in this file for the copyright holders
who made their wish known. In the list below [Y] indicates consent while [N]
indicates disapproval. [?] indicates yet unknown data.
To express
the wish either send an email to our mailing list <networkmanager@lists.freedesktop.org>
or open a merge request against this file, adding your name to the list. Then this

file will be updated to track the information. The git commit messages in the history of this file will give details when/how an entry was added.

Consent/Disapproval List
==========

- [Y] Aleksander Morgado <aleksander@aleksander.es>
- [Y] Alfonso Snchez-Beato <alfonso.sanchez-beato@canonical.com> (Canonical, Ltd.)
- [Y] Andrew Zaborowski <andrew.zaborowski@intel.com> (Intel Corporation)
- [Y] Antoine Faure <antoine.faure@sigfox.com> (Sigfox)
- [Y] Antony Mee <antony@onlymee.co.uk>
- [Y] Atul Anand <atulhjp@gmail.com>
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- [Y] Benjamin Berg <bberg@redhat.com> (Red Hat, Inc.)
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- [Y] Colin Walters <walters@verbum.org> (Red Hat,
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- [Y] Francesco Giudici <fgiudici@redhat.com> (Red Hat, Inc.)
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# 1.2821 dnf-plugins-core 4.3.0-24.el9_7

## 1.2821.1 Available under license :

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# 1.2822 alpine-keys 2.6-r0

## 1.2822.1 Available under license :

```
# Automatically generated by apkbuild-cpan, template 1
# Contributor: Francesco Colista <francesco.colista@gmail.com>
# Maintainer: Francesco Colista <francesco.colista@gmail.com>
pkgname=perl-software-license
_pkgreal=Software-License
pkgver=0.103004
pkgrel=0
pkgdesc="packages that provide templated software licenses"
url="http://search.cpan.org/dist/Software-License/"
arch="noarch"
license="GPL PerlArtistic"
cpandepends="perl-text-template perl-data-section perl-sub-install"
cpanmakedepends="   "
depends="$cpandepends"
makedepends="perl-dev $cpanmakedepends"
subpackages="$pkgname-doc"
source="http://search.cpan.org/CPAN/authors/id/R/RJ/RJBS/$_pkgreal-$pkgver.tar.gz"

_builddir="$srcdir/$_pkgreal-$pkgver"

prepare() {
 cd "$_builddir"
 export CFLAGS=`perl -MConfig -E 'say $Config{ccflags}'`
 PERL_MM_USE_DEFAULT=1 perl Makefile.PL INSTALLDIRS=vendor
}

build() {
 cd "$_builddir"
 export CFLAGS=`perl -MConfig -E 'say $Config{ccflags}'`
 make && make test
}

package() {
 cd "$_builddir"
 make
```

```
 DESTDIR="$pkgdir" install || return 1
 find "$pkgdir" \( -name perllocal.pod -o -name .packlist \) -delete
}

md5sums="0c5fd53d93818566234578b27d667b35  Software-License-0.103004.tar.gz"
# Maintainer: Natanael Copa <ncopa@alpinelinux.org>
pkgname=libart-lgpl
pkgver=2.3.21
pkgrel=5
pkgdesc="A library for high-performance 2D graphics"
url="http://www.levien.com/libart/"
arch="all"
license="LGPL"
depends=
makedepends=
subpackages="$pkgname-dev"
source="http://ftp.gnome.org/pub/GNOME/sources/libart_lgpl/2.3/libart_lgpl-$pkgver.tar.bz2
 "

_builddir="$srcdir"/libart_lgpl-$pkgver
build() {
 cd "$_builddir"
 ./configure --prefix=/usr || return 1
 make || return 1
}

package() {
 cd "$_builddir"
 make DESTDIR="$pkgdir" install || return 1
 rm "$pkgdir"/usr/lib/*.la
}

md5sums="08559ff3c67fd95d57b0c5e91a6b4302  libart_lgpl-2.3.21.tar.bz2"
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# 1.2823 alpine-baselayout 3.7.1-r8

## 1.2823.1 Available under license :

```
# Contributor: Carlo Landmeter <clandmeter@alpinelinux.org>
# Maintainer: Kevin Daudt <kdaudt@alpinelinux.org>
pkgname=spdx-licenses
pkgver=3.27.0
pkgrel=0
pkgdesc="Various data formats for the SPDX License List"
url="https://spdx.org/"
arch="noarch"
options="!check" # no test suite
license="CC-BY-3.0"
source="license-list-data-$pkgver.tar.gz::https://github.com/spdx/license-list-data/archive/v$pkgver.tar.gz"
builddir="$srcdir/license-list-data-$pkgver"
subpackages="$pkgname-list"

_types="html json rdfa rdfnt rdfturtle rdfxml template text"

for type in $_types; do
 subpackages="$subpackages $pkgname-$type:_subpkg"
done

package() {
 mkdir -p "$pkgdir"
}

_subpkg() {
 local type=${subpkgname/$pkgname-/}
 pkgdesc="$pkgdesc ($type)"
 install_if="$pkgname=$pkgver-r$pkgrel"
 mkdir -p "$subpkgdir"/usr/share/spdx
 cp -r "$builddir"/$type "$subpkgdir"/usr/share/spdx/
}

list() {
 pkgdesc="$pkgdesc (licence list)"
 mkdir -p "$subpkgdir"/usr/share/spdx
 local i; for i in "$builddir"/text/*.txt;
 do
  local license=${i##*/}
  echo ${license%.*} >> "$subpkgdir"/usr/share/spdx/license.lst
 done
}

sha512sums="
16d59c81e331b54b52639826f83408d98144cdaa70eacc3e8ce35dc3b13992e4794cf7515eb9db200efd390a0c0e35ae9
```

```
d4706fbe0ca6a8d236189e88870720c  license-list-data-3.27.0.tar.gz
"
maintainer="Achill Gilgenast <achill@achill.org>"
pkgname=cargo-license
pkgver=0.7.0
pkgrel=1
pkgdesc="Cargo subcommand to see license of dependencies"
url="https://github.com/onur/cargo-license"
arch="all"
license="MIT"
makedepends="cargo cargo-auditable"
source="$pkgname-$pkgver.tar.gz::https://crates.io/api/v1/crates/cargo-license/$pkgver/download"

prepare() {
 default_prepare

 cargo fetch --target="$CTARGET" --locked
}

build() {
 cargo auditable build --release --frozen
}

check() {
 cargo test --frozen
}

package() {
 install -Dm755 target/release/cargo-license -t "$pkgdir"/usr/bin
}

sha512sums="
9b3f0ead35515e85ef4074ebdbdbe5b9ec8bcaec244fabe414e2ed60f90366e8b1692d8bf7ffe4c07d778e60d94bab86bc
0c8be9823232e9c360a38bc65e9c5a  cargo-license-0.7.0.tar.gz
"
# Automatically generated by apkbuild-cpan, template 4
# Contributor: Valery Kartel <valery.kartel@gmail.com>
# Contributor: Celeste <cielesti@protonmail.com>
# Maintainer:
pkgname=perl-bsd-resource
pkgver=1.2911
pkgrel=11
#_pkgreal is used by apkbuild-cpan to find modules at MetaCpan
_pkgreal=BSD-Resource
pkgdesc="Perl extension implements the BSD process resource limit functions"
url="https://metacpan.org/release/BSD-Resource/"
arch="all"
license="Artistic-2.0 OR LGPL-2.0"
```

```
depends="perl"
makedepends="perl-dev"
subpackages="$pkgname-doc"
source="https://cpan.metacpan.org/authors/id/J/JH/JHI/BSD-Resource-$pkgver.tar.gz"
builddir="$srcdir/$_pkgreal-$pkgver"

build() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 PERL_MM_USE_DEFAULT=1 perl -I. Makefile.PL \
  INSTALLDIRS=vendor \
  NO_PACKLIST=1 \
  NO_PERLLOCAL=1
 make
}

check() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 make test
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="
d0032d41c7c0468ed1c6d8f57b885f6cb97a5039d754c8cb60b2067daedaf53bd15fb6561a3d0f828df16dfa5417f663b
8065ba65f4fea16dc9262728b3b6b85
  BSD-Resource-1.2911.tar.gz
"
#!/sbin/openrc-run

command="/usr/libexec/xdg-permission-store"
supervisor=supervise-daemon
command_args="--replace $command_args"
error_logger="logger -t '${RC_SVCNAME}' -p daemon.error"

depend() {
 need dbus
}
# Contributor: Maxim Karasev <begs@disroot.org>
# Maintainer: mio <miyopan@e.email>
pkgname=bsd-games
pkgver=3.3
pkgrel=2
pkgdesc="traditional text mode games from BSD"
url="https://bsd-games.sourceforge.io/"
arch="all"
license="BSD-3-Clause"
```

```
install="$pkgname.post-install"
makedepends="ncurses-dev coreutils" # configure causes busybox expr error
subpackages="$pkgname-doc"
source="https://sourceforge.net/projects/bsd-games/files/bsd-games-$pkgver.tar.gz
 0001-bsd-games-scores-dir.patch
 "
options="!check" # no tests

build() {
 # some GNU autoconf options are ignored, but it works
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr \
  --sysconfdir=/etc \
  --mandir=/usr/share/man \
  --scoredir=/usr/share/$pkgname
 make
}

package() {
 make DESTDIR="$pkgdir" install
 install -Dm644 LICENSE "$pkgdir"/usr/share/licenses/bsd-games/LICENSE
}

sha512sums="
aaf36d09d4fe68514a5c279063d7e77a9a9a84c447037cba974b29faa07eb80c2aab2379d0699c196b5c27ffe1b2bb2c6
8d3390143e0e62d5e3d210ccfb61294
  bsd-games-3.3.tar.gz
e1def0d4835a877242c4173fae862e278a7858738e0bacacbb045a42bcabec2aa7c72d000bbd2421ce35fe66cdc1f52c0
577b7e278029ca5ed50f7aab22319f6  0001-bsd-games-scores-dir.patch
"
```

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```
# Maintainer: Natanael Copa <ncopa@alpinelinux.org>
pkgname=libart-lgpl
pkgver=2.3.21
pkgrel=8
pkgdesc="A library for high-performance 2D graphics"
url="https://www.levien.com/libart/"
arch="all"
options="!check"  # No test suite.
license="LGPL-2.0-or-later"
subpackages="$pkgname-dev"
source="https://download.gnome.org/sources/libart_lgpl/2.3/libart_lgpl-$pkgver.tar.bz2
 "

builddir="$srcdir"/libart_lgpl-$pkgver

prepare() {
 update_config_sub
 default_prepare
}

build() {
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr
 make
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="8a632a6a4da59e5e8c02ec2f5a57e36d182b325b46513765425e5f171ff9ae326af1b133725beba28f7e7
6654309e001aee9bace727b5b4c8589405256a3c020  libart_lgpl-2.3.21.tar.bz2"
```

mini_sendmail - accept email on behalf of real sendmail

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```
# Contributor: Patrycja Rosa <alpine@ptrcnull.me>
# Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=bsd-compat-headers
pkgver=0.7.2
pkgrel=6
pkgdesc="BSD compatibility headers (cdefs, queue, tree)"
url="https://gitlab.alpinelinux.org/alpine/aports"
arch="noarch"
license="BSD-2-Clause AND BSD-3-Clause"
source="
 cdefs.h
 queue.h
 tree.h
"
builddir="$srcdir"
options="!check" # just headers

package() {
 mkdir -p "$pkgdir"
 install -Dm644 -t "$pkgdir"/usr/include/sys \
  cdefs.h queue.h tree.h
}
sha512sums="
37c8fc73c7aea7b490f7850927e2bb91d12137c9e59e22c084146d515696dbc7973b5de92f4c987ba080dd2502ba8312
7006442c3f019b6447a620c0cae73178  cdefs.h
2f0d5e6e4dc3350285cf17009265dddcbe12431c111868eea39bc8cb038ab7c1f2acacbb21735c4e9d4a1fd106a8fc0f86
11ea33987d4faba37dde5ce6da0750  queue.h
d9ac210d81feb8ad2655bc80fb065d3fe20ae4417b32b4a1711e6738a4870140005c13373b5d1846ef3ce5ae6da45f2da
cef2092881eded0a2e94f6a07752ef3  tree.h
"
```

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"X-Splines: A Spline Model Designed for the End User" by C. Blanc and C. Schlick, Proceedings of SIGGRAPH'95
http://dept-info.labri.u-bordeaux.fr/~schlick/DOC/sig1.html
/* $NetBSD: queue.h,v 1.70 2015/11/02 15:21:23 christos Exp $ */

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*
* @(#)queue.h 8.5 (Berkeley) 8/20/94
*/

#ifndef _SYS_QUEUE_H_
#define _SYS_QUEUE_H_

/*
* This file defines five types of data structures: singly-linked lists,
* lists, simple queues, tail queues, and circular queues.
*
* A singly-linked list is headed by a single forward pointer. The
* elements are singly linked for minimum space and
 pointer manipulation
* overhead at the expense of O(n) removal for arbitrary elements. New
* elements can be added to the list after an existing element or at the
* head of the list.  Elements being removed from the head of the list
* should use the explicit macro for this purpose for optimum
* efficiency. A singly-linked list may only be traversed in the forward
* direction.  Singly-linked lists are ideal for applications with large
* datasets and few or no removals or for implementing a LIFO queue.
*
* A list is headed by a single forward pointer (or an array of forward
* pointers for a hash table header). The elements are doubly linked
* so that an arbitrary element can be removed without a need to
* traverse the list. New elements can be added to the list before
* or after an existing element or at the head of the list. A list
* may only be traversed in the forward direction.
*
* A simple queue is headed by a pair of pointers, one the head of the
* list and the
 other to the tail of the list. The elements are singly
* linked to save space, so elements can only be removed from the
* head of the list. New elements can be added to the list after
* an existing element, at the head of the list, or at the end of the
* list. A simple queue may only be traversed in the forward direction.
*
```

```
* A tail queue is headed by a pair of pointers, one to the head of the
* list and the other to the tail of the list. The elements are doubly
* linked so that an arbitrary element can be removed without a need to
* traverse the list. New elements can be added to the list before or
* after an existing element, at the head of the list, or at the end of
* the list. A tail queue may be traversed in either direction.
*
* A circle queue is headed by a pair of pointers, one to the head of the
* list and the other to the tail of the list. The elements are doubly
* linked so that an arbitrary element can be removed without a need to
* traverse the list. New elements
 can be added to the list before or after
* an existing element, at the head of the list, or at the end of the list.
* A circle queue may be traversed in either direction, but has a more
* complex end of list detection.
*
* For details on the use of these macros, see the queue(3) manual page.
*/

/*
* Include the definition of NULL only on NetBSD because sys/null.h
* is not available elsewhere.  This conditional makes the header
* portable and it can simply be dropped verbatim into any system.
* The caveat is that on other systems some other header
* must provide NULL before the macros can be used.
*/
#ifdef __NetBSD__
#include <sys/null.h>
#endif

#if defined(QUEUEDEBUG)
# if defined(_KERNEL)
#  define QUEUEDEBUG_ABORT(...) panic(__VA_ARGS__)
# else
#  include <err.h>
#  define QUEUEDEBUG_ABORT(...) err(1, __VA_ARGS__)
# endif
#endif

/*
* Singly-linked List definitions.
*/
#define SLIST_HEAD(name, type)      \
struct name {        \
 struct type *slh_first; /* first
 element */   \
}
```

```
#define SLIST_HEAD_INITIALIZER(head)	\
 { NULL }

#define SLIST_ENTRY(type)	\
struct {	\
 struct type *sle_next; /* next element */	\
}

/*
* Singly-linked List access methods.
*/
#define SLIST_FIRST(head) ((head)->slh_first)
#define SLIST_END(head)  NULL
#define SLIST_EMPTY(head) ((head)->slh_first == NULL)
#define SLIST_NEXT(elm, field) ((elm)->field.sle_next)

#define SLIST_FOREACH(var, head, field)	\
 for((var) = (head)->slh_first;	\
    (var) != SLIST_END(head);	\
    (var) = (var)->field.sle_next)

#define SLIST_FOREACH_SAFE(var, head, field, tvar)	\
 for ((var) = SLIST_FIRST((head));	\
    (var) != SLIST_END(head) &&	\
    ((tvar) = SLIST_NEXT((var), field), 1);	\
    (var) = (tvar))

/*
* Singly-linked List functions.
*/
#define SLIST_INIT(head) do {	\
 (head)->slh_first = SLIST_END(head);	\
} while (/*CONSTCOND*/0)

#define SLIST_INSERT_AFTER(slistelm, elm, field) do {	\
 (elm)->field.sle_next = (slistelm)->field.sle_next;	\
 (slistelm)->field.sle_next
 = (elm);	\
} while (/*CONSTCOND*/0)

#define SLIST_INSERT_HEAD(head, elm, field) do {	\
 (elm)->field.sle_next = (head)->slh_first;	\
 (head)->slh_first = (elm);	\
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE_AFTER(slistelm, field) do {	\
 (slistelm)->field.sle_next =	\
    SLIST_NEXT(SLIST_NEXT((slistelm), field), field);	\
```

```
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE_HEAD(head, field) do {    \
 (head)->slh_first = (head)->slh_first->field.sle_next;  \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE(head, elm, type, field) do {   \
 if ((head)->slh_first == (elm)) {    \
  SLIST_REMOVE_HEAD((head), field);   \
 }        \
 else {        \
  struct type *curelm = (head)->slh_first;  \
  while(curelm->field.sle_next != (elm))   \
   curelm = curelm->field.sle_next;  \
  curelm->field.sle_next =    \
      curelm->field.sle_next->field.sle_next;  \
 }        \
} while (/*CONSTCOND*/0)


/*
* List definitions.
 */
#define LIST_HEAD(name, type)      \
struct name {        \
 struct type *lh_first; /* first element */   \
}

#define LIST_HEAD_INITIALIZER(head)     \
 { NULL }

#define LIST_ENTRY(type)      \
struct {        \
 struct type *le_next; /* next element */   \
 struct type **le_prev; /* address of previous next element */ \
}

/*
* List access methods.
*/
#define LIST_FIRST(head)  ((head)->lh_first)
#define LIST_END(head)   NULL
#define LIST_EMPTY(head)  ((head)->lh_first == LIST_END(head))
#define LIST_NEXT(elm, field)  ((elm)->field.le_next)

#define LIST_FOREACH(var, head, field)     \
 for ((var) = ((head)->lh_first);    \
     (var) != LIST_END(head);     \
```

```
    (var) = ((var)->field.le_next))

#define LIST_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = LIST_FIRST((head));    \
    (var) != LIST_END(head) &&     \
    ((tvar) = LIST_NEXT((var), field), 1);   \
    (var) = (tvar))

#define LIST_MOVE(head1, head2) do {     \
 LIST_INIT((head2));      \
 if (!LIST_EMPTY((head1)))
 {     \
  (head2)->lh_first = (head1)->lh_first;   \
  LIST_INIT((head1));     \
 }        \
} while (/*CONSTCOND*/0)

/*
* List functions.
*/
#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_LIST_INSERT_HEAD(head, elm, field)   \
 if ((head)->lh_first &&      \
    (head)->lh_first->field.le_prev != &(head)->lh_first) \
  QUEUEDEBUG_ABORT("LIST_INSERT_HEAD %p %s:%d", (head), \
     __FILE__, __LINE__);
#define QUEUEDEBUG_LIST_OP(elm, field)     \
 if ((elm)->field.le_next &&     \
    (elm)->field.le_next->field.le_prev !=   \
    &(elm)->field.le_next)     \
  QUEUEDEBUG_ABORT("LIST_* forw %p %s:%d", (elm),  \
     __FILE__, __LINE__);    \
 if (*(elm)->field.le_prev != (elm))    \
  QUEUEDEBUG_ABORT("LIST_* back %p %s:%d", (elm),  \
     __FILE__, __LINE__);
#define QUEUEDEBUG_LIST_POSTREMOVE(elm, field)    \
 (elm)->field.le_next = (void *)1L;    \
 (elm)->field.le_prev = (void *)1L;
#else
#define QUEUEDEBUG_LIST_INSERT_HEAD(head, elm, field)
#define QUEUEDEBUG_LIST_OP(elm,
 field)
#define QUEUEDEBUG_LIST_POSTREMOVE(elm, field)
#endif

#define LIST_INIT(head) do {      \
 (head)->lh_first = LIST_END(head);    \
} while (/*CONSTCOND*/0)
```

```
#define LIST_INSERT_AFTER(listelm, elm, field) do {   \
 QUEUEDEBUG_LIST_OP((listelm), field)    \
 if (((elm)->field.le_next = (listelm)->field.le_next) !=  \
     LIST_END(head))      \
  (listelm)->field.le_next->field.le_prev =  \
      &(elm)->field.le_next;    \
 (listelm)->field.le_next = (elm);    \
 (elm)->field.le_prev = &(listelm)->field.le_next;  \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_BEFORE(listelm, elm, field) do {   \
 QUEUEDEBUG_LIST_OP((listelm), field)    \
 (elm)->field.le_prev = (listelm)->field.le_prev;  \
 (elm)->field.le_next = (listelm);    \
 *(listelm)->field.le_prev = (elm);    \
 (listelm)->field.le_prev = &(elm)->field.le_next;  \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_HEAD(head, elm, field) do {    \
 QUEUEDEBUG_LIST_INSERT_HEAD((head), (elm), field)  \
 if (((elm)->field.le_next
 = (head)->lh_first) != LIST_END(head))\
  (head)->lh_first->field.le_prev = &(elm)->field.le_next;\
 (head)->lh_first = (elm);     \
 (elm)->field.le_prev = &(head)->lh_first;   \
} while (/*CONSTCOND*/0)

#define LIST_REMOVE(elm, field) do {     \
 QUEUEDEBUG_LIST_OP((elm), field)    \
 if ((elm)->field.le_next != NULL)    \
  (elm)->field.le_next->field.le_prev =    \
      (elm)->field.le_prev;    \
 *(elm)->field.le_prev = (elm)->field.le_next;   \
 QUEUEDEBUG_LIST_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

#define LIST_REPLACE(elm, elm2, field) do {    \
 if (((elm2)->field.le_next = (elm)->field.le_next) != NULL) \
  (elm2)->field.le_next->field.le_prev =   \
      &(elm2)->field.le_next;    \
 (elm2)->field.le_prev = (elm)->field.le_prev;   \
 *(elm2)->field.le_prev = (elm2);    \
 QUEUEDEBUG_LIST_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

/*
* Simple queue definitions.
```

```
*/
#define SIMPLEQ_HEAD(name, type)     \
struct name {        \
 struct
 type *sqh_first; /* first element */   \
 struct type **sqh_last; /* addr of last next element */  \
}

#define SIMPLEQ_HEAD_INITIALIZER(head)     \
 { NULL, &(head).sqh_first }

#define SIMPLEQ_ENTRY(type)      \
struct {        \
 struct type *sqe_next; /* next element */   \
}

/*
* Simple queue access methods.
*/
#define SIMPLEQ_FIRST(head)  ((head)->sqh_first)
#define SIMPLEQ_END(head)  NULL
#define SIMPLEQ_EMPTY(head)  ((head)->sqh_first == SIMPLEQ_END(head))
#define SIMPLEQ_NEXT(elm, field) ((elm)->field.sqe_next)

#define SIMPLEQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->sqh_first);    \
     (var) != SIMPLEQ_END(head);     \
     (var) = ((var)->field.sqe_next))

#define SIMPLEQ_FOREACH_SAFE(var, head, field, next)   \
 for ((var) = ((head)->sqh_first);    \
     (var) != SIMPLEQ_END(head) &&    \
     ((next = ((var)->field.sqe_next)), 1);   \
     (var) = (next))

/*
* Simple queue functions.
*/
#define SIMPLEQ_INIT(head) do {      \
 (head)->sqh_first = NULL;     \
 (head)->sqh_last
 = &(head)->sqh_first;    \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_HEAD(head, elm, field) do {   \
 if (((elm)->field.sqe_next = (head)->sqh_first) == NULL) \
  (head)->sqh_last = &(elm)->field.sqe_next;  \
 (head)->sqh_first = (elm);     \
```

```
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_TAIL(head, elm, field) do {   \
 (elm)->field.sqe_next = NULL;     \
 *(head)->sqh_last = (elm);     \
 (head)->sqh_last = &(elm)->field.sqe_next;   \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 if (((elm)->field.sqe_next = (listelm)->field.sqe_next) == NULL)\
  (head)->sqh_last = &(elm)->field.sqe_next;  \
 (listelm)->field.sqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE_HEAD(head, field) do {    \
 if (((head)->sqh_first = (head)->sqh_first->field.sqe_next) == NULL) \
  (head)->sqh_last = &(head)->sqh_first;   \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE_AFTER(head, elm, field) do {   \
 if
 (((elm)->field.sqe_next = (elm)->field.sqe_next->field.sqe_next) \
     == NULL)       \
  (head)->sqh_last = &(elm)->field.sqe_next;  \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE(head, elm, type, field) do {   \
 if ((head)->sqh_first == (elm)) {    \
  SIMPLEQ_REMOVE_HEAD((head), field);   \
 } else {       \
  struct type *curelm = (head)->sqh_first;  \
  while (curelm->field.sqe_next != (elm))   \
   curelm = curelm->field.sqe_next;  \
  if ((curelm->field.sqe_next =    \
   curelm->field.sqe_next->field.sqe_next) == NULL) \
       (head)->sqh_last = &(curelm)->field.sqe_next; \
 }       \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_CONCAT(head1, head2) do {    \
 if (!SIMPLEQ_EMPTY((head2))) {     \
  *(head1)->sqh_last = (head2)->sqh_first;  \
  (head1)->sqh_last = (head2)->sqh_last;  \
  SIMPLEQ_INIT((head2));     \
 }       \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_LAST(head, type, field)     \
```

```
 (SIMPLEQ_EMPTY((head)) ?      \
  NULL :      \
        ((struct type
 *)(void *)    \
  ((char *)((head)->sqh_last) - offsetof(struct type, field))))

/*
* Tail queue definitions.
*/
#define _TAILQ_HEAD(name, type, qual)     \
struct name {        \
 qual type *tqh_first;  /* first element */  \
 qual type *qual *tqh_last; /* addr of last next element */ \
}
#define TAILQ_HEAD(name, type) _TAILQ_HEAD(name, struct type,)

#define TAILQ_HEAD_INITIALIZER(head)     \
 { TAILQ_END(head), &(head).tqh_first }

#define _TAILQ_ENTRY(type, qual)     \
struct {        \
 qual type *tqe_next;  /* next element */  \
 qual type *qual *tqe_prev; /* address of previous next element */\
}
#define TAILQ_ENTRY(type) _TAILQ_ENTRY(struct type,)

/*
* Tail queue access methods.
*/
#define TAILQ_FIRST(head)  ((head)->tqh_first)
#define TAILQ_END(head)   (NULL)
#define TAILQ_NEXT(elm, field)  ((elm)->field.tqe_next)
#define TAILQ_LAST(head, headname) \
 (*(((struct headname *)(void *)((head)->tqh_last))->tqh_last))
#define TAILQ_PREV(elm, headname, field) \
 (*(((struct headname
 *)(void *)((elm)->field.tqe_prev))->tqh_last))
#define TAILQ_EMPTY(head)  (TAILQ_FIRST(head) == TAILQ_END(head))


#define TAILQ_FOREACH(var, head, field)     \
 for ((var) = ((head)->tqh_first);    \
     (var) != TAILQ_END(head);     \
     (var) = ((var)->field.tqe_next))

#define TAILQ_FOREACH_SAFE(var, head, field, next)   \
 for ((var) = ((head)->tqh_first);    \
     (var) != TAILQ_END(head) &&     \
```

```
    ((next) = TAILQ_NEXT(var, field), 1); (var) = (next))

#define TAILQ_FOREACH_REVERSE(var, head, headname, field)  \
 for ((var) = TAILQ_LAST((head), headname);   \
    (var) != TAILQ_END(head);     \
    (var) = TAILQ_PREV((var), headname, field))

#define TAILQ_FOREACH_REVERSE_SAFE(var, head, headname, field, prev) \
 for ((var) = TAILQ_LAST((head), headname);   \
    (var) != TAILQ_END(head) &&     \
    ((prev) = TAILQ_PREV((var), headname, field), 1); (var) = (prev))

/*
* Tail queue functions.
*/
#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_TAILQ_INSERT_HEAD(head,
 elm, field)   \
 if ((head)->tqh_first &&     \
    (head)->tqh_first->field.tqe_prev != &(head)->tqh_first) \
  QUEUEDEBUG_ABORT("TAILQ_INSERT_HEAD %p %s:%d", (head), \
     __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_INSERT_TAIL(head, elm, field)   \
 if (*(head)->tqh_last != NULL)     \
  QUEUEDEBUG_ABORT("TAILQ_INSERT_TAIL %p %s:%d", (head), \
     __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_OP(elm, field)     \
 if ((elm)->field.tqe_next &&     \
    (elm)->field.tqe_next->field.tqe_prev !=   \
    &(elm)->field.tqe_next)     \
  QUEUEDEBUG_ABORT("TAILQ_* forw %p %s:%d", (elm), \
     __FILE__, __LINE__);    \
 if (*(elm)->field.tqe_prev != (elm))    \
  QUEUEDEBUG_ABORT("TAILQ_* back %p %s:%d", (elm), \
     __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_PREREMOVE(head, elm, field)   \
 if ((elm)->field.tqe_next == NULL &&    \
    (head)->tqh_last != &(elm)->field.tqe_next)   \
  QUEUEDEBUG_ABORT("TAILQ_PREREMOVE head %p elm %p %s:%d",\
     (head), (elm), __FILE__,
 __LINE__);
#define QUEUEDEBUG_TAILQ_POSTREMOVE(elm, field)    \
 (elm)->field.tqe_next = (void *)1L;    \
 (elm)->field.tqe_prev = (void *)1L;
#else
#define QUEUEDEBUG_TAILQ_INSERT_HEAD(head, elm, field)
#define QUEUEDEBUG_TAILQ_INSERT_TAIL(head, elm, field)
#define QUEUEDEBUG_TAILQ_OP(elm, field)
```

```
#define QUEUEDEBUG_TAILQ_PREREMOVE(head, elm, field)
#define QUEUEDEBUG_TAILQ_POSTREMOVE(elm, field)
#endif

#define TAILQ_INIT(head) do {      \
 (head)->tqh_first = TAILQ_END(head);    \
 (head)->tqh_last = &(head)->tqh_first;    \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_HEAD(head, elm, field) do {   \
 QUEUEDEBUG_TAILQ_INSERT_HEAD((head), (elm), field)  \
 if (((elm)->field.tqe_next = (head)->tqh_first) != TAILQ_END(head))\
  (head)->tqh_first->field.tqe_prev =   \
      &(elm)->field.tqe_next;    \
 else       \
  (head)->tqh_last = &(elm)->field.tqe_next;  \
 (head)->tqh_first = (elm);     \
 (elm)->field.tqe_prev = &(head)->tqh_first;   \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_TAIL(head,
 elm, field) do {   \
 QUEUEDEBUG_TAILQ_INSERT_TAIL((head), (elm), field)  \
 (elm)->field.tqe_next = TAILQ_END(head);   \
 (elm)->field.tqe_prev = (head)->tqh_last;   \
 *(head)->tqh_last = (elm);     \
 (head)->tqh_last = &(elm)->field.tqe_next;   \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 QUEUEDEBUG_TAILQ_OP((listelm), field)    \
 if (((elm)->field.tqe_next = (listelm)->field.tqe_next) !=  \
     TAILQ_END(head))      \
  (elm)->field.tqe_next->field.tqe_prev =   \
      &(elm)->field.tqe_next;    \
 else       \
  (head)->tqh_last = &(elm)->field.tqe_next;  \
 (listelm)->field.tqe_next = (elm);    \
 (elm)->field.tqe_prev = &(listelm)->field.tqe_next;  \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_BEFORE(listelm, elm, field) do {   \
 QUEUEDEBUG_TAILQ_OP((listelm), field)    \
 (elm)->field.tqe_prev = (listelm)->field.tqe_prev;  \
 (elm)->field.tqe_next = (listelm);    \
 *(listelm)->field.tqe_prev = (elm);    \
 (listelm)->field.tqe_prev
```

```
 = &(elm)->field.tqe_next;  \
} while (/*CONSTCOND*/0)

#define TAILQ_REMOVE(head, elm, field) do {    \
 QUEUEDEBUG_TAILQ_PREREMOVE((head), (elm), field)  \
 QUEUEDEBUG_TAILQ_OP((elm), field)    \
 if (((elm)->field.tqe_next) != TAILQ_END(head))   \
  (elm)->field.tqe_next->field.tqe_prev =   \
      (elm)->field.tqe_prev;    \
 else       \
  (head)->tqh_last = (elm)->field.tqe_prev;  \
 *(elm)->field.tqe_prev = (elm)->field.tqe_next;   \
 QUEUEDEBUG_TAILQ_POSTREMOVE((elm), field);   \
} while (/*CONSTCOND*/0)

#define TAILQ_REPLACE(head, elm, elm2, field) do {   \
       if (((elm2)->field.tqe_next = (elm)->field.tqe_next) !=  \
     TAILQ_END(head))        \
              (elm2)->field.tqe_next->field.tqe_prev =  \
                 &(elm2)->field.tqe_next;    \
       else       \
              (head)->tqh_last = &(elm2)->field.tqe_next;  \
       (elm2)->field.tqe_prev = (elm)->field.tqe_prev;   \
       *(elm2)->field.tqe_prev = (elm2);    \
 QUEUEDEBUG_TAILQ_POSTREMOVE((elm),
 field);   \
} while (/*CONSTCOND*/0)

#define TAILQ_CONCAT(head1, head2, field) do {    \
 if (!TAILQ_EMPTY(head2)) {     \
  *(head1)->tqh_last = (head2)->tqh_first;  \
  (head2)->tqh_first->field.tqe_prev = (head1)->tqh_last; \
  (head1)->tqh_last = (head2)->tqh_last;   \
  TAILQ_INIT((head2));     \
 }       \
} while (/*CONSTCOND*/0)

/*
* Singly-linked Tail queue declarations.
*/
#define STAILQ_HEAD(name, type)      \
struct name {        \
 struct type *stqh_first; /* first element */  \
 struct type **stqh_last; /* addr of last next element */ \
}

#define STAILQ_HEAD_INITIALIZER(head)     \
 { NULL, &(head).stqh_first }
```

```
#define STAILQ_ENTRY(type)      \
struct {        \
 struct type *stqe_next; /* next element */   \
}

/*
* Singly-linked Tail queue access methods.
*/
#define STAILQ_FIRST(head) ((head)->stqh_first)
#define STAILQ_END(head) NULL
#define STAILQ_NEXT(elm, field) ((elm)->field.stqe_next)
#define STAILQ_EMPTY(head) (STAILQ_FIRST(head)
 == STAILQ_END(head))

/*
* Singly-linked Tail queue functions.
*/
#define STAILQ_INIT(head) do {      \
 (head)->stqh_first = NULL;     \
 (head)->stqh_last = &(head)->stqh_first;    \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_HEAD(head, elm, field) do {   \
 if (((elm)->field.stqe_next = (head)->stqh_first) == NULL) \
  (head)->stqh_last = &(elm)->field.stqe_next;  \
 (head)->stqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_TAIL(head, elm, field) do {   \
 (elm)->field.stqe_next = NULL;     \
 *(head)->stqh_last = (elm);     \
 (head)->stqh_last = &(elm)->field.stqe_next;   \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 if (((elm)->field.stqe_next = (listelm)->field.stqe_next) == NULL)\
  (head)->stqh_last = &(elm)->field.stqe_next;  \
 (listelm)->field.stqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define STAILQ_REMOVE_HEAD(head, field) do {    \
 if (((head)->stqh_first = (head)->stqh_first->field.stqe_next)
 == NULL) \
  (head)->stqh_last = &(head)->stqh_first;   \
} while (/*CONSTCOND*/0)

#define STAILQ_REMOVE(head, elm, type, field) do {   \
```

```
 if ((head)->stqh_first == (elm)) {    \
  STAILQ_REMOVE_HEAD((head), field);   \
 } else {       \
  struct type *curelm = (head)->stqh_first;  \
  while (curelm->field.stqe_next != (elm))   \
   curelm = curelm->field.stqe_next;  \
  if ((curelm->field.stqe_next =    \
   curelm->field.stqe_next->field.stqe_next) == NULL) \
       (head)->stqh_last = &(curelm)->field.stqe_next; \
 }        \
} while (/*CONSTCOND*/0)

#define STAILQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->stqh_first);    \
  (var);       \
  (var) = ((var)->field.stqe_next))

#define STAILQ_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = STAILQ_FIRST((head));    \
     (var) && ((tvar) = STAILQ_NEXT((var), field), 1);  \
     (var) = (tvar))

#define STAILQ_CONCAT(head1, head2) do {    \
 if (!STAILQ_EMPTY((head2))) {     \
  *(head1)->stqh_last
 = (head2)->stqh_first;  \
  (head1)->stqh_last = (head2)->stqh_last;  \
  STAILQ_INIT((head2));     \
 }        \
} while (/*CONSTCOND*/0)

#define STAILQ_LAST(head, type, field)     \
 (STAILQ_EMPTY((head)) ?      \
  NULL :       \
        ((struct type *)(void *)    \
  ((char *)((head)->stqh_last) - offsetof(struct type, field))))


#ifndef _KERNEL
/*
* Circular queue definitions. Do not use. We still keep the macros
* for compatibility but because of pointer aliasing issues their use
* is discouraged!
*/

/*
* __launder_type():  We use this ugly hack to work around the the compiler
* noticing that two types may not alias each other and elide tests in code.
```

```
* We hit this in the CIRCLEQ macros when comparing 'struct name *' and
* 'struct type *' (see CIRCLEQ_HEAD()).  Modern compilers (such as GCC
* 4.8) declare these comparisons as always false, causing the code to
* not run as designed.
*
* This hack is only to be used for comparisons and thus can be fully const.
 * Do not use for assignment.
*
* If we ever choose to change the ABI of the CIRCLEQ macros, we could fix
* this by changing the head/tail sentinal values, but see the note above
* this one.
*/
static __inline const void * __launder_type(const void *);
static __inline const void *
__launder_type(const void *__x)
{
 __asm __volatile("" : "+r" (__x));
 return __x;
}

#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_CIRCLEQ_HEAD(head, field)    \
 if ((head)->cqh_first != CIRCLEQ_ENDC(head) &&   \
     (head)->cqh_first->field.cqe_prev != CIRCLEQ_ENDC(head)) \
  QUEUEDEBUG_ABORT("CIRCLEQ head forw %p %s:%d", (head), \
        __FILE__, __LINE__);    \
 if ((head)->cqh_last != CIRCLEQ_ENDC(head) &&   \
     (head)->cqh_last->field.cqe_next != CIRCLEQ_ENDC(head)) \
  QUEUEDEBUG_ABORT("CIRCLEQ head back %p %s:%d", (head), \
        __FILE__, __LINE__);
#define QUEUEDEBUG_CIRCLEQ_ELM(head, elm, field)   \
 if ((elm)->field.cqe_next == CIRCLEQ_ENDC(head)) {  \
  if ((head)->cqh_last != (elm))    \
   QUEUEDEBUG_ABORT("CIRCLEQ
 elm last %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 } else {       \
  if ((elm)->field.cqe_next->field.cqe_prev != (elm)) \
   QUEUEDEBUG_ABORT("CIRCLEQ elm forw %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 }        \
 if ((elm)->field.cqe_prev == CIRCLEQ_ENDC(head)) {  \
  if ((head)->cqh_first != (elm))    \
   QUEUEDEBUG_ABORT("CIRCLEQ elm first %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 } else {       \
  if ((elm)->field.cqe_prev->field.cqe_next != (elm)) \
   QUEUEDEBUG_ABORT("CIRCLEQ elm prev %p %s:%d", \
```

```
        (elm), __FILE__, __LINE__);   \
 }
#define QUEUEDEBUG_CIRCLEQ_POSTREMOVE(elm, field)   \
 (elm)->field.cqe_next = (void *)1L;    \
 (elm)->field.cqe_prev = (void *)1L;
#else
#define QUEUEDEBUG_CIRCLEQ_HEAD(head, field)
#define QUEUEDEBUG_CIRCLEQ_ELM(head, elm, field)
#define QUEUEDEBUG_CIRCLEQ_POSTREMOVE(elm, field)
#endif

#define CIRCLEQ_HEAD(name, type)     \
struct name {        \
 struct type *cqh_first;  /*
 first element */  \
 struct type *cqh_last;  /* last element */  \
}

#define CIRCLEQ_HEAD_INITIALIZER(head)     \
 { CIRCLEQ_END(&head), CIRCLEQ_END(&head) }

#define CIRCLEQ_ENTRY(type)      \
struct {        \
 struct type *cqe_next;  /* next element */  \
 struct type *cqe_prev;  /* previous element */  \
}

/*
* Circular queue functions.
*/
#define CIRCLEQ_INIT(head) do {      \
 (head)->cqh_first = CIRCLEQ_END(head);    \
 (head)->cqh_last = CIRCLEQ_END(head);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (listelm), field)  \
 (elm)->field.cqe_next = (listelm)->field.cqe_next;  \
 (elm)->field.cqe_prev = (listelm);    \
 if ((listelm)->field.cqe_next == CIRCLEQ_ENDC(head))  \
  (head)->cqh_last = (elm);    \
 else        \
  (listelm)->field.cqe_next->field.cqe_prev = (elm); \
 (listelm)->field.cqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_BEFORE(head,
```

```
 listelm, elm, field) do {  \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (listelm), field)  \
 (elm)->field.cqe_next = (listelm);    \
 (elm)->field.cqe_prev = (listelm)->field.cqe_prev;  \
 if ((listelm)->field.cqe_prev == CIRCLEQ_ENDC(head))  \
  (head)->cqh_first = (elm);    \
 else       \
  (listelm)->field.cqe_prev->field.cqe_next = (elm); \
 (listelm)->field.cqe_prev = (elm);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_HEAD(head, elm, field) do {   \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 (elm)->field.cqe_next = (head)->cqh_first;   \
 (elm)->field.cqe_prev = CIRCLEQ_END(head);   \
 if ((head)->cqh_last == CIRCLEQ_ENDC(head))   \
  (head)->cqh_last = (elm);    \
 else       \
  (head)->cqh_first->field.cqe_prev = (elm);  \
 (head)->cqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_TAIL(head, elm, field) do {   \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 (elm)->field.cqe_next
 = CIRCLEQ_END(head);   \
 (elm)->field.cqe_prev = (head)->cqh_last;   \
 if ((head)->cqh_first == CIRCLEQ_ENDC(head))   \
  (head)->cqh_first = (elm);    \
 else       \
  (head)->cqh_last->field.cqe_next = (elm);  \
 (head)->cqh_last = (elm);     \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_REMOVE(head, elm, field) do {    \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (elm), field)   \
 if ((elm)->field.cqe_next == CIRCLEQ_ENDC(head))  \
  (head)->cqh_last = (elm)->field.cqe_prev;  \
 else       \
  (elm)->field.cqe_next->field.cqe_prev =   \
     (elm)->field.cqe_prev;    \
 if ((elm)->field.cqe_prev == CIRCLEQ_ENDC(head))  \
  (head)->cqh_first = (elm)->field.cqe_next;  \
 else       \
  (elm)->field.cqe_prev->field.cqe_next =   \
     (elm)->field.cqe_next;    \
```

```
 QUEUEDEBUG_CIRCLEQ_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->cqh_first);    \
  (var) != CIRCLEQ_ENDC(head);    \
  (var)
 = ((var)->field.cqe_next))

#define CIRCLEQ_FOREACH_REVERSE(var, head, field)   \
 for ((var) = ((head)->cqh_last);    \
  (var) != CIRCLEQ_ENDC(head);    \
  (var) = ((var)->field.cqe_prev))

/*
* Circular queue access methods.
*/
#define CIRCLEQ_FIRST(head)  ((head)->cqh_first)
#define CIRCLEQ_LAST(head)  ((head)->cqh_last)
/* For comparisons */
#define CIRCLEQ_ENDC(head)  (__launder_type(head))
/* For assignments */
#define CIRCLEQ_END(head)  ((void *)(head))
#define CIRCLEQ_NEXT(elm, field) ((elm)->field.cqe_next)
#define CIRCLEQ_PREV(elm, field) ((elm)->field.cqe_prev)
#define CIRCLEQ_EMPTY(head)      \
   (CIRCLEQ_FIRST(head) == CIRCLEQ_ENDC(head))

#define CIRCLEQ_LOOP_NEXT(head, elm, field)    \
 (((elm)->field.cqe_next == CIRCLEQ_ENDC(head))   \
     ? ((head)->cqh_first)     \
     : (elm->field.cqe_next))
#define CIRCLEQ_LOOP_PREV(head, elm, field)    \
 (((elm)->field.cqe_prev == CIRCLEQ_ENDC(head))   \
     ? ((head)->cqh_last)     \
     :
 (elm->field.cqe_prev))
#endif /* !_KERNEL */

#endif /* !_SYS_QUEUE_H_ */
#ifndef _SYS_CDEFS_H_
#define _SYS_CDEFS_H_

#warning usage of non-standard #include <sys/cdefs.h> is deprecated

#undef __P
#undef __PMT
```

```
#define __P(args) args
#define __PMT(args) args

#define __CONCAT(x,y) x ## y
#define __STRING(x) #x

#ifdef  __cplusplus
# define __BEGIN_DECLS extern "C" {
# define __END_DECLS }
#else
# define __BEGIN_DECLS
# define __END_DECLS
#endif

#if defined(__GNUC__) && !defined(__cplusplus)
# define __THROW __attribute__ ((__nothrow__))
# define __NTH(fct) __attribute__ ((__nothrow__)) fct
#else
# define __THROW
# define __NTH(fct)     fct
#endif

#endif /* _SYS_CDEFS_H_ */
# Contributor: Fabian Affolter <fabian@affolter-engineering.ch>
# Maintainer: Fabian Affolter <fabian@affolter-engineering.ch>
pkgname=py3-flake8-copyright
_pkgname=flake8-copyright
pkgver=0.2.4
pkgrel=3
pkgdesc="Extension for flake8 which checks for copyrights"
options="!check" # No testsuite
url="https://github.com/savoirfairelinux/flake8-copyright"
arch="noarch"
license="MIT"
depends="py3-flake8 py3-setuptools"
makedepends="py3-gpep517 py3-wheel"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/${_pkgname:0:1}/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir"/$_pkgname-$pkgver

replaces="py-flake8-copyright"                  # Backwards compatibility
provides="py-flake8-copyright=$pkgver-r$pkgrel" # Backwards compatibility

build() {
 gpep517 build-wheel \
  --wheel-dir .dist \
  --output-fd 3 3>&1 >&2
}
```

```
package() {
 gpep517 install-wheel --destdir "$pkgdir" \
  .dist/*.whl
}

sha512sums="
a6ab47e1bb715618f075c51f398e18180404871b3b0faf1c2d30701d5203db6bc23771bf22ffb5bafcd8ee856b9b64237
b316bd503ae7dceed6ca284ccd5a74d
  flake8-copyright-0.2.4.tar.gz
"
```

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```
/* $NetBSD: tree.h,v 1.20 2013/09/14 13:20:45 joerg Exp $ */
/* $OpenBSD: tree.h,v 1.13 2011/07/09 00:19:45 pirofti Exp $ */
/* Modified by Void Linux. */
/*
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```
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*/

#ifndef _SYS_TREE_H_
#define _SYS_TREE_H_

#ifdef __GNUC__
#define __GNUC_PREREQ__(x, y)      \
 ((__GNUC__ == (x) && __GNUC_MINOR__ >= (y)) ||   \
  (__GNUC__ > (x)))
#else
#define __GNUC_PREREQ__(x, y) 0
#endif

#if __GNUC_PREREQ__(2, 7) || defined(__lint__)
#define _sys_tree_h_unused __attribute__((__unused__))
#else
#define _sys_tree_h_unused /* delete */
#endif

/*
* This file defines data structures for different types of trees:
* splay trees and red-black trees.
*
* A splay tree is a self-organizing
 data structure.  Every operation
* on the tree causes a splay to happen.  The splay moves the requested
* node to the root of the tree and partly rebalances it.
*
* This has the benefit that request locality causes faster lookups as
* the requested nodes move to the top of the tree.  On the other hand,
* every lookup causes memory writes.
*
* The Balance Theorem bounds the total access time for m operations
* and n inserts on an initially empty tree as O((m + n)lg n).  The
* amortized cost for a sequence of m accesses to a splay tree is O(lg n);
```

```
*
* A red-black tree is a binary search tree with the node color as an
* extra attribute.  It fulfills a set of conditions:
* - every search path from the root to a leaf consists of the
*   same number of black nodes,
* - each red node (except for the root) has a black parent,
* - each leaf node is black.
*
* Every operation on a red-black tree is bounded as O(lg n).
* The maximum height of a red-black tree is 2lg (n+1).
 */

#define SPLAY_HEAD(name, type)      \
struct name {       \
 struct type *sph_root; /* root of the tree */   \
}

#define SPLAY_INITIALIZER(root)      \
 { NULL }

#define SPLAY_INIT(root) do {      \
 (root)->sph_root = NULL;     \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ENTRY(type)      \
struct {       \
 struct type *spe_left; /* left element */   \
 struct type *spe_right; /* right element */   \
}

#define SPLAY_LEFT(elm, field)  (elm)->field.spe_left
#define SPLAY_RIGHT(elm, field)  (elm)->field.spe_right
#define SPLAY_ROOT(head)  (head)->sph_root
#define SPLAY_EMPTY(head)  (SPLAY_ROOT(head) == NULL)

/* SPLAY_ROTATE_{LEFT,RIGHT} expect that tmp hold SPLAY_{RIGHT,LEFT} */
#define SPLAY_ROTATE_RIGHT(head, tmp, field) do {   \
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(tmp, field); \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;      \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ROTATE_LEFT(head, tmp, field) do {   \
 SPLAY_RIGHT((head)->sph_root,
 field) = SPLAY_LEFT(tmp, field); \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;      \
} while (/*CONSTCOND*/ 0)
```

```
#define SPLAY_LINKLEFT(head, tmp, field) do {    \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;      \
 (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);  \
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKRIGHT(head, tmp, field) do {    \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;      \
 (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field); \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ASSEMBLE(head, node, left, right, field) do {  \
 SPLAY_RIGHT(left, field) = SPLAY_LEFT((head)->sph_root, field); \
 SPLAY_LEFT(right, field) = SPLAY_RIGHT((head)->sph_root, field);\
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(node, field); \
 SPLAY_RIGHT((head)->sph_root, field) = SPLAY_LEFT(node, field); \
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */

#define
 SPLAY_PROTOTYPE(name, type, field, cmp)    \
void name##_SPLAY(struct name *, struct type *);   \
void name##_SPLAY_MINMAX(struct name *, int);    \
struct type *name##_SPLAY_INSERT(struct name *, struct type *);  \
struct type *name##_SPLAY_REMOVE(struct name *, struct type *);  \
        \
/* Finds the node with the same key as elm */    \
static __inline struct type *      \
name##_SPLAY_FIND(struct name *head, struct type *elm)   \
{        \
 if (SPLAY_EMPTY(head))      \
  return(NULL);      \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0)    \
  return (head->sph_root);    \
 return (NULL);       \
}        \
        \
static __inline _sys_tree_h_unused struct type *   \
name##_SPLAY_NEXT(struct name *head, struct type *elm)   \
{        \
 name##_SPLAY(head, elm);     \
 if (SPLAY_RIGHT(elm, field) != NULL) {    \
  elm = SPLAY_RIGHT(elm, field);    \
  while (SPLAY_LEFT(elm, field) != NULL) {  \
```

```
   elm = SPLAY_LEFT(elm, field);   \
  }       \
 }
 else       \
  elm = NULL;      \
 return (elm);       \
}         \
         \
static _sys_tree_h_unused __inline struct type *   \
name##_SPLAY_MIN_MAX(struct name *head, int val)   \
{         \
 name##_SPLAY_MINMAX(head, val);     \
       return (SPLAY_ROOT(head));     \
}

/* Main splay operation.
* Moves node close to the key of elm to top
*/
#define SPLAY_GENERATE(name, type, field, cmp)    \
struct type *        \
name##_SPLAY_INSERT(struct name *head, struct type *elm)  \
{         \
   if (SPLAY_EMPTY(head)) {      \
     SPLAY_LEFT(elm, field) = SPLAY_RIGHT(elm, field) = NULL; \
   } else {        \
     int __comp;       \
     name##_SPLAY(head, elm);     \
     __comp = (cmp)(elm, (head)->sph_root);   \
     if(__comp < 0) {      \
      SPLAY_LEFT(elm, field) = SPLAY_LEFT((head)->sph_root, field);\
      SPLAY_RIGHT(elm, field) = (head)->sph_root;  \
      SPLAY_LEFT((head)->sph_root, field) = NULL;  \
     } else if (__comp > 0) {     \
      SPLAY_RIGHT(elm,
 field) = SPLAY_RIGHT((head)->sph_root, field);\
      SPLAY_LEFT(elm, field) = (head)->sph_root;  \
      SPLAY_RIGHT((head)->sph_root, field) = NULL; \
     } else       \
      return ((head)->sph_root);    \
   }         \
   (head)->sph_root = (elm);      \
   return (NULL);       \
}         \
         \
struct type *        \
name##_SPLAY_REMOVE(struct name *head, struct type *elm)  \
{         \
 struct type *__tmp;      \
```

```
 if (SPLAY_EMPTY(head))      \
  return (NULL);      \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0) {   \
  if (SPLAY_LEFT((head)->sph_root, field) == NULL) { \
   (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field);\
  } else {      \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);\
   name##_SPLAY(head, elm);   \
   SPLAY_RIGHT((head)->sph_root, field) = __tmp; \
  }       \
  return (elm);      \
 }        \
 return (NULL);       \
}         \
         \
void         \
name##_SPLAY(struct
 name *head, struct type *elm)   \
{         \
 struct type __node, *__left, *__right, *__tmp;   \
 int __comp;       \
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
 __left = __right = &__node;     \
\
 while ((__comp = (cmp)(elm, (head)->sph_root)) != 0) {  \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if ((cmp)(elm, __tmp) < 0){   \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKLEFT(head, __right, field);  \
  } else if (__comp > 0) {    \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if ((cmp)(elm, __tmp) > 0){   \
    SPLAY_ROTATE_LEFT(head, __tmp, field); \
    if (SPLAY_RIGHT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKRIGHT(head, __left, field);  \
```

```
  }       \
 }        \
 SPLAY_ASSEMBLE(head,
 &__node, __left, __right, field);  \
}         \
         \
/* Splay with either the minimum or the maximum element   \
* Used to find minimum or maximum element in tree.   \
*/         \
void name##_SPLAY_MINMAX(struct name *head, int __comp) \
{         \
 struct type __node, *__left, *__right, *__tmp;   \
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
 __left = __right = &__node;     \
\
 while (1) {       \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if (__comp < 0){    \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKLEFT(head, __right, field);  \
  } else if (__comp > 0) {    \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if (__comp > 0) {    \
    SPLAY_ROTATE_LEFT(head, __tmp, field); \
    if (SPLAY_RIGHT((head)->sph_root,
 field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKRIGHT(head, __left, field);  \
  }       \
 }        \
 SPLAY_ASSEMBLE(head, &__node, __left, __right, field);  \
}

#define SPLAY_NEGINF -1
#define SPLAY_INF 1

#define SPLAY_INSERT(name, x, y) name##_SPLAY_INSERT(x, y)
#define SPLAY_REMOVE(name, x, y) name##_SPLAY_REMOVE(x, y)
```

```
#define SPLAY_FIND(name, x, y)  name##_SPLAY_FIND(x, y)
#define SPLAY_NEXT(name, x, y)  name##_SPLAY_NEXT(x, y)
#define SPLAY_MIN(name, x)  (SPLAY_EMPTY(x) ? NULL \
    : name##_SPLAY_MIN_MAX(x, SPLAY_NEGINF))
#define SPLAY_MAX(name, x)  (SPLAY_EMPTY(x) ? NULL \
    : name##_SPLAY_MIN_MAX(x, SPLAY_INF))

#define SPLAY_FOREACH(x, name, head)    \
 for ((x) = SPLAY_MIN(name, head);   \
     (x) != NULL;     \
     (x) = SPLAY_NEXT(name, head, x))

/* Macros that define a red-black tree */
#define RB_HEAD(name, type)     \
struct name {       \
 struct type *rbh_root; /* root of the tree */   \
}

#define RB_INITIALIZER(root)     \
 {
 NULL }

#define RB_INIT(root) do {      \
 (root)->rbh_root = NULL;    \
} while (/*CONSTCOND*/ 0)

#define RB_BLACK 0
#define RB_RED  1
#define RB_ENTRY(type)      \
struct {       \
 struct type *rbe_left;  /* left element */  \
 struct type *rbe_right;  /* right element */  \
 struct type *rbe_parent; /* parent element */  \
 int rbe_color;   /* node color */  \
}

#define RB_LEFT(elm, field)  (elm)->field.rbe_left
#define RB_RIGHT(elm, field)  (elm)->field.rbe_right
#define RB_PARENT(elm, field)  (elm)->field.rbe_parent
#define RB_COLOR(elm, field)  (elm)->field.rbe_color
#define RB_ROOT(head)   (head)->rbh_root
#define RB_EMPTY(head)   (RB_ROOT(head) == NULL)

#define RB_SET(elm, parent, field) do {     \
 RB_PARENT(elm, field) = parent;     \
 RB_LEFT(elm, field) = RB_RIGHT(elm, field) = NULL;  \
 RB_COLOR(elm, field) = RB_RED;     \
} while (/*CONSTCOND*/ 0)
```

```
#define RB_SET_BLACKRED(black, red, field) do {    \
 RB_COLOR(black, field) = RB_BLACK;    \
 RB_COLOR(red, field)
 = RB_RED;     \
} while (/*CONSTCOND*/ 0)

#ifndef RB_AUGMENT
#define RB_AUGMENT(x) do {} while (/*CONSTCOND*/ 0)
#endif

#define RB_ROTATE_LEFT(head, elm, tmp, field) do {   \
 (tmp) = RB_RIGHT(elm, field);     \
 if ((RB_RIGHT(elm, field) = RB_LEFT(tmp, field)) != NULL) { \
  RB_PARENT(RB_LEFT(tmp, field), field) = (elm);  \
 }       \
 RB_AUGMENT(elm);      \
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
   RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
  else      \
   RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else       \
  (head)->rbh_root = (tmp);    \
 RB_LEFT(tmp, field) = (elm);     \
 RB_PARENT(elm, field) = (tmp);     \
 RB_AUGMENT(tmp);      \
 if ((RB_PARENT(tmp, field)))     \
  RB_AUGMENT(RB_PARENT(tmp, field));   \
} while (/*CONSTCOND*/ 0)

#define RB_ROTATE_RIGHT(head, elm, tmp, field) do {   \
 (tmp) = RB_LEFT(elm, field);     \
 if ((RB_LEFT(elm, field) = RB_RIGHT(tmp, field))
 != NULL) { \
  RB_PARENT(RB_RIGHT(tmp, field), field) = (elm);  \
 }       \
 RB_AUGMENT(elm);      \
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
   RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
  else      \
   RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else       \
  (head)->rbh_root = (tmp);    \
 RB_RIGHT(tmp, field) = (elm);     \
 RB_PARENT(elm, field) = (tmp);     \
 RB_AUGMENT(tmp);      \
```

```
 if ((RB_PARENT(tmp, field)))     \
  RB_AUGMENT(RB_PARENT(tmp, field));   \
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */
#define RB_PROTOTYPE(name, type, field, cmp)    \
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp,)
#define RB_PROTOTYPE_STATIC(name, type, field, cmp)   \
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_PROTOTYPE_INTERNAL(name, type, field, cmp, attr)  \
attr void name##_RB_INSERT_COLOR(struct name *, struct
 type *);  \
attr void name##_RB_REMOVE_COLOR(struct name *, struct type *, struct type *);\
attr struct type *name##_RB_REMOVE(struct name *, struct type *); \
attr struct type *name##_RB_INSERT(struct name *, struct type *); \
attr struct type *name##_RB_FIND(struct name *, struct type *);  \
attr struct type *name##_RB_NFIND(struct name *, struct type *); \
attr struct type *name##_RB_NEXT(struct type *);   \
attr struct type *name##_RB_PREV(struct type *);   \
attr struct type *name##_RB_MINMAX(struct name *, int);   \
        \

/* Main rb operation.
* Moves node close to the key of elm to top
*/
#define RB_GENERATE(name, type, field, cmp)    \
 RB_GENERATE_INTERNAL(name, type, field, cmp,)
#define RB_GENERATE_STATIC(name, type, field, cmp)   \
 RB_GENERATE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_GENERATE_INTERNAL(name, type, field, cmp, attr)  \
attr void       \
name##_RB_INSERT_COLOR(struct name *head, struct type *elm)  \
{        \
 struct type
 *parent, *gparent, *tmp;    \
 while ((parent = RB_PARENT(elm, field)) != NULL &&  \
     RB_COLOR(parent, field) == RB_RED) {   \
  gparent = RB_PARENT(parent, field);   \
  if (parent == RB_LEFT(gparent, field)) {  \
   tmp = RB_RIGHT(gparent, field);   \
   if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
    RB_COLOR(tmp, field) = RB_BLACK; \
    RB_SET_BLACKRED(parent, gparent, field);\
    elm = gparent;    \
    continue;    \
   }      \
   if (RB_RIGHT(parent, field) == elm) {  \
    RB_ROTATE_LEFT(head, parent, tmp, field);\
```

```
    tmp = parent;    \
    parent = elm;    \
    elm = tmp;    \
   }      \
   RB_SET_BLACKRED(parent, gparent, field); \
   RB_ROTATE_RIGHT(head, gparent, tmp, field); \
  } else {      \
   tmp = RB_LEFT(gparent, field);   \
   if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
    RB_COLOR(tmp, field) = RB_BLACK; \
    RB_SET_BLACKRED(parent, gparent, field);\
    elm = gparent;    \
    continue;    \
   }      \
   if (RB_LEFT(parent, field) == elm)
  {  \
    RB_ROTATE_RIGHT(head, parent, tmp, field);\
    tmp = parent;    \
    parent = elm;    \
    elm = tmp;    \
   }      \
   RB_SET_BLACKRED(parent, gparent, field); \
   RB_ROTATE_LEFT(head, gparent, tmp, field); \
  }       \
 }        \
 RB_COLOR(head->rbh_root, field) = RB_BLACK;   \
}         \
         \
attr void        \
name##_RB_REMOVE_COLOR(struct name *head, struct type *parent, struct type *elm) \
{         \
 struct type *tmp;      \
 while ((elm == NULL || RB_COLOR(elm, field) == RB_BLACK) && \
     elm != RB_ROOT(head)) {     \
  if (RB_LEFT(parent, field) == elm) {   \
   tmp = RB_RIGHT(parent, field);   \
   if (RB_COLOR(tmp, field) == RB_RED) {  \
    RB_SET_BLACKRED(tmp, parent, field); \
    RB_ROTATE_LEFT(head, parent, tmp, field);\
    tmp = RB_RIGHT(parent, field);  \
   }      \
   if ((RB_LEFT(tmp, field) == NULL ||  \
       RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
       (RB_RIGHT(tmp, field) == NULL ||  \
       RB_COLOR(RB_RIGHT(tmp,
 field), field) == RB_BLACK)) {\
    RB_COLOR(tmp, field) = RB_RED;  \
    elm = parent;    \
```

```
 parent = RB_PARENT(elm, field);  \
 } else {     \
 if (RB_RIGHT(tmp, field) == NULL || \
     RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK) {\
  struct type *oleft;  \
  if ((oleft = RB_LEFT(tmp, field)) \
      != NULL)   \
   RB_COLOR(oleft, field) = RB_BLACK;\
  RB_COLOR(tmp, field) = RB_RED; \
  RB_ROTATE_RIGHT(head, tmp, oleft, field);\
  tmp = RB_RIGHT(parent, field); \
 }     \
 RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
 RB_COLOR(parent, field) = RB_BLACK; \
 if (RB_RIGHT(tmp, field))  \
  RB_COLOR(RB_RIGHT(tmp, field), field) = RB_BLACK;\
 RB_ROTATE_LEFT(head, parent, tmp, field);\
 elm = RB_ROOT(head);   \
 break;     \
 }      \
} else {      \
tmp = RB_LEFT(parent, field);   \
if (RB_COLOR(tmp, field) == RB_RED) {  \
 RB_SET_BLACKRED(tmp, parent, field); \
 RB_ROTATE_RIGHT(head, parent, tmp, field);\
 tmp
= RB_LEFT(parent, field);  \
 }      \
if ((RB_LEFT(tmp, field) == NULL ||  \
    RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
    (RB_RIGHT(tmp, field) == NULL ||  \
    RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK)) {\
 RB_COLOR(tmp, field) = RB_RED;  \
 elm = parent;    \
 parent = RB_PARENT(elm, field);  \
 } else {     \
 if (RB_LEFT(tmp, field) == NULL || \
     RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) {\
  struct type *oright;  \
  if ((oright = RB_RIGHT(tmp, field)) \
      != NULL)   \
   RB_COLOR(oright, field) = RB_BLACK;\
  RB_COLOR(tmp, field) = RB_RED; \
  RB_ROTATE_LEFT(head, tmp, oright, field);\
  tmp = RB_LEFT(parent, field); \
 }     \
 RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
 RB_COLOR(parent, field) = RB_BLACK; \
```

```
    if (RB_LEFT(tmp, field))  \
     RB_COLOR(RB_LEFT(tmp, field), field) = RB_BLACK;\
    RB_ROTATE_RIGHT(head, parent, tmp, field);\
    elm = RB_ROOT(head);   \
    break;     \
   }      \
  }       \
 }        \
 if
 (elm)       \
  RB_COLOR(elm, field) = RB_BLACK;   \
}         \
         \
attr struct type *       \
name##_RB_REMOVE(struct name *head, struct type *elm)   \
{         \
 struct type *child, *parent, *old = elm;   \
 int color;       \
 if (RB_LEFT(elm, field) == NULL)    \
  child = RB_RIGHT(elm, field);    \
 else if (RB_RIGHT(elm, field) == NULL)    \
  child = RB_LEFT(elm, field);    \
 else {        \
  struct type *left;     \
  elm = RB_RIGHT(elm, field);    \
  while ((left = RB_LEFT(elm, field)) != NULL)  \
   elm = left;     \
  child = RB_RIGHT(elm, field);    \
  parent = RB_PARENT(elm, field);    \
  color = RB_COLOR(elm, field);    \
  if (child)      \
   RB_PARENT(child, field) = parent;  \
  if (parent) {      \
   if (RB_LEFT(parent, field) == elm)  \
    RB_LEFT(parent, field) = child;  \
   else      \
    RB_RIGHT(parent, field) = child; \
   RB_AUGMENT(parent);    \
  } else       \
   RB_ROOT(head)
 = child;    \
  if (RB_PARENT(elm, field) == old)   \
   parent = elm;     \
  (elm)->field = (old)->field;    \
  if (RB_PARENT(old, field)) {    \
   if (RB_LEFT(RB_PARENT(old, field), field) == old)\
    RB_LEFT(RB_PARENT(old, field), field) = elm;\
   else      \
```

```
    RB_RIGHT(RB_PARENT(old, field), field) = elm;\
   RB_AUGMENT(RB_PARENT(old, field));  \
  } else       \
   RB_ROOT(head) = elm;    \
  RB_PARENT(RB_LEFT(old, field), field) = elm;  \
  if (RB_RIGHT(old, field))    \
   RB_PARENT(RB_RIGHT(old, field), field) = elm; \
  if (parent) {      \
   left = parent;     \
   do {      \
    RB_AUGMENT(left);   \
   } while ((left = RB_PARENT(left, field)) != NULL); \
  }       \
  goto color;      \
 }        \
 parent = RB_PARENT(elm, field);     \
 color = RB_COLOR(elm, field);     \
 if (child)       \
  RB_PARENT(child, field) = parent;   \
 if (parent) {       \
  if (RB_LEFT(parent, field) == elm)   \
   RB_LEFT(parent, field) = child;   \
  else       \
   RB_RIGHT(parent,
 field) = child;  \
  RB_AUGMENT(parent);     \
 } else       \
  RB_ROOT(head) = child;     \
color:        \
 if (color == RB_BLACK)      \
  name##_RB_REMOVE_COLOR(head, parent, child);  \
 return (old);       \
}        \
        \
/* Inserts a node into the RB tree */     \
attr struct type *       \
name##_RB_INSERT(struct name *head, struct type *elm)   \
{        \
 struct type *tmp;      \
 struct type *parent = NULL;     \
 int comp = 0;       \
 tmp = RB_ROOT(head);      \
 while (tmp) {       \
  parent = tmp;      \
  comp = (cmp)(elm, parent);    \
  if (comp < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else if (comp > 0)     \
```

```
  tmp = RB_RIGHT(tmp, field);   \
 else      \
  return (tmp);     \
 }        \
 RB_SET(elm, parent, field);     \
 if (parent != NULL) {      \
  if (comp < 0)      \
   RB_LEFT(parent, field) = elm;   \
  else      \
   RB_RIGHT(parent, field) = elm;   \
  RB_AUGMENT(parent);     \
 } else       \
  RB_ROOT(head) = elm;     \
 name##_RB_INSERT_COLOR(head,
 elm);    \
 return (NULL);       \
}         \
         \
/* Finds the node with the same key as elm */    \
attr struct type *       \
name##_RB_FIND(struct name *head, struct type *elm)   \
{         \
 struct type *tmp = RB_ROOT(head);    \
 int comp;       \
 while (tmp) {       \
  comp = cmp(elm, tmp);     \
  if (comp < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else if (comp > 0)     \
   tmp = RB_RIGHT(tmp, field);   \
  else      \
   return (tmp);     \
 }        \
 return (NULL);       \
}         \
         \
/* Finds the first node greater than or equal to the search key */ \
attr struct type *       \
name##_RB_NFIND(struct name *head, struct type *elm)   \
{         \
 struct type *tmp = RB_ROOT(head);    \
 struct type *res = NULL;     \
 int comp;       \
 while (tmp) {       \
  comp = cmp(elm, tmp);     \
  if (comp < 0) {      \
   res = tmp;     \
   tmp = RB_LEFT(tmp, field);   \
```

```
  }       \
  else if (comp > 0)     \
   tmp =
 RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }        \
 return (res);       \
}         \
         \
/* ARGSUSED */        \
attr struct type *       \
name##_RB_NEXT(struct type *elm)     \
{         \
 if (RB_RIGHT(elm, field)) {     \
  elm = RB_RIGHT(elm, field);    \
  while (RB_LEFT(elm, field))    \
   elm = RB_LEFT(elm, field);   \
 } else {       \
  if (RB_PARENT(elm, field) &&    \
      (elm == RB_LEFT(RB_PARENT(elm, field), field))) \
   elm = RB_PARENT(elm, field);   \
  else {       \
   while (RB_PARENT(elm, field) &&   \
       (elm == RB_RIGHT(RB_PARENT(elm, field), field)))\
    elm = RB_PARENT(elm, field);  \
   elm = RB_PARENT(elm, field);   \
  }       \
 }        \
 return (elm);       \
}         \
         \
/* ARGSUSED */        \
attr struct type *       \
name##_RB_PREV(struct type *elm)     \
{         \
 if (RB_LEFT(elm, field)) {     \
  elm = RB_LEFT(elm, field);    \
  while (RB_RIGHT(elm, field))    \
   elm = RB_RIGHT(elm, field);   \
 }
 else {       \
  if (RB_PARENT(elm, field) &&    \
      (elm == RB_RIGHT(RB_PARENT(elm, field), field))) \
   elm = RB_PARENT(elm, field);   \
  else {       \
   while (RB_PARENT(elm, field) &&   \
       (elm == RB_LEFT(RB_PARENT(elm, field), field)))\
```

```
    elm = RB_PARENT(elm, field);  \
   elm = RB_PARENT(elm, field);   \
  }       \
 }        \
 return (elm);       \
}         \
         \
attr struct type *       \
name##_RB_MINMAX(struct name *head, int val)    \
{         \
 struct type *tmp = RB_ROOT(head);    \
 struct type *parent = NULL;     \
 while (tmp) {       \
  parent = tmp;      \
  if (val < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else       \
   tmp = RB_RIGHT(tmp, field);   \
 }        \
 return (parent);      \
}

#define RB_NEGINF -1
#define RB_INF 1

#define RB_INSERT(name, x, y) name##_RB_INSERT(x, y)
#define RB_REMOVE(name, x, y) name##_RB_REMOVE(x, y)
#define RB_FIND(name, x, y) name##_RB_FIND(x, y)
#define RB_NFIND(name, x, y) name##_RB_NFIND(x,
 y)
#define RB_NEXT(name, x, y) name##_RB_NEXT(y)
#define RB_PREV(name, x, y) name##_RB_PREV(y)
#define RB_MIN(name, x)  name##_RB_MINMAX(x, RB_NEGINF)
#define RB_MAX(name, x)  name##_RB_MINMAX(x, RB_INF)

#define RB_FOREACH(x, name, head)     \
 for ((x) = RB_MIN(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_NEXT(x))

#define RB_FOREACH_FROM(x, name, y)     \
 for ((x) = (y);       \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_SAFE(x, name, head, y)    \
 for ((x) = RB_MIN(name, head);     \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
```

```
     (x) = (y))

#define RB_FOREACH_REVERSE(x, name, head)    \
 for ((x) = RB_MAX(name, head);     \
     (x) != NULL;      \
     (x) = name##_RB_PREV(x))

#define RB_FOREACH_REVERSE_FROM(x, name, y)    \
 for ((x) = (y);       \
    ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
     (x) = (y))

#define RB_FOREACH_REVERSE_SAFE(x, name,
 head, y)   \
 for ((x) = RB_MAX(name, head);     \
    ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
     (x) = (y))

#endif /* _SYS_TREE_H_ */
# Contributor: Wen Heping <wenhepingalpine@sohu.com>
# Maintainer: Wen Heping <wenhepingalpine@sohu.com>
pkgname=perl-software-license
pkgver=0.104007
pkgrel=0
# _pkgreal is used by apkbuild-cpan to find modules at MetaCpan
_pkgreal=Software-License
pkgdesc="packages that provide templated software licenses"
url="https://metacpan.org/release/Software-License/"
arch="noarch"
license="GPL-1.0-or-later OR Artistic-1.0-Perl"
depends="perl perl-data-section perl-text-template"
checkdepends="perl-try-tiny"
subpackages="$pkgname-doc"
source="https://cpan.metacpan.org/authors/id/L/LE/LEONT/Software-License-$pkgver.tar.gz"
builddir="$srcdir/$_pkgreal-$pkgver"

build() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 PERL_MM_USE_DEFAULT=1 perl -I. Makefile.PL \
  INSTALLDIRS=vendor \
  NO_PACKLIST=1 \
  NO_PERLLOCAL=1
 make
}

check() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 make test
```

```
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="
12d75e9583b3013d9b4a282467f1ac80ab6b7f3251926d66591d01404489b528f22adc396dfd4528a0f0ca650f0eed6d
9c959e69eace2169c6ed1cfffe5277e4
  Software-License-0.104007.tar.gz
"
```

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```
# Contributor: Dhruvin Gandhi <contact@dhru.vin>
# Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=py3-license-expression
_pkgname=license_expression
pkgver=30.4.4
pkgrel=0
pkgdesc="Library to parse, compare, simplify and normalize license expressions"
url="https://github.com/nexB/license-expression"
arch="noarch"
license="Apache-2.0"
depends="python3 py3-boolean.py"
makedepends="py3-setuptools py3-setuptools_scm py3-gpep517 py3-wheel"
checkdepends="py3-pytest py3-pytest-xdist"
subpackages="$pkgname-pyc"
```

```
source="https://files.pythonhosted.org/packages/source/l/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir/$_pkgname-$pkgver"

build() {
 gpep517 build-wheel \
  --wheel-dir .dist \
  --output-fd 3 3>&1 >&2
}

check() {
 python3 -m venv --clear --without-pip --system-site-packages .testenv
 .testenv/bin/python3 -m installer .dist/*.whl
 .testenv/bin/python3 -m pytest
}

package() {
 python3 -m installer -d "$pkgdir" \
  .dist/*.whl
}

sha512sums="
f46dd4cf524b3962115fe26f5545bfdd6767275b482724af51e7ca07da79244969a3bfc5d2fd5b95bc0f19d1b95a26a8f3
ab36c676e56ec302178d7166588066
  license_expression-30.4.4.tar.gz
"
```

# 1.2824 cilium 1.17.5

## 1.2824.1 Available under license :

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// Package source constructs public URLs that link to the source files in a module. It
// can be used to build references to Go source code, or to any other files in a
// module.
//
// Of course, the module zip file contains all the files in the module. This
// package attempts to find the origin of the zip file, in a repository that is
// publicly readable, and constructs links to that repo. While a module zip file
// could in theory come from anywhere, including a non-public location, this
// package recognizes standard module path patterns and construct repository
// URLs from them, like the go command does.
package source

//
// Much of this code was adapted from
// https://go.googlesource.com/gddo/+/refs/heads/master/gosrc
// and
// https://go.googlesource.com/go/+/refs/heads/master/src/cmd/go/internal/get

import (
 "context"
 "fmt"
 "log"
 // We cannot use glog instead, because its "v" flag conflicts with other libraries we use.
 "net/http"
 "path"

```
 "regexp"
 "strconv"
 "strings"
 "time"

 "github.com/google/go-licenses/internal/third_party/pkgsite/derrors"
 "github.com/google/go-licenses/internal/third_party/pkgsite/stdlib"
 "github.com/google/go-licenses/internal/third_party/pkgsite/version"
 "go.opencensus.io/plugin/ochttp"
 "go.opencensus.io/trace"
 "golang.org/x/net/context/ctxhttp"
)

// Info holds source information about a module, used to generate URLs referring
// to directories, files and lines.
type Info struct {
 repoURL   string       // URL of repo containing module; exported for DB schema compatibility
 moduleDir string       // directory of module relative to repo root
 commit    string       // tag or ID of commit corresponding to version
 templates urlTemplates // for building URLs
}

// FileURL returns a URL for a file whose pathname is relative to the module's home directory.
func (i
 *Info) FileURL(pathname string) string {
 if i == nil {
  return ""
 }
 dir, base := path.Split(pathname)
 return expand(i.templates.File, map[string]string{
  "repo":       i.repoURL,
  "importPath": path.Join(strings.TrimPrefix(i.repoURL, "https://"), dir),
  "commit":     i.commit,
  "dir":        dir,
  "file":       path.Join(i.moduleDir, pathname),
  "base":       base,
 })
}

type Client struct {
 // client used for HTTP requests. It is mutable for testing purposes.
 // If nil, then moduleInfoDynamic will return nil, nil; also for testing.
 httpClient *http.Client
}

// New constructs a *Client using the provided timeout.
func NewClient(timeout time.Duration) *Client {
 return &Client{
```

```
  httpClient: &http.Client{
   Transport: &ochttp.Transport{},
   Timeout:   timeout,
  },
 }
}

// NewClientForTesting returns a Client suitable for testing. It returns the
// same results as an ordinary client for statically recognizable paths, but
// always returns a nil *Info for dynamic paths
 (those requiring HTTP requests).
func NewClientForTesting() *Client {
 return &Client{}
}

// doURL makes an HTTP request using the given url and method. It returns an
// error if the request returns an error. If only200 is true, it also returns an
// error if any status code other than 200 is returned.
func (c *Client) doURL(ctx context.Context, method, url string, only200 bool) (_ *http.Response, err error) {
 defer derrors.Wrap(&err, "doURL(ctx, client, %q, %q)", method, url)

 if c == nil || c.httpClient == nil {
  return nil, fmt.Errorf("c.httpClient cannot be nil")
 }
 req, err := http.NewRequest(method, url, nil)
 if err != nil {
  return nil, err
 }
 resp, err := ctxhttp.Do(ctx, c.httpClient, req)
 if err != nil {
  return nil, err
 }
 if only200 && resp.StatusCode != 200 {
  resp.Body.Close()
  return nil, fmt.Errorf("status %s", resp.Status)
 }
 return resp, nil
}

// ModuleInfo determines the repository corresponding to the module path. It
// returns a URL to that repo, as
 well as the directory of the module relative
// to the repo root.
//
// ModuleInfo may fetch from arbitrary URLs, so it can be slow.
func ModuleInfo(ctx context.Context, client *Client, modulePath, v string) (info *Info, err error) {
 defer derrors.Wrap(&err, "source.ModuleInfo(ctx, %q, %q)", modulePath, v)
 ctx, span := trace.StartSpan(ctx, "source.ModuleInfo")
```

```
 defer span.End()

 // The example.com domain can never be real; it is reserved for testing
 // (https://en.wikipedia.org/wiki/Example.com). Treat it as if it used
 // GitHub templates.
 if strings.HasPrefix(modulePath, "example.com/") {
  return NewGitHubInfo("https://"+modulePath, "", v), nil
 }

 if modulePath == stdlib.ModulePath {
  return newStdlibInfo(v)
 }

 repo, relativeModulePath, templates, transformCommit, err := matchStatic(modulePath)
 if err != nil {
  info, err = moduleInfoDynamic(ctx, client, modulePath, v)
  if err != nil {
   return nil, err
  }
 } else {
  commit, isHash := commitFromVersion(v, relativeModulePath)
  if
 transformCommit != nil {
   commit = transformCommit(commit, isHash)
  }
  info = &Info{
   repoURL:   trimVCSSuffix("https://" + repo),
   moduleDir: relativeModulePath,
   commit:    commit,
   templates: templates,
  }
 }
 if info != nil {
  adjustVersionedModuleDirectory(ctx, client, info)
 }
 if strings.HasPrefix(modulePath, "golang.org/") {
  adjustGoRepoInfo(info, modulePath, version.IsPseudo(v))
 }
 return info, nil
 // TODO(golang/go#39627): support launchpad.net, including the special case
 // in cmd/go/internal/get/vcs.go.
}

func newStdlibInfo(version string) (_ *Info, err error) {
 defer derrors.Wrap(&err, "newStdlibInfo(%q)", version)

 commit, err := stdlib.TagForVersion(version)
 if err != nil {
```

```
 return nil, err
}

templates := csopensourceTemplates
templates.Raw = "https://github.com/golang/go/raw/{commit}/{file}"
return &Info{
 repoURL:   stdlib.GoSourceRepoURL,
 moduleDir: stdlib.Directory(version),
 commit:    commit,
 templates: templates,
},
nil
}

// csNonXRepos is a set of repos hosted at https://cs.opensource.google/go,
// that are not an x/repo.
var csNonXRepos = map[string]bool{
 "dl":        true,
 "proposal":  true,
 "vscode-go": true,
}

// csXRepos is the set of repos hosted at https://cs.opensource.google/go,
// that have a x/ prefix.
//
// x/scratch is not included.
var csXRepos = map[string]bool{
 "x/arch":       true,
 "x/benchmarks": true,
 "x/blog":       true,
 "x/build":      true,
 "x/crypto":     true,
 "x/debug":      true,
 "x/example":    true,
 "x/exp":        true,
 "x/image":      true,
 "x/mobile":     true,
 "x/mod":        true,
 "x/net":        true,
 "x/oauth2":     true,
 "x/perf":       true,
 "x/pkgsite":    true,
 "x/playground": true,
 "x/review":     true,
 "x/sync":       true,
 "x/sys":        true,
 "x/talks":      true,
 "x/term":       true,
```

```
 "x/text":       true,
 "x/time":       true,
 "x/tools":      true,
 "x/tour":       true,
 "x/vgo":        true,
 "x/website":    true,
 "x/xerrors":
    true,
}

func adjustGoRepoInfo(info *Info, modulePath string, isHash bool) {
 suffix := strings.TrimPrefix(modulePath, "golang.org/")

 // Validate that this is a repo that exists on
 // https://cs.opensource.google/go. Otherwise, default to the existing
 // info.
 parts := strings.Split(suffix, "/")
 if len(parts) >= 2 {
  suffix = parts[0] + "/" + parts[1]
 }
 if strings.HasPrefix(suffix, "x/") {
  if !csXRepos[suffix] {
   return
  }
 } else if !csNonXRepos[suffix] {
  return
 }

 // rawURL needs to be set before info.templates is changed.
 rawURL := fmt.Sprintf(
  "https://github.com/golang/%s/raw/{commit}/{file}", strings.TrimPrefix(suffix, "x/"))

 info.repoURL = fmt.Sprintf("https://cs.opensource.google/go/%s", suffix)
 info.templates = csopensourceTemplates
 info.templates.Raw = rawURL

 if isHash {
  // When we have a pseudoversion, info.commit will be an actual commit
  // instead of a tag.
  //
  // https://cs.opensource.google/go/* has short commits hardcoded to
 8
  // chars. Commits shorter or longer will not work, unless it is the full
  // commit hash.
  info.commit = info.commit[0:8]
 }
}
```

```
// matchStatic matches the given module or repo path against a list of known
// patterns. It returns the repo name, the module path relative to the repo
// root, and URL templates if there is a match.
//
// The relative module path may not be correct in all cases: it is wrong if it
// ends in a version that is not part of the repo directory structure, because
// the repo follows the "major branch" convention for versions 2 and above.
// E.g. this function could return "foo/v2", but the module files live under "foo"; the
// "/v2" is part of the module path (and the import paths of its packages) but
// is not a subdirectory. This mistake is corrected in adjustVersionedModuleDirectory,
// once we have all the information we need to fix it.
//
// repo + "/" + relativeModulePath is often, but not always, equal to
// moduleOrRepoPath. It is not when the argument
 is a module path that uses the
// go command's general syntax, which ends in a ".vcs" (e.g. ".git", ".hg") that
// is neither part of the repo nor the suffix. For example, if the argument is
//
// github.com/a/b/c
//
// then repo="github.com/a/b" and relativeModulePath="c"; together they make up the module path.
// But if the argument is
//
// example.com/a/b.git/c
//
// then repo="example.com/a/b" and relativeModulePath="c"; the ".git" is omitted, since it is neither
// part of the repo nor part of the relative path to the module within the repo.
func matchStatic(moduleOrRepoPath string) (repo, relativeModulePath string, _ urlTemplates, transformCommit
transformCommitFunc, _ error) {
 for _, pat := range patterns {
  matches := pat.re.FindStringSubmatch(moduleOrRepoPath)
  if matches == nil {
   continue
  }
  var repo string
  for i, n := range pat.re.SubexpNames() {
   if n == "repo" {
    repo = matches[i]
    break
   }
  }
  // Special case: git.apache.org has a go-import tag
 that points to
  // github.com/apache, but it's not quite right (the repo prefix is
  // missing a ".git"), so handle it here.
  const apacheDomain = "git.apache.org/"
  if strings.HasPrefix(repo, apacheDomain) {
   repo = strings.Replace(repo, apacheDomain, "github.com/apache/", 1)
```

```
 }
 // Special case: module paths are blitiri.com.ar/go/..., but repos are blitiri.com.ar/git/r/...
 if strings.HasPrefix(repo, "blitiri.com.ar/") {
  repo = strings.Replace(repo, "/go/", "/git/r/", 1)
 }
 relativeModulePath = strings.TrimPrefix(moduleOrRepoPath, matches[0])
 relativeModulePath = strings.TrimPrefix(relativeModulePath, "/")
 return repo, relativeModulePath, pat.templates, pat.transformCommit, nil
}
return "", "", urlTemplates{}, nil, derrors.NotFound
}

// moduleInfoDynamic uses the go-import and go-source meta tags to construct an Info.
func moduleInfoDynamic(ctx context.Context, client *Client, modulePath, version string) (_ *Info, err error) {
 defer derrors.Wrap(&err, "moduleInfoDynamic(ctx,
 client, %q, %q)", modulePath, version)

 if client.httpClient == nil {
  return nil, nil // for testing
 }

 sourceMeta, err := fetchMeta(ctx, client, modulePath)
 if err != nil {
  return nil, err
 }
 // Don't check that the tag information at the repo root prefix is the same
 // as in the module path. It was done for us by the proxy and/or go command.
 // (This lets us merge information from the go-import and go-source tags.)

 // sourceMeta contains some information about where the module's source lives. But there
 // are some problems:
 // - We may only have a go-import tag, not a go-source tag, so we don't have URL templates for
 //   building URLs to files and directories.
 // - Even if we do have a go-source tag, its URL template format predates
 //   versioning, so the URL templates won't provide a way to specify a
 //   version or commit.
 //
 // We resolve these problems as follows:
 // 1. First look at the repo URL from the tag. If that matches a known hosting
 site, use the
 //    URL templates corresponding to that site and ignore whatever's in the tag.
 // 2. Then look at the URL templates to see if they match a known pattern, and use the templates
 //    from that pattern. For example, the meta tags for gopkg.in/yaml.v2 only mention github
 //    in the URL templates, like "https://github.com/go-yaml/yaml/tree/v2.2.3{/dir}". We can observe
 //    that that template begins with a known pattern--a GitHub repo, ignore the rest of it, and use the
 //    GitHub URL templates that we know.
 repoURL := sourceMeta.repoURL
 _, _, templates, transformCommit, _ := matchStatic(removeHTTPScheme(repoURL))
```

```
 // If err != nil, templates will be the zero value, so we can ignore it (same just below).
 if templates == (urlTemplates{}) {
  var repo string
  repo, _, templates, transformCommit, _ = matchStatic(removeHTTPScheme(sourceMeta.dirTemplate))
  if templates == (urlTemplates{}) {
   if err == nil {
    templates, transformCommit = matchLegacyTemplates(ctx,
sourceMeta)
    repoURL = strings.TrimSuffix(repoURL, ".git")
   } else {
    log.Printf("no templates for repo URL %q from meta tag: err=%v", sourceMeta.repoURL, err)
   }
  } else {
   // Use the repo from the template, not the original one.
   repoURL = "https://" + repo
  }
 }
 dir := strings.TrimPrefix(strings.TrimPrefix(modulePath, sourceMeta.repoRootPrefix), "/")
 commit, isHash := commitFromVersion(version, dir)
 if transformCommit != nil {
  commit = transformCommit(commit, isHash)
 }
 return &Info{
  repoURL:   strings.TrimSuffix(repoURL, "/"),
  moduleDir: dir,
  commit:    commit,
  templates: templates,
 }, nil
}

// List of template regexps and their corresponding likely templates,
// used by matchLegacyTemplates below.
var legacyTemplateMatches = []struct {
 fileRegexp      *regexp.Regexp
 templates       urlTemplates
 transformCommit transformCommitFunc
}{
 {
  regexp.MustCompile(`/src/branch/\w+\{/dir\}/\{file\}#L\{line\}$`),
  giteaURLTemplates, giteaTransformCommit,
 },
 {
  regexp.MustCompile(`/src/\w+\{/dir\}/\{file\}#L\{line\}$`),
  giteaURLTemplates,
 nil,
 },
 {
  regexp.MustCompile(`/-/blob/\w+\{/dir\}/\{file\}#L\{line\}$`),
```

```
 gitlabURLTemplates, nil,
 },
 {
 regexp.MustCompile(`/tree\{/dir\}/\{file\}#n\{line\}$`),
 fdioURLTemplates, fdioTransformCommit,
 },
}

// matchLegacyTemplates matches the templates from the go-source meta tag
// against some known patterns to guess the version-aware URL templates. If it
// can't find a match, it falls back using the go-source templates with some
// small replacements. These will not be version-aware but will still serve
// source at a fixed commit, which is better than nothing.
func matchLegacyTemplates(ctx context.Context, sm *sourceMeta) (_ urlTemplates, transformCommit
transformCommitFunc) {
 if sm.fileTemplate == "" {
  return urlTemplates{}, nil
 }
 for _, ltm := range legacyTemplateMatches {
  if ltm.fileRegexp.MatchString(sm.fileTemplate) {
   return ltm.templates, ltm.transformCommit
  }
 }
 log.Printf("matchLegacyTemplates:
 no matches for repo URL %q; replacing", sm.repoURL)
 rep := strings.NewReplacer(
  "{/dir}/{file}", "/{file}",
  "{dir}/{file}", "{file}",
  "{/dir}", "/{dir}")
 line := rep.Replace(sm.fileTemplate)
 file := line
 if i := strings.LastIndexByte(line, '#'); i > 0 {
  file = line[:i]
 }
 return urlTemplates{
  Repo:      sm.repoURL,
  Directory: rep.Replace(sm.dirTemplate),
  File:      file,
  Line:      line,
 }, nil
}

// adjustVersionedModuleDirectory changes info.moduleDir if necessary to
// correctly reflect the repo structure. info.moduleDir will be wrong if it has
// a suffix "/vN" for N > 1, and the repo uses the "major branch" convention,
// where modules at version 2 and higher live on branches rather than
// subdirectories. See https://research.swtch.com/vgo-module for a discussion of
// the "major branch" vs. "major subdirectory" conventions for organizing a
```

```
// repo.
func adjustVersionedModuleDirectory(ctx context.Context, client *Client,
 info *Info) {
 dirWithoutVersion := removeVersionSuffix(info.moduleDir)
 if info.moduleDir == dirWithoutVersion {
  return
 }
 // moduleDir does have a "/vN" for N > 1. To see if that is the actual directory,
 // fetch the go.mod file from it.
 res, err := client.doURL(ctx, "HEAD", info.FileURL("go.mod"), true)
 // On any failure, assume that the right directory is the one without the version.
 if err != nil {
  info.moduleDir = dirWithoutVersion
 } else {
  res.Body.Close()
 }
}

// removeHTTPScheme removes an initial "http://" or "https://" from url.
// The result can be used to match against our static patterns.
// If the URL uses a different scheme, it won't be removed and it won't
// match any patterns, as intended.
func removeHTTPScheme(url string) string {
 for _, prefix := range []string{"https://", "http://"} {
  if strings.HasPrefix(url, prefix) {
   return url[len(prefix):]
  }
 }
 return url
}

// removeVersionSuffix returns s with "/vN" removed if N is an integer > 1.
//
 Otherwise it returns s.
func removeVersionSuffix(s string) string {
 dir, base := path.Split(s)
 if !strings.HasPrefix(base, "v") {
  return s
 }
 if n, err := strconv.Atoi(base[1:]); err != nil || n < 2 {
  return s
 }
 return strings.TrimSuffix(dir, "/")
}

type transformCommitFunc func(commit string, isHash bool) string

// Patterns for determining repo and URL templates from module paths or repo
```

```
// URLs. Each regexp must match a prefix of the target string, and must have a
// group named "repo".
var patterns = []struct {
 pattern   string // uncompiled regexp
 templates urlTemplates
 re        *regexp.Regexp
 // transformCommit may alter the commit before substitution
 transformCommit transformCommitFunc
}{
 {
  pattern:   `^(?P<repo>github\.com/[a-z0-9A-Z_.\-]+/[a-z0-9A-Z_.\-]+)`,
  templates: githubURLTemplates,
 },
 {
  // Assume that any site beginning with "github." works like github.com.
  pattern:   `^(?P<repo>github\.[a-z0-9A-Z.-]+/[a-z0-9A-Z_.\-]+/[a-z0-9A-Z_.\-]+)(\.git|$)`,
  templates:
 githubURLTemplates,
 },
 {
  pattern:   `^(?P<repo>bitbucket\.org/[a-z0-9A-Z_.\-]+/[a-z0-9A-Z_.\-]+)`,
  templates: bitbucketURLTemplates,
 },
 {
  // Gitlab repos can have multiple path components.
  pattern:   `^(?P<repo>gitlab\.com/[^.]+)(\.git|$)`,
  templates: gitlabURLTemplates,
 },
 {
  // Assume that any site beginning with "gitlab." works like gitlab.com.
  pattern:   `^(?P<repo>gitlab\.[a-z0-9A-Z.-]+/[a-z0-9A-Z_.\-]+/[a-z0-9A-Z_.\-]+)(\.git|$)`,
  templates: gitlabURLTemplates,
 },
 {
  pattern:   `^(?P<repo>gitee\.com/[a-z0-9A-Z_.\-]+/[a-z0-9A-Z_.\-]+)(\.git|$)`,
  templates: githubURLTemplates,
 },
 {
  pattern: `^(?P<repo>git\.sr\.ht/~[a-z0-9A-Z_.\-]+/[a-z0-9A-Z_.\-]+)`,
  templates: urlTemplates{
   Directory: "{repo}/tree/{commit}/{dir}",
   File:      "{repo}/tree/{commit}/{file}",
   Line:      "{repo}/tree/{commit}/{file}#L{line}",
   Raw:       "{repo}/blob/{commit}/{file}",
  },
 },
 {
  pattern:         `^(?P<repo>git\.fd\.io/[a-z0-9A-Z_.\-]+)`,
```

```
templates:
    fdioURLTemplates,
transformCommit: fdioTransformCommit,
},
{
pattern:   `^(?P<repo>git\.pirl\.io/[a-z0-9A-Z_.\-]+/[a-z0-9A-Z_.\-]+)`,
templates: gitlabURLTemplates,
},
{
pattern:        `^(?P<repo>gitea\.com/[a-z0-9A-Z_.\-]+/[a-z0-9A-Z_.\-]+)(\.git|$)`,
templates:      giteaURLTemplates,
transformCommit: giteaTransformCommit,
},
{
// Assume that any site beginning with "gitea." works like gitea.com.
pattern:        `^(?P<repo>gitea\.[a-z0-9A-Z.-]+/[a-z0-9A-Z_.\-]+/[a-z0-9A-Z_.\-]+)(\.git|$)`,
templates:      giteaURLTemplates,
transformCommit: giteaTransformCommit,
},
{
pattern:        `^(?P<repo>go\.isomorphicgo\.org/[a-z0-9A-Z_.\-]+/[a-z0-9A-Z_.\-]+)(\.git|$)`,
templates:      giteaURLTemplates,
transformCommit: giteaTransformCommit,
},
{
pattern:        `^(?P<repo>git\.openprivacy\.ca/[a-z0-9A-Z_.\-]+/[a-z0-9A-Z_.\-]+)(\.git|$)`,
templates:      giteaURLTemplates,
transformCommit: giteaTransformCommit,
},
{
pattern:
      `^(?P<repo>codeberg\.org/[a-z0-9A-Z_.\-]+/[a-z0-9A-Z_.\-]+)(\.git|$)`,
templates:      giteaURLTemplates,
transformCommit: giteaTransformCommit,
},
{
pattern: `^(?P<repo>gogs\.[a-z0-9A-Z.-]+/[a-z0-9A-Z_.\-]+/[a-z0-9A-Z_.\-]+)(\.git|$)`,
// Gogs uses the same basic structure as Gitea, but omits the type of
// commit ("tag" or "commit"), so we don't need a transformCommit
// function. Gogs does not support short hashes, but we create those
// URLs anyway. See gogs/gogs#6242.
templates: giteaURLTemplates,
},
{
pattern: `^(?P<repo>dmitri\.shuralyov\.com\/.+)$`,
templates: urlTemplates{
 Repo:      "{repo}/...",
 Directory: "https://gotools.org/{importPath}?rev={commit}",
```

```
  File:      "https://gotools.org/{importPath}?rev={commit}#{base}",
  Line:      "https://gotools.org/{importPath}?rev={commit}#{base}-L{line}",
 },
},
{
 pattern: `^(?P<repo>blitiri\.com\.ar/go/.+)$`,
 templates: urlTemplates{
  Repo:      "{repo}",
  Directory: "{repo}/b/master/t/{dir}",
  File:
     "{repo}/b/master/t/{dir}f={file}.html",
  Line:      "{repo}/b/master/t/{dir}f={file}.html#line-{line}",
 },
},

// Patterns that match the general go command pattern, where they must have
// a ".git" repo suffix in an import path. If matching a repo URL from a meta tag,
// there is no ".git".
{
 pattern:   `^(?P<repo>[^.]+\.googlesource\.com/[^.]+)(\.git|$)`,
 templates: googlesourceURLTemplates,
},
{
 pattern:   `^(?P<repo>git\.apache\.org/[^.]+)(\.git|$)`,
 templates: githubURLTemplates,
},
// General syntax for the go command. We can extract the repo and directory, but
// we don't know the URL templates.
// Must be last in this list.
{
 pattern:   `(?P<repo>([a-z0-9.\-]+\.)+[a-z0-9.\-]+(:[0-9]+)?(/~?[A-Za-z0-9_.\-]+)+?)\.(bzr|fossil|git|hg|svn)`,
 templates: urlTemplates{},
},
}

func init() {
 for i := range patterns {
  re := regexp.MustCompile(patterns[i].pattern)
  // The pattern regexp must contain a group named "repo".
  found
 := false
  for _, n := range re.SubexpNames() {
   if n == "repo" {
    found = true
    break
   }
  }
  if !found {
```

```
   panic(fmt.Sprintf("pattern %s missing <repo> group", patterns[i].pattern))
  }
  patterns[i].re = re
 }
}

// giteaTransformCommit transforms commits for the Gitea code hosting system.
func giteaTransformCommit(commit string, isHash bool) string {
 // Hashes use "commit", tags use "tag".
 // Short hashes are supported as of v1.14.0.
 if isHash {
  return "commit/" + commit
 }
 return "tag/" + commit
}

func fdioTransformCommit(commit string, isHash bool) string {
 // hashes use "?id=", tags use "?h="
 p := "h"
 if isHash {
  p = "id"
 }
 return fmt.Sprintf("%s=%s", p, commit)
}

// urlTemplates describes how to build URLs from bits of source information.
// The fields are exported for JSON encoding.
//
// The template variables are:
//
//   - {repo}       - Repository URL with "https://" prefix ("https://example.com/myrepo").
//   - {importPath} - Package import
 path ("example.com/myrepo/mypkg").
//   - {commit}     - Tag name or commit hash corresponding to version ("v0.1.0" or "1234567890ab").
//   - {dir}        - Path to directory of the package, relative to repo root ("mypkg").
//   - {file}       - Path to file containing the identifier, relative to repo root ("mypkg/file.go").
//   - {base}       - Base name of file containing the identifier, including file extension ("file.go").
//   - {line}       - Line number for the identifier ("41").
type urlTemplates struct {
 Repo      string `json:",omitempty"` // Optional URL template for the repository home page, with {repo}. If left
empty, a default template "{repo}" is used.
 Directory string // URL template for a directory, with {repo}, {importPath}, {commit}, {dir}.
 File      string // URL template for a file, with {repo}, {importPath}, {commit}, {file}, {base}.
 Line      string // URL template for a line, with {repo}, {importPath}, {commit}, {file}, {base}, {line}.
 Raw       string
 // Optional URL template for the raw contents of a file, with {repo}, {commit}, {file}.
}
```

```
var (
 githubURLTemplates = urlTemplates{
  Directory: "{repo}/tree/{commit}/{dir}",
  File:      "{repo}/blob/{commit}/{file}",
  Line:      "{repo}/blob/{commit}/{file}#L{line}",
  Raw:       "{repo}/raw/{commit}/{file}",
 }

 bitbucketURLTemplates = urlTemplates{
  Directory: "{repo}/src/{commit}/{dir}",
  File:      "{repo}/src/{commit}/{file}",
  Line:      "{repo}/src/{commit}/{file}#lines-{line}",
  Raw:       "{repo}/raw/{commit}/{file}",
 }
 giteaURLTemplates = urlTemplates{
  Directory: "{repo}/src/{commit}/{dir}",
  File:      "{repo}/src/{commit}/{file}",
  Line:      "{repo}/src/{commit}/{file}#L{line}",
  Raw:       "{repo}/raw/{commit}/{file}",
 }
 googlesourceURLTemplates = urlTemplates{
  Directory: "{repo}/+/{commit}/{dir}",
  File:      "{repo}/+/{commit}/{file}",
  Line:      "{repo}/+/{commit}/{file}#{line}",
  // Gitiles has no support for serving raw content at this time.
 }
 gitlabURLTemplates
 = urlTemplates{
  Directory: "{repo}/-/tree/{commit}/{dir}",
  File:      "{repo}/-/blob/{commit}/{file}",
  Line:      "{repo}/-/blob/{commit}/{file}#L{line}",
  Raw:       "{repo}/-/raw/{commit}/{file}",
 }
 fdioURLTemplates = urlTemplates{
  Directory: "{repo}/tree/{dir}?{commit}",
  File:      "{repo}/tree/{file}?{commit}",
  Line:      "{repo}/tree/{file}?{commit}#n{line}",
  Raw:       "{repo}/plain/{file}?{commit}",
 }
 csopensourceTemplates = urlTemplates{
  Directory: "{repo}/+/{commit}:{dir}",
  File:      "{repo}/+/{commit}:{file}",
  Line:      "{repo}/+/{commit}:{file};l={line}",
  // Gitiles has no support for serving raw content at this time.
 }
)

// commitFromVersion returns a string that refers to a commit corresponding to version.
```

```
// It also reports whether the returned value is a commit hash.
// The string may be a tag, or it may be the hash or similar unique identifier of a commit.
// The second argument is the module path relative to the repo
 root.
func commitFromVersion(vers, relativeModulePath string) (commit string, isHash bool) {
 // Commit for the module: either a sha for pseudoversions, or a tag.
 v := strings.TrimSuffix(vers, "+incompatible")
 if version.IsPseudo(v) {
  // Use the commit hash at the end.
  return v[strings.LastIndex(v, "-")+1:], true
 } else {
  // The tags for a nested module begin with the relative module path of the module,
  // removing a "/vN" suffix if N > 1.
  prefix := removeVersionSuffix(relativeModulePath)
  if prefix != "" {
   return prefix + "/" + v, false
  }
  return v, false
 }
}

// trimVCSSuffix removes a VCS suffix from a repo URL in selected cases.
//
// The Go command allows a VCS suffix on a repo, like github.com/foo/bar.git. But
// some code hosting sites don't support all paths constructed from such URLs.
// For example, GitHub will redirect github.com/foo/bar.git to github.com/foo/bar,
// but will 404 on github.com/goo/bar.git/tree/master and any other URL with a
// non-empty
 path.
//
// To be conservative, we remove the suffix only in cases where we know it's
// wrong.
func trimVCSSuffix(repoURL string) string {
 if !strings.HasSuffix(repoURL, ".git") {
  return repoURL
 }
 if strings.HasPrefix(repoURL, "https://github.com/") || strings.HasPrefix(repoURL, "https://gitlab.com/") {
  return strings.TrimSuffix(repoURL, ".git")
 }
 return repoURL
}

// The following code copied from cmd/go/internal/get:

// expand rewrites s to replace {k} with match[k] for each key k in match.
func expand(s string, match map[string]string) string {
 // We want to replace each match exactly once, and the result of expansion
 // must not depend on the iteration order through the map.
```

```
 // A strings.Replacer has exactly the properties we're looking for.
 oldNew := make([]string, 0, 2*len(match))
 for k, v := range match {
  oldNew = append(oldNew, "{"+k+"}", v)
 }
 return strings.NewReplacer(oldNew...).Replace(s)
}

// NewGitHubInfo creates a source.Info with GitHub URL templates.
//
 It is for testing only.
func NewGitHubInfo(repoURL, moduleDir, commit string) *Info {
 return &Info{
  repoURL:   trimVCSSuffix(repoURL),
  moduleDir: moduleDir,
  commit:    commit,
  templates: githubURLTemplates,
 }
}
```

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This Go package is a modified version of

XZ Embedded <http://tukaani.org/xz/embedded.html>

The contents of the testdata directory are modified versions of the test files from

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package source

import (
 "context"
 "encoding/xml"
 "fmt"
 "io"
 "strings"

 "github.com/google/go-licenses/internal/third_party/pkgsite/derrors"
)

// This code adapted from https://go.googlesource.com/gddo/+/refs/heads/master/gosrc/gosrc.go.
```

```
// sourceMeta represents the values in a go-source meta tag, or as a fallback,
// values from a go-import meta tag.
// The go-source spec is at https://github.com/golang/gddo/wiki/Source-Code-Links.
// The go-import spec is in "go help importpath".
type sourceMeta struct {
 repoRootPrefix string // import path prefix corresponding to repo root
 repoURL        string // URL of the repo root
 // The next two are only present in a go-source tag.
 dirTemplate  string // URL template for a directory
 fileTemplate string // URL template for a file and line
}

// fetchMeta retrieves go-import and
 go-source meta tag information, using the import path to construct
// a URL as described in "go help importpath".
//
// The importPath argument, as the name suggests, could be any package import
// path. But we only pass module paths.
//
// The discovery site only cares about linking to source, not fetching it (we
// already have it in the module zip file). So we merge the go-import and
// go-source meta tag information, preferring the latter.
func fetchMeta(ctx context.Context, client *Client, importPath string) (_ *sourceMeta, err error) {
 defer derrors.Wrap(&err, "fetchMeta(ctx, client, %q)", importPath)

 uri := importPath
 if !strings.Contains(uri, "/") {
  // Add slash for root of domain.
  uri = uri + "/"
 }
 uri = uri + "?go-get=1"

 resp, err := client.doURL(ctx, "GET", "https://"+uri, true)
 if err != nil {
  resp, err = client.doURL(ctx, "GET", "http://"+uri, false)
  if err != nil {
   return nil, err
  }
 }
 defer resp.Body.Close()
 return parseMeta(importPath, resp.Body)
}

func
 parseMeta(importPath string, r io.Reader) (sm *sourceMeta, err error) {
 errorMessage := "go-import and go-source meta tags not found"
 // gddo uses an xml parser, and this code is adapted from it.
 d := xml.NewDecoder(r)
```

```
 d.Strict = false
metaScan:
 for {
  t, tokenErr := d.Token()
  if tokenErr != nil {
   break metaScan
  }
  switch t := t.(type) {
  case xml.EndElement:
   if strings.EqualFold(t.Name.Local, "head") {
    break metaScan
   }
  case xml.StartElement:
   if strings.EqualFold(t.Name.Local, "body") {
    break metaScan
   }
   if !strings.EqualFold(t.Name.Local, "meta") {
    continue metaScan
   }
   nameAttr := attrValue(t.Attr, "name")
   if nameAttr != "go-import" && nameAttr != "go-source" {
    continue metaScan
   }
   fields := strings.Fields(attrValue(t.Attr, "content"))
   if len(fields) < 1 {
    continue metaScan
   }
   repoRootPrefix := fields[0]
   if !strings.HasPrefix(importPath, repoRootPrefix) ||
    !(len(importPath) == len(repoRootPrefix)
|| importPath[len(repoRootPrefix)] == '/') {
    // Ignore if root is not a prefix of the  path. This allows a
    // site to use a single error page for multiple repositories.
    continue metaScan
   }
   switch nameAttr {
   case "go-import":
    if len(fields) != 3 {
     errorMessage = "go-import meta tag content attribute does not have three fields"
     continue metaScan
    }
    if fields[1] == "mod" {
     // We can't make source links from a "mod" vcs type, so skip it.
     continue
    }
    if sm != nil {
     sm = nil
     errorMessage = "more than one go-import meta tag found"
```

```
     break metaScan
    }
    sm = &sourceMeta{
     repoRootPrefix: repoRootPrefix,
     repoURL:        fields[2],
    }
    // Keep going in the hope of finding a go-source tag.
   case "go-source":
    if len(fields) != 4 {
     errorMessage = "go-source meta tag content attribute does not have four fields"
     continue metaScan
    }
    if sm != nil && sm.repoRootPrefix != repoRootPrefix {
     errorMessage
 = fmt.Sprintf("import path prefixes %q for go-import and %q for go-source disagree", sm.repoRootPrefix,
repoRootPrefix)
     sm = nil
     break metaScan
    }
    // If go-source repo is "_", then default to the go-import repo.
    repoURL := fields[1]
    if repoURL == "_" {
     if sm == nil {
      errorMessage = `go-source repo is "_", but no previous go-import tag`
      break metaScan
     }
     repoURL = sm.repoURL
    }
    sm = &sourceMeta{
     repoRootPrefix: repoRootPrefix,
     repoURL:        repoURL,
     dirTemplate:    fields[2],
     fileTemplate:   fields[3],
    }
    break metaScan
   }
  }
 }
 if sm == nil {
  return nil, fmt.Errorf("%s: %w", errorMessage, derrors.NotFound)
 }
 return sm, nil
}

func attrValue(attrs []xml.Attr, name string) string {
 for _, a := range attrs {
  if strings.EqualFold(a.Name.Local, name) {
   return a.Value
```

```
  }
 }
 return ""
}
```

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package licenses

```
import (
 "fmt"
 "os"
 "path/filepath"
 "regexp"
 "strings"
)

var (
 licenseRegexp = regexp.MustCompile(`^(?i)((UN)?LICEN(S|C)E|COPYING|README|NOTICE).*$`)
)

// FindCandidates returns the candidate file path of the license for this package.
//
// dir is path of the directory where we want to find a license.
// rootDir is path of the module containing this package. Find
 will not search out of the
// rootDir.
func FindCandidates(dir string, rootDir string) ([]string, error) {
 dir, err := filepath.Abs(dir)
 if err != nil {
  return nil, err
 }

 rootDir, err = filepath.Abs(rootDir)
 if err != nil {
  return nil, err
 }

 if !strings.HasPrefix(dir, rootDir) {
  return nil, fmt.Errorf("licenses.Find: rootDir %s should contain dir %s", rootDir, dir)
 }

 return findAllUpwards(dir, licenseRegexp, rootDir)
}

func findAllUpwards(dir string, r *regexp.Regexp, stopAt string) ([]string, error) {
 var foundPaths []string

 // Stop once we go out of the stopAt dir.
 for strings.HasPrefix(dir, stopAt) {
  dirContents, err := os.ReadDir(dir)
  if err != nil {
   return nil, err
  }

  for _, f := range dirContents {
```

```
  if f.IsDir() {
   continue
  }

  if r.MatchString(f.Name()) {
   path := filepath.Join(dir, f.Name())
   foundPaths = append(foundPaths, path)
  }
 }

 parent := filepath.Dir(dir)
 if parent == dir {
  // Can't go any higher up the directory
tree.
  break
 }
 dir = parent
}

return foundPaths, nil
}
```

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go-toml v2
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package spec

// License information for the exposed API.
//
// For more information: http://goo.gl/8us55a#licenseObject
type License struct {
 Name string `json:"name,omitempty"`
 URL  string `json:"url,omitempty"`
}
```

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Go support for Protocol Buffers - Google's data interchange format

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```
package licenses

// Type identifies a class of software license.
type Type string

// License types
const (
 // Unknown license type.
 Unknown = Type("")
 // Restricted licenses require mandatory source distribution if we ship a
 // product that includes third-party code protected by such a license.
 Restricted = Type("restricted")
 // Reciprocal licenses allow usage of software made available under such
 // licenses freely in *unmodified* form. If the third-party source code is
 // modified in any way these modifications to the original third-party
 // source code must be made available.
 Reciprocal = Type("reciprocal")
 // Notice licenses contain few restrictions, allowing original or modified
 // third-party software to be shipped in any product without endangering or
 // encumbering our source code. All of the licenses in this category do,
 // however, have an "original Copyright notice" or "advertising clause",
 // wherein any external distributions must include the notice or clause
 //
 specified in the license.
 Notice = Type("notice")
 // Permissive licenses are even more lenient than a 'notice' license.
 // Not even a copyright notice is required for license compliance.
 Permissive = Type("permissive")
 // Unencumbered covers licenses that basically declare that the code is "free for any use".
 Unencumbered = Type("unencumbered")

 ByExceptionOnly = Type("byExceptionOnly")
 // Forbidden licenses are forbidden to be used.
 Forbidden = Type("forbidden")
)

func (t Type) String() string {
 switch t {
 case Unknown:
  // licenseclassifier uses an empty string to indicate an unknown license
  // type, which is unclear to users when printed as a string.
  return "unknown"
 default:
  return string(t)
 }
}
```

```
var typeMap = map[string]Type{
 "BCL":                          Restricted,
 "CC-BY-ND-1.0":                 Restricted,
 "CC-BY-ND-2.0":                 Restricted,
 "CC-BY-ND-2.5":                 Restricted,
 "CC-BY-ND-3.0":
   Restricted,
 "CC-BY-ND-4.0":                 Restricted,
 "CC-BY-SA-1.0":                 Restricted,
 "CC-BY-SA-2.0":                 Restricted,
 "CC-BY-SA-2.5":                 Restricted,
 "CC-BY-SA-3.0":                 Restricted,
 "CC-BY-SA-4.0":                 Restricted,
 "GPL-1.0":                      Restricted,
 "GPL-2.0":                      Restricted,
 "GPL-2.0-with-GCC-exception":       Restricted,
 "GPL-2.0-with-autoconf-exception":  Restricted,
 "GPL-2.0-with-bison-exception":     Restricted,
 "GPL-2.0-with-classpath-exception": Restricted,
 "GPL-2.0-with-font-exception":      Restricted,
 "GPL-3.0":                      Restricted,
 "GPL-3.0-with-GCC-exception":       Restricted,
 "GPL-3.0-with-autoconf-exception":  Restricted,
 "GPL-3.0-with-bison-exception":     Restricted,
 "LGPL-2.0":                     Restricted,
 "LGPL-2.1":                     Restricted,
 "LGPL-3.0":                     Restricted,
 "NPL-1.0":
                     Restricted,
 "NPL-1.1":                      Restricted,
 "OSL-1.0":                      Restricted,
 "OSL-1.1":                      Restricted,
 "OSL-2.0":                      Restricted,
 "OSL-2.1":                      Restricted,
 "OSL-3.0":                      Restricted,
 "QPL-1.0":                      Restricted,
 "Sleepycat":                    Restricted,

 "APSL-1.0":  Reciprocal,
 "APSL-1.1":  Reciprocal,
 "APSL-1.2":  Reciprocal,
 "APSL-2.0":  Reciprocal,
 "CDDL-1.0":  Reciprocal,
 "CDDL-1.1":  Reciprocal,
 "CPL-1.0":   Reciprocal,
 "EPL-1.0":   Reciprocal,
 "EPL-2.0":   Reciprocal,
```

"FreeImage": Reciprocal,
"IPL-1.0": Reciprocal,
"MPL-1.0": Reciprocal,
"MPL-1.1": Reciprocal,
"MPL-2.0": Reciprocal,
"Ruby": Reciprocal,

"AFL-1.1": Notice,
"AFL-1.2": Notice,
"AFL-2.0": Notice,
"AFL-2.1": Notice,
"AFL-3.0":
Notice,
"Apache-1.0": Notice,
"Apache-1.1": Notice,
"Apache-2.0": Notice,
"Apache-2.0-Modified": Notice,
"Apache-with-LLVM-Exception": Notice,
"Apache-with-Runtime-Exception": Notice,
"Artistic-1.0": Notice,
"Artistic-1.0-Perl": Notice,
"Artistic-1.0-cl8": Notice,
"Artistic-2.0": Notice,
"BSD-2-Clause": Notice,
"BSD-2-Clause-FreeBSD": Notice,
"BSD-2-Clause-NetBSD": Notice,
"BSD-2-Clause-Flex": Notice,
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"BSD-3-Clause-LBNL": Notice,
"BSD-3-Clause-OpenMPI": Notice,
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"BSD-4-Clause-UC": Notice,
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"BSL-1.0":
Notice,
"CC-BY-1.0": Notice,
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"CC-BY-2.5": Notice,
"CC-BY-3.0": Notice,
"CC-BY-4.0": Notice,
"FTL": Notice,
"ISC": Notice,
"ImageMagick": Notice,
"LPL-1.0": Notice,
"LPL-1.02": Notice,

"Libpng": Notice,
"Lil-1.0": Notice,
"Linux-OpenIB": Notice,
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"OpenSSL": Notice,
"PHP-3.0": Notice,
"PHP-3.01": Notice,
"PIL": Notice,
"PostgreSQL": Notice,
"Python-2.0": Notice,
"Python-2.0-complete":
Notice,
"SGI-B-1.0": Notice,
"SGI-B-1.1": Notice,
"SGI-B-2.0": Notice,
"UPL-1.0": Notice,
"Unicode-DFS-2015": Notice,
"Unicode-DFS-2016": Notice,
"Unicode-TOU": Notice,
"W3C": Notice,
"W3C-19980720": Notice,
"W3C-20150513": Notice,
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"CC-BY-NC-2.5":
Forbidden,
"CC-BY-NC-3.0": Forbidden,
"CC-BY-NC-4.0": Forbidden,
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"dso":
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"eGenix": Unknown,
"geant4": Unknown,
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"hdparm": Unknown,
"libtiff": Unknown,
"pffft": Unknown,
"re2c": Unknown,
"tcl_tk": Unknown,
"unicode_org": Unknown,
"wxWindows-3.1": Unknown,
}

```
func LicenseType(license string) Type {
 if t, ok := typeMap[license]; ok {
  return t
 }

 return Unknown
}
```

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11.2 Any failure by either Party, on one or more occasions, to invoke one or more of the provisions hereof, shall under no circumstances be interpreted as being a waiver by the interested Party of its right to invoke said provision(s) subsequently.

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11.5 LANGUAGE

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13.2 Failing an amicable solution within two (2) months as from their occurrence, and unless emergency proceedings are necessary, the disagreements or disputes shall be referred to the Paris Courts having jurisdiction, by the more diligent Party.

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Written by Wilco Dijkstra, 1996. The following email exchange establishes the license.

From: Wilco Dijkstra <Wilco.Dijkstra@ntlworld.com>
Date: Fri, Jun 24, 2011 at 3:20 AM
Subject: Re: sqrt routine
To: Kevin Ma <kma@google.com>
Hi Kevin,
Thanks for asking. Those routines are public domain (originally posted to comp.sys.arm a long time ago), so you can use them freely for any purpose.
Cheers,
Wilco

----- Original Message -----
From: "Kevin Ma" <kma@google.com>
To: <Wilco.Dijkstra@ntlworld.com>
Sent: Thursday, June 23, 2011 11:44 PM
Subject: Fwd: sqrt routine
Hi Wilco,
I saw your sqrt routine from several web sites, including http://www.finesse.demon.co.uk/steven/sqrt.html.
Just wonder if there's any copyright information with your Successive approximation routines, or if I can freely use it for any purpose.
Thanks.
Kevin
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```
package licenses

type LicenseRestrictiveness string

const (
 RestrictionsShareLicense LicenseRestrictiveness = "ShareLicense"
 RestrictionsShareCode    LicenseRestrictiveness = "ShareCode"
 RestrictionsUnknown      LicenseRestrictiveness = "Unknown"
 RestrictionsNotAllowed   LicenseRestrictiveness = "NotAllowed"
)

func LicenseTypeRestrictiveness(licenseTypes ...Type) LicenseRestrictiveness {
 if len(licenseTypes) == 0 {
  // No licenses foundm, so we don't know what the restrictions are
  return RestrictionsUnknown
 }

 // Find any non-allowed licenses
 for _, licenseType := range licenseTypes {
  switch licenseType {
  case Notice, Permissive, Unencumbered,
   Restricted, Reciprocal,
   Unknown:
   // these are allowed/ handled by following logic
  default:
   return RestrictionsNotAllowed
  }
 }

 // Find unknown licenses
 for _, licenseType := range licenseTypes {
  switch licenseType {
  case Unknown:
   return RestrictionsUnknown
  }
 }

 // Find any licenses that require sharing
```

```
 code
 for _, licenseType := range licenseTypes {
  switch licenseType {
  case Restricted, Reciprocal:
   return RestrictionsShareCode
  }
 }

 // Find any licenses that require sharing license
 for _, licenseType := range licenseTypes {
  switch licenseType {
  case Notice, Permissive, Unencumbered:
   return RestrictionsShareLicense
  }
 }

 panic("unreachable")
}
```

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$Revision: 8.13 $, Last updated $Date: 2004/05/11 23:57:57 $
Point to Point Protocol (PPP) RFC1331

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package licenses

import (
 "strings"

 "golang.org/x/tools/go/packages"
)

// Module provides module information for a package.
type Module struct {
 // Differences from packages.Module:
 // * Replace field is removed, it's only an implementation detail in this package.
 //   If a module is replaced, we'll directly return the replaced module.
 // * Version field +incompatible suffix is trimmed.
 //
 * Main, ModuleError, Time, Indirect, GoMod, GoVersion fields are removed, because they are not used.
 Path    string // module path
 Version string // module version
 Dir     string // directory holding files for this module, if any
}

func newModule(mod *packages.Module) *Module {
 // Example of a module with replace directive:  k8s.io/kubernetes => k8s.io/kubernetes v1.11.1
 // {
 //        "Path": "k8s.io/kubernetes",
 //        "Version": "v0.17.9",
 //        "Replace": {
 //                "Path": "k8s.io/kubernetes",
 //                "Version": "v1.11.1",
 //                "Time": "2018-07-17T04:20:29Z",
 //                "Dir": "/home/gongyuan_kubeflow_org/go/pkg/mod/k8s.io/kubernetes@v1.11.1",
 //                "GoMod":
"/home/gongyuan_kubeflow_org/go/pkg/mod/cache/download/k8s.io/kubernetes/@v/v1.11.1.mod"
 //        },
 //        "Dir": "/home/gongyuan_kubeflow_org/go/pkg/mod/k8s.io/kubernetes@v1.11.1",
 //        "GoMod":
"/home/gongyuan_kubeflow_org/go/pkg/mod/cache/download/k8s.io/kubernetes/@v/v1.11.1.mod"
 //
 }
 // handle replace directives
 // Note, we specifically want to replace version field.
 // Haven't confirmed, but we may also need to override the
 // entire struct when using replace directive with local folders.
 tmp := *mod
```

```
 if tmp.Replace != nil {
  tmp = *tmp.Replace
 }

 // The +incompatible suffix does not affect module version.
 // ref: https://golang.org/ref/mod#incompatible-versions
 tmp.Version = strings.TrimSuffix(tmp.Version, "+incompatible")
 return &Module{
  Path:    tmp.Path,
  Version: tmp.Version,
  Dir:     tmp.Dir,
 }
}
```

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Version 2.1, February 1999

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by publisher if a) the publishers lifetime earnings are less than $100 and it has been more than 12 months since the publisher had earnings or b) the publisher has not provided payment information, outstanding earnings are less than $1,000 and it has been more than 12 months since the publisher had earnings. 7. Term and Termination

Term. This Agreement is effective until terminated in accordance with this Agreement. Termination by AdColony. AdColony may terminate this Agreement at any time by providing sixty (60) days notice to Developer. Additionally, AdColony may terminate this Agreement immediately if Developer breaches any provision of this Agreement. Termination by Developer. Developer may terminate this Agreement at any time by providing written notice to AdColony (email to suffice), ceasing all use of the AdColony Platform and AdColony Property, and destroying or removing from all hard drives, networks, and other storage media all copies of the AdColony Property. Effect
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tomb - support for clean goroutine termination in Go.

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1. Definitions

Whenever capitalized in this Agreement:

Agreement means this Xcode and Apple SDKs Agreement.

Apple means Apple Inc., a California corporation with its principal place of business at One Infinite Loop, Cupertino, California 95014, U.S.A.

Apple Developer Program License Agreement means a separate agreement that may be entered into between You and Apple regarding the development and submission of Applications to the App Store for approval and digital signing by Apple, development of libraries for iOS, watchOS, iPadOS, and/or tvOS, and the use of Apple services such as the Apple Push Notification Service, In-App Purchase, and iCloud, among other things.

Apple Maps Service means the mapping platform and Map Data provided by Apple via the MapKit API (which is the documented API that enables You to add mapping features or functionality to Applications).

Apple Services or Services means the developer services that Apple provides to You under this Agreement solely for use with Your Applications and not for use by You as an end-user (e.g., Game Center, Apple Maps Service, any Apple-certificate issuance services, etc.), including any Updates thereto (if any) that may be provided to You by

Apple.

Apple Software means the
Xcode Developer Tools and the Apple SDKs, including any Updates thereto (if any) that may be provided to You by Apple.

Apple SDKs means the macOS SDK, and the Apple-proprietary Software Development Kits (SDKs) provided hereunder, including but not limited to header files, APIs, libraries, simulators, and software (source code and object code) labeled as part of the iOS SDK, watchOS SDK, iPadOS SDK, and/or tvOS SDK and included in the Xcode Developer Tools package for purposes of targeting Apple-branded products running iOS, watchOS, iPadOS, or tvOS.

Application means a software program (including extensions and media that are enclosed in a single software bundle) developed by You hereunder, for use under Your own name, trademark or brand, and specifically for use on Apple-branded products running macOS, iOS, watchOS, iPadOS, tvOS, as applicable, including new releases and new versions of such software program, but excluding libraries for iOS, watchOS, iPadOS, or tvOS applications.

For
clarity, the term Application as used in this Agreement excludes libraries that are for use in Applications designed for iOS, watchOS, iPadOS, or tvOS. Such libraries can be developed by You only under the terms of the Apple Developer Program License Agreement.

Authorized Developers means Your employees and contractors, members of Your organization or, if You are an educational institution, Your faculty, staff and students, who: (a) have a demonstrable need to know or use the Apple Software or Apple Services in order to develop and test Applications, and (b) to the extent they will access Apple Confidential Information, have written and binding agreements with You that prohibit the unauthorized use and disclosure of such confidential information.

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Your Authorized Developers so long as such units are used for testing and development purposes on Your behalf and only as permitted hereunder.

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macOS SDK means the Apple-proprietary Software Development Kits (SDKs) provided hereunder, including but not limited to header files, APIs, libraries, simulators,
and software (source code and object code) labeled as part of the macOS SDK and included in the Xcode Developer Tools package for purposes of targeting Apple-branded products running macOS.

Map Data means any content, data or information provided through the Apple Maps Service including, but not limited to, imagery, terrain data, latitude and longitude coordinates, transit data, points of interest and traffic data.

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Updates means bug fixes, updates, upgrades, modifications, enhancements and supplements to the Apple Software or Apple
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Xcode Developer Tools means the Apple-proprietary development platform, including but not limited to software tools, compilers, sample code, Documentation, programming languages, and overall design package provided by Apple hereunder, excluding the Apple SDKs.

You or Your means the person(s) or entity using the Apple Software or Services or otherwise exercising rights under this Agreement. If You are entering into this Agreement on behalf of Your company, organization, educational institution, or an agency, instrumentality, or department of the federal government, You or Your refers to your company, organization, educational institution or agency, instrumentality, or department of the federal government as well.

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You certify to Apple that You have the right and authority to enter into this Agreement on Your own behalf, or if You are entering into this
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2.2 Permitted
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Subject to the terms and conditions of this Agreement, Apple hereby grants You during the Term, a limited, non-exclusive, personal, revocable, non-sublicensable, non-transferable, and internal use license to:

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(ii) You may use the macOS SDKs to test and develop application and other software;

(iii) You may use the Apple SDKs (excluding the macOS SDK) solely to test and develop Applications that are specifically for use with the applicable Apple-branded products for which the SDK is targeted, unless otherwise permitted by Apple in writing; and

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2.4 Apple Developer Program
If You would like a third-party to use Your Application for iOS, watchOS, iPadOS, or tvOS, or You would like to distribute Your Application for macOS through the App Store, then You must enter into a separate written agreement with Apple (the Apple Developer Program License Agreement) and Your Application must comply with the Program Requirements and Documentation. Information regarding the Program Requirements
is available at: http://developer.apple.com/programs/ios/information/index.html. Apple reserves the right to change the Program Requirements and/or the terms of the Apple Developer Program License Agreement from time to time. You are fully responsible for any and all costs, expenses or other liabilities You may incur as a result of Your

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If
You access the Xcode Server feature of the Apple Software (e.g., via the command line tools), then You may use the Xcode Server feature for Your own personal use or within Your company or organization, but solely for Your own internal testing and development purposes. You may not provide a service to any other party that integrates with or leverages services or information provided by Xcode Server or uses the Xcode Server feature in any way. As a condition of using the Xcode Server feature of the Apple Software, You represent and warrant to Apple that You (and any user of a client-computer that You permit to access Xcode Server on Your behalf) are appropriately licensed to use the applicable services, features or functionality of the Xcode Developer Tools, the Apple SDKs and/or the Apple Developer Program account and associated resources accessed through Xcode Server (e.g., anyone attempting to gain access to Your Apple Developer certificates stored on Xcode Server must be a member
of Your paid Apple Developer Program account team). You agree to monitor and will be responsible for all such use by any user of a client-computer that You permit to access Xcode Server and their compliance with the terms of this Agreement and other applicable license agreements.

2.11 QuickTime Development Software
You may use the QuickTime development software only to develop application software that is compatible with, and runs only on supported macOS and/or Windows platforms with QuickTime installed. Your software application may not interfere with the functionality of QuickTime Player or the QuickTime Plug-in, including but not limited to file type or MIME type associations that are registered to QuickTime.

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A. The Reality Composer software (Composer Software) that is included with the Apple Software contains, displays and provides access to certain content, photographs, text, images, graphics, artwork, audio, video, augmented
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2.14 Additional Restrictions for Applications

A. Use of the Apple Maps Service; Location

If Your Application uses or accesses the Map Kit API from a device running iOS version 6 or later, Your Application will access and use the Apple Maps Service. All use of the Map Kit API and Apple Maps Service must be in accordance with the terms of this Agreement, and You agree that the Apple Maps Service is solely for use by Applications running on Apple-branded products. Your Application may use the MapKit API only to access the Apple Maps Service and/or Map Data in Your Applications (except as otherwise set forth below).

As part of such access to the Apple Maps Service and/or Map Data through

the MapKit API:

- Your Application must not remove, obscure or alter Apples or its licensors copyright notices, trademarks, or any other proprietary rights or legal notices, documents or hyperlinks that may appear in or be provided through the Apple Maps Service;

- You must not use the Apple Maps Service in any manner that enables or permits bulk downloads or feeds of the Map Data, or any portion thereof, or that in any way attempts to extract, scrape or reutilize any portions of the Map Data. For example, neither You nor Your Application may use or make available the Map Data, or any portion thereof, as part of any secondary or derived database;

- Your Application may display the Map Data only as permitted herein, and when displaying it on a map, You agree that it will be displayed only on an Apple map provided through the Apple Maps Service;

- Except to the extent expressly permitted herein, You agree not to copy, modify, translate, create a derivative work of, publish or
publicly display the Map Data in any way. Further, You may not use or compare the data provided by the Apple Maps Service for the purpose of improving or creating another mapping service;

- Unless otherwise expressly permitted in the MapKit Documentation for the Apple Maps Service, Map Data may not be cached, pre-fetched, or stored by You or Your Application, other than on a temporary and limited basis solely to improve the performance of the Apple Maps Service with Your Application;

- You acknowledge and agree that results You may receive from the Apple Maps Service may vary from actual conditions due to variable factors that can affect the accuracy of Map Data, such as road or weather conditions; and

- If Your Application accesses the MapKit API from a device running iOS version 5 or earlier, Your Application will access and use only the Google Mobile Maps (GMM) service. Such use of the GMM is subject to the following terms: http://code.google.com/apis/maps/terms/iPhone.html.
If You do not accept such terms, You may not use the GMM service in Your Application, and You acknowledge and agree that such use will constitute Your acceptance of such terms.

Applications that use location-based APIs (e.g., Core Location, MapKit API) or otherwise provide location-based services may not be designed or marketed for automatic or autonomous control of vehicle behavior, or for emergency or life-saving purposes. Map Data and other location data provided by Apple is not intended to be relied upon in situations where precise location information is needed or where erroneous, delayed, non-existent, inaccurate or incomplete location data may lead to death, personal injury, property or environmental damage.

If You choose to provide Your own location-based service, data and/or information in conjunction with the Apple maps provided through the Apple Maps Service (e.g., overlaying a map or route You have created on top of an Apple map), You are solely responsible for ensuring
that Your service, data and/or information correctly aligns with any Apple maps used. For Applications that use location-based APIs for real-time navigation (including, but not limited to, turn-by-turn route guidance and other routing that is enabled through the use of a sensor), You must have an end-user license agreement that includes the following notice: YOUR USE OF THIS REAL TIME ROUTE GUIDANCE APPLICATION IS AT YOUR SOLE RISK. LOCATION DATA MAY NOT BE ACCURATE. Further, any Applications that offer location-based services or location-based functionality must notify and obtain consent from an individual before his or her location data is collected, transmitted or otherwise used by the Application.

B. Use of the HealthKit APIs and the HomeKit APIs

You may use the HealthKit APIs only for internal testing and development purposes for Your Application. Your Application must not access the HealthKit APIs unless it is primarily designed to provide health and/or fitness services.

You must not use the HealthKit APIs, or any information obtained through the HealthKit APIs, to disclose or provide an end-users health and/or fitness information to any third party and may only use such APIs for internal testing and development purposes for Your Application. If Your Application accesses NikeFuel points information through the HealthKit APIs, then Your use of the NikeFuel points information is subject to the NikeFuel points terms of service set forth at: https://developer.nike.com/healthkit/nikefuel-use-agreement.html. If You do not accept such NikeFuel points terms of service, including, but not limited to all limitations and restrictions therein, You may not use such NikeFuel points information in Your Application, and You acknowledge and agree that such use will constitute Your acceptance of such terms of service.

You may use the HomeKit APIs only for internal testing and development purposes for Your Application. Your Application must not access the HomeKit APIs unless it is primarily designed to provide home configuration or home automation services (e.g., turning on a light, lifting a garage door) for hardware accessories licensed under Apples MFi Program. You agree not to use the HomeKit APIs for any purpose other than interfacing, communicating, interoperating with or otherwise controlling hardware accessories licensed under Apples MFi Program or for using the HomeKit database, and then only for home configuration or home automation purposes in connection with Your Application. Your Application may use information obtained from the HomeKit APIs and/or the HomeKit database only on supported Apple-branded products. You agree not to export, remotely access, or transfer such information off such device (e.g., a lock password cannot be sent off an end-users device to be stored in an external non-Apple database).

C. Compliance with Laws

You agree that neither You nor Your Applications will disable, override or otherwise interfere with any Apple-implemented system alerts, warnings, display panels, consent panels and the like. You understand and agree that You and Your Applications must comply with all applicable criminal, civil and statutory laws and regulations (including privacy, data collection and location service laws and regulations) in any jurisdictions in which Your Applications may be delivered. You shall be solely responsible for, and Apple shall have no responsibility or liability whatsoever with respect to, any and all claims, suits, liabilities, losses, damages, costs and expenses arising from, related or attributable to, or otherwise involving Your Application.

You agree not to use the Apple Software and Services for any unlawful or illegal activity, nor to develop any Application that would commit or facilitate the commission of a crime, or other tortious, unlawful, or illegal act. You agree that, to the best of Your knowledge and belief, Your Applications will not violate, misappropriate, or infringe any Apple or third party copyrights, trademarks, rights of privacy and publicity, trade secrets, patents, or other proprietary or legal rights (e.g. musical composition or performance rights, video rights, photography or image rights, logo rights, third party data rights, etc. for content and materials that may be included in Your Application). Further, You agree not to use the Apple Software or Apple Services to create any Application or other software program that would disable, hack or otherwise interfere with any security, digital signing, digital rights management, content protection, verification or authentication mechanisms implemented in or by the Apple Software or the Apple Services, or by other Apple software, services or technology, or enable others to do so, unless otherwise permitted by Apple in writing.

Applications must not contain any malware, malicious or harmful code, program, or other internal component (e.g.

computer viruses, trojan horses, backdoors) and may
not use any Apple Software or services in a way that could damage, destroy, or adversely affect Apple hardware, software or services, or any other software, firmware, hardware, data, systems, services, or networks. If Your Application includes any FOSS, You agree to comply with all applicable FOSS licensing terms, and You agree not to use any FOSS in the development of Your Application in such a way that would cause the non-FOSS portions of the Provisioning Profiles, Apple Software, Services, or any Apple-issued certificates to be subject to any FOSS licensing terms or obligations.

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package source

// This file includes all local additions to source package for google/go-licenses use-cases.

// SetCommit overrides commit to a specified commit. Usually, you should pass your version to
// ModuleInfo(). However, when you do not know the version and just wants a link that points to

```
// a known commit/branch/tag. You can use this method to directly override the commit like
// info.SetCommit("master").
//
//
 Note this is different from directly passing "master" as version to ModuleInfo(), because for
// modules not at the root of a repo, there are conventions that add a module's relative dir in
// front of the version as the actual git tag. For example, for a sub module at ./submod whose
// version is v1.0.1, the actual git tag should be submod/v1.0.1.
func (i *Info) SetCommit(commit string) {
 if i == nil {
  return
 }
 i.commit = commit
}
```

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package licenses

import (
 "context"
 "fmt"
 "go/build"
 "path/filepath"
 "sort"
 "strings"

 "github.com/google/go-licenses/internal/third_party/pkgsite/source"
 "golang.org/x/sync/errgroup"
 "golang.org/x/tools/go/packages"
 "k8s.io/klog/v2"
)

// Library is a collection of packages covered by the same license file.
type Library struct {
 // LicenseFile is the path of the file containing
 the library's license.
 LicenseFile string
 // Packages contains import paths for Go packages in this library.
 // It may not be the complete set of all packages in the library.
 Packages []string
 // Parent go module.
 module *Module
 // List of licenses for found at the LicenseFile.
 Licenses []License
```

```
}

// PackagesError aggregates all Packages[].Errors into a single error.
type PackagesError struct {
 pkgs []*packages.Package
}

func (e PackagesError) Error() string {
 var str strings.Builder
 str.WriteString(fmt.Sprintf("errors for %q:", e.pkgs))
 packages.Visit(e.pkgs, nil, func(pkg *packages.Package) {
  for _, err := range pkg.Errors {
   str.WriteString(fmt.Sprintf("\n%s: %s", pkg.PkgPath, err))
  }
 })
 return str.String()
}

// Libraries returns the collection of libraries used by this package, directly or transitively.
// A library is a collection of one or more packages covered by the same license file.
// Packages not covered by a license will be returned as individual
 libraries.
// Standard library packages will be ignored.
func Libraries(ctx context.Context, classifier Classifier, includeTests bool, ignoredPaths []string, importPaths
...string) ([]*Library, error) {
 // These are the steps we take to find libraries:
 // 1. we list all modules and all packages
 // 2. for each package, we find a list of candidates
 // 3. we deduplicate all candidates
 // 4. for each candidate, we classify if the candidate is a license file
 // 5. for each package, we select the first candidates that is a license
 //    file & add the package to a list of packages for that license file
 // 6. we return an array of libraries (which are the license files, the
 //    found licenses in that file, all the packages that had that file as
 //    its first candidate and the module in which those packages live)

 cfg := &packages.Config{
  Context: ctx,
  Mode:    packages.NeedImports | packages.NeedDeps | packages.NeedFiles | packages.NeedName |
packages.NeedModule,
  Tests:
   includeTests,
 }

 rootPkgs, err := packages.Load(cfg, importPaths...)
 if err != nil {
  return nil, err
 }
```

```
vendoredSearch := []*Module{}
for _, parentPkg := range rootPkgs {
 if parentPkg.Module == nil {
  continue
 }

 module := newModule(parentPkg.Module)
 if module.Dir == "" {
  continue
 }

 vendoredSearch = append(vendoredSearch, module)
}

type pkgInfo struct {
 // pkgPath is the import path of the package.
 pkgPath string
 // modulePath is the module path of the package.
 modulePath string

 // pkgDir is the directory containing the package's source code.
 pkgDir string
 // moduleDir is the directory containing the module's source code.
 moduleDir string
}

allModules := map[string]*Module{}
allPackages := []pkgInfo{}
{
 pkgErrorOccurred := false
 otherErrorOccurred := false
 packages.Visit(rootPkgs, func(p *packages.Package) bool {
  if len(p.Errors) > 0 {
   pkgErrorOccurred = true
   return false
  }
  if isStdLib(p) {
   // No license requirements
for the Go standard library.
   return false
  }
  if includeTests && isTestBinary(p) {
   // A test binary only imports the standard library, so we do not need to check its license.
   // Moreover, Find below will return an error because pkgDir is not under p.Module.Dir
   // as pkgDir is under GOCACHE instead.
   return false
  }
```

```
  for _, i := range ignoredPaths {
   if strings.HasPrefix(p.PkgPath, i) {
    // Marked to be ignored.
    return true
   }
  }

  if len(p.OtherFiles) > 0 {
   klog.Warningf("%q contains non-Go code that can't be inspected for further dependencies:\n%s", p.PkgPath,
strings.Join(p.OtherFiles, "\n"))
  }

  var pkgDir string
  switch {
  case len(p.GoFiles) > 0:
   pkgDir = filepath.Dir(p.GoFiles[0])
  case len(p.CompiledGoFiles) > 0:
   pkgDir = filepath.Dir(p.CompiledGoFiles[0])
  case len(p.OtherFiles) > 0:
   pkgDir = filepath.Dir(p.OtherFiles[0])
  default:
   // This package is empty - nothing to do.
   return true
  }

  if
 p.Module == nil {
   otherErrorOccurred = true
   klog.Errorf("Package %s does not have module info. Non go modules projects are no longer supported. For
feedback, refer to https://github.com/google/go-licenses/issues/128.", p.PkgPath)
   return false
  }

  module := newModule(p.Module)

  if module.Dir == "" {
   // A known cause is that the module is vendored, so some information is lost.
   isVendored := strings.Contains(pkgDir, "/vendor/")
   if !isVendored {
    klog.Warningf("module %s does not have dir and it's not vendored, cannot discover the license URL. Report to go-
licenses developer if you see this.", module.Path)
   } else {
    // This is vendored. Handle this known special case.

    // Extra note why we identify a vendored package like this.
    //
    // For a normal package:
    // * if it's not in a module, lib.module == nil
```

```
    // * if it's in a module, lib.module.Dir != ""
    // Only vendored modules will have lib.module != nil &&
lib.module.Path != "" && lib.module.Dir == "" as far as I know.
    // So the if condition above is already very strict for vendored packages.
    // On top of it, we checked the lib.LicensePath contains a vendor folder in it.
    // So it's rare to have a false positive for both conditions at the same time, although it may happen in theory.
    //
    // These assumptions may change in the future,
    // so we need to keep this updated with go tooling changes.
    for _, parentModule := range vendoredSearch {
     if strings.HasPrefix(pkgDir, parentModule.Dir) {
      module = parentModule
      break
     }
    }

    if module.Dir == "" {
     klog.Warningf("cannot find parent package of vendored module %s", module.Path)
    }
   }
  }

  allPackages = append(allPackages, pkgInfo{
   pkgPath:    p.PkgPath,
   modulePath: module.Path,
   pkgDir:     pkgDir,
   moduleDir:  module.Dir,
  })
  allModules[module.Path] = module

  return true
 }, nil)
 if pkgErrorOccurred
{
  return nil, PackagesError{
   pkgs: rootPkgs,
  }
 }
 if otherErrorOccurred {
  return nil, fmt.Errorf("some errors occurred when loading direct and transitive dependency packages")
 }
}

pkgCandidates := map[string][]string{}
allCandidates := map[string]struct{}{}
for _, pkg := range allPackages {
 candidates, err := FindCandidates(pkg.pkgDir, pkg.moduleDir)
 if err != nil {
```

```
  return nil, err
 }

 pkgCandidates[pkg.pkgDir] = candidates
 for _, candidate := range candidates {
  allCandidates[candidate] = struct{}{}
 }
}

group, _ := errgroup.WithContext(ctx)
foundLicenseSlice := make([]struct {
 candidate string
 licenes   []License
}, len(allCandidates))
counter := 0
for candidate := range allCandidates {
 idx := counter
 counter++
 candidate := candidate

 group.Go(func() error {
  licenses, err := classifier.Identify(candidate)
  if err != nil {
   klog.Errorf("Failed to parse %s: %v", candidate, err)
   return nil // Continue even
if one LICENSE file fails to parse.
  }

  foundLicenseSlice[idx] = struct {
   candidate string
   licenes   []License
  }{
   candidate: candidate,
   licenes:   licenses,
  }
  return nil
 })
}

if err := group.Wait(); err != nil {
 return nil, err
}

foundLicenses := map[string][]License{}
for _, found := range foundLicenseSlice {
 if len(found.licenes) == 0 {
  continue
 }
```

```
 foundLicenses[found.candidate] = found.licenes
}

pkgsByLicense := make(map[string][]pkgInfo)
for _, pkg := range allPackages {
 candidates := pkgCandidates[pkg.pkgDir]

 bestCandidate := ""
 for _, candidate := range candidates {
  if _, ok := foundLicenses[candidate]; ok {
   bestCandidate = candidate
   break
  }
 }

 pkgsByLicense[bestCandidate] = append(pkgsByLicense[bestCandidate], pkg)
}

var libraries []*Library
for licenseFile, pkgs := range pkgsByLicense {
 if licenseFile == "" {
  // No license for these packages - return each one as a separate library.
  for _,
p := range pkgs {
   libraries = append(libraries, &Library{
    Packages: []string{p.pkgPath},
    module:   allModules[p.modulePath],
   })
  }
  continue
 }

 lib := &Library{
  LicenseFile: licenseFile,
  Licenses:    foundLicenses[licenseFile],
  Packages:    make([]string, len(pkgs)),
  module:      allModules[pkgs[0].modulePath],
 }

 for i, p := range pkgs {
  lib.Packages[i] = p.pkgPath
 }

 libraries = append(libraries, lib)
}

// Sort libraries to produce a stable result for snapshot diffing.
```

```
 sort.Slice(libraries, func(i, j int) bool {
  return libraries[i].Name() < libraries[j].Name()
 })

 return libraries, nil
}

// Name is the common prefix of the import paths for all of the packages in this library.
func (l *Library) Name() string {
 return commonAncestor(l.Packages)
}

func commonAncestor(paths []string) string {
 if len(paths) == 0 {
  return ""
 }
 if len(paths) == 1 {
  return paths[0]
 }
 sort.Strings(paths)
 min, max := paths[0], paths[len(paths)-1]
 lastSlashIndex
 := 0
 for i := 0; i < len(min) && i < len(max); i++ {
  if min[i] != max[i] {
   return min[:lastSlashIndex]
  }
  if min[i] == '/' {
   lastSlashIndex = i
  }
 }
 return min
}

func (l *Library) String() string {
 return l.Name()
}

// FileURL attempts to determine the URL for a file in this library using
// go module name and version.
func (l *Library) FileURL(ctx context.Context, cl *source.Client, filePath string) (string, error) {
 if l == nil {
  return "", fmt.Errorf("library is nil")
 }
 wrap := func(err error) error {
  return fmt.Errorf("getting file URL in library %s: %w", l.Name(), err)
 }
 m := l.module
```

```
if m == nil {
 return "", wrap(fmt.Errorf("empty go module info"))
}
if m.Dir == "" {
 return "", wrap(fmt.Errorf("empty go module dir"))
}
remote, err := source.ModuleInfo(ctx, cl, m.Path, m.Version)
if err != nil {
 return "", wrap(err)
}
if m.Version == "" {
 // This always happens for the module in development.
 // Note#1 if we pass version=HEAD
to source.ModuleInfo, github tag for modules not at the root
 // of the repo will be incorrect, because there's a convention that:
 // * I have a module at github.com/google/go-licenses/submod.
 // * The module is of version v1.0.0.
 // Then the github tag should be submod/v1.0.0.
 // In our case, if we pass HEAD as version, the result commit will be submod/HEAD which is incorrect.
 // Therefore, to workaround this problem, we directly set the commit after getting module info.
 //
 // Note#2 repos have different branches as default, some use the
 // master branch and some use the main branch. However, HEAD
 // always refers to the default branch, so it's better than
 // both of master/main when we do not know which branch is default.
 // Examples:
 // * https://github.com/google/go-licenses/blob/HEAD/LICENSE
 // points to latest commit of master branch.
 // * https://github.com/google/licenseclassifier/blob/HEAD/LICENSE
 // points to latest commit of main branch.
 remote.SetCommit("HEAD")
 klog.Warningf("module
%s has empty version, defaults to HEAD. The license URL may be incorrect. Please verify!", m.Path)
}
relativePath, err := filepath.Rel(m.Dir, filePath)
if err != nil {
 return "", wrap(err)
}
// TODO: there are still rare cases this may result in an incorrect URL.
// https://github.com/google/go-licenses/issues/73#issuecomment-1005587408
return remote.FileURL(relativePath), nil
}

func (l *Library) Version() string {
 if l.module != nil {
  return l.module.Version
 }
 return ""
```

```
}

// isStdLib returns true if this package is part of the Go standard library.
func isStdLib(pkg *packages.Package) bool {
 if pkg.Name == "unsafe" {
  // Special case unsafe stdlib, because it does not contain go files.
  return true
 }
 if len(pkg.GoFiles) == 0 {
  return false
 }
 prefix := build.Default.GOROOT
 sep := string(filepath.Separator)
 if !strings.HasSuffix(prefix, sep) {
  prefix += sep
 }
 return strings.HasPrefix(pkg.GoFiles[0], prefix)
}

//
 isTestBinary returns true iff pkg is a test binary.
func isTestBinary(pkg *packages.Package) bool {
 return strings.HasSuffix(pkg.PkgPath, ".test")
}
```

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THE BASIC LIBRARY FUNCTIONS
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```
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// Package derrors defines internal error values to categorize the different
// types error semantics we support.
package derrors

import (
 "errors"
 "fmt"
)

//lint:file-ignore ST1012 prefixing error values with Err would stutter

var (
 // NotFound indicates that a requested entity was not found (HTTP 404).
 NotFound = errors.New("not found")

 // InvalidArgument indicates that the input into the request is invalid in
 // some way (HTTP 400).
 InvalidArgument = errors.New("invalid argument")
)

// Wrap adds context to the error and allows
// unwrapping the result to recover the original error.
//
```

```
// Example:
//
// defer derrors.Wrap(&err, "copy(%s, %s)", src, dst)
//
// See Add for an equivalent function that does not allow
// the result to be unwrapped.
func Wrap(errp *error, format string, args ...any) {
 if *errp != nil {
  *errp
 = fmt.Errorf("%s: %w", fmt.Sprintf(format, args...), *errp)
 }
}
```

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EXHIBIT B - Standards

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2.0 Additional requirements. The additional requirements pursuant to Section 3.1 are defined as:

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in "Network: Computation in Neural Systems" Vol. 5 (1994) pp 351-367.
for a discussion of the algorithm.
See also http://www.acm.org/~dekker/NEUQUANT.HTML

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package spec

import (
 "encoding/json"

 "github.com/go-openapi/swag"
)

// License information for the exposed API.
//
// For more information: http://goo.gl/8us55a#licenseObject
type License struct {
 LicenseProps
 VendorExtensible
}

// LicenseProps holds the properties of a License object
type LicenseProps struct {
 Name string `json:"name,omitempty"`
 URL  string `json:"url,omitempty"`
}

// UnmarshalJSON
 hydrates License from json
func (l *License) UnmarshalJSON(data []byte) error {
 if err := json.Unmarshal(data, &l.LicenseProps); err != nil {
  return err
 }
 return json.Unmarshal(data, &l.VendorExtensible)
}

// MarshalJSON produces License as json
func (l License) MarshalJSON() ([]byte, error) {
 b1, err := json.Marshal(l.LicenseProps)
 if err != nil {
  return nil, err
 }
 b2, err := json.Marshal(l.VendorExtensible)
 if err != nil {
  return nil, err
 }
 return swag.ConcatJSON(b1, b2), nil
}
```

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// Package version handles version types.
package version

import (
"regexp"

```
 "strings"
)

const (
 // Latest signifies the latest available version in requests to the
 // proxy client.
 Latest = "latest"

 // Main represents the main branch.
 Main = "main"

 // Master represents the master branch.
 Master = "master"
)

var pseudoVersionRE = regexp.MustCompile(`^v[0-9]+\.(0\.0-|\d+\.\d+-([^+]*\.)?0\.)\d{14}-[A-Za-z0-
9]+(\+incompatible)?$`)

// IsPseudo reports whether a valid version v is a pseudo-version.
// Modified from src/cmd/go/internal/modfetch.
func IsPseudo(v string) bool {
 return strings.Count(v, "-") >= 2 && pseudoVersionRE.MatchString(v)
}
```

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```
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// Package stdlib supports special handling of the Go standard library.
// Regardless of the how the standard library has been split into modules for
// development and testing, the discovery site treats it as a single module
// named "std".
package stdlib
```

```
import (
 "fmt"
 "strings"

 "github.com/google/go-licenses/internal/third_party/pkgsite/derrors"
 "github.com/google/go-licenses/internal/third_party/pkgsite/version"
 "golang.org/x/mod/semver"
)

const (
 // ModulePath is the name of the module for the standard library.
 ModulePath = "std"

 // DevFuzz is the branch name for fuzzing in beta.
 DevFuzz = "dev.fuzz"

 // DevBoringCrypto is the branch name for dev.boringcrypto.
 DevBoringCrypto = "dev.boringcrypto"
)

// SupportedBranches are the branches of the stdlib repo supported by pkgsite.
var SupportedBranches = map[string]bool{
 version.Master:
  true,
 DevBoringCrypto: true,
 DevFuzz:         true,
}

// TagForVersion returns the Go standard library repository tag corresponding
// to semver. The Go tags differ from standard semantic versions in a few ways,
// such as beginning with "go" instead of "v".
func TagForVersion(v string) (_ string, err error) {
 defer derrors.Wrap(&err, "TagForVersion(%q)", v)

 // Special case: master => master or dev.fuzz => dev.fuzz
 if SupportedBranches[v] {
  return v, nil
 }
 if strings.HasPrefix(v, "v0.0.0") {
  return version.Master, nil
 }
 // Special case: v1.0.0 => go1.
 if v == "v1.0.0" {
  return "go1", nil
 }
 if !semver.IsValid(v) {
  return "", fmt.Errorf("%w: requested version is not a valid semantic version: %q ", derrors.InvalidArgument, v)
 }
```

```
 goVersion := semver.Canonical(v)
 prerelease := semver.Prerelease(goVersion)
 versionWithoutPrerelease := strings.TrimSuffix(goVersion, prerelease)
 patch := strings.TrimPrefix(versionWithoutPrerelease, semver.MajorMinor(goVersion)+".")
 if
 patch == "0" {
  versionWithoutPrerelease = strings.TrimSuffix(versionWithoutPrerelease, ".0")
 }
 goVersion = fmt.Sprintf("go%s", strings.TrimPrefix(versionWithoutPrerelease, "v"))
 if prerelease != "" {
  // Go prereleases look like  "beta1" instead of "beta.1".
  // "beta1" is bad for sorting (since beta10 comes before beta9), so
  // require the dot form.
  i := finalDigitsIndex(prerelease)
  if i >= 1 {
   if prerelease[i-1] != '.' {
    return "", fmt.Errorf("%w: final digits in a prerelease must follow a period", derrors.InvalidArgument)
   }
   // Remove the dot.
   prerelease = prerelease[:i-1] + prerelease[i:]
  }
  goVersion += strings.TrimPrefix(prerelease, "-")
 }
 return goVersion, nil
}

// finalDigitsIndex returns the index of the first digit in the sequence of digits ending s.
// If s doesn't end in digits, it returns -1.
func finalDigitsIndex(s string) int {
 // Assume ASCII (since the semver package does anyway).
 var i int
 for i = len(s) -
 1; i >= 0; i-- {
  if s[i] < '0' || s[i] > '9' {
   break
  }
 }
 if i == len(s)-1 {
  return -1
 }
 return i + 1
}

const (
 GoSourceRepoURL = "https://cs.opensource.google/go/go"
)

// Directory returns the directory of the standard library relative to the repo root.
```

```
func Directory(v string) string {
 if semver.Compare(v, "v1.4.0-beta.1") >= 0 ||
  SupportedBranches[v] || strings.HasPrefix(v, "v0.0.0") {
  return "src"
 }
 // For versions older than v1.4.0-beta.1, the stdlib is in src/pkg.
 return "src/pkg"
}
```

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package licenses

import (
 "os"

 licenseclassifier "github.com/google/licenseclassifier/v2"
 "github.com/google/licenseclassifier/v2/assets"
)

// Classifier can detect the type of a software license.
type Classifier interface {
 Identify(licensePath string) ([]License, error)
}

type googleClassifier struct {
 classifier *licenseclassifier.Classifier
}

// NewClassifier creates a classifier
func
 NewClassifier() (Classifier, error) {
 c, err := assets.DefaultClassifier()
 if err != nil {
  return nil, err
 }
 return &googleClassifier{classifier: c}, nil
}

type License struct {
 Name string
 Type Type
}

// Identify returns the name and type of a license, given its file path.
// An empty license path results in an empty name and Unknown type.
func (c *googleClassifier) Identify(licensePath string) ([]License, error) {
 if licensePath == "" {
  return nil, nil
 }

 file, err := os.Open(licensePath)
 if err != nil {
  return nil, err
 }
```

```
 defer file.Close()

 matches, err := c.classifier.MatchFrom(file)
 if err != nil {
  return nil, err
 }

 foundLicenseNames := map[string]struct{}{}

 licenses := []License{}
 for _, match := range matches.Matches {
  if match.MatchType != "License" {
   continue
  }

  // Skip duplicate licenses.
  if _, ok := foundLicenseNames[match.Name]; ok {
   continue
  }
  foundLicenseNames[match.Name] = struct{}{}

  licenses = append(licenses,
 License{
   Name: match.Name,
   Type: LicenseType(match.Name),
  })
 }

 return licenses, nil
}
```

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```
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This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

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```
Yoyodyne, Inc., hereby disclaims all copyright interest in the
program `Gnomovision' (a program to direct compilers to make passes
at assemblers) written by James Hacker.

<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

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compat_getopt - a command-line argument parser
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Source: https://github.com/OpenSC/OpenSC.git

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# 1.2836 opencryptoki 3.25.0-4.el9

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```
* - usr/lib/ica_s390_stdll/rsa_sup_mul.c: Copied from OpenSSL from
*   crypto/bn/rsa_sup_mul.c and modified to fit to the OpenCrptoki environment.
*   See comment in usr/lib/ica_s390_stdll/rsa_sup_mul.c for a list of changes.
*   Note that in OpenSSL the file crypto/bn/rsa_sup_mul.c does no longer
*   exist, it was removed with commit
https://github.com/openssl/openssl/commit/4209ce68d8fe8b1506494efa03d378d05baf9ff8
* - usr/lib/common/constant_time.h: Copied unchanged from OpenSSL from
*   include/internal/constant_time.h
* - The implementation of function rsa_parse_block_type_2() in
*   usr/lib/common/mech_rsa.c is copied from OpenSSL's function
*   ossl_rsa_padding_check_PKCS1_type_2() in crypto/rsa/rsa_pk1.c
*   and is slightly modified to fit to the OpenCryptoki environment.
*   See comment in function rsa_parse_block_type_2()
 for a list of changes.
* - The implementation of function openssl_specific_rsa_derive_kdk() in
*   usr/lib/common/mech_openssl.c is copied from OpenSSL's function
*   derive_kdk() in crypto/rsa/rsa_ossl.c and is slightly modified to fit to
*   the OpenCryptoki environment. See comment in function
*   openssl_specific_rsa_derive_kdk() for a list of changes.
* - The implementation of function openssl_specific_rsa_prf() in
*   usr/lib/common/mech_openssl.c is copied from OpenSSL's function
*   ossl_rsa_prf() in crypto/rsa/rsapk1.c and is slightly modified to fit to
*   the OpenCryptoki environment. See comment in function
*   openssl_specific_rsa_prf() for a list of changes.
* - The implementation of function decode_eme_oaep() in
*   usr/lib/common/mech_rsa.c is copied from OpenSSL's function
*   RSA_padding_check_PKCS1_OAEP_mgf1() in crypto/rsa/rsa_oaep.c and is
*   slightly modified to fit to the OpenCryptoki environment. See comment in
*   function decode_eme_oaep()
 for a list of changes.
* - The implementation of the AESKW functions in usr/lib/common/mech_aes.c is
*   copied from OpenSSL's source file crypto/modes/wrap128.c and is slightly
*   modified to fit to the OpenCryptoki environment. See comment in
*   file usr/lib/common/mech_aes.c for a list of changes.
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*
* Written by Graue <graue@oceanbase.org> on January 16, 2006.

2. getopt_long.c:
* getopt_long() -- long options parser
*
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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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Jean-loup Gailly Mark Adler
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The data format used by the zlib library is described by RFCs (Request for
Comments) 1950 to 1952 in the files ftp://ds.internic.net/rfc/rfc1950.txt
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# 1.2845 @asamuzakjp/css-color 4.1.1

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@macro copyrightend{}
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AES in libhcrypto

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rijndael-alg-fst.c

@version 3.0 (December 2000)

Optimised ANSI C code for the Rijndael cipher (now AES)

@author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
@author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
@author Paulo Barreto <paulo.barreto@terra.com.br>

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DES core in libhcrypto

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D3DES (V5.09) -

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AES in libhcrypto

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rijndael-alg-fst.c

@version 3.0 (December 2000)

Optimised ANSI C code for the Rijndael cipher (now AES)

@author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
@author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>

@author Paulo Barreto <paulo.barreto@terra.com.br>

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DES core in libhcrypto

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lib/hcrypto/test_dh.c

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ca-bundle.crt -- Bundle of CA Root Certificates

This is a bundle of X.509 certificates of public Certificate Authorities
(CA). These were automatically extracted from Mozilla's root certificates
file (certdata.txt). This file can be found in the mozilla source tree:
https://hg.mozilla.org/mozilla-central/file/tip/security/nss/lib/ckfw/builtins/certdata.txt
It contains the certificates in PEM format and therefore
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@(#) $RCSfile: certdata.txt,v $ $Revision: 1.80 $ $Date: 2011/11/03 15:11:58 $

# 1.2855 chainguard-baselayout 20230214-r16

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```

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```

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# 1.2865 libcurl-openssl4 8.18.0-r2

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# 1.2866 curl 8.18.0-r2

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# 1.2867 libunistring 1.4.1-r2

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```
#ifndef _BASENAME_LGPL_H
#define _BASENAME_LGPL_H

/* This file uses _GL_ATTRIBUTE_PURE.  */
#if !_GL_CONFIG_H_INCLUDED
#error "Please include config.h first."
#endif

#include <stddef.h>

#ifndef
 DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif


/* Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
          FILENAME      RESULT
          "foo.c"       "foo.c"
          "foo/bar.c"   "bar.c"
          "/foo/bar.c"  "bar.c"
          "foo/bar/"    "bar/"
          "foo/bar//"   "bar//"
          "/"           ""
          "//"          ""
          ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(),
 defined in <string.h>, does
      not consider trailing slashes to be part of the component:
          FILENAME      RESULT
          "foo/bar/"    ""
          "foo/bar//"   ""
    * The 'basename' command eliminates trailing slashes and for a root
      produces a non-empty result:
```

```
          FILENAME      RESULT
          "foo/bar/"    "bar"
          "foo/bar//"   "bar"
          "/"           "/"
          "//"          "/"
*/
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;


#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
```

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```
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Version 3, 29 June 2007

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From strings/apr_strnatcmp.c,

include/apr_strings.h:

strnatcmp.c -- Perform 'natural order' comparisons of strings in C.
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From
strings/apr_snprintf.c:

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file_io/unix/mktemp.c, strings/apr_strings.c:

```
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From network_io/unix/inet_ntop.c, network_io/unix/inet_pton.c:

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From dso/aix/dso.c:

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From strings/apr_strnatcmp.c,
 include/apr_strings.h:

 strnatcmp.c -- Perform 'natural order' comparisons of strings in C.
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From
strings/apr_snprintf.c:

```
*
* cvt - IEEE floating point formatting routines.
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*
```

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<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice

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```
# Contributor: Carlo Landmeter <clandmeter@alpinelinux.org>
# Maintainer: Kevin Daudt <kdaudt@alpinelinux.org>
pkgname=spdx-licenses
pkgver=3.27.0
pkgrel=0
pkgdesc="Various data formats for the SPDX License List"
url="https://spdx.org/"
arch="noarch"
options="!check" # no test suite
license="CC-BY-3.0"
source="license-list-data-$pkgver.tar.gz::https://github.com/spdx/license-list-data/archive/v$pkgver.tar.gz"
builddir="$srcdir/license-list-data-$pkgver"
subpackages="$pkgname-list"

_types="html json rdfa rdfnt rdfturtle rdfxml template text"

for type in $_types; do
 subpackages="$subpackages $pkgname-$type:_subpkg"
done

package() {
 mkdir -p "$pkgdir"
}

_subpkg() {
 local type=${subpkgname/$pkgname-/}
 pkgdesc="$pkgdesc ($type)"
 install_if="$pkgname=$pkgver-r$pkgrel"
 mkdir -p "$subpkgdir"/usr/share/spdx
 cp -r "$builddir"/$type "$subpkgdir"/usr/share/spdx/
}

list() {
 pkgdesc="$pkgdesc (licence list)"
 mkdir -p "$subpkgdir"/usr/share/spdx
 local i; for i in "$builddir"/text/*.txt;
 do
  local license=${i##*/}
  echo ${license%.*} >> "$subpkgdir"/usr/share/spdx/license.lst
 done
}

sha512sums="
16d59c81e331b54b52639826f83408d98144cdaa70eacc3e8ce35dc3b13992e4794cf7515eb9db200efd390a0c0e35ae9
```

```
d4706fbe0ca6a8d236189e88870720c  license-list-data-3.27.0.tar.gz
"
# Automatically generated by apkbuild-cpan, template 4
# Contributor: Valery Kartel <valery.kartel@gmail.com>
# Maintainer: Celeste <cielesti@protonmail.com>
maintainer="Celeste <cielesti@protonmail.com>"
pkgname=perl-bsd-resource
pkgver=1.2911
pkgrel=11
#_pkgreal is used by apkbuild-cpan to find modules at MetaCpan
_pkgreal=BSD-Resource
pkgdesc="Perl extension implements the BSD process resource limit functions"
url="https://metacpan.org/release/BSD-Resource/"
arch="all"
license="Artistic-2.0 OR LGPL-2.0"
depends="perl"
makedepends="perl-dev"
subpackages="$pkgname-doc"
source="https://cpan.metacpan.org/authors/id/J/JH/JHI/BSD-Resource-$pkgver.tar.gz"
builddir="$srcdir/$_pkgreal-$pkgver"

build() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 PERL_MM_USE_DEFAULT=1 perl -I. Makefile.PL \
  INSTALLDIRS=vendor \
  NO_PACKLIST=1 \
  NO_PERLLOCAL=1
 make
}

check() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 make test
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="
d0032d41c7c0468ed1c6d8f57b885f6cb97a5039d754c8cb60b2067daedaf53bd15fb6561a3d0f828df16dfa5417f663b
8065ba65f4fea16dc9262728b3b6b85
  BSD-Resource-1.2911.tar.gz
"
maintainer="Achill Gilgenast <achill@achill.org>"
pkgname=cargo-license
pkgver=0.7.0
pkgrel=1
```

```
pkgdesc="Cargo subcommand to see license of dependencies"
url="https://github.com/onur/cargo-license"
arch="all"
license="MIT"
makedepends="cargo cargo-auditable"
source="$pkgname-$pkgver.tar.gz::https://crates.io/api/v1/crates/cargo-license/$pkgver/download"

prepare() {
 default_prepare

 cargo fetch --target="$CTARGET" --locked
}

build() {
 cargo auditable build --release --frozen
}

check() {
 cargo test --frozen
}

package() {
 install -Dm755 target/release/cargo-license -t "$pkgdir"/usr/bin
}

sha512sums="
9b3f0ead35515e85ef4074ebdbdbe5b9ec8bcaec244fabe414e2ed60f90366e8b1692d8bf7ffe4c07d778e60d94bab86bc
0c8be9823232e9c360a38bc65e9c5a  cargo-license-0.7.0.tar.gz
"
#!/sbin/openrc-run

command="/usr/libexec/xdg-permission-store"
supervisor=supervise-daemon
command_args="--replace $command_args"
error_logger="logger -t '${RC_SVCNAME}' -p daemon.error"

depend() {
 need dbus
}
# Contributor: Maxim Karasev <begs@disroot.org>
# Maintainer: mio <miyopan@e.email>
pkgname=bsd-games
pkgver=3.3
pkgrel=2
pkgdesc="traditional text mode games from BSD"
url="https://bsd-games.sourceforge.io/"
arch="all"
license="BSD-3-Clause"
```

```
install="$pkgname.post-install"
makedepends="ncurses-dev coreutils" # configure causes busybox expr error
subpackages="$pkgname-doc"
source="https://sourceforge.net/projects/bsd-games/files/bsd-games-$pkgver.tar.gz
 0001-bsd-games-scores-dir.patch
 "
options="!check" # no tests

build() {
 # some GNU autoconf options are ignored, but it works
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr \
  --sysconfdir=/etc \
  --mandir=/usr/share/man \
  --scoredir=/usr/share/$pkgname
 make
}

package() {
 make DESTDIR="$pkgdir" install
 install -Dm644 LICENSE "$pkgdir"/usr/share/licenses/bsd-games/LICENSE
}

sha512sums="
aaf36d09d4fe68514a5c279063d7e77a9a9a84c447037cba974b29faa07eb80c2aab2379d0699c196b5c27ffe1b2bb2c6
8d3390143e0e62d5e3d210ccfb61294
  bsd-games-3.3.tar.gz
e1def0d4835a877242c4173fae862e278a7858738e0bacacbb045a42bcabec2aa7c72d000bbd2421ce35fe66cdc1f52c0
577b7e278029ca5ed50f7aab22319f6  0001-bsd-games-scores-dir.patch
"
```

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# Maintainer: Natanael Copa <ncopa@alpinelinux.org>
pkgname=libart-lgpl
pkgver=2.3.21
pkgrel=8
pkgdesc="A library for high-performance 2D graphics"
url="https://www.levien.com/libart/"
arch="all"
options="!check"  # No test suite.
license="LGPL-2.0-or-later"
subpackages="$pkgname-dev"
source="https://download.gnome.org/sources/libart_lgpl/2.3/libart_lgpl-$pkgver.tar.bz2
 "

builddir="$srcdir"/libart_lgpl-$pkgver

prepare() {

```
 update_config_sub
 default_prepare
}

build() {
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr
 make
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="8a632a6a4da59e5e8c02ec2f5a57e36d182b325b46513765425e5f171ff9ae326af1b133725beba28f7e7
6654309e001aee9bace727b5b4c8589405256a3c020  libart_lgpl-2.3.21.tar.bz2"
# Contributor: Patrycja Rosa <alpine@ptrcnull.me>
# Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=bsd-compat-headers
pkgver=0.7.2
pkgrel=6
pkgdesc="BSD compatibility headers (cdefs, queue, tree)"
url="https://gitlab.alpinelinux.org/alpine/aports"
arch="noarch"
license="BSD-2-Clause AND BSD-3-Clause"
source="
 cdefs.h
 queue.h
 tree.h
"
builddir="$srcdir"
options="!check" # just headers

package() {
 mkdir -p "$pkgdir"
 install -Dm644 -t "$pkgdir"/usr/include/sys \
  cdefs.h queue.h tree.h
}
sha512sums="
37c8fc73c7aea7b490f7850927e2bb91d12137c9e59e22c084146d515696dbc7973b5de92f4c987ba080dd2502ba8312
7006442c3f019b6447a620c0cae73178  cdefs.h
2f0d5e6e4dc3350285cf17009265dddcbe12431c111868eea39bc8cb038ab7c1f2acacbb21735c4e9d4a1fd106a8fc0f86
11ea33987d4faba37dde5ce6da0750  queue.h
d9ac210d81feb8ad2655bc80fb065d3fe20ae4417b32b4a1711e6738a4870140005c13373b5d1846ef3ce5ae6da45f2da
cef2092881eded0a2e94f6a07752ef3  tree.h
"
```

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"X-Splines: A Spline Model Designed for the End User" by C. Blanc and C. Schlick, Proceedings of SIGGRAPH'95
http://dept-info.labri.u-bordeaux.fr/~schlick/DOC/sig1.html
/* $NetBSD: queue.h,v 1.70 2015/11/02 15:21:23 christos Exp $ */

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*
* @(#)queue.h 8.5 (Berkeley) 8/20/94
*/

#ifndef _SYS_QUEUE_H_
#define _SYS_QUEUE_H_

/*
* This file defines five types of data structures: singly-linked lists,
* lists, simple queues, tail queues, and circular queues.
*
* A singly-linked list is headed by a single forward pointer. The
* elements are singly linked for minimum space and
 pointer manipulation
* overhead at the expense of O(n) removal for arbitrary elements. New
* elements can be added to the list after an existing element or at the
* head of the list.  Elements being removed from the head of the list
* should use the explicit macro for this purpose for optimum
* efficiency. A singly-linked list may only be traversed in the forward
* direction.  Singly-linked lists are ideal for applications with large
* datasets and few or no removals or for implementing a LIFO queue.
*
* A list is headed by a single forward pointer (or an array of forward
* pointers for a hash table header). The elements are doubly linked
* so that an arbitrary element can be removed without a need to
* traverse the list. New elements can be added to the list before
* or after an existing element or at the head of the list. A list
* may only be traversed in the forward direction.
*
* A simple queue is headed by a pair of pointers, one the head of the
* list and the
 other to the tail of the list. The elements are singly
* linked to save space, so elements can only be removed from the
* head of the list. New elements can be added to the list after
* an existing element, at the head of the list, or at the end of the
* list. A simple queue may only be traversed in the forward direction.
*
```

```
* A tail queue is headed by a pair of pointers, one to the head of the
* list and the other to the tail of the list. The elements are doubly
* linked so that an arbitrary element can be removed without a need to
* traverse the list. New elements can be added to the list before or
* after an existing element, at the head of the list, or at the end of
* the list. A tail queue may be traversed in either direction.
*
* A circle queue is headed by a pair of pointers, one to the head of the
* list and the other to the tail of the list. The elements are doubly
* linked so that an arbitrary element can be removed without a need to
* traverse the list. New elements
 can be added to the list before or after
* an existing element, at the head of the list, or at the end of the list.
* A circle queue may be traversed in either direction, but has a more
* complex end of list detection.
*
* For details on the use of these macros, see the queue(3) manual page.
*/

/*
* Include the definition of NULL only on NetBSD because sys/null.h
* is not available elsewhere.  This conditional makes the header
* portable and it can simply be dropped verbatim into any system.
* The caveat is that on other systems some other header
* must provide NULL before the macros can be used.
*/
#ifdef __NetBSD__
#include <sys/null.h>
#endif

#if defined(QUEUEDEBUG)
# if defined(_KERNEL)
#  define QUEUEDEBUG_ABORT(...) panic(__VA_ARGS__)
# else
#  include <err.h>
#  define QUEUEDEBUG_ABORT(...) err(1, __VA_ARGS__)
# endif
#endif

/*
* Singly-linked List definitions.
*/
#define SLIST_HEAD(name, type)      \
struct name {        \
 struct type *slh_first; /* first
 element */   \
}
```

```
#define SLIST_HEAD_INITIALIZER(head)	\
 { NULL }

#define SLIST_ENTRY(type)	\
struct {	\
 struct type *sle_next; /* next element */	\
}

/*
* Singly-linked List access methods.
*/
#define SLIST_FIRST(head) ((head)->slh_first)
#define SLIST_END(head)  NULL
#define SLIST_EMPTY(head) ((head)->slh_first == NULL)
#define SLIST_NEXT(elm, field) ((elm)->field.sle_next)

#define SLIST_FOREACH(var, head, field)	\
 for((var) = (head)->slh_first;	\
    (var) != SLIST_END(head);	\
    (var) = (var)->field.sle_next)

#define SLIST_FOREACH_SAFE(var, head, field, tvar)	\
 for ((var) = SLIST_FIRST((head));	\
    (var) != SLIST_END(head) &&	\
    ((tvar) = SLIST_NEXT((var), field), 1);	\
    (var) = (tvar))

/*
* Singly-linked List functions.
*/
#define SLIST_INIT(head) do {	\
 (head)->slh_first = SLIST_END(head);	\
} while (/*CONSTCOND*/0)

#define SLIST_INSERT_AFTER(slistelm, elm, field) do {	\
 (elm)->field.sle_next = (slistelm)->field.sle_next;	\
 (slistelm)->field.sle_next
 = (elm);	\
} while (/*CONSTCOND*/0)

#define SLIST_INSERT_HEAD(head, elm, field) do {	\
 (elm)->field.sle_next = (head)->slh_first;	\
 (head)->slh_first = (elm);	\
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE_AFTER(slistelm, field) do {	\
 (slistelm)->field.sle_next =	\
    SLIST_NEXT(SLIST_NEXT((slistelm), field), field);	\
```

```
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE_HEAD(head, field) do {	\
	(head)->slh_first = (head)->slh_first->field.sle_next;	\
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE(head, elm, type, field) do {	\
	if ((head)->slh_first == (elm)) {	\
		SLIST_REMOVE_HEAD((head), field);	\
	}	\
	else {	\
		struct type *curelm = (head)->slh_first;	\
		while(curelm->field.sle_next != (elm))	\
			curelm = curelm->field.sle_next;	\
		curelm->field.sle_next =	\
		    curelm->field.sle_next->field.sle_next;	\
	}	\
} while (/*CONSTCOND*/0)


/*
* List definitions.
 */
#define LIST_HEAD(name, type)	\
struct name {	\
	struct type *lh_first; /* first element */	\
}

#define LIST_HEAD_INITIALIZER(head)	\
	{ NULL }

#define LIST_ENTRY(type)	\
struct {	\
	struct type *le_next; /* next element */	\
	struct type **le_prev; /* address of previous next element */ \
}

/*
* List access methods.
*/
#define LIST_FIRST(head)	((head)->lh_first)
#define LIST_END(head)	NULL
#define LIST_EMPTY(head)	((head)->lh_first == LIST_END(head))
#define LIST_NEXT(elm, field)	((elm)->field.le_next)

#define LIST_FOREACH(var, head, field)	\
	for ((var) = ((head)->lh_first);	\
	    (var) != LIST_END(head);	\
```

```
    (var) = ((var)->field.le_next))

#define LIST_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = LIST_FIRST((head));    \
    (var) != LIST_END(head) &&     \
    ((tvar) = LIST_NEXT((var), field), 1);   \
    (var) = (tvar))

#define LIST_MOVE(head1, head2) do {     \
 LIST_INIT((head2));      \
 if (!LIST_EMPTY((head1)))
 {     \
  (head2)->lh_first = (head1)->lh_first;   \
  LIST_INIT((head1));     \
 }        \
} while (/*CONSTCOND*/0)

/*
* List functions.
*/
#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_LIST_INSERT_HEAD(head, elm, field)   \
 if ((head)->lh_first &&      \
    (head)->lh_first->field.le_prev != &(head)->lh_first) \
  QUEUEDEBUG_ABORT("LIST_INSERT_HEAD %p %s:%d", (head), \
     __FILE__, __LINE__);
#define QUEUEDEBUG_LIST_OP(elm, field)     \
 if ((elm)->field.le_next &&     \
    (elm)->field.le_next->field.le_prev !=   \
    &(elm)->field.le_next)     \
  QUEUEDEBUG_ABORT("LIST_* forw %p %s:%d", (elm),  \
     __FILE__, __LINE__);    \
 if (*(elm)->field.le_prev != (elm))    \
  QUEUEDEBUG_ABORT("LIST_* back %p %s:%d", (elm),  \
     __FILE__, __LINE__);
#define QUEUEDEBUG_LIST_POSTREMOVE(elm, field)    \
 (elm)->field.le_next = (void *)1L;    \
 (elm)->field.le_prev = (void *)1L;
#else
#define QUEUEDEBUG_LIST_INSERT_HEAD(head, elm, field)
#define QUEUEDEBUG_LIST_OP(elm,
 field)
#define QUEUEDEBUG_LIST_POSTREMOVE(elm, field)
#endif

#define LIST_INIT(head) do {      \
 (head)->lh_first = LIST_END(head);    \
} while (/*CONSTCOND*/0)
```

```
#define LIST_INSERT_AFTER(listelm, elm, field) do {   \
 QUEUEDEBUG_LIST_OP((listelm), field)    \
 if (((elm)->field.le_next = (listelm)->field.le_next) !=  \
     LIST_END(head))      \
  (listelm)->field.le_next->field.le_prev =  \
      &(elm)->field.le_next;    \
 (listelm)->field.le_next = (elm);    \
 (elm)->field.le_prev = &(listelm)->field.le_next;  \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_BEFORE(listelm, elm, field) do {   \
 QUEUEDEBUG_LIST_OP((listelm), field)    \
 (elm)->field.le_prev = (listelm)->field.le_prev;  \
 (elm)->field.le_next = (listelm);    \
 *(listelm)->field.le_prev = (elm);    \
 (listelm)->field.le_prev = &(elm)->field.le_next;  \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_HEAD(head, elm, field) do {    \
 QUEUEDEBUG_LIST_INSERT_HEAD((head), (elm), field)  \
 if (((elm)->field.le_next
 = (head)->lh_first) != LIST_END(head))\
  (head)->lh_first->field.le_prev = &(elm)->field.le_next;\
 (head)->lh_first = (elm);     \
 (elm)->field.le_prev = &(head)->lh_first;   \
} while (/*CONSTCOND*/0)

#define LIST_REMOVE(elm, field) do {     \
 QUEUEDEBUG_LIST_OP((elm), field)    \
 if ((elm)->field.le_next != NULL)    \
  (elm)->field.le_next->field.le_prev =    \
      (elm)->field.le_prev;    \
 *(elm)->field.le_prev = (elm)->field.le_next;   \
 QUEUEDEBUG_LIST_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

#define LIST_REPLACE(elm, elm2, field) do {    \
 if (((elm2)->field.le_next = (elm)->field.le_next) != NULL) \
  (elm2)->field.le_next->field.le_prev =   \
      &(elm2)->field.le_next;    \
 (elm2)->field.le_prev = (elm)->field.le_prev;   \
 *(elm2)->field.le_prev = (elm2);    \
 QUEUEDEBUG_LIST_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

/*
* Simple queue definitions.
```

```
*/
#define SIMPLEQ_HEAD(name, type)     \
struct name {        \
 struct
 type *sqh_first; /* first element */   \
 struct type **sqh_last; /* addr of last next element */  \
}

#define SIMPLEQ_HEAD_INITIALIZER(head)     \
 { NULL, &(head).sqh_first }

#define SIMPLEQ_ENTRY(type)      \
struct {        \
 struct type *sqe_next; /* next element */   \
}

/*
* Simple queue access methods.
*/
#define SIMPLEQ_FIRST(head)  ((head)->sqh_first)
#define SIMPLEQ_END(head)  NULL
#define SIMPLEQ_EMPTY(head)  ((head)->sqh_first == SIMPLEQ_END(head))
#define SIMPLEQ_NEXT(elm, field) ((elm)->field.sqe_next)

#define SIMPLEQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->sqh_first);    \
     (var) != SIMPLEQ_END(head);     \
     (var) = ((var)->field.sqe_next))

#define SIMPLEQ_FOREACH_SAFE(var, head, field, next)   \
 for ((var) = ((head)->sqh_first);    \
     (var) != SIMPLEQ_END(head) &&    \
     ((next = ((var)->field.sqe_next)), 1);   \
     (var) = (next))

/*
* Simple queue functions.
*/
#define SIMPLEQ_INIT(head) do {      \
 (head)->sqh_first = NULL;     \
 (head)->sqh_last
 = &(head)->sqh_first;    \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_HEAD(head, elm, field) do {   \
 if (((elm)->field.sqe_next = (head)->sqh_first) == NULL) \
  (head)->sqh_last = &(elm)->field.sqe_next;  \
 (head)->sqh_first = (elm);     \
```

```
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_TAIL(head, elm, field) do {   \
 (elm)->field.sqe_next = NULL;     \
 *(head)->sqh_last = (elm);     \
 (head)->sqh_last = &(elm)->field.sqe_next;   \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 if (((elm)->field.sqe_next = (listelm)->field.sqe_next) == NULL)\
  (head)->sqh_last = &(elm)->field.sqe_next;  \
 (listelm)->field.sqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE_HEAD(head, field) do {    \
 if (((head)->sqh_first = (head)->sqh_first->field.sqe_next) == NULL) \
  (head)->sqh_last = &(head)->sqh_first;   \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE_AFTER(head, elm, field) do {   \
 if
 (((elm)->field.sqe_next = (elm)->field.sqe_next->field.sqe_next) \
     == NULL)       \
  (head)->sqh_last = &(elm)->field.sqe_next;  \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE(head, elm, type, field) do {   \
 if ((head)->sqh_first == (elm)) {    \
  SIMPLEQ_REMOVE_HEAD((head), field);   \
 } else {       \
  struct type *curelm = (head)->sqh_first;  \
  while (curelm->field.sqe_next != (elm))   \
   curelm = curelm->field.sqe_next;  \
  if ((curelm->field.sqe_next =    \
   curelm->field.sqe_next->field.sqe_next) == NULL) \
       (head)->sqh_last = &(curelm)->field.sqe_next; \
 }       \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_CONCAT(head1, head2) do {    \
 if (!SIMPLEQ_EMPTY((head2))) {     \
  *(head1)->sqh_last = (head2)->sqh_first;  \
  (head1)->sqh_last = (head2)->sqh_last;  \
  SIMPLEQ_INIT((head2));     \
 }       \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_LAST(head, type, field)     \
```

```
 (SIMPLEQ_EMPTY((head)) ?      \
  NULL :      \
        ((struct type
 *)(void *)    \
  ((char *)((head)->sqh_last) - offsetof(struct type, field))))

/*
* Tail queue definitions.
*/
#define _TAILQ_HEAD(name, type, qual)     \
struct name {        \
 qual type *tqh_first;  /* first element */  \
 qual type *qual *tqh_last; /* addr of last next element */ \
}
#define TAILQ_HEAD(name, type) _TAILQ_HEAD(name, struct type,)

#define TAILQ_HEAD_INITIALIZER(head)     \
 { TAILQ_END(head), &(head).tqh_first }

#define _TAILQ_ENTRY(type, qual)     \
struct {        \
 qual type *tqe_next;  /* next element */  \
 qual type *qual *tqe_prev; /* address of previous next element */\
}
#define TAILQ_ENTRY(type) _TAILQ_ENTRY(struct type,)

/*
* Tail queue access methods.
*/
#define TAILQ_FIRST(head)  ((head)->tqh_first)
#define TAILQ_END(head)   (NULL)
#define TAILQ_NEXT(elm, field)  ((elm)->field.tqe_next)
#define TAILQ_LAST(head, headname) \
 (*(((struct headname *)(void *)((head)->tqh_last))->tqh_last))
#define TAILQ_PREV(elm, headname, field) \
 (*(((struct headname
 *)(void *)((elm)->field.tqe_prev))->tqh_last))
#define TAILQ_EMPTY(head)  (TAILQ_FIRST(head) == TAILQ_END(head))



#define TAILQ_FOREACH(var, head, field)     \
 for ((var) = ((head)->tqh_first);    \
     (var) != TAILQ_END(head);     \
     (var) = ((var)->field.tqe_next))

#define TAILQ_FOREACH_SAFE(var, head, field, next)   \
 for ((var) = ((head)->tqh_first);    \
     (var) != TAILQ_END(head) &&     \
```

```
    ((next) = TAILQ_NEXT(var, field), 1); (var) = (next))

#define TAILQ_FOREACH_REVERSE(var, head, headname, field)  \
 for ((var) = TAILQ_LAST((head), headname);   \
    (var) != TAILQ_END(head);     \
    (var) = TAILQ_PREV((var), headname, field))

#define TAILQ_FOREACH_REVERSE_SAFE(var, head, headname, field, prev) \
 for ((var) = TAILQ_LAST((head), headname);   \
    (var) != TAILQ_END(head) &&     \
    ((prev) = TAILQ_PREV((var), headname, field), 1); (var) = (prev))

/*
* Tail queue functions.
*/
#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_TAILQ_INSERT_HEAD(head,
 elm, field)   \
 if ((head)->tqh_first &&     \
    (head)->tqh_first->field.tqe_prev != &(head)->tqh_first) \
  QUEUEDEBUG_ABORT("TAILQ_INSERT_HEAD %p %s:%d", (head), \
     __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_INSERT_TAIL(head, elm, field)   \
 if (*(head)->tqh_last != NULL)     \
  QUEUEDEBUG_ABORT("TAILQ_INSERT_TAIL %p %s:%d", (head), \
     __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_OP(elm, field)     \
 if ((elm)->field.tqe_next &&     \
    (elm)->field.tqe_next->field.tqe_prev !=   \
    &(elm)->field.tqe_next)     \
  QUEUEDEBUG_ABORT("TAILQ_* forw %p %s:%d", (elm), \
     __FILE__, __LINE__);    \
 if (*(elm)->field.tqe_prev != (elm))    \
  QUEUEDEBUG_ABORT("TAILQ_* back %p %s:%d", (elm), \
     __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_PREREMOVE(head, elm, field)   \
 if ((elm)->field.tqe_next == NULL &&    \
    (head)->tqh_last != &(elm)->field.tqe_next)   \
  QUEUEDEBUG_ABORT("TAILQ_PREREMOVE head %p elm %p %s:%d",\
     (head), (elm), __FILE__,
 __LINE__);
#define QUEUEDEBUG_TAILQ_POSTREMOVE(elm, field)    \
 (elm)->field.tqe_next = (void *)1L;    \
 (elm)->field.tqe_prev = (void *)1L;
#else
#define QUEUEDEBUG_TAILQ_INSERT_HEAD(head, elm, field)
#define QUEUEDEBUG_TAILQ_INSERT_TAIL(head, elm, field)
#define QUEUEDEBUG_TAILQ_OP(elm, field)
```

```
#define QUEUEDEBUG_TAILQ_PREREMOVE(head, elm, field)
#define QUEUEDEBUG_TAILQ_POSTREMOVE(elm, field)
#endif

#define TAILQ_INIT(head) do {      \
 (head)->tqh_first = TAILQ_END(head);    \
 (head)->tqh_last = &(head)->tqh_first;    \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_HEAD(head, elm, field) do {   \
 QUEUEDEBUG_TAILQ_INSERT_HEAD((head), (elm), field)  \
 if (((elm)->field.tqe_next = (head)->tqh_first) != TAILQ_END(head))\
  (head)->tqh_first->field.tqe_prev =   \
      &(elm)->field.tqe_next;    \
 else       \
  (head)->tqh_last = &(elm)->field.tqe_next;  \
 (head)->tqh_first = (elm);     \
 (elm)->field.tqe_prev = &(head)->tqh_first;   \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_TAIL(head,
 elm, field) do {   \
 QUEUEDEBUG_TAILQ_INSERT_TAIL((head), (elm), field)  \
 (elm)->field.tqe_next = TAILQ_END(head);   \
 (elm)->field.tqe_prev = (head)->tqh_last;   \
 *(head)->tqh_last = (elm);     \
 (head)->tqh_last = &(elm)->field.tqe_next;   \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 QUEUEDEBUG_TAILQ_OP((listelm), field)    \
 if (((elm)->field.tqe_next = (listelm)->field.tqe_next) !=  \
     TAILQ_END(head))      \
  (elm)->field.tqe_next->field.tqe_prev =   \
      &(elm)->field.tqe_next;    \
 else       \
  (head)->tqh_last = &(elm)->field.tqe_next;  \
 (listelm)->field.tqe_next = (elm);    \
 (elm)->field.tqe_prev = &(listelm)->field.tqe_next;  \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_BEFORE(listelm, elm, field) do {   \
 QUEUEDEBUG_TAILQ_OP((listelm), field)    \
 (elm)->field.tqe_prev = (listelm)->field.tqe_prev;  \
 (elm)->field.tqe_next = (listelm);    \
 *(listelm)->field.tqe_prev = (elm);    \
 (listelm)->field.tqe_prev
```

```
 = &(elm)->field.tqe_next;  \
} while (/*CONSTCOND*/0)

#define TAILQ_REMOVE(head, elm, field) do {    \
 QUEUEDEBUG_TAILQ_PREREMOVE((head), (elm), field)  \
 QUEUEDEBUG_TAILQ_OP((elm), field)    \
 if (((elm)->field.tqe_next) != TAILQ_END(head))   \
  (elm)->field.tqe_next->field.tqe_prev =   \
      (elm)->field.tqe_prev;    \
 else       \
  (head)->tqh_last = (elm)->field.tqe_prev;  \
 *(elm)->field.tqe_prev = (elm)->field.tqe_next;   \
 QUEUEDEBUG_TAILQ_POSTREMOVE((elm), field);   \
} while (/*CONSTCOND*/0)

#define TAILQ_REPLACE(head, elm, elm2, field) do {   \
       if (((elm2)->field.tqe_next = (elm)->field.tqe_next) !=  \
     TAILQ_END(head))        \
              (elm2)->field.tqe_next->field.tqe_prev =  \
                 &(elm2)->field.tqe_next;    \
       else       \
              (head)->tqh_last = &(elm2)->field.tqe_next;  \
       (elm2)->field.tqe_prev = (elm)->field.tqe_prev;   \
       *(elm2)->field.tqe_prev = (elm2);    \
 QUEUEDEBUG_TAILQ_POSTREMOVE((elm),
 field);   \
} while (/*CONSTCOND*/0)

#define TAILQ_CONCAT(head1, head2, field) do {    \
 if (!TAILQ_EMPTY(head2)) {     \
  *(head1)->tqh_last = (head2)->tqh_first;  \
  (head2)->tqh_first->field.tqe_prev = (head1)->tqh_last; \
  (head1)->tqh_last = (head2)->tqh_last;   \
  TAILQ_INIT((head2));     \
 }       \
} while (/*CONSTCOND*/0)

/*
* Singly-linked Tail queue declarations.
*/
#define STAILQ_HEAD(name, type)      \
struct name {        \
 struct type *stqh_first; /* first element */  \
 struct type **stqh_last; /* addr of last next element */ \
}

#define STAILQ_HEAD_INITIALIZER(head)     \
 { NULL, &(head).stqh_first }
```

```
#define STAILQ_ENTRY(type)      \
struct {        \
 struct type *stqe_next; /* next element */   \
}

/*
* Singly-linked Tail queue access methods.
*/
#define STAILQ_FIRST(head) ((head)->stqh_first)
#define STAILQ_END(head) NULL
#define STAILQ_NEXT(elm, field) ((elm)->field.stqe_next)
#define STAILQ_EMPTY(head) (STAILQ_FIRST(head)
 == STAILQ_END(head))

/*
* Singly-linked Tail queue functions.
*/
#define STAILQ_INIT(head) do {      \
 (head)->stqh_first = NULL;     \
 (head)->stqh_last = &(head)->stqh_first;    \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_HEAD(head, elm, field) do {   \
 if (((elm)->field.stqe_next = (head)->stqh_first) == NULL) \
  (head)->stqh_last = &(elm)->field.stqe_next;  \
 (head)->stqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_TAIL(head, elm, field) do {   \
 (elm)->field.stqe_next = NULL;     \
 *(head)->stqh_last = (elm);     \
 (head)->stqh_last = &(elm)->field.stqe_next;   \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 if (((elm)->field.stqe_next = (listelm)->field.stqe_next) == NULL)\
  (head)->stqh_last = &(elm)->field.stqe_next;  \
 (listelm)->field.stqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define STAILQ_REMOVE_HEAD(head, field) do {    \
 if (((head)->stqh_first = (head)->stqh_first->field.stqe_next)
 == NULL) \
  (head)->stqh_last = &(head)->stqh_first;   \
} while (/*CONSTCOND*/0)

#define STAILQ_REMOVE(head, elm, type, field) do {   \
```

```
 if ((head)->stqh_first == (elm)) {    \
  STAILQ_REMOVE_HEAD((head), field);   \
 } else {       \
  struct type *curelm = (head)->stqh_first;  \
  while (curelm->field.stqe_next != (elm))   \
   curelm = curelm->field.stqe_next;  \
  if ((curelm->field.stqe_next =    \
   curelm->field.stqe_next->field.stqe_next) == NULL) \
       (head)->stqh_last = &(curelm)->field.stqe_next; \
 }        \
} while (/*CONSTCOND*/0)

#define STAILQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->stqh_first);    \
  (var);       \
  (var) = ((var)->field.stqe_next))

#define STAILQ_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = STAILQ_FIRST((head));    \
     (var) && ((tvar) = STAILQ_NEXT((var), field), 1);  \
     (var) = (tvar))

#define STAILQ_CONCAT(head1, head2) do {    \
 if (!STAILQ_EMPTY((head2))) {     \
  *(head1)->stqh_last
 = (head2)->stqh_first;  \
  (head1)->stqh_last = (head2)->stqh_last;  \
  STAILQ_INIT((head2));     \
 }        \
} while (/*CONSTCOND*/0)

#define STAILQ_LAST(head, type, field)     \
 (STAILQ_EMPTY((head)) ?      \
  NULL :       \
        ((struct type *)(void *)    \
  ((char *)((head)->stqh_last) - offsetof(struct type, field))))


#ifndef _KERNEL
/*
* Circular queue definitions. Do not use. We still keep the macros
* for compatibility but because of pointer aliasing issues their use
* is discouraged!
*/

/*
* __launder_type():  We use this ugly hack to work around the the compiler
* noticing that two types may not alias each other and elide tests in code.
```

```
* We hit this in the CIRCLEQ macros when comparing 'struct name *' and
* 'struct type *' (see CIRCLEQ_HEAD()).  Modern compilers (such as GCC
* 4.8) declare these comparisons as always false, causing the code to
* not run as designed.
*
* This hack is only to be used for comparisons and thus can be fully const.
 * Do not use for assignment.
*
* If we ever choose to change the ABI of the CIRCLEQ macros, we could fix
* this by changing the head/tail sentinal values, but see the note above
* this one.
*/
static __inline const void * __launder_type(const void *);
static __inline const void *
__launder_type(const void *__x)
{
 __asm __volatile("" : "+r" (__x));
 return __x;
}

#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_CIRCLEQ_HEAD(head, field)    \
 if ((head)->cqh_first != CIRCLEQ_ENDC(head) &&   \
     (head)->cqh_first->field.cqe_prev != CIRCLEQ_ENDC(head)) \
  QUEUEDEBUG_ABORT("CIRCLEQ head forw %p %s:%d", (head), \
        __FILE__, __LINE__);    \
 if ((head)->cqh_last != CIRCLEQ_ENDC(head) &&   \
     (head)->cqh_last->field.cqe_next != CIRCLEQ_ENDC(head)) \
  QUEUEDEBUG_ABORT("CIRCLEQ head back %p %s:%d", (head), \
        __FILE__, __LINE__);
#define QUEUEDEBUG_CIRCLEQ_ELM(head, elm, field)   \
 if ((elm)->field.cqe_next == CIRCLEQ_ENDC(head)) {  \
  if ((head)->cqh_last != (elm))    \
   QUEUEDEBUG_ABORT("CIRCLEQ
 elm last %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 } else {       \
  if ((elm)->field.cqe_next->field.cqe_prev != (elm)) \
   QUEUEDEBUG_ABORT("CIRCLEQ elm forw %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 }        \
 if ((elm)->field.cqe_prev == CIRCLEQ_ENDC(head)) {  \
  if ((head)->cqh_first != (elm))    \
   QUEUEDEBUG_ABORT("CIRCLEQ elm first %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 } else {       \
  if ((elm)->field.cqe_prev->field.cqe_next != (elm)) \
   QUEUEDEBUG_ABORT("CIRCLEQ elm prev %p %s:%d", \
```

```
        (elm), __FILE__, __LINE__);   \
 }
#define QUEUEDEBUG_CIRCLEQ_POSTREMOVE(elm, field)   \
 (elm)->field.cqe_next = (void *)1L;    \
 (elm)->field.cqe_prev = (void *)1L;
#else
#define QUEUEDEBUG_CIRCLEQ_HEAD(head, field)
#define QUEUEDEBUG_CIRCLEQ_ELM(head, elm, field)
#define QUEUEDEBUG_CIRCLEQ_POSTREMOVE(elm, field)
#endif

#define CIRCLEQ_HEAD(name, type)     \
struct name {        \
 struct type *cqh_first;  /*
 first element */  \
 struct type *cqh_last;  /* last element */  \
}

#define CIRCLEQ_HEAD_INITIALIZER(head)     \
 { CIRCLEQ_END(&head), CIRCLEQ_END(&head) }

#define CIRCLEQ_ENTRY(type)      \
struct {        \
 struct type *cqe_next;  /* next element */  \
 struct type *cqe_prev;  /* previous element */  \
}

/*
* Circular queue functions.
*/
#define CIRCLEQ_INIT(head) do {      \
 (head)->cqh_first = CIRCLEQ_END(head);    \
 (head)->cqh_last = CIRCLEQ_END(head);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (listelm), field)  \
 (elm)->field.cqe_next = (listelm)->field.cqe_next;  \
 (elm)->field.cqe_prev = (listelm);    \
 if ((listelm)->field.cqe_next == CIRCLEQ_ENDC(head))  \
  (head)->cqh_last = (elm);    \
 else        \
  (listelm)->field.cqe_next->field.cqe_prev = (elm); \
 (listelm)->field.cqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_BEFORE(head,
```

```
 listelm, elm, field) do {  \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (listelm), field)  \
 (elm)->field.cqe_next = (listelm);    \
 (elm)->field.cqe_prev = (listelm)->field.cqe_prev;  \
 if ((listelm)->field.cqe_prev == CIRCLEQ_ENDC(head))  \
  (head)->cqh_first = (elm);    \
 else       \
  (listelm)->field.cqe_prev->field.cqe_next = (elm); \
 (listelm)->field.cqe_prev = (elm);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_HEAD(head, elm, field) do {   \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 (elm)->field.cqe_next = (head)->cqh_first;   \
 (elm)->field.cqe_prev = CIRCLEQ_END(head);   \
 if ((head)->cqh_last == CIRCLEQ_ENDC(head))   \
  (head)->cqh_last = (elm);    \
 else       \
  (head)->cqh_first->field.cqe_prev = (elm);  \
 (head)->cqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_TAIL(head, elm, field) do {   \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 (elm)->field.cqe_next
 = CIRCLEQ_END(head);   \
 (elm)->field.cqe_prev = (head)->cqh_last;   \
 if ((head)->cqh_first == CIRCLEQ_ENDC(head))   \
  (head)->cqh_first = (elm);    \
 else       \
  (head)->cqh_last->field.cqe_next = (elm);  \
 (head)->cqh_last = (elm);     \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_REMOVE(head, elm, field) do {    \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (elm), field)   \
 if ((elm)->field.cqe_next == CIRCLEQ_ENDC(head))  \
  (head)->cqh_last = (elm)->field.cqe_prev;  \
 else       \
  (elm)->field.cqe_next->field.cqe_prev =   \
     (elm)->field.cqe_prev;    \
 if ((elm)->field.cqe_prev == CIRCLEQ_ENDC(head))  \
  (head)->cqh_first = (elm)->field.cqe_next;  \
 else       \
  (elm)->field.cqe_prev->field.cqe_next =   \
     (elm)->field.cqe_next;    \
```

```
 QUEUEDEBUG_CIRCLEQ_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->cqh_first);    \
  (var) != CIRCLEQ_ENDC(head);    \
  (var)
 = ((var)->field.cqe_next))

#define CIRCLEQ_FOREACH_REVERSE(var, head, field)   \
 for ((var) = ((head)->cqh_last);    \
  (var) != CIRCLEQ_ENDC(head);    \
  (var) = ((var)->field.cqe_prev))

/*
* Circular queue access methods.
*/
#define CIRCLEQ_FIRST(head)  ((head)->cqh_first)
#define CIRCLEQ_LAST(head)  ((head)->cqh_last)
/* For comparisons */
#define CIRCLEQ_ENDC(head)  (__launder_type(head))
/* For assignments */
#define CIRCLEQ_END(head)  ((void *)(head))
#define CIRCLEQ_NEXT(elm, field) ((elm)->field.cqe_next)
#define CIRCLEQ_PREV(elm, field) ((elm)->field.cqe_prev)
#define CIRCLEQ_EMPTY(head)      \
   (CIRCLEQ_FIRST(head) == CIRCLEQ_ENDC(head))

#define CIRCLEQ_LOOP_NEXT(head, elm, field)    \
 (((elm)->field.cqe_next == CIRCLEQ_ENDC(head))   \
     ? ((head)->cqh_first)     \
     : (elm->field.cqe_next))
#define CIRCLEQ_LOOP_PREV(head, elm, field)    \
 (((elm)->field.cqe_prev == CIRCLEQ_ENDC(head))   \
     ? ((head)->cqh_last)     \
     :
 (elm->field.cqe_prev))
#endif /* !_KERNEL */

#endif /* !_SYS_QUEUE_H_ */
# Contributor: Fabian Affolter <fabian@affolter-engineering.ch>
# Maintainer: Fabian Affolter <fabian@affolter-engineering.ch>
pkgname=py3-flake8-copyright
_pkgname=flake8-copyright
pkgver=0.2.4
pkgrel=3
pkgdesc="Extension for flake8 which checks for copyrights"
options="!check" # No testsuite
```

```
url="https://github.com/savoirfairelinux/flake8-copyright"
arch="noarch"
license="MIT"
depends="py3-flake8 py3-setuptools"
makedepends="py3-gpep517 py3-wheel"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/${_pkgname:0:1}/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir"/$_pkgname-$pkgver

replaces="py-flake8-copyright"                  # Backwards compatibility
provides="py-flake8-copyright=$pkgver-r$pkgrel" # Backwards compatibility

build() {
 gpep517 build-wheel \
  --wheel-dir .dist \
  --output-fd 3 3>&1 >&2
}

package() {
 gpep517 install-wheel --destdir "$pkgdir" \
  .dist/*.whl
}

sha512sums="
a6ab47e1bb715618f075c51f398e18180404871b3b0faf1c2d30701d5203db6bc23771bf22ffb5bafcd8ee856b9b64237
b316bd503ae7dceed6ca284ccd5a74d
  flake8-copyright-0.2.4.tar.gz
"
```

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```
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/* $NetBSD: tree.h,v 1.20 2013/09/14 13:20:45 joerg Exp $ */
/* $OpenBSD: tree.h,v 1.13 2011/07/09 00:19:45 pirofti Exp $ */
/* Modified by Void Linux. */
/*
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*/

#ifndef _SYS_TREE_H_
#define _SYS_TREE_H_

#ifdef __GNUC__
#define __GNUC_PREREQ__(x, y)      \
 ((__GNUC__ == (x) && __GNUC_MINOR__ >= (y)) ||   \
  (__GNUC__ > (x)))
#else
#define __GNUC_PREREQ__(x, y) 0
#endif

#if __GNUC_PREREQ__(2, 7) || defined(__lint__)
#define _sys_tree_h_unused __attribute__((__unused__))
#else
#define _sys_tree_h_unused /* delete */
#endif
```

```
/*
* This file defines data structures for different types of trees:
* splay trees and red-black trees.
*
* A splay tree is a self-organizing
 data structure.  Every operation
* on the tree causes a splay to happen.  The splay moves the requested
* node to the root of the tree and partly rebalances it.
*
* This has the benefit that request locality causes faster lookups as
* the requested nodes move to the top of the tree.  On the other hand,
* every lookup causes memory writes.
*
* The Balance Theorem bounds the total access time for m operations
* and n inserts on an initially empty tree as O((m + n)lg n).  The
* amortized cost for a sequence of m accesses to a splay tree is O(lg n);
*
* A red-black tree is a binary search tree with the node color as an
* extra attribute.  It fulfills a set of conditions:
* - every search path from the root to a leaf consists of the
*   same number of black nodes,
* - each red node (except for the root) has a black parent,
* - each leaf node is black.
*
* Every operation on a red-black tree is bounded as O(lg n).
* The maximum height of a red-black tree is 2lg (n+1).
 */

#define SPLAY_HEAD(name, type)      \
struct name {        \
 struct type *sph_root; /* root of the tree */   \
}

#define SPLAY_INITIALIZER(root)      \
 { NULL }

#define SPLAY_INIT(root) do {      \
 (root)->sph_root = NULL;     \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ENTRY(type)      \
struct {        \
 struct type *spe_left; /* left element */   \
 struct type *spe_right; /* right element */   \
}

#define SPLAY_LEFT(elm, field)  (elm)->field.spe_left
```

```
#define SPLAY_RIGHT(elm, field)  (elm)->field.spe_right
#define SPLAY_ROOT(head)  (head)->sph_root
#define SPLAY_EMPTY(head)  (SPLAY_ROOT(head) == NULL)

/* SPLAY_ROTATE_{LEFT,RIGHT} expect that tmp hold SPLAY_{RIGHT,LEFT} */
#define SPLAY_ROTATE_RIGHT(head, tmp, field) do {   \
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(tmp, field); \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;      \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ROTATE_LEFT(head, tmp, field) do {   \
 SPLAY_RIGHT((head)->sph_root,
 field) = SPLAY_LEFT(tmp, field); \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;      \
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKLEFT(head, tmp, field) do {    \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;      \
 (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);  \
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKRIGHT(head, tmp, field) do {    \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;      \
 (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field); \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ASSEMBLE(head, node, left, right, field) do {  \
 SPLAY_RIGHT(left, field) = SPLAY_LEFT((head)->sph_root, field); \
 SPLAY_LEFT(right, field) = SPLAY_RIGHT((head)->sph_root, field);\
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(node, field); \
 SPLAY_RIGHT((head)->sph_root, field) = SPLAY_LEFT(node, field); \
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */

#define
 SPLAY_PROTOTYPE(name, type, field, cmp)    \
void name##_SPLAY(struct name *, struct type *);   \
void name##_SPLAY_MINMAX(struct name *, int);    \
struct type *name##_SPLAY_INSERT(struct name *, struct type *);  \
struct type *name##_SPLAY_REMOVE(struct name *, struct type *);  \
        \
/* Finds the node with the same key as elm */    \
static __inline struct type *      \
```

```
name##_SPLAY_FIND(struct name *head, struct type *elm)   \
{        \
 if (SPLAY_EMPTY(head))      \
  return(NULL);      \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0)    \
  return (head->sph_root);    \
 return (NULL);       \
}        \
        \
static __inline _sys_tree_h_unused struct type *   \
name##_SPLAY_NEXT(struct name *head, struct type *elm)   \
{        \
 name##_SPLAY(head, elm);     \
 if (SPLAY_RIGHT(elm, field) != NULL) {    \
  elm = SPLAY_RIGHT(elm, field);    \
  while (SPLAY_LEFT(elm, field) != NULL) {  \
   elm = SPLAY_LEFT(elm, field);   \
  }       \
 }
 else       \
  elm = NULL;      \
 return (elm);       \
}        \
        \
static _sys_tree_h_unused __inline struct type *   \
name##_SPLAY_MIN_MAX(struct name *head, int val)   \
{        \
 name##_SPLAY_MINMAX(head, val);     \
      return (SPLAY_ROOT(head));     \
}

/* Main splay operation.
* Moves node close to the key of elm to top
*/
#define SPLAY_GENERATE(name, type, field, cmp)    \
struct type *       \
name##_SPLAY_INSERT(struct name *head, struct type *elm)  \
{        \
   if (SPLAY_EMPTY(head)) {      \
     SPLAY_LEFT(elm, field) = SPLAY_RIGHT(elm, field) = NULL; \
   } else {       \
     int __comp;       \
     name##_SPLAY(head, elm);     \
     __comp = (cmp)(elm, (head)->sph_root);   \
     if(__comp < 0) {      \
      SPLAY_LEFT(elm, field) = SPLAY_LEFT((head)->sph_root, field);\
      SPLAY_RIGHT(elm, field) = (head)->sph_root;  \
```

```
      SPLAY_LEFT((head)->sph_root, field) = NULL;  \
     } else if (__comp > 0) {     \
      SPLAY_RIGHT(elm,
 field) = SPLAY_RIGHT((head)->sph_root, field);\
      SPLAY_LEFT(elm, field) = (head)->sph_root;  \
      SPLAY_RIGHT((head)->sph_root, field) = NULL; \
     } else       \
      return ((head)->sph_root);    \
   }         \
   (head)->sph_root = (elm);      \
   return (NULL);       \
}         \
         \
struct type *        \
name##_SPLAY_REMOVE(struct name *head, struct type *elm)  \
{         \
 struct type *__tmp;      \
 if (SPLAY_EMPTY(head))      \
  return (NULL);      \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0) {   \
  if (SPLAY_LEFT((head)->sph_root, field) == NULL) { \
   (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field);\
  } else {      \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);\
   name##_SPLAY(head, elm);   \
   SPLAY_RIGHT((head)->sph_root, field) = __tmp; \
  }       \
  return (elm);      \
 }        \
 return (NULL);       \
}         \
         \
void         \
name##_SPLAY(struct
 name *head, struct type *elm)   \
{         \
 struct type __node, *__left, *__right, *__tmp;   \
 int __comp;       \
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
 __left = __right = &__node;     \
\
 while ((__comp = (cmp)(elm, (head)->sph_root)) != 0) {  \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
```

```
    break;     \
   if ((cmp)(elm, __tmp) < 0){   \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKLEFT(head, __right, field);  \
  } else if (__comp > 0) {    \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if ((cmp)(elm, __tmp) > 0){   \
    SPLAY_ROTATE_LEFT(head, __tmp, field); \
    if (SPLAY_RIGHT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKRIGHT(head, __left, field);  \
  }       \
 }        \
 SPLAY_ASSEMBLE(head,
 &__node, __left, __right, field);  \
}         \
         \
/* Splay with either the minimum or the maximum element   \
* Used to find minimum or maximum element in tree.   \
*/         \
void name##_SPLAY_MINMAX(struct name *head, int __comp) \
{         \
 struct type __node, *__left, *__right, *__tmp;   \
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
 __left = __right = &__node;     \
\
 while (1) {       \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if (__comp < 0){    \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKLEFT(head, __right, field);  \
  } else if (__comp > 0) {    \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
```

```
  if (__comp > 0) {    \
   SPLAY_ROTATE_LEFT(head, __tmp, field); \
   if (SPLAY_RIGHT((head)->sph_root,
 field) == NULL)\
    break;    \
  }      \
  SPLAY_LINKRIGHT(head, __left, field);  \
 }       \
}        \
SPLAY_ASSEMBLE(head, &__node, __left, __right, field);  \
}

#define SPLAY_NEGINF -1
#define SPLAY_INF 1

#define SPLAY_INSERT(name, x, y) name##_SPLAY_INSERT(x, y)
#define SPLAY_REMOVE(name, x, y) name##_SPLAY_REMOVE(x, y)
#define SPLAY_FIND(name, x, y)  name##_SPLAY_FIND(x, y)
#define SPLAY_NEXT(name, x, y)  name##_SPLAY_NEXT(x, y)
#define SPLAY_MIN(name, x)  (SPLAY_EMPTY(x) ? NULL \
    : name##_SPLAY_MIN_MAX(x, SPLAY_NEGINF))
#define SPLAY_MAX(name, x)  (SPLAY_EMPTY(x) ? NULL \
    : name##_SPLAY_MIN_MAX(x, SPLAY_INF))

#define SPLAY_FOREACH(x, name, head)     \
 for ((x) = SPLAY_MIN(name, head);    \
     (x) != NULL;      \
     (x) = SPLAY_NEXT(name, head, x))

/* Macros that define a red-black tree */
#define RB_HEAD(name, type)      \
struct name {        \
 struct type *rbh_root; /* root of the tree */   \
}

#define RB_INITIALIZER(root)      \
 {
 NULL }

#define RB_INIT(root) do {      \
 (root)->rbh_root = NULL;     \
} while (/*CONSTCOND*/ 0)

#define RB_BLACK 0
#define RB_RED  1
#define RB_ENTRY(type)       \
struct {        \
 struct type *rbe_left;  /* left element */  \
```

```
 struct type *rbe_right;  /* right element */  \
 struct type *rbe_parent; /* parent element */  \
 int rbe_color;   /* node color */  \
}

#define RB_LEFT(elm, field)  (elm)->field.rbe_left
#define RB_RIGHT(elm, field)  (elm)->field.rbe_right
#define RB_PARENT(elm, field)  (elm)->field.rbe_parent
#define RB_COLOR(elm, field)  (elm)->field.rbe_color
#define RB_ROOT(head)   (head)->rbh_root
#define RB_EMPTY(head)   (RB_ROOT(head) == NULL)

#define RB_SET(elm, parent, field) do {     \
 RB_PARENT(elm, field) = parent;     \
 RB_LEFT(elm, field) = RB_RIGHT(elm, field) = NULL;  \
 RB_COLOR(elm, field) = RB_RED;     \
} while (/*CONSTCOND*/ 0)

#define RB_SET_BLACKRED(black, red, field) do {    \
 RB_COLOR(black, field) = RB_BLACK;    \
 RB_COLOR(red, field)
 = RB_RED;     \
} while (/*CONSTCOND*/ 0)

#ifndef RB_AUGMENT
#define RB_AUGMENT(x) do {} while (/*CONSTCOND*/ 0)
#endif

#define RB_ROTATE_LEFT(head, elm, tmp, field) do {   \
 (tmp) = RB_RIGHT(elm, field);     \
 if ((RB_RIGHT(elm, field) = RB_LEFT(tmp, field)) != NULL) { \
  RB_PARENT(RB_LEFT(tmp, field), field) = (elm);  \
 }       \
 RB_AUGMENT(elm);      \
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
   RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
  else      \
   RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else       \
  (head)->rbh_root = (tmp);    \
 RB_LEFT(tmp, field) = (elm);     \
 RB_PARENT(elm, field) = (tmp);     \
 RB_AUGMENT(tmp);      \
 if ((RB_PARENT(tmp, field)))     \
  RB_AUGMENT(RB_PARENT(tmp, field));   \
} while (/*CONSTCOND*/ 0)
```

```
#define RB_ROTATE_RIGHT(head, elm, tmp, field) do {   \
 (tmp) = RB_LEFT(elm, field);     \
 if ((RB_LEFT(elm, field) = RB_RIGHT(tmp, field))
 != NULL) { \
  RB_PARENT(RB_RIGHT(tmp, field), field) = (elm);  \
 }        \
 RB_AUGMENT(elm);      \
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
   RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
  else       \
   RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else        \
  (head)->rbh_root = (tmp);    \
 RB_RIGHT(tmp, field) = (elm);     \
 RB_PARENT(elm, field) = (tmp);     \
 RB_AUGMENT(tmp);      \
 if ((RB_PARENT(tmp, field)))     \
  RB_AUGMENT(RB_PARENT(tmp, field));   \
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */
#define RB_PROTOTYPE(name, type, field, cmp)    \
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp,)
#define RB_PROTOTYPE_STATIC(name, type, field, cmp)   \
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_PROTOTYPE_INTERNAL(name, type, field, cmp, attr)  \
attr void name##_RB_INSERT_COLOR(struct name *, struct
 type *);  \
attr void name##_RB_REMOVE_COLOR(struct name *, struct type *, struct type *);\
attr struct type *name##_RB_REMOVE(struct name *, struct type *); \
attr struct type *name##_RB_INSERT(struct name *, struct type *); \
attr struct type *name##_RB_FIND(struct name *, struct type *);  \
attr struct type *name##_RB_NFIND(struct name *, struct type *); \
attr struct type *name##_RB_NEXT(struct type *);   \
attr struct type *name##_RB_PREV(struct type *);   \
attr struct type *name##_RB_MINMAX(struct name *, int);   \
         \

/* Main rb operation.
* Moves node close to the key of elm to top
*/
#define RB_GENERATE(name, type, field, cmp)    \
 RB_GENERATE_INTERNAL(name, type, field, cmp,)
#define RB_GENERATE_STATIC(name, type, field, cmp)   \
 RB_GENERATE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_GENERATE_INTERNAL(name, type, field, cmp, attr)  \
attr void        \
```

```
name##_RB_INSERT_COLOR(struct name *head, struct type *elm)  \
{        \
 struct type
 *parent, *gparent, *tmp;    \
 while ((parent = RB_PARENT(elm, field)) != NULL &&  \
     RB_COLOR(parent, field) == RB_RED) {   \
  gparent = RB_PARENT(parent, field);   \
  if (parent == RB_LEFT(gparent, field)) {  \
   tmp = RB_RIGHT(gparent, field);   \
   if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
    RB_COLOR(tmp, field) = RB_BLACK; \
    RB_SET_BLACKRED(parent, gparent, field);\
    elm = gparent;    \
    continue;    \
   }      \
   if (RB_RIGHT(parent, field) == elm) {  \
    RB_ROTATE_LEFT(head, parent, tmp, field);\
    tmp = parent;    \
    parent = elm;    \
    elm = tmp;    \
   }      \
   RB_SET_BLACKRED(parent, gparent, field); \
   RB_ROTATE_RIGHT(head, gparent, tmp, field); \
  } else {      \
   tmp = RB_LEFT(gparent, field);   \
   if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
    RB_COLOR(tmp, field) = RB_BLACK; \
    RB_SET_BLACKRED(parent, gparent, field);\
    elm = gparent;    \
    continue;    \
   }      \
   if (RB_LEFT(parent, field) == elm)
  {  \
    RB_ROTATE_RIGHT(head, parent, tmp, field);\
    tmp = parent;    \
    parent = elm;    \
    elm = tmp;    \
   }      \
   RB_SET_BLACKRED(parent, gparent, field); \
   RB_ROTATE_LEFT(head, gparent, tmp, field); \
  }       \
 }        \
 RB_COLOR(head->rbh_root, field) = RB_BLACK;   \
}        \
         \
attr void        \
name##_RB_REMOVE_COLOR(struct name *head, struct type *parent, struct type *elm) \
{        \
```

```
struct type *tmp;      \
while ((elm == NULL || RB_COLOR(elm, field) == RB_BLACK) && \
    elm != RB_ROOT(head)) {     \
 if (RB_LEFT(parent, field) == elm) {   \
  tmp = RB_RIGHT(parent, field);   \
  if (RB_COLOR(tmp, field) == RB_RED) {  \
   RB_SET_BLACKRED(tmp, parent, field); \
   RB_ROTATE_LEFT(head, parent, tmp, field);\
   tmp = RB_RIGHT(parent, field);  \
  }      \
  if ((RB_LEFT(tmp, field) == NULL ||  \
      RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
      (RB_RIGHT(tmp, field) == NULL ||  \
      RB_COLOR(RB_RIGHT(tmp,
field), field) == RB_BLACK)) {\
   RB_COLOR(tmp, field) = RB_RED;  \
   elm = parent;    \
   parent = RB_PARENT(elm, field);  \
  } else {     \
   if (RB_RIGHT(tmp, field) == NULL || \
       RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK) {\
    struct type *oleft;  \
    if ((oleft = RB_LEFT(tmp, field)) \
        != NULL)   \
     RB_COLOR(oleft, field) = RB_BLACK;\
    RB_COLOR(tmp, field) = RB_RED; \
    RB_ROTATE_RIGHT(head, tmp, oleft, field);\
    tmp = RB_RIGHT(parent, field); \
   }     \
   RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
   RB_COLOR(parent, field) = RB_BLACK; \
   if (RB_RIGHT(tmp, field))  \
    RB_COLOR(RB_RIGHT(tmp, field), field) = RB_BLACK;\
   RB_ROTATE_LEFT(head, parent, tmp, field);\
   elm = RB_ROOT(head);   \
   break;     \
  }      \
 } else {      \
  tmp = RB_LEFT(parent, field);   \
  if (RB_COLOR(tmp, field) == RB_RED) {  \
   RB_SET_BLACKRED(tmp, parent, field); \
   RB_ROTATE_RIGHT(head, parent, tmp, field);\
   tmp
= RB_LEFT(parent, field);  \
  }      \
  if ((RB_LEFT(tmp, field) == NULL ||  \
      RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
      (RB_RIGHT(tmp, field) == NULL ||  \
```

```
      RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK)) {\
    RB_COLOR(tmp, field) = RB_RED;  \
    elm = parent;    \
    parent = RB_PARENT(elm, field);  \
   } else {     \
    if (RB_LEFT(tmp, field) == NULL || \
        RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) {\
     struct type *oright;  \
     if ((oright = RB_RIGHT(tmp, field)) \
         != NULL)   \
      RB_COLOR(oright, field) = RB_BLACK;\
     RB_COLOR(tmp, field) = RB_RED; \
     RB_ROTATE_LEFT(head, tmp, oright, field);\
     tmp = RB_LEFT(parent, field); \
    }     \
    RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
    RB_COLOR(parent, field) = RB_BLACK; \
    if (RB_LEFT(tmp, field))  \
     RB_COLOR(RB_LEFT(tmp, field), field) = RB_BLACK;\
    RB_ROTATE_RIGHT(head, parent, tmp, field);\
    elm = RB_ROOT(head);   \
    break;     \
   }      \
  }       \
 }        \
 if
 (elm)       \
  RB_COLOR(elm, field) = RB_BLACK;   \
}         \
         \
attr struct type *       \
name##_RB_REMOVE(struct name *head, struct type *elm)   \
{         \
 struct type *child, *parent, *old = elm;   \
 int color;       \
 if (RB_LEFT(elm, field) == NULL)    \
  child = RB_RIGHT(elm, field);    \
 else if (RB_RIGHT(elm, field) == NULL)    \
  child = RB_LEFT(elm, field);    \
 else {        \
  struct type *left;     \
  elm = RB_RIGHT(elm, field);    \
  while ((left = RB_LEFT(elm, field)) != NULL)  \
   elm = left;     \
  child = RB_RIGHT(elm, field);    \
  parent = RB_PARENT(elm, field);    \
  color = RB_COLOR(elm, field);    \
  if (child)      \
```

```
  RB_PARENT(child, field) = parent;  \
 if (parent) {      \
  if (RB_LEFT(parent, field) == elm)  \
   RB_LEFT(parent, field) = child;  \
  else      \
   RB_RIGHT(parent, field) = child; \
  RB_AUGMENT(parent);    \
 } else       \
  RB_ROOT(head)
= child;    \
 if (RB_PARENT(elm, field) == old)   \
  parent = elm;     \
 (elm)->field = (old)->field;    \
 if (RB_PARENT(old, field)) {    \
  if (RB_LEFT(RB_PARENT(old, field), field) == old)\
   RB_LEFT(RB_PARENT(old, field), field) = elm;\
  else      \
   RB_RIGHT(RB_PARENT(old, field), field) = elm;\
  RB_AUGMENT(RB_PARENT(old, field));  \
 } else       \
  RB_ROOT(head) = elm;    \
 RB_PARENT(RB_LEFT(old, field), field) = elm;  \
 if (RB_RIGHT(old, field))    \
  RB_PARENT(RB_RIGHT(old, field), field) = elm; \
 if (parent) {      \
  left = parent;     \
  do {      \
   RB_AUGMENT(left);   \
  } while ((left = RB_PARENT(left, field)) != NULL); \
 }       \
 goto color;      \
}        \
parent = RB_PARENT(elm, field);     \
color = RB_COLOR(elm, field);     \
if (child)       \
 RB_PARENT(child, field) = parent;   \
if (parent) {       \
 if (RB_LEFT(parent, field) == elm)   \
  RB_LEFT(parent, field) = child;   \
 else       \
  RB_RIGHT(parent,
field) = child;  \
 RB_AUGMENT(parent);     \
} else        \
 RB_ROOT(head) = child;     \
color:         \
if (color == RB_BLACK)      \
 name##_RB_REMOVE_COLOR(head, parent, child);  \
```

```
 return (old);       \
}         \
         \
/* Inserts a node into the RB tree */     \
attr struct type *       \
name##_RB_INSERT(struct name *head, struct type *elm)   \
{         \
 struct type *tmp;      \
 struct type *parent = NULL;     \
 int comp = 0;       \
 tmp = RB_ROOT(head);      \
 while (tmp) {       \
  parent = tmp;      \
  comp = (cmp)(elm, parent);    \
  if (comp < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else if (comp > 0)     \
   tmp = RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }        \
 RB_SET(elm, parent, field);     \
 if (parent != NULL) {      \
  if (comp < 0)      \
   RB_LEFT(parent, field) = elm;   \
  else       \
   RB_RIGHT(parent, field) = elm;   \
  RB_AUGMENT(parent);     \
 } else        \
  RB_ROOT(head) = elm;     \
 name##_RB_INSERT_COLOR(head,
 elm);    \
 return (NULL);       \
}         \
         \
/* Finds the node with the same key as elm */    \
attr struct type *       \
name##_RB_FIND(struct name *head, struct type *elm)   \
{         \
 struct type *tmp = RB_ROOT(head);    \
 int comp;       \
 while (tmp) {       \
  comp = cmp(elm, tmp);     \
  if (comp < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else if (comp > 0)     \
   tmp = RB_RIGHT(tmp, field);   \
  else       \
```

```
  return (tmp);     \
 }        \
 return (NULL);       \
}         \
         \
/* Finds the first node greater than or equal to the search key */ \
attr struct type *       \
name##_RB_NFIND(struct name *head, struct type *elm)   \
{         \
 struct type *tmp = RB_ROOT(head);    \
 struct type *res = NULL;     \
 int comp;       \
 while (tmp) {       \
  comp = cmp(elm, tmp);     \
  if (comp < 0) {      \
   res = tmp;     \
   tmp = RB_LEFT(tmp, field);   \
  }       \
  else if (comp > 0)     \
   tmp =
 RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }        \
 return (res);       \
}         \
         \
/* ARGSUSED */        \
attr struct type *       \
name##_RB_NEXT(struct type *elm)     \
{         \
 if (RB_RIGHT(elm, field)) {     \
  elm = RB_RIGHT(elm, field);    \
  while (RB_LEFT(elm, field))    \
   elm = RB_LEFT(elm, field);   \
 } else {       \
  if (RB_PARENT(elm, field) &&    \
      (elm == RB_LEFT(RB_PARENT(elm, field), field))) \
   elm = RB_PARENT(elm, field);   \
  else {       \
   while (RB_PARENT(elm, field) &&   \
       (elm == RB_RIGHT(RB_PARENT(elm, field), field)))\
    elm = RB_PARENT(elm, field);  \
   elm = RB_PARENT(elm, field);   \
  }       \
 }        \
 return (elm);       \
}         \
```

```
        \
/* ARGSUSED */        \
attr struct type *       \
name##_RB_PREV(struct type *elm)     \
{         \
 if (RB_LEFT(elm, field)) {     \
  elm = RB_LEFT(elm, field);    \
  while (RB_RIGHT(elm, field))    \
   elm = RB_RIGHT(elm, field);   \
 }
 else {       \
  if (RB_PARENT(elm, field) &&    \
      (elm == RB_RIGHT(RB_PARENT(elm, field), field))) \
   elm = RB_PARENT(elm, field);   \
  else {       \
   while (RB_PARENT(elm, field) &&   \
       (elm == RB_LEFT(RB_PARENT(elm, field), field)))\
    elm = RB_PARENT(elm, field);  \
   elm = RB_PARENT(elm, field);   \
  }       \
 }        \
 return (elm);       \
}         \
        \
attr struct type *       \
name##_RB_MINMAX(struct name *head, int val)    \
{         \
 struct type *tmp = RB_ROOT(head);    \
 struct type *parent = NULL;     \
 while (tmp) {       \
  parent = tmp;      \
  if (val < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else       \
   tmp = RB_RIGHT(tmp, field);   \
 }        \
 return (parent);      \
}

#define RB_NEGINF -1
#define RB_INF 1

#define RB_INSERT(name, x, y) name##_RB_INSERT(x, y)
#define RB_REMOVE(name, x, y) name##_RB_REMOVE(x, y)
#define RB_FIND(name, x, y) name##_RB_FIND(x, y)
#define RB_NFIND(name, x, y) name##_RB_NFIND(x,
 y)
#define RB_NEXT(name, x, y) name##_RB_NEXT(y)
```

```
#define RB_PREV(name, x, y) name##_RB_PREV(y)
#define RB_MIN(name, x)  name##_RB_MINMAX(x, RB_NEGINF)
#define RB_MAX(name, x)  name##_RB_MINMAX(x, RB_INF)

#define RB_FOREACH(x, name, head)     \
 for ((x) = RB_MIN(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_NEXT(x))

#define RB_FOREACH_FROM(x, name, y)     \
 for ((x) = (y);       \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_SAFE(x, name, head, y)    \
 for ((x) = RB_MIN(name, head);     \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_REVERSE(x, name, head)    \
 for ((x) = RB_MAX(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_PREV(x))

#define RB_FOREACH_REVERSE_FROM(x, name, y)    \
 for ((x) = (y);       \
     ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_REVERSE_SAFE(x, name,
 head, y)   \
 for ((x) = RB_MAX(name, head);     \
     ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
      (x) = (y))

#endif /* _SYS_TREE_H_ */
# Contributor: Wen Heping <wenhepingalpine@sohu.com>
# Maintainer: Wen Heping <wenhepingalpine@sohu.com>
pkgname=perl-software-license
pkgver=0.104007
pkgrel=0
# _pkgreal is used by apkbuild-cpan to find modules at MetaCpan
_pkgreal=Software-License
pkgdesc="packages that provide templated software licenses"
url="https://metacpan.org/release/Software-License/"
arch="noarch"
license="GPL-1.0-or-later OR Artistic-1.0-Perl"
depends="perl perl-data-section perl-text-template"
```

```
checkdepends="perl-try-tiny"
subpackages="$pkgname-doc"
source="https://cpan.metacpan.org/authors/id/L/LE/LEONT/Software-License-$pkgver.tar.gz"
builddir="$srcdir/$_pkgreal-$pkgver"

build() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 PERL_MM_USE_DEFAULT=1 perl -I. Makefile.PL \
  INSTALLDIRS=vendor \
  NO_PACKLIST=1 \
  NO_PERLLOCAL=1
 make
}

check() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 make test
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="
12d75e9583b3013d9b4a282467f1ac80ab6b7f3251926d66591d01404489b528f22adc396dfd4528a0f0ca650f0eed6d
9c959e69eace2169c6ed1cfffe5277e4
  Software-License-0.104007.tar.gz
"
```

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SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.
# Contributor: Dhruvin Gandhi <contact@dhru.vin>
# Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=py3-license-expression
_pkgname=license_expression
pkgver=30.4.4
pkgrel=0
pkgdesc="Library to parse, compare, simplify and normalize license expressions"
url="https://github.com/nexB/license-expression"
arch="noarch"
license="Apache-2.0"
depends="python3 py3-boolean.py"
makedepends="py3-setuptools py3-setuptools_scm py3-gpep517 py3-wheel"
checkdepends="py3-pytest py3-pytest-xdist"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/l/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir/$_pkgname-$pkgver"

build() {
 gpep517 build-wheel \
  --wheel-dir .dist \
  --output-fd 3 3>&1 >&2
}

check() {
 python3 -m venv --clear --without-pip --system-site-packages .testenv
 .testenv/bin/python3 -m installer .dist/*.whl
 .testenv/bin/python3 -m pytest
}

package() {
 python3 -m installer -d "$pkgdir" \
  .dist/*.whl
}

sha512sums="
f46dd4cf524b3962115fe26f5545bfdd6767275b482724af51e7ca07da79244969a3bfc5d2fd5b95bc0f19d1b95a26a8f3
ab36c676e56ec302178d7166588066
  license_expression-30.4.4.tar.gz
"
```

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Version 2, June 1991

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Specification: {doctitle}

Version: {revnumber}

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Status: {revremark}
endif::[]
ifeval::["{revremark}" == ""]
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Manifest-Version: 1.0
Bundle-Description: An artifact of well-specified annotations to power
static analysis checks and JVM language interop.
Bundle-DocURL: https://jspecify.dev/docs/start-here
Bundle-License: https://www.apache.org/licenses/LICENSE-2.0

Bundle-ManifestVersion: 2
Bundle-Name: JSpecify annotations
Bundle-SymbolicName: org.jspecify.jspecify
Bundle-Vendor: The JSpecify Authors
Bundle-Version: 1.0.0
Export-Package: org.jspecify.annotations;version="1.0.0"
Implementation-Version: 1.0.0
Import-Package: java.lang,java.lang.annotation
Multi-Release: true
Require-Capability: osgi.ee;filter:="(&(osgi.ee=JavaSE)(version=1.8))"

Found in path(s):
* /jspecify-1-0-0-2-jar/META-INF/MANIFEST.MF

# 1.2882 cyrus-sasl 2.1.28-r46

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* Rob Earhart
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validate-npm-package-license
==========

Give me a string and I'll tell you if it's a valid npm package license string.

```javascript
var valid = require('validate-npm-package-license');
```

SPDX license identifiers are valid license strings:

```javascript

var assert = require('assert');
var validSPDXExpression = {
 validForNewPackages: true,
 validForOldPackages: true,
 spdx: true
};

assert.deepEqual(valid('MIT'), validSPDXExpression);
assert.deepEqual(valid('BSD-2-Clause'), validSPDXExpression);
assert.deepEqual(valid('Apache-2.0'), validSPDXExpression);
assert.deepEqual(valid('ISC'), validSPDXExpression);
```

The function will return a warning and suggestion for nearly-correct license identifiers:

```javascript
assert.deepEqual(
 valid('Apache 2.0'),
 {
   validForOldPackages: false,
   validForNewPackages: false,
   warnings: [
     'license should be ' +
     'a valid SPDX license expression (without "LicenseRef"), ' +
     '"UNLICENSED", or ' +
      '"SEE LICENSE IN <filename>"',
     'license is similar to the valid expression "Apache-2.0"'
   ]
 }
);
```

SPDX expressions are valid, too ...

```javascript
// Simple SPDX license expression for dual licensing
assert.deepEqual(
 valid('(GPL-3.0-only OR BSD-2-Clause)'),
 validSPDXExpression
```

```
);
```

... except if they contain `LicenseRef`:

```javascript
var warningAboutLicenseRef = {
 validForOldPackages: false,
 validForNewPackages: false,
 spdx: true,
 warnings: [
   'license should be ' +
   'a valid SPDX license expression (without "LicenseRef"), ' +
   '"UNLICENSED", or ' +
   '"SEE LICENSE IN <filename>"',
 ]
};

assert.deepEqual(
 valid('LicenseRef-Made-Up'),
 warningAboutLicenseRef
);

assert.deepEqual(
 valid('(MIT OR LicenseRef-Made-Up)'),
 warningAboutLicenseRef
);
```

If you can't describe your licensing terms with standardized SPDX identifiers, put the terms in a file in the package and point users there:

```javascript
assert.deepEqual(
 valid('SEE
 LICENSE IN LICENSE.txt'),
 {
   validForNewPackages: true,
   validForOldPackages: true,
   inFile: 'LICENSE.txt'
 }
);

assert.deepEqual(
 valid('SEE LICENSE IN license.md'),
 {
   validForNewPackages: true,
   validForOldPackages: true,
```

```
  inFile: 'license.md'
 }
);
```

If there aren't any licensing terms, use `UNLICENSED`:

```javascript
var unlicensed = {
 validForNewPackages: true,
 validForOldPackages: true,
 unlicensed: true
};
assert.deepEqual(valid('UNLICENSED'), unlicensed);
assert.deepEqual(valid('UNLICENCED'), unlicensed);
```

# 1.2894 just-diff 6.0.2

## 1.2894.1 Available under license :

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# 1.2895 go-difflib 1.0.1-0.20181226105442-5d4384ee4fb2

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# 1.2896 match 1.1.1

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# 1.2897 util-linux 1:2.39.3-9ubuntu6.2

## 1.2897.1 Available under license :

NR START END SECTORS SIZE NAME UUID
1 32 7679 7648 3.7M 8f8378c0-01
2 7680 16383 8704 4.3M 8f8378c0-02
5 7936 12799 4864 2.4M
6 12544 16127 3584 1.8M

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```
/*
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*/
#ifndef UTIL_LINUX_PT_BSD_H
#define UTIL_LINUX_PT_BSD_H

#define BSD_MAXPARTITIONS 16
#define BSD_FS_UNUSED  0
```

```
#ifndef BSD_DISKMAGIC
# define BSD_DISKMAGIC     ((uint32_t) 0x82564557)
#endif

#define BSD_LINUX_BOOTDIR "/usr/ucb/mdec"

#if defined (__alpha__) || defined (__powerpc__) || \
   defined (__ia64__) || defined (__hppa__)
# define BSD_LABELSECTOR   0
# define BSD_LABELOFFSET   64
#else
# define BSD_LABELSECTOR   1
# define BSD_LABELOFFSET   0
#endif

#define BSD_BBSIZE        8192  /* size of boot area, with label */
#define BSD_SBSIZE        8192  /* max size of fs superblock */

struct bsd_disklabel {
 uint32_t d_magic;  /* the magic number */
 int16_t  d_type;   /* drive type */
 int16_t  d_subtype;  /* controller/d_type specific */
 char  d_typename[16];  /* type name, e.g. "eagle" */
 char  d_packname[16];  /* pack identifier */

   /* disk geometry: */
 uint32_t d_secsize;  /*
 # of bytes per sector */
 uint32_t d_nsectors;  /* # of data sectors per track */
 uint32_t d_ntracks;  /* # of tracks per cylinder */
 uint32_t d_ncylinders;  /* # of data cylinders per unit */
 uint32_t d_secpercyl;  /* # of data sectors per cylinder */
 uint32_t d_secperunit;  /* # of data sectors per unit */

 /*
  * Spares (bad sector replacements) below
  * are not counted in d_nsectors or d_secpercyl.
  * Spare sectors are assumed to be physical sectors
  * which occupy space at the end of each track and/or cylinder.
  */
 uint16_t d_sparespertrack; /* # of spare sectors per track */
 uint16_t d_sparespercyl;  /* # of spare sectors per cylinder */

 /*
  * Alternate cylinders include maintenance, replacement,
  * configuration description areas, etc.
  */
```

```
uint32_t d_acylinders;  /* # of alt. cylinders per unit */

  /* hardware characteristics: */
/*
 * d_interleave, d_trackskew and d_cylskew describe perturbations
 * in the media format used to compensate for a slow
controller.
 * Interleave is physical sector interleave, set up by the formatter
 * or controller when formatting.  When interleaving is in use,
 * logically adjacent sectors are not physically contiguous,
 * but instead are separated by some number of sectors.
 * It is specified as the ratio of physical sectors traversed
 * per logical sector.  Thus an interleave of 1:1 implies contiguous
 * layout, while 2:1 implies that logical sector 0 is separated
 * by one sector from logical sector 1.
 * d_trackskew is the offset of sector 0 on track N
 * relative to sector 0 on track N-1 on the same cylinder.
 * Finally, d_cylskew is the offset of sector 0 on cylinder N
 * relative to sector 0 on cylinder N-1.
 */
uint16_t d_rpm;   /* rotational speed */
uint16_t d_interleave;  /* hardware sector interleave */
uint16_t d_trackskew;  /* sector 0 skew, per track */
uint16_t d_cylskew;  /* sector 0 skew, per cylinder */
uint32_t d_headswitch;  /* head switch time, usec */
uint32_t d_trkseek;  /*
track-to-track seek, usec */
uint32_t d_flags;  /* generic flags */
uint32_t d_drivedata[5];  /* drive-type specific information */
uint32_t d_spare[5];  /* reserved for future use */
uint32_t d_magic2;  /* the magic number (again) */
uint16_t d_checksum;  /* xor of data incl. partitions */

  /* filesystem and partition information: */
uint16_t d_npartitions;        /* number of partitions in following */
uint32_t d_bbsize;        /* size of boot area at sn0, bytes */
uint32_t d_sbsize;        /* max size of fs superblock, bytes */

struct bsd_partition  {  /* the partition table */
 uint32_t p_size;        /* number of sectors in partition */
 uint32_t p_offset;       /* starting sector */
 uint32_t p_fsize;        /* filesystem basic fragment size */
 uint8_t  p_fstype; /* filesystem type, see below */
 uint8_t  p_frag;  /* filesystem fragments per block */
 uint16_t p_cpg;        /* filesystem cylinders per group */
} __attribute__((packed))
d_partitions[BSD_MAXPARTITIONS]; /* actually may be more */
} __attribute__((packed));
```

```
/* d_type values: */
#define BSD_DTYPE_SMD  1  /* SMD, XSMD; VAX hp/up */
#define BSD_DTYPE_MSCP  2  /* MSCP */
#define BSD_DTYPE_DEC  3  /* other DEC (rk, rl) */
#define BSD_DTYPE_SCSI  4  /* SCSI */
#define BSD_DTYPE_ESDI  5  /* ESDI interface */
#define BSD_DTYPE_ST506  6  /* ST506 etc. */
#define BSD_DTYPE_HPIB  7  /* CS/80 on HP-IB */
#define BSD_DTYPE_HPFL  8  /* HP Fiber-link */
#define BSD_DTYPE_FLOPPY 10  /* floppy */

/* d_subtype values: */
#define BSD_DSTYPE_INDOSPART 0x8  /* is inside dos partition */
#define BSD_DSTYPE_DOSPART(s) ((s) & 3) /* dos partition number */
#define BSD_DSTYPE_GEOMETRY 0x10  /* drive params in label */

/*
* Filesystem type and version.
* Used to interpret other filesystem-specific
* per-partition information.
*/
#define BSD_FS_UNUSED 0  /* unused */
#define BSD_FS_SWAP     1  /* swap */
#define BSD_FS_V6       2  /* Sixth Edition */
#define BSD_FS_V7
   3  /* Seventh Edition */
#define BSD_FS_SYSV     4  /* System V */
#define BSD_FS_V71K     5  /* V7 with 1K blocks (4.1, 2.9) */
#define BSD_FS_V8       6  /* Eighth Edition, 4K blocks */
#define BSD_FS_BSDFFS 7  /* 4.2BSD fast file system */
#define BSD_FS_BSDLFS 9  /* 4.4BSD log-structured file system */
#define BSD_FS_OTHER 10  /* in use, but unknown/unsupported */
#define BSD_FS_HPFS 11  /* OS/2 high-performance file system */
#define BSD_FS_ISO9660 12  /* ISO-9660 filesystem (cdrom) */
#define BSD_FS_ISOFS BSD_FS_ISO9660
#define BSD_FS_BOOT 13  /* partition contains bootstrap */
#define BSD_FS_ADOS 14  /* AmigaDOS fast file system */
#define BSD_FS_HFS 15  /* Macintosh HFS */
#define BSD_FS_ADVFS 16  /* Digital Unix AdvFS */

/* this is annoying, but it's also the way it is :-( */
#ifdef __alpha__
#define BSD_FS_EXT2 8  /* ext2 file system */
#else
#define BSD_FS_MSDOS 8  /* MS-DOS file system */
#endif
```

```
/*
* flags shared by various drives:
*/
#define BSD_D_REMOVABLE 0x01  /*
 removable media */
#define BSD_D_ECC       0x02  /* supports ECC */
#define BSD_D_BADSECT 0x04  /* supports bad sector forw. */
#define BSD_D_RAMDISK 0x08  /* disk emulator */
#define BSD_D_CHAIN     0x10  /* can do back-back transfers */
#define BSD_D_DOSPART 0x20  /* within MSDOS partition */

#endif /* UTIL_LINUX_PT_BSD_H */
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*/
```

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The Kohonen neural network code for color optimization was written by Anthony Dekker.

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The X-Spline code was written Carole Blanc (blanc@labri.u-bordeaux.fr) and Christophe Schlick (schlick@labri.u-bordeaux.fr) starting from an initial implementation done by C. Feuille, S. Grosbois, L. Maziere and L. Minihot as a student practice (Universite Bordeaux, France). For additional information about X-splines, see:
"X-Splines: A Spline Model Designed for the End User" by C. Blanc and C. Schlick, Proceedings of SIGGRAPH'95
http://dept-info.labri.u-bordeaux.fr/~schlick/DOC/sig1.html

```
/* $NetBSD: queue.h,v 1.70 2015/11/02 15:21:23 christos Exp $ */

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*
* @(#)queue.h 8.5 (Berkeley) 8/20/94
*/

#ifndef _SYS_QUEUE_H_
#define _SYS_QUEUE_H_
```

```
/*
* This file defines five types of data structures: singly-linked lists,
* lists, simple queues, tail queues, and circular queues.
*
* A singly-linked list is headed by a single forward pointer. The
* elements are singly linked for minimum space and
 pointer manipulation
* overhead at the expense of O(n) removal for arbitrary elements. New
* elements can be added to the list after an existing element or at the
* head of the list.  Elements being removed from the head of the list
* should use the explicit macro for this purpose for optimum
* efficiency. A singly-linked list may only be traversed in the forward
* direction.  Singly-linked lists are ideal for applications with large
* datasets and few or no removals or for implementing a LIFO queue.
*
* A list is headed by a single forward pointer (or an array of forward
* pointers for a hash table header). The elements are doubly linked
* so that an arbitrary element can be removed without a need to
* traverse the list. New elements can be added to the list before
* or after an existing element or at the head of the list. A list
* may only be traversed in the forward direction.
*
* A simple queue is headed by a pair of pointers, one the head of the
* list and the
 other to the tail of the list. The elements are singly
* linked to save space, so elements can only be removed from the
* head of the list. New elements can be added to the list after
* an existing element, at the head of the list, or at the end of the
* list. A simple queue may only be traversed in the forward direction.
*
* A tail queue is headed by a pair of pointers, one to the head of the
* list and the other to the tail of the list. The elements are doubly
* linked so that an arbitrary element can be removed without a need to
* traverse the list. New elements can be added to the list before or
* after an existing element, at the head of the list, or at the end of
* the list. A tail queue may be traversed in either direction.
*
* A circle queue is headed by a pair of pointers, one to the head of the
* list and the other to the tail of the list. The elements are doubly
* linked so that an arbitrary element can be removed without a need to
* traverse the list. New elements
 can be added to the list before or after
* an existing element, at the head of the list, or at the end of the list.
* A circle queue may be traversed in either direction, but has a more
* complex end of list detection.
*
* For details on the use of these macros, see the queue(3) manual page.
```

```
*/

/*
* Include the definition of NULL only on NetBSD because sys/null.h
* is not available elsewhere.  This conditional makes the header
* portable and it can simply be dropped verbatim into any system.
* The caveat is that on other systems some other header
* must provide NULL before the macros can be used.
*/
#ifdef __NetBSD__
#include <sys/null.h>
#endif

#if defined(QUEUEDEBUG)
# if defined(_KERNEL)
#  define QUEUEDEBUG_ABORT(...) panic(__VA_ARGS__)
# else
#  include <err.h>
#  define QUEUEDEBUG_ABORT(...) err(1, __VA_ARGS__)
# endif
#endif

/*
* Singly-linked List definitions.
*/
#define SLIST_HEAD(name, type)      \
struct name {        \
 struct type *slh_first; /* first
 element */   \
}

#define SLIST_HEAD_INITIALIZER(head)     \
 { NULL }

#define SLIST_ENTRY(type)      \
struct {        \
 struct type *sle_next; /* next element */   \
}

/*
* Singly-linked List access methods.
*/
#define SLIST_FIRST(head) ((head)->slh_first)
#define SLIST_END(head)  NULL
#define SLIST_EMPTY(head) ((head)->slh_first == NULL)
#define SLIST_NEXT(elm, field) ((elm)->field.sle_next)

#define SLIST_FOREACH(var, head, field)     \
```

```
 for((var) = (head)->slh_first;     \
     (var) != SLIST_END(head);     \
     (var) = (var)->field.sle_next)

#define SLIST_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = SLIST_FIRST((head));    \
     (var) != SLIST_END(head) &&     \
     ((tvar) = SLIST_NEXT((var), field), 1);   \
     (var) = (tvar))

/*
* Singly-linked List functions.
*/
#define SLIST_INIT(head) do {      \
 (head)->slh_first = SLIST_END(head);    \
} while (/*CONSTCOND*/0)

#define SLIST_INSERT_AFTER(slistelm, elm, field) do {   \
 (elm)->field.sle_next = (slistelm)->field.sle_next;  \
 (slistelm)->field.sle_next
 = (elm);    \
} while (/*CONSTCOND*/0)

#define SLIST_INSERT_HEAD(head, elm, field) do {   \
 (elm)->field.sle_next = (head)->slh_first;   \
 (head)->slh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE_AFTER(slistelm, field) do {   \
 (slistelm)->field.sle_next =     \
     SLIST_NEXT(SLIST_NEXT((slistelm), field), field);  \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE_HEAD(head, field) do {    \
 (head)->slh_first = (head)->slh_first->field.sle_next;  \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE(head, elm, type, field) do {   \
 if ((head)->slh_first == (elm)) {    \
  SLIST_REMOVE_HEAD((head), field);   \
 }        \
 else {        \
  struct type *curelm = (head)->slh_first;  \
  while(curelm->field.sle_next != (elm))   \
   curelm = curelm->field.sle_next;  \
  curelm->field.sle_next =    \
      curelm->field.sle_next->field.sle_next;  \
 }        \
```

```
} while (/*CONSTCOND*/0)


/*
* List definitions.
 */
#define LIST_HEAD(name, type)      \
struct name {        \
 struct type *lh_first; /* first element */   \
}

#define LIST_HEAD_INITIALIZER(head)     \
 { NULL }

#define LIST_ENTRY(type)      \
struct {        \
 struct type *le_next; /* next element */   \
 struct type **le_prev; /* address of previous next element */ \
}

/*
* List access methods.
*/
#define LIST_FIRST(head)  ((head)->lh_first)
#define LIST_END(head)   NULL
#define LIST_EMPTY(head)  ((head)->lh_first == LIST_END(head))
#define LIST_NEXT(elm, field)  ((elm)->field.le_next)

#define LIST_FOREACH(var, head, field)     \
 for ((var) = ((head)->lh_first);    \
     (var) != LIST_END(head);     \
     (var) = ((var)->field.le_next))

#define LIST_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = LIST_FIRST((head));    \
     (var) != LIST_END(head) &&     \
     ((tvar) = LIST_NEXT((var), field), 1);   \
     (var) = (tvar))

#define LIST_MOVE(head1, head2) do {     \
 LIST_INIT((head2));      \
 if (!LIST_EMPTY((head1)))
 {     \
  (head2)->lh_first = (head1)->lh_first;   \
  LIST_INIT((head1));     \
 }        \
} while (/*CONSTCOND*/0)
```

```
/*
* List functions.
*/
#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_LIST_INSERT_HEAD(head, elm, field)   \
 if ((head)->lh_first &&      \
     (head)->lh_first->field.le_prev != &(head)->lh_first) \
  QUEUEDEBUG_ABORT("LIST_INSERT_HEAD %p %s:%d", (head), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_LIST_OP(elm, field)     \
 if ((elm)->field.le_next &&     \
     (elm)->field.le_next->field.le_prev !=   \
     &(elm)->field.le_next)     \
  QUEUEDEBUG_ABORT("LIST_* forw %p %s:%d", (elm),  \
      __FILE__, __LINE__);    \
 if (*(elm)->field.le_prev != (elm))    \
  QUEUEDEBUG_ABORT("LIST_* back %p %s:%d", (elm),  \
      __FILE__, __LINE__);
#define QUEUEDEBUG_LIST_POSTREMOVE(elm, field)    \
 (elm)->field.le_next = (void *)1L;    \
 (elm)->field.le_prev = (void *)1L;
#else
#define QUEUEDEBUG_LIST_INSERT_HEAD(head, elm, field)
#define QUEUEDEBUG_LIST_OP(elm,
 field)
#define QUEUEDEBUG_LIST_POSTREMOVE(elm, field)
#endif

#define LIST_INIT(head) do {      \
 (head)->lh_first = LIST_END(head);    \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_AFTER(listelm, elm, field) do {   \
 QUEUEDEBUG_LIST_OP((listelm), field)    \
 if (((elm)->field.le_next = (listelm)->field.le_next) !=  \
     LIST_END(head))      \
  (listelm)->field.le_next->field.le_prev =  \
      &(elm)->field.le_next;    \
 (listelm)->field.le_next = (elm);    \
 (elm)->field.le_prev = &(listelm)->field.le_next;  \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_BEFORE(listelm, elm, field) do {   \
 QUEUEDEBUG_LIST_OP((listelm), field)    \
 (elm)->field.le_prev = (listelm)->field.le_prev;  \
 (elm)->field.le_next = (listelm);    \
 *(listelm)->field.le_prev = (elm);    \
 (listelm)->field.le_prev = &(elm)->field.le_next;  \
```

```
} while (/*CONSTCOND*/0)

#define LIST_INSERT_HEAD(head, elm, field) do {    \
 QUEUEDEBUG_LIST_INSERT_HEAD((head), (elm), field)  \
 if (((elm)->field.le_next
 = (head)->lh_first) != LIST_END(head))\
  (head)->lh_first->field.le_prev = &(elm)->field.le_next;\
 (head)->lh_first = (elm);     \
 (elm)->field.le_prev = &(head)->lh_first;   \
} while (/*CONSTCOND*/0)

#define LIST_REMOVE(elm, field) do {     \
 QUEUEDEBUG_LIST_OP((elm), field)    \
 if ((elm)->field.le_next != NULL)    \
  (elm)->field.le_next->field.le_prev =    \
      (elm)->field.le_prev;    \
 *(elm)->field.le_prev = (elm)->field.le_next;   \
 QUEUEDEBUG_LIST_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

#define LIST_REPLACE(elm, elm2, field) do {    \
 if (((elm2)->field.le_next = (elm)->field.le_next) != NULL) \
  (elm2)->field.le_next->field.le_prev =   \
      &(elm2)->field.le_next;    \
 (elm2)->field.le_prev = (elm)->field.le_prev;   \
 *(elm2)->field.le_prev = (elm2);    \
 QUEUEDEBUG_LIST_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

/*
* Simple queue definitions.
*/
#define SIMPLEQ_HEAD(name, type)     \
struct name {        \
 struct
 type *sqh_first; /* first element */   \
 struct type **sqh_last; /* addr of last next element */  \
}

#define SIMPLEQ_HEAD_INITIALIZER(head)     \
 { NULL, &(head).sqh_first }

#define SIMPLEQ_ENTRY(type)      \
struct {        \
 struct type *sqe_next; /* next element */   \
}

/*
```

```
* Simple queue access methods.
*/
#define SIMPLEQ_FIRST(head)  ((head)->sqh_first)
#define SIMPLEQ_END(head)  NULL
#define SIMPLEQ_EMPTY(head)  ((head)->sqh_first == SIMPLEQ_END(head))
#define SIMPLEQ_NEXT(elm, field) ((elm)->field.sqe_next)

#define SIMPLEQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->sqh_first);    \
     (var) != SIMPLEQ_END(head);     \
     (var) = ((var)->field.sqe_next))

#define SIMPLEQ_FOREACH_SAFE(var, head, field, next)   \
 for ((var) = ((head)->sqh_first);    \
     (var) != SIMPLEQ_END(head) &&    \
     ((next = ((var)->field.sqe_next)), 1);   \
     (var) = (next))

/*
* Simple queue functions.
*/
#define SIMPLEQ_INIT(head) do {      \
 (head)->sqh_first = NULL;     \
 (head)->sqh_last
 = &(head)->sqh_first;    \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_HEAD(head, elm, field) do {   \
 if (((elm)->field.sqe_next = (head)->sqh_first) == NULL) \
  (head)->sqh_last = &(elm)->field.sqe_next;  \
 (head)->sqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_TAIL(head, elm, field) do {   \
 (elm)->field.sqe_next = NULL;     \
 *(head)->sqh_last = (elm);     \
 (head)->sqh_last = &(elm)->field.sqe_next;   \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 if (((elm)->field.sqe_next = (listelm)->field.sqe_next) == NULL)\
  (head)->sqh_last = &(elm)->field.sqe_next;  \
 (listelm)->field.sqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE_HEAD(head, field) do {    \
 if (((head)->sqh_first = (head)->sqh_first->field.sqe_next) == NULL) \
  (head)->sqh_last = &(head)->sqh_first;   \
```

```
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE_AFTER(head, elm, field) do {   \
 if
 (((elm)->field.sqe_next = (elm)->field.sqe_next->field.sqe_next) \
     == NULL)       \
  (head)->sqh_last = &(elm)->field.sqe_next;  \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE(head, elm, type, field) do {   \
 if ((head)->sqh_first == (elm)) {    \
  SIMPLEQ_REMOVE_HEAD((head), field);   \
 } else {       \
  struct type *curelm = (head)->sqh_first;  \
  while (curelm->field.sqe_next != (elm))   \
   curelm = curelm->field.sqe_next;  \
  if ((curelm->field.sqe_next =    \
   curelm->field.sqe_next->field.sqe_next) == NULL) \
       (head)->sqh_last = &(curelm)->field.sqe_next; \
 }        \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_CONCAT(head1, head2) do {    \
 if (!SIMPLEQ_EMPTY((head2))) {     \
  *(head1)->sqh_last = (head2)->sqh_first;  \
  (head1)->sqh_last = (head2)->sqh_last;  \
  SIMPLEQ_INIT((head2));     \
 }        \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_LAST(head, type, field)     \
 (SIMPLEQ_EMPTY((head)) ?      \
  NULL :       \
        ((struct type
 *)(void *)    \
  ((char *)((head)->sqh_last) - offsetof(struct type, field))))

/*
* Tail queue definitions.
*/
#define _TAILQ_HEAD(name, type, qual)     \
struct name {        \
 qual type *tqh_first;  /* first element */  \
 qual type *qual *tqh_last; /* addr of last next element */ \
}
#define TAILQ_HEAD(name, type) _TAILQ_HEAD(name, struct type,)

#define TAILQ_HEAD_INITIALIZER(head)     \
```

```
 { TAILQ_END(head), &(head).tqh_first }

#define _TAILQ_ENTRY(type, qual)     \
struct {        \
 qual type *tqe_next;  /* next element */  \
 qual type *qual *tqe_prev; /* address of previous next element */\
}
#define TAILQ_ENTRY(type) _TAILQ_ENTRY(struct type,)

/*
* Tail queue access methods.
*/
#define TAILQ_FIRST(head)  ((head)->tqh_first)
#define TAILQ_END(head)   (NULL)
#define TAILQ_NEXT(elm, field)  ((elm)->field.tqe_next)
#define TAILQ_LAST(head, headname) \
 (*(((struct headname *)(void *)((head)->tqh_last))->tqh_last))
#define TAILQ_PREV(elm, headname, field) \
 (*(((struct headname
 *)(void *)((elm)->field.tqe_prev))->tqh_last))
#define TAILQ_EMPTY(head)  (TAILQ_FIRST(head) == TAILQ_END(head))


#define TAILQ_FOREACH(var, head, field)     \
 for ((var) = ((head)->tqh_first);    \
     (var) != TAILQ_END(head);     \
     (var) = ((var)->field.tqe_next))

#define TAILQ_FOREACH_SAFE(var, head, field, next)   \
 for ((var) = ((head)->tqh_first);    \
     (var) != TAILQ_END(head) &&     \
     ((next) = TAILQ_NEXT(var, field), 1); (var) = (next))

#define TAILQ_FOREACH_REVERSE(var, head, headname, field)  \
 for ((var) = TAILQ_LAST((head), headname);   \
     (var) != TAILQ_END(head);     \
     (var) = TAILQ_PREV((var), headname, field))

#define TAILQ_FOREACH_REVERSE_SAFE(var, head, headname, field, prev) \
 for ((var) = TAILQ_LAST((head), headname);   \
     (var) != TAILQ_END(head) &&     \
     ((prev) = TAILQ_PREV((var), headname, field), 1); (var) = (prev))

/*
* Tail queue functions.
*/
#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_TAILQ_INSERT_HEAD(head,
```

```
 elm, field)   \
 if ((head)->tqh_first &&     \
     (head)->tqh_first->field.tqe_prev != &(head)->tqh_first) \
  QUEUEDEBUG_ABORT("TAILQ_INSERT_HEAD %p %s:%d", (head), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_INSERT_TAIL(head, elm, field)   \
 if (*(head)->tqh_last != NULL)     \
  QUEUEDEBUG_ABORT("TAILQ_INSERT_TAIL %p %s:%d", (head), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_OP(elm, field)     \
 if ((elm)->field.tqe_next &&     \
     (elm)->field.tqe_next->field.tqe_prev !=   \
     &(elm)->field.tqe_next)     \
  QUEUEDEBUG_ABORT("TAILQ_* forw %p %s:%d", (elm), \
      __FILE__, __LINE__);    \
 if (*(elm)->field.tqe_prev != (elm))    \
  QUEUEDEBUG_ABORT("TAILQ_* back %p %s:%d", (elm), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_PREREMOVE(head, elm, field)   \
 if ((elm)->field.tqe_next == NULL &&    \
     (head)->tqh_last != &(elm)->field.tqe_next)   \
  QUEUEDEBUG_ABORT("TAILQ_PREREMOVE head %p elm %p %s:%d",\
      (head), (elm), __FILE__,
 __LINE__);
#define QUEUEDEBUG_TAILQ_POSTREMOVE(elm, field)    \
 (elm)->field.tqe_next = (void *)1L;    \
 (elm)->field.tqe_prev = (void *)1L;
#else
#define QUEUEDEBUG_TAILQ_INSERT_HEAD(head, elm, field)
#define QUEUEDEBUG_TAILQ_INSERT_TAIL(head, elm, field)
#define QUEUEDEBUG_TAILQ_OP(elm, field)
#define QUEUEDEBUG_TAILQ_PREREMOVE(head, elm, field)
#define QUEUEDEBUG_TAILQ_POSTREMOVE(elm, field)
#endif

#define TAILQ_INIT(head) do {      \
 (head)->tqh_first = TAILQ_END(head);    \
 (head)->tqh_last = &(head)->tqh_first;    \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_HEAD(head, elm, field) do {   \
 QUEUEDEBUG_TAILQ_INSERT_HEAD((head), (elm), field)  \
 if (((elm)->field.tqe_next = (head)->tqh_first) != TAILQ_END(head))\
  (head)->tqh_first->field.tqe_prev =   \
      &(elm)->field.tqe_next;    \
 else       \
  (head)->tqh_last = &(elm)->field.tqe_next;  \
 (head)->tqh_first = (elm);     \
```

```
 (elm)->field.tqe_prev = &(head)->tqh_first;   \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_TAIL(head,
 elm, field) do {   \
 QUEUEDEBUG_TAILQ_INSERT_TAIL((head), (elm), field)  \
 (elm)->field.tqe_next = TAILQ_END(head);   \
 (elm)->field.tqe_prev = (head)->tqh_last;   \
 *(head)->tqh_last = (elm);     \
 (head)->tqh_last = &(elm)->field.tqe_next;   \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 QUEUEDEBUG_TAILQ_OP((listelm), field)    \
 if (((elm)->field.tqe_next = (listelm)->field.tqe_next) !=  \
     TAILQ_END(head))      \
  (elm)->field.tqe_next->field.tqe_prev =   \
      &(elm)->field.tqe_next;    \
 else       \
  (head)->tqh_last = &(elm)->field.tqe_next;  \
 (listelm)->field.tqe_next = (elm);    \
 (elm)->field.tqe_prev = &(listelm)->field.tqe_next;  \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_BEFORE(listelm, elm, field) do {   \
 QUEUEDEBUG_TAILQ_OP((listelm), field)    \
 (elm)->field.tqe_prev = (listelm)->field.tqe_prev;  \
 (elm)->field.tqe_next = (listelm);    \
 *(listelm)->field.tqe_prev = (elm);    \
 (listelm)->field.tqe_prev
 = &(elm)->field.tqe_next;  \
} while (/*CONSTCOND*/0)

#define TAILQ_REMOVE(head, elm, field) do {    \
 QUEUEDEBUG_TAILQ_PREREMOVE((head), (elm), field)  \
 QUEUEDEBUG_TAILQ_OP((elm), field)    \
 if (((elm)->field.tqe_next) != TAILQ_END(head))   \
  (elm)->field.tqe_next->field.tqe_prev =   \
      (elm)->field.tqe_prev;    \
 else       \
  (head)->tqh_last = (elm)->field.tqe_prev;  \
 *(elm)->field.tqe_prev = (elm)->field.tqe_next;   \
 QUEUEDEBUG_TAILQ_POSTREMOVE((elm), field);   \
} while (/*CONSTCOND*/0)

#define TAILQ_REPLACE(head, elm, elm2, field) do {   \
       if (((elm2)->field.tqe_next = (elm)->field.tqe_next) !=  \
     TAILQ_END(head))        \
```

```
            (elm2)->field.tqe_next->field.tqe_prev =  \
                &(elm2)->field.tqe_next;    \
        else        \
            (head)->tqh_last = &(elm2)->field.tqe_next;  \
        (elm2)->field.tqe_prev = (elm)->field.tqe_prev;   \
        *(elm2)->field.tqe_prev = (elm2);    \
 QUEUEDEBUG_TAILQ_POSTREMOVE((elm),
 field);   \
} while (/*CONSTCOND*/0)

#define TAILQ_CONCAT(head1, head2, field) do {    \
 if (!TAILQ_EMPTY(head2)) {     \
  *(head1)->tqh_last = (head2)->tqh_first;  \
  (head2)->tqh_first->field.tqe_prev = (head1)->tqh_last; \
  (head1)->tqh_last = (head2)->tqh_last;   \
  TAILQ_INIT((head2));     \
 }        \
} while (/*CONSTCOND*/0)

/*
* Singly-linked Tail queue declarations.
*/
#define STAILQ_HEAD(name, type)      \
struct name {        \
 struct type *stqh_first; /* first element */  \
 struct type **stqh_last; /* addr of last next element */ \
}

#define STAILQ_HEAD_INITIALIZER(head)     \
 { NULL, &(head).stqh_first }

#define STAILQ_ENTRY(type)      \
struct {        \
 struct type *stqe_next; /* next element */   \
}

/*
* Singly-linked Tail queue access methods.
*/
#define STAILQ_FIRST(head) ((head)->stqh_first)
#define STAILQ_END(head) NULL
#define STAILQ_NEXT(elm, field) ((elm)->field.stqe_next)
#define STAILQ_EMPTY(head) (STAILQ_FIRST(head)
 == STAILQ_END(head))

/*
* Singly-linked Tail queue functions.
*/
```

```
#define STAILQ_INIT(head) do {      \
 (head)->stqh_first = NULL;     \
 (head)->stqh_last = &(head)->stqh_first;    \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_HEAD(head, elm, field) do {   \
 if (((elm)->field.stqe_next = (head)->stqh_first) == NULL) \
  (head)->stqh_last = &(elm)->field.stqe_next;  \
 (head)->stqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_TAIL(head, elm, field) do {   \
 (elm)->field.stqe_next = NULL;     \
 *(head)->stqh_last = (elm);     \
 (head)->stqh_last = &(elm)->field.stqe_next;   \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 if (((elm)->field.stqe_next = (listelm)->field.stqe_next) == NULL)\
  (head)->stqh_last = &(elm)->field.stqe_next;  \
 (listelm)->field.stqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define STAILQ_REMOVE_HEAD(head, field) do {    \
 if (((head)->stqh_first = (head)->stqh_first->field.stqe_next)
 == NULL) \
  (head)->stqh_last = &(head)->stqh_first;   \
} while (/*CONSTCOND*/0)

#define STAILQ_REMOVE(head, elm, type, field) do {   \
 if ((head)->stqh_first == (elm)) {    \
  STAILQ_REMOVE_HEAD((head), field);   \
 } else {       \
  struct type *curelm = (head)->stqh_first;  \
  while (curelm->field.stqe_next != (elm))   \
   curelm = curelm->field.stqe_next;  \
  if ((curelm->field.stqe_next =    \
   curelm->field.stqe_next->field.stqe_next) == NULL) \
       (head)->stqh_last = &(curelm)->field.stqe_next; \
 }        \
} while (/*CONSTCOND*/0)

#define STAILQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->stqh_first);    \
  (var);       \
  (var) = ((var)->field.stqe_next))

#define STAILQ_FOREACH_SAFE(var, head, field, tvar)   \
```

```
 for ((var) = STAILQ_FIRST((head));    \
     (var) && ((tvar) = STAILQ_NEXT((var), field), 1);  \
     (var) = (tvar))

#define STAILQ_CONCAT(head1, head2) do {    \
 if (!STAILQ_EMPTY((head2))) {     \
  *(head1)->stqh_last
 = (head2)->stqh_first;  \
  (head1)->stqh_last = (head2)->stqh_last;  \
  STAILQ_INIT((head2));     \
 }        \
} while (/*CONSTCOND*/0)

#define STAILQ_LAST(head, type, field)     \
 (STAILQ_EMPTY((head)) ?      \
  NULL :       \
        ((struct type *)(void *)    \
  ((char *)((head)->stqh_last) - offsetof(struct type, field))))


#ifndef _KERNEL
/*
* Circular queue definitions. Do not use. We still keep the macros
* for compatibility but because of pointer aliasing issues their use
* is discouraged!
*/

/*
* __launder_type():  We use this ugly hack to work around the the compiler
* noticing that two types may not alias each other and elide tests in code.
* We hit this in the CIRCLEQ macros when comparing 'struct name *' and
* 'struct type *' (see CIRCLEQ_HEAD()).  Modern compilers (such as GCC
* 4.8) declare these comparisons as always false, causing the code to
* not run as designed.
*
* This hack is only to be used for comparisons and thus can be fully const.
 * Do not use for assignment.
*
* If we ever choose to change the ABI of the CIRCLEQ macros, we could fix
* this by changing the head/tail sentinal values, but see the note above
* this one.
*/
static __inline const void * __launder_type(const void *);
static __inline const void *
__launder_type(const void *__x)
{
 __asm __volatile("" : "+r" (__x));
 return __x;
```

```
}

#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_CIRCLEQ_HEAD(head, field)    \
 if ((head)->cqh_first != CIRCLEQ_ENDC(head) &&   \
     (head)->cqh_first->field.cqe_prev != CIRCLEQ_ENDC(head)) \
  QUEUEDEBUG_ABORT("CIRCLEQ head forw %p %s:%d", (head), \
        __FILE__, __LINE__);    \
 if ((head)->cqh_last != CIRCLEQ_ENDC(head) &&   \
     (head)->cqh_last->field.cqe_next != CIRCLEQ_ENDC(head)) \
  QUEUEDEBUG_ABORT("CIRCLEQ head back %p %s:%d", (head), \
        __FILE__, __LINE__);
#define QUEUEDEBUG_CIRCLEQ_ELM(head, elm, field)   \
 if ((elm)->field.cqe_next == CIRCLEQ_ENDC(head)) {  \
  if ((head)->cqh_last != (elm))    \
   QUEUEDEBUG_ABORT("CIRCLEQ
 elm last %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 } else {       \
  if ((elm)->field.cqe_next->field.cqe_prev != (elm)) \
   QUEUEDEBUG_ABORT("CIRCLEQ elm forw %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 }        \
 if ((elm)->field.cqe_prev == CIRCLEQ_ENDC(head)) {  \
  if ((head)->cqh_first != (elm))    \
   QUEUEDEBUG_ABORT("CIRCLEQ elm first %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 } else {       \
  if ((elm)->field.cqe_prev->field.cqe_next != (elm)) \
   QUEUEDEBUG_ABORT("CIRCLEQ elm prev %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 }
#define QUEUEDEBUG_CIRCLEQ_POSTREMOVE(elm, field)   \
 (elm)->field.cqe_next = (void *)1L;    \
 (elm)->field.cqe_prev = (void *)1L;
#else
#define QUEUEDEBUG_CIRCLEQ_HEAD(head, field)
#define QUEUEDEBUG_CIRCLEQ_ELM(head, elm, field)
#define QUEUEDEBUG_CIRCLEQ_POSTREMOVE(elm, field)
#endif

#define CIRCLEQ_HEAD(name, type)     \
struct name {        \
 struct type *cqh_first;  /*
 first element */  \
 struct type *cqh_last;  /* last element */  \
}
```

```
#define CIRCLEQ_HEAD_INITIALIZER(head)     \
 { CIRCLEQ_END(&head), CIRCLEQ_END(&head) }

#define CIRCLEQ_ENTRY(type)      \
struct {        \
 struct type *cqe_next;  /* next element */  \
 struct type *cqe_prev;  /* previous element */  \
}

/*
* Circular queue functions.
*/
#define CIRCLEQ_INIT(head) do {      \
 (head)->cqh_first = CIRCLEQ_END(head);    \
 (head)->cqh_last = CIRCLEQ_END(head);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (listelm), field)  \
 (elm)->field.cqe_next = (listelm)->field.cqe_next;  \
 (elm)->field.cqe_prev = (listelm);    \
 if ((listelm)->field.cqe_next == CIRCLEQ_ENDC(head))  \
  (head)->cqh_last = (elm);    \
 else        \
  (listelm)->field.cqe_next->field.cqe_prev = (elm); \
 (listelm)->field.cqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_BEFORE(head,
 listelm, elm, field) do {  \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (listelm), field)  \
 (elm)->field.cqe_next = (listelm);    \
 (elm)->field.cqe_prev = (listelm)->field.cqe_prev;  \
 if ((listelm)->field.cqe_prev == CIRCLEQ_ENDC(head))  \
  (head)->cqh_first = (elm);    \
 else        \
  (listelm)->field.cqe_prev->field.cqe_next = (elm); \
 (listelm)->field.cqe_prev = (elm);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_HEAD(head, elm, field) do {   \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 (elm)->field.cqe_next = (head)->cqh_first;   \
 (elm)->field.cqe_prev = CIRCLEQ_END(head);   \
 if ((head)->cqh_last == CIRCLEQ_ENDC(head))   \
  (head)->cqh_last = (elm);    \
```

```
 else        \
  (head)->cqh_first->field.cqe_prev = (elm);  \
 (head)->cqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_TAIL(head, elm, field) do {   \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 (elm)->field.cqe_next
 = CIRCLEQ_END(head);   \
 (elm)->field.cqe_prev = (head)->cqh_last;   \
 if ((head)->cqh_first == CIRCLEQ_ENDC(head))   \
  (head)->cqh_first = (elm);    \
 else        \
  (head)->cqh_last->field.cqe_next = (elm);  \
 (head)->cqh_last = (elm);     \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_REMOVE(head, elm, field) do {    \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (elm), field)   \
 if ((elm)->field.cqe_next == CIRCLEQ_ENDC(head))  \
  (head)->cqh_last = (elm)->field.cqe_prev;  \
 else        \
  (elm)->field.cqe_next->field.cqe_prev =   \
      (elm)->field.cqe_prev;    \
 if ((elm)->field.cqe_prev == CIRCLEQ_ENDC(head))  \
  (head)->cqh_first = (elm)->field.cqe_next;  \
 else        \
  (elm)->field.cqe_prev->field.cqe_next =   \
      (elm)->field.cqe_next;    \
 QUEUEDEBUG_CIRCLEQ_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->cqh_first);    \
  (var) != CIRCLEQ_ENDC(head);    \
  (var)
 = ((var)->field.cqe_next))

#define CIRCLEQ_FOREACH_REVERSE(var, head, field)   \
 for ((var) = ((head)->cqh_last);    \
  (var) != CIRCLEQ_ENDC(head);    \
  (var) = ((var)->field.cqe_prev))

/*
* Circular queue access methods.
*/
#define CIRCLEQ_FIRST(head)  ((head)->cqh_first)
```

```
#define CIRCLEQ_LAST(head)  ((head)->cqh_last)
/* For comparisons */
#define CIRCLEQ_ENDC(head)  (__launder_type(head))
/* For assignments */
#define CIRCLEQ_END(head)  ((void *)(head))
#define CIRCLEQ_NEXT(elm, field) ((elm)->field.cqe_next)
#define CIRCLEQ_PREV(elm, field) ((elm)->field.cqe_prev)
#define CIRCLEQ_EMPTY(head)      \
   (CIRCLEQ_FIRST(head) == CIRCLEQ_ENDC(head))

#define CIRCLEQ_LOOP_NEXT(head, elm, field)    \
 (((elm)->field.cqe_next == CIRCLEQ_ENDC(head))   \
     ? ((head)->cqh_first)     \
     : (elm->field.cqe_next))
#define CIRCLEQ_LOOP_PREV(head, elm, field)    \
 (((elm)->field.cqe_prev == CIRCLEQ_ENDC(head))   \
     ? ((head)->cqh_last)     \
     :
 (elm->field.cqe_prev))
#endif /* !_KERNEL */

#endif /* !_SYS_QUEUE_H_ */
/* $NetBSD: tree.h,v 1.20 2013/09/14 13:20:45 joerg Exp $ */
/* $OpenBSD: tree.h,v 1.13 2011/07/09 00:19:45 pirofti Exp $ */
/* Modified by Void Linux. */
/*
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```

```
* THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
*/

#ifndef _SYS_TREE_H_
#define _SYS_TREE_H_

#ifdef __GNUC__
#define __GNUC_PREREQ__(x, y)      \
 ((__GNUC__ == (x) && __GNUC_MINOR__ >= (y)) ||   \
  (__GNUC__ > (x)))
#else
#define __GNUC_PREREQ__(x, y) 0
#endif

#if __GNUC_PREREQ__(2, 7) || defined(__lint__)
#define _sys_tree_h_unused __attribute__((__unused__))
#else
#define _sys_tree_h_unused /* delete */
#endif

/*
* This file defines data structures for different types of trees:
* splay trees and red-black trees.
*
* A splay tree is a self-organizing
 data structure.  Every operation
* on the tree causes a splay to happen.  The splay moves the requested
* node to the root of the tree and partly rebalances it.
*
* This has the benefit that request locality causes faster lookups as
* the requested nodes move to the top of the tree.  On the other hand,
* every lookup causes memory writes.
*
* The Balance Theorem bounds the total access time for m operations
* and n inserts on an initially empty tree as O((m + n)lg n).  The
* amortized cost for a sequence of m accesses to a splay tree is O(lg n);
*
* A red-black tree is a binary search tree with the node color as an
* extra attribute.  It fulfills a set of conditions:
* - every search path from the root to a leaf consists of the
*   same number of black nodes,
* - each red node (except for the root) has a black parent,
* - each leaf node is black.
*
* Every operation on a red-black tree is bounded as O(lg n).
* The maximum height of a red-black tree is 2lg (n+1).
 */
```

```
#define SPLAY_HEAD(name, type)      \
struct name {        \
 struct type *sph_root; /* root of the tree */   \
}

#define SPLAY_INITIALIZER(root)      \
 { NULL }

#define SPLAY_INIT(root) do {      \
 (root)->sph_root = NULL;     \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ENTRY(type)      \
struct {        \
 struct type *spe_left; /* left element */   \
 struct type *spe_right; /* right element */   \
}

#define SPLAY_LEFT(elm, field)  (elm)->field.spe_left
#define SPLAY_RIGHT(elm, field)  (elm)->field.spe_right
#define SPLAY_ROOT(head)  (head)->sph_root
#define SPLAY_EMPTY(head)  (SPLAY_ROOT(head) == NULL)

/* SPLAY_ROTATE_{LEFT,RIGHT} expect that tmp hold SPLAY_{RIGHT,LEFT} */
#define SPLAY_ROTATE_RIGHT(head, tmp, field) do {   \
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(tmp, field); \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;      \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ROTATE_LEFT(head, tmp, field) do {   \
 SPLAY_RIGHT((head)->sph_root,
 field) = SPLAY_LEFT(tmp, field); \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;      \
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKLEFT(head, tmp, field) do {    \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;      \
 (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);  \
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKRIGHT(head, tmp, field) do {    \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;      \
 (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field); \
} while (/*CONSTCOND*/ 0)
```

```
#define SPLAY_ASSEMBLE(head, node, left, right, field) do {  \
 SPLAY_RIGHT(left, field) = SPLAY_LEFT((head)->sph_root, field); \
 SPLAY_LEFT(right, field) = SPLAY_RIGHT((head)->sph_root, field);\
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(node, field); \
 SPLAY_RIGHT((head)->sph_root, field) = SPLAY_LEFT(node, field); \
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */

#define
 SPLAY_PROTOTYPE(name, type, field, cmp)    \
void name##_SPLAY(struct name *, struct type *);   \
void name##_SPLAY_MINMAX(struct name *, int);    \
struct type *name##_SPLAY_INSERT(struct name *, struct type *);  \
struct type *name##_SPLAY_REMOVE(struct name *, struct type *);  \
        \
/* Finds the node with the same key as elm */    \
static __inline struct type *      \
name##_SPLAY_FIND(struct name *head, struct type *elm)   \
{        \
 if (SPLAY_EMPTY(head))      \
  return(NULL);      \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0)    \
  return (head->sph_root);    \
 return (NULL);       \
}        \
        \
static __inline _sys_tree_h_unused struct type *   \
name##_SPLAY_NEXT(struct name *head, struct type *elm)   \
{        \
 name##_SPLAY(head, elm);     \
 if (SPLAY_RIGHT(elm, field) != NULL) {    \
  elm = SPLAY_RIGHT(elm, field);    \
  while (SPLAY_LEFT(elm, field) != NULL) {  \
   elm = SPLAY_LEFT(elm, field);   \
  }       \
 }
 else       \
  elm = NULL;      \
 return (elm);       \
}        \
        \
static _sys_tree_h_unused __inline struct type *   \
name##_SPLAY_MIN_MAX(struct name *head, int val)   \
{        \
 name##_SPLAY_MINMAX(head, val);     \
```

```
        return (SPLAY_ROOT(head));     \
}

/* Main splay operation.
* Moves node close to the key of elm to top
*/
#define SPLAY_GENERATE(name, type, field, cmp)    \
struct type *        \
name##_SPLAY_INSERT(struct name *head, struct type *elm)  \
{         \
   if (SPLAY_EMPTY(head)) {      \
     SPLAY_LEFT(elm, field) = SPLAY_RIGHT(elm, field) = NULL; \
   } else {        \
     int __comp;       \
     name##_SPLAY(head, elm);     \
     __comp = (cmp)(elm, (head)->sph_root);   \
     if(__comp < 0) {      \
      SPLAY_LEFT(elm, field) = SPLAY_LEFT((head)->sph_root, field);\
      SPLAY_RIGHT(elm, field) = (head)->sph_root;  \
      SPLAY_LEFT((head)->sph_root, field) = NULL;  \
     } else if (__comp > 0) {     \
      SPLAY_RIGHT(elm,
 field) = SPLAY_RIGHT((head)->sph_root, field);\
      SPLAY_LEFT(elm, field) = (head)->sph_root;  \
      SPLAY_RIGHT((head)->sph_root, field) = NULL; \
     } else       \
      return ((head)->sph_root);    \
   }         \
   (head)->sph_root = (elm);      \
   return (NULL);       \
}         \
         \
struct type *        \
name##_SPLAY_REMOVE(struct name *head, struct type *elm)  \
{         \
 struct type *__tmp;      \
 if (SPLAY_EMPTY(head))      \
  return (NULL);      \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0) {   \
  if (SPLAY_LEFT((head)->sph_root, field) == NULL) { \
   (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field);\
  } else {      \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);\
   name##_SPLAY(head, elm);   \
   SPLAY_RIGHT((head)->sph_root, field) = __tmp; \
  }       \
```

```
  return (elm);      \
 }        \
 return (NULL);       \
}         \
         \
void         \
name##_SPLAY(struct
 name *head, struct type *elm)   \
{         \
 struct type __node, *__left, *__right, *__tmp;   \
 int __comp;       \
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
  __left = __right = &__node;     \
\
 while ((__comp = (cmp)(elm, (head)->sph_root)) != 0) {  \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if ((cmp)(elm, __tmp) < 0){   \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKLEFT(head, __right, field);  \
  } else if (__comp > 0) {    \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if ((cmp)(elm, __tmp) > 0){   \
    SPLAY_ROTATE_LEFT(head, __tmp, field); \
    if (SPLAY_RIGHT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKRIGHT(head, __left, field);  \
  }       \
 }        \
 SPLAY_ASSEMBLE(head,
 &__node, __left, __right, field);  \
}         \
         \
/* Splay with either the minimum or the maximum element   \
* Used to find minimum or maximum element in tree.   \
*/         \
void name##_SPLAY_MINMAX(struct name *head, int __comp) \
{         \
 struct type __node, *__left, *__right, *__tmp;   \
```

```
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
 __left = __right = &__node;     \
\
 while (1) {       \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if (__comp < 0){    \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKLEFT(head, __right, field);  \
  } else if (__comp > 0) {    \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if (__comp > 0) {    \
    SPLAY_ROTATE_LEFT(head, __tmp, field); \
    if (SPLAY_RIGHT((head)->sph_root,
 field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKRIGHT(head, __left, field);  \
  }       \
 }       \
 SPLAY_ASSEMBLE(head, &__node, __left, __right, field);  \
}

#define SPLAY_NEGINF -1
#define SPLAY_INF 1

#define SPLAY_INSERT(name, x, y) name##_SPLAY_INSERT(x, y)
#define SPLAY_REMOVE(name, x, y) name##_SPLAY_REMOVE(x, y)
#define SPLAY_FIND(name, x, y)  name##_SPLAY_FIND(x, y)
#define SPLAY_NEXT(name, x, y)  name##_SPLAY_NEXT(x, y)
#define SPLAY_MIN(name, x)  (SPLAY_EMPTY(x) ? NULL \
     : name##_SPLAY_MIN_MAX(x, SPLAY_NEGINF))
#define SPLAY_MAX(name, x)  (SPLAY_EMPTY(x) ? NULL \
     : name##_SPLAY_MIN_MAX(x, SPLAY_INF))

#define SPLAY_FOREACH(x, name, head)     \
 for ((x) = SPLAY_MIN(name, head);    \
      (x) != NULL;      \
      (x) = SPLAY_NEXT(name, head, x))
```

```
/* Macros that define a red-black tree */
#define RB_HEAD(name, type)      \
struct name {        \
 struct type *rbh_root; /* root of the tree */   \
}

#define RB_INITIALIZER(root)      \
 {
 NULL }

#define RB_INIT(root) do {      \
 (root)->rbh_root = NULL;     \
} while (/*CONSTCOND*/ 0)

#define RB_BLACK 0
#define RB_RED  1
#define RB_ENTRY(type)       \
struct {        \
 struct type *rbe_left;  /* left element */  \
 struct type *rbe_right;  /* right element */  \
 struct type *rbe_parent; /* parent element */  \
 int rbe_color;   /* node color */  \
}

#define RB_LEFT(elm, field)  (elm)->field.rbe_left
#define RB_RIGHT(elm, field)  (elm)->field.rbe_right
#define RB_PARENT(elm, field)  (elm)->field.rbe_parent
#define RB_COLOR(elm, field)  (elm)->field.rbe_color
#define RB_ROOT(head)   (head)->rbh_root
#define RB_EMPTY(head)   (RB_ROOT(head) == NULL)

#define RB_SET(elm, parent, field) do {     \
 RB_PARENT(elm, field) = parent;     \
 RB_LEFT(elm, field) = RB_RIGHT(elm, field) = NULL;  \
 RB_COLOR(elm, field) = RB_RED;     \
} while (/*CONSTCOND*/ 0)

#define RB_SET_BLACKRED(black, red, field) do {    \
 RB_COLOR(black, field) = RB_BLACK;    \
 RB_COLOR(red, field)
 = RB_RED;     \
} while (/*CONSTCOND*/ 0)

#ifndef RB_AUGMENT
#define RB_AUGMENT(x) do {} while (/*CONSTCOND*/ 0)
#endif

#define RB_ROTATE_LEFT(head, elm, tmp, field) do {   \
```

```
 (tmp) = RB_RIGHT(elm, field);     \
 if ((RB_RIGHT(elm, field) = RB_LEFT(tmp, field)) != NULL) { \
  RB_PARENT(RB_LEFT(tmp, field), field) = (elm);  \
 }        \
 RB_AUGMENT(elm);      \
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
   RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
  else       \
   RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else        \
  (head)->rbh_root = (tmp);    \
 RB_LEFT(tmp, field) = (elm);     \
 RB_PARENT(elm, field) = (tmp);     \
 RB_AUGMENT(tmp);      \
 if ((RB_PARENT(tmp, field)))     \
  RB_AUGMENT(RB_PARENT(tmp, field));   \
} while (/*CONSTCOND*/ 0)

#define RB_ROTATE_RIGHT(head, elm, tmp, field) do {   \
 (tmp) = RB_LEFT(elm, field);     \
 if ((RB_LEFT(elm, field) = RB_RIGHT(tmp, field))
 != NULL) { \
  RB_PARENT(RB_RIGHT(tmp, field), field) = (elm);  \
 }        \
 RB_AUGMENT(elm);      \
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
   RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
  else       \
   RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else        \
  (head)->rbh_root = (tmp);    \
 RB_RIGHT(tmp, field) = (elm);     \
 RB_PARENT(elm, field) = (tmp);     \
 RB_AUGMENT(tmp);      \
 if ((RB_PARENT(tmp, field)))     \
  RB_AUGMENT(RB_PARENT(tmp, field));   \
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */
#define RB_PROTOTYPE(name, type, field, cmp)    \
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp,)
#define RB_PROTOTYPE_STATIC(name, type, field, cmp)   \
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_PROTOTYPE_INTERNAL(name, type, field, cmp, attr)  \
attr void name##_RB_INSERT_COLOR(struct name *, struct
```

```
 type *);  \
attr void name##_RB_REMOVE_COLOR(struct name *, struct type *, struct type *);\
attr struct type *name##_RB_REMOVE(struct name *, struct type *); \
attr struct type *name##_RB_INSERT(struct name *, struct type *); \
attr struct type *name##_RB_FIND(struct name *, struct type *);  \
attr struct type *name##_RB_NFIND(struct name *, struct type *); \
attr struct type *name##_RB_NEXT(struct type *);   \
attr struct type *name##_RB_PREV(struct type *);   \
attr struct type *name##_RB_MINMAX(struct name *, int);   \
        \

/* Main rb operation.
* Moves node close to the key of elm to top
*/
#define RB_GENERATE(name, type, field, cmp)    \
 RB_GENERATE_INTERNAL(name, type, field, cmp,)
#define RB_GENERATE_STATIC(name, type, field, cmp)   \
 RB_GENERATE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_GENERATE_INTERNAL(name, type, field, cmp, attr)  \
attr void        \
name##_RB_INSERT_COLOR(struct name *head, struct type *elm)  \
{        \
 struct type
 *parent, *gparent, *tmp;    \
 while ((parent = RB_PARENT(elm, field)) != NULL &&  \
     RB_COLOR(parent, field) == RB_RED) {   \
  gparent = RB_PARENT(parent, field);   \
  if (parent == RB_LEFT(gparent, field)) {  \
   tmp = RB_RIGHT(gparent, field);   \
   if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
    RB_COLOR(tmp, field) = RB_BLACK; \
    RB_SET_BLACKRED(parent, gparent, field);\
    elm = gparent;    \
    continue;    \
   }      \
   if (RB_RIGHT(parent, field) == elm) {  \
    RB_ROTATE_LEFT(head, parent, tmp, field);\
    tmp = parent;    \
    parent = elm;    \
    elm = tmp;    \
   }      \
   RB_SET_BLACKRED(parent, gparent, field); \
   RB_ROTATE_RIGHT(head, gparent, tmp, field); \
  } else {      \
   tmp = RB_LEFT(gparent, field);   \
   if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
    RB_COLOR(tmp, field) = RB_BLACK; \
    RB_SET_BLACKRED(parent, gparent, field);\
```

```
    elm = gparent;    \
    continue;    \
   }      \
   if (RB_LEFT(parent, field) == elm)
  {  \
    RB_ROTATE_RIGHT(head, parent, tmp, field);\
    tmp = parent;    \
    parent = elm;    \
    elm = tmp;    \
   }      \
   RB_SET_BLACKRED(parent, gparent, field); \
   RB_ROTATE_LEFT(head, gparent, tmp, field); \
  }       \
 }        \
 RB_COLOR(head->rbh_root, field) = RB_BLACK;   \
}         \
         \
attr void        \
name##_RB_REMOVE_COLOR(struct name *head, struct type *parent, struct type *elm) \
{         \
 struct type *tmp;      \
 while ((elm == NULL || RB_COLOR(elm, field) == RB_BLACK) && \
     elm != RB_ROOT(head)) {     \
  if (RB_LEFT(parent, field) == elm) {   \
   tmp = RB_RIGHT(parent, field);   \
   if (RB_COLOR(tmp, field) == RB_RED) {  \
    RB_SET_BLACKRED(tmp, parent, field); \
    RB_ROTATE_LEFT(head, parent, tmp, field);\
    tmp = RB_RIGHT(parent, field);  \
   }      \
   if ((RB_LEFT(tmp, field) == NULL ||  \
       RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
       (RB_RIGHT(tmp, field) == NULL ||  \
       RB_COLOR(RB_RIGHT(tmp,
 field), field) == RB_BLACK)) {\
    RB_COLOR(tmp, field) = RB_RED;  \
    elm = parent;    \
    parent = RB_PARENT(elm, field);  \
   } else {     \
    if (RB_RIGHT(tmp, field) == NULL || \
        RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK) {\
     struct type *oleft;  \
     if ((oleft = RB_LEFT(tmp, field)) \
         != NULL)   \
      RB_COLOR(oleft, field) = RB_BLACK;\
     RB_COLOR(tmp, field) = RB_RED; \
     RB_ROTATE_RIGHT(head, tmp, oleft, field);\
     tmp = RB_RIGHT(parent, field); \
```

```
   }     \
   RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
   RB_COLOR(parent, field) = RB_BLACK; \
   if (RB_RIGHT(tmp, field))  \
    RB_COLOR(RB_RIGHT(tmp, field), field) = RB_BLACK;\
   RB_ROTATE_LEFT(head, parent, tmp, field);\
   elm = RB_ROOT(head);   \
   break;     \
  }      \
 } else {      \
  tmp = RB_LEFT(parent, field);   \
  if (RB_COLOR(tmp, field) == RB_RED) {  \
   RB_SET_BLACKRED(tmp, parent, field); \
   RB_ROTATE_RIGHT(head, parent, tmp, field);\
   tmp
= RB_LEFT(parent, field);  \
  }      \
  if ((RB_LEFT(tmp, field) == NULL ||  \
      RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
      (RB_RIGHT(tmp, field) == NULL ||  \
      RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK)) {\
   RB_COLOR(tmp, field) = RB_RED;  \
   elm = parent;    \
   parent = RB_PARENT(elm, field);  \
  } else {     \
   if (RB_LEFT(tmp, field) == NULL || \
       RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) {\
    struct type *oright;  \
    if ((oright = RB_RIGHT(tmp, field)) \
        != NULL)   \
     RB_COLOR(oright, field) = RB_BLACK;\
    RB_COLOR(tmp, field) = RB_RED; \
    RB_ROTATE_LEFT(head, tmp, oright, field);\
    tmp = RB_LEFT(parent, field); \
   }     \
   RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
   RB_COLOR(parent, field) = RB_BLACK; \
   if (RB_LEFT(tmp, field))  \
    RB_COLOR(RB_LEFT(tmp, field), field) = RB_BLACK;\
   RB_ROTATE_RIGHT(head, parent, tmp, field);\
   elm = RB_ROOT(head);   \
   break;     \
  }      \
 }       \
}        \
if
(elm)       \
 RB_COLOR(elm, field) = RB_BLACK;   \
```

```
}        \
        \
attr struct type *       \
name##_RB_REMOVE(struct name *head, struct type *elm)   \
{        \
 struct type *child, *parent, *old = elm;   \
 int color;       \
 if (RB_LEFT(elm, field) == NULL)    \
  child = RB_RIGHT(elm, field);    \
 else if (RB_RIGHT(elm, field) == NULL)    \
  child = RB_LEFT(elm, field);    \
 else {        \
  struct type *left;     \
  elm = RB_RIGHT(elm, field);    \
  while ((left = RB_LEFT(elm, field)) != NULL)  \
   elm = left;     \
  child = RB_RIGHT(elm, field);    \
  parent = RB_PARENT(elm, field);    \
  color = RB_COLOR(elm, field);    \
  if (child)      \
   RB_PARENT(child, field) = parent;  \
  if (parent) {      \
   if (RB_LEFT(parent, field) == elm)  \
    RB_LEFT(parent, field) = child;  \
   else      \
    RB_RIGHT(parent, field) = child; \
   RB_AUGMENT(parent);    \
  } else       \
   RB_ROOT(head)
 = child;    \
  if (RB_PARENT(elm, field) == old)   \
   parent = elm;     \
  (elm)->field = (old)->field;    \
  if (RB_PARENT(old, field)) {    \
   if (RB_LEFT(RB_PARENT(old, field), field) == old)\
    RB_LEFT(RB_PARENT(old, field), field) = elm;\
   else      \
    RB_RIGHT(RB_PARENT(old, field), field) = elm;\
   RB_AUGMENT(RB_PARENT(old, field));  \
  } else       \
   RB_ROOT(head) = elm;    \
  RB_PARENT(RB_LEFT(old, field), field) = elm;  \
  if (RB_RIGHT(old, field))    \
   RB_PARENT(RB_RIGHT(old, field), field) = elm; \
  if (parent) {      \
   left = parent;     \
   do {      \
    RB_AUGMENT(left);   \
```

```
  } while ((left = RB_PARENT(left, field)) != NULL); \
 }      \
 goto color;     \
}       \
parent = RB_PARENT(elm, field);    \
color = RB_COLOR(elm, field);    \
if (child)      \
 RB_PARENT(child, field) = parent;   \
if (parent) {      \
 if (RB_LEFT(parent, field) == elm)   \
  RB_LEFT(parent, field) = child;   \
 else      \
  RB_RIGHT(parent,
field) = child;  \
 RB_AUGMENT(parent);    \
} else       \
 RB_ROOT(head) = child;    \
color:        \
if (color == RB_BLACK)     \
 name##_RB_REMOVE_COLOR(head, parent, child);  \
return (old);      \
}        \
        \
/* Inserts a node into the RB tree */    \
attr struct type *      \
name##_RB_INSERT(struct name *head, struct type *elm)   \
{        \
struct type *tmp;     \
struct type *parent = NULL;    \
int comp = 0;      \
tmp = RB_ROOT(head);     \
while (tmp) {      \
 parent = tmp;     \
 comp = (cmp)(elm, parent);   \
 if (comp < 0)     \
  tmp = RB_LEFT(tmp, field);   \
 else if (comp > 0)    \
  tmp = RB_RIGHT(tmp, field);   \
 else      \
  return (tmp);    \
}       \
RB_SET(elm, parent, field);    \
if (parent != NULL) {     \
 if (comp < 0)     \
  RB_LEFT(parent, field) = elm;   \
 else      \
  RB_RIGHT(parent, field) = elm;   \
 RB_AUGMENT(parent);    \
```

```
 } else       \
  RB_ROOT(head) = elm;     \
 name##_RB_INSERT_COLOR(head,
 elm);    \
 return (NULL);       \
}         \
         \
/* Finds the node with the same key as elm */    \
attr struct type *       \
name##_RB_FIND(struct name *head, struct type *elm)   \
{         \
 struct type *tmp = RB_ROOT(head);    \
 int comp;       \
 while (tmp) {       \
  comp = cmp(elm, tmp);     \
  if (comp < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else if (comp > 0)     \
   tmp = RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }        \
 return (NULL);       \
}         \
         \
/* Finds the first node greater than or equal to the search key */ \
attr struct type *       \
name##_RB_NFIND(struct name *head, struct type *elm)   \
{         \
 struct type *tmp = RB_ROOT(head);    \
 struct type *res = NULL;     \
 int comp;       \
 while (tmp) {       \
  comp = cmp(elm, tmp);     \
  if (comp < 0) {      \
   res = tmp;     \
   tmp = RB_LEFT(tmp, field);   \
  }       \
  else if (comp > 0)     \
   tmp =
 RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }        \
 return (res);       \
}         \
         \
/* ARGSUSED */        \
```

```
attr struct type *       \
name##_RB_NEXT(struct type *elm)     \
{        \
 if (RB_RIGHT(elm, field)) {     \
  elm = RB_RIGHT(elm, field);    \
  while (RB_LEFT(elm, field))    \
   elm = RB_LEFT(elm, field);   \
 } else {       \
  if (RB_PARENT(elm, field) &&    \
      (elm == RB_LEFT(RB_PARENT(elm, field), field))) \
   elm = RB_PARENT(elm, field);   \
  else {       \
   while (RB_PARENT(elm, field) &&   \
       (elm == RB_RIGHT(RB_PARENT(elm, field), field)))\
    elm = RB_PARENT(elm, field);  \
   elm = RB_PARENT(elm, field);   \
  }       \
 }        \
 return (elm);       \
}        \
        \
/* ARGSUSED */        \
attr struct type *       \
name##_RB_PREV(struct type *elm)     \
{        \
 if (RB_LEFT(elm, field)) {     \
  elm = RB_LEFT(elm, field);    \
  while (RB_RIGHT(elm, field))    \
   elm = RB_RIGHT(elm, field);   \
 }
 else {       \
  if (RB_PARENT(elm, field) &&    \
      (elm == RB_RIGHT(RB_PARENT(elm, field), field))) \
   elm = RB_PARENT(elm, field);   \
  else {       \
   while (RB_PARENT(elm, field) &&   \
       (elm == RB_LEFT(RB_PARENT(elm, field), field)))\
    elm = RB_PARENT(elm, field);  \
   elm = RB_PARENT(elm, field);   \
  }       \
 }        \
 return (elm);       \
}        \
        \
attr struct type *       \
name##_RB_MINMAX(struct name *head, int val)    \
{        \
 struct type *tmp = RB_ROOT(head);    \
```

```
 struct type *parent = NULL;     \
 while (tmp) {       \
  parent = tmp;      \
  if (val < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else       \
   tmp = RB_RIGHT(tmp, field);   \
 }        \
 return (parent);      \
}

#define RB_NEGINF -1
#define RB_INF 1

#define RB_INSERT(name, x, y) name##_RB_INSERT(x, y)
#define RB_REMOVE(name, x, y) name##_RB_REMOVE(x, y)
#define RB_FIND(name, x, y) name##_RB_FIND(x, y)
#define RB_NFIND(name, x, y) name##_RB_NFIND(x,
 y)
#define RB_NEXT(name, x, y) name##_RB_NEXT(y)
#define RB_PREV(name, x, y) name##_RB_PREV(y)
#define RB_MIN(name, x)  name##_RB_MINMAX(x, RB_NEGINF)
#define RB_MAX(name, x)  name##_RB_MINMAX(x, RB_INF)

#define RB_FOREACH(x, name, head)     \
 for ((x) = RB_MIN(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_NEXT(x))

#define RB_FOREACH_FROM(x, name, y)     \
 for ((x) = (y);       \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_SAFE(x, name, head, y)    \
 for ((x) = RB_MIN(name, head);     \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_REVERSE(x, name, head)    \
 for ((x) = RB_MAX(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_PREV(x))

#define RB_FOREACH_REVERSE_FROM(x, name, y)    \
 for ((x) = (y);       \
     ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
      (x) = (y))
```

```
#define RB_FOREACH_REVERSE_SAFE(x, name,
 head, y)   \
 for ((x) = RB_MAX(name, head);     \
     ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
      (x) = (y))

#endif /* _SYS_TREE_H_ */
```

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# 1.2900 nghttp3 1.15.0-r1

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# 1.2901 libcom-err 1.47.3-r2

## 1.2901.1 Available under license :

```
Index: tdbsa/tdb.c
===================================================================
--- tdbsa.orig/tdb.c
+++ tdbsa/tdb.c
@@ -4,11 +4,11 @@ Rev: 23371
Last Changed Date: 2007-06-06 20:14:06 -0400 (Wed, 06 Jun 2007)
*/
 /*
-   Unix SMB/CIFS implementation.
+   trivial database library - standalone version

-   trivial database library - private includes
-
-   Copyright (C) Andrew Tridgell            2005
+   Copyright (C) Andrew Tridgell            1999-2005
+   Copyright (C) Jeremy Allison             2000-2006
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    ** NOTE! The following LGPL license applies to the tdb
    ** library. This does NOT imply that all of Samba is released
```

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Gadi Oxman, August 1995

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Theodore Ts'o
23-June-2007

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That's all there is to it!
#
# This is a Makefile stub which handles the creation of BSD shared
# libraries.
#
# In order to use this stub, the following makefile variables must be defined.
#
# BSDLIB_VERSION = 1.0

```
# BSDLIB_IMAGE = libce
# BSDLIB_MYDIR = et
# BSDLIB_INSTALL_DIR = $(SHLIBDIR)
#

all:: image

real-subdirs:: Makefile
 @echo " MKDIR pic"
 @mkdir -p pic

BSD_LIB = $(BSDLIB_IMAGE).so.$(BSDLIB_VERSION)
BSDLIB_PIC_FLAG = -fpic

image:  $(BSD_LIB)

$(BSD_LIB): $(OBJS)
 (cd pic; ld -Bshareable -o $(BSD_LIB) $(LDFLAGS_SHLIB) $(OBJS))
 $(MV) pic/$(BSD_LIB) .
 $(RM) -f ../$(BSD_LIB)
 (cd ..; $(LN) $(LINK_BUILD_FLAGS) \
  `echo $(my_dir) | sed -e 's;lib/;;'`/$(BSD_LIB) $(BSD_LIB))

install-shlibs install:: $(BSD_LIB)
 @echo " INSTALL_PROGRAM $(BSDLIB_INSTALL_DIR)/$(BSD_LIB)"
 @$(INSTALL_PROGRAM) $(BSD_LIB) \
  $(DESTDIR)$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)
 @-$(LDCONFIG)

install-strip: install

install-shlibs-strip:: install-shlibs

uninstall-shlibs uninstall::
 $(RM) -f $(DESTDIR)$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)

clean::
 $(RM)
 -rf pic
 $(RM) -f $(BSD_LIB)
 $(RM) -f ../$(BSD_LIB)
```

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    lib/support/plausible.c
    misc/fuse2fs.c
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```
*/
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# 1.2902 e2fsprogs 1.47.3-r2

## 1.2902.1 Available under license :

```
Index: tdbsa/tdb.c
===================================================================
--- tdbsa.orig/tdb.c
+++ tdbsa/tdb.c
@@ -4,11 +4,11 @@ Rev: 23371
Last Changed Date: 2007-06-06 20:14:06 -0400 (Wed, 06 Jun 2007)
*/
 /*
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-
-   Copyright (C) Andrew Tridgell            2005
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Theodore Ts'o
23-June-2007

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That's all there is to it!
#
# This is a Makefile stub which handles the creation of BSD shared
# libraries.
#
# In order to use this stub, the following makefile variables must be defined.
#
# BSDLIB_VERSION = 1.0
# BSDLIB_IMAGE = libce
# BSDLIB_MYDIR = et
# BSDLIB_INSTALL_DIR = $(SHLIBDIR)
#

all:: image

```
real-subdirs:: Makefile
 @echo " MKDIR pic"
 @mkdir -p pic

BSD_LIB = $(BSDLIB_IMAGE).so.$(BSDLIB_VERSION)
BSDLIB_PIC_FLAG = -fpic

image:  $(BSD_LIB)

$(BSD_LIB): $(OBJS)
 (cd pic; ld -Bshareable -o $(BSD_LIB) $(LDFLAGS_SHLIB) $(OBJS))
 $(MV) pic/$(BSD_LIB) .
 $(RM) -f ../$(BSD_LIB)
 (cd ..; $(LN) $(LINK_BUILD_FLAGS) \
  `echo $(my_dir) | sed -e 's;lib/;;'`/$(BSD_LIB) $(BSD_LIB))

install-shlibs install:: $(BSD_LIB)
 @echo " INSTALL_PROGRAM $(BSDLIB_INSTALL_DIR)/$(BSD_LIB)"
 @$(INSTALL_PROGRAM) $(BSD_LIB) \
  $(DESTDIR)$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)
 @-$(LDCONFIG)

install-strip: install

install-shlibs-strip:: install-shlibs

uninstall-shlibs uninstall::
 $(RM) -f $(DESTDIR)$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)

clean::
 $(RM)
 -rf pic
 $(RM) -f $(BSD_LIB)
 $(RM) -f ../$(BSD_LIB)
```

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*/

# 1.2903 krb5-conf 1.0-r8

## 1.2903.1 Available under license :

```
package:
 name: py3-license-expression
 version: "30.4.4"
 epoch: 3 # go/wolfi-rsc/py3-license-expression
 description: license-expression is a comprehensive utility library to parse, compare, simplify and normalize license
expressions (such as SPDX license expressions) using boolean logic.
 copyright:
   - license: Apache-2.0
 dependencies:
   provider-priority: 0
 resources:
   cpu: "2"
   memory: 4Gi

vars:
 pypi-package: license-expression
 import: license_expression

data:
 - name: py-versions
   items:
     3.10: '310'
     3.11: '311'
     3.12: '312'
     3.13: '313'

environment:
 contents:
   packages:
     - py3-supported-build-base

pipeline:
 - uses: git-checkout
   with:
     repository: https://github.com/nexB/license-expression
     tag: v${{package.version}}
     expected-commit: a3c00c09986bcca1240afd5b1844b56de3f581c1

subpackages:
 - range: py-versions
   name: py${{range.key}}-${{vars.pypi-package}}
   description: python${{range.key}}
 version of ${{vars.pypi-package}}
   dependencies:
```

```
    provider-priority: ${{range.value}}
    provides:
      - ${{package.name}}
      - py3-${{vars.pypi-package}}
    runtime:
      - py${{range.key}}-boolean.py
  pipeline:
    - uses: py/pip-build-install
      with:
        python: python${{range.key}}
    - uses: strip
  test:
    pipeline:
      - uses: test/tw/pip-check
      - uses: python/import
        with:
          python: python${{range.key}}
          imports: |
            import ${{vars.import}}

- name: py3-supported-${{vars.pypi-package}}
  description: meta package providing ${{vars.pypi-package}} for supported python versions.
  dependencies:
    runtime:
      - py3.10-${{vars.pypi-package}}
      - py3.11-${{vars.pypi-package}}
      - py3.12-${{vars.pypi-package}}
      - py3.13-${{vars.pypi-package}}
  test:
    pipeline:
      - uses: test/metapackage

test:
 pipeline:
   - uses: python/import

    with:
      imports: |
        import ${{vars.import}}

update:
 enabled: true
 github:
   identifier: nexB/license-expression
   strip-prefix: v
```

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```
package:
 name: go-licenses
 version: "2.0.1"
 epoch: 5
 description: A lightweight tool to report on the licenses used by a Go package and its dependencies. Highlight! Versioned external URL to licenses can be found at the same time.
 copyright:
   - license: Apache-2.0

pipeline:
 - uses: git-checkout
   with:
     repository: https://github.com/google/go-licenses
     tag: v${{package.version}}
     expected-commit: 3e084b0caf710f7bfead967567539214f598c0a2

 - uses: go/build
   with:
     modroot: .
     packages: .
     output: go-licenses

update:
 enabled: true
 github:
   identifier: google/go-licenses
   strip-prefix: v

test:
 pipeline:
   # AUTOGENERATED
   - runs: |
       go-licenses --help

environment:
 contents:
   packages:
     - go-1.25
package:
 name: libart-lgpl
 version: 2.3.21
 epoch: 5 # go/wolfi-rsc/libart-lgpl
 description: A library for high-performance 2D graphics
```

```
 copyright:
   - license: LGPL-2.0-or-later
 resources:
   cpu: "1"
   memory: 4Gi

var-transforms:
 - from: ${{package.version}}
   match: ^(\d+)\.(\d+)\.(\d+)$
   replace: LIBART_LGPL_${1}_${2}_$3
   to: tag-name

environment:
 contents:
   packages:
     - autoconf
     - automake
     - build-base
     - busybox
     - ca-certificates-bundle
     - libtool

pipeline:
 - uses: git-checkout
   with:
     repository: https://gitlab.gnome.org/Archive/libart_lgpl
     tag: ${{vars.tag-name}}
     expected-commit: 7119bfe163a5a5325405acb7eab1b16152e8032a

 - runs: autoreconf -vif

 - uses: autoconf/configure
   with:
     opts: |
       --disable-static

 - uses: autoconf/make

 - uses: autoconf/make-install

 - uses: strip

subpackages:
 - name: libart-lgpl-dev
   pipeline:
     - uses: split/dev
   dependencies:
```

```
      runtime:
      - libart-lgpl
  description: libart-lgpl dev
  test:
    environment:
      contents:
        packages:
          - build-base
          - pkgconf
    pipeline:
      - runs: |
          libart2-config --version
      - uses: test/pkgconf
      - uses: test/tw/ldd-check
      - uses: test/tw/devpackage
      - name: Test compile and link against libart
        runs: |
          set -euo pipefail

          tee test.c <<'EOF'
          #include <libart_lgpl/libart.h>
          #include <stdio.h>
          int main() {
              double affine[6];
              art_affine_identity(affine);
              /* Identity matrix should be [1,0,0,1,0,0] */
              if (affine[0] != 1.0 || affine[3] != 1.0) {
                  fprintf(stderr, "FAIL: unexpected identity affine\n");
                  return 1;
              }
              printf("SUCCESS: libart affine identity works\n");
              return
 0;
          }
          EOF

          gcc $(pkg-config --cflags libart-2.0) test.c -o test $(pkg-config --libs libart-2.0)
          ./test

update:
 enabled: true
 release-monitor:
   identifier: 21864

test:
 environment:
   contents:
     packages:
```

```
    - libart-lgpl-dev
    - build-base
    - pkgconf
pipeline:
  - uses: test/tw/ldd-check
  - name: Test library compilation and linking
    runs: |
      set -euo pipefail

      tee test.c <<'EOF'
      #include <libart_lgpl/libart.h>
      #include <stdio.h>
      int main() {
          double affine[6];
          art_affine_identity(affine);
          /* Identity matrix should be [1,0,0,1,0,0] */
          if (affine[0] != 1.0 || affine[3] != 1.0) {
              fprintf(stderr, "FAIL: unexpected identity affine\n");
              return 1;
          }
          printf("SUCCESS: libart compile and link works\n");
          return 0;
      }
      EOF

      gcc $(pkg-config
--cflags libart-2.0) test.c -o test $(pkg-config --libs libart-2.0)
      ./test
```

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These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Program, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Program, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Program.

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1 and 2 above on a medium customarily used for software interchange; or,

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machine-readable copy of the corresponding source code, to be
distributed under the terms of Sections 1 and 2 above on a medium
customarily used for software interchange; or,

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in object code or executable form with such
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The source code for a work means the preferred form of the work for
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END OF TERMS AND CONDITIONS

Appendix: How to Apply These Terms to Your New Programs

If you develop a new program, and you want it to be of the greatest possible use to the public, the best way to achieve this is to make it free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

<one line to give the program's name and a brief idea of what it does.>
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The hypothetical commands `show
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`Gnomovision' (which makes passes at compilers) written by James Hacker.

<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice

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For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

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2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License.
Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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b) Give prominent notice with the combined library of the fact
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<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

That's all there is to it!

# 1.2905 keyutils 1.6.3-r38

## 1.2905.1 Available under license :

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Version 2, June 1991

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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which
must be distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

If distribution of object code is made by offering access to copy
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Section 6 states terms for distribution of such executables.

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Whether this is true is especially significant if the work can be
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threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data
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functions (ten lines or less in length), then the use of the object
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Any executables containing that work also fall under Section 6,
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6. As an exception to the Sections above, you may also combine or
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b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

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# 1.2906 alpine-base 3.23.2-r0

## 1.2906.1 Available under license :

```
# Contributor: Carlo Landmeter <clandmeter@alpinelinux.org>
# Maintainer: Kevin Daudt <kdaudt@alpinelinux.org>
pkgname=spdx-licenses
pkgver=3.27.0
pkgrel=0
pkgdesc="Various data formats for the SPDX License List"
url="https://spdx.org/"
arch="noarch"
options="!check" # no test suite
license="CC-BY-3.0"
source="license-list-data-$pkgver.tar.gz::https://github.com/spdx/license-list-data/archive/v$pkgver.tar.gz"
builddir="$srcdir/license-list-data-$pkgver"
subpackages="$pkgname-list"

_types="html json rdfa rdfnt rdfturtle rdfxml template text"

for type in $_types; do
 subpackages="$subpackages $pkgname-$type:_subpkg"
done

package() {
 mkdir -p "$pkgdir"
}

_subpkg() {
 local type=${subpkgname/$pkgname-/}
 pkgdesc="$pkgdesc ($type)"
 install_if="$pkgname=$pkgver-r$pkgrel"
 mkdir -p "$subpkgdir"/usr/share/spdx
 cp -r "$builddir"/$type "$subpkgdir"/usr/share/spdx/
}

list() {
 pkgdesc="$pkgdesc (licence list)"
 mkdir -p "$subpkgdir"/usr/share/spdx
 local i; for i in "$builddir"/text/*.txt;
 do
  local license=${i##*/}
  echo ${license%.*} >> "$subpkgdir"/usr/share/spdx/license.lst
 done
}
```

```
sha512sums="
16d59c81e331b54b52639826f83408d98144cdaa70eacc3e8ce35dc3b13992e4794cf7515eb9db200efd390a0c0e35ae9
d4706fbe0ca6a8d236189e88870720c  license-list-data-3.27.0.tar.gz
"
# Automatically generated by apkbuild-cpan, template 4
# Contributor: Valery Kartel <valery.kartel@gmail.com>
# Maintainer: Celeste <cielesti@protonmail.com>
maintainer="Celeste <cielesti@protonmail.com>"
pkgname=perl-bsd-resource
pkgver=1.2911
pkgrel=11
#_pkgreal is used by apkbuild-cpan to find modules at MetaCpan
_pkgreal=BSD-Resource
pkgdesc="Perl extension implements the BSD process resource limit functions"
url="https://metacpan.org/release/BSD-Resource/"
arch="all"
license="Artistic-2.0 OR LGPL-2.0"
depends="perl"
makedepends="perl-dev"
subpackages="$pkgname-doc"
source="https://cpan.metacpan.org/authors/id/J/JH/JHI/BSD-Resource-$pkgver.tar.gz"
builddir="$srcdir/$_pkgreal-$pkgver"

build() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 PERL_MM_USE_DEFAULT=1 perl -I. Makefile.PL \
  INSTALLDIRS=vendor \
  NO_PACKLIST=1 \
  NO_PERLLOCAL=1
 make
}

check() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 make test
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="
d0032d41c7c0468ed1c6d8f57b885f6cb97a5039d754c8cb60b2067daedaf53bd15fb6561a3d0f828df16dfa5417f663b
8065ba65f4fea16dc9262728b3b6b85
  BSD-Resource-1.2911.tar.gz
"
maintainer="Achill Gilgenast <achill@achill.org>"
pkgname=cargo-license
```

```
pkgver=0.7.0
pkgrel=1
pkgdesc="Cargo subcommand to see license of dependencies"
url="https://github.com/onur/cargo-license"
arch="all"
license="MIT"
makedepends="cargo cargo-auditable"
source="$pkgname-$pkgver.tar.gz::https://crates.io/api/v1/crates/cargo-license/$pkgver/download"

prepare() {
 default_prepare

 cargo fetch --target="$CTARGET" --locked
}

build() {
 cargo auditable build --release --frozen
}

check() {
 cargo test --frozen
}

package() {
 install -Dm755 target/release/cargo-license -t "$pkgdir"/usr/bin
}

sha512sums="
9b3f0ead35515e85ef4074ebdbdbe5b9ec8bcaec244fabe414e2ed60f90366e8b1692d8bf7ffe4c07d778e60d94bab86bc
0c8be9823232e9c360a38bc65e9c5a  cargo-license-0.7.0.tar.gz
"
# Contributor: Maxim Karasev <begs@disroot.org>
# Maintainer: mio <miyopan@e.email>
pkgname=bsd-games
pkgver=3.3
pkgrel=2
pkgdesc="traditional text mode games from BSD"
url="https://bsd-games.sourceforge.io/"
arch="all"
license="BSD-3-Clause"
install="$pkgname.post-install"
makedepends="ncurses-dev coreutils" # configure causes busybox expr error
subpackages="$pkgname-doc"
source="https://sourceforge.net/projects/bsd-games/files/bsd-games-$pkgver.tar.gz
 0001-bsd-games-scores-dir.patch
 "
options="!check" # no tests
```

```
build() {
 # some GNU autoconf options are ignored, but it works
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr \
  --sysconfdir=/etc \
  --mandir=/usr/share/man \
  --scoredir=/usr/share/$pkgname
 make
}

package() {
 make DESTDIR="$pkgdir" install
 install -Dm644 LICENSE "$pkgdir"/usr/share/licenses/bsd-games/LICENSE
}

sha512sums="
aaf36d09d4fe68514a5c279063d7e77a9a9a84c447037cba974b29faa07eb80c2aab2379d0699c196b5c27ffe1b2bb2c6
8d3390143e0e62d5e3d210ccfb61294
  bsd-games-3.3.tar.gz
e1def0d4835a877242c4173fae862e278a7858738e0bacacbb045a42bcabec2aa7c72d000bbd2421ce35fe66cdc1f52c0
577b7e278029ca5ed50f7aab22319f6  0001-bsd-games-scores-dir.patch
"
```

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mini_sendmail - accept email on behalf of real sendmail

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```
# Maintainer: Natanael Copa <ncopa@alpinelinux.org>
pkgname=libart-lgpl
pkgver=2.3.21
pkgrel=8
pkgdesc="A library for high-performance 2D graphics"
url="https://www.levien.com/libart/"
arch="all"
options="!check"  # No test suite.
license="LGPL-2.0-or-later"
subpackages="$pkgname-dev"
source="https://download.gnome.org/sources/libart_lgpl/2.3/libart_lgpl-$pkgver.tar.bz2
 "

builddir="$srcdir"/libart_lgpl-$pkgver

prepare() {
 update_config_sub
 default_prepare
}

build() {
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
```

```
  --prefix=/usr
 make
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="8a632a6a4da59e5e8c02ec2f5a57e36d182b325b46513765425e5f171ff9ae326af1b133725beba28f7e7
6654309e001aee9bace727b5b4c8589405256a3c020  libart_lgpl-2.3.21.tar.bz2"
# Contributor: Patrycja Rosa <alpine@ptrcnull.me>
# Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=bsd-compat-headers
pkgver=0.7.2
pkgrel=6
pkgdesc="BSD compatibility headers (cdefs, queue, tree)"
url="https://gitlab.alpinelinux.org/alpine/aports"
arch="noarch"
license="BSD-2-Clause AND BSD-3-Clause"
source="
 cdefs.h
 queue.h
 tree.h
"
builddir="$srcdir"
options="!check" # just headers

package() {
 mkdir -p "$pkgdir"
 install -Dm644 -t "$pkgdir"/usr/include/sys \
  cdefs.h queue.h tree.h
}
sha512sums="
37c8fc73c7aea7b490f7850927e2bb91d12137c9e59e22c084146d515696dbc7973b5de92f4c987ba080dd2502ba8312
7006442c3f019b6447a620c0cae73178  cdefs.h
2f0d5e6e4dc3350285cf17009265dddcbe12431c111868eea39bc8cb038ab7c1f2acacbb21735c4e9d4a1fd106a8fc0f86
11ea33987d4faba37dde5ce6da0750  queue.h
d9ac210d81feb8ad2655bc80fb065d3fe20ae4417b32b4a1711e6738a4870140005c13373b5d1846ef3ce5ae6da45f2da
cef2092881eded0a2e94f6a07752ef3  tree.h
"
```

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"X-Splines: A Spline Model Designed for the End User" by C. Blanc and C. Schlick, Proceedings of SIGGRAPH'95
http://dept-info.labri.u-bordeaux.fr/~schlick/DOC/sig1.html
/* $NetBSD: queue.h,v 1.70 2015/11/02 15:21:23 christos Exp $ */

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*
* @(#)queue.h 8.5 (Berkeley) 8/20/94
*/

#ifndef _SYS_QUEUE_H_
#define _SYS_QUEUE_H_

/*
* This file defines five types of data structures: singly-linked lists,
* lists, simple queues, tail queues, and circular queues.
*
* A singly-linked list is headed by a single forward pointer. The
* elements are singly linked for minimum space and
 pointer manipulation
* overhead at the expense of O(n) removal for arbitrary elements. New
* elements can be added to the list after an existing element or at the
* head of the list.  Elements being removed from the head of the list
* should use the explicit macro for this purpose for optimum
* efficiency. A singly-linked list may only be traversed in the forward
* direction.  Singly-linked lists are ideal for applications with large
* datasets and few or no removals or for implementing a LIFO queue.
*
* A list is headed by a single forward pointer (or an array of forward
* pointers for a hash table header). The elements are doubly linked
* so that an arbitrary element can be removed without a need to
* traverse the list. New elements can be added to the list before
* or after an existing element or at the head of the list. A list
* may only be traversed in the forward direction.
*
* A simple queue is headed by a pair of pointers, one the head of the
* list and the
 other to the tail of the list. The elements are singly
* linked to save space, so elements can only be removed from the
* head of the list. New elements can be added to the list after
* an existing element, at the head of the list, or at the end of the
* list. A simple queue may only be traversed in the forward direction.
*
* A tail queue is headed by a pair of pointers, one to the head of the
* list and the other to the tail of the list. The elements are doubly
* linked so that an arbitrary element can be removed without a need to
* traverse the list. New elements can be added to the list before or
* after an existing element, at the head of the list, or at the end of
* the list. A tail queue may be traversed in either direction.
*
* A circle queue is headed by a pair of pointers, one to the head of the
```

```
* list and the other to the tail of the list. The elements are doubly
* linked so that an arbitrary element can be removed without a need to
* traverse the list. New elements
 can be added to the list before or after
* an existing element, at the head of the list, or at the end of the list.
* A circle queue may be traversed in either direction, but has a more
* complex end of list detection.
*
* For details on the use of these macros, see the queue(3) manual page.
*/

/*
* Include the definition of NULL only on NetBSD because sys/null.h
* is not available elsewhere.  This conditional makes the header
* portable and it can simply be dropped verbatim into any system.
* The caveat is that on other systems some other header
* must provide NULL before the macros can be used.
*/
#ifdef __NetBSD__
#include <sys/null.h>
#endif

#if defined(QUEUEDEBUG)
# if defined(_KERNEL)
#  define QUEUEDEBUG_ABORT(...) panic(__VA_ARGS__)
# else
#  include <err.h>
#  define QUEUEDEBUG_ABORT(...) err(1, __VA_ARGS__)
# endif
#endif

/*
* Singly-linked List definitions.
*/
#define SLIST_HEAD(name, type)      \
struct name {        \
 struct type *slh_first; /* first
 element */   \
}

#define SLIST_HEAD_INITIALIZER(head)     \
 { NULL }

#define SLIST_ENTRY(type)      \
struct {        \
 struct type *sle_next; /* next element */   \
}
```

```
/*
* Singly-linked List access methods.
*/
#define SLIST_FIRST(head) ((head)->slh_first)
#define SLIST_END(head)  NULL
#define SLIST_EMPTY(head) ((head)->slh_first == NULL)
#define SLIST_NEXT(elm, field) ((elm)->field.sle_next)

#define SLIST_FOREACH(var, head, field)     \
 for((var) = (head)->slh_first;     \
     (var) != SLIST_END(head);     \
     (var) = (var)->field.sle_next)

#define SLIST_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = SLIST_FIRST((head));    \
     (var) != SLIST_END(head) &&     \
     ((tvar) = SLIST_NEXT((var), field), 1);   \
     (var) = (tvar))

/*
* Singly-linked List functions.
*/
#define SLIST_INIT(head) do {      \
 (head)->slh_first = SLIST_END(head);    \
} while (/*CONSTCOND*/0)

#define SLIST_INSERT_AFTER(slistelm, elm, field) do {   \
 (elm)->field.sle_next = (slistelm)->field.sle_next;  \
 (slistelm)->field.sle_next
 = (elm);    \
} while (/*CONSTCOND*/0)

#define SLIST_INSERT_HEAD(head, elm, field) do {   \
 (elm)->field.sle_next = (head)->slh_first;   \
 (head)->slh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE_AFTER(slistelm, field) do {   \
 (slistelm)->field.sle_next =     \
     SLIST_NEXT(SLIST_NEXT((slistelm), field), field);  \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE_HEAD(head, field) do {    \
 (head)->slh_first = (head)->slh_first->field.sle_next;  \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE(head, elm, type, field) do {   \
 if ((head)->slh_first == (elm)) {    \
```

```
  SLIST_REMOVE_HEAD((head), field);   \
 }        \
 else {        \
  struct type *curelm = (head)->slh_first;  \
  while(curelm->field.sle_next != (elm))   \
   curelm = curelm->field.sle_next;  \
  curelm->field.sle_next =    \
      curelm->field.sle_next->field.sle_next;  \
 }        \
} while (/*CONSTCOND*/0)


/*
* List definitions.
 */
#define LIST_HEAD(name, type)      \
struct name {        \
 struct type *lh_first; /* first element */   \
}

#define LIST_HEAD_INITIALIZER(head)     \
 { NULL }

#define LIST_ENTRY(type)      \
struct {        \
 struct type *le_next; /* next element */   \
 struct type **le_prev; /* address of previous next element */ \
}

/*
* List access methods.
*/
#define LIST_FIRST(head)  ((head)->lh_first)
#define LIST_END(head)   NULL
#define LIST_EMPTY(head)  ((head)->lh_first == LIST_END(head))
#define LIST_NEXT(elm, field)  ((elm)->field.le_next)

#define LIST_FOREACH(var, head, field)     \
 for ((var) = ((head)->lh_first);    \
     (var) != LIST_END(head);     \
     (var) = ((var)->field.le_next))

#define LIST_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = LIST_FIRST((head));    \
     (var) != LIST_END(head) &&     \
     ((tvar) = LIST_NEXT((var), field), 1);   \
     (var) = (tvar))
```

```
#define LIST_MOVE(head1, head2) do {     \
 LIST_INIT((head2));      \
 if (!LIST_EMPTY((head1)))
 {     \
  (head2)->lh_first = (head1)->lh_first;   \
  LIST_INIT((head1));     \
 }        \
} while (/*CONSTCOND*/0)

/*
* List functions.
*/
#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_LIST_INSERT_HEAD(head, elm, field)   \
 if ((head)->lh_first &&      \
     (head)->lh_first->field.le_prev != &(head)->lh_first) \
  QUEUEDEBUG_ABORT("LIST_INSERT_HEAD %p %s:%d", (head), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_LIST_OP(elm, field)     \
 if ((elm)->field.le_next &&     \
     (elm)->field.le_next->field.le_prev !=   \
     &(elm)->field.le_next)     \
  QUEUEDEBUG_ABORT("LIST_* forw %p %s:%d", (elm),  \
      __FILE__, __LINE__);    \
 if (*(elm)->field.le_prev != (elm))    \
  QUEUEDEBUG_ABORT("LIST_* back %p %s:%d", (elm),  \
      __FILE__, __LINE__);
#define QUEUEDEBUG_LIST_POSTREMOVE(elm, field)    \
 (elm)->field.le_next = (void *)1L;    \
 (elm)->field.le_prev = (void *)1L;
#else
#define QUEUEDEBUG_LIST_INSERT_HEAD(head, elm, field)
#define QUEUEDEBUG_LIST_OP(elm,
 field)
#define QUEUEDEBUG_LIST_POSTREMOVE(elm, field)
#endif

#define LIST_INIT(head) do {      \
 (head)->lh_first = LIST_END(head);    \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_AFTER(listelm, elm, field) do {   \
 QUEUEDEBUG_LIST_OP((listelm), field)    \
 if (((elm)->field.le_next = (listelm)->field.le_next) !=  \
     LIST_END(head))      \
  (listelm)->field.le_next->field.le_prev =  \
      &(elm)->field.le_next;    \
 (listelm)->field.le_next = (elm);    \
```

```
 (elm)->field.le_prev = &(listelm)->field.le_next;  \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_BEFORE(listelm, elm, field) do {   \
 QUEUEDEBUG_LIST_OP((listelm), field)    \
 (elm)->field.le_prev = (listelm)->field.le_prev;  \
 (elm)->field.le_next = (listelm);    \
 *(listelm)->field.le_prev = (elm);    \
 (listelm)->field.le_prev = &(elm)->field.le_next;  \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_HEAD(head, elm, field) do {    \
 QUEUEDEBUG_LIST_INSERT_HEAD((head), (elm), field)  \
 if (((elm)->field.le_next
 = (head)->lh_first) != LIST_END(head))\
  (head)->lh_first->field.le_prev = &(elm)->field.le_next;\
 (head)->lh_first = (elm);     \
 (elm)->field.le_prev = &(head)->lh_first;   \
} while (/*CONSTCOND*/0)

#define LIST_REMOVE(elm, field) do {     \
 QUEUEDEBUG_LIST_OP((elm), field)    \
 if ((elm)->field.le_next != NULL)    \
  (elm)->field.le_next->field.le_prev =    \
      (elm)->field.le_prev;    \
 *(elm)->field.le_prev = (elm)->field.le_next;   \
 QUEUEDEBUG_LIST_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

#define LIST_REPLACE(elm, elm2, field) do {    \
 if (((elm2)->field.le_next = (elm)->field.le_next) != NULL) \
  (elm2)->field.le_next->field.le_prev =   \
      &(elm2)->field.le_next;    \
 (elm2)->field.le_prev = (elm)->field.le_prev;   \
 *(elm2)->field.le_prev = (elm2);    \
 QUEUEDEBUG_LIST_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

/*
* Simple queue definitions.
*/
#define SIMPLEQ_HEAD(name, type)     \
struct name {        \
 struct
 type *sqh_first; /* first element */   \
 struct type **sqh_last; /* addr of last next element */  \
 }
```

```
#define SIMPLEQ_HEAD_INITIALIZER(head)     \
 { NULL, &(head).sqh_first }

#define SIMPLEQ_ENTRY(type)      \
struct {        \
 struct type *sqe_next; /* next element */   \
}

/*
* Simple queue access methods.
*/
#define SIMPLEQ_FIRST(head)  ((head)->sqh_first)
#define SIMPLEQ_END(head)  NULL
#define SIMPLEQ_EMPTY(head)  ((head)->sqh_first == SIMPLEQ_END(head))
#define SIMPLEQ_NEXT(elm, field) ((elm)->field.sqe_next)

#define SIMPLEQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->sqh_first);    \
     (var) != SIMPLEQ_END(head);     \
     (var) = ((var)->field.sqe_next))

#define SIMPLEQ_FOREACH_SAFE(var, head, field, next)   \
 for ((var) = ((head)->sqh_first);    \
     (var) != SIMPLEQ_END(head) &&    \
     ((next = ((var)->field.sqe_next)), 1);   \
     (var) = (next))

/*
* Simple queue functions.
*/
#define SIMPLEQ_INIT(head) do {      \
 (head)->sqh_first = NULL;     \
 (head)->sqh_last
 = &(head)->sqh_first;    \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_HEAD(head, elm, field) do {   \
 if (((elm)->field.sqe_next = (head)->sqh_first) == NULL) \
  (head)->sqh_last = &(elm)->field.sqe_next;  \
 (head)->sqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_TAIL(head, elm, field) do {   \
 (elm)->field.sqe_next = NULL;     \
 *(head)->sqh_last = (elm);     \
 (head)->sqh_last = &(elm)->field.sqe_next;   \
} while (/*CONSTCOND*/0)
```

```
#define SIMPLEQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 if (((elm)->field.sqe_next = (listelm)->field.sqe_next) == NULL)\
  (head)->sqh_last = &(elm)->field.sqe_next;  \
 (listelm)->field.sqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE_HEAD(head, field) do {    \
 if (((head)->sqh_first = (head)->sqh_first->field.sqe_next) == NULL) \
  (head)->sqh_last = &(head)->sqh_first;   \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE_AFTER(head, elm, field) do {   \
 if
 (((elm)->field.sqe_next = (elm)->field.sqe_next->field.sqe_next) \
    == NULL)       \
  (head)->sqh_last = &(elm)->field.sqe_next;  \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE(head, elm, type, field) do {   \
 if ((head)->sqh_first == (elm)) {    \
  SIMPLEQ_REMOVE_HEAD((head), field);   \
 } else {       \
  struct type *curelm = (head)->sqh_first;  \
  while (curelm->field.sqe_next != (elm))   \
   curelm = curelm->field.sqe_next;  \
  if ((curelm->field.sqe_next =    \
   curelm->field.sqe_next->field.sqe_next) == NULL) \
       (head)->sqh_last = &(curelm)->field.sqe_next; \
 }        \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_CONCAT(head1, head2) do {    \
 if (!SIMPLEQ_EMPTY((head2))) {     \
  *(head1)->sqh_last = (head2)->sqh_first;  \
  (head1)->sqh_last = (head2)->sqh_last;  \
  SIMPLEQ_INIT((head2));     \
 }        \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_LAST(head, type, field)     \
 (SIMPLEQ_EMPTY((head)) ?      \
  NULL :       \
        ((struct type
 *)(void *)    \
  ((char *)((head)->sqh_last) - offsetof(struct type, field))))

/*
* Tail queue definitions.
```

```
*/
#define _TAILQ_HEAD(name, type, qual)     \
struct name {        \
 qual type *tqh_first;  /* first element */  \
 qual type *qual *tqh_last; /* addr of last next element */ \
}
#define TAILQ_HEAD(name, type) _TAILQ_HEAD(name, struct type,)

#define TAILQ_HEAD_INITIALIZER(head)     \
 { TAILQ_END(head), &(head).tqh_first }

#define _TAILQ_ENTRY(type, qual)     \
struct {        \
 qual type *tqe_next;  /* next element */  \
 qual type *qual *tqe_prev; /* address of previous next element */\
}
#define TAILQ_ENTRY(type) _TAILQ_ENTRY(struct type,)

/*
* Tail queue access methods.
*/
#define TAILQ_FIRST(head)  ((head)->tqh_first)
#define TAILQ_END(head)   (NULL)
#define TAILQ_NEXT(elm, field)  ((elm)->field.tqe_next)
#define TAILQ_LAST(head, headname) \
 (*(((struct headname *)(void *)((head)->tqh_last))->tqh_last))
#define TAILQ_PREV(elm, headname, field) \
 (*(((struct headname
 *)(void *)((elm)->field.tqe_prev))->tqh_last))
#define TAILQ_EMPTY(head)  (TAILQ_FIRST(head) == TAILQ_END(head))


#define TAILQ_FOREACH(var, head, field)     \
 for ((var) = ((head)->tqh_first);    \
     (var) != TAILQ_END(head);     \
     (var) = ((var)->field.tqe_next))

#define TAILQ_FOREACH_SAFE(var, head, field, next)   \
 for ((var) = ((head)->tqh_first);    \
     (var) != TAILQ_END(head) &&     \
     ((next) = TAILQ_NEXT(var, field), 1); (var) = (next))

#define TAILQ_FOREACH_REVERSE(var, head, headname, field)  \
 for ((var) = TAILQ_LAST((head), headname);   \
     (var) != TAILQ_END(head);     \
     (var) = TAILQ_PREV((var), headname, field))

#define TAILQ_FOREACH_REVERSE_SAFE(var, head, headname, field, prev) \
```

```
 for ((var) = TAILQ_LAST((head), headname);   \
     (var) != TAILQ_END(head) &&     \
     ((prev) = TAILQ_PREV((var), headname, field), 1); (var) = (prev))

/*
* Tail queue functions.
*/
#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_TAILQ_INSERT_HEAD(head,
 elm, field)   \
 if ((head)->tqh_first &&     \
     (head)->tqh_first->field.tqe_prev != &(head)->tqh_first) \
  QUEUEDEBUG_ABORT("TAILQ_INSERT_HEAD %p %s:%d", (head), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_INSERT_TAIL(head, elm, field)   \
 if (*(head)->tqh_last != NULL)     \
  QUEUEDEBUG_ABORT("TAILQ_INSERT_TAIL %p %s:%d", (head), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_OP(elm, field)     \
 if ((elm)->field.tqe_next &&     \
     (elm)->field.tqe_next->field.tqe_prev !=   \
     &(elm)->field.tqe_next)     \
  QUEUEDEBUG_ABORT("TAILQ_* forw %p %s:%d", (elm), \
      __FILE__, __LINE__);    \
 if (*(elm)->field.tqe_prev != (elm))    \
  QUEUEDEBUG_ABORT("TAILQ_* back %p %s:%d", (elm), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_PREREMOVE(head, elm, field)   \
 if ((elm)->field.tqe_next == NULL &&    \
     (head)->tqh_last != &(elm)->field.tqe_next)   \
  QUEUEDEBUG_ABORT("TAILQ_PREREMOVE head %p elm %p %s:%d",\
      (head), (elm), __FILE__,
 __LINE__);
#define QUEUEDEBUG_TAILQ_POSTREMOVE(elm, field)    \
 (elm)->field.tqe_next = (void *)1L;    \
 (elm)->field.tqe_prev = (void *)1L;
#else
#define QUEUEDEBUG_TAILQ_INSERT_HEAD(head, elm, field)
#define QUEUEDEBUG_TAILQ_INSERT_TAIL(head, elm, field)
#define QUEUEDEBUG_TAILQ_OP(elm, field)
#define QUEUEDEBUG_TAILQ_PREREMOVE(head, elm, field)
#define QUEUEDEBUG_TAILQ_POSTREMOVE(elm, field)
#endif

#define TAILQ_INIT(head) do {      \
 (head)->tqh_first = TAILQ_END(head);    \
 (head)->tqh_last = &(head)->tqh_first;    \
} while (/*CONSTCOND*/0)
```

```
#define TAILQ_INSERT_HEAD(head, elm, field) do {   \
 QUEUEDEBUG_TAILQ_INSERT_HEAD((head), (elm), field)  \
 if (((elm)->field.tqe_next = (head)->tqh_first) != TAILQ_END(head))\
  (head)->tqh_first->field.tqe_prev =   \
      &(elm)->field.tqe_next;    \
 else       \
  (head)->tqh_last = &(elm)->field.tqe_next;  \
 (head)->tqh_first = (elm);     \
 (elm)->field.tqe_prev = &(head)->tqh_first;   \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_TAIL(head,
 elm, field) do {   \
 QUEUEDEBUG_TAILQ_INSERT_TAIL((head), (elm), field)  \
 (elm)->field.tqe_next = TAILQ_END(head);   \
 (elm)->field.tqe_prev = (head)->tqh_last;   \
 *(head)->tqh_last = (elm);     \
 (head)->tqh_last = &(elm)->field.tqe_next;   \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 QUEUEDEBUG_TAILQ_OP((listelm), field)    \
 if (((elm)->field.tqe_next = (listelm)->field.tqe_next) !=  \
     TAILQ_END(head))      \
  (elm)->field.tqe_next->field.tqe_prev =   \
      &(elm)->field.tqe_next;    \
 else       \
  (head)->tqh_last = &(elm)->field.tqe_next;  \
 (listelm)->field.tqe_next = (elm);    \
 (elm)->field.tqe_prev = &(listelm)->field.tqe_next;  \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_BEFORE(listelm, elm, field) do {   \
 QUEUEDEBUG_TAILQ_OP((listelm), field)    \
 (elm)->field.tqe_prev = (listelm)->field.tqe_prev;  \
 (elm)->field.tqe_next = (listelm);    \
 *(listelm)->field.tqe_prev = (elm);    \
 (listelm)->field.tqe_prev
 = &(elm)->field.tqe_next;  \
} while (/*CONSTCOND*/0)

#define TAILQ_REMOVE(head, elm, field) do {    \
 QUEUEDEBUG_TAILQ_PREREMOVE((head), (elm), field)  \
 QUEUEDEBUG_TAILQ_OP((elm), field)    \
 if (((elm)->field.tqe_next) != TAILQ_END(head))   \
  (elm)->field.tqe_next->field.tqe_prev =   \
      (elm)->field.tqe_prev;    \
```

```
 else       \
  (head)->tqh_last = (elm)->field.tqe_prev;  \
 *(elm)->field.tqe_prev = (elm)->field.tqe_next;   \
 QUEUEDEBUG_TAILQ_POSTREMOVE((elm), field);   \
} while (/*CONSTCOND*/0)

#define TAILQ_REPLACE(head, elm, elm2, field) do {   \
      if (((elm2)->field.tqe_next = (elm)->field.tqe_next) !=  \
    TAILQ_END(head))        \
            (elm2)->field.tqe_next->field.tqe_prev =  \
               &(elm2)->field.tqe_next;    \
      else       \
            (head)->tqh_last = &(elm2)->field.tqe_next;  \
      (elm2)->field.tqe_prev = (elm)->field.tqe_prev;   \
      *(elm2)->field.tqe_prev = (elm2);    \
 QUEUEDEBUG_TAILQ_POSTREMOVE((elm),
 field);   \
} while (/*CONSTCOND*/0)

#define TAILQ_CONCAT(head1, head2, field) do {    \
 if (!TAILQ_EMPTY(head2)) {     \
  *(head1)->tqh_last = (head2)->tqh_first;  \
  (head2)->tqh_first->field.tqe_prev = (head1)->tqh_last; \
  (head1)->tqh_last = (head2)->tqh_last;   \
  TAILQ_INIT((head2));     \
 }       \
} while (/*CONSTCOND*/0)

/*
* Singly-linked Tail queue declarations.
*/
#define STAILQ_HEAD(name, type)      \
struct name {       \
 struct type *stqh_first; /* first element */  \
 struct type **stqh_last; /* addr of last next element */ \
}

#define STAILQ_HEAD_INITIALIZER(head)     \
 { NULL, &(head).stqh_first }

#define STAILQ_ENTRY(type)      \
struct {       \
 struct type *stqe_next; /* next element */   \
}

/*
* Singly-linked Tail queue access methods.
*/
```

```
#define STAILQ_FIRST(head) ((head)->stqh_first)
#define STAILQ_END(head) NULL
#define STAILQ_NEXT(elm, field) ((elm)->field.stqe_next)
#define STAILQ_EMPTY(head) (STAILQ_FIRST(head)
 == STAILQ_END(head))

/*
* Singly-linked Tail queue functions.
*/
#define STAILQ_INIT(head) do {      \
 (head)->stqh_first = NULL;     \
 (head)->stqh_last = &(head)->stqh_first;    \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_HEAD(head, elm, field) do {   \
 if (((elm)->field.stqe_next = (head)->stqh_first) == NULL) \
  (head)->stqh_last = &(elm)->field.stqe_next;  \
 (head)->stqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_TAIL(head, elm, field) do {   \
 (elm)->field.stqe_next = NULL;     \
 *(head)->stqh_last = (elm);     \
 (head)->stqh_last = &(elm)->field.stqe_next;   \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 if (((elm)->field.stqe_next = (listelm)->field.stqe_next) == NULL)\
  (head)->stqh_last = &(elm)->field.stqe_next;  \
 (listelm)->field.stqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define STAILQ_REMOVE_HEAD(head, field) do {    \
 if (((head)->stqh_first = (head)->stqh_first->field.stqe_next)
 == NULL) \
  (head)->stqh_last = &(head)->stqh_first;   \
} while (/*CONSTCOND*/0)

#define STAILQ_REMOVE(head, elm, type, field) do {   \
 if ((head)->stqh_first == (elm)) {    \
  STAILQ_REMOVE_HEAD((head), field);   \
 } else {       \
  struct type *curelm = (head)->stqh_first;  \
  while (curelm->field.stqe_next != (elm))   \
   curelm = curelm->field.stqe_next;  \
  if ((curelm->field.stqe_next =    \
   curelm->field.stqe_next->field.stqe_next) == NULL) \
       (head)->stqh_last = &(curelm)->field.stqe_next; \
```

```
 }       \
} while (/*CONSTCOND*/0)

#define STAILQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->stqh_first);    \
  (var);       \
  (var) = ((var)->field.stqe_next))

#define STAILQ_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = STAILQ_FIRST((head));    \
     (var) && ((tvar) = STAILQ_NEXT((var), field), 1);  \
     (var) = (tvar))

#define STAILQ_CONCAT(head1, head2) do {    \
 if (!STAILQ_EMPTY((head2))) {     \
  *(head1)->stqh_last
 = (head2)->stqh_first;  \
  (head1)->stqh_last = (head2)->stqh_last;  \
  STAILQ_INIT((head2));     \
 }       \
} while (/*CONSTCOND*/0)

#define STAILQ_LAST(head, type, field)     \
 (STAILQ_EMPTY((head)) ?      \
  NULL :       \
        ((struct type *)(void *)    \
  ((char *)((head)->stqh_last) - offsetof(struct type, field))))


#ifndef _KERNEL
/*
* Circular queue definitions. Do not use. We still keep the macros
* for compatibility but because of pointer aliasing issues their use
* is discouraged!
*/

/*
* __launder_type():  We use this ugly hack to work around the the compiler
* noticing that two types may not alias each other and elide tests in code.
* We hit this in the CIRCLEQ macros when comparing 'struct name *' and
* 'struct type *' (see CIRCLEQ_HEAD()).  Modern compilers (such as GCC
* 4.8) declare these comparisons as always false, causing the code to
* not run as designed.
*
* This hack is only to be used for comparisons and thus can be fully const.
 * Do not use for assignment.
*
* If we ever choose to change the ABI of the CIRCLEQ macros, we could fix
```

```
* this by changing the head/tail sentinal values, but see the note above
* this one.
*/
static __inline const void * __launder_type(const void *);
static __inline const void *
__launder_type(const void *__x)
{
 __asm __volatile("" : "+r" (__x));
 return __x;
}

#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_CIRCLEQ_HEAD(head, field)    \
 if ((head)->cqh_first != CIRCLEQ_ENDC(head) &&   \
     (head)->cqh_first->field.cqe_prev != CIRCLEQ_ENDC(head)) \
  QUEUEDEBUG_ABORT("CIRCLEQ head forw %p %s:%d", (head), \
        __FILE__, __LINE__);    \
 if ((head)->cqh_last != CIRCLEQ_ENDC(head) &&   \
     (head)->cqh_last->field.cqe_next != CIRCLEQ_ENDC(head)) \
  QUEUEDEBUG_ABORT("CIRCLEQ head back %p %s:%d", (head), \
        __FILE__, __LINE__);
#define QUEUEDEBUG_CIRCLEQ_ELM(head, elm, field)   \
 if ((elm)->field.cqe_next == CIRCLEQ_ENDC(head)) {  \
  if ((head)->cqh_last != (elm))    \
   QUEUEDEBUG_ABORT("CIRCLEQ
 elm last %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 } else {       \
  if ((elm)->field.cqe_next->field.cqe_prev != (elm)) \
   QUEUEDEBUG_ABORT("CIRCLEQ elm forw %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 }        \
 if ((elm)->field.cqe_prev == CIRCLEQ_ENDC(head)) {  \
  if ((head)->cqh_first != (elm))    \
   QUEUEDEBUG_ABORT("CIRCLEQ elm first %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 } else {       \
  if ((elm)->field.cqe_prev->field.cqe_next != (elm)) \
   QUEUEDEBUG_ABORT("CIRCLEQ elm prev %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 }
#define QUEUEDEBUG_CIRCLEQ_POSTREMOVE(elm, field)   \
 (elm)->field.cqe_next = (void *)1L;    \
 (elm)->field.cqe_prev = (void *)1L;
#else
#define QUEUEDEBUG_CIRCLEQ_HEAD(head, field)
#define QUEUEDEBUG_CIRCLEQ_ELM(head, elm, field)
#define QUEUEDEBUG_CIRCLEQ_POSTREMOVE(elm, field)
```

```
#endif

#define CIRCLEQ_HEAD(name, type)     \
struct name {        \
 struct type *cqh_first;  /*
 first element */  \
 struct type *cqh_last;  /* last element */  \
}

#define CIRCLEQ_HEAD_INITIALIZER(head)     \
 { CIRCLEQ_END(&head), CIRCLEQ_END(&head) }

#define CIRCLEQ_ENTRY(type)      \
struct {        \
 struct type *cqe_next;  /* next element */  \
 struct type *cqe_prev;  /* previous element */  \
}

/*
* Circular queue functions.
*/
#define CIRCLEQ_INIT(head) do {      \
 (head)->cqh_first = CIRCLEQ_END(head);    \
 (head)->cqh_last = CIRCLEQ_END(head);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (listelm), field)  \
 (elm)->field.cqe_next = (listelm)->field.cqe_next;  \
 (elm)->field.cqe_prev = (listelm);    \
 if ((listelm)->field.cqe_next == CIRCLEQ_ENDC(head))  \
  (head)->cqh_last = (elm);    \
 else        \
  (listelm)->field.cqe_next->field.cqe_prev = (elm); \
 (listelm)->field.cqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_BEFORE(head,
 listelm, elm, field) do {  \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (listelm), field)  \
 (elm)->field.cqe_next = (listelm);    \
 (elm)->field.cqe_prev = (listelm)->field.cqe_prev;  \
 if ((listelm)->field.cqe_prev == CIRCLEQ_ENDC(head))  \
  (head)->cqh_first = (elm);    \
 else        \
  (listelm)->field.cqe_prev->field.cqe_next = (elm); \
```

```
 (listelm)->field.cqe_prev = (elm);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_HEAD(head, elm, field) do {   \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 (elm)->field.cqe_next = (head)->cqh_first;   \
 (elm)->field.cqe_prev = CIRCLEQ_END(head);   \
 if ((head)->cqh_last == CIRCLEQ_ENDC(head))   \
  (head)->cqh_last = (elm);    \
 else       \
  (head)->cqh_first->field.cqe_prev = (elm);  \
 (head)->cqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_TAIL(head, elm, field) do {   \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 (elm)->field.cqe_next
 = CIRCLEQ_END(head);   \
 (elm)->field.cqe_prev = (head)->cqh_last;   \
 if ((head)->cqh_first == CIRCLEQ_ENDC(head))   \
  (head)->cqh_first = (elm);    \
 else       \
  (head)->cqh_last->field.cqe_next = (elm);  \
 (head)->cqh_last = (elm);     \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_REMOVE(head, elm, field) do {    \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (elm), field)   \
 if ((elm)->field.cqe_next == CIRCLEQ_ENDC(head))  \
  (head)->cqh_last = (elm)->field.cqe_prev;  \
 else       \
  (elm)->field.cqe_next->field.cqe_prev =   \
     (elm)->field.cqe_prev;    \
 if ((elm)->field.cqe_prev == CIRCLEQ_ENDC(head))  \
  (head)->cqh_first = (elm)->field.cqe_next;  \
 else       \
  (elm)->field.cqe_prev->field.cqe_next =   \
     (elm)->field.cqe_next;    \
 QUEUEDEBUG_CIRCLEQ_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->cqh_first);    \
  (var) != CIRCLEQ_ENDC(head);    \
  (var)
 = ((var)->field.cqe_next))
```

```
#define CIRCLEQ_FOREACH_REVERSE(var, head, field)   \
 for ((var) = ((head)->cqh_last);    \
  (var) != CIRCLEQ_ENDC(head);    \
  (var) = ((var)->field.cqe_prev))

/*
* Circular queue access methods.
*/
#define CIRCLEQ_FIRST(head)  ((head)->cqh_first)
#define CIRCLEQ_LAST(head)  ((head)->cqh_last)
/* For comparisons */
#define CIRCLEQ_ENDC(head)  (__launder_type(head))
/* For assignments */
#define CIRCLEQ_END(head)  ((void *)(head))
#define CIRCLEQ_NEXT(elm, field) ((elm)->field.cqe_next)
#define CIRCLEQ_PREV(elm, field) ((elm)->field.cqe_prev)
#define CIRCLEQ_EMPTY(head)      \
   (CIRCLEQ_FIRST(head) == CIRCLEQ_ENDC(head))

#define CIRCLEQ_LOOP_NEXT(head, elm, field)    \
 (((elm)->field.cqe_next == CIRCLEQ_ENDC(head))   \
     ? ((head)->cqh_first)     \
     : (elm->field.cqe_next))
#define CIRCLEQ_LOOP_PREV(head, elm, field)    \
 (((elm)->field.cqe_prev == CIRCLEQ_ENDC(head))   \
     ? ((head)->cqh_last)     \
     :
 (elm->field.cqe_prev))
#endif /* !_KERNEL */

#endif /* !_SYS_QUEUE_H_ */
# Contributor: Fabian Affolter <fabian@affolter-engineering.ch>
# Maintainer: Fabian Affolter <fabian@affolter-engineering.ch>
pkgname=py3-flake8-copyright
_pkgname=flake8-copyright
pkgver=0.2.4
pkgrel=3
pkgdesc="Extension for flake8 which checks for copyrights"
options="!check" # No testsuite
url="https://github.com/savoirfairelinux/flake8-copyright"
arch="noarch"
license="MIT"
depends="py3-flake8 py3-setuptools"
makedepends="py3-gpep517 py3-wheel"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/${_pkgname:0:1}/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir"/$_pkgname-$pkgver
```

```
replaces="py-flake8-copyright"                # Backwards compatibility
provides="py-flake8-copyright=$pkgver-r$pkgrel" # Backwards compatibility

build() {
 gpep517 build-wheel \
  --wheel-dir .dist \
  --output-fd 3 3>&1 >&2
}

package() {
 gpep517 install-wheel --destdir "$pkgdir" \
  .dist/*.whl
}

sha512sums="
a6ab47e1bb715618f075c51f398e18180404871b3b0faf1c2d30701d5203db6bc23771bf22ffb5bafcd8ee856b9b64237
b316bd503ae7dceed6ca284ccd5a74d
  flake8-copyright-0.2.4.tar.gz
"
```

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```
/* $NetBSD: tree.h,v 1.20 2013/09/14 13:20:45 joerg Exp $ */
/* $OpenBSD: tree.h,v 1.13 2011/07/09 00:19:45 pirofti Exp $ */
/* Modified by Void Linux. */
/*
* Copyright 2002 Niels Provos <provos@citi.umich.edu>
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```

```
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*/

#ifndef _SYS_TREE_H_
#define _SYS_TREE_H_

#ifdef __GNUC__
#define __GNUC_PREREQ__(x, y)      \
 ((__GNUC__ == (x) && __GNUC_MINOR__ >= (y)) ||   \
  (__GNUC__ > (x)))
#else
#define __GNUC_PREREQ__(x, y) 0
#endif

#if __GNUC_PREREQ__(2, 7) || defined(__lint__)
#define _sys_tree_h_unused __attribute__((__unused__))
#else
#define _sys_tree_h_unused /* delete */
#endif

/*
* This file defines data structures for different types of trees:
* splay trees and red-black trees.
*
* A splay tree is a self-organizing
 data structure.  Every operation
* on the tree causes a splay to happen.  The splay moves the requested
* node to the root of the tree and partly rebalances it.
```

```
*
* This has the benefit that request locality causes faster lookups as
* the requested nodes move to the top of the tree.  On the other hand,
* every lookup causes memory writes.
*
* The Balance Theorem bounds the total access time for m operations
* and n inserts on an initially empty tree as O((m + n)lg n).  The
* amortized cost for a sequence of m accesses to a splay tree is O(lg n);
*
* A red-black tree is a binary search tree with the node color as an
* extra attribute.  It fulfills a set of conditions:
* - every search path from the root to a leaf consists of the
*   same number of black nodes,
* - each red node (except for the root) has a black parent,
* - each leaf node is black.
*
* Every operation on a red-black tree is bounded as O(lg n).
* The maximum height of a red-black tree is 2lg (n+1).
 */

#define SPLAY_HEAD(name, type)      \
struct name {        \
 struct type *sph_root; /* root of the tree */   \
}

#define SPLAY_INITIALIZER(root)      \
 { NULL }

#define SPLAY_INIT(root) do {      \
 (root)->sph_root = NULL;     \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ENTRY(type)      \
struct {        \
 struct type *spe_left; /* left element */   \
 struct type *spe_right; /* right element */   \
}

#define SPLAY_LEFT(elm, field)  (elm)->field.spe_left
#define SPLAY_RIGHT(elm, field)  (elm)->field.spe_right
#define SPLAY_ROOT(head)  (head)->sph_root
#define SPLAY_EMPTY(head)  (SPLAY_ROOT(head) == NULL)

/* SPLAY_ROTATE_{LEFT,RIGHT} expect that tmp hold SPLAY_{RIGHT,LEFT} */
#define SPLAY_ROTATE_RIGHT(head, tmp, field) do {   \
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(tmp, field); \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;      \
```

```
} while (/*CONSTCOND*/ 0)

#define SPLAY_ROTATE_LEFT(head, tmp, field) do {   \
 SPLAY_RIGHT((head)->sph_root,
 field) = SPLAY_LEFT(tmp, field); \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;      \
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKLEFT(head, tmp, field) do {    \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;      \
 (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);  \
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKRIGHT(head, tmp, field) do {    \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;      \
 (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field); \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ASSEMBLE(head, node, left, right, field) do {  \
 SPLAY_RIGHT(left, field) = SPLAY_LEFT((head)->sph_root, field); \
 SPLAY_LEFT(right, field) = SPLAY_RIGHT((head)->sph_root, field);\
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(node, field); \
 SPLAY_RIGHT((head)->sph_root, field) = SPLAY_LEFT(node, field); \
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */

#define
 SPLAY_PROTOTYPE(name, type, field, cmp)    \
void name##_SPLAY(struct name *, struct type *);   \
void name##_SPLAY_MINMAX(struct name *, int);    \
struct type *name##_SPLAY_INSERT(struct name *, struct type *);  \
struct type *name##_SPLAY_REMOVE(struct name *, struct type *);  \
        \
/* Finds the node with the same key as elm */    \
static __inline struct type *      \
name##_SPLAY_FIND(struct name *head, struct type *elm)   \
{        \
 if (SPLAY_EMPTY(head))      \
  return(NULL);      \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0)    \
  return (head->sph_root);    \
 return (NULL);       \
}        \
```

```
        \
static __inline _sys_tree_h_unused struct type *   \
name##_SPLAY_NEXT(struct name *head, struct type *elm)   \
{        \
 name##_SPLAY(head, elm);     \
 if (SPLAY_RIGHT(elm, field) != NULL) {    \
  elm = SPLAY_RIGHT(elm, field);    \
  while (SPLAY_LEFT(elm, field) != NULL) {  \
   elm = SPLAY_LEFT(elm, field);   \
  }       \
 }
 else       \
  elm = NULL;      \
 return (elm);       \
}        \
        \
static _sys_tree_h_unused __inline struct type *   \
name##_SPLAY_MIN_MAX(struct name *head, int val)   \
{        \
 name##_SPLAY_MINMAX(head, val);     \
      return (SPLAY_ROOT(head));     \
}

/* Main splay operation.
* Moves node close to the key of elm to top
*/
#define SPLAY_GENERATE(name, type, field, cmp)    \
struct type *       \
name##_SPLAY_INSERT(struct name *head, struct type *elm)  \
{        \
   if (SPLAY_EMPTY(head)) {      \
     SPLAY_LEFT(elm, field) = SPLAY_RIGHT(elm, field) = NULL; \
   } else {       \
     int __comp;       \
     name##_SPLAY(head, elm);     \
     __comp = (cmp)(elm, (head)->sph_root);   \
     if(__comp < 0) {      \
      SPLAY_LEFT(elm, field) = SPLAY_LEFT((head)->sph_root, field);\
      SPLAY_RIGHT(elm, field) = (head)->sph_root;  \
      SPLAY_LEFT((head)->sph_root, field) = NULL;  \
     } else if (__comp > 0) {     \
      SPLAY_RIGHT(elm,
 field) = SPLAY_RIGHT((head)->sph_root, field);\
      SPLAY_LEFT(elm, field) = (head)->sph_root;  \
      SPLAY_RIGHT((head)->sph_root, field) = NULL; \
     } else       \
      return ((head)->sph_root);    \
   }        \
```

```
   (head)->sph_root = (elm);      \
   return (NULL);       \
}         \
         \
struct type *        \
name##_SPLAY_REMOVE(struct name *head, struct type *elm)  \
{         \
 struct type *__tmp;      \
 if (SPLAY_EMPTY(head))      \
  return (NULL);      \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0) {   \
  if (SPLAY_LEFT((head)->sph_root, field) == NULL) { \
   (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field);\
  } else {      \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);\
   name##_SPLAY(head, elm);   \
   SPLAY_RIGHT((head)->sph_root, field) = __tmp; \
  }       \
  return (elm);      \
 }        \
 return (NULL);       \
}         \
         \
void         \
name##_SPLAY(struct
 name *head, struct type *elm)   \
{         \
 struct type __node, *__left, *__right, *__tmp;   \
 int __comp;       \
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
 __left = __right = &__node;     \
\
 while ((__comp = (cmp)(elm, (head)->sph_root)) != 0) {  \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if ((cmp)(elm, __tmp) < 0){   \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKLEFT(head, __right, field);  \
  } else if (__comp > 0) {    \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
```

```
  if (__tmp == NULL)    \
   break;     \
  if ((cmp)(elm, __tmp) > 0){   \
   SPLAY_ROTATE_LEFT(head, __tmp, field); \
   if (SPLAY_RIGHT((head)->sph_root, field) == NULL)\
    break;    \
  }      \
  SPLAY_LINKRIGHT(head, __left, field);  \
 }       \
}        \
SPLAY_ASSEMBLE(head,
&__node, __left, __right, field);  \
}         \
        \
/* Splay with either the minimum or the maximum element   \
* Used to find minimum or maximum element in tree.   \
*/         \
void name##_SPLAY_MINMAX(struct name *head, int __comp) \
{         \
 struct type __node, *__left, *__right, *__tmp;   \
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
 __left = __right = &__node;     \
\
 while (1) {       \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if (__comp < 0){    \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKLEFT(head, __right, field);  \
  } else if (__comp > 0) {    \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if (__comp > 0) {    \
    SPLAY_ROTATE_LEFT(head, __tmp, field); \
    if (SPLAY_RIGHT((head)->sph_root,
 field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKRIGHT(head, __left, field);  \
  }       \
 }        \
```

```
 SPLAY_ASSEMBLE(head, &__node, __left, __right, field);  \
}

#define SPLAY_NEGINF -1
#define SPLAY_INF 1

#define SPLAY_INSERT(name, x, y) name##_SPLAY_INSERT(x, y)
#define SPLAY_REMOVE(name, x, y) name##_SPLAY_REMOVE(x, y)
#define SPLAY_FIND(name, x, y)  name##_SPLAY_FIND(x, y)
#define SPLAY_NEXT(name, x, y)  name##_SPLAY_NEXT(x, y)
#define SPLAY_MIN(name, x)  (SPLAY_EMPTY(x) ? NULL \
    : name##_SPLAY_MIN_MAX(x, SPLAY_NEGINF))
#define SPLAY_MAX(name, x)  (SPLAY_EMPTY(x) ? NULL \
    : name##_SPLAY_MIN_MAX(x, SPLAY_INF))

#define SPLAY_FOREACH(x, name, head)     \
 for ((x) = SPLAY_MIN(name, head);    \
     (x) != NULL;      \
     (x) = SPLAY_NEXT(name, head, x))

/* Macros that define a red-black tree */
#define RB_HEAD(name, type)      \
struct name {        \
 struct type *rbh_root; /* root of the tree */   \
}

#define RB_INITIALIZER(root)      \
 {
 NULL }

#define RB_INIT(root) do {      \
 (root)->rbh_root = NULL;     \
} while (/*CONSTCOND*/ 0)

#define RB_BLACK 0
#define RB_RED  1
#define RB_ENTRY(type)       \
struct {        \
 struct type *rbe_left;  /* left element */  \
 struct type *rbe_right;  /* right element */  \
 struct type *rbe_parent; /* parent element */  \
 int rbe_color;   /* node color */  \
}

#define RB_LEFT(elm, field)  (elm)->field.rbe_left
#define RB_RIGHT(elm, field)  (elm)->field.rbe_right
#define RB_PARENT(elm, field)  (elm)->field.rbe_parent
#define RB_COLOR(elm, field)  (elm)->field.rbe_color
```

```
#define RB_ROOT(head)   (head)->rbh_root
#define RB_EMPTY(head)   (RB_ROOT(head) == NULL)

#define RB_SET(elm, parent, field) do {     \
 RB_PARENT(elm, field) = parent;     \
 RB_LEFT(elm, field) = RB_RIGHT(elm, field) = NULL;  \
 RB_COLOR(elm, field) = RB_RED;     \
} while (/*CONSTCOND*/ 0)

#define RB_SET_BLACKRED(black, red, field) do {    \
 RB_COLOR(black, field) = RB_BLACK;    \
 RB_COLOR(red, field)
 = RB_RED;     \
} while (/*CONSTCOND*/ 0)

#ifndef RB_AUGMENT
#define RB_AUGMENT(x) do {} while (/*CONSTCOND*/ 0)
#endif

#define RB_ROTATE_LEFT(head, elm, tmp, field) do {   \
 (tmp) = RB_RIGHT(elm, field);     \
 if ((RB_RIGHT(elm, field) = RB_LEFT(tmp, field)) != NULL) { \
  RB_PARENT(RB_LEFT(tmp, field), field) = (elm);  \
 }       \
 RB_AUGMENT(elm);      \
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
   RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
  else      \
   RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else       \
  (head)->rbh_root = (tmp);    \
 RB_LEFT(tmp, field) = (elm);     \
 RB_PARENT(elm, field) = (tmp);     \
 RB_AUGMENT(tmp);      \
 if ((RB_PARENT(tmp, field)))     \
  RB_AUGMENT(RB_PARENT(tmp, field));   \
} while (/*CONSTCOND*/ 0)

#define RB_ROTATE_RIGHT(head, elm, tmp, field) do {   \
 (tmp) = RB_LEFT(elm, field);     \
 if ((RB_LEFT(elm, field) = RB_RIGHT(tmp, field))
 != NULL) { \
  RB_PARENT(RB_RIGHT(tmp, field), field) = (elm);  \
 }       \
 RB_AUGMENT(elm);      \
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
```

```
  RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
 else      \
  RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else       \
  (head)->rbh_root = (tmp);    \
 RB_RIGHT(tmp, field) = (elm);     \
 RB_PARENT(elm, field) = (tmp);     \
 RB_AUGMENT(tmp);      \
 if ((RB_PARENT(tmp, field)))     \
  RB_AUGMENT(RB_PARENT(tmp, field));   \
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */
#define RB_PROTOTYPE(name, type, field, cmp)    \
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp,)
#define RB_PROTOTYPE_STATIC(name, type, field, cmp)   \
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_PROTOTYPE_INTERNAL(name, type, field, cmp, attr)  \
attr void name##_RB_INSERT_COLOR(struct name *, struct
 type *);  \
attr void name##_RB_REMOVE_COLOR(struct name *, struct type *, struct type *);\
attr struct type *name##_RB_REMOVE(struct name *, struct type *); \
attr struct type *name##_RB_INSERT(struct name *, struct type *); \
attr struct type *name##_RB_FIND(struct name *, struct type *);  \
attr struct type *name##_RB_NFIND(struct name *, struct type *); \
attr struct type *name##_RB_NEXT(struct type *);   \
attr struct type *name##_RB_PREV(struct type *);   \
attr struct type *name##_RB_MINMAX(struct name *, int);   \
        \

/* Main rb operation.
* Moves node close to the key of elm to top
*/
#define RB_GENERATE(name, type, field, cmp)    \
 RB_GENERATE_INTERNAL(name, type, field, cmp,)
#define RB_GENERATE_STATIC(name, type, field, cmp)   \
 RB_GENERATE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_GENERATE_INTERNAL(name, type, field, cmp, attr)  \
attr void       \
name##_RB_INSERT_COLOR(struct name *head, struct type *elm)  \
{        \
 struct type
 *parent, *gparent, *tmp;    \
 while ((parent = RB_PARENT(elm, field)) != NULL &&  \
     RB_COLOR(parent, field) == RB_RED) {   \
  gparent = RB_PARENT(parent, field);   \
  if (parent == RB_LEFT(gparent, field)) {  \
   tmp = RB_RIGHT(gparent, field);   \
```

```
  if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
   RB_COLOR(tmp, field) = RB_BLACK; \
   RB_SET_BLACKRED(parent, gparent, field);\
   elm = gparent;    \
   continue;    \
  }      \
  if (RB_RIGHT(parent, field) == elm) {  \
   RB_ROTATE_LEFT(head, parent, tmp, field);\
   tmp = parent;    \
   parent = elm;    \
   elm = tmp;    \
  }      \
  RB_SET_BLACKRED(parent, gparent, field); \
  RB_ROTATE_RIGHT(head, gparent, tmp, field); \
 } else {      \
  tmp = RB_LEFT(gparent, field);   \
  if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
   RB_COLOR(tmp, field) = RB_BLACK; \
   RB_SET_BLACKRED(parent, gparent, field);\
   elm = gparent;    \
   continue;    \
  }      \
  if (RB_LEFT(parent, field) == elm)
 {  \
   RB_ROTATE_RIGHT(head, parent, tmp, field);\
   tmp = parent;    \
   parent = elm;    \
   elm = tmp;    \
  }      \
  RB_SET_BLACKRED(parent, gparent, field); \
  RB_ROTATE_LEFT(head, gparent, tmp, field); \
 }       \
 }        \
 RB_COLOR(head->rbh_root, field) = RB_BLACK;   \
}         \
        \
attr void        \
name##_RB_REMOVE_COLOR(struct name *head, struct type *parent, struct type *elm) \
{         \
 struct type *tmp;      \
 while ((elm == NULL || RB_COLOR(elm, field) == RB_BLACK) && \
    elm != RB_ROOT(head)) {     \
  if (RB_LEFT(parent, field) == elm) {   \
  tmp = RB_RIGHT(parent, field);   \
  if (RB_COLOR(tmp, field) == RB_RED) {  \
   RB_SET_BLACKRED(tmp, parent, field); \
   RB_ROTATE_LEFT(head, parent, tmp, field);\
   tmp = RB_RIGHT(parent, field);  \
```

```
  }      \
  if ((RB_LEFT(tmp, field) == NULL ||  \
      RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
      (RB_RIGHT(tmp, field) == NULL ||  \
      RB_COLOR(RB_RIGHT(tmp,
field), field) == RB_BLACK)) {\
   RB_COLOR(tmp, field) = RB_RED;  \
   elm = parent;    \
   parent = RB_PARENT(elm, field);  \
  } else {     \
   if (RB_RIGHT(tmp, field) == NULL || \
       RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK) {\
    struct type *oleft;  \
    if ((oleft = RB_LEFT(tmp, field)) \
        != NULL)   \
     RB_COLOR(oleft, field) = RB_BLACK;\
    RB_COLOR(tmp, field) = RB_RED; \
    RB_ROTATE_RIGHT(head, tmp, oleft, field);\
    tmp = RB_RIGHT(parent, field); \
   }     \
   RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
   RB_COLOR(parent, field) = RB_BLACK; \
   if (RB_RIGHT(tmp, field))  \
    RB_COLOR(RB_RIGHT(tmp, field), field) = RB_BLACK;\
   RB_ROTATE_LEFT(head, parent, tmp, field);\
   elm = RB_ROOT(head);   \
   break;     \
  }      \
 } else {      \
  tmp = RB_LEFT(parent, field);   \
  if (RB_COLOR(tmp, field) == RB_RED) {  \
   RB_SET_BLACKRED(tmp, parent, field); \
   RB_ROTATE_RIGHT(head, parent, tmp, field);\
   tmp
= RB_LEFT(parent, field);  \
  }      \
  if ((RB_LEFT(tmp, field) == NULL ||  \
      RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
      (RB_RIGHT(tmp, field) == NULL ||  \
      RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK)) {\
   RB_COLOR(tmp, field) = RB_RED;  \
   elm = parent;    \
   parent = RB_PARENT(elm, field);  \
  } else {     \
   if (RB_LEFT(tmp, field) == NULL || \
       RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) {\
    struct type *oright;  \
    if ((oright = RB_RIGHT(tmp, field)) \
```

```
        != NULL)   \
      RB_COLOR(oright, field) = RB_BLACK;\
     RB_COLOR(tmp, field) = RB_RED; \
     RB_ROTATE_LEFT(head, tmp, oright, field);\
     tmp = RB_LEFT(parent, field); \
    }     \
    RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
    RB_COLOR(parent, field) = RB_BLACK; \
    if (RB_LEFT(tmp, field))  \
     RB_COLOR(RB_LEFT(tmp, field), field) = RB_BLACK;\
    RB_ROTATE_RIGHT(head, parent, tmp, field);\
    elm = RB_ROOT(head);   \
    break;     \
   }      \
  }       \
 }        \
 if
 (elm)       \
  RB_COLOR(elm, field) = RB_BLACK;   \
}         \
        \
attr struct type *       \
name##_RB_REMOVE(struct name *head, struct type *elm)   \
{         \
 struct type *child, *parent, *old = elm;   \
 int color;       \
 if (RB_LEFT(elm, field) == NULL)    \
  child = RB_RIGHT(elm, field);    \
 else if (RB_RIGHT(elm, field) == NULL)    \
  child = RB_LEFT(elm, field);    \
 else {        \
  struct type *left;     \
  elm = RB_RIGHT(elm, field);    \
  while ((left = RB_LEFT(elm, field)) != NULL)  \
   elm = left;     \
  child = RB_RIGHT(elm, field);    \
  parent = RB_PARENT(elm, field);    \
  color = RB_COLOR(elm, field);    \
  if (child)      \
   RB_PARENT(child, field) = parent;  \
  if (parent) {      \
   if (RB_LEFT(parent, field) == elm)  \
    RB_LEFT(parent, field) = child;  \
   else      \
    RB_RIGHT(parent, field) = child; \
   RB_AUGMENT(parent);    \
  } else       \
   RB_ROOT(head)
```

```
 = child;    \
  if (RB_PARENT(elm, field) == old)   \
   parent = elm;     \
  (elm)->field = (old)->field;    \
  if (RB_PARENT(old, field)) {    \
   if (RB_LEFT(RB_PARENT(old, field), field) == old)\
    RB_LEFT(RB_PARENT(old, field), field) = elm;\
   else      \
    RB_RIGHT(RB_PARENT(old, field), field) = elm;\
   RB_AUGMENT(RB_PARENT(old, field));  \
  } else       \
   RB_ROOT(head) = elm;    \
  RB_PARENT(RB_LEFT(old, field), field) = elm;  \
  if (RB_RIGHT(old, field))    \
   RB_PARENT(RB_RIGHT(old, field), field) = elm; \
  if (parent) {      \
   left = parent;     \
   do {      \
    RB_AUGMENT(left);   \
   } while ((left = RB_PARENT(left, field)) != NULL); \
  }       \
  goto color;      \
 }        \
 parent = RB_PARENT(elm, field);     \
 color = RB_COLOR(elm, field);     \
 if (child)       \
  RB_PARENT(child, field) = parent;   \
 if (parent) {       \
  if (RB_LEFT(parent, field) == elm)   \
   RB_LEFT(parent, field) = child;   \
  else       \
   RB_RIGHT(parent,
 field) = child;  \
  RB_AUGMENT(parent);     \
 } else        \
  RB_ROOT(head) = child;     \
color:         \
 if (color == RB_BLACK)      \
  name##_RB_REMOVE_COLOR(head, parent, child);  \
 return (old);       \
}         \
         \
/* Inserts a node into the RB tree */     \
attr struct type *       \
name##_RB_INSERT(struct name *head, struct type *elm)   \
{         \
 struct type *tmp;      \
 struct type *parent = NULL;     \
```

```
 int comp = 0;       \
 tmp = RB_ROOT(head);      \
 while (tmp) {       \
  parent = tmp;      \
  comp = (cmp)(elm, parent);    \
  if (comp < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else if (comp > 0)     \
   tmp = RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }        \
 RB_SET(elm, parent, field);     \
 if (parent != NULL) {      \
  if (comp < 0)      \
   RB_LEFT(parent, field) = elm;   \
  else       \
   RB_RIGHT(parent, field) = elm;   \
  RB_AUGMENT(parent);     \
 } else        \
  RB_ROOT(head) = elm;     \
 name##_RB_INSERT_COLOR(head,
 elm);    \
 return (NULL);       \
}         \
         \
/* Finds the node with the same key as elm */    \
attr struct type *       \
name##_RB_FIND(struct name *head, struct type *elm)   \
{         \
 struct type *tmp = RB_ROOT(head);    \
 int comp;       \
 while (tmp) {       \
  comp = cmp(elm, tmp);     \
  if (comp < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else if (comp > 0)     \
   tmp = RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }        \
 return (NULL);       \
}         \
         \
/* Finds the first node greater than or equal to the search key */ \
attr struct type *       \
name##_RB_NFIND(struct name *head, struct type *elm)   \
{         \
```

```
 struct type *tmp = RB_ROOT(head);    \
 struct type *res = NULL;     \
 int comp;       \
 while (tmp) {       \
  comp = cmp(elm, tmp);     \
  if (comp < 0) {      \
   res = tmp;     \
   tmp = RB_LEFT(tmp, field);   \
  }       \
  else if (comp > 0)     \
   tmp =
 RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }        \
 return (res);       \
}         \
         \
/* ARGSUSED */        \
attr struct type *       \
name##_RB_NEXT(struct type *elm)     \
{         \
 if (RB_RIGHT(elm, field)) {     \
  elm = RB_RIGHT(elm, field);    \
  while (RB_LEFT(elm, field))    \
   elm = RB_LEFT(elm, field);   \
 } else {       \
  if (RB_PARENT(elm, field) &&    \
      (elm == RB_LEFT(RB_PARENT(elm, field), field))) \
   elm = RB_PARENT(elm, field);   \
  else {       \
   while (RB_PARENT(elm, field) &&   \
       (elm == RB_RIGHT(RB_PARENT(elm, field), field)))\
    elm = RB_PARENT(elm, field);  \
   elm = RB_PARENT(elm, field);   \
  }       \
 }        \
 return (elm);       \
}         \
         \
/* ARGSUSED */        \
attr struct type *       \
name##_RB_PREV(struct type *elm)     \
{         \
 if (RB_LEFT(elm, field)) {     \
  elm = RB_LEFT(elm, field);    \
  while (RB_RIGHT(elm, field))    \
   elm = RB_RIGHT(elm, field);   \
```

```
 }
 else {       \
  if (RB_PARENT(elm, field) &&    \
      (elm == RB_RIGHT(RB_PARENT(elm, field), field))) \
   elm = RB_PARENT(elm, field);   \
  else {       \
   while (RB_PARENT(elm, field) &&   \
       (elm == RB_LEFT(RB_PARENT(elm, field), field)))\
    elm = RB_PARENT(elm, field);  \
   elm = RB_PARENT(elm, field);   \
  }       \
 }        \
 return (elm);       \
}         \
         \
attr struct type *       \
name##_RB_MINMAX(struct name *head, int val)    \
{         \
 struct type *tmp = RB_ROOT(head);    \
 struct type *parent = NULL;     \
 while (tmp) {       \
  parent = tmp;      \
  if (val < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else       \
   tmp = RB_RIGHT(tmp, field);   \
 }        \
 return (parent);      \
}

#define RB_NEGINF -1
#define RB_INF 1

#define RB_INSERT(name, x, y) name##_RB_INSERT(x, y)
#define RB_REMOVE(name, x, y) name##_RB_REMOVE(x, y)
#define RB_FIND(name, x, y) name##_RB_FIND(x, y)
#define RB_NFIND(name, x, y) name##_RB_NFIND(x,
 y)
#define RB_NEXT(name, x, y) name##_RB_NEXT(y)
#define RB_PREV(name, x, y) name##_RB_PREV(y)
#define RB_MIN(name, x)  name##_RB_MINMAX(x, RB_NEGINF)
#define RB_MAX(name, x)  name##_RB_MINMAX(x, RB_INF)

#define RB_FOREACH(x, name, head)     \
 for ((x) = RB_MIN(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_NEXT(x))
```

```
#define RB_FOREACH_FROM(x, name, y)     \
 for ((x) = (y);       \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_SAFE(x, name, head, y)    \
 for ((x) = RB_MIN(name, head);     \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_REVERSE(x, name, head)    \
 for ((x) = RB_MAX(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_PREV(x))

#define RB_FOREACH_REVERSE_FROM(x, name, y)    \
 for ((x) = (y);       \
     ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_REVERSE_SAFE(x, name,
 head, y)   \
 for ((x) = RB_MAX(name, head);     \
     ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
      (x) = (y))

#endif /* _SYS_TREE_H_ */
# Contributor: Wen Heping <wenhepingalpine@sohu.com>
# Maintainer: Wen Heping <wenhepingalpine@sohu.com>
pkgname=perl-software-license
pkgver=0.104007
pkgrel=0
# _pkgreal is used by apkbuild-cpan to find modules at MetaCpan
_pkgreal=Software-License
pkgdesc="packages that provide templated software licenses"
url="https://metacpan.org/release/Software-License/"
arch="noarch"
license="GPL-1.0-or-later OR Artistic-1.0-Perl"
depends="perl perl-data-section perl-text-template"
checkdepends="perl-try-tiny"
subpackages="$pkgname-doc"
source="https://cpan.metacpan.org/authors/id/L/LE/LEONT/Software-License-$pkgver.tar.gz"
builddir="$srcdir/$_pkgreal-$pkgver"

build() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 PERL_MM_USE_DEFAULT=1 perl -I. Makefile.PL \
  INSTALLDIRS=vendor \
```

```
  NO_PACKLIST=1 \
  NO_PERLLOCAL=1
 make
}

check() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 make test
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="
12d75e9583b3013d9b4a282467f1ac80ab6b7f3251926d66591d01404489b528f22adc396dfd4528a0f0ca650f0eed6d
9c959e69eace2169c6ed1cfffe5277e4
  Software-License-0.104007.tar.gz
"
```

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# 1.2907 hraban-opus 2.0.0-20230925203106-0188a62cb302

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# 1.2908 go-autorest-autorest-date 0.3.0

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# 1.2909 go-autorest-autorest-adal 0.9.23

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 Name string `json:"name,omitempty"`
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* github.com/rogpeppe/go-internal - https://github.com/rogpeppe/go-internal

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* golang.org/x/mod/module - https://github.com/golang/mod

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Feb, 2010

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procfs provides functions to retrieve system, kernel and process metrics from the pseudo-filesystem proc.

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package simulator

import (
 "github.com/vmware/govmomi/object"

```
 "github.com/vmware/govmomi/vim25/methods"
 "github.com/vmware/govmomi/vim25/mo"
 "github.com/vmware/govmomi/vim25/soap"
 "github.com/vmware/govmomi/vim25/types"
)

// EvalLicense is the default license
var EvalLicense = types.LicenseManagerLicenseInfo{
 LicenseKey: "00000-00000-00000-00000-00000",
 EditionKey: "eval",
 Name:       "Evaluation Mode",
 Properties: []types.KeyAnyValue{
  {
   Key: "feature",
   Value: types.KeyValue{
    Key:   "serialuri:2",
    Value: "Remote virtual Serial Port Concentrator",
   },
  },
  {
   Key: "feature",
   Value: types.KeyValue{
    Key:   "dvs",
    Value: "vSphere Distributed Switch",
   },
  },
 },
}

type LicenseManager struct {
 mo.LicenseManager
}

func NewLicenseManager(ref types.ManagedObjectReference)
 object.Reference {
 m := &LicenseManager{}
 m.Self = ref
 m.Licenses = []types.LicenseManagerLicenseInfo{EvalLicense}

 if Map.IsVPX() {
  am := Map.Put(&LicenseAssignmentManager{}).Reference()
  m.LicenseAssignmentManager = &am
 }

 return m
}

func (m *LicenseManager) AddLicense(req *types.AddLicense) soap.HasFault {
```

```
 body := &methods.AddLicenseBody{
  Res: &types.AddLicenseResponse{},
 }

 for _, license := range m.Licenses {
  if license.LicenseKey == req.LicenseKey {
   body.Res.Returnval = licenseInfo(license.LicenseKey, license.Labels)
   return body
  }
 }

 m.Licenses = append(m.Licenses, types.LicenseManagerLicenseInfo{
  LicenseKey: req.LicenseKey,
  Labels:     req.Labels,
 })

 body.Res.Returnval = licenseInfo(req.LicenseKey, req.Labels)

 return body
}

func (m *LicenseManager) RemoveLicense(req *types.RemoveLicense) soap.HasFault {
 body := &methods.RemoveLicenseBody{
  Res: &types.RemoveLicenseResponse{},
 }

 for i, license := range m.Licenses {
  if
 req.LicenseKey == license.LicenseKey {
   m.Licenses = append(m.Licenses[:i], m.Licenses[i+1:]...)
   return body
  }
 }
 return body
}

func (m *LicenseManager) UpdateLicenseLabel(req *types.UpdateLicenseLabel) soap.HasFault {
 body := &methods.UpdateLicenseLabelBody{}

 for i := range m.Licenses {
  license := &m.Licenses[i]

  if req.LicenseKey != license.LicenseKey {
   continue
  }

  body.Res = new(types.UpdateLicenseLabelResponse)
```

```
 for j := range license.Labels {
  label := &license.Labels[j]

  if label.Key == req.LabelKey {
   if req.LabelValue == "" {
    license.Labels = append(license.Labels[:i], license.Labels[i+1:]...)
   } else {
    label.Value = req.LabelValue
   }
   return body
  }
 }

 license.Labels = append(license.Labels, types.KeyValue{
  Key:   req.LabelKey,
  Value: req.LabelValue,
 })

 return body
}

body.Fault_ = Fault("", &types.InvalidArgument{InvalidProperty: "licenseKey"})
return body
}

type LicenseAssignmentManager struct {
 mo.LicenseAssignmentManager
}

func
 (m *LicenseAssignmentManager) QueryAssignedLicenses(req *types.QueryAssignedLicenses) soap.HasFault {
 body := &methods.QueryAssignedLicensesBody{
  Res: &types.QueryAssignedLicensesResponse{},
 }

 // EntityId can be a HostSystem or the vCenter InstanceUuid
 if req.EntityId != "" {
  if req.EntityId != Map.content().About.InstanceUuid {
   id := types.ManagedObjectReference{
    Type:  "HostSystem",
    Value: req.EntityId,
   }

   if Map.Get(id) == nil {
    return body
   }
  }
 }
```

```
 body.Res.Returnval = []types.LicenseAssignmentManagerLicenseAssignment{
  {
   EntityId:       req.EntityId,
   AssignedLicense: EvalLicense,
  },
 }

 return body
}

func licenseInfo(key string, labels []types.KeyValue) types.LicenseManagerLicenseInfo {
 info := EvalLicense

 info.LicenseKey = key
 info.Labels = labels

 return info
}
```

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```
package migration

import "fmt"

// Notice is a migration warning
type Notice struct {
 Plugin     string
```

```
 Option     string
 Severity   string // 'deprecated', 'removed', or 'unsupported'
 ReplacedBy string
 Additional string
 Version    string
}

func (n *Notice) ToString() string {
 s := ""
 if n.Option == "" {
  s += fmt.Sprintf(`Plugin "%v" `, n.Plugin)
 } else {
  s += fmt.Sprintf(`Option "%v" in plugin "%v" `, n.Option, n.Plugin)
 }
 if n.Severity == unsupported {
  s += "is unsupported by this migration tool in " + n.Version + "."
 } else if n.Severity == newdefault {
  s += "is added as a default in " + n.Version + "."
 } else {
  s += "is " + n.Severity + " in " + n.Version + "."
 }
 if n.ReplacedBy != "" {
  s += fmt.Sprintf(` It is replaced by "%v".`, n.ReplacedBy)
 }
 if n.Additional != "" {
  s += " " + n.Additional
 }
 return s
}

const (
 // The following statuses are used to indicate the state of support/deprecation in a given release.
 deprecated  = "deprecated"  // deprecated,
 but still completely functional
 ignored     = "ignored"     // if included in the corefile, it will be ignored by CoreDNS
 removed     = "removed"     // completely removed from CoreDNS, and would cause CoreDNS to exit if present in
the Corefile
 newdefault  = "newdefault"  // added to the default corefile.  CoreDNS may not function properly if it is not present
in the corefile.
 unsupported = "unsupported" // the plugin/option is not supported by the migration tool

 // The following statuses are used for selecting/filtering notifications
 all = "all" // show all statuses
)
```

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runc

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{% endpanel %}

{% panel style="info", title="TL;DR" %}
- Copy files to and from Containers in a cluster
{% endpanel %}

# Copying Container Files

## Motivation

- Copying files from Containers in a cluster to a local filesystem
- Copying files from a local filesystem to Containers in a cluster

{% panel style="warning", title="Install Tar" %}
Copy requires that *tar* be installed in the container image.
{% endpanel %}

{% method %}
## Local to Remote

Copy a local file to a remote Pod in a cluster.

- Local file format is `<path>`
- Remote file format is `<pod-name>:<path>`

{% sample lang="yaml" %}

```bash
kubectl cp /tmp/foo_dir <some-pod>:/tmp/bar_dir
```

{% endmethod %}

{% method %}
## Remote to Local

Copy a remote file from a Pod to a local file.

- Local file format is `<path>`
- Remote file format is `<pod-name>:<path>`

{% sample lang="yaml"
 %}

```bash
kubectl cp <some-pod>:/tmp/foo /tmp/bar
```

{% endmethod %}

{% method %}
## Specify the Container

Specify the Container within a Pod running multiple containers.

- `-c <container-name>`

{% sample lang="yaml" %}

```bash
kubectl cp /tmp/foo <some-pod>:/tmp/bar -c <specific-container>
```

{% endmethod %}

{% method %}
## Namespaces

Set the Pod namespace by prefixing the Pod name with `<namespace>/` .

- `<pod-namespace>/<pod-name>:<path>`

{% sample lang="yaml" %}

```bash
```

kubectl cp /tmp/foo <some-namespace>/<some-pod>:/tmp/bar
```

{% endmethod %}

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# 1.2911 rsyslog 8.2506.0-2.el9

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# 1.2912 e2fsprogs 1.46.5-8.el9

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Theodore Ts'o <tytso@mit.edu> on Sat Mar 15 15:33:37 EST 2003

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This is the Debian GNU/Linux prepackaged version of the static EXT2
file system consistency checker (e2fsck.static). The EXT2 utilities
were written by Theodore Ts'o <tytso@mit.edu> and Remy Card

```
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#
# This is a Makefile stub which handles the creation of BSD shared
# libraries.
#
# In order to use this stub, the following makefile variables must be defined.
#
# BSDLIB_VERSION = 1.0
# BSDLIB_IMAGE = libce
# BSDLIB_MYDIR = et
# BSDLIB_INSTALL_DIR = $(SHLIBDIR)
#

all:: image

real-subdirs:: Makefile
 @echo " MKDIR pic"
 @mkdir -p pic

BSD_LIB = $(BSDLIB_IMAGE).so.$(BSDLIB_VERSION)
BSDLIB_PIC_FLAG = -fpic

image:  $(BSD_LIB)

$(BSD_LIB): $(OBJS)
 (cd pic; ld -Bshareable -o $(BSD_LIB) $(LDFLAGS_SHLIB) $(OBJS))
 $(MV) pic/$(BSD_LIB) .
```

```
 $(RM) -f ../$(BSD_LIB)
 (cd ..; $(LN) $(LINK_BUILD_FLAGS) \
  `echo $(my_dir) | sed -e 's;lib/;;'`/$(BSD_LIB) $(BSD_LIB))

install-shlibs install:: $(BSD_LIB)
 @echo " INSTALL_PROGRAM $(BSDLIB_INSTALL_DIR)/$(BSD_LIB)"
 @$(INSTALL_PROGRAM) $(BSD_LIB) \
  $(DESTDIR)$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)
 @-$(LDCONFIG)

install-strip: install

install-shlibs-strip:: install-shlibs

uninstall-shlibs uninstall::
 $(RM) -f $(DESTDIR)$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)

clean::
 $(RM)
 -rf pic
 $(RM) -f $(BSD_LIB)
 $(RM) -f ../$(BSD_LIB)
```

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*/
Index: tdbsa/tdb.c
==========
--- tdbsa.orig/tdb.c
+++ tdbsa/tdb.c
@@ -4,11 +4,11 @@ Rev: 23371
Last Changed Date: 2007-06-06 20:14:06 -0400 (Wed, 06 Jun 2007)
*/
/*
- Unix SMB/CIFS implementation.
+ trivial database library - standalone version

- trivial database library - private includes
-

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Gadi Oxman, August 1995

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Theodore Ts'o
23-June-2007

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This package was added to the e2fsprogs debian source package by
Theodore Ts'o <tytso@mit.edu> on Sat Mar 15 15:33:37 EST 2003

It is part of the main e2fsprogs distribution, which can be found at:

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The following people have worked to translate sudo into other languages as part of the Translation Project, see https://translationproject.org for more details.

Albuquerque, Pedro
Blttermann, Mario
Bogusz, Jakub
Buo-ren, Lin
Casagrande, Milo
Castro, Felipe
Cho, Seong-ho
Chornoivan, Yuri
Diguez, Francisco
Fontenelle, Rafael
Garca-Fontes, Walter
Gezer, Volkan
Hamasaki, Takeshi
Hamming, Peter
Hansen, Joe
Hantrais, Frdric
Hein, Jochen
Hufthammer, Karl Ove
Jerovek, Damir
Karvonen, Jorma
Kazik, Duan
Kelemen, Gbor
Keeci, Mehmet
Koir, Klemen
Kozlov, Yuri
Kramer, Jakob
Krznar, Tomislav
Marchal, Frdric
Margeviius, Algimantas
Maryanov, Pavel
Florentina Muat
Nurmi, Lauri
Nikoli, Miroslav
Nylander, Daniel
Pan, Yi-Jyun
Psa, Petr
Puente, Enol
Putanec, Boidar
Qun, Trn Ngc
Rasmussen, Sebastian
Regueiro, Leandro
Sarer, zgr

Sendn, Abel
erbnescu, Daniel
Sikrom, ka
Spingos, Dimitris
Taniguchi, Yasuaki
Tomat, Fbio
r, Balzs
Uranga, Mikel Olasagasti
Vorotnikov, Artem
Wang, Wylmer
Yang, Boyuan

The following people designed the artwork used on the sudo website:

Shield logo: Badger, Trent
Sandwich logo: Stillman, Mark

# 1.2921 log-rotate 3.18.0-12.el9

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# 1.2924 libsemanage-common 3.6-5.el9_6

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If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

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When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data

structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute
the object code for the work under the terms of Section 6.
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b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2)

will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

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d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

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For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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# 1.2936 ncurses 6.2-12.20210508.el9

## 1.2936.1 Available under license :

Upstream source https://invisible-island.net/ncurses/ncurses-examples.html

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-- vile: txtmode file-encoding=utf-8
Upstream source https://invisible-island.net/ncurses/ncurses-examples.html

Current ncurses maintainer: Thomas Dickey <dickey@invisible-island.net>

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-- vile: txtmode file-encoding=utf-8

# 1.2937 gdbm 1:1.23-1.el9

## 1.2937.1 Available under license :

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Version 3, 29 June 2007

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To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively state the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

```
  <one line to give the program's name and a brief
idea of what it does.>
  Copyright (C) <year>  <name of author>

  This program is free software: you can redistribute it and/or modify
  it under the terms of the GNU General Public License as published by
  the Free Software Foundation, either version 3 of the License, or
  (at your option) any later version.

  This program is distributed in the hope that it will be useful,
  but WITHOUT ANY WARRANTY; without even the implied warranty of
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```

Also add information on how to contact you by electronic and paper mail.

If the program does terminal interaction, make it output a short notice like this when it starts in an interactive mode:

```
  <program>  Copyright (C) <year>  <name of author>
  This program comes
with ABSOLUTELY NO WARRANTY; for details type `show w'.
  This is free software, and you are welcome to redistribute it
  under certain conditions; type `show c' for details.
```

The hypothetical commands `show w' and `show c' should show the appropriate parts of the General Public License. Of course, your program's commands might be different; for a GUI interface, you would use an "about box".

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# 1.2938 libmnl 1.0.4-16.el9_4

## 1.2938.1 Available under license :

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Version 2.1, February 1999

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In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

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a) The modified work must itself be a software library.

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

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If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

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a) Accompany
the work with the complete corresponding
machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

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d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

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That's all there is to it!

# 1.2939 bash 5.1.8-9.el9

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Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Program.

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b) Accompany it with a written offer, valid for at least three years, to give any third party, for a charge no more than your cost of physically performing source distribution, a complete machine-readable copy of the corresponding source code, to be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,

c) Accompany it with the information you received as to the offer to distribute corresponding source code. (This alternative is allowed only for noncommercial distribution and only if you received the program in object code or executable form with such an offer, in accord with Subsection b above.)

The source code for a work means the preferred form of the work for making modifications to it. For an executable work, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the executable. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

If distribution of executable or object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place counts as

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# 1.2950 libidn 2.3.8-r3

## 1.2950.1 Available under license :

```
/* Extract the last component (base name) of a file name.

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   along with this program.  If not, see <https://www.gnu.org/licenses/>.  */

#ifndef _BASENAME_LGPL_H
#define _BASENAME_LGPL_H

/* This file uses _GL_ATTRIBUTE_PURE.  */
#if !_GL_CONFIG_H_INCLUDED
#error "Please include config.h first."
#endif

#include <stddef.h>
```

```
#ifndef
 DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif


/* Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
          FILENAME      RESULT
          "foo.c"       "foo.c"
          "foo/bar.c"   "bar.c"
          "/foo/bar.c"  "bar.c"
          "foo/bar/"    "bar/"
          "foo/bar//"   "bar//"
          "/"           ""
          "//"          ""
          ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(),
 defined in <string.h>, does
      not consider trailing slashes to be part of the component:
          FILENAME      RESULT
          "foo/bar/"    ""
          "foo/bar//"   ""
    * The 'basename' command eliminates trailing slashes and for a root
      produces a non-empty result:
          FILENAME      RESULT
          "foo/bar/"    "bar"
          "foo/bar//"   "bar"
          "/"           "/"
          "//"          "/"
*/
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
```

```
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;


#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
```

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# 1.2959 berkeley-db 5.3.28

# 1.2960 os-prober 1.77-12.el9_5

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# 1.2962 open-vm-tools 13.0.0-1.el9_7.1

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$OpenLDAP: pkg/ldap/libraries/liblutil/base64.c,v 1.15 2006/01/03 22:12:11 kurt Exp $ /
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* DNS resolver (dirmngr/dns.c)

dns.c - Recursive, Reentrant DNS Resolver.
---
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* Regular
expression support

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Subsequently modified by:

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1987 James A. Woods ames!jaw
1993 Christopher Seiwald seiwald@vix.com
2000, 2002 Christopher Seiwald <seiwald@perforce.com>
2010 Steve Bennett <steveb@workware.net.au>
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# 1.2972 iputils 20210202-15.el9_7

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@subheading Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public Licenses are intended to guarantee your freedom to share and change free software---to make sure the software is free for all its users.

This license, the Lesser General Public License, applies to some specially designated software---typically libraries---of the Free Software Foundation and other authors who decide to use it. You can use it too, but we suggest you first think carefully about whether this license or the ordinary General Public License is the better strategy to use in any particular case, based on the explanations below.

When we speak of free software, we are referring to freedom of use, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish); that you receive source code or can get it if you want it; that you can change the software and use pieces of it in new free programs; and that you are informed that you can do these things.

To protect your rights, we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights. These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it.

For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link other code with the library, you must provide complete object files to the recipients, so that they can relink them with the library after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

We protect your rights with a two-step method: (1) we copyright the library, and (2) we offer you this license, which gives you legal permission to copy, distribute and/or modify the library.

To protect each distributor, we want to make it very clear that there is no warranty for the free library. Also, if the library is modified by someone else and passed on, the recipients should know that what they have is not the original version, so that the original author's reputation will not be affected by problems that might be introduced by others.

Finally, software patents pose a constant threat to the existence of

any free program.  We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder.  Therefore, we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License.  This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License.  We use this license for certain libraries in order to permit linking those libraries into non-free programs.

When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library.  The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom.  The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the @dfn{Lesser} General Public License because it does @emph{Less} to protect the user's freedom than the ordinary General Public License.  It also provides other free software developers Less of an advantage over competing non-free programs.  These disadvantages are the reason we use the ordinary General Public License for many libraries.  However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard.  To achieve this, non-free programs must be allowed to use the library.  A more frequent case is that a free library does the same job as widely used non-free libraries.  In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software.  For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is

linked with the Library has the freedom and the wherewithal to run
that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and
modification follow. Pay close attention to the difference between a
``work based on the library'' and a ``work that uses the library''. The
former
contains code derived from the library, whereas the latter must
be combined with the library in order to run.

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licensee is addressed as ``you''.

A ``library'' means a collection of software functions and/or data
prepared so as to be conveniently linked with application programs
(which use some of those functions and data) to form executables.

The ``Library'', below, refers to any such software library or work
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Library'' means either the Library or any derivative work under
copyright law: that is to say, a work containing the Library or a
portion of it,
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straightforwardly into another language. (Hereinafter, translation is
included without limitation in the term ``modification''.)

``Source code'' for a work means the preferred form of the work for
making modifications to it. For a library, complete source code means
all the source code for all modules it contains, plus any associated
interface definition files, plus the scripts used to control compilation
and installation of the library.

Activities other than copying, distribution and modification are not
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running a program using the Library is not restricted, and output from
such a program is covered only if its contents constitute a work based
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writing it). Whether that is true depends on what the Library does
and what the program that uses the Library does.

@item

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@enumerate a
@item
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@item
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@item
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cause the whole of the work to be licensed at no
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If a facility in the modified Library refers to a function or a
table of data to be supplied by an application program that uses
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is invoked, then you must make a good faith effort to ensure that,
in the event an application does not supply such function or
table, the facility still operates, and performs whatever part of
its purpose remains meaningful.

(For example, a function in a library to compute square roots has
a purpose that is entirely well-defined independent of the
application. Therefore, Subsection 2d requires that any
application-supplied function or table used by this function must
be optional: if the application does not supply it, the square
root function must still compute square roots.)
@end enumerate

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of that work are not derived from the Library,
and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this
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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

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You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and
2 above provided that you accompany
it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a

medium customarily used for software interchange.

If distribution of object code is made by offering access to copy
from a designated place, then offering equivalent access to copy the
source code from the same place satisfies the requirement to
distribute the source code, even though third parties are not
compelled to copy the source along with the object code.

@item
A program that contains no derivative of any portion of the
Library, but is designed to work with the Library by being compiled or
linked with it, is called a ``work that uses the Library''. Such a
work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

However, linking a ``work that uses the Library'' with the Library
creates an executable that is a derivative of the Library (because
it
contains portions of the Library), rather than a ``work that uses the
library''. The executable is therefore covered by this License.
Section 6 states terms for distribution of such executables.

When a ``work that uses the Library'' uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library. The
threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small inline
functions (ten lines or less in length), then the use of the object
file is unrestricted, regardless of whether it is legally a derivative
work. (Executables containing this object code plus portions of the
Library will still fall under Section 6.)

Otherwise,
if the work is a derivative of the Library, you may
distribute the object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.

@item
As an exception to the Sections above, you may also combine or
link a ``work that uses the Library'' with the Library to produce a
work containing portions of the Library, and distribute that work
under terms of your choice, provided that the terms permit
modification of the work for the customer's own use and reverse

engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of
this License. Also, you must do one
of these things:

@enumerate a
@item
Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable ``work that uses the Library'', as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

@item
Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable,
and (2) will operate
properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

@item
Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

@item
If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

@item
Verify that the user has already received a copy of these

materials or that you have already sent this user a copy.
@end enumerate

For an executable, the required form of the ``work that uses the
Library" must include any data and utility programs needed for
reproducing the executable from it. However, as a special exception,
the materials to be distributed need not include anything that
is
normally distributed (in either source or binary form) with the major
components (compiler, kernel, and so on) of the operating system on
which the executable runs, unless that component itself accompanies the
executable.

It may happen that this requirement contradicts the license
restrictions of other proprietary libraries that do not normally
accompany the operating system. Such a contradiction means you cannot
use both them and the Library together in an executable that you
distribute.

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library, provided that the separate distribution of the work based on
the Library and of the other library facilities is otherwise
permitted, and provided that you do these two things:

@enumerate a
@item
Accompany the combined library with a copy of the same work
based on the Library,
uncombined with any other library
facilities. This must be distributed under the terms of the
Sections above.

@item
Give prominent notice with the combined library of the fact
that part of it is a work based on the Library, and explaining
where to find the accompanying uncombined form of the same work.
@end enumerate

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@end enumerate

@subheading END OF TERMS AND CONDITIONS

@page
@subheading How to Apply These Terms to Your New Libraries

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file to most effectively
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@end
smallexample

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`Frob' (a library for tweaking knobs) written by James Random Hacker.

@var{signature of Ty Coon}, 1 April 1990
Ty Coon, President of Vice
@end smallexample

That's all there is to it!

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Version 3, 29 June 2007

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Some devices are designed to deny users access to install or run modified versions of the software inside them, although the manufacturer can do so. This is fundamentally incompatible with the aim of protecting users' freedom to change the software. The systematic pattern of such abuse occurs in the area of products for individuals to use, which is precisely where it is most unacceptable. Therefore, we have designed this version of the GPL to prohibit the practice for those products. If such problems arise substantially in other domains, we stand ready to extend this provision to those domains in future versions of the GPL, as needed to protect the freedom of users.

Finally, every program is threatened constantly by software patents. States should not allow patents to restrict development and use of software on general-purpose computers, but in those that do, we wish to avoid the special danger that patents applied to a free program could make it effectively proprietary. To prevent this, the GPL assures that patents cannot be used to render the program non-free.

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1. Source Code.

The "source code" for a work means the preferred form of the work for making modifications to it. "Object code" means any non-source form of a work.

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```
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/* Extract the last component (base name) of a file name.

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#ifndef _BASENAME_LGPL_H
#define _BASENAME_LGPL_H

#include <stddef.h>

#ifndef DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif


/*
```

```
 Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
          FILENAME      RESULT
          "foo.c"       "foo.c"
          "foo/bar.c"   "bar.c"
          "/foo/bar.c"  "bar.c"
          "foo/bar/"    "bar/"
          "foo/bar//"   "bar//"
          "/"           ""
          "//"          ""
          ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(), defined in <string.h>, does
      not consider trailing slashes to be part of the component:

 FILENAME      RESULT
          "foo/bar/"    ""
          "foo/bar//"   ""
    * The 'basename' command eliminates trailing slashes and for a root
      produces a non-empty result:
          FILENAME      RESULT
          "foo/bar/"    "bar"
          "foo/bar//"   "bar"
          "/"           "/"
          "//"          "/"
*/
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;



#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
```

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* Put the code in the public domain. Then there is nothing to stop

hoarding of modified versions, but we
can still use the program in GNU.

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<signature of Mo Ghoul>, 1 April 1987
Mo Ghoul, President of Vice, Digital Simulation Corp.

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```
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*/

#ifndef GRUB_BSD_CPU_HEADER
#define GRUB_BSD_CPU_HEADER 1

#include <grub/types.h>
#include <grub/relocator.h>

#include <grub/i386/freebsd_reboot.h>
#include <grub/i386/netbsd_reboot.h>
#include <grub/i386/openbsd_reboot.h>
#include <grub/i386/freebsd_linker.h>
#include
 <grub/i386/netbsd_bootinfo.h>
#include <grub/i386/openbsd_bootarg.h>

enum bsd_kernel_types
 {
   KERNEL_TYPE_NONE,
```

```
  KERNEL_TYPE_FREEBSD,
  KERNEL_TYPE_OPENBSD,
  KERNEL_TYPE_NETBSD,
 };

#define GRUB_BSD_TEMP_BUFFER   0x80000

#define FREEBSD_B_DEVMAGIC OPENBSD_B_DEVMAGIC
#define FREEBSD_B_SLICESHIFT OPENBSD_B_CTRLSHIFT
#define FREEBSD_B_UNITSHIFT OPENBSD_B_UNITSHIFT
#define FREEBSD_B_PARTSHIFT OPENBSD_B_PARTSHIFT
#define FREEBSD_B_TYPESHIFT OPENBSD_B_TYPESHIFT

#define FREEBSD_MODTYPE_KERNEL  "elf kernel"
#define FREEBSD_MODTYPE_KERNEL64 "elf64 kernel"
#define FREEBSD_MODTYPE_ELF_MODULE "elf module"
#define FREEBSD_MODTYPE_ELF_MODULE_OBJ "elf obj module"
#define FREEBSD_MODTYPE_RAW  "raw"

#define FREEBSD_BOOTINFO_VERSION 1

struct grub_freebsd_bootinfo
{
 grub_uint32_t version;
 grub_uint8_t unused1[44];
 grub_uint32_t length;
 grub_uint8_t unused2;
 grub_uint8_t boot_device;
 grub_uint8_t unused3[18];
 grub_uint32_t kern_end;
 grub_uint32_t environment;
  grub_uint32_t tags;
} GRUB_PACKED;

struct freebsd_tag_header
{
 grub_uint32_t type;
 grub_uint32_t len;
};

grub_err_t grub_freebsd_load_elfmodule32 (struct grub_relocator *relocator,
      grub_file_t file, int argc,
      char *argv[], grub_addr_t *kern_end);
grub_err_t grub_freebsd_load_elfmodule_obj64 (struct grub_relocator *relocator,
          grub_file_t file, int argc,
          char *argv[],
          grub_addr_t *kern_end);
grub_err_t grub_freebsd_load_elf_meta32 (struct grub_relocator *relocator,
```

```
      grub_file_t file,
      const char *filename,
      grub_addr_t *kern_end);
grub_err_t grub_freebsd_load_elf_meta64 (struct grub_relocator *relocator,
      grub_file_t file,
      const char *filename,
      grub_addr_t *kern_end);

grub_err_t grub_netbsd_load_elf_meta32 (struct grub_relocator *relocator,
     grub_file_t file,
     const char *filename,
     grub_addr_t *kern_end);
grub_err_t grub_netbsd_load_elf_meta64 (struct grub_relocator *relocator,
     grub_file_t
 file,
     const char *filename,
     grub_addr_t *kern_end);

grub_err_t grub_bsd_add_meta (grub_uint32_t type,
         const void *data, grub_uint32_t len);
grub_err_t grub_freebsd_add_meta_module (const char *filename, const char *type,
      int argc, char **argv,
      grub_addr_t addr, grub_uint32_t size);

struct grub_openbsd_ramdisk_descriptor
{
 grub_size_t max_size;
 grub_uint8_t *target;
 grub_uint32_t *size;
};

grub_err_t grub_openbsd_find_ramdisk32 (grub_file_t file,
     const char *filename,
     grub_addr_t kern_start,
     void *kern_chunk_src,
     struct grub_openbsd_ramdisk_descriptor *desc);
grub_err_t grub_openbsd_find_ramdisk64 (grub_file_t file,
     const char *filename,
     grub_addr_t kern_start,
     void *kern_chunk_src,
     struct grub_openbsd_ramdisk_descriptor *desc);

extern grub_uint8_t grub_bsd64_trampoline_start, grub_bsd64_trampoline_end;
extern grub_uint32_t grub_bsd64_trampoline_selfjump;
extern grub_uint32_t grub_bsd64_trampoline_gdt;

#endif
```

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Description:
realpath, canonicalize_file_name: Provide canonical absolute file name

Files:
lib/canonicalize-lgpl.c
m4/canonicalize.m4
m4/double-slash-root.m4
m4/lstat.m4

Depends-on:
extensions
stdlib
nocrash
double-slash-root [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
eloop-threshold [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
errno [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
fcntl-h [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
filename [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
idx [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
intprops [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
libc-config [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME
= 1]
memmove [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
mempcpy [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
pathmax [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
rawmemchr [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
readlink [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
scratch_buffer [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
stat [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]

stdbool [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
sys_stat [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
unistd [test $HAVE_CANONICALIZE_FILE_NAME = 0
|| test $REPLACE_CANONICALIZE_FILE_NAME = 1]

configure.ac:
gl_CANONICALIZE_LGPL
gl_CONDITIONAL([GL_COND_OBJ_CANONICALIZE_LGPL],
[test $HAVE_CANONICALIZE_FILE_NAME = 0 || test $REPLACE_CANONICALIZE_FILE_NAME =
1])
gl_MODULE_INDICATOR([canonicalize-lgpl])
gl_STDLIB_MODULE_INDICATOR([canonicalize_file_name])
gl_STDLIB_MODULE_INDICATOR([realpath])

Makefile.am:
if GL_COND_OBJ_CANONICALIZE_LGPL
lib_SOURCES += canonicalize-lgpl.c
endif

Include:
<stdlib.h>

License:
LGPLv2+

Maintainer:
all
Description:
Concatenate two arbitrary file names.

Files:
lib/filenamecat.h
lib/filenamecat-lgpl.c
m4/filenamecat.m4

Depends-on:
c99
basename-lgpl
filename
malloc-posix

configure.ac:
gl_FILE_NAME_CONCAT_LGPL

Makefile.am:
lib_SOURCES += filenamecat-lgpl.c

Include:
"filenamecat.h"

License:
LGPLv2+

Maintainer:
Jim Meyering
Files:
tests/test-update-copyright.sh

Depends-on:

configure.ac:
abs_aux_dir=`cd "$ac_aux_dir"; pwd`
AC_SUBST([abs_aux_dir])

Makefile.am:
TESTS += test-update-copyright.sh
TESTS_ENVIRONMENT += abs_aux_dir='$(abs_aux_dir)'

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machine-readable copy of the corresponding source code, to be
distributed under the terms of Sections 1 and 2 above on a medium
customarily used for software interchange; or,

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Accompany it with the information you received as to the offer
to distribute corresponding source code. (This alternative is
allowed only for noncommercial
distribution and only if you
received the program in object code or executable form with such
an offer, in accord with Subsection b above.)
@end enumerate

The source code for a work means the preferred form of the work for
making modifications to it. For an executable work, complete source
code means all the source code for all modules it contains, plus any
associated interface definition files, plus the scripts used to
control compilation and installation of the executable. However, as a
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@end enumerate

@iftex
@heading END OF TERMS AND CONDITIONS
@end iftex
@ifinfo
@center END OF TERMS AND CONDITIONS

@end ifinfo

@page
@heading Appendix: How to Apply These Terms to Your New Programs

If you develop a new program, and you want it to be of the greatest possible use to the public, the best way to achieve this is to make it free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the ``copyright'' line and a pointer to where the full notice is found.

@smallexample
@var{one line to give the program's name
and a brief idea of what it does.}
Copyright (C) @var{yyyy} @var{name of author}

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@end smallexample

Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

@smallexample
Gnomovision version
69, Copyright (C) @var{year} @var{name of author}
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
@end smallexample

The hypothetical commands @samp{show w} and @samp{show c} should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than @samp{show w} and @samp{show c}; they could even be mouse-clicks or menu items---whatever suits your program.

You should also get your employer (if you work as a programmer) or your
school, if any, to sign a ``copyright disclaimer'' for the program, if
necessary.  Here is a sample; alter the names:

@example
Yoyodyne, Inc., hereby disclaims all copyright interest in the program
`Gnomovision' (which makes passes at compilers) written by James Hacker.

@var{signature of Ty Coon}, 1 April 1989
Ty Coon, President of Vice
@end example

This General
 Public License does not permit incorporating your program into
proprietary programs.  If your program is a subroutine library, you may
consider it more useful to permit linking proprietary applications with the
library.  If this is what you want to do, use the GNU Lesser General
Public License instead of this License.
Description:
Provide the GNU Free Documentation License in Texinfo format.

Notice:
Don't use this module! Instead, copy the referenced license file into your version control repository.

Files:
doc/fdl.texi

Depends-on:

configure.ac:

Makefile.am:

Include:

License:
unmodifiable license text

Maintainer:
all
Description:
Help make libraries relocatable, that is, to allow them to function
properly when copied to an arbitrary directory.

Files:
doc/relocatable.texi
lib/relocatable.h

lib/relocatable.c
lib/relocatable.valgrind
m4/relocatable-lib.m4

Depends-on:
strdup

configure.ac:
gl_RELOCATABLE_LIBRARY
if test $RELOCATABLE = yes; then
 AC_LIBOBJ([relocatable])
fi

Makefile.am:
DEFS += -DNO_XMALLOC

Include:
"relocatable.h"

License:
LGPLv2+

Maintainer:
Ben Pfaff
Description:
Extract specific portions of filenames.

Files:
lib/dirname.h
lib/dirname-lgpl.c
lib/stripslash.c

Depends-on:
basename-lgpl
double-slash-root
filename
malloc-posix
stdbool

configure.ac:

Makefile.am:
lib_SOURCES += dirname-lgpl.c stripslash.c

Include:
"dirname.h"

License:

LGPLv2+

Maintainer:
Jim Meyering, Eric Blake

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Version 2.1, February 1999

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

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d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

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consider it more useful to permit linking proprietary applications with the
library. If this
is what you want to do, use the GNU Lesser General
Public License instead of this License.
Files:
tests/test-canonicalize-lgpl.c
tests/signature.h
tests/null-ptr.h
tests/macros.h

Depends-on:
ignore-value
same-inode
symlink

configure.ac:

Makefile.am:
TESTS += test-canonicalize-lgpl
check_PROGRAMS += test-canonicalize-lgpl
test_canonicalize_lgpl_LDADD = $(LDADD) $(LIBINTL)

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Description:
Extract the last component (base name) of a file name.

Files:
lib/basename-lgpl.h
lib/basename-lgpl.c

Depends-on:
double-slash-root
filename
stdbool

configure.ac:

Makefile.am:
lib_SOURCES += basename-lgpl.c

Include:
"basename-lgpl.h"

License:
LGPLv2+

Maintainer:
all

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Files:
tests/test-getcwd-lgpl.c
tests/signature.h
tests/macros.h

Depends-on:

configure.ac:

Makefile.am:
TESTS += test-getcwd-lgpl
check_PROGRAMS += test-getcwd-lgpl
test_getcwd_lgpl_LDADD = $(LDADD) $(LIBINTL)
Description:
Ensure getcwd(NULL, 0) returns a buffer allocated by the malloc() function.

Files:
lib/getcwd-lgpl.c
m4/getcwd.m4

Depends-on:
unistd
free-posix  [test $REPLACE_GETCWD = 1]
strdup  [test $REPLACE_GETCWD = 1]

configure.ac:
gl_FUNC_GETCWD_LGPL
gl_CONDITIONAL([GL_COND_OBJ_GETCWD_LGPL], [test $REPLACE_GETCWD = 1])
gl_UNISTD_MODULE_INDICATOR([getcwd])

Makefile.am:
if GL_COND_OBJ_GETCWD_LGPL
lib_SOURCES += getcwd-lgpl.c
endif

Include:
<unistd.h>

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Maintainer:
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Description:
Locating a program in PATH (LGPLed version).

Files:
lib/findprog.h
lib/findprog.c
lib/findprog-lgpl.c
m4/findprog.m4
m4/eaccess.m4

Depends-on:
stdbool
sys_stat
strdup
concat-filename
access
stat
unistd

configure.ac:
gl_FINDPROG
gl_MODULE_INDICATOR([findprog-lgpl])

Makefile.am:
lib_SOURCES += findprog.h findprog-lgpl.c

Include:
"findprog.h"

License:
LGPLv2+

Maintainer:
all

# 1.2974 librepo 1.14.5-3.el9

## 1.2974.1 Available under license :

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# 1.2975 crypto-policies 20250905-1.git377cc42.el9_7

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```
/* c_rehash.c - Create hash symlinks for certificates
* C implementation based on the original Perl and shell versions
*
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*/
```

Found in path(s):
* /ca-certificates-alpine-20260413-r0-tar-bz2/ca-certificates-20260413/c_rehash.c
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```
#!/usr/bin/env perl
# ***************************************************************************
# *                              _   _ ____  _
# *  Project                    ___| | | |  _ \| |
# *                            / __| | | | |_) | |
# *                           | (__| |_| |  _ <| |___
# *                            \___|\___/|_| \_\_____|
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# *
```

# ************************************************************************
# This Perl script creates a fresh ca-bundle.crt file for use with libcurl.
# It downloads certdata.txt from Mozilla's source tree (see URL below),
# then parses certdata.txt and extracts CA Root Certificates into PEM format.
# These are then processed with the OpenSSL commandline tool to produce the
# final ca-bundle.crt file.
# The script is based on the parse-certs script written by Roland Krikava.
# This Perl script works on almost any platform since its only external
# dependency is the OpenSSL commandline tool for optional text listing.
# Hacked by Guenter Knauf.
#

Found in path(s):
* /ca-certificates-alpine-20260413-r0-tar-bz2/ca-certificates-20260413/mk-ca-bundle.pl

# 1.2981 python-setuptools 53.0.0-15.el9

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# 1.2982 binutils 2.35.2-67.el9_7.1

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```
  02110-1301, USA.  */


#ifndef __VTV_H__
#define __VTV_H__

/* We could have used an enumeration here but it just makes it more
  difficult for the compiler to generate a call to this.  These are
  used as arguments to the function __VLTChangePermission, declared
  below.  */
#define __VLTP_READ_ONLY  0
#define __VLTP_READ_WRITE 1

#ifdef __cplusplus
extern "C" void __VLTChangePermission (int);
#else
extern void __VLTChangePermission (int);
#endif

#ifdef BIG_PAGE_SIZE
/* TODO - Replace '4096' below with correct big page size.  */
#define VTV_PAGE_SIZE 4096
#else
#if defined(__sun__) && defined(__svr4__) && defined(__sparc__)
#define VTV_PAGE_SIZE 8192
#else
#define VTV_PAGE_SIZE 4096
#endif
#endif



#endif /* __VTV_H__ */
```

(This file is under construction.)  -*- text -*-

If you've contributed to gas and your name isn't listed here, it is
not meant as a slight.  I just don't know about it.  Email me,
nickc@redhat.com and I'll correct the situation.

This file will eventually be deleted: The general info will go into
the documentation, and info on specific files will go into an AUTHORS
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++++++++++++++++

Dean Elsner wrote the original gas for vax.  [more details?]

Jay Fenlason maintained gas for a while, adding support for

gdb-specific debug information and the 68k series machines, most of the preprocessing pass, and extensive changes in messages.c, input-file.c, write.c.

K. Richard Pixley maintained gas for a while, adding various enhancements and many bug fixes, including merging support for several processors, breaking gas up to handle multiple object file format backends (including heavy rewrite, testing, an integration of the coff and b.out backends), adding configuration including heavy testing and verification of cross assemblers and file splits and renaming, converted gas to strictly ansi C including full prototypes, added support for m680[34]0 & cpu32, considerable work on i960 including a coff port (including considerable amounts of reverse engineering), a sparc opcode file rewrite, decstation, rs6000, and hp300hpux host ports, updated "know" assertions and made them work, much other reorganization, cleanup, and lint.

Ken Raeburn wrote the high-level BFD interface code to replace most of the code in format-specific I/O modules.

The original Vax-VMS support was contributed by David L. Kashtan. Eric Youngdale and Pat Rankin have done much work with it since.

The Intel 80386 machine description was written by Eliot Dresselhaus.

Minh Tran-Le at IntelliCorp contributed some AIX 386 support.

The Motorola 88k machine description was contributed by Devon Bowen of Buffalo University and Torbjorn Granlund of the Swedish Institute of Computer Science.

Keith Knowles at the Open Software Foundation wrote the original MIPS back end (tc-mips.c, tc-mips.h), and contributed Rose format support that hasn't been merged in yet. Ralph Campbell worked with the MIPS code to support a.out format.

Support for the Zilog Z8k and Hitachi H8/300, H8/500 and SH processors (tc-z8k, tc-h8300, tc-h8500, tc-sh), and IEEE 695 object file format (obj-ieee), was written by Steve Chamberlain of Cygnus Solutions. Steve also modified the COFF back end (obj-coffbfd) to use BFD for some low-level operations, for use with the Hitachi, 29k and Zilog targets.

John Gilmore built the AMD 29000 support, added .include support, and simplified the configuration of which versions accept which pseudo-ops. He updated the 68k machine description so that Motorola's

opcodes always produced fixed-size instructions (e.g. jsr), while synthetic instructions remained shrinkable (jbsr). John fixed many bugs, including true tested cross-compilation support, and one bug in relaxation
that took a week and required the proverbial one-bit fix.

Ian Lance Taylor of Cygnus Solutions merged the Motorola and MIT syntaxes for the 68k, completed support for some COFF targets (68k, i386 SVR3, and SCO Unix), wrote the ECOFF support based on Michael Meissner's mips-tfile program, wrote the PowerPC and RS/6000 support, and made a few other minor patches. He handled the binutils releases for versions 2.7 through 2.9.

David Edelsohn contributed fixes for the PowerPC and AIX support.

Steve Chamberlain made gas able to generate listings.

Support for the HP9000/300 was contributed by Glenn Engel of HP.

Support for ELF format files has been worked on by Mark Eichin of Cygnus Solutions (original, incomplete implementation), Pete Hoogenboom at the University of Utah (HPPA mainly), Michael Meissner of the Open Software Foundation (i386 mainly), and Ken Raeburn of Cygnus Solutions (sparc, initial 64-bit support).

Several engineers at Cygnus Solutions have also provided many
small
bug fixes and configuration enhancements.

The initial Alpha support was contributed by Carnegie-Mellon University. Additional work was done by Ken Raeburn of Cygnus Solutions. Richard Henderson then rewrote much of the Alpha support.

Ian Dall updated the support code for the National Semiconductor 32000 series, and added support for Mach 3 and NetBSD running on the PC532.

Klaus Kaempf ported the assembler and the binutils to openVMS/Alpha.

Steve Haworth contributed the support for the Texas Instruction c30 (tms320c30).

H.J. Lu has contributed many patches and much testing.

Alan Modra reworked much of the i386 backend, improving the error checking, updating the code, and improving the 16 bit support, using patches from the work of Martynas Kunigelis and H.J. Lu.

Many others have contributed large or small bugfixes and enhancements. If

you've contributed significant work and are not mentioned on this list, and
want to be, let us know.  Some of the history has been lost;
 we aren't
intentionally leaving anyone out.

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table, the facility still operates, and performs whatever part of
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(For example, a function in a library to compute square roots has
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application-supplied function or table used by this function must
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The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the

users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

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This option is useful when you wish to copy part of the code of the
Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

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6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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a copy of this License. If the work
during execution displays copyright notices, you must include the
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with the Library, with the complete machine-readable "work that
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to use the modified definitions.)

b) Accompany the
work with a written offer, valid for at
least three years, to give the same user the materials
specified in Subsection 6a, above, for a charge no more
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from a designated place, offer equivalent access to copy the above
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For an executable, the required form of the "work that uses the
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7. You may place library facilities that are a work based on the

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END OF TERMS AND CONDITIONS

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<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

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A "Standard Interface" means an interface that either is an official standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.

The "System Libraries" of an executable work include anything, other than the work as a whole, that (a) is included in the normal form of packaging a Major Component, but which is not part of that Major Component, and (b) serves only to enable use of the work with that Major Component, or to implement a Standard Interface for which an implementation is available to the public in source code form. A "Major Component", in this context, means a major essential component (kernel, window system, and so on) of the specific operating system (if any) on which the executable work runs, or a compiler used to produce the work, or an object code interpreter used to run it.

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b) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years and valid for as long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a copy of the Corresponding Source for all the software in the product that is covered by this License, on a durable physical medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the Corresponding Source from a network server at no charge.

c) Convey individual copies of the object code with a copy of the written offer to provide the Corresponding Source. This alternative is allowed only occasionally and noncommercially, and only if you received the object code with such an offer, in accord with subsection 6b.

d) Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements.

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# 1.2989 tar 2:1.34-9.el9_7

## 1.2989.1 Available under license :

```
/*  Extract the last component (base name) of a file name.

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   along with this program.  If not, see <https://www.gnu.org/licenses/>.  */

#ifndef _BASENAME_LGPL_H
#define _BASENAME_LGPL_H

#include <stddef.h>

#ifndef DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif


/*
 Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
```

```
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
          FILENAME      RESULT
          "foo.c"       "foo.c"
          "foo/bar.c"   "bar.c"
          "/foo/bar.c"  "bar.c"
          "foo/bar/"    "bar/"
          "foo/bar//"   "bar//"
          "/"           ""
          "//"          ""
          ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(), defined in <string.h>, does
      not consider trailing slashes to be part of the component:
          FILENAME
      RESULT
          "foo/bar/"    ""
          "foo/bar//"   ""
    * The 'basename' command eliminates trailing slashes and for a root
      produces a non-empty result:
          FILENAME      RESULT
          "foo/bar/"    "bar"
          "foo/bar//"   "bar"
          "/"           "/"
          "//"          "/"
*/
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;



#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
                GNU GENERAL PUBLIC LICENSE
                  Version 3, 29 June 2007
```

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# 1.2991 jq 1.6-19.el9

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# 1.2992 slirp4netns 1.3.3-1.el9

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That's all there is to it!

Mathieu Desnoyers
May 13th, 2009

IBM Corporation allowed LGPLv2.1+ licensing of their contribution to the
userspace RCU library in a patch submitted on May 8, 2009 from Paul E.
McKenney and reviewed by Steven L. Bennett:

https://lists.lttng.org/pipermail/lttng-dev/2009-May/012835.html

I (Mathieu Desnoyers) re-implemented ACCESS_ONCE(), likely(), unlikely() and
barrier() from scratch without reference to the original code.

commit id : 2dc5fa0f7cfbfb0a64a7a67b39626650e863f16a

Bert Wesarg <bert.wesarg@googlemail.com> approved LGPL relicensing of his
patch in an email dated May 13, 2009 :

http://lkml.org/lkml/2009/5/13/16

xchg() primitives has been rewritten from a MIT-licensed cmpxchg for Intel
and powerpc. They are MIT-licensed and therefore usable in LGPL code.
This cmpxchg code was obtained from the atomic_ops project:

http://www.hpl.hp.com/research/linux/atomic_ops/

I (Mathieu Desnoyers) wrote the remainder of the code.

The license for the library files in this project
was therefore changed to
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d) If a facility in the modified Library refers to a function or a

table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be
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Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the

object code for the work under the terms of Section 6.
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whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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a) Accompany
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machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate
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c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above

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For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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# 1.2999 libssh 0.10.6-1.ph4

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limitation in the term "modification".)

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Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

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c) You must cause the whole of the work to be licensed at no
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d) If a facility in the modified Library
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table of data to be supplied by an application program that uses
the facility, other than as an argument passed when the facility
is invoked, then you must make a good faith effort to ensure that,
in the event an application does not supply such function or
table, the facility still operates, and performs whatever part of
its purpose remains meaningful.

(For example, a function in a library to compute square roots has
a purpose that is entirely well-defined independent of the
application. Therefore, Subsection 2d requires that any
application-supplied function or table used by this function must
be optional: if the application does not supply it, the square
root function must still compute square roots.)

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No license file was found, but licenses were detected in source scan.

Found in path(s):
*
No license file was found, but licenses were detected in source scan.

Summary: The basic required files for the root user's directory

Found in path(s):
* /rootfiles.8.1-35.el9.os.almalinux.9.7.src.rpm-cosi-expand-archive-pEBEBqvF/rootfiles.spec

# 1.3001 expat 2.5.0-5.el9_7.1

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# 1.3002 oniguruma 6.9.6-1.el9.6

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That's all there is to it!

# 1.3005 fuse-overlayfs 1.16-1.el9_7

## 1.3005.1 Available under license :

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# 1.3006 libdnf 0.69.0-16.el9.alma.1

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not

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5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

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When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

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the work with the complete corresponding
machine-readable source code for the Library including whatever
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will operate
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c) Accompany the work with a written offer, valid for at
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For an executable, the required form of the "work that uses the
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#include <stddef.h>

#ifndef DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif


/*
 Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
          FILENAME      RESULT
          "foo.c"       "foo.c"
          "foo/bar.c"   "bar.c"
          "/foo/bar.c"  "bar.c"
```

```
          "foo/bar/"    "bar/"
          "foo/bar//"   "bar//"
          "/"           ""
          "//"          ""
          ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(), defined in <string.h>, does
      not consider trailing slashes to be part of the component:
          FILENAME
      RESULT
          "foo/bar/"    ""
          "foo/bar//"   ""
    * The 'basename' command eliminates trailing slashes and for a root
      produces a non-empty result:
          FILENAME      RESULT
          "foo/bar/"    "bar"
          "foo/bar//"   "bar"
          "/"           "/"
          "//"          "/"
*/
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;


#ifdef __cplusplus
} /* extern "C" */
#endif

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d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

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corresponding machine-readable source code, which
must be distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

If distribution of object code is made by offering access to copy
from a designated place, then offering equivalent access to copy the
source code from the same place satisfies the requirement to
distribute the source code, even though third parties are not
compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the
Library, but is designed to work with the Library by being compiled or
linked with it, is called a "work that uses the Library". Such a
work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library
creates an executable that is a derivative of the Library (because it
contains portions of the Library), rather than a "work
that uses the
library". The executable is therefore covered by this License.
Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.

Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute
the object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.
^L
6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a)
Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system,

rather than copying library functions into the executable, and (2) will
operate properly with a modified version of the library, if
the user installs one, as long as the modified version is
interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at
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than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy
from a designated place, offer equivalent access to copy the above
specified materials from the same place.

e) Verify that the user has already received a copy of these
materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the
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reproducing the executable from it. However, as a special exception,
the materials to be distributed need not include anything that is
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which the executable runs, unless that component itself accompanies
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# 1.3013 patch 2.7.6-16.el9

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<http://www.gnu.org/licenses/>.  */

/* Use the Sequent Symmetry assembler syntax.  */

/* Define the syntax of pseudo-ops, labels and comments.  */

/* Prefix for internally generated assembler
 labels.  If we aren't using
  underscores, we are using prefix `.'s to identify labels that should
  be ignored, as in `i386/gas.h' --karl@cs.umb.edu  */

#define LPREFIX "L"

/* Assembler pseudos to introduce constants of various size.  */

#define ASM_BYTE "\t.byte\t"
#define ASM_SHORT "\t.word\t"
#define ASM_LONG "\t.long\t"
#define ASM_QUAD "\t.quad\t"  /* Should not be used for 32bit compilation.  */
```

```
/* This was suggested, but it shouldn't be right for debugger output. -- RMS
  #define ASM_OUTPUT_SOURCE_FILENAME(FILE, NAME) */


/* Define the syntax of labels and symbol definitions/declarations.  */

/* This is how to output an assembler line
  that says to advance the location counter by SIZE bytes.  */

#define ASM_OUTPUT_SKIP(FILE,SIZE)  \
 fprintf (FILE, "\t.space " HOST_WIDE_INT_PRINT_UNSIGNED"\n", (SIZE))

/* Define the syntax of labels and symbol definitions/declarations.  */

/* This says how to output an assembler line
  to define a global common symbol.  */

#define
 ASM_OUTPUT_COMMON(FILE, NAME, SIZE, ROUNDED)  \
( fputs (".comm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u\n", (int)(ROUNDED)))

/* This says how to output an assembler line
  to define a local common symbol.  */

#define ASM_OUTPUT_LOCAL(FILE, NAME, SIZE, ROUNDED)  \
( fputs (".lcomm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u\n", (int)(ROUNDED)))

#ifdef HAVE_GAS_LCOMM_WITH_ALIGNMENT
#define ASM_OUTPUT_ALIGNED_LOCAL(FILE, NAME, SIZE, ALIGNMENT)  \
( fputs (".lcomm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u,%u\n", (int)(SIZE), (int)(ALIGNMENT) / BITS_PER_UNIT))
#endif

/* This is how to output an assembler line
  that says to advance the location counter
  to a multiple of 2**LOG bytes.  */

#define ASM_OUTPUT_ALIGN(FILE,LOG) \
 if ((LOG)!=0) fprintf ((FILE), "\t.align %d\n", (LOG))

/* This is how to store into the string BUF
  the symbol_ref name of an internal numbered
```

```
 label where
  PREFIX is the class of label and NUM is the number within the class.
  This is suitable for output with `assemble_name'.  */

#define ASM_GENERATE_INTERNAL_LABEL(BUF,PREFIX,NUMBER) \
   sprintf ((BUF), "*%s%ld", (PREFIX), (long)(NUMBER))

/* The prefix to add to user-visible assembler symbols.  */

#define USER_LABEL_PREFIX "_"
```

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Version 3.1, 31 March 2009

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```
  02110-1301, USA.  */


#ifndef __VTV_H__
#define __VTV_H__

/* We could have used an enumeration here but it just makes it more
  difficult for the compiler to generate a call to this.  These are
  used as arguments to the function __VLTChangePermission, declared
  below.  */
#define __VLTP_READ_ONLY  0
#define __VLTP_READ_WRITE 1

#ifdef __cplusplus
extern "C" void __VLTChangePermission (int);
#else
extern void __VLTChangePermission (int);
#endif

#ifdef BIG_PAGE_SIZE
/* TODO - Replace '4096' below with correct big page size.  */
#define VTV_PAGE_SIZE 4096
#else
#if defined(__sun__) && defined(__svr4__) && defined(__sparc__)
#define VTV_PAGE_SIZE 8192
#elif defined(__loongarch_lp64)
/* The page size is configurable by the kernel to be 4,
 16 or 64 KiB.
  For now, only the default page size of 16KiB is supported.  */
#define VTV_PAGE_SIZE 16384
#else
#define VTV_PAGE_SIZE 4096
#endif
#endif



#endif /* __VTV_H__ */
```

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Version 3.1, 31 March 2009

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/* Use the Sequent Symmetry assembler syntax.  */

/* Define the syntax of pseudo-ops, labels and comments.  */

```
/* Prefix for internally generated assembler
 labels.  If we aren't using
  underscores, we are using prefix `.'s to identify labels that should
  be ignored, as in `i386/gas.h' --karl@cs.umb.edu  */

#define LPREFIX "L"

/* Assembler pseudos to introduce constants of various size.  */

#define ASM_BYTE "\t.byte\t"
#define ASM_SHORT "\t.word\t"
#define ASM_LONG "\t.long\t"
#define ASM_QUAD "\t.quad\t"  /* Should not be used for 32bit compilation.  */

/* This was suggested, but it shouldn't be right for debugger output. -- RMS
  #define ASM_OUTPUT_SOURCE_FILENAME(FILE, NAME) */


/* Define the syntax of labels and symbol definitions/declarations.  */

/* This is how to output an assembler line
  that says to advance the location counter by SIZE bytes.  */

#define ASM_OUTPUT_SKIP(FILE,SIZE)  \
 fprintf (FILE, "\t.space " HOST_WIDE_INT_PRINT_UNSIGNED"\n", (SIZE))

/* Define the syntax of labels and symbol definitions/declarations.  */

/* This says how to output an assembler line
  to define a global common symbol.  */

#define
 ASM_OUTPUT_COMMON(FILE, NAME, SIZE, ROUNDED)  \
( fputs (".comm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u\n", (int)(ROUNDED)))

/* This says how to output an assembler line
  to define a local common symbol.  */

#define ASM_OUTPUT_LOCAL(FILE, NAME, SIZE, ROUNDED)  \
( fputs (".lcomm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u\n", (int)(ROUNDED)))

#ifdef HAVE_GAS_LCOMM_WITH_ALIGNMENT
#define ASM_OUTPUT_ALIGNED_LOCAL(FILE, NAME, SIZE, ALIGNMENT)  \
```

```
( fputs (".lcomm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u,%u\n", (int)(SIZE), (int)(ALIGNMENT) / BITS_PER_UNIT))
#endif

/* This is how to output an assembler line
  that says to advance the location counter
  to a multiple of 2**LOG bytes.  */

#define ASM_OUTPUT_ALIGN(FILE,LOG) \
 if ((LOG)!=0) fprintf ((FILE), "\t.align %d\n", (LOG))

/* This is how to store into the string BUF
  the symbol_ref name of an internal numbered
 label where
  PREFIX is the class of label and NUM is the number within the class.
  This is suitable for output with `assemble_name'.  */

#define ASM_GENERATE_INTERNAL_LABEL(BUF,PREFIX,NUMBER) \
   sprintf ((BUF), "*%s%ld", (PREFIX), (long)(NUMBER))

/* The prefix to add to user-visible assembler symbols.  */

#define USER_LABEL_PREFIX "_"
```

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  02110-1301, USA.  */


#ifndef __VTV_H__
#define __VTV_H__

/* We could have used an enumeration here but it just makes it more
  difficult for the compiler to generate a call to this.  These are
  used as arguments to the function __VLTChangePermission, declared
  below.  */
#define __VLTP_READ_ONLY  0
#define __VLTP_READ_WRITE 1

#ifdef __cplusplus
extern "C" void __VLTChangePermission (int);
#else
extern void __VLTChangePermission (int);
#endif

#ifdef BIG_PAGE_SIZE
/* TODO - Replace '4096' below with correct big page size.  */
#define VTV_PAGE_SIZE 4096
#else
#if defined(__sun__) && defined(__svr4__) && defined(__sparc__)
#define VTV_PAGE_SIZE 8192
#elif defined(__loongarch_lp64)
/* The page size is configurable by the kernel to be 4,
 16 or 64 KiB.
  For now, only the default page size of 16KiB is supported.  */
#define VTV_PAGE_SIZE 16384
#else
#define VTV_PAGE_SIZE 4096
#endif
```

#endif

#endif /* __VTV_H__ */

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* /golang-1-25-7-zip/golang 1.25.7.txt

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NR START END SECTORS SIZE NAME UUID
1 32 7679 7648 3.7M 8f8378c0-01
2 7680 16383 8704 4.3M 8f8378c0-02
5 7936 12799 4864 2.4M
6 12544 16127 3584 1.8M

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#ifndef UTIL_LINUX_PT_BSD_H
#define UTIL_LINUX_PT_BSD_H

#define BSD_MAXPARTITIONS 16
#define BSD_FS_UNUSED  0

#ifndef BSD_DISKMAGIC
# define BSD_DISKMAGIC     ((uint32_t) 0x82564557)
#endif

#define BSD_LINUX_BOOTDIR "/usr/ucb/mdec"

#if defined (__alpha__) || defined (__powerpc__) || \
   defined (__ia64__) || defined (__hppa__)
# define BSD_LABELSECTOR   0
# define BSD_LABELOFFSET   64
#else
# define BSD_LABELSECTOR   1
# define BSD_LABELOFFSET   0
#endif

#define BSD_BBSIZE        8192  /* size of boot area, with label */
#define BSD_SBSIZE        8192  /* max size of fs superblock */

struct bsd_disklabel {
 uint32_t d_magic;  /* the magic number */
 int16_t  d_type;   /* drive type */
 int16_t  d_subtype;  /* controller/d_type specific */
 char  d_typename[16];  /* type name, e.g. "eagle" */
 char  d_packname[16];  /* pack identifier */

   /* disk geometry: */
 uint32_t d_secsize;  /* # of bytes per sector */
 uint32_t d_nsectors;  /* # of data sectors per track */
 uint32_t d_ntracks;  /*
 # of tracks per cylinder */
 uint32_t d_ncylinders;  /* # of data cylinders per unit */
 uint32_t d_secpercyl;  /* # of data sectors per cylinder */
 uint32_t d_secperunit;  /* # of data sectors per unit */

 /*
  * Spares (bad sector replacements) below
```

```
 * are not counted in d_nsectors or d_secpercyl.
 * Spare sectors are assumed to be physical sectors
 * which occupy space at the end of each track and/or cylinder.
 */
uint16_t d_sparespertrack; /* # of spare sectors per track */
uint16_t d_sparespercyl;  /* # of spare sectors per cylinder */

/*
 * Alternate cylinders include maintenance, replacement,
 * configuration description areas, etc.
 */
uint32_t d_acylinders;  /* # of alt. cylinders per unit */

  /* hardware characteristics: */
/*
 * d_interleave, d_trackskew and d_cylskew describe perturbations
 * in the media format used to compensate for a slow controller.
 * Interleave is physical sector interleave, set up by the formatter
 * or controller
when formatting.  When interleaving is in use,
 * logically adjacent sectors are not physically contiguous,
 * but instead are separated by some number of sectors.
 * It is specified as the ratio of physical sectors traversed
 * per logical sector.  Thus an interleave of 1:1 implies contiguous
 * layout, while 2:1 implies that logical sector 0 is separated
 * by one sector from logical sector 1.
 * d_trackskew is the offset of sector 0 on track N
 * relative to sector 0 on track N-1 on the same cylinder.
 * Finally, d_cylskew is the offset of sector 0 on cylinder N
 * relative to sector 0 on cylinder N-1.
 */
uint16_t d_rpm;   /* rotational speed */
uint16_t d_interleave;  /* hardware sector interleave */
uint16_t d_trackskew;  /* sector 0 skew, per track */
uint16_t d_cylskew;  /* sector 0 skew, per cylinder */
uint32_t d_headswitch;  /* head switch time, usec */
uint32_t d_trkseek;  /* track-to-track seek, usec */
uint32_t d_flags;  /* generic flags */
uint32_t d_drivedata[5];  /*
drive-type specific information */
uint32_t d_spare[5];  /* reserved for future use */
uint32_t d_magic2;  /* the magic number (again) */
uint16_t d_checksum;  /* xor of data incl. partitions */

  /* filesystem and partition information: */
uint16_t d_npartitions;        /* number of partitions in following */
uint32_t d_bbsize;        /* size of boot area at sn0, bytes */
uint32_t d_sbsize;        /* max size of fs superblock, bytes */
```

```
 struct bsd_partition  {  /* the partition table */
  uint32_t p_size;        /* number of sectors in partition */
  uint32_t p_offset;       /* starting sector */
  uint32_t p_fsize;        /* filesystem basic fragment size */
  uint8_t  p_fstype; /* filesystem type, see below */
  uint8_t  p_frag;  /* filesystem fragments per block */
  uint16_t p_cpg;         /* filesystem cylinders per group */
 } __attribute__((packed)) d_partitions[BSD_MAXPARTITIONS]; /* actually may be more */
} __attribute__((packed));


/* d_type values:
 */
#define BSD_DTYPE_SMD  1  /* SMD, XSMD; VAX hp/up */
#define BSD_DTYPE_MSCP  2  /* MSCP */
#define BSD_DTYPE_DEC  3  /* other DEC (rk, rl) */
#define BSD_DTYPE_SCSI  4  /* SCSI */
#define BSD_DTYPE_ESDI  5  /* ESDI interface */
#define BSD_DTYPE_ST506  6  /* ST506 etc. */
#define BSD_DTYPE_HPIB  7  /* CS/80 on HP-IB */
#define BSD_DTYPE_HPFL  8  /* HP Fiber-link */
#define BSD_DTYPE_FLOPPY 10  /* floppy */

/* d_subtype values: */
#define BSD_DSTYPE_INDOSPART 0x8  /* is inside dos partition */
#define BSD_DSTYPE_DOSPART(s) ((s) & 3) /* dos partition number */
#define BSD_DSTYPE_GEOMETRY 0x10  /* drive params in label */

/*
* Filesystem type and version.
* Used to interpret other filesystem-specific
* per-partition information.
*/
#define BSD_FS_UNUSED 0  /* unused */
#define BSD_FS_SWAP     1  /* swap */
#define BSD_FS_V6       2  /* Sixth Edition */
#define BSD_FS_V7       3  /* Seventh Edition */
#define BSD_FS_SYSV     4  /* System V */
#define BSD_FS_V71K     5  /* V7
 with 1K blocks (4.1, 2.9) */
#define BSD_FS_V8       6  /* Eighth Edition, 4K blocks */
#define BSD_FS_BSDFFS 7  /* 4.2BSD fast file system */
#define BSD_FS_BSDLFS 9  /* 4.4BSD log-structured file system */
#define BSD_FS_OTHER 10  /* in use, but unknown/unsupported */
#define BSD_FS_HPFS 11  /* OS/2 high-performance file system */
#define BSD_FS_ISO9660 12  /* ISO-9660 filesystem (cdrom) */
#define BSD_FS_ISOFS BSD_FS_ISO9660
```

```
#define BSD_FS_BOOT 13  /* partition contains bootstrap */
#define BSD_FS_ADOS 14  /* AmigaDOS fast file system */
#define BSD_FS_HFS 15  /* Macintosh HFS */
#define BSD_FS_ADVFS 16  /* Digital Unix AdvFS */

/* this is annoying, but it's also the way it is :-( */
#ifdef __alpha__
#define BSD_FS_EXT2 8  /* ext2 file system */
#else
#define BSD_FS_MSDOS 8  /* MS-DOS file system */
#endif

/*
* flags shared by various drives:
*/
#define BSD_D_REMOVABLE 0x01  /* removable media */
#define BSD_D_ECC       0x02  /* supports ECC */
#define BSD_D_BADSECT 0x04  /* supports
 bad sector forw. */
#define BSD_D_RAMDISK 0x08  /* disk emulator */
#define BSD_D_CHAIN     0x10  /* can do back-back transfers */
#define BSD_D_DOSPART 0x20  /* within MSDOS partition */

#endif /* UTIL_LINUX_PT_BSD_H */
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Linus Torvalds

# 1.3026 tevent 0.16.2-1.el9

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# 1.3027 lshw B.02.20-2.el9

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form

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If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

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6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work

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# 1.3033 mokutil 2:0.7.2-1.el9

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# 1.3037 polkit 0.117-14.el9

## 1.3037.1 Available under license :

```
; 7zAsm.asm -- ASM macros
; 2018-02-03 : Igor Pavlov : Public domain

MY_ASM_START macro
 ifdef x64
   .code
 else
   .386
   .model flat
   _TEXT$00 SEGMENT PARA PUBLIC 'CODE'
 endif
endm

MY_PROC macro name:req, numParams:req
 align 16
 proc_numParams = numParams
 ifdef x64
   proc_name equ name
 else
   proc_name equ @CatStr(@,name,@, %numParams * 4)
 endif
 proc_name PROC
endm

MY_ENDP macro
 ifdef x64
   ret
 else
   if proc_numParams LT 3
     ret
   else
     ret (proc_numParams - 2) * 4
   endif
 endif
 proc_name ENDP
endm

ifdef x64
 REG_SIZE equ 8
 REG_LOGAR_SIZE equ 3
else
 REG_SIZE equ 4
 REG_LOGAR_SIZE equ 2
endif
```

```
x0 equ EAX
x1 equ ECX
x2 equ EDX
x3 equ EBX
x4 equ ESP
x5 equ EBP
x6 equ ESI
x7 equ EDI

x0_W equ AX
x1_W equ CX
x2_W equ DX
x3_W equ BX

x5_W equ BP
x6_W equ SI
x7_W equ DI

x0_L equ AL
x1_L equ CL
x2_L equ DL
x3_L equ BL

x0_H equ AH
x1_H equ CH
x2_H equ DH
x3_H equ BH

ifdef x64
x5_L
equ BPL
x6_L equ SIL
x7_L equ DIL

r0 equ RAX
r1 equ RCX
r2 equ RDX
r3 equ RBX
r4 equ RSP
r5 equ RBP
r6 equ RSI
r7 equ RDI
x8 equ r8d
x9 equ r9d
x10 equ r10d
x11 equ r11d
x12 equ r12d
```

```
 x13 equ r13d
 x14 equ r14d
 x15 equ r15d
else
 r0 equ x0
 r1 equ x1
 r2 equ x2
 r3 equ x3
 r4 equ x4
 r5 equ x5
 r6 equ x6
 r7 equ x7
endif

MY_PUSH_4_REGS macro
   push    r3
   push    r5
   push    r6
   push    r7
endm

MY_POP_4_REGS macro
   pop     r7
   pop     r6
   pop     r5
   pop     r3
endm


ifdef x64

; for WIN64-x64 ABI:

REG_PARAM_0 equ r1
REG_PARAM_1 equ r2
REG_PARAM_2 equ r8
REG_PARAM_3 equ r9

MY_PUSH_PRESERVED_REGS macro
   MY_PUSH_4_REGS
   push    r12
   push    r13
   push    r14
   push    r15
endm


MY_POP_PRESERVED_REGS macro
```

```
  pop     r15
  pop     r14
  pop     r13
  pop     r12
  MY_POP_4_REGS
endm

endif
```

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```
// Windows/Control/Dialog.h

#ifndef __WINDOWS_CONTROL_DIALOG_H
#define __WINDOWS_CONTROL_DIALOG_H

#include "../Window.h"

namespace NWindows {
namespace NControl {

class CDialog: public CWindow
{
public:
 CDialog(HWND wnd = NULL): CWindow(wnd){};
 virtual ~CDialog() {};

 HWND GetItem(int itemID) const
   { return GetDlgItem(_window, itemID); }

 bool EnableItem(int itemID, bool enable) const
   { return BOOLToBool(::EnableWindow(GetItem(itemID), BoolToBOOL(enable))); }

 bool ShowItem(int itemID, int cmdShow) const
   { return BOOLToBool(::ShowWindow(GetItem(itemID), cmdShow)); }

 bool ShowItem_Bool(int itemID, bool show) const
   { return ShowItem(itemID, show ? SW_SHOW: SW_HIDE); }

 bool HideItem(int itemID) const { return ShowItem(itemID, SW_HIDE); }

 bool SetItemText(int itemID, LPCTSTR s)
   { return BOOLToBool(SetDlgItemText(_window, itemID, s)); }

 #ifndef _UNICODE
 bool SetItemText(int itemID, LPCWSTR s)
 {
   CWindow window(GetItem(itemID));
   return
 window.SetText(s);
 }
 #endif

 UINT GetItemText(int itemID, LPTSTR string, int maxCount)
   { return GetDlgItemText(_window, itemID, string, maxCount); }
 #ifndef _UNICODE
 /*
```

```
bool GetItemText(int itemID, LPWSTR string, int maxCount)
{
  CWindow window(GetItem(itemID));
  return window.GetText(string, maxCount);
}
*/
#endif

bool SetItemInt(int itemID, UINT value, bool isSigned)
  { return BOOLToBool(SetDlgItemInt(_window, itemID, value, BoolToBOOL(isSigned))); }
bool GetItemInt(int itemID, bool isSigned, UINT &value)
{
  BOOL result;
  value = GetDlgItemInt(_window, itemID, &result, BoolToBOOL(isSigned));
  return BOOLToBool(result);
}

HWND GetNextGroupItem(HWND control, bool previous)
  { return GetNextDlgGroupItem(_window, control, BoolToBOOL(previous)); }
HWND GetNextTabItem(HWND control, bool previous)
  { return GetNextDlgTabItem(_window, control, BoolToBOOL(previous)); }

bool MapRect(LPRECT rect)
  { return BOOLToBool(MapDialogRect(_window,
rect)); }

bool IsMessage(LPMSG message)
  { return BOOLToBool(IsDialogMessage(_window, message)); }

LRESULT SendItemMessage(int itemID, UINT message, WPARAM wParam, LPARAM lParam)
  { return SendDlgItemMessage(_window, itemID, message, wParam, lParam); }

bool CheckButton(int buttonID, UINT checkState)
  { return BOOLToBool(CheckDlgButton(_window, buttonID, checkState)); }
bool CheckButton(int buttonID, bool checkState)
  { return CheckButton(buttonID, UINT(checkState ? BST_CHECKED : BST_UNCHECKED)); }

UINT IsButtonChecked(int buttonID) const
  { return IsDlgButtonChecked(_window, buttonID); }
bool IsButtonCheckedBool(int buttonID) const
  { return (IsButtonChecked(buttonID) == BST_CHECKED); }

bool CheckRadioButton(int firstButtonID, int lastButtonID, int checkButtonID)
  { return BOOLToBool(::CheckRadioButton(_window, firstButtonID, lastButtonID, checkButtonID)); }

virtual bool OnMessage(UINT message, WPARAM wParam, LPARAM lParam);
virtual
```

```
 bool OnInit() { return true; }
 virtual bool OnCommand(WPARAM wParam, LPARAM lParam);
 virtual bool OnCommand(int code, int itemID, LPARAM lParam);
 virtual bool OnSize(WPARAM /* wParam */, int /* xSize */, int /* ySize */) { return false; }

 /*
 #ifdef UNDER_CE
 virtual void OnHelp(void *) { OnHelp(); }
 #else
 virtual void OnHelp(LPHELPINFO) { OnHelp(); }
 #endif
 */
 virtual void OnHelp() {};

 virtual bool OnButtonClicked(int buttonID, HWND buttonHWND);
 virtual void OnOK() {};
 virtual void OnCancel() {};
 virtual void OnClose() {}
 virtual bool OnNotify(UINT /* controlID */, LPNMHDR /* lParam */) { return false; }
 virtual bool OnTimer(WPARAM /* timerID */, LPARAM /* callback */) { return false; }

 LONG_PTR SetMsgResult(LONG_PTR newLongPtr )
   { return SetLongPtr(DWLP_MSGRESULT, newLongPtr); }
 LONG_PTR GetMsgResult() const
   { return GetLongPtr(DWLP_MSGRESULT); }

 bool GetMargins(int margin, int &x, int &y);
 int Units_To_Pixels_X(int units);
 bool
 GetItemSizes(int id, int &x, int &y);
 void GetClientRectOfItem(int id, RECT &rect);
 bool MoveItem(int id, int x, int y, int width, int height, bool repaint = true);

 void NormalizeSize(bool fullNormalize = false);
 void NormalizePosition();
};

class CModelessDialog: public CDialog
{
public:
 bool Create(LPCTSTR templateName, HWND parentWindow);
 bool Create(UINT resID, HWND parentWindow) { return Create(MAKEINTRESOURCEW(resID),
parentWindow); }
 #ifndef _UNICODE
 bool Create(LPCWSTR templateName, HWND parentWindow);
 #endif
 virtual void OnOK() { Destroy(); }
 virtual void OnCancel() { Destroy(); }
```

```
 virtual void OnClose() { Destroy(); }
};

class CModalDialog: public CDialog
{
public:
 INT_PTR Create(LPCTSTR templateName, HWND parentWindow);
 INT_PTR Create(UINT resID, HWND parentWindow) { return Create(MAKEINTRESOURCEW(resID),
parentWindow); }
 #ifndef _UNICODE
 INT_PTR Create(LPCWSTR templateName, HWND parentWindow);
 #endif

 bool End(INT_PTR result) { return
 BOOLToBool(::EndDialog(_window, result)); }
 virtual void OnOK() { End(IDOK); }
 virtual void OnCancel() { End(IDCANCEL); }
 virtual void OnClose() { End(IDCLOSE); }
};

class CDialogChildControl: public NWindows::CWindow
{
 int m_ID;
public:
 void Init(const NWindows::NControl::CDialog &parentDialog, int id)
 {
   m_ID = id;
   Attach(parentDialog.GetItem(id));
 }
};

bool IsDialogSizeOK(int xSize, int ySize);

}}

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With One div Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
```

```
  <link rel="match" href="metadatadisplay-schema-copyright-017-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element that contains a div element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
 {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-017.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   &lt;div&gt;Paragraph 1&lt;/div&gt;
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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```
// XzEncoder.h

#ifndef __XZ_ENCODER_H
#define __XZ_ENCODER_H

#include "../../../C/XzEnc.h"

#include "../../Common/MyCom.h"

#include "../ICoder.h"

namespace NCompress {
namespace NXz {


class CEncoder:
```

```
 public ICompressCoder,
 public ICompressSetCoderProperties,
 public ICompressSetCoderPropertiesOpt,
 public CMyUnknownImp
{
 CXzEncHandle _encoder;
public:
 CXzProps xzProps;

 MY_UNKNOWN_IMP3(
    ICompressCoder,
    ICompressSetCoderProperties,
    ICompressSetCoderPropertiesOpt)

 void InitCoderProps();
 HRESULT SetCheckSize(UInt32 checkSizeInBytes);
 HRESULT SetCoderProp(PROPID propID, const PROPVARIANT &prop);

 STDMETHOD(Code)(ISequentialInStream *inStream, ISequentialOutStream *outStream,
    const UInt64 *inSize, const UInt64 *outSize, ICompressProgressInfo *progress);
 STDMETHOD(SetCoderProperties)(const PROPID *propIDs, const PROPVARIANT *props, UInt32 numProps);
 STDMETHOD(SetCoderPropertiesOpt)(const PROPID *propIDs, const PROPVARIANT *props, UInt32
 numProps);

 CEncoder();
 virtual ~CEncoder();
};

}}

#endif
```

Snappy framing format description
Last revised: 2013-10-25

This format decribes a framing format for Snappy, allowing compressing to files or streams that can then more easily be decompressed without having to hold the entire stream in memory. It also provides data checksums to help verify integrity. It does not provide metadata checksums, so it does not protect against e.g. all forms of truncations.

Implementation of the framing format is optional for Snappy compressors and decompressor; it is not part of the Snappy core specification.

1. General structure

The file consists solely of chunks, lying back-to-back with no padding in between. Each chunk consists first a single byte of chunk identifier,

then a three-byte little-endian length of the chunk in bytes (from 0 to 16777215, inclusive), and then the data if any. The four bytes of chunk header is not counted in the data length.

The different chunk types are listed below. The first chunk must always be the stream identifier chunk (see section 4.1, below). The stream ends when the file ends -- there is no explicit end-of-file marker.

## 2. File type identification

The following identifiers for this format are recommended where appropriate. However, note that none have been registered officially, so this is only to be taken as a guideline. We use "Snappy framed" to distinguish between this format and raw Snappy data.

| | |
|---|---|
| File extension: | .sz |
| MIME type: | application/x-snappy-framed |
| HTTP Content-Encoding: | x-snappy-framed |

## 3. Checksum format

Some chunks have data protected by a checksum (the ones that do will say so explicitly). The checksums are always masked CRC-32Cs.

A description of CRC-32C can be found in RFC 3720, section 12.1, with examples in section B.4.

Checksums are not stored directly, but masked, as checksumming data and then its own checksum can be problematic. The masking is the same as used in Apache Hadoop: Rotate the checksum by 15 bits, then add the constant 0xa282ead8 (using wraparound as normal for unsigned integers). This is equivalent to the following C code:

```
uint32_t mask_checksum(uint32_t x) {
  return ((x >> 15) | (x << 17)) + 0xa282ead8;
}
```

Note that the masking is reversible.

The checksum is always stored as a four bytes long integer, in little-endian.

## 4. Chunk types

The currently supported chunk types are described below. The list may be extended in the future.

4.1. Stream identifier (chunk type 0xff)

The stream identifier is always the first element in the stream. It is exactly six bytes long and contains "sNaPpY" in ASCII. This means that a valid Snappy framed stream always starts with the bytes

0xff 0x06 0x00 0x00 0x73 0x4e 0x61 0x50 0x70 0x59

The stream identifier chunk can come multiple times in the stream besides the first; if such a chunk shows up, it should simply be ignored, assuming it has the right length and contents. This allows for easy concatenation of compressed files without the need for re-framing.

4.2. Compressed data (chunk type 0x00)

Compressed data chunks contain a normal Snappy compressed bitstream; see the compressed format specification. The compressed data is preceded by the CRC-32C (see section 3) of the _uncompressed_ data.

Note that the data portion of the chunk, i.e., the compressed contents, can be at most 16777211 bytes (2^24 - 1, minus the checksum). However, we place an additional restriction that the uncompressed data in a chunk must be no longer than 65536 bytes. This allows consumers to easily use small fixed-size buffers.

4.3. Uncompressed data (chunk type 0x01)

Uncompressed data chunks allow a compressor to send uncompressed, raw data; this is useful if, for instance, uncompressible or near-incompressible data is detected, and faster decompression is desired.

As in the compressed chunks, the data is preceded by its own masked CRC-32C (see section 3).

An uncompressed data chunk, like compressed data chunks, should contain no more than 65536 data bytes, so the maximum legal chunk length with the checksum is 65540.

4.4. Padding (chunk type 0xfe)

Padding chunks allow a compressor to increase the size of the data stream so that it complies with external demands, e.g. that the total number of bytes is a multiple of some value.

All bytes of the padding chunk, except the chunk byte itself and the length, should be zero, but decompressors must not try to interpret or verify the padding data in any way.

4.5. Reserved unskippable chunks (chunk types 0x02-0x7f)

These are reserved for future expansion. A decoder that sees such a chunk should immediately return an error, as it must assume it cannot decode the stream correctly.

Future versions of this specification may define meanings for these chunks.

4.6. Reserved skippable chunks (chunk types 0x80-0xfd)

These are also reserved for future expansion, but unlike the chunks described in 4.5, a decoder seeing these must skip them and continue decoding.

Future versions of this specification
may define meanings for these chunks.

```
C_OBJS = $(C_OBJS) \
 $O\XzCrc64.obj
!IF "$(CPU)" == "IA64" || "$(CPU)" == "MIPS" || "$(CPU)" == "ARM" || "$(CPU)" == "ARM64"
C_OBJS = $(C_OBJS) \
!ELSE
ASM_OBJS = $(ASM_OBJS) \
!ENDIF
 $O\XzCrc64Opt.obj
```

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```
#define IDD_PROGRESS  97

#define IDC_PROGRESS1  100
// ComTry.h

#ifndef __COM_TRY_H
#define __COM_TRY_H

#include "MyWindows.h"
// #include "Exception.h"
// #include "NewHandler.h"

#define COM_TRY_BEGIN try {
#define COM_TRY_END } catch(...) { return E_OUTOFMEMORY; }

/*
#define COM_TRY_END } \
 catch(const CNewException &) { return E_OUTOFMEMORY; } \
 catch(...) { return HRESULT_FROM_WIN32(ERROR_NOACCESS); } \
*/
```

```
 // catch(const CSystemException &e) { return e.ErrorCode; }
 // catch(...) { return E_FAIL; }

#endif
```

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```
/* ATK -  Accessibility Toolkit
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*
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* License along with this library; if not, write to the
* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_RELATION_SET_H__
#define __ATK_RELATION_SET_H__
```

```
#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

#include <glib-object.h>
#include <atk/atkobject.h>
#include
 <atk/atkrelation.h>

#define ATK_TYPE_RELATION_SET                    (atk_relation_set_get_type ())
#define ATK_RELATION_SET(obj)                    (G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_RELATION_SET, AtkRelationSet))
#define ATK_RELATION_SET_CLASS(klass)            (G_TYPE_CHECK_CLASS_CAST ((klass),
ATK_TYPE_RELATION_SET, AtkRelationSetClass))
#define ATK_IS_RELATION_SET(obj)                 (G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_RELATION_SET))
#define ATK_IS_RELATION_SET_CLASS(klass)         (G_TYPE_CHECK_CLASS_TYPE ((klass),
ATK_TYPE_RELATION_SET))
#define ATK_RELATION_SET_GET_CLASS(obj)          (G_TYPE_INSTANCE_GET_CLASS ((obj),
ATK_TYPE_RELATION_SET, AtkRelationSetClass))

typedef struct _AtkRelationSetClass       AtkRelationSetClass;


struct _AtkRelationSet
{
 GObject parent;

 GPtrArray *relations;
};

struct _AtkRelationSetClass
{
 GObjectClass parent;

 AtkFunction pad1;
 AtkFunction pad2;
};

GType atk_relation_set_get_type (void);

AtkRelationSet*
 atk_relation_set_new                    (void);
gboolean        atk_relation_set_contains            (AtkRelationSet  *set,
                                                     AtkRelationType relationship);
void            atk_relation_set_remove              (AtkRelationSet  *set,
                                                     AtkRelation     *relation);
void            atk_relation_set_add                 (AtkRelationSet  *set,
```

```
                                        AtkRelation     *relation);
gint            atk_relation_set_get_n_relations      (AtkRelationSet  *set);
AtkRelation*    atk_relation_set_get_relation         (AtkRelationSet  *set,
                                        gint            i);
AtkRelation*    atk_relation_set_get_relation_by_type (AtkRelationSet  *set,
                                        AtkRelationType relationship);
void            atk_relation_set_add_relation_by_type (AtkRelationSet  *set,
                                         AtkRelationType relationship,
                                        AtkObject       *target);

#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_RELATION_SET_H__ */
```

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```
/* XzCrc64.h -- CRC64 calculation
2013-01-18 : Igor Pavlov : Public domain */

#ifndef __XZ_CRC64_H
#define __XZ_CRC64_H

#include <stddef.h>
```

```
#include "7zTypes.h"

EXTERN_C_BEGIN

extern UInt64 g_Crc64Table[];

void MY_FAST_CALL Crc64GenerateTable(void);

#define CRC64_INIT_VAL UINT64_CONST(0xFFFFFFFFFFFFFFFF)
#define CRC64_GET_DIGEST(crc) ((crc) ^ CRC64_INIT_VAL)
#define CRC64_UPDATE_BYTE(crc, b) (g_Crc64Table[((crc) ^ (b)) & 0xFF] ^ ((crc) >> 8))

UInt64 MY_FAST_CALL Crc64Update(UInt64 crc, const void *data, size_t size);
UInt64 MY_FAST_CALL Crc64Calc(const void *data, size_t size);

EXTERN_C_END

#endif
```

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```
// Bench.h

#ifndef __7ZIP_BENCH_H
```

```
#define __7ZIP_BENCH_H

#include "../../../Windows/System.h"

#include "../../Common/CreateCoder.h"
#include "../../UI/Common/Property.h"

struct CBenchInfo
{
 UInt64 GlobalTime;
 UInt64 GlobalFreq;
 UInt64 UserTime;
 UInt64 UserFreq;
 UInt64 UnpackSize;
 UInt64 PackSize;
 UInt64 NumIterations;

 CBenchInfo(): NumIterations(0) {}
 UInt64 GetUsage() const;
 UInt64 GetRatingPerUsage(UInt64 rating) const;
 UInt64 GetSpeed(UInt64 numCommands) const;
};

struct IBenchCallback
{
 virtual HRESULT SetFreq(bool showFreq, UInt64 cpuFreq) = 0;
 virtual HRESULT SetEncodeResult(const CBenchInfo &info, bool final) = 0;
 virtual HRESULT SetDecodeResult(const CBenchInfo &info, bool final) = 0;
};

UInt64 GetCompressRating(UInt32 dictSize, UInt64 elapsedTime, UInt64 freq, UInt64 size);
UInt64 GetDecompressRating(UInt64 elapsedTime, UInt64 freq, UInt64 outSize, UInt64 inSize, UInt64
numIterations);

const unsigned kBenchMinDicLogSize = 18;

UInt64 GetBenchMemoryUsage(UInt32
 numThreads, UInt32 dictionary, bool totalBench = false);

struct IBenchPrintCallback
{
 virtual void Print(const char *s) = 0;
 virtual void NewLine() = 0;
 virtual HRESULT CheckBreak() = 0;
};

/*
struct IBenchFreqCallback
```

```
{
 virtual void AddCpuFreq(UInt64 freq) = 0;
};
*/

HRESULT Bench(
  DECL_EXTERNAL_CODECS_LOC_VARS
  IBenchPrintCallback *printCallback,
  IBenchCallback *benchCallback,
  // IBenchFreqCallback *freqCallback,
  const CObjectVector<CProperty> &props,
  UInt32 numIterations,
  bool multiDict
  );

AString GetProcessThreadsInfo(const NWindows::NSystem::CProcessAffinity &ti);

void GetSysInfo(AString &s1, AString &s2);
void GetCpuName(AString &s);
void GetCpuFeatures(AString &s);


#endif
```

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```
// Common/NewHandler.h

#ifndef __COMMON_NEW_HANDLER_H
```

```
#define __COMMON_NEW_HANDLER_H

/*
NewHandler.h and NewHandler.cpp allows to solve problem with compilers that
don't throw exception in operator new().

This file must be included before any code that uses operators new() or delete()
and you must compile and link "NewHandler.cpp", if you use some old MSVC compiler.

The operator new() in some MSVC versions doesn't throw exception std::bad_alloc.
MSVC 6.0 (_MSC_VER == 1200) doesn't throw exception.
The code produced by some another MSVC compilers also can be linked
to library that doesn't throw exception.
We suppose that code compiled with VS2015+ (_MSC_VER >= 1900) throws exception std::bad_alloc.
For older _MSC_VER versions we redefine operator new() and operator delete().
Our version of operator new() throws CNewException() exception on failure.

It's still allowed to use redefined version of operator new() from "NewHandler.cpp"
with any compiler. 7-Zip's code can work with std::bad_alloc
 and CNewException() exceptions.
But if you use some additional code (outside of 7-Zip's code), you must check
that redefined version of operator new() is not problem for your code.
*/

#include <stddef.h>

#ifdef _WIN32
// We can compile my_new and my_delete with _fastcall
/*
void * my_new(size_t size);
void my_delete(void *p) throw();
// void * my_Realloc(void *p, size_t newSize, size_t oldSize);
*/
#endif


#if defined(_MSC_VER) && (_MSC_VER < 1900)
 // If you want to use default operator new(), you can disable the following line
 #define _7ZIP_REDEFINE_OPERATOR_NEW
#endif


#ifdef _7ZIP_REDEFINE_OPERATOR_NEW

// std::bad_alloc can require additional DLL dependency.
// So we don't define CNewException as std::bad_alloc here.

class CNewException {};
```

```
void *
#ifdef _MSC_VER
__cdecl
#endif
operator new(size_t size);

void
#ifdef _MSC_VER
__cdecl
#endif
operator delete(void *p) throw();

#else

#include <new>

#define CNewException std::bad_alloc

#endif

/*
#ifdef _WIN32
void
 *
#ifdef _MSC_VER
__cdecl
#endif
operator new[](size_t size);

void
#ifdef _MSC_VER
__cdecl
#endif
operator delete[](void *p) throw();
#endif
*/

#endif
```

shutilwhich contains code from Python 3.3 and uses the same license:

A. HISTORY OF THE SOFTWARE
==========

Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC.  Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.2 | 2.1.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
| 2.2.1 | 2.2 | 2002 | PSF | yes |
| 2.2.2 | 2.2.1 | 2002 | PSF | yes |
| 2.2.3 | 2.2.2 | 2003 | PSF | yes |
| 2.3 | 2.2.2 | 2002-2003 | PSF | yes |
| 2.3.1 | 2.3 | 2002-2003 | PSF | yes |
| 2.3.2 | 2.3.1 | 2002-2003 | PSF | yes |
| 2.3.3 | 2.3.2 | 2002-2003 | PSF | yes |
| 2.3.4 | 2.3.3 | 2004 | PSF | yes |
| 2.3.5 | 2.3.4 | 2005 | PSF | yes |
| 2.4 | 2.3 | 2004 | PSF | yes |
| 2.4.1 | 2.4 | 2005 | PSF | yes |
| 2.4.2 | 2.4.1 | 2005 | PSF | yes |

| | | | | |
|---|---|---|---|---|
| 2.4.3 | 2.4.2 | 2006 | PSF | yes |
| 2.4.4 | 2.4.3 | 2006 | PSF | yes |
| 2.5 | 2.4 | 2006 | PSF | yes |
| 2.5.1 | 2.5 | 2007 | PSF | yes |
| 2.5.2 | 2.5.1 | 2008 | PSF | yes |
| 2.5.3 | 2.5.2 | 2008 | PSF | yes |
| 2.6 | 2.5 | 2008 | PSF | yes |
| 2.6.1 | 2.6 | 2008 | PSF | yes |
| 2.6.2 | 2.6.1 | 2009 | PSF | yes |
| 2.6.3 | 2.6.2 | 2009 | PSF | yes |
| 2.6.4 | 2.6.3 | 2009 | PSF | yes |
| 2.6.5 | 2.6.4 | 2010 | PSF | yes |
| 3.0 | 2.6 | 2008 | PSF | yes |
| 3.0.1 | 3.0 | 2009 | PSF | yes |
| 3.1 | 3.0.1 | 2009 | PSF | yes |
| 3.1.1 | 3.1 | 2009 | PSF | yes |
| 3.1.2 | 3.1.1 | 2010 | PSF | yes |
| 3.1.3 | 3.1.2 | 2010 | PSF | yes |
| 3.1.4 | 3.1.3 | 2011 | PSF | yes |
| 3.2 | 3.1 | 2011 | PSF | yes |
| 3.2.1 | 3.2 | 2011 | PSF | yes |
| 3.2.2 | 3.2.1 | 2011 | PSF | yes |
| 3.2.3 | 3.2.2 | 2012 | PSF | yes |
| 3.3.0 | 3.2 | 2012 | PSF | yes |

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(2) According to Richard Stallman, 1.6.1 is not GPL-compatible, because its license has a choice of law clause. According to CNRI, however, Stallman's lawyer has told CNRI's lawyer that 1.6.1 is "not incompatible" with the GPL.

Thanks to the many outside volunteers who have worked under Guido's direction to make these releases possible.

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```
// Windows/SecurityUtils.h

#ifndef __WINDOWS_SECURITY_UTILS_H
#define __WINDOWS_SECURITY_UTILS_H

#include <NTSecAPI.h>

#include "Defs.h"

namespace NWindows {
namespace NSecurity {

class CAccessToken
{
 HANDLE _handle;
public:
 CAccessToken(): _handle(NULL) {};
 ~CAccessToken() { Close(); }
 bool Close()
 {
  if (_handle == NULL)
    return true;
  bool res = BOOLToBool(::CloseHandle(_handle));
  if (res)
    _handle = NULL;
  return res;
 }

 bool OpenProcessToken(HANDLE processHandle, DWORD desiredAccess)
 {
  Close();
  return BOOLToBool(::OpenProcessToken(processHandle, desiredAccess, &_handle));
 }

 /*
 bool OpenThreadToken(HANDLE threadHandle, DWORD desiredAccess, bool openAsSelf)
 {
  Close();
  return BOOLToBool(::OpenTreadToken(threadHandle, desiredAccess, BoolToBOOL(anOpenAsSelf),
```

```
&_handle));
 }
 */

 bool AdjustPrivileges(bool disableAllPrivileges, PTOKEN_PRIVILEGES newState,
     DWORD bufferLength, PTOKEN_PRIVILEGES previousState, PDWORD
 returnLength)
   { return BOOLToBool(::AdjustTokenPrivileges(_handle, BoolToBOOL(disableAllPrivileges),
     newState, bufferLength, previousState, returnLength)); }

 bool AdjustPrivileges(bool disableAllPrivileges, PTOKEN_PRIVILEGES newState)
   { return AdjustPrivileges(disableAllPrivileges, newState, 0, NULL, NULL); }

 bool AdjustPrivileges(PTOKEN_PRIVILEGES newState)
   { return AdjustPrivileges(false, newState); }

};

#ifndef _UNICODE
typedef NTSTATUS (NTAPI *LsaOpenPolicyP)(PLSA_UNICODE_STRING SystemName,
   PLSA_OBJECT_ATTRIBUTES ObjectAttributes, ACCESS_MASK DesiredAccess, PLSA_HANDLE
PolicyHandle);
typedef NTSTATUS (NTAPI *LsaCloseP)(LSA_HANDLE ObjectHandle);
typedef NTSTATUS (NTAPI *LsaAddAccountRightsP)(LSA_HANDLE PolicyHandle,
   PSID AccountSid, PLSA_UNICODE_STRING UserRights, ULONG CountOfRights );
#define MY_STATUS_NOT_IMPLEMENTED          ((NTSTATUS)0xC0000002L)
#endif

struct CPolicy
{
protected:
 LSA_HANDLE _handle;
 #ifndef _UNICODE
 HMODULE hModule;
  #endif
public:
 operator LSA_HANDLE() const { return _handle; }
 CPolicy(): _handle(NULL)
 {
   #ifndef _UNICODE
   hModule = GetModuleHandle(TEXT("Advapi32.dll"));
   #endif
 };
 ~CPolicy() { Close(); }

 NTSTATUS Open(PLSA_UNICODE_STRING systemName, PLSA_OBJECT_ATTRIBUTES objectAttributes,
     ACCESS_MASK desiredAccess)
 {
```

```
  #ifndef _UNICODE
  if (hModule == NULL)
    return MY_STATUS_NOT_IMPLEMENTED;
  LsaOpenPolicyP lsaOpenPolicy = (LsaOpenPolicyP)GetProcAddress(hModule, "LsaOpenPolicy");
  if (lsaOpenPolicy == NULL)
    return MY_STATUS_NOT_IMPLEMENTED;
  #endif

  Close();
  return
    #ifdef _UNICODE
    ::LsaOpenPolicy
    #else
    lsaOpenPolicy
    #endif
    (systemName, objectAttributes, desiredAccess, &_handle);
}

NTSTATUS Close()
{
  if (_handle == NULL)
    return 0;

  #ifndef _UNICODE
  if (hModule == NULL)
    return MY_STATUS_NOT_IMPLEMENTED;
  LsaCloseP lsaClose = (LsaCloseP)GetProcAddress(hModule,
"LsaClose");
  if (lsaClose == NULL)
    return MY_STATUS_NOT_IMPLEMENTED;
  #endif

  NTSTATUS res =
    #ifdef _UNICODE
    ::LsaClose
    #else
    lsaClose
    #endif
    (_handle);
  _handle = NULL;
  return res;
}

NTSTATUS EnumerateAccountsWithUserRight(PLSA_UNICODE_STRING userRights,
    PLSA_ENUMERATION_INFORMATION *enumerationBuffer, PULONG countReturned)
  { return LsaEnumerateAccountsWithUserRight(_handle, userRights, (void **)enumerationBuffer,
countReturned); }
```

```
 NTSTATUS EnumerateAccountRights(PSID sid, PLSA_UNICODE_STRING* userRights, PULONG
countOfRights)
   { return ::LsaEnumerateAccountRights(_handle, sid, userRights, countOfRights); }

 NTSTATUS LookupSids(ULONG count, PSID* sids,
     PLSA_REFERENCED_DOMAIN_LIST* referencedDomains, PLSA_TRANSLATED_NAME* names)
   { return LsaLookupSids(_handle, count, sids, referencedDomains, names); }

 NTSTATUS AddAccountRights(PSID accountSid, PLSA_UNICODE_STRING userRights, ULONG
countOfRights)
  {
   #ifndef _UNICODE
   if (hModule == NULL)
     return MY_STATUS_NOT_IMPLEMENTED;
   LsaAddAccountRightsP lsaAddAccountRights = (LsaAddAccountRightsP)GetProcAddress(hModule,
"LsaAddAccountRights");
   if (lsaAddAccountRights == NULL)
     return MY_STATUS_NOT_IMPLEMENTED;
   #endif

   return
     #ifdef _UNICODE
     ::LsaAddAccountRights
     #else
     lsaAddAccountRights
     #endif
     (_handle, accountSid, userRights, countOfRights);
 }
 NTSTATUS AddAccountRights(PSID accountSid, PLSA_UNICODE_STRING userRights)
   { return AddAccountRights(accountSid, userRights, 1); }

 NTSTATUS RemoveAccountRights(PSID accountSid, bool allRights, PLSA_UNICODE_STRING userRights,
ULONG countOfRights)
   { return LsaRemoveAccountRights(_handle, accountSid, (BOOLEAN)(allRights ? TRUE : FALSE), userRights,
countOfRights); }
};

bool AddLockMemoryPrivilege();

}}

#endif
// ExtractCallback.h

#ifndef __EXTRACT_CALLBACK_H
#define __EXTRACT_CALLBACK_H

#include "../../../../C/Alloc.h"
```

```
#include "../../../Common/MyCom.h"
#include "../../../Common/StringConvert.h"

#ifndef _SFX
#include "../Agent/IFolderArchive.h"
#endif

#include "../Common/ArchiveExtractCallback.h"
#include "../Common/ArchiveOpenCallback.h"

#ifndef _NO_CRYPTO
#include "../../IPassword.h"
#endif

#ifndef _SFX
#include "IFolder.h"
#endif

#include "ProgressDialog2.h"

#ifdef LANG
#include "LangUtils.h"
#endif

#ifndef _SFX

class CGrowBuf
{
 Byte *_items;
 size_t _size;

 CLASS_NO_COPY(CGrowBuf);

public:
 bool ReAlloc_KeepData(size_t newSize, size_t keepSize)
 {
   void *buf = MyAlloc(newSize);
   if (!buf)
     return false;
   if (keepSize != 0)
     memcpy(buf, _items, keepSize);
   MyFree(_items);
   _items = (Byte *)buf;
   _size = newSize;
   return true;
 }
```

```
 CGrowBuf(): _items(0), _size(0) {}
 ~CGrowBuf() { MyFree(_items); }

 operator Byte *() { return _items; }
  operator const Byte *() const { return _items; }
 size_t Size() const { return _size; }
};

struct CVirtFile
{
 CGrowBuf Data;

 UInt64 Size; // real size
 UInt64 ExpectedSize; // the size from props request. 0 if unknown

 UString Name;

 bool CTimeDefined;
 bool ATimeDefined;
 bool MTimeDefined;
 bool AttribDefined;

 bool IsDir;
 bool IsAltStream;

 DWORD Attrib;

 FILETIME CTime;
 FILETIME ATime;
 FILETIME MTime;

 CVirtFile():
   CTimeDefined(false),
   ATimeDefined(false),
   MTimeDefined(false),
   AttribDefined(false),
   IsDir(false),
   IsAltStream(false) {}
};

class CVirtFileSystem:
 public ISequentialOutStream,
 public CMyUnknownImp
{
 UInt64 _totalAllocSize;

 size_t _pos;
 unsigned _numFlushed;
```

```
 bool _fileIsOpen;
 bool _fileMode;
 COutFileStream *_outFileStreamSpec;
 CMyComPtr<ISequentialOutStream> _outFileStream;
public:
 CObjectVector<CVirtFile> Files;
 UInt64 MaxTotalAllocSize;
 FString DirPrefix;

 CVirtFile &AddNewFile()
  {
   if (!Files.IsEmpty())
   {
     MaxTotalAllocSize -= Files.Back().Data.Size();
   }
   return Files.AddNew();
 }
 HRESULT CloseMemFile()
 {
   if (_fileMode)
   {
     return FlushToDisk(true);
   }
   CVirtFile &file = Files.Back();
   if (file.Data.Size() != file.Size)
   {
     file.Data.ReAlloc_KeepData((size_t)file.Size, (size_t)file.Size);
   }
   return S_OK;
 }

 bool IsStreamInMem() const
 {
   if (_fileMode)
     return false;
   if (Files.Size() < 1 || /* Files[0].IsAltStream || */ Files[0].IsDir)
     return false;
   return true;
 }

 size_t GetMemStreamWrittenSize() const { return _pos; }

 CVirtFileSystem(): _outFileStreamSpec(NULL), MaxTotalAllocSize((UInt64)0 - 1) {}

 void Init()
 {
   _totalAllocSize = 0;
   _fileMode = false;
```

```
  _pos = 0;
  _numFlushed = 0;
  _fileIsOpen = false;
 }

 HRESULT CloseFile(const FString &path);
 HRESULT FlushToDisk(bool closeLast);
 size_t GetPos() const { return _pos; }

 MY_UNKNOWN_IMP
  STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
};

#endif

class CExtractCallbackImp:
 public IExtractCallbackUI, // it includes IFolderArchiveExtractCallback
 public IOpenCallbackUI,
 public IFolderArchiveExtractCallback2,
 #ifndef _SFX
 public IFolderOperationsExtractCallback,
 public IFolderExtractToStreamCallback,
 public ICompressProgressInfo,
 #endif
 #ifndef _NO_CRYPTO
 public ICryptoGetTextPassword,
 #endif
 public CMyUnknownImp
{
 HRESULT MessageError(const char *message, const FString &path);
 void Add_ArchiveName_Error();
public:
 MY_QUERYINTERFACE_BEGIN2(IFolderArchiveExtractCallback)
 MY_QUERYINTERFACE_ENTRY(IFolderArchiveExtractCallback2)
 #ifndef _SFX
 MY_QUERYINTERFACE_ENTRY(IFolderOperationsExtractCallback)
 MY_QUERYINTERFACE_ENTRY(IFolderExtractToStreamCallback)
 MY_QUERYINTERFACE_ENTRY(ICompressProgressInfo)
 #endif
 #ifndef _NO_CRYPTO
 MY_QUERYINTERFACE_ENTRY(ICryptoGetTextPassword)
 #endif
 MY_QUERYINTERFACE_END
  MY_ADDREF_RELEASE

 INTERFACE_IProgress(;)
 INTERFACE_IOpenCallbackUI(;)
 INTERFACE_IFolderArchiveExtractCallback(;)
```

```
 INTERFACE_IFolderArchiveExtractCallback2(;)
 // STDMETHOD(SetTotalFiles)(UInt64 total);
 // STDMETHOD(SetCompletedFiles)(const UInt64 *value);

 INTERFACE_IExtractCallbackUI(;)

 #ifndef _SFX
 // IFolderOperationsExtractCallback
 STDMETHOD(AskWrite)(
    const wchar_t *srcPath,
    Int32 srcIsFolder,
    const FILETIME *srcTime,
    const UInt64 *srcSize,
    const wchar_t *destPathRequest,
    BSTR *destPathResult,
    Int32 *writeAnswer);
 STDMETHOD(ShowMessage)(const wchar_t *message);
 STDMETHOD(SetCurrentFilePath)(const wchar_t *filePath);
 STDMETHOD(SetNumFiles)(UInt64 numFiles);
 INTERFACE_IFolderExtractToStreamCallback(;)
 STDMETHOD(SetRatioInfo)(const UInt64 *inSize, const UInt64 *outSize);
 #endif

 // ICryptoGetTextPassword
 #ifndef _NO_CRYPTO
 STDMETHOD(CryptoGetTextPassword)(BSTR *password);
 #endif

private:
 UString
 _currentArchivePath;
 bool _needWriteArchivePath;

 UString _currentFilePath;
 bool _isFolder;

 bool _isAltStream;
 UInt64 _curSize;
 bool _curSizeDefined;
 UString _filePath;
 // bool _extractMode;
 // bool _testMode;
 bool _newVirtFileWasAdded;
 bool _needUpdateStat;


 HRESULT SetCurrentFilePath2(const wchar_t *filePath);
 void AddError_Message(LPCWSTR message);
```

```
 #ifndef _SFX
 bool _hashStreamWasUsed;
 COutStreamWithHash *_hashStreamSpec;
 CMyComPtr<ISequentialOutStream> _hashStream;
 IHashCalc *_hashCalc; // it's for stat in Test operation
 #endif

public:

 #ifndef _SFX
 CVirtFileSystem *VirtFileSystemSpec;
 CMyComPtr<ISequentialOutStream> VirtFileSystem;
 #endif

 bool ProcessAltStreams;

 bool StreamMode;

 CProgressDialog *ProgressDialog;
 #ifndef _SFX
 UInt64 NumFolders;
 UInt64 NumFiles;
 bool NeedAddFile;
 #endif
 UInt32 NumArchiveErrors;
 bool ThereAreMessageErrors;
 NExtract::NOverwriteMode::EEnum OverwriteMode;

 #ifndef _NO_CRYPTO
 bool
 PasswordIsDefined;
 bool PasswordWasAsked;
 UString Password;
 #endif


 UString _lang_Extracting;
 UString _lang_Testing;
 UString _lang_Skipping;
 UString _lang_Empty;

 bool _totalFilesDefined;
 bool _totalBytesDefined;
 bool MultiArcMode;

 CExtractCallbackImp():
  #ifndef _NO_CRYPTO
```

```
  PasswordIsDefined(false),
  PasswordWasAsked(false),
  #endif
  OverwriteMode(NExtract::NOverwriteMode::kAsk),
  StreamMode(false),
  ProcessAltStreams(true),

  _totalFilesDefined(false),
  _totalBytesDefined(false),
  MultiArcMode(false)

  #ifndef _SFX
  , _hashCalc(NULL)
  #endif
  {}

~CExtractCallbackImp();
void Init();

#ifndef _SFX
void SetHashCalc(IHashCalc *hashCalc) { _hashCalc = hashCalc; }

void SetHashMethods(IHashCalc *hash)
{
  if (!hash)
    return;
  _hashStreamSpec = new COutStreamWithHash;
  _hashStream = _hashStreamSpec;
  _hashStreamSpec->_hash = hash;
}
#endif

bool IsOK() const { return NumArchiveErrors
== 0 && !ThereAreMessageErrors; }
};

#endif
/* Lzma2DecMt.h -- LZMA2 Decoder Multi-thread
2018-02-17 : Igor Pavlov : Public domain */

#ifndef __LZMA2_DEC_MT_H
#define __LZMA2_DEC_MT_H

#include "7zTypes.h"

EXTERN_C_BEGIN

typedef struct
```

```
{
 size_t inBufSize_ST;
 size_t outStep_ST;

 #ifndef _7ZIP_ST
 unsigned numThreads;
 size_t inBufSize_MT;
 size_t outBlockMax;
 size_t inBlockMax;
 #endif
} CLzma2DecMtProps;

/* init to single-thread mode */
void Lzma2DecMtProps_Init(CLzma2DecMtProps *p);


/* ---------- CLzma2DecMtHandle Interface ---------- */

/* Lzma2DecMt_ * functions can return the following exit codes:
SRes:
 SZ_OK           - OK
 SZ_ERROR_MEM    - Memory allocation error
 SZ_ERROR_PARAM  - Incorrect paramater in props
 SZ_ERROR_WRITE  - ISeqOutStream write callback error
 // SZ_ERROR_OUTPUT_EOF - output buffer overflow - version with (Byte *) output
 SZ_ERROR_PROGRESS - some break from progress callback
 SZ_ERROR_THREAD - error in multithreading functions (only for Mt version)
*/

typedef void * CLzma2DecMtHandle;

CLzma2DecMtHandle
 Lzma2DecMt_Create(ISzAllocPtr alloc, ISzAllocPtr allocMid);
void Lzma2DecMt_Destroy(CLzma2DecMtHandle p);

SRes Lzma2DecMt_Decode(CLzma2DecMtHandle p,
  Byte prop,
  const CLzma2DecMtProps *props,
  ISeqOutStream *outStream,
  const UInt64 *outDataSize, // NULL means undefined
  int finishMode,           // 0 - partial unpacking is allowed, 1 - if lzma2 stream must be finished
  // Byte *outBuf, size_t *outBufSize,
  ISeqInStream *inStream,
  // const Byte *inData, size_t inDataSize,

  // out variables:
  UInt64 *inProcessed,
  int *isMT,  /* out: (*isMT == 0), if single thread decoding was used */
```

```
  // UInt64 *outProcessed,
  ICompressProgress *progress);


/* ---------- Read from CLzma2DecMtHandle Interface ---------- */

SRes Lzma2DecMt_Init(CLzma2DecMtHandle pp,
  Byte prop,
  const CLzma2DecMtProps *props,
  const UInt64 *outDataSize, int finishMode,
  ISeqInStream *inStream);

SRes Lzma2DecMt_Read(CLzma2DecMtHandle
 pp,
  Byte *data, size_t *outSize,
  UInt64 *inStreamProcessed);


EXTERN_C_END

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With Nested div Elements in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-022-ref.xht" />
  <meta name="assert" content="The license element contains a text element that contains nested div elements." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
  {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-022.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
```

```
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   &lt;div&gt;
    div 1 start
    &lt;div&gt;
     div 2 start
     &lt;div&gt;
      div 3
     &lt;/div&gt;
     div 2 end
    &lt;/div&gt;
    div 1 end
   &lt;/div&gt;
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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```
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  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
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  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-028-ref.xht" />
  <meta name="assert" content="The license element contains a text element that contains two span elements." />
  <style type="text/css"><![CDATA[
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   @font-face
  {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-028.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
```

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&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
    Text with &lt;span&gt;span 1&lt;/span&gt; and &lt;span&gt;span 2&lt;/span&gt;.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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---

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* License along with this library; if not, write to the
* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

```
#ifndef __ATK_RELATION_H__
#define __ATK_RELATION_H__

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

#include <glib-object.h>
#include <atk/atkrelationtype.h>

/*
* An
 AtkRelation describes a relation between the object and one or more
* other objects. The actual relations that an object has with other objects
* are defined as an AtkRelationSet, which is a set of AtkRelations.
*/

#define ATK_TYPE_RELATION                    (atk_relation_get_type ())
#define ATK_RELATION(obj)                    (G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_RELATION, AtkRelation))
#define ATK_RELATION_CLASS(klass)            (G_TYPE_CHECK_CLASS_CAST ((klass),
ATK_TYPE_RELATION, AtkRelationClass))
#define ATK_IS_RELATION(obj)                 (G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_RELATION))
#define ATK_IS_RELATION_CLASS(klass)         (G_TYPE_CHECK_CLASS_TYPE ((klass),
ATK_TYPE_RELATION))
#define ATK_RELATION_GET_CLASS(obj)          (G_TYPE_INSTANCE_GET_CLASS ((obj),
ATK_TYPE_RELATION, AtkRelationClass))

typedef struct _AtkRelation          AtkRelation;
typedef struct _AtkRelationClass     AtkRelationClass;

struct _AtkRelation
{
  GObject parent;

 GPtrArray       *target;
 AtkRelationType relationship;
};

struct _AtkRelationClass
{
 GObjectClass parent;
};

GType atk_relation_get_type (void);

AtkRelationType       atk_relation_type_register      (const gchar     *name);
```

```
G_CONST_RETURN gchar* atk_relation_type_get_name      (AtkRelationType type);
AtkRelationType       atk_relation_type_for_name      (const gchar     *name);

/*
* Create a new relation for the specified key and the specified list
* of targets.
*/
AtkRelation*          atk_relation_new                (AtkObject       **targets,
                                                       gint            n_targets,
                                                       AtkRelationType relationship);
/*
* Returns the type of a relation.
*/
AtkRelationType       atk_relation_get_relation_type  (AtkRelation     *relation);
/*
* Returns the target list of a relation.
*/
GPtrArray*            atk_relation_get_target         (AtkRelation
    *relation);
void                  atk_relation_add_target         (AtkRelation     *relation,
                                                       AtkObject       *target);


#ifdef __cplusplus
}
#endif /* __cplusplus */

#endif /* __ATK_RELATION_H__ */
// PropertyName.h

#ifndef __PROPERTY_NAME_H
#define __PROPERTY_NAME_H

#include "../../../Common/MyString.h"

UString GetNameOfProperty(PROPID propID, const wchar_t *name);

#endif
```

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// Update.h

#ifndef __COMMON_UPDATE_H

```
#define __COMMON_UPDATE_H

#include "../../../Common/Wildcard.h"

#include "ArchiveOpenCallback.h"
#include "LoadCodecs.h"
#include "OpenArchive.h"
#include "Property.h"
#include "UpdateAction.h"
#include "UpdateCallback.h"

#include "DirItem.h"

enum EArcNameMode
{
 k_ArcNameMode_Smart,
 k_ArcNameMode_Exact,
 k_ArcNameMode_Add,
};

struct CArchivePath
{
 UString OriginalPath;

 UString Prefix;   // path(folder) prefix including slash
 UString Name; // base name
 UString BaseExtension; // archive type extension or "exe" extension
 UString VolExtension;  // archive type extension for volumes

 bool Temp;
 FString TempPrefix;  // path(folder) for temp location
 FString TempPostfix;

 CArchivePath(): Temp(false) {};

 void ParseFromPath(const UString &path, EArcNameMode mode);
 UString GetPathWithoutExt() const { return Prefix + Name; }
 UString GetFinalPath() const;
 UString GetFinalVolPath() const;
 FString GetTempPath() const;
};

struct
 CUpdateArchiveCommand
{
 UString UserArchivePath;
 CArchivePath ArchivePath;
 NUpdateArchive::CActionSet ActionSet;
```

```
};

struct CCompressionMethodMode
{
 bool Type_Defined;
 COpenType Type;
 CObjectVector<CProperty> Properties;

 CCompressionMethodMode(): Type_Defined(false) {}
};

namespace NRecursedType { enum EEnum
{
 kRecursed,
 kWildcardOnlyRecursed,
 kNonRecursed
};}

struct CRenamePair
{
 UString OldName;
 UString NewName;
 bool WildcardParsing;
 NRecursedType::EEnum RecursedType;

 CRenamePair(): WildcardParsing(true), RecursedType(NRecursedType::kNonRecursed) {}

 bool Prepare();
 bool GetNewPath(bool isFolder, const UString &src, UString &dest) const;
};

struct CUpdateOptions
{
 CCompressionMethodMode MethodMode;

 CObjectVector<CUpdateArchiveCommand> Commands;
 bool UpdateArchiveItself;
 CArchivePath ArchivePath;
 EArcNameMode ArcNameMode;

 bool SfxMode;
 FString SfxModule;

 bool OpenShareForWrite;
 bool StopAfterOpenError;

 bool
```

```
 StdInMode;
 UString StdInFileName;
 bool StdOutMode;

 bool EMailMode;
 bool EMailRemoveAfter;
 UString EMailAddress;

 FString WorkingDir;
 NWildcard::ECensorPathMode PathMode;
 UString AddPathPrefix;

 CBoolPair NtSecurity;
 CBoolPair AltStreams;
 CBoolPair HardLinks;
 CBoolPair SymLinks;

 bool DeleteAfterCompressing;

 bool SetArcMTime;

 CObjectVector<CRenamePair> RenamePairs;

 bool InitFormatIndex(const CCodecs *codecs, const CObjectVector<COpenType> &types, const UString
&arcPath);
 bool SetArcPath(const CCodecs *codecs, const UString &arcPath);

 CUpdateOptions():
   UpdateArchiveItself(true),
   SfxMode(false),
   StdInMode(false),
   StdOutMode(false),
   EMailMode(false),
   EMailRemoveAfter(false),
   OpenShareForWrite(false),
   StopAfterOpenError(false),
   ArcNameMode(k_ArcNameMode_Smart),
   PathMode(NWildcard::k_RelatPath),

   DeleteAfterCompressing(false),
   SetArcMTime(false)

     {};

 void SetActionCommand_Add()
 {
   Commands.Clear();
```

```
    CUpdateArchiveCommand c;
   c.ActionSet = NUpdateArchive::k_ActionSet_Add;
   Commands.Add(c);
 }

 CRecordVector<UInt64> VolumesSizes;
};

struct CUpdateErrorInfo
{
 DWORD SystemError;
 AString Message;
 FStringVector FileNames;

 bool ThereIsError() const { return SystemError != 0 || !Message.IsEmpty() || !FileNames.IsEmpty(); }
 HRESULT Get_HRESULT_Error() const { return SystemError == 0 ? E_FAIL :
HRESULT_FROM_WIN32(SystemError); }
 void SetFromLastError(const char *message);
 HRESULT SetFromLastError(const char *message, const FString &fileName);

 CUpdateErrorInfo(): SystemError(0) {};
};

struct CFinishArchiveStat
{
 UInt64 OutArcFileSize;

 CFinishArchiveStat(): OutArcFileSize(0) {}
};

#define INTERFACE_IUpdateCallbackUI2(x) \
 INTERFACE_IUpdateCallbackUI(x) \
 INTERFACE_IDirItemsCallback(x) \
 virtual HRESULT OpenResult(const CCodecs *codecs, const CArchiveLink &arcLink, const wchar_t *name,
HRESULT result) x; \
 virtual HRESULT StartScanning()
 x; \
 virtual HRESULT FinishScanning(const CDirItemsStat &st) x; \
 virtual HRESULT StartOpenArchive(const wchar_t *name) x; \
 virtual HRESULT StartArchive(const wchar_t *name, bool updating) x; \
 virtual HRESULT FinishArchive(const CFinishArchiveStat &st) x; \
 virtual HRESULT DeletingAfterArchiving(const FString &path, bool isDir) x; \
 virtual HRESULT FinishDeletingAfterArchiving() x; \

struct IUpdateCallbackUI2: public IUpdateCallbackUI, public IDirItemsCallback
{
 INTERFACE_IUpdateCallbackUI2(=0)
};
```

```
HRESULT UpdateArchive(
  CCodecs *codecs,
  const CObjectVector<COpenType> &types,
  const UString &cmdArcPath2,
  NWildcard::CCensor &censor,
  CUpdateOptions &options,
  CUpdateErrorInfo &errorInfo,
  IOpenCallbackUI *openCallback,
  IUpdateCallbackUI2 *callback,
  bool needSetPath);

#endif
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Content in copyright Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-010-ref.xht" />
  <meta name="assert" content="The copyright element contains content." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF
 Test";
    src: url("support/metadatadisplay-schema-copyright-010.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
```

```
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
/* ATK -  Accessibility Toolkit
* Copyright 2001 Sun Microsystems Inc.
*
* This library is free software; you can redistribute it and/or
* modify it under the terms of the GNU Library General Public
* License as published by the Free Software Foundation; either
* version 2 of the License, or (at your option) any later version.
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* License along with this library; if not, write to the
* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_HYPERLINK_IMPL_H__
#define __ATK_HYPERLINK_IMPL_H__

#include <atk/atkobject.h>
#include <atk/atkhyperlink.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

/*
 * The AtkHyperlinkImpl interface should be supported by objects
* exposed within the hierarchy as children of an AtkHypertext container
* which correspond to "links" or embedded content within the text.
* HTML anchors are not, for instance, normally exposed this way,
* but embedded images and components which appear inline in the
* content of a text object are. The AtkHyperlinkIface interface
* allows a means of determining which children are hyperlinks in this
* sense of the word, and for obtaining their corresponding AtkHyperlink
* object, from which the embedding range, URI, etc. can be obtained.
*
* To some extent this interface exists because, for historical
```

```
* reasons, AtkHyperlink was defined as an object type, not an interface.
* Thus, in order to interact with AtkObjects via AtkHyperlink semantics,
* a new interface was required.
*/

#define ATK_TYPE_HYPERLINK_IMPL          (atk_hyperlink_impl_get_type ())
#define ATK_IS_HYPERLINK_IMPL(obj)       G_TYPE_CHECK_INSTANCE_TYPE
 ((obj), ATK_TYPE_HYPERLINK_IMPL)
#define ATK_HYPERLINK_IMPL(obj)          G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_HYPERLINK_IMPL, AtkHyperlinkImpl)
#define ATK_HYPERLINK_IMPL_GET_IFACE(obj)   G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_HYPERLINK_IMPL, AtkHyperlinkImplIface)

#ifndef _TYPEDEF_ATK_HYPERLINK_IMPL_
#define _TYPEDEF_ATK_HYPERLINK_IMPL__
typedef struct _AtkHyperlinkImpl AtkHyperlinkImpl;
#endif
typedef struct _AtkHyperlinkImplIface AtkHyperlinkImplIface;

struct _AtkHyperlinkImplIface
{
 GTypeInterface parent;

 AtkHyperlink*  (* get_hyperlink) (AtkHyperlinkImpl *impl);

 AtkFunction pad1;
};

GType           atk_hyperlink_impl_get_type (void);

AtkHyperlink    *atk_hyperlink_impl_get_hyperlink (AtkHyperlinkImpl *obj);

#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_HYPERLINK_IMPL_H__ */
```

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```
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strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With Nested div Elements in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
```

```
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-018-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element that contains nested div elements." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-018.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   &lt;div&gt;Paragraph 1&lt;/div&gt;
   &lt;div&gt;Paragraph 2&lt;/div&gt;
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
// Unicode support by Jim Park -- 08/23/2007
// Jim Park: Should probably turn this into a nice class for C++ programs.

#pragma once
#include <windows.h>
```

```
#include <tchar.h>
// only include this file from one place in your DLL.
// (it is all static, if you use it in two places it will fail)

#define EXDLL_INIT()          {  \
       g_stringsize=string_size; \
       g_stacktop=stacktop;      \
       g_variables=variables; }

// For page showing plug-ins
#define WM_NOTIFY_OUTER_NEXT (WM_USER+0x8)
#define WM_NOTIFY_CUSTOM_READY (WM_USER+0xd)

/* Jim Park: This char is compared as an int value and therefore
  it's fine as an ASCII.  Do not need to change to wchar_t since
  it will get the same integer value. */
#define NOTIFY_BYE_BYE _T('x')

typedef struct _stack_t {
 struct _stack_t *next;
 TCHAR text[1]; // this should be the length of string_size
} stack_t;

static unsigned int g_stringsize;
static stack_t **g_stacktop;
static TCHAR *g_variables;


enum
{
INST_0,        // $0
INST_1,
        // $1
INST_2,        // $2
INST_3,        // $3
INST_4,        // $4
INST_5,        // $5
INST_6,        // $6
INST_7,        // $7
INST_8,        // $8
INST_9,        // $9
INST_R0,       // $R0
INST_R1,       // $R1
INST_R2,       // $R2
INST_R3,       // $R3
INST_R4,       // $R4
INST_R5,       // $R5
INST_R6,       // $R6
```

```
INST_R7,       // $R7
INST_R8,       // $R8
INST_R9,       // $R9
INST_CMDLINE,   // $CMDLINE
INST_INSTDIR,   // $INSTDIR
INST_OUTDIR,    // $OUTDIR
INST_EXEDIR,    // $EXEDIR
INST_LANG,      // $LANGUAGE
__INST_LAST
};

typedef struct {
 int autoclose;
 int all_user_var;
 int exec_error;
 int abort;
 int exec_reboot;
 int reboot_called;
 int XXX_cur_insttype; // deprecated
 int XXX_insttype_changed; // deprecated
 int silent;
 int instdir_error;
 int rtl;
 int errlvl;
 int alter_reg_view;
} exec_flags_type;

typedef struct {
 exec_flags_type *exec_flags;
 int (__stdcall *ExecuteCodeSegment)(int, HWND);
 void (__stdcall
 *validate_filename)(TCHAR *);
} extra_parameters;

static int    __stdcall popstring(TCHAR *str); // 0 on success, 1 on empty stack
static void   __stdcall pushstring(const TCHAR *str);
static char * __stdcall getuservariable(const int varnum);
static void   __stdcall setuservariable(const int varnum, const TCHAR *var);

#ifdef _UNICODE
#define PopStringW(x) popstring(x)
#define PushStringW(x) pushstring(x)
#define SetUserVariableW(x,y) setuservariable(x,y)

static int  __stdcall PopStringA(char* ansiStr);
static void __stdcall PushStringA(const char* ansiStr);
static void __stdcall GetUserVariableW(const int varnum, wchar_t* wideStr);
static void __stdcall GetUserVariableA(const int varnum, char* ansiStr);
```

```
static void __stdcall SetUserVariableA(const int varnum, const char* ansiStr);

#else
// ANSI defs

#define PopStringA(x) popstring(x)
#define PushStringA(x) pushstring(x)
#define SetUserVariableA(x,y) setuservariable(x,y)

static int  __stdcall PopStringW(wchar_t* wideStr);
static
 void __stdcall PushStringW(wchar_t* wideStr);
static void __stdcall GetUserVariableW(const int varnum, wchar_t* wideStr);
static void __stdcall GetUserVariableA(const int varnum, char* ansiStr);
static void __stdcall SetUserVariableW(const int varnum, const wchar_t* wideStr);

#endif

static BOOL __stdcall IsUnicode(void)
static TCHAR* __stdcall AllocString();
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With class Attribute in span Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element that contains a span element with
&quot;class1 class2 class3&quot; as the value for the class attribute." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
```

```
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   Text with &lt;span class="class1 class2 class3"&gt;span&lt;/span&gt;.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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```
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strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
```

```
  <title>WOFF Test: Valid license Element With One No Language Tagged text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element matches the schema. It contains one text element that does not
have a language tag." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size:
 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts" id="License ID"&gt;
  &lt;text&gt;
   License without language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With dir Attribute in div Element in text Element 1</title>
```

```
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element that contains a div element with ltr as
the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   &lt;div dir="ltr"&gt;Paragraph 1&lt;/div&gt;
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
/* Precomp.h -- StdAfx
2013-06-16 : Igor Pavlov : Public domain */

#ifndef __7Z_PRECOMP_H
#define __7Z_PRECOMP_H

#include "../../Compiler.h"
#include "../../7zTypes.h"
```

```
#endif
#define MY_VER_MAJOR 18
#define MY_VER_MINOR 05
#define MY_VER_BUILD 0
#define MY_VERSION_NUMBERS "18.05"
#define MY_VERSION MY_VERSION_NUMBERS

#ifdef MY_CPU_NAME
 #define MY_VERSION_CPU MY_VERSION " (" MY_CPU_NAME ")"
#else
 #define MY_VERSION_CPU MY_VERSION
#endif

#define MY_DATE "2018-04-30"
#undef MY_COPYRIGHT
#undef MY_VERSION_COPYRIGHT_DATE
#define MY_AUTHOR_NAME "Igor Pavlov"
#define MY_COPYRIGHT_PD "Igor Pavlov : Public domain"
#define MY_COPYRIGHT_CR "Copyright (c) 1999-2018 Igor Pavlov"

#ifdef USE_COPYRIGHT_CR
 #define MY_COPYRIGHT MY_COPYRIGHT_CR
#else
 #define MY_COPYRIGHT MY_COPYRIGHT_PD
#endif

#define MY_COPYRIGHT_DATE MY_COPYRIGHT " : " MY_DATE
#define MY_VERSION_COPYRIGHT_DATE MY_VERSION_CPU " : " MY_COPYRIGHT " : " MY_DATE
```

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```
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<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With dir Attribute in span Element in text Element 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-027-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element that contains a span element with ltr as the value for the dir attribute."
 />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
```

```
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-027.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   Text with &lt;span dir="ltr"&gt;span&lt;/span&gt;.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
// Windows/Control/ToolBar.h

#ifndef __WINDOWS_CONTROL_TOOLBAR_H
#define __WINDOWS_CONTROL_TOOLBAR_H

#include "../Window.h"

namespace NWindows {
namespace NControl {

class CToolBar: public NWindows::CWindow
{
public:
 void AutoSize() { SendMsg(TB_AUTOSIZE, 0, 0); }
```

```
 DWORD GetButtonSize() { return (DWORD)SendMsg(TB_GETBUTTONSIZE, 0, 0); }

 bool GetMaxSize(LPSIZE size)
 #ifdef UNDER_CE
 {
   // maybe it must be fixed for more than 1 buttons
   DWORD val = GetButtonSize();
   size->cx = LOWORD(val);
   size->cy = HIWORD(val);
   return true;
 }
 #else
 {
   return LRESULTToBool(SendMsg(TB_GETMAXSIZE, 0, (LPARAM)size));
 }
 #endif

 bool EnableButton(UINT buttonID, bool enable) { return LRESULTToBool(SendMsg(TB_ENABLEBUTTON,
buttonID, MAKELONG(BoolToBOOL(enable), 0))); }
 void ButtonStructSize() { SendMsg(TB_BUTTONSTRUCTSIZE, sizeof(TBBUTTON)); }
 HIMAGELIST SetImageList(UINT listIndex, HIMAGELIST imageList) { return
HIMAGELIST(SendMsg(TB_SETIMAGELIST, listIndex,
 (LPARAM)imageList)); }
 bool AddButton(UINT numButtons, LPTBBUTTON buttons) { return
LRESULTToBool(SendMsg(TB_ADDBUTTONS, numButtons, (LPARAM)buttons)); }
 #ifndef _UNICODE
 bool AddButtonW(UINT numButtons, LPTBBUTTON buttons) { return
LRESULTToBool(SendMsg(TB_ADDBUTTONSW, numButtons, (LPARAM)buttons)); }
 #endif
};

}}

#endif
```

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 SOFTWARE OR THE USE OR OTHER
DEALINGS IN THE SOFTWARE.
// Lzma2Decoder.h

```
#ifndef __LZMA2_DECODER_H
#define __LZMA2_DECODER_H

#include "../../../C/Lzma2DecMt.h"

#include "../Common/CWrappers.h"

namespace NCompress {
namespace NLzma2 {

class CDecoder:
 public ICompressCoder,
 public ICompressSetDecoderProperties2,
 public ICompressSetFinishMode,
```

```
 public ICompressGetInStreamProcessedSize,
 public ICompressSetBufSize,

 #ifndef NO_READ_FROM_CODER
 public ICompressSetInStream,
 public ICompressSetOutStreamSize,
 public ISequentialInStream,
 #endif

 #ifndef _7ZIP_ST
 public ICompressSetCoderMt,
 public ICompressSetMemLimit,
 #endif

 public CMyUnknownImp
{
 CLzma2DecMtHandle _dec;
 UInt64 _inProcessed;
 Byte _prop;
 int _finishMode;
 UInt32 _inBufSize;
 UInt32 _outStep;

public:
 MY_QUERYINTERFACE_BEGIN2(ICompressCoder)
 MY_QUERYINTERFACE_ENTRY(ICompressSetDecoderProperties2)
 MY_QUERYINTERFACE_ENTRY(ICompressSetFinishMode)
 MY_QUERYINTERFACE_ENTRY(ICompressGetInStreamProcessedSize)
 MY_QUERYINTERFACE_ENTRY(ICompressSetBufSize)

 #ifndef NO_READ_FROM_CODER
 MY_QUERYINTERFACE_ENTRY(ICompressSetInStream)
 MY_QUERYINTERFACE_ENTRY(ICompressSetOutStreamSize)
 MY_QUERYINTERFACE_ENTRY(ISequentialInStream)
 #endif

 #ifndef _7ZIP_ST
 MY_QUERYINTERFACE_ENTRY(ICompressSetCoderMt)
 MY_QUERYINTERFACE_ENTRY(ICompressSetMemLimit)
 #endif

 MY_QUERYINTERFACE_END
 MY_ADDREF_RELEASE

 STDMETHOD(Code)(ISequentialInStream *inStream, ISequentialOutStream *outStream,
    const UInt64 *inSize, const UInt64 *outSize, ICompressProgressInfo *progress);
 STDMETHOD(SetDecoderProperties2)(const Byte *data, UInt32 size);
 STDMETHOD(SetFinishMode)(UInt32 finishMode);
```

```
 STDMETHOD(GetInStreamProcessedSize)(UInt64 *value);
 STDMETHOD(SetInBufSize)(UInt32 streamIndex, UInt32 size);
 STDMETHOD(SetOutBufSize)(UInt32 streamIndex, UInt32 size);

 #ifndef _7ZIP_ST
private:
 int _tryMt;
 UInt32 _numThreads;
 UInt64 _memUsage;
public:
 STDMETHOD(SetNumberOfThreads)(UInt32 numThreads);
 STDMETHOD(SetMemLimit)(UInt64
 memUsage);
 #endif

 #ifndef NO_READ_FROM_CODER
private:
 CMyComPtr<ISequentialInStream> _inStream;
 CSeqInStreamWrap _inWrap;
public:
 STDMETHOD(SetOutStreamSize)(const UInt64 *outSize);
 STDMETHOD(SetInStream)(ISequentialInStream *inStream);
 STDMETHOD(ReleaseInStream)();
 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 #endif

 CDecoder();
 virtual ~CDecoder();
};

}}

#endif
```

License information for hyph_hu.dic:

Derived from hyph_hu.tex in the "huhyphn" package <https://github.com/nagybence/huhyphn>,
by processing the TeX hyphenation patterns with substrings.pl.

```
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7z Format description (4.59)
---

This file contains description of 7z archive format.
7z archive can contain files compressed with any method.
See "Methods.txt" for description for defined compressing methods.

Format structure Overview
---

Some fields can be optional.

Archive structure
~~~~~~~~~~~~~~~~~
SignatureHeader
[PackedStreams]
[PackedStreamsForHeaders]
[
 Header
 or
~~~~~~~~~~~~~~~~~

```
 {
   Packed Header
   HeaderInfo
 }
]



Header structure
~~~~~~~~~~~~~~~~
{
 ArchiveProperties
 AdditionalStreams
 {
   PackInfo
   {
     PackPos
     NumPackStreams
     Sizes[NumPackStreams]
     CRCs[NumPackStreams]
   }
   CodersInfo
   {
     NumFolders
     Folders[NumFolders]
     {
       NumCoders
       CodersInfo[NumCoders]
       {
         ID
         NumInStreams;
         NumOutStreams;
         PropertiesSize
         Properties[PropertiesSize]
       }
       NumBindPairs
       BindPairsInfo[NumBindPairs]
        {
         InIndex;
         OutIndex;
       }
       PackedIndices
     }
     UnPackSize[Folders][Folders.NumOutstreams]
     CRCs[NumFolders]
   }
   SubStreamsInfo
   {
```

```
    NumUnPackStreamsInFolders[NumFolders];
    UnPackSizes[]
    CRCs[]
  }
 }
 MainStreamsInfo
 {
  (Same as in AdditionalStreams)
 }
 FilesInfo
 {
  NumFiles
  Properties[]
  {
    ID
    Size
    Data
  }
 }
}
```

HeaderInfo structure
~~~~~~~~~~~~~~~~~~~~

```
{
 (Same as in AdditionalStreams)
}
```

Notes about Notation and encoding
---

7z uses little endian encoding.

7z archive format has optional headers that are marked as
[]
Header
[]

REAL_UINT64 means real UINT64.

UINT64 means real UINT64 encoded with the following scheme:

```
 Size of encoding sequence depends from first byte:
 First_Byte  Extra_Bytes        Value
 (binary)
 0xxxxxxx               : ( xxxxxxx           )
 10xxxxxx    BYTE y[1]  : (  xxxxxx << (8 * 1)) + y
```
~~~~~~~~~~~~~~~~~~~~

```
110xxxxx
   BYTE y[2]  : (   xxxxx << (8 * 2)) + y
...
1111110x    BYTE y[6]  : (       x << (8 * 6)) + y
11111110    BYTE y[7]  :                      y
11111111    BYTE y[8]  :                      y
```

Property IDs
---

0x00 = kEnd

0x01 = kHeader

0x02 = kArchiveProperties

0x03 = kAdditionalStreamsInfo
0x04 = kMainStreamsInfo
0x05 = kFilesInfo

0x06 = kPackInfo
0x07 = kUnPackInfo
0x08 = kSubStreamsInfo

0x09 = kSize
0x0A = kCRC

0x0B = kFolder

0x0C = kCodersUnPackSize
0x0D = kNumUnPackStream

0x0E = kEmptyStream
0x0F = kEmptyFile
0x10 = kAnti

0x11 = kName
0x12 = kCTime
0x13 = kATime
0x14 = kMTime
0x15 = kWinAttributes
0x16 = kComment

0x17 = kEncodedHeader

0x18 = kStartPos

0x19 = kDummy

7z format headers
---

SignatureHeader
~~~~~~~~~~~~~~~~

```
 BYTE kSignature[6] = {'7', 'z', 0xBC, 0xAF, 0x27, 0x1C};

 ArchiveVersion
 {
   BYTE Major;   // now = 0
   BYTE Minor;   // now = 2
 };

 UINT32 StartHeaderCRC;

 StartHeader
 {
   REAL_UINT64
 NextHeaderOffset
   REAL_UINT64 NextHeaderSize
   UINT32 NextHeaderCRC
 }
```

.....

ArchiveProperties
~~~~~~~~~~~~~~~~~~

```
BYTE NID::kArchiveProperties (0x02)
for (;;)
{
 BYTE PropertyType;
 if (aType == 0)
   break;
 UINT64 PropertySize;
 BYTE PropertyData[PropertySize];
}
```

Digests (NumStreams)
~~~~~~~~~~~~~~~~~~~~~~

```
 BYTE AllAreDefined
 if (AllAreDefined == 0)
 {
```
~~~~~~~~~~~~~~~~~~~~~~

```
  for(NumStreams)
    BIT Defined
 }
 UINT32 CRCs[NumDefined]
```

PackInfo
~~~~~~~~~~~~

```
 BYTE NID::kPackInfo  (0x06)
 UINT64 PackPos
 UINT64 NumPackStreams

 []
 BYTE NID::kSize    (0x09)
 UINT64 PackSizes[NumPackStreams]
 []

 []
 BYTE NID::kCRC      (0x0A)
 PackStreamDigests[NumPackStreams]
 []

 BYTE NID::kEnd
```

Folder
~~~~~~

```
 UINT64 NumCoders;
 for (NumCoders)
 {
  BYTE
  {
    0:3 CodecIdSize
    4:  Is Complex Coder
    5:  There Are Attributes
    6:  Reserved
    7:  There are more alternative methods. (Not used anymore, must be 0).
  }
  BYTE
 CodecId[CodecIdSize]
  if (Is Complex Coder)
  {
    UINT64 NumInStreams;
    UINT64 NumOutStreams;
  }
  if (There Are Attributes)
  {
    UINT64 PropertiesSize
```

```
    BYTE Properties[PropertiesSize]
  }
}

NumBindPairs = NumOutStreamsTotal - 1;

for (NumBindPairs)
{
  UINT64 InIndex;
  UINT64 OutIndex;
}

NumPackedStreams = NumInStreamsTotal - NumBindPairs;
if (NumPackedStreams > 1)
  for(NumPackedStreams)
  {
    UINT64 Index;
  };
```

Coders Info
~~~~~~~~~~~~

```
BYTE NID::kUnPackInfo  (0x07)


BYTE NID::kFolder  (0x0B)
UINT64 NumFolders
BYTE External
switch(External)
{
  case 0:
    Folders[NumFolders]
  case 1:
    UINT64 DataStreamIndex
}


BYTE ID::kCodersUnPackSize  (0x0C)
for(Folders)
  for(Folder.NumOutStreams)
   UINT64 UnPackSize;


[]
BYTE NID::kCRC   (0x0A)
```
~~~~~~~~~~~~

UnPackDigests[NumFolders]
[]

BYTE NID::kEnd

SubStreams Info
~~~~~~~~~~~~~~~
BYTE NID::kSubStreamsInfo; (0x08)

[]
BYTE NID::kNumUnPackStream;
(0x0D)
UINT64 NumUnPackStreamsInFolders[NumFolders];
[]

[]
BYTE NID::kSize (0x09)
UINT64 UnPackSizes[]
[]

[]
BYTE NID::kCRC (0x0A)
Digests[Number of streams with unknown CRC]
[]

BYTE NID::kEnd

Streams Info
~~~~~~~~~~~~~

[]
PackInfo
[]

[]
CodersInfo
[]

```
[]
SubStreamsInfo
[]

BYTE NID::kEnd


FilesInfo
~~~~~~~~~~
BYTE NID::kFilesInfo;  (0x05)
UINT64 NumFiles

for (;;)
{
  BYTE PropertyType;
  if (aType == 0)
    break;

  UINT64 Size;

  switch(PropertyType)
  {
    kEmptyStream:   (0x0E)
      for(NumFiles)
        BIT IsEmptyStream

    kEmptyFile:     (0x0F)
      for(EmptyStreams)
        BIT IsEmptyFile

    kAnti:          (0x10)
      for(EmptyStreams)
        BIT IsAntiFile

    case kCTime: (0x12)
    case kATime: (0x13)
    case kMTime: (0x14)
      BYTE AllAreDefined
      if (AllAreDefined == 0)
      {
        for(NumFiles)
          BIT TimeDefined
       }
      BYTE External;
      if(External != 0)
        UINT64 DataIndex
      []
      for(Definded Items)
```

```
      UINT64 Time
    []

  kNames:     (0x11)
    BYTE External;
    if(External != 0)
      UINT64 DataIndex
    []
    for(Files)
    {
      wchar_t Names[NameSize];
      wchar_t 0;
    }
    []

  kAttributes:  (0x15)
    BYTE AllAreDefined
    if (AllAreDefined == 0)
    {
      for(NumFiles)
        BIT AttributesAreDefined
    }
    BYTE External;
    if(External != 0)
      UINT64 DataIndex
    []
    for(Definded Attributes)
      UINT32 Attributes
    []
  }
}
```

Header
~~~~~~

```
BYTE NID::kHeader (0x01)

[]
ArchiveProperties
[]

[]
BYTE NID::kAdditionalStreamsInfo; (0x03)
StreamsInfo
[]

[]
BYTE NID::kMainStreamsInfo;    (0x04)
```
~~~~~~

StreamsInfo
[]

[]
FilesInfo
[]

BYTE NID::kEnd

HeaderInfo
~~~~~~~~~~
[]
BYTE NID::kEncodedHeader; (0x17)
StreamsInfo for Encoded Header
[]

---
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% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%  and helped with testing, suggestions and bug reports
% - Norbert Preining, who tested & integrated patterns
 into TeX Live
%

```
% However, the "copyright/copyleft" owner of patterns remains the original author.
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%
%-----------------------------------------------------------------------------
%
% Estonian hyphenation patterns
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```

% version 2003/12/01 or later.
%
% This work has the LPPL maintenance status "author-maintained".
% This work consists of this file only (eehyph.tex).
%
% The patterns were generated long ago by applying patgen to
% an Estonian dictionary; a few patterns were added later manually
% to prohibit aa-bits type cases.
% Declare the special characters
%
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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

At the time this file was first modified, a complete, unmodified copy of
the LPPL Work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

Portions of this file were originally made available under the following license
(copied verbatim from hyph-mn-cyrl.lic.txt in the original work):

(New) Mongolian hyphenation patterns

(more info about the licence to be added later)

% This file is part of hyph-utf8 package
 and resulted from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% Source: mnhyphn.tex (2008-03-30)
% Author: Dorjgotov Batmunkh <bataak at gmail.com>
%
% The above mentioned file should become obsolete,
% and the author of the original file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.

```
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%             and helped with testing, suggestions and bug reports
% - Norbert Preining, who tested
 & integrated patterns into TeX Live
%
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%    plese remove all of the TUG comments & credits that we added here -
%    you are the Queen / the King, we are only the servants.
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%   and if you really cannot do without, also \input and \message
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%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
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%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
```

%
%----------
%
%% mnhyphn.tex v1.2 2008/03/23 (2010/04/03)
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% version 2005/12/01 or later.
%
% Special thanks to: Jim Hefferon and Robin Fairbairns
%
% There are few basic rules in mongolian
%
% 1. If there is a consonant then it can use hyphen before it.
%    And if there're two consonants then it can use hyphen before second consonant.
%    Are there three consonants then it can put hyphen before third consonant,
%    also are there four consonants then it can use hyphen before fourth consonant.
% 2. In the case of hardsign or softsign, it's possible to hyphen after these signs.
%    For instance, -, -
% 3. However one vowel can be belong to a syllable, it's not possible to use hyphen.
%

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```
!IF "$(CPU)" == "AMD64"
CFLAGS_C_SPEC = -D_LZMA_DEC_OPT
ASM_OBJS = $(ASM_OBJS) \
 $O\LzmaDecOpt.obj
!ENDIF
// Common/StringConvert.h

#ifndef __COMMON_STRING_CONVERT_H
#define __COMMON_STRING_CONVERT_H

#include "MyString.h"
#include "MyWindows.h"

UString MultiByteToUnicodeString(const AString &src, UINT codePage = CP_ACP);
UString MultiByteToUnicodeString(const char *src, UINT codePage = CP_ACP);

// optimized versions that work faster for ASCII strings
void MultiByteToUnicodeString2(UString &dest, const AString &src, UINT codePage = CP_ACP);
// void UnicodeStringToMultiByte2(AString &dest, const UString &s, UINT codePage, char defaultChar, bool
&defaultCharWasUsed);
void UnicodeStringToMultiByte2(AString &dest, const UString &src, UINT codePage);

AString UnicodeStringToMultiByte(const UString &src, UINT codePage, char defaultChar, bool
&defaultCharWasUsed);
AString UnicodeStringToMultiByte(const UString &src, UINT codePage = CP_ACP);
```

```
inline const wchar_t* GetUnicodeString(const wchar_t *u)  { return u; }
inline const UString& GetUnicodeString(const UString &u)  { return u; }

inline UString
 GetUnicodeString(const AString &a)  { return MultiByteToUnicodeString(a); }
inline UString GetUnicodeString(const char *a)     { return MultiByteToUnicodeString(a); }

inline UString GetUnicodeString(const AString &a, UINT codePage)
 { return MultiByteToUnicodeString(a, codePage); }
inline UString GetUnicodeString(const char *a, UINT codePage)
 { return MultiByteToUnicodeString(a, codePage); }

inline const wchar_t* GetUnicodeString(const wchar_t *u, UINT) { return u; }
inline const UString& GetUnicodeString(const UString &u, UINT) { return u; }

inline const char*    GetAnsiString(const char    *a) { return a; }
inline const AString& GetAnsiString(const AString &a) { return a; }

inline AString GetAnsiString(const wchar_t *u) { return UnicodeStringToMultiByte(UString(u)); }
inline AString GetAnsiString(const UString &u) { return UnicodeStringToMultiByte(u); }

/*
inline const char* GetOemString(const char* oem)
 { return oem; }
inline const AString& GetOemString(const AString
 &oem)
 { return oem; }
*/
const char* GetOemString(const char* oem);
const AString& GetOemString(const AString &oem);
inline AString GetOemString(const UString &u)
 { return UnicodeStringToMultiByte(u, CP_OEMCP); }

#ifdef _UNICODE
 inline const wchar_t* GetSystemString(const wchar_t *u) { return u;}
 inline const UString& GetSystemString(const UString &u) { return u;}
 inline const wchar_t* GetSystemString(const wchar_t *u, UINT /* codePage */) { return u;}
 inline const UString& GetSystemString(const UString &u, UINT /* codePage */) { return u;}

 inline UString GetSystemString(const AString &a, UINT codePage) { return MultiByteToUnicodeString(a,
codePage); }
 inline UString GetSystemString(const char    *a, UINT codePage) { return MultiByteToUnicodeString(a,
codePage); }
 inline UString GetSystemString(const AString &a) { return MultiByteToUnicodeString(a); }
 inline UString GetSystemString(const char    *a) { return MultiByteToUnicodeString(a); }
#else
 inline const char*
```

```
   GetSystemString(const char    *a) { return a; }
 inline const AString& GetSystemString(const AString &a) { return a; }
 inline const char*    GetSystemString(const char    *a, UINT) { return a; }
 inline const AString& GetSystemString(const AString &a, UINT) { return a; }

 inline AString GetSystemString(const wchar_t *u) { return UnicodeStringToMultiByte(UString(u)); }
 inline AString GetSystemString(const UString &u) { return UnicodeStringToMultiByte(u); }
 inline AString GetSystemString(const UString &u, UINT codePage) { return UnicodeStringToMultiByte(u,
codePage); }



 /*
 inline AString GetSystemString(const wchar_t *u)
 {
   UString s;
   s = u;
   return UnicodeStringToMultiByte(s);
 }
 */

#endif

#ifndef UNDER_CE
AString SystemStringToOemString(const CSysString &src);
#endif

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With Mixed text Element Language Tags 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element matches the schema. One text element does not have a
language tag. One text element has a language tag." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
```

```
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   Copyright without language.
  &lt;/text&gt;
  &lt;text xml:lang="en"&gt;
   Copyright with "en" language.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

UNRECOGNIZED LICENSE; MD5 sum: 59a9b86800cec32b0da02b15f30af7ef

```
// CoderMixer2.h

#ifndef __CODER_MIXER2_H
#define __CODER_MIXER2_H

#include "../../../Common/MyCom.h"
#include "../../../Common/MyVector.h"

#include "../../ICoder.h"

#include "../../Common/CreateCoder.h"

#ifdef _7ZIP_ST
 #define USE_MIXER_ST
#else
 #define USE_MIXER_MT
 #ifndef _SFX
```

```
   #define USE_MIXER_ST
 #endif
#endif

#ifdef USE_MIXER_MT
#include "../../Common/StreamBinder.h"
#include "../../Common/VirtThread.h"
#endif



#ifdef USE_MIXER_ST

class CSequentialInStreamCalcSize:
 public ISequentialInStream,
 public CMyUnknownImp
{
public:
 MY_UNKNOWN_IMP1(ISequentialInStream)

 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
private:
 CMyComPtr<ISequentialInStream> _stream;
 UInt64 _size;
 bool _wasFinished;
public:
 void SetStream(ISequentialInStream *stream) { _stream = stream;  }
 void Init()
 {
   _size = 0;
   _wasFinished = false;
 }
 void ReleaseStream() { _stream.Release(); }
 UInt64 GetSize() const { return _size; }
 bool WasFinished()
 const { return _wasFinished; }
};


class COutStreamCalcSize:
 public ISequentialOutStream,
 public IOutStreamFinish,
 public CMyUnknownImp
{
 CMyComPtr<ISequentialOutStream> _stream;
 UInt64 _size;
public:
 MY_UNKNOWN_IMP2(ISequentialOutStream, IOutStreamFinish)
```

```
 STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(OutStreamFinish)();

 void SetStream(ISequentialOutStream *stream) { _stream = stream; }
 void ReleaseStream() { _stream.Release(); }
 void Init() { _size = 0; }
 UInt64 GetSize() const { return _size; }
};

#endif



namespace NCoderMixer2 {

struct CBond
{
 UInt32 PackIndex;
 UInt32 UnpackIndex;

 UInt32 Get_InIndex(bool encodeMode) const { return encodeMode ? UnpackIndex : PackIndex; }
 UInt32 Get_OutIndex(bool encodeMode) const { return encodeMode ? PackIndex : UnpackIndex; }
};


struct CCoderStreamsInfo
{
 UInt32 NumStreams;
};


struct CBindInfo
{
 CRecordVector<CCoderStreamsInfo> Coders;
 CRecordVector<CBond>
 Bonds;
 CRecordVector<UInt32> PackStreams;
 unsigned UnpackCoder;

 unsigned GetNum_Bonds_and_PackStreams() const { return Bonds.Size() + PackStreams.Size(); }

 int FindBond_for_PackStream(UInt32 packStream) const
 {
   FOR_VECTOR (i, Bonds)
     if (Bonds[i].PackIndex == packStream)
       return i;
   return -1;
```

```
}

int FindBond_for_UnpackStream(UInt32 unpackStream) const
{
  FOR_VECTOR (i, Bonds)
    if (Bonds[i].UnpackIndex == unpackStream)
      return i;
  return -1;
}

bool SetUnpackCoder()
{
  bool isOk = false;
  FOR_VECTOR(i, Coders)
  {
    if (FindBond_for_UnpackStream(i) < 0)
    {
      if (isOk)
        return false;
      UnpackCoder = i;
      isOk = true;
    }
  }
  return isOk;
}

bool IsStream_in_PackStreams(UInt32 streamIndex) const
{
  return FindStream_in_PackStreams(streamIndex) >= 0;
}

int FindStream_in_PackStreams(UInt32 streamIndex) const
{
  FOR_VECTOR(i, PackStreams)
    if (PackStreams[i]
== streamIndex)
      return i;
  return -1;
}


// that function is used before Maps is calculated

UInt32 GetStream_for_Coder(UInt32 coderIndex) const
{
  UInt32 streamIndex = 0;
  for (UInt32 i = 0; i < coderIndex; i++)
    streamIndex += Coders[i].NumStreams;
```

```
  return streamIndex;
 }

 // ---------- Maps Section ----------

 CRecordVector<UInt32> Coder_to_Stream;
 CRecordVector<UInt32> Stream_to_Coder;

 void ClearMaps();
 bool CalcMapsAndCheck();

 // ---------- End of Maps Section ----------

 void Clear()
 {
  Coders.Clear();
  Bonds.Clear();
  PackStreams.Clear();

  ClearMaps();
 }

 void GetCoder_for_Stream(UInt32 streamIndex, UInt32 &coderIndex, UInt32 &coderStreamIndex) const
 {
  coderIndex = Stream_to_Coder[streamIndex];
  coderStreamIndex = streamIndex - Coder_to_Stream[coderIndex];
 }
};



class CCoder
{
 CLASS_NO_COPY(CCoder);
public:
 CMyComPtr<ICompressCoder> Coder;
 CMyComPtr<ICompressCoder2> Coder2;
  UInt32 NumStreams;

 UInt64 UnpackSize;
 const UInt64 *UnpackSizePointer;

 CRecordVector<UInt64> PackSizes;
 CRecordVector<const UInt64 *> PackSizePointers;

 bool Finish;

 CCoder(): Finish(false) {}
```

```
 void SetCoderInfo(const UInt64 *unpackSize, const UInt64 * const *packSizes, bool finish);

 HRESULT CheckDataAfterEnd(bool &dataAfterEnd_Error /* , bool &InternalPackSizeError */) const;

 IUnknown *GetUnknown() const
 {
   return Coder ? (IUnknown *)Coder : (IUnknown *)Coder2;
 }

 HRESULT QueryInterface(REFGUID iid, void** pp) const
 {
   return GetUnknown()->QueryInterface(iid, pp);
 }
};



class CMixer
{
 bool Is_PackSize_Correct_for_Stream(UInt32 streamIndex);

protected:
 CBindInfo _bi;

 int FindBond_for_Stream(bool forInputStream, UInt32 streamIndex) const
 {
   if (EncodeMode == forInputStream)
     return _bi.FindBond_for_UnpackStream(streamIndex);
   else
     return _bi.FindBond_for_PackStream(streamIndex);
 }

 CBoolVector IsFilter_Vector;
 CBoolVector
 IsExternal_Vector;
 bool EncodeMode;
public:
 unsigned MainCoderIndex;

 // bool InternalPackSizeError;

 CMixer(bool encodeMode):
     EncodeMode(encodeMode),
     MainCoderIndex(0)
     // , InternalPackSizeError(false)
     {}
```

```
/*
Sequence of calling:

    SetBindInfo();
    for each coder
      AddCoder();
    SelectMainCoder();

    for each file
    {
      ReInit()
      for each coder
        SetCoderInfo();
      Code();
    }
*/

virtual HRESULT SetBindInfo(const CBindInfo &bindInfo)
{
  _bi = bindInfo;
  IsFilter_Vector.Clear();
  MainCoderIndex = 0;
  return S_OK;
}

virtual void AddCoder(const CCreatedCoder &cod) = 0;
virtual CCoder &GetCoder(unsigned index) = 0;
virtual void SelectMainCoder(bool useFirst) = 0;
virtual void ReInit() = 0;
virtual void SetCoderInfo(unsigned coderIndex, const UInt64 *unpackSize, const UInt64 * const *packSizes, bool
finish) = 0;
virtual HRESULT Code(
    ISequentialInStream
* const *inStreams,
    ISequentialOutStream * const *outStreams,
    ICompressProgressInfo *progress,
    bool &dataAfterEnd_Error) = 0;
virtual UInt64 GetBondStreamSize(unsigned bondIndex) const = 0;

bool Is_UnpackSize_Correct_for_Coder(UInt32 coderIndex);
bool Is_PackSize_Correct_for_Coder(UInt32 coderIndex);
bool IsThere_ExternalCoder_in_PackTree(UInt32 coderIndex);
};



#ifdef USE_MIXER_ST
```

```
struct CCoderST: public CCoder
{
 bool CanRead;
 bool CanWrite;

 CCoderST(): CanRead(false), CanWrite(false) {}
};


struct CStBinderStream
{
 CSequentialInStreamCalcSize *InStreamSpec;
 COutStreamCalcSize *OutStreamSpec;
 CMyComPtr<IUnknown> StreamRef;

 CStBinderStream(): InStreamSpec(NULL), OutStreamSpec(NULL) {}
};


class CMixerST:
 public IUnknown,
 public CMixer,
 public CMyUnknownImp
{
 HRESULT GetInStream2(ISequentialInStream * const *inStreams, /* const UInt64 * const *inSizes, */
    UInt32 outStreamIndex, ISequentialInStream **inStreamRes);

 HRESULT GetInStream(ISequentialInStream * const *inStreams, /* const UInt64 * const *inSizes, */
    UInt32 inStreamIndex, ISequentialInStream **inStreamRes);
 HRESULT GetOutStream(ISequentialOutStream * const *outStreams, /* const UInt64 * const *outSizes, */
    UInt32 outStreamIndex, ISequentialOutStream **outStreamRes);

 HRESULT FinishStream(UInt32 streamIndex);
 HRESULT FinishCoder(UInt32 coderIndex);

public:
 CObjectVector<CCoderST> _coders;

 CObjectVector<CStBinderStream> _binderStreams;

 MY_UNKNOWN_IMP

 CMixerST(bool encodeMode);
 ~CMixerST();

 virtual void AddCoder(const CCreatedCoder &cod);
 virtual CCoder &GetCoder(unsigned index);
```

```
 virtual void SelectMainCoder(bool useFirst);
 virtual void ReInit();
 virtual void SetCoderInfo(unsigned coderIndex, const UInt64 *unpackSize, const UInt64 * const *packSizes, bool
finish)
   { _coders[coderIndex].SetCoderInfo(unpackSize, packSizes, finish); }
 virtual HRESULT Code(
     ISequentialInStream * const *inStreams,
      ISequentialOutStream * const *outStreams,
     ICompressProgressInfo *progress,
     bool &dataAfterEnd_Error);
 virtual UInt64 GetBondStreamSize(unsigned bondIndex) const;

 HRESULT GetMainUnpackStream(
     ISequentialInStream * const *inStreams,
     ISequentialInStream **inStreamRes);
};

#endif




#ifdef USE_MIXER_MT

class CCoderMT: public CCoder, public CVirtThread
{
 CLASS_NO_COPY(CCoderMT)
 CRecordVector<ISequentialInStream*> InStreamPointers;
 CRecordVector<ISequentialOutStream*> OutStreamPointers;

private:
 void Execute();
public:
 bool EncodeMode;
 HRESULT Result;
 CObjectVector< CMyComPtr<ISequentialInStream> > InStreams;
 CObjectVector< CMyComPtr<ISequentialOutStream> > OutStreams;

 void Release()
 {
   InStreamPointers.Clear();
   OutStreamPointers.Clear();
   unsigned i;
   for (i = 0; i < InStreams.Size(); i++)
     InStreams[i].Release();
   for (i = 0; i < OutStreams.Size(); i++)
     OutStreams[i].Release();
 }
```

```
 class CReleaser
  {
   CLASS_NO_COPY(CReleaser)
   CCoderMT &_c;
 public:
   CReleaser(CCoderMT &c): _c(c) {}
   ~CReleaser() { _c.Release(); }
 };

 CCoderMT(): EncodeMode(false) {}
 ~CCoderMT() { CVirtThread::WaitThreadFinish(); }

 void Code(ICompressProgressInfo *progress);
};


class CMixerMT:
 public IUnknown,
 public CMixer,
 public CMyUnknownImp
{
 CObjectVector<CStreamBinder> _streamBinders;

 HRESULT Init(ISequentialInStream * const *inStreams, ISequentialOutStream * const *outStreams);
 HRESULT ReturnIfError(HRESULT code);

public:
 CObjectVector<CCoderMT> _coders;

 MY_UNKNOWN_IMP

 virtual HRESULT SetBindInfo(const CBindInfo &bindInfo);
 virtual void AddCoder(const CCreatedCoder &cod);
 virtual CCoder &GetCoder(unsigned index);
 virtual void SelectMainCoder(bool useFirst);
 virtual void ReInit();
 virtual void SetCoderInfo(unsigned coderIndex, const UInt64 *unpackSize, const UInt64 * const *packSizes, bool
finish)
   { _coders[coderIndex].SetCoderInfo(unpackSize,
 packSizes, finish); }
 virtual HRESULT Code(
     ISequentialInStream * const *inStreams,
     ISequentialOutStream * const *outStreams,
     ICompressProgressInfo *progress,
     bool &dataAfterEnd_Error);
 virtual UInt64 GetBondStreamSize(unsigned bondIndex) const;
```

```
 CMixerMT(bool encodeMode): CMixer(encodeMode) {}
};

#endif

}

#endif
// StreamObjects.h

#ifndef __STREAM_OBJECTS_H
#define __STREAM_OBJECTS_H

#include "../../Common/MyBuffer.h"
#include "../../Common/MyCom.h"
#include "../../Common/MyVector.h"

#include "../IStream.h"

class CBufferInStream:
 public IInStream,
 public CMyUnknownImp
{
 UInt64 _pos;
public:
 CByteBuffer Buf;
 void Init() { _pos = 0; }

 MY_UNKNOWN_IMP2(ISequentialInStream, IInStream)

 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition);
};

struct CReferenceBuf:
 public IUnknown,
 public CMyUnknownImp
{
 CByteBuffer Buf;
 MY_UNKNOWN_IMP
};

class CBufInStream:
 public IInStream,
 public CMyUnknownImp
{
 const Byte *_data;
 UInt64 _pos;
```

```
 size_t _size;
 CMyComPtr<IUnknown> _ref;
public:
 void Init(const Byte *data, size_t size, IUnknown *ref = 0)
 {
   _data = data;
   _size = size;
   _pos = 0;
   _ref = ref;
 }
 void Init(CReferenceBuf *ref) { Init(ref->Buf, ref->Buf.Size(), ref);
 }

 MY_UNKNOWN_IMP2(ISequentialInStream, IInStream)
 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition);
};

void Create_BufInStream_WithReference(const void *data, size_t size, IUnknown *ref, ISequentialInStream
**stream);
void Create_BufInStream_WithNewBuffer(const void *data, size_t size, ISequentialInStream **stream);
inline void Create_BufInStream_WithNewBuffer(const CByteBuffer &buf, ISequentialInStream **stream)
 { Create_BufInStream_WithNewBuffer(buf, buf.Size(), stream); }

class CByteDynBuffer
{
 size_t _capacity;
 Byte *_buf;
public:
 CByteDynBuffer(): _capacity(0), _buf(0) {};
 // there is no copy constructor. So don't copy this object.
 ~CByteDynBuffer() { Free(); }
 void Free() throw();
 size_t GetCapacity() const { return _capacity; }
 operator Byte*() const { return _buf; }
 operator const Byte*() const { return _buf; }
 bool EnsureCapacity(size_t capacity) throw();
};

class
 CDynBufSeqOutStream:
 public ISequentialOutStream,
 public CMyUnknownImp
{
 CByteDynBuffer _buffer;
 size_t _size;
public:
 CDynBufSeqOutStream(): _size(0) {}
```

```
 void Init() { _size = 0;  }
 size_t GetSize() const { return _size; }
 const Byte *GetBuffer() const { return _buffer; }
 void CopyToBuffer(CByteBuffer &dest) const;
 Byte *GetBufPtrForWriting(size_t addSize);
 void UpdateSize(size_t addSize) { _size += addSize; }

 MY_UNKNOWN_IMP1(ISequentialOutStream)
 STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
};

class CBufPtrSeqOutStream:
 public ISequentialOutStream,
 public CMyUnknownImp
{
 Byte *_buffer;
 size_t _size;
 size_t _pos;
public:
 void Init(Byte *buffer, size_t size)
 {
   _buffer = buffer;
   _pos = 0;
   _size = size;
 }
 size_t GetPos() const { return _pos; }

 MY_UNKNOWN_IMP1(ISequentialOutStream)
 STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
};

class CSequentialOutStreamSizeCount:
  public ISequentialOutStream,
 public CMyUnknownImp
{
 CMyComPtr<ISequentialOutStream> _stream;
 UInt64 _size;
public:
 void SetStream(ISequentialOutStream *stream) { _stream = stream; }
 void Init() { _size = 0; }
 UInt64 GetSize() const { return _size; }

 MY_UNKNOWN_IMP1(ISequentialOutStream)
 STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
};

class CCachedInStream:
 public IInStream,
```

```
 public CMyUnknownImp
{
 UInt64 *_tags;
 Byte *_data;
 size_t _dataSize;
 unsigned _blockSizeLog;
 unsigned _numBlocksLog;
 UInt64 _size;
 UInt64 _pos;
protected:
 virtual HRESULT ReadBlock(UInt64 blockIndex, Byte *dest, size_t blockSize) = 0;
public:
 CCachedInStream(): _tags(0), _data(0) {}
 virtual ~CCachedInStream() { Free(); } // the destructor must be virtual (release calls it) !!!
 void Free() throw();
 bool Alloc(unsigned blockSizeLog, unsigned numBlocksLog) throw();
 void Init(UInt64 size) throw();

 MY_UNKNOWN_IMP2(ISequentialInStream, IInStream)
  STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition);
};

#endif
```

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7-Zip method IDs for 7z and xz archives
---

Version: 17.01
Date: 2017-05-27

Each compression or crypto method in 7z is associated with unique binary value (ID).
The length of ID in bytes is arbitrary but it can not exceed 63 bits (8 bytes).

xz and 7z formats use same ID map.

If you want to add some new ID, you have two ways:
1) Write request for allocating IDs to 7-Zip developers.
2) Generate 8-bytes ID:

3F ZZ ZZ ZZ ZZ ZZ MM MM

3F - Prefix for random IDs (1 byte)
ZZ ZZ ZZ ZZ ZZ - Developer ID (5 bytes). Use real random bytes.

MM MM - Method ID (2 bytes)

You can notify 7-Zip developers about your Developer ID / Method ID.

Note: Use new ID, if old codec can not decode data encoded with new version.

List of defined IDs
---

00 - Copy

03 - Delta
04 - BCJ (x86)
05 - PPC (big-endian)
06 - IA64
07 - ARM (little-endian)
08 - ARMT (little-endian)
09 -
SPARC

21 - LZMA2

02.. - Common
03 [Swap]
- 2 Swap2
- 4 Swap4

03.. - 7z
01 -
01 - LZMA

03 - [Branch Codecs]
  01 - [x86 Codecs]
    03  - BCJ
    1B  - BCJ2 (4 packed streams)
  02 -
    05 - PPC (big-endian)
  03 -
    01 - Alpha
  04 -
    01 - IA64
  05 -
    01 - ARM (little-endian)
  06 -
    05 - M68 (big-endian)
  07 -
    01 - ARMT (little-endian)
  08 -
    05 - SPARC

04 -
  01 - PPMD

7F -
  01 - experimental method.

04.. - Misc codecs

00 - Reserved

01 - [Zip]
  00 - Copy (not used. Use {00} instead)
  01 - Shrink
  06 - Implode
  08 - Deflate
  09 - Deflate64
  0A - Imploding
  0C - BZip2 (not used. Use {040202} instead)
  0E - LZMA (LZMA-zip)
  5F - xz
  60 - Jpeg
  61 - WavPack
  62 - PPMd (PPMd-zip)
  63 - wzAES

02 -
  02 - BZip2

03 - [Rar]
01 - Rar1
02 - Rar2
03 - Rar3
05 - Rar5

04 - [Arj]
01 - Arj(1,2,3)
02 - Arj4

05 - [Z]

06 - [Lzh]

07 - Reserved for 7z

08 - [Cab]

09 - [NSIS]
01 - DeflateNSIS
02 - BZip2NSIS

F7 - External codecs (that are not included to 7-Zip)

0x xx - reserved

10 xx - reserved (LZHAM)
01 - LZHAM

11 xx - reserved (Tino Reichardt)
01 - ZSTD
02 - BROTLI
04 - LZ4
05 - LZ5
06 - LIZARD

06.. - Crypto

F0 - Ciphers without hashing algo

01 - [AES]
0x - AES-128
4x - AES-192
8x - AES-256
Cx - AES

x0 - ECB
x1 - CBC
x2 - CFB
x3 - OFB
x4 - CTR

F1 - Combine Ciphers

01 - [Zip]
01 - ZipCrypto (Main Zip crypto algo)

03 - [RAR]
02 -
03 - Rar29AES (AES-128 + modified SHA-1)

07 - [7z]
01 - 7zAES (AES-256 + SHA-256)

---
End of document
// ParseProperties.h

#ifndef __PARSE_PROPERTIES_H
#define __PARSE_PROPERTIES_H

#endif
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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With class Attribute in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element with &quot;class1 class2
class3&quot; as the value for the class attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text class="class 1 class2 class3"&gt;
   Copyright without language.
```

</text>
</copyright>
</metadata>
</pre>
</body>
</html>

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LZMA compression
---
Version: 9.35

This file describes LZMA encoding and decoding functions written in C language.

LZMA is an improved version of famous LZ77 compression algorithm.
It was improved in way of maximum increasing of compression ratio,
keeping high decompression speed and low memory requirements for
decompressing.

Note: you can read also LZMA Specification (lzma-specification.txt from LZMA SDK)

Also you can look source code for LZMA encoding and decoding:
C/Util/Lzma/LzmaUtil.c

LZMA compressed file format
---

| Offset | Size | Description |
|---|---|---|
| 0 | 1 | Special LZMA properties (lc,lp, pb in encoded form) |
| 1 | 4 | Dictionary size (little endian) |
| 5 | 8 | Uncompressed size (little endian). -1 means unknown size |
| 13 | | Compressed data |

ANSI-C LZMA Decoder
~~~~~~~~~~~~~~~~~~~~

Please note that interfaces for ANSI-C code were changed in LZMA SDK 4.58.
If you want to use old interfaces you can download previous version of LZMA SDK
from
sourceforge.net site.

To use ANSI-C LZMA Decoder you need the following files:
1) LzmaDec.h + LzmaDec.c + 7zTypes.h + Precomp.h + Compiler.h

Look example code:
~~~~~~~~~~~~~~~~~~~~

C/Util/Lzma/LzmaUtil.c

Memory requirements for LZMA decoding
---

Stack usage of LZMA decoding function for local variables is not
larger than 200-400 bytes.

LZMA Decoder uses dictionary buffer and internal state structure.
Internal state structure consumes
 state_size = (4 + (1.5 << (lc + lp))) KB
by default (lc=3, lp=0), state_size = 16 KB.

How To decompress data
---

LZMA Decoder (ANSI-C version) now supports 2 interfaces:
1) Single-call Decompressing
2) Multi-call State Decompressing (zlib-like interface)

You must use external allocator:
Example:
```
void *SzAlloc(void *p, size_t size) { p = p; return malloc(size); }
void SzFree(void *p, void *address) { p = p; free(address); }
ISzAlloc alloc = { SzAlloc, SzFree };
```

You can use p = p; operator to disable compiler
 warnings.

Single-call Decompressing
---
When to use: RAM->RAM decompressing
Compile files: LzmaDec.h + LzmaDec.c + 7zTypes.h
Compile defines: no defines
Memory Requirements:
 - Input buffer: compressed size
 - Output buffer: uncompressed size
 - LZMA Internal Structures: state_size (16 KB for default settings)

Interface:
```
 int LzmaDecode(Byte *dest, SizeT *destLen, const Byte *src, SizeT *srcLen,
     const Byte *propData, unsigned propSize, ELzmaFinishMode finishMode,
     ELzmaStatus *status, ISzAlloc *alloc);
```
 In:
   dest     - output data

```
  destLen  - output data size
  src      - input data
  srcLen   - input data size
  propData - LZMA properties  (5 bytes)
  propSize - size of propData buffer (5 bytes)
  finishMode - It has meaning only if the decoding reaches output limit (*destLen).
      LZMA_FINISH_ANY - Decode just destLen bytes.
      LZMA_FINISH_END - Stream must be finished after (*destLen).

    You can use LZMA_FINISH_END, when you know that
                    current output buffer covers last bytes of stream.
  alloc    - Memory allocator.

Out:
  destLen  - processed output size
  srcLen   - processed input size

Output:
  SZ_OK
    status:
      LZMA_STATUS_FINISHED_WITH_MARK
      LZMA_STATUS_NOT_FINISHED
      LZMA_STATUS_MAYBE_FINISHED_WITHOUT_MARK
  SZ_ERROR_DATA - Data error
  SZ_ERROR_MEM  - Memory allocation error
  SZ_ERROR_UNSUPPORTED - Unsupported properties
  SZ_ERROR_INPUT_EOF - It needs more bytes in input buffer (src).

If LZMA decoder sees end_marker before reaching output limit, it returns OK result,
and output value of destLen will be less than output buffer size limit.

You can use multiple checks to test data integrity after full decompression:
  1) Check Result and "status" variable.
  2) Check that output(destLen) = uncompressedSize, if you know real uncompressedSize.
  3) Check that output(srcLen)
= compressedSize, if you know real compressedSize.
    You must use correct finish mode in that case. */


Multi-call State Decompressing (zlib-like interface)
----------------------------------------------------

When to use: file->file decompressing
Compile files: LzmaDec.h + LzmaDec.c + 7zTypes.h

Memory Requirements:
- Buffer for input stream: any size (for example, 16 KB)
- Buffer for output stream: any size (for example, 16 KB)
```

- LZMA Internal Structures: state_size (16 KB for default settings)
- LZMA dictionary (dictionary size is encoded in LZMA properties header)

1) read LZMA properties (5 bytes) and uncompressed size (8 bytes, little-endian) to header:

```
  unsigned char header[LZMA_PROPS_SIZE + 8];
  ReadFile(inFile, header, sizeof(header)
```

2) Allocate CLzmaDec structures (state + dictionary) using LZMA properties

```
 CLzmaDec state;
 LzmaDec_Constr(&state);
 res = LzmaDec_Allocate(&state, header, LZMA_PROPS_SIZE, &g_Alloc);
 if (res != SZ_OK)
   return res;
```

3)
Init LzmaDec structure before any new LZMA stream. And call LzmaDec_DecodeToBuf in loop

```
 LzmaDec_Init(&state);
 for (;;)
 {
   ...
   int res = LzmaDec_DecodeToBuf(CLzmaDec *p, Byte *dest, SizeT *destLen,
       const Byte *src, SizeT *srcLen, ELzmaFinishMode finishMode);
   ...
 }
```

4) Free all allocated structures

```
 LzmaDec_Free(&state, &g_Alloc);
```

Look example code:
C/Util/Lzma/LzmaUtil.c

How To compress data
---

Compile files:
7zTypes.h
Threads.h
LzmaEnc.h
LzmaEnc.c
LzFind.h
LzFind.c
LzFindMt.h
LzFindMt.c
LzHash.h

Memory Requirements:
 - (dictSize * 11.5 + 6 MB) + state_size

Lzma Encoder can use two memory allocators:
1) alloc - for small arrays.
2) allocBig - for big arrays.

For example, you can use Large RAM Pages (2 MB) in allocBig allocator for
better compression speed. Note that Windows has bad implementation for
Large RAM Pages.
It's OK to use same allocator for alloc and allocBig.

Single-call Compression with
 callbacks
---

Look example code:
 C/Util/Lzma/LzmaUtil.c

When to use: file->file compressing

1) you must implement callback structures for interfaces:
ISeqInStream
ISeqOutStream
ICompressProgress
ISzAlloc

```
static void *SzAlloc(void *p, size_t size) { p = p; return MyAlloc(size); }
static void SzFree(void *p, void *address) {  p = p; MyFree(address); }
static ISzAlloc g_Alloc = { SzAlloc, SzFree };

 CFileSeqInStream inStream;
 CFileSeqOutStream outStream;

 inStream.funcTable.Read = MyRead;
 inStream.file = inFile;
 outStream.funcTable.Write = MyWrite;
 outStream.file = outFile;
```

2) Create CLzmaEncHandle object;

```
 CLzmaEncHandle enc;

 enc = LzmaEnc_Create(&g_Alloc);
 if (enc == 0)
```

```
  return SZ_ERROR_MEM;
```

3) initialize CLzmaEncProps properties;

```
LzmaEncProps_Init(&props);
```

Then you can change some properties in that structure.

4) Send LZMA properties to LZMA Encoder

```
res = LzmaEnc_SetProps(enc, &props);
```

5) Write encoded properties
to header

```
  Byte header[LZMA_PROPS_SIZE + 8];
  size_t headerSize = LZMA_PROPS_SIZE;
  UInt64 fileSize;
  int i;

  res = LzmaEnc_WriteProperties(enc, header, &headerSize);
  fileSize = MyGetFileLength(inFile);
  for (i = 0; i < 8; i++)
    header[headerSize++] = (Byte)(fileSize >> (8 * i));
  MyWriteFileAndCheck(outFile, header, headerSize)
```

6) Call encoding function:

```
    res = LzmaEnc_Encode(enc, &outStream.funcTable, &inStream.funcTable,
      NULL, &g_Alloc, &g_Alloc);
```

7) Destroy LZMA Encoder Object

```
LzmaEnc_Destroy(enc, &g_Alloc, &g_Alloc);
```

If callback function return some error code, LzmaEnc_Encode also returns that code
or it can return the code like SZ_ERROR_READ, SZ_ERROR_WRITE or SZ_ERROR_PROGRESS.

Single-call RAM->RAM Compression
---

Single-call RAM->RAM Compression is similar to Compression with callbacks,
but you provide pointers to buffers instead of pointers to stream callbacks:

```
SRes LzmaEncode(Byte *dest,
 SizeT *destLen, const Byte *src, SizeT srcLen,
  const CLzmaEncProps *props, Byte *propsEncoded, SizeT *propsSize, int writeEndMark,
```

```
  ICompressProgress *progress, ISzAlloc *alloc, ISzAlloc *allocBig);
```

Return code:

```
 SZ_OK               - OK
 SZ_ERROR_MEM        - Memory allocation error
 SZ_ERROR_PARAM      - Incorrect paramater
 SZ_ERROR_OUTPUT_EOF - output buffer overflow
 SZ_ERROR_THREAD     - errors in multithreading functions (only for Mt version)
```

Defines
---

_LZMA_SIZE_OPT - Enable some optimizations in LZMA Decoder to get smaller executable code.

_LZMA_PROB32 - It can increase the speed on some 32-bit CPUs, but memory usage for
some structures will be doubled in that case.

_LZMA_UINT32_IS_ULONG - Define it if int is 16-bit on your compiler and long is 32-bit.

_LZMA_NO_SYSTEM_SIZE_T - Define it if you don't want to use size_t type.

_7ZIP_PPMD_SUPPPORT - Define it if you don't want to support PPMD method in AMSI-C .7z decoder.

C++
LZMA Encoder/Decoder
~~~~~~~~~~~~~~~~~~~~~~~~~~
C++ LZMA code use COM-like interfaces. So if you want to use it,
you can study basics of COM/OLE.
C++ LZMA code is just wrapper over ANSI-C code.

C++ Notes
~~~~~~~~~~~~~~~~~~~~~~~~~~
If you use some C++ code folders in 7-Zip (for example, C++ code for .7z handling),
you must check that you correctly work with "new" operator.
7-Zip can be compiled with MSVC 6.0 that doesn't throw "exception" from "new" operator.
So 7-Zip uses "CPP\Common\NewHandler.cpp" that redefines "new" operator:

```
operator new(size_t size)
{
 void *p = ::malloc(size);
 if (p == 0)
   throw CNewException();
 return p;
}
```

If you use MSCV that throws exception for "new" operator, you can compile without
"NewHandler.cpp". So standard exception will be used. Actually some code of
7-Zip catches any exception in internal code and converts it to HRESULT code.
So you don't need to catch CNewException, if you call COM interfaces of 7-Zip.

---

http://www.7-zip.org
http://www.7-zip.org/sdk.html
http://www.7-zip.org/support.html
#define IDD_PASSWORD 3800
#define IDT_PASSWORD_ENTER 3801
#define IDX_PASSWORD_SHOW 3803

#define IDE_PASSWORD_PASSWORD 120
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%
% AUTHORS:  Tilla Fick and Chris Swanepoel
%          hyphen at rekenaar dot net
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% Define lefthyphenmin to one and righthyphenmin to two
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%
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*/

#if defined(ATK_DISABLE_SINGLE_INCLUDES) && !defined (__ATK_H_INSIDE__) && !defined
(ATK_COMPILATION)
#error "Only <atk/atk.h> can be included directly."
#endif

#ifndef __ATK_RELATION_TYPE_H__
#define
 __ATK_RELATION_TYPE_H__

#include <glib.h>

G_BEGIN_DECLS

/**
*AtkRelationType:
*@ATK_RELATION_NULL: Not used, represens "no relationship" or an error condition.
*@ATK_RELATION_CONTROLLED_BY: Indicates an object controlled by one or more target objects.
*@ATK_RELATION_CONTROLLER_FOR: Indicates an object is an controller for one or more target objects.
*@ATK_RELATION_LABEL_FOR: Indicates an object is a label for one or more target objects.
*@ATK_RELATION_LABELLED_BY: Indicates an object is labelled by one or more target objects.
*@ATK_RELATION_MEMBER_OF: Indicates an object is a member of a group of one or more target objects.
*@ATK_RELATION_NODE_CHILD_OF: Indicates an object is a cell in a treetable which is displayed because a
cell in the same column is expanded and identifies that cell.
*@ATK_RELATION_FLOWS_TO: Indicates that the object has content that flows logically to another
*  AtkObject in a sequential way, (for instance text-flow).
*@ATK_RELATION_FLOWS_FROM:
 Indicates that the object has content that flows logically from
*  another AtkObject in a sequential way, (for instance text-flow).
*@ATK_RELATION_SUBWINDOW_OF: Indicates a subwindow attached to a component but otherwise has no
connection in  the UI heirarchy to that component.
*@ATK_RELATION_EMBEDS: Indicates that the object visually embeds
*  another object's content, i.e. this object's content flows around
*  another's content.
*@ATK_RELATION_EMBEDDED_BY: Reciprocal of %ATK_RELATION_EMBEDS, indicates that
*  this object's content is visualy embedded in another object.
*@ATK_RELATION_POPUP_FOR: Indicates that an object is a popup for another object.
```

```
*@ATK_RELATION_PARENT_WINDOW_OF: Indicates that an object is a parent window of another object.
*@ATK_RELATION_DESCRIBED_BY: Reciprocal of %ATK_RELATION_DESCRIPTION_FOR. Indicates
that one
* or more target objects provide descriptive information about this object. This relation
* type is most appropriate for
 information that is not essential as its presentation may
* be user-configurable and/or limited to an on-demand mechanism such as an assistive
* technology command. For brief, essential information such as can be found in a widget's
* on-screen label, use %ATK_RELATION_LABELLED_BY. For an on-screen error message, use
* %ATK_RELATION_ERROR_MESSAGE. For lengthy extended descriptive information contained in
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*@ATK_RELATION_DESCRIPTION_FOR: Reciprocal of %ATK_RELATION_DESCRIBED_BY. Indicates
that this
* object provides descriptive information about the target object(s). See also
* %ATK_RELATION_DETAILS_FOR and %ATK_RELATION_ERROR_FOR.
*@ATK_RELATION_NODE_PARENT_OF: Indicates an object is a cell in a treetable and is expanded to display
other cells in the
 same column.
*@ATK_RELATION_DETAILS: Reciprocal of %ATK_RELATION_DETAILS_FOR. Indicates that this object
* has a detailed or extended description, the contents of which can be found in the target
* object(s). This relation type is most appropriate for information that is sufficiently
* lengthy as to make navigation to the container of that information desirable. For less
* verbose information suitable for announcement only, see %ATK_RELATION_DESCRIBED_BY. If
* the detailed information describes an error condition, %ATK_RELATION_ERROR_FOR should be
* used instead. @Since: ATK-2.26.
*@ATK_RELATION_DETAILS_FOR: Reciprocal of %ATK_RELATION_DETAILS. Indicates that this object
* provides a detailed or extended description about the target object(s). See also
* %ATK_RELATION_DESCRIPTION_FOR and %ATK_RELATION_ERROR_FOR. @Since: ATK-2.26.
*@ATK_RELATION_ERROR_MESSAGE: Reciprocal of %ATK_RELATION_ERROR_FOR. Indicates that this
object
* has one or more errors, the nature of which is
 described in the contents of the target
* object(s). Objects that have this relation type should also contain %ATK_STATE_INVALID_ENTRY
* in their #AtkStateSet. @Since: ATK-2.26.
*@ATK_RELATION_ERROR_FOR: Reciprocal of %ATK_RELATION_ERROR_MESSAGE. Indicates that this
object
* contains an error message describing an invalid condition in the target object(s). @Since:
* ATK_2.26.
*@ATK_RELATION_LAST_DEFINED: Not used, this value indicates the end of the enumeration.
*
*Describes the type of the relation
**/
typedef enum
{
 ATK_RELATION_NULL = 0,
 ATK_RELATION_CONTROLLED_BY,
```

```
 ATK_RELATION_CONTROLLER_FOR,
 ATK_RELATION_LABEL_FOR,
 ATK_RELATION_LABELLED_BY,
 ATK_RELATION_MEMBER_OF,
 ATK_RELATION_NODE_CHILD_OF,
 ATK_RELATION_FLOWS_TO,
 ATK_RELATION_FLOWS_FROM,
 ATK_RELATION_SUBWINDOW_OF,
 ATK_RELATION_EMBEDS,
 ATK_RELATION_EMBEDDED_BY,
 ATK_RELATION_POPUP_FOR,
 ATK_RELATION_PARENT_WINDOW_OF,
 ATK_RELATION_DESCRIBED_BY,
 ATK_RELATION_DESCRIPTION_FOR,
 ATK_RELATION_NODE_PARENT_OF,
  ATK_RELATION_DETAILS,
 ATK_RELATION_DETAILS_FOR,
 ATK_RELATION_ERROR_MESSAGE,
 ATK_RELATION_ERROR_FOR,
 ATK_RELATION_LAST_DEFINED
} AtkRelationType;

G_END_DECLS

#endif /* __ATK_RELATION_TYPE_H__ */
// OutBuffer.h

#ifndef __OUT_BUFFER_H
#define __OUT_BUFFER_H

#include "../IStream.h"
#include "../../Common/MyCom.h"
#include "../../Common/MyException.h"

#ifndef _NO_EXCEPTIONS
struct COutBufferException: public CSystemException
{
 COutBufferException(HRESULT errorCode): CSystemException(errorCode) {}
};
#endif

class COutBuffer
{
protected:
 Byte *_buf;
 UInt32 _pos;
 UInt32 _limitPos;
 UInt32 _streamPos;
```

```
 UInt32 _bufSize;
 ISequentialOutStream *_stream;
 UInt64 _processedSize;
 Byte  *_buf2;
 bool _overDict;

 HRESULT FlushPart() throw();
public:
 #ifdef _NO_EXCEPTIONS
 HRESULT ErrorCode;
 #endif

 COutBuffer(): _buf(0), _pos(0), _stream(0), _buf2(0) {}
 ~COutBuffer() { Free(); }

 bool Create(UInt32 bufSize) throw();
 void Free() throw();

 void SetMemStream(Byte *buf) { _buf2 = buf; }
 void SetStream(ISequentialOutStream *stream) { _stream = stream; }
 void Init() throw();
 HRESULT Flush() throw();
 void FlushWithCheck();

 void WriteByte(Byte b)
 {

   UInt32 pos = _pos;
   _buf[pos] = b;
   pos++;
   _pos = pos;
   if (pos == _limitPos)
     FlushWithCheck();
 }
 void WriteBytes(const void *data, size_t size)
 {
   for (size_t i = 0; i < size; i++)
     WriteByte(((const Byte *)data)[i]);
 }

 UInt64 GetProcessedSize() const throw();
};

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
```

```
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Content in license Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-013-ref.xht" />
  <meta name="assert" content="The license element contains content." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src:
 url("support/metadatadisplay-schema-license-013.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

A. HISTORY OF THE SOFTWARE
==========

contextlib2 is a derivative of the contextlib module distributed by the PSF as part of the Python standard library. According, it is itself redistributed under the PSF license (reproduced in full below). As the contextlib module was added only in Python 2.5, the licenses for earlier Python versions are not applicable and have not been included.

Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases that included the contextlib module.

| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 2.5 | 2.4 | 2006 | PSF | yes |
| 2.5.1 | 2.5 | 2007 | PSF | yes |
| 2.5.2 | 2.5.1 | 2008 | PSF | yes |
| 2.5.3 | 2.5.2 | 2008 | PSF | yes |
| 2.6 | 2.5 | 2008 | PSF | yes |
| 2.6.1 | 2.6 | 2008 | PSF | yes |
| 2.6.2 | 2.6.1 | 2009 | PSF | yes |
| 2.6.3 | 2.6.2 | 2009 | PSF | yes |
| 2.6.4 | 2.6.3 | 2009 | PSF | yes |
| 2.6.5 | 2.6.4 | 2010 | PSF | yes |
| 3.0 | 2.6 | 2008 | PSF | yes |
| 3.0.1 | 3.0 | 2009 | PSF | yes |
| 3.1 | 3.0.1 | 2009 | PSF | yes |
| 3.1.1 | 3.1 | 2009 | PSF | yes |
| 3.1.2 | 3.1.1 | 2010 | PSF | yes |
| 3.1.3 | 3.1.2 | 2010 | PSF | yes |
| 3.1.4 | 3.1.3 | 2011 | PSF | yes |
| 3.2 | 3.1 | 2011 | PSF | yes |
| 3.2.1 | 3.2 | 2011 | PSF | yes |

3.2.2 3.2.1 2011 PSF yes
3.3 3.2
2012 PSF yes

Footnotes:

(1) GPL-compatible doesn't mean that we're distributing Python under the GPL. All Python licenses, unlike the GPL, let you distribute a modified version without making your changes open source. The GPL-compatible licenses make it possible to combine Python with other software that is released under the GPL; the others don't.

Thanks to the many outside volunteers who have worked under Guido's direction to make these releases possible.

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==========

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---

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Agreement.

```
// ArchiveOpenCallback.h

#ifndef __ARCHIVE_OPEN_CALLBACK_H
#define __ARCHIVE_OPEN_CALLBACK_H

#include "../../../Common/MyCom.h"

#include "../../../Windows/FileFind.h"

#ifndef _NO_CRYPTO
#include "../../IPassword.h"
#endif
#include "../../Archive/IArchive.h"

#ifdef _NO_CRYPTO

#define INTERFACE_IOpenCallbackUI_Crypto(x)

#else

#define INTERFACE_IOpenCallbackUI_Crypto(x) \
 virtual HRESULT Open_CryptoGetTextPassword(BSTR *password) x; \
 /* virtual HRESULT Open_GetPasswordIfAny(bool &passwordIsDefined, UString &password) x; */ \
 /* virtual bool Open_WasPasswordAsked() x; */ \
 /* virtual void Open_Clear_PasswordWasAsked_Flag() x; */  \

#endif
```

```
#define INTERFACE_IOpenCallbackUI(x) \
 virtual HRESULT Open_CheckBreak() x; \
 virtual HRESULT Open_SetTotal(const UInt64 *files, const UInt64 *bytes) x; \
 virtual HRESULT Open_SetCompleted(const UInt64 *files, const UInt64 *bytes) x; \
 virtual HRESULT Open_Finished() x; \
 INTERFACE_IOpenCallbackUI_Crypto(x)

struct IOpenCallbackUI
{
  INTERFACE_IOpenCallbackUI(=0)
};

class COpenCallbackImp:
 public IArchiveOpenCallback,
 public IArchiveOpenVolumeCallback,
 public IArchiveOpenSetSubArchiveName,
 #ifndef _NO_CRYPTO
 public ICryptoGetTextPassword,
 #endif
 public CMyUnknownImp
{
public:
 MY_QUERYINTERFACE_BEGIN2(IArchiveOpenVolumeCallback)
 MY_QUERYINTERFACE_ENTRY(IArchiveOpenSetSubArchiveName)
 #ifndef _NO_CRYPTO
 MY_QUERYINTERFACE_ENTRY(ICryptoGetTextPassword)
 #endif
 MY_QUERYINTERFACE_END
 MY_ADDREF_RELEASE

 INTERFACE_IArchiveOpenCallback(;)
 INTERFACE_IArchiveOpenVolumeCallback(;)

 #ifndef _NO_CRYPTO
 STDMETHOD(CryptoGetTextPassword)(BSTR *password);
 #endif

 STDMETHOD(SetSubArchiveName(const wchar_t *name))
 {
   _subArchiveMode = true;
   _subArchiveName = name;
   // TotalSize = 0;
   return S_OK;
 }

private:
 FString _folderPrefix;
```

```
 NWindows::NFile::NFind::CFileInfo _fileInfo;
 bool _subArchiveMode;
 UString _subArchiveName;

public:
 UStringVector FileNames;
 CBoolVector
 FileNames_WasUsed;
 CRecordVector<UInt64> FileSizes;

 bool PasswordWasAsked;

 IOpenCallbackUI *Callback;
 CMyComPtr<IArchiveOpenCallback> ReOpenCallback;
 // UInt64 TotalSize;

 COpenCallbackImp(): Callback(NULL), _subArchiveMode(false) {}

 void Init(const FString &folderPrefix, const FString &fileName)
 {
   _folderPrefix = folderPrefix;
   if (!_fileInfo.Find(_folderPrefix + fileName))
     throw 20121118;
   FileNames.Clear();
   FileNames_WasUsed.Clear();
   FileSizes.Clear();
   _subArchiveMode = false;
   // TotalSize = 0;
   PasswordWasAsked = false;
 }

 bool SetSecondFileInfo(CFSTR newName)
 {
   return _fileInfo.Find(newName) && !_fileInfo.IsDir();
 }
};

#endif
```

License information for hyph_sl.dic:

This file is based on the TeX hyphenation patterns distributed under the LaTeX Project Public License (LPPL) as part of the hyph-utf8 package.

This Source Code Form is subject to the terms of the Mozilla Public License, v. 2.0. If a copy of the MPL was not distributed with this file, You can obtain one at http://mozilla.org/MPL/2.0/.

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

At the time this file was first modified, a complete, unmodified copy of
the LPPL Work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

Portions of this file were originally made available under the following license
(copied verbatim from hyph-sl.lic.txt in the original work):

Slovenian hyphenation patterns

(more info about the licence to be added later)

% This file is part of hyph-utf8 package and resulted
 from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% Source: slhyph.tex (2007-01-29)
% Author: Matja Vreko <matjaz at mg-soft.si>
%
% The above mentioned file should become obsolete,
% and the author of the original file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%  and helped with testing, suggestions and bug reports
% - Norbert Preining, who tested & integrated
 patterns into TeX Live
%
% However, the "copyright/copyleft" owner of patterns remains the original author.
%
% The copyright statement of this file is thus:
%
%  Do with this file whatever needs to be done in future for the sake of
%  "a better world" as long as you respect the copyright of original file.
%  If you're the original author of patterns or taking over a new revolution,
%  plese remove all of the TUG comments & credits that we added here -
%  you are the Queen / the King, we are only the servants.
%

```
% If you want to change this file, rather than uploading directly to CTAN,
% we would be grateful if you could send it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
% Before a new "pattern-revolution" starts,
% please try to follow some guidelines if possible:
%
% - \lccode is *forbidden*, and I really mean it
% - all the patterns should be in UTF-8
% - the only
 "allowed" TeX commands in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
%-----------------------------------------------------------------------------
%
% This is `slhyph.tex' as of 15. 4. 97.
%
% Copyright (C) 1990 Matja Vreko, TeXCeX (SLO)
%               [slovenian hyphenation patterns]
%
% This program can be redistributed and/or modified under the terms
% of the LaTeX Project Public License Distributed from CTAN
% archives in directory macros/latex/base/lppl.txt;
 either
% version 1 of the License, or any later version.
%
% This file contains slovene hyphen patterns with
%
% Generation of hyphen patterns for TeX
%
%         Matja Vreko, TeXCeH (SLO), 1990
%   Email: matjaz@mg-soft.si
%
% Changes:
```

```
%  1990       First version of `hyphen.si' (Matja Vreko, TeXCeX)
%
% Some cosmetic changes done later on, but none of these apply any more;
% the patterns are still the same as they were originally:
%
%  1994-05-17 Use of code page 852 in patterns (Leon lajpah)
%  1995-04-06 Release of `sihyph21.tex'
%  1995-06-20 Added \slovenehyphenmins
%             Release of `sihyph22.tex'
%  1997-15-04 Some changes concerning "c, "s, "z and ...
%             Release of `sihyph23.tex'
%  2007-01-20 `sihyph23.tex' renamed to `slhyph.tex'
%             (sl is the proper language code for Slovenian)
%
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With Nested span Elements in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-026-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element that contains nested span elements."
/>
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-026.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
```

```
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   &lt;span&gt;
    span 1 start
    &lt;span&gt;
     span 2 start
     &lt;span&gt;
      span 3
     &lt;/span&gt;
     span 2 end
    &lt;/span&gt;
    span 1 end
   &lt;/span&gt;
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With Two div Elements in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element that contains two div elements." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size:
```

```
 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   &lt;div&gt;Paragraph 1&lt;/div&gt;
   &lt;div&gt;Paragraph 2&lt;/div&gt;
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

Apache License
Version 2.0, January 2004
http://www.apache.org/licenses/

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```
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// Property.h

#ifndef __7Z_PROPERTY_H
#define __7Z_PROPERTY_H

#include "../../../Common/MyString.h"

struct CProperty
{
 UString Name;
 UString Value;
};

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With dir Attribute in span Element in text Element 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element that contains a span element with ltr
as the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
```

```
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   Text with &lt;span dir="ltr"&gt;span&lt;/span&gt;.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```


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```
// UserInputUtils.h

#ifndef __USER_INPUT_UTILS_H
#define __USER_INPUT_UTILS_H

#include "../../../Common/StdOutStream.h"

namespace NUserAnswerMode {

enum EEnum
{
 kYes,
```

```
 kNo,
 kYesAll,
 kNoAll,
 kAutoRenameAll,
 kQuit,
 kEof,
 kError
};
}

NUserAnswerMode::EEnum ScanUserYesNoAllQuit(CStdOutStream *outStream);
// bool GetPassword(CStdOutStream *outStream, UString &psw);
HRESULT GetPassword_HRESULT(CStdOutStream *outStream, UString &psw);

#endif
```

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  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With dir Attribute in div Element in text Element 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
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  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-023-ref.xht" />
  <meta name="assert" content="The license element contains a text element that contains a div element with ltr as
the value for the dir attribute." />
  <style
 type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-023.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   &lt;div dir="ltr"&gt;Paragraph 1&lt;/div&gt;
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
```

```
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CODE32

EXPORT |CrcUpdateT4@16|

AREA |.text|, CODE, ARM

MACRO
CRC32_STEP_1

ldrb    r4, [r1], #1
subs    r2, r2, #1
eor     r4, r4, r0
and     r4, r4, #0xFF
ldr     r4, [r3, +r4, lsl #2]
eor     r0, r4, r0, lsr #8

MEND


MACRO
CRC32_STEP_4 $STREAM_WORD

eor     r7, r7, r8
eor     r7, r7, r9
eor     r0, r0, r7
eor     r0, r0, $STREAM_WORD
ldr     $STREAM_WORD, [r1], #4

and     r7, r0, #0xFF
and     r8, r0, #0xFF00
and     r9, r0, #0xFF0000
and     r0, r0, #0xFF000000

ldr     r7, [r6, +r7, lsl #2]
```

```
 ldr     r8, [r5, +r8, lsr #6]
 ldr     r9, [r4, +r9, lsr #14]
 ldr     r0, [r3, +r0, lsr #22]

 MEND


|CrcUpdateT4@16| PROC

 stmdb   sp!, {r4-r11, lr}
 cmp     r2, #0
 beq     |$fin|

|$v1|
 tst     r1, #7
 beq     |$v2|
 CRC32_STEP_1
 bne     |$v1|

|$v2|
 cmp     r2, #16
 blo     |$v3|

 ldr     r10, [r1], #4
 ldr     r11, [r1], #4

 add     r4, r3, #0x400
 add     r5, r3, #0x800
 add     r6, r3, #0xC00

 mov     r7, #0
 mov     r8, #0
 mov     r9, #0

 sub
    r2, r2, #16

|$loop|
 ; pld     [r1, #0x40]

 CRC32_STEP_4 r10
 CRC32_STEP_4 r11

 subs    r2, r2, #8
 bhs     |$loop|

 sub     r1, r1, #8
 add     r2, r2, #16
```

```
 eor     r7, r7, r8
 eor     r7, r7, r9
 eor     r0, r0, r7

|$v3|
 cmp     r2, #0
 beq     |$fin|

|$v4|
 CRC32_STEP_1
 bne     |$v4|

|$fin|
 ldmia   sp!, {r4-r11, pc}

|CrcUpdateT4@16| ENDP

 END
```

This directory contains the LZMA SDK code used in building the self-extracting Windows installer.

The src/ directory contains an almost-unmodified copy of the 7-zip source code version 18.05, as downloaded from https://www.7-zip.org/a/lzma1805.7z (linked from https://www.7-zip.org/sdk.html) on August 30, 2018. As stated in DOC/lzma-sdk.txt and on the web page, this code is in the public domain. A few modifications have been made to this copy of the source code. Those modifications are contained in mozilla_customizations.diff, which should be found in the same directory as this file.

The firefox/ directory contains several things:

* SFXSetup.sln and SFXSetup.vcxproj
  These are Visual Studio 2017 conversions of the Visual C++ 6 workspace and project files from the src/CPP/7zip/Bundles/SFXSetup/ directory, with some changes and additions to support AArch64 and to include our resources.
* 7zSD.arm64.manifest and 7zSD.win32.manifest
  We need to add a manifest file to the binary for several reasons, and one isn't supplied with the source package (Visual C++ 6 doesn't support them), so we've written our own.
* setup.ico
  The icon group used for the installer package.
* resource.rc
  The resource script containing the above manifest and icon references, as well as other resources we need. This is derived from the supplied SFXSetup resource.rc, but heavily customized.
* 7zSD.ARM64.sfx
  AArch64 binary built using all the above files. Checking this into the tree in

compiled binary form means that packaging the installer does not require
having a compiler toolchain configured (which is the case for artifact
builds). To compile your own version of this file, open SFXSetup.sln and build
the ReleaseD configuration.

* 7zSD.Win32.sfx

32-bit x86 binary built using some of the above files, but through a different
build procedure that uses Visual C++ 6 in order to maintain compatibility with
legacy Windows platforms (Firefox doesn't run on these platforms,
but at least
we can display a helpful error message). The exact procedure that generated
this file was:

1) Install Microsoft Visual C++ 6 Professional or Enterprise edition (the
   Standard edition does not include the optimizing compiler, so it should
   not be used). You'll likely want a virtual machine running Windows XP,
   because running VC6 under more modern Windows versions is tricky.
2) Install an appropriate Windows SDK version. The Windows XP Service Pack 2
   SDK is known to work well, but that particular version appears to only be
   available from archive.org:
https://web.archive.org/web/20080209175723/http://www.microsoft.com:80/msdownload/platformsdk/sdkupdate/XPSP2FULLInstall.htm
3) Run the tool included with the SDK that configures Visual C++ to use it.
4) If using a fresh copy of the LZMA SDK sources, apply the patch in
   mozilla_customizations.diff. The copy in the Firefox source tree already
   has these changes applied.
5) Open
the workspace file at src\CPP\7zip\Bundles\SFXSetup\SFXSetup.dsw and
   build it using the "SFXSetup - Win32 ReleaseD" configuration. The output
   executable should be at the path ReleaseD\7zSD.sfx relative to SFXSetup.dsw.
6) Use Resource Hacker (available from http://angusj.com/resourcehacker/) to
   replace the existing icon on 7zSD.sfx and to add the manifest as a new
   resource. Also edit the version info resource to replace CompanyName and
   LegalCopyright with "Mozilla" (or appropriate vendor name) and
   FileDescription and ProductName with "Firefox" (or appropriate product name).
   Be sure to recompile the resources using the green "play" button in the
   toolbar (or by pressing F5) before saving the file.

In the future this file may be replaced with one built in the same manner as
the AArch64 version using a modern toolchain, if the loss of platform support
is deemed acceptable.

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<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With dir Attribute in span Element in text Element 2</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element that contains a span element with rtl as the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  Test passes if the word PASS appears below.
  The Extended Metadata Block is valid and may be displayed to the user upon request.
  P
  The XML contained in the Extended Metadata Block is below.
  <pre>
<?xml version="1.0" encoding="UTF-8"?>
<metadata version="1.0">
 <copyright>
  <text>
   Text with <span dir="rtl">span</span>.
  </text>
 </copyright>
</metadata>
  </pre>
 </body>
</html>

```
/* Delta.h -- Delta converter
2013-01-18 : Igor Pavlov : Public domain */

#ifndef __DELTA_H
#define __DELTA_H

#include "7zTypes.h"

EXTERN_C_BEGIN

#define DELTA_STATE_SIZE 256

void Delta_Init(Byte *state);
void Delta_Encode(Byte *state, unsigned delta, Byte *data, SizeT size);
void Delta_Decode(Byte *state, unsigned delta, Byte *data, SizeT size);

EXTERN_C_END

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: No text Element in license Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element does not contain a text child element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family:
 "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
```

```
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts" id="License ID" /&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
// Common.h

#ifndef __COMMON_COMMON_H
#define __COMMON_COMMON_H

/*
This file is included to all cpp files in 7-Zip.
Each folder contains StdAfx.h file that includes "Common.h".
So 7-Zip includes "Common.h" in both modes:
 with precompiled StdAfx.h
and
 without precompiled StdAfx.h

If you use 7-Zip code, you must include "Common.h" before other h files of 7-zip.
If you don't need some things that are used in 7-Zip,
you can change this h file or h files included in this file.
*/

// compiler pragmas to disable some warnings
#include "../../C/Compiler.h"

// it's <windows.h> or code that defines windows things, if it's not _WIN32
#include "MyWindows.h"

// NewHandler.h and NewHandler.cpp redefine operator new() to throw exceptions, if compiled with old MSVC
compilers
#include "NewHandler.h"



#define ARRAY_SIZE(a) (sizeof(a) / sizeof((a)[0]))


/* There is BUG in MSVC 6.0 compiler for operator new[]:
  It doesn't check overflow, when it calculates size in bytes for allocated array.
```

So we can use MY_ARRAY_NEW macro instead of new[] operator. */

```
#if defined(_MSC_VER) && (_MSC_VER == 1200) && !defined(_WIN64)
 #define MY_ARRAY_NEW(p, T, size) p = new T[(size > (unsigned)0xFFFFFFFF / sizeof(T)) ?
(unsigned)0xFFFFFFFF / sizeof(T) : size];
#else
 #define MY_ARRAY_NEW(p, T, size) p = new T[size];
#endif

#endif
```

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liteFirewall is based on nsisFirewall.

nsisFirewall -- Small NSIS plugin for simple tasks with Windows Firewall
Web site: http://wiz0u.free.fr/prog/nsisFirewall

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```
// ICoder.h

#ifndef __ICODER_H
#define __ICODER_H

#include "IStream.h"

#define CODER_INTERFACE(i, x) DECL_INTERFACE(i, 4, x)

CODER_INTERFACE(ICompressProgressInfo, 0x04)
{
 STDMETHOD(SetRatioInfo)(const UInt64 *inSize, const UInt64 *outSize) PURE;

 /* (inSize) can be NULL, if unknown
    (outSize) can be NULL, if unknown

 returns:
   S_OK
```

```
  E_ABORT  : Break by user
  another error codes
 */
};

CODER_INTERFACE(ICompressCoder, 0x05)
{
 STDMETHOD(Code)(ISequentialInStream *inStream, ISequentialOutStream *outStream,
    const UInt64 *inSize, const UInt64 *outSize,
    ICompressProgressInfo *progress) PURE;
};

CODER_INTERFACE(ICompressCoder2, 0x18)
{
 STDMETHOD(Code)(ISequentialInStream * const *inStreams, const UInt64 * const *inSizes, UInt32
numInStreams,
    ISequentialOutStream * const *outStreams, const UInt64 * const *outSizes, UInt32 numOutStreams,
    ICompressProgressInfo *progress) PURE;
};

/*
 ICompressCoder::Code
 ICompressCoder2::Code

 returns:
   S_OK     : OK
  S_FALSE  : data error (for decoders)
  E_OUTOFMEMORY : memory allocation error
  E_NOTIMPL : unsupported encoding method (for decoders)
  another error code : some error. For example, it can be error code received from inStream or outStream function.

 Parameters:
  (inStream != NULL)
  (outStream != NULL)

  if (inSize != NULL)
  {
    Encoders in 7-Zip ignore (inSize).
    Decoder can use (*inSize) to check that stream was decoded correctly.
    Some decoder in 7-Zip check it, if (full_decoding mode was set via ICompressSetFinishMode)
  }

  If it's required to limit the reading from input stream (inStream), it can
    be done with ISequentialInStream implementation.

  if (outSize != NULL)
  {
    Encoders in 7-Zip ignore (outSize).
```

```
    Decoder unpacks no more than (*outSize) bytes.
  }

  (progress == NULL) is allowed.


Decoding with Code() function
-----------------------------

You can request some interfaces
before decoding
 - ICompressSetDecoderProperties2
 - ICompressSetFinishMode

If you need to decode full stream:
{
  1) try to set full_decoding mode with ICompressSetFinishMode::SetFinishMode(1);
  2) call the Code() function with specified (inSize) and (outSize), if these sizes are known.
}

If you need to decode only part of stream:
{
  1) try to set partial_decoding mode with ICompressSetFinishMode::SetFinishMode(0);
  2) Call the Code() function with specified (inSize = NULL) and specified (outSize).
}

Encoding with Code() function
-----------------------------

You can request some interfaces :
- ICompressSetCoderProperties   - use it before encoding to set properties
- ICompressWriteCoderProperties - use it before or after encoding to request encoded properties.

ICompressCoder2 is used when (numInStreams != 1 || numOutStreams != 1)
   The rules are similar to ICompressCoder rules
*/


namespace NCoderPropID
{
 enum EEnum
 {

  kDefaultProp = 0,
  kDictionarySize,    // VT_UI4
  kUsedMemorySize,    // VT_UI4
  kOrder,             // VT_UI4
  kBlockSize,         // VT_UI4 or VT_UI8
```

```
  kPosStateBits,      // VT_UI4
  kLitContextBits,    // VT_UI4
  kLitPosBits,        // VT_UI4
  kNumFastBytes,      // VT_UI4
  kMatchFinder,       // VT_BSTR
  kMatchFinderCycles, // VT_UI4
  kNumPasses,         // VT_UI4
  kAlgorithm,         // VT_UI4
  kNumThreads,        // VT_UI4
  kEndMarker,         // VT_BOOL
  kLevel,             // VT_UI4
  kReduceSize,        // VT_UI8 : it's estimated size of largest data stream that will be compressed
                      //   encoder can use this value to reduce dictionary size and allocate data buffers

  kExpectedDataSize,  // VT_UI8 : for ICompressSetCoderPropertiesOpt :
                      //   it's estimated size of current data stream
                      //   real data size can differ from that size
                      //   encoder
 can use this value to optimize encoder initialization

  kBlockSize2,        // VT_UI4 or VT_UI8
  kCheckSize,         // VT_UI4 : size of digest in bytes
  kFilter,            // VT_BSTR
  kMemUse             // VT_UI8
 };
}

CODER_INTERFACE(ICompressSetCoderPropertiesOpt, 0x1F)
{
 STDMETHOD(SetCoderPropertiesOpt)(const PROPID *propIDs, const PROPVARIANT *props, UInt32
numProps) PURE;
};

CODER_INTERFACE(ICompressSetCoderProperties, 0x20)
{
 STDMETHOD(SetCoderProperties)(const PROPID *propIDs, const PROPVARIANT *props, UInt32 numProps)
PURE;
};

/*
CODER_INTERFACE(ICompressSetCoderProperties, 0x21)
{
 STDMETHOD(SetDecoderProperties)(ISequentialInStream *inStream) PURE;
};
*/

CODER_INTERFACE(ICompressSetDecoderProperties2, 0x22)
{
```

```
 /* returns:
   S_OK
   E_NOTIMP      : unsupported properties
   E_INVALIDARG  : incorrect (or unsupported) properties
   E_OUTOFMEMORY : memory allocation error
 */
 STDMETHOD(SetDecoderProperties2)(const Byte *data, UInt32 size) PURE;
};

CODER_INTERFACE(ICompressWriteCoderProperties,
 0x23)
{
 STDMETHOD(WriteCoderProperties)(ISequentialOutStream *outStream) PURE;
};

CODER_INTERFACE(ICompressGetInStreamProcessedSize, 0x24)
{
 STDMETHOD(GetInStreamProcessedSize)(UInt64 *value) PURE;
};

CODER_INTERFACE(ICompressSetCoderMt, 0x25)
{
 STDMETHOD(SetNumberOfThreads)(UInt32 numThreads) PURE;
};

CODER_INTERFACE(ICompressSetFinishMode, 0x26)
{
 STDMETHOD(SetFinishMode)(UInt32 finishMode) PURE;

 /* finishMode:
   0 : partial decoding is allowed. It's default mode for ICompressCoder::Code(), if (outSize) is defined.
   1 : full decoding. The stream must be finished at the end of decoding. */
};

CODER_INTERFACE(ICompressGetInStreamProcessedSize2, 0x27)
{
 STDMETHOD(GetInStreamProcessedSize2)(UInt32 streamIndex, UInt64 *value) PURE;
};

CODER_INTERFACE(ICompressSetMemLimit, 0x28)
{
 STDMETHOD(SetMemLimit)(UInt64 memUsage) PURE;
};



CODER_INTERFACE(ICompressGetSubStreamSize, 0x30)
{
```

```
 STDMETHOD(GetSubStreamSize)(UInt64
 subStream, UInt64 *value) PURE;

 /* returns:
   S_OK     : (*value) contains the size or estimated size (can be incorrect size)
   S_FALSE  : size is undefined
   E_NOTIMP : the feature is not implemented

 Let's (read_size) is size of data that was already read by ISequentialInStream::Read().
 The caller should call GetSubStreamSize() after each Read() and check sizes:
   if (start_of_subStream + *value < read_size)
   {
     // (*value) is correct, and it's allowed to call GetSubStreamSize() for next subStream:
     start_of_subStream += *value;
     subStream++;
   }
 */
};

CODER_INTERFACE(ICompressSetInStream, 0x31)
{
 STDMETHOD(SetInStream)(ISequentialInStream *inStream) PURE;
 STDMETHOD(ReleaseInStream)() PURE;
};

CODER_INTERFACE(ICompressSetOutStream, 0x32)
{
 STDMETHOD(SetOutStream)(ISequentialOutStream *outStream) PURE;
 STDMETHOD(ReleaseOutStream)() PURE;
};

/*
CODER_INTERFACE(ICompressSetInStreamSize, 0x33)
{
 STDMETHOD(SetInStreamSize)(const UInt64
 *inSize) PURE;
};
*/

CODER_INTERFACE(ICompressSetOutStreamSize, 0x34)
{
 STDMETHOD(SetOutStreamSize)(const UInt64 *outSize) PURE;

 /* That function initializes decoder structures.
    Call this function only for stream version of decoder.
      if (outSize == NULL), then output size is unknown
      if (outSize != NULL), then the decoder must stop decoding after (*outSize) bytes. */
};
```

```
CODER_INTERFACE(ICompressSetBufSize, 0x35)
{
 STDMETHOD(SetInBufSize)(UInt32 streamIndex, UInt32 size) PURE;
 STDMETHOD(SetOutBufSize)(UInt32 streamIndex, UInt32 size) PURE;
};

CODER_INTERFACE(ICompressInitEncoder, 0x36)
{
 STDMETHOD(InitEncoder)() PURE;

 /* That function initializes encoder structures.
    Call this function only for stream version of encoder. */
};

CODER_INTERFACE(ICompressSetInStream2, 0x37)
{
 STDMETHOD(SetInStream2)(UInt32 streamIndex, ISequentialInStream *inStream) PURE;
 STDMETHOD(ReleaseInStream2)(UInt32 streamIndex) PURE;
};

/*
CODER_INTERFACE(ICompressSetOutStream2,
 0x38)
{
 STDMETHOD(SetOutStream2)(UInt32 streamIndex, ISequentialOutStream *outStream) PURE;
 STDMETHOD(ReleaseOutStream2)(UInt32 streamIndex) PURE;
};

CODER_INTERFACE(ICompressSetInStreamSize2, 0x39)
{
 STDMETHOD(SetInStreamSize2)(UInt32 streamIndex, const UInt64 *inSize) PURE;
};
*/


/*
 ICompressFilter
 Filter() converts as most as possible bytes
    returns: (outSize):
      if (outSize <= size) : Filter have converted outSize bytes
      if (outSize >  size) : Filter have not converted anything.
          and it needs at least outSize bytes to convert one block
          (it's for crypto block algorithms).
*/

#define INTERFACE_ICompressFilter(x) \
 STDMETHOD(Init)() x; \
```

```
 STDMETHOD_(UInt32, Filter)(Byte *data, UInt32 size) x; \

CODER_INTERFACE(ICompressFilter, 0x40)
{
 INTERFACE_ICompressFilter(PURE);
};


CODER_INTERFACE(ICompressCodecsInfo, 0x60)
{
 STDMETHOD(GetNumMethods)(UInt32 *numMethods) PURE;
 STDMETHOD(GetProperty)(UInt32 index, PROPID propID,
 PROPVARIANT *value) PURE;
 STDMETHOD(CreateDecoder)(UInt32 index, const GUID *iid, void **coder) PURE;
 STDMETHOD(CreateEncoder)(UInt32 index, const GUID *iid, void **coder) PURE;
};

CODER_INTERFACE(ISetCompressCodecsInfo, 0x61)
{
 STDMETHOD(SetCompressCodecsInfo)(ICompressCodecsInfo *compressCodecsInfo) PURE;
};

CODER_INTERFACE(ICryptoProperties, 0x80)
{
 STDMETHOD(SetKey)(const Byte *data, UInt32 size) PURE;
 STDMETHOD(SetInitVector)(const Byte *data, UInt32 size) PURE;
};

/*
CODER_INTERFACE(ICryptoResetSalt, 0x88)
{
 STDMETHOD(ResetSalt)() PURE;
};
*/

CODER_INTERFACE(ICryptoResetInitVector, 0x8C)
{
 STDMETHOD(ResetInitVector)() PURE;

 /* Call ResetInitVector() only for encoding.
    Call ResetInitVector() before encoding and before WriteCoderProperties().
    Crypto encoder can create random IV in that function. */
};

CODER_INTERFACE(ICryptoSetPassword, 0x90)
{
 STDMETHOD(CryptoSetPassword)(const Byte *data, UInt32 size) PURE;
};
```

```
CODER_INTERFACE(ICryptoSetCRC,
 0xA0)
{
 STDMETHOD(CryptoSetCRC)(UInt32 crc) PURE;
};


namespace NMethodPropID
{
 enum EEnum
 {
   kID,
   kName,
   kDecoder,
   kEncoder,
   kPackStreams,
   kUnpackStreams,
   kDescription,
   kDecoderIsAssigned,
   kEncoderIsAssigned,
   kDigestSize
 };
}


#define INTERFACE_IHasher(x) \
 STDMETHOD_(void, Init)() throw() x; \
 STDMETHOD_(void, Update)(const void *data, UInt32 size) throw() x; \
 STDMETHOD_(void, Final)(Byte *digest) throw() x; \
 STDMETHOD_(UInt32, GetDigestSize)() throw() x; \

CODER_INTERFACE(IHasher, 0xC0)
{
 INTERFACE_IHasher(PURE)
};

CODER_INTERFACE(IHashers, 0xC1)
{
 STDMETHOD_(UInt32, GetNumHashers)() PURE;
 STDMETHOD(GetHasherProp)(UInt32 index, PROPID propID, PROPVARIANT *value) PURE;
 STDMETHOD(CreateHasher)(UInt32 index, IHasher **hasher) PURE;
};

extern "C"
{
 typedef HRESULT (WINAPI *Func_GetNumberOfMethods)(UInt32 *numMethods);
 typedef HRESULT (WINAPI *Func_GetMethodProperty)(UInt32 index, PROPID propID, PROPVARIANT
```

```
*value);
  typedef HRESULT (WINAPI *Func_CreateDecoder)(UInt32 index, const GUID *iid, void **outObject);
 typedef HRESULT (WINAPI *Func_CreateEncoder)(UInt32 index, const GUID *iid, void **outObject);

 typedef HRESULT (WINAPI *Func_GetHashers)(IHashers **hashers);

 typedef HRESULT (WINAPI *Func_SetCodecs)(ICompressCodecsInfo *compressCodecsInfo);
}

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With One Language Tagged (using lang) text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-003-ref.xht" />
  <meta name="assert" content="The copyright element matches the schema. It contains one text element that has a
language tag using the lang tag instead
 of xml:lang." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-003.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
```

```
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text lang="en"&gt;
   Copyright with "en" language.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```


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Jean-loup Gailly Mark Adler
jloup@gzip.org madler@alumni.caltech.edu

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With dir Attribute in text Element 2</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-015-ref.xht" />
  <meta name="assert" content="The license element contains a text element with rtl as the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-015.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
```

```
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text dir="rtl"&gt;
   License without language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

UNRECOGNIZED LICENSE; MD5 sum: 14fe18eabf460ef792731acced133573

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IN CONNECTION WITH THE
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DEALINGS IN THE SOFTWARE.

```
#ifndef _EXDLL_H_
#define _EXDLL_H_

// only include this file from one place in your DLL.
// (it is all static, if you use it in two places it will fail)

#define EXDLL_INIT()          {  \
```

```
        g_stringsize=string_size; \
        g_stacktop=stacktop;      \
        g_variables=variables; }

// For page showing plug-ins
#define WM_NOTIFY_OUTER_NEXT (WM_USER+0x8)
#define WM_NOTIFY_CUSTOM_READY (WM_USER+0xd)
#define NOTIFY_BYE_BYE 'x'

typedef struct _stack_t {
 struct _stack_t *next;
 TCHAR text[1]; // this should be the length of string_size
} stack_t;


static unsigned int g_stringsize;
static stack_t **g_stacktop;
static TCHAR *g_variables;

static int __stdcall popstring(TCHAR *str); // 0 on success, 1 on empty stack
static void __stdcall pushstring(const TCHAR *str);

enum
{
INST_0,         // $0
INST_1,         // $1
INST_2,         // $2
INST_3,         // $3
INST_4,         // $4
INST_5,         // $5
INST_6,         // $6
INST_7,         // $7
INST_8,         // $8
INST_9,
        // $9
INST_R0,        // $R0
INST_R1,        // $R1
INST_R2,        // $R2
INST_R3,        // $R3
INST_R4,        // $R4
INST_R5,        // $R5
INST_R6,        // $R6
INST_R7,        // $R7
INST_R8,        // $R8
INST_R9,        // $R9
INST_CMDLINE,   // $CMDLINE
INST_INSTDIR,   // $INSTDIR
INST_OUTDIR,    // $OUTDIR
```

```
INST_EXEDIR,    // $EXEDIR
INST_LANG,      // $LANGUAGE
__INST_LAST
};


// utility functions (not required but often useful)
static int __stdcall popstring(TCHAR *str)
{
 stack_t *th;
 if (!g_stacktop || !*g_stacktop) return 1;
 th=(*g_stacktop);
 lstrcpy(str,th->text);
 *g_stacktop = th->next;
 GlobalFree((HGLOBAL)th);
 return 0;
}

static void __stdcall pushstring(const TCHAR *str)
{
 stack_t *th;
 if (!g_stacktop) return;
 th=(stack_t*)GlobalAlloc(GPTR,sizeof(stack_t)+g_stringsize*sizeof(TCHAR));
 lstrcpyn(th->text,str,g_stringsize);
 th->next=*g_stacktop;
 *g_stacktop=th;
}

static TCHAR * __stdcall getuservariable(int varnum)
{
 if (varnum < 0
 || varnum >= __INST_LAST) return NULL;
 return g_variables+varnum*g_stringsize;
}

static void __stdcall setuservariable(int varnum, const TCHAR *var)
{
 if (var != NULL && varnum >= 0 && varnum < __INST_LAST)
  lstrcpy(g_variables + varnum*g_stringsize, var);
}



#endif//_EXDLL_H_
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
```

```
<head>
 <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
 <title>WOFF Test: Valid license Element With Two div Elements in text Element</title>
 <link rel="author" title="Tal Leming" href="http://typesupply.com" />
 <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
 <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
 <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
 <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
 <link rel="match" href="metadatadisplay-schema-license-021-ref.xht" />
 <meta name="assert" content="The license element contains a text element that contains two div elements." />
 <style type="text/css"><![CDATA[
  @import url("support/test-fonts.css");
  @font-face
 {
   font-family: "WOFF Test";
   src: url("support/metadatadisplay-schema-license-021.woff2") format("woff2");
  }
  body {
   font-size: 20px;
  }
  pre {
   font-size: 12px;
  }
  .test {
   font-family: "WOFF Test", "WOFF Test CFF Fallback";
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
</head>
<body>
 <p>Test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
 <div class="test">P</div>
 <p>The XML contained in the Extended Metadata Block is below.</p>
 <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   &lt;div&gt;Paragraph 1&lt;/div&gt;
   &lt;div&gt;Paragraph 2&lt;/div&gt;
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
 </pre>
</body>
</html>
```

---
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---

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v1.0
MSFT Ae! d,X Lx@

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<ph4"@H@< !@ !4"
`@l4"d8x@X !8"hX4"|"@04"#`@PL !%l4" |&`@(4"
'`@L4"`)x@P04"`*@T !
-4"- @ $4"-8@
04"X/`XP@40 P8`x|X|Fe0FFsoJ2fL.{ |jB^Z,;HGMwA~
C -XWy6JDdy>ByyHOND^PRNdlH9RW0L
JD;!f|Vx$m@UcU6x2FOJpMwf0 @0-stdole2.tlbWWW
HTH
d
P  d 4D
 8xxT
<P

H$p0P
(,
]NetFwTypeLib8INetFwRemoteAdminSettingsWWWd8jNET_FW_IP_VERSION_WWd0XNET_FW_IP_VERSI
ON_V4d0XNET_FW_IP_VERSION_V6d0ZFNET_FW_IP_VERSION_ANYWWWd0NET_FW_IP_VERSION_
MAXWWW 4IpVersionWWW
89FNET_FW_SCOPE_WWW0]NET_FW_SCOPE_ALL0,\NET_FW_SCOPE_LOCAL_SUBNETWWW0NET_F
W_SCOPE_CUSTOMW0>NET_FW_SCOPE_MAX0ScopeWWWRemoteAddressesW)remoteAddrsWEnabledW,
8 INetFwIcmpSettingsWW,#AllowOutboundDestinationUnreachableWallowWWW,
o'AllowRedirectWWW,AllowInboundEchoRequestW,iAllowOutboundTimeExceededWWW,nAllowOutboundPara
meterProblemWWW,PAllowOutboundSourceQuenchWWW,0AllowInboundRouterRequestWWW,AllowInboundT
imestampRequest,AllowInboundMaskRequestW,AllowOutboundPacketTooBigWWW8INetFwOpenPortWWName
8NET_FW_IP_PROTOCOL_W0z8NET_FW_IP_PROTOCOL_TCPWW`0=NET_FW_IP_PROTOCOL_UDPWW
]Protocol
KipProtocolWWPort
gportNumberWWaBuiltInWX8|pINetFwOpenPortsWX@0vCountWWWXrAddWXRemoveWWXzItemopenPortX
$xA_NewEnumjnewEnumW
8INetFwServiceWWW
 8NET_FW_SERVICE_TYPE_ 0HNET_FW_SERVICE_FILE_AND_PRINTWWW
09NET_FW_SERVICE_UPNPW 0jNET_FW_SERVICE_REMOTE_DESKTOPWWW
0NET_FW_SERVICE_NONEW 0wNET_FW_SERVICE_TYPE_MAXWType
hCustomizedWW"rGloballyOpenPortsWWW
.openPortsWWW88,&INetFwServicesWWsvcTypeWD]serviceW8INetFwAuthorizedApplicationWProcessImageFi
leNameh
imageFileNameWWWL8NINetFwAuthorizedApplicationstappW
8INetFwProfileWWW8kNET_FW_PROFILE_TYPE_X0hNET_FW_PROFILE_DOMAINWWW0ONET_FW_PR
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nabledWfExceptionsNotAllowed\
KynotAllowedWWvNotificationsDisabledWWWdisabled,UnicastResponsesToMulticastBroadcastDisabled\Remote
AdminSettingsWpIcmpSettingsServices)AuthorizedApplicationsWW8
9appsx8INetFwPolicyxCurrentProfileWWprofileWx2GetProfileByType@;4profileTypeW
8INetFwMgrWWW~LocalPolicyWCurrentProfileTypeWWRestoreDefaultsW`
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<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">

<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With Mixed text Element Language Tags 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element matches the schema. One text element does not have a language tag. One text element has a language tag." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  Test passes if the word PASS appears below.
  The Extended Metadata Block is valid and may be displayed to the user upon request.
  P
  The XML contained in the Extended Metadata Block is below.
  <pre>
<?xml version="1.0" encoding="UTF-8"?>
<metadata version="1.0">
 <license url="http://w3c.org/Fonts" id="License ID">
  <text>
   License without language.
  </text>
  <text xml:lang="en">
   License with "en" language.
  </text>
 </license>
</metadata>
  </pre>
 </body>
</html>

<!-- DO NOT EDIT! Generated by `%(generating_script_filename)s --spec %(spec_directory)s/` -->
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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Child Element in copyright Element text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element with an unknown child element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size:
 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
```

```
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
// Windows/Handle.h

#ifndef __WINDOWS_HANDLE_H
#define __WINDOWS_HANDLE_H

namespace NWindows {

class CHandle
{
protected:
 HANDLE _handle;
public:
 operator HANDLE() { return _handle; }
 CHandle(): _handle(NULL) {}
 ~CHandle() { Close(); }
 bool IsCreated() const { return (_handle != NULL); }
 bool Close()
 {
  if (_handle == NULL)
    return true;
  if (!::CloseHandle(_handle))
    return false;
  _handle = NULL;
  return true;
 }
 void Attach(HANDLE handle) { _handle = handle; }
 HANDLE Detach()
 {
  HANDLE handle = _handle;
  _handle = NULL;
  return handle;
 }
};

}

#endif
/* ATK -  Accessibility Toolkit
* Copyright 2001 Sun Microsystems Inc.
```

```
*
* This library is free software; you can redistribute it and/or
* modify it under the terms of the GNU Library General Public
* License as published by the Free Software Foundation; either
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*
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* License along with this library; if not, write to the
* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_ACTION_H__
#define __ATK_ACTION_H__

#include <atk/atkobject.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

/*
* The interface AtkAction should be supported
 by any object that can
* perform one or more actions. The interface provides the standard
* mechanism for an assistive technology to determine what those actions
* are as well as tell the object to perform them. Any object that can
* be manipulated should support this interface.
*/


#define ATK_TYPE_ACTION                 (atk_action_get_type ())
#define ATK_IS_ACTION(obj)              G_TYPE_CHECK_INSTANCE_TYPE ((obj), ATK_TYPE_ACTION)
#define ATK_ACTION(obj)                 G_TYPE_CHECK_INSTANCE_CAST ((obj), ATK_TYPE_ACTION,
AtkAction)
#define ATK_ACTION_GET_IFACE(obj)       (G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_ACTION, AtkActionIface))

#ifndef _TYPEDEF_ATK_ACTION_
#define _TYPEDEF_ATK_ACTION_
typedef struct _AtkAction AtkAction;
#endif
typedef struct _AtkActionIface AtkActionIface;
```

```
struct _AtkActionIface
{
 GTypeInterface parent;

 gboolean              (*do_action)        (AtkAction        *action,

          gint            i);
 gint                  (*get_n_actions)    (AtkAction        *action);
 G_CONST_RETURN gchar*   (*get_description)   (AtkAction        *action,
                                    gint            i);
 G_CONST_RETURN gchar*   (*get_name)         (AtkAction        *action,
                                    gint            i);
 G_CONST_RETURN gchar*   (*get_keybinding)    (AtkAction        *action,
                                    gint            i);
 gboolean              (*set_description)   (AtkAction        *action,
                                    gint            i,
                                    const gchar       *desc);
 G_CONST_RETURN gchar*   (*get_localized_name)(AtkAction        *action,
     gint            i);
 AtkFunction             pad2;
};

GType atk_action_get_type (void);

/*
* These are the function which would be called by an application
 with
* the argument being a AtkObject object cast to (AtkAction).
*
* The function will just check that * the corresponding
* function pointer is not NULL and will call it.
*
* The "real" implementation of the function for accessible will be
* provided in a support library
*/

gboolean   atk_action_do_action              (AtkAction        *action,
                                  gint            i);
gint   atk_action_get_n_actions           (AtkAction *action);
G_CONST_RETURN gchar* atk_action_get_description  (AtkAction        *action,
                                    gint            i);
G_CONST_RETURN gchar* atk_action_get_name         (AtkAction        *action,
                                    gint            i);
G_CONST_RETURN gchar* atk_action_get_keybinding   (AtkAction        *action,
                                    gint            i);
gboolean             atk_action_set_description  (AtkAction
```

```
        *action,
                                        gint            i,
                                        const gchar     *desc);

/* NEW in ATK 1.1: */

G_CONST_RETURN gchar* atk_action_get_localized_name (AtkAction      *action,
          gint          i);

/*
* Additional GObject properties exported by AtkAction:
*    "accessible_action"
*       (an accessible action, or the list of actions, has changed)
*/

#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_ACTION_H__ */
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With Mixed text Element Language Tags 2</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element matches the schema. Two text elements have a language tags."
/>
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size:
 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
```

```
  }
 ]]></style>
</head>
<body>
 <p>Test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
 <div class="test">P</div>
 <p>The XML contained in the Extended Metadata Block is below.</p>
 <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts" id="License ID"&gt;
  &lt;text xml:lang="en"&gt;
   License with "en" language.
  &lt;/text&gt;
  &lt;text xml:lang="fr"&gt;
   License with "fr" language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
 </pre>
</body>
</html>
```

UNRECOGNIZED LICENSE; MD5 sum: bfaf70067bcf4d1a274778b4f891d0a2

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OF CONTRACT, TORT OR OTHERWISE,

ARISING FROM, OUT OF OR
IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER
DEALINGS IN THE SOFTWARE.

```
#include "resourceGui.h"

#define IDR_MENUBAR1      70
#define IDM_MENU          71
#define IDR_ACCELERATOR1  72

#define IDB_ADD      100
#define IDB_EXTRACT  101
#define IDB_TEST     102
#define IDB_COPY     103
#define IDB_MOVE     104
#define IDB_DELETE   105
#define IDB_INFO     106

#define IDB_ADD2     150
#define IDB_EXTRACT2 151
#define IDB_TEST2    152
#define IDB_COPY2    153
#define IDB_MOVE2    154
#define IDB_DELETE2  155
#define IDB_INFO2    156

#define IDM_HASH_ALL            101
#define IDM_CRC32               102
#define IDM_CRC64               103
#define IDM_SHA1                104
#define IDM_SHA256              105

#define IDM_OPEN                540
#define IDM_OPEN_INSIDE         541
#define IDM_OPEN_OUTSIDE        542
#define IDM_FILE_VIEW           543
#define IDM_FILE_EDIT           544
#define IDM_RENAME              545
#define IDM_COPY_TO             546
#define IDM_MOVE_TO             547
#define IDM_DELETE              548
#define IDM_SPLIT
            549
#define IDM_COMBINE             550
#define IDM_PROPERTIES          551
#define IDM_COMMENT             552
#define IDM_CRC                 553
#define IDM_DIFF                554
#define IDM_CREATE_FOLDER       555
```

```
#define IDM_CREATE_FILE         556
// #define IDM_EXIT                557
#define IDM_LINK                558
#define IDM_ALT_STREAMS         559

#define IDM_OPEN_INSIDE_ONE      590
#define IDM_OPEN_INSIDE_PARSER   591

#define IDM_SELECT_ALL           600
#define IDM_DESELECT_ALL         601
#define IDM_INVERT_SELECTION     602
#define IDM_SELECT               603
#define IDM_DESELECT             604
#define IDM_SELECT_BY_TYPE       605
#define IDM_DESELECT_BY_TYPE     606

#define IDM_VIEW_LARGE_ICONS     700
#define IDM_VIEW_SMALL_ICONS     701
#define IDM_VIEW_LIST            702
#define IDM_VIEW_DETAILS         703

#define IDM_VIEW_ARANGE_BY_NAME  710
#define IDM_VIEW_ARANGE_BY_TYPE  711
#define IDM_VIEW_ARANGE_BY_DATE  712
#define IDM_VIEW_ARANGE_BY_SIZE
  713

#define IDM_VIEW_ARANGE_NO_SORT  730
#define IDM_VIEW_FLAT_VIEW       731
#define IDM_VIEW_TWO_PANELS      732
#define IDM_VIEW_TOOLBARS        733
#define IDM_OPEN_ROOT_FOLDER     734
#define IDM_OPEN_PARENT_FOLDER   735
#define IDM_FOLDERS_HISTORY      736
#define IDM_VIEW_REFRESH         737
#define IDM_VIEW_AUTO_REFRESH    738
// #define IDM_VIEW_SHOW_DELETED    739
// #define IDM_VIEW_SHOW_STREAMS    740

#define IDM_VIEW_ARCHIVE_TOOLBAR           750
#define IDM_VIEW_STANDARD_TOOLBAR          751
#define IDM_VIEW_TOOLBARS_LARGE_BUTTONS     752
#define IDM_VIEW_TOOLBARS_SHOW_BUTTONS_TEXT 753

#define IDM_VIEW_TIME            761

#define IDS_BOOKMARK             801
```

```
#define IDM_OPTIONS             900
#define IDM_BENCHMARK           901
#define IDM_BENCHMARK2          902

#define IDM_HELP_CONTENTS       960
#define IDM_ABOUT               961

#define IDS_OPTIONS                 2100

#define IDS_N_SELECTED_ITEMS            3002

#define IDS_FILE_EXIST
                3008
#define IDS_WANT_UPDATE_MODIFIED_FILE   3009
#define IDS_CANNOT_UPDATE_FILE          3010
#define IDS_CANNOT_START_EDITOR         3011
#define IDS_VIRUS                   3012
#define IDS_MESSAGE_UNSUPPORTED_OPERATION_FOR_LONG_PATH_FOLDER  3013
#define IDS_SELECT_ONE_FILE             3014
#define IDS_SELECT_FILES                3015
#define IDS_TOO_MANY_ITEMS              3016

#define IDS_COPY                    6000
#define IDS_MOVE                    6001
#define IDS_COPY_TO                 6002
#define IDS_MOVE_TO                 6003
#define IDS_COPYING                 6004
#define IDS_MOVING                  6005
#define IDS_RENAMING                6006

#define IDS_OPERATION_IS_NOT_SUPPORTED  6008
#define IDS_ERROR_RENAMING              6009
#define IDS_CONFIRM_FILE_COPY           6010
#define IDS_WANT_TO_COPY_FILES          6011

#define IDS_CONFIRM_FILE_DELETE         6100
#define IDS_CONFIRM_FOLDER_DELETE
   6101
#define IDS_CONFIRM_ITEMS_DELETE        6102
#define IDS_WANT_TO_DELETE_FILE         6103
#define IDS_WANT_TO_DELETE_FOLDER       6104
#define IDS_WANT_TO_DELETE_ITEMS        6105
#define IDS_DELETING                    6106
#define IDS_ERROR_DELETING              6107
#define IDS_ERROR_LONG_PATH_TO_RECYCLE  6108

#define IDS_CREATE_FOLDER               6300
#define IDS_CREATE_FILE                 6301
```

```
#define IDS_CREATE_FOLDER_NAME          6302
#define IDS_CREATE_FILE_NAME            6303
#define IDS_CREATE_FOLDER_DEFAULT_NAME  6304
#define IDS_CREATE_FILE_DEFAULT_NAME    6305
#define IDS_CREATE_FOLDER_ERROR         6306
#define IDS_CREATE_FILE_ERROR           6307

#define IDS_COMMENT                     6400
#define IDS_COMMENT2                    6401
#define IDS_SELECT                      6402
#define IDS_DESELECT                    6403
#define IDS_SELECT_MASK                 6404

#define IDS_PROPERTIES                  6600
#define IDS_FOLDERS_HISTORY             6601

#define
 IDS_COMPUTER                   7100
#define IDS_NETWORK                     7101
#define IDS_DOCUMENTS                   7102
#define IDS_SYSTEM                      7103

#define IDS_ADD                         7200
#define IDS_EXTRACT                     7201
#define IDS_TEST                        7202
#define IDS_BUTTON_COPY                 7203
#define IDS_BUTTON_MOVE                 7204
#define IDS_BUTTON_DELETE               7205
#define IDS_BUTTON_INFO                 7206

#define IDS_SPLITTING                   7303
#define IDS_SPLIT_CONFIRM_TITLE         7304
#define IDS_SPLIT_CONFIRM_MESSAGE       7305
#define IDS_SPLIT_VOL_MUST_BE_SMALLER   7306

#define IDS_COMBINE                     7400
#define IDS_COMBINE_TO                  7401
#define IDS_COMBINING                   7402
#define IDS_COMBINE_SELECT_ONE_FILE     7403
#define IDS_COMBINE_CANT_DETECT_SPLIT_FILE 7404
#define IDS_COMBINE_CANT_FIND_MORE_THAN_ONE_PART 7405
// Windows/Control/Window2.h

#ifndef __WINDOWS_CONTROL_WINDOW2_H
#define __WINDOWS_CONTROL_WINDOW2_H

#include "../Window.h"
```

```
namespace NWindows {
namespace NControl {

class CWindow2: public CWindow
{
 LRESULT DefProc(UINT message, WPARAM wParam, LPARAM lParam);
public:
 CWindow2(HWND newWindow = NULL): CWindow(newWindow){};
 virtual ~CWindow2() {};

 bool CreateEx(DWORD exStyle, LPCTSTR className, LPCTSTR windowName,
    DWORD style, int x, int y, int width, int height,
    HWND parentWindow, HMENU idOrHMenu, HINSTANCE instance);

 #ifndef _UNICODE
 bool CreateEx(DWORD exStyle, LPCWSTR className, LPCWSTR windowName,
    DWORD style, int x, int y, int width, int height,
    HWND parentWindow, HMENU idOrHMenu, HINSTANCE instance);
 #endif

 virtual LRESULT OnMessage(UINT message, WPARAM wParam, LPARAM lParam);
 virtual bool OnCreate(CREATESTRUCT * /* createStruct */) { return true; }
 // virtual LRESULT OnCommand(WPARAM wParam, LPARAM lParam);
 virtual bool OnCommand(WPARAM
 wParam, LPARAM lParam, LRESULT &result);
 virtual bool OnCommand(int code, int itemID, LPARAM lParam, LRESULT &result);
 virtual bool OnSize(WPARAM /* wParam */, int /* xSize */, int /* ySize */) { return false; }
 virtual bool OnNotify(UINT /* controlID */, LPNMHDR /* lParam */, LRESULT & /* result */) { return false; }
 virtual void OnDestroy() { PostQuitMessage(0); }
 virtual void OnClose() { Destroy(); }
 /*
 virtual LRESULT  OnHelp(LPHELPINFO helpInfo) { OnHelp(); }
 virtual LRESULT  OnHelp() {};
 virtual bool OnButtonClicked(int buttonID, HWND buttonHWND);
 virtual void OnOK() {};
 virtual void OnCancel() {};
 */

 LONG_PTR SetMsgResult(LONG_PTR newLongPtr) { return SetLongPtr(DWLP_MSGRESULT, newLongPtr); }
 LONG_PTR GetMsgResult() const { return GetLongPtr(DWLP_MSGRESULT); }
};

}}

#endif
// ConsoleClose.h

#ifndef __CONSOLE_CLOSE_H
```

```
#define __CONSOLE_CLOSE_H

namespace NConsoleClose {

extern unsigned g_BreakCounter;

inline bool TestBreakSignal()
{
 #ifdef UNDER_CE
 return false;
 #else
 return (g_BreakCounter != 0);
 #endif
}

class CCtrlHandlerSetter
{
public:
 CCtrlHandlerSetter();
 virtual ~CCtrlHandlerSetter();
};

class CCtrlBreakException
{};

// void CheckCtrlBreak();

}

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: More Than One copyright Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-006-ref.xht" />
  <meta name="assert" content="The copyright element occurs more than once." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family:
```

```
 "WOFF Test";
   src: url("support/metadatadisplay-schema-copyright-006.woff2") format("woff2");
  }
  body {
   font-size: 20px;
  }
  pre {
   font-size: 12px;
  }
  .test {
   font-family: "WOFF Test", "WOFF Test CFF Fallback";
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
</head>
<body>
 <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
 <div class="test">P</div>
</body>
</html>
// ExtractingFilePath.h

#ifndef __EXTRACTING_FILE_PATH_H
#define __EXTRACTING_FILE_PATH_H

#include "../../../Common/MyString.h"

#ifdef _WIN32
void Correct_AltStream_Name(UString &s);
#endif

// replaces unsuported characters, and replaces "." , ".." and "" to "[]"
UString Get_Correct_FsFile_Name(const UString &name);

/*
 Correct_FsPath() corrects path parts to prepare it for File System operations.
 It also corrects empty path parts like "\\\\":
  - frontal empty path parts : it removes them or changes them to "_"
  - another empty path parts : it removes them
 if (absIsAllowed && path is absolute)  : it removes empty path parts after start absolute path prefix marker
 else
 {
  if (!keepAndReplaceEmptyPrefixes) : it removes empty path parts
  if ( keepAndReplaceEmptyPrefixes) : it changes each empty frontal path part to "_"
 }
```

```
*/
void Correct_FsPath(bool absIsAllowed, bool keepAndReplaceEmptyPrefixes, UStringVector &parts, bool isDir);

UString MakePathFromParts(const
 UStringVector &parts);

#endif
```

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```
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#ifndef __MY_WINDOWS_NEW_H
#define __MY_WINDOWS_NEW_H

#ifdef _MSC_VER

#include <ShObjIdl.h>

#ifndef __ITaskbarList3_INTERFACE_DEFINED__
#define __ITaskbarList3_INTERFACE_DEFINED__

typedef enum THUMBBUTTONFLAGS
{
 THBF_ENABLED = 0,
 THBF_DISABLED = 0x1,
 THBF_DISMISSONCLICK = 0x2,
 THBF_NOBACKGROUND = 0x4,
 THBF_HIDDEN = 0x8,
 THBF_NONINTERACTIVE = 0x10
} THUMBBUTTONFLAGS;

typedef enum THUMBBUTTONMASK
{
 THB_BITMAP = 0x1,
 THB_ICON = 0x2,
```

```
 THB_TOOLTIP = 0x4,
 THB_FLAGS = 0x8
} THUMBBUTTONMASK;

// #include <pshpack8.h>

typedef struct THUMBBUTTON
{
 THUMBBUTTONMASK dwMask;
 UINT iId;
 UINT iBitmap;
 HICON hIcon;
 WCHAR szTip[260];
 THUMBBUTTONFLAGS dwFlags;
} THUMBBUTTON;

typedef struct THUMBBUTTON *LPTHUMBBUTTON;

typedef enum TBPFLAG
{
 TBPF_NOPROGRESS = 0,
 TBPF_INDETERMINATE = 0x1,
 TBPF_NORMAL = 0x2,
 TBPF_ERROR = 0x4,
 TBPF_PAUSED = 0x8
} TBPFLAG;

DEFINE_GUID(IID_ITaskbarList3, 0xEA1AFB91, 0x9E28, 0x4B86, 0x90, 0xE9, 0x9E, 0x9F, 0x8A,
 0x5E, 0xEF, 0xAF);

struct ITaskbarList3: public ITaskbarList2
{
 STDMETHOD(SetProgressValue)(HWND hwnd, ULONGLONG ullCompleted, ULONGLONG ullTotal) = 0;
 STDMETHOD(SetProgressState)(HWND hwnd, TBPFLAG tbpFlags) = 0;
 STDMETHOD(RegisterTab)(HWND hwndTab, HWND hwndMDI) = 0;
 STDMETHOD(UnregisterTab)(HWND hwndTab) = 0;
 STDMETHOD(SetTabOrder)(HWND hwndTab, HWND hwndInsertBefore) = 0;
 STDMETHOD(SetTabActive)(HWND hwndTab, HWND hwndMDI, DWORD dwReserved) = 0;
 STDMETHOD(ThumbBarAddButtons)(HWND hwnd, UINT cButtons, LPTHUMBBUTTON pButton) = 0;
 STDMETHOD(ThumbBarUpdateButtons)(HWND hwnd, UINT cButtons, LPTHUMBBUTTON pButton) = 0;
 STDMETHOD(ThumbBarSetImageList)(HWND hwnd, HIMAGELIST himl) = 0;
 STDMETHOD(SetOverlayIcon)(HWND hwnd, HICON hIcon, LPCWSTR pszDescription) = 0;
 STDMETHOD(SetThumbnailTooltip)(HWND hwnd, LPCWSTR pszTip) = 0;
 STDMETHOD(SetThumbnailClip)(HWND hwnd, RECT *prcClip) = 0;
};

#endif
```

#endif

#endif
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```
#define IDS_PROGRESS_COMPRESSING  3301
#define IDS_ARCHIVES_COLON        3907
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 is `hyph-sh-{latn,cyrl}.tex' version 2.02 as of Jun 22, 2008.
%
% Copyright (C) 1990,2008 Dejan Muhamedagi\'c
%  [hyphen patterns for Serbocroatian language]
%
%%% ==========================================================================
%%%  @TeX-hyphen-file{

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%%%     author         = "Dejan Muhamedagi\'c",
%%%     version        = "2.02",
%%%     date           = "22 June 2008",
%%%     filename       = "hyph-sh-{latn,cyrl}.tex",
%%%     email          = "dejan@hello-penguin.com",
%%%     codetable      = "UTF-8",
%%%     keywords       = "TeX, hyphen, serbocroatian, {latinic,cyrillic}",
%%%     supported      = "yes",
%%%     abstract       = "Serbocroatian hyphenation patterns",
%%%     docstring      = "This file contains the hyphenation patterns
%%%                     for the Serbocroatian language and the
%%%                     {latinic,cyrillic} alphabet."
%%%  }
%%% ====================================================================
%
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% version 1 of the License, or any later version.
%
% NB:
% It is allowed to leave one character at the end of the row.
% If you find that awkward these patterns will work well with
% \lefthyphenmin=2.
% \lefthyphenmin=1 \righthyphenmin=2
%
% Osnovni skup paterna dobijen je na osnovu fonolo\v skih osobina
% srpskohrvatskog jezika.  Pravila i preporuke sam preuzeo iz:
%
% M. Pe\v sikan, J. Jerkovi\'c, M. Pi\v zurica:
% Pravopis srpskoga jezika
% Matica srpska, Novi Sad, 1995.
%
% U drugom delu se nalaze izuzeci od fonolo\v skih pravila bazirani
% na boljem psiholo\v skom prelomu re\v ci. Izradjen je kori\v s\'cenjem
% slede\'cih re\v cnika:
%
% Re\v cnik srpskohrvatskoga knji\v zevnog jezika
%
 Matica srpska, Matica hrvatska, Novi Sad, Zagreb, 1967-1976.
%
% Milan Vujaklija: Leksikon stranih re\v ci i izraza
% Prosveta, Beograd, 1992.
%
```

% ----------
%
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<?xml version="1.0" encoding="utf-8"?>
<Project DefaultTargets="Build" ToolsVersion="15.0"
xmlns="http://schemas.microsoft.com/developer/msbuild/2003">
 <ItemGroup Label="ProjectConfigurations">
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   <Configuration>Debug</Configuration>
   <Platform>ARM64</Platform>
  </ProjectConfiguration>
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   <Platform>Win32</Platform>
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   <Platform>ARM64</Platform>
  </ProjectConfiguration>
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   <Configuration>ReleaseD</Configuration>
   <Platform>Win32</Platform>
  </ProjectConfiguration>
 </ItemGroup>
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  <SccProjectName />
  <SccLocalPath />
  <ProjectGuid>{B348342A-1787-4311-B120-EDAE3018868F}</ProjectGuid>
  <WindowsTargetPlatformVersion>10.0</WindowsTargetPlatformVersion>
 </PropertyGroup>
 <Import Project="$(VCTargetsPath)\Microsoft.Cpp.Default.props" />
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'" Label="Configuration">
  <ConfigurationType>Application</ConfigurationType>
  <PlatformToolset>v142</PlatformToolset>
  <UseOfMfc>false</UseOfMfc>
```

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  <CharacterSet>Unicode</CharacterSet>
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  <CharacterSet>Unicode</CharacterSet>
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  <CharacterSet>Unicode</CharacterSet>
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  <ConfigurationType>Application</ConfigurationType>
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  <UseOfMfc>false</UseOfMfc>
  <CharacterSet>Unicode</CharacterSet>
 </PropertyGroup>
 <Import Project="$(VCTargetsPath)\Microsoft.Cpp.props" />
 <ImportGroup Label="ExtensionSettings">
 </ImportGroup>
 <ImportGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'" Label="PropertySheets">
  <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform" />
  <Import Project="$(VCTargetsPath)Microsoft.Cpp.UpgradeFromVC60.props" />
 </ImportGroup>
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  <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')"
 Label="LocalAppDataPlatform" />
  <Import Project="$(VCTargetsPath)Microsoft.Cpp.UpgradeFromVC60.props" />
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Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform" />
  <Import Project="$(VCTargetsPath)Microsoft.Cpp.UpgradeFromVC60.props" />
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 </ImportGroup>
 <PropertyGroup Label="UserMacros" />
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='ReleaseD|Win32'">
   <OutDir>$(SolutionDir)$(Platform)\$(Configuration)\</OutDir>
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  <LinkIncremental>false</LinkIncremental>
  <TargetName>7zSD.$(Platform)</TargetName>
  <GenerateManifest>false</GenerateManifest>
  <TargetExt>.sfx</TargetExt>
</PropertyGroup>
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  <TargetExt>.sfx</TargetExt>
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  <GenerateManifest>false</GenerateManifest>
  <TargetExt>.sfx</TargetExt>
</PropertyGroup>
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  <ClCompile>
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    <InlineFunctionExpansion>Default</InlineFunctionExpansion>
    <StringPooling>true</StringPooling>
    <Optimization>MinSpace</Optimization>
    <SuppressStartupBanner>true</SuppressStartupBanner>
    <WarningLevel>Level4</WarningLevel>
    <TreatWarningAsError>true</TreatWarningAsError>
<PreprocessorDefinitions>NDEBUG;WIN32;_WINDOWS;EXTRACT_ONLY;NO_REGISTRY;_SFX;_NO_CRY
PTO;UNICODE;_UNICODE;%(PreprocessorDefinitions)</PreprocessorDefinitions>
     <AssemblerListingLocation>$(IntDir)</AssemblerListingLocation>
    <PrecompiledHeaderOutputFile>$(IntDir)</PrecompiledHeaderOutputFile>
    <PrecompiledHeader>Use</PrecompiledHeader>
    <PrecompiledHeaderFile>StdAfx.h</PrecompiledHeaderFile>
    <ObjectFileName>$(IntDir)</ObjectFileName>
    <ProgramDataBaseFileName>$(IntDir)</ProgramDataBaseFileName>
    <CallingConvention>StdCall</CallingConvention>
    <DebugInformationFormat>None</DebugInformationFormat>
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    <FavorSizeOrSpeed>Size</FavorSizeOrSpeed>
    <WholeProgramOptimization>true</WholeProgramOptimization>
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  <Midl>
    <SuppressStartupBanner>true</SuppressStartupBanner>
    <PreprocessorDefinitions>NDEBUG;%(PreprocessorDefinitions)</PreprocessorDefinitions>
    <TypeLibraryName>.\ReleaseD\SFXSetup.tlb</TypeLibraryName>
    <MkTypLibCompatible>true</MkTypLibCompatible>
     <TargetEnvironment>Win32</TargetEnvironment>
  </Midl>
  <ResourceCompile>
    <Culture>0x0409</Culture>
    <PreprocessorDefinitions>NDEBUG;%(PreprocessorDefinitions)</PreprocessorDefinitions>
  </ResourceCompile>
  <Bscmake>
    <SuppressStartupBanner>true</SuppressStartupBanner>
    <OutputFile>
    </OutputFile>
  </Bscmake>
  <Link>
    <SuppressStartupBanner>true</SuppressStartupBanner>
    <SubSystem>Windows</SubSystem>
    <DelayLoadDLLs>user32.dll;shell32.dll;oleaut32.dll;%(DelayLoadDLLs)</DelayLoadDLLs>
<AdditionalDependencies>odbc32.lib;odbccp32.lib;delayimp.lib;%(AdditionalDependencies)</AdditionalDependencies>
    <ProfileGuidedDatabase />
    <GenerateDebugInformation>false</GenerateDebugInformation>
    <LinkTimeCodeGeneration>UseLinkTimeCodeGeneration</LinkTimeCodeGeneration>
  </Link>
 </ItemDefinitionGroup>
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   <ClCompile>
    <RuntimeLibrary>MultiThreaded</RuntimeLibrary>
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    <WarningLevel>Level4</WarningLevel>
    <TreatWarningAsError>true</TreatWarningAsError>
<PreprocessorDefinitions>NDEBUG;WIN32;_WINDOWS;EXTRACT_ONLY;NO_REGISTRY;_SFX;_NO_CRYPTO;UNICODE;_UNICODE;%(PreprocessorDefinitions)</PreprocessorDefinitions>
    <AssemblerListingLocation>$(IntDir)</AssemblerListingLocation>
    <PrecompiledHeaderOutputFile>$(IntDir)</PrecompiledHeaderOutputFile>
    <PrecompiledHeaderFile>StdAfx.h</PrecompiledHeaderFile>
    <ObjectFileName>$(IntDir)</ObjectFileName>
    <ProgramDataBaseFileName>$(IntDir)</ProgramDataBaseFileName>
    <CallingConvention>StdCall</CallingConvention>
    <DebugInformationFormat>None</DebugInformationFormat>
```

```
    <FavorSizeOrSpeed>Size</FavorSizeOrSpeed>
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s)</AdditionalDependencies>
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    <LinkTimeCodeGeneration>UseLinkTimeCodeGeneration</LinkTimeCodeGeneration>
    <ProfileGuidedDatabase />
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  </Link>
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    <MinimalRebuild>true</MinimalRebuild>
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    <ObjectFileName>$(IntDir)</ObjectFileName>
```

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    <ProgramDataBaseFileName>$(IntDir)</ProgramDataBaseFileName>
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    <MkTypLibCompatible>true</MkTypLibCompatible>
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    <PrecompiledHeader>Use</PrecompiledHeader>
    <PrecompiledHeaderFile>StdAfx.h</PrecompiledHeaderFile>
    <ObjectFileName>$(IntDir)</ObjectFileName>
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```
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    <MkTypLibCompatible>true</MkTypLibCompatible>
  </Midl>
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  <ClCompile Include="..\src\C\Lzma2Dec.c">
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```

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    </PrecompiledHeader>
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  <ClCompile Include="..\src\C\MtDec.c">
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    <PrecompiledHeader Condition="'$(Configuration)|$(Platform)'=='ReleaseD|ARM64'">
    </PrecompiledHeader>
    <PrecompiledHeader Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'">
    </PrecompiledHeader>
    <PrecompiledHeader Condition="'$(Configuration)|$(Platform)'=='Debug|ARM64'">
    </PrecompiledHeader>
  </ClCompile>
  <ClCompile Include="..\src\C\Threads.c">
    <PrecompiledHeader Condition="'$(Configuration)|$(Platform)'=='ReleaseD|Win32'">
    </PrecompiledHeader>
    <PrecompiledHeader Condition="'$(Configuration)|$(Platform)'=='ReleaseD|ARM64'">
    </PrecompiledHeader>
    <PrecompiledHeader Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'">
    </PrecompiledHeader>
    <PrecompiledHeader Condition="'$(Configuration)|$(Platform)'=='Debug|ARM64'">
    </PrecompiledHeader>
  </ClCompile>
  <ClCompile Include="..\src\CPP\Common\CommandLineParser.cpp" />
  <ClCompile
Include="..\src\CPP\Common\CRC.cpp" />
  <ClCompile Include="..\src\CPP\Common\IntToString.cpp" />
  <ClCompile Include="..\src\CPP\Common\MyString.cpp" />
  <ClCompile Include="..\src\CPP\Common\MyVector.cpp" />
```

```
  <ClCompile Include="..\src\CPP\Common\NewHandler.cpp" />
  <ClCompile Include="..\src\CPP\Common\StringConvert.cpp" />
  <ClCompile Include="..\src\CPP\Common\TextConfig.cpp" />
  <ClCompile Include="..\src\CPP\Common\UTFConvert.cpp" />
  <ClCompile Include="..\src\CPP\Common\Wildcard.cpp" />
  <ClCompile Include="..\src\CPP\Windows\Control\Dialog.cpp" />
  <ClCompile Include="..\src\CPP\Windows\DLL.cpp" />
  <ClCompile Include="..\src\CPP\Windows\ErrorMsg.cpp" />
  <ClCompile Include="..\src\CPP\Windows\FileDir.cpp" />
  <ClCompile Include="..\src\CPP\Windows\FileFind.cpp" />
  <ClCompile Include="..\src\CPP\Windows\FileIO.cpp" />
  <ClCompile Include="..\src\CPP\Windows\FileName.cpp" />
  <ClCompile Include="..\src\CPP\Windows\PropVariant.cpp"
/>
  <ClCompile Include="..\src\CPP\Windows\ResourceString.cpp" />
  <ClCompile Include="..\src\CPP\Windows\Synchronization.cpp" />
  <ClCompile Include="..\src\CPP\Windows\System.cpp" />
  <ClCompile Include="..\src\CPP\Windows\Window.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Archive\7z\7zDecode.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Archive\7z\7zExtract.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Archive\7z\7zHandler.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Archive\7z\7zIn.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Archive\7z\7zRegister.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Archive\Common\CoderMixer2.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Archive\Common\ItemNameUtils.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Archive\Common\OutStreamWithCRC.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Common\CreateCoder.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Common\CWrappers.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Common\FileStreams.cpp"
/>
  <ClCompile Include="..\src\CPP\7zip\Common\FilterCoder.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Common\InBuffer.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Common\LimitedStreams.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Common\OutBuffer.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Common\ProgressUtils.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Common\PropId.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Common\StreamBinder.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Common\StreamObjects.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Common\StreamUtils.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Common\VirtThread.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Compress\Bcj2Coder.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Compress\Bcj2Register.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Compress\BcjCoder.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Compress\BcjRegister.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Compress\BranchMisc.cpp"
/>
  <ClCompile Include="..\src\CPP\7zip\Compress\BranchRegister.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Compress\CopyCoder.cpp" />
```

```
  <ClCompile Include="..\src\CPP\7zip\Compress\CopyRegister.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Compress\DeltaFilter.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Compress\Lzma2Decoder.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Compress\Lzma2Register.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Compress\LzmaDecoder.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Compress\LzmaRegister.cpp" />
  <ClCompile Include="..\src\CPP\7zip\UI\Common\ArchiveOpenCallback.cpp" />
  <ClCompile Include="..\src\CPP\7zip\UI\Common\DefaultName.cpp" />
  <ClCompile Include="..\src\CPP\7zip\UI\Common\LoadCodecs.cpp" />
  <ClCompile Include="..\src\CPP\7zip\UI\Common\OpenArchive.cpp" />
  <ClCompile Include="..\src\CPP\7zip\UI\Explorer\MyMessages.cpp" />
  <ClCompile Include="..\src\CPP\7zip\UI\FileManager\FormatUtils.cpp"
/>
  <ClCompile Include="..\src\CPP\7zip\UI\FileManager\ProgressDialog.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Bundles\SFXSetup\ExtractCallbackSfx.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Bundles\SFXSetup\ExtractEngine.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Bundles\SFXSetup\SfxSetup.cpp" />
  <ClCompile Include="..\src\CPP\7zip\Bundles\SFXSetup\StdAfx.cpp">
    <PrecompiledHeader
Condition="'$(Configuration)|$(Platform)'=='ReleaseD|Win32'">Create</PrecompiledHeader>
    <PrecompiledHeader
Condition="'$(Configuration)|$(Platform)'=='ReleaseD|ARM64'">Create</PrecompiledHeader>
    <PrecompiledHeaderFile
Condition="'$(Configuration)|$(Platform)'=='ReleaseD|Win32'">StdAfx.h</PrecompiledHeaderFile>
    <PrecompiledHeaderFile
Condition="'$(Configuration)|$(Platform)'=='ReleaseD|ARM64'">StdAfx.h</PrecompiledHeaderFile>
    <PrecompiledHeader
Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'">Create</PrecompiledHeader>

  <PrecompiledHeader Condition="'$(Configuration)|$(Platform)'=='Debug|ARM64'">Create</PrecompiledHeader>
    <PrecompiledHeaderFile
Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'">StdAfx.h</PrecompiledHeaderFile>
    <PrecompiledHeaderFile
Condition="'$(Configuration)|$(Platform)'=='Debug|ARM64'">StdAfx.h</PrecompiledHeaderFile>
  </ClCompile>
 </ItemGroup>
 <ItemGroup>
  <ClInclude Include="..\src\C\7zCrc.h" />
  <ClInclude Include="..\src\C\Alloc.h" />
  <ClInclude Include="..\src\C\Bcj2.h" />
  <ClInclude Include="..\src\C\Bra.h" />
  <ClInclude Include="..\src\C\CpuArch.h" />
  <ClInclude Include="..\src\C\Delta.h" />
  <ClInclude Include="..\src\C\DllSecur.h" />
  <ClInclude Include="..\src\C\Lzma2Dec.h" />
  <ClInclude Include="..\src\C\Lzma2DecMt.h" />
  <ClInclude Include="..\src\C\LzmaDec.h" />
  <ClInclude Include="..\src\C\MtDec.h" />
```

```
  <ClInclude Include="..\src\C\Threads.h" />
  <ClInclude Include="..\src\CPP\Common\CommandLineParser.h"
/>
  <ClInclude Include="..\src\CPP\Common\IntToString.h" />
  <ClInclude Include="..\src\CPP\Common\MyString.h" />
  <ClInclude Include="..\src\CPP\Common\MyVector.h" />
  <ClInclude Include="..\src\CPP\Common\NewHandler.h" />
  <ClInclude Include="..\src\CPP\Common\StringConvert.h" />
  <ClInclude Include="..\src\CPP\Common\TextConfig.h" />
  <ClInclude Include="..\src\CPP\Common\UTFConvert.h" />
  <ClInclude Include="..\src\CPP\Common\Wildcard.h" />
  <ClInclude Include="..\src\CPP\Windows\Control\Dialog.h" />
  <ClInclude Include="..\src\CPP\Windows\DLL.h" />
  <ClInclude Include="..\src\CPP\Windows\ErrorMsg.h" />
  <ClInclude Include="..\src\CPP\Windows\FileDir.h" />
  <ClInclude Include="..\src\CPP\Windows\FileFind.h" />
  <ClInclude Include="..\src\CPP\Windows\FileIO.h" />
  <ClInclude Include="..\src\CPP\Windows\FileName.h" />
  <ClInclude Include="..\src\CPP\Windows\PropVariant.h" />
  <ClInclude Include="..\src\CPP\Windows\ResourceString.h"
/>
  <ClInclude Include="..\src\CPP\Windows\Synchronization.h" />
  <ClInclude Include="..\src\CPP\Windows\System.h" />
  <ClInclude Include="..\src\CPP\Windows\Window.h" />
  <ClInclude Include="..\src\CPP\7zip\Archive\7z\7zDecode.h" />
  <ClInclude Include="..\src\CPP\7zip\Archive\7z\7zHandler.h" />
  <ClInclude Include="..\src\CPP\7zip\Archive\7z\7zHeader.h" />
  <ClInclude Include="..\src\CPP\7zip\Archive\7z\7zIn.h" />
  <ClInclude Include="..\src\CPP\7zip\Archive\7z\7zItem.h" />
  <ClInclude Include="..\src\CPP\7zip\Archive\Common\CoderMixer2.h" />
  <ClInclude Include="..\src\CPP\7zip\Archive\Common\ItemNameUtils.h" />
  <ClInclude Include="..\src\CPP\7zip\Archive\Common\OutStreamWithCRC.h" />
  <ClInclude Include="..\src\CPP\7zip\Common\CreateCoder.h" />
  <ClInclude Include="..\src\CPP\7zip\Common\CWrappers.h" />
  <ClInclude Include="..\src\CPP\7zip\Common\FileStreams.h" />
  <ClInclude Include="..\src\CPP\7zip\Common\FilterCoder.h" />

<ClInclude Include="..\src\CPP\7zip\Common\InBuffer.h" />
  <ClInclude Include="..\src\CPP\7zip\Common\LimitedStreams.h" />
  <ClInclude Include="..\src\CPP\7zip\Common\OutBuffer.h" />
  <ClInclude Include="..\src\CPP\7zip\Common\ProgressUtils.h" />
  <ClInclude Include="..\src\CPP\7zip\Common\StreamBinder.h" />
  <ClInclude Include="..\src\CPP\7zip\Common\StreamObjects.h" />
  <ClInclude Include="..\src\CPP\7zip\Common\StreamUtils.h" />
  <ClInclude Include="..\src\CPP\7zip\Common\VirtThread.h" />
  <ClInclude Include="..\src\CPP\7zip\Compress\BranchMisc.h" />
  <ClInclude Include="..\src\CPP\7zip\Compress\Lzma2Decoder.h" />
  <ClInclude Include="..\src\CPP\7zip\UI\Common\ArchiveOpenCallback.h" />
```

```
  <ClInclude Include="..\src\CPP\7zip\UI\Common\DefaultName.h" />
  <ClInclude Include="..\src\CPP\7zip\UI\Common\ExtractMode.h" />
  <ClInclude Include="..\src\CPP\7zip\UI\Common\LoadCodecs.h" />
  <ClInclude Include="..\src\CPP\7zip\UI\Common\OpenArchive.h" />
   <ClInclude Include="..\src\CPP\7zip\UI\Explorer\MyMessages.h" />
  <ClInclude Include="..\src\CPP\7zip\UI\FileManager\FormatUtils.h" />
  <ClInclude Include="..\src\CPP\7zip\UI\FileManager\LangUtils.h" />
  <ClInclude Include="..\src\CPP\7zip\UI\FileManager\ProgressDialog.h" />
  <ClInclude Include="..\src\CPP\7zip\Bundles\SFXSetup\ExtractCallbackSfx.h" />
  <ClInclude Include="..\src\CPP\7zip\Bundles\SFXSetup\ExtractEngine.h" />
  <ClInclude Include="..\src\CPP\7zip\Bundles\SFXSetup\StdAfx.h" />
 </ItemGroup>
 <Import Project="$(VCTargetsPath)\Microsoft.Cpp.targets" />
 <ImportGroup Label="ExtensionTargets">
 </ImportGroup>
</Project>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With class Attribute in div Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element that contains a div element with
&quot;class1 class2 class3&quot; as the value for the class attribute." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
```

  The Extended Metadata Block is valid and may be displayed to the user upon request.
  P
  The XML contained in the Extended Metadata Block is below.
  <pre>
<?xml version="1.0" encoding="UTF-8"?>
<metadata version="1.0">
 <copyright>
  <text>
   <div class="class1 class2 class3">Paragraph 1</div>
  </text>
 </copyright>
</metadata>
  </pre>
 </body>
</html>

License information for hyph_ia.dic:

This file is based on the TeX hyphenation patterns distributed under the
LaTeX Project Public License (LPPL) as part of the hyph-utf8 package.

This Source Code Form is subject to the terms of the Mozilla Public
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file, You can obtain one at http://mozilla.org/MPL/2.0/.

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

At the time this file was first modified, a complete, unmodified copy of
the LPPL Work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

Portions of this file were originally made available under the following license
(copied verbatim from hyph-ia.lic.txt in the original work):

Hyphenation patterns for Interlingua

(more info about the licence to be added later)

% This file is part of hyph-utf8 package
 and resulted from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% Source: iahyphen.tex (2005-06-28)
% Author: Peter Kleiweg <p.c.j.kleiweg at rug.nl>
%
% The above mentioned file should become obsolete,
% and the author of the original file should preferaby modify this file instead.

```
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%             and helped with testing, suggestions and bug reports
% - Norbert Preining, who tested
 & integrated patterns into TeX Live
%
% However, the "copyright/copyleft" owner of patterns remains the original author.
%
% The copyright statement of this file is thus:
%
%    Do with this file whatever needs to be done in future for the sake of
%    "a better world" as long as you respect the copyright of original file.
%    If you're the original author of patterns or taking over a new revolution,
%    plese remove all of the TUG comments & credits that we added here -
%    you are the Queen / the King, we are only the servants.
%
% If you want to change this file, rather than uploading directly to CTAN,
% we would be grateful if you could send it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
% Before a new "pattern-revolution" starts,
% please try to follow some guidelines if possible:
%
% - \lccode is *forbidden*, and I really mean it
% - all the patterns should be in UTF-8
%
 - the only "allowed" TeX commands in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
%
```

% For more unformation see
%
%  http://tug.org/tex-hyphen
%
%----------
%
% File: iahyphen.tex
% TeX hyphenation patterns for Interlingua.
% Version 0.2b. Released 3 July 2001.
% version 0.2c  Released 28 June 2005 (added LPPL header)
% Created by Peter Kleiweg, p.c.j.kleiweg at rug.nl
% About Interlingua: http://www.interlingua.com/
%
% \iffalse meta-comment
%
% Copyright
 1989-2005 Peter Kleiweg.  All rights reserved.
%
% This file is distributed as part of the Babel system.
% ----------
%
% It may be distributed and/or modified under the
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% of this license or (at your option) any later version.
% The latest version of this license is in
%  http://www.latex-project.org/lppl.txt
% and version 1.3 or later is part of all distributions of LaTeX
% version 2003/12/01 or later.
%
% This work has the LPPL maintenance status "maintained".
%
% The Current Maintainer of this work is Peter Kleiweg.
%
% The list of all files belonging to the Babel system is
% given in the file `manifest.bbl. See also `legal.bbl' for additional
% information.
%
% \fi
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CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION
OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR
IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER
DEALINGS
 IN THE SOFTWARE.

```
# MY_STATIC_LINK=1
PROG = LZMAc.exe

CFLAGS = $(CFLAGS) \

LIB_OBJS = \
 $O\LzmaUtil.obj \

C_OBJS = \
 $O\Alloc.obj \
 $O\LzFind.obj \
 $O\LzFindMt.obj \
 $O\LzmaDec.obj \
 $O\LzmaEnc.obj \
 $O\7zFile.obj \
 $O\7zStream.obj \
 $O\Threads.obj \

OBJS = \
 $(LIB_OBJS) \
 $(C_OBJS) \

!include "../../../CPP/Build.mak"

$(LIB_OBJS): $(*B).c
 $(COMPL_O2)
$(C_OBJS): ../../$(*B).c
```

```
 $(COMPL_O2)
/* MtDec.h -- Multi-thread Decoder
2018-03-02 : Igor Pavlov : Public domain */

#ifndef __MT_DEC_H
#define __MT_DEC_H

#include "7zTypes.h"

#ifndef _7ZIP_ST
#include "Threads.h"
#endif

EXTERN_C_BEGIN

#ifndef _7ZIP_ST

#ifndef _7ZIP_ST
 #define MTDEC__THREADS_MAX 32
#else
 #define MTDEC__THREADS_MAX 1
#endif


typedef struct
{
 ICompressProgress *progress;
 SRes res;
 UInt64 totalInSize;
 UInt64 totalOutSize;
 CCriticalSection cs;
} CMtProgress;

void MtProgress_Init(CMtProgress *p, ICompressProgress *progress);
SRes MtProgress_Progress_ST(CMtProgress *p);
SRes MtProgress_ProgressAdd(CMtProgress *p, UInt64 inSize, UInt64 outSize);
SRes MtProgress_GetError(CMtProgress *p);
void MtProgress_SetError(CMtProgress *p, SRes res);

struct _CMtDec;

typedef struct
{
 struct _CMtDec *mtDec;
 unsigned index;
 void *inBuf;

 size_t inDataSize_Start; // size of input data in start block
```

```
 UInt64 inDataSize;       // total size of input data in all blocks

 CThread thread;
 CAutoResetEvent
 canRead;
 CAutoResetEvent canWrite;
 void  *allocaPtr;
} CMtDecThread;

void MtDecThread_FreeInBufs(CMtDecThread *t);


typedef enum
{
 MTDEC_PARSE_CONTINUE, // continue this block with more input data
 MTDEC_PARSE_OVERFLOW, // MT buffers overflow, need switch to single-thread
 MTDEC_PARSE_NEW,      // new block
 MTDEC_PARSE_END       // end of block threading. But we still can return to threading after
Write(&needContinue)
} EMtDecParseState;

typedef struct
{
 // in
 int startCall;
 const Byte *src;
 size_t srcSize;
    // in  : (srcSize == 0) is allowed
    // out : it's allowed to return less that actually was used ?
 int srcFinished;

 // out
 EMtDecParseState state;
 Bool canCreateNewThread;
 UInt64 outPos; // check it (size_t)
} CMtDecCallbackInfo;


typedef struct
{
 void (*Parse)(void *p, unsigned coderIndex, CMtDecCallbackInfo *ci);

 // PreCode() and Code():
 // (SRes_return_result != SZ_OK) means stop decoding, no need another blocks
 SRes (*PreCode)(void
 *p, unsigned coderIndex);
 SRes (*Code)(void *p, unsigned coderIndex,
    const Byte *src, size_t srcSize, int srcFinished,
```

```
    UInt64 *inCodePos, UInt64 *outCodePos, int *stop);
 // stop - means stop another Code calls


 /* Write() must be called, if Parse() was called
    set (needWrite) if
    {
      && (was not interrupted by progress)
      && (was not interrupted in previous block)
    }

  out:
    if (*needContinue), decoder still need to continue decoding with new iteration,
      even after MTDEC_PARSE_END
    if (*canRecode), we didn't flush current block data, so we still can decode current block later.
 */
 SRes (*Write)(void *p, unsigned coderIndex,
    Bool needWriteToStream,
    const Byte *src, size_t srcSize,
    // int srcFinished,
    Bool *needContinue,
    Bool *canRecode);
} IMtDecCallback;



typedef struct _CMtDec
{
 /* input variables */

 size_t inBufSize;        /* size of input block */
 unsigned numThreadsMax;
  // size_t inBlockMax;
 unsigned numThreadsMax_2;

 ISeqInStream *inStream;
 // const Byte *inData;
 // size_t inDataSize;

 ICompressProgress *progress;
 ISzAllocPtr alloc;

 IMtDecCallback *mtCallback;
 void *mtCallbackObject;


 /* internal variables */
```

```
 size_t allocatedBufsSize;

 Bool exitThread;
 WRes exitThreadWRes;

 UInt64 blockIndex;
 Bool isAllocError;
 Bool overflow;
 SRes threadingErrorSRes;

 Bool needContinue;

 // CAutoResetEvent finishedEvent;

 SRes readRes;
 SRes codeRes;

 Bool wasInterrupted;

 unsigned numStartedThreads_Limit;
 unsigned numStartedThreads;

 Byte *crossBlock;
 size_t crossStart;
 size_t crossEnd;
 UInt64 readProcessed;
 Bool readWasFinished;
 UInt64 inProcessed;

 unsigned filledThreadStart;
 unsigned numFilledThreads;

 #ifndef _7ZIP_ST
 Bool needInterrupt;
 UInt64 interruptIndex;
 CMtProgress mtProgress;
 CMtDecThread threads[MTDEC__THREADS_MAX];
 #endif
} CMtDec;


void MtDec_Construct(CMtDec
 *p);
void MtDec_Destruct(CMtDec *p);

/*
MtDec_Code() returns:
 SZ_OK - in most cases
```

```
 MY_SRes_HRESULT_FROM_WRes(WRes_error) - in case of unexpected error in threading function
*/

SRes MtDec_Code(CMtDec *p);
Byte *MtDec_GetCrossBuff(CMtDec *p);

int MtDec_PrepareRead(CMtDec *p);
const Byte *MtDec_Read(CMtDec *p, size_t *inLim);

#endif

EXTERN_C_END

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With One No Language Tagged text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-001-ref.xht" />
  <meta name="assert" content="The copyright element matches the schema. It contains one text element that does
not have a language tag." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-001.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
```

```
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   Copyright without language.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
// PropIDUtils.h

#ifndef __PROPID_UTILS_H
#define __PROPID_UTILS_H

#include "../../../Common/MyString.h"

// provide at least 64 bytes for buffer including zero-end
void ConvertPropertyToShortString2(char *dest, const PROPVARIANT &propVariant, PROPID propID, int level
= 0) throw();
void ConvertPropertyToString2(UString &dest, const PROPVARIANT &propVariant, PROPID propID, int level =
0);

bool ConvertNtReparseToString(const Byte *data, UInt32 size, UString &s);
void ConvertNtSecureToString(const Byte *data, UInt32 size, AString &s);
bool CheckNtSecure(const Byte *data, UInt32 size) throw();;

void ConvertWinAttribToString(char *s, UInt32 wa) throw();

#endif
```

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# This file contains a list of people who've made non-trivial
# contribution to the Google C++ Testing Framework project.  People
# who commit code to the project are encouraged to add their names
# here.  Please keep the list sorted by first names.

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Vlad Losev <vladl@google.com>
Zhanyong Wan <wan@google.com>

```
/* Xz.h - Xz interface
2018-02-28 : Igor Pavlov : Public domain */

#ifndef __XZ_H
#define __XZ_H

#include "Sha256.h"

EXTERN_C_BEGIN

#define XZ_ID_Subblock 1
#define XZ_ID_Delta 3
#define XZ_ID_X86 4
#define XZ_ID_PPC 5
#define XZ_ID_IA64 6
```

```
#define XZ_ID_ARM 7
#define XZ_ID_ARMT 8
#define XZ_ID_SPARC 9
#define XZ_ID_LZMA2 0x21

unsigned Xz_ReadVarInt(const Byte *p, size_t maxSize, UInt64 *value);
unsigned Xz_WriteVarInt(Byte *buf, UInt64 v);

/* ---------- xz block ---------- */

#define XZ_BLOCK_HEADER_SIZE_MAX 1024

#define XZ_NUM_FILTERS_MAX 4
#define XZ_BF_NUM_FILTERS_MASK 3
#define XZ_BF_PACK_SIZE (1 << 6)
#define XZ_BF_UNPACK_SIZE (1 << 7)

#define XZ_FILTER_PROPS_SIZE_MAX 20

typedef struct
{
 UInt64 id;
 UInt32 propsSize;
 Byte props[XZ_FILTER_PROPS_SIZE_MAX];
} CXzFilter;

typedef struct
{
 UInt64 packSize;
 UInt64 unpackSize;
 Byte flags;
 CXzFilter filters[XZ_NUM_FILTERS_MAX];
} CXzBlock;

#define XzBlock_GetNumFilters(p) (((p)->flags & XZ_BF_NUM_FILTERS_MASK) + 1)
#define
 XzBlock_HasPackSize(p)   (((p)->flags & XZ_BF_PACK_SIZE) != 0)
#define XzBlock_HasUnpackSize(p) (((p)->flags & XZ_BF_UNPACK_SIZE) != 0)
#define XzBlock_HasUnsupportedFlags(p) (((p)->flags & ~(XZ_BF_NUM_FILTERS_MASK |
XZ_BF_PACK_SIZE | XZ_BF_UNPACK_SIZE)) != 0)

SRes XzBlock_Parse(CXzBlock *p, const Byte *header);
SRes XzBlock_ReadHeader(CXzBlock *p, ISeqInStream *inStream, Bool *isIndex, UInt32 *headerSizeRes);

/* ---------- xz stream ---------- */

#define XZ_SIG_SIZE 6
#define XZ_FOOTER_SIG_SIZE 2
```

```
extern const Byte XZ_SIG[XZ_SIG_SIZE];

/*
extern const Byte XZ_FOOTER_SIG[XZ_FOOTER_SIG_SIZE];
*/

#define XZ_FOOTER_SIG_0 'Y'
#define XZ_FOOTER_SIG_1 'Z'

#define XZ_STREAM_FLAGS_SIZE 2
#define XZ_STREAM_CRC_SIZE 4

#define XZ_STREAM_HEADER_SIZE (XZ_SIG_SIZE + XZ_STREAM_FLAGS_SIZE +
XZ_STREAM_CRC_SIZE)
#define XZ_STREAM_FOOTER_SIZE (XZ_FOOTER_SIG_SIZE + XZ_STREAM_FLAGS_SIZE +
XZ_STREAM_CRC_SIZE + 4)

#define XZ_CHECK_MASK 0xF
#define XZ_CHECK_NO 0
#define XZ_CHECK_CRC32 1
#define
 XZ_CHECK_CRC64 4
#define XZ_CHECK_SHA256 10

typedef struct
{
 unsigned mode;
 UInt32 crc;
 UInt64 crc64;
 CSha256 sha;
} CXzCheck;

void XzCheck_Init(CXzCheck *p, unsigned mode);
void XzCheck_Update(CXzCheck *p, const void *data, size_t size);
int XzCheck_Final(CXzCheck *p, Byte *digest);

typedef UInt16 CXzStreamFlags;

#define XzFlags_IsSupported(f) ((f) <= XZ_CHECK_MASK)
#define XzFlags_GetCheckType(f) ((f) & XZ_CHECK_MASK)
#define XzFlags_HasDataCrc32(f) (Xz_GetCheckType(f) == XZ_CHECK_CRC32)
unsigned XzFlags_GetCheckSize(CXzStreamFlags f);

SRes Xz_ParseHeader(CXzStreamFlags *p, const Byte *buf);
SRes Xz_ReadHeader(CXzStreamFlags *p, ISeqInStream *inStream);

typedef struct
```

```
{
 UInt64 unpackSize;
 UInt64 totalSize;
} CXzBlockSizes;

typedef struct
{
 CXzStreamFlags flags;
 size_t numBlocks;
 CXzBlockSizes *blocks;
 UInt64 startOffset;
} CXzStream;

void Xz_Construct(CXzStream *p);
void Xz_Free(CXzStream *p, ISzAllocPtr alloc);

#define XZ_SIZE_OVERFLOW ((UInt64)(Int64)-1)

UInt64
 Xz_GetUnpackSize(const CXzStream *p);
UInt64 Xz_GetPackSize(const CXzStream *p);

typedef struct
{
 size_t num;
 size_t numAllocated;
 CXzStream *streams;
} CXzs;

void Xzs_Construct(CXzs *p);
void Xzs_Free(CXzs *p, ISzAllocPtr alloc);
SRes Xzs_ReadBackward(CXzs *p, ILookInStream *inStream, Int64 *startOffset, ICompressProgress *progress,
ISzAllocPtr alloc);

UInt64 Xzs_GetNumBlocks(const CXzs *p);
UInt64 Xzs_GetUnpackSize(const CXzs *p);


// ECoderStatus values are identical to ELzmaStatus values of LZMA2 decoder

typedef enum
{
 CODER_STATUS_NOT_SPECIFIED,              /* use main error code instead */
 CODER_STATUS_FINISHED_WITH_MARK,         /* stream was finished with end mark. */
 CODER_STATUS_NOT_FINISHED,               /* stream was not finished */
 CODER_STATUS_NEEDS_MORE_INPUT            /* you must provide more input bytes */
} ECoderStatus;
```

```
// ECoderFinishMode values are identical to ELzmaFinishMode

typedef enum
{
 CODER_FINISH_ANY,   /* finish at
 any point */
 CODER_FINISH_END    /* block must be finished at the end */
} ECoderFinishMode;


typedef struct _IStateCoder
{
 void *p;
 void (*Free)(void *p, ISzAllocPtr alloc);
 SRes (*SetProps)(void *p, const Byte *props, size_t propSize, ISzAllocPtr alloc);
 void (*Init)(void *p);
 SRes (*Code2)(void *p, Byte *dest, SizeT *destLen, const Byte *src, SizeT *srcLen,
    int srcWasFinished, ECoderFinishMode finishMode,
    // int *wasFinished,
    ECoderStatus *status);
 SizeT (*Filter)(void *p, Byte *data, SizeT size);
} IStateCoder;



#define MIXCODER_NUM_FILTERS_MAX 4

typedef struct
{
 ISzAllocPtr alloc;
 Byte *buf;
 unsigned numCoders;

 Byte *outBuf;
 size_t outBufSize;
 size_t outWritten; // is equal to lzmaDecoder.dicPos (in outBuf mode)
 Bool wasFinished;
 SRes res;
 ECoderStatus status;
 // Bool SingleBufMode;

 int finished[MIXCODER_NUM_FILTERS_MAX - 1];
 size_t pos[MIXCODER_NUM_FILTERS_MAX - 1];
 size_t size[MIXCODER_NUM_FILTERS_MAX - 1];
 UInt64
 ids[MIXCODER_NUM_FILTERS_MAX];
 SRes results[MIXCODER_NUM_FILTERS_MAX];
```

```
 IStateCoder coders[MIXCODER_NUM_FILTERS_MAX];
} CMixCoder;


typedef enum
{
 XZ_STATE_STREAM_HEADER,
 XZ_STATE_STREAM_INDEX,
 XZ_STATE_STREAM_INDEX_CRC,
 XZ_STATE_STREAM_FOOTER,
 XZ_STATE_STREAM_PADDING,
 XZ_STATE_BLOCK_HEADER,
 XZ_STATE_BLOCK,
 XZ_STATE_BLOCK_FOOTER
} EXzState;


typedef struct
{
 EXzState state;
 UInt32 pos;
 unsigned alignPos;
 unsigned indexPreSize;

 CXzStreamFlags streamFlags;

 UInt32 blockHeaderSize;
 UInt64 packSize;
 UInt64 unpackSize;

 UInt64 numBlocks; // number of finished blocks in current stream
 UInt64 indexSize;
 UInt64 indexPos;
 UInt64 padSize;

 UInt64 numStartedStreams;
 UInt64 numFinishedStreams;
 UInt64 numTotalBlocks;

 UInt32 crc;
 CMixCoder decoder;
 CXzBlock block;
 CXzCheck check;
 CSha256 sha;

 Bool parseMode;
 Bool headerParsedOk;
 Bool decodeToStreamSignature;
```

```
 unsigned decodeOnlyOneBlock;

 Byte *outBuf;
 size_t outBufSize;
  size_t outDataWritten; // the size of data in (outBuf) that were fully unpacked

 Byte shaDigest[SHA256_DIGEST_SIZE];
 Byte buf[XZ_BLOCK_HEADER_SIZE_MAX];
} CXzUnpacker;

/* alloc : aligned for cache line allocation is better */
void XzUnpacker_Construct(CXzUnpacker *p, ISzAllocPtr alloc);
void XzUnpacker_Init(CXzUnpacker *p);
void XzUnpacker_SetOutBuf(CXzUnpacker *p, Byte *outBuf, size_t outBufSize);
void XzUnpacker_Free(CXzUnpacker *p);

/*
 XzUnpacker
 The sequence for decoding functions:
 {
   XzUnpacker_Construct()
   [Decoding_Calls]
   XzUnpacker_Free()
 }

 [Decoding_Calls]

 There are 3 types of interfaces for [Decoding_Calls] calls:

 Interface-1 : Partial output buffers:
   {
     XzUnpacker_Init()
     for()
       XzUnpacker_Code();
   }

 Interface-2 : Direct output buffer:
   Use it, if you know exact size of decoded data, and you need
   whole xz unpacked data in one output buffer.
   xz unpacker doesn't allocate additional buffer for lzma2
 dictionary in that mode.
   {
     XzUnpacker_Init()
     XzUnpacker_SetOutBufMode(); // to set output buffer and size
     for()
       XzUnpacker_Code(); // (dest = NULL) in XzUnpacker_Code()
   }
```

```
 Interface-3 : Direct output buffer : One call full decoding
   It unpacks whole input buffer to output buffer in one call.
   It uses Interface-2 internally.
   {
     XzUnpacker_CodeFull()
   }
*/

/*
finishMode:
 It has meaning only if the decoding reaches output limit (*destLen).
 CODER_FINISH_ANY - use smallest number of input bytes
 CODER_FINISH_END - read EndOfStream marker after decoding

Returns:
 SZ_OK
   status:
     CODER_STATUS_NOT_FINISHED,
     CODER_STATUS_NEEDS_MORE_INPUT - maybe there are more xz streams,
                                     call XzUnpacker_IsStreamWasFinished to check that current stream was finished
 SZ_ERROR_MEM  - Memory allocation error
 SZ_ERROR_DATA - Data error
 SZ_ERROR_UNSUPPORTED - Unsupported method or method properties
  SZ_ERROR_CRC  - CRC error
 // SZ_ERROR_INPUT_EOF - It needs more bytes in input buffer (src).

 SZ_ERROR_NO_ARCHIVE - the error with xz Stream Header with one of the following reasons:
    - xz Stream Signature failure
    - CRC32 of xz Stream Header is failed
    - The size of Stream padding is not multiple of four bytes.
   It's possible to get that error, if xz stream was finished and the stream
   contains some another data. In that case you can call XzUnpacker_GetExtraSize()
   function to get real size of xz stream.
*/


SRes XzUnpacker_Code(CXzUnpacker *p, Byte *dest, SizeT *destLen,
   const Byte *src, SizeT *srcLen, int srcFinished,
   ECoderFinishMode finishMode, ECoderStatus *status);

SRes XzUnpacker_CodeFull(CXzUnpacker *p, Byte *dest, SizeT *destLen,
   const Byte *src, SizeT *srcLen,
   ECoderFinishMode finishMode, ECoderStatus *status);

Bool XzUnpacker_IsStreamWasFinished(const CXzUnpacker *p);

/*
XzUnpacker_GetExtraSize() returns then number of uncofirmed
```

```
 bytes,
if it's in (XZ_STATE_STREAM_HEADER) state or in (XZ_STATE_STREAM_PADDING) state.
These bytes can be some bytes after xz archive, or
it can be start of new xz stream.

Call XzUnpacker_GetExtraSize() after XzUnpacker_Code() function to detect real size of
xz stream in two cases, if XzUnpacker_Code() returns:
 res == SZ_OK && status == CODER_STATUS_NEEDS_MORE_INPUT
 res == SZ_ERROR_NO_ARCHIVE
*/

UInt64 XzUnpacker_GetExtraSize(const CXzUnpacker *p);



/*
 for random block decoding:
   XzUnpacker_Init();
   set CXzUnpacker::streamFlags
   XzUnpacker_PrepareToRandomBlockDecoding()
   loop
   {
     XzUnpacker_Code()
     XzUnpacker_IsBlockFinished()
   }
*/

void XzUnpacker_PrepareToRandomBlockDecoding(CXzUnpacker *p);
Bool XzUnpacker_IsBlockFinished(const CXzUnpacker *p);

#define XzUnpacker_GetPackSizeForIndex(p) ((p)->packSize + (p)->blockHeaderSize +
XzFlags_GetCheckSize((p)->streamFlags))



/* ---------- Multi Threading Decoding ---------- */


typedef struct
{
  size_t inBufSize_ST;
 size_t outStep_ST;
 Bool ignoreErrors;

 #ifndef _7ZIP_ST
 unsigned numThreads;
 size_t inBufSize_MT;
 size_t memUseMax;
 #endif
```

```
} CXzDecMtProps;

void XzDecMtProps_Init(CXzDecMtProps *p);


typedef void * CXzDecMtHandle;

/*
 alloc    : XzDecMt uses CAlignOffsetAlloc for addresses allocated by (alloc).
 allocMid : for big allocations, aligned allocation is better
*/

CXzDecMtHandle XzDecMt_Create(ISzAllocPtr alloc, ISzAllocPtr allocMid);
void XzDecMt_Destroy(CXzDecMtHandle p);


typedef struct
{
 Byte UnpackSize_Defined;
 Byte NumStreams_Defined;
 Byte NumBlocks_Defined;

 Byte DataAfterEnd;
 Byte DecodingTruncated; // Decoding was Truncated, we need only partial output data

 UInt64 InSize;  // pack size processed
 UInt64 OutSize;

 UInt64 NumStreams;
 UInt64 NumBlocks;

 SRes DecodeRes;
 SRes ReadRes;
 SRes ProgressRes;
 SRes CombinedRes;
 SRes CombinedRes_Type;

} CXzStatInfo;

void XzStatInfo_Clear(CXzStatInfo *p);

/*
XzDecMt_Decode()
SRes:
  SZ_OK               - OK
 SZ_ERROR_MEM        - Memory allocation error
 SZ_ERROR_NO_ARCHIVE - is not xz archive
 SZ_ERROR_ARCHIVE    - Headers error
```

```
 SZ_ERROR_DATA       - Data Error
 SZ_ERROR_CRC        - CRC Error
 SZ_ERROR_INPUT_EOF  - it needs more input data
 SZ_ERROR_WRITE      - ISeqOutStream error
 (SZ_ERROR_READ)     - ISeqInStream errors
 (SZ_ERROR_PROGRESS) - ICompressProgress errors
 // SZ_ERROR_THREAD     - error in multi-threading functions
 MY_SRes_HRESULT_FROM_WRes(WRes_error) - error in multi-threading function
*/

SRes XzDecMt_Decode(CXzDecMtHandle p,
  const CXzDecMtProps *props,
  const UInt64 *outDataSize, // NULL means undefined
  int finishMode,            // 0 - partial unpacking is allowed, 1 - xz stream(s) must be finished
  ISeqOutStream *outStream,
  // Byte *outBuf, size_t *outBufSize,
  ISeqInStream *inStream,
  // const Byte *inData, size_t inDataSize,
  CXzStatInfo *stat,
  int *isMT,                 // 0 means
 that ST (Single-Thread) version was used
  ICompressProgress *progress);

EXTERN_C_END

#endif
```

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```
/* 7zAlloc.h -- Allocation functions
2017-04-03 : Igor Pavlov : Public domain */

#ifndef __7Z_ALLOC_H
#define __7Z_ALLOC_H

#include "7zTypes.h"

EXTERN_C_BEGIN

void *SzAlloc(ISzAllocPtr p, size_t size);
void SzFree(ISzAllocPtr p, void *address);

void *SzAllocTemp(ISzAllocPtr p, size_t size);
void SzFreeTemp(ISzAllocPtr p, void *address);

EXTERN_C_END

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With One div Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-020-ref.xht" />
  <meta name="assert" content="The license element contains a text element that contains a div element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
  {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-020.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
```

```
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   &lt;div&gt;Paragraph 1&lt;/div&gt;
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With class Attribute in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
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  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element with &quot;class1 class2 class3&quot; as the value for the class attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
```

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   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
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  <div class="test">P</div>
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&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text class="class1 class2 class3"&gt;
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 </body>
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```
// UpdateProduce.h

#ifndef __UPDATE_PRODUCE_H
#define __UPDATE_PRODUCE_H

#include "UpdatePair.h"

struct CUpdatePair2
{
 bool NewData;
 bool NewProps;
 bool UseArcProps; // if (UseArcProps && NewProps), we want to change only some properties.
 bool IsAnti; // if (!IsAnti) we use other ways to detect Anti status

 int DirIndex;
 int ArcIndex;
 int NewNameIndex;

 bool IsMainRenameItem;

 void SetAs_NoChangeArcItem(int arcIndex)
 {
  NewData = NewProps = false;
  UseArcProps = true;
  IsAnti = false;
  ArcIndex = arcIndex;
 }

 bool ExistOnDisk() const { return DirIndex != -1; }
 bool ExistInArchive() const { return ArcIndex != -1; }

 CUpdatePair2():
    NewData(false),
    NewProps(false),
    UseArcProps(false),
    IsAnti(false),
```

```
    DirIndex(-1),
    ArcIndex(-1),
    NewNameIndex(-1),
    IsMainRenameItem(false)
    {}
};

struct IUpdateProduceCallback
{
 virtual HRESULT ShowDeleteFile(unsigned arcIndex) = 0;
};

void UpdateProduce(
   const
 CRecordVector<CUpdatePair> &updatePairs,
   const NUpdateArchive::CActionSet &actionSet,
   CRecordVector<CUpdatePair2> &operationChain,
   IUpdateProduceCallback *callback);

#endif
```

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```
// Windows/Control/PropertyPage.h

#ifndef __WINDOWS_CONTROL_PROPERTYPAGE_H
#define __WINDOWS_CONTROL_PROPERTYPAGE_H

#include "../../Common/MyWindows.h"

#include <prsht.h>

#include "Dialog.h"

namespace NWindows {
```

```
namespace NControl {

INT_PTR APIENTRY ProperyPageProcedure(HWND dialogHWND, UINT message, WPARAM wParam,
LPARAM lParam);

class CPropertyPage: public CDialog
{
public:
 CPropertyPage(HWND window = NULL): CDialog(window){};

 void Changed() { PropSheet_Changed(GetParent(), (HWND)*this); }
 void UnChanged() { PropSheet_UnChanged(GetParent(), (HWND)*this); }

 virtual bool OnNotify(UINT controlID, LPNMHDR lParam);

 virtual bool OnKillActive() { return false; } // false = OK
 virtual bool OnKillActive(const PSHNOTIFY *) { return OnKillActive(); }
 virtual LONG OnSetActive() { return false; } // false = OK
 virtual LONG OnSetActive(const PSHNOTIFY *) { return OnSetActive(); }
 virtual LONG OnApply() { return PSNRET_NOERROR; }
 virtual LONG OnApply(const PSHNOTIFY *)
 { return OnApply(); }
 virtual void OnNotifyHelp() {}
 virtual void OnNotifyHelp(const PSHNOTIFY *) { OnNotifyHelp(); }
 virtual void OnReset() {}
 virtual void OnReset(const PSHNOTIFY *) { OnReset(); }
};

struct CPageInfo
{
 CPropertyPage *Page;
 UString Title;
 UINT ID;
};

INT_PTR MyPropertySheet(const CObjectVector<CPageInfo> &pagesInfo, HWND hwndParent, const UString
&title);

}}

#endif
```

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```
// UpdateAction.h

#ifndef __UPDATE_ACTION_H
#define __UPDATE_ACTION_H

namespace NUpdateArchive {

 namespace NPairState
 {
   const unsigned kNumValues = 7;
   enum EEnum
   {
     kNotMasked = 0,
     kOnlyInArchive,
     kOnlyOnDisk,
     kNewInArchive,
     kOldInArchive,
     kSameFiles,
     kUnknowNewerFiles
   };
 }

 namespace NPairAction
 {
   enum EEnum
   {
     kIgnore = 0,
     kCopy,
     kCompress,
```

```
    kCompressAsAnti
  };
}

struct CActionSet
{
  NPairAction::EEnum StateActions[NPairState::kNumValues];

  bool IsEqualTo(const CActionSet &a) const
  {
    for (unsigned i = 0; i < NPairState::kNumValues; i++)
      if (StateActions[i] != a.StateActions[i])
        return false;
    return true;
  }

  bool NeedScanning() const
  {
    unsigned i;
    for (i = 0; i < NPairState::kNumValues; i++)
      if (StateActions[i] == NPairAction::kCompress)
        return true;
    for (i = 1; i < NPairState::kNumValues;
i++)
      if (StateActions[i] != NPairAction::kIgnore)
        return true;
    return false;
  }
};

extern const CActionSet k_ActionSet_Add;
extern const CActionSet k_ActionSet_Update;
extern const CActionSet k_ActionSet_Fresh;
extern const CActionSet k_ActionSet_Sync;
extern const CActionSet k_ActionSet_Delete;
}

#endif
```

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CMake was initially developed by Kitware with the following sponsorship:

* National Library of Medicine at the National Institutes of Health
  as part of the Insight Segmentation and Registration Toolkit (ITK).

* US National Labs (Los Alamos, Livermore, Sandia) ASC Parallel
  Visualization Initiative.

* National Alliance for Medical Image Computing (NAMIC) is funded by the
  National Institutes of Health through the NIH Roadmap for Medical Research,
  Grant U54 EB005149.

* Kitware, Inc.
// List.h

#ifndef __LIST_H
#define __LIST_H

```
#include "../../../Common/Wildcard.h"

#include "../Common/LoadCodecs.h"

HRESULT ListArchives(CCodecs *codecs,
  const CObjectVector<COpenType> &types,
  const CIntVector &excludedFormats,
  bool stdInMode,
  UStringVector &archivePaths, UStringVector &archivePathsFull,
  bool processAltStreams, bool showAltStreams,
  const NWildcard::CCensorNode &wildcardCensor,
  bool enableHeaders, bool techMode,
  #ifndef _NO_CRYPTO
  bool &passwordEnabled, UString &password,
  #endif
  #ifndef _SFX
  const CObjectVector<CProperty> *props,
  #endif
  UInt64 &errors,
  UInt64 &numWarnings);

#endif
// Windows/CommonDialog.h

#ifndef __WINDOWS_COMMON_DIALOG_H
#define __WINDOWS_COMMON_DIALOG_H

#include "../Common/MyString.h"

namespace NWindows {

bool MyGetOpenFileName(HWND hwnd, LPCWSTR title,
  LPCWSTR initialDir,  // can be NULL, so dir prefix in filePath will be used
  LPCWSTR filePath,    // full path
  LPCWSTR filterDescription,  // like "All files (*.*)"
  LPCWSTR filter,             // like "*.exe"
  UString &resPath
  #ifdef UNDER_CE
  , bool openFolder = false
  #endif
);

}

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
```

```
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Child Element in license Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains an unknown child element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family:
 "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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```
// PropID.h

#ifndef __7ZIP_PROP_ID_H
#define __7ZIP_PROP_ID_H

#include "../Common/MyTypes.h"
```

```
enum
{
 kpidNoProperty = 0,
 kpidMainSubfile,
 kpidHandlerItemIndex,
 kpidPath,
 kpidName,
 kpidExtension,
 kpidIsDir,
 kpidSize,
 kpidPackSize,
 kpidAttrib,
 kpidCTime,
 kpidATime,
 kpidMTime,
 kpidSolid,
 kpidCommented,
 kpidEncrypted,
 kpidSplitBefore,
 kpidSplitAfter,
 kpidDictionarySize,
 kpidCRC,
 kpidType,
 kpidIsAnti,
 kpidMethod,
 kpidHostOS,
 kpidFileSystem,
 kpidUser,
 kpidGroup,
 kpidBlock,
 kpidComment,
 kpidPosition,
 kpidPrefix,
 kpidNumSubDirs,
 kpidNumSubFiles,
 kpidUnpackVer,
 kpidVolume,
 kpidIsVolume,
 kpidOffset,
 kpidLinks,
 kpidNumBlocks,
 kpidNumVolumes,
 kpidTimeType,
 kpidBit64,
 kpidBigEndian,
 kpidCpu,
 kpidPhySize,
 kpidHeadersSize,
```

kpidChecksum,
kpidCharacts,
kpidVa,
kpidId,
kpidShortName,
kpidCreatorApp,
kpidSectorSize,
kpidPosixAttrib,
kpidSymLink,
kpidError,
kpidTotalSize,
kpidFreeSpace,
kpidClusterSize,
kpidVolumeName,
kpidLocalName,
kpidProvider,
kpidNtSecure,
kpidIsAltStream,
kpidIsAux,
kpidIsDeleted,
kpidIsTree,
kpidSha1,
kpidSha256,
kpidErrorType,
kpidNumErrors,
kpidErrorFlags,
kpidWarningFlags,
kpidWarning,
kpidNumStreams,
kpidNumAltStreams,
kpidAltStreamsSize,
kpidVirtualSize,
kpidUnpackSize,
kpidTotalPhySize,
kpidVolumeIndex,
kpidSubType,
kpidShortComment,
kpidCodePage,
kpidIsNotArcType,
kpidPhySizeCantBeDetected,
kpidZerosTailIsAllowed,
kpidTailSize,
kpidEmbeddedStubSize,
kpidNtReparse,
kpidHardLink,
kpidINode,
kpidStreamId,
kpidReadOnly,

```
 kpidOutName,
 kpidCopyLink,

 kpid_NUM_DEFINED,

 kpidUserDefined = 0x10000
};

extern const Byte k7z_PROPID_To_VARTYPE[kpid_NUM_DEFINED]; // VARTYPE

const UInt32 kpv_ErrorFlags_IsNotArc             = 1 << 0;
const UInt32 kpv_ErrorFlags_HeadersError         = 1 << 1;
const UInt32 kpv_ErrorFlags_EncryptedHeadersError = 1 << 2;
const UInt32 kpv_ErrorFlags_UnavailableStart
     = 1 << 3;
const UInt32 kpv_ErrorFlags_UnconfirmedStart     = 1 << 4;
const UInt32 kpv_ErrorFlags_UnexpectedEnd        = 1 << 5;
const UInt32 kpv_ErrorFlags_DataAfterEnd         = 1 << 6;
const UInt32 kpv_ErrorFlags_UnsupportedMethod    = 1 << 7;
const UInt32 kpv_ErrorFlags_UnsupportedFeature   = 1 << 8;
const UInt32 kpv_ErrorFlags_DataError            = 1 << 9;
const UInt32 kpv_ErrorFlags_CrcError             = 1 << 10;
// const UInt32 kpv_ErrorFlags_Unsupported          = 1 << 11;

#endif
```

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// HandlerOut.h

#ifndef __HANDLER_OUT_H
#define __HANDLER_OUT_H

#include "../../../Windows/System.h"

#include "../../Common/MethodProps.h"

namespace NArchive {

bool ParseSizeString(const wchar_t *name, const PROPVARIANT &prop, UInt64 percentsBase, UInt64 &res);

class CCommonMethodProps
{
protected:
 void InitCommon()
 {
   #ifndef _7ZIP_ST
   _numProcessors = _numThreads = NWindows::NSystem::GetNumberOfProcessors();
   #endif

   UInt64 memAvail = (UInt64)(sizeof(size_t)) << 28;
   _memAvail = memAvail;
   _memUsage = memAvail;
   if (NWindows::NSystem::GetRamSize(memAvail))
```

```
  {
    _memAvail = memAvail;
    _memUsage = memAvail / 32 * 17;
  }
 }

public:
 #ifndef _7ZIP_ST
 UInt32 _numThreads;
 UInt32 _numProcessors;
 #endif

 UInt64 _memUsage;
 UInt64 _memAvail;

 bool SetCommonProperty(const UString &name, const PROPVARIANT &value, HRESULT &hres);

 CCommonMethodProps() { InitCommon(); }
};


#ifndef EXTRACT_ONLY

class CMultiMethodProps: public CCommonMethodProps
{
  UInt32 _level;
 int _analysisLevel;

 void InitMulti();
public:
 UInt32 _crcSize;
 CObjectVector<COneMethodInfo> _methods;
 COneMethodInfo _filterMethod;
 bool _autoFilter;


 void SetGlobalLevelTo(COneMethodInfo &oneMethodInfo) const;

 #ifndef _7ZIP_ST
 static void SetMethodThreadsTo(COneMethodInfo &oneMethodInfo, UInt32 numThreads);
 #endif


 unsigned GetNumEmptyMethods() const
 {
  unsigned i;
  for (i = 0; i < _methods.Size(); i++)
    if (!_methods[i].IsEmpty())
```

```
      break;
  return i;
 }

 int GetLevel() const { return _level == (UInt32)(Int32)-1 ? 5 : (int)_level; }
 int GetAnalysisLevel() const { return _analysisLevel; }

 void Init();
 CMultiMethodProps() { InitMulti(); }

 HRESULT SetProperty(const wchar_t *name, const PROPVARIANT &value);
};


class CSingleMethodProps: public COneMethodInfo, public CCommonMethodProps
{
 UInt32 _level;

 void InitSingle()
 {
   _level = (UInt32)(Int32)-1;
 }

public:
 void Init();
 CSingleMethodProps()
 { InitSingle(); }

 int GetLevel() const { return _level == (UInt32)(Int32)-1 ? 5 : (int)_level; }
 HRESULT SetProperties(const wchar_t * const *names, const PROPVARIANT *values, UInt32 numProps);
};

#endif

}

#endif
```

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```
#include <exdisp.h>
#include <mshtmhst.h>

#include <vector>
#include <string>

class WebBrowser final :
  /* public IUnknown, */
  /* public IOleWindow, */
  public IOleInPlaceSite,
  public IOleClientSite,
  public IDropTarget,
```

```
  public IStorage,
  public IDocHostUIHandler,
  public IDocHostShowUI,
  public IDispatch {
public:
 ////////////////////////////////////////////////////////////////////////////
 // Our own methods
 ////////////////////////////////////////////////////////////////////////////
 WebBrowser(HWND hWndParent);
 ~WebBrowser();

 WebBrowser(const WebBrowser&) = delete;
 WebBrowser& operator=(const WebBrowser&) = delete;

 void Shutdown();

 bool IsInitialized();

 HRESULT ActiveObjectTranslateAccelerator(bool tab, LPMSG lpmsg);
 void SetRect(const
 RECT& _rc);
 void Resize(DWORD width, DWORD height);
 void Navigate(wchar_t* szUrl);

 using CustomFunction = void (*)(void* context, VARIANT parameter,
                                 VARIANT* retVal);
 void AddCustomFunction(wchar_t* name, CustomFunction function, void* arg);

 ////////////////////////////////////////////////////////////////////////////
 // Data members
 ////////////////////////////////////////////////////////////////////////////
private:
 IOleObject* mOleObject = nullptr;
 IOleInPlaceObject* mOleInPlaceObject = nullptr;
 IOleInPlaceActiveObject* mOleInPlaceActiveObject = nullptr;
 IWebBrowser2* mWebBrowser2 = nullptr;

 LONG mComRefCount = 0;

 RECT mRect = {0, 0, 0, 0};

 HWND mHwndParent = nullptr;

 struct CustomFunctionRecord {
  std::wstring mName;
  CustomFunction mFunction;
  void* mArg;
 };
```

```
std::vector<CustomFunctionRecord> mCustomFunctions;

//////////////////////////////////////////////////////////////////////////////
 // COM interface methods
//////////////////////////////////////////////////////////////////////////////
public:
 // IUnknown
 HRESULT STDMETHODCALLTYPE QueryInterface(REFIID riid,
                                void** ppvObject) override;
 ULONG STDMETHODCALLTYPE AddRef() override;
 ULONG STDMETHODCALLTYPE Release() override;

 // IOleWindow
 HRESULT STDMETHODCALLTYPE
 GetWindow(__RPC__deref_out_opt HWND* phwnd) override;
 HRESULT STDMETHODCALLTYPE ContextSensitiveHelp(BOOL fEnterMode) override;

 // IOleInPlaceSite
 HRESULT STDMETHODCALLTYPE CanInPlaceActivate() override;
 HRESULT STDMETHODCALLTYPE OnInPlaceActivate() override;
 HRESULT STDMETHODCALLTYPE OnUIActivate() override;
 HRESULT STDMETHODCALLTYPE GetWindowContext(
    __RPC__deref_out_opt IOleInPlaceFrame** ppFrame,
    __RPC__deref_out_opt IOleInPlaceUIWindow** ppDoc,
    __RPC__out LPRECT lprcPosRect, __RPC__out LPRECT lprcClipRect,
    __RPC__inout LPOLEINPLACEFRAMEINFO lpFrameInfo)
 override;
 HRESULT STDMETHODCALLTYPE Scroll(SIZE scrollExtant) override;
 HRESULT STDMETHODCALLTYPE OnUIDeactivate(BOOL fUndoable) override;
 HRESULT STDMETHODCALLTYPE OnInPlaceDeactivate() override;
 HRESULT STDMETHODCALLTYPE DiscardUndoState() override;
 HRESULT STDMETHODCALLTYPE DeactivateAndUndo() override;
 HRESULT STDMETHODCALLTYPE
 OnPosRectChange(__RPC__in LPCRECT lprcPosRect) override;

 // IOleClientSite
 HRESULT STDMETHODCALLTYPE SaveObject() override;
 HRESULT STDMETHODCALLTYPE
 GetMoniker(DWORD dwAssign, DWORD dwWhichMoniker,
          __RPC__deref_out_opt IMoniker** ppmk) override;
 HRESULT STDMETHODCALLTYPE
 GetContainer(__RPC__deref_out_opt IOleContainer** ppContainer) override;
 HRESULT STDMETHODCALLTYPE ShowObject() override;
 HRESULT STDMETHODCALLTYPE OnShowWindow(BOOL fShow) override;
 HRESULT STDMETHODCALLTYPE RequestNewObjectLayout() override;

 // IDropTarget
 HRESULT STDMETHODCALLTYPE DragEnter(__RPC__in_opt IDataObject* pDataObj,
```

```
                    DWORD grfKeyState, POINTL pt,
                        __RPC__inout DWORD* pdwEffect) override;
HRESULT STDMETHODCALLTYPE DragOver(DWORD grfKeyState, POINTL pt,
                        __RPC__inout DWORD* pdwEffect) override;
HRESULT STDMETHODCALLTYPE DragLeave() override;
HRESULT STDMETHODCALLTYPE Drop(__RPC__in_opt IDataObject* pDataObj,
                    DWORD grfKeyState, POINTL pt,
                    __RPC__inout DWORD* pdwEffect) override;

// IStorage
HRESULT STDMETHODCALLTYPE CreateStream(
   __RPC__in_string const OLECHAR* pwcsName, DWORD grfMode, DWORD reserved1,
   DWORD reserved2, __RPC__deref_out_opt IStream** ppstm) override;
HRESULT STDMETHODCALLTYPE OpenStream(const OLECHAR* pwcsName, void* reserved1,
                        DWORD grfMode, DWORD reserved2,
                        IStream** ppstm) override;
HRESULT STDMETHODCALLTYPE CreateStorage(
    __RPC__in_string const OLECHAR* pwcsName, DWORD grfMode, DWORD reserved1,
   DWORD reserved2, __RPC__deref_out_opt IStorage** ppstg) override;
HRESULT STDMETHODCALLTYPE
OpenStorage(__RPC__in_opt_string const OLECHAR* pwcsName,
        __RPC__in_opt IStorage* pstgPriority, DWORD grfMode,
        __RPC__deref_opt_in_opt SNB snbExclude, DWORD reserved,
        __RPC__deref_out_opt IStorage** ppstg) override;
HRESULT STDMETHODCALLTYPE CopyTo(DWORD ciidExclude, const IID* rgiidExclude,
                        __RPC__in_opt SNB snbExclude,
                        IStorage* pstgDest) override;
HRESULT STDMETHODCALLTYPE MoveElementTo(
   __RPC__in_string const OLECHAR* pwcsName,
   __RPC__in_opt IStorage* pstgDest,
   __RPC__in_string const OLECHAR* pwcsNewName, DWORD grfFlags) override;
HRESULT STDMETHODCALLTYPE Commit(DWORD grfCommitFlags) override;
HRESULT STDMETHODCALLTYPE Revert(void) override;
HRESULT STDMETHODCALLTYPE
EnumElements(DWORD reserved1, void* reserved2,
                        DWORD reserved3,
                        IEnumSTATSTG** ppenum) override;
HRESULT STDMETHODCALLTYPE
DestroyElement(__RPC__in_string const OLECHAR* pwcsName) override;
HRESULT STDMETHODCALLTYPE
RenameElement(__RPC__in_string const OLECHAR* pwcsOldName,
        __RPC__in_string const OLECHAR* pwcsNewName) override;
HRESULT STDMETHODCALLTYPE
SetElementTimes(__RPC__in_opt_string const OLECHAR* pwcsName,
            __RPC__in_opt const FILETIME* pctime,
            __RPC__in_opt const FILETIME* patime,
            __RPC__in_opt const FILETIME* pmtime) override;
```

```
HRESULT STDMETHODCALLTYPE SetClass(__RPC__in REFCLSID clsid) override;
HRESULT STDMETHODCALLTYPE SetStateBits(DWORD grfStateBits,
                                       DWORD grfMask) override;
HRESULT STDMETHODCALLTYPE Stat(__RPC__out STATSTG* pstatstg,

                DWORD grfStatFlag) override;

// IDocHostUIHandler
HRESULT STDMETHODCALLTYPE ShowContextMenu(
    _In_ DWORD dwID, _In_ POINT* ppt, _In_ IUnknown* pcmdtReserved,
    _In_ IDispatch* pdispReserved) override;
HRESULT STDMETHODCALLTYPE GetHostInfo(_Inout_ DOCHOSTUIINFO* pInfo) override;
HRESULT STDMETHODCALLTYPE ShowUI(_In_ DWORD dwID,
                                 _In_ IOleInPlaceActiveObject* pActiveObject,
                                 _In_ IOleCommandTarget* pCommandTarget,
                                 _In_ IOleInPlaceFrame* pFrame,
                                 _In_ IOleInPlaceUIWindow* pDoc) override;
HRESULT STDMETHODCALLTYPE HideUI() override;
HRESULT STDMETHODCALLTYPE UpdateUI() override;
HRESULT STDMETHODCALLTYPE EnableModeless(BOOL fEnable) override;
HRESULT STDMETHODCALLTYPE OnDocWindowActivate(BOOL fActivate) override;
HRESULT STDMETHODCALLTYPE OnFrameWindowActivate(BOOL fActivate) override;
HRESULT STDMETHODCALLTYPE
ResizeBorder(_In_ LPCRECT prcBorder,
                                _In_ IOleInPlaceUIWindow* pUIWindow,
                                _In_ BOOL fRameWindow) override;
HRESULT STDMETHODCALLTYPE TranslateAccelerator(LPMSG lpMsg,
                                       const GUID* pguidCmdGroup,
                                       DWORD nCmdID) override;
HRESULT STDMETHODCALLTYPE GetOptionKeyPath(_Out_ LPOLESTR* pchKey,
                                         DWORD dw) override;
HRESULT STDMETHODCALLTYPE
GetDropTarget(_In_ IDropTarget* pDropTarget,
            _Outptr_ IDropTarget** ppDropTarget) override;
HRESULT STDMETHODCALLTYPE
GetExternal(_Outptr_result_maybenull_ IDispatch** ppDispatch) override;
HRESULT STDMETHODCALLTYPE TranslateUrl(DWORD dwTranslate,
                                _In_ LPWSTR pchURLIn,
                                _Outptr_ LPWSTR* ppchURLOut) override;
HRESULT STDMETHODCALLTYPE
 FilterDataObject(_In_ IDataObject* pDO,
              _Outptr_result_maybenull_ IDataObject** ppDORet) override;

// IDocHostShowUI
HRESULT STDMETHODCALLTYPE ShowMessage(
    /* [in] */ HWND hwnd,
    /* [annotation][in] */
    _In_ LPOLESTR lpstrText,
```

```
    /* [annotation][in] */
    _In_ LPOLESTR lpstrCaption,
    /* [in] */ DWORD dwType,
    /* [annotation][in] */
    _In_ LPOLESTR lpstrHelpFile,
    /* [in] */ DWORD dwHelpContext,
    /* [out] */ LRESULT* plResult) override;
HRESULT STDMETHODCALLTYPE ShowHelp(
    /* [in] */ HWND hwnd,
    /* [annotation][in] */
    _In_ LPOLESTR pszHelpFile,
    /* [in] */ UINT uCommand,
    /* [in] */ DWORD dwData,
    /* [in] */ POINT ptMouse,
    /* [out] */ IDispatch* pDispatchObjectHit) override;

// IDispatch
HRESULT STDMETHODCALLTYPE GetTypeInfoCount(
    /* [out] */ __RPC__out UINT* pctinfo) override;
HRESULT STDMETHODCALLTYPE GetTypeInfo(
    /* [in] */ UINT iTInfo,
    /* [in]
*/ LCID lcid,
    /* [out] */ __RPC__deref_out_opt ITypeInfo** ppTInfo) override;
HRESULT STDMETHODCALLTYPE GetIDsOfNames(
    /* [in] */ __RPC__in REFIID riid,
    /* [size_is][in] */ __RPC__in_ecount_full(cNames) LPOLESTR* rgszNames,
    /* [range][in] */ __RPC__in_range(0, 16384) UINT cNames,
    /* [in] */ LCID lcid,
    /* [size_is][out] */ __RPC__out_ecount_full(cNames) DISPID* rgDispId)
    override;
/* [local] */ HRESULT STDMETHODCALLTYPE Invoke(
    /* [annotation][in] */
    _In_ DISPID dispIdMember,
    /* [annotation][in] */
    _In_ REFIID riid,
    /* [annotation][in] */
    _In_ LCID lcid,
    /* [annotation][in] */
    _In_ WORD wFlags,
    /* [annotation][out][in] */
    _In_ DISPPARAMS* pDispParams,
    /* [annotation][out] */
    _Out_opt_ VARIANT* pVarResult,
    /* [annotation][out] */
    _Out_opt_ EXCEPINFO* pExcepInfo,
    /* [annotation][out] */
    _Out_opt_ UINT* puArgErr) override;
```

};
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<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->

```
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: No text Element in copyright Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-007-ref.xht" />
  <meta name="assert" content="The copyright element does not contain a text child element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
  {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-007.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Child Element in license Element text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element with an unknown child element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size:
 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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LaTeX Project Public License (LPPL) as part of the hyph-utf8 package.

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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

At the time this file was first modified, a complete, unmodified copy of
the LPPL Work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

Portions of this file were originally made available under the following license
(copied verbatim from hyph-it.lic.txt in the original work):

Italian hyphenation patterns

(more info about the licence to be added later)

```
% hyph-it.tex
%
% Italian hyphenation patterns
%
%
 This file is part of the hyph-utf8 package.
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
%-----------------------------------------------------------------------------
%
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% version 1.3 of this license or (at your option) any later
% version. The latest version of this license is in
%        http://www.latex-project.org/lppl.txt
% and version 1.3 or later is part of all distributions
% of LaTeX version 2003/12/01 or later.
%
% This work has the LPPL maintenance status "maintained".
%
```

```
% This Current Maintainer of this work is Claudio Beccari
% e-mail:  claudio dot beccari at gmail dot com
%
% This work consists of the single file hyph-it.tex.
%
% \versionnumber{4.8i}   \versiondate{2011/08/16}
%
% These hyphenation patterns for the Italian language are supposed to comply
% with the Recommendation UNI 6461 on hyphenation
 issued by the Italian
% Standards Institution (Ente Nazionale di Unificazione UNI).  No guarantee
% or declaration of fitness to any particular purpose is given and any
% liability is disclaimed.
%
% ChangeLog:
% - 2011-08-16 - Change the licence from GNU LGPL into LPPL v1.3.
% - 2010-05-24 - Fix for Italian patterns for proper hyphenation of -ich and Ljubljana.
% - 2008-06-09 - Import of original ithyph.tex into hyph-utf8 package.
% - 2008-03-08 - (last change in ithyph.tex)
%
<?xml version="1.0" encoding="utf-8"?>
<Project DefaultTargets="Build" ToolsVersion="15.0"
xmlns="http://schemas.microsoft.com/developer/msbuild/2003">
 <ItemGroup Label="ProjectConfigurations">
  <ProjectConfiguration Include="Debug|Win32">
    <Configuration>Debug</Configuration>
    <Platform>Win32</Platform>
  </ProjectConfiguration>
  <ProjectConfiguration Include="Release|Win32">
    <Configuration>Release</Configuration>
    <Platform>Win32</Platform>
  </ProjectConfiguration>
 </ItemGroup>
 <PropertyGroup Label="Globals">
  <SccProjectName />
  <SccLocalPath />
  <ProjectGuid>{EF903B79-AD97-45E0-BC6E-4FF846D6A2ED}</ProjectGuid>
  <WindowsTargetPlatformVersion>10.0</WindowsTargetPlatformVersion>
 </PropertyGroup>
 <Import Project="$(VCTargetsPath)\Microsoft.Cpp.Default.props" />
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'" Label="Configuration">
  <ConfigurationType>DynamicLibrary</ConfigurationType>
  <PlatformToolset>v142</PlatformToolset>
   <UseOfMfc>false</UseOfMfc>
  <CharacterSet>Unicode</CharacterSet>
  <SpectreMitigation>false</SpectreMitigation>
 </PropertyGroup>
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'" Label="Configuration">
```

```
  <ConfigurationType>DynamicLibrary</ConfigurationType>
  <PlatformToolset>v142</PlatformToolset>
  <UseOfMfc>false</UseOfMfc>
  <CharacterSet>Unicode</CharacterSet>
  <WholeProgramOptimization>true</WholeProgramOptimization>
  <SpectreMitigation>false</SpectreMitigation>
 </PropertyGroup>
 <Import Project="$(VCTargetsPath)\Microsoft.Cpp.props" />
 <ImportGroup Label="ExtensionSettings">
 </ImportGroup>
 <ImportGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'" Label="PropertySheets">
  <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform" />
  <Import Project="$(VCTargetsPath)Microsoft.Cpp.UpgradeFromVC60.props"
 />
 </ImportGroup>
 <ImportGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'" Label="PropertySheets">
  <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform" />
  <Import Project="$(VCTargetsPath)Microsoft.Cpp.UpgradeFromVC60.props" />
 </ImportGroup>
 <PropertyGroup Label="UserMacros" />
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'">
  <OutDir>.\Release\</OutDir>
  <IntDir>.\Release\</IntDir>
  <LinkIncremental>false</LinkIncremental>
 </PropertyGroup>
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'">
  <OutDir>.\Debug\</OutDir>
  <IntDir>.\Debug\</IntDir>
  <LinkIncremental>true</LinkIncremental>
 </PropertyGroup>
 <ItemDefinitionGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'">
  <ClCompile>
    <RuntimeLibrary>MultiThreaded</RuntimeLibrary>
     <StringPooling>true</StringPooling>
    <Optimization>MinSpace</Optimization>
    <SuppressStartupBanner>true</SuppressStartupBanner>
    <WarningLevel>Level3</WarningLevel>
<PreprocessorDefinitions>WIN32;NDEBUG;_WINDOWS;_USRDLL;%(PreprocessorDefinitions)</PreprocessorD
efinitions>
    <FavorSizeOrSpeed>Size</FavorSizeOrSpeed>
    <DebugInformationFormat>None</DebugInformationFormat>
    <ExceptionHandling>false</ExceptionHandling>
    <BufferSecurityCheck>false</BufferSecurityCheck>
    <RuntimeTypeInfo>false</RuntimeTypeInfo>
    <IntrinsicFunctions>true</IntrinsicFunctions>
  </ClCompile>
```

```
  <Midl>
    <SuppressStartupBanner>true</SuppressStartupBanner>
    <PreprocessorDefinitions>NDEBUG;%(PreprocessorDefinitions)</PreprocessorDefinitions>
    <TypeLibraryName>.\Release\WebBrowser.tlb</TypeLibraryName>
    <MkTypLibCompatible>true</MkTypLibCompatible>
    <TargetEnvironment>Win32</TargetEnvironment>
  </Midl>
   <ResourceCompile>
    <Culture>0x080a</Culture>
    <PreprocessorDefinitions>NDEBUG;%(PreprocessorDefinitions)</PreprocessorDefinitions>
  </ResourceCompile>
  <Bscmake>
    <SuppressStartupBanner>true</SuppressStartupBanner>
    <OutputFile>.\Release\WebBrowser.bsc</OutputFile>
  </Bscmake>
  <Link>
    <SuppressStartupBanner>true</SuppressStartupBanner>
    <LinkDLL>true</LinkDLL>
    <SubSystem>Windows</SubSystem>
    <OutputFile>.\Release\WebBrowser.dll</OutputFile>
    <ImportLibrary>.\Release\WebBrowser.lib</ImportLibrary>
<AdditionalDependencies>odbc32.lib;odbccp32.lib;urlmon.lib;%(AdditionalDependencies)</AdditionalDependenci
es>
    <GenerateDebugInformation>false</GenerateDebugInformation>
    <OptimizeReferences>true</OptimizeReferences>
    <LinkTimeCodeGeneration>UseLinkTimeCodeGeneration</LinkTimeCodeGeneration>
    <EnableCOMDATFolding>true</EnableCOMDATFolding>
    <EntryPointSymbol>
    </EntryPointSymbol>
  </Link>
 </ItemDefinitionGroup>
  <ItemDefinitionGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'">
  <ClCompile>
    <RuntimeLibrary>MultiThreadedDebug</RuntimeLibrary>
    <InlineFunctionExpansion>Default</InlineFunctionExpansion>
    <Optimization>Disabled</Optimization>
    <SuppressStartupBanner>true</SuppressStartupBanner>
    <WarningLevel>Level3</WarningLevel>
    <DebugInformationFormat>EditAndContinue</DebugInformationFormat>
<PreprocessorDefinitions>WIN32;_DEBUG;_WINDOWS;_USRDLL;%(PreprocessorDefinitions)</PreprocessorD
efinitions>
    <BasicRuntimeChecks>EnableFastChecks</BasicRuntimeChecks>
    <ExceptionHandling>false</ExceptionHandling>
    <LanguageStandard>Default</LanguageStandard>
  </ClCompile>
  <Midl>
    <SuppressStartupBanner>true</SuppressStartupBanner>
    <PreprocessorDefinitions>_DEBUG;%(PreprocessorDefinitions)</PreprocessorDefinitions>
```

```
    <TypeLibraryName>.\Debug\WebBrowser.tlb</TypeLibraryName>
    <MkTypLibCompatible>true</MkTypLibCompatible>
     <TargetEnvironment>Win32</TargetEnvironment>
  </Midl>
  <ResourceCompile>
    <Culture>0x080a</Culture>
    <PreprocessorDefinitions>_DEBUG;%(PreprocessorDefinitions)</PreprocessorDefinitions>
  </ResourceCompile>
  <Bscmake>
    <SuppressStartupBanner>true</SuppressStartupBanner>
    <OutputFile>.\Debug\WebBrowser.bsc</OutputFile>
  </Bscmake>
  <Link>
    <SuppressStartupBanner>true</SuppressStartupBanner>
    <LinkDLL>true</LinkDLL>
    <GenerateDebugInformation>true</GenerateDebugInformation>
    <SubSystem>Windows</SubSystem>
    <OutputFile>.\Debug\WebBrowser.dll</OutputFile>
    <ImportLibrary>.\Debug\WebBrowser.lib</ImportLibrary>
<AdditionalDependencies>odbc32.lib;odbccp32.lib;urlmon.lib;%(AdditionalDependencies)</AdditionalDependenci
es>
    <OptimizeReferences>false</OptimizeReferences>
    <ImageHasSafeExceptionHandlers>false</ImageHasSafeExceptionHandlers>
  </Link>
 </ItemDefinitionGroup>
 <ItemGroup>
   <ClCompile Include="CustomFunctions.cpp" />
  <ClCompile Include="exdll.cpp" />
  <ClCompile Include="main.cpp" />
  <ClCompile Include="Timers.cpp" />
  <ClCompile Include="WebBrowser.cpp" />
 </ItemGroup>
 <ItemGroup>
  <ClInclude Include="exdll.h" />
  <ClInclude Include="resource.h" />
  <ClInclude Include="WebBrowser.h" />
 </ItemGroup>
 <ItemGroup>
  <ResourceCompile Include="resource.rc" />
 </ItemGroup>
 <Import Project="$(VCTargetsPath)\Microsoft.Cpp.targets" />
 <ImportGroup Label="ExtensionTargets">
 </ImportGroup>
</Project>
```



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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With dir Attribute in div Element in text Element 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element that contains a div element with ltr as
the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
```

```
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   &lt;div dir="ltr"&gt;Paragraph 1&lt;/div&gt;
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
// StdAfx.h

#ifndef __STDAFX_H
#define __STDAFX_H

#include "../../../Common/Common.h"

#endif
/* ATK -  Accessibility Toolkit
* Copyright 2001 Sun Microsystems Inc.
*
* This library is free software; you can redistribute it and/or
* modify it under the terms of the GNU Library General Public
* License as published by the Free Software Foundation; either
* version 2 of the License, or (at your option) any later version.
*
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* Library General Public License for more details.
*
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* License along with this library; if not, write to the
* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_HYPERLINK_H__
#define __ATK_HYPERLINK_H__

#ifdef __cplusplus
```

```
extern "C" {
#endif /* __cplusplus */

#include <atk/atkaction.h>

/*
* AtkHyperlink encapsulates a link
 or set of links in a hypertext document.
*
* It implements the AtkAction interface.
*/

/**
*AtkHyperlinkStateFlags
*@ATK_HYPERLINK_IS_INLINE: Link is inline
*
*Describes the type of link
**/
typedef enum
{
 ATK_HYPERLINK_IS_INLINE = 1 << 0
} AtkHyperlinkStateFlags;

#define ATK_TYPE_HYPERLINK                    (atk_hyperlink_get_type ())
#define ATK_HYPERLINK(obj)                    (G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_HYPERLINK, AtkHyperlink))
#define ATK_HYPERLINK_CLASS(klass)            (G_TYPE_CHECK_CLASS_CAST ((klass),
ATK_TYPE_HYPERLINK, AtkHyperlinkClass))
#define ATK_IS_HYPERLINK(obj)                 (G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_HYPERLINK))
#define ATK_IS_HYPERLINK_CLASS(klass)         (G_TYPE_CHECK_CLASS_TYPE ((klass),
ATK_TYPE_HYPERLINK))
#define ATK_HYPERLINK_GET_CLASS(obj)          (G_TYPE_INSTANCE_GET_CLASS ((obj),
ATK_TYPE_HYPERLINK, AtkHyperlinkClass))

typedef struct _AtkHyperlink                  AtkHyperlink;
typedef
 struct _AtkHyperlinkClass                AtkHyperlinkClass;

struct _AtkHyperlink
{
 GObject parent;
};

struct _AtkHyperlinkClass
{
 GObjectClass parent;
```

```
 gchar*          (* get_uri)            (AtkHyperlink     *link_,
                                  gint            i);
 AtkObject*      (* get_object)         (AtkHyperlink     *link_,
                                  gint            i);
 gint            (* get_end_index)      (AtkHyperlink     *link_);
 gint            (* get_start_index)     (AtkHyperlink     *link_);
 gboolean        (* is_valid)           (AtkHyperlink     *link_);
 gint            (* get_n_anchors)    (AtkHyperlink     *link_);
 guint           (* link_state)    (AtkHyperlink     *link_);
 gboolean        (* is_selected_link)    (AtkHyperlink     *link_);

 /* Signals */
 void            ( *link_activated)      (AtkHyperlink     *link_);
 AtkFunction      pad1;
};

GType           atk_hyperlink_get_type
            (void);

gchar*          atk_hyperlink_get_uri            (AtkHyperlink     *link_,
                                          gint            i);

AtkObject*      atk_hyperlink_get_object         (AtkHyperlink     *link_,
                                          gint            i);

gint            atk_hyperlink_get_end_index       (AtkHyperlink     *link_);

gint            atk_hyperlink_get_start_index     (AtkHyperlink     *link_);

gboolean        atk_hyperlink_is_valid           (AtkHyperlink     *link_);

gboolean        atk_hyperlink_is_inline           (AtkHyperlink     *link_);

gint   atk_hyperlink_get_n_anchors       (AtkHyperlink     *link_);
gboolean        atk_hyperlink_is_selected_link     (AtkHyperlink     *link_);


#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_HYPERLINK_H__ */
# -*- Mode: python; indent-tabs-mode: nil; tab-width: 40 -*-
# vim: set filetype=python:
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# License, v. 2.0. If a copy of the MPL was not distributed with this
# file, You can obtain one at http://mozilla.org/MPL/2.0/.
```

```
HOST_SOURCES += [
  'bsdiff.c',
]

HostProgram('mbsdiff')

if CONFIG['HOST_OS_ARCH'] == 'WINNT':
  HOST_OS_LIBS += [
     'ws2_32',
  ]
  USE_STATIC_LIBS = True

LOCAL_INCLUDES += [
  '/toolkit/mozapps/update/updater',
  '/toolkit/mozapps/update/updater/bspatch',
]
```

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```
/*****************************************************************
*
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*
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* REPRESENTATION OR WARRANTY OF ANY KIND CONCERNING THE MERCHANTABILITY
* OF THIS SOFTWARE OR ITS FITNESS FOR ANY PARTICULAR PURPOSE.
*
*****************************************************************/
// Common/MyTypes.h

#ifndef __COMMON_MY_TYPES_H
#define __COMMON_MY_TYPES_H

#include "../../C/7zTypes.h"

typedef int HRes;

struct CBoolPair
{
 bool Val;
```

```
 bool Def;

 CBoolPair(): Val(false), Def(false) {}

 void Init()
 {
   Val = false;
   Def = false;
 }

 void SetTrueTrue()
 {
   Val = true;
   Def = true;
 }
};

#define CLASS_NO_COPY(cls) \
 private: \
 cls(const cls &); \
 cls &operator=(const cls &);

#endif
```

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UNRECOGNIZED LICENSE; MD5 sum: 7326e262da7e223516bc77ef7e900d68

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With class Attribute in div Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element that contains a div element with &quot;class1 class2 class3&quot; as the value for the class attribute." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   &lt;div class="class1 class2 class3"&gt;Paragraph 1&lt;/div&gt;
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
```

```
  </pre>
 </body>
</html>
// Extract.h

#ifndef __EXTRACT_H
#define __EXTRACT_H

#include "../../../Windows/FileFind.h"

#include "../../Archive/IArchive.h"

#include "ArchiveExtractCallback.h"
#include "ArchiveOpenCallback.h"
#include "ExtractMode.h"
#include "Property.h"

#include "../Common/LoadCodecs.h"

struct CExtractOptionsBase
{
 CBoolPair ElimDup;

 bool PathMode_Force;
 bool OverwriteMode_Force;
 NExtract::NPathMode::EEnum PathMode;
 NExtract::NOverwriteMode::EEnum OverwriteMode;

 FString OutputDir;
 CExtractNtOptions NtOptions;

 CExtractOptionsBase():
    PathMode_Force(false),
    OverwriteMode_Force(false),
    PathMode(NExtract::NPathMode::kFullPaths),
    OverwriteMode(NExtract::NOverwriteMode::kAsk)
    {}
};

struct CExtractOptions: public CExtractOptionsBase
{
 bool StdInMode;
 bool StdOutMode;
 bool YesToAll;
 bool TestMode;

 // bool ShowDialog;
 // bool PasswordEnabled;
```

```
 // UString Password;
 #ifndef _SFX
 CObjectVector<CProperty> Properties;
 #endif

 #ifdef
 EXTERNAL_CODECS
 CCodecs *Codecs;
 #endif

 CExtractOptions():
    TestMode(false),
    StdInMode(false),
    StdOutMode(false),
    YesToAll(false)
    {}
};

struct CDecompressStat
{
 UInt64 NumArchives;
 UInt64 UnpackSize;
 UInt64 AltStreams_UnpackSize;
 UInt64 PackSize;
 UInt64 NumFolders;
 UInt64 NumFiles;
 UInt64 NumAltStreams;

 void Clear()
 {
   NumArchives = UnpackSize = AltStreams_UnpackSize = PackSize = NumFolders = NumFiles = NumAltStreams
= 0;
 }
};

HRESULT Extract(
   CCodecs *codecs,
   const CObjectVector<COpenType> &types,
   const CIntVector &excludedFormats,
   UStringVector &archivePaths, UStringVector &archivePathsFull,
   const NWildcard::CCensorNode &wildcardCensor,
   const CExtractOptions &options,
   IOpenCallbackUI *openCallback,
   IExtractCallbackUI *extractCallback,
   #ifndef _SFX
   IHashCalc *hash,
   #endif
   UString &errorMessage,
```

CDecompressStat &st);

#endif
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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

At the time this file was first modified, a complete, unmodified copy of
the LPPL Work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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Swedish hyphenation patterns (Jan Michael Rynning, 1994-03-03)

(more info about the licence to be added later)

% This file is

```
 part of hyph-utf8 package and resulted from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% Source: sehyph.tex (2003-09-08)
% Author: Jan Michael Rynning
%
% The above mentioned file should become obsolete,
% and the author of the original file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%               and helped with testing, suggestions and bug reports
% - Norbert Preining, who tested
 & integrated patterns into TeX Live
%
% However, the "copyright/copyleft" owner of patterns remains the original author.
%
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%
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%    "a better world" as long as you respect the copyright of original file.
%    If you're the original author of patterns or taking over a new revolution,
%    plese remove all of the TUG comments & credits that we added here -
%    you are the Queen / the King, we are only the servants.
%
% If you want to change this file, rather than uploading directly to CTAN,
% we would be grateful if you could send it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
% Before a new "pattern-revolution" starts,
% please try to follow some guidelines if possible:
%
% - \lccode is *forbidden*, and I really mean it
% - all the patterns should be in
 UTF-8
% - the only "allowed" TeX commands in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
```

```
%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
%-----------------------------------------------------------------------------
%
% Swedish hyphenation patterns.
%
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 version of this license
% is in http://www.latex-project.org/lppl.txt and version 1.2 or later is
% part of all distributions of LaTeX version 1999/12/01 or later.
%
% Last update: 1994-03-03 (March 3, 1994).
% Revision history:
% 1991-01-08: First version available for anonymous FTP.
% 1991-08-08: Changed \aa to \aa0 at end of line, to stop TeX from
%           concatenating the patterns.
% 1991-09-03: Cleaned up lots of inconsistencies in the dictionary.
%           As a consequence, the patterns shrunk a lot.  Also
%           added some 4000 one-syllable words, some of which were
%           hyphenated by the old patterns, and some 1500 compound
%           words, about half of which were incorrectly hyphenated
%           by the old patterns.
% 1991-11-01: Added another some 6200 compound words, all of which were
%           incorrectly hyphenated by the old patterns.
% 1991-11-13: Added another some 6500 compound words, all of which were
%           incorrectly hyphenated
 by the old patterns.
% 1992-01-30: Changed macros to ^^, for use with LaTeX and dc fonts.
% 1994-03-03: The hyphenated dictionary now contains about 118,000 words.
%           The hyphenation now works much better for compound words.
%           Patgen parameters: 1 2 20, 2 1 8, 1 4 7, 3 2 1, 1 10000 4.
%
% This file contains Swedish hyphenation patterns for TeX.  It assumes
% that you have fonts with the Swedish letters in the positions where
% they occur in ISO Latin 1 (ISO 8859/1):
```

% Letter:  \AA  \"A  \"O  \'E  \aa  \"a  \"o  \'e
% Position: "C5  "C4  "D6  "C9  "E5  "E4  "F6  "E9
%
% Load this file into initex after plain.tex (or lplain.tex, splain.tex,
% or whatever).
%
% The patterns were generated in such a way that they will hyphenate
% correctly if \lefthyphenmin>=1 and \righthyphenmin>=2.
%
% These hyphenation patterns work quite well for simple words, but not
% quite as well for compound words.  I'm working on improving the quality,
% by adding more words.  If
you know any Swedish words which are not
% correctly hypheneted using these patterns, or if you have questions or
% comments, please contact me:
%
% Jan Michael Rynning <jmr@incolumitas.se>
% ----------
%

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====

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<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With Nested div Elements in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element that contains nested div elements." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {

```
   font-size: 20px;
  }
  pre {
   font-size:
 12px;
  }
  .test {
   font-family: "WOFF Test CFF Reference";
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   &lt;div&gt;
    div 1 start
    &lt;div&gt;
     div 2 start
     &lt;div&gt;
      div 3
     &lt;/div&gt;
     div 2 end
    &lt;/div&gt;
    div 1 end
   &lt;/div&gt;
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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Version 3, 29 June 2007

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At the time this file was first modified, a complete, unmodified copy of
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http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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German hyphenation patterns (reformed orthography)

(more info about the licence to be added later)

% dehyphn-x-2011-06-01.pat

\message{German

Hyphenation Patterns (Reformed Orthography, 2006) `dehyphn-x' 2011-06-01 (WL)}

```
% TeX-Trennmuster fr die reformierte (2006) deutsche Rechtschreibung
%
%
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% version 1 of the License, or any later version.
%
%
% The word list is available from
%
%   http://repo.or.cz/w/wortliste.git?a=commit;h=2d246449f5c4f570f4d735d3ad091f6ad70f6972
%
% The used patgen parameters are
%
%   1 1 | 2 5 | 1 1 1
%   2 2 | 2 5 | 1 2 1
%   3 3 | 2 6 | 1 1 1
%   4 4 | 2 6 | 1 4 1
%   5 5 | 2 7 | 1 1 1
%   6 6 | 2 7 | 1 6 1
%   7 7 | 2 13 | 1 4 1
%   8 8 | 2 13 | 1 8 1
<?xml version="1.0" encoding="utf-8"?>
<Project DefaultTargets="Build" xmlns="http://schemas.microsoft.com/developer/msbuild/2003">
 <ItemGroup Label="ProjectConfigurations">
  <ProjectConfiguration Include="Debug|Win32">
   <Configuration>Debug</Configuration>
   <Platform>Win32</Platform>
  </ProjectConfiguration>
  <ProjectConfiguration Include="Release|Win32">
   <Configuration>Release</Configuration>
   <Platform>Win32</Platform>
  </ProjectConfiguration>
 </ItemGroup>
 <ItemGroup>
  <ClCompile Include="InetBgDL.cpp" />
 </ItemGroup>
 <ItemGroup>
  <ClInclude Include="InetBgDL.h" />
 </ItemGroup>
 <PropertyGroup Label="Globals">
  <VCProjectVersion>16.0</VCProjectVersion>
  <ProjectGuid>{B9B76BC4-5C6C-4808-AC23-2C10126CDFC0}</ProjectGuid>
```

```
  <Keyword>Win32Proj</Keyword>
  <RootNamespace>InetBgDl</RootNamespace>
  <WindowsTargetPlatformVersion>10.0</WindowsTargetPlatformVersion>
 </PropertyGroup>
 <Import Project="$(VCTargetsPath)\Microsoft.Cpp.Default.props"
 />
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'" Label="Configuration">
  <ConfigurationType>DynamicLibrary</ConfigurationType>
  <UseDebugLibraries>true</UseDebugLibraries>
  <PlatformToolset>v142</PlatformToolset>
  <CharacterSet>Unicode</CharacterSet>
 </PropertyGroup>
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'" Label="Configuration">
  <ConfigurationType>DynamicLibrary</ConfigurationType>
  <UseDebugLibraries>false</UseDebugLibraries>
  <PlatformToolset>v142</PlatformToolset>
  <WholeProgramOptimization>true</WholeProgramOptimization>
  <CharacterSet>Unicode</CharacterSet>
 </PropertyGroup>
 <Import Project="$(VCTargetsPath)\Microsoft.Cpp.props" />
 <ImportGroup Label="ExtensionSettings">
 </ImportGroup>
 <ImportGroup Label="Shared">
 </ImportGroup>
 <ImportGroup Label="PropertySheets" Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'">
  <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
 Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform" />
 </ImportGroup>
 <ImportGroup Label="PropertySheets" Condition="'$(Configuration)|$(Platform)'=='Release|Win32'">
  <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform" />
 </ImportGroup>
 <PropertyGroup Label="UserMacros" />
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'">
  <LinkIncremental>true</LinkIncremental>
 </PropertyGroup>
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'">
  <LinkIncremental>false</LinkIncremental>
 </PropertyGroup>
 <ItemDefinitionGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'">
  <ClCompile>
   <PrecompiledHeader>NotUsing</PrecompiledHeader>
   <WarningLevel>Level3</WarningLevel>
   <Optimization>Disabled</Optimization>
    <SDLCheck>false</SDLCheck>
<PreprocessorDefinitions>WINVER=0x601;_WIN32_WINNT=0x601;WIN32;_DEBUG;INETBGDL_EXPORTS;
_WINDOWS;_USRDLL;%(PreprocessorDefinitions)</PreprocessorDefinitions>
   <ConformanceMode>true</ConformanceMode>
```

```
    <PrecompiledHeaderFile>pch.h</PrecompiledHeaderFile>
    <ExceptionHandling>false</ExceptionHandling>
  </ClCompile>
  <Link>
    <SubSystem>Console</SubSystem>
    <GenerateDebugInformation>true</GenerateDebugInformation>
    <EnableUAC>false</EnableUAC>
    <AdditionalDependencies>wininet.lib;%(AdditionalDependencies)</AdditionalDependencies>
    <LinkTimeCodeGeneration>UseLinkTimeCodeGeneration</LinkTimeCodeGeneration>
    <ImageHasSafeExceptionHandlers>false</ImageHasSafeExceptionHandlers>
  </Link>
 </ItemDefinitionGroup>
 <ItemDefinitionGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'">
  <ClCompile>
    <PrecompiledHeader>NotUsing</PrecompiledHeader>
    <WarningLevel>Level3</WarningLevel>
     <Optimization>MinSpace</Optimization>
    <FunctionLevelLinking>true</FunctionLevelLinking>
    <IntrinsicFunctions>true</IntrinsicFunctions>
    <SDLCheck>false</SDLCheck>
<PreprocessorDefinitions>WINVER=0x601;_WIN32_WINNT=0x601;WIN32;NDEBUG;INETBGDL_EXPORTS;
_WINDOWS;_USRDLL;%(PreprocessorDefinitions)</PreprocessorDefinitions>
    <ExceptionHandling>false</ExceptionHandling>
    <RuntimeLibrary>MultiThreaded</RuntimeLibrary>
    <OmitDefaultLibName>true</OmitDefaultLibName>
    <BufferSecurityCheck>false</BufferSecurityCheck>
    <FavorSizeOrSpeed>Size</FavorSizeOrSpeed>
  </ClCompile>
  <Link>
    <SubSystem>Console</SubSystem>
    <EnableCOMDATFolding>true</EnableCOMDATFolding>
    <OptimizeReferences>true</OptimizeReferences>
    <GenerateDebugInformation>false</GenerateDebugInformation>
    <EnableUAC>false</EnableUAC>
    <AdditionalDependencies>wininet.lib;%(AdditionalDependencies)</AdditionalDependencies>
    <LinkTimeCodeGeneration>UseLinkTimeCodeGeneration</LinkTimeCodeGeneration>
     <ImageHasSafeExceptionHandlers>false</ImageHasSafeExceptionHandlers>
    <EntryPointSymbol>DllMain</EntryPointSymbol>
  </Link>
 </ItemDefinitionGroup>
 <Import Project="$(VCTargetsPath)\Microsoft.Cpp.targets" />
 <ImportGroup Label="ExtensionTargets">
 </ImportGroup>
</Project>
```

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```
// Lzma2Encoder.h

#ifndef __LZMA2_ENCODER_H
#define __LZMA2_ENCODER_H

#include "../../../C/Lzma2Enc.h"

#include "../../Common/MyCom.h"

#include "../ICoder.h"

namespace NCompress {
namespace NLzma2 {

class CEncoder:
 public ICompressCoder,
 public ICompressSetCoderProperties,
 public ICompressWriteCoderProperties,
 public ICompressSetCoderPropertiesOpt,
 public CMyUnknownImp
{
 CLzma2EncHandle _encoder;
public:
 MY_UNKNOWN_IMP4(
    ICompressCoder,
```

```
    ICompressSetCoderProperties,
    ICompressWriteCoderProperties,
    ICompressSetCoderPropertiesOpt)

 STDMETHOD(Code)(ISequentialInStream *inStream, ISequentialOutStream *outStream,
    const UInt64 *inSize, const UInt64 *outSize, ICompressProgressInfo *progress);
 STDMETHOD(SetCoderProperties)(const PROPID *propIDs, const PROPVARIANT *props, UInt32 numProps);
 STDMETHOD(WriteCoderProperties)(ISequentialOutStream *outStream);
 STDMETHOD(SetCoderPropertiesOpt)(const PROPID *propIDs, const PROPVARIANT *props, UInt32
 numProps);

 CEncoder();
 virtual ~CEncoder();
};

}}

#endif
PROG = 7zxr.dll
DEF_FILE = ../../Archive/Archive2.def
CFLAGS = $(CFLAGS) \
 -DEXTRACT_ONLY \
 -D_NO_CRYPTO

COMMON_OBJS = \
 $O\CRC.obj \
 $O\CrcReg.obj \
 $O\IntToString.obj \
 $O\NewHandler.obj \
 $O\MyString.obj \
 $O\StringConvert.obj \
 $O\StringToInt.obj \
 $O\MyVector.obj \
 $O\Wildcard.obj \

WIN_OBJS = \
 $O\PropVariant.obj \
 $O\Synchronization.obj \
 $O\System.obj \

7ZIP_COMMON_OBJS = \
 $O\CreateCoder.obj \
 $O\CWrappers.obj \
 $O\InBuffer.obj \
 $O\FilterCoder.obj \
 $O\LimitedStreams.obj \
 $O\MethodId.obj \
 $O\MethodProps.obj \
```

```
 $O\OutBuffer.obj \
 $O\ProgressUtils.obj \
 $O\PropId.obj \
 $O\StreamBinder.obj \
 $O\StreamObjects.obj \
 $O\StreamUtils.obj \
 $O\VirtThread.obj \

AR_OBJS = \
 $O\ArchiveExports.obj \
 $O\DllExports2.obj \

AR_COMMON_OBJS = \
 $O\CoderMixer2.obj \
 $O\HandlerOut.obj \
 $O\ItemNameUtils.obj \
 $O\OutStreamWithCRC.obj \
 $O\ParseProperties.obj \


7Z_OBJS = \
 $O\7zCompressionMode.obj \
 $O\7zDecode.obj \
  $O\7zExtract.obj \
 $O\7zHandler.obj \
 $O\7zHeader.obj \
 $O\7zIn.obj \
 $O\7zProperties.obj \
 $O\7zRegister.obj \


COMPRESS_OBJS = \
 $O\CodecExports.obj \
 $O\Bcj2Coder.obj \
 $O\Bcj2Register.obj \
 $O\BcjCoder.obj \
 $O\BcjRegister.obj \
 $O\BranchMisc.obj \
 $O\BranchRegister.obj \
 $O\ByteSwap.obj \
 $O\CopyCoder.obj \
 $O\CopyRegister.obj \
 $O\DeltaFilter.obj \
 $O\Lzma2Decoder.obj \
 $O\Lzma2Register.obj \
 $O\LzmaDecoder.obj \
 $O\LzmaRegister.obj \
```

```
C_OBJS = \
 $O\Alloc.obj \
 $O\Bcj2.obj \
 $O\Bra.obj \
 $O\Bra86.obj \
 $O\BraIA64.obj \
 $O\CpuArch.obj \
 $O\Delta.obj \
 $O\Lzma2Dec.obj \
 $O\Lzma2DecMt.obj \
 $O\LzmaDec.obj \
 $O\MtDec.obj \
 $O\Threads.obj \

!include "../../Crc.mak"
!include "../../LzmaDec.mak"

!include "../../7zip.mak"
// StdAfx.h

#ifndef __STDAFX_H
#define __STDAFX_H

#include "../../../Common/Common.h"

#include <commctrl.h>
#include <ShlObj.h>

// #define printf(x) NO_PRINTF_(x)
// #define sprintf(x) NO_SPRINTF_(x)

#endif
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: More Than One copyright Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element occurs more than once." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF
 Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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```
/* 7zBuf.h -- Byte Buffer
2017-04-03 : Igor Pavlov : Public domain */

#ifndef __7Z_BUF_H
#define __7Z_BUF_H

#include "7zTypes.h"

EXTERN_C_BEGIN

typedef struct
{
 Byte *data;
 size_t size;
} CBuf;

void Buf_Init(CBuf *p);
int Buf_Create(CBuf *p, size_t size, ISzAllocPtr alloc);
void Buf_Free(CBuf *p, ISzAllocPtr alloc);

typedef struct
{
 Byte *data;
 size_t size;
```

```
 size_t pos;
} CDynBuf;

void DynBuf_Construct(CDynBuf *p);
void DynBuf_SeekToBeg(CDynBuf *p);
int DynBuf_Write(CDynBuf *p, const Byte *buf, size_t size, ISzAllocPtr alloc);
void DynBuf_Free(CDynBuf *p, ISzAllocPtr alloc);

EXTERN_C_END

#endif
// Common/MyBuffer.h

#ifndef __COMMON_MY_BUFFER_H
#define __COMMON_MY_BUFFER_H

#include "Defs.h"

/* 7-Zip now uses CBuffer only as CByteBuffer.
  So there is no need to use MY_ARRAY_NEW macro in CBuffer code. */

template <class T> class CBuffer
{
 T *_items;
 size_t _size;

public:
 void Free()
 {
   if (_items)
   {
     delete []_items;
     _items = 0;
   }
   _size = 0;
 }

 CBuffer(): _items(0), _size(0) {};
 CBuffer(size_t size): _items(0), _size(0) { _items = new T[size]; _size = size; }
 CBuffer(const CBuffer &buffer): _items(0), _size(0)
 {
   size_t size = buffer._size;
   if (size != 0)
   {
     _items = new T[size];
     memcpy(_items, buffer._items, size * sizeof(T));
     _size = size;
   }
```

```
}

~CBuffer() { delete []_items; }

operator       T *()       { return _items; }
operator const T *() const { return _items; }
size_t Size() const { return _size; }

void Alloc(size_t size)
{
  if (size != _size)
  {
    Free();
    if
(size != 0)
    {
      _items = new T[size];
      _size = size;
    }
  }
}

void AllocAtLeast(size_t size)
{
  if (size > _size)
  {
    Free();
    _items = new T[size];
    _size = size;
  }
}

void CopyFrom(const T *data, size_t size)
{
  Alloc(size);
  if (size != 0)
    memcpy(_items, data, size * sizeof(T));
}

void ChangeSize_KeepData(size_t newSize, size_t keepSize)
{
  if (newSize == _size)
    return;
  T *newBuffer = NULL;
  if (newSize != 0)
  {
    newBuffer = new T[newSize];
    if (keepSize > _size)
```

```
      keepSize = _size;
    if (keepSize != 0)
      memcpy(newBuffer, _items, MyMin(keepSize, newSize) * sizeof(T));
  }
  delete []_items;
  _items = newBuffer;
  _size = newSize;
}

CBuffer& operator=(const CBuffer &buffer)
{
  if (&buffer != this)
    CopyFrom(buffer, buffer._size);
  return *this;
}
};

template <class T>
bool operator==(const CBuffer<T>& b1, const CBuffer<T>& b2)
{
  size_t size1 = b1.Size();
 if (size1 != b2.Size())
   return false;
 if (size1 == 0)
   return true;
 return memcmp(b1, b2, size1 * sizeof(T)) == 0;
}

template <class T>
bool operator!=(const CBuffer<T>& b1, const CBuffer<T>& b2)
{
 size_t size1 = b1.Size();
 if (size1 != b2.Size())
   return true;
 if (size1 == 0)
   return false;
 return memcmp(b1, b2, size1 * sizeof(T)) != 0;
}


// typedef CBuffer<char> CCharBuffer;
// typedef CBuffer<wchar_t> CWCharBuffer;
typedef CBuffer<unsigned char> CByteBuffer;


template <class T> class CObjArray
{
protected:
```

```
 T *_items;
private:
 // we disable copy
 CObjArray(const CObjArray &buffer);
 void operator=(const CObjArray &buffer);
public:
 void Free()
 {
   delete []_items;
   _items = 0;
 }
 CObjArray(size_t size): _items(0)
 {
   if (size != 0)
   {
     MY_ARRAY_NEW(_items, T, size)
     // _items = new T[size];
   }
 }
 CObjArray(): _items(0) {};
 ~CObjArray() { delete []_items; }

 operator       T *()
       { return _items; }
 operator const T *() const { return _items; }

 void Alloc(size_t newSize)
 {
   delete []_items;
   _items = 0;
   MY_ARRAY_NEW(_items, T, newSize)
   // _items = new T[newSize];
 }
};

typedef CObjArray<unsigned char> CByteArr;
typedef CObjArray<bool> CBoolArr;
typedef CObjArray<int> CIntArr;
typedef CObjArray<unsigned> CUIntArr;


template <class T> class CObjArray2
{
 T *_items;
 unsigned _size;

 // we disable copy
 CObjArray2(const CObjArray2 &buffer);
```

```
 void operator=(const CObjArray2 &buffer);
public:

 void Free()
 {
   delete []_items;
   _items = 0;
   _size = 0;
 }
 CObjArray2(): _items(0), _size(0) {};
 /*
 CObjArray2(const CObjArray2 &buffer): _items(0), _size(0)
 {
   size_t newSize = buffer._size;
   if (newSize != 0)
   {
     T *newBuffer = new T[newSize];;
     _items = newBuffer;
     _size = newSize;
     const T *src = buffer;
     for (size_t i = 0; i < newSize; i++)
       newBuffer[i] = src[i];

 }
 }
 */
 /*
 CObjArray2(size_t size): _items(0), _size(0)
 {
   if (size != 0)
   {
     _items = new T[size];
     _size = size;
   }
 }
 */

 ~CObjArray2() { delete []_items; }

 operator       T *()       { return _items; }
 operator const T *() const { return _items; }

 unsigned Size() const { return (unsigned)_size; }
 bool IsEmpty() const { return _size == 0; }

 // SetSize doesn't keep old items. It allocates new array if size is not equal
 void SetSize(unsigned size)
 {
```

```
  if (size == _size)
    return;
  T *newBuffer = NULL;
  if (size != 0)
  {
    MY_ARRAY_NEW(newBuffer, T, size)
    // newBuffer = new T[size];
  }
  delete []_items;
  _items = newBuffer;
  _size = size;
}

/*
CObjArray2& operator=(const CObjArray2 &buffer)
{
  Free();
  size_t newSize = buffer._size;
  if (newSize != 0)
  {
    T *newBuffer = new T[newSize];;
    _items = newBuffer;
    _size = newSize;
    const T *src = buffer;
    for
(size_t i = 0; i < newSize; i++)
      newBuffer[i] = src[i];
  }
  return *this;
}
*/
};

#endif
```

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* Boston, MA 02111-1307, USA.
*/

```
#ifndef __ATK_GOBJECT_ACCESSIBLE_H__
#define __ATK_GOBJECT_ACCESSIBLE_H__

#include <atk/atk.h>


#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

/*
* The AtkGObjectAccessible
 class is provided as a basis for implementing
* accessibility support for objects which are not GTK+ widgets
*/
#define ATK_TYPE_GOBJECT_ACCESSIBLE            (atk_gobject_accessible_get_type ())
#define ATK_GOBJECT_ACCESSIBLE(obj)            (G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_GOBJECT_ACCESSIBLE, AtkGObjectAccessible))
#define ATK_GOBJECT_ACCESSIBLE_CLASS(klass)    (G_TYPE_CHECK_CLASS_CAST ((klass),
ATK_TYPE_GOBJECT_ACCESSIBLE, AtkGObjectAccessibleClass))
#define ATK_IS_GOBJECT_ACCESSIBLE(obj)         (G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_GOBJECT_ACCESSIBLE))
#define ATK_IS_GOBJECT_ACCESSIBLE_CLASS(klass) (G_TYPE_CHECK_CLASS_TYPE ((klass),
ATK_TYPE_GOBJECT_ACCESSIBLE))
#define ATK_GOBJECT_ACCESSIBLE_GET_CLASS(obj)  (G_TYPE_INSTANCE_GET_CLASS ((obj),
ATK_TYPE_GOBJECT_ACCESSIBLE, AtkGObjectAccessibleClass))

typedef struct _AtkGObjectAccessible                AtkGObjectAccessible;
typedef struct _AtkGObjectAccessibleClass           AtkGObjectAccessibleClass;

struct
 _AtkGObjectAccessible
{
 AtkObject parent;
};

GType atk_gobject_accessible_get_type (void);

struct _AtkGObjectAccessibleClass
{
 AtkObjectClass parent_class;

 AtkFunction pad1;
 AtkFunction pad2;
};

AtkObject *atk_gobject_accessible_for_object      (GObject           *obj);
GObject   *atk_gobject_accessible_get_object      (AtkGObjectAccessible *obj);
```

```
#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_GOBJECT_ACCESSIBLE_H__ */
/* ATK -  Accessibility Toolkit
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* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_NO_OP_OBJECT_H__
#define __ATK_NO_OP_OBJECT_H__

G_BEGIN_DECLS

#define ATK_TYPE_NO_OP_OBJECT                (atk_no_op_object_get_type ())
#define ATK_NO_OP_OBJECT(obj)
            (G_TYPE_CHECK_INSTANCE_CAST ((obj), ATK_TYPE_NO_OP_OBJECT, AtkNoOpObject))
#define ATK_NO_OP_OBJECT_CLASS(klass)       (G_TYPE_CHECK_CLASS_CAST ((klass),
ATK_TYPE_NO_OP_OBJECT, AtkNoOpObjectClass))
#define ATK_IS_NO_OP_OBJECT(obj)            (G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_NO_OP_OBJECT))
#define ATK_IS_NO_OP_OBJECT_CLASS(klass)    (G_TYPE_CHECK_CLASS_TYPE ((klass),
ATK_TYPE_NO_OP_OBJECT))
#define ATK_NO_OP_OBJECT_GET_CLASS(obj)     (G_TYPE_INSTANCE_GET_CLASS ((obj),
ATK_TYPE_NO_OP_OBJECT, AtkNoOpObjectClass))

typedef struct _AtkNoOpObject                AtkNoOpObject;
typedef struct _AtkNoOpObjectClass           AtkNoOpObjectClass;

struct _AtkNoOpObject
{
```

```
 AtkObject     parent;
};

GType atk_no_op_object_get_type (void);

struct _AtkNoOpObjectClass
{
 AtkObjectClass parent_class;
};

AtkObject *atk_no_op_object_new (GObject  *obj);

G_END_DECLS

#endif /* __ATK_NO_OP_OBJECT_H__ */
```

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```
// MyLinux.h

#ifndef __MY_LIN_LINUX_H
#define __MY_LIN_LINUX_H

#define MY_LIN_S_IFMT  00170000
#define MY_LIN_S_IFSOCK 0140000
#define MY_LIN_S_IFLNK  0120000
#define MY_LIN_S_IFREG  0100000
#define MY_LIN_S_IFBLK  0060000
#define MY_LIN_S_IFDIR  0040000
#define MY_LIN_S_IFCHR  0020000
#define MY_LIN_S_IFIFO  0010000

#define MY_LIN_S_ISLNK(m)   (((m) & MY_LIN_S_IFMT) == MY_LIN_S_IFLNK)
#define MY_LIN_S_ISREG(m)   (((m) & MY_LIN_S_IFMT) == MY_LIN_S_IFREG)
#define MY_LIN_S_ISDIR(m)   (((m) & MY_LIN_S_IFMT) == MY_LIN_S_IFDIR)
#define MY_LIN_S_ISCHR(m)   (((m) & MY_LIN_S_IFMT) == MY_LIN_S_IFCHR)
#define MY_LIN_S_ISBLK(m)   (((m) & MY_LIN_S_IFMT) == MY_LIN_S_IFBLK)
#define MY_LIN_S_ISFIFO(m)  (((m) & MY_LIN_S_IFMT) == MY_LIN_S_IFIFO)
#define MY_LIN_S_ISSOCK(m)  (((m) & MY_LIN_S_IFMT) == MY_LIN_S_IFSOCK)

#define MY_LIN_S_ISUID 0004000
#define MY_LIN_S_ISGID 0002000
```

```
#define MY_LIN_S_ISVTX 0001000

#define MY_LIN_S_IRWXU 00700
#define MY_LIN_S_IRUSR 00400
#define MY_LIN_S_IWUSR 00200
#define
 MY_LIN_S_IXUSR 00100

#define MY_LIN_S_IRWXG 00070
#define MY_LIN_S_IRGRP 00040
#define MY_LIN_S_IWGRP 00020
#define MY_LIN_S_IXGRP 00010

#define MY_LIN_S_IRWXO 00007
#define MY_LIN_S_IROTH 00004
#define MY_LIN_S_IWOTH 00002
#define MY_LIN_S_IXOTH 00001

#endif
```

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strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With One span Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element that contains a span element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size:
 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
```

```
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   Text with &lt;span&gt;span&lt;/span&gt;.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
MZ@ !L!This program cannot be run in DOS mode.

$+NsEsEsElNsEooKsElOsElAsEb{sEsDsEo{sEUNsEsEsE+uCsERichsEPEL@Z.Xf[p@@P
p$.textWX `.rdata*p,\@@.data0"@.sxdata@.rsrc@@.reloc@B
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@USVWRjYGuUUE~^tRjYGU;VuU;Vu;u;t9UFVUNVUvvwAKvv _^3[t$t$
wA U uMuM^AHGSVWMebeUMEMM-M4l@wA$l@MMjXM_^d
[VwA^qA@PQqAYYqA@Pj
pAYYT_AFSVWeYuzAwu
u&3]]]]~5OS\B$PMEe\$#OYu|XE|Pjh8qAEuMUF@|E8d
xZ
M,Mu|39]w|ME9]]]eMxdEt/@l0EjZ6MUzAj|x<t@D06zAMChzAP|EtP0
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]}E]tljd ;YtXyA3PM1.qAhppAYY]}E ]j ;YXXXyArEj$EpYE;Et-3WME}-6Od$uyAEE;tPQj^
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qAhp0pAYYE32;}}MQH"hAPyA)CEMj<;YtXHtyA3VMu,^jPN^f$mXyA(EE;PQ}uuHyAu}t5}u/Et$jYj3X;Uw
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AP<xA9@;tixAEE;tPQEE;tPQP%YEMCe|MM
jXuM<t4qAhAP?4hAP4xAq?}}}E
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Z|tEjYj
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;MDxAhAhYd;E
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tVPEE tPQEEtPQEEtPQt/FHUNL;uE;tHwAhAHP9E
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1YjU
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MW
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uS.0jj
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\`A!eVRM.ue}uYM^d
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fD$F^Vf>t
fD$FD$F^3%}/;t+~~! ~~QqA|~@uQffQfQfQQ3f9u3VVqAL$%}/|~% ~~QVqA^|~@ujQVpA3Vf>u3^}f
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UQSVWU3WA;v6A1^;]u^;]t
B;rMP v_^3[tPQVW|$tWPtPQ>_^3@d|A@T|A@D|AHHHHH
,|A@|A@|A@{AUVuW}&jhAWuEtjhwAWztjh`wAWfu
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%
^]U9EsEVMjQPujDpAPhpAEtMupAmu3
^]t3pAu@~
%
U}r1EPEuHuuRUtM
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;sURPSVQ]+}u9Eu@3_^[]D$Vt$H+H;v;v3vWP|$P
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U
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P-AAAU9EsEA38t3MO3-QPQPjjRPjYfuuuuu uRPkRP*]SUVWjXj_3p;vBr@ r _^][USVWuujvu$u
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@r3;P29}uJ}KeMEGEEvM)MUA;MMrEEG3
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D$@3@^D$@@Vt$NFut
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Y3#EKu6j
YEM#u"j
YEG#3uj
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U8SV3sW EPEPEPU}uK}swEMuMue3}UEPEPEPEKuj_FOuE}|}OUj(EPj)_^[UQSVW3]}tuF|_^[`cAVWf
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uuuv6jYRPjZhOuPuTYY3

uTY (HA(eAEtEE}E}Eu}6 8}Et+} E}EurE
t5tP}vPP}EPt7v2ujZM;Drw;@vNwjX}Et#;thAjZjVPMUQhAuRPjAPP}teEEe3}}}tE}EtE*t7Au@5AAu%P}Aux
A3j
pAhAjdAj\Aj}tjXAPAj}t;u5AF|P}LAAj
DAZjOjDj9}tj(j}t}u5AE}|PPEMtEM}e}39}tPj@AztEEu3jXlQMQMuuPuut'MEtMEu
tjZ3EHPuuGfttuuj^V}u@}EuE}u
}u3tQSuMPuuuMuVPtPSuutD@Aj>EEEEEEt3MQMQMuuPuumtEE;EKTAE'e}AvMtEM:E|"EtDP;}s
E}$TMtGxtkh<AtYYOt 8tBt4u-
tuEEYAY,8Fte|FFuEtYY}9}txe}E=@}uj^jZ;vvNj_;_#38t@u:j0P<AEtgffhzA$EVEQP0$OY*E
}tE=rxUQtQSjuP0Puu|P}E0tFj_;}EE;EXu-PL}t5A-
V0P}tS4AUPuu?5AUPuuP,A5U\`dhlpTTPXuu\PE}T8K@TYF0ETYM1MWM1MM_^[d
VW|$j'|fxu @2_^Vj|fxu@^jLX^3I^UQQEVuUUM&Fwr= =s
}u =3rw=r}t!}tRPjujYaV^cdAQV3uFFNENEM^d
dAWSVWMu
l3PEP,];p}
@j_9lt
W8]}utN}uE9]u@;u }Wj
;v;vuEuMu9]E}]VM\#M$`HM \FQpPE{;E\9u 9^\E)E(jSxNhHHFiFHPj F(SPjFXSP$9]]v}ELPLP2uEu5;E
LM;9uE9$LEpEEE;ErEE;EMDU;H;] tU
E 9]] NPEFEFE FDP uP!;EEE;Er\EM];tjFuVE\/LEqM];tju%ELLM];tj@M M];tj]tC9]E]E]uuiu3PE(uSpRPF(FV,E
EjXb;YtXX8X<XPxAE]EM
PAME MtAHu9]uFM$HPMH8HX<}v
EViP%@F0B;+EE;E}v9]vEEMuu;]]OEPM]]]]G(EG,;EvPU]U]IuM$UjRP;E]E9]]E]?uEi9]uwM(ua}aMuWQM$F(
FV,HPMH8HX<1tP$pAM];tjt1H(N(@,F, <;jX}Fvg39]vrEEE9]u ;ujY3UiPD0xPPH#@x0d;E
G;}rS;;EE;EE}](9]E}E9]v/EEE0\E0;tE(MuEMu9](tLtP$pAM];tj7](tP$pAM];tj] u;lOEP-
]]]]w,w(Su6ME;UvPU]U]Iuu$MSQP;t"tP$pAM];tju5MjQPt;P$pAM];tj<M nM_^[d
$Vj
e|fxu@^^V%uj|
3A^jX^Vj|fxu@^3^D$@@dAQQSVueWF0e$2E@@uEtPFHHrMe3d
_^[UVuWF$H>v<Ne_3^]dASVW}i3P3YE;uthp@h@pWhV8M3_^[d
leAQVWhrq@h7@jjVum3}~~h%C@h7@jFjPEGh%C@h7@jjPEFtFu!8x8xE 7M_^d
tjU}jXwr9EseEuuuuuj3X]eA|QVW}WueGPNNWEM_^d
VW|$WGNP9NW_^Q$pA
T$3333333333333333333333333333333333333333333333333333333333333333333IUQQSVWUj
MZu>^uj3_uuSWvv.RPSWvvRPSWvvMRUP_^[UVWhAW}tEUjYRPjZhAhA=AthAhAujZjud_^]j3HHpH`HdHh
HtYAHxH|3AA
A(A0AA$A,A4A8A@AHAPA<ADALATeAHSVW}UM~AVOXjFMGGFG3EfEfEEvME)MMEQPMEuY8]Eu
9^uNUOxNO|OQWu2vuPEPuu`=@u`u
u=MMMA3M_^[d

MZMMseAFE S3VEW;UXuj_EUjYEUu
E]]]]]]PYE ;Ethrq@h7@pWj V83;]uv+3Eu JpupuXp@uh=;] v)3E|@Q;KEE  9} rM3;vzE;u
B ;rdhEM5pA;MEw;v3MP;5pAEUu9]wE
 0EhP]]9]]]]]E]u3uVWShRPMRPKEUVWRPM8]QtEUtMI33SQPuuUuuSP;tMMM_^[d
UQQSVuW=pAF^Ewv,NPFu 5pAVUu~_^3[SUW339ovV7yC ;_r^g_][V^tjfA6SV3;WuMuEE UHu
@]]M3]u;t3QM/u
E;EEUE;EtuuSh3uuWVRPSuRPEjU^uu]`d]]}E;k8PYE;Eth<s@h@pWj8V83;Eu]uMk8uu~(MuE2;9]?MQhwAWE
9]t#M EPEu]Y;}UE$MFEVFEFEPNE^ ;tF$3;F EiP%F0E;tPQuEGY;}}}0;]vy3E@Q
;u[EE89}rR@uYlEE;tPQuY]MMM1MY3;hE,;u
B8;rOUMEPj0]MEKuUMEub;Et"uEY;EtPQuE;u$uEY;EtPQ@m]URhwAPE9]t$M EPuu]K;t EE'u$UMuuuu;E;Et-
;tPQu@EY;EPQ;tPQuEY;EtPQp0P]]uuSu
RPSW9]$u}u}E]tQW3VPujY<pRPjM$u(u4u0u,RPupM$P;WVp.M3QM]XM6M_^[d
0UPSMV33WU3\u@r39]]w9]v|uU;t3%uP;u\VPuuVPMQVPVP@w<33;v3L;rE;t;u]E;Erw;}r3_^[jXUVuF0$[vF(N
$VPF #NPvveF,3^]SUW339ovV7/C8;_r^g_][V^tjQVWt$_^
`(<fAPVWUMAEjHXMefefee6ME>MMEQPMEu1Yu|u$EUMu uuuPFPEvvPuu=@tu=MMMMA53M_^d
MMMUQVWU,Mf9u&~t wrw
PRPV_^sAI@@;v|VhAHpAthAPLpAu3^VjX^ZfASVW3u>~~E}X;t?;wPY^;}vQjY}Et#EMHOPO3Fe<FE9]rM_^
[d
nfA.QQVW};ukSW}3vLjY}et EHOPOT3FM<FC;]r[M_^d
VWwtSNtK~SYu[7Y_^VWwtSNt{S[Yu[g_^Vt PQ&^ S\$V;^v<?;wWPFYtP6W6Y>^_^[UQVjh@A
pAuEhAPEA^|$ujXA=AVD$tVyY^jh@A
 pAqt$qAYYqj
pAYYA%@UQQEjRQ3MEAE3@t|A@A@A@|A@|A@|A@|AH
H$H0H4H5H6PPHTPXH@|A@lA@\A@LA@8A@$A@A@AHDH,H(HlHdT$D$SVWA3uD$_^H [AH 3
wA3uD$_^H [AH 3vA3u D$4H_
H A^H 3[vA3u D$H_
H A^H 3[vA3u D$H_
H A^H 3[vA3u D$H_
H A^H 3[vA3uD$tpH_
H A^H 3[vA3uD$tBH_
H A^H 3[wA3u/D$tH_
H A^H 3[3_
H A^H 3[_^@[D$H AH L$A HA u
tjP3VD$t V<~^jhfAdPd%Vt$|AFlAF\AFLAF8AF$AFAFA@AN\D$^N$tVPL$^d
D$L$HH3D$L$H@3VN$t
FXVT;t('NXFTF$u^NXNT3^D$T$Vt$h@APNXe_uNF1^w"$@3W@@I@@@@@@T$S3;Y8:A6Y<tA8RQ<YH
YLY0\V[D$3H(H,HHL$QH3D$L$A,3D$L$P4@8A3,SUVWF$F5vF@ND^tD$,L$0\$D$~HV(N,F,;u,L$u$L$@P
FTPF$F(PQRD$FpNPnt+;v+D$ F6T$(t4F8NH^L~H+N<3;rw;rF4T$(tD$
F(N,+^$L$$L$QL$$QL$,QPN\TT$^(N@V0T$$D$ ^(N@FDNtFD+//o8^6ot^Ln<~H;rw n8;rD$D$\$
ujutbl$tYT$tuLT$(D$;rFD$Vl+QL$H`NtVp;uFt^t\$D$uKD$\$D$HJV@l$,ND|$0+~HL$8L$4T$4WQPRuxD$
ufD$u6F4t!F6tV8NHFH8;u?NP;u5D$_^][,L$ttN4tuD$_^][,_^][,Vt$F$u
W^T$NFRPQD$L$T$PQRu+N4t$T$tN@2W9;_u
Rq;t^Vt$W|$tVPtPQ_3^Vt$tPQ3^D$3;tSUVt$WT$Ft1Fn,N
^0+l$(;rw;rFtD$l$(\$$T$(~F;u.D$(u&FV8WRVRPQD$(F+T$L$ L$RT$$QRVN@PD$4Pl$8TL$T$
NND$NF$F$N(N(L$$N,F0D$,+tD$uBt9_^][D$(_^][l$l$vl$vl$l$Fl$Fl$Vl$l$l$&l$l$l$l$l$l$l$l$l$Vl$VjhfAdPd
%Vt$F{AF|AFAF@AD$AFAFAFAF1FuD$hAPD$L$^d
T$D$SVWA3uD$_^H[AH3 wA3uD$_^H[AH3wA3uD$tpH_
HA^H3[vA3uD$tBH_

HA^H3[wA3u/D$tH_
HA^H3[3_
HA^H3[_^@[D$HAHL$AHAu
tjP3VD$t Vs^AAAAAAAIth8A@A u.f8L$Q
RQH,%Wv3uf8L$PQ0@A43f8@$@D$P3L$3T$B3L$A$3T$B3L$A3T$B3L$A3T$B3L$A,3Wm@@@@@@@
@@@@@@@@@@ff=arf=zwf=HuGff=arf=zwf=Cuz3f0|mkfyudL$f=BuJff=arf=zwf=Tu-3f0|
fyuT$38L$SUVWUl$X3v?\$Pt$TtD$Pu7f>u93f9NL$8G;rD$LT$H'Wz_^][8_^]W[8S\$v<Ul$Vt$W|$?uf>uFNPQ
MWKu_^]3[3[L$D$PT$ID$@uT$L$RT$~D$<L$VPzL$LQL$,"{L$t$XVFzT$h8A#h@AVt$PD$PT$8NT$
D$$VFD$^uD$,u
D$uy<l$l$l$l$fl$fl$fl$6l$6l$6jhfAdPd%QhnD$D$tL$d
L$3d
jhgAdPd%Qj nD$D$tL$d
L$3d
Ayu3Q5Q"Yu3jhQjpAthjQpAu3RRYu3jhRjpAthjRpA;s3tPKtHt
BP+YD$UV0W3l$s_^3]D$SZ\$/;sI
tB;r+++;vA3JABBBL$,|$$t-+twtD@uGf+t0CuK3|$$t+\$3l$BJ$JB
l$G[vT$3_2^]T$_2^]Q$X3$PX3R!$$YSVL$333D$D$\$L$T$D$L$ T$D$$L$T$(D$^[VstC
et5FPNQVR3lFPNQVRVS^3^SVWy3PA39zuZ;Yu;Yt@$r_^[
D$PL$QT$RT$3D$PL$QT$RT$L$V%WL$'t7Ht#HuruJsE_^
ru*r
rut&t't5t6t_3^ W~D~@|$~t~<_V4t9~<tCF4~<F439F4_A+A)Q)Q)QQ~u-
~\u'~t#NFVL+H;v)FLNuFY+VF<V+F4$tIN8$PF\u$tFF+F;FDw+VN<V+N4$uYVNF@+NQ+F4RPIN4N@^yt3A
<A4+9AD@yuA+A9ADr V^V~u6N<V4+9NDAt"N@W~+~+WPRV@V4_^3VQ4QQ$hlA0 AHfAq`% 3 3% 3 3%
3 3% 3 3Bh^VWGV$~F$uV4GF4_^SVWv-|$V$G3^$8^u
V4G^4_^3[r
rL$TUl$V@T$*^D\$ P
VHn 3_nTuX3;lrw;hvh;tI
=vuF,@vFTvFTvFTFT~~PFX^tV$<;t9`t>\$ Cn$`;t3F$;tNXV(]_^[3V$C~n$u
V4Cn4]_^3[Wy$ITt3_ATQ$I,AW<t3_UVF4FFFFF\FtcFn+F+;sV+W~D;wt +_;sF
;vnV^]UVN$FTW<N,At3NT~$t3FV4FFFF\FFn+F+;sV~D+;wt +;sV
;v_nF^]W|$3tVd$4;w3+4@;r^_~SWu:`~$+FP3%t;w3+A;r)F)F)F~uF+F9FDuN9NuF^+N+;sV~D+;wt +;sV
;v_^N[T$L$SD$Ul$L$Vt$(+|$,W|$4t$,D$(L$0;+;#+D$$D$:+uU:EuND$;t$+}T$ T$
::uFG;u|$4;sI7O|$4;t|$4L$+L$|$0__^][$D$$SL$L$,UVpW|$,t$3+\$t$
t$9t$@D$0L$8L$@;|$<;#\$<+L$4,L$+l$$;r:uWF;t$t/:u'F;t$t
,+):EuFE;t$uD$0l$$9t$HsL$DO1yt$HL$D;t$te:sL$]t$t$ \$L$\$Ul$t$ |$,+|$@#L$D$D_^][ UD$_UD$^][ D$
SUVt$0HWD$(33+L$|$\$l$9\$<IL$<;D$8;#L$8+t$0<L$,+;rt$,:0uE@;D$$t4+I.:u#@F;D$$uD$OT$_^]
[;D$$tt$,:0sL$\$|$l$L$l$|$|$\$D$(+|$<t
t$4)D$_^][SVNsFFF;Fu^3[BV$W~j8F0SPFPFPF(PPFPFFF+;FuA_^[VFT$D$s!FFF;Fu3^N$SUW>W3T`G3#F,V
T$+l$l$,3;V+ :{L$G;t(:u@;u\$+JS;uMV0FRVPF(RPFRT$,PQ:FFF;Fu
_][^L$\$PF0RVPFRV(PRVPRT$8FFF+;Fu_][^VFT$D$s!FFF;Fu3^A3D`QSUL$IW|`N33F$#~,l$ +T$$+T$T$
T$$T$33;^s+ :
uL${y;t$;ns+ :
u\$MLL$tz,
\$$;t\$$:u@;u+T$D;uEF0VPFRV(PRVPRT$4QQFFF;Fu7_][^sPD$F0RVPFRV(PRVPRT$<+\$FFF;Fu_][^VFT$D
$s!FFF;Fu3^A3D`QL$IL`SU3W~3F$#N,+\$ l$$+l$l$
<l$$L$33;Vs+:uD$jh8;t$;^s+:uD$STtjT$$T$;t\$$:uG;u+L$|;u5VF(L$FFF;Fu[_][^T$sD$F0QNPFQN(PQNPD$4Q
PR+|$FFF;Fu_][^SUVWI~r8A
V$NF0NPFQN(PQNPQW^F^;Fu{+u_^][QSUVWT$InrRAI3D`~$^3#N,%F0NPFQN(PQNPQUFFF;FuL$u_^][YS

UVWT$IFD$rrA3D`QIL`^33#N,F$V0FNRV(PQNRT$$PQRRFFF;Fu8L$^_^][QSUVWT$I~rXAy3D`IL`3~3#N,F
$<VF(,FFF;FuL$u_^][YP@B@@B0@yuB`@B@IHuB`@B@@uB@B@Bp@B@@W39~t2NFH~~~uNuNuNXu
F0P4pAFHN ~,>vN$6uN0Q0pAF,_~W~HtX~uR~,FtF0P4pAF,SN uNt;~HtN$GtN
u;~HuF[_V~Wt*~FtNtNtNLt~(tF0P$pAF(N-tN%tNtN tN$
t_^>uN0SutNF(tuNtuNtuWN
tuWN$3tuD$T$PNFsu3S\$t:UVt$W|$+$D,+,nBKu_^][|$tIS\$UVt$W|$AAi3)3#D$+,A.BL$
u_^][|$tVS\$UVt$W|$$i3i3i3#D$+,A.BL$
u_^][|$tRS\$UVt$W|$A)3i3i3#D$+,A.BL$ u_^][QSUV
$I<D$
r@Rrx$044
xIt<-
0pA_\SXP.+.54pA)/)SXPH~qF=v$+FPXF,NTV$@Pl$^+^D$E]FH;r@+vN,V`RVTSEPF$QVtQKM^LqT$Dpq^][
YS +UW|$$3T$l$\$G;w
/_][3;99,tN@p,40pD~p<Sp@ol$(XQ4pApHTpLoXR0pATpH
@@T$W;RT<Iu_][+T$;rD$+@;sD$ +;sT$;T$L$IL$t}L$<@+THP$OQ PQUPQL$0SxL$+P|$$ECL$;L$t+L$+;
u3\$l$;/_][V,WuXP0pAT?~W=v
+Q),uXR4pAT_^3(PT8<@DHLA,ATAXA<A@ADAHALAPVW(/F,'G_^W|$v3_3D$D$D$UV$WN@3plNDl~4~
8uNLHl_NPG6m~t8pt{,urT4tXP4pATHlDk;pt LGkHl;pu,NHk _^]3D$SUxW{ @r_][Vt$ uDt0CL$T$D$V
QRP#u^_][S(h@uSs,h@x@t ^_][^_]3[SVWx33^^aN ^ANW$VGTFO`N$W(G OHWOW
G0_$^[Vq,^Vw,WGtOH?GG@GWOO@G^rW+O RWIG
@GWG;GuG_SYUVqW9/GI$3%4;r%+::D$u+N_p^][D$_^][QSYUVqT$Q$W9O3G3%4\$;r?+D=:u3+HD$HL=:O
u_^][YD$;r+9:u+Np_^][YAVWy4I|ytSUhE>^:ZMu][A_^SUVFNW;T8Vu/FHNrRV+V
F(UF+_^][VN+SF(UK+\Xu+F_^][QSU-
0pAVWT$$F;F39~0t.ND^t~0~8~4gNHgN@YgNDgN\Q4pA^tNL~XgNPfV\R^XFtN+?FF@FVNN@FrV+N
RV+F FFN^)\$NDF&_^][YQSU-
0pAVWT$$F;F39~0t.ND^t~0~8~4fNHfN@YfNDfN\Q4pA^tNL~XfNPeV\R^XFtN+?FF@FVNN@FrV+N RV+F
FFHNr@N$3NV%F^)\$NDF_^][YQSUV3WT$]F;F9n0t.ND^tn0n8n4keNHceN@;eNDdN\Q4pA^tNLnXeNPdV\R
0pA^XFtN+?FF@FVNN@FrV+N
RV+F FFHNr8H@n$3L~3N%3F^)\$NDF_^][Y@B
@B@B@VxFHtCHt&~@u@tA(@Bp@^tP@A(@@B@@^t@A(B@@B`@^sVt$FAVAVAVA VA
FAFAFA
F3^QS\$VWs_^[YD$U(~]_^[Yh(AL$ L$QjjPRL$0QP&T$uuPD$D$Pj3]_^[YPSVWL$$|$
\$D$+'D$hL$lD$$L$(s_^[P\$d3N|$pNN N
N3NU^N
D$ltMt-D$lu]_^[PL$dSQPeL$ljT$tRjD$|33L$tL$hL$pDD$;T$T$$D$L$pT$T$D$ ~&H;u!|$htu
D$ly3tD$lD$dh(Ah(AjjL$0QVRL$@QSPNT$8_t%u6D$;D$tv|$tD$t|$hD$D$p@D$p;D$DD$|$hD$tL$$t
L$lD$]_^[PLT$PJ0B@L$J8D$B4SL$4JD$0B<UjVD$DJW:JNL$4J+D$PBD$8B(D$(BL$J,D$B
R$l$Dt$X|$TL$LD$0\$(#\$$\$]=st$>Ft$;1+|$(f]u|$Lt.L$uL$8\$4\L$(#\$PL$T[4NL$D$(rl$+L$Ns}El$;s+f~+++fN
3=s}El$;s+f<3+++f3C3=s}El$;s+f<3+++f3C3=s}El$;s+f<3+++f3C3=s}El$;s+f<3+++f3C3=s}El$;s+f<3+++f3C3=
s}El$;s+f<3+++f3C,.=s|$G|$;s)+f<.t$|$4>Ft$+++|$4f.t$M>Ft$L$
+\$,L$L$;#l$8+L$4,)Ns|$?D$;s#+fN+++fN|$ #<~|$?l$$=sl$mD$;s+|$3L$ f/,+++l$f}l|$$#\$
|$$<^|$?=s\$D$;s+|$3L$ f+++\$f;l-|$$#\$ |$$<^|$?=s\$D$;s+|$3L$ f+++\$f;l-|$$#\$ |$$<^|$?=s\$D$;s+|$3L$
f+++\$f;l-|$$#\$ |$$<^|$?=s\$D$;s+|$3L$ f+++\$f;l-|$$#\$ |$$<^|$?=s\$D$;s+|$3L$ f+++\$f;l-
|$$#~4~=s|$G|$;s*+f>t$|$4L->Ft$
+++|$4ft$L->Ft$
+f]L$LM ++=st$>Ft$;s%+L$ftM |$+++fL} t}8=sL$ D$;+|$ft}8]sL$ D$;sR+t$f]L$,l$4;#\$8D$(++.Ft$L$=
+++f]+++ft}8L}P=st$Ft$;s+L$<ft}Py+++fL}PL}h=st$Ft$;s+L$@ft}h+++t$@fL}hL$Ht$Ht$<t$@t$,t$<L$,>L$=s
L$AL$;#+|$$f4~~sL$AL$;s+fN+++f~

3=s|$?D$;s+f<3+++f3C<1=s\$D$;s+f1+++f<1A+++f>~=sL$AL$;+|$$f^t~~sL$AL$;s+fN+++f~
3=s|$?D$;s+f<3+++f3C<1=s\$D$;s+f1+++f<1A+++f~
$I
3=s|$?D$;s+f3+++f3Kr|$L$0prAt)=s|$G|$;s+fy+++fql$64=s}El$;s+f<+++f4C4=s}El$;s+f<+++f4C4=s}El$;s+f<++
+f4C4=s}El$;s+f<+++f4C4<=s]El$;s+f+++f<F@+IFI|$Dw=s\$D$;s +|$Dfw+++\$DfsIu+l$=s
}E+tw#Iu|$DOl$=s]El$;s+f_+++fOO=smD$;s+f,O+++fOO=sl$mD$;s+f,O+++fOO=sl$mD$;s+f,O+++fOL$@|$L$
HL$<L$@L$,L$<NL$,
L$L$LuL$(;\$0L$d|$+;r;|$,#t$8L$(+t$,+\$0\$8+;w\$4,+)|$.ME;ul$4./FG;t$8u3Iu|$L$;L$dsSL$;L$hsIt$Xl$Dl$4D$
`T$_^]P[LL$`y_^][Lt$0L$`|$=sGQ$T$A
D$(QT$,A(D$<y_Q0T$<qDA4D$D^Q8T$]A<Q@3[LQS^DtbsZNFUn0L$+W~;s~,uV+V(;wVV,N(+^Dt;#T$+:8
@Iu_F][YUl$VW$~,u'V(FN++;v<u ~$sBl$UWVu,9F,uF9F(rF,.9^s9ns ~Dr3_^]_^]SUVWL$(o@W
w$GL$OD$K#_(+HL$
D$s&D$(;D$r_^]3[@D$(D$;~D$,D$u(t=OuO_*OH#G(i\$sa$D$<HsD$(;D$K@D$(;s++L rO_0;sG3+Il$D$
#DED$sD$(;D$(@D$(D$;s
3|$ ++L rD$D$(s
;D$bD$_^][|$Lo ++L$L$(s;L$-AL$(D$;sD$ D$D++Do8D$s;L$9AL$(D$;sg|$ xD$(s;D$@D$(;s
;D$W_^][|$(++LhPL$s;|$%G|$(L$;s?Dhh++s;|$G|$(;s++|$L$(D$
s;L$)AL$(D$(;s_3D$^o++s;D$N@D$(;s_l$++D$s;D$@D$({;s++|?D$;sD$(+|$
0rD$(ol$\}sD$(;D$n@D$(;s++|?@r@IL$sL$yD|$s;@+K#+IuL$D$(D$L$L$is"D$9D$(D$(8@D$(;s++L$u3AALA
(A,ADD$SUD$$VWT$\$9nDt.$NLsD$ @T1PFLD$ D$$Ku\$FLt
~P^NQVRFSVT~DN$F FLvLN~tfF<F8F4F0F@FDT$9nDu)~$T$,_^]3[I\$L$3D$9Nr/FDu
9F$=|$(HVD$D$~Lupru
|$ D;,|$ W63|$t
|$ \$P~yFL$$+)D$|$ 3s;sT$ *L7PGEr~Lrt%VPR|$t \$FPFPuyF+P;+;D$$+(l$
)l$FL~D{D$,_^]3[L$,_^]3[T$,_^][SFPWP$GD$0L$8^L_^]3[D$$(D$,_^]3[L$,_^][_^][(D$,SUVL$@W9|$$3T$08
T$(9N9Nu~F+D$4;v
L$|$,D$D$HD$,|$L\$@l$$3~D\$l$L$;v"FLsT0PFLCAMu\$L$l$FLt~Pt
sFQNRVSNT~DF$F FLvRNVt f|$LF<F8F4F0F@FDT$~Du%~$$\$l$F3L$ ;D$r.FDu 9N$=9L$,;;D$ L$ FLufr
ul+$S|$
t ^\$UL$F+D$)D$L$3sI;l$s+T7PGEr~Lrt%FPP|$ t
\$FPFPIF+P;+;+l$l$)l$FL~D|$L`XMUNPSQCl$nL.T$Ll$D$L3L$D$DD$4L$@)L$$~Nl$0+WQU*CD$H)|$48l$0
ut9\$(tT$(3q_^][(_^]3[(VFWWWGFG_^|$sBVrrr=sAr ^ ^AQ3D$VPL$ludS\$WVt;~Ht0Ul$ EFE?F]t
F~HL$_N3[^_[^D$VPL$D$UVW|$t;nHt*GFT-Ft$
FnHS\$@r?_]^@r,#;sVt;nt=GFFu
VG[_]F^L$^[_n3]^hSUVt$|.3WL$$s_^][h$D$$D$$R$PL$3;uq$T$.$UPL$4L$hL$DL$H$VT$0QL$$\$8D$hT$,u
}up$T$A_^][h3Q$QA0A4A,A AAAAAAQ(V0yx0u*
L63JPP3;H4rFw;P0v?P0W;v;vAvP_x}@x}@x}@x}3Hx}3J@Px^}39HHx }@
x$uP39HP$x,}xtxuH,SVWfItVWS?Gr_^[8SVW|$L$bt$T$L$D$==`D$$s=vC039D$
D$(utD$,}}D$4T$03|$8_^3[8_^[8D$T$~0u*V N$W~+W;tF0 ~(N NV,_SVVW~
:F3Fr;uF_F^[NF@~F;FuhVVt1$F@F;Fu=~F~Fu_^[SUl$V7L$AAD$##+GAW%+#T$fs
r7^][SUV7D$L$#L$T$J3l$T$#*D$##+GAW%+#T$fs
2i7^][VW$3q$=rd$A=sNu+r_^3S$W3s[SUV3#\$k33#r^][QUl$V3WD$TEL$L$##+CGS%+#L$l$fDMs
T$L$D$u_3^]YL$SUVW/|$+wW+fs'AY|$rF+wW+fsL$D$PQ/p_^][l$+fs
D$l$CD$##+GEW%#L$+fCs
@El$D$CD$##+GEW#L$%+L$fKs
T$DUCl$D$##+GEW%+#L$fKs
w7_^][U3VLC3k%3DsL$,t$5,Dr^]L$S\$UWi@DDPD$PKFT$,
RQVL$,T$l$D$D;vFK3IN3sT$L$C;\$r_][SVFF4F(FH L$u^[W@ ;~0t_^[Un(vVH9+D 4)];t:u@;u_^+[WyTu,|$y

5HH_HVyluH^_y+3HH^_SUVD$W{,x00,*+t5 O +u) O Bt O D$)L$y_^][hSUl$tV3uu9u4uD$ PD$M U$L$T$
](\$$s^][hv
\$$MEHHt$0t$L$xt$4W$<T/8+T<XT$|:uCP:Qu;;vp+:1\$(uBF;rt$L$8T<h;Thvt$4|$8D<hFt$rT$4|hM0|$D;r#MEW
U4W_^][ht$ ;r1L$$D MFE4EV_^][h+L$X
L$s$8L$|ts_^][hfU,$uL],#f(@#EHMPt$(@<ArD$L$|WHT$|Hdt$(MHD3fJPMH]<HD$<D$|t$@8D$uGM
]THH;DsD3PfJL$ D$D;rL$D$sP_^][hT$XL$\4T$`<8L$d@L*$@H s3D$thr^|$(E,\$W4iD$@y|$)0;QsQ3q9fQN
sD$@D$r\$hrC;\$ E,E<H|$<3L$||$D;H v$;H wL$|D$(i4D$(*0T$(L D$ Crs9/,GL$|D$ ;PsP3X0fP;H u
L$|;L$$tD$(|$DC JD$9D$i|$D$8PD$P;E0\.,+u40((uA|$lA|$*0ft+|$u2"*(s
AxA|$(4($sPuHT$XP@L$\T$`D$dJT$\PuHT$XP*T$`TDT$XD$dL$XHT$\PT$dL$`D$XL$\T$`4D$df(8<@MU$
XD$|+D$XT$,D$@ELL$$A#D$0D$<EHD$,$D$$K#EHL$|@EPP\$
D$(T$DrD$RHt|$@D$4T$DJ3D$4HD$4sL$$L$$;Ds(D3LPfJD$(T$<U}<T$|5HD$,HD$TL$H8T$usLrPtafJwWD
$<E
}THH;Dw%D33LPfJD$(u(+D$t$4;vD$4}0t$,;v|$,|$(S8T$I@CT$@:B0K:J$G;vt$|;vB+:uF@;rt$|D$lA$A#MLE
E5D$DH|$DHU<UTH|$HT$D$$;s..$t$D+|$|$D N@ut$|iNy;*$*$s
rBfBD$|L$|D$@\$
+DXD$<:S:Ps|$,;vT$ H+
:uFA;rL$T$D$D;s +)$T$ H@uT$0D$\$|RL$0D$HiL$LyL$DD$$D$|)0T$$;QsQ3yfQO suFD$@M0T$4F;v;s
\$<T$ <+::u@G;r+D$([T$<T$ <T2$#]L#UH|$DHRUPJQL$HT$AML$LHyL$$C#ELE
E<HHFH^HT$L$$L$(L$;s%/$+T$I O@uT$(iJyD$$)$T$(;sD$|FQfqAL$|AL$|WT$PL$,;v&3;H v;H wH
D$8D$@;kL$M<|$t$H\$T:\$P;s(+*$t$ I@u3L$,;H v;H wL$,)L L$@T$(.,NL$<$L$$L$0ip4(0L$0
F|$DrsD$<L$|;OsONOB3fOL$@F;)H \$ M0+T$4H;v;s+\$T\$T:uGB;rN+|$@Y$L$
\2TD#]LT$TT1T$$#UHHRUPJQL$XT$xAML$|HC#ELE EHHDH\HL$|L$@LL$9L$s.\$*$+\$
J@uT$@iJyD$|;)$)$sQT$(fAQD$,D$,;D$8tU|$DD$@(L =D$(T$((,HL$<L$0D$$\$P FtD$@D$;D$D$U_^][hT$8E
UU$_^][hS39^4uD$PID$N V$L$T$F(D$s
[=vD$FN8UH\$\$L$WT$+
:uAP:Qu99|$vP+I
:*uGB;|$r;~0sO;|$v\$ |$D$Crl$;n0rLL$D EF4FU_][FWV4W_][3\$rcT$D L$v0<
HA;u|$;vML$wl$u|$rD$l$\$|$rHW;sG;rsO;r+r#T$ GF4FW_][|$~$W`F rHD ;r;M;u;;@;rr
;VN8HD$ L$T$+
:u2P:Qu*]P+d$;sM
:*uGB\$l$L$ D$AL$
rtFUV4U_][_][SF,UFW~X+N`Vd+fsFX(V,V<V<+fsFXF,xASj$RFXN,~X\~Xd$3!+N`Vd+f3!sFXC@rI~`VdsFXT
Ku
$I3+N`Vd+f3sFXCr~X_][u99t
t
t
SVtGL#D$
wXIiKu!^[u99t
t
t
SUVWd$w\$3l$3HH\$\$\$3H\$XHYH1w3\$l$H3H\$\$\$3H\$XHYHq\$3l$3HH\$\$\$3H\$XHYHwQ3\$l$3HH\$\
$\$3H\$XHYHqW_^][SUVWt$I2,ID$B#|$+\$,{3\$HI\$<xut$\,Ft$rL$0+$!\$D$L$D$3l$(t$
F D$$4G3HG3HG3HG_33HHD$$G\$Ht$ 5,Hl$(Dt$ ;D$;v4A;rHKHKKH$
,4l$l((l$,(hrD$l$L$\$D$S_^][8SVW3X~|~xxT$PD$|$0|$D$<D$@D$8D$,D$(D$$D$ D$D$D$|$4h,H~P$_^[8V@t
I^S\$VW(XVPG$G3^P$VxG^xG_^[Ul$ tME9t
t
t]SVW\$,\$MUuS_^[]D$,PiuX}X+fs
17MU+E4MPPQM4C\$,MUt

D$9M9MuD$,PUD$ *$P@AT$M}L#|$,M,uXM
|$+f:=s
EXTMUuX+E4L$,P#UHMP}XRQM,lAu,sPR$+E8QR+E`Ud+f
sEXM,M<
+E`Ud+f
sEXM,MT
+f=s
EX>U,U U |$t+M`Ud+f+f
U,AE,+E`Ud+f
sEXM,MlMlu+f
E<}+M`Ud+fsEX\U,UUu+f
E@+M`Ud+fU@EDUDM<M@U8U<E8sEX|$uXD$WP(VEXSuxuWxHQU,AE,+f:=s
EXgM,D$uXxAL$QPD$($VEXU,u$D$4uT$R4HQ*U@E<M8UDSE@M<U8s(,*,HuXD$ L$@|$L$r(!L$ $D$L$
<QQT$$D$##+E`AUd%+#T$$fsEX|$ruXT$Hs#+SPU#P]X
+$#M`UdsEXu##+E`GT$$Ud#T$$%+fsEX"GD$ED$##+E`GUd#L$%+L$fMsEXT$WD$ED$##+E`GUd#L$%+L
$fMsEXBT$<W}##+E`CUd%+#f}sEXuXD$D$,)E4u#rrMEt:D$,+D$|$0tT,;D$4s +MxUhMp
;D$0YD$,+L$P_^[]=%D$,+D$_^[]QU3WD$9nxuFx;t(Ft9t#9uut
_]Y3VPS;t9$t9t\G$GnP$FPVP3$;;D$v;s+D$tdD$N0PD$hQP>vr3Vv"[_3]YL$F0QL$hPXQ
t2V>[_3]YG$GnP$[_]YQS3Z,UVWzDz@z<z8BxBpBXZ\Z`ZdZhZl
 $(,048T D$
$ff(+ufqf1fqfq0)|$u!#@zP;vf$&(*_HBLZZZ4+^]BH[YSUVWuG0HxL$34t$U4PHE;r3t$HD$L$D$SQ(C;r_^][VW
;v4;v;v;v;v rB
L$T$QD$3R
;u3_^VFW|$;s FFWRP)~~_^WjjVUuWuNt3Fp+FxFhVlRPPQujjVt
t_D$VL$V|T$QRjsuS\$E[^VL$9Ws
_^S[=@r=sA%5d$;v;vAvGGOW_3^D$UVT$T$(D$F|W|$(T$8wD$4R3PL$L$,UD$@QAl$$(;u$S\$4[;u9u9tT$L$
)9l$_^]tS\$,T$L$V@trT$UWl$<u>L$,T$(Q0u(T$4D$0L$ USRT$(PD$
QRT$,PU(_]^[$^[$Vt"PtpAupAu^3^jQpAVD$PjL$QRjj^t3pAuPpAt3pAuPpAt3pAuVjjjjpA^t3pAuD$VjPRjpA^t3
pAujjPpAt3pAuUjhAh[AdPd%SVWeEQpAE3Md
_^[]eEMd
_^[]D$h AP Ah AP AVt$;tT$W933A;u_^3% 3 3% 3 3% 3 3% 3 3 ABf$AVH3 AH3 AH3 AH3 AJu]A]AA A5Aru5
A^@s s333VD$tV-Y^%qAjPdPD$d%l$l$P@s s333D$L$L$u
D$SD$d$D$[SVD$uL$D$3D$A\$T$D$ud$D$r;T$wr;D$vN3^[%pA%pA%pAUjhAh[AdPd%SVWeuEEeMx)uM
UEMMd
_^[}uuuuuUjhAh[AdPd%QQSVWeeMxM+MMUuYeMMd
_^[D$8csmt3UjhAh[AdPd%SVW3EEEE;E}uUuuEEMMd
_^[}uuuuu%pASD$uL$D$3D$3P\$T$D$ud$d$r;T$wr;D$v+D$T$+D$T$[%pA%pA%pA%pA%pA%pAQ=L$r-
=s+@P%pA%pAUjhAh[AdPd%
 SVWeejpAY
$A
(ApA
AqA
ApA,A=Auh\ApAYhAhAAEEP5AEPEPEPpAhAhAXpAMuuuo0EPpAE
MPQYYeupA%pA%pA%pA%pAhhYY3%pASUVW|$l$t2B33DOu|$+3:L:t:3333tL:3333u3:|$+t2B33DO_^][SUV
W|$l$t2B33DOu|$+3:%3L:33L33D:33D3u3:|$+t2B33DO_^][M7U@AzM4\|
MPMMuTYMuBYdd*Yd AMAuYAuYMQ0AM?`AMMMAtM-MM AIMA6uQYA
u=Y@AMAMAM(AME#$?MNPAMMAuYAtMMAZMMMA6M@A"MMMGhAMAMAMkAuYAM}MuMmMe
M]MU@ArMAM9M1ANMMM

MMMMMAhrq@jjuMMh%C@jjEPh%C@jjEPMuMgMMM=(AZMvAFMgA2MAMA
M8AM`AM
MdMZ`LtFM>M6M.M&MtttTMMMMt0P
$AM2M`A
M=\Lt=AAuY0A|hrq@jjuyM8M-h%C@jjEPMh%C@jjEP5MMM'MMXAMz1M`AMM>M;AMECu
Y0AtMMIuYMM#MMM`A(MSMMAMuYAuY(A}E EEM
9PAM8xAwEPYAWEPhYA7zdF.vfR@*r\L<V.|dD2(
DsA,sA sAsAsAsAsAsAsArArArArArArArArArArArArArArA
+F86SOSIEOSMTMFPBLPLCMCFBDAXMMH?Write errorRead errorCan not allocate memoryUsage: lzma
<command> [inputFile] [outputFile] [<switches>...]

<command>
e : Encode file
d : Decode file
b : Benchmark
<switches>
-a{N} : set compression mode : [0, 1] : default
= 1 (max)
-d{N} : set dictionary size : [12, 30] : default = 24 (16 MiB)
-fb{N} : set number of fast bytes : [5, 273] : default = 128
-mc{N} : set number of cycles for match finder
-lc{N} : set number of literal context bits : [0, 8] : default = 3
-lp{N} : set number of literal pos bits : [0, 4] : default = 0
-pb{N} : set number of pos bits : [0, 4] : default = 2
-mf{M} : set match finder: [hc4, bt2, bt3, bt4] : default = bt4
-mt{N} : set number of CPU threads
-eos : write end of stream marker
-si : read data from stdin
-so : write data to stdout
i#@'i#@'i#@'i#@'5i#@'4i#@'1i#@'&i#@'%i#@'$i#@'#i#@'"'i#@' i#@'i#@'i#@'i#@' i#@'i#@'i#@'i#@'i#@' ->
MiBUnknown Error
ERROR: File closing errorOutput size: incorrect uncompressed size in headerDecoding errorSetDecoderProperties
errorIncorrect size of processed dataEncoding errorincorrect encoder properties"@@b@@Can not use stdin in this
modeDecode errorincorrect processed sizeUnpack size is too bigdata errorEncode
errorCan not readFile is too bigInput size: can not open output file @@!@G@G@H@ !@Can not get file
lengthcan not open input fileJ!@@y @hH@!@J!@@y @NE@ @eBenchmark errorbmmtBT4xdUnsupported
Windows versionError code = )
(
LZMA 18.05 (x86) : Igor Pavlov : Public domain : 2018-04-30

Incorrect commandError code = 0xUnunsupported parameter

Break signaled
zA--Too long switch:Incorrect switch postfix:Too short switch:Multiple instances for switch:Unknown
switch:`*@p{ACRC32t+@~+@+@)@*@3+@@+@*@)*@H*@Z*@ZAZAZAZA{Aout of
memorykernel32.dllGlobalMemoryStatusExI@
I@I@F@H@H@H@+F@H@H@H@F@C@MD@ZD@D@E@vD@ZAZAZAZAZAZAZAZAZAZAZAZAZA
ZAZAZAZAZAZAZAZAZAZAZAZAZAZAZAZAZAZAZAZAZAZAZAZAZAZAZAZA}AzA}A}A}A}A}A}A}A}A

}A}AzA}AzA}A}AyA}A}A}AmemusefiltercheckexpectreduceeosapassmcmffblplcpbcomemOFFON(eAPAPxA
|(lAx(`A
:(TA
(DA
NEE8A/zz,A
/zzA
 zzA
~A
w&AAA
AAA
.A
SA
A
.y-A
$ +%LA|AAAAAA|AxApAhA`A\ALADA<A,A
AAAAAAAAAAAAAAAAAAAtAlA\ALA@A4AAAAAAAAARDTSCPARM_V8_CRC32ARM_V8_CRYPTO
ARM_V8RDRANDARM_FMACARM_EXTERNAL_CACHEARM_64BIT_LOADSTORE_ATOMICARM_DIV
IDEFASTFAILRDWRFSGSBASEVIRT_FIRMWAREL2ATARM_NEONARM_VFP_32XSAVECHANNELSC
MP8XCHG16CMPXCHG16BSSE3NXSSE_DAZSSE2PAERDTSC3DNOWSSEALPHA_BYTEPPC_MOVEME
M_64BITMMXCMPXCHGFP_EMUFP_ERRATAARM32_ON_WIN64ARM64NEUTRALIA32_ON_WIN64x64
MSILALPHA64IA64ARMSHXPPCALPHAMIPSx86
 |
BLAKE2spSHA1SHA256CRC64CRC32:8CRC32:4CRC32:1AES256CBC:2AES256CBC:1BCJDelta:4PPMD:x5P
PMD:x1BZip2:x7BZip2:x5:mt2BZip2:x5BZip2:x1Deflate64:x5Deflate:x7Deflate:x5Deflate:x1LZMA:x5:mt2LZM
A:x5:mt1LZMA:x1J!@@b@V@J!@@b@U@ub@b@b@+V@ :  / kernel32.dllGetNativeSystemInfo- gran: page:
cpus: act:. K
(LP)Tot:Avr:x5CPUKiB/s%EffecE/URatingR/UUsageSpeedDictMethodDecompressingCompressingusage:Benchm
ark threads:   Dictionary reduced to: hashAvg:Size8crc32CRCLZMACPU hardware threads:size:  -CPU Freq: -
Windows*freq=freqtimefile size =fileJ!@@b@W@,  #  LP MB      ?RAM
]u@wu@x@RtlGetVersionntdll.dllSetConsoleCtrlHandler fails@@%@3@@@@@P@`@p@@
@0@@@@@@@@@@@@@`@@@@@@`@p@@@@ @@@0@ @ZAZAZAZAZAZAZAZA@
@0@@@@@@@@@@P@`@p@
@@ZAZAZAZA@@@A@@@@@@@0@GenuineIntelAuthenticAMDCentaurHauls

F(A/XAYAZA
 ZAZA\A\AAAAAA `AxA^AA AN@\@0A AAAAA @AA^A^A^A^A^A_A_A
_A _A
'_A
1_A
<_A
I_AA@ A`_A (At_A PA_A_A A_A A_A_A A_A_A_A A`A 8A`A `A,`A@AhAAPAAA A@`A  AT`A HAh`A
pA|`A`A A`A`A A`A A`A`A (A`A`AaA `AaA A,aA4aA<aA APaA AdaA AxaA 8AaA `AaAaAaAaAaAaA
AaAaAaA AbAbAbAbA bA(bA0bA8bA
HALbA^bAibAtbAbAbAbAbAbAbA AbA AcA AcA 0A0cA XADcA AXcA AlcAwcAcAcAcAcAcAcAcAcA
cAcAcAcAcAcAdA dAdAdA$dA/dA:dA APdAXdA ApdA{dAdAdAdA AA A@ PAdA

xAdAdAdAdAeA&eA4eABeAPeA^eA AxeAeA AeAeAeA PAeAeA AeAeAeAeAeAfA
fAfA A$fA,fA4fA AHfAPfA HAdfA pAfA AfA AfA AgAVA$VA`pqXpLpzdF.vfR@*r\L<V.|dD2(
OLEAUT32.dllUSER32.dllZfputs_iobI__CxxFrameHandlerYfputc_setmodeA_CxxThrowExceptionmemcmpmemcpy_purecallmemmovestrcmpmalloc^freestrlenmemset_beginthreadex_except_handler3MSVCRT.dll??1type_info@@UAE@XZ.?terminate@@YAXXZ_exitH_XcptFilterIexitd__p___initenvX__getmainargs_initterm__setusermatherr_adjust_fdivj__p__commodeo__p__fmode__set_app_type_controlfpGetVersionExWiGetLastErrorkMultiByteToWideCharWideCharToMultiBytePCreateFileW.CloseHandle[GetFileSizeSetFilePointerReadFileWriteFileSetEndOfFileGetProcessAffinityMask:GetCurrentProcessGetSystemInfoGlobalMemoryStatusGetProcAddresszGetModuleHandleWGetStdHandleZGetFileInformationByHandleGetTickCountGetProcessTimesGLeaveCriticalSectionEnterCriticalSectionwGetModuleHandleA2IsProcessorFeaturePresentzDeleteCriticalSectionSetConsoleCtrlHandleruVirtualAllocxVirtualFreeWaitForSingleObectJCreateEventWSetEventResetEventfCreateSemaphoreWReleaseSemaphoreInitializeCriticalSectionKERNEL32.dll)@e+@@A.PADA.PAXA.HA.?AVCNewException@@@A.?AVtype_info@@n0 H`4VS_VERSION_INFO?StringFileInfo040904b08CompanyNameIgor
Pavlov2FileDescriptionLZMA,FileVersion18.05*InternalNamelzmal$LegalCopyrightCopyright (c) 1999-2018 Igor Pavlov: OriginalFilenamelzma.exe,ProductName7-Zip0ProductVersion18.05DVarFileInfo$Translation
000%0001W1]1g11111111l2223V3c3334I4f444455E555566=6q66)747O7T7777778G8l8w888888999999:f<<<<<+=X=]===>>>@?E????
p_0000>1R1112E2f2s222222H3g3}333F4456a66.7Y7w778*888899993:a::::::k;>?0hX22R5_5w555556t667"778899d9q9:5::;f;;/<;<@<|<<.=n====>@>G>r>>>>>>??@h000000000&1X1h1111E2Q2222`3g3n3333333334444445m5t555=666l788=9Z9::5;;4<9<< =*?A??P80122"334m4667e78888;<A==>>O??`
}23d3~3778<8r899Y:pXP0011W123=3s3b44449*:9:>:D:K:h:|::::A;Y;x;;;;<=t===>>>??d01V111223+33455667778~888D94;;;<<==========>>$>?>e>j>q>>#?8]000]112234=4h467:`;<;==>>>??TZ000000001
11W23"4-
474A4L444456666\7788!9A:F::;<??0M1S1\1c1x1)233333334444,444V4|44444444444444515^55556M6{66C7a7h7o7v7}77777N88888888??????\000+0a00001111111i233333333
3$3(3,3034383<3W5^5C667c7~777:$>>>>>>>>>>>>P?p??(002244647899E==E>>??,00000000 111#11181#244
[;k;;;
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0#070I0]0q00000
1!1E1Y1m11111A2M2u22223%393M3a3F4d4444445m55556=6[6o66667pT(1,1014181D1P1\1h1t111111111111228888t9x9|999999999999999:X;h;x;|;;;;;;;;;;;;;;;<<<<<<<<
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```
// FormatUtils.h

#ifndef __FORMAT_UTILS_H
#define __FORMAT_UTILS_H

#include "../../../Common/MyTypes.h"
#include "../../../Common/MyString.h"

UString NumberToString(UInt64 number);

UString MyFormatNew(const UString &format, const UString &argument);
UString MyFormatNew(UINT resourceID, const UString &argument);

#endif
```

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```
// InOutTempBuffer.h

#ifndef __IN_OUT_TEMP_BUFFER_H
#define __IN_OUT_TEMP_BUFFER_H

#include "../../Common/MyCom.h"
#include "../../Windows/FileDir.h"

#include "../IStream.h"

class CInOutTempBuffer
{
 NWindows::NFile::NDir::CTempFile _tempFile;
 NWindows::NFile::NIO::COutFile _outFile;
 Byte *_buf;
 size_t _bufPos;
 UInt64 _size;
 UInt32 _crc;
 bool _tempFileCreated;

 bool WriteToFile(const void *data, UInt32 size);
public:
 CInOutTempBuffer();
 ~CInOutTempBuffer();
 void Create();

 void InitWriting();
 bool Write(const void *data, UInt32 size);
```

```
 HRESULT WriteToStream(ISequentialOutStream *stream);
 UInt64 GetDataSize() const { return _size; }
};

/*
class CSequentialOutTempBufferImp:
 public ISequentialOutStream,
 public CMyUnknownImp
{
 CInOutTempBuffer *_buf;
public:
 void Init(CInOutTempBuffer *buffer)  { _buf = buffer; }
 MY_UNKNOWN_IMP

 STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
};
*/

#endif
```

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```
// RegisterArc.h

#ifndef __REGISTER_ARC_H
#define __REGISTER_ARC_H

#include "../Archive/IArchive.h"

struct CArcInfo
{
 UInt16 Flags;
 Byte Id;
 Byte SignatureSize;
 UInt16 SignatureOffset;

 const Byte *Signature;
 const char *Name;
 const char *Ext;
 const char *AddExt;

 Func_CreateInArchive CreateInArchive;
 Func_CreateOutArchive CreateOutArchive;
 Func_IsArc IsArc;

 bool IsMultiSignature() const { return (Flags & NArcInfoFlags::kMultiSignature) != 0; }
};

void RegisterArc(const CArcInfo *arcInfo) throw();


#define IMP_CreateArcIn_2(c) \
 static IInArchive *CreateArc() { return new c; }
```

```
#define IMP_CreateArcIn IMP_CreateArcIn_2(CHandler())

#ifdef EXTRACT_ONLY
 #define IMP_CreateArcOut
 #define CreateArcOut NULL
#else
 #define IMP_CreateArcOut static IOutArchive *CreateArcOut() { return new CHandler(); }
#endif

#define REGISTER_ARC_V(n, e, ae, id, sigSize, sig, offs, flags, crIn, crOut, isArc) \
 static const CArcInfo g_ArcInfo = { flags, id, sigSize, offs,
 sig, n, e, ae, crIn, crOut, isArc } ; \

#define REGISTER_ARC_R(n, e, ae, id, sigSize, sig, offs, flags, crIn, crOut, isArc) \
 REGISTER_ARC_V(n, e, ae, id, sigSize, sig, offs, flags, crIn, crOut, isArc) \
 struct CRegisterArc { CRegisterArc() { RegisterArc(&g_ArcInfo); }}; \
 static CRegisterArc g_RegisterArc;


#define REGISTER_ARC_I_CLS(cls, n, e, ae, id, sig, offs, flags, isArc) \
 IMP_CreateArcIn_2(cls) \
 REGISTER_ARC_R(n, e, ae, id, ARRAY_SIZE(sig), sig, offs, flags, CreateArc, NULL, isArc)

#define REGISTER_ARC_I_CLS_NO_SIG(cls, n, e, ae, id, offs, flags, isArc) \
 IMP_CreateArcIn_2(cls) \
 REGISTER_ARC_R(n, e, ae, id, 0, NULL, offs, flags, CreateArc, NULL, isArc)

#define REGISTER_ARC_I(n, e, ae, id, sig, offs, flags, isArc) \
 REGISTER_ARC_I_CLS(CHandler(), n, e, ae, id, sig, offs, flags, isArc)

#define REGISTER_ARC_I_NO_SIG(n, e, ae, id, offs, flags, isArc) \
 REGISTER_ARC_I_CLS_NO_SIG(CHandler(), n, e, ae, id, offs, flags, isArc)


#define REGISTER_ARC_IO(n, e,
 ae, id, sig, offs, flags, isArc) \
 IMP_CreateArcIn \
 IMP_CreateArcOut \
 REGISTER_ARC_R(n, e, ae, id, ARRAY_SIZE(sig), sig, offs, flags, CreateArc, CreateArcOut, isArc)

#define REGISTER_ARC_IO_DECREMENT_SIG(n, e, ae, id, sig, offs, flags, isArc) \
 IMP_CreateArcIn \
 IMP_CreateArcOut \
 REGISTER_ARC_V(n, e, ae, id, ARRAY_SIZE(sig), sig, offs, flags, CreateArc, CreateArcOut, isArc) \
 struct CRegisterArcDecSig { CRegisterArcDecSig() { sig[0]--; RegisterArc(&g_ArcInfo); }}; \
 static CRegisterArcDecSig g_RegisterArc;

#endif
```

```
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*/

#ifndef __ATK_REGISTRY_H__
#define __ATK_REGISTRY_H__

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

#include <glib-object.h>
#include "atkobjectfactory.h"

#define ATK_TYPE_REGISTRY
            (atk_registry_get_type ())
#define ATK_REGISTRY(obj)            (G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_REGISTRY, AtkRegistry))
#define ATK_REGISTRY_CLASS(klass)      (G_TYPE_CHECK_CLASS_CAST ((klass),
ATK_TYPE_REGISTRY, AtkRegistryClass))
#define ATK_IS_REGISTRY(obj)          (G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_REGISTRY))
#define ATK_IS_REGISTRY_CLASS(klass)    (G_TYPE_CHECK_CLASS_TYPE ((klass),
ATK_TYPE_REGISTRY))
#define ATK_REGISTRY_GET_CLASS(obj)     (G_TYPE_INSTANCE_GET_CLASS ((obj),
ATK_TYPE_REGISTRY, AtkRegistryClass))

struct _AtkRegistry
{
 GObject    parent;
 GHashTable *factory_type_registry;
 GHashTable *factory_singleton_cache;
};
```

```
struct _AtkRegistryClass
{
 GObjectClass    parent_class;
};

typedef struct _AtkRegistry             AtkRegistry;
typedef struct _AtkRegistryClass        AtkRegistryClass;


GType           atk_registry_get_type        (void);
void            atk_registry_set_factory_type (AtkRegistry
 *registry,
                                        GType type,
                                        GType factory_type);
GType           atk_registry_get_factory_type (AtkRegistry *registry,
      GType type);
AtkObjectFactory* atk_registry_get_factory      (AtkRegistry *registry,
                                        GType type);

AtkRegistry*      atk_get_default_registry      (void);

#ifdef __cplusplus
}
#endif /* __cplusplus */

#endif /* __ATK_REGISTRY_H__ */
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With One Language Tagged text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element matches the schema. It contains one text element that has a
language tag." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre
 {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
```

```
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts" id="License ID"&gt;
  &lt;text xml:lang="en"&gt;
   License with "en" language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```


```
// Windows/Window.h

#ifndef __WINDOWS_WINDOW_H
#define __WINDOWS_WINDOW_H

#include "../Common/MyWindows.h"
#include "../Common/MyString.h"

#include "Defs.h"

#ifndef UNDER_CE

#define MY__WM_CHANGEUISTATE  0x0127
#define MY__WM_UPDATEUISTATE  0x0128
#define MY__WM_QUERYUISTATE   0x0129

// LOWORD(wParam) values in WM_*UISTATE
#define MY__UIS_SET         1
#define MY__UIS_CLEAR       2
#define MY__UIS_INITIALIZE  3

// HIWORD(wParam) values in WM_*UISTATE
#define MY__UISF_HIDEFOCUS  0x1
#define MY__UISF_HIDEACCEL  0x2
#define MY__UISF_ACTIVE     0x4

#endif

namespace NWindows {

inline ATOM MyRegisterClass(CONST WNDCLASS *wndClass)
 { return ::RegisterClass(wndClass); }

#ifndef _UNICODE
ATOM MyRegisterClass(CONST WNDCLASSW *wndClass);
#endif
```

```
#ifdef _UNICODE
inline bool MySetWindowText(HWND wnd, LPCWSTR s) { return BOOLToBool(::SetWindowText(wnd, s)); }
#else
bool MySetWindowText(HWND wnd, LPCWSTR s);
#endif


#ifdef UNDER_CE
#define GWLP_USERDATA GWL_USERDATA
#define GWLP_WNDPROC
 GWL_WNDPROC
#define BTNS_BUTTON TBSTYLE_BUTTON
#define WC_COMBOBOXW L"ComboBox"
#define DWLP_MSGRESULT DWL_MSGRESULT
#endif

class CWindow
{
private:
  // bool ModifyStyleBase(int styleOffset, DWORD remove, DWORD add, UINT flags);
protected:
 HWND _window;
public:
 CWindow(HWND newWindow = NULL): _window(newWindow){};
 CWindow& operator=(HWND newWindow)
 {
   _window = newWindow;
   return *this;
 }
 operator HWND() const { return _window; }
 void Attach(HWND newWindow) { _window = newWindow; }
 HWND Detach()
 {
   HWND window = _window;
   _window = NULL;
   return window;
 }

 bool Foreground() { return BOOLToBool(::SetForegroundWindow(_window)); }

 HWND GetParent() const { return ::GetParent(_window); }
 bool GetWindowRect(LPRECT rect) const { return BOOLToBool(::GetWindowRect(_window,rect)); }
 #ifndef UNDER_CE
 bool IsZoomed() const { return BOOLToBool(::IsZoomed(_window)); }
 #endif
 bool ClientToScreen(LPPOINT point) const { return BOOLToBool(::ClientToScreen(_window,
```

```
point)); }
bool ScreenToClient(LPPOINT point) const { return BOOLToBool(::ScreenToClient(_window, point)); }

bool CreateEx(DWORD exStyle, LPCTSTR className,
    LPCTSTR windowName, DWORD style,
    int x, int y, int width, int height,
    HWND parentWindow, HMENU idOrHMenu,
    HINSTANCE instance, LPVOID createParam)
{
  _window = ::CreateWindowEx(exStyle, className, windowName,
    style, x, y, width, height, parentWindow,
    idOrHMenu, instance, createParam);
  return (_window != NULL);
}

bool Create(LPCTSTR className,
    LPCTSTR windowName, DWORD style,
    int x, int y, int width, int height,
    HWND parentWindow, HMENU idOrHMenu,
    HINSTANCE instance, LPVOID createParam)
{
  _window = ::CreateWindow(className, windowName,
    style, x, y, width, height, parentWindow,
    idOrHMenu, instance, createParam);
  return (_window != NULL);
}

#ifndef _UNICODE
bool Create(LPCWSTR className,
    LPCWSTR windowName,
DWORD style,
    int x, int y, int width, int height,
    HWND parentWindow, HMENU idOrHMenu,
    HINSTANCE instance, LPVOID createParam);
bool CreateEx(DWORD exStyle, LPCWSTR className,
    LPCWSTR windowName, DWORD style,
    int x, int y, int width, int height,
    HWND parentWindow, HMENU idOrHMenu,
    HINSTANCE instance, LPVOID createParam);
#endif


bool Destroy()
{
  if (_window == NULL)
    return true;
  bool result = BOOLToBool(::DestroyWindow(_window));
  if (result)
```

```
    _window = NULL;
  return result;
}
bool IsWindow() {  return BOOLToBool(::IsWindow(_window)); }
bool Move(int x, int y, int width, int height, bool repaint = true)
  { return BOOLToBool(::MoveWindow(_window, x, y, width, height, BoolToBOOL(repaint))); }

bool ChangeSubWindowSizeX(HWND hwnd, int xSize)
{
  RECT rect;
  ::GetWindowRect(hwnd, &rect);
  POINT p1;
  p1.x = rect.left;
  p1.y = rect.top;
  ScreenToClient(&p1);
  return BOOLToBool(::MoveWindow(hwnd,
p1.x, p1.y, xSize, rect.bottom - rect.top, TRUE));
}

void ScreenToClient(RECT *rect)
{
  POINT p1, p2;
  p1.x = rect->left;
  p1.y = rect->top;
  p2.x = rect->right;
  p2.y = rect->bottom;
  ScreenToClient(&p1);
  ScreenToClient(&p2);

  rect->left = p1.x;
  rect->top = p1.y;
  rect->right = p2.x;
  rect->bottom = p2.y;
}

bool GetClientRect(LPRECT rect) { return BOOLToBool(::GetClientRect(_window, rect)); }
bool Show(int cmdShow) { return BOOLToBool(::ShowWindow(_window, cmdShow)); }
bool Show_Bool(bool show) { return Show(show ? SW_SHOW: SW_HIDE); }

#ifndef UNDER_CE
bool SetPlacement(CONST WINDOWPLACEMENT *placement) { return
BOOLToBool(::SetWindowPlacement(_window, placement)); }
bool GetPlacement(WINDOWPLACEMENT *placement) { return
BOOLToBool(::GetWindowPlacement(_window, placement)); }
#endif
bool Update() { return BOOLToBool(::UpdateWindow(_window)); }
bool InvalidateRect(LPCRECT rect, bool backgroundErase = true)
```

```
{ return BOOLToBool(::InvalidateRect(_window, rect, BoolToBOOL(backgroundErase))); }
void SetRedraw(bool redraw = true) { SendMsg(WM_SETREDRAW, BoolToBOOL(redraw), 0); }

LONG_PTR SetStyle(LONG_PTR style) { return SetLongPtr(GWL_STYLE, style); }
LONG_PTR GetStyle() const { return GetLongPtr(GWL_STYLE); }
// bool MyIsMaximized() const { return ((GetStyle() & WS_MAXIMIZE) != 0); }

LONG_PTR SetLong(int index, LONG newLongPtr) { return ::SetWindowLong(_window, index, newLongPtr); }
LONG_PTR GetLong(int index) const { return ::GetWindowLong(_window, index); }
LONG_PTR SetUserDataLong(LONG newLongPtr) { return SetLong(GWLP_USERDATA, newLongPtr); }
LONG_PTR GetUserDataLong() const { return GetLong(GWLP_USERDATA); }


#ifdef UNDER_CE

LONG_PTR SetLongPtr(int index, LONG_PTR newLongPtr) { return SetLong(index, newLongPtr); }
LONG_PTR GetLongPtr(int index) const { return GetLong(index); }

LONG_PTR SetUserDataLongPtr(LONG_PTR newLongPtr) { return SetUserDataLong(newLongPtr);
}
LONG_PTR GetUserDataLongPtr() const { return GetUserDataLong(); }

#else

LONG_PTR SetLongPtr(int index, LONG_PTR newLongPtr)
  { return ::SetWindowLongPtr(_window, index,
      #ifndef _WIN64
      (LONG)
      #endif
      newLongPtr); }
#ifndef _UNICODE
LONG_PTR SetLongPtrW(int index, LONG_PTR newLongPtr)
  { return ::SetWindowLongPtrW(_window, index,
      #ifndef _WIN64
      (LONG)
      #endif
      newLongPtr); }
#endif

LONG_PTR GetLongPtr(int index) const { return ::GetWindowLongPtr(_window, index); }
LONG_PTR SetUserDataLongPtr(LONG_PTR newLongPtr) { return SetLongPtr(GWLP_USERDATA,
newLongPtr); }
LONG_PTR GetUserDataLongPtr() const { return GetLongPtr(GWLP_USERDATA); }

#endif

/*
bool ModifyStyle(HWND hWnd, DWORD remove, DWORD add, UINT flags = 0)
```

```
  {  return ModifyStyleBase(GWL_STYLE, remove, add, flags); }
bool ModifyStyleEx(HWND hWnd, DWORD remove, DWORD add, UINT flags = 0)
  { return ModifyStyleBase(GWL_EXSTYLE,
remove, add, flags); }
*/

HWND SetFocus() { return ::SetFocus(_window); }

LRESULT SendMsg(UINT message, WPARAM wParam = 0, LPARAM lParam = 0)
  { return ::SendMessage(_window, message, wParam, lParam); }
#ifndef _UNICODE
LRESULT SendMsgW(UINT message, WPARAM wParam = 0, LPARAM lParam = 0)
  { return ::SendMessageW(_window, message, wParam, lParam); }
#endif

bool PostMsg(UINT message, WPARAM wParam = 0, LPARAM lParam = 0)
  { return BOOLToBool(::PostMessage(_window, message, wParam, lParam)); }
#ifndef _UNICODE
bool PostMsgW(UINT message, WPARAM wParam = 0, LPARAM lParam = 0)
  { return BOOLToBool(::PostMessageW(_window, message, wParam, lParam)); }
#endif

bool SetText(LPCTSTR s) { return BOOLToBool(::SetWindowText(_window, s)); }
#ifndef _UNICODE
bool SetText(LPCWSTR s) { return MySetWindowText(_window, s); }
#endif

int GetTextLength() const
  { return GetWindowTextLength(_window); }
UINT GetText(LPTSTR string, int
maxCount) const
  { return GetWindowText(_window, string, maxCount); }
bool GetText(CSysString &s);
#ifndef _UNICODE
/*
UINT GetText(LPWSTR string, int maxCount) const
  { return GetWindowTextW(_window, string, maxCount); }
*/
bool GetText(UString &s);
#endif

bool Enable(bool enable)
  { return BOOLToBool(::EnableWindow(_window, BoolToBOOL(enable))); }

bool IsEnabled()
  { return BOOLToBool(::IsWindowEnabled(_window)); }

#ifndef UNDER_CE
```

```
 HMENU GetSystemMenu(bool revert)
   { return ::GetSystemMenu(_window, BoolToBOOL(revert)); }
 #endif

 UINT_PTR SetTimer(UINT_PTR idEvent, UINT elapse, TIMERPROC timerFunc = 0)
   { return ::SetTimer(_window, idEvent, elapse, timerFunc); }
 bool KillTimer(UINT_PTR idEvent)
   {return BOOLToBool(::KillTimer(_window, idEvent)); }

 HICON SetIcon(WPARAM sizeType, HICON icon) { return (HICON)SendMsg(WM_SETICON, sizeType,
(LPARAM)icon); }
};

#define RECT_SIZE_X(r) ((r).right - (r).left)
#define RECT_SIZE_Y(r) ((r).bottom
 - (r).top)

inline bool IsKeyDown(int virtKey) { return (::GetKeyState(virtKey) & 0x8000) != 0; }

}

#endif
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```
use errno::Errno;
use libc::{self, c_int};
use std::ptr;
use sys::signal::Signal;
use unistd::Pid;
use Result;

pub type RequestType = c_int;

cfg_if! {
  if #[cfg(any(target_os = "dragonfly",
               target_os = "freebsd",
               target_os = "macos",
               target_os = "openbsd"))] {
      #[doc(hidden)]
      pub type AddressType = *mut ::libc::c_char;
  } else {
      #[doc(hidden)]
      pub type AddressType = *mut ::libc::c_void;
  }
}

libc_enum! {
  #[repr(i32)]
  /// Ptrace Request enum defining the action to be taken.
  pub enum Request {
      PT_TRACE_ME,
      PT_READ_I,
      PT_READ_D,
      #[cfg(target_os = "macos")]
      PT_READ_U,
      PT_WRITE_I,
      PT_WRITE_D,
      #[cfg(target_os = "macos")]
      PT_WRITE_U,
      PT_CONTINUE,
      PT_KILL,
      #[cfg(any(any(target_os = "dragonfly",
                target_os = "freebsd",
                target_os = "macos"),
                all(target_os
 = "openbsd", target_arch = "x86_64"),
                all(target_os = "netbsd", any(target_arch = "x86_64",
                                              target_arch = "powerpc"))))]
```

```
        PT_STEP,
        PT_ATTACH,
        PT_DETACH,
        #[cfg(target_os = "macos")]
        PT_SIGEXC,
        #[cfg(target_os = "macos")]
        PT_THUPDATE,
        #[cfg(target_os = "macos")]
        PT_ATTACHEXC
    }
}

unsafe fn ptrace_other(
    request: Request,
    pid: Pid,
    addr: AddressType,
    data: c_int,
) -> Result<c_int> {
    Errno::result(libc::ptrace(
        request as RequestType,
        libc::pid_t::from(pid),
        addr,
        data,
    )).map(|_| 0)
}

/// Sets the process as traceable, as with `ptrace(PT_TRACEME, ...)`
///
/// Indicates that this process is to be traced by its parent.
/// This is the only ptrace request to be issued by the tracee.
pub fn traceme() -> Result<()> {
    unsafe { ptrace_other(Request::PT_TRACE_ME, Pid::from_raw(0), ptr::null_mut(),
 0).map(drop) }
}

/// Attach to a running process, as with `ptrace(PT_ATTACH, ...)`
///
/// Attaches to the process specified in pid, making it a tracee of the calling process.
pub fn attach(pid: Pid) -> Result<()> {
    unsafe { ptrace_other(Request::PT_ATTACH, pid, ptr::null_mut(), 0).map(drop) }
}

/// Detaches the current running process, as with `ptrace(PT_DETACH, ...)`
///
/// Detaches from the process specified in pid allowing it to run freely
pub fn detach(pid: Pid) -> Result<()> {
    unsafe { ptrace_other(Request::PT_DETACH, pid, ptr::null_mut(), 0).map(drop) }
}
```

```
/// Restart the stopped tracee process, as with `ptrace(PTRACE_CONT, ...)`
///
/// Continues the execution of the process with PID `pid`, optionally
/// delivering a signal specified by `sig`.
pub fn cont<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
   let data = match sig.into() {
       Some(s) => s as c_int,
       None => 0,
   };
   unsafe {
       // Ignore the useless return
 value
       ptrace_other(Request::PT_CONTINUE, pid, 1 as AddressType, data).map(drop)
   }
}

/// Issues a kill request as with `ptrace(PT_KILL, ...)`
///
/// This request is equivalent to `ptrace(PT_CONTINUE, ..., SIGKILL);`
pub fn kill(pid: Pid) -> Result<()> {
   unsafe {
       ptrace_other(Request::PT_KILL, pid, 0 as AddressType, 0).map(drop)
   }
}

/// Move the stopped tracee process forward by a single step as with
/// `ptrace(PT_STEP, ...)`
///
/// Advances the execution of the process with PID `pid` by a single step optionally delivering a
/// signal specified by `sig`.
///
/// # Example
/// ```rust
/// extern crate nix;
/// use nix::sys::ptrace::step;
/// use nix::unistd::Pid;
/// use nix::sys::signal::Signal;
/// use nix::sys::wait::*;
/// fn main() {
///     // If a process changes state to the stopped state because of a SIGUSR1
///     // signal, this will step the process forward and forward the user
///     // signal to the stopped process
///     match waitpid(Pid::from_raw(-1),
 None) {
///         Ok(WaitStatus::Stopped(pid, Signal::SIGUSR1)) => {
///             let _ = step(pid, Signal::SIGUSR1);
///         }
```

```
///         _ => {},
///     }
/// }
/// ```
#[cfg(
   any(
       any(target_os = "dragonfly", target_os = "freebsd", target_os = "macos"),
       all(target_os = "openbsd", target_arch = "x86_64"),
       all(target_os = "netbsd",
           any(target_arch = "x86_64", target_arch = "powerpc")
       )
   )
)]
pub fn step<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
   let data = match sig.into() {
       Some(s) => s as c_int,
       None => 0,
   };
   unsafe { ptrace_other(Request::PT_STEP, pid, ptr::null_mut(), data).map(drop) }
}

/// Reads a word from a processes memory at the given address
pub fn read(pid: Pid, addr: AddressType) -> Result<c_int> {
   unsafe {
       // Traditionally there was a difference between reading data or
       // instruction memory but not in modern systems.
       ptrace_other(Request::PT_READ_D,
 pid, addr, 0)
   }
}

/// Writes a word into the processes memory at the given address
pub fn write(pid: Pid, addr: AddressType, data: c_int) -> Result<()> {
   unsafe { ptrace_other(Request::PT_WRITE_D, pid, addr, data).map(drop) }
}
// Windows/Thread.h

#ifndef __WINDOWS_THREAD_H
#define __WINDOWS_THREAD_H

#include "../../C/Threads.h"

#include "Defs.h"

namespace NWindows {

class CThread
{
```

```
 ::CThread thread;
public:
 CThread() { Thread_Construct(&thread); }
 ~CThread() { Close(); }
 bool IsCreated() { return Thread_WasCreated(&thread) != 0; }
 WRes Close()  { return Thread_Close(&thread); }
 WRes Create(THREAD_FUNC_RET_TYPE (THREAD_FUNC_CALL_TYPE *startAddress)(void *), LPVOID
parameter)
   { return Thread_Create(&thread, startAddress, parameter); }
 WRes Wait() { return Thread_Wait(&thread); }

 #ifdef _WIN32
 operator HANDLE() { return thread; }
 void Attach(HANDLE handle) { thread = handle; }
 HANDLE Detach() { HANDLE h = thread; thread = NULL; return h; }
 DWORD Resume() { return ::ResumeThread(thread); }
 DWORD Suspend() { return ::SuspendThread(thread); }
 bool Terminate(DWORD exitCode) { return BOOLToBool(::TerminateThread(thread, exitCode)); }
 int GetPriority() { return ::GetThreadPriority(thread);
 }
 bool SetPriority(int priority) { return BOOLToBool(::SetThreadPriority(thread, priority)); }
 #endif
};

}

#endif
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license <LICENSE-MIT or http://opensource.org/licenses/MIT>,
at your option. All files in the project carrying such
notice may not be copied, modified, or distributed except
according to those terms.
// StreamBinder.h

#ifndef __STREAM_BINDER_H
#define __STREAM_BINDER_H

#include "../../Windows/Synchronization.h"

#include "../IStream.h"

/*
We don't use probably UNSAFE version:
reader thread:
   _canWrite_Event.Set();
   _readingWasClosed = true
```

```
   _canWrite_Event.Set();
writer thread:
   _canWrite_Event.Wait()
    if (_readingWasClosed)
Can second call of _canWrite_Event.Set() be executed without memory barrier, if event is already set?
*/

class CStreamBinder
{
 NWindows::NSynchronization::CAutoResetEvent _canWrite_Event;
 NWindows::NSynchronization::CManualResetEvent _canRead_Event;
 NWindows::NSynchronization::CManualResetEvent _readingWasClosed_Event;

 // bool _readingWasClosed;
 bool _readingWasClosed2;
 // bool WritingWasCut;
 bool _waitWrite;
 UInt32 _bufSize;
 const void *_buf;
public:
 UInt64 ProcessedSize;

 WRes CreateEvents();
 void CreateStreams(ISequentialInStream **inStream, ISequentialOutStream **outStream);

 void ReInit();

 HRESULT Read(void
 *data, UInt32 size, UInt32 *processedSize);
 HRESULT Write(const void *data, UInt32 size, UInt32 *processedSize);

 void CloseRead()
 {
  _readingWasClosed_Event.Set();
  // _readingWasClosed = true;
  // _canWrite_Event.Set();
 }

 void CloseWrite()
 {
  _buf = NULL;
  _bufSize = 0;
  _canRead_Event.Set();
 }
};

#endif
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Child Element in copyright Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains an unknown child element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test
  {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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the LPPL Work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

and the original Lithuanian TeX package (from which this was derived) was available from:
http://www.vtex.lt/tex/distfiles/littex-20081028.tar.gz

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(copied verbatim from hyph-lt.lic.txt in
 the original work):

Lithuanian hyphenation patterns

(more info about the licence to be added later)

% This file is part of hyph-utf8 package and resulted from
% semi-manual conversions of hyphenation patterns into UTF-8
% in October 2008 by Mojca & Arthur.
%
% Source available on:
% - http://www.vtex.lt/tex/littex/index.html
%
% Authors:
%
% First version in LT encoding (modified T1):
% - Vytas Statuleviius <vytas at vtex.lt>
% - Yannis Haralambous
%   (Vilnius, March 4, 1992)
% Conversion into Latin 7 and aditional support files (babel, fonts):
% - Sigitas Tolusis <sigitas at vtex.lt>
%   (2002-11-20)
% Adaptation for hyph-utf8:
% - Mojca & Arthur (see below), October 2008
%
% The copyright statement of this file is:
%
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%    "a better world" as long as you respect the copyright of original file.
%
% If you want to change this file, rather than uploading directly to CTAN,
% we would be grateful if you could send
 it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;

```
% we will then upload the whole "package" to CTAN.
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
%-----------------------------------------------------------------------------
%
% A note about lefthyphenmin/righthyphenmin (by Sigitas, February 2009):
%
% At the moment the lefthyphenmin & righthyphenmin are both set to 2.
% The Lithuanian patterns were build earlier then the latest grammatical rules
% took place in 1997. At that time it was forbidden to leave one character at boundary.
% One may change it to one now, but from typographical point of view there is no need to do
% any changes. Even more, changing lefthyphen and righthyphen to 1 requires
% to review and maybe rebuild the patterns file.
%
%-----------------------------------------------------------------------------
/*
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```

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DEALINGS IN THE SOFTWARE.

```
// ExtractDialog.h

#ifndef __EXTRACT_DIALOG_H
#define __EXTRACT_DIALOG_H

#include "ExtractDialogRes.h"

#include "../../../Windows/Control/ComboBox.h"
#include "../../../Windows/Control/Edit.h"

#include "../Common/ExtractMode.h"

#include "../FileManager/DialogSize.h"

#ifndef NO_REGISTRY
#include "../Common/ZipRegistry.h"
#endif
```

```
namespace NExtractionDialog
{
 /*
 namespace NFilesMode
 {
   enum EEnum
   {
     kSelected,
     kAll,
     kSpecified
   };
 }
 */
}

class CExtractDialog: public NWindows::NControl::CModalDialog
{
 #ifdef NO_REGISTRY
 NWindows::NControl::CDialogChildControl _path;
 #else
 NWindows::NControl::CComboBox _path;
 #endif

 #ifndef _SFX
 NWindows::NControl::CEdit _pathName;
 NWindows::NControl::CEdit _passwordControl;
 NWindows::NControl::CComboBox _pathMode;
 NWindows::NControl::CComboBox _overwriteMode;
 #endif

 #ifndef _SFX
 // int GetFilesMode() const;
 void UpdatePasswordControl();
 #endif

 void OnButtonSetPath();

 void CheckButton_TwoBools(UINT
 id, const CBoolPair &b1, const CBoolPair &b2);
 void GetButton_Bools(UINT id, CBoolPair &b1, CBoolPair &b2);
 virtual bool OnInit();
 virtual bool OnButtonClicked(int buttonID, HWND buttonHWND);
 virtual void OnOK();

 #ifndef NO_REGISTRY

 virtual void OnHelp();
```

```
 NExtract::CInfo _info;

 #endif

 bool IsShowPasswordChecked() const { return IsButtonCheckedBool(IDX_PASSWORD_SHOW); }
public:
 // bool _enableSelectedFilesButton;
 // bool _enableFilesButton;
 // NExtractionDialog::NFilesMode::EEnum FilesMode;

 UString DirPath;
 UString ArcPath;

 #ifndef _SFX
 UString Password;
 #endif
 bool PathMode_Force;
 bool OverwriteMode_Force;
 NExtract::NPathMode::EEnum PathMode;
 NExtract::NOverwriteMode::EEnum OverwriteMode;

 #ifndef _SFX
 // CBoolPair AltStreams;
 CBoolPair NtSecurity;
 #endif

 CBoolPair ElimDup;

 INT_PTR Create(HWND aWndParent = 0)
 {
  #ifdef _SFX
  BIG_DIALOG_SIZE(240, 64);
  #else
  BIG_DIALOG_SIZE(300,
 160);
  #endif
  return CModalDialog::Create(SIZED_DIALOG(IDD_EXTRACT), aWndParent);
 }

 CExtractDialog():
  PathMode_Force(false),
  OverwriteMode_Force(false)
 {
  ElimDup.Val = true;
 }

};
```

```
#endif
//
// Copyright (C) Anders Kjersem. Licensed under the zlib/libpng license
//

#ifdef UNICODE
# ifndef _UNICODE
#    define _UNICODE
#  endif
#endif

#define _WIN32_WINNT 0x0400
#include <windows.h>
#include <tchar.h>
#include <wininet.h>

#if defined(_DEBUG) || 0
#  define PLUGIN_DEBUG 1
void MYTRACE(LPCTSTR fmt, ...)
{
 va_list argptr;
 va_start(argptr, fmt);
 TCHAR buffer[2048] = { _T('\0') };
 wvsprintf(buffer, fmt, argptr);
 buffer[(sizeof(buffer)/sizeof(*buffer)) - 1] = _T('\0');
 OutputDebugString(buffer);
 va_end(argptr);
}
#else
void MYTRACE(...) { }
#endif
#  define TRACE MYTRACE

#ifndef ASSERT
#  define ASSERT(x)
#endif

#define NSISPIEXPORTFUNC EXTERN_C void __declspec(dllexport) __cdecl

namespace NSIS {

#define NSISCALL __stdcall
typedef struct _xparams_t {
 LPVOID xx1;//exec_flags_type *exec_flags;
 int (NSISCALL *ExecuteCodeSegment)(int, HWND);
 void (NSISCALL *validate_filename)(TCHAR*);
 int (NSISCALL *RegisterPluginCallback)(HMODULE,LPVOID);
} xparams_t;
```

```
typedef
 struct _stack_t {
 struct _stack_t *next;
 TCHAR text[1];
} stack_t;

} // namespace NSIS

enum NSPIM
{
 NSPIM_UNLOAD,
 NSPIM_GUIUNLOAD,
};
```

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http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

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(copied verbatim from hyph-cy.lic.txt in the original work):

Welsh hyphenation patterns

(more info about the licence to be added later)

```
%% hyph-cy.tex, Welsh hyphenation patterns
%% Copyright
 1996 Yannis Haralambous
%%     <yannis dat haralambous at telecom-bretagne dot eu>
%
% This work may be distributed and/or modified under the
% conditions of the LaTeX Project Public License, either version 1.0
% of this license or (at your option) any later version.
% The latest version of this license is in
%   http://www.latex-project.org/lppl.txt
%
```

```
% This work has the LPPL maintenance status `maintained'.
%
% The Current Maintainer of this work (patterns) is Yannis Haralambous.
%
% This work consists of the file hyph-cy.tex and is part of hyph-utf8
% maintained by tex-hyphen team which also contains derived files.
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
% CHANGES:
% - 1996 - last change to patterns
% - 2008 - inclusion into hyph-utf8 and file rename (cyhyph.tex -> hyph-cy.tex)
% - June 2011 - added LPPL licence
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Invalid copyright Element With dir Attribute in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element with INVALID as the value for the
dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size:
 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
```

```
fails.</p>
  <div class="test">P</div>
 </body>
</html>
PROG = 7zcl.exe
MY_CONSOLE = 1

CURRENT_OBJS = \
 $O\Client7z.obj \

COMMON_OBJS = \
 $O\IntToString.obj \
 $O\NewHandler.obj \
 $O\MyString.obj \
 $O\StringConvert.obj \
 $O\StringToInt.obj \
 $O\MyVector.obj \
 $O\Wildcard.obj \

WIN_OBJS = \
 $O\DLL.obj \
 $O\FileDir.obj \
 $O\FileFind.obj \
 $O\FileIO.obj \
 $O\FileName.obj \
 $O\PropVariant.obj \
 $O\PropVariantConv.obj \

7ZIP_COMMON_OBJS = \
 $O\FileStreams.obj \

!include "../../7zip.mak"
// 7zDecode.h

#ifndef __7Z_DECODE_H
#define __7Z_DECODE_H

#include "../Common/CoderMixer2.h"

#include "7zIn.h"

namespace NArchive {
namespace N7z {

struct CBindInfoEx: public NCoderMixer2::CBindInfo
{
 CRecordVector<CMethodId> CoderMethodIDs;
```

```
 void Clear()
 {
   CBindInfo::Clear();
   CoderMethodIDs.Clear();
 }
};

class CDecoder
{
 bool _bindInfoPrev_Defined;
 CBindInfoEx _bindInfoPrev;

 bool _useMixerMT;

 #ifdef USE_MIXER_ST
   NCoderMixer2::CMixerST *_mixerST;
 #endif

 #ifdef USE_MIXER_MT
   NCoderMixer2::CMixerMT *_mixerMT;
 #endif

 NCoderMixer2::CMixer *_mixer;
 CMyComPtr<IUnknown> _mixerRef;

public:

 CDecoder(bool useMixerMT);

 HRESULT Decode(
     DECL_EXTERNAL_CODECS_LOC_VARS
     IInStream *inStream,
     UInt64 startPos,
     const CFolders &folders, unsigned folderIndex,
     const UInt64 *unpackSize // if (!unpackSize), then full folder is required
                              // if (unpackSize), then only *unpackSize bytes from
 folder are required

     , ISequentialOutStream *outStream
     , ICompressProgressInfo *compressProgress

     , ISequentialInStream **inStreamMainRes
     , bool &dataAfterEnd_Error

     _7Z_DECODER_CRYPRO_VARS_DECL

     #if !defined(_7ZIP_ST)
     , bool mtMode, UInt32 numThreads, UInt64 memUsage
```

```
    #endif
    );
};

}}

#endif
PROG = 7zS.sfx
MY_FIXED = 1

CFLAGS = $(CFLAGS) \
 -DNO_REGISTRY \
 -DEXTRACT_ONLY \
 -DNO_READ_FROM_CODER \
 -D_SFX \
 -D_NO_CRYPTO \

CURRENT_OBJS = \
 $O\SfxSetup.obj \
 $O\ExtractCallbackSfx.obj \
 $O\ExtractEngine.obj \

COMMON_OBJS = \
 $O\CommandLineParser.obj \
 $O\CRC.obj \
 $O\IntToString.obj \
 $O\NewHandler.obj \
 $O\MyString.obj \
 $O\StringConvert.obj \
 $O\TextConfig.obj \
 $O\UTFConvert.obj \
 $O\MyVector.obj \
 $O\Wildcard.obj \

WIN_OBJS = \
 $O\DLL.obj \
 $O\ErrorMsg.obj \
 $O\FileDir.obj \
 $O\FileFind.obj \
 $O\FileIO.obj \
 $O\FileName.obj \
 $O\PropVariant.obj \
 $O\ResourceString.obj \
 $O\Synchronization.obj \
 $O\System.obj \
 $O\Window.obj \

WIN_CTRL_OBJS = \
```

```
 $O\Dialog.obj \

7ZIP_COMMON_OBJS = \
 $O\CreateCoder.obj \
 $O\CWrappers.obj \
 $O\FileStreams.obj \
 $O\InBuffer.obj \
 $O\FilterCoder.obj \
 $O\LimitedStreams.obj \
 $O\OutBuffer.obj \
 $O\ProgressUtils.obj \
 $O\PropId.obj \
 $O\StreamBinder.obj \
 $O\StreamObjects.obj
 \
 $O\StreamUtils.obj \
 $O\VirtThread.obj \

UI_COMMON_OBJS = \
 $O\ArchiveOpenCallback.obj \
 $O\DefaultName.obj \
 $O\LoadCodecs.obj \
 $O\OpenArchive.obj \

EXPLORER_OBJS = \
 $O\MyMessages.obj \

FM_OBJS = \
 $O\FormatUtils.obj \
 $O\ProgressDialog.obj \

AR_COMMON_OBJS = \
 $O\CoderMixer2.obj \
 $O\ItemNameUtils.obj \
 $O\OutStreamWithCRC.obj \

7Z_OBJS = \
 $O\7zDecode.obj \
 $O\7zExtract.obj \
 $O\7zHandler.obj \
 $O\7zIn.obj \
 $O\7zRegister.obj \

COMPRESS_OBJS = \
 $O\Bcj2Coder.obj \
 $O\Bcj2Register.obj \
 $O\BcjCoder.obj \
 $O\BcjRegister.obj \
```

```
 $O\BranchMisc.obj \
 $O\BranchRegister.obj \
 $O\CopyCoder.obj \
 $O\CopyRegister.obj \
 $O\DeltaFilter.obj \
 $O\Lzma2Decoder.obj \
 $O\Lzma2Register.obj \
 $O\LzmaDecoder.obj \
 $O\LzmaRegister.obj \

C_OBJS = \
 $O\Alloc.obj \
 $O\Bcj2.obj \
 $O\Bra.obj \
 $O\Bra86.obj \
 $O\BraIA64.obj \
 $O\CpuArch.obj \
 $O\Delta.obj \
 $O\DllSecur.obj \
 $O\Lzma2Dec.obj \
 $O\Lzma2DecMt.obj
 \
 $O\LzmaDec.obj \
 $O\MtDec.obj \
 $O\Threads.obj \

!include "../../Crc.mak"
!include "../../LzmaDec.mak"

!include "../../7zip.mak"
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element matches the schema." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
```

```
  pre {
   font-size: 12px;
  }
  .test {
   font-family: "WOFF Test CFF Reference";
   font-size:
 200px;
   margin-top: 50px;
  }
 ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts" id="License ID"&gt;
  &lt;text&gt;
   License without language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With dir Attribute in div Element in text Element 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-020-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element that contains a div element with ltr as
the value for the dir attribute."
 />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
```

```
   src: url("support/metadatadisplay-schema-copyright-020.woff2") format("woff2");
  }
  body {
   font-size: 20px;
  }
  pre {
   font-size: 12px;
  }
  .test {
   font-family: "WOFF Test", "WOFF Test CFF Fallback";
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
</head>
<body>
 <p>Test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
 <div class="test">P</div>
 <p>The XML contained in the Extended Metadata Block is below.</p>
 <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   &lt;div dir="ltr"&gt;Paragraph 1&lt;/div&gt;
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
 </pre>
</body>
</html>
```

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```
// Windows/FileDir.h

#ifndef __WINDOWS_FILE_DIR_H
#define __WINDOWS_FILE_DIR_H

#include "../Common/MyString.h"

#include "FileIO.h"

namespace NWindows {
namespace NFile {
namespace NDir {

bool GetWindowsDir(FString &path);
bool GetSystemDir(FString &path);

bool SetDirTime(CFSTR path, const FILETIME *cTime, const FILETIME *aTime, const FILETIME *mTime);


bool SetFileAttrib(CFSTR path, DWORD attrib);

/*
 Some programs store posix attributes in high 16 bits of windows attributes field.
 Also some programs use additional flag markers: 0x8000 or 0x4000.
 SetFileAttrib_PosixHighDetect() tries to detect posix field, and it extracts only attribute
 bits that are related to current system only.
*/

bool SetFileAttrib_PosixHighDetect(CFSTR path, DWORD attrib);


bool MyMoveFile(CFSTR existFileName, CFSTR newFileName);
```

```
#ifndef UNDER_CE
bool MyCreateHardLink(CFSTR newFileName, CFSTR existFileName);
#endif

bool RemoveDir(CFSTR path);
bool CreateDir(CFSTR path);

/* CreateComplexDir returns
 true, if directory can contain files after the call (two cases):
   1) the directory already exists (network shares and drive paths are supported)
   2) the directory was created
 path can be WITH or WITHOUT trailing path separator. */

bool CreateComplexDir(CFSTR path);

bool DeleteFileAlways(CFSTR name);
bool RemoveDirWithSubItems(const FString &path);

bool MyGetFullPathName(CFSTR path, FString &resFullPath);
bool GetFullPathAndSplit(CFSTR path, FString &resDirPrefix, FString &resFileName);
bool GetOnlyDirPrefix(CFSTR path, FString &resDirPrefix);

#ifndef UNDER_CE

bool SetCurrentDir(CFSTR path);
bool GetCurrentDir(FString &resultPath);

#endif

bool MyGetTempPath(FString &resultPath);

class CTempFile
{
 bool _mustBeDeleted;
 FString _path;
 void DisableDeleting() { _mustBeDeleted = false; }
public:
 CTempFile(): _mustBeDeleted(false) {}
 ~CTempFile() { Remove(); }
 const FString &GetPath() const { return _path; }
 bool Create(CFSTR pathPrefix, NIO::COutFile *outFile);
 // pathPrefix is not folder prefix
 bool CreateRandomInTempFolder(CFSTR namePrefix, NIO::COutFile *outFile);
 bool Remove();
 bool MoveTo(CFSTR name, bool deleteDestBefore);
};

class CTempDir
```

```
{
 bool _mustBeDeleted;
 FString _path;
public:
 CTempDir(): _mustBeDeleted(false) {}
 ~CTempDir() { Remove();  }
 const FString &GetPath() const { return _path; }
 void DisableDeleting() { _mustBeDeleted = false; }
 bool Create(CFSTR namePrefix) ;
 bool Remove();
};

#if !defined(UNDER_CE)
class CCurrentDirRestorer
{
 FString _path;
public:
 bool NeedRestore;

 CCurrentDirRestorer(): NeedRestore(true)
 {
   GetCurrentDir(_path);
 }
 ~CCurrentDirRestorer()
 {
   if (!NeedRestore)
     return;
   FString s;
   if (GetCurrentDir(s))
     if (s != _path)
       SetCurrentDir(_path);
 }
};
#endif

}}}

#endif
```

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```
/*  LzmaEnc.h -- LZMA Encoder
2017-07-27 : Igor Pavlov : Public domain */

#ifndef __LZMA_ENC_H
#define __LZMA_ENC_H

#include "7zTypes.h"

EXTERN_C_BEGIN

#define LZMA_PROPS_SIZE 5

typedef struct _CLzmaEncProps
{
 int level;       /* 0 <= level <= 9 */
 UInt32 dictSize; /* (1 << 12) <= dictSize <= (1 << 27) for 32-bit version
                  (1 << 12) <= dictSize <= (3 << 29) for 64-bit version
                  default = (1 << 24) */
 int lc;          /* 0 <= lc <= 8, default = 3 */
 int lp;          /* 0 <= lp <= 4, default = 0 */
 int pb;          /* 0 <= pb <= 4, default = 2 */
 int algo;        /* 0 - fast, 1 - normal, default = 1 */
 int fb;          /* 5 <= fb <= 273, default = 32 */
 int btMode;      /* 0 - hashChain Mode, 1 - binTree mode - normal, default = 1 */
 int numHashBytes; /* 2, 3 or 4, default = 4 */
 UInt32 mc;       /* 1 <= mc <= (1 << 30), default = 32 */
 unsigned writeEndMark;  /* 0 - do not write EOPM, 1 - write EOPM, default = 0 */
```

```
 int
 numThreads;  /* 1 or 2, default = 2 */

 UInt64 reduceSize; /* estimated size of data that will be compressed. default = (UInt64)(Int64)-1.
                    Encoder uses this value to reduce dictionary size */
} CLzmaEncProps;

void LzmaEncProps_Init(CLzmaEncProps *p);
void LzmaEncProps_Normalize(CLzmaEncProps *p);
UInt32 LzmaEncProps_GetDictSize(const CLzmaEncProps *props2);


/* ---------- CLzmaEncHandle Interface ---------- */

/* LzmaEnc* functions can return the following exit codes:
SRes:
 SZ_OK           - OK
 SZ_ERROR_MEM    - Memory allocation error
 SZ_ERROR_PARAM  - Incorrect paramater in props
 SZ_ERROR_WRITE  - ISeqOutStream write callback error
 SZ_ERROR_OUTPUT_EOF - output buffer overflow - version with (Byte *) output
 SZ_ERROR_PROGRESS - some break from progress callback
 SZ_ERROR_THREAD - error in multithreading functions (only for Mt version)
*/

typedef void * CLzmaEncHandle;

CLzmaEncHandle LzmaEnc_Create(ISzAllocPtr alloc);
void LzmaEnc_Destroy(CLzmaEncHandle
 p, ISzAllocPtr alloc, ISzAllocPtr allocBig);

SRes LzmaEnc_SetProps(CLzmaEncHandle p, const CLzmaEncProps *props);
void LzmaEnc_SetDataSize(CLzmaEncHandle p, UInt64 expectedDataSiize);
SRes LzmaEnc_WriteProperties(CLzmaEncHandle p, Byte *properties, SizeT *size);
unsigned LzmaEnc_IsWriteEndMark(CLzmaEncHandle p);

SRes LzmaEnc_Encode(CLzmaEncHandle p, ISeqOutStream *outStream, ISeqInStream *inStream,
   ICompressProgress *progress, ISzAllocPtr alloc, ISzAllocPtr allocBig);
SRes LzmaEnc_MemEncode(CLzmaEncHandle p, Byte *dest, SizeT *destLen, const Byte *src, SizeT srcLen,
   int writeEndMark, ICompressProgress *progress, ISzAllocPtr alloc, ISzAllocPtr allocBig);


/* ---------- One Call Interface ---------- */

SRes LzmaEncode(Byte *dest, SizeT *destLen, const Byte *src, SizeT srcLen,
   const CLzmaEncProps *props, Byte *propsEncoded, SizeT *propsSize, int writeEndMark,
   ICompressProgress *progress, ISzAllocPtr alloc, ISzAllocPtr allocBig);
```

EXTERN_C_END

#endif
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//
// A light-weight compression algorithm.  It is designed for speed of
// compression and decompression, rather than for the utmost in space
// savings.
//
// For getting better compression ratios when you are compressing data
// with long repeated sequences or compressing data that is similar to
// other data, while still compressing fast, you might look at first
// using BMDiff and then compressing the output of BMDiff with
// Snappy.

#ifndef THIRD_PARTY_SNAPPY_SNAPPY_H__
#define

```
 THIRD_PARTY_SNAPPY_SNAPPY_H__

#include <stddef.h>
#include <string>

#include "snappy-stubs-public.h"

namespace snappy {
 class Source;
 class Sink;

 // -----------------------------------------------------------------------
 // Generic compression/decompression routines.
 // -----------------------------------------------------------------------

 // Compress the bytes read from "*source" and append to "*sink". Return the
 // number of bytes written.
 size_t Compress(Source* source, Sink* sink);

 // Find the uncompressed length of the given stream, as given by the header.
 // Note that the true length could deviate from this; the stream could e.g.
 // be truncated.
 //
 // Also note that this leaves "*source" in a state that is unsuitable for
 // further operations, such as RawUncompress(). You will need to rewind
 // or recreate the source yourself before attempting any further calls.
 bool GetUncompressedLength(Source* source, uint32*
 result);

 // -----------------------------------------------------------------------
 // Higher-level string based routines (should be sufficient for most users)
 // -----------------------------------------------------------------------

 // Sets "*output" to the compressed version of "input[0,input_length-1]".
 // Original contents of *output are lost.
 //
 // REQUIRES: "input[]" is not an alias of "*output".
 size_t Compress(const char* input, size_t input_length, string* output);

 // Decompresses "compressed[0,compressed_length-1]" to "*uncompressed".
 // Original contents of "*uncompressed" are lost.
 //
 // REQUIRES: "compressed[]" is not an alias of "*uncompressed".
 //
 // returns false if the message is corrupted and could not be decompressed
 bool Uncompress(const char* compressed, size_t compressed_length,
                 string* uncompressed);
```

```
// Decompresses "compressed" to "*uncompressed".
//
// returns false if the message is corrupted and
could not be decompressed
bool Uncompress(Source* compressed, Sink* uncompressed);

// This routine uncompresses as much of the "compressed" as possible
// into sink.  It returns the number of valid bytes added to sink
// (extra invalid bytes may have been added due to errors; the caller
// should ignore those). The emitted data typically has length
// GetUncompressedLength(), but may be shorter if an error is
// encountered.
size_t UncompressAsMuchAsPossible(Source* compressed, Sink* uncompressed);

// ---------------------------------------------------------------------------
// Lower-level character array based routines.  May be useful for
// efficiency reasons in certain circumstances.
// ---------------------------------------------------------------------------

// REQUIRES: "compressed" must point to an area of memory that is at
// least "MaxCompressedLength(input_length)" bytes in length.
//
// Takes the data stored in "input[0..input_length]" and stores
 // it in the array pointed to by "compressed".
//
// "*compressed_length" is set to the length of the compressed output.
//
// Example:
//    char* output = new char[snappy::MaxCompressedLength(input_length)];
//    size_t output_length;
//    RawCompress(input, input_length, output, &output_length);
//    ... Process(output, output_length) ...
//    delete [] output;
void RawCompress(const char* input,
                 size_t input_length,
                 char* compressed,
                 size_t* compressed_length);

// Given data in "compressed[0..compressed_length-1]" generated by
// calling the Snappy::Compress routine, this routine
// stores the uncompressed data to
//    uncompressed[0..GetUncompressedLength(compressed)-1]
// returns false if the message is corrupted and could not be decrypted
bool RawUncompress(const char* compressed, size_t compressed_length,
                   char* uncompressed);

// Given data from the byte
```

```
source 'compressed' generated by calling
// the Snappy::Compress routine, this routine stores the uncompressed
// data to
//    uncompressed[0..GetUncompressedLength(compressed,compressed_length)-1]
// returns false if the message is corrupted and could not be decrypted
bool RawUncompress(Source* compressed, char* uncompressed);

// Given data in "compressed[0..compressed_length-1]" generated by
// calling the Snappy::Compress routine, this routine
// stores the uncompressed data to the iovec "iov". The number of physical
// buffers in "iov" is given by iov_cnt and their cumulative size
// must be at least GetUncompressedLength(compressed). The individual buffers
// in "iov" must not overlap with each other.
//
// returns false if the message is corrupted and could not be decrypted
bool RawUncompressToIOVec(const char* compressed, size_t compressed_length,
                          const struct iovec* iov, size_t iov_cnt);

// Given data from the byte source
'compressed' generated by calling
// the Snappy::Compress routine, this routine stores the uncompressed
// data to the iovec "iov". The number of physical
// buffers in "iov" is given by iov_cnt and their cumulative size
// must be at least GetUncompressedLength(compressed). The individual buffers
// in "iov" must not overlap with each other.
//
// returns false if the message is corrupted and could not be decrypted
bool RawUncompressToIOVec(Source* compressed, const struct iovec* iov,
                          size_t iov_cnt);

// Returns the maximal size of the compressed representation of
// input data that is "source_bytes" bytes in length;
size_t MaxCompressedLength(size_t source_bytes);

// REQUIRES: "compressed[]" was produced by RawCompress() or Compress()
// Returns true and stores the length of the uncompressed data in
// *result normally.  Returns false on parsing error.
// This operation takes O(1) time.
bool GetUncompressedLength(const
char* compressed, size_t compressed_length,
                           size_t* result);

// Returns true iff the contents of "compressed[]" can be uncompressed
// successfully.  Does not return the uncompressed data.  Takes
// time proportional to compressed_length, but is usually at least
// a factor of four faster than actual decompression.
bool IsValidCompressedBuffer(const char* compressed,
                             size_t compressed_length);
```

```
 // Returns true iff the contents of "compressed" can be uncompressed
 // successfully.  Does not return the uncompressed data.  Takes
 // time proportional to *compressed length, but is usually at least
 // a factor of four faster than actual decompression.
 // On success, consumes all of *compressed.  On failure, consumes an
 // unspecified prefix of *compressed.
 bool IsValidCompressed(Source* compressed);

 // The size of a compression block. Note that many parts of the compression
 // code assumes that kBlockSize
 <= 65536; in particular, the hash table
 // can only store 16-bit offsets, and EmitCopy() also assumes the offset
 // is 65535 bytes or less. Note also that if you change this, it will
 // affect the framing format (see framing_format.txt).
 //
 // Note that there might be older data around that is compressed with larger
 // block sizes, so the decompression code should not rely on the
 // non-existence of long backreferences.
 static const int kBlockLog = 16;
 static const size_t kBlockSize = 1 << kBlockLog;

 static const int kMaxHashTableBits = 14;
 static const size_t kMaxHashTableSize = 1 << kMaxHashTableBits;
}  // end namespace snappy

#endif  // THIRD_PARTY_SNAPPY_SNAPPY_H__
// FilePathAutoRename.h

#ifndef __FILE_PATH_AUTO_RENAME_H
#define __FILE_PATH_AUTO_RENAME_H

#include "../../Common/MyString.h"

bool AutoRenamePath(FString &fullProcessedPath);

#endif
// GUI/ExtractGUI.h

#ifndef __EXTRACT_GUI_H
#define __EXTRACT_GUI_H

#include "../Common/Extract.h"

#include "../FileManager/ExtractCallback.h"

/*
 RESULT can be S_OK, even if there are errors!!!
```

```
 if RESULT == S_OK, check extractCallback->IsOK() after ExtractGUI().

 RESULT = E_ABORT - user break.
 RESULT != E_ABORT:
 {
  messageWasDisplayed = true  - message was displayed already.
  messageWasDisplayed = false - there was some internal error, so you must show error message.
 }
*/

HRESULT ExtractGUI(
  CCodecs *codecs,
  const CObjectVector<COpenType> &formatIndices,
  const CIntVector &excludedFormatIndices,
  UStringVector &archivePaths,
  UStringVector &archivePathsFull,
  const NWildcard::CCensorNode &wildcardCensor,
  CExtractOptions &options,
  #ifndef _SFX
  CHashBundle *hb,
  #endif
  bool showDialog,
  bool &messageWasDisplayed,
  CExtractCallbackImp *extractCallback,
  HWND hwndParent = NULL);

#endif
// Windows/FileFind.h

#ifndef __WINDOWS_FILE_FIND_H
#define __WINDOWS_FILE_FIND_H

#include "../Common/MyString.h"
#include "Defs.h"

namespace NWindows {
namespace NFile {
namespace NFind {

namespace NAttributes
{
 inline bool IsReadOnly(DWORD attrib) { return (attrib & FILE_ATTRIBUTE_READONLY) != 0; }
 inline bool IsHidden(DWORD attrib) { return (attrib & FILE_ATTRIBUTE_HIDDEN) != 0; }
 inline bool IsSystem(DWORD attrib) { return (attrib & FILE_ATTRIBUTE_SYSTEM) != 0; }
 inline bool IsDir(DWORD attrib) { return (attrib & FILE_ATTRIBUTE_DIRECTORY) != 0; }
 inline bool IsArchived(DWORD attrib) { return (attrib & FILE_ATTRIBUTE_ARCHIVE) != 0; }
 inline bool IsCompressed(DWORD attrib) { return (attrib & FILE_ATTRIBUTE_COMPRESSED) != 0; }
 inline bool IsEncrypted(DWORD attrib) { return (attrib & FILE_ATTRIBUTE_ENCRYPTED) != 0; }
```

```
}

class CFileInfoBase
{
 bool MatchesMask(UINT32 mask) const { return ((Attrib & mask) != 0); }
public:
 UInt64 Size;
 FILETIME CTime;
 FILETIME ATime;
  FILETIME MTime;
 DWORD Attrib;
 bool IsAltStream;
 bool IsDevice;

 /*
 #ifdef UNDER_CE
 DWORD ObjectID;
 #else
 UINT32 ReparseTag;
 #endif
 */

 CFileInfoBase() { ClearBase(); }
 void ClearBase() throw();

 void SetAsDir() { Attrib = FILE_ATTRIBUTE_DIRECTORY; }

 bool IsArchived() const { return MatchesMask(FILE_ATTRIBUTE_ARCHIVE); }
 bool IsCompressed() const { return MatchesMask(FILE_ATTRIBUTE_COMPRESSED); }
 bool IsDir() const { return MatchesMask(FILE_ATTRIBUTE_DIRECTORY); }
 bool IsEncrypted() const { return MatchesMask(FILE_ATTRIBUTE_ENCRYPTED); }
 bool IsHidden() const { return MatchesMask(FILE_ATTRIBUTE_HIDDEN); }
 bool IsNormal() const { return MatchesMask(FILE_ATTRIBUTE_NORMAL); }
 bool IsOffline() const { return MatchesMask(FILE_ATTRIBUTE_OFFLINE); }
 bool IsReadOnly() const { return MatchesMask(FILE_ATTRIBUTE_READONLY); }
 bool HasReparsePoint() const { return MatchesMask(FILE_ATTRIBUTE_REPARSE_POINT); }
 bool IsSparse() const { return MatchesMask(FILE_ATTRIBUTE_SPARSE_FILE);
 }
 bool IsSystem() const { return MatchesMask(FILE_ATTRIBUTE_SYSTEM); }
 bool IsTemporary() const { return MatchesMask(FILE_ATTRIBUTE_TEMPORARY); }
};

struct CFileInfo: public CFileInfoBase
{
 FString Name;
 #if defined(_WIN32) && !defined(UNDER_CE)
 // FString ShortName;
 #endif
```

```
 bool IsDots() const throw();
 bool Find(CFSTR path);
};

class CFindFileBase
{
protected:
 HANDLE _handle;
public:
 bool IsHandleAllocated() const { return _handle != INVALID_HANDLE_VALUE; }
 CFindFileBase(): _handle(INVALID_HANDLE_VALUE) {}
 ~CFindFileBase() { Close(); }
 bool Close() throw();
};

class CFindFile: public CFindFileBase
{
public:
 bool FindFirst(CFSTR wildcard, CFileInfo &fileInfo);
 bool FindNext(CFileInfo &fileInfo);
};

#if defined(_WIN32) && !defined(UNDER_CE)

struct CStreamInfo
{
 UString Name;
 UInt64 Size;

 UString GetReducedName() const; // returns ":Name"
 // UString GetReducedName2() const; // returns "Name"
 bool IsMainStream()
 const throw();
};

class CFindStream: public CFindFileBase
{
public:
 bool FindFirst(CFSTR filePath, CStreamInfo &streamInfo);
 bool FindNext(CStreamInfo &streamInfo);
};

class CStreamEnumerator
{
 CFindStream _find;
 FString _filePath;
```

```
 bool NextAny(CFileInfo &fileInfo);
public:
 CStreamEnumerator(const FString &filePath): _filePath(filePath) {}
 bool Next(CStreamInfo &streamInfo, bool &found);
};

#endif

bool DoesFileExist(CFSTR name);
bool DoesDirExist(CFSTR name);
bool DoesFileOrDirExist(CFSTR name);

DWORD GetFileAttrib(CFSTR path);

class CEnumerator
{
 CFindFile _findFile;
 FString _wildcard;

 bool NextAny(CFileInfo &fileInfo);
public:
 void SetDirPrefix(const FString &dirPrefix);
 bool Next(CFileInfo &fileInfo);
 bool Next(CFileInfo &fileInfo, bool &found);
};

class CFindChangeNotification
{
 HANDLE _handle;
public:
 operator HANDLE () { return _handle; }
 bool IsHandleAllocated() const { return _handle != INVALID_HANDLE_VALUE && _handle != 0; }
 CFindChangeNotification():
 _handle(INVALID_HANDLE_VALUE) {}
 ~CFindChangeNotification() { Close(); }
 bool Close() throw();
 HANDLE FindFirst(CFSTR pathName, bool watchSubtree, DWORD notifyFilter);
 bool FindNext() { return BOOLToBool(::FindNextChangeNotification(_handle)); }
};

#ifndef UNDER_CE
bool MyGetLogicalDriveStrings(CObjectVector<FString> &driveStrings);
#endif

}}}

#endif
```

```
// Common/CommandLineParser.h

#ifndef __COMMON_COMMAND_LINE_PARSER_H
#define __COMMON_COMMAND_LINE_PARSER_H

#include "MyString.h"

namespace NCommandLineParser {

bool SplitCommandLine(const UString &src, UString &dest1, UString &dest2);
void SplitCommandLine(const UString &s, UStringVector &parts);

namespace NSwitchType
{
 enum EEnum
 {
   kSimple,
   kMinus,
   kString,
   kChar
 };
}

struct CSwitchForm
{
 const char *Key;
 Byte Type;
 bool Multi;
 Byte MinLen;
 // int MaxLen;
 const char *PostCharSet;
};

struct CSwitchResult
{
 bool ThereIs;
 bool WithMinus;
 int PostCharIndex;
 UStringVector PostStrings;

 CSwitchResult(): ThereIs(false) {};
};

class CParser
{
 CSwitchResult *_switches;

 bool ParseString(const UString &s, const CSwitchForm *switchForms, unsigned numSwitches);
```

```
public:
 UStringVector NonSwitchStrings;
 int StopSwitchIndex;  // NonSwitchStrings[StopSwitchIndex+] are after "--"
 AString ErrorMessage;
 UString ErrorLine;

 CParser();
  ~CParser();
 bool ParseStrings(const CSwitchForm *switchForms, unsigned numSwitches, const UStringVector
&commandStrings);
 const CSwitchResult& operator[](unsigned index) const { return _switches[index]; }
};

}

#endif
// Common/StringToInt.h

#ifndef __COMMON_STRING_TO_INT_H
#define __COMMON_STRING_TO_INT_H

#include "MyTypes.h"

UInt32 ConvertStringToUInt32(const char *s, const char **end) throw();
UInt64 ConvertStringToUInt64(const char *s, const char **end) throw();
UInt32 ConvertStringToUInt32(const wchar_t *s, const wchar_t **end) throw();
UInt64 ConvertStringToUInt64(const wchar_t *s, const wchar_t **end) throw();

Int32 ConvertStringToInt32(const wchar_t *s, const wchar_t **end) throw();

UInt32 ConvertOctStringToUInt32(const char *s, const char **end) throw();
UInt64 ConvertOctStringToUInt64(const char *s, const char **end) throw();

UInt32 ConvertHexStringToUInt32(const char *s, const char **end) throw();
UInt64 ConvertHexStringToUInt64(const char *s, const char **end) throw();

#endif
```

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```
// OverwriteDialog.h

#ifndef __OVERWRITE_DIALOG_H
#define __OVERWRITE_DIALOG_H

#include "../../../Windows/Control/Dialog.h"

#include "DialogSize.h"
#include "OverwriteDialogRes.h"

namespace NOverwriteDialog
{
 struct CFileInfo
 {
   bool SizeIsDefined;
   bool TimeIsDefined;
   UInt64 Size;
   FILETIME Time;
   UString Name;

   void SetTime(const FILETIME *t)
   {
     if (t == 0)
       TimeIsDefined = false;
     else
     {
       TimeIsDefined = true;
       Time = *t;
     }
   }
   void SetSize(const UInt64 *size)
   {
     if (size == 0)
       SizeIsDefined = false;
     else
     {
       SizeIsDefined = true;
       Size = *size;
     }
   }
 };
}

class COverwriteDialog: public NWindows::NControl::CModalDialog
{
 bool _isBig;
```

```
 void SetFileInfoControl(int textID, int iconID, const NOverwriteDialog::CFileInfo &fileInfo);
 virtual bool OnInit();
 bool OnButtonClicked(int buttonID, HWND buttonHWND);
 void ReduceString(UString &s);

public:
  INT_PTR Create(HWND parent = 0)
  {
   BIG_DIALOG_SIZE(280, 200);
   #ifdef UNDER_CE
   _isBig = isBig;
   #else
   _isBig = true;
   #endif
   return CModalDialog::Create(SIZED_DIALOG(IDD_OVERWRITE), parent);
  }

 NOverwriteDialog::CFileInfo OldFileInfo;
 NOverwriteDialog::CFileInfo NewFileInfo;
};

#endif
```

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%
% Source: icehyph.tex (2004-03-08)
% Author: Jorgen Pind <jorgen at lexis.hi.is>
%
% The above mentioned file should become obsolete,
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 modify this file instead.
%
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% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
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```
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%
% Before a new "pattern-revolution" starts,
% please try to follow some guidelines if possible:
%
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%   and if you really cannot do without, also \input and \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
%
  they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
%-----------------------------------------------------------------------------
%
% The Icelandic Plain TeX hyphenation tables
% as of Nov 2 1988.
% Jorgen Pind, Institute of Lexicography, Univ. of Iceland
% jorgen@lexis.hi.is (Internet)
%
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%
```

```
// ArchiveName.h

#ifndef __ARCHIVE_NAME_H
#define __ARCHIVE_NAME_H

#include "../../../Common/MyString.h"

#include "../../../Windows/FileFind.h"

UString CreateArchiveName(const UString &path, bool fromPrev, bool keepName);
UString CreateArchiveName(const NWindows::NFile::NFind::CFileInfo &fileInfo, bool keepName);

#endif
```

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//
// CityHash Version 1, by Geoff Pike and Jyrki Alakuijala
//
// This file provides a few functions for hashing strings. On x86-64
// hardware in 2011, CityHash64() is faster than other high-quality
// hash functions, such as Murmur.  This is largely due to higher
// instruction-level parallelism.  CityHash64() and CityHash128() also perform
// well on hash-quality tests.
//
// CityHash128() is optimized for relatively long strings and returns
// a 128-bit hash.  For strings more than about 2000 bytes it can be
// faster than CityHash64().
//
// Functions in the CityHash family are not suitable for cryptography.
//
// WARNING: This code has not been tested on big-endian platforms!
// It is known to work well on little-endian platforms that have a small penalty
// for unaligned reads, such as current Intel and AMD moderate-to-high-end CPUs.
//
// By the way, for some hash functions,
 given strings a and b, the hash
// of a+b is easily derived from the hashes of a and b.  This property
// doesn't hold for any hash functions in this file.

#ifndef CITY_HASH_H_
#define CITY_HASH_H_

#include <stdlib.h>  // for size_t.
#include <stdint.h>

typedef uint8_t uint8;
typedef uint32_t uint32;
typedef uint64_t uint64;

#ifdef __cplusplus
```

```
#include <utility>
typedef std::pair<uint64, uint64> uint128;
inline uint64 Uint128Low64(const uint128& x) { return x.first; }
inline uint64 Uint128High64(const uint128& x) { return x.second; }

extern "C" {
#endif

// Hash function for a byte array.
uint64 CityHash64(const char *buf, size_t len);

// Hash function for a byte array.  For convenience, a 64-bit seed is also
// hashed into the result.
uint64 CityHash64WithSeed(const char *buf, size_t len, uint64 seed);

// Hash function for a byte array.  For convenience, two seeds are also
// hashed into the result.
uint64 CityHash64WithSeeds(const char *buf, size_t len,

          uint64 seed0, uint64 seed1);

#ifdef __cplusplus
}
// Hash function for a byte array.
uint128 CityHash128(const char *s, size_t len);

// Hash function for a byte array.  For convenience, a 128-bit seed is also
// hashed into the result.
uint128 CityHash128WithSeed(const char *s, size_t len, uint128 seed);

// Hash 128 input bits down to 64 bits of output.
// This is intended to be a reasonably good hash function.
inline uint64 Hash128to64(const uint128& x) {
 // Murmur-inspired hashing.
 const uint64 kMul = 0x9ddfea08eb382d69;
 uint64 a = (Uint128Low64(x) ^ Uint128High64(x)) * kMul;
 a ^= (a >> 47);
 uint64 b = (Uint128High64(x) ^ a) * kMul;
 b ^= (b >> 47);
 b *= kMul;
 return b;
}
#endif

#endif  // CITY_HASH_H_
PROG = 7zCon.sfx
MY_CONSOLE = 1
```

```
MY_FIXED = 1

CFLAGS = $(CFLAGS) \
 -DEXTRACT_ONLY \
 -DNO_READ_FROM_CODER \
 -D_SFX \
 -D_CONSOLE \

CURRENT_OBJS = \
 $O\SfxCon.obj \

CONSOLE_OBJS = \
 $O\ConsoleClose.obj \
 $O\ExtractCallbackConsole.obj \
 $O\List.obj \
 $O\MainAr.obj \
 $O\OpenCallbackConsole.obj \
 $O\PercentPrinter.obj \
 $O\UserInputUtils.obj \

COMMON_OBJS = \
 $O\CommandLineParser.obj \
 $O\CRC.obj \
 $O\IntToString.obj \
 $O\MyString.obj \
 $O\MyVector.obj \
 $O\NewHandler.obj \
 $O\StdInStream.obj \
 $O\StdOutStream.obj \
 $O\StringConvert.obj \
 $O\Wildcard.obj \
 $O\UTFConvert.obj \

WIN_OBJS = \
 $O\DLL.obj \
 $O\ErrorMsg.obj \
 $O\FileDir.obj \
 $O\FileFind.obj \
 $O\FileIO.obj \
 $O\FileName.obj \
 $O\PropVariant.obj \
 $O\PropVariantConv.obj \
 $O\Synchronization.obj \
 $O\System.obj \

7ZIP_COMMON_OBJS = \
 $O\CreateCoder.obj \
 $O\CWrappers.obj \
```

```
 $O\FilePathAutoRename.obj \
 $O\FileStreams.obj \
 $O\InBuffer.obj \
 $O\FilterCoder.obj
 \
 $O\LimitedStreams.obj \
 $O\OutBuffer.obj \
 $O\ProgressUtils.obj \
 $O\PropId.obj \
 $O\StreamBinder.obj \
 $O\StreamObjects.obj \
 $O\StreamUtils.obj \
 $O\VirtThread.obj \

UI_COMMON_OBJS = \
 $O\ArchiveExtractCallback.obj \
 $O\ArchiveOpenCallback.obj \
 $O\DefaultName.obj \
 $O\LoadCodecs.obj \
 $O\Extract.obj \
 $O\ExtractingFilePath.obj \
 $O\OpenArchive.obj \
 $O\PropIDUtils.obj \

AR_OBJS = \
 $O\SplitHandler.obj \

AR_COMMON_OBJS = \
 $O\CoderMixer2.obj \
 $O\ItemNameUtils.obj \
 $O\MultiStream.obj \
 $O\OutStreamWithCRC.obj \


7Z_OBJS = \
 $O\7zDecode.obj \
 $O\7zExtract.obj \
 $O\7zHandler.obj \
 $O\7zIn.obj \
 $O\7zRegister.obj \

COMPRESS_OBJS = \
 $O\Bcj2Coder.obj \
 $O\Bcj2Register.obj \
 $O\BcjCoder.obj \
 $O\BcjRegister.obj \
 $O\BranchMisc.obj \
 $O\BranchRegister.obj \
```

```
 $O\CopyCoder.obj \
 $O\CopyRegister.obj \
 $O\DeltaFilter.obj \
 $O\Lzma2Decoder.obj \
 $O\Lzma2Register.obj \
 $O\LzmaDecoder.obj \
 $O\LzmaRegister.obj
 \
 $O\PpmdDecoder.obj \
 $O\PpmdRegister.obj \

CRYPTO_OBJS = \
 $O\7zAes.obj \
 $O\7zAesRegister.obj \
 $O\MyAes.obj \

C_OBJS = \
 $O\Alloc.obj \
 $O\Bcj2.obj \
 $O\Bra.obj \
 $O\Bra86.obj \
 $O\BraIA64.obj \
 $O\CpuArch.obj \
 $O\Delta.obj \
 $O\DllSecur.obj \
 $O\Lzma2Dec.obj \
 $O\Lzma2DecMt.obj \
 $O\LzmaDec.obj \
 $O\MtDec.obj \
 $O\Ppmd7.obj \
 $O\Ppmd7Dec.obj \
 $O\Sha256.obj \
 $O\Threads.obj \

!include "../../Aes.mak"
!include "../../Crc.mak"
!include "../../LzmaDec.mak"

!include "../../7zip.mak"
```

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Please be apprised of the following Legal Notices:

A) The U.S. District Court for the Eastern District of Virginia has
ruled that the Netscape Navigator code does not infringe Wang's U.S.
Patent No. 4,751,669 ("the '669 Patent") because: 1) HTML is not
Videotex as defined by the '669 patent; 2) web servers are not central
suppliers; and 3) Navigator does not "connect," as defined by the '669
Patent, to web servers on the Internet. Wang may appeal this decision to
the Federal Circuit. Wang contended that its Patent disclosing a
"Videotex" system, is infringed by the following functionality in the
Netscape Navigator code: 1) the animated logo and status line indicators
--See Claims 1,8 and 9; 2) the "File Save As" function --See Claims
23-27; 3) Bookmarks and Rename Bookmarks in the Properties window --See
Claims 20-22; 4) storing HTML, GIF, and JPEG files and adding filename
extensions --See Claim 38

B) Intermind owns pending U.S. patent applications on communications
systems which employ
metadata ("channel objects") to define a control
structure for information transfer. The Netscape code does not infringe
as released; however, modifications which utilize channel objects as
described by Intermind should be considered carefully. The following is
a statement from Intermind: "Intermind's claims fundamentally involve
the use of a control structure to automate communications. ...The
essence of Intermind's top claim is that two devices sender and receiver
have persistent storage, communicate over a network, and exchange a
control structure including metadata which describes: 1) what
information is to be updated, 2) when to update this information, and 3)
how to transfer the updated information. In addition, at least the
receiving device must be able to process the metadata in order to
perform the update determination and transfer. Any digital
communications system which incorporates all of these elements will be
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Inc., and its licensing agent Hi/fn, own several patents which
disclose data compression methods implementing an LZS compression
algorithm, including U.S. Patent Nos. 4,701,745 and 5,016, 009 ("the
Stac Patents"). The Netscape Communicator code does not perform
compression. If you modify the Netscape source code to perform

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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

At the time this file was first modified, a complete, unmodified copy of
the LPPL Work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

Portions of this file were originally made available under the following license
(copied verbatim from hyph-nl.lic.txt in the original work):

Dutch hyphenation patterns

(more info about the licence to be added later)

% This file is part of hyph-utf8 package and resulted
 from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% Source: nehyph96.tex (yyyy-mm-dd)
% Author: Piet Tutelaers
%

```
% The above mentioned file should become obsolete,
% and the author of the original file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%               and helped with testing, suggestions and bug reports
% - Norbert Preining, who tested & integrated patterns into TeX Live
%
%
 However, the "copyright/copyleft" owner of patterns remains the original author.
%
% The copyright statement of this file is thus:
%
%    Do with this file whatever needs to be done in future for the sake of
%    "a better world" as long as you respect the copyright of original file.
%    If you're the original author of patterns or taking over a new revolution,
%    plese remove all of the TUG comments & credits that we added here -
%    you are the Queen / the King, we are only the servants.
%
% If you want to change this file, rather than uploading directly to CTAN,
% we would be grateful if you could send it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
% Before a new "pattern-revolution" starts,
% please try to follow some guidelines if possible:
%
% - \lccode is *forbidden*, and I really mean it
% - all the patterns should be in UTF-8
% - the only "allowed" TeX commands
 in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
```

```
% at least a chance to read your patterns.
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
%-----------------------------------------------------------------------------
%
% PURPOSE: 8-bit hyphenation patterns for TeX based upon the new Dutch
%         spelling, officially since 1 August 1996. These patterns follow
%         the new hyphenation rules in the `Woordenlijst Nederlandse
%         Taal, SDU Uitgevers, Den Haag 1995' (the so called `Groene
%         Boekje') described in section 5.2 (Het
 afbreekteken).
%
%         The main differences with our earlier patterns based upon the
%         CELEX dictionary are:
%          (1) provide 8-bit patterns based upon the T1 character encoding
%              (the encoding for DC/EC compatible TeX fonts)
%          (2) don't hyphenate if this results in a syllable of one letter
%              before or after the hyphen (hence hyphens in a-drenaline,
%              studi-o, mensa-pen and vide-oachtig are invalid)
%          (3) handle words derived from other languages (`bastaard
%              woorden') according to the new rules
%
%         Like the CELEX patterns these patterns don't hyphenate:
%          (4) in a changing syllable (menuutje can not be hyphenated as
%              menu-tje)
%          (5) in words that have different hyphenations according to
%              there meaning (buur-tje/buurt-je)
%
% COPYRIGHT (C) 1996: Piet Tutelaers
%
% ----------------------------------------------------------------
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% archives in directory macros/latex/base/lppl.txt; either
% version 1 of the License, or any later version.
% ----------------------------------------------------------------
% VERSION: 1.1 (November 1996) Copyright changed March 2000
%
% AUTHOR:  Piet Tutelaers P.T.H.Tutelaers@tue.nl
%
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```

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SOFTWARE.

```
// Windows/Control/ReBar.h

#ifndef __WINDOWS_CONTROL_REBAR_H
#define __WINDOWS_CONTROL_REBAR_H

#include "../Window.h"

namespace NWindows {
namespace NControl {

class CReBar: public NWindows::CWindow
{
public:
 bool SetBarInfo(LPREBARINFO barInfo)
   { return LRESULTToBool(SendMsg(RB_SETBARINFO, 0, (LPARAM)barInfo)); }
 bool InsertBand(int index, LPREBARBANDINFO bandInfo)
   { return LRESULTToBool(SendMsg(RB_INSERTBAND, index, (LPARAM)bandInfo)); }
 bool SetBandInfo(unsigned index, LPREBARBANDINFO bandInfo)
   { return LRESULTToBool(SendMsg(RB_SETBANDINFO, index, (LPARAM)bandInfo)); }
 void MaximizeBand(unsigned index, bool ideal)
   { SendMsg(RB_MAXIMIZEBAND, index, BoolToBOOL(ideal)); }
 bool SizeToRect(LPRECT rect)
   { return LRESULTToBool(SendMsg(RB_SIZETORECT, 0, (LPARAM)rect)); }
 UINT GetHeight()
   { return (UINT)SendMsg(RB_GETBARHEIGHT); }
 UINT GetBandCount()
   { return (UINT)SendMsg(RB_GETBANDCOUNT); }
 bool DeleteBand(UINT index)
```

```
  { return LRESULTToBool(SendMsg(RB_DELETEBAND,
 index)); }
};

}}

#endif
```

PngSuite
---

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```
// OpenCallbackConsole.h

#ifndef __OPEN_CALLBACK_CONSOLE_H
#define __OPEN_CALLBACK_CONSOLE_H

#include "../../../Common/StdOutStream.h"

#include "../Common/ArchiveOpenCallback.h"

#include "PercentPrinter.h"

class COpenCallbackConsole: public IOpenCallbackUI
{
protected:
 CPercentPrinter _percent;

 CStdOutStream *_so;
 CStdOutStream *_se;

 bool _totalFilesDefined;
 // bool _totalBytesDefined;
 // UInt64 _totalFiles;
 UInt64 _totalBytes;

 bool NeedPercents() const { return _percent._so != NULL; }

public:

 bool MultiArcMode;

 void ClosePercents()
 {
  if (NeedPercents())
```

```
    _percent.ClosePrint(true);
 }

 COpenCallbackConsole():
    _totalFilesDefined(false),
    // _totalBytesDefined(false),
    _totalBytes(0),
    MultiArcMode(false)

    #ifndef _NO_CRYPTO
    , PasswordIsDefined(false)
    // , PasswordWasAsked(false)
    #endif

    {}

 void Init(CStdOutStream *outStream, CStdOutStream *errorStream, CStdOutStream *percentStream)
  {
   _so = outStream;
   _se = errorStream;
   _percent._so = percentStream;
 }

 INTERFACE_IOpenCallbackUI(;)

 #ifndef _NO_CRYPTO
 bool PasswordIsDefined;
 // bool PasswordWasAsked;
 UString Password;
 #endif
};

#endif
!<arch>
/               1516160955  0     0     0       270       `
R$$

__C__Users_Peter_Code_winapi_rs_i686_lib_libwinapi_oemlicense_a_iname__head_C__Users_Peter_Code_wina
pi_rs_i686_lib_libwinapi_oemlicense_a_RemoveDemoAppLicense@4__imp__RemoveDemoAppLicense@4_Add
DemoAppLicense@8__imp__AddDemoAppLicense@8doxebt.o/       1516160955  0     0     100666  628       `
L.text
0`.data@0.bss0.idata$4@0.idata$5@0.idata$7@0OEMLicense.dll.filegfake.text.data.bss.idata$4.idata$5.idata$7J__
C__Users_Peter_Code_winapi_rs_i686_lib_libwinapi_oemlicense_a_inamedoxebh.o/       1516160955  0     0
100666  741       `
L6.text 0`.data@0.bss0.idata$2@0.idata$5@0.idata$4@0
.filegfakehnamefthunk.text.data.bss.idata$2.idata$4.idata$5I__head_C__Users_Peter_Code_winapi_rs_i686_lib_lib
winapi_oemlicense_a__C__Users_Peter_Code_winapi_rs_i686_lib_libwinapi_oemlicense_a_iname
doxebs00001.o/  1516160955  0     0     100666  691       `
```

L
.text,X 0`.data@0.bss0.idata$74b0.idata$58l0.idata$4<v0.idata$6@ %RemoveDemoAppLicense
.text.data.bss.idata$7.idata$5.idata$4.idata$6:_RemoveDemoAppLicense@4__imp__RemoveDemoAppLicense@4
__head_C__Users_Peter_Code_winapi_rs_i686_lib_libwinapi_oemlicense_a
doxebs00000.o/
  1516160955  0     0     100666  681       `
L|
.text,T 0`.data@0.bss0.idata$74^0.idata$58h0.idata$4<r0.idata$6@ %AddDemoAppLicense
.text.data.bss.idata$7.idata$5.idata$4.idata$64y_AddDemoAppLicense@8__imp__AddDemoAppLicense@8__head
_C__Users_Peter_Code_winapi_rs_i686_lib_libwinapi_oemlicense_a

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With Two span Elements in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element that contains two span elements." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size:
 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
```

<text>
Text with <span>span 1</span> and <span>span 2</span>.
</text>
</copyright>
</metadata>
</pre>
</body>
</html>
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file, You can obtain one at https://mozilla.org/MPL/2.0/.
// DialogSize.h

#ifndef __DIALOG_SIZE_H
#define __DIALOG_SIZE_H

```
#include "../../../Windows/Control/Dialog.h"

#ifdef UNDER_CE
#define BIG_DIALOG_SIZE(x, y) bool isBig = NWindows::NControl::IsDialogSizeOK(x, y);
#define SIZED_DIALOG(big) (isBig ? big : big ## _2)
#else
#define BIG_DIALOG_SIZE(x, y)
#define SIZED_DIALOG(big) big
#endif

#endif
```

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```
// IArchive.h

#ifndef __IARCHIVE_H
#define __IARCHIVE_H

#include "../IProgress.h"
#include "../IStream.h"
#include "../PropID.h"

#define ARCHIVE_INTERFACE_SUB(i, base, x) DECL_INTERFACE_SUB(i, base, 6, x)
#define ARCHIVE_INTERFACE(i, x) ARCHIVE_INTERFACE_SUB(i, IUnknown, x)
```

```
namespace NFileTimeType
{
 enum EEnum
 {
   kWindows,
   kUnix,
   kDOS
 };
}

namespace NArcInfoFlags
{
 const UInt32 kKeepName        = 1 << 0;  // keep name of file in archive name
 const UInt32 kAltStreams      = 1 << 1;  // the handler supports alt streams
 const UInt32 kNtSecure        = 1 << 2;  // the handler supports NT security
 const UInt32 kFindSignature   = 1 << 3;  // the handler can find start of archive
 const UInt32 kMultiSignature  = 1 << 4;  // there are several signatures
 const UInt32 kUseGlobalOffset = 1 << 5;  // the seek position of stream must be set as global offset
 const UInt32 kStartOpen       = 1 << 6;  // call handler for each start position
 const UInt32 kPureStartOpen
   = 1 << 7;  // call handler only for start of file
 const UInt32 kBackwardOpen    = 1 << 8;  // archive can be open backward
 const UInt32 kPreArc          = 1 << 9;  // such archive can be stored before real archive (like SFX stub)
 const UInt32 kSymLinks        = 1 << 10; // the handler supports symbolic links
 const UInt32 kHardLinks       = 1 << 11; // the handler supports hard links
}

namespace NArchive
{
 namespace NHandlerPropID
 {
   enum
   {
     kName = 0,        // VT_BSTR
     kClassID,         // binary GUID in VT_BSTR
     kExtension,       // VT_BSTR
     kAddExtension,    // VT_BSTR
     kUpdate,          // VT_BOOL
     kKeepName,        // VT_BOOL
     kSignature,       // binary in VT_BSTR
     kMultiSignature,  // binary in VT_BSTR
     kSignatureOffset, // VT_UI4
     kAltStreams,      // VT_BOOL
     kNtSecure,        // VT_BOOL
     kFlags            // VT_UI4
     // kVersion          // VT_UI4 ((VER_MAJOR << 8) | VER_MINOR)
   };
```

```
}

 namespace NExtract
{
  namespace NAskMode
  {
    enum
    {
      kExtract = 0,
      kTest,
      kSkip
    };
  }

  namespace NOperationResult
  {
    enum
    {
      kOK = 0,
      kUnsupportedMethod,
      kDataError,
      kCRCError,
      kUnavailable,
      kUnexpectedEnd,
      kDataAfterEnd,
      kIsNotArc,
      kHeadersError,
      kWrongPassword
    };
  }
}

namespace NEventIndexType
{
  enum
  {
    kNoIndex = 0,
    kInArcIndex,
    kBlockIndex,
    kOutArcIndex
  };
}

namespace NUpdate
{
  namespace NOperationResult
  {
    enum
```

```
    {
      kOK = 0
      , // kError
    };
  }
 }
}

#define INTERFACE_IArchiveOpenCallback(x) \
 STDMETHOD(SetTotal)(const UInt64 *files, const UInt64 *bytes) x; \
 STDMETHOD(SetCompleted)(const UInt64 *files, const UInt64 *bytes) x; \

ARCHIVE_INTERFACE(IArchiveOpenCallback, 0x10)
{
 INTERFACE_IArchiveOpenCallback(PURE);
};

/*
IArchiveExtractCallback::

7-Zip
 doesn't call IArchiveExtractCallback functions
 GetStream()
 PrepareOperation()
 SetOperationResult()
from different threads simultaneously.
But 7-Zip can call functions for IProgress or ICompressProgressInfo functions
from another threads simultaneously with calls for IArchiveExtractCallback interface.

IArchiveExtractCallback::GetStream()
 UInt32 index - index of item in Archive
 Int32 askExtractMode  (Extract::NAskMode)
   if (askMode != NExtract::NAskMode::kExtract)
   {
     then the callee can not real stream: (*inStream == NULL)
   }

 Out:
     (*inStream == NULL) - for directories
     (*inStream == NULL) - if link (hard link or symbolic link) was created
     if (*inStream == NULL && askMode == NExtract::NAskMode::kExtract)
     {
       then the caller must skip extracting of that file.
     }

 returns:
   S_OK     : OK
   S_FALSE  : data error (for decoders)
```

```
if (IProgress::SetTotal() was called)
{
 IProgress::SetCompleted(completeValue)
 uses
   packSize   - for some stream formats (xz, gz, bz2, lzma, z, ppmd).
   unpackSize - for another formats.
}
else
{
 IProgress::SetCompleted(completeValue) uses packSize.
}

SetOperationResult()
 7-Zip calls SetOperationResult at the end of extracting,
 so the callee can close the file, set attributes, timestamps and security information.

 Int32 opRes (NExtract::NOperationResult)
*/

#define INTERFACE_IArchiveExtractCallback(x) \
 INTERFACE_IProgress(x) \
 STDMETHOD(GetStream)(UInt32 index, ISequentialOutStream **outStream, Int32 askExtractMode) x; \
 STDMETHOD(PrepareOperation)(Int32 askExtractMode) x; \
 STDMETHOD(SetOperationResult)(Int32 opRes) x; \

ARCHIVE_INTERFACE_SUB(IArchiveExtractCallback, IProgress, 0x20)
{
 INTERFACE_IArchiveExtractCallback(PURE)
};



/*
IArchiveExtractCallbackMessage can be requested from IArchiveExtractCallback object
 by Extract() or UpdateItems() functions to report about extracting errors
ReportExtractResult()
 UInt32
 indexType (NEventIndexType)
 UInt32 index
 Int32 opRes (NExtract::NOperationResult)
*/

#define INTERFACE_IArchiveExtractCallbackMessage(x) \
 STDMETHOD(ReportExtractResult)(UInt32 indexType, UInt32 index, Int32 opRes) x; \

ARCHIVE_INTERFACE_SUB(IArchiveExtractCallbackMessage, IProgress, 0x21)
{
```

```
 INTERFACE_IArchiveExtractCallbackMessage(PURE)
};


#define INTERFACE_IArchiveOpenVolumeCallback(x) \
 STDMETHOD(GetProperty)(PROPID propID, PROPVARIANT *value) x; \
 STDMETHOD(GetStream)(const wchar_t *name, IInStream **inStream) x; \

ARCHIVE_INTERFACE(IArchiveOpenVolumeCallback, 0x30)
{
 INTERFACE_IArchiveOpenVolumeCallback(PURE);
};


ARCHIVE_INTERFACE(IInArchiveGetStream, 0x40)
{
 STDMETHOD(GetStream)(UInt32 index, ISequentialInStream **stream) PURE;
};


ARCHIVE_INTERFACE(IArchiveOpenSetSubArchiveName, 0x50)
{
 STDMETHOD(SetSubArchiveName)(const wchar_t *name) PURE;
};


/*
IInArchive::Open
  stream
    if (kUseGlobalOffset), stream current position can be non 0.
    if
 (!kUseGlobalOffset), stream current position is 0.
  if (maxCheckStartPosition == NULL), the handler can try to search archive start in stream
  if (*maxCheckStartPosition == 0), the handler must check only current position as archive start

IInArchive::Extract:
 indices must be sorted
 numItems = (UInt32)(Int32)-1 = 0xFFFFFFFF means "all files"
 testMode != 0 means "test files without writing to outStream"

IInArchive::GetArchiveProperty:
 kpidOffset  - start offset of archive.
    VT_EMPTY : means offset = 0.
    VT_UI4, VT_UI8, VT_I8 : result offset; negative values is allowed
 kpidPhySize - size of archive. VT_EMPTY means unknown size.
  kpidPhySize is allowed to be larger than file size. In that case it must show
  supposed size.
```

```
 kpidIsDeleted:
 kpidIsAltStream:
 kpidIsAux:
 kpidINode:
   must return VARIANT_TRUE (VT_BOOL), if archive can support that property in GetProperty.


Notes:
 Don't call IInArchive functions for same IInArchive object from different
 threads simultaneously.
 Some IInArchive handlers will work incorrectly in that case.
*/

#ifdef _MSC_VER
 #define MY_NO_THROW_DECL_ONLY throw()
#else
 #define MY_NO_THROW_DECL_ONLY
#endif

#define INTERFACE_IInArchive(x) \
 STDMETHOD(Open)(IInStream *stream, const UInt64 *maxCheckStartPosition, IArchiveOpenCallback
*openCallback) MY_NO_THROW_DECL_ONLY x; \
 STDMETHOD(Close)() MY_NO_THROW_DECL_ONLY x; \
 STDMETHOD(GetNumberOfItems)(UInt32 *numItems) MY_NO_THROW_DECL_ONLY x; \
 STDMETHOD(GetProperty)(UInt32 index, PROPID propID, PROPVARIANT *value)
MY_NO_THROW_DECL_ONLY x; \
 STDMETHOD(Extract)(const UInt32* indices, UInt32 numItems, Int32 testMode, IArchiveExtractCallback
*extractCallback) MY_NO_THROW_DECL_ONLY x; \
 STDMETHOD(GetArchiveProperty)(PROPID propID, PROPVARIANT *value)
MY_NO_THROW_DECL_ONLY x; \
 STDMETHOD(GetNumberOfProperties)(UInt32 *numProps) MY_NO_THROW_DECL_ONLY x; \
 STDMETHOD(GetPropertyInfo)(UInt32 index, BSTR *name, PROPID *propID, VARTYPE *varType)
 MY_NO_THROW_DECL_ONLY x; \
 STDMETHOD(GetNumberOfArchiveProperties)(UInt32 *numProps) MY_NO_THROW_DECL_ONLY x; \
 STDMETHOD(GetArchivePropertyInfo)(UInt32 index, BSTR *name, PROPID *propID, VARTYPE *varType)
MY_NO_THROW_DECL_ONLY x; \

ARCHIVE_INTERFACE(IInArchive, 0x60)
{
 INTERFACE_IInArchive(PURE)
};

namespace NParentType
{
 enum
 {
   kDir = 0,
   kAltStream
```

```
 };
};

namespace NPropDataType
{
 const UInt32 kMask_ZeroEnd   = 1 << 4;
 // const UInt32 kMask_BigEndian = 1 << 5;
 const UInt32 kMask_Utf       = 1 << 6;
 const UInt32 kMask_Utf8  = kMask_Utf | 0;
 const UInt32 kMask_Utf16 = kMask_Utf | 1;
 // const UInt32 kMask_Utf32 = kMask_Utf | 2;

 const UInt32 kNotDefined = 0;
 const UInt32 kRaw = 1;

 const UInt32 kUtf8z  = kMask_Utf8  | kMask_ZeroEnd;
 const UInt32 kUtf16z = kMask_Utf16 | kMask_ZeroEnd;
};

// UTF string (pointer to wchar_t) with zero end and little-endian.
#define PROP_DATA_TYPE_wchar_t_PTR_Z_LE ((NPropDataType::kMask_Utf |
NPropDataType::kMask_ZeroEnd)
 + (sizeof(wchar_t) >> 1))

/*
GetRawProp:
 Result:
   S_OK - even if property is not set
*/

#define INTERFACE_IArchiveGetRawProps(x) \
 STDMETHOD(GetParent)(UInt32 index, UInt32 *parent, UInt32 *parentType) x; \
 STDMETHOD(GetRawProp)(UInt32 index, PROPID propID, const void **data, UInt32 *dataSize, UInt32
*propType) x; \
 STDMETHOD(GetNumRawProps)(UInt32 *numProps) x; \
 STDMETHOD(GetRawPropInfo)(UInt32 index, BSTR *name, PROPID *propID) x;

ARCHIVE_INTERFACE(IArchiveGetRawProps, 0x70)
{
 INTERFACE_IArchiveGetRawProps(PURE)
};

#define INTERFACE_IArchiveGetRootProps(x) \
 STDMETHOD(GetRootProp)(PROPID propID, PROPVARIANT *value) x; \
 STDMETHOD(GetRootRawProp)(PROPID propID, const void **data, UInt32 *dataSize, UInt32 *propType) x; \

ARCHIVE_INTERFACE(IArchiveGetRootProps, 0x71)
{
```

```
 INTERFACE_IArchiveGetRootProps(PURE)
};

ARCHIVE_INTERFACE(IArchiveOpenSeq, 0x61)
{
 STDMETHOD(OpenSeq)(ISequentialInStream *stream) PURE;
};

/*
 OpenForSize
 Result:
   S_FALSE -
 is not archive
   ? - DATA error
*/

/*
const UInt32 kOpenFlags_RealPhySize = 1 << 0;
const UInt32 kOpenFlags_NoSeek = 1 << 1;
// const UInt32 kOpenFlags_BeforeExtract = 1 << 2;
*/

/*
Flags:
  0 - opens archive with IInStream, if IInStream interface is supported
    - if phySize is not available, it doesn't try to make full parse to get phySize
  kOpenFlags_NoSeek -  ArcOpen2 function doesn't use IInStream interface, even if it's available
  kOpenFlags_RealPhySize - the handler will try to get PhySize, even if it requires full decompression for file

 if handler is not allowed to use IInStream and the flag kOpenFlags_RealPhySize is not specified,
 the handler can return S_OK, but it doesn't check even Signature.
 So next Extract can be called for that sequential stream.
*/

/*
ARCHIVE_INTERFACE(IArchiveOpen2, 0x62)
{
 STDMETHOD(ArcOpen2)(ISequentialInStream *stream, UInt32 flags, IArchiveOpenCallback *openCallback)
PURE;
};
*/

// ---------- UPDATE ----------

/*
GetUpdateItemInfo
 outs:
*newData  *newProps
```

```
  0      0     - Copy data and properties from archive
  0      1     - Copy data from archive, request new properties
  1      0     - that combination is unused now
  1      1     - Request new data and new properties. It can be used even for folders

 indexInArchive = -1 if there is no item in archive, or if it doesn't matter.


GetStream out:
 Result:
   S_OK:
     (*inStream == NULL) - only for directories
                         - the bug was fixed in 9.33: (*Stream == NULL) was in case of anti-file
     (*inStream != NULL) - for any file, even for empty file or anti-file
   S_FALSE - skip that file (don't add item to archive) - (client code can't open stream of that file by some reason)
     (*inStream == NULL)

The order of calling for hard links:
 - GetStream()
 - GetProperty(kpidHardLink)

SetOperationResult()
 Int32 opRes (NExtract::NOperationResult::kOK)
*/

#define INTERFACE_IArchiveUpdateCallback(x) \
 INTERFACE_IProgress(x);
 \
 STDMETHOD(GetUpdateItemInfo)(UInt32 index, Int32 *newData, Int32 *newProps, UInt32 *indexInArchive) x;
\
 STDMETHOD(GetProperty)(UInt32 index, PROPID propID, PROPVARIANT *value) x; \
 STDMETHOD(GetStream)(UInt32 index, ISequentialInStream **inStream) x; \
 STDMETHOD(SetOperationResult)(Int32 operationResult) x; \

ARCHIVE_INTERFACE_SUB(IArchiveUpdateCallback, IProgress, 0x80)
{
 INTERFACE_IArchiveUpdateCallback(PURE);
};

#define INTERFACE_IArchiveUpdateCallback2(x) \
 INTERFACE_IArchiveUpdateCallback(x) \
 STDMETHOD(GetVolumeSize)(UInt32 index, UInt64 *size) x; \
 STDMETHOD(GetVolumeStream)(UInt32 index, ISequentialOutStream **volumeStream) x; \

ARCHIVE_INTERFACE_SUB(IArchiveUpdateCallback2, IArchiveUpdateCallback, 0x82)
{
 INTERFACE_IArchiveUpdateCallback2(PURE);
};
```

```
namespace NUpdateNotifyOp
{
 enum
 {
   kAdd = 0,
   kUpdate,
   kAnalyze,
   kReplicate,
   kRepack,
   kSkip,
   kDelete,
   kHeader

   // kNumDefined
 };
};

/*
IArchiveUpdateCallbackFile::ReportOperation
  UInt32 indexType (NEventIndexType)
 UInt32 index
 UInt32 notifyOp (NUpdateNotifyOp)
*/

#define INTERFACE_IArchiveUpdateCallbackFile(x) \
 STDMETHOD(GetStream2)(UInt32 index, ISequentialInStream **inStream, UInt32 notifyOp) x; \
 STDMETHOD(ReportOperation)(UInt32 indexType, UInt32 index, UInt32 notifyOp) x; \

ARCHIVE_INTERFACE(IArchiveUpdateCallbackFile, 0x83)
{
 INTERFACE_IArchiveUpdateCallbackFile(PURE);
};


/*
UpdateItems()
-------------

 outStream: output stream. (the handler) MUST support the case when
   Seek position in outStream is not ZERO.
   but the caller calls with empty outStream and seek position is ZERO??

 archives with stub:

 If archive is open and the handler and (Offset > 0), then the handler
 knows about stub size.
 UpdateItems():
```

```
 1) the handler MUST copy that stub to outStream
 2) the caller MUST NOT copy the stub to outStream, if
    "rsfx" property is set with SetProperties

 the handler must support the
 case where
   ISequentialOutStream *outStream
*/


#define INTERFACE_IOutArchive(x) \
 STDMETHOD(UpdateItems)(ISequentialOutStream *outStream, UInt32 numItems, IArchiveUpdateCallback
*updateCallback) x; \
 STDMETHOD(GetFileTimeType)(UInt32 *type) x;

ARCHIVE_INTERFACE(IOutArchive, 0xA0)
{
 INTERFACE_IOutArchive(PURE)
};


/*
ISetProperties::SetProperties()
 PROPVARIANT values[i].vt:
   VT_EMPTY
   VT_BOOL
   VT_UI4   - if 32-bit number
   VT_UI8   - if 64-bit number
   VT_BSTR
*/

ARCHIVE_INTERFACE(ISetProperties, 0x03)
{
 STDMETHOD(SetProperties)(const wchar_t * const *names, const PROPVARIANT *values, UInt32 numProps)
PURE;
};

ARCHIVE_INTERFACE(IArchiveKeepModeForNextOpen, 0x04)
{
 STDMETHOD(KeepModeForNextOpen)() PURE;
};

/* Exe handler: the handler for executable format (PE, ELF, Mach-O).
  SFX archive: executable stub + some tail data.
    before 9.31: exe handler didn't parse SFX archives as executable format.
    for 9.31+: exe handler parses SFX archives as executable
 format, only if AllowTail(1) was called */
```

```
ARCHIVE_INTERFACE(IArchiveAllowTail, 0x05)
{
 STDMETHOD(AllowTail)(Int32 allowTail) PURE;
};


#define IMP_IInArchive_GetProp(k) \
 (UInt32 index, BSTR *name, PROPID *propID, VARTYPE *varType) \
   { if (index >= ARRAY_SIZE(k)) return E_INVALIDARG; \
   *propID = k[index]; *varType = k7z_PROPID_To_VARTYPE[(unsigned)*propID];  *name = 0; return S_OK; } \


struct CStatProp
{
 const char *Name;
 UInt32 PropID;
 VARTYPE vt;
};

namespace NWindows {
namespace NCOM {
// PropVariant.cpp
BSTR AllocBstrFromAscii(const char *s) throw();
}}

#define IMP_IInArchive_GetProp_WITH_NAME(k) \
 (UInt32 index, BSTR *name, PROPID *propID, VARTYPE *varType) \
   { if (index >= ARRAY_SIZE(k)) return E_INVALIDARG; \
   const CStatProp &prop = k[index]; \
   *propID = (PROPID)prop.PropID; *varType = prop.vt; \
   *name = NWindows::NCOM::AllocBstrFromAscii(prop.Name); return S_OK; } \

#define IMP_IInArchive_Props \
 STDMETHODIMP CHandler::GetNumberOfProperties(UInt32
 *numProps) \
   { *numProps = ARRAY_SIZE(kProps); return S_OK; } \
 STDMETHODIMP CHandler::GetPropertyInfo IMP_IInArchive_GetProp(kProps)

#define IMP_IInArchive_Props_WITH_NAME \
 STDMETHODIMP CHandler::GetNumberOfProperties(UInt32 *numProps) \
   { *numProps = ARRAY_SIZE(kProps); return S_OK; } \
 STDMETHODIMP CHandler::GetPropertyInfo IMP_IInArchive_GetProp_WITH_NAME(kProps)


#define IMP_IInArchive_ArcProps \
 STDMETHODIMP CHandler::GetNumberOfArchiveProperties(UInt32 *numProps) \
   { *numProps = ARRAY_SIZE(kArcProps); return S_OK; } \
 STDMETHODIMP CHandler::GetArchivePropertyInfo IMP_IInArchive_GetProp(kArcProps)
```

```
#define IMP_IInArchive_ArcProps_WITH_NAME \
 STDMETHODIMP CHandler::GetNumberOfArchiveProperties(UInt32 *numProps) \
   { *numProps = ARRAY_SIZE(kArcProps); return S_OK; } \
 STDMETHODIMP CHandler::GetArchivePropertyInfo IMP_IInArchive_GetProp_WITH_NAME(kArcProps)

#define IMP_IInArchive_ArcProps_NO_Table \
 STDMETHODIMP CHandler::GetNumberOfArchiveProperties(UInt32
 *numProps) \
   { *numProps = 0; return S_OK; } \
 STDMETHODIMP CHandler::GetArchivePropertyInfo(UInt32, BSTR *, PROPID *, VARTYPE *) \
   { return E_NOTIMPL; } \

#define IMP_IInArchive_ArcProps_NO \
 IMP_IInArchive_ArcProps_NO_Table \
 STDMETHODIMP CHandler::GetArchiveProperty(PROPID, PROPVARIANT *value) \
   { value->vt = VT_EMPTY; return S_OK; }



#define k_IsArc_Res_NO   0
#define k_IsArc_Res_YES  1
#define k_IsArc_Res_NEED_MORE 2
// #define k_IsArc_Res_YES_LOW_PROB 3

#define API_FUNC_IsArc EXTERN_C UInt32 WINAPI
#define API_FUNC_static_IsArc extern "C" { static UInt32 WINAPI

extern "C"
{
 typedef HRESULT (WINAPI *Func_CreateObject)(const GUID *clsID, const GUID *iid, void **outObject);

 typedef UInt32 (WINAPI *Func_IsArc)(const Byte *p, size_t size);
 typedef HRESULT (WINAPI *Func_GetIsArc)(UInt32 formatIndex, Func_IsArc *isArc);

 typedef HRESULT (WINAPI *Func_GetNumberOfFormats)(UInt32 *numFormats);
 typedef HRESULT (WINAPI *Func_GetHandlerProperty)(PROPID
 propID, PROPVARIANT *value);
 typedef HRESULT (WINAPI *Func_GetHandlerProperty2)(UInt32 index, PROPID propID, PROPVARIANT
*value);

 typedef HRESULT (WINAPI *Func_SetCaseSensitive)(Int32 caseSensitive);
 typedef HRESULT (WINAPI *Func_SetLargePageMode)();

 typedef IOutArchive * (*Func_CreateOutArchive)();
 typedef IInArchive * (*Func_CreateInArchive)();
}
```

```
#endif
UNRECOGNIZED LICENSE; MD5 sum: a2712c4c54f8cb884d0aed34c4d929ef
# -*- Mode: python; indent-tabs-mode: nil; tab-width: 40 -*-
# vim: set filetype=python:
# This Source Code Form is subject to the terms of the Mozilla Public
# License, v. 2.0. If a copy of the MPL was not distributed with this
# file, You can obtain one at http://mozilla.org/MPL/2.0/.

with Files("**"):
   BUG_COMPONENT = ("Core", "DOM: Core & HTML")

EXPORTS.mozilla.dom += [
   'Permissions.h',
   'PermissionStatus.h',
]

UNIFIED_SOURCES += [
   'PermissionObserver.cpp',
   'Permissions.cpp',
   'PermissionStatus.cpp',
   'PermissionUtils.cpp',
]

MOCHITEST_MANIFESTS += ['tests/mochitest.ini']

FINAL_LIBRARY = 'xul'

include('/ipc/chromium/chromium-config.mozbuild')
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With class Attribute in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-017-ref.xht" />
  <meta name="assert" content="The license element contains a text element with &quot;class1 class2 class3&quot;
as the value for the class attribute." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
```

```
   src: url("support/metadatadisplay-schema-license-017.woff2") format("woff2");
  }
  body {
   font-size: 20px;
  }
  pre {
   font-size: 12px;
  }
  .test {
   font-family: "WOFF Test", "WOFF Test CFF Fallback";
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
</head>
<body>
 <p>Test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
 <div class="test">P</div>
 <p>The XML contained in the Extended Metadata Block is below.</p>
 <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text class="class1 class2 class3"&gt;
   License without language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
 </pre>
</body>
</html>
```

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file, You can obtain one at http://mozilla.org/MPL/2.0/.

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At the time this file was first modified, a complete, unmodified copy of
the LPPL Work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

Portions of this file were originally made available under the following license
(copied verbatim from hyph-uk.lic.txt in the original work):

Ukrainian hyphenation patterns

(more info about the licence to be added later)

% This file is part of hyph-utf8 package and resulted
from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% Source: TODO:WRITEME (yyyy-mm-dd)
% Author: Maksym Polyakov <polyama at auburn.edu>, <mpoliak at i.com.ua>
%
% The above mentioned file should become obsolete,
% and the author of the original file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.

```
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%               and helped with testing, suggestions and bug reports
% - Norbert Preining,
 who tested & integrated patterns into TeX Live
%
% However, the "copyright/copyleft" owner of patterns remains the original author.
%
% The copyright statement of this file is thus:
%
%    Do with this file whatever needs to be done in future for the sake of
%    "a better world" as long as you respect the copyright of original file.
%    If you're the original author of patterns or taking over a new revolution,
%    plese remove all of the TUG comments & credits that we added here -
%    you are the Queen / the King, we are only the servants.
%
% If you want to change this file, rather than uploading directly to CTAN,
% we would be grateful if you could send it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
% Before a new "pattern-revolution" starts,
% please try to follow some guidelines if possible:
%
% - \lccode is *forbidden*, and I really mean it
% - all the patterns
 should be in UTF-8
% - the only "allowed" TeX commands in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
%-----------------------------------------------------------------------------
```

%
% Ukrainian hyphenation patterns in LCY (cp866nav) encoding.
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%  polyama@auburn.edu
%
  mpoliak@i.com.ua
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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With Nested span Elements in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element that contains nested span elements." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre
```

```
 {
   font-size: 12px;
  }
  .test {
   font-family: "WOFF Test CFF Reference";
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
</head>
<body>
 <p>Test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
 <div class="test">P</div>
 <p>The XML contained in the Extended Metadata Block is below.</p>
 <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   &lt;span&gt;
    span 1 start
    &lt;span&gt;
     span 2 start
     &lt;span&gt;
      span 3
     &lt;/span&gt;
     span 2 end
    &lt;/span&gt;
    span 1 end
   &lt;/span&gt;
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
 </pre>
</body>
</html>
```

UNRECOGNIZED LICENSE; MD5 sum: c21fb78d6f5b19f1aa0413ea2527e1fb

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*/
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  <style type="text/css"><![CDATA[
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    font-size: 20px;
   }
   pre
  {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
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&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   &lt;span&gt;
    span 1 start
    &lt;span&gt;
     span 2 start
     &lt;span&gt;
      span 3
     &lt;/span&gt;
```

```
      span 2 end
     &lt;/span&gt;
     span 1 end
    &lt;/span&gt;
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With dir Attribute in text Element 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />

```
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-011-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element with ltr as the value for the dir
attribute." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-011.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
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  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text dir="ltr"&gt;
   Copyright without language.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
// Windows/DLL.h

#ifndef __WINDOWS_DLL_H
#define __WINDOWS_DLL_H

#include "../Common/MyString.h"
```

```
namespace NWindows {
namespace NDLL {

#ifdef UNDER_CE
#define My_GetProcAddress(module, procName) ::GetProcAddressA(module, procName)
#else
#define My_GetProcAddress(module, procName) ::GetProcAddress(module, procName)
#endif

/* Win32: Don't call CLibrary::Free() and FreeLibrary() from another
   FreeLibrary() code: detaching code in DLL entry-point or in
   destructors of global objects in DLL module. */

class CLibrary
{
 HMODULE _module;

 // CLASS_NO_COPY(CLibrary);
public:
 CLibrary(): _module(NULL) {};
 ~CLibrary() { Free(); }

 operator HMODULE() const { return _module; }
 HMODULE* operator&() { return &_module; }
 bool IsLoaded() const { return (_module != NULL); }

 void Attach(HMODULE m)
 {
   Free();
   _module = m;
 }
 HMODULE Detach()
 {
   HMODULE m = _module;
   _module = NULL;
   return m;
 }

 bool Free() throw();
 bool LoadEx(CFSTR path, DWORD flags
 = LOAD_LIBRARY_AS_DATAFILE) throw();
 bool Load(CFSTR path) throw();
 FARPROC GetProc(LPCSTR procName) const { return My_GetProcAddress(_module, procName); }
};

bool MyGetModuleFileName(FString &path);

FString GetModuleDirPrefix();
```

```
}}

#endif
// DirItem.h

#ifndef __DIR_ITEM_H
#define __DIR_ITEM_H

#include "../../../Common/MyString.h"

#include "../../../Windows/FileFind.h"

#include "../../Common/UniqBlocks.h"

#include "../../Archive/IArchive.h"

struct CDirItemsStat
{
 UInt64 NumDirs;
 UInt64 NumFiles;
 UInt64 NumAltStreams;
 UInt64 FilesSize;
 UInt64 AltStreamsSize;

 UInt64 NumErrors;

 // UInt64 Get_NumItems() const { return NumDirs + NumFiles + NumAltStreams; }
 UInt64 Get_NumDataItems() const { return NumFiles + NumAltStreams; }
 UInt64 GetTotalBytes() const { return FilesSize + AltStreamsSize; }

 bool IsEmpty() const { return
         0 == NumDirs
      && 0 == NumFiles
      && 0 == NumAltStreams
      && 0 == FilesSize
      && 0 == AltStreamsSize
      && 0 == NumErrors; }

 CDirItemsStat():
    NumDirs(0),
    NumFiles(0),
    NumAltStreams(0),
    FilesSize(0),
    AltStreamsSize(0),
    NumErrors(0)
   {}
};
```

```
struct CDirItemsStat2: public CDirItemsStat
{
 UInt64 Anti_NumDirs;
  UInt64 Anti_NumFiles;
 UInt64 Anti_NumAltStreams;

 // UInt64 Get_NumItems() const { return Anti_NumDirs + Anti_NumFiles + Anti_NumAltStreams +
CDirItemsStat::Get_NumItems(); }
 UInt64 Get_NumDataItems2() const { return Anti_NumFiles + Anti_NumAltStreams +
CDirItemsStat::Get_NumDataItems(); }

 bool IsEmpty() const { return CDirItemsStat::IsEmpty()
       && 0 == Anti_NumDirs
       && 0 == Anti_NumFiles
       && 0 == Anti_NumAltStreams; }

 CDirItemsStat2():
     Anti_NumDirs(0),
     Anti_NumFiles(0),
     Anti_NumAltStreams(0)
   {}
};



#define INTERFACE_IDirItemsCallback(x) \
 virtual HRESULT ScanError(const FString &path, DWORD systemError) x; \
 virtual HRESULT ScanProgress(const CDirItemsStat &st, const FString &path, bool isDir) x; \

struct IDirItemsCallback
{
 INTERFACE_IDirItemsCallback(=0)
};

struct CDirItem
{
 UInt64 Size;
 FILETIME CTime;
 FILETIME ATime;
 FILETIME MTime;
 UString Name;

 #if defined(_WIN32) && !defined(UNDER_CE)
  // UString ShortName;
 CByteBuffer ReparseData;
 CByteBuffer ReparseData2; // fixed (reduced) absolute links
```

```
 bool AreReparseData() const { return ReparseData.Size() != 0 || ReparseData2.Size() != 0; }
 #endif

 UInt32 Attrib;
 int PhyParent;
 int LogParent;
 int SecureIndex;

 bool IsAltStream;

 CDirItem(): PhyParent(-1), LogParent(-1), SecureIndex(-1), IsAltStream(false) {}
 bool IsDir() const { return (Attrib & FILE_ATTRIBUTE_DIRECTORY) != 0 ; }
};

class CDirItems
{
 UStringVector Prefixes;
 CIntVector PhyParents;
 CIntVector LogParents;

 UString GetPrefixesPath(const CIntVector &parents, int index, const UString &name) const;

 HRESULT EnumerateDir(int phyParent, int logParent, const FString &phyPrefix);

public:
 CObjectVector<CDirItem> Items;

 bool SymLinks;

 bool ScanAltStreams;

 CDirItemsStat Stat;

 #ifndef UNDER_CE
 HRESULT SetLinkInfo(CDirItem &dirItem, const NWindows::NFile::NFind::CFileInfo &fi,
    const FString &phyPrefix);
 #endif


  #if defined(_WIN32) && !defined(UNDER_CE)

 CUniqBlocks SecureBlocks;
 CByteBuffer TempSecureBuf;
 bool _saclEnabled;
 bool ReadSecure;

 HRESULT AddSecurityItem(const FString &path, int &secureIndex);
```

```
#endif

IDirItemsCallback *Callback;

CDirItems();

void AddDirFileInfo(int phyParent, int logParent, int secureIndex,
    const NWindows::NFile::NFind::CFileInfo &fi);

HRESULT AddError(const FString &path, DWORD errorCode);
HRESULT AddError(const FString &path);

HRESULT ScanProgress(const FString &path);

// unsigned GetNumFolders() const { return Prefixes.Size(); }
FString GetPhyPath(unsigned index) const;
UString GetLogPath(unsigned index) const;

unsigned AddPrefix(int phyParent, int logParent, const UString &prefix);
void DeleteLastPrefix();

HRESULT EnumerateItems2(
  const FString &phyPrefix,
  const UString &logPrefix,
  const FStringVector &filePaths,
  FStringVector *requestedPaths);

#if defined(_WIN32) && !defined(UNDER_CE)
 void FillFixedReparse();
#endif

void ReserveDown();
};

struct CArcItem
{
UInt64 Size;
FILETIME MTime;
UString Name;
bool IsDir;
bool IsAltStream;
bool SizeDefined;
bool MTimeDefined;
bool Censored;
UInt32 IndexInServer;
int TimeType;
```

```
 CArcItem(): IsDir(false), IsAltStream(false), SizeDefined(false), MTimeDefined(false), Censored(false),
TimeType(-1) {}
};

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
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 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
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   }
   body {
    font-size: 20px;
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&lt;metadata version="1.0"&gt;
```

```
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text dir="ltr"&gt;
   License without language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
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* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_TABLE_H__
#define __ATK_TABLE_H__

#include <atk/atkobject.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

/*
* AtkTable describes a user-interface component
 that presents data in
* two-dimensional table format.
*/


#define ATK_TYPE_TABLE                  (atk_table_get_type ())
#define ATK_IS_TABLE(obj)               G_TYPE_CHECK_INSTANCE_TYPE ((obj), ATK_TYPE_TABLE)
#define ATK_TABLE(obj)                  G_TYPE_CHECK_INSTANCE_CAST ((obj), ATK_TYPE_TABLE,
AtkTable)
```

```
#define ATK_TABLE_GET_IFACE(obj)        (G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_TABLE, AtkTableIface))

#ifndef _TYPEDEF_ATK_TABLE_
#define _TYPEDEF_ATK_TABLE_
typedef struct _AtkTable AtkTable;
#endif
typedef struct _AtkTableIface AtkTableIface;

struct _AtkTableIface
{
 GTypeInterface parent;

 AtkObject*       (* ref_at)                (AtkTable      *table,
                                   gint         row,
                                   gint         column);
 gint             (* get_index_at)          (AtkTable      *table,
                                   gint         row,

                                 gint         column);
 gint             (* get_column_at_index)     (AtkTable      *table,
                                   gint         index_);
 gint             (* get_row_at_index)        (AtkTable      *table,
                                   gint         index_);
 gint             (* get_n_columns)          (AtkTable      *table);
 gint             (* get_n_rows)             (AtkTable      *table);
 gint             (* get_column_extent_at)    (AtkTable      *table,
                                   gint         row,
                                   gint         column);
 gint             (* get_row_extent_at)       (AtkTable      *table,
                                   gint         row,
                                   gint         column);
 AtkObject*
                (* get_caption)            (AtkTable
    *table);
 G_CONST_RETURN gchar*
                (* get_column_description)   (AtkTable      *table,
                                   gint         column);
 AtkObject*       (* get_column_header)       (AtkTable      *table,
      gint  column);
 G_CONST_RETURN gchar*
                (* get_row_description)      (AtkTable      *table,
                                   gint         row);
 AtkObject*       (* get_row_header)          (AtkTable      *table,
      gint  row);
 AtkObject*       (* get_summary)            (AtkTable      *table);
 void             (* set_caption)            (AtkTable      *table,
                                   AtkObject     *caption);
```

```
void            (* set_column_description)   (AtkTable      *table,
                                             gint          column,
                                             const gchar   *description);
void
(* set_column_header)       (AtkTable      *table,
                                             gint          column,
                                             AtkObject     *header);
void            (* set_row_description)     (AtkTable      *table,
                                             gint          row,
                                             const gchar   *description);
void            (* set_row_header)          (AtkTable      *table,
                                             gint          row,
                                             AtkObject     *header);
void            (* set_summary)             (AtkTable      *table,
                                             AtkObject     *accessible);
gint            (* get_selected_columns)    (AtkTable      *table,
                                             gint          **selected);
gint            (* get_selected_rows)       (AtkTable      *table,
                                             gint          **selected);
gboolean        (* is_column_selected)      (AtkTable      *table,
                                             gint          column);
gboolean        (* is_row_selected)         (AtkTable      *table,
                                             gint          row);
gboolean        (* is_selected)             (AtkTable      *table,
                                             gint          row,
                                             gint          column);
gboolean        (* add_row_selection)       (AtkTable      *table,
                                             gint          row);
gboolean        (* remove_row_selection)    (AtkTable      *table,
                                             gint          row);
gboolean        (* add_column_selection)    (AtkTable      *table,
                                             gint
  column);
gboolean        (* remove_column_selection)  (AtkTable      *table,
                                             gint          column);

/*
 * signal handlers
 */
void            (* row_inserted)            (AtkTable      *table,
                                             gint          row,
                                             gint          num_inserted);
void            (* column_inserted)         (AtkTable      *table,
                                             gint          column,
                                             gint          num_inserted);
void            (* row_deleted)             (AtkTable      *table,
                                             gint          row,
                                             gint          num_deleted);
```

```
 void            (* column_deleted)         (AtkTable      *table,
                                    gint         column,

                                    gint         num_deleted);
 void            (* row_reordered)          (AtkTable      *table);
 void            (* column_reordered)        (AtkTable      *table);
 void            (* model_changed)          (AtkTable      *table);

 AtkFunction       pad1;
 AtkFunction       pad2;
 AtkFunction       pad3;
 AtkFunction       pad4;
};

GType atk_table_get_type (void);

AtkObject*       atk_table_ref_at              (AtkTable        *table,
                                    gint           row,
                                    gint           column);
gint             atk_table_get_index_at        (AtkTable        *table,
                                    gint           row,
                                    gint           column);
gint             atk_table_get_column_at_index  (AtkTable        *table,

      gint           index_);
gint             atk_table_get_row_at_index     (AtkTable        *table,
                                    gint           index_);
gint             atk_table_get_n_columns        (AtkTable        *table);
gint             atk_table_get_n_rows           (AtkTable        *table);
gint             atk_table_get_column_extent_at (AtkTable        *table,
                                    gint           row,
                                    gint           column);
gint             atk_table_get_row_extent_at    (AtkTable        *table,
                                    gint           row,
                                    gint           column);
AtkObject*
               atk_table_get_caption          (AtkTable        *table);
G_CONST_RETURN gchar*
               atk_table_get_column_description (AtkTable        *table,

                gint           column);
AtkObject*       atk_table_get_column_header    (AtkTable        *table,
      gint     column);
G_CONST_RETURN gchar*
               atk_table_get_row_description  (AtkTable        *table,
                                    gint           row);
AtkObject*       atk_table_get_row_header       (AtkTable        *table,
      gint     row);
```

```
AtkObject*      atk_table_get_summary         (AtkTable        *table);
void            atk_table_set_caption         (AtkTable        *table,
                                               AtkObject       *caption);
void            atk_table_set_column_description
                                              (AtkTable        *table,
                                               gint            column,
                                               const gchar     *description);
void            atk_table_set_column_header   (AtkTable        *table,
                                               gint            column,
                                               AtkObject       *header);
void            atk_table_set_row_description (AtkTable        *table,
                                               gint            row,
                                               const gchar     *description);
void            atk_table_set_row_header      (AtkTable        *table,
                                               gint            row,
                                               AtkObject       *header);
void            atk_table_set_summary         (AtkTable        *table,
                                               AtkObject       *accessible);
gint            atk_table_get_selected_columns (AtkTable       *table,
                                               gint            **selected);
gint            atk_table_get_selected_rows   (AtkTable        *table,

                                               gint            **selected);
gboolean        atk_table_is_column_selected  (AtkTable        *table,
                                               gint            column);
gboolean        atk_table_is_row_selected     (AtkTable        *table,
                                               gint            row);
gboolean        atk_table_is_selected         (AtkTable        *table,
                                               gint            row,
                                               gint            column);
gboolean        atk_table_add_row_selection   (AtkTable        *table,
                                               gint            row);
gboolean        atk_table_remove_row_selection (AtkTable       *table,
                                               gint            row);
gboolean        atk_table_add_column_selection (AtkTable       *table,

                gint            column);
gboolean        atk_table_remove_column_selection
                                              (AtkTable        *table,
                                               gint            column);

#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_TABLE_H__ */
```

```
// InBuffer.h

#ifndef __IN_BUFFER_H
#define __IN_BUFFER_H

#include "../../Common/MyException.h"
#include "../IStream.h"

#ifndef _NO_EXCEPTIONS
struct CInBufferException: public CSystemException
{
 CInBufferException(HRESULT errorCode): CSystemException(errorCode) {}
};
#endif

class CInBufferBase
{
protected:
 Byte *_buf;
 Byte *_bufLim;
 Byte *_bufBase;

 ISequentialInStream *_stream;
 UInt64 _processedSize;
 size_t _bufSize; // actually it's number of Bytes for next read. The buf can be larger
                  // only up to 32-bits values now are supported!
 bool _wasFinished;

 bool ReadBlock();
 bool ReadByte_FromNewBlock(Byte &b);
 Byte ReadByte_FromNewBlock();

public:
 #ifdef _NO_EXCEPTIONS
 HRESULT ErrorCode;
 #endif
 UInt32 NumExtraBytes;

 CInBufferBase() throw();

 UInt64 GetStreamSize() const { return _processedSize + (_buf - _bufBase); }
 UInt64 GetProcessedSize() const { return _processedSize + NumExtraBytes + (_buf - _bufBase); }
 bool WasFinished()
 const { return _wasFinished; }

 void SetStream(ISequentialInStream *stream) { _stream = stream; }

 void SetBuf(Byte *buf, size_t bufSize, size_t end, size_t pos)
```

```
 {
  _bufBase = buf;
  _bufSize = bufSize;
  _processedSize = 0;
  _buf = buf + pos;
  _bufLim = buf + end;
  _wasFinished = false;
  #ifdef _NO_EXCEPTIONS
  ErrorCode = S_OK;
  #endif
  NumExtraBytes = 0;
 }

 void Init() throw();

 MY_FORCE_INLINE
 bool ReadByte(Byte &b)
 {
  if (_buf >= _bufLim)
    return ReadByte_FromNewBlock(b);
  b = *_buf++;
  return true;
 }

 MY_FORCE_INLINE
 Byte ReadByte()
 {
  if (_buf >= _bufLim)
    return ReadByte_FromNewBlock();
  return *_buf++;
 }

 size_t ReadBytes(Byte *buf, size_t size);
 size_t Skip(size_t size);
};

class CInBuffer: public CInBufferBase
{
public:
 ~CInBuffer() { Free(); }
 bool Create(size_t bufSize) throw(); // only up to 32-bits values now are supported!
 void Free() throw();
};

#endif
```

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```
// MyCom.h

#ifndef __MY_COM_H
#define __MY_COM_H

#include "MyWindows.h"

#ifndef RINOK
#define RINOK(x) { HRESULT __result_ = (x); if (__result_ != S_OK) return __result_; }
#endif

template <class T>
```

```
class CMyComPtr
{
 T* _p;
public:
 CMyComPtr(): _p(NULL) {}
 CMyComPtr(T* p) throw() { if ((_p = p) != NULL) p->AddRef(); }
 CMyComPtr(const CMyComPtr<T>& lp) throw() { if ((_p = lp._p) != NULL) _p->AddRef(); }
 ~CMyComPtr() { if (_p) _p->Release(); }
 void Release() { if (_p) { _p->Release(); _p = NULL; } }
 operator T*() const {  return (T*)_p;  }
 // T& operator*() const {  return *_p; }
 T** operator&() { return &_p; }
 T* operator->() const { return _p; }
 T* operator=(T* p)
 {
  if (p)
    p->AddRef();
  if (_p)
    _p->Release();
  _p = p;
  return p;
 }
 T* operator=(const CMyComPtr<T>& lp) { return (*this = lp._p); }
 bool operator!() const { return (_p == NULL); }
 // bool operator==(T* pT) const {  return _p == pT; }
 void Attach(T* p2)
 {
  Release();
   _p = p2;
 }
 T* Detach()
 {
  T* pt = _p;
  _p = NULL;
  return pt;
 }
 #ifdef _WIN32
 HRESULT CoCreateInstance(REFCLSID rclsid, REFIID iid, LPUNKNOWN pUnkOuter = NULL, DWORD
dwClsContext = CLSCTX_ALL)
 {
  return ::CoCreateInstance(rclsid, pUnkOuter, dwClsContext, iid, (void**)&_p);
 }
 #endif
 /*
 HRESULT CoCreateInstance(LPCOLESTR szProgID, LPUNKNOWN pUnkOuter = NULL, DWORD
dwClsContext = CLSCTX_ALL)
 {
  CLSID clsid;
```

```
  HRESULT hr = CLSIDFromProgID(szProgID, &clsid);
  ATLASSERT(_p == NULL);
  if (SUCCEEDED(hr))
    hr = ::CoCreateInstance(clsid, pUnkOuter, dwClsContext, __uuidof(T), (void**)&_p);
  return hr;
 }
 */
 template <class Q>
 HRESULT QueryInterface(REFGUID iid, Q** pp) const throw()
 {
  return _p->QueryInterface(iid, (void**)pp);
 }
};

//////////////////////////////////////////////////////////////

inline HRESULT StringToBstr(LPCOLESTR src, BSTR *bstr)
{
 *bstr = ::SysAllocString(src);
 return (*bstr) ? S_OK : E_OUTOFMEMORY;
}

class
 CMyComBSTR
{
 BSTR m_str;

public:
 CMyComBSTR(): m_str(NULL) {}
 ~CMyComBSTR() { ::SysFreeString(m_str); }
 BSTR* operator&() { return &m_str; }
 operator LPCOLESTR() const { return m_str; }
 // operator bool() const { return m_str != NULL; }
 // bool operator!() const { return m_str == NULL; }
private:
 // operator BSTR() const { return m_str; }

 CMyComBSTR(LPCOLESTR src) { m_str = ::SysAllocString(src); }
 // CMyComBSTR(int nSize) { m_str = ::SysAllocStringLen(NULL, nSize); }
 // CMyComBSTR(int nSize, LPCOLESTR sz) { m_str = ::SysAllocStringLen(sz, nSize);  }
 CMyComBSTR(const CMyComBSTR& src) { m_str = src.MyCopy(); }

 /*
 CMyComBSTR(REFGUID src)
 {
  LPOLESTR szGuid;
  StringFromCLSID(src, &szGuid);
  m_str = ::SysAllocString(szGuid);
```

```
  CoTaskMemFree(szGuid);
}
*/

CMyComBSTR& operator=(const CMyComBSTR& src)
{
  if (m_str != src.m_str)
  {
    if (m_str)
      ::SysFreeString(m_str);
    m_str = src.MyCopy();
  }

 return *this;
}

CMyComBSTR& operator=(LPCOLESTR src)
{
  ::SysFreeString(m_str);
  m_str = ::SysAllocString(src);
  return *this;
}

unsigned Len() const { return ::SysStringLen(m_str); }

BSTR MyCopy() const
{
  // We don't support Byte BSTRs here
  return ::SysAllocStringLen(m_str, ::SysStringLen(m_str));
  /*
  UINT byteLen = ::SysStringByteLen(m_str);
  BSTR res = ::SysAllocStringByteLen(NULL, byteLen);
  if (res && byteLen != 0 && m_str)
    memcpy(res, m_str, byteLen);
  return res;
  */
}

/*
void Attach(BSTR src) { m_str = src; }
BSTR Detach()
{
  BSTR s = m_str;
  m_str = NULL;
  return s;
}
*/
```

```
 void Empty()
 {
   ::SysFreeString(m_str);
   m_str = NULL;
 }
};



/*
 If CMyUnknownImp doesn't use virtual destructor, the code size is smaller.
 But if some class_1 derived from CMyUnknownImp
   uses MY_ADDREF_RELEASE and IUnknown::Release()
   and some another class_2 is derived from class_1,
   then class_1
 must use virtual destructor:
     virtual ~class_1();
   In that case, class_1::Release() calls correct destructor of class_2.

 Also you can use virtual ~CMyUnknownImp(), if you want to disable warning
   "class has virtual functions, but destructor is not virtual".
*/

class CMyUnknownImp
{
public:
 ULONG __m_RefCount;
 CMyUnknownImp(): __m_RefCount(0) {}

 // virtual
 ~CMyUnknownImp() {}
};



#define MY_QUERYINTERFACE_BEGIN STDMETHOD(QueryInterface) \
(REFGUID iid, void **outObject) throw() { *outObject = NULL;

#define MY_QUERYINTERFACE_ENTRY(i) else if (iid == IID_ ## i) \
   { *outObject = (void *)(i *)this; }

#define MY_QUERYINTERFACE_ENTRY_UNKNOWN(i) if (iid == IID_IUnknown) \
   { *outObject = (void *)(IUnknown *)(i *)this; }

#define MY_QUERYINTERFACE_BEGIN2(i) MY_QUERYINTERFACE_BEGIN \
   MY_QUERYINTERFACE_ENTRY_UNKNOWN(i) \
   MY_QUERYINTERFACE_ENTRY(i)
```

```
#define MY_QUERYINTERFACE_END else return E_NOINTERFACE; ++__m_RefCount; /* AddRef(); */ return
S_OK; }

#define
 MY_ADDREF_RELEASE \
STDMETHOD_(ULONG, AddRef)() throw() { return ++__m_RefCount; } \
STDMETHOD_(ULONG, Release)() { if (--__m_RefCount != 0)  \
 return __m_RefCount; delete this; return 0; }

#define MY_UNKNOWN_IMP_SPEC(i) \
 MY_QUERYINTERFACE_BEGIN \
 i \
 MY_QUERYINTERFACE_END \
 MY_ADDREF_RELEASE


#define MY_UNKNOWN_IMP MY_QUERYINTERFACE_BEGIN \
 MY_QUERYINTERFACE_ENTRY_UNKNOWN(IUnknown) \
 MY_QUERYINTERFACE_END \
 MY_ADDREF_RELEASE

#define MY_UNKNOWN_IMP1(i) MY_UNKNOWN_IMP_SPEC( \
 MY_QUERYINTERFACE_ENTRY_UNKNOWN(i) \
 MY_QUERYINTERFACE_ENTRY(i) \
 )

#define MY_UNKNOWN_IMP2(i1, i2) MY_UNKNOWN_IMP_SPEC( \
 MY_QUERYINTERFACE_ENTRY_UNKNOWN(i1) \
 MY_QUERYINTERFACE_ENTRY(i1) \
 MY_QUERYINTERFACE_ENTRY(i2) \
 )

#define MY_UNKNOWN_IMP3(i1, i2, i3) MY_UNKNOWN_IMP_SPEC( \
 MY_QUERYINTERFACE_ENTRY_UNKNOWN(i1) \
 MY_QUERYINTERFACE_ENTRY(i1) \
 MY_QUERYINTERFACE_ENTRY(i2) \
 MY_QUERYINTERFACE_ENTRY(i3) \
 )

#define MY_UNKNOWN_IMP4(i1, i2, i3, i4) MY_UNKNOWN_IMP_SPEC(
 \
 MY_QUERYINTERFACE_ENTRY_UNKNOWN(i1) \
 MY_QUERYINTERFACE_ENTRY(i1) \
 MY_QUERYINTERFACE_ENTRY(i2) \
 MY_QUERYINTERFACE_ENTRY(i3) \
 MY_QUERYINTERFACE_ENTRY(i4) \
 )
```

```
#define MY_UNKNOWN_IMP5(i1, i2, i3, i4, i5) MY_UNKNOWN_IMP_SPEC( \
 MY_QUERYINTERFACE_ENTRY_UNKNOWN(i1) \
 MY_QUERYINTERFACE_ENTRY(i1) \
 MY_QUERYINTERFACE_ENTRY(i2) \
 MY_QUERYINTERFACE_ENTRY(i3) \
 MY_QUERYINTERFACE_ENTRY(i4) \
 MY_QUERYINTERFACE_ENTRY(i5) \
 )

#define MY_UNKNOWN_IMP6(i1, i2, i3, i4, i5, i6) MY_UNKNOWN_IMP_SPEC( \
 MY_QUERYINTERFACE_ENTRY_UNKNOWN(i1) \
 MY_QUERYINTERFACE_ENTRY(i1) \
 MY_QUERYINTERFACE_ENTRY(i2) \
 MY_QUERYINTERFACE_ENTRY(i3) \
 MY_QUERYINTERFACE_ENTRY(i4) \
 MY_QUERYINTERFACE_ENTRY(i5) \
 MY_QUERYINTERFACE_ENTRY(i6) \
 )

#define MY_UNKNOWN_IMP7(i1, i2, i3, i4, i5, i6, i7) MY_UNKNOWN_IMP_SPEC( \
 MY_QUERYINTERFACE_ENTRY_UNKNOWN(i1) \
 MY_QUERYINTERFACE_ENTRY(i1) \
 MY_QUERYINTERFACE_ENTRY(i2) \
 MY_QUERYINTERFACE_ENTRY(i3) \
 MY_QUERYINTERFACE_ENTRY(i4)
 \
 MY_QUERYINTERFACE_ENTRY(i5) \
 MY_QUERYINTERFACE_ENTRY(i6) \
 MY_QUERYINTERFACE_ENTRY(i7) \
 )

const HRESULT k_My_HRESULT_WritingWasCut = 0x20000010;

#endif
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Content in copyright Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains content." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF
 Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test fails.</p>
  <div class="test">P</div>
 </body>
</html>
// WorkDir.h

#ifndef __WORK_DIR_H
#define __WORK_DIR_H

#include "../../../Windows/FileDir.h"
```

```
#include "../../Common/FileStreams.h"

#include "ZipRegistry.h"

FString GetWorkDir(const NWorkDir::CInfo &workDirInfo, const FString &path, FString &fileName);

class CWorkDirTempFile
{
 FString _originalPath;
 NWindows::NFile::NDir::CTempFile _tempFile;
 COutFileStream *_outStreamSpec;
public:
 CMyComPtr<IOutStream> OutStream;

 HRESULT CreateTempFile(const FString &originalPath);
 HRESULT MoveToOriginal(bool deleteOriginal);
};

#endif
```

# Contributions to the urllib3 project

## Creator & Maintainer

* Andrey Petrov <andrey.petrov@shazow.net>

## Contributors

In chronological order:

* victor.vde <http://code.google.com/u/victor.vde/>
 * HTTPS patch (which inspired HTTPSConnectionPool)

* erikcederstrand <http://code.google.com/u/erikcederstrand/>
 * NTLM-authenticated HTTPSConnectionPool
 * Basic-authenticated HTTPSConnectionPool (merged into make_headers)

* niphlod <niphlod@gmail.com>
 * Client-verified SSL certificates for HTTPSConnectionPool
 * Response gzip and deflate encoding support
 * Better unicode support for filepost using StringIO buffers

* btoconnor <brian@btoconnor.net>
 * Non-multipart encoding for POST requests

* p.dobrogost <http://code.google.com/u/@WBRSRlBZDhBFXQB6/>
 * Code review, PEP8 compliance, benchmark fix

* kennethreitz <me@kennethreitz.com>
 * Bugfixes, suggestions, Requests integration

* georgemarshall <https://github.com/georgemarshall>
 * Bugfixes, Improvements and Test
 coverage

* Thomas Kluyver <thomas@kluyver.me.uk>
 * Python 3 support

* brandon-rhodes <http://rhodesmill.org/brandon>
 * Design review, bugfixes, test coverage.

* studer <theo.studer@gmail.com>
 * IPv6 url support and test coverage

* Shivaram Lingamneni <slingamn@cs.stanford.edu>
 * Support for explicitly closing pooled connections

* hartator <hartator@gmail.com>
 * Corrected multipart behavior for params

* Thomas Weischuh <thomas@t-8ch.de>
 * Support for TLS SNI
 * API unification of ssl_version/cert_reqs
 * SSL fingerprint and alternative hostname verification
 * Bugfixes in testsuite

* Sune Kirkeby <mig@ibofobi.dk>
 * Optional SNI-support for Python 2 via PyOpenSSL.

* Marc Schlaich <marc.schlaich@gmail.com>
 * Various bugfixes and test improvements.

* Bryce Boe <bbzbryce@gmail.com>
 * Correct six.moves conflict
 * Fixed pickle support of some exceptions

* Boris Figovsky <boris.figovsky@ravellosystems.com>
 * Allowed to skip SSL hostname verification

* Cory Benfield
 <https://lukasa.co.uk/about/>
 * Stream method for Response objects.
 * Return native strings in header values.
 * Generate 'Host' header when using proxies.

* Jason Robinson <jaywink@basshero.org>
 * Add missing WrappedSocket.fileno method in PyOpenSSL

* Audrius Butkevicius <audrius.butkevicius@elastichosts.com>
 * Fixed a race condition

* Stanislav Vitkovskiy <stas.vitkovsky@gmail.com>
 * Added HTTPS (CONNECT) proxy support

* Stephen Holsapple <sholsapp@gmail.com>
 * Added abstraction for granular control of request fields

* Martin von Gagern <Martin.vGagern@gmx.net>
 * Support for non-ASCII header parameters

* Kevin Burke <kev@inburke.com> and Pavel Kirichenko <juanych@yandex-team.ru>
 * Support for separate connect and request timeouts

* Peter Waller <p@pwaller.net>
 * HTTPResponse.tell() for determining amount received over the wire

* Nipunn Koorapati <nipunn1313@gmail.com>
 * Ignore default ports when comparing hosts for equality

* Danilo @dbrgn <https://dbrgn.ch/>
  * Disabled TLS compression by default on Python 3.2+
 * Disabled TLS compression in pyopenssl contrib module
 * Configurable cipher suites in pyopenssl contrib module

* Roman Bogorodskiy <roman.bogorodskiy@ericsson.com>
 * Account retries on proxy errors

* Nicolas Delaby <nicolas.delaby@ezeep.com>
 * Use the platform-specific CA certificate locations

* Josh Schneier <https://github.com/jschneier>
 * HTTPHeaderDict and associated tests and docs
 * Bugfixes, docs, test coverage

* Tahia Khan <http://tahia.tk/>
 * Added Timeout examples in docs

* Arthur Grunseid <https://grunseid.com>
 * source_address support and tests (with https://github.com/bui)

* Ian Cordasco <graffatcolmingov@gmail.com>
 * PEP8 Compliance and Linting
 * Add ability to pass socket options to an HTTP Connection

* Erik Tollerud <erik.tollerud@gmail.com>
 * Support for standard library io module.

* Krishna Prasad <kprasad.iitd@gmail.com>
 * Google App Engine documentation

* Aaron Meurer
 <asmeurer@gmail.com>
 * Added Url.url, which unparses a Url

* Evgeny Kapun <abacabadabacaba@gmail.com>
 * Bugfixes

* Benjamen Meyer <bm_witness@yahoo.com>
 * Security Warning Documentation update for proper capture

* Shivan Sornarajah <github@sornars.com>
 * Support for using ConnectionPool and PoolManager as context managers.

* Alex Gaynor <alex.gaynor@gmail.com>
 * Updates to the default SSL configuration

* Tomas Tomecek <ttomecek@redhat.com>
 * Implemented generator for getting chunks from chunked responses.

* tlynn <https://github.com/tlynn>
 * Respect the warning preferences at import.

* David D. Riddle <ddriddle@illinois.edu>
 * IPv6 bugfixes in testsuite

* Thea Flowers <magicalgirl@google.com>
 * App Engine environment tests.
 * Documentation re-write.

* John Krauss <https://github.com/talos>
 * Clues to debugging problems with `cryptography` dependency in docs

* Disassem <https://github.com/Disassem>
 * Fix pool-default headers not applying for url-encoded
 requests like GET.

* James Atherfold <jlatherfold@hotmail.com>
 * Bugfixes relating to cleanup of connections during errors.

* Christian Pedersen <https://github.com/chripede>
 * IPv6 HTTPS proxy bugfix

* Jordan Moldow <https://github.com/jmoldow>
 * Fix low-level exceptions leaking from ``HTTPResponse.stream()``.
 * Bugfix for ``ConnectionPool.urlopen(release_conn=False)``.
 * Creation of ``HTTPConnectionPool.ResponseCls``.

* Predrag Gruevski <https://github.com/obi1kenobi>
 * Made cert digest comparison use a constant-time algorithm.

* Adam Talsma <https://github.com/a-tal>
 * Bugfix to ca_cert file paths.

* Evan Meagher <https://evanmeagher.net>
 * Bugfix related to `memoryview` usage in PyOpenSSL adapter

* John Vandenberg <jayvdb@gmail.com>
 * Python 2.6 fixes; pyflakes and pep8 compliance

* Andy Caldwell <andy.m.caldwell@googlemail.com>
 * Bugfix related to reusing connections in indeterminate states.

* Ville Skytt <ville.skytta@iki.fi>
 * Logging efficiency
 improvements, spelling fixes, Travis config.

* Shige Takeda <smtakeda@gmail.com>
 * Started Recipes documentation and added a recipe about handling concatenated gzip data in HTTP response

* Jess Shapiro <jesse@jesseshapiro.net>
 * Various character-encoding fixes/tweaks
 * Disabling IPv6 DNS when IPv6 connections not supported

* David Foster <http://dafoster.net/>
 * Ensure order of request and response headers are preserved.

* Jeremy Cline <jeremy@jcline.org>
 * Added connection pool keys by scheme

* Aviv Palivoda <palaviv@gmail.com>
 * History list to Retry object.
 * HTTPResponse contains the last Retry object.

* Nate Prewitt <nate.prewitt@gmail.com>
 * Ensure timeouts are not booleans and greater than zero.
 * Fixed infinite loop in ``stream`` when amt=None.
 * Added length_remaining to determine remaining data to be read.
 * Added enforce_content_length to raise exception when incorrect content-length received.

* Seth Michael Larson <sethmichaellarson@protonmail.com>
  * Created selectors backport that supports PEP 475.

* Alexandre Dias <alex.dias@smarkets.com>
 * Don't retry on timeout if method not in whitelist

* Moinuddin Quadri <moin18@gmail.com>
 * Lazily load idna package

* Tom White <s6yg1ez3@mail2tor.com>
 * Made SOCKS handler differentiate socks5h from socks5 and socks4a from socks4.

* Tim Burke <tim.burke@gmail.com>
 * Stop buffering entire deflate-encoded responses.

* Tuukka Mustonen <tuukka.mustonen@gmail.com>
 * Add counter for status_forcelist retries.

* Erik Rose <erik@mozilla.com>
 * Bugfix to pyopenssl vendoring

* Wolfgang Richter <wolfgang.richter@gmail.com>
 * Bugfix related to loading full certificate chains with PyOpenSSL backend.

* Mike Miller <github@mikeage.net>
 * Logging improvements to include the HTTP(S) port when opening a new connection

* Ioannis Tziakos <mail@itziakos.gr>
 * Fix ``util.selectors._fileobj_to_fd`` to accept ``long``.
 * Update appveyor tox setup to use the 64bit python.

* Akamai
 (through Jess Shapiro) <jshapiro@akamai.com>
 * Ongoing maintenance; 2017-2018

* Dominique Leuenberger <dimstar@opensuse.org>
 * Minor fixes in the test suite

* Will Bond <will@wbond.net>
 * Add Python 2.6 support to ``contrib.securetransport``

* Aleksei Alekseev <alekseev.yeskela@gmail.com>
 * using auth info for socks proxy

* Chris Wilcox <git@crwilcox.com>
 * Improve contribution guide
 * Add ``HTTPResponse.geturl`` method to provide ``urllib2.urlopen().geturl()`` behavior

* Bruce Merry <https://www.brucemerry.org.za>
 * Fix leaking exceptions when system calls are interrupted with zero timeout

* Hugo van Kemenade <https://github.com/hugovk>
 * Drop support for EOL Python 2.6

* Tim Bell <https://github.com/timb07>
 * Bugfix for responses with Content-Type: message/* logging warnings

* Justin Bramley <https://github.com/jbramleycl>
 * Add ability to handle multiple Content-Encodings

* Katsuhiko YOSHIDA <https://github.com/kyoshidajp>
 * Remove Authorization header
 regardless of case when redirecting to cross-site

* James Meickle <https://permadeath.com/>
 * Improve handling of Retry-After header

* Chris Jerdonek <chris.jerdonek@gmail.com>
 * Remove a spurious TypeError from the exception chain inside
   HTTPConnectionPool._make_request(), also for BaseExceptions.

* Jorge Lopez Silva <https://github.com/jalopezsilva>
 * Added support for forwarding requests through HTTPS proxies.

* Benno Rice <benno@jeamland.net>
 * Allow cadata parameter to be passed to underlying ``SSLContext.load_verify_locations()``.

* Keiichi Kobayashi <abok.1k@gmail.com>
 * Rename VerifiedHTTPSConnection to HTTPSConnection

* Himanshu Garg <garg_himanshu@outlook.com>
 * DOC & LICENSE Update

* Hod Bin Noon <bin.noon.hod@gmail.com>
 * Test improvements

* Chris Olufson <tycarac@gmail.com>
 * Fix for connection not being released on HTTP redirect and response not preloaded

* [Your name or handle] <[email or website]>
 * [Brief summary of your changes]

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Invalid license Element With dir Attribute in span Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element that contains a span element with INVALID as the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With Two div Elements in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-019-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element that contains two div elements." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
 {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-019.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
```

```
  }
 ]]></style>
</head>
<body>
 <p>Test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
 <div class="test">P</div>
 <p>The XML contained in the Extended Metadata Block is below.</p>
 <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   &lt;div&gt;
    div 1 start
    &lt;div&gt;
     div 2 start
     &lt;div&gt;
      div 3
     &lt;/div&gt;
     div 2 end
    &lt;/div&gt;
    div 1 end
   &lt;/div&gt;
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
 </pre>
</body>
</html>
```

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according to those terms.

```
/* Threads.h -- multithreading library
2017-06-18 : Igor Pavlov : Public domain */

#ifndef __7Z_THREADS_H
#define __7Z_THREADS_H

#ifdef _WIN32
#include <windows.h>
#endif
```

```
#include "7zTypes.h"

EXTERN_C_BEGIN

WRes HandlePtr_Close(HANDLE *h);
WRes Handle_WaitObject(HANDLE h);

typedef HANDLE CThread;
#define Thread_Construct(p) *(p) = NULL
#define Thread_WasCreated(p) (*(p) != NULL)
#define Thread_Close(p) HandlePtr_Close(p)
#define Thread_Wait(p) Handle_WaitObject(*(p))

typedef
#ifdef UNDER_CE
 DWORD
#else
 unsigned
#endif
 THREAD_FUNC_RET_TYPE;

#define THREAD_FUNC_CALL_TYPE MY_STD_CALL
#define THREAD_FUNC_DECL THREAD_FUNC_RET_TYPE THREAD_FUNC_CALL_TYPE
typedef THREAD_FUNC_RET_TYPE (THREAD_FUNC_CALL_TYPE * THREAD_FUNC_TYPE)(void *);
WRes Thread_Create(CThread *p, THREAD_FUNC_TYPE func, LPVOID param);

typedef HANDLE CEvent;
typedef CEvent CAutoResetEvent;
typedef CEvent CManualResetEvent;
#define Event_Construct(p) *(p) = NULL
#define Event_IsCreated(p) (*(p) != NULL)
#define Event_Close(p)
 HandlePtr_Close(p)
#define Event_Wait(p) Handle_WaitObject(*(p))
WRes Event_Set(CEvent *p);
WRes Event_Reset(CEvent *p);
WRes ManualResetEvent_Create(CManualResetEvent *p, int signaled);
WRes ManualResetEvent_CreateNotSignaled(CManualResetEvent *p);
WRes AutoResetEvent_Create(CAutoResetEvent *p, int signaled);
WRes AutoResetEvent_CreateNotSignaled(CAutoResetEvent *p);

typedef HANDLE CSemaphore;
#define Semaphore_Construct(p) *(p) = NULL
#define Semaphore_IsCreated(p) (*(p) != NULL)
#define Semaphore_Close(p) HandlePtr_Close(p)
#define Semaphore_Wait(p) Handle_WaitObject(*(p))
WRes Semaphore_Create(CSemaphore *p, UInt32 initCount, UInt32 maxCount);
WRes Semaphore_ReleaseN(CSemaphore *p, UInt32 num);
```

```
WRes Semaphore_Release1(CSemaphore *p);

typedef CRITICAL_SECTION CCriticalSection;
WRes CriticalSection_Init(CCriticalSection *p);
#define CriticalSection_Delete(p) DeleteCriticalSection(p)
#define CriticalSection_Enter(p) EnterCriticalSection(p)
#define CriticalSection_Leave(p)
 LeaveCriticalSection(p)

EXTERN_C_END

#endif
```

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SOFTWARE.
C_OBJS = $(C_OBJS) \
 $O\7zCrc.obj
!IF "$(CPU)" == "IA64" || "$(CPU)" == "MIPS" || "$(CPU)" == "ARM" || "$(CPU)" == "ARM64"
C_OBJS = $(C_OBJS) \
!ELSE
ASM_OBJS = $(ASM_OBJS) \
!ENDIF
 $O\7zCrcOpt.obj
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/* Lzma2Dec.h -- LZMA2 Decoder
2018-02-19 : Igor Pavlov : Public domain */

#ifndef __LZMA2_DEC_H

```
#define __LZMA2_DEC_H

#include "LzmaDec.h"

EXTERN_C_BEGIN

/* ---------- State Interface ---------- */

typedef struct
{
 unsigned state;
 Byte control;
 Byte needInitLevel;
 Byte isExtraMode;
 Byte _pad_;
 UInt32 packSize;
 UInt32 unpackSize;
 CLzmaDec decoder;
} CLzma2Dec;

#define Lzma2Dec_Construct(p) LzmaDec_Construct(&(p)->decoder)
#define Lzma2Dec_FreeProbs(p, alloc) LzmaDec_FreeProbs(&(p)->decoder, alloc)
#define Lzma2Dec_Free(p, alloc) LzmaDec_Free(&(p)->decoder, alloc)

SRes Lzma2Dec_AllocateProbs(CLzma2Dec *p, Byte prop, ISzAllocPtr alloc);
SRes Lzma2Dec_Allocate(CLzma2Dec *p, Byte prop, ISzAllocPtr alloc);
void Lzma2Dec_Init(CLzma2Dec *p);

/*
finishMode:
 It has meaning only if the decoding reaches output limit (*destLen or dicLimit).
 LZMA_FINISH_ANY - use smallest number of input bytes
 LZMA_FINISH_END - read EndOfStream marker after decoding

Returns:
 SZ_OK

   status:
     LZMA_STATUS_FINISHED_WITH_MARK
     LZMA_STATUS_NOT_FINISHED
     LZMA_STATUS_NEEDS_MORE_INPUT
 SZ_ERROR_DATA - Data error
*/

SRes Lzma2Dec_DecodeToDic(CLzma2Dec *p, SizeT dicLimit,
   const Byte *src, SizeT *srcLen, ELzmaFinishMode finishMode, ELzmaStatus *status);

SRes Lzma2Dec_DecodeToBuf(CLzma2Dec *p, Byte *dest, SizeT *destLen,
```

```
  const Byte *src, SizeT *srcLen, ELzmaFinishMode finishMode, ELzmaStatus *status);


/* ---------- LZMA2 block and chunk parsing ---------- */

/*
Lzma2Dec_Parse() parses compressed data stream up to next independent block or next chunk data.
It can return LZMA_STATUS_* code or LZMA2_PARSE_STATUS_* code:
 - LZMA2_PARSE_STATUS_NEW_BLOCK - there is new block, and 1 additional byte (control byte of next block
header) was read from input.
 - LZMA2_PARSE_STATUS_NEW_CHUNK - there is new chunk, and only lzma2 header of new chunk was read.
                                CLzma2Dec::unpackSize contains unpack size of that chunk
*/

typedef
 enum
{
/*
 LZMA_STATUS_NOT_SPECIFIED               // data error
 LZMA_STATUS_FINISHED_WITH_MARK
 LZMA_STATUS_NOT_FINISHED                //
 LZMA_STATUS_NEEDS_MORE_INPUT
 LZMA_STATUS_MAYBE_FINISHED_WITHOUT_MARK   // unused
*/
 LZMA2_PARSE_STATUS_NEW_BLOCK = LZMA_STATUS_MAYBE_FINISHED_WITHOUT_MARK + 1,
 LZMA2_PARSE_STATUS_NEW_CHUNK
} ELzma2ParseStatus;

ELzma2ParseStatus Lzma2Dec_Parse(CLzma2Dec *p,
  SizeT outSize,   // output size
  const Byte *src, SizeT *srcLen,
  int checkFinishBlock   // set (checkFinishBlock = 1), if it must read full input data, if decoder.dicPos reaches
blockMax position.
  );

/*
LZMA2 parser doesn't decode LZMA chunks, so we must read
 full input LZMA chunk to decode some part of LZMA chunk.

Lzma2Dec_GetUnpackExtra() returns the value that shows
  max possible number of output bytes that can be output by decoder
  at current input positon.
*/

#define Lzma2Dec_GetUnpackExtra(p) ((p)->isExtraMode ? (p)->unpackSize : 0);


/* ----------
```

```
 One Call Interface ---------- */

/*
finishMode:
 It has meaning only if the decoding reaches output limit (*destLen).
 LZMA_FINISH_ANY - use smallest number of input bytes
 LZMA_FINISH_END - read EndOfStream marker after decoding

Returns:
 SZ_OK
   status:
     LZMA_STATUS_FINISHED_WITH_MARK
     LZMA_STATUS_NOT_FINISHED
 SZ_ERROR_DATA - Data error
 SZ_ERROR_MEM  - Memory allocation error
 SZ_ERROR_UNSUPPORTED - Unsupported properties
 SZ_ERROR_INPUT_EOF - It needs more bytes in input buffer (src).
*/

SRes Lzma2Decode(Byte *dest, SizeT *destLen, const Byte *src, SizeT *srcLen,
   Byte prop, ELzmaFinishMode finishMode, ELzmaStatus *status, ISzAllocPtr alloc);

EXTERN_C_END

#endif
```

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At the time of preparation, the original work was available from the texhyphen
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- - - - - - - - - -

Polish hyphenation patterns

(more info about the licence to be added later)

% This file is part of hyph-utf8 package and resulted from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% Source: plhyph.tex (1995-06-26)
% Author: Hanna Koodziejska, Bogusaw Jackowski, Marek Ryko
%
% The above mentioned file should become obsolete,
% and the author of the original
 file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%  and helped with testing, suggestions and bug reports
% - Norbert Preining, who tested & integrated patterns into TeX Live
%
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%

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%    plese remove all of the TUG comments & credits that we added here -
%    you are the Queen / the King, we are only the servants.
%
% If you want to change this file, rather than uploading directly to CTAN,
% we would be grateful if you could send it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
% Before a new "pattern-revolution" starts,
% please try to follow some guidelines if possible:
%
% - \lccode is *forbidden*, and I really mean it
% - all the patterns should be in UTF-8
% - the only "allowed" TeX commands in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin
 and \righthyphenmin,
%   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
%-----------------------------------------------------------------------------
%
% This is PLHYPH.TeX - the Polish hyphenation patterns
%         version 3.0a, Wednesday, May 17th, 1995
% to be used for the inclusion of Polish hyphenation patterns in any format,
% not necessarily in the MeX or LaMeX ones. The patterns are exactly
% the same as in the version 3.0 being the part of the MeX package,
% only the surrounding of the \pattern command is changed. The authors
% claim the upward compatibility, i.e., the version 3.0a can also be used
% with the MeX or LaMeX formats.

% The history of development of the Polish hyphenation patterns:
%
%
```

The first version of the patterns was developed
% by Hanna Koodziejska (1987).
%
% The adaptation to the LeX format (see below) and extensive modification
% were done by Bogusaw Jackowski & Marek Ryko (1987--1989).
%
% The hyphenation rules were further improved and adapted to the
% TeX 3.x requirements by Hanna Koodziejska (1991).
%
% Lone-standing version (3.0a) of patterns was prepared (under pressure
% from LaTeX users) by Bogusaw Jackowski and Marek Ryko, following
% Mariusz Olko's suggestions, 1995.

% The LeX format mentioned above was the first version of the adaptation
% of TeX to the Polish language. The next version is called MeX.

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```
PROG = lzma
CXX = g++
LIB =
RM = rm -f
CFLAGS = -c -O2 -Wall -D_7ZIP_ST

OBJS = \
 LzmaUtil.o \
 Alloc.o \
 LzFind.o \
 LzmaDec.o \
 LzmaEnc.o \
 7zFile.o \
 7zStream.o \


all: $(PROG)

$(PROG): $(OBJS)
 $(CXX) -o $(PROG) $(LDFLAGS) $(OBJS) $(LIB) $(LIB2)

LzmaUtil.o: LzmaUtil.c
 $(CXX) $(CFLAGS) LzmaUtil.c

Alloc.o: ../../Alloc.c
 $(CXX) $(CFLAGS) ../../Alloc.c

LzFind.o: ../../LzFind.c
 $(CXX) $(CFLAGS) ../../LzFind.c

LzmaDec.o: ../../LzmaDec.c
 $(CXX) $(CFLAGS) ../../LzmaDec.c

LzmaEnc.o: ../../LzmaEnc.c
 $(CXX) $(CFLAGS) ../../LzmaEnc.c

7zFile.o: ../../7zFile.c
 $(CXX) $(CFLAGS) ../../7zFile.c

7zStream.o: ../../7zStream.c
 $(CXX) $(CFLAGS) ../../7zStream.c

clean:
 -$(RM) $(PROG) $(OBJS)
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
```

```
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Attribute in license Element text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-018-ref.xht" />
  <meta name="assert" content="The license element contains a text element with an unknown attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
 {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-018.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Invalid copyright Element With dir Attribute in span Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />

```
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element that contains a span element with
INVALID as the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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```
# -*- Mode: python; indent-tabs-mode: nil; tab-width: 40 -*-
# vim: set filetype=python:
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# file, You can obtain one at http://mozilla.org/MPL/2.0/.

with Files('**'):
    BUG_COMPONENT = ('Core', 'General')

with Files('7zstub/**'):
    BUG_COMPONENT = ('Firefox', 'Installer')

with Files('atk-1.0/**'):
    BUG_COMPONENT = ('Core', 'Disability Access APIs')

with Files('bsdiff/**'):
    BUG_COMPONENT = ('Core', 'XPCOM')

with Files('ia2/**'):
    BUG_COMPONENT = ('Core', 'Disability Access APIs')

with Files('nsis/**'):
    BUG_COMPONENT = ('Firefox', 'Installer')

with Files('ply/**'):
    BUG_COMPONENT = ('Core', 'JavaScript Engine')

with Files('snappy/**'):
    BUG_COMPONENT = ('Core', 'XPCOM')
```

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```
// StdAfx.h

#ifndef __STDAFX_H
#define __STDAFX_H

#include "../../../Common/Common.h"

#include <commctrl.h>

// #define printf(x) NO_PRINTF_(x)
// #define sprintf(x) NO_SPRINTF_(x)

#endif
```

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```
// Windows/Control/Static.h

#ifndef __WINDOWS_CONTROL_STATIC_H
#define __WINDOWS_CONTROL_STATIC_H

#include "../Window.h"

namespace NWindows {
namespace NControl {

class CStatic: public CWindow
{
public:
 HANDLE SetImage(WPARAM imageType, HANDLE handle) { return (HANDLE)SendMsg(STM_SETIMAGE, imageType, (LPARAM)handle); }
 HANDLE GetImage(WPARAM imageType) { return (HANDLE)SendMsg(STM_GETIMAGE, imageType, 0); }

 #ifdef UNDER_CE
 HICON SetIcon(HICON icon) { return (HICON)SetImage(IMAGE_ICON, icon); }
 HICON GetIcon() { return (HICON)GetImage(IMAGE_ICON); }
 #else
 HICON SetIcon(HICON icon) { return (HICON)SendMsg(STM_SETICON, (WPARAM)icon, 0); }
 HICON GetIcon() { return (HICON)SendMsg(STM_GETICON, 0, 0); }
 #endif
};

}}

#endif
// HashGUI.h

#ifndef __HASH_GUI_H
#define __HASH_GUI_H

#include "../Common/HashCalc.h"
#include "../Common/Property.h"

HRESULT HashCalcGUI(
   DECL_EXTERNAL_CODECS_LOC_VARS
   const NWildcard::CCensor &censor,
   const CHashOptions &options,
   bool &messageWasDisplayed);

typedef CObjectVector<CProperty> CPropNameValPairs;
```

void AddValuePair(CPropNameValPairs &pairs, UINT resourceID, UInt64 value);
void AddSizeValue(UString &s, UInt64 value);
void AddSizeValuePair(CPropNameValPairs &pairs, UINT resourceID, UInt64 value);

void AddHashBundleRes(CPropNameValPairs &s, const CHashBundle &hb, const UString &firstFileName);
void AddHashBundleRes(UString &s, const CHashBundle &hb, const UString &firstFileName);

void ShowHashResults(const CPropNameValPairs &propPairs, HWND hwnd);
void ShowHashResults(const CHashBundle &hb, const UString &firstFileName, HWND hwnd);

#endif
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```
// Windows/System.h

#ifndef __WINDOWS_SYSTEM_H
#define __WINDOWS_SYSTEM_H

#include "../Common/MyTypes.h"

namespace NWindows {
namespace NSystem {

UInt32 CountAffinity(DWORD_PTR mask);

struct CProcessAffinity
{
 // UInt32 numProcessThreads;
 // UInt32 numSysThreads;
 DWORD_PTR processAffinityMask;
 DWORD_PTR systemAffinityMask;

 void InitST()
 {
   // numProcessThreads = 1;
   // numSysThreads = 1;
```

```
  processAffinityMask = 1;
  systemAffinityMask = 1;
 }

 UInt32 GetNumProcessThreads() const { return CountAffinity(processAffinityMask); }
 UInt32 GetNumSystemThreads() const { return CountAffinity(systemAffinityMask); }

 BOOL Get();
};

UInt32 GetNumberOfProcessors();

bool GetRamSize(UInt64 &size); // returns false, if unknown ram size

}}

#endif
/* ATK -  Accessibility Toolkit
* Copyright 2001 Sun Microsystems Inc.
*
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* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_COMPONENT_H__
#define __ATK_COMPONENT_H__

#include <atk/atkobject.h>
#include <atk/atkutil.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

/**
*AtkScrollType:
```

```
 *@ATK_SCROLL_TOP_LEFT: Scroll the object vertically and horizontally to the top
*left corner of the window.
*@ATK_SCROLL_BOTTOM_RIGHT: Scroll the object vertically and horizontally to the
*bottom right corner of the window.
*@ATK_SCROLL_TOP_EDGE: Scroll the object vertically to the top edge of the
window.
*@ATK_SCROLL_BOTTOM_EDGE: Scroll the object vertically to the bottom edge of
*the window.
*@ATK_SCROLL_LEFT_EDGE: Scroll the object vertically and horizontally to the
*left edge of the window.
*@ATK_SCROLL_RIGHT_EDGE: Scroll the object vertically and horizontally to the
*right edge of the window.
*@ATK_SCROLL_ANYWHERE: Scroll the object vertically and horizontally so that
*as much as possible of the object becomes visible. The exact placement is
*determined by the application.
*
* Specifies where an object should be placed on the screen when using scroll_to.
**/
typedef enum {
 ATK_SCROLL_TOP_LEFT,
 ATK_SCROLL_BOTTOM_RIGHT,
 ATK_SCROLL_TOP_EDGE,
 ATK_SCROLL_BOTTOM_EDGE,
  ATK_SCROLL_LEFT_EDGE,
 ATK_SCROLL_RIGHT_EDGE,
 ATK_SCROLL_ANYWHERE
} AtkScrollType;

/*
* The AtkComponent interface should be supported by any object that is
* rendered on the screen. The interface provides the standard mechanism
* for an assistive technology to determine and set the graphical
* representation of an object.
*/

#define ATK_TYPE_COMPONENT                  (atk_component_get_type ())
#define ATK_IS_COMPONENT(obj)               G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_COMPONENT)
#define ATK_COMPONENT(obj)                  G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_COMPONENT, AtkComponent)
#define ATK_COMPONENT_GET_IFACE(obj)        (G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_COMPONENT, AtkComponentIface))

#ifndef _TYPEDEF_ATK_COMPONENT_
#define _TYPEDEF_ATK_COMPONENT_
typedef struct _AtkComponent AtkComponent;
#endif
typedef struct _AtkComponentIface  AtkComponentIface;
```

```
typedef void (*AtkFocusHandler) (AtkObject*, gboolean);

typedef
 struct _AtkRectangle       AtkRectangle;

struct _AtkRectangle
{
 gint x;
 gint y;
 gint width;
 gint height;
};

GType atk_rectangle_get_type (void);

#define ATK_TYPE_RECTANGLE (atk_rectangle_get_type ())
struct _AtkComponentIface
{
 GTypeInterface parent;

 guint          (* add_focus_handler)  (AtkComponent          *component,
                                AtkFocusHandler        handler);

 gboolean       (* contains)          (AtkComponent          *component,
                                gint                 x,
                                gint                 y,
                                AtkCoordType          coord_type);

 AtkObject*    (* ref_accessible_at_point)  (AtkComponent     *component,
                                gint                 x,
                                gint                 y,
                                AtkCoordType          coord_type);
 void
        (* get_extents)        (AtkComponent          *component,
                                gint                *x,
                                gint                *y,
                                gint                *width,
                                gint                *height,
                                AtkCoordType          coord_type);
 void                   (* get_position)    (AtkComponent   *component,
                                     gint          *x,
                                     gint          *y,
                                     AtkCoordType   coord_type);
 void                   (* get_size)               (AtkComponent   *component,
                                          gint          *width,
                                          gint          *height);
 gboolean               (* grab_focus)
```

```
            (AtkComponent   *component);
void                (* remove_focus_handler)     (AtkComponent  *component,
                                        guint        handler_id);
gboolean            (* set_extents)     (AtkComponent   *component,
                                gint         x,
                                gint         y,
                                gint         width,
                                gint         height,
                                AtkCoordType   coord_type);
gboolean            (* set_position)    (AtkComponent   *component,
                                gint         x,
                                gint         y,
                                AtkCoordType   coord_type);
gboolean            (* set_size)        (AtkComponent   *component,
                                 gint         width,
                                gint         height);

AtkLayer            (* get_layer)       (AtkComponent   *component);
gint                (* get_mdi_zorder)   (AtkComponent   *component);

/*
 * signal handlers
 */
void                (* bounds_changed)   (AtkComponent   *component,
                                AtkRectangle   *bounds);
gdouble             (* get_alpha)       (AtkComponent   *component);

/*
 * Scrolls this object so it becomes visible on the screen.
 * Since ATK 2.30
 */
gboolean            (*scroll_to)        (AtkComponent   *component,
                                AtkScrollType   type);

gboolean            (*scroll_to_point)   (AtkComponent   *component,
                                AtkCoordType    coords,

        gint         x,
                                gint         y);
};

GType atk_component_get_type (void);

/* convenience functions */

guint               atk_component_add_focus_handler     (AtkComponent    *component,
                                        AtkFocusHandler handler);
gboolean            atk_component_contains              (AtkComponent    *component,
```

```
                                        gint          x,
                                        gint          y,
                                        AtkCoordType    coord_type);
AtkObject*          atk_component_ref_accessible_at_point(AtkComponent    *component,
                                        gint          x,
                                        gint          y,
                                        AtkCoordType    coord_type);
void
            atk_component_get_extents          (AtkComponent    *component,
                                        gint          *x,
                                        gint          *y,
                                        gint          *width,
                                        gint          *height,
                                        AtkCoordType    coord_type);
void              atk_component_get_position         (AtkComponent    *component,
                                        gint          *x,
                                        gint          *y,
                                        AtkCoordType    coord_type);
void              atk_component_get_size             (AtkComponent    *component,

  gint          *width,
                                        gint          *height);
AtkLayer          atk_component_get_layer            (AtkComponent    *component);
gint              atk_component_get_mdi_zorder       (AtkComponent    *component);
gboolean          atk_component_grab_focus           (AtkComponent    *component);
void              atk_component_remove_focus_handler  (AtkComponent    *component,
                                        guint         handler_id);
gboolean          atk_component_set_extents          (AtkComponent    *component,
                                        gint          x,
                                        gint          y,
                                        gint          width,
                                        gint          height,

                        AtkCoordType    coord_type);
gboolean          atk_component_set_position         (AtkComponent    *component,
                                        gint          x,
                                        gint          y,
                                        AtkCoordType    coord_type);
gboolean          atk_component_set_size             (AtkComponent    *component,
                                        gint          width,
                                        gint          height);
gdouble           atk_component_get_alpha            (AtkComponent    *component);
gboolean          atk_component_scroll_to            (AtkComponent    *component,
                                        AtkScrollType   type);

gboolean          atk_component_scroll_to_point      (AtkComponent    *component,
```

```
                                        AtkCoordType    coords,
                                        gint            x,
                                        gint            y);

#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_COMPONENT_H__ */
```

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// RegisterCodec.h

```
#ifndef __REGISTER_CODEC_H
#define __REGISTER_CODEC_H

#include "../Common/MethodId.h"

#include "../ICoder.h"

typedef void * (*CreateCodecP)();

struct CCodecInfo
{
 CreateCodecP CreateDecoder;
 CreateCodecP CreateEncoder;
 CMethodId Id;
 const char *Name;
 UInt32 NumStreams;
 bool IsFilter;
};

void RegisterCodec(const CCodecInfo *codecInfo) throw();


#define REGISTER_CODEC_CREATE_2(name, cls, i) static void *name() { return (void *)(i *)(new cls); }
#define REGISTER_CODEC_CREATE(name, cls) REGISTER_CODEC_CREATE_2(name, cls, ICompressCoder)

#define REGISTER_CODEC_NAME(x) CRegisterCodec ## x
#define REGISTER_CODEC_VAR static const CCodecInfo g_CodecInfo =

#define REGISTER_CODEC(x) struct REGISTER_CODEC_NAME(x) { \
   REGISTER_CODEC_NAME(x)() { RegisterCodec(&g_CodecInfo); }}; \
   static REGISTER_CODEC_NAME(x) g_RegisterCodec;


#define REGISTER_CODECS_NAME(x) CRegisterCodecs ## x
#define REGISTER_CODECS_VAR static const CCodecInfo g_CodecsInfo[] =

#define
 REGISTER_CODECS(x) struct REGISTER_CODECS_NAME(x) { \
   REGISTER_CODECS_NAME(x)() { for (unsigned i = 0; i < ARRAY_SIZE(g_CodecsInfo); i++) \
   RegisterCodec(&g_CodecsInfo[i]); }}; \
   static REGISTER_CODECS_NAME(x) g_RegisterCodecs;


#define REGISTER_CODEC_2(x, crDec, crEnc, id, name) \
   REGISTER_CODEC_VAR \
   { crDec, crEnc, id, name, 1, false }; \
   REGISTER_CODEC(x)
```

```
#ifdef EXTRACT_ONLY
 #define REGISTER_CODEC_E(x, clsDec, clsEnc, id, name) \
   REGISTER_CODEC_CREATE(CreateDec, clsDec) \
   REGISTER_CODEC_2(x, CreateDec, NULL, id, name)
#else
 #define REGISTER_CODEC_E(x, clsDec, clsEnc, id, name) \
   REGISTER_CODEC_CREATE(CreateDec, clsDec) \
   REGISTER_CODEC_CREATE(CreateEnc, clsEnc) \
   REGISTER_CODEC_2(x, CreateDec, CreateEnc, id, name)
#endif



#define REGISTER_FILTER_CREATE(name, cls) REGISTER_CODEC_CREATE_2(name, cls, ICompressFilter)

#define REGISTER_FILTER_ITEM(crDec, crEnc, id, name) \
   { crDec, crEnc, id, name, 1, true }

#define REGISTER_FILTER(x,
 crDec, crEnc, id, name) \
   REGISTER_CODEC_VAR \
   REGISTER_FILTER_ITEM(crDec, crEnc, id, name); \
   REGISTER_CODEC(x)

#ifdef EXTRACT_ONLY
 #define REGISTER_FILTER_E(x, clsDec, clsEnc, id, name) \
   REGISTER_FILTER_CREATE(CreateDec, clsDec) \
   REGISTER_FILTER(x, CreateDec, NULL, id, name)
#else
 #define REGISTER_FILTER_E(x, clsDec, clsEnc, id, name) \
   REGISTER_FILTER_CREATE(CreateDec, clsDec) \
   REGISTER_FILTER_CREATE(CreateEnc, clsEnc) \
   REGISTER_FILTER(x, CreateDec, CreateEnc, id, name)
#endif



struct CHasherInfo
{
 IHasher * (*CreateHasher)();
 CMethodId Id;
 const char *Name;
 UInt32 DigestSize;
};

void RegisterHasher(const CHasherInfo *hasher) throw();
```

```
#define REGISTER_HASHER_NAME(x) CRegHasher_ ## x

#define REGISTER_HASHER(cls, id, name, size) \
   STDMETHODIMP_(UInt32) cls::GetDigestSize() throw() { return size; } \
   static IHasher *CreateHasherSpec() { return new cls(); } \
   static const CHasherInfo g_HasherInfo = { CreateHasherSpec,
 id, name, size }; \
   struct REGISTER_HASHER_NAME(cls) { REGISTER_HASHER_NAME(cls)() {
RegisterHasher(&g_HasherInfo); }}; \
   static REGISTER_HASHER_NAME(cls) g_RegisterHasher;

#endif
// Archive/Common/ItemNameUtils.h

#ifndef __ARCHIVE_ITEM_NAME_UTILS_H
#define __ARCHIVE_ITEM_NAME_UTILS_H

#include "../../../Common/MyString.h"

namespace NArchive {
namespace NItemName {

void ReplaceSlashes_OsToUnix(UString &name);

UString GetOsPath(const UString &name);
UString GetOsPath_Remove_TailSlash(const UString &name);

void ReplaceToOsSlashes_Remove_TailSlash(UString &name);

bool HasTailSlash(const AString &name, UINT codePage);

#ifdef _WIN32
 inline UString WinPathToOsPath(const UString &name)  { return name; }
#else
 UString WinPathToOsPath(const UString &name);
#endif

}}

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With class Attribute in span Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
```

```
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element that contains a span element with
&quot;class1 class2 class3&quot; as the value for the class attribute." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   Text with &lt;span class="class1 class2 class3"&gt;span&lt;/span&gt;.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
#define IDD_COMBO   98

#define IDT_COMBO  100
#define IDC_COMBO  101
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Invalid copyright Element With dir Attribute in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-013-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element with INVALID as the value for the
dir attribute." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-013.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
```

```
  }
 ]]></style>
</head>
<body>
 <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
 <div class="test">P</div>
</body>
</html>
```

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```
// Common/Exception.h

#ifndef __COMMON_EXCEPTION_H
#define __COMMON_EXCEPTION_H

#include "MyWindows.h"

struct CSystemException
{
 HRESULT ErrorCode;
 CSystemException(HRESULT errorCode): ErrorCode(errorCode) {}
```

```
};

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element Without id Attribute</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-003-ref.xht" />
  <meta name="assert" content="The license element does not have an id attribute but it still matches the schema." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
  {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-003.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   License without language.
```

</text>
</license>
</metadata>
</pre>
</body>
</html>
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```
// CWrappers.h

#ifndef __C_WRAPPERS_H
#define __C_WRAPPERS_H

#include "../ICoder.h"
#include "../../Common/MyCom.h"

SRes HRESULT_To_SRes(HRESULT res, SRes defaultRes) throw();
HRESULT SResToHRESULT(SRes res) throw();

struct CCompressProgressWrap
{
 ICompressProgress vt;
 ICompressProgressInfo *Progress;
```

```
 HRESULT Res;

 void Init(ICompressProgressInfo *progress) throw();
};


struct CSeqInStreamWrap
{
 ISeqInStream vt;
 ISequentialInStream *Stream;
 HRESULT Res;
 UInt64 Processed;

 void Init(ISequentialInStream *stream) throw();
};


struct CSeekInStreamWrap
{
 ISeekInStream vt;
 IInStream *Stream;
 HRESULT Res;

 void Init(IInStream *stream) throw();
};


struct CSeqOutStreamWrap
{
 ISeqOutStream vt;
 ISequentialOutStream *Stream;
 HRESULT Res;
 UInt64 Processed;

 void Init(ISequentialOutStream *stream) throw();
};


struct CByteInBufWrap
{
 IByteIn vt;
 const Byte *Cur;
 const Byte *Lim;
 Byte *Buf;
 UInt32 Size;
 ISequentialInStream *Stream;
 UInt64
```

```
 Processed;
 bool Extra;
 HRESULT Res;

 CByteInBufWrap();
 ~CByteInBufWrap() { Free(); }
 void Free() throw();
 bool Alloc(UInt32 size) throw();
 void Init()
 {
   Lim = Cur = Buf;
   Processed = 0;
   Extra = false;
   Res = S_OK;
 }
 UInt64 GetProcessed() const { return Processed + (Cur - Buf); }
 Byte ReadByteFromNewBlock() throw();
 Byte ReadByte()
 {
   if (Cur != Lim)
     return *Cur++;
   return ReadByteFromNewBlock();
 }
};


struct CByteOutBufWrap
{
 IByteOut vt;
 Byte *Cur;
 const Byte *Lim;
 Byte *Buf;
 size_t Size;
 ISequentialOutStream *Stream;
 UInt64 Processed;
 HRESULT Res;

 CByteOutBufWrap() throw();
 ~CByteOutBufWrap() { Free(); }
 void Free() throw();
 bool Alloc(size_t size) throw();
 void Init()
 {
   Cur = Buf;
   Lim = Buf + Size;
   Processed = 0;
   Res = S_OK;
 }
```

```
 UInt64 GetProcessed() const { return Processed + (Cur - Buf); }
 HRESULT Flush() throw();
 void WriteByte(Byte b)
 {
   *Cur++ = b;
   if (Cur
 == Lim)
     Flush();
 }
};

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With One span Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element that contains a span element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size:
 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
```

<metadata version="1.0">
 <license url="http://w3c.org/Fonts">
  <text>
   Text with <span>span</span>.
  </text>
 </license>
</metadata>
  </pre>
 </body>
</html>

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==========

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```
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strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Child Element in copyright Element text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-016-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element with an unknown child element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
  {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-016.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
```

```
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
// DummyOutStream.h

#ifndef __DUMMY_OUT_STREAM_H
#define __DUMMY_OUT_STREAM_H

#include "../../../Common/MyCom.h"

#include "../../IStream.h"

class CDummyOutStream:
 public ISequentialOutStream,
 public CMyUnknownImp
{
 CMyComPtr<ISequentialOutStream> _stream;
 UInt64 _size;
public:
 void SetStream(ISequentialOutStream *outStream) { _stream = outStream; }
 void ReleaseStream() { _stream.Release(); }
 void Init() { _size = 0; }
 MY_UNKNOWN_IMP
 STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
 UInt64 GetSize() const { return _size; }
};

#endif
/* -*- Mode: C++; tab-width: 8; indent-tabs-mode: nil; c-basic-offset: 2 -*- */
/* vim: set ts=8 sts=2 et sw=2 tw=80: */
/* This Source Code Form is subject to the terms of the Mozilla Public
* License, v. 2.0. If a copy of the MPL was not distributed with this file,
* You can obtain one at http://mozilla.org/MPL/2.0/. */

#ifndef mozilla_dom_PermissionObserver_h_
#define mozilla_dom_PermissionObserver_h_

#include "mozilla/dom/PermissionsBinding.h"

#include "nsIObserver.h"
#include "nsIPrincipal.h"
#include "nsTArray.h"
```

```
#include "nsWeakReference.h"

namespace mozilla {
namespace dom {

class PermissionStatus;

// Singleton that watches for perm-changed notifications in order to notify
// PermissionStatus objects.
class PermissionObserver final : public nsIObserver,
                                 public nsSupportsWeakReference {
public:
 NS_DECL_ISUPPORTS
 NS_DECL_NSIOBSERVER

 static already_AddRefed<PermissionObserver> GetInstance();

 void AddSink(PermissionStatus* aObs);
  void RemoveSink(PermissionStatus* aObs);

private:
 PermissionObserver();
 virtual ~PermissionObserver();

 void Notify(PermissionName aName, nsIPrincipal& aPrincipal);

 nsTArray<PermissionStatus*> mSinks;
};

}  // namespace dom
}  // namespace mozilla

#endif
// HashCalc.h

#ifndef __HASH_CALC_H
#define __HASH_CALC_H

#include "../../../Common/Wildcard.h"

#include "../../Common/CreateCoder.h"
#include "../../Common/MethodProps.h"

#include "DirItem.h"

const unsigned k_HashCalc_DigestSize_Max = 64;

const unsigned k_HashCalc_NumGroups = 4;
```

```
enum
{
 k_HashCalc_Index_Current,
 k_HashCalc_Index_DataSum,
 k_HashCalc_Index_NamesSum,
 k_HashCalc_Index_StreamsSum
};

struct CHasherState
{
 CMyComPtr<IHasher> Hasher;
 AString Name;
 UInt32 DigestSize;
 Byte Digests[k_HashCalc_NumGroups][k_HashCalc_DigestSize_Max];
};

struct IHashCalc
{
 virtual void InitForNewFile() = 0;
 virtual void Update(const void *data, UInt32 size) = 0;
 virtual void SetSize(UInt64 size) = 0;
 virtual void Final(bool isDir, bool isAltStream, const UString &path) = 0;
};

struct CHashBundle: public IHashCalc
{
 CObjectVector<CHasherState> Hashers;

 UInt64 NumDirs;
 UInt64 NumFiles;
 UInt64 NumAltStreams;
 UInt64 FilesSize;
 UInt64 AltStreamsSize;
 UInt64
 NumErrors;

 UInt64 CurSize;

 HRESULT SetMethods(DECL_EXTERNAL_CODECS_LOC_VARS const UStringVector &methods);

 void Init()
 {
   NumDirs = NumFiles = NumAltStreams = FilesSize = AltStreamsSize = NumErrors = 0;
 }

 void InitForNewFile();
 void Update(const void *data, UInt32 size);
```

```
 void SetSize(UInt64 size);
 void Final(bool isDir, bool isAltStream, const UString &path);
};

#define INTERFACE_IHashCallbackUI(x) \
 INTERFACE_IDirItemsCallback(x) \
 virtual HRESULT StartScanning() x; \
 virtual HRESULT FinishScanning(const CDirItemsStat &st) x; \
 virtual HRESULT SetNumFiles(UInt64 numFiles) x; \
 virtual HRESULT SetTotal(UInt64 size) x; \
 virtual HRESULT SetCompleted(const UInt64 *completeValue) x; \
 virtual HRESULT CheckBreak() x; \
 virtual HRESULT BeforeFirstFile(const CHashBundle &hb) x; \
 virtual HRESULT GetStream(const wchar_t *name, bool isFolder) x; \
 virtual HRESULT OpenFileError(const FString &path, DWORD systemError) x; \
 virtual HRESULT SetOperationResult(UInt64
 fileSize, const CHashBundle &hb, bool showHash) x; \
 virtual HRESULT AfterLastFile(const CHashBundle &hb) x; \

struct IHashCallbackUI: public IDirItemsCallback
{
 INTERFACE_IHashCallbackUI(=0)
};

struct CHashOptions
{
 UStringVector Methods;
 bool OpenShareForWrite;
 bool StdInMode;
 bool AltStreamsMode;
 NWildcard::ECensorPathMode PathMode;

 CHashOptions(): StdInMode(false), OpenShareForWrite(false), AltStreamsMode(false),
PathMode(NWildcard::k_RelatPath) {};
};

HRESULT HashCalc(
  DECL_EXTERNAL_CODECS_LOC_VARS
  const NWildcard::CCensor &censor,
  const CHashOptions &options,
  AString &errorInfo,
  IHashCallbackUI *callback);

void AddHashHexToString(char *dest, const Byte *data, UInt32 size);

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
```

```
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Child Element in license Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-012-ref.xht" />
  <meta name="assert" content="The license element contains an unknown child element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
  {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-012.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
// Windows/COM.h

#ifndef __WINDOWS_COM_H
#define __WINDOWS_COM_H

#include "../Common/MyString.h"

namespace NWindows {
namespace NCOM {
```

```
#ifdef _WIN32

class CComInitializer
{
public:
 CComInitializer()
 {
   #ifdef UNDER_CE
   CoInitializeEx(NULL, COINIT_MULTITHREADED);
   #else
   // it's single thread. Do we need multithread?
   CoInitialize(NULL);
   #endif
 };
 ~CComInitializer() { CoUninitialize(); }
};

class CStgMedium
{
 STGMEDIUM _object;
public:
 bool _mustBeReleased;
 CStgMedium(): _mustBeReleased(false) {}
 ~CStgMedium() { Free(); }
 void Free()
 {
   if (_mustBeReleased)
     ReleaseStgMedium(&_object);
   _mustBeReleased = false;
 }
 const STGMEDIUM* operator->() const { return &_object;}
 STGMEDIUM* operator->() { return &_object;}
 STGMEDIUM* operator&() { return &_object; }
};

#endif

/*
//////////////////////////////////
// GUID <--> String Conversions
UString GUIDToStringW(REFGUID guid);
AString GUIDToStringA(REFGUID guid);
#ifdef UNICODE
  #define GUIDToString GUIDToStringW
#else
 #define GUIDToString GUIDToStringA
#endif
```

```
HRESULT StringToGUIDW(const wchar_t *string, GUID &classID);
HRESULT StringToGUIDA(const char *string, GUID &classID);
#ifdef UNICODE
 #define StringToGUID StringToGUIDW
#else
 #define StringToGUID StringToGUIDA
#endif
*/

}}

#endif
/*
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*
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* met:
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* (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE
* OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
*
* Plain C interface (a wrapper around the C++ implementation).
*/

#ifndef THIRD_PARTY_SNAPPY_OPENSOURCE_SNAPPY_C_H_
#define THIRD_PARTY_SNAPPY_OPENSOURCE_SNAPPY_C_H_
```

```
#ifdef __cplusplus
extern "C" {
#endif

#include <stddef.h>

/*
* Return values; see the documentation for each function to know
* what each can return.
*/
typedef enum {
 SNAPPY_OK = 0,
 SNAPPY_INVALID_INPUT = 1,
 SNAPPY_BUFFER_TOO_SMALL = 2
} snappy_status;

/*
 * Takes the data stored in "input[0..input_length-1]" and stores
* it in the array pointed to by "compressed".
*
* <compressed_length> signals the space available in "compressed".
* If it is not at least equal to "snappy_max_compressed_length(input_length)",
* SNAPPY_BUFFER_TOO_SMALL is returned. After successful compression,
* <compressed_length> contains the true length of the compressed output,
* and SNAPPY_OK is returned.
*
* Example:
*   size_t output_length = snappy_max_compressed_length(input_length);
*   char* output = (char*)malloc(output_length);
*   if (snappy_compress(input, input_length, output, &output_length)
*       == SNAPPY_OK) {
*     ... Process(output, output_length) ...
*   }
*   free(output);
*/
snappy_status snappy_compress(const char* input,
                              size_t input_length,
                              char* compressed,
                              size_t* compressed_length);

/*
* Given data in "compressed[0..compressed_length-1]"
 generated by
* calling the snappy_compress routine, this routine stores
* the uncompressed data to
*   uncompressed[0..uncompressed_length-1].
* Returns failure (a value not equal to SNAPPY_OK) if the message
```

```
* is corrupted and could not be decrypted.
*
* <uncompressed_length> signals the space available in "uncompressed".
* If it is not at least equal to the value returned by
* snappy_uncompressed_length for this stream, SNAPPY_BUFFER_TOO_SMALL
* is returned. After successful decompression, <uncompressed_length>
* contains the true length of the decompressed output.
*
* Example:
*   size_t output_length;
*   if (snappy_uncompressed_length(input, input_length, &output_length)
*       != SNAPPY_OK) {
*     ... fail ...
*   }
*   char* output = (char*)malloc(output_length);
*   if (snappy_uncompress(input, input_length, output, &output_length)
*       == SNAPPY_OK) {
*     ... Process(output, output_length) ...
*   }
*   free(output);
*/
snappy_status
 snappy_uncompress(const char* compressed,
                   size_t compressed_length,
                   char* uncompressed,
                   size_t* uncompressed_length);

/*
* Returns the maximal size of the compressed representation of
* input data that is "source_length" bytes in length.
*/
size_t snappy_max_compressed_length(size_t source_length);

/*
* REQUIRES: "compressed[]" was produced by snappy_compress()
* Returns SNAPPY_OK and stores the length of the uncompressed data in
* *result normally. Returns SNAPPY_INVALID_INPUT on parsing error.
* This operation takes O(1) time.
*/
snappy_status snappy_uncompressed_length(const char* compressed,
                         size_t compressed_length,
                         size_t* result);

/*
* Check if the contents of "compressed[]" can be uncompressed successfully.
* Does not return the uncompressed data; if so, returns SNAPPY_OK,
* or if not,
```

```
 returns SNAPPY_INVALID_INPUT.
* Takes time proportional to compressed_length, but is usually at least a
* factor of four faster than actual decompression.
*/
snappy_status snappy_validate_compressed_buffer(const char* compressed,
                                                size_t compressed_length);

#ifdef __cplusplus
}  // extern "C"
#endif

#endif  /* THIRD_PARTY_SNAPPY_OPENSOURCE_SNAPPY_C_H_ */
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With dir Attribute in div Element in text Element 2</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element that contains a div element with rtl as
the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
```

<?xml version="1.0" encoding="UTF-8"?>
<metadata version="1.0">
 <license url="http://w3c.org/Fonts">
  <text>
   <div dir="rtl">Paragraph 1</div>
  </text>
 </license>
</metadata>
  </pre>
 </body>
</html>
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OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR
IN CONNECTION
 WITH THE SOFTWARE OR THE USE OR OTHER
DEALINGS IN THE SOFTWARE.
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With class Attribute in div Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />

```
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-023-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element that contains a div element with
&quot;class1 class2 class3&quot; as the
 value for the class attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-023.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   &lt;div class="class1 class2 class3"&gt;Paragraph 1&lt;/div&gt;
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
// HashCon.h

#ifndef __HASH_CON_H
#define __HASH_CON_H

#include "../Common/HashCalc.h"
```

```
#include "UpdateCallbackConsole.h"

class CHashCallbackConsole: public IHashCallbackUI, public CCallbackConsoleBase
{
 UString _fileName;
 AString _s;

 void AddSpacesBeforeName()
 {
   _s.Add_Space();
   _s.Add_Space();
 }

 void PrintSeparatorLine(const CObjectVector<CHasherState> &hashers);
 void PrintResultLine(UInt64 fileSize,
     const CObjectVector<CHasherState> &hashers, unsigned digestIndex, bool showHash);
 void PrintProperty(const char *name, UInt64 value);

public:
 bool PrintNameInPercents;

 bool PrintHeaders;

 bool PrintSize;
 bool PrintName;

 CHashCallbackConsole():
     PrintNameInPercents(true),
     PrintHeaders(false),
     PrintSize(true),
     PrintName(true)
   {}

 ~CHashCallbackConsole() { }

 INTERFACE_IHashCallbackUI(;)
};

void PrintHashStat(CStdOutStream &so, const CHashBundle &hb);

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With One No Language Tagged text Element</title>
```

```
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-004-ref.xht" />
  <meta name="assert" content="The license element matches the schema. It contains one text element that does not
have a language tag." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-004.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts" id="License ID"&gt;
  &lt;text&gt;
   License without language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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## A. HISTORY OF THE SOFTWARE

Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
| 2.2 and above | | | | |
| 2.1.1 | | 2001-now | PSF | yes |

Footnotes:

(1) GPL-compatible doesn't mean that we're distributing Python under the GPL. All Python licenses, unlike the GPL, let you distribute

a modified version without making your changes open source. The GPL-compatible licenses make it possible to combine Python with other software that is released under the GPL; the others don't.

(2) According to Richard Stallman, 1.6.1 is not GPL-compatible, because its license has a choice of law clause. According to CNRI, however, Stallman's lawyer has told CNRI's lawyer that 1.6.1 is "not incompatible" with the GPL.

Thanks to the many outside volunteers who have worked under Guido's direction to make these releases possible.

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element Without url Attribute</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element does not have a url attribute but it still matches the schema." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size:
 12px;
   }
```

```
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license id="License ID"&gt;
  &lt;text&gt;
   License without language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
/* ATK -  Accessibility Toolkit
* Copyright 2001 Sun Microsystems Inc.
*
* This library is free software; you can redistribute it and/or
* modify it under the terms of the GNU Library General Public
* License as published by the Free Software Foundation; either
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* License along with this library; if not, write to the
* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_IMAGE_H__
#define __ATK_IMAGE_H__

#include <atk/atkobject.h>
#include <atk/atkutil.h>
```

```
#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

/*
* The AtkImage interface
 should be supported by any object that has an
* associated image. This interface provides the standard mechanism for
* an assistive technology to get descriptive information about images.
*/

#define ATK_TYPE_IMAGE                  (atk_image_get_type ())
#define ATK_IS_IMAGE(obj)               G_TYPE_CHECK_INSTANCE_TYPE ((obj), ATK_TYPE_IMAGE)
#define ATK_IMAGE(obj)                  G_TYPE_CHECK_INSTANCE_CAST ((obj), ATK_TYPE_IMAGE,
AtkImage)
#define ATK_IMAGE_GET_IFACE(obj)        (G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_IMAGE, AtkImageIface))

#ifndef _TYPEDEF_ATK_IMAGE_
#define _TYPEDEF_ATK_IMAGE_
typedef struct _AtkImage AtkImage;
#endif
typedef struct _AtkImageIface AtkImageIface;

struct _AtkImageIface
{
 GTypeInterface parent;
 void          ( *get_image_position)    (AtkImage   *image,
                                          gint                *x,
                    gint                *y,
                              AtkCoordType
        coord_type);
 G_CONST_RETURN gchar* ( *get_image_description) (AtkImage             *image);
 void                ( *get_image_size)       (AtkImage             *image,
                                          gint                *width,
                                          gint                *height);
 gboolean            ( *set_image_description) (AtkImage             *image,
                                          const gchar          *description);
 G_CONST_RETURN gchar* ( *get_image_locale)     (AtkImage             *image);

 AtkFunction          pad1;

};

GType  atk_image_get_type            (void);

G_CONST_RETURN gchar* atk_image_get_image_description (AtkImage   *image);
```

```
void     atk_image_get_image_size        (AtkImage           *image,
                                          gint               *width,
                                          gint               *height);

gboolean atk_image_set_image_description
 (AtkImage           *image,
                                          const gchar       *description);
void     atk_image_get_image_position    (AtkImage      *image,
                                          gint               *x,
      gint             *y,
         AtkCoordType      coord_type);

G_CONST_RETURN gchar* atk_image_get_image_locale (AtkImage   *image);

#ifdef __cplusplus
}
#endif /* __cplusplus */
#endif /* __ATK_IMAGE_H__ */
// ExtractEngine.h

#ifndef __EXTRACT_ENGINE_H
#define __EXTRACT_ENGINE_H

#include "../../UI/Common/LoadCodecs.h"

HRESULT ExtractArchive(CCodecs *codecs, const FString &fileName, const FString &destFolder,
   bool showProgress, bool &isCorrupt, UString &errorMessage);

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With One Language Tagged text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-005-ref.xht" />
  <meta name="assert" content="The license element matches the schema. It contains one text element that has a
language tag." />
  <style type="text/css"><![CDATA[
   @import
```

```
 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-005.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts" id="License ID"&gt;
  &lt;text xml:lang="en"&gt;
   License with "en" language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With dir Attribute in span Element in text Element 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-030-ref.xht" />

```
  <meta name="assert" content="The license element contains a text element that contains a span element with ltr as
the value for the dir attribute."
 />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-030.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   Text with &lt;span dir="ltr"&gt;span&lt;/span&gt;.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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```
<?xml version="1.0" encoding="utf-8"?>
<Project DefaultTargets="Build" ToolsVersion="15.0"
xmlns="http://schemas.microsoft.com/developer/msbuild/2003">
 <ItemGroup Label="ProjectConfigurations">
   <ProjectConfiguration Include="Release|Win32">
     <Configuration>Release</Configuration>
     <Platform>Win32</Platform>
   </ProjectConfiguration>
 </ItemGroup>
 <PropertyGroup Label="Globals">
   <VCProjectVersion>15.0</VCProjectVersion>
   <ProjectGuid>{5058AAED-D02A-4F86-B011-31516AB5CD63}</ProjectGuid>
   <Keyword>Win32Proj</Keyword>
   <RootNamespace>BitsUtils</RootNamespace>
   <WindowsTargetPlatformVersion>10.0.15063.0</WindowsTargetPlatformVersion>
 </PropertyGroup>
 <Import Project="$(VCTargetsPath)\Microsoft.Cpp.Default.props" />
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'" Label="Configuration">
   <ConfigurationType>DynamicLibrary</ConfigurationType>
```

```
  <UseDebugLibraries>false</UseDebugLibraries>
  <PlatformToolset>v141</PlatformToolset>
   <WholeProgramOptimization>true</WholeProgramOptimization>
  <CharacterSet>Unicode</CharacterSet>
 </PropertyGroup>
 <Import Project="$(VCTargetsPath)\Microsoft.Cpp.props" />
 <ImportGroup Label="ExtensionSettings">
 </ImportGroup>
 <ImportGroup Label="Shared">
 </ImportGroup>
 <ImportGroup Label="PropertySheets" Condition="'$(Configuration)|$(Platform)'=='Release|Win32'">
  <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform" />
 </ImportGroup>
 <PropertyGroup Label="UserMacros" />
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'" />
 <ItemDefinitionGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'">
  <ClCompile>
    <PrecompiledHeader>NotUsing</PrecompiledHeader>
    <WarningLevel>Level3</WarningLevel>
    <Optimization>MaxSpeed</Optimization>
    <FunctionLevelLinking>true</FunctionLevelLinking>
     <IntrinsicFunctions>true</IntrinsicFunctions>
    <SDLCheck>false</SDLCheck>
<PreprocessorDefinitions>WINVER=0x601;_WIN32_WINNT=0x601;WIN32;NDEBUG;CANCELBITSJOBS_E
XPORTS;_WINDOWS;_USRDLL;%(PreprocessorDefinitions)</PreprocessorDefinitions>
    <RuntimeLibrary>MultiThreaded</RuntimeLibrary>
    <BufferSecurityCheck>false</BufferSecurityCheck>
    <OmitDefaultLibName>true</OmitDefaultLibName>
    <ExceptionHandling>false</ExceptionHandling>
  </ClCompile>
  <Link>
    <SubSystem>Windows</SubSystem>
    <EnableCOMDATFolding>true</EnableCOMDATFolding>
    <OptimizeReferences>true</OptimizeReferences>
    <GenerateDebugInformation>false</GenerateDebugInformation>
    <EntryPointSymbol>DllMain</EntryPointSymbol>
  </Link>
 </ItemDefinitionGroup>
 <ItemGroup>
  <ClCompile Include="BitsUtils.cpp" />
 </ItemGroup>
 <Import Project="$(VCTargetsPath)\Microsoft.Cpp.targets" />
 <ImportGroup Label="ExtensionTargets">
 </ImportGroup>
</Project>
/* MtCoder.h -- Multi-thread Coder
2018-02-21 : Igor Pavlov : Public domain */
```

```
#ifndef __MT_CODER_H
#define __MT_CODER_H

#include "MtDec.h"

EXTERN_C_BEGIN

/*
 if (    defined MTCODER__USE_WRITE_THREAD) : main thread writes all data blocks to output stream
 if (not defined MTCODER__USE_WRITE_THREAD) : any coder thread can write data blocks to output stream
*/
/* #define MTCODER__USE_WRITE_THREAD */

#ifndef _7ZIP_ST
 #define MTCODER__GET_NUM_BLOCKS_FROM_THREADS(numThreads) ((numThreads) + (numThreads) /
8 + 1)
 #define MTCODER__THREADS_MAX 64
 #define MTCODER__BLOCKS_MAX
(MTCODER__GET_NUM_BLOCKS_FROM_THREADS(MTCODER__THREADS_MAX) + 3)
#else
 #define MTCODER__THREADS_MAX 1
 #define MTCODER__BLOCKS_MAX 1
#endif


#ifndef _7ZIP_ST


typedef struct
{
 ICompressProgress vt;
 CMtProgress *mtProgress;
 UInt64 inSize;
 UInt64 outSize;
} CMtProgressThunk;

void MtProgressThunk_CreateVTable(CMtProgressThunk *p);

#define MtProgressThunk_Init(p) { (p)->inSize = 0; (p)->outSize =
 0; }


struct _CMtCoder;


typedef struct
{
```

```
 struct _CMtCoder *mtCoder;
 unsigned index;
 int stop;
 Byte *inBuf;

 CAutoResetEvent startEvent;
 CThread thread;
} CMtCoderThread;


typedef struct
{
 SRes (*Code)(void *p, unsigned coderIndex, unsigned outBufIndex,
     const Byte *src, size_t srcSize, int finished);
 SRes (*Write)(void *p, unsigned outBufIndex);
} IMtCoderCallback2;


typedef struct
{
 SRes res;
 unsigned bufIndex;
 Bool finished;
} CMtCoderBlock;


typedef struct _CMtCoder
{
 /* input variables */

 size_t blockSize;        /* size of input block */
 unsigned numThreadsMax;
 UInt64 expectedDataSize;

 ISeqInStream *inStream;
 const Byte *inData;
 size_t inDataSize;

 ICompressProgress *progress;
 ISzAllocPtr allocBig;

 IMtCoderCallback2 *mtCallback;
 void *mtCallbackObject;


 /* internal variables */

 size_t allocatedBufsSize;
```

```
 CAutoResetEvent readEvent;
 CSemaphore blocksSemaphore;

 Bool stopReading;
 SRes readRes;

 #ifdef MTCODER__USE_WRITE_THREAD
    CAutoResetEvent writeEvents[MTCODER__BLOCKS_MAX];
 #else
   CAutoResetEvent finishedEvent;
   SRes writeRes;
   unsigned writeIndex;
   Byte ReadyBlocks[MTCODER__BLOCKS_MAX];
   LONG numFinishedThreads;
 #endif

 unsigned numStartedThreadsLimit;
 unsigned numStartedThreads;

 unsigned numBlocksMax;
 unsigned blockIndex;
 UInt64 readProcessed;

 CCriticalSection cs;

 unsigned freeBlockHead;
 unsigned freeBlockList[MTCODER__BLOCKS_MAX];

 CMtProgress mtProgress;
 CMtCoderBlock blocks[MTCODER__BLOCKS_MAX];
 CMtCoderThread threads[MTCODER__THREADS_MAX];
} CMtCoder;


void MtCoder_Construct(CMtCoder *p);
void MtCoder_Destruct(CMtCoder *p);
SRes MtCoder_Code(CMtCoder *p);


#endif


EXTERN_C_END

#endif
```

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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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the LPPL Work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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German hyphenation patterns (traditional orthography)

(more info about the licence to be added later)

```
% dehypht-x-2011-06-01.pat

\message{German
 Hyphenation Patterns (Traditional Orthography) `dehypht-x' 2011-06-01 (WL)}

% TeX-Trennmuster fr die traditionelle deutsche Rechtschreibung
%
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% version 1 of the License, or any later version.
%
%
% The word list is available from
%
%   http://repo.or.cz/w/wortliste.git?a=commit;h=2d246449f5c4f570f4d735d3ad091f6ad70f6972
%
% The used patgen parameters are
%
%   1 1 | 2 5 | 1 1 1
%   2 2 | 2 5 | 1 2 1
%   3 3 | 2 6 | 1 1 1
%   4 4 | 2 6 | 1 4 1
```

% 5 5 | 2 7 | 1 1 1
% 6 6 | 2 7 | 1 6 1
% 7 7 | 2 13 | 1 4 1
% 8 8 | 2 13 | 1 8 1

## A. HISTORY OF THE SOFTWARE

==========

Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
| 2.2 and above | | | | |
| 2.1.1 | | 2001-now | PSF | yes |

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(2) According to Richard Stallman, 1.6.1 is not GPL-compatible, because its license has a choice of law clause. According to CNRI, however, Stallman's lawyer has told CNRI's lawyer that 1.6.1 is "not incompatible" with the GPL.

Thanks to the many outside volunteers who have worked under Guido's direction to make these releases possible.

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```
// 7z/Handler.h

#ifndef __7Z_HANDLER_H
#define __7Z_HANDLER_H

#include "../../ICoder.h"
#include "../IArchive.h"

#include "../../Common/CreateCoder.h"

#ifndef __7Z_SET_PROPERTIES

#ifdef EXTRACT_ONLY
 #if !defined(_7ZIP_ST) && !defined(_SFX)
   #define __7Z_SET_PROPERTIES
 #endif
#else
```

```
 #define __7Z_SET_PROPERTIES
#endif

#endif

// #ifdef __7Z_SET_PROPERTIES
#include "../Common/HandlerOut.h"
// #endif

#include "7zCompressionMode.h"
#include "7zIn.h"

namespace NArchive {
namespace N7z {


#ifndef EXTRACT_ONLY

class COutHandler: public CMultiMethodProps
{
 HRESULT SetSolidFromString(const UString &s);
 HRESULT SetSolidFromPROPVARIANT(const PROPVARIANT &value);
public:
 UInt64 _numSolidFiles;
 UInt64 _numSolidBytes;
 bool _numSolidBytesDefined;
 bool _solidExtension;
 bool _useTypeSorting;

 bool _compressHeaders;
 bool _encryptHeadersSpecified;
 bool _encryptHeaders;
 // bool _useParents; 9.26

 CBoolPair Write_CTime;
 CBoolPair Write_ATime;
 CBoolPair Write_MTime;
  CBoolPair Write_Attrib;

 bool _useMultiThreadMixer;

 bool _removeSfxBlock;

 // bool _volumeMode;

 void InitSolidFiles() { _numSolidFiles = (UInt64)(Int64)(-1); }
 void InitSolidSize()  { _numSolidBytes = (UInt64)(Int64)(-1); }
 void InitSolid()
```

```
 {
   InitSolidFiles();
   InitSolidSize();
   _solidExtension = false;
   _numSolidBytesDefined = false;
 }

 void InitProps7z();
 void InitProps();

 COutHandler() { InitProps7z(); }

 HRESULT SetProperty(const wchar_t *name, const PROPVARIANT &value);
};

#endif

class CHandler:
 public IInArchive,
 public IArchiveGetRawProps,

 #ifdef __7Z_SET_PROPERTIES
 public ISetProperties,
 #endif

 #ifndef EXTRACT_ONLY
 public IOutArchive,
 #endif

 PUBLIC_ISetCompressCodecsInfo

 public CMyUnknownImp,

 #ifndef EXTRACT_ONLY
   public COutHandler
 #else
   public CCommonMethodProps
 #endif
{
public:
 MY_QUERYINTERFACE_BEGIN2(IInArchive)
 MY_QUERYINTERFACE_ENTRY(IArchiveGetRawProps)
 #ifdef __7Z_SET_PROPERTIES
  MY_QUERYINTERFACE_ENTRY(ISetProperties)
 #endif
 #ifndef EXTRACT_ONLY
 MY_QUERYINTERFACE_ENTRY(IOutArchive)
 #endif
```

```
QUERY_ENTRY_ISetCompressCodecsInfo
MY_QUERYINTERFACE_END
MY_ADDREF_RELEASE

INTERFACE_IInArchive(;)
INTERFACE_IArchiveGetRawProps(;)

#ifdef __7Z_SET_PROPERTIES
STDMETHOD(SetProperties)(const wchar_t * const *names, const PROPVARIANT *values, UInt32 numProps);
#endif

#ifndef EXTRACT_ONLY
INTERFACE_IOutArchive(;)
#endif

DECL_ISetCompressCodecsInfo

CHandler();

private:
CMyComPtr<IInStream> _inStream;
NArchive::N7z::CDbEx _db;

#ifndef _NO_CRYPTO
bool _isEncrypted;
bool _passwordIsDefined;
UString _password;
#endif

#ifdef EXTRACT_ONLY

#ifdef __7Z_SET_PROPERTIES
bool _useMultiThreadMixer;
#endif

UInt32 _crcSize;

#else

CRecordVector<CBond2> _bonds;

HRESULT PropsMethod_To_FullMethod(CMethodFull &dest, const COneMethodInfo &m);
HRESULT SetHeaderMethod(CCompressionMethodMode &headerMethod);
 HRESULT SetMainMethod(CCompressionMethodMode &method
   #ifndef _7ZIP_ST
   , UInt32 numThreads
   #endif
   );
```

```
#endif

bool IsFolderEncrypted(CNum folderIndex) const;
#ifndef _SFX

CRecordVector<UInt64> _fileInfoPopIDs;
void FillPopIDs();
void AddMethodName(AString &s, UInt64 id);
HRESULT SetMethodToProp(CNum folderIndex, PROPVARIANT *prop) const;

#endif

DECL_EXTERNAL_CODECS_VARS
};

}}

#endif
```

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//
// Various type stubs for the open-source version of Snappy.
//
// This file cannot include config.h, as it is included from snappy.h,
// which is a public header. Instead, snappy-stubs-public.h is generated by
// from snappy-stubs-public.h.in at configure time.

#ifndef THIRD_PARTY_SNAPPY_OPENSOURCE_SNAPPY_STUBS_PUBLIC_H_
#define THIRD_PARTY_SNAPPY_OPENSOURCE_SNAPPY_STUBS_PUBLIC_H_

#include
 <stdint.h>

#if defined IS_BIG_ENDIAN || defined __BIG_ENDIAN__
#define WORDS_BIGENDIAN
#endif
```

```
#define SNAPPY_MAJOR 1
#define SNAPPY_MINOR 1
#define SNAPPY_PATCHLEVEL 3
#define SNAPPY_VERSION \
   ((SNAPPY_MAJOR << 16) | (SNAPPY_MINOR << 8) | SNAPPY_PATCHLEVEL)

#include <string>

namespace snappy {

typedef int8_t int8;
typedef uint8_t uint8;
typedef int16_t int16;
typedef uint16_t uint16;
typedef int32_t int32;
typedef uint32_t uint32;
typedef int64_t int64;
typedef uint64_t uint64;

typedef std::string string;

#ifndef DISALLOW_COPY_AND_ASSIGN
#define DISALLOW_COPY_AND_ASSIGN(TypeName) \
 TypeName(const TypeName&);               \
 void operator=(const TypeName&)
#endif

struct iovec {
 void* iov_base;
 size_t iov_len;
};

#if defined(_WIN32) || defined(_WIN64)
#if defined(_WIN64)
typedef __int64 LONG_PTR;
#else
typedef long LONG_PTR;
#endif
typedef LONG_PTR SSIZE_T;
typedef SSIZE_T ssize_t;
#endif

}  // namespace snappy

#endif  // THIRD_PARTY_SNAPPY_OPENSOURCE_SNAPPY_STUBS_PUBLIC_H_
/* ***** BEGIN LICENSE BLOCK *****
* Version: MPL 1.1/GPL 2.0/LGPL 2.1
```

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LZMA specification (DRAFT version)
---

Author: Igor Pavlov
Date: 2015-06-14

This specification defines the format of LZMA compressed data and lzma file format.

Notation
---

We use the syntax of C++ programming language.
We use the following types in C++ code:
unsigned - unsigned integer, at least 16 bits in size
int - signed integer, at least 16 bits in size
UInt64 - 64-bit unsigned integer
UInt32 - 32-bit unsigned integer
UInt16 - 16-bit unsigned integer

Byte - 8-bit unsigned integer
bool - boolean type with two possible values: false, true

lzma file format
==========

The lzma file contains the raw LZMA stream and the header with related properties.

The files in that format use ".lzma" extension.

The lzma file format layout:

Offset Size Description

0 1 LZMA model properties (lc, lp, pb) in encoded form
1 4 Dictionary size (32-bit unsigned integer, little-endian)
5 8 Uncompressed
size (64-bit unsigned integer, little-endian)
13 Compressed data (LZMA stream)

LZMA properties:

name Range Description

lc [0, 8] the number of "literal context" bits
lp [0, 4] the number of "literal pos" bits
pb [0, 4] the number of "pos" bits
dictSize [0, 2^32 - 1] the dictionary size

The following code encodes LZMA properties:

```
void EncodeProperties(Byte *properties)
{
 properties[0] = (Byte)((pb * 5 + lp) * 9 + lc);
 Set_UInt32_LittleEndian(properties + 1, dictSize);
}
```

If the value of dictionary size in properties is smaller than (1 << 12),
the LZMA decoder must set the dictionary size variable to (1 << 12).

```
#define LZMA_DIC_MIN (1 << 12)

 unsigned lc, pb, lp;
 UInt32 dictSize;
 UInt32 dictSizeInProperties;

 void DecodeProperties(const Byte *properties)
```

```
{
  unsigned d = properties[0];
  if (d >= (9 * 5 * 5))
    throw "Incorrect LZMA properties";
  lc = d % 9;
  d /= 9;
  pb = d / 5;
   lp = d % 5;
  dictSizeInProperties = 0;
  for (int i = 0; i < 4; i++)
    dictSizeInProperties |= (UInt32)properties[i + 1] << (8 * i);
  dictSize = dictSizeInProperties;
  if (dictSize < LZMA_DIC_MIN)
    dictSize = LZMA_DIC_MIN;
}
```

If "Uncompressed size" field contains ones in all 64 bits, it means that uncompressed size is unknown and there is the "end marker" in stream, that indicates the end of decoding point.
In opposite case, if the value from "Uncompressed size" field is not equal to ((2^64) - 1), the LZMA stream decoding must be finished after specified number of bytes (Uncompressed size) is decoded. And if there is the "end marker", the LZMA decoder must read that marker also.

## The new scheme to encode LZMA properties

If LZMA compression is used for some another format, it's recommended to use a new improved scheme to encode LZMA properties. That new scheme was used in xz format that uses the LZMA2 compression algorithm.
The
 LZMA2 is a new compression algorithm that is based on the LZMA algorithm.

The dictionary size in LZMA2 is encoded with just one byte and LZMA2 supports only reduced set of dictionary sizes:

```
(2 << 11), (3 << 11),
(2 << 12), (3 << 12),
...
(2 << 30), (3 << 30),
(2 << 31) - 1
```

The dictionary size can be extracted from encoded value with the following code:

```
dictSize = (p == 40) ? 0xFFFFFFFF : (((UInt32)2 | ((p) & 1)) << ((p) / 2 + 11));
```

Also there is additional limitation (lc + lp <= 4) in LZMA2 for values of "lc" and "lp" properties:

```
if (lc + lp > 4)
  throw "Unsupported properties: (lc + lp) > 4";
```

There are some advantages for LZMA decoder with such (lc + lp) value limitation. It reduces the maximum size of tables allocated by decoder. And it reduces the complexity of initialization procedure, that can be important to keep high speed of decoding of big number of small LZMA streams.

It's recommended to use that limitation (lc + lp <= 4) for any new format that uses LZMA compression. Note that the combinations of "lc" and "lp" parameters, where (lc + lp > 4), can provide significant improvement in compression ratio only in some rare cases.

The LZMA properties can be encoded into two bytes in new scheme:

| Offset | Size | Description |
|---|---|---|
| 0 | 1 | The dictionary size encoded with LZMA2 scheme |
| 1 | 1 | LZMA model properties (lc, lp, pb) in encoded form |

## The RAM usage

The RAM usage for LZMA decoder is determined by the following parts:

1) The Sliding Window (from 4 KiB to 4 GiB).
2) The probability model counter arrays (arrays of 16-bit variables).
3) Some additional state variables (about 10 variables of 32-bit integers).

### The RAM usage for Sliding Window

There are two main scenarios of decoding:

1) The decoding of full stream to one RAM buffer.

If we decode full LZMA stream to one output buffer in RAM, the decoder can use that output buffer as sliding window. So the decoder doesn't need additional buffer allocated for sliding window.

2) The decoding to some external storage.

If we decode LZMA stream to external storage, the decoder must allocate

the buffer for sliding window. The size of that buffer must be equal
or larger than the value of dictionary size from properties of LZMA stream.

In this specification we describe the code for decoding to some external
storage. The optimized version of code for decoding of full stream to one
output RAM buffer can require some minor changes in code.

The RAM usage for the probability model counters
---

The size of the probability model counter arrays is calculated with the
following formula:

size_of_prob_arrays = 1846 + 768 * (1 << (lp + lc))

Each probability model counter is 11-bit unsigned integer.
If we use 16-bit integer variables (2-byte integers) for these probability
model counters, the RAM usage required by probability model counter arrays
can be
estimated with the following formula:

RAM = 4 KiB + 1.5 KiB * (1 << (lp + lc))

For example, for default LZMA parameters (lp = 0 and lc = 3), the RAM usage is

RAM_lc3_lp0 = 4 KiB + 1.5 KiB * 8 = 16 KiB

The maximum RAM state usage is required for decoding the stream with lp = 4
and lc = 8:

RAM_lc8_lp4 = 4 KiB + 1.5 KiB * 4096 = 6148 KiB

If the decoder uses LZMA2's limited property condition
(lc + lp <= 4), the RAM usage will be not larger than

RAM_lc_lp_4 = 4 KiB + 1.5 KiB * 16 = 28 KiB

The RAM usage for encoder
---

There are many variants for LZMA encoding code.
These variants have different values for memory consumption.
Note that memory consumption for LZMA Encoder can not be
smaller than memory consumption of LZMA Decoder for same stream.

The RAM usage required by modern effective implementation of

LZMA Encoder can be estimated with the following formula:

Encoder_RAM_Usage = 4 MiB + 11 * dictionarySize.

But there are some modes of the
encoder that require less memory.

LZMA Decoding
==========

The LZMA compression algorithm uses LZ-based compression with Sliding Window
and Range Encoding as entropy coding method.

Sliding Window
---

LZMA uses Sliding Window compression similar to LZ77 algorithm.

LZMA stream must be decoded to the sequence that consists
of MATCHES and LITERALS:

- a LITERAL is a 8-bit character (one byte).
  The decoder just puts that LITERAL to the uncompressed stream.

- a MATCH is a pair of two numbers (DISTANCE-LENGTH pair).
  The decoder takes one byte exactly "DISTANCE" characters behind
  current position in the uncompressed stream and puts it to
  uncompressed stream. The decoder must repeat it "LENGTH" times.

The "DISTANCE" can not be larger than dictionary size.
And the "DISTANCE" can not be larger than the number of bytes in
the uncompressed stream that were decoded before that match.

In this specification we use cyclic buffer to implement Sliding Window
for
LZMA decoder:

```
class COutWindow
{
 Byte *Buf;
 UInt32 Pos;
 UInt32 Size;
 bool IsFull;

public:
 unsigned TotalPos;
```

```
COutStream OutStream;

COutWindow(): Buf(NULL) {}
~COutWindow() { delete []Buf; }

void Create(UInt32 dictSize)
{
  Buf = new Byte[dictSize];
  Pos = 0;
  Size = dictSize;
  IsFull = false;
  TotalPos = 0;
}

void PutByte(Byte b)
{
  TotalPos++;
  Buf[Pos++] = b;
  if (Pos == Size)
  {
    Pos = 0;
    IsFull = true;
  }
  OutStream.WriteByte(b);
}

Byte GetByte(UInt32 dist) const
{
  return Buf[dist <= Pos ? Pos - dist : Size - dist + Pos];
}

void CopyMatch(UInt32 dist, unsigned len)
{
  for (; len > 0; len--)
    PutByte(GetByte(dist));
}

bool CheckDistance(UInt32 dist) const
{
  return dist <= Pos || IsFull;
}

bool IsEmpty() const
{
  return Pos == 0 && !IsFull;
}
};
```

In another implementation it's possible to use one buffer that contains
Sliding Window and the whole data
 stream after uncompressing.

Range Decoder
---

LZMA algorithm uses Range Encoding (1) as entropy coding method.

LZMA stream contains just one very big number in big-endian encoding.
LZMA decoder uses the Range Decoder to extract a sequence of binary
symbols from that big number.

The state of the Range Decoder:

```
struct CRangeDecoder
{
 UInt32 Range;
 UInt32 Code;
 InputStream *InStream;

 bool Corrupted;
}
```

The notes about UInt32 type for the "Range" and "Code" variables:

 It's possible to use 64-bit (unsigned or signed) integer type
 for the "Range" and the "Code" variables instead of 32-bit unsigned,
 but some additional code must be used to truncate the values to
 low 32-bits after some operations.

 If the programming language does not support 32-bit unsigned integer type
 (like in case of JAVA language), it's possible to use 32-bit signed integer,
 but some code must be changed. For example, it's required to change the code
 that uses comparison operations
 for UInt32 variables in this specification.

The Range Decoder can be in some states that can be treated as
"Corruption" in LZMA stream. The Range Decoder uses the variable "Corrupted":

 (Corrupted == false), if the Range Decoder has not detected any corruption.
 (Corrupted == true), if the Range Decoder has detected some corruption.

The reference LZMA Decoder ignores the value of the "Corrupted" variable.
So it continues to decode the stream, even if the corruption can be detected
in the Range Decoder. To provide the full compatibility with output of the

reference LZMA Decoder, another LZMA Decoder implementations must also ignore the value of the "Corrupted" variable.

The LZMA Encoder is required to create only such LZMA streams, that will not lead the Range Decoder to states, where the "Corrupted" variable is set to true.

The Range Decoder reads first 5 bytes from input stream to initialize the state:

```
bool CRangeDecoder::Init()
{
 Corrupted = false;
 Range = 0xFFFFFFFF;
  Code = 0;

 Byte b = InStream->ReadByte();

 for (int i = 0; i < 4; i++)
   Code = (Code << 8) | InStream->ReadByte();

 if (b != 0 || Code == Range)
   Corrupted = true;
 return b == 0;
}
```

The LZMA Encoder always writes ZERO in initial byte of compressed stream. That scheme allows to simplify the code of the Range Encoder in the LZMA Encoder. If initial byte is not equal to ZERO, the LZMA Decoder must stop decoding and report error.

After the last bit of data was decoded by Range Decoder, the value of the "Code" variable must be equal to 0. The LZMA Decoder must check it by calling the IsFinishedOK() function:

```
 bool IsFinishedOK() const { return Code == 0; }
```

If there is corruption in data stream, there is big probability that the "Code" value will be not equal to 0 in the Finish() function. So that check in the IsFinishedOK() function provides very good feature for corruption detection.

The value of the "Range" variable before each bit decoding can not be smaller

than ((UInt32)1 << 24). The Normalize() function keeps the "Range" value in described range.

```
#define kTopValue ((UInt32)1 << 24)
```

```
void CRangeDecoder::Normalize()
{
 if (Range < kTopValue)
 {
   Range <<= 8;
   Code = (Code << 8) | InStream->ReadByte();
 }
}
```

Notes: if the size of the "Code" variable is larger than 32 bits, it's required to keep only low 32 bits of the "Code" variable after the change in Normalize() function.

If the LZMA Stream is not corrupted, the value of the "Code" variable is always smaller than value of the "Range" variable.
But the Range Decoder ignores some types of corruptions, so the value of the "Code" variable can be equal or larger than value of the "Range" variable for some "Corrupted" archives.

LZMA uses Range Encoding only with binary symbols of two types:
1) binary symbols with fixed and equal probabilities (direct bits)
2) binary symbols with predicted probabilities

The DecodeDirectBits() function decodes the sequence of direct bits:

```
UInt32
 CRangeDecoder::DecodeDirectBits(unsigned numBits)
{
 UInt32 res = 0;
 do
 {
   Range >>= 1;
   Code -= Range;
   UInt32 t = 0 - ((UInt32)Code >> 31);
   Code += Range & t;

   if (Code == Range)
     Corrupted = true;

   Normalize();
   res <<= 1;
   res += t + 1;
 }
 while (--numBits);
 return res;
}
```

The Bit Decoding with Probability Model
---

The task of Bit Probability Model is to estimate probabilities of binary symbols. And then it provides the Range Decoder with that information. The better prediction provides better compression ratio.
The Bit Probability Model uses statistical data of previous decoded symbols.

That estimated probability is presented as 11-bit unsigned integer value that represents the probability of symbol "0".

```
#define kNumBitModelTotalBits 11
```

Mathematical probabilities can be presented with the following formulas:

```
   probability(symbol_0) = prob / 2048.
   probability(symbol_1) =
 1 - Probability(symbol_0) =
                    =  1 - prob / 2048 =
                    =  (2048 - prob) / 2048
```

where the "prob" variable contains 11-bit integer probability counter.

It's recommended to use 16-bit unsigned integer type, to store these 11-bit probability values:

```
typedef UInt16 CProb;
```

Each probability value must be initialized with value ((1 << 11) / 2), that represents the state, where probabilities of symbols 0 and 1 are equal to 0.5:

```
#define PROB_INIT_VAL ((1 << kNumBitModelTotalBits) / 2)
```

The INIT_PROBS macro is used to initialize the array of CProb variables:

```
#define INIT_PROBS(p) \
{ for (unsigned i = 0; i < sizeof(p) / sizeof(p[0]); i++) p[i] = PROB_INIT_VAL; }
```

The DecodeBit() function decodes one bit.
The LZMA decoder provides the pointer to CProb variable that contains information about estimated probability for symbol 0 and the Range Decoder updates that CProb variable after decoding. The Range Decoder increases estimated probability
 of the symbol that was decoded:

```
#define kNumMoveBits 5
```

```
unsigned CRangeDecoder::DecodeBit(CProb *prob)
{
 unsigned v = *prob;
 UInt32 bound = (Range >> kNumBitModelTotalBits) * v;
 unsigned symbol;
 if (Code < bound)
 {
   v += ((1 << kNumBitModelTotalBits) - v) >> kNumMoveBits;
   Range = bound;
   symbol = 0;
 }
 else
 {
   v -= v >> kNumMoveBits;
   Code -= bound;
   Range -= bound;
   symbol = 1;
 }
 *prob = (CProb)v;
 Normalize();
 return symbol;
}
```

The Binary Tree of bit model counters
---

LZMA uses a tree of Bit model variables to decode symbol that needs
several bits for storing. There are two versions of such trees in LZMA:
 1) the tree that decodes bits from high bit to low bit (the normal scheme).
 2) the tree that decodes bits from low bit to high bit (the reverse scheme).

Each binary tree structure supports different size of decoded symbol
(the size of binary sequence that contains value of symbol).
If that size
 of decoded symbol is "NumBits" bits, the tree structure
uses the array of (2 << NumBits) counters of CProb type.
But only ((2 << NumBits) - 1) items are used by encoder and decoder.
The first item (the item with index equal to 0) in array is unused.
That scheme with unused array's item allows to simplify the code.

```
unsigned BitTreeReverseDecode(CProb *probs, unsigned numBits, CRangeDecoder *rc)
{
 unsigned m = 1;
 unsigned symbol = 0;
 for (unsigned i = 0; i < numBits; i++)
 {
```

```
  unsigned bit = rc->DecodeBit(&probs[m]);
  m <<= 1;
  m += bit;
  symbol |= (bit << i);
 }
 return symbol;
}

template <unsigned NumBits>
class CBitTreeDecoder
{
 CProb Probs[(unsigned)1 << NumBits];

public:

 void Init()
 {
  INIT_PROBS(Probs);
 }

 unsigned Decode(CRangeDecoder *rc)
 {
  unsigned m = 1;
  for (unsigned i = 0; i < NumBits; i++)
    m = (m << 1) + rc->DecodeBit(&Probs[m]);
  return m - ((unsigned)1 << NumBits);
 }

 unsigned ReverseDecode(CRangeDecoder *rc)
  {
  return BitTreeReverseDecode(Probs, NumBits, rc);
 }
};
```

LZ part of LZMA
---

LZ part of LZMA describes details about the decoding of MATCHES and LITERALS.

The Literal Decoding
---

The LZMA Decoder uses (1 << (lc + lp)) tables with CProb values, where
each table contains 0x300 CProb values:

```
 CProb *LitProbs;
```

```
void CreateLiterals()
{
  LitProbs = new CProb[(UInt32)0x300 << (lc + lp)];
}

void InitLiterals()
{
  UInt32 num = (UInt32)0x300 << (lc + lp);
  for (UInt32 i = 0; i < num; i++)
    LitProbs[i] = PROB_INIT_VAL;
}
```

To select the table for decoding it uses the context that consists of
(lc) high bits from previous literal and (lp) low bits from value that
represents current position in outputStream.

If (State > 7), the Literal Decoder also uses "matchByte" that represents
the byte in OutputStream at position the is the DISTANCE bytes before
current position, where the DISTANCE is the distance in DISTANCE-LENGTH
pair
of latest decoded match.

The following code decodes one literal and puts it to Sliding Window buffer:

```
void DecodeLiteral(unsigned state, UInt32 rep0)
{
  unsigned prevByte = 0;
  if (!OutWindow.IsEmpty())
    prevByte = OutWindow.GetByte(1);

  unsigned symbol = 1;
  unsigned litState = ((OutWindow.TotalPos & ((1 << lp) - 1)) << lc) + (prevByte >> (8 - lc));
  CProb *probs = &LitProbs[(UInt32)0x300 * litState];

  if (state >= 7)
  {
    unsigned matchByte = OutWindow.GetByte(rep0 + 1);
    do
    {
      unsigned matchBit = (matchByte >> 7) & 1;
      matchByte <<= 1;
      unsigned bit = RangeDec.DecodeBit(&probs[((1 + matchBit) << 8) + symbol]);
      symbol = (symbol << 1) | bit;
      if (matchBit != bit)
        break;
    }
    while (symbol < 0x100);
```

```
  }
  while (symbol < 0x100)
    symbol = (symbol << 1) | RangeDec.DecodeBit(&probs[symbol]);
  OutWindow.PutByte((Byte)(symbol - 0x100));
}
```

The match length decoding
---

The
 match length decoder returns normalized (zero-based value)
length of match. That value can be converted to real length of the match
with the following code:

```
#define kMatchMinLen 2

  matchLen = len + kMatchMinLen;
```

The match length decoder can return the values from 0 to 271.
And the corresponded real match length values can be in the range
from 2 to 273.

The following scheme is used for the match length encoding:

| Binary encoding sequence | Binary Tree structure | Zero-based match length (binary + decimal): |
|---|---|---|
| 0 xxx | LowCoder[posState] | xxx |
| 1 0 yyy | MidCoder[posState] | yyy + 8 |
| 1 1 zzzzzzzz | HighCoder | zzzzzzzz + 16 |

LZMA uses bit model variable "Choice" to decode the first selection bit.

If the first selection bit is equal to 0, the decoder uses binary tree
 LowCoder[posState] to decode 3-bit zero-based match length (xxx).

If the first selection
 bit is equal to 1, the decoder uses bit model
 variable "Choice2" to decode the second selection bit.

 If the second selection bit is equal to 0, the decoder uses binary tree
   MidCoder[posState] to decode 3-bit "yyy" value, and zero-based match
   length is equal to (yyy + 8).

 If the second selection bit is equal to 1, the decoder uses binary tree
   HighCoder to decode 8-bit "zzzzzzzz" value, and zero-based
   match length is equal to (zzzzzzzz + 16).

LZMA uses "posState" value as context to select the binary tree
from LowCoder and MidCoder binary tree arrays:

```
  unsigned posState = OutWindow.TotalPos & ((1 << pb) - 1);
```

The full code of the length decoder:

```
class CLenDecoder
{
 CProb Choice;
 CProb Choice2;
 CBitTreeDecoder<3> LowCoder[1 << kNumPosBitsMax];
 CBitTreeDecoder<3> MidCoder[1 << kNumPosBitsMax];
 CBitTreeDecoder<8> HighCoder;

public:

 void Init()
 {
  Choice = PROB_INIT_VAL;
  Choice2 = PROB_INIT_VAL;
  HighCoder.Init();
  for (unsigned
 i = 0; i < (1 << kNumPosBitsMax); i++)
  {
   LowCoder[i].Init();
   MidCoder[i].Init();
  }
 }

 unsigned Decode(CRangeDecoder *rc, unsigned posState)
 {
  if (rc->DecodeBit(&Choice) == 0)
   return LowCoder[posState].Decode(rc);
  if (rc->DecodeBit(&Choice2) == 0)
   return 8 + MidCoder[posState].Decode(rc);
  return 16 + HighCoder.Decode(rc);
 }
};
```

The LZMA decoder uses two instances of CLenDecoder class.
The first instance is for the matches of "Simple Match" type,
and the second instance is for the matches of "Rep Match" type:

```
 CLenDecoder LenDecoder;
 CLenDecoder RepLenDecoder;
```

The match distance decoding
---

LZMA supports dictionary sizes up to 4 GiB minus 1.
The value of match distance (decoded by distance decoder) can be
from 1 to 2^32. But the distance value that is equal to 2^32 is used to
indicate the "End of stream" marker. So real largest match distance
that is used for LZ-window match is (2^32 - 1).

LZMA uses
 normalized match length (zero-based length)
to calculate the context state "lenState" do decode the distance value:

```
#define kNumLenToPosStates 4

  unsigned lenState = len;
  if (lenState > kNumLenToPosStates - 1)
    lenState = kNumLenToPosStates - 1;
```

The distance decoder returns the "dist" value that is zero-based value
of match distance. The real match distance can be calculated with the
following code:

```
 matchDistance = dist + 1;
```

The state of the distance decoder and the initialization code:

```
 #define kEndPosModelIndex 14
 #define kNumFullDistances (1 << (kEndPosModelIndex >> 1))
 #define kNumAlignBits 4

 CBitTreeDecoder<6> PosSlotDecoder[kNumLenToPosStates];
 CProb PosDecoders[1 + kNumFullDistances - kEndPosModelIndex];
 CBitTreeDecoder<kNumAlignBits> AlignDecoder;

 void InitDist()
 {
  for (unsigned i = 0; i < kNumLenToPosStates; i++)
    PosSlotDecoder[i].Init();
  AlignDecoder.Init();
  INIT_PROBS(PosDecoders);
 }
```

At first stage the distance
 decoder decodes 6-bit "posSlot" value with bit
tree decoder from PosSlotDecoder array. It's possible to get 2^6=64 different
"posSlot" values.

```
unsigned posSlot = PosSlotDecoder[lenState].Decode(&RangeDec);
```

The encoding scheme for distance value is shown in the following table:

```
posSlot (decimal) /
    zero-based distance (binary)
0   0
1   1
2   10
3   11

4   10 x
5   11 x
6   10 xx
7   11 xx
8   10 xxx
9   11 xxx
10   10 xxxx
11   11 xxxx
12   10 xxxxx
13   11 xxxxx

14   10 yy zzzz
15   11 yy zzzz
16   10 yyy zzzz
17   11 yyy zzzz
...
62   10 yyyyyyyyyyyyyyyyyyyyyyyyy zzzz
63   11 yyyyyyyyyyyyyyyyyyyyyyyyy zzzz
```

where
"x ... x" means the sequence of binary symbols encoded with binary tree and
"Reverse" scheme. It uses separated binary tree for each posSlot from 4 to 13.
"y" means direct bit encoded with range coder.
"zzzz" means the sequence of four binary symbols encoded with binary
tree with "Reverse" scheme, where one
common binary tree "AlignDecoder"
is used for all posSlot values.

If (posSlot < 4), the "dist" value is equal to posSlot value.

If (posSlot >= 4), the decoder uses "posSlot" value to calculate the value of
the high bits of "dist" value and the number of the low bits.

If (4 <= posSlot < kEndPosModelIndex), the decoder uses bit tree decoders.
(one separated bit tree decoder per one posSlot value) and "Reverse" scheme.
In this implementation we use one CProb array "PosDecoders" that contains

all CProb variables for all these bit decoders.

if (posSlot >= kEndPosModelIndex), the middle bits are decoded as direct bits from RangeDecoder and the low 4 bits are decoded with a bit tree decoder "AlignDecoder" with "Reverse" scheme.

The code to decode zero-based match distance:

```
unsigned DecodeDistance(unsigned len)
{
  unsigned lenState = len;
  if (lenState > kNumLenToPosStates - 1)
    lenState = kNumLenToPosStates - 1;

  unsigned posSlot
= PosSlotDecoder[lenState].Decode(&RangeDec);
  if (posSlot < 4)
    return posSlot;

  unsigned numDirectBits = (unsigned)((posSlot >> 1) - 1);
  UInt32 dist = ((2 | (posSlot & 1)) << numDirectBits);
  if (posSlot < kEndPosModelIndex)
    dist += BitTreeReverseDecode(PosDecoders + dist - posSlot, numDirectBits, &RangeDec);
  else
  {
    dist += RangeDec.DecodeDirectBits(numDirectBits - kNumAlignBits) << kNumAlignBits;
    dist += AlignDecoder.ReverseDecode(&RangeDec);
  }
  return dist;
}
```

LZMA Decoding modes
---

There are 2 types of LZMA streams:

1) The stream with "End of stream" marker.
2) The stream without "End of stream" marker.

And the LZMA Decoder supports 3 modes of decoding:

1) The unpack size is undefined. The LZMA decoder stops decoding after getting "End of stream" marker.
The input variables for that case:

markerIsMandatory = true

unpackSizeDefined = false
unpackSize contains any value

2)
The unpack size is defined and LZMA decoder supports both variants, where the stream can contain "End of stream" marker or the stream is finished without "End of stream" marker. The LZMA decoder must detect any of these situations.
The input variables for that case:

markerIsMandatory = false
unpackSizeDefined = true
unpackSize contains unpack size

3) The unpack size is defined and the LZMA stream must contain "End of stream" marker
The input variables for that case:

markerIsMandatory = true
unpackSizeDefined = true
unpackSize contains unpack size

The main loop of decoder
---

The main loop of LZMA decoder:

```
Initialize the LZMA state.
loop
{
 // begin of loop
 Check "end of stream" conditions.
 Decode Type of MATCH / LITERAL.
   If it's LITERAL, decode LITERAL value and put the LITERAL to Window.
   If it's MATCH, decode the length of match and the match distance.
       Check error
 conditions, check end of stream conditions and copy
       the sequence of match bytes from sliding window to current position
       in window.
 Go to begin of loop
}
```

The reference implementation of LZMA decoder uses "unpackSize" variable to keep the number of remaining bytes in output stream. So it reduces "unpackSize" value after each decoded LITERAL or MATCH.

The following code contains the "end of stream" condition check at the start

of the loop:

```
  if (unpackSizeDefined && unpackSize == 0 && !markerIsMandatory)
    if (RangeDec.IsFinishedOK())
      return LZMA_RES_FINISHED_WITHOUT_MARKER;
```

LZMA uses three types of matches:

1) "Simple Match" - the match with distance value encoded with bit models.

2) "Rep Match" - the match that uses the distance from distance history table.

3) "Short Rep Match" - the match of single byte length, that uses the latest distance from distance history table.

The LZMA decoder
keeps the history of latest 4 match distances that were used
by decoder. That set of 4 variables contains zero-based match distances and
these variables are initialized with zero values:

```
 UInt32 rep0 = 0, rep1 = 0, rep2 = 0, rep3 = 0;
```

The LZMA decoder uses binary model variables to select type of MATCH or LITERAL:

```
#define kNumStates 12
#define kNumPosBitsMax 4

 CProb IsMatch[kNumStates << kNumPosBitsMax];
 CProb IsRep[kNumStates];
 CProb IsRepG0[kNumStates];
 CProb IsRepG1[kNumStates];
 CProb IsRepG2[kNumStates];
 CProb IsRep0Long[kNumStates << kNumPosBitsMax];
```

The decoder uses "state" variable value to select exact variable
from "IsRep", "IsRepG0", "IsRepG1" and "IsRepG2" arrays.
The "state" variable can get the value from 0 to 11.
Initial value for "state" variable is zero:

```
 unsigned state = 0;
```

The "state" variable is updated after each LITERAL or MATCH with one of the
following functions:

```
unsigned UpdateState_Literal(unsigned state)
{
 if (state < 4) return 0;
```

```
  else if (state < 10) return state - 3;
 else return state - 6;
}
unsigned UpdateState_Match   (unsigned state) { return state < 7 ? 7 : 10; }
unsigned UpdateState_Rep     (unsigned state) { return state < 7 ? 8 : 11; }
unsigned UpdateState_ShortRep(unsigned state) { return state < 7 ? 9 : 11; }
```

The decoder calculates "state2" variable value to select exact variable from "IsMatch" and "IsRep0Long" arrays:

```
unsigned posState = OutWindow.TotalPos & ((1 << pb) - 1);
unsigned state2 = (state << kNumPosBitsMax) + posState;
```

The decoder uses the following code flow scheme to select exact type of LITERAL or MATCH:

```
IsMatch[state2] decode
 0 - the Literal
 1 - the Match
   IsRep[state] decode
     0 - Simple Match
     1 - Rep Match
       IsRepG0[state] decode
         0 - the distance is rep0
           IsRep0Long[state2] decode
             0 - Short Rep Match
             1 - Rep Match 0
         1 -
           IsRepG1[state] decode
             0 - Rep Match 1

        1 -
               IsRepG2[state] decode
                 0 - Rep Match 2
                 1 - Rep Match 3
```

LITERAL symbol
---
If the value "0" was decoded with IsMatch[state2] decoding, we have "LITERAL" type.

At first the LZMA decoder must check that it doesn't exceed specified uncompressed size:

```
     if (unpackSizeDefined && unpackSize == 0)
       return LZMA_RES_ERROR;
```

Then it decodes literal value and puts it to sliding window:

```
DecodeLiteral(state, rep0);
```

Then the decoder must update the "state" value and "unpackSize" value;

```
state = UpdateState_Literal(state);
unpackSize--;
```

Then the decoder must go to the begin of main loop to decode next Match or Literal.

Simple Match
---

If the value "1" was decoded with IsMatch[state2] decoding,
we have the "Simple Match" type.

The distance history table is updated with the following scheme:

```
rep3 = rep2;
rep2 = rep1;
rep1 = rep0;
```

The zero-based length is decoded
with "LenDecoder":

```
len = LenDecoder.Decode(&RangeDec, posState);
```

The state is update with UpdateState_Match function:

```
state = UpdateState_Match(state);
```

and the new "rep0" value is decoded with DecodeDistance:

```
rep0 = DecodeDistance(len);
```

That "rep0" will be used as zero-based distance for current match.

If the value of "rep0" is equal to 0xFFFFFFFF, it means that we have
"End of stream" marker, so we can stop decoding and check finishing
condition in Range Decoder:

```
if (rep0 == 0xFFFFFFFF)
  return RangeDec.IsFinishedOK() ?
      LZMA_RES_FINISHED_WITH_MARKER :
      LZMA_RES_ERROR;
```

If uncompressed size is defined, LZMA decoder must check that it doesn't

exceed that specified uncompressed size:

```
    if (unpackSizeDefined && unpackSize == 0)
      return LZMA_RES_ERROR;
```

Also the decoder must check that "rep0" value is not larger than dictionary size
and is not larger than the number of already decoded bytes:

```
    if (rep0
 >= dictSize || !OutWindow.CheckDistance(rep0))
      return LZMA_RES_ERROR;
```

Then the decoder must copy match bytes as described in
"The match symbols copying" section.

Rep Match
---

If the LZMA decoder has decoded the value "1" with IsRep[state] variable,
we have "Rep Match" type.

At first the LZMA decoder must check that it doesn't exceed
specified uncompressed size:

```
    if (unpackSizeDefined && unpackSize == 0)
      return LZMA_RES_ERROR;
```

Also the decoder must return error, if the LZ window is empty:

```
    if (OutWindow.IsEmpty())
      return LZMA_RES_ERROR;
```

If the match type is "Rep Match", the decoder uses one of the 4 variables of
distance history table to get the value of distance for current match.
And there are 4 corresponding ways of decoding flow.

The decoder updates the distance history with the following scheme
depending from type of match:

```
- "Rep Match 0" or "Short Rep Match":
    ; LZMA doesn't update the distance history

- "Rep Match
 1":
    UInt32 dist = rep1;
    rep1 = rep0;
    rep0 = dist;
```

- "Rep Match 2":

```
UInt32 dist = rep2;
rep2 = rep1;
rep1 = rep0;
rep0 = dist;
```

- "Rep Match 3":

```
UInt32 dist = rep3;
rep3 = rep2;
rep2 = rep1;
rep1 = rep0;
rep0 = dist;
```

Then the decoder decodes exact subtype of "Rep Match" using "IsRepG0", "IsRep0Long", "IsRepG1", "IsRepG2".

If the subtype is "Short Rep Match", the decoder updates the state, puts the one byte from window to current position in window and goes to next MATCH/LITERAL symbol (the begin of main loop):

```
state = UpdateState_ShortRep(state);
OutWindow.PutByte(OutWindow.GetByte(rep0 + 1));
unpackSize--;
continue;
```

In other cases (Rep Match 0/1/2/3), it decodes the zero-based length of match with "RepLenDecoder" decoder:

```
len = RepLenDecoder.Decode(&RangeDec, posState);
```

Then it updates the state:

```
state = UpdateState_Rep(state);
```

Then the decoder must copy
 match bytes as described in
"The Match symbols copying" section.

The match symbols copying
---

If we have the match (Simple Match or Rep Match 0/1/2/3), the decoder must copy the sequence of bytes with calculated match distance and match length. If uncompressed size is defined, LZMA decoder must check that it doesn't exceed that specified uncompressed size:

```
  len += kMatchMinLen;
  bool isError = false;
  if (unpackSizeDefined && unpackSize < len)
  {
    len = (unsigned)unpackSize;
    isError = true;
  }
  OutWindow.CopyMatch(rep0 + 1, len);
  unpackSize -= len;
  if (isError)
    return LZMA_RES_ERROR;
```

Then the decoder must go to the begin of main loop to decode next MATCH or LITERAL.

NOTES
---

This specification doesn't describe the variant of decoder implementation
that supports partial decoding. Such partial decoding case can require some
changes in "end of stream" condition checks code. Also such code
can use additional
 status codes, returned by decoder.

This specification uses C++ code with templates to simplify describing.
The optimized version of LZMA decoder doesn't need templates.
Such optimized version can use just two arrays of CProb variables:
 1) The dynamic array of CProb variables allocated for the Literal Decoder.
 2) The one common array that contains all other CProb variables.

References:

1. G. N. N. Martin, Range encoding: an algorithm for removing redundancy
  from a digitized message, Video & Data Recording Conference,
  Southampton, UK, July 24-27, 1979.
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% Adapted to the new pattern-loading scheme.
% Original file name was nbhyph.tex

% TeX hyphenation patterns for Norwegian Bokmal
%
% Version 2007-02-10
%
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```
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% exceptions, for words that needs to be hyphenated differently for
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%
% Please send bugs or suggestions to karl@huftis.org.
%

\input hyph-no.tex

\hyphenation{
at-ten-de
be-tre
}
```

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```
PROG = 7zS2con.sfx
MY_FIXED = 1
CFLAGS = $(CFLAGS) -D_CONSOLE

C_OBJS = \
 $O\7zAlloc.obj \
 $O\7zArcIn.obj \
 $O\7zBuf.obj \
 $O\7zBuf2.obj \
 $O\7zCrc.obj \
 $O\7zCrcOpt.obj \
 $O\7zFile.obj \
 $O\7zDec.obj \
 $O\7zStream.obj \
 $O\Bcj2.obj \
 $O\Bra.obj \
 $O\Bra86.obj \
 $O\BraIA64.obj \
 $O\CpuArch.obj \
 $O\Delta.obj \
 $O\DllSecur.obj \
 $O\Lzma2Dec.obj \
 $O\LzmaDec.obj \

7Z_OBJS = \
```

```
 $O\SfxSetup.obj \

OBJS = \
 $(7Z_OBJS) \
 $(C_OBJS) \
 $O\resource.res

!include "../../../CPP/Build.mak"

$(7Z_OBJS): $(*B).c
 $(COMPL_O1)
$(C_OBJS): ../../$(*B).c
 $(COMPL_O1)
```

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$Revision: 1.80 $ $Date: 2011/11/03 15:11:58 $
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<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With class Attribute in div Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
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  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-026-ref.xht" />
  <meta name="assert" content="The license element contains a text element that contains a div element with
&quot;class1 class2 class3&quot; as the value
 for the class attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-026.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
```

<metadata version="1.0">
 <license url="http://w3c.org/Fonts">
  <text>
   <div class="class1 class2 class3">Paragraph 1</div>
  </text>
 </license>
</metadata>
  </pre>
 </body>
</html>
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%
% The used patgen parameters are
%
%  1 1 | 2 5 | 1 1 1
%  2 2 | 2 5 | 1 2 1
%  3 3 | 2 6 | 1 1 1
%  4 4 | 2 6 | 1 4 1
%  5 5 | 2 7 | 1 1 1
%  6 6 | 2 7 | 1 6 1
%  7 7 | 2 13 | 1 4 1
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~~~~

```
// ZipRegistry.h

#ifndef __ZIP_REGISTRY_H
#define __ZIP_REGISTRY_H

#include "../../../Common/MyTypes.h"
#include "../../../Common/MyString.h"

#include "ExtractMode.h"

namespace NExtract
{
 struct CInfo
 {
   NPathMode::EEnum PathMode;
   NOverwriteMode::EEnum OverwriteMode;
   bool PathMode_Force;
   bool OverwriteMode_Force;

   CBoolPair SplitDest;
   CBoolPair ElimDup;
   // CBoolPair AltStreams;
   CBoolPair NtSecurity;
   CBoolPair ShowPassword;

   UStringVector Paths;

   void Save() const;
   void Load();
 };

 void Save_ShowPassword(bool showPassword);
```
~~~~

```
 bool Read_ShowPassword();
}

namespace NCompression
{
 struct CFormatOptions
 {
  UInt32 Level;
  UInt32 Dictionary;
  UInt32 Order;
  UInt32 BlockLogSize;
  UInt32 NumThreads;

  CSysString FormatID;
  UString Method;
  UString Options;
  UString EncryptionMethod;

  void Reset_BlockLogSize()
  {
   BlockLogSize = (UInt32)(Int32)-1;
  }

  void ResetForLevelChange()
   {
   BlockLogSize = NumThreads = Level = Dictionary = Order = (UInt32)(Int32)-1;
   Method.Empty();
   // Options.Empty();
   // EncryptionMethod.Empty();
  }
  CFormatOptions() { ResetForLevelChange(); }
 };

 struct CInfo
 {
  UInt32 Level;
  bool ShowPassword;
  bool EncryptHeaders;
  UString ArcType;
  UStringVector ArcPaths;

  CObjectVector<CFormatOptions> Formats;

  CBoolPair NtSecurity;
  CBoolPair AltStreams;
  CBoolPair HardLinks;
  CBoolPair SymLinks;
```

```
  void Save() const;
  void Load();
 };
}

namespace NWorkDir
{
 namespace NMode
 {
  enum EEnum
  {
   kSystem,
   kCurrent,
   kSpecified
  };
 }
 struct CInfo
 {
  NMode::EEnum Mode;
  FString Path;
  bool ForRemovableOnly;

  void SetForRemovableOnlyDefault() { ForRemovableOnly = true; }
  void SetDefault()
  {
   Mode = NMode::kSystem;
   Path.Empty();
   SetForRemovableOnlyDefault();
  }

  void Save() const;
  void Load();

 };
}


struct CContextMenuInfo
{
 CBoolPair Cascaded;
 CBoolPair MenuIcons;
 CBoolPair ElimDup;

 bool Flags_Def;
 UInt32 Flags;

 void Save() const;
 void Load();
```

};

#endif
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{23170F69-40C1-278A-0000-00yy00xx0000}

00 IProgress.h

05 IProgress
// 050002 IProgress2

01 IFolderArchive.h

// 05 IArchiveFolder // old
// 06 IInFolderArchive // old
07 IFileExtractCallback.h::IFolderArchiveExtractCallback
08 IFileExtractCallback.h::IFolderArchiveExtractCallback2
// 0A IOutFolderArchive
0B IFolderArchiveUpdateCallback
0C Agent.h::IArchiveFolderInternal
0D IArchiveFolder
0E IInFolderArchive
0F IOutFolderArchive
10 IFolderArchiveUpdateCallback2
11 IFolderScanProgress

20 IFileExtractCallback.h::IGetProp
30 IFileExtractCallback.h::IFolderExtractToStreamCallback

03 IStream.h

01 ISequentialInStream
02 ISequentialOutStream
03 IInStream
04 IOutStream
06 IStreamGetSize
07 IOutStreamFinish
08 IStreamGetProps
09 IStreamGetProps2

04 ICoder.h

04 ICompressProgressInfo
05 ICompressCoder
18 ICompressCoder2
1F ICompressSetCoderPropertiesOpt
20 ICompressSetCoderProperties
21 ICompressSetDecoderProperties
//
22 ICompressSetDecoderProperties2
23 ICompressWriteCoderProperties
24 ICompressGetInStreamProcessedSize
25 ICompressSetCoderMt
26 ICompressSetFinishMode
27 ICompressGetInStreamProcessedSize2
28 ICompressSetMemLimit

30 ICompressGetSubStreamSize
31 ICompressSetInStream
32 ICompressSetOutStream
// 33 ICompressSetInStreamSize
34 ICompressSetOutStreamSize
35 ICompressSetBufSize
36 ICompressInitEncoder
37 ICompressSetInStream2
// 38 ICompressSetOutStream2
// 39 SetInStreamSize2
// 3A SetOutStreamSize2

40 ICompressFilter
60 ICompressCodecsInfo
61 ISetCompressCodecsInfo
80 ICryptoProperties

88 ICryptoResetSalt
8C ICryptoResetInitVector
90 ICryptoSetPassword
A0 ICryptoSetCRC
C0 IHasher
C1 IHashers

05 IPassword.h

10 ICryptoGetTextPassword
11 ICryptoGetTextPassword2

06 IArchive.h

03 ISetProperties
04 IArchiveKeepModeForNextOpen
05 IArchiveAllowTail

10 IArchiveOpenCallback

20 IArchiveExtractCallback
21 IArchiveExtractCallbackMessage

30 IArchiveOpenVolumeCallback
40 IInArchiveGetStream
50 IArchiveOpenSetSubArchiveName
60 IInArchive
61 IArchiveOpenSeq
70 IArchiveGetRawProps
71 IArchiveGetRootProps

80 IArchiveUpdateCallback
82 IArchiveUpdateCallback2
83 IArchiveUpdateCallbackFile

A0 IOutArchive

08 IFolder.h

00 IFolderFolder
01 IEnumProperties
02 IFolderGetTypeID
03 IFolderGetPath
04 IFolderWasChanged

05 // IFolderReload
06 // IFolderOperations old
07 IFolderGetSystemIconIndex
08 IFolderGetItemFullSize
09 IFolderClone
0A IFolderSetFlatMode
0B IFolderOperationsExtractCallback
0C //
0D //
0E IFolderProperties
0F
10 IFolderArcProps
11 IGetFolderArcProps
12 // IFolderOperations
13 IFolderOperations
14 IFolderCalcItemFullSize
15 IFolderCompare
16 IFolderGetItemName
17 IFolderAltStreams

09 IFolder.h :: FOLDER_MANAGER_INTERFACE

00 - 04 // old IFolderManager
05 IFolderManager

// 0A PluginInterface.h
00 IInitContextMenu
01 IPluginOptionsCallback
02 IPluginOptions

Handler GUIDs:

{23170F69-40C1-278A-1000-000110xx0000}

01 Zip
02 BZip2
03 Rar
04 Arj
05 Z
06 Lzh
07 7z
08 Cab
09 Nsis
0A lzma
0B lzma86

0C xz
0D ppmd

C6 COFF
C7 Ext
C8 VMDK
C9 VDI
CA Qcow
CB GPT
CC Rar5
CD IHex
CE Hxs
CF TE
D0 UEFIc
D1 UEFIs
D2 SquashFS
D3 CramFS
D4 APM
D5 Mslz
D6 Flv
D7 Swf
D8 Swfc
D9 Ntfs
DA Fat
DB Mbr
DC Vhd
DD Pe
DE Elf
DF Mach-O
E0 Udf
E1 Xar
E2 Mub
E3 Hfs
E4 Dmg
E5 Compound
E6 Wim
E7 Iso
E8
E9 Chm
EA Split
EB Rpm
EC Deb
ED Cpio
EE Tar
EF GZip

{23170F69-40C1-278A-1000-000100020000} ContextMenu.h::CZipContextMenu

// {23170F69-40C1-278A-1000-000100030000} // CAgentArchiveHandler
// {23170F69-40C1-278B- old codecs clsids
// {23170F69-40C1-278D-1000-000100020000} OptionsDialog.h::CLSID_CSevenZipOptions

{23170F69-40C1-2790-id} Codec Decoders
{23170F69-40C1-2791-id}
Codec Encoders
{23170F69-40C1-2792-id} Hashers

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With One span Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-024-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element that contains a span element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
  {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-024.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
```

<?xml version="1.0" encoding="UTF-8"?>
<metadata version="1.0">
 <copyright>
  <text>
   Text with <span>span</span>.
  </text>
 </copyright>
</metadata>
  </pre>
 </body>
</html>
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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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%
% Generated with the mkpattern utility (v. 1.2), on 2010/04/23
% The original source file were glpatter-utf8.tex
% This is a generated file
%
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%
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%
% Javier Mgica, javier at digi21.eu
%
% Note that there is no 'j' nor 'y' in Galician
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#define __STDAFX_H

#include "../Common/Common.h"

#endif
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*
*
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* and affix
 compression in general, please see:
* http://www.cs.ucla.edu/ficus-members/geoff/ispell.html
* (the home page for ispell)
*
```

```
* An almost complete rewrite  of MySpell for use by
* the Mozilla project has been developed by David Einstein
* (Deinst@world.std.com).  David and I are now
* working on parallel development tracks to help
* our respective projects (Mozilla and OpenOffice.org
* and we will maintain full affix file and dictionary
* file compatibility and work on merging our versions
* of MySpell back into a single tree. David has been
* a significant help in improving MySpell.
*
* Special thanks also go to La'szlo' Ne'meth
* <nemethl@gyorsposta.hu> who is the author of the
* Hungarian dictionary and who developed and contributed
* the code to support compound words in MySpell
* and fixed numerous problems with the encoding
* case conversion tables.
*
*/
```

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```
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<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Invalid license Element With dir Attribute in div Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-025-ref.xht" />
  <meta name="assert" content="The license element contains a text element that contains a div element with INVALID as the value for the dir attribute."
 />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
```

```
    src: url("support/metadatadisplay-schema-license-025.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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```
/* -*- Mode: C++; tab-width: 8; indent-tabs-mode: nil; c-basic-offset: 2 -*- */
/* vim: set ts=8 sts=2 et sw=2 tw=80: */
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#ifndef mozilla_dom_PermissionUtils_h_
#define mozilla_dom_PermissionUtils_h_

#include "mozilla/dom/PermissionsBinding.h"
#include "mozilla/dom/PermissionStatusBinding.h"
#include "mozilla/Maybe.h"

namespace mozilla {
namespace dom {

const nsLiteralCString& PermissionNameToType(PermissionName aName);
Maybe<PermissionName> TypeToPermissionName(const nsACString& aType);

PermissionState ActionToPermissionState(uint32_t aAction);

}  // namespace dom
}  // namespace mozilla

#endif
```

```
// Common/ListFileUtils.h

#ifndef __COMMON_LIST_FILE_UTILS_H
#define __COMMON_LIST_FILE_UTILS_H

#include "MyString.h"
#include "MyTypes.h"

#define MY__CP_UTF16   1200
#define MY__CP_UTF16BE 1201

bool ReadNamesFromListFile(CFSTR fileName, UStringVector &strings, UINT codePage = CP_OEMCP);

#endif
```

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```
/* Alloc.h -- Memory allocation functions
2018-02-19 : Igor Pavlov : Public domain */

#ifndef __COMMON_ALLOC_H
#define __COMMON_ALLOC_H

#include "7zTypes.h"

EXTERN_C_BEGIN

void *MyAlloc(size_t size);
void MyFree(void *address);

#ifdef _WIN32

void SetLargePageSize();

void *MidAlloc(size_t size);
void MidFree(void *address);
void *BigAlloc(size_t size);
void BigFree(void *address);

#else

#define MidAlloc(size) MyAlloc(size)
#define MidFree(address) MyFree(address)
#define BigAlloc(size) MyAlloc(size)
#define BigFree(address) MyFree(address)

#endif

extern const ISzAlloc g_Alloc;
extern const ISzAlloc g_BigAlloc;
```

```
extern const ISzAlloc g_MidAlloc;
extern const ISzAlloc g_AlignedAlloc;


typedef struct
{
 ISzAlloc vt;
 ISzAllocPtr baseAlloc;
 unsigned numAlignBits; /* ((1 << numAlignBits) >= sizeof(void *)) */
 size_t offset;         /* (offset == (k * sizeof(void *)) && offset < (1 << numAlignBits) */
} CAlignOffsetAlloc;

void AlignOffsetAlloc_CreateVTable(CAlignOffsetAlloc *p);


EXTERN_C_END

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Attribute in license Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains an unknown attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family:
 "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
```

```
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
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  <div class="test">P</div>
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```

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python-dotenv

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```
// PasswordDialog.h

#ifndef __PASSWORD_DIALOG_H
#define __PASSWORD_DIALOG_H

#include "../../../Windows/Control/Dialog.h"
#include "../../../Windows/Control/Edit.h"

#include "PasswordDialogRes.h"

class CPasswordDialog: public NWindows::NControl::CModalDialog
{
 NWindows::NControl::CEdit _passwordEdit;

 virtual void OnOK();
 virtual bool OnInit();
 virtual bool OnButtonClicked(int buttonID, HWND buttonHWND);
 void SetTextSpec();
 void ReadControls();
public:
 UString Password;
 bool ShowPassword;

 CPasswordDialog(): ShowPassword(false) {}
 INT_PTR Create(HWND parentWindow = 0) { return CModalDialog::Create(IDD_PASSWORD, parentWindow);
}
```

```
};

#endif
```

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```
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DEALINGS IN THE SOFTWARE.
PROG = 7zDec
CXX = gcc
LIB =
RM = rm -f
CFLAGS = -c -O2 -Wall

OBJS = 7zMain.o 7zAlloc.o 7zArcIn.o 7zBuf.o 7zBuf2.o 7zCrc.o 7zCrcOpt.o 7zDec.o CpuArch.o Delta.o
LzmaDec.o Lzma2Dec.o Bra.o Bra86.o BraIA64.o Bcj2.o Ppmd7.o Ppmd7Dec.o 7zFile.o 7zStream.o

all: $(PROG)

$(PROG): $(OBJS)
 $(CXX) -o $(PROG) $(LDFLAGS) $(OBJS) $(LIB)

7zMain.o: 7zMain.c
 $(CXX) $(CFLAGS) 7zMain.c

7zAlloc.o: ../../7zAlloc.c
 $(CXX) $(CFLAGS) ../../7zAlloc.c

7zArcIn.o: ../../7zArcIn.c
 $(CXX) $(CFLAGS) ../../7zArcIn.c

7zBuf.o: ../../7zBuf.c
 $(CXX) $(CFLAGS) ../../7zBuf.c

7zBuf2.o: ../../7zBuf2.c
 $(CXX) $(CFLAGS) ../../7zBuf2.c

7zCrc.o: ../../7zCrc.c
 $(CXX) $(CFLAGS) ../../7zCrc.c

7zCrcOpt.o: ../../7zCrc.c
 $(CXX) $(CFLAGS) ../../7zCrcOpt.c

7zDec.o: ../../7zDec.c
 $(CXX) $(CFLAGS) -D_7ZIP_PPMD_SUPPPORT ../../7zDec.c

CpuArch.o: ../../CpuArch.c
 $(CXX) $(CFLAGS) ../../CpuArch.c

Delta.o: ../../Delta.c
 $(CXX) $(CFLAGS) ../../Delta.c
```

```
LzmaDec.o: ../../LzmaDec.c
 $(CXX) $(CFLAGS) ../../LzmaDec.c

Lzma2Dec.o:
 ../../Lzma2Dec.c
 $(CXX) $(CFLAGS) ../../Lzma2Dec.c

Bra.o: ../../Bra.c
 $(CXX) $(CFLAGS) ../../Bra.c

Bra86.o: ../../Bra86.c
 $(CXX) $(CFLAGS) ../../Bra86.c

BraIA64.o: ../../BraIA64.c
 $(CXX) $(CFLAGS) ../../BraIA64.c

Bcj2.o: ../../Bcj2.c
 $(CXX) $(CFLAGS) ../../Bcj2.c

Ppmd7.o: ../../Ppmd7.c
 $(CXX) $(CFLAGS) ../../Ppmd7.c

Ppmd7Dec.o: ../../Ppmd7Dec.c
 $(CXX) $(CFLAGS) ../../Ppmd7Dec.c

7zFile.o: ../../7zFile.c
 $(CXX) $(CFLAGS) ../../7zFile.c

7zStream.o: ../../7zStream.c
 $(CXX) $(CFLAGS) ../../7zStream.c

clean:
 -$(RM) $(PROG) $(OBJS)
```

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#define IDI_ICON  1

#define IDS_MESSAGE_NO_ERRORS  3001

#define IDS_PROGRESS_TESTING  3302
#define IDS_OPENNING  3303
#define IDS_SCANNING  3304

#define IDS_CHECKSUM_CALCULATING  7500
#define IDS_CHECKSUM_INFORMATION  7501
#define IDS_CHECKSUM_CRC_DATA  7502
#define IDS_CHECKSUM_CRC_DATA_NAMES  7503
#define IDS_CHECKSUM_CRC_STREAMS_NAMES  7504

#define IDS_INCORRECT_VOLUME_SIZE  7307
/* ATK -  Accessibility Toolkit
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*/

#ifndef __ATK_H__
#define __ATK_H__

#define __ATK_H_INSIDE__

// XXX this is a Mozilla hack to avoid using atkversion.h which needs to be run
// through m4, and we don't want to deal
 with that.  Fortunately we don't need
// any of the fancyness in that header to deal with compile time version
// detection.
#define ATK_AVAILABLE_IN_2_12 extern

#include <atk/atkobject.h>
#include <atk/atkaction.h>
#include <atk/atkcomponent.h>
#include <atk/atkdocument.h>
#include <atk/atkeditabletext.h>
#include <atk/atkgobjectaccessible.h>
#include <atk/atkhyperlink.h>
#include <atk/atkhyperlinkimpl.h>
#include <atk/atkhypertext.h>
#include <atk/atkimage.h>
#include <atk/atknoopobject.h>
#include <atk/atknoopobjectfactory.h>
#include <atk/atkobjectfactory.h>
#include <atk/atkplug.h>
#include <atk/atkregistry.h>
#include <atk/atkrelation.h>
#include <atk/atkrelationset.h>
#include <atk/atkrelationtype.h>
#include <atk/atkselection.h>
#include <atk/atksocket.h>
#include <atk/atkstate.h>
#include <atk/atkstateset.h>
#include <atk/atkstreamablecontent.h>
#include <atk/atktable.h>
#include <atk/atktablecell.h>
#include <atk/atktext.h>
#include <atk/atkutil.h>
#include <atk/atkvalue.h>

#undef
 __ATK_H_INSIDE__
```

#endif /* __ATK_H__ */
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Kurmanji hyphenation patterns (v. 1.0 2009/06/29 JKn and MSh)

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```
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%
%
 Hyphenation patterns for Kurmanji (Northern Kurdish)
%
% (as spoken in Turkey and by the Kurdish diaspora in Europe).
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%
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%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
% The patterns were generated by Jrg Knappen with patgen using
% a list of 2.5k hyphenated Kurmanji words provided by Medeni Shemd.
%
% For 8-bit engines the T1 (Cork) encoding is needed
% for the special letters occurring in the Kurmanji alphabet.
%
% \message{Kurmanji hyphenation patterns kmrhyph v. 1.0 2009/06/29 JKn and MSh}
%
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SUCH DAMAGE.

```
// 7zUpdate.h

#ifndef __7Z_UPDATE_H
#define __7Z_UPDATE_H

#include "../IArchive.h"

// #include "../../Common/UniqBlocks.h"

#include "7zCompressionMode.h"
#include "7zIn.h"
#include "7zOut.h"

namespace NArchive {
namespace N7z {

/*
struct CTreeFolder
{
 UString Name;
 int Parent;
 CIntVector SubFolders;
 int UpdateItemIndex;
 int SortIndex;
 int SortIndexEnd;

 CTreeFolder(): UpdateItemIndex(-1) {}
};
*/

struct CUpdateItem
{
 int IndexInArchive;
 int IndexInClient;

 UInt64 CTime;
 UInt64 ATime;
 UInt64 MTime;
```

```
UInt64 Size;
UString Name;
/*
bool IsAltStream;
int ParentFolderIndex;
int TreeFolderIndex;
*/

// that code is not used in 9.26
// int ParentSortIndex;
// int ParentSortIndexEnd;

UInt32 Attrib;

bool NewData;
bool NewProps;

bool IsAnti;
bool IsDir;

bool AttribDefined;
bool CTimeDefined;
bool ATimeDefined;
bool MTimeDefined;

// int SecureIndex; // 0 means (no_security)

bool HasStream() const { return !IsDir && !IsAnti
&& Size != 0; }
// bool HasStream() const { return !IsDir && !IsAnti /* && Size != 0 */; } // for test purposes

CUpdateItem():
   // ParentSortIndex(-1),
   // IsAltStream(false),
   IsAnti(false),
   IsDir(false),
   AttribDefined(false),
   CTimeDefined(false),
   ATimeDefined(false),
   MTimeDefined(false)
   // SecureIndex(0)
   {}
void SetDirStatusFromAttrib() { IsDir = ((Attrib & FILE_ATTRIBUTE_DIRECTORY) != 0); }

// unsigned GetExtensionPos() const;
// UString GetExtension() const;
};
```

```
struct CUpdateOptions
{
 const CCompressionMethodMode *Method;
 const CCompressionMethodMode *HeaderMethod;
 bool UseFilters; // use additional filters for some files
 bool MaxFilter;  // use BCJ2 filter instead of BCJ
 int AnalysisLevel;

 CHeaderOptions HeaderOptions;

 UInt64 NumSolidFiles;
 UInt64 NumSolidBytes;
 bool SolidExtension;

 bool UseTypeSorting;

 bool RemoveSfxBlock;
 bool MultiThreadMixer;

 CUpdateOptions():

 Method(NULL),
    HeaderMethod(NULL),
    UseFilters(false),
    MaxFilter(false),
    AnalysisLevel(-1),
    NumSolidFiles((UInt64)(Int64)(-1)),
    NumSolidBytes((UInt64)(Int64)(-1)),
    SolidExtension(false),
    UseTypeSorting(true),
    RemoveSfxBlock(false),
    MultiThreadMixer(true)
   {}
};

HRESULT Update(
   DECL_EXTERNAL_CODECS_LOC_VARS
   IInStream *inStream,
   const CDbEx *db,
   const CObjectVector<CUpdateItem> &updateItems,
   // const CObjectVector<CTreeFolder> &treeFolders, // treeFolders[0] is root
   // const CUniqBlocks &secureBlocks,
   COutArchive &archive,
   CArchiveDatabaseOut &newDatabase,
   ISequentialOutStream *seqOutStream,
   IArchiveUpdateCallback *updateCallback,
   const CUpdateOptions &options
```

```
  #ifndef _NO_CRYPTO
  , ICryptoGetTextPassword *getDecoderPassword
  #endif
  );
}}

#endif
C_OBJS = $(C_OBJS) \
 $O\Aes.obj

!IF "$(CPU)" != "IA64" && "$(CPU)" != "MIPS" && "$(CPU)" != "ARM" && "$(CPU)" != "ARM64"
ASM_OBJS = $(ASM_OBJS) \
 $O\AesOpt.obj
!ENDIF
```

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//
// Various stubs for the open-source version of Snappy.

#ifndef THIRD_PARTY_SNAPPY_OPENSOURCE_SNAPPY_STUBS_INTERNAL_H_
#define THIRD_PARTY_SNAPPY_OPENSOURCE_SNAPPY_STUBS_INTERNAL_H_

#ifdef HAVE_CONFIG_H
#include "config.h"
#endif

#include <string>

#include <assert.h>
#include <stdlib.h>
#include <string.h>

#ifdef HAVE_SYS_MMAN_H
#include <sys/mman.h>
#endif

#include "snappy-stubs-public.h"

#if defined(__x86_64__)

// Enable 64-bit optimized
```

```
 versions of some routines.
#define ARCH_K8 1

#endif

// Needed by OS X, among others.
#ifndef MAP_ANONYMOUS
#define MAP_ANONYMOUS MAP_ANON
#endif

// Pull in std::min, std::ostream, and the likes. This is safe because this
// header file is never used from any public header files.
using namespace std;

// The size of an array, if known at compile-time.
// Will give unexpected results if used on a pointer.
// We undefine it first, since some compilers already have a definition.
#ifdef ARRAYSIZE
#undef ARRAYSIZE
#endif
#define ARRAYSIZE(a) (sizeof(a) / sizeof(*(a)))

// Static prediction hints.
#ifdef HAVE_BUILTIN_EXPECT
#define PREDICT_FALSE(x) (__builtin_expect(x, 0))
#define PREDICT_TRUE(x) (__builtin_expect(!!(x), 1))
#else
#define PREDICT_FALSE(x) x
#define PREDICT_TRUE(x) x
#endif

// This is only used for recomputing the tag byte table used during
// decompression; for simplicity we just remove it from the open-source
// version (anyone who wants to regenerate it can just do
 the call
// themselves within main()).
#define DEFINE_bool(flag_name, default_value, description) \
 bool FLAGS_ ## flag_name = default_value
#define DECLARE_bool(flag_name) \
 extern bool FLAGS_ ## flag_name

namespace snappy {

static const uint32 kuint32max = static_cast<uint32>(0xFFFFFFFF);
static const int64 kint64max = static_cast<int64>(0x7FFFFFFFFFFFFFFFLL);

// Potentially unaligned loads and stores.
```

```
// x86 and PowerPC can simply do these loads and stores native.

#if defined(__i386__) || defined(__x86_64__) || defined(__powerpc__)

#define UNALIGNED_LOAD16(_p) (*reinterpret_cast<const uint16 *>(_p))
#define UNALIGNED_LOAD32(_p) (*reinterpret_cast<const uint32 *>(_p))
#define UNALIGNED_LOAD64(_p) (*reinterpret_cast<const uint64 *>(_p))

#define UNALIGNED_STORE16(_p, _val) (*reinterpret_cast<uint16 *>(_p) = (_val))
#define UNALIGNED_STORE32(_p, _val) (*reinterpret_cast<uint32 *>(_p) = (_val))
#define UNALIGNED_STORE64(_p, _val) (*reinterpret_cast<uint64 *>(_p) = (_val))

//
 ARMv7 and newer support native unaligned accesses, but only of 16-bit
// and 32-bit values (not 64-bit); older versions either raise a fatal signal,
// do an unaligned read and rotate the words around a bit, or do the reads very
// slowly (trip through kernel mode). There's no simple #define that says just
// ARMv7 or higher, so we have to filter away all ARMv5 and ARMv6
// sub-architectures.
//
// This is a mess, but there's not much we can do about it.
//
// To further complicate matters, only LDR instructions (single reads) are
// allowed to be unaligned, not LDRD (two reads) or LDM (many reads). Unless we
// explicitly tell the compiler that these accesses can be unaligned, it can and
// will combine accesses. On armcc, the way to signal this is done by accessing
// through the type (uint32 __packed *), but GCC has no such attribute
// (it ignores __attribute__((packed)) on individual variables). However,
// we can tell it that a _struct_ is unaligned, which has the same effect,
//
 so we do that.

#elif defined(__arm__) && \
    !defined(__ARM_ARCH_4__) && \
    !defined(__ARM_ARCH_4T__) && \
    !defined(__ARM_ARCH_5__) && \
    !defined(__ARM_ARCH_5T__) && \
    !defined(__ARM_ARCH_5TE__) && \
    !defined(__ARM_ARCH_5TEJ__) && \
    !defined(__ARM_ARCH_6__) && \
    !defined(__ARM_ARCH_6J__) && \
    !defined(__ARM_ARCH_6K__) && \
    !defined(__ARM_ARCH_6Z__) && \
    !defined(__ARM_ARCH_6ZK__) && \
    !defined(__ARM_ARCH_6T2__)

#if __GNUC__
#define ATTRIBUTE_PACKED __attribute__((__packed__))
```

```
#else
#define ATTRIBUTE_PACKED
#endif

namespace base {
namespace internal {

struct Unaligned16Struct {
 uint16 value;
 uint8 dummy;  // To make the size non-power-of-two.
} ATTRIBUTE_PACKED;

struct Unaligned32Struct {
 uint32 value;
 uint8 dummy;  // To make the size non-power-of-two.
} ATTRIBUTE_PACKED;

}  // namespace internal
}  // namespace base

#define UNALIGNED_LOAD16(_p) \
   ((reinterpret_cast<const ::snappy::base::internal::Unaligned16Struct
 *>(_p))->value)
#define UNALIGNED_LOAD32(_p) \
   ((reinterpret_cast<const ::snappy::base::internal::Unaligned32Struct *>(_p))->value)

#define UNALIGNED_STORE16(_p, _val) \
   ((reinterpret_cast< ::snappy::base::internal::Unaligned16Struct *>(_p))->value = \
        (_val))
#define UNALIGNED_STORE32(_p, _val) \
   ((reinterpret_cast< ::snappy::base::internal::Unaligned32Struct *>(_p))->value = \
        (_val))

// TODO(user): NEON supports unaligned 64-bit loads and stores.
// See if that would be more efficient on platforms supporting it,
// at least for copies.

inline uint64 UNALIGNED_LOAD64(const void *p) {
 uint64 t;
 memcpy(&t, p, sizeof t);
 return t;
}

inline void UNALIGNED_STORE64(void *p, uint64 v) {
 memcpy(p, &v, sizeof v);
}

#else
```

```
// These functions are provided for architectures that don't support
// unaligned loads and stores.

inline uint16 UNALIGNED_LOAD16(const void *p) {
 uint16 t;
 memcpy(&t, p, sizeof t);
 return t;
}

inline uint32
 UNALIGNED_LOAD32(const void *p) {
 uint32 t;
 memcpy(&t, p, sizeof t);
 return t;
}

inline uint64 UNALIGNED_LOAD64(const void *p) {
 uint64 t;
 memcpy(&t, p, sizeof t);
 return t;
}

inline void UNALIGNED_STORE16(void *p, uint16 v) {
 memcpy(p, &v, sizeof v);
}

inline void UNALIGNED_STORE32(void *p, uint32 v) {
 memcpy(p, &v, sizeof v);
}

inline void UNALIGNED_STORE64(void *p, uint64 v) {
 memcpy(p, &v, sizeof v);
}

#endif

// This can be more efficient than UNALIGNED_LOAD64 + UNALIGNED_STORE64
// on some platforms, in particular ARM.
inline void UnalignedCopy64(const void *src, void *dst) {
 if (sizeof(void *) == 8) {
   UNALIGNED_STORE64(dst, UNALIGNED_LOAD64(src));
 } else {
   const char *src_char = reinterpret_cast<const char *>(src);
   char *dst_char = reinterpret_cast<char *>(dst);

   UNALIGNED_STORE32(dst_char, UNALIGNED_LOAD32(src_char));
   UNALIGNED_STORE32(dst_char + 4, UNALIGNED_LOAD32(src_char + 4));
```

```
 }
}

// The following guarantees declaration
 of the byte swap functions.
#ifdef WORDS_BIGENDIAN

#ifdef HAVE_SYS_BYTEORDER_H
#include <sys/byteorder.h>
#endif

#ifdef HAVE_SYS_ENDIAN_H
#include <sys/endian.h>
#endif

#ifdef _MSC_VER
#include <stdlib.h>
#define bswap_16(x) _byteswap_ushort(x)
#define bswap_32(x) _byteswap_ulong(x)
#define bswap_64(x) _byteswap_uint64(x)

#elif defined(__APPLE__)
// Mac OS X / Darwin features
#include <libkern/OSByteOrder.h>
#define bswap_16(x) OSSwapInt16(x)
#define bswap_32(x) OSSwapInt32(x)
#define bswap_64(x) OSSwapInt64(x)

#elif defined(HAVE_BYTESWAP_H)
#include <byteswap.h>

#elif defined(bswap32)
// FreeBSD defines bswap{16,32,64} in <sys/endian.h> (already #included).
#define bswap_16(x) bswap16(x)
#define bswap_32(x) bswap32(x)
#define bswap_64(x) bswap64(x)

#elif defined(BSWAP_64)
// Solaris 10 defines BSWAP_{16,32,64} in <sys/byteorder.h> (already #included).
#define bswap_16(x) BSWAP_16(x)
#define bswap_32(x) BSWAP_32(x)
#define bswap_64(x) BSWAP_64(x)

#else

inline uint16 bswap_16(uint16
 x) {
 return (x << 8) | (x >> 8);
```

```
}

inline uint32 bswap_32(uint32 x) {
 x = ((x & 0xff00ff00UL) >> 8) | ((x & 0x00ff00ffUL) << 8);
 return (x >> 16) | (x << 16);
}

inline uint64 bswap_64(uint64 x) {
 x = ((x & 0xff00ff00ff00ff00ULL) >> 8) | ((x & 0x00ff00ff00ff00ffULL) << 8);
 x = ((x & 0xffff0000ffff0000ULL) >> 16) | ((x & 0x0000ffff0000ffffULL) << 16);
 return (x >> 32) | (x << 32);
}

#endif

#endif  // WORDS_BIGENDIAN

// Convert to little-endian storage, opposite of network format.
// Convert x from host to little endian: x = LittleEndian.FromHost(x);
// convert x from little endian to host: x = LittleEndian.ToHost(x);
//
//  Store values into unaligned memory converting to little endian order:
//    LittleEndian.Store16(p, x);
//
//  Load unaligned values stored in little endian converting to host order:
//    x = LittleEndian.Load16(p);
class LittleEndian {
public:
 // Conversion functions.
#ifdef WORDS_BIGENDIAN

 static uint16 FromHost16(uint16 x) { return bswap_16(x);
 }
 static uint16 ToHost16(uint16 x) { return bswap_16(x); }

 static uint32 FromHost32(uint32 x) { return bswap_32(x); }
 static uint32 ToHost32(uint32 x) { return bswap_32(x); }

 static bool IsLittleEndian() { return false; }

#else  // !defined(WORDS_BIGENDIAN)

 static uint16 FromHost16(uint16 x) { return x; }
 static uint16 ToHost16(uint16 x) { return x; }

 static uint32 FromHost32(uint32 x) { return x; }
 static uint32 ToHost32(uint32 x) { return x; }
```

```
 static bool IsLittleEndian() { return true; }

#endif  // !defined(WORDS_BIGENDIAN)

 // Functions to do unaligned loads and stores in little-endian order.
 static uint16 Load16(const void *p) {
   return ToHost16(UNALIGNED_LOAD16(p));
 }

 static void Store16(void *p, uint16 v) {
   UNALIGNED_STORE16(p, FromHost16(v));
 }

 static uint32 Load32(const void *p) {
   return ToHost32(UNALIGNED_LOAD32(p));
 }

 static void Store32(void *p, uint32 v) {
   UNALIGNED_STORE32(p, FromHost32(v));
 }
};

//
 Some bit-manipulation functions.
class Bits {
public:
 // Return floor(log2(n)) for positive integer n.  Returns -1 iff n == 0.
 static int Log2Floor(uint32 n);

 // Return the first set least / most significant bit, 0-indexed.  Returns an
 // undefined value if n == 0.  FindLSBSetNonZero() is similar to ffs() except
 // that it's 0-indexed.
 static int FindLSBSetNonZero(uint32 n);
 static int FindLSBSetNonZero64(uint64 n);

private:
 DISALLOW_COPY_AND_ASSIGN(Bits);
};

#ifdef HAVE_BUILTIN_CTZ

inline int Bits::Log2Floor(uint32 n) {
 return n == 0 ? -1 : 31 ^ __builtin_clz(n);
}

inline int Bits::FindLSBSetNonZero(uint32 n) {
 return __builtin_ctz(n);
}
```

```
inline int Bits::FindLSBSetNonZero64(uint64 n) {
 return __builtin_ctzll(n);
}

#else  // Portable versions.

inline int Bits::Log2Floor(uint32 n) {
 if (n == 0)
   return -1;
 int log = 0;
 uint32 value = n;
 for (int i = 4; i >= 0; --i) {
   int shift = (1 << i);
   uint32 x = value >> shift;
   if (x != 0) {

     value = x;
     log += shift;
   }
 }
 assert(value == 1);
 return log;
}

inline int Bits::FindLSBSetNonZero(uint32 n) {
 int rc = 31;
 for (int i = 4, shift = 1 << 4; i >= 0; --i) {
   const uint32 x = n << shift;
   if (x != 0) {
     n = x;
     rc -= shift;
   }
   shift >>= 1;
 }
 return rc;
}

// FindLSBSetNonZero64() is defined in terms of FindLSBSetNonZero().
inline int Bits::FindLSBSetNonZero64(uint64 n) {
 const uint32 bottombits = static_cast<uint32>(n);
 if (bottombits == 0) {
   // Bottom bits are zero, so scan in top bits
   return 32 + FindLSBSetNonZero(static_cast<uint32>(n >> 32));
 } else {
   return FindLSBSetNonZero(bottombits);
 }
}
```

```
#endif  // End portable versions.

// Variable-length integer encoding.
class Varint {
public:
 // Maximum lengths of varint encoding of uint32.
 static const int kMax32 = 5;

 // Attempts to parse a varint32 from a prefix of the bytes in [ptr,limit-1].
 // Never reads a character at or beyond limit.  If
 a valid/terminated varint32
 // was found in the range, stores it in *OUTPUT and returns a pointer just
 // past the last byte of the varint32. Else returns NULL.  On success,
 // "result <= limit".
 static const char* Parse32WithLimit(const char* ptr, const char* limit,
                                     uint32* OUTPUT);

 // REQUIRES   "ptr" points to a buffer of length sufficient to hold "v".
 // EFFECTS    Encodes "v" into "ptr" and returns a pointer to the
 //            byte just past the last encoded byte.
 static char* Encode32(char* ptr, uint32 v);

 // EFFECTS    Appends the varint representation of "value" to "*s".
 static void Append32(string* s, uint32 value);
};

inline const char* Varint::Parse32WithLimit(const char* p,
                                            const char* l,
                                            uint32* OUTPUT) {
 const unsigned char* ptr = reinterpret_cast<const unsigned char*>(p);
 const unsigned char* limit = reinterpret_cast<const
 unsigned char*>(l);
 uint32 b, result;
 if (ptr >= limit) return NULL;
 b = *(ptr++); result = b & 127;          if (b < 128) goto done;
 if (ptr >= limit) return NULL;
 b = *(ptr++); result |= (b & 127) <<  7; if (b < 128) goto done;
 if (ptr >= limit) return NULL;
 b = *(ptr++); result |= (b & 127) << 14; if (b < 128) goto done;
 if (ptr >= limit) return NULL;
 b = *(ptr++); result |= (b & 127) << 21; if (b < 128) goto done;
 if (ptr >= limit) return NULL;
 b = *(ptr++); result |= (b & 127) << 28; if (b < 16) goto done;
 return NULL;       // Value is too long to be a varint32
done:
 *OUTPUT = result;
 return reinterpret_cast<const char*>(ptr);
```

```
}

inline char* Varint::Encode32(char* sptr, uint32 v) {
 // Operate on characters as unsigneds
 unsigned char* ptr = reinterpret_cast<unsigned char*>(sptr);
 static const int B = 128;
 if (v < (1<<7)) {
   *(ptr++) = v;
 } else if (v < (1<<14)) {
   *(ptr++) = v | B;
   *(ptr++) = v>>7;
 } else if (v < (1<<21)) {
    *(ptr++) = v | B;
   *(ptr++) = (v>>7) | B;
   *(ptr++) = v>>14;
 } else if (v < (1<<28)) {
   *(ptr++) = v | B;
   *(ptr++) = (v>>7) | B;
   *(ptr++) = (v>>14) | B;
   *(ptr++) = v>>21;
 } else {
   *(ptr++) = v | B;
   *(ptr++) = (v>>7) | B;
   *(ptr++) = (v>>14) | B;
   *(ptr++) = (v>>21) | B;
   *(ptr++) = v>>28;
 }
 return reinterpret_cast<char*>(ptr);
}

// If you know the internal layout of the std::string in use, you can
// replace this function with one that resizes the string without
// filling the new space with zeros (if applicable) --
// it will be non-portable but faster.
inline void STLStringResizeUninitialized(string* s, size_t new_size) {
 s->resize(new_size);
}

// Return a mutable char* pointing to a string's internal buffer,
// which may not be null-terminated. Writing through this pointer will
// modify the string.
//
// string_as_array(&str)[i] is valid for 0 <= i < str.size() until the
// next call to a string method that invalidates iterators.
//
//
 As of 2006-04, there is no standard-blessed way of getting a
// mutable reference to a string's internal buffer. However, issue 530
```

```
// (http://www.open-std.org/JTC1/SC22/WG21/docs/lwg-defects.html#530)
// proposes this as the method. It will officially be part of the standard
// for C++0x. This should already work on all current implementations.
inline char* string_as_array(string* str) {
 return str->empty() ? NULL : &*str->begin();
}

}  // namespace snappy

#endif  // THIRD_PARTY_SNAPPY_OPENSOURCE_SNAPPY_STUBS_INTERNAL_H_
```

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  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
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  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
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not have a language tag." />
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    font-size:
 20px;
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   pre {
    font-size: 12px;
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   .test {
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    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
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&lt;metadata version="1.0"&gt;
```

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<text>
Copyright without language.
</text>
</copyright>
</metadata>
</pre>
</body>
</html>
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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

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Portuguese hyphenation patterns

(more info about the licence to be added later)

% This file is part of hyph-utf8 package and
 resulted from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% Source: pthyph.tex (1994-10-13 - date on CTAN) or (1996-07-21 - date in file) - no idea
% Author: Pedro J. de Rezende <rezende at dcc.unicamp.br>, J.Joao Dias Almeida <jj at di.uminho.pt>
%
% The above mentioned file should become obsolete,
% and the author of the original file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%
            and helped with testing, suggestions and bug reports
% - Norbert Preining, who tested & integrated patterns into TeX Live
%
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%    If you're the original author of patterns or taking over a new revolution,
%    plese remove all of the TUG comments & credits that we added here -

```
%    you are the Queen / the King, we are only the servants.
%
% If you want to change this file, rather than uploading directly to CTAN,
% we would be grateful if you could send it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
% Before a new "pattern-revolution" starts,
% please try to follow some guidelines if
 possible:
%
% - \lccode is *forbidden*, and I really mean it
% - all the patterns should be in UTF-8
% - the only "allowed" TeX commands in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
%-----------------------------------------------------------------------------
%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
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% (C) 1996 by  Pedro J. de Rezende (rezende@dcc.unicamp.br)
%         and J.Joao Dias Almeida
 (jj@di.uminho.pt)
% Version: 1.2 Release date: 21/07/96
%
% (C) 1994 by Pedro J. de Rezende (rezende@dcc.unicamp.br)
% Version: 1.1 Release date: 04/12/94
%
% (C) 1987 by Pedro J. de Rezende
% Version: 1.0 Release date: 02/13/87
%
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% Remember! If you *must* change it, then call the resulting file
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% ==========
%
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```
// ArchiveCommandLine.h

#ifndef __ARCHIVE_COMMAND_LINE_H
#define __ARCHIVE_COMMAND_LINE_H

#include "../../../Common/CommandLineParser.h"
#include "../../../Common/Wildcard.h"

#include "EnumDirItems.h"

#include "Extract.h"
#include "HashCalc.h"
#include "Update.h"

typedef CMessagePathException CArcCmdLineException;

namespace NCommandType { enum EEnum
```

```
{
 kAdd = 0,
 kUpdate,
 kDelete,
 kTest,
 kExtract,
 kExtractFull,
 kList,
 kBenchmark,
 kInfo,
 kHash,
 kRename
};}

struct CArcCommand
{
 NCommandType::EEnum CommandType;

 bool IsFromExtractGroup() const;
 bool IsFromUpdateGroup() const;
 bool IsTestCommand() const { return CommandType == NCommandType::kTest; }
 NExtract::NPathMode::EEnum GetPathMode() const;
};

enum
{
 k_OutStream_disabled = 0,
 k_OutStream_stdout = 1,
 k_OutStream_stderr = 2
};

struct CArcCmdLineOptions
{
 bool HelpMode;

 // bool LargePages;
 bool CaseSensitiveChange;
 bool CaseSensitive;

 bool IsInTerminal;
 bool IsStdOutTerminal;
 bool
 IsStdErrTerminal;
 bool StdInMode;
 bool StdOutMode;
 bool EnableHeaders;

 bool YesToAll;
```

```
bool ShowDialog;
NWildcard::CCensor Censor;

CArcCommand Command;
UString ArchiveName;

#ifndef _NO_CRYPTO
bool PasswordEnabled;
UString Password;
#endif

bool TechMode;
bool ShowTime;

UStringVector HashMethods;

bool AppendName;
// UStringVector ArchivePathsSorted;
// UStringVector ArchivePathsFullSorted;
NWildcard::CCensor arcCensor;
UString ArcName_for_StdInMode;

CObjectVector<CProperty> Properties;

CExtractOptionsBase ExtractOptions;

CBoolPair NtSecurity;
CBoolPair AltStreams;
CBoolPair HardLinks;
CBoolPair SymLinks;

CUpdateOptions UpdateOptions;
CHashOptions HashOptions;
UString ArcType;
UStringVector ExcludedArcTypes;

unsigned Number_for_Out;
unsigned Number_for_Errors;
unsigned Number_for_Percents;
unsigned LogLevel;

// bool IsOutAllowed() const { return Number_for_Out != k_OutStream_disabled; }

// Benchmark
 UInt32 NumIterations;

CArcCmdLineOptions():
    // LargePages(false),
```

```
    CaseSensitiveChange(false),
    CaseSensitive(false),

    StdInMode(false),
    StdOutMode(false),

    Number_for_Out(k_OutStream_stdout),
    Number_for_Errors(k_OutStream_stderr),
    Number_for_Percents(k_OutStream_stdout),

    LogLevel(0)
 {
 };
};

class CArcCmdLineParser
{
 NCommandLineParser::CParser parser;
public:
 void Parse1(const UStringVector &commandStrings, CArcCmdLineOptions &options);
 void Parse2(CArcCmdLineOptions &options);
};

#endif
```

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* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_HYPERTEXT_H__
#define __ATK_HYPERTEXT_H__

```
#include <atk/atkobject.h>
#include <atk/atkhyperlink.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

/*
* The
 AtkHypertext interface provides standard  mechanisms for manipulating
* hyperlinks.
*/

#define ATK_TYPE_HYPERTEXT                    (atk_hypertext_get_type ())
#define ATK_IS_HYPERTEXT(obj)                 G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_HYPERTEXT)
#define ATK_HYPERTEXT(obj)                    G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_HYPERTEXT, AtkHypertext)
#define ATK_HYPERTEXT_GET_IFACE(obj)          (G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_HYPERTEXT, AtkHypertextIface))

#ifndef _TYPEDEF_ATK_HYPERTEXT_
#define _TYPEDEF_ATK_HYPERTEXT_
typedef struct _AtkHypertext AtkHypertext;
#endif
typedef struct _AtkHypertextIface AtkHypertextIface;

struct _AtkHypertextIface
{
 GTypeInterface parent;

 AtkHyperlink*(* get_link)              (AtkHypertext       *hypertext,
                                gint              link_index);
 gint        (* get_n_links)            (AtkHypertext       *hypertext);
 gint        (* get_link_index)
      (AtkHypertext       *hypertext,
                                gint              char_index);

 /*
  * signal handlers
  */
 void        (* link_selected)          (AtkHypertext       *hypertext,
                                gint              link_index);

 AtkFunction pad1;
 AtkFunction pad2;
 AtkFunction pad3;
};
```

```
GType atk_hypertext_get_type (void);

AtkHyperlink* atk_hypertext_get_link       (AtkHypertext *hypertext,
                                            gint         link_index);
gint         atk_hypertext_get_n_links    (AtkHypertext *hypertext);
gint         atk_hypertext_get_link_index (AtkHypertext *hypertext,
                                            gint         char_index);


#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_HYPERTEXT_H__ */
wOF2OTTO4 @`
.`f6$ Q
NB3T}1"a5tC::BU1QEX%->+g~Fm*vYP8_*y5{h'5IGVl
t;g"XBD4N7.lGGwSO({crQ5*X!"cIH1$l1\#8j~!0-
.T/bBP&.*?SBPZpOAD6x7ogG~I~.9.tY1Cdy-
vtXK\8S34Slt-q6($oPsKHu3p mZ8^|E_)=+wQhjy5J.ZM/gP2mm
<D6\9%XK52S4@e$K}%lN$ >W#cw)~_;ddtm nI@r ~y!rG[(/}X!=_9M?x{O8ys{
+4qAZ5pL
*u@uT(]8E$^0ZP~q{`u%4$Q4sB]p?Jak(3i![}fsgK@ft9!G,KdikhMm4iI!#zVetl-wnuL@x5x)MiP^:620k;{i6tDf s$-
lF^%OU+m01;VA[?r<4B6_
~>l)$*
8E{
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```
Please see each file in the implementation for Copyright and licensing
information.
PROG = 7z.exe
MY_CONSOLE = 1
CFLAGS = $(CFLAGS)  \
 -DEXTERNAL_CODECS \

!IFNDEF UNDER_CE
CFLAGS = $(CFLAGS) -DWIN_LONG_PATH -D_7ZIP_LARGE_PAGES -DSUPPORT_DEVICE_FILE
!ENDIF

COMMON_OBJS = \
 $O\CommandLineParser.obj \
 $O\CRC.obj \
 $O\IntToString.obj \
 $O\ListFileUtils.obj \
 $O\NewHandler.obj \
 $O\StdInStream.obj \
 $O\StdOutStream.obj \
 $O\MyString.obj \
 $O\StringConvert.obj \
 $O\StringToInt.obj \
 $O\UTFConvert.obj \
 $O\MyVector.obj \
 $O\Wildcard.obj \

WIN_OBJS = \
 $O\DLL.obj \
 $O\ErrorMsg.obj \
 $O\FileDir.obj \
 $O\FileFind.obj \
 $O\FileIO.obj \
 $O\FileLink.obj \
 $O\FileName.obj \
 $O\FileSystem.obj \
 $O\MemoryLock.obj \
 $O\PropVariant.obj \
 $O\PropVariantConv.obj \
 $O\Registry.obj \
 $O\System.obj \
 $O\TimeUtils.obj \

7ZIP_COMMON_OBJS = \
 $O\CreateCoder.obj \
 $O\FilePathAutoRename.obj \
 $O\FileStreams.obj \
 $O\FilterCoder.obj \
```

```
 $O\LimitedStreams.obj \
 $O\MethodProps.obj \
 $O\ProgressUtils.obj \
 $O\PropId.obj \
 $O\StreamObjects.obj
 \
 $O\StreamUtils.obj \
 $O\UniqBlocks.obj \

AR_COMMON_OBJS = \
 $O\OutStreamWithCRC.obj \

COMPRESS_OBJS = \
 $O\CopyCoder.obj \

C_OBJS = \
 $O\Alloc.obj \
 $O\CpuArch.obj \
 $O\Sort.obj \
 $O\Threads.obj \

!include "../../Crc.mak"
!include "Console.mak"

!include "../../7zip.mak"
#define IDI_ICON  1
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With Mixed text Element Language Tags 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-007-ref.xht" />
  <meta name="assert" content="The license element matches the schema. One text element does not have a language
tag. One text element has a language tag." />
  <style
 type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-007.woff2") format("woff2");
   }
```

```
  body {
   font-size: 20px;
  }
  pre {
   font-size: 12px;
  }
  .test {
   font-family: "WOFF Test", "WOFF Test CFF Fallback";
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
</head>
<body>
 <p>Test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
 <div class="test">P</div>
 <p>The XML contained in the Extended Metadata Block is below.</p>
 <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts" id="License ID"&gt;
  &lt;text&gt;
   License without language.
  &lt;/text&gt;
  &lt;text xml:lang="en"&gt;
   License with "en" language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
 </pre>
</body>
</html>
```

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gw432047.ttf, gw1270797.ttf

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*
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* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

```
#ifndef __ATK_VALUE_H__
#define __ATK_VALUE_H__

#include <atk/atkobject.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

/*
* The AtkValue interface should be supported
 by any object that
* supports a numerical value (e.g., a scroll bar). This interface
* provides the standard mechanism for an assistive technology to
* determine and set the numerical value as well as get the minimum
* and maximum values.
*/

#define ATK_TYPE_VALUE                  (atk_value_get_type ())
#define ATK_IS_VALUE(obj)               G_TYPE_CHECK_INSTANCE_TYPE ((obj), ATK_TYPE_VALUE)
#define ATK_VALUE(obj)                  G_TYPE_CHECK_INSTANCE_CAST ((obj), ATK_TYPE_VALUE,
AtkValue)
#define ATK_VALUE_GET_IFACE(obj)        (G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_VALUE, AtkValueIface))

#ifndef _TYPEDEF_ATK_VALUE_
#define _TYPEDEF_ATK_VALUE__
typedef struct _AtkValue AtkValue;
#endif
typedef struct _AtkValueIface AtkValueIface;

struct _AtkValueIface
{
 GTypeInterface parent;

 void     (* get_current_value) (AtkValue     *obj,
                                 GValue       *value);
 void     (* get_maximum_value) (AtkValue     *obj,

                         GValue       *value);
 void     (* get_minimum_value) (AtkValue     *obj,
                                 GValue       *value);
 gboolean (* set_current_value) (AtkValue     *obj,
                                 const GValue *value);
 void     (* get_minimum_increment) (AtkValue   *obj,
          GValue     *value);
 AtkFunction pad1;
```

```
};

GType           atk_value_get_type (void);

void      atk_value_get_current_value (AtkValue     *obj,
                                       GValue       *value);


void     atk_value_get_maximum_value  (AtkValue     *obj,
                                       GValue       *value);

void     atk_value_get_minimum_value  (AtkValue     *obj,
                                       GValue       *value);

gboolean atk_value_set_current_value  (AtkValue     *obj,
                                       const GValue *value);

void     atk_value_get_minimum_increment  (AtkValue     *obj,
        GValue       *value);

/*
* Additional
 GObject properties exported by GaccessibleValue:
*    "accessible_value"
*       (the accessible value has changed)
*/


#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_VALUE_H__ */
PROG = 7zS2.sfx
MY_FIXED = 1

C_OBJS = \
 $O\7zAlloc.obj \
 $O\7zArcIn.obj \
 $O\7zBuf.obj \
 $O\7zBuf2.obj \
 $O\7zCrc.obj \
 $O\7zCrcOpt.obj \
 $O\7zFile.obj \
 $O\7zDec.obj \
 $O\7zStream.obj \
 $O\Bcj2.obj \
```

```
 $O\Bra.obj \
 $O\Bra86.obj \
 $O\BraIA64.obj \
 $O\CpuArch.obj \
 $O\Delta.obj \
 $O\DllSecur.obj \
 $O\Lzma2Dec.obj \
 $O\LzmaDec.obj \

7Z_OBJS = \
 $O\SfxSetup.obj \

OBJS = \
 $(7Z_OBJS) \
 $(C_OBJS) \
 $O\resource.res

!include "../../../CPP/Build.mak"

$(7Z_OBJS): $(*B).c
 $(COMPL_O1)
$(C_OBJS): ../../$(*B).c
 $(COMPL_O1)
```

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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

At the time this file was first modified, a complete, unmodified copy of
the LPPL Work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

Portions of this file were originally made available under the following license
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Croatian hyphenation patterns

(more info about the licence to be added later)

%

```
% Hyphenation patterns for Croatian language
%
%
 Copyright (C) 1994, 1996, 2011 Igor Marinovi <marinowski at gmail.com>
%
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% of the LaTeX Project Public License Distributed from CTAN
% archives in directory macros/latex/base/lppl.txt; either
% version 1 of the License, or any later version.
%
% Changes:
% - The first version was realised in late 1994.
% - Second, much more improved version was realised in the beginning of 1996.
%   (Date of the last change: 19.03.1996).
% - In summer 2008 the patterns have been incorporated into hyph-utf8
%   and renamed from hrhyph.tex to hyph-hr.tex.
% - LPPL licence added on 06.06.2011.
%
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element Without url Attribute</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-002-ref.xht" />
  <meta name="assert" content="The license element does not have a url attribute but it still matches the schema." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
  {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-002.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
```

```
   margin-top: 50px;
  }
 ]]></style>
</head>
<body>
 <p>Test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
 <div class="test">P</div>
 <p>The XML contained in the Extended Metadata Block is below.</p>
 <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license id="License ID"&gt;
  &lt;text&gt;
   License without language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
 </pre>
</body>
</html>
```

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```
// 7zFolderInStream.h

#ifndef __7Z_FOLDER_IN_STREAM_H
#define __7Z_FOLDER_IN_STREAM_H

#include "../../../../C/7zCrc.h"

#include "../../../Common/MyCom.h"
#include "../../../Common/MyVector.h"

#include "../../ICoder.h"
#include "../IArchive.h"

namespace NArchive {
namespace N7z {

class CFolderInStream:
 public ISequentialInStream,
 public ICompressGetSubStreamSize,
 public CMyUnknownImp
{
 CMyComPtr<ISequentialInStream> _stream;
 UInt64 _pos;
 UInt32 _crc;
 bool _size_Defined;
 UInt64 _size;

 const UInt32 *_indexes;
 unsigned _numFiles;
 unsigned _index;

 CMyComPtr<IArchiveUpdateCallback> _updateCallback;

 HRESULT OpenStream();
 void AddFileInfo(bool isProcessed);
```

```
public:
 CRecordVector<bool> Processed;
 CRecordVector<UInt32> CRCs;
 CRecordVector<UInt64> Sizes;

 MY_UNKNOWN_IMP2(ISequentialInStream, ICompressGetSubStreamSize)
 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(GetSubStreamSize)(UInt64 subStream, UInt64 *value);

 void
 Init(IArchiveUpdateCallback *updateCallback, const UInt32 *indexes, unsigned numFiles);

 bool WasFinished() const { return _index == _numFiles; }

 UInt64 GetFullSize() const
 {
   UInt64 size = 0;
   FOR_VECTOR (i, Sizes)
     size += Sizes[i];
   return size;
 }
};

}}

#endif
```

MZ@ !L!This program cannot be run in DOS mode.

$I>[
_5E
_5E
_5EPhE_5E
_4E_5E*XE_5E*IE_5E*ME_5ERich
_5EPELu[DG @P d@ T.text `.rdata @@.data00
@.rsrc@@@=$0@uh0@ @$0@D$-8#$0@UE-VHlEHtHHt3Vu@ @V< @I3f}D 0@y 0@(= 0@r
0@(0@3;tP8 @ 0@Vh@u40@5,0@4 @;(0@EPhu0 @P, @EPuL @jVVuuV5(0@$ @j5(0@  @S]W=( @h @S50
@h @hSPht @jSPhd @jSPhT @jSPjjS=  @PjhSPjjhSH @jS_[3^VW @h @ @5 @3WWh1@WjiW,0@PD @W
@_^"!!! "."P"`"n"""""!>"CancelNext >< BackNSIS versionNSIS User Interface - TestingRichEd32.dllll!! \!! |!"  d!"
"!!!
"."P"`"n"""""!>"ExitProcessGetModuleHandleWULoadLibraryWKERNEL32.dllCOMCTL32.dll@SendMessage
WSetWindowTextWShowWindowSetWindowPos1ScreenToClienttGetWindowRectGetDlgItemVCreateDialogPara
mWDestroyWindowPostQuitMessageEndDialogDialogBoxParamWUSER32.dll)CreateBrushIndirectGDI32.dllfhgj
ki0 HX@DHMS Shell Dlg 2@,@
@@@@@H
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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Invalid license Element With dir Attribute in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-016-ref.xht" />
  <meta name="assert" content="The license element contains a text element with INVALID as the value for the dir
attribute." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-016.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
```

```
   margin-top: 50px;
  }
 ]]></style>
</head>
<body>
 <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
 <div class="test">P</div>
</body>
</html>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
 <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
 <title>WOFF Test: Valid copyright Element With Two div Elements in text Element</title>
 <link rel="author" title="Tal Leming" href="http://typesupply.com" />
 <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
 <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
 <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
 <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
 <meta name="assert" content="The copyright element contains a text element that contains two div elements." />
 <style type="text/css"><![CDATA[
  @import url("support/test-fonts.css");
  body {
   font-size: 20px;
  }
  pre {
   font-size:
12px;
  }
  .test {
   font-family: "WOFF Test CFF Reference";
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
</head>
<body>
 <p>Test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
 <div class="test">P</div>
 <p>The XML contained in the Extended Metadata Block is below.</p>
 <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
```

<copyright>
<text>
<div>
div 1 start
<div>
div 2 start
<div>
div 3
</div>
div 2 end
</div>
div 1 end
</div>
</text>
</copyright>
</metadata>
</pre>
</body>
</html>

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```
// 7zAes.h

#ifndef __CRYPTO_7Z_AES_H
#define __CRYPTO_7Z_AES_H

#include "../../Common/MyBuffer.h"
#include "../../Common/MyCom.h"
#include "../../Common/MyVector.h"

#include "../ICoder.h"
#include "../IPassword.h"

namespace NCrypto {
namespace N7z {
```

```
const unsigned kKeySize = 32;
const unsigned kSaltSizeMax = 16;
const unsigned kIvSizeMax = 16; // AES_BLOCK_SIZE;

class CKeyInfo
{
public:
 unsigned NumCyclesPower;
 unsigned SaltSize;
 Byte Salt[kSaltSizeMax];
 CByteBuffer Password;
 Byte Key[kKeySize];

 bool IsEqualTo(const CKeyInfo &a) const;
 void CalcKey();

 CKeyInfo() { ClearProps(); }
 void ClearProps()
 {
   NumCyclesPower = 0;
   SaltSize = 0;
   for (unsigned i = 0; i < sizeof(Salt); i++)
     Salt[i] = 0;
 }
};

class CKeyInfoCache
{
 unsigned Size;
 CObjectVector<CKeyInfo> Keys;
public:
 CKeyInfoCache(unsigned size): Size(size) {}
 bool GetKey(CKeyInfo &key);
 void Add(const CKeyInfo &key);
 void FindAndAdd(const CKeyInfo &key);
};

class CBase
{
 CKeyInfoCache
 _cachedKeys;
protected:
 CKeyInfo _key;
 Byte _iv[kIvSizeMax];
 unsigned _ivSize;

 void PrepareKey();
```

```
 CBase();
};

class CBaseCoder:
 public ICompressFilter,
 public ICryptoSetPassword,
 public CMyUnknownImp,
 public CBase
{
protected:
 CMyComPtr<ICompressFilter> _aesFilter;

public:
 INTERFACE_ICompressFilter(;)

 STDMETHOD(CryptoSetPassword)(const Byte *data, UInt32 size);
};

#ifndef EXTRACT_ONLY

class CEncoder:
 public CBaseCoder,
 public ICompressWriteCoderProperties,
 // public ICryptoResetSalt,
 public ICryptoResetInitVector
{
public:
 MY_UNKNOWN_IMP4(
    ICompressFilter,
    ICryptoSetPassword,
    ICompressWriteCoderProperties,
    // ICryptoResetSalt,
    ICryptoResetInitVector)
 STDMETHOD(WriteCoderProperties)(ISequentialOutStream *outStream);
 // STDMETHOD(ResetSalt)();
 STDMETHOD(ResetInitVector)();
 CEncoder();
};

#endif

class CDecoder:
 public CBaseCoder,
 public ICompressSetDecoderProperties2
{
public:
 MY_UNKNOWN_IMP3(
```

```
    ICompressFilter,
    ICryptoSetPassword,
    ICompressSetDecoderProperties2)
 STDMETHOD(SetDecoderProperties2)(const Byte *data, UInt32 size);
 CDecoder();
};

}}

#endif
/*
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http://www.boost.org/LICENSE_1_0.txt)
*/

#ifndef MSGPACK_PREDEF_OS_BSD_H
#define MSGPACK_PREDEF_OS_BSD_H

/* Special case: OSX will define BSD predefs if the sys/param.h
* header is included. We can guard against that, but only if we
* detect OSX first. Hence we will force include OSX detection
* before doing any BSD detection.
*/
#include <msgpack/predef/os/macos.h>

#include <msgpack/predef/version_number.h>
#include <msgpack/predef/make.h>

/*`
[heading `MSGPACK_OS_BSD`]

[@http://en.wikipedia.org/wiki/Berkeley_Software_Distribution BSD] operating system.

BSD has various branch operating systems possible and each detected
individually. This detects the following variations and sets a specific
version number macro to match:

* `MSGPACK_OS_BSD_DRAGONFLY` [@http://en.wikipedia.org/wiki/DragonFly_BSD DragonFly BSD]
* `MSGPACK_OS_BSD_FREE` [@http://en.wikipedia.org/wiki/Freebsd
 FreeBSD]
* `MSGPACK_OS_BSD_BSDI` [@http://en.wikipedia.org/wiki/BSD/OS BSDi BSD/OS]
* `MSGPACK_OS_BSD_NET` [@http://en.wikipedia.org/wiki/Netbsd NetBSD]
* `MSGPACK_OS_BSD_OPEN` [@http://en.wikipedia.org/wiki/Openbsd OpenBSD]

[note The general `MSGPACK_OS_BSD` is set in all cases to indicate some form
of BSD. If the above variants is detected the corresponding macro is also set.]
```

```
[table
  [[__predef_symbol__] [__predef_version__]]

  [[`BSD`] [__predef_detection__]]
  [[`_SYSTYPE_BSD`] [__predef_detection__]]

  [[`BSD4_2`] [4.2.0]]
  [[`BSD4_3`] [4.3.0]]
  [[`BSD4_4`] [4.4.0]]
  [[`BSD`] [V.R.0]]
  ]
*/

#include <msgpack/predef/os/bsd/bsdi.h>
#include <msgpack/predef/os/bsd/dragonfly.h>
#include <msgpack/predef/os/bsd/free.h>
#include <msgpack/predef/os/bsd/open.h>
#include <msgpack/predef/os/bsd/net.h>

#ifndef MSGPACK_OS_BSD
#define MSGPACK_OS_BSD MSGPACK_VERSION_NUMBER_NOT_AVAILABLE
#endif

#if !defined(MSGPACK_PREDEF_DETAIL_OS_DETECTED)
 && ( \
  defined(BSD) || \
  defined(_SYSTYPE_BSD) \
  )
#   undef MSGPACK_OS_BSD
#   include <sys/param.h>
#   if !defined(MSGPACK_OS_BSD) && defined(BSD4_4)
#       define MSGPACK_OS_BSD MSGPACK_VERSION_NUMBER(4,4,0)
#   endif
#   if !defined(MSGPACK_OS_BSD) && defined(BSD4_3)
#       define MSGPACK_OS_BSD MSGPACK_VERSION_NUMBER(4,3,0)
#   endif
#   if !defined(MSGPACK_OS_BSD) && defined(BSD4_2)
#       define MSGPACK_OS_BSD MSGPACK_VERSION_NUMBER(4,2,0)
#   endif
#   if !defined(MSGPACK_OS_BSD) && defined(BSD)
#       define MSGPACK_OS_BSD MSGPACK_PREDEF_MAKE_10_VVRR(BSD)
#   endif
#   if !defined(MSGPACK_OS_BSD)
#       define MSGPACK_OS_BSD MSGPACK_VERSION_NUMBER_AVAILABLE
#   endif
#endif
```

```
#if MSGPACK_OS_BSD
#   define MSGPACK_OS_BSD_AVAILABLE
#   include <msgpack/predef/detail/os_detected.h>
#endif

#define MSGPACK_OS_BSD_NAME "BSD"

#else

#include <msgpack/predef/os/bsd/bsdi.h>
#include <msgpack/predef/os/bsd/dragonfly.h>
#include <msgpack/predef/os/bsd/free.h>
#include
 <msgpack/predef/os/bsd/open.h>
#include <msgpack/predef/os/bsd/net.h>

#endif

#include <msgpack/predef/detail/test.h>
MSGPACK_PREDEF_DECLARE_TEST(MSGPACK_OS_BSD,MSGPACK_OS_BSD_NAME)
```

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```
// Common/StdOutStream.h

#ifndef __COMMON_STD_OUT_STREAM_H
#define __COMMON_STD_OUT_STREAM_H

#include <stdio.h>

#include "MyString.h"
#include "MyTypes.h"

class CStdOutStream
{
 FILE *_stream;
 bool _streamIsOpen;
public:
 bool IsTerminalMode;
```

```
CStdOutStream(): _stream(0), _streamIsOpen(false), IsTerminalMode(false) {};
CStdOutStream(FILE *stream): _stream(stream), _streamIsOpen(false) {};
~CStdOutStream() { Close(); }

// void AttachStdStream(FILE *stream) { _stream  = stream; _streamIsOpen = false; }
// bool IsDefined() const { return _stream  != NULL; }

operator FILE *() { return _stream; }
bool Open(const char *fileName) throw();
bool Close() throw();
bool Flush() throw();

CStdOutStream & operator<<(CStdOutStream & (* func)(CStdOutStream  &))
{
  (*func)(*this);
  return *this;
}

CStdOutStream & operator<<(const char *s) throw()
{
  fputs(s, _stream);
  return *this;
}

CStdOutStream & operator<<(char c) throw()
{
  fputc((unsigned
char)c, _stream);
  return *this;
}

CStdOutStream & operator<<(Int32 number) throw();
CStdOutStream & operator<<(Int64 number) throw();
CStdOutStream & operator<<(UInt32 number) throw();
CStdOutStream & operator<<(UInt64 number) throw();

CStdOutStream & operator<<(const wchar_t *s);
void PrintUString(const UString &s, AString &temp);

void Normalize_UString__LF_Allowed(UString &s);
void Normalize_UString(UString &s);

void NormalizePrint_UString(const UString &s, UString &tempU, AString &tempA);
void NormalizePrint_UString(const UString &s);
void NormalizePrint_wstr(const wchar_t *s);
};
```

```
CStdOutStream & endl(CStdOutStream & outStream) throw();

extern CStdOutStream g_StdOut;
extern CStdOutStream g_StdErr;

void StdOut_Convert_UString_to_AString(const UString &s, AString &temp);

#endif
```

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*/

#if defined(ATK_DISABLE_SINGLE_INCLUDES) && !defined (__ATK_H_INSIDE__) && !defined
(ATK_COMPILATION)
#error "Only <atk/atk.h> can be included directly."
#endif

#ifndef __ATK_PLUG_H__
#define
 __ATK_PLUG_H__

G_BEGIN_DECLS

#define ATK_TYPE_PLUG              (atk_plug_get_type ())
#define ATK_PLUG(obj)              (G_TYPE_CHECK_INSTANCE_CAST ((obj), ATK_TYPE_PLUG, AtkPlug))
#define ATK_IS_PLUG(obj)           (G_TYPE_CHECK_INSTANCE_TYPE ((obj), ATK_TYPE_PLUG))
#define ATK_PLUG_CLASS(klass)      (G_TYPE_CHECK_CLASS_CAST ((klass), ATK_TYPE_PLUG,
AtkPlugClass))
#define ATK_IS_PLUG_CLASS(klass)   (G_TYPE_CHECK_CLASS_TYPE ((klass), ATK_TYPE_PLUG))
#define ATK_PLUG_GET_CLASS(obj)    (G_TYPE_INSTANCE_GET_CLASS ((obj), ATK_TYPE_PLUG,
AtkPlugClass))

typedef struct _AtkPlug         AtkPlug;
typedef struct _AtkPlugClass    AtkPlugClass;

struct _AtkPlug
{
 AtkObject parent;
};

GType atk_plug_get_type (void);

struct _AtkPlugClass
```

```
{
 AtkObjectClass parent_class;

 /* to be subscribed to by atk-bridge */

 /*< protected >*/
 gchar* (* get_object_id) (AtkPlug* obj);
};

AtkObject*    atk_plug_new     (void);
gchar*        atk_plug_get_id  (AtkPlug* plug);

G_END_DECLS

#endif
 /* __ATK_PLUG_H__ */
```

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```
// Windows/FileName.h

#ifndef __WINDOWS_FILE_NAME_H
#define __WINDOWS_FILE_NAME_H

#include "../Common/MyString.h"

namespace NWindows {
namespace NFile {
namespace NName {
```

```
int FindSepar(const wchar_t *s) throw();
#ifndef USE_UNICODE_FSTRING
int FindSepar(const FChar *s) throw();
#endif

void NormalizeDirPathPrefix(FString &dirPath); // ensures that it ended with '\\', if dirPath is not epmty
void NormalizeDirPathPrefix(UString &dirPath);

bool IsDrivePath(const wchar_t *s) throw();  // first 3 chars are drive chars like "a:\\"

bool IsAltPathPrefix(CFSTR s) throw(); /* name: */

#if defined(_WIN32) && !defined(UNDER_CE)

extern const char * const kSuperPathPrefix; /* \\?\ */
const unsigned kDevicePathPrefixSize = 4;
const unsigned kSuperPathPrefixSize = 4;
const unsigned kSuperUncPathPrefixSize = kSuperPathPrefixSize + 4;

bool IsDevicePath(CFSTR s) throw();   /* \\.\ */
bool IsSuperUncPath(CFSTR s) throw(); /* \\?\UNC\ */
bool IsNetworkPath(CFSTR s) throw();  /* \\?\UNC\ or \\SERVER
 */

/* GetNetworkServerPrefixSize() returns size of server prefix:
   \\?\UNC\SERVER\
   \\SERVER\
 in another cases it returns 0
*/

unsigned GetNetworkServerPrefixSize(CFSTR s) throw();

bool IsNetworkShareRootPath(CFSTR s) throw();  /* \\?\UNC\SERVER\share or \\SERVER\share or with slash */

bool IsDrivePath_SuperAllowed(CFSTR s) throw();  // first chars are drive chars like "a:\" or "\\?\a:\"
bool IsDriveRootPath_SuperAllowed(CFSTR s) throw();  // exact drive root path "a:\" or "\\?\a:\"

bool IsDrivePath2(const wchar_t *s) throw(); // first 2 chars are drive chars like "a:"
// bool IsDriveName2(const wchar_t *s) throw(); // is drive name like "a:"
bool IsSuperPath(const wchar_t *s) throw();
bool IsSuperOrDevicePath(const wchar_t *s) throw();

#ifndef USE_UNICODE_FSTRING
bool IsDrivePath2(CFSTR s) throw(); // first 2 chars are drive chars like "a:"
// bool IsDriveName2(CFSTR s) throw(); // is drive name like "a:"
bool IsDrivePath(CFSTR s) throw();
bool IsSuperPath(CFSTR s) throw();
```

```
bool
 IsSuperOrDevicePath(CFSTR s) throw();

/* GetRootPrefixSize() returns size of ROOT PREFIX for cases:
    \
    \\.\
    C:\
    \\?\C:\
    \\?\UNC\SERVER\Shared\
    \\SERVER\Shared\
 in another cases it returns 0
*/

unsigned GetRootPrefixSize(CFSTR s) throw();

#endif

int FindAltStreamColon(CFSTR path) throw();

#endif // _WIN32

bool IsAbsolutePath(const wchar_t *s) throw();
unsigned GetRootPrefixSize(const wchar_t *s) throw();

#ifdef WIN_LONG_PATH

const int kSuperPathType_UseOnlyMain = 0;
const int kSuperPathType_UseOnlySuper = 1;
const int kSuperPathType_UseMainAndSuper = 2;

int GetUseSuperPathType(CFSTR s) throw();
bool GetSuperPath(CFSTR path, UString &superPath, bool onlyIfNew);
bool GetSuperPaths(CFSTR s1, CFSTR s2, UString &d1, UString &d2, bool onlyIfNew);

#define USE_MAIN_PATH (__useSuperPathType != kSuperPathType_UseOnlySuper)
#define USE_MAIN_PATH_2 (__useSuperPathType1 != kSuperPathType_UseOnlySuper &&
__useSuperPathType2 != kSuperPathType_UseOnlySuper)

#define
 USE_SUPER_PATH (__useSuperPathType != kSuperPathType_UseOnlyMain)
#define USE_SUPER_PATH_2 (__useSuperPathType1 != kSuperPathType_UseOnlyMain || __useSuperPathType2
!= kSuperPathType_UseOnlyMain)

#define IF_USE_MAIN_PATH int __useSuperPathType = GetUseSuperPathType(path); if (USE_MAIN_PATH)
#define IF_USE_MAIN_PATH_2(x1, x2) \
   int __useSuperPathType1 = GetUseSuperPathType(x1); \
   int __useSuperPathType2 = GetUseSuperPathType(x2); \
   if (USE_MAIN_PATH_2)
```

```
#else

#define IF_USE_MAIN_PATH
#define IF_USE_MAIN_PATH_2(x1, x2)

#endif // WIN_LONG_PATH

bool GetFullPath(CFSTR dirPrefix, CFSTR path, FString &fullPath);
bool GetFullPath(CFSTR path, FString &fullPath);

}}}

#endif
```

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```
MY_STATIC_LINK=1
SLIB = sLZMA.lib
PROG = LZMA.dll
SLIBPATH = $O\$(SLIB)

DEF_FILE = LzmaLib.def
CFLAGS = $(CFLAGS) \

LIB_OBJS = \
 $O\LzmaLibExports.obj \

C_OBJS = \
 $O\Alloc.obj \
 $O\LzFind.obj \
 $O\LzFindMt.obj \
 $O\LzmaDec.obj \
 $O\LzmaEnc.obj \
 $O\LzmaLib.obj \
 $O\Threads.obj \

OBJS = \
 $(LIB_OBJS) \
 $(C_OBJS) \
 $O\resource.res

!include "../../../CPP/Build.mak"

$(SLIBPATH): $O $(OBJS)
 lib -out:$(SLIBPATH) $(OBJS) $(LIBS)
```

```
$(LIB_OBJS): $(*B).c
 $(COMPL_O2)
$(C_OBJS): ../../$(*B).c
 $(COMPL_O2)
// Windows/PropVariant.h

#ifndef __WINDOWS_PROP_VARIANT_H
#define __WINDOWS_PROP_VARIANT_H

#include "../Common/MyTypes.h"
#include "../Common/MyWindows.h"
#include "../Common/MyString.h"

namespace NWindows {
namespace NCOM {

BSTR AllocBstrFromAscii(const char *s) throw();

HRESULT PropVariant_Clear(PROPVARIANT *p) throw();

HRESULT PropVarEm_Alloc_Bstr(PROPVARIANT *p, unsigned numChars) throw();
HRESULT PropVarEm_Set_Str(PROPVARIANT *p, const char *s) throw();

inline void PropVarEm_Set_UInt32(PROPVARIANT *p, UInt32 v) throw()
{
 p->vt = VT_UI4;
 p->ulVal = v;
}

inline void PropVarEm_Set_UInt64(PROPVARIANT *p, UInt64 v) throw()
{
 p->vt = VT_UI8;
 p->uhVal.QuadPart = v;
}

inline void PropVarEm_Set_FileTime64(PROPVARIANT *p, UInt64 v) throw()
{
 p->vt = VT_FILETIME;
 p->filetime.dwLowDateTime = (DWORD)v;
 p->filetime.dwHighDateTime = (DWORD)(v >> 32);
}

inline void PropVarEm_Set_Bool(PROPVARIANT *p, bool b) throw()
{
 p->vt = VT_BOOL;
 p->boolVal = (b ? VARIANT_TRUE : VARIANT_FALSE);
}
```

```
class
 CPropVariant : public tagPROPVARIANT
{
public:
 CPropVariant()
 {
   vt = VT_EMPTY;
   wReserved1 = 0;
   // wReserved2 = 0;
   // wReserved3 = 0;
   // uhVal.QuadPart = 0;
   bstrVal = 0;
 }
 ~CPropVariant() throw() { Clear(); }
 CPropVariant(const PROPVARIANT &varSrc);
 CPropVariant(const CPropVariant &varSrc);
 CPropVariant(BSTR bstrSrc);
 CPropVariant(LPCOLESTR lpszSrc);
 CPropVariant(bool bSrc) { vt = VT_BOOL; wReserved1 = 0; boolVal = (bSrc ? VARIANT_TRUE :
VARIANT_FALSE); }
 CPropVariant(Byte value) { vt = VT_UI1; wReserved1 = 0; bVal = value; }

private:
 CPropVariant(Int16 value); // { vt = VT_I2; wReserved1 = 0; iVal = value; }
 CPropVariant(Int32 value); // { vt = VT_I4; wReserved1 = 0; lVal = value; }

public:
 CPropVariant(UInt32 value) { vt = VT_UI4; wReserved1 = 0; ulVal = value; }
 CPropVariant(UInt64 value) { vt = VT_UI8; wReserved1 = 0; uhVal.QuadPart = value; }
 CPropVariant(Int64 value) { vt = VT_I8; wReserved1 = 0; hVal.QuadPart
 = value; }
 CPropVariant(const FILETIME &value) { vt = VT_FILETIME; wReserved1 = 0; filetime = value; }

 CPropVariant& operator=(const CPropVariant &varSrc);
 CPropVariant& operator=(const PROPVARIANT &varSrc);
 CPropVariant& operator=(BSTR bstrSrc);
 CPropVariant& operator=(LPCOLESTR lpszSrc);
 CPropVariant& operator=(const UString &s);
 CPropVariant& operator=(const UString2 &s);
 CPropVariant& operator=(const char *s);
 CPropVariant& operator=(const AString &s)
   { return (*this)=(const char *)s; }

 CPropVariant& operator=(bool bSrc) throw();
 CPropVariant& operator=(Byte value) throw();
```

```
private:
 CPropVariant& operator=(Int16 value) throw();

public:
 CPropVariant& operator=(Int32 value) throw();
 CPropVariant& operator=(UInt32 value) throw();
 CPropVariant& operator=(UInt64 value) throw();
 CPropVariant& operator=(Int64 value) throw();
 CPropVariant& operator=(const FILETIME &value) throw();

 BSTR AllocBstr(unsigned numChars);

 HRESULT Clear()
 throw();
 HRESULT Copy(const PROPVARIANT *pSrc) throw();
 HRESULT Attach(PROPVARIANT *pSrc) throw();
 HRESULT Detach(PROPVARIANT *pDest) throw();

 HRESULT InternalClear() throw();
 void InternalCopy(const PROPVARIANT *pSrc);

 int Compare(const CPropVariant &a) throw();
};

}}

#endif
```

A. HISTORY OF THE SOFTWARE
==========

Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member

of
the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.2 | 2.1.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
| 2.2.1 | 2.2 | 2002 | PSF | yes |
| 2.2.2 | 2.2.1 | 2002 | PSF | yes |
| 2.2.3 | 2.2.2 | 2003 | PSF | yes |
| 2.3 | 2.2.2 | 2002-2003 | PSF | yes |
| 2.3.1 | 2.3 | 2002-2003 | PSF | yes |
| 2.3.2 | 2.3.1 | 2002-2003 | PSF | yes |
| 2.3.3 | 2.3.2 | 2002-2003 | PSF | yes |
| 2.3.4 | 2.3.3 | 2004 | PSF | yes |
| 2.3.5 | 2.3.4 | 2005 | PSF | yes |
| 2.4 | 2.3 | 2004 | PSF | yes |
| 2.4.1 | 2.4 | 2005 | PSF | yes |
| 2.4.2 | 2.4.1 | 2005 | PSF | yes |
| 2.4.3 | 2.4.2 | 2006 | PSF | yes |
| 2.4.4 | 2.4.3 | 2006 | PSF | yes |
| 2.5 | 2.4 | 2006 | PSF | yes |
| 2.5.1 | 2.5 | 2007 | PSF | yes |
| 2.5.2 | 2.5.1 | 2008 | PSF | yes |
| 2.5.3 | 2.5.2 | 2008 | PSF | yes |
| 2.6 | 2.5 | 2008 | PSF | yes |
| 2.6.1 | 2.6 | 2008 | PSF | yes |
| 2.6.2 | 2.6.1 | 2009 | PSF | yes |
| 2.6.3 | 2.6.2 | 2009 | PSF | yes |
| 2.6.4 | 2.6.3 | 2009 | PSF | yes |
| 2.6.5 | 2.6.4 | 2010 | PSF | yes |
| 3.0 | 2.6 | 2008 | PSF | yes |

| | | | | |
|---|---|---|---|---|
| 3.0.1 | 3.0 | 2009 | PSF | yes |
| 3.1 | 3.0.1 | 2009 | PSF | yes |
| 3.1.1 | 3.1 | 2009 | PSF | yes |
| 3.1.2 | 3.1 | 2010 | PSF | yes |
| 3.2 | 3.1 | 2010 | PSF | yes |

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  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
```

```
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element matches the schema. It contains one text element that has a
language tag using the lang tag instead of xml:lang." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text lang="en"&gt;
   Copyright with "en" language.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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```
OBJS = \
 $O\StdAfx.obj \
 $(CURRENT_OBJS) \
 $(COMMON_OBJS) \
 $(WIN_OBJS) \
 $(WIN_CTRL_OBJS) \
 $(7ZIP_COMMON_OBJS) \
 $(AR_OBJS) \
 $(AR_COMMON_OBJS) \
 $(UI_COMMON_OBJS) \
 $(AGENT_OBJS) \
 $(CONSOLE_OBJS) \
```

```
 $(EXPLORER_OBJS) \
 $(FM_OBJS) \
 $(GUI_OBJS) \
 $(7Z_OBJS) \
 $(CAB_OBJS) \
 $(CHM_OBJS) \
 $(COM_OBJS) \
 $(ISO_OBJS) \
 $(NSIS_OBJS) \
 $(RAR_OBJS) \
 $(TAR_OBJS) \
 $(UDF_OBJS) \
 $(WIM_OBJS) \
 $(ZIP_OBJS) \
 $(COMPRESS_OBJS) \
 $(CRYPTO_OBJS) \
 $(C_OBJS) \
 $(ASM_OBJS) \
 $O\resource.res \

!include "../../../Build.mak"

# MAK_SINGLE_FILE = 1

!IFDEF MAK_SINGLE_FILE

!IFDEF CURRENT_OBJS
$(CURRENT_OBJS): ./$(*B).cpp
 $(COMPL)
!ENDIF


!IFDEF COMMON_OBJS
$(COMMON_OBJS): ../../../Common/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF WIN_OBJS
$(WIN_OBJS): ../../../Windows/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF WIN_CTRL_OBJS
$(WIN_CTRL_OBJS): ../../../Windows/Control/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF 7ZIP_COMMON_OBJS
```

```
$(7ZIP_COMMON_OBJS): ../../Common/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF
 AR_OBJS
$(AR_OBJS): ../../Archive/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF AR_COMMON_OBJS
$(AR_COMMON_OBJS): ../../Archive/Common/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF 7Z_OBJS
$(7Z_OBJS): ../../Archive/7z/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF CAB_OBJS
$(CAB_OBJS): ../../Archive/Cab/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF CHM_OBJS
$(CHM_OBJS): ../../Archive/Chm/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF COM_OBJS
$(COM_OBJS): ../../Archive/Com/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF ISO_OBJS
$(ISO_OBJS): ../../Archive/Iso/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF NSIS_OBJS
$(NSIS_OBJS): ../../Archive/Nsis/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF RAR_OBJS
$(RAR_OBJS): ../../Archive/Rar/$(*B).cpp
 $(COMPL)
```

```
!ENDIF

!IFDEF TAR_OBJS
$(TAR_OBJS): ../../Archive/Tar/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF UDF_OBJS
$(UDF_OBJS): ../../Archive/Udf/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF WIM_OBJS
$(WIM_OBJS): ../../Archive/Wim/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF ZIP_OBJS
$(ZIP_OBJS): ../../Archive/Zip/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF
 COMPRESS_OBJS
$(COMPRESS_OBJS): ../../Compress/$(*B).cpp
 $(COMPL_O2)
!ENDIF

!IFDEF CRYPTO_OBJS
$(CRYPTO_OBJS): ../../Crypto/$(*B).cpp
 $(COMPL_O2)
!ENDIF

!IFDEF UI_COMMON_OBJS
$(UI_COMMON_OBJS): ../../UI/Common/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF AGENT_OBJS
$(AGENT_OBJS): ../../UI/Agent/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF CONSOLE_OBJS
$(CONSOLE_OBJS): ../../UI/Console/$(*B).cpp
 $(COMPL)
!ENDIF
```

```
!IFDEF EXPLORER_OBJS
$(EXPLORER_OBJS): ../../UI/Explorer/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF FM_OBJS
$(FM_OBJS): ../../UI/FileManager/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF GUI_OBJS
$(GUI_OBJS): ../../UI/GUI/$(*B).cpp
 $(COMPL)
!ENDIF

!IFDEF C_OBJS
$(C_OBJS): ../../../../C/$(*B).c
 $(COMPL_O2)
!ENDIF


!ELSE

{.}.cpp{$O}.obj::
 $(COMPLB)
{../../../Common}.cpp{$O}.obj::
 $(COMPLB)
{../../../Windows}.cpp{$O}.obj::
 $(COMPLB)
{../../../Windows/Control}.cpp{$O}.obj::
 $(COMPLB)
{../../Common}.cpp{$O}.obj::
 $(COMPLB)

{../../UI/Common}.cpp{$O}.obj::
 $(COMPLB)
{../../UI/Agent}.cpp{$O}.obj::
 $(COMPLB)
{../../UI/Console}.cpp{$O}.obj::
 $(COMPLB)
{../../UI/Explorer}.cpp{$O}.obj::
 $(COMPLB)
{../../UI/FileManager}.cpp{$O}.obj::
 $(COMPLB)
{../../UI/GUI}.cpp{$O}.obj::
 $(COMPLB)
```

```
{../../Archive}.cpp{$O}.obj::
 $(COMPLB)
{../../Archive/Common}.cpp{$O}.obj::
 $(COMPLB)

{../../Archive/7z}.cpp{$O}.obj::
 $(COMPLB)
{../../Archive/Cab}.cpp{$O}.obj::
 $(COMPLB)
{../../Archive/Chm}.cpp{$O}.obj::
 $(COMPLB)
{../../Archive/Com}.cpp{$O}.obj::
 $(COMPLB)
{../../Archive/Iso}.cpp{$O}.obj::
 $(COMPLB)
{../../Archive/Nsis}.cpp{$O}.obj::
 $(COMPLB)
{../../Archive/Rar}.cpp{$O}.obj::
 $(COMPLB)
{../../Archive/Tar}.cpp{$O}.obj::
 $(COMPLB)
{../../Archive/Udf}.cpp{$O}.obj::
 $(COMPLB)
{../../Archive/Wim}.cpp{$O}.obj::
 $(COMPLB)
{../../Archive/Zip}.cpp{$O}.obj::
 $(COMPLB)

{../../Compress}.cpp{$O}.obj::
 $(COMPLB_O2)
{../../Crypto}.cpp{$O}.obj::
 $(COMPLB_O2)
{../../../../C}.c{$O}.obj::
 $(CCOMPLB)

!ENDIF

!include
 "Asm.mak"
```

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```
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//
// Internals shared between the Snappy implementation and its unittest.

#ifndef THIRD_PARTY_SNAPPY_SNAPPY_INTERNAL_H_
#define THIRD_PARTY_SNAPPY_SNAPPY_INTERNAL_H_

#include "snappy-stubs-internal.h"

namespace snappy {
```

```
namespace internal {

class WorkingMemory {
public:
 WorkingMemory() : large_table_(NULL) { }
 ~WorkingMemory() { delete[] large_table_; }

 // Allocates and clears a hash table using memory in "*this",
 // stores the number
 of buckets in "*table_size" and returns a pointer to
 // the base of the hash table.
 uint16* GetHashTable(size_t input_size, int* table_size);

private:
 uint16 small_table_[1<<10];    // 2KB
 uint16* large_table_;          // Allocated only when needed

 DISALLOW_COPY_AND_ASSIGN(WorkingMemory);
};

// Flat array compression that does not emit the "uncompressed length"
// prefix. Compresses "input" string to the "*op" buffer.
//
// REQUIRES: "input_length <= kBlockSize"
// REQUIRES: "op" points to an array of memory that is at least
// "MaxCompressedLength(input_length)" in size.
// REQUIRES: All elements in "table[0..table_size-1]" are initialized to zero.
// REQUIRES: "table_size" is a power of two
//
// Returns an "end" pointer into "op" buffer.
// "end - op" is the compressed size of "input".
char* CompressFragment(const char* input,
                       size_t input_length,
                       char* op,
                       uint16* table,

 const int table_size);

// Return the largest n such that
//
//   s1[0,n-1] == s2[0,n-1]
//   and n <= (s2_limit - s2).
//
// Does not read *s2_limit or beyond.
// Does not read *(s1 + (s2_limit - s2)) or beyond.
// Requires that s2_limit >= s2.
//
// Separate implementation for x86_64, for speed.  Uses the fact that
```

```
// x86_64 is little endian.
#if defined(ARCH_K8)
static inline int FindMatchLength(const char* s1,
                                  const char* s2,
                                  const char* s2_limit) {
 assert(s2_limit >= s2);
 int matched = 0;

 // Find out how long the match is. We loop over the data 64 bits at a
 // time until we find a 64-bit block that doesn't match; then we find
 // the first non-matching bit and use that to calculate the total
 // length of the match.
 while (PREDICT_TRUE(s2 <= s2_limit - 8)) {
   if (UNALIGNED_LOAD64(s2) == UNALIGNED_LOAD64(s1 + matched)) {
     s2 += 8;
     matched += 8;
   } else {
     // On current (mid-2008)
 Opteron models there is a 3% more
     // efficient code sequence to find the first non-matching byte.
     // However, what follows is ~10% better on Intel Core 2 and newer,
     // and we expect AMD's bsf instruction to improve.
     uint64 x = UNALIGNED_LOAD64(s2) ^ UNALIGNED_LOAD64(s1 + matched);
     int matching_bits = Bits::FindLSBSetNonZero64(x);
     matched += matching_bits >> 3;
     return matched;
   }
 }
 while (PREDICT_TRUE(s2 < s2_limit)) {
   if (s1[matched] == *s2) {
     ++s2;
     ++matched;
   } else {
     return matched;
   }
 }
 return matched;
}
#else
static inline int FindMatchLength(const char* s1,
                                  const char* s2,
                                  const char* s2_limit) {
 // Implementation based on the x86-64 version, above.
 assert(s2_limit >= s2);
 int matched = 0;

 while (s2 <= s2_limit - 4 &&
        UNALIGNED_LOAD32(s2) == UNALIGNED_LOAD32(s1 + matched)) {
```

```
  s2 += 4;
  matched += 4;
 }
 if (LittleEndian::IsLittleEndian()
 && s2 <= s2_limit - 4) {
  uint32 x = UNALIGNED_LOAD32(s2) ^ UNALIGNED_LOAD32(s1 + matched);
  int matching_bits = Bits::FindLSBSetNonZero(x);
  matched += matching_bits >> 3;
 } else {
  while ((s2 < s2_limit) && (s1[matched] == *s2)) {
    ++s2;
    ++matched;
  }
 }
 return matched;
}
#endif

// Lookup tables for decompression code.  Give --snappy_dump_decompression_table
// to the unit test to recompute char_table.

enum {
 LITERAL = 0,
 COPY_1_BYTE_OFFSET = 1,  // 3 bit length + 3 bits of offset in opcode
 COPY_2_BYTE_OFFSET = 2,
 COPY_4_BYTE_OFFSET = 3
};
static const int kMaximumTagLength = 5;  // COPY_4_BYTE_OFFSET plus the actual offset.

// Mapping from i in range [0,4] to a mask to extract the bottom 8*i bits
static const uint32 wordmask[] = {
 0u, 0xffu, 0xffffu, 0xffffffu, 0xffffffffu
};

// Data stored per entry in lookup table:
//      Range   Bits-used       Description
//      ------------------------------------
//
      1..64   0..7            Literal/copy length encoded in opcode byte
//      0..7    8..10           Copy offset encoded in opcode byte / 256
//      0..4    11..13          Extra bytes after opcode
//
// We use eight bits for the length even though 7 would have sufficed
// because of efficiency reasons:
//      (1) Extracting a byte is faster than a bit-field
//      (2) It properly aligns copy offset so we do not need a <<8
static const uint16 char_table[256] = {
 0x0001, 0x0804, 0x1001, 0x2001, 0x0002, 0x0805, 0x1002, 0x2002,
```

```
 0x0003, 0x0806, 0x1003, 0x2003, 0x0004, 0x0807, 0x1004, 0x2004,
 0x0005, 0x0808, 0x1005, 0x2005, 0x0006, 0x0809, 0x1006, 0x2006,
 0x0007, 0x080a, 0x1007, 0x2007, 0x0008, 0x080b, 0x1008, 0x2008,
 0x0009, 0x0904, 0x1009, 0x2009, 0x000a, 0x0905, 0x100a, 0x200a,
 0x000b, 0x0906, 0x100b, 0x200b, 0x000c, 0x0907, 0x100c, 0x200c,
 0x000d, 0x0908, 0x100d, 0x200d, 0x000e, 0x0909, 0x100e, 0x200e,
 0x000f, 0x090a, 0x100f, 0x200f, 0x0010, 0x090b, 0x1010, 0x2010,
  0x0011, 0x0a04, 0x1011, 0x2011, 0x0012, 0x0a05, 0x1012, 0x2012,
 0x0013, 0x0a06, 0x1013, 0x2013, 0x0014, 0x0a07, 0x1014, 0x2014,
 0x0015, 0x0a08, 0x1015, 0x2015, 0x0016, 0x0a09, 0x1016, 0x2016,
 0x0017, 0x0a0a, 0x1017, 0x2017, 0x0018, 0x0a0b, 0x1018, 0x2018,
 0x0019, 0x0b04, 0x1019, 0x2019, 0x001a, 0x0b05, 0x101a, 0x201a,
 0x001b, 0x0b06, 0x101b, 0x201b, 0x001c, 0x0b07, 0x101c, 0x201c,
 0x001d, 0x0b08, 0x101d, 0x201d, 0x001e, 0x0b09, 0x101e, 0x201e,
 0x001f, 0x0b0a, 0x101f, 0x201f, 0x0020, 0x0b0b, 0x1020, 0x2020,
 0x0021, 0x0c04, 0x1021, 0x2021, 0x0022, 0x0c05, 0x1022, 0x2022,
 0x0023, 0x0c06, 0x1023, 0x2023, 0x0024, 0x0c07, 0x1024, 0x2024,
 0x0025, 0x0c08, 0x1025, 0x2025, 0x0026, 0x0c09, 0x1026, 0x2026,
 0x0027, 0x0c0a, 0x1027, 0x2027, 0x0028, 0x0c0b, 0x1028, 0x2028,
 0x0029, 0x0d04, 0x1029, 0x2029, 0x002a, 0x0d05, 0x102a, 0x202a,
 0x002b, 0x0d06, 0x102b, 0x202b, 0x002c, 0x0d07, 0x102c, 0x202c,
 0x002d, 0x0d08, 0x102d, 0x202d, 0x002e, 0x0d09, 0x102e, 0x202e,
 0x002f,
 0x0d0a, 0x102f, 0x202f, 0x0030, 0x0d0b, 0x1030, 0x2030,
 0x0031, 0x0e04, 0x1031, 0x2031, 0x0032, 0x0e05, 0x1032, 0x2032,
 0x0033, 0x0e06, 0x1033, 0x2033, 0x0034, 0x0e07, 0x1034, 0x2034,
 0x0035, 0x0e08, 0x1035, 0x2035, 0x0036, 0x0e09, 0x1036, 0x2036,
 0x0037, 0x0e0a, 0x1037, 0x2037, 0x0038, 0x0e0b, 0x1038, 0x2038,
 0x0039, 0x0f04, 0x1039, 0x2039, 0x003a, 0x0f05, 0x103a, 0x203a,
 0x003b, 0x0f06, 0x103b, 0x203b, 0x003c, 0x0f07, 0x103c, 0x203c,
 0x0801, 0x0f08, 0x103d, 0x203d, 0x1001, 0x0f09, 0x103e, 0x203e,
 0x1801, 0x0f0a, 0x103f, 0x203f, 0x2001, 0x0f0b, 0x1040, 0x2040
};

}  // end namespace internal
}  // end namespace snappy

#endif  // THIRD_PARTY_SNAPPY_SNAPPY_INTERNAL_H_
// 7zItem.h

#ifndef __7Z_ITEM_H
#define __7Z_ITEM_H

#include "../../../Common/MyBuffer.h"
#include "../../../Common/MyString.h"

#include "../../Common/MethodId.h"
```

```
#include "7zHeader.h"

namespace NArchive {
namespace N7z {

typedef UInt32 CNum;
const CNum kNumMax     = 0x7FFFFFFF;
const CNum kNumNoIndex = 0xFFFFFFFF;

struct CCoderInfo
{
 CMethodId MethodID;
 CByteBuffer Props;
 UInt32 NumStreams;

 bool IsSimpleCoder() const { return NumStreams == 1; }
};


struct CBond
{
 UInt32 PackIndex;
 UInt32 UnpackIndex;
};


struct CFolder
{
 CLASS_NO_COPY(CFolder)
public:
 CObjArray2<CCoderInfo> Coders;
 CObjArray2<CBond> Bonds;
 CObjArray2<UInt32> PackStreams;

 CFolder() {}

 bool IsDecodingSupported() const { return Coders.Size() <= 32; }

 int Find_in_PackStreams(UInt32 packStream) const
 {
   FOR_VECTOR(i, PackStreams)
     if (PackStreams[i] == packStream)
       return i;
   return -1;
 }

 int FindBond_for_PackStream(UInt32 packStream) const
 {
```

```
  FOR_VECTOR(i,
 Bonds)
    if (Bonds[i].PackIndex == packStream)
      return i;
  return -1;
 }

 /*
 int FindBond_for_UnpackStream(UInt32 unpackStream) const
 {
  FOR_VECTOR(i, Bonds)
    if (Bonds[i].UnpackIndex == unpackStream)
      return i;
  return -1;
 }

 int FindOutCoder() const
 {
  for (int i = (int)Coders.Size() - 1; i >= 0; i--)
    if (FindBond_for_UnpackStream(i) < 0)
      return i;
  return -1;
 }
 */

 bool IsEncrypted() const
 {
  FOR_VECTOR(i, Coders)
    if (Coders[i].MethodID == k_AES)
      return true;
  return false;
 }
};


struct CUInt32DefVector
{
 CBoolVector Defs;
 CRecordVector<UInt32> Vals;

 void ClearAndSetSize(unsigned newSize)
 {
  Defs.ClearAndSetSize(newSize);
  Vals.ClearAndSetSize(newSize);
 }

 void Clear()
 {
```

```
  Defs.Clear();
  Vals.Clear();
 }

 void ReserveDown()
 {
  Defs.ReserveDown();
  Vals.ReserveDown();
 }

 bool GetItem(unsigned index, UInt32 &value) const
 {
  if (index < Defs.Size()
 && Defs[index])
  {
    value = Vals[index];
    return true;
  }
  value = 0;
  return false;
 }

 bool ValidAndDefined(unsigned i) const { return i < Defs.Size() && Defs[i]; }

 bool CheckSize(unsigned size) const { return Defs.Size() == size || Defs.Size() == 0; }

 void SetItem(unsigned index, bool defined, UInt32 value);
};


struct CUInt64DefVector
{
 CBoolVector Defs;
 CRecordVector<UInt64> Vals;

 void Clear()
 {
  Defs.Clear();
  Vals.Clear();
 }

 void ReserveDown()
 {
  Defs.ReserveDown();
  Vals.ReserveDown();
 }

 bool GetItem(unsigned index, UInt64 &value) const
```

```
 {
   if (index < Defs.Size() && Defs[index])
   {
     value = Vals[index];
     return true;
   }
   value = 0;
   return false;
 }

 bool CheckSize(unsigned size) const { return Defs.Size() == size || Defs.Size() == 0; }

 void SetItem(unsigned index, bool defined, UInt64 value);
};


struct CFileItem
{
 UInt64 Size;
 UInt32 Crc;
 /*
 int Parent;

 bool IsAltStream;
 */
 bool HasStream; // Test it !!! it means that there is
                 // stream in some folder. It can be empty stream
 bool IsDir;
 bool CrcDefined;

 /*
 void Clear()
 {
   HasStream = true;
   IsDir = false;
   CrcDefined = false;
 }

 CFileItem():
   // Parent(-1),
   // IsAltStream(false),
   HasStream(true),
   IsDir(false),
   CrcDefined(false),
     {}
 */
};
```

```
}}

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With class Attribute in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-014-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element with &quot;class1 class2
class3&quot; as the value for the class attribute." />
  <style
 type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-014.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text class="class 1 class2 class3"&gt;
```

Copyright without language.
</text>
</copyright>
</metadata>
</pre>
</body>
</html>
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* dl/sp/api/omxSP.h

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```
// SysIconUtils.h

#ifndef __SYS_ICON_UTILS_H
#define __SYS_ICON_UTILS_H

#include "../../../Common/MyWindows.h"

#include <commctrl.h>

#include "../../../Common/MyString.h"

struct CExtIconPair
{
 UString Ext;
 int IconIndex;
 // UString TypeName;
```

```
 // int Compare(const CExtIconPair &a) const { return MyStringCompareNoCase(Ext, a.Ext); }
};

struct CAttribIconPair
{
 DWORD Attrib;
 int IconIndex;
 // UString TypeName;

 // int Compare(const CAttribIconPair &a) const { return Ext.Compare(a.Ext); }
};

class CExtToIconMap
{
public:
 CRecordVector<CAttribIconPair> _attribMap;
 CObjectVector<CExtIconPair> _extMap;
 int SplitIconIndex;
 int SplitIconIndex_Defined;

 CExtToIconMap(): SplitIconIndex_Defined(false) {}

 void Clear()
 {
   SplitIconIndex_Defined = false;
   _extMap.Clear();
   _attribMap.Clear();
 }
 int GetIconIndex(DWORD attrib, const wchar_t *fileName /* , UString *typeName */);
 // int GetIconIndex(DWORD attrib, const UString &fileName);
};

DWORD_PTR
 GetRealIconIndex(CFSTR path, DWORD attrib, int &iconIndex);
int GetIconIndexForCSIDL(int csidl);

inline HIMAGELIST GetSysImageList(bool smallIcons)
{
 SHFILEINFO shellInfo;
 return (HIMAGELIST)SHGetFileInfo(TEXT(""),
     FILE_ATTRIBUTE_NORMAL | FILE_ATTRIBUTE_DIRECTORY,
     &shellInfo, sizeof(shellInfo),
     SHGFI_USEFILEATTRIBUTES | SHGFI_SYSICONINDEX | (smallIcons ? SHGFI_SMALLICON :
SHGFI_ICON));
}

#endif
```

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*/

#if defined(ATK_DISABLE_SINGLE_INCLUDES) && !defined (__ATK_H_INSIDE__) && !defined
(ATK_COMPILATION)
#error "Only <atk/atk.h> can be included directly."
#endif

#ifndef __ATK_TABLE_CELL_H__
#define
```

```
 __ATK_TABLE_CELL_H__

#include <atk/atkobject.h>

G_BEGIN_DECLS

#define ATK_TYPE_TABLE_CELL                    (atk_table_cell_get_type ())
#define ATK_IS_TABLE_CELL(obj)                 G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_TABLE_CELL)
#define ATK_TABLE_CELL(obj)                    G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_TABLE_CELL, AtkTableCell)
#define ATK_TABLE_CELL_GET_IFACE(obj)          (G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_TABLE_CELL, AtkTableCellIface))

#ifndef _TYPEDEF_ATK_TABLE_CELL_
#define _TYPEDEF_ATK_TABLE_CELL_
typedef struct _AtkTableCell AtkTableCell;
#endif
typedef struct _AtkTableCellIface AtkTableCellIface;

/**
* AtkTableCellIface:
* @get_column_span: virtual function that returns the number of
* columns occupied by this cell accessible. @Since: 2.12
* @get_column_header_cells: virtual function that returns the column
* headers as an array of cell accessibles. @Since: 2.12
* @get_position: virtual function that retrieves the tabular
 position
* of this cell. @Since: 2.12
* @get_row_span: virtual function that returns the number of rows
* occupied by this cell. @Since: 2.12
* @get_row_header_cells: virtual function that returns the row
* headers as an array of cell accessibles. @Since: 2.12
* @get_row_column_span: virtual function that get the row an column
* indexes and span of this cell. @Since: 2.12
* @get_table: virtual function that returns a reference to the
* accessible of the containing table. @Since: 2.12
*/
struct _AtkTableCellIface
{
 GTypeInterface parent;

 gint          (*get_column_span)         (AtkTableCell *cell);
 GPtrArray *   (*get_column_header_cells) (AtkTableCell *cell);
 gboolean      (*get_position)            (AtkTableCell *cell,
                                          gint         *row,
                                          gint         *column);
 gint          (*get_row_span)            (AtkTableCell *cell);
```

```
 GPtrArray *   (*get_row_header_cells)    (AtkTableCell
 *cell);
 gboolean      (*get_row_column_span)     (AtkTableCell *cell,
                                  gint        *row,
                                  gint        *column,
                                  gint        *row_span,
                                  gint        *column_span);
 AtkObject *   (*get_table)               (AtkTableCell *cell);
};

ATK_AVAILABLE_IN_2_12
GType atk_table_cell_get_type (void);

ATK_AVAILABLE_IN_2_12
gint        atk_table_cell_get_column_span         (AtkTableCell *cell);
ATK_AVAILABLE_IN_2_12
GPtrArray * atk_table_cell_get_column_header_cells (AtkTableCell *cell);
ATK_AVAILABLE_IN_2_12
gboolean    atk_table_cell_get_position            (AtkTableCell *cell,
                                        gint        *row,
                                        gint        *column);
ATK_AVAILABLE_IN_2_12
gint        atk_table_cell_get_row_span            (AtkTableCell *cell);
ATK_AVAILABLE_IN_2_12
GPtrArray
 * atk_table_cell_get_row_header_cells    (AtkTableCell *cell);
ATK_AVAILABLE_IN_2_12
gboolean    atk_table_cell_get_row_column_span     (AtkTableCell *cell,
                                        gint        *row,
                                        gint        *column,
                                        gint        *row_span,
                                        gint        *column_span);
ATK_AVAILABLE_IN_2_12
AtkObject * atk_table_cell_get_table               (AtkTableCell *cell);

G_END_DECLS

#endif /* __ATK_TABLE_CELL_H__ */
```

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```
// IDecl.h

#ifndef __IDECL_H
#define __IDECL_H

#include "../Common/MyUnknown.h"

#define k_7zip_GUID_Data1 0x23170F69
#define k_7zip_GUID_Data2 0x40C1

#define k_7zip_GUID_Data3_Common  0x278A

#define k_7zip_GUID_Data3_Decoder 0x2790
#define k_7zip_GUID_Data3_Encoder 0x2791
#define k_7zip_GUID_Data3_Hasher  0x2792


#define DECL_INTERFACE_SUB(i, base, groupId, subId) \
 DEFINE_GUID(IID_ ## i, \
   k_7zip_GUID_Data1, \
   k_7zip_GUID_Data2, \
   k_7zip_GUID_Data3_Common, \
   0, 0, 0, (groupId), 0, (subId), 0, 0); \
 struct i: public base

#define DECL_INTERFACE(i, groupId, subId) DECL_INTERFACE_SUB(i, IUnknown, groupId, subId)

#endif
```

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Software.

```
// TempFiles.h

#ifndef __TEMP_FILES_H
#define __TEMP_FILES_H

#include "../../../Common/MyString.h"

class CTempFiles
{
 void Clear();
public:
 FStringVector Paths;
 ~CTempFiles() { Clear(); }
};

#endif
```

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```
// 7zOut.h

#ifndef __7Z_OUT_H
#define __7Z_OUT_H

#include "7zCompressionMode.h"
#include "7zEncode.h"
#include "7zHeader.h"
#include "7zItem.h"

#include "../../Common/OutBuffer.h"
#include "../../Common/StreamUtils.h"

namespace NArchive {
namespace N7z {

class CWriteBufferLoc
{
 Byte *_data;
 size_t _size;
 size_t _pos;
public:
 CWriteBufferLoc(): _size(0), _pos(0) {}
 void Init(Byte *data, size_t size)
 {
   _data = data;
   _size = size;
   _pos = 0;
 }
 void WriteBytes(const void *data, size_t size)
 {
   if (size == 0)
     return;
   if (size > _size - _pos)
     throw 1;
   memcpy(_data + _pos, data, size);
   _pos += size;
 }
 void WriteByte(Byte b)
 {
   if (_size == _pos)
     throw 1;
   _data[_pos++] = b;
 }
 size_t GetPos() const { return _pos; }
```

```
};


struct CHeaderOptions
{
 bool CompressMainHeader;
 /*
 bool WriteCTime;
 bool WriteATime;
 bool WriteMTime;
 */

 CHeaderOptions():
    CompressMainHeader(true)
    /*
    , WriteCTime(false)
     , WriteATime(false)
    , WriteMTime(true)
    */
    {}
};


struct CFileItem2
{
 UInt64 CTime;
 UInt64 ATime;
 UInt64 MTime;
 UInt64 StartPos;
 UInt32 Attrib;

 bool CTimeDefined;
 bool ATimeDefined;
 bool MTimeDefined;
 bool StartPosDefined;
 bool AttribDefined;
 bool IsAnti;
 // bool IsAux;

 /*
 void Init()
 {
   CTimeDefined = false;
   ATimeDefined = false;
   MTimeDefined = false;
   StartPosDefined = false;
   AttribDefined = false;
   IsAnti = false;
```

```
  // IsAux = false;
 }
 */
};


struct COutFolders
{
 CUInt32DefVector FolderUnpackCRCs; // Now we use it for headers only.

 CRecordVector<CNum> NumUnpackStreamsVector;
 CRecordVector<UInt64> CoderUnpackSizes; // including unpack sizes of bond coders

 void OutFoldersClear()
 {
  FolderUnpackCRCs.Clear();
  NumUnpackStreamsVector.Clear();
  CoderUnpackSizes.Clear();
 }

 void OutFoldersReserveDown()
 {
  FolderUnpackCRCs.ReserveDown();
  NumUnpackStreamsVector.ReserveDown();
   CoderUnpackSizes.ReserveDown();
 }
};


struct CArchiveDatabaseOut: public COutFolders
{
 CRecordVector<UInt64> PackSizes;
 CUInt32DefVector PackCRCs;
 CObjectVector<CFolder> Folders;

 CRecordVector<CFileItem> Files;
 UStringVector Names;
 CUInt64DefVector CTime;
 CUInt64DefVector ATime;
 CUInt64DefVector MTime;
 CUInt64DefVector StartPos;
 CUInt32DefVector Attrib;
 CBoolVector IsAnti;

 /*
 CBoolVector IsAux;

 CByteBuffer SecureBuf;
```

```
CRecordVector<UInt32> SecureSizes;
CRecordVector<UInt32> SecureIDs;

void ClearSecure()
{
  SecureBuf.Free();
  SecureSizes.Clear();
  SecureIDs.Clear();
}
*/

void Clear()
{
  OutFoldersClear();

  PackSizes.Clear();
  PackCRCs.Clear();
  Folders.Clear();

  Files.Clear();
  Names.Clear();
  CTime.Clear();
  ATime.Clear();
  MTime.Clear();
  StartPos.Clear();
  Attrib.Clear();
  IsAnti.Clear();

  /*
  IsAux.Clear();
  ClearSecure();
  */
}

void ReserveDown()
{
   OutFoldersReserveDown();

  PackSizes.ReserveDown();
  PackCRCs.ReserveDown();
  Folders.ReserveDown();

  Files.ReserveDown();
  Names.ReserveDown();
  CTime.ReserveDown();
  ATime.ReserveDown();
  MTime.ReserveDown();
  StartPos.ReserveDown();
```

```
  Attrib.ReserveDown();
  IsAnti.ReserveDown();

  /*
  IsAux.ReserveDown();
  */
}

bool IsEmpty() const
{
  return (
    PackSizes.IsEmpty() &&
    NumUnpackStreamsVector.IsEmpty() &&
    Folders.IsEmpty() &&
    Files.IsEmpty());
}

bool CheckNumFiles() const
{
  unsigned size = Files.Size();
  return (
        CTime.CheckSize(size)
      && ATime.CheckSize(size)
      && MTime.CheckSize(size)
      && StartPos.CheckSize(size)
      && Attrib.CheckSize(size)
      && (size == IsAnti.Size() || IsAnti.Size() == 0));
}

bool IsItemAnti(unsigned index) const { return (index < IsAnti.Size() && IsAnti[index]); }
// bool IsItemAux(unsigned index) const { return (index <
IsAux.Size() && IsAux[index]); }

void SetItem_Anti(unsigned index, bool isAnti)
{
  while (index >= IsAnti.Size())
    IsAnti.Add(false);
  IsAnti[index] = isAnti;
}
/*
void SetItem_Aux(unsigned index, bool isAux)
{
  while (index >= IsAux.Size())
    IsAux.Add(false);
  IsAux[index] = isAux;
}
*/
```

```
 void AddFile(const CFileItem &file, const CFileItem2 &file2, const UString &name);
};


class COutArchive
{
 UInt64 _prefixHeaderPos;

 HRESULT WriteDirect(const void *data, UInt32 size) { return WriteStream(SeqStream, data, size); }

 UInt64 GetPos() const;
 void WriteBytes(const void *data, size_t size);
 void WriteBytes(const CByteBuffer &data) { WriteBytes(data, data.Size()); }
 void WriteByte(Byte b);
 void WriteUInt32(UInt32 value);
 void WriteUInt64(UInt64 value);
 void WriteNumber(UInt64 value);
 void WriteID(UInt64 value) { WriteNumber(value); }

 void WriteFolder(const CFolder &folder);
 HRESULT WriteFileHeader(const CFileItem &itemInfo);
  void WriteBoolVector(const CBoolVector &boolVector);
 void WritePropBoolVector(Byte id, const CBoolVector &boolVector);

 void WriteHashDigests(const CUInt32DefVector &digests);

 void WritePackInfo(
    UInt64 dataOffset,
    const CRecordVector<UInt64> &packSizes,
    const CUInt32DefVector &packCRCs);

 void WriteUnpackInfo(
    const CObjectVector<CFolder> &folders,
    const COutFolders &outFolders);

 void WriteSubStreamsInfo(
    const CObjectVector<CFolder> &folders,
    const COutFolders &outFolders,
    const CRecordVector<UInt64> &unpackSizes,
    const CUInt32DefVector &digests);

 void SkipToAligned(unsigned pos, unsigned alignShifts);
 void WriteAlignedBools(const CBoolVector &v, unsigned numDefined, Byte type, unsigned itemSizeShifts);
 void WriteUInt64DefVector(const CUInt64DefVector &v, Byte type);

 HRESULT EncodeStream(
    DECL_EXTERNAL_CODECS_LOC_VARS
    CEncoder &encoder, const CByteBuffer &data,
```

```
    CRecordVector<UInt64> &packSizes,
  CObjectVector<CFolder> &folders, COutFolders &outFolders);
  void WriteHeader(
    const CArchiveDatabaseOut &db,
    // const CHeaderOptions &headerOptions,
    UInt64 &headerOffset);

  bool _countMode;
  bool _writeToStream;
  size_t _countSize;
  UInt32 _crc;
  COutBuffer _outByte;
  CWriteBufferLoc _outByte2;

  #ifdef _7Z_VOL
  bool _endMarker;
  #endif

  bool _useAlign;

  HRESULT WriteSignature();
  #ifdef _7Z_VOL
  HRESULT WriteFinishSignature();
  #endif
  HRESULT WriteStartHeader(const CStartHeader &h);
  #ifdef _7Z_VOL
  HRESULT WriteFinishHeader(const CFinishHeader &h);
  #endif
  CMyComPtr<IOutStream> Stream;
 public:

  COutArchive() { _outByte.Create(1 << 16); }
  CMyComPtr<ISequentialOutStream> SeqStream;
  HRESULT Create(ISequentialOutStream *stream, bool endMarker);
  void Close();
  HRESULT SkipPrefixArchiveHeader();
  HRESULT WriteDatabase(
    DECL_EXTERNAL_CODECS_LOC_VARS
    const CArchiveDatabaseOut &db,
    const CCompressionMethodMode *options,
     const CHeaderOptions &headerOptions);

  #ifdef _7Z_VOL
  static UInt32 GetVolHeadersSize(UInt64 dataSize, int nameLength = 0, bool props = false);
  static UInt64 GetVolPureSize(UInt64 volSize, int nameLength = 0, bool props = false);
  #endif

 };
```

```
}}

#endif
/*
* tchar.h
*
* This file is a part of NSIS.
*
* Copyright (C) 1999-2007 Nullsoft and Contributors
*
* This software is provided 'as-is', without any express or implied
* warranty.
*
* For Unicode support by Jim Park -- 08/30/2007
*/

// Jim Park: Only those we use are listed here.

#pragma once

#ifdef _UNICODE

#ifndef _T
#define __T(x)   L ## x
#define _T(x)    __T(x)
#define _TEXT(x) __T(x)
#endif
typedef wchar_t TCHAR;
typedef wchar_t _TUCHAR;

// program
#define _tmain      wmain
#define _tWinMain   wWinMain
#define _tenviron   _wenviron
#define __targv     __wargv

// printfs
#define _ftprintf   fwprintf
#define _sntprintf  _snwprintf
#define _stprintf   _swprintf
#define _tprintf    wprintf
#define _vftprintf  vfwprintf
#define _vsntprintf _vsnwprintf
#define _vstprintf  _vswprintf

// scanfs
#define _tscanf     wscanf
```

```
#define _stscanf    swscanf

// string manipulations
#define _tcscat     wcscat
#define _tcschr     wcschr
#define _tcsclen    wcslen
#define _tcscpy
    wcscpy
#define _tcsdup     _wcsdup
#define _tcslen     wcslen
#define _tcsnccpy   wcsncpy
#define _tcsncpy    wcsncpy
#define _tcsrchr    wcsrchr
#define _tcsstr     wcsstr
#define _tcstok     wcstok

// string comparisons
#define _tcscmp     wcscmp
#define _tcsicmp    _wcsicmp
#define _tcsncicmp  _wcsnicmp
#define _tcsncmp    wcsncmp
#define _tcsnicmp   _wcsnicmp

// upper / lower
#define _tcslwr     _wcslwr
#define _tcsupr     _wcsupr
#define _totlower   towlower
#define _totupper   towupper

// conversions to numbers
#define _tcstoi64   _wcstoi64
#define _tcstol     wcstol
#define _tcstoul    wcstoul
#define _tstof      _wtof
#define _tstoi      _wtoi
#define _tstoi64    _wtoi64
#define _ttoi       _wtoi
#define _ttoi64     _wtoi64
#define _ttol       _wtol

// conversion from numbers to strings
#define _itot       _itow
#define _ltot       _ltow
#define _i64tot     _i64tow
#define _ui64tot    _ui64tow

// file manipulations
#define _tfopen     _wfopen
```

```
#define _topen      _wopen
#define
 _tremove    _wremove
#define _tunlink    _wunlink

// reading and writing to i/o
#define _fgettc     fgetwc
#define _fgetts     fgetws
#define _fputts     fputws
#define _gettchar   getwchar

// directory
#define _tchdir     _wchdir

// environment
#define _tgetenv    _wgetenv
#define _tsystem    _wsystem

// time
#define _tcsftime   wcsftime

#else // ANSI

#ifndef _T
#define _T(x)    x
#define _TEXT(x) x
#endif
typedef char            TCHAR;
typedef unsigned char   _TUCHAR;

// program
#define _tmain      main
#define _tWinMain   WinMain
#define _tenviron   environ
#define __targv     __argv

// printfs
#define _ftprintf   fprintf
#define _sntprintf  _snprintf
#define _stprintf   sprintf
#define _tprintf    printf
#define _vftprintf  vfprintf
#define _vsntprintf _vsnprintf
#define _vstprintf  vsprintf

// scanfs
#define _tscanf     scanf
#define _stscanf    sscanf
```

```
// string manipulations
#define _tcscat     strcat
#define _tcschr     strchr
#define _tcsclen    strlen
#define
 _tcscnlen   strnlen
#define _tcscpy     strcpy
#define _tcsdup     _strdup
#define _tcslen     strlen
#define _tcsnccpy   strncpy
#define _tcsrchr    strrchr
#define _tcsstr     strstr
#define _tcstok     strtok

// string comparisons
#define _tcscmp     strcmp
#define _tcsicmp    _stricmp
#define _tcsncmp    strncmp
#define _tcsncicmp  _strnicmp
#define _tcsnicmp   _strnicmp

// upper / lower
#define _tcslwr     _strlwr
#define _tcsupr     _strupr

#define _totupper   toupper
#define _totlower   tolower

// conversions to numbers
#define _tcstol     strtol
#define _tcstoul    strtoul
#define _tstof      atof
#define _tstoi      atoi
#define _tstoi64    _atoi64
#define _tstoi64    _atoi64
#define _ttoi       atoi
#define _ttoi64     _atoi64
#define _ttol       atol

// conversion from numbers to strings
#define _i64tot     _i64toa
#define _itot       _itoa
#define _ltot       _ltoa
#define _ui64tot    _ui64toa

// file manipulations
#define _tfopen     fopen
```

```
#define _topen      _open
#define
 _tremove    remove
#define _tunlink    _unlink

// reading and writing to i/o
#define _fgettc     fgetc
#define _fgetts     fgets
#define _fputts     fputs
#define _gettchar   getchar

// directory
#define _tchdir     _chdir

// environment
#define _tgetenv    getenv
#define _tsystem    system

// time
#define _tcsftime   strftime

#endif

// is functions (the same in Unicode / ANSI)
#define _istgraph   isgraph
#define _istascii   __isascii
// LzmaEncoder.h

#ifndef __LZMA_ENCODER_H
#define __LZMA_ENCODER_H

#include "../../../C/LzmaEnc.h"

#include "../../Common/MyCom.h"

#include "../ICoder.h"

namespace NCompress {
namespace NLzma {

class CEncoder:
 public ICompressCoder,
 public ICompressSetCoderProperties,
 public ICompressWriteCoderProperties,
 public ICompressSetCoderPropertiesOpt,
 public CMyUnknownImp
{
 CLzmaEncHandle _encoder;
```

```
 UInt64 _inputProcessed;
public:
 MY_UNKNOWN_IMP4(
    ICompressCoder,
    ICompressSetCoderProperties,
    ICompressWriteCoderProperties,
    ICompressSetCoderPropertiesOpt)

 STDMETHOD(Code)(ISequentialInStream *inStream, ISequentialOutStream *outStream,
    const UInt64 *inSize, const UInt64 *outSize, ICompressProgressInfo *progress);
 STDMETHOD(SetCoderProperties)(const PROPID *propIDs, const PROPVARIANT *props, UInt32 numProps);
 STDMETHOD(WriteCoderProperties)(ISequentialOutStream *outStream);
 STDMETHOD(SetCoderPropertiesOpt)(const PROPID *propIDs, const PROPVARIANT
 *props, UInt32 numProps);

 CEncoder();
 virtual ~CEncoder();

 UInt64 GetInputProcessedSize() const { return _inputProcessed; }
 bool IsWriteEndMark() const { return LzmaEnc_IsWriteEndMark(_encoder) != 0; }
};

}}

#endif
// Common/UTFConvert.h

#ifndef __COMMON_UTF_CONVERT_H
#define __COMMON_UTF_CONVERT_H

#include "MyString.h"

bool CheckUTF8(const char *src, bool allowReduced = false) throw();
bool ConvertUTF8ToUnicode(const AString &utfString, UString &resultString);
void ConvertUnicodeToUTF8(const UString &unicodeString, AString &resultString);

#endif
```

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```
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* License along with this library; if not, write to the
* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_STATE_H__
#define __ATK_STATE_H__

#include <glib-object.h>

G_BEGIN_DECLS

/**
*AtkStateType:
*@ATK_STATE_INVALID: Indicates an invalid state - probably an error condition.
 *@ATK_STATE_ACTIVE: Indicates a window is currently the active window, or an object is the active
subelement within a container or table. ATK_STATE_ACTIVE should not be used for objects which have
ATK_STATE_FOCUSABLE or ATK_STATE_SELECTABLE: Those objects should use
ATK_STATE_FOCUSED and ATK_STATE_SELECTED respectively. ATK_STATE_ACTIVE is a means to
indicate that an object which is not focusable and not selectable is the currently-active item within its parent
container.
```

*@ATK_STATE_ARMED: Indicates that the object is 'armed', i.e. will be activated by if a pointer button-release event occurs within its bounds.  Buttons often enter this state when a pointer click occurs within their bounds, as a precursor to activation. ATK_STATE_ARMED has been deprecated since ATK-2.16 and should not be used in newly-written code.
*@ATK_STATE_BUSY:  Indicates the current object is busy, i.e. onscreen representation is in the process of changing, or the object is temporarily unavailable for
 interaction due to activity already in progress.  This state may be used by implementors of Document to indicate that content loading is underway.  It also may indicate other 'pending' conditions; clients may wish to interrogate this object when the ATK_STATE_BUSY flag is removed.
*@ATK_STATE_CHECKED: Indicates this object is currently checked, for instance a checkbox is 'non-empty'.
*@ATK_STATE_DEFUNCT: Indicates that this object no longer has a valid backing widget (for instance, if its peer object has been destroyed)
*@ATK_STATE_EDITABLE: Indicates that this object can contain text, and that the
* user can change the textual contents of this object by editing those contents
* directly. For an object which is expected to be editable due to its type, but
* which cannot be edited due to the application or platform preventing the user
* from doing so, that object's #AtkStateSet should lack ATK_STATE_EDITABLE and
* should contain ATK_STATE_READ_ONLY.
*@ATK_STATE_ENABLED:   Indicates
 that this object is enabled, i.e. that it currently reflects some application state. Objects that are "greyed out" may lack this state, and may lack the STATE_SENSITIVE if direct user interaction cannot cause them to acquire STATE_ENABLED. See also: ATK_STATE_SENSITIVE
*@ATK_STATE_EXPANDABLE: Indicates this object allows progressive disclosure of its children
*@ATK_STATE_EXPANDED: Indicates this object its expanded - see ATK_STATE_EXPANDABLE above
*@ATK_STATE_FOCUSABLE: Indicates this object can accept keyboard focus, which means all events resulting from typing on the keyboard will normally be passed to it when it has focus
*@ATK_STATE_FOCUSED: Indicates this object currently has the keyboard focus
*@ATK_STATE_HORIZONTAL: Indicates the orientation of this object is horizontal; used, for instance, by objects of ATK_ROLE_SCROLL_BAR.  For objects where vertical/horizontal orientation is especially meaningful.
*@ATK_STATE_ICONIFIED: Indicates this object is minimized and is
 represented only by an icon
*@ATK_STATE_MODAL: Indicates something must be done with this object before the user can interact with an object in a different window
*@ATK_STATE_MULTI_LINE: Indicates this (text) object can contain multiple lines of text
*@ATK_STATE_MULTISELECTABLE: Indicates this object allows more than one of its children to be selected at the same time, or in the case of text objects, that the object supports non-contiguous text selections.
*@ATK_STATE_OPAQUE: Indicates this object paints every pixel within its rectangular region.
*@ATK_STATE_PRESSED: Indicates this object is currently pressed.
*@ATK_STATE_RESIZABLE: Indicates the size of this object is not fixed
*@ATK_STATE_SELECTABLE: Indicates this object is the child of an object that allows its children to be selected and that this child is one of those children that can be selected
*@ATK_STATE_SELECTED: Indicates this object is the child of an object that allows its children to be selected and that this child
 is one of those children that has been selected
*@ATK_STATE_SENSITIVE: Indicates this object is sensitive, e.g. to user interaction.
* STATE_SENSITIVE usually accompanies STATE_ENABLED for user-actionable controls,
* but may be found in the absence of STATE_ENABLED if the current visible state of the
* control is "disconnected" from the application state.  In such cases, direct user interaction

* can often result in the object gaining STATE_SENSITIVE, for instance if a user makes
* an explicit selection using an object whose current state is ambiguous or undefined.
* @see STATE_ENABLED, STATE_INDETERMINATE.
*@ATK_STATE_SHOWING: Indicates this object, the object's parent, the object's parent's parent, and so on,
* are all 'shown' to the end-user, i.e. subject to "exposure" if blocking or obscuring objects do not interpose
* between this object and the top of the window stack.
*@ATK_STATE_SINGLE_LINE: Indicates this (text) object can contain only a single line of text
*@ATK_STATE_STALE: Indicates that the information returned for this object may no longer be
* synchronized with the application state. This is implied if the object has STATE_TRANSIENT,
* and can also occur towards the end of the object peer's lifecycle. It can also be used to indicate that
* the index associated with this object has changed since the user accessed the object (in lieu of
* "index-in-parent-changed" events).
*@ATK_STATE_TRANSIENT: Indicates this object is transient, i.e. a snapshot which may not emit events when its
* state changes. Data from objects with ATK_STATE_TRANSIENT should not be cached, since there may be no
* notification given when the cached data becomes obsolete.
*@ATK_STATE_VERTICAL: Indicates the orientation of this object is vertical
*@ATK_STATE_VISIBLE: Indicates this object is visible, e.g. has been explicitly marked for exposure to the user.
* @note: STATE_VISIBLE is no guarantee that the object is actually unobscured on the screen, only
* that it is 'potentially' visible, barring obstruction, being scrolled or clipped out of the
* field of view, or having an ancestor container that has not yet made visible.
* A widget is potentially onscreen if it has both STATE_VISIBLE and STATE_SHOWING.
* The absence of STATE_VISIBLE and STATE_SHOWING is semantically equivalent to saying
* that an object is 'hidden'. See also STATE_TRUNCATED, which applies if a VISIBLE and SHOWING object
* lies within a viewport which means that its contents are clipped, e.g. a truncated spreadsheet cell or
* an image within a scrolling viewport. Mostly useful for screen-review and magnification algorithms.
*@ATK_STATE_MANAGES_DESCENDANTS: Indicates that "active-descendant-changed" event
* is sent when children become 'active' (i.e. are selected or navigated to onscreen).
* Used to prevent need to enumerate all children in very large containers, like tables.
* The presence of STATE_MANAGES_DESCENDANTS is an indication to the client.
* that the children should not, and need not, be enumerated by the client.
* Objects implementing this state are expected to provide relevant state
* notifications to listening clients, for instance notifications of visibility
* changes and activation of their contained child objects, without the client
* having previously requested references to those children.
*@ATK_STATE_INDETERMINATE: Indicates that the value, or some other quantifiable
* property, of this AtkObject cannot be fully determined. In the case of a large
* data set in which the total number of items in that set is unknown (e.g. 1 of
* 999+), implementors should expose the currently-known set size (999) along
* with this state. In the case of a check box, this state should be used to
* indicate that the check box is a tri-state check box which is currently
* neither checked nor unchecked.
*@ATK_STATE_TRUNCATED: Indicates that an object is truncated, e.g. a text value in a speradsheet cell.
*@ATK_STATE_REQUIRED:
Indicates that explicit user interaction with an object is required by the user interface, e.g. a required field in a "web-form" interface.
*@ATK_STATE_INVALID_ENTRY: Indicates that the object has encountered an error condition due to failure of input validation. For instance, a form control may acquire this state in response to invalid or malformed user input.

*@ATK_STATE_SUPPORTS_AUTOCOMPLETION:  Indicates that the object in question implements some form of typeahead or
* pre-selection behavior whereby entering the first character of one or more sub-elements
* causes those elements to scroll into view or become selected.  Subsequent character input
* may narrow the selection further as long as one or more sub-elements match the string.
* This state is normally only useful and encountered on objects that implement Selection.
* In some cases the typeahead behavior may result in full or partial completion of
* the data in the input field, in which case these input events
 may trigger text-changed
* events from the AtkText interface.  This state supplants @ATK_ROLE_AUTOCOMPLETE.
*@ATK_STATE_SELECTABLE_TEXT:Indicates that the object in question supports text selection. It should only be exposed on objects which implement the Text interface, in order to distinguish this state from @ATK_STATE_SELECTABLE, which infers that the object in question is a selectable child of an object which implements Selection. While similar, text selection and subelement selection are distinct operations.
*@ATK_STATE_DEFAULT: Indicates that the object is the "default" active component, i.e. the object which is activated by an end-user press of the "Enter" or "Return" key.  Typically a "close" or "submit" button.
*@ATK_STATE_ANIMATED: Indicates that the object changes its appearance dynamically as an inherent part of its presentation.  This state may come and go if an object is only temporarily animated on the way to a 'final' onscreen presentation.
* @note some applications,
 notably content viewers, may not be able to detect
* all kinds of animated content.  Therefore the absence of this state should not
* be taken as definitive evidence that the object's visual representation is
* static; this state is advisory.
*@ATK_STATE_VISITED: Indicates that the object (typically a hyperlink) has already been 'activated', and/or its backing data has already been downloaded, rendered, or otherwise "visited".
*@ATK_STATE_CHECKABLE: Indicates this object has the potential to be
*  checked, such as a checkbox or toggle-able table cell. @Since:
*  ATK-2.12
*@ATK_STATE_HAS_POPUP: Indicates that the object has a popup context
* menu or sub-level menu which may or may not be showing. This means
* that activation renders conditional content.  Note that ordinary
* tooltips are not considered popups in this context. @Since: ATK-2.12
*@ATK_STATE_HAS_TOOLTIP: Indicates this object has a tooltip. @Since: ATK-2.16
*@ATK_STATE_READ_ONLY: Indicates that a widget which
 is ENABLED and SENSITIVE
* has a value which can be read, but not modified, by the user. Note that this
* state should only be applied to widget types whose value is normally directly
* user modifiable, such as check boxes, radio buttons, spin buttons, text input
* fields, and combo boxes, as a means to convey that the expected interaction
* with that widget is not possible. When the expected interaction with a
* widget does not include modification by the user, as is the case with
* labels and containers, ATK_STATE_READ_ONLY should not be applied. See also
* ATK_STATE_EDITABLE. @Since: ATK-2-16
*@ATK_STATE_LAST_DEFINED: Not a valid state, used for finding end of enumeration
*
*The possible types of states of an object
**/

```
typedef enum
{
 ATK_STATE_INVALID,
 ATK_STATE_ACTIVE,
 ATK_STATE_ARMED,
 ATK_STATE_BUSY,
 ATK_STATE_CHECKED,
 ATK_STATE_DEFUNCT,
 ATK_STATE_EDITABLE,
 ATK_STATE_ENABLED,
 ATK_STATE_EXPANDABLE,
 ATK_STATE_EXPANDED,
 ATK_STATE_FOCUSABLE,
 ATK_STATE_FOCUSED,
  ATK_STATE_HORIZONTAL,
 ATK_STATE_ICONIFIED,
 ATK_STATE_MODAL,
 ATK_STATE_MULTI_LINE,
 ATK_STATE_MULTISELECTABLE,
 ATK_STATE_OPAQUE,
 ATK_STATE_PRESSED,
 ATK_STATE_RESIZABLE,
 ATK_STATE_SELECTABLE,
 ATK_STATE_SELECTED,
 ATK_STATE_SENSITIVE,
 ATK_STATE_SHOWING,
 ATK_STATE_SINGLE_LINE,
 ATK_STATE_STALE,
 ATK_STATE_TRANSIENT,
 ATK_STATE_VERTICAL,
 ATK_STATE_VISIBLE,
 ATK_STATE_MANAGES_DESCENDANTS,
 ATK_STATE_INDETERMINATE,
 ATK_STATE_TRUNCATED,
 ATK_STATE_REQUIRED,
 ATK_STATE_INVALID_ENTRY,
 ATK_STATE_SUPPORTS_AUTOCOMPLETION,
 ATK_STATE_SELECTABLE_TEXT,
 ATK_STATE_DEFAULT,
 ATK_STATE_ANIMATED,
 ATK_STATE_VISITED,
 ATK_STATE_CHECKABLE,
 ATK_STATE_HAS_POPUP,
 ATK_STATE_HAS_TOOLTIP,
 ATK_STATE_READ_ONLY,
 ATK_STATE_LAST_DEFINED
} AtkStateType;
```

```
typedef guint64      AtkState;

AtkStateType atk_state_type_register           (const gchar *name);

const gchar*         atk_state_type_get_name   (AtkStateType type);
AtkStateType         atk_state_type_for_name
   (const gchar  *name);

G_END_DECLS

#endif /* __ATK_STATE_H__ */
```

License information for hyph_fr.dic:

This file is based on the TeX hyphenation patterns distributed as part of the
hyph-utf8 package, and retains the same copyright and licensing conditions (below).

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

At the time this file was first modified, a complete, unmodified copy of
the original work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

Portions of this file were originally made available under the following license
(copied verbatim from hyph-fr.lic.txt in the original work):

French hyphenation patterns (V2.12, 2002/12/11)

(more info about the licence to be added later)

```
% This file is part of hyph-utf8 package and resulted from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% Source: frhyph.tex <2006-10-20>
% Author: R. Bastian, D. Flipo,
 B. Gaulle <cesure-l at gutenberg.eu.org>
%
% The above mentioned file should become obsolete,
% and the author of the original file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
```

```
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%               and helped with testing, suggestions and bug reports
% - Norbert Preining, who tested & integrated patterns into TeX Live
%
% However, the "copyright/copyleft" owner of patterns remains the original author.
%
% The copyright
 statement of this file is thus:
%
%    Do with this file whatever needs to be done in future for the sake of
%    "a better world" as long as you respect the copyright of original file.
%    If you're the original author of patterns or taking over a new revolution,
%    plese remove all of the TUG comments & credits that we added here -
%    you are the Queen / the King, we are only the servants.
%
% If you want to change this file, rather than uploading directly to CTAN,
% we would be grateful if you could send it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
% Before a new "pattern-revolution" starts,
% please try to follow some guidelines if possible:
%
% - \lccode is *forbidden*, and I really mean it
% - all the patterns should be in UTF-8
% - the only "allowed" TeX commands in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and
 \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
%-----------------------------------------------------------------------------
%
% French hyphenation patterns
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

```
%%%%%%%%%%
% This file is available for free and can used and redistributed
% asis for free. Modified versions should have another name.
%%%%%%%%%%
```

%
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LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM,
OUT OF OR IN CONNECTION
 WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN
THE SOFTWARE.

```
// Bcj2Coder.h

#ifndef __COMPRESS_BCJ2_CODER_H
#define __COMPRESS_BCJ2_CODER_H

#include "../../../C/Bcj2.h"

#include "../../Common/MyCom.h"

#include "../ICoder.h"

namespace NCompress {
namespace NBcj2 {

class CBaseCoder
{
protected:
 Byte *_bufs[BCJ2_NUM_STREAMS + 1];
 UInt32 _bufsCurSizes[BCJ2_NUM_STREAMS + 1];
 UInt32 _bufsNewSizes[BCJ2_NUM_STREAMS + 1];

 HRESULT Alloc(bool allocForOrig = true);
public:
 CBaseCoder();
 ~CBaseCoder();
};
```

```
#ifndef EXTRACT_ONLY

class CEncoder:
 public ICompressCoder2,
 public ICompressSetCoderProperties,
 public ICompressSetBufSize,
 public CMyUnknownImp,
 public CBaseCoder
{
 UInt32 _relatLim;

 HRESULT CodeReal(ISequentialInStream * const *inStreams, const UInt64 * const *inSizes, UInt32
numInStreams,
    ISequentialOutStream * const *outStreams, const UInt64 * const *outSizes, UInt32 numOutStreams,
    ICompressProgressInfo *progress);

public:
 MY_UNKNOWN_IMP3(ICompressCoder2, ICompressSetCoderProperties, ICompressSetBufSize)

  STDMETHOD(Code)(ISequentialInStream * const *inStreams, const UInt64 * const *inSizes, UInt32
numInStreams,
    ISequentialOutStream * const *outStreams, const UInt64 * const *outSizes, UInt32 numOutStreams,
    ICompressProgressInfo *progress);

 STDMETHOD(SetCoderProperties)(const PROPID *propIDs, const PROPVARIANT *props, UInt32 numProps);

 STDMETHOD(SetInBufSize)(UInt32 streamIndex, UInt32 size);
 STDMETHOD(SetOutBufSize)(UInt32 streamIndex, UInt32 size);

 CEncoder();
 ~CEncoder();
};

#endif

class CDecoder:
 public ICompressCoder2,
 public ICompressSetFinishMode,
 public ICompressGetInStreamProcessedSize2,
 public ICompressSetInStream2,
 public ISequentialInStream,
 public ICompressSetOutStreamSize,
 public ICompressSetBufSize,
 public CMyUnknownImp,
 public CBaseCoder
{
 unsigned _extraReadSizes[BCJ2_NUM_STREAMS];
```

```
 UInt64 _inStreamsProcessed[BCJ2_NUM_STREAMS];
 HRESULT _readRes[BCJ2_NUM_STREAMS];
 CMyComPtr<ISequentialInStream> _inStreams[BCJ2_NUM_STREAMS];

  bool _finishMode;
 bool _outSizeDefined;
 UInt64 _outSize;
 UInt64 _outSize_Processed;
 CBcj2Dec dec;

 void InitCommon();
 // HRESULT ReadSpec();

public:
 MY_UNKNOWN_IMP7(
   ICompressCoder2,
   ICompressSetFinishMode,
   ICompressGetInStreamProcessedSize2,
   ICompressSetInStream2,
   ISequentialInStream,
   ICompressSetOutStreamSize,
   ICompressSetBufSize
   );

 STDMETHOD(Code)(ISequentialInStream * const *inStreams, const UInt64 * const *inSizes, UInt32
numInStreams,
     ISequentialOutStream * const *outStreams, const UInt64 * const *outSizes, UInt32 numOutStreams,
     ICompressProgressInfo *progress);

 STDMETHOD(SetFinishMode)(UInt32 finishMode);
 STDMETHOD(GetInStreamProcessedSize2)(UInt32 streamIndex, UInt64 *value);

 STDMETHOD(SetInStream2)(UInt32 streamIndex, ISequentialInStream *inStream);
 STDMETHOD(ReleaseInStream2)(UInt32 streamIndex);

 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);

 STDMETHOD(SetOutStreamSize)(const
 UInt64 *outSize);

 STDMETHOD(SetInBufSize)(UInt32 streamIndex, UInt32 size);
 STDMETHOD(SetOutBufSize)(UInt32 streamIndex, UInt32 size);

 CDecoder();
};

}}
```

```
#endif
// MultiStream.h

#ifndef __MULTI_STREAM_H
#define __MULTI_STREAM_H

#include "../../../Common/MyCom.h"
#include "../../../Common/MyVector.h"

#include "../../IStream.h"

class CMultiStream:
 public IInStream,
 public CMyUnknownImp
{
 UInt64 _pos;
 UInt64 _totalLength;
 unsigned _streamIndex;

public:

 struct CSubStreamInfo
 {
  CMyComPtr<IInStream> Stream;
  UInt64 Size;
  UInt64 GlobalOffset;
  UInt64 LocalPos;

  CSubStreamInfo(): Size(0), GlobalOffset(0), LocalPos(0) {}
 };

 CObjectVector<CSubStreamInfo> Streams;

 HRESULT Init()
 {
  UInt64 total = 0;
  FOR_VECTOR (i, Streams)
  {
   CSubStreamInfo &s = Streams[i];
   s.GlobalOffset = total;
   total += Streams[i].Size;
   RINOK(s.Stream->Seek(0, STREAM_SEEK_CUR, &s.LocalPos));
  }
  _totalLength = total;
  _pos = 0;
  _streamIndex = 0;
  return S_OK;
 }
```

```
 MY_UNKNOWN_IMP1(IInStream)

 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(Seek)(Int64 offset,
 UInt32 seekOrigin, UInt64 *newPosition);
};

/*
class COutMultiStream:
 public IOutStream,
 public CMyUnknownImp
{
 unsigned _streamIndex; // required stream
 UInt64 _offsetPos; // offset from start of _streamIndex index
 UInt64 _absPos;
 UInt64 _length;

 struct CSubStreamInfo
 {
   CMyComPtr<ISequentialOutStream> Stream;
   UInt64 Size;
   UInt64 Pos;
};
 CObjectVector<CSubStreamInfo> Streams;
public:
 CMyComPtr<IArchiveUpdateCallback2> VolumeCallback;
 void Init()
 {
   _streamIndex = 0;
   _offsetPos = 0;
   _absPos = 0;
   _length = 0;
 }

 MY_UNKNOWN_IMP1(IOutStream)

 STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition);
};
*/

#endif
// Common/MyVector.h

#ifndef __COMMON_MY_VECTOR_H
#define __COMMON_MY_VECTOR_H
```

```
#include <string.h>

template <class T>
class CRecordVector
{
 T *_items;
 unsigned _size;
 unsigned _capacity;

 void MoveItems(unsigned destIndex, unsigned srcIndex)
 {
   memmove(_items + destIndex, _items + srcIndex, (size_t)(_size - srcIndex) * sizeof(T));
 }

 void ReserveOnePosition()
 {
   if (_size == _capacity)
   {
     unsigned newCapacity = _capacity + (_capacity >> 2) + 1;
     T *p;
     MY_ARRAY_NEW(p, T, newCapacity);
     // p = new T[newCapacity];
     if (_size != 0)
       memcpy(p, _items, (size_t)_size * sizeof(T));
     delete []_items;
     _items = p;
     _capacity = newCapacity;
   }
 }

public:

 CRecordVector(): _items(0), _size(0), _capacity(0) {}

 CRecordVector(const CRecordVector &v): _items(0), _size(0), _capacity(0)
 {
   unsigned size = v.Size();
   if (size != 0)
   {
     _items = new T[size];
     _size = size;
     _capacity = size;
      memcpy(_items, v._items, (size_t)size * sizeof(T));
   }
 }

 unsigned Size() const { return _size; }
 bool IsEmpty() const { return _size == 0; }
```

```
void ConstructReserve(unsigned size)
{
  if (size != 0)
  {
    MY_ARRAY_NEW(_items, T, size)
    // _items = new T[size];
    _capacity = size;
  }
}

void Reserve(unsigned newCapacity)
{
  if (newCapacity > _capacity)
  {
    T *p;
    MY_ARRAY_NEW(p, T, newCapacity);
    // p = new T[newCapacity];
    if (_size != 0)
      memcpy(p, _items, (size_t)_size * sizeof(T));
    delete []_items;
    _items = p;
    _capacity = newCapacity;
  }
}

void ClearAndReserve(unsigned newCapacity)
{
  Clear();
  if (newCapacity > _capacity)
  {
    delete []_items;
    _items = NULL;
    _capacity = 0;
    MY_ARRAY_NEW(_items, T, newCapacity)
    // _items = new T[newCapacity];
    _capacity = newCapacity;
  }
}

void ClearAndSetSize(unsigned newSize)
{
  ClearAndReserve(newSize);
   _size = newSize;
}

void ChangeSize_KeepData(unsigned newSize)
{
```

```
  if (newSize > _capacity)
  {
    T *p;
    MY_ARRAY_NEW(p, T, newSize)
    // p = new T[newSize];
    if (_size != 0)
      memcpy(p, _items, (size_t)_size * sizeof(T));
    delete []_items;
    _items = p;
    _capacity = newSize;
  }
  _size = newSize;
}

void ReserveDown()
{
  if (_size == _capacity)
    return;
  T *p = NULL;
  if (_size != 0)
  {
    p = new T[_size];
    memcpy(p, _items, (size_t)_size * sizeof(T));
  }
  delete []_items;
  _items = p;
  _capacity = _size;
}

~CRecordVector() { delete []_items; }

void ClearAndFree()
{
  delete []_items;
  _items = NULL;
  _size = 0;
  _capacity = 0;
}

void Clear() { _size = 0; }

void DeleteBack() { _size--; }

void DeleteFrom(unsigned index)
{
  // if (index <= _size)
    _size = index;
}
```

```
void DeleteFrontal(unsigned num)
{
  if (num
!= 0)
  {
    MoveItems(0, num);
    _size -= num;
  }
}

void Delete(unsigned index)
{
  MoveItems(index, index + 1);
  _size -= 1;
}

/*
void Delete(unsigned index, unsigned num)
{
  if (num > 0)
  {
    MoveItems(index, index + num);
    _size -= num;
  }
}
*/

CRecordVector& operator=(const CRecordVector &v)
{
  if (&v == this)
    return *this;
  unsigned size = v.Size();
  if (size > _capacity)
  {
    delete []_items;
    _capacity = 0;
    _size = 0;
    _items = NULL;
    _items = new T[size];
    _capacity = size;
  }
  _size = size;
  if (size != 0)
    memcpy(_items, v._items, (size_t)size * sizeof(T));
  return *this;
}
```

```
CRecordVector& operator+=(const CRecordVector &v)
{
  unsigned size = v.Size();
  Reserve(_size + size);
  if (size != 0)
    memcpy(_items + _size, v._items, (size_t)size * sizeof(T));
  _size += size;
  return *this;
}

unsigned Add(const T item)
{

ReserveOnePosition();
  _items[_size] = item;
  return _size++;
}

void AddInReserved(const T item)
{
  _items[_size++] = item;
}

void Insert(unsigned index, const T item)
{
  ReserveOnePosition();
  MoveItems(index + 1, index);
  _items[index] = item;
  _size++;
}

void MoveToFront(unsigned index)
{
  if (index != 0)
  {
    T temp = _items[index];
    memmove(_items + 1, _items, (size_t)index * sizeof(T));
    _items[0] = temp;
  }
}

const T& operator[](unsigned index) const { return _items[index]; }
      T& operator[](unsigned index)       { return _items[index]; }
const T& Front() const { return _items[0]; }
      T& Front()       { return _items[0]; }
const T& Back() const  { return _items[(size_t)_size - 1]; }
      T& Back()        { return _items[(size_t)_size - 1]; }
```

```
/*
void Swap(unsigned i, unsigned j)
{
  T temp = _items[i];
  _items[i] = _items[j];
  _items[j] = temp;
}
*/

int FindInSorted(const
T item, unsigned left, unsigned right) const
{
  while (left != right)
  {
    unsigned mid = (left + right) / 2;
    const T midVal = (*this)[mid];
    if (item == midVal)
      return mid;
    if (item < midVal)
      right = mid;
    else
      left = mid + 1;
  }
  return -1;
}

int FindInSorted2(const T &item, unsigned left, unsigned right) const
{
  while (left != right)
  {
    unsigned mid = (left + right) / 2;
    const T& midVal = (*this)[mid];
    int comp = item.Compare(midVal);
    if (comp == 0)
      return mid;
    if (comp < 0)
      right = mid;
    else
      left = mid + 1;
  }
  return -1;
}

int FindInSorted(const T item) const
{
  return FindInSorted(item, 0, _size);
}
```

```
int FindInSorted2(const T &item) const
{
  return FindInSorted2(item, 0, _size);
}

unsigned AddToUniqueSorted(const T item)
{
  unsigned left = 0, right = _size;
  while (left != right)
  {
    unsigned mid
= (left + right) / 2;
    const T midVal = (*this)[mid];
    if (item == midVal)
      return mid;
    if (item < midVal)
      right = mid;
    else
      left = mid + 1;
  }
  Insert(right, item);
  return right;
}

unsigned AddToUniqueSorted2(const T &item)
{
  unsigned left = 0, right = _size;
  while (left != right)
  {
    unsigned mid = (left + right) / 2;
    const T& midVal = (*this)[mid];
    int comp = item.Compare(midVal);
    if (comp == 0)
      return mid;
    if (comp < 0)
      right = mid;
    else
      left = mid + 1;
  }
  Insert(right, item);
  return right;
}

static void SortRefDown(T* p, unsigned k, unsigned size, int (*compare)(const T*, const T*, void *), void *param)
{
  T temp = p[k];
  for (;;)
  {
```

```
    unsigned s = (k << 1);
    if (s > size)
      break;
    if (s < size && compare(p + s + 1, p + s, param) > 0)
      s++;
    if (compare(&temp, p + s, param) >= 0)
      break;
     p[k] = p[s];
    k = s;
  }
  p[k] = temp;
}

void Sort(int (*compare)(const T*, const T*, void *), void *param)
{
  unsigned size = _size;
  if (size <= 1)
    return;
  T* p = (&Front()) - 1;
  {
    unsigned i = size >> 1;
    do
      SortRefDown(p, i, size, compare, param);
    while (--i != 0);
  }
  do
  {
    T temp = p[size];
    p[size--] = p[1];
    p[1] = temp;
    SortRefDown(p, 1, size, compare, param);
  }
  while (size > 1);
}

static void SortRefDown2(T* p, unsigned k, unsigned size)
{
  T temp = p[k];
  for (;;)
  {
    unsigned s = (k << 1);
    if (s > size)
      break;
    if (s < size && p[(size_t)s + 1].Compare(p[s]) > 0)
      s++;
    if (temp.Compare(p[s]) >= 0)
      break;
    p[k] = p[s];
```

```
    k = s;
  }
  p[k] = temp;
}

void Sort2()
{
  unsigned size = _size;
  if (size <= 1)
    return;
  T* p = (&Front()) - 1;
  {
    unsigned i = size >> 1;

  do
      SortRefDown2(p, i, size);
    while (--i != 0);
  }
  do
  {
    T temp = p[size];
    p[size--] = p[1];
    p[1] = temp;
    SortRefDown2(p, 1, size);
  }
  while (size > 1);
}
};

typedef CRecordVector<int> CIntVector;
typedef CRecordVector<unsigned int> CUIntVector;
typedef CRecordVector<bool> CBoolVector;
typedef CRecordVector<unsigned char> CByteVector;
typedef CRecordVector<void *> CPointerVector;

template <class T>
class CObjectVector
{
 CPointerVector _v;
public:
 unsigned Size() const { return _v.Size(); }
 bool IsEmpty() const { return _v.IsEmpty(); }
 void ReserveDown() { _v.ReserveDown(); }
 // void Reserve(unsigned newCapacity) { _v.Reserve(newCapacity); }
 void ClearAndReserve(unsigned newCapacity) { Clear(); _v.ClearAndReserve(newCapacity); }

 CObjectVector() {};
 CObjectVector(const CObjectVector &v)
```

```
{
  unsigned size = v.Size();
  _v.ConstructReserve(size);
  for (unsigned i = 0; i < size; i++)
    _v.AddInReserved(new
T(v[i]));
}
CObjectVector& operator=(const CObjectVector &v)
{
  if (&v == this)
    return *this;
  Clear();
  unsigned size = v.Size();
  _v.Reserve(size);
  for (unsigned i = 0; i < size; i++)
    _v.AddInReserved(new T(v[i]));
  return *this;
}

CObjectVector& operator+=(const CObjectVector &v)
{
  unsigned size = v.Size();
  _v.Reserve(Size() + size);
  for (unsigned i = 0; i < size; i++)
    _v.AddInReserved(new T(v[i]));
  return *this;
}

const T& operator[](unsigned index) const { return *((T *)_v[index]); }
      T& operator[](unsigned index)       { return *((T *)_v[index]); }
const T& Front() const { return operator[](0); }
      T& Front()       { return operator[](0); }
const T& Back() const  { return *(T *)_v.Back(); }
      T& Back()        { return *(T *)_v.Back(); }

void MoveToFront(unsigned index) { _v.MoveToFront(index); }

unsigned Add(const T& item) { return _v.Add(new T(item)); }

void AddInReserved(const
T& item) { _v.AddInReserved(new T(item)); }

T& AddNew()
{
  T *p = new T;
  _v.Add(p);
  return *p;
}
```

```
T& AddNewInReserved()
{
  T *p = new T;
  _v.AddInReserved(p);
  return *p;
}

void Insert(unsigned index, const T& item) { _v.Insert(index, new T(item)); }

T& InsertNew(unsigned index)
{
  T *p = new T;
  _v.Insert(index, p);
  return *p;
}

~CObjectVector()
{
  for (unsigned i = _v.Size(); i != 0;)
    delete (T *)_v[--i];
}

void ClearAndFree()
{
  Clear();
  _v.ClearAndFree();
}

void Clear()
{
  for (unsigned i = _v.Size(); i != 0;)
    delete (T *)_v[--i];
  _v.Clear();
}

void DeleteFrom(unsigned index)
{
  unsigned size = _v.Size();
  for (unsigned i = index; i < size; i++)
    delete (T *)_v[i];
  _v.DeleteFrom(index);
}

void DeleteFrontal(unsigned num)
{
  for (unsigned i = 0; i < num; i++)
    delete (T *)_v[i];
```

```
  _v.DeleteFrontal(num);
}

void DeleteBack()
 {
  delete (T *)_v.Back();
  _v.DeleteBack();
}

void Delete(unsigned index)
{
  delete (T *)_v[index];
  _v.Delete(index);
}

/*
void Delete(unsigned index, unsigned num)
{
  for (unsigned i = 0; i < num; i++)
    delete (T *)_v[index + i];
  _v.Delete(index, num);
}
*/

/*
int Find(const T& item) const
{
  unsigned size = Size();
  for (unsigned i = 0; i < size; i++)
    if (item == (*this)[i])
      return i;
  return -1;
}
*/

int FindInSorted(const T& item) const
{
  unsigned left = 0, right = Size();
  while (left != right)
  {
    unsigned mid = (left + right) / 2;
    const T& midVal = (*this)[mid];
    int comp = item.Compare(midVal);
    if (comp == 0)
      return mid;
    if (comp < 0)
      right = mid;
    else
```

```
      left = mid + 1;
  }
  return -1;
}

unsigned AddToUniqueSorted(const T& item)
{
  unsigned left = 0, right = Size();
  while (left != right)
  {

 unsigned mid = (left + right) / 2;
    const T& midVal = (*this)[mid];
    int comp = item.Compare(midVal);
    if (comp == 0)
      return mid;
    if (comp < 0)
      right = mid;
    else
      left = mid + 1;
  }
  Insert(right, item);
  return right;
}

/*
unsigned AddToSorted(const T& item)
{
  unsigned left = 0, right = Size();
  while (left != right)
  {
    unsigned mid = (left + right) / 2;
    const T& midVal = (*this)[mid];
    int comp = item.Compare(midVal);
    if (comp == 0)
    {
      right = mid + 1;
      break;
    }
    if (comp < 0)
      right = mid;
    else
      left = mid + 1;
  }
  Insert(right, item);
  return right;
}
*/
```

```
 void Sort(int (*compare)(void *const *, void *const *, void *), void *param)
   { _v.Sort(compare, param); }

 static int CompareObjectItems(void *const *a1, void *const *a2, void * /* param */)
   { return (*(*((const T **)a1))).Compare(*(*((const T **)a2))); }

  void Sort() { _v.Sort(CompareObjectItems, 0); }
};

#define FOR_VECTOR(_i_, _v_) for (unsigned _i_ = 0; _i_ < (_v_).Size(); _i_++)

#endif
```

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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

At the time this file was first modified, a complete, unmodified copy of
the original work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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Norwegian Nynorsk hyphenation patterns

(more info about the licence to be added later)

```
% Adapted to the new pattern-loading scheme.
% Original file name was nnhyph.tex

% TeX hyphenation patterns for Norwegian Nynorsk
%
% Version 2007-02-10
%
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%
% This file contains hyphenation patterns for Norwegian Nynorsk.
% It uses the Norwegian hyphenation patterns from nohyphbx.tex,
```

```
% created by Rune Kleveland and Ole Michael Selberg. Please see
% that file for copyright information on those patterns.
%
% The patterns in nohyphbx are based on both Norwegian Bokmal
% and Norwegian Nynorsk, and works about equally well for both
% languages. This file, nnhyph.tex, contains only a few hyphenation
% exceptions, for words that needs to be hyphenated differently for
% the two languages.
%
% Please send bugs or suggestions to karl@huftis.org.
%

\input hyph-no.tex

\hyphenation{
att-en-de
bet-re
}
```

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```
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* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_DOCUMENT_H__
#define __ATK_DOCUMENT_H__

#include <atk/atkobject.h>
#include <atk/atkutil.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

/*
* The AtkDocument
 interface should be supported by any object that is a container
* for 'document content' as opposed to a collection of user interface elements.
*
*/

#define ATK_TYPE_DOCUMENT                    (atk_document_get_type ())
#define ATK_IS_DOCUMENT(obj)                 G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_DOCUMENT)
#define ATK_DOCUMENT(obj)                    G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_DOCUMENT, AtkDocument)
#define ATK_DOCUMENT_GET_IFACE(obj)          (G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_DOCUMENT, AtkDocumentIface))

#ifndef _TYPEDEF_ATK_DOCUMENT_
#define _TYPEDEF_ATK_DOCUMENT_
typedef struct _AtkDocument AtkDocument;
#endif
typedef struct _AtkDocumentIface AtkDocumentIface;

struct _AtkDocumentIface
{
 GTypeInterface parent;
 G_CONST_RETURN gchar* ( *get_document_type) (AtkDocument             *document);
 gpointer             ( *get_document)      (AtkDocument             *document);

 G_CONST_RETURN gchar* ( *get_document_locale) (AtkDocument
            *document);
 AtkAttributeSet *     ( *get_document_attributes) (AtkDocument        *document);
```

```
 G_CONST_RETURN gchar* ( *get_document_attribute_value) (AtkDocument   *document,
                                        const gchar   *attribute_name);
 gboolean             ( *set_document_attribute) (AtkDocument        *document,
                                      const gchar        *attribute_name,
                                      const gchar        *attribute_value);
 AtkFunction pad1;
 AtkFunction pad2;
 AtkFunction pad3;
 AtkFunction pad4;
};

GType  atk_document_get_type            (void);

G_CONST_RETURN gchar* atk_document_get_document_type (AtkDocument   *document);
gpointer atk_document_get_document (AtkDocument   *document);
G_CONST_RETURN gchar* atk_document_get_locale (AtkDocument *document);
AtkAttributeSet*      atk_document_get_attributes (AtkDocument *document);
G_CONST_RETURN gchar* atk_document_get_attribute_value
 (AtkDocument *document,
                                        const gchar *attribute_name);
gboolean             atk_document_set_attribute_value (AtkDocument *document,
                                        const gchar *attribute_name,
                                        const gchar *attribute_value);
#ifdef __cplusplus
}
#endif /* __cplusplus */
#endif /* __ATK_DOCUMENT_H__ */
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With One div Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element that contains a div element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size:
 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
```

```
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   &lt;div&gt;Paragraph 1&lt;/div&gt;
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With dir Attribute in text Element 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element with ltr as the value for the dir
attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre
 {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
```

```
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text dir="ltr"&gt;
   License without language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With Mixed text Element Language Tags 2</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-005-ref.xht" />
  <meta name="assert" content="The copyright element matches the schema. Two text elements have a language
tags." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-005.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
```

```
   font-size: 200px;
   margin-top: 50px;
  }
 ]]></style>
</head>
<body>
 <p>Test passes if the word PASS appears below.</p>
 <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
 <div class="test">P</div>
 <p>The XML contained in the Extended Metadata Block is below.</p>
 <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text xml:lang="en"&gt;
   Copyright with "en" language.
  &lt;/text&gt;
  &lt;text xml:lang="fr"&gt;
   Copyright with "fr" language.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
 </pre>
</body>
</html>
/*
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and its documentation for any purpose is hereby granted without fee,
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that both that copyright notice and this permission notice appear
in supporting documentation.  Samphan Raruenrom makes no
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*/
/* ATK -  Accessibility Toolkit
* Copyright 2001 Sun Microsystems Inc.
*
* This library is free software; you can redistribute it and/or
* modify it under the terms of the GNU Library General Public
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* Library General Public License for more details.
*
* You should have received a copy of the GNU Library General Public
```

```
* License along with this library; if not, write to the
* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_OBJECT_FACTORY_H__
#define __ATK_OBJECT_FACTORY_H__

#include <glib-object.h>
#include <atk/atkobject.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

#define
 ATK_TYPE_OBJECT_FACTORY                    (atk_object_factory_get_type ())
#define ATK_OBJECT_FACTORY(obj)                    (G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_OBJECT_FACTORY, AtkObjectFactory))
#define ATK_OBJECT_FACTORY_CLASS(klass)            (G_TYPE_CHECK_CLASS_CAST ((klass),
ATK_TYPE_OBJECT_FACTORY, AtkObjectFactoryClass))
#define ATK_IS_OBJECT_FACTORY(obj)                 (G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_OBJECT_FACTORY))
#define ATK_IS_OBJECT_FACTORY_CLASS(klass)         (G_TYPE_CHECK_CLASS_TYPE ((klass),
ATK_TYPE_OBJECT_FACTORY))
#define ATK_OBJECT_FACTORY_GET_CLASS(obj)          (G_TYPE_INSTANCE_GET_CLASS ((obj),
ATK_TYPE_OBJECT_FACTORY, AtkObjectFactoryClass))

typedef struct _AtkObjectFactory               AtkObjectFactory;
typedef struct _AtkObjectFactoryClass          AtkObjectFactoryClass;

struct _AtkObjectFactory
{
 GObject parent;
};

struct _AtkObjectFactoryClass
{
 GObjectClass parent_class;

 AtkObject* (* create_accessible) (GObject
        *obj);
 void      (* invalidate)       (AtkObjectFactory *factory);
 GType     (* get_accessible_type)    (void);

 AtkFunction pad1;
 AtkFunction pad2;
};
```

```
GType atk_object_factory_get_type(void);

AtkObject* atk_object_factory_create_accessible (AtkObjectFactory *factory, GObject *obj);
void       atk_object_factory_invalidate (AtkObjectFactory *factory);
GType      atk_object_factory_get_accessible_type (AtkObjectFactory *factory);
#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __GTK_OBJECT_FACTORY_H__ */
```

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```
cd $(@D)
$(MAKE) -nologo $(TARGETS)
cd ..
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Invalid copyright Element With dir Attribute in div Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element that contains a div element with INVALID as the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body
 {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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```
//{{NO_DEPENDENCIES}}
// Microsoft Visual C++ generated include file.
// Used by ServicesHelper.rc

// Next default values for new objects
//
#ifdef APSTUDIO_INVOKED
#ifndef APSTUDIO_READONLY_SYMBOLS
#define _APS_NEXT_RESOURCE_VALUE        101
#define _APS_NEXT_COMMAND_VALUE         40001
#define _APS_NEXT_CONTROL_VALUE         1001
#define _APS_NEXT_SYMED_VALUE           101
#endif
#endif
// Common/Defs.h

#ifndef __COMMON_DEFS_H
#define __COMMON_DEFS_H

template <class T> inline T MyMin(T a, T b) { return a < b ? a : b; }
template <class T> inline T MyMax(T a, T b) { return a > b ? a : b; }

template <class T> inline int MyCompare(T a, T b)
 { return a == b ? 0 : (a < b ? -1 : 1); }

inline int BoolToInt(bool v) { return (v ? 1 : 0); }
inline bool IntToBool(int v) { return (v != 0); }

#endif
/* ATK -  Accessibility Toolkit
* Copyright 2001 Sun Microsystems Inc.
*
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*
```

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* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_STREAMABLE_CONTENT_H__
#define __ATK_STREAMABLE_CONTENT_H__

#include <atk/atkobject.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

#define ATK_TYPE_STREAMABLE_CONTENT
        (atk_streamable_content_get_type ())
#define ATK_IS_STREAMABLE_CONTENT(obj)       G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_STREAMABLE_CONTENT)
#define ATK_STREAMABLE_CONTENT(obj)          G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_STREAMABLE_CONTENT, AtkStreamableContent)
#define ATK_STREAMABLE_CONTENT_GET_IFACE(obj) (G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_STREAMABLE_CONTENT, AtkStreamableContentIface))

#ifndef _TYPEDEF_ATK_STREAMABLE_CONTENT
#define _TYPEDEF_ATK_STREAMABLE_CONTENT
typedef struct _AtkStreamableContent AtkStreamableContent;
#endif
typedef struct _AtkStreamableContentIface AtkStreamableContentIface;

struct _AtkStreamableContentIface
{
 GTypeInterface parent;

 /*
  * Get the number of mime types supported by this object
  */
 gint                    (* get_n_mime_types)  (AtkStreamableContent     *streamable);
 /*
  * Gets the specified mime type supported by this object.
  * The mime types are 0-based so the first mime
 type is
  * at index 0, the second at index 1 and so on.  The mime-type
```

```
 * at index 0 should be considered the "default" data type for the stream.
 *
 * This assumes that the strings for the mime types are stored in the
 * AtkStreamableContent. Alternatively the G_CONST_RETURN could be removed
 * and the caller would be responsible for calling g_free() on the
 * returned value.
 */
G_CONST_RETURN gchar*     (* get_mime_type)     (AtkStreamableContent     *streamable,
                                                gint                     i);
/*
 * One possible implementation for this method is that it constructs the
 * content appropriate for the mime type and then creates a temporary
 * file containing the content, opens the file and then calls
 * g_io_channel_unix_new_fd().
 */
GIOChannel*               (* get_stream)       (AtkStreamableContent     *streamable,
                                                const gchar              *mime_type);

/*
 * Returns a string representing a URI in IETF standard format
* (see http://www.ietf.org/rfc/rfc2396.txt) from which the object's content
* may be streamed in the specified mime-type.
* If mime_type is NULL, the URI for the default (and possibly only) mime-type is
* returned.
*
* returns NULL if the mime-type is not supported, or if no URI can be
* constructed.  Note that it is possible for get_uri to return NULL but for
* get_stream to work nonetheless, since not all GIOChannels connect to URIs.
*/
  G_CONST_RETURN  gchar*  (* get_uri)          (AtkStreamableContent     *streamable,
                                                const gchar              *mime_type);


 AtkFunction              pad1;
 AtkFunction              pad2;
 AtkFunction              pad3;
};
GType                 atk_streamable_content_get_type (void);

gint                  atk_streamable_content_get_n_mime_types (AtkStreamableContent     *streamable);


G_CONST_RETURN gchar*  atk_streamable_content_get_mime_type    (AtkStreamableContent     *streamable,
                                                gint                     i);
GIOChannel*           atk_streamable_content_get_stream       (AtkStreamableContent     *streamable,
                                                const gchar              *mime_type);

gchar*                atk_streamable_content_get_uri          (AtkStreamableContent     *streamable,
```

```
                                        const gchar             *mime_type);


#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_STREAMABLE_CONTENT_H__ */
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Attribute in copyright Element text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-015-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element with an unknown attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face
  {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-015.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
```

</body>
</html>
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```
#ifndef WINVER
#define WINVER 0x0600
#endif

#ifndef _WIN32_WINNT
#define _WIN32_WINNT 0x0600
#endif

#ifndef _WIN32_WINDOWS
#define _WIN32_WINDOWS 0x0410
#endif

#ifndef _WIN32_IE
```

```
#define _WIN32_IE 0x0700
#endif

#ifndef WIN32_LEAN_AND_MEAN
#define WIN32_LEAN_AND_MEAN
#endif
#include <windows.h>

#ifdef CITYHASH_EXPORTS
#define CITYHASH_API __declspec(dllexport)
#else
#define CITYHASH_API __declspec(dllimport)
#endif
```

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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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```
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* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_STATE_SET_H__
#define __ATK_STATE_SET_H__

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

#include <glib-object.h>
#include <atk/atkobject.h>
#include <atk/atkstate.h>

#define
 ATK_TYPE_STATE_SET                    (atk_state_set_get_type ())
#define ATK_STATE_SET(obj)                    (G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_STATE_SET, AtkStateSet))
#define ATK_STATE_SET_CLASS(klass)              (G_TYPE_CHECK_CLASS_CAST ((klass),
ATK_TYPE_STATE_SET, AtkStateSetClass))
#define ATK_IS_STATE_SET(obj)                  (G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_STATE_SET))
#define ATK_IS_STATE_SET_CLASS(klass)           (G_TYPE_CHECK_CLASS_TYPE ((klass),
ATK_TYPE_STATE_SET))
#define ATK_STATE_SET_GET_CLASS(obj)            (G_TYPE_INSTANCE_GET_CLASS ((obj),
ATK_TYPE_STATE_SET, AtkStateSetClass))

typedef struct _AtkStateSetClass       AtkStateSetClass;
```

```
struct _AtkStateSet
{
 GObject parent;

};

struct _AtkStateSetClass
{
 GObjectClass parent;
};

GType atk_state_set_get_type (void);

AtkStateSet*    atk_state_set_new               (void);
gboolean        atk_state_set_is_empty          (AtkStateSet  *set);
gboolean
        atk_state_set_add_state         (AtkStateSet  *set,
                                         AtkStateType type);
void            atk_state_set_add_states        (AtkStateSet  *set,
                                         AtkStateType *types,
                                         gint         n_types);
void            atk_state_set_clear_states      (AtkStateSet  *set);
gboolean        atk_state_set_contains_state    (AtkStateSet  *set,
                                         AtkStateType type);
gboolean        atk_state_set_contains_states   (AtkStateSet  *set,
                                         AtkStateType *types,
                                         gint         n_types);
gboolean        atk_state_set_remove_state      (AtkStateSet  *set,
                                         AtkStateType type);
AtkStateSet*    atk_state_set_and_sets          (AtkStateSet  *set,

            AtkStateSet  *compare_set);
AtkStateSet*    atk_state_set_or_sets           (AtkStateSet  *set,
                                         AtkStateSet  *compare_set);
AtkStateSet*    atk_state_set_xor_sets          (AtkStateSet  *set,
                                         AtkStateSet  *compare_set);

#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_STATE_SET_H__ */
```

7-Zip for installers 9.38

---

7-Zip is a file archiver for Windows NT/2000/2003/2008/XP/Vista/7/8/10.

7-Zip for installers is part of LZMA SDK.
LZMA SDK is written and placed in the public domain by Igor Pavlov.

It's allowed to join 7-Zip SFX module with another software.
It's allowed to change resources of 7-Zip's SFX modules.

HOW to use
---

7zr.exe is reduced version of 7za.exe of 7-Zip.
7zr.exe supports only format with these codecs: LZMA, LZMA2, BCJ, BCJ2, ARM, Copy.

Example of compressing command for installation packages:

7zr a archive.7z files

7zSD.sfx is SFX module for installers. 7zSD.sfx uses msvcrt.dll.

SFX modules for installers allow to create installation program.
Such module extracts archive to temp folder and then runs specified program and removes
temp files after program finishing. Self-extract archive for installers must be created
as joining 3 files: SFX_Module, Installer_Config, 7z_Archive.
Installer_Config is optional file.
You can use the following command to create installer
self-extract archive:

copy /b 7zSD.sfx + config.txt + archive.7z archive.exe

The smallest installation package size can be achieved, if installation files was
uncompressed before including to 7z archive.

-y switch for installer module (at runtime) specifies quiet mode for extracting.

Installer Config file format
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Config file contains commands for Installer. File begins from string
;!@Install@!UTF-8! and ends with ;!@InstallEnd@!. File must be written
in UTF-8 encoding. File contains string pairs:

ID_String="Value"

ID_String Description

Title Title for messages
BeginPrompt Begin Prompt message
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Progress Value can be "yes" or "no". Default value is "yes".
RunProgram Command for executing. Default value is "setup.exe".
Substring %%T will be replaced with path to temporary
folder, where files were extracted

Directory Directory prefix for "RunProgram". Default value is ".\\"
ExecuteFile Name of file for executing
ExecuteParameters Parameters for "ExecuteFile"

You can omit any string pair.

There are two ways to run program: RunProgram and ExecuteFile.
Use RunProgram, if you want to run some program from .7z archive.
Use ExecuteFile, if you want to open some document from .7z archive or
if you want to execute some command from Windows.

If you use RunProgram and if you specify empty directory prefix: Directory="",
the system searches for the executable file in the following sequence:

1. The directory from which the application (installer) loaded.
2. The temporary folder, where files were extracted.
3. The Windows system directory.

Config file Examples
~~~~~~~~~~~~~~~~~~~

```
;!@Install@!UTF-8!
Title="7-Zip 4.00"
BeginPrompt="Do you want to install the 7-Zip 4.00?"
RunProgram="setup.exe"
;!@InstallEnd@!
```

```
;!@Install@!UTF-8!
Title="7-Zip 4.00"
BeginPrompt="Do
 you want to install the 7-Zip 4.00?"
ExecuteFile="7zip.msi"
;!@InstallEnd@!
```

```
;!@Install@!UTF-8!
Title="7-Zip 4.01 Update"
BeginPrompt="Do you want to install the 7-Zip 4.01 Update?"
```
~~~~~~~~~~~~~~~~~~~

```
ExecuteFile="msiexec.exe"
ExecuteParameters="/i 7zip.msi REINSTALL=ALL REINSTALLMODE=vomus"
;!@InstallEnd@!
```

Small SFX modules for installers
---

7zS2.sfx  - small SFX module (GUI version)
7zS2con.sfx  - small SFX module (Console version)

Small SFX modules support this codecs: LZMA, LZMA2, BCJ, BCJ2, ARM, COPY

Small SFX module is similar to common SFX module for installers.
The difference (what's new in small version):
- Smaller size (30 KB vs 100 KB)
- C source code instead of ++
- No installer Configuration file
- No extracting progress window
- It decompresses solid 7z blocks (it can be whole 7z archive) to RAM.
  So user that calls SFX installer must have free RAM of size of largest
  solid 7z block (size of 7z archive at simplest case).

How to use
---

```
copy
 /b 7zS2.sfx + archive.7z sfx.exe
```

When you run installer sfx module (sfx.exe)
1) It creates "7zNNNNNNNN" temp folder in system temp folder.
2) It extracts .7z archive to that folder
3) It executes one file from "7zNNNNNNNN" temp folder.
4) It removes "7zNNNNNNNN" temp folder

You can send parameters to installer, and installer will transfer them to extracted .exe file.

Small SFX uses 3 levels of priorities to select file to execute:

1) Files in root folder have higher priority than files in subfolders.
2) File extension priorities (from high to low priority order):
   bat, cmd, exe, inf, msi, cab (under Windows CE), html, htm
3) File name priorities (from high to low priority order):
   setup, install, run, start

Windows CE (ARM) version of 7zS2.sfx is included to 7-Zip for Windows Mobile package.

Examples
---

1) To create compressed console 7-Zip:

```
7zr a c.7z 7z.exe 7z.dll -mx
copy /b 7zS2con.sfx + c.7z 7zCompr.exe
7zCompr.exe b -md22
```

2) To create
 compressed GUI 7-Zip:

```
7zr a g.7z 7zg.exe 7z.dll -mx
copy /b 7zS2.sfx + g.7z 7zgCompr.exe
7zgCompr.exe b -md22
```

3) To open some file:

```
7zr a h.7z readme.txt -mx
copy /b 7zS2.sfx + h.7z 7zTxt.exe
7zTxt.exe
```

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```
// Windows/Control/CommandBar.h

#ifndef __WINDOWS_CONTROL_COMMANDBAR_H
#define __WINDOWS_CONTROL_COMMANDBAR_H

#ifdef UNDER_CE

#include "../../Common/MyWindows.h"

#include <commctrl.h>

#include "../Window.h"

namespace NWindows {
namespace NControl {

class CCommandBar: public NWindows::CWindow
{
public:
 bool Create(HINSTANCE hInst, HWND hwndParent, int idCmdBar)
 {
   _window = ::CommandBar_Create(hInst, hwndParent, idCmdBar);
   return (_window != NULL);
 }

 // Macros
 // void Destroy() { CommandBar_Destroy(_window); }
```

```
 // bool AddButtons(UINT numButtons, LPTBBUTTON buttons) { return
BOOLToBool(SendMsg(TB_ADDBUTTONS, (WPARAM)numButtons, (LPARAM)buttons)); }
 bool InsertButton(int iButton, LPTBBUTTON button) { return BOOLToBool(SendMsg(TB_INSERTBUTTON,
(WPARAM)iButton, (LPARAM)button)); }
 BOOL AddToolTips(UINT numToolTips, LPTSTR toolTips) { return
BOOLToBool(SendMsg(TB_SETTOOLTIPS, (WPARAM)numToolTips, (LPARAM)toolTips)); }
 void AutoSize() { SendMsg(TB_AUTOSIZE,
 0, 0); }

 bool AddAdornments(DWORD dwFlags) { return BOOLToBool(::CommandBar_AddAdornments(_window,
dwFlags, 0)); }
 int AddBitmap(HINSTANCE hInst, int idBitmap, int iNumImages, int iImageWidth, int iImageHeight) { return
::CommandBar_AddBitmap(_window, hInst, idBitmap, iNumImages, iImageWidth, iImageHeight); }
 bool DrawMenuBar(WORD iButton) { return BOOLToBool(::CommandBar_DrawMenuBar(_window, iButton));
}
 HMENU GetMenu(WORD iButton) { return ::CommandBar_GetMenu(_window, iButton); }
 int Height() { return CommandBar_Height(_window); }
 HWND InsertComboBox(HINSTANCE hInst, int iWidth, UINT dwStyle, WORD idComboBox, WORD iButton)
{ return ::CommandBar_InsertComboBox(_window, hInst, iWidth, dwStyle, idComboBox, iButton); }
 bool InsertMenubar(HINSTANCE hInst, WORD idMenu, WORD iButton) { return
BOOLToBool(::CommandBar_InsertMenubar(_window, hInst, idMenu, iButton)); }
 bool InsertMenubarEx(HINSTANCE hInst, LPTSTR pszMenu, WORD iButton) { return
BOOLToBool(::CommandBar_InsertMenubarEx(_window,
 hInst, pszMenu, iButton)); }
 bool Show(bool cmdShow) { return BOOLToBool(::CommandBar_Show(_window, BoolToBOOL(cmdShow))); }


 // CE 4.0
 void AlignAdornments() { CommandBar_AlignAdornments(_window); }
};

}}

#endif

#endif
```

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```
/* -*- Mode: C++; tab-width: 8; indent-tabs-mode: nil; c-basic-offset: 2 -*- */
/* vim: set ts=8 sts=2 et sw=2 tw=80: */
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* License, v. 2.0. If a copy of the MPL was not distributed with this file,
* You can obtain one at http://mozilla.org/MPL/2.0/. */

#ifndef mozilla_dom_Permissions_h_
#define mozilla_dom_Permissions_h_

#include "nsISupports.h"
#include "nsPIDOMWindow.h"
#include "nsWrapperCache.h"

namespace mozilla {

class ErrorResult;

namespace dom {

class Promise;

class Permissions final : public nsISupports, public nsWrapperCache {
public:
 NS_DECL_CYCLE_COLLECTING_ISUPPORTS
 NS_DECL_CYCLE_COLLECTION_SCRIPT_HOLDER_CLASS(Permissions)

 explicit Permissions(nsPIDOMWindowInner* aWindow);

 nsPIDOMWindowInner* GetParentObject() const { return mWindow; }

 JSObject* WrapObject(JSContext* aCx,
                      JS::Handle<JSObject*> aGivenProto) override;

 already_AddRefed<Promise> Query(JSContext*
 aCx,
                                 JS::Handle<JSObject*> aPermission,
                                 ErrorResult& aRv);

 static nsresult RemovePermission(nsIPrincipal* aPrincipal,
                                  const nsACString& aPermissionType);

 already_AddRefed<Promise> Revoke(JSContext* aCx,
                                  JS::Handle<JSObject*> aPermission,
                                  ErrorResult& aRv);
```

```
private:
 ~Permissions();

 nsCOMPtr<nsPIDOMWindowInner> mWindow;
};

}  // namespace dom
}  // namespace mozilla

#endif  // mozilla_dom_permissions_h_
// Common/IntToString.h

#ifndef __COMMON_INT_TO_STRING_H
#define __COMMON_INT_TO_STRING_H

#include "MyTypes.h"

void ConvertUInt32ToString(UInt32 value, char *s) throw();
void ConvertUInt64ToString(UInt64 value, char *s) throw();

void ConvertUInt32ToString(UInt32 value, wchar_t *s) throw();
void ConvertUInt64ToString(UInt64 value, wchar_t *s) throw();

void ConvertUInt64ToOct(UInt64 value, char *s) throw();

void ConvertUInt32ToHex(UInt32 value, char *s) throw();
void ConvertUInt64ToHex(UInt64 value, char *s) throw();
void ConvertUInt32ToHex8Digits(UInt32 value, char *s) throw();
// void ConvertUInt32ToHex8Digits(UInt32 value, wchar_t *s) throw();

void ConvertInt64ToString(Int64 value, char *s) throw();
void ConvertInt64ToString(Int64 value, wchar_t *s) throw();

// use RawLeGuid only for RAW bytes that contain stored GUID as Little-endian.
char *RawLeGuidToString(const Byte *guid, char *s) throw();
char *RawLeGuidToString_Braced(const Byte *guid, char *s) throw();

#endif
```

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```
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* License along with this library; if not, write to the
* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#if defined(ATK_DISABLE_SINGLE_INCLUDES) && !defined (__ATK_H_INSIDE__) && !defined
(ATK_COMPILATION)
#error "Only <atk/atk.h> can be included directly."
#endif

#ifndef __ATK_SOCKET_H__
#define
 __ATK_SOCKET_H__

G_BEGIN_DECLS

#define ATK_TYPE_SOCKET             (atk_socket_get_type ())
#define ATK_SOCKET(obj)             (G_TYPE_CHECK_INSTANCE_CAST ((obj), ATK_TYPE_SOCKET,
AtkSocket))
#define ATK_IS_SOCKET(obj)          (G_TYPE_CHECK_INSTANCE_TYPE ((obj), ATK_TYPE_SOCKET))
#define ATK_SOCKET_CLASS(klass)     (G_TYPE_CHECK_CLASS_CAST ((klass), ATK_TYPE_SOCKET,
AtkSocketClass))
```

```
#define ATK_IS_SOCKET_CLASS(klass)    (G_TYPE_CHECK_CLASS_TYPE ((klass), ATK_TYPE_SOCKET))
#define ATK_SOCKET_GET_CLASS(obj)     (G_TYPE_INSTANCE_GET_CLASS ((obj),
ATK_TYPE_SOCKET, AtkSocketClass))

typedef struct _AtkSocket         AtkSocket;
typedef struct _AtkSocketClass    AtkSocketClass;

struct _AtkSocket
{
 AtkObject parent;

 /*< private >*/
 gchar* embedded_plug_id;
};

GType atk_socket_get_type (void);

struct _AtkSocketClass
{
 AtkObjectClass parent_class;

 /* to be subscribed to by atk-bridge */

 /*< protected >*/
 void (* embed) (AtkSocket *obj, gchar* plug_id);
};

AtkObject*
   atk_socket_new           (void);
void          atk_socket_embed         (AtkSocket* obj, gchar* plug_id);
gboolean      atk_socket_is_occupied   (AtkSocket* obj);

G_END_DECLS

#endif /* __ATK_SOCKET_H__ */
```

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```
// LimitedStreams.h

#ifndef __LIMITED_STREAMS_H
#define __LIMITED_STREAMS_H

#include "../../Common/MyBuffer.h"
#include "../../Common/MyCom.h"
#include "../../Common/MyVector.h"
#include "../IStream.h"

class CLimitedSequentialInStream:
 public ISequentialInStream,
 public CMyUnknownImp
{
 CMyComPtr<ISequentialInStream> _stream;
 UInt64 _size;
 UInt64 _pos;
 bool _wasFinished;
public:
 void SetStream(ISequentialInStream *stream) { _stream = stream; }
 void ReleaseStream() { _stream.Release(); }
```

```
 void Init(UInt64 streamSize)
 {
   _size = streamSize;
   _pos = 0;
   _wasFinished = false;
 }

 MY_UNKNOWN_IMP1(ISequentialInStream)

 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 UInt64 GetSize() const { return _pos; }
 UInt64 GetRem() const { return _size - _pos; }
 bool WasFinished() const { return _wasFinished; }
};

class CLimitedInStream:
 public IInStream,
 public CMyUnknownImp
{
 CMyComPtr<IInStream> _stream;
 UInt64 _virtPos;
 UInt64 _physPos;
  UInt64 _size;
 UInt64 _startOffset;

 HRESULT SeekToPhys() { return _stream->Seek(_physPos, STREAM_SEEK_SET, NULL); }
public:
 void SetStream(IInStream *stream) { _stream = stream; }
 HRESULT InitAndSeek(UInt64 startOffset, UInt64 size)
 {
   _startOffset = startOffset;
   _physPos = startOffset;
   _virtPos = 0;
   _size = size;
   return SeekToPhys();
 }

 MY_UNKNOWN_IMP2(ISequentialInStream, IInStream)

 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition);

 HRESULT SeekToStart() { return Seek(0, STREAM_SEEK_SET, NULL); }
};

HRESULT CreateLimitedInStream(IInStream *inStream, UInt64 pos, UInt64 size, ISequentialInStream
**resStream);
```

```
class CClusterInStream:
 public IInStream,
 public CMyUnknownImp
{
 UInt64 _virtPos;
 UInt64 _physPos;
 UInt32 _curRem;
public:
 unsigned BlockSizeLog;
 UInt64 Size;
 CMyComPtr<IInStream> Stream;
 CRecordVector<UInt32> Vector;
 UInt64
 StartOffset;

 HRESULT SeekToPhys() { return Stream->Seek(_physPos, STREAM_SEEK_SET, NULL); }

 HRESULT InitAndSeek()
 {
   _curRem = 0;
   _virtPos = 0;
   _physPos = StartOffset;
   if (Vector.Size() > 0)
   {
     _physPos = StartOffset + (Vector[0] << BlockSizeLog);
     return SeekToPhys();
   }
   return S_OK;
 }

 MY_UNKNOWN_IMP2(ISequentialInStream, IInStream)

 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition);
};

struct CSeekExtent
{
 UInt64 Phy;
 UInt64 Virt;
};

class CExtentsStream:
 public IInStream,
 public CMyUnknownImp
{
 UInt64 _phyPos;
 UInt64 _virtPos;
```

```
 bool _needStartSeek;

 HRESULT SeekToPhys() { return Stream->Seek(_phyPos, STREAM_SEEK_SET, NULL); }

public:
 CMyComPtr<IInStream> Stream;
 CRecordVector<CSeekExtent> Extents;

 MY_UNKNOWN_IMP2(ISequentialInStream, IInStream)
 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(Seek)(Int64
 offset, UInt32 seekOrigin, UInt64 *newPosition);
 void ReleaseStream() { Stream.Release(); }

 void Init()
 {
   _virtPos = 0;
   _phyPos = 0;
   _needStartSeek = true;
 }
};

class CLimitedSequentialOutStream:
 public ISequentialOutStream,
 public CMyUnknownImp
{
 CMyComPtr<ISequentialOutStream> _stream;
 UInt64 _size;
 bool _overflow;
 bool _overflowIsAllowed;
public:
 MY_UNKNOWN_IMP1(ISequentialOutStream)
 STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
 void SetStream(ISequentialOutStream *stream) { _stream = stream; }
 void ReleaseStream() { _stream.Release(); }
 void Init(UInt64 size, bool overflowIsAllowed = false)
 {
   _size = size;
   _overflow = false;
   _overflowIsAllowed = overflowIsAllowed;
 }
 bool IsFinishedOK() const { return (_size == 0 && !_overflow); }
 UInt64 GetRem() const { return _size; }
};


class CTailInStream:
 public IInStream,
```

```
 public CMyUnknownImp
{
 UInt64 _virtPos;
public:
 CMyComPtr<IInStream>
 Stream;
 UInt64 Offset;

 void Init()
 {
   _virtPos = 0;
 }

 MY_UNKNOWN_IMP2(ISequentialInStream, IInStream)

 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition);

 HRESULT SeekToStart() { return Stream->Seek(Offset, STREAM_SEEK_SET, NULL); }
};

class CLimitedCachedInStream:
 public IInStream,
 public CMyUnknownImp
{
 CMyComPtr<IInStream> _stream;
 UInt64 _virtPos;
 UInt64 _physPos;
 UInt64 _size;
 UInt64 _startOffset;

 const Byte *_cache;
 size_t _cacheSize;
 size_t _cachePhyPos;


 HRESULT SeekToPhys() { return _stream->Seek(_physPos, STREAM_SEEK_SET, NULL); }
public:
 CByteBuffer Buffer;

 void SetStream(IInStream *stream) { _stream = stream; }
 void SetCache(size_t cacheSize, size_t cachePos)
 {
   _cache = Buffer;
   _cacheSize = cacheSize;
   _cachePhyPos = cachePos;
 }
```

```
 HRESULT InitAndSeek(UInt64 startOffset, UInt64 size)
 {
   _startOffset = startOffset;
    _physPos = startOffset;
   _virtPos = 0;
   _size = size;
   return SeekToPhys();
 }

 MY_UNKNOWN_IMP2(ISequentialInStream, IInStream)

 STDMETHOD(Read)(void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition);

 HRESULT SeekToStart() { return Seek(0, STREAM_SEEK_SET, NULL); }
};

class CTailOutStream:
 public IOutStream,
 public CMyUnknownImp
{
 UInt64 _virtPos;
 UInt64 _virtSize;
public:
 CMyComPtr<IOutStream> Stream;
 UInt64 Offset;

 virtual ~CTailOutStream() {}

 MY_UNKNOWN_IMP2(ISequentialOutStream, IOutStream)

 void Init()
 {
   _virtPos = 0;
   _virtSize = 0;
 }

 STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition);
 STDMETHOD(SetSize)(UInt64 newSize);
};

#endif
```

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```
; LzmaDecOpt.asm -- ASM version of LzmaDec_DecodeReal_3() function
; 2018-02-06: Igor Pavlov : Public domain
;
; 3 - is the code compatibility version of LzmaDec_DecodeReal_*()
; function for check at link time.
; That code is tightly coupled with LzmaDec_TryDummy()
; and with another functions in LzmaDec.c file.
; CLzmaDec structure, (probs) array layout, input and output of
; LzmaDec_DecodeReal_*() must be equal in both versions (C / ASM).

ifndef x64
; x64=1
; .err <x64_IS_REQUIRED>
endif

include 7zAsm.asm

MY_ASM_START

_TEXT$LZMADECOPT SEGMENT ALIGN(64) 'CODE'

MY_ALIGN macro num:req
      align  num
endm

MY_ALIGN_16 macro
      MY_ALIGN 16
endm

MY_ALIGN_32 macro
      MY_ALIGN 32
endm

MY_ALIGN_64 macro
```

```
        MY_ALIGN 64
endm


; _LZMA_SIZE_OPT  equ 1

; _LZMA_PROB32 equ 1

ifdef _LZMA_PROB32
        PSHIFT  equ 2
        PLOAD macro dest, mem
                mov     dest, dword ptr [mem]
        endm
        PSTORE  macro src, mem
                mov     dword ptr [mem],
 src
        endm
else
        PSHIFT  equ 1
        PLOAD macro dest, mem
                movzx   dest, word ptr [mem]
        endm
        PSTORE macro src, mem
                mov     word ptr [mem], @CatStr(src, _W)
        endm
endif

PMULT           equ (1 SHL PSHIFT)
PMULT_HALF      equ (1 SHL (PSHIFT - 1))
PMULT_2         equ (1 SHL (PSHIFT + 1))


;       x0      range
;       x1      pbPos / (prob) TREE
;       x2      probBranch / prm (MATCHED) / pbPos / cnt
;       x3      sym
;====== r4 ===  RSP
;       x5      cod
;       x6      t1 NORM_CALC / probs_state / dist
;       x7      t0 NORM_CALC / prob2 IF_BIT_1
;       x8      state
;       x9      match (MATCHED) / sym2 / dist2 / lpMask_reg
;       x10     kBitModelTotal_reg
;       r11     probs
;       x12     offs (MATCHED) / dic / len_temp
;       x13     processedPos
;       x14     bit (MATCHED) / dicPos
;       r15     buf
```

```
cod     equ x5
cod_L   equ x5_L
range   equ x0
state   equ x8
state_R equ r8
buf     equ r15
processedPos
 equ x13
kBitModelTotal_reg equ x10

probBranch   equ x2
probBranch_R equ r2
probBranch_W equ x2_W

pbPos   equ x1
pbPos_R equ r1

cnt     equ x2
cnt_R   equ r2

lpMask_reg equ x9
dicPos  equ r14

sym     equ x3
sym_R   equ r3
sym_L   equ x3_L

probs   equ r11
dic     equ r12

t0      equ x7
t0_W    equ x7_W
t0_R    equ r7

prob2   equ t0
prob2_W equ t0_W

t1      equ x6
t1_R    equ r6

probs_state     equ t1
probs_state_R   equ t1_R

prm     equ r2
match   equ x9
match_R equ r9
```

```
offs    equ x12
offs_R  equ r12
bit     equ x14
bit_R   equ r14

sym2    equ x9
sym2_R  equ r9

len_temp equ x12

dist    equ sym
dist2   equ x9



kNumBitModelTotalBits   equ 11
kBitModelTotal          equ (1 SHL kNumBitModelTotalBits)
kNumMoveBits            equ 5
kBitModelOffset         equ ((1 SHL kNumMoveBits) - 1)
kTopValue               equ (1 SHL 24)

NORM_2 macro
      ; movzx   t0, BYTE PTR [buf]
      shl     cod, 8
      mov     cod_L, BYTE PTR [buf]
      shl     range, 8

    ; or      cod, t0
      inc     buf
endm


NORM macro
      cmp     range, kTopValue
      jae     SHORT @F
      NORM_2
@@:
endm


; ---------- Branch MACROS ----------

UPDATE_0 macro probsArray:req, probOffset:req, probDisp:req
      mov     prob2, kBitModelTotal_reg
      sub     prob2, probBranch
      shr     prob2, kNumMoveBits
      add     probBranch, prob2
      PSTORE  probBranch, probOffset * 1 + probsArray + probDisp * PMULT
```

```
endm


UPDATE_1 macro probsArray:req, probOffset:req, probDisp:req
	sub	prob2, range
	sub	cod, range
	mov	range, prob2
	mov	prob2, probBranch
	shr	probBranch, kNumMoveBits
	sub	prob2, probBranch
	PSTORE  prob2, probOffset * 1 + probsArray + probDisp * PMULT
endm


CMP_COD macro probsArray:req, probOffset:req, probDisp:req
	PLOAD	probBranch, probOffset * 1 + probsArray + probDisp * PMULT
	NORM
	mov	prob2, range
	shr	range,
 kNumBitModelTotalBits
	imul	range, probBranch
	cmp	cod, range
endm


IF_BIT_1_NOUP macro probsArray:req, probOffset:req, probDisp:req, toLabel:req
	CMP_COD probsArray, probOffset, probDisp
	jae	toLabel
endm


IF_BIT_1 macro probsArray:req, probOffset:req, probDisp:req, toLabel:req
	IF_BIT_1_NOUP probsArray, probOffset, probDisp, toLabel
	UPDATE_0 probsArray, probOffset, probDisp
endm


IF_BIT_0_NOUP macro probsArray:req, probOffset:req, probDisp:req, toLabel:req
	CMP_COD probsArray, probOffset, probDisp
	jb	toLabel
endm


; ---------- CMOV MACROS ----------

NORM_CALC macro prob:req
	NORM
	mov	t0, range
```

```
        shr     range, kNumBitModelTotalBits
        imul    range, prob
        sub     t0, range
        mov     t1, cod
        sub     cod, range
endm


PUP macro prob:req, probPtr:req
        sub     t0, prob
       ; only sar works for both 16/32 bit prob modes
        sar     t0, kNumMoveBits
         add     t0, prob
        PSTORE  t0, probPtr
endm


PUP_SUB macro prob:req, probPtr:req, symSub:req
        sbb     sym, symSub
        PUP prob, probPtr
endm


PUP_COD macro prob:req, probPtr:req, symSub:req
        mov     t0, kBitModelOffset
        cmovb   cod, t1
        mov     t1, sym
        cmovb   t0, kBitModelTotal_reg
        PUP_SUB prob, probPtr, symSub
endm


BIT_0 macro prob:req, probNext:req
        PLOAD   prob, probs + 1 * PMULT
        PLOAD   probNext, probs + 1 * PMULT_2

        NORM_CALC prob

        cmovae  range, t0
        PLOAD   t0, probs + 1 * PMULT_2 + PMULT
        cmovae  probNext, t0
        mov     t0, kBitModelOffset
        cmovb   cod, t1
        cmovb   t0, kBitModelTotal_reg
        mov     sym, 2
        PUP_SUB prob, probs + 1 * PMULT, 0 - 1
endm
```

```
BIT_1 macro prob:req, probNext:req
      PLOAD   probNext, probs + sym_R * PMULT_2
      add     sym, sym

      NORM_CALC prob

      cmovae  range, t0

      PLOAD   t0, probs + sym_R * PMULT + PMULT
      cmovae  probNext, t0
      PUP_COD prob, probs + t1_R * PMULT_HALF, 0 - 1
endm


BIT_2 macro prob:req, symSub:req
      add     sym, sym

      NORM_CALC prob

      cmovae  range, t0
      PUP_COD prob, probs + t1_R * PMULT_HALF, symSub
endm


; ---------- MATCHED LITERAL ----------

LITM_0 macro
      mov     offs, 256 * PMULT
      shl     match, (PSHIFT + 1)
      mov     bit, offs
      and     bit, match
      PLOAD   x1, probs + 256 * PMULT + bit_R * 1 + 1 * PMULT
      lea     prm, [probs + 256 * PMULT + bit_R * 1 + 1 * PMULT]
      ; lea     prm, [probs + 256 * PMULT + 1 * PMULT]
      ; add     prm, bit_R
      xor     offs, bit
      add     match, match

      NORM_CALC x1

      cmovae  offs, bit
      mov     bit, match
      cmovae  range, t0
      mov     t0, kBitModelOffset
      cmovb   cod, t1
      cmovb   t0, kBitModelTotal_reg
      mov     sym, 0
```

```
 PUP_SUB x1, prm, -2-1
endm


LITM macro
      and     bit, offs
      lea     prm, [probs + offs_R * 1]
      add     prm, bit_R
      PLOAD   x1, prm + sym_R * PMULT
      xor     offs, bit
      add     sym, sym
      add     match, match

      NORM_CALC x1

      cmovae  offs, bit
      mov     bit, match
      cmovae  range, t0
      PUP_COD x1, prm + t1_R * PMULT_HALF, - 1
endm


LITM_2 macro
      and     bit, offs
      lea     prm, [probs + offs_R * 1]
      add     prm, bit_R
      PLOAD   x1, prm + sym_R * PMULT
      add     sym, sym

      NORM_CALC x1

      cmovae  range, t0
      PUP_COD x1, prm + t1_R * PMULT_HALF, 256 - 1
endm


; ---------- REVERSE BITS ----------

REV_0 macro prob:req, probNext:req
      ; PLOAD   prob, probs + 1 * PMULT
      ; lea     sym2_R, [probs + 2 * PMULT]
      ; PLOAD   probNext, probs + 2 * PMULT
      PLOAD   probNext, sym2_R

      NORM_CALC prob

      cmovae  range, t0
```

```
        PLOAD
    t0, probs + 3 * PMULT
        cmovae  probNext, t0
        cmovb   cod, t1
        mov     t0, kBitModelOffset
        cmovb   t0, kBitModelTotal_reg
        lea     t1_R, [probs + 3 * PMULT]
        cmovae  sym2_R, t1_R
        PUP prob, probs + 1 * PMULT
endm


REV_1 macro prob:req, probNext:req, step:req
        add     sym2_R, step * PMULT
        PLOAD   probNext, sym2_R

        NORM_CALC prob

        cmovae  range, t0
        PLOAD   t0, sym2_R + step * PMULT
        cmovae  probNext, t0
        cmovb   cod, t1
        mov     t0, kBitModelOffset
        cmovb   t0, kBitModelTotal_reg
        lea     t1_R, [sym2_R + step * PMULT]
        cmovae  sym2_R, t1_R
        PUP prob, t1_R - step * PMULT_2
endm


REV_2 macro prob:req, step:req
        sub     sym2_R, probs
        shr     sym2, PSHIFT
        or      sym, sym2

        NORM_CALC prob

        cmovae  range, t0
        lea     t0, [sym - step]
        cmovb   sym, t0
        cmovb   cod, t1
        mov     t0, kBitModelOffset
         cmovb   t0, kBitModelTotal_reg
        PUP prob, probs + sym2_R * PMULT
endm


REV_1_VAR macro prob:req
```

```
    PLOAD   prob, sym_R
    mov     probs, sym_R
    add     sym_R, sym2_R

    NORM_CALC prob

    cmovae  range, t0
    lea     t0_R, [sym_R + sym2_R]
    cmovae  sym_R, t0_R
    mov     t0, kBitModelOffset
    cmovb   cod, t1
    ; mov     t1, kBitModelTotal
    ; cmovb   t0, t1
    cmovb   t0, kBitModelTotal_reg
    add     sym2, sym2
    PUP prob, probs
endm




LIT_PROBS macro lpMaskParam:req
    ; prob += (UInt32)3 * ((((processedPos << 8) + dic[(dicPos == 0 ? dicBufSize : dicPos) - 1]) & lpMask) << lc);
    mov     t0, processedPos
    shl     t0, 8
    add     sym, t0
    and     sym, lpMaskParam
    add     probs_state_R, pbPos_R
    mov     x1, LOC lc2
    lea     sym, dword ptr[sym_R + 2 * sym_R]
    add     probs, Literal * PMULT
    shl     sym, x1_L
    add
   probs, sym_R
    UPDATE_0 probs_state_R, 0, IsMatch
    inc     processedPos
endm



kNumPosBitsMax          equ 4
kNumPosStatesMax        equ (1 SHL kNumPosBitsMax)

kLenNumLowBits          equ 3
kLenNumLowSymbols       equ (1 SHL kLenNumLowBits)
kLenNumHighBits         equ 8
kLenNumHighSymbols      equ (1 SHL kLenNumHighBits)
kNumLenProbs            equ (2 * kLenNumLowSymbols * kNumPosStatesMax + kLenNumHighSymbols)
```

```
LenLow                  equ 0
LenChoice               equ LenLow
LenChoice2              equ (LenLow + kLenNumLowSymbols)
LenHigh                 equ (LenLow + 2 * kLenNumLowSymbols * kNumPosStatesMax)

kNumStates              equ 12
kNumStates2             equ 16
kNumLitStates           equ 7

kStartPosModelIndex     equ 4
kEndPosModelIndex       equ 14
kNumFullDistances       equ (1 SHL (kEndPosModelIndex SHR 1))

kNumPosSlotBits         equ 6
kNumLenToPosStates      equ 4

kNumAlignBits           equ 4
kAlignTableSize         equ (1 SHL kNumAlignBits)

kMatchMinLen
          equ 2
kMatchSpecLenStart      equ (kMatchMinLen + kLenNumLowSymbols * 2 + kLenNumHighSymbols)

kStartOffset    equ 1664
SpecPos         equ (-kStartOffset)
IsRep0Long      equ (SpecPos + kNumFullDistances)
RepLenCoder     equ (IsRep0Long + (kNumStates2 SHL kNumPosBitsMax))
LenCoder        equ (RepLenCoder + kNumLenProbs)
IsMatch         equ (LenCoder + kNumLenProbs)
kAlign          equ (IsMatch + (kNumStates2 SHL kNumPosBitsMax))
IsRep           equ (kAlign + kAlignTableSize)
IsRepG0         equ (IsRep + kNumStates)
IsRepG1         equ (IsRepG0 + kNumStates)
IsRepG2         equ (IsRepG1 + kNumStates)
PosSlot         equ (IsRepG2 + kNumStates)
Literal         equ (PosSlot + (kNumLenToPosStates SHL kNumPosSlotBits))
NUM_BASE_PROBS  equ (Literal + kStartOffset)

if kAlign ne 0
 .err <Stop_Compiling_Bad_LZMA_kAlign>
endif

if NUM_BASE_PROBS ne 1984
 .err <Stop_Compiling_Bad_LZMA_PROBS>
endif
```

```
PTR_FIELD equ dq ?

CLzmaDec_Asm struct
    lc      db ?
    lp
   db ?
    pb      db ?
    _pad_   db ?
    dicSize dd ?

    probs_Spec      PTR_FIELD
    probs_1664      PTR_FIELD
    dic_Spec        PTR_FIELD
    dicBufSize      PTR_FIELD
    dicPos_Spec     PTR_FIELD
    buf_Spec        PTR_FIELD

    range_Spec      dd ?
    code_Spec       dd ?
    processedPos_Spec  dd ?
    checkDicSize    dd ?
    rep0    dd ?
    rep1    dd ?
    rep2    dd ?
    rep3    dd ?
    state_Spec      dd ?
    remainLen dd ?
CLzmaDec_Asm ends


CLzmaDec_Asm_Loc struct
    OLD_RSP    PTR_FIELD
    lzmaPtr    PTR_FIELD
    _pad0_     PTR_FIELD
    _pad1_     PTR_FIELD
    _pad2_     PTR_FIELD
    dicBufSize PTR_FIELD
    probs_Spec PTR_FIELD
    dic_Spec   PTR_FIELD

    limit      PTR_FIELD
    bufLimit   PTR_FIELD
    lc2        dd ?
    lpMask     dd ?
    pbMask     dd ?
    checkDicSize   dd ?

    _pad_      dd ?
```

```
 remainLen dd ?
    dicPos_Spec     PTR_FIELD
    rep0      dd ?
    rep1      dd ?
    rep2      dd ?
    rep3      dd ?
CLzmaDec_Asm_Loc ends


GLOB_2  equ [sym_R].CLzmaDec_Asm.
GLOB    equ [r1].CLzmaDec_Asm.
LOC_0   equ [r0].CLzmaDec_Asm_Loc.
LOC     equ [RSP].CLzmaDec_Asm_Loc.


COPY_VAR macro name
    mov     t0, GLOB_2 name
    mov     LOC_0 name, t0
endm


RESTORE_VAR macro name
    mov     t0, LOC name
    mov     GLOB name, t0
endm



IsMatchBranch_Pre macro reg
    ; prob = probs + IsMatch + (state << kNumPosBitsMax) + posState;
    mov     pbPos, LOC pbMask
    and     pbPos, processedPos
    shl     pbPos, (kLenNumLowBits + 1 + PSHIFT)
    lea     probs_state_R, [probs + state_R]
endm


IsMatchBranch macro reg
    IsMatchBranch_Pre
    IF_BIT_1 probs_state_R, pbPos_R, IsMatch, IsMatch_label
endm


CheckLimits macro reg
    cmp     buf, LOC bufLimit
    jae     fin_OK
    cmp     dicPos,
```

```
 LOC limit
      jae     fin_OK
endm



; RSP is (16x + 8) bytes aligned in WIN64-x64
; LocalSize equ ((((SIZEOF CLzmaDec_Asm_Loc) + 7) / 16 * 16) + 8)

PARAM_lzma      equ REG_PARAM_0
PARAM_limit     equ REG_PARAM_1
PARAM_bufLimit  equ REG_PARAM_2

; MY_ALIGN_64
MY_PROC LzmaDec_DecodeReal_3, 3
MY_PUSH_PRESERVED_REGS

      lea     r0, [RSP - (SIZEOF CLzmaDec_Asm_Loc)]
      and     r0, -128
      mov     r5, RSP
      mov     RSP, r0
      mov     LOC_0 Old_RSP, r5
      mov     LOC_0 lzmaPtr, PARAM_lzma

      mov     LOC_0 remainLen, 0  ; remainLen must be ZERO

      mov     LOC_0 bufLimit, PARAM_bufLimit
      mov     sym_R, PARAM_lzma  ;  CLzmaDec_Asm_Loc pointer for GLOB_2
      mov     dic, GLOB_2 dic_Spec
      add     PARAM_limit, dic
      mov     LOC_0 limit, PARAM_limit

      COPY_VAR(rep0)
      COPY_VAR(rep1)
      COPY_VAR(rep2)
      COPY_VAR(rep3)

      mov     dicPos, GLOB_2 dicPos_Spec
      add     dicPos, dic
       mov     LOC_0 dicPos_Spec, dicPos
      mov     LOC_0 dic_Spec, dic

      mov     x1_L, GLOB_2 pb
      mov     t0, 1
      shl     t0, x1_L
      dec     t0
      mov     LOC_0 pbMask, t0
```

```
; unsigned pbMask = ((unsigned)1 << (p->prop.pb)) - 1;
; unsigned lc = p->prop.lc;
; unsigned lpMask = ((unsigned)0x100 << p->prop.lp) - ((unsigned)0x100 >> lc);

mov     x1_L, GLOB_2 lc
mov     x2, 100h
mov     t0, x2
shr     x2, x1_L
; inc     x1
add     x1_L, PSHIFT
mov     LOC_0 lc2, x1
mov     x1_L, GLOB_2 lp
shl     t0, x1_L
sub     t0, x2
mov     LOC_0 lpMask, t0
mov     lpMask_reg, t0

; mov     probs, GLOB_2 probs_Spec
; add     probs, kStartOffset SHL PSHIFT
mov     probs, GLOB_2 probs_1664
mov     LOC_0 probs_Spec, probs

mov     t0_R, GLOB_2 dicBufSize
mov     LOC_0 dicBufSize, t0_R

mov     x1, GLOB_2 checkDicSize
mov     LOC_0 checkDicSize, x1

mov     processedPos, GLOB_2 processedPos_Spec

mov     state, GLOB_2 state_Spec
shl     state, PSHIFT

mov     buf,   GLOB_2 buf_Spec
mov     range, GLOB_2 range_Spec
mov     cod,   GLOB_2 code_Spec
mov     kBitModelTotal_reg, kBitModelTotal
xor     sym, sym

; if (processedPos != 0 || checkDicSize != 0)
or      x1, processedPos
jz      @f

add     t0_R, dic
cmp     dicPos, dic
cmovnz  t0_R, dicPos
movzx   sym, byte ptr[t0_R - 1]
```

```
@@:
      IsMatchBranch_Pre
      cmp     state, 4 * PMULT
      jb      lit_end
      cmp     state, kNumLitStates * PMULT
      jb      lit_matched_end
      jmp     lz_end




; ---------- LITERAL ----------
MY_ALIGN_64
lit_start:
      xor     state, state
lit_start_2:
      LIT_PROBS lpMask_reg

  ifdef _LZMA_SIZE_OPT

       PLOAD   x1, probs + 1 * PMULT
      mov     sym, 1
MY_ALIGN_16
lit_loop:
      BIT_1   x1, x2
      mov     x1, x2
      cmp     sym, 127
      jbe     lit_loop

  else

      BIT_0   x1, x2
      BIT_1   x2, x1
      BIT_1   x1, x2
      BIT_1   x2, x1
      BIT_1   x1, x2
      BIT_1   x2, x1
      BIT_1   x1, x2

  endif

      BIT_2   x2, 256 - 1

      ; mov     dic, LOC dic_Spec
      mov     probs, LOC probs_Spec
      IsMatchBranch_Pre
      mov     byte ptr[dicPos], sym_L
      inc     dicPos
```

```
        CheckLimits
lit_end:
        IF_BIT_0_NOUP probs_state_R, pbPos_R, IsMatch, lit_start

        ; jmp     IsMatch_label

; ---------- MATCHES ----------
; MY_ALIGN_32
IsMatch_label:
        UPDATE_1 probs_state_R, pbPos_R, IsMatch
        IF_BIT_1 probs_state_R, 0, IsRep, IsRep_label

        add     probs, LenCoder * PMULT
        add     state, kNumStates * PMULT

;
 ---------- LEN DECODE ----------
len_decode:
        mov     len_temp, 8 - 1 - kMatchMinLen
        IF_BIT_0_NOUP probs, 0, 0, len_mid_0
        UPDATE_1 probs, 0, 0
        add     probs, (1 SHL (kLenNumLowBits + PSHIFT))
        mov     len_temp, -1 - kMatchMinLen
        IF_BIT_0_NOUP probs, 0, 0, len_mid_0
        UPDATE_1 probs, 0, 0
        add     probs, LenHigh * PMULT - (1 SHL (kLenNumLowBits + PSHIFT))
        mov     sym, 1
        PLOAD   x1, probs + 1 * PMULT

MY_ALIGN_32
len8_loop:
        BIT_1   x1, x2
        mov     x1, x2
        cmp     sym, 64
        jb      len8_loop

        mov     len_temp, (kLenNumHighSymbols - kLenNumLowSymbols * 2) - 1 - kMatchMinLen
        jmp     len_mid_2

MY_ALIGN_32
len_mid_0:
        UPDATE_0 probs, 0, 0
        add     probs, pbPos_R
        BIT_0   x2, x1
len_mid_2:
        BIT_1   x1, x2
        BIT_2   x2, len_temp
```

```
        mov     probs, LOC probs_Spec
        cmp     state, kNumStates * PMULT
        jb      copy_match


; ---------- DECODE DISTANCE ----------
        ; probs + PosSlot + ((len < kNumLenToPosStates ? len : kNumLenToPosStates - 1) << kNumPosSlotBits);

        mov     t0, 3 + kMatchMinLen
        cmp     sym, 3 + kMatchMinLen
        cmovb   t0, sym
        add     probs, PosSlot * PMULT - (kMatchMinLen SHL (kNumPosSlotBits + PSHIFT))
        shl     t0, (kNumPosSlotBits + PSHIFT)
        add     probs, t0_R

        ; sym = Len
        ; mov     LOC remainLen, sym
        mov     len_temp, sym

    ifdef _LZMA_SIZE_OPT

        PLOAD   x1, probs + 1 * PMULT
        mov     sym, 1
MY_ALIGN_16
slot_loop:
        BIT_1   x1, x2
        mov     x1, x2
        cmp     sym, 32
        jb      slot_loop

    else

        BIT_0   x1, x2
        BIT_1   x2, x1
        BIT_1   x1, x2
        BIT_1   x2, x1
        BIT_1   x1, x2

    endif

        mov     x1, sym
        BIT_2   x2, 64-1

        and     sym, 3
        mov     probs, LOC
 probs_Spec
        cmp     x1, 32 + kEndPosModelIndex / 2
        jb      short_dist
```

```
        ;  unsigned numDirectBits = (unsigned)(((distance >> 1) - 1));
        sub     x1, (32 + 1 + kNumAlignBits)
        ;  distance = (2 | (distance & 1));
        or      sym, 2
        PLOAD   x2, probs + 1 * PMULT
        shl     sym, kNumAlignBits + 1
        lea     sym2_R, [probs + 2 * PMULT]

        jmp     direct_norm
        ; lea     t1, [sym_R + (1 SHL kNumAlignBits)]
        ; cmp     range, kTopValue
        ; jb      direct_norm

; ---------- DIRECT DISTANCE ----------
MY_ALIGN_32
direct_loop:
        shr     range, 1
        mov     t0, cod
        sub     cod, range
        cmovs   cod, t0
        cmovns  sym, t1

        comment ~
        sub     cod, range
        mov     x2, cod
        sar     x2, 31
        lea     sym, dword ptr [r2 + sym_R * 2 + 1]
        and     x2, range
        add     cod, x2
        ~
        dec     x1
        je      direct_end

         add     sym, sym
direct_norm:
        lea     t1, [sym_R + (1 SHL kNumAlignBits)]
        cmp     range, kTopValue
        jae     near ptr direct_loop
        ; we align for 32 here with "near ptr" command above
        NORM_2
        jmp     direct_loop

MY_ALIGN_32
direct_end:
        ;  prob =  + kAlign;
        ;  distance <<= kNumAlignBits;
        REV_0   x2, x1
```

```
        REV_1   x1, x2, 2
        REV_1   x2, x1, 4
        REV_2   x1, 8

decode_dist_end:

        ; if (distance >= (checkDicSize == 0 ? processedPos: checkDicSize))

        mov     t0, LOC checkDicSize
        test    t0, t0
        cmove   t0, processedPos
        cmp     sym, t0
        jae     end_of_payload

        ; rep3 = rep2;
        ; rep2 = rep1;
        ; rep1 = rep0;
        ; rep0 = distance + 1;

        inc     sym
        mov     t0, LOC rep0
        mov     t1, LOC rep1
        mov     x1, LOC rep2
        mov     LOC rep0, sym
        ; mov     sym, LOC remainLen
        mov
      sym, len_temp
        mov     LOC rep1, t0
        mov     LOC rep2, t1
        mov     LOC rep3, x1

        ; state = (state < kNumStates + kNumLitStates) ? kNumLitStates : kNumLitStates + 3;
        cmp     state, (kNumStates + kNumLitStates) * PMULT
        mov     state, kNumLitStates * PMULT
        mov     t0, (kNumLitStates + 3) * PMULT
        cmovae  state, t0


; ---------- COPY MATCH ----------
copy_match:

        ; len += kMatchMinLen;
        ; add     sym, kMatchMinLen

        ; if ((rem = limit - dicPos) == 0)
        ; {
        ;   p->dicPos = dicPos;
        ;   return SZ_ERROR_DATA;
```

```
        ; }
        mov     cnt_R, LOC limit
        sub     cnt_R, dicPos
        jz      fin_ERROR

        ; curLen = ((rem < len) ? (unsigned)rem : len);
        cmp     cnt_R, sym_R
        ; cmovae  cnt_R, sym_R ; 64-bit
        cmovae  cnt, sym ; 32-bit

        mov     dic, LOC dic_Spec
        mov     x1, LOC rep0

        mov     t0_R, dicPos
        add
    dicPos, cnt_R
        ; processedPos += curLen;
        add     processedPos, cnt
        ; len -= curLen;
        sub     sym, cnt
        mov     LOC remainLen, sym

        sub     t0_R, dic

        ; pos = dicPos - rep0 + (dicPos < rep0 ? dicBufSize : 0);
        sub     t0_R, r1
        jae     @f

        mov     r1, LOC dicBufSize
        add     t0_R, r1
        sub     r1, t0_R
        cmp     cnt_R, r1
        ja      copy_match_cross
@@:
        ; if (curLen <= dicBufSize - pos)

; ---------- COPY MATCH FAST ----------
        ; Byte *dest = dic + dicPos;
        ; mov     r1, dic
        ; ptrdiff_t src = (ptrdiff_t)pos - (ptrdiff_t)dicPos;
        ; sub   t0_R, dicPos
        ; dicPos += curLen;

        ; const Byte *lim = dest + curLen;
        add     t0_R, dic
        movzx   sym, byte ptr[t0_R]
        add     t0_R, cnt_R
        neg     cnt_R
```

```
        ; lea     r1, [dicPos - 1]
copy_common:
        dec     dicPos
        ; cmp   LOC rep0, 1
        ; je
 rep0Label

        ; t0_R - src_lim
        ; r1 - dest_lim - 1
        ; cnt_R - (-cnt)

        IsMatchBranch_Pre
        inc     cnt_R
        jz      copy_end
MY_ALIGN_16
@@:
        mov     byte ptr[cnt_R * 1 + dicPos], sym_L
        movzx   sym, byte ptr[cnt_R * 1 + t0_R]
        inc     cnt_R
        jnz     @b

copy_end:
lz_end_match:
        mov     byte ptr[dicPos], sym_L
        inc     dicPos

        ; IsMatchBranch_Pre
        CheckLimits
lz_end:
        IF_BIT_1_NOUP probs_state_R, pbPos_R, IsMatch, IsMatch_label



; ---------- LITERAL MATCHED ----------

        LIT_PROBS LOC lpMask

        ; matchByte = dic[dicPos - rep0 + (dicPos < rep0 ? dicBufSize : 0)];
        mov     x1, LOC rep0
        ; mov     dic, LOC dic_Spec
        mov     LOC dicPos_Spec, dicPos

        ; state -= (state < 10) ? 3 : 6;
        lea     t0, [state_R - 6 * PMULT]
        sub     state, 3 * PMULT
        cmp     state, 7 * PMULT
        cmovae  state, t0
```

```
        sub     dicPos, dic
        sub     dicPos, r1
        jae     @f
        add     dicPos, LOC dicBufSize
@@:
        comment ~
        xor     t0, t0
        sub     dicPos, r1
        cmovb   t0_R, LOC dicBufSize
        ~

        movzx   match, byte ptr[dic + dicPos * 1]

    ifdef _LZMA_SIZE_OPT

        mov     offs, 256 * PMULT
        shl     match, (PSHIFT + 1)
        mov     bit, match
        mov     sym, 1
MY_ALIGN_16
litm_loop:
        LITM
        cmp     sym, 256
        jb      litm_loop
        sub     sym, 256

    else

        LITM_0
        LITM
        LITM
        LITM
        LITM
        LITM
        LITM
        LITM_2

    endif

        mov     probs, LOC probs_Spec
        IsMatchBranch_Pre
        ; mov     dic, LOC dic_Spec
        mov     dicPos, LOC dicPos_Spec
        mov     byte ptr[dicPos], sym_L
        inc     dicPos

        CheckLimits
```

```
lit_matched_end:
        IF_BIT_1_NOUP probs_state_R,
 pbPos_R, IsMatch, IsMatch_label
        ; IsMatchBranch
        mov     lpMask_reg, LOC lpMask
        sub     state, 3 * PMULT
        jmp     lit_start_2



; ---------- REP 0 LITERAL ----------
MY_ALIGN_32
IsRep0Short_label:
        UPDATE_0 probs_state_R, pbPos_R, IsRep0Long

        ; dic[dicPos] = dic[dicPos - rep0 + (dicPos < rep0 ? dicBufSize : 0)];
        mov     dic, LOC dic_Spec
        mov     t0_R, dicPos
        mov     probBranch, LOC rep0
        sub     t0_R, dic

        sub     probs, RepLenCoder * PMULT
        inc     processedPos
        ; state = state < kNumLitStates ? 9 : 11;
        or      state, 1 * PMULT
        IsMatchBranch_Pre

        sub     t0_R, probBranch_R
        jae     @f
        add     t0_R, LOC dicBufSize
@@:
        movzx   sym, byte ptr[dic + t0_R * 1]
        jmp     lz_end_match


MY_ALIGN_32
IsRep_label:
        UPDATE_1 probs_state_R, 0, IsRep

        ; The (checkDicSize == 0 && processedPos ==
 0) case was checked before in LzmaDec.c with kBadRepCode.
        ; So we don't check it here.

        ; mov     t0, processedPos
        ; or      t0, LOC checkDicSize
        ; jz      fin_ERROR_2

        ; state = state < kNumLitStates ? 8 : 11;
```

```
        cmp     state, kNumLitStates * PMULT
        mov     state, 8 * PMULT
        mov     probBranch, 11 * PMULT
        cmovae  state, probBranch

        ; prob = probs + RepLenCoder;
        add     probs, RepLenCoder * PMULT

        IF_BIT_1 probs_state_R, 0, IsRepG0, IsRepG0_label
        IF_BIT_0_NOUP probs_state_R, pbPos_R, IsRep0Long, IsRep0Short_label
        UPDATE_1 probs_state_R, pbPos_R, IsRep0Long
        jmp     len_decode

MY_ALIGN_32
IsRepG0_label:
        UPDATE_1 probs_state_R, 0, IsRepG0
        mov     dist2, LOC rep0
        mov     dist, LOC rep1
        mov     LOC rep1, dist2

        IF_BIT_1 probs_state_R, 0, IsRepG1, IsRepG1_label
        mov     LOC rep0, dist
        jmp     len_decode

; MY_ALIGN_32
IsRepG1_label:
        UPDATE_1 probs_state_R, 0, IsRepG1
        mov     dist2, LOC rep2
        mov     LOC rep2, dist

        IF_BIT_1 probs_state_R, 0, IsRepG2, IsRepG2_label
        mov     LOC rep0, dist2
        jmp     len_decode

; MY_ALIGN_32
IsRepG2_label:
        UPDATE_1 probs_state_R, 0, IsRepG2
        mov     dist, LOC rep3
        mov     LOC rep3, dist2
        mov     LOC rep0, dist
        jmp     len_decode



; ---------- SPEC SHORT DISTANCE ----------

MY_ALIGN_32
short_dist:
```

```
        sub     x1, 32 + 1
        jbe     decode_dist_end
        or      sym, 2
        shl     sym, x1_L
        lea     sym_R, [probs + sym_R * PMULT + SpecPos * PMULT + 1 * PMULT]
        mov     sym2, PMULT ; step
MY_ALIGN_32
spec_loop:
        REV_1_VAR x2
        dec     x1
        jnz     spec_loop

        mov     probs, LOC probs_Spec
        sub     sym, sym2
        sub     sym, SpecPos * PMULT
        sub     sym_R, probs
        shr
      sym, PSHIFT

        jmp     decode_dist_end


; ---------- COPY MATCH CROSS ----------
copy_match_cross:
        ; t0_R - src pos
        ; r1 - len to dicBufSize
        ; cnt_R - total copy len

        mov     t1_R, t0_R         ; srcPos
        mov     t0_R, dic
        mov     r1, LOC dicBufSize   ;
        neg     cnt_R
@@:
        movzx   sym, byte ptr[t1_R * 1 + t0_R]
        inc     t1_R
        mov     byte ptr[cnt_R * 1 + dicPos], sym_L
        inc     cnt_R
        cmp     t1_R, r1
        jne     @b

        movzx   sym, byte ptr[t0_R]
        sub     t0_R, cnt_R
        jmp     copy_common




fin_ERROR:
```

```
        mov     LOC remainLen, len_temp
; fin_ERROR_2:
        mov     sym, 1
        jmp     fin

end_of_payload:
        cmp     sym, 0FFFFFFFFh ; -1
        jne     fin_ERROR

        mov     LOC remainLen, kMatchSpecLenStart
        sub     state, kNumStates * PMULT

fin_OK:
        xor     sym, sym

fin:
        NORM

        mov     r1, LOC lzmaPtr

        sub     dicPos, LOC dic_Spec
        mov     GLOB dicPos_Spec, dicPos
        mov     GLOB buf_Spec, buf
        mov     GLOB range_Spec, range
        mov     GLOB code_Spec, cod
        shr     state, PSHIFT
        mov     GLOB state_Spec, state
        mov     GLOB processedPos_Spec, processedPos

        RESTORE_VAR(remainLen)
        RESTORE_VAR(rep0)
        RESTORE_VAR(rep1)
        RESTORE_VAR(rep2)
        RESTORE_VAR(rep3)

        mov     x0, sym

        mov     RSP, LOC Old_RSP

MY_POP_PRESERVED_REGS
MY_ENDP

_TEXT$LZMADECOPT ENDS

end
// LangUtils.h

#ifndef __LANG_UTILS_H
```

```
#define __LANG_UTILS_H

#include "../../../Windows/ResourceString.h"

#ifdef LANG

extern UString g_LangID;

struct CIDLangPair
{
 UInt32 ControlID;
 UInt32 LangID;
};

void ReloadLang();
void LoadLangOneTime();
FString GetLangDirPrefix();

void LangSetDlgItemText(HWND dialog, UInt32 controlID, UInt32 langID);
void LangSetDlgItems(HWND dialog, const UInt32 *ids, unsigned numItems);
void LangSetDlgItems_Colon(HWND dialog, const UInt32 *ids, unsigned numItems);
void LangSetWindowText(HWND window, UInt32 langID);

UString LangString(UInt32 langID);
void AddLangString(UString &s, UInt32 langID);
void LangString(UInt32 langID, UString &dest);
void LangString_OnlyFromLangFile(UInt32 langID, UString &dest);

#else

inline UString LangString(UInt32 langID) { return NWindows::MyLoadString(langID); }
inline void LangString(UInt32 langID, UString &dest) { NWindows::MyLoadString(langID, dest); }
inline void AddLangString(UString &s, UInt32 langID) { s += NWindows::MyLoadString(langID);
 }

#endif

#endif
```

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TORT OR OTHERWISE, ARISING
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SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With Mixed text Element Language Tags 2</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element matches the schema. Two text elements have a language tags." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre
 {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
```

```
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text xml:lang="en"&gt;
   Copyright with "en" language.
  &lt;/text&gt;
  &lt;text xml:lang="fr"&gt;
   Copyright with "fr" language.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```


UNRECOGNIZED LICENSE; MD5 sum: dce8e29443c864364a35d6cc733a58d3

```
## -*-makefile-*-
## Copyright (C) 2016 and later: Unicode, Inc. and others.
## License & terms of use: http://www.unicode.org/copyright.html
## BSD-specific setup (FreeBSD, OpenBSD, NetBSD, *BSD)
## Copyright (c) 1999-2013, International Business Machines Corporation and
## others. All Rights Reserved.

## Commands to generate dependency files
GEN_DEPS.c= $(CC) -E -MM $(DEFS) $(CPPFLAGS)
GEN_DEPS.cc= $(CXX) -E -MM $(DEFS) $(CPPFLAGS)

## Flags for position independent code
SHAREDLIBCFLAGS = -fPIC
SHAREDLIBCXXFLAGS = -fPIC
SHAREDLIBCPPFLAGS = -DPIC

## Additional flags when building libraries and with threads
THREADSCPPFLAGS = -D_REENTRANT
LIBCPPFLAGS =

## Compiler switch to embed a runtime search path
LD_RPATH=
LD_RPATH_PRE= -Wl,-rpath,

## Compiler switch to embed a library name
LD_SONAME = -Wl,-soname -Wl,$(notdir $(MIDDLE_SO_TARGET))

## Shared library options
LD_SOOPTIONS= -Wl,-Bsymbolic

## Shared object suffix
SO = so
```

```
## Non-shared intermediate object suffix
STATIC_O = ao

## Compilation
 rules
%.$(STATIC_O): $(srcdir)/%.c
 $(COMPILE.c) $(STATICCPPFLAGS) $(STATICCFLAGS) -o $@ $<
%.o: $(srcdir)/%.c
 $(COMPILE.c) $(DYNAMICCPPFLAGS) $(DYNAMICCFLAGS) -o $@ $<

%.$(STATIC_O): $(srcdir)/%.cpp
 $(COMPILE.cc) $(STATICCPPFLAGS) $(STATICCXXFLAGS) -o $@ $<
%.o: $(srcdir)/%.cpp
 $(COMPILE.cc) $(DYNAMICCPPFLAGS) $(DYNAMICCXXFLAGS) -o $@ $<



## Dependency rules
%.d: $(srcdir)/%.c
 @echo "generating dependency information for $<"
 @$(SHELL) -ec '$(GEN_DEPS.c) $< \
  | sed '\"s/\($*\)\.o[ :]*/\1.o $@ : /g'\" > $@; \
  [ -s $@ ] || rm -f $@'

%.d: $(srcdir)/%.cpp
 @echo "generating dependency information for $<"
 @$(SHELL) -ec '$(GEN_DEPS.cc) $< \
  | sed '\"s/\($*\)\.o[ :]*/\1.o $@ : /g'\" > $@; \
  [ -s $@ ] || rm -f $@'

## Versioned libraries rules

%.$(SO).$(SO_TARGET_VERSION_MAJOR): %.$(SO).$(SO_TARGET_VERSION)
 $(RM) $@ && ln -s ${<F} $@
%.$(SO): %.$(SO).$(SO_TARGET_VERSION_MAJOR)
 $(RM) $@ && ln -s ${*F}.$(SO).$(SO_TARGET_VERSION) $@

##  Bind internal references

# LDflags that pkgdata will use
BIR_LDFLAGS= -Wl,-Bsymbolic

# Dependencies [i.e. map files] for the final library
BIR_DEPS=

## Remove shared library 's'
STATIC_PREFIX_WHEN_USED =
STATIC_PREFIX =
```

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// StreamUtils.h

#ifndef __STREAM_UTILS_H
#define __STREAM_UTILS_H

#include "../IStream.h"

HRESULT ReadStream(ISequentialInStream *stream, void *data, size_t *size) throw();
HRESULT ReadStream_FALSE(ISequentialInStream *stream, void *data, size_t size) throw();
HRESULT ReadStream_FAIL(ISequentialInStream *stream, void *data, size_t size) throw();
HRESULT WriteStream(ISequentialOutStream *stream, const void *data, size_t size) throw();

#endif
```

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The End

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With dir Attribute in text Element 2</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element with rtl as the value for the dir attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre
 {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
```

```
  &lt;text dir="rtl"&gt;
   Copyright without language.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
/* LzFindMt.h -- multithreaded Match finder for LZ algorithms
2017-04-03 : Igor Pavlov : Public domain */

#ifndef __LZ_FIND_MT_H
#define __LZ_FIND_MT_H

#include "LzFind.h"
#include "Threads.h"

EXTERN_C_BEGIN

#define kMtHashBlockSize (1 << 13)
#define kMtHashNumBlocks (1 << 3)
#define kMtHashNumBlocksMask (kMtHashNumBlocks - 1)

#define kMtBtBlockSize (1 << 14)
#define kMtBtNumBlocks (1 << 6)
#define kMtBtNumBlocksMask (kMtBtNumBlocks - 1)

typedef struct _CMtSync
{
 Bool wasCreated;
 Bool needStart;
 Bool exit;
 Bool stopWriting;

 CThread thread;
 CAutoResetEvent canStart;
 CAutoResetEvent wasStarted;
 CAutoResetEvent wasStopped;
 CSemaphore freeSemaphore;
 CSemaphore filledSemaphore;
 Bool csWasInitialized;
 Bool csWasEntered;
 CCriticalSection cs;
 UInt32 numProcessedBlocks;
} CMtSync;

typedef UInt32 * (*Mf_Mix_Matches)(void *p, UInt32 matchMinPos, UInt32 *distances);
```

```
/* kMtCacheLineDummy must be >= size_of_CPU_cache_line */
#define kMtCacheLineDummy 128

typedef
 void (*Mf_GetHeads)(const Byte *buffer, UInt32 pos,
 UInt32 *hash, UInt32 hashMask, UInt32 *heads, UInt32 numHeads, const UInt32 *crc);

typedef struct _CMatchFinderMt
{
 /* LZ */
 const Byte *pointerToCurPos;
 UInt32 *btBuf;
 UInt32 btBufPos;
 UInt32 btBufPosLimit;
 UInt32 lzPos;
 UInt32 btNumAvailBytes;

 UInt32 *hash;
 UInt32 fixedHashSize;
 UInt32 historySize;
 const UInt32 *crc;

 Mf_Mix_Matches MixMatchesFunc;

 /* LZ + BT */
 CMtSync btSync;
 Byte btDummy[kMtCacheLineDummy];

 /* BT */
 UInt32 *hashBuf;
 UInt32 hashBufPos;
 UInt32 hashBufPosLimit;
 UInt32 hashNumAvail;

 CLzRef *son;
 UInt32 matchMaxLen;
 UInt32 numHashBytes;
 UInt32 pos;
 const Byte *buffer;
 UInt32 cyclicBufferPos;
 UInt32 cyclicBufferSize; /* it must be historySize + 1 */
 UInt32 cutValue;

 /* BT + Hash */
 CMtSync hashSync;
 /* Byte hashDummy[kMtCacheLineDummy]; */

 /* Hash */
```

```
 Mf_GetHeads GetHeadsFunc;
 CMatchFinder *MatchFinder;
} CMatchFinderMt;

void MatchFinderMt_Construct(CMatchFinderMt
 *p);
void MatchFinderMt_Destruct(CMatchFinderMt *p, ISzAllocPtr alloc);
SRes MatchFinderMt_Create(CMatchFinderMt *p, UInt32 historySize, UInt32 keepAddBufferBefore,
   UInt32 matchMaxLen, UInt32 keepAddBufferAfter, ISzAllocPtr alloc);
void MatchFinderMt_CreateVTable(CMatchFinderMt *p, IMatchFinder *vTable);
void MatchFinderMt_ReleaseStream(CMatchFinderMt *p);

EXTERN_C_END

#endif
```

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```
# Files that don't get a copyright, or which are taken from elsewhere.
#
# All lines in this file are patterns, including the comment lines; this
# means that e.g. `FTL.TXT' matches all files that have this string in
# the file name (including the path relative to the current directory,
```

```
# always starting with `./').
#
# Don't put empty lines into this file!
#
.gitignore
#
builds/unix/pkg.m4
#
docs/FTL.TXT
docs/GPLv2.TXT
#
include/freetype/internal/fthash.h
#
src/base/fthash.c
src/base/md5.c
src/base/md5.h
#
src/bdf/bdf.c
src/bdf/bdf.h
src/bdf/bdfdrivr.c
src/bdf/bdfdrivr.h
src/bdf/bdferror.h
src/bdf/bdflib.c
src/bdf/module.mk
src/bdf/README
src/bdf/rules.mk
#
src/pcf/module.mk
src/pcf/pcf.c
src/pcf/pcf.h
src/pcf/pcfdrivr.c
src/pcf/pcfdrivr.h
src/pcf/pcferror.h
src/pcf/pcfread.c
src/pcf/pcfread.h
src/pcf/pcfutil.c
src/pcf/pcfutil.h
src/pcf/README
src/pcf/rules.mk
#
src/gzip/adler32.c
src/gzip/infblock.c
src/gzip/infblock.h
src/gzip/infcodes.c
src/gzip/infcodes.h
src/gzip/inffixed.h
src/gzip/inflate.c
src/gzip/inftrees.c
```

src/gzip/inftrees.h
src/gzip/infutil.c
src/gzip/infutil.h
src/gzip/zconf.h
src/gzip/zlib.h
src/gzip/zutil.c
src/gzip/zutil.h
#
src/tools/apinames.c
src/tools/ftrandom/ftrandom.c
#
#
EOF
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- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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Latin hyphenation patterns

(more info about the licence to be added later)

% This file is part of hyph-utf8 package and resulted
 from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% Source: lahyph.tex (2007-09-03)
% Author: Claudio Beccari <claudio.beccari at polito.it>
%
% The above mentioned file should become obsolete,
% and the author of the original file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%  and helped with testing, suggestions and bug reports
% - Norbert Preining, who tested & integrated
 patterns into TeX Live
%
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%
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%  "a better world" as long as you respect the copyright of original file.
%  If you're the original author of patterns or taking over a new revolution,

```
%    plese remove all of the TUG comments & credits that we added here -
%    you are the Queen / the King, we are only the servants.
%
% If you want to change this file, rather than uploading directly to CTAN,
% we would be grateful if you could send it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
% Before a new "pattern-revolution" starts,
% please try to follow some guidelines if possible:
%
% - \lccode is *forbidden*, and I really mean it
% - all the patterns should be in UTF-8
%
 - the only "allowed" TeX commands in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
%-----------------------------------------------------------------------------
%
%                 ********** lahyph.tex *************
%
% Copyright 1999- 2001 Claudio Beccari
%               [latin hyphenation patterns]
%
% ----------------------------------------------------------------
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%
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% archives in directory macros/latex/base/lppl.txt; either
% version 1 of the License, or any later version.
% ----------------------------------------------------------------
%
% Patterns for the latin language mainly in modern spelling
```

```
% (u when u is needed and v when v is needed); medieval spelling
% with the ligatures \ae and \oe  and the (uncial) lowercase `v'
% written as a `u' is also supported; apparently there is no conflict
% between the patterns of modern  Latin and those of medieval Latin.
%
% Support for font encoding T1 with a 256-character set.
%
% Prepared by  Claudio Beccari
%            Politecnico di Torino
%            Torino, Italy
%            e-mail beccari@polito.it
%
% 1999/03/10 Integration of `lahyph7.tex' and `lahyph8.tex' into
% one file `lahyph.tex' supporting fonts in OT1 and T1 encoding by
% Bernd Raichle using the macro code from `dehypht.tex' (this code
% is Copyright 1993,1994,1998,1999
 Bernd Raichle/DANTE e.V.).
%
% 2010/05/31 Removal of OT1 support
% 2010/06/01 Removal of pattern 2'2 (probably a leftover from Italian)
%
% \versionnumber{3.2}   \versiondate{2010/06/01}
%
% Information after \endinput.
%
%%%
```

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```
// 7z/7zHeader.h

#ifndef __7Z_HEADER_H
#define __7Z_HEADER_H

#include "../../../Common/MyTypes.h"

namespace NArchive {
namespace N7z {

const unsigned kSignatureSize = 6;
extern Byte kSignature[kSignatureSize];
```

```
// #define _7Z_VOL
// 7z-MultiVolume is not finished yet.
// It can work already, but I still do not like some
// things of that new multivolume format.
// So please keep it commented.

#ifdef _7Z_VOL
extern Byte kFinishSignature[kSignatureSize];
#endif

struct CArchiveVersion
{
 Byte Major;
 Byte Minor;
};

const Byte kMajorVersion = 0;

struct CStartHeader
{
 UInt64 NextHeaderOffset;
 UInt64 NextHeaderSize;
 UInt32 NextHeaderCRC;
};

const UInt32 kStartHeaderSize = 20;

#ifdef _7Z_VOL
struct CFinishHeader: public CStartHeader
{
 UInt64 ArchiveStartOffset;  // data offset from end if that struct
 UInt64 AdditionalStartBlockSize; // start  signature & start header size
};

const UInt32 kFinishHeaderSize = kStartHeaderSize + 16;
#endif

namespace NID
{
 enum EEnum
 {
    kEnd,

   kHeader,

   kArchiveProperties,

   kAdditionalStreamsInfo,
```

```
  kMainStreamsInfo,
  kFilesInfo,

  kPackInfo,
  kUnpackInfo,
  kSubStreamsInfo,

  kSize,
  kCRC,

  kFolder,

  kCodersUnpackSize,
  kNumUnpackStream,

  kEmptyStream,
  kEmptyFile,
  kAnti,

  kName,
  kCTime,
  kATime,
  kMTime,
  kWinAttrib,
  kComment,

  kEncodedHeader,

  kStartPos,
  kDummy

  // kNtSecure,
  // kParent,
  // kIsAux
 };
}


const UInt32 k_Copy = 0;
const UInt32 k_Delta = 3;

const UInt32 k_LZMA2 = 0x21;

const UInt32 k_SWAP2 = 0x20302;
const UInt32 k_SWAP4 = 0x20304;

const UInt32 k_LZMA  = 0x30101;
const UInt32 k_PPMD  = 0x30401;
```

```
const UInt32 k_Deflate = 0x40108;
const UInt32 k_BZip2   = 0x40202;

const UInt32 k_BCJ   = 0x3030103;
const UInt32 k_BCJ2  = 0x303011B;
const UInt32 k_PPC   = 0x3030205;
const UInt32 k_IA64  = 0x3030401;
const UInt32 k_ARM   = 0x3030501;
const UInt32 k_ARMT  = 0x3030701;
const UInt32 k_SPARC = 0x3030805;

const
 UInt32 k_AES   = 0x6F10701;


static inline bool IsFilterMethod(UInt64 m)
{
 if (m > (UInt64)0xFFFFFFFF)
   return false;
 switch ((UInt32)m)
 {
   case k_Delta:
   case k_BCJ:
   case k_BCJ2:
   case k_PPC:
   case k_IA64:
   case k_ARM:
   case k_ARMT:
   case k_SPARC:
   case k_SWAP2:
   case k_SWAP4:
     return true;
 }
 return false;
}

}}

#endif
```

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```
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#ifndef __WINDOWS_DEFS_H
#define __WINDOWS_DEFS_H

#include "../Common/MyWindows.h"

#ifdef _WIN32
inline bool LRESULTToBool(LRESULT v) { return (v != FALSE); }
inline bool BOOLToBool(BOOL v) { return (v != FALSE); }
inline BOOL BoolToBOOL(bool v) { return (v ? TRUE: FALSE); }
#endif

inline VARIANT_BOOL BoolToVARIANT_BOOL(bool v) { return (v ? VARIANT_TRUE: VARIANT_FALSE);
}
inline bool VARIANT_BOOLToBool(VARIANT_BOOL v) { return (v != VARIANT_FALSE); }

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
```

```
  <title>WOFF Test: Invalid license Element With dir Attribute in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The license element contains a text element with INVALID as the value for the dir
attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre
  {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
#define IDD_PROGRESS       97
#define IDD_PROGRESS_2  10097

#define IDS_CLOSE                  408
#define IDS_CONTINUE               411

#define IDB_PROGRESS_BACKGROUND    444
#define IDS_PROGRESS_FOREGROUND    445
#define IDB_PAUSE                  446
#define IDS_PROGRESS_PAUSED        447
#define IDS_PROGRESS_ASK_CANCEL    448

#define IDT_PROGRESS_PACKED        1008
#define IDT_PROGRESS_FILES         1032

#define IDT_PROGRESS_ELAPSED       3900
#define IDT_PROGRESS_REMAINING     3901
```

```
#define IDT_PROGRESS_TOTAL        3902
#define IDT_PROGRESS_SPEED        3903
#define IDT_PROGRESS_PROCESSED    3904
#define IDT_PROGRESS_RATIO        3905
#define IDT_PROGRESS_ERRORS       3906

#define IDC_PROGRESS1             100
#define IDL_PROGRESS_MESSAGES     101
#define IDT_PROGRESS_FILE_NAME    102
#define IDT_PROGRESS_STATUS       103

#define IDT_PROGRESS_PACKED_VAL   110
#define IDT_PROGRESS_FILES_VAL    111

#define IDT_PROGRESS_ELAPSED_VAL   120
#define IDT_PROGRESS_REMAINING_VAL 121
#define
 IDT_PROGRESS_TOTAL_VAL     122
#define IDT_PROGRESS_SPEED_VAL     123
#define IDT_PROGRESS_PROCESSED_VAL 124
#define IDT_PROGRESS_RATIO_VAL     125
#define IDT_PROGRESS_ERRORS_VAL    126


#ifdef UNDER_CE
#define MY_PROGRESS_VAL_UNITS  44
#else
#define MY_PROGRESS_VAL_UNITS  76
#endif
#define MY_PROGRESS_LABEL_UNITS_MIN   60
#define MY_PROGRESS_LABEL_UNITS_START 90
#define MY_PROGRESS_PAD_UNITS  4
// Common/StdInStream.h

#ifndef __COMMON_STD_IN_STREAM_H
#define __COMMON_STD_IN_STREAM_H

#include <stdio.h>

#include "MyString.h"
#include "MyTypes.h"

class CStdInStream
{
 FILE *_stream;
 bool _streamIsOpen;
public:
 CStdInStream(): _stream(0), _streamIsOpen(false) {};
```

```
 CStdInStream(FILE *stream): _stream(stream), _streamIsOpen(false) {};
 ~CStdInStream() { Close(); }

 bool Open(LPCTSTR fileName) throw();
 bool Close() throw();

 // returns:
 //   false, if ZERO character in stream
 //   true, if EOF or '\n'
 bool ScanAStringUntilNewLine(AString &s);
 bool ScanUStringUntilNewLine(UString &s);
 // bool ReadToString(AString &resultString);

 bool Eof() const throw() { return (feof(_stream) != 0); }
 bool Error() const throw() { return (ferror(_stream) != 0); }

 int GetChar();
};

extern CStdInStream g_StdIn;

#endif
// This Source Code Form is subject to the terms of the Mozilla Public
// License, v. 2.0.If a copy of the MPL was not distributed with this
// file, You can obtain one at http://mozilla.org/MPL/2.0/.

#define IDD_DIALOG1 101
/* ATK -  Accessibility Toolkit
* Copyright 2001 Sun Microsystems Inc.
*
* This library is free software; you can redistribute it and/or
* modify it under the terms of the GNU Library General Public
* License as published by the Free Software Foundation; either
* version 2 of the License, or (at your option) any later version.
*
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* Library General Public License for more details.
*
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* License along with this library; if not, write to the
* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_UTIL_H__
#define __ATK_UTIL_H__
```

```
#include <atk/atkobject.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

#define ATK_TYPE_UTIL                 (atk_util_get_type
 ())
#define ATK_IS_UTIL(obj)              G_TYPE_CHECK_INSTANCE_TYPE ((obj), ATK_TYPE_UTIL)
#define ATK_UTIL(obj)                 G_TYPE_CHECK_INSTANCE_CAST ((obj), ATK_TYPE_UTIL, AtkUtil)
#define ATK_UTIL_CLASS(klass)                 (G_TYPE_CHECK_CLASS_CAST ((klass), ATK_TYPE_UTIL,
AtkUtilClass))
#define ATK_IS_UTIL_CLASS(klass)              (G_TYPE_CHECK_CLASS_TYPE ((klass), ATK_TYPE_UTIL))
#define ATK_UTIL_GET_CLASS(obj)               (G_TYPE_INSTANCE_GET_CLASS ((obj),
ATK_TYPE_UTIL, AtkUtilClass))


#ifndef _TYPEDEF_ATK_UTIL_
#define _TYPEDEF_ATK_UTIL_
typedef struct _AtkUtil      AtkUtil;
typedef struct _AtkUtilClass AtkUtilClass;
typedef struct _AtkKeyEventStruct AtkKeyEventStruct;
#endif

/**
* AtkEventListener:
* @obj: An #AtkObject instance for whom the callback will be called when
* the specified event (e.g. 'focus:') takes place.
*
* A function which is called when an object emits a matching event,
* as used in #atk_add_focus_tracker.
* Currently
 the only events for which object-specific handlers are
* supported are events of type "focus:".  Most clients of ATK will prefer to
* attach signal handlers for the various ATK signals instead.
*
* @see: atk_add_focus_tracker.
**/
typedef void  (*AtkEventListener) (AtkObject* obj);
/**
* AtkEventListenerInit:
*
* An #AtkEventListenerInit function is a special function that is
* called in order to initialize the per-object event registration system
* used by #AtkEventListener, if any preparation is required.
*
* @see: atk_focus_tracker_init.
```

```
**/
typedef void  (*AtkEventListenerInit) (void);
/**
* AtkKeySnoopFunc:
* @event: an AtkKeyEventStruct containing information about the key event for which
* notification is being given.
* @func_data: a block of data which will be passed to the event listener, on notification.
*
* An #AtkKeySnoopFunc is a type of callback which is called whenever a key event occurs,
* if registered via atk_add_key_event_listener.  It allows
 for pre-emptive
* interception of key events via the return code as described below.
*
* Returns: TRUE (nonzero) if the event emission should be stopped and the event
* discarded without being passed to the normal GUI recipient; FALSE (zero) if the
* event dispatch to the client application should proceed as normal.
*
* @see: atk_add_key_event_listener.
**/
typedef gint  (*AtkKeySnoopFunc)  (AtkKeyEventStruct *event,
      gpointer func_data);

/**
* AtkKeyEventStruct:
* @type: An AtkKeyEventType, generally one of ATK_KEY_EVENT_PRESS or ATK_KEY_EVENT_RELEASE
* @state: A bitmask representing the state of the modifier keys immediately after the event takes place.
* The meaning of the bits is currently defined to match the bitmask used by GDK in
* GdkEventType.state, see
* http://developer.gnome.org/doc/API/2.0/gdk/gdk-Event-Structures.html#GdkEventKey
* @keyval: A guint representing a keysym value corresponding to those used by GDK and X11: see
* /usr/X11/include/keysymdef.h.
 * @length: The length of member #string.
* @string: A string containing one of the following: either a string approximating the text that would
* result from this keypress, if the key is a control or graphic character, or a symbolic name for this keypress.
* Alphanumeric and printable keys will have the symbolic key name in this string member, for instance "A". "0",
* "semicolon", "aacute".  Keypad keys have the prefix "KP".
* @keycode: The raw hardware code that generated the key event.  This field is raraly useful.
* @timestamp: A timestamp in milliseconds indicating when the event occurred.
* These timestamps are relative to a starting point which should be considered arbitrary,
* and only used to compare the dispatch times of events to one another.
*
* Encapsulates information about a key event.
**/
struct _AtkKeyEventStruct {
 gint type;
 guint state;
 guint keyval;
 gint length;
```

```
 gchar *string;
 guint16 keycode;
 guint32 timestamp;
};

/**
 *AtkKeyEventType:
*@ATK_KEY_EVENT_PRESS: specifies a key press event
*@ATK_KEY_EVENT_RELEASE: specifies a key release event
*@ATK_KEY_EVENT_LAST_DEFINED: Not a valid value; specifies end of enumeration
*
*Specifies the type of a keyboard evemt.
**/
typedef enum
{
 ATK_KEY_EVENT_PRESS,
 ATK_KEY_EVENT_RELEASE,
 ATK_KEY_EVENT_LAST_DEFINED
} AtkKeyEventType;

struct _AtkUtil
{
 GObject parent;
};

struct _AtkUtilClass
{
  GObjectClass parent;
  guint       (* add_global_event_listener)    (GSignalEmissionHook listener,
       const gchar        *event_type);
  void        (* remove_global_event_listener) (guint               listener_id);
  guint (* add_key_event_listener)   (AtkKeySnoopFunc     listener,
       gpointer data);
  void        (* remove_key_event_listener)    (guint               listener_id);
  AtkObject*   (* get_root)                    (void);
  G_CONST_RETURN gchar* (* get_toolkit_name)    (void);
  G_CONST_RETURN gchar* (* get_toolkit_version)
 (void);
};
GType atk_util_get_type (void);

/**
*AtkCoordType:
*@ATK_XY_SCREEN: specifies xy coordinates relative to the screen
*@ATK_XY_WINDOW: specifies xy coordinates relative to the widget's
* top-level window
*@ATK_XY_PARENT: specifies xy coordinates relative to the widget's
* immediate parent.
```

```
*
*Specifies how xy coordinates are to be interpreted. Used by functions such
*as atk_component_get_position() and atk_text_get_character_extents()
**/
typedef enum {
 ATK_XY_SCREEN,
 ATK_XY_WINDOW,
 ATK_XY_PARENT
}AtkCoordType;

/*
* Adds the specified function to the list of functions to be called
* when an object receives focus.
*/
guint    atk_add_focus_tracker     (AtkEventListener      focus_tracker);

/*
* Removes the specified focus tracker from the list of function
* to be called when any object receives focus
*/
void     atk_remove_focus_tracker  (guint                tracker_id);

/*
* atk_focus_tracker_init:
* @init: An #AtkEventListenerInit function to be
 called
* prior to any focus-tracking requests.
*
* Specifies the function to be called for focus tracker initialization.
* removal. This function should be called by an implementation of the
* ATK interface if any specific work needs to be done to enable
* focus tracking.
*/
void     atk_focus_tracker_init    (AtkEventListenerInit  init);

/*
* Cause the focus tracker functions which have been specified to be
* executed for the object.
*/
void     atk_focus_tracker_notify  (AtkObject            *object);

/*
* Adds the specified function to the list of functions to be called
* when an event of type event_type occurs.
*/
guint atk_add_global_event_listener (GSignalEmissionHook listener,
          const gchar        *event_type);
```

```
/*
* Removes the specified event listener
*/
void atk_remove_global_event_listener (guint listener_id);

/*
* Adds the specified function to the list of functions to be called
* when an keyboard event occurs.
*/
guint atk_add_key_event_listener
 (AtkKeySnoopFunc listener, gpointer data);

/*
* Removes the specified event listener
*/
void atk_remove_key_event_listener (guint listener_id);

/*
* Returns the root accessible container for the current application.
*/
AtkObject* atk_get_root(void);

AtkObject* atk_get_focus_object (void);

/*
* Returns name string for the GUI toolkit.
*/
G_CONST_RETURN gchar *atk_get_toolkit_name (void);

/*
* Returns version string for the GUI toolkit.
*/
G_CONST_RETURN gchar *atk_get_toolkit_version (void);

#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_UTIL_H__ */
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Attribute in license Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
```

```
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-011-ref.xht" />
  <meta name="assert" content="The license element contains an unknown attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family:
 "WOFF Test";
    src: url("support/metadatadisplay-schema-license-011.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
```

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```
// 7zEncode.h

#ifndef __7Z_ENCODE_H
#define __7Z_ENCODE_H

#include "7zCompressionMode.h"

#include "../Common/CoderMixer2.h"

#include "7zItem.h"

namespace NArchive {
namespace N7z {

class CMtEncMultiProgress:
 public ICompressProgressInfo,
 public CMyUnknownImp
{
 CMyComPtr<ICompressProgressInfo> _progress;
 #ifndef _7ZIP_ST
 NWindows::NSynchronization::CCriticalSection CriticalSection;
 #endif

public:
 UInt64 OutSize;

 CMtEncMultiProgress(): OutSize(0) {}

 void Init(ICompressProgressInfo *progress);

 void AddOutSize(UInt64 addOutSize)
 {
  #ifndef _7ZIP_ST
  NWindows::NSynchronization::CCriticalSectionLock lock(CriticalSection);
  #endif
  OutSize += addOutSize;
 }

 MY_UNKNOWN_IMP1(ICompressProgressInfo)

 STDMETHOD(SetRatioInfo)(const UInt64 *inSize, const UInt64 *outSize);
};

class CEncoder
{
```

```
#ifdef USE_MIXER_ST
  NCoderMixer2::CMixerST *_mixerST;
#endif
#ifdef USE_MIXER_MT
  NCoderMixer2::CMixerMT *_mixerMT;
#endif

NCoderMixer2::CMixer
*_mixer;
CMyComPtr<IUnknown> _mixerRef;

CCompressionMethodMode _options;
NCoderMixer2::CBindInfo _bindInfo;
CRecordVector<CMethodId> _decompressionMethods;

CRecordVector<UInt32> _SrcIn_to_DestOut;
CRecordVector<UInt32> _SrcOut_to_DestIn;
// CRecordVector<UInt32> _DestIn_to_SrcOut;
CRecordVector<UInt32> _DestOut_to_SrcIn;

void InitBindConv();
void SetFolder(CFolder &folder);

HRESULT CreateMixerCoder(DECL_EXTERNAL_CODECS_LOC_VARS
    const UInt64 *inSizeForReduce);

bool _constructed;
public:

CEncoder(const CCompressionMethodMode &options);
~CEncoder();
HRESULT EncoderConstr();
HRESULT Encode(
    DECL_EXTERNAL_CODECS_LOC_VARS
    ISequentialInStream *inStream,
    // const UInt64 *inStreamSize,
    const UInt64 *inSizeForReduce,
    CFolder &folderItem,
    CRecordVector<UInt64> &coderUnpackSizes,
    UInt64 &unpackSize,
    ISequentialOutStream *outStream,
    CRecordVector<UInt64> &packSizes,
    ICompressProgressInfo *compressProgress);
};

}}

#endif
```

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```
/* Sort.h -- Sort functions
2014-04-05 : Igor Pavlov : Public domain */

#ifndef __7Z_SORT_H
#define __7Z_SORT_H

#include "7zTypes.h"

EXTERN_C_BEGIN

void HeapSort(UInt32 *p, size_t size);
void HeapSort64(UInt64 *p, size_t size);

/* void HeapSortRef(UInt32 *p, UInt32 *vals, size_t size); */

EXTERN_C_END
```

#endif
http://scripts.sil.org/cms/scripts/page.php?site_id=nrsi&item_id=Gentium_download

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```
/* LzmaLib.h -- LZMA library interface
2013-01-18 : Igor Pavlov : Public domain */

#ifndef __LZMA_LIB_H
#define __LZMA_LIB_H
```

```
#include "7zTypes.h"

EXTERN_C_BEGIN

#define MY_STDAPI int MY_STD_CALL

#define LZMA_PROPS_SIZE 5

/*
RAM requirements for LZMA:
 for compression:   (dictSize * 11.5 + 6 MB) + state_size
 for decompression: dictSize + state_size
   state_size = (4 + (1.5 << (lc + lp))) KB
   by default (lc=3, lp=0), state_size = 16 KB.

LZMA properties (5 bytes) format
   Offset Size  Description
     0     1    lc, lp and pb in encoded form.
     1     4    dictSize (little endian).
*/

/*
LzmaCompress
------------

outPropsSize -
    In:  the pointer to the size of outProps buffer; *outPropsSize = LZMA_PROPS_SIZE = 5.
    Out: the pointer to the size of written properties in outProps buffer; *outPropsSize = LZMA_PROPS_SIZE = 5.

 LZMA Encoder will use defult values for any parameter, if it is
 -1  for any from: level, loc, lp, pb, fb, numThreads
  0  for dictSize

level - compression level: 0 <= level <= 9;

 level dictSize algo  fb
   0:    16 KB   0    32
   1:    64 KB   0    32
   2:   256 KB   0    32
   3:     1 MB   0    32
   4:     4 MB   0    32
   5:    16 MB   1    32
   6:    32 MB   1    32
   7+:   64 MB   1    64

 The default value for "level" is 5.

 algo = 0 means fast method
```

```
 algo = 1 means normal method

dictSize - The dictionary size in bytes. The maximum value is
      128 MB = (1 << 27) bytes for 32-bit version
        1 GB = (1 << 30) bytes for 64-bit version
   The default value is 16 MB = (1 << 24) bytes.
   It's recommended to use the dictionary that is larger than 4 KB and
   that can be calculated as (1 << N) or (3 << N) sizes.

lc - The number of literal context bits (high bits of previous literal).
   It can be in the range from 0 to 8. The default value is 3.
   Sometimes lc=4 gives the gain for big files.

lp - The number of literal pos bits (low bits of current position for literals).
    It can be in the range from 0 to 4. The default value is 0.
   The lp switch is intended for periodical data when the period is equal to 2^lp.
   For example, for 32-bit (4 bytes) periodical data you can use lp=2. Often it's
   better to set lc=0, if you change lp switch.

pb - The number of pos bits (low bits of current position).
   It can be in the range from 0 to 4. The default value is 2.
   The pb switch is intended for periodical data when the period is equal 2^pb.

fb - Word size (the number of fast bytes).
   It can be in the range from 5 to 273. The default value is 32.
   Usually, a big number gives a little bit better compression ratio and
   slower compression process.

numThreads - The number of thereads. 1 or 2. The default value is 2.
   Fast mode (algo = 0) can use only 1 thread.

Out:
 destLen  - processed output size
Returns:
 SZ_OK               - OK
 SZ_ERROR_MEM        - Memory allocation error
 SZ_ERROR_PARAM      - Incorrect paramater
  SZ_ERROR_OUTPUT_EOF - output buffer overflow
 SZ_ERROR_THREAD     - errors in multithreading functions (only for Mt version)
*/

MY_STDAPI LzmaCompress(unsigned char *dest, size_t *destLen, const unsigned char *src, size_t srcLen,
 unsigned char *outProps, size_t *outPropsSize, /* *outPropsSize must be = 5 */
 int level,      /* 0 <= level <= 9, default = 5 */
 unsigned dictSize,  /* default = (1 << 24) */
 int lc,        /* 0 <= lc <= 8, default = 3  */
 int lp,        /* 0 <= lp <= 4, default = 0  */
 int pb,        /* 0 <= pb <= 4, default = 2  */
```

```
 int fb,        /* 5 <= fb <= 273, default = 32 */
 int numThreads /* 1 or 2, default = 2 */
 );

/*
LzmaUncompress
--------------
In:
 dest     - output data
 destLen  - output data size
 src      - input data
 srcLen   - input data size
Out:
 destLen  - processed output size
 srcLen   - processed input size
Returns:
 SZ_OK               - OK
 SZ_ERROR_DATA       - Data error
 SZ_ERROR_MEM        - Memory allocation
 arror
 SZ_ERROR_UNSUPPORTED - Unsupported properties
 SZ_ERROR_INPUT_EOF   - it needs more bytes in input buffer (src)
*/

MY_STDAPI LzmaUncompress(unsigned char *dest, size_t *destLen, const unsigned char *src, SizeT *srcLen,
 const unsigned char *props, size_t propsSize);

EXTERN_C_END

#endif

/* Generated data (by glib-mkenums) */

#ifndef __ATK_ENUM_TYPES_H__
#define __ATK_ENUM_TYPES_H__

#include <glib-object.h>

G_BEGIN_DECLS
/* enumerations from "atkhyperlink.h" */
GType atk_hyperlink_state_flags_get_type (void);
#define ATK_TYPE_HYPERLINK_STATE_FLAGS (atk_hyperlink_state_flags_get_type())
/* enumerations from "atkobject.h" */
GType atk_role_get_type (void);
#define ATK_TYPE_ROLE (atk_role_get_type())
GType atk_layer_get_type (void);
#define ATK_TYPE_LAYER (atk_layer_get_type())
/* enumerations from "atkrelationtype.h" */
```

```
GType atk_relation_type_get_type (void);
#define ATK_TYPE_RELATION_TYPE (atk_relation_type_get_type())
/* enumerations from "atkstate.h" */
GType atk_state_type_get_type (void);
#define ATK_TYPE_STATE_TYPE (atk_state_type_get_type())
/* enumerations from "atktext.h" */
GType atk_text_attribute_get_type (void);
#define ATK_TYPE_TEXT_ATTRIBUTE (atk_text_attribute_get_type())
GType atk_text_boundary_get_type (void);
#define ATK_TYPE_TEXT_BOUNDARY (atk_text_boundary_get_type())
GType
 atk_text_clip_type_get_type (void);
#define ATK_TYPE_TEXT_CLIP_TYPE (atk_text_clip_type_get_type())
/* enumerations from "atkutil.h" */
GType atk_key_event_type_get_type (void);
#define ATK_TYPE_KEY_EVENT_TYPE (atk_key_event_type_get_type())
GType atk_coord_type_get_type (void);
#define ATK_TYPE_COORD_TYPE (atk_coord_type_get_type())
G_END_DECLS

#endif /* __ATK_ENUM_TYPES_H__ */

/* Generated data ends here */
```

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```
// ExtractCallbackConsole.h

#ifndef __EXTRACT_CALLBACK_CONSOLE_H
```

```
#define __EXTRACT_CALLBACK_CONSOLE_H

#include "../../../Common/StdOutStream.h"

#include "../../IPassword.h"

#include "../../Archive/IArchive.h"

#include "../Common/ArchiveExtractCallback.h"

#include "PercentPrinter.h"

#include "OpenCallbackConsole.h"

class CExtractScanConsole: public IDirItemsCallback
{
 CStdOutStream *_so;
 CStdOutStream *_se;
 CPercentPrinter _percent;

 bool NeedPercents() const { return _percent._so != NULL; }

 void ClosePercentsAndFlush()
 {
  if (NeedPercents())
    _percent.ClosePrint(true);
  if (_so)
    _so->Flush();
 }

public:
 void Init(CStdOutStream *outStream, CStdOutStream *errorStream, CStdOutStream *percentStream)
 {
  _so = outStream;
  _se = errorStream;
  _percent._so = percentStream;
 }

 void SetWindowWidth(unsigned width) { _percent.MaxLen = width - 1; }

 void StartScanning();

 INTERFACE_IDirItemsCallback(;)

 void CloseScanning()
 {
```

```
  if (NeedPercents())
    _percent.ClosePrint(true);
 }

 void PrintStat(const CDirItemsStat &st);
};




class CExtractCallbackConsole:
 public IExtractCallbackUI,
 // public IArchiveExtractCallbackMessage,
 public IFolderArchiveExtractCallback2,
 #ifndef _NO_CRYPTO
 public ICryptoGetTextPassword,
 #endif
 public COpenCallbackConsole,
 public CMyUnknownImp
{
 AString _tempA;
 UString _tempU;

 UString _currentName;

 void ClosePercents_for_so()
 {
  if (NeedPercents() && _so == _percent._so)
    _percent.ClosePrint(false);
 }

 void ClosePercentsAndFlush()
 {
  if (NeedPercents())
    _percent.ClosePrint(true);
  if (_so)
    _so->Flush();
 }

public:
 MY_QUERYINTERFACE_BEGIN2(IFolderArchiveExtractCallback)
 // MY_QUERYINTERFACE_ENTRY(IArchiveExtractCallbackMessage)
 MY_QUERYINTERFACE_ENTRY(IFolderArchiveExtractCallback2)
 #ifndef _NO_CRYPTO
 MY_QUERYINTERFACE_ENTRY(ICryptoGetTextPassword)
 #endif
 MY_QUERYINTERFACE_END
 MY_ADDREF_RELEASE
```

```
STDMETHOD(SetTotal)(UInt64
total);
STDMETHOD(SetCompleted)(const UInt64 *completeValue);

INTERFACE_IFolderArchiveExtractCallback(;)

INTERFACE_IExtractCallbackUI(;)
// INTERFACE_IArchiveExtractCallbackMessage(;)
INTERFACE_IFolderArchiveExtractCallback2(;)

#ifndef _NO_CRYPTO

STDMETHOD(CryptoGetTextPassword)(BSTR *password);

#endif

UInt64 NumTryArcs;

bool ThereIsError_in_Current;
bool ThereIsWarning_in_Current;

UInt64 NumOkArcs;
UInt64 NumCantOpenArcs;
UInt64 NumArcsWithError;
UInt64 NumArcsWithWarnings;

UInt64 NumOpenArcErrors;
UInt64 NumOpenArcWarnings;

UInt64 NumFileErrors;
UInt64 NumFileErrors_in_Current;

bool NeedFlush;
unsigned PercentsNameLevel;
unsigned LogLevel;

CExtractCallbackConsole():
   NeedFlush(false),
   PercentsNameLevel(1),
   LogLevel(0)
   {}

void SetWindowWidth(unsigned width) { _percent.MaxLen = width - 1; }

void Init(CStdOutStream *outStream, CStdOutStream *errorStream, CStdOutStream *percentStream)
 {
  COpenCallbackConsole::Init(outStream, errorStream, percentStream);
```

```
  NumTryArcs = 0;

  ThereIsError_in_Current = false;
  ThereIsWarning_in_Current = false;

  NumOkArcs = 0;
  NumCantOpenArcs = 0;
  NumArcsWithError = 0;
  NumArcsWithWarnings = 0;

  NumOpenArcErrors = 0;
  NumOpenArcWarnings = 0;

  NumFileErrors = 0;
  NumFileErrors_in_Current = 0;
 }
};

#endif
```

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%
%  + January 1988: completely rewritten by Kauko Saarinen.
%    The new patterns make much less mistakes with foreign
%    and compound words. The article "Automatic Hyphenation
%    of Finnish" by Professor Fred Karlsson is also referred
%
%  + 8th March 1989 (vers. 2.2): some vowel
 triples added by
%    Kauko Saarinen based on Fred Karlsson's ideas
%
%  + 9th January 1995: added \uccode and \lccode by Thomas Esser
%
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```
// StdAfx.h

#ifndef __STDAFX_H
#define __STDAFX_H

#include "../../Common/Common.h"

#endif
// Windows/Control/StatusBar.h

#ifndef __WINDOWS_CONTROL_STATUSBAR_H
#define __WINDOWS_CONTROL_STATUSBAR_H

#include "../Window.h"

namespace NWindows {
namespace NControl {

class CStatusBar: public NWindows::CWindow
{
public:
 bool Create(LONG style, LPCTSTR text, HWND hwndParent, UINT id)
   { return (_window = ::CreateStatusWindow(style, text, hwndParent, id)) != 0; }
 bool SetText(LPCTSTR text)
   { return CWindow::SetText(text); }
 bool SetText(unsigned index, LPCTSTR text, UINT type)
   { return LRESULTToBool(SendMsg(SB_SETTEXT, index | type, (LPARAM)text)); }
 bool SetText(unsigned index, LPCTSTR text)
   { return SetText(index, text, 0); }

 #ifndef _UNICODE
 bool Create(LONG style, LPCWSTR text, HWND hwndParent, UINT id)
   { return (_window = ::CreateStatusWindowW(style, text, hwndParent, id)) != 0; }
 bool SetText(LPCWSTR text)
   { return CWindow::SetText(text); }
 bool SetText(unsigned index, LPCWSTR text, UINT type)
   { return LRESULTToBool(SendMsg(SB_SETTEXTW,
 index | type, (LPARAM)text)); }
 bool SetText(unsigned index, LPCWSTR text)
```

```
  { return SetText(index, text, 0); }
 #endif

 bool SetParts(unsigned numParts, const int *edgePostions)
  { return LRESULTToBool(SendMsg(SB_SETPARTS, numParts, (LPARAM)edgePostions)); }
 void Simple(bool simple)
  { SendMsg(SB_SIMPLE, BoolToBOOL(simple), 0); }
};

}}

#endif
```

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```
// SortUtils.h

#ifndef __SORT_UTLS_H
#define __SORT_UTLS_H

#include "../../../Common/MyString.h"

void SortFileNames(const UStringVector &strings, CUIntVector &indices);

#endif
```

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SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With dir Attribute in div Element in text Element 2</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />

```
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-021-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element that contains a div element with rtl as
the value for the dir attribute."
 />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-021.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text&gt;
   &lt;div dir="rtl"&gt;Paragraph 1&lt;/div&gt;
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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```
PROG = lzma
CXX = g++ -O2
# -Wall -Werror -Wno-delete-non-virtual-dtor
CXX_C = gcc -O2 -Wall -Werror

ifdef SystemDrive
IS_MINGW = 1
endif

ifdef IS_MINGW

RM = del
CFLAGS = -c
LIB2 = -loleaut32 -luuid
LDFLAGS = -s

FILE_IO =FileIO
FILE_IO_2 =Windows/$(FILE_IO)

MT_FILES = \
 LzFindMt.o \
 Threads.o \

else

RM = rm -f
CFLAGS = -c -D_7ZIP_ST

FILE_IO =C_FileIO
FILE_IO_2 =Common/$(FILE_IO)


endif
```

```
OBJS = \
 $(MT_FILES) \
 $(FILE_IO).o \
 LzmaAlone.o \
 Bench.o \
 BenchCon.o \
 ConsoleClose.o \
 LzmaDecoder.o \
 LzmaEncoder.o \
 LzmaRegister.o \
 CreateCoder.o \
 CWrappers.o \
 FileStreams.o \
 FilterCoder.o \
 MethodProps.o \
 StreamUtils.o \
 CommandLineParser.o \
 CRC.o \
 CrcReg.o \
 IntToString.o \
 MyString.o \
 MyVector.o \
 MyWindows.o \
 StringConvert.o \
 StringToInt.o \
 PropVariant.o \
 System.o \
 7zCrc.o \
 7zCrcOpt.o \
 Alloc.o \
 Bra86.o \
 CpuArch.o \
 LzFind.o \
 LzmaDec.o \
 LzmaEnc.o \
 Lzma86Dec.o \
 Lzma86Enc.o \


all: $(PROG)

$(PROG):
 $(OBJS)
 $(CXX) -o $(PROG) $(LDFLAGS) $(OBJS) $(LIB2)

LzmaAlone.o: LzmaAlone.cpp
```

```
 $(CXX) $(CFLAGS) LzmaAlone.cpp

Bench.o: ../../UI/Common/Bench.cpp
 $(CXX) $(CFLAGS) ../../UI/Common/Bench.cpp

BenchCon.o: ../../UI/Console/BenchCon.cpp
 $(CXX) $(CFLAGS) ../../UI/Console/BenchCon.cpp

ConsoleClose.o: ../../UI/Console/ConsoleClose.cpp
 $(CXX) $(CFLAGS) ../../UI/Console/ConsoleClose.cpp

LzmaDecoder.o: ../../Compress/LzmaDecoder.cpp
 $(CXX) $(CFLAGS) ../../Compress/LzmaDecoder.cpp

LzmaEncoder.o: ../../Compress/LzmaEncoder.cpp
 $(CXX) $(CFLAGS) ../../Compress/LzmaEncoder.cpp

LzmaRegister.o: ../../Compress/LzmaRegister.cpp
 $(CXX) $(CFLAGS) ../../Compress/LzmaRegister.cpp

CreateCoder.o: ../../Common/CreateCoder.cpp
 $(CXX) $(CFLAGS) ../../Common/CreateCoder.cpp

CWrappers.o: ../../Common/CWrappers.cpp
 $(CXX) $(CFLAGS) ../../Common/CWrappers.cpp

FileStreams.o: ../../Common/FileStreams.cpp
 $(CXX) $(CFLAGS) ../../Common/FileStreams.cpp

FilterCoder.o: ../../Common/FilterCoder.cpp
 $(CXX)
 $(CFLAGS) ../../Common/FilterCoder.cpp

MethodProps.o: ../../Common/MethodProps.cpp
 $(CXX) $(CFLAGS) ../../Common/MethodProps.cpp

StreamUtils.o: ../../Common/StreamUtils.cpp
 $(CXX) $(CFLAGS) ../../Common/StreamUtils.cpp

$(FILE_IO).o: ../../../$(FILE_IO_2).cpp
 $(CXX) $(CFLAGS) ../../../$(FILE_IO_2).cpp


CommandLineParser.o: ../../../Common/CommandLineParser.cpp
 $(CXX) $(CFLAGS) ../../../Common/CommandLineParser.cpp

CRC.o: ../../../Common/CRC.cpp
 $(CXX) $(CFLAGS) ../../../Common/CRC.cpp
```

```
CrcReg.o: ../../../Common/CrcReg.cpp
 $(CXX) $(CFLAGS) ../../../Common/CrcReg.cpp

IntToString.o: ../../../Common/IntToString.cpp
 $(CXX) $(CFLAGS) ../../../Common/IntToString.cpp

MyString.o: ../../../Common/MyString.cpp
 $(CXX) $(CFLAGS) ../../../Common/MyString.cpp

MyVector.o: ../../../Common/MyVector.cpp
 $(CXX) $(CFLAGS) ../../../Common/MyVector.cpp

MyWindows.o: ../../../Common/MyWindows.cpp
 $(CXX) $(CFLAGS) ../../../Common/MyWindows.cpp

StringConvert.o: ../../../Common/StringConvert.cpp
 $(CXX)
 $(CFLAGS) ../../../Common/StringConvert.cpp

StringToInt.o: ../../../Common/StringToInt.cpp
 $(CXX) $(CFLAGS) ../../../Common/StringToInt.cpp

PropVariant.o: ../../../Windows/PropVariant.cpp
 $(CXX) $(CFLAGS) ../../../Windows/PropVariant.cpp

System.o: ../../../Windows/System.cpp
 $(CXX) $(CFLAGS) ../../../Windows/System.cpp

7zCrc.o: ../../../../C/7zCrc.c
 $(CXX_C) $(CFLAGS) ../../../../C/7zCrc.c

7zCrcOpt.o: ../../../../C/7zCrcOpt.c
 $(CXX_C) $(CFLAGS) ../../../../C/7zCrcOpt.c

Alloc.o: ../../../../C/Alloc.c
 $(CXX_C) $(CFLAGS) ../../../../C/Alloc.c

Bra86.o: ../../../../C/Bra86.c
 $(CXX_C) $(CFLAGS) ../../../../C/Bra86.c

CpuArch.o: ../../../../C/CpuArch.c
 $(CXX_C) $(CFLAGS) ../../../../C/CpuArch.c

LzFind.o: ../../../../C/LzFind.c
 $(CXX_C) $(CFLAGS) ../../../../C/LzFind.c

ifdef MT_FILES
```

```
LzFindMt.o: ../../../../C/LzFindMt.c
 $(CXX_C) $(CFLAGS) ../../../../C/LzFindMt.c

Threads.o: ../../../../C/Threads.c
 $(CXX_C) $(CFLAGS) ../../../../C/Threads.c
endif

LzmaDec.o:
 ../../../../C/LzmaDec.c
 $(CXX_C) $(CFLAGS) ../../../../C/LzmaDec.c

LzmaEnc.o: ../../../../C/LzmaEnc.c
 $(CXX_C) $(CFLAGS) ../../../../C/LzmaEnc.c

Lzma86Dec.o: ../../../../C/Lzma86Dec.c
 $(CXX_C) $(CFLAGS) ../../../../C/Lzma86Dec.c

Lzma86Enc.o: ../../../../C/Lzma86Enc.c
 $(CXX_C) $(CFLAGS) ../../../../C/Lzma86Enc.c

clean:
 -$(RM) $(PROG) $(OBJS)
```

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* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_NO_OP_OBJECT_FACTORY_H__
#define __ATK_NO_OP_OBJECT_FACTORY_H__

#include <atk/atkobjectfactory.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

#define ATK_TYPE_NO_OP_OBJECT_FACTORY
            (atk_no_op_object_factory_get_type ())
#define ATK_NO_OP_OBJECT_FACTORY(obj)            (G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_NO_OP_OBJECT_FACTORY, AtkNoOpObjectFactory))
#define ATK_NO_OP_OBJECT_FACTORY_CLASS(klass)      (G_TYPE_CHECK_CLASS_CAST ((klass),
ATK_TYPE_NO_OP_OBJECT_FACTORY, AtkNoOpObjectFactoryClass))
#define ATK_IS_NO_OP_OBJECT_FACTORY(obj)          (G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_NO_OP_OBJECT_FACTORY))
#define ATK_IS_NO_OP_OBJECT_FACTORY_CLASS(klass)    (G_TYPE_CHECK_CLASS_TYPE ((klass),
ATK_TYPE_NO_OP_OBJECT_FACTORY))
#define ATK_NO_OP_OBJECT_FACTORY_GET_CLASS(obj)     (G_TYPE_INSTANCE_GET_CLASS ( (obj),
ATK_TYPE_NO_OP_OBJECT_FACTORY, AtkNoOpObjectFactoryClass))

typedef struct _AtkNoOpObjectFactory              AtkNoOpObjectFactory;
typedef struct _AtkNoOpObjectFactoryClass          AtkNoOpObjectFactoryClass;

struct _AtkNoOpObjectFactory
{
 AtkObjectFactory parent;
};

struct _AtkNoOpObjectFactoryClass
{
  AtkObjectFactoryClass parent_class;
};
```

```
GType atk_no_op_object_factory_get_type(void);

AtkObjectFactory *atk_no_op_object_factory_new(void);

#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_NO_OP_OBJECT_FACTORY_H__ */
```

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==========

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==========

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```
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* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_EDITABLE_TEXT_H__
#define __ATK_EDITABLE_TEXT_H__

#include <atk/atkobject.h>
#include <atk/atktext.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

/*
 * AtkEditableText is used to support access in an "accessibility" context
* to editing features of editable text widgets.
*/

#define ATK_TYPE_EDITABLE_TEXT                  (atk_editable_text_get_type ())
#define ATK_IS_EDITABLE_TEXT(obj)               G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_EDITABLE_TEXT)
#define ATK_EDITABLE_TEXT(obj)                  G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_EDITABLE_TEXT, AtkEditableText)
#define ATK_EDITABLE_TEXT_GET_IFACE(obj)        (G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_EDITABLE_TEXT, AtkEditableTextIface))

#ifndef _TYPEDEF_ATK_EDITABLE_TEXT_
#define _TYPEDEF_ATK_EDITABLE_TEXT_
```

```
typedef struct _AtkEditableText AtkEditableText;
#endif
typedef struct _AtkEditableTextIface AtkEditableTextIface;

struct _AtkEditableTextIface
{
 GTypeInterface parent_interface;

 gboolean (* set_run_attributes) (AtkEditableText  *text,
                                  AtkAttributeSet  *attrib_set,
                                  gint
   start_offset,
      gint      end_offset);
 void   (* set_text_contents)    (AtkEditableText  *text,
                                  const gchar      *string);
 void   (* insert_text)          (AtkEditableText  *text,
                                  const gchar      *string,
                                  gint             length,
                                  gint             *position);
 void   (* copy_text)            (AtkEditableText  *text,
                                  gint             start_pos,
                                  gint             end_pos);
 void   (* cut_text)             (AtkEditableText  *text,
                                  gint             start_pos,
                                  gint             end_pos);
 void   (* delete_text)          (AtkEditableText  *text,
                                  gint             start_pos,
                                  gint             end_pos);
 void   (* paste_text)
   (AtkEditableText  *text,
                                  gint             position);

 AtkFunction                    pad1;
 AtkFunction                    pad2;
};
GType atk_editable_text_get_type (void);


gboolean atk_editable_text_set_run_attributes (AtkEditableText          *text,
                                               AtkAttributeSet  *attrib_set,
                                               gint             start_offset,
            gint         end_offset);
void atk_editable_text_set_text_contents    (AtkEditableText  *text,
                                             const gchar      *string);
void atk_editable_text_insert_text          (AtkEditableText  *text,
                                             const gchar      *string,
                                             gint             length,
                                             gint             *position);
```

```
void atk_editable_text_copy_text          (AtkEditableText  *text,

                        gint          start_pos,
                              gint          end_pos);
void atk_editable_text_cut_text           (AtkEditableText  *text,
                              gint          start_pos,
                              gint          end_pos);
void atk_editable_text_delete_text        (AtkEditableText  *text,
                              gint          start_pos,
                              gint          end_pos);
void atk_editable_text_paste_text         (AtkEditableText  *text,
                              gint          position);

#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_EDITABLE_TEXT_H__ */
```

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*
* ---
* Author: Kostya Serebryany
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```
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Invalid copyright Element With dir Attribute in div Element in text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-022-ref.xht" />
  <meta name="assert" content="The copyright element contains a text element that contains a div element with
INVALID as the value for the dir
 attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-022.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
PROG = 7zra.dll
DEF_FILE = ../../Archive/Archive2.def
CFLAGS = $(CFLAGS) \
 -D_NO_CRYPTO

COMMON_OBJS = \
 $O\CRC.obj \
 $O\CrcReg.obj \
 $O\IntToString.obj \
```

```
 $O\NewHandler.obj \
 $O\MyString.obj \
 $O\StringConvert.obj \
 $O\StringToInt.obj \
 $O\MyVector.obj \
 $O\Wildcard.obj \

WIN_OBJS = \
 $O\FileDir.obj \
 $O\FileFind.obj \
 $O\FileIO.obj \
 $O\FileName.obj \
 $O\PropVariant.obj \
 $O\Synchronization.obj \
 $O\System.obj \

7ZIP_COMMON_OBJS = \
 $O\CreateCoder.obj \
 $O\CWrappers.obj \
 $O\InBuffer.obj \
 $O\InOutTempBuffer.obj \
 $O\FilterCoder.obj \
 $O\LimitedStreams.obj \
 $O\MethodId.obj \
 $O\MethodProps.obj \
 $O\OutBuffer.obj \
 $O\ProgressUtils.obj \
 $O\PropId.obj \
 $O\StreamBinder.obj \
 $O\StreamObjects.obj \
 $O\StreamUtils.obj \
 $O\UniqBlocks.obj \
 $O\VirtThread.obj \

AR_OBJS = \
 $O\ArchiveExports.obj \
 $O\DllExports2.obj \

AR_COMMON_OBJS = \
 $O\CoderMixer2.obj \
 $O\HandlerOut.obj \
 $O\InStreamWithCRC.obj \
 $O\ItemNameUtils.obj
 \
 $O\OutStreamWithCRC.obj \
 $O\ParseProperties.obj \
```

```
7Z_OBJS = \
 $O\7zCompressionMode.obj \
 $O\7zDecode.obj \
 $O\7zEncode.obj \
 $O\7zExtract.obj \
 $O\7zFolderInStream.obj \
 $O\7zHandler.obj \
 $O\7zHandlerOut.obj \
 $O\7zHeader.obj \
 $O\7zIn.obj \
 $O\7zOut.obj \
 $O\7zProperties.obj \
 $O\7zSpecStream.obj \
 $O\7zUpdate.obj \
 $O\7zRegister.obj \


COMPRESS_OBJS = \
 $O\CodecExports.obj \
 $O\Bcj2Coder.obj \
 $O\Bcj2Register.obj \
 $O\BcjCoder.obj \
 $O\BcjRegister.obj \
 $O\BranchMisc.obj \
 $O\BranchRegister.obj \
 $O\ByteSwap.obj \
 $O\CopyCoder.obj \
 $O\CopyRegister.obj \
 $O\DeltaFilter.obj \
 $O\Lzma2Decoder.obj \
 $O\Lzma2Encoder.obj \
 $O\Lzma2Register.obj \
 $O\LzmaDecoder.obj \
 $O\LzmaEncoder.obj \
 $O\LzmaRegister.obj \

C_OBJS = \
 $O\Alloc.obj \
 $O\Bcj2.obj \
 $O\Bcj2Enc.obj \
 $O\Bra.obj \
 $O\Bra86.obj \
 $O\BraIA64.obj \
 $O\CpuArch.obj \
 $O\Delta.obj \
 $O\LzFind.obj \
 $O\LzFindMt.obj \
 $O\Lzma2Dec.obj
```

```
\
$O\Lzma2DecMt.obj \
$O\Lzma2Enc.obj \
$O\LzmaDec.obj \
$O\LzmaEnc.obj \
$O\MtCoder.obj \
$O\MtDec.obj \
$O\Threads.obj \

!include "../../Crc.mak"
!include "../../LzmaDec.mak"

!include "../../7zip.mak"
```

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This file is based on the TeX hyphenation patterns distributed under the
LaTeX Project Public License (LPPL) as part of the hyph-utf8 package.

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file, You can obtain one at http://mozilla.org/MPL/2.0/.

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At the time this file was first modified, a complete, unmodified copy of
the LPPL Work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

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Portions of this file were originally made available under the following license
(copied verbatim from hyph-ca.lic.txt in the original work):

Catalan hyphenation patterns

(more info about the licence to be added later)

```
% This file is part of hyph-utf8 package and resulted
 from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% Source: cahyph.tex (2003-09-08)
% Author: Gonal Badenes <g.badenes at ieee.org>
%
% The above mentioned file should become obsolete,
% and the author of the original file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%               and helped with testing, suggestions and bug reports
% - Norbert Preining, who tested & integrated
 patterns into TeX Live
%
% However, the "copyright/copyleft" owner of patterns remains the original author.
%
% The copyright statement of this file is thus:
%
%    Do with this file whatever needs to be done in future for the sake of
%    "a better world" as long as you respect the copyright of original file.
%    If you're the original author of patterns or taking over a new revolution,
%    plese remove all of the TUG comments & credits that we added here -
%    you are the Queen / the King, we are only the servants.
%
% If you want to change this file, rather than uploading directly to CTAN,
% we would be grateful if you could send it to us (http://tug.org/tex-hyphen)
% or ask for credentials for SVN repository and commit it yourself;
% we will then upload the whole "package" to CTAN.
%
% Before a new "pattern-revolution" starts,
% please try to follow some guidelines if possible:
%
% - \lccode is *forbidden*, and I really mean it
% - all the patterns should be in UTF-8
% - the only
```

```
 "allowed" TeX commands in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
% at least a chance to read your patterns.
%
% For more unformation see
%
%    http://tug.org/tex-hyphen
%
%-------------------------------------------------------------------------------
%
% Hyphenation patterns for Catalan.
% This is version 1.11
% Compiled by Gonal Badenes and Francina Turon,
%       December 1991-January 1995.
%
% Copyright (C) 1991-2003 Gonal Badenes
%
% ---------------------------------------------------------------
% IMPORTANT NOTICE:
%
% This program can be redistributed
 and/or modified under the terms
% of the LaTeX Project Public License Distributed from CTAN
% archives in directory macros/latex/base/lppl.txt; either
% version 1 of the License, or any later version.
% ---------------------------------------------------------------
%
%%% ====================================================================
%%%  @TeX-hyphen-file{
%%%     author          = "Gonal Badenes",
%%%     version         = "1.11",
%%%     date            = "15 July 2003",
%%%     time            = "15:08:12 CET",
%%%     filename        = "cahyph.tex",
%%%     email           = "g.badenes@ieee.org",
%%%     codetable       = "UTF-8",
%%%     keywords        = "TeX, hyphen, catalan",
%%%     supported       = "yes",
%%%     abstract        = "Catalan hyphenation patterns",
%%%     docstring       = "This file contains the hyphenation patterns
```

```
%%%                    for the catalan language",
%%%  }
%%% ==================================================================
%
%
 NOTICE: Version 1.11 is identical to version 1.10 (issued on January 17,
%        1995) except for the updated copyright notice above.
%
% The macros used were created for ghyph31.tex by Bernd Raichle (see the
% German hyphenation pattern files for further details)
%
% This patterns have been created using standard, conservative
% hyphenation rules for catalan. The results have refined running them
% through patgen. In that way, the number of hits has been increased.
%
% These rules produce no wrong patterns (Results checked against the
% ``Diccionari Ortogr\`afic i de Pron\'uncia'', Enciclop\`edia
% Catalana. The percentage of valid hyphen misses is lower than 1%
%
% Some of the patterns below represent combinations that never
% happen in Catalan. We have tried to keep them to a minimum.
%
% *** IMPORTANT ***
% \lefthyphenmin and \righthyphenmin should be set to 2 and 2
% respectively. If you set them below these values incorrect breaks
% will happen (specially at the beginning of
 foreign words and words
% which begin with some prefixes).
% *** IMPORTANT ***
%
% Please report any problem you might have to the authors!!!
%
%%%
```

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At the time this file was first modified, a complete, unmodified copy of
the LPPL Work was available from:
http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

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(copied verbatim from hyph-tr.lic.txt in the original work):

Turkish hyphenation patterns

(more info about the licence to be added later)

% hyph-tr.tex
%
% Turkish hyphenation patterns
%
%
 This file is auto-generated from source/generic/hyph-utf8/languages/tr/generate_patterns_tr.rb that is part of hyph-utf8.
% Please don't modify this file; modify the generating script instead.
%
% Copyright (C) 1987 Pierre A. MacKay
%  2008, 2011 TUG
%
% This program can redistributed and/or modified under the terms
% of the LaTeX Project Public License Distributed from CTAN
% archives in directory macros/latex/base/lppl.txt; either
% version 1 of the License, or (at your option) any later version.
%
% Credits:
% - algorithm developed by P. A. MacKay for the Ottoman Texts Project in 1987
% - rules adapted for modern Turkish by H. Turgut Uyar <uyar at itu.edu.tr>
% - initiative to improve Turkish patterns by S. Ekin Kocabas <kocabas at stanford.edu>
% - script written by Mojca Miklavec <mojca.miklavec.lists at gmail.com> in June 2008
%
% See also:
% - http://www.ctan.org/tex-archive/language/turkish/hyphen/turk_hyf.c
% - http://www.tug.org/TUGboat/Articles/tb09-1/tb20mackay.pdf
%
%
 Differences with Ottoman patterns:
% - adapted for the use on modern TeX engines, using UTF-8 charactes
% - only letters for Modern Turkish +  (the first one often needed, the other two don't hurt)
% - (if needed, support for Ottoman Turkish might be provided separately under language code 'ota')
%

% Changes:
% - 2008-06-25/27/28 - create this file by adapting Ottoman rules for modern Turkish
% - 2011-08-10 - add LPPL licence with permission of Pierre A. MacKay
%
# This file contains a list of people who've made non-trivial
# contribution to the Google C++ Mocking Framework project.  People
# who commit code to the project are encouraged to add their names
# here.  Please keep the list sorted by first names.

Benoit Sigoure <tsuna@google.com>
Bogdan Piloca <boo@google.com>
Chandler Carruth <chandlerc@google.com>
Dave MacLachlan <dmaclach@gmail.com>
David Anderson <danderson@google.com>
Dean Sturtevant
Gene Volovich <gv@cite.com>
Hal Burch <gmock@hburch.com>
Jeffrey Yasskin <jyasskin@google.com>
Jim Keller <jimkeller@google.com>
Joe Walnes <joe@truemesh.com>
Jon Wray <jwray@google.com>
Keir Mierle <mierle@gmail.com>
Keith Ray <keith.ray@gmail.com>
Kostya Serebryany <kcc@google.com>
Lev Makhlis
Manuel Klimek <klimek@google.com>
Mario Tanev <radix@google.com>
Mark Paskin
Markus Heule <markus.heule@gmail.com>
Matthew Simmons <simmonmt@acm.org>
Mike Bland <mbland@google.com>
Neal Norwitz <nnorwitz@gmail.com>
Nermin Ozkiranartli <nermin@google.com>
Owen
 Carlsen <ocarlsen@google.com>
Paneendra Ba <paneendra@google.com>
Paul Menage <menage@google.com>
Piotr Kaminski <piotrk@google.com>
Russ Rufer <russ@pentad.com>
Sverre Sundsdal <sundsdal@gmail.com>
Takeshi Yoshino <tyoshino@google.com>
Vadim Berman <vadimb@google.com>
Vlad Losev <vladl@google.com>
Wolfgang Klier <wklier@google.com>
Zhanyong Wan <wan@google.com>
<?xml version="1.0" encoding="utf-8"?>
<Project DefaultTargets="Build" ToolsVersion="15.0"
xmlns="http://schemas.microsoft.com/developer/msbuild/2003">

```
<ItemGroup Label="ProjectConfigurations">
  <ProjectConfiguration Include="Debug|Win32">
    <Configuration>Debug</Configuration>
    <Platform>Win32</Platform>
  </ProjectConfiguration>
  <ProjectConfiguration Include="Release|Win32">
    <Configuration>Release</Configuration>
    <Platform>Win32</Platform>
  </ProjectConfiguration>
  <ProjectConfiguration Include="Debug|x64">
    <Configuration>Debug</Configuration>
    <Platform>x64</Platform>
  </ProjectConfiguration>
  <ProjectConfiguration Include="Release|x64">
    <Configuration>Release</Configuration>
    <Platform>x64</Platform>
  </ProjectConfiguration>
</ItemGroup>
<PropertyGroup Label="Globals">
  <VCProjectVersion>15.0</VCProjectVersion>
  <ProjectGuid>{B5DBA89B-37EE-425C-A375-4E04E69731FA}</ProjectGuid>
  <Keyword>Win32Proj</Keyword>
   <RootNamespace>ExecInExplorer</RootNamespace>
  <WindowsTargetPlatformVersion>10.0.15063.0</WindowsTargetPlatformVersion>
</PropertyGroup>
<Import Project="$(VCTargetsPath)\Microsoft.Cpp.Default.props" />
<PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'" Label="Configuration">
  <ConfigurationType>DynamicLibrary</ConfigurationType>
  <UseDebugLibraries>true</UseDebugLibraries>
  <PlatformToolset>v141</PlatformToolset>
  <CharacterSet>Unicode</CharacterSet>
</PropertyGroup>
<PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'" Label="Configuration">
  <ConfigurationType>DynamicLibrary</ConfigurationType>
  <UseDebugLibraries>false</UseDebugLibraries>
  <PlatformToolset>v141</PlatformToolset>
  <WholeProgramOptimization>true</WholeProgramOptimization>
  <CharacterSet>Unicode</CharacterSet>
</PropertyGroup>
<PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Debug|x64'" Label="Configuration">

 <ConfigurationType>DynamicLibrary</ConfigurationType>
  <UseDebugLibraries>true</UseDebugLibraries>
  <PlatformToolset>v141</PlatformToolset>
  <CharacterSet>Unicode</CharacterSet>
</PropertyGroup>
<PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Release|x64'" Label="Configuration">
  <ConfigurationType>DynamicLibrary</ConfigurationType>
```

```
  <UseDebugLibraries>false</UseDebugLibraries>
  <PlatformToolset>v141</PlatformToolset>
  <WholeProgramOptimization>true</WholeProgramOptimization>
  <CharacterSet>Unicode</CharacterSet>
 </PropertyGroup>
 <Import Project="$(VCTargetsPath)\Microsoft.Cpp.props" />
 <ImportGroup Label="ExtensionSettings">
 </ImportGroup>
 <ImportGroup Label="Shared">
 </ImportGroup>
 <ImportGroup Label="PropertySheets" Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'">
  <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform"
 />
 </ImportGroup>
 <ImportGroup Label="PropertySheets" Condition="'$(Configuration)|$(Platform)'=='Release|Win32'">
  <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform" />
 </ImportGroup>
 <ImportGroup Label="PropertySheets" Condition="'$(Configuration)|$(Platform)'=='Debug|x64'">
  <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform" />
 </ImportGroup>
 <ImportGroup Label="PropertySheets" Condition="'$(Configuration)|$(Platform)'=='Release|x64'">
  <Import Project="$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props"
Condition="exists('$(UserRootDir)\Microsoft.Cpp.$(Platform).user.props')" Label="LocalAppDataPlatform" />
 </ImportGroup>
 <PropertyGroup Label="UserMacros" />
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'">
   <LinkIncremental>false</LinkIncremental>
 </PropertyGroup>
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Debug|x64'">
  <LinkIncremental>false</LinkIncremental>
 </PropertyGroup>
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'">
  <LinkIncremental>false</LinkIncremental>
 </PropertyGroup>
 <PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Release|x64'">
  <LinkIncremental>false</LinkIncremental>
 </PropertyGroup>
 <ItemDefinitionGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'">
  <ClCompile>
    <PrecompiledHeader>NotUsing</PrecompiledHeader>
    <WarningLevel>Level3</WarningLevel>
    <Optimization>Disabled</Optimization>
    <SDLCheck>false</SDLCheck>
<PreprocessorDefinitions>WIN32;_DEBUG;EXECINEXPLORER_EXPORTS;_WINDOWS;_USRDLL;%(Prepro
cessorDefinitions)</PreprocessorDefinitions>
```

```
    <RuntimeLibrary>MultiThreadedDebug</RuntimeLibrary>
    <OmitDefaultLibName>true</OmitDefaultLibName>
     <BufferSecurityCheck>false</BufferSecurityCheck>
    <BasicRuntimeChecks>Default</BasicRuntimeChecks>
  </ClCompile>
  <Link>
    <SubSystem>Windows</SubSystem>
    <GenerateDebugInformation>true</GenerateDebugInformation>
    <EntryPointSymbol>DllMain</EntryPointSymbol>
    <LinkTimeCodeGeneration>Default</LinkTimeCodeGeneration>
  </Link>
 </ItemDefinitionGroup>
 <ItemDefinitionGroup Condition="'$(Configuration)|$(Platform)'=='Debug|x64'">
  <ClCompile>
    <PrecompiledHeader>NotUsing</PrecompiledHeader>
    <WarningLevel>Level3</WarningLevel>
    <Optimization>Disabled</Optimization>
    <SDLCheck>false</SDLCheck>
<PreprocessorDefinitions>_DEBUG;EXECINEXPLORER_EXPORTS;_WINDOWS;_USRDLL;%(PreprocessorD
efinitions)</PreprocessorDefinitions>
    <RuntimeLibrary>MultiThreadedDebug</RuntimeLibrary>
    <OmitDefaultLibName>true</OmitDefaultLibName>
    <BufferSecurityCheck>false</BufferSecurityCheck>
    <BasicRuntimeChecks>Default</BasicRuntimeChecks>
   </ClCompile>
  <Link>
    <SubSystem>Windows</SubSystem>
    <GenerateDebugInformation>true</GenerateDebugInformation>
    <EntryPointSymbol>DllMain</EntryPointSymbol>
    <LinkTimeCodeGeneration>Default</LinkTimeCodeGeneration>
  </Link>
 </ItemDefinitionGroup>
 <ItemDefinitionGroup Condition="'$(Configuration)|$(Platform)'=='Release|Win32'">
  <ClCompile>
    <PrecompiledHeader>NotUsing</PrecompiledHeader>
    <WarningLevel>Level3</WarningLevel>
    <Optimization>MaxSpeed</Optimization>
    <FunctionLevelLinking>true</FunctionLevelLinking>
    <IntrinsicFunctions>true</IntrinsicFunctions>
    <SDLCheck>false</SDLCheck>
<PreprocessorDefinitions>WIN32;NDEBUG;EXECINEXPLORER_EXPORTS;_WINDOWS;_USRDLL;%(Prepro
cessorDefinitions)</PreprocessorDefinitions>
    <RuntimeLibrary>MultiThreaded</RuntimeLibrary>
    <OmitDefaultLibName>true</OmitDefaultLibName>
    <BufferSecurityCheck>false</BufferSecurityCheck>
     <WholeProgramOptimization>false</WholeProgramOptimization>
  </ClCompile>
  <Link>
```

```
    <SubSystem>Windows</SubSystem>
    <EnableCOMDATFolding>true</EnableCOMDATFolding>
    <OptimizeReferences>true</OptimizeReferences>
    <GenerateDebugInformation>false</GenerateDebugInformation>
    <EntryPointSymbol>DllMain</EntryPointSymbol>
    <LinkTimeCodeGeneration>Default</LinkTimeCodeGeneration>
  </Link>
 </ItemDefinitionGroup>
 <ItemDefinitionGroup Condition="'$(Configuration)|$(Platform)'=='Release|x64'">
  <ClCompile>
    <PrecompiledHeader>NotUsing</PrecompiledHeader>
    <WarningLevel>Level3</WarningLevel>
    <Optimization>MaxSpeed</Optimization>
    <FunctionLevelLinking>true</FunctionLevelLinking>
    <IntrinsicFunctions>true</IntrinsicFunctions>
    <SDLCheck>false</SDLCheck>
<PreprocessorDefinitions>NDEBUG;EXECINEXPLORER_EXPORTS;_WINDOWS;_USRDLL;%(PreprocessorD
efinitions)</PreprocessorDefinitions>
    <RuntimeLibrary>MultiThreaded</RuntimeLibrary>
     <OmitDefaultLibName>true</OmitDefaultLibName>
    <BufferSecurityCheck>false</BufferSecurityCheck>
    <WholeProgramOptimization>false</WholeProgramOptimization>
  </ClCompile>
  <Link>
    <SubSystem>Windows</SubSystem>
    <EnableCOMDATFolding>true</EnableCOMDATFolding>
    <OptimizeReferences>true</OptimizeReferences>
    <GenerateDebugInformation>false</GenerateDebugInformation>
    <EntryPointSymbol>DllMain</EntryPointSymbol>
    <LinkTimeCodeGeneration>Default</LinkTimeCodeGeneration>
  </Link>
 </ItemDefinitionGroup>
 <ItemGroup>
  <ClCompile Include="ExecInExplorer.cpp" />
 </ItemGroup>
 <Import Project="$(VCTargetsPath)\Microsoft.Cpp.targets" />
 <ImportGroup Label="ExtensionTargets">
 </ImportGroup>
</Project>
```

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Version 2.0, January 2004

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END OF TERMS AND CONDITIONS

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Ty Coon, President of Vice

That's all there is to it!
/* Bcj2.h -- BCJ2 Converter for x86 code
2014-11-10 : Igor Pavlov : Public domain */

```
#ifndef __BCJ2_H
#define __BCJ2_H
```

```
#include "7zTypes.h"

EXTERN_C_BEGIN

#define BCJ2_NUM_STREAMS 4

enum
{
 BCJ2_STREAM_MAIN,
 BCJ2_STREAM_CALL,
 BCJ2_STREAM_JUMP,
 BCJ2_STREAM_RC
};

enum
{
 BCJ2_DEC_STATE_ORIG_0 = BCJ2_NUM_STREAMS,
 BCJ2_DEC_STATE_ORIG_1,
 BCJ2_DEC_STATE_ORIG_2,
 BCJ2_DEC_STATE_ORIG_3,

 BCJ2_DEC_STATE_ORIG,
 BCJ2_DEC_STATE_OK
};

enum
{
 BCJ2_ENC_STATE_ORIG = BCJ2_NUM_STREAMS,
 BCJ2_ENC_STATE_OK
};


#define BCJ2_IS_32BIT_STREAM(s) ((s) == BCJ2_STREAM_CALL || (s) == BCJ2_STREAM_JUMP)

/*
CBcj2Dec / CBcj2Enc
bufs sizes:
 BUF_SIZE(n) = lims[n] - bufs[n]
bufs sizes for BCJ2_STREAM_CALL and BCJ2_STREAM_JUMP must be mutliply of 4:
   (BUF_SIZE(BCJ2_STREAM_CALL) & 3) == 0
   (BUF_SIZE(BCJ2_STREAM_JUMP) & 3) == 0
*/

/*
CBcj2Dec:
dest is allowed to overlap with bufs[BCJ2_STREAM_MAIN], with the following conditions:
 bufs[BCJ2_STREAM_MAIN] >= dest &&
 bufs[BCJ2_STREAM_MAIN]
```

```
 - dest >= tempReserv +
       BUF_SIZE(BCJ2_STREAM_CALL) +
       BUF_SIZE(BCJ2_STREAM_JUMP)
    tempReserv = 0 : for first call of Bcj2Dec_Decode
    tempReserv = 4 : for any other calls of Bcj2Dec_Decode
 overlap with offset = 1 is not allowed
*/

typedef struct
{
 const Byte *bufs[BCJ2_NUM_STREAMS];
 const Byte *lims[BCJ2_NUM_STREAMS];
 Byte *dest;
 const Byte *destLim;

 unsigned state; /* BCJ2_STREAM_MAIN has more priority than BCJ2_STATE_ORIG */

 UInt32 ip;
 Byte temp[4];
 UInt32 range;
 UInt32 code;
 UInt16 probs[2 + 256];
} CBcj2Dec;

void Bcj2Dec_Init(CBcj2Dec *p);

/* Returns: SZ_OK or SZ_ERROR_DATA */
SRes Bcj2Dec_Decode(CBcj2Dec *p);

#define Bcj2Dec_IsFinished(_p_) ((_p_)->code == 0)



typedef enum
{
 BCJ2_ENC_FINISH_MODE_CONTINUE,
 BCJ2_ENC_FINISH_MODE_END_BLOCK,
 BCJ2_ENC_FINISH_MODE_END_STREAM
} EBcj2Enc_FinishMode;

typedef struct
{
 Byte *bufs[BCJ2_NUM_STREAMS];
 const Byte *lims[BCJ2_NUM_STREAMS];
 const Byte *src;
 const Byte *srcLim;
```

```
 unsigned state;
 EBcj2Enc_FinishMode finishMode;

 Byte prevByte;

 Byte cache;
 UInt32 range;
 UInt64 low;
 UInt64 cacheSize;

 UInt32 ip;

 /* 32-bit ralative offset in JUMP/CALL commands is
      - (mod 4 GB)   in 32-bit mode
      - signed Int32 in 64-bit mode
    We use (mod 4 GB) check for fileSize.
    Use fileSize up to 2 GB, if you want to support 32-bit and 64-bit code conversion. */
 UInt32 fileIp;
 UInt32 fileSize;    /* (fileSize <= ((UInt32)1 << 31)), 0 means no_limit */
 UInt32 relatLimit;  /* (relatLimit <= ((UInt32)1 << 31)), 0 means desable_conversion */

 UInt32 tempTarget;
 unsigned tempPos;
 Byte temp[4 * 2];

 unsigned flushPos;

 UInt16 probs[2 + 256];
} CBcj2Enc;

void Bcj2Enc_Init(CBcj2Enc *p);
void Bcj2Enc_Encode(CBcj2Enc *p);

#define Bcj2Enc_Get_InputData_Size(p) ((SizeT)((p)->srcLim - (p)->src) + (p)->tempPos)
#define Bcj2Enc_IsFinished(p) ((p)->flushPos == 5)


#define BCJ2_RELAT_LIMIT_NUM_BITS 26
#define BCJ2_RELAT_LIMIT ((UInt32)1 <<
 BCJ2_RELAT_LIMIT_NUM_BITS)

/* limit for CBcj2Enc::fileSize variable */
#define BCJ2_FileSize_MAX ((UInt32)1 << 31)

EXTERN_C_END

#endif
```

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Unknown Attribute in copyright Element text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element with an unknown attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size:
 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test fails.</p>
  <div class="test">P</div>
 </body>
</html>
/* ATK -  Accessibility Toolkit
* Copyright 2001 Sun Microsystems Inc.
*
* This library is free software; you can redistribute it and/or
* modify it under the terms of the GNU Library General Public
* License as published by the Free Software Foundation; either
* version 2 of the License, or (at your option) any later version.
*
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* but WITHOUT ANY WARRANTY; without even the implied warranty of
* MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the GNU
* Library General Public License for more details.
```

```
*
* You should have received a copy of the GNU Library General Public
* License along with this library; if not, write to the
* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_OBJECT_H__
#define __ATK_OBJECT_H__

#include <glib-object.h>
#include <atk/atkstate.h>
#include <atk/atkrelationtype.h>

#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus
 */

/*
* AtkObject represents the minimum information all accessible objects
* return. This information includes accessible name, accessible
* description, role and state of the object, as well information about
* its parent and children. It is also possible to obtain more specific
* accessibility information about a component if it supports one or more
* of the following interfaces:
*/

/**
*AtkRole:
*@ATK_ROLE_INVALID: Invalid role
*@ATK_ROLE_ACCEL_LABEL: A label which represents an accelerator
*@ATK_ROLE_ALERT: An object which is an alert to the user. Assistive
*Technologies typically respond to ATK_ROLE_ALERT by reading the entire
*onscreen contents of containers advertising this role.  Should be used for
*warning dialogs, etc.
*@ATK_ROLE_ANIMATION: An object which is an animated image
*@ATK_ROLE_ARROW: An arrow in one of the four cardinal directions
*@ATK_ROLE_CALENDAR:  An object that displays a calendar and allows the user to
*select a date
*@ATK_ROLE_CANVAS:
 An object that can be drawn into and is used to trap events
*@ATK_ROLE_CHECK_BOX: A choice that can be checked or unchecked and provides a
*separate indicator for the current state
*@ATK_ROLE_CHECK_MENU_ITEM: A menu item with a check box
*@ATK_ROLE_COLOR_CHOOSER: A specialized dialog that lets the user choose a
*color
*@ATK_ROLE_COLUMN_HEADER: The header for a column of data
```

*@ATK_ROLE_COMBO_BOX: A collapsible list of choices the user can select from
*@ATK_ROLE_DATE_EDITOR: An object whose purpose is to allow a user to edit a
*date
*@ATK_ROLE_DESKTOP_ICON: An inconifed internal frame within a DESKTOP_PANE
*@ATK_ROLE_DESKTOP_FRAME: A pane that supports internal frames and iconified
*versions of those internal frames
*@ATK_ROLE_DIAL: An object whose purpose is to allow a user to set a value
*@ATK_ROLE_DIALOG: A top level window with title bar and a border
*@ATK_ROLE_DIRECTORY_PANE: A pane that allows the user to navigate through and
*select the contents of a directory
*@ATK_ROLE_DRAWING_AREA: An object used for drawing custom user interface
*elements
*@ATK_ROLE_FILE_CHOOSER: A specialized dialog that lets the user choose a file
*@ATK_ROLE_FILLER: A object that fills up space in a user interface
*@ATK_ROLE_FONT_CHOOSER: A specialized dialog that lets the user choose a font
*@ATK_ROLE_FRAME: A top level window with a title bar, border, menubar, etc.
*@ATK_ROLE_GLASS_PANE: A pane that is guaranteed to be painted on top of all
*panes beneath it
*@ATK_ROLE_HTML_CONTAINER: A document container for HTML, whose children
*represent the document content
*@ATK_ROLE_ICON: A small fixed size picture, typically used to decorate
*components
*@ATK_ROLE_IMAGE: An object whose primary purpose is to display an image
*@ATK_ROLE_INTERNAL_FRAME: A frame-like object that is clipped by a desktop
*pane
*@ATK_ROLE_LABEL: An object used to present an icon or short string in an
*interface
*@ATK_ROLE_LAYERED_PANE: A specialized pane that allows its children
to be
*drawn in layers, providing a form of stacking order
*@ATK_ROLE_LIST: An object that presents a list of objects to the user and
*allows the user to select one or more of them
*@ATK_ROLE_LIST_ITEM: An object that represents an element of a list
*@ATK_ROLE_MENU: An object usually found inside a menu bar that contains a list
*of actions the user can choose from
*@ATK_ROLE_MENU_BAR: An object usually drawn at the top of the primary dialog
*box of an application that contains a list of menus the user can choose from
*@ATK_ROLE_MENU_ITEM: An object usually contained in a menu that presents an
*action the user can choose
*@ATK_ROLE_OPTION_PANE: A specialized pane whose primary use is inside a DIALOG
*@ATK_ROLE_PAGE_TAB: An object that is a child of a page tab list
*@ATK_ROLE_PAGE_TAB_LIST: An object that presents a series of panels (or page
*tabs), one at a time, through some mechanism provided by the object
*@ATK_ROLE_PANEL: A generic container that is often used to
group objects
*@ATK_ROLE_PASSWORD_TEXT: A text object uses for passwords, or other places
*where the text content is not shown visibly to the user
*@ATK_ROLE_POPUP_MENU: A temporary window that is usually used to offer the

*user a list of choices, and then hides when the user selects one of those
*choices
*@ATK_ROLE_PROGRESS_BAR: An object used to indicate how much of a task has been
*completed
*@ATK_ROLE_PUSH_BUTTON: An object the user can manipulate to tell the
*application to do something
*@ATK_ROLE_RADIO_BUTTON: A specialized check box that will cause other radio
*buttons in the same group to become unchecked when this one is checked
*@ATK_ROLE_RADIO_MENU_ITEM: A check menu item which belongs to a group. At each
*instant exactly one of the radio menu items from a group is selected
*@ATK_ROLE_ROOT_PANE: A specialized pane that has a glass pane and a layered
*pane as its children
*@ATK_ROLE_ROW_HEADER: The header for a row of data
*@ATK_ROLE_SCROLL_BAR: An object usually
 used to allow a user to incrementally
*view a large amount of data.
*@ATK_ROLE_SCROLL_PANE: An object that allows a user to incrementally view a
*large amount of information
*@ATK_ROLE_SEPARATOR: An object usually contained in a menu to provide a
*visible and logical separation of the contents in a menu
*@ATK_ROLE_SLIDER: An object that allows the user to select from a bounded
*range
*@ATK_ROLE_SPLIT_PANE: A specialized panel that presents two other panels at
*the same time
*@ATK_ROLE_SPIN_BUTTON: An object used to get an integer or floating point
*number from the user
*@ATK_ROLE_STATUSBAR: An object which reports messages of minor importance to
*the user
*@ATK_ROLE_TABLE: An object used to represent information in terms of rows and
*columns
*@ATK_ROLE_TABLE_CELL: A cell in a table
*@ATK_ROLE_TABLE_COLUMN_HEADER: The header for a column of a table
*@ATK_ROLE_TABLE_ROW_HEADER: The header for a row of a table
*@ATK_ROLE_TEAR_OFF_MENU_ITEM: A menu item used to tear
 off and reattach its
*menu
*@ATK_ROLE_TERMINAL: An object that represents an accessible terminal.  @Since:
*ATK-0.6
*@ATK_ROLE_TEXT: An interactive widget that supports multiple lines of text and
* optionally accepts user input, but whose purpose is not to solicit user
*input. Thus ATK_ROLE_TEXT is appropriate for the text view in a plain text
*editor but inappropriate for an input field in a dialog box or web form. For
*widgets whose purpose is to solicit input from the user, see ATK_ROLE_ENTRY
*and ATK_ROLE_PASSWORD_TEXT. For generic objects which display a brief amount
*of textual information, see ATK_ROLE_STATIC.
*@ATK_ROLE_TOGGLE_BUTTON: A specialized push button that can be checked or
*unchecked, but does not provide a separate indicator for the current state
*@ATK_ROLE_TOOL_BAR: A bar or palette usually composed of push buttons or

*toggle buttons
*@ATK_ROLE_TOOL_TIP: An object that provides information about another object
*@ATK_ROLE_TREE: An object used to represent
hierarchical information to the
*user
*@ATK_ROLE_TREE_TABLE: An object capable of expanding and collapsing rows as
*well as showing multiple columns of data. @Since: ATK-0.7
*@ATK_ROLE_UNKNOWN: The object contains some Accessible information, but its
*role is not known
*@ATK_ROLE_VIEWPORT: An object usually used in a scroll pane
*@ATK_ROLE_WINDOW: A top level window with no title or border.
*@ATK_ROLE_HEADER: An object that serves as a document header. @Since:
*ATK-1.1.1
*@ATK_ROLE_FOOTER: An object that serves as a document footer. @Since:
*ATK-1.1.1
*@ATK_ROLE_PARAGRAPH: An object which is contains a paragraph of text content.
*@Since: ATK-1.1.1
*@ATK_ROLE_RULER: An object which describes margins and tab stops, etc. for
*text objects which it controls (should have CONTROLLER_FOR relation to such).
*@Since: ATK-1.1.1
*@ATK_ROLE_APPLICATION: The object is an application object, which may contain
*@ATK_ROLE_FRAME objects or other types of accessibles. The root
accessible of
*any application's ATK hierarchy should have ATK_ROLE_APPLICATION. @Since:
*ATK-1.1.4
*@ATK_ROLE_AUTOCOMPLETE: The object is a dialog or list containing items for
*insertion into an entry widget, for instance a list of words for completion of
*a text entry. @Since: ATK-1.3
*@ATK_ROLE_EDITBAR: The object is an editable text object in a toolbar. @Since:
*ATK-1.5
*@ATK_ROLE_EMBEDDED: The object is an embedded container within a document or
*panel. This role is a grouping "hint" indicating that the contained objects
*share a context. @Since: ATK-1.7.2
*@ATK_ROLE_ENTRY: The object is a component whose textual content may be
*entered or modified by the user, provided @ATK_STATE_EDITABLE is present.
*@Since: ATK-1.11
*@ATK_ROLE_CHART: The object is a graphical depiction of quantitative data. It
*may contain multiple subelements whose attributes and/or description may be
*queried to obtain both the quantitative data and information about how the
*data is
being presented. The LABELLED_BY relation is particularly important in
*interpreting objects of this type, as is the accessible-description property.
*@Since: ATK-1.11
*@ATK_ROLE_CAPTION: The object contains descriptive information, usually
*textual, about another user interface element such as a table, chart, or
*image. @Since: ATK-1.11
*@ATK_ROLE_DOCUMENT_FRAME: The object is a visual frame or container which
*contains a view of document content. Document frames may occur within another

*Document instance, in which case the second document may be said to be
*embedded in the containing instance. HTML frames are often
*ROLE_DOCUMENT_FRAME. Either this object, or a singleton descendant, should
*implement the Document interface.  @Since: ATK-1.11
*@ATK_ROLE_HEADING: The object serves as a heading for content which follows it
*in a document. The 'heading level' of the heading, if availabe, may be
*obtained by querying the object's attributes.
*@ATK_ROLE_PAGE: The object is
 a containing instance which encapsulates a page
*of information. @ATK_ROLE_PAGE is used in documents and content which support
*a paginated navigation model.  @Since: ATK-1.11
*@ATK_ROLE_SECTION: The object is a containing instance of document content
*which constitutes a particular 'logical' section of the document. The type of
*content within a section, and the nature of the section division itself, may
*be obtained by querying the object's attributes. Sections may be nested.
*@Since: ATK-1.11
*@ATK_ROLE_REDUNDANT_OBJECT: The object is redundant with another object in the
*hierarchy, and is exposed for purely technical reasons.  Objects of this role
*should normally be ignored by clients. @Since: ATK-1.11
*@ATK_ROLE_FORM: The object is a container for form controls, for instance as
*part of a web form or user-input form within a document.  This role is
*primarily a tag/convenience for clients when navigating complex documents, it
*is not expected that ordinary GUI containers
 will always have ATK_ROLE_FORM.
*@Since: ATK-1.12.0
*@ATK_ROLE_LINK: The object is a hypertext anchor, i.e. a "link" in a
* hypertext document.  Such objects are distinct from 'inline'
* content which may also use the Hypertext/Hyperlink interfaces
* to indicate the range/location within a text object where
* an inline or embedded object lies.  @Since: ATK-1.12.1
*@ATK_ROLE_INPUT_METHOD_WINDOW: The object is a window or similar viewport
* which is used to allow composition or input of a 'complex character',
* in other words it is an "input method window." @Since: ATK-1.12.1
*@ATK_ROLE_TABLE_ROW: A row in a table.  @Since: ATK-2.1.0
*@ATK_ROLE_TREE_ITEM: An object that represents an element of a tree.  @Since:
*ATK-2.1.0
*@ATK_ROLE_DOCUMENT_SPREADSHEET: A document frame which contains a spreadsheet.
*@Since: ATK-2.1.0
*@ATK_ROLE_DOCUMENT_PRESENTATION: A document frame which contains a
*presentation or slide content.  @Since: ATK-2.1.0
*@ATK_ROLE_DOCUMENT_TEXT: A
 document frame which contains textual content, such
*as found in a word processing application.  @Since: ATK-2.1.0
*@ATK_ROLE_DOCUMENT_WEB: A document frame which contains HTML or other markup
*suitable for display in a web browser.  @Since: ATK-2.1.0
*@ATK_ROLE_DOCUMENT_EMAIL: A document frame which contains email content to be
*displayed or composed either in plain text or HTML.  @Since: ATK-2.1.0
*@ATK_ROLE_COMMENT: An object found within a document and designed to present a

*comment, note, or other annotation. In some cases, this object might not be
*visible until activated.  @Since: ATK-2.1.0
*@ATK_ROLE_LIST_BOX: A non-collapsible list of choices the user can select
*from. @Since: ATK-2.1.0
*@ATK_ROLE_GROUPING: A group of related widgets. This group typically has a
*label. @Since: ATK-2.1.0
*@ATK_ROLE_IMAGE_MAP: An image map object. Usually a graphic with multiple
*hotspots, where each hotspot can be activated resulting in the loading of
*another document or section
 of a document. @Since: ATK-2.1.0
*@ATK_ROLE_NOTIFICATION: A transitory object designed to present a message to
*the user, typically at the desktop level rather than inside a particular
*application.  @Since: ATK-2.1.0
*@ATK_ROLE_INFO_BAR: An object designed to present a message to the user within
*an existing window. @Since: ATK-2.1.0
*@ATK_ROLE_LEVEL_BAR: A bar that serves as a level indicator to, for instance,
*show the strength of a password or the state of a battery.  @Since: ATK-2.7.3
*@ATK_ROLE_TITLE_BAR: A bar that serves as the title of a window or a
* dialog. @Since: ATK-2.12
*@ATK_ROLE_BLOCK_QUOTE: An object which contains a text section
* that is quoted from another source. @Since: ATK-2.12
*@ATK_ROLE_AUDIO: An object which represents an audio element. @Since: ATK-2.12
*@ATK_ROLE_VIDEO: An object which represents a video element. @Since: ATK-2.12
*@ATK_ROLE_DEFINITION: A definition of a term or concept. @Since: ATK-2.12
*@ATK_ROLE_ARTICLE: A section of a page
 that consists of a
* composition that forms an independent part of a document, page, or
* site. Examples: A blog entry, a news story, a forum post. @Since:
* ATK-2.12
*@ATK_ROLE_LANDMARK: A region of a web page intended as a
* navigational landmark. This is designed to allow Assistive
* Technologies to provide quick navigation among key regions within a
* document. @Since: ATK-2.12
*@ATK_ROLE_LOG: A text widget or container holding log content, such
* as chat history and error logs. In this role there is a
* relationship between the arrival of new items in the log and the
* reading order. The log contains a meaningful sequence and new
* information is added only to the end of the log, not at arbitrary
* points. @Since: ATK-2.12
*@ATK_ROLE_MARQUEE: A container where non-essential information
* changes frequently. Common usages of marquee include stock tickers
* and ad banners. The primary difference between a marquee and a log
* is that logs usually have a meaningful
 order or sequence of
* important content changes. @Since: ATK-2.12
*@ATK_ROLE_MATH: A text widget or container that holds a mathematical
* expression. @Since: ATK-2.12
*@ATK_ROLE_RATING: A widget whose purpose is to display a rating,

* such as the number of stars associated with a song in a media
* player. Objects of this role should also implement
* AtkValue. @Since: ATK-2.12
*@ATK_ROLE_TIMER: An object containing a numerical counter which
* indicates an amount of elapsed time from a start point, or the time
* remaining until an end point. @Since: ATK-2.12
*@ATK_ROLE_DESCRIPTION_LIST: An object that represents a list of
* term-value groups. A term-value group represents a individual
* description and consist of one or more names
* (ATK_ROLE_DESCRIPTION_TERM) followed by one or more values
* (ATK_ROLE_DESCRIPTION_VALUE). For each list, there should not be
* more than one group with the same term name. @Since: ATK-2.12
*@ATK_ROLE_DESCRIPTION_TERM: An object that represents
 the term, or
* name, part of a term-description group in a description
* list. @Since: ATK-2.12
*@ATK_ROLE_DESCRIPTION_VALUE: An object that represents the
* description, definition or value of a term-description group in a
* description list. The values within a group are alternatives,
* meaning that you can have several ATK_ROLE_DESCRIPTION_VALUE for a
* given ATK_ROLE_DESCRIPTION_TERM. @Since: ATK-2.12
*@ATK_ROLE_STATIC: A generic non-container object whose purpose is to display a
* brief amount of information to the user and whose role is known by the
* implementor but lacks semantic value for the user. Examples in which
* ATK_ROLE_STATIC is appropriate include the message displayed in a message box
* and an image used as an alternative means to display text. ATK_ROLE_STATIC
* should not be applied to widgets which are traditionally interactive, objects
* which display a significant amount of content, or any object which has an
* accessible relation pointing to another
 object. Implementors should expose
*the displayed information through the accessible name of the object. If doing
*so seems inappropriate, it may indicate that a different role should be used.
*For labels which describe another widget, see ATK_ROLE_LABEL. For text views,
*see ATK_ROLE_TEXT. For generic containers, see ATK_ROLE_PANEL. For objects
*whose role is not known by the implementor, see ATK_ROLE_UNKNOWN. @Since:
*ATK-2.16.
*@ATK_ROLE_MATH_FRACTION: An object that represents a mathematical fraction.
* @Since: ATK-2.16.
*@ATK_ROLE_MATH_ROOT: An object that represents a mathematical expression
* displayed with a radical. @Since: ATK-2.16.
*@ATK_ROLE_SUBSCRIPT: An object that contains text that is displayed as a
* subscript. @Since: ATK-2.16.
*@ATK_ROLE_SUPERSCRIPT: An object that contains text that is displayed as a
* superscript. @Since: ATK-2.16.
*@ATK_ROLE_FOOTNOTE: An object that contains the text of a footnote. @Since:
*ATK-2.26.
*@ATK_ROLE_CONTENT_DELETION:

```
 Content previously deleted or proposed to be
* deleted, e.g. in revision history or a content view providing suggestions
* from reviewers. (Since: 2.34)
*@ATK_ROLE_CONTENT_INSERTION: Content previously inserted or proposed to be
* inserted, e.g. in revision history or a content view providing suggestions
* from reviewers. (Since: 2.34)
*@ATK_ROLE_MARK: A run of content that is marked or highlighted, such as for
* reference purposes, or to call it out as having a special purpose. If the
* marked content has an associated section in the document elaborating on the
* reason for the mark, then %ATK_RELATION_DETAILS should be used on the mark
* to point to that associated section. In addition, the reciprocal relation
* %ATK_RELATION_DETAILS_FOR should be used on the associated content section
* to point back to the mark. (Since: 2.36)
*@ATK_ROLE_SUGGESTION: A container for content that is called out as a proposed
* change from the current version of the document, such as
 by a reviewer of the
* content. This role should include either %ATK_ROLE_CONTENT_DELETION and/or
* %ATK_ROLE_CONTENT_INSERTION children, in any order, to indicate what the
* actual change is. (Since: 2.36)
*@ATK_ROLE_LAST_DEFINED: not a valid role, used for finding end of the
*enumeration
*
* Describes the role of an object
*
* These are the built-in enumerated roles that UI components can have in
* ATK.  Other roles may be added at runtime, so an AtkRole >=
* ATK_ROLE_LAST_DEFINED is not necessarily an error.
**/
typedef enum {
 ATK_ROLE_INVALID = 0,
 ATK_ROLE_ACCEL_LABEL, /*<nick=accelerator-label>*/
 ATK_ROLE_ALERT,
 ATK_ROLE_ANIMATION,
 ATK_ROLE_ARROW,
 ATK_ROLE_CALENDAR,
 ATK_ROLE_CANVAS,
 ATK_ROLE_CHECK_BOX,
 ATK_ROLE_CHECK_MENU_ITEM,
 ATK_ROLE_COLOR_CHOOSER,
 ATK_ROLE_COLUMN_HEADER,
 ATK_ROLE_COMBO_BOX,
 ATK_ROLE_DATE_EDITOR,
 ATK_ROLE_DESKTOP_ICON,
 ATK_ROLE_DESKTOP_FRAME,
 ATK_ROLE_DIAL,
 ATK_ROLE_DIALOG,
 ATK_ROLE_DIRECTORY_PANE,
 ATK_ROLE_DRAWING_AREA,
```

ATK_ROLE_FILE_CHOOSER,
ATK_ROLE_FILLER,
ATK_ROLE_FONT_CHOOSER,
ATK_ROLE_FRAME,
ATK_ROLE_GLASS_PANE,
ATK_ROLE_HTML_CONTAINER,
ATK_ROLE_ICON,
ATK_ROLE_IMAGE,
ATK_ROLE_INTERNAL_FRAME,
ATK_ROLE_LABEL,
ATK_ROLE_LAYERED_PANE,
ATK_ROLE_LIST,
ATK_ROLE_LIST_ITEM,
ATK_ROLE_MENU,
ATK_ROLE_MENU_BAR,
ATK_ROLE_MENU_ITEM,
ATK_ROLE_OPTION_PANE,
ATK_ROLE_PAGE_TAB,
ATK_ROLE_PAGE_TAB_LIST,
ATK_ROLE_PANEL,
ATK_ROLE_PASSWORD_TEXT,
ATK_ROLE_POPUP_MENU,
ATK_ROLE_PROGRESS_BAR,
ATK_ROLE_PUSH_BUTTON,
ATK_ROLE_RADIO_BUTTON,
ATK_ROLE_RADIO_MENU_ITEM,
ATK_ROLE_ROOT_PANE,
ATK_ROLE_ROW_HEADER,
ATK_ROLE_SCROLL_BAR,
ATK_ROLE_SCROLL_PANE,
ATK_ROLE_SEPARATOR,
ATK_ROLE_SLIDER,
ATK_ROLE_SPLIT_PANE,
ATK_ROLE_SPIN_BUTTON,
ATK_ROLE_STATUSBAR,
ATK_ROLE_TABLE,
ATK_ROLE_TABLE_CELL,
ATK_ROLE_TABLE_COLUMN_HEADER,
ATK_ROLE_TABLE_ROW_HEADER,
ATK_ROLE_TEAR_OFF_MENU_ITEM,
ATK_ROLE_TERMINAL,
ATK_ROLE_TEXT,
ATK_ROLE_TOGGLE_BUTTON,
ATK_ROLE_TOOL_BAR,
ATK_ROLE_TOOL_TIP,
ATK_ROLE_TREE,
ATK_ROLE_TREE_TABLE,
ATK_ROLE_UNKNOWN,

ATK_ROLE_VIEWPORT,
ATK_ROLE_WINDOW,
ATK_ROLE_HEADER,
ATK_ROLE_FOOTER,
ATK_ROLE_PARAGRAPH,
ATK_ROLE_RULER,
ATK_ROLE_APPLICATION,
ATK_ROLE_AUTOCOMPLETE,
ATK_ROLE_EDITBAR,
ATK_ROLE_EMBEDDED,
ATK_ROLE_ENTRY,
ATK_ROLE_CHART,
ATK_ROLE_CAPTION,
ATK_ROLE_DOCUMENT_FRAME,
ATK_ROLE_HEADING,
ATK_ROLE_PAGE,
ATK_ROLE_SECTION,
ATK_ROLE_REDUNDANT_OBJECT,
ATK_ROLE_FORM,
ATK_ROLE_LINK,
ATK_ROLE_INPUT_METHOD_WINDOW,
ATK_ROLE_TABLE_ROW,
ATK_ROLE_TREE_ITEM,
ATK_ROLE_DOCUMENT_SPREADSHEET,
ATK_ROLE_DOCUMENT_PRESENTATION,
ATK_ROLE_DOCUMENT_TEXT,
ATK_ROLE_DOCUMENT_WEB,
ATK_ROLE_DOCUMENT_EMAIL,
ATK_ROLE_COMMENT,
ATK_ROLE_LIST_BOX,
ATK_ROLE_GROUPING,
ATK_ROLE_IMAGE_MAP,
ATK_ROLE_NOTIFICATION,
ATK_ROLE_INFO_BAR,
ATK_ROLE_LEVEL_BAR,
ATK_ROLE_TITLE_BAR,
ATK_ROLE_BLOCK_QUOTE,
ATK_ROLE_AUDIO,
ATK_ROLE_VIDEO,
ATK_ROLE_DEFINITION,
ATK_ROLE_ARTICLE,
ATK_ROLE_LANDMARK,
ATK_ROLE_LOG,
ATK_ROLE_MARQUEE,
ATK_ROLE_MATH,
ATK_ROLE_RATING,
ATK_ROLE_TIMER,
ATK_ROLE_DESCRIPTION_LIST,

```
 ATK_ROLE_DESCRIPTION_TERM,
 ATK_ROLE_DESCRIPTION_VALUE,
 ATK_ROLE_STATIC,
 ATK_ROLE_MATH_FRACTION,
 ATK_ROLE_MATH_ROOT,
 ATK_ROLE_SUBSCRIPT,
 ATK_ROLE_SUPERSCRIPT,
 ATK_ROLE_FOOTNOTE,
 ATK_ROLE_CONTENT_DELETION,
 ATK_ROLE_CONTENT_INSERTION,
 ATK_ROLE_MARK,
 ATK_ROLE_SUGGESTION,
 ATK_ROLE_LAST_DEFINED
} AtkRole;

AtkRole atk_role_register(const gchar* name);

/**
*AtkLayer:
*@ATK_LAYER_INVALID: The object does not have a layer
*@ATK_LAYER_BACKGROUND: This layer is reserved for the desktop background
*@ATK_LAYER_CANVAS: This layer is used for Canvas components
*@ATK_LAYER_WIDGET: This layer is normally used for components
*@ATK_LAYER_MDI: This layer is used for layered components
*@ATK_LAYER_POPUP: This layer is used for popup components, such as menus
*@ATK_LAYER_OVERLAY: This layer is reserved for future use.
*@ATK_LAYER_WINDOW:
 This layer is used for toplevel windows.
*
* Describes the layer of a component
*
* These enumerated "layer values" are used when determining which UI
* rendering layer a component is drawn into, which can help in making
* determinations of when components occlude one another.
**/
typedef enum {
 ATK_LAYER_INVALID,
 ATK_LAYER_BACKGROUND,
 ATK_LAYER_CANVAS,
 ATK_LAYER_WIDGET,
 ATK_LAYER_MDI,
 ATK_LAYER_POPUP,
 ATK_LAYER_OVERLAY,
 ATK_LAYER_WINDOW
} AtkLayer;

/**
* AtkAttributeSet:
```

```
*
* This is a singly-linked list (a #GSList) of #AtkAttribute. It is
* used by atk_text_get_run_attributes(), atk_text_get_default_attributes()
* and atk_editable_text_set_run_attributes()
**/
typedef GSList AtkAttributeSet;

/**
* AtkAttribute:
* @name: The attribute name. Call atk_text_attr_get_name()
* @value: the value of the attribute, represented as a string.
* Call atk_text_attr_get_value() for those which are strings.
* For values which are numbers, the string representation
 of the number
* is in value.
*
* A string name/value pair representing a text attribute.
**/
typedef struct _AtkAttribute AtkAttribute;

struct _AtkAttribute {
 gchar* name;
 gchar* value;
};

#define ATK_TYPE_OBJECT (atk_object_get_type())
#define ATK_OBJECT(obj) \
 (G_TYPE_CHECK_INSTANCE_CAST((obj), ATK_TYPE_OBJECT, AtkObject))
#define ATK_OBJECT_CLASS(klass) \
 (G_TYPE_CHECK_CLASS_CAST((klass), ATK_TYPE_OBJECT, AtkObjectClass))
#define ATK_IS_OBJECT(obj) (G_TYPE_CHECK_INSTANCE_TYPE((obj), ATK_TYPE_OBJECT))
#define ATK_IS_OBJECT_CLASS(klass) \
 (G_TYPE_CHECK_CLASS_TYPE((klass), ATK_TYPE_OBJECT))
#define ATK_OBJECT_GET_CLASS(obj) \
 (G_TYPE_INSTANCE_GET_CLASS((obj), ATK_TYPE_OBJECT, AtkObjectClass))

#define ATK_TYPE_IMPLEMENTOR (atk_implementor_get_type())
#define ATK_IS_IMPLEMENTOR(obj) \
 G_TYPE_CHECK_INSTANCE_TYPE((obj), ATK_TYPE_IMPLEMENTOR)
#define ATK_IMPLEMENTOR(obj) \
 G_TYPE_CHECK_INSTANCE_CAST((obj), ATK_TYPE_IMPLEMENTOR, AtkImplementor)
#define ATK_IMPLEMENTOR_GET_IFACE(obj)
                    \
 (G_TYPE_INSTANCE_GET_INTERFACE((obj), ATK_TYPE_IMPLEMENTOR, \
                          AtkImplementorIface))

typedef struct _AtkImplementor AtkImplementor; /* dummy typedef */
typedef struct _AtkImplementorIface AtkImplementorIface;
```

```
typedef struct _AtkObject AtkObject;
typedef struct _AtkObjectClass AtkObjectClass;
typedef struct _AtkRelationSet AtkRelationSet;
typedef struct _AtkStateSet AtkStateSet;

/**
* AtkPropertyValues:
* @property_name: The name of the ATK property which is being presented or
*which has been changed.
* @old_value: The old property value, NULL; in some contexts this value is
*undefined (see note below).
* @new_value: The new value of the named property.
*
* @note: For most properties the old_value field of AtkPropertyValues will
* not contain a valid value.
*
* Currently, the only property for which old_value is used is
* accessible-state; for instance if there is a focus state the
* property
 change handler will be called for the object which lost the focus
* with the old_value containing an AtkState value corresponding to focused
* and the property change handler will be called for the object which
* received the focus with the new_value containing an AtkState value
* corresponding to focused.
*
**/
struct _AtkPropertyValues {
 const gchar* property_name;
 GValue old_value;
 GValue new_value;
};

typedef struct _AtkPropertyValues AtkPropertyValues;

typedef gboolean (*AtkFunction)(gpointer data);
/*
* For most properties the old_value field of AtkPropertyValues will
* not contain a valid value.
*
* Currently, the only property for which old_value is used is
* accessible-state; for instance if there is a focus state the
* property change handler will be called for the object which lost the focus
* with the old_value containing an AtkState value corresponding to focused
* and the property change handler will be called for the object which
* received the focus
 with the new_value containing an AtkState value
* corresponding to focused.
```

```
*/
typedef void (*AtkPropertyChangeHandler)(AtkObject*, AtkPropertyValues*);

struct _AtkObject {
 GObject parent;

 gchar* description;
 gchar* name;
 AtkObject* accessible_parent;
 AtkRole role;
 AtkRelationSet* relation_set;
 AtkLayer layer;
};

struct _AtkObjectClass {
 GObjectClass parent;

 /*
  * Gets the accessible name of the object
  */
 G_CONST_RETURN gchar* (*get_name)(AtkObject* accessible);
 /*
  * Gets the accessible description of the object
  */
 G_CONST_RETURN gchar* (*get_description)(AtkObject* accessible);
 /*
  * Gets the accessible parent of the object
  */
 AtkObject* (*get_parent)(AtkObject* accessible);

 /*
  * Gets the number of accessible children of the object
  */
 gint (*get_n_children)(AtkObject* accessible);
 /*
  * Returns a reference to the specified accessible child of the object.
  * The accessible children are 0-based so the first accessible
 child is
  * at index 0, the second at index 1 and so on.
  */
 AtkObject* (*ref_child)(AtkObject* accessible, gint i);
 /*
  * Gets the 0-based index of this object in its parent; returns -1 if the
  * object does not have an accessible parent.
  */
 gint (*get_index_in_parent)(AtkObject* accessible);
 /*
  * Gets the RelationSet associated with the object
```

```
 */
AtkRelationSet* (*ref_relation_set)(AtkObject* accessible);
/*
 * Gets the role of the object
 */
AtkRole (*get_role)(AtkObject* accessible);
AtkLayer (*get_layer)(AtkObject* accessible);
gint (*get_mdi_zorder)(AtkObject* accessible);
/*
 * Gets the state set of the object
 */
AtkStateSet* (*ref_state_set)(AtkObject* accessible);
/*
 * Sets the accessible name of the object
 */
void (*set_name)(AtkObject* accessible, const gchar* name);
/*
 * Sets the accessible description of the object
 */
void (*set_description)(AtkObject* accessible, const gchar* description);
/*
 * Sets
the accessible parent of the object
 */
void (*set_parent)(AtkObject* accessible, AtkObject* parent);
/*
 * Sets the accessible role of the object
 */
void (*set_role)(AtkObject* accessible, AtkRole role);
/*
 * Specifies a function to be called when a property changes value
 */
guint (*connect_property_change_handler)(AtkObject* accessible,
                                         AtkPropertyChangeHandler* handler);
/*
 * Removes a property change handler which was specified using
 * connect_property_change_handler
 */
void (*remove_property_change_handler)(AtkObject* accessible,
                                       guint handler_id);
void (*initialize)(AtkObject* accessible, gpointer data);
/*
 * The signal handler which is executed when there is a change in the
 * children of the object
 */
void (*children_changed)(AtkObject* accessible, guint change_index,
                         gpointer changed_child);
/*
```

```
 * The signal handler
which is executed  when there is a focus event
 * for an object.
 */
void (*focus_event)(AtkObject* accessible, gboolean focus_in);
/*
 * The signal handler which is executed  when there is a property_change
 * signal for an object.
 */
void (*property_change)(AtkObject* accessible, AtkPropertyValues* values);
/*
 * The signal handler which is executed  when there is a state_change
 * signal for an object.
 */
void (*state_change)(AtkObject* accessible, const gchar* name,
                     gboolean state_set);
/*
 * The signal handler which is executed when there is a change in the
 * visible data for an object
 */
void (*visible_data_changed)(AtkObject* accessible);

/*
 * The signal handler which is executed when there is a change in the
 * 'active' child or children of the object, for instance when
 * interior focus changes in a table or list.  This signal should be emitted
 * by objects whose state includes ATK_STATE_MANAGES_DESCENDANTS.
  */
void (*active_descendant_changed)(AtkObject* accessible, gpointer* child);

/*
 * Gets a list of properties applied to this object as a whole, as an
 * #AtkAttributeSet consisting of name-value pairs. Since ATK 1.12
 */
AtkAttributeSet* (*get_attributes)(AtkObject* accessible);

const gchar* (*get_object_locale)(AtkObject* accessible);

AtkFunction pad1;
};

GType atk_object_get_type(void);

struct _AtkImplementorIface {
 GTypeInterface parent;

 AtkObject* (*ref_accessible)(AtkImplementor* implementor);
};
```

```
GType atk_implementor_get_type(void);

/*
* This method uses the ref_accessible method in AtkImplementorIface,
* if the object's class implements AtkImplementorIface.
* Otherwise it returns %NULL.
*
* IMPORTANT:
* Note also that because this method may return flyweight objects,
* it increments the returned AtkObject's reference count.
* Therefore it is the responsibility of the calling
* program to unreference the object when no longer needed.
 * (c.f. gtk_widget_get_accessible() where this is not the case).
*/
AtkObject* atk_implementor_ref_accessible(AtkImplementor* implementor);

/*
* Properties directly supported by AtkObject
*/

G_CONST_RETURN gchar* atk_object_get_name(AtkObject* accessible);
G_CONST_RETURN gchar* atk_object_get_description(AtkObject* accessible);
AtkObject* atk_object_get_parent(AtkObject* accessible);
gint atk_object_get_n_accessible_children(AtkObject* accessible);
AtkObject* atk_object_ref_accessible_child(AtkObject* accessible, gint i);
AtkRelationSet* atk_object_ref_relation_set(AtkObject* accessible);
AtkRole atk_object_get_role(AtkObject* accessible);
AtkLayer atk_object_get_layer(AtkObject* accessible);
gint atk_object_get_mdi_zorder(AtkObject* accessible);
AtkAttributeSet* atk_object_get_attributes(AtkObject* accessible);
AtkStateSet* atk_object_ref_state_set(AtkObject* accessible);
gint atk_object_get_index_in_parent(AtkObject* accessible);
void atk_object_set_name(AtkObject* accessible,
 const gchar* name);
void atk_object_set_description(AtkObject* accessible,
                          const gchar* description);
void atk_object_set_parent(AtkObject* accessible, AtkObject* parent);
void atk_object_set_role(AtkObject* accessible, AtkRole role);

guint atk_object_connect_property_change_handler(
   AtkObject* accessible, AtkPropertyChangeHandler* handler);
void atk_object_remove_property_change_handler(AtkObject* accessible,
                                     guint handler_id);

void atk_object_notify_state_change(AtkObject* accessible, AtkState state,
                             gboolean value);
void atk_object_initialize(AtkObject* accessible, gpointer data);
```

```
G_CONST_RETURN gchar* atk_role_get_name(AtkRole role);
AtkRole atk_role_for_name(const gchar* name);

/* NEW in 1.1: convenience API */
gboolean atk_object_add_relationship(AtkObject* object,
                                     AtkRelationType relationship,

                AtkObject* target);
gboolean atk_object_remove_relationship(AtkObject* object,
                                        AtkRelationType relationship,
                                        AtkObject* target);
G_CONST_RETURN gchar* atk_role_get_localized_name(AtkRole role);

/* */

/*
* Note: the properties which are registered with the GType
*   property registry, for type ATK_TYPE_OBJECT, are as follows:
*
*   "accessible-name"
*   "accessible-description"
*   "accessible-parent"
*   "accessible-role"
*   "accessible-value"
*   "accessible-component-layer"
*   "accessible-component-zorder"
*   "accessible-table-caption"
*   "accessible-table-column-description"
*   "accessible-table-column-header"
*   "accessible-table-row-description"
*   "accessible-table-row-header"
*   "accessible-table-summary"
*   "accessible-model"
*
* accessibility property change listeners should use the
*   normal GObject property interfaces and "property-change"
*   signal
 handler semantics to interpret the property change
*   information relayed from AtkObject.
*   (AtkObject instances will connect to the "notify"
*   signal in their host objects, and relay the signals when appropriate).
*/

/* For other signals, see related interfaces
*
*    AtkActionIface,
*    AtkComponentIface,
*    AtkHypertextIface,
```

```
*    AtkImageIface,
*    AtkSelectionIface,
*    AtkTableIface,
*    AtkTextIface,
*    AtkValueIface.
*
*  The usage model for obtaining these interface instances is:
*    ATK_<interfacename>_GET_IFACE(GObject *accessible),
*    where accessible, though specified as a GObject, is
*    the AtkObject instance being queried.
*  More usually, the interface will be used via a cast to the
*    interface's corresponding "type":
*
*    AtkText textImpl = ATK_TEXT(accessible);
*    if (textImpl)
*      {
*        cpos = atk_text_get_caret_position(textImpl);
*      }
*
*  If it's known in advance that accessible implements AtkTextIface,
 *    this is shortened to:
*
*    cpos = atk_text_get_caret_position (ATK_TEXT (accessible));
*/

#ifdef __cplusplus
}
#endif /* __cplusplus */

#endif /* __ATK_OBJECT_H__ */
/* 7zTypes.h -- Basic types
2017-07-17 : Igor Pavlov : Public domain */

#ifndef __7Z_TYPES_H
#define __7Z_TYPES_H

#ifdef _WIN32
/* #include <windows.h> */
#endif

#include <stddef.h>

#ifndef EXTERN_C_BEGIN
#ifdef __cplusplus
#define EXTERN_C_BEGIN extern "C" {
#define EXTERN_C_END }
#else
#define EXTERN_C_BEGIN
```

```
#define EXTERN_C_END
#endif
#endif

EXTERN_C_BEGIN

#define SZ_OK 0

#define SZ_ERROR_DATA 1
#define SZ_ERROR_MEM 2
#define SZ_ERROR_CRC 3
#define SZ_ERROR_UNSUPPORTED 4
#define SZ_ERROR_PARAM 5
#define SZ_ERROR_INPUT_EOF 6
#define SZ_ERROR_OUTPUT_EOF 7
#define SZ_ERROR_READ 8
#define SZ_ERROR_WRITE 9
#define SZ_ERROR_PROGRESS 10
#define SZ_ERROR_FAIL 11
#define SZ_ERROR_THREAD 12

#define SZ_ERROR_ARCHIVE 16
#define SZ_ERROR_NO_ARCHIVE 17

typedef int SRes;


#ifdef _WIN32

/* typedef DWORD WRes; */
typedef unsigned WRes;
#define MY_SRes_HRESULT_FROM_WRes(x) HRESULT_FROM_WIN32(x)

#else

typedef int WRes;
#define MY__FACILITY_WIN32 7
#define MY__FACILITY__WRes MY__FACILITY_WIN32
#define
 MY_SRes_HRESULT_FROM_WRes(x) ((HRESULT)(x) <= 0 ? ((HRESULT)(x)) : ((HRESULT) (((x) &
0x0000FFFF) | (MY__FACILITY__WRes << 16) | 0x80000000)))

#endif


#ifndef RINOK
#define RINOK(x) { int __result__ = (x); if (__result__ != 0) return __result__; }
#endif
```

```
typedef unsigned char Byte;
typedef short Int16;
typedef unsigned short UInt16;

#ifdef _LZMA_UINT32_IS_ULONG
typedef long Int32;
typedef unsigned long UInt32;
#else
typedef int Int32;
typedef unsigned int UInt32;
#endif

#ifdef _SZ_NO_INT_64

/* define _SZ_NO_INT_64, if your compiler doesn't support 64-bit integers.
  NOTES: Some code will work incorrectly in that case! */

typedef long Int64;
typedef unsigned long UInt64;

#else

#if defined(_MSC_VER) || defined(__BORLANDC__)
typedef __int64 Int64;
typedef unsigned __int64 UInt64;
#define UINT64_CONST(n) n
#else
typedef long long int Int64;
typedef unsigned long long int UInt64;
#define UINT64_CONST(n) n ## ULL
#endif

#endif

#ifdef _LZMA_NO_SYSTEM_SIZE_T
typedef UInt32
 SizeT;
#else
typedef size_t SizeT;
#endif

typedef int Bool;
#define True 1
#define False 0


#ifdef _WIN32
```

```
#define MY_STD_CALL __stdcall
#else
#define MY_STD_CALL
#endif

#ifdef _MSC_VER

#if _MSC_VER >= 1300
#define MY_NO_INLINE __declspec(noinline)
#else
#define MY_NO_INLINE
#endif

#define MY_FORCE_INLINE __forceinline

#define MY_CDECL __cdecl
#define MY_FAST_CALL __fastcall

#else

#define MY_NO_INLINE
#define MY_FORCE_INLINE
#define MY_CDECL
#define MY_FAST_CALL

/* inline keyword : for C++ / C99 */

/* GCC, clang: */
/*
#if defined (__GNUC__) && (__GNUC__ >= 4)
#define MY_FORCE_INLINE __attribute__((always_inline))
#define MY_NO_INLINE __attribute__((noinline))
#endif
*/

#endif


/* The following interfaces use first parameter as pointer to structure */

typedef struct IByteIn IByteIn;
struct IByteIn
{
 Byte (*Read)(const IByteIn *p); /* reads one byte, returns 0 in case of EOF or error */
};
#define IByteIn_Read(p) (p)->Read(p)
```

```
typedef struct IByteOut IByteOut;
struct
 IByteOut
{
 void (*Write)(const IByteOut *p, Byte b);
};
#define IByteOut_Write(p, b) (p)->Write(p, b)


typedef struct ISeqInStream ISeqInStream;
struct ISeqInStream
{
 SRes (*Read)(const ISeqInStream *p, void *buf, size_t *size);
   /* if (input(*size) != 0 && output(*size) == 0) means end_of_stream.
      (output(*size) < input(*size)) is allowed */
};
#define ISeqInStream_Read(p, buf, size) (p)->Read(p, buf, size)

/* it can return SZ_ERROR_INPUT_EOF */
SRes SeqInStream_Read(const ISeqInStream *stream, void *buf, size_t size);
SRes SeqInStream_Read2(const ISeqInStream *stream, void *buf, size_t size, SRes errorType);
SRes SeqInStream_ReadByte(const ISeqInStream *stream, Byte *buf);


typedef struct ISeqOutStream ISeqOutStream;
struct ISeqOutStream
{
 size_t (*Write)(const ISeqOutStream *p, const void *buf, size_t size);
   /* Returns: result - the number of actually written bytes.
      (result < size) means error */
};
#define ISeqOutStream_Write(p, buf, size) (p)->Write(p,
 buf, size)

typedef enum
{
 SZ_SEEK_SET = 0,
 SZ_SEEK_CUR = 1,
 SZ_SEEK_END = 2
} ESzSeek;


typedef struct ISeekInStream ISeekInStream;
struct ISeekInStream
{
 SRes (*Read)(const ISeekInStream *p, void *buf, size_t *size);  /* same as ISeqInStream::Read */
 SRes (*Seek)(const ISeekInStream *p, Int64 *pos, ESzSeek origin);
};
```

```
#define ISeekInStream_Read(p, buf, size)   (p)->Read(p, buf, size)
#define ISeekInStream_Seek(p, pos, origin) (p)->Seek(p, pos, origin)


typedef struct ILookInStream ILookInStream;
struct ILookInStream
{
 SRes (*Look)(const ILookInStream *p, const void **buf, size_t *size);
   /* if (input(*size) != 0 && output(*size) == 0) means end_of_stream.
      (output(*size) > input(*size)) is not allowed
      (output(*size) < input(*size)) is allowed */
 SRes (*Skip)(const ILookInStream *p, size_t offset);
   /* offset must be <= output(*size) of Look */

 SRes (*Read)(const ILookInStream *p, void *buf, size_t *size);
   /* reads directly (without buffer).
 It's same as ISeqInStream::Read */
 SRes (*Seek)(const ILookInStream *p, Int64 *pos, ESzSeek origin);
};

#define ILookInStream_Look(p, buf, size)   (p)->Look(p, buf, size)
#define ILookInStream_Skip(p, offset)      (p)->Skip(p, offset)
#define ILookInStream_Read(p, buf, size)   (p)->Read(p, buf, size)
#define ILookInStream_Seek(p, pos, origin) (p)->Seek(p, pos, origin)


SRes LookInStream_LookRead(const ILookInStream *stream, void *buf, size_t *size);
SRes LookInStream_SeekTo(const ILookInStream *stream, UInt64 offset);

/* reads via ILookInStream::Read */
SRes LookInStream_Read2(const ILookInStream *stream, void *buf, size_t size, SRes errorType);
SRes LookInStream_Read(const ILookInStream *stream, void *buf, size_t size);



typedef struct
{
 ILookInStream vt;
 const ISeekInStream *realStream;

 size_t pos;
 size_t size; /* it's data size */

 /* the following variables must be set outside */
 Byte *buf;
 size_t bufSize;
} CLookToRead2;
```

```
void LookToRead2_CreateVTable(CLookToRead2
 *p, int lookahead);

#define LookToRead2_Init(p) { (p)->pos = (p)->size = 0; }


typedef struct
{
 ISeqInStream vt;
 const ILookInStream *realStream;
} CSecToLook;

void SecToLook_CreateVTable(CSecToLook *p);



typedef struct
{
 ISeqInStream vt;
 const ILookInStream *realStream;
} CSecToRead;

void SecToRead_CreateVTable(CSecToRead *p);


typedef struct ICompressProgress ICompressProgress;

struct ICompressProgress
{
 SRes (*Progress)(const ICompressProgress *p, UInt64 inSize, UInt64 outSize);
   /* Returns: result. (result != SZ_OK) means break.
      Value (UInt64)(Int64)-1 for size means unknown value. */
};
#define ICompressProgress_Progress(p, inSize, outSize) (p)->Progress(p, inSize, outSize)



typedef struct ISzAlloc ISzAlloc;
typedef const ISzAlloc * ISzAllocPtr;

struct ISzAlloc
{
 void *(*Alloc)(ISzAllocPtr p, size_t size);
 void (*Free)(ISzAllocPtr p, void *address); /* address can be 0 */
};

#define ISzAlloc_Alloc(p, size) (p)->Alloc(p, size)
#define ISzAlloc_Free(p,
```

```
 a) (p)->Free(p, a)

/* deprecated */
#define IAlloc_Alloc(p, size) ISzAlloc_Alloc(p, size)
#define IAlloc_Free(p, a) ISzAlloc_Free(p, a)





#ifndef MY_offsetof
 #ifdef offsetof
   #define MY_offsetof(type, m) offsetof(type, m)
   /*
   #define MY_offsetof(type, m) FIELD_OFFSET(type, m)
   */
 #else
   #define MY_offsetof(type, m) ((size_t)&(((type *)0)->m))
 #endif
#endif



#ifndef MY_container_of

/*
#define MY_container_of(ptr, type, m) container_of(ptr, type, m)
#define MY_container_of(ptr, type, m) CONTAINING_RECORD(ptr, type, m)
#define MY_container_of(ptr, type, m) ((type *)((char *)(ptr) - offsetof(type, m)))
#define MY_container_of(ptr, type, m) (&((type *)0)->m == (ptr), ((type *)(((char *)(ptr)) - MY_offsetof(type,
m))))
*/

/*
 GCC shows warning: "perhaps the 'offsetof' macro was used incorrectly"
   GCC 3.4.4 : classes with constructor
   GCC 4.8.1 : classes with non-public variable members"
*/

#define MY_container_of(ptr, type, m) ((type *)((char
 *)(1 ? (ptr) : &((type *)0)->m) - MY_offsetof(type, m)))


#endif

#define CONTAINER_FROM_VTBL_SIMPLE(ptr, type, m) ((type *)(ptr))

/*
```

```
#define CONTAINER_FROM_VTBL(ptr, type, m) CONTAINER_FROM_VTBL_SIMPLE(ptr, type, m)
*/
#define CONTAINER_FROM_VTBL(ptr, type, m) MY_container_of(ptr, type, m)

#define CONTAINER_FROM_VTBL_CLS(ptr, type, m) CONTAINER_FROM_VTBL_SIMPLE(ptr, type, m)
/*
#define CONTAINER_FROM_VTBL_CLS(ptr, type, m) CONTAINER_FROM_VTBL(ptr, type, m)
*/



#ifdef _WIN32

#define CHAR_PATH_SEPARATOR '\\'
#define WCHAR_PATH_SEPARATOR L'\\'
#define STRING_PATH_SEPARATOR "\\"
#define WSTRING_PATH_SEPARATOR L"\\"

#else

#define CHAR_PATH_SEPARATOR '/'
#define WCHAR_PATH_SEPARATOR L'/'
#define STRING_PATH_SEPARATOR "/"
#define WSTRING_PATH_SEPARATOR L"/"

#endif

EXTERN_C_END

#endif
```

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```
<Project DefaultTargets="Build" xmlns="http://schemas.microsoft.com/developer/msbuild/2003">
 <PropertyGroup>
   <Configuration Condition=" '$(Configuration)' == '' ">Debug</Configuration>
   <Platform Condition=" '$(Platform)' == '' ">AnyCPU</Platform>
   <ProductVersion>8.0.50727</ProductVersion>
   <SchemaVersion>2.0</SchemaVersion>
   <ProjectGuid>{CE33DF18-F9C8-4D6F-9057-DBB4DB96E973}</ProjectGuid>
   <OutputType>Exe</OutputType>
   <RootNamespace>LzmaAlone</RootNamespace>
   <AssemblyName>Lzma#</AssemblyName>
   <WarningLevel>4</WarningLevel>
 </PropertyGroup>
 <PropertyGroup Condition=" '$(Configuration)|$(Platform)' == 'Debug|AnyCPU' ">
   <DebugSymbols>true</DebugSymbols>
   <DebugType>full</DebugType>
   <Optimize>false</Optimize>
   <OutputPath>.\bin\Debug\</OutputPath>
   <DefineConstants>DEBUG;TRACE</DefineConstants>
 </PropertyGroup>
 <PropertyGroup Condition=" '$(Configuration)|$(Platform)' == 'Release|AnyCPU' ">
   <DebugSymbols>false</DebugSymbols>
    <Optimize>true</Optimize>
   <OutputPath>.\bin\Release\</OutputPath>
   <DefineConstants>TRACE</DefineConstants>
   <PlatformTarget>AnyCPU</PlatformTarget>
 </PropertyGroup>
 <ItemGroup>
   <Reference Include="System" />
   <Reference Include="System.Data" />
   <Reference Include="System.Xml" />
 </ItemGroup>
 <ItemGroup>
   <Compile Include="..\..\Common\CommandLineParser.cs">
     <Link>Common\CommandLineParser.cs</Link>
   </Compile>
   <Compile Include="..\..\Common\CRC.cs">
     <Link>Common\CRC.cs</Link>
   </Compile>
   <Compile Include="..\..\ICoder.cs">
```

```
  <Link>ICoder.cs</Link>
</Compile>
<Compile Include="..\LZ\IMatchFinder.cs">
  <Link>LZ\IMatchFinder.cs</Link>
</Compile>
<Compile Include="..\LZ\LzBinTree.cs">
  <Link>LZ\LzBinTree.cs</Link>
</Compile>
<Compile Include="..\LZ\LzInWindow.cs">
  <Link>LZ\LzInWindow.cs</Link>
</Compile>
<Compile Include="..\LZ\LzOutWindow.cs">
  <Link>LZ\LzOutWindow.cs</Link>
 </Compile>
<Compile Include="..\LZMA\LzmaBase.cs">
  <Link>LZMA\LzmaBase.cs</Link>
</Compile>
<Compile Include="..\LZMA\LzmaDecoder.cs">
  <Link>LZMA\LzmaDecoder.cs</Link>
</Compile>
<Compile Include="..\LZMA\LzmaEncoder.cs">
  <Link>LZMA\LzmaEncoder.cs</Link>
</Compile>
<Compile Include="..\RangeCoder\RangeCoder.cs">
  <Link>RangeCoder\RangeCoder.cs</Link>
</Compile>
<Compile Include="..\RangeCoder\RangeCoderBit.cs">
  <Link>RangeCoder\RangeCoderBit.cs</Link>
</Compile>
<Compile Include="..\RangeCoder\RangeCoderBitTree.cs">
  <Link>RangeCoder\RangeCoderBitTree.cs</Link>
</Compile>
<Compile Include="LzmaAlone.cs">
  <SubType>Code</SubType>
</Compile>
<Compile Include="LzmaBench.cs">
  <SubType>Code</SubType>
</Compile>
<Compile Include="Properties\AssemblyInfo.cs" />
<Compile Include="Properties\Settings.cs">
  <AutoGen>True</AutoGen>
  <DependentUpon>Settings.settings</DependentUpon>
 </Compile>
<None Include="Properties\Settings.settings">
  <Generator>SettingsSingleFileGenerator</Generator>
  <LastGenOutput>Settings.cs</LastGenOutput>
</None>
<AppDesigner Include="Properties\" />
```

```
 </ItemGroup>
 <Import Project="$(MSBuildBinPath)\Microsoft.CSHARP.Targets" />
</Project>
```

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```
// Windows/ErrorMsg.h

#ifndef __WINDOWS_ERROR_MSG_H
#define __WINDOWS_ERROR_MSG_H

#include "../Common/MyString.h"

namespace NWindows {
namespace NError {

UString MyFormatMessage(DWORD errorCode);

}}

#endif
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
```

```
  <title>WOFF Test: Valid copyright Element With dir Attribute in text Element 1</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element contains a text element with ltr as the value for the dir
attribute." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre
 {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;copyright&gt;
  &lt;text dir="ltr"&gt;
   Copyright without language.
  &lt;/text&gt;
 &lt;/copyright&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
```

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LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM,
OUT OF OR IN CONNECTION
WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
SOFTWARE.
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With dir Attribute in span Element in text Element 2</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />

```
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-031-ref.xht" />
  <meta name="assert" content="The license element contains a text element that contains a span element with rtl as
the value for the dir attribute."
 />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-031.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts"&gt;
  &lt;text&gt;
   Text with &lt;span dir="rtl"&gt;span&lt;/span&gt;.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
// MyMessages.h

#ifndef __MY_MESSAGES_H
#define __MY_MESSAGES_H

#include "../../../Common/MyString.h"
```

```
void ShowErrorMessage(HWND window, LPCWSTR message);
inline void ShowErrorMessage(LPCWSTR message) { ShowErrorMessage(0, message); }

void ShowErrorMessageHwndRes(HWND window, UInt32 langID);
void ShowErrorMessageRes(UInt32 langID);

void ShowLastErrorMessage(HWND window = 0);

#endif
# -*- Mode: python; indent-tabs-mode: nil; tab-width: 40 -*-
# vim: set filetype=python:
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# License, v. 2.0. If a copy of the MPL was not distributed with this
# file, You can obtain one at http://mozilla.org/MPL/2.0/.

EXPORTS.snappy += [
  'snappy-stubs-public.h',
  'src/snappy-c.h',
  'src/snappy.h',
]

UNIFIED_SOURCES += [
  'src/snappy-c.cc',
  'src/snappy-sinksource.cc',
  'src/snappy-stubs-internal.cc',
  'src/snappy.cc',
]

# We allow warnings for third-party code that can be updated from upstream.
AllowCompilerWarnings()

FINAL_LIBRARY = 'xul'

# Suppress warnings in third-party code.
if CONFIG['CC_TYPE'] in ('clang', 'gcc'):
  CXXFLAGS += [
    '-Wno-sign-compare',
    '-Wno-unused-function'
  ]

if CONFIG['TARGET_ENDIANNESS'] == 'big':
  DEFINES['IS_BIG_ENDIAN'] = 1
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==================================

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--------------
```

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```
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<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-001-ref.xht" />
  <meta name="assert" content="The license element matches the schema." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src:
 url("support/metadatadisplay-schema-license-001.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts" id="License ID"&gt;
  &lt;text&gt;
   License without language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
```

```
  </pre>
 </body>
</html>
```

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-
strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid license Element With One Language Tagged (using lang) text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-license-006-ref.xht" />
  <meta name="assert" content="The license element matches the schema. It contains one text element that has a
language tag using the lang tag instead of
 xml:lang." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-license-006.woff2") format("woff2");
   }
   body {
```

```
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>Test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is valid and may be displayed to the user upon request.</p>
  <div class="test">P</div>
  <p>The XML contained in the Extended Metadata Block is below.</p>
  <pre>
&lt;?xml version="1.0" encoding="UTF-8"?&gt;
&lt;metadata version="1.0"&gt;
 &lt;license url="http://w3c.org/Fonts" id="License ID"&gt;
  &lt;text lang="en"&gt;
   License with "en" language.
  &lt;/text&gt;
 &lt;/license&gt;
&lt;/metadata&gt;
  </pre>
 </body>
</html>
PROG = lzma.exe
MY_CONSOLE = 1
CFLAGS = $(CFLAGS)

CURRENT_OBJS = \
 $O\LzmaAlone.obj \

COMPRESS_OBJS = \
 $O\LzmaDecoder.obj \
 $O\LzmaEncoder.obj \
 $O\LzmaRegister.obj \

COMMON_OBJS = \
 $O\CommandLineParser.obj \
 $O\CRC.obj \
 $O\CrcReg.obj \
 $O\IntToString.obj \
 $O\MyString.obj \
 $O\NewHandler.obj \
```

```
 $O\StringConvert.obj \
 $O\StringToInt.obj \
 $O\MyVector.obj

WIN_OBJS = \
 $O\FileIO.obj \
 $O\PropVariant.obj \
 $O\System.obj

7ZIP_COMMON_OBJS = \
 $O\CWrappers.obj \
 $O\CreateCoder.obj \
 $O\FileStreams.obj \
 $O\FilterCoder.obj \
 $O\MethodProps.obj \
 $O\OutBuffer.obj \
 $O\StreamUtils.obj \

UI_COMMON_OBJS = \
 $O\Bench.obj \

CONSOLE_OBJS = \
 $O\ConsoleClose.obj \
 $O\BenchCon.obj \

C_OBJS = \
 $O\Alloc.obj \
 $O\Bra86.obj \
 $O\CpuArch.obj \
 $O\LzFind.obj \
 $O\LzFindMt.obj \
 $O\Lzma86Dec.obj \
 $O\Lzma86Enc.obj \
 $O\LzmaDec.obj \
 $O\LzmaEnc.obj \
 $O\Threads.obj \

!include "../../Crc.mak"

!include "../../7zip.mak"
```

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```
#define IDS_PROP_PATH          1003
#define IDS_PROP_NAME          1004
```

```
#define IDS_PROP_EXTENSION        1005
#define IDS_PROP_IS_FOLDER        1006
#define IDS_PROP_SIZE             1007
#define IDS_PROP_PACKED_SIZE      1008
#define IDS_PROP_ATTRIBUTES       1009
#define IDS_PROP_CTIME            1010
#define IDS_PROP_ATIME            1011
#define IDS_PROP_MTIME            1012
#define IDS_PROP_SOLID            1013
#define IDS_PROP_C0MMENTED        1014
#define IDS_PROP_ENCRYPTED        1015
#define IDS_PROP_SPLIT_BEFORE     1016
#define IDS_PROP_SPLIT_AFTER      1017
#define IDS_PROP_DICTIONARY_SIZE  1018
#define IDS_PROP_CRC              1019
#define IDS_PROP_FILE_TYPE        1020
#define IDS_PROP_ANTI             1021
#define IDS_PROP_METHOD           1022
#define IDS_PROP_HOST_OS          1023
#define IDS_PROP_FILE_SYSTEM      1024
#define IDS_PROP_USER             1025
#define IDS_PROP_GROUP            1026
#define IDS_PROP_BLOCK            1027
#define IDS_PROP_COMMENT
        1028
#define IDS_PROP_POSITION         1029
#define IDS_PROP_PREFIX           1030
#define IDS_PROP_FOLDERS          1031
#define IDS_PROP_FILES            1032
#define IDS_PROP_VERSION          1033
#define IDS_PROP_VOLUME           1034
#define IDS_PROP_IS_VOLUME        1035
#define IDS_PROP_OFFSET           1036
#define IDS_PROP_LINKS            1037
#define IDS_PROP_NUM_BLOCKS       1038
#define IDS_PROP_NUM_VOLUMES      1039

#define IDS_PROP_BIT64            1041
#define IDS_PROP_BIG_ENDIAN       1042
#define IDS_PROP_CPU              1043
#define IDS_PROP_PHY_SIZE         1044
#define IDS_PROP_HEADERS_SIZE     1045
#define IDS_PROP_CHECKSUM         1046
#define IDS_PROP_CHARACTS         1047
#define IDS_PROP_VA               1048
#define IDS_PROP_ID               1049
#define IDS_PROP_SHORT_NAME       1050
#define IDS_PROP_CREATOR_APP      1051
```

```
#define IDS_PROP_SECTOR_SIZE      1052
#define IDS_PROP_POSIX_ATTRIB     1053
#define IDS_PROP_SYM_LINK         1054
#define IDS_PROP_ERROR
          1055
#define IDS_PROP_TOTAL_SIZE       1056
#define IDS_PROP_FREE_SPACE       1057
#define IDS_PROP_CLUSTER_SIZE     1058
#define IDS_PROP_VOLUME_NAME      1059
#define IDS_PROP_LOCAL_NAME       1060
#define IDS_PROP_PROVIDER         1061
#define IDS_PROP_NT_SECURITY      1062
#define IDS_PROP_ALT_STREAM       1063
#define IDS_PROP_AUX              1064
#define IDS_PROP_DELETED          1065
#define IDS_PROP_IS_TREE          1066
#define IDS_PROP_SHA1             1067
#define IDS_PROP_SHA256           1068
#define IDS_PROP_ERROR_TYPE       1069
#define IDS_PROP_NUM_ERRORS       1070
#define IDS_PROP_ERROR_FLAGS      1071
#define IDS_PROP_WARNING_FLAGS    1072
#define IDS_PROP_WARNING          1073
#define IDS_PROP_NUM_STREAMS      1074
#define IDS_PROP_NUM_ALT_STREAMS  1075
#define IDS_PROP_ALT_STREAMS_SIZE 1076
#define IDS_PROP_VIRTUAL_SIZE     1077
#define IDS_PROP_UNPACK_SIZE      1078
#define IDS_PROP_TOTAL_PHY_SIZE   1079
#define IDS_PROP_VOLUME_INDEX
 1080
#define IDS_PROP_SUBTYPE          1081
#define IDS_PROP_SHORT_COMMENT    1082
#define IDS_PROP_CODE_PAGE        1083
#define IDS_PROP_IS_NOT_ARC_TYPE  1084
#define IDS_PROP_PHY_SIZE_CANT_BE_DETECTED 1085
#define IDS_PROP_ZEROS_TAIL_IS_ALLOWED 1086
#define IDS_PROP_TAIL_SIZE        1087
#define IDS_PROP_EMB_STUB_SIZE    1088
#define IDS_PROP_NT_REPARSE       1089
#define IDS_PROP_HARD_LINK        1090
#define IDS_PROP_INODE            1091
#define IDS_PROP_STREAM_ID        1092
#define IDS_PROP_READ_ONLY        1093
#define IDS_PROP_OUT_NAME         1094
#define IDS_PROP_COPY_LINK        1095
```

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THE SOFTWARE.
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>

```
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: No text Element in copyright Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-invalid-mustignore" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <meta name="assert" content="The copyright element does not contain a text child element." />
  <style type="text/css"><![CDATA[
   @import url("support/test-fonts.css");
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family:
 "WOFF Test CFF Reference";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  <p>If the UA does not display WOFF metadata, the test passes if the word PASS appears below.</p>
  <p>The Extended Metadata Block is not valid and must not be displayed. If the UA does display it, the test
fails.</p>
  <div class="test">P</div>
 </body>
</html>
// RandGen.h

#ifndef __CRYPTO_RAND_GEN_H
#define __CRYPTO_RAND_GEN_H

#include "../../../C/Sha256.h"

class CRandomGenerator
{
 Byte _buff[SHA256_DIGEST_SIZE];
 bool _needInit;

 void Init();
public:
 CRandomGenerator(): _needInit(true) {};
 void Generate(Byte *data, unsigned size);
};
```

```
extern CRandomGenerator g_RandomGenerator;

#endif
```

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```
/* ATK - The Accessibility Toolkit for GTK+
* Copyright 2001 Sun Microsystems Inc.
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* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/


#ifndef __ATK_TEXT_H__
#define __ATK_TEXT_H__

#include <glib-object.h>
#include <atk/atkobject.h>
#include <atk/atkutil.h>

#ifdef __cplusplus
extern "C" {
#endif /*
 __cplusplus */

/**
*AtkTextAttribute
*@ATK_TEXT_ATTR_INVALID: Invalid attribute
*@ATK_TEXT_ATTR_LEFT_MARGIN: The pixel width of the left margin
*@ATK_TEXT_ATTR_RIGHT_MARGIN: The pixel width of the right margin
*@ATK_TEXT_ATTR_INDENT: The number of pixels that the text is indented
*@ATK_TEXT_ATTR_INVISIBLE: Either "true" or "false" indicating whether text is visible or not
*@ATK_TEXT_ATTR_EDITABLE: Either "true" or "false" indicating whether text is editable or not
*@ATK_TEXT_ATTR_PIXELS_ABOVE_LINES: Pixels of blank space to leave above each newline-terminated
line.
*@ATK_TEXT_ATTR_PIXELS_BELOW_LINES: Pixels of blank space to leave below each newline-terminated
line.
*@ATK_TEXT_ATTR_PIXELS_INSIDE_WRAP: Pixels of blank space to leave between wrapped lines inside the
same newline-terminated line (paragraph).
*@ATK_TEXT_ATTR_BG_FULL_HEIGHT: "true" or "false" whether to make the background color for each
character the height of the highest font used on the current line, or the
```

```
 height of the font used for the current character.
*@ATK_TEXT_ATTR_RISE: Number of pixels that the characters are risen above the baseline
*@ATK_TEXT_ATTR_UNDERLINE: "none", "single", "double" or "low"
*@ATK_TEXT_ATTR_STRIKETHROUGH: "true" or "false" whether the text is strikethrough
*@ATK_TEXT_ATTR_SIZE: The size of the characters.
*@ATK_TEXT_ATTR_SCALE: The scale of the characters. The value is a string representation of a double
*@ATK_TEXT_ATTR_WEIGHT: The weight of the characters.
*@ATK_TEXT_ATTR_LANGUAGE: The language used
*@ATK_TEXT_ATTR_FAMILY_NAME: The font family name
*@ATK_TEXT_ATTR_BG_COLOR: The background color. The value is an RGB value of the format
"%u,%u,%u"
*@ATK_TEXT_ATTR_FG_COLOR:The foreground color. The value is an RGB value of the format "%u,%u,%u"
*@ATK_TEXT_ATTR_BG_STIPPLE: "true" if a #GdkBitmap is set for stippling the background color.
*@ATK_TEXT_ATTR_FG_STIPPLE: "true" if a #GdkBitmap is set for stippling the foreground color.
*@ATK_TEXT_ATTR_WRAP_MODE:
 The wrap mode of the text, if any. Values are "none", "char" or "word"
*@ATK_TEXT_ATTR_DIRECTION: The direction of the text, if set. Values are "none", "ltr" or "rtl"
*@ATK_TEXT_ATTR_JUSTIFICATION: The justification of the text, if set. Values are "left", "right", "center" or
"fill"
*@ATK_TEXT_ATTR_STRETCH: The stretch of the text, if set. Values are "ultra_condensed",
"extra_condensed", "condensed", "semi_condensed", "normal", "semi_expanded", "expanded", "extra_expanded" or
"ultra_expanded"
*@ATK_TEXT_ATTR_VARIANT: The capitalization variant of the text, if set. Values are "normal" or
"small_caps"
*@ATK_TEXT_ATTR_STYLE: The slant style of the text, if set. Values are "normal", "oblique" or "italic"
*@ATK_TEXT_ATTR_LAST_DEFINED: not a valid text attribute, used for finding end of enumeration
*
* Describes the text attributes supported
**/
typedef enum
{
 ATK_TEXT_ATTR_INVALID = 0,
 ATK_TEXT_ATTR_LEFT_MARGIN,
 ATK_TEXT_ATTR_RIGHT_MARGIN,
 ATK_TEXT_ATTR_INDENT,
  ATK_TEXT_ATTR_INVISIBLE,
 ATK_TEXT_ATTR_EDITABLE,
 ATK_TEXT_ATTR_PIXELS_ABOVE_LINES,
 ATK_TEXT_ATTR_PIXELS_BELOW_LINES,
 ATK_TEXT_ATTR_PIXELS_INSIDE_WRAP,
 ATK_TEXT_ATTR_BG_FULL_HEIGHT,
 ATK_TEXT_ATTR_RISE,
 ATK_TEXT_ATTR_UNDERLINE,
 ATK_TEXT_ATTR_STRIKETHROUGH,
 ATK_TEXT_ATTR_SIZE,
 ATK_TEXT_ATTR_SCALE,
 ATK_TEXT_ATTR_WEIGHT,
 ATK_TEXT_ATTR_LANGUAGE,
```

```
 ATK_TEXT_ATTR_FAMILY_NAME,
 ATK_TEXT_ATTR_BG_COLOR,
 ATK_TEXT_ATTR_FG_COLOR,
 ATK_TEXT_ATTR_BG_STIPPLE,
 ATK_TEXT_ATTR_FG_STIPPLE,
 ATK_TEXT_ATTR_WRAP_MODE,
 ATK_TEXT_ATTR_DIRECTION,
 ATK_TEXT_ATTR_JUSTIFICATION,
 ATK_TEXT_ATTR_STRETCH,
 ATK_TEXT_ATTR_VARIANT,
 ATK_TEXT_ATTR_STYLE,
 ATK_TEXT_ATTR_LAST_DEFINED
} AtkTextAttribute;

AtkTextAttribute        atk_text_attribute_register   (const gchar *name);


#define ATK_TYPE_TEXT                  (atk_text_get_type ())
#define ATK_IS_TEXT(obj)               G_TYPE_CHECK_INSTANCE_TYPE ((obj), ATK_TYPE_TEXT)
#define ATK_TEXT(obj)                  G_TYPE_CHECK_INSTANCE_CAST
 ((obj), ATK_TYPE_TEXT, AtkText)
#define ATK_TEXT_GET_IFACE(obj)        (G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_TEXT, AtkTextIface))

#ifndef _TYPEDEF_ATK_TEXT_
#define _TYPEDEF_ATK_TEXT_
typedef struct _AtkText AtkText;
#endif
typedef struct _AtkTextIface AtkTextIface;

/**
*AtkTextBoundary:
*@ATK_TEXT_BOUNDARY_CHAR: Boundary is the boundary between characters
* (including non-printing characters)
*@ATK_TEXT_BOUNDARY_WORD_START: Boundary is the start (i.e. first character) of a word.
*@ATK_TEXT_BOUNDARY_WORD_END: Boundary is the end (i.e. last character) of a word.
*@ATK_TEXT_BOUNDARY_SENTENCE_START: Boundary is the first character in a sentence.
*@ATK_TEXT_BOUNDARY_SENTENCE_END: Boundary is the last (terminal) character in a sentence;
* in languages which use "sentence stop" punctuation such as English, the boundary is thus the
* '.', '?', or similar terminal punctuation character.
*@ATK_TEXT_BOUNDARY_LINE_START: Boundary is the initial character
 of the content or a
* character immediately following a newline, linefeed, or return character.
*@ATK_TEXT_BOUNDARY_LINE_END: Boundary is the linefeed, or return character.
*
*Text boundary types used for specifying boundaries for regions of text
**/
typedef enum {
```

```
 ATK_TEXT_BOUNDARY_CHAR,
 ATK_TEXT_BOUNDARY_WORD_START,
 ATK_TEXT_BOUNDARY_WORD_END,
 ATK_TEXT_BOUNDARY_SENTENCE_START,
 ATK_TEXT_BOUNDARY_SENTENCE_END,
 ATK_TEXT_BOUNDARY_LINE_START,
 ATK_TEXT_BOUNDARY_LINE_END
} AtkTextBoundary;

/**
*AtkTextGranularity:
*@ATK_TEXT_GRANULARITY_CHAR: Granularity is defined by the boundaries between characters
* (including non-printing characters)
*@ATK_TEXT_GRANULARITY_WORD: Granularity is defined by the boundaries of a word,
* starting at the beginning of the current word and finishing at the beginning of
* the following one, if present.
*@ATK_TEXT_GRANULARITY_SENTENCE: Granularity is defined by the boundaries of a sentence,
* starting at the beginning of the current
 sentence and finishing at the beginning of
* the following one, if present.
*@ATK_TEXT_GRANULARITY_LINE: Granularity is defined by the boundaries of a line,
* starting at the beginning of the current line and finishing at the beginning of
* the following one, if present.
*@ATK_TEXT_GRANULARITY_PARAGRAPH: Granularity is defined by the boundaries of a paragraph,
* starting at the beginning of the current paragraph and finishing at the beginning of
* the following one, if present.
*
* Text granularity types used for specifying the granularity of the region of
* text we are interested in.
**/
typedef enum {
 ATK_TEXT_GRANULARITY_CHAR,
 ATK_TEXT_GRANULARITY_WORD,
 ATK_TEXT_GRANULARITY_SENTENCE,
 ATK_TEXT_GRANULARITY_LINE,
 ATK_TEXT_GRANULARITY_PARAGRAPH
} AtkTextGranularity;

/**
* AtkTextRectangle:
* @x: The horizontal coordinate of a rectangle
* @y: The vertical coordinate of a rectangle
* @width: The width of a rectangle
* @height: The height of a rectangle
*
* A
 structure used to store a rectangle used by AtkText.
**/
```

```
typedef struct _AtkTextRectangle AtkTextRectangle;

struct _AtkTextRectangle {
 gint x;
 gint y;
 gint width;
 gint height;
};

/**
* AtkTextRange:
* @bounds: A rectangle giving the bounds of the text range
* @start_offset: The start offset of a AtkTextRange
* @end_offset: The end offset of a AtkTextRange
* @content: The text in the text range
*
* A structure used to describe a text range.
**/
typedef struct _AtkTextRange AtkTextRange;

struct _AtkTextRange {
 AtkTextRectangle bounds;
 gint start_offset;
 gint end_offset;
 gchar* content;
};

/**
*AtkTextClipType
*@ATK_TEXT_CLIP_NONE: No clipping to be done
*@ATK_TEXT_CLIP_MIN: Text clipped by min coordinate is omitted
*@ATK_TEXT_CLIP_MAX: Text clipped by max coordinate is omitted
*@ATK_TEXT_CLIP_BOTH: Only text fully within mix/max bound is retained
*
*Describes the type of clipping required.
**/
typedef enum {
   ATK_TEXT_CLIP_NONE,
   ATK_TEXT_CLIP_MIN,
    ATK_TEXT_CLIP_MAX,
   ATK_TEXT_CLIP_BOTH
} AtkTextClipType;

struct _AtkTextIface
{
 GTypeInterface parent;
```

```
gchar*        (* get_text)                (AtkText        *text,
                                         gint            start_offset,
                                         gint            end_offset);
gchar*        (* get_text_after_offset)       (AtkText        *text,
                                         gint            offset,
                                         AtkTextBoundary  boundary_type,
        gint            *start_offset,
        gint            *end_offset);
gchar*        (* get_text_at_offset)          (AtkText        *text,
                                         gint            offset,
                                         AtkTextBoundary  boundary_type,
        gint            *start_offset,
        gint            *end_offset);
gunichar
    (* get_character_at_offset)     (AtkText        *text,
                                         gint            offset);
gchar*        (* get_text_before_offset)      (AtkText        *text,
                                         gint            offset,
                                         AtkTextBoundary  boundary_type,
        gint            *start_offset,
        gint            *end_offset);
gint          (* get_caret_offset)            (AtkText        *text);
AtkAttributeSet* (* get_run_attributes)        (AtkText     *text,
        gint        offset,
        gint            *start_offset,
        gint       *end_offset);
AtkAttributeSet* (* get_default_attributes)    (AtkText     *text);
void          (* get_character_extents)       (AtkText        *text,
                                         gint            offset,
                                         gint            *x,
                                          gint            *y,
                                         gint            *width,
                                         gint            *height,
                                         AtkCoordType     coords);
gint          (* get_character_count)         (AtkText        *text);
gint          (* get_offset_at_point)         (AtkText        *text,
                                         gint            x,
                                         gint            y,
                                         AtkCoordType     coords);
gint   (* get_n_selections)    (AtkText        *text);
gchar*        (* get_selection)          (AtkText        *text,
        gint      selection_num,
        gint      *start_offset,
        gint      *end_offset);
gboolean       (* add_selection)    (AtkText        *text,
        gint      start_offset,
```

```
  gint      end_offset);
gboolean      (* remove_selection)    (AtkText          *text,
        gint            selection_num);
gboolean      (* set_selection)    (AtkText          *text,
        gint      selection_num,
        gint      start_offset,
        gint      end_offset);
gboolean      (* set_caret_offset)            (AtkText          *text,
                                        gint            offset);

/*
 * signal handlers
 */
void   (* text_changed)                (AtkText          *text,
                                        gint            position,
                                        gint            length);
void          (* text_caret_moved)            (AtkText          *text,
                                        gint            location);
void          (* text_selection_changed)      (AtkText          *text);

void          (* text_attributes_changed)     (AtkText
     *text);


void          (* get_range_extents)           (AtkText          *text,
                                        gint            start_offset,
                                        gint            end_offset,
                                        AtkCoordType     coord_type,
                                        AtkTextRectangle *rect);

AtkTextRange** (* get_bounded_ranges)          (AtkText          *text,
                                        AtkTextRectangle *rect,
                                        AtkCoordType     coord_type,
                                        AtkTextClipType  x_clip_type,
                                        AtkTextClipType  y_clip_type);

gchar*        (* get_string_at_offset)        (AtkText          *text,
                                        gint            offset,

         AtkTextGranularity granularity,
                                        gint            *start_offset,
                                        gint            *end_offset);
/*
 * Scrolls this text range so it becomes visible on the screen.
 *
 * scroll_substring_to lets the implementation compute an appropriate target
 * position on the screen, with type used as a positioning hint.
 *
```

```
 * scroll_substring_to_point lets the client specify a precise target position
 * on the screen.
 *
 * Since ATK 2.32
 */
gboolean      (* scroll_substring_to)        (AtkText        *text,
                                    gint           start_offset,
                                    gint           end_offset,
                                    AtkScrollType    type);
gboolean      (* scroll_substring_to_point)    (AtkText        *text,

        gint           start_offset,
                                    gint           end_offset,
                                    AtkCoordType     coords,
                                    gint           x,
                                    gint           y);
};

GType           atk_text_get_type (void);


/*
* Additional AtkObject properties used by AtkText:
*    "accessible_text" (accessible text has changed)
*    "accessible_caret" (accessible text cursor position changed:
*                        editable text only)
*/

gchar*       atk_text_get_text                        (AtkText        *text,
                                          gint           start_offset,
                                          gint           end_offset);
gunichar      atk_text_get_character_at_offset           (AtkText        *text,

                gint           offset);
gchar*       atk_text_get_text_after_offset             (AtkText        *text,
                                          gint           offset,
                                          AtkTextBoundary  boundary_type,
        gint           *start_offset,
        gint           *end_offset);
gchar*       atk_text_get_text_at_offset                (AtkText        *text,
                                          gint           offset,
                                          AtkTextBoundary  boundary_type,
        gint           *start_offset,
        gint           *end_offset);
gchar*       atk_text_get_text_before_offset            (AtkText        *text,
                                          gint           offset,
                                          AtkTextBoundary  boundary_type,
        gint
```

```
        *start_offset,
        gint        *end_offset);
gchar*      atk_text_get_string_at_offset          (AtkText        *text,
                                                   gint           offset,
                                                   AtkTextGranularity granularity,
                                                   gint           *start_offset,
                                                   gint           *end_offset);
gint        atk_text_get_caret_offset              (AtkText        *text);
void        atk_text_get_character_extents         (AtkText        *text,
                                                   gint           offset,
                                                   gint           *x,
                                                   gint           *y,
                                                   gint
  *width,
                                                   gint           *height,
                                                   AtkCoordType   coords);
AtkAttributeSet* atk_text_get_run_attributes       (AtkText    *text,
            gint       offset,
            gint       *start_offset,
            gint       *end_offset);
AtkAttributeSet* atk_text_get_default_attributes   (AtkText    *text);
gint        atk_text_get_character_count           (AtkText        *text);
gint        atk_text_get_offset_at_point           (AtkText        *text,
                                                   gint           x,
                                                   gint           y,
                                                   AtkCoordType   coords);
gint        atk_text_get_n_selections   (AtkText       *text);
gchar*      atk_text_get_selection   (AtkText
   *text,
        gint     selection_num,
        gint        *start_offset,
        gint        *end_offset);
gboolean    atk_text_add_selection                 (AtkText        *text,
        gint        start_offset,
        gint        end_offset);
gboolean    atk_text_remove_selection              (AtkText        *text,
        gint     selection_num);
gboolean    atk_text_set_selection                 (AtkText        *text,
        gint     selection_num,
        gint        start_offset,
        gint        end_offset);
gboolean    atk_text_set_caret_offset              (AtkText        *text,
                                                   gint           offset);
void        atk_text_get_range_extents             (AtkText        *text,

                                                   gint           start_offset,
```

```
            gint            end_offset,
                                        AtkCoordType     coord_type,
                                        AtkTextRectangle *rect);
AtkTextRange**  atk_text_get_bounded_ranges             (AtkText         *text,
                                        AtkTextRectangle *rect,
                                        AtkCoordType     coord_type,
                                        AtkTextClipType  x_clip_type,
                                        AtkTextClipType  y_clip_type);
void          atk_text_free_ranges                      (AtkTextRange     **ranges);
void        atk_attribute_set_free                    (AtkAttributeSet  *attrib_set);
G_CONST_RETURN gchar*  atk_text_attribute_get_name       (AtkTextAttribute attr);
AtkTextAttribute       atk_text_attribute_for_name       (const gchar      *name);
G_CONST_RETURN
 gchar*  atk_text_attribute_get_value       (AtkTextAttribute attr,
                                        gint            index_);

gboolean      atk_text_scroll_substring_to              (AtkText         *text,
                                        gint            start_offset,
                                        gint            end_offset,
                                        AtkScrollType    type);

gboolean      atk_text_scroll_substring_to_point        (AtkText         *text,
                                        gint            start_offset,
                                        gint            end_offset,
                                        AtkCoordType     coords,
                                        gint            x,
                                        gint
  y);

#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_TEXT_H__ */
/* 7zFile.h -- File IO
2017-04-03 : Igor Pavlov : Public domain */

#ifndef __7Z_FILE_H
#define __7Z_FILE_H

#ifdef _WIN32
#define USE_WINDOWS_FILE
#endif

#ifdef USE_WINDOWS_FILE
#include <windows.h>
#else
```

```
#include <stdio.h>
#endif

#include "7zTypes.h"

EXTERN_C_BEGIN

/* ---------- File ---------- */

typedef struct
{
 #ifdef USE_WINDOWS_FILE
 HANDLE handle;
 #else
 FILE *file;
 #endif
} CSzFile;

void File_Construct(CSzFile *p);
#if !defined(UNDER_CE) || !defined(USE_WINDOWS_FILE)
WRes InFile_Open(CSzFile *p, const char *name);
WRes OutFile_Open(CSzFile *p, const char *name);
#endif
#ifdef USE_WINDOWS_FILE
WRes InFile_OpenW(CSzFile *p, const WCHAR *name);
WRes OutFile_OpenW(CSzFile *p, const WCHAR *name);
#endif
WRes File_Close(CSzFile *p);

/* reads max(*size, remain file's size) bytes */
WRes File_Read(CSzFile *p, void *data, size_t *size);

/* writes *size bytes */
WRes File_Write(CSzFile *p, const void *data, size_t *size);

WRes File_Seek(CSzFile *p, Int64 *pos, ESzSeek origin);
WRes
 File_GetLength(CSzFile *p, UInt64 *length);


/* ---------- FileInStream ---------- */

typedef struct
{
 ISeqInStream vt;
 CSzFile file;
} CFileSeqInStream;
```

```
void FileSeqInStream_CreateVTable(CFileSeqInStream *p);


typedef struct
{
 ISeekInStream vt;
 CSzFile file;
} CFileInStream;

void FileInStream_CreateVTable(CFileInStream *p);


typedef struct
{
 ISeqOutStream vt;
 CSzFile file;
} CFileOutStream;

void FileOutStream_CreateVTable(CFileOutStream *p);

EXTERN_C_END

#endif
// UpdateCallbackConsole.h

#ifndef __UPDATE_CALLBACK_CONSOLE_H
#define __UPDATE_CALLBACK_CONSOLE_H

#include "../../../Common/StdOutStream.h"

#include "../Common/Update.h"

#include "PercentPrinter.h"

struct CErrorPathCodes
{
 FStringVector Paths;
 CRecordVector<DWORD> Codes;

 void AddError(const FString &path, DWORD systemError)
 {
   Paths.Add(path);
   Codes.Add(systemError);
 }
 void Clear()
 {
   Paths.Clear();
   Codes.Clear();
```

```
 }
};

class CCallbackConsoleBase
{
protected:
 CPercentPrinter _percent;

 CStdOutStream *_so;
 CStdOutStream *_se;

 void CommonError(const FString &path, DWORD systemError, bool isWarning);

 HRESULT ScanError_Base(const FString &path, DWORD systemError);
 HRESULT OpenFileError_Base(const FString &name, DWORD systemError);
 HRESULT ReadingFileError_Base(const FString &name, DWORD systemError);

public:
 bool NeedPercents() const { return _percent._so != NULL; };

 bool StdOutMode;

 bool NeedFlush;
 unsigned PercentsNameLevel;
  unsigned LogLevel;

 AString _tempA;
 UString _tempU;

 CCallbackConsoleBase():
    StdOutMode(false),
    NeedFlush(false),
    PercentsNameLevel(1),
    LogLevel(0)
    {}

 void SetWindowWidth(unsigned width) { _percent.MaxLen = width - 1; }

 void Init(CStdOutStream *outStream, CStdOutStream *errorStream, CStdOutStream *percentStream)
 {
  FailedFiles.Clear();

  _so = outStream;
  _se = errorStream;
  _percent._so = percentStream;
 }

 void ClosePercents2()
```

```
{
  if (NeedPercents())
    _percent.ClosePrint(true);
}

void ClosePercents_for_so()
{
  if (NeedPercents() && _so == _percent._so)
    _percent.ClosePrint(false);
}


CErrorPathCodes FailedFiles;
CErrorPathCodes ScanErrors;

HRESULT PrintProgress(const wchar_t *name, const char *command, bool showInLog);

};

class CUpdateCallbackConsole: public IUpdateCallbackUI2, public CCallbackConsoleBase
{
 // void PrintPropPair(const char *name, const wchar_t *val);

public:
 #ifndef
 _NO_CRYPTO
 bool PasswordIsDefined;
 UString Password;
 bool AskPassword;
 #endif

 bool DeleteMessageWasShown;

 CUpdateCallbackConsole()
    : DeleteMessageWasShown(false)
    #ifndef _NO_CRYPTO
    , PasswordIsDefined(false)
    , AskPassword(false)
    #endif
    {}

 /*
 void Init(CStdOutStream *outStream)
 {
   CCallbackConsoleBase::Init(outStream);
 }
 */
 // ~CUpdateCallbackConsole() { if (NeedPercents()) _percent.ClosePrint(); }
```

```
 INTERFACE_IUpdateCallbackUI2(;)
};

#endif
// UpdateCallback.h

#ifndef __UPDATE_CALLBACK_H
#define __UPDATE_CALLBACK_H

#include "../../../Common/MyCom.h"

#include "../../Common/FileStreams.h"

#include "../../IPassword.h"
#include "../../ICoder.h"

#include "../Common/UpdatePair.h"
#include "../Common/UpdateProduce.h"

#include "OpenArchive.h"

struct CArcToDoStat
{
 CDirItemsStat2 NewData;
 CDirItemsStat2 OldData;
 CDirItemsStat2 DeleteData;

 UInt64 Get_NumDataItems_Total() const
 {
   return NewData.Get_NumDataItems2() + OldData.Get_NumDataItems2();
 }
};

#define INTERFACE_IUpdateCallbackUI(x) \
 virtual HRESULT WriteSfx(const wchar_t *name, UInt64 size) x; \
 virtual HRESULT SetTotal(UInt64 size) x; \
 virtual HRESULT SetCompleted(const UInt64 *completeValue) x; \
 virtual HRESULT SetRatioInfo(const UInt64 *inSize, const UInt64 *outSize) x; \
 virtual HRESULT CheckBreak() x; \
 /* virtual HRESULT Finalize() x; */ \
 virtual HRESULT SetNumItems(const CArcToDoStat &stat) x; \
 virtual HRESULT GetStream(const
 wchar_t *name, bool isDir, bool isAnti, UInt32 mode) x; \
 virtual HRESULT OpenFileError(const FString &path, DWORD systemError) x; \
 virtual HRESULT ReadingFileError(const FString &path, DWORD systemError) x; \
 virtual HRESULT SetOperationResult(Int32 opRes) x; \
 virtual HRESULT ReportExtractResult(Int32 opRes, Int32 isEncrypted, const wchar_t *name) x; \
 virtual HRESULT ReportUpdateOpeartion(UInt32 op, const wchar_t *name, bool isDir) x; \
```

```
 /* virtual HRESULT SetPassword(const UString &password) x; */ \
 virtual HRESULT CryptoGetTextPassword2(Int32 *passwordIsDefined, BSTR *password) x; \
 virtual HRESULT CryptoGetTextPassword(BSTR *password) x; \
 virtual HRESULT ShowDeleteFile(const wchar_t *name, bool isDir) x; \
 /* virtual HRESULT CloseProgress() { return S_OK; } */

struct IUpdateCallbackUI
{
 INTERFACE_IUpdateCallbackUI(=0)
};

struct CKeyKeyValPair
{
 UInt64 Key1;
 UInt64 Key2;
 unsigned Value;

 int Compare(const CKeyKeyValPair &a) const
 {
   if (Key1
 < a.Key1) return -1;
   if (Key1 > a.Key1) return 1;
   return MyCompare(Key2, a.Key2);
 }
};


class CArchiveUpdateCallback:
 public IArchiveUpdateCallback2,
 public IArchiveUpdateCallbackFile,
 public IArchiveExtractCallbackMessage,
 public IArchiveGetRawProps,
 public IArchiveGetRootProps,
 public ICryptoGetTextPassword2,
 public ICryptoGetTextPassword,
 public ICompressProgressInfo,
 public IInFileStream_Callback,
 public CMyUnknownImp
{
 #if defined(_WIN32) && !defined(UNDER_CE)
 bool _saclEnabled;
 #endif
 CRecordVector<CKeyKeyValPair> _map;

 UInt32 _hardIndex_From;
 UInt32 _hardIndex_To;

public:
```

```
MY_QUERYINTERFACE_BEGIN2(IArchiveUpdateCallback2)
  MY_QUERYINTERFACE_ENTRY(IArchiveUpdateCallbackFile)
  MY_QUERYINTERFACE_ENTRY(IArchiveExtractCallbackMessage)
  MY_QUERYINTERFACE_ENTRY(IArchiveGetRawProps)
  MY_QUERYINTERFACE_ENTRY(IArchiveGetRootProps)
  MY_QUERYINTERFACE_ENTRY(ICryptoGetTextPassword2)
  MY_QUERYINTERFACE_ENTRY(ICryptoGetTextPassword)
   MY_QUERYINTERFACE_ENTRY(ICompressProgressInfo)
MY_QUERYINTERFACE_END
MY_ADDREF_RELEASE


STDMETHOD(SetRatioInfo)(const UInt64 *inSize, const UInt64 *outSize);

INTERFACE_IArchiveUpdateCallback2(;)
INTERFACE_IArchiveUpdateCallbackFile(;)
INTERFACE_IArchiveExtractCallbackMessage(;)
INTERFACE_IArchiveGetRawProps(;)
INTERFACE_IArchiveGetRootProps(;)

STDMETHOD(CryptoGetTextPassword2)(Int32 *passwordIsDefined, BSTR *password);
STDMETHOD(CryptoGetTextPassword)(BSTR *password);

CRecordVector<UInt32> _openFiles_Indexes;
FStringVector _openFiles_Paths;

bool AreAllFilesClosed() const { return _openFiles_Indexes.IsEmpty(); }
virtual HRESULT InFileStream_On_Error(UINT_PTR val, DWORD error);
virtual void InFileStream_On_Destroy(UINT_PTR val);

CRecordVector<UInt64> VolumesSizes;
FString VolName;
FString VolExt;

IUpdateCallbackUI *Callback;

const CDirItems *DirItems;
const CDirItem *ParentDirItem;

const CArc *Arc;
CMyComPtr<IInArchive> Archive;
 const CObjectVector<CArcItem> *ArcItems;
const CRecordVector<CUpdatePair2> *UpdatePairs;
const UStringVector *NewNames;
int CommentIndex;
const UString *Comment;

bool ShareForWrite;
```

```
 bool StopAfterOpenError;
 bool StdInMode;

 bool KeepOriginalItemNames;
 bool StoreNtSecurity;
 bool StoreHardLinks;
 bool StoreSymLinks;

 Byte *ProcessedItemsStatuses;


 CArchiveUpdateCallback();

 bool IsDir(const CUpdatePair2 &up) const
 {
   if (up.DirIndex >= 0)
     return DirItems->Items[up.DirIndex].IsDir();
   else if (up.ArcIndex >= 0)
     return (*ArcItems)[up.ArcIndex].IsDir;
   return false;
 }
};

#endif
```

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```
/* Ppmd7.h -- PPMdH compression codec
2017-04-03 : Igor Pavlov : Public domain
This code is based on PPMd var.H (2001): Dmitry Shkarin : Public domain */

/* This code supports virtual RangeDecoder and includes the implementation
of RangeCoder from 7z, instead of RangeCoder from original PPMd var.H.
If you need the compatibility with original PPMd var.H, you can use external RangeDecoder */

#ifndef __PPMD7_H
#define __PPMD7_H

#include "Ppmd.h"

EXTERN_C_BEGIN

#define PPMD7_MIN_ORDER 2
#define PPMD7_MAX_ORDER 64

#define PPMD7_MIN_MEM_SIZE (1 << 11)
#define PPMD7_MAX_MEM_SIZE (0xFFFFFFFF - 12 * 3)

struct CPpmd7_Context_;
```

```
typedef
 #ifdef PPMD_32BIT
   struct CPpmd7_Context_ *
 #else
   UInt32
 #endif
 CPpmd7_Context_Ref;

typedef struct CPpmd7_Context_
{
 UInt16 NumStats;
 UInt16 SummFreq;
 CPpmd_State_Ref Stats;
 CPpmd7_Context_Ref Suffix;
} CPpmd7_Context;

#define Ppmd7Context_OneState(p) ((CPpmd_State *)&(p)->SummFreq)

typedef struct
{
 CPpmd7_Context *MinContext, *MaxContext;
  CPpmd_State *FoundState;
 unsigned OrderFall, InitEsc, PrevSuccess, MaxOrder, HiBitsFlag;
 Int32 RunLength, InitRL; /* must be 32-bit at least */

 UInt32 Size;
 UInt32 GlueCount;
 Byte *Base, *LoUnit, *HiUnit, *Text, *UnitsStart;
 UInt32 AlignOffset;

 Byte Indx2Units[PPMD_NUM_INDEXES];
 Byte Units2Indx[128];
 CPpmd_Void_Ref FreeList[PPMD_NUM_INDEXES];
 Byte NS2Indx[256], NS2BSIndx[256], HB2Flag[256];
 CPpmd_See DummySee, See[25][16];
 UInt16 BinSumm[128][64];
} CPpmd7;

void Ppmd7_Construct(CPpmd7 *p);
Bool Ppmd7_Alloc(CPpmd7 *p, UInt32 size, ISzAllocPtr alloc);
void Ppmd7_Free(CPpmd7 *p, ISzAllocPtr alloc);
void Ppmd7_Init(CPpmd7 *p, unsigned maxOrder);
#define Ppmd7_WasAllocated(p) ((p)->Base != NULL)


/* ---------- Internal Functions ---------- */

extern const Byte PPMD7_kExpEscape[16];
```

```
#ifdef PPMD_32BIT
 #define Ppmd7_GetPtr(p, ptr) (ptr)
 #define Ppmd7_GetContext(p, ptr) (ptr)
 #define Ppmd7_GetStats(p, ctx) ((ctx)->Stats)
#else
 #define Ppmd7_GetPtr(p,
 offs) ((void *)((p)->Base + (offs)))
 #define Ppmd7_GetContext(p, offs) ((CPpmd7_Context *)Ppmd7_GetPtr((p), (offs)))
 #define Ppmd7_GetStats(p, ctx) ((CPpmd_State *)Ppmd7_GetPtr((p), ((ctx)->Stats)))
#endif

void Ppmd7_Update1(CPpmd7 *p);
void Ppmd7_Update1_0(CPpmd7 *p);
void Ppmd7_Update2(CPpmd7 *p);
void Ppmd7_UpdateBin(CPpmd7 *p);

#define Ppmd7_GetBinSumm(p) \
   &p->BinSumm[(size_t)(unsigned)Ppmd7Context_OneState(p->MinContext)->Freq - 1][p->PrevSuccess + \
   p->NS2BSIndx[(size_t)Ppmd7_GetContext(p, p->MinContext->Suffix)->NumStats - 1] + \
   (p->HiBitsFlag = p->HB2Flag[p->FoundState->Symbol]) + \
   2 * p->HB2Flag[(unsigned)Ppmd7Context_OneState(p->MinContext)->Symbol] + \
   ((p->RunLength >> 26) & 0x20)]

CPpmd_See *Ppmd7_MakeEscFreq(CPpmd7 *p, unsigned numMasked, UInt32 *scale);


/* ---------- Decode ---------- */

typedef struct IPpmd7_RangeDec IPpmd7_RangeDec;

struct IPpmd7_RangeDec
{
 UInt32 (*GetThreshold)(const IPpmd7_RangeDec *p, UInt32 total);
 void
 (*Decode)(const IPpmd7_RangeDec *p, UInt32 start, UInt32 size);
 UInt32 (*DecodeBit)(const IPpmd7_RangeDec *p, UInt32 size0);
};

typedef struct
{
 IPpmd7_RangeDec vt;
 UInt32 Range;
 UInt32 Code;
 IByteIn *Stream;
} CPpmd7z_RangeDec;

void Ppmd7z_RangeDec_CreateVTable(CPpmd7z_RangeDec *p);
```

```
Bool Ppmd7z_RangeDec_Init(CPpmd7z_RangeDec *p);
#define Ppmd7z_RangeDec_IsFinishedOK(p) ((p)->Code == 0)

int Ppmd7_DecodeSymbol(CPpmd7 *p, const IPpmd7_RangeDec *rc);


/* ---------- Encode ---------- */

typedef struct
{
 UInt64 Low;
 UInt32 Range;
 Byte Cache;
 UInt64 CacheSize;
 IByteOut *Stream;
} CPpmd7z_RangeEnc;

void Ppmd7z_RangeEnc_Init(CPpmd7z_RangeEnc *p);
void Ppmd7z_RangeEnc_FlushData(CPpmd7z_RangeEnc *p);

void Ppmd7_EncodeSymbol(CPpmd7 *p, CPpmd7z_RangeEnc *rc, int symbol);

EXTERN_C_END

#endif
```

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//
// Various stubs for the unit tests for the open-source version of Snappy.

#ifndef THIRD_PARTY_SNAPPY_OPENSOURCE_SNAPPY_TEST_H_
#define THIRD_PARTY_SNAPPY_OPENSOURCE_SNAPPY_TEST_H_

#include <iostream>
#include <string>

#include "snappy-stubs-internal.h"

#include <stdio.h>
#include <stdarg.h>
```

```
#ifdef HAVE_SYS_MMAN_H
#include <sys/mman.h>
#endif

#ifdef HAVE_SYS_RESOURCE_H
#include <sys/resource.h>
#endif

#ifdef HAVE_SYS_TIME_H
#include <sys/time.h>
#endif

#ifdef
 HAVE_WINDOWS_H
#include <windows.h>
#endif

#include <string>

#ifdef HAVE_GTEST

#include <gtest/gtest.h>
#undef TYPED_TEST
#define TYPED_TEST TEST
#define INIT_GTEST(argc, argv) ::testing::InitGoogleTest(argc, *argv)

#else

// Stubs for if the user doesn't have Google Test installed.

#define TEST(test_case, test_subcase) \
 void Test_ ## test_case ## _ ## test_subcase()
#define INIT_GTEST(argc, argv)

#define TYPED_TEST TEST
#define EXPECT_EQ CHECK_EQ
#define EXPECT_NE CHECK_NE
#define EXPECT_FALSE(cond) CHECK(!(cond))

#endif

#ifdef HAVE_GFLAGS

#include <gflags/gflags.h>

// This is tricky; both gflags and Google Test want to look at the command line
// arguments. Google Test seems to be the most happy with unknown arguments,
```

```
// though, so we call it first and hope for the best.
#define InitGoogle(argv0, argc, argv, remove_flags) \
 INIT_GTEST(argc, argv); \
 google::ParseCommandLineFlags(argc, argv, remove_flags);

#else

// If we don't have the gflags
 package installed, these can only be
// changed at compile time.
#define DEFINE_int32(flag_name, default_value, description) \
 static int FLAGS_ ## flag_name = default_value;

#define InitGoogle(argv0, argc, argv, remove_flags) \
 INIT_GTEST(argc, argv)

#endif

#ifdef HAVE_LIBZ
#include "zlib.h"
#endif

#ifdef HAVE_LIBLZO2
#include "lzo/lzo1x.h"
#endif

#ifdef HAVE_LIBLZF
extern "C" {
#include "lzf.h"
}
#endif

#ifdef HAVE_LIBFASTLZ
#include "fastlz.h"
#endif

#ifdef HAVE_LIBQUICKLZ
#include "quicklz.h"
#endif

namespace {

namespace File {
 void Init() { }
}  // namespace File

namespace file {
 int Defaults() { return 0; }
```

```
class DummyStatus {
 public:
  void CheckSuccess() { }
};

DummyStatus GetContents(const string& filename, string* data, int unused) {
  FILE* fp = fopen(filename.c_str(), "rb");
  if (fp == NULL) {
    perror(filename.c_str());
    exit(1);
  }

  data->clear();
  while (!feof(fp)) {
    char buf[4096];
    size_t ret = fread(buf,
1, 4096, fp);
    if (ret == 0 && ferror(fp)) {
      perror("fread");
      exit(1);
    }
    data->append(string(buf, ret));
  }

  fclose(fp);

  return DummyStatus();
}

DummyStatus SetContents(const string& filename,
                        const string& str,
                        int unused) {
  FILE* fp = fopen(filename.c_str(), "wb");
  if (fp == NULL) {
    perror(filename.c_str());
    exit(1);
  }

  int ret = fwrite(str.data(), str.size(), 1, fp);
  if (ret != 1) {
    perror("fwrite");
    exit(1);
  }

  fclose(fp);

  return DummyStatus();
```

```
 }
}  // namespace file

}  // namespace

namespace snappy {

#define FLAGS_test_random_seed 301
typedef string TypeParam;

void Test_CorruptedTest_VerifyCorrupted();
void Test_Snappy_SimpleTests();
void Test_Snappy_MaxBlowup();
void Test_Snappy_RandomData();
void Test_Snappy_FourByteOffset();
void Test_SnappyCorruption_TruncatedVarint();
void Test_SnappyCorruption_UnterminatedVarint();
void
 Test_SnappyCorruption_OverflowingVarint();
void Test_Snappy_ReadPastEndOfBuffer();
void Test_Snappy_FindMatchLength();
void Test_Snappy_FindMatchLengthRandom();

string ReadTestDataFile(const string& base, size_t size_limit);

string ReadTestDataFile(const string& base);

// A sprintf() variant that returns a std::string.
// Not safe for general use due to truncation issues.
string StringPrintf(const char* format, ...);

// A simple, non-cryptographically-secure random generator.
class ACMRandom {
public:
 explicit ACMRandom(uint32 seed) : seed_(seed) {}

 int32 Next();

 int32 Uniform(int32 n) {
   return Next() % n;
 }
 uint8 Rand8() {
   return static_cast<uint8>((Next() >> 1) & 0x000000ff);
 }
 bool OneIn(int X) { return Uniform(X) == 0; }

 // Skewed: pick "base" uniformly from range [0,max_log] and then
 // return "base" random bits.  The effect is to pick a number in the
```

```
 // range [0,2^max_log-1] with bias towards smaller numbers.
 int32 Skewed(int max_log);

 private:
 static const uint32 M = 2147483647L;   // 2^31-1
 uint32 seed_;
};

inline int32 ACMRandom::Next() {
 static const uint64 A = 16807;  // bits 14, 8, 7, 5, 2, 1, 0
 // We are computing
 //       seed_ = (seed_ * A) % M,    where M = 2^31-1
 //
 // seed_ must not be zero or M, or else all subsequent computed values
 // will be zero or M respectively.  For all other values, seed_ will end
 // up cycling through every number in [1,M-1]
 uint64 product = seed_ * A;

 // Compute (product % M) using the fact that ((x << 31) % M) == x.
 seed_ = (product >> 31) + (product & M);
 // The first reduction may overflow by 1 bit, so we may need to repeat.
 // mod == M is not possible; using > allows the faster sign-bit-based test.
 if (seed_ > M) {
   seed_ -= M;
 }
 return seed_;
}

inline int32 ACMRandom::Skewed(int max_log) {
 const int32 base = (Next() - 1) % (max_log+1);
 return (Next() - 1) & ((1u << base)-1);
}

// A wall-time clock. This stub is not super-accurate,
 nor resistant to the
// system time changing.
class CycleTimer {
public:
 CycleTimer() : real_time_us_(0) {}

 void Start() {
#ifdef WIN32
   QueryPerformanceCounter(&start_);
#else
   gettimeofday(&start_, NULL);
#endif
 }
```

```
 void Stop() {
#ifdef WIN32
   LARGE_INTEGER stop;
   LARGE_INTEGER frequency;
   QueryPerformanceCounter(&stop);
   QueryPerformanceFrequency(&frequency);

   double elapsed = static_cast<double>(stop.QuadPart - start_.QuadPart) /
       frequency.QuadPart;
   real_time_us_ += elapsed * 1e6 + 0.5;
#else
   struct timeval stop;
   gettimeofday(&stop, NULL);

   real_time_us_ += 1000000 * (stop.tv_sec - start_.tv_sec);
   real_time_us_ += (stop.tv_usec - start_.tv_usec);
#endif
 }

 double Get() {
   return real_time_us_ * 1e-6;
 }

private:
 int64 real_time_us_;
#ifdef WIN32
 LARGE_INTEGER start_;
#else
 struct timeval start_;
#endif
};

// Minimalistic microbenchmark framework.

typedef void (*BenchmarkFunction)(int, int);

class
 Benchmark {
public:
 Benchmark(const string& name, BenchmarkFunction function) :
     name_(name), function_(function) {}

 Benchmark* DenseRange(int start, int stop) {
   start_ = start;
   stop_ = stop;
   return this;
 }
```

```
 void Run();

private:
 const string name_;
 const BenchmarkFunction function_;
 int start_, stop_;
};
#define BENCHMARK(benchmark_name) \
 Benchmark* Benchmark_ ## benchmark_name = \
        (new Benchmark(#benchmark_name, benchmark_name))

extern Benchmark* Benchmark_BM_UFlat;
extern Benchmark* Benchmark_BM_UIOVec;
extern Benchmark* Benchmark_BM_UValidate;
extern Benchmark* Benchmark_BM_ZFlat;

void ResetBenchmarkTiming();
void StartBenchmarkTiming();
void StopBenchmarkTiming();
void SetBenchmarkLabel(const string& str);
void SetBenchmarkBytesProcessed(int64 bytes);

#ifdef HAVE_LIBZ

// Object-oriented wrapper around zlib.
class ZLib {
public:
 ZLib();
 ~ZLib();

 // Wipe a ZLib object to a virgin state.  This differs from Reset()
 // in
 that it also breaks any state.
 void Reinit();

 // Call this to make a zlib buffer as good as new.  Here's the only
 // case where they differ:
 //    CompressChunk(a); CompressChunk(b); CompressChunkDone();   vs
 //    CompressChunk(a); Reset(); CompressChunk(b); CompressChunkDone();
 // You'll want to use Reset(), then, when you interrupt a compress
 // (or uncompress) in the middle of a chunk and want to start over.
 void Reset();

 // According to the zlib manual, when you Compress, the destination
 // buffer must have size at least src + .1%*src + 12.  This function
 // helps you calculate that.  Augment this to account for a potential
 // gzip header and footer, plus a few bytes of slack.
 static int MinCompressbufSize(int uncompress_size) {
```

```
  return uncompress_size + uncompress_size/1000 + 40;
}

// Compresses the source buffer into the destination buffer.
// sourceLen is the byte length of the source buffer.
// Upon entry, destLen is the total size of
the destination buffer,
// which must be of size at least MinCompressbufSize(sourceLen).
// Upon exit, destLen is the actual size of the compressed buffer.
//
// This function can be used to compress a whole file at once if the
// input file is mmap'ed.
//
// Returns Z_OK if success, Z_MEM_ERROR if there was not
// enough memory, Z_BUF_ERROR if there was not enough room in the
// output buffer. Note that if the output buffer is exactly the same
// size as the compressed result, we still return Z_BUF_ERROR.
// (check CL#1936076)
int Compress(Bytef *dest, uLongf *destLen,
             const Bytef *source, uLong sourceLen);

// Uncompresses the source buffer into the destination buffer.
// The destination buffer must be long enough to hold the entire
// decompressed contents.
//
// Returns Z_OK on success, otherwise, it returns a zlib error code.
int Uncompress(Bytef *dest, uLongf *destLen,
               const Bytef *source, uLong sourceLen);

//
Uncompress data one chunk at a time -- ie you can call this
// more than once.  To get this to work you need to call per-chunk
// and "done" routines.
//
// Returns Z_OK if success, Z_MEM_ERROR if there was not
// enough memory, Z_BUF_ERROR if there was not enough room in the
// output buffer.

int UncompressAtMost(Bytef *dest, uLongf *destLen,
                     const Bytef *source, uLong *sourceLen);

// Checks gzip footer information, as needed.  Mostly this just
// makes sure the checksums match.  Whenever you call this, it
// will assume the last 8 bytes from the previous UncompressChunk
// call are the footer.  Returns true iff everything looks ok.
bool UncompressChunkDone();

private:
```

```
int InflateInit();       // sets up the zlib inflate structure
int DeflateInit();       // sets up the zlib deflate structure

// These init the zlib data structures for compressing/uncompressing
int CompressInit(Bytef *dest, uLongf *destLen,

 const Bytef *source, uLong *sourceLen);
int UncompressInit(Bytef *dest, uLongf *destLen,
                const Bytef *source, uLong *sourceLen);
// Initialization method to be called if we hit an error while
// uncompressing. On hitting an error, call this method before
// returning the error.
void UncompressErrorInit();

// Helper function for Compress
int CompressChunkOrAll(Bytef *dest, uLongf *destLen,
                   const Bytef *source, uLong sourceLen,
                   int flush_mode);
int CompressAtMostOrAll(Bytef *dest, uLongf *destLen,
                    const Bytef *source, uLong *sourceLen,
                    int flush_mode);

// Likewise for UncompressAndUncompressChunk
int UncompressChunkOrAll(Bytef *dest, uLongf *destLen,
                     const Bytef *source, uLong sourceLen,
                     int flush_mode);

int UncompressAtMostOrAll(Bytef *dest, uLongf *destLen,
                      const
Bytef *source, uLong *sourceLen,
                      int flush_mode);

// Initialization method to be called if we hit an error while
// compressing. On hitting an error, call this method before
// returning the error.
void CompressErrorInit();

int compression_level_;   // compression level
int window_bits_;         // log base 2 of the window size used in compression
int mem_level_;           // specifies the amount of memory to be used by
                      // compressor (1-9)
z_stream comp_stream_;    // Zlib stream data structure
bool comp_init_;          // True if we have initialized comp_stream_
z_stream uncomp_stream_;  // Zlib stream data structure
bool uncomp_init_;        // True if we have initialized uncomp_stream_

// These are used only with chunked compression.
bool first_chunk_;       // true if we need to emit headers with this chunk
```

```
};

#endif  // HAVE_LIBZ

}  // namespace snappy

DECLARE_bool(run_microbenchmarks);

static
 void RunSpecifiedBenchmarks() {
 if (!FLAGS_run_microbenchmarks) {
   return;
 }

 fprintf(stderr, "Running microbenchmarks.\n");
#ifndef NDEBUG
 fprintf(stderr, "WARNING: Compiled with assertions enabled, will be slow.\n");
#endif
#ifndef __OPTIMIZE__
 fprintf(stderr, "WARNING: Compiled without optimization, will be slow.\n");
#endif
 fprintf(stderr, "Benchmark            Time(ns)    CPU(ns) Iterations\n");
 fprintf(stderr, "---------------------------------------------------\n");

 snappy::Benchmark_BM_UFlat->Run();
 snappy::Benchmark_BM_UIOVec->Run();
 snappy::Benchmark_BM_UValidate->Run();
 snappy::Benchmark_BM_ZFlat->Run();

 fprintf(stderr, "\n");
}

#ifndef HAVE_GTEST

static inline int RUN_ALL_TESTS() {
 fprintf(stderr, "Running correctness tests.\n");
 snappy::Test_CorruptedTest_VerifyCorrupted();
 snappy::Test_Snappy_SimpleTests();
 snappy::Test_Snappy_MaxBlowup();
 snappy::Test_Snappy_RandomData();
 snappy::Test_Snappy_FourByteOffset();
 snappy::Test_SnappyCorruption_TruncatedVarint();
  snappy::Test_SnappyCorruption_UnterminatedVarint();
 snappy::Test_SnappyCorruption_OverflowingVarint();
 snappy::Test_Snappy_ReadPastEndOfBuffer();
 snappy::Test_Snappy_FindMatchLength();
 snappy::Test_Snappy_FindMatchLengthRandom();
 fprintf(stderr, "All tests passed.\n");
```

```
 return 0;
}

#endif  // HAVE_GTEST

// For main().
namespace snappy {

static void CompressFile(const char* fname);
static void UncompressFile(const char* fname);
static void MeasureFile(const char* fname);

// Logging.

#define LOG(level) LogMessage()
#define VLOG(level) true ? (void)0 : \
   snappy::LogMessageVoidify() & snappy::LogMessage()

class LogMessage {
public:
 LogMessage() { }
 ~LogMessage() {
   cerr << endl;
 }

 LogMessage& operator<<(const std::string& msg) {
   cerr << msg;
   return *this;
 }
 LogMessage& operator<<(int x) {
   cerr << x;
   return *this;
 }
};

// Asserts, both versions activated in debug mode only,
// and ones that are
 always active.

#define CRASH_UNLESS(condition) \
   PREDICT_TRUE(condition) ? (void)0 : \
   snappy::LogMessageVoidify() & snappy::LogMessageCrash()

#ifdef _MSC_VER
// ~LogMessageCrash calls abort() and therefore never exits. This is by design
// so temporarily disable warning C4722.
#pragma warning(push)
```

```
#pragma warning(disable:4722)
#endif

class LogMessageCrash : public LogMessage {
public:
 LogMessageCrash() { }
 ~LogMessageCrash() {
   cerr << endl;
   abort();
 }
};

#ifdef _MSC_VER
#pragma warning(pop)
#endif

// This class is used to explicitly ignore values in the conditional
// logging macros.  This avoids compiler warnings like "value computed
// is not used" and "statement has no effect".

class LogMessageVoidify {
public:
 LogMessageVoidify() { }
 // This has to be an operator with a precedence lower than << but
 // higher than ?:
 void operator&(const LogMessage&) { }
};

#define CHECK(cond) CRASH_UNLESS(cond)
#define CHECK_LE(a, b) CRASH_UNLESS((a) <= (b))
#define
 CHECK_GE(a, b) CRASH_UNLESS((a) >= (b))
#define CHECK_EQ(a, b) CRASH_UNLESS((a) == (b))
#define CHECK_NE(a, b) CRASH_UNLESS((a) != (b))
#define CHECK_LT(a, b) CRASH_UNLESS((a) < (b))
#define CHECK_GT(a, b) CRASH_UNLESS((a) > (b))
#define CHECK_OK(cond) (cond).CheckSuccess()

}  // namespace

using snappy::CompressFile;
using snappy::UncompressFile;
using snappy::MeasureFile;

#endif  // THIRD_PARTY_SNAPPY_OPENSOURCE_SNAPPY_TEST_H_
```

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```
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* Free Software Foundation, Inc., 59 Temple Place - Suite 330,
* Boston, MA 02111-1307, USA.
*/

#ifndef __ATK_SELECTION_H__
#define __ATK_SELECTION_H__

#include <atk/atkobject.h>
```

```
#ifdef __cplusplus
extern "C" {
#endif /* __cplusplus */

/*
* This AtkSelection interface provides
 the standard mechanism for an
* assistive technology to determine what the current selected children are,
* as well as modify the selection set. Any object that has children that
* can be selected should support the AtkSelection interface.
*/

#define ATK_TYPE_SELECTION                    (atk_selection_get_type ())
#define ATK_IS_SELECTION(obj)                 G_TYPE_CHECK_INSTANCE_TYPE ((obj),
ATK_TYPE_SELECTION)
#define ATK_SELECTION(obj)                    G_TYPE_CHECK_INSTANCE_CAST ((obj),
ATK_TYPE_SELECTION, AtkSelection)
#define ATK_SELECTION_GET_IFACE(obj)          (G_TYPE_INSTANCE_GET_INTERFACE ((obj),
ATK_TYPE_SELECTION, AtkSelectionIface))

#ifndef _TYPEDEF_ATK_SELECTION_
#define _TYPEDEF_ATK_SELECTION_
typedef struct _AtkSelection AtkSelection;
#endif
typedef struct _AtkSelectionIface AtkSelectionIface;

struct _AtkSelectionIface
{
 GTypeInterface parent;

 gboolean     (* add_selection)       (AtkSelection   *selection,

                  gint          i);
 gboolean     (* clear_selection)      (AtkSelection   *selection);
 AtkObject*   (* ref_selection)        (AtkSelection   *selection,
                                gint          i);
 gint         (* get_selection_count)  (AtkSelection   *selection);
 gboolean     (* is_child_selected)    (AtkSelection   *selection,
                                gint          i);
 gboolean     (* remove_selection)     (AtkSelection   *selection,
                                gint          i);
 gboolean     (* select_all_selection) (AtkSelection   *selection);

 /* signal handlers */

 void         (*selection_changed)     (AtkSelection   *selection);
```

```
 AtkFunction  pad1;
 AtkFunction  pad2;
};

GType atk_selection_get_type (void);

gboolean     atk_selection_add_selection       (AtkSelection   *selection,
                                                gint           i);

gboolean     atk_selection_clear_selection
     (AtkSelection   *selection);

AtkObject*   atk_selection_ref_selection       (AtkSelection   *selection,
                                                gint           i);

gint         atk_selection_get_selection_count  (AtkSelection   *selection);

gboolean     atk_selection_is_child_selected    (AtkSelection   *selection,
                                                gint           i);

gboolean     atk_selection_remove_selection     (AtkSelection   *selection,
                                                gint           i);

gboolean     atk_selection_select_all_selection (AtkSelection   *selection);

#ifdef __cplusplus
}
#endif /* __cplusplus */


#endif /* __ATK_SELECTION_H__ */
```

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http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

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Esperanto hyphenation patterns

(more info about the licence to be added later)

% This file is part of hyph-utf8 package and resulted
from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% See http://tug.org/tex-hyphen and other files in the package
%
% However, this file does not comply with rules of other patterns
% as it still uses TeX macros, and a dedicated converter would be needed
% to convert patterns into OponOffice-friendly form for example.
%
% But it should work OK with both 8-bit engines (TeX, pdfTeX, ...)
% as well as with native UTF-8 ones (XeTeX, LuaTeX, ...)

```
%
%-----------------------------------------------------------------------------
%
% \message{Esperanto Hyphenation Patterns `eohyph', 1999-08-10}
%
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%
% More documentation can be found near the end of this file.
%
\begingroup
%
 Makrooj por la finaoj:
\def\adj#1{#1a. #1aj. #1ajn. #1an. #1e.}
\edef\nom#1{\adj{#1} #1o. #1oj. #1ojn. #1on.}
\def\ver#1{#1as. #1i. #1is. #1os. #1u. #1us.}
%
```


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```
/// The datatype used for the ioctl number
#[doc(hidden)]
pub type ioctl_num_type = ::libc::c_ulong;
/// The datatype used for the 3rd argument
#[doc(hidden)]
pub type ioctl_param_type = ::libc::c_int;

mod consts {
  use ::sys::ioctl::ioctl_num_type;
  #[doc(hidden)]
  pub const VOID: ioctl_num_type = 0x2000_0000;
  #[doc(hidden)]
  pub const OUT: ioctl_num_type = 0x4000_0000;
  #[doc(hidden)]
  pub const IN: ioctl_num_type = 0x8000_0000;
  #[doc(hidden)]
  pub const INOUT: ioctl_num_type = (IN|OUT);
  #[doc(hidden)]
  pub const IOCPARM_MASK: ioctl_num_type = 0x1fff;
}

pub use self::consts::*;

#[macro_export]
#[doc(hidden)]
macro_rules! ioc {
  ($inout:expr, $group:expr, $num:expr, $len:expr) => (
     $inout | (($len as $crate::sys::ioctl::ioctl_num_type & $crate::sys::ioctl::IOCPARM_MASK) << 16) | (($group
as $crate::sys::ioctl::ioctl_num_type) << 8) | ($num as $crate::sys::ioctl::ioctl_num_type)
  )
}
```

```
/// Generate an ioctl request code for a command that
 passes no data.
///
/// This is equivalent to the `_IO()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_none!()` directly.
///
/// # Example
///
/// ```
/// # #[macro_use] extern crate nix;
/// const KVMIO: u8 = 0xAE;
/// ioctl_write_int_bad!(kvm_create_vm, request_code_none!(KVMIO, 0x03));
/// # fn main() {}
/// ```
#[macro_export]
macro_rules! request_code_none {
   ($g:expr, $n:expr) => (ioc!($crate::sys::ioctl::VOID, $g, $n, 0))
}

/// Generate an ioctl request code for a command that passes an integer
///
/// This is equivalent to the `_IOWINT()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write_int!()` directly.
#[macro_export]
macro_rules! request_code_write_int {
   ($g:expr, $n:expr) => (ioc!($crate::sys::ioctl::VOID, $g, $n, ::std::mem::size_of::<$crate::libc::c_int>()))
}

///
 Generate an ioctl request code for a command that reads.
///
/// This is equivalent to the `_IOR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_read!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is reading and the kernel is
/// writing.
#[macro_export]
macro_rules! request_code_read {
   ($g:expr, $n:expr, $len:expr) => (ioc!($crate::sys::ioctl::OUT, $g, $n, $len))
}
```

```
/// Generate an ioctl request code for a command that writes.
///
/// This is equivalent to the `_IOW()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is writing and the kernel is
/// reading.
#[macro_export]
macro_rules!
 request_code_write {
   ($g:expr, $n:expr, $len:expr) => (ioc!($crate::sys::ioctl::IN, $g, $n, $len))
}

/// Generate an ioctl request code for a command that reads and writes.
///
/// This is equivalent to the `_IOWR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_readwrite!()` directly.
#[macro_export]
macro_rules! request_code_readwrite {
   ($g:expr, $n:expr, $len:expr) => (ioc!($crate::sys::ioctl::INOUT, $g, $n, $len))
}
```

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Upper Sorbian hyphenation patterns (E. Werner)

(more info about the licence to be added later)

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 package and resulted from
% semi-manual conversions of hyphenation patterns into UTF-8 in June 2008.
%
% Source: sorhyph.tex (1997-05-07)
% Author: E. Werner
%
% The above mentioned file should become obsolete,
% and the author of the original file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%  and helped with testing, suggestions and bug reports
% - Norbert Preining, who tested & integrated patterns

```
 into TeX Live
%
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% - the only "allowed"
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%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
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%
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%
% For more unformation see
%
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%
%-----------------------------------------------------------------------------
%
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% of this license or (at your option) any later version.
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%   http://www.latex-project.org/lppl.txt
% and version 1.3 or
```

later is part of all distributions of LaTeX
% version 2005/12/01 or later.
% \message{Hyphenation patterns for Upper Sorbian, E. Werner}
% \message{Completely new revision 1997, March 22}
%
% - ccaron
% - cacute
% - ecaron
% - lslash
% - nacute
% - oacute
% - rcaron
% - scaron
% - zcaron
% - zacute
%
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http://tug.org/svn/texhyphen/trunk/hyph-utf8/tex/generic/hyph-utf8/patterns/?pathrev=580

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%
% Source: TODO:WRITEME (2003-03-10)
% Author: Alexander I. Lebedev <swan at scon155.phys.msu.su>
%

```
% The above mentioned file should become obsolete,
% and the author of the original file should preferaby modify this file instead.
%
% Modificatios were needed in order to support native UTF-8 engines,
% but functionality (hopefully) didn't change in any way, at least not intentionally.
% This file is no longer stand-alone; at least for 8-bit engines
% you probably want to use loadhyph-foo.tex (which will load this file) instead.
%
% Modifications were done by Jonathan Kew, Mojca Miklavec & Arthur Reutenauer
% with help & support from:
% - Karl Berry, who gave us free hands and all resources
% - Taco Hoekwater, with useful macros
% - Hans Hagen, who did the unicodifisation of patterns already long before
%               and helped with testing, suggestions and bug reports
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%
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% - all the patterns should be in
 UTF-8
% - the only "allowed" TeX commands in this file are: \patterns, \hyphenation,
%   and if you really cannot do without, also \input and \message
% - in particular, please no \catcode or \lccode changes,
%   they belong to loadhyph-foo.tex,
%   and no \lefthyphenmin and \righthyphenmin,
%   they have no influence here and belong elsewhere
% - \begingroup and/or \endinput is not needed
% - feel free to do whatever you want inside comments
%
% We know that TeX is extremely powerful, but give a stupid parser
```

% at least a chance to read your patterns.
%
% For more unformation see
%
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%
%----------
%
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% version.
%
% Patterns were
 generated with patgen from a 990,000-word list and then
% manually corrected.
%
% The program consists of the files ruhyphal.tex, cyryoal.tex and two
% document files README.ruhyphal and hyphen.rules.  The file cyryoal.tex
% can be regenerated using mkcyryo script (a part of ruhyphen package)
% and the latest release of rus-ispell dictionaries
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```
/* Ppmd.h -- PPMD codec common code
2017-04-03 : Igor Pavlov : Public domain
This code is based on PPMd var.H (2001): Dmitry Shkarin : Public domain */

#ifndef __PPMD_H
#define __PPMD_H

#include "CpuArch.h"

EXTERN_C_BEGIN

#ifdef MY_CPU_32BIT
 #define PPMD_32BIT
#endif

#define PPMD_INT_BITS 7
#define PPMD_PERIOD_BITS 7
#define PPMD_BIN_SCALE (1 << (PPMD_INT_BITS + PPMD_PERIOD_BITS))

#define PPMD_GET_MEAN_SPEC(summ, shift, round) (((summ) + (1 << ((shift) - (round)))) >> (shift))
#define PPMD_GET_MEAN(summ) PPMD_GET_MEAN_SPEC((summ), PPMD_PERIOD_BITS, 2)
#define PPMD_UPDATE_PROB_0(prob) ((prob) + (1 << PPMD_INT_BITS) - PPMD_GET_MEAN(prob))
#define PPMD_UPDATE_PROB_1(prob) ((prob) - PPMD_GET_MEAN(prob))

#define PPMD_N1 4
#define PPMD_N2 4
#define PPMD_N3 4
#define PPMD_N4 ((128 + 3 - 1 * PPMD_N1 - 2 * PPMD_N2 - 3 * PPMD_N3) / 4)
#define PPMD_NUM_INDEXES (PPMD_N1 + PPMD_N2 + PPMD_N3 + PPMD_N4)

#pragma pack(push, 1)
/* Most compilers works OK here even without #pragma pack(push, 1),
 but some GCC compilers need it. */

/* SEE-contexts for PPM-contexts with masked symbols */
typedef struct
{
 UInt16 Summ; /* Freq */
 Byte Shift;  /* Speed of Freq change; low Shift is for fast change */
```

```
 Byte Count;  /* Count to next change of Shift */
} CPpmd_See;

#define Ppmd_See_Update(p)  if ((p)->Shift < PPMD_PERIOD_BITS && --(p)->Count == 0) \
   { (p)->Summ <<= 1; (p)->Count = (Byte)(3 << (p)->Shift++); }

typedef struct
{
 Byte Symbol;
 Byte Freq;
 UInt16 SuccessorLow;
 UInt16 SuccessorHigh;
} CPpmd_State;

#pragma pack(pop)

typedef
 #ifdef PPMD_32BIT
   CPpmd_State *
 #else
   UInt32
 #endif
 CPpmd_State_Ref;

typedef
 #ifdef PPMD_32BIT
   void *
 #else
   UInt32
 #endif
 CPpmd_Void_Ref;

typedef
 #ifdef PPMD_32BIT
   Byte *
 #else
   UInt32
 #endif
 CPpmd_Byte_Ref;

#define PPMD_SetAllBitsIn256Bytes(p) \
 { size_t z; for (z = 0; z < 256 / sizeof(p[0]); z += 8) { \
 p[z+7] = p[z+6] = p[z+5] = p[z+4] = p[z+3] = p[z+2] = p[z+1] = p[z+0] = ~(size_t)0;
 }}

EXTERN_C_END

#endif
```

<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- THIS FILE WAS AUTOMATICALLY GENERATED, DO NOT EDIT. -->
<html xmlns="http://www.w3.org/1999/xhtml">
 <head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8"/>
  <title>WOFF Test: Valid copyright Element With One Language Tagged text Element</title>
  <link rel="author" title="Tal Leming" href="http://typesupply.com" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="help" href="http://www.w3.org/TR/WOFF/#conform-metadata-noeffect" />
  <link rel="help" href="http://dev.w3.org/webfonts/WOFF2/spec/#Metadata" />
  <link rel="reviewer" title="Chris Lilley" href="mailto:chris@w3.org" />
  <link rel="match" href="metadatadisplay-schema-copyright-002-ref.xht" />
  <meta name="assert" content="The copyright element matches the schema. It contains one text element that has a language tag." />
  <style type="text/css"><![CDATA[
   @import
 url("support/test-fonts.css");
   @font-face {
    font-family: "WOFF Test";
    src: url("support/metadatadisplay-schema-copyright-002.woff2") format("woff2");
   }
   body {
    font-size: 20px;
   }
   pre {
    font-size: 12px;
   }
   .test {
    font-family: "WOFF Test", "WOFF Test CFF Fallback";
    font-size: 200px;
    margin-top: 50px;
   }
  ]]></style>
 </head>
 <body>
  Test passes if the word PASS appears below.
  The Extended Metadata Block is valid and may be displayed to the user upon request.
  P
  The XML contained in the Extended Metadata Block is below.
  <pre>
<?xml version="1.0" encoding="UTF-8"?>
<metadata version="1.0">
 <copyright>
  <text xml:lang="en">
   Copyright with "en" language.
  </text>
 </copyright>

</metadata>
</pre>
</body>
</html>
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This reference implementation is originally derived from the On2 VP3
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with the VP3 video format, consisting of a backward-compatible superset.
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```
// OffsetStream.h

#ifndef __OFFSET_STREAM_H
#define __OFFSET_STREAM_H

#include "../../Common/MyCom.h"

#include "../IStream.h"

class COffsetOutStream:
 public IOutStream,
 public CMyUnknownImp
{
 UInt64 _offset;
 CMyComPtr<IOutStream> _stream;
public:
 HRESULT Init(IOutStream *stream, UInt64 offset);

 MY_UNKNOWN_IMP

 STDMETHOD(Write)(const void *data, UInt32 size, UInt32 *processedSize);
 STDMETHOD(Seek)(Int64 offset, UInt32 seekOrigin, UInt64 *newPosition);
 STDMETHOD(SetSize)(UInt64 newSize);
};

#endif
```

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# 1.3038 python-dateutil 1:2.9.0.post0-1.el9_7

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dateutil - Extensions to the standard Python datetime module.

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# 1.3039 libxmlb 0.3.10-1.el9

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For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

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Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

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# 1.3040 tdb 1.4.13-1.el9

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# 1.3041 policycoreutils 3.6-3.el9

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its purpose remains meaningful.

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---

## Introduction

While all newer (some X10, all X11 and H12 series) mainboard for Supermicro support Redfish some features are only available after buying them as additional feature. One of those are applying BIOS and BMC firmware updates.

## Details

If you want to update your Supermicro board via redfish using fwupd you will need either the [SFT-OOB-LIC](https://store.supermicro.com/out-of-band-sft-oob-lic.html) or the [SFT-DCMS-Single](https://store.supermicro.com/supermicro-server-manager-dcms-license-key-sft-dcms-single.html) license.

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# 1.3043 kexec-tools 2.0.29-10.el9

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# 1.3047 network-manager 1:1.54.0-3.el9_7

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==========

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==========

Mixing two licenses in the same source tree is cumbersome:

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2) For example keyfile and ifcfg-rh implementations are GPL licensed as they
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- [1]
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```
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package copyright

import (
 "bytes"
 "internal/testenv"
 "io"
 "io/fs"
 "os"
 "path/filepath"
 "testing"
)

var copyright = []byte("Copyright")

var permitted = [][]byte{
 []byte("// Code generated by "),
 []byte("// Code generated from "),
 []byte("// Created by cgo -cdefs"),
 []byte("// DO NOT EDIT\n// generated by:"),
 []byte("// Empty assembly file"),
 []byte("// Generated using cgo"),
 []byte("// Original source:\n//\thttp://www.zorinaq.com/papers/md5-amd64.html"), // public domain crypto/md5
 []byte("// created by cgo -cdefs"),
```

```
 []byte("// go run mkasm.go"),
 []byte("// mkerrors"),
 []byte("// mksys"),
 []byte("// run\n// Code generated by"), // cmd/compile/internal/test/constFold_test.go
}

func TestCopyright(t *testing.T) {
 buf := make([]byte, 2048)
 filepath.WalkDir(filepath.Join(testenv.GOROOT(t), "src"), func(path string,
 d fs.DirEntry, err error) error {
  if d.IsDir() && (d.Name() == "testdata" || d.Name() == "vendor") {
   return filepath.SkipDir
  }
  switch filepath.Ext(d.Name()) {
  default:
   return nil
  case ".s", ".go":
   // check
  }

  f, err := os.Open(path)
  if err != nil {
   t.Error(err)
   return nil
  }
  defer f.Close()
  n, err := f.Read(buf)
  if err != nil && err != io.EOF {
   t.Error(err)
   return nil
  }
  b := buf[:n]
  if bytes.Contains(b, copyright) {
   return nil
  }
  for _, ok := range permitted {
   if bytes.HasPrefix(b, ok) {
    return nil
   }
  }
  t.Errorf("%s: missing copyright notice", path)
  return nil
 })
}
```

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pkgname=perl-bsd-resource
pkgver=1.2911
pkgrel=10
#_pkgreal is used by apkbuild-cpan to find modules at MetaCpan
_pkgreal=BSD-Resource
pkgdesc="Perl extension implements the BSD process resource limit functions"
url="https://metacpan.org/release/BSD-Resource/"
arch="all"
```

```
license="Artistic-2.0 OR LGPL-2.0"
depends="perl"
makedepends="perl-dev"
subpackages="$pkgname-doc"
source="https://cpan.metacpan.org/authors/id/J/JH/JHI/BSD-Resource-$pkgver.tar.gz"
builddir="$srcdir/$_pkgreal-$pkgver"

build() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 PERL_MM_USE_DEFAULT=1 perl -I. Makefile.PL \
  INSTALLDIRS=vendor \
  NO_PACKLIST=1 \
  NO_PERLLOCAL=1
 make
}

check() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 make test
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="
d0032d41c7c0468ed1c6d8f57b885f6cb97a5039d754c8cb60b2067daedaf53bd15fb6561a3d0f828df16dfa5417f663b
8065ba65f4fea16dc9262728b3b6b85
  BSD-Resource-1.2911.tar.gz
"
# Contributor: Maxim Karasev <begs@disroot.org>
# Maintainer: mio <miyopan@e.email>
pkgname=bsd-games
pkgver=3.3
pkgrel=2
pkgdesc="traditional text mode games from BSD"
url="https://bsd-games.sourceforge.io/"
arch="all"
license="BSD-3-Clause"
install="$pkgname.post-install"
makedepends="ncurses-dev coreutils" # configure causes busybox expr error
subpackages="$pkgname-doc"
source="https://sourceforge.net/projects/bsd-games/files/bsd-games-$pkgver.tar.gz
 0001-bsd-games-scores-dir.patch
 "
options="!check" # no tests

build() {
```

```
 # some GNU autoconf options are ignored, but it works
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr \
  --sysconfdir=/etc \
  --mandir=/usr/share/man \
  --scoredir=/usr/share/$pkgname
 make
}

package() {
 make DESTDIR="$pkgdir" install
 install -Dm644 LICENSE "$pkgdir"/usr/share/licenses/bsd-games/LICENSE
}

sha512sums="
aaf36d09d4fe68514a5c279063d7e77a9a9a84c447037cba974b29faa07eb80c2aab2379d0699c196b5c27ffe1b2bb2c6
8d3390143e0e62d5e3d210ccfb61294
  bsd-games-3.3.tar.gz
e1def0d4835a877242c4173fae862e278a7858738e0bacacbb045a42bcabec2aa7c72d000bbd2421ce35fe66cdc1f52c0
577b7e278029ca5ed50f7aab22319f6  0001-bsd-games-scores-dir.patch
"
```

Vintage Dreams Waves v 2.0. for Creative Labs' AWE Soundcards
(EMU Soundfont 2 Format)

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# Maintainer: Kevin Daudt <kdaudt@alpinelinux.org>
pkgname=spdx-licenses
pkgver=3.24.0
pkgrel=0
pkgdesc="Various data formats for the SPDX License List"
url="https://spdx.org/"
arch="noarch"
options="!check" # no test suite
license="CC-BY-3.0"
source="license-list-data-$pkgver.tar.gz::https://github.com/spdx/license-list-data/archive/v$pkgver.tar.gz"
builddir="$srcdir/license-list-data-$pkgver"
subpackages="$pkgname-list"

_types="html json rdfa rdfnt rdfturtle rdfxml template text"

for type in $_types; do
 subpackages="$subpackages $pkgname-$type:_subpkg"
done

package() {
 mkdir -p "$pkgdir"
}

_subpkg() {
 local type=${subpkgname/$pkgname-/}
 pkgdesc="$pkgdesc ($type)"
 install_if="$pkgname=$pkgver-r$pkgrel"
 mkdir -p "$subpkgdir"/usr/share/spdx
 cp -r "$builddir"/$type "$subpkgdir"/usr/share/spdx/
```

```
}

list() {
 pkgdesc="$pkgdesc (licence list)"
 mkdir -p "$subpkgdir"/usr/share/spdx
 local i; for i in "$builddir"/text/*.txt;
 do
  local license=${i##*/}
  echo ${license%.*} >> "$subpkgdir"/usr/share/spdx/license.lst
 done
}

sha512sums="
6eb81424e1b3173dbd8e17859b2e15dfe1c2af8f4da59b7dad0729c038a4cbdba95c34c2c546285fcdbbd41562e39575e
6a6ebb9463b70121e0a12b99d1307e7  license-list-data-3.24.0.tar.gz
"
mini_sendmail - accept email on behalf of real sendmail

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SUCH DAMAGE.
# Maintainer: Natanael Copa <ncopa@alpinelinux.org>
pkgname=libart-lgpl
pkgver=2.3.21
pkgrel=8
pkgdesc="A library for high-performance 2D graphics"
url="https://www.levien.com/libart/"
```

```
arch="all"
options="!check"  # No test suite.
license="LGPL-2.0-or-later"
subpackages="$pkgname-dev"
source="https://download.gnome.org/sources/libart_lgpl/2.3/libart_lgpl-$pkgver.tar.bz2
 "

builddir="$srcdir"/libart_lgpl-$pkgver

prepare() {
 update_config_sub
 default_prepare
}

build() {
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr
 make
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="8a632a6a4da59e5e8c02ec2f5a57e36d182b325b46513765425e5f171ff9ae326af1b133725beba28f7e7
6654309e001aee9bace727b5b4c8589405256a3c020  libart_lgpl-2.3.21.tar.bz2"
# Contributor: Patrycja Rosa <alpine@ptrcnull.me>
# Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=bsd-compat-headers
pkgver=0.7.2
pkgrel=6
pkgdesc="BSD compatibility headers (cdefs, queue, tree)"
url="https://gitlab.alpinelinux.org/alpine/aports"
arch="noarch"
license="BSD-2-Clause AND BSD-3-Clause"
source="
 cdefs.h
 queue.h
 tree.h
"
builddir="$srcdir"
options="!check" # just headers

package() {
 mkdir -p "$pkgdir"
 install -Dm644 -t "$pkgdir"/usr/include/sys \
```

```
  cdefs.h queue.h tree.h
}
sha512sums="
37c8fc73c7aea7b490f7850927e2bb91d12137c9e59e22c084146d515696dbc7973b5de92f4c987ba080dd2502ba8312
7006442c3f019b6447a620c0cae73178  cdefs.h
2f0d5e6e4dc3350285cf17009265dddcbe12431c111868eea39bc8cb038ab7c1f2acacbb21735c4e9d4a1fd106a8fc0f86
11ea33987d4faba37dde5ce6da0750  queue.h
d9ac210d81feb8ad2655bc80fb065d3fe20ae4417b32b4a1711e6738a4870140005c13373b5d1846ef3ce5ae6da45f2da
cef2092881eded0a2e94f6a07752ef3  tree.h
"
```

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The X-Spline code was written Carole Blanc (blanc@labri.u-bordeaux.fr) and Christophe Schlick (schlick@labri.u-bordeaux.fr) starting from an initial implementation done by C. Feuille, S. Grosbois, L. Maziere and L. Minihot as a student practice (Universite Bordeaux, France). For additional information about X-splines, see:
"X-Splines: A Spline Model Designed for the End User" by C. Blanc and C. Schlick, Proceedings of SIGGRAPH'95
http://dept-info.labri.u-bordeaux.fr/~schlick/DOC/sig1.html

```
/* $NetBSD: queue.h,v 1.70 2015/11/02 15:21:23 christos Exp $ */

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*
* @(#)queue.h 8.5 (Berkeley) 8/20/94
*/

#ifndef _SYS_QUEUE_H_
#define _SYS_QUEUE_H_

/*
* This file defines five types of data structures: singly-linked lists,
* lists, simple queues, tail queues, and circular queues.
*
* A singly-linked list is headed by a single forward pointer. The
* elements are singly linked for minimum space and
 pointer manipulation
* overhead at the expense of O(n) removal for arbitrary elements. New
* elements can be added to the list after an existing element or at the
* head of the list.  Elements being removed from the head of the list
* should use the explicit macro for this purpose for optimum
* efficiency. A singly-linked list may only be traversed in the forward
* direction.  Singly-linked lists are ideal for applications with large
* datasets and few or no removals or for implementing a LIFO queue.
*
* A list is headed by a single forward pointer (or an array of forward
* pointers for a hash table header). The elements are doubly linked
* so that an arbitrary element can be removed without a need to
* traverse the list. New elements can be added to the list before
* or after an existing element or at the head of the list. A list
```

```
* may only be traversed in the forward direction.
*
* A simple queue is headed by a pair of pointers, one the head of the
* list and the
 other to the tail of the list. The elements are singly
* linked to save space, so elements can only be removed from the
* head of the list. New elements can be added to the list after
* an existing element, at the head of the list, or at the end of the
* list. A simple queue may only be traversed in the forward direction.
*
* A tail queue is headed by a pair of pointers, one to the head of the
* list and the other to the tail of the list. The elements are doubly
* linked so that an arbitrary element can be removed without a need to
* traverse the list. New elements can be added to the list before or
* after an existing element, at the head of the list, or at the end of
* the list. A tail queue may be traversed in either direction.
*
* A circle queue is headed by a pair of pointers, one to the head of the
* list and the other to the tail of the list. The elements are doubly
* linked so that an arbitrary element can be removed without a need to
* traverse the list. New elements
 can be added to the list before or after
* an existing element, at the head of the list, or at the end of the list.
* A circle queue may be traversed in either direction, but has a more
* complex end of list detection.
*
* For details on the use of these macros, see the queue(3) manual page.
*/

/*
* Include the definition of NULL only on NetBSD because sys/null.h
* is not available elsewhere.  This conditional makes the header
* portable and it can simply be dropped verbatim into any system.
* The caveat is that on other systems some other header
* must provide NULL before the macros can be used.
*/
#ifdef __NetBSD__
#include <sys/null.h>
#endif

#if defined(QUEUEDEBUG)
# if defined(_KERNEL)
#  define QUEUEDEBUG_ABORT(...) panic(__VA_ARGS__)
# else
#  include <err.h>
#  define QUEUEDEBUG_ABORT(...) err(1, __VA_ARGS__)
# endif
#endif
```

```
/*
* Singly-linked List definitions.
*/
#define SLIST_HEAD(name, type)      \
struct name {        \
 struct type *slh_first; /* first
 element */   \
}

#define SLIST_HEAD_INITIALIZER(head)     \
 { NULL }

#define SLIST_ENTRY(type)      \
struct {        \
 struct type *sle_next; /* next element */   \
}

/*
* Singly-linked List access methods.
*/
#define SLIST_FIRST(head) ((head)->slh_first)
#define SLIST_END(head)  NULL
#define SLIST_EMPTY(head) ((head)->slh_first == NULL)
#define SLIST_NEXT(elm, field) ((elm)->field.sle_next)

#define SLIST_FOREACH(var, head, field)     \
 for((var) = (head)->slh_first;     \
     (var) != SLIST_END(head);     \
     (var) = (var)->field.sle_next)

#define SLIST_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = SLIST_FIRST((head));    \
     (var) != SLIST_END(head) &&     \
     ((tvar) = SLIST_NEXT((var), field), 1);   \
     (var) = (tvar))

/*
* Singly-linked List functions.
*/
#define SLIST_INIT(head) do {      \
 (head)->slh_first = SLIST_END(head);    \
} while (/*CONSTCOND*/0)

#define SLIST_INSERT_AFTER(slistelm, elm, field) do {   \
 (elm)->field.sle_next = (slistelm)->field.sle_next;  \
 (slistelm)->field.sle_next
```

```
 = (elm);    \
} while (/*CONSTCOND*/0)

#define SLIST_INSERT_HEAD(head, elm, field) do {   \
 (elm)->field.sle_next = (head)->slh_first;   \
 (head)->slh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE_AFTER(slistelm, field) do {   \
 (slistelm)->field.sle_next =     \
     SLIST_NEXT(SLIST_NEXT((slistelm), field), field);  \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE_HEAD(head, field) do {    \
 (head)->slh_first = (head)->slh_first->field.sle_next;  \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE(head, elm, type, field) do {   \
 if ((head)->slh_first == (elm)) {    \
  SLIST_REMOVE_HEAD((head), field);   \
 }        \
 else {        \
  struct type *curelm = (head)->slh_first;  \
  while(curelm->field.sle_next != (elm))   \
   curelm = curelm->field.sle_next;  \
  curelm->field.sle_next =    \
      curelm->field.sle_next->field.sle_next;  \
 }        \
} while (/*CONSTCOND*/0)


/*
* List definitions.
 */
#define LIST_HEAD(name, type)      \
struct name {        \
 struct type *lh_first; /* first element */   \
}

#define LIST_HEAD_INITIALIZER(head)     \
 { NULL }

#define LIST_ENTRY(type)      \
struct {        \
 struct type *le_next; /* next element */   \
 struct type **le_prev; /* address of previous next element */ \
}
```

```
/*
* List access methods.
*/
#define LIST_FIRST(head)  ((head)->lh_first)
#define LIST_END(head)   NULL
#define LIST_EMPTY(head)  ((head)->lh_first == LIST_END(head))
#define LIST_NEXT(elm, field)  ((elm)->field.le_next)

#define LIST_FOREACH(var, head, field)     \
 for ((var) = ((head)->lh_first);    \
     (var) != LIST_END(head);     \
     (var) = ((var)->field.le_next))

#define LIST_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = LIST_FIRST((head));    \
     (var) != LIST_END(head) &&     \
     ((tvar) = LIST_NEXT((var), field), 1);   \
     (var) = (tvar))

#define LIST_MOVE(head1, head2) do {     \
 LIST_INIT((head2));      \
 if (!LIST_EMPTY((head1)))
 {     \
  (head2)->lh_first = (head1)->lh_first;   \
  LIST_INIT((head1));     \
 }        \
} while (/*CONSTCOND*/0)

/*
* List functions.
*/
#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_LIST_INSERT_HEAD(head, elm, field)   \
 if ((head)->lh_first &&      \
     (head)->lh_first->field.le_prev != &(head)->lh_first) \
  QUEUEDEBUG_ABORT("LIST_INSERT_HEAD %p %s:%d", (head), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_LIST_OP(elm, field)     \
 if ((elm)->field.le_next &&     \
     (elm)->field.le_next->field.le_prev !=   \
     &(elm)->field.le_next)     \
  QUEUEDEBUG_ABORT("LIST_* forw %p %s:%d", (elm),  \
      __FILE__, __LINE__);    \
 if (*(elm)->field.le_prev != (elm))    \
  QUEUEDEBUG_ABORT("LIST_* back %p %s:%d", (elm),  \
      __FILE__, __LINE__);
#define QUEUEDEBUG_LIST_POSTREMOVE(elm, field)    \
 (elm)->field.le_next = (void *)1L;    \
```

```
 (elm)->field.le_prev = (void *)1L;
#else
#define QUEUEDEBUG_LIST_INSERT_HEAD(head, elm, field)
#define QUEUEDEBUG_LIST_OP(elm,
 field)
#define QUEUEDEBUG_LIST_POSTREMOVE(elm, field)
#endif

#define LIST_INIT(head) do {      \
 (head)->lh_first = LIST_END(head);    \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_AFTER(listelm, elm, field) do {   \
 QUEUEDEBUG_LIST_OP((listelm), field)    \
 if (((elm)->field.le_next = (listelm)->field.le_next) !=  \
     LIST_END(head))      \
  (listelm)->field.le_next->field.le_prev =  \
      &(elm)->field.le_next;    \
 (listelm)->field.le_next = (elm);    \
 (elm)->field.le_prev = &(listelm)->field.le_next;  \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_BEFORE(listelm, elm, field) do {   \
 QUEUEDEBUG_LIST_OP((listelm), field)    \
 (elm)->field.le_prev = (listelm)->field.le_prev;  \
 (elm)->field.le_next = (listelm);    \
 *(listelm)->field.le_prev = (elm);    \
 (listelm)->field.le_prev = &(elm)->field.le_next;  \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_HEAD(head, elm, field) do {    \
 QUEUEDEBUG_LIST_INSERT_HEAD((head), (elm), field)  \
 if (((elm)->field.le_next
 = (head)->lh_first) != LIST_END(head))\
  (head)->lh_first->field.le_prev = &(elm)->field.le_next;\
 (head)->lh_first = (elm);     \
 (elm)->field.le_prev = &(head)->lh_first;   \
} while (/*CONSTCOND*/0)

#define LIST_REMOVE(elm, field) do {     \
 QUEUEDEBUG_LIST_OP((elm), field)    \
 if ((elm)->field.le_next != NULL)    \
  (elm)->field.le_next->field.le_prev =    \
      (elm)->field.le_prev;    \
 *(elm)->field.le_prev = (elm)->field.le_next;   \
 QUEUEDEBUG_LIST_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)
```

```
#define LIST_REPLACE(elm, elm2, field) do {    \
 if (((elm2)->field.le_next = (elm)->field.le_next) != NULL) \
  (elm2)->field.le_next->field.le_prev =   \
      &(elm2)->field.le_next;    \
 (elm2)->field.le_prev = (elm)->field.le_prev;   \
 *(elm2)->field.le_prev = (elm2);    \
 QUEUEDEBUG_LIST_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

/*
* Simple queue definitions.
*/
#define SIMPLEQ_HEAD(name, type)     \
struct name {        \
 struct
 type *sqh_first; /* first element */   \
 struct type **sqh_last; /* addr of last next element */  \
}

#define SIMPLEQ_HEAD_INITIALIZER(head)     \
 { NULL, &(head).sqh_first }

#define SIMPLEQ_ENTRY(type)      \
struct {        \
 struct type *sqe_next; /* next element */   \
}

/*
* Simple queue access methods.
*/
#define SIMPLEQ_FIRST(head)  ((head)->sqh_first)
#define SIMPLEQ_END(head)  NULL
#define SIMPLEQ_EMPTY(head)  ((head)->sqh_first == SIMPLEQ_END(head))
#define SIMPLEQ_NEXT(elm, field) ((elm)->field.sqe_next)

#define SIMPLEQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->sqh_first);    \
     (var) != SIMPLEQ_END(head);     \
     (var) = ((var)->field.sqe_next))

#define SIMPLEQ_FOREACH_SAFE(var, head, field, next)   \
 for ((var) = ((head)->sqh_first);    \
     (var) != SIMPLEQ_END(head) &&    \
     ((next = ((var)->field.sqe_next)), 1);   \
     (var) = (next))

/*
* Simple queue functions.
```

```
*/
#define SIMPLEQ_INIT(head) do {      \
 (head)->sqh_first = NULL;     \
 (head)->sqh_last
 = &(head)->sqh_first;    \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_HEAD(head, elm, field) do {   \
 if (((elm)->field.sqe_next = (head)->sqh_first) == NULL) \
  (head)->sqh_last = &(elm)->field.sqe_next;  \
 (head)->sqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_TAIL(head, elm, field) do {   \
 (elm)->field.sqe_next = NULL;     \
 *(head)->sqh_last = (elm);     \
 (head)->sqh_last = &(elm)->field.sqe_next;   \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 if (((elm)->field.sqe_next = (listelm)->field.sqe_next) == NULL)\
  (head)->sqh_last = &(elm)->field.sqe_next;  \
 (listelm)->field.sqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE_HEAD(head, field) do {    \
 if (((head)->sqh_first = (head)->sqh_first->field.sqe_next) == NULL) \
  (head)->sqh_last = &(head)->sqh_first;   \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE_AFTER(head, elm, field) do {   \
 if
 (((elm)->field.sqe_next = (elm)->field.sqe_next->field.sqe_next) \
     == NULL)       \
  (head)->sqh_last = &(elm)->field.sqe_next;  \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE(head, elm, type, field) do {   \
 if ((head)->sqh_first == (elm)) {    \
  SIMPLEQ_REMOVE_HEAD((head), field);   \
 } else {       \
  struct type *curelm = (head)->sqh_first;  \
  while (curelm->field.sqe_next != (elm))   \
   curelm = curelm->field.sqe_next;  \
  if ((curelm->field.sqe_next =    \
   curelm->field.sqe_next->field.sqe_next) == NULL) \
       (head)->sqh_last = &(curelm)->field.sqe_next; \
 }        \
```

```
} while (/*CONSTCOND*/0)

#define SIMPLEQ_CONCAT(head1, head2) do {    \
 if (!SIMPLEQ_EMPTY((head2))) {     \
  *(head1)->sqh_last = (head2)->sqh_first;  \
  (head1)->sqh_last = (head2)->sqh_last;  \
  SIMPLEQ_INIT((head2));     \
 }        \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_LAST(head, type, field)     \
 (SIMPLEQ_EMPTY((head)) ?      \
  NULL :       \
        ((struct type
 *)(void *)    \
  ((char *)((head)->sqh_last) - offsetof(struct type, field))))

/*
* Tail queue definitions.
*/
#define _TAILQ_HEAD(name, type, qual)     \
struct name {        \
 qual type *tqh_first;  /* first element */  \
 qual type *qual *tqh_last; /* addr of last next element */ \
}
#define TAILQ_HEAD(name, type) _TAILQ_HEAD(name, struct type,)

#define TAILQ_HEAD_INITIALIZER(head)     \
 { TAILQ_END(head), &(head).tqh_first }

#define _TAILQ_ENTRY(type, qual)     \
struct {        \
 qual type *tqe_next;  /* next element */  \
 qual type *qual *tqe_prev; /* address of previous next element */\
}
#define TAILQ_ENTRY(type) _TAILQ_ENTRY(struct type,)

/*
* Tail queue access methods.
*/
#define TAILQ_FIRST(head)  ((head)->tqh_first)
#define TAILQ_END(head)   (NULL)
#define TAILQ_NEXT(elm, field)  ((elm)->field.tqe_next)
#define TAILQ_LAST(head, headname) \
 (*(((struct headname *)(void *)((head)->tqh_last))->tqh_last))
#define TAILQ_PREV(elm, headname, field) \
 (*(((struct headname
```

```
 *)(void *)((elm)->field.tqe_prev))->tqh_last))
#define TAILQ_EMPTY(head)  (TAILQ_FIRST(head) == TAILQ_END(head))


#define TAILQ_FOREACH(var, head, field)     \
 for ((var) = ((head)->tqh_first);    \
     (var) != TAILQ_END(head);     \
     (var) = ((var)->field.tqe_next))

#define TAILQ_FOREACH_SAFE(var, head, field, next)   \
 for ((var) = ((head)->tqh_first);    \
     (var) != TAILQ_END(head) &&     \
     ((next) = TAILQ_NEXT(var, field), 1); (var) = (next))

#define TAILQ_FOREACH_REVERSE(var, head, headname, field)  \
 for ((var) = TAILQ_LAST((head), headname);   \
     (var) != TAILQ_END(head);     \
     (var) = TAILQ_PREV((var), headname, field))

#define TAILQ_FOREACH_REVERSE_SAFE(var, head, headname, field, prev) \
 for ((var) = TAILQ_LAST((head), headname);   \
     (var) != TAILQ_END(head) &&     \
     ((prev) = TAILQ_PREV((var), headname, field), 1); (var) = (prev))

/*
* Tail queue functions.
*/
#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_TAILQ_INSERT_HEAD(head,
 elm, field)   \
 if ((head)->tqh_first &&     \
     (head)->tqh_first->field.tqe_prev != &(head)->tqh_first) \
  QUEUEDEBUG_ABORT("TAILQ_INSERT_HEAD %p %s:%d", (head), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_INSERT_TAIL(head, elm, field)   \
 if (*(head)->tqh_last != NULL)     \
  QUEUEDEBUG_ABORT("TAILQ_INSERT_TAIL %p %s:%d", (head), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_OP(elm, field)     \
 if ((elm)->field.tqe_next &&     \
     (elm)->field.tqe_next->field.tqe_prev !=   \
     &(elm)->field.tqe_next)     \
  QUEUEDEBUG_ABORT("TAILQ_* forw %p %s:%d", (elm), \
      __FILE__, __LINE__);    \
 if (*(elm)->field.tqe_prev != (elm))    \
  QUEUEDEBUG_ABORT("TAILQ_* back %p %s:%d", (elm), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_PREREMOVE(head, elm, field)   \
```

```
 if ((elm)->field.tqe_next == NULL &&    \
     (head)->tqh_last != &(elm)->field.tqe_next)   \
  QUEUEDEBUG_ABORT("TAILQ_PREREMOVE head %p elm %p %s:%d",\
      (head), (elm), __FILE__,
 __LINE__);
#define QUEUEDEBUG_TAILQ_POSTREMOVE(elm, field)    \
 (elm)->field.tqe_next = (void *)1L;    \
 (elm)->field.tqe_prev = (void *)1L;
#else
#define QUEUEDEBUG_TAILQ_INSERT_HEAD(head, elm, field)
#define QUEUEDEBUG_TAILQ_INSERT_TAIL(head, elm, field)
#define QUEUEDEBUG_TAILQ_OP(elm, field)
#define QUEUEDEBUG_TAILQ_PREREMOVE(head, elm, field)
#define QUEUEDEBUG_TAILQ_POSTREMOVE(elm, field)
#endif

#define TAILQ_INIT(head) do {      \
 (head)->tqh_first = TAILQ_END(head);    \
 (head)->tqh_last = &(head)->tqh_first;    \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_HEAD(head, elm, field) do {   \
 QUEUEDEBUG_TAILQ_INSERT_HEAD((head), (elm), field)  \
 if (((elm)->field.tqe_next = (head)->tqh_first) != TAILQ_END(head))\
  (head)->tqh_first->field.tqe_prev =   \
      &(elm)->field.tqe_next;    \
 else       \
  (head)->tqh_last = &(elm)->field.tqe_next;  \
 (head)->tqh_first = (elm);     \
 (elm)->field.tqe_prev = &(head)->tqh_first;   \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_TAIL(head,
 elm, field) do {   \
 QUEUEDEBUG_TAILQ_INSERT_TAIL((head), (elm), field)  \
 (elm)->field.tqe_next = TAILQ_END(head);   \
 (elm)->field.tqe_prev = (head)->tqh_last;   \
 *(head)->tqh_last = (elm);     \
 (head)->tqh_last = &(elm)->field.tqe_next;   \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 QUEUEDEBUG_TAILQ_OP((listelm), field)    \
 if (((elm)->field.tqe_next = (listelm)->field.tqe_next) !=  \
     TAILQ_END(head))      \
  (elm)->field.tqe_next->field.tqe_prev =   \
      &(elm)->field.tqe_next;    \
 else       \
```

```
 (head)->tqh_last = &(elm)->field.tqe_next;  \
(listelm)->field.tqe_next = (elm);    \
(elm)->field.tqe_prev = &(listelm)->field.tqe_next;  \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_BEFORE(listelm, elm, field) do {   \
 QUEUEDEBUG_TAILQ_OP((listelm), field)    \
 (elm)->field.tqe_prev = (listelm)->field.tqe_prev;  \
 (elm)->field.tqe_next = (listelm);    \
 *(listelm)->field.tqe_prev = (elm);    \
 (listelm)->field.tqe_prev
 = &(elm)->field.tqe_next;  \
} while (/*CONSTCOND*/0)

#define TAILQ_REMOVE(head, elm, field) do {    \
 QUEUEDEBUG_TAILQ_PREREMOVE((head), (elm), field)  \
 QUEUEDEBUG_TAILQ_OP((elm), field)    \
 if (((elm)->field.tqe_next) != TAILQ_END(head))   \
  (elm)->field.tqe_next->field.tqe_prev =   \
     (elm)->field.tqe_prev;    \
 else       \
  (head)->tqh_last = (elm)->field.tqe_prev;  \
 *(elm)->field.tqe_prev = (elm)->field.tqe_next;   \
 QUEUEDEBUG_TAILQ_POSTREMOVE((elm), field);   \
} while (/*CONSTCOND*/0)

#define TAILQ_REPLACE(head, elm, elm2, field) do {   \
      if (((elm2)->field.tqe_next = (elm)->field.tqe_next) !=  \
    TAILQ_END(head))        \
            (elm2)->field.tqe_next->field.tqe_prev =  \
               &(elm2)->field.tqe_next;    \
      else       \
            (head)->tqh_last = &(elm2)->field.tqe_next;  \
      (elm2)->field.tqe_prev = (elm)->field.tqe_prev;   \
      *(elm2)->field.tqe_prev = (elm2);    \
 QUEUEDEBUG_TAILQ_POSTREMOVE((elm),
 field);   \
} while (/*CONSTCOND*/0)

#define TAILQ_CONCAT(head1, head2, field) do {    \
 if (!TAILQ_EMPTY(head2)) {     \
  *(head1)->tqh_last = (head2)->tqh_first;  \
  (head2)->tqh_first->field.tqe_prev = (head1)->tqh_last; \
  (head1)->tqh_last = (head2)->tqh_last;   \
  TAILQ_INIT((head2));     \
 }       \
} while (/*CONSTCOND*/0)
```

```
/*
* Singly-linked Tail queue declarations.
*/
#define STAILQ_HEAD(name, type)      \
struct name {        \
 struct type *stqh_first; /* first element */  \
 struct type **stqh_last; /* addr of last next element */ \
}

#define STAILQ_HEAD_INITIALIZER(head)     \
 { NULL, &(head).stqh_first }

#define STAILQ_ENTRY(type)      \
struct {        \
 struct type *stqe_next; /* next element */   \
}

/*
* Singly-linked Tail queue access methods.
*/
#define STAILQ_FIRST(head) ((head)->stqh_first)
#define STAILQ_END(head) NULL
#define STAILQ_NEXT(elm, field) ((elm)->field.stqe_next)
#define STAILQ_EMPTY(head) (STAILQ_FIRST(head)
 == STAILQ_END(head))

/*
* Singly-linked Tail queue functions.
*/
#define STAILQ_INIT(head) do {      \
 (head)->stqh_first = NULL;     \
 (head)->stqh_last = &(head)->stqh_first;    \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_HEAD(head, elm, field) do {   \
 if (((elm)->field.stqe_next = (head)->stqh_first) == NULL) \
  (head)->stqh_last = &(elm)->field.stqe_next;  \
 (head)->stqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_TAIL(head, elm, field) do {   \
 (elm)->field.stqe_next = NULL;     \
 *(head)->stqh_last = (elm);     \
 (head)->stqh_last = &(elm)->field.stqe_next;   \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 if (((elm)->field.stqe_next = (listelm)->field.stqe_next) == NULL)\
```

```
  (head)->stqh_last = &(elm)->field.stqe_next;  \
 (listelm)->field.stqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define STAILQ_REMOVE_HEAD(head, field) do {    \
 if (((head)->stqh_first = (head)->stqh_first->field.stqe_next)
 == NULL) \
  (head)->stqh_last = &(head)->stqh_first;   \
} while (/*CONSTCOND*/0)

#define STAILQ_REMOVE(head, elm, type, field) do {   \
 if ((head)->stqh_first == (elm)) {    \
  STAILQ_REMOVE_HEAD((head), field);   \
 } else {       \
  struct type *curelm = (head)->stqh_first;  \
  while (curelm->field.stqe_next != (elm))   \
   curelm = curelm->field.stqe_next;  \
  if ((curelm->field.stqe_next =    \
   curelm->field.stqe_next->field.stqe_next) == NULL) \
       (head)->stqh_last = &(curelm)->field.stqe_next; \
 }        \
} while (/*CONSTCOND*/0)

#define STAILQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->stqh_first);    \
  (var);       \
  (var) = ((var)->field.stqe_next))

#define STAILQ_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = STAILQ_FIRST((head));    \
     (var) && ((tvar) = STAILQ_NEXT((var), field), 1);  \
     (var) = (tvar))

#define STAILQ_CONCAT(head1, head2) do {    \
 if (!STAILQ_EMPTY((head2))) {     \
  *(head1)->stqh_last
 = (head2)->stqh_first;  \
  (head1)->stqh_last = (head2)->stqh_last;  \
  STAILQ_INIT((head2));     \
 }        \
} while (/*CONSTCOND*/0)

#define STAILQ_LAST(head, type, field)     \
 (STAILQ_EMPTY((head)) ?      \
  NULL :       \
        ((struct type *)(void *)    \
  ((char *)((head)->stqh_last) - offsetof(struct type, field))))
```

```
#ifndef _KERNEL
/*
* Circular queue definitions. Do not use. We still keep the macros
* for compatibility but because of pointer aliasing issues their use
* is discouraged!
*/

/*
* __launder_type():  We use this ugly hack to work around the the compiler
* noticing that two types may not alias each other and elide tests in code.
* We hit this in the CIRCLEQ macros when comparing 'struct name *' and
* 'struct type *' (see CIRCLEQ_HEAD()).  Modern compilers (such as GCC
* 4.8) declare these comparisons as always false, causing the code to
* not run as designed.
*
* This hack is only to be used for comparisons and thus can be fully const.
 * Do not use for assignment.
*
* If we ever choose to change the ABI of the CIRCLEQ macros, we could fix
* this by changing the head/tail sentinal values, but see the note above
* this one.
*/
static __inline const void * __launder_type(const void *);
static __inline const void *
__launder_type(const void *__x)
{
 __asm __volatile("" : "+r" (__x));
 return __x;
}

#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_CIRCLEQ_HEAD(head, field)    \
 if ((head)->cqh_first != CIRCLEQ_ENDC(head) &&   \
     (head)->cqh_first->field.cqe_prev != CIRCLEQ_ENDC(head)) \
  QUEUEDEBUG_ABORT("CIRCLEQ head forw %p %s:%d", (head), \
        __FILE__, __LINE__);    \
 if ((head)->cqh_last != CIRCLEQ_ENDC(head) &&   \
     (head)->cqh_last->field.cqe_next != CIRCLEQ_ENDC(head)) \
  QUEUEDEBUG_ABORT("CIRCLEQ head back %p %s:%d", (head), \
        __FILE__, __LINE__);
#define QUEUEDEBUG_CIRCLEQ_ELM(head, elm, field)   \
 if ((elm)->field.cqe_next == CIRCLEQ_ENDC(head)) {  \
  if ((head)->cqh_last != (elm))    \
   QUEUEDEBUG_ABORT("CIRCLEQ
 elm last %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 } else {       \
```

```
 if ((elm)->field.cqe_next->field.cqe_prev != (elm)) \
  QUEUEDEBUG_ABORT("CIRCLEQ elm forw %p %s:%d", \
      (elm), __FILE__, __LINE__);   \
 }       \
 if ((elm)->field.cqe_prev == CIRCLEQ_ENDC(head)) {  \
  if ((head)->cqh_first != (elm))    \
  QUEUEDEBUG_ABORT("CIRCLEQ elm first %p %s:%d", \
      (elm), __FILE__, __LINE__);   \
 } else {      \
  if ((elm)->field.cqe_prev->field.cqe_next != (elm)) \
  QUEUEDEBUG_ABORT("CIRCLEQ elm prev %p %s:%d", \
      (elm), __FILE__, __LINE__);   \
 }
#define QUEUEDEBUG_CIRCLEQ_POSTREMOVE(elm, field)   \
 (elm)->field.cqe_next = (void *)1L;    \
 (elm)->field.cqe_prev = (void *)1L;
#else
#define QUEUEDEBUG_CIRCLEQ_HEAD(head, field)
#define QUEUEDEBUG_CIRCLEQ_ELM(head, elm, field)
#define QUEUEDEBUG_CIRCLEQ_POSTREMOVE(elm, field)
#endif

#define CIRCLEQ_HEAD(name, type)     \
struct name {       \
 struct type *cqh_first;  /*
 first element */  \
 struct type *cqh_last;  /* last element */  \
}

#define CIRCLEQ_HEAD_INITIALIZER(head)     \
 { CIRCLEQ_END(&head), CIRCLEQ_END(&head) }

#define CIRCLEQ_ENTRY(type)      \
struct {       \
 struct type *cqe_next;  /* next element */  \
 struct type *cqe_prev;  /* previous element */  \
}

/*
* Circular queue functions.
*/
#define CIRCLEQ_INIT(head) do {      \
 (head)->cqh_first = CIRCLEQ_END(head);    \
 (head)->cqh_last = CIRCLEQ_END(head);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
```

```
 QUEUEDEBUG_CIRCLEQ_ELM((head), (listelm), field)  \
 (elm)->field.cqe_next = (listelm)->field.cqe_next;  \
 (elm)->field.cqe_prev = (listelm);    \
 if ((listelm)->field.cqe_next == CIRCLEQ_ENDC(head))  \
  (head)->cqh_last = (elm);    \
 else       \
  (listelm)->field.cqe_next->field.cqe_prev = (elm); \
 (listelm)->field.cqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_BEFORE(head,
 listelm, elm, field) do {  \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (listelm), field)  \
 (elm)->field.cqe_next = (listelm);    \
 (elm)->field.cqe_prev = (listelm)->field.cqe_prev;  \
 if ((listelm)->field.cqe_prev == CIRCLEQ_ENDC(head))  \
  (head)->cqh_first = (elm);    \
 else       \
  (listelm)->field.cqe_prev->field.cqe_next = (elm); \
 (listelm)->field.cqe_prev = (elm);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_HEAD(head, elm, field) do {   \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 (elm)->field.cqe_next = (head)->cqh_first;   \
 (elm)->field.cqe_prev = CIRCLEQ_END(head);   \
 if ((head)->cqh_last == CIRCLEQ_ENDC(head))   \
  (head)->cqh_last = (elm);    \
 else       \
  (head)->cqh_first->field.cqe_prev = (elm);  \
 (head)->cqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_TAIL(head, elm, field) do {   \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 (elm)->field.cqe_next
 = CIRCLEQ_END(head);   \
 (elm)->field.cqe_prev = (head)->cqh_last;   \
 if ((head)->cqh_first == CIRCLEQ_ENDC(head))   \
  (head)->cqh_first = (elm);    \
 else       \
  (head)->cqh_last->field.cqe_next = (elm);  \
 (head)->cqh_last = (elm);     \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_REMOVE(head, elm, field) do {    \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
```

```
 QUEUEDEBUG_CIRCLEQ_ELM((head), (elm), field)   \
 if ((elm)->field.cqe_next == CIRCLEQ_ENDC(head))  \
  (head)->cqh_last = (elm)->field.cqe_prev;  \
 else       \
  (elm)->field.cqe_next->field.cqe_prev =   \
      (elm)->field.cqe_prev;    \
 if ((elm)->field.cqe_prev == CIRCLEQ_ENDC(head))  \
  (head)->cqh_first = (elm)->field.cqe_next;  \
 else       \
  (elm)->field.cqe_prev->field.cqe_next =   \
      (elm)->field.cqe_next;    \
 QUEUEDEBUG_CIRCLEQ_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->cqh_first);    \
  (var) != CIRCLEQ_ENDC(head);    \
  (var)
 = ((var)->field.cqe_next))

#define CIRCLEQ_FOREACH_REVERSE(var, head, field)   \
 for ((var) = ((head)->cqh_last);    \
  (var) != CIRCLEQ_ENDC(head);    \
  (var) = ((var)->field.cqe_prev))

/*
* Circular queue access methods.
*/
#define CIRCLEQ_FIRST(head)  ((head)->cqh_first)
#define CIRCLEQ_LAST(head)  ((head)->cqh_last)
/* For comparisons */
#define CIRCLEQ_ENDC(head)  (__launder_type(head))
/* For assignments */
#define CIRCLEQ_END(head)  ((void *)(head))
#define CIRCLEQ_NEXT(elm, field) ((elm)->field.cqe_next)
#define CIRCLEQ_PREV(elm, field) ((elm)->field.cqe_prev)
#define CIRCLEQ_EMPTY(head)      \
   (CIRCLEQ_FIRST(head) == CIRCLEQ_ENDC(head))

#define CIRCLEQ_LOOP_NEXT(head, elm, field)    \
 (((elm)->field.cqe_next == CIRCLEQ_ENDC(head))   \
     ? ((head)->cqh_first)     \
     : (elm->field.cqe_next))
#define CIRCLEQ_LOOP_PREV(head, elm, field)    \
 (((elm)->field.cqe_prev == CIRCLEQ_ENDC(head))   \
     ? ((head)->cqh_last)     \
     :
```

```
 (elm->field.cqe_prev))
#endif /* !_KERNEL */

#endif /* !_SYS_QUEUE_H_ */
#ifndef _SYS_CDEFS_H_
#define _SYS_CDEFS_H_

#warning usage of non-standard #include <sys/cdefs.h> is deprecated

#undef __P
#undef __PMT

#define __P(args) args
#define __PMT(args) args

#define __CONCAT(x,y) x ## y
#define __STRING(x) #x

#ifdef  __cplusplus
# define __BEGIN_DECLS extern "C" {
# define __END_DECLS }
#else
# define __BEGIN_DECLS
# define __END_DECLS
#endif

#if defined(__GNUC__) && !defined(__cplusplus)
# define __THROW __attribute__ ((__nothrow__))
# define __NTH(fct) __attribute__ ((__nothrow__)) fct
#else
# define __THROW
# define __NTH(fct)     fct
#endif

#endif /* _SYS_CDEFS_H_ */
# Contributor: Fabian Affolter <fabian@affolter-engineering.ch>
# Maintainer: Fabian Affolter <fabian@affolter-engineering.ch>
pkgname=py3-flake8-copyright
_pkgname=flake8-copyright
pkgver=0.2.4
pkgrel=3
pkgdesc="Extension for flake8 which checks for copyrights"
options="!check" # No testsuite
url="https://github.com/savoirfairelinux/flake8-copyright"
arch="noarch"
license="MIT"
depends="py3-flake8 py3-setuptools"
makedepends="py3-gpep517 py3-wheel"
```

```
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/${_pkgname:0:1}/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir"/$_pkgname-$pkgver

replaces="py-flake8-copyright"                  # Backwards compatibility
provides="py-flake8-copyright=$pkgver-r$pkgrel" # Backwards compatibility

build() {
 gpep517 build-wheel \
  --wheel-dir .dist \
  --output-fd 3 3>&1 >&2
}

package() {
 gpep517 install-wheel --destdir "$pkgdir" \
  .dist/*.whl
}

sha512sums="
a6ab47e1bb715618f075c51f398e18180404871b3b0faf1c2d30701d5203db6bc23771bf22ffb5bafcd8ee856b9b64237
b316bd503ae7dceed6ca284ccd5a74d
  flake8-copyright-0.2.4.tar.gz
"
# Maintainer: fossdd <fossdd@pwned.life>
pkgname=cargo-license
pkgver=0.6.1
pkgrel=1
pkgdesc="Cargo subcommand to see license of dependencies"
url="https://github.com/onur/cargo-license"
arch="all"
license="MIT"
makedepends="cargo cargo-auditable"
source="$pkgname-$pkgver.tar.gz::https://crates.io/api/v1/crates/cargo-license/$pkgver/download"

prepare() {
 default_prepare

 cargo fetch --target="$CTARGET" --locked
}

build() {
 cargo auditable build --release --frozen
}

check() {
 cargo test --frozen
}
```

```
package() {
 install -Dm755 target/release/cargo-license -t "$pkgdir"/usr/bin
}

sha512sums="
36215145e79965be090ae2f5ce6f5eb208465eb67a94c26bed1fe70a131c46c6dc35695e30852759b7366883fbc3caf00
272d796ac634f0a5e1d49232b6b29d5  cargo-license-0.6.1.tar.gz
"
/* $NetBSD: tree.h,v 1.20 2013/09/14 13:20:45 joerg Exp $ */
/* $OpenBSD: tree.h,v 1.13 2011/07/09 00:19:45 pirofti Exp $ */
/* Modified by Void Linux. */
/*
* Copyright 2002 Niels Provos <provos@citi.umich.edu>
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* NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE,
* DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY
* THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT
* (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF
* THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
*/

#ifndef _SYS_TREE_H_
#define _SYS_TREE_H_

#ifdef __GNUC__
#define __GNUC_PREREQ__(x, y)      \
 ((__GNUC__ == (x) && __GNUC_MINOR__ >= (y)) ||   \
  (__GNUC__ > (x)))
#else
#define __GNUC_PREREQ__(x, y) 0
#endif
```

```
#if __GNUC_PREREQ__(2, 7) || defined(__lint__)
#define _sys_tree_h_unused __attribute__((__unused__))
#else
#define _sys_tree_h_unused /* delete */
#endif

/*
* This file defines data structures for different types of trees:
* splay trees and red-black trees.
*
* A splay tree is a self-organizing
 data structure.  Every operation
* on the tree causes a splay to happen.  The splay moves the requested
* node to the root of the tree and partly rebalances it.
*
* This has the benefit that request locality causes faster lookups as
* the requested nodes move to the top of the tree.  On the other hand,
* every lookup causes memory writes.
*
* The Balance Theorem bounds the total access time for m operations
* and n inserts on an initially empty tree as O((m + n)lg n).  The
* amortized cost for a sequence of m accesses to a splay tree is O(lg n);
*
* A red-black tree is a binary search tree with the node color as an
* extra attribute.  It fulfills a set of conditions:
* - every search path from the root to a leaf consists of the
*   same number of black nodes,
* - each red node (except for the root) has a black parent,
* - each leaf node is black.
*
* Every operation on a red-black tree is bounded as O(lg n).
* The maximum height of a red-black tree is 2lg (n+1).
 */

#define SPLAY_HEAD(name, type)      \
struct name {        \
 struct type *sph_root; /* root of the tree */   \
}

#define SPLAY_INITIALIZER(root)      \
 { NULL }

#define SPLAY_INIT(root) do {      \
 (root)->sph_root = NULL;     \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ENTRY(type)      \
struct {        \
```

```
 struct type *spe_left; /* left element */   \
 struct type *spe_right; /* right element */   \
}

#define SPLAY_LEFT(elm, field)  (elm)->field.spe_left
#define SPLAY_RIGHT(elm, field)  (elm)->field.spe_right
#define SPLAY_ROOT(head)  (head)->sph_root
#define SPLAY_EMPTY(head)  (SPLAY_ROOT(head) == NULL)

/* SPLAY_ROTATE_{LEFT,RIGHT} expect that tmp hold SPLAY_{RIGHT,LEFT} */
#define SPLAY_ROTATE_RIGHT(head, tmp, field) do {   \
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(tmp, field); \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;      \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ROTATE_LEFT(head, tmp, field) do {   \
 SPLAY_RIGHT((head)->sph_root,
 field) = SPLAY_LEFT(tmp, field); \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;      \
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKLEFT(head, tmp, field) do {    \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;      \
 (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);  \
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKRIGHT(head, tmp, field) do {    \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;      \
 (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field); \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ASSEMBLE(head, node, left, right, field) do {  \
 SPLAY_RIGHT(left, field) = SPLAY_LEFT((head)->sph_root, field); \
 SPLAY_LEFT(right, field) = SPLAY_RIGHT((head)->sph_root, field);\
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(node, field); \
 SPLAY_RIGHT((head)->sph_root, field) = SPLAY_LEFT(node, field); \
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */

#define
 SPLAY_PROTOTYPE(name, type, field, cmp)    \
void name##_SPLAY(struct name *, struct type *);   \
void name##_SPLAY_MINMAX(struct name *, int);    \
```

```
struct type *name##_SPLAY_INSERT(struct name *, struct type *);  \
struct type *name##_SPLAY_REMOVE(struct name *, struct type *);  \
        \
/* Finds the node with the same key as elm */    \
static __inline struct type *      \
name##_SPLAY_FIND(struct name *head, struct type *elm)   \
{        \
 if (SPLAY_EMPTY(head))      \
  return(NULL);      \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0)    \
  return (head->sph_root);    \
 return (NULL);       \
}        \
        \
static __inline _sys_tree_h_unused struct type *   \
name##_SPLAY_NEXT(struct name *head, struct type *elm)   \
{        \
 name##_SPLAY(head, elm);     \
 if (SPLAY_RIGHT(elm, field) != NULL) {    \
  elm = SPLAY_RIGHT(elm, field);    \
  while (SPLAY_LEFT(elm, field) != NULL) {  \
   elm = SPLAY_LEFT(elm, field);   \
  }       \
 }
 else       \
  elm = NULL;      \
 return (elm);       \
}        \
        \
static _sys_tree_h_unused __inline struct type *   \
name##_SPLAY_MIN_MAX(struct name *head, int val)   \
{        \
 name##_SPLAY_MINMAX(head, val);     \
      return (SPLAY_ROOT(head));     \
}

/* Main splay operation.
* Moves node close to the key of elm to top
*/
#define SPLAY_GENERATE(name, type, field, cmp)    \
struct type *       \
name##_SPLAY_INSERT(struct name *head, struct type *elm)  \
{        \
   if (SPLAY_EMPTY(head)) {      \
     SPLAY_LEFT(elm, field) = SPLAY_RIGHT(elm, field) = NULL; \
   } else {       \
     int __comp;       \
```

```
    name##_SPLAY(head, elm);     \
    __comp = (cmp)(elm, (head)->sph_root);   \
    if(__comp < 0) {      \
     SPLAY_LEFT(elm, field) = SPLAY_LEFT((head)->sph_root, field);\
     SPLAY_RIGHT(elm, field) = (head)->sph_root;  \
     SPLAY_LEFT((head)->sph_root, field) = NULL;  \
    } else if (__comp > 0) {     \
     SPLAY_RIGHT(elm,
 field) = SPLAY_RIGHT((head)->sph_root, field);\
     SPLAY_LEFT(elm, field) = (head)->sph_root;  \
     SPLAY_RIGHT((head)->sph_root, field) = NULL; \
    } else      \
     return ((head)->sph_root);    \
   }        \
   (head)->sph_root = (elm);      \
   return (NULL);       \
}        \
        \
struct type *        \
name##_SPLAY_REMOVE(struct name *head, struct type *elm)  \
{        \
 struct type *__tmp;      \
 if (SPLAY_EMPTY(head))      \
  return (NULL);      \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0) {   \
  if (SPLAY_LEFT((head)->sph_root, field) == NULL) { \
   (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field);\
  } else {      \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);\
   name##_SPLAY(head, elm);   \
   SPLAY_RIGHT((head)->sph_root, field) = __tmp; \
  }       \
  return (elm);      \
 }        \
 return (NULL);       \
}        \
        \
void        \
name##_SPLAY(struct
 name *head, struct type *elm)   \
{        \
 struct type __node, *__left, *__right, *__tmp;   \
 int __comp;       \
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
 __left = __right = &__node;     \
```

```
\
 while ((__comp = (cmp)(elm, (head)->sph_root)) != 0) {  \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if ((cmp)(elm, __tmp) < 0){   \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKLEFT(head, __right, field);  \
  } else if (__comp > 0) {    \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if ((cmp)(elm, __tmp) > 0){   \
    SPLAY_ROTATE_LEFT(head, __tmp, field); \
    if (SPLAY_RIGHT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKRIGHT(head, __left, field);  \
  }       \
 }        \
 SPLAY_ASSEMBLE(head,
 &__node, __left, __right, field);  \
}         \
         \
/* Splay with either the minimum or the maximum element   \
* Used to find minimum or maximum element in tree.   \
*/         \
void name##_SPLAY_MINMAX(struct name *head, int __comp) \
{         \
 struct type __node, *__left, *__right, *__tmp;   \
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
 __left = __right = &__node;     \
\
 while (1) {       \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if (__comp < 0){    \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
```

```
  SPLAY_LINKLEFT(head, __right, field);  \
 } else if (__comp > 0) {    \
  __tmp = SPLAY_RIGHT((head)->sph_root, field); \
  if (__tmp == NULL)    \
   break;     \
  if (__comp > 0) {    \
   SPLAY_ROTATE_LEFT(head, __tmp, field); \
   if (SPLAY_RIGHT((head)->sph_root,
field) == NULL)\
    break;    \
  }      \
  SPLAY_LINKRIGHT(head, __left, field);  \
 }       \
}        \
SPLAY_ASSEMBLE(head, &__node, __left, __right, field);  \
}

#define SPLAY_NEGINF -1
#define SPLAY_INF 1

#define SPLAY_INSERT(name, x, y) name##_SPLAY_INSERT(x, y)
#define SPLAY_REMOVE(name, x, y) name##_SPLAY_REMOVE(x, y)
#define SPLAY_FIND(name, x, y)  name##_SPLAY_FIND(x, y)
#define SPLAY_NEXT(name, x, y)  name##_SPLAY_NEXT(x, y)
#define SPLAY_MIN(name, x)  (SPLAY_EMPTY(x) ? NULL \
    : name##_SPLAY_MIN_MAX(x, SPLAY_NEGINF))
#define SPLAY_MAX(name, x)  (SPLAY_EMPTY(x) ? NULL \
    : name##_SPLAY_MIN_MAX(x, SPLAY_INF))

#define SPLAY_FOREACH(x, name, head)     \
 for ((x) = SPLAY_MIN(name, head);    \
     (x) != NULL;      \
     (x) = SPLAY_NEXT(name, head, x))

/* Macros that define a red-black tree */
#define RB_HEAD(name, type)      \
struct name {        \
 struct type *rbh_root; /* root of the tree */   \
}

#define RB_INITIALIZER(root)      \
 {
 NULL }

#define RB_INIT(root) do {      \
 (root)->rbh_root = NULL;     \
} while (/*CONSTCOND*/ 0)
```

```
#define RB_BLACK 0
#define RB_RED  1
#define RB_ENTRY(type)       \
struct {        \
 struct type *rbe_left;  /* left element */  \
 struct type *rbe_right;  /* right element */  \
 struct type *rbe_parent; /* parent element */  \
 int rbe_color;   /* node color */  \
}

#define RB_LEFT(elm, field)  (elm)->field.rbe_left
#define RB_RIGHT(elm, field)  (elm)->field.rbe_right
#define RB_PARENT(elm, field)  (elm)->field.rbe_parent
#define RB_COLOR(elm, field)  (elm)->field.rbe_color
#define RB_ROOT(head)   (head)->rbh_root
#define RB_EMPTY(head)   (RB_ROOT(head) == NULL)

#define RB_SET(elm, parent, field) do {     \
 RB_PARENT(elm, field) = parent;     \
 RB_LEFT(elm, field) = RB_RIGHT(elm, field) = NULL;  \
 RB_COLOR(elm, field) = RB_RED;     \
} while (/*CONSTCOND*/ 0)

#define RB_SET_BLACKRED(black, red, field) do {    \
 RB_COLOR(black, field) = RB_BLACK;    \
 RB_COLOR(red, field)
 = RB_RED;     \
} while (/*CONSTCOND*/ 0)

#ifndef RB_AUGMENT
#define RB_AUGMENT(x) do {} while (/*CONSTCOND*/ 0)
#endif

#define RB_ROTATE_LEFT(head, elm, tmp, field) do {   \
 (tmp) = RB_RIGHT(elm, field);     \
 if ((RB_RIGHT(elm, field) = RB_LEFT(tmp, field)) != NULL) { \
  RB_PARENT(RB_LEFT(tmp, field), field) = (elm);  \
 }        \
 RB_AUGMENT(elm);      \
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
   RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
  else       \
   RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else        \
  (head)->rbh_root = (tmp);    \
 RB_LEFT(tmp, field) = (elm);     \
 RB_PARENT(elm, field) = (tmp);     \
```

```
 RB_AUGMENT(tmp);      \
 if ((RB_PARENT(tmp, field)))     \
  RB_AUGMENT(RB_PARENT(tmp, field));   \
} while (/*CONSTCOND*/ 0)

#define RB_ROTATE_RIGHT(head, elm, tmp, field) do {   \
 (tmp) = RB_LEFT(elm, field);     \
 if ((RB_LEFT(elm, field) = RB_RIGHT(tmp, field))
 != NULL) { \
  RB_PARENT(RB_RIGHT(tmp, field), field) = (elm);  \
 }        \
 RB_AUGMENT(elm);      \
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
   RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
  else       \
   RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else        \
  (head)->rbh_root = (tmp);    \
 RB_RIGHT(tmp, field) = (elm);     \
 RB_PARENT(elm, field) = (tmp);     \
 RB_AUGMENT(tmp);      \
 if ((RB_PARENT(tmp, field)))     \
  RB_AUGMENT(RB_PARENT(tmp, field));   \
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */
#define RB_PROTOTYPE(name, type, field, cmp)    \
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp,)
#define RB_PROTOTYPE_STATIC(name, type, field, cmp)   \
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_PROTOTYPE_INTERNAL(name, type, field, cmp, attr)  \
attr void name##_RB_INSERT_COLOR(struct name *, struct
 type *);  \
attr void name##_RB_REMOVE_COLOR(struct name *, struct type *, struct type *);\
attr struct type *name##_RB_REMOVE(struct name *, struct type *); \
attr struct type *name##_RB_INSERT(struct name *, struct type *); \
attr struct type *name##_RB_FIND(struct name *, struct type *);  \
attr struct type *name##_RB_NFIND(struct name *, struct type *); \
attr struct type *name##_RB_NEXT(struct type *);   \
attr struct type *name##_RB_PREV(struct type *);   \
attr struct type *name##_RB_MINMAX(struct name *, int);   \
        \

/* Main rb operation.
* Moves node close to the key of elm to top
*/
#define RB_GENERATE(name, type, field, cmp)    \
```

```
 RB_GENERATE_INTERNAL(name, type, field, cmp,)
#define RB_GENERATE_STATIC(name, type, field, cmp)   \
 RB_GENERATE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_GENERATE_INTERNAL(name, type, field, cmp, attr)  \
attr void        \
name##_RB_INSERT_COLOR(struct name *head, struct type *elm)  \
{         \
 struct type
 *parent, *gparent, *tmp;    \
 while ((parent = RB_PARENT(elm, field)) != NULL &&  \
     RB_COLOR(parent, field) == RB_RED) {   \
  gparent = RB_PARENT(parent, field);   \
  if (parent == RB_LEFT(gparent, field)) {  \
   tmp = RB_RIGHT(gparent, field);   \
   if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
    RB_COLOR(tmp, field) = RB_BLACK; \
    RB_SET_BLACKRED(parent, gparent, field);\
    elm = gparent;    \
    continue;    \
   }      \
   if (RB_RIGHT(parent, field) == elm) {  \
    RB_ROTATE_LEFT(head, parent, tmp, field);\
    tmp = parent;    \
    parent = elm;    \
    elm = tmp;    \
   }      \
   RB_SET_BLACKRED(parent, gparent, field); \
   RB_ROTATE_RIGHT(head, gparent, tmp, field); \
  } else {      \
   tmp = RB_LEFT(gparent, field);   \
   if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
    RB_COLOR(tmp, field) = RB_BLACK; \
    RB_SET_BLACKRED(parent, gparent, field);\
    elm = gparent;    \
    continue;    \
   }      \
   if (RB_LEFT(parent, field) == elm)
  {  \
    RB_ROTATE_RIGHT(head, parent, tmp, field);\
    tmp = parent;    \
    parent = elm;    \
    elm = tmp;    \
   }      \
   RB_SET_BLACKRED(parent, gparent, field); \
   RB_ROTATE_LEFT(head, gparent, tmp, field); \
  }       \
 }        \
 RB_COLOR(head->rbh_root, field) = RB_BLACK;   \
```

```
}        \
        \
attr void        \
name##_RB_REMOVE_COLOR(struct name *head, struct type *parent, struct type *elm) \
{        \
 struct type *tmp;      \
 while ((elm == NULL || RB_COLOR(elm, field) == RB_BLACK) && \
     elm != RB_ROOT(head)) {     \
  if (RB_LEFT(parent, field) == elm) {   \
   tmp = RB_RIGHT(parent, field);   \
   if (RB_COLOR(tmp, field) == RB_RED) {  \
    RB_SET_BLACKRED(tmp, parent, field); \
    RB_ROTATE_LEFT(head, parent, tmp, field);\
    tmp = RB_RIGHT(parent, field);  \
   }      \
   if ((RB_LEFT(tmp, field) == NULL ||  \
       RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
       (RB_RIGHT(tmp, field) == NULL ||  \
       RB_COLOR(RB_RIGHT(tmp,
 field), field) == RB_BLACK)) {\
    RB_COLOR(tmp, field) = RB_RED;  \
    elm = parent;    \
    parent = RB_PARENT(elm, field);  \
   } else {     \
    if (RB_RIGHT(tmp, field) == NULL || \
        RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK) {\
     struct type *oleft;  \
     if ((oleft = RB_LEFT(tmp, field)) \
         != NULL)   \
      RB_COLOR(oleft, field) = RB_BLACK;\
     RB_COLOR(tmp, field) = RB_RED; \
     RB_ROTATE_RIGHT(head, tmp, oleft, field);\
     tmp = RB_RIGHT(parent, field); \
    }     \
    RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
    RB_COLOR(parent, field) = RB_BLACK; \
    if (RB_RIGHT(tmp, field))  \
     RB_COLOR(RB_RIGHT(tmp, field), field) = RB_BLACK;\
    RB_ROTATE_LEFT(head, parent, tmp, field);\
    elm = RB_ROOT(head);   \
    break;     \
   }      \
  } else {      \
   tmp = RB_LEFT(parent, field);   \
   if (RB_COLOR(tmp, field) == RB_RED) {  \
    RB_SET_BLACKRED(tmp, parent, field); \
    RB_ROTATE_RIGHT(head, parent, tmp, field);\
    tmp
```

```
 = RB_LEFT(parent, field);  \
   }      \
   if ((RB_LEFT(tmp, field) == NULL ||  \
       RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
       (RB_RIGHT(tmp, field) == NULL ||  \
       RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK)) {\
    RB_COLOR(tmp, field) = RB_RED;  \
    elm = parent;    \
    parent = RB_PARENT(elm, field);  \
   } else {     \
    if (RB_LEFT(tmp, field) == NULL || \
        RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) {\
     struct type *oright;  \
     if ((oright = RB_RIGHT(tmp, field)) \
         != NULL)   \
      RB_COLOR(oright, field) = RB_BLACK;\
     RB_COLOR(tmp, field) = RB_RED; \
     RB_ROTATE_LEFT(head, tmp, oright, field);\
     tmp = RB_LEFT(parent, field); \
    }     \
    RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
    RB_COLOR(parent, field) = RB_BLACK; \
    if (RB_LEFT(tmp, field))  \
     RB_COLOR(RB_LEFT(tmp, field), field) = RB_BLACK;\
    RB_ROTATE_RIGHT(head, parent, tmp, field);\
    elm = RB_ROOT(head);   \
    break;     \
   }      \
  }       \
 }        \
 if
 (elm)       \
  RB_COLOR(elm, field) = RB_BLACK;   \
}         \
         \
attr struct type *       \
name##_RB_REMOVE(struct name *head, struct type *elm)   \
{         \
 struct type *child, *parent, *old = elm;   \
 int color;       \
 if (RB_LEFT(elm, field) == NULL)    \
  child = RB_RIGHT(elm, field);    \
 else if (RB_RIGHT(elm, field) == NULL)    \
  child = RB_LEFT(elm, field);    \
 else {        \
  struct type *left;     \
  elm = RB_RIGHT(elm, field);    \
  while ((left = RB_LEFT(elm, field)) != NULL)  \
```

```
 elm = left;     \
 child = RB_RIGHT(elm, field);    \
 parent = RB_PARENT(elm, field);    \
 color = RB_COLOR(elm, field);    \
 if (child)      \
  RB_PARENT(child, field) = parent;  \
 if (parent) {      \
  if (RB_LEFT(parent, field) == elm)  \
   RB_LEFT(parent, field) = child;  \
  else      \
   RB_RIGHT(parent, field) = child; \
  RB_AUGMENT(parent);    \
 } else       \
  RB_ROOT(head)
= child;    \
 if (RB_PARENT(elm, field) == old)   \
  parent = elm;     \
 (elm)->field = (old)->field;    \
 if (RB_PARENT(old, field)) {    \
  if (RB_LEFT(RB_PARENT(old, field), field) == old)\
   RB_LEFT(RB_PARENT(old, field), field) = elm;\
  else      \
   RB_RIGHT(RB_PARENT(old, field), field) = elm;\
  RB_AUGMENT(RB_PARENT(old, field));  \
 } else       \
  RB_ROOT(head) = elm;    \
 RB_PARENT(RB_LEFT(old, field), field) = elm;  \
 if (RB_RIGHT(old, field))    \
  RB_PARENT(RB_RIGHT(old, field), field) = elm; \
 if (parent) {      \
  left = parent;     \
  do {      \
   RB_AUGMENT(left);   \
  } while ((left = RB_PARENT(left, field)) != NULL); \
 }       \
 goto color;      \
}        \
parent = RB_PARENT(elm, field);     \
color = RB_COLOR(elm, field);     \
if (child)       \
 RB_PARENT(child, field) = parent;   \
if (parent) {       \
 if (RB_LEFT(parent, field) == elm)   \
  RB_LEFT(parent, field) = child;   \
 else       \
  RB_RIGHT(parent,
field) = child;  \
 RB_AUGMENT(parent);     \
```

```
 } else       \
  RB_ROOT(head) = child;     \
color:        \
 if (color == RB_BLACK)      \
  name##_RB_REMOVE_COLOR(head, parent, child);  \
 return (old);       \
}        \
        \
/* Inserts a node into the RB tree */     \
attr struct type *       \
name##_RB_INSERT(struct name *head, struct type *elm)   \
{        \
 struct type *tmp;      \
 struct type *parent = NULL;     \
 int comp = 0;       \
 tmp = RB_ROOT(head);      \
 while (tmp) {       \
  parent = tmp;      \
  comp = (cmp)(elm, parent);    \
  if (comp < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else if (comp > 0)     \
   tmp = RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }       \
 RB_SET(elm, parent, field);     \
 if (parent != NULL) {      \
  if (comp < 0)      \
   RB_LEFT(parent, field) = elm;   \
  else       \
   RB_RIGHT(parent, field) = elm;   \
  RB_AUGMENT(parent);     \
 } else       \
  RB_ROOT(head) = elm;     \
 name##_RB_INSERT_COLOR(head,
 elm);    \
 return (NULL);       \
}        \
        \
/* Finds the node with the same key as elm */    \
attr struct type *       \
name##_RB_FIND(struct name *head, struct type *elm)   \
{        \
 struct type *tmp = RB_ROOT(head);    \
 int comp;       \
 while (tmp) {       \
  comp = cmp(elm, tmp);     \
```

```
  if (comp < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else if (comp > 0)     \
   tmp = RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }        \
 return (NULL);       \
}         \
         \
/* Finds the first node greater than or equal to the search key */ \
attr struct type *       \
name##_RB_NFIND(struct name *head, struct type *elm)   \
{         \
 struct type *tmp = RB_ROOT(head);    \
 struct type *res = NULL;     \
 int comp;       \
 while (tmp) {       \
  comp = cmp(elm, tmp);     \
  if (comp < 0) {      \
   res = tmp;     \
   tmp = RB_LEFT(tmp, field);   \
  }       \
  else if (comp > 0)     \
   tmp =
 RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }        \
 return (res);       \
}         \
         \
/* ARGSUSED */        \
attr struct type *       \
name##_RB_NEXT(struct type *elm)     \
{         \
 if (RB_RIGHT(elm, field)) {     \
  elm = RB_RIGHT(elm, field);    \
  while (RB_LEFT(elm, field))    \
   elm = RB_LEFT(elm, field);   \
 } else {       \
  if (RB_PARENT(elm, field) &&    \
     (elm == RB_LEFT(RB_PARENT(elm, field), field))) \
   elm = RB_PARENT(elm, field);   \
  else {       \
   while (RB_PARENT(elm, field) &&   \
      (elm == RB_RIGHT(RB_PARENT(elm, field), field)))\
    elm = RB_PARENT(elm, field);  \
```

```
   elm = RB_PARENT(elm, field);   \
  }       \
 }        \
 return (elm);       \
}         \
         \
/* ARGSUSED */        \
attr struct type *       \
name##_RB_PREV(struct type *elm)     \
{         \
 if (RB_LEFT(elm, field)) {     \
  elm = RB_LEFT(elm, field);    \
  while (RB_RIGHT(elm, field))    \
   elm = RB_RIGHT(elm, field);   \
 }
 else {       \
  if (RB_PARENT(elm, field) &&    \
      (elm == RB_RIGHT(RB_PARENT(elm, field), field))) \
   elm = RB_PARENT(elm, field);   \
  else {       \
   while (RB_PARENT(elm, field) &&   \
       (elm == RB_LEFT(RB_PARENT(elm, field), field)))\
    elm = RB_PARENT(elm, field);  \
   elm = RB_PARENT(elm, field);   \
  }       \
 }        \
 return (elm);       \
}         \
         \
attr struct type *       \
name##_RB_MINMAX(struct name *head, int val)    \
{         \
 struct type *tmp = RB_ROOT(head);    \
 struct type *parent = NULL;     \
 while (tmp) {       \
  parent = tmp;      \
  if (val < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else       \
   tmp = RB_RIGHT(tmp, field);   \
 }        \
 return (parent);      \
}

#define RB_NEGINF -1
#define RB_INF 1

#define RB_INSERT(name, x, y) name##_RB_INSERT(x, y)
```

```
#define RB_REMOVE(name, x, y) name##_RB_REMOVE(x, y)
#define RB_FIND(name, x, y) name##_RB_FIND(x, y)
#define RB_NFIND(name, x, y) name##_RB_NFIND(x,
 y)
#define RB_NEXT(name, x, y) name##_RB_NEXT(y)
#define RB_PREV(name, x, y) name##_RB_PREV(y)
#define RB_MIN(name, x)  name##_RB_MINMAX(x, RB_NEGINF)
#define RB_MAX(name, x)  name##_RB_MINMAX(x, RB_INF)

#define RB_FOREACH(x, name, head)     \
 for ((x) = RB_MIN(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_NEXT(x))

#define RB_FOREACH_FROM(x, name, y)     \
 for ((x) = (y);       \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_SAFE(x, name, head, y)    \
 for ((x) = RB_MIN(name, head);     \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_REVERSE(x, name, head)    \
 for ((x) = RB_MAX(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_PREV(x))

#define RB_FOREACH_REVERSE_FROM(x, name, y)    \
 for ((x) = (y);       \
     ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_REVERSE_SAFE(x, name,
 head, y)   \
 for ((x) = RB_MAX(name, head);     \
     ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
      (x) = (y))

#endif /* _SYS_TREE_H_ */
# Contributor: Dhruvin Gandhi <contact@dhru.vin>
# Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=py3-license-expression
_pkgname=license_expression
pkgver=30.4.0
pkgrel=0
pkgdesc="Library to parse, compare, simplify and normalize license expressions"
```

```
url="https://github.com/nexB/license-expression"
arch="noarch"
license="Apache-2.0"
depends="python3 py3-boolean.py"
makedepends="py3-setuptools py3-setuptools_scm py3-gpep517 py3-wheel"
checkdepends="py3-pytest py3-pytest-xdist"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/l/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir/$_pkgname-$pkgver"

build() {
 gpep517 build-wheel \
  --wheel-dir .dist \
  --output-fd 3 3>&1 >&2
}

check() {
 python3 -m venv --clear --without-pip --system-site-packages .testenv
 .testenv/bin/python3 -m installer .dist/*.whl
 .testenv/bin/python3 -m pytest
}

package() {
 python3 -m installer -d "$pkgdir" \
  .dist/*.whl
}

sha512sums="
cc7cd6b5bd8ea4c99b66f074871ffd7cc78b3e8b1b0d3afd9b95efdb7147c8293db2fac977d684fc34d3d60bd79066a06
dc2bff0a38b130d9d83c63538502db1
  license_expression-30.4.0.tar.gz
"
```

# 1.3053 nginx 1.29.5

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# 1.3069 brotli 1.0.9-9.el9_7

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# 1.3078 tomcat-embed-jasper-el 11.0.14

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that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library.  The
threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small inline
functions (ten lines or less in length), then the use of the object
file is unrestricted, regardless of whether it is legally a derivative
work.  (Executables containing this object code plus portions of the
Library will still fall under Section 6.)

Otherwise,
if the work is a derivative of the Library, you may
distribute the object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.

@item
As an exception to the Sections above, you may also combine or
link a ``work that uses the Library'' with the Library to produce a
work containing portions of the Library, and distribute that work
under terms of your choice, provided that the terms permit
modification of the work for the customer's own use and reverse
engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the
Library is used in it and that the Library and its use are covered by
this License.  You must supply a copy of this License.  If the work
during execution displays copyright notices, you must include the
copyright notice for the Library among them, as well as a reference

directing the user to the copy of
this License. Also, you must do one
of these things:

@enumerate a
@item
Accompany the work with the complete corresponding
machine-readable source code for the Library including whatever
changes were used in the work (which must be distributed under
Sections 1 and 2 above); and, if the work is an executable linked
with the Library, with the complete machine-readable ``work that
uses the Library'', as object code and/or source code, so that the
user can modify the Library and then relink to produce a modified
executable containing the modified Library. (It is understood
that the user who changes the contents of definitions files in the
Library will not necessarily be able to recompile the application
to use the modified definitions.)

@item
Use a suitable shared library mechanism for linking with the Library. A
suitable mechanism is one that (1) uses at run time a copy of the
library already present on the user's computer system, rather than
copying library functions into the executable,
and (2) will operate
properly with a modified version of the library, if the user installs
one, as long as the modified version is interface-compatible with the
version that the work was made with.

@item
Accompany the work with a written offer, valid for at
least three years, to give the same user the materials
specified in Subsection 6a, above, for a charge no more
than the cost of performing this distribution.

@item
If distribution of the work is made by offering access to copy
from a designated place, offer equivalent access to copy the above
specified materials from the same place.

@item
Verify that the user has already received a copy of these
materials or that you have already sent this user a copy.
@end enumerate

For an executable, the required form of the ``work that uses the
Library'' must include any data and utility programs needed for
reproducing the executable from it. However, as a special exception,
the materials to be distributed need not include anything that

is
normally distributed (in either source or binary form) with the major
components (compiler, kernel, and so on) of the operating system on
which the executable runs, unless that component itself accompanies the
executable.

It may happen that this requirement contradicts the license
restrictions of other proprietary libraries that do not normally
accompany the operating system. Such a contradiction means you cannot
use both them and the Library together in an executable that you
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@item
You may place library facilities that are a work based on the
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library, provided that the separate distribution of the work based on
the Library and of the other library facilities is otherwise
permitted, and provided that you do these two things:

@enumerate a
@item
Accompany the combined library with a copy of the same work
based on the Library,
uncombined with any other library
facilities. This must be distributed under the terms of the
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@item
Give prominent notice with the combined library of the fact
that part of it is a work based on the Library, and explaining
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@end enumerate

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@subheading END OF TERMS AND CONDITIONS

@page
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smallexample

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@var{signature of Ty Coon}, 1 April 1990
Ty Coon, President of Vice
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We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

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In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in

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The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based

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b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

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d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library,

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This option is useful when you wish to copy part of the code of
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If distribution of object code is made by offering access to copy
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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

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For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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# 1.3099 glob 13.0.6

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# 1.3100 cidr-regex 5.0.3

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# 1.3101 java-common-jre 0.2-r3

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```
package:
 name: py3-license-expression
 version: "30.4.4"
 epoch: 3 # go/wolfi-rsc/py3-license-expression
 description: license-expression is a comprehensive utility library to parse, compare, simplify and normalize license
expressions (such as SPDX license expressions) using boolean logic.
 copyright:
   - license: Apache-2.0
 dependencies:
   provider-priority: 0
 resources:
   cpu: "2"
   memory: 4Gi

vars:
 pypi-package: license-expression
 import: license_expression

data:
 - name: py-versions
   items:
     3.10: '310'
     3.11: '311'
     3.12: '312'
     3.13: '313'

environment:
 contents:
   packages:
     - py3-supported-build-base

pipeline:
 - uses: git-checkout
   with:
     repository: https://github.com/nexB/license-expression
     tag: v${{package.version}}
     expected-commit: a3c00c09986bcca1240afd5b1844b56de3f581c1

subpackages:
 - range: py-versions
   name: py${{range.key}}-${{vars.pypi-package}}
```

```
  description: python${{range.key}}
 version of ${{vars.pypi-package}}
  dependencies:
    provider-priority: ${{range.value}}
    provides:
      - ${{package.name}}
      - py3-${{vars.pypi-package}}
    runtime:
      - py${{range.key}}-boolean.py
  pipeline:
    - uses: py/pip-build-install
      with:
        python: python${{range.key}}
    - uses: strip
  test:
    pipeline:
      - uses: test/tw/pip-check
      - uses: python/import
        with:
          python: python${{range.key}}
          imports: |
            import ${{vars.import}}

 - name: py3-supported-${{vars.pypi-package}}
  description: meta package providing ${{vars.pypi-package}} for supported python versions.
  dependencies:
    runtime:
      - py3.10-${{vars.pypi-package}}
      - py3.11-${{vars.pypi-package}}
      - py3.12-${{vars.pypi-package}}
      - py3.13-${{vars.pypi-package}}
  test:
    pipeline:
      - uses: test/metapackage

test:
 pipeline:
  - uses: python/import

   with:
      imports: |
        import ${{vars.import}}

update:
 enabled: true
 github:
  identifier: nexB/license-expression
  strip-prefix: v
```

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```
package:
 name: go-licenses
 version: "2.0.1"
 epoch: 5
 description: A lightweight tool to report on the licenses used by a Go package and its dependencies. Highlight!
Versioned external URL to licenses can be found at the same time.
 copyright:
   - license: Apache-2.0

pipeline:
 - uses: git-checkout
   with:
     repository: https://github.com/google/go-licenses
     tag: v${{package.version}}
     expected-commit: 3e084b0caf710f7bfead967567539214f598c0a2

 - uses: go/build
   with:
     modroot: .
     packages: .
     output: go-licenses

update:
 enabled: true
 github:
   identifier: google/go-licenses
   strip-prefix: v

test:
 pipeline:
   # AUTOGENERATED
   - runs: |
       go-licenses --help

environment:
 contents:
   packages:
     - go-1.25
package:
 name: libart-lgpl
```

```
 version: 2.3.21
 epoch: 5 # go/wolfi-rsc/libart-lgpl
 description: A library for high-performance 2D graphics
 copyright:
   - license: LGPL-2.0-or-later
 resources:
   cpu: "1"
   memory: 4Gi

var-transforms:
 - from: ${{package.version}}
   match: ^(\d+)\.(\d+)\.(\d+)$
   replace: LIBART_LGPL_${1}_${2}_$3
   to: tag-name

environment:
 contents:
   packages:
     - autoconf
     - automake
     - build-base
     - busybox
     - ca-certificates-bundle
     - libtool

pipeline:
 - uses: git-checkout
   with:
     repository: https://gitlab.gnome.org/Archive/libart_lgpl
     tag: ${{vars.tag-name}}
     expected-commit: 7119bfe163a5a5325405acb7eab1b16152e8032a

 - runs: autoreconf -vif

 - uses: autoconf/configure
   with:
     opts: |
       --disable-static

 - uses: autoconf/make

 - uses: autoconf/make-install

 - uses: strip

subpackages:
 - name: libart-lgpl-dev
   pipeline:
```

```
    - uses: split/dev
  dependencies:
    runtime:
     - libart-lgpl
  description: libart-lgpl dev
  test:
    environment:
      contents:
        packages:
          - build-base
          - pkgconf
    pipeline:
      - runs: |
          libart2-config --version
      - uses: test/pkgconf
      - uses: test/tw/ldd-check
      - uses: test/tw/devpackage
      - name: Test compile and link against libart
        runs: |
          set -euo pipefail

          tee test.c <<'EOF'
          #include <libart_lgpl/libart.h>
          #include <stdio.h>
          int main() {
              double affine[6];
              art_affine_identity(affine);
              /* Identity matrix should be [1,0,0,1,0,0] */
              if (affine[0] != 1.0 || affine[3] != 1.0) {
                  fprintf(stderr, "FAIL: unexpected identity affine\n");
                  return 1;
              }
              printf("SUCCESS: libart affine identity works\n");
              return
 0;
          }
          EOF

          gcc $(pkg-config --cflags libart-2.0) test.c -o test $(pkg-config --libs libart-2.0)
          ./test

update:
 enabled: true
 release-monitor:
   identifier: 21864

test:
 environment:
```

```
  contents:
    packages:
      - libart-lgpl-dev
      - build-base
      - pkgconf
pipeline:
  - uses: test/tw/ldd-check
  - name: Test library compilation and linking
    runs: |
      set -euo pipefail

      tee test.c <<'EOF'
      #include <libart_lgpl/libart.h>
      #include <stdio.h>
      int main() {
          double affine[6];
          art_affine_identity(affine);
          /* Identity matrix should be [1,0,0,1,0,0] */
          if (affine[0] != 1.0 || affine[3] != 1.0) {
              fprintf(stderr, "FAIL: unexpected identity affine\n");
              return 1;
          }
          printf("SUCCESS: libart compile and link works\n");
          return 0;
      }
      EOF

      gcc $(pkg-config
--cflags libart-2.0) test.c -o test $(pkg-config --libs libart-2.0)
      ./test
```

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# Contributions to the urllib3 project

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## Contributors

In chronological order:

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 * HTTPS patch (which inspired HTTPSConnectionPool)

* erikcederstrand <http://code.google.com/u/erikcederstrand/>
 * NTLM-authenticated HTTPSConnectionPool
 * Basic-authenticated HTTPSConnectionPool (merged into make_headers)

* niphlod <niphlod@gmail.com>
 * Client-verified SSL certificates for HTTPSConnectionPool
 * Response gzip and deflate encoding support
 * Better unicode support for filepost using StringIO buffers

* btoconnor <brian@btoconnor.net>
 * Non-multipart encoding for POST requests

* p.dobrogost <http://code.google.com/u/@WBRSRlBZDhBFXQB6/>
 * Code review, PEP8 compliance, benchmark fix

* kennethreitz <me@kennethreitz.com>
 * Bugfixes, suggestions, Requests integration

* georgemarshall <https://github.com/georgemarshall>
 * Bugfixes, Improvements and Test
 coverage

* Thomas Kluyver <thomas@kluyver.me.uk>
 * Python 3 support

* brandon-rhodes <http://rhodesmill.org/brandon>
 * Design review, bugfixes, test coverage.

* studer <theo.studer@gmail.com>
 * IPv6 url support and test coverage

* Shivaram Lingamneni <slingamn@cs.stanford.edu>

* Support for explicitly closing pooled connections

* hartator <hartator@gmail.com>
* Corrected multipart behavior for params

* Thomas Weischuh <thomas@t-8ch.de>
* Support for TLS SNI
* API unification of ssl_version/cert_reqs
* SSL fingerprint and alternative hostname verification
* Bugfixes in testsuite

* Sune Kirkeby <mig@ibofobi.dk>
* Optional SNI-support for Python 2 via PyOpenSSL.

* Marc Schlaich <marc.schlaich@gmail.com>
* Various bugfixes and test improvements.

* Bryce Boe <bbzbryce@gmail.com>
* Correct six.moves conflict
* Fixed pickle support of some exceptions

* Boris Figovsky <boris.figovsky@ravellosystems.com>
* Allowed to skip SSL hostname verification

* Cory Benfield
<https://lukasa.co.uk/about/>
* Stream method for Response objects.
* Return native strings in header values.
* Generate 'Host' header when using proxies.

* Jason Robinson <jaywink@basshero.org>
* Add missing WrappedSocket.fileno method in PyOpenSSL

* Audrius Butkevicius <audrius.butkevicius@elastichosts.com>
* Fixed a race condition

* Stanislav Vitkovskiy <stas.vitkovsky@gmail.com>
* Added HTTPS (CONNECT) proxy support

* Stephen Holsapple <sholsapp@gmail.com>
* Added abstraction for granular control of request fields

* Martin von Gagern <Martin.vGagern@gmx.net>
* Support for non-ASCII header parameters

* Kevin Burke <kev@inburke.com> and Pavel Kirichenko <juanych@yandex-team.ru>
* Support for separate connect and request timeouts

* Peter Waller <p@pwaller.net>
 * HTTPResponse.tell() for determining amount received over the wire

* Nipunn Koorapati <nipunn1313@gmail.com>
 * Ignore default ports when comparing hosts for equality

* Danilo @dbrgn <https://dbrgn.ch/>
  * Disabled TLS compression by default on Python 3.2+
 * Disabled TLS compression in pyopenssl contrib module
 * Configurable cipher suites in pyopenssl contrib module

* Roman Bogorodskiy <roman.bogorodskiy@ericsson.com>
 * Account retries on proxy errors

* Nicolas Delaby <nicolas.delaby@ezeep.com>
 * Use the platform-specific CA certificate locations

* Josh Schneier <https://github.com/jschneier>
 * HTTPHeaderDict and associated tests and docs
 * Bugfixes, docs, test coverage

* Tahia Khan <http://tahia.tk/>
 * Added Timeout examples in docs

* Arthur Grunseid <https://grunseid.com>
 * source_address support and tests (with https://github.com/bui)

* Ian Cordasco <graffatcolmingov@gmail.com>
 * PEP8 Compliance and Linting
 * Add ability to pass socket options to an HTTP Connection

* Erik Tollerud <erik.tollerud@gmail.com>
 * Support for standard library io module.

* Krishna Prasad <kprasad.iitd@gmail.com>
 * Google App Engine documentation

* Aaron Meurer
 <asmeurer@gmail.com>
 * Added Url.url, which unparses a Url

* Evgeny Kapun <abacabadabacaba@gmail.com>
 * Bugfixes

* Benjamen Meyer <bm_witness@yahoo.com>
 * Security Warning Documentation update for proper capture

* Shivan Sornarajah <github@sornars.com>

* Support for using ConnectionPool and PoolManager as context managers.

* Alex Gaynor <alex.gaynor@gmail.com>
* Updates to the default SSL configuration

* Tomas Tomecek <ttomecek@redhat.com>
* Implemented generator for getting chunks from chunked responses.

* tlynn <https://github.com/tlynn>
* Respect the warning preferences at import.

* David D. Riddle <ddriddle@illinois.edu>
* IPv6 bugfixes in testsuite

* Thea Flowers <magicalgirl@google.com>
* App Engine environment tests.
* Documentation re-write.

* John Krauss <https://github.com/talos>
* Clues to debugging problems with `cryptography` dependency in docs

* Disassem <https://github.com/Disassem>
* Fix pool-default headers not applying for url-encoded
requests like GET.

* James Atherfold <jlatherfold@hotmail.com>
* Bugfixes relating to cleanup of connections during errors.

* Christian Pedersen <https://github.com/chripede>
* IPv6 HTTPS proxy bugfix

* Jordan Moldow <https://github.com/jmoldow>
* Fix low-level exceptions leaking from ``HTTPResponse.stream()``.
* Bugfix for ``ConnectionPool.urlopen(release_conn=False)``.
* Creation of ``HTTPConnectionPool.ResponseCls``.

* Predrag Gruevski <https://github.com/obi1kenobi>
* Made cert digest comparison use a constant-time algorithm.

* Adam Talsma <https://github.com/a-tal>
* Bugfix to ca_cert file paths.

* Evan Meagher <https://evanmeagher.net>
* Bugfix related to `memoryview` usage in PyOpenSSL adapter

* John Vandenberg <jayvdb@gmail.com>
* Python 2.6 fixes; pyflakes and pep8 compliance

* Andy Caldwell <andy.m.caldwell@googlemail.com>
 * Bugfix related to reusing connections in indeterminate states.

* Ville Skytt <ville.skytta@iki.fi>
 * Logging efficiency
 improvements, spelling fixes, Travis config.

* Shige Takeda <smtakeda@gmail.com>
 * Started Recipes documentation and added a recipe about handling concatenated gzip data in HTTP response

* Jess Shapiro <jesse@jesseshapiro.net>
 * Various character-encoding fixes/tweaks
 * Disabling IPv6 DNS when IPv6 connections not supported

* David Foster <http://dafoster.net/>
 * Ensure order of request and response headers are preserved.

* Jeremy Cline <jeremy@jcline.org>
 * Added connection pool keys by scheme

* Aviv Palivoda <palaviv@gmail.com>
 * History list to Retry object.
 * HTTPResponse contains the last Retry object.

* Nate Prewitt <nate.prewitt@gmail.com>
 * Ensure timeouts are not booleans and greater than zero.
 * Fixed infinite loop in ``stream`` when amt=None.
 * Added length_remaining to determine remaining data to be read.
 * Added enforce_content_length to raise exception when incorrect content-length received.

* Seth Michael Larson <sethmichaellarson@protonmail.com>
  * Created selectors backport that supports PEP 475.

* Alexandre Dias <alex.dias@smarkets.com>
 * Don't retry on timeout if method not in whitelist

* Moinuddin Quadri <moin18@gmail.com>
 * Lazily load idna package

* Tom White <s6yg1ez3@mail2tor.com>
 * Made SOCKS handler differentiate socks5h from socks5 and socks4a from socks4.

* Tim Burke <tim.burke@gmail.com>
 * Stop buffering entire deflate-encoded responses.

* Tuukka Mustonen <tuukka.mustonen@gmail.com>
 * Add counter for status_forcelist retries.

* Erik Rose <erik@mozilla.com>
 * Bugfix to pyopenssl vendoring

* Wolfgang Richter <wolfgang.richter@gmail.com>
 * Bugfix related to loading full certificate chains with PyOpenSSL backend.

* Mike Miller <github@mikeage.net>
 * Logging improvements to include the HTTP(S) port when opening a new connection

* Ioannis Tziakos <mail@itziakos.gr>
 * Fix ``util.selectors._fileobj_to_fd`` to accept ``long``.
 * Update appveyor tox setup to use the 64bit python.

* Akamai
 (through Jess Shapiro) <jshapiro@akamai.com>
 * Ongoing maintenance; 2017-2018

* Dominique Leuenberger <dimstar@opensuse.org>
 * Minor fixes in the test suite

* Will Bond <will@wbond.net>
 * Add Python 2.6 support to ``contrib.securetransport``

* Aleksei Alekseev <alekseev.yeskela@gmail.com>
 * using auth info for socks proxy

* Chris Wilcox <git@crwilcox.com>
 * Improve contribution guide
 * Add ``HTTPResponse.geturl`` method to provide ``urllib2.urlopen().geturl()`` behavior

* Bruce Merry <https://www.brucemerry.org.za>
 * Fix leaking exceptions when system calls are interrupted with zero timeout

* Hugo van Kemenade <https://github.com/hugovk>
 * Drop support for EOL Python 2.6

* Tim Bell <https://github.com/timb07>
 * Bugfix for responses with Content-Type: message/* logging warnings

* Justin Bramley <https://github.com/jbramleycl>
 * Add ability to handle multiple Content-Encodings

* Katsuhiko YOSHIDA <https://github.com/kyoshidajp>
 * Remove Authorization header
 regardless of case when redirecting to cross-site

* James Meickle <https://permadeath.com/>
 * Improve handling of Retry-After header

* Chris Jerdonek <chris.jerdonek@gmail.com>
 * Remove a spurious TypeError from the exception chain inside
   HTTPConnectionPool._make_request(), also for BaseExceptions.

* Jorge Lopez Silva <https://github.com/jalopezsilva>
 * Added support for forwarding requests through HTTPS proxies.

* Benno Rice <benno@jeamland.net>
 * Allow cadata parameter to be passed to underlying ``SSLContext.load_verify_locations()``.

* Keiichi Kobayashi <abok.1k@gmail.com>
 * Rename VerifiedHTTPSConnection to HTTPSConnection

* Himanshu Garg <garg_himanshu@outlook.com>
 * DOC & LICENSE Update

* Hod Bin Noon <bin.noon.hod@gmail.com>
 * Test improvements

* Chris Olufson <tycarac@gmail.com>
 * Fix for connection not being released on HTTP redirect and response not preloaded

* [Bastiaan Bakker] <https://github.com/bastiaanb>
 * Support for logging session keys
 via environment variable ``SSLKEYLOGFILE`` (Python 3.8+)

* [Ezzeri Esa] <https://github.com/savarin>
 * Ports and extends on types from typeshed

* [Your name or handle] <[email or website]>
 * [Brief summary of your changes]
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# 1.3117 device-mapper-multipath 0.8.7-39.el9_7.1

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```
/*
* Soft:       multipath device mapper target autoconfig
*
* Version:     $Id: main.h,v 0.0.1 2003/09/18 15:13:38 cvaroqui Exp $
*
* Author:      Christophe Varoqui
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# 1.3118 dialog 1.3-32.20210117.el9

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Upstream source http://invisible-island.net/dialog/dialog.html

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---
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# 1.3120 spring-boot 4.0.0

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permanent authorization for you to choose that version for the
Library.
/* Extract the last component (base name) of a file name.

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  along with this program.  If not, see <https://www.gnu.org/licenses/>.  */

#ifndef _BASENAME_LGPL_H
#define _BASENAME_LGPL_H

/* This file uses _GL_ATTRIBUTE_PURE.  */
#if !_GL_CONFIG_H_INCLUDED
#error "Please include config.h first."
#endif

#include <stddef.h>

#ifndef
 DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
```

```
#endif

#ifdef __cplusplus
extern "C" {
#endif


/* Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
          FILENAME      RESULT
          "foo.c"       "foo.c"
          "foo/bar.c"   "bar.c"
          "/foo/bar.c"  "bar.c"
          "foo/bar/"    "bar/"
          "foo/bar//"   "bar//"
          "/"           ""
          "//"          ""
          ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(),
 defined in <string.h>, does
      not consider trailing slashes to be part of the component:
          FILENAME      RESULT
          "foo/bar/"    ""
          "foo/bar//"   ""
    * The 'basename' command eliminates trailing slashes and for a root
      produces a non-empty result:
          FILENAME      RESULT
          "foo/bar/"    "bar"
          "foo/bar//"   "bar"
          "/"           "/"
          "//"          "/"
*/
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;
```

```
#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
```

# 1.3123 npmcli-git 7.0.2

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https://github.com/bitinn/node-fetch

# 1.3125 npm-packlist 10.0.4

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# 1.3126 @npmcli/run-script 10.0.4

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# 1.3127 retry 0.13.1

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# 1.3128 spdx-license-ids 3.0.23

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```
[
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 "AGPL-3.0",
 "BSD-2-Clause-FreeBSD",
 "BSD-2-Clause-NetBSD",
 "GFDL-1.1",
```

"GFDL-1.2",
"GFDL-1.3",
"GPL-1.0",
"GPL-2.0",
"GPL-2.0-with-GCC-exception",
"GPL-2.0-with-autoconf-exception",
"GPL-2.0-with-bison-exception",
"GPL-2.0-with-classpath-exception",
"GPL-2.0-with-font-exception",
"GPL-3.0",
"GPL-3.0-with-GCC-exception",
"GPL-3.0-with-autoconf-exception",
"LGPL-2.0",
"LGPL-2.1",
"LGPL-3.0",
"Net-SNMP",
"Nunit",
"StandardML-NJ",
"bzip2-1.0.5",
"eCos-2.0",
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]
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# spdx-license-ids

[![npm version](https://img.shields.io/npm/v/spdx-license-ids.svg)](https://www.npmjs.com/package/spdx-license-ids)

A list of [SPDX license](https://spdx.org/licenses/) identifiers

## Installation

[Download JSON directly](https://raw.githubusercontent.com/jslicense/spdx-license-ids/main/index.json), or [use](https://docs.npmjs.com/cli/install) [npm](https://docs.npmjs.com/about-npm/):

```
npm install spdx-license-ids
```

## [Node.js](https://nodejs.org/) API

### require('spdx-license-ids')

Type: `string[]`

All license IDs except for the currently deprecated ones.

```javascript
```

```
const ids = require('spdx-license-ids');
//=> ['0BSD', 'AAL', 'ADSL', 'AFL-1.1', 'AFL-1.2', 'AFL-2.0', 'AFL-2.1', 'AFL-3.0', 'AGPL-1.0-only', ...]

ids.includes('BSD-3-Clause'); //=> true
ids.includes('CC-BY-1.0'); //=> true

ids.includes('GPL-3.0'); //=> false
```

### require('spdx-license-ids/deprecated')

Type: `string[]`

Deprecated license IDs.

```javascript
const deprecatedIds
 = require('spdx-license-ids/deprecated');
//=> ['AGPL-1.0', 'AGPL-3.0', 'GFDL-1.1', 'GFDL-1.2', 'GFDL-1.3', 'GPL-1.0', 'GPL-2.0', ...]

deprecatedIds.includes('BSD-3-Clause'); //=> false
deprecatedIds.includes('CC-BY-1.0'); //=> false

deprecatedIds.includes('GPL-3.0'); //=> true
```

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```
[
 "0BSD",
 "3D-Slicer-1.0",
 "AAL",
 "ADSL",
 "AFL-1.1",
 "AFL-1.2",
 "AFL-2.0",
 "AFL-2.1",
 "AFL-3.0",
 "AGPL-1.0-only",
 "AGPL-1.0-or-later",
 "AGPL-3.0-only",
 "AGPL-3.0-or-later",
 "ALGLIB-Documentation",
 "AMD-newlib",
 "AMDPLPA",
 "AML",
 "AML-glslang",
```

"AMPAS",
"ANTLR-PD",
"ANTLR-PD-fallback",
"APAFML",
"APL-1.0",
"APSL-1.0",
"APSL-1.1",
"APSL-1.2",
"APSL-2.0",
"ASWF-Digital-Assets-1.0",
"ASWF-Digital-Assets-1.1",
"Abstyles",
"AdaCore-doc",
"Adobe-2006",
"Adobe-Display-PostScript",
"Adobe-Glyph",
"Adobe-Utopia",
"Advanced-Cryptics-Dictionary",
"Afmparse",
"Aladdin",
"Apache-1.0",
"Apache-1.1",
"Apache-2.0",
"App-s2p",
"Arphic-1999",
"Artistic-1.0",
"Artistic-1.0-Perl",
"Artistic-1.0-cl8",
"Artistic-2.0",
"Artistic-dist",
"Aspell-RU",
"BOLA-1.1",
"BSD-1-Clause",
"BSD-2-Clause",
"BSD-2-Clause-Darwin",
"BSD-2-Clause-Patent",
"BSD-2-Clause-Views",
"BSD-2-Clause-first-lines",
"BSD-2-Clause-pkgconf-disclaimer",
"BSD-3-Clause",
"BSD-3-Clause-Attribution",
"BSD-3-Clause-Clear",
"BSD-3-Clause-HP",
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"BSD-4-Clause-Shortened",
"BSD-4-Clause-UC",
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"BSD-Mark-Modifications",
"BSD-Protection",
"BSD-Source-Code",
"BSD-Source-beginning-file",
"BSD-Systemics",
"BSD-Systemics-W3Works",
"BSL-1.0",
"BUSL-1.1",
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"Barr",
"Beerware",
"BitTorrent-1.0",
"BitTorrent-1.1",
"Bitstream-Charter",
"Bitstream-Vera",
"BlueOak-1.0.0",
"Boehm-GC",
"Boehm-GC-without-fee",
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"Brian-Gladman-2-Clause",
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"C-UDA-1.0",
"CAL-1.0",
"CAL-1.0-Combined-Work-Exception",
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"CC-BY-1.0",
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"CC-BY-2.5-AU",
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"CC-BY-3.0-AT",

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"CC-BY-ND-2.0",
"CC-BY-ND-2.5",
"CC-BY-ND-3.0",
"CC-BY-ND-3.0-DE",
"CC-BY-ND-4.0",
"CC-BY-SA-1.0",
"CC-BY-SA-2.0",
"CC-BY-SA-2.0-UK",
"CC-BY-SA-2.1-JP",
"CC-BY-SA-2.5",
"CC-BY-SA-3.0",
"CC-BY-SA-3.0-AT",
"CC-BY-SA-3.0-DE",
"CC-BY-SA-3.0-IGO",
"CC-BY-SA-4.0",
"CC-PDDC",
"CC-PDM-1.0",
"CC-SA-1.0",

"CC0-1.0",
"CDDL-1.0",
"CDDL-1.1",
"CDL-1.0",
"CDLA-Permissive-1.0",
"CDLA-Permissive-2.0",
"CDLA-Sharing-1.0",
"CECILL-1.0",
"CECILL-1.1",
"CECILL-2.0",
"CECILL-2.1",
"CECILL-B",
"CECILL-C",
"CERN-OHL-1.1",
"CERN-OHL-1.2",
"CERN-OHL-P-2.0",
"CERN-OHL-S-2.0",
"CERN-OHL-W-2.0",
"CFITSIO",
"CMU-Mach",
"CMU-Mach-nodoc",
"CNRI-Jython",
"CNRI-Python",
"CNRI-Python-GPL-Compatible",
"COIL-1.0",
"CPAL-1.0",
"CPL-1.0",
"CPOL-1.02",
"CUA-OPL-1.0",
"Caldera",
"Caldera-no-preamble",
"Catharon",
"ClArtistic",
"Clips",
"Community-Spec-1.0",
"Condor-1.1",
"Cornell-Lossless-JPEG",
"Cronyx",
"Crossword",
"CryptoSwift",
"CrystalStacker",
"Cube",
"D-FSL-1.0",
"DEC-3-Clause",
"DL-DE-BY-2.0",
"DL-DE-ZERO-2.0",
"DOC",
"DRL-1.0",

"DRL-1.1",
"DSDP",
"DocBook-DTD",
"DocBook-Schema",
"DocBook-Stylesheet",
"DocBook-XML",
"Dotseqn",
"ECL-1.0",
"ECL-2.0",
"EFL-1.0",
"EFL-2.0",
"EPICS",
"EPL-1.0",
"EPL-2.0",
"ESA-PL-permissive-2.4",
"ESA-PL-strong-copyleft-2.4",
"ESA-PL-weak-copyleft-2.4",
"EUDatagrid",
"EUPL-1.0",
"EUPL-1.1",
"EUPL-1.2",
"Elastic-2.0",
"Entessa",
"ErlPL-1.1",
"Eurosym",
"FBM",
"FDK-AAC",
"FSFAP",
"FSFAP-no-warranty-disclaimer",
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"FSL-1.1-ALv2",
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"GFDL-1.1-invariants-only",
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"GFDL-1.1-no-invariants-only",
"GFDL-1.1-no-invariants-or-later",

"GFDL-1.1-only",
"GFDL-1.1-or-later",
"GFDL-1.2-invariants-only",
"GFDL-1.2-invariants-or-later",
"GFDL-1.2-no-invariants-only",
"GFDL-1.2-no-invariants-or-later",
"GFDL-1.2-only",
"GFDL-1.2-or-later",
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# including the comment lines; this means that e.g. `FTL.TXT' matches all
# files that have this string in the file name (including the path relative
# to the current directory, always starting with `./').
#
# Don't put empty lines into this file!
#
builds/unix/pkg.m4
#
docs/FTL.TXT
docs/GPLv2.TXT
#
include/freetype/internal/fthash.h
#
src/base/fthash.c
src/base/md5.c
src/base/md5.h
#
src/bdf/bdf.c
src/bdf/bdf.h
src/bdf/bdfdrivr.c
src/bdf/bdfdrivr.h
src/bdf/bdferror.h
```

src/bdf/bdflib.c
src/bdf/module.mk
src/bdf/README
src/bdf/rules.mk
#
src/pcf/module.mk
src/pcf/pcf.c
src/pcf/pcf.h
src/pcf/pcfdrivr.c
src/pcf/pcfdrivr.h
src/pcf/pcferror.h
src/pcf/pcfread.c
src/pcf/pcfread.h
src/pcf/pcfutil.c
src/pcf/pcfutil.h
src/pcf/README
src/pcf/rules.mk
#
src/gzip/adler32.c
src/gzip/ftzconf.c
src/gzip/infblock.c
src/gzip/infblock.h
src/gzip/infcodes.c
src/gzip/infcodes.h
src/gzip/inffixed.h
src/gzip/inflate.c
src/gzip/inftrees.c
src/gzip/inftrees.h
src/gzip/infutil.c
src/gzip/infutil.h
src/gzip/zconf.h
src/gzip/zlib.h
src/gzip/zutil.c
src/gzip/zutil.h
#
src/tools/apinames.c
src/tools/ftrandom/ftrandom.c
#
subprojects/dlg
#
#
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The contributed BDF and PCF drivers come with a license similar to that of the X Window System. It is compatible to the above two licenses (see files `src/bdf/README` and `src/pcf/README`). The same holds for the source code files `src/base/fthash.c` and `include/freetype/internal/fthash.h`; they were part of the BDF driver in earlier FreeType versions.

The gzip module uses the zlib license (see `src/gzip/zlib.h`) which too is compatible to the above two licenses.

The files `src/autofit/ft-hb-ft.c`, `src/autofit/ft-hb-decls.h`, `src/autofit/ft-hb-types.h`, and `src/autofit/hb-script-list.h` contain code taken (almost) verbatim from the HarfBuzz library, which uses the 'Old MIT' license compatible to the above two licenses.

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# 1.3135 json-iterator-go 1.1.12

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# 1.3136 go-autorest-autorest-azure-cli 0.4.6

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# 1.3137 wolfi-baselayout 20230201-r28

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```
package:
 name: libart-lgpl
 version: 2.3.21
 epoch: 3
 description: A library for high-performance 2D graphics
 copyright:
   - license: LGPL-2.0-or-later

var-transforms:
 - from: ${{package.version}}
   match: ^(\d+)\.(\d+)\.(\d+)$
   replace: LIBART_LGPL_${1}_${2}_$3
   to: tag-name

environment:
 contents:
   packages:
     - autoconf
     - automake
     - build-base
     - busybox
     - ca-certificates-bundle
     - libtool

pipeline:
 - uses: git-checkout
   with:
     repository: https://gitlab.gnome.org/Archive/libart_lgpl
     tag: ${{vars.tag-name}}
     expected-commit: 7119bfe163a5a5325405acb7eab1b16152e8032a

 - runs: autoreconf -vif
```

```
 - uses: autoconf/configure
   with:
     opts: |
       --disable-static

 - uses: autoconf/make

 - uses: autoconf/make-install

 - uses: strip

subpackages:
 - name: libart-lgpl-dev
   pipeline:
     - uses: split/dev
   dependencies:
     runtime:
       - libart-lgpl
   description: libart-lgpl dev
    test:
     pipeline:
       - runs: |
           libart2-config --version
       - uses: test/pkgconf
       - uses: test/tw/ldd-check

update:
 enabled: true
 release-monitor:
   identifier: 21864

test:
 pipeline:
   - uses: test/tw/ldd-check
```

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```
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  distributed under the License is distributed on an "AS IS" BASIS,
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  limitations under the License.
package:
 name: py3-license-expression
 version: "30.4.4"
 epoch: 1
 description: license-expression is a comprehensive utility library to parse, compare, simplify and normalize license
expressions (such as SPDX license expressions) using boolean logic.
 copyright:
  - license: Apache-2.0
 dependencies:
  provider-priority: 0

vars:
 pypi-package: license-expression
 import: license_expression

data:
 - name: py-versions
  items:
   3.10: '310'
   3.11: '311'
   3.12: '312'
   3.13: '313'

environment:
 contents:
  packages:
   - py3-supported-build-base

pipeline:
 - uses: git-checkout
  with:
   repository: https://github.com/nexB/license-expression
   tag: v${{package.version}}
   expected-commit: a3c00c09986bcca1240afd5b1844b56de3f581c1

subpackages:
 - range: py-versions
  name: py${{range.key}}-${{vars.pypi-package}}
  description: python${{range.key}} version of ${{vars.pypi-package}}
  dependencies:
   provider-priority: ${{range.value}}
    provides:
     - ${{package.name}}
```

```
      - py3-${{vars.pypi-package}}
    runtime:
      - py${{range.key}}-boolean.py
  pipeline:
    - uses: py/pip-build-install
      with:
        python: python${{range.key}}
    - uses: strip
  test:
    pipeline:
      - uses: python/import
        with:
          python: python${{range.key}}
          imports: |
            import ${{vars.import}}

- name: py3-supported-${{vars.pypi-package}}
  description: meta package providing ${{vars.pypi-package}} for supported python versions.
  dependencies:
    runtime:
      - py3.10-${{vars.pypi-package}}
      - py3.11-${{vars.pypi-package}}
      - py3.12-${{vars.pypi-package}}
      - py3.13-${{vars.pypi-package}}
  test:
    pipeline:
      - uses: test/metapackage

test:
 pipeline:
   - uses: python/import
     with:
       imports: |
         import ${{vars.import}}

update:
 enabled: true
 github:
   identifier: nexB/license-expression
    strip-prefix: v
package:
 name: go-licenses
 version: "2.0.1"
 epoch: 2 # CVE-2025-61729
 description: A lightweight tool to report on the licenses used by a Go package and its dependencies. Highlight!
Versioned external URL to licenses can be found at the same time.
 copyright:
   - license: Apache-2.0
```

```
pipeline:
 - uses: git-checkout
   with:
     repository: https://github.com/google/go-licenses
     tag: v${{package.version}}
     expected-commit: 3e084b0caf710f7bfead967567539214f598c0a2

 - uses: go/build
   with:
     modroot: .
     packages: .
     output: go-licenses

update:
 enabled: true
 github:
   identifier: google/go-licenses
   strip-prefix: v

test:
 pipeline:
   # AUTOGENERATED
   - runs: |
       go-licenses --help
issuer: https://accounts.google.com

# staging-enforce: ci-license-checka7daalc99klekq@staging-enforce-cd1e.iam.gserviceaccount.com
(111508570611001124410)
# prod-images: TODO
subject_pattern: "(111508570611001124410)"

permissions:
 checks: write
 pull_requests: write # need to comment on PRs
```

# 1.3138 go-autorest-autorest-azure-auth 0.5.13

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more than your reasonable cost of physically performing this
conveying of source, or (2) access to copy the
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alternative is allowed only occasionally and noncommercially, and
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with subsection 6b.

d) Convey the object code by offering access from a designated
place (gratis or for a charge), and offer equivalent access to the
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the same way through the same place at no
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which
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covered by this License.
Section 6 states terms for distribution of such executables.

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derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library. The
threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small inline
functions (ten lines or less in length), then the use of the object
file is unrestricted, regardless of whether it is legally a derivative
work. (Executables containing this object code plus portions of the
Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may
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Section 6.
Any executables containing that work also fall under Section 6,
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# 1.3146 commons-daemon 1.5.1

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Julian Seward, jseward@acm.org
bzip2/libbzip2 version 1.0.8 of 13 July 2019

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# 1.3153 libbz2-1 1.0.8-r23

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Julian Seward, jseward@acm.org
bzip2/libbzip2 version 1.0.8 of 13 July 2019

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Version 3.0, 18 August 2009

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# 1.3155 dumb-init 1.2.5-r11

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Upstream-Name: dumb-init
Source: https://github.com/Yelp/dumb-init/

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# 1.3156 libbrotlicommon1 1.2.0-r2

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---
fontconfig/fc-case/CaseFolding.txt

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fontconfig/src/fcatomic.h

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* Mutex operations.  Originally copied from HarfBuzz.
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---

fontconfig/src/fcfoundry.h

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---

fontconfig/src/fcmd5.h

/*
* This code implements the MD5 message-digest algorithm.
* The algorithm is due to Ron Rivest.  This code was
* written by Colin Plumb in 1993, no copyright is claimed.
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*
* Equivalent code is available from RSA Data Security, Inc.
* This code has been tested against that, and is equivalent,
* except that you don't need to include two pages of legalese
* with every copy.

```
*
* To compute the message digest of a chunk of bytes, declare an
* MD5Context structure, pass it to MD5Init, call MD5Update
 as
* needed on buffers full of bytes, and then call MD5Final, which
* will fill a supplied 16-byte array with the digest.
*/
```

---

fontconfig/src/fcmutex.h

```
/*
* Atomic int and pointer operations.  Originally copied from HarfBuzz.
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*/
```

---

fontconfig/src/ftglue.[ch]

```
/* ftglue.c: Glue code for compiling the OpenType code from
*          FreeType 1 using only the public API of FreeType 2
*
* By David Turner, The FreeType Project (www.freetype.org)
*
* This code is explicitely put in the public domain
*
* ============================================================================
*
* the OpenType
 parser codes was originally written as an extension to
* FreeType 1.x. As such, its source code was embedded within the library,
* and used many internal FreeType functions to deal with memory and
* stream i/o.
*
* When it was 'salvaged' for Pango and Qt, the code was "ported" to FreeType 2,
* which basically means that some macro tricks were performed in order to
* directly access FT2 _internal_ functions.
*
* these functions were never part of FT2 public API, and _did_ change between
* various releases. This created chaos for many users: when they upgraded the
* FreeType library on their system, they couldn't run Gnome anymore since
* Pango refused to link.
*
* Very fortunately, it's possible to completely avoid this problem because
* the FT_StreamRec and FT_MemoryRec structure types, which describe how
* memory and stream implementations interface with the rest of the font
* library, have always been part of the public API, and never changed.
*
* What we do
 thus is re-implement, within the OpenType parser, the few
* functions that depend on them. This only adds one or two kilobytes of
* code, and ensures that the parser can work with _any_ version
* of FreeType installed on your system. How sweet... !
*
* Note that we assume that Pango doesn't use any other internal functions
* from FreeType. It used to in old versions, but this should no longer
* be the case. (crossing my fingers).
*
*  - David Turner
*  - The FreeType Project  (www.freetype.org)
*
* PS: This "glue" code is explicitely put in the public domain
*/
```

# 1.3158 libbrotlidec1 1.2.0-r2

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fontconfig/src/fcatomic.h

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* Mutex operations.  Originally copied from HarfBuzz.
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*/

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fontconfig/src/fcfoundry.h

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*/

---

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/*
* This code implements the MD5 message-digest algorithm.
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* Equivalent code is available from RSA Data Security, Inc.
* This code has been tested against that, and is equivalent,
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*

```
* To compute the message digest of a chunk of bytes, declare an
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 as
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*/
```

---

fontconfig/src/fcmutex.h

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* Atomic int and pointer operations.  Originally copied from HarfBuzz.
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* Google Author(s): Behdad Esfahbod
*/
```

---

fontconfig/src/ftglue.[ch]

```
/* ftglue.c: Glue code for compiling the OpenType code from
```

```
*          FreeType 1 using only the public API of FreeType 2
*
* By David Turner, The FreeType Project (www.freetype.org)
*
* This code is explicitely put in the public domain
*
* ==========================================================================
*
* the OpenType
 parser codes was originally written as an extension to
* FreeType 1.x. As such, its source code was embedded within the library,
* and used many internal FreeType functions to deal with memory and
* stream i/o.
*
* When it was 'salvaged' for Pango and Qt, the code was "ported" to FreeType 2,
* which basically means that some macro tricks were performed in order to
* directly access FT2 _internal_ functions.
*
* these functions were never part of FT2 public API, and _did_ change between
* various releases. This created chaos for many users: when they upgraded the
* FreeType library on their system, they couldn't run Gnome anymore since
* Pango refused to link.
*
* Very fortunately, it's possible to completely avoid this problem because
* the FT_StreamRec and FT_MemoryRec structure types, which describe how
* memory and stream implementations interface with the rest of the font
* library, have always been part of the public API, and never changed.
*
* What we do
 thus is re-implement, within the OpenType parser, the few
* functions that depend on them. This only adds one or two kilobytes of
* code, and ensures that the parser can work with _any_ version
* of FreeType installed on your system. How sweet... !
*
* Note that we assume that Pango doesn't use any other internal functions
* from FreeType. It used to in old versions, but this should no longer
* be the case. (crossing my fingers).
*
*  - David Turner
*  - The FreeType Project  (www.freetype.org)
*
* PS: This "glue" code is explicitely put in the public domain
*/
```

# 1.3160 libpkit 0.26.2-r1

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# 1.3161 python-setuptools 82.0.1

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Please avoid changing it manually.

You can report issues or suggest changes directly to `validate-pyproject`
(or to the relevant plugin repository)

- https://github.com/abravalheri/validate-pyproject/issues

***

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***

`fastjsonschema`
==========

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`validate-pyproject`
==========

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# 1.3164 libbrotlienc1 1.2.0-r2

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Version 3.1, 31 March 2009

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/* Use the Sequent Symmetry assembler syntax.  */

/* Define the syntax of pseudo-ops, labels and comments.  */

/* Prefix for internally generated assembler
 labels.  If we aren't using
  underscores, we are using prefix `.'s to identify labels that should
  be ignored, as in `i386/gas.h' --karl@cs.umb.edu  */

#define LPREFIX "L"

/* Assembler pseudos to introduce constants of various size.  */

#define ASM_BYTE "\t.byte\t"
#define ASM_SHORT "\t.word\t"
#define ASM_LONG "\t.long\t"
#define ASM_QUAD "\t.quad\t"  /* Should not be used for 32bit compilation.  */

/* This was suggested, but it shouldn't be right for debugger output. -- RMS
  #define ASM_OUTPUT_SOURCE_FILENAME(FILE, NAME) */


/* Define the syntax of labels and symbol definitions/declarations.  */

/* This is how to output an assembler line
  that says to advance the location counter by SIZE bytes.  */

#define ASM_OUTPUT_SKIP(FILE,SIZE)  \
 fprintf (FILE, "\t.space " HOST_WIDE_INT_PRINT_UNSIGNED"\n", (SIZE))

/* Define the syntax of labels and symbol definitions/declarations.  */

/* This says how to output an assembler line
  to define a global common symbol.  */

#define
 ASM_OUTPUT_COMMON(FILE, NAME, SIZE, ROUNDED)  \
( fputs (".comm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u\n", (int)(ROUNDED)))
```

```
/* This says how to output an assembler line
  to define a local common symbol.  */

#define ASM_OUTPUT_LOCAL(FILE, NAME, SIZE, ROUNDED)  \
( fputs (".lcomm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u\n", (int)(ROUNDED)))

#ifdef HAVE_GAS_LCOMM_WITH_ALIGNMENT
#define ASM_OUTPUT_ALIGNED_LOCAL(FILE, NAME, SIZE, ALIGNMENT)  \
( fputs (".lcomm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u,%u\n", (int)(SIZE), (int)(ALIGNMENT) / BITS_PER_UNIT))
#endif

/* This is how to output an assembler line
  that says to advance the location counter
  to a multiple of 2**LOG bytes.  */

#define ASM_OUTPUT_ALIGN(FILE,LOG) \
 if ((LOG)!=0) fprintf ((FILE), "\t.align %d\n", (LOG))

/* This is how to store into the string BUF
  the symbol_ref name of an internal numbered
 label where
  PREFIX is the class of label and NUM is the number within the class.
  This is suitable for output with `assemble_name'.  */

#define ASM_GENERATE_INTERNAL_LABEL(BUF,PREFIX,NUMBER) \
   sprintf ((BUF), "*%s%ld", (PREFIX), (long)(NUMBER))

/* The prefix to add to user-visible assembler symbols.  */

#define USER_LABEL_PREFIX "_"
```

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GCC RUNTIME LIBRARY EXCEPTION

Version 3.1, 31 March 2009

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   License along with this program; if not, write to the Free Software
   Foundation, Inc., 51 Franklin Street - Fifth Floor, Boston, MA
   02110-1301, USA.  */


#ifndef __VTV_H__
#define __VTV_H__

/* We could have used an enumeration here but it just makes it more
   difficult for the compiler to generate a call to this.  These are
   used as arguments to the function __VLTChangePermission, declared
   below.  */
#define __VLTP_READ_ONLY  0
#define __VLTP_READ_WRITE 1

#ifdef __cplusplus
extern "C" void __VLTChangePermission (int);
#else
extern void __VLTChangePermission (int);
#endif

#ifdef BIG_PAGE_SIZE
/* TODO - Replace '4096' below with correct big page size.  */
#define VTV_PAGE_SIZE 4096
```

```
#else
#if defined(__sun__) && defined(__svr4__) && defined(__sparc__)
#define VTV_PAGE_SIZE 8192
#elif defined(__loongarch_lp64)
/* The page size is configurable by the kernel to be 4,
 16 or 64 KiB.
  For now, only the default page size of 16KiB is supported.  */
#define VTV_PAGE_SIZE 16384
#else
#define VTV_PAGE_SIZE 4096
#endif
#endif



#endif /* __VTV_H__ */
```

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/* Use the Sequent Symmetry assembler syntax.  */

/* Define the syntax of pseudo-ops, labels and comments.  */

/* Prefix for internally generated assembler
 labels.  If we aren't using
  underscores, we are using prefix `.'s to identify labels that should
  be ignored, as in `i386/gas.h' --karl@cs.umb.edu  */

#define LPREFIX "L"

/* Assembler pseudos to introduce constants of various size.  */

#define ASM_BYTE "\t.byte\t"
#define ASM_SHORT "\t.word\t"
#define ASM_LONG "\t.long\t"
#define ASM_QUAD "\t.quad\t"  /* Should not be used for 32bit compilation.  */
```

```
/* This was suggested, but it shouldn't be right for debugger output. -- RMS
  #define ASM_OUTPUT_SOURCE_FILENAME(FILE, NAME) */


/* Define the syntax of labels and symbol definitions/declarations.  */

/* This is how to output an assembler line
  that says to advance the location counter by SIZE bytes.  */

#define ASM_OUTPUT_SKIP(FILE,SIZE)  \
 fprintf (FILE, "\t.space " HOST_WIDE_INT_PRINT_UNSIGNED"\n", (SIZE))

/* Define the syntax of labels and symbol definitions/declarations.  */

/* This says how to output an assembler line
  to define a global common symbol.  */

#define
 ASM_OUTPUT_COMMON(FILE, NAME, SIZE, ROUNDED)  \
( fputs (".comm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u\n", (int)(ROUNDED)))

/* This says how to output an assembler line
  to define a local common symbol.  */

#define ASM_OUTPUT_LOCAL(FILE, NAME, SIZE, ROUNDED)  \
( fputs (".lcomm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u\n", (int)(ROUNDED)))

#ifdef HAVE_GAS_LCOMM_WITH_ALIGNMENT
#define ASM_OUTPUT_ALIGNED_LOCAL(FILE, NAME, SIZE, ALIGNMENT)  \
( fputs (".lcomm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u,%u\n", (int)(SIZE), (int)(ALIGNMENT) / BITS_PER_UNIT))
#endif

/* This is how to output an assembler line
  that says to advance the location counter
  to a multiple of 2**LOG bytes.  */

#define ASM_OUTPUT_ALIGN(FILE,LOG) \
 if ((LOG)!=0) fprintf ((FILE), "\t.align %d\n", (LOG))

/* This is how to store into the string BUF
  the symbol_ref name of an internal numbered
```

```
 label where
  PREFIX is the class of label and NUM is the number within the class.
  This is suitable for output with `assemble_name'.  */

#define ASM_GENERATE_INTERNAL_LABEL(BUF,PREFIX,NUMBER) \
   sprintf ((BUF), "*%s%ld", (PREFIX), (long)(NUMBER))

/* The prefix to add to user-visible assembler symbols.  */

#define USER_LABEL_PREFIX "_"
```

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Version 3.1, 31 March 2009

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```
  02110-1301, USA.  */


#ifndef __VTV_H__
#define __VTV_H__

/* We could have used an enumeration here but it just makes it more
  difficult for the compiler to generate a call to this.  These are
  used as arguments to the function __VLTChangePermission, declared
  below.  */
#define __VLTP_READ_ONLY  0
#define __VLTP_READ_WRITE 1

#ifdef __cplusplus
extern "C" void __VLTChangePermission (int);
#else
extern void __VLTChangePermission (int);
#endif

#ifdef BIG_PAGE_SIZE
/* TODO - Replace '4096' below with correct big page size.  */
#define VTV_PAGE_SIZE 4096
#else
#if defined(__sun__) && defined(__svr4__) && defined(__sparc__)
#define VTV_PAGE_SIZE 8192
#elif defined(__loongarch_lp64)
/* The page size is configurable by the kernel to be 4,
 16 or 64 KiB.
  For now, only the default page size of 16KiB is supported.  */
#define VTV_PAGE_SIZE 16384
#else
#define VTV_PAGE_SIZE 4096
#endif
#endif



#endif /* __VTV_H__ */
```

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```
Index: tdbsa/tdb.c
===================================================================
--- tdbsa.orig/tdb.c
+++ tdbsa/tdb.c
@@ -4,11 +4,11 @@ Rev: 23371
Last Changed Date: 2007-06-06 20:14:06 -0400 (Wed, 06 Jun 2007)
*/
 /*
-   Unix SMB/CIFS implementation.
+   trivial database library - standalone version

-   trivial database library - private includes
-
-   Copyright (C) Andrew Tridgell            2005
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Gadi Oxman, August 1995
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Theodore Ts'o
23-June-2007

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compelled
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relink to produce a modified
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library `Frob' (a library for tweaking knobs) written by James Random Hacker.

```
 <signature of Ty Coon>, 1 April 1990
 Ty Coon, President of Vice

That's all there is to it!
#
# This is a Makefile stub which handles the creation of BSD shared
# libraries.
#
# In order to use this stub, the following makefile variables must be defined.
#
# BSDLIB_VERSION = 1.0
# BSDLIB_IMAGE = libce
# BSDLIB_MYDIR = et
# BSDLIB_INSTALL_DIR = $(SHLIBDIR)
#

all:: image

real-subdirs:: Makefile
 @echo " MKDIR pic"
 @mkdir -p pic

BSD_LIB = $(BSDLIB_IMAGE).so.$(BSDLIB_VERSION)
BSDLIB_PIC_FLAG = -fpic

image:  $(BSD_LIB)

$(BSD_LIB): $(OBJS)
 (cd pic; ld -Bshareable -o $(BSD_LIB) $(LDFLAGS_SHLIB) $(OBJS))
 $(MV) pic/$(BSD_LIB) .
 $(RM) -f ../$(BSD_LIB)
 (cd ..; $(LN) $(LINK_BUILD_FLAGS) \
  `echo $(my_dir) | sed -e 's;lib/;;'`/$(BSD_LIB) $(BSD_LIB))

install-shlibs install:: $(BSD_LIB)
 @echo " INSTALL_PROGRAM $(BSDLIB_INSTALL_DIR)/$(BSD_LIB)"
 @$(INSTALL_PROGRAM) $(BSD_LIB) \
  $(DESTDIR)$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)
 @-$(LDCONFIG)

install-strip: install

install-shlibs-strip:: install-shlibs

uninstall-shlibs uninstall::
 $(RM) -f $(DESTDIR)$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)

clean::
```

```
 $(RM)
 -rf pic
 $(RM) -f $(BSD_LIB)
 $(RM) -f ../$(BSD_LIB)
```

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Source: http://sourceforge.net/projects/e2fsprogs
Comment:
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@@ -4,11 +4,11 @@ Rev: 23371
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*/
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Appendix: How to Apply These Terms to Your New Programs

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To do so, attach the following notices to the program. It is safest
to attach them to the start of each source file to most effectively
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the "copyright" line and a pointer to where the full notice is found.

<one line to give the program's name and a brief idea of what it does.>
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If the program is interactive, make it output a short notice like this

when it starts in an interactive mode:

```
  Gnomovision version 69, Copyright (C) 19yy name of author
  Gnomovision comes with ABSOLUTELY NO WARRANTY;
for details type `show w'.
  This is free software, and you are welcome to redistribute it
  under certain conditions; type `show c' for details.
```

The hypothetical commands `show w' and `show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than `show w' and `show c'; they could even be mouse-clicks or menu items--whatever suits your program.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the program, if necessary. Here is a sample; alter the names:

```
 Yoyodyne, Inc., hereby disclaims all copyright interest in the program
 `Gnomovision' (which makes passes at compilers) written by James Hacker.

 <signature of Ty Coon>, 1 April 1989
 Ty Coon, President of Vice
```

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before you ship. The release schedules for this package are flexible, if you give me enough lead time.

Theodore Ts'o
23-June-2007

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If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

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The hypothetical commands `show w' and `show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than `show w' and `show c'; they could even be mouse-clicks or menu items--whatever suits your program.

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<signature of Ty Coon>, 1 April 1989
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distribute the source code, even though third parties are not
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to copy the source along with the object code.

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Section 6 states terms for distribution of such executables.

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Whether this is true is especially significant if the work can be
linked without the Library,
or if the work is itself a library. The
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```
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```

That's all there is to it!

```
#
# This is a Makefile stub which handles the creation of BSD shared
# libraries.
#
# In order to use this stub, the following makefile variables must be defined.
#
# BSDLIB_VERSION = 1.0
# BSDLIB_IMAGE = libce
# BSDLIB_MYDIR = et
# BSDLIB_INSTALL_DIR = $(SHLIBDIR)
#

all:: image

real-subdirs:: Makefile
 @echo " MKDIR pic"
 @mkdir -p pic

BSD_LIB = $(BSDLIB_IMAGE).so.$(BSDLIB_VERSION)
BSDLIB_PIC_FLAG = -fpic

image:  $(BSD_LIB)

$(BSD_LIB): $(OBJS)
 (cd pic; ld -Bshareable -o $(BSD_LIB) $(LDFLAGS_SHLIB) $(OBJS))
 $(MV) pic/$(BSD_LIB) .
 $(RM) -f ../$(BSD_LIB)
 (cd ..; $(LN) $(LINK_BUILD_FLAGS) \
  `echo $(my_dir) | sed -e 's;lib/;;'`/$(BSD_LIB) $(BSD_LIB))

install-shlibs install:: $(BSD_LIB)
 @echo " INSTALL_PROGRAM $(BSDLIB_INSTALL_DIR)/$(BSD_LIB)"
 @$(INSTALL_PROGRAM) $(BSD_LIB) \
  $(DESTDIR)$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)
 @-$(LDCONFIG)

install-strip: install

install-shlibs-strip:: install-shlibs
```

```
uninstall-shlibs uninstall::
 $(RM) -f $(DESTDIR)$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)

clean::
 $(RM)
 -rf pic
 $(RM) -f $(BSD_LIB)
 $(RM) -f ../$(BSD_LIB)
```

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Upstream-Contact: Theodore Ts'o <tytso@mit.edu>
Source: http://sourceforge.net/projects/e2fsprogs
Comment:
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written by Theodore Ts'o <tytso@mit.edu> and Remy Card <card@masi.ibp.fr>.

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# 1.3175 aws-sdk-secretsmanager 1.76.0

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# 1.3178 pinky-swear 6.1.0

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# 1.3179 aws-runtime 1.5.10

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# 1.3180 oauth 4.4.2

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# 1.3187 websocket-client 2.1

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# 1.3189 roaring 0.11.2

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# 1.3190 aws-smithy-runtime 1.9.2

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# 1.3191 lapin 2.5.3

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# 1.3196 combine 4.6.6

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# 1.3198 rustyline 17.0.2

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name: license

on:
pull_request:
types: [opened, synchronize, reopened]
push:

```
  branches:
    - main

jobs:
 check-license:
   name: Check License
   runs-on: ubuntu-latest
   timeout-minutes: 3

   steps:
     - uses: actions/checkout@v3
     - name: Check License Header
       uses: apache/skywalking-eyes@v0.3.0
```

# 1.3204 aws-sdk-kinesis 1.66.0

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# 1.3206 hibernate-community-dialects 7.1.8.Final

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# 1.3211 async-graphql-warp 7.0.17

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# 1.3216 aws-sdk-firehose 1.71.0

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* /async-nats-0-42-0-tar-gz/async-nats-0.42.0/tests/kv_tests.rs
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* /async-nats-0-42-0-tar-gz/async-nats-0.42.0/tests/websocket_test.rs
* /async-nats-0-42-0-tar-gz/async-nats-0.42.0/src/service/endpoint.rs
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/async-nats-0-42-0-tar-gz/async-nats-0.42.0/src/jetstream/consumer/push.rs
* /async-nats-0-42-0-tar-gz/async-nats-0.42.0/src/lib.rs
* /async-nats-0-42-0-tar-gz/async-nats-0.42.0/examples/sync_context.rs
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# 1.3219 aws-sdk-cloudwatchlogs 1.76.0

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# 1.3221 aws-smithy-runtime-api 1.9.0

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# 1.3223 aws-smithy-http 0.62.3

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# 1.3224 redis 0.32.5

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- web-app_5_0.xsd
- web-app_6_0.xsd
- web-commonn_5_0.xsd
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For the following XML Schemas for Java EE Deployment Descriptors:
- javaee_5.xsd
- javaee_web_services_1_2.xsd
- javaee_web_services_client_1_2.xsd
- javaee_6.xsd
- javaee_web_services_1_3.xsd
- javaee_web_services_client_1_3.xsd
- web-app_3_0.xsd
- web-common_3_0.xsd
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org.apache.tomcat.util.json.JSONParser.jj is
 a public domain javacc grammar
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https://github.com/RobertFischer/json-parser

For portions of the Tomcat JNI OpenSSL API and the OpenSSL JSSE integration
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The original XML Schemas for Java EE Deployment Descriptors:

- javaee_5.xsd
- javaee_web_services_1_2.xsd
- javaee_web_services_client_1_2.xsd
- javaee_6.xsd
- javaee_web_services_1_3.xsd
- javaee_web_services_client_1_3.xsd
- jsp_2_2.xsd
- web-app_3_0.xsd
- web-common_3_0.xsd
- web-fragment_3_0.xsd
- javaee_7.xsd
- javaee_web_services_1_4.xsd
- javaee_web_services_client_1_4.xsd
- jsp_2_3.xsd
- web-app_3_1.xsd
- web-common_3_1.xsd
- web-fragment_3_1.xsd
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may be obtained from:
http://www.oracle.com/webfolder/technetwork/jsc/xml/ns/javaee/index.html

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- jsp_2_2.xsd
- web-app_3_0.xsd
- web-common_3_0.xsd
- web-fragment_3_0.xsd
- javaee_7.xsd
- javaee_web_services_1_4.xsd
- javaee_web_services_client_1_4.xsd
- jsp_2_3.xsd
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- jsp_2_2.xsd
- web-app_3_0.xsd
- web-common_3_0.xsd
- web-fragment_3_0.xsd
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*       bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*       bug 403086 - [compiler][null] include the effect of 'assert' in syntactic null analysis for fields
*       bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred
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*       Bug 405066 - [1.8][compiler][codegen] Implement code generation infrastructure for JSR335
*       Bug 406982 - [1.8][compiler] Generation of MethodParameters Attribute in classfile
*     Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                     Bug 405104 - [1.8][compiler][codegen] Implement support for serializeable lambdas
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*    het@google.com - Bug 415274 - Annotation processing throws a NPE in getElementsAnnotatedWith()
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```

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/apt/dispatch/RoundEnvImpl.java
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* Contributors:
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*     Stephan Herrmann - Contributions for
*       bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
```

```
*       Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*       Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                       Bug 415543 - [1.8][compiler] Incorrect bound index in RuntimeInvisibleTypeAnnotations attribute
*******************************************************************************/
```

Found
 in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/TypeParameter.java
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*     Stephan Herrmann - Contributions for
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 367203 - [compiler][null] detect assigning null to nonnull argument
*       bug 365519 - editorial cleanup after bug 186342 and bug 365387
*       bug 365531 - [compiler][null] investigate alternative strategy for internally encoding nullness defaults
*       bug 382353 - [1.8][compiler] Implementation property modifiers
 should be accepted on default methods.
*       bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       bug 388281 - [compiler][null] inheritance of null annotations as an option
*       bug 401030 - [1.8][null] Null analysis support for lambda methods.
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*       Bug 403216 - [1.8][null] TypeReference#captureTypeAnnotations treats type annotations as type argument
annotations
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*       Bug 435570 - [1.8][null] @NonNullByDefault illegally tries to affect "throws E"
*       Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize
 declaration style null annotations
*       Bug 466713 - Null Annotations: NullPointerException using <int @Nullable []> as Type Param
*******************************************************************************/
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*     Jesper S Moller - Contributions for
*       bug 382701 - [1.8][compiler] Implement semantic analysis of Lambda expressions & Reference expression
*                    Bug 384687 - [1.8] Wildcard type arguments should be rejected for lambda and reference
expressions
*       Bug 416885 - [1.8][compiler]IncompatibleClassChange error (edit)
*    Stephan Herrmann - Contribution for
*       bug 402028 - [1.8][compiler] null analysis for reference
 expressions
*       bug 404649 - [1.8][compiler] detect illegal reference to indirect or redundant super via I.super.m() syntax
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 415850 - [1.8] Ensure RunJDTCoreTests can cope with null annotations enabled
*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 423504 - [1.8] Implement "18.5.3 Functional Interface Parameterization Inference"
*       Bug 424637 - [1.8][compiler][null] AIOOB in ReferenceExpression.resolveType with a method reference to
Files::walk
*       Bug 424415 - [1.8][compiler] Eventual resolution of ReferenceExpression is not seen to be happening.
*       Bug 424403 - [1.8][compiler] Generic method call with method reference argument fails to resolve properly.
*       Bug 427196 - [1.8][compiler] Compiler error for method reference to overloaded method
*       Bug 427438
 - [1.8][compiler] NPE at
org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*       Bug 428264 - [1.8] method reference of generic class causes problems (wrong inference result or NPE)
*       Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*       Bug 426537 - [1.8][inference] Eclipse compiler thinks I<? super J> is compatible with I<J<?>> - raw type J
involved
*       Bug 435570 - [1.8][null] @NonNullByDefault illegally tries to affect "throws E"
*       Bug 435689 - [1.8][inference] Type inference not occurring with lambda expression and method reference
*       Bug 438383 - [1.8][null] Bogus warning: Null type safety at method return type
*       Bug 434483 - [1.8][compiler][inference] Type inference not picked up with method reference
*       Bug 441734 - [1.8][inference] Generic method with nested parameterized type argument fails on method reference
*       Bug 438945 - [1.8] NullPointerException
 InferenceContext18.checkExpression in java 8 with generics, primitives, and overloading
*       Bug 452788 - [1.8][compiler] Type not correctly inferred in lambda expression
*       Bug 448709 - [1.8][null] ensure we don't infer types that violate null constraints on a type parameter's bound
*       Bug 459967 - [null] compiler should know about nullness of special methods like MyEnum.valueOf()
*       Bug 466713 - Null Annotations: NullPointerException using <int @Nullable []> as Type Param
```

```
*       Bug 470542 - NullPointerException in ReferenceExpression.isPotentiallyCompatibleWith (962)
*       Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contribution for
*                       Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
work)
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ReferenceExpression.java
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*         Bug 407191 - [1.8] Binary access support for type annotations
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/TypeAnnotationInfo.java
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*       bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*       bug 403086 - [compiler][null] include the effect of 'assert' in syntactic null analysis for fields
*       bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred
checking
*       Bug 422796 - [compiler][null] boxed boolean reported as potentially null after
```

null test in lazy disjunction
**********/

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*  BEA - Patch for bug 172743
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*  Bug 365662 - [compiler][null] warn on contradictory and redundant null annotations
*  Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*  Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*  Keigo Imai - Contribution for bug 388903 - Cannot extend inner class as an anonymous class when it extends the outer class
**********/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/NestedTypeBinding.java

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*           bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*           bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 265744 - Enum switch should warn about missing default
*       bug 374605 - Unreasonable warning for enum-based switch statements
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
 ********************************************************************************/
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*       bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*       bug 331649 - [compiler][null] consider null annotations for fields
```

```
*       bug 400761 - [compiler][null] null may be return as boolean without a diagnostic
*       Bug 427438 - [1.8][compiler] NPE at
org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
 *       Bug 429403 - [1.8][null] null mismatch from type arguments is not reported at field initializer
*       Bug 453483 - [compiler][null][loop] Improve null analysis for loops
*       Bug 458396 - NPE in CodeStream.invoke()
*       Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*       Bug 409250 - [1.8][compiler] Various loose ends in 308 code generation
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/FieldDeclaration.java
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*     Stephan Herrmann - Contribution for
*       Bug 440687 - [compiler][batch][null] improve command line option for external annotations
*     Lars Vogel <Lars.Vogel@vogella.com> - Contributions for
*         Bug 473178
*******************************************************************************/
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*  bug 349326 - [1.7] new warning for missing try-with-resources
*  bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*  bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*  bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
*  Bug 392099
 - [1.8][compiler][null] Apply null annotation on types for null analysis
*  Bug 415291 - [1.8][null] differentiate type incompatibilities due to null annotations
*  Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*  Bug 412076 - [compiler] @NonNullByDefault doesn't work for varargs parameter when in generic interface
*  Bug 403216 - [1.8][null] TypeReference#captureTypeAnnotations treats type annotations as type argument annotations
*  Bug 415850 - [1.8] Ensure RunJDTCoreTests can cope with null annotations enabled
*  Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*  Bug 416175 - [1.8][compiler][null] NPE with a code snippet that used null annotations on wildcards
*  Bug 416174 - [1.8][compiler][null] Bogus name clash error with null annotations
*  Bug 416176 - [1.8][compiler][null] null type annotations cause grief on type variables
*  Bug 400874 - [1.8][compiler]
 Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*  Bug 423504 - [1.8] Implement "18.5.3 Functional Interface Parameterization Inference"
*  Bug 425278 - [1.8][compiler] Suspect error: The target type of this expression is not a well formed parameterized type due to bound(s) mismatch
*  Bug 425798 - [1.8][compiler] Another NPE in ConstraintTypeFormula.reduceSubType
*  Bug 425156 - [1.8] Lambda as an argument is flagged with incompatible error
*  Bug 426563 - [1.8] AIOOBE when method with error invoked with lambda expression as argument
*  Bug 426792 - [1.8][inference][impl] generify new type inference engine
*  Bug 428294 - [1.8][compiler] Type mismatch: cannot convert from List<Object> to Collection<Object[]>
*  Bug 427199 - [1.8][resource] avoid resource leak warnings on Streams that have no resource
*  Bug 416182 - [1.8][compiler][null] Contradictory null annotations not rejected

```
 *       Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
*       Bug 438179 - [1.8][null] 'Contradictory null annotations' error on type variable with explicit null-annotation.
*       Bug 441693 - [1.8][null] Bogus warning for type argument annotated with @NonNull
*       Bug 446434 - [1.8][null] Enable interned captures also when analysing null type annotations
*       Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*       Bug 456508 - Unexpected RHS PolyTypeBinding for: <code-snippet>
*       Bug 390064 - [compiler][resource] Resource leak warning missing when extending parameterized class
*     Jesper S Møller  - Contributions for bug 381345 : [1.8] Take care of the Java 8 major version
*       Bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
*******************************************************************************/
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*           bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*           bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*       bug 383368 - [compiler][null] syntactic null analysis for field references
*       bug 403147 - [compiler][null] FUP of bug 400761:
 consolidate interaction between unboxing, NPE, and deferred checking
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*  bug 411098 - [compiler][resource] Invalid Resource Leak Warning using ternary operator inside try-with-resource
**********/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/FakedTrackingVariable.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/antadapter/messages.properties
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*  bug 186342 - [compiler][null] Using annotations for null checking
*  bug 365519 - editorial cleanup after bug 186342 and bug 365387
*  bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*  bug 365859 - [compiler][null] distinguish warnings based on flow analysis vs. null annotations
*  bug 385626 - @NonNull fails across
 loop boundaries
*  bug 388996 - [compiler][resource] Incorrect 'potential resource leak'
*  bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred checking
*  Bug 453483 - [compiler][null][loop] Improve null analysis for loops
*  Bug 455723 - Nonnull argument not correctly inferred in loop
*  Jesper S Moller - Contributions for
*  bug 404657 - [1.8][compiler] Analysis for effectively final variables fails to consider loops
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/CompactConstructorDeclaration.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/TextBlock.java
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*       Bug 429813 - [1.8][dom ast] IMethodBinding#getJavaElement() should return IMethod for lambda
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* Contributors:
*    wharley@bea.com - derived base class from BatchMessagerImpl
*
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*      Stephen Herrmann <stephan@cs.tu-berlin.de> -  Contributions for
*       bug 317046 - Exception during debugging when hover mouse over a field
*       bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*       bug 392862 - [1.8][compiler][null] Evaluate null annotations on array types
*       bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class
 files
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 415291 - [1.8][null] differentiate type incompatibilities due to null annotations
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 423504 - [1.8] Implement "18.5.3 Functional Interface Parameterization Inference"
*       Bug 424712 - [1.8][compiler] NPE in TypeBinding.isProvablyDistinctTypeArgument
*       Bug 426792 - [1.8][inference][impl] generify new type inference engine
*       Bug 426764 - [1.8] Presence of conditional expression as method argument confuses compiler
```

```
*       Bug 423505 - [1.8] Implement "18.5.4 More Specific Method Inference"
*       Bug 427626 - [1.8] StackOverflow while typing new ArrayList<String>().toArray( and asking for code completion
 *       Bug 428019 - [1.8][compiler] Type inference failure with nested generic invocation.
*       Bug 435962 - [RC2] StackOverFlowError when building
*       Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
*       Bug 440759 - [1.8][null] @NonNullByDefault should never affect wildcards and uses of a type variable
*       Bug 441693 - [1.8][null] Bogus warning for type argument annotated with @NonNull
*       Bug 446434 - [1.8][null] Enable interned captures also when analysing null type annotations
*     Jesper S Moller <jesper@selskabet.org> -  Contributions for
*       bug 382701 - [1.8][compiler] Implement semantic analysis of Lambda expressions & Reference expression
*       bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
*
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/TypeBinding.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/AptSourceLocalVariableBinding.java
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```
*     Stephan Herrmann - Contributions for
*           bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*           bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*       bug 370639 - [compiler][resource] restore the
 default for resource leak warnings
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*       bug 388996 - [compiler][resource] Incorrect 'potential resource leak'
*       bug 395977 - [compiler][resource] Resource leak warning behavior possibly incorrect for anonymous inner class
*       bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred
checking
*       Bug 415850 - [1.8] Ensure RunJDTCoreTests can cope with null annotations enabled
*       Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 416267 - NPE in QualifiedAllocationExpression.resolveType
*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 424415 - [1.8][compiler] Eventual
 resolution of ReferenceExpression is not seen to be happening.
*       Bug 427438 - [1.8][compiler] NPE at
org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*     Jesper S Moller <jesper@selskabet.org> - Contributions for
*       bug 378674 - "The method can be declared as static" is wrong
*     Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                     Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
work)
*                     Bug 409245 - [1.8][compiler] Type annotations dropped when call is routed through a synthetic
bridge method
*     Till Brychcy - Contributions for
*           bug 413460 - NonNullByDefault is not inherited to Constructors when accessed via Class File
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/QualifiedAllocationExpression.java
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```
*     Jesper S Moller - Contributions for
*       Bug 405066 - [1.8][compiler][codegen] Implement code generation infrastructure for JSR335
*       Bug 406973 - [compiler] Parse MethodParameters attribute
*        Andy Clement - Contributions for
*                       Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
work)
*******************************************************************************/
```

Found
 in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/AttributeNamesConstants.java
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*     Stephan Herrmann - Contribution for
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*       bug 383368 - [compiler][null] syntactic null analysis for field references
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/BinaryExpression.java
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*     Stephan Herrmann <stephan@cs.tu-berlin.de> - Contributions for
*       bug 185682 - Increment/decrement operators mark local variables as read
```

```
*       bug 331649 - [compiler][null] consider null annotations for fields
*       bug 383368 - [compiler][null] syntactic null analysis for field references
*       Bug 412203 - [compiler] Internal compiler error: java.lang.IllegalArgumentException: info cannot be null
*       Bug 400874 - [1.8][compiler]
 Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 458396 - NPE in CodeStream.invoke()
*     Jesper S Moller - Contributions for
*       Bug 378674 - "The method can be declared as static" is wrong
*     Robert Roth <robert.roth.off@gmail.com> - Contributions for
*       Bug 361039 - NPE in FieldReference.optimizedBooleanConstant
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/FieldReference.java
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*     Lars Vogel <Lars.Vogel@vogella.com> - Contributions for
*         Bug 473178
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* Contributors:
*       Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
```

```
*         Bug 407191 - [1.8] Binary access support for type annotations
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Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/FieldInfoWithTypeAnnotation.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/IBinaryTypeAnnotation.java
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*     Stephan Herrmann - contributions for
*          bug 337868 - [compiler][model] incomplete support for package-info.java when using SearchableEnvironment
*          bug 186342 - [compiler][null] Using annotations for null checking
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/Compiler.java
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*     Stephan Herrmann - Contributions for
*       Bug 186342 - [compiler][null] Using annotations for null checking
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/MostSpecificExceptionMethodBinding.java

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*     IBM Corporation - initial API and implementation
*     Stephan Herrmann - Contribution for
*       bug 392862 - [1.8][compiler][null] Evaluate null annotations on array types
*       bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*       bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug
 415291 - [1.8][null] differentiate type incompatibilities due to null annotations
*       Bug 415850 - [1.8] Ensure RunJDTCoreTests can cope with null annotations enabled
*       Bug 416176 - [1.8][compiler][null] null type annotations cause grief on type variables
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 425460 - [1.8] [inference] Type not inferred on stream.toArray
*       Bug 426792 - [1.8][inference][impl] generify new type inference engine
*       Bug 428019 - [1.8][compiler] Type inference failure with nested generic invocation.
*       Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
*       Bug 440759 - [1.8][null] @NonNullByDefault should never affect wildcards and uses of a type variable
*       Bug 441693 -
 [1.8][null] Bogus warning for type argument annotated with @NonNull
*     Jesper S Møller - Contributions for bug 381345 : [1.8] Take care of the Java 8 major version
*       Bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
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Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ArrayBinding.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/core/compiler/CompilationProgress.java
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*                    (originally in org.eclipse.jdt.apt.core)
*    IBM Corporation - Bug 513790
```

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*     Jesper Steen Moeller - Contributions for:
*         Bug 407297: [1.8][compiler] Control generation of parameter names by option
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*    tyeung@bea.com - initial API and implementation
*    olivier_thomann@ca.ibm.com - add hashCode() and equals(..) methods
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/ClassSignature.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/EnumConstantSignature.java
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*  bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*  bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred checking
*  Bug 415790 - [compiler][resource]Incorrect potential resource leak warning in for loop with close in try/catch
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*  IBM Corporation - fix for 342598
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*     Stephan Herrmann - Contribution for
*       bug 365531 - [compiler][null] investigate alternative strategy for internally encoding nullness defaults
*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*     Jesper Steen Moller - Contributions for
*       Bug 412150 [1.8] [compiler]
 Enable reflected parameter names during annotation processing
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*       bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*       bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred
checking
*       Bug 417758 - [1.8][null] Null safety compromise during array creation.
*       Bug
 427163 - [1.8][null] bogus error "Contradictory null specification" on varags
*     Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
```

*  Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's work)
*  Bug 409247 - [1.8][compiler] Verify error with code allocating multidimensional array
**********/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ArrayAllocationExpression.java
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* Contributors:
*  wharley@bea.com - initial API and implementation
*  philippe.marschall@netcetera.ch - Fix for 338370
*  IBM Corporation - Fix for validating relative name
**********/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/apt/dispatch/BatchFilerImpl.java
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* Contributors:
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*       bug 331649 - [compiler][null] consider null annotations for fields
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 458396 - NPE in CodeStream.invoke()
*******************************************************************************/
```

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/VariableBinding.java
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* Contributors:
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*     Stephan Herrmann - Contributions for
*       bug 365662 - [compiler][null] warn on contradictory and redundant null annotations
*       bug 401030 - [1.8][null] Null analysis support for lambda methods.
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*       Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*******************************************************************************/
```

Found
 in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/LocalTypeBinding.java
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*     het@google.com - Bug 441790
*******************************************************************************/
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*           bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 359334 - Analysis for resource leak warnings does not consider exceptions as method exit points
*       bug 358903 - Filter practically unimportant resource leak warnings
*       bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*       bug 370639 - [compiler][resource]
 restore the default for resource leak warnings
*       bug 388996 - [compiler][resource] Incorrect 'potential resource leak'
*       bug 379784 - [compiler] "Method can be static" is not getting reported
*       bug 394768 - [compiler][resource] Incorrect resource leak warning when creating stream in conditional
*       bug 404649 - [1.8][compiler] detect illegal reference to indirect or redundant super
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*       Bug 371614 - [compiler][resource] Wrong "resource leak" problem on return/throw inside while loop
```

```
*       Bug 421035 - [resource] False alarm of resource leak warning when casting a closeable in its assignment
*       Bug 444964 - [1.7+][resource] False resource leak warning (try-with-resources for ByteArrayOutputStream -
return inside for loop)
*       Bug 396575 - [compiler][resources] Incorrect Errors/Warnings check for potential resource leak when surrounding
 with try-catch
*     Jesper S Moller <jesper@selskabet.org> - Contributions for
*       bug 378674 - "The method can be declared as static" is wrong
*     Keigo Imai - Contribution for  bug 388903 - Cannot extend inner class as an anonymous class when it extends
the outer class
*******************************************************************************/
```

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/BlockScope.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/apt/dispatch/AnnotationDiscoveryVisitor.java
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*       Bug 452788 - [1.8][compiler] Type not correctly inferred in lambda expression
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* Contributors:
*    tyeung@bea.com - initial API and implementation
*    olivier_thomann@ca.ibm.com - add hashCode() and equals(..) methods
*******************************************************************************/
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Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/ElementValuePairInfo.java
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*       Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                    Bug 415397 - [1.8][compiler] Type Annotations on wildcard type argument dropped
*       Stephan Herrmann - Contribution for
*       Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 429958
 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*       Bug 440462 - [null][compiler]NPE in EJC for erroneous null annotations
*       Bug 441693 - [1.8][null] Bogus warning for type argument annotated with @NonNull
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/Wildcard.java
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*     Stephan Herrmann <stephan@cs.tu-berlin.de> - Contributions for
*          bug 292478 - Report potentially null across variable assignment
*          bug 332637 - Dead Code detection removing code that isn't dead
*       bug 394768 - [compiler][resource] Incorrect resource leak warning when creating stream in conditional
*       Bug 411964 - [1.8][null] leverage null type annotation in foreach statement
*       Bug 421035 - [resource]
 False alarm of resource leak warning when casting a closeable in its assignment
*******************************************************************************/
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*       bug 383368 - [compiler][null] syntactic null analysis for field references
*       Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*       Bug 416307 - [1.8][compiler][null] subclass with type parameter substitution confuses null checking
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 417295 - [1.8[[null]
```

Massage type annotated null analysis to gel well with deep encoded type bindings.
*	Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*	Bug 435570 - [1.8][null] @NonNullByDefault illegally tries to affect "throws E"
*	Bug 466713 - Null Annotations: NullPointerException using <int @Nullable []> as Type Param
*	Andy Clement - Contributions for
*		Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's work)
**********/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/InstanceOfExpression.java
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*	Stephan Herrmann <stephan@cs.tu-berlin.de> - Contributions for
*	bug 185682 - Increment/decrement operators mark local variables as read
*	bug 392862 - [1.8][compiler][null] Evaluate null annotations on array types
*	bug 331649 - [compiler][null] consider null annotations for fields
*	bug 383368 - [compiler][null] syntactic null analysis for field references
*	bug 392384 - [1.8][compiler][null] Restore nullness
info from type annotations in class files
*	Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*	Bug 411964 - [1.8][null] leverage null type annotation in foreach statement
*	Bug 407414 - [compiler][null] Incorrect warning on a primitive type being null
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*       bug 383368 - [compiler][null] syntactic null analysis for field references
*     Jesper S Moller - Contributions for
*       Bug 378674 - "The method can be declared as static" is wrong
*******************************************************************************/
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*       bug 185682 - Increment/decrement operators mark local variables as read
*       bug 331649 - [compiler][null] consider null annotations for fields
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 447088 - [null] @Nullable on fully qualified field type is ignored
*       Bug 435805 - [1.8][compiler][null]
 Java 8 compiler does not recognize declaration style null annotations
*       Bug 458396 - NPE in CodeStream.invoke()
*       Bug 446217 - [null] @NonNullByDefault in package-info.java causes bogus "null type safety" warning
*     Till Brychcy - Contribution for
*             bug 467094 - [1.8][null] TYPE_USE NullAnnotations of array contents are applied to field.
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/apt/dispatch/BatchAnnotationProcessorManager.java
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*  Stephan Herrmann - Contributions for
*  Bug 360328 - [compiler][null] detect null problems in nested code (local class inside a loop)
*  Bug 388630 - @NonNull diagnostics at line 0
*  Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*  Bug 416176 - [1.8][compiler][null] null type annotations cause grief on type variables
*  Bug 424727 - [compiler][null] NullPointerException
 in nullAnnotationUnsupportedLocation(ProblemReporter.java:5708)
*  Bug 457210 - [1.8][compiler][null] Wrong Nullness errors given on full build build but not on incremental build?
*  Keigo Imai - Contribution for  bug 388903 - Cannot extend inner class as an anonymous class when it extends
the outer class
 *  Pierre-Yves B. <pyvesdev@gmail.com> - Contributions for
*  Bug 542520 - [JUnit 5] Warning The method xxx from the type X is never used locally is shown
when using MethodSource
*  Bug 546084 - Using Junit 5s MethodSource leads to ClassCastException
**********/

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*    IBM Corporation - fix for 342598, 382590
*    Jean-Marie Henaff <jmhenaff@google.com> (Google) - Bug 481555
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*     Nick Teryaev - fix for bug (https://bugs.eclipse.org/bugs/show_bug.cgi?id=40752)
*     Stephan Herrmann - Contributions for
*       bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*       bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 358903 - Filter practically unimportant resource leak warnings
*       bug
 370639 - [compiler][resource] restore the default for resource leak warnings
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*       bug 388996 - [compiler][resource] Incorrect 'potential resource leak'
*       bug 379784 - [compiler] "Method can be static" is not getting reported
*       bug 379834 - Wrong "method can be static" in presence of qualified super and different staticness of nested super
class.
*       bug 388281 - [compiler][null] inheritance of null annotations as an option
*       bug 392862 - [1.8][compiler][null] Evaluate null annotations on array types
*       bug 394768 - [compiler][resource] Incorrect resource leak warning when creating stream in conditional
*       bug 381445 - [compiler][resource] Can the resource leak check be made aware of Closeables.closeQuietly?
*       bug 331649 - [compiler][null] consider null annotations for fields
*       bug 383368 - [compiler][null] syntactic null
 analysis for field references
*       bug 382069 - [null] Make the null analysis consider JUnit's assertNotNull similarly to assertions
*       bug 382350 - [1.8][compiler] Unable to invoke inherited default method via I.super.m() syntax
*       bug 404649 - [1.8][compiler] detect illegal reference to indirect or redundant super
*       bug 403086 - [compiler][null] include the effect of 'assert' in syntactic null analysis for fields

*	bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred checking
*	Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*	Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*	Bug 405569 - Resource leak check false positive when using DbUtils.closeQuietly
*	Bug 411964 - [1.8][null] leverage null type annotation in foreach statement
*	Bug 417295 - [1.8[[null] Massage type annotated null analysis
 to gel well with deep encoded type bindings.
*	Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*	Bug 423504 - [1.8] Implement "18.5.3 Functional Interface Parameterization Inference"
*	Bug 424710 - [1.8][compiler] CCE in SingleNameReference.localVariableBinding
*	Bug 425152 - [1.8] [compiler] Lambda Expression not resolved but flow analyzed leading to NPE.
*	Bug 424205 - [1.8] Cannot infer type for diamond type with lambda on method invocation
*	Bug 424415 - [1.8][compiler] Eventual resolution of ReferenceExpression is not seen to be happening.
*	Bug 426366 - [1.8][compiler] Type inference doesn't handle multiple candidate target types in outer overload context
*	Bug 426290 - [1.8][compiler] Inference + overloading => wrong method resolution ?
*	Bug 427483 - [Java 8] Variables in lambdas sometimes can't be resolved
*	Bug 427438 - [1.8][compiler]
 NPE at org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*	Bug 426996 - [1.8][inference] try to avoid method Expression.unresolve()?
*	Bug 428352 - [1.8][compiler] Resolution errors don't always surface
*	Bug 429430 - [1.8] Lambdas and method reference infer wrong exception type with generics (RuntimeException instead of IOException)
*	Bug 441734 - [1.8][inference] Generic method with nested parameterized type argument fails on method reference
*	Bug 452788 - [1.8][compiler] Type not correctly inferred in lambda expression
*	Bug 456487 - [1.8][null] @Nullable type variant of @NonNull-constrained type parameter causes grief
*	Bug 407414 - [compiler][null] Incorrect warning on a primitive type being null
*	Bug 472618 - [compiler][null] assertNotNull vs. Assert.assertNotNull
*	Bug 470958 - [1.8] Unable to convert lambda
*	Bug 410218 - Optional warning
 for arguments of "unexpected" types to Map#get(Object), Collection#remove(Object) et al.
*	Jesper S Moller - Contributions for
*	Bug 378674 - "The method can be declared as static" is wrong
*	Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*	Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's work)
*	Bug 409245 - [1.8][compiler] Type annotations dropped when call is routed through a synthetic bridge method
**********/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/MessageSend.java
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* Contributors:
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*  Jesper S Moller - Contributions for
*  bug 382701 - [1.8][compiler] Implement semantic analysis of Lambda expressions & Reference expression
*  bug 382721 - [1.8][compiler] Effectively final variables needs special treatment
*  Bug 416885 - [1.8][compiler]IncompatibleClassChange error (edit)
*  Stephan Herrmann - Contribution for
*  bug 401030 - [1.8][null] Null analysis support for lambda methods.
*  Bug 392099
 - [1.8][compiler][null] Apply null annotation on types for null analysis
*  Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*  Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*  Bug 423504 - [1.8] Implement "18.5.3 Functional Interface Parameterization Inference"
*  Bug 425142 - [1.8][compiler] NPE in ConstraintTypeFormula.reduceSubType
*  Bug 425153 - [1.8] Having wildcard allows incompatible types in a lambda expression
*  Bug 424205 - [1.8] Cannot infer type for diamond type with lambda on method invocation
*  Bug 425798 - [1.8][compiler] Another NPE in ConstraintTypeFormula.reduceSubType
*  Bug 425156 - [1.8] Lambda as an argument is flagged with incompatible error
*  Bug 424403 - [1.8][compiler] Generic method call with method reference argument fails to resolve properly.
*  Bug 426563 - [1.8] AIOOBE when method with error
 invoked with lambda expression as argument
*  Bug 420525 - [1.8] [compiler] Incorrect error "The type Integer does not define sum(Object, Object) that is applicable here"
*  Bug 427438 - [1.8][compiler] NPE at org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*  Bug 428294 - [1.8][compiler] Type mismatch: cannot convert from List<Object> to Collection<Object[]>
*  Bug 428786 - [1.8][compiler] Inference needs to compute the "ground target type" when reducing a lambda compatibility constraint
*  Bug 428980 - [1.8][null] simple expression as lambda body doesn't leverage null annotation on argument
*  Bug 429430 - [1.8] Lambdas and method reference infer wrong exception type with generics (RuntimeException instead of IOException)
*  Bug 432110 - [1.8][compiler] nested lambda type incorrectly inferred vs javac
*  Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type
 variables
*  Bug 441693 - [1.8][null] Bogus warning for type argument annotated with @NonNull
*  Bug 452788 - [1.8][compiler] Type not correctly inferred in lambda expression
*  Bug 453483 - [compiler][null][loop] Improve null analysis for loops
*  Bug 455723 - Nonnull argument not correctly inferred in loop
*  Bug 463728 - [1.8][compiler][inference] Ternary operator in lambda derives wrong type
*  Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*  Bug 405104 - [1.8][compiler][codegen] Implement support for serializeable lambdas

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*     Jesper Steen Moller - Contributions for:
*         Bug 412149: [1.8][compiler] Emit repeated annotations into the designated container
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/InferenceSubstitution.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/TypeAnnotationWalker.java
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*        bug 349326 - [1.7] new warning for missing try-with-resources
*        bug 186342 - [compiler][null] Using annotations for null checking
*        bug 365519 - editorial cleanup after bug 186342 and bug 365387
*        bug 358903 - Filter practically unimportant resource leak warnings
*        bug 365531 - [compiler][null] investigate alternative strategy for internally encoding nullness defaults
 *        bug 388281 - [compiler][null] inheritance of null annotations as an option
*        bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*        bug 392862 - [1.8][compiler][null] Evaluate null annotations on array types
*        bug 400421 - [compiler] Null analysis for fields does not take @com.google.inject.Inject into account
*        bug 382069 - [null] Make the null analysis consider JUnit's assertNotNull similarly to assertions
*        bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
*        Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*        Bug 415291 - [1.8][null] differentiate type incompatibilities due to null annotations
*        Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*        Bug 416176 - [1.8][compiler][null] null type annotations cause grief on type variables
*        Bug
 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*        Bug 423504 - [1.8] Implement "18.5.3 Functional Interface Parameterization Inference"
*        Bug 426792 - [1.8][inference][impl] generify new type inference engine
*        Bug 428019 - [1.8][compiler] Type inference failure with nested generic invocation.
*        Bug 427199 - [1.8][resource] avoid resource leak warnings on Streams that have no resource
*        Bug 418743 - [1.8][null] contradictory annotations on invocation of generic method not reported
*        Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*        Bug 431581 - Eclipse compiles what it should not
*        Bug 440759 - [1.8][null] @NonNullByDefault should never affect wildcards and uses of a type variable
*        Bug 452788 - [1.8][compiler] Type not correctly inferred in lambda expression
*        Bug 446442 - [1.8] merge null annotations from
 super methods
*        Bug 456532 - [1.8][null] ReferenceBinding.appendNullAnnotation() includes phantom annotations in error
messages
*        Bug 410218 - Optional warning for arguments of "unexpected" types to Map#get(Object),
Collection#remove(Object) et al.
*      Jesper S Moller - Contributions for
*        bug 382701 - [1.8][compiler] Implement semantic analysis of Lambda expressions & Reference expression
*        bug 412153 - [1.8][compiler] Check validity of annotations which may be repeatable
*        bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
*     Ulrich Grave <ulrich.grave@gmx.de> - Contributions for
*                              bug 386692 - Missing "unused" warning on "autowired" fields
```

```
*     Pierre-Yves B. <pyvesdev@gmail.com> - Contribution for
*                         bug 542520 - [JUnit 5] Warning The method xxx from the type X is never used locally is shown
when using MethodSource
*     Sebastian Zarnekow - Contributions
 for
*       bug 544921 - [performance] Poor performance with large source files
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ReferenceBinding.java
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*       bug 384380 - False positive on a "Potential null pointer access" after a continue
*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
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*     Stephan Herrmann - Contributions for
*          bug 236385 - [compiler] Warn for potential programming problem if an object is created but not used
*          bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*          bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 358903 - Filter practically unimportant resource
 leak warnings
*       bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*       bug 370639 - [compiler][resource] restore the default for resource leak warnings
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*       bug 388996 - [compiler][resource] Incorrect 'potential resource leak'
*       bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred
checking
*       Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
```

```
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 424727 - [compiler][null] NullPointerException in
nullAnnotationUnsupportedLocation(ProblemReporter.java:5708)
*       Bug 424710
 - [1.8][compiler] CCE in SingleNameReference.localVariableBinding
*       Bug 425152 - [1.8] [compiler] Lambda Expression not resolved but flow analyzed leading to NPE.
*       Bug 424205 - [1.8] Cannot infer type for diamond type with lambda on method invocation
*       Bug 424415 - [1.8][compiler] Eventual resolution of ReferenceExpression is not seen to be happening.
*       Bug 426366 - [1.8][compiler] Type inference doesn't handle multiple candidate target types in outer overload
context
*       Bug 426290 - [1.8][compiler] Inference + overloading => wrong method resolution ?
*       Bug 426764 - [1.8] Presence of conditional expression as method argument confuses compiler
*       Bug 424930 - [1.8][compiler] Regression: "Cannot infer type arguments" error from compiler.
*       Bug 427483 - [Java 8] Variables in lambdas sometimes can't be resolved
*       Bug 427438 - [1.8][compiler] NPE at
org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
 *       Bug 426996 - [1.8][inference] try to avoid method Expression.unresolve()?
*       Bug 428352 - [1.8][compiler] Resolution errors don't always surface
*       Bug 429203 - [1.8][compiler] NPE in AllocationExpression.binding
*       Bug 429430 - [1.8] Lambdas and method reference infer wrong exception type with generics (RuntimeException
instead of IOException)
*       Bug 434297 - [1.8] NPE in LamdaExpression.analyseCode with lamda expression nested in a conditional
expression
*       Bug 452788 - [1.8][compiler] Type not correctly inferred in lambda expression
*       Bug 448709 - [1.8][null] ensure we don't infer types that violate null constraints on a type parameter's bound
*     Jesper S Moller <jesper@selskabet.org> - Contributions for
*       bug 378674 - "The method can be declared as static" is wrong
*     Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                     Bug 383624 - [1.8][compiler] Revive
 code generation support for type annotations (from Olivier's work)
*                     Bug 409245 - [1.8][compiler] Type annotations dropped when call is routed through a synthetic
bridge method
*     Till Brychcy - Contributions for
*          bug 413460 - NonNullByDefault is not inherited to Constructors when accessed via Class File
*     Lars Vogel <Lars.Vogel@vogella.com> - Contributions for
*          Bug 473178
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/MethodInfoWithAnnotations.java
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*           bug 185682 - Increment/decrement operators mark local variables as read
*           bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 365859 - [compiler][null] distinguish warnings based on flow analysis vs. null annotations
*       bug 331649 - [compiler][null] consider
 null annotations for fields
*       Bug 466308 - [hovering] Javadoc header for parameter is wrong with annotation-based null analysis
*     Jesper S Møller <jesper@selskabet.org> -  Contributions for
*       Bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
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*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ElementValuePair.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/JavadocImplicitTypeReference.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/batch/BatchCompilerRequestor.java
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*  Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's work)
*  Stephan Herrmann - Contribution for
*  Bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
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*  bug 358903 - Filter practically unimportant resource leak warnings
*  bug 381445 - [compiler][resource] Can the resource leak check be made aware of Closeables.closeQuietly?
*  bug 400421 - [compiler] Null analysis for fields does not take @com.google.inject.Inject into account
*  bug 382069 - [null] Make
 the null analysis consider JUnit's assertNotNull similarly to assertions
*  Bug 405569 - Resource leak check false positive when using DbUtils.closeQuietly
*  Bug 427199 - [1.8][resource] avoid resource leak warnings on Streams that have no resource
*  Bug 425183 - [1.8][inference] make CaptureBinding18 safe
*  Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*  Bug 410218 - Optional warning for arguments of "unexpected" types to Map#get(Object),
Collection#remove(Object) et al.
*  Jesper S Moller - Contributions for
*  Bug 405066 - [1.8][compiler][codegen] Implement code generation infrastructure for JSR335
*  Bug 412153 - [1.8][compiler] Check validity of annotations which may be repeatable
*  bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
*  Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*  Bug 405104 - [1.8][compiler][codegen]
 Implement support for serializeable lambdas
*  Ulrich Grave <ulrich.grave@gmx.de> - Contributions for
*  bug 386692 - Missing "unused" warning on "autowired" fields
*  Pierre-Yves B. <pyvesdev@gmail.com> - Contribution for

```
*                        bug 542520 - [JUnit 5] Warning The method xxx from the type X is never used locally is shown
when using MethodSource
*******************************************************************************/
```

Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/TypeConstants.java
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* Contributors:
*     IBM Corporation - initial API and implementation
*     Stephan Herrmann - Contribution for
*       Bug 432977 - [1.8][null] Incorrect 'type is not visible' compiler error
*       Bug 446434 - [1.8][null] Enable interned captures also when analysing null type annotations
*******************************************************************************/
/* Taking the binding of QTR as an example, there could be different annotatable components, but we come in a
with a single binding, e.g:

 @T Z;                          type => Z  annotations => [[@T]]
     @T Y.@T Z                        type => Z  annotations => [[@T][@T]]
     @T X.@T Y.@T Z                       type => Z  annotations => [[@T][@T][@T]]
     java.lang.@T X.@T Y.@T Z                 type => Z  annotations => [[][][@T][@T][@T]]
     in all these cases the incoming type binding is for Z, but annotations are for different levels. We need to align their
layout for proper attribution.
    */
```

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```
*
* Contributors:
*     IBM Corporation - initial API and implementation
*     Stephan Herrmann - Contribution for
*       Bug 365992 - [builder] [null] Change of nullness for a parameter doesn't trigger a build for the files that call the
method
*       Bug 440477 - [null] Infrastructure for feeding external annotations into compilation
*       Bug 440687 - [compiler][batch][null] improve command line option for external annotations
*     Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*
            bug 407191 - [1.8] Binary access support for type annotations
*******************************************************************************/
```

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/ClassFileReader.java
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* Contributors:
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*     Stephan Herrmann - Contributions for
*       bug 332637 - Dead Code detection removing code that isn't dead
*       bug 391517 - java.lang.VerifyError on code that runs correctly in Eclipse 3.7 and eclipse 3.6
*       bug 394768 - [compiler][resource] Incorrect resource leak warning when creating stream in conditional
*******************************************************************************/
```

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/flow/ConditionalFlowInfo.java
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```

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/apt/dispatch/BatchProcessingEnvImpl.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/apt/dispatch/RoundDispatcher.java
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*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*******************************************************************************/
```

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/flow/LabelFlowContext.java
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*     Stephan Herrmann - Contributions for
*          bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 370639 - [compiler][resource] restore the default for resource leak warnings
*       bug 265744 - Enum switch should warn about missing default
*       bug 374605 - Unreasonable warning for enum-based switch statements
*       bug 381443
 - [compiler][null] Allow parameter widening from @NonNull to unannotated
*       Bug 441208 - [1.8][null]SuppressWarnings("null") does not suppress / marked Unnecessary
*       Bug 410218 - Optional warning for arguments of "unexpected" types to Map#get(Object),
Collection#remove(Object) et al.
*******************************************************************************/
```

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* Contributors:
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*     Stephan Herrmann - Contribution for
*       bug 382350 - [1.8][compiler] Unable to invoke inherited default method via I.super.m() syntax
*       bug 404649 - [1.8][compiler] detect illegal reference to indirect or redundant super
*       bug 404728 - [1.8]NPE on QualifiedSuperReference error
*******************************************************************************/
```

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/QualifiedSuperReference.java
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*     Jesper S Moller - Contributions for
*       bug 382701 - [1.8][compiler] Implement semantic analysis of Lambda expressions & Reference expression
*       Bug 405066 - [1.8][compiler][codegen] Implement code generation infrastructure for JSR335
*     Stephan Herrmann - Contribution for
*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 423504 - [1.8] Implement "18.5.3
 Functional Interface Parameterization Inference"
*       Bug 425142 - [1.8][compiler] NPE in ConstraintTypeFormula.reduceSubType
*       Bug 425153 - [1.8] Having wildcard allows incompatible types in a lambda expression
*       Bug 425156 - [1.8] Lambda as an argument is flagged with incompatible error
*       Bug 424403 - [1.8][compiler] Generic method call with method reference argument fails to resolve properly.
*       Bug 427438 - [1.8][compiler] NPE at
org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*       Bug 428352 - [1.8][compiler] Resolution errors don't always surface
*       Bug 446442 - [1.8] merge null annotations from super methods
```

```
*     Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                    Bug 405104 - [1.8][compiler][codegen] Implement support for serializeable lambdas
*******************************************************************************/
```

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/FunctionalExpression.java
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*       Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/SingleTypeReference.java
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* Contributors:
*  IBM Corporation - initial API and implementation
*  Luiz-Otavio Zorzella <zorzella at gmail dot com> - Improve CamelCase algorithm
*  Gábor Kövesdán - Contribution for Bug 350000 - [content assist] Include non-prefix matches in auto-complete suggestions
*  Stefan Xenos <sxenos@gmail.com> (Google) - Bug 501283 - Lots of hash collisions during indexing
*******************************************************************************/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/core/compiler/CharOperation.java
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*  bug 349326 - [1.7] new warning for missing try-with-resources
*  bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
*  Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*  Bug 467032 - TYPE_USE Null Annotations: IllegalStateException with annotated arrays of Enum when accessed via BinaryTypeBinding
**********/

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 in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/UnresolvedReferenceBinding.java
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*  Stephan Herrmann - Contribution for
*  Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
**********/

Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/JavadocQualifiedTypeReference.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/JavadocSingleTypeReference.java
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*  Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
**********/

Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/VoidTypeBinding.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/NullTypeBinding.java
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*  wharley@bea.com - initial API and implementation
*  IBM Corporation - fix for 342470
*  IBM Corporation - fix for 342598
*  IBM Corporation - Java 8 support
**********/

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*  Stephan Herrmann - Contribution for
*  bug 400710 - [1.8][compiler] synthetic access to default method generates wrong code
*  bug 391376 - [1.8] check interaction of default methods with bridge methods and generics

*  bug 421543 - [1.8][compiler] Compiler fails to recognize default method being turned into abstract by subtytpe
*  Jesper S Moller - Contributions for
*  Bug 405066 - [1.8][compiler][codegen] Implement
code generation infrastructure for JSR335
*  Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*  Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
work)
*  Bug 409247 - [1.8][compiler] Verify error with code allocating multidimensional array
*  Bug 409236 - [1.8][compiler] Type annotations on intersection cast types dropped by code
generator
*  Bug 409250 - [1.8][compiler] Various loose ends in 308 code generation
*  Bug 405104 - [1.8][compiler][codegen] Implement support for serializeable lambdas
*  Bug 449467 - [1.8][compiler] Invalid lambda deserialization with anonymous class
*  Olivier Tardieu (tardieu@us.ibm.com) - Contributions for
*  Bug 442418 - $deserializeLambda$ off-by-one error when deserializing the captured arguments
of a lambda that also capture this
**********/

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*    tyeung@bea.com  - initial API and implementation
*    IBM Corporation - fix for bug 342757
*    Stephan Herrmann - Contribution for bug 186342 - [compiler][null] Using annotations for null checking
*******************************************************************************/
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*     Perry James - nullStatus method improvement (165346)
*     Stephan Herrmann - Contribution for
*       bug 383368 - [compiler][null] syntactic null analysis for field references
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/OperatorExpression.java
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*     Patrick Wienands <pwienands@abit.de> - Contribution for bug 393749
*     Stephan Herrmann - Contribution for
*       bug 331649 - [compiler][null] consider null annotations for fields
*******************************************************************************/
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*     Stephan Herrmann - Contribution for
*       bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
*       Bug 416174 - [1.8][compiler][null] Bogus name clash error with null annotations
*       Bug 416176 - [1.8][compiler][null] null type annotations cause grief on type variables
*       Bug 423504 - [1.8] Implement "18.5.3 Functional Interface Parameterization Inference"
*       Bug 425783 - An
 internal error occurred during: "Requesting Java AST from selection". java.lang.StackOverflowError
*       Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
*       Bug 441693 - [1.8][null] Bogus warning for type argument annotated with @NonNull
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/diagnose/LexStream.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/Literal.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/SortedCharArrays.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/SortedSimpleNameVector.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/SortedCompoundNameVector.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/CaptureBinding18.java

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*     Matt McCutchen - partial fix for https://bugs.eclipse.org/bugs/show_bug.cgi?id=122995
*     Karen Moore - fix for https://bugs.eclipse.org/bugs/show_bug.cgi?id=207411
*     Stephan Herrmann <stephan@cs.tu-berlin.de> - Contributions for
*          bug 185682 - Increment/decrement operators mark local variables as read
*          bug 186342 - [compiler][null] Using annotations for null checking
*       bug 365519 - editorial cleanup after
 bug 186342 and bug 365387
*       bug 374605 - Unreasonable warning for enum-based switch statements
*       bug 384870 - [compiler] @Deprecated annotation not detected if preceded by other annotation
*       bug 393719 - [compiler] inconsistent warnings on iteration variables
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 424742 - [1.8] NPE in LambdaExpression.isCompatibleWith
*       Bug 424710 - [1.8][compiler] CCE in SingleNameReference.localVariableBinding
*       Bug 424205 - [1.8] Cannot infer type for diamond type with lambda on method invocation
*       Bug 424415 - [1.8][compiler] Eventual resolution of ReferenceExpression is not seen to be happening.
*       Bug 426366
 - [1.8][compiler] Type inference doesn't handle multiple candidate target types in outer overload context
*       Bug 427282 - [1.8][compiler] AIOOB (-1) at
org.eclipse.jdt.internal.compiler.ClassFile.traverse(ClassFile.java:6209)
*       Bug 427483 - [Java 8] Variables in lambdas sometimes can't be resolved
*       Bug 428352 - [1.8][compiler] Resolution errors don't always surface
*       Bug 427163 - [1.8][null] bogus error "Contradictory null specification" on varags
*       Bug 432348 - [1.8] Internal compiler error (NPE) after upgrade to 1.8
*       Bug 440143 - [1.8][null] one more case of contradictory null annotations regarding type variables
*       Bug 441693 - [1.8][null] Bogus warning for type argument annotated with @NonNull
*       Bug 434483 - [1.8][compiler][inference] Type inference not picked up with method reference
*       Bug 446442 - [1.8] merge null annotations from super methods
*       Bug 437072 - [compiler][null] Null analysis emits
 possibly incorrect warning for new int[][] despite @NonNullByDefault
*     Jesper S Moller - Contributions for
*       bug 382721 - [1.8][compiler] Effectively final variables needs special treatment
*       bug 412153 - [1.8][compiler] Check validity of annotations which may be repeatable
```

```
*       bug 412153 - [1.8][compiler] Check validity of annotations which may be repeatable
*       bug 412149 - [1.8][compiler] Emit repeated annotations into the designated container
*       bug 419209 - [1.8] Repeating container annotations should be rejected in the presence of annotation it contains
*     Till Brychcy - Contributions for
*               bug 467094 - [1.8][null] TYPE_USE NullAnnotations of array contents are applied to field.
*******************************************************************************/
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* Contributors:
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*     Stephan Herrmann - Contribution for
*       bug 383368 - [compiler][null] syntactic null analysis for field references
*       bug 403086 - [compiler][null] include the effect of 'assert' in syntactic null analysis for fields
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/UnaryExpression.java

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*       bug 342671 - ClassCastException: org.eclipse.jdt.internal.compiler.lookup.SourceTypeBinding cannot be cast to
org.eclipse.jdt.internal.compiler.lookup.ArrayBinding
*       bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*       Bug 416181 - [1.8][compiler][null] Invalid assignment
 is not rejected by the compiler
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*       Bug 434600 - Incorrect null analysis error reporting on type parameters
*       Bug 435570 - [1.8][null] @NonNullByDefault illegally tries to affect "throws E"
*       Bug 456508 - Unexpected RHS PolyTypeBinding for: <code-snippet>
*       Bug 466713 - Null Annotations: NullPointerException using <int @Nullable []> as Type Param
*       Andy Clement - Contributions for
*                       Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
work)
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ParameterizedQualifiedTypeReference.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/IRecordComponent.java
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*     Lars Vogel <Lars.Vogel@vogella.com> - Contributions for
*         Bug 473178
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Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ConstraintExceptionFormula.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ConstraintFormula.java
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* Contributors:
*  IBM Corporation - initial API and implementation
*  Genady Beriozkin - added support for reporting assignment with no effect
*  Stephan Herrmann <stephan@cs.tu-berlin.de> - Contributions for
*  bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*  bug 292478 - Report potentially null across variable assignment
*  bug 335093 - [compiler][null] minimal hook for future null annotation support
*  bug 349326 - [1.7] new warning for missing
try-with-resources
*  bug 186342 - [compiler][null] Using annotations for null checking
*  bug 358903 - Filter practically unimportant resource leak warnings
*  bug 370639 - [compiler][resource] restore the default for resource leak warnings
*  bug 365859 - [compiler][null] distinguish warnings based on flow analysis vs. null annotations
*  bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*  bug 388996 - [compiler][resource] Incorrect 'potential resource leak'
*  bug 394768 - [compiler][resource] Incorrect resource leak warning when creating stream in conditional
*  bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*  bug 331649 - [compiler][null] consider null annotations for fields
*  bug 383368 - [compiler][null] syntactic null analysis for field references
*  bug 402993 - [null] Follow up of bug 401088: Missing
warning about redundant null check
*  bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred
checking

```
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 427438 - [1.8][compiler] NPE at
org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*       Bug 453483 - [compiler][null][loop] Improve null analysis for loops
*       Bug 407414 - [compiler][null] Incorrect warning on a primitive type being null
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/Assignment.java
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*     Stephan Herrmann - Contribution for bug 186342 - [compiler][null] Using annotations for null checking
*     Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*         Bug 407191 - [1.8] Binary access support for type annotations
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/IBinaryMethod.java
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*          bug 349326 - [1.7] new warning for missing try-with-resources
*          bug 359362 - FUP of bug 349326: Resource leak on non-Closeable resource
*       bug 358903 - Filter practically unimportant resource leak warnings
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 400874 - [1.8][compiler] Inference infrastructure
 should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 423504 - [1.8] Implement "18.5.3 Functional Interface Parameterization Inference"
*       Bug 426676 - [1.8][compiler] Wrong generic method type inferred from lambda expression
*       Bug 427411 - [1.8][generics] JDT reports type mismatch when using method that returns generic type
*       Bug 428019 - [1.8][compiler] Type inference failure with nested generic invocation.
*       Bug 435962 - [RC2] StackOverFlowError when building
*       Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
*       Bug 440759 - [1.8][null] @NonNullByDefault should never affect wildcards and uses of a type variable
*       Bug 441693 - [1.8][null] Bogus warning for type argument annotated with @NonNull
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```
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 365662 - [compiler][null] warn on contradictory and redundant null annotations
*       bug 331649 - [compiler][null] consider null annotations for fields
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 415043 - [1.8][null] Follow-up re null type annotations
 after bug 392099
*       Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*       Bug 415850 - [1.8] Ensure RunJDTCoreTests can cope with null annotations enabled
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 424728 - [1.8][null] Unexpected error: The nullness annotation 'XXXX' is not applicable at this location
*       Bug 392245 - [1.8][compiler][null] Define whether / how @NonNullByDefault applies to TYPE_USE locations
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*       Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*       Bug 457210 - [1.8][compiler][null] Wrong Nullness errors given on full build build but not on incremental build?
*       Bug 469584 - ClassCastException in Annotation.detectStandardAnnotation (320)
*       Andy Clement (GoPivotal,
 Inc) aclement@gopivotal.com - Contributions for
*                       Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
work)
*                       Bug 409517 - [1.8][compiler] Type annotation problems on more elaborate array references
*                       Bug 415397 - [1.8][compiler] Type Annotations on wildcard type argument dropped
*                       Bug 414384 - [1.8] type annotation on abbreviated inner class is not marked as inner type
*     Jesper S Moller <jesper@selskabet.org> -  Contributions for
*                       Bug 412153 - [1.8][compiler] Check validity of annotations which may be repeatable
*                       Bug 412151 - [1.8][compiler] Check repeating annotation's collection type
*                       Bug 412149 - [1.8][compiler] Emit repeated annotations into the designated container
*                       Bug 419209 - [1.8] Repeating container annotations
 should be rejected in the presence of annotation it contains
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*     Jesper S Moller  -. Contribution for bug 400830: [1.8][formatter] Code formatter for Java 8
```

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/LongLiteralMinValue.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/IntLiteral.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/InferenceContext.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/LongLiteral.java
*
 /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/FloatLiteral.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/NumberLiteral.java

* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/IntLiteralMinValue.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/flow/InitializationFlowContext.java
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*        bug 186342 - [compiler][null] Using annotations for null checking
*        bug 365519 - editorial cleanup after bug 186342 and bug 365387
*        Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*        Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*        Bug 435570 - [1.8][null] @NonNullByDefault
 illegally tries to affect "throws E"
*        Bug 438012 - [1.8][null] Bogus Warning: The nullness annotation is redundant with a default that applies to this
location
*        Bug 466713 - Null Annotations: NullPointerException using <int @Nullable []> as Type Param
*        Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                        Bug 409246 - [1.8][compiler] Type annotations on catch parameters not handled properly
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ReductionResult.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/InferenceFailureException.java
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*       bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*       bug 383368 - [compiler][null] syntactic null analysis for field references
*       bug 402993 - [null] Follow up
 of bug 401088: Missing warning about redundant null check
*       Bug 440282 - [resource] Resource leak detection false negative with empty finally block
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*     Stephan Herrmann - Contributions for
*           bug 332637 - Dead Code detection removing code that isn't dead
*           bug 358827 - [1.7] exception analysis for t-w-r spoils null analysis
*           bug 349326 - [1.7] new warning for missing try-with-resources
*           bug 359334 - Analysis for resource leak warnings does not consider exceptions as method exit points
```

*	bug 358903 - Filter practically unimportant resource
leak warnings
*	bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*	bug 388996 - [compiler][resource] Incorrect 'potential resource leak'
*	bug 401088 - [compiler][null] Wrong warning "Redundant null check" inside nested try statement
*	bug 401092 - [compiler][null] Wrong warning "Redundant null check" in outer catch of nested try
*	bug 402993 - [null] Follow up of bug 401088: Missing warning about redundant null check
*	bug 384380 - False positive on a ?? Potential null pointer access ?? after a continue
*	Bug 415790 - [compiler][resource]Incorrect potential resource leak warning in for loop with close in try/catch
*	Bug 371614 - [compiler][resource] Wrong "resource leak" problem on return/throw inside while loop
*	Bug 444964 - [1.7+][resource] False resource leak warning (try-with-resources for ByteArrayOutputStream - return inside for loop)
*	Jesper Steen Moller -
Contributions for
*	bug 404146 - [1.7][compiler] nested try-catch-finally-blocks leads to unrunnable Java byte code
*	Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*	Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's work)
*
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*  IBM Corporation - fix for 342936
*  Kenneth Olson - Contribution for bug 188796 - [jsr199] Using JSR199 to extend ECJ
*  Dennis Hendriks - Contribution for bug 188796 - [jsr199] Using JSR199 to extend ECJ
*  Dennis Hendriks - fix for bug 574449.
*  Frits Jalvingh  - fix for bug 533830.
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/impl/Constant.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/impl/StringConstant.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/HashtableOfObject.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/impl/FloatConstant.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/impl/LongConstant.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/impl/CharConstant.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/impl/BooleanConstant.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/JavadocArgumentExpression.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/impl/IntConstant.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredProvidesStatement.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ExportsStatement.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredTypeReference.java
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*       bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*       bug 292478 - Report potentially null across variable assignment
*       bug 335093 - [compiler][null] minimal hook for future null annotation support
*       bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 358903 - Filter practically unimportant resource leak warnings
*       bug 370639 - [compiler][resource] restore the default for resource leak warnings
*       bug 365859 - [compiler][null] distinguish warnings based on flow analysis vs. null annotations
*       bug 388996 - [compiler][resource] Incorrect 'potential resource leak'
*       bug 394768 - [compiler][resource] Incorrect resource leak warning when creating stream in conditional
```

*	bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*	bug 383368 - [compiler][null] syntactic null analysis for field references
*	bug 400761 - [compiler][null] null may be return as boolean without a diagnostic
*	Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*	Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*	Bug 427438 - [1.8][compiler] NPE at
org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*	Bug 430150 - [1.8][null] stricter checking against type variables
*	Bug 453483 - [compiler][null][loop] Improve null analysis for loops
*	Jesper S Moller - Contributions for
*	Bug 378674 - "The method can be declared as static" is wrong
*	Bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
*	Bug 529556 - [18.3] Add content assist support for 'var' as a type
*	Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*	Bug 409250 - [1.8][compiler] Various loose ends in 308 code generation
*	Bug 426616 - [1.8][compiler] Type Annotations, multiple problems
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*  bug 359334 - Analysis for resource leak warnings does not consider exceptions as method exit points
*  bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*  bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*  Bug 429430 - [1.8] Lambdas and method reference infer wrong exception type with
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*  bug 186342 - [compiler][null] Using annotations for null checking
*  bug 365983 - [compiler][null] AIOOB with null annotation analysis and varargs
*  bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*  bug 370930 - NonNull annotation not considered for enhanced for loops
*  bug 365859 - [compiler][null] distinguish warnings based on flow analysis vs. null annotations
*  bug 392862 - [1.8][compiler][null] Evaluate null annotations on array types
*  bug 331649 - [compiler][null] consider null annotations for fields
*  bug 383368 - [compiler][null] syntactic null analysis for field references
*  Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis

*	Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*	Bug 415291 - [1.8][null] differentiate type incompatibilities due to null annotations
*	Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*	Bug 416307 - [1.8][compiler][null] subclass with type parameter substitution confuses null checking
*	Bug 417758 - [1.8][null] Null safety compromise
during array creation.
*	Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*	Bug 424415 - [1.8][compiler] Eventual resolution of ReferenceExpression is not seen to be happening.
*	Bug 418537 - [1.8][null] Fix null type annotation analysis for poly conditional expressions
*	Bug 428352 - [1.8][compiler] Resolution errors don't always surface
*	Bug 429430 - [1.8] Lambdas and method reference infer wrong exception type with generics (RuntimeException instead of IOException)
*	Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*	Bug 453483 - [compiler][null][loop] Improve null analysis for loops
*	Bug 455723 - Nonnull argument not correctly inferred in loop
*	Andy Clement - Contributions for
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*	Jesper S Moller - Contributions for
*	Bug 405066 - [1.8][compiler][codegen] Implement code generation infrastructure for JSR335
*	Bug 406982 - [1.8][compiler] Generation of MethodParameters Attribute in classfile
*	Bug 416885 - [1.8][compiler]IncompatibleClassChange error (edit)
*	Bug 412149 - [1.8][compiler] Emit repeated annotations into the designated container
*	Andy Clement (GoPivotal, Inc) aclement@gopivotal.com
- Contributions for
*		Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's work)
*		Bug 409236 - [1.8][compiler] Type annotations on intersection cast types dropped by code generator

```
*                    Bug 409246 - [1.8][compiler] Type annotations on catch parameters not handled properly
*                    Bug 415541 - [1.8][compiler] Type annotations in the body of static initializer get dropped
*                    Bug 415399 - [1.8][compiler] Type annotations on constructor results dropped by the code
generator
*                    Bug 415470 - [1.8][compiler] Type annotations on class declaration go vanishing
*                    Bug 405104 - [1.8][compiler][codegen] Implement support for serializeable lambdas
*                    Bug 434556 - Broken class file generated for incorrect annotation usage
*                    Bug 442416
 - $deserializeLambda$ missing cases for nested lambdas
*     Stephan Herrmann - Contribution for
*       Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
*     Olivier Tardieu tardieu@us.ibm.com - Contributions for
*       Bug 442416 - $deserializeLambda$ missing cases for nested lambdas
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ClassFile.java
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*     IBM Corporation - initial API and implementation
*       Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                       Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
work)
*                       Bug 409246 - [1.8][compiler] Type annotations on catch parameters not handled properly
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/MultiCatchExceptionLabel.java
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*     Stephan Herrmann - Contributions for
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 367203 - [compiler][null] detect assigning null to nonnull argument
*       bug 365519 - editorial cleanup after bug 186342 and bug 365387
*       bug 365662 - [compiler][null] warn on contradictory and redundant null annotations
*       bug 365531 - [compiler][null] investigate alternative strategy for internally
 encoding nullness defaults
*       bug 388281 - [compiler][null] inheritance of null annotations as an option
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 425152 - [1.8] [compiler] Lambda Expression not resolved but flow analyzed leading to NPE.
*       Bug 423505 - [1.8] Implement "18.5.4 More Specific Method Inference"
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*       Bug 438012 - [1.8][null] Bogus Warning: The nullness annotation is redundant with a default that applies to this
location
*       Bug 440759 - [1.8][null] @NonNullByDefault should never affect wildcards and uses of a type variable
*       Bug 443347 - [1.8][null]
 @NonNullByDefault should not affect constructor arguments of an anonymous instantiation
*       Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*       Bug 466713 - Null Annotations: NullPointerException using <int @Nullable []> as Type Param
*       Bug 456584 - [1.8][null] Bogus warning for return type variable's @NonNull annotation being 'redundant'
*       Bug 471611 - Error on hover on call to generic method with null annotation
*     Jesper Steen Moller - Contributions for
*       Bug 412150 [1.8] [compiler] Enable reflected parameter names during annotation processing
```

```
*******************************************************************************/
```

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/MethodBinding.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/batch/ClasspathJrt.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/apt/dispatch/HookedJavaFileObject.java
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*     Till Brychcy - Contributions for
*                         Bug 467482 - TYPE_USE null annotations: Incorrect "Redundant null check"-warning
*******************************************************************************/
```

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/NullAnnotationMatching.java
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*
*     Jesper S Moller - Contributions for
*       Bug 405066 - [1.8][compiler][codegen] Implement code generation infrastructure for JSR335
```

```
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/Opcodes.java
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* Contributors:
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*     Stephan Herrmann - Contribution for
*       bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 370930 - NonNull annotation not considered for enhanced for loops
*       bug 365859 - [compiler][null] distinguish warnings based on flow analysis vs. null annotations
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*       bug 393719 - [compiler] inconsistent warnings
 on iteration variables
*       Bug 411964 - [1.8][null] leverage null type annotation in foreach statement
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 453483 - [compiler][null][loop] Improve null analysis for loops
*       Bug 415790 - [compiler][resource]Incorrect potential resource leak warning in for loop with close in try/catch
*     Jesper S Moller -  Contribution for
*       bug 401853 - Eclipse Java compiler creates invalid bytecode (java.lang.VerifyError)
*                          bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
*******************************************************************************/
```

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ForeachStatement.java
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*  Lars Vogel <Lars.Vogel@vogella.com> - Contributions for
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*  bug 349326 - [1.7] new warning for missing try-with-resources
*  bug 359362 - FUP of bug 349326: Resource leak on non-Closeable resource
*  bug 186342 - [compiler][null] Using annotations for null checking
*  bug 358903 - Filter practically unimportant resource leak warnings
*  bug 400421 - [compiler] Null analysis for fields does not take @com.google.inject.Inject
 into account
*  bug 382069 - [null] Make the null analysis consider JUnit's assertNotNull similarly to assertions
*  Bug 410218 - Optional warning for arguments of "unexpected" types to Map#get(Object),
Collection#remove(Object) et al.
*  Jesper S Moller <jesper@selskabet.org> -  Contributions for
*  Bug 412153 - [1.8][compiler] Check validity of annotations which may be repeatable
*  Ulrich Grave <ulrich.grave@gmx.de> - Contributions for
*  bug 386692 - Missing "unused" warning on "autowired" fields
*  Pierre-Yves B. <pyvesdev@gmail.com> - Contribution for
*  bug 542520 - [JUnit 5] Warning The method xxx from the type X is never used locally is shown
when using MethodSource
**********/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/TypeIds.java
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*  Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*  Bug 429384 - [1.8][null] implement conformance rules for null-annotated lower / upper type bounds
*  Bug 441797 - [1.8] synchronize type annotations on capture and its wildcard
*  Bug 456497 - [1.8][null] during inference nullness from target type is lost against weaker
 hint from applicability analysis
*  Bug 456924 - StackOverflowError during compilation
*  Bug 462790 - [null] NPE in Expression.computeConversion()
*  Jesper S Møller - Contributions for bug 381345 : [1.8] Take care of the Java 8 major version
*  Bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
**********/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/CaptureBinding.java
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*  Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*  Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
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```
*     Stephan Herrmann - Contributions for
*         bug 325755 - [compiler] wrong initialization state after conditional expression
*         bug 320170 - [compiler] [null] Whitebox issues in null analysis
*         bug 292478 - Report potentially null across variable assignment
*         bug 332637 - Dead Code detection removing code that isn't dead
*         bug 341499 - [compiler][null] allocate extra bits in all methods of UnconditionalFlowInfo
 *         bug 349326 - [1.7] new warning for missing try-with-resources
*      bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*      bug 386181 - [compiler][null] wrong transition in UnconditionalFlowInfo.mergedWith()
*      bug 394768 - [compiler][resource] Incorrect resource leak warning when creating stream in conditional
*      Bug 453483 - [compiler][null][loop] Improve null analysis for loops
*      Bug 454031 - [compiler][null][loop] bug in null analysis; wrong "dead code" detection
*      Bug 421035 - [resource] False alarm of resource leak warning when casting a closeable in its assignment
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/Messages.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ASTVisitor.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/AnnotationBinding.java
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*       Bug 458396 - NPE in CodeStream.invoke()
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/ModuleReferenceImpl.java
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*    tyeung@bea.com - initial API and implementation
*        Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*         Bug 407191 - [1.8] Binary access support for type annotations
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*         NonStaticAccessToStaticField
*         NonStaticAccessToStaticMethod
*         Task
*         ExpressionShouldBeAVariable
*         AssignmentHasNoEffect
*     IBM Corporation - added the following constants
*         TooManySyntheticArgumentSlots
*         TooManyArrayDimensions
*         TooManyBytesForStringConstant
*         TooManyMethods
*         TooManyFields
 *         NonBlankFinalLocalAssignment
*         ObjectCannotHaveSuperTypes
*         MissingSemiColon
*         InvalidParenthesizedExpression
*         EnclosingInstanceInConstructorCall
*         BytecodeExceeds64KLimitForConstructor
*         IncompatibleReturnTypeForNonInheritedInterfaceMethod
*         UnusedPrivateMethod
*         UnusedPrivateConstructor
*         UnusedPrivateType
*         UnusedPrivateField
*         IncompatibleExceptionInThrowsClauseForNonInheritedInterfaceMethod
*         InvalidExplicitConstructorCall
*     IBM Corporation - added the following constants
*         PossibleAccidentalBooleanAssignment
```

```
*         SuperfluousSemicolon
*         IndirectAccessToStaticField
*         IndirectAccessToStaticMethod
*         IndirectAccessToStaticType
*         BooleanMethodThrowingException
*         UnnecessaryCast
*         UnnecessaryArgumentCast
*         UnnecessaryInstanceof
*
  FinallyMustCompleteNormally
*         UnusedMethodDeclaredThrownException
*         UnusedConstructorDeclaredThrownException
*         InvalidCatchBlockSequence
*         UnqualifiedFieldAccess
*     IBM Corporation - added the following constants
*         Javadoc
*         JavadocUnexpectedTag
*         JavadocMissingParamTag
*         JavadocMissingParamName
*         JavadocDuplicateParamName
*         JavadocInvalidParamName
*         JavadocMissingReturnTag
*         JavadocDuplicateReturnTag
*         JavadocMissingThrowsTag
*         JavadocMissingThrowsClassName
*         JavadocInvalidThrowsClass
*         JavadocDuplicateThrowsClassName
*         JavadocInvalidThrowsClassName
*         JavadocMissingSeeReference
*         JavadocInvalidSeeReference
*         JavadocInvalidSeeHref
*         JavadocInvalidSeeArgs
*         JavadocMissing
*         JavadocInvalidTag
*         JavadocMessagePrefix
 *         EmptyControlFlowStatement
*     IBM Corporation - added the following constants
*         IllegalUsageOfQualifiedTypeReference
*         InvalidDigit
*     IBM Corporation - added the following constants
*         ParameterAssignment
*         FallthroughCase
*     IBM Corporation - added the following constants
*                         UnusedLabel
*                         UnnecessaryNLSTag
*                         LocalVariableMayBeNull
*                         EnumConstantsCannotBeSurroundedByParenthesis
*                         JavadocMissingIdentifier
```

```
*                       JavadocNonStaticTypeFromStaticInvocation
*                       RawTypeReference
*                       NoAdditionalBoundAfterTypeVariable
*                       UnsafeGenericArrayForVarargs
*                       IllegalAccessFromTypeVariable
*
  AnnotationValueMustBeArrayInitializer
*                       InvalidEncoding
*                       CannotReadSource
*                       EnumStaticFieldInInInitializerContext
*                       ExternalProblemNotFixable
*                       ExternalProblemFixable
*    IBM Corporation - added the following constants
*                       AnnotationValueMustBeAnEnumConstant
*                       OverridingMethodWithoutSuperInvocation
*                       MethodMustOverrideOrImplement
*                       TypeHidingTypeParameterFromType
*                       TypeHidingTypeParameterFromMethod
*                       TypeHidingType
*    IBM Corporation - added the following constants
*        NullLocalVariableReference
*        PotentialNullLocalVariableReference
*        RedundantNullCheckOnNullLocalVariable
*         NullLocalVariableComparisonYieldsFalse
 *         RedundantLocalVariableNullAssignment
*         NullLocalVariableInstanceofYieldsFalse
*         RedundantNullCheckOnNonNullLocalVariable
*         NonNullLocalVariableComparisonYieldsFalse
*    IBM Corporation - added the following constants
*                       InvalidUsageOfTypeParametersForAnnotationDeclaration
*                       InvalidUsageOfTypeParametersForEnumDeclaration
*    IBM Corporation - added the following constants
*        RedundantSuperinterface
*  Benjamin Muskalla - added the following constants
*       MissingSynchronizedModifierInInheritedMethod
*  Stephan Herrmann  - added the following constants
*       UnusedObjectAllocation
*       PotentiallyUnclosedCloseable
*       PotentiallyUnclosedCloseableAtExit
*       UnclosedCloseable
*       UnclosedCloseableAtExit
*       ExplicitlyClosedAutoCloseable
*          RequiredNonNullButProvidedNull
 *        RequiredNonNullButProvidedPotentialNull
*        RequiredNonNullButProvidedUnknown
*        NullAnnotationNameMustBeQualified
*        IllegalReturnNullityRedefinition
*        IllegalRedefinitionToNonNullParameter
```

* IllegalDefinitionToNonNullParameter
* ParameterLackingNonNullAnnotation
* ParameterLackingNullableAnnotation
* PotentialNullMessageSendReference
* RedundantNullCheckOnNonNullMessageSend
* CannotImplementIncompatibleNullness
* RedundantNullAnnotation
* RedundantNullDefaultAnnotation
* RedundantNullDefaultAnnotationPackage
* RedundantNullDefaultAnnotationType
* RedundantNullDefaultAnnotationMethod
* ContradictoryNullAnnotations
* IllegalAnnotationForBaseType
* RedundantNullCheckOnSpecdNonNullLocalVariable
* SpecdNonNullLocalVariableComparisonYieldsFalse
* RequiredNonNullButProvidedSpecdNullable
* MissingDefaultCase
* MissingEnumConstantCaseDespiteDefault
* UninitializedLocalVariableHintMissingDefault
* UninitializedBlankFinalFieldHintMissingDefault
* ShouldReturnValueHintMissingDefault
* IllegalModifierForInterfaceDefaultMethod
* InheritedDefaultMethodConflictsWithOtherInherited
* ConflictingNullAnnotations
* ConflictingInheritedNullAnnotations
* UnsafeElementTypeConversion
* ArrayReferencePotentialNullReference
* DereferencingNullableExpression
* NullityMismatchingTypeAnnotation
* NullityMismatchingTypeAnnotationSuperHint
* NullityUncheckedTypeAnnotationDetail
* NullityUncheckedTypeAnnotationDetailSuperHint
* NullableFieldReference
* UninitializedNonNullField
* UninitializedNonNullFieldHintMissingDefault
* NonNullMessageSendComparisonYieldsFalse
* RedundantNullCheckOnNonNullSpecdField
* NonNullSpecdFieldComparisonYieldsFalse
* NonNullExpressionComparisonYieldsFalse
* RedundantNullCheckOnNonNullExpression
* ReferenceExpressionParameterNullityMismatch
* ReferenceExpressionParameterNullityUnchecked
* ReferenceExpressionReturnNullRedef
* ReferenceExpressionReturnNullRedefUnchecked
* DuplicateInheritedDefaultMethods
* SuperAccessCannotBypassDirectSuper
* SuperCallCannotBypassOverride
* ConflictingNullAnnotations

```
*       ConflictingInheritedNullAnnotations
*       UnsafeElementTypeConversion
*       PotentialNullUnboxing
*       NullUnboxing
*       NullExpressionReference
*       PotentialNullExpressionReference
*       RedundantNullCheckAgainstNonNullType
*       NullAnnotationUnsupportedLocation
*       NullAnnotationUnsupportedLocationAtType
*       NullityMismatchTypeArgument
*       ContradictoryNullAnnotationsOnBound
*       UnsafeNullnessCast
 *       ContradictoryNullAnnotationsInferred
*       NonNullDefaultDetailIsNotEvaluated
*       NullNotCompatibleToFreeTypeVariable
*       NullityMismatchAgainstFreeTypeVariable
*       ImplicitObjectBoundNoNullDefault
*       IllegalParameterNullityRedefinition
*       ContradictoryNullAnnotationsInferredFunctionType
*       IllegalReturnNullityRedefinitionFreeTypeVariable
*       UnlikelyCollectionMethodArgumentType
*       UnlikelyEqualsArgumentType
*     Jesper S Moller  - added the following constants
*       TargetTypeNotAFunctionalInterface
*       OuterLocalMustBeEffectivelyFinal
*       IllegalModifiersForPackage
*       DuplicateAnnotationNotMarkedRepeatable
*       DisallowedTargetForContainerAnnotation
*       RepeatedAnnotationWithContainerAnnotation
*       ContainingAnnotationMustHaveValue
*       ContainingAnnotationHasNonDefaultMembers
*       ContainingAnnotationHasWrongValueType
*       ContainingAnnotationHasShorterRetention
 *       RepeatableAnnotationHasTargets
*       RepeatableAnnotationTargetMismatch
*       RepeatableAnnotationIsDocumented
*       RepeatableAnnotationIsInherited
*       RepeatableAnnotationWithRepeatingContainerAnnotation
*       VarLocalMultipleDeclarators
*       VarLocalCannotBeArray
*       VarLocalReferencesItself
*       VarLocalWithoutInitizalier
*       VarLocalInitializedToNull
*       VarLocalCannotBeArrayInitalizers
*       VarLocalCannotBeLambda
*       VarLocalCannotBeMethodReference
*       VarIsReserved
*       VarIsReservedInFuture
```

```
*       VarIsNotAllowedHere
*******************************************************************************/
```

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/core/compiler/IProblem.java
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*     Stephan Herrmann - initial API and implementation
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ExternalAnnotationSuperimposer.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/SwitchExpression.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/IMultiModuleEntry.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/INameEnvironmentExtension.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/IModuleAwareNameEnvironment.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ProvidesStatement.java
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* Contributors:
*  Stefan Xenos <sxenos@gmail.com> (Google) - initial API and implementation
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/ExternalAnnotationDecorator.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/Pattern.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/TypePattern.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/batch/ClasspathSourceJar.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/apt/util/EclipseFileManager.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/tool/EclipseFileManager.java
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*     Dennis Hendriks - initial API and implementation
*     IBM Corporation - Contribution for bug 188796
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/batch/ClasspathJsr199.java
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Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/AnnotationMethodDeclaration.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ClassLiteralAccess.java

* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredUnit.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredField.java
*
 /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/ICompilationUnit.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/INameEnvironment.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/CompilationResult.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/NameEnvironmentAnswer.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredElement.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/batch/ClasspathLocation.java
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* Contributors:
*     IBM Corporation - initial API and implementation
*     Stephan Herrmann - Contributions for
*       bug 342671 - ClassCastException: org.eclipse.jdt.internal.compiler.lookup.SourceTypeBinding cannot be cast to
org.eclipse.jdt.internal.compiler.lookup.ArrayBinding
*       Bug 420894 - ClassCastException in DefaultBindingResolver.resolveType(Type)
*       bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 415043 - [1.8][null] Follow-up re null type
 annotations after bug 392099
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*       Bug 434600 - Incorrect null analysis error reporting on type parameters
*       Bug 435570 - [1.8][null] @NonNullByDefault illegally tries to affect "throws E"
*       Bug 456508 - Unexpected RHS PolyTypeBinding for: <code-snippet>
*       Bug 466713 - Null Annotations: NullPointerException using <int @Nullable []> as Type Param
*       Andy Clement - Contributions for
*                       Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
work)
*******************************************************************************/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ParameterizedSingleTypeReference.java
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* Contributors:
*     IBM Corporation - initial API and implementation
*     Stephan Herrmann <stephan@cs.tu-berlin.de> - Contributions for
*         Bug 328281 - visibility leaks not detected when analyzing unused field in private class
*         Bug 300576 - NPE Computing type hierarchy when compliance doesn't match libraries
*         Bug 354536 - compiling package-info.java still depends on the order of compilation units
*         Bug 349326 - [1.7] new warning for missing try-with-resources
*         Bug
 358903 - Filter practically unimportant resource leak warnings
*      Bug 395977 - [compiler][resource] Resource leak warning behavior possibly incorrect for anonymous inner class
*      Bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*      Bug 416176 - [1.8][compiler][null] null type annotations cause grief on type variables
*      Bug 427199 - [1.8][resource] avoid resource leak warnings on Streams that have no resource
*      Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*      Bug 434570 - Generic type mismatch for parametrized class annotation attribute with inner class
*      Bug 444024 - [1.8][compiler][null] Type mismatch error in annotation generics assignment which happens
"sometimes"
*      Bug 459967 - [null] compiler should know about nullness of special methods like MyEnum.valueOf()
*       Andy Clement (GoPivotal, Inc) aclement@gopivotal.com -
 Contributions for
*                      Bug 415821 - [1.8][compiler] CLASS_EXTENDS target type annotation missing for anonymous
classes
*     het@google.com - Bug 456986 - Bogus error when annotation processor generates annotation type
*     Lars Vogel <Lars.Vogel@vogella.com> - Contributions for
*         Bug 473178
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ClassScope.java
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*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       bug 388281 - [compiler][null] inheritance of null annotations as an option
*       Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/TagBits.java
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*     Stephan Herrmann <stephan@cs.tu-berlin.de> - Contributions for
*       bug 328281 - visibility leaks not detected when analyzing unused field in private class
*       bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 365836 - [compiler][null] Incomplete propagation of null defaults.
*       bug 365519 - editorial cleanup after bug 186342
 and bug 365387
*       bug 365662 - [compiler][null] warn on contradictory and redundant null annotations
*       bug 365531 - [compiler][null] investigate alternative strategy for internally encoding nullness defaults
*       bug 366063 - Compiler should not add synthetic @NonNull annotations
*       bug 384663 - Package Based Annotation Compilation Error in JDT 3.8/4.2 (works in 3.7.2)
*       bug 386356 - Type mismatch error with annotations and generics
*       bug 388281 - [compiler][null] inheritance of null annotations as an option
*       bug 331649 - [compiler][null] consider null annotations for fields
*       bug 380896 - [compiler][null] Enum constants not recognised as being NonNull.
*       bug 391376 - [1.8] check interaction of default methods with bridge methods and generics
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
 *       Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*       Bug 415850 - [1.8] Ensure RunJDTCoreTests can cope with null annotations enabled
*       Bug 416172 - [1.8][compiler][null] null type annotation not evaluated on method return type
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 426048 - [1.8] NPE in TypeVariableBinding.internalBoundCheck when parentheses are not balanced
```

```
*       Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*       Bug 432348 - [1.8] Internal compiler error (NPE) after upgrade to 1.8
*       Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
*       Bug 435570 - [1.8][null] @NonNullByDefault illegally tries to affect "throws E"
*       Bug 441693 - [1.8][null]
 Bogus warning for type argument annotated with @NonNull
*       Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*       Bug 457210 - [1.8][compiler][null] Wrong Nullness errors given on full build build but not on incremental build?
*       Bug 461250 - ArrayIndexOutOfBoundsException in SourceTypeBinding.fields
*       Bug 466713 - Null Annotations: NullPointerException using <int @Nullable []> as Type Param
*     Jesper S Moller <jesper@selskabet.org> -  Contributions for
*       Bug 412153 - [1.8][compiler] Check validity of annotations which may be repeatable
*     Till Brychcy - Contributions for
*           bug 415269 - NonNullByDefault is not always inherited to nested classes
*     Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                       Bug 405104 - [1.8][compiler][codegen] Implement support for serializeable lambdas
*     Sebastian Zarnekow - Contributions
 for
*       bug 544921 - [performance] Poor performance with large source files
*******************************************************************************/
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*  wharley@bea.com - initial API and implementation
*  IBM Corporation - fix for 342598
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/RequiresStatement.java
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*     Stephan Herrmann  - Contribution for bug 295551
*     Jesper S Moller   - Contributions for
*         Bug 405066 - [1.8][compiler][codegen] Implement code generation infrastructure for JSR335
*     Frits Jalvingh    - contributions for bug 533830.
*     Red Hat Inc.      - add module-info Javadoc support
*******************************************************************************/
```

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*  bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*  bug 402993 - [null] Follow up of bug 401088: Missing warning about redundant null check
*  Bug 453483 - [compiler][null][loop] Improve null analysis for loops
*  Bug 421035 - [resource] False alarm of resource leak warning when casting a closeable in its assignment
**********/

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 in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/flow/ExceptionHandlingFlowContext.java
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* Contributors:
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*  Stephan Herrmann - Contributions for
*  bug 292478 - Report potentially null across variable assignment
*  bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*  bug 392862 - [1.8][compiler][null] Evaluate null annotations on array types
*  bug 331649 - [compiler][null] consider null annotations for fields
*  bug 383368 - [compiler][null] syntactic null analysis for field
 references
*  bug 400761 - [compiler][null] null may be return as boolean without a diagnostic
*  bug 402993 - [null] Follow up of bug 401088: Missing warning about redundant null check
*  bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred
checking
*  Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*  Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*  Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*  Bug 426792 - [1.8][inference][impl] generify new type inference engine

```
*       Bug 423505 - [1.8] Implement "18.5.4 More Specific Method Inference"
*       Bug 427438 - [1.8][compiler] NPE at
org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*       Bug 426996 - [1.8][inference]
 try to avoid method Expression.unresolve()?
*       Bug 428274 - [1.8] [compiler] Cannot cast from Number to double
*       Bug 428352 - [1.8][compiler] Resolution errors don't always surface
*       Bug 452788 - [1.8][compiler] Type not correctly inferred in lambda expression
*     Lars Vogel <Lars.Vogel@vogella.com> - Contributions for
*          Bug 473178
*******************************************************************************/
```

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*    wharley@bea.com - initial API and implementation
*    IBM Corporation - fix for 342598
*    IBM Corporation - Java 8 support
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* Contributors:
*     IBM Corporation - initial API and implementation
*     Christoph Läubrich - use Filesystem helper method
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*     Benjamin Muskalla - Contribution for bug 239066
*     Stephan Herrmann  - Contributions for
*          bug 236385 - [compiler] Warn for potential programming problem if an object is created but not used
*          bug 295551 - Add option to automatically promote all warnings to errors
*          bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug
 370639 - [compiler][resource] restore the default for resource leak warnings
*       bug 366063 - Compiler should not add synthetic @NonNull annotations
*       bug 374605 - Unreasonable warning for enum-based switch statements
*       bug 388281 - [compiler][null] inheritance of null annotations as an option
*       bug 381443 - [compiler][null] Allow parameter widening from @NonNull to unannotated
*       bug 383368 - [compiler][null] syntactic null analysis for field references
*       Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
```

*	Bug 410218 - Optional warning for arguments of "unexpected" types to Map#get(Object), Collection#remove(Object) et al.
*	Jesper Steen Moller - Contributions for
*	bug 404146 - [1.7][compiler] nested try-catch-finally-blocks leads to unrunnable Java byte code
*	bug 407297 - [1.8][compiler] Control generation of parameter names by option
**********/

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*	Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*		Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's work)
*		Bug 409247 - [1.8][compiler] Verify error with code allocating multidimensional array
*		Bug 409517 - [1.8][compiler] Type annotation problems on more elaborate array references
*
		Bug 409250 - [1.8][compiler] Various loose ends in 308 code generation
**********/

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```
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*     Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*         Bug 407191 - [1.8] Binary access support for type annotations
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/IBinaryField.java
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*     Stephan Herrmann - Contribution for
*           bug 382347 - [1.8][compiler] Compiler accepts incorrect default method inheritance
*       bug 388954 - [1.8][compiler] detect default methods in class files
*       bug 388281 - [compiler][null] inheritance of null annotations as an option
*       bug 388739 - [1.8][compiler] consider default methods when detecting whether a class needs
 to be declared abstract
*       bug 390883 - [1.8][compiler] Unable to override default method
*       bug 401796 - [1.8][compiler] don't treat default methods as overriding an independent inherited abstract method
*       bug 395681 - [compiler] Improve simulation of javac6 behavior from bug 317719 after fixing bug 388795
*       bug 406928 - computation of inherited methods seems damaged (affecting @Overrides)
*       bug 409473 - [compiler] JDT cannot compile against JRE 1.8
*       Bug 420080 - [1.8] Overridden Default method is reported as duplicated
*******************************************************************************/
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*    tyeung@bea.com - initial API and implementation
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/AnnotationMethodInfo.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/AnnotationMethodInfoWithAnnotations.java
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*        bug 186342 - [compiler][null] Using annotations for null checking
*        bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*        bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
*        Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*        Bug 417295 - [1.8[[null] Massage type annotated
 null analysis to gel well with deep encoded type bindings.
*        Bug 425152 - [1.8] [compiler] Lambda Expression not resolved but flow analyzed leading to NPE.
*        Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
**********/

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*  bug 331649 - [compiler][null] consider null annotations for fields
*  Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*  Bug 426996 - [1.8][inference] try to avoid method Expression.unresolve()?
*  Jesper S Moller - Contributions for
*  bug 382721 - [1.8][compiler] Effectively final variables needs special treatment
**********/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/NameReference.java

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*        bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*        bug 186342 - [compiler][null] Using annotations for null checking
*        bug 361407 - Resource leak warning when resource is assigned to a field outside of constructor
*        bug 370639 - [compiler][resource] restore the default for resource leak warnings
*        bug 388996 - [compiler][resource] Incorrect
 'potential resource leak'
*        bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred
checking
*        Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*        Bug 424710 - [1.8][compiler] CCE in SingleNameReference.localVariableBinding
*        Bug 425152 - [1.8] [compiler] Lambda Expression not resolved but flow analyzed leading to NPE.
*        Bug 424205 - [1.8] Cannot infer type for diamond type with lambda on method invocation
*        Bug 424415 - [1.8][compiler] Eventual resolution of ReferenceExpression is not seen to be happening.
*        Bug 426366 - [1.8][compiler] Type inference doesn't handle multiple candidate target types in outer overload
context
*        Bug 426290 - [1.8][compiler] Inference + overloading => wrong method resolution ?
*        Bug 427483 - [Java 8] Variables in lambdas sometimes can't be resolved
*        Bug 427438 - [1.8][compiler]
 NPE at org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*        Bug 428352 - [1.8][compiler] Resolution errors don't always surface
*        Bug 452788 - [1.8][compiler] Type not correctly inferred in lambda expression
*        Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                        Bug 409245 - [1.8][compiler] Type annotations dropped when call is routed through a synthetic
bridge method
*******************************************************************************/
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*	bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
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*	bug 186342 - [compiler][null] Using annotations for null checking
*	bug 387612 - Unreachable catch block...exception is never thrown from the try
*	bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*	bug 401456 - Code compiles from javac/intellij, but fails from eclipse
*	bug 401271 - StackOverflowError
when searching for a methods references
*	bug 405706 - Eclipse compiler fails to give compiler error when return type is a inferred generic
*	Bug 408441 - Type mismatch using Arrays.asList with 3 or more implementations of an interface with the
interface type as the last parameter

* Bug 413958 - Function override returning inherited Generic Type
* Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
* Bug 416183 - [1.8][compiler][null] Overload resolution fails with null annotations
* Bug 416176 - [1.8][compiler][null] null type annotations cause grief on type variables
* Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
* Bug 424710 - [1.8][compiler] CCE in SingleNameReference.localVariableBinding
* Bug 424205 - [1.8] Cannot infer type for diamond type with lambda on method invocation
* Bug 424415 - [1.8][compiler]
Eventual resolution of ReferenceExpression is not seen to be happening.
* Bug 426366 - [1.8][compiler] Type inference doesn't handle multiple candidate target types in outer overload context
* Bug 426290 - [1.8][compiler] Inference + overloading => wrong method resolution ?
* Bug 426589 - [1.8][compiler] Compiler error with generic method/constructor invocation as vargs argument
* Bug 426590 - [1.8][compiler] Compiler error with tenary operator
* Bug 426764 - [1.8] Presence of conditional expression as method argument confuses compiler
* Bug 426998 - [1.8][compiler] method(java.lang.Class, java.lang.String) not applicable for the arguments (java.lang.Class, java.lang.String)
* Bug 423505 - [1.8] Implement "18.5.4 More Specific Method Inference"
* Bug 427196 - [1.8][compiler] Compiler error for method reference to overloaded method
* Bug 427483 - [Java 8] Variables in lambdas sometimes can't be resolved
* Bug
427728 - [1.8] Type Inference rejects calls requiring boxing/unboxing
* Bug 427218 - [1.8][compiler] Verify error varargs + inference
* Bug 426836 - [1.8] special handling for return type in references to method getClass()?
* Bug 427628 - [1.8] regression : The method * is ambiguous for the type *
* Bug 428352 - [1.8][compiler] Resolution errors don't always surface
* Bug 428366 - [1.8] [compiler] The method valueAt(ObservableList<Object>, int) is ambiguous for the type Bindings
* Bug 424728 - [1.8][null] Unexpected error: The nullness annotation 'XXXX' is not applicable at this location
* Bug 428811 - [1.8][compiler] Type witness unnecessarily required
* Bug 429424 - [1.8][inference] Problem inferring type of method's parameter
* Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
* Bug 434570 - Generic type mismatch for parametrized class annotation attribute with inner
class
* Bug 434483 - [1.8][compiler][inference] Type inference not picked up with method reference
* Bug 441734 - [1.8][inference] Generic method with nested parameterized type argument fails on method reference
* Bug 452194 - Code no longer compiles in 4.4.1, but with confusing error
* Bug 452788 - [1.8][compiler] Type not correctly inferred in lambda expression
* Bug 456236 - [1.8][null] Cannot infer type when constructor argument is annotated with @Nullable
* Bug 437072 - [compiler][null] Null analysis emits possibly incorrect warning for new int[][] despite @NonNullByDefault
* Bug 462083 - [1.8][inference] Java 8 generic return type mismatch with interface involving type parameter.
* Jesper S Moller - Contributions for
* Bug 378674 - "The method can be declared as static" is wrong
* Bug 405066 - [1.8][compiler][codegen] Implement code generation infrastructure for JSR335
* Andy Clement (GoPivotal, Inc)
aclement@gopivotal.com - Contributions for
* Bug 405104 - [1.8][compiler][codegen] Implement support for serializeable lambdas

```
*     Pierre-Yves B. <pyvesdev@gmail.com> - Contributions for
*                         Bug 559618 - No compiler warning for import from same package
*                         Bug 560630 - No warning on unused import on class from same package
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*       Bug 440474 - [null] textual encoding of external null annotations
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*     Stephan Herrmann - Contribution for
*       bug 383368 - [compiler][null] syntactic null analysis for field references
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/NullLiteral.java

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*     Stephan Herrmann - Contributions for
*         bug 349326 - [1.7] new warning for missing try-with-resources
*         bug 186342 - [compiler][null] Using annotations for null checking
*         bug 364890 - BinaryTypeBinding should use char constants from Util
*         bug 365387 - [compiler][null] bug 186342: Issues to follow up post review and verification.
*         bug 358903 - Filter practically unimportant resource leak warnings
*         bug
 365531 - [compiler][null] investigate alternative strategy for internally encoding nullness defaults
*         bug 388800 - [1.8][compiler] detect default methods in class files
*         bug 388281 - [compiler][null] inheritance of null annotations as an option
*         bug 331649 - [compiler][null] consider null annotations for fields
*         bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
*         Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*         Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*         Bug 415850 - [1.8] Ensure RunJDTCoreTests can cope with null annotations enabled
*         Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*         Bug 427199 - [1.8][resource] avoid resource leak warnings on Streams that have no resource
*         Bug 392245 - [1.8][compiler][null] Define whether
 / how @NonNullByDefault applies to TYPE_USE locations
*         Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*         Bug 390889 - [1.8][compiler] Evaluate options to support 1.7- projects against 1.8 JRE.
*         Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
*         Bug 439516 - [1.8][null] NonNullByDefault wrongly applied to implicit type bound of binary type
*         Bug 434602 - Possible error with inferred null annotations leading to contradictory null annotations
*         Bug 440477 - [null] Infrastructure for feeding external annotations into compilation
*         Bug 441693 - [1.8][null] Bogus warning for type argument annotated with @NonNull
*         Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*         Bug 453475 - [1.8][null] Contradictory null annotations (4.5 M3 edition)
*         Bug 454182 - Internal compiler error when using
 1.8 compliance for simple project
*         Bug 470467 - [null] Nullness of special Enum methods not detected from .class file
*         Bug 447661 - [1.8][null] Incorrect 'expression needs unchecked conversion' warning
*    Jesper Steen Moller - Contributions for
*         Bug 412150 [1.8] [compiler] Enable reflected parameter names during annotation processing
```

```
*       Bug 412153 - [1.8][compiler] Check validity of annotations which may be repeatable
*    Sebastian Zarnekow - Contributions for
*       bug 544921 - [performance] Poor performance with large source files
*    Alexander Lehmann - Contributions for
*       bug 566258 - Intermittent NPE in APT RoundDispatcher
*******************************************************************************/
```

Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/BinaryTypeBinding.java
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Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/OpensStatement.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/UsesStatement.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/PackageExportImpl.java
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*     Stephan Herrmann - Contribution for
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/UnionTypeReference.java
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*     Stephan Herrmann - Contribution for bug 349326 - [1.7] new warning for missing try-with-resources
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/EmptyStatement.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ExtendedTagBits.java
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*  Stephan Herrmann - Contribution for
*  Bug 434602 - Possible error with inferred null annotations leading to contradictory null annotations
*  Bug 456497 - [1.8][null] during inference nullness from target type is lost against weaker hint from applicability analysis
*  Bug 456487 - [1.8][null] @Nullable type variant of @NonNull-constrained type parameter causes grief
*  Till Brychcy - Contribution for
*  Bug 473713
 - [1.8][null] Type mismatch: cannot convert from @NonNull A1 to @NonNull A1
**********/
/* Cache the derived type, tagging it as a derivative of both the key type and the naked type.
  E.g: int @NonNull [] would be tagged as a derived type of both int and int []. This is not
  needed for correctness, but for annotated object reuse. We provide two alternate ways to
  annotate a type:

  Taking parameterized types as an example, a call to getParamaterizedType can be made with annotations
  to create @NonNull List<@NonNull String> in one stroke. Or a parameterized type can be created first
  and then annotated via getAnnotatedType. In the former case, the tables get looked up with List as
  the key, in the latter with List<String> as the key.

  Binary vs source, substitutions, annotation re-attribution from SE7 locations etc trigger these
  alternate code paths. Unless care is exercised,
 we will end up with duplicate objects (that share
  the same TypeBinding.id => correctness is not an issue, but memory wastage is)
 */

Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/TypeSystem.java
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* Contributors:
*  IBM Corporation - initial API and implementation
*  Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*  Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's work)

```
*******************************************************************************/

Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/ExceptionLabel.java
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*     Stephan Herrmann - Contribution for bug 186342 - [compiler][null] Using annotations for null checking
*     Jesper Steen Moeller - Contribution for bug 406973 - [compiler] Parse MethodParameters attribute
*     Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*         Bug 407191 - [1.8] Binary access support for type annotations
*******************************************************************************/

Found
 in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/MethodInfo.java
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*     Stephan Herrmann - Contribution for
*         Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ArrayQualifiedTypeReference.java
```

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*     Jesper S Moller - Contributions for
*        bug 382701 - [1.8][compiler] Implement semantic analysis of Lambda expressions & Reference expression
*    Stephan Herrmann - Contribution for
*        bug 404649 - [1.8][compiler] detect illegal reference to indirect or redundant super
*        Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*        Bug 416182 - [1.8][compiler][null]
 Contradictory null annotations not rejected
*******************************************************************************/
```

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ProblemReasons.java
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*     Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*        bug 407191 - [1.8] Binary access support for type annotations
*     Stephan Herrmann - Contribution for
*        Bug 440474 - [null] textual encoding of external null annotations
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/IBinaryType.java

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*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 433478 - [compiler][null] NPE in ReferenceBinding.isCompatibleWith
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```

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ProblemMethodBinding.java
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*       bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       bug 392862 - [1.8][compiler][null] Evaluate null annotations on array types
*       bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
*       Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*       Bug 415850 - [1.8] Ensure RunJDTCoreTests
 can cope with null annotations enabled
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 427163 - [1.8][null] bogus error "Contradictory null specification" on varags
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*       Bug 434570 - Generic type mismatch for parametrized class annotation attribute with inner class
*       Bug 434600 - Incorrect null analysis error reporting on type parameters
*       Bug 439516 - [1.8][null] NonNullByDefault wrongly applied to implicit type bound of binary type
```

```
*       Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
*       Bug 435570 - [1.8][null] @NonNullByDefault illegally tries to affect "throws E"
*       Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*       Bug 437072 - [compiler][null] Null analysis
 emits possibly incorrect warning for new int[][] despite @NonNullByDefault
*       Bug 466713 - Null Annotations: NullPointerException using <int @Nullable []> as Type Param
*       Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                       Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
work)
*                       Bug 409236 - [1.8][compiler] Type annotations on intersection cast types dropped by code
generator
*                       Bug 415399 - [1.8][compiler] Type annotations on constructor results dropped by the code
generator
*     Jesper S Møller <jesper@selskabet.org> -  Contributions for
*                       bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
*                       bug 529556 - [18.3] Add content assist support for 'var' as a type
*
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/TypeReference.java
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*     Stephan Herrmann - Contributions for
*       bug 366003 - CCE in ASTNode.resolveAnnotations(ASTNode.java:639)
*       bug 383973 - [1.8][compiler] syntax recovery in the presence of default methods
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*  bug 186342 - [compiler][null] Using annotations for null checking
*  bug 365519 - editorial cleanup after bug 186342 and bug 365387
*  bug 388281 - [compiler][null] inheritance of null annotations as an option
*  bug 388795 - [compiler] detection of name clash depends on order of super interfaces
*  bug 388739 - [1.8][compiler] consider default methods when detecting whether
 a class needs to be declared abstract
*  bug 390883 - [1.8][compiler] Unable to override default method
*  bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*  bug 401246 - [1.8][compiler] abstract class method should now trump conflicting default methods
*  bug 401796 - [1.8][compiler] don't treat default methods as overriding an independent inherited abstract method
*  bug 403867 - [1.8][compiler] Suspect error about duplicate default methods
*  bug 391376 - [1.8] check interaction of default methods with bridge methods and generics
*  bug 395681 - [compiler] Improve simulation of javac6 behavior from bug 317719 after fixing bug 388795
*  bug 409473 - [compiler] JDT cannot compile against JRE 1.8
*  Bug 420080 - [1.8] Overridden Default method is reported as duplicated
*  Bug 404690 - [1.8][compiler] revisit bridge generation after VM bug is fixed
 *  Bug 410325 - [1.7][compiler] Generified method override different between javac and eclipse compiler
*  Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*  Bug 390889 - [1.8][compiler] Evaluate options to support 1.7- projects against 1.8 JRE.
*  Bug 440773 - [1.8][null]DefaultLocation.RETURN_TYPE erroneously affects method parameters in
@NonNullByDefault
*  Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*  Bug 446442 - [1.8] merge null annotations from super methods
**********/

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*     Tom Tromey - Contribution for bug 159641
*     Benjamin Muskalla - Contribution for bug 239066
*     Stephan Herrmann  - Contributions for
*          bug 236385 - [compiler] Warn for potential programming problem if an object is created but not used
*          bug 295551 - Add option to automatically promote all warnings to errors
*          bug 359721 - [options] add command line option
 for new warning token "resource"
*       bug 365208 - [compiler][batch] command line options for annotation based null analysis
*       bug 374605 - Unreasonable warning for enum-based switch statements
*       bug 375366 - ECJ ignores unusedParameterIncludeDocCommentReference unless enableJavadoc option is set
*       bug 388281 - [compiler][null] inheritance of null annotations as an option
*       bug 381443 - [compiler][null] Allow parameter widening from @NonNull to unannotated
*       Bug 440477 - [null] Infrastructure for feeding external annotations into compilation
*       Bug 440687 - [compiler][batch][null] improve command line option for external annotations
*       Bug 408815 - [batch][null] Add CLI option for
COMPILER_PB_SYNTACTIC_NULL_ANALYSIS_FOR_FIELDS
*     Jesper S Moller   - Contributions for
*       bug 407297 - [1.8][compiler] Control generation of parameter names by option
*    Mat Booth - Contribution for bug 405176
*    Frits Jalvingh -
 fix for bug 533830.
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/HashtableOfObjectToIntArray.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/TrueLiteral.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/AccessRestriction.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/DoubleCache.java
*
 /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ProblemFieldBinding.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/LongCache.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/MagicLiteral.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/antadapter/AntAdapterMessages.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/InnerEmulationDependency.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ParameterizedFieldBinding.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/HashtableOfLong.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/HashtableOfType.java

* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/problem/AbortCompilationUnit.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/HashtableOfInt.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/ISourceImport.java
*
 /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ProblemBinding.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/HashtableOfIntValues.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ImportConflictBinding.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/CharLiteral.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/ObjectCache.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/SyntheticArgumentBinding.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ICompilerRequestor.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/Label.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/PostfixExpression.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/IDebugRequestor.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/StringLiteralConcatenation.java
*
 /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/IDependent.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/HashtableOfObjectToInt.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/AnnotationHolder.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/SubRoutineStatement.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/SimpleSet.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/problem/AbortType.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/SyntheticFieldBinding.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/problem/AbortCompilation.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/FalseLiteral.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/IProblemFactory.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/JavadocSingleNameReference.java
*
 /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/JavadocReturnStatement.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/PrefixExpression.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/InnerClassInfo.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredImport.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/problem/AbortMethod.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/problem/ShouldNotImplement.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/diagnose/RangeUtil.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/OperatorIds.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/FloatCache.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/ClassFileStruct.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/IntegerCache.java
*
 /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/AccessRule.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/SimpleLookupTable.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/CaseLabel.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/JavadocArrayQualifiedTypeReference.java
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*  bug 358827 - [1.7] exception analysis for t-w-r spoils null analysis
*  bug 186342 - [compiler][null] Using annotations for null checking
*  bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*  bug 365859 - [compiler][null] distinguish warnings based on flow analysis vs. null annotations
*  bug 345305 - [compiler][null]
Compiler misidentifies a case of "variable can only be null"
*  bug 383368 - [compiler][null] syntactic null analysis for field references
*  bug 402993 - [null] Follow up of bug 401088: Missing warning about redundant null check
*  bug 403086 - [compiler][null] include the effect of 'assert' in syntactic null analysis for fields
*  bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred
checking
*  Bug 453483 - [compiler][null][loop] Improve null analysis for loops
*  Bug 455723 - Nonnull argument not correctly inferred in loop
*  Bug 415790 - [compiler][resource]Incorrect potential resource leak warning in for loop with close in try/catch
*  Bug 446691 - [1.8][null][compiler] NullPointerException in SingleNameReference.analyseCode
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/batch/ClasspathJmod.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/CharArrayMap.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/CharArrayHashMap.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/CharArrayMapper.java
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*  bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*  bug 392862 - [1.8][compiler][null] Evaluate null annotations on array types
*  bug 383368 - [compiler][null] syntactic null analysis for field references
*  bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred checking
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ArrayReference.java
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*  Christoph Läubrich - use Filesystem helper method
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*  IBM Corporation - initial API and implementation
*  Stephan Herrmann - Contributions for

```
*       bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 374605 - Unreasonable warning for enum-based switch statements
*       bug 382353 - [1.8][compiler] Implementation property modifiers should be accepted on default methods.
*       bug 382354 - [1.8][compiler] Compiler silent on conflicting modifier
*       bug 401030 - [1.8][null] Null analysis support for lambda methods.
*       Bug
 416176 - [1.8][compiler][null] null type annotations cause grief on type variables
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*     Jesper S Moller - Contributions for
*       bug 382701 - [1.8][compiler] Implement semantic analysis of Lambda expressions & Reference expression
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/MethodScope.java
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* Contributors:
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*     Stephan Herrmann - Contribution for
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*       Bug 435570 - [1.8][null] @NonNullByDefault illegally tries to affect "throws E"
*       Bug 466713 - Null Annotations: NullPointerException using <int @Nullable []> as Type Param
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ArrayTypeReference.java
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*       bug 382350 - [1.8][compiler] Unable to invoke inherited default method via I.super.m() syntax
*       bug 404649 - [1.8][compiler] detect illegal reference to indirect or redundant super
*     Jesper S Moller <jesper@selskabet.org> - Contributions for
*       bug 378674 - "The method can be declared as static" is wrong
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/QualifiedThisReference.java
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*    Frits Jalvingh  - fix for bug 533830.
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*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 365519 - editorial cleanup after bug 186342 and bug 365387
*       bug 365531 - [compiler][null] investigate alternative strategy for internally encoding nullness defaults
```

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*     Stephan Herrmann - Contributions for
*          bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*          bug 349326 - [1.7] new warning for missing try-with-resources
*          bug 360328 - [compiler][null] detect null problems in nested code (local class inside a loop)
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 365835 - [compiler][null] inconsistent error reporting.
 *       bug 365519 - editorial cleanup after bug 186342 and bug 365387
*       bug 358903 - Filter practically unimportant resource leak warnings
*       bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*       bug 370639 - [compiler][resource] restore the default for resource leak warnings
*       bug 365859 - [compiler][null] distinguish warnings based on flow analysis vs. null annotations
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
```

```
*       bug 388996 - [compiler][resource] Incorrect 'potential resource leak'
*       bug 394768 - [compiler][resource] Incorrect resource leak warning when creating stream in conditional
*       bug 383368 - [compiler][null] syntactic null analysis for field references
*       bug 400761 - [compiler][null] null may be return as boolean without a diagnostic
*       bug 401030 - [1.8][null] Null analysis support for lambda
 methods.
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*       Bug 416307 - [1.8][compiler][null] subclass with type parameter substitution confuses null checking
*       Bug 417758 - [1.8][null] Null safety compromise during array creation.
*       Bug 427438 - [1.8][compiler] NPE at
org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*       Bug 430150 - [1.8][null] stricter checking against type variables
*       Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*       Bug 452788 - [1.8][compiler] Type not correctly inferred in lambda expression
*       Bug 453483 - [compiler][null][loop] Improve null analysis for loops
*       Bug 455723 - Nonnull argument not correctly inferred in loop
*     Jesper S Moller - Contributions
 for
*       bug 382701 - [1.8][compiler] Implement semantic analysis of Lambda expressions & Reference expression
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*  bug 328281 - visibility leaks not detected when analyzing unused field in private class
*  bug 382353 - [1.8][compiler] Implementation property modifiers should be accepted on default methods.
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*  Jesper Steen Moller - Bug 412150 [1.8] [compiler] Enable reflected parameter names during annotation processing
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*     IBM Corporation - initial API and implementation
*     Nick Teryaev - fix for bug (https://bugs.eclipse.org/bugs/show_bug.cgi?id=40752)
*     Stephan Herrmann - Contributions for
*       bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*       bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*       bug
 383368 - [compiler][null] syntactic null analysis for field references
*       bug 401017 - [compiler][null] casted reference to @Nullable field lacks a warning
*       bug 400761 - [compiler][null] null may be return as boolean without a diagnostic
*       Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*       Bug 416307 - [1.8][compiler][null] subclass with type parameter substitution confuses null checking
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 427438 - [1.8][compiler] NPE at
org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*       Bug 430150 - [1.8][null] stricter checking against type variables
*       Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style
 null annotations
*       Bug 407414 - [compiler][null] Incorrect warning on a primitive type being null
*       Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                       Bug 415541 - [1.8][compiler] Type annotations in the body of static initializer get dropped
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ImportBinding.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ImportReference.java

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*  Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*  Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*  Bug 409236 - [1.8][compiler] Type annotations on intersection cast types dropped by code generator
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*  bug 336428 - [compiler][null] bogus warning "redundant null check" in condition of do {} while() loop
*  bug 186342 - [compiler][null] Using annotations for null checking
*  bug 365519 - editorial cleanup after bug 186342 and bug 365387
*  bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*  bug 365859 - [compiler][null] distinguish warnings based on flow analysis vs. null annotations
*  bug 385626 - @NonNull fails across loop boundaries
*  bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*  bug 376263 - Bogus "Potential null pointer access" warning
*  bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred checking
*  bug 406384 - Internal error with I20130413
*  Bug 415413 - [compiler][null] NullpointerException in Null Analysis caused by interaction of LoopingFlowContext and FinallyFlowContext
*  Bug 453483 - [compiler][null][loop] Improve null analysis for loops
*  Bug 455557 - [jdt] NPE LoopingFlowContext.recordNullReference
*  Bug 455723 - Nonnull argument not correctly inferred in loop
*  Bug 415790 - [compiler][resource]Incorrect potential resource leak warning in for loop with close in try/catch
*  Bug 421035 - [resource] False alarm of resource leak warning when casting a closeable in its assignment
*  Jesper S Moller - contributions for

*	bug 404657 - [1.8][compiler] Analysis for effectively final variables fails to consider loops
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*	Jesper S Moller - Bug 392671
*	NPE with a method with explicit this and a following incomplete parameter
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*  Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*  Bug 427438 - [1.8][compiler] NPE at
org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
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*  Bug 428811 - [1.8][compiler] Type witness unnecessarily required
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/PolyTypeBinding.java
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*     Frits Jalvingh  - fix for bug 533830.
**********/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/tool/EclipseCompiler.java
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* Contributors:
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*     Jesper S Moller - Contributions for
*       Bug 405066 - [1.8][compiler][codegen] Implement code generation infrastructure for JSR335
*       Bug 406982 - [1.8][compiler] Generation of MethodParameters Attribute in classfile
*       Bug 416885 - [1.8][compiler]IncompatibleClassChange error (edit)
*       Bug 412153 - [1.8][compiler] Check validity of annotations which may be repeatable
*     Andy Clement (GoPivotal, Inc) aclement@gopivotal.com
 - Contributions for
*                       Bug 405104 - [1.8][compiler][codegen] Implement support for serializeable lambdas
*                       Bug 439889 - [1.8][compiler] [lambda] Deserializing lambda fails with IllegalArgumentException:
"Invalid lambda deserialization"
**********/

Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/ConstantPool.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/JavadocScanner.java
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Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/StackMapFrame.java
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Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/IErrorHandlingPolicy.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/DefaultErrorHandlingPolicies.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/ManifestAnalyzer.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/flow/InsideSubRoutineFlowContext.java
*
 /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/impl/CompilerStats.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredLocalVariable.java

* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/UnresolvedAnnotationBinding.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/Receiver.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/GenericXMLWriter.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/problem/DefaultProblemFactory.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/core/JDTCompilerAdapter.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/impl/ReferenceContext.java
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Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ImplicitNullAnnotationVerifier.java
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*     Stephan Herrmann - Contributions for
*          bug 343713 - [compiler] bogus line number in constructor of inner class in 1.5 compliance
*          bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 361407 - Resource leak warning when resource is assigned to a field outside of constructor
*       bug 368546 - [compiler][resource] Avoid
 remaining false positives found when compiling the Eclipse SDK
*       bug 383690 - [compiler] location of error re uninitialized final field should be aligned
*       bug 331649 - [compiler][null] consider null annotations for fields
*       bug 383368 - [compiler][null] syntactic null analysis for field references

```
*       bug 400421 - [compiler] Null analysis for fields does not take @com.google.inject.Inject into account
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 416176 - [1.8][compiler][null] null type annotations cause grief on type variables
*       Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*       Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                       Bug 415399 - [1.8][compiler] Type annotations on constructor results dropped by the code
generator
*     Ulrich Grave <ulrich.grave@gmx.de> - Contributions
 for
*                           bug 386692 - Missing "unused" warning on "autowired" fields
*******************************************************************************/
```

Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ConstructorDeclaration.java
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*     Jesper S Moller - Contributions for
*       Bug 378674 - "The method can be declared as static" is wrong
*******************************************************************************/
```

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/SuperReference.java
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*  Stephan Herrmann - Contributions for
*  bug 186342 - [compiler][null] Using annotations for null checking
*  bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*  Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*  bug 413958 - Function override returning inherited Generic Type
*  Bug 400874 - [1.8][compiler] Inference infrastructure
should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*  Bug 424710 - [1.8][compiler] CCE in SingleNameReference.localVariableBinding
*  Bug 423505 - [1.8] Implement "18.5.4 More Specific Method Inference"
*  Bug 427438 - [1.8][compiler] NPE at
org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*  Bug 418743 - [1.8][null] contradictory annotations on invocation of generic method not reported
*  Bug 416182 - [1.8][compiler][null] Contradictory null annotations not rejected
*  Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*  Bug 434602 - Possible error with inferred null annotations leading to contradictory null annotations
*  Bug 434483 - [1.8][compiler][inference] Type inference not picked up with method reference
*  Bug 446442 - [1.8] merge null annotations from super methods
*  Bug 457079 - Regression: type
inference
**********/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ParameterizedGenericMethodBinding.java
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Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/IGenericField.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/IGenericMethod.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/IGenericType.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/IBinaryNestedType.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/ISourceMethod.java
*
/ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/ISourceField.java

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* Contributors:
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*     Stephan Herrmann <stephan@cs.tu-berlin.de> - Contributions for
*          bug 185682 - Increment/decrement operators mark local variables as read
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 365519 - editorial cleanup after bug 186342 and bug 365387
*       bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*       bug 345305 - [compiler][null]
 Compiler misidentifies a case of "variable can only be null"
*       Bug 414380 - [compiler][internal] QualifiedNameReference#indexOfFirstFieldBinding does not point to the first
field
*       Bug 458396 - NPE in CodeStream.invoke()
*     Jesper S Moller - Contributions for
*       bug 382721 - [1.8][compiler] Effectively final variables needs special treatment
*       bug 331649 - [compiler][null] consider null annotations for fields
*       bug 383368 - [compiler][null] syntactic null analysis for field references
*       bug 402993 - [null] Follow up of bug 401088: Missing warning about redundant null check
*     Jesper S Moller <jesper@selskabet.org> - Contributions for
```

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*       bug 378674 - "The method can be declared as static" is wrong
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/SimpleSetOfCharArray.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveryScannerData.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/CachedIndexEntry.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/Substitution.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/LabeledStatement.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/impl/ITypeRequestor.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/batch/CompilationUnit.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/problem/DefaultProblem.java
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Manifest-Version: 1.0
Created-By: Maven Archiver 3.6.0
Build-Jdk-Spec: 17
Bundle-ManifestVersion: 2
Bundle-SymbolicName: org.eclipse.jdt.core.compiler.batch.source
Bundle-Version: 3.33.0.v20230218-1114
Eclipse-SourceBundle: org.eclipse.jdt.core.compiler.batch;version="3.33.
0.v20230218-1114";roots:="."
Bundle-Name: %bundleName
Bundle-Vendor: %bundleVendor

Bundle-Localization: OSGI-INF/l10n/bundle-src

Name: org/eclipse/jdt/internal/compiler/Compiler.java
SHA-256-Digest: qavdAtD8BxozxHMIVMyxpCXI0SoDXk50Rd/hrDZ/57A=

Name: org/eclipse/jdt/internal/compiler/lookup/Substitution.java
SHA-256-Digest: xbTFqeGH6RpvripaJmxqdl68CqOyNge53jwHmJEt//8=

Name: org/eclipse/jdt/internal/compiler/lookup/TypeBound.java
SHA-256-Digest: Cg88GD2DrXwbsVHUokBxBQknO68xpMEFyhKycpAX5Mc=

Name: org/eclipse/jdt/internal/compiler/lookup/PackageBinding.java
SHA-256-Digest: AMZ3OrQoHVJcLsAGf1gO7vo40sqnD0mI4iB/PgZdK38=

Name: org/eclipse/jdt/internal/compiler/parser/diagnose/RangeUtil.java
SHA-256-Digest:
 ebnzNJveQJciv+qg7optaHvQhz0KiGs3i3PyF9+yndA=

Name: org/eclipse/jdt/internal/compiler/parser/unicode8/start2.rsc
SHA-256-Digest: /oFYyNQm6bxMPJ0MtgZs+crctPdo50HdEUNMzBO9XLg=

Name: org/eclipse/jdt/core/compiler/batch/package.html
SHA-256-Digest: DxJFqMppFiOvAOR5DyecFo36HFXQNdK7imEZ6J8qAsg=

Name: org/eclipse/jdt/internal/compiler/lookup/WildcardBinding.java
SHA-256-Digest: xhqG+QC1G9iGlhR29mtyMPO2QGTDJtpRIrSPjX1+dkU=

Name: org/eclipse/jdt/internal/compiler/parser/unicode13/start0.rsc
SHA-256-Digest: NNengjZg44z2G3PqWSPZr2fJ5fC4DkVR1kf6ZdS3qjM=

Name: org/eclipse/jdt/internal/compiler/ast/Literal.java
SHA-256-Digest: IUPPjPpj8Xoyz2kIJxIOERcxDe1C9vyRlHiG6xIuyC8=

Name: org/eclipse/jdt/internal/compiler/env/IBinaryElementValuePair.java
SHA-256-Digest: ldx+yIRxCL8r+q+vVugtk73HXrle5hA7cEZjCkC/vDo=

Name: org/eclipse/jdt/internal/compiler/lookup/MemberTypeBinding.java
SHA-256-Digest: GkJ3g8Epdr+vyo0iKfUeO961H6VB+MDl0KxhoCpinwk=

Name:
 org/eclipse/jdt/internal/compiler/parser/unicode13/part2.rsc
SHA-256-Digest: TslTNlywPQfQNz7lePBTcyeCWt9WSiABnCNgOMMNe9I=

Name: org/eclipse/jdt/internal/compiler/flow/FlowContext.java
SHA-256-Digest: cwQRok9IUmVN4fMX0bDrjtt8F4RV6fbXveXR2WWkOGQ=

Name: org/eclipse/jdt/internal/compiler/apt/dispatch/HookedJavaFileObjec
t.java

SHA-256-Digest: XJHqmYqtE0StCxfVaCKWnttSusd+eSaKhgvXXSeEZvI=

Name: org/eclipse/jdt/internal/compiler/codegen/AnnotationTargetTypeCons
tants.java
SHA-256-Digest: BtCcXDiTxP1WUGdYUr2uR7oYK9v8Z4ocLRXj09oMpvw=

Name: org/eclipse/jdt/internal/compiler/impl/ShortConstant.java
SHA-256-Digest: Ts43r/z8ZaDOT5/neut4K7tAuO/f9yFkKO8faUAGsCk=

Name: org/eclipse/jdt/internal/compiler/problem/ProblemHandler.java
SHA-256-Digest: xEMPReHnCA7IH2FXMghTzWNyc9kyHcx2vjV7N60P61Y=

Name: org/eclipse/jdt/internal/compiler/util/HashtableOfPackage.java
SHA-256-Digest: LsNLf8ljE0GO1MGm1PGZpc7ATtzA7FNzyLMcbR2yfXw=

Name: org/eclipse/jdt/internal/compiler/classfmt/TypeAnnotationInfo.java
SHA-256-Digest:
K3NvOidX1eF5vUJOC1J4N7Ni7zELdLFe0lvzI6zy+Kw=

Name: OSGI-INF/l10n/bundle-src.properties
SHA-256-Digest: wanjxAv0+y4OVERKkGiyqPP/v+bHhBBcN4LIsQVCogA=

Name: org/eclipse/jdt/internal/compiler/ast/Wildcard.java
SHA-256-Digest: GwikK+88JokQ3OSU5At9iscSA1mgVKYB2TFQ2+gMcj0=

Name: org/eclipse/jdt/internal/compiler/batch/Main.java
SHA-256-Digest: hHzerf/pH8pPbvTcXWSu9rDOdJu+/SGCEzKpEVYDQiU=

Name: org/eclipse/jdt/internal/compiler/parser/unicode11/start1.rsc
SHA-256-Digest: sa0wabOcvK19thXVL5HMoZ2XMLclPD+nzBLzM3vFfE4=

Name: org/eclipse/jdt/internal/compiler/lookup/ExternalAnnotationSuperim
poser.java
SHA-256-Digest: 9j21X73f4+f6FdshtKpE2dCcUPOx4fRwOnwGC5aBXtI=

Name: org/eclipse/jdt/internal/compiler/impl/CharConstant.java
SHA-256-Digest: CugDXcZIPEKrh1zlRQGJjI3Y6AxtCaU8eU4jPWJVsrQ=

Name: org/eclipse/jdt/internal/compiler/ast/QualifiedSuperReference.java
SHA-256-Digest: +i1OiNmfN3T4Xf272raxQuWTclsak3EshIjWwTKzjww=

Name: org/eclipse/jdt/internal/compiler/parser/parser13.rsc
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l+dzebxpkrEuNCcAXR+f19fj5uzMAhzn9GxcnSa+rnQ=

Name: org/eclipse/jdt/internal/compiler/parser/parser8.rsc
SHA-256-Digest: daNYobh8gp0cps8qx/Nzq2PGaIa1Zv1S8rv/QaaRmFk=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveryScanner.java
SHA-256-Digest: 6E7G09H6AsitqB+1vQvMIYkfIj+78cCzRoOuBjVrXOo=

Name: org/eclipse/jdt/internal/compiler/lookup/AptBinaryLocalVariableBin
ding.java
SHA-256-Digest: CKyCkAchIwH4NJWLrXaS7fBL0LuyGK7kD5fKek92PQM=

Name: org/eclipse/jdt/internal/compiler/lookup/CatchParameterBinding.jav
a
SHA-256-Digest: 0Dy6TNAw1c+20wQmUCCdrngzgfTF730TIljxqOHYeCI=

Name: org/eclipse/jdt/internal/compiler/batch/FileFinder.java
SHA-256-Digest: n+/yMuqQ7eCGqyTgRdUwXmRJ9aUqcqmfnCw59/a0Pu4=

Name: org/eclipse/jdt/internal/compiler/env/AccessRuleSet.java
SHA-256-Digest: /Hnw5j96kNTjU3hGHbqWPzNAXrcPQCMgeQ5cJxtcbFk=

Name: org/eclipse/jdt/internal/compiler/parser/unicode12_1/part1.rsc
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Name: org/eclipse/jdt/internal/compiler/parser/RecoveredProvidesStatemen
t.java
SHA-256-Digest: D38wytVkTbXjvFtmJoVNKEKkGftbtkkBwo99bp37d88=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6_2/part0.rsc
SHA-256-Digest: Z1KOOxKI57TdP+hpni3m3QEORk7+zx+HiKRMMx/Fxr0=

Name: org/eclipse/jdt/internal/compiler/apt/model/ExecutableTypeImpl.jav
a
SHA-256-Digest: dPdvzf8WLgvQoNUcn/pIKDNvWdn5f7anjxN6l19kS1s=

Name: org/eclipse/jdt/internal/compiler/ast/CombinedBinaryExpression.jav
a
SHA-256-Digest: w3xU40x1NsTt3MHusf9ubDPDSaHgysGnUntNRoAxJpE=

Name: org/eclipse/jdt/internal/compiler/env/ClassSignature.java
SHA-256-Digest: X6qSL/DQOnWr7X3Q3eVHPURss21nFChwRG6vP0coEg4=

Name: org/eclipse/jdt/internal/compiler/flow/UnconditionalFlowInfo.java
SHA-256-Digest: PW3l7BEU/LRLER26MiVifPIoAPFDeopZFWIHzbzNspg=

Name: org/eclipse/jdt/internal/compiler/lookup/SortedSimpleNameVector.ja
va
SHA-256-Digest: p2t//vJ0GHUpLD6nKVPB+ZaIQsKh8IoCFJjf49/YKG0=

Name: org/eclipse/jdt/internal/compiler/ast/QualifiedNameReference.java
SHA-256-Digest:

79VVrDp4xW5B3ZYnKlEXAlzDhlS7qpjI+xkJyDNxzQY=

Name: org/eclipse/jdt/internal/compiler/env/EnumConstantSignature.java
SHA-256-Digest: aYkm4BGYN9qUovPcsK8gsqJIa28ORNKua/U2egW5Z9M=

Name: org/eclipse/jdt/internal/compiler/ast/BreakStatement.java
SHA-256-Digest: ld/+YfPq+xwmM4lm8yod68K6/cdjpTuLMq9jFgS9LW8=

Name: org/eclipse/jdt/internal/compiler/ast/NormalAnnotation.java
SHA-256-Digest: 5Ud8Fi3jZ6QjEeUvls2uFkU+fZKK+HLN+RH3GTFz9hA=

Name: org/eclipse/jdt/internal/compiler/ast/LambdaExpression.java
SHA-256-Digest: p3rwVh/H4pmLK8a4tzwzAQQXXdEe/sdV2l3SRBPQZR8=

Name: org/eclipse/jdt/internal/compiler/ast/ArrayReference.java
SHA-256-Digest: 0mu0K2nxwGQyVEuDBjGDh3rrPSWBdxB5E/utKjgqcjQ=

Name: org/eclipse/jdt/internal/compiler/util/CtSym.java
SHA-256-Digest: Y94kLaXfvOiepYHQZlzc3iT/fUKn2KoLENCMTC+SOqY=

Name: org/eclipse/jdt/internal/compiler/ast/UsesStatement.java
SHA-256-Digest: LzBfsiQRmIgf6uHhwzLwEnCsF3SMGKg1zMKmMoIF+KI=

Name: org/eclipse/jdt/internal/compiler/classfmt/AnnotationMethodInfo.ja
va
SHA-256-Digest: zfpXUpM76OCjFUdZ3gF4YIXxlkICwKSDAosnW1SgaJU=

Name: org/eclipse/jdt/internal/compiler/lookup/CaptureBinding.java
SHA-256-Digest: EJ/pW8nPai3IKI8vS5Tog/xP3bohX03OKsszelTEbAo=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveryScannerData.java
SHA-256-Digest: NeLGFzee7dLllNJKhe6Y/8WkG9OIkdb2qdP9k2FaLJ0=

Name: org/eclipse/jdt/internal/compiler/classfmt/MethodInfoWithAnnotatio
ns.java
SHA-256-Digest: OT+wMvX0wsIedHrSeOLzZl41wEdhg6uiA8ZQtl2q8vE=

Name: org/eclipse/jdt/internal/compiler/parser/unicode7/part2.rsc
SHA-256-Digest: cENGbHGTfBx4FTJBMY3gopEj6ecVPCCOSVDuhhj8H8M=

Name: org/eclipse/jdt/internal/compiler/lookup/PolymorphicMethodBinding.
java
SHA-256-Digest: RqvgIoX5tOjWepQGLyFeHJ2xXx2Z6+qK4UFB5NSHgH8=

Name: org/eclipse/jdt/internal/compiler/tool/EclipseCompilerRequestor.ja
va
SHA-256-Digest: lscChrpjf7+U4MUR7mLyEA1UFp6inqGZOGxSIfc7gGQ=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredExportsStatement
.java
SHA-256-Digest: 7GghAmZqxZSE1TG/ilxks+9S6fzKGy3sMXNvT2tXpVw=

Name:
org/eclipse/jdt/internal/compiler/classfmt/AnnotationInfo.java
SHA-256-Digest: APqfgANyzjGpJ9Mlhvq2LEsqtxmxgtT5joJRn8j3Ix0=

Name: org/eclipse/jdt/internal/compiler/problem/DefaultProblemFactory.ja
va
SHA-256-Digest: 2X2o+CRKzUI//XeswDluGwcOVrfYuXZSbtUXUUrfmBI=

Name: org/eclipse/jdt/internal/compiler/util/CharArray.java
SHA-256-Digest: tfycJMPkhQRRyPF6RM7QbYKN5lUjBbwYg3a2sRCt33U=

Name: org/eclipse/jdt/internal/compiler/parser/unicode11/start2.rsc
SHA-256-Digest: 04VMyR2oGLNoJWK6xYvZv3gPXGxYB6RpHuNdBUBuFAo=

Name: org/eclipse/jdt/internal/compiler/apt/model/ExecutableElementImpl.
java
SHA-256-Digest: waJ4+eSy6nlEg3mZoCISrzTf6grMd1GN+ocJPijHh8I=

Name: org/eclipse/jdt/internal/compiler/ast/ProvidesStatement.java
SHA-256-Digest: yL2kxAP+OswAzs3ytBYAQWm2603D2oeJfm/LA12gfBc=

Name: org/eclipse/jdt/internal/compiler/batch/ClasspathJrt.java
SHA-256-Digest: In4umvtP1r8A2ZnGvghHSSHxq6WEXsCbHmqhpcam0/I=

Name: org/eclipse/jdt/internal/compiler/ast/TryStatement.java
SHA-256-Digest:
Rn0Ago4vjUOP94UjNNr6wPmOrQM74Ybx+lfumqERudA=

Name: org/eclipse/jdt/internal/compiler/classfmt/MethodInfoWithParameter
Annotations.java
SHA-256-Digest: +Fm/qe/35lPlqs7uYdNgbn9iKSca6Z9pJ/VFi08FvZw=

Name: org/eclipse/jdt/internal/compiler/env/ISourceMethod.java
SHA-256-Digest: 4XXi2dg+j2n8R4Lqgw7WlijeNFayEr6gmpY2Y14+CK0=

Name: org/eclipse/jdt/internal/compiler/lookup/ReductionResult.java
SHA-256-Digest: LS17+9nJEqgJWjikB3DinhttoMOClI+hOzTcUbqljco=

Name: org/eclipse/jdt/internal/compiler/parser/unicode10/part0.rsc
SHA-256-Digest: oQlhlvw/gLVSGbEQAfhvQ2SZ0/vDYuzhavqxyohMNjw=

Name: org/eclipse/jdt/internal/compiler/lookup/SourceTypeBinding.java
SHA-256-Digest: 3Los3T3Mx8dM6zdQlsnShI6wjfdtjaO9hG/SECKSECY=

Name: org/eclipse/jdt/internal/compiler/classfmt/ElementValuePairInfo.ja
va
SHA-256-Digest: npnhVG8NsnqkjM2nJLA7ne9JvBwj894uwydkUAbQG2s=

Name: org/eclipse/jdt/internal/compiler/tool/EclipseBatchRequestor.java
SHA-256-Digest: 68gIhOPRbrMT7CYl/XcsjhIxzOi3Va/cfTksTn/8Gw8=

Name:
org/eclipse/jdt/internal/compiler/parser/AbstractCommentParser.jav
a
SHA-256-Digest: 4pJwOQB6tCRv0ADrQjRoXTuo0mKzPwcqU6SqUZi9Yuc=

Name: org/eclipse/jdt/internal/compiler/batch/ClasspathJsr199.java
SHA-256-Digest: GdJWjTfvg9ApThfm5hYt2loJd3Vr+mZr7kiahiAHtZM=

Name: org/eclipse/jdt/internal/compiler/tool/EclipseFileObject.java
SHA-256-Digest: 0Dj0BAOheLoqhXT0BIMxt+j/imguKf/F9rlBh4VBlDU=

Name: org/eclipse/jdt/internal/compiler/ast/ArrayQualifiedTypeReference.
java
SHA-256-Digest: 7x1Ua/HnmsN1ojVLTFHOXcWuJKtM7xEEbDLItyeAg9I=

Name: org/eclipse/jdt/internal/compiler/lookup/TypeSystem.java
SHA-256-Digest: izJMyczGtGYZBxsp9+Z0M4pyUOLMKlFF5gDrQKHYkWw=

Name: org/eclipse/jdt/internal/compiler/IErrorHandlingPolicy.java
SHA-256-Digest: NxauUyXcJw8bMP+2tc9c5BGlWsmjub1wT6mchr9kj4g=

Name: org/eclipse/jdt/internal/compiler/env/ISourceType.java
SHA-256-Digest: zfr3CgF7eyzy+81eUR7/dmxu0reUssdoA/5RjJvBmAI=

Name: org/eclipse/jdt/internal/compiler/ast/JavadocArrayQualifiedTypeRef
erence.java
SHA-256-Digest: Q+AFY2AZqcWxk0mkgr63zeFB1KlixiMEMRv4fOOeiOQ=

Name: org/eclipse/jdt/internal/compiler/lookup/BaseTypeBinding.java
SHA-256-Digest: 7YLbjIuInQUcEmV9AslzuutTsugxiUv1I0vYyispzf8=

Name: org/eclipse/jdt/internal/compiler/ASTVisitor.java
SHA-256-Digest: KwpkpA8Mmb69AZt0va4UEOUUh0ruXO/zYIUcdCGu3a8=

Name: org/eclipse/jdt/internal/compiler/parser/Parser.java
SHA-256-Digest: 6P0ZTIQfnA5a4dMNc47/xOyX/KBJh42rMIvjajvSYdU=

Name: org/eclipse/jdt/internal/compiler/lookup/SyntheticFactoryMethodBin
ding.java
SHA-256-Digest: KDf42avKZ7g0qMSKjBHmhkbAJB02eUAsFdAscf8cTnk=

Name: org/eclipse/jdt/internal/compiler/parser/unicode/start2.rsc
SHA-256-Digest: K9XWs/PT+ucJ8VxJDdMdBpO3RKC/pug9ZfGwdnNeWNc=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredField.java
SHA-256-Digest: K8JfnhKXl413amAhg1jg6VsjU+e/l/f9SGnU/RQEboI=

Name: org/eclipse/jdt/internal/compiler/parser/parser20.rsc
SHA-256-Digest: IN8ZZvvHcSWL5jU0EHlxPcr7c7oKsuLSAjHzOrZToXE=

Name: org/eclipse/jdt/internal/compiler/ast/JavadocSingleNameReference.j
ava
SHA-256-Digest: mlDInDh4ARjCBZfrdH9m/kM8NyyrnYdGM46H8FN63zQ=

Name: org/eclipse/jdt/internal/compiler/lookup/InferenceContext18.java
SHA-256-Digest: BZn8rkOHXj3x8Z5Q/p++EfANR1r2aB/4HJS9SdP0XaI=

Name: org/eclipse/jdt/internal/compiler/lookup/ImportBinding.java
SHA-256-Digest: 5qJ4u31QBFrp0D+VrUYJUKGohuGBkSqircM2xs7bZO8=

Name: org/eclipse/jdt/internal/compiler/lookup/SourceModuleBinding.java
SHA-256-Digest: +m5LNqpurfMyWqtCR/ALah7wW8xNHCyauHFRsTUHMiU=

Name: org/eclipse/jdt/internal/compiler/apt/dispatch/AnnotationDiscovery
Visitor.java
SHA-256-Digest: URAvmbdh2zQjeiRWBnE3BNl3UIRHz/NolaLlEn//N0c=

Name: org/eclipse/jdt/internal/compiler/apt/dispatch/ProcessorInfo.java
SHA-256-Digest: YLbltP+Syr5qFIeW55ts/zLnUEj+Gq/1TaZKGCBCHWo=

Name: org/eclipse/jdt/internal/compiler/ast/AllocationExpression.java
SHA-256-Digest: +yIDLhPvbpG3erLed0r60JAt+wDToIe0k0gCd8UPaXM=

Name: org/eclipse/jdt/internal/compiler/parser/parser14.rsc
SHA-256-Digest:
UabMJgdDxxkIYBnPfkyw7/xwGxRcp3+JWokfJnNyXhs=

Name: org/eclipse/jdt/internal/compiler/ast/IPolyExpression.java
SHA-256-Digest: MIikPBg28m0VOM9j1YssRd9qXhVvdsjMftGdED6N7Ig=

Name: org/eclipse/jdt/internal/compiler/env/IMultiModuleEntry.java
SHA-256-Digest: tpuh4qr/cznDWA/A/Xs0leCb3fZPrE1FF54ZY7lthZg=

Name: org/eclipse/jdt/internal/compiler/ast/FieldDeclaration.java
SHA-256-Digest: XlezdklUPQgbcl8j3LDIvKlXuEIYO49EGviXlcBx3Vo=

Name: org/eclipse/jdt/internal/compiler/classfmt/FieldInfoWithAnnotation
.java
SHA-256-Digest: sKGpLNioLt1G16+vF9rx0QDXDxOJBV42yRGkpM5iC54=

Name: org/eclipse/jdt/internal/compiler/parser/unicode12_1/part0.rsc
SHA-256-Digest: 5buTUde4FO3ujITlYxixTHxuz5UVVgNuXkSy3SWHZiE=

Name: org/eclipse/jdt/internal/compiler/lookup/InferenceContext.java
SHA-256-Digest: oTz8jA1UNAX8JN60uJ3wZi/ridvJi5J1/1dPkO7N8hc=

Name: org/eclipse/jdt/internal/compiler/util/ManifestAnalyzer.java
SHA-256-Digest: riULzjpJdWO+hj0Pp/75Vb5UVJfkIgOotnVHA63uHZ0=

Name: org/eclipse/jdt/internal/antadapter/messages.properties
SHA-256-Digest:
3DdYDIRo18/w68cM85go06kP0bsf47ihnF+2Y2oJ8rw=

Name: org/eclipse/jdt/internal/compiler/parser/parser19.rsc
SHA-256-Digest: 8CaJtsBCXPqI7YTlTDBeM3rqoqMBP/E4DuELMDzvtbI=

Name: org/eclipse/jdt/internal/compiler/ast/LongLiteralMinValue.java
SHA-256-Digest: uS8zTtAFPliyoery69BTjRq9lAqclOLH+y3koJwG5FU=

Name: org/eclipse/jdt/internal/compiler/util/HashtableOfLong.java
SHA-256-Digest: Hr7GGP7goT/4zwTFf/XqV6hONR5T7glixGxnPsCry5U=

Name: org/eclipse/jdt/internal/compiler/parser/parser1.rsc
SHA-256-Digest: bhHHNpzodlN1113TxP7P0ZA4gpALyufJ3BmfsL/O6pg=

Name: org/eclipse/jdt/internal/compiler/impl/IrritantSet.java
SHA-256-Digest: zQj2YLb0UX9zoWEg9zyZouJOEsz/LEGBy2o3Uf+cwkI=

Name: org/eclipse/jdt/internal/compiler/util/CharArrayHashMap.java
SHA-256-Digest: OIxzywG2DxiUzrFZLKQ1Ydd11FOR+MB6x4qLMlaUWCw=

Name: org/eclipse/jdt/internal/compiler/problem/AbortType.java
SHA-256-Digest: mlEqIusr1GOo6T9DqZ/xKeN6RE4mnRvxJb9oA1RMWkA=

Name: org/eclipse/jdt/internal/compiler/parser/parser7.rsc
SHA-256-Digest:
5Djaw+ePtRH2DlvUaIUb3Pf2H1OjRxyKX5ZlvK8Rm4s=

Name: org/eclipse/jdt/internal/compiler/parser/unicode11/part2.rsc
SHA-256-Digest: 04VMyR2oGLNoJWK6xYvZv3gPXGxYB6RpHuNdBUBuFAo=

Name: org/eclipse/jdt/internal/compiler/ast/YieldStatement.java
SHA-256-Digest: OCmzO0Z1r9SLeTvZ3B+fBkkjvaxtWQ16Hg+jg4haDSQ=

Name: org/eclipse/jdt/internal/compiler/env/ISourceField.java
SHA-256-Digest: dLPlDylQrBfXPNu6qFmGkndeODYXh9URnUUcomGmO40=

Name: org/eclipse/jdt/internal/compiler/ast/ArrayAllocationExpression.ja
va
SHA-256-Digest: zyUi9A9mJKMhZ7Y96mSj+ki34TnTMSERaUJUbaxXX80=

Name: org/eclipse/jdt/internal/compiler/lookup/SignatureWrapper.java
SHA-256-Digest: ZB6GUBmSC4A5D7f2BAa1xWFn1aqfCPnEYMCTcv1fA84=

Name: org/eclipse/jdt/internal/compiler/ast/Initializer.java
SHA-256-Digest: owaFECBgvWJtwJ851IaPn3zbt2EpbT38fnOGJ3FP8OI=

Name: org/eclipse/jdt/internal/compiler/lookup/ProblemFieldBinding.java
SHA-256-Digest: BQKB6kqTQWESds0FhrYWkQJpiVdHUyMXRkzyMQ0xvYg=

Name:
org/eclipse/jdt/internal/compiler/lookup/TypeConstants.java
SHA-256-Digest: uA+Bt5lcxC4ImDJse9BFjJwuFU+VGVscZm3bjplTI5U=

Name: org/eclipse/jdt/internal/compiler/lookup/FieldBinding.java
SHA-256-Digest: Qo+/D7l5ynj6U9v2SkxkymVR36yVp+Qha4pu0E+RKhU=

Name: org/eclipse/jdt/internal/compiler/ast/JavadocArgumentExpression.ja
va
SHA-256-Digest: P0UR18iua6eKr4TN/1VYucFGaVmB5kozUcVf9DWKpMY=

Name: org/eclipse/jdt/internal/compiler/util/SimpleSetOfCharArray.java
SHA-256-Digest: pS4TuSTiCrybwNi5DqZcMNJdit9kh1HLqQz/YMpCFH0=

Name: org/eclipse/jdt/internal/compiler/ast/QualifiedThisReference.java
SHA-256-Digest: 7ZHdFnDLkVd65xA1+HJb0M154gr5KPq9/jHgnbIyCsk=

Name: org/eclipse/jdt/internal/compiler/lookup/ArrayBinding.java
SHA-256-Digest: 9ECWWweCZ4hHFX7hqre9QFyqF6MzLMjHJ6kta4wRWfs=

Name: org/eclipse/jdt/internal/compiler/ast/JavadocModuleReference.java
SHA-256-Digest: w4kkpV9h6dKJ7puDyW1cUBoSaIusKZ9urYYeaNigQOA=

Name: org/eclipse/jdt/internal/compiler/codegen/TypeAnnotationCodeStream
.java
SHA-256-Digest:
zjILkrK0Dwel+RFOY4rbjIJNa2v8SdfAPzDZoGaHq/w=

Name: org/eclipse/jdt/internal/compiler/tool/ModuleLocationHandler.java
SHA-256-Digest: 8LdKxPd0UzEQEULL1sJ10rBftY+E9BKgf1uSw1ckpPI=

Name: org/eclipse/jdt/internal/compiler/ast/ContainerAnnotation.java
SHA-256-Digest: D5cD6eptoT1grdQU0vnCd1wPrR4cxraRcBeH0r0M+Ko=

Name: org/eclipse/jdt/internal/compiler/impl/CompilerOptions.java

SHA-256-Digest: YlxeCLBhHfFRzGyomDgk2e3cBMwg9HwDglabehGawvA=

Name: org/eclipse/jdt/internal/compiler/parser/unicode8/start1.rsc
SHA-256-Digest: O/fQtEuW/21Rk7UBoSn9Gr0lorc7QCFa0awfpIzXaa0=

Name: org/eclipse/jdt/internal/compiler/ast/ConditionalExpression.java
SHA-256-Digest: FLObAnF+Ce5+ZpdqTktE3oq1Gf3i+2yEQja5yr1C9Dc=

Name: org/eclipse/jdt/internal/compiler/tool/EclipseCompiler.java
SHA-256-Digest: +y7nJVIRHaETiEP06DjQ2Myqw4KB7NvPqK7MJQJM1kI=

Name: org/eclipse/jdt/internal/compiler/codegen/ObjectCache.java
SHA-256-Digest: cur/jP+/D8irfu/U2vC54YTbsQgHsA0OWe2s1lmKmAU=

Name: org/eclipse/jdt/internal/compiler/env/ISourceImport.java
SHA-256-Digest:
VH9pJM+hHU04Cp1hDMB3AgErl+dRn1CYtqQLrWaG9U0=

Name: org/eclipse/jdt/internal/compiler/apt/model/DeclaredTypeImpl.java
SHA-256-Digest: o9t8DjIWRz7pk8KOrv4QpHhKLLBV/gJm5Drp2mKHUJo=

Name: org/eclipse/jdt/internal/compiler/ast/ForeachStatement.java
SHA-256-Digest: llhEQgEDe+AsQ/k4bnV8DE1QnKRASlSYF5p/HVkhc4c=

Name: org/eclipse/jdt/internal/antadapter/AntAdapterMessages.java
SHA-256-Digest: EwIfQTJPY0Z9rA7OHXOSM/1NDEUMqyYjpeF2Oe4cGGM=

Name: org/eclipse/jdt/internal/compiler/ast/SingleTypeReference.java
SHA-256-Digest: uoO+OC5E1q/kerpC24KmccJgQeU5kmnbtByGBwuxqjA=

Name: org/eclipse/jdt/internal/compiler/batch/ClasspathSourceJar.java
SHA-256-Digest: Tjsnccpd81DhBq0s/4Sdg47FoIbVLDMk/QzVUZPDWX8=

Name: org/eclipse/jdt/internal/compiler/lookup/ModuleScope.java
SHA-256-Digest: 5HMoOtDj0uAl1a3bvjvC4KfRFVFPSb5Y9JUFdhqZ3i8=

Name: org/eclipse/jdt/internal/compiler/ast/NullAnnotationMatching.java
SHA-256-Digest: 7hx0KZamM3ua2ehFSGNWeMZlp/snNQnG2J8B6VmbDUQ=

Name:
org/eclipse/jdt/internal/compiler/tool/JrtFileSystem.java
SHA-256-Digest: K740GuMt9o/nlWbClXp4l96EIEuBXebx4aKMz3zukUI=

Name: org/eclipse/jdt/internal/compiler/util/GenericXMLWriter.java
SHA-256-Digest: jQF+Rp97iG+t47uRCLkjtCFnC+PlNHNwYIlecSN6+z8=

Name: org/eclipse/jdt/internal/compiler/classfmt/FieldInfo.java
SHA-256-Digest: BiIeP0spYLy1Ysj9BIb0622woSjWmkl7nSkjs0HmEMg=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredPackageVisibilit
yStatement.java
SHA-256-Digest: eo4vpVH1UzN3J96+oCS8ZbkX9cSPj48atsTY+iNidR4=

Name: org/eclipse/jdt/internal/compiler/codegen/AttributeNamesConstants.
java
SHA-256-Digest: aMKpdEa9QEJN613EJpce86zh2a9Hn9YbR/UDIoVnqzY=

Name: org/eclipse/jdt/internal/compiler/flow/TryFlowContext.java
SHA-256-Digest: 81Kmgzo4N3NCUCaJOn3IN+e+Eh3Yw4SmNOoZMcymwU8=

Name: org/eclipse/jdt/core/compiler/CategorizedProblem.java
SHA-256-Digest: KDyu88HnXvt3J4Yhj+a7dm4YywFfZwh3YVEKofnAFzI=

Name: org/eclipse/jdt/internal/compiler/ast/UnionTypeReference.java
SHA-256-Digest:
njp+ST2wFFO0IGvcGExfj6NyVBmLRn0rCt6cZcpv/Zo=

Name: org/eclipse/jdt/internal/compiler/parser/Scanner.java
SHA-256-Digest: PubLzeXzHc4sTCU5xZX/FSis6r19JyYdlQWRrJ2FxG4=

Name: org/eclipse/jdt/internal/compiler/apt/model/VariableElementImpl.ja
va
SHA-256-Digest: iqUKY3HEmi1OhmCsbunwoUw42yezbLL2AaqRHeQjswU=

Name: org/eclipse/jdt/internal/compiler/ast/StringLiteralConcatenation.j
ava
SHA-256-Digest: 1RB0n1B7iotWCp8VcorBAHdA+dGG9ddF+MK9AXj6qRI=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6_2/part14.rsc
SHA-256-Digest: zAkaPM3Ejlgf1/HENfa61QhvcZlyZlZ7dZsXWDNsizs=

Name: org/eclipse/jdt/internal/compiler/ast/NumberLiteral.java
SHA-256-Digest: Piq4L9r6Qpq0vSXtWTjTm27Bz2KhMJbLUzCSiP5s/D8=

Name: org/eclipse/jdt/internal/compiler/ast/JavadocFieldReference.java
SHA-256-Digest: PM1YjP6RsX5AB3WzLeTOU/93SyefIYqyTCOLPoThavQ=

Name: org/eclipse/jdt/internal/compiler/parser/unicode13/part1.rsc
SHA-256-Digest: uEpRg0+tYKKszCdRjTRnHSteT1W6x6d+IngVgSkklgg=

Name: org/eclipse/jdt/internal/compiler/util/CharDelegateMap.java
SHA-256-Digest:
zWOpi7p+Rwu7ofs+MKkVFSvY4fzzd2OIVXj6Mi0QRKA=

Name: org/eclipse/jdt/internal/compiler/ast/Argument.java
SHA-256-Digest: Cv/7gyiUwI+KvtNbdBafuP3S3NDJc+Yp/Cc1sXgi1hQ=

Name: org/eclipse/jdt/internal/compiler/classfmt/FieldInfoWithTypeAnnota
tion.java
SHA-256-Digest: 7jGEsF82Eka63OY0bWkZB1VOc9JVVoo7Wmu+VY/suZk=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredMethod.java
SHA-256-Digest: 935/+IDRLtMVs/aNdpcUM9NCRoygUN0OW793ssX5IA8=

Name: org/eclipse/jdt/internal/compiler/classfmt/ClassFileStruct.java
SHA-256-Digest: 0oney/1yBMcHf1cSBGv15ghBjvpnrrXdxLC3PlYP52Q=

Name: org/eclipse/jdt/internal/compiler/parser/parser21.rsc
SHA-256-Digest: 6N/h49ZxaNTQaajQpgNgvp1jBXzzYQ2fYEgq1rqDDT0=

Name: org/eclipse/jdt/internal/compiler/codegen/CharArrayCache.java
SHA-256-Digest: IfHGifUh3XEx1f1N1YUtodiMsHNhtW1MuLiAyH9Gw+g=

Name: org/eclipse/jdt/internal/compiler/lookup/BlockScope.java
SHA-256-Digest: WXo+yPIe20y1Up6Ar92iFmdonKMGZAJFwy1J5fMBzto=

Name:
org/eclipse/jdt/internal/compiler/ast/AND_AND_Expression.java
SHA-256-Digest: WngP1HOjs6uIrmHGSywBs2M4fEGW9pbcIwEXzYB6du0=

Name: org/eclipse/jdt/internal/compiler/apt/model/PackageElementImpl.jav
a
SHA-256-Digest: P7xgbu8IXTzL9Dts5vkPYrCfJ9C38dDJWPKrP0e8NCk=

Name: org/eclipse/jdt/internal/compiler/parser/unicode/start1.rsc
SHA-256-Digest: GDyHQAzqnyM3mQg9MAqdyIh3/Woiq+zguM7uPNsvfGk=

Name: org/eclipse/jdt/internal/compiler/tool/PathFileObject.java
SHA-256-Digest: rPRGZivMIv9G7StS+mCpgytClbov5QjoDAHFnYSCYoQ=

Name: org/eclipse/jdt/internal/compiler/apt/model/NoTypeImpl.java
SHA-256-Digest: JM5G/AnI2RkPZqHYYpNehIW8vvJQfICmKkRp+o3nSIk=

Name: org/eclipse/jdt/internal/compiler/ast/Clinit.java
SHA-256-Digest: xi7mRNYXbWUrgC/2eol6KNk4y/Lu1LZs+wPFcxxaQ4E=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredModuleStatement.
java
SHA-256-Digest: Ika46HAAyucfgDa5Ttth59BrdlN3KwMq2g3RscJmpC0=

Name: org/eclipse/jdt/internal/compiler/impl/ReferenceContext.java
SHA-256-Digest:
NRAYJUx4KZgODTAuB5m0WB1eHWxyvUMyC79eSxISeJg=

Name: org/eclipse/jdt/internal/compiler/ast/DoStatement.java
SHA-256-Digest: Dn6L0mQH+td5K/LoA3arkPJyvPRUZLRtMHjd+q/G1Yc=

Name: org/eclipse/jdt/internal/compiler/ClassFilePool.java
SHA-256-Digest: SFdxdnDgVq52Vr8iwRhNhK11P5z4mLtXcqPzLbfi8Tg=

Name: org/eclipse/jdt/internal/compiler/ast/LocalDeclaration.java
SHA-256-Digest: ZcBzgFIrIAOi1jG1ngFv26EFImqrbwSp03cDRFBVYm4=

Name: org/eclipse/jdt/internal/compiler/problem/ShouldNotImplement.java
SHA-256-Digest: bQH2yg7NCoJ6OQVUuzUWByAYbKdT20sPJeQSxtHzp5M=

Name: org/eclipse/jdt/internal/compiler/lookup/TypeBinding.java
SHA-256-Digest: QxFyZE5id4HX2dxsk1z6Bl6V5lYc1rUVniLhEuWO5II=

Name: org/eclipse/jdt/internal/compiler/ast/IfStatement.java
SHA-256-Digest: P7SIsGX93HKKnr34hx1nWPf54+syCiXAsorrwWJHvKs=

Name: org/eclipse/jdt/internal/compiler/ast/MarkerAnnotation.java
SHA-256-Digest: enczKvTJZGdR4fDTsO0uEIHtKCSEooZ50skv7lu191E=

Name: org/eclipse/jdt/internal/compiler/impl/ITypeRequestor.java
SHA-256-Digest:
aCwT8MUsZVFGD6VGQmHu7aQXKwUAoefSB6JIAge7+V8=

Name: org/eclipse/jdt/internal/compiler/lookup/ProblemReasons.java
SHA-256-Digest: D1qNAqCQBP4SGtZusX3avBwvMv9noYuuPo2Dst2k12w=

Name: org/eclipse/jdt/internal/compiler/parser/unicode10/part1.rsc
SHA-256-Digest: 7KT61Zmtb8hKNeT/FeySY3mScm3BUpncAy0GmLTvCK4=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6/part0.rsc
SHA-256-Digest: UBhck16G7oKzi6BUK6JwvTj+d4J+adi862bj1m/w5eM=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredUsesStatement.ja
va
SHA-256-Digest: 3wo+BEv0SdVd5xNMKM5vYF2OcxPy5dnAlxhylGUf1Rg=

Name: org/eclipse/jdt/internal/compiler/apt/model/ErrorTypeImpl.java
SHA-256-Digest: GYJOLO2+BfrfrVmxRYM99RgISmhqZjCazDKxRowHcMA=

Name: org/eclipse/jdt/internal/compiler/ast/PrefixExpression.java
SHA-256-Digest: HkgvXLCcqYo/vWTExAMAwgd06nHk09Sd15oyifFyF5E=

Name: org/eclipse/jdt/internal/compiler/util/HashtableOfInt.java
SHA-256-Digest: s0xStm4pCd8P5yQggA5deBXY1A6WANaUDIevdo20DRA=

Name: org/eclipse/jdt/internal/compiler/apt/model/ErrorTypeElement.java

SHA-256-Digest:
xrx0uGO7gzk08jd7gKdjYy1NGOAlHzHjtpkdHSvWBb8=

Name: org/eclipse/jdt/internal/compiler/lookup/ProblemMethodBinding.java
SHA-256-Digest: ALA0g14HWycsVHF6BZYEs8oL2iKgDaH8BCMd10lW0lY=

Name: org/eclipse/jdt/internal/compiler/ast/BranchStatement.java
SHA-256-Digest: zChwopWUwkwkrcnYa3iEYFG9a4cvV+/ecu/YIqx2GrI=

Name: org/eclipse/jdt/internal/compiler/ast/JavadocSingleTypeReference.j
ava
SHA-256-Digest: uXB+VMammiUPz7mSf/4AP0cJ4HYIH3NCdRmw/aud4RY=

Name: org/eclipse/jdt/internal/compiler/classfmt/InnerClassInfo.java
SHA-256-Digest: zl23biiC/yrJkjcAkyr3WtDlg2dr706juHi2uszsl58=

Name: org/eclipse/jdt/internal/compiler/lookup/IQualifiedTypeResolutionL
istener.java
SHA-256-Digest: sOlN/m5tbfh7PEs1xwkzg9l0eCeNZcI/qQEGTVUkMZk=

Name: org/eclipse/jdt/internal/compiler/util/JRTUtil.java
SHA-256-Digest: 6pZzRlxbm4kLQYlPeW9CeGZL7QbuNRmNcPre/gk2WWw=

Name: org/eclipse/jdt/internal/compiler/parser/unicode7/start1.rsc
SHA-256-Digest: qjXziG/8STO5sCDpKVtCQZF5dx6kecZHm4+yBXO9pwI=

Name:
org/eclipse/jdt/internal/compiler/DefaultErrorHandlingPolicies.jav
a
SHA-256-Digest: F2VovHC3yo3fzcypVtKKKyaPOdn/QG2AhxoHf1h6xow=

Name: org/eclipse/jdt/internal/compiler/codegen/CachedIndexEntry.java
SHA-256-Digest: Fn53Nc1OlJgBUMavYY4j9zWb+07tfp2IxYN8/ls1Xec=

Name: org/eclipse/jdt/internal/compiler/lookup/PolyTypeBinding.java
SHA-256-Digest: +QgNZynDJP/5+0uRO3izu6OAEggWHu6D+0bmqXpocIM=

Name: org/eclipse/jdt/internal/compiler/lookup/ParameterizedGenericMetho
dBinding.java
SHA-256-Digest: OP00LydpOaNXeSu5T4yNUZtquyrUE49Zz+cLI4vzeUk=

Name: org/eclipse/jdt/internal/compiler/ast/SynchronizedStatement.java
SHA-256-Digest: /4mzS85PnmhaW3LMnvQUzZn12NADc9tcfCIRdJBrkH4=

Name: org/eclipse/jdt/internal/compiler/parser/unicode11/part1.rsc
SHA-256-Digest: oGPJXaoTUs3zRhXIuWS1Jf77WIBgqQxrr1kde72sbcg=

Name: org/eclipse/jdt/internal/compiler/codegen/CodeStream.java

SHA-256-Digest: C3baqu5CV5Cowx+1zhnrAUQDp/RGMw2SEIBY2iy3QoA=

Name: org/eclipse/jdt/internal/compiler/batch/BasicModule.java
SHA-256-Digest:
0lQ99V+7C8zPwBm7mz+//4KUrGWr8obRjVVtMji6VIs=

Name: org/eclipse/jdt/internal/compiler/ast/TypeDeclaration.java
SHA-256-Digest: 3XxGCDJ04qLxMqsSJARpqvFmWnBqqVqJXRAiN/dsoDY=

Name: org/eclipse/jdt/internal/compiler/ast/Invocation.java
SHA-256-Digest: 7AQi1/tJZgD0wIsWzwTetV23untDXhO48VbRvOvZvaE=

Name: org/eclipse/jdt/internal/compiler/util/HashtableOfInteger.java
SHA-256-Digest: yzAfXM7l1qy4yEHPXvdsHSv2wtDxaGL1WBq/lwAqn7Y=

Name: org/eclipse/jdt/internal/compiler/classfmt/ExternalAnnotationDecor
ator.java
SHA-256-Digest: bYfN0xQnIoYL+hI9IbJ+APUfK1cVhIu68f+t7KGax/Y=

Name: org/eclipse/jdt/internal/compiler/classfmt/NonNullDefaultAwareType
AnnotationWalker.java
SHA-256-Digest: Od/qaIpp10xvRy/D7xP3HQw2m8uzWOipMZaMV37A5e8=

Name: org/eclipse/jdt/internal/compiler/ast/ImportReference.java
SHA-256-Digest: 4jSyGnZ6VBTmZU74HXE8ZpekUgVEqRkt0DDD3RFmGCM=

Name: org/eclipse/jdt/internal/compiler/lookup/VoidTypeBinding.java
SHA-256-Digest:
iJ1tI5RKrweLhDFdotz8AYGyZCtjuezl/xZ+u4bg+6A=

Name: org/eclipse/jdt/internal/compiler/ast/RequiresStatement.java
SHA-256-Digest: rH3T2aDQsOLsX/66tclKGpehwH2t1UVx/eVF6jGL+jc=

Name: org/eclipse/jdt/internal/compiler/parser/unicode/part1.rsc
SHA-256-Digest: 6bzFSJQkMCpuBMtcYhLfgDgdfo97C6ZyVAG/1L/A++E=

Name: org/eclipse/jdt/internal/compiler/env/IGenericField.java
SHA-256-Digest: 1jr4Qd2VOw1PUkbyysh+yP6yjK2G/YJH4ctMRUGAVwk=

Name: org/eclipse/jdt/internal/compiler/lookup/RawTypeBinding.java
SHA-256-Digest: 0LMXlPmF8uEGy5MrfzRpMoY6Pm9kNYvM5wVRaphtsVw=

Name: org/eclipse/jdt/internal/compiler/parser/parser18.rsc
SHA-256-Digest: MmkVUgIpU/5BiiOcJbOpqmBUQyO6/G/1WQn/SRKWRsY=

Name: org/eclipse/jdt/internal/compiler/lookup/SortedCompoundNameVector.
java
SHA-256-Digest: 5cEw5GZM4uJXXDv4kBvC5h2poiU/tLtH7O7Jrzw7EVY=

Name: org/eclipse/jdt/internal/compiler/ast/SingleMemberAnnotation.java
SHA-256-Digest: vGfy+NAFG3iN4eD79z6qKBa480lp0N5ntw76uvj0Sag=

Name: org/eclipse/jdt/internal/compiler/ast/Javadoc.java
SHA-256-Digest:
/HMYwKRYVWekO2ZgOVy+0fxHHxD5Or3oyUm/IcCmgfc=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredUnit.java
SHA-256-Digest: Zf9/Tm6bGhjsl4D4+QI0SSxKG8Qu2LnE3uRusAcX5yw=

Name: org/eclipse/jdt/internal/compiler/batch/ModuleFinder.java
SHA-256-Digest: PBcN8X/LbpZmTAcY7qyYrIRvTfFTFm1lNU8H0QIpEMk=

Name: org/eclipse/jdt/internal/compiler/util/CharArrayMap.java
SHA-256-Digest: irD4Liu8uSTImZdYGjseKg9lJOJiYBFaBbTGH3Q8ywM=

Name: org/eclipse/jdt/internal/compiler/util/HashSetOfInt.java
SHA-256-Digest: /84qEmNwAT/IEgTX/6VydXh1JQFiGrf3dEE+ydthWYw=

Name: org/eclipse/jdt/internal/compiler/util/Util.java
SHA-256-Digest: YgEOQCvvGbNyB0MVBOY2bbVSb4d/D0FEgmNrUzyrw/g=

Name: org/eclipse/jdt/internal/compiler/parser/parser22.rsc
SHA-256-Digest: dlj12HdySJ9/dS2FtxozIFiYR/SkvvmE7KUs1yHWvOY=

Name: org/eclipse/jdt/internal/compiler/lookup/ParameterizedFieldBinding
.java
SHA-256-Digest: HRJbMJCy9F8QeR6h8kdEIkQO0qDIxlzlbEagwRlEkMQ=

Name: grammar/java.g
SHA-256-Digest: OiKXPYKVBoyIoWUC0g0UNqwP3vWwyXqjNSthmJZ6hSM=

Name:
org/eclipse/jdt/internal/compiler/ast/Assignment.java
SHA-256-Digest: mbcXBiXQHz4ve6O2VF49yopP2lwy9GnlrnPdaoXApXk=

Name: org/eclipse/jdt/internal/compiler/parser/unicode13/start2.rsc
SHA-256-Digest: TslTNlywPQfQNz7lePBTcyeCWt9WSiABnCNgOMMNe9I=

Name: org/eclipse/jdt/internal/compiler/lookup/LocalTypeBinding.java
SHA-256-Digest: JPIPT0ZQzSr4hQlt4j32Ug61COfO2Ak6GKQxcX5cwk8=

Name: org/eclipse/jdt/internal/compiler/parser/unicode7/part0.rsc
SHA-256-Digest: 0FqBbyYpC5Qqh69jAmAqK2pRvjmZhjA3bDFXV1gXmbk=

Name: org/eclipse/jdt/internal/compiler/lookup/ConstraintExpressionFormu
la.java

SHA-256-Digest: lRiy7z7NMLBwpAvxFp3xl89WGThppqDUDTqepxHkNI0=

Name: org/eclipse/jdt/internal/compiler/ast/TextBlock.java
SHA-256-Digest: ruvimjuUasIVJiXDmmDOjyndTkZgQwhMG7hM3yQ05lY=

Name: org/eclipse/jdt/internal/compiler/parser/unicode13/part0.rsc
SHA-256-Digest: wpop4HYIaDkSaC16ZKJssKINHI3SV0wn5oQ9hloSmTg=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6_2/start1.rsc
SHA-256-Digest:
Dfg/rM9EofrQEDvyFutswNErjVT0JDOrJ7TQoagiGX4=

Name: org/eclipse/jdt/internal/compiler/parser/unicode10/part2.rsc
SHA-256-Digest: 04VMyR2oGLNoJWK6xYvZv3gPXGxYB6RpHuNdBUBuFAo=

Name: org/eclipse/jdt/internal/compiler/apt/model/AnnotationValueImpl.ja
va
SHA-256-Digest: L3iFq2OvXJVAWp4BgaHpV4aeh9mUYWVcyr5csplTG/M=

Name: org/eclipse/jdt/internal/compiler/classfmt/ModuleInfo.java
SHA-256-Digest: uZUV+89nRSe/vszg4N+rdO05AP44+CyFyCH7FmoSIZk=

Name: org/eclipse/jdt/internal/compiler/flow/ExceptionHandlingFlowContex
t.java
SHA-256-Digest: aEfUDJqxTmOWTGe/SYzvIl0NzvPFaI3GL6i5frbcetg=

Name: org/eclipse/jdt/internal/compiler/ast/CharLiteral.java
SHA-256-Digest: nlctERld7nYFFwAnHDa6gg9Ah1DKGweXtwT3gPnGUGo=

Name: org/eclipse/jdt/internal/compiler/parser/unicode13/start1.rsc
SHA-256-Digest: PofIYpM6w0uX6lwgylYVRRx7q+5VFKABhvVLrqVm4VQ=

Name: org/eclipse/jdt/internal/compiler/parser/JavadocTagConstants.java
SHA-256-Digest: TQtyDuQukAkpVWnVTd2bmXUbIhHUKPI6cX1ULSG/V34=

Name:
org/eclipse/jdt/internal/compiler/apt/model/AnnotationMirrorImpl.j
ava
SHA-256-Digest: Gd9YP9pWM/2UEDDis68N5cUFbltGhvwaZiuVxnxC0CE=

Name: org/eclipse/jdt/internal/compiler/apt/model/RecordComponentElement
Impl.java
SHA-256-Digest: lUMi8WD4tSidufrEEEZfW/ke82vAiuRFhX9t6vg27HY=

Name: org/eclipse/jdt/internal/compiler/parser/unicode11/part0.rsc
SHA-256-Digest: +KGSmYGaG0hJWaQSqCHwg32AliwDiLVRduVafVsf+90=

Name: org/eclipse/jdt/internal/compiler/env/INameEnvironmentExtension.ja

va
SHA-256-Digest: XSOE8AyHCoDc2CgSxgJV9JW+aXfchdZm02Ycurov9ak=

Name: org/eclipse/jdt/internal/compiler/lookup/LocalVariableBinding.java
SHA-256-Digest: qDIPJYwCcywFGfxuaJxw+Lg8GAvQwgJbBzQmmKq73A0=

Name: org/eclipse/jdt/internal/compiler/parser/unicode/start0.rsc
SHA-256-Digest: 2uzENhpiZu1nRnsFWAV8jZ4xq+FD21cHUMSP3xDBfME=

Name: org/eclipse/jdt/internal/compiler/flow/FieldInitsFakingFlowContext
.java
SHA-256-Digest: gvOl+5KqC2kOP1Hh+UBrDrhpQ5Oo9qxWcPpnZn8DsBI=

Name: org/eclipse/jdt/internal/compiler/util/FloatUtil.java
SHA-256-Digest:
 U9N/R8hzcsqyo2nCyMjyTjZpDi5FSrL7NM+Xtegxdss=

Name: org/eclipse/jdt/internal/compiler/apt/dispatch/BatchProcessingEnvI
mpl.java
SHA-256-Digest: PjWegMD26Ix8jMsubC4C7+bja/2svaQ1RGPRvHj71QM=

Name: org/eclipse/jdt/internal/compiler/ast/ParameterizedQualifiedTypeRe
ference.java
SHA-256-Digest: P21bFov4+pol/Y2kdhlzU4pwhHaE0wgodBnYR3C2BgA=

Name: org/eclipse/jdt/internal/compiler/classfmt/ComponentInfoWithAnnota
tion.java
SHA-256-Digest: BUaPA3IhltBCvfFdcEYoQjiIwH2/qMgMNx1AqOO6cXE=

Name: org/eclipse/jdt/internal/compiler/ast/SingleNameReference.java
SHA-256-Digest: DrAkslBr2FrvvqfQAdE2h9olZ91kan5ZNkMWLev/HVo=

Name: org/eclipse/jdt/internal/compiler/env/IGenericType.java
SHA-256-Digest: Z20he4yCXDGNCQMZrHWw8bfr+2LtH0zfgQ8D5Tdj6fU=

Name: org/eclipse/jdt/internal/compiler/apt/dispatch/RoundEnvImpl.java
SHA-256-Digest: kiSHc/9FG8C7ubEBlw3ao5al194+ayGpOh2CGsWHb7k=

Name: org/eclipse/jdt/internal/compiler/ast/CastExpression.java
SHA-256-Digest: lg+WOiwEEFImVzgiaaWVOEx3/Tr6CEqdWkG9upWMxy8=

Name:
 org/eclipse/jdt/internal/compiler/codegen/ConstantPool.java
SHA-256-Digest: gYQNO5UWPeeXaAIdbsIU//LMDPXW78U9XgXM5RbQFWc=

Name: org/eclipse/jdt/internal/compiler/lookup/ElementValuePair.java
SHA-256-Digest: g3gC6ddMYOrQrG2fOcck3PNf7pP1VPiuPm/yS/SLAHE=

Name: org/eclipse/jdt/internal/compiler/lookup/InferenceSubstitution.jav
a
SHA-256-Digest: KIz/KtTgyrgI2etCyiLfXAToU2q9nlssMYu5M6ov2/A=

Name: org/eclipse/jdt/internal/compiler/util/SimpleLookupTable.java
SHA-256-Digest: H44eTY1YKya+dEiSYxgTpIOmCsGTjS/JB3xkc64o1h4=

Name: org/eclipse/jdt/internal/compiler/parser/unicode7/start0.rsc
SHA-256-Digest: 4DaSJ2W0Hfswtznhyulngw7PrvcJg3EcsiMVfdxhyls=

Name: org/eclipse/jdt/internal/compiler/util/HashtableOfModule.java
SHA-256-Digest: mAu3bgawla6RqzmYSiLqyqBllca2rAdMszIMOanIu7E=

Name: org/eclipse/jdt/internal/compiler/ast/ModuleReference.java
SHA-256-Digest: atwrbhrSqnvPigbFEsZqXpJTa5W/rYPjib/TIF9zMTo=

Name: org/eclipse/jdt/internal/compiler/env/IUpdatableModule.java
SHA-256-Digest:
GBVacyiWuSaNhDhBroaMJx3QKtT8gY2VWHaoka2+9ig=

Name: org/eclipse/jdt/internal/compiler/parser/unicode12_1/part14.rsc
SHA-256-Digest: zAkaPM3Ejlgf1/HENfa61QhvcZlyZlZ7dZsXWDNsizs=

Name: org/eclipse/jdt/internal/compiler/parser/unicode8/part0.rsc
SHA-256-Digest: hNWvpW/yJmBhdNNY56IwEtrblKdhkTaqgy2iJfBvuVI=

Name: org/eclipse/jdt/internal/compiler/apt/model/TypeElementImpl.java
SHA-256-Digest: l2oLytk6+Fbifa4QuWz8e155fomRTiaZ5oI3FclzFx4=

Name: org/eclipse/jdt/internal/compiler/parser/diagnose/DiagnoseParser.j
ava
SHA-256-Digest: m684tzS3Rb7ewd02L3Fr3RF09gXey0pbrdKHlw2dBuM=

Name: org/eclipse/jdt/internal/compiler/problem/AbortCompilation.java
SHA-256-Digest: 9ubNV/mkWAy48NaM6USeTmeSlw9vQif9VI5UDzSqxwE=

Name: org/eclipse/jdt/internal/compiler/impl/BooleanConstant.java
SHA-256-Digest: sc5BzRl5ENglzgun3e8CrGVtiQ46N32vkzoMbRwp9zs=

Name: org/eclipse/jdt/core/compiler/SubwordMatcher.java
SHA-256-Digest: yDM7ohGVt2fmD3hai4cbdP7Y6cXORvJxdog+RaP3jE4=

Name: org/eclipse/jdt/internal/compiler/lookup/ImplicitNullAnnotationVer
ifier.java
SHA-256-Digest: B0EEOKYPrd5eEYEgJRw6u2QWny2tEHmltFBRS6cs42E=

Name: org/eclipse/jdt/internal/compiler/lookup/Binding.java
SHA-256-Digest: E2qPabrjQnSsbm98eXL7+CUXcU+Z7M0TsEHHhjsC0eE=

Name: org/eclipse/jdt/internal/compiler/env/IRecordComponent.java
SHA-256-Digest: heFn7rIjnMQm3pEvS4xpmDk6notJ/BdMokdCd8PQ2Fo=

Name: org/eclipse/jdt/internal/compiler/parser/parser9.rsc
SHA-256-Digest: Y9FZRPM+OFedNhzPmT7dMiiNozOeMGINNkmqglb213A=

Name: org/eclipse/jdt/internal/compiler/env/ITypeAnnotationWalker.java
SHA-256-Digest: Z1ypAsVTcQgX2QxJvQWKTXermAf8ldVUOB/nFlBMF8Y=

Name: org/eclipse/jdt/internal/compiler/env/ModuleReferenceImpl.java
SHA-256-Digest: g/vIJ6PbTOIqsVrk30lffrMb/R6Ct/6N4R8BXjq6P6Y=

Name: org/eclipse/jdt/internal/compiler/parser/parser17.rsc
SHA-256-Digest: qIjXsiTPCgSKFkn1w/mydtZmOMYyB2Ej6qmnVIOZAr8=

Name: org/eclipse/jdt/internal/compiler/parser/unicode/part2.rsc
SHA-256-Digest: K9XWs/PT+ucJ8VxJDdMdBpO3RKC/pug9ZfGwdnNeWNc=

Name:
org/eclipse/jdt/internal/compiler/codegen/CaseLabel.java
SHA-256-Digest: sAMFCDu/nQDZTtZwh643CudtjxfLVZhNaKjUm8/AuJI=

Name: org/eclipse/jdt/internal/compiler/problem/ProblemSeverities.java
SHA-256-Digest: uh+F8HrWv48BohLMY2+BfhK2dgfnKR7g1mzzqWZsE2s=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredTypeReference.ja
va
SHA-256-Digest: F9OMbSHgJw/VL0x6Zp0LwDpwjmfOpqXs0a+a3o8iNfc=

Name: org/eclipse/jdt/internal/compiler/parser/unicode7/part1.rsc
SHA-256-Digest: Mp5ohkkh0rdL2HfWbId+O86WC+WmdBjhh1Nq87564gU=

Name: org/eclipse/jdt/internal/compiler/codegen/Label.java
SHA-256-Digest: 2CUy4cCaV43AHY7dFhoyv5VIjTKjZ8bh7TrK9gIIfWs=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6_2/start0.rsc
SHA-256-Digest: vCS9d/5yWPMgaB2XSpV7hFpeMddMeRrkkbw2Ggd71CA=

Name: org/eclipse/jdt/internal/compiler/ast/OperatorIds.java
SHA-256-Digest: V/QzBdATIBHyGJzE9DxZXHhziXRUAS9Gjl/criz4SV0=

Name: org/eclipse/jdt/internal/compiler/codegen/AnnotationContext.java
SHA-256-Digest:
XGudA2koHyqGhi5HvsJ+D/gd+1zEnCLiTqnlVOIrNVo=

Name: org/eclipse/jdt/internal/compiler/batch/ClasspathJmod.java
SHA-256-Digest: I1m+Whyj1lkjlg85uuDHkneiqVNTHmUjySs4GVQPsmI=

Name: org/eclipse/jdt/internal/compiler/codegen/Opcodes.java
SHA-256-Digest: LLPHZ106vvn4TpspzoboT2F53GSJObhdofJMP4R41f4=

Name: org/eclipse/jdt/internal/compiler/env/IModulePathEntry.java
SHA-256-Digest: KKuue2O2vgPif+27XECjeL32hmj5t5BlbLv0xsWvumE=

Name: org/eclipse/jdt/internal/compiler/lookup/MethodScope.java
SHA-256-Digest: 3nJ/oqPVINMbYUVx3d0wtfOXb3HrYYpg9irheU5zMss=

Name: org/eclipse/jdt/internal/compiler/GenericAstVisitor.java
SHA-256-Digest: HY19C1Awgr4MaVUknTs5pwVgmSUTUQCuQUJ7HPsAeiU=

Name: org/eclipse/jdt/internal/compiler/problem/ProblemReporter.java
SHA-256-Digest: HvRQ1zWM+Zfizgla+3JbS8aIV6eC6423XSjkuhDT5k0=

Name: org/eclipse/jdt/internal/compiler/ast/NameReference.java
SHA-256-Digest: NDDXIwvvyh8UWcFkD4+c4jMH0sBFh9o2FJOIVjEb/7I=

Name: org/eclipse/jdt/internal/compiler/parser/parser23.rsc
SHA-256-Digest:
zTGmGKjOY0tg0NNkQrkZP09AeT7laJ4FlJB6KjLmRjk=

Name: org/eclipse/jdt/internal/compiler/ast/Pattern.java
SHA-256-Digest: M/lJgCdqJovy7+kmmGy8rnKs5RV6m5auqmvlk2Eyn2A=

Name: org/eclipse/jdt/internal/compiler/lookup/BinaryModuleBinding.java
SHA-256-Digest: ODIgEKok1CurSqV0HiWz5oXQZuD9A0sj7EYO/Z3Nxq0=

Name: org/eclipse/jdt/internal/compiler/lookup/InferenceVariable.java
SHA-256-Digest: DihcYhLSxaL74ZEH5F3sJ5V6vpgdyOoJDnGdhg7Przc=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6/part14.rsc
SHA-256-Digest: zAkaPM3Ejlgf1/HENfa61QhvcZlyZlZ7dZsXWDNsizs=

Name: org/eclipse/jdt/internal/compiler/codegen/BranchLabel.java
SHA-256-Digest: ZuyGeQJRmPlmTEv8FZvzxQC1FgJjX1I8S0V/jziop9E=

Name: org/eclipse/jdt/internal/compiler/ast/UnaryExpression.java
SHA-256-Digest: MqEZTOWUSpVl7kvP4wfmvcRyiMX7pKD0MQiqLZcTGbo=

Name: org/eclipse/jdt/internal/compiler/apt/model/Factory.java
SHA-256-Digest: etcOOkfZTUqxsU0haq+ASW4j/aAckyRxcA4HS8pQyaQ=

Name: org/eclipse/jdt/internal/compiler/ast/JavadocQualifiedTypeReferenc
e.java
SHA-256-Digest: /WtGzfu8szx4Jo5ebuGoJ+BkuoX3mxY28kvhbgowNVo=

Name: org/eclipse/jdt/internal/compiler/env/ISourceModule.java
SHA-256-Digest: IsqIY0t0o7pjv8CuVuEd96FVZwd7uR5lQygK3MvNd5w=

Name: org/eclipse/jdt/internal/compiler/impl/JavaFeature.java
SHA-256-Digest: UUKEBcgWmgGtry/StS2BbxdRKGQvoAqau0btiJW8Zuc=

Name: org/eclipse/jdt/internal/compiler/ast/WhileStatement.java
SHA-256-Digest: dhfjPEieoqkFKJ4nSLy+O5dSFp+9RKl6OFn8r94eKnY=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredOpensStatement.j
ava
SHA-256-Digest: 6n5C/dPB8151bWelnSofzn0gzGpiIFtSTShL7mYGbIc=

Name: org/eclipse/jdt/core/compiler/IProblem.java
SHA-256-Digest: 9JeDJhgd8kRKRzRISS0900kJQVxlugdTKTPpUObfKXo=

Name: org/eclipse/jdt/internal/compiler/ast/FieldReference.java
SHA-256-Digest: p6iYeDSFLdgXNRFQAeEhJVpHhzmWljkSEaX0dAThR6U=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6/part2.rsc
SHA-256-Digest: cENGbHGTfBx4FTJBMY3gopEj6ecVPCCOSVDuhhj8H8M=

Name: org/eclipse/jdt/internal/compiler/problem/messages.properties
SHA-256-Digest:
ArFKpZd303oyV/Q7iOfHqJPsLatIp4BMtvJu0RU7aiQ=

Name: org/eclipse/jdt/internal/compiler/codegen/LongCache.java
SHA-256-Digest: yAvcvnQghrJ1iqJiJRyxzzyerQhGrXWeak/49hU6l/k=

Name: org/eclipse/jdt/internal/compiler/ast/ASTNode.java
SHA-256-Digest: ta28dEk/o9U8dTn3vjxf/OqwtuZDvxKwNgBG29WOTZg=

Name: org/eclipse/jdt/internal/compiler/classfmt/BinaryTypeFormatter.jav
a
SHA-256-Digest: 360NgptCOcjy6PEOwTOyNvcTVOxqLv4krRSLIm8e1Pk=

Name: org/eclipse/jdt/internal/compiler/problem/DefaultProblem.java
SHA-256-Digest: p8HZ9vR5Eu0J2fnj0zNjgep/E1lFufHz6YF3jAFawxY=

Name: org/eclipse/jdt/internal/compiler/env/ICompilationUnit.java
SHA-256-Digest: W+65xcnuFMmr0+Y/n6An4rVnkHSFjNgNgQyb7YdURrE=

Name: org/eclipse/jdt/internal/compiler/ast/OpensStatement.java
SHA-256-Digest: KlyJQd1WglrzuKfnR3qbdWTWUJFHnKk/bBhJUwu8jzA=

Name: org/eclipse/jdt/internal/compiler/ast/IJavadocTypeReference.java
SHA-256-Digest: hZikjww8skyYSIQgzYCOUF4P3BiKNxXGExTsgScfnVM=

Name:
org/eclipse/jdt/internal/compiler/tool/Options.java
SHA-256-Digest: yQ1aMEVTklOoVMbdhcoY3FedrGUPHIf9r1UoXHNJDgE=

Name: org/eclipse/jdt/internal/compiler/ast/TrueLiteral.java
SHA-256-Digest: 9H1jsbzRHez8UEEJeaedfaDadZ+KmHJ44Tr5C4yqmY8=

Name: org/eclipse/jdt/internal/compiler/parser/parser4.rsc
SHA-256-Digest: yUoTNtXrwMpLANRmxKY+CDZuDhFqAtk70UGUIuAUq68=

Name: org/eclipse/jdt/internal/compiler/impl/DoubleConstant.java
SHA-256-Digest: FdjILMzpSauxkLbH0BiTd4A55kmrGnoK4IwxK1DVL7Y=

Name: org/eclipse/jdt/internal/compiler/ast/MessageSend.java
SHA-256-Digest: 5lvdCR+rXsNjJf8dgKlhkQPTWA67MSp1M4dsvYgExv8=

Name: org/eclipse/jdt/internal/compiler/batch/ClasspathLocation.java
SHA-256-Digest: 4GNWZ0iQnwmI3/advrpCgKkS9Pkq9P6rCvdkKrEEOlc=

Name: org/eclipse/jdt/internal/compiler/env/AutomaticModuleNaming.java
SHA-256-Digest: B/SOjS2OXnm+uy4u5JcGYha+xs2DTuYf14dlvPPUwCo=

Name: org/eclipse/jdt/internal/compiler/classfmt/AnnotationMethodInfoWit
hAnnotations.java
SHA-256-Digest: R2lJw+B+OCBUDkSYxb3XIJh4YqFaUvoZZVZhStHfKa4=

Name:
org/eclipse/jdt/internal/compiler/ast/MemberValuePair.java
SHA-256-Digest: MCVMW3fBi0H6fD2URLYIoDj167/ZBPqyw7OtGIxVfGo=

Name: org/eclipse/jdt/internal/compiler/classfmt/TypeAnnotationWalker.ja
va
SHA-256-Digest: Id80VOA7m7GrTyyPTYChMSS/4l91lYTy+8Qrt5y/OZk=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredModuleReference.
java
SHA-256-Digest: axQeJhMMAUUVTAkeJXMW2pACmSix9WeAIaFP5JYSQ/U=

Name: org/eclipse/jdt/internal/compiler/ast/OR_OR_Expression.java
SHA-256-Digest: UlkvbNNliLRMOlQTozRQ6NBA9DIDJ8OgeE2180sTkH8=

Name: org/eclipse/jdt/internal/compiler/apt/dispatch/RoundDispatcher.jav
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SHA-256-Digest: mZVgn885hoYfprE0t4nkQ/maZOPz7uYEzliCAEzo8ok=

Name: org/eclipse/jdt/internal/compiler/parser/unicode10/start2.rsc
SHA-256-Digest: 04VMyR2oGLNoJWK6xYvZv3gPXGxYB6RpHuNdBUBuFAo=

Name: org/eclipse/jdt/internal/compiler/impl/LongConstant.java
SHA-256-Digest: ALyhAwikW/E27gYuwedZ2UcWiBqUYPtAYH0Q/0Q1VLE=

Name: org/eclipse/jdt/internal/compiler/parser/JavadocParser.java
SHA-256-Digest:
7CM7thE+n/ykhwTMll7GVfzFLd2hOkzscM7c0JFpHp4=

Name: org/eclipse/jdt/internal/compiler/flow/InitializationFlowContext.j
ava
SHA-256-Digest: lZLjOIgoimHGxjedCS64Jaz3coNV96f91aSrzTLSY/A=

Name: org/eclipse/jdt/internal/compiler/parser/unicode12_1/start2.rsc
SHA-256-Digest: 04VMyR2oGLNoJWK6xYvZv3gPXGxYB6RpHuNdBUBuFAo=

Name: org/eclipse/jdt/internal/compiler/util/ObjectVector.java
SHA-256-Digest: MTXHFRYxPKWKjZuv+eetDguNMNfML4Eeeaj3CDdNsP8=

Name: org/eclipse/jdt/internal/compiler/ProcessTaskManager.java
SHA-256-Digest: IYFDCPb8d5Uu9r6VRGehu/BmBoVrMsnxfXkSQhc/Phc=

Name: org/eclipse/jdt/internal/compiler/tool/EclipseCompilerImpl.java
SHA-256-Digest: bANfCqBakul2e7N4oGsYmL7v6cd6m8QWvJk9jUBDN2c=

Name: org/eclipse/jdt/internal/compiler/parser/diagnose/LexStream.java
SHA-256-Digest: ccFqecpcSMwIKRnkUFaKD0EaCandpQFbM/g9UnurU4M=

Name: org/eclipse/jdt/internal/compiler/impl/IntConstant.java
SHA-256-Digest: hH3xw4PiuMQjk6eaq6KdaoLix7F4g7ET6HKgYDVAL98=

Name:
org/eclipse/jdt/internal/compiler/ast/Reference.java
SHA-256-Digest: PVQ0SXkreRZ+4vqR9QejTYFA5scqtb5j7xukzAjT5UM=

Name: org/eclipse/jdt/internal/compiler/lookup/ClassScope.java
SHA-256-Digest: wE521TxvOk8lc0rai9U6Xj5PccVnjSLqawP6/LTW3oQ=

Name: org/eclipse/jdt/internal/compiler/lookup/MethodVerifier15.java
SHA-256-Digest: X35ynxk/vAxQ+DReDnKY92HJJVdUb7d+1KRA12W5nyc=

Name: org/eclipse/jdt/internal/compiler/ast/DoubleLiteral.java
SHA-256-Digest: vTLbH6xq+NyG24e47Ae1Him2XJSYB20vEWRqeWBC9WA=

Name: org/eclipse/jdt/internal/compiler/env/NameEnvironmentAnswer.java
SHA-256-Digest: R92ImwqgTssWAE6rlKLHxTbOM5BO3SuD6CdEZJG+iRk=

Name: org/eclipse/jdt/internal/compiler/messages.properties
SHA-256-Digest: JVcXKja+FllBjaaIteBGOagKjfR62S5euXuxuB5ZEoA=

Name: org/eclipse/jdt/internal/compiler/util/SuffixConstants.java
SHA-256-Digest: nQn+GTD7FojSHpyStK3YJ9s6DsAaymUXIH3bau6McRM=

Name: org/eclipse/jdt/internal/compiler/lookup/CaptureBinding18.java
SHA-256-Digest: 6uupq5krOIkiK0gkta1Iip8GcXOLXz7Wd97BqqPzAr4=

Name:
org/eclipse/jdt/internal/compiler/parser/TerminalTokens.java
SHA-256-Digest: g1JMqcQZLM0xlQQwc1F4EKLJAeGouRA5CvKCbRyL4M0=

Name: org/eclipse/jdt/internal/compiler/lookup/MethodVerifier.java
SHA-256-Digest: Fkz8SRuzTNj2k6FaS/kfiyXr5Mgj+uCPAtndOpPtEx8=

Name: org/eclipse/jdt/internal/compiler/ast/IntLiteral.java
SHA-256-Digest: kLPMdOrdcO4MUTR53Flm+lWGw/mrMfhyyopSuomUaXU=

Name: org/eclipse/jdt/internal/compiler/ast/PostfixExpression.java
SHA-256-Digest: 1Steo0PyVWgvsHORMGZ6yi3DejAg+NvVIO+oQ2RKr+Y=

Name: org/eclipse/jdt/internal/compiler/env/IGenericMethod.java
SHA-256-Digest: V4Oy4rwtQm/tOE12RG+mgYQsPhNEmZ0CVFFhj3U99xU=

Name: org/eclipse/jdt/core/compiler/CompilationProgress.java
SHA-256-Digest: nAbtyQIRc6XhEeqI6XYmGmTR0gvX4ne3zaCLanl1T3U=

Name: org/eclipse/jdt/internal/compiler/flow/FinallyFlowContext.java
SHA-256-Digest: 2vkMrvUN04oOa7sKOEsGdB5gz+VTrSsDdKdYaQCqQow=

Name: org/eclipse/jdt/internal/compiler/apt/dispatch/IProcessorProvider.
java
SHA-256-Digest:
p3r20CvHFQZdRUf5H6qPOeCV86slB2ZjFzK5UClEHqo=

Name: org/eclipse/jdt/internal/compiler/lookup/MostSpecificExceptionMeth
odBinding.java
SHA-256-Digest: z/wniCQpWofsz0f923Uyzv7QUpKU3XVG+aP4LToPjl0=

Name: org/eclipse/jdt/internal/compiler/parser/unicode8/part1.rsc
SHA-256-Digest: nOXVCPVJlEl62WSQg9CZDnwgIIwUFECDN6E0UsYfelg=

Name: org/eclipse/jdt/internal/compiler/ast/CompactConstructorDeclaratio
n.java
SHA-256-Digest: nY3F3IRS88HTahjggdmn0JpTYZlw8w/3P/oFaoaCzmQ=

Name: org/eclipse/jdt/internal/compiler/lookup/SyntheticArgumentBinding.
java
SHA-256-Digest: tfqYNjyXzSil0BHDxrVzlPgzeIEIBsjJmkIKQNGNAgs=

Name: org/eclipse/jdt/internal/compiler/classfmt/RecordComponentInfo.jav
a
SHA-256-Digest: 0DA+ieKnH158MZ9jqX5smk7t44BagVK5KPmzJHFUyfc=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredModule.java
SHA-256-Digest: a7ZHgDuNYaiEPcFuq2VrClyCOi3fuUeJ3OvIF4O0lCw=

Name: org/eclipse/jdt/internal/compiler/ast/SuperReference.java
SHA-256-Digest: 2A2JS75m3jexKd+n7L4drJN9YaNnAtaxcKf4BFbodN4=

Name:
org/eclipse/jdt/internal/compiler/batch/ClasspathJep247.java
SHA-256-Digest: X7evRnyEJS14ssiIwnITseJs0Jn/ff89oR780782G8o=

Name: org/eclipse/jdt/internal/compiler/batch/BatchCompilerRequestor.jav
a
SHA-256-Digest: F9jRkQVm2tcAUHZ40ZncAvLj2cisXluJkwQRrMG4Ugk=

Name: org/eclipse/jdt/internal/compiler/ast/ExplicitConstructorCall.java
SHA-256-Digest: HqvlmpKvz9X/Wi11k9qAoc3D3HIg4FncJNZ629FHE0o=

Name: org/eclipse/jdt/internal/compiler/apt/model/NameImpl.java
SHA-256-Digest: qxuA8qgbce2kNdiyTDlEz7kbBKIKfto/kuG5+XNhqCQ=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredType.java
SHA-256-Digest: fPg6qqMc5SWZ+2f0qyPxNPKAx+UFlOng1SP4eW9ATFQ=

Name: org/eclipse/jdt/internal/compiler/parser/JavadocScanner.java
SHA-256-Digest: bEHZjp/Q5OPoAL/0niSIyQbtmCq8vdjaOreJ8oSCMvw=

Name: org/eclipse/jdt/internal/compiler/parser/parser24.rsc
SHA-256-Digest: nDZ/V9ZT+J2UH51K55IfeJfYL7nAjoc0/9m8yQ2P6JM=

Name: org/eclipse/jdt/internal/compiler/ast/EmptyStatement.java
SHA-256-Digest: 9MeKItRYAoiTCIVWk252OEWc3YzO8oR+foVVPgLL1Q8=

Name:
org/eclipse/jdt/internal/compiler/ast/JavadocReturnStatement.java
SHA-256-Digest: BZO1ZkXY2z3PtMOnNgbIFOgjg7x6U9phVZ/JdAbNc5U=

Name: org/eclipse/jdt/internal/compiler/ast/NullLiteral.java
SHA-256-Digest: 1yIqh7Bq8DkHzxMPVv8FdUiaAlSbKpi/P3xge9QpAxk=

Name: org/eclipse/jdt/internal/compiler/parser/unicode13/part14.rsc
SHA-256-Digest: haoJRj50zZ85Nw8yKzJcw88CAiPKhgGqeEjosEh+kak=

Name: org/eclipse/jdt/core/README.md
SHA-256-Digest: RF6LppkwQVB8DEQ/Hx2phs863bLqXrOEY5VhYkjRZQE=

Name: org/eclipse/jdt/internal/compiler/ast/AnnotationMethodDeclaration.
java
SHA-256-Digest: +9TEeELg8GFy/Eko7vJhRTbqTnQaqfujZGFmxCvcTDY=

Name: META-INF/services/javax.tools.JavaCompiler
SHA-256-Digest: gA6b1OQIa8kFFxPyMPio/CGkZGeCJ80l48AoqCEQjk4=

Name: org/eclipse/jdt/internal/compiler/lookup/MethodBinding.java
SHA-256-Digest: Q/JiHFsV1ku8fFpJbWr5VHhrjp9js5ccpob81R/Aj6A=

Name: org/eclipse/jdt/internal/compiler/apt/dispatch/BaseProcessingEnvIm
pl.java
SHA-256-Digest:
IRFc9rAnQVSrmtnaKOyGat05sxyYTnLyBvg7lb7kMq0=

Name: org/eclipse/jdt/internal/compiler/ast/ContinueStatement.java
SHA-256-Digest: U8udHlYH/8KViZNhAdPJ8n3io8lhedmSaJBcGlst0mk=

Name: org/eclipse/jdt/internal/compiler/classfmt/ExternalAnnotationProvi
der.java
SHA-256-Digest: thNdsq2aRSBFaBB88XxAsHcGrHV5SP7gcRt6Gy3XXUA=

Name: org/eclipse/jdt/internal/compiler/lookup/VariableBinding.java
SHA-256-Digest: dANQTpXsQUixn2Ie+RpKC0WOy8YQ3pglQHf42jKt+uY=

Name: org/eclipse/jdt/internal/compiler/ast/InstanceOfExpression.java
SHA-256-Digest: 9qz5AGQ38tkJ032Lv+pm7qZbiewiEGEINTlLt+w0TsE=

Name: org/eclipse/jdt/internal/compiler/ast/ParameterizedSingleTypeRefer
ence.java
SHA-256-Digest: WwW5EpY999nPSUgNX1hLXlnDOKMVXM2mZvzke9atKS8=

Name: org/eclipse/jdt/internal/compiler/util/Sorting.java
SHA-256-Digest: 7f7JfE+zDgz1QFbsjk4HqkcfbL6v1GersT9e4v7WKnU=

Name: org/eclipse/jdt/internal/compiler/ast/Expression.java
SHA-256-Digest: 6AVX4+fjRakd452Zj1c/fmrdrqsq6rU2IdobkeBgI8s=

Name: org/eclipse/jdt/internal/compiler/lookup/AnnotationHolder.java
SHA-256-Digest:
TzGtuiYSovNRXc0MCVukIuanJlE45an9w//a9o5vxM4=

Name: org/eclipse/jdt/internal/compiler/flow/SwitchFlowContext.java
SHA-256-Digest: N8X7ikdV+aGSzGBPQlTqVEFl2wOX2rAqZwq0of+uMAs=

Name: org/eclipse/jdt/internal/compiler/apt/model/ElementImpl.java
SHA-256-Digest: QvkDJU7SmVIy6bBUdqDIQHNs1FbJq1y3sXUpOWTO1Ec=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6/part1.rsc
SHA-256-Digest: EGqyCtI7oAbUti3+mdSIZttdzDPhzbrc+swdA50mVyM=

Name: org/eclipse/jdt/internal/compiler/lookup/ExtraCompilerModifiers.ja
va
SHA-256-Digest: ThZV0sDEo24g4sUTBbiV6dMuSN3w4l2XlaXewSuLnxg=

Name: org/eclipse/jdt/internal/compiler/ast/ThisReference.java
SHA-256-Digest: Qh00xNpRsQqhj/6bFnq2trs/t0gdYhmR+Wqg4XbWnFw=

Name: org/eclipse/jdt/internal/compiler/parser/parser16.rsc
SHA-256-Digest: e2AMF7tYFfuCCnZf0oAoYxouVGREKQbLULiTyQ5SGWs=

Name: org/eclipse/jdt/internal/compiler/classfmt/ClassFormatException.ja
va
SHA-256-Digest: fEAgAGOo5JpzyzRDIWsLPF1mR9NlG/7GpU7hd0BSuxA=

Name:
 org/eclipse/jdt/internal/compiler/classfmt/ClassFileReader.java
SHA-256-Digest: XEBMM0o/yp0EuY/7FpCWbJBBZ736iH21Ammy7oeH41o=

Name: org/eclipse/jdt/internal/compiler/env/IDependent.java
SHA-256-Digest: fpgd6m/yVtibcI2+R5/zWgWCPCMCEv/Momkzm3PFkrU=

Name: org/eclipse/jdt/internal/compiler/lookup/TagBits.java
SHA-256-Digest: 6MQPcowBJe2EO7ddAnGbUT44QYdLJq9pUE+U+Z/fDYc=

Name: org/eclipse/jdt/internal/compiler/ast/ReferenceExpression.java
SHA-256-Digest: hMleEGjlZCNQhgK41XKkuvLIPf7kmsydekslvK2cqLA=

Name: org/eclipse/jdt/internal/compiler/classfmt/JavaBinaryNames.java
SHA-256-Digest: NBcoMH+VH8DSj+Xzc2ww4HAmf6bxzIboOFj2dhAsyoA=

Name: org/eclipse/jdt/internal/compiler/parser/unicode10/start1.rsc
SHA-256-Digest: JZlDollummU4hNiOft/ehe+XlohXVP+Gyax1W0PmOUc=

Name: org/eclipse/jdt/internal/compiler/ast/ExtendedStringLiteral.java
SHA-256-Digest: ZBCOxuMQQD0cb8EuxdgZMmm79glbJME27+/OIQ1mui8=

Name: org/eclipse/jdt/internal/compiler/lookup/InnerEmulationDependency.
java
SHA-256-Digest:
 JP5EIYWFXAX6sRhm7T626VoNcYhdF6On7zFkG4mPTLU=

Name: org/eclipse/jdt/internal/compiler/ast/UnlikelyArgumentCheck.java
SHA-256-Digest: E4IPtCULbDvdmDAE2aGtyHCw1lVxDGskjYfIwKqoP6w=

Name: org/eclipse/jdt/internal/compiler/parser/unicode8/part2.rsc
SHA-256-Digest: /oFYyNQm6bxMPJ0MtgZs+crctPdo50HdEUNMzBO9XLg=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredBlock.java
SHA-256-Digest: w4wYeU4OF2Eeo1QAkxdf4/mbWJWbgQX9ywKQHd+tWeI=

Name: org/eclipse/jdt/internal/compiler/problem/AbortMethod.java
SHA-256-Digest: yZc9wzRkrQZa+haTqu4QFar+zCTfBcLiZCCBX6vtGoY=

Name: org/eclipse/jdt/internal/compiler/apt/dispatch/BaseMessagerImpl.ja
va
SHA-256-Digest: iYVQA2wCmC46TuNhAc+E6d6hbcCWK5XZFJHpWV6zZSM=

Name: org/eclipse/jdt/internal/compiler/batch/ClasspathMultiReleaseJar.j
ava
SHA-256-Digest: zAm3Drk83hKDTRV2Lt9/UMD4RKVY1cl1HOjps5cjn+0=

Name: org/eclipse/jdt/internal/compiler/apt/model/WildcardTypeImpl.java
SHA-256-Digest: UnkMpzWbpcFEElosi6w8C7WjNfTD2a4JzLnal30Om14=

Name: org/eclipse/jdt/internal/compiler/ast/OperatorExpression.java
SHA-256-Digest:
CniltjIq5225CfAo7KQeE4N8Db+4KR2N6kPdFRDGbcQ=

Name: org/eclipse/jdt/internal/compiler/ast/FakeDefaultLiteral.java
SHA-256-Digest: pXX8fiIhx9wvvvGx+U1Kmi+u1NzTaCW66aurZb7rd/k=

Name: org/eclipse/jdt/internal/compiler/util/CharDeduplication.java
SHA-256-Digest: bnWE0WM7C5NguQl4ROOI+O5HlgieItwiVtWNdE+sIrQ=

Name: org/eclipse/jdt/internal/compiler/batch/messages.properties
SHA-256-Digest: GSXVM/aBRhHcgNRROFtNs2kVLmi7fbAQ1UTTr3QLE7A=

Name: org/eclipse/jdt/internal/compiler/ast/AssertStatement.java
SHA-256-Digest: 8iwvDlwIgTwjI2UqzXJzyQ1OvqohWTMA+Ly3ybzY+EI=

Name: org/eclipse/jdt/internal/compiler/lookup/TypeBindingVisitor.java
SHA-256-Digest: mZPpPGKbLdfnEJYzlj3LKtOi49jRttS2DvwUKeuP7YQ=

Name: org/eclipse/jdt/internal/compiler/parser/ParserBasicInformation.ja
va
SHA-256-Digest: jD9w2YY/guf1dggS4HSRSAGIJpUDS82Rf+lx+3EJU0o=

Name: org/eclipse/jdt/internal/compiler/ast/CompilationUnitDeclaration.j
ava
SHA-256-Digest:
yJxsdkPxNAvBySQSiLyUWGCq/c1luz27PspUR8E/WDk=

Name: org/eclipse/jdt/internal/compiler/parser/parser10.rsc
SHA-256-Digest: sC7vOyBdt8dZ14851nMpH0bx7+pRgZYULFMJBz4dyKs=

Name: org/eclipse/jdt/internal/compiler/parser/unicode7/start2.rsc
SHA-256-Digest: cENGbHGTfBx4FTJBMY3gopEj6ecVPCCOSVDuhhj8H8M=

Name: org/eclipse/jdt/internal/compiler/apt/model/ArrayTypeImpl.java
SHA-256-Digest: vU87XfW5EWoPB2NcN64wQLNwTZmPbWk4oARhl37P2qc=

Name: org/eclipse/jdt/internal/compiler/env/IBinaryField.java
SHA-256-Digest: LtZsMbV3YtAN4e95n5A0JgWRXB5TZDamVsFBoNkXvBc=

Name: org/eclipse/jdt/internal/compiler/tool/ArchiveFileObject.java
SHA-256-Digest: AV9oZbRIaU3ycVTYVJYUbujFV36YC0QPlTWrevwF5C8=

Name: org/eclipse/jdt/internal/compiler/ast/ArrayInitializer.java
SHA-256-Digest: UhDgZw9lcEZxS4DTUuifoICoAFIQ9vb6CRUzSTNdmrE=

Name: org/eclipse/jdt/internal/compiler/problem/AbortCompilationUnit.jav
a
SHA-256-Digest: iaK1qSBh+6fQg/cb8+1npHlMJiEFXhWS3cl49z/kIDU=

Name: org/eclipse/jdt/internal/compiler/ast/ArrayTypeReference.java
SHA-256-Digest:
HevUZJY+d9DkbeRqQRrSxgo8DOtqlgo0rfXMsobUBIw=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredAnnotation.java
SHA-256-Digest: nzo8X3ntAyXMOIggqdsEYvQYz9Zc/6uM7MxqLhakjQM=

Name: org/eclipse/jdt/internal/compiler/ast/MagicLiteral.java
SHA-256-Digest: jZzzh3h3Asz5zZGRsS7wAL+yvdx7kQHNDOGYE+pnQcM=

Name: org/eclipse/jdt/internal/compiler/ast/CaseStatement.java
SHA-256-Digest: sEFcgeMGWKlCvScEJG0r/YJ5CFwpn+oP2sp0F2ubmio=

Name: org/eclipse/jdt/internal/compiler/ast/ConstructorDeclaration.java
SHA-256-Digest: WbnsSxZthX6ttYEic5hGWn9JMjDbu8g31eVnSnAISE0=

Name: org/eclipse/jdt/internal/compiler/impl/ByteConstant.java
SHA-256-Digest: HWPlIDRPq4cn+nhIIYP8m9EOTxKuPB431sxCco4orKg=

Name: org/eclipse/jdt/core/JDTCompilerAdapter.java
SHA-256-Digest: V2K7lnm5sPk925OSeGvpuiZ2JQpGhaeWXmWLO9REYZw=

Name: org/eclipse/jdt/internal/compiler/lookup/SyntheticFieldBinding.jav
a
SHA-256-Digest: IvdK1rkAHKBF8/DUOPD2FTRpv1l1dL8G2JjSv5dZA6A=

Name: org/eclipse/jdt/internal/compiler/ast/IntersectionCastTypeReferenc
e.java
SHA-256-Digest: C8BdQ0Klt3/T/2Q/5a7oVbSC0fDHcxsZxbyCX65DClE=

Name: org/eclipse/jdt/internal/compiler/lookup/ParameterizedTypeBinding.
java
SHA-256-Digest: dGh/V4hHnYFCxAj9hCYG1t14NBazqn4fiYZpQdtvzcM=

Name: org/eclipse/jdt/internal/compiler/apt/util/EclipseFileManager.java
SHA-256-Digest: 1EbsmhrQI9YuD6XTn0QCE0Sg2UltDkHUNkxGd5FpIs4=

Name: org/eclipse/jdt/internal/compiler/parser/unicode11/part14.rsc
SHA-256-Digest: zAkaPM3Ejlgf1/HENfa61QhvcZlyZlZ7dZsXWDNsizs=

Name: org/eclipse/jdt/internal/compiler/ast/FloatLiteral.java
SHA-256-Digest: hSrZWF8seULkDDRBLMCntdYJwJNf2YgWfJNk3OWdmdY=

Name: org/eclipse/jdt/internal/compiler/batch/CompilationUnit.java
SHA-256-Digest: CbX83+9JeM99CSQqoBErfqes9Fel2Hq2yRkZwyTqHUw=

Name: org/eclipse/jdt/internal/compiler/env/IModuleAwareNameEnvironment.
java
SHA-256-Digest: OShlmr9Q/PiSopJqKRSfb9jtMaxeEMXV0rhZLho6R7k=

Name: org/eclipse/jdt/internal/compiler/batch/ClasspathJar.java
SHA-256-Digest: ekFxfaUaOeCBbZd7UjvlT2F+UKXytlfCM9zfjXpBhac=

Name:
org/eclipse/jdt/internal/compiler/lookup/BinaryTypeBinding.java
SHA-256-Digest: k5qbhyAy+BQNJ4cZjEP4f/OKpiwyOfpMeZ94bxbQVTs=

Name: org/eclipse/jdt/internal/compiler/ast/QualifiedAllocationExpressio
n.java
SHA-256-Digest: 42l2ls9JOuxe2YRgYt7uYazmUy79LlzhM3gEGvpIVLk=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6/start0.rsc
SHA-256-Digest: LBPmiPyWIaPKXbXMpYtzbhN7IxuibkEy5NMDDdkjYcA=

Name: org/eclipse/jdt/internal/compiler/lookup/LookupEnvironment.java
SHA-256-Digest: Wa17HbHtjkUcnafvkB5dmCf3edmAO7q5+xtAlQ9Rbzk=

Name: org/eclipse/jdt/internal/compiler/parser/NLSTag.java
SHA-256-Digest: zrZoQRHp/CR6/0t+i8cNEMYYex6dbOiUUwxJxfZQyrM=

Name: org/eclipse/jdt/internal/compiler/apt/model/TypeParameterElementIm
pl.java
SHA-256-Digest: lfQdRcPsDQsP//xzgxkqInTi/e1NovyvOHoeFa/5dUE=

Name: org/eclipse/jdt/internal/compiler/ast/QualifiedTypeReference.java
SHA-256-Digest: 6plfuF9p/TzNoNNvfQIGQ8Rog6anwEHaRpCRG4804rU=

Name: org/eclipse/jdt/internal/compiler/lookup/CompilationUnitScope.java
SHA-256-Digest:
HYLAcMLo4QSqs75nGdvDiW167X1jDXrB4bDHjkVDuGA=

Name: org/eclipse/jdt/internal/compiler/codegen/ExceptionLabel.java
SHA-256-Digest: rpQrGuQkrnsTTXRWtY7CRWuvUCr/0APo76LdfuD5t14=

Name: org/eclipse/jdt/internal/compiler/apt/util/ManyToMany.java
SHA-256-Digest: Vtch9EJ76mj0z3t4snfV0eVTD0dkImM//SwOGr1QYq8=

Name: org/eclipse/jdt/internal/compiler/ast/AbstractMethodDeclaration.ja
va
SHA-256-Digest: XaPb+leGbY9KwdlHURlrXA0ycPA24lVM1Yxn8nPr7Sc=

Name: org/eclipse/jdt/internal/compiler/env/IBinaryNestedType.java
SHA-256-Digest: DQ9BFZnMYKqMnGk79CvPenQUIfvKcmCLMQIKmvHFQLs=

Name: org/eclipse/jdt/internal/compiler/parser/unicode/part0.rsc
SHA-256-Digest: 3oJGIUSpb+eve9nU1zwDetDqkmo3ZfMw47h9gwonuZQ=

Name: org/eclipse/jdt/internal/compiler/ast/TypePattern.java
SHA-256-Digest: r0fiTfpTXAdq8ju6Ne8eRrRcFMIAOrrSqzmNqAaEk6k=

Name: org/eclipse/jdt/internal/compiler/codegen/DoubleCache.java
SHA-256-Digest: TZiTAprIgnWaCWEtfYG7vOPmcXpfaKqkmie6we5+/5Y=

Name:
org/eclipse/jdt/internal/compiler/parser/RecoveredElement.java
SHA-256-Digest: d+e/RmhPjYwa8CE8rH1DQ99OEBfyQkX6kioRpgEtIpU=

Name: org/eclipse/jdt/internal/compiler/ast/RecordPattern.java
SHA-256-Digest: Ice6YTBhB+TA08TEUia8MM/8M3bdTqWDGXZiwlaG0R0=

Name: org/eclipse/jdt/internal/compiler/parser/parser15.rsc
SHA-256-Digest: ghyjkS9Q1foTSJJZHjMtHRImRHwNUvClJ+zRhI+v3iI=

Name: org/eclipse/jdt/internal/compiler/apt/model/AnnotationMemberValue.
java
SHA-256-Digest: cGkypXJUDL8A6+kCxkh7DXC6EVcUjHDR/Sf0TxuqRDM=

Name: org/eclipse/jdt/internal/compiler/parser/unicode13/start3.rsc
SHA-256-Digest: nHNAbc9aOhg9dYfogYtYQUPxeQRCRmT2tvOA3Xu9ZfI=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredLocalVariable.ja
va

SHA-256-Digest: dk3ndRTo9+UuHe5Vnxe6EHJHTA0kBR4knmVuKH9H5go=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6_2/start2.rsc
SHA-256-Digest: cENGbHGTfBx4FTJBMY3gopEj6ecVPCCOSVDuhhj8H8M=

Name: META-INF/eclipse.inf
SHA-256-Digest: FSHTa647gYSOCplUfiJTfpKBbRzo9EcInHKafP6qYVg=

Name:
 org/eclipse/jdt/internal/compiler/ast/SwitchStatement.java
SHA-256-Digest: 1Ifbu0cipdC3FSY+2vAaCi+8+yhFrqfF6xhOQmMia0E=

Name: org/eclipse/jdt/internal/compiler/util/HashtableOfIntValues.java
SHA-256-Digest: 6dwQadGjgBB4gScfIjgzkCpJvhxDdQg5ffajIM9Cq6A=

Name: org/eclipse/jdt/internal/compiler/apt/dispatch/BatchMessagerImpl.j
ava
SHA-256-Digest: 1bRtJAYbhSz9mrpJQP3RmwRJt3Toor7F6Ki50AagFF4=

Name: org/eclipse/jdt/internal/compiler/env/IBinaryMethod.java
SHA-256-Digest: fTdIF7qh3SE1DrY3W0ONAteMK3E8cafbW8A6NJNVrAY=

Name: org/eclipse/jdt/internal/compiler/apt/model/ModuleElementImpl.java
SHA-256-Digest: 5qR6r6lDoaorj/wO2RtNwUzsaov1LIprS+W/XvHfr/A=

Name: org/eclipse/jdt/internal/compiler/ast/ForStatement.java
SHA-256-Digest: LnuSoAuJdIJxaSYaa9O/hso1MNRt2KETRig2pR4YCqY=

Name: org/eclipse/jdt/internal/compiler/lookup/IntersectionTypeBinding18
.java
SHA-256-Digest: GBT6XfW9M49xxJ2vFB5cGQCwq3mn+X2HbiBNgK5dx8g=

Name: org/eclipse/jdt/internal/compiler/lookup/ProblemReferenceBinding.j
 ava
SHA-256-Digest: HOfQkUAc/QMM6aZXxkaK5aF9lYb6CDhEYugS5dYVWBQ=

Name: org/eclipse/jdt/internal/compiler/apt/model/IElementInfo.java
SHA-256-Digest: 8D5jjiL8JzToxy0m1qB7FvzDcizll57zoZrXxRScYrg=

Name: org/eclipse/jdt/internal/compiler/env/AccessRule.java
SHA-256-Digest: jeqzcCzHE3VffRuDpdEfOKT9+4gH+bjGtEjOeDg1B5A=

Name: org/eclipse/jdt/internal/compiler/codegen/VerificationTypeInfo.jav
a
SHA-256-Digest: VEMoMn8QoDROtJZiHiy2Jl/zzfRCFu1IYdPiUdm+SQs=

Name: org/eclipse/jdt/internal/compiler/env/INameEnvironment.java
SHA-256-Digest: FrlJZFLCoKx2ug3S+eH0yBTRXV0a4RXoBlI6mf51uQM=

Name: org/eclipse/jdt/internal/compiler/env/PackageExportImpl.java
SHA-256-Digest: k9OgwgGHKvOFH6B0GdIS5yeS0Ka4Qq6+mPYz3fpk4JQ=

Name: org/eclipse/jdt/internal/compiler/tool/EclipseDiagnostic.java
SHA-256-Digest: 024rApaMf/6p1SMAwr4nktVrXIRMa9SpJv8t/i0gBhQ=

Name: org/eclipse/jdt/internal/compiler/ReadManager.java
SHA-256-Digest: FwvM+S9gVK6HBiNzrX6LdIdnr7757HNWl2GNDr6XV0Y=

Name: org/eclipse/jdt/internal/compiler/parser/unicode10/start0.rsc
SHA-256-Digest:
psMHK8mTblYBTX+0mJ45ANepvjVGZ6tFktKIeR7cUog=

Name: org/eclipse/jdt/internal/compiler/lookup/ImportConflictBinding.jav
a
SHA-256-Digest: V1jafQSx3HpzeMTEndct0FdFDDlkjQ9Q91PnnLzOiJE=

Name: org/eclipse/jdt/internal/compiler/parser/parser11.rsc
SHA-256-Digest: WyvknKbQk9zw2+5GeCawciEmpsseejbvUMYyOGPkMvk=

Name: org/eclipse/jdt/internal/compiler/ast/Statement.java
SHA-256-Digest: fZLXiyAXWu/nqVfvkuBaRwTLABmVmzso3tgYch98+mo=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredStatement.java
SHA-256-Digest: Gf3GV9PwxoamEWF83Coy8wDA/idPVdWsGOksCkmgW7c=

Name: org/eclipse/jdt/internal/compiler/util/SortedCharArrays.java
SHA-256-Digest: DamW2gKP4XVy2IEtIIe3emFxoDKT00T3Imp0+ZF15tU=

Name: org/eclipse/jdt/internal/compiler/parser/unicode7/part14.rsc
SHA-256-Digest: zAkaPM3Ejlgf1/HENfa61QhvcZlyZlZ7dZsXWDNsizs=

Name: org/eclipse/jdt/internal/compiler/apt/dispatch/BaseAnnotationProce
ssorManager.java
SHA-256-Digest: oPZoxJMwJw1frk46M/fZB0p1eR5X+TE/qzKUB4AH6SE=

Name:
org/eclipse/jdt/internal/compiler/lookup/ExtendedTagBits.java
SHA-256-Digest: ZPhWXNMs8AG3pZ0ejwSdmNSwJfW0HHSbqJq7QO1JxkY=

Name: org/eclipse/jdt/internal/compiler/ast/Receiver.java
SHA-256-Digest: vvQgwHjwKvIyNnjMejmWHxtDJY6bC7UhmV4pUysxGfY=

Name: org/eclipse/jdt/internal/compiler/lookup/BoundSet.java
SHA-256-Digest: 9EyWWrn7fo4vP/hE9aixGLEPOvcS4glBT4NVpw7ezE0=

Name: org/eclipse/jdt/internal/compiler/codegen/StackMapFrameCodeStream.

java
SHA-256-Digest: NHW9DnYu5J+jrXeIzCMQBYDfwYxCEiRUt2oqU6C4oCk=

Name: org/eclipse/jdt/internal/compiler/parser/parser6.rsc
SHA-256-Digest: 6YTlmw+cz/jNtwZeFFqHmKe9lS1P0g4LxATDhMP2o7I=

Name: org/eclipse/jdt/internal/compiler/ast/TypeReference.java
SHA-256-Digest: mS4l1eOv8t7d/J5AwTWw7AtOQqxq0W9zjS0UGSi/drM=

Name: org/eclipse/jdt/internal/compiler/lookup/ConstraintFormula.java
SHA-256-Digest: Enp0WKoAbai6N0wlk405InG/2bxBp6UdKapWFE/+r/0=

Name: org/eclipse/jdt/internal/compiler/lookup/RecordComponentBinding.ja
va
SHA-256-Digest: D8MmXJ84OcnavgOq87nu9zLlREAIQn6zakwYDIAglWw=

Name: org/eclipse/jdt/internal/compiler/apt/model/ElementsImpl.java
SHA-256-Digest: L+M6HRP6LrarvMfHKkB15WXiiYyv5dxMJZKXJqM300Y=

Name: org/eclipse/jdt/internal/compiler/lookup/SyntheticMethodBinding.ja
va
SHA-256-Digest: neFj2D8tZNKSyh4IjUw5+thegItMFU0JetuzV9gp8fw=

Name: org/eclipse/jdt/internal/compiler/ast/IntLiteralMinValue.java
SHA-256-Digest: NERL/4h45mIbKGaF8tR7oYUcu8KGZnPMaNRnxhSm97o=

Name: org/eclipse/jdt/internal/compiler/parser/parser2.rsc
SHA-256-Digest: gxVg5Co0TQ+6j3PKsKNEmgFN6xmC9nIlSjEityVezo8=

Name: org/eclipse/jdt/internal/compiler/ast/RecordComponent.java
SHA-256-Digest: 3zE8hv6vl2tuTK3Rg2p6+xH6fSz279PcgjFnWgD3NII=

Name: org/eclipse/jdt/internal/compiler/ast/LongLiteral.java
SHA-256-Digest: fR00peXlTsV8np71h4Hb4sXCbpqPzmq0hB/e+BHqikk=

Name: org/eclipse/jdt/internal/compiler/parser/unicode/part14.rsc
SHA-256-Digest: zAkaPM3Ejlgf1/HENfa61QhvcZlyZlZ7dZsXWDNsizs=

Name: org/eclipse/jdt/internal/compiler/flow/InsideSubRoutineFlowContext
.java
SHA-256-Digest: RGHEpQREfqoq9lR/Ar8VFy8pjXg2ReAOILoCEwIQQUk=

Name: org/eclipse/jdt/internal/compiler/parser/unicode8/start0.rsc
SHA-256-Digest: qX3cYK0m+s1NTlMWuyEA24QHHUH+zUca9aXLmJIw30k=

Name: org/eclipse/jdt/internal/compiler/ast/AbstractVariableDeclaration.
java
SHA-256-Digest: mTA4k9q5NuDmFgg4xHjAKrV3AhfZwpHldFqfjiRVHZs=

Name: org/eclipse/jdt/internal/compiler/tool/Archive.java
SHA-256-Digest: frVZZOU4zZRb/aBYR/Pl47nNW0mdgAZMuXUm4tjq5MQ=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredRequiresStatemen
t.java
SHA-256-Digest: leNy9x8oasr3u39mD94f+7oSwL8iRO0k10Y34e27Hqc=

Name: org/eclipse/jdt/internal/compiler/parser/ConflictedParser.java
SHA-256-Digest: 5V08hMZ9mnZj3p8gsD4NiX0RLbenOKB0Bjy00eghG7c=

Name: org/eclipse/jdt/internal/compiler/parser/unicode12_1/start0.rsc
SHA-256-Digest: Dp2OYjHt5Nd4lu/vixXww2Ukb950nmOURkjDR3gMPY0=

Name: org/eclipse/jdt/core/compiler/InvalidInputException.java
SHA-256-Digest: JbK1gLxkAy+WZbP5SKHvlOVyt39rxOSFq770hudHJwg=

Name:
 org/eclipse/jdt/internal/compiler/codegen/FloatCache.java
SHA-256-Digest: 46X6UtOOfXbrjnSMpNvMSP08ZmA1zxZMdphFEIPKTCE=

Name: org/eclipse/jdt/internal/compiler/flow/ExceptionInferenceFlowConte
xt.java
SHA-256-Digest: SGRfrm181aUiAjlSPEprRqjmmZ5noMmdfaRUwY6+DOY=

Name: org/eclipse/jdt/internal/compiler/impl/Constant.java
SHA-256-Digest: d0dQuOxO9WKI4pupuERC8nud9TovCb1DbJj0I+lHf6E=

Name: org/eclipse/jdt/internal/compiler/IDebugRequestor.java
SHA-256-Digest: 59fw/shIZJtfQio8sg8R52Ak1oH+zQuoGJIcH+zZ3mo=

Name: org/eclipse/jdt/internal/compiler/CompilationResult.java
SHA-256-Digest: wgSZuH7UkPN+VIJJzWcDy1En631VqFTk5Gu7V/r5CqQ=

Name: org/eclipse/jdt/internal/compiler/ast/SwitchExpression.java
SHA-256-Digest: h+0wg163y0pK6CHbGpgu1/kgnSgcsntPJiXW14YBn84=

Name: org/eclipse/jdt/internal/compiler/classfmt/MethodInfo.java
SHA-256-Digest: ZbSVqezDLMN1LvLTz6+l+E7pKWg3xZabrJ0MJv9NI5E=

Name: org/eclipse/jdt/internal/compiler/ast/LabeledStatement.java
SHA-256-Digest:
 3bQAAOy+YZX4AxzrIPgn+OKHy9hCuK5JYTI0CIM3Tvc=

Name: org/eclipse/jdt/internal/compiler/flow/FlowInfo.java
SHA-256-Digest: i0wM1gYfhIC4oqq6PINMKI7bQUDNn5FuOi5QCEqxclw=

Name: org/eclipse/jdt/internal/compiler/apt/model/TypeVariableImpl.java

SHA-256-Digest: frCtUqom4Spi0/K3Zb0wx4rZL7a2Uz4t6OAU5Cblt5A=

Name: org/eclipse/jdt/internal/compiler/lookup/ConstraintExceptionFormul
a.java
SHA-256-Digest: +vWwQMrOqGPW9fPuJvDzfc1his10bY6eC4dpqQJEQf4=

Name: org/eclipse/jdt/internal/compiler/ast/ExpressionContext.java
SHA-256-Digest: fZF8Q711Y9Hd5+bozlARoQLu82c/NRqb+QsXfGgxbHU=

Name: org/eclipse/jdt/internal/compiler/parser/unicode12_1/part2.rsc
SHA-256-Digest: 04VMyR2oGLNoJWK6xYvZv3gPXGxYB6RpHuNdBUBuFAo=

Name: org/eclipse/jdt/internal/compiler/util/SimpleSet.java
SHA-256-Digest: DtiVe2TP5NvpqXI9uOz4IqTn2Z+W35e/xk2ow+3/YIU=

Name: org/eclipse/jdt/internal/compiler/IProblemFactory.java
SHA-256-Digest: EJaAEM7QHeAPmfAsbezjERjJZtCo0giRhr4Px28VfbI=

Name: org/eclipse/jdt/internal/compiler/ast/GuardedPattern.java
SHA-256-Digest:
rgbWd4Q5Iu2qREzjUNBjbqEDLj1Gdojdasoh6NC5cEE=

Name: org/eclipse/jdt/internal/compiler/ast/JavadocMessageSend.java
SHA-256-Digest: Ewz5eYk51IGbve1Nq41zb7bwn6mO7oPhmbjgLtzWQvI=

Name: org/eclipse/jdt/internal/compiler/env/IModule.java
SHA-256-Digest: amebm5xVRycmkVhDYwf0LKUzSr0lw1rEXHh2UEJl4nU=

Name: org/eclipse/jdt/internal/compiler/batch/FileSystem.java
SHA-256-Digest: duG/z0izvMh/r4fsWclI3h6hM0jRB3mmvSTO1i6icAI=

Name: org/eclipse/jdt/internal/compiler/lookup/InvocationSite.java
SHA-256-Digest: 5mLua8L7Q3Ag0ho+JDVoKHZ+Fde5JwTI3AJxl0zY1Ug=

Name: org/eclipse/jdt/internal/compiler/lookup/MissingTypeBinding.java
SHA-256-Digest: Chy0yHtWU050QUy6yb2DLzQPcOrz7K0ro41w9NIbGpQ=

Name: org/eclipse/jdt/internal/compiler/batch/ClasspathJep247Jdk12.java
SHA-256-Digest: jiEJMFhVQEyqheYMCV/etIMkpCcJr7hvsQbpY17qllo=

Name: org/eclipse/jdt/internal/compiler/apt/model/PrimitiveTypeImpl.java
SHA-256-Digest: u9M4VlT77uqAb/PafQLSAjCyCemUAHx3JcDdL/TJtnQ=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6/start1.rsc
SHA-256-Digest:
qJnkmI8sEfaYA+EPRMfPF14J0Tk152ZFHTIS5UVg43I=

Name: org/eclipse/jdt/internal/compiler/classfmt/ClassFileConstants.java

SHA-256-Digest: WOVkM7Dlu1c05Wy5EBXG7bll73Nz+qlcOyHkigeUAcc=

Name: org/eclipse/jdt/internal/compiler/env/IBinaryModule.java
SHA-256-Digest: NnMeZZ96j98PXOVU7oob9BZPE3mQzvm3TrdtGsQYVUc=

Name: org/eclipse/jdt/internal/compiler/apt/dispatch/BatchFilerImpl.java
SHA-256-Digest: cNK9LMYiC+sLCJEjWcqRMvdAiMBlN/upO4KGI22D3gE=

Name: org/eclipse/jdt/internal/compiler/ast/TypeParameter.java
SHA-256-Digest: 7UoPRqLjFSB7cYFJYeqznekCWT/UzlrsG0bmWVeopG4=

Name: org/eclipse/jdt/internal/compiler/lookup/ProblemPackageBinding.jav
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SHA-256-Digest: af2SsWizYF7y9Gjygc2sBBvKrdgZpcq+NAoi5FaQ78A=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredImport.java
SHA-256-Digest: IH2JGNeo1/6KvKmf9IyUh/14N/XIelF2aqVIV+JFeUY=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6_2/part2.rsc
SHA-256-Digest: cENGbHGTfBx4FTJBMY3gopEj6ecVPCCOSVDuhhj8H8M=

Name:
 org/eclipse/jdt/internal/compiler/lookup/ParameterNonNullDefaultPr
ovider.java
SHA-256-Digest: DWR2Du9YhAodn8AFR8mkr9IlMdBWwQzfy2ZkMFeiejc=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredExport.java
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Name: org/eclipse/jdt/internal/compiler/lookup/PlainPackageBinding.java
SHA-256-Digest: 8ObDfjCNj3Yl9QHAM5E6pM0cvk6Ji3b2Th+sDwPWvuI=

Name: org/eclipse/jdt/internal/compiler/lookup/TypeVariableBinding.java
SHA-256-Digest: r/IOXbMEqMhBo5mQJu7Jy+njdxURT12XHw2ALhHvDVk=

Name: org/eclipse/jdt/core/compiler/batch/BatchCompiler.java
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Name: org/eclipse/jdt/internal/compiler/util/HashtableOfObject.java
SHA-256-Digest: sZzPcE75LnkarFzX9YLqrej+Etzb6Q7T86mrma/Rn6o=

Name: org/eclipse/jdt/internal/compiler/ast/Annotation.java
SHA-256-Digest: gFswuYWx1MuMgivLI1W4sFx7fEBD2ykHlVybbzNL7HM=

Name: org/eclipse/jdt/internal/compiler/util/HashtableOfObjectToInt.java
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Name: org/eclipse/jdt/internal/compiler/util/Messages.java
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Name: org/eclipse/jdt/internal/compiler/env/IBinaryTypeAnnotation.java
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SHA-256-Digest: dch7I8fQzUK76JjwsvSoGfwtYYxX5Dh163sHI0hmHJM=

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Name: org/eclipse/jdt/internal/compiler/impl/StringConstant.java
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Name: org/eclipse/jdt/internal/compiler/ast/FunctionalExpression.java
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SHA-256-Digest: n4AMfq30Puh0Q67yv+zNx6F+dGPhOsUBVu0bHab4tO4=

Name: org/eclipse/jdt/internal/compiler/ClassFile.java
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Name: org/eclipse/jdt/internal/compiler/lookup/InferenceFailureException
.java
SHA-256-Digest: gbfCtZJuhu6ju12brtcRgGT/xs8GaB9restNbLLnNJc=

Name: org/eclipse/jdt/internal/compiler/ast/FakedTrackingVariable.java
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java
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Name: org/eclipse/jdt/internal/compiler/flow/LoopingFlowContext.java
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Name: org/eclipse/jdt/internal/compiler/ast/CompoundAssignment.java
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g.java
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org/eclipse/jdt/internal/compiler/codegen/MultiCatchExceptionLabel
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SHA-256-Digest: YfiOtbEGzSndIkzVakEh6J3uMI46M/kyS8EmqW/22S0=

Name: org/eclipse/jdt/internal/compiler/env/IBinaryAnnotation.java
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Name: org/eclipse/jdt/internal/compiler/ast/JavadocArraySingleTypeRefere
nce.java
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Name: org/eclipse/jdt/core/compiler/package.html
SHA-256-Digest: yFY1vSH16uC15ePwo+UvSIEEQQeJiqoDeMJPd+19WNo=

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ding.java
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Name: org/eclipse/jdt/internal/compiler/lookup/TypeIds.java
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Name: org/eclipse/jdt/internal/compiler/ast/StringLiteral.java
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Name: org/eclipse/jdt/internal/compiler/ast/Block.java
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Name: org/eclipse/jdt/internal/compiler/ast/PackageVisibilityStatement.j
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SHA-256-Digest: yxKwdbKF0C/m7O5HmR028i5eVcG4fxhOb8VWUKcnlJQ=

Name: org/eclipse/jdt/internal/compiler/lookup/SourceTypeCollisionExcept
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Name: org/eclipse/jdt/internal/compiler/apt/dispatch/AptProblem.java
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Name: org/eclipse/jdt/internal/compiler/lookup/AnnotatableTypeSystem.jav
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Name: org/eclipse/jdt/internal/compiler/util/HashtableOfObjectToIntArray
.java
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Name: about.html

SHA-256-Digest: 7mbS+ztMDS7S5/aYvJ7U49bPd/pcr0CtAylhJdsaxfA=

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Name: org/eclipse/jdt/internal/compiler/util/CharArrayMapper.java
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Name: org/eclipse/jdt/internal/compiler/apt/model/TypesImpl.java
SHA-256-Digest: PHnVux5SZ7Jc6FV6x/D6L1/WXAw/vDdfdjOjex5dgbM=

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SHA-256-Digest: +3SHBAIAnL2jDSxRtMZCVNrDMEIJvqdEGQkmteMzbrE=

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/TerminalTokens.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/AbstractCommentParser.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/ParserBasicInformation.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/ClassFormatException.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/diagnose/DiagnoseParser.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/JavadocMessageSend.java
*
 /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ProblemPackageBinding.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/QualifiedTypeReference.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/HashtableOfPackage.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/core/compiler/CategorizedProblem.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/ConflictedParser.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/JavadocAllocationExpression.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/BranchStatement.java
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* Contributors:
*  Stephan Herrmann - initial API and implementation
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*  IBM Corporation - initial API and implementation
*  Tom Tromey - patch for readTable(String) as described in http://bugs.eclipse.org/bugs/show_bug.cgi?id=32196
*  Stephan Herrmann - Contributions for
*  bug 366003 - CCE in ASTNode.resolveAnnotations(ASTNode.java:639)
*  bug 374605 - Unreasonable warning for enum-based switch statements
*  bug 393719 - [compiler] inconsistent warnings on iteration variables
*  bug 382353 - [1.8][compiler] Implementation property modifiers
 should be accepted on default methods.
*  bug 383973 - [1.8][compiler] syntax recovery in the presence of default methods
*  bug 401035 - [1.8] A few tests have started failing recently
*  Jesper S Moller - Contributions for
*  bug 382701 - [1.8][compiler] Implement semantic analysis of Lambda expressions & Reference expression
*  bug 399695 - [1.8][compiler] [1.8][compiler] migrate parser to other syntax for default methods
*  bug 384567 - [1.5][compiler] Compiler accepts illegal modifiers on package declaration
*  bug 393192 - Incomplete type hierarchy with > 10 annotations
*  bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
*  Andy Clement - Contributions for
*  Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's work)
*  Bug 409250 - [1.8][compiler] Various loose ends in 308 code generation
*
 Bug 415821 - [1.8][compiler] CLASS_EXTENDS target type annotation missing for anonymous classes
**********/

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* Contributors:
*  IBM Corporation - initial API and implementation
*  Stephen Herrmann <stephan@cs.tu-berlin.de> -  Contributions for
*  bug 133125 - [compiler][null] need to report the null status of expressions and analyze them simultaneously
*  bug 292478 - Report potentially null across variable assignment
*  bug 324178 - [null] ConditionalExpression.nullStatus(..) doesn't take into account the analysis of condition itself
*  bug 354554 - [null] conditional with redundant condition
yields weak error message
*  bug 349326 - [1.7] new warning for missing try-with-resources
*  bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*  bug 383368 - [compiler][null] syntactic null analysis for field references
*  bug 400761 - [compiler][null] null may be return as boolean without a diagnostic
*  Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*  Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*  Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*  Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*  Bug 426078 - [1.8] VerifyError when conditional expression passed as an argument
*  Bug 427438 - [1.8][compiler] NPE at
org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*  Bug 418537 - [1.8][null] Fix null type annotation analysis for poly conditional expressions
*  Bug 428352 - [1.8][compiler] Resolution errors don't always surface
*  Bug 407414 - [compiler][null] Incorrect warning on a primitive type being null
**********/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ConditionalExpression.java
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* Contributors:
*  Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*  Bug 407191 - [1.8] Binary access support for type annotations
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* Contributors:
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*  Bug 440477 - [null] Infrastructure for feeding external annotations into compilation
*  Bug 440687 - [compiler][batch][null] improve command line option for external annotations
**********/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/batch/ClasspathJar.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/batch/FileFinder.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/MemberTypeBinding.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredInitializer.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/SuffixConstants.java
*
 /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/problem/ProblemSeverities.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/SourceTypeCollisionException.java
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* Contributors:
*  wharley@bea.com - initial API and implementation
*  IBM Corporation - Fix for bug 341494
*  IBM Corporation - Fix for bug 328575
*  IBM Corporation - Java 8 support
**********/

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```
*       bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/BaseTypeBinding.java
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*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*       bug 383368 - [compiler][null] syntactic null analysis for field references
*       bug 402993 - [null] Follow up of bug 401088: Missing warning about redundant null check
*     Jesper S Moller - Contributions for
*       bug 382721 - [1.8][compiler] Effectively final variables needs special treatment
 *******************************************************************************/
```

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/CompoundAssignment.java
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*     Stephan Herrmann - Contributions for
*       bug 186342 - [compiler][null] Using annotations for null checking
```

*	bug 365519 - editorial cleanup after bug 186342 and bug 365387
*	Bug 434570 - Generic type mismatch for parametrized class annotation attribute with inner class
**********/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/MemberValuePair.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/flow/FieldInitsFakingFlowContext.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/AnnotationMethodInfoWithTypeAnnotations.java
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*	bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*	bug 383368 - [compiler][null] syntactic null analysis for field references
*	bug 403086 - [compiler][null] include the effect of 'assert' in syntactic null analysis for fields
*	bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred checking
*	Bug

422796 - [compiler][null] boxed boolean reported as potentially null after null test in lazy disjunction
**********/

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*  bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*  bug 349326 - [1.7] new warning for missing try-with-resources
*  bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*  bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred checking
*  Bug 415790
 - [compiler][resource]Incorrect potential resource leak warning in for loop with close in try/catch
**********/

Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/WhileStatement.java
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*         Bug 473178
*     IBM Corporation - Bug fixes
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*     Erling Ellingsen -  patch for bug 125570
*     Stephan Herrmann - Contribution for
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*       Bug 434570 - Generic type mismatch for parametrized class annotation attribute with inner class
*     Sebastian Zarnekow - Contribution for
*       Bug 544921 - [performance] Poor performance with large source files
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*
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*       bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*       bug 370639 - [compiler][resource] restore the default for resource leak warnings
*       bug 388996 - [compiler][resource] Incorrect 'potential resource leak'
*       Bug 417758 - [1.8][null] Null safety compromise during array creation.
*       Bug 427438 - [1.8][compiler] NPE at
 org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*       Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*       Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                       Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
work)
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*           bug 282152 - [1.5][compiler] Generics code rejected by Eclipse but accepted by javac
*           bug 349326 - [1.7] new warning for missing try-with-resources
*           bug 359362 - FUP of bug 349326: Resource leak on non-Closeable resource
*       bug 358903 - Filter practically unimportant resource leak warnings
*       bug 395002 - Self bound generic class
 doesn't resolve bounds properly for wildcards for certain parametrisation.
*       bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
*       Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 426792 - [1.8][inference][impl] generify new type inference engine
*       Bug 428019 - [1.8][compiler] Type inference failure with nested generic invocation.
*       Bug 429384 - [1.8][null] implement conformance rules for null-annotated lower / upper type bounds
*       Bug 431269 - [1.8][compiler][null] StackOverflow in nullAnnotatedReadableName
*       Bug 431408 - Java 8 (1.8) generics bug
```

```
*       Bug 435962 - [RC2] StackOverFlowError when building
*       Bug
 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
*       Bug 438250 - [1.8][null] NPE trying to report bogus null annotation conflict
*       Bug 438179 - [1.8][null] 'Contradictory null annotations' error on type variable with explicit null-annotation.
*       Bug 440143 - [1.8][null] one more case of contradictory null annotations regarding type variables
*       Bug 440759 - [1.8][null] @NonNullByDefault should never affect wildcards and uses of a type variable
*       Bug 441693 - [1.8][null] Bogus warning for type argument annotated with @NonNull
*       Bug 456497 - [1.8][null] during inference nullness from target type is lost against weaker hint from applicability
analysis
*       Bug 456459 - Discrepancy between Eclipse compiler and javac - Enums, interfaces, and generics
*       Bug 456487 - [1.8][null] @Nullable type variant of @NonNull-constrained type parameter causes grief
*       Bug 462790 - [null] NPE in Expression.computeConversion()
 *       Bug 456532 - [1.8][null] ReferenceBinding.appendNullAnnotation() includes phantom annotations in error
messages
*     Jesper S Møller <jesper@selskabet.org>  - Contributions for bug 381345 : [1.8] Take care of the Java 8 major
version
*       Bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
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*       Bug 423504 - [1.8] Implement "18.5.3 Functional Interface Parameterization Inference"
*       Bug 426676 - [1.8][compiler] Wrong generic method type inferred from lambda expression
*       Bug 426542 - [1.8] Most specific method not picked when one method has intersection type as type parameter
*       Bug 428019 - [1.8][compiler] Type inference failure with nested generic invocation.
*     Andy
 Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                       Bug 405104 - [1.8][compiler][codegen] Implement support for serializeable lambdas
*     Jesper S Møller - Contributions for bug 381345 : [1.8] Take care of the Java 8 major version
*                       Bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
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*     Stephan Herrmann - Contributions for
*        bug 186342 - [compiler][null] Using annotations for null checking
*        bug 331649 - [compiler][null] consider null annotations for fields
*        bug 383368 - [compiler][null] syntactic null analysis for field references
*        bug 382069 - [null] Make the null analysis consider JUnit's assertNotNull similarly to assertions
*        bug 403086 - [compiler][null] include the effect of 'assert'
 in syntactic null analysis for fields
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/apt/model/TypeMirrorImpl.java

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*     Stephan Herrmann - contributions for
*          bug 337868 - [compiler][model] incomplete support for package-info.java when using SearchableEnvironment
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 365531 - [compiler][null] investigate alternative strategy for internally encoding nullness defaults
*       bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       bug
 392862 - [1.8][compiler][null] Evaluate null annotations on array types
*       bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 415291 - [1.8][null] differentiate type incompatibilities due to null annotations
*       Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*       Bug 415850 - [1.8] Ensure RunJDTCoreTests can cope with null annotations enabled
*       Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*       Bug 416183 - [1.8][compiler][null] Overload resolution fails with null annotations
*       Bug 416307 - [1.8][compiler][null] subclass with type parameter substitution confuses null checking
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 416190 - [1.8][null]
 detect incompatible overrides due to null type annotations
*       Bug 424624 - [1.8][null] if a static-object with annotation @NonNull is used, a warning is shown
*       Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
*       Bug 439516 - [1.8][null] NonNullByDefault wrongly applied to implicit type bound of binary type
*       Bug 434602 - Possible error with inferred null annotations leading to contradictory null annotations
*       Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*       Bug 453475 - [1.8][null] Contradictory null annotations (4.5 M3 edition)
*       Bug 457079 - Regression: type inference
*       Bug 440477 - [null] Infrastructure for feeding external annotations into compilation
*       Bug 455180 - IllegalStateException in AnnotatableTypeSystem.getRawType
*       Bug 470467 - [null] Nullness of special Enum methods not detected from .class file
 *******************************************************************************/
```

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*  Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*  Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's work)
*******************************************************************************/

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*  bug 349326 - [1.7] new warning for missing try-with-resources
*  bug 186342 - [compiler][null] Using annotations for null checking
*  bug 365519 - editorial cleanup after bug 186342 and bug 365387
*  bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*  bug 382353 - [1.8][compiler] Implementation property modifiers should be accepted on default methods.
*  bug 383368 - [compiler][null] syntactic null analysis for field references
*  Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*  Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*  Bug 416176 - [1.8][compiler][null] null type annotations cause grief on type variables
*  Bug 438012 - [1.8][null] Bogus Warning: The nullness annotation is redundant with a default that applies to this location
*  Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*  Bug 466713 - Null Annotations: NullPointerException using <int @Nullable []> as Type Param

```
*     Jesper S Moller <jesper@selskabet.org> - Contributions for
*       bug 378674 - "The method can be declared as static" is wrong
*                          bug 413873 - Warning "Method can be static" on method referencing a non-static
 inner class
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* Contributors:
*    wharley@bea.com - initial API and implementation
*    IBM Corporation - fix for 342598
*    IBM Corporation - Java 8 support
*    het@google.com - Bug 427943 - The method
org.eclipse.jdt.internal.compiler.apt.model.Factory.getPrimitiveType does not throw IllegalArgumentException
*******************************************************************************/
```

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*     Benjamin Muskalla - Contribution for bug 239066
*     Stephan Herrmann  - Contributions for
*          bug 236385 - [compiler] Warn for potential programming problem if an object is created but not used
*          bug 338303 - Warning about Redundant assignment conflicts with definite assignment
```

* bug 349326 - [1.7] new warning for missing try-with-resources
* bug 186342 - [compiler][null] Using annotations for null checking
* bug 365519 - editorial cleanup after bug 186342 and bug 365387
* bug 365662 - [compiler][null] warn on contradictory and redundant null annotations
* bug 365531 - [compiler][null] investigate alternative strategy for internally encoding nullness defaults
* bug 365859 - [compiler][null] distinguish warnings based on flow analysis vs. null annotations
* bug 374605 - Unreasonable warning for enum-based switch statements
* bug 382353 - [1.8][compiler] Implementation property modifiers should be accepted on default methods.
* bug 382347 - [1.8][compiler] Compiler accepts incorrect default method inheritance
* bug 388281 - [compiler][null] inheritance of null annotations as an option
* bug 376053 - [compiler][resource] Strange potential resource leak problems
* bug 381443 - [compiler][null] Allow parameter widening from @NonNull to unannotated
* bug 393719 - [compiler] inconsistent warnings on iteration
variables
* bug 392862 - [1.8][compiler][null] Evaluate null annotations on array types
* bug 388739 - [1.8][compiler] consider default methods when detecting whether a class needs to be declared abstract
* bug 331649 - [compiler][null] consider null annotations for fields
* bug 382789 - [compiler][null] warn when syntactically-nonnull expression is compared against null
* bug 376590 - Private fields with @Inject are ignored by unused field validation
* bug 400761 - [compiler][null] null may be return as boolean without a diagnostic
* bug 402028 - [1.8][compiler] null analysis for reference expressions
* bug 401796 - [1.8][compiler] don't treat default methods as overriding an independent inherited abstract method
* bug 404649 - [1.8][compiler] detect illegal reference to indirect or redundant super
* bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
* Bug
392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
* Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
* Bug 415291 - [1.8][null] differentiate type incompatibilities due to null annotations
* Bug 415850 - [1.8] Ensure RunJDTCoreTests can cope with null annotations enabled
* Bug 414380 - [compiler][internal] QualifiedNameReference#indexOfFirstFieldBinding does not point to the first field
* Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
* Bug 416307 - [1.8][compiler][null] subclass with type parameter substitution confuses null checking
* Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
* Bug 424637 - [1.8][compiler][null] AIOOB in ReferenceExpression.resolveType with a method reference to Files::walk
* Bug 428294 - [1.8][compiler] Type mismatch: cannot convert
from List<Object> to Collection<Object[]>
* Bug 428366 - [1.8] [compiler] The method valueAt(ObservableList<Object>, int) is ambiguous for the type Bindings
* Bug 416190 - [1.8][null] detect incompatible overrides due to null type annotations
* Bug 392245 - [1.8][compiler][null] Define whether / how @NonNullByDefault applies to TYPE_USE locations
* Bug 390889 - [1.8][compiler] Evaluate options to support 1.7- projects against 1.8 JRE.
* Bug 430150 - [1.8][null] stricter checking against type variables
* Bug 434600 - Incorrect null analysis error reporting on type parameters
* Bug 439516 - [1.8][null] NonNullByDefault wrongly applied to implicit type bound of binary type
* Bug 438467 - [compiler][null] Better error position for "The method _ cannot implement the corresponding

method _ due to incompatible nullness constraints"
*	Bug 439298 - [null] "Missing code implementation in the compiler" when using @NonNullByDefault
 in package-info.java
*	Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*	Bug 446442 - [1.8] merge null annotations from super methods
*	Bug 455723 - Nonnull argument not correctly inferred in loop
*	Bug 458361 - [1.8][null] reconciler throws NPE in ProblemReporter.illegalReturnRedefinition()
*	Bug 459967 - [null] compiler should know about nullness of special methods like MyEnum.valueOf()
*	Bug 461878 - [1.7][1.8][compiler][null] ECJ compiler does not allow to use null annotations on annotations
*	Bug 410218 - Optional warning for arguments of "unexpected" types to Map#get(Object),
Collection#remove(Object) et al.
*	Jesper S Moller <jesper@selskabet.org> -  Contributions for
*	bug 382701 - [1.8][compiler] Implement semantic analysis of Lambda expressions & Reference expression
*	bug 382721 - [1.8][compiler] Effectively final variables needs
 special treatment
*	bug 384567 - [1.5][compiler] Compiler accepts illegal modifiers on package declaration
*	bug 412153 - [1.8][compiler] Check validity of annotations which may be repeatable
*	bug 412151 - [1.8][compiler] Check repeating annotation's collection type
*	bug 419209 - [1.8] Repeating container annotations should be rejected in the presence of annotation it contains
*	Bug 429384 - [1.8][null] implement conformance rules for null-annotated lower / upper type bounds
*	Bug 416182 - [1.8][compiler][null] Contradictory null annotations not rejected
*	bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
*	Ulrich Grave <ulrich.grave@gmx.de> - Contributions for
*	bug 386692 - Missing "unused" warning on "autowired" fields
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/HashSetOfInt.java

* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/CharArrayCache.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/ObjectVector.java
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 /ecj-3-33-0-sources-jar/org/eclipse/jdt/core/compiler/InvalidInputException.java
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*  Stephan Herrmann - Contribution for
*       bug 400710 - [1.8][compiler] synthetic access to default method generates wrong code
*       Bug 459967 - [null] compiler should know about nullness of special methods like MyEnum.valueOf()
*       Bug 470467 - [null] Nullness of special Enum methods not detected from .class file
*      Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                      Bug 405104 -
 [1.8][compiler][codegen] Implement support for serializeable lambdas
*******************************************************************************/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/SyntheticMethodBinding.java

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* Contributors:
*     IBM Corporation - initial API and implementation
*     Carmi Grushko - Bug 465048 - Binding is null for class literals in synchronized blocks
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*     IBM Corporation - initial API and implementation
*     Stephan Herrmann <stephan@cs.tu-berlin.de> - Contributions for
*       bug 292478 - Report potentially null across variable assignment,
*       bug 185682 - Increment/decrement operators mark local variables as read
*       bug 331649 - [compiler][null] consider null annotations for fields
*       bug 383368 - [compiler][null] syntactic null analysis for field references
*       Bug 412203 - [compiler] Internal compiler error: java.lang.IllegalArgumentException:
 info cannot be null
*       Bug 458396 - NPE in CodeStream.invoke()
*       Bug 407414 - [compiler][null] Incorrect warning on a primitive type being null
*     Jesper S Moller - <jesper@selskabet.org>   - Contributions for
*           bug 382721 - [1.8][compiler] Effectively final variables needs special treatment
*       bug 378674 - "The method can be declared as static" is wrong
*       bug 404657 - [1.8][compiler] Analysis for effectively final variables fails to consider loops
*       bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
*******************************************************************************/
```

Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/SingleNameReference.java

# 1.3229 referencing 0.38.1

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- javaee_5.xsd
- javaee_web_services_1_2.xsd
- javaee_web_services_client_1_2.xsd
- javaee_6.xsd
- javaee_web_services_1_3.xsd
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- javaee_web_services_1_3.xsd
- javaee_web_services_client_1_3.xsd
- jsp_2_2.xsd
- web-app_3_0.xsd
- web-common_3_0.xsd
- web-fragment_3_0.xsd

- javaee_7.xsd
- javaee_web_services_1_4.xsd
- javaee_web_services_client_1_4.xsd
- jsp_2_3.xsd
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- web-common_3_1.xsd
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- jsp_2_2.xsd
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# 1.3231 poly1305 0.8.0

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# 1.3237 aws-smithy-json 0.61.3

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# 1.3238 aws-smithy-http-client 1.1.1

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*       bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
```

```
*       bug 403086 - [compiler][null] include the effect of 'assert' in syntactic null analysis for fields
*       bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred
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*  Bug 405066 - [1.8][compiler][codegen] Implement code generation infrastructure for JSR335
*  Bug 406982 - [1.8][compiler] Generation of MethodParameters Attribute in classfile
*  Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*  Bug 405104 - [1.8][compiler][codegen] Implement support for serializeable lambdas
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*        bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
*        Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*        Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                        Bug 415543 - [1.8][compiler] Incorrect bound index in RuntimeInvisibleTypeAnnotations attribute
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*     Stephan Herrmann - Contributions for
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 367203 - [compiler][null] detect assigning null to nonnull argument
*       bug 365519 - editorial cleanup after bug 186342 and bug 365387
*       bug 365531 - [compiler][null] investigate alternative strategy for internally encoding nullness defaults
*       bug 382353 - [1.8][compiler] Implementation property modifiers
 should be accepted on default methods.
*       bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       bug 388281 - [compiler][null] inheritance of null annotations as an option
*       bug 401030 - [1.8][null] Null analysis support for lambda methods.
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*       Bug 403216 - [1.8][null] TypeReference#captureTypeAnnotations treats type annotations as type argument
annotations
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*       Bug 435570 - [1.8][null] @NonNullByDefault illegally tries to affect "throws E"
*       Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize
 declaration style null annotations
*       Bug 466713 - Null Annotations: NullPointerException using <int @Nullable []> as Type Param
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*       bug 382701 - [1.8][compiler] Implement semantic analysis of Lambda expressions & Reference expression
*                    Bug 384687 - [1.8] Wildcard type arguments should be rejected for lambda and reference
expressions
*       Bug 416885 - [1.8][compiler]IncompatibleClassChange error (edit)
*    Stephan Herrmann - Contribution for
*       bug 402028 - [1.8][compiler] null analysis for reference
 expressions
*       bug 404649 - [1.8][compiler] detect illegal reference to indirect or redundant super via I.super.m() syntax
```

*	Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*	Bug 415850 - [1.8] Ensure RunJDTCoreTests can cope with null annotations enabled
*	Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*	Bug 423504 - [1.8] Implement "18.5.3 Functional Interface Parameterization Inference"
*	Bug 424637 - [1.8][compiler][null] AIOOB in ReferenceExpression.resolveType with a method reference to Files::walk
*	Bug 424415 - [1.8][compiler] Eventual resolution of ReferenceExpression is not seen to be happening.
*	Bug 424403 - [1.8][compiler] Generic method call with method reference argument fails to resolve properly.
*	Bug 427196 - [1.8][compiler] Compiler error for method reference to overloaded method
*	Bug 427438
 - [1.8][compiler] NPE at org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*	Bug 428264 - [1.8] method reference of generic class causes problems (wrong inference result or NPE)
*	Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*	Bug 426537 - [1.8][inference] Eclipse compiler thinks I<? super J> is compatible with I<J<?>> - raw type J involved
*	Bug 435570 - [1.8][null] @NonNullByDefault illegally tries to affect "throws E"
*	Bug 435689 - [1.8][inference] Type inference not occurring with lambda expression and method reference
*	Bug 438383 - [1.8][null] Bogus warning: Null type safety at method return type
*	Bug 434483 - [1.8][compiler][inference] Type inference not picked up with method reference
*	Bug 441734 - [1.8][inference] Generic method with nested parameterized type argument fails on method reference
*	Bug 438945 - [1.8] NullPointerException
 InferenceContext18.checkExpression in java 8 with generics, primitives, and overloading
*	Bug 452788 - [1.8][compiler] Type not correctly inferred in lambda expression
*	Bug 448709 - [1.8][null] ensure we don't infer types that violate null constraints on a type parameter's bound
*	Bug 459967 - [null] compiler should know about nullness of special methods like MyEnum.valueOf()
*	Bug 466713 - Null Annotations: NullPointerException using <int @Nullable []> as Type Param
*	Bug 470542 - NullPointerException in ReferenceExpression.isPotentiallyCompatibleWith (962)
*	 Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contribution for
*	Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's work)
**********/

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*         Bug 407191 - [1.8] Binary access support for type annotations
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*       bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred
checking
*       Bug 422796 - [compiler][null] boxed boolean reported as potentially null after
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*        Bug 365662 - [compiler][null] warn on contradictory and redundant null annotations
*        Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*        Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*     Keigo Imai - Contribution for  bug 388903 - Cannot extend inner class as an anonymous class when it
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*  bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*  bug 349326 - [1.7] new warning for missing try-with-resources
*  bug 265744 - Enum switch should warn about missing default
*  bug 374605 - Unreasonable warning for enum-based switch statements
*  bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
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*  bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*  bug 331649 - [compiler][null] consider null annotations for fields
*  bug 400761 - [compiler][null] null may be return as boolean without a diagnostic
*  Bug 427438 - [1.8][compiler] NPE at
org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*  Bug 429403 - [1.8][null] null mismatch from type arguments is not reported at field initializer
*  Bug 453483 - [compiler][null][loop] Improve null analysis for loops
*  Bug 458396 - NPE in CodeStream.invoke()
*  Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*  Bug 409250 - [1.8][compiler] Various loose ends in 308 code generation
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*        Bug 440687 - [compiler][batch][null] improve command line option for external annotations
*     Lars Vogel <Lars.Vogel@vogella.com> - Contributions for
*          Bug 473178
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*        bug 349326 - [1.7] new warning for missing try-with-resources
*        bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*        bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
```

```
*       bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
*       Bug 392099
 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 415291 - [1.8][null] differentiate type incompatibilities due to null annotations
*       Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*       Bug 412076 - [compiler] @NonNullByDefault doesn't work for varargs parameter when in generic interface
*       Bug 403216 - [1.8][null] TypeReference#captureTypeAnnotations treats type annotations as type argument
annotations
*       Bug 415850 - [1.8] Ensure RunJDTCoreTests can cope with null annotations enabled
*       Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*       Bug 416175 - [1.8][compiler][null] NPE with a code snippet that used null annotations on wildcards
*       Bug 416174 - [1.8][compiler][null] Bogus name clash error with null annotations
*       Bug 416176 - [1.8][compiler][null] null type annotations cause grief on type variables
*       Bug 400874 - [1.8][compiler]
 Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 423504 - [1.8] Implement "18.5.3 Functional Interface Parameterization Inference"
*       Bug 425278 - [1.8][compiler] Suspect error: The target type of this expression is not a well formed parameterized
type due to bound(s) mismatch
*       Bug 425798 - [1.8][compiler] Another NPE in ConstraintTypeFormula.reduceSubType
*       Bug 425156 - [1.8] Lambda as an argument is flagged with incompatible error
*       Bug 426563 - [1.8] AIOOBE when method with error invoked with lambda expression as argument
*       Bug 426792 - [1.8][inference][impl] generify new type inference engine
*       Bug 428294 - [1.8][compiler] Type mismatch: cannot convert from List<Object> to Collection<Object[]>
*       Bug 427199 - [1.8][resource] avoid resource leak warnings on Streams that have no resource
*       Bug 416182 - [1.8][compiler][null] Contradictory null annotations not rejected
 *       Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
*       Bug 438179 - [1.8][null] 'Contradictory null annotations' error on type variable with explicit null-annotation.
*       Bug 441693 - [1.8][null] Bogus warning for type argument annotated with @NonNull
*       Bug 446434 - [1.8][null] Enable interned captures also when analysing null type annotations
*       Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*       Bug 456508 - Unexpected RHS PolyTypeBinding for: <code-snippet>
*       Bug 390064 - [compiler][resource] Resource leak warning missing when extending parameterized class
*     Jesper S Møller  - Contributions for bug 381345 : [1.8] Take care of the Java 8 major version
*       Bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
*******************************************************************************/
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*          bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*          bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*       bug 383368 - [compiler][null] syntactic null analysis for field references
*       bug 403147 - [compiler][null] FUP of bug 400761:
 consolidate interaction between unboxing, NPE, and deferred checking
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* Contributors:
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*     Nikolay Metchev (nikolaymetchev@gmail.com) - Contributions for
*       bug 411098 - [compiler][resource] Invalid Resource Leak Warning using ternary operator inside try-with-resource
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/antadapter/messages.properties
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*  bug 186342 - [compiler][null] Using annotations for null checking
*  bug 365519 - editorial cleanup after bug 186342 and bug 365387
*  bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*  bug 365859 - [compiler][null] distinguish warnings based on flow analysis vs. null annotations
*  bug 385626 - @NonNull fails across
 loop boundaries
*  bug 388996 - [compiler][resource] Incorrect 'potential resource leak'
*  bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred
checking
*  Bug 453483 - [compiler][null][loop] Improve null analysis for loops
*  Bug 455723 - Nonnull argument not correctly inferred in loop
*  Jesper S Moller - Contributions for
*  bug 404657 - [1.8][compiler] Analysis for effectively final variables fails to consider loops
**********/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/CompactConstructorDeclaration.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/TextBlock.java
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*
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*     Stephan Herrmann - Contribution for
*       Bug 429813 - [1.8][dom ast] IMethodBinding#getJavaElement() should return IMethod for lambda
**********/

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*
* Contributors:
*    wharley@bea.com - derived base class from BatchMessagerImpl
*
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*  Stephen Herrmann <stephan@cs.tu-berlin.de> -  Contributions for
*  bug 317046 - Exception during debugging when hover mouse over a field
*  bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*  bug 392862 - [1.8][compiler][null] Evaluate null annotations on array types
*  bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class
files
*  Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*  Bug 415291 - [1.8][null] differentiate type incompatibilities due to null annotations
*  Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*  Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*  Bug 423504 - [1.8] Implement "18.5.3 Functional Interface Parameterization Inference"
*  Bug 424712 - [1.8][compiler] NPE in TypeBinding.isProvablyDistinctTypeArgument
*  Bug 426792 - [1.8][inference][impl] generify new type inference engine
*  Bug 426764 - [1.8] Presence of conditional expression as method argument confuses compiler
*  Bug 423505 - [1.8] Implement "18.5.4 More Specific Method Inference"
*  Bug 427626 - [1.8] StackOverflow while typing new ArrayList<String>().toArray( and asking for code completion
*  Bug 428019 - [1.8][compiler] Type inference failure with nested generic invocation.
*  Bug 435962 - [RC2] StackOverFlowError when building
*  Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
*  Bug 440759 - [1.8][null] @NonNullByDefault should never affect wildcards and uses of a type variable
*  Bug 441693 - [1.8][null] Bogus warning for type argument annotated with @NonNull
*  Bug 446434 - [1.8][null] Enable interned captures also when analysing null type annotations
*  Jesper S Moller <jesper@selskabet.org> -  Contributions for
*  bug 382701 - [1.8][compiler] Implement semantic analysis of Lambda expressions & Reference expression
*  bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
*
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*  bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*  bug 349326 - [1.7] new warning for missing try-with-resources
*  bug 186342 - [compiler][null] Using annotations for null checking
*  bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*  bug 370639 - [compiler][resource] restore the
default for resource leak warnings
*  bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*  bug 388996 - [compiler][resource] Incorrect 'potential resource leak'
*  bug 395977 - [compiler][resource] Resource leak warning behavior possibly incorrect for anonymous inner class
*  bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred
checking
*  Bug 415850 - [1.8] Ensure RunJDTCoreTests can cope with null annotations enabled
*  Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*  Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*  Bug 416267 - NPE in QualifiedAllocationExpression.resolveType
*  Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*  Bug 424415 - [1.8][compiler] Eventual
resolution of ReferenceExpression is not seen to be happening.
*  Bug 427438 - [1.8][compiler] NPE at
org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*  Jesper S Moller <jesper@selskabet.org> - Contributions for
*  bug 378674 - "The method can be declared as static" is wrong

```
*     Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                     Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
work)
*                     Bug 409245 - [1.8][compiler] Type annotations dropped when call is routed through a synthetic
bridge method
*     Till Brychcy - Contributions for
*          bug 413460 - NonNullByDefault is not inherited to Constructors when accessed via Class File
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*     Jesper S Moller - Contributions for
*       Bug 405066 - [1.8][compiler][codegen] Implement code generation infrastructure for JSR335
*       Bug 406973 - [compiler] Parse MethodParameters attribute
*        Andy Clement - Contributions for
*                     Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
work)
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*  bug 185682 - Increment/decrement operators mark local variables as read
*  bug 331649 - [compiler][null] consider null annotations for fields
*  bug 383368 - [compiler][null] syntactic null analysis for field references
*  Bug 412203 - [compiler] Internal compiler error: java.lang.IllegalArgumentException: info cannot be null
*  Bug 400874 - [1.8][compiler]
Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*  Bug 458396 - NPE in CodeStream.invoke()
*  Jesper S Moller - Contributions for
*  Bug 378674 - "The method can be declared as static" is wrong
*  Robert Roth <robert.roth.off@gmail.com> - Contributions for
*  Bug 361039 - NPE in FieldReference.optimizedBooleanConstant
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*       Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*         Bug 407191 - [1.8] Binary access support for type annotations
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/FieldInfoWithTypeAnnotation.java
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*     Stephan Herrmann - contributions for
*           bug 337868 - [compiler][model] incomplete support for package-info.java when using SearchableEnvironment
*           bug 186342 - [compiler][null] Using annotations for null checking
```

```
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*       Bug 186342 - [compiler][null] Using annotations for null checking
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
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*       bug 392862 - [1.8][compiler][null] Evaluate null annotations on array types
*       bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*       bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug
 415291 - [1.8][null] differentiate type incompatibilities due to null annotations
*       Bug 415850 - [1.8] Ensure RunJDTCoreTests can cope with null annotations enabled
*       Bug 416176 - [1.8][compiler][null] null type annotations cause grief on type variables
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 425460 - [1.8] [inference] Type not inferred on stream.toArray
*       Bug 426792 - [1.8][inference][impl] generify new type inference engine
*       Bug 428019 - [1.8][compiler] Type inference failure with nested generic invocation.
*       Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
*       Bug 440759 - [1.8][null] @NonNullByDefault should never affect wildcards and uses of a type variable
*       Bug 441693 -
 [1.8][null] Bogus warning for type argument annotated with @NonNull
*     Jesper S Møller - Contributions for bug 381345 : [1.8] Take care of the Java 8 major version
*       Bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
*******************************************************************************/
```

Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ArrayBinding.java
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* Contributors:
*    Igor Fedorenko - extracted from ElementsImpl
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/apt/model/ElementsImpl9.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredAnnotation.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/core/compiler/CompilationProgress.java
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* Contributors:
*  wharley@bea.com - initial API and implementation
*  (originally in org.eclipse.jdt.apt.core)
*  IBM Corporation - Bug 513790
**********/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/apt/util/ManyToMany.java
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* Contributors:
*  IBM Corporation - initial API and implementation
*  Jesper Steen Moeller - Contributions for:
*  Bug 407297: [1.8][compiler] Control generation of parameter names by option
**********/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/tool/Options.java
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*
* Contributors:
*    tyeung@bea.com - initial API and implementation
*    olivier_thomann@ca.ibm.com - add hashCode() and equals(..) methods
*******************************************************************************/
```

Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/ClassSignature.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/EnumConstantSignature.java
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* Contributors:
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*     Stephan Herrmann - Contributions for
*       bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*       bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred
checking
*       Bug 415790 - [compiler][resource]Incorrect potential resource leak warning in for loop
 with close in try/catch
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/DoStatement.java
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Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/NonNullDefaultAwareTypeAnnotationWalker.java
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*    wharley@bea.com - initial API and implementation
*    IBM Corporation - fix for 342598
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Found in path(s):
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* Contributors:
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*     Stephan Herrmann - Contribution for
*       bug 365531 - [compiler][null] investigate alternative strategy for internally encoding nullness defaults
*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*     Jesper Steen Moller - Contributions for
*       Bug 412150 [1.8] [compiler]
 Enable reflected parameter names during annotation processing
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/Binding.java
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*       bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*       bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred
checking
*       Bug 417758 - [1.8][null] Null safety compromise during array creation.
*       Bug
 427163 - [1.8][null] bogus error "Contradictory null specification" on varags
*     Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                     Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
work)
*                     Bug 409247 - [1.8][compiler] Verify error with code allocating multidimensional array
*******************************************************************************/
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Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ArrayAllocationExpression.java
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* Contributors:
*    wharley@bea.com - initial API and implementation
*    philippe.marschall@netcetera.ch - Fix for 338370
*    IBM Corporation - Fix for validating relative name
*******************************************************************************/
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Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/apt/dispatch/BatchFilerImpl.java
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* Contributors:
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*     Stephan Herrmann - Contribution for
*       bug 331649 - [compiler][null] consider null annotations for fields
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 458396 - NPE in CodeStream.invoke()
*******************************************************************************/
```

Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/VariableBinding.java
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*  Stephan Herrmann - Contributions for
*  bug 365662 - [compiler][null] warn on contradictory and redundant null annotations

```
*       bug 401030 - [1.8][null] Null analysis support for lambda methods.
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*       Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*******************************************************************************/
```

Found
 in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/LocalTypeBinding.java
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*     het@google.com - Bug 441790
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*  bug 349326 - [1.7] new warning for missing try-with-resources
*  bug 359334 - Analysis for resource leak warnings does not consider exceptions as method exit points
*  bug 358903 - Filter practically unimportant resource leak warnings
*  bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*  bug 370639 - [compiler][resource]
 restore the default for resource leak warnings
*  bug 388996 - [compiler][resource] Incorrect 'potential resource leak'
*  bug 379784 - [compiler] "Method can be static" is not getting reported
*  bug 394768 - [compiler][resource] Incorrect resource leak warning when creating stream in conditional
*  bug 404649 - [1.8][compiler] detect illegal reference to indirect or redundant super
*  Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*  Bug 371614 - [compiler][resource] Wrong "resource leak" problem on return/throw inside while loop
*  Bug 421035 - [resource] False alarm of resource leak warning when casting a closeable in its assignment
*  Bug 444964 - [1.7+][resource] False resource leak warning (try-with-resources for ByteArrayOutputStream - return inside for loop)
*  Bug 396575 - [compiler][resources] Incorrect Errors/Warnings check for potential resource leak when surrounding with try-catch
*  Jesper S Moller <jesper@selskabet.org> - Contributions for
*  bug 378674 - "The method can be declared as static" is wrong
*  Keigo Imai - Contribution for bug 388903 - Cannot extend inner class as an anonymous class when it extends the outer class
**********/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/apt/dispatch/AnnotationDiscoveryVisitor.java
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*     Stephan Herrmann - Contributions for
*       Bug 452788 - [1.8][compiler] Type not correctly inferred in lambda expression
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* Contributors:
*    tyeung@bea.com - initial API and implementation
*    olivier_thomann@ca.ibm.com - add hashCode() and equals(..) methods
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Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/ElementValuePairInfo.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/AnnotationInfo.java

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*       Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                       Bug 415397 - [1.8][compiler] Type Annotations on wildcard type argument dropped
*       Stephan Herrmann - Contribution for
*       Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 429958
 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*       Bug 440462 - [null][compiler]NPE in EJC for erroneous null annotations
*       Bug 441693 - [1.8][null] Bogus warning for type argument annotated with @NonNull
*******************************************************************************/
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*     Stephan Herrmann <stephan@cs.tu-berlin.de> - Contributions for
*           bug 292478 - Report potentially null across variable assignment
*           bug 332637 - Dead Code detection removing code that isn't dead
*       bug 394768 - [compiler][resource] Incorrect resource leak warning when creating stream in conditional
*       Bug 411964 - [1.8][null] leverage null type annotation in foreach statement
*       Bug 421035 - [resource]
```

False alarm of resource leak warning when casting a closeable in its assignment
**********/

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*  Stephan Herrmann - Contribution for
*  bug 383368 - [compiler][null] syntactic null analysis for field references
*  Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*  Bug 416307 - [1.8][compiler][null] subclass with type parameter substitution confuses null checking
*  Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*  Bug 417295 - [1.8[[null]
Massage type annotated null analysis to gel well with deep encoded type bindings.
*  Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*  Bug 435570 - [1.8][null] @NonNullByDefault illegally tries to affect "throws E"
*  Bug 466713 - Null Annotations: NullPointerException using <int @Nullable []> as Type Param
*  Andy Clement - Contributions for
*  Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's work)
**********/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/InstanceOfExpression.java
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*  Stephan Herrmann <stephan@cs.tu-berlin.de> - Contributions for
*  bug 185682 - Increment/decrement operators mark local variables as read
*  bug 392862 - [1.8][compiler][null] Evaluate null annotations on array types
*  bug 331649 - [compiler][null] consider null annotations for fields
*  bug 383368 - [compiler][null] syntactic null analysis for field references
*  bug 392384 - [1.8][compiler][null] Restore nullness
 info from type annotations in class files
*  Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*  Bug 411964 - [1.8][null] leverage null type annotation in foreach statement
*  Bug 407414 - [compiler][null] Incorrect warning on a primitive type being null
**********/

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*  Stephan Herrmann - Contribution for
*  bug 331649 - [compiler][null] consider null annotations for fields
*  bug 383368 - [compiler][null] syntactic null analysis for field references
*  Jesper S Moller - Contributions for
*  Bug 378674 - "The method can be declared as static" is wrong
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* Contributors:
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*     Stephan Herrmann <stephan@cs.tu-berlin.de> - Contributions for
*       bug 185682 - Increment/decrement operators mark local variables as read
*       bug 331649 - [compiler][null] consider null annotations for fields
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 447088 - [null] @Nullable on fully qualified field type is ignored
*       Bug 435805 - [1.8][compiler][null]
 Java 8 compiler does not recognize declaration style null annotations
*       Bug 458396 - NPE in CodeStream.invoke()
*       Bug 446217 - [null] @NonNullByDefault in package-info.java causes bogus "null type safety" warning
*     Till Brychcy - Contribution for
*             bug 467094 - [1.8][null] TYPE_USE NullAnnotations of array contents are applied to field.
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*     daolaf@gmail.com - Contribution for bug 3292227
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*     Stephan Herrmann - Contributions for
*       Bug 360328 - [compiler][null] detect null problems in nested code (local class inside a loop)
*       Bug 388630 - @NonNull diagnostics at line 0
```

```
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 416176 - [1.8][compiler][null] null type annotations cause grief on type variables
*       Bug 424727 - [compiler][null] NullPointerException
 in nullAnnotationUnsupportedLocation(ProblemReporter.java:5708)
*       Bug 457210 - [1.8][compiler][null] Wrong Nullness errors given on full build build but not on incremental build?
*     Keigo Imai - Contribution for  bug 388903 - Cannot extend inner class as an anonymous class when it extends
the outer class
 *    Pierre-Yves B. <pyvesdev@gmail.com> - Contributions for
*                       Bug 542520 - [JUnit 5] Warning The method xxx from the type X is never used locally is shown
when using MethodSource
*                       Bug 546084 - Using Junit 5s MethodSource leads to ClassCastException
*******************************************************************************/
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* Contributors:
*    Walter Harley - initial API and implementation
*    IBM Corporation - fix for 342598, 382590
*    Jean-Marie Henaff <jmhenaff@google.com> (Google) - Bug 481555
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* IBM Corporation - initial API and implementation
* Nick Teryaev - fix for bug (https://bugs.eclipse.org/bugs/show_bug.cgi?id=40752)
* Stephan Herrmann - Contributions for
* bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
* bug 349326 - [1.7] new warning for missing try-with-resources
* bug 186342 - [compiler][null] Using annotations for null checking
* bug 358903 - Filter practically unimportant resource leak warnings
* bug
370639 - [compiler][resource] restore the default for resource leak warnings
* bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
* bug 388996 - [compiler][resource] Incorrect 'potential resource leak'
* bug 379784 - [compiler] "Method can be static" is not getting reported
* bug 379834 - Wrong "method can be static" in presence of qualified super and different staticness of nested super class.
* bug 388281 - [compiler][null] inheritance of null annotations as an option
* bug 392862 - [1.8][compiler][null] Evaluate null annotations on array types
* bug 394768 - [compiler][resource] Incorrect resource leak warning when creating stream in conditional
* bug 381445 - [compiler][resource] Can the resource leak check be made aware of Closeables.closeQuietly?
* bug 331649 - [compiler][null] consider null annotations for fields
* bug 383368 - [compiler][null] syntactic null
analysis for field references
* bug 382069 - [null] Make the null analysis consider JUnit's assertNotNull similarly to assertions
* bug 382350 - [1.8][compiler] Unable to invoke inherited default method via I.super.m() syntax
* bug 404649 - [1.8][compiler] detect illegal reference to indirect or redundant super
* bug 403086 - [compiler][null] include the effect of 'assert' in syntactic null analysis for fields
* bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred checking
* Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
* Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
* Bug 405569 - Resource leak check false positive when using DbUtils.closeQuietly
* Bug 411964 - [1.8][null] leverage null type annotation in foreach statement
* Bug 417295 - [1.8[[null] Massage type annotated null analysis
to gel well with deep encoded type bindings.
* Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
* Bug 423504 - [1.8] Implement "18.5.3 Functional Interface Parameterization Inference"
* Bug 424710 - [1.8][compiler] CCE in SingleNameReference.localVariableBinding
* Bug 425152 - [1.8] [compiler] Lambda Expression not resolved but flow analyzed leading to NPE.
* Bug 424205 - [1.8] Cannot infer type for diamond type with lambda on method invocation
* Bug 424415 - [1.8][compiler] Eventual resolution of ReferenceExpression is not seen to be happening.
* Bug 426366 - [1.8][compiler] Type inference doesn't handle multiple candidate target types in outer overload context
* Bug 426290 - [1.8][compiler] Inference + overloading => wrong method resolution ?
* Bug 427483 - [Java 8] Variables in lambdas sometimes can't be resolved
* Bug 427438 - [1.8][compiler]
NPE at org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
* Bug 426996 - [1.8][inference] try to avoid method Expression.unresolve()?
* Bug 428352 - [1.8][compiler] Resolution errors don't always surface
* Bug 429430 - [1.8] Lambdas and method reference infer wrong exception type with generics (RuntimeException

instead of IOException)
*	Bug 441734 - [1.8][inference] Generic method with nested parameterized type argument fails on method reference
*	Bug 452788 - [1.8][compiler] Type not correctly inferred in lambda expression
*	Bug 456487 - [1.8][null] @Nullable type variant of @NonNull-constrained type parameter causes grief
*	Bug 407414 - [compiler][null] Incorrect warning on a primitive type being null
*	Bug 472618 - [compiler][null] assertNotNull vs. Assert.assertNotNull
*	Bug 470958 - [1.8] Unable to convert lambda
*	Bug 410218 - Optional warning
 for arguments of "unexpected" types to Map#get(Object), Collection#remove(Object) et al.
*	Jesper S Moller - Contributions for
*	Bug 378674 - "The method can be declared as static" is wrong
*	Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*	Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's work)
*	Bug 409245 - [1.8][compiler] Type annotations dropped when call is routed through a synthetic bridge method
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* Contributors:
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*	Jesper S Moller - Contributions for
*	bug 382701 - [1.8][compiler] Implement semantic analysis of Lambda expressions & Reference expression
*	bug 382721 - [1.8][compiler] Effectively final variables needs special treatment
*	Bug 416885 - [1.8][compiler]IncompatibleClassChange error (edit)
*	Stephan Herrmann - Contribution for
*	bug 401030 - [1.8][null] Null analysis support for lambda methods.
*	Bug 392099
 - [1.8][compiler][null] Apply null annotation on types for null analysis
*	Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*	Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*	Bug 423504 - [1.8] Implement "18.5.3 Functional Interface Parameterization Inference"
*	Bug 425142 - [1.8][compiler] NPE in ConstraintTypeFormula.reduceSubType
*	Bug 425153 - [1.8] Having wildcard allows incompatible types in a lambda expression
*	Bug 424205 - [1.8] Cannot infer type for diamond type with lambda on method invocation

```
*       Bug 425798 - [1.8][compiler] Another NPE in ConstraintTypeFormula.reduceSubType
*       Bug 425156 - [1.8] Lambda as an argument is flagged with incompatible error
*       Bug 424403 - [1.8][compiler] Generic method call with method reference argument fails to resolve properly.
*       Bug 426563 - [1.8] AIOOBE when method with error
 invoked with lambda expression as argument
*       Bug 420525 - [1.8] [compiler] Incorrect error "The type Integer does not define sum(Object, Object) that is
applicable here"
*       Bug 427438 - [1.8][compiler] NPE at
org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*       Bug 428294 - [1.8][compiler] Type mismatch: cannot convert from List<Object> to Collection<Object[]>
*       Bug 428786 - [1.8][compiler] Inference needs to compute the "ground target type" when reducing a lambda
compatibility constraint
*       Bug 428980 - [1.8][null] simple expression as lambda body doesn't leverage null annotation on argument
*       Bug 429430 - [1.8] Lambdas and method reference infer wrong exception type with generics (RuntimeException
instead of IOException)
*       Bug 432110 - [1.8][compiler] nested lambda type incorrectly inferred vs javac
*       Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type
 variables
*       Bug 441693 - [1.8][null] Bogus warning for type argument annotated with @NonNull
*       Bug 452788 - [1.8][compiler] Type not correctly inferred in lambda expression
*       Bug 453483 - [compiler][null][loop] Improve null analysis for loops
*       Bug 455723 - Nonnull argument not correctly inferred in loop
*       Bug 463728 - [1.8][compiler][inference] Ternary operator in lambda derives wrong type
*     Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                     Bug 405104 - [1.8][compiler][codegen] Implement support for serializeable lambdas
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/LambdaExpression.java
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*     Jesper Steen Moller - Contributions for:
*         Bug 412149: [1.8][compiler] Emit repeated annotations into the designated container
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*       bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 365519 - editorial cleanup after bug 186342 and bug 365387
*       bug 358903 - Filter practically unimportant resource leak warnings
*       bug 365531 - [compiler][null] investigate alternative strategy for internally encoding nullness defaults
*       bug 388281 - [compiler][null] inheritance of null annotations as an option
*       bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*       bug 392862 - [1.8][compiler][null] Evaluate null annotations on array types
*       bug 400421 - [compiler] Null analysis for fields does not take @com.google.inject.Inject into account
*       bug 382069 - [null] Make the null analysis consider JUnit's assertNotNull similarly to assertions
*       bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 415291 - [1.8][null] differentiate type incompatibilities due to null annotations
```

```
*       Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*       Bug 416176 - [1.8][compiler][null] null type annotations cause grief on type variables
*       Bug
 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 423504 - [1.8] Implement "18.5.3 Functional Interface Parameterization Inference"
*       Bug 426792 - [1.8][inference][impl] generify new type inference engine
*       Bug 428019 - [1.8][compiler] Type inference failure with nested generic invocation.
*       Bug 427199 - [1.8][resource] avoid resource leak warnings on Streams that have no resource
*       Bug 418743 - [1.8][null] contradictory annotations on invocation of generic method not reported
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*       Bug 431581 - Eclipse compiles what it should not
*       Bug 440759 - [1.8][null] @NonNullByDefault should never affect wildcards and uses of a type variable
*       Bug 452788 - [1.8][compiler] Type not correctly inferred in lambda expression
*       Bug 446442 - [1.8] merge null annotations from
 super methods
*       Bug 456532 - [1.8][null] ReferenceBinding.appendNullAnnotation() includes phantom annotations in error
messages
*       Bug 410218 - Optional warning for arguments of "unexpected" types to Map#get(Object),
Collection#remove(Object) et al.
*     Jesper S Moller - Contributions for
*       bug 382701 - [1.8][compiler] Implement semantic analysis of Lambda expressions & Reference expression
*       bug 412153 - [1.8][compiler] Check validity of annotations which may be repeatable
*       bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
*     Ulrich Grave <ulrich.grave@gmx.de> - Contributions for
*                       bug 386692 - Missing "unused" warning on "autowired" fields
*     Pierre-Yves B. <pyvesdev@gmail.com> - Contribution for
*                       bug 542520 - [JUnit 5] Warning The method xxx from the type X is never used locally is shown
when using MethodSource
*     Sebastian Zarnekow - Contributions
 for
*       bug 544921 - [performance] Poor performance with large source files
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*     Stephan Herrmann - initial API and implementation
*     IBM Corporation - Bug fixes
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*     Stephan Herrmann - Contribution for
*       bug 384380 - False positive on a "Potential null pointer access" after a continue
*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
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*  Stephan Herrmann - Contributions for
*  bug 236385 - [compiler] Warn for potential programming problem if an object is created but not used
*  bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*  bug 349326 - [1.7] new warning for missing try-with-resources
*  bug 186342 - [compiler][null] Using annotations for null checking
*  bug 358903 - Filter practically unimportant resource
leak warnings
*  bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*  bug 370639 - [compiler][resource] restore the default for resource leak warnings
*  bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*  bug 388996 - [compiler][resource] Incorrect 'potential resource leak'
*  bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred checking
*  Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*  Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*  Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*  Bug 424727 - [compiler][null] NullPointerException in nullAnnotationUnsupportedLocation(ProblemReporter.java:5708)
*  Bug 424710
- [1.8][compiler] CCE in SingleNameReference.localVariableBinding
*  Bug 425152 - [1.8] [compiler] Lambda Expression not resolved but flow analyzed leading to NPE.
*  Bug 424205 - [1.8] Cannot infer type for diamond type with lambda on method invocation
*  Bug 424415 - [1.8][compiler] Eventual resolution of ReferenceExpression is not seen to be happening.
*  Bug 426366 - [1.8][compiler] Type inference doesn't handle multiple candidate target types in outer overload context
*  Bug 426290 - [1.8][compiler] Inference + overloading => wrong method resolution ?
*  Bug 426764 - [1.8] Presence of conditional expression as method argument confuses compiler
*  Bug 424930 - [1.8][compiler] Regression: "Cannot infer type arguments" error from compiler.
*  Bug 427483 - [Java 8] Variables in lambdas sometimes can't be resolved
*  Bug 427438 - [1.8][compiler] NPE at org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*  Bug 426996 - [1.8][inference] try to avoid method Expression.unresolve()?
*  Bug 428352 - [1.8][compiler] Resolution errors don't always surface
*  Bug 429203 - [1.8][compiler] NPE in AllocationExpression.binding
*  Bug 429430 - [1.8] Lambdas and method reference infer wrong exception type with generics (RuntimeException instead of IOException)
*  Bug 434297 - [1.8] NPE in LamdaExpression.analyseCode with lamda expression nested in a conditional

expression
*  Bug 452788 - [1.8][compiler] Type not correctly inferred in lambda expression
*  Bug 448709 - [1.8][null] ensure we don't infer types that violate null constraints on a type parameter's bound
*  Jesper S Moller <jesper@selskabet.org> - Contributions for
*  bug 378674 - "The method can be declared as static" is wrong
*  Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*  Bug 383624 - [1.8][compiler] Revive
 code generation support for type annotations (from Olivier's work)
*  Bug 409245 - [1.8][compiler] Type annotations dropped when call is routed through a synthetic
bridge method
*  Till Brychcy - Contributions for
*  bug 413460 - NonNullByDefault is not inherited to Constructors when accessed via Class File
*  Lars Vogel <Lars.Vogel@vogella.com> - Contributions for
*  Bug 473178
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*     Stephan Herrmann <stephan@cs.tu-berlin.de> - Contributions for
```

```
*           bug 185682 - Increment/decrement operators mark local variables as read
*           bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 365859 - [compiler][null] distinguish warnings based on flow analysis vs. null annotations
*       bug 331649 - [compiler][null] consider
 null annotations for fields
*       Bug 466308 - [hovering] Javadoc header for parameter is wrong with annotation-based null analysis
*     Jesper S Møller <jesper@selskabet.org> -  Contributions for
*       Bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
*
*******************************************************************************/
```

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*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
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Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ElementValuePair.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/JavadocImplicitTypeReference.java
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*  Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*  Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's work)
*  Stephan Herrmann - Contribution for
*  Bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
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*  bug 349326 - [1.7] new warning for missing try-with-resources
*  bug 358903 - Filter practically unimportant resource leak warnings
*  bug 381445 - [compiler][resource] Can the resource leak check be made aware of Closeables.closeQuietly?
*  bug 400421 - [compiler] Null analysis for fields does not take @com.google.inject.Inject into account
*  bug 382069 - [null] Make
the null analysis consider JUnit's assertNotNull similarly to assertions
*  Bug 405569 - Resource leak check false positive when using DbUtils.closeQuietly
*  Bug 427199 - [1.8][resource] avoid resource leak warnings on Streams that have no resource
*  Bug 425183 - [1.8][inference] make CaptureBinding18 safe
*  Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*  Bug 410218 - Optional warning for arguments of "unexpected" types to Map#get(Object), Collection#remove(Object) et al.
*  Jesper S Moller - Contributions for
*  Bug 405066 - [1.8][compiler][codegen] Implement code generation infrastructure for JSR335
*  Bug 412153 - [1.8][compiler] Check validity of annotations which may be repeatable
*  bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
*  Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*  Bug 405104 - [1.8][compiler][codegen]
Implement support for serializeable lambdas
*  Ulrich Grave <ulrich.grave@gmx.de> - Contributions for
*  bug 386692 - Missing "unused" warning on "autowired" fields
*  Pierre-Yves B. <pyvesdev@gmail.com> - Contribution for
*  bug 542520 - [JUnit 5] Warning The method xxx from the type X is never used locally is shown when using MethodSource
**********/

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*  Bug 432977 - [1.8][null] Incorrect 'type is not visible' compiler error
*  Bug 446434 - [1.8][null] Enable interned captures also when analysing null type annotations

```
*******************************************************************************/
/* Taking the binding of QTR as an example, there could be different annotatable components, but we come in a
with a single binding, e.g:

 @T Z;                          type => Z  annotations => [[@T]]
     @T Y.@T Z                        type => Z  annotations => [[@T][@T]]
     @T X.@T Y.@T Z                       type => Z  annotations => [[@T][@T][@T]]
     java.lang.@T X.@T Y.@T Z                 type => Z  annotations => [[][][@T][@T][@T]]
     in all these cases the incoming type binding is for Z, but annotations are for different levels. We need to align their
layout for proper attribution.
    */
```

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*     Stephan Herrmann - Contribution for
*       Bug 365992 - [builder] [null] Change of nullness for a parameter doesn't trigger a build for the files that call the
method
*       Bug 440477 - [null] Infrastructure for feeding external annotations into compilation
*       Bug 440687 - [compiler][batch][null] improve command line option for external annotations
*     Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*
             bug 407191 - [1.8] Binary access support for type annotations
*******************************************************************************/
```

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*        bug 332637 - Dead Code detection removing code that isn't dead
*        bug 391517 - java.lang.VerifyError on code that runs correctly in Eclipse 3.7 and eclipse 3.6
*        bug 394768 - [compiler][resource] Incorrect resource leak warning when creating stream in conditional
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```
*     Stephan Herrmann - Contribution for
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
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*           bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 370639 - [compiler][resource] restore the default for resource leak warnings
*       bug 265744 - Enum switch should warn about missing default
*       bug 374605 - Unreasonable warning for enum-based switch statements
*       bug 381443
 - [compiler][null] Allow parameter widening from @NonNull to unannotated
*       Bug 441208 - [1.8][null]SuppressWarnings("null") does not suppress / marked Unnecessary
*       Bug 410218 - Optional warning for arguments of "unexpected" types to Map#get(Object),
```

Collection#remove(Object) et al.
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*  bug 382350 - [1.8][compiler] Unable to invoke inherited default method via I.super.m() syntax
*  bug 404649 - [1.8][compiler] detect illegal reference to indirect or redundant super
*  bug 404728 - [1.8]NPE on QualifiedSuperReference error
**********/

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*  bug 382701 - [1.8][compiler] Implement semantic analysis of Lambda expressions & Reference expression
*  Bug 405066 - [1.8][compiler][codegen] Implement code generation infrastructure for JSR335
*  Stephan Herrmann - Contribution for
*  Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*  Bug 423504 - [1.8] Implement "18.5.3

Functional Interface Parameterization Inference"
*  Bug 425142 - [1.8][compiler] NPE in ConstraintTypeFormula.reduceSubType
*  Bug 425153 - [1.8] Having wildcard allows incompatible types in a lambda expression
*  Bug 425156 - [1.8] Lambda as an argument is flagged with incompatible error
*  Bug 424403 - [1.8][compiler] Generic method call with method reference argument fails to resolve properly.
*  Bug 427438 - [1.8][compiler] NPE at
org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*  Bug 428352 - [1.8][compiler] Resolution errors don't always surface
*  Bug 446442 - [1.8] merge null annotations from super methods
*  Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*  Bug 405104 - [1.8][compiler][codegen] Implement support for serializeable lambdas
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*  Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*  Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
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* Contributors:
*  IBM Corporation - initial API and implementation
*  Luiz-Otavio Zorzella <zorzella at gmail dot com> - Improve CamelCase algorithm
*  Gábor Kövesdán - Contribution for Bug 350000 - [content assist] Include non-prefix matches in auto-complete suggestions
*  Stefan Xenos <sxenos@gmail.com> (Google) - Bug 501283 - Lots of hash collisions during indexing
*******************************************************************************/

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*  bug 349326 - [1.7] new warning for missing try-with-resources
*  bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
*  Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*  Bug 467032 - TYPE_USE Null Annotations: IllegalStateException with annotated arrays of Enum when accessed via BinaryTypeBinding
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*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
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Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/JavadocQualifiedTypeReference.java
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*       Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
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Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/VoidTypeBinding.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/NullTypeBinding.java
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```
*    wharley@bea.com - initial API and implementation
*    IBM Corporation - fix for 342470
*    IBM Corporation - fix for 342598
*    IBM Corporation - Java 8 support
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Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/apt/model/TypeParameterElementImpl.java
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*     Stephan Herrmann - Contribution for
*       bug 400710 - [1.8][compiler] synthetic access to default method generates wrong code
*       bug 391376 - [1.8] check interaction of default methods with bridge methods and generics
*       bug 421543 - [1.8][compiler] Compiler fails to recognize default method being turned into abstract by subtytpe
*     Jesper S Moller - Contributions for
*      Bug 405066 - [1.8][compiler][codegen] Implement
 code generation infrastructure for JSR335
*     Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                    Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
work)
*                    Bug 409247 - [1.8][compiler] Verify error with code allocating multidimensional array
*                    Bug 409236 - [1.8][compiler] Type annotations on intersection cast types dropped by code
generator
*                    Bug 409250 - [1.8][compiler] Various loose ends in 308 code generation
*                    Bug 405104 - [1.8][compiler][codegen] Implement support for serializeable lambdas
*                    Bug 449467 - [1.8][compiler] Invalid lambda deserialization with anonymous class
*       Olivier Tardieu (tardieu@us.ibm.com) - Contributions for
*                    Bug 442418 - $deserializeLambda$ off-by-one error when deserializing the captured arguments
 of a lambda that also capture this
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* Contributors:
*  tyeung@bea.com  - initial API and implementation
*  IBM Corporation - fix for bug 342757

```
*    Stephan Herrmann - Contribution for bug 186342 - [compiler][null] Using annotations for null checking
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Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/MethodInfoWithParameterAnnotations.java
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* Contributors:
*     IBM Corporation - initial API and implementation
*     Perry James - nullStatus method improvement (165346)
*     Stephan Herrmann - Contribution for
*       bug 383368 - [compiler][null] syntactic null analysis for field references
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Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/OperatorExpression.java
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*     Patrick Wienands <pwienands@abit.de> - Contribution for bug 393749
*     Stephan Herrmann - Contribution for
*       bug 331649 - [compiler][null] consider null annotations for fields
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/Clinit.java

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*     Stephan Herrmann - Contribution for
*        bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
*        Bug 416174 - [1.8][compiler][null] Bogus name clash error with null annotations
*        Bug 416176 - [1.8][compiler][null] null type annotations cause grief on type variables
*        Bug 423504 - [1.8] Implement "18.5.3 Functional Interface Parameterization Inference"
*        Bug 425783 - An
 internal error occurred during: "Requesting Java AST from selection". java.lang.StackOverflowError
*        Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
*        Bug 441693 - [1.8][null] Bogus warning for type argument annotated with @NonNull
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/RawTypeBinding.java

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/NormalAnnotation.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/diagnose/LexStream.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/Literal.java

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/SortedCharArrays.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/SortedSimpleNameVector.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/SortedCompoundNameVector.java

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*  Matt McCutchen - partial fix for https://bugs.eclipse.org/bugs/show_bug.cgi?id=122995
*  Karen Moore - fix for https://bugs.eclipse.org/bugs/show_bug.cgi?id=207411
*  Stephan Herrmann <stephan@cs.tu-berlin.de> - Contributions for
*  bug 185682 - Increment/decrement operators mark local variables as read
*  bug 186342 - [compiler][null] Using annotations for null checking
*  bug 365519 - editorial cleanup after
 bug 186342 and bug 365387
*  bug 374605 - Unreasonable warning for enum-based switch statements

```
*       bug 384870 - [compiler] @Deprecated annotation not detected if preceded by other annotation
*       bug 393719 - [compiler] inconsistent warnings on iteration variables
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 424742 - [1.8] NPE in LambdaExpression.isCompatibleWith
*       Bug 424710 - [1.8][compiler] CCE in SingleNameReference.localVariableBinding
*       Bug 424205 - [1.8] Cannot infer type for diamond type with lambda on method invocation
*       Bug 424415 - [1.8][compiler] Eventual resolution of ReferenceExpression is not seen to be happening.
*       Bug 426366
 - [1.8][compiler] Type inference doesn't handle multiple candidate target types in outer overload context
*       Bug 427282 - [1.8][compiler] AIOOB (-1) at
org.eclipse.jdt.internal.compiler.ClassFile.traverse(ClassFile.java:6209)
*       Bug 427483 - [Java 8] Variables in lambdas sometimes can't be resolved
*       Bug 428352 - [1.8][compiler] Resolution errors don't always surface
*       Bug 427163 - [1.8][null] bogus error "Contradictory null specification" on varags
*       Bug 432348 - [1.8] Internal compiler error (NPE) after upgrade to 1.8
*       Bug 440143 - [1.8][null] one more case of contradictory null annotations regarding type variables
*       Bug 441693 - [1.8][null] Bogus warning for type argument annotated with @NonNull
*       Bug 434483 - [1.8][compiler][inference] Type inference not picked up with method reference
*       Bug 446442 - [1.8] merge null annotations from super methods
*       Bug 437072 - [compiler][null] Null analysis emits
 possibly incorrect warning for new int[][] despite @NonNullByDefault
*     Jesper S Moller - Contributions for
*       bug 382721 - [1.8][compiler] Effectively final variables needs special treatment
*       bug 412153 - [1.8][compiler] Check validity of annotations which may be repeatable
*       bug 412153 - [1.8][compiler] Check validity of annotations which may be repeatable
*       bug 412149 - [1.8][compiler] Emit repeated annotations into the designated container
*       bug 419209 - [1.8] Repeating container annotations should be rejected in the presence of annotation it contains
*     Till Brychcy - Contributions for
*               bug 467094 - [1.8][null] TYPE_USE NullAnnotations of array contents are applied to field.
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ASTNode.java
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*       bug 383368 - [compiler][null] syntactic null analysis for field references
*       bug 403086 - [compiler][null] include the effect of 'assert' in syntactic null analysis for fields
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*       bug 342671 - ClassCastException: org.eclipse.jdt.internal.compiler.lookup.SourceTypeBinding cannot be cast to
org.eclipse.jdt.internal.compiler.lookup.ArrayBinding
*       bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*       Bug 416181 - [1.8][compiler][null] Invalid assignment
 is not rejected by the compiler
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
```

```
*       Bug 434600 - Incorrect null analysis error reporting on type parameters
*       Bug 435570 - [1.8][null] @NonNullByDefault illegally tries to affect "throws E"
*       Bug 456508 - Unexpected RHS PolyTypeBinding for: <code-snippet>
*       Bug 466713 - Null Annotations: NullPointerException using <int @Nullable []> as Type Param
*       Andy Clement - Contributions for
*                       Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/IRecordComponent.java
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*     Lars Vogel <Lars.Vogel@vogella.com> - Contributions for
*         Bug 473178
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ConstraintExceptionFormula.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ConstraintFormula.java
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*  Genady Beriozkin - added support for reporting assignment with no effect
*  Stephan Herrmann <stephan@cs.tu-berlin.de> - Contributions for
*  bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*  bug 292478 - Report potentially null across variable assignment
*  bug 335093 - [compiler][null] minimal hook for future null annotation support
*  bug 349326 - [1.7] new warning for missing
try-with-resources
*  bug 186342 - [compiler][null] Using annotations for null checking
*  bug 358903 - Filter practically unimportant resource leak warnings
*  bug 370639 - [compiler][resource] restore the default for resource leak warnings
*  bug 365859 - [compiler][null] distinguish warnings based on flow analysis vs. null annotations
*  bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*  bug 388996 - [compiler][resource] Incorrect 'potential resource leak'
*  bug 394768 - [compiler][resource] Incorrect resource leak warning when creating stream in conditional
*  bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*  bug 331649 - [compiler][null] consider null annotations for fields
*  bug 383368 - [compiler][null] syntactic null analysis for field references
*  bug 402993 - [null] Follow up of bug 401088: Missing
warning about redundant null check
*  bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred checking
*  Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*  Bug 427438 - [1.8][compiler] NPE at org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*  Bug 453483 - [compiler][null][loop] Improve null analysis for loops
*  Bug 407414 - [compiler][null] Incorrect warning on a primitive type being null
**********/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/Assignment.java
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*     IBM Corporation - initial API and implementation
*     Stephan Herrmann - Contribution for bug 186342 - [compiler][null] Using annotations for null checking
*     Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*         Bug 407191 - [1.8] Binary access support for type annotations
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*           bug 349326 - [1.7] new warning for missing try-with-resources
*           bug 359362 - FUP of bug 349326: Resource leak on non-Closeable resource
*       bug 358903 - Filter practically unimportant resource leak warnings
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 400874 - [1.8][compiler] Inference infrastructure
 should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 423504 - [1.8] Implement "18.5.3 Functional Interface Parameterization Inference"
```

```
*       Bug 426676 - [1.8][compiler] Wrong generic method type inferred from lambda expression
*       Bug 427411 - [1.8][generics] JDT reports type mismatch when using method that returns generic type
*       Bug 428019 - [1.8][compiler] Type inference failure with nested generic invocation.
*       Bug 435962 - [RC2] StackOverFlowError when building
*       Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
*       Bug 440759 - [1.8][null] @NonNullByDefault should never affect wildcards and uses of a type variable
*       Bug 441693 - [1.8][null] Bogus warning for type argument annotated with @NonNull
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*     Stephan Herrmann - Contributions for
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 365662 - [compiler][null] warn on contradictory and redundant null annotations
*       bug 331649 - [compiler][null] consider null annotations for fields
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 415043 - [1.8][null] Follow-up re null type annotations
 after bug 392099
*       Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*       Bug 415850 - [1.8] Ensure RunJDTCoreTests can cope with null annotations enabled
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 424728 - [1.8][null] Unexpected error: The nullness annotation 'XXXX' is not applicable at this location
*       Bug 392245 - [1.8][compiler][null] Define whether / how @NonNullByDefault applies to TYPE_USE locations
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*       Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*       Bug 457210 - [1.8][compiler][null] Wrong Nullness errors given on full build build but not on incremental build?
*       Bug 469584 - ClassCastException in Annotation.detectStandardAnnotation (320)
*       Andy Clement (GoPivotal,
 Inc) aclement@gopivotal.com - Contributions for
*                       Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
work)
*                       Bug 409517 - [1.8][compiler] Type annotation problems on more elaborate array references
*                       Bug 415397 - [1.8][compiler] Type Annotations on wildcard type argument dropped
*                       Bug 414384 - [1.8] type annotation on abbreviated inner class is not marked as inner type
```

```
*     Jesper S Moller <jesper@selskabet.org> -  Contributions for
*                    Bug 412153 - [1.8][compiler] Check validity of annotations which may be repeatable
*                    Bug 412151 - [1.8][compiler] Check repeating annotation's collection type
*                    Bug 412149 - [1.8][compiler] Emit repeated annotations into the designated container
*                    Bug 419209 - [1.8] Repeating container annotations
 should be rejected in the presence of annotation it contains
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* Contributors:
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*     Stephan Herrmann - Contribution for bug 186342 - [compiler][null] Using annotations for null checking
*     Jesper S Moller  -. Contribution for bug 400830: [1.8][formatter] Code formatter for Java 8
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/Scanner.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/LongLiteralMinValue.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/IntLiteral.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/InferenceContext.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/LongLiteral.java
*
 /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/FloatLiteral.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/NumberLiteral.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/IntLiteralMinValue.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/flow/InitializationFlowContext.java
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*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 365519 - editorial cleanup after bug 186342 and bug 365387
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*       Bug 435570 - [1.8][null] @NonNullByDefault
```

illegally tries to affect "throws E"
*	Bug 438012 - [1.8][null] Bogus Warning: The nullness annotation is redundant with a default that applies to this location
*	Bug 466713 - Null Annotations: NullPointerException using <int @Nullable []> as Type Param
*	Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*		Bug 409246 - [1.8][compiler] Type annotations on catch parameters not handled properly
**********/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ReductionResult.java
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*	bug 349326 - [1.7] new warning for missing try-with-resources
*	bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*	bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*	bug 383368 - [compiler][null] syntactic null analysis for field references

```
*       bug 402993 - [null] Follow up
 of bug 401088: Missing warning about redundant null check
*       Bug 440282 - [resource] Resource leak detection false negative with empty finally block
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/Block.java
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*           bug 332637 - Dead Code detection removing code that isn't dead
*           bug 358827 - [1.7] exception analysis for t-w-r spoils null analysis
*           bug 349326 - [1.7] new warning for missing try-with-resources
*           bug 359334 - Analysis for resource leak warnings does not consider exceptions as method exit points
*       bug 358903 - Filter practically unimportant resource
 leak warnings
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*       bug 388996 - [compiler][resource] Incorrect 'potential resource leak'
*       bug 401088 - [compiler][null] Wrong warning "Redundant null check" inside nested try statement
*       bug 401092 - [compiler][null] Wrong warning "Redundant null check" in outer catch of nested try
*       bug 402993 - [null] Follow up of bug 401088: Missing warning about redundant null check
*       bug 384380 - False positive on a ?? Potential null pointer access ?? after a continue
*       Bug 415790 - [compiler][resource]Incorrect potential resource leak warning in for loop with close in try/catch
*       Bug 371614 - [compiler][resource] Wrong "resource leak" problem on return/throw inside while loop
*       Bug 444964 - [1.7+][resource] False resource leak warning (try-with-resources for ByteArrayOutputStream -
return inside for loop)
*     Jesper Steen Moller -
 Contributions for
*       bug 404146 - [1.7][compiler] nested try-catch-finally-blocks leads to unrunnable Java byte code
*     Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                     Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/ISourceModule.java
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*    Dennis Hendriks - Contribution for bug 188796 - [jsr199] Using JSR199 to extend ECJ
*    Dennis Hendriks - fix for bug 574449.
*    Frits Jalvingh  - fix for bug 533830.
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*         Bug 407191 - [1.8] Binary access support for type annotations
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/impl/DoubleConstant.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/impl/Constant.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/impl/StringConstant.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/HashtableOfObject.java
*
 /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/impl/ShortConstant.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/impl/FloatConstant.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/impl/LongConstant.java

* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/impl/CharConstant.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/impl/BooleanConstant.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/JavadocArgumentExpression.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/impl/IntConstant.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/AccessRuleSet.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/PackageVisibilityStatement.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredModule.java
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*       Bug 440687 - [compiler][batch][null] improve command line option for external annotations
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredOpensStatement.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredProvidesStatement.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ExportsStatement.java
*
 /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredExportsStatement.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredModuleReference.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredTypeReference.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredPackageVisibilityStatement.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ModuleStatement.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredModuleStatement.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredRequiresStatement.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredExport.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/HashtableOfModule.java
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*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
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*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/BreakStatement.java

* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/flow/SwitchFlowContext.java
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*       bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*       bug 292478 - Report potentially null across variable assignment
*       bug 335093 - [compiler][null] minimal hook for future null annotation support
*       bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 358903 - Filter practically unimportant resource leak warnings
*       bug 370639 - [compiler][resource] restore the default for resource leak warnings
*       bug 365859 - [compiler][null] distinguish warnings based on flow analysis vs. null annotations
*       bug 388996 - [compiler][resource] Incorrect 'potential resource leak'
*       bug 394768 - [compiler][resource] Incorrect resource leak warning when creating stream in conditional
*       bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*       bug 383368 - [compiler][null] syntactic null analysis for field references
*       bug 400761 - [compiler][null] null may be return as boolean without a diagnostic
*       Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 427438 - [1.8][compiler] NPE at
org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*       Bug 430150 - [1.8][null] stricter checking against type variables
*       Bug 453483 - [compiler][null][loop] Improve null analysis for loops
*     Jesper S Moller - Contributions for
*       Bug 378674 - "The method can be declared as static" is wrong
*       Bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
*       Bug 529556 - [18.3] Add content assist support for 'var' as a type
*       Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*       Bug 409250 - [1.8][compiler] Various loose ends in 308 code generation
*       Bug 426616 - [1.8][compiler] Type Annotations, multiple problems
*******************************************************************************/
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*  Bug 427438 - [1.8][compiler] NPE at
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*  Stephan Herrmann - Contributions for
*  bug 359334 - Analysis for resource leak warnings does not consider exceptions as method exit points
*  bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*  bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*  Bug 429430 - [1.8] Lambdas and method reference infer wrong exception type with
 generics (RuntimeException instead of IOException)
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*  David Foerster - patch for toUpperCase as described in https://bugs.eclipse.org/bugs/show_bug.cgi?id=153125
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*  Christoph Läubrich - adding helper for getting a JarFileSystem
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*  Stephan Herrmann <stephan@cs.tu-berlin.de> - Contribution for bug 185682 - Increment/decrement operators mark local variables as read
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/JavadocFieldReference.java

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*         bug 335093 - [compiler][null] minimal hook for future null annotation support
*         bug 349326 - [1.7] new warning for missing try-with-resources
*         bug 186342 - [compiler][null] Using annotations for null checking
*         bug 365983 - [compiler][null] AIOOB with null annotation analysis and varargs
*         bug 368546 - [compiler][resource] Avoid remaining false positives found when
 compiling the Eclipse SDK
*         bug 370930 - NonNull annotation not considered for enhanced for loops
*         bug 365859 - [compiler][null] distinguish warnings based on flow analysis vs. null annotations
*         bug 392862 - [1.8][compiler][null] Evaluate null annotations on array types
*         bug 331649 - [compiler][null] consider null annotations for fields
*         bug 383368 - [compiler][null] syntactic null analysis for field references
*         Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*         Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*         Bug 415291 - [1.8][null] differentiate type incompatibilities due to null annotations
*         Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*         Bug 416307 - [1.8][compiler][null] subclass with type parameter substitution confuses null checking
*         Bug 417758 - [1.8][null] Null safety compromise
 during array creation.
*         Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*         Bug 424415 - [1.8][compiler] Eventual resolution of ReferenceExpression is not seen to be happening.
*         Bug 418537 - [1.8][null] Fix null type annotation analysis for poly conditional expressions
*         Bug 428352 - [1.8][compiler] Resolution errors don't always surface
*         Bug 429430 - [1.8] Lambdas and method reference infer wrong exception type with generics (RuntimeException
instead of IOException)
*         Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*         Bug 453483 - [compiler][null][loop] Improve null analysis for loops
*         Bug 455723 - Nonnull argument not correctly inferred in loop
*         Andy Clement - Contributions for
*                         Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
 work)
*                         Bug 409250 - [1.8][compiler] Various loose ends in 308 code generation
*******************************************************************************/
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*       Bug 405066 - [1.8][compiler][codegen] Implement code generation infrastructure for JSR335
*       Bug 406982 - [1.8][compiler] Generation of MethodParameters Attribute in classfile
*       Bug 416885 - [1.8][compiler]IncompatibleClassChange error (edit)
*       Bug 412149 - [1.8][compiler] Emit repeated annotations into the designated container
*     Andy Clement (GoPivotal, Inc) aclement@gopivotal.com
 - Contributions for
*                       Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
work)
*                       Bug 409236 - [1.8][compiler] Type annotations on intersection cast types dropped by code
generator
*                       Bug 409246 - [1.8][compiler] Type annotations on catch parameters not handled properly
*                       Bug 415541 - [1.8][compiler] Type annotations in the body of static initializer get dropped
*                       Bug 415399 - [1.8][compiler] Type annotations on constructor results dropped by the code
generator
*                       Bug 415470 - [1.8][compiler] Type annotations on class declaration go vanishing
*                       Bug 405104 - [1.8][compiler][codegen] Implement support for serializeable lambdas
*                       Bug 434556 - Broken class file generated for incorrect annotation usage
*                       Bug 442416
 - $deserializeLambda$ missing cases for nested lambdas
*     Stephan Herrmann - Contribution for
*       Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
*     Olivier Tardieu tardieu@us.ibm.com - Contributions for
*       Bug 442416 - $deserializeLambda$ missing cases for nested lambdas
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*  Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's work)
*  Bug 409246 - [1.8][compiler] Type annotations on catch parameters not handled properly
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*  bug 186342 - [compiler][null] Using annotations for null checking
*  bug 367203 - [compiler][null] detect assigning null to nonnull argument
*  bug 365519 - editorial cleanup after bug 186342 and bug 365387
*  bug 365662 - [compiler][null] warn on contradictory and redundant null annotations
*  bug 365531 - [compiler][null] investigate alternative strategy for internally
 encoding nullness defaults
*  bug 388281 - [compiler][null] inheritance of null annotations as an option
*  Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*  Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*  Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*  Bug 425152 - [1.8] [compiler] Lambda Expression not resolved but flow analyzed leading to NPE.
*  Bug 423505 - [1.8] Implement "18.5.4 More Specific Method Inference"
*  Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*  Bug 438012 - [1.8][null] Bogus Warning: The nullness annotation is redundant with a default that applies to this
location
*  Bug 440759 - [1.8][null] @NonNullByDefault should never affect wildcards and uses of a type variable
*  Bug 443347 - [1.8][null]
 @NonNullByDefault should not affect constructor arguments of an anonymous instantiation
*  Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*  Bug 466713 - Null Annotations: NullPointerException using <int @Nullable []> as Type Param
*  Bug 456584 - [1.8][null] Bogus warning for return type variable's @NonNull annotation being 'redundant'
*  Bug 471611 - Error on hover on call to generic method with null annotation
*  Jesper Steen Moller - Contributions for
*  Bug 412150 [1.8] [compiler] Enable reflected parameter names during annotation processing
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*       bug 370930 - NonNull annotation not considered for enhanced for loops
*       bug 365859 - [compiler][null] distinguish warnings based on flow analysis vs. null annotations
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*       bug 393719 - [compiler] inconsistent warnings
 on iteration variables
*       Bug 411964 - [1.8][null] leverage null type annotation in foreach statement
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 453483 - [compiler][null][loop] Improve null analysis for loops
*       Bug 415790 - [compiler][resource]Incorrect potential resource leak warning in for loop with close in try/catch
*     Jesper S Moller -  Contribution for
*       bug 401853 - Eclipse Java compiler creates invalid bytecode (java.lang.VerifyError)
*                         bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
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*     Jesper S Moller - Contributions for
*       Bug 405066 - [1.8][compiler][codegen] Implement code generation infrastructure for JSR335
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*           bug 349326 - [1.7] new warning for missing try-with-resources
*           bug 359362 - FUP of bug 349326: Resource leak on non-Closeable resource
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 358903 - Filter practically unimportant resource leak warnings
*       bug 400421 - [compiler] Null analysis for fields does not take @com.google.inject.Inject
 into account
*       bug 382069 - [null] Make the null analysis consider JUnit's assertNotNull similarly to assertions
*       Bug 410218 - Optional warning for arguments of "unexpected" types to Map#get(Object),
Collection#remove(Object) et al.
*     Jesper S Moller <jesper@selskabet.org> -  Contributions for
*       Bug 412153 - [1.8][compiler] Check validity of annotations which may be repeatable
*     Ulrich Grave <ulrich.grave@gmx.de> - Contributions for
*                       bug 386692 - Missing "unused" warning on "autowired" fields
*     Pierre-Yves B. <pyvesdev@gmail.com> - Contribution for
*                       bug 542520 - [JUnit 5] Warning The method xxx from the type X is never used locally is shown
when using MethodSource
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*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 429384 - [1.8][null] implement conformance rules for null-annotated lower / upper type bounds
*       Bug 441797 - [1.8] synchronize type annotations on capture and its wildcard
*       Bug 456497 - [1.8][null] during inference nullness from target type is lost against weaker
 hint from applicability analysis
*       Bug 456924 - StackOverflowError during compilation
*       Bug 462790 - [null] NPE in Expression.computeConversion()
*     Jesper S Møller - Contributions for bug 381345 : [1.8] Take care of the Java 8 major version
*       Bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
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*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
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*  Stephan Herrmann - Contributions for
*  bug 325755 - [compiler] wrong initialization state after conditional expression
*  bug 320170 - [compiler] [null] Whitebox issues in null analysis
*  bug 292478 - Report potentially null across variable assignment
*  bug 332637 - Dead Code detection removing code that isn't dead
*  bug 341499 - [compiler][null] allocate extra bits in all methods of UnconditionalFlowInfo
*  bug 349326 - [1.7] new warning for missing try-with-resources
*  bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*  bug 386181 - [compiler][null] wrong transition in UnconditionalFlowInfo.mergedWith()
*  bug 394768 - [compiler][resource] Incorrect resource leak warning when creating stream in conditional
*  Bug 453483 - [compiler][null][loop] Improve null analysis for loops
*  Bug 454031 - [compiler][null][loop] bug in null analysis; wrong "dead code" detection
*  Bug 421035 - [resource] False alarm of resource leak warning when casting a closeable in its assignment
**********/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/flow/UnconditionalFlowInfo.java
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Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/Messages.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ASTVisitor.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/AnnotationBinding.java
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*  Stephan Herrmann - Contribution for
*  Bug 458396 - NPE in CodeStream.invoke()
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/problem/ProblemHandler.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/AutomaticModuleNaming.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/ModuleReferenceImpl.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/batch/BasicModule.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/FloatUtil.java
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* Contributors:
*     IBM Corporation - initial API and implementation
*     Walter Harley   - Patch for ensuring the parent folders are created
*******************************************************************************/
```

Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/tool/EclipseFileObject.java
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*
* Contributors:
*    tyeung@bea.com - initial API and implementation
*        Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*          Bug 407191 - [1.8] Binary access support for type annotations
*******************************************************************************/
```

Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/FieldInfoWithAnnotation.java
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* Contributors:
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```

```
*    IBM Corporation - added the following constants
*        NonStaticAccessToStaticField
*        NonStaticAccessToStaticMethod
*        Task
*        ExpressionShouldBeAVariable
*        AssignmentHasNoEffect
*    IBM Corporation - added the following constants
*        TooManySyntheticArgumentSlots
*        TooManyArrayDimensions
*        TooManyBytesForStringConstant
*        TooManyMethods
*        TooManyFields
 *        NonBlankFinalLocalAssignment
*        ObjectCannotHaveSuperTypes
*        MissingSemiColon
*        InvalidParenthesizedExpression
*        EnclosingInstanceInConstructorCall
*        BytecodeExceeds64KLimitForConstructor
*        IncompatibleReturnTypeForNonInheritedInterfaceMethod
*        UnusedPrivateMethod
*        UnusedPrivateConstructor
*        UnusedPrivateType
*        UnusedPrivateField
*        IncompatibleExceptionInThrowsClauseForNonInheritedInterfaceMethod
*        InvalidExplicitConstructorCall
*    IBM Corporation - added the following constants
*        PossibleAccidentalBooleanAssignment
*        SuperfluousSemicolon
*        IndirectAccessToStaticField
*        IndirectAccessToStaticMethod
*        IndirectAccessToStaticType
*        BooleanMethodThrowingException
*        UnnecessaryCast
*        UnnecessaryArgumentCast
*        UnnecessaryInstanceof
*
  FinallyMustCompleteNormally
*        UnusedMethodDeclaredThrownException
*        UnusedConstructorDeclaredThrownException
*        InvalidCatchBlockSequence
*        UnqualifiedFieldAccess
*    IBM Corporation - added the following constants
*        Javadoc
*        JavadocUnexpectedTag
*        JavadocMissingParamTag
*        JavadocMissingParamName
*        JavadocDuplicateParamName
*        JavadocInvalidParamName
```

```
*       JavadocMissingReturnTag
*       JavadocDuplicateReturnTag
*       JavadocMissingThrowsTag
*       JavadocMissingThrowsClassName
*       JavadocInvalidThrowsClass
*       JavadocDuplicateThrowsClassName
*       JavadocInvalidThrowsClassName
*       JavadocMissingSeeReference
*       JavadocInvalidSeeReference
*       JavadocInvalidSeeHref
*       JavadocInvalidSeeArgs
*       JavadocMissing
*       JavadocInvalidTag
*       JavadocMessagePrefix
 *       EmptyControlFlowStatement
*    IBM Corporation - added the following constants
*       IllegalUsageOfQualifiedTypeReference
*       InvalidDigit
*    IBM Corporation - added the following constants
*       ParameterAssignment
*       FallthroughCase
*    IBM Corporation - added the following constants
*                       UnusedLabel
*                       UnnecessaryNLSTag
*                       LocalVariableMayBeNull
*                       EnumConstantsCannotBeSurroundedByParenthesis
*                       JavadocMissingIdentifier
*                       JavadocNonStaticTypeFromStaticInvocation
*                       RawTypeReference
*                       NoAdditionalBoundAfterTypeVariable
*                       UnsafeGenericArrayForVarargs
*                       IllegalAccessFromTypeVariable
*
  AnnotationValueMustBeArrayInitializer
*                       InvalidEncoding
*                       CannotReadSource
*                       EnumStaticFieldInInInitializerContext
*                       ExternalProblemNotFixable
*                       ExternalProblemFixable
*    IBM Corporation - added the following constants
*                       AnnotationValueMustBeAnEnumConstant
*                       OverridingMethodWithoutSuperInvocation
*                       MethodMustOverrideOrImplement
*                       TypeHidingTypeParameterFromType
*                       TypeHidingTypeParameterFromMethod
*                       TypeHidingType
*    IBM Corporation - added the following constants
*       NullLocalVariableReference
```

```
*          PotentialNullLocalVariableReference
*          RedundantNullCheckOnNullLocalVariable
*          NullLocalVariableComparisonYieldsFalse
 *          RedundantLocalVariableNullAssignment
*          NullLocalVariableInstanceofYieldsFalse
*          RedundantNullCheckOnNonNullLocalVariable
*          NonNullLocalVariableComparisonYieldsFalse
*    IBM Corporation - added the following constants
*                              InvalidUsageOfTypeParametersForAnnotationDeclaration
*                              InvalidUsageOfTypeParametersForEnumDeclaration
*    IBM Corporation - added the following constants
*          RedundantSuperinterface
*  Benjamin Muskalla - added the following constants
*        MissingSynchronizedModifierInInheritedMethod
*  Stephan Herrmann  - added the following constants
*        UnusedObjectAllocation
*        PotentiallyUnclosedCloseable
*        PotentiallyUnclosedCloseableAtExit
*        UnclosedCloseable
*        UnclosedCloseableAtExit
*        ExplicitlyClosedAutoCloseable
*           RequiredNonNullButProvidedNull
 *         RequiredNonNullButProvidedPotentialNull
*         RequiredNonNullButProvidedUnknown
*         NullAnnotationNameMustBeQualified
*         IllegalReturnNullityRedefinition
*         IllegalRedefinitionToNonNullParameter
*         IllegalDefinitionToNonNullParameter
*         ParameterLackingNonNullAnnotation
*         ParameterLackingNullableAnnotation
*         PotentialNullMessageSendReference
*         RedundantNullCheckOnNonNullMessageSend
*         CannotImplementIncompatibleNullness
*         RedundantNullAnnotation
*        RedundantNullDefaultAnnotation
*        RedundantNullDefaultAnnotationPackage
*        RedundantNullDefaultAnnotationType
*        RedundantNullDefaultAnnotationMethod
*        ContradictoryNullAnnotations
*        IllegalAnnotationForBaseType
*        RedundantNullCheckOnSpecdNonNullLocalVariable
*        SpecdNonNullLocalVariableComparisonYieldsFalse
*        RequiredNonNullButProvidedSpecdNullable
*        MissingDefaultCase
 *        MissingEnumConstantCaseDespiteDefault
*        UninitializedLocalVariableHintMissingDefault
*        UninitializedBlankFinalFieldHintMissingDefault
*        ShouldReturnValueHintMissingDefault
```

* IllegalModifierForInterfaceDefaultMethod
* InheritedDefaultMethodConflictsWithOtherInherited
* ConflictingNullAnnotations
* ConflictingInheritedNullAnnotations
* UnsafeElementTypeConversion
* ArrayReferencePotentialNullReference
* DereferencingNullableExpression
* NullityMismatchingTypeAnnotation
* NullityMismatchingTypeAnnotationSuperHint
* NullityUncheckedTypeAnnotationDetail
* NullityUncheckedTypeAnnotationDetailSuperHint
* NullableFieldReference
* UninitializedNonNullField
* UninitializedNonNullFieldHintMissingDefault
* NonNullMessageSendComparisonYieldsFalse
* RedundantNullCheckOnNonNullSpecdField
* NonNullSpecdFieldComparisonYieldsFalse
* NonNullExpressionComparisonYieldsFalse
* RedundantNullCheckOnNonNullExpression
* ReferenceExpressionParameterNullityMismatch
* ReferenceExpressionParameterNullityUnchecked
* ReferenceExpressionReturnNullRedef
* ReferenceExpressionReturnNullRedefUnchecked
* DuplicateInheritedDefaultMethods
* SuperAccessCannotBypassDirectSuper
* SuperCallCannotBypassOverride
* ConflictingNullAnnotations
* ConflictingInheritedNullAnnotations
* UnsafeElementTypeConversion
* PotentialNullUnboxing
* NullUnboxing
* NullExpressionReference
* PotentialNullExpressionReference
* RedundantNullCheckAgainstNonNullType
* NullAnnotationUnsupportedLocation
* NullAnnotationUnsupportedLocationAtType
* NullityMismatchTypeArgument
* ContradictoryNullAnnotationsOnBound
* UnsafeNullnessCast
* ContradictoryNullAnnotationsInferred
* NonNullDefaultDetailIsNotEvaluated
* NullNotCompatibleToFreeTypeVariable
* NullityMismatchAgainstFreeTypeVariable
* ImplicitObjectBoundNoNullDefault
* IllegalParameterNullityRedefinition
* ContradictoryNullAnnotationsInferredFunctionType
* IllegalReturnNullityRedefinitionFreeTypeVariable
* UnlikelyCollectionMethodArgumentType

```
*        UnlikelyEqualsArgumentType
*      Jesper S Moller  - added the following constants
*        TargetTypeNotAFunctionalInterface
*        OuterLocalMustBeEffectivelyFinal
*        IllegalModifiersForPackage
*        DuplicateAnnotationNotMarkedRepeatable
*        DisallowedTargetForContainerAnnotation
*        RepeatedAnnotationWithContainerAnnotation
*        ContainingAnnotationMustHaveValue
*        ContainingAnnotationHasNonDefaultMembers
*        ContainingAnnotationHasWrongValueType
*         ContainingAnnotationHasShorterRetention
 *         RepeatableAnnotationHasTargets
*        RepeatableAnnotationTargetMismatch
*        RepeatableAnnotationIsDocumented
*        RepeatableAnnotationIsInherited
*        RepeatableAnnotationWithRepeatingContainerAnnotation
*        VarLocalMultipleDeclarators
*        VarLocalCannotBeArray
*        VarLocalReferencesItself
*        VarLocalWithoutInitizalier
*        VarLocalInitializedToNull
*        VarLocalCannotBeArrayInitalizers
*        VarLocalCannotBeLambda
*        VarLocalCannotBeMethodReference
*        VarIsReserved
*        VarIsReservedInFuture
*        VarIsNotAllowedHere
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/core/compiler/IProblem.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ExternalAnnotationSuperimposer.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/SwitchExpression.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/IMultiModuleEntry.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/INameEnvironmentExtension.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/IModuleAwareNameEnvironment.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ProvidesStatement.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/Pattern.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/TypePattern.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/batch/ClasspathSourceJar.java

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/apt/util/EclipseFileManager.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/tool/EclipseFileManager.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/AnnotationMethodDeclaration.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ClassLiteralAccess.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredUnit.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredField.java
*
 /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/ICompilationUnit.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/INameEnvironment.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/CompilationResult.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/NameEnvironmentAnswer.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredElement.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/batch/ClasspathLocation.java
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*  Dennis Hendriks - initial API and implementation
*  IBM Corporation - Contribution for bug 188796
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*
* Contributors:
*     IBM Corporation - initial API and implementation
*     Stephan Herrmann - Contributions for
*       bug 342671 - ClassCastException: org.eclipse.jdt.internal.compiler.lookup.SourceTypeBinding cannot be cast to
org.eclipse.jdt.internal.compiler.lookup.ArrayBinding
*       Bug 420894 - ClassCastException in DefaultBindingResolver.resolveType(Type)
*       bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 415043 - [1.8][null] Follow-up re null type
 annotations after bug 392099
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*       Bug 434600 - Incorrect null analysis error reporting on type parameters
*       Bug 435570 - [1.8][null] @NonNullByDefault illegally tries to affect "throws E"
*       Bug 456508 - Unexpected RHS PolyTypeBinding for: <code-snippet>
*       Bug 466713 - Null Annotations: NullPointerException using <int @Nullable []> as Type Param
*       Andy Clement - Contributions for
*                       Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
work)
*******************************************************************************/
```

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ParameterizedSingleTypeReference.java
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*     Stephan Herrmann <stephan@cs.tu-berlin.de> - Contributions for
*         Bug 328281 - visibility leaks not detected when analyzing unused field in private class
*         Bug 300576 - NPE Computing type hierarchy when compliance doesn't match libraries
*         Bug 354536 - compiling package-info.java still depends on the order of compilation units
*         Bug 349326 - [1.7] new warning for missing try-with-resources
*         Bug
 358903 - Filter practically unimportant resource leak warnings
*      Bug 395977 - [compiler][resource] Resource leak warning behavior possibly incorrect for anonymous inner class
*      Bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*      Bug 416176 - [1.8][compiler][null] null type annotations cause grief on type variables
*      Bug 427199 - [1.8][resource] avoid resource leak warnings on Streams that have no resource
*      Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
```

```
*       Bug 434570 - Generic type mismatch for parametrized class annotation attribute with inner class
*       Bug 444024 - [1.8][compiler][null] Type mismatch error in annotation generics assignment which happens
"sometimes"
*       Bug 459967 - [null] compiler should know about nullness of special methods like MyEnum.valueOf()
*        Andy Clement (GoPivotal, Inc) aclement@gopivotal.com -
 Contributions for
*                       Bug 415821 - [1.8][compiler] CLASS_EXTENDS target type annotation missing for anonymous
classes
*     het@google.com - Bug 456986 - Bogus error when annotation processor generates annotation type
*     Lars Vogel <Lars.Vogel@vogella.com> - Contributions for
*          Bug 473178
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ClassScope.java
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*     Stephan Herrmann - Contributions for
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       bug 388281 - [compiler][null] inheritance of null annotations as an option
*       Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*******************************************************************************/
```

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*     Stephan Herrmann <stephan@cs.tu-berlin.de> - Contributions for
*       bug 328281 - visibility leaks not detected when analyzing unused field in private class
*       bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 365836 - [compiler][null] Incomplete propagation of null defaults.
*       bug 365519 - editorial cleanup after bug 186342
 and bug 365387
*       bug 365662 - [compiler][null] warn on contradictory and redundant null annotations
*       bug 365531 - [compiler][null] investigate alternative strategy for internally encoding nullness defaults
*       bug 366063 - Compiler should not add synthetic @NonNull annotations
*       bug 384663 - Package Based Annotation Compilation Error in JDT 3.8/4.2 (works in 3.7.2)
*       bug 386356 - Type mismatch error with annotations and generics
*       bug 388281 - [compiler][null] inheritance of null annotations as an option
*       bug 331649 - [compiler][null] consider null annotations for fields
*       bug 380896 - [compiler][null] Enum constants not recognised as being NonNull.
*       bug 391376 - [1.8] check interaction of default methods with bridge methods and generics
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
 *       Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*       Bug 415850 - [1.8] Ensure RunJDTCoreTests can cope with null annotations enabled
*       Bug 416172 - [1.8][compiler][null] null type annotation not evaluated on method return type
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 426048 - [1.8] NPE in TypeVariableBinding.internalBoundCheck when parentheses are not balanced
*       Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*       Bug 432348 - [1.8] Internal compiler error (NPE) after upgrade to 1.8
*       Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
*       Bug 435570 - [1.8][null] @NonNullByDefault illegally tries to affect "throws E"
*       Bug 441693 - [1.8][null]
 Bogus warning for type argument annotated with @NonNull
*       Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*       Bug 457210 - [1.8][compiler][null] Wrong Nullness errors given on full build build but not on incremental build?
*       Bug 461250 - ArrayIndexOutOfBoundsException in SourceTypeBinding.fields
*       Bug 466713 - Null Annotations: NullPointerException using <int @Nullable []> as Type Param
*      Jesper S Moller <jesper@selskabet.org> -  Contributions for
*       Bug 412153 - [1.8][compiler] Check validity of annotations which may be repeatable
*      Till Brychcy - Contributions for
*           bug 415269 - NonNullByDefault is not always inherited to nested classes
*      Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                       Bug 405104 - [1.8][compiler][codegen] Implement support for serializeable lambdas
*      Sebastian Zarnekow - Contributions
 for
*       bug 544921 - [performance] Poor performance with large source files
```

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*    wharley@bea.com - initial API and implementation
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* Contributors:
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*     Stephan Herrmann  - Contribution for bug 295551
*     Jesper S Moller   - Contributions for
*         Bug 405066 - [1.8][compiler][codegen] Implement code generation infrastructure for JSR335
*     Frits Jalvingh    - contributions for bug 533830.
```

```
*     Red Hat Inc.      - add module-info Javadoc support
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/CompilationUnitDeclaration.java
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* Contributors:
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*     Stephan Herrmann - Contribution for
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*       bug 402993 - [null] Follow up of bug 401088: Missing warning about redundant null check
*       Bug 453483 - [compiler][null][loop] Improve null analysis for loops
*       Bug 421035 - [resource] False alarm of resource leak warning when casting a closeable in its assignment
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/flow/ExceptionHandlingFlowContext.java

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* Contributors:
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*     Stephan Herrmann - Contributions for
*       bug 292478 - Report potentially null across variable assignment
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*       bug 392862 - [1.8][compiler][null] Evaluate null annotations on array types
*       bug 331649 - [compiler][null] consider null annotations for fields
*       bug 383368 - [compiler][null] syntactic null analysis for field
 references
*       bug 400761 - [compiler][null] null may be return as boolean without a diagnostic
*       bug 402993 - [null] Follow up of bug 401088: Missing warning about redundant null check
*       bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred
checking
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 426792 - [1.8][inference][impl] generify new type inference engine
*       Bug 423505 - [1.8] Implement "18.5.4 More Specific Method Inference"
*       Bug 427438 - [1.8][compiler] NPE at
org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*       Bug 426996 - [1.8][inference]
 try to avoid method Expression.unresolve()?
*       Bug 428274 - [1.8] [compiler] Cannot cast from Number to double
*       Bug 428352 - [1.8][compiler] Resolution errors don't always surface
*       Bug 452788 - [1.8][compiler] Type not correctly inferred in lambda expression
*     Lars Vogel <Lars.Vogel@vogella.com> - Contributions for
*         Bug 473178
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*  wharley@bea.com - initial API and implementation
*  IBM Corporation - fix for 342598
*  IBM Corporation - Java 8 support
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*  Christoph Läubrich - use Filesystem helper method
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*  Benjamin Muskalla - Contribution for bug 239066
*  Stephan Herrmann  - Contributions for
*  bug 236385 - [compiler] Warn for potential programming problem if an object is created but not used
*  bug 295551 - Add option to automatically promote all warnings to errors
*  bug 349326 - [1.7] new warning for missing try-with-resources
*  bug 186342 - [compiler][null] Using annotations for null checking
*  bug
370639 - [compiler][resource] restore the default for resource leak warnings
*  bug 366063 - Compiler should not add synthetic @NonNull annotations
*  bug 374605 - Unreasonable warning for enum-based switch statements
*  bug 388281 - [compiler][null] inheritance of null annotations as an option
*  bug 381443 - [compiler][null] Allow parameter widening from @NonNull to unannotated
*  bug 383368 - [compiler][null] syntactic null analysis for field references
*  Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*  Bug 410218 - Optional warning for arguments of "unexpected" types to Map#get(Object),
Collection#remove(Object) et al.
*  Jesper Steen Moller - Contributions for
*  bug 404146 - [1.7][compiler] nested try-catch-finally-blocks leads to unrunnable Java byte code
*  bug 407297 - [1.8][compiler] Control generation of parameter names by option
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/impl/CompilerOptions.java
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*  Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's work)
*  Bug 409247 - [1.8][compiler] Verify error with code allocating multidimensional array
*  Bug 409517 - [1.8][compiler] Type annotation problems on more elaborate array references
*
Bug 409250 - [1.8][compiler] Various loose ends in 308 code generation
**********/

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*  Bug 407191 - [1.8] Binary access support for type annotations
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*     Stephan Herrmann - Contribution for
*          bug 382347 - [1.8][compiler] Compiler accepts incorrect default method inheritance
*       bug 388954 - [1.8][compiler] detect default methods in class files
*       bug 388281 - [compiler][null] inheritance of null annotations as an option
*       bug 388739 - [1.8][compiler] consider default methods when detecting whether a class needs
 to be declared abstract
*       bug 390883 - [1.8][compiler] Unable to override default method
*       bug 401796 - [1.8][compiler] don't treat default methods as overriding an independent inherited abstract method
*       bug 395681 - [compiler] Improve simulation of javac6 behavior from bug 317719 after fixing bug 388795
*       bug 406928 - computation of inherited methods seems damaged (affecting @Overrides)
*       bug 409473 - [compiler] JDT cannot compile against JRE 1.8
*       Bug 420080 - [1.8] Overridden Default method is reported as duplicated
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/AnnotationMethodInfoWithAnnotations.java
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*  bug 186342 - [compiler][null] Using annotations for null checking
*  bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*  bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
*  Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*  Bug 417295 - [1.8[[null] Massage type annotated
null analysis to gel well with deep encoded type bindings.
*  Bug 425152 - [1.8] [compiler] Lambda Expression not resolved but flow analyzed leading to NPE.
*  Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
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*       bug 331649 - [compiler][null] consider null annotations for fields
*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 426996 - [1.8][inference] try to avoid method Expression.unresolve()?
*     Jesper S Moller - Contributions for
*      bug 382721 - [1.8][compiler] Effectively final variables needs special treatment
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*     Stephan Herrmann - Contributions for
*       bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 361407 - Resource leak warning when resource is assigned to a field outside of constructor
*       bug 370639 - [compiler][resource] restore the default for resource leak warnings
```

```
*       bug 388996 - [compiler][resource] Incorrect
 'potential resource leak'
*       bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred
checking
*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 424710 - [1.8][compiler] CCE in SingleNameReference.localVariableBinding
*       Bug 425152 - [1.8] [compiler] Lambda Expression not resolved but flow analyzed leading to NPE.
*       Bug 424205 - [1.8] Cannot infer type for diamond type with lambda on method invocation
*       Bug 424415 - [1.8][compiler] Eventual resolution of ReferenceExpression is not seen to be happening.
*       Bug 426366 - [1.8][compiler] Type inference doesn't handle multiple candidate target types in outer overload
context
*       Bug 426290 - [1.8][compiler] Inference + overloading => wrong method resolution ?
*       Bug 427483 - [Java 8] Variables in lambdas sometimes can't be resolved
*       Bug 427438 - [1.8][compiler]
 NPE at org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*       Bug 428352 - [1.8][compiler] Resolution errors don't always surface
*       Bug 452788 - [1.8][compiler] Type not correctly inferred in lambda expression
*       Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                       Bug 409245 - [1.8][compiler] Type annotations dropped when call is routed through a synthetic
bridge method
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/tool/Archive.java
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```
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*******************************************************************************/
```

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ContinueStatement.java
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*     Stephan Herrmann - Contributions for
*         bug 186342 - [compiler][null] Using annotations for null checking
*       bug 387612 - Unreachable catch block...exception is never thrown from the try
*       bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*       bug 401456 - Code compiles from javac/intellij, but fails from eclipse
*       bug 401271 - StackOverflowError
 when searching for a methods references
*       bug 405706 - Eclipse compiler fails to give compiler error when return type is a inferred generic
*       Bug 408441 - Type mismatch using Arrays.asList with 3 or more implementations of an interface with the
interface type as the last parameter
*       Bug 413958 - Function override returning inherited Generic Type
*       Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*       Bug 416183 - [1.8][compiler][null] Overload resolution fails with null annotations
*       Bug 416176 - [1.8][compiler][null] null type annotations cause grief on type variables
*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 424710 - [1.8][compiler] CCE in SingleNameReference.localVariableBinding
*       Bug 424205 - [1.8] Cannot infer type for diamond type with lambda on method invocation
*       Bug 424415 - [1.8][compiler]
 Eventual resolution of ReferenceExpression is not seen to be happening.
*       Bug 426366 - [1.8][compiler] Type inference doesn't handle multiple candidate target types in outer overload
context
*       Bug 426290 - [1.8][compiler] Inference + overloading => wrong method resolution ?
*       Bug 426589 - [1.8][compiler] Compiler error with generic method/constructor invocation as vargs argument
*       Bug 426590 - [1.8][compiler] Compiler error with tenary operator
*       Bug 426764 - [1.8] Presence of conditional expression as method argument confuses compiler
*       Bug 426998 - [1.8][compiler] method(java.lang.Class, java.lang.String) not applicable for the arguments
(java.lang.Class, java.lang.String)
*       Bug 423505 - [1.8] Implement "18.5.4 More Specific Method Inference"
*       Bug 427196 - [1.8][compiler] Compiler error for method reference to overloaded method
```

```
*       Bug 427483 - [Java 8] Variables in lambdas sometimes can't be resolved
*       Bug
 427728 - [1.8] Type Inference rejects calls requiring boxing/unboxing
*       Bug 427218 - [1.8][compiler] Verify error varargs + inference
*       Bug 426836 - [1.8] special handling for return type in references to method getClass()?
*       Bug 427628 - [1.8] regression : The method * is ambiguous for the type *
*       Bug 428352 - [1.8][compiler] Resolution errors don't always surface
*       Bug 428366 - [1.8] [compiler] The method valueAt(ObservableList<Object>, int) is ambiguous for the type
Bindings
*       Bug 424728 - [1.8][null] Unexpected error: The nullness annotation 'XXXX' is not applicable at this location
*       Bug 428811 - [1.8][compiler] Type witness unnecessarily required
*       Bug 429424 - [1.8][inference] Problem inferring type of method's parameter
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*       Bug 434570 - Generic type mismatch for parametrized class annotation attribute with inner
 class
*       Bug 434483 - [1.8][compiler][inference] Type inference not picked up with method reference
*       Bug 441734 - [1.8][inference] Generic method with nested parameterized type argument fails on method reference
*       Bug 452194 - Code no longer compiles in 4.4.1, but with confusing error
*       Bug 452788 - [1.8][compiler] Type not correctly inferred in lambda expression
*       Bug 456236 - [1.8][null] Cannot infer type when constructor argument is annotated with @Nullable
*       Bug 437072 - [compiler][null] Null analysis emits possibly incorrect warning for new int[][] despite
@NonNullByDefault
*       Bug 462083 - [1.8][inference] Java 8 generic return type mismatch with interface involving type parameter.
*     Jesper S Moller - Contributions for
*       Bug 378674 - "The method can be declared as static" is wrong
*        Bug 405066 - [1.8][compiler][codegen] Implement code generation infrastructure for JSR335
*     Andy Clement (GoPivotal, Inc)
 aclement@gopivotal.com - Contributions for
*                       Bug 405104 - [1.8][compiler][codegen] Implement support for serializeable lambdas
*     Pierre-Yves B. <pyvesdev@gmail.com> - Contributions for
*                         Bug 559618 - No compiler warning for import from same package
*                         Bug 560630 - No warning on unused import on class from same package
*******************************************************************************/
```

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/Scope.java
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*       Bug 440474 - [null] textual encoding of external null annotations
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/SignatureWrapper.java
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* Contributors:
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*     Stephan Herrmann - Contribution for
*       bug 383368 - [compiler][null] syntactic null analysis for field references
*******************************************************************************/
```

Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/NullLiteral.java
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*     Stephan Herrmann - Contributions for
*       bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 364890 - BinaryTypeBinding should use char constants from Util
*       bug 365387 - [compiler][null] bug 186342: Issues to follow up post review and verification.
*       bug 358903 - Filter practically unimportant resource leak warnings
```

```
*       bug
 365531 - [compiler][null] investigate alternative strategy for internally encoding nullness defaults
*       bug 388800 - [1.8][compiler] detect default methods in class files
*       bug 388281 - [compiler][null] inheritance of null annotations as an option
*       bug 331649 - [compiler][null] consider null annotations for fields
*       bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*       Bug 415850 - [1.8] Ensure RunJDTCoreTests can cope with null annotations enabled
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 427199 - [1.8][resource] avoid resource leak warnings on Streams that have no resource
*       Bug 392245 - [1.8][compiler][null] Define whether
 / how @NonNullByDefault applies to TYPE_USE locations
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*       Bug 390889 - [1.8][compiler] Evaluate options to support 1.7- projects against 1.8 JRE.
*       Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
*       Bug 439516 - [1.8][null] NonNullByDefault wrongly applied to implicit type bound of binary type
*       Bug 434602 - Possible error with inferred null annotations leading to contradictory null annotations
*       Bug 440477 - [null] Infrastructure for feeding external annotations into compilation
*       Bug 441693 - [1.8][null] Bogus warning for type argument annotated with @NonNull
*       Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*       Bug 453475 - [1.8][null] Contradictory null annotations (4.5 M3 edition)
*       Bug 454182 - Internal compiler error when using
 1.8 compliance for simple project
*       Bug 470467 - [null] Nullness of special Enum methods not detected from .class file
*       Bug 447661 - [1.8][null] Incorrect 'expression needs unchecked conversion' warning
*    Jesper Steen Moller - Contributions for
*       Bug 412150 [1.8] [compiler] Enable reflected parameter names during annotation processing
*       Bug 412153 - [1.8][compiler] Check validity of annotations which may be repeatable
*    Sebastian Zarnekow - Contributions for
*       bug 544921 - [performance] Poor performance with large source files
*    Alexander Lehmann - Contributions for
*       bug 566258 - Intermittent NPE in APT RoundDispatcher
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/BinaryTypeBinding.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/OpensStatement.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/UsesStatement.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/PackageExportImpl.java
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* Contributors:
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*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*******************************************************************************/
```

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/UnionTypeReference.java
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*     Stephan Herrmann - Contribution for bug 349326 - [1.7] new warning for missing try-with-resources
*******************************************************************************/
```

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/EmptyStatement.java

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ExtendedTagBits.java
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*       Bug 434602 - Possible error with inferred null annotations leading to contradictory null annotations
*       Bug 456497 - [1.8][null] during inference nullness from target type is lost against weaker hint from applicability
analysis
*       Bug 456487 - [1.8][null] @Nullable type variant of @NonNull-constrained type parameter causes grief
*     Till Brychcy - Contribution for
*       Bug 473713
 - [1.8][null] Type mismatch: cannot convert from @NonNull A1 to @NonNull A1
*******************************************************************************/
/* Cache the derived type, tagging it as a derivative of both the key type and the naked type.
    E.g: int @NonNull [] would be tagged as a derived type of both int and int []. This is not
    needed for correctness, but for annotated object reuse. We provide two alternate ways to
    annotate a type:

    Taking parameterized types as an example, a call to getParamaterizedType can be made with annotations
    to create @NonNull List<@NonNull String> in one stroke. Or a parameterized type can be created first
```

```
    and then annotated via getAnnotatedType. In the former case, the tables get looked up with List as
    the key, in the latter with List<String> as the key.

    Binary vs source, substitutions, annotation re-attribution from SE7 locations etc trigger these
    alternate code paths. Unless care is exercised,
 we will end up with duplicate objects (that share
    the same TypeBinding.id => correctness is not an issue, but memory wastage is)
  */
```

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/TypeSystem.java
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*       Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                     Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
work)
*******************************************************************************/
```

Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/ExceptionLabel.java
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*     Stephan Herrmann - Contribution for bug 186342 - [compiler][null] Using annotations for null checking
*     Jesper Steen Moeller - Contribution for bug 406973 - [compiler] Parse MethodParameters attribute
```

```
*     Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*        Bug 407191 - [1.8] Binary access support for type annotations
*******************************************************************************/
```

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 in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/MethodInfo.java
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*     Stephan Herrmann - Contribution for
*        Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ArrayQualifiedTypeReference.java
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*     Jesper S Moller - Contributions for
*        bug 382701 - [1.8][compiler] Implement semantic analysis of Lambda expressions & Reference expression
*    Stephan Herrmann - Contribution for
*        bug 404649 - [1.8][compiler] detect illegal reference to indirect or redundant super
*        Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*        Bug 416182 - [1.8][compiler][null]
```

Contradictory null annotations not rejected
**********/

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*  Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*  bug 407191 - [1.8] Binary access support for type annotations
*  Stephan Herrmann - Contribution for
*  Bug 440474 - [null] textual encoding of external null annotations
**********/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/IBinaryType.java
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*  Stephan Herrmann - Contribution for
*  Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*  Bug 433478 - [compiler][null] NPE in ReferenceBinding.isCompatibleWith
**********/

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ProblemMethodBinding.java

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*        bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*        bug 392862 - [1.8][compiler][null] Evaluate null annotations on array types
*        bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
*        Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*        Bug 415850 - [1.8] Ensure RunJDTCoreTests
 can cope with null annotations enabled
*        Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*        Bug 427163 - [1.8][null] bogus error "Contradictory null specification" on varags
*        Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*        Bug 434570 - Generic type mismatch for parametrized class annotation attribute with inner class
*        Bug 434600 - Incorrect null analysis error reporting on type parameters
*        Bug 439516 - [1.8][null] NonNullByDefault wrongly applied to implicit type bound of binary type
*        Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
*        Bug 435570 - [1.8][null] @NonNullByDefault illegally tries to affect "throws E"
*        Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*        Bug 437072 - [compiler][null] Null analysis
 emits possibly incorrect warning for new int[][] despite @NonNullByDefault
*        Bug 466713 - Null Annotations: NullPointerException using <int @Nullable []> as Type Param
*        Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                        Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
work)
*                        Bug 409236 - [1.8][compiler] Type annotations on intersection cast types dropped by code
generator
*                        Bug 415399 - [1.8][compiler] Type annotations on constructor results dropped by the code
generator
*      Jesper S Møller <jesper@selskabet.org> -  Contributions for
*                        bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
*                        bug 529556 - [18.3] Add content assist support for 'var' as a type
*
*******************************************************************************/
```

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*     Stephan Herrmann - Contributions for
*        bug 366003 - CCE in ASTNode.resolveAnnotations(ASTNode.java:639)
*        bug 383973 - [1.8][compiler] syntax recovery in the presence of default methods
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredType.java
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*     Stephan Herrmann - Contributions for
*        bug 186342 - [compiler][null] Using annotations for null checking
*        bug 365519 - editorial cleanup after bug 186342 and bug 365387
*        bug 388281 - [compiler][null] inheritance of null annotations as an option
*        bug 388795 - [compiler] detection of name clash depends on order of super interfaces
*        bug 388739 - [1.8][compiler] consider default methods when detecting whether
 a class needs to be declared abstract
*        bug 390883 - [1.8][compiler] Unable to override default method
*        bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*        bug 401246 - [1.8][compiler] abstract class method should now trump conflicting default methods
*        bug 401796 - [1.8][compiler] don't treat default methods as overriding an independent inherited abstract method
```

```
*       bug 403867 - [1.8][compiler] Suspect error about duplicate default methods
*       bug 391376 - [1.8] check interaction of default methods with bridge methods and generics
*       bug 395681 - [compiler] Improve simulation of javac6 behavior from bug 317719 after fixing bug 388795
*       bug 409473 - [compiler] JDT cannot compile against JRE 1.8
*       Bug 420080 - [1.8] Overridden Default method is reported as duplicated
*       Bug 404690 - [1.8][compiler] revisit bridge generation after VM bug is fixed
 *       Bug 410325 - [1.7][compiler] Generified method override different between javac and eclipse compiler
*       Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*       Bug 390889 - [1.8][compiler] Evaluate options to support 1.7- projects against 1.8 JRE.
*       Bug 440773 - [1.8][null]DefaultLocation.RETURN_TYPE erroneously affects method parameters in
@NonNullByDefault
*       Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*       Bug 446442 - [1.8] merge null annotations from super methods
*******************************************************************************/
```

Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/MethodVerifier15.java
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*     Tom Tromey - Contribution for bug 125961
*     Tom Tromey - Contribution for bug 159641
*     Benjamin Muskalla - Contribution for bug 239066
*     Stephan Herrmann  - Contributions for
*          bug 236385 - [compiler] Warn for potential programming problem if an object is created but not used
*          bug 295551 - Add option to automatically promote all warnings to errors
*          bug 359721 - [options] add command line option
 for new warning token "resource"
*       bug 365208 - [compiler][batch] command line options for annotation based null analysis
*       bug 374605 - Unreasonable warning for enum-based switch statements
*       bug 375366 - ECJ ignores unusedParameterIncludeDocCommentReference unless enableJavadoc option is set
*       bug 388281 - [compiler][null] inheritance of null annotations as an option
*       bug 381443 - [compiler][null] Allow parameter widening from @NonNull to unannotated
*       Bug 440477 - [null] Infrastructure for feeding external annotations into compilation
*       Bug 440687 - [compiler][batch][null] improve command line option for external annotations
*       Bug 408815 - [batch][null] Add CLI option for
COMPILER_PB_SYNTACTIC_NULL_ANALYSIS_FOR_FIELDS
```

```
*     Jesper S Moller   - Contributions for
*        bug 407297 - [1.8][compiler] Control generation of parameter names by option
*    Mat Booth - Contribution for bug 405176
*    Frits Jalvingh -
 fix for bug 533830.
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/HashtableOfObjectToIntArray.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/TrueLiteral.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/AccessRestriction.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/DoubleCache.java
*
 /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ProblemFieldBinding.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/LongCache.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/MagicLiteral.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/antadapter/AntAdapterMessages.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/InnerEmulationDependency.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ParameterizedFieldBinding.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/HashtableOfLong.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/HashtableOfType.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/problem/AbortCompilationUnit.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/HashtableOfInt.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/ISourceImport.java
*
 /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ProblemBinding.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/HashtableOfIntValues.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ImportConflictBinding.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/CharLiteral.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/ObjectCache.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/SyntheticArgumentBinding.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ICompilerRequestor.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/Label.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/PostfixExpression.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/IDebugRequestor.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/StringLiteralConcatenation.java
*
 /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/IDependent.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/HashtableOfObjectToInt.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/AnnotationHolder.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/SubRoutineStatement.java

* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/SimpleSet.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/problem/AbortType.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/SyntheticFieldBinding.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/problem/AbortCompilation.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ExtendedStringLiteral.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/FalseLiteral.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/IProblemFactory.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/JavadocSingleNameReference.java
*
 /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/JavadocReturnStatement.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/PrefixExpression.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/InnerClassInfo.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredImport.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/problem/AbortMethod.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/problem/ShouldNotImplement.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/diagnose/RangeUtil.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/OperatorIds.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/FloatCache.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/ClassFileStruct.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/IntegerCache.java
*
 /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/AccessRule.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/SimpleLookupTable.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/CaseLabel.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/JavadocArrayQualifiedTypeReference.java
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*  bug 358827 - [1.7] exception analysis for t-w-r spoils null analysis
*  bug 186342 - [compiler][null] Using annotations for null checking
*  bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*  bug 365859 - [compiler][null] distinguish warnings based on flow analysis vs. null annotations
*  bug 345305 - [compiler][null]
Compiler misidentifies a case of "variable can only be null"
*  bug 383368 - [compiler][null] syntactic null analysis for field references
*  bug 402993 - [null] Follow up of bug 401088: Missing warning about redundant null check
*  bug 403086 - [compiler][null] include the effect of 'assert' in syntactic null analysis for fields
*  bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred checking
*  Bug 453483 - [compiler][null][loop] Improve null analysis for loops
*  Bug 455723 - Nonnull argument not correctly inferred in loop
*  Bug 415790 - [compiler][resource]Incorrect potential resource leak warning in for loop with close in try/catch
*  Bug 446691 - [1.8][null][compiler] NullPointerException in SingleNameReference.analyseCode
**********/

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*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*       bug 392862 - [1.8][compiler][null] Evaluate null annotations on array types
*       bug 383368 - [compiler][null] syntactic null analysis for field references
*       bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred
checking
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/CharArrayMap.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/CharArrayHashMap.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/CharArrayMapper.java
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*  Christoph Läubrich - use Filesystem helper method
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*  IBM Corporation - initial API and implementation
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*  bug 349326 - [1.7] new warning for missing try-with-resources
*  bug 374605 - Unreasonable warning for enum-based switch statements
*  bug 382353 - [1.8][compiler] Implementation property modifiers should be accepted on default methods.
*  bug 382354 - [1.8][compiler] Compiler silent on conflicting modifier
*  bug 401030 - [1.8][null] Null analysis support for lambda methods.
*  Bug
416176 - [1.8][compiler][null] null type annotations cause grief on type variables
*  Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*  Jesper S Moller - Contributions for
*  bug 382701 - [1.8][compiler] Implement semantic analysis of Lambda expressions & Reference expression
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*  Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*  Bug 435570 - [1.8][null] @NonNullByDefault illegally tries to affect "throws E"
*  Bug 466713 - Null Annotations: NullPointerException using <int @Nullable []> as Type Param
**********/

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*  bug 382350 - [1.8][compiler] Unable to invoke inherited default method via I.super.m() syntax
*  bug 404649 - [1.8][compiler] detect illegal reference to indirect or redundant super
*  Jesper S Moller <jesper@selskabet.org> - Contributions for
*  bug 378674 - "The method can be declared as static" is wrong
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*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 365519 - editorial cleanup after bug 186342 and bug 365387
*       bug 365531 - [compiler][null] investigate alternative strategy for internally encoding nullness defaults
*******************************************************************************/
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*     Stephan Herrmann - Contributions for
*          bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*          bug 349326 - [1.7] new warning for missing try-with-resources
*          bug 360328 - [compiler][null] detect null problems in nested code (local class inside a loop)
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 365835 - [compiler][null] inconsistent error reporting.
 *       bug 365519 - editorial cleanup after bug 186342 and bug 365387
*       bug 358903 - Filter practically unimportant resource leak warnings
*       bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*       bug 370639 - [compiler][resource] restore the default for resource leak warnings
*       bug 365859 - [compiler][null] distinguish warnings based on flow analysis vs. null annotations
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*       bug 388996 - [compiler][resource] Incorrect 'potential resource leak'
*       bug 394768 - [compiler][resource] Incorrect resource leak warning when creating stream in conditional
*       bug 383368 - [compiler][null] syntactic null analysis for field references
*       bug 400761 - [compiler][null] null may be return as boolean without a diagnostic
*       bug 401030 - [1.8][null] Null analysis support for lambda
 methods.
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*       Bug 416307 - [1.8][compiler][null] subclass with type parameter substitution confuses null checking
*       Bug 417758 - [1.8][null] Null safety compromise during array creation.
*       Bug 427438 - [1.8][compiler] NPE at
org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*       Bug 430150 - [1.8][null] stricter checking against type variables
*       Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*       Bug 452788 - [1.8][compiler] Type not correctly inferred in lambda expression
*       Bug 453483 - [compiler][null][loop] Improve null analysis for loops
*       Bug 455723 - Nonnull argument not correctly inferred in loop
*     Jesper S Moller - Contributions
 for
*       bug 382701 - [1.8][compiler] Implement semantic analysis of Lambda expressions & Reference expression
```

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*       bug 328281 - visibility leaks not detected when analyzing unused field in private class
*       bug 382353 - [1.8][compiler] Implementation property modifiers should be accepted on default methods.
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*  Jesper Steen Moller - Bug 412150 [1.8] [compiler] Enable reflected parameter names during annotation processing
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*  Nick Teryaev - fix for bug (https://bugs.eclipse.org/bugs/show_bug.cgi?id=40752)
*  Stephan Herrmann - Contributions for
*  bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*  bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*  bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*  bug 383368 - [compiler][null] syntactic null analysis for field references
*  bug 401017 - [compiler][null] casted reference to @Nullable field lacks a warning
*  bug 400761 - [compiler][null] null may be return as boolean without a diagnostic
*  Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*  Bug 416307 - [1.8][compiler][null] subclass with type parameter substitution confuses null checking
*  Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*  Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*  Bug 427438 - [1.8][compiler] NPE at org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*  Bug 430150 - [1.8][null] stricter checking against type variables
*  Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*  Bug 407414 - [compiler][null] Incorrect warning on a primitive type being null

*	Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*	Bug 415541 - [1.8][compiler] Type annotations in the body of static initializer get dropped
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/MissingTypeBinding.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/ISourceType.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ImportBinding.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ImportReference.java
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*  Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*  Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*  Bug 409236 - [1.8][compiler] Type annotations on intersection cast types dropped by code generator
**********/

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*  bug 336428 - [compiler][null] bogus warning "redundant null check" in condition of do {} while() loop
*  bug 186342 - [compiler][null] Using annotations for null checking
*  bug 365519 - editorial cleanup after bug 186342 and bug 365387
*  bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*  bug 365859 - [compiler][null]
distinguish warnings based on flow analysis vs. null annotations
*  bug 385626 - @NonNull fails across loop boundaries
*  bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*  bug 376263 - Bogus "Potential null pointer access" warning
*  bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred checking
*  bug 406384 - Internal error with I20130413
*  Bug 415413 - [compiler][null] NullpointerException in Null Analysis caused by interaction of LoopingFlowContext and FinallyFlowContext
*  Bug 453483 - [compiler][null][loop] Improve null analysis for loops
*  Bug 455557 - [jdt] NPE LoopingFlowContext.recordNullReference
*  Bug 455723 - Nonnull argument not correctly inferred in loop
*  Bug 415790 - [compiler][resource]Incorrect potential resource leak warning in for loop with close in try/catch
*  Bug 421035 - [resource]
False alarm of resource leak warning when casting a closeable in its assignment
*  Jesper S Moller - contributions for
*  bug 404657 - [1.8][compiler] Analysis for effectively final variables fails to consider loops
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*     Jesper S Moller - Bug 392671
*         NPE with a method with explicit this and a following incomplete parameter
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*     Stephan Herrmann - Contribution for
*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 427438 - [1.8][compiler] NPE at
org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*******************************************************************************/
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*       Bug 428811 - [1.8][compiler] Type witness unnecessarily required
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*     Frits Jalvingh  - fix for bug 533830.
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*     IBM Corporation - initial API and implementation
*     Jesper S Moller - Contributions for
*       Bug 405066 - [1.8][compiler][codegen] Implement code generation infrastructure for JSR335
*       Bug 406982 - [1.8][compiler] Generation of MethodParameters Attribute in classfile
*       Bug 416885 - [1.8][compiler]IncompatibleClassChange error (edit)
*       Bug 412153 - [1.8][compiler] Check validity of annotations which may be repeatable
*     Andy Clement (GoPivotal, Inc) aclement@gopivotal.com
 - Contributions for
*                       Bug 405104 - [1.8][compiler][codegen] Implement support for serializeable lambdas
*                       Bug 439889 - [1.8][compiler] [lambda] Deserializing lambda fails with IllegalArgumentException:
"Invalid lambda deserialization"
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/ManifestAnalyzer.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/flow/InsideSubRoutineFlowContext.java
*
 /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/impl/CompilerStats.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredLocalVariable.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/UnresolvedAnnotationBinding.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/Receiver.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/GenericXMLWriter.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/problem/DefaultProblemFactory.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/core/JDTCompilerAdapter.java
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*     Stephan Herrmann - Contributions for
*          bug 343713 - [compiler] bogus line number in constructor of inner class in 1.5 compliance
*          bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 361407 - Resource leak warning when resource is assigned to a field outside of constructor
*       bug 368546 - [compiler][resource] Avoid
 remaining false positives found when compiling the Eclipse SDK
*       bug 383690 - [compiler] location of error re uninitialized final field should be aligned
*       bug 331649 - [compiler][null] consider null annotations for fields
*       bug 383368 - [compiler][null] syntactic null analysis for field references
*       bug 400421 - [compiler] Null analysis for fields does not take @com.google.inject.Inject into account
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 416176 - [1.8][compiler][null] null type annotations cause grief on type variables
*       Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*       Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                       Bug 415399 - [1.8][compiler] Type annotations on constructor results dropped by the code
generator
*     Ulrich Grave <ulrich.grave@gmx.de> - Contributions
 for
*                         bug 386692 - Missing "unused" warning on "autowired" fields
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*  Bug 378674 - "The method can be declared as static" is wrong
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*  bug 186342 - [compiler][null] Using annotations for null checking
*  bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*  Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*  bug 413958 - Function override returning inherited Generic Type
*  Bug 400874 - [1.8][compiler] Inference infrastructure
 should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*  Bug 424710 - [1.8][compiler] CCE in SingleNameReference.localVariableBinding
*  Bug 423505 - [1.8] Implement "18.5.4 More Specific Method Inference"
*  Bug 427438 - [1.8][compiler] NPE at
org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*  Bug 418743 - [1.8][null] contradictory annotations on invocation of generic method not reported
*  Bug 416182 - [1.8][compiler][null] Contradictory null annotations not rejected
*  Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*  Bug 434602 - Possible error with inferred null annotations leading to contradictory null annotations
*  Bug 434483 - [1.8][compiler][inference] Type inference not picked up with method reference
*  Bug 446442 - [1.8] merge null annotations from super methods
*  Bug 457079 - Regression: type
 inference
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/IGenericMethod.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/IGenericType.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/IBinaryNestedType.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/env/ISourceMethod.java
*
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*  bug 185682 - Increment/decrement operators mark local variables as read
*  bug 186342 - [compiler][null] Using annotations for null checking
*  bug 365519 - editorial cleanup after bug 186342 and bug 365387
*  bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*  bug 345305 - [compiler][null]
Compiler misidentifies a case of "variable can only be null"
*  Bug 414380 - [compiler][internal] QualifiedNameReference#indexOfFirstFieldBinding does not point to the first field
*  Bug 458396 - NPE in CodeStream.invoke()
*  Jesper S Moller - Contributions for
*  bug 382721 - [1.8][compiler] Effectively final variables needs special treatment
*  bug 331649 - [compiler][null] consider null annotations for fields
*  bug 383368 - [compiler][null] syntactic null analysis for field references
*  bug 402993 - [null] Follow up of bug 401088: Missing warning about redundant null check
*  Jesper S Moller <jesper@selskabet.org> - Contributions for
*  bug 378674 - "The method can be declared as static" is wrong
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveryScannerData.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/CachedIndexEntry.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/LabeledStatement.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/impl/ITypeRequestor.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/batch/CompilationUnit.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/problem/DefaultProblem.java
No license file was found, but licenses were detected in source scan.

Manifest-Version: 1.0
Created-By: Maven Archiver 3.6.0
Build-Jdk-Spec: 17
Bundle-ManifestVersion: 2
Bundle-SymbolicName: org.eclipse.jdt.core.compiler.batch.source
Bundle-Version: 3.33.0.v20230218-1114
Eclipse-SourceBundle: org.eclipse.jdt.core.compiler.batch;version="3.33.
0.v20230218-1114";roots:="."
Bundle-Name: %bundleName
Bundle-Vendor: %bundleVendor
Bundle-Localization: OSGI-INF/l10n/bundle-src

Name: org/eclipse/jdt/internal/compiler/Compiler.java
SHA-256-Digest: qavdAtD8BxozxHMIVMyxpCXI0SoDXk50Rd/hrDZ/57A=

Name: org/eclipse/jdt/internal/compiler/lookup/Substitution.java
SHA-256-Digest: xbTFqeGH6RpvripaJmxqdl68CqOyNge53jwHmJEt//8=

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SHA-256-Digest: Cg88GD2DrXwbsVHUokBxBQknO68xpMEFyhKycpAX5Mc=

Name: org/eclipse/jdt/internal/compiler/lookup/PackageBinding.java
SHA-256-Digest: AMZ3OrQoHVJcLsAGf1gO7vo40sqnD0mI4iB/PgZdK38=

Name: org/eclipse/jdt/internal/compiler/parser/diagnose/RangeUtil.java
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Name: org/eclipse/jdt/internal/compiler/parser/unicode8/start2.rsc
SHA-256-Digest: /oFYyNQm6bxMPJ0MtgZs+crctPdo50HdEUNMzBO9XLg=

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SHA-256-Digest: DxJFqMppFiOvAOR5DyecFo36HFXQNdK7imEZ6J8qAsg=

Name: org/eclipse/jdt/internal/compiler/lookup/WildcardBinding.java
SHA-256-Digest: xhqG+QC1G9iGlhR29mtyMPO2QGTDJtpRIrSPjX1+dkU=

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SHA-256-Digest: NNengjZg44z2G3PqWSPZr2fJ5fC4DkVR1kf6ZdS3qjM=

Name: org/eclipse/jdt/internal/compiler/ast/Literal.java
SHA-256-Digest: IUPPjPpj8Xoyz2kIJxIOERcxDe1C9vyRlHiG6xIuyC8=

Name: org/eclipse/jdt/internal/compiler/env/IBinaryElementValuePair.java
SHA-256-Digest: ldx+yIRxCL8r+q+vVugtk73HXrle5hA7cEZjCkC/vDo=

Name: org/eclipse/jdt/internal/compiler/lookup/MemberTypeBinding.java
SHA-256-Digest: GkJ3g8Epdr+vyo0iKfUeO961H6VB+MDl0KxhoCpinwk=

Name:
org/eclipse/jdt/internal/compiler/parser/unicode13/part2.rsc
SHA-256-Digest: TslTNlywPQfQNz7lePBTcyeCWt9WSiABnCNgOMMNe9I=

Name: org/eclipse/jdt/internal/compiler/flow/FlowContext.java
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Name: org/eclipse/jdt/internal/compiler/apt/dispatch/HookedJavaFileObjec
t.java
SHA-256-Digest: XJHqmYqtE0StCxfVaCKWnttSusd+eSaKhgvXXSeEZvI=

Name: org/eclipse/jdt/internal/compiler/codegen/AnnotationTargetTypeCons
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SHA-256-Digest: BtCcXDiTxP1WUGdYUr2uR7oYK9v8Z4ocLRXj09oMpvw=

Name: org/eclipse/jdt/internal/compiler/impl/ShortConstant.java
SHA-256-Digest: Ts43r/z8ZaDOT5/neut4K7tAuO/f9yFkKO8faUAGsCk=

Name: org/eclipse/jdt/internal/compiler/problem/ProblemHandler.java
SHA-256-Digest: xEMPReHnCA7IH2FXMghTzWNyc9kyHcx2vjV7N60P61Y=

Name: org/eclipse/jdt/internal/compiler/util/HashtableOfPackage.java
SHA-256-Digest: LsNLf8ljE0GO1MGm1PGZpc7ATtzA7FNzyLMcbR2yfXw=

Name: org/eclipse/jdt/internal/compiler/classfmt/TypeAnnotationInfo.java
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SHA-256-Digest: wanjxAv0+y4OVERKkGiyqPP/v+bHhBBcN4LIsQVCogA=

Name: org/eclipse/jdt/internal/compiler/ast/Wildcard.java
SHA-256-Digest: GwikK+88JokQ3OSU5At9iscSA1mgVKYB2TFQ2+gMcj0=

Name: org/eclipse/jdt/internal/compiler/batch/Main.java
SHA-256-Digest: hHzerf/pH8pPbvTcXWSu9rDOdJu+/SGCEzKpEVYDQiU=

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poser.java
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SHA-256-Digest: CugDXcZIPEKrh1zlRQGJjI3Y6AxtCaU8eU4jPWJVsrQ=

Name: org/eclipse/jdt/internal/compiler/ast/QualifiedSuperReference.java
SHA-256-Digest: +i1OiNmfN3T4Xf272raxQuWTclsak3EshIjWwTKzjww=

Name: org/eclipse/jdt/internal/compiler/parser/parser13.rsc
SHA-256-Digest:
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Name: org/eclipse/jdt/internal/compiler/parser/parser8.rsc
SHA-256-Digest: daNYobh8gp0cps8qx/Nzq2PGaIa1Zv1S8rv/QaaRmFk=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveryScanner.java
SHA-256-Digest: 6E7G09H6AsitqB+1vQvMIYkfIj+78cCzRoOuBjVrXOo=

Name: org/eclipse/jdt/internal/compiler/lookup/AptBinaryLocalVariableBin
ding.java
SHA-256-Digest: CKyCkAchIwH4NJWLrXaS7fBL0LuyGK7kD5fKek92PQM=

Name: org/eclipse/jdt/internal/compiler/lookup/CatchParameterBinding.jav
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SHA-256-Digest: 0Dy6TNAw1c+20wQmUCCdrngzgfTF730TIljxqOHYeCI=

Name: org/eclipse/jdt/internal/compiler/batch/FileFinder.java
SHA-256-Digest: n+/yMuqQ7eCGqyTgRdUwXmRJ9aUqcqmfnCw59/a0Pu4=

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SHA-256-Digest: /Hnw5j96kNTjU3hGHbqWPzNAXrcPQCMgeQ5cJxtcbFk=

Name: org/eclipse/jdt/internal/compiler/parser/unicode12_1/part1.rsc
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Name: org/eclipse/jdt/internal/compiler/parser/RecoveredProvidesStatemen

t.java
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Name: org/eclipse/jdt/internal/compiler/parser/unicode6_2/part0.rsc
SHA-256-Digest: Z1KOOxKI57TdP+hpni3m3QEORk7+zx+HiKRMMx/Fxr0=

Name: org/eclipse/jdt/internal/compiler/apt/model/ExecutableTypeImpl.jav
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SHA-256-Digest: dPdvzf8WLgvQoNUcn/pIKDNvWdn5f7anjxN6l19kS1s=

Name: org/eclipse/jdt/internal/compiler/ast/CombinedBinaryExpression.jav
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SHA-256-Digest: w3xU40x1NsTt3MHusf9ubDPDSaHgysGnUntNRoAxJpE=

Name: org/eclipse/jdt/internal/compiler/env/ClassSignature.java
SHA-256-Digest: X6qSL/DQOnWr7X3Q3eVHPURss21nFChwRG6vP0coEg4=

Name: org/eclipse/jdt/internal/compiler/flow/UnconditionalFlowInfo.java
SHA-256-Digest: PW3l7BEU/LRLER26MiVifPIoAPFDeopZFWIHzbzNspg=

Name: org/eclipse/jdt/internal/compiler/lookup/SortedSimpleNameVector.ja
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SHA-256-Digest: p2t//vJ0GHUpLD6nKVPB+ZaIQsKh8IoCFJjf49/YKG0=

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Name: org/eclipse/jdt/internal/compiler/env/EnumConstantSignature.java
SHA-256-Digest: aYkm4BGYN9qUovPcsK8gsqJIa28ORNKua/U2egW5Z9M=

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SHA-256-Digest: ld/+YfPq+xwmM4lm8yod68K6/cdjpTuLMq9jFgS9LW8=

Name: org/eclipse/jdt/internal/compiler/ast/NormalAnnotation.java
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SHA-256-Digest: Y94kLaXfvOiepYHQZlzc3iT/fUKn2KoLENCMTC+SOqY=

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ns.java
SHA-256-Digest: OT+wMvX0wsIedHrSeOLzZl41wEdhg6uiA8ZQtl2q8vE=

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java
SHA-256-Digest: RqvgIoX5tOjWepQGLyFeHJ2xXx2Z6+qK4UFB5NSHgH8=

Name: org/eclipse/jdt/internal/compiler/tool/EclipseCompilerRequestor.ja
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SHA-256-Digest: lscChrpjf7+U4MUR7mLyEA1UFp6inqGZOGxSIfc7gGQ=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredExportsStatement
.java
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org/eclipse/jdt/internal/compiler/classfmt/AnnotationInfo.java
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SHA-256-Digest: 2X2o+CRKzUI//XeswDluGwcOVrfYuXZSbtUXUUrfmBI=

Name: org/eclipse/jdt/internal/compiler/util/CharArray.java
SHA-256-Digest: tfycJMPkhQRRyPF6RM7QbYKN5lUjBbwYg3a2sRCt33U=

Name: org/eclipse/jdt/internal/compiler/parser/unicode11/start2.rsc
SHA-256-Digest: 04VMyR2oGLNoJWK6xYvZv3gPXGxYB6RpHuNdBUBuFAo=

Name: org/eclipse/jdt/internal/compiler/apt/model/ExecutableElementImpl.
java
SHA-256-Digest: waJ4+eSy6nlEg3mZoCISrzTf6grMd1GN+ocJPijHh8I=

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Name: org/eclipse/jdt/internal/compiler/batch/ClasspathJrt.java
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org/eclipse/jdt/internal/compiler/parser/AbstractCommentParser.jav
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SHA-256-Digest: Q+AFY2AZqcWxk0mkgr63zeFB1KlixiMEMRv4fOOeiOQ=

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ava
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Name: org/eclipse/jdt/internal/compiler/lookup/InferenceContext18.java
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Visitor.java
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Name: org/eclipse/jdt/internal/compiler/ast/LongLiteralMinValue.java
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Name: org/eclipse/jdt/internal/compiler/util/HashtableOfLong.java
SHA-256-Digest: Hr7GGP7goT/4zwTFf/XqV6hONR5T7glixGxnPsCry5U=

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Name: org/eclipse/jdt/internal/compiler/impl/IrritantSet.java
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Name: org/eclipse/jdt/internal/compiler/util/CharArrayHashMap.java
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Name: org/eclipse/jdt/internal/compiler/env/ISourceField.java
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Name: org/eclipse/jdt/internal/compiler/ast/ArrayAllocationExpression.ja
va
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Name: org/eclipse/jdt/internal/compiler/lookup/SignatureWrapper.java
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Name: org/eclipse/jdt/internal/compiler/ast/Initializer.java
SHA-256-Digest: owaFECBgvWJtwJ851IaPn3zbt2EpbT38fnOGJ3FP8OI=

Name: org/eclipse/jdt/internal/compiler/lookup/ProblemFieldBinding.java
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Name:
org/eclipse/jdt/internal/compiler/lookup/TypeConstants.java
SHA-256-Digest: uA+Bt5lcxC4ImDJse9BFjJwuFU+VGVscZm3bjplTI5U=

Name: org/eclipse/jdt/internal/compiler/lookup/FieldBinding.java
SHA-256-Digest: Qo+/D7l5ynj6U9v2SkxkymVR36yVp+Qha4pu0E+RKhU=

Name: org/eclipse/jdt/internal/compiler/ast/JavadocArgumentExpression.ja
va

SHA-256-Digest: P0UR18iua6eKr4TN/1VYucFGaVmB5kozUcVf9DWKpMY=

Name: org/eclipse/jdt/internal/compiler/util/SimpleSetOfCharArray.java
SHA-256-Digest: pS4TuSTiCrybwNi5DqZcMNJdit9kh1HLqQz/YMpCFH0=

Name: org/eclipse/jdt/internal/compiler/ast/QualifiedThisReference.java
SHA-256-Digest: 7ZHdFnDLkVd65xA1+HJb0M154gr5KPq9/jHgnbIyCsk=

Name: org/eclipse/jdt/internal/compiler/lookup/ArrayBinding.java
SHA-256-Digest: 9ECWWweCZ4hHFX7hqre9QFyqF6MzLMjHJ6kta4wRWfs=

Name: org/eclipse/jdt/internal/compiler/ast/JavadocModuleReference.java
SHA-256-Digest: w4kkpV9h6dKJ7puDyW1cUBoSaIusKZ9urYYeaNigQOA=

Name: org/eclipse/jdt/internal/compiler/codegen/TypeAnnotationCodeStream
.java
SHA-256-Digest:
zjILkrK0Dwel+RFOY4rbjIJNa2v8SdfAPzDZoGaHq/w=

Name: org/eclipse/jdt/internal/compiler/tool/ModuleLocationHandler.java
SHA-256-Digest: 8LdKxPd0UzEQEULL1sJ10rBftY+E9BKgf1uSw1ckpPI=

Name: org/eclipse/jdt/internal/compiler/ast/ContainerAnnotation.java
SHA-256-Digest: D5cD6eptoT1grdQU0vnCd1wPrR4cxraRcBeH0r0M+Ko=

Name: org/eclipse/jdt/internal/compiler/impl/CompilerOptions.java
SHA-256-Digest: YlxeCLBhHfFRzGyomDgk2e3cBMwg9HwDglabehGawvA=

Name: org/eclipse/jdt/internal/compiler/parser/unicode8/start1.rsc
SHA-256-Digest: O/fQtEuW/21Rk7UBoSn9Gr0lorc7QCFa0awfpIzXaa0=

Name: org/eclipse/jdt/internal/compiler/ast/ConditionalExpression.java
SHA-256-Digest: FLObAnF+Ce5+ZpdqTktE3oq1Gf3i+2yEQja5yr1C9Dc=

Name: org/eclipse/jdt/internal/compiler/tool/EclipseCompiler.java
SHA-256-Digest: +y7nJVIRHaETiEP06DjQ2Myqw4KB7NvPqK7MJQJM1kI=

Name: org/eclipse/jdt/internal/compiler/codegen/ObjectCache.java
SHA-256-Digest: cur/jP+/D8irfu/U2vC54YTbsQgHsA0OWe2s1lmKmAU=

Name: org/eclipse/jdt/internal/compiler/env/ISourceImport.java
SHA-256-Digest:
VH9pJM+hHU04Cp1hDMB3AgErl+dRn1CYtqQLrWaG9U0=

Name: org/eclipse/jdt/internal/compiler/apt/model/DeclaredTypeImpl.java
SHA-256-Digest: o9t8DjIWRz7pk8KOrv4QpHhKLLBV/gJm5Drp2mKHUJo=

Name: org/eclipse/jdt/internal/compiler/ast/ForeachStatement.java

SHA-256-Digest: llhEQgEDe+AsQ/k4bnV8DE1QnKRASlSYF5p/HVkhc4c=

Name: org/eclipse/jdt/internal/antadapter/AntAdapterMessages.java
SHA-256-Digest: EwIfQTJPY0Z9rA7OHXOSM/1NDEUMqyYjpeF2Oe4cGGM=

Name: org/eclipse/jdt/internal/compiler/ast/SingleTypeReference.java
SHA-256-Digest: uoO+OC5E1q/kerpC24KmccJgQeU5kmnbtByGBwuxqjA=

Name: org/eclipse/jdt/internal/compiler/batch/ClasspathSourceJar.java
SHA-256-Digest: Tjsnccpd81DhBq0s/4Sdg47FoIbVLDMk/QzVUZPDWX8=

Name: org/eclipse/jdt/internal/compiler/lookup/ModuleScope.java
SHA-256-Digest: 5HMoOtDj0uAl1a3bvjvC4KfRFVFPSb5Y9JUFdhqZ3i8=

Name: org/eclipse/jdt/internal/compiler/ast/NullAnnotationMatching.java
SHA-256-Digest: 7hx0KZamM3ua2ehFSGNWeMZlp/snNQnG2J8B6VmbDUQ=

Name:
org/eclipse/jdt/internal/compiler/tool/JrtFileSystem.java
SHA-256-Digest: K740GuMt9o/nlWbClXp4l96EIEuBXebx4aKMz3zukUI=

Name: org/eclipse/jdt/internal/compiler/util/GenericXMLWriter.java
SHA-256-Digest: jQF+Rp97iG+t47uRCLkjtCFnC+PlNHNwYIlecSN6+z8=

Name: org/eclipse/jdt/internal/compiler/classfmt/FieldInfo.java
SHA-256-Digest: BiIeP0spYLy1Ysj9BIb0622woSjWmkl7nSkjs0HmEMg=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredPackageVisibilit
yStatement.java
SHA-256-Digest: eo4vpVH1UzN3J96+oCS8ZbkX9cSPj48atsTY+iNidR4=

Name: org/eclipse/jdt/internal/compiler/codegen/AttributeNamesConstants.
java
SHA-256-Digest: aMKpdEa9QEJN613EJpce86zh2a9Hn9YbR/UDIoVnqzY=

Name: org/eclipse/jdt/internal/compiler/flow/TryFlowContext.java
SHA-256-Digest: 81Kmgzo4N3NCUCaJOn3IN+e+Eh3Yw4SmNOoZMcymwU8=

Name: org/eclipse/jdt/core/compiler/CategorizedProblem.java
SHA-256-Digest: KDyu88HnXvt3J4Yhj+a7dm4YywFfZwh3YVEKofnAFzI=

Name: org/eclipse/jdt/internal/compiler/ast/UnionTypeReference.java
SHA-256-Digest:
njp+ST2wFFO0IGvcGExfj6NyVBmLRn0rCt6cZcpv/Zo=

Name: org/eclipse/jdt/internal/compiler/parser/Scanner.java
SHA-256-Digest: PubLzeXzHc4sTCU5xZX/FSis6r19JyYdlQWRrJ2FxG4=

Name: org/eclipse/jdt/internal/compiler/apt/model/VariableElementImpl.ja
va
SHA-256-Digest: iqUKY3HEmi1OhmCsbunwoUw42yezbLL2AaqRHeQjswU=

Name: org/eclipse/jdt/internal/compiler/ast/StringLiteralConcatenation.j
ava
SHA-256-Digest: 1RB0n1B7iotWCp8VcorBAHdA+dGG9ddF+MK9AXj6qRI=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6_2/part14.rsc
SHA-256-Digest: zAkaPM3Ejlgf1/HENfa61QhvcZlyZlZ7dZsXWDNsizs=

Name: org/eclipse/jdt/internal/compiler/ast/NumberLiteral.java
SHA-256-Digest: Piq4L9r6Qpq0vSXtWTjTm27Bz2KhMJbLUzCSiP5s/D8=

Name: org/eclipse/jdt/internal/compiler/ast/JavadocFieldReference.java
SHA-256-Digest: PM1YjP6RsX5AB3WzLeTOU/93SyefIYqyTCOLPoThavQ=

Name: org/eclipse/jdt/internal/compiler/parser/unicode13/part1.rsc
SHA-256-Digest: uEpRg0+tYKKszCdRjTRnHSteT1W6x6d+IngVgSkklgg=

Name: org/eclipse/jdt/internal/compiler/util/CharDelegateMap.java
SHA-256-Digest:
zWOpi7p+Rwu7ofs+MKkVFSvY4fzzd2OIVXj6Mi0QRKA=

Name: org/eclipse/jdt/internal/compiler/ast/Argument.java
SHA-256-Digest: Cv/7gyiUwI+KvtNbdBafuP3S3NDJc+Yp/Cc1sXgi1hQ=

Name: org/eclipse/jdt/internal/compiler/classfmt/FieldInfoWithTypeAnnota
tion.java
SHA-256-Digest: 7jGEsF82Eka63OY0bWkZB1VOc9JVVoo7Wmu+VY/suZk=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredMethod.java
SHA-256-Digest: 935/+IDRLtMVs/aNdpcUM9NCRoygUN0OW793ssX5IA8=

Name: org/eclipse/jdt/internal/compiler/classfmt/ClassFileStruct.java
SHA-256-Digest: 0oney/1yBMcHf1cSBGv15ghBjvpnrrXdxLC3PlYP52Q=

Name: org/eclipse/jdt/internal/compiler/parser/parser21.rsc
SHA-256-Digest: 6N/h49ZxaNTQaajQpgNgvp1jBXzzYQ2fYEgq1rqDDT0=

Name: org/eclipse/jdt/internal/compiler/codegen/CharArrayCache.java
SHA-256-Digest: IfHGifUh3XEx1f1N1YUtodiMsHNhtW1MuLiAyH9Gw+g=

Name: org/eclipse/jdt/internal/compiler/lookup/BlockScope.java
SHA-256-Digest: WXo+yPIe20y1Up6Ar92iFmdonKMGZAJFwy1J5fMBzto=

Name:

org/eclipse/jdt/internal/compiler/ast/AND_AND_Expression.java
SHA-256-Digest: WngP1HOjs6uIrmHGSywBs2M4fEGW9pbcIwEXzYB6du0=

Name: org/eclipse/jdt/internal/compiler/apt/model/PackageElementImpl.jav
a
SHA-256-Digest: P7xgbu8IXTzL9Dts5vkPYrCfJ9C38dDJWPKrP0e8NCk=

Name: org/eclipse/jdt/internal/compiler/parser/unicode/start1.rsc
SHA-256-Digest: GDyHQAzqnyM3mQg9MAqdyIh3/Woiq+zguM7uPNsvfGk=

Name: org/eclipse/jdt/internal/compiler/tool/PathFileObject.java
SHA-256-Digest: rPRGZivMIv9G7StS+mCpgytClbov5QjoDAHFnYSCYoQ=

Name: org/eclipse/jdt/internal/compiler/apt/model/NoTypeImpl.java
SHA-256-Digest: JM5G/AnI2RkPZqHYYpNehIW8vvJQfICmKkRp+o3nSIk=

Name: org/eclipse/jdt/internal/compiler/ast/Clinit.java
SHA-256-Digest: xi7mRNYXbWUrgC/2eol6KNk4y/Lu1LZs+wPFcxxaQ4E=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredModuleStatement.
java
SHA-256-Digest: Ika46HAAyucfgDa5Ttth59BrdlN3KwMq2g3RscJmpC0=

Name: org/eclipse/jdt/internal/compiler/impl/ReferenceContext.java
SHA-256-Digest:
NRAYJUx4KZgODTAuB5m0WB1eHWxyvUMyC79eSxISeJg=

Name: org/eclipse/jdt/internal/compiler/ast/DoStatement.java
SHA-256-Digest: Dn6L0mQH+td5K/LoA3arkPJyvPRUZLRtMHjd+q/G1Yc=

Name: org/eclipse/jdt/internal/compiler/ClassFilePool.java
SHA-256-Digest: SFdxdnDgVq52Vr8iwRhNhK11P5z4mLtXcqPzLbfi8Tg=

Name: org/eclipse/jdt/internal/compiler/ast/LocalDeclaration.java
SHA-256-Digest: ZcBzgFIrIAOi1jG1ngFv26EFImqrbwSp03cDRFBVYm4=

Name: org/eclipse/jdt/internal/compiler/problem/ShouldNotImplement.java
SHA-256-Digest: bQH2yg7NCoJ6OQVUuzUWByAYbKdT20sPJeQSxtHzp5M=

Name: org/eclipse/jdt/internal/compiler/lookup/TypeBinding.java
SHA-256-Digest: QxFyZE5id4HX2dxsk1z6Bl6V5lYc1rUVniLhEuWO5II=

Name: org/eclipse/jdt/internal/compiler/ast/IfStatement.java
SHA-256-Digest: P7SIsGX93HKKnr34hx1nWPf54+syCiXAsorrwWJHvKs=

Name: org/eclipse/jdt/internal/compiler/ast/MarkerAnnotation.java
SHA-256-Digest: enczKvTJZGdR4fDTsO0uEIHtKCSEooZ50skv7lu191E=

Name: org/eclipse/jdt/internal/compiler/impl/ITypeRequestor.java
SHA-256-Digest:
aCwT8MUsZVFGD6VGQmHu7aQXKwUAoefSB6JIAge7+V8=

Name: org/eclipse/jdt/internal/compiler/lookup/ProblemReasons.java
SHA-256-Digest: D1qNAqCQBP4SGtZusX3avBwvMv9noYuuPo2Dst2k12w=

Name: org/eclipse/jdt/internal/compiler/parser/unicode10/part1.rsc
SHA-256-Digest: 7KT61Zmtb8hKNeT/FeySY3mScm3BUpncAy0GmLTvCK4=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6/part0.rsc
SHA-256-Digest: UBhck16G7oKzi6BUK6JwvTj+d4J+adi862bj1m/w5eM=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredUsesStatement.ja
va
SHA-256-Digest: 3wo+BEv0SdVd5xNMKM5vYF2OcxPy5dnAlxhylGUf1Rg=

Name: org/eclipse/jdt/internal/compiler/apt/model/ErrorTypeImpl.java
SHA-256-Digest: GYJOLO2+BfrfrVmxRYM99RgISmhqZjCazDKxRowHcMA=

Name: org/eclipse/jdt/internal/compiler/ast/PrefixExpression.java
SHA-256-Digest: HkgvXLCcqYo/vWTExAMAwgd06nHk09Sd15oyifFyF5E=

Name: org/eclipse/jdt/internal/compiler/util/HashtableOfInt.java
SHA-256-Digest: s0xStm4pCd8P5yQggA5deBXY1A6WANaUDIevdo20DRA=

Name: org/eclipse/jdt/internal/compiler/apt/model/ErrorTypeElement.java
SHA-256-Digest:
xrx0uGO7gzk08jd7gKdjYy1NGOAlHzHjtpkdHSvWBb8=

Name: org/eclipse/jdt/internal/compiler/lookup/ProblemMethodBinding.java
SHA-256-Digest: ALA0g14HWycsVHF6BZYEs8oL2iKgDaH8BCMd10lW0lY=

Name: org/eclipse/jdt/internal/compiler/ast/BranchStatement.java
SHA-256-Digest: zChwopWUwkwkrcnYa3iEYFG9a4cvV+/ecu/YIqx2GrI=

Name: org/eclipse/jdt/internal/compiler/ast/JavadocSingleTypeReference.j
ava
SHA-256-Digest: uXB+VMammiUPz7mSf/4AP0cJ4HYIH3NCdRmw/aud4RY=

Name: org/eclipse/jdt/internal/compiler/classfmt/InnerClassInfo.java
SHA-256-Digest: zl23biiC/yrJkjcAkyr3WtDlg2dr706juHi2uszsl58=

Name: org/eclipse/jdt/internal/compiler/lookup/IQualifiedTypeResolutionL
istener.java
SHA-256-Digest: sOlN/m5tbfh7PEs1xwkzg9l0eCeNZcI/qQEGTVUkMZk=

Name: org/eclipse/jdt/internal/compiler/util/JRTUtil.java

SHA-256-Digest: 6pZzRlxbm4kLQYlPeW9CeGZL7QbuNRmNcPre/gk2WWw=

Name: org/eclipse/jdt/internal/compiler/parser/unicode7/start1.rsc
SHA-256-Digest: qjXziG/8STO5sCDpKVtCQZF5dx6kecZHm4+yBXO9pwI=

Name:
org/eclipse/jdt/internal/compiler/DefaultErrorHandlingPolicies.jav
a
SHA-256-Digest: F2VovHC3yo3fzcypVtKKKyaPOdn/QG2AhxoHf1h6xow=

Name: org/eclipse/jdt/internal/compiler/codegen/CachedIndexEntry.java
SHA-256-Digest: Fn53Nc1OlJgBUMavYY4j9zWb+07tfp2IxYN8/ls1Xec=

Name: org/eclipse/jdt/internal/compiler/lookup/PolyTypeBinding.java
SHA-256-Digest: +QgNZynDJP/5+0uRO3izu6OAEggWHu6D+0bmqXpocIM=

Name: org/eclipse/jdt/internal/compiler/lookup/ParameterizedGenericMetho
dBinding.java
SHA-256-Digest: OP00LydpOaNXeSu5T4yNUZtquyrUE49Zz+cLI4vzeUk=

Name: org/eclipse/jdt/internal/compiler/ast/SynchronizedStatement.java
SHA-256-Digest: /4mzS85PnmhaW3LMnvQUzZn12NADc9tcfCIRdJBrkH4=

Name: org/eclipse/jdt/internal/compiler/parser/unicode11/part1.rsc
SHA-256-Digest: oGPJXaoTUs3zRhXIuWS1Jf77WIBgqQxrr1kde72sbcg=

Name: org/eclipse/jdt/internal/compiler/codegen/CodeStream.java
SHA-256-Digest: C3baqu5CV5Cowx+1zhnrAUQDp/RGMw2SEIBY2iy3QoA=

Name: org/eclipse/jdt/internal/compiler/batch/BasicModule.java
SHA-256-Digest:
0lQ99V+7C8zPwBm7mz+//4KUrGWr8obRjVVtMji6VIs=

Name: org/eclipse/jdt/internal/compiler/ast/TypeDeclaration.java
SHA-256-Digest: 3XxGCDJ04qLxMqsSJARpqvFmWnBqqVqJXRAiN/dsoDY=

Name: org/eclipse/jdt/internal/compiler/ast/Invocation.java
SHA-256-Digest: 7AQi1/tJZgD0wIsWzwTetV23untDXhO48VbRvOvZvaE=

Name: org/eclipse/jdt/internal/compiler/util/HashtableOfInteger.java
SHA-256-Digest: yzAfXM7l1qy4yEHPXvdsHSv2wtDxaGL1WBq/lwAqn7Y=

Name: org/eclipse/jdt/internal/compiler/classfmt/ExternalAnnotationDecor
ator.java
SHA-256-Digest: bYfN0xQnIoYL+hI9IbJ+APUfK1cVhIu68f+t7KGax/Y=

Name: org/eclipse/jdt/internal/compiler/classfmt/NonNullDefaultAwareType
AnnotationWalker.java

SHA-256-Digest: Od/qaIpp10xvRy/D7xP3HQw2m8uzWOipMZaMV37A5e8=

Name: org/eclipse/jdt/internal/compiler/ast/ImportReference.java
SHA-256-Digest: 4jSyGnZ6VBTmZU74HXE8ZpekUgVEqRkt0DDD3RFmGCM=

Name: org/eclipse/jdt/internal/compiler/lookup/VoidTypeBinding.java
SHA-256-Digest:
iJ1tI5RKrweLhDFdotz8AYGyZCtjuezl/xZ+u4bg+6A=

Name: org/eclipse/jdt/internal/compiler/ast/RequiresStatement.java
SHA-256-Digest: rH3T2aDQsOLsX/66tclKGpehwH2t1UVx/eVF6jGL+jc=

Name: org/eclipse/jdt/internal/compiler/parser/unicode/part1.rsc
SHA-256-Digest: 6bzFSJQkMCpuBMtcYhLfgDgdfo97C6ZyVAG/1L/A++E=

Name: org/eclipse/jdt/internal/compiler/env/IGenericField.java
SHA-256-Digest: 1jr4Qd2VOw1PUkbyysh+yP6yjK2G/YJH4ctMRUGAVwk=

Name: org/eclipse/jdt/internal/compiler/lookup/RawTypeBinding.java
SHA-256-Digest: 0LMXlPmF8uEGy5MrfzRpMoY6Pm9kNYvM5wVRaphtsVw=

Name: org/eclipse/jdt/internal/compiler/parser/parser18.rsc
SHA-256-Digest: MmkVUgIpU/5BiiOcJbOpqmBUQyO6/G/1WQn/SRKWRsY=

Name: org/eclipse/jdt/internal/compiler/lookup/SortedCompoundNameVector.
java
SHA-256-Digest: 5cEw5GZM4uJXXDv4kBvC5h2poiU/tLtH7O7Jrzw7EVY=

Name: org/eclipse/jdt/internal/compiler/ast/SingleMemberAnnotation.java
SHA-256-Digest: vGfy+NAFG3iN4eD79z6qKBa480lp0N5ntw76uvj0Sag=

Name: org/eclipse/jdt/internal/compiler/ast/Javadoc.java
SHA-256-Digest:
/HMYwKRYVWekO2ZgOVy+0fxHHxD5Or3oyUm/IcCmgfc=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredUnit.java
SHA-256-Digest: Zf9/Tm6bGhjsl4D4+QI0SSxKG8Qu2LnE3uRusAcX5yw=

Name: org/eclipse/jdt/internal/compiler/batch/ModuleFinder.java
SHA-256-Digest: PBcN8X/LbpZmTAcY7qyYrIRvTfFTFm1lNU8H0QIpEMk=

Name: org/eclipse/jdt/internal/compiler/util/CharArrayMap.java
SHA-256-Digest: irD4Liu8uSTImZdYGjseKg9lJOJiYBFaBbTGH3Q8ywM=

Name: org/eclipse/jdt/internal/compiler/util/HashSetOfInt.java
SHA-256-Digest: /84qEmNwAT/IEgTX/6VydXh1JQFiGrf3dEE+ydthWYw=

Name: org/eclipse/jdt/internal/compiler/util/Util.java

SHA-256-Digest: YgEOQCvvGbNyB0MVBOY2bbVSb4d/D0FEgmNrUzyrw/g=

Name: org/eclipse/jdt/internal/compiler/parser/parser22.rsc
SHA-256-Digest: dlj12HdySJ9/dS2FtxozIFiYR/SkvvmE7KUs1yHWvOY=

Name: org/eclipse/jdt/internal/compiler/lookup/ParameterizedFieldBinding
.java
SHA-256-Digest: HRJbMJCy9F8QeR6h8kdEIkQO0qDIxlzlbEagwRlEkMQ=

Name: grammar/java.g
SHA-256-Digest: OiKXPYKVBoyIoWUC0g0UNqwP3vWwyXqjNSthmJZ6hSM=

Name:
 org/eclipse/jdt/internal/compiler/ast/Assignment.java
SHA-256-Digest: mbcXBiXQHz4ve6O2VF49yopP2lwy9GnlrnPdaoXApXk=

Name: org/eclipse/jdt/internal/compiler/parser/unicode13/start2.rsc
SHA-256-Digest: TslTNlywPQfQNz7lePBTcyeCWt9WSiABnCNgOMMNe9I=

Name: org/eclipse/jdt/internal/compiler/lookup/LocalTypeBinding.java
SHA-256-Digest: JPIPT0ZQzSr4hQlt4j32Ug61COfO2Ak6GKQxcX5cwk8=

Name: org/eclipse/jdt/internal/compiler/parser/unicode7/part0.rsc
SHA-256-Digest: 0FqBbyYpC5Qqh69jAmAqK2pRvjmZhjA3bDFXV1gXmbk=

Name: org/eclipse/jdt/internal/compiler/lookup/ConstraintExpressionFormu
la.java
SHA-256-Digest: lRiy7z7NMLBwpAvxFp3xl89WGThppqDUDTqepxHkNI0=

Name: org/eclipse/jdt/internal/compiler/ast/TextBlock.java
SHA-256-Digest: ruvimjuUasIVJiXDmmDOjyndTkZgQwhMG7hM3yQ05lY=

Name: org/eclipse/jdt/internal/compiler/parser/unicode13/part0.rsc
SHA-256-Digest: wpop4HYIaDkSaC16ZKJssKINHI3SV0wn5oQ9hloSmTg=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6_2/start1.rsc
SHA-256-Digest:
 Dfg/rM9EofrQEDvyFutswNErjVT0JDOrJ7TQoagiGX4=

Name: org/eclipse/jdt/internal/compiler/parser/unicode10/part2.rsc
SHA-256-Digest: 04VMyR2oGLNoJWK6xYvZv3gPXGxYB6RpHuNdBUBuFAo=

Name: org/eclipse/jdt/internal/compiler/apt/model/AnnotationValueImpl.ja
va
SHA-256-Digest: L3iFq2OvXJVAWp4BgaHpV4aeh9mUYWVcyr5csplTG/M=

Name: org/eclipse/jdt/internal/compiler/classfmt/ModuleInfo.java
SHA-256-Digest: uZUV+89nRSe/vszg4N+rdO05AP44+CyFyCH7FmoSIZk=

Name: org/eclipse/jdt/internal/compiler/flow/ExceptionHandlingFlowContex
t.java
SHA-256-Digest: aEfUDJqxTmOWTGe/SYzvIl0NzvPFaI3GL6i5frbcetg=

Name: org/eclipse/jdt/internal/compiler/ast/CharLiteral.java
SHA-256-Digest: nlctERld7nYFFwAnHDa6gg9Ah1DKGweXtwT3gPnGUGo=

Name: org/eclipse/jdt/internal/compiler/parser/unicode13/start1.rsc
SHA-256-Digest: PofIYpM6w0uX6lwgylYVRRx7q+5VFKABhvVLrqVm4VQ=

Name: org/eclipse/jdt/internal/compiler/parser/JavadocTagConstants.java
SHA-256-Digest: TQtyDuQukAkpVWnVTd2bmXUbIhHUKPI6cX1ULSG/V34=

Name:
org/eclipse/jdt/internal/compiler/apt/model/AnnotationMirrorImpl.j
ava
SHA-256-Digest: Gd9YP9pWM/2UEDDis68N5cUFbltGhvwaZiuVxnxC0CE=

Name: org/eclipse/jdt/internal/compiler/apt/model/RecordComponentElement
Impl.java
SHA-256-Digest: lUMi8WD4tSidufrEEEZfW/ke82vAiuRFhX9t6vg27HY=

Name: org/eclipse/jdt/internal/compiler/parser/unicode11/part0.rsc
SHA-256-Digest: +KGSmYGaG0hJWaQSqCHwg32AliwDiLVRduVafVsf+90=

Name: org/eclipse/jdt/internal/compiler/env/INameEnvironmentExtension.ja
va
SHA-256-Digest: XSOE8AyHCoDc2CgSxgJV9JW+aXfchdZm02Ycurov9ak=

Name: org/eclipse/jdt/internal/compiler/lookup/LocalVariableBinding.java
SHA-256-Digest: qDIPJYwCcywFGfxuaJxw+Lg8GAvQwgJbBzQmmKq73A0=

Name: org/eclipse/jdt/internal/compiler/parser/unicode/start0.rsc
SHA-256-Digest: 2uzENhpiZu1nRnsFWAV8jZ4xq+FD21cHUMSP3xDBfME=

Name: org/eclipse/jdt/internal/compiler/flow/FieldInitsFakingFlowContext
.java
SHA-256-Digest: gvOl+5KqC2kOP1Hh+UBrDrhpQ5Oo9qxWcPpnZn8DsBI=

Name: org/eclipse/jdt/internal/compiler/util/FloatUtil.java
SHA-256-Digest:
U9N/R8hzcsqyo2nCyMjyTjZpDi5FSrL7NM+Xtegxdss=

Name: org/eclipse/jdt/internal/compiler/apt/dispatch/BatchProcessingEnvI
mpl.java
SHA-256-Digest: PjWegMD26Ix8jMsubC4C7+bja/2svaQ1RGPRvHj71QM=

Name: org/eclipse/jdt/internal/compiler/ast/ParameterizedQualifiedTypeRe
ference.java
SHA-256-Digest: P21bFov4+pol/Y2kdhlzU4pwhHaE0wgodBnYR3C2BgA=

Name: org/eclipse/jdt/internal/compiler/classfmt/ComponentInfoWithAnnota
tion.java
SHA-256-Digest: BUaPA3IhltBCvfFdcEYoQjiIwH2/qMgMNx1AqOO6cXE=

Name: org/eclipse/jdt/internal/compiler/ast/SingleNameReference.java
SHA-256-Digest: DrAkslBr2FrvvqfQAdE2h9olZ91kan5ZNkMWLev/HVo=

Name: org/eclipse/jdt/internal/compiler/env/IGenericType.java
SHA-256-Digest: Z20he4yCXDGNCQMZrHWw8bfr+2LtH0zfgQ8D5Tdj6fU=

Name: org/eclipse/jdt/internal/compiler/apt/dispatch/RoundEnvImpl.java
SHA-256-Digest: kiSHc/9FG8C7ubEBlw3ao5al194+ayGpOh2CGsWHb7k=

Name: org/eclipse/jdt/internal/compiler/ast/CastExpression.java
SHA-256-Digest: lg+WOiwEEFImVzgiaaWVOEx3/Tr6CEqdWkG9upWMxy8=

Name:
org/eclipse/jdt/internal/compiler/codegen/ConstantPool.java
SHA-256-Digest: gYQNO5UWPeeXaAIdbsIU//LMDPXW78U9XgXM5RbQFWc=

Name: org/eclipse/jdt/internal/compiler/lookup/ElementValuePair.java
SHA-256-Digest: g3gC6ddMYOrQrG2fOcck3PNf7pP1VPiuPm/yS/SLAHE=

Name: org/eclipse/jdt/internal/compiler/lookup/InferenceSubstitution.jav
a
SHA-256-Digest: KIz/KtTgyrgI2etCyiLfXAToU2q9nlssMYu5M6ov2/A=

Name: org/eclipse/jdt/internal/compiler/util/SimpleLookupTable.java
SHA-256-Digest: H44eTY1YKya+dEiSYxgTpIOmCsGTjS/JB3xkc64o1h4=

Name: org/eclipse/jdt/internal/compiler/parser/unicode7/start0.rsc
SHA-256-Digest: 4DaSJ2W0Hfswtznhyulngw7PrvcJg3EcsiMVfdxhyls=

Name: org/eclipse/jdt/internal/compiler/util/HashtableOfModule.java
SHA-256-Digest: mAu3bgawla6RqzmYSiLqyqBllca2rAdMszIMOanIu7E=

Name: org/eclipse/jdt/internal/compiler/ast/ModuleReference.java
SHA-256-Digest: atwrbhrSqnvPigbFEsZqXpJTa5W/rYPjib/TIF9zMTo=

Name: org/eclipse/jdt/internal/compiler/env/IUpdatableModule.java
SHA-256-Digest:
GBVacyiWuSaNhDhBroaMJx3QKtT8gY2VWHaoka2+9ig=

Name: org/eclipse/jdt/internal/compiler/parser/unicode12_1/part14.rsc

SHA-256-Digest: zAkaPM3Ejlgf1/HENfa61QhvcZlyZlZ7dZsXWDNsizs=

Name: org/eclipse/jdt/internal/compiler/parser/unicode8/part0.rsc
SHA-256-Digest: hNWvpW/yJmBhdNNY56IwEtrblKdhkTaqgy2iJfBvuVI=

Name: org/eclipse/jdt/internal/compiler/apt/model/TypeElementImpl.java
SHA-256-Digest: l2oLytk6+Fbifa4QuWz8e155fomRTiaZ5oI3FclzFx4=

Name: org/eclipse/jdt/internal/compiler/parser/diagnose/DiagnoseParser.j
ava
SHA-256-Digest: m684tzS3Rb7ewd02L3Fr3RF09gXey0pbrdKHlw2dBuM=

Name: org/eclipse/jdt/internal/compiler/problem/AbortCompilation.java
SHA-256-Digest: 9ubNV/mkWAy48NaM6USeTmeSlw9vQif9VI5UDzSqxwE=

Name: org/eclipse/jdt/internal/compiler/impl/BooleanConstant.java
SHA-256-Digest: sc5BzRl5ENglzgun3e8CrGVtiQ46N32vkzoMbRwp9zs=

Name: org/eclipse/jdt/core/compiler/SubwordMatcher.java
SHA-256-Digest: yDM7ohGVt2fmD3hai4cbdP7Y6cXORvJxdog+RaP3jE4=

Name: org/eclipse/jdt/internal/compiler/lookup/ImplicitNullAnnotationVer
ifier.java
SHA-256-Digest: B0EEOKYPrd5eEYEgJRw6u2QWny2tEHmltFBRS6cs42E=

Name: org/eclipse/jdt/internal/compiler/lookup/Binding.java
SHA-256-Digest: E2qPabrjQnSsbm98eXL7+CUXcU+Z7M0TsEHHhjsC0eE=

Name: org/eclipse/jdt/internal/compiler/env/IRecordComponent.java
SHA-256-Digest: heFn7rIjnMQm3pEvS4xpmDk6notJ/BdMokdCd8PQ2Fo=

Name: org/eclipse/jdt/internal/compiler/parser/parser9.rsc
SHA-256-Digest: Y9FZRPM+OFedNhzPmT7dMiiNozOeMGINNkmqglb213A=

Name: org/eclipse/jdt/internal/compiler/env/ITypeAnnotationWalker.java
SHA-256-Digest: Z1ypAsVTcQgX2QxJvQWKTXermAf8ldVUOB/nFlBMF8Y=

Name: org/eclipse/jdt/internal/compiler/env/ModuleReferenceImpl.java
SHA-256-Digest: g/vIJ6PbTOIqsVrk30lffrMb/R6Ct/6N4R8BXjq6P6Y=

Name: org/eclipse/jdt/internal/compiler/parser/parser17.rsc
SHA-256-Digest: qIjXsiTPCgSKFkn1w/mydtZmOMYyB2Ej6qmnVIOZAr8=

Name: org/eclipse/jdt/internal/compiler/parser/unicode/part2.rsc
SHA-256-Digest: K9XWs/PT+ucJ8VxJDdMdBpO3RKC/pug9ZfGwdnNeWNc=

Name:

org/eclipse/jdt/internal/compiler/codegen/CaseLabel.java
SHA-256-Digest: sAMFCDu/nQDZTtZwh643CudtjxfLVZhNaKjUm8/AuJI=

Name: org/eclipse/jdt/internal/compiler/problem/ProblemSeverities.java
SHA-256-Digest: uh+F8HrWv48BohLMY2+BfhK2dgfnKR7g1mzzqWZsE2s=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredTypeReference.ja
va
SHA-256-Digest: F9OMbSHgJw/VL0x6Zp0LwDpwjmfOpqXs0a+a3o8iNfc=

Name: org/eclipse/jdt/internal/compiler/parser/unicode7/part1.rsc
SHA-256-Digest: Mp5ohkkh0rdL2HfWbId+O86WC+WmdBjhh1Nq87564gU=

Name: org/eclipse/jdt/internal/compiler/codegen/Label.java
SHA-256-Digest: 2CUy4cCaV43AHY7dFhoyv5VIjTKjZ8bh7TrK9gIIfWs=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6_2/start0.rsc
SHA-256-Digest: vCS9d/5yWPMgaB2XSpV7hFpeMddMeRrkkbw2Ggd71CA=

Name: org/eclipse/jdt/internal/compiler/ast/OperatorIds.java
SHA-256-Digest: V/QzBdATIBHyGJzE9DxZXHhziXRUAS9Gjl/criz4SV0=

Name: org/eclipse/jdt/internal/compiler/codegen/AnnotationContext.java
SHA-256-Digest:
XGudA2koHyqGhi5HvsJ+D/gd+1zEnCLiTqnlVOIrNVo=

Name: org/eclipse/jdt/internal/compiler/batch/ClasspathJmod.java
SHA-256-Digest: I1m+Whyj1lkjlg85uuDHkneiqVNTHmUjySs4GVQPsmI=

Name: org/eclipse/jdt/internal/compiler/codegen/Opcodes.java
SHA-256-Digest: LLPHZ106vvn4TpspzoboT2F53GSJObhdofJMP4R41f4=

Name: org/eclipse/jdt/internal/compiler/env/IModulePathEntry.java
SHA-256-Digest: KKuue2O2vgPif+27XECjeL32hmj5t5BlbLv0xsWvumE=

Name: org/eclipse/jdt/internal/compiler/lookup/MethodScope.java
SHA-256-Digest: 3nJ/oqPVINMbYUVx3d0wtfOXb3HrYYpg9irheU5zMss=

Name: org/eclipse/jdt/internal/compiler/GenericAstVisitor.java
SHA-256-Digest: HY19C1Awgr4MaVUknTs5pwVgmSUTUQCuQUJ7HPsAeiU=

Name: org/eclipse/jdt/internal/compiler/problem/ProblemReporter.java
SHA-256-Digest: HvRQ1zWM+Zfizgla+3JbS8aIV6eC6423XSjkuhDT5k0=

Name: org/eclipse/jdt/internal/compiler/ast/NameReference.java
SHA-256-Digest: NDDXIwvvyh8UWcFkD4+c4jMH0sBFh9o2FJOIVjEb/7I=

Name: org/eclipse/jdt/internal/compiler/parser/parser23.rsc

SHA-256-Digest:
zTGmGKjOY0tg0NNkQrkZP09AeT7laJ4FlJB6KjLmRjk=

Name: org/eclipse/jdt/internal/compiler/ast/Pattern.java
SHA-256-Digest: M/lJgCdqJovy7+kmmGy8rnKs5RV6m5auqmvlk2Eyn2A=

Name: org/eclipse/jdt/internal/compiler/lookup/BinaryModuleBinding.java
SHA-256-Digest: ODIgEKok1CurSqV0HiWz5oXQZuD9A0sj7EYO/Z3Nxq0=

Name: org/eclipse/jdt/internal/compiler/lookup/InferenceVariable.java
SHA-256-Digest: DihcYhLSxaL74ZEH5F3sJ5V6vpgdyOoJDnGdhg7Przc=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6/part14.rsc
SHA-256-Digest: zAkaPM3Ejlgf1/HENfa61QhvcZlyZlZ7dZsXWDNsizs=

Name: org/eclipse/jdt/internal/compiler/codegen/BranchLabel.java
SHA-256-Digest: ZuyGeQJRmPlmTEv8FZvzxQC1FgJjX1I8S0V/jziop9E=

Name: org/eclipse/jdt/internal/compiler/ast/UnaryExpression.java
SHA-256-Digest: MqEZTOWUSpVl7kvP4wfmvcRyiMX7pKD0MQiqLZcTGbo=

Name: org/eclipse/jdt/internal/compiler/apt/model/Factory.java
SHA-256-Digest: etcOOkfZTUqxsU0haq+ASW4j/aAckyRxcA4HS8pQyaQ=

Name: org/eclipse/jdt/internal/compiler/ast/JavadocQualifiedTypeReferenc
e.java
SHA-256-Digest: /WtGzfu8szx4Jo5ebuGoJ+BkuoX3mxY28kvhbgowNVo=

Name: org/eclipse/jdt/internal/compiler/env/ISourceModule.java
SHA-256-Digest: IsqIY0t0o7pjv8CuVuEd96FVZwd7uR5lQygK3MvNd5w=

Name: org/eclipse/jdt/internal/compiler/impl/JavaFeature.java
SHA-256-Digest: UUKEBcgWmgGtry/StS2BbxdRKGQvoAqau0btiJW8Zuc=

Name: org/eclipse/jdt/internal/compiler/ast/WhileStatement.java
SHA-256-Digest: dhfjPEieoqkFKJ4nSLy+O5dSFp+9RKl6OFn8r94eKnY=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredOpensStatement.j
ava
SHA-256-Digest: 6n5C/dPB8151bWelnSofzn0gzGpiIFtSTShL7mYGbIc=

Name: org/eclipse/jdt/core/compiler/IProblem.java
SHA-256-Digest: 9JeDJhgd8kRKRzRISS0900kJQVxlugdTKTPpUObfKXo=

Name: org/eclipse/jdt/internal/compiler/ast/FieldReference.java
SHA-256-Digest: p6iYeDSFLdgXNRFQAeEhJVpHhzmWljkSEaX0dAThR6U=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6/part2.rsc

SHA-256-Digest: cENGbHGTfBx4FTJBMY3gopEj6ecVPCCOSVDuhhj8H8M=

Name: org/eclipse/jdt/internal/compiler/problem/messages.properties
SHA-256-Digest:
ArFKpZd303oyV/Q7iOfHqJPsLatIp4BMtvJu0RU7aiQ=

Name: org/eclipse/jdt/internal/compiler/codegen/LongCache.java
SHA-256-Digest: yAvcvnQghrJ1iqJiJRyxzzyerQhGrXWeak/49hU6l/k=

Name: org/eclipse/jdt/internal/compiler/ast/ASTNode.java
SHA-256-Digest: ta28dEk/o9U8dTn3vjxf/OqwtuZDvxKwNgBG29WOTZg=

Name: org/eclipse/jdt/internal/compiler/classfmt/BinaryTypeFormatter.jav
a
SHA-256-Digest: 360NgptCOcjy6PEOwTOyNvcTVOxqLv4krRSLIm8e1Pk=

Name: org/eclipse/jdt/internal/compiler/problem/DefaultProblem.java
SHA-256-Digest: p8HZ9vR5Eu0J2fnj0zNjgep/E1lFufHz6YF3jAFawxY=

Name: org/eclipse/jdt/internal/compiler/env/ICompilationUnit.java
SHA-256-Digest: W+65xcnuFMmr0+Y/n6An4rVnkHSFjNgNgQyb7YdURrE=

Name: org/eclipse/jdt/internal/compiler/ast/OpensStatement.java
SHA-256-Digest: KlyJQd1WglrzuKfnR3qbdWTWUJFHnKk/bBhJUwu8jzA=

Name: org/eclipse/jdt/internal/compiler/ast/IJavadocTypeReference.java
SHA-256-Digest: hZikjww8skyYSIQgzYCOUF4P3BiKNxXGExTsgScfnVM=

Name:
org/eclipse/jdt/internal/compiler/tool/Options.java
SHA-256-Digest: yQ1aMEVTklOoVMbdhcoY3FedrGUPHIf9r1UoXHNJDgE=

Name: org/eclipse/jdt/internal/compiler/ast/TrueLiteral.java
SHA-256-Digest: 9H1jsbzRHez8UEEJeaedfaDadZ+KmHJ44Tr5C4yqmY8=

Name: org/eclipse/jdt/internal/compiler/parser/parser4.rsc
SHA-256-Digest: yUoTNtXrwMpLANRmxKY+CDZuDhFqAtk70UGUIuAUq68=

Name: org/eclipse/jdt/internal/compiler/impl/DoubleConstant.java
SHA-256-Digest: FdjILMzpSauxkLbH0BiTd4A55kmrGnoK4IwxK1DVL7Y=

Name: org/eclipse/jdt/internal/compiler/ast/MessageSend.java
SHA-256-Digest: 5lvdCR+rXsNjJf8dgKlhkQPTWA67MSp1M4dsvYgExv8=

Name: org/eclipse/jdt/internal/compiler/batch/ClasspathLocation.java
SHA-256-Digest: 4GNWZ0iQnwmI3/advrpCgKkS9Pkq9P6rCvdkKrEEOlc=

Name: org/eclipse/jdt/internal/compiler/env/AutomaticModuleNaming.java

SHA-256-Digest: B/SOjS2OXnm+uy4u5JcGYha+xs2DTuYf14dlvPPUwCo=

Name: org/eclipse/jdt/internal/compiler/classfmt/AnnotationMethodInfoWit
hAnnotations.java
SHA-256-Digest: R2lJw+B+OCBUDkSYxb3XIJh4YqFaUvoZZVZhStHfKa4=

Name:
org/eclipse/jdt/internal/compiler/ast/MemberValuePair.java
SHA-256-Digest: MCVMW3fBi0H6fD2URLYIoDj167/ZBPqyw7OtGIxVfGo=

Name: org/eclipse/jdt/internal/compiler/classfmt/TypeAnnotationWalker.ja
va
SHA-256-Digest: Id80VOA7m7GrTyyPTYChMSS/4l91lYTy+8Qrt5y/OZk=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredModuleReference.
java
SHA-256-Digest: axQeJhMMAUUVTAkeJXMW2pACmSix9WeAIaFP5JYSQ/U=

Name: org/eclipse/jdt/internal/compiler/ast/OR_OR_Expression.java
SHA-256-Digest: UlkvbNNliLRMOlQTozRQ6NBA9DIDJ8OgeE2180sTkH8=

Name: org/eclipse/jdt/internal/compiler/apt/dispatch/RoundDispatcher.jav
a
SHA-256-Digest: mZVgn885hoYfprE0t4nkQ/maZOPz7uYEzliCAEzo8ok=

Name: org/eclipse/jdt/internal/compiler/parser/unicode10/start2.rsc
SHA-256-Digest: 04VMyR2oGLNoJWK6xYvZv3gPXGxYB6RpHuNdBUBuFAo=

Name: org/eclipse/jdt/internal/compiler/impl/LongConstant.java
SHA-256-Digest: ALyhAwikW/E27gYuwedZ2UcWiBqUYPtAYH0Q/0Q1VLE=

Name: org/eclipse/jdt/internal/compiler/parser/JavadocParser.java
SHA-256-Digest:
7CM7thE+n/ykhwTMll7GVfzFLd2hOkzscM7c0JFpHp4=

Name: org/eclipse/jdt/internal/compiler/flow/InitializationFlowContext.j
ava
SHA-256-Digest: lZLjOIgoimHGxjedCS64Jaz3coNV96f91aSrzTLSY/A=

Name: org/eclipse/jdt/internal/compiler/parser/unicode12_1/start2.rsc
SHA-256-Digest: 04VMyR2oGLNoJWK6xYvZv3gPXGxYB6RpHuNdBUBuFAo=

Name: org/eclipse/jdt/internal/compiler/util/ObjectVector.java
SHA-256-Digest: MTXHFRYxPKWKjZuv+eetDguNMNfML4Eeeaj3CDdNsP8=

Name: org/eclipse/jdt/internal/compiler/ProcessTaskManager.java
SHA-256-Digest: IYFDCPb8d5Uu9r6VRGehu/BmBoVrMsnxfXkSQhc/Phc=

Name: org/eclipse/jdt/internal/compiler/tool/EclipseCompilerImpl.java
SHA-256-Digest: bANfCqBakul2e7N4oGsYmL7v6cd6m8QWvJk9jUBDN2c=

Name: org/eclipse/jdt/internal/compiler/parser/diagnose/LexStream.java
SHA-256-Digest: ccFqecpcSMwIKRnkUFaKD0EaCandpQFbM/g9UnurU4M=

Name: org/eclipse/jdt/internal/compiler/impl/IntConstant.java
SHA-256-Digest: hH3xw4PiuMQjk6eaq6KdaoLix7F4g7ET6HKgYDVAL98=

Name:
org/eclipse/jdt/internal/compiler/ast/Reference.java
SHA-256-Digest: PVQ0SXkreRZ+4vqR9QejTYFA5scqtb5j7xukzAjT5UM=

Name: org/eclipse/jdt/internal/compiler/lookup/ClassScope.java
SHA-256-Digest: wE521TxvOk8lc0rai9U6Xj5PccVnjSLqawP6/LTW3oQ=

Name: org/eclipse/jdt/internal/compiler/lookup/MethodVerifier15.java
SHA-256-Digest: X35ynxk/vAxQ+DReDnKY92HJJVdUb7d+1KRA12W5nyc=

Name: org/eclipse/jdt/internal/compiler/ast/DoubleLiteral.java
SHA-256-Digest: vTLbH6xq+NyG24e47Ae1Him2XJSYB20vEWRqeWBC9WA=

Name: org/eclipse/jdt/internal/compiler/env/NameEnvironmentAnswer.java
SHA-256-Digest: R92ImwqgTssWAE6rlKLHxTbOM5BO3SuD6CdEZJG+iRk=

Name: org/eclipse/jdt/internal/compiler/messages.properties
SHA-256-Digest: JVcXKja+FllBjaaIteBGOagKjfR62S5euXuxuB5ZEoA=

Name: org/eclipse/jdt/internal/compiler/util/SuffixConstants.java
SHA-256-Digest: nQn+GTD7FojSHpyStK3YJ9s6DsAaymUXIH3bau6McRM=

Name: org/eclipse/jdt/internal/compiler/lookup/CaptureBinding18.java
SHA-256-Digest: 6uupq5krOIkiK0gkta1Iip8GcXOLXz7Wd97BqqPzAr4=

Name:
org/eclipse/jdt/internal/compiler/parser/TerminalTokens.java
SHA-256-Digest: g1JMqcQZLM0xlQQwc1F4EKLJAeGouRA5CvKCbRyL4M0=

Name: org/eclipse/jdt/internal/compiler/lookup/MethodVerifier.java
SHA-256-Digest: Fkz8SRuzTNj2k6FaS/kfiyXr5Mgj+uCPAtndOpPtEx8=

Name: org/eclipse/jdt/internal/compiler/ast/IntLiteral.java
SHA-256-Digest: kLPMdOrdcO4MUTR53Flm+lWGw/mrMfhyyopSuomUaXU=

Name: org/eclipse/jdt/internal/compiler/ast/PostfixExpression.java
SHA-256-Digest: 1Steo0PyVWgvsHORMGZ6yi3DejAg+NvVIO+oQ2RKr+Y=

Name: org/eclipse/jdt/internal/compiler/env/IGenericMethod.java

SHA-256-Digest: V4Oy4rwtQm/tOE12RG+mgYQsPhNEmZ0CVFFhj3U99xU=

Name: org/eclipse/jdt/core/compiler/CompilationProgress.java
SHA-256-Digest: nAbtyQIRc6XhEeqI6XYmGmTR0gvX4ne3zaCLanl1T3U=

Name: org/eclipse/jdt/internal/compiler/flow/FinallyFlowContext.java
SHA-256-Digest: 2vkMrvUN04oOa7sKOEsGdB5gz+VTrSsDdKdYaQCqQow=

Name: org/eclipse/jdt/internal/compiler/apt/dispatch/IProcessorProvider.
java
SHA-256-Digest:
p3r20CvHFQZdRUf5H6qPOeCV86slB2ZjFzK5UClEHqo=

Name: org/eclipse/jdt/internal/compiler/lookup/MostSpecificExceptionMeth
odBinding.java
SHA-256-Digest: z/wniCQpWofsz0f923Uyzv7QUpKU3XVG+aP4LToPjl0=

Name: org/eclipse/jdt/internal/compiler/parser/unicode8/part1.rsc
SHA-256-Digest: nOXVCPVJlEl62WSQg9CZDnwgIIwUFECDN6E0UsYfelg=

Name: org/eclipse/jdt/internal/compiler/ast/CompactConstructorDeclaratio
n.java
SHA-256-Digest: nY3F3IRS88HTahjggdmn0JpTYZlw8w/3P/oFaoaCzmQ=

Name: org/eclipse/jdt/internal/compiler/lookup/SyntheticArgumentBinding.
java
SHA-256-Digest: tfqYNjyXzSil0BHDxrVzlPgzeIEIBsjJmkIKQNGNAgs=

Name: org/eclipse/jdt/internal/compiler/classfmt/RecordComponentInfo.jav
a
SHA-256-Digest: 0DA+ieKnH158MZ9jqX5smk7t44BagVK5KPmzJHFUyfc=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredModule.java
SHA-256-Digest: a7ZHgDuNYaiEPcFuq2VrClyCOi3fuUeJ3OvIF4O0lCw=

Name: org/eclipse/jdt/internal/compiler/ast/SuperReference.java
SHA-256-Digest: 2A2JS75m3jexKd+n7L4drJN9YaNnAtaxcKf4BFbodN4=

Name:
org/eclipse/jdt/internal/compiler/batch/ClasspathJep247.java
SHA-256-Digest: X7evRnyEJS14ssiIwnITseJs0Jn/ff89oR780782G8o=

Name: org/eclipse/jdt/internal/compiler/batch/BatchCompilerRequestor.jav
a
SHA-256-Digest: F9jRkQVm2tcAUHZ40ZncAvLj2cisXluJkwQRrMG4Ugk=

Name: org/eclipse/jdt/internal/compiler/ast/ExplicitConstructorCall.java
SHA-256-Digest: HqvlmpKvz9X/Wi11k9qAoc3D3HIg4FncJNZ629FHE0o=

Name: org/eclipse/jdt/internal/compiler/apt/model/NameImpl.java
SHA-256-Digest: qxuA8qgbce2kNdiyTDlEz7kbBKIKfto/kuG5+XNhqCQ=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredType.java
SHA-256-Digest: fPg6qqMc5SWZ+2f0qyPxNPKAx+UFlOng1SP4eW9ATFQ=

Name: org/eclipse/jdt/internal/compiler/parser/JavadocScanner.java
SHA-256-Digest: bEHZjp/Q5OPoAL/0niSIyQbtmCq8vdjaOreJ8oSCMvw=

Name: org/eclipse/jdt/internal/compiler/parser/parser24.rsc
SHA-256-Digest: nDZ/V9ZT+J2UH51K55IfeJfYL7nAjoc0/9m8yQ2P6JM=

Name: org/eclipse/jdt/internal/compiler/ast/EmptyStatement.java
SHA-256-Digest: 9MeKItRYAoiTCIVWk252OEWc3YzO8oR+foVVPgLL1Q8=

Name:
org/eclipse/jdt/internal/compiler/ast/JavadocReturnStatement.java
SHA-256-Digest: BZO1ZkXY2z3PtMOnNgbIFOgjg7x6U9phVZ/JdAbNc5U=

Name: org/eclipse/jdt/internal/compiler/ast/NullLiteral.java
SHA-256-Digest: 1yIqh7Bq8DkHzxMPVv8FdUiaAlSbKpi/P3xge9QpAxk=

Name: org/eclipse/jdt/internal/compiler/parser/unicode13/part14.rsc
SHA-256-Digest: haoJRj50zZ85Nw8yKzJcw88CAiPKhgGqeEjosEh+kak=

Name: org/eclipse/jdt/core/README.md
SHA-256-Digest: RF6LppkwQVB8DEQ/Hx2phs863bLqXrOEY5VhYkjRZQE=

Name: org/eclipse/jdt/internal/compiler/ast/AnnotationMethodDeclaration.
java
SHA-256-Digest: +9TEeELg8GFy/Eko7vJhRTbqTnQaqfujZGFmxCvcTDY=

Name: META-INF/services/javax.tools.JavaCompiler
SHA-256-Digest: gA6b1OQIa8kFFxPyMPio/CGkZGeCJ80l48AoqCEQjk4=

Name: org/eclipse/jdt/internal/compiler/lookup/MethodBinding.java
SHA-256-Digest: Q/JiHFsV1ku8fFpJbWr5VHhrjp9js5ccpob81R/Aj6A=

Name: org/eclipse/jdt/internal/compiler/apt/dispatch/BaseProcessingEnvIm
pl.java
SHA-256-Digest:
IRFc9rAnQVSrmtnaKOyGat05sxyYTnLyBvg7lb7kMq0=

Name: org/eclipse/jdt/internal/compiler/ast/ContinueStatement.java
SHA-256-Digest: U8udHlYH/8KViZNhAdPJ8n3io8lhedmSaJBcGlst0mk=

Name: org/eclipse/jdt/internal/compiler/classfmt/ExternalAnnotationProvi

der.java
SHA-256-Digest: thNdsq2aRSBFaBB88XxAsHcGrHV5SP7gcRt6Gy3XXUA=

Name: org/eclipse/jdt/internal/compiler/lookup/VariableBinding.java
SHA-256-Digest: dANQTpXsQUixn2Ie+RpKC0WOy8YQ3pglQHf42jKt+uY=

Name: org/eclipse/jdt/internal/compiler/ast/InstanceOfExpression.java
SHA-256-Digest: 9qz5AGQ38tkJ032Lv+pm7qZbiewiEGEINTlLt+w0TsE=

Name: org/eclipse/jdt/internal/compiler/ast/ParameterizedSingleTypeRefer
ence.java
SHA-256-Digest: WwW5EpY999nPSUgNX1hLXlnDOKMVXM2mZvzke9atKS8=

Name: org/eclipse/jdt/internal/compiler/util/Sorting.java
SHA-256-Digest: 7f7JfE+zDgz1QFbsjk4HqkcfbL6v1GersT9e4v7WKnU=

Name: org/eclipse/jdt/internal/compiler/ast/Expression.java
SHA-256-Digest: 6AVX4+fjRakd452Zj1c/fmrdrqsq6rU2IdobkeBgI8s=

Name: org/eclipse/jdt/internal/compiler/lookup/AnnotationHolder.java
SHA-256-Digest:
TzGtuiYSovNRXc0MCVukIuanJlE45an9w//a9o5vxM4=

Name: org/eclipse/jdt/internal/compiler/flow/SwitchFlowContext.java
SHA-256-Digest: N8X7ikdV+aGSzGBPQlTqVEFl2wOX2rAqZwq0of+uMAs=

Name: org/eclipse/jdt/internal/compiler/apt/model/ElementImpl.java
SHA-256-Digest: QvkDJU7SmVIy6bBUdqDIQHNs1FbJq1y3sXUpOWTO1Ec=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6/part1.rsc
SHA-256-Digest: EGqyCtI7oAbUti3+mdSIZttdzDPhzbrc+swdA50mVyM=

Name: org/eclipse/jdt/internal/compiler/lookup/ExtraCompilerModifiers.ja
va
SHA-256-Digest: ThZV0sDEo24g4sUTBbiV6dMuSN3w4l2XlaXewSuLnxg=

Name: org/eclipse/jdt/internal/compiler/ast/ThisReference.java
SHA-256-Digest: Qh00xNpRsQqhj/6bFnq2trs/t0gdYhmR+Wqg4XbWnFw=

Name: org/eclipse/jdt/internal/compiler/parser/parser16.rsc
SHA-256-Digest: e2AMF7tYFfuCCnZf0oAoYxouVGREKQbLULiTyQ5SGWs=

Name: org/eclipse/jdt/internal/compiler/classfmt/ClassFormatException.ja
va
SHA-256-Digest: fEAgAGOo5JpzyzRDIWsLPF1mR9NlG/7GpU7hd0BSuxA=

Name:

org/eclipse/jdt/internal/compiler/classfmt/ClassFileReader.java
SHA-256-Digest: XEBMM0o/yp0EuY/7FpCWbJBBZ736iH21Ammy7oeH41o=

Name: org/eclipse/jdt/internal/compiler/env/IDependent.java
SHA-256-Digest: fpgd6m/yVtibcI2+R5/zWgWCPCMCEv/Momkzm3PFkrU=

Name: org/eclipse/jdt/internal/compiler/lookup/TagBits.java
SHA-256-Digest: 6MQPcowBJe2EO7ddAnGbUT44QYdLJq9pUE+U+Z/fDYc=

Name: org/eclipse/jdt/internal/compiler/ast/ReferenceExpression.java
SHA-256-Digest: hMleEGjlZCNQhgK41XKkuvLIPf7kmsydekslvK2cqLA=

Name: org/eclipse/jdt/internal/compiler/classfmt/JavaBinaryNames.java
SHA-256-Digest: NBcoMH+VH8DSj+Xzc2ww4HAmf6bxzIboOFj2dhAsyoA=

Name: org/eclipse/jdt/internal/compiler/parser/unicode10/start1.rsc
SHA-256-Digest: JZlDollummU4hNiOft/ehe+XlohXVP+Gyax1W0PmOUc=

Name: org/eclipse/jdt/internal/compiler/ast/ExtendedStringLiteral.java
SHA-256-Digest: ZBCOxuMQQD0cb8EuxdgZMmm79glbJME27+/OIQ1mui8=

Name: org/eclipse/jdt/internal/compiler/lookup/InnerEmulationDependency.
java
SHA-256-Digest:
JP5EIYWFXAX6sRhm7T626VoNcYhdF6On7zFkG4mPTLU=

Name: org/eclipse/jdt/internal/compiler/ast/UnlikelyArgumentCheck.java
SHA-256-Digest: E4IPtCULbDvdmDAE2aGtyHCw1lVxDGskjYfIwKqoP6w=

Name: org/eclipse/jdt/internal/compiler/parser/unicode8/part2.rsc
SHA-256-Digest: /oFYyNQm6bxMPJ0MtgZs+crctPdo50HdEUNMzBO9XLg=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredBlock.java
SHA-256-Digest: w4wYeU4OF2Eeo1QAkxdf4/mbWJWbgQX9ywKQHd+tWeI=

Name: org/eclipse/jdt/internal/compiler/problem/AbortMethod.java
SHA-256-Digest: yZc9wzRkrQZa+haTqu4QFar+zCTfBcLiZCCBX6vtGoY=

Name: org/eclipse/jdt/internal/compiler/apt/dispatch/BaseMessagerImpl.ja
va
SHA-256-Digest: iYVQA2wCmC46TuNhAc+E6d6hbcCWK5XZFJHpWV6zZSM=

Name: org/eclipse/jdt/internal/compiler/batch/ClasspathMultiReleaseJar.j
ava
SHA-256-Digest: zAm3Drk83hKDTRV2Lt9/UMD4RKVY1cl1HOjps5cjn+0=

Name: org/eclipse/jdt/internal/compiler/apt/model/WildcardTypeImpl.java
SHA-256-Digest: UnkMpzWbpcFEElosi6w8C7WjNfTD2a4JzLnal30Om14=

Name: org/eclipse/jdt/internal/compiler/ast/OperatorExpression.java
SHA-256-Digest:
CniltjIq5225CfAo7KQeE4N8Db+4KR2N6kPdFRDGbcQ=

Name: org/eclipse/jdt/internal/compiler/ast/FakeDefaultLiteral.java
SHA-256-Digest: pXX8fiIhx9wvvvGx+U1Kmi+u1NzTaCW66aurZb7rd/k=

Name: org/eclipse/jdt/internal/compiler/util/CharDeduplication.java
SHA-256-Digest: bnWE0WM7C5NguQl4ROOI+O5HlgieItwiVtWNdE+sIrQ=

Name: org/eclipse/jdt/internal/compiler/batch/messages.properties
SHA-256-Digest: GSXVM/aBRhHcgNRROFtNs2kVLmi7fbAQ1UTTr3QLE7A=

Name: org/eclipse/jdt/internal/compiler/ast/AssertStatement.java
SHA-256-Digest: 8iwvDlwIgTwjI2UqzXJzyQ1OvqohWTMA+Ly3ybzY+EI=

Name: org/eclipse/jdt/internal/compiler/lookup/TypeBindingVisitor.java
SHA-256-Digest: mZPpPGKbLdfnEJYzlj3LKtOi49jRttS2DvwUKeuP7YQ=

Name: org/eclipse/jdt/internal/compiler/parser/ParserBasicInformation.ja
va
SHA-256-Digest: jD9w2YY/guf1dggS4HSRSAGIJpUDS82Rf+lx+3EJU0o=

Name: org/eclipse/jdt/internal/compiler/ast/CompilationUnitDeclaration.j
ava
SHA-256-Digest:
yJxsdkPxNAvBySQSiLyUWGCq/c1luz27PspUR8E/WDk=

Name: org/eclipse/jdt/internal/compiler/parser/parser10.rsc
SHA-256-Digest: sC7vOyBdt8dZ14851nMpH0bx7+pRgZYULFMJBz4dyKs=

Name: org/eclipse/jdt/internal/compiler/parser/unicode7/start2.rsc
SHA-256-Digest: cENGbHGTfBx4FTJBMY3gopEj6ecVPCCOSVDuhhj8H8M=

Name: org/eclipse/jdt/internal/compiler/apt/model/ArrayTypeImpl.java
SHA-256-Digest: vU87XfW5EWoPB2NcN64wQLNwTZmPbWk4oARhl37P2qc=

Name: org/eclipse/jdt/internal/compiler/env/IBinaryField.java
SHA-256-Digest: LtZsMbV3YtAN4e95n5A0JgWRXB5TZDamVsFBoNkXvBc=

Name: org/eclipse/jdt/internal/compiler/tool/ArchiveFileObject.java
SHA-256-Digest: AV9oZbRIaU3ycVTYVJYUbujFV36YC0QPlTWrevwF5C8=

Name: org/eclipse/jdt/internal/compiler/ast/ArrayInitializer.java
SHA-256-Digest: UhDgZw9lcEZxS4DTUuifoICoAFIQ9vb6CRUzSTNdmrE=

Name: org/eclipse/jdt/internal/compiler/problem/AbortCompilationUnit.jav

a
SHA-256-Digest: iaK1qSBh+6fQg/cb8+1npHlMJiEFXhWS3cl49z/kIDU=

Name: org/eclipse/jdt/internal/compiler/ast/ArrayTypeReference.java
SHA-256-Digest:
HevUZJY+d9DkbeRqQRrSxgo8DOtqlgo0rfXMsobUBIw=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredAnnotation.java
SHA-256-Digest: nzo8X3ntAyXMOIggqdsEYvQYz9Zc/6uM7MxqLhakjQM=

Name: org/eclipse/jdt/internal/compiler/ast/MagicLiteral.java
SHA-256-Digest: jZzzh3h3Asz5zZGRsS7wAL+yvdx7kQHNDOGYE+pnQcM=

Name: org/eclipse/jdt/internal/compiler/ast/CaseStatement.java
SHA-256-Digest: sEFcgeMGWKlCvScEJG0r/YJ5CFwpn+oP2sp0F2ubmio=

Name: org/eclipse/jdt/internal/compiler/ast/ConstructorDeclaration.java
SHA-256-Digest: WbnsSxZthX6ttYEic5hGWn9JMjDbu8g31eVnSnAISE0=

Name: org/eclipse/jdt/internal/compiler/impl/ByteConstant.java
SHA-256-Digest: HWPlIDRPq4cn+nhIIYP8m9EOTxKuPB431sxCco4orKg=

Name: org/eclipse/jdt/core/JDTCompilerAdapter.java
SHA-256-Digest: V2K7lnm5sPk925OSeGvpuiZ2JQpGhaeWXmWLO9REYZw=

Name: org/eclipse/jdt/internal/compiler/lookup/SyntheticFieldBinding.jav
a
SHA-256-Digest: IvdK1rkAHKBF8/DUOPD2FTRpv1l1dL8G2JjSv5dZA6A=

Name: org/eclipse/jdt/internal/compiler/ast/IntersectionCastTypeReferenc
e.java
SHA-256-Digest: C8BdQ0Klt3/T/2Q/5a7oVbSC0fDHcxsZxbyCX65DClE=

Name: org/eclipse/jdt/internal/compiler/lookup/ParameterizedTypeBinding.
java
SHA-256-Digest: dGh/V4hHnYFCxAj9hCYG1t14NBazqn4fiYZpQdtvzcM=

Name: org/eclipse/jdt/internal/compiler/apt/util/EclipseFileManager.java
SHA-256-Digest: 1EbsmhrQI9YuD6XTn0QCE0Sg2UltDkHUNkxGd5FpIs4=

Name: org/eclipse/jdt/internal/compiler/parser/unicode11/part14.rsc
SHA-256-Digest: zAkaPM3Ejlgf1/HENfa61QhvcZlyZlZ7dZsXWDNsizs=

Name: org/eclipse/jdt/internal/compiler/ast/FloatLiteral.java
SHA-256-Digest: hSrZWF8seULkDDRBLMCntdYJwJNf2YgWfJNk3OWdmdY=

Name: org/eclipse/jdt/internal/compiler/batch/CompilationUnit.java
SHA-256-Digest: CbX83+9JeM99CSQqoBErfqes9Fel2Hq2yRkZwyTqHUw=

Name: org/eclipse/jdt/internal/compiler/env/IModuleAwareNameEnvironment.
java
SHA-256-Digest: OShlmr9Q/PiSopJqKRSfb9jtMaxeEMXV0rhZLho6R7k=

Name: org/eclipse/jdt/internal/compiler/batch/ClasspathJar.java
SHA-256-Digest: ekFxfaUaOeCBbZd7UjvlT2F+UKXytlfCM9zfjXpBhac=

Name:
org/eclipse/jdt/internal/compiler/lookup/BinaryTypeBinding.java
SHA-256-Digest: k5qbhyAy+BQNJ4cZjEP4f/OKpiwyOfpMeZ94bxbQVTs=

Name: org/eclipse/jdt/internal/compiler/ast/QualifiedAllocationExpressio
n.java
SHA-256-Digest: 42l2ls9JOuxe2YRgYt7uYazmUy79LlzhM3gEGvpIVLk=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6/start0.rsc
SHA-256-Digest: LBPmiPyWIaPKXbXMpYtzbhN7IxuibkEy5NMDDdkjYcA=

Name: org/eclipse/jdt/internal/compiler/lookup/LookupEnvironment.java
SHA-256-Digest: Wa17HbHtjkUcnafvkB5dmCf3edmAO7q5+xtAlQ9Rbzk=

Name: org/eclipse/jdt/internal/compiler/parser/NLSTag.java
SHA-256-Digest: zrZoQRHp/CR6/0t+i8cNEMYYex6dbOiUUwxJxfZQyrM=

Name: org/eclipse/jdt/internal/compiler/apt/model/TypeParameterElementIm
pl.java
SHA-256-Digest: lfQdRcPsDQsP//xzgxkqInTi/e1NovyvOHoeFa/5dUE=

Name: org/eclipse/jdt/internal/compiler/ast/QualifiedTypeReference.java
SHA-256-Digest: 6plfuF9p/TzNoNNvfQIGQ8Rog6anwEHaRpCRG4804rU=

Name: org/eclipse/jdt/internal/compiler/lookup/CompilationUnitScope.java
SHA-256-Digest:
HYLAcMLo4QSqs75nGdvDiW167X1jDXrB4bDHjkVDuGA=

Name: org/eclipse/jdt/internal/compiler/codegen/ExceptionLabel.java
SHA-256-Digest: rpQrGuQkrnsTTXRWtY7CRWuvUCr/0APo76LdfuD5t14=

Name: org/eclipse/jdt/internal/compiler/apt/util/ManyToMany.java
SHA-256-Digest: Vtch9EJ76mj0z3t4snfV0eVTD0dkImM//SwOGr1QYq8=

Name: org/eclipse/jdt/internal/compiler/ast/AbstractMethodDeclaration.ja
va
SHA-256-Digest: XaPb+leGbY9KwdlHURlrXA0ycPA24lVM1Yxn8nPr7Sc=

Name: org/eclipse/jdt/internal/compiler/env/IBinaryNestedType.java
SHA-256-Digest: DQ9BFZnMYKqMnGk79CvPenQUIfvKcmCLMQIKmvHFQLs=

Name: org/eclipse/jdt/internal/compiler/parser/unicode/part0.rsc
SHA-256-Digest: 3oJGIUSpb+eve9nU1zwDetDqkmo3ZfMw47h9gwonuZQ=

Name: org/eclipse/jdt/internal/compiler/ast/TypePattern.java
SHA-256-Digest: r0fiTfpTXAdq8ju6Ne8eRrRcFMIAOrrSqzmNqAaEk6k=

Name: org/eclipse/jdt/internal/compiler/codegen/DoubleCache.java
SHA-256-Digest: TZiTAprIgnWaCWEtfYG7vOPmcXpfaKqkmie6we5+/5Y=

Name:
org/eclipse/jdt/internal/compiler/parser/RecoveredElement.java
SHA-256-Digest: d+e/RmhPjYwa8CE8rH1DQ99OEBfyQkX6kioRpgEtIpU=

Name: org/eclipse/jdt/internal/compiler/ast/RecordPattern.java
SHA-256-Digest: Ice6YTBhB+TA08TEUia8MM/8M3bdTqWDGXZiwlaG0R0=

Name: org/eclipse/jdt/internal/compiler/parser/parser15.rsc
SHA-256-Digest: ghyjkS9Q1foTSJJZHjMtHRImRHwNUvClJ+zRhI+v3iI=

Name: org/eclipse/jdt/internal/compiler/apt/model/AnnotationMemberValue.
java
SHA-256-Digest: cGkypXJUDL8A6+kCxkh7DXC6EVcUjHDR/Sf0TxuqRDM=

Name: org/eclipse/jdt/internal/compiler/parser/unicode13/start3.rsc
SHA-256-Digest: nHNAbc9aOhg9dYfogYtYQUPxeQRCRmT2tvOA3Xu9ZfI=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredLocalVariable.ja
va
SHA-256-Digest: dk3ndRTo9+UuHe5Vnxe6EHJHTA0kBR4knmVuKH9H5go=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6_2/start2.rsc
SHA-256-Digest: cENGbHGTfBx4FTJBMY3gopEj6ecVPCCOSVDuhhj8H8M=

Name: META-INF/eclipse.inf
SHA-256-Digest: FSHTa647gYSOCplUfiJTfpKBbRzo9EcInHKafP6qYVg=

Name:
org/eclipse/jdt/internal/compiler/ast/SwitchStatement.java
SHA-256-Digest: 1Ifbu0cipdC3FSY+2vAaCi+8+yhFrqfF6xhOQmMia0E=

Name: org/eclipse/jdt/internal/compiler/util/HashtableOfIntValues.java
SHA-256-Digest: 6dwQadGjgBB4gScfIjgzkCpJvhxDdQg5ffajIM9Cq6A=

Name: org/eclipse/jdt/internal/compiler/apt/dispatch/BatchMessagerImpl.j
ava
SHA-256-Digest: 1bRtJAYbhSz9mrpJQP3RmwRJt3Toor7F6Ki50AagFF4=

Name: org/eclipse/jdt/internal/compiler/env/IBinaryMethod.java
SHA-256-Digest: fTdIF7qh3SE1DrY3W0ONAteMK3E8cafbW8A6NJNVrAY=

Name: org/eclipse/jdt/internal/compiler/apt/model/ModuleElementImpl.java
SHA-256-Digest: 5qR6r6lDoaorj/wO2RtNwUzsaov1LIprS+W/XvHfr/A=

Name: org/eclipse/jdt/internal/compiler/ast/ForStatement.java
SHA-256-Digest: LnuSoAuJdIJxaSYaa9O/hso1MNRt2KETRig2pR4YCqY=

Name: org/eclipse/jdt/internal/compiler/lookup/IntersectionTypeBinding18
.java
SHA-256-Digest: GBT6XfW9M49xxJ2vFB5cGQCwq3mn+X2HbiBNgK5dx8g=

Name: org/eclipse/jdt/internal/compiler/lookup/ProblemReferenceBinding.j
ava
SHA-256-Digest: HOfQkUAc/QMM6aZXxkaK5aF9lYb6CDhEYugS5dYVWBQ=

Name: org/eclipse/jdt/internal/compiler/apt/model/IElementInfo.java
SHA-256-Digest: 8D5jjiL8JzToxy0m1qB7FvzDcizll57zoZrXxRScYrg=

Name: org/eclipse/jdt/internal/compiler/env/AccessRule.java
SHA-256-Digest: jeqzcCzHE3VffRuDpdEfOKT9+4gH+bjGtEjOeDg1B5A=

Name: org/eclipse/jdt/internal/compiler/codegen/VerificationTypeInfo.jav
a
SHA-256-Digest: VEMoMn8QoDROtJZiHiy2Jl/zzfRCFu1IYdPiUdm+SQs=

Name: org/eclipse/jdt/internal/compiler/env/INameEnvironment.java
SHA-256-Digest: FrlJZFLCoKx2ug3S+eH0yBTRXV0a4RXoBlI6mf51uQM=

Name: org/eclipse/jdt/internal/compiler/env/PackageExportImpl.java
SHA-256-Digest: k9OgwgGHKvOFH6B0GdIS5yeS0Ka4Qq6+mPYz3fpk4JQ=

Name: org/eclipse/jdt/internal/compiler/tool/EclipseDiagnostic.java
SHA-256-Digest: 024rApaMf/6p1SMAwr4nktVrXIRMa9SpJv8t/i0gBhQ=

Name: org/eclipse/jdt/internal/compiler/ReadManager.java
SHA-256-Digest: FwvM+S9gVK6HBiNzrX6LdIdnr7757HNWl2GNDr6XV0Y=

Name: org/eclipse/jdt/internal/compiler/parser/unicode10/start0.rsc
SHA-256-Digest:
psMHK8mTblYBTX+0mJ45ANepvjVGZ6tFktKIeR7cUog=

Name: org/eclipse/jdt/internal/compiler/lookup/ImportConflictBinding.jav
a
SHA-256-Digest: V1jafQSx3HpzeMTEndct0FdFDDlkjQ9Q91PnnLzOiJE=

Name: org/eclipse/jdt/internal/compiler/parser/parser11.rsc

SHA-256-Digest: WyvknKbQk9zw2+5GeCawciEmpsseejbvUMYyOGPkMvk=

Name: org/eclipse/jdt/internal/compiler/ast/Statement.java
SHA-256-Digest: fZLXiyAXWu/nqVfvkuBaRwTLABmVmzso3tgYch98+mo=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredStatement.java
SHA-256-Digest: Gf3GV9PwxoamEWF83Coy8wDA/idPVdWsGOksCkmgW7c=

Name: org/eclipse/jdt/internal/compiler/util/SortedCharArrays.java
SHA-256-Digest: DamW2gKP4XVy2IEtIIe3emFxoDKT00T3Imp0+ZF15tU=

Name: org/eclipse/jdt/internal/compiler/parser/unicode7/part14.rsc
SHA-256-Digest: zAkaPM3Ejlgf1/HENfa61QhvcZlyZlZ7dZsXWDNsizs=

Name: org/eclipse/jdt/internal/compiler/apt/dispatch/BaseAnnotationProce
ssorManager.java
SHA-256-Digest: oPZoxJMwJw1frk46M/fZB0p1eR5X+TE/qzKUB4AH6SE=

Name:
 org/eclipse/jdt/internal/compiler/lookup/ExtendedTagBits.java
SHA-256-Digest: ZPhWXNMs8AG3pZ0ejwSdmNSwJfW0HHSbqJq7QO1JxkY=

Name: org/eclipse/jdt/internal/compiler/ast/Receiver.java
SHA-256-Digest: vvQgwHjwKvIyNnjMejmWHxtDJY6bC7UhmV4pUysxGfY=

Name: org/eclipse/jdt/internal/compiler/lookup/BoundSet.java
SHA-256-Digest: 9EyWWrn7fo4vP/hE9aixGLEPOvcS4glBT4NVpw7ezE0=

Name: org/eclipse/jdt/internal/compiler/codegen/StackMapFrameCodeStream.
java
SHA-256-Digest: NHW9DnYu5J+jrXeIzCMQBYDfwYxCEiRUt2oqU6C4oCk=

Name: org/eclipse/jdt/internal/compiler/parser/parser6.rsc
SHA-256-Digest: 6YTlmw+cz/jNtwZeFFqHmKe9lS1P0g4LxATDhMP2o7I=

Name: org/eclipse/jdt/internal/compiler/ast/TypeReference.java
SHA-256-Digest: mS4l1eOv8t7d/J5AwTWw7AtOQqxq0W9zjS0UGSi/drM=

Name: org/eclipse/jdt/internal/compiler/lookup/ConstraintFormula.java
SHA-256-Digest: Enp0WKoAbai6N0wlk405InG/2bxBp6UdKapWFE/+r/0=

Name: org/eclipse/jdt/internal/compiler/lookup/RecordComponentBinding.ja
 va
SHA-256-Digest: D8MmXJ84OcnavgOq87nu9zLlREAIQn6zakwYDIAglWw=

Name: org/eclipse/jdt/internal/compiler/apt/model/ElementsImpl.java
SHA-256-Digest: L+M6HRP6LrarvMfHKkB15WXiiYyv5dxMJZKXJqM300Y=

Name: org/eclipse/jdt/internal/compiler/lookup/SyntheticMethodBinding.ja
va
SHA-256-Digest: neFj2D8tZNKSyh4IjUw5+thegItMFU0JetuzV9gp8fw=

Name: org/eclipse/jdt/internal/compiler/ast/IntLiteralMinValue.java
SHA-256-Digest: NERL/4h45mIbKGaF8tR7oYUcu8KGZnPMaNRnxhSm97o=

Name: org/eclipse/jdt/internal/compiler/parser/parser2.rsc
SHA-256-Digest: gxVg5Co0TQ+6j3PKsKNEmgFN6xmC9nIlSjEityVezo8=

Name: org/eclipse/jdt/internal/compiler/ast/RecordComponent.java
SHA-256-Digest: 3zE8hv6vl2tuTK3Rg2p6+xH6fSz279PcgjFnWgD3NII=

Name: org/eclipse/jdt/internal/compiler/ast/LongLiteral.java
SHA-256-Digest: fR00peXlTsV8np71h4Hb4sXCbpqPzmq0hB/e+BHqikk=

Name: org/eclipse/jdt/internal/compiler/parser/unicode/part14.rsc
SHA-256-Digest: zAkaPM3Ejlgf1/HENfa61QhvcZlyZlZ7dZsXWDNsizs=

Name: org/eclipse/jdt/internal/compiler/flow/InsideSubRoutineFlowContext
.java
SHA-256-Digest: RGHEpQREfqoq9lR/Ar8VFy8pjXg2ReAOILoCEwIQQUk=

Name: org/eclipse/jdt/internal/compiler/parser/unicode8/start0.rsc
SHA-256-Digest: qX3cYK0m+s1NTlMWuyEA24QHHUH+zUca9aXLmJIw30k=

Name: org/eclipse/jdt/internal/compiler/ast/AbstractVariableDeclaration.
java
SHA-256-Digest: mTA4k9q5NuDmFgg4xHjAKrV3AhfZwpHldFqfjiRVHZs=

Name: org/eclipse/jdt/internal/compiler/tool/Archive.java
SHA-256-Digest: frVZZOU4zZRb/aBYR/Pl47nNW0mdgAZMuXUm4tjq5MQ=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredRequiresStatemen
t.java
SHA-256-Digest: leNy9x8oasr3u39mD94f+7oSwL8iRO0k10Y34e27Hqc=

Name: org/eclipse/jdt/internal/compiler/parser/ConflictedParser.java
SHA-256-Digest: 5V08hMZ9mnZj3p8gsD4NiX0RLbenOKB0Bjy00eghG7c=

Name: org/eclipse/jdt/internal/compiler/parser/unicode12_1/start0.rsc
SHA-256-Digest: Dp2OYjHt5Nd4lu/vixXww2Ukb950nmOURkjDR3gMPY0=

Name: org/eclipse/jdt/core/compiler/InvalidInputException.java
SHA-256-Digest: JbK1gLxkAy+WZbP5SKHvlOVyt39rxOSFq770hudHJwg=

Name:

org/eclipse/jdt/internal/compiler/codegen/FloatCache.java
SHA-256-Digest: 46X6UtOOfXbrjnSMpNvMSP08ZmA1zxZMdphFEIPKTCE=

Name: org/eclipse/jdt/internal/compiler/flow/ExceptionInferenceFlowConte
xt.java
SHA-256-Digest: SGRfrm181aUiAjlSPEprRqjmmZ5noMmdfaRUwY6+DOY=

Name: org/eclipse/jdt/internal/compiler/impl/Constant.java
SHA-256-Digest: d0dQuOxO9WKI4pupuERC8nud9TovCb1DbJj0I+lHf6E=

Name: org/eclipse/jdt/internal/compiler/IDebugRequestor.java
SHA-256-Digest: 59fw/shIZJtfQio8sg8R52Ak1oH+zQuoGJIcH+zZ3mo=

Name: org/eclipse/jdt/internal/compiler/CompilationResult.java
SHA-256-Digest: wgSZuH7UkPN+VIJJzWcDy1En631VqFTk5Gu7V/r5CqQ=

Name: org/eclipse/jdt/internal/compiler/ast/SwitchExpression.java
SHA-256-Digest: h+0wg163y0pK6CHbGpgu1/kgnSgcsntPJiXW14YBn84=

Name: org/eclipse/jdt/internal/compiler/classfmt/MethodInfo.java
SHA-256-Digest: ZbSVqezDLMN1LvLTz6+l+E7pKWg3xZabrJ0MJv9NI5E=

Name: org/eclipse/jdt/internal/compiler/ast/LabeledStatement.java
SHA-256-Digest:
3bQAAOy+YZX4AxzrIPgn+OKHy9hCuK5JYTI0CIM3Tvc=

Name: org/eclipse/jdt/internal/compiler/flow/FlowInfo.java
SHA-256-Digest: i0wM1gYfhIC4oqq6PINMKI7bQUDNn5FuOi5QCEqxclw=

Name: org/eclipse/jdt/internal/compiler/apt/model/TypeVariableImpl.java
SHA-256-Digest: frCtUqom4Spi0/K3Zb0wx4rZL7a2Uz4t6OAU5Cblt5A=

Name: org/eclipse/jdt/internal/compiler/lookup/ConstraintExceptionFormul
a.java
SHA-256-Digest: +vWwQMrOqGPW9fPuJvDzfc1his10bY6eC4dpqQJEQf4=

Name: org/eclipse/jdt/internal/compiler/ast/ExpressionContext.java
SHA-256-Digest: fZF8Q711Y9Hd5+bozlARoQLu82c/NRqb+QsXfGgxbHU=

Name: org/eclipse/jdt/internal/compiler/parser/unicode12_1/part2.rsc
SHA-256-Digest: 04VMyR2oGLNoJWK6xYvZv3gPXGxYB6RpHuNdBUBuFAo=

Name: org/eclipse/jdt/internal/compiler/util/SimpleSet.java
SHA-256-Digest: DtiVe2TP5NvpqXI9uOz4IqTn2Z+W35e/xk2ow+3/YIU=

Name: org/eclipse/jdt/internal/compiler/IProblemFactory.java
SHA-256-Digest: EJaAEM7QHeAPmfAsbezjERjJZtCo0giRhr4Px28VfbI=

Name: org/eclipse/jdt/internal/compiler/ast/GuardedPattern.java
SHA-256-Digest:
rgbWd4Q5Iu2qREzjUNBjbqEDLj1Gdojdasoh6NC5cEE=

Name: org/eclipse/jdt/internal/compiler/ast/JavadocMessageSend.java
SHA-256-Digest: Ewz5eYk51IGbve1Nq41zb7bwn6mO7oPhmbjgLtzWQvI=

Name: org/eclipse/jdt/internal/compiler/env/IModule.java
SHA-256-Digest: amebm5xVRycmkVhDYwf0LKUzSr0lw1rEXHh2UEJl4nU=

Name: org/eclipse/jdt/internal/compiler/batch/FileSystem.java
SHA-256-Digest: duG/z0izvMh/r4fsWclI3h6hM0jRB3mmvSTO1i6icAI=

Name: org/eclipse/jdt/internal/compiler/lookup/InvocationSite.java
SHA-256-Digest: 5mLua8L7Q3Ag0ho+JDVoKHZ+Fde5JwTI3AJxl0zY1Ug=

Name: org/eclipse/jdt/internal/compiler/lookup/MissingTypeBinding.java
SHA-256-Digest: Chy0yHtWU050QUy6yb2DLzQPcOrz7K0ro41w9NIbGpQ=

Name: org/eclipse/jdt/internal/compiler/batch/ClasspathJep247Jdk12.java
SHA-256-Digest: jiEJMFhVQEyqheYMCV/etIMkpCcJr7hvsQbpY17qllo=

Name: org/eclipse/jdt/internal/compiler/apt/model/PrimitiveTypeImpl.java
SHA-256-Digest: u9M4VlT77uqAb/PafQLSAjCyCemUAHx3JcDdL/TJtnQ=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6/start1.rsc
SHA-256-Digest:
qJnkmI8sEfaYA+EPRMfPF14J0Tk152ZFHTIS5UVg43I=

Name: org/eclipse/jdt/internal/compiler/classfmt/ClassFileConstants.java
SHA-256-Digest: WOVkM7Dlu1c05Wy5EBXG7bll73Nz+qlcOyHkigeUAcc=

Name: org/eclipse/jdt/internal/compiler/env/IBinaryModule.java
SHA-256-Digest: NnMeZZ96j98PXOVU7oob9BZPE3mQzvm3TrdtGsQYVUc=

Name: org/eclipse/jdt/internal/compiler/apt/dispatch/BatchFilerImpl.java
SHA-256-Digest: cNK9LMYiC+sLCJEjWcqRMvdAiMBlN/upO4KGI22D3gE=

Name: org/eclipse/jdt/internal/compiler/ast/TypeParameter.java
SHA-256-Digest: 7UoPRqLjFSB7cYFJYeqznekCWT/UzlrsG0bmWVeopG4=

Name: org/eclipse/jdt/internal/compiler/lookup/ProblemPackageBinding.jav
a
SHA-256-Digest: af2SsWizYF7y9Gjygc2sBBvKrdgZpcq+NAoi5FaQ78A=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredImport.java
SHA-256-Digest: IH2JGNeo1/6KvKmf9IyUh/14N/XIelF2aqVIV+JFeUY=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6_2/part2.rsc
SHA-256-Digest: cENGbHGTfBx4FTJBMY3gopEj6ecVPCCOSVDuhhj8H8M=

Name:
org/eclipse/jdt/internal/compiler/lookup/ParameterNonNullDefaultPr
ovider.java
SHA-256-Digest: DWR2Du9YhAodn8AFR8mkr9IlMdBWwQzfy2ZkMFeiejc=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredExport.java
SHA-256-Digest: Ugq9zIBjXt9kQiu8OG1Ziqk4jMGgm5jGUngRZ9eQNNE=

Name: org/eclipse/jdt/internal/compiler/lookup/PlainPackageBinding.java
SHA-256-Digest: 8ObDfjCNj3Yl9QHAM5E6pM0cvk6Ji3b2Th+sDwPWvuI=

Name: org/eclipse/jdt/internal/compiler/lookup/TypeVariableBinding.java
SHA-256-Digest: r/IOXbMEqMhBo5mQJu7Jy+njdxURT12XHw2ALhHvDVk=

Name: org/eclipse/jdt/core/compiler/batch/BatchCompiler.java
SHA-256-Digest: Oa4OFQc+pSa3wycngKcQkfN/EfyOnkW3pDPM0YvLq7o=

Name: org/eclipse/jdt/internal/compiler/util/HashtableOfObject.java
SHA-256-Digest: sZzPcE75LnkarFzX9YLqrej+Etzb6Q7T86mrma/Rn6o=

Name: org/eclipse/jdt/internal/compiler/ast/Annotation.java
SHA-256-Digest: gFswuYWx1MuMgivLI1W4sFx7fEBD2ykHlVybbzNL7HM=

Name: org/eclipse/jdt/internal/compiler/util/HashtableOfObjectToInt.java
SHA-256-Digest:
MGTrGzqc9LlFYi2E72uKBYX20hO55dkHBtYg9vNYvxw=

Name: org/eclipse/jdt/internal/compiler/util/Messages.java
SHA-256-Digest: z1D+Oax0PM84p/lvpeUrqpJFwlap7MUJrWchIP3c22k=

Name: org/eclipse/jdt/internal/compiler/ast/SubRoutineStatement.java
SHA-256-Digest: ij42EVaY3HwU/HN83ruMo0sQhvc6n5YCxyIIP4HvzWY=

Name: org/eclipse/jdt/internal/compiler/util/HashtableOfType.java
SHA-256-Digest: BaZRYRtHLsPI87YwMAuD0we3zv4v+HP30fo9+rXXOUY=

Name: org/eclipse/jdt/internal/compiler/lookup/NullTypeBinding.java
SHA-256-Digest: WSwAaF9IOf+/NMVK+FIZNRV6VEWz2Q41q4kmizZxinE=

Name: org/eclipse/jdt/internal/compiler/lookup/AnnotationBinding.java
SHA-256-Digest: DKwU6uLr6EwUiJAStcEkBo04pPKkkvN7+tgtmI7CN3E=

Name: org/eclipse/jdt/internal/compiler/ast/ModuleStatement.java
SHA-256-Digest: A9cAlNPAoK1lYfCcjvpES1clG2U2Q+EtUijNKZsCTok=

Name: org/eclipse/jdt/internal/compiler/classfmt/MethodInfoWithTypeAnnot
ations.java
SHA-256-Digest: mDTGezI0c53Ve3UhmspoUcvxoKW8hYQZRTVNsUxcrTk=

Name:
org/eclipse/jdt/internal/compiler/flow/LabelFlowContext.java
SHA-256-Digest: 1ekmenQ+k878hrL0ExrcR3P7J2XrV2calnr1ul4/2O0=

Name: org/eclipse/jdt/internal/compiler/env/IBinaryTypeAnnotation.java
SHA-256-Digest: gjUHpF09pdDCs1P7Qxsfsj2CNRne0D4RGJ5SldHt/v4=

Name: org/eclipse/jdt/internal/compiler/lookup/SplitPackageBinding.java
SHA-256-Digest: r/cJ40JTZaE1NbEofxLC3AMwR4b4rw+TeJItsn4WbdU=

Name: org/eclipse/jdt/internal/compiler/parser/parser12.rsc
SHA-256-Digest: rCefmeL4kEBVFMinQ3UcaEc5J28B8911N5n8dDJC0K8=

Name: org/eclipse/jdt/internal/compiler/lookup/ProblemBinding.java
SHA-256-Digest: dch7I8fQzUK76JjwsvSoGfwtYYxX5Dh163sHI0hmHJM=

Name: org/eclipse/jdt/internal/compiler/parser/unicode12_1/start1.rsc
SHA-256-Digest: Hu+lWScZmve5ieKGtV7AdVPL3pzNaPtHPDRu43ce9j8=

Name: org/eclipse/jdt/internal/compiler/impl/StringConstant.java
SHA-256-Digest: 0YwiIa2M//0rncvSm0TW02Z5PIhxAUQxJ9p65ma9aVI=

Name: org/eclipse/jdt/internal/compiler/ast/FunctionalExpression.java
SHA-256-Digest: mirv2JQF1Hqm1D2SCBukH1kTjaAY9NaXoJ8BwvWiLM0=

Name:
org/eclipse/jdt/internal/compiler/parser/unicode13/part3.rsc
SHA-256-Digest: nHNAbc9aOhg9dYfogYtYQUPxeQRCRmT2tvOA3Xu9ZfI=

Name: org/eclipse/jdt/internal/compiler/ast/ModuleDeclaration.java
SHA-256-Digest: URPYlaK0cskdWQxEoHQ8tywgbh7ntjHmLq4WaSY8AMM=

Name: org/eclipse/jdt/internal/compiler/AbstractAnnotationProcessorManag
er.java
SHA-256-Digest: n4AMfq30Puh0Q67yv+zNx6F+dGPhOsUBVu0bHab4tO4=

Name: org/eclipse/jdt/internal/compiler/ClassFile.java
SHA-256-Digest: 0Kt1kIuWpptRDUT6JcdUlr8JLPD5ch3HVC4wtyC69Mk=

Name: org/eclipse/jdt/internal/compiler/lookup/InferenceFailureException
.java
SHA-256-Digest: gbfCtZJuhu6ju12brtcRgGT/xs8GaB9restNbLLnNJc=

Name: org/eclipse/jdt/internal/compiler/ast/FakedTrackingVariable.java

SHA-256-Digest: 3E/Y/oPBEfAacaT6O0rcFJEigKedmqu2HxVr71OMK1E=

Name: org/eclipse/jdt/internal/compiler/batch/ClasspathDirectory.java
SHA-256-Digest: C76K1OoEsAA2XzeL7w3CMdhu2EGhgJCzFfwKELsyFDo=

Name: org/eclipse/jdt/internal/compiler/parser/parser5.rsc
SHA-256-Digest:
GYGrDFhbt77HANzCbzjB6UWCrZC56demhwamgYjcjuI=

Name: org/eclipse/jdt/internal/compiler/parser/parser3.rsc
SHA-256-Digest: CbB5GBmX+MB15SB4xt2175bnQ8QJ9dwbavL+4cFbaQw=

Name: org/eclipse/jdt/internal/compiler/ast/JavadocAllocationExpression.
java
SHA-256-Digest: sAc7IYqaTXd52UW8ua8U8CRJqpeRPXA8nHvcAByVs5c=

Name: org/eclipse/jdt/internal/compiler/flow/LoopingFlowContext.java
SHA-256-Digest: Xpbz/UCe8jW1fhPsRqGAmjkj/fLHD4spAwYBAj3P1Cs=

Name: org/eclipse/jdt/internal/compiler/lookup/ReferenceBindingSetWrappe
r.java
SHA-256-Digest: 4v2Y8druJlscloANH6gvb0/P/wRftdouL0aOLXs9bf4=

Name: org/eclipse/jdt/internal/compiler/ast/CompoundAssignment.java
SHA-256-Digest: j+4Yk756/CJ2N5JyoMjTBzIGPCYdbxlWqaoZ9BIN6Fk=

Name: org/eclipse/jdt/internal/compiler/lookup/UnresolvedReferenceBindin
g.java
SHA-256-Digest: SAUV8Egrq3In6tDhSBNAYockbtvXUXTA9sPyL6vbHH0=

Name: org/eclipse/jdt/internal/compiler/impl/CompilerStats.java
SHA-256-Digest: Bee6kUcNiJbTyhb0zwM6bixT6pIrMsUSWRDynhJN0Ps=

Name:
org/eclipse/jdt/internal/compiler/codegen/MultiCatchExceptionLabel
.java
SHA-256-Digest: YfiOtbEGzSndIkzVakEh6J3uMI46M/kyS8EmqW/22S0=

Name: org/eclipse/jdt/internal/compiler/env/IBinaryAnnotation.java
SHA-256-Digest: bNJ5BYNwKeckJiRMyKK9qyJfhN45rTfPDNFTW+wYlmo=

Name: org/eclipse/jdt/internal/compiler/env/IBinaryType.java
SHA-256-Digest: QEz/AEZSkQNAJYLENLtzmRnNMoz4Cq3ArqpnCgraHLk=

Name: org/eclipse/jdt/internal/compiler/apt/dispatch/BatchAnnotationProc
essorManager.java
SHA-256-Digest: ZSbuHjhBpDZJEAmZ6onvIT+So7yVr2wQu2vgw7MBw9Y=

Name: org/eclipse/jdt/internal/compiler/flow/ConditionalFlowInfo.java
SHA-256-Digest: p4N6kUdzD4ajRGQV03PrtWJhKvu5+Fa/ctz2HM8SwKU=

Name: org/eclipse/jdt/internal/compiler/apt/model/ElementsImpl9.java
SHA-256-Digest: 4TTLbLWvZDZ/9CP5N5h85HK+CyKVoLlWow3uAG/R3P8=

Name: org/eclipse/jdt/internal/compiler/ast/JavadocArraySingleTypeRefere
nce.java
SHA-256-Digest: O1CLDgkiR/8EKDBvEFpYYsiSxPXhcyKyxqDvA8VM3u4=

Name: org/eclipse/jdt/internal/compiler/ast/MethodDeclaration.java
SHA-256-Digest:
l5SqNxDjUVLg8tMk2y2GOF+993lvdOi7jWIeaEvy87c=

Name: org/eclipse/jdt/internal/compiler/parser/unicode10/part14.rsc
SHA-256-Digest: zAkaPM3Ejlgf1/HENfa61QhvcZlyZlZ7dZsXWDNsizs=

Name: org/eclipse/jdt/internal/compiler/tool/Util.java
SHA-256-Digest: 0xi0flj3jWU7tIpU5UBoNGunYpPAIlLgJ2IZ9TfJSyI=

Name: org/eclipse/jdt/internal/compiler/lookup/ParameterizedMethodBindin
g.java
SHA-256-Digest: u5ctuz6SBkwHFJ1N4CJr516vbcucox01c4T2RdaCe4A=

Name: org/eclipse/jdt/internal/compiler/parser/unicode11/start0.rsc
SHA-256-Digest: BHSW9NqBoOTbmNIq0h/IxyQppZMuZH15WvHs02E0C0c=

Name: org/eclipse/jdt/internal/compiler/tool/ExceptionDiagnostic.java
SHA-256-Digest: FvqYR5ga2PR/GCUTZ81Hg8nxfntV3FoFMQs40NSyz1U=

Name: org/eclipse/jdt/internal/compiler/parser/RecoveredInitializer.java
SHA-256-Digest: OYIBUKdphsHCc6h4CKBPBVLViFKxXxC6PQyn54FlrHQ=

Name: org/eclipse/jdt/core/compiler/package.html
SHA-256-Digest: yFY1vSH16uC15ePwo+UvSIEEQQeJiqoDeMJPd+19WNo=

Name:
org/eclipse/jdt/internal/compiler/lookup/AptSourceLocalVariableBin
ding.java
SHA-256-Digest: BmkFOERQziD9SAwxLF8LvGeTQTBJQDoKJkhmqNc9RTE=

Name: org/eclipse/jdt/internal/compiler/lookup/TypeIds.java
SHA-256-Digest: b8GY0DumuPRuySkAhOk58pPR8wQHymPykc9QUg3rLlo=

Name: org/eclipse/jdt/internal/compiler/lookup/NestedTypeBinding.java
SHA-256-Digest: 19NbeubZzQa0s5pLU72ERaZXzfXkaRbAevFvWXrAZ+w=

Name: org/eclipse/jdt/internal/compiler/ast/StringLiteral.java

SHA-256-Digest: X9rrdB2W2A8L66/uMELc018eLoXbqKQ9k245oCeY+Og=

Name: org/eclipse/jdt/internal/compiler/parser/ScannerHelper.java
SHA-256-Digest: /OgP/7oZHJXdKr4LK4+Mftmiy8vbrcJZauetSOQ3qBQ=

Name: org/eclipse/jdt/internal/compiler/lookup/PolyParameterizedGenericM
ethodBinding.java
SHA-256-Digest: s7eeDgtS0jbNLGda+TUcKycuwvSSkG0McMeXPLA7foQ=

Name: org/eclipse/jdt/internal/compiler/ICompilerRequestor.java
SHA-256-Digest: 23swF4Ct/6uPpG1ZCOHsQNb92nWtVlStyGZ5YdKQjRg=

Name: org/eclipse/jdt/internal/compiler/apt/model/TypeMirrorImpl.java
SHA-256-Digest:
7wA4cikgy9oeg+IDeMu7JMPWXeVTx9bhEKLQ7f4rCqg=

Name: org/eclipse/jdt/internal/compiler/ast/Block.java
SHA-256-Digest: qwc3/1Bg35Gcz1rIHTBdKSYG1mDDwLUmx8pVrGEUugA=

Name: org/eclipse/jdt/internal/compiler/ast/PackageVisibilityStatement.j
ava
SHA-256-Digest: yxKwdbKF0C/m7O5HmR028i5eVcG4fxhOb8VWUKcnlJQ=

Name: org/eclipse/jdt/internal/compiler/lookup/SourceTypeCollisionExcept
ion.java
SHA-256-Digest: SmaWHSsUwMfF21do7Vll62ma5YpCNp5RIM6ZonK2qXs=

Name: org/eclipse/jdt/internal/compiler/codegen/IntegerCache.java
SHA-256-Digest: VN0h47vdVMHrkIIbvACzQT7Eooi7bVg92+B9ht2e8K8=

Name: org/eclipse/jdt/internal/compiler/parser/unicode8/part14.rsc
SHA-256-Digest: zAkaPM3Ejlgf1/HENfa61QhvcZlyZlZ7dZsXWDNsizs=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6/start2.rsc
SHA-256-Digest: cENGbHGTfBx4FTJBMY3gopEj6ecVPCCOSVDuhhj8H8M=

Name: org/eclipse/jdt/internal/compiler/ast/ClassLiteralAccess.java
SHA-256-Digest: 3ekmsK1HMl/xygSl6ivR25+Y78rfAKyO8Ii9fF59C08=

Name: org/eclipse/jdt/internal/compiler/classfmt/ComponentInfoWithTypeAn
notation.java
SHA-256-Digest: 5vL5lwjKGtMdOu52BnxRiSqgpiufPyJeaEhfG+Xor5w=

Name: org/eclipse/jdt/internal/compiler/apt/dispatch/AptProblem.java
SHA-256-Digest: CpFRtA2aTTBP/9HN/pORyGZu3lJZ8u/qKzAdlj2Ed/0=

Name: org/eclipse/jdt/internal/compiler/lookup/UnresolvedAnnotationBindi
ng.java

SHA-256-Digest: BkamkYmIp62j3kEW/92ioUOxkH5EG51XwClZMPTfiuM=

Name: org/eclipse/jdt/internal/compiler/ast/BinaryExpression.java
SHA-256-Digest: IZWwYgYic1HkGqRQzrsIFPF0Z2CSYofwJcJlgM8xkWk=

Name: org/eclipse/jdt/internal/compiler/impl/FloatConstant.java
SHA-256-Digest: pl9gh/wiKBaWWTcA3RprEA8G+MYpAHpJPGDMLmu90W0=

Name: org/eclipse/jdt/internal/compiler/ast/FalseLiteral.java
SHA-256-Digest: GEu+m4Cf3D3/mSJnfX2NqOhcxdS5+0pLKogKOJURvkE=

Name: org/eclipse/jdt/internal/compiler/env/AccessRestriction.java
SHA-256-Digest: Yw9wH/eYJOhkYF3qo+894hc6ClRn6UOfDKWuAUALpnE=

Name: org/eclipse/jdt/internal/compiler/ast/ThrowStatement.java
SHA-256-Digest:
D/hfE852OI1chVLqP9cHmAs5DbPvHykj04UZ1qkH6fc=

Name: org/eclipse/jdt/internal/compiler/ast/ExportsStatement.java
SHA-256-Digest: I69gnOFZoHf9Yv1VnOl4aAtB3PuxPymnUOogcFDmjmI=

Name: org/eclipse/jdt/internal/compiler/lookup/AnnotatableTypeSystem.jav
a
SHA-256-Digest: /VT6Q+rpaAmKbx4NDKkpnLe1BnrS90A/Kx/AcmunxcM=

Name: org/eclipse/jdt/internal/compiler/util/HashtableOfObjectToIntArray
.java
SHA-256-Digest: GaOKxi7BfAxcIjjiqOBaLTG74/9Sio3Ql4CbByO/7Hs=

Name: about.html
SHA-256-Digest: 7mbS+ztMDS7S5/aYvJ7U49bPd/pcr0CtAylhJdsaxfA=

Name: org/eclipse/jdt/internal/compiler/ast/EqualExpression.java
SHA-256-Digest: ptghy+nyutd+rYsvS5uw5JQxwmJvSSC87CsebfxYniA=

Name: org/eclipse/jdt/internal/compiler/util/CharArrayMapper.java
SHA-256-Digest: lBMKxYpDzoeuXOv0TkVVxe5/MsB2WUetsvRetGOZ3r4=

Name: org/eclipse/jdt/internal/compiler/lookup/ConstraintTypeFormula.jav
a
SHA-256-Digest: nhCoBmoGu0R0N+POpOI8+xr9rFCXo7aj0L8YvY+jkOU=

Name: org/eclipse/jdt/internal/compiler/ast/JavadocImplicitTypeReference
.java
SHA-256-Digest: 7YECGwOrDlEf38UCFWEVR0w9zqS2/Ft0k25rdfrelSQ=

Name: org/eclipse/jdt/internal/compiler/classfmt/AnnotationMethodInfoWit
hTypeAnnotations.java

SHA-256-Digest: 2audn9mPwfPryeT9Qq5pCCRDgvPNIgiRo3u9LaRdSE4=

Name: org/eclipse/jdt/internal/compiler/apt/model/TypesImpl.java
SHA-256-Digest: PHnVux5SZ7Jc6FV6x/D6L1/WXAw/vDdfdjOjex5dgbM=

Name: org/eclipse/jdt/internal/compiler/parser/unicode6_2/part1.rsc
SHA-256-Digest: EVYA9qrNWe94AWpPP7GBw/2m2xlZrswtVgJoUnY0QeI=

Name: org/eclipse/jdt/internal/compiler/parser/readableNames.props
SHA-256-Digest: E41YG+6fPQOxnYkFaSJ5l02t7qP9JL0onh2CHfHc6lU=

Name: org/eclipse/jdt/internal/compiler/tool/EclipseFileManager.java
SHA-256-Digest: VeXa1MqCNzlX/4taI8ekrasXOgXQN4FB2g7Ntm39Q2A=

Name: org/eclipse/jdt/internal/compiler/ast/ReturnStatement.java
SHA-256-Digest: c6Kf4i0zEOSmvR2Z4XxfTSl2RK7X4j1rtCsXvKxTP8w=

Name: org/eclipse/jdt/internal/compiler/lookup/ReferenceBinding.java
SHA-256-Digest: XavmMPsCeR3HUSASLQFT6+TKvAWAA9V4LbR9ASA/Bkw=

Name:
org/eclipse/jdt/internal/compiler/lookup/Scope.java
SHA-256-Digest: aVdIasiYbtYA+kasPfOJ6SMGlvWjoJ/zxf4SE1MeGOk=

Name: org/eclipse/jdt/core/compiler/CharOperation.java
SHA-256-Digest: jixjclASvh6dhgpb51HsNHlBccuPFfhBBHVyLgp7sB4=

Name: org/eclipse/jdt/internal/compiler/codegen/StackMapFrame.java
SHA-256-Digest: xyXwgrVe+VZKOTldKMkkkZX5W+CISPMPsTwaJZDUjdk=

Name: org/eclipse/jdt/internal/compiler/lookup/ModuleBinding.java
SHA-256-Digest: +3SHBAIAnL2jDSxRtMZCVNrDMEIJvqdEGQkmteMzbrE=

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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/TerminalTokens.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/AbstractCommentParser.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/ParserBasicInformation.java
*
 /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/JavadocParser.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/diagnose/DiagnoseParser.java

* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/JavadocMessageSend.java
*
 /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/ProblemPackageBinding.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/QualifiedTypeReference.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/HashtableOfPackage.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/core/compiler/CategorizedProblem.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/ConflictedParser.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/JavadocAllocationExpression.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/BranchStatement.java
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* Contributors:
*     IBM Corporation - initial API and implementation
*     Tom Tromey - patch for readTable(String) as described in http://bugs.eclipse.org/bugs/show_bug.cgi?id=32196
*     Stephan Herrmann - Contributions for
*       bug 366003 - CCE in ASTNode.resolveAnnotations(ASTNode.java:639)
*       bug 374605 - Unreasonable warning for enum-based switch statements
*       bug 393719 - [compiler] inconsistent warnings on iteration variables
*       bug 382353 - [1.8][compiler] Implementation property modifiers
```

```
 should be accepted on default methods.
*       bug 383973 - [1.8][compiler] syntax recovery in the presence of default methods
*       bug 401035 - [1.8] A few tests have started failing recently
*     Jesper S Moller - Contributions for
*       bug 382701 - [1.8][compiler] Implement semantic analysis of Lambda expressions & Reference expression
*       bug 399695 - [1.8][compiler] [1.8][compiler] migrate parser to other syntax for default methods
*       bug 384567 - [1.5][compiler] Compiler accepts illegal modifiers on package declaration
*       bug 393192 - Incomplete type hierarchy with > 10 annotations
*       bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
*       Andy Clement - Contributions for
*                       Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
work)
*                       Bug 409250 - [1.8][compiler] Various loose ends in 308 code generation
*
            Bug 415821 - [1.8][compiler] CLASS_EXTENDS target type annotation missing for anonymous classes
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*     Stephen Herrmann <stephan@cs.tu-berlin.de> -  Contributions for
*          bug 133125 - [compiler][null] need to report the null status of expressions and analyze them simultaneously
*          bug 292478 - Report potentially null across variable assignment
*       bug 324178 - [null] ConditionalExpression.nullStatus(..) doesn't take into account the analysis of condition itself
*       bug 354554 - [null] conditional with redundant condition
 yields weak error message
*          bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*       bug 383368 - [compiler][null] syntactic null analysis for field references
*       bug 400761 - [compiler][null] null may be return as boolean without a diagnostic
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 426078 - [1.8] VerifyError when conditional expression passed as an argument
```

```
*       Bug 427438 - [1.8][compiler] NPE at
org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
 *       Bug 418537 - [1.8][null] Fix null type annotation analysis for poly conditional expressions
*       Bug 428352 - [1.8][compiler] Resolution errors don't always surface
*       Bug 407414 - [compiler][null] Incorrect warning on a primitive type being null
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ConditionalExpression.java
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*       Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*           Bug 407191 - [1.8] Binary access support for type annotations
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/classfmt/MethodInfoWithTypeAnnotations.java
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*       Bug 440477 - [null] Infrastructure for feeding external annotations into compilation
*       Bug 440687 - [compiler][batch][null] improve command line option for external annotations
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/batch/ClasspathJar.java
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/MemberTypeBinding.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/parser/RecoveredInitializer.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/SuffixConstants.java
*
 /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/problem/ProblemSeverities.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/SourceTypeCollisionException.java
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*    wharley@bea.com - initial API and implementation
*    IBM Corporation - Fix for bug 341494
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*    IBM Corporation - Java 8 support
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/apt/model/ElementsImpl.java
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*       bug 395002 - Self bound generic class doesn't resolve bounds properly for wildcards for certain parametrisation.
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/BaseTypeBinding.java
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*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*       bug 383368 - [compiler][null] syntactic null analysis for field references
*       bug 402993 - [null] Follow up of bug 401088: Missing warning about redundant null check
*     Jesper S Moller - Contributions for
*       bug 382721 - [1.8][compiler] Effectively final variables needs special treatment
 ********************************************************************************/
```

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*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 365519 - editorial cleanup after bug 186342 and bug 365387
*       Bug 434570 - Generic type mismatch for parametrized class annotation attribute with inner class
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jar/org/eclipse/jdt/internal/compiler/classfmt/AnnotationMethodInfoWithTypeAnnotations.java
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*       bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*       bug 383368 - [compiler][null] syntactic null analysis for field references
*       bug 403086 - [compiler][null] include the effect of 'assert' in syntactic null analysis for fields
*       bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred
checking
*       Bug
 422796 - [compiler][null] boxed boolean reported as potentially null after null test in lazy disjunction
**********/

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*          bug 319201 - [null] no warning when unboxing SingleNameReference causes NPE
*          bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 345305 - [compiler][null] Compiler misidentifies a case of "variable can only be null"
*       bug 403147 - [compiler][null] FUP of bug 400761: consolidate interaction between unboxing, NPE, and deferred
checking
*       Bug 415790
 - [compiler][resource]Incorrect potential resource leak warning in for loop with close in try/catch
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/WhileStatement.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ForStatement.java
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*     Lars Vogel <Lars.Vogel@vogella.com> - Contributions for
*         Bug 473178
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*  Erling Ellingsen -  patch for bug 125570
*  Stephan Herrmann - Contribution for
*  Bug 429958 - [1.8][null] evaluate new DefaultLocation attribute of @NonNullByDefault
*  Bug 434570 - Generic type mismatch for parametrized class annotation attribute with inner class
*  Sebastian Zarnekow - Contribution for
*  Bug 544921 - [performance] Poor performance with large source files
**********/

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 in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/CompilationUnitScope.java
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* Contributors:
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*  Stephan Herrmann - Contributions for
*  bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*  bug 370639 - [compiler][resource] restore the default for resource leak warnings
*  bug 388996 - [compiler][resource] Incorrect 'potential resource leak'
*  Bug 417758 - [1.8][null] Null safety compromise during array creation.
*  Bug 427438 - [1.8][compiler] NPE at
 org.eclipse.jdt.internal.compiler.ast.ConditionalExpression.generateCode(ConditionalExpression.java:280)
*  Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*  Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*  Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
work)
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/ArrayInitializer.java

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*     Stephan Herrmann <stephan@cs.tu-berlin.de> - Contributions for
*          bug 282152 - [1.5][compiler] Generics code rejected by Eclipse but accepted by javac
*          bug 349326 - [1.7] new warning for missing try-with-resources
*          bug 359362 - FUP of bug 349326: Resource leak on non-Closeable resource
*       bug 358903 - Filter practically unimportant resource leak warnings
*       bug 395002 - Self bound generic class
 doesn't resolve bounds properly for wildcards for certain parametrisation.
*       bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
*       Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
*       Bug 426792 - [1.8][inference][impl] generify new type inference engine
*       Bug 428019 - [1.8][compiler] Type inference failure with nested generic invocation.
*       Bug 429384 - [1.8][null] implement conformance rules for null-annotated lower / upper type bounds
*       Bug 431269 - [1.8][compiler][null] StackOverflow in nullAnnotatedReadableName
*       Bug 431408 - Java 8 (1.8) generics bug
*       Bug 435962 - [RC2] StackOverFlowError when building
*       Bug
 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
*       Bug 438250 - [1.8][null] NPE trying to report bogus null annotation conflict
*       Bug 438179 - [1.8][null] 'Contradictory null annotations' error on type variable with explicit null-annotation.
*       Bug 440143 - [1.8][null] one more case of contradictory null annotations regarding type variables
*       Bug 440759 - [1.8][null] @NonNullByDefault should never affect wildcards and uses of a type variable
*       Bug 441693 - [1.8][null] Bogus warning for type argument annotated with @NonNull
*       Bug 456497 - [1.8][null] during inference nullness from target type is lost against weaker hint from applicability
analysis
*       Bug 456459 - Discrepancy between Eclipse compiler and javac - Enums, interfaces, and generics
*       Bug 456487 - [1.8][null] @Nullable type variant of @NonNull-constrained type parameter causes grief
*       Bug 462790 - [null] NPE in Expression.computeConversion()
 *       Bug 456532 - [1.8][null] ReferenceBinding.appendNullAnnotation() includes phantom annotations in error
messages
*     Jesper S Møller <jesper@selskabet.org>  - Contributions for bug 381345 : [1.8] Take care of the Java 8 major
version
*       Bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
```

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*     Stephan Herrmann - Contribution for
*       Bug 423504 - [1.8] Implement "18.5.3 Functional Interface Parameterization Inference"
*       Bug 426676 - [1.8][compiler] Wrong generic method type inferred from lambda expression
*       Bug 426542 - [1.8] Most specific method not picked when one method has intersection type as type parameter
*       Bug 428019 - [1.8][compiler] Type inference failure with nested generic invocation.
*     Andy
 Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                       Bug 405104 - [1.8][compiler][codegen] Implement support for serializeable lambdas
*     Jesper S Møller - Contributions for bug 381345 : [1.8] Take care of the Java 8 major version
*                       Bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
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* Contributors:
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*     Stephan Herrmann - Contributions for
*       bug 186342 - [compiler][null] Using annotations for null checking
```

```
*       bug 331649 - [compiler][null] consider null annotations for fields
*       bug 383368 - [compiler][null] syntactic null analysis for field references
*       bug 382069 - [null] Make the null analysis consider JUnit's assertNotNull similarly to assertions
*       bug 403086 - [compiler][null] include the effect of 'assert'
 in syntactic null analysis for fields
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/EqualExpression.java
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* Contributors:
*    wharley@bea.com - initial API and implementation
*    IBM Corporation - Java 8 support
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Found in path(s):
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/apt/model/PrimitiveTypeImpl.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/apt/model/TypeMirrorImpl.java
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* Contributors:
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*     Stephan Herrmann - contributions for
*           bug 337868 - [compiler][model] incomplete support for package-info.java when using SearchableEnvironment
*       bug 186342 - [compiler][null] Using annotations for null checking
*       bug 365531 - [compiler][null] investigate alternative strategy for internally encoding nullness defaults
*       bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
```

```
*       bug
 392862 - [1.8][compiler][null] Evaluate null annotations on array types
*       bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
*       Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*       Bug 415291 - [1.8][null] differentiate type incompatibilities due to null annotations
*       Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*       Bug 415850 - [1.8] Ensure RunJDTCoreTests can cope with null annotations enabled
*       Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
*       Bug 416183 - [1.8][compiler][null] Overload resolution fails with null annotations
*       Bug 416307 - [1.8][compiler][null] subclass with type parameter substitution confuses null checking
*       Bug 417295 - [1.8[[null] Massage type annotated null analysis to gel well with deep encoded type bindings.
*       Bug 416190 - [1.8][null]
 detect incompatible overrides due to null type annotations
*       Bug 424624 - [1.8][null] if a static-object with annotation @NonNull is used, a warning is shown
*       Bug 438458 - [1.8][null] clean up handling of null type annotations wrt type variables
*       Bug 439516 - [1.8][null] NonNullByDefault wrongly applied to implicit type bound of binary type
*       Bug 434602 - Possible error with inferred null annotations leading to contradictory null annotations
*       Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*       Bug 453475 - [1.8][null] Contradictory null annotations (4.5 M3 edition)
*       Bug 457079 - Regression: type inference
*       Bug 440477 - [null] Infrastructure for feeding external annotations into compilation
*       Bug 455180 - IllegalStateException in AnnotatableTypeSystem.getRawType
*       Bug 470467 - [null] Nullness of special Enum methods not detected from .class file
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/lookup/LookupEnvironment.java
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*       Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                       Bug 383624 - [1.8][compiler] Revive code generation support for type annotations (from Olivier's
work)
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/AnnotationContext.java

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*        bug 349326 - [1.7] new warning for missing try-with-resources
*        bug 186342 - [compiler][null] Using annotations for null checking
*        bug 365519 - editorial cleanup after bug 186342 and bug 365387
*        bug 368546 - [compiler][resource] Avoid remaining false positives found when compiling the Eclipse SDK
*        bug 382353 - [1.8][compiler] Implementation property modifiers should
 be accepted on default methods.
*        bug 383368 - [compiler][null] syntactic null analysis for field references
*        Bug 392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
*        Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
*        Bug 416176 - [1.8][compiler][null] null type annotations cause grief on type variables
*        Bug 438012 - [1.8][null] Bogus Warning: The nullness annotation is redundant with a default that applies to this
location
*        Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
*        Bug 466713 - Null Annotations: NullPointerException using <int @Nullable []> as Type Param
*     Jesper S Moller <jesper@selskabet.org> - Contributions for
*        bug 378674 - "The method can be declared as static" is wrong
*                          bug 413873 - Warning "Method can be static" on method referencing a non-static
 inner class
*******************************************************************************/
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/ast/MethodDeclaration.java
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*
* Contributors:
*    wharley@bea.com - initial API and implementation
*    IBM Corporation - fix for 342598
*    IBM Corporation - Java 8 support
*    het@google.com - Bug 427943 - The method
org.eclipse.jdt.internal.compiler.apt.model.Factory.getPrimitiveType does not throw IllegalArgumentException
**********/

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*     Benjamin Muskalla - Contribution for bug 239066
*     Stephan Herrmann  - Contributions for
*          bug 236385 - [compiler] Warn for potential programming problem if an object is created but not used
*          bug 338303 - Warning about Redundant assignment conflicts with definite assignment
*       bug 349326 - [1.7] new warning for missing try-with-resources
*       bug 186342 - [compiler][null] Using annotations for null checking
 *       bug 365519 - editorial cleanup after bug 186342 and bug 365387
*       bug 365662 - [compiler][null] warn on contradictory and redundant null annotations
*       bug 365531 - [compiler][null] investigate alternative strategy for internally encoding nullness defaults
*       bug 365859 - [compiler][null] distinguish warnings based on flow analysis vs. null annotations
*       bug 374605 - Unreasonable warning for enum-based switch statements
*       bug 382353 - [1.8][compiler] Implementation property modifiers should be accepted on default methods.
*       bug 382347 - [1.8][compiler] Compiler accepts incorrect default method inheritance
*       bug 388281 - [compiler][null] inheritance of null annotations as an option
*       bug 376053 - [compiler][resource] Strange potential resource leak problems
*       bug 381443 - [compiler][null] Allow parameter widening from @NonNull to unannotated
*       bug 393719 - [compiler] inconsistent warnings on iteration
 variables
*       bug 392862 - [1.8][compiler][null] Evaluate null annotations on array types
*       bug 388739 - [1.8][compiler] consider default methods when detecting whether a class needs to be declared
abstract
*       bug 331649 - [compiler][null] consider null annotations for fields
*       bug 382789 - [compiler][null] warn when syntactically-nonnull expression is compared against null

* bug 376590 - Private fields with @Inject are ignored by unused field validation
* bug 400761 - [compiler][null] null may be return as boolean without a diagnostic
* bug 402028 - [1.8][compiler] null analysis for reference expressions
* bug 401796 - [1.8][compiler] don't treat default methods as overriding an independent inherited abstract method
* bug 404649 - [1.8][compiler] detect illegal reference to indirect or redundant super
* bug 392384 - [1.8][compiler][null] Restore nullness info from type annotations in class files
* Bug
392099 - [1.8][compiler][null] Apply null annotation on types for null analysis
* Bug 415043 - [1.8][null] Follow-up re null type annotations after bug 392099
* Bug 415291 - [1.8][null] differentiate type incompatibilities due to null annotations
* Bug 415850 - [1.8] Ensure RunJDTCoreTests can cope with null annotations enabled
* Bug 414380 - [compiler][internal] QualifiedNameReference#indexOfFirstFieldBinding does not point to the first field
* Bug 392238 - [1.8][compiler][null] Detect semantically invalid null type annotations
* Bug 416307 - [1.8][compiler][null] subclass with type parameter substitution confuses null checking
* Bug 400874 - [1.8][compiler] Inference infrastructure should evolve to meet JLS8 18.x (Part G of JSR335 spec)
* Bug 424637 - [1.8][compiler][null] AIOOB in ReferenceExpression.resolveType with a method reference to Files::walk
* Bug 428294 - [1.8][compiler] Type mismatch: cannot convert
from List<Object> to Collection<Object[]>
* Bug 428366 - [1.8] [compiler] The method valueAt(ObservableList<Object>, int) is ambiguous for the type Bindings
* Bug 416190 - [1.8][null] detect incompatible overrides due to null type annotations
* Bug 392245 - [1.8][compiler][null] Define whether / how @NonNullByDefault applies to TYPE_USE locations
* Bug 390889 - [1.8][compiler] Evaluate options to support 1.7- projects against 1.8 JRE.
* Bug 430150 - [1.8][null] stricter checking against type variables
* Bug 434600 - Incorrect null analysis error reporting on type parameters
* Bug 439516 - [1.8][null] NonNullByDefault wrongly applied to implicit type bound of binary type
* Bug 438467 - [compiler][null] Better error position for "The method _ cannot implement the corresponding method _ due to incompatible nullness constraints"
* Bug 439298 - [null] "Missing code implementation in the compiler" when using @NonNullByDefault
in package-info.java
* Bug 435805 - [1.8][compiler][null] Java 8 compiler does not recognize declaration style null annotations
* Bug 446442 - [1.8] merge null annotations from super methods
* Bug 455723 - Nonnull argument not correctly inferred in loop
* Bug 458361 - [1.8][null] reconciler throws NPE in ProblemReporter.illegalReturnRedefinition()
* Bug 459967 - [null] compiler should know about nullness of special methods like MyEnum.valueOf()
* Bug 461878 - [1.7][1.8][compiler][null] ECJ compiler does not allow to use null annotations on annotations
* Bug 410218 - Optional warning for arguments of "unexpected" types to Map#get(Object), Collection#remove(Object) et al.
* Jesper S Moller <jesper@selskabet.org> - Contributions for
* bug 382701 - [1.8][compiler] Implement semantic analysis of Lambda expressions & Reference expression
* bug 382721 - [1.8][compiler] Effectively final variables needs
special treatment
* bug 384567 - [1.5][compiler] Compiler accepts illegal modifiers on package declaration
* bug 412153 - [1.8][compiler] Check validity of annotations which may be repeatable
* bug 412151 - [1.8][compiler] Check repeating annotation's collection type
* bug 419209 - [1.8] Repeating container annotations should be rejected in the presence of annotation it contains

```
*       Bug 429384 - [1.8][null] implement conformance rules for null-annotated lower / upper type bounds
*       Bug 416182 - [1.8][compiler][null] Contradictory null annotations not rejected
*       bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
*     Ulrich Grave <ulrich.grave@gmx.de> - Contributions for
*                         bug 386692 - Missing "unused" warning on "autowired" fields
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* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/VerificationTypeInfo.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/HashSetOfInt.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/codegen/CharArrayCache.java
* /ecj-3-33-0-sources-jar/org/eclipse/jdt/internal/compiler/util/ObjectVector.java
*
 /ecj-3-33-0-sources-jar/org/eclipse/jdt/core/compiler/InvalidInputException.java
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*  Stephan Herrmann - Contribution for
*       bug 400710 - [1.8][compiler] synthetic access to default method generates wrong code
*       Bug 459967 - [null] compiler should know about nullness of special methods like MyEnum.valueOf()
*       Bug 470467 - [null] Nullness of special Enum methods not detected from .class file
*      Andy Clement (GoPivotal, Inc) aclement@gopivotal.com - Contributions for
*                      Bug 405104 -
 [1.8][compiler][codegen] Implement support for serializeable lambdas
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* Contributors:
*     IBM Corporation - initial API and implementation
*     Carmi Grushko - Bug 465048 - Binding is null for class literals in synchronized blocks
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*     Stephan Herrmann <stephan@cs.tu-berlin.de> - Contributions for
*       bug 292478 - Report potentially null across variable assignment,
*       bug 185682 - Increment/decrement operators mark local variables as read
*       bug 331649 - [compiler][null] consider null annotations for fields
*       bug 383368 - [compiler][null] syntactic null analysis for field references
*       Bug 412203 - [compiler] Internal compiler error: java.lang.IllegalArgumentException:
 info cannot be null
*       Bug 458396 - NPE in CodeStream.invoke()
*       Bug 407414 - [compiler][null] Incorrect warning on a primitive type being null
*     Jesper S Moller - <jesper@selskabet.org>   - Contributions for
*           bug 382721 - [1.8][compiler] Effectively final variables needs special treatment
*       bug 378674 - "The method can be declared as static" is wrong
*       bug 404657 - [1.8][compiler] Analysis for effectively final variables fails to consider loops
*       bug 527554 - [18.3] Compiler support for JEP 286 Local-Variable Type
*******************************************************************************/
```

Found in path(s):
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# 1.3247 http-body 1.0.0

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# 1.3248 aws-smithy-eventstream 0.60.10

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# 1.3249 resolv-conf 0.7.5

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# 1.3251 uom 0.31.1

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# 1.3255 unicode-truncate 2.0.0

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# 1.3256 wolfi-keys 1-r13

## 1.3256.1 Available under license :

```
package:
 name: py3-license-expression
 version: "30.4.4"
 epoch: 3 # go/wolfi-rsc/py3-license-expression
 description: license-expression is a comprehensive utility library to parse, compare, simplify and normalize license
expressions (such as SPDX license expressions) using boolean logic.
 copyright:
   - license: Apache-2.0
 dependencies:
   provider-priority: 0
 resources:
   cpu: "2"
   memory: 4Gi

vars:
 pypi-package: license-expression
 import: license_expression
```

```
data:
 - name: py-versions
   items:
     3.10: '310'
     3.11: '311'
     3.12: '312'
     3.13: '313'

environment:
 contents:
   packages:
     - py3-supported-build-base

pipeline:
 - uses: git-checkout
   with:
     repository: https://github.com/nexB/license-expression
     tag: v${{package.version}}
     expected-commit: a3c00c09986bcca1240afd5b1844b56de3f581c1

subpackages:
 - range: py-versions
   name: py${{range.key}}-${{vars.pypi-package}}
   description: python${{range.key}}
 version of ${{vars.pypi-package}}
   dependencies:
     provider-priority: ${{range.value}}
     provides:
       - ${{package.name}}
       - py3-${{vars.pypi-package}}
     runtime:
       - py${{range.key}}-boolean.py
   pipeline:
     - uses: py/pip-build-install
       with:
         python: python${{range.key}}
     - uses: strip
   test:
     pipeline:
       - uses: test/tw/pip-check
       - uses: python/import
         with:
           python: python${{range.key}}
           imports: |
             import ${{vars.import}}

 - name: py3-supported-${{vars.pypi-package}}
```

```
  description: meta package providing ${{vars.pypi-package}} for supported python versions.
  dependencies:
    runtime:
      - py3.10-${{vars.pypi-package}}
      - py3.11-${{vars.pypi-package}}
      - py3.12-${{vars.pypi-package}}
      - py3.13-${{vars.pypi-package}}
  test:
    pipeline:
      - uses: test/metapackage

test:
 pipeline:
   - uses: python/import

    with:
      imports: |
        import ${{vars.import}}

update:
 enabled: true
 github:
   identifier: nexB/license-expression
   strip-prefix: v
package:
 name: perl-software-license
 version: "0.104007"
 epoch: 2
 description: "Packages that provide templated software licenses"
 copyright:
   - license: GPL-1.0-or-later OR Artistic-1.0-Perl
 dependencies:
   runtime:
     - perl
     - perl-data-section
     - perl-text-template
 resources:
   cpu: "2"
   memory: 4Gi

environment:
 contents:
   packages:
     - build-base
     - perl
     - perl-data-section
     - perl-dist-zilla
     - perl-text-template
```

```
    - perl-try-tiny

pipeline:
 - uses: git-checkout
   with:
     repository: https://github.com/Perl-Toolchain-Gang/Software-License
     tag: ${{package.version}}
     expected-commit: 36967ff8682fdc9f497319655bcfd2e742828dec

 - uses: perl/dzil

 - uses: perl/make

 - uses: autoconf/make

 - uses: autoconf/make-install

 - uses: perl/cleanup

 - uses: strip

subpackages:
 - name: ${{package.name}}-doc
   pipeline:
     - uses: split/alldocs
   description: Documentation for ${{package.name}}
    test:
     pipeline:
       - uses: test/docs

test:
 pipeline:
   - uses: test/no-docs
   - uses: test/perl-module-check
     with:
       modules: Software::License

update:
 enabled: true
 github:
   identifier: Perl-Toolchain-Gang/Software-License
   use-tag: true
```

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```
package:
 name: libart-lgpl
 version: 2.3.21
 epoch: 5 # go/wolfi-rsc/libart-lgpl
 description: A library for high-performance 2D graphics
 copyright:
   - license: LGPL-2.0-or-later
 resources:
   cpu: "1"
   memory: 4Gi

var-transforms:
 - from: ${{package.version}}
   match: ^(\d+)\.(\d+)\.(\d+)$
   replace: LIBART_LGPL_${1}_${2}_$3
   to: tag-name

environment:
 contents:
   packages:
     - autoconf
     - automake
     - build-base
     - busybox
     - ca-certificates-bundle
     - libtool

pipeline:
 - uses: git-checkout
   with:
     repository: https://gitlab.gnome.org/Archive/libart_lgpl
     tag: ${{vars.tag-name}}
     expected-commit: 7119bfe163a5a5325405acb7eab1b16152e8032a

 - runs: autoreconf -vif

 - uses: autoconf/configure
   with:
     opts: |
       --disable-static

 - uses: autoconf/make

 - uses: autoconf/make-install
```

```
 - uses: strip

subpackages:
 - name: libart-lgpl-dev
   pipeline:
     - uses: split/dev
   dependencies:
      runtime:
       - libart-lgpl
   description: libart-lgpl dev
   test:
     environment:
       contents:
         packages:
           - build-base
           - pkgconf
     pipeline:
       - runs: |
           libart2-config --version
       - uses: test/pkgconf
       - uses: test/tw/ldd-check
       - uses: test/tw/devpackage
       - name: Test compile and link against libart
         runs: |
           set -euo pipefail

           tee test.c <<'EOF'
           #include <libart_lgpl/libart.h>
           #include <stdio.h>
           int main() {
               double affine[6];
               art_affine_identity(affine);
               /* Identity matrix should be [1,0,0,1,0,0] */
               if (affine[0] != 1.0 || affine[3] != 1.0) {
                   fprintf(stderr, "FAIL: unexpected identity affine\n");
                   return 1;
               }
               printf("SUCCESS: libart affine identity works\n");
               return
 0;
           }
           EOF

           gcc $(pkg-config --cflags libart-2.0) test.c -o test $(pkg-config --libs libart-2.0)
           ./test

update:
 enabled: true
```

```
 release-monitor:
   identifier: 21864

test:
 environment:
   contents:
     packages:
       - libart-lgpl-dev
       - build-base
       - pkgconf
 pipeline:
   - uses: test/tw/ldd-check
   - name: Test library compilation and linking
     runs: |
       set -euo pipefail

       tee test.c <<'EOF'
       #include <libart_lgpl/libart.h>
       #include <stdio.h>
       int main() {
           double affine[6];
           art_affine_identity(affine);
           /* Identity matrix should be [1,0,0,1,0,0] */
           if (affine[0] != 1.0 || affine[3] != 1.0) {
               fprintf(stderr, "FAIL: unexpected identity affine\n");
               return 1;
           }
           printf("SUCCESS: libart compile and link works\n");
           return 0;
       }
       EOF

       gcc $(pkg-config
 --cflags libart-2.0) test.c -o test $(pkg-config --libs libart-2.0)
       ./test
```

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package:
 name: go-licenses
 version: "2.0.1"
 epoch: 7 # CVE-2026-32280
 description: A lightweight tool to report on the licenses used by a Go package and its dependencies. Highlight!
Versioned external URL to licenses can be found at the same time.
 copyright:
   - license: Apache-2.0

pipeline:
 - uses: git-checkout
   with:
     repository: https://github.com/google/go-licenses
     tag: v${{package.version}}
     expected-commit: 3e084b0caf710f7bfead967567539214f598c0a2

 - uses: go/build
   with:
     modroot: .
     packages: .
     output: go-licenses

update:
 enabled: true
 github:
   identifier: google/go-licenses
   strip-prefix: v

test:
 pipeline:
   # AUTOGENERATED
   - runs: |
       go-licenses --help

environment:
 contents:
   packages:
     - go-1.25
```

# 1.3257 netlink-sys 0.8.7

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```
name: license

on:
 pull_request:
   types: [opened, synchronize, reopened]
 push:
   branches:
     - main

jobs:
 check-license:
   name: Check License
   runs-on: ubuntu-latest
   timeout-minutes: 3

   steps:
     - uses: actions/checkout@v3
     - name: Check License Header
       uses: apache/skywalking-eyes@v0.3.0
```

# 1.3258 webbrowser 1.0.0

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# 1.3259 aws-credential-types 1.2.6

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This option is useful when you wish to copy part of the code of

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# 1.3264 warp 0.3.7

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[overrides]
"crunchy" = { origin = "https://github.com/eira-fransham/crunchy" }

# 1.3267 nginx-mainline 1.29.5-r0

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# 1.3269 containers-common 4:1-135.el9_7

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# 1.3270 openidconnect 3.5.0

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# 1.3273 community-dialects 7.1.8.Final

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public boolean supportsLockTimeouts() {
public boolean supportsLobValueChangePropagation() {
public boolean supportsLateral() {

Found in path(s):
* /hibernate-community-dialects-7-0-8-final-sources-jar/org/hibernate/community/dialect/DB2LegacyDialect.java
* /hibernate-community-dialects-7-0-8-final-sources-jar/org/hibernate/community/dialect/HSQLLegacyDialect.java
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if ( supportsLateral() ) {
public boolean supportsLateral() {

Found in path(s):
* /hibernate-community-dialects-7-0-8-final-sources-jar/org/hibernate/community/dialect/OracleLegacyDialect.java
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public boolean supportsLobValueChangePropagation() {
public boolean supportsLateral() {

Found in path(s):
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* /hibernate-community-dialects-7-0-8-final-sources-jar/org/hibernate/community/dialect/CockroachLegacyDialect.java
* /hibernate-community-dialects-7-0-8-final-sources-jar/org/hibernate/community/dialect/SQLServerLegacyDialect.java
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public boolean supportsLockTimeouts() {
public boolean supportsLobValueChangePropagation() {

Found in path(s):
* /hibernate-community-dialects-7-0-8-final-sources-jar/org/hibernate/community/dialect/DerbyDialect.java
* /hibernate-community-dialects-7-0-8-final-sources-jar/org/hibernate/community/dialect/SybaseASELegacyDialect.java
* /hibernate-community-dialects-7-0-8-final-sources-jar/org/hibernate/community/dialect/DerbyLegacyDialect.java
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public boolean supportsLateral() {

public boolean supportsLobValueChangePropagation() {

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public final boolean supportsLimit() {

Found in path(s):
* /hibernate-community-dialects-7-0-8-final-sources-jar/org/hibernate/community/dialect/pagination/SkipFirstLimitHandler.java
* /hibernate-community-dialects-7-0-8-final-sources-jar/org/hibernate/community/dialect/pagination/SQLServer2005LimitHandler.java
* /hibernate-community-dialects-7-0-8-final-sources-jar/org/hibernate/community/dialect/pagination/FirstSkipLimitHandler.java
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public boolean supportsLockTimeouts() {

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* /hibernate-community-dialects-7-0-8-final-sources-jar/org/hibernate/community/dialect/SQLiteDialect.java
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public boolean supportsLimit() {

Found in path(s):
* /hibernate-community-dialects-7-0-8-final-sources-jar/org/hibernate/community/dialect/pagination/LegacyOracleLimitHandler.java
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// It supports a proprietary operator

Found in path(s):
* /hibernate-community-dialects-7-0-8-final-sources-jar/org/hibernate/community/dialect/MySQLLegacyDialect.java
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public boolean supportsLateral() {

Found in path(s):
* /hibernate-community-dialects-7-0-8-final-sources-jar/org/hibernate/community/dialect/MariaDBLegacyDialect.java
* /hibernate-community-dialects-7-0-8-final-sources-jar/org/hibernate/community/dialect/SybaseAnywhereDialect.java
* /hibernate-community-dialects-7-0-8-final-sources-jar/org/hibernate/community/dialect/DB2iLegacyDialect.java
* /hibernate-community-dialects-7-0-8-final-sources-jar/org/hibernate/community/dialect/HANALegacyDialect.java
* /hibernate-community-dialects-7-0-8-final-sources-jar/org/hibernate/community/dialect/DB2zLegacyDialect.java

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public boolean supportsLobValueChangePropagation() {
public boolean supportsLockTimeouts() {
public boolean supportsLateral() {

Found in path(s):
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public boolean supportsLobValueChangePropagation() {

Found in path(s):
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public boolean supportsLobValueChangePropagation() {
public boolean supportsLockTimeouts() {

Found in path(s):
* /hibernate-community-dialects-7-0-8-final-sources-jar/org/hibernate/community/dialect/SingleStoreDialect.java

# 1.3274 aws-sdk-sqs 1.64.0

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# 1.3282 libuv 1.52.1-r1

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*/

#ifndef UV_BSD_H
#define UV_BSD_H

#define UV_PLATFORM_FS_EVENT_FIELDS                                   \
 uv__io_t event_watcher;                                              \

#define UV_IO_PRIVATE_PLATFORM_FIELDS                                 \
 int rcount;                                                          \
 int wcount;                                                          \

#define UV_HAVE_KQUEUE 1

#endif /* UV_BSD_H */
```

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# 1.3283 ca-certificates-bundle 20251003-r4

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```
#!/usr/bin/env perl
# ***************************************************************************
# *                            _   _ ____  _
# *  Project                  ___| | | |  _ \| |
# *                          / __| | | | |_) | |
# *                         | (__| |_| |  _ <| |___
# *                          \___|\___/|_| \_\_____|
# *
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```

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# *
# ******************************************************************************
# This Perl script creates a fresh ca-bundle.crt file for use with libcurl.
# It downloads certdata.txt from Mozilla's source tree (see URL below),
# then parses certdata.txt and extracts CA Root Certificates into PEM format.
# These are then processed with the OpenSSL commandline tool to produce the
# final ca-bundle.crt file.
# The script is based on the parse-certs script written by Roland Krikava.
# This Perl script works on almost any platform since its only external
# dependency is the OpenSSL commandline tool for optional text listing.
# Hacked by Guenter Knauf.
#

Found in path(s):
* /ee722aa868591f33d5a7585909e3a57129e37977-1-tar-gz/ca-certificates-ee722aa868591f33d5a7585909e3a57129e37977/mk-ca-bundle.pl
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/* c_rehash.c - Create hash symlinks for certificates
* C implementation based on the original Perl and shell versions
*
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*/

Found in path(s):
* /ee722aa868591f33d5a7585909e3a57129e37977-1-tar-gz/ca-certificates-ee722aa868591f33d5a7585909e3a57129e37977/c_rehash.c

# 1.3284 libxcb 1.17.0-r11

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# 1.3285 java-cacerts 20251003-r4

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```
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# ***************************************************************************
# *                            _   _ ____  _
# *  Project                  ___| | | |  _ \| |
# *                          / __| | | | |_) | |
# *                         | (__| |_| |  _ <| |___
# *                          \___|\___/|_| \_\_____|
# *
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#
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# *
# * SPDX-License-Identifier: curl
# *
# ***********************************************************************
# This Perl script creates a fresh ca-bundle.crt file for use with libcurl.
# It downloads certdata.txt from Mozilla's source tree (see URL below),
# then parses certdata.txt and extracts CA Root Certificates into PEM format.
# These are then processed with the OpenSSL commandline tool to produce the
# final ca-bundle.crt file.
# The script is based on the parse-certs script written by Roland Krikava.
# This Perl script works on almost any platform since its only external
# dependency is the OpenSSL commandline tool for optional text listing.
# Hacked by Guenter Knauf.
#

Found in path(s):
* /ee722aa868591f33d5a7585909e3a57129e37977-1-tar-gz/ca-certificates-
ee722aa868591f33d5a7585909e3a57129e37977/mk-ca-bundle.pl
No license file was found, but licenses were detected in source scan.

/* c_rehash.c - Create hash symlinks for certificates
* C implementation based on the original Perl and shell versions
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*/

Found in path(s):
* /ee722aa868591f33d5a7585909e3a57129e37977-1-tar-gz/ca-certificates-
ee722aa868591f33d5a7585909e3a57129e37977/c_rehash.c

# 1.3286 giflib 6.1.2-r0

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# 1.3287 libunistring 1.4.2-r0

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#ifndef _BASENAME_LGPL_H
#define _BASENAME_LGPL_H

/* This file uses _GL_ATTRIBUTE_PURE.  */
#if !_GL_CONFIG_H_INCLUDED
#error "Please include config.h first."
#endif

#include <stddef.h>

#ifndef
 DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif


/* Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
          FILENAME      RESULT
          "foo.c"       "foo.c"
          "foo/bar.c"   "bar.c"
          "/foo/bar.c"  "bar.c"
          "foo/bar/"    "bar/"
          "foo/bar//"   "bar//"
          "/"           ""
          "//"          ""
          ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(),
 defined in <string.h>, does
      not consider trailing slashes to be part of the component:
```

```
          FILENAME     RESULT
          "foo/bar/"    ""
          "foo/bar//"   ""
   * The 'basename' command eliminates trailing slashes and for a root
     produces a non-empty result:
          FILENAME     RESULT
          "foo/bar/"    "bar"
          "foo/bar//"   "bar"
          "/"           "/"
          "//"          "/"
*/
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;


#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
```

# 1.3288 write-file-atomic 7.0.1

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# 1.3291 openjdk 17.0.18-r3

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## xwd v1.0.7

### xwd utility
<pre>

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Ext headers       GL/glext.h            Khronos
                  GL/glxext.h           Khronos
                  GL/wglext.h           Khronos
                  KHR/khrplatform.h     Khronos
```

**********

---
include/GL/gl.h :

Mesa 3-D
graphics library

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include/GL/glxext.h
include/GL/wglxext.h :

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tree/README

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tree/openbsd-reallocarray.c

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```
```

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## 1.3292.1 Available under license :

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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see https://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see https://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see https://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

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| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
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```
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#ifndef _BASENAME_LGPL_H
#define _BASENAME_LGPL_H

#include <stddef.h>

#ifndef DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif
```

```
#ifdef __cplusplus
extern "C" {
#endif


/*
 Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
          FILENAME      RESULT
          "foo.c"       "foo.c"
          "foo/bar.c"   "bar.c"
          "/foo/bar.c"  "bar.c"
          "foo/bar/"    "bar/"
          "foo/bar//"   "bar//"
          "/"           ""
          "//"          ""
          ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
   * Various platforms have different functions in their libc.
     In particular, the glibc basename(), defined in <string.h>, does
     not consider trailing slashes to be part of the component:

 FILENAME      RESULT
          "foo/bar/"    ""
          "foo/bar//"   ""
   * The 'basename' command eliminates trailing slashes and for a root
     produces a non-empty result:
          FILENAME      RESULT
          "foo/bar/"    "bar"
          "foo/bar//"   "bar"
          "/"           "/"
          "//"          "/"
*/
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;
```

```
#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
```

==========

Written by Andy Polyakov <appro@fy.chalmers.se> for the OpenSSL project. The module is, however, dual licensed under OpenSSL and CRYPTOGAMS licenses depending on where you obtain it. For further details see https://www.openssl.org/~appro/cryptogams/.

==========

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```
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## version 0.1
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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see https://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

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| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
| 2.2 and above | 2.1.1 | 2001-now | PSF | yes |

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the
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Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany
the work with the complete corresponding
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b) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years and valid for as long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a copy of the Corresponding Source for all the software in the product that is covered by this License, on a durable physical medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the Corresponding Source from a network server at no charge.

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d) Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source

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#ifndef _BASENAME_LGPL_H

```
#define _BASENAME_LGPL_H

#include <stddef.h>

#ifndef DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif


/*
 Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
          FILENAME      RESULT
          "foo.c"       "foo.c"
          "foo/bar.c"   "bar.c"
          "/foo/bar.c"  "bar.c"
          "foo/bar/"    "bar/"
          "foo/bar//"   "bar//"
          "/"           ""
          "//"          ""
          ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(), defined in <string.h>, does
      not consider trailing slashes to be part of the component:

 FILENAME      RESULT
          "foo/bar/"    ""
          "foo/bar//"   ""
    * The 'basename' command eliminates trailing slashes and for a root
      produces a non-empty result:
          FILENAME      RESULT
          "foo/bar/"    "bar"
          "foo/bar//"   "bar"
          "/"           "/"
          "//"          "/"
*/
```

```
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;


#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
```

==========

Written by Andy Polyakov <appro@fy.chalmers.se> for the OpenSSL
project. The module is, however, dual licensed under OpenSSL and
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==========

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```
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## version 0.1
##
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##
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```
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Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

The hypothetical commands `show w' and `show c' should show the
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commands you use may be called something other than `show w' and `show
c'; they could even be mouse-clicks or menu items--whatever suits your
program.

You should also get your employer (if you work as a programmer) or your
school, if any, to sign a "copyright disclaimer" for the program, if
necessary. Here a sample; alter
the names:

```
Yoyodyne, Inc., hereby disclaims all copyright interest in the
program `Gnomovision' (a program to direct compilers to make passes
at assemblers) written by James Hacker.

<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

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# 1.3302 bash 5.3-r6

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```
/* nicstar.c  v0.22  Jawaid Bazyar (bazyar@hypermall.com)
* nicstar.c, M. Welsh (matt.welsh@cl.cam.ac.uk)
*
* Hacked October, 1997 by Jawaid Bazyar, Interlink Advertising Services Inc.
*  http://www.hypermall.com/
* 10/1/97 - commented out CFG_PHYIE bit - we don't care when the PHY
* interrupts us (except possibly for removal/insertion of the cable?)
* 10/4/97 - began heavy inline documentation of the code. Corrected typos
* and spelling mistakes.
* 10/5/97 - added code to handle PHY interrupts, disable PHY on
* loss of link, and correctly re-enable PHY when link is
* re-established. (put back CFG_PHYIE)
*
*   Modified to work with the IDT7721 nicstar -- AAL5 (tested) only.
*
* R. D. Rechenmacher <ron@fnal.gov>, Aug. 6, 1997
*
* Linux driver for the IDT77201 NICStAR PCI ATM controller.
* PHY component is expected to be 155 Mbps S/UNI-Lite or IDT 77155;
* see init_nicstar() for PHY initialization to change this. This driver
* expects the Linux ATM stack to support scatter-gather
 lists
* (skb->atm.iovcnt != 0) for Rx skb's passed to vcc->push.
*
* Implementing minimal-copy of received data:
*   IDT always receives data into a small buffer, then large buffers
*     as needed. This means that data must always be copied to create
*     the linear buffer needed by most non-ATM protocol stacks (e.g. IP)
*     Fix is simple: make large buffers large enough to hold entire
*     SDU, and leave <small_buffer_data> bytes empty at the start. Then
*     copy small buffer contents to head of large buffer.
*   Trick is to avoid fragmenting Linux, due to need for a lot of large
*     buffers. This is done by 2 things:
```

```
*       1) skb->destructor / skb->atm.recycle_buffer
*          combined, allow nicstar_free_rx_skb to be called to
*          recycle large data buffers
*       2) skb_clone of received buffers
*   See nicstar_free_rx_skb and linearize_buffer for implementation
*     details.
*
*
*
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*
* M. Welsh, 6 July 1996
*
*
*/
```

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The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

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is invoked, then you must make a good faith effort to ensure that,
in the event an application does not supply such function or
table, the facility still operates, and performs whatever part of
its purpose remains meaningful.

(For example, a function in a library to compute square roots has
a purpose that is entirely well-defined independent of the
application. Therefore, Subsection 2d requires that any
application-supplied function or table used by this
function must
be optional: if the application does not supply it, the square
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Thus, it is not the intent of this section to claim rights or contest
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threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

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c) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

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package copyright

import (
 "bytes"
 "internal/testenv"
 "io"
 "io/fs"
 "os"
 "path/filepath"
 "testing"
)

var copyright = []byte("Copyright")

var permitted = [][]byte{
 []byte("// Code generated by "),
 []byte("// Code generated from "),
 []byte("// Created by cgo -cdefs"),
 []byte("// DO NOT EDIT\n// generated by:"),
 []byte("// Empty assembly file"),
 []byte("// Generated using cgo"),
 []byte("// Original source:\n//\thttp://www.zorinaq.com/papers/md5-amd64.html"), // public domain crypto/md5
 []byte("// created by cgo -cdefs"),
 []byte("// go run mkasm.go"),
 []byte("// mkerrors"),
 []byte("// mksys"),
 []byte("// run\n// Code generated by"), // cmd/compile/internal/test/constFold_test.go
}

func TestCopyright(t *testing.T) {
 buf := make([]byte, 2048)
 filepath.WalkDir(filepath.Join(testenv.GOROOT(t), "src"), func(path string,
 d fs.DirEntry, err error) error {
  if d.IsDir() && (d.Name() == "testdata" || d.Name() == "vendor") {
   return filepath.SkipDir
  }
```

```
  switch filepath.Ext(d.Name()) {
  default:
   return nil
  case ".s", ".go":
   // check
  }

  f, err := os.Open(path)
  if err != nil {
   t.Error(err)
   return nil
  }
  defer f.Close()
  n, err := f.Read(buf)
  if err != nil && err != io.EOF {
   t.Error(err)
   return nil
  }
  b := buf[:n]
  if bytes.Contains(b, copyright) {
   return nil
  }
  for _, ok := range permitted {
   if bytes.HasPrefix(b, ok) {
    return nil
   }
  }
  t.Errorf("%s: missing copyright notice", path)
  return nil
 })
}
```

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# 1.3325 @npmcli/arborist 9.4.2

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

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```
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Also add information on how to contact you by electronic and paper
 mail.

If the program is interactive, make it output a short notice like this
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 Yoyodyne, Inc., hereby disclaims all copyright interest in the program
 `Gnomovision' (which makes passes at compilers) written by James Hacker.

  <signature of Ty Coon>, 1 April 1989
 Ty Coon, President of Vice

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Public License instead of this License.
/*
* Copyright  2020 Google LLC
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*/

#include "common/freedreno_dev_info.h"

struct testcase {
  enum pipe_format format;

  int array_size; /* Size for array textures, or 0 otherwise. */
  bool is_3d;
```

```
  /* Partially filled layout of input parameters and expected results. */
  struct {
    uint32_t tile_mode : 2;
    bool tile_all : 1;
    bool ubwc : 1;
    uint32_t width0, height0, depth0;
    uint32_t nr_samples;
    struct {
      uint32_t offset;
      uint32_t pitch;
      uint32_t size0;
    } slices[FDL_MAX_MIP_LEVELS];
    struct {
      uint32_t offset;
      uint32_t pitch;
    } ubwc_slices[FDL_MAX_MIP_LEVELS];
  } layout;
};

bool fdl_test_layout(const struct testcase *testcase, const struct fd_dev_id *dev_id);
```

Subject: RE: Question about Mesa MLAA license
From: Jorge Jimenez <iryoku@gmail.com>
Date: 01/08/2013 12:50 PM
To: Tom Callaway <tcallawa@redhat.com>
CC: "jorge@iryoku.com" <jorge@iryoku.com>

Yes to both questions.

Thanks,
Jorge

From: Tom Callaway <tcallawa@redhat.com>
Sent: January 8, 2013 6:49 PM
To: Jorge Jimenez <iryoku@gmail.com>
CC: jorge@iryoku.com
Subject: Re: Question about Mesa MLAA license

On 01/08/2013 12:39 PM, Jorge Jimenez wrote:
> Hi Tom,
>
> What we meant with that is that we made an exception for clause 2.
> Instead of clause 2, in the case of the Mesa project, you have to name
> the technique Jimenez's MLAA in the config options of Mesa. We did that
> just to allow them to solve license issues. This exception should be for
> the Mesa project, and any project using Mesa, like Fedora.
>
> We want to widespread usage of our MLAA, so we want to avoid any kind of

> license complications. Hope current one is good for Fedora, if not
> please tell, and we'll see what
we can do!

Okay, a few more questions:

* If Fedora decides to simply reproduce the quoted statement:
"Uses Jimenez's MLAA. Copyright (C) 2010 by Jorge Jimenez, Belen Masia,
Jose I. Echevarria, Fernando Navarro and Diego Gutierrez."

Specifically, if this is done as part of documentation included with
Mesa, is that sufficient to meet clause 2 even if the Mesa config option
is not set as described in your exception?

* Currently, the Mesa config option for MLAA says: "Morphological
anti-aliasing based on Jimenez\' MLAA. 0 to disable, 8 for default
quality". Is this in compliance with your exception?

Thanks again,

~tom

==
Fedora Project

Subject: RE: Question about Mesa MLAA license
From: Jorge Jimenez <iryoku@gmail.com>
Date: 01/08/2013 12:39 PM
To: "jorge@iryoku.com" <jorge@iryoku.com>, Tom Callaway <tcallawa@redhat.com>

Hi Tom,

What we meant with that is that we made an exception for clause 2.
Instead of clause 2, in the case of the Mesa project, you have to name
the technique
Jimenez's MLAA in the config options of Mesa. We did that
just to allow them to solve license issues. This exception should be for
the Mesa project, and any project using Mesa, like Fedora.

We want to widespread usage of our MLAA, so we want to avoid any kind of
license complications. Hope current one is good for Fedora, if not
please tell, and we'll see what we can do!

Cheers,
Jorge

From: Tom Callaway <tcallawa@redhat.com>
Sent: January 8, 2013 6:30 PM

To: jorge@iryoku.com
Subject: Question about Mesa MLAA license

Jorge,

Thanks for all of your fantastic graphics work! I have been auditing
Fedora (a popular distribution of Linux) for license compliance and I
came across your MLAA code in Mesa.

The license says:

```
*    2. Redistributions in binary form must reproduce the following
statement:
*
*       "Uses Jimenez's MLAA. Copyright (C) 2010 by Jorge Jimenez, Belen Masia,
*        Jose I. Echevarria, Fernando Navarro and Diego Gutierrez."
*
*       Only for use in the
 Mesa project, this point 2 is filled by naming the
*       technique Jimenez's MLAA in the Mesa config options.
```

That wording is unclear. When you say "Only for use in the Mesa
project...", it seems like you could either be saying:

- This code may only be used as part of Mesa.

OR

- In Mesa, you can comply with clause 2 by simply selecting "Jimenez's
MLAA" in the Mesa config options.

*****

If the first item is true, then we may have to remove the MLAA code from
Fedora's copy of Mesa. However, looking at the license on your SMAA
code, I do not believe it to be the case. Please let me know either way!

Thanks in advance,

Tom Callaway
Fedora Legal

==
Fedora Project
/*
* Copyright  2019 Google, Inc.
* SPDX-License-Identifier: MIT
*/

```
#ifndef FREEDRENO_LAYOUT_H_
#define FREEDRENO_LAYOUT_H_

#include <stdbool.h>
#include <stdint.h>

#include "util/format/u_format.h"
#include "util/u_debug.h"
#include "util/u_math.h"

#include "common/freedreno_common.h"
#include "common/freedreno_dev_info.h"

BEGINC;

/* Shared freedreno mipmap layout helper
*
* It does *not* attempt to track surface transitions, in particular
* about UBWC state.  Possibly it should, but
*  (a) I'm not sure if in all cases we can transparently do in-
*      place transitions (ie. a5xx textures with interleaved
*      meta and pixel data
*  (b) Even if we can, we probably can't assume that we have
*      figured out yet how to do in-place transition for every
*      generation.
*/

/* Texture Layout on a3xx:
* -----------------------
*
* Each mipmap-level contains all of it's layers (ie. all cubmap
* faces, all 1d/2d array elements, etc).  The texture sampler is
* programmed
 with the start address of each mipmap level, and hw
* derives the layer offset within the level.
*
*
* Texture Layout on a4xx+:
* ------------------------
*
* For cubemap and 2d array, each layer contains all of it's mipmap
* levels (layer_first layout).
*
* 3d textures are laid out as on a3xx.
*
* In either case, the slice represents the per-miplevel information,
* but in layer_first layout it only includes the first layer, and
```

```
* an additional offset of (rsc->layer_size * layer) must be added.
*
*
* UBWC Color Compressions (a5xx+):
* -------------------------------
*
* Color compression is only supported for tiled layouts.  In general
* the meta "flag" buffer (ie. what holds the compression state for
* each block) can be separate from the color data, except for textures
* on a5xx where it needs to be interleaved with layers/levels of a
* texture.
*/

#define FDL_MAX_MIP_LEVELS 15

struct fdl_slice {
  uint32_t offset; /* offset of first layer in slice
 */
  uint32_t size0;  /* size of first layer in slice */
};

/* parameters for explicit (imported) layout */
struct fdl_explicit_layout {
  uint32_t offset;
  uint32_t pitch;
};

/**
* Metadata shared between vk and gallium driver for interop.
*
* NOTE: EXT_external_objects requires app to check device and driver
* UUIDs to ensure that the vk and gl driver are compatible.  So for
* now we don't need any additional versioning of the metadata.
*/
struct fdl_metadata {
  uint64_t modifier;
};

/**
* Encapsulates the layout of a resource, including position of given 2d
* surface (layer, level) within.  Or rather all the information needed
* to derive this.
*/
struct fdl_layout {
  struct fdl_slice slices[FDL_MAX_MIP_LEVELS];
  struct fdl_slice ubwc_slices[FDL_MAX_MIP_LEVELS];
  uint32_t pitch0;
  uint32_t ubwc_width0;
```

```
  uint64_t layer_size;
  uint64_t ubwc_layer_size; /* in bytes */
  bool ubwc : 1;
  bool layer_first : 1; /* see above description */
  bool tile_all
 : 1;
  bool is_mutable : 1;

  /* Note that for tiled textures, beyond a certain mipmap level (ie.
   * when width is less than block size) things switch to linear.  In
   * general you should not directly look at fdl_layout::tile_mode,
   * but instead use fdl_surface::tile_mode which will correctly take
   * this into account.
   */
  uint32_t tile_mode : 2;
  /* Bytes per pixel (where a "pixel" is a single row of a block in the case
   * of compression), including each sample in the case of multisample
   * layouts.
   */
  uint8_t cpp;

  /**
   * Left shift necessary to multiply by cpp.  Invalid for NPOT cpp, please
   * use fdl_cpp_shift() to sanity check you aren't hitting that case.
   */
  uint8_t cpp_shift;

  uint32_t width0, height0, depth0;
  uint32_t mip_levels;
  uint32_t nr_samples;
  enum pipe_format format;

  uint64_t size;       /* Size of the whole image, in bytes. */
  uint32_t base_align; /* Alignment of the base address, in bytes. */

 uint8_t pitchalign;  /* log2(pitchalign) */
};

static inline uint32_t
fdl_cpp_shift(const struct fdl_layout *layout)
{
  assert(util_is_power_of_two_or_zero(layout->cpp));
  return layout->cpp_shift;
}

static inline uint32_t
fdl_pitch(const struct fdl_layout *layout, unsigned level)
{
```

```
  return align(u_minify(layout->pitch0, level), 1 << layout->pitchalign);
}

#define RGB_TILE_WIDTH_ALIGNMENT  64
#define RGB_TILE_HEIGHT_ALIGNMENT 16
#define UBWC_PLANE_SIZE_ALIGNMENT 4096

static inline uint32_t
fdl_ubwc_pitch(const struct fdl_layout *layout, unsigned level)
{
  if (!layout->ubwc)
     return 0;
  return align(u_minify(layout->ubwc_width0, level), RGB_TILE_WIDTH_ALIGNMENT);
}

static inline uint32_t
fdl_layer_stride(const struct fdl_layout *layout, unsigned level)
{
  if (layout->layer_first)
     return layout->layer_size;
  else
     return layout->slices[level].size0;
}

/* a2xx is special and needs PoT alignment for mipmaps: */
static inline uint32_t
fdl2_pitch(const struct
 fdl_layout *layout, unsigned level)
{
  uint32_t pitch = fdl_pitch(layout, level);
  if (level)
     pitch = util_next_power_of_two(pitch);
  return pitch;
}

static inline uint32_t
fdl2_pitch_pixels(const struct fdl_layout *layout, unsigned level)
{
  return fdl2_pitch(layout, level) >> fdl_cpp_shift(layout);
}

static inline uint32_t
fdl_surface_offset(const struct fdl_layout *layout, unsigned level,
                   unsigned layer)
{
  const struct fdl_slice *slice = &layout->slices[level];
  return slice->offset + fdl_layer_stride(layout, level) * layer;
}
```

```
static inline uint32_t
fdl_ubwc_offset(const struct fdl_layout *layout, unsigned level, unsigned layer)
{
  const struct fdl_slice *slice = &layout->ubwc_slices[level];
  return slice->offset + layer * layout->ubwc_layer_size;
}

/* Minimum layout width to enable UBWC. */
#define FDL_MIN_UBWC_WIDTH 16

static inline bool
fdl_level_linear(const struct fdl_layout *layout, int level)
{
  if (layout->tile_all)

 return false;

  unsigned w = u_minify(layout->width0, level);
  if (w < FDL_MIN_UBWC_WIDTH)
     return true;

  return false;
}

static inline uint32_t
fdl_tile_mode(const struct fdl_layout *layout, int level)
{
  if (layout->tile_mode && fdl_level_linear(layout, level))
     return 0; /* linear */
  else
     return layout->tile_mode;
}

static inline bool
fdl_ubwc_enabled(const struct fdl_layout *layout, int level)
{
  return layout->ubwc && !fdl_level_linear(layout, level);
}

const char *fdl_tile_mode_desc(const struct fdl_layout *layout, int level);

void fdl_layout_buffer(struct fdl_layout *layout, uint32_t size);

void fdl5_layout(struct fdl_layout *layout, enum pipe_format format,
                 uint32_t nr_samples, uint32_t width0, uint32_t height0,
                 uint32_t depth0, uint32_t mip_levels, uint32_t array_size,
                 bool is_3d);
```

```
bool fdl6_layout(struct fdl_layout *layout, const struct fd_dev_info *info,
                 enum pipe_format format,
 uint32_t nr_samples, uint32_t width0,
                 uint32_t height0, uint32_t depth0, uint32_t mip_levels,
                 uint32_t array_size, bool is_3d, bool is_mutable,
                 bool force_ubwc,
                 struct fdl_explicit_layout *plane_layout);

static inline void
fdl_set_pitchalign(struct fdl_layout *layout, unsigned pitchalign)
{
  uint32_t nblocksx = util_format_get_nblocksx(layout->format, layout->width0);
  layout->pitchalign = pitchalign;
  layout->pitch0 = align(nblocksx * layout->cpp, 1 << pitchalign);
}

void fdl_dump_layout(struct fdl_layout *layout);

void fdl6_get_ubwc_blockwidth(const struct fdl_layout *layout,
                              uint32_t *blockwidth, uint32_t *blockheight);

enum fdl_view_type {
  FDL_VIEW_TYPE_1D = 0,
  FDL_VIEW_TYPE_2D = 1,
  FDL_VIEW_TYPE_CUBE = 2,
  FDL_VIEW_TYPE_3D = 3,
  FDL_VIEW_TYPE_BUFFER = 4,
};

enum fdl_chroma_location {
  FDL_CHROMA_LOCATION_COSITED_EVEN = 0,
  FDL_CHROMA_LOCATION_MIDPOINT
 = 1,
};

struct fdl_view_args {
  uint32_t chip;
  uint64_t iova;
  uint32_t base_miplevel;
  uint32_t level_count;
  uint32_t base_array_layer;
  uint32_t layer_count;
  float min_lod_clamp;
  unsigned char swiz[4];
  enum pipe_format format;
  enum fdl_view_type type;
  enum fdl_chroma_location chroma_offsets[2];
```

```
};

#define FDL6_TEX_CONST_DWORDS 16

struct fdl6_view {
  uint64_t base_addr;
  uint64_t ubwc_addr;
  uint32_t layer_size;
  uint32_t ubwc_layer_size;

  uint32_t offset;

  uint32_t width, height;
  bool need_y2_align;

  bool ubwc_enabled;
  bool is_mutable;
  uint8_t color_swap;

  enum pipe_format format;

  uint32_t descriptor[FDL6_TEX_CONST_DWORDS];

  /* Descriptor for use as a storage image as opposed to a sampled image.
   * This has a few differences for cube maps (e.g. type).
   */
  uint32_t storage_descriptor[FDL6_TEX_CONST_DWORDS];

  uint32_t pitch;

  /* pre-filled register values */
  uint32_t FLAG_BUFFER_PITCH;

  uint32_t
 RB_MRT_BUF_INFO;
  uint32_t SP_FS_MRT_REG;

  uint32_t SP_PS_2D_SRC_INFO;
  uint32_t SP_PS_2D_SRC_SIZE;

  uint32_t RB_2D_DST_INFO;

  uint32_t RB_BLIT_DST_INFO;

  uint32_t GRAS_LRZ_DEPTH_VIEW;
};

void
```

```
fdl6_view_init(struct fdl6_view *view, const struct fdl_layout **layouts,
            const struct fdl_view_args *args, bool has_z24uint_s8uint);
void
fdl6_buffer_view_init(uint32_t *descriptor, enum pipe_format format,
                  const uint8_t *swiz, uint64_t iova, uint32_t size);

void
fdl6_format_swiz(enum pipe_format format, bool has_z24uint_s8uint,
              unsigned char *format_swiz);

enum fdl_macrotile_mode {
  FDL_MACROTILE_4_CHANNEL,
  FDL_MACROTILE_8_CHANNEL,
  /* Used internally by turnip */
  FDL_MACROTILE_INVALID = ~0,
};

/* Parameters that affect UBWC swizzling. Note that because we don't handle
* compression, this isn't a complete set of knobs. See the documentation in
* fd6_tiled_memcpy.c for a description of each one.
*/
struct fdl_ubwc_config
 {
  unsigned highest_bank_bit;
  unsigned bank_swizzle_levels;
  enum fdl_macrotile_mode macrotile_mode;
};

void
fdl6_memcpy_linear_to_tiled(uint32_t x_start, uint32_t y_start,
                      uint32_t width, uint32_t height,
                      char *dst, const char *src,
                      const struct fdl_layout *dst_layout,
                      unsigned dst_miplevel,
                      uint32_t src_pitch,
                      const struct fdl_ubwc_config *config);

void
fdl6_memcpy_tiled_to_linear(uint32_t x_start, uint32_t y_start,
                      uint32_t width, uint32_t height,
                      char *dst, const char *src,
                      const struct fdl_layout *src_layout,
                      unsigned src_miplevel,
                      uint32_t dst_pitch,
                      const struct fdl_ubwc_config *config);

ENDC;
```

```
#endif /* FREEDRENO_LAYOUT_H_ */
```

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The screenshot-layer directory was created from using mesa-overlay as a template, then
adding portions of the screenshotting layer from LunarG's VulkanTools repository:
https://github.com/LunarG/VulkanTools/tree/main

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```
/*
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*/

#ifndef FREEDRENO_LRZ_LAYOUT_H_
#define FREEDRENO_LRZ_LAYOUT_H_

#include <stdint.h>

#include "freedreno_layout.h"

BEGINC;

struct fdl_lrz_layout {
  uint32_t lrz_offset;
  uint32_t lrz_pitch;
  uint32_t lrz_height;
  uint32_t lrz_layer_size;
  uint32_t lrz_fc_offset;
  uint32_t lrz_fc_size;
  uint32_t lrz_total_size;
};

void
fdl5_lrz_layout_init(struct fdl_lrz_layout *lrz_layout, uint32_t width,
                     uint32_t height, uint32_t nr_samples);
ENDC;

#ifdef __cplusplus
#include "common/freedreno_lrz.h"

template <chip CHIP>
static void
fdl6_lrz_layout_init(struct fdl_lrz_layout *lrz_layout,
                     struct fdl_layout *layout,
```

```
                const struct fd_dev_info *dev_info, uint32_t lrz_offset,
                uint32_t array_layers)
{
 unsigned width = layout->width0;
 unsigned height = layout->height0;

 /* LRZ buffer is super-sampled */
 switch (layout->nr_samples)
 {
 case 8:
   height *= 2;
   FALLTHROUGH;
 case 4:
   width *= 2;
   FALLTHROUGH;
 case 2:
   height *= 2;
   break;
 default:
   break;
 }

 unsigned lrz_pitch = align(DIV_ROUND_UP(width, 8), 32);
 unsigned lrz_height = align(DIV_ROUND_UP(height, 8), 32);

 lrz_layout->lrz_offset = lrz_offset;
 lrz_layout->lrz_height = lrz_height;
 lrz_layout->lrz_pitch = lrz_pitch;
 lrz_layout->lrz_layer_size = lrz_pitch * lrz_height * sizeof(uint16_t);

 unsigned nblocksx = DIV_ROUND_UP(DIV_ROUND_UP(width, 8), 16);
 unsigned nblocksy = DIV_ROUND_UP(DIV_ROUND_UP(height, 8), 4);

 /* Fast-clear buffer is 1bit/block */
 lrz_layout->lrz_fc_size =
   DIV_ROUND_UP(nblocksx * nblocksy, 8) * array_layers;

 /* Fast-clear buffer cannot be larger than 512 bytes on A6XX and 1024 bytes
  * on A7XX (HW limitation) */
 if (!dev_info->a6xx.enable_lrz_fast_clear ||
     lrz_layout->lrz_fc_size > fd_lrzfc_layout<CHIP>::FC_SIZE) {
   lrz_layout->lrz_fc_size
= 0;
 }

 uint32_t lrz_size = lrz_layout->lrz_layer_size * array_layers;
 if (dev_info->a6xx.enable_lrz_fast_clear ||
     dev_info->a6xx.has_lrz_dir_tracking) {
```

```
    lrz_layout->lrz_fc_offset =
      lrz_layout->lrz_offset + lrz_size;
    lrz_size += sizeof(fd_lrzfc_layout<CHIP>);
  }

  lrz_layout->lrz_total_size = lrz_size;

  uint32_t lrz_clear_height = lrz_layout->lrz_height * array_layers;
  if (((lrz_clear_height - 1) >> 14) > 0) {
    /* For simplicity bail out if LRZ cannot be cleared in one go. */
    lrz_layout->lrz_height = 0;
    lrz_layout->lrz_total_size = 0;
  }
}
#endif

#endif
```

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<signature of Ty Coon>, 1 April 1989
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```
project('bar', 'c', license: 'Apache-2.0')

executable('bar', 'bar.c')

license = meson.project_license()[0]
if license != 'Apache-2.0'
  error('The license should be Apache-2.0, but it is: ' + license)
endif
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libfreedreno_layout = static_library(
 'freedreno_layout',
 [
  'fd5_layout.c',
  'fd6_format_table.c',
  'fd6_layout.c',
```

```
  'fd6_tiled_memcpy.cc',
  'fd6_view.c',
  'freedreno_layout.c',
  'freedreno_lrz_layout.c',
  freedreno_xml_header_files,
 ],
 include_directories : [inc_freedreno, inc_include, inc_src],
 c_args : [no_override_init_args],
 gnu_symbol_visibility : 'hidden',
 dependencies : [idep_nir_headers, idep_mesautil, idep_libfreedreno_common],
 build_by_default : false,
)

foreach major : ['5', '6']
 test(
  'fd' + major + '_layout',
  executable(
   'fd' + major + '_layout',
   [
    'fd_layout_test.c',
    'fd' + major + '_layout_test.c',
    freedreno_xml_header_files,
   ],
   link_with: libfreedreno_layout,
   dependencies : [idep_mesautil, idep_libfreedreno_common],
   include_directories: [
    inc_include,
    inc_src,
    inc_freedreno],
  ),
  suite : ['freedreno'],
 )
endforeach
/*
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*
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*    Rob Clark <robclark@freedesktop.org>
*/

#ifndef FD6_FORMAT_TABLE_H
#define FD6_FORMAT_TABLE_H

#include "util/format/u_format.h"
#include "util/u_math.h"
```

```
#include "common/freedreno_common.h"

#include "adreno_pm4.xml.h"
#include "adreno_common.xml.h"
#include "a6xx.xml.h"

BEGINC;

static inline enum a6xx_tex_swiz
fdl6_swiz(unsigned char swiz)
{
  STATIC_ASSERT((unsigned) A6XX_TEX_X == (unsigned) PIPE_SWIZZLE_X);
  STATIC_ASSERT((unsigned) A6XX_TEX_Y == (unsigned) PIPE_SWIZZLE_Y);
  STATIC_ASSERT((unsigned) A6XX_TEX_Z == (unsigned) PIPE_SWIZZLE_Z);
  STATIC_ASSERT((unsigned) A6XX_TEX_W == (unsigned) PIPE_SWIZZLE_W);
  STATIC_ASSERT((unsigned) A6XX_TEX_ZERO == (unsigned) PIPE_SWIZZLE_0);
  STATIC_ASSERT((unsigned) A6XX_TEX_ONE == (unsigned) PIPE_SWIZZLE_1);
  return (enum a6xx_tex_swiz) swiz;
}

enum a6xx_depth_format fd6_pipe2depth(enum
 pipe_format format);

enum a6xx_format fd6_vertex_format(enum pipe_format format) ATTRIBUTE_CONST;
enum a3xx_color_swap fd6_vertex_swap(enum pipe_format format) ATTRIBUTE_CONST;
enum a6xx_format fd6_texture_format(enum pipe_format format,
                                    enum a6xx_tile_mode tile_mode,
                                    bool is_mutable) ATTRIBUTE_CONST;
enum a3xx_color_swap fd6_texture_swap(enum pipe_format format,
                                      enum a6xx_tile_mode tile_mode,
                                      bool is_mutable) ATTRIBUTE_CONST;
enum a6xx_format fd6_color_format(enum pipe_format format,
                                  enum a6xx_tile_mode tile_mode) ATTRIBUTE_CONST;
enum a3xx_color_swap fd6_color_swap(enum pipe_format format,
                                    enum a6xx_tile_mode tile_mode,
                                    bool is_mutable) ATTRIBUTE_CONST;

ENDC;

#endif /* FD6_FORMAT_TABLE_H */
```

# 1.3330 make-fetch-happen 15.0.5

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ISC

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# 1.3331 gdbm 1.26-r4

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Ext headers       GL/glext.h            Khronos
                  GL/glxext.h           Khronos
                  GL/wglext.h           Khronos
                  KHR/khrplatform.h     Khronos
```

**********

---
include/GL/gl.h :

Mesa 3-D
graphics library

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include/GL/glxext.h
include/GL/wglxext.h :

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## ASM Bytecode Manipulation Framework v8.0.1

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```
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```
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## Mesa 3-D Graphics Library v21.0.3
```

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```
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Component        Location              License
-------------------------------------------------------------------
Main Mesa code    src/mesa/             MIT
Device drivers    src/mesa/drivers/*     MIT, generally

Gallium code      src/gallium/          MIT

Ext headers       GL/glext.h            Khronos
                  GL/glxext.h           Khronos
                  GL/wglext.h           Khronos
                  KHR/khrplatform.h     Khronos

*****************************************************************************
```

---
include/GL/gl.h :

Mesa 3-D
graphics library

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**********

---
include/GL/glext.h
include/GL/glxext.h
include/GL/wglxext.h :

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---
include/KHR/khrplatform.h :

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```
## GIFLIB v5.2.2

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```

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tree/README

== Authors ==

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original giflib code

Toshio Kuratomi <toshio[AT]tiki-lounge.com>
uncompressed gif writing code
former maintainer

Eric Raymond <esr[AT]snark.thyrsus.com>
current as well as long time former maintainer of giflib code

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tree/openbsd-reallocarray.c

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```

# 1.3341 node.js 22.22.2
```

## 1.3341.1 Available under license :

```
#ifndef SRC_PERMISSION_WORKER_PERMISSION_H_
#define SRC_PERMISSION_WORKER_PERMISSION_H_

#if defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS

#include <vector>
#include "permission/permission_base.h"

namespace node {

namespace permission {

class WorkerPermission final : public PermissionBase {
public:
 void Apply(Environment* env,
            const std::vector<std::string>& allow,
            PermissionScope scope) override;
 bool is_granted(Environment* env,
                 PermissionScope perm,
                 const std::string_view& param = "") const override;

private:
 bool deny_all_;
};

}  // namespace permission

}  // namespace node

#endif  // defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
#endif  // SRC_PERMISSION_WORKER_PERMISSION_H_
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     'openssl/ssl/s3_enc.c',
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```

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  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-2k-avxifma.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-3k-avx512.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-3k-avxifma.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-4k-avx512.s',

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  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/x86_64-gf2m.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/x86_64-mont.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/x86_64-mont5.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/camellia/cmll-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/chacha/chacha-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/ec/ecp_nistz256-x86_64.s',
```

```
  './config/archs/BSD-x86_64/asm_avx2/crypto/ec/x25519-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/params_idx.c',
  './config/archs/BSD-x86_64/asm_avx2/crypto/x86_64cpuid.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/md5/md5-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/modes/aes-gcm-avx512.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/modes/aesni-gcm-x86_64.s',
   './config/archs/BSD-x86_64/asm_avx2/crypto/modes/ghash-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/poly1305/poly1305-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/rc4/rc4-md5-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/rc4/rc4-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/sha/keccak1600-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/sha/sha1-mb-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/sha/sha1-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/sha/sha256-mb-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/sha/sha256-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/sha/sha512-x86_64.s',
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  './config/archs/BSD-x86_64/asm_avx2/engines/e_padlock-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_sm2_gen.c',
  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_digests_gen.c',
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  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_ecx_gen.c',
  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_ml_dsa_gen.c',
  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_rsa_gen.c',
  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_slh_dsa_gen.c',
  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_wrap_gen.c',
  './config/archs/BSD-x86_64/asm_avx2/providers/legacy.ld',
  './config/archs/BSD-x86_64/asm_avx2/providers/fips.ld',
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  'CMLL_ASM',
  'ECP_NISTZ256_ASM',
  'GHASH_ASM',
  'KECCAK1600_ASM',

'MD5_ASM',
  'OPENSSL_BN_ASM_GF2m',
  'OPENSSL_BN_ASM_MONT',
  'OPENSSL_BN_ASM_MONT5',
  'OPENSSL_CPUID_OBJ',
  'OPENSSL_IA32_SSE2',
  'PADLOCK_ASM',
```

```
    'POLY1305_ASM',
    'RC4_ASM',
    'SHA1_ASM',
    'SHA256_ASM',
    'SHA512_ASM',
    'VPAES_ASM',
    'WHIRLPOOL_ASM',
    'X25519_ASM',
    'OPENSSL_PIC',
  ],
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    '-Wall -O3',
    '-pthread',
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  ],
  'openssl_ex_libs_BSD-x86_64': [
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  ],
 },
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  './include',
  './crypto',
  './crypto/include/internal',
  './providers/common/include',
 ],
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  'include_dirs': ['./include', '.'],
  'defines': ['<@(openssl_defines_BSD-x86_64)'],
  },
}
/*
* WARNING: do not edit!
* Generated by util/mkbuildinf.pl
*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/
```

```
#define PLATFORM "platform: BSD-x86_64"
#define DATE "built on: Tue Jan 27 17:26:46 2026 UTC"

/*
* Generate compiler_flags as an array of individual characters. This is a
* workaround for the situation where CFLAGS gets too long for a C90 string
* literal
*/
static const char compiler_flags[] = {
   'c','o','m','p','i','l','e','r',':',' ','.','.','/','c','o','n',
   'f','i','g','/','f','a','k','e','_','g','c','c','.','p','l',' ',
   '-','f','P','I','C',' ','-','p','t','h','r','e','a','d',' ','-',
   'W','a',',','-','-','n','o','e','x','e','c','s','t','a','c','k',
   ' ','-','W','a','l','l','
 ','-','O','3',' ','-','D','L','_','E',
   'N','D','I','A','N',' ','-','D','O','P','E','N','S','S','L','_',
   'P','I','C',' ','-','D','_','T','H','R','E','A','D','_','S','A',
   'F','E',' ','-','D','_','R','E','E','N','T','R','A','N','T',' ',
   '-','D','O','P','E','N','S','S','L','_','B','U','I','L','D','I',
   'N','G','_','O','P','E','N','S','S','L',' ','-','D','N','D','E',
   'B','U','G','\0'
};
#ifndef SRC_PERMISSION_CHILD_PROCESS_PERMISSION_H_
#define SRC_PERMISSION_CHILD_PROCESS_PERMISSION_H_

#if defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS

#include <vector>
#include "permission/permission_base.h"

namespace node {

namespace permission {

class ChildProcessPermission final : public PermissionBase {
public:
 void Apply(Environment* env,
            const std::vector<std::string>& allow,
            PermissionScope scope) override;
 bool is_granted(Environment* env,
                 PermissionScope perm,
                 const std::string_view& param = "") const override;

private:
 bool deny_all_;
};

}  // namespace permission
```

}  // namespace node

#endif  // defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
#endif  // SRC_PERMISSION_CHILD_PROCESS_PERMISSION_H_
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 OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.
```
{
 'variables': {
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     'openssl/ssl/d1_lib.c',
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     'openssl/ssl/methods.c',
     'openssl/ssl/pqueue.c',
     'openssl/ssl/priority_queue.c',
     'openssl/ssl/s3_enc.c',
     'openssl/ssl/s3_lib.c',
     'openssl/ssl/s3_msg.c',
     'openssl/ssl/ssl_asn1.c',
     'openssl/ssl/ssl_cert.c',
     'openssl/ssl/ssl_cert_comp.c',
     'openssl/ssl/ssl_ciph.c',
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     'openssl/ssl/ssl_lib.c',
     'openssl/ssl/ssl_mcnf.c',
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     'openssl/ssl/ssl_sess.c',
     'openssl/ssl/ssl_stat.c',
```

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'openssl/ssl/quic/quic_method.c',
'openssl/ssl/quic/quic_obj.c',
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'openssl/ssl/record/rec_layer_d1.c',
'openssl/ssl/record/rec_layer_s3.c',
'openssl/ssl/record/methods/dtls_meth.c',
'openssl/ssl/record/methods/ssl3_meth.c',
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'openssl/crypto/aes/aes_misc.c',
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'openssl/crypto/asn1/d2i_pr.c',
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'openssl/crypto/asn1/evp_asn1.c',
'openssl/crypto/asn1/f_int.c',
'openssl/crypto/asn1/f_string.c',
'openssl/crypto/asn1/i2d_evp.c',
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'openssl/crypto/camellia/cmll_ofb.c',
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'openssl/crypto/cast/c_skey.c',
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  './config/archs/BSD-x86/no-asm/providers/common/der/der_digests_gen.c',
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  'OPENSSL_BUILDING_OPENSSL',
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  './crypto',
  './crypto/include/internal',
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  'include_dirs': ['./include', '.'],
  'defines': ['<@(openssl_defines_BSD-x86)'],
 },
}
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/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/crypto.h.in
*

```
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*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_CRYPTO_H
#define OPENSSL_CRYPTO_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_CRYPTO_H
#endif

#include <stdlib.h>
#include <time.h>

#include <openssl/e_os2.h>

#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif

#include <openssl/safestack.h>
#include <openssl/opensslv.h>
#include <openssl/types.h>
#include <openssl/opensslconf.h>
#include <openssl/cryptoerr.h>
#include <openssl/core.h>

#ifdef
 CHARSET_EBCDIC
#include <openssl/ebcdic.h>
#endif

/*
* Resolve problems on some operating systems with symbol names that clash
* one way or another
*/
#include <openssl/symhacks.h>
```

```
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#include <openssl/opensslv.h>
#endif

#ifdef __cplusplus
extern "C" {
#endif

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define SSLeay OpenSSL_version_num
#define SSLeay_version OpenSSL_version
#define SSLEAY_VERSION_NUMBER OPENSSL_VERSION_NUMBER
#define SSLEAY_VERSION OPENSSL_VERSION
#define SSLEAY_CFLAGS OPENSSL_CFLAGS
#define SSLEAY_BUILT_ON OPENSSL_BUILT_ON
#define SSLEAY_PLATFORM OPENSSL_PLATFORM
#define SSLEAY_DIR OPENSSL_DIR

/*
* Old type for allocating dynamic locks. No longer used. Use the new thread
* API instead.
*/
typedef struct {
  int dummy;
} CRYPTO_dynlock;

#endif /* OPENSSL_NO_DEPRECATED_1_1_0 */

typedef void CRYPTO_RWLOCK;

CRYPTO_RWLOCK *CRYPTO_THREAD_lock_new(void);
__owur int CRYPTO_THREAD_read_lock(CRYPTO_RWLOCK *lock);
__owur int CRYPTO_THREAD_write_lock(CRYPTO_RWLOCK
 *lock);
int CRYPTO_THREAD_unlock(CRYPTO_RWLOCK *lock);
void CRYPTO_THREAD_lock_free(CRYPTO_RWLOCK *lock);

int CRYPTO_atomic_add(int *val, int amount, int *ret, CRYPTO_RWLOCK *lock);
int CRYPTO_atomic_add64(uint64_t *val, uint64_t op, uint64_t *ret,
  CRYPTO_RWLOCK *lock);
int CRYPTO_atomic_and(uint64_t *val, uint64_t op, uint64_t *ret,
  CRYPTO_RWLOCK *lock);
int CRYPTO_atomic_or(uint64_t *val, uint64_t op, uint64_t *ret,
  CRYPTO_RWLOCK *lock);
int CRYPTO_atomic_load(uint64_t *val, uint64_t *ret, CRYPTO_RWLOCK *lock);
int CRYPTO_atomic_load_int(int *val, int *ret, CRYPTO_RWLOCK *lock);
int CRYPTO_atomic_store(uint64_t *dst, uint64_t val, CRYPTO_RWLOCK *lock);
```

```
/* No longer needed, so this is a no-op */
#define OPENSSL_malloc_init() \
   while (0)                \
   continue

#define OPENSSL_malloc(num) \
   CRYPTO_malloc(num, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_zalloc(num) \
   CRYPTO_zalloc(num, OPENSSL_FILE, OPENSSL_LINE)
#define
 OPENSSL_aligned_alloc(num, alignment, freeptr) \
   CRYPTO_aligned_alloc(num, alignment, freeptr,      \
      OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_realloc(addr, num) \
   CRYPTO_realloc(addr, num, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_clear_realloc(addr, old_num, num) \
   CRYPTO_clear_realloc(addr, old_num, num, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_clear_free(addr, num) \
   CRYPTO_clear_free(addr, num, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_free(addr) \
   CRYPTO_free(addr, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_memdup(str, s) \
   CRYPTO_memdup((str), s, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_strdup(str) \
   CRYPTO_strdup(str, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_strndup(str, n) \
   CRYPTO_strndup(str, n, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_secure_malloc(num) \
   CRYPTO_secure_malloc(num, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_secure_zalloc(num) \
   CRYPTO_secure_zalloc(num, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_secure_free(addr)
 \
   CRYPTO_secure_free(addr, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_secure_clear_free(addr, num) \
   CRYPTO_secure_clear_free(addr, num, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_secure_actual_size(ptr) \
   CRYPTO_secure_actual_size(ptr)

size_t OPENSSL_strlcpy(char *dst, const char *src, size_t siz);
size_t OPENSSL_strlcat(char *dst, const char *src, size_t siz);
size_t OPENSSL_strnlen(const char *str, size_t maxlen);
int OPENSSL_strtoul(const char *str, char **endptr, int base, unsigned long *num);
int OPENSSL_buf2hexstr_ex(char *str, size_t str_n, size_t *strlength,
   const unsigned char *buf, size_t buflen,
   const char sep);
char *OPENSSL_buf2hexstr(const unsigned char *buf, long buflen);
```

```
int OPENSSL_hexstr2buf_ex(unsigned char *buf, size_t buf_n, size_t *buflen,
   const char *str, const char sep);
unsigned char *OPENSSL_hexstr2buf(const char *str, long *buflen);
int OPENSSL_hexchar2int(unsigned char c);
int OPENSSL_strcasecmp(const char
 *s1, const char *s2);
int OPENSSL_strncasecmp(const char *s1, const char *s2, size_t n);

#define OPENSSL_MALLOC_MAX_NELEMS(type) (((1U << (sizeof(int) * 8 - 1)) - 1) / sizeof(type))

/*
* These functions return the values of OPENSSL_VERSION_MAJOR,
* OPENSSL_VERSION_MINOR, OPENSSL_VERSION_PATCH, OPENSSL_VERSION_PRE_RELEASE
* and OPENSSL_VERSION_BUILD_METADATA, respectively.
*/
unsigned int OPENSSL_version_major(void);
unsigned int OPENSSL_version_minor(void);
unsigned int OPENSSL_version_patch(void);
const char *OPENSSL_version_pre_release(void);
const char *OPENSSL_version_build_metadata(void);

unsigned long OpenSSL_version_num(void);
const char *OpenSSL_version(int type);
#define OPENSSL_VERSION 0
#define OPENSSL_CFLAGS 1
#define OPENSSL_BUILT_ON 2
#define OPENSSL_PLATFORM 3
#define OPENSSL_DIR 4
#define OPENSSL_ENGINES_DIR 5
#define OPENSSL_VERSION_STRING 6
#define OPENSSL_FULL_VERSION_STRING 7
#define OPENSSL_MODULES_DIR 8
#define OPENSSL_CPU_INFO 9
#define OPENSSL_WINCTX 10

const
 char *OPENSSL_info(int type);
/*
* The series starts at 1001 to avoid confusion with the OpenSSL_version
* types.
*/
#define OPENSSL_INFO_CONFIG_DIR 1001
#define OPENSSL_INFO_ENGINES_DIR 1002
#define OPENSSL_INFO_MODULES_DIR 1003
#define OPENSSL_INFO_DSO_EXTENSION 1004
#define OPENSSL_INFO_DIR_FILENAME_SEPARATOR 1005
#define OPENSSL_INFO_LIST_SEPARATOR 1006
#define OPENSSL_INFO_SEED_SOURCE 1007
```

```
#define OPENSSL_INFO_CPU_SETTINGS 1008
#define OPENSSL_INFO_WINDOWS_CONTEXT 1009

int OPENSSL_issetugid(void);

struct crypto_ex_data_st {
  OSSL_LIB_CTX *ctx;
  STACK_OF(void) *sk;
};

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(void, void, void)
#define sk_void_num(sk) OPENSSL_sk_num(ossl_check_const_void_sk_type(sk))
#define sk_void_value(sk, idx) ((void *)OPENSSL_sk_value(ossl_check_const_void_sk_type(sk), (idx)))
#define sk_void_new(cmp) ((STACK_OF(void) *)OPENSSL_sk_new(ossl_check_void_compfunc_type(cmp)))
#define sk_void_new_null() ((STACK_OF(void) *)OPENSSL_sk_new_null())
#define
 sk_void_new_reserve(cmp, n) ((STACK_OF(void)
*)OPENSSL_sk_new_reserve(ossl_check_void_compfunc_type(cmp), (n)))
#define sk_void_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_void_sk_type(sk), (n))
#define sk_void_free(sk) OPENSSL_sk_free(ossl_check_void_sk_type(sk))
#define sk_void_zero(sk) OPENSSL_sk_zero(ossl_check_void_sk_type(sk))
#define sk_void_delete(sk, i) ((void *)OPENSSL_sk_delete(ossl_check_void_sk_type(sk), (i)))
#define sk_void_delete_ptr(sk, ptr) ((void *)OPENSSL_sk_delete_ptr(ossl_check_void_sk_type(sk),
ossl_check_void_type(ptr)))
#define sk_void_push(sk, ptr) OPENSSL_sk_push(ossl_check_void_sk_type(sk), ossl_check_void_type(ptr))
#define sk_void_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_void_sk_type(sk), ossl_check_void_type(ptr))
#define sk_void_pop(sk) ((void *)OPENSSL_sk_pop(ossl_check_void_sk_type(sk)))
#define sk_void_shift(sk) ((void *)OPENSSL_sk_shift(ossl_check_void_sk_type(sk)))
#define sk_void_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_void_sk_type(sk),ossl_check_void_freefunc_type(freefunc))
#define
 sk_void_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_void_sk_type(sk), ossl_check_void_type(ptr), (idx))
#define sk_void_set(sk, idx, ptr) ((void *)OPENSSL_sk_set(ossl_check_void_sk_type(sk), (idx),
ossl_check_void_type(ptr)))
#define sk_void_find(sk, ptr) OPENSSL_sk_find(ossl_check_void_sk_type(sk), ossl_check_void_type(ptr))
#define sk_void_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_void_sk_type(sk), ossl_check_void_type(ptr))
#define sk_void_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_void_sk_type(sk),
ossl_check_void_type(ptr), pnum)
#define sk_void_sort(sk) OPENSSL_sk_sort(ossl_check_void_sk_type(sk))
#define sk_void_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_void_sk_type(sk))
#define sk_void_dup(sk) ((STACK_OF(void) *)OPENSSL_sk_dup(ossl_check_const_void_sk_type(sk)))
#define sk_void_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(void)
*)OPENSSL_sk_deep_copy(ossl_check_const_void_sk_type(sk),
 ossl_check_void_copyfunc_type(copyfunc), ossl_check_void_freefunc_type(freefunc)))
#define sk_void_set_cmp_func(sk, cmp)
((sk_void_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_void_sk_type(sk),
ossl_check_void_compfunc_type(cmp)))
```

```
/* clang-format on */

/*
* Per class, we have a STACK of function pointers.
*/
#define CRYPTO_EX_INDEX_SSL 0
#define CRYPTO_EX_INDEX_SSL_CTX 1
#define CRYPTO_EX_INDEX_SSL_SESSION 2
#define CRYPTO_EX_INDEX_X509 3
#define CRYPTO_EX_INDEX_X509_STORE 4
#define CRYPTO_EX_INDEX_X509_STORE_CTX 5
#define CRYPTO_EX_INDEX_DH 6
#define CRYPTO_EX_INDEX_DSA 7
#define CRYPTO_EX_INDEX_EC_KEY 8
#define CRYPTO_EX_INDEX_RSA 9
#define CRYPTO_EX_INDEX_ENGINE 10
#define CRYPTO_EX_INDEX_UI 11
#define CRYPTO_EX_INDEX_BIO 12
#define CRYPTO_EX_INDEX_APP 13
#define CRYPTO_EX_INDEX_UI_METHOD 14
#define CRYPTO_EX_INDEX_RAND_DRBG 15
#define CRYPTO_EX_INDEX_DRBG CRYPTO_EX_INDEX_RAND_DRBG
#define CRYPTO_EX_INDEX_OSSL_LIB_CTX 16
#define CRYPTO_EX_INDEX_EVP_PKEY 17
#define CRYPTO_EX_INDEX__COUNT
 18

typedef void CRYPTO_EX_new(void *parent, void *ptr, CRYPTO_EX_DATA *ad,
   int idx, long argl, void *argp);
typedef void CRYPTO_EX_free(void *parent, void *ptr, CRYPTO_EX_DATA *ad,
   int idx, long argl, void *argp);
typedef int CRYPTO_EX_dup(CRYPTO_EX_DATA *to, const CRYPTO_EX_DATA *from,
   void **from_d, int idx, long argl, void *argp);
__owur int CRYPTO_get_ex_new_index(int class_index, long argl, void *argp,
   CRYPTO_EX_new *new_func,
   CRYPTO_EX_dup *dup_func,
   CRYPTO_EX_free *free_func);
/* No longer use an index. */
int CRYPTO_free_ex_index(int class_index, int idx);

/*
* Initialise/duplicate/free CRYPTO_EX_DATA variables corresponding to a
* given class (invokes whatever per-class callbacks are applicable)
*/
int CRYPTO_new_ex_data(int class_index, void *obj, CRYPTO_EX_DATA *ad);
int CRYPTO_dup_ex_data(int class_index, CRYPTO_EX_DATA *to,
   const CRYPTO_EX_DATA *from);
```

```
void CRYPTO_free_ex_data(int class_index, void *obj, CRYPTO_EX_DATA
 *ad);

/* Allocate a single item in the CRYPTO_EX_DATA variable */
int CRYPTO_alloc_ex_data(int class_index, void *obj, CRYPTO_EX_DATA *ad,
   int idx);

/*
* Get/set data in a CRYPTO_EX_DATA variable corresponding to a particular
* index (relative to the class type involved)
*/
int CRYPTO_set_ex_data(CRYPTO_EX_DATA *ad, int idx, void *val);
void *CRYPTO_get_ex_data(const CRYPTO_EX_DATA *ad, int idx);

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
/*
* This function cleans up all "ex_data" state. It mustn't be called under
* potential race-conditions.
*/
#define CRYPTO_cleanup_all_ex_data() \
   while (0)                    \
   continue

/*
* The old locking functions have been removed completely without compatibility
* macros. This is because the old functions either could not properly report
* errors, or the returned error values were not clearly documented.
* Replacing the locking functions with no-ops would cause race condition
* issues in the affected applications. It is
 far better for them to fail at
* compile time.
* On the other hand, the locking callbacks are no longer used.  Consequently,
* the callback management functions can be safely replaced with no-op macros.
*/
#define CRYPTO_num_locks() (1)
#define CRYPTO_set_locking_callback(func)
#define CRYPTO_get_locking_callback() (NULL)
#define CRYPTO_set_add_lock_callback(func)
#define CRYPTO_get_add_lock_callback() (NULL)

/*
* These defines where used in combination with the old locking callbacks,
* they are not called anymore, but old code that's not called might still
* use them.
*/
#define CRYPTO_LOCK 1
#define CRYPTO_UNLOCK 2
```

```
#define CRYPTO_READ 4
#define CRYPTO_WRITE 8

/* This structure is no longer used */
typedef struct crypto_threadid_st {
   int dummy;
} CRYPTO_THREADID;
/* Only use CRYPTO_THREADID_set_[numeric|pointer]() within callbacks */
#define CRYPTO_THREADID_set_numeric(id, val)
#define CRYPTO_THREADID_set_pointer(id, ptr)
#define CRYPTO_THREADID_set_callback(threadid_func)
 (0)
#define CRYPTO_THREADID_get_callback() (NULL)
#define CRYPTO_THREADID_current(id)
#define CRYPTO_THREADID_cmp(a, b) (-1)
#define CRYPTO_THREADID_cpy(dest, src)
#define CRYPTO_THREADID_hash(id) (0UL)

#ifndef OPENSSL_NO_DEPRECATED_1_0_0
#define CRYPTO_set_id_callback(func)
#define CRYPTO_get_id_callback() (NULL)
#define CRYPTO_thread_id() (0UL)
#endif /* OPENSSL_NO_DEPRECATED_1_0_0 */

#define CRYPTO_set_dynlock_create_callback(dyn_create_function)
#define CRYPTO_set_dynlock_lock_callback(dyn_lock_function)
#define CRYPTO_set_dynlock_destroy_callback(dyn_destroy_function)
#define CRYPTO_get_dynlock_create_callback() (NULL)
#define CRYPTO_get_dynlock_lock_callback() (NULL)
#define CRYPTO_get_dynlock_destroy_callback() (NULL)
#endif /* OPENSSL_NO_DEPRECATED_1_1_0 */

typedef void *(*CRYPTO_malloc_fn)(size_t num, const char *file, int line);
typedef void *(*CRYPTO_realloc_fn)(void *addr, size_t num, const char *file,
   int line);
typedef void (*CRYPTO_free_fn)(void *addr, const char
 *file, int line);
int CRYPTO_set_mem_functions(CRYPTO_malloc_fn malloc_fn,
   CRYPTO_realloc_fn realloc_fn,
   CRYPTO_free_fn free_fn);
void CRYPTO_get_mem_functions(CRYPTO_malloc_fn *malloc_fn,
   CRYPTO_realloc_fn *realloc_fn,
   CRYPTO_free_fn *free_fn);

OSSL_CRYPTO_ALLOC void *CRYPTO_malloc(size_t num, const char *file, int line);
OSSL_CRYPTO_ALLOC void *CRYPTO_zalloc(size_t num, const char *file, int line);
OSSL_CRYPTO_ALLOC void *CRYPTO_aligned_alloc(size_t num, size_t align,
   void **freeptr, const char *file,
```

```
   int line);
void *CRYPTO_memdup(const void *str, size_t siz, const char *file, int line);
char *CRYPTO_strdup(const char *str, const char *file, int line);
char *CRYPTO_strndup(const char *str, size_t s, const char *file, int line);
void CRYPTO_free(void *ptr, const char *file, int line);
void CRYPTO_clear_free(void *ptr, size_t num, const char *file, int line);
void *CRYPTO_realloc(void *addr, size_t num, const char *file, int line);
void *CRYPTO_clear_realloc(void
 *addr, size_t old_num, size_t num,
   const char *file, int line);

int CRYPTO_secure_malloc_init(size_t sz, size_t minsize);
int CRYPTO_secure_malloc_done(void);
OSSL_CRYPTO_ALLOC void *CRYPTO_secure_malloc(size_t num, const char *file, int line);
OSSL_CRYPTO_ALLOC void *CRYPTO_secure_zalloc(size_t num, const char *file, int line);
void CRYPTO_secure_free(void *ptr, const char *file, int line);
void CRYPTO_secure_clear_free(void *ptr, size_t num,
   const char *file, int line);
int CRYPTO_secure_allocated(const void *ptr);
int CRYPTO_secure_malloc_initialized(void);
size_t CRYPTO_secure_actual_size(void *ptr);
size_t CRYPTO_secure_used(void);

void OPENSSL_cleanse(void *ptr, size_t len);

#ifndef OPENSSL_NO_CRYPTO_MDEBUG
/*
* The following can be used to detect memory leaks in the library. If
* used, it turns on malloc checking
*/
#define CRYPTO_MEM_CHECK_OFF 0x0 /* Control only */
#define CRYPTO_MEM_CHECK_ON 0x1 /* Control and mode bit */
#define CRYPTO_MEM_CHECK_ENABLE 0x2
 /* Control and mode bit */
#define CRYPTO_MEM_CHECK_DISABLE 0x3 /* Control only */

/* max allowed length for value of OPENSSL_MALLOC_FAILURES env var. */
#define CRYPTO_MEM_CHECK_MAX_FS 256

void CRYPTO_get_alloc_counts(int *mcount, int *rcount, int *fcount);
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define OPENSSL_mem_debug_push(info) \
   CRYPTO_mem_debug_push(info, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_mem_debug_pop() \
   CRYPTO_mem_debug_pop()
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 int CRYPTO_set_mem_debug(int flag);
```

```
OSSL_DEPRECATEDIN_3_0 int CRYPTO_mem_ctrl(int mode);
OSSL_DEPRECATEDIN_3_0 int CRYPTO_mem_debug_push(const char *info,
   const char *file, int line);
OSSL_DEPRECATEDIN_3_0 int CRYPTO_mem_debug_pop(void);
OSSL_DEPRECATEDIN_3_0 void CRYPTO_mem_debug_malloc(void *addr, size_t num,
   int flag,
   const char *file, int line);
OSSL_DEPRECATEDIN_3_0 void CRYPTO_mem_debug_realloc(void *addr1, void *addr2,
   size_t num, int flag,
   const char
 *file, int line);
OSSL_DEPRECATEDIN_3_0 void CRYPTO_mem_debug_free(void *addr, int flag,
   const char *file, int line);
OSSL_DEPRECATEDIN_3_0
int CRYPTO_mem_leaks_cb(int (*cb)(const char *str, size_t len, void *u),
   void *u);
#endif
#ifndef OPENSSL_NO_STDIO
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 int CRYPTO_mem_leaks_fp(FILE *);
#endif
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 int CRYPTO_mem_leaks(BIO *bio);
#endif
#endif /* OPENSSL_NO_CRYPTO_MDEBUG */

/* die if we have to */
ossl_noreturn void OPENSSL_die(const char *assertion, const char *file, int line);
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define OpenSSLDie(f, l, a) OPENSSL_die((a), (f), (l))
#endif
#define OPENSSL_assert(e) \
   (void)((e) ? 0 : (OPENSSL_die("assertion failed: " #e, OPENSSL_FILE, OPENSSL_LINE), 1))

int OPENSSL_isservice(void);

void OPENSSL_init(void);
#ifdef OPENSSL_SYS_UNIX
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 void OPENSSL_fork_prepare(void);
OSSL_DEPRECATEDIN_3_0
 void OPENSSL_fork_parent(void);
OSSL_DEPRECATEDIN_3_0 void OPENSSL_fork_child(void);
#endif
#endif

struct tm *OPENSSL_gmtime(const time_t *timer, struct tm *result);
```

```
int OPENSSL_gmtime_adj(struct tm *tm, int offset_day, long offset_sec);
int OPENSSL_gmtime_diff(int *pday, int *psec,
   const struct tm *from, const struct tm *to);

/*
* CRYPTO_memcmp returns zero iff the |len| bytes at |a| and |b| are equal.
* It takes an amount of time dependent on |len|, but independent of the
* contents of |a| and |b|. Unlike memcmp, it cannot be used to put elements
* into a defined order as the return value when a != b is undefined, other
* than to be non-zero.
*/
int CRYPTO_memcmp(const void *in_a, const void *in_b, size_t len);

/* Standard initialisation options */
#define OPENSSL_INIT_NO_LOAD_CRYPTO_STRINGS 0x00000001L
#define OPENSSL_INIT_LOAD_CRYPTO_STRINGS 0x00000002L
#define OPENSSL_INIT_ADD_ALL_CIPHERS 0x00000004L
#define OPENSSL_INIT_ADD_ALL_DIGESTS 0x00000008L
#define
 OPENSSL_INIT_NO_ADD_ALL_CIPHERS 0x00000010L
#define OPENSSL_INIT_NO_ADD_ALL_DIGESTS 0x00000020L
#define OPENSSL_INIT_LOAD_CONFIG 0x00000040L
#define OPENSSL_INIT_NO_LOAD_CONFIG 0x00000080L
#define OPENSSL_INIT_ASYNC 0x00000100L
#define OPENSSL_INIT_ENGINE_RDRAND 0x00000200L
#define OPENSSL_INIT_ENGINE_DYNAMIC 0x00000400L
#define OPENSSL_INIT_ENGINE_OPENSSL 0x00000800L
#define OPENSSL_INIT_ENGINE_CRYPTODEV 0x00001000L
#define OPENSSL_INIT_ENGINE_CAPI 0x00002000L
#define OPENSSL_INIT_ENGINE_PADLOCK 0x00004000L
#define OPENSSL_INIT_ENGINE_AFALG 0x00008000L
/* FREE:                                0x00010000L */
#define OPENSSL_INIT_ATFORK 0x00020000L
/* OPENSSL_INIT_BASE_ONLY                    0x00040000L */
#define OPENSSL_INIT_NO_ATEXIT 0x00080000L
/* OPENSSL_INIT flag range 0x03f00000 reserved for OPENSSL_init_ssl() */
/* FREE: 0x04000000L */
/* FREE: 0x08000000L */
/* FREE: 0x10000000L */
/* FREE: 0x20000000L */
/* FREE: 0x40000000L */
/* FREE: 0x80000000L */
/* Max OPENSSL_INIT
 flag value is 0x80000000 */

/* openssl and dasync not counted as builtin */
#define OPENSSL_INIT_ENGINE_ALL_BUILTIN                    \
   (OPENSSL_INIT_ENGINE_RDRAND | OPENSSL_INIT_ENGINE_DYNAMIC \
```

```
      | OPENSSL_INIT_ENGINE_CRYPTODEV | OPENSSL_INIT_ENGINE_CAPI |
OPENSSL_INIT_ENGINE_PADLOCK)

/* Library initialisation functions */
void OPENSSL_cleanup(void);
int OPENSSL_init_crypto(uint64_t opts, const OPENSSL_INIT_SETTINGS *settings);
int OPENSSL_atexit(void (*handler)(void));
void OPENSSL_thread_stop(void);
void OPENSSL_thread_stop_ex(OSSL_LIB_CTX *ctx);

/* Low-level control of initialization */
OPENSSL_INIT_SETTINGS *OPENSSL_INIT_new(void);
#ifndef OPENSSL_NO_STDIO
int OPENSSL_INIT_set_config_filename(OPENSSL_INIT_SETTINGS *settings,
   const char *config_filename);
void OPENSSL_INIT_set_config_file_flags(OPENSSL_INIT_SETTINGS *settings,
   unsigned long flags);
int OPENSSL_INIT_set_config_appname(OPENSSL_INIT_SETTINGS *settings,
   const char *config_appname);
#endif
void
 OPENSSL_INIT_free(OPENSSL_INIT_SETTINGS *settings);

#if defined(OPENSSL_THREADS) && !defined(CRYPTO_TDEBUG)
#if defined(_WIN32)
#if defined(BASETYPES) || defined(_WINDEF_H)
/* application has to include <windows.h> in order to use this */
typedef DWORD CRYPTO_THREAD_LOCAL;
typedef DWORD CRYPTO_THREAD_ID;

typedef LONG CRYPTO_ONCE;
#define CRYPTO_ONCE_STATIC_INIT 0
#endif
#else
#if defined(__TANDEM) && defined(_SPT_MODEL_)
#define SPT_THREAD_SIGNAL 1
#define SPT_THREAD_AWARE 1
#include <spthread.h>
#else
#include <pthread.h>
#endif
typedef pthread_once_t CRYPTO_ONCE;
typedef pthread_key_t CRYPTO_THREAD_LOCAL;
typedef pthread_t CRYPTO_THREAD_ID;

#define CRYPTO_ONCE_STATIC_INIT PTHREAD_ONCE_INIT
#endif
#endif
```

```
#if !defined(CRYPTO_ONCE_STATIC_INIT)
typedef unsigned int CRYPTO_ONCE;
typedef unsigned int CRYPTO_THREAD_LOCAL;
typedef unsigned int CRYPTO_THREAD_ID;
#define CRYPTO_ONCE_STATIC_INIT 0
#endif

int CRYPTO_THREAD_run_once(CRYPTO_ONCE *once, void (*init)(void));

int
 CRYPTO_THREAD_init_local(CRYPTO_THREAD_LOCAL *key, void (*cleanup)(void *));
void *CRYPTO_THREAD_get_local(CRYPTO_THREAD_LOCAL *key);
int CRYPTO_THREAD_set_local(CRYPTO_THREAD_LOCAL *key, void *val);
int CRYPTO_THREAD_cleanup_local(CRYPTO_THREAD_LOCAL *key);

CRYPTO_THREAD_ID CRYPTO_THREAD_get_current_id(void);
int CRYPTO_THREAD_compare_id(CRYPTO_THREAD_ID a, CRYPTO_THREAD_ID b);

OSSL_LIB_CTX *OSSL_LIB_CTX_new(void);
OSSL_LIB_CTX *OSSL_LIB_CTX_new_from_dispatch(const OSSL_CORE_HANDLE *handle,
   const OSSL_DISPATCH *in);
OSSL_LIB_CTX *OSSL_LIB_CTX_new_child(const OSSL_CORE_HANDLE *handle,
   const OSSL_DISPATCH *in);
int OSSL_LIB_CTX_load_config(OSSL_LIB_CTX *ctx, const char *config_file);
void OSSL_LIB_CTX_free(OSSL_LIB_CTX *);
OSSL_LIB_CTX *OSSL_LIB_CTX_get0_global_default(void);
OSSL_LIB_CTX *OSSL_LIB_CTX_set0_default(OSSL_LIB_CTX *libctx);
int OSSL_LIB_CTX_get_conf_diagnostics(OSSL_LIB_CTX *ctx);
void OSSL_LIB_CTX_set_conf_diagnostics(OSSL_LIB_CTX *ctx, int value);

void OSSL_sleep(uint64_t
 millis);

void *OSSL_LIB_CTX_get_data(OSSL_LIB_CTX *ctx, int index);

#ifdef __cplusplus
}
#endif
#endif
```

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```
* Ecma International Standards hereafter means Ecma International Standards as well as Ecma Technical Reports
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/pkcs12.h.in
*
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*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_PKCS12_H
#define OPENSSL_PKCS12_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_PKCS12_H
#endif

#include <openssl/bio.h>
#include <openssl/core.h>
#include <openssl/x509.h>
#include <openssl/pkcs12err.h>
#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif

#ifdef __cplusplus
extern "C" {
#endif

#define PKCS12_KEY_ID 1
#define PKCS12_IV_ID 2
#define PKCS12_MAC_ID 3

/* Default iteration count */
#ifndef PKCS12_DEFAULT_ITER
#define PKCS12_DEFAULT_ITER PKCS5_DEFAULT_ITER
#endif
```

```
#define
 PKCS12_MAC_KEY_LENGTH 20

/* The macro is expected to be used only internally. Kept for backwards compatibility. */
#define PKCS12_SALT_LEN 8

/* It's not clear if these are actually needed... */
#define PKCS12_key_gen PKCS12_key_gen_utf8
#define PKCS12_add_friendlyname PKCS12_add_friendlyname_utf8

/* MS key usage constants */

#define KEY_EX 0x10
#define KEY_SIG 0x80

typedef struct PKCS12_MAC_DATA_st PKCS12_MAC_DATA;

typedef struct PKCS12_st PKCS12;

typedef struct PKCS12_SAFEBAG_st PKCS12_SAFEBAG;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(PKCS12_SAFEBAG, PKCS12_SAFEBAG, PKCS12_SAFEBAG)
#define sk_PKCS12_SAFEBAG_num(sk)
OPENSSL_sk_num(ossl_check_const_PKCS12_SAFEBAG_sk_type(sk))
#define sk_PKCS12_SAFEBAG_value(sk, idx) ((PKCS12_SAFEBAG
*)OPENSSL_sk_value(ossl_check_const_PKCS12_SAFEBAG_sk_type(sk), (idx)))
#define sk_PKCS12_SAFEBAG_new(cmp) ((STACK_OF(PKCS12_SAFEBAG)
*)OPENSSL_sk_new(ossl_check_PKCS12_SAFEBAG_compfunc_type(cmp)))
#define sk_PKCS12_SAFEBAG_new_null()
 ((STACK_OF(PKCS12_SAFEBAG) *)OPENSSL_sk_new_null())
#define sk_PKCS12_SAFEBAG_new_reserve(cmp, n) ((STACK_OF(PKCS12_SAFEBAG)
*)OPENSSL_sk_new_reserve(ossl_check_PKCS12_SAFEBAG_compfunc_type(cmp), (n)))
#define sk_PKCS12_SAFEBAG_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_PKCS12_SAFEBAG_sk_type(sk), (n))
#define sk_PKCS12_SAFEBAG_free(sk) OPENSSL_sk_free(ossl_check_PKCS12_SAFEBAG_sk_type(sk))
#define sk_PKCS12_SAFEBAG_zero(sk) OPENSSL_sk_zero(ossl_check_PKCS12_SAFEBAG_sk_type(sk))
#define sk_PKCS12_SAFEBAG_delete(sk, i) ((PKCS12_SAFEBAG
*)OPENSSL_sk_delete(ossl_check_PKCS12_SAFEBAG_sk_type(sk), (i)))
#define sk_PKCS12_SAFEBAG_delete_ptr(sk, ptr) ((PKCS12_SAFEBAG
*)OPENSSL_sk_delete_ptr(ossl_check_PKCS12_SAFEBAG_sk_type(sk),
ossl_check_PKCS12_SAFEBAG_type(ptr)))
#define sk_PKCS12_SAFEBAG_push(sk, ptr) OPENSSL_sk_push(ossl_check_PKCS12_SAFEBAG_sk_type(sk),
ossl_check_PKCS12_SAFEBAG_type(ptr))
#define sk_PKCS12_SAFEBAG_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_PKCS12_SAFEBAG_sk_type(sk),
 ossl_check_PKCS12_SAFEBAG_type(ptr))
#define sk_PKCS12_SAFEBAG_pop(sk) ((PKCS12_SAFEBAG
```

```
*)OPENSSL_sk_pop(ossl_check_PKCS12_SAFEBAG_sk_type(sk)))
#define sk_PKCS12_SAFEBAG_shift(sk) ((PKCS12_SAFEBAG
*)OPENSSL_sk_shift(ossl_check_PKCS12_SAFEBAG_sk_type(sk)))
#define sk_PKCS12_SAFEBAG_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_PKCS12_SAFEBAG_sk_type(sk),ossl_check_PKCS12_SAFEBAG_freefunc_
type(freefunc))
#define sk_PKCS12_SAFEBAG_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_PKCS12_SAFEBAG_sk_type(sk), ossl_check_PKCS12_SAFEBAG_type(ptr),
(idx))
#define sk_PKCS12_SAFEBAG_set(sk, idx, ptr) ((PKCS12_SAFEBAG
*)OPENSSL_sk_set(ossl_check_PKCS12_SAFEBAG_sk_type(sk), (idx),
ossl_check_PKCS12_SAFEBAG_type(ptr)))
#define sk_PKCS12_SAFEBAG_find(sk, ptr) OPENSSL_sk_find(ossl_check_PKCS12_SAFEBAG_sk_type(sk),
ossl_check_PKCS12_SAFEBAG_type(ptr))
#define sk_PKCS12_SAFEBAG_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_PKCS12_SAFEBAG_sk_type(sk), ossl_check_PKCS12_SAFEBAG_type(ptr))
#define
 sk_PKCS12_SAFEBAG_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_PKCS12_SAFEBAG_sk_type(sk), ossl_check_PKCS12_SAFEBAG_type(ptr),
pnum)
#define sk_PKCS12_SAFEBAG_sort(sk) OPENSSL_sk_sort(ossl_check_PKCS12_SAFEBAG_sk_type(sk))
#define sk_PKCS12_SAFEBAG_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_PKCS12_SAFEBAG_sk_type(sk))
#define sk_PKCS12_SAFEBAG_dup(sk) ((STACK_OF(PKCS12_SAFEBAG)
*)OPENSSL_sk_dup(ossl_check_const_PKCS12_SAFEBAG_sk_type(sk)))
#define sk_PKCS12_SAFEBAG_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(PKCS12_SAFEBAG)
*)OPENSSL_sk_deep_copy(ossl_check_const_PKCS12_SAFEBAG_sk_type(sk),
ossl_check_PKCS12_SAFEBAG_copyfunc_type(copyfunc),
ossl_check_PKCS12_SAFEBAG_freefunc_type(freefunc)))
#define sk_PKCS12_SAFEBAG_set_cmp_func(sk, cmp)
((sk_PKCS12_SAFEBAG_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_PKCS12_SAFEBAG_sk_type(sk),
ossl_check_PKCS12_SAFEBAG_compfunc_type(cmp)))

/* clang-format on */

typedef struct pkcs12_bag_st PKCS12_BAGS;

#define
 PKCS12_ERROR 0
#define PKCS12_OK 1

/* Compatibility macros */

#ifndef OPENSSL_NO_DEPRECATED_1_1_0

#define M_PKCS12_bag_type PKCS12_bag_type
#define M_PKCS12_cert_bag_type PKCS12_cert_bag_type
#define M_PKCS12_crl_bag_type PKCS12_cert_bag_type
```

```
#define PKCS12_certbag2x509 PKCS12_SAFEBAG_get1_cert
#define PKCS12_certbag2scrl PKCS12_SAFEBAG_get1_crl
#define PKCS12_bag_type PKCS12_SAFEBAG_get_nid
#define PKCS12_cert_bag_type PKCS12_SAFEBAG_get_bag_nid
#define PKCS12_x5092certbag PKCS12_SAFEBAG_create_cert
#define PKCS12_x509crl2certbag PKCS12_SAFEBAG_create_crl
#define PKCS12_MAKE_KEYBAG PKCS12_SAFEBAG_create0_p8inf
#define PKCS12_MAKE_SHKEYBAG PKCS12_SAFEBAG_create_pkcs8_encrypt

#endif
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 ASN1_TYPE *PKCS12_get_attr(const PKCS12_SAFEBAG *bag,
   int attr_nid);
#endif

ASN1_TYPE *PKCS8_get_attr(PKCS8_PRIV_KEY_INFO *p8, int attr_nid);
int PKCS12_mac_present(const PKCS12 *p12);
void PKCS12_get0_mac(const ASN1_OCTET_STRING **pmac,
    const X509_ALGOR **pmacalg,
   const ASN1_OCTET_STRING **psalt,
   const ASN1_INTEGER **piter,
   const PKCS12 *p12);

const ASN1_TYPE *PKCS12_SAFEBAG_get0_attr(const PKCS12_SAFEBAG *bag,
   int attr_nid);
const ASN1_OBJECT *PKCS12_SAFEBAG_get0_type(const PKCS12_SAFEBAG *bag);
int PKCS12_SAFEBAG_get_nid(const PKCS12_SAFEBAG *bag);
int PKCS12_SAFEBAG_get_bag_nid(const PKCS12_SAFEBAG *bag);
const ASN1_TYPE *PKCS12_SAFEBAG_get0_bag_obj(const PKCS12_SAFEBAG *bag);
const ASN1_OBJECT *PKCS12_SAFEBAG_get0_bag_type(const PKCS12_SAFEBAG *bag);

X509 *PKCS12_SAFEBAG_get1_cert_ex(const PKCS12_SAFEBAG *bag, OSSL_LIB_CTX *libctx, const char
*propq);
X509 *PKCS12_SAFEBAG_get1_cert(const PKCS12_SAFEBAG *bag);
X509_CRL *PKCS12_SAFEBAG_get1_crl_ex(const PKCS12_SAFEBAG *bag, OSSL_LIB_CTX *libctx, const
char *propq);
X509_CRL *PKCS12_SAFEBAG_get1_crl(const PKCS12_SAFEBAG *bag);
const STACK_OF(PKCS12_SAFEBAG) *
PKCS12_SAFEBAG_get0_safes(const PKCS12_SAFEBAG *bag);
const PKCS8_PRIV_KEY_INFO
 *PKCS12_SAFEBAG_get0_p8inf(const PKCS12_SAFEBAG *bag);
const X509_SIG *PKCS12_SAFEBAG_get0_pkcs8(const PKCS12_SAFEBAG *bag);

PKCS12_SAFEBAG *PKCS12_SAFEBAG_create_cert(X509 *x509);
PKCS12_SAFEBAG *PKCS12_SAFEBAG_create_crl(X509_CRL *crl);
PKCS12_SAFEBAG *PKCS12_SAFEBAG_create_secret(int type, int vtype, const unsigned char *value, int len);
PKCS12_SAFEBAG *PKCS12_SAFEBAG_create0_p8inf(PKCS8_PRIV_KEY_INFO *p8);
```

```
PKCS12_SAFEBAG *PKCS12_SAFEBAG_create0_pkcs8(X509_SIG *p8);
PKCS12_SAFEBAG *PKCS12_SAFEBAG_create_pkcs8_encrypt(int pbe_nid,
   const char *pass,
   int passlen,
   unsigned char *salt,
   int saltlen, int iter,
   PKCS8_PRIV_KEY_INFO *p8inf);
PKCS12_SAFEBAG *PKCS12_SAFEBAG_create_pkcs8_encrypt_ex(int pbe_nid,
   const char *pass,
   int passlen,
   unsigned char *salt,
   int saltlen, int iter,
   PKCS8_PRIV_KEY_INFO *p8inf,
   OSSL_LIB_CTX *ctx,
   const char *propq);

PKCS12_SAFEBAG *PKCS12_item_pack_safebag(void *obj, const ASN1_ITEM *it,
   int nid1, int nid2);
PKCS8_PRIV_KEY_INFO
 *PKCS8_decrypt(const X509_SIG *p8, const char *pass,
   int passlen);
PKCS8_PRIV_KEY_INFO *PKCS8_decrypt_ex(const X509_SIG *p8, const char *pass,
   int passlen, OSSL_LIB_CTX *ctx,
   const char *propq);
PKCS8_PRIV_KEY_INFO *PKCS12_decrypt_skey(const PKCS12_SAFEBAG *bag,
   const char *pass, int passlen);
PKCS8_PRIV_KEY_INFO *PKCS12_decrypt_skey_ex(const PKCS12_SAFEBAG *bag,
   const char *pass, int passlen,
   OSSL_LIB_CTX *ctx,
   const char *propq);
X509_SIG *PKCS8_encrypt(int pbe_nid, const EVP_CIPHER *cipher,
   const char *pass, int passlen, unsigned char *salt,
   int saltlen, int iter, PKCS8_PRIV_KEY_INFO *p8);
X509_SIG *PKCS8_encrypt_ex(int pbe_nid, const EVP_CIPHER *cipher,
   const char *pass, int passlen, unsigned char *salt,
   int saltlen, int iter, PKCS8_PRIV_KEY_INFO *p8,
   OSSL_LIB_CTX *ctx, const char *propq);
X509_SIG *PKCS8_set0_pbe(const char *pass, int passlen,
   PKCS8_PRIV_KEY_INFO *p8inf, X509_ALGOR *pbe);
X509_SIG *PKCS8_set0_pbe_ex(const
 char *pass, int passlen,
   PKCS8_PRIV_KEY_INFO *p8inf, X509_ALGOR *pbe,
   OSSL_LIB_CTX *ctx, const char *propq);
PKCS7 *PKCS12_pack_p7data(STACK_OF(PKCS12_SAFEBAG) *sk);
STACK_OF(PKCS12_SAFEBAG) *PKCS12_unpack_p7data(PKCS7 *p7);
PKCS7 *PKCS12_pack_p7encdata(int pbe_nid, const char *pass, int passlen,
   unsigned char *salt, int saltlen, int iter,
   STACK_OF(PKCS12_SAFEBAG) *bags);
```

```
PKCS7 *PKCS12_pack_p7encdata_ex(int pbe_nid, const char *pass, int passlen,
   unsigned char *salt, int saltlen, int iter,
   STACK_OF(PKCS12_SAFEBAG) *bags,
   OSSL_LIB_CTX *ctx, const char *propq);

STACK_OF(PKCS12_SAFEBAG) *PKCS12_unpack_p7encdata(PKCS7 *p7, const char *pass,
   int passlen);

int PKCS12_pack_authsafes(PKCS12 *p12, STACK_OF(PKCS7) *safes);
STACK_OF(PKCS7) *PKCS12_unpack_authsafes(const PKCS12 *p12);

int PKCS12_add_localkeyid(PKCS12_SAFEBAG *bag, unsigned char *name,
   int namelen);
int PKCS12_add_friendlyname_asc(PKCS12_SAFEBAG *bag, const char *name,
   int namelen);
int
 PKCS12_add_friendlyname_utf8(PKCS12_SAFEBAG *bag, const char *name,
   int namelen);
int PKCS12_add_CSPName_asc(PKCS12_SAFEBAG *bag, const char *name,
   int namelen);
int PKCS12_add_friendlyname_uni(PKCS12_SAFEBAG *bag,
   const unsigned char *name, int namelen);
int PKCS12_add1_attr_by_NID(PKCS12_SAFEBAG *bag, int nid, int type,
   const unsigned char *bytes, int len);
int PKCS12_add1_attr_by_txt(PKCS12_SAFEBAG *bag, const char *attrname, int type,
   const unsigned char *bytes, int len);
int PKCS8_add_keyusage(PKCS8_PRIV_KEY_INFO *p8, int usage);
ASN1_TYPE *PKCS12_get_attr_gen(const STACK_OF(X509_ATTRIBUTE) *attrs,
   int attr_nid);
char *PKCS12_get_friendlyname(PKCS12_SAFEBAG *bag);
const STACK_OF(X509_ATTRIBUTE) *
PKCS12_SAFEBAG_get0_attrs(const PKCS12_SAFEBAG *bag);
void PKCS12_SAFEBAG_set0_attrs(PKCS12_SAFEBAG *bag, STACK_OF(X509_ATTRIBUTE) *attrs);
unsigned char *PKCS12_pbe_crypt(const X509_ALGOR *algor,
   const char *pass, int passlen,
   const unsigned char
 *in, int inlen,
   unsigned char **data, int *datalen,
   int en_de);
unsigned char *PKCS12_pbe_crypt_ex(const X509_ALGOR *algor,
   const char *pass, int passlen,
   const unsigned char *in, int inlen,
   unsigned char **data, int *datalen,
   int en_de, OSSL_LIB_CTX *libctx,
   const char *propq);
void *PKCS12_item_decrypt_d2i(const X509_ALGOR *algor, const ASN1_ITEM *it,
   const char *pass, int passlen,
   const ASN1_OCTET_STRING *oct, int zbuf);
```

```
void *PKCS12_item_decrypt_d2i_ex(const X509_ALGOR *algor, const ASN1_ITEM *it,
   const char *pass, int passlen,
   const ASN1_OCTET_STRING *oct, int zbuf,
   OSSL_LIB_CTX *libctx,
   const char *propq);
ASN1_OCTET_STRING *PKCS12_item_i2d_encrypt(X509_ALGOR *algor,
   const ASN1_ITEM *it,
   const char *pass, int passlen,
   void *obj, int zbuf);
ASN1_OCTET_STRING *PKCS12_item_i2d_encrypt_ex(X509_ALGOR *algor,
   const ASN1_ITEM *it,
   const char *pass, int passlen,
   void *obj, int zbuf,
   OSSL_LIB_CTX *ctx,

 const char *propq);
PKCS12 *PKCS12_init(int mode);
PKCS12 *PKCS12_init_ex(int mode, OSSL_LIB_CTX *ctx, const char *propq);

int PKCS12_key_gen_asc(const char *pass, int passlen, unsigned char *salt,
   int saltlen, int id, int iter, int n,
   unsigned char *out, const EVP_MD *md_type);
int PKCS12_key_gen_asc_ex(const char *pass, int passlen, unsigned char *salt,
   int saltlen, int id, int iter, int n,
   unsigned char *out, const EVP_MD *md_type,
   OSSL_LIB_CTX *ctx, const char *propq);
int PKCS12_key_gen_uni(unsigned char *pass, int passlen, unsigned char *salt,
   int saltlen, int id, int iter, int n,
   unsigned char *out, const EVP_MD *md_type);
int PKCS12_key_gen_uni_ex(unsigned char *pass, int passlen, unsigned char *salt,
   int saltlen, int id, int iter, int n,
   unsigned char *out, const EVP_MD *md_type,
   OSSL_LIB_CTX *ctx, const char *propq);
int PKCS12_key_gen_utf8(const char *pass, int passlen, unsigned char *salt,
   int saltlen, int id, int iter, int n,

   unsigned char *out, const EVP_MD *md_type);
int PKCS12_key_gen_utf8_ex(const char *pass, int passlen, unsigned char *salt,
   int saltlen, int id, int iter, int n,
   unsigned char *out, const EVP_MD *md_type,
   OSSL_LIB_CTX *ctx, const char *propq);

int PKCS12_PBE_keyivgen(EVP_CIPHER_CTX *ctx, const char *pass, int passlen,
   ASN1_TYPE *param, const EVP_CIPHER *cipher,
   const EVP_MD *md_type, int en_de);
int PKCS12_PBE_keyivgen_ex(EVP_CIPHER_CTX *ctx, const char *pass, int passlen,
   ASN1_TYPE *param, const EVP_CIPHER *cipher,
   const EVP_MD *md_type, int en_de,
```

```
   OSSL_LIB_CTX *libctx, const char *propq);
int PKCS12_gen_mac(PKCS12 *p12, const char *pass, int passlen,
   unsigned char *mac, unsigned int *maclen);
int PKCS12_verify_mac(PKCS12 *p12, const char *pass, int passlen);
int PKCS12_set_mac(PKCS12 *p12, const char *pass, int passlen,
   unsigned char *salt, int saltlen, int iter,
   const EVP_MD *md_type);
int PKCS12_set_pbmac1_pbkdf2(PKCS12 *p12, const char
 *pass, int passlen,
   unsigned char *salt, int saltlen, int iter,
   const EVP_MD *md_type, const char *prf_md_name);
int PKCS12_setup_mac(PKCS12 *p12, int iter, unsigned char *salt,
   int saltlen, const EVP_MD *md_type);
unsigned char *OPENSSL_asc2uni(const char *asc, int asclen,
   unsigned char **uni, int *unilen);
char *OPENSSL_uni2asc(const unsigned char *uni, int unilen);
unsigned char *OPENSSL_utf82uni(const char *asc, int asclen,
   unsigned char **uni, int *unilen);
char *OPENSSL_uni2utf8(const unsigned char *uni, int unilen);

DECLARE_ASN1_FUNCTIONS(PKCS12)
DECLARE_ASN1_FUNCTIONS(PKCS12_MAC_DATA)
DECLARE_ASN1_FUNCTIONS(PKCS12_SAFEBAG)
DECLARE_ASN1_FUNCTIONS(PKCS12_BAGS)

DECLARE_ASN1_ITEM(PKCS12_SAFEBAGS)
DECLARE_ASN1_ITEM(PKCS12_AUTHSAFES)

void PKCS12_PBE_add(void);
int PKCS12_parse(PKCS12 *p12, const char *pass, EVP_PKEY **pkey, X509 **cert,
   STACK_OF(X509) **ca);
typedef int PKCS12_create_cb(PKCS12_SAFEBAG *bag, void *cbarg);
PKCS12 *PKCS12_create(const char *pass,
 const char *name, EVP_PKEY *pkey,
   X509 *cert, STACK_OF(X509) *ca, int nid_key, int nid_cert,
   int iter, int mac_iter, int keytype);
PKCS12 *PKCS12_create_ex(const char *pass, const char *name, EVP_PKEY *pkey,
   X509 *cert, STACK_OF(X509) *ca, int nid_key, int nid_cert,
   int iter, int mac_iter, int keytype,
   OSSL_LIB_CTX *ctx, const char *propq);
PKCS12 *PKCS12_create_ex2(const char *pass, const char *name, EVP_PKEY *pkey,
   X509 *cert, STACK_OF(X509) *ca, int nid_key, int nid_cert,
   int iter, int mac_iter, int keytype,
   OSSL_LIB_CTX *ctx, const char *propq,
   PKCS12_create_cb *cb, void *cbarg);

PKCS12_SAFEBAG *PKCS12_add_cert(STACK_OF(PKCS12_SAFEBAG) **pbags, X509 *cert);
PKCS12_SAFEBAG *PKCS12_add_key(STACK_OF(PKCS12_SAFEBAG) **pbags,
```

```
   EVP_PKEY *key, int key_usage, int iter,
   int key_nid, const char *pass);
PKCS12_SAFEBAG *PKCS12_add_key_ex(STACK_OF(PKCS12_SAFEBAG) **pbags,
   EVP_PKEY *key, int key_usage, int iter,
   int key_nid, const char *pass,
    OSSL_LIB_CTX *ctx, const char *propq);

PKCS12_SAFEBAG *PKCS12_add_secret(STACK_OF(PKCS12_SAFEBAG) **pbags,
   int nid_type, const unsigned char *value, int len);
int PKCS12_add_safe(STACK_OF(PKCS7) **psafes, STACK_OF(PKCS12_SAFEBAG) *bags,
   int safe_nid, int iter, const char *pass);
int PKCS12_add_safe_ex(STACK_OF(PKCS7) **psafes, STACK_OF(PKCS12_SAFEBAG) *bags,
   int safe_nid, int iter, const char *pass,
   OSSL_LIB_CTX *ctx, const char *propq);

PKCS12 *PKCS12_add_safes(STACK_OF(PKCS7) *safes, int p7_nid);
PKCS12 *PKCS12_add_safes_ex(STACK_OF(PKCS7) *safes, int p7_nid,
   OSSL_LIB_CTX *ctx, const char *propq);

int i2d_PKCS12_bio(BIO *bp, const PKCS12 *p12);
#ifndef OPENSSL_NO_STDIO
int i2d_PKCS12_fp(FILE *fp, const PKCS12 *p12);
#endif
PKCS12 *d2i_PKCS12_bio(BIO *bp, PKCS12 **p12);
#ifndef OPENSSL_NO_STDIO
PKCS12 *d2i_PKCS12_fp(FILE *fp, PKCS12 **p12);
#endif
int PKCS12_newpass(PKCS12 *p12, const char *oldpass, const char *newpass);

#ifdef __cplusplus
}
#endif
#endif
{
 'variables': {
   'openssl_sources': [
     'openssl/crypto/aes/aes_cbc.c',
     'openssl/crypto/aes/aes_core.c',
     'openssl/crypto/aes/aes_ecb.c',
     'openssl/crypto/aes/aes_misc.c',
     'openssl/crypto/bn/bn_add.c',
     'openssl/crypto/bn/bn_asm.c',
     'openssl/crypto/bn/bn_blind.c',
     'openssl/crypto/bn/bn_const.c',
     'openssl/crypto/bn/bn_conv.c',
     'openssl/crypto/bn/bn_ctx.c',
     'openssl/crypto/bn/bn_dh.c',
     'openssl/crypto/bn/bn_div.c',
```

'openssl/crypto/bn/bn_exp.c',
'openssl/crypto/bn/bn_exp2.c',
'openssl/crypto/bn/bn_gcd.c',
'openssl/crypto/bn/bn_gf2m.c',
'openssl/crypto/bn/bn_intern.c',
'openssl/crypto/bn/bn_kron.c',
'openssl/crypto/bn/bn_lib.c',
'openssl/crypto/bn/bn_mod.c',
'openssl/crypto/bn/bn_mont.c',
'openssl/crypto/bn/bn_mpi.c',
'openssl/crypto/bn/bn_mul.c',
'openssl/crypto/bn/bn_nist.c',
'openssl/crypto/bn/bn_prime.c',
'openssl/crypto/bn/bn_rand.c',
'openssl/crypto/bn/bn_recp.c',
'openssl/crypto/bn/bn_rsa_fips186_4.c',
'openssl/crypto/bn/bn_shift.c',
'openssl/crypto/bn/bn_sqr.c',
'openssl/crypto/bn/bn_sqrt.c',
'openssl/crypto/bn/bn_word.c',
'openssl/crypto/buffer/buffer.c',
'openssl/crypto/cmac/cmac.c',
'openssl/crypto/des/des_enc.c',
'openssl/crypto/des/ecb3_enc.c',
'openssl/crypto/des/fcrypt_b.c',
'openssl/crypto/des/set_key.c',
'openssl/crypto/dh/dh_backend.c',
'openssl/crypto/dh/dh_check.c',
'openssl/crypto/dh/dh_gen.c',
'openssl/crypto/dh/dh_group_params.c',
'openssl/crypto/dh/dh_kdf.c',
'openssl/crypto/dh/dh_key.c',
'openssl/crypto/dh/dh_lib.c',
'openssl/crypto/dsa/dsa_backend.c',
'openssl/crypto/dsa/dsa_check.c',
'openssl/crypto/dsa/dsa_gen.c',
'openssl/crypto/dsa/dsa_key.c',
'openssl/crypto/dsa/dsa_lib.c',
'openssl/crypto/dsa/dsa_ossl.c',
'openssl/crypto/dsa/dsa_sign.c',
'openssl/crypto/dsa/dsa_vrf.c',
'openssl/crypto/ec/curve448/arch_32/f_impl32.c',
'openssl/crypto/ec/curve448/arch_64/f_impl64.c',
'openssl/crypto/ec/curve448/curve448.c',
'openssl/crypto/ec/curve448/curve448_tables.c',
'openssl/crypto/ec/curve448/eddsa.c',
'openssl/crypto/ec/curve448/f_generic.c',
'openssl/crypto/ec/curve448/scalar.c',

'openssl/crypto/ec/curve25519.c',
'openssl/crypto/ec/ec2_oct.c',
'openssl/crypto/ec/ec2_smpl.c',
'openssl/crypto/ec/ec_asn1.c',
'openssl/crypto/ec/ec_backend.c',
'openssl/crypto/ec/ec_check.c',
'openssl/crypto/ec/ec_curve.c',
'openssl/crypto/ec/ec_cvt.c',
'openssl/crypto/ec/ec_key.c',
'openssl/crypto/ec/ec_kmeth.c',
'openssl/crypto/ec/ec_lib.c',
'openssl/crypto/ec/ec_mult.c',
'openssl/crypto/ec/ec_oct.c',
'openssl/crypto/ec/ecdh_kdf.c',
'openssl/crypto/ec/ecdh_ossl.c',
'openssl/crypto/ec/ecdsa_ossl.c',

'openssl/crypto/ec/ecdsa_sign.c',
'openssl/crypto/ec/ecdsa_vrf.c',
'openssl/crypto/ec/ecp_mont.c',
'openssl/crypto/ec/ecp_nist.c',
'openssl/crypto/ec/ecp_oct.c',
'openssl/crypto/ec/ecp_smpl.c',
'openssl/crypto/ec/ecx_backend.c',
'openssl/crypto/ec/ecx_key.c',
'openssl/crypto/evp/asymcipher.c',
'openssl/crypto/evp/dh_support.c',
'openssl/crypto/evp/digest.c',
'openssl/crypto/evp/ec_support.c',
'openssl/crypto/evp/evp_enc.c',
'openssl/crypto/evp/evp_fetch.c',
'openssl/crypto/evp/evp_lib.c',
'openssl/crypto/evp/evp_rand.c',
'openssl/crypto/evp/evp_utils.c',
'openssl/crypto/evp/exchange.c',
'openssl/crypto/evp/kdf_lib.c',
'openssl/crypto/evp/kdf_meth.c',
'openssl/crypto/evp/kem.c',
'openssl/crypto/evp/keymgmt_lib.c',
'openssl/crypto/evp/keymgmt_meth.c',
'openssl/crypto/evp/mac_lib.c',
'openssl/crypto/evp/mac_meth.c',
'openssl/crypto/evp/p_lib.c',
'openssl/crypto/evp/pmeth_check.c',
'openssl/crypto/evp/pmeth_gn.c',
'openssl/crypto/evp/pmeth_lib.c',
'openssl/crypto/evp/s_lib.c',
'openssl/crypto/evp/signature.c',

'openssl/crypto/evp/skeymgmt_meth.c',
'openssl/crypto/ffc/ffc_backend.c',
'openssl/crypto/ffc/ffc_dh.c',
'openssl/crypto/ffc/ffc_key_generate.c',
'openssl/crypto/ffc/ffc_key_validate.c',
'openssl/crypto/ffc/ffc_params.c',
'openssl/crypto/ffc/ffc_params_generate.c',
'openssl/crypto/ffc/ffc_params_validate.c',
'openssl/crypto/hashtable/hashfunc.c',
'openssl/crypto/hashtable/hashtable.c',
'openssl/crypto/hmac/hmac.c',
'openssl/crypto/lhash/lhash.c',
'openssl/crypto/asn1_dsa.c',
'openssl/crypto/bsearch.c',
'openssl/crypto/context.c',
'openssl/crypto/core_algorithm.c',
'openssl/crypto/core_fetch.c',
'openssl/crypto/core_namemap.c',
'openssl/crypto/cpuid.c',
'openssl/crypto/cryptlib.c',
'openssl/crypto/ctype.c',
'openssl/crypto/der_writer.c',
'openssl/crypto/ex_data.c',
'openssl/crypto/initthread.c',
'openssl/crypto/mem_clr.c',
'openssl/crypto/o_str.c',
'openssl/crypto/packet.c',
'openssl/crypto/param_build.c',
'openssl/crypto/param_build_set.c',
'openssl/crypto/params.c',
'openssl/crypto/params_dup.c',
'openssl/crypto/params_from_text.c',
'openssl/crypto/provider_core.c',
'openssl/crypto/provider_predefined.c',
'openssl/crypto/self_test_core.c',
'openssl/crypto/sparse_array.c',
'openssl/crypto/threads_lib.c',
'openssl/crypto/threads_none.c',
'openssl/crypto/threads_pthread.c',
'openssl/crypto/threads_win.c',
'openssl/crypto/time.c',
'openssl/crypto/ml_dsa/ml_dsa_encoders.c',
'openssl/crypto/ml_dsa/ml_dsa_key.c',
'openssl/crypto/ml_dsa/ml_dsa_key_compress.c',
'openssl/crypto/ml_dsa/ml_dsa_matrix.c',
'openssl/crypto/ml_dsa/ml_dsa_ntt.c',
'openssl/crypto/ml_dsa/ml_dsa_params.c',
'openssl/crypto/ml_dsa/ml_dsa_sample.c',

'openssl/crypto/ml_dsa/ml_dsa_sign.c',
'openssl/crypto/ml_kem/ml_kem.c',
'openssl/crypto/modes/cbc128.c',
'openssl/crypto/modes/ccm128.c',
'openssl/crypto/modes/cfb128.c',
'openssl/crypto/modes/ctr128.c',
'openssl/crypto/modes/gcm128.c',
'openssl/crypto/modes/ofb128.c',
'openssl/crypto/modes/wrap128.c',
'openssl/crypto/modes/xts128.c',
'openssl/crypto/modes/xts128gb.c',
'openssl/crypto/property/defn_cache.c',
'openssl/crypto/property/property.c',
'openssl/crypto/property/property_parse.c',
'openssl/crypto/property/property_query.c',
'openssl/crypto/property/property_string.c',
'openssl/crypto/rand/rand_lib.c',
'openssl/crypto/rsa/rsa_acvp_test_params.c',
'openssl/crypto/rsa/rsa_backend.c',
'openssl/crypto/rsa/rsa_chk.c',
'openssl/crypto/rsa/rsa_crpt.c',
'openssl/crypto/rsa/rsa_gen.c',
'openssl/crypto/rsa/rsa_lib.c',
'openssl/crypto/rsa/rsa_mp_names.c',
'openssl/crypto/rsa/rsa_none.c',
'openssl/crypto/rsa/rsa_oaep.c',
'openssl/crypto/rsa/rsa_ossl.c',
'openssl/crypto/rsa/rsa_pk1.c',
'openssl/crypto/rsa/rsa_pss.c',
'openssl/crypto/rsa/rsa_schemes.c',
'openssl/crypto/rsa/rsa_sign.c',
'openssl/crypto/rsa/rsa_sp800_56b_check.c',
'openssl/crypto/rsa/rsa_sp800_56b_gen.c',
'openssl/crypto/rsa/rsa_x931.c',
'openssl/crypto/sha/keccak1600.c',
'openssl/crypto/sha/sha1dgst.c',
'openssl/crypto/sha/sha256.c',
'openssl/crypto/sha/sha3.c',
'openssl/crypto/sha/sha512.c',
'openssl/crypto/slh_dsa/slh_adrs.c',
'openssl/crypto/slh_dsa/slh_dsa.c',
'openssl/crypto/slh_dsa/slh_dsa_hash_ctx.c',
'openssl/crypto/slh_dsa/slh_dsa_key.c',
'openssl/crypto/slh_dsa/slh_fors.c',
'openssl/crypto/slh_dsa/slh_hash.c',
'openssl/crypto/slh_dsa/slh_hypertree.c',
'openssl/crypto/slh_dsa/slh_params.c',
'openssl/crypto/slh_dsa/slh_wots.c',

'openssl/crypto/slh_dsa/slh_xmss.c',
'openssl/crypto/stack/stack.c',
'openssl/crypto/thread/arch/thread_none.c',
'openssl/crypto/thread/arch/thread_posix.c',
'openssl/crypto/thread/arch/thread_win.c',
'openssl/crypto/thread/api.c',
'openssl/crypto/thread/arch.c',
'openssl/crypto/thread/internal.c',
'openssl/providers/common/der/der_rsa_sig.c',
'openssl/providers/common/bio_prov.c',
'openssl/providers/common/capabilities.c',
'openssl/providers/common/digest_to_nid.c',
'openssl/providers/common/provider_seeding.c',
'openssl/providers/common/provider_util.c',
'openssl/providers/common/securitycheck.c',
'openssl/providers/common/securitycheck_fips.c',
'openssl/providers/fips/fipsindicator.c',
'openssl/providers/fips/fipsprov.c',
'openssl/providers/fips/self_test.c',
'openssl/providers/fips/self_test_kats.c',
'openssl/providers/implementations/asymciphers/rsa_enc.c',
'openssl/providers/implementations/ciphers/cipher_aes.c',
'openssl/providers/implementations/ciphers/cipher_aes_cbc_hmac_sha.c',
'openssl/providers/implementations/ciphers/cipher_aes_cbc_hmac_sha1_hw.c',
'openssl/providers/implementations/ciphers/cipher_aes_cbc_hmac_sha256_hw.c',
'openssl/providers/implementations/ciphers/cipher_aes_ccm.c',
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'openssl/providers/implementations/ciphers/cipher_aes_gcm_hw.c',
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'openssl/providers/implementations/ciphers/cipher_aes_ocb.c',
'openssl/providers/implementations/ciphers/cipher_aes_ocb_hw.c',
'openssl/providers/implementations/ciphers/cipher_aes_wrp.c',
'openssl/providers/implementations/ciphers/cipher_aes_xts.c',
'openssl/providers/implementations/ciphers/cipher_aes_xts_fips.c',
'openssl/providers/implementations/ciphers/cipher_aes_xts_hw.c',
'openssl/providers/implementations/ciphers/cipher_cts.c',
'openssl/providers/implementations/ciphers/cipher_tdes.c',
'openssl/providers/implementations/ciphers/cipher_tdes_common.c',
'openssl/providers/implementations/ciphers/cipher_tdes_hw.c',
'openssl/providers/implementations/digests/sha2_prov.c',
'openssl/providers/implementations/digests/sha3_prov.c',
'openssl/providers/implementations/exchange/dh_exch.c',
'openssl/providers/implementations/exchange/ecdh_exch.c',
'openssl/providers/implementations/exchange/ecx_exch.c',
'openssl/providers/implementations/exchange/kdf_exch.c',
'openssl/providers/implementations/kdfs/hkdf.c',
'openssl/providers/implementations/kdfs/kbkdf.c',

'openssl/providers/implementations/kdfs/pbkdf2.c',
'openssl/providers/implementations/kdfs/pbkdf2_fips.c',
'openssl/providers/implementations/kdfs/sshkdf.c',
'openssl/providers/implementations/kdfs/sskdf.c',
'openssl/providers/implementations/kdfs/tls1_prf.c',
'openssl/providers/implementations/kdfs/x942kdf.c',
'openssl/providers/implementations/kem/ml_kem_kem.c',
'openssl/providers/implementations/kem/mlx_kem.c',
'openssl/providers/implementations/kem/rsa_kem.c',
'openssl/providers/implementations/keymgmt/dh_kmgmt.c',
'openssl/providers/implementations/keymgmt/dsa_kmgmt.c',
'openssl/providers/implementations/keymgmt/ec_kmgmt.c',
'openssl/providers/implementations/keymgmt/ecx_kmgmt.c',
'openssl/providers/implementations/keymgmt/kdf_legacy_kmgmt.c',
'openssl/providers/implementations/keymgmt/mac_legacy_kmgmt.c',
'openssl/providers/implementations/keymgmt/ml_dsa_kmgmt.c',
'openssl/providers/implementations/keymgmt/ml_kem_kmgmt.c',
'openssl/providers/implementations/keymgmt/mlx_kmgmt.c',
'openssl/providers/implementations/keymgmt/rsa_kmgmt.c',
'openssl/providers/implementations/keymgmt/slh_dsa_kmgmt.c',
'openssl/providers/implementations/macs/cmac_prov.c',
'openssl/providers/implementations/macs/gmac_prov.c',
'openssl/providers/implementations/macs/hmac_prov.c',
'openssl/providers/implementations/macs/kmac_prov.c',
'openssl/providers/implementations/rands/drbg.c',
'openssl/providers/implementations/rands/drbg_ctr.c',
'openssl/providers/implementations/rands/drbg_hash.c',
'openssl/providers/implementations/rands/drbg_hmac.c',
'openssl/providers/implementations/rands/fips_crng_test.c',
'openssl/providers/implementations/rands/test_rng.c',
'openssl/providers/implementations/signature/dsa_sig.c',
'openssl/providers/implementations/signature/ecdsa_sig.c',
'openssl/providers/implementations/signature/eddsa_sig.c',
'openssl/providers/implementations/signature/mac_legacy_sig.c',
'openssl/providers/implementations/signature/ml_dsa_sig.c',
'openssl/providers/implementations/signature/rsa_sig.c',
'openssl/providers/implementations/signature/slh_dsa_sig.c',
'openssl/providers/implementations/skeymgmt/aes_skmgmt.c',
'openssl/providers/implementations/skeymgmt/generic.c',
'openssl/ssl/record/methods/ssl3_cbc.c',
'openssl/providers/common/der/der_dsa_key.c',
'openssl/providers/common/der/der_dsa_sig.c',
'openssl/providers/common/der/der_ec_key.c',
'openssl/providers/common/der/der_ec_sig.c',
'openssl/providers/common/der/der_ecx_key.c',
'openssl/providers/common/der/der_ml_dsa_key.c',
'openssl/providers/common/der/der_rsa_key.c',
'openssl/providers/common/der/der_slh_dsa_key.c',

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    'openssl/providers/common/provider_ctx.c',
    'openssl/providers/common/provider_err.c',
    'openssl/providers/implementations/ciphers/ciphercommon.c',
     'openssl/providers/implementations/ciphers/ciphercommon_block.c',
    'openssl/providers/implementations/ciphers/ciphercommon_ccm.c',
    'openssl/providers/implementations/ciphers/ciphercommon_ccm_hw.c',
    'openssl/providers/implementations/ciphers/ciphercommon_gcm.c',
    'openssl/providers/implementations/ciphers/ciphercommon_gcm_hw.c',
    'openssl/providers/implementations/ciphers/ciphercommon_hw.c',
    'openssl/providers/implementations/digests/digestcommon.c',
    'openssl/ssl/record/methods/tls_pad.c',
    'openssl/providers/fips/fips_entry.c',

  ],
  'openssl_sources_BSD-x86_64': [
    './config/archs/BSD-x86_64/no-asm/crypto/params_idx.c',
    './config/archs/BSD-x86_64/no-asm/providers/common/der/der_sm2_gen.c',
    './config/archs/BSD-x86_64/no-asm/providers/common/der/der_digests_gen.c',
    './config/archs/BSD-x86_64/no-asm/providers/common/der/der_dsa_gen.c',
    './config/archs/BSD-x86_64/no-asm/providers/common/der/der_ec_gen.c',
     './config/archs/BSD-x86_64/no-asm/providers/common/der/der_ecx_gen.c',
    './config/archs/BSD-x86_64/no-asm/providers/common/der/der_ml_dsa_gen.c',
    './config/archs/BSD-x86_64/no-asm/providers/common/der/der_rsa_gen.c',
    './config/archs/BSD-x86_64/no-asm/providers/common/der/der_slh_dsa_gen.c',
    './config/archs/BSD-x86_64/no-asm/providers/common/der/der_wrap_gen.c',
    './config/archs/BSD-x86_64/no-asm/providers/legacy.ld',
    './config/archs/BSD-x86_64/no-asm/providers/fips.ld',

  ],
  'openssl_defines_BSD-x86_64': [
    'NDEBUG',
    'L_ENDIAN',
    'OPENSSL_BUILDING_OPENSSL',
    'FIPS_MODULE',
    'FIPS_MODULE',
  ],
  'openssl_cflags_BSD-x86_64': [
    '-Wall -O3',
    '-pthread',
    '-Wall -O3',
  ],
  'openssl_ex_libs_BSD-x86_64': [
    '-pthread',
  ],
  'linker_script': ''
},
'include_dirs': [
  '.',
```

```
  './include',
  './crypto',
  './crypto/include/internal',
  './providers/common/include',
 ],
 'defines': ['<@(openssl_defines_BSD-x86_64)'],
 'cflags': ['<@(openssl_cflags_BSD-x86_64)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86_64)'],

 'sources': ['<@(openssl_sources)', '<@(openssl_sources_BSD-x86_64)'],
 'direct_dependent_settings': {
  'include_dirs': ['./include', '.'],
  'defines': ['<@(openssl_defines_BSD-x86_64)'],
 },
}
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/cms.h.in
```

```
*
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* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_CMS_H
#define OPENSSL_CMS_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_CMS_H
#endif

#include <openssl/opensslconf.h>

#ifndef OPENSSL_NO_CMS
#include <openssl/x509.h>
#include <openssl/x509v3.h>
#include <openssl/cmserr.h>
#ifdef __cplusplus
extern "C" {
#endif

typedef struct CMS_EnvelopedData_st CMS_EnvelopedData;
typedef struct CMS_ContentInfo_st CMS_ContentInfo;
typedef struct CMS_SignerInfo_st CMS_SignerInfo;
typedef struct CMS_SignedData_st CMS_SignedData;
typedef
 struct CMS_CertificateChoices CMS_CertificateChoices;
typedef struct CMS_RevocationInfoChoice_st CMS_RevocationInfoChoice;
typedef struct CMS_RecipientInfo_st CMS_RecipientInfo;
typedef struct CMS_ReceiptRequest_st CMS_ReceiptRequest;
typedef struct CMS_Receipt_st CMS_Receipt;
typedef struct CMS_RecipientEncryptedKey_st CMS_RecipientEncryptedKey;
typedef struct CMS_OtherKeyAttribute_st CMS_OtherKeyAttribute;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(CMS_SignerInfo, CMS_SignerInfo, CMS_SignerInfo)
#define sk_CMS_SignerInfo_num(sk) OPENSSL_sk_num(ossl_check_const_CMS_SignerInfo_sk_type(sk))
```

```
#define sk_CMS_SignerInfo_value(sk, idx) ((CMS_SignerInfo
*)OPENSSL_sk_value(ossl_check_const_CMS_SignerInfo_sk_type(sk), (idx)))
#define sk_CMS_SignerInfo_new(cmp) ((STACK_OF(CMS_SignerInfo)
*)OPENSSL_sk_new(ossl_check_CMS_SignerInfo_compfunc_type(cmp)))
#define sk_CMS_SignerInfo_new_null() ((STACK_OF(CMS_SignerInfo) *)OPENSSL_sk_new_null())
#define sk_CMS_SignerInfo_new_reserve(cmp,
 n) ((STACK_OF(CMS_SignerInfo)
*)OPENSSL_sk_new_reserve(ossl_check_CMS_SignerInfo_compfunc_type(cmp), (n)))
#define sk_CMS_SignerInfo_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_CMS_SignerInfo_sk_type(sk), (n))
#define sk_CMS_SignerInfo_free(sk) OPENSSL_sk_free(ossl_check_CMS_SignerInfo_sk_type(sk))
#define sk_CMS_SignerInfo_zero(sk) OPENSSL_sk_zero(ossl_check_CMS_SignerInfo_sk_type(sk))
#define sk_CMS_SignerInfo_delete(sk, i) ((CMS_SignerInfo
*)OPENSSL_sk_delete(ossl_check_CMS_SignerInfo_sk_type(sk), (i)))
#define sk_CMS_SignerInfo_delete_ptr(sk, ptr) ((CMS_SignerInfo
*)OPENSSL_sk_delete_ptr(ossl_check_CMS_SignerInfo_sk_type(sk), ossl_check_CMS_SignerInfo_type(ptr)))
#define sk_CMS_SignerInfo_push(sk, ptr) OPENSSL_sk_push(ossl_check_CMS_SignerInfo_sk_type(sk),
ossl_check_CMS_SignerInfo_type(ptr))
#define sk_CMS_SignerInfo_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_CMS_SignerInfo_sk_type(sk),
ossl_check_CMS_SignerInfo_type(ptr))
#define sk_CMS_SignerInfo_pop(sk) ((CMS_SignerInfo
*)OPENSSL_sk_pop(ossl_check_CMS_SignerInfo_sk_type(sk)))
#define
 sk_CMS_SignerInfo_shift(sk) ((CMS_SignerInfo
*)OPENSSL_sk_shift(ossl_check_CMS_SignerInfo_sk_type(sk)))
#define sk_CMS_SignerInfo_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_CMS_SignerInfo_sk_type(sk),ossl_check_CMS_SignerInfo_freefunc_type(fre
efunc))
#define sk_CMS_SignerInfo_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_CMS_SignerInfo_sk_type(sk),
ossl_check_CMS_SignerInfo_type(ptr), (idx))
#define sk_CMS_SignerInfo_set(sk, idx, ptr) ((CMS_SignerInfo
*)OPENSSL_sk_set(ossl_check_CMS_SignerInfo_sk_type(sk), (idx), ossl_check_CMS_SignerInfo_type(ptr)))
#define sk_CMS_SignerInfo_find(sk, ptr) OPENSSL_sk_find(ossl_check_CMS_SignerInfo_sk_type(sk),
ossl_check_CMS_SignerInfo_type(ptr))
#define sk_CMS_SignerInfo_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_CMS_SignerInfo_sk_type(sk),
ossl_check_CMS_SignerInfo_type(ptr))
#define sk_CMS_SignerInfo_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_CMS_SignerInfo_sk_type(sk),
 ossl_check_CMS_SignerInfo_type(ptr), pnum)
#define sk_CMS_SignerInfo_sort(sk) OPENSSL_sk_sort(ossl_check_CMS_SignerInfo_sk_type(sk))
#define sk_CMS_SignerInfo_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_CMS_SignerInfo_sk_type(sk))
#define sk_CMS_SignerInfo_dup(sk) ((STACK_OF(CMS_SignerInfo)
*)OPENSSL_sk_dup(ossl_check_const_CMS_SignerInfo_sk_type(sk)))
#define sk_CMS_SignerInfo_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(CMS_SignerInfo)
*)OPENSSL_sk_deep_copy(ossl_check_const_CMS_SignerInfo_sk_type(sk),
ossl_check_CMS_SignerInfo_copyfunc_type(copyfunc), ossl_check_CMS_SignerInfo_freefunc_type(freefunc)))
#define sk_CMS_SignerInfo_set_cmp_func(sk, cmp)
((sk_CMS_SignerInfo_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_CMS_SignerInfo_sk_type(sk),
```

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ossl_check_CMS_SignerInfo_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(CMS_RecipientEncryptedKey, CMS_RecipientEncryptedKey,
CMS_RecipientEncryptedKey)
#define sk_CMS_RecipientEncryptedKey_num(sk)
OPENSSL_sk_num(ossl_check_const_CMS_RecipientEncryptedKey_sk_type(sk))
#define
 sk_CMS_RecipientEncryptedKey_value(sk, idx) ((CMS_RecipientEncryptedKey
*)OPENSSL_sk_value(ossl_check_const_CMS_RecipientEncryptedKey_sk_type(sk), (idx)))
#define sk_CMS_RecipientEncryptedKey_new(cmp) ((STACK_OF(CMS_RecipientEncryptedKey)
*)OPENSSL_sk_new(ossl_check_CMS_RecipientEncryptedKey_compfunc_type(cmp)))
#define sk_CMS_RecipientEncryptedKey_new_null() ((STACK_OF(CMS_RecipientEncryptedKey)
*)OPENSSL_sk_new_null())
#define sk_CMS_RecipientEncryptedKey_new_reserve(cmp, n) ((STACK_OF(CMS_RecipientEncryptedKey)
*)OPENSSL_sk_new_reserve(ossl_check_CMS_RecipientEncryptedKey_compfunc_type(cmp), (n)))
#define sk_CMS_RecipientEncryptedKey_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk), (n))
#define sk_CMS_RecipientEncryptedKey_free(sk)
OPENSSL_sk_free(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk))
#define sk_CMS_RecipientEncryptedKey_zero(sk)
OPENSSL_sk_zero(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk))
#define
 sk_CMS_RecipientEncryptedKey_delete(sk, i) ((CMS_RecipientEncryptedKey
*)OPENSSL_sk_delete(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk), (i)))
#define sk_CMS_RecipientEncryptedKey_delete_ptr(sk, ptr) ((CMS_RecipientEncryptedKey
*)OPENSSL_sk_delete_ptr(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk),
ossl_check_CMS_RecipientEncryptedKey_type(ptr)))
#define sk_CMS_RecipientEncryptedKey_push(sk, ptr)
OPENSSL_sk_push(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk),
ossl_check_CMS_RecipientEncryptedKey_type(ptr))
#define sk_CMS_RecipientEncryptedKey_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk),
ossl_check_CMS_RecipientEncryptedKey_type(ptr))
#define sk_CMS_RecipientEncryptedKey_pop(sk) ((CMS_RecipientEncryptedKey
*)OPENSSL_sk_pop(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk)))
#define sk_CMS_RecipientEncryptedKey_shift(sk) ((CMS_RecipientEncryptedKey
*)OPENSSL_sk_shift(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk)))
#define
 sk_CMS_RecipientEncryptedKey_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk),ossl_check_CMS_RecipientEncry
ptedKey_freefunc_type(freefunc))
#define sk_CMS_RecipientEncryptedKey_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk),
ossl_check_CMS_RecipientEncryptedKey_type(ptr), (idx))
#define sk_CMS_RecipientEncryptedKey_set(sk, idx, ptr) ((CMS_RecipientEncryptedKey
*)OPENSSL_sk_set(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk), (idx),
ossl_check_CMS_RecipientEncryptedKey_type(ptr)))
#define sk_CMS_RecipientEncryptedKey_find(sk, ptr)
OPENSSL_sk_find(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk),
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ossl_check_CMS_RecipientEncryptedKey_type(ptr))
#define sk_CMS_RecipientEncryptedKey_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk),
ossl_check_CMS_RecipientEncryptedKey_type(ptr))
#define sk_CMS_RecipientEncryptedKey_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk),
 ossl_check_CMS_RecipientEncryptedKey_type(ptr), pnum)
#define sk_CMS_RecipientEncryptedKey_sort(sk)
OPENSSL_sk_sort(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk))
#define sk_CMS_RecipientEncryptedKey_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_CMS_RecipientEncryptedKey_sk_type(sk))
#define sk_CMS_RecipientEncryptedKey_dup(sk) ((STACK_OF(CMS_RecipientEncryptedKey)
*)OPENSSL_sk_dup(ossl_check_const_CMS_RecipientEncryptedKey_sk_type(sk)))
#define sk_CMS_RecipientEncryptedKey_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(CMS_RecipientEncryptedKey)
*)OPENSSL_sk_deep_copy(ossl_check_const_CMS_RecipientEncryptedKey_sk_type(sk),
ossl_check_CMS_RecipientEncryptedKey_copyfunc_type(copyfunc),
ossl_check_CMS_RecipientEncryptedKey_freefunc_type(freefunc)))
#define sk_CMS_RecipientEncryptedKey_set_cmp_func(sk, cmp)
((sk_CMS_RecipientEncryptedKey_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_CMS_RecipientEncrypted
Key_sk_type(sk), ossl_check_CMS_RecipientEncryptedKey_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(CMS_RecipientInfo,
 CMS_RecipientInfo, CMS_RecipientInfo)
#define sk_CMS_RecipientInfo_num(sk) OPENSSL_sk_num(ossl_check_const_CMS_RecipientInfo_sk_type(sk))
#define sk_CMS_RecipientInfo_value(sk, idx) ((CMS_RecipientInfo
*)OPENSSL_sk_value(ossl_check_const_CMS_RecipientInfo_sk_type(sk), (idx)))
#define sk_CMS_RecipientInfo_new(cmp) ((STACK_OF(CMS_RecipientInfo)
*)OPENSSL_sk_new(ossl_check_CMS_RecipientInfo_compfunc_type(cmp)))
#define sk_CMS_RecipientInfo_new_null() ((STACK_OF(CMS_RecipientInfo) *)OPENSSL_sk_new_null())
#define sk_CMS_RecipientInfo_new_reserve(cmp, n) ((STACK_OF(CMS_RecipientInfo)
*)OPENSSL_sk_new_reserve(ossl_check_CMS_RecipientInfo_compfunc_type(cmp), (n)))
#define sk_CMS_RecipientInfo_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_CMS_RecipientInfo_sk_type(sk),
(n))
#define sk_CMS_RecipientInfo_free(sk) OPENSSL_sk_free(ossl_check_CMS_RecipientInfo_sk_type(sk))
#define sk_CMS_RecipientInfo_zero(sk) OPENSSL_sk_zero(ossl_check_CMS_RecipientInfo_sk_type(sk))
#define
 sk_CMS_RecipientInfo_delete(sk, i) ((CMS_RecipientInfo
*)OPENSSL_sk_delete(ossl_check_CMS_RecipientInfo_sk_type(sk), (i)))
#define sk_CMS_RecipientInfo_delete_ptr(sk, ptr) ((CMS_RecipientInfo
*)OPENSSL_sk_delete_ptr(ossl_check_CMS_RecipientInfo_sk_type(sk),
ossl_check_CMS_RecipientInfo_type(ptr)))
#define sk_CMS_RecipientInfo_push(sk, ptr) OPENSSL_sk_push(ossl_check_CMS_RecipientInfo_sk_type(sk),
ossl_check_CMS_RecipientInfo_type(ptr))
#define sk_CMS_RecipientInfo_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_CMS_RecipientInfo_sk_type(sk), ossl_check_CMS_RecipientInfo_type(ptr))
#define sk_CMS_RecipientInfo_pop(sk) ((CMS_RecipientInfo
*)OPENSSL_sk_pop(ossl_check_CMS_RecipientInfo_sk_type(sk)))
#define sk_CMS_RecipientInfo_shift(sk) ((CMS_RecipientInfo
```

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*)OPENSSL_sk_shift(ossl_check_CMS_RecipientInfo_sk_type(sk)))
#define sk_CMS_RecipientInfo_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_CMS_RecipientInfo_sk_type(sk),ossl_check_CMS_RecipientInfo_freefunc_ty
pe(freefunc))
#define
 sk_CMS_RecipientInfo_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_CMS_RecipientInfo_sk_type(sk),
ossl_check_CMS_RecipientInfo_type(ptr), (idx))
#define sk_CMS_RecipientInfo_set(sk, idx, ptr) ((CMS_RecipientInfo
*)OPENSSL_sk_set(ossl_check_CMS_RecipientInfo_sk_type(sk), (idx),
ossl_check_CMS_RecipientInfo_type(ptr)))
#define sk_CMS_RecipientInfo_find(sk, ptr) OPENSSL_sk_find(ossl_check_CMS_RecipientInfo_sk_type(sk),
ossl_check_CMS_RecipientInfo_type(ptr))
#define sk_CMS_RecipientInfo_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_CMS_RecipientInfo_sk_type(sk), ossl_check_CMS_RecipientInfo_type(ptr))
#define sk_CMS_RecipientInfo_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_CMS_RecipientInfo_sk_type(sk), ossl_check_CMS_RecipientInfo_type(ptr),
pnum)
#define sk_CMS_RecipientInfo_sort(sk) OPENSSL_sk_sort(ossl_check_CMS_RecipientInfo_sk_type(sk))
#define sk_CMS_RecipientInfo_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_CMS_RecipientInfo_sk_type(sk))
#define
 sk_CMS_RecipientInfo_dup(sk) ((STACK_OF(CMS_RecipientInfo)
*)OPENSSL_sk_dup(ossl_check_const_CMS_RecipientInfo_sk_type(sk)))
#define sk_CMS_RecipientInfo_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(CMS_RecipientInfo)
*)OPENSSL_sk_deep_copy(ossl_check_const_CMS_RecipientInfo_sk_type(sk),
ossl_check_CMS_RecipientInfo_copyfunc_type(copyfunc),
ossl_check_CMS_RecipientInfo_freefunc_type(freefunc)))
#define sk_CMS_RecipientInfo_set_cmp_func(sk, cmp)
((sk_CMS_RecipientInfo_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_CMS_RecipientInfo_sk_type(sk),
ossl_check_CMS_RecipientInfo_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(CMS_RevocationInfoChoice, CMS_RevocationInfoChoice,
CMS_RevocationInfoChoice)
#define sk_CMS_RevocationInfoChoice_num(sk)
OPENSSL_sk_num(ossl_check_const_CMS_RevocationInfoChoice_sk_type(sk))
#define sk_CMS_RevocationInfoChoice_value(sk, idx) ((CMS_RevocationInfoChoice
*)OPENSSL_sk_value(ossl_check_const_CMS_RevocationInfoChoice_sk_type(sk),
 (idx)))
#define sk_CMS_RevocationInfoChoice_new(cmp) ((STACK_OF(CMS_RevocationInfoChoice)
*)OPENSSL_sk_new(ossl_check_CMS_RevocationInfoChoice_compfunc_type(cmp)))
#define sk_CMS_RevocationInfoChoice_new_null() ((STACK_OF(CMS_RevocationInfoChoice)
*)OPENSSL_sk_new_null())
#define sk_CMS_RevocationInfoChoice_new_reserve(cmp, n) ((STACK_OF(CMS_RevocationInfoChoice)
*)OPENSSL_sk_new_reserve(ossl_check_CMS_RevocationInfoChoice_compfunc_type(cmp), (n)))
#define sk_CMS_RevocationInfoChoice_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_CMS_RevocationInfoChoice_sk_type(sk), (n))
#define sk_CMS_RevocationInfoChoice_free(sk)
OPENSSL_sk_free(ossl_check_CMS_RevocationInfoChoice_sk_type(sk))
#define sk_CMS_RevocationInfoChoice_zero(sk)
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OPENSSL_sk_zero(ossl_check_CMS_RevocationInfoChoice_sk_type(sk))
#define sk_CMS_RevocationInfoChoice_delete(sk, i) ((CMS_RevocationInfoChoice
*)OPENSSL_sk_delete(ossl_check_CMS_RevocationInfoChoice_sk_type(sk), (i)))
#define sk_CMS_RevocationInfoChoice_delete_ptr(sk,
 ptr) ((CMS_RevocationInfoChoice
*)OPENSSL_sk_delete_ptr(ossl_check_CMS_RevocationInfoChoice_sk_type(sk),
ossl_check_CMS_RevocationInfoChoice_type(ptr)))
#define sk_CMS_RevocationInfoChoice_push(sk, ptr)
OPENSSL_sk_push(ossl_check_CMS_RevocationInfoChoice_sk_type(sk),
ossl_check_CMS_RevocationInfoChoice_type(ptr))
#define sk_CMS_RevocationInfoChoice_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_CMS_RevocationInfoChoice_sk_type(sk),
ossl_check_CMS_RevocationInfoChoice_type(ptr))
#define sk_CMS_RevocationInfoChoice_pop(sk) ((CMS_RevocationInfoChoice
*)OPENSSL_sk_pop(ossl_check_CMS_RevocationInfoChoice_sk_type(sk)))
#define sk_CMS_RevocationInfoChoice_shift(sk) ((CMS_RevocationInfoChoice
*)OPENSSL_sk_shift(ossl_check_CMS_RevocationInfoChoice_sk_type(sk)))
#define sk_CMS_RevocationInfoChoice_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_CMS_RevocationInfoChoice_sk_type(sk),ossl_check_CMS_RevocationInfoC
hoice_freefunc_type(freefunc))
#define sk_CMS_RevocationInfoChoice_insert(sk,
 ptr, idx) OPENSSL_sk_insert(ossl_check_CMS_RevocationInfoChoice_sk_type(sk),
ossl_check_CMS_RevocationInfoChoice_type(ptr), (idx))
#define sk_CMS_RevocationInfoChoice_set(sk, idx, ptr) ((CMS_RevocationInfoChoice
*)OPENSSL_sk_set(ossl_check_CMS_RevocationInfoChoice_sk_type(sk), (idx),
ossl_check_CMS_RevocationInfoChoice_type(ptr)))
#define sk_CMS_RevocationInfoChoice_find(sk, ptr)
OPENSSL_sk_find(ossl_check_CMS_RevocationInfoChoice_sk_type(sk),
ossl_check_CMS_RevocationInfoChoice_type(ptr))
#define sk_CMS_RevocationInfoChoice_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_CMS_RevocationInfoChoice_sk_type(sk),
ossl_check_CMS_RevocationInfoChoice_type(ptr))
#define sk_CMS_RevocationInfoChoice_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_CMS_RevocationInfoChoice_sk_type(sk),
ossl_check_CMS_RevocationInfoChoice_type(ptr), pnum)
#define sk_CMS_RevocationInfoChoice_sort(sk)
OPENSSL_sk_sort(ossl_check_CMS_RevocationInfoChoice_sk_type(sk))
#define sk_CMS_RevocationInfoChoice_is_sorted(sk)
 OPENSSL_sk_is_sorted(ossl_check_const_CMS_RevocationInfoChoice_sk_type(sk))
#define sk_CMS_RevocationInfoChoice_dup(sk) ((STACK_OF(CMS_RevocationInfoChoice)
*)OPENSSL_sk_dup(ossl_check_const_CMS_RevocationInfoChoice_sk_type(sk)))
#define sk_CMS_RevocationInfoChoice_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(CMS_RevocationInfoChoice)
*)OPENSSL_sk_deep_copy(ossl_check_const_CMS_RevocationInfoChoice_sk_type(sk),
ossl_check_CMS_RevocationInfoChoice_copyfunc_type(copyfunc),
ossl_check_CMS_RevocationInfoChoice_freefunc_type(freefunc)))
#define sk_CMS_RevocationInfoChoice_set_cmp_func(sk, cmp)
((sk_CMS_RevocationInfoChoice_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_CMS_RevocationInfoChoi
```

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ce_sk_type(sk), ossl_check_CMS_RevocationInfoChoice_compfunc_type(cmp)))

/* clang-format on */

DECLARE_ASN1_ITEM(CMS_EnvelopedData)
DECLARE_ASN1_ALLOC_FUNCTIONS(CMS_SignedData)
DECLARE_ASN1_FUNCTIONS(CMS_ContentInfo)
DECLARE_ASN1_FUNCTIONS(CMS_ReceiptRequest)
DECLARE_ASN1_PRINT_FUNCTION(CMS_ContentInfo)

DECLARE_ASN1_DUP_FUNCTION(CMS_EnvelopedData)

CMS_ContentInfo
 *CMS_ContentInfo_new_ex(OSSL_LIB_CTX *libctx, const char *propq);

#define CMS_SIGNERINFO_ISSUER_SERIAL 0
#define CMS_SIGNERINFO_KEYIDENTIFIER 1

#define CMS_RECIPINFO_NONE -1
#define CMS_RECIPINFO_TRANS 0
#define CMS_RECIPINFO_AGREE 1
#define CMS_RECIPINFO_KEK 2
#define CMS_RECIPINFO_PASS 3
#define CMS_RECIPINFO_OTHER 4

/* S/MIME related flags */

#define CMS_TEXT 0x1
#define CMS_NOCERTS 0x2
#define CMS_NO_CONTENT_VERIFY 0x4
#define CMS_NO_ATTR_VERIFY 0x8
#define CMS_NOSIGS \
   (CMS_NO_CONTENT_VERIFY | CMS_NO_ATTR_VERIFY)
#define CMS_NOINTERN 0x10
#define CMS_NO_SIGNER_CERT_VERIFY 0x20
#define CMS_NOVERIFY 0x20
#define CMS_DETACHED 0x40
#define CMS_BINARY 0x80
#define CMS_NOATTR 0x100
#define CMS_NOSMIMECAP 0x200
#define CMS_NOOLDMIMETYPE 0x400
#define CMS_CRLFEOL 0x800
#define CMS_STREAM 0x1000
#define CMS_NOCRL 0x2000
#define CMS_PARTIAL 0x4000
#define CMS_REUSE_DIGEST 0x8000
#define CMS_USE_KEYID
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 0x10000
#define CMS_DEBUG_DECRYPT 0x20000
#define CMS_KEY_PARAM 0x40000
#define CMS_ASCIICRLF 0x80000
#define CMS_CADES 0x100000
#define CMS_USE_ORIGINATOR_KEYID 0x200000
#define CMS_NO_SIGNING_TIME 0x400000

const ASN1_OBJECT *CMS_get0_type(const CMS_ContentInfo *cms);

BIO *CMS_dataInit(CMS_ContentInfo *cms, BIO *icont);
int CMS_dataFinal(CMS_ContentInfo *cms, BIO *bio);

ASN1_OCTET_STRING **CMS_get0_content(CMS_ContentInfo *cms);
int CMS_is_detached(CMS_ContentInfo *cms);
int CMS_set_detached(CMS_ContentInfo *cms, int detached);

#ifdef OPENSSL_PEM_H
DECLARE_PEM_rw(CMS, CMS_ContentInfo)
#endif
int CMS_stream(unsigned char ***boundary, CMS_ContentInfo *cms);
CMS_ContentInfo *d2i_CMS_bio(BIO *bp, CMS_ContentInfo **cms);
int i2d_CMS_bio(BIO *bp, CMS_ContentInfo *cms);

BIO *BIO_new_CMS(BIO *out, CMS_ContentInfo *cms);
int i2d_CMS_bio_stream(BIO *out, CMS_ContentInfo *cms, BIO *in, int flags);
int PEM_write_bio_CMS_stream(BIO *out, CMS_ContentInfo *cms, BIO *in,
   int flags);
CMS_ContentInfo
 *SMIME_read_CMS(BIO *bio, BIO **bcont);
CMS_ContentInfo *SMIME_read_CMS_ex(BIO *bio, int flags, BIO **bcont, CMS_ContentInfo **ci);
int SMIME_write_CMS(BIO *bio, CMS_ContentInfo *cms, BIO *data, int flags);

int CMS_final(CMS_ContentInfo *cms, BIO *data, BIO *dcont,
   unsigned int flags);
int CMS_final_digest(CMS_ContentInfo *cms,
   const unsigned char *md, unsigned int mdlen, BIO *dcont,
   unsigned int flags);

CMS_ContentInfo *CMS_sign(X509 *signcert, EVP_PKEY *pkey,
   STACK_OF(X509) *certs, BIO *data,
   unsigned int flags);
CMS_ContentInfo *CMS_sign_ex(X509 *signcert, EVP_PKEY *pkey,
   STACK_OF(X509) *certs, BIO *data,
   unsigned int flags, OSSL_LIB_CTX *libctx,
   const char *propq);

CMS_ContentInfo *CMS_sign_receipt(CMS_SignerInfo *si,
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   X509 *signcert, EVP_PKEY *pkey,
   STACK_OF(X509) *certs, unsigned int flags);

int CMS_data(CMS_ContentInfo *cms, BIO *out, unsigned int flags);
CMS_ContentInfo *CMS_data_create(BIO *in, unsigned int flags);
CMS_ContentInfo
 *CMS_data_create_ex(BIO *in, unsigned int flags,
   OSSL_LIB_CTX *libctx, const char *propq);

int CMS_digest_verify(CMS_ContentInfo *cms, BIO *dcont, BIO *out,
   unsigned int flags);
CMS_ContentInfo *CMS_digest_create(BIO *in, const EVP_MD *md,
   unsigned int flags);
CMS_ContentInfo *CMS_digest_create_ex(BIO *in, const EVP_MD *md,
   unsigned int flags, OSSL_LIB_CTX *libctx,
   const char *propq);

int CMS_EncryptedData_decrypt(CMS_ContentInfo *cms,
   const unsigned char *key, size_t keylen,
   BIO *dcont, BIO *out, unsigned int flags);
CMS_ContentInfo *CMS_EncryptedData_encrypt(BIO *in, const EVP_CIPHER *cipher,
   const unsigned char *key,
   size_t keylen, unsigned int flags);
CMS_ContentInfo *CMS_EncryptedData_encrypt_ex(BIO *in, const EVP_CIPHER *cipher,
   const unsigned char *key,
   size_t keylen, unsigned int flags,
   OSSL_LIB_CTX *libctx,
   const char *propq);

int CMS_EncryptedData_set1_key(CMS_ContentInfo *cms, const EVP_CIPHER *ciph,
   const unsigned
 char *key, size_t keylen);

int CMS_verify(CMS_ContentInfo *cms, STACK_OF(X509) *certs,
   X509_STORE *store, BIO *dcont, BIO *out, unsigned int flags);

int CMS_verify_receipt(CMS_ContentInfo *rcms, CMS_ContentInfo *ocms,
   STACK_OF(X509) *certs,
   X509_STORE *store, unsigned int flags);

STACK_OF(X509) *CMS_get0_signers(CMS_ContentInfo *cms);

CMS_ContentInfo *CMS_encrypt(STACK_OF(X509) *certs, BIO *in,
   const EVP_CIPHER *cipher, unsigned int flags);
CMS_ContentInfo *CMS_encrypt_ex(STACK_OF(X509) *certs, BIO *in,
   const EVP_CIPHER *cipher, unsigned int flags,
   OSSL_LIB_CTX *libctx, const char *propq);
```

```
int CMS_decrypt(CMS_ContentInfo *cms, EVP_PKEY *pkey, X509 *cert,
   BIO *dcont, BIO *out, unsigned int flags);

int CMS_decrypt_set1_pkey(CMS_ContentInfo *cms, EVP_PKEY *pk, X509 *cert);
int CMS_decrypt_set1_pkey_and_peer(CMS_ContentInfo *cms, EVP_PKEY *pk,
   X509 *cert, X509 *peer);
int CMS_decrypt_set1_key(CMS_ContentInfo *cms,
   unsigned char *key, size_t
 keylen,
   const unsigned char *id, size_t idlen);
int CMS_decrypt_set1_password(CMS_ContentInfo *cms,
   unsigned char *pass, ossl_ssize_t passlen);

STACK_OF(CMS_RecipientInfo) *CMS_get0_RecipientInfos(CMS_ContentInfo *cms);
int CMS_RecipientInfo_type(CMS_RecipientInfo *ri);
EVP_PKEY_CTX *CMS_RecipientInfo_get0_pkey_ctx(CMS_RecipientInfo *ri);
CMS_ContentInfo *CMS_AuthEnvelopedData_create(const EVP_CIPHER *cipher);
CMS_ContentInfo *
CMS_AuthEnvelopedData_create_ex(const EVP_CIPHER *cipher, OSSL_LIB_CTX *libctx,
   const char *propq);
CMS_ContentInfo *CMS_EnvelopedData_create(const EVP_CIPHER *cipher);
CMS_ContentInfo *CMS_EnvelopedData_create_ex(const EVP_CIPHER *cipher,
   OSSL_LIB_CTX *libctx,
   const char *propq);
BIO *CMS_EnvelopedData_decrypt(CMS_EnvelopedData *env, BIO *detached_data,
   EVP_PKEY *pkey, X509 *cert,
   ASN1_OCTET_STRING *secret, unsigned int flags,
   OSSL_LIB_CTX *libctx, const char *propq);

CMS_RecipientInfo *CMS_add1_recipient_cert(CMS_ContentInfo
 *cms,
   X509 *recip, unsigned int flags);
CMS_RecipientInfo *CMS_add1_recipient(CMS_ContentInfo *cms, X509 *recip,
   EVP_PKEY *originatorPrivKey, X509 *originator, unsigned int flags);
int CMS_RecipientInfo_set0_pkey(CMS_RecipientInfo *ri, EVP_PKEY *pkey);
int CMS_RecipientInfo_ktri_cert_cmp(CMS_RecipientInfo *ri, X509 *cert);
int CMS_RecipientInfo_ktri_get0_algs(CMS_RecipientInfo *ri,
   EVP_PKEY **pk, X509 **recip,
   X509_ALGOR **palg);
int CMS_RecipientInfo_ktri_get0_signer_id(CMS_RecipientInfo *ri,
   ASN1_OCTET_STRING **keyid,
   X509_NAME **issuer,
   ASN1_INTEGER **sno);

CMS_RecipientInfo *CMS_add0_recipient_key(CMS_ContentInfo *cms, int nid,
   unsigned char *key, size_t keylen,
   unsigned char *id, size_t idlen,
   ASN1_GENERALIZEDTIME *date,
```

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   ASN1_OBJECT *otherTypeId,
   ASN1_TYPE *otherType);

int CMS_RecipientInfo_kekri_get0_id(CMS_RecipientInfo *ri,
   X509_ALGOR **palg,
   ASN1_OCTET_STRING **pid,
   ASN1_GENERALIZEDTIME **pdate,
   ASN1_OBJECT **potherid,
    ASN1_TYPE **pothertype);

int CMS_RecipientInfo_set0_key(CMS_RecipientInfo *ri,
   unsigned char *key, size_t keylen);

int CMS_RecipientInfo_kekri_id_cmp(CMS_RecipientInfo *ri,
   const unsigned char *id, size_t idlen);

int CMS_RecipientInfo_set0_password(CMS_RecipientInfo *ri,
   unsigned char *pass,
   ossl_ssize_t passlen);

CMS_RecipientInfo *CMS_add0_recipient_password(CMS_ContentInfo *cms,
   int iter, int wrap_nid,
   int pbe_nid,
   unsigned char *pass,
   ossl_ssize_t passlen,
   const EVP_CIPHER *kekciph);

int CMS_RecipientInfo_decrypt(CMS_ContentInfo *cms, CMS_RecipientInfo *ri);
int CMS_RecipientInfo_encrypt(const CMS_ContentInfo *cms, CMS_RecipientInfo *ri);

int CMS_uncompress(CMS_ContentInfo *cms, BIO *dcont, BIO *out,
   unsigned int flags);
CMS_ContentInfo *CMS_compress(BIO *in, int comp_nid, unsigned int flags);

int CMS_set1_eContentType(CMS_ContentInfo *cms, const ASN1_OBJECT *oid);
const ASN1_OBJECT *CMS_get0_eContentType(CMS_ContentInfo *cms);

CMS_CertificateChoices
 *CMS_add0_CertificateChoices(CMS_ContentInfo *cms);
int CMS_add0_cert(CMS_ContentInfo *cms, X509 *cert);
int CMS_add1_cert(CMS_ContentInfo *cms, X509 *cert);
STACK_OF(X509) *CMS_get1_certs(CMS_ContentInfo *cms);

CMS_RevocationInfoChoice *CMS_add0_RevocationInfoChoice(CMS_ContentInfo *cms);
int CMS_add0_crl(CMS_ContentInfo *cms, X509_CRL *crl);
int CMS_add1_crl(CMS_ContentInfo *cms, X509_CRL *crl);
STACK_OF(X509_CRL) *CMS_get1_crls(CMS_ContentInfo *cms);
```

```
int CMS_SignedData_init(CMS_ContentInfo *cms);
CMS_SignerInfo *CMS_add1_signer(CMS_ContentInfo *cms,
   X509 *signer, EVP_PKEY *pk, const EVP_MD *md,
   unsigned int flags);
EVP_PKEY_CTX *CMS_SignerInfo_get0_pkey_ctx(CMS_SignerInfo *si);
EVP_MD_CTX *CMS_SignerInfo_get0_md_ctx(CMS_SignerInfo *si);
STACK_OF(CMS_SignerInfo) *CMS_get0_SignerInfos(CMS_ContentInfo *cms);

void CMS_SignerInfo_set1_signer_cert(CMS_SignerInfo *si, X509 *signer);
int CMS_SignerInfo_get0_signer_id(CMS_SignerInfo *si,
   ASN1_OCTET_STRING
 **keyid,
   X509_NAME **issuer, ASN1_INTEGER **sno);
int CMS_SignerInfo_cert_cmp(CMS_SignerInfo *si, X509 *cert);
int CMS_set1_signers_certs(CMS_ContentInfo *cms, STACK_OF(X509) *certs,
   unsigned int flags);
void CMS_SignerInfo_get0_algs(CMS_SignerInfo *si, EVP_PKEY **pk,
   X509 **signer, X509_ALGOR **pdig,
   X509_ALGOR **psig);
ASN1_OCTET_STRING *CMS_SignerInfo_get0_signature(CMS_SignerInfo *si);
int CMS_SignerInfo_sign(CMS_SignerInfo *si);
int CMS_SignerInfo_verify(CMS_SignerInfo *si);
int CMS_SignerInfo_verify_content(CMS_SignerInfo *si, BIO *chain);
BIO *CMS_SignedData_verify(CMS_SignedData *sd, BIO *detached_data,
   STACK_OF(X509) *scerts, X509_STORE *store,
   STACK_OF(X509) *extra, STACK_OF(X509_CRL) *crls,
   unsigned int flags,
   OSSL_LIB_CTX *libctx, const char *propq);

int CMS_add_smimecap(CMS_SignerInfo *si, STACK_OF(X509_ALGOR) *algs);
int CMS_add_simple_smimecap(STACK_OF(X509_ALGOR) **algs,
   int algnid, int keysize);
int CMS_add_standard_smimecap(STACK_OF(X509_ALGOR)
 **smcap);

int CMS_signed_get_attr_count(const CMS_SignerInfo *si);
int CMS_signed_get_attr_by_NID(const CMS_SignerInfo *si, int nid,
   int lastpos);
int CMS_signed_get_attr_by_OBJ(const CMS_SignerInfo *si, const ASN1_OBJECT *obj,
   int lastpos);
X509_ATTRIBUTE *CMS_signed_get_attr(const CMS_SignerInfo *si, int loc);
X509_ATTRIBUTE *CMS_signed_delete_attr(CMS_SignerInfo *si, int loc);
int CMS_signed_add1_attr(CMS_SignerInfo *si, X509_ATTRIBUTE *attr);
int CMS_signed_add1_attr_by_OBJ(CMS_SignerInfo *si,
   const ASN1_OBJECT *obj, int type,
   const void *bytes, int len);
int CMS_signed_add1_attr_by_NID(CMS_SignerInfo *si,
   int nid, int type,
```

```
   const void *bytes, int len);
int CMS_signed_add1_attr_by_txt(CMS_SignerInfo *si,
   const char *attrname, int type,
   const void *bytes, int len);
void *CMS_signed_get0_data_by_OBJ(const CMS_SignerInfo *si,
   const ASN1_OBJECT *oid,
   int lastpos, int type);

int CMS_unsigned_get_attr_count(const CMS_SignerInfo
 *si);
int CMS_unsigned_get_attr_by_NID(const CMS_SignerInfo *si, int nid,
   int lastpos);
int CMS_unsigned_get_attr_by_OBJ(const CMS_SignerInfo *si,
   const ASN1_OBJECT *obj, int lastpos);
X509_ATTRIBUTE *CMS_unsigned_get_attr(const CMS_SignerInfo *si, int loc);
X509_ATTRIBUTE *CMS_unsigned_delete_attr(CMS_SignerInfo *si, int loc);
int CMS_unsigned_add1_attr(CMS_SignerInfo *si, X509_ATTRIBUTE *attr);
int CMS_unsigned_add1_attr_by_OBJ(CMS_SignerInfo *si,
   const ASN1_OBJECT *obj, int type,
   const void *bytes, int len);
int CMS_unsigned_add1_attr_by_NID(CMS_SignerInfo *si,
   int nid, int type,
   const void *bytes, int len);
int CMS_unsigned_add1_attr_by_txt(CMS_SignerInfo *si,
   const char *attrname, int type,
   const void *bytes, int len);
void *CMS_unsigned_get0_data_by_OBJ(CMS_SignerInfo *si, ASN1_OBJECT *oid,
   int lastpos, int type);

int CMS_get1_ReceiptRequest(CMS_SignerInfo *si, CMS_ReceiptRequest **prr);
CMS_ReceiptRequest *CMS_ReceiptRequest_create0(

 unsigned char *id, int idlen, int allorfirst,
   STACK_OF(GENERAL_NAMES) *receiptList,
   STACK_OF(GENERAL_NAMES) *receiptsTo);
CMS_ReceiptRequest *CMS_ReceiptRequest_create0_ex(
   unsigned char *id, int idlen, int allorfirst,
   STACK_OF(GENERAL_NAMES) *receiptList,
   STACK_OF(GENERAL_NAMES) *receiptsTo,
   OSSL_LIB_CTX *libctx);

int CMS_add1_ReceiptRequest(CMS_SignerInfo *si, CMS_ReceiptRequest *rr);
void CMS_ReceiptRequest_get0_values(CMS_ReceiptRequest *rr,
   ASN1_STRING **pcid,
   int *pallorfirst,
   STACK_OF(GENERAL_NAMES) **plist,
   STACK_OF(GENERAL_NAMES) **prto);
int CMS_RecipientInfo_kari_get0_alg(CMS_RecipientInfo *ri,
```

```
   X509_ALGOR **palg,
   ASN1_OCTET_STRING **pukm);
STACK_OF(CMS_RecipientEncryptedKey)
*CMS_RecipientInfo_kari_get0_reks(CMS_RecipientInfo *ri);

int CMS_RecipientInfo_kari_get0_orig_id(CMS_RecipientInfo *ri,
   X509_ALGOR **pubalg,
   ASN1_BIT_STRING **pubkey,
   ASN1_OCTET_STRING **keyid,
   X509_NAME **issuer,
   ASN1_INTEGER **sno);

int
 CMS_RecipientInfo_kari_orig_id_cmp(CMS_RecipientInfo *ri, X509 *cert);

int CMS_RecipientEncryptedKey_get0_id(CMS_RecipientEncryptedKey *rek,
   ASN1_OCTET_STRING **keyid,
   ASN1_GENERALIZEDTIME **tm,
   CMS_OtherKeyAttribute **other,
   X509_NAME **issuer, ASN1_INTEGER **sno);
int CMS_RecipientEncryptedKey_cert_cmp(CMS_RecipientEncryptedKey *rek,
   X509 *cert);
int CMS_RecipientInfo_kari_set0_pkey(CMS_RecipientInfo *ri, EVP_PKEY *pk);
int CMS_RecipientInfo_kari_set0_pkey_and_peer(CMS_RecipientInfo *ri, EVP_PKEY *pk, X509 *peer);
EVP_CIPHER_CTX *CMS_RecipientInfo_kari_get0_ctx(CMS_RecipientInfo *ri);
int CMS_RecipientInfo_kari_decrypt(CMS_ContentInfo *cms,
   CMS_RecipientInfo *ri,
   CMS_RecipientEncryptedKey *rek);

int CMS_SharedInfo_encode(unsigned char **pder, X509_ALGOR *kekalg,
   ASN1_OCTET_STRING *ukm, int keylen);

/* Backward compatibility for spelling errors. */
#define CMS_R_UNKNOWN_DIGEST_ALGORITM CMS_R_UNKNOWN_DIGEST_ALGORITHM
#define CMS_R_UNSUPPORTED_RECPIENTINFO_TYPE
 \
   CMS_R_UNSUPPORTED_RECIPIENTINFO_TYPE

#ifdef __cplusplus
}
#endif
#endif
#endif
```

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```
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* https://www.openssl.org/source/license.html
*/

#define PLATFORM "platform: BSD-x86"
#define DATE "built on: Tue Jan 27 17:26:06 2026 UTC"

/*
* Generate compiler_flags as an array of individual characters. This is a
* workaround for the situation where CFLAGS gets too long for a C90 string
* literal
*/
static const char compiler_flags[] = {
   'c','o','m','p','i','l','e','r',':',' ','c','c',' ','-','f','P',
   'I','C',' ','-','p','t','h','r','e','a','d',' ','-','W','a','l',
   'l',' ','-','O','3',' ','-','f','o','m','i','t','-','f','r','a',
   'm','e','-','p','o','i','n','t','e','r',' ','-','D','L','_','E',
   'N','D','I','A','N','
 ','-','D','O','P','E','N','S','S','L','_',
   'P','I','C',' ','-','D','_','T','H','R','E','A','D','_','S','A',
   'F','E',' ','-','D','_','R','E','E','N','T','R','A','N','T',' ',
   '-','D','O','P','E','N','S','S','L','_','B','U','I','L','D','I',
   'N','G','_','O','P','E','N','S','S','L',' ','-','D','N','D','E',
   'B','U','G','\0'
};
/*
* WARNING: do not edit!
```

```
* Generated by Makefile from providers/common/include/prov/der_dsa.h.in
*
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#include "internal/der.h"

/* Well known OIDs precompiled */
/* clang-format off */

/*
* id-dsa OBJECT IDENTIFIER ::= {
*      iso(1) member-body(2) us(840) x9-57(10040) x9algorithm(4) 1 }
*/
#define DER_OID_V_id_dsa DER_P_OBJECT, 7, 0x2A, 0x86, 0x48, 0xCE, 0x38, 0x04, 0x01
#define DER_OID_SZ_id_dsa 9
extern const unsigned char ossl_der_oid_id_dsa[DER_OID_SZ_id_dsa];

/*
* id-dsa-with-sha1 OBJECT IDENTIFIER ::=  {
*      iso(1) member-body(2) us(840) x9-57 (10040) x9algorithm(4) 3 }
*/
#define DER_OID_V_id_dsa_with_sha1 DER_P_OBJECT, 7, 0x2A, 0x86, 0x48,
 0xCE, 0x38, 0x04, 0x03
#define DER_OID_SZ_id_dsa_with_sha1 9
extern const unsigned char ossl_der_oid_id_dsa_with_sha1[DER_OID_SZ_id_dsa_with_sha1];

/*
* id-dsa-with-sha224 OBJECT IDENTIFIER ::= { sigAlgs 1 }
*/
#define DER_OID_V_id_dsa_with_sha224 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x03,
0x01
#define DER_OID_SZ_id_dsa_with_sha224 11
extern const unsigned char ossl_der_oid_id_dsa_with_sha224[DER_OID_SZ_id_dsa_with_sha224];

/*
* id-dsa-with-sha256 OBJECT IDENTIFIER ::= { sigAlgs 2 }
*/
#define DER_OID_V_id_dsa_with_sha256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x03,
0x02
#define DER_OID_SZ_id_dsa_with_sha256 11
extern const unsigned char ossl_der_oid_id_dsa_with_sha256[DER_OID_SZ_id_dsa_with_sha256];
```

```
/*
* id-dsa-with-sha384 OBJECT IDENTIFIER ::= { sigAlgs 3 }
*/
#define DER_OID_V_id_dsa_with_sha384 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x03,
0x03
#define DER_OID_SZ_id_dsa_with_sha384 11
extern const unsigned char
 ossl_der_oid_id_dsa_with_sha384[DER_OID_SZ_id_dsa_with_sha384];

/*
* id-dsa-with-sha512 OBJECT IDENTIFIER ::= { sigAlgs 4 }
*/
#define DER_OID_V_id_dsa_with_sha512 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x03,
0x04
#define DER_OID_SZ_id_dsa_with_sha512 11
extern const unsigned char ossl_der_oid_id_dsa_with_sha512[DER_OID_SZ_id_dsa_with_sha512];

/*
* id-dsa-with-sha3-224 OBJECT IDENTIFIER ::= { sigAlgs 5 }
*/
#define DER_OID_V_id_dsa_with_sha3_224 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x05
#define DER_OID_SZ_id_dsa_with_sha3_224 11
extern const unsigned char ossl_der_oid_id_dsa_with_sha3_224[DER_OID_SZ_id_dsa_with_sha3_224];

/*
* id-dsa-with-sha3-256 OBJECT IDENTIFIER ::= { sigAlgs 6 }
*/
#define DER_OID_V_id_dsa_with_sha3_256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x06
#define DER_OID_SZ_id_dsa_with_sha3_256 11
extern const unsigned char ossl_der_oid_id_dsa_with_sha3_256[DER_OID_SZ_id_dsa_with_sha3_256];

/*
 * id-dsa-with-sha3-384 OBJECT IDENTIFIER ::= { sigAlgs 7 }
*/
#define DER_OID_V_id_dsa_with_sha3_384 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x07
#define DER_OID_SZ_id_dsa_with_sha3_384 11
extern const unsigned char ossl_der_oid_id_dsa_with_sha3_384[DER_OID_SZ_id_dsa_with_sha3_384];

/*
* id-dsa-with-sha3-512 OBJECT IDENTIFIER ::= { sigAlgs 8 }
*/
#define DER_OID_V_id_dsa_with_sha3_512 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x08
#define DER_OID_SZ_id_dsa_with_sha3_512 11
extern const unsigned char ossl_der_oid_id_dsa_with_sha3_512[DER_OID_SZ_id_dsa_with_sha3_512];
```

/* clang-format on */

/* Subject Public Key Info */
int ossl_DER_w_algorithmIdentifier_DSA(WPACKET *pkt, int tag, DSA *dsa);
/* Signature */
int ossl_DER_w_algorithmIdentifier_DSA_with_MD(WPACKET *pkt, int tag,
  DSA *dsa, int mdnid);
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 "AGPL-1.0",
 "AGPL-3.0",
 "BSD-2-Clause-FreeBSD",
 "BSD-2-Clause-NetBSD",
 "GFDL-1.1",
 "GFDL-1.2",
 "GFDL-1.3",
 "GPL-1.0",
 "GPL-2.0",
 "GPL-2.0-with-GCC-exception",
 "GPL-2.0-with-autoconf-exception",
 "GPL-2.0-with-bison-exception",
 "GPL-2.0-with-classpath-exception",
 "GPL-2.0-with-font-exception",
 "GPL-3.0",
 "GPL-3.0-with-GCC-exception",
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 "LGPL-2.1",
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 "Net-SNMP",
 "Nunit",
 "StandardML-NJ",
 "bzip2-1.0.5",
 "eCos-2.0",
 "wxWindows"
]
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     'OPENSSL_PIC',
   ],
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     '-Wall -O3 -fomit-frame-pointer',
     '-pthread',
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   ],
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     'openssl/apps/lib/cmp_mock_srv.c',
     'openssl/apps/asn1parse.c',
     'openssl/apps/ca.c',
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'openssl/apps/ciphers.c',
'openssl/apps/cmp.c',
'openssl/apps/cms.c',
'openssl/apps/crl.c',
'openssl/apps/crl2pkcs7.c',
'openssl/apps/dgst.c',
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'openssl/apps/genpkey.c',

'openssl/apps/genrsa.c',
'openssl/apps/info.c',
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'openssl/apps/mac.c',
'openssl/apps/nseq.c',
'openssl/apps/ocsp.c',
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'openssl/apps/passwd.c',
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'openssl/apps/pkeyparam.c',
'openssl/apps/pkeyutl.c',
'openssl/apps/prime.c',
'./config/archs/BSD-x86/no-asm/apps/progs.c',
'openssl/apps/rand.c',
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'openssl/apps/s_server.c',
'openssl/apps/s_time.c',
'openssl/apps/sess_id.c',
'openssl/apps/skeyutl.c',
'openssl/apps/smime.c',
'openssl/apps/speed.c',
'openssl/apps/spkac.c',

```
    'openssl/apps/srp.c',
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    'openssl/apps/ts.c',
     'openssl/apps/verify.c',
    'openssl/apps/version.c',
    'openssl/apps/x509.c',
    'openssl/apps/lib/app_libctx.c',
    'openssl/apps/lib/app_params.c',
    'openssl/apps/lib/app_provider.c',
    'openssl/apps/lib/app_rand.c',
    'openssl/apps/lib/app_x509.c',
    'openssl/apps/lib/apps.c',
    'openssl/apps/lib/apps_opt_printf.c',
    'openssl/apps/lib/apps_ui.c',
    'openssl/apps/lib/columns.c',
    'openssl/apps/lib/engine.c',
    'openssl/apps/lib/engine_loader.c',
    'openssl/apps/lib/fmt.c',
    'openssl/apps/lib/http_server.c',
    'openssl/apps/lib/log.c',
    'openssl/apps/lib/names.c',
    'openssl/apps/lib/opt.c',
    'openssl/apps/lib/s_cb.c',
    'openssl/apps/lib/s_socket.c',
    'openssl/apps/lib/tlssrp_depr.c',
  ],
 },
 'defines': ['<@(openssl_defines_BSD-x86)'],
 'include_dirs': [
   './include',
 ],
 'cflags' : ['<@(openssl_cflags_BSD-x86)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86)'],
  'sources': ['<@(openssl_cli_srcs_BSD-x86)'],
}
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/asn1.h.in
*
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_ASN1_H
#define OPENSSL_ASN1_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_ASN1_H
#endif

#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif
#include <time.h>
#include <openssl/e_os2.h>
#include <openssl/opensslconf.h>
#include <openssl/bio.h>
#include <openssl/safestack.h>
#include <openssl/asn1err.h>
#include <openssl/symhacks.h>

#include <openssl/types.h>
#include <openssl/bn.h>

#ifdef OPENSSL_BUILD_SHLIBCRYPTO
```

```
#undef OPENSSL_EXTERN
#define OPENSSL_EXTERN OPENSSL_EXPORT
#endif

#ifdef
 __cplusplus
extern "C" {
#endif

#define V_ASN1_UNIVERSAL 0x00
#define V_ASN1_APPLICATION 0x40
#define V_ASN1_CONTEXT_SPECIFIC 0x80
#define V_ASN1_PRIVATE 0xc0

#define V_ASN1_CONSTRUCTED 0x20
#define V_ASN1_PRIMITIVE_TAG 0x1f
#define V_ASN1_PRIMATIVE_TAG /*compat*/ V_ASN1_PRIMITIVE_TAG

#define V_ASN1_APP_CHOOSE -2 /* let the recipient choose */
#define V_ASN1_OTHER -3 /* used in ASN1_TYPE */
#define V_ASN1_ANY -4 /* used in ASN1 template code */

#define V_ASN1_UNDEF -1
/* ASN.1 tag values */
#define V_ASN1_EOC 0
#define V_ASN1_BOOLEAN 1
#define V_ASN1_INTEGER 2
#define V_ASN1_BIT_STRING 3
#define V_ASN1_OCTET_STRING 4
#define V_ASN1_NULL 5
#define V_ASN1_OBJECT 6
#define V_ASN1_OBJECT_DESCRIPTOR 7
#define V_ASN1_EXTERNAL 8
#define V_ASN1_REAL 9
#define V_ASN1_ENUMERATED 10
#define V_ASN1_UTF8STRING 12
#define V_ASN1_SEQUENCE 16
#define V_ASN1_SET 17
#define V_ASN1_NUMERICSTRING 18
#define V_ASN1_PRINTABLESTRING 19
#define V_ASN1_T61STRING 20
#define V_ASN1_TELETEXSTRING
 20 /* alias */
#define V_ASN1_VIDEOTEXSTRING 21
#define V_ASN1_IA5STRING 22
#define V_ASN1_UTCTIME 23
#define V_ASN1_GENERALIZEDTIME 24
#define V_ASN1_GRAPHICSTRING 25
```

```
#define V_ASN1_ISO64STRING 26
#define V_ASN1_VISIBLESTRING 26 /* alias */
#define V_ASN1_GENERALSTRING 27
#define V_ASN1_UNIVERSALSTRING 28
#define V_ASN1_BMPSTRING 30

/*
* NB the constants below are used internally by ASN1_INTEGER
* and ASN1_ENUMERATED to indicate the sign. They are *not* on
* the wire tag values.
*/

#define V_ASN1_NEG 0x100
#define V_ASN1_NEG_INTEGER (2 | V_ASN1_NEG)
#define V_ASN1_NEG_ENUMERATED (10 | V_ASN1_NEG)

/* For use with d2i_ASN1_type_bytes() */
#define B_ASN1_NUMERICSTRING 0x0001
#define B_ASN1_PRINTABLESTRING 0x0002
#define B_ASN1_T61STRING 0x0004
#define B_ASN1_TELETEXSTRING 0x0004
#define B_ASN1_VIDEOTEXSTRING 0x0008
#define B_ASN1_IA5STRING 0x0010
#define B_ASN1_GRAPHICSTRING 0x0020
#define B_ASN1_ISO64STRING 0x0040
#define B_ASN1_VISIBLESTRING 0x0040
#define B_ASN1_GENERALSTRING
 0x0080
#define B_ASN1_UNIVERSALSTRING 0x0100
#define B_ASN1_OCTET_STRING 0x0200
#define B_ASN1_BIT_STRING 0x0400
#define B_ASN1_BMPSTRING 0x0800
#define B_ASN1_UNKNOWN 0x1000
#define B_ASN1_UTF8STRING 0x2000
#define B_ASN1_UTCTIME 0x4000
#define B_ASN1_GENERALIZEDTIME 0x8000
#define B_ASN1_SEQUENCE 0x10000
/* For use with ASN1_mbstring_copy() */
#define MBSTRING_FLAG 0x1000
#define MBSTRING_UTF8 (MBSTRING_FLAG)
#define MBSTRING_ASC (MBSTRING_FLAG | 1)
#define MBSTRING_BMP (MBSTRING_FLAG | 2)
#define MBSTRING_UNIV (MBSTRING_FLAG | 4)
#define SMIME_OLDMIME 0x400
#define SMIME_CRLFEOL 0x800
#define SMIME_STREAM 0x1000

/* Stacks for types not otherwise defined in this header */
```

```
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_ALGOR, X509_ALGOR, X509_ALGOR)
#define sk_X509_ALGOR_num(sk) OPENSSL_sk_num(ossl_check_const_X509_ALGOR_sk_type(sk))
#define sk_X509_ALGOR_value(sk, idx) ((X509_ALGOR
*)OPENSSL_sk_value(ossl_check_const_X509_ALGOR_sk_type(sk), (idx)))
#define sk_X509_ALGOR_new(cmp)
 ((STACK_OF(X509_ALGOR) *)OPENSSL_sk_new(ossl_check_X509_ALGOR_compfunc_type(cmp)))
#define sk_X509_ALGOR_new_null() ((STACK_OF(X509_ALGOR) *)OPENSSL_sk_new_null())
#define sk_X509_ALGOR_new_reserve(cmp, n) ((STACK_OF(X509_ALGOR)
*)OPENSSL_sk_new_reserve(ossl_check_X509_ALGOR_compfunc_type(cmp), (n)))
#define sk_X509_ALGOR_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_ALGOR_sk_type(sk), (n))
#define sk_X509_ALGOR_free(sk) OPENSSL_sk_free(ossl_check_X509_ALGOR_sk_type(sk))
#define sk_X509_ALGOR_zero(sk) OPENSSL_sk_zero(ossl_check_X509_ALGOR_sk_type(sk))
#define sk_X509_ALGOR_delete(sk, i) ((X509_ALGOR
*)OPENSSL_sk_delete(ossl_check_X509_ALGOR_sk_type(sk), (i)))
#define sk_X509_ALGOR_delete_ptr(sk, ptr) ((X509_ALGOR
*)OPENSSL_sk_delete_ptr(ossl_check_X509_ALGOR_sk_type(sk), ossl_check_X509_ALGOR_type(ptr)))
#define sk_X509_ALGOR_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_ALGOR_sk_type(sk),
ossl_check_X509_ALGOR_type(ptr))
#define sk_X509_ALGOR_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_ALGOR_sk_type(sk),
 ossl_check_X509_ALGOR_type(ptr))
#define sk_X509_ALGOR_pop(sk) ((X509_ALGOR
*)OPENSSL_sk_pop(ossl_check_X509_ALGOR_sk_type(sk)))
#define sk_X509_ALGOR_shift(sk) ((X509_ALGOR
*)OPENSSL_sk_shift(ossl_check_X509_ALGOR_sk_type(sk)))
#define sk_X509_ALGOR_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_ALGOR_sk_type(sk),ossl_check_X509_ALGOR_freefunc_type(freefu
nc))
#define sk_X509_ALGOR_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_ALGOR_sk_type(sk),
ossl_check_X509_ALGOR_type(ptr), (idx))
#define sk_X509_ALGOR_set(sk, idx, ptr) ((X509_ALGOR
*)OPENSSL_sk_set(ossl_check_X509_ALGOR_sk_type(sk), (idx), ossl_check_X509_ALGOR_type(ptr)))
#define sk_X509_ALGOR_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_ALGOR_sk_type(sk),
ossl_check_X509_ALGOR_type(ptr))
#define sk_X509_ALGOR_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_ALGOR_sk_type(sk),
ossl_check_X509_ALGOR_type(ptr))
#define sk_X509_ALGOR_find_all(sk, ptr, pnum)
 OPENSSL_sk_find_all(ossl_check_X509_ALGOR_sk_type(sk), ossl_check_X509_ALGOR_type(ptr), pnum)
#define sk_X509_ALGOR_sort(sk) OPENSSL_sk_sort(ossl_check_X509_ALGOR_sk_type(sk))
#define sk_X509_ALGOR_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_X509_ALGOR_sk_type(sk))
#define sk_X509_ALGOR_dup(sk) ((STACK_OF(X509_ALGOR)
*)OPENSSL_sk_dup(ossl_check_const_X509_ALGOR_sk_type(sk)))
#define sk_X509_ALGOR_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_ALGOR)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_ALGOR_sk_type(sk),
ossl_check_X509_ALGOR_copyfunc_type(copyfunc), ossl_check_X509_ALGOR_freefunc_type(freefunc)))
#define sk_X509_ALGOR_set_cmp_func(sk, cmp)
((sk_X509_ALGOR_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_ALGOR_sk_type(sk),
ossl_check_X509_ALGOR_compfunc_type(cmp)))
```

```
/* clang-format on */

#define ASN1_STRING_FLAG_BITS_LEFT 0x08 /* Set if 0x07 has bits left value */
/*
* This indicates that the ASN1_STRING is not a real value but just a place
* holder for the location
 where indefinite length constructed data should be
* inserted in the memory buffer
*/
#define ASN1_STRING_FLAG_NDEF 0x010

/*
* This flag is used by the CMS code to indicate that a string is not
* complete and is a place holder for content when it had all been accessed.
* The flag will be reset when content has been written to it.
*/

#define ASN1_STRING_FLAG_CONT 0x020
/*
* This flag is used by ASN1 code to indicate an ASN1_STRING is an MSTRING
* type.
*/
#define ASN1_STRING_FLAG_MSTRING 0x040
/* String is embedded and only content should be freed */
#define ASN1_STRING_FLAG_EMBED 0x080
/* String should be parsed in RFC 5280's time format */
#define ASN1_STRING_FLAG_X509_TIME 0x100
/* This is the base type that holds just about everything :-) */
struct asn1_string_st {
   int length;
   int type;
   unsigned char *data;
   /*
    * The value of the following field depends on the type being held.  It
    * is mostly being used for BIT_STRING so if the input data has a
     * non-zero 'unused bits' value, it will be handled correctly
    */
   long flags;
};

/*
* ASN1_ENCODING structure: this is used to save the received encoding of an
* ASN1 type. This is useful to get round problems with invalid encodings
* which can break signatures.
*/

typedef struct ASN1_ENCODING_st {
```

```
  unsigned char *enc; /* DER encoding */
  long len; /* Length of encoding */
  int modified; /* set to 1 if 'enc' is invalid */
} ASN1_ENCODING;

/* Used with ASN1 LONG type: if a long is set to this it is omitted */
#define ASN1_LONG_UNDEF 0x7fffffffL

#define STABLE_FLAGS_MALLOC 0x01
/*
* A zero passed to ASN1_STRING_TABLE_new_add for the flags is interpreted
* as "don't change" and STABLE_FLAGS_MALLOC is always set. By setting
* STABLE_FLAGS_MALLOC only we can clear the existing value. Use the alias
* STABLE_FLAGS_CLEAR to reflect this.
*/
#define STABLE_FLAGS_CLEAR STABLE_FLAGS_MALLOC
#define STABLE_NO_MASK 0x02
#define DIRSTRING_TYPE \
  (B_ASN1_PRINTABLESTRING
 | B_ASN1_T61STRING | B_ASN1_BMPSTRING | B_ASN1_UTF8STRING)
#define PKCS9STRING_TYPE (DIRSTRING_TYPE | B_ASN1_IA5STRING)

struct asn1_string_table_st {
  int nid;
  long minsize;
  long maxsize;
  unsigned long mask;
  unsigned long flags;
};

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ASN1_STRING_TABLE, ASN1_STRING_TABLE,
ASN1_STRING_TABLE)
#define sk_ASN1_STRING_TABLE_num(sk)
OPENSSL_sk_num(ossl_check_const_ASN1_STRING_TABLE_sk_type(sk))
#define sk_ASN1_STRING_TABLE_value(sk, idx) ((ASN1_STRING_TABLE
*)OPENSSL_sk_value(ossl_check_const_ASN1_STRING_TABLE_sk_type(sk), (idx)))
#define sk_ASN1_STRING_TABLE_new(cmp) ((STACK_OF(ASN1_STRING_TABLE)
*)OPENSSL_sk_new(ossl_check_ASN1_STRING_TABLE_compfunc_type(cmp)))
#define sk_ASN1_STRING_TABLE_new_null() ((STACK_OF(ASN1_STRING_TABLE)
*)OPENSSL_sk_new_null())
#define sk_ASN1_STRING_TABLE_new_reserve(cmp, n) ((STACK_OF(ASN1_STRING_TABLE)
*)OPENSSL_sk_new_reserve(ossl_check_ASN1_STRING_TABLE_compfunc_type(cmp), (n)))
#define
 sk_ASN1_STRING_TABLE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_ASN1_STRING_TABLE_sk_type(sk), (n))
#define sk_ASN1_STRING_TABLE_free(sk)
OPENSSL_sk_free(ossl_check_ASN1_STRING_TABLE_sk_type(sk))
```

```
#define sk_ASN1_STRING_TABLE_zero(sk)
OPENSSL_sk_zero(ossl_check_ASN1_STRING_TABLE_sk_type(sk))
#define sk_ASN1_STRING_TABLE_delete(sk, i) ((ASN1_STRING_TABLE
*)OPENSSL_sk_delete(ossl_check_ASN1_STRING_TABLE_sk_type(sk), (i)))
#define sk_ASN1_STRING_TABLE_delete_ptr(sk, ptr) ((ASN1_STRING_TABLE
*)OPENSSL_sk_delete_ptr(ossl_check_ASN1_STRING_TABLE_sk_type(sk),
ossl_check_ASN1_STRING_TABLE_type(ptr)))
#define sk_ASN1_STRING_TABLE_push(sk, ptr)
OPENSSL_sk_push(ossl_check_ASN1_STRING_TABLE_sk_type(sk),
ossl_check_ASN1_STRING_TABLE_type(ptr))
#define sk_ASN1_STRING_TABLE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_ASN1_STRING_TABLE_sk_type(sk),
ossl_check_ASN1_STRING_TABLE_type(ptr))
#define sk_ASN1_STRING_TABLE_pop(sk) ((ASN1_STRING_TABLE
*)OPENSSL_sk_pop(ossl_check_ASN1_STRING_TABLE_sk_type(sk)))
#define
 sk_ASN1_STRING_TABLE_shift(sk) ((ASN1_STRING_TABLE
*)OPENSSL_sk_shift(ossl_check_ASN1_STRING_TABLE_sk_type(sk)))
#define sk_ASN1_STRING_TABLE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASN1_STRING_TABLE_sk_type(sk),ossl_check_ASN1_STRING_TABLE_
freefunc_type(freefunc))
#define sk_ASN1_STRING_TABLE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_ASN1_STRING_TABLE_sk_type(sk),
ossl_check_ASN1_STRING_TABLE_type(ptr), (idx))
#define sk_ASN1_STRING_TABLE_set(sk, idx, ptr) ((ASN1_STRING_TABLE
*)OPENSSL_sk_set(ossl_check_ASN1_STRING_TABLE_sk_type(sk), (idx),
ossl_check_ASN1_STRING_TABLE_type(ptr)))
#define sk_ASN1_STRING_TABLE_find(sk, ptr)
OPENSSL_sk_find(ossl_check_ASN1_STRING_TABLE_sk_type(sk),
ossl_check_ASN1_STRING_TABLE_type(ptr))
#define sk_ASN1_STRING_TABLE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_ASN1_STRING_TABLE_sk_type(sk),
ossl_check_ASN1_STRING_TABLE_type(ptr))
#define sk_ASN1_STRING_TABLE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ASN1_STRING_TABLE_sk_type(sk),
 ossl_check_ASN1_STRING_TABLE_type(ptr), pnum)
#define sk_ASN1_STRING_TABLE_sort(sk)
OPENSSL_sk_sort(ossl_check_ASN1_STRING_TABLE_sk_type(sk))
#define sk_ASN1_STRING_TABLE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_ASN1_STRING_TABLE_sk_type(sk))
#define sk_ASN1_STRING_TABLE_dup(sk) ((STACK_OF(ASN1_STRING_TABLE)
*)OPENSSL_sk_dup(ossl_check_const_ASN1_STRING_TABLE_sk_type(sk)))
#define sk_ASN1_STRING_TABLE_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ASN1_STRING_TABLE)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASN1_STRING_TABLE_sk_type(sk),
ossl_check_ASN1_STRING_TABLE_copyfunc_type(copyfunc),
ossl_check_ASN1_STRING_TABLE_freefunc_type(freefunc)))
#define sk_ASN1_STRING_TABLE_set_cmp_func(sk, cmp)
((sk_ASN1_STRING_TABLE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASN1_STRING_TABLE_sk_t
```

```
ype(sk), ossl_check_ASN1_STRING_TABLE_compfunc_type(cmp)))

/* clang-format on */

/* size limits: this stuff is taken straight from RFC2459 */

#define ub_name 32768
#define
 ub_common_name 64
#define ub_locality_name 128
#define ub_state_name 128
#define ub_organization_name 64
#define ub_organization_unit_name 64
#define ub_title 64
#define ub_email_address 128

/*
* Declarations for template structures: for full definitions see asn1t.h
*/
typedef struct ASN1_TEMPLATE_st ASN1_TEMPLATE;
typedef struct ASN1_TLC_st ASN1_TLC;
/* This is just an opaque pointer */
typedef struct ASN1_VALUE_st ASN1_VALUE;

/* Declare ASN1 functions: the implement macro is in asn1t.h */

/*
* The mysterious 'extern' that's passed to some macros is innocuous,
* and is there to quiet pre-C99 compilers that may complain about empty
* arguments in macro calls.
*/

#define DECLARE_ASN1_FUNCTIONS_attr(attr, type) \
   DECLARE_ASN1_FUNCTIONS_name_attr(attr, type, type)
#define DECLARE_ASN1_FUNCTIONS(type) \
   DECLARE_ASN1_FUNCTIONS_attr(extern, type)

#define DECLARE_ASN1_ALLOC_FUNCTIONS_attr(attr, type) \
   DECLARE_ASN1_ALLOC_FUNCTIONS_name_attr(attr, type, type)
#define
 DECLARE_ASN1_ALLOC_FUNCTIONS(type) \
   DECLARE_ASN1_ALLOC_FUNCTIONS_attr(extern, type)

#define DECLARE_ASN1_FUNCTIONS_name_attr(attr, type, name)   \
   DECLARE_ASN1_ALLOC_FUNCTIONS_name_attr(attr, type, name) \
   DECLARE_ASN1_ENCODE_FUNCTIONS_name_attr(attr, type, name)
#define DECLARE_ASN1_FUNCTIONS_name(type, name) \
   DECLARE_ASN1_FUNCTIONS_name_attr(extern, type, name)
```

```
#define DECLARE_ASN1_ENCODE_FUNCTIONS_attr(attr, type, itname, name) \
   DECLARE_ASN1_ENCODE_FUNCTIONS_only_attr(attr, type, name)        \
   DECLARE_ASN1_ITEM_attr(attr, itname)
#define DECLARE_ASN1_ENCODE_FUNCTIONS(type, itname, name) \
   DECLARE_ASN1_ENCODE_FUNCTIONS_attr(extern, type, itname, name)

#define DECLARE_ASN1_ENCODE_FUNCTIONS_name_attr(attr, type, name) \
   DECLARE_ASN1_ENCODE_FUNCTIONS_attr(attr, type, name, name)
#define DECLARE_ASN1_ENCODE_FUNCTIONS_name(type, name) \
   DECLARE_ASN1_ENCODE_FUNCTIONS_name_attr(extern, type, name)

#define DECLARE_ASN1_ENCODE_FUNCTIONS_only_attr(attr,
 type, name)        \
   attr type *d2i_##name(type **a, const unsigned char **in, long len); \
   attr int i2d_##name(const type *a, unsigned char **out);
#define DECLARE_ASN1_ENCODE_FUNCTIONS_only(type, name) \
   DECLARE_ASN1_ENCODE_FUNCTIONS_only_attr(extern, type, name)

#define DECLARE_ASN1_NDEF_FUNCTION_attr(attr, name) \
   attr int i2d_##name##_NDEF(const name *a, unsigned char **out);
#define DECLARE_ASN1_NDEF_FUNCTION(name) \
   DECLARE_ASN1_NDEF_FUNCTION_attr(extern, name)

#define DECLARE_ASN1_ALLOC_FUNCTIONS_name_attr(attr, type, name) \
   attr type *name##_new(void);                                  \
   attr void name##_free(type *a);
#define DECLARE_ASN1_ALLOC_FUNCTIONS_name(type, name) \
   DECLARE_ASN1_ALLOC_FUNCTIONS_name_attr(extern, type, name)

#define DECLARE_ASN1_DUP_FUNCTION_attr(attr, type) \
   DECLARE_ASN1_DUP_FUNCTION_name_attr(attr, type, type)
#define DECLARE_ASN1_DUP_FUNCTION(type) \
   DECLARE_ASN1_DUP_FUNCTION_attr(extern, type)

#define
 DECLARE_ASN1_DUP_FUNCTION_name_attr(attr, type, name) \
   attr type *name##_dup(const type *a);
#define DECLARE_ASN1_DUP_FUNCTION_name(type, name) \
   DECLARE_ASN1_DUP_FUNCTION_name_attr(extern, type, name)

#define DECLARE_ASN1_PRINT_FUNCTION_attr(attr, stname) \
   DECLARE_ASN1_PRINT_FUNCTION_fname_attr(attr, stname, stname)
#define DECLARE_ASN1_PRINT_FUNCTION(stname) \
   DECLARE_ASN1_PRINT_FUNCTION_attr(extern, stname)

#define DECLARE_ASN1_PRINT_FUNCTION_fname_attr(attr, stname, fname)   \
   attr int fname##_print_ctx(BIO *out, const stname *x, int indent, \
```

```
      const ASN1_PCTX *pctx);
#define DECLARE_ASN1_PRINT_FUNCTION_fname(stname, fname) \
   DECLARE_ASN1_PRINT_FUNCTION_fname_attr(extern, stname, fname)

#define D2I_OF(type) type *(*)(type **, const unsigned char **, long)
#define I2D_OF(type) int (*)(const type *, unsigned char **)

#define CHECKED_D2I_OF(type, d2i) \
   ((d2i_of_void *)(1 ? d2i : ((D2I_OF(type))0)))
#define CHECKED_I2D_OF(type, i2d) \

  ((i2d_of_void *)(1 ? i2d : ((I2D_OF(type))0)))
#define CHECKED_NEW_OF(type, xnew) \
   ((void *(*)(void))(1 ? xnew : ((type * (*)(void))0)))
#define CHECKED_PTR_OF(type, p) \
   ((void *)(1 ? p : (type *)0))
#define CHECKED_PPTR_OF(type, p) \
   ((void **)(1 ? p : (type **)0))

#define TYPEDEF_D2I_OF(type) typedef type *d2i_of_##type(type **, const unsigned char **, long)
#define TYPEDEF_I2D_OF(type) typedef int i2d_of_##type(const type *, unsigned char **)
#define TYPEDEF_D2I2D_OF(type) \
   TYPEDEF_D2I_OF(type);      \
   TYPEDEF_I2D_OF(type)

typedef void *d2i_of_void(void **, const unsigned char **, long);
typedef int i2d_of_void(const void *, unsigned char **);
typedef int OSSL_i2d_of_void_ctx(const void *, unsigned char **, void *vctx);

/*-
* The following macros and typedefs allow an ASN1_ITEM
* to be embedded in a structure and referenced. Since
* the ASN1_ITEM pointers need to be globally accessible
* (possibly from shared libraries) they may exist in
* different forms.
 On platforms that support it the
* ASN1_ITEM structure itself will be globally exported.
* Other platforms will export a function that returns
* an ASN1_ITEM pointer.
*
* To handle both cases transparently the macros below
* should be used instead of hard coding an ASN1_ITEM
* pointer in a structure.
*
* The structure will look like this:
*
* typedef struct SOMETHING_st {
*      ...
```

```
*      ASN1_ITEM_EXP *iptr;
*      ...
* } SOMETHING;
*
* It would be initialised as e.g.:
*
* SOMETHING somevar = {...,ASN1_ITEM_ref(X509),...};
*
* and the actual pointer extracted with:
*
* const ASN1_ITEM *it = ASN1_ITEM_ptr(somevar.iptr);
*
* Finally an ASN1_ITEM pointer can be extracted from an
* appropriate reference with: ASN1_ITEM_rptr(X509). This
* would be used when a function takes an ASN1_ITEM * argument.
*
*/

/*
* Platforms that can't easily handle shared global variables are declared as
* functions returning ASN1_ITEM pointers.
*/

/* ASN1_ITEM pointer exported
 type */
typedef const ASN1_ITEM *ASN1_ITEM_EXP(void);

/* Macro to obtain ASN1_ITEM pointer from exported type */
#define ASN1_ITEM_ptr(iptr) (iptr())

/* Macro to include ASN1_ITEM pointer from base type */
#define ASN1_ITEM_ref(iptr) (iptr##_it)

#define ASN1_ITEM_rptr(ref) (ref##_it())

#define DECLARE_ASN1_ITEM_attr(attr, name) \
   attr const ASN1_ITEM *name##_it(void);
#define DECLARE_ASN1_ITEM(name) \
   DECLARE_ASN1_ITEM_attr(extern, name)

/* Parameters used by ASN1_STRING_print_ex() */

/*
* These determine which characters to escape: RFC2253 special characters,
* control characters and MSB set characters
*/

#define ASN1_STRFLGS_ESC_2253 1
```

```
#define ASN1_STRFLGS_ESC_CTRL 2
#define ASN1_STRFLGS_ESC_MSB 4

/* Lower 8 bits are reserved as an output type specifier */
#define ASN1_DTFLGS_TYPE_MASK 0x0FUL
#define ASN1_DTFLGS_RFC822 0x00UL
#define ASN1_DTFLGS_ISO8601 0x01UL

/*
* This flag determines how we do escaping: normally RC2253 backslash only,
* set this to use
 backslash and quote.
*/

#define ASN1_STRFLGS_ESC_QUOTE 8

/* These three flags are internal use only. */

/* Character is a valid PrintableString character */
#define CHARTYPE_PRINTABLESTRING 0x10
/* Character needs escaping if it is the first character */
#define CHARTYPE_FIRST_ESC_2253 0x20
/* Character needs escaping if it is the last character */
#define CHARTYPE_LAST_ESC_2253 0x40

/*
* NB the internal flags are safely reused below by flags handled at the top
* level.
*/

/*
* If this is set we convert all character strings to UTF8 first
*/

#define ASN1_STRFLGS_UTF8_CONVERT 0x10

/*
* If this is set we don't attempt to interpret content: just assume all
* strings are 1 byte per character. This will produce some pretty odd
* looking output!
*/

#define ASN1_STRFLGS_IGNORE_TYPE 0x20

/* If this is set we include the string type in the output */
#define ASN1_STRFLGS_SHOW_TYPE 0x40

/*
```

```
* This determines which strings to display and which to 'dump' (hex dump of
* content
 octets or DER encoding). We can only dump non character strings or
* everything. If we don't dump 'unknown' they are interpreted as character
* strings with 1 octet per character and are subject to the usual escaping
* options.
*/

#define ASN1_STRFLGS_DUMP_ALL 0x80
#define ASN1_STRFLGS_DUMP_UNKNOWN 0x100

/*
* These determine what 'dumping' does, we can dump the content octets or the
* DER encoding: both use the RFC2253 #XXXXX notation.
*/

#define ASN1_STRFLGS_DUMP_DER 0x200

/*
* This flag specifies that RC2254 escaping shall be performed.
*/
#define ASN1_STRFLGS_ESC_2254 0x400

/*
* All the string flags consistent with RFC2253, escaping control characters
* isn't essential in RFC2253 but it is advisable anyway.
*/

#define ASN1_STRFLGS_RFC2253 (ASN1_STRFLGS_ESC_2253 | ASN1_STRFLGS_ESC_CTRL |
ASN1_STRFLGS_ESC_MSB | ASN1_STRFLGS_UTF8_CONVERT | ASN1_STRFLGS_DUMP_UNKNOWN |
ASN1_STRFLGS_DUMP_DER)

struct asn1_type_st {
   int type;
   union {
       char *ptr;
       ASN1_BOOLEAN
 boolean;
       ASN1_STRING *asn1_string;
       ASN1_OBJECT *object;
       ASN1_INTEGER *integer;
       ASN1_ENUMERATED *enumerated;
       ASN1_BIT_STRING *bit_string;
       ASN1_OCTET_STRING *octet_string;
       ASN1_PRINTABLESTRING *printablestring;
       ASN1_T61STRING *t61string;
       ASN1_IA5STRING *ia5string;
       ASN1_GENERALSTRING *generalstring;
```

```
        ASN1_BMPSTRING *bmpstring;
        ASN1_UNIVERSALSTRING *universalstring;
        ASN1_UTCTIME *utctime;
        ASN1_GENERALIZEDTIME *generalizedtime;
        ASN1_VISIBLESTRING *visiblestring;
        ASN1_UTF8STRING *utf8string;
        /*
         * set and sequence are left complete and still contain the set or
         * sequence bytes
         */
        ASN1_STRING *set;
        ASN1_STRING *sequence;
        ASN1_VALUE *asn1_value;
    } value;
};

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ASN1_TYPE, ASN1_TYPE, ASN1_TYPE)
#define sk_ASN1_TYPE_num(sk) OPENSSL_sk_num(ossl_check_const_ASN1_TYPE_sk_type(sk))
#define
 sk_ASN1_TYPE_value(sk, idx) ((ASN1_TYPE
*)OPENSSL_sk_value(ossl_check_const_ASN1_TYPE_sk_type(sk), (idx)))
#define sk_ASN1_TYPE_new(cmp) ((STACK_OF(ASN1_TYPE)
*)OPENSSL_sk_new(ossl_check_ASN1_TYPE_compfunc_type(cmp)))
#define sk_ASN1_TYPE_new_null() ((STACK_OF(ASN1_TYPE) *)OPENSSL_sk_new_null())
#define sk_ASN1_TYPE_new_reserve(cmp, n) ((STACK_OF(ASN1_TYPE)
*)OPENSSL_sk_new_reserve(ossl_check_ASN1_TYPE_compfunc_type(cmp), (n)))
#define sk_ASN1_TYPE_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_ASN1_TYPE_sk_type(sk), (n))
#define sk_ASN1_TYPE_free(sk) OPENSSL_sk_free(ossl_check_ASN1_TYPE_sk_type(sk))
#define sk_ASN1_TYPE_zero(sk) OPENSSL_sk_zero(ossl_check_ASN1_TYPE_sk_type(sk))
#define sk_ASN1_TYPE_delete(sk, i) ((ASN1_TYPE
*)OPENSSL_sk_delete(ossl_check_ASN1_TYPE_sk_type(sk), (i)))
#define sk_ASN1_TYPE_delete_ptr(sk, ptr) ((ASN1_TYPE
*)OPENSSL_sk_delete_ptr(ossl_check_ASN1_TYPE_sk_type(sk), ossl_check_ASN1_TYPE_type(ptr)))
#define sk_ASN1_TYPE_push(sk,
 ptr) OPENSSL_sk_push(ossl_check_ASN1_TYPE_sk_type(sk), ossl_check_ASN1_TYPE_type(ptr))
#define sk_ASN1_TYPE_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_ASN1_TYPE_sk_type(sk),
ossl_check_ASN1_TYPE_type(ptr))
#define sk_ASN1_TYPE_pop(sk) ((ASN1_TYPE *)OPENSSL_sk_pop(ossl_check_ASN1_TYPE_sk_type(sk)))
#define sk_ASN1_TYPE_shift(sk) ((ASN1_TYPE *)OPENSSL_sk_shift(ossl_check_ASN1_TYPE_sk_type(sk)))
#define sk_ASN1_TYPE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASN1_TYPE_sk_type(sk),ossl_check_ASN1_TYPE_freefunc_type(freefunc))
#define sk_ASN1_TYPE_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_ASN1_TYPE_sk_type(sk),
ossl_check_ASN1_TYPE_type(ptr), (idx))
#define sk_ASN1_TYPE_set(sk, idx, ptr) ((ASN1_TYPE
*)OPENSSL_sk_set(ossl_check_ASN1_TYPE_sk_type(sk), (idx), ossl_check_ASN1_TYPE_type(ptr)))
#define sk_ASN1_TYPE_find(sk, ptr) OPENSSL_sk_find(ossl_check_ASN1_TYPE_sk_type(sk),
ossl_check_ASN1_TYPE_type(ptr))
```

```
#define sk_ASN1_TYPE_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_ASN1_TYPE_sk_type(sk),
 ossl_check_ASN1_TYPE_type(ptr))
#define sk_ASN1_TYPE_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_ASN1_TYPE_sk_type(sk),
ossl_check_ASN1_TYPE_type(ptr), pnum)
#define sk_ASN1_TYPE_sort(sk) OPENSSL_sk_sort(ossl_check_ASN1_TYPE_sk_type(sk))
#define sk_ASN1_TYPE_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_ASN1_TYPE_sk_type(sk))
#define sk_ASN1_TYPE_dup(sk) ((STACK_OF(ASN1_TYPE)
*)OPENSSL_sk_dup(ossl_check_const_ASN1_TYPE_sk_type(sk)))
#define sk_ASN1_TYPE_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ASN1_TYPE)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASN1_TYPE_sk_type(sk),
ossl_check_ASN1_TYPE_copyfunc_type(copyfunc), ossl_check_ASN1_TYPE_freefunc_type(freefunc)))
#define sk_ASN1_TYPE_set_cmp_func(sk, cmp)
((sk_ASN1_TYPE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASN1_TYPE_sk_type(sk),
ossl_check_ASN1_TYPE_compfunc_type(cmp)))

/* clang-format on */

typedef STACK_OF(ASN1_TYPE) ASN1_SEQUENCE_ANY;

DECLARE_ASN1_ENCODE_FUNCTIONS_name(ASN1_SEQUENCE_ANY,
 ASN1_SEQUENCE_ANY)
DECLARE_ASN1_ENCODE_FUNCTIONS_name(ASN1_SEQUENCE_ANY, ASN1_SET_ANY)

/* This is used to contain a list of bit names */
typedef struct BIT_STRING_BITNAME_st {
   int bitnum;
   const char *lname;
   const char *sname;
} BIT_STRING_BITNAME;

#define B_ASN1_TIME \
   B_ASN1_UTCTIME | B_ASN1_GENERALIZEDTIME

#define B_ASN1_PRINTABLE \
   B_ASN1_NUMERICSTRING | B_ASN1_PRINTABLESTRING | B_ASN1_T61STRING |
B_ASN1_IA5STRING | B_ASN1_BIT_STRING | B_ASN1_UNIVERSALSTRING | B_ASN1_BMPSTRING |
B_ASN1_UTF8STRING | B_ASN1_SEQUENCE | B_ASN1_UNKNOWN

#define B_ASN1_DIRECTORYSTRING \
   B_ASN1_PRINTABLESTRING | B_ASN1_TELETEXSTRING | B_ASN1_BMPSTRING |
B_ASN1_UNIVERSALSTRING | B_ASN1_UTF8STRING

#define B_ASN1_DISPLAYTEXT \
   B_ASN1_IA5STRING | B_ASN1_VISIBLESTRING | B_ASN1_BMPSTRING | B_ASN1_UTF8STRING

DECLARE_ASN1_ALLOC_FUNCTIONS_name(ASN1_TYPE, ASN1_TYPE)
DECLARE_ASN1_ENCODE_FUNCTIONS(ASN1_TYPE, ASN1_ANY, ASN1_TYPE)
```

```
int ASN1_TYPE_get(const ASN1_TYPE *a);
void ASN1_TYPE_set(ASN1_TYPE
 *a, int type, void *value);
int ASN1_TYPE_set1(ASN1_TYPE *a, int type, const void *value);
int ASN1_TYPE_cmp(const ASN1_TYPE *a, const ASN1_TYPE *b);

ASN1_TYPE *ASN1_TYPE_pack_sequence(const ASN1_ITEM *it, void *s, ASN1_TYPE **t);
void *ASN1_TYPE_unpack_sequence(const ASN1_ITEM *it, const ASN1_TYPE *t);

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ASN1_OBJECT, ASN1_OBJECT, ASN1_OBJECT)
#define sk_ASN1_OBJECT_num(sk) OPENSSL_sk_num(ossl_check_const_ASN1_OBJECT_sk_type(sk))
#define sk_ASN1_OBJECT_value(sk, idx) ((ASN1_OBJECT
*)OPENSSL_sk_value(ossl_check_const_ASN1_OBJECT_sk_type(sk), (idx)))
#define sk_ASN1_OBJECT_new(cmp) ((STACK_OF(ASN1_OBJECT)
*)OPENSSL_sk_new(ossl_check_ASN1_OBJECT_compfunc_type(cmp)))
#define sk_ASN1_OBJECT_new_null() ((STACK_OF(ASN1_OBJECT) *)OPENSSL_sk_new_null())
#define sk_ASN1_OBJECT_new_reserve(cmp, n) ((STACK_OF(ASN1_OBJECT)
*)OPENSSL_sk_new_reserve(ossl_check_ASN1_OBJECT_compfunc_type(cmp), (n)))
#define sk_ASN1_OBJECT_reserve(sk,
 n) OPENSSL_sk_reserve(ossl_check_ASN1_OBJECT_sk_type(sk), (n))
#define sk_ASN1_OBJECT_free(sk) OPENSSL_sk_free(ossl_check_ASN1_OBJECT_sk_type(sk))
#define sk_ASN1_OBJECT_zero(sk) OPENSSL_sk_zero(ossl_check_ASN1_OBJECT_sk_type(sk))
#define sk_ASN1_OBJECT_delete(sk, i) ((ASN1_OBJECT
*)OPENSSL_sk_delete(ossl_check_ASN1_OBJECT_sk_type(sk), (i)))
#define sk_ASN1_OBJECT_delete_ptr(sk, ptr) ((ASN1_OBJECT
*)OPENSSL_sk_delete_ptr(ossl_check_ASN1_OBJECT_sk_type(sk), ossl_check_ASN1_OBJECT_type(ptr)))
#define sk_ASN1_OBJECT_push(sk, ptr) OPENSSL_sk_push(ossl_check_ASN1_OBJECT_sk_type(sk),
ossl_check_ASN1_OBJECT_type(ptr))
#define sk_ASN1_OBJECT_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_ASN1_OBJECT_sk_type(sk),
ossl_check_ASN1_OBJECT_type(ptr))
#define sk_ASN1_OBJECT_pop(sk) ((ASN1_OBJECT
*)OPENSSL_sk_pop(ossl_check_ASN1_OBJECT_sk_type(sk)))
#define sk_ASN1_OBJECT_shift(sk) ((ASN1_OBJECT
*)OPENSSL_sk_shift(ossl_check_ASN1_OBJECT_sk_type(sk)))
#define sk_ASN1_OBJECT_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASN1_OBJECT_sk_type(sk),ossl_check_ASN1_OBJECT_freefunc_type(free
func))
#define sk_ASN1_OBJECT_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_ASN1_OBJECT_sk_type(sk),
ossl_check_ASN1_OBJECT_type(ptr), (idx))
#define sk_ASN1_OBJECT_set(sk, idx, ptr) ((ASN1_OBJECT
*)OPENSSL_sk_set(ossl_check_ASN1_OBJECT_sk_type(sk), (idx), ossl_check_ASN1_OBJECT_type(ptr)))
#define sk_ASN1_OBJECT_find(sk, ptr) OPENSSL_sk_find(ossl_check_ASN1_OBJECT_sk_type(sk),
ossl_check_ASN1_OBJECT_type(ptr))
#define sk_ASN1_OBJECT_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_ASN1_OBJECT_sk_type(sk),
ossl_check_ASN1_OBJECT_type(ptr))
#define sk_ASN1_OBJECT_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ASN1_OBJECT_sk_type(sk), ossl_check_ASN1_OBJECT_type(ptr), pnum)
```

```
#define sk_ASN1_OBJECT_sort(sk) OPENSSL_sk_sort(ossl_check_ASN1_OBJECT_sk_type(sk))
#define sk_ASN1_OBJECT_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_ASN1_OBJECT_sk_type(sk))
#define sk_ASN1_OBJECT_dup(sk)
 ((STACK_OF(ASN1_OBJECT) *)OPENSSL_sk_dup(ossl_check_const_ASN1_OBJECT_sk_type(sk)))
#define sk_ASN1_OBJECT_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ASN1_OBJECT)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASN1_OBJECT_sk_type(sk),
ossl_check_ASN1_OBJECT_copyfunc_type(copyfunc), ossl_check_ASN1_OBJECT_freefunc_type(freefunc)))
#define sk_ASN1_OBJECT_set_cmp_func(sk, cmp)
((sk_ASN1_OBJECT_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASN1_OBJECT_sk_type(sk),
ossl_check_ASN1_OBJECT_compfunc_type(cmp)))

/* clang-format on */

DECLARE_ASN1_FUNCTIONS(ASN1_OBJECT)

ASN1_STRING *ASN1_STRING_new(void);
void ASN1_STRING_free(ASN1_STRING *a);
void ASN1_STRING_clear_free(ASN1_STRING *a);
int ASN1_STRING_copy(ASN1_STRING *dst, const ASN1_STRING *str);
DECLARE_ASN1_DUP_FUNCTION(ASN1_STRING)
ASN1_STRING *ASN1_STRING_type_new(int type);
int ASN1_STRING_cmp(const ASN1_STRING *a, const ASN1_STRING *b);
/*
* Since this is used to store all sorts of things, via macros, for now,
* make its data void *
*/
int
 ASN1_STRING_set(ASN1_STRING *str, const void *data, int len);
void ASN1_STRING_set0(ASN1_STRING *str, void *data, int len);
int ASN1_STRING_length(const ASN1_STRING *x);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 void ASN1_STRING_length_set(ASN1_STRING *x, int n);
#endif
int ASN1_STRING_type(const ASN1_STRING *x);
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 unsigned char *ASN1_STRING_data(ASN1_STRING *x);
#endif
const unsigned char *ASN1_STRING_get0_data(const ASN1_STRING *x);

DECLARE_ASN1_FUNCTIONS(ASN1_BIT_STRING)
int ASN1_BIT_STRING_set(ASN1_BIT_STRING *a, unsigned char *d, int length);
int ASN1_BIT_STRING_set_bit(ASN1_BIT_STRING *a, int n, int value);
int ASN1_BIT_STRING_get_bit(const ASN1_BIT_STRING *a, int n);
int ASN1_BIT_STRING_check(const ASN1_BIT_STRING *a,
   const unsigned char *flags, int flags_len);

int ASN1_BIT_STRING_name_print(BIO *out, ASN1_BIT_STRING *bs,
```

```
   BIT_STRING_BITNAME *tbl, int indent);
int ASN1_BIT_STRING_num_asc(const
 char *name, BIT_STRING_BITNAME *tbl);
int ASN1_BIT_STRING_set_asc(ASN1_BIT_STRING *bs, const char *name, int value,
   BIT_STRING_BITNAME *tbl);

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ASN1_INTEGER, ASN1_INTEGER, ASN1_INTEGER)
#define sk_ASN1_INTEGER_num(sk) OPENSSL_sk_num(ossl_check_const_ASN1_INTEGER_sk_type(sk))
#define sk_ASN1_INTEGER_value(sk, idx) ((ASN1_INTEGER
*)OPENSSL_sk_value(ossl_check_const_ASN1_INTEGER_sk_type(sk), (idx)))
#define sk_ASN1_INTEGER_new(cmp) ((STACK_OF(ASN1_INTEGER)
*)OPENSSL_sk_new(ossl_check_ASN1_INTEGER_compfunc_type(cmp)))
#define sk_ASN1_INTEGER_new_null() ((STACK_OF(ASN1_INTEGER) *)OPENSSL_sk_new_null())
#define sk_ASN1_INTEGER_new_reserve(cmp, n) ((STACK_OF(ASN1_INTEGER)
*)OPENSSL_sk_new_reserve(ossl_check_ASN1_INTEGER_compfunc_type(cmp), (n)))
#define sk_ASN1_INTEGER_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_ASN1_INTEGER_sk_type(sk),
(n))
#define sk_ASN1_INTEGER_free(sk) OPENSSL_sk_free(ossl_check_ASN1_INTEGER_sk_type(sk))
#define sk_ASN1_INTEGER_zero(sk)
 OPENSSL_sk_zero(ossl_check_ASN1_INTEGER_sk_type(sk))
#define sk_ASN1_INTEGER_delete(sk, i) ((ASN1_INTEGER
*)OPENSSL_sk_delete(ossl_check_ASN1_INTEGER_sk_type(sk), (i)))
#define sk_ASN1_INTEGER_delete_ptr(sk, ptr) ((ASN1_INTEGER
*)OPENSSL_sk_delete_ptr(ossl_check_ASN1_INTEGER_sk_type(sk), ossl_check_ASN1_INTEGER_type(ptr)))
#define sk_ASN1_INTEGER_push(sk, ptr) OPENSSL_sk_push(ossl_check_ASN1_INTEGER_sk_type(sk),
ossl_check_ASN1_INTEGER_type(ptr))
#define sk_ASN1_INTEGER_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_ASN1_INTEGER_sk_type(sk),
ossl_check_ASN1_INTEGER_type(ptr))
#define sk_ASN1_INTEGER_pop(sk) ((ASN1_INTEGER
*)OPENSSL_sk_pop(ossl_check_ASN1_INTEGER_sk_type(sk)))
#define sk_ASN1_INTEGER_shift(sk) ((ASN1_INTEGER
*)OPENSSL_sk_shift(ossl_check_ASN1_INTEGER_sk_type(sk)))
#define sk_ASN1_INTEGER_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASN1_INTEGER_sk_type(sk),ossl_check_ASN1_INTEGER_freefunc_type(f
reefunc))
#define sk_ASN1_INTEGER_insert(sk,
 ptr, idx) OPENSSL_sk_insert(ossl_check_ASN1_INTEGER_sk_type(sk), ossl_check_ASN1_INTEGER_type(ptr),
(idx))
#define sk_ASN1_INTEGER_set(sk, idx, ptr) ((ASN1_INTEGER
*)OPENSSL_sk_set(ossl_check_ASN1_INTEGER_sk_type(sk), (idx), ossl_check_ASN1_INTEGER_type(ptr)))
#define sk_ASN1_INTEGER_find(sk, ptr) OPENSSL_sk_find(ossl_check_ASN1_INTEGER_sk_type(sk),
ossl_check_ASN1_INTEGER_type(ptr))
#define sk_ASN1_INTEGER_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_ASN1_INTEGER_sk_type(sk),
ossl_check_ASN1_INTEGER_type(ptr))
#define sk_ASN1_INTEGER_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ASN1_INTEGER_sk_type(sk), ossl_check_ASN1_INTEGER_type(ptr), pnum)
#define sk_ASN1_INTEGER_sort(sk) OPENSSL_sk_sort(ossl_check_ASN1_INTEGER_sk_type(sk))
```

```
#define sk_ASN1_INTEGER_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_ASN1_INTEGER_sk_type(sk))
#define sk_ASN1_INTEGER_dup(sk) ((STACK_OF(ASN1_INTEGER)
*)OPENSSL_sk_dup(ossl_check_const_ASN1_INTEGER_sk_type(sk)))
#define sk_ASN1_INTEGER_deep_copy(sk,
 copyfunc, freefunc) ((STACK_OF(ASN1_INTEGER)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASN1_INTEGER_sk_type(sk),
ossl_check_ASN1_INTEGER_copyfunc_type(copyfunc), ossl_check_ASN1_INTEGER_freefunc_type(freefunc)))
#define sk_ASN1_INTEGER_set_cmp_func(sk, cmp)
((sk_ASN1_INTEGER_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASN1_INTEGER_sk_type(sk),
ossl_check_ASN1_INTEGER_compfunc_type(cmp)))

/* clang-format on */

DECLARE_ASN1_FUNCTIONS(ASN1_INTEGER)
ASN1_INTEGER *d2i_ASN1_UINTEGER(ASN1_INTEGER **a, const unsigned char **pp,
  long length);
DECLARE_ASN1_DUP_FUNCTION(ASN1_INTEGER)
int ASN1_INTEGER_cmp(const ASN1_INTEGER *x, const ASN1_INTEGER *y);

DECLARE_ASN1_FUNCTIONS(ASN1_ENUMERATED)

int ASN1_UTCTIME_check(const ASN1_UTCTIME *a);
ASN1_UTCTIME *ASN1_UTCTIME_set(ASN1_UTCTIME *s, time_t t);
ASN1_UTCTIME *ASN1_UTCTIME_adj(ASN1_UTCTIME *s, time_t t,
  int offset_day, long offset_sec);
int ASN1_UTCTIME_set_string(ASN1_UTCTIME *s, const char *str);
int ASN1_UTCTIME_cmp_time_t(const
 ASN1_UTCTIME *s, time_t t);

int ASN1_GENERALIZEDTIME_check(const ASN1_GENERALIZEDTIME *a);
ASN1_GENERALIZEDTIME *ASN1_GENERALIZEDTIME_set(ASN1_GENERALIZEDTIME *s,
  time_t t);
ASN1_GENERALIZEDTIME *ASN1_GENERALIZEDTIME_adj(ASN1_GENERALIZEDTIME *s,
  time_t t, int offset_day,
  long offset_sec);
int ASN1_GENERALIZEDTIME_set_string(ASN1_GENERALIZEDTIME *s, const char *str);

int ASN1_TIME_diff(int *pday, int *psec,
  const ASN1_TIME *from, const ASN1_TIME *to);

DECLARE_ASN1_FUNCTIONS(ASN1_OCTET_STRING)
DECLARE_ASN1_DUP_FUNCTION(ASN1_OCTET_STRING)
int ASN1_OCTET_STRING_cmp(const ASN1_OCTET_STRING *a,
  const ASN1_OCTET_STRING *b);
int ASN1_OCTET_STRING_set(ASN1_OCTET_STRING *str, const unsigned char *data,
  int len);
```

```
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ASN1_UTF8STRING, ASN1_UTF8STRING, ASN1_UTF8STRING)
#define sk_ASN1_UTF8STRING_num(sk)
OPENSSL_sk_num(ossl_check_const_ASN1_UTF8STRING_sk_type(sk))
#define sk_ASN1_UTF8STRING_value(sk, idx) ((ASN1_UTF8STRING
 *)OPENSSL_sk_value(ossl_check_const_ASN1_UTF8STRING_sk_type(sk), (idx)))
#define sk_ASN1_UTF8STRING_new(cmp) ((STACK_OF(ASN1_UTF8STRING)
*)OPENSSL_sk_new(ossl_check_ASN1_UTF8STRING_compfunc_type(cmp)))
#define sk_ASN1_UTF8STRING_new_null() ((STACK_OF(ASN1_UTF8STRING) *)OPENSSL_sk_new_null())
#define sk_ASN1_UTF8STRING_new_reserve(cmp, n) ((STACK_OF(ASN1_UTF8STRING)
*)OPENSSL_sk_new_reserve(ossl_check_ASN1_UTF8STRING_compfunc_type(cmp), (n)))
#define sk_ASN1_UTF8STRING_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_ASN1_UTF8STRING_sk_type(sk), (n))
#define sk_ASN1_UTF8STRING_free(sk) OPENSSL_sk_free(ossl_check_ASN1_UTF8STRING_sk_type(sk))
#define sk_ASN1_UTF8STRING_zero(sk) OPENSSL_sk_zero(ossl_check_ASN1_UTF8STRING_sk_type(sk))
#define sk_ASN1_UTF8STRING_delete(sk, i) ((ASN1_UTF8STRING
*)OPENSSL_sk_delete(ossl_check_ASN1_UTF8STRING_sk_type(sk), (i)))
#define sk_ASN1_UTF8STRING_delete_ptr(sk, ptr) ((ASN1_UTF8STRING
*)OPENSSL_sk_delete_ptr(ossl_check_ASN1_UTF8STRING_sk_type(sk),
ossl_check_ASN1_UTF8STRING_type(ptr)))
#define
 sk_ASN1_UTF8STRING_push(sk, ptr) OPENSSL_sk_push(ossl_check_ASN1_UTF8STRING_sk_type(sk),
ossl_check_ASN1_UTF8STRING_type(ptr))
#define sk_ASN1_UTF8STRING_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_ASN1_UTF8STRING_sk_type(sk),
ossl_check_ASN1_UTF8STRING_type(ptr))
#define sk_ASN1_UTF8STRING_pop(sk) ((ASN1_UTF8STRING
*)OPENSSL_sk_pop(ossl_check_ASN1_UTF8STRING_sk_type(sk)))
#define sk_ASN1_UTF8STRING_shift(sk) ((ASN1_UTF8STRING
*)OPENSSL_sk_shift(ossl_check_ASN1_UTF8STRING_sk_type(sk)))
#define sk_ASN1_UTF8STRING_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASN1_UTF8STRING_sk_type(sk),ossl_check_ASN1_UTF8STRING_freefun
c_type(freefunc))
#define sk_ASN1_UTF8STRING_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_ASN1_UTF8STRING_sk_type(sk), ossl_check_ASN1_UTF8STRING_type(ptr),
(idx))
#define sk_ASN1_UTF8STRING_set(sk, idx, ptr) ((ASN1_UTF8STRING
*)OPENSSL_sk_set(ossl_check_ASN1_UTF8STRING_sk_type(sk), (idx),
ossl_check_ASN1_UTF8STRING_type(ptr)))
#define
 sk_ASN1_UTF8STRING_find(sk, ptr) OPENSSL_sk_find(ossl_check_ASN1_UTF8STRING_sk_type(sk),
ossl_check_ASN1_UTF8STRING_type(ptr))
#define sk_ASN1_UTF8STRING_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_ASN1_UTF8STRING_sk_type(sk),
ossl_check_ASN1_UTF8STRING_type(ptr))
#define sk_ASN1_UTF8STRING_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ASN1_UTF8STRING_sk_type(sk),
ossl_check_ASN1_UTF8STRING_type(ptr), pnum)
```

```
#define sk_ASN1_UTF8STRING_sort(sk) OPENSSL_sk_sort(ossl_check_ASN1_UTF8STRING_sk_type(sk))
#define sk_ASN1_UTF8STRING_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_ASN1_UTF8STRING_sk_type(sk))
#define sk_ASN1_UTF8STRING_dup(sk) ((STACK_OF(ASN1_UTF8STRING)
*)OPENSSL_sk_dup(ossl_check_const_ASN1_UTF8STRING_sk_type(sk)))
#define sk_ASN1_UTF8STRING_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ASN1_UTF8STRING)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASN1_UTF8STRING_sk_type(sk),
ossl_check_ASN1_UTF8STRING_copyfunc_type(copyfunc),
ossl_check_ASN1_UTF8STRING_freefunc_type(freefunc)))
#define
 sk_ASN1_UTF8STRING_set_cmp_func(sk, cmp)
((sk_ASN1_UTF8STRING_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASN1_UTF8STRING_sk_type(sk
), ossl_check_ASN1_UTF8STRING_compfunc_type(cmp)))

/* clang-format on */

DECLARE_ASN1_FUNCTIONS(ASN1_VISIBLESTRING)
DECLARE_ASN1_FUNCTIONS(ASN1_UNIVERSALSTRING)
DECLARE_ASN1_FUNCTIONS(ASN1_UTF8STRING)
DECLARE_ASN1_FUNCTIONS(ASN1_NULL)
DECLARE_ASN1_FUNCTIONS(ASN1_BMPSTRING)

int UTF8_getc(const unsigned char *str, int len, unsigned long *val);
int UTF8_putc(unsigned char *str, int len, unsigned long value);

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ASN1_GENERALSTRING, ASN1_GENERALSTRING,
ASN1_GENERALSTRING)
#define sk_ASN1_GENERALSTRING_num(sk)
OPENSSL_sk_num(ossl_check_const_ASN1_GENERALSTRING_sk_type(sk))
#define sk_ASN1_GENERALSTRING_value(sk, idx) ((ASN1_GENERALSTRING
*)OPENSSL_sk_value(ossl_check_const_ASN1_GENERALSTRING_sk_type(sk), (idx)))
#define sk_ASN1_GENERALSTRING_new(cmp) ((STACK_OF(ASN1_GENERALSTRING)
 *)OPENSSL_sk_new(ossl_check_ASN1_GENERALSTRING_compfunc_type(cmp)))
#define sk_ASN1_GENERALSTRING_new_null() ((STACK_OF(ASN1_GENERALSTRING)
*)OPENSSL_sk_new_null())
#define sk_ASN1_GENERALSTRING_new_reserve(cmp, n) ((STACK_OF(ASN1_GENERALSTRING)
*)OPENSSL_sk_new_reserve(ossl_check_ASN1_GENERALSTRING_compfunc_type(cmp), (n)))
#define sk_ASN1_GENERALSTRING_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_ASN1_GENERALSTRING_sk_type(sk), (n))
#define sk_ASN1_GENERALSTRING_free(sk)
OPENSSL_sk_free(ossl_check_ASN1_GENERALSTRING_sk_type(sk))
#define sk_ASN1_GENERALSTRING_zero(sk)
OPENSSL_sk_zero(ossl_check_ASN1_GENERALSTRING_sk_type(sk))
#define sk_ASN1_GENERALSTRING_delete(sk, i) ((ASN1_GENERALSTRING
*)OPENSSL_sk_delete(ossl_check_ASN1_GENERALSTRING_sk_type(sk), (i)))
#define sk_ASN1_GENERALSTRING_delete_ptr(sk, ptr) ((ASN1_GENERALSTRING
*)OPENSSL_sk_delete_ptr(ossl_check_ASN1_GENERALSTRING_sk_type(sk),
```

```
ossl_check_ASN1_GENERALSTRING_type(ptr)))
#define sk_ASN1_GENERALSTRING_push(sk,
 ptr) OPENSSL_sk_push(ossl_check_ASN1_GENERALSTRING_sk_type(sk),
ossl_check_ASN1_GENERALSTRING_type(ptr))
#define sk_ASN1_GENERALSTRING_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_ASN1_GENERALSTRING_sk_type(sk),
ossl_check_ASN1_GENERALSTRING_type(ptr))
#define sk_ASN1_GENERALSTRING_pop(sk) ((ASN1_GENERALSTRING
*)OPENSSL_sk_pop(ossl_check_ASN1_GENERALSTRING_sk_type(sk)))
#define sk_ASN1_GENERALSTRING_shift(sk) ((ASN1_GENERALSTRING
*)OPENSSL_sk_shift(ossl_check_ASN1_GENERALSTRING_sk_type(sk)))
#define sk_ASN1_GENERALSTRING_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASN1_GENERALSTRING_sk_type(sk),ossl_check_ASN1_GENERALSTRI
NG_freefunc_type(freefunc))
#define sk_ASN1_GENERALSTRING_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_ASN1_GENERALSTRING_sk_type(sk),
ossl_check_ASN1_GENERALSTRING_type(ptr), (idx))
#define sk_ASN1_GENERALSTRING_set(sk, idx, ptr) ((ASN1_GENERALSTRING
*)OPENSSL_sk_set(ossl_check_ASN1_GENERALSTRING_sk_type(sk), (idx),
ossl_check_ASN1_GENERALSTRING_type(ptr)))
#define
 sk_ASN1_GENERALSTRING_find(sk, ptr)
OPENSSL_sk_find(ossl_check_ASN1_GENERALSTRING_sk_type(sk),
ossl_check_ASN1_GENERALSTRING_type(ptr))
#define sk_ASN1_GENERALSTRING_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_ASN1_GENERALSTRING_sk_type(sk),
ossl_check_ASN1_GENERALSTRING_type(ptr))
#define sk_ASN1_GENERALSTRING_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ASN1_GENERALSTRING_sk_type(sk),
ossl_check_ASN1_GENERALSTRING_type(ptr), pnum)
#define sk_ASN1_GENERALSTRING_sort(sk)
OPENSSL_sk_sort(ossl_check_ASN1_GENERALSTRING_sk_type(sk))
#define sk_ASN1_GENERALSTRING_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_ASN1_GENERALSTRING_sk_type(sk))
#define sk_ASN1_GENERALSTRING_dup(sk) ((STACK_OF(ASN1_GENERALSTRING)
*)OPENSSL_sk_dup(ossl_check_const_ASN1_GENERALSTRING_sk_type(sk)))
#define sk_ASN1_GENERALSTRING_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(ASN1_GENERALSTRING)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASN1_GENERALSTRING_sk_type(sk),
ossl_check_ASN1_GENERALSTRING_copyfunc_type(copyfunc),
 ossl_check_ASN1_GENERALSTRING_freefunc_type(freefunc)))
#define sk_ASN1_GENERALSTRING_set_cmp_func(sk, cmp)
((sk_ASN1_GENERALSTRING_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASN1_GENERALSTRING
_sk_type(sk), ossl_check_ASN1_GENERALSTRING_compfunc_type(cmp)))

/* clang-format on */

DECLARE_ASN1_FUNCTIONS_name(ASN1_STRING, ASN1_PRINTABLE)
```

```
DECLARE_ASN1_FUNCTIONS_name(ASN1_STRING, DIRECTORYSTRING)
DECLARE_ASN1_FUNCTIONS_name(ASN1_STRING, DISPLAYTEXT)
DECLARE_ASN1_FUNCTIONS(ASN1_PRINTABLESTRING)
DECLARE_ASN1_FUNCTIONS(ASN1_T61STRING)
DECLARE_ASN1_FUNCTIONS(ASN1_IA5STRING)
DECLARE_ASN1_FUNCTIONS(ASN1_GENERALSTRING)
DECLARE_ASN1_FUNCTIONS(ASN1_UTCTIME)
DECLARE_ASN1_FUNCTIONS(ASN1_GENERALIZEDTIME)
DECLARE_ASN1_FUNCTIONS(ASN1_TIME)

DECLARE_ASN1_DUP_FUNCTION(ASN1_TIME)
DECLARE_ASN1_DUP_FUNCTION(ASN1_UTCTIME)
DECLARE_ASN1_DUP_FUNCTION(ASN1_GENERALIZEDTIME)

DECLARE_ASN1_ITEM(ASN1_OCTET_STRING_NDEF)

ASN1_TIME *ASN1_TIME_set(ASN1_TIME *s, time_t t);
ASN1_TIME
 *ASN1_TIME_adj(ASN1_TIME *s, time_t t,
   int offset_day, long offset_sec);
int ASN1_TIME_check(const ASN1_TIME *t);
ASN1_GENERALIZEDTIME *ASN1_TIME_to_generalizedtime(const ASN1_TIME *t,
   ASN1_GENERALIZEDTIME **out);
int ASN1_TIME_set_string(ASN1_TIME *s, const char *str);
int ASN1_TIME_set_string_X509(ASN1_TIME *s, const char *str);
int ASN1_TIME_to_tm(const ASN1_TIME *s, struct tm *tm);
int ASN1_TIME_normalize(ASN1_TIME *s);
int ASN1_TIME_cmp_time_t(const ASN1_TIME *s, time_t t);
int ASN1_TIME_compare(const ASN1_TIME *a, const ASN1_TIME *b);

int i2a_ASN1_INTEGER(BIO *bp, const ASN1_INTEGER *a);
int a2i_ASN1_INTEGER(BIO *bp, ASN1_INTEGER *bs, char *buf, int size);
int i2a_ASN1_ENUMERATED(BIO *bp, const ASN1_ENUMERATED *a);
int a2i_ASN1_ENUMERATED(BIO *bp, ASN1_ENUMERATED *bs, char *buf, int size);
int i2a_ASN1_OBJECT(BIO *bp, const ASN1_OBJECT *a);
int a2i_ASN1_STRING(BIO *bp, ASN1_STRING *bs, char *buf, int size);
int i2a_ASN1_STRING(BIO *bp, const ASN1_STRING *a, int type);
int
 i2t_ASN1_OBJECT(char *buf, int buf_len, const ASN1_OBJECT *a);

int a2d_ASN1_OBJECT(unsigned char *out, int olen, const char *buf, int num);
ASN1_OBJECT *ASN1_OBJECT_create(int nid, unsigned char *data, int len,
   const char *sn, const char *ln);

int ASN1_INTEGER_get_int64(int64_t *pr, const ASN1_INTEGER *a);
int ASN1_INTEGER_set_int64(ASN1_INTEGER *a, int64_t r);
int ASN1_INTEGER_get_uint64(uint64_t *pr, const ASN1_INTEGER *a);
```

```
int ASN1_INTEGER_set_uint64(ASN1_INTEGER *a, uint64_t r);

int ASN1_INTEGER_set(ASN1_INTEGER *a, long v);
long ASN1_INTEGER_get(const ASN1_INTEGER *a);
ASN1_INTEGER *BN_to_ASN1_INTEGER(const BIGNUM *bn, ASN1_INTEGER *ai);
BIGNUM *ASN1_INTEGER_to_BN(const ASN1_INTEGER *ai, BIGNUM *bn);

int ASN1_ENUMERATED_get_int64(int64_t *pr, const ASN1_ENUMERATED *a);
int ASN1_ENUMERATED_set_int64(ASN1_ENUMERATED *a, int64_t r);

int ASN1_ENUMERATED_set(ASN1_ENUMERATED *a, long v);
long ASN1_ENUMERATED_get(const ASN1_ENUMERATED *a);
ASN1_ENUMERATED *BN_to_ASN1_ENUMERATED(const
 BIGNUM *bn, ASN1_ENUMERATED *ai);
BIGNUM *ASN1_ENUMERATED_to_BN(const ASN1_ENUMERATED *ai, BIGNUM *bn);

/* General */
/* given a string, return the correct type, max is the maximum length */
int ASN1_PRINTABLE_type(const unsigned char *s, int max);

unsigned long ASN1_tag2bit(int tag);

/* SPECIALS */
int ASN1_get_object(const unsigned char **pp, long *plength, int *ptag,
   int *pclass, long omax);
int ASN1_check_infinite_end(unsigned char **p, long len);
int ASN1_const_check_infinite_end(const unsigned char **p, long len);
void ASN1_put_object(unsigned char **pp, int constructed, int length,
   int tag, int xclass);
int ASN1_put_eoc(unsigned char **pp);
int ASN1_object_size(int constructed, int length, int tag);

/* Used to implement other functions */
void *ASN1_dup(i2d_of_void *i2d, d2i_of_void *d2i, const void *x);

#define ASN1_dup_of(type, i2d, d2i, x)          \
   ((type *)ASN1_dup(CHECKED_I2D_OF(type, i2d), \
       CHECKED_D2I_OF(type, d2i),              \

     CHECKED_PTR_OF(const type, x)))

void *ASN1_item_dup(const ASN1_ITEM *it, const void *x);
int ASN1_item_sign_ex(const ASN1_ITEM *it, X509_ALGOR *algor1,
   X509_ALGOR *algor2, ASN1_BIT_STRING *signature,
   const void *data, const ASN1_OCTET_STRING *id,
   EVP_PKEY *pkey, const EVP_MD *md, OSSL_LIB_CTX *libctx,
   const char *propq);
int ASN1_item_verify_ex(const ASN1_ITEM *it, const X509_ALGOR *alg,
```

```
   const ASN1_BIT_STRING *signature, const void *data,
   const ASN1_OCTET_STRING *id, EVP_PKEY *pkey,
   OSSL_LIB_CTX *libctx, const char *propq);

/* ASN1 alloc/free macros for when a type is only used internally */

#define M_ASN1_new_of(type) (type *)ASN1_item_new(ASN1_ITEM_rptr(type))
#define M_ASN1_free_of(x, type) \
   ASN1_item_free(CHECKED_PTR_OF(type, x), ASN1_ITEM_rptr(type))

#ifndef OPENSSL_NO_STDIO
void *ASN1_d2i_fp(void *(*xnew)(void), d2i_of_void *d2i, FILE *in, void **x);

#define ASN1_d2i_fp_of(type, xnew, d2i, in, x)       \
   ((type *)ASN1_d2i_fp(CHECKED_NEW_OF(type,
 xnew), \
       CHECKED_D2I_OF(type, d2i),                    \
       in,                                           \
       CHECKED_PPTR_OF(type, x)))

void *ASN1_item_d2i_fp_ex(const ASN1_ITEM *it, FILE *in, void *x,
   OSSL_LIB_CTX *libctx, const char *propq);
void *ASN1_item_d2i_fp(const ASN1_ITEM *it, FILE *in, void *x);
int ASN1_i2d_fp(i2d_of_void *i2d, FILE *out, const void *x);

#define ASN1_i2d_fp_of(type, i2d, out, x)   \
   (ASN1_i2d_fp(CHECKED_I2D_OF(type, i2d), \
       out,                                \
       CHECKED_PTR_OF(const type, x)))

int ASN1_item_i2d_fp(const ASN1_ITEM *it, FILE *out, const void *x);
int ASN1_STRING_print_ex_fp(FILE *fp, const ASN1_STRING *str, unsigned long flags);
#endif

int ASN1_STRING_to_UTF8(unsigned char **out, const ASN1_STRING *in);

void *ASN1_d2i_bio(void *(*xnew)(void), d2i_of_void *d2i, BIO *in, void **x);

#define ASN1_d2i_bio_of(type, xnew, d2i, in, x)       \
   ((type *)ASN1_d2i_bio(CHECKED_NEW_OF(type, xnew),
 \
       CHECKED_D2I_OF(type, d2i),                    \
       in,                                           \
       CHECKED_PPTR_OF(type, x)))

void *ASN1_item_d2i_bio_ex(const ASN1_ITEM *it, BIO *in, void *pval,
   OSSL_LIB_CTX *libctx, const char *propq);
void *ASN1_item_d2i_bio(const ASN1_ITEM *it, BIO *in, void *pval);
```

```
int ASN1_i2d_bio(i2d_of_void *i2d, BIO *out, const void *x);

#define ASN1_i2d_bio_of(type, i2d, out, x)   \
   (ASN1_i2d_bio(CHECKED_I2D_OF(type, i2d), \
      out,                                  \
      CHECKED_PTR_OF(const type, x)))

int ASN1_item_i2d_bio(const ASN1_ITEM *it, BIO *out, const void *x);
BIO *ASN1_item_i2d_mem_bio(const ASN1_ITEM *it, const ASN1_VALUE *val);
int ASN1_UTCTIME_print(BIO *fp, const ASN1_UTCTIME *a);
int ASN1_GENERALIZEDTIME_print(BIO *fp, const ASN1_GENERALIZEDTIME *a);
int ASN1_TIME_print(BIO *bp, const ASN1_TIME *tm);
int ASN1_TIME_print_ex(BIO *bp, const ASN1_TIME *tm, unsigned long flags);
int ASN1_STRING_print(BIO
 *bp, const ASN1_STRING *v);
int ASN1_STRING_print_ex(BIO *out, const ASN1_STRING *str, unsigned long flags);
int ASN1_buf_print(BIO *bp, const unsigned char *buf, size_t buflen, int off);
int ASN1_bn_print(BIO *bp, const char *number, const BIGNUM *num,
   unsigned char *buf, int off);
int ASN1_parse(BIO *bp, const unsigned char *pp, long len, int indent);
int ASN1_parse_dump(BIO *bp, const unsigned char *pp, long len, int indent,
   int dump);
const char *ASN1_tag2str(int tag);

/* Used to load and write Netscape format cert */

int ASN1_UNIVERSALSTRING_to_string(ASN1_UNIVERSALSTRING *s);

int ASN1_TYPE_set_octetstring(ASN1_TYPE *a, unsigned char *data, int len);
int ASN1_TYPE_get_octetstring(const ASN1_TYPE *a, unsigned char *data, int max_len);
int ASN1_TYPE_set_int_octetstring(ASN1_TYPE *a, long num,
   unsigned char *data, int len);
int ASN1_TYPE_get_int_octetstring(const ASN1_TYPE *a, long *num,
   unsigned char *data, int max_len);

void *ASN1_item_unpack(const ASN1_STRING
 *oct, const ASN1_ITEM *it);
void *ASN1_item_unpack_ex(const ASN1_STRING *oct, const ASN1_ITEM *it,
   OSSL_LIB_CTX *libctx, const char *propq);

ASN1_STRING *ASN1_item_pack(void *obj, const ASN1_ITEM *it,
   ASN1_OCTET_STRING **oct);

void ASN1_STRING_set_default_mask(unsigned long mask);
int ASN1_STRING_set_default_mask_asc(const char *p);
unsigned long ASN1_STRING_get_default_mask(void);
int ASN1_mbstring_copy(ASN1_STRING **out, const unsigned char *in, int len,
   int inform, unsigned long mask);
```

```
int ASN1_mbstring_ncopy(ASN1_STRING **out, const unsigned char *in, int len,
   int inform, unsigned long mask,
   long minsize, long maxsize);

ASN1_STRING *ASN1_STRING_set_by_NID(ASN1_STRING **out,
   const unsigned char *in, int inlen,
   int inform, int nid);
ASN1_STRING_TABLE *ASN1_STRING_TABLE_get(int nid);
int ASN1_STRING_TABLE_add(int, long, long, unsigned long, unsigned long);
void ASN1_STRING_TABLE_cleanup(void);

/* ASN1 template functions */

/* Old API compatible functions
 */
ASN1_VALUE *ASN1_item_new(const ASN1_ITEM *it);
ASN1_VALUE *ASN1_item_new_ex(const ASN1_ITEM *it, OSSL_LIB_CTX *libctx,
   const char *propq);
void ASN1_item_free(ASN1_VALUE *val, const ASN1_ITEM *it);
ASN1_VALUE *ASN1_item_d2i_ex(ASN1_VALUE **val, const unsigned char **in,
   long len, const ASN1_ITEM *it,
   OSSL_LIB_CTX *libctx, const char *propq);
ASN1_VALUE *ASN1_item_d2i(ASN1_VALUE **val, const unsigned char **in,
   long len, const ASN1_ITEM *it);
int ASN1_item_i2d(const ASN1_VALUE *val, unsigned char **out, const ASN1_ITEM *it);
int ASN1_item_ndef_i2d(const ASN1_VALUE *val, unsigned char **out,
   const ASN1_ITEM *it);

void ASN1_add_oid_module(void);
void ASN1_add_stable_module(void);

ASN1_TYPE *ASN1_generate_nconf(const char *str, CONF *nconf);
ASN1_TYPE *ASN1_generate_v3(const char *str, X509V3_CTX *cnf);
int ASN1_str2mask(const char *str, unsigned long *pmask);

/* ASN1 Print flags */

/* Indicate missing OPTIONAL fields */
#define ASN1_PCTX_FLAGS_SHOW_ABSENT 0x001
/*
 Mark start and end of SEQUENCE */
#define ASN1_PCTX_FLAGS_SHOW_SEQUENCE 0x002
/* Mark start and end of SEQUENCE/SET OF */
#define ASN1_PCTX_FLAGS_SHOW_SSOF 0x004
/* Show the ASN1 type of primitives */
#define ASN1_PCTX_FLAGS_SHOW_TYPE 0x008
/* Don't show ASN1 type of ANY */
#define ASN1_PCTX_FLAGS_NO_ANY_TYPE 0x010
```

```
/* Don't show ASN1 type of MSTRINGs */
#define ASN1_PCTX_FLAGS_NO_MSTRING_TYPE 0x020
/* Don't show field names in SEQUENCE */
#define ASN1_PCTX_FLAGS_NO_FIELD_NAME 0x040
/* Show structure names of each SEQUENCE field */
#define ASN1_PCTX_FLAGS_SHOW_FIELD_STRUCT_NAME 0x080
/* Don't show structure name even at top level */
#define ASN1_PCTX_FLAGS_NO_STRUCT_NAME 0x100

int ASN1_item_print(BIO *out, const ASN1_VALUE *ifld, int indent,
   const ASN1_ITEM *it, const ASN1_PCTX *pctx);
ASN1_PCTX *ASN1_PCTX_new(void);
void ASN1_PCTX_free(ASN1_PCTX *p);
unsigned long ASN1_PCTX_get_flags(const ASN1_PCTX *p);
void ASN1_PCTX_set_flags(ASN1_PCTX *p, unsigned long flags);
unsigned
 long ASN1_PCTX_get_nm_flags(const ASN1_PCTX *p);
void ASN1_PCTX_set_nm_flags(ASN1_PCTX *p, unsigned long flags);
unsigned long ASN1_PCTX_get_cert_flags(const ASN1_PCTX *p);
void ASN1_PCTX_set_cert_flags(ASN1_PCTX *p, unsigned long flags);
unsigned long ASN1_PCTX_get_oid_flags(const ASN1_PCTX *p);
void ASN1_PCTX_set_oid_flags(ASN1_PCTX *p, unsigned long flags);
unsigned long ASN1_PCTX_get_str_flags(const ASN1_PCTX *p);
void ASN1_PCTX_set_str_flags(ASN1_PCTX *p, unsigned long flags);

ASN1_SCTX *ASN1_SCTX_new(int (*scan_cb)(ASN1_SCTX *ctx));
void ASN1_SCTX_free(ASN1_SCTX *p);
const ASN1_ITEM *ASN1_SCTX_get_item(ASN1_SCTX *p);
const ASN1_TEMPLATE *ASN1_SCTX_get_template(ASN1_SCTX *p);
unsigned long ASN1_SCTX_get_flags(ASN1_SCTX *p);
void ASN1_SCTX_set_app_data(ASN1_SCTX *p, void *data);
void *ASN1_SCTX_get_app_data(ASN1_SCTX *p);

const BIO_METHOD *BIO_f_asn1(void);

/* cannot constify val because of CMS_stream() */
BIO *BIO_new_NDEF(BIO *out, ASN1_VALUE *val, const ASN1_ITEM *it);

int
 i2d_ASN1_bio_stream(BIO *out, ASN1_VALUE *val, BIO *in, int flags,
   const ASN1_ITEM *it);
int PEM_write_bio_ASN1_stream(BIO *out, ASN1_VALUE *val, BIO *in, int flags,
   const char *hdr, const ASN1_ITEM *it);
/* cannot constify val because of CMS_dataFinal() */
int SMIME_write_ASN1(BIO *bio, ASN1_VALUE *val, BIO *data, int flags,
   int ctype_nid, int econt_nid,
   STACK_OF(X509_ALGOR) *mdalgs, const ASN1_ITEM *it);
int SMIME_write_ASN1_ex(BIO *bio, ASN1_VALUE *val, BIO *data, int flags,
```

```
   int ctype_nid, int econt_nid,
   STACK_OF(X509_ALGOR) *mdalgs, const ASN1_ITEM *it,
   OSSL_LIB_CTX *libctx, const char *propq);
ASN1_VALUE *SMIME_read_ASN1(BIO *bio, BIO **bcont, const ASN1_ITEM *it);
ASN1_VALUE *SMIME_read_ASN1_ex(BIO *bio, int flags, BIO **bcont,
   const ASN1_ITEM *it, ASN1_VALUE **x,
   OSSL_LIB_CTX *libctx, const char *propq);
int SMIME_crlf_copy(BIO *in, BIO *out, int flags);
int SMIME_text(BIO *in, BIO *out);

const ASN1_ITEM *ASN1_ITEM_lookup(const char *name);
const
 ASN1_ITEM *ASN1_ITEM_get(size_t i);

/* Legacy compatibility */
#define DECLARE_ASN1_FUNCTIONS_fname(type, itname, name) \
   DECLARE_ASN1_ALLOC_FUNCTIONS_name(type, name)       \
   DECLARE_ASN1_ENCODE_FUNCTIONS(type, itname, name)
#define DECLARE_ASN1_FUNCTIONS_const(type) DECLARE_ASN1_FUNCTIONS(type)
#define DECLARE_ASN1_ENCODE_FUNCTIONS_const(type, name) \
   DECLARE_ASN1_ENCODE_FUNCTIONS(type, name)
#define I2D_OF_const(type) I2D_OF(type)
#define ASN1_dup_of_const(type, i2d, d2i, x) ASN1_dup_of(type, i2d, d2i, x)
#define ASN1_i2d_fp_of_const(type, i2d, out, x) ASN1_i2d_fp_of(type, i2d, out, x)
#define ASN1_i2d_bio_of_const(type, i2d, out, x) ASN1_i2d_bio_of(type, i2d, out, x)

#ifdef __cplusplus
}
#endif
#endif
```

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```
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/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/ess.h.in
*
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* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_ESS_H
#define OPENSSL_ESS_H
#pragma once

#include <openssl/opensslconf.h>

#include <openssl/safestack.h>
#include <openssl/x509.h>
#include <openssl/esserr.h>

#ifdef __cplusplus
extern "C" {
#endif

typedef struct ESS_issuer_serial ESS_ISSUER_SERIAL;
typedef struct ESS_cert_id ESS_CERT_ID;
typedef struct ESS_signing_cert ESS_SIGNING_CERT;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ESS_CERT_ID, ESS_CERT_ID, ESS_CERT_ID)
#define sk_ESS_CERT_ID_num(sk) OPENSSL_sk_num(ossl_check_const_ESS_CERT_ID_sk_type(sk))
#define
 sk_ESS_CERT_ID_value(sk, idx) ((ESS_CERT_ID
*)OPENSSL_sk_value(ossl_check_const_ESS_CERT_ID_sk_type(sk), (idx)))
#define sk_ESS_CERT_ID_new(cmp) ((STACK_OF(ESS_CERT_ID)
```

```
*)OPENSSL_sk_new(ossl_check_ESS_CERT_ID_compfunc_type(cmp)))
#define sk_ESS_CERT_ID_new_null() ((STACK_OF(ESS_CERT_ID) *)OPENSSL_sk_new_null())
#define sk_ESS_CERT_ID_new_reserve(cmp, n) ((STACK_OF(ESS_CERT_ID)
*)OPENSSL_sk_new_reserve(ossl_check_ESS_CERT_ID_compfunc_type(cmp), (n)))
#define sk_ESS_CERT_ID_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_ESS_CERT_ID_sk_type(sk), (n))
#define sk_ESS_CERT_ID_free(sk) OPENSSL_sk_free(ossl_check_ESS_CERT_ID_sk_type(sk))
#define sk_ESS_CERT_ID_zero(sk) OPENSSL_sk_zero(ossl_check_ESS_CERT_ID_sk_type(sk))
#define sk_ESS_CERT_ID_delete(sk, i) ((ESS_CERT_ID
*)OPENSSL_sk_delete(ossl_check_ESS_CERT_ID_sk_type(sk), (i)))
#define sk_ESS_CERT_ID_delete_ptr(sk, ptr) ((ESS_CERT_ID
*)OPENSSL_sk_delete_ptr(ossl_check_ESS_CERT_ID_sk_type(sk), ossl_check_ESS_CERT_ID_type(ptr)))
#define
 sk_ESS_CERT_ID_push(sk, ptr) OPENSSL_sk_push(ossl_check_ESS_CERT_ID_sk_type(sk),
ossl_check_ESS_CERT_ID_type(ptr))
#define sk_ESS_CERT_ID_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_ESS_CERT_ID_sk_type(sk),
ossl_check_ESS_CERT_ID_type(ptr))
#define sk_ESS_CERT_ID_pop(sk) ((ESS_CERT_ID
*)OPENSSL_sk_pop(ossl_check_ESS_CERT_ID_sk_type(sk)))
#define sk_ESS_CERT_ID_shift(sk) ((ESS_CERT_ID
*)OPENSSL_sk_shift(ossl_check_ESS_CERT_ID_sk_type(sk)))
#define sk_ESS_CERT_ID_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ESS_CERT_ID_sk_type(sk),ossl_check_ESS_CERT_ID_freefunc_type(freefu
nc))
#define sk_ESS_CERT_ID_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_ESS_CERT_ID_sk_type(sk),
ossl_check_ESS_CERT_ID_type(ptr), (idx))
#define sk_ESS_CERT_ID_set(sk, idx, ptr) ((ESS_CERT_ID
*)OPENSSL_sk_set(ossl_check_ESS_CERT_ID_sk_type(sk), (idx), ossl_check_ESS_CERT_ID_type(ptr)))
#define sk_ESS_CERT_ID_find(sk, ptr) OPENSSL_sk_find(ossl_check_ESS_CERT_ID_sk_type(sk),
ossl_check_ESS_CERT_ID_type(ptr))
#define
 sk_ESS_CERT_ID_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_ESS_CERT_ID_sk_type(sk),
ossl_check_ESS_CERT_ID_type(ptr))
#define sk_ESS_CERT_ID_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ESS_CERT_ID_sk_type(sk), ossl_check_ESS_CERT_ID_type(ptr), pnum)
#define sk_ESS_CERT_ID_sort(sk) OPENSSL_sk_sort(ossl_check_ESS_CERT_ID_sk_type(sk))
#define sk_ESS_CERT_ID_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_ESS_CERT_ID_sk_type(sk))
#define sk_ESS_CERT_ID_dup(sk) ((STACK_OF(ESS_CERT_ID)
*)OPENSSL_sk_dup(ossl_check_const_ESS_CERT_ID_sk_type(sk)))
#define sk_ESS_CERT_ID_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ESS_CERT_ID)
*)OPENSSL_sk_deep_copy(ossl_check_const_ESS_CERT_ID_sk_type(sk),
ossl_check_ESS_CERT_ID_copyfunc_type(copyfunc), ossl_check_ESS_CERT_ID_freefunc_type(freefunc)))
#define sk_ESS_CERT_ID_set_cmp_func(sk, cmp)
((sk_ESS_CERT_ID_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ESS_CERT_ID_sk_type(sk),
ossl_check_ESS_CERT_ID_compfunc_type(cmp)))

/*
 clang-format on */
```

```
typedef struct ESS_signing_cert_v2_st ESS_SIGNING_CERT_V2;
typedef struct ESS_cert_id_v2_st ESS_CERT_ID_V2;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ESS_CERT_ID_V2, ESS_CERT_ID_V2, ESS_CERT_ID_V2)
#define sk_ESS_CERT_ID_V2_num(sk) OPENSSL_sk_num(ossl_check_const_ESS_CERT_ID_V2_sk_type(sk))
#define sk_ESS_CERT_ID_V2_value(sk, idx) ((ESS_CERT_ID_V2
*)OPENSSL_sk_value(ossl_check_const_ESS_CERT_ID_V2_sk_type(sk), (idx)))
#define sk_ESS_CERT_ID_V2_new(cmp) ((STACK_OF(ESS_CERT_ID_V2)
*)OPENSSL_sk_new(ossl_check_ESS_CERT_ID_V2_compfunc_type(cmp)))
#define sk_ESS_CERT_ID_V2_new_null() ((STACK_OF(ESS_CERT_ID_V2) *)OPENSSL_sk_new_null())
#define sk_ESS_CERT_ID_V2_new_reserve(cmp, n) ((STACK_OF(ESS_CERT_ID_V2)
*)OPENSSL_sk_new_reserve(ossl_check_ESS_CERT_ID_V2_compfunc_type(cmp), (n)))
#define sk_ESS_CERT_ID_V2_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_ESS_CERT_ID_V2_sk_type(sk),
(n))
#define sk_ESS_CERT_ID_V2_free(sk) OPENSSL_sk_free(ossl_check_ESS_CERT_ID_V2_sk_type(sk))
#define
 sk_ESS_CERT_ID_V2_zero(sk) OPENSSL_sk_zero(ossl_check_ESS_CERT_ID_V2_sk_type(sk))
#define sk_ESS_CERT_ID_V2_delete(sk, i) ((ESS_CERT_ID_V2
*)OPENSSL_sk_delete(ossl_check_ESS_CERT_ID_V2_sk_type(sk), (i)))
#define sk_ESS_CERT_ID_V2_delete_ptr(sk, ptr) ((ESS_CERT_ID_V2
*)OPENSSL_sk_delete_ptr(ossl_check_ESS_CERT_ID_V2_sk_type(sk),
ossl_check_ESS_CERT_ID_V2_type(ptr)))
#define sk_ESS_CERT_ID_V2_push(sk, ptr) OPENSSL_sk_push(ossl_check_ESS_CERT_ID_V2_sk_type(sk),
ossl_check_ESS_CERT_ID_V2_type(ptr))
#define sk_ESS_CERT_ID_V2_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_ESS_CERT_ID_V2_sk_type(sk), ossl_check_ESS_CERT_ID_V2_type(ptr))
#define sk_ESS_CERT_ID_V2_pop(sk) ((ESS_CERT_ID_V2
*)OPENSSL_sk_pop(ossl_check_ESS_CERT_ID_V2_sk_type(sk)))
#define sk_ESS_CERT_ID_V2_shift(sk) ((ESS_CERT_ID_V2
*)OPENSSL_sk_shift(ossl_check_ESS_CERT_ID_V2_sk_type(sk)))
#define sk_ESS_CERT_ID_V2_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ESS_CERT_ID_V2_sk_type(sk),ossl_check_ESS_CERT_ID_V2_freefunc_ty
pe(freefunc))
#define
 sk_ESS_CERT_ID_V2_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_ESS_CERT_ID_V2_sk_type(sk),
ossl_check_ESS_CERT_ID_V2_type(ptr), (idx))
#define sk_ESS_CERT_ID_V2_set(sk, idx, ptr) ((ESS_CERT_ID_V2
*)OPENSSL_sk_set(ossl_check_ESS_CERT_ID_V2_sk_type(sk), (idx),
ossl_check_ESS_CERT_ID_V2_type(ptr)))
#define sk_ESS_CERT_ID_V2_find(sk, ptr) OPENSSL_sk_find(ossl_check_ESS_CERT_ID_V2_sk_type(sk),
ossl_check_ESS_CERT_ID_V2_type(ptr))
#define sk_ESS_CERT_ID_V2_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_ESS_CERT_ID_V2_sk_type(sk), ossl_check_ESS_CERT_ID_V2_type(ptr))
#define sk_ESS_CERT_ID_V2_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ESS_CERT_ID_V2_sk_type(sk), ossl_check_ESS_CERT_ID_V2_type(ptr),
pnum)
#define sk_ESS_CERT_ID_V2_sort(sk) OPENSSL_sk_sort(ossl_check_ESS_CERT_ID_V2_sk_type(sk))
```

```
#define sk_ESS_CERT_ID_V2_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_ESS_CERT_ID_V2_sk_type(sk))
#define sk_ESS_CERT_ID_V2_dup(sk)
 ((STACK_OF(ESS_CERT_ID_V2) *)OPENSSL_sk_dup(ossl_check_const_ESS_CERT_ID_V2_sk_type(sk)))
#define sk_ESS_CERT_ID_V2_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ESS_CERT_ID_V2)
*)OPENSSL_sk_deep_copy(ossl_check_const_ESS_CERT_ID_V2_sk_type(sk),
ossl_check_ESS_CERT_ID_V2_copyfunc_type(copyfunc),
ossl_check_ESS_CERT_ID_V2_freefunc_type(freefunc)))
#define sk_ESS_CERT_ID_V2_set_cmp_func(sk, cmp)
((sk_ESS_CERT_ID_V2_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ESS_CERT_ID_V2_sk_type(sk),
ossl_check_ESS_CERT_ID_V2_compfunc_type(cmp)))

/* clang-format on */

DECLARE_ASN1_ALLOC_FUNCTIONS(ESS_ISSUER_SERIAL)
DECLARE_ASN1_ENCODE_FUNCTIONS_only(ESS_ISSUER_SERIAL, ESS_ISSUER_SERIAL)
DECLARE_ASN1_DUP_FUNCTION(ESS_ISSUER_SERIAL)

DECLARE_ASN1_ALLOC_FUNCTIONS(ESS_CERT_ID)
DECLARE_ASN1_ENCODE_FUNCTIONS_only(ESS_CERT_ID, ESS_CERT_ID)
DECLARE_ASN1_DUP_FUNCTION(ESS_CERT_ID)

DECLARE_ASN1_FUNCTIONS(ESS_SIGNING_CERT)
DECLARE_ASN1_DUP_FUNCTION(ESS_SIGNING_CERT)

DECLARE_ASN1_ALLOC_FUNCTIONS(ESS_CERT_ID_V2)
DECLARE_ASN1_ENCODE_FUNCTIONS_only(ESS_CERT_ID_V2,
 ESS_CERT_ID_V2)
DECLARE_ASN1_DUP_FUNCTION(ESS_CERT_ID_V2)

DECLARE_ASN1_FUNCTIONS(ESS_SIGNING_CERT_V2)
DECLARE_ASN1_DUP_FUNCTION(ESS_SIGNING_CERT_V2)

ESS_SIGNING_CERT *OSSL_ESS_signing_cert_new_init(const X509 *signcert,
   const STACK_OF(X509) *certs,
   int set_issuer_serial);
ESS_SIGNING_CERT_V2 *OSSL_ESS_signing_cert_v2_new_init(const EVP_MD *hash_alg,
   const X509 *signcert,
   const STACK_OF(X509) *certs,
   int set_issuer_serial);
int OSSL_ESS_check_signing_certs(const ESS_SIGNING_CERT *ss,
   const ESS_SIGNING_CERT_V2 *ssv2,
   const STACK_OF(X509) *chain,
   int require_signing_cert);

#ifdef __cplusplus
}
#endif
```

```
#endif
ISC
{
 'variables': {
   'openssl_sources': [
     'openssl/crypto/aes/aes_ecb.c',
     'openssl/crypto/aes/aes_misc.c',
     'openssl/crypto/bn/bn_add.c',
     'openssl/crypto/bn/bn_blind.c',
     'openssl/crypto/bn/bn_const.c',
     'openssl/crypto/bn/bn_conv.c',
     'openssl/crypto/bn/bn_ctx.c',
     'openssl/crypto/bn/bn_dh.c',
     'openssl/crypto/bn/bn_div.c',
     'openssl/crypto/bn/bn_exp.c',
     'openssl/crypto/bn/bn_exp2.c',
     'openssl/crypto/bn/bn_gcd.c',
     'openssl/crypto/bn/bn_gf2m.c',
     'openssl/crypto/bn/bn_intern.c',
     'openssl/crypto/bn/bn_kron.c',
     'openssl/crypto/bn/bn_lib.c',
     'openssl/crypto/bn/bn_mod.c',
     'openssl/crypto/bn/bn_mont.c',
     'openssl/crypto/bn/bn_mpi.c',
     'openssl/crypto/bn/bn_mul.c',
     'openssl/crypto/bn/bn_nist.c',
     'openssl/crypto/bn/bn_prime.c',
     'openssl/crypto/bn/bn_rand.c',
     'openssl/crypto/bn/bn_recp.c',
     'openssl/crypto/bn/bn_rsa_fips186_4.c',
     'openssl/crypto/bn/bn_shift.c',
      'openssl/crypto/bn/bn_sqr.c',
     'openssl/crypto/bn/bn_sqrt.c',
     'openssl/crypto/bn/bn_word.c',
     'openssl/crypto/buffer/buffer.c',
     'openssl/crypto/cmac/cmac.c',
     'openssl/crypto/des/ecb3_enc.c',
     'openssl/crypto/des/set_key.c',
     'openssl/crypto/dh/dh_backend.c',
     'openssl/crypto/dh/dh_check.c',
     'openssl/crypto/dh/dh_gen.c',
     'openssl/crypto/dh/dh_group_params.c',
     'openssl/crypto/dh/dh_kdf.c',
     'openssl/crypto/dh/dh_key.c',
     'openssl/crypto/dh/dh_lib.c',
     'openssl/crypto/dsa/dsa_backend.c',
     'openssl/crypto/dsa/dsa_check.c',
     'openssl/crypto/dsa/dsa_gen.c',
```

'openssl/crypto/dsa/dsa_key.c',
'openssl/crypto/dsa/dsa_lib.c',
'openssl/crypto/dsa/dsa_ossl.c',
'openssl/crypto/dsa/dsa_sign.c',
'openssl/crypto/dsa/dsa_vrf.c',
'openssl/crypto/ec/curve448/arch_32/f_impl32.c',
'openssl/crypto/ec/curve448/arch_64/f_impl64.c',
'openssl/crypto/ec/curve448/curve448.c',
'openssl/crypto/ec/curve448/curve448_tables.c',
'openssl/crypto/ec/curve448/eddsa.c',
'openssl/crypto/ec/curve448/f_generic.c',
'openssl/crypto/ec/curve448/scalar.c',
'openssl/crypto/ec/curve25519.c',
'openssl/crypto/ec/ec2_oct.c',
'openssl/crypto/ec/ec2_smpl.c',
'openssl/crypto/ec/ec_asn1.c',
'openssl/crypto/ec/ec_backend.c',
'openssl/crypto/ec/ec_check.c',
'openssl/crypto/ec/ec_curve.c',
'openssl/crypto/ec/ec_cvt.c',
'openssl/crypto/ec/ec_key.c',
'openssl/crypto/ec/ec_kmeth.c',
'openssl/crypto/ec/ec_lib.c',
'openssl/crypto/ec/ec_mult.c',
'openssl/crypto/ec/ec_oct.c',
'openssl/crypto/ec/ecdh_kdf.c',
'openssl/crypto/ec/ecdh_ossl.c',
'openssl/crypto/ec/ecdsa_ossl.c',
'openssl/crypto/ec/ecdsa_sign.c',
'openssl/crypto/ec/ecdsa_vrf.c',
'openssl/crypto/ec/ecp_mont.c',
'openssl/crypto/ec/ecp_nist.c',
'openssl/crypto/ec/ecp_nistz256.c',
'openssl/crypto/ec/ecp_oct.c',
'openssl/crypto/ec/ecp_smpl.c',
'openssl/crypto/ec/ecx_backend.c',
'openssl/crypto/ec/ecx_key.c',
'openssl/crypto/evp/asymcipher.c',
'openssl/crypto/evp/dh_support.c',
'openssl/crypto/evp/digest.c',
'openssl/crypto/evp/ec_support.c',
'openssl/crypto/evp/evp_enc.c',
'openssl/crypto/evp/evp_fetch.c',
'openssl/crypto/evp/evp_lib.c',
'openssl/crypto/evp/evp_rand.c',
'openssl/crypto/evp/evp_utils.c',
'openssl/crypto/evp/exchange.c',
'openssl/crypto/evp/kdf_lib.c',

'openssl/crypto/evp/kdf_meth.c',
'openssl/crypto/evp/kem.c',
'openssl/crypto/evp/keymgmt_lib.c',
'openssl/crypto/evp/keymgmt_meth.c',
'openssl/crypto/evp/mac_lib.c',
'openssl/crypto/evp/mac_meth.c',
'openssl/crypto/evp/p_lib.c',
'openssl/crypto/evp/pmeth_check.c',
'openssl/crypto/evp/pmeth_gn.c',
'openssl/crypto/evp/pmeth_lib.c',
'openssl/crypto/evp/s_lib.c',
'openssl/crypto/evp/signature.c',
'openssl/crypto/evp/skeymgmt_meth.c',
'openssl/crypto/ffc/ffc_backend.c',
'openssl/crypto/ffc/ffc_dh.c',
'openssl/crypto/ffc/ffc_key_generate.c',
'openssl/crypto/ffc/ffc_key_validate.c',
'openssl/crypto/ffc/ffc_params.c',
'openssl/crypto/ffc/ffc_params_generate.c',
'openssl/crypto/ffc/ffc_params_validate.c',
'openssl/crypto/hashtable/hashfunc.c',
'openssl/crypto/hashtable/hashtable.c',
'openssl/crypto/hmac/hmac.c',
'openssl/crypto/lhash/lhash.c',
'openssl/crypto/asn1_dsa.c',
'openssl/crypto/bsearch.c',
'openssl/crypto/context.c',
'openssl/crypto/core_algorithm.c',
'openssl/crypto/core_fetch.c',
'openssl/crypto/core_namemap.c',
'openssl/crypto/cpuid.c',
'openssl/crypto/cryptlib.c',
'openssl/crypto/ctype.c',
'openssl/crypto/der_writer.c',
'openssl/crypto/ex_data.c',
'openssl/crypto/initthread.c',
'openssl/crypto/o_str.c',
'openssl/crypto/packet.c',
'openssl/crypto/param_build.c',
'openssl/crypto/param_build_set.c',
'openssl/crypto/params.c',
'openssl/crypto/params_dup.c',
'openssl/crypto/params_from_text.c',
'openssl/crypto/provider_core.c',
'openssl/crypto/provider_predefined.c',
'openssl/crypto/self_test_core.c',
'openssl/crypto/sparse_array.c',
'openssl/crypto/threads_lib.c',

```
    'openssl/crypto/threads_none.c',
    'openssl/crypto/threads_pthread.c',
    'openssl/crypto/threads_win.c',
    'openssl/crypto/time.c',
    'openssl/crypto/ml_dsa/ml_dsa_encoders.c',
    'openssl/crypto/ml_dsa/ml_dsa_key.c',
    'openssl/crypto/ml_dsa/ml_dsa_key_compress.c',
    'openssl/crypto/ml_dsa/ml_dsa_matrix.c',
    'openssl/crypto/ml_dsa/ml_dsa_ntt.c',
    'openssl/crypto/ml_dsa/ml_dsa_params.c',
    'openssl/crypto/ml_dsa/ml_dsa_sample.c',
    'openssl/crypto/ml_dsa/ml_dsa_sign.c',

'openssl/crypto/ml_kem/ml_kem.c',
    'openssl/crypto/modes/cbc128.c',
    'openssl/crypto/modes/ccm128.c',
    'openssl/crypto/modes/cfb128.c',
    'openssl/crypto/modes/ctr128.c',
    'openssl/crypto/modes/gcm128.c',
    'openssl/crypto/modes/ofb128.c',
    'openssl/crypto/modes/wrap128.c',
    'openssl/crypto/modes/xts128.c',
    'openssl/crypto/modes/xts128gb.c',
    'openssl/crypto/property/defn_cache.c',
    'openssl/crypto/property/property.c',
    'openssl/crypto/property/property_parse.c',
    'openssl/crypto/property/property_query.c',
    'openssl/crypto/property/property_string.c',
    'openssl/crypto/rand/rand_lib.c',
    'openssl/crypto/rsa/rsa_acvp_test_params.c',
    'openssl/crypto/rsa/rsa_backend.c',
    'openssl/crypto/rsa/rsa_chk.c',
    'openssl/crypto/rsa/rsa_crpt.c',
    'openssl/crypto/rsa/rsa_gen.c',
    'openssl/crypto/rsa/rsa_lib.c',
    'openssl/crypto/rsa/rsa_mp_names.c',
    'openssl/crypto/rsa/rsa_none.c',

   'openssl/crypto/rsa/rsa_oaep.c',
    'openssl/crypto/rsa/rsa_ossl.c',
    'openssl/crypto/rsa/rsa_pk1.c',
    'openssl/crypto/rsa/rsa_pss.c',
    'openssl/crypto/rsa/rsa_schemes.c',
    'openssl/crypto/rsa/rsa_sign.c',
    'openssl/crypto/rsa/rsa_sp800_56b_check.c',
    'openssl/crypto/rsa/rsa_sp800_56b_gen.c',
    'openssl/crypto/rsa/rsa_x931.c',
    'openssl/crypto/sha/keccak1600.c',
```

'openssl/crypto/sha/sha1dgst.c',
'openssl/crypto/sha/sha256.c',
'openssl/crypto/sha/sha3.c',
'openssl/crypto/sha/sha512.c',
'openssl/crypto/slh_dsa/slh_adrs.c',
'openssl/crypto/slh_dsa/slh_dsa.c',
'openssl/crypto/slh_dsa/slh_dsa_hash_ctx.c',
'openssl/crypto/slh_dsa/slh_dsa_key.c',
'openssl/crypto/slh_dsa/slh_fors.c',
'openssl/crypto/slh_dsa/slh_hash.c',
'openssl/crypto/slh_dsa/slh_hypertree.c',
'openssl/crypto/slh_dsa/slh_params.c',
'openssl/crypto/slh_dsa/slh_wots.c',
'openssl/crypto/slh_dsa/slh_xmss.c',
'openssl/crypto/stack/stack.c',
'openssl/crypto/thread/arch/thread_none.c',
'openssl/crypto/thread/arch/thread_posix.c',
'openssl/crypto/thread/arch/thread_win.c',
'openssl/crypto/thread/api.c',
'openssl/crypto/thread/arch.c',
'openssl/crypto/thread/internal.c',
'openssl/providers/common/der/der_rsa_sig.c',
'openssl/providers/common/bio_prov.c',
'openssl/providers/common/capabilities.c',
'openssl/providers/common/digest_to_nid.c',
'openssl/providers/common/provider_seeding.c',
'openssl/providers/common/provider_util.c',
'openssl/providers/common/securitycheck.c',
'openssl/providers/common/securitycheck_fips.c',
'openssl/providers/fips/fipsindicator.c',
'openssl/providers/fips/fipsprov.c',
'openssl/providers/fips/self_test.c',
'openssl/providers/fips/self_test_kats.c',
'openssl/providers/implementations/asymciphers/rsa_enc.c',
'openssl/providers/implementations/ciphers/cipher_aes.c',
'openssl/providers/implementations/ciphers/cipher_aes_cbc_hmac_sha.c',
'openssl/providers/implementations/ciphers/cipher_aes_cbc_hmac_sha1_hw.c',
'openssl/providers/implementations/ciphers/cipher_aes_cbc_hmac_sha256_hw.c',
'openssl/providers/implementations/ciphers/cipher_aes_ccm.c',
'openssl/providers/implementations/ciphers/cipher_aes_ccm_hw.c',
'openssl/providers/implementations/ciphers/cipher_aes_gcm.c',
'openssl/providers/implementations/ciphers/cipher_aes_gcm_hw.c',
'openssl/providers/implementations/ciphers/cipher_aes_hw.c',
'openssl/providers/implementations/ciphers/cipher_aes_ocb.c',
'openssl/providers/implementations/ciphers/cipher_aes_ocb_hw.c',
'openssl/providers/implementations/ciphers/cipher_aes_wrp.c',
'openssl/providers/implementations/ciphers/cipher_aes_xts.c',
'openssl/providers/implementations/ciphers/cipher_aes_xts_fips.c',

'openssl/providers/implementations/ciphers/cipher_aes_xts_hw.c',
'openssl/providers/implementations/ciphers/cipher_cts.c',
'openssl/providers/implementations/ciphers/cipher_tdes.c',
'openssl/providers/implementations/ciphers/cipher_tdes_common.c',
'openssl/providers/implementations/ciphers/cipher_tdes_hw.c',
'openssl/providers/implementations/digests/sha2_prov.c',
'openssl/providers/implementations/digests/sha3_prov.c',
'openssl/providers/implementations/exchange/dh_exch.c',
'openssl/providers/implementations/exchange/ecdh_exch.c',
'openssl/providers/implementations/exchange/ecx_exch.c',
'openssl/providers/implementations/exchange/kdf_exch.c',
'openssl/providers/implementations/kdfs/hkdf.c',
'openssl/providers/implementations/kdfs/kbkdf.c',
'openssl/providers/implementations/kdfs/pbkdf2.c',
'openssl/providers/implementations/kdfs/pbkdf2_fips.c',
'openssl/providers/implementations/kdfs/sshkdf.c',
'openssl/providers/implementations/kdfs/sskdf.c',
'openssl/providers/implementations/kdfs/tls1_prf.c',
'openssl/providers/implementations/kdfs/x942kdf.c',
'openssl/providers/implementations/kem/ml_kem_kem.c',
'openssl/providers/implementations/kem/mlx_kem.c',
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'openssl/providers/implementations/keymgmt/dh_kmgmt.c',
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'openssl/providers/implementations/keymgmt/ec_kmgmt.c',
'openssl/providers/implementations/keymgmt/ecx_kmgmt.c',
'openssl/providers/implementations/keymgmt/kdf_legacy_kmgmt.c',
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'openssl/providers/implementations/keymgmt/rsa_kmgmt.c',
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'openssl/providers/implementations/macs/cmac_prov.c',
'openssl/providers/implementations/macs/gmac_prov.c',
'openssl/providers/implementations/macs/hmac_prov.c',
'openssl/providers/implementations/macs/kmac_prov.c',
'openssl/providers/implementations/rands/drbg.c',
'openssl/providers/implementations/rands/drbg_ctr.c',
'openssl/providers/implementations/rands/drbg_hash.c',
'openssl/providers/implementations/rands/drbg_hmac.c',
'openssl/providers/implementations/rands/fips_crng_test.c',
'openssl/providers/implementations/rands/test_rng.c',
'openssl/providers/implementations/signature/dsa_sig.c',
'openssl/providers/implementations/signature/ecdsa_sig.c',
'openssl/providers/implementations/signature/eddsa_sig.c',
'openssl/providers/implementations/signature/mac_legacy_sig.c',
'openssl/providers/implementations/signature/ml_dsa_sig.c',

```
  'openssl/providers/implementations/signature/rsa_sig.c',
   'openssl/providers/implementations/signature/slh_dsa_sig.c',
  'openssl/providers/implementations/skeymgmt/aes_skmgmt.c',
  'openssl/providers/implementations/skeymgmt/generic.c',
  'openssl/ssl/record/methods/ssl3_cbc.c',
  'openssl/providers/common/der/der_dsa_key.c',
  'openssl/providers/common/der/der_dsa_sig.c',
  'openssl/providers/common/der/der_ec_key.c',
  'openssl/providers/common/der/der_ec_sig.c',
  'openssl/providers/common/der/der_ecx_key.c',
  'openssl/providers/common/der/der_ml_dsa_key.c',
  'openssl/providers/common/der/der_rsa_key.c',
  'openssl/providers/common/der/der_slh_dsa_key.c',
  'openssl/providers/common/provider_ctx.c',
  'openssl/providers/common/provider_err.c',
  'openssl/providers/implementations/ciphers/ciphercommon.c',
  'openssl/providers/implementations/ciphers/ciphercommon_block.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm_hw.c',
   'openssl/providers/implementations/ciphers/ciphercommon_gcm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_gcm_hw.c',
  'openssl/providers/implementations/ciphers/ciphercommon_hw.c',
  'openssl/providers/implementations/digests/digestcommon.c',
  'openssl/ssl/record/methods/tls_pad.c',
  'openssl/providers/fips/fips_entry.c',

],
'openssl_sources_BSD-x86': [
  './config/archs/BSD-x86/asm/crypto/aes/aes-586.S',
  './config/archs/BSD-x86/asm/crypto/aes/aesni-x86.S',
  './config/archs/BSD-x86/asm/crypto/aes/vpaes-x86.S',
  './config/archs/BSD-x86/asm/crypto/bf/bf-586.S',
  './config/archs/BSD-x86/asm/crypto/bn/bn-586.S',
  './config/archs/BSD-x86/asm/crypto/bn/co-586.S',
  './config/archs/BSD-x86/asm/crypto/bn/x86-gf2m.S',
  './config/archs/BSD-x86/asm/crypto/bn/x86-mont.S',
  './config/archs/BSD-x86/asm/crypto/camellia/cmll-x86.S',
  './config/archs/BSD-x86/asm/crypto/chacha/chacha-x86.S',
   './config/archs/BSD-x86/asm/crypto/des/crypt586.S',
  './config/archs/BSD-x86/asm/crypto/des/des-586.S',
  './config/archs/BSD-x86/asm/crypto/ec/ecp_nistz256-x86.S',
  './config/archs/BSD-x86/asm/crypto/params_idx.c',
  './config/archs/BSD-x86/asm/crypto/x86cpuid.S',
  './config/archs/BSD-x86/asm/crypto/md5/md5-586.S',
  './config/archs/BSD-x86/asm/crypto/modes/ghash-x86.S',
  './config/archs/BSD-x86/asm/crypto/poly1305/poly1305-x86.S',
  './config/archs/BSD-x86/asm/crypto/rc4/rc4-586.S',
  './config/archs/BSD-x86/asm/crypto/ripemd/rmd-586.S',
```

```
  './config/archs/BSD-x86/asm/crypto/sha/sha1-586.S',
  './config/archs/BSD-x86/asm/crypto/sha/sha256-586.S',
  './config/archs/BSD-x86/asm/crypto/sha/sha512-586.S',
  './config/archs/BSD-x86/asm/crypto/whrlpool/wp-mmx.S',
  './config/archs/BSD-x86/asm/engines/e_padlock-x86.S',
  './config/archs/BSD-x86/asm/providers/common/der/der_sm2_gen.c',
   './config/archs/BSD-x86/asm/providers/common/der/der_digests_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_dsa_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_ec_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_ecx_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_ml_dsa_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_rsa_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_slh_dsa_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_wrap_gen.c',
  './config/archs/BSD-x86/asm/providers/legacy.ld',
  './config/archs/BSD-x86/asm/providers/fips.ld',

],
'openssl_defines_BSD-x86': [
  'NDEBUG',
  'L_ENDIAN',
  'OPENSSL_BUILDING_OPENSSL',
  'AES_ASM',
  'DES_ASM',
  'ECP_NISTZ256_ASM',
  'FIPS_MODULE',
  'GHASH_ASM',
  'OPENSSL_BN_ASM_GF2m',
  'OPENSSL_BN_ASM_MONT',
  'OPENSSL_BN_ASM_PART_WORDS',
   'OPENSSL_CPUID_OBJ',
  'OPENSSL_IA32_SSE2',
  'SHA1_ASM',
  'SHA256_ASM',
  'SHA512_ASM',
  'VPAES_ASM',
  'FIPS_MODULE',
],
'openssl_cflags_BSD-x86': [
  '-Wa,--noexecstack',
  '-Wall -O3 -fomit-frame-pointer',
  '-pthread',
  '-Wall -O3 -fomit-frame-pointer',
],
'openssl_ex_libs_BSD-x86': [
  '-pthread',
],
'linker_script': ''
```

```
 },
 'include_dirs': [
   '.',
   './include',
   './crypto',
   './crypto/include/internal',
   './providers/common/include',
 ],
 'defines': ['<@(openssl_defines_BSD-x86)'],
 'cflags': ['<@(openssl_cflags_BSD-x86)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86)'],

 'sources': ['<@(openssl_sources)', '<@(openssl_sources_BSD-x86)'],
 'direct_dependent_settings': {
   'include_dirs': ['./include', '.'],
   'defines': ['<@(openssl_defines_BSD-x86)'],
 },
}
/*
* WARNING: do not edit!
* Generated by configdata.pm from Configurations/common0.tmpl, Configurations/unix-Makefile.tmpl
* via Makefile.in
*
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*/

#ifndef OPENSSL_CONFIGURATION_H
#define OPENSSL_CONFIGURATION_H
#pragma once

#ifdef __cplusplus
extern "C" {
#endif

#ifdef OPENSSL_ALGORITHM_DEFINES
#error OPENSSL_ALGORITHM_DEFINES no longer supported
#endif

/*
* OpenSSL was configured with the following options:
*/

/* clang-format off */
```

```
# define OPENSSL_CONFIGURED_API 30500
# ifndef OPENSSL_RAND_SEED_OS
#  define OPENSSL_RAND_SEED_OS
# endif
# ifndef OPENSSL_THREADS
#  define OPENSSL_THREADS
# endif
# ifndef OPENSSL_NO_AFALGENG
#  define OPENSSL_NO_AFALGENG
#
 endif
# ifndef OPENSSL_NO_ASAN
#  define OPENSSL_NO_ASAN
# endif
# ifndef OPENSSL_NO_BROTLI
#  define OPENSSL_NO_BROTLI
# endif
# ifndef OPENSSL_NO_BROTLI_DYNAMIC
#  define OPENSSL_NO_BROTLI_DYNAMIC
# endif
# ifndef OPENSSL_NO_COMP
#  define OPENSSL_NO_COMP
# endif
# ifndef OPENSSL_NO_CRYPTO_MDEBUG
#  define OPENSSL_NO_CRYPTO_MDEBUG
# endif
# ifndef OPENSSL_NO_CRYPTO_MDEBUG_BACKTRACE
#  define OPENSSL_NO_CRYPTO_MDEBUG_BACKTRACE
# endif
# ifndef OPENSSL_NO_DEMOS
#  define OPENSSL_NO_DEMOS
# endif
# ifndef OPENSSL_NO_EC_NISTP_64_GCC_128
#  define OPENSSL_NO_EC_NISTP_64_GCC_128
# endif
# ifndef OPENSSL_NO_EGD
#  define OPENSSL_NO_EGD
# endif
# ifndef OPENSSL_NO_EXTERNAL_TESTS
#  define OPENSSL_NO_EXTERNAL_TESTS
# endif
# ifndef OPENSSL_NO_FIPS_JITTER
#  define OPENSSL_NO_FIPS_JITTER
# endif
# ifndef OPENSSL_NO_FUZZ_AFL
#  define OPENSSL_NO_FUZZ_AFL
# endif
# ifndef OPENSSL_NO_FUZZ_LIBFUZZER
```

```
#  define OPENSSL_NO_FUZZ_LIBFUZZER
# endif
# ifndef OPENSSL_NO_H3DEMO
#  define OPENSSL_NO_H3DEMO
#
 endif
# ifndef OPENSSL_NO_HQINTEROP
#  define OPENSSL_NO_HQINTEROP
# endif
# ifndef OPENSSL_NO_JITTER
#  define OPENSSL_NO_JITTER
# endif
# ifndef OPENSSL_NO_KTLS
#  define OPENSSL_NO_KTLS
# endif
# ifndef OPENSSL_NO_LOADERENG
#  define OPENSSL_NO_LOADERENG
# endif
# ifndef OPENSSL_NO_MD2
#  define OPENSSL_NO_MD2
# endif
# ifndef OPENSSL_NO_MSAN
#  define OPENSSL_NO_MSAN
# endif
# ifndef OPENSSL_NO_PIE
#  define OPENSSL_NO_PIE
# endif
# ifndef OPENSSL_NO_RC5
#  define OPENSSL_NO_RC5
# endif
# ifndef OPENSSL_NO_SCTP
#  define OPENSSL_NO_SCTP
# endif
# ifndef OPENSSL_NO_SSL3
#  define OPENSSL_NO_SSL3
# endif
# ifndef OPENSSL_NO_SSL3_METHOD
#  define OPENSSL_NO_SSL3_METHOD
# endif
# ifndef OPENSSL_NO_SSLKEYLOG
#  define OPENSSL_NO_SSLKEYLOG
# endif
# ifndef OPENSSL_NO_TFO
#  define OPENSSL_NO_TFO
# endif
# ifndef OPENSSL_NO_TRACE
#  define OPENSSL_NO_TRACE
# endif
```

```
# ifndef OPENSSL_NO_UBSAN
#  define OPENSSL_NO_UBSAN
# endif
# ifndef OPENSSL_NO_UNIT_TEST
#  define OPENSSL_NO_UNIT_TEST
#
 endif
# ifndef OPENSSL_NO_UPLINK
#  define OPENSSL_NO_UPLINK
# endif
# ifndef OPENSSL_NO_WEAK_SSL_CIPHERS
#  define OPENSSL_NO_WEAK_SSL_CIPHERS
# endif
# ifndef OPENSSL_NO_WINSTORE
#  define OPENSSL_NO_WINSTORE
# endif
# ifndef OPENSSL_NO_ZLIB
#  define OPENSSL_NO_ZLIB
# endif
# ifndef OPENSSL_NO_ZLIB_DYNAMIC
#  define OPENSSL_NO_ZLIB_DYNAMIC
# endif
# ifndef OPENSSL_NO_ZSTD
#  define OPENSSL_NO_ZSTD
# endif
# ifndef OPENSSL_NO_ZSTD_DYNAMIC
#  define OPENSSL_NO_ZSTD_DYNAMIC
# endif
# ifndef OPENSSL_NO_DYNAMIC_ENGINE
#  define OPENSSL_NO_DYNAMIC_ENGINE
# endif

/* clang-format on */

/* Generate 80386 code? */
/* clang-format off */
# undef I386_ONLY
/* clang-format on */

/*
* The following are cipher-specific, but are part of the public API.
*/
#if !defined(OPENSSL_SYS_UEFI)
   /* clang-format off */
#  define BN_LLONG
   /* clang-format on */
   /* Only one for the following should be defined */
   /* clang-format off */
```

```
#  undef SIXTY_FOUR_BIT_LONG
   /* clang-format on
 */
   /* clang-format off */
#  undef SIXTY_FOUR_BIT
   /* clang-format on */
   /* clang-format off */
#  define THIRTY_TWO_BIT
/* clang-format on */
#endif

/* clang-format off */
# define RC4_INT unsigned int
/* clang-format on */

#if defined(OPENSSL_NO_COMP) || (defined(OPENSSL_NO_BROTLI) && defined(OPENSSL_NO_ZSTD) &&
defined(OPENSSL_NO_ZLIB))
#define OPENSSL_NO_COMP_ALG
#else
#undef OPENSSL_NO_COMP_ALG
#endif

#ifdef __cplusplus
}
#endif

#endif /* OPENSSL_CONFIGURATION_H */
```

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JSON parsing library (nlohmann/json)

File: vendor/json/upstream/single_include/nlohmann/json.hpp (only for
ICU4C)

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File: aclocal.m4 (only for ICU4C)
Section: pkg.m4 - Macros to locate and utilise pkg-config.

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File: sorttable.js (only for ICU4J)

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  './config/archs/BSD-x86_64/asm/crypto/aes/aesni-mb-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/aesni-sha1-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/aesni-sha256-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/aesni-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/aesni-xts-avx512.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/bsaes-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/vpaes-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-2k-avx512.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-2k-avxifma.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-3k-avx512.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-3k-avxifma.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-4k-avx512.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-4k-avxifma.s',
   './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-avx2.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/x86_64-gf2m.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/x86_64-mont.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/x86_64-mont5.s',
  './config/archs/BSD-x86_64/asm/crypto/camellia/cmll-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/chacha/chacha-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/ec/ecp_nistz256-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/ec/x25519-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/params_idx.c',
  './config/archs/BSD-x86_64/asm/crypto/x86_64cpuid.s',
  './config/archs/BSD-x86_64/asm/crypto/md5/md5-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/modes/aes-gcm-avx512.s',
  './config/archs/BSD-x86_64/asm/crypto/modes/aesni-gcm-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/modes/ghash-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/poly1305/poly1305-x86_64.s',
   './config/archs/BSD-x86_64/asm/crypto/rc4/rc4-md5-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/rc4/rc4-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/sha/keccak1600-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/sha/sha1-mb-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/sha/sha1-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/sha/sha256-mb-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/sha/sha256-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/sha/sha512-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/whrlpool/wp-x86_64.s',
  './config/archs/BSD-x86_64/asm/engines/e_padlock-x86_64.s',
```

```
  './config/archs/BSD-x86_64/asm/providers/common/der/der_sm2_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_digests_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_dsa_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_ec_gen.c',
   './config/archs/BSD-x86_64/asm/providers/common/der/der_ecx_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_ml_dsa_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_rsa_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_slh_dsa_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_wrap_gen.c',
  './config/archs/BSD-x86_64/asm/providers/legacy.ld',
  './config/archs/BSD-x86_64/asm/providers/fips.ld',
],
'openssl_defines_BSD-x86_64': [
  'NDEBUG',
  'L_ENDIAN',
  'OPENSSL_BUILDING_OPENSSL',
  'AES_ASM',
  'BSAES_ASM',
  'CMLL_ASM',
  'ECP_NISTZ256_ASM',
  'GHASH_ASM',
  'KECCAK1600_ASM',
  'MD5_ASM',
  'OPENSSL_BN_ASM_GF2m',
  'OPENSSL_BN_ASM_MONT',
  'OPENSSL_BN_ASM_MONT5',
  'OPENSSL_CPUID_OBJ',
  'OPENSSL_IA32_SSE2',
  'PADLOCK_ASM',
  'POLY1305_ASM',
  'RC4_ASM',
  'SHA1_ASM',
  'SHA256_ASM',

  'SHA512_ASM',
  'VPAES_ASM',
  'WHIRLPOOL_ASM',
  'X25519_ASM',
  'OPENSSL_PIC',
],
'openssl_cflags_BSD-x86_64': [
  '-Wa,--noexecstack',
  '-Wall -O3',
  '-pthread',
  '-Wall -O3',
],
'openssl_ex_libs_BSD-x86_64': [
  '-pthread',
```

```
  ],
 },
 'include_dirs': [
  '.',
  './include',
  './crypto',
  './crypto/include/internal',
  './providers/common/include',
 ],
 'defines': ['<@(openssl_defines_BSD-x86_64)'],
 'cflags' : ['<@(openssl_cflags_BSD-x86_64)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86_64)'],
 'sources': ['<@(openssl_sources)', '<@(openssl_sources_BSD-x86_64)'],
 'direct_dependent_settings': {
  'include_dirs': ['./include', '.'],
  'defines': ['<@(openssl_defines_BSD-x86_64)'],
 },
}
```

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version 1.2.12, March 27th, 2022

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# Recognizing Contributors

The project looks to recognize and thank contributors for their contributions
as one of the ways we can help them continue to contribute to the project.

This document captures some of the processes we have in place to do that.

Some of the benefits we hope to achieve through these programs include:

* Ensuring people know that the project appreciates their work
* Encouraging people to repeat/grow their contributions
* Helping people demonstrate to their managers the value of the
 contributions they are making, which in terms helps their manager support
 their employer investing in the project (unfortunately this is
 something that matters)
* Highlighting the new features in Node.js and showing that they are
 being added by individuals like those mentioned. This should encourage
 other people to get involved and make similar contributions.
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 done by individuals or teams like those mentioned.
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## Sponsorship link on nodejs/node README.md

Collaborators may add a single link beside their name on the nodejs/node
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named `Support me`. This link may be:

1. a direct link to one of the sponsorship platforms listed below,
2. a page that has text explaining how to support the collaborator
   including zero or more links to the sponsorship platforms listed below.
   The page should not have any outgoing links other than to the
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The sponsorship platforms to which links can be made currently
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* [GitHub Sponsors](https://github.com/sponsors)
* [Polar](https://polar.sh/)
* [thanks.dev](https://thanks.dev)

## Amplification of posts announcing talks by collaborators

When a collaborator
 is speaking at a public event they may request amplification
by the Node.js social media accounts. They can request that a post highlighting
that they are speaking at the event be amplified by the Node.js accounts by
making a request in the #nodejs-social channel in the OpenJS Foundation slack.
We trust that collaborators will only request amplification when they believe
the event is relevant to the Node.js community and the content of the post is
in line with the norms of the project.

## Bi-monthly contributor spotlight

The contributor spotlight program showcases individual(s) or teams who have
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a member of the Technical Steering Committee (TSC) and has made a
notable contribution to the project can be nominated. They DO NOT need
to be a collaborator, team member etc.

The work of the team or individual(s) will be showcased on the
Node.js social channels and, if warranted, through a blog post created by the
OpenJS
 marketing staff along with the team or individual(s) which will
be published on [openjsf.org](https://openjsf.org/).

Nominations can be made through this web form:
[Contributor Spotlight nomination](https://forms.gle/dXBXZn8yu83HLJ57A)

Nominations will be reviewed/approved by the Technical Steering Committee (TSC)
on a regular basis as scheduled by the TSC chair. The TSC will also
recommend the order in which approved nominations are processed
by the OpenJS marketing staff.

Before any work proceeds on an approved nomination the individual(s) or team will be contacted to confirm they want to participate. Social content and or spotlight blog post will only be published after the team or individual(s) have confirmed they are happy with the content.

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```
/*
* WARNING: do not edit!
* Generated by Makefile from providers/common/include/prov/der_digests.h.in
*
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*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#include "internal/der.h"

/* Well known OIDs precompiled */
/* clang-format off */
```

```
/*
* sigAlgs OBJECT IDENTIFIER ::= { nistAlgorithms 3 }
*/
#define DER_OID_V_sigAlgs DER_P_OBJECT, 8, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x03
#define DER_OID_SZ_sigAlgs 10
extern const unsigned char ossl_der_oid_sigAlgs[DER_OID_SZ_sigAlgs];

/*
* id-sha1  OBJECT IDENTIFIER  ::=  { iso(1)
*                    identified-organization(3) oiw(14)
*                    secsig(3) algorithms(2) 26 }
*/
#define DER_OID_V_id_sha1 DER_P_OBJECT, 5, 0x2B, 0x0E, 0x03,
 0x02, 0x1A
#define DER_OID_SZ_id_sha1 7
extern const unsigned char ossl_der_oid_id_sha1[DER_OID_SZ_id_sha1];

/*
* id-md2  OBJECT IDENTIFIER ::= {
*   iso(1) member-body(2) us(840) rsadsi(113549) digestAlgorithm(2) 2 }
*/
#define DER_OID_V_id_md2 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x02, 0x02
#define DER_OID_SZ_id_md2 10
extern const unsigned char ossl_der_oid_id_md2[DER_OID_SZ_id_md2];

/*
* id-md5  OBJECT IDENTIFIER ::= {
*   iso(1) member-body(2) us(840) rsadsi(113549) digestAlgorithm(2) 5 }
*/
#define DER_OID_V_id_md5 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x02, 0x05
#define DER_OID_SZ_id_md5 10
extern const unsigned char ossl_der_oid_id_md5[DER_OID_SZ_id_md5];

/*
* id-sha256 OBJECT IDENTIFIER ::= { hashAlgs 1 }
*/
#define DER_OID_V_id_sha256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x01
#define DER_OID_SZ_id_sha256 11
extern const unsigned char ossl_der_oid_id_sha256[DER_OID_SZ_id_sha256];

/*
* id-sha384 OBJECT IDENTIFIER
 ::= { hashAlgs 2 }
*/
#define DER_OID_V_id_sha384 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x02
#define DER_OID_SZ_id_sha384 11
extern const unsigned char ossl_der_oid_id_sha384[DER_OID_SZ_id_sha384];
```

```
/*
* id-sha512 OBJECT IDENTIFIER ::= { hashAlgs 3 }
*/
#define DER_OID_V_id_sha512 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x03
#define DER_OID_SZ_id_sha512 11
extern const unsigned char ossl_der_oid_id_sha512[DER_OID_SZ_id_sha512];

/*
* id-sha224 OBJECT IDENTIFIER ::= { hashAlgs 4 }
*/
#define DER_OID_V_id_sha224 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x04
#define DER_OID_SZ_id_sha224 11
extern const unsigned char ossl_der_oid_id_sha224[DER_OID_SZ_id_sha224];

/*
* id-sha512-224 OBJECT IDENTIFIER ::= { hashAlgs 5 }
*/
#define DER_OID_V_id_sha512_224 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x05
#define DER_OID_SZ_id_sha512_224 11
extern const unsigned char ossl_der_oid_id_sha512_224[DER_OID_SZ_id_sha512_224];

/*
 * id-sha512-256 OBJECT IDENTIFIER ::= { hashAlgs 6 }
*/
#define DER_OID_V_id_sha512_256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x06
#define DER_OID_SZ_id_sha512_256 11
extern const unsigned char ossl_der_oid_id_sha512_256[DER_OID_SZ_id_sha512_256];

/*
* id-sha3-224 OBJECT IDENTIFIER ::= { hashAlgs 7 }
*/
#define DER_OID_V_id_sha3_224 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x07
#define DER_OID_SZ_id_sha3_224 11
extern const unsigned char ossl_der_oid_id_sha3_224[DER_OID_SZ_id_sha3_224];

/*
* id-sha3-256 OBJECT IDENTIFIER ::= { hashAlgs 8 }
*/
#define DER_OID_V_id_sha3_256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x08
#define DER_OID_SZ_id_sha3_256 11
extern const unsigned char ossl_der_oid_id_sha3_256[DER_OID_SZ_id_sha3_256];

/*
* id-sha3-384 OBJECT IDENTIFIER ::= { hashAlgs 9 }
*/
#define DER_OID_V_id_sha3_384 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03,
 0x04, 0x02, 0x09
#define DER_OID_SZ_id_sha3_384 11
```

```
extern const unsigned char ossl_der_oid_id_sha3_384[DER_OID_SZ_id_sha3_384];

/*
* id-sha3-512 OBJECT IDENTIFIER ::= { hashAlgs 10 }
*/
#define DER_OID_V_id_sha3_512 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x0A
#define DER_OID_SZ_id_sha3_512 11
extern const unsigned char ossl_der_oid_id_sha3_512[DER_OID_SZ_id_sha3_512];

/*
* id-shake128 OBJECT IDENTIFIER ::= { hashAlgs 11 }
*/
#define DER_OID_V_id_shake128 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x0B
#define DER_OID_SZ_id_shake128 11
extern const unsigned char ossl_der_oid_id_shake128[DER_OID_SZ_id_shake128];

/*
* id-shake256 OBJECT IDENTIFIER ::= { hashAlgs 12 }
*/
#define DER_OID_V_id_shake256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x0C
#define DER_OID_SZ_id_shake256 11
extern const unsigned char ossl_der_oid_id_shake256[DER_OID_SZ_id_shake256];

/*
* id-shake128-len OBJECT IDENTIFIER ::= { hashAlgs
 17 }
*/
#define DER_OID_V_id_shake128_len DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02,
0x11
#define DER_OID_SZ_id_shake128_len 11
extern const unsigned char ossl_der_oid_id_shake128_len[DER_OID_SZ_id_shake128_len];

/*
* id-shake256-len OBJECT IDENTIFIER ::= { hashAlgs 18 }
*/
#define DER_OID_V_id_shake256_len DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02,
0x12
#define DER_OID_SZ_id_shake256_len 11
extern const unsigned char ossl_der_oid_id_shake256_len[DER_OID_SZ_id_shake256_len];

/*
* id-KMACWithSHAKE128 OBJECT IDENTIFIER ::={hashAlgs 19}
*/
#define DER_OID_V_id_KMACWithSHAKE128 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x02, 0x13
#define DER_OID_SZ_id_KMACWithSHAKE128 11
extern const unsigned char ossl_der_oid_id_KMACWithSHAKE128[DER_OID_SZ_id_KMACWithSHAKE128];
```

```
/*
* id-KMACWithSHAKE256 OBJECT IDENTIFIER ::={ hashAlgs 20}
*/
#define DER_OID_V_id_KMACWithSHAKE256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
 0x02, 0x14
#define DER_OID_SZ_id_KMACWithSHAKE256 11
extern const unsigned char ossl_der_oid_id_KMACWithSHAKE256[DER_OID_SZ_id_KMACWithSHAKE256];

/* clang-format on */
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/bio.h.in
*
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* https://www.openssl.org/source/license.html
*/
/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_BIO_H
#define OPENSSL_BIO_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_BIO_H
#endif

#include <openssl/e_os2.h>

#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif
#include <stdarg.h>

#include <openssl/crypto.h>
#include <openssl/bioerr.h>
#include <openssl/core.h>

#ifdef __cplusplus
extern "C" {
#endif
```

```
/* There are the classes of BIOs */
#define BIO_TYPE_DESCRIPTOR 0x0100 /* socket, fd, connect or accept */
#define BIO_TYPE_FILTER 0x0200
#define BIO_TYPE_SOURCE_SINK
 0x0400

/* These are the 'types' of BIOs */
#define BIO_TYPE_NONE 0
#define BIO_TYPE_MEM (1 | BIO_TYPE_SOURCE_SINK)
#define BIO_TYPE_FILE (2 | BIO_TYPE_SOURCE_SINK)

#define BIO_TYPE_FD (4 | BIO_TYPE_SOURCE_SINK | BIO_TYPE_DESCRIPTOR)
#define BIO_TYPE_SOCKET (5 | BIO_TYPE_SOURCE_SINK | BIO_TYPE_DESCRIPTOR)
#define BIO_TYPE_NULL (6 | BIO_TYPE_SOURCE_SINK)
#define BIO_TYPE_SSL (7 | BIO_TYPE_FILTER)
#define BIO_TYPE_MD (8 | BIO_TYPE_FILTER)
#define BIO_TYPE_BUFFER (9 | BIO_TYPE_FILTER)
#define BIO_TYPE_CIPHER (10 | BIO_TYPE_FILTER)
#define BIO_TYPE_BASE64 (11 | BIO_TYPE_FILTER)
#define BIO_TYPE_CONNECT (12 | BIO_TYPE_SOURCE_SINK | BIO_TYPE_DESCRIPTOR)
#define BIO_TYPE_ACCEPT (13 | BIO_TYPE_SOURCE_SINK | BIO_TYPE_DESCRIPTOR)

#define BIO_TYPE_NBIO_TEST (16 | BIO_TYPE_FILTER) /* server proxy BIO */
#define BIO_TYPE_NULL_FILTER (17 | BIO_TYPE_FILTER)
#define BIO_TYPE_BIO (19 | BIO_TYPE_SOURCE_SINK) /* half a BIO pair */
#define BIO_TYPE_LINEBUFFER (20 | BIO_TYPE_FILTER)
#define BIO_TYPE_DGRAM
 (21 | BIO_TYPE_SOURCE_SINK | BIO_TYPE_DESCRIPTOR)
#define BIO_TYPE_ASN1 (22 | BIO_TYPE_FILTER)
#define BIO_TYPE_COMP (23 | BIO_TYPE_FILTER)
#ifndef OPENSSL_NO_SCTP
#define BIO_TYPE_DGRAM_SCTP (24 | BIO_TYPE_SOURCE_SINK | BIO_TYPE_DESCRIPTOR)
#endif
#define BIO_TYPE_CORE_TO_PROV (25 | BIO_TYPE_SOURCE_SINK)
#define BIO_TYPE_DGRAM_PAIR (26 | BIO_TYPE_SOURCE_SINK)
#define BIO_TYPE_DGRAM_MEM (27 | BIO_TYPE_SOURCE_SINK)

/* Custom type starting index returned by BIO_get_new_index() */
#define BIO_TYPE_START 128
/* Custom type maximum index that can be returned by BIO_get_new_index() */
#define BIO_TYPE_MASK 0xFF

/*
* BIO_FILENAME_READ|BIO_CLOSE to open or close on free.
* BIO_set_fp(in,stdin,BIO_NOCLOSE);
*/
#define BIO_NOCLOSE 0x00
#define BIO_CLOSE 0x01
```

```
/*
* These are used in the following macros and are passed to BIO_ctrl()
*/
#define BIO_CTRL_RESET 1 /* opt - rewind/zero etc */
#define BIO_CTRL_EOF 2 /* opt - are we at the eof */
#define BIO_CTRL_INFO 3 /* opt - extra tit-bits
 */
#define BIO_CTRL_SET 4 /* man - set the 'IO' type */
#define BIO_CTRL_GET 5 /* man - get the 'IO' type */
#define BIO_CTRL_PUSH 6 /* opt - internal, used to signify change */
#define BIO_CTRL_POP 7 /* opt - internal, used to signify change */
#define BIO_CTRL_GET_CLOSE 8 /* man - set the 'close' on free */
#define BIO_CTRL_SET_CLOSE 9 /* man - set the 'close' on free */
#define BIO_CTRL_PENDING 10 /* opt - is their more data buffered */
#define BIO_CTRL_FLUSH 11 /* opt - 'flush' buffered output */
#define BIO_CTRL_DUP 12 /* man - extra stuff for 'duped' BIO */
#define BIO_CTRL_WPENDING 13 /* opt - number of bytes still to write */
#define BIO_CTRL_SET_CALLBACK 14 /* opt - set callback function */
#define BIO_CTRL_GET_CALLBACK 15 /* opt - set callback function */

#define BIO_CTRL_PEEK 29 /* BIO_f_buffer special */
#define BIO_CTRL_SET_FILENAME 30 /* BIO_s_file special */

/* dgram BIO stuff */
#define BIO_CTRL_DGRAM_CONNECT 31 /* BIO dgram special */
#define BIO_CTRL_DGRAM_SET_CONNECTED
 32 /* allow for an externally connected \
                                * socket to be passed in */
#define BIO_CTRL_DGRAM_SET_RECV_TIMEOUT 33 /* setsockopt, essentially */
#define BIO_CTRL_DGRAM_GET_RECV_TIMEOUT 34 /* getsockopt, essentially */
#define BIO_CTRL_DGRAM_SET_SEND_TIMEOUT 35 /* setsockopt, essentially */
#define BIO_CTRL_DGRAM_GET_SEND_TIMEOUT 36 /* getsockopt, essentially */

#define BIO_CTRL_DGRAM_GET_RECV_TIMER_EXP 37 /* flag whether the last */
#define BIO_CTRL_DGRAM_GET_SEND_TIMER_EXP 38 /* I/O operation timed out */

/* #ifdef IP_MTU_DISCOVER */
#define BIO_CTRL_DGRAM_MTU_DISCOVER 39 /* set DF bit on egress packets */
/* #endif */

#define BIO_CTRL_DGRAM_QUERY_MTU 40 /* as kernel for current MTU */
#define BIO_CTRL_DGRAM_GET_FALLBACK_MTU 47
#define BIO_CTRL_DGRAM_GET_MTU 41 /* get cached value for MTU */
#define BIO_CTRL_DGRAM_SET_MTU 42 /* set cached value for MTU.  \
                              * want to use this if asking \
```

```
                * the kernel fails */

#define BIO_CTRL_DGRAM_MTU_EXCEEDED 43 /* check whether the MTU was    \
                                * exceed in the previous write \
                                * operation */

#define BIO_CTRL_DGRAM_GET_PEER 46
#define BIO_CTRL_DGRAM_SET_PEER 44 /* Destination for the data */

#define BIO_CTRL_DGRAM_SET_NEXT_TIMEOUT 45 /* Next DTLS handshake timeout \
                                  * to adjust socket timeouts */
#define BIO_CTRL_DGRAM_SET_DONT_FRAG 48

#define BIO_CTRL_DGRAM_GET_MTU_OVERHEAD 49

/* Deliberately outside of OPENSSL_NO_SCTP - used in bss_dgram.c */
#define BIO_CTRL_DGRAM_SCTP_SET_IN_HANDSHAKE 50
#ifndef OPENSSL_NO_SCTP
/* SCTP stuff */
#define BIO_CTRL_DGRAM_SCTP_ADD_AUTH_KEY 51
#define BIO_CTRL_DGRAM_SCTP_NEXT_AUTH_KEY 52
#define BIO_CTRL_DGRAM_SCTP_AUTH_CCS_RCVD 53
#define BIO_CTRL_DGRAM_SCTP_GET_SNDINFO 60
#define BIO_CTRL_DGRAM_SCTP_SET_SNDINFO 61
#define BIO_CTRL_DGRAM_SCTP_GET_RCVINFO
 62
#define BIO_CTRL_DGRAM_SCTP_SET_RCVINFO 63
#define BIO_CTRL_DGRAM_SCTP_GET_PRINFO 64
#define BIO_CTRL_DGRAM_SCTP_SET_PRINFO 65
#define BIO_CTRL_DGRAM_SCTP_SAVE_SHUTDOWN 70
#endif

#define BIO_CTRL_DGRAM_SET_PEEK_MODE 71

/*
* internal BIO:
* # define BIO_CTRL_SET_KTLS_SEND                72
* # define BIO_CTRL_SET_KTLS_SEND_CTRL_MSG        74
* # define BIO_CTRL_CLEAR_KTLS_CTRL_MSG           75
*/

#define BIO_CTRL_GET_KTLS_SEND 73
#define BIO_CTRL_GET_KTLS_RECV 76

#define BIO_CTRL_DGRAM_SCTP_WAIT_FOR_DRY 77
#define BIO_CTRL_DGRAM_SCTP_MSG_WAITING 78

/* BIO_f_prefix controls */
```

```
#define BIO_CTRL_SET_PREFIX 79
#define BIO_CTRL_SET_INDENT 80
#define BIO_CTRL_GET_INDENT 81

#define BIO_CTRL_DGRAM_GET_LOCAL_ADDR_CAP 82
#define BIO_CTRL_DGRAM_GET_LOCAL_ADDR_ENABLE 83
#define BIO_CTRL_DGRAM_SET_LOCAL_ADDR_ENABLE 84
#define BIO_CTRL_DGRAM_GET_EFFECTIVE_CAPS 85
#define BIO_CTRL_DGRAM_GET_CAPS 86
#define BIO_CTRL_DGRAM_SET_CAPS 87
#define BIO_CTRL_DGRAM_GET_NO_TRUNC 88
#define BIO_CTRL_DGRAM_SET_NO_TRUNC
 89

/*
* internal BIO:
* # define BIO_CTRL_SET_KTLS_TX_ZEROCOPY_SENDFILE 90
*/

#define BIO_CTRL_GET_RPOLL_DESCRIPTOR 91
#define BIO_CTRL_GET_WPOLL_DESCRIPTOR 92
#define BIO_CTRL_DGRAM_DETECT_PEER_ADDR 93
#define BIO_CTRL_DGRAM_SET0_LOCAL_ADDR 94

#define BIO_DGRAM_CAP_NONE 0U
#define BIO_DGRAM_CAP_HANDLES_SRC_ADDR (1U << 0)
#define BIO_DGRAM_CAP_HANDLES_DST_ADDR (1U << 1)
#define BIO_DGRAM_CAP_PROVIDES_SRC_ADDR (1U << 2)
#define BIO_DGRAM_CAP_PROVIDES_DST_ADDR (1U << 3)

#ifndef OPENSSL_NO_KTLS
#define BIO_get_ktls_send(b) \
   (BIO_ctrl(b, BIO_CTRL_GET_KTLS_SEND, 0, NULL) > 0)
#define BIO_get_ktls_recv(b) \
   (BIO_ctrl(b, BIO_CTRL_GET_KTLS_RECV, 0, NULL) > 0)
#else
#define BIO_get_ktls_send(b) (0)
#define BIO_get_ktls_recv(b) (0)
#endif

/* modifiers */
#define BIO_FP_READ 0x02
#define BIO_FP_WRITE 0x04
#define BIO_FP_APPEND 0x08
#define BIO_FP_TEXT 0x10

#define BIO_FLAGS_READ 0x01
#define BIO_FLAGS_WRITE 0x02
```

```
#define BIO_FLAGS_IO_SPECIAL 0x04
#define BIO_FLAGS_RWS
 (BIO_FLAGS_READ | BIO_FLAGS_WRITE | BIO_FLAGS_IO_SPECIAL)
#define BIO_FLAGS_SHOULD_RETRY 0x08
#ifndef OPENSSL_NO_DEPRECATED_3_0
/* This #define was replaced by an internal constant and should not be used. */
#define BIO_FLAGS_UPLINK 0
#endif

#define BIO_FLAGS_BASE64_NO_NL 0x100

/*
* This is used with memory BIOs:
* BIO_FLAGS_MEM_RDONLY means we shouldn't free up or change the data in any way;
* BIO_FLAGS_NONCLEAR_RST means we shouldn't clear data on reset.
*/
#define BIO_FLAGS_MEM_RDONLY 0x200
#define BIO_FLAGS_NONCLEAR_RST 0x400
#define BIO_FLAGS_IN_EOF 0x800

/* the BIO FLAGS values 0x1000 to 0x8000 are reserved for internal KTLS flags */

typedef union bio_addr_st BIO_ADDR;
typedef struct bio_addrinfo_st BIO_ADDRINFO;

int BIO_get_new_index(void);
void BIO_set_flags(BIO *b, int flags);
int BIO_test_flags(const BIO *b, int flags);
void BIO_clear_flags(BIO *b, int flags);

#define BIO_get_flags(b) BIO_test_flags(b, ~(0x0))
#define BIO_set_retry_special(b) \
   BIO_set_flags(b,
 (BIO_FLAGS_IO_SPECIAL | BIO_FLAGS_SHOULD_RETRY))
#define BIO_set_retry_read(b) \
   BIO_set_flags(b, (BIO_FLAGS_READ | BIO_FLAGS_SHOULD_RETRY))
#define BIO_set_retry_write(b) \
   BIO_set_flags(b, (BIO_FLAGS_WRITE | BIO_FLAGS_SHOULD_RETRY))

/* These are normally used internally in BIOs */
#define BIO_clear_retry_flags(b) \
   BIO_clear_flags(b, (BIO_FLAGS_RWS | BIO_FLAGS_SHOULD_RETRY))
#define BIO_get_retry_flags(b) \
   BIO_test_flags(b, (BIO_FLAGS_RWS | BIO_FLAGS_SHOULD_RETRY))

/* These should be used by the application to tell why we should retry */
#define BIO_should_read(a) BIO_test_flags(a, BIO_FLAGS_READ)
#define BIO_should_write(a) BIO_test_flags(a, BIO_FLAGS_WRITE)
```

```
#define BIO_should_io_special(a) BIO_test_flags(a, BIO_FLAGS_IO_SPECIAL)
#define BIO_retry_type(a) BIO_test_flags(a, BIO_FLAGS_RWS)
#define BIO_should_retry(a) BIO_test_flags(a, BIO_FLAGS_SHOULD_RETRY)

/*
* The next three are used in conjunction with the BIO_should_io_special()
* condition.  After
 this returns true, BIO *BIO_get_retry_BIO(BIO *bio, int
* *reason); will walk the BIO stack and return the 'reason' for the special
* and the offending BIO. Given a BIO, BIO_get_retry_reason(bio) will return
* the code.
*/
/*
* Returned from the SSL bio when the certificate retrieval code had an error
*/
#define BIO_RR_SSL_X509_LOOKUP 0x01
/* Returned from the connect BIO when a connect would have blocked */
#define BIO_RR_CONNECT 0x02
/* Returned from the accept BIO when an accept would have blocked */
#define BIO_RR_ACCEPT 0x03

/* These are passed by the BIO callback */
#define BIO_CB_FREE 0x01
#define BIO_CB_READ 0x02
#define BIO_CB_WRITE 0x03
#define BIO_CB_PUTS 0x04
#define BIO_CB_GETS 0x05
#define BIO_CB_CTRL 0x06
#define BIO_CB_RECVMMSG 0x07
#define BIO_CB_SENDMMSG 0x08

/*
* The callback is called before and after the underling operation, The
* BIO_CB_RETURN flag indicates if it is after the call
*/
#define BIO_CB_RETURN 0x80
#define BIO_CB_return(a) ((a) | BIO_CB_RETURN)
#define
 BIO_cb_pre(a) (!((a) & BIO_CB_RETURN))
#define BIO_cb_post(a) ((a) & BIO_CB_RETURN)

#ifndef OPENSSL_NO_DEPRECATED_3_0
typedef long (*BIO_callback_fn)(BIO *b, int oper, const char *argp, int argi,
   long argl, long ret);
OSSL_DEPRECATEDIN_3_0 BIO_callback_fn BIO_get_callback(const BIO *b);
OSSL_DEPRECATEDIN_3_0 void BIO_set_callback(BIO *b, BIO_callback_fn callback);
OSSL_DEPRECATEDIN_3_0 long BIO_debug_callback(BIO *bio, int cmd,
   const char *argp, int argi,
```

```
   long argl, long ret);
#endif

typedef long (*BIO_callback_fn_ex)(BIO *b, int oper, const char *argp,
   size_t len, int argi,
   long argl, int ret, size_t *processed);
BIO_callback_fn_ex BIO_get_callback_ex(const BIO *b);
void BIO_set_callback_ex(BIO *b, BIO_callback_fn_ex callback);
long BIO_debug_callback_ex(BIO *bio, int oper, const char *argp, size_t len,
   int argi, long argl, int ret, size_t *processed);

char *BIO_get_callback_arg(const BIO *b);
void BIO_set_callback_arg(BIO *b, char *arg);

typedef
 struct bio_method_st BIO_METHOD;

const char *BIO_method_name(const BIO *b);
int BIO_method_type(const BIO *b);

typedef int BIO_info_cb(BIO *, int, int);
typedef BIO_info_cb bio_info_cb; /* backward compatibility */

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(BIO, BIO, BIO)
#define sk_BIO_num(sk) OPENSSL_sk_num(ossl_check_const_BIO_sk_type(sk))
#define sk_BIO_value(sk, idx) ((BIO *)OPENSSL_sk_value(ossl_check_const_BIO_sk_type(sk), (idx)))
#define sk_BIO_new(cmp) ((STACK_OF(BIO) *)OPENSSL_sk_new(ossl_check_BIO_compfunc_type(cmp)))
#define sk_BIO_new_null() ((STACK_OF(BIO) *)OPENSSL_sk_new_null())
#define sk_BIO_new_reserve(cmp, n) ((STACK_OF(BIO)
*)OPENSSL_sk_new_reserve(ossl_check_BIO_compfunc_type(cmp), (n)))
#define sk_BIO_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_BIO_sk_type(sk), (n))
#define sk_BIO_free(sk) OPENSSL_sk_free(ossl_check_BIO_sk_type(sk))
#define sk_BIO_zero(sk) OPENSSL_sk_zero(ossl_check_BIO_sk_type(sk))
#define sk_BIO_delete(sk, i) ((BIO *)OPENSSL_sk_delete(ossl_check_BIO_sk_type(sk),
 (i)))
#define sk_BIO_delete_ptr(sk, ptr) ((BIO *)OPENSSL_sk_delete_ptr(ossl_check_BIO_sk_type(sk),
ossl_check_BIO_type(ptr)))
#define sk_BIO_push(sk, ptr) OPENSSL_sk_push(ossl_check_BIO_sk_type(sk), ossl_check_BIO_type(ptr))
#define sk_BIO_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_BIO_sk_type(sk), ossl_check_BIO_type(ptr))
#define sk_BIO_pop(sk) ((BIO *)OPENSSL_sk_pop(ossl_check_BIO_sk_type(sk)))
#define sk_BIO_shift(sk) ((BIO *)OPENSSL_sk_shift(ossl_check_BIO_sk_type(sk)))
#define sk_BIO_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_BIO_sk_type(sk),ossl_check_BIO_freefunc_type(freefunc))
#define sk_BIO_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_BIO_sk_type(sk), ossl_check_BIO_type(ptr),
(idx))
#define sk_BIO_set(sk, idx, ptr) ((BIO *)OPENSSL_sk_set(ossl_check_BIO_sk_type(sk), (idx),
ossl_check_BIO_type(ptr)))
```

```
#define sk_BIO_find(sk, ptr) OPENSSL_sk_find(ossl_check_BIO_sk_type(sk), ossl_check_BIO_type(ptr))
#define sk_BIO_find_ex(sk,
 ptr) OPENSSL_sk_find_ex(ossl_check_BIO_sk_type(sk), ossl_check_BIO_type(ptr))
#define sk_BIO_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_BIO_sk_type(sk),
ossl_check_BIO_type(ptr), pnum)
#define sk_BIO_sort(sk) OPENSSL_sk_sort(ossl_check_BIO_sk_type(sk))
#define sk_BIO_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_BIO_sk_type(sk))
#define sk_BIO_dup(sk) ((STACK_OF(BIO) *)OPENSSL_sk_dup(ossl_check_const_BIO_sk_type(sk)))
#define sk_BIO_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(BIO)
*)OPENSSL_sk_deep_copy(ossl_check_const_BIO_sk_type(sk), ossl_check_BIO_copyfunc_type(copyfunc),
ossl_check_BIO_freefunc_type(freefunc)))
#define sk_BIO_set_cmp_func(sk, cmp)
((sk_BIO_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_BIO_sk_type(sk),
ossl_check_BIO_compfunc_type(cmp)))

/* clang-format on */

/* Prefix and suffix callback in ASN1 BIO */
typedef int asn1_ps_func(BIO *b, unsigned char **pbuf, int *plen,
   void *parg);

typedef void (*BIO_dgram_sctp_notification_handler_fn)(BIO
 *b,
   void *context,
   void *buf);
#ifndef OPENSSL_NO_SCTP
/* SCTP parameter structs */
struct bio_dgram_sctp_sndinfo {
   uint16_t snd_sid;
   uint16_t snd_flags;
   uint32_t snd_ppid;
   uint32_t snd_context;
};

struct bio_dgram_sctp_rcvinfo {
   uint16_t rcv_sid;
   uint16_t rcv_ssn;
   uint16_t rcv_flags;
   uint32_t rcv_ppid;
   uint32_t rcv_tsn;
   uint32_t rcv_cumtsn;
   uint32_t rcv_context;
};

struct bio_dgram_sctp_prinfo {
   uint16_t pr_policy;
   uint32_t pr_value;
};
```

```
#endif

/* BIO_sendmmsg/BIO_recvmmsg-related definitions */
typedef struct bio_msg_st {
   void *data;
   size_t data_len;
   BIO_ADDR *peer, *local;
   uint64_t flags;
} BIO_MSG;

typedef struct bio_mmsg_cb_args_st {
   BIO_MSG *msg;
   size_t stride, num_msg;
   uint64_t flags;
   size_t *msgs_processed;
} BIO_MMSG_CB_ARGS;

#define BIO_POLL_DESCRIPTOR_TYPE_NONE 0
#define BIO_POLL_DESCRIPTOR_TYPE_SOCK_FD 1
#define BIO_POLL_DESCRIPTOR_TYPE_SSL 2
#define BIO_POLL_DESCRIPTOR_CUSTOM_START
 8192

typedef struct bio_poll_descriptor_st {
   uint32_t type;
   union {
      int fd;
      void *custom;
      uintptr_t custom_ui;
      SSL *ssl;
   } value;
} BIO_POLL_DESCRIPTOR;

/*
* #define BIO_CONN_get_param_hostname BIO_ctrl
*/

#define BIO_C_SET_CONNECT 100
#define BIO_C_DO_STATE_MACHINE 101
#define BIO_C_SET_NBIO 102
/* # define BIO_C_SET_PROXY_PARAM                    103 */
#define BIO_C_SET_FD 104
#define BIO_C_GET_FD 105
#define BIO_C_SET_FILE_PTR 106
#define BIO_C_GET_FILE_PTR 107
#define BIO_C_SET_FILENAME 108
#define BIO_C_SET_SSL 109
#define BIO_C_GET_SSL 110
```

```
#define BIO_C_SET_MD 111
#define BIO_C_GET_MD 112
#define BIO_C_GET_CIPHER_STATUS 113
#define BIO_C_SET_BUF_MEM 114
#define BIO_C_GET_BUF_MEM_PTR 115
#define BIO_C_GET_BUFF_NUM_LINES 116
#define BIO_C_SET_BUFF_SIZE 117
#define BIO_C_SET_ACCEPT 118
#define BIO_C_SSL_MODE 119
#define BIO_C_GET_MD_CTX 120
/* # define BIO_C_GET_PROXY_PARAM                    121 */
#define BIO_C_SET_BUFF_READ_DATA
 122 /* data to read first */
#define BIO_C_GET_CONNECT 123
#define BIO_C_GET_ACCEPT 124
#define BIO_C_SET_SSL_RENEGOTIATE_BYTES 125
#define BIO_C_GET_SSL_NUM_RENEGOTIATES 126
#define BIO_C_SET_SSL_RENEGOTIATE_TIMEOUT 127
#define BIO_C_FILE_SEEK 128
#define BIO_C_GET_CIPHER_CTX 129
#define BIO_C_SET_BUF_MEM_EOF_RETURN 130 /* return end of input \
                                 * value */
#define BIO_C_SET_BIND_MODE 131
#define BIO_C_GET_BIND_MODE 132
#define BIO_C_FILE_TELL 133
#define BIO_C_GET_SOCKS 134
#define BIO_C_SET_SOCKS 135

#define BIO_C_SET_WRITE_BUF_SIZE 136 /* for BIO_s_bio */
#define BIO_C_GET_WRITE_BUF_SIZE 137
#define BIO_C_MAKE_BIO_PAIR 138
#define BIO_C_DESTROY_BIO_PAIR 139
#define BIO_C_GET_WRITE_GUARANTEE 140
#define BIO_C_GET_READ_REQUEST 141
#define BIO_C_SHUTDOWN_WR 142
#define BIO_C_NREAD0 143
#define BIO_C_NREAD 144
#define BIO_C_NWRITE0 145
#define BIO_C_NWRITE 146
#define BIO_C_RESET_READ_REQUEST 147
#define BIO_C_SET_MD_CTX 148

#define BIO_C_SET_PREFIX
 149
#define BIO_C_GET_PREFIX 150
#define BIO_C_SET_SUFFIX 151
#define BIO_C_GET_SUFFIX 152
```

```
#define BIO_C_SET_EX_ARG 153
#define BIO_C_GET_EX_ARG 154

#define BIO_C_SET_CONNECT_MODE 155

#define BIO_C_SET_TFO 156 /* like BIO_C_SET_NBIO */

#define BIO_C_SET_SOCK_TYPE 157
#define BIO_C_GET_SOCK_TYPE 158
#define BIO_C_GET_DGRAM_BIO 159

#define BIO_set_app_data(s, arg) BIO_set_ex_data(s, 0, arg)
#define BIO_get_app_data(s) BIO_get_ex_data(s, 0)

#define BIO_set_nbio(b, n) BIO_ctrl(b, BIO_C_SET_NBIO, (n), NULL)
#define BIO_set_tfo(b, n) BIO_ctrl(b, BIO_C_SET_TFO, (n), NULL)

#ifndef OPENSSL_NO_SOCK
/* IP families we support, for BIO_s_connect() and BIO_s_accept() */
/* Note: the underlying operating system may not support some of them */
#define BIO_FAMILY_IPV4 4
#define BIO_FAMILY_IPV6 6
#define BIO_FAMILY_IPANY 256

/* BIO_s_connect() */
#define BIO_set_conn_hostname(b, name) BIO_ctrl(b, BIO_C_SET_CONNECT, 0, \
   (char *)(name))
#define BIO_set_conn_port(b, port) BIO_ctrl(b,
 BIO_C_SET_CONNECT, 1, \
   (char *)(port))
#define BIO_set_conn_address(b, addr) BIO_ctrl(b, BIO_C_SET_CONNECT, 2, \
   (char *)(addr))
#define BIO_set_conn_ip_family(b, f) BIO_int_ctrl(b, BIO_C_SET_CONNECT, 3, f)
#define BIO_get_conn_hostname(b) ((const char *)BIO_ptr_ctrl(b, BIO_C_GET_CONNECT, 0))
#define BIO_get_conn_port(b) ((const char *)BIO_ptr_ctrl(b, BIO_C_GET_CONNECT, 1))
#define BIO_get_conn_address(b) ((const BIO_ADDR *)BIO_ptr_ctrl(b, BIO_C_GET_CONNECT, 2))
#define BIO_get_conn_ip_family(b) BIO_ctrl(b, BIO_C_GET_CONNECT, 3, NULL)
#define BIO_get_conn_mode(b) BIO_ctrl(b, BIO_C_GET_CONNECT, 4, NULL)
#define BIO_set_conn_mode(b, n) BIO_ctrl(b, BIO_C_SET_CONNECT_MODE, (n), NULL)
#define BIO_set_sock_type(b, t) BIO_ctrl(b, BIO_C_SET_SOCK_TYPE, (t), NULL)
#define BIO_get_sock_type(b) BIO_ctrl(b, BIO_C_GET_SOCK_TYPE, 0, NULL)
#define BIO_get0_dgram_bio(b, p) BIO_ctrl(b, BIO_C_GET_DGRAM_BIO, 0, (void *)(BIO **)(p))

/* BIO_s_accept() */
#define BIO_set_accept_name(b, name) BIO_ctrl(b,
 BIO_C_SET_ACCEPT, 0, \
   (char *)(name))
#define BIO_set_accept_port(b, port) BIO_ctrl(b, BIO_C_SET_ACCEPT, 1, \
```

```
   (char *)(port))
#define BIO_get_accept_name(b) ((const char *)BIO_ptr_ctrl(b, BIO_C_GET_ACCEPT, 0))
#define BIO_get_accept_port(b) ((const char *)BIO_ptr_ctrl(b, BIO_C_GET_ACCEPT, 1))
#define BIO_get_peer_name(b) ((const char *)BIO_ptr_ctrl(b, BIO_C_GET_ACCEPT, 2))
#define BIO_get_peer_port(b) ((const char *)BIO_ptr_ctrl(b, BIO_C_GET_ACCEPT, 3))
/* #define BIO_set_nbio(b,n)    BIO_ctrl(b,BIO_C_SET_NBIO,(n),NULL) */
#define BIO_set_nbio_accept(b, n) BIO_ctrl(b, BIO_C_SET_ACCEPT, 2, (n) ? (void *)"a" : NULL)
#define BIO_set_accept_bios(b, bio) BIO_ctrl(b, BIO_C_SET_ACCEPT, 3, \
   (char *)(bio))
#define BIO_set_accept_ip_family(b, f) BIO_int_ctrl(b, BIO_C_SET_ACCEPT, 4, f)
#define BIO_get_accept_ip_family(b) BIO_ctrl(b, BIO_C_GET_ACCEPT, 4, NULL)
#define BIO_set_tfo_accept(b, n) BIO_ctrl(b, BIO_C_SET_ACCEPT, 5, (n) ? (void *)"a" : NULL)

/* Aliases kept for backward
 compatibility */
#define BIO_BIND_NORMAL 0
#define BIO_BIND_REUSEADDR BIO_SOCK_REUSEADDR
#define BIO_BIND_REUSEADDR_IF_UNUSED BIO_SOCK_REUSEADDR
#define BIO_set_bind_mode(b, mode) BIO_ctrl(b, BIO_C_SET_BIND_MODE, mode, NULL)
#define BIO_get_bind_mode(b) BIO_ctrl(b, BIO_C_GET_BIND_MODE, 0, NULL)
#endif /* OPENSSL_NO_SOCK */

#define BIO_do_connect(b) BIO_do_handshake(b)
#define BIO_do_accept(b) BIO_do_handshake(b)

#define BIO_do_handshake(b) BIO_ctrl(b, BIO_C_DO_STATE_MACHINE, 0, NULL)

/* BIO_s_datagram(), BIO_s_fd(), BIO_s_socket(), BIO_s_accept() and BIO_s_connect() */
#define BIO_set_fd(b, fd, c) BIO_int_ctrl(b, BIO_C_SET_FD, c, fd)
#define BIO_get_fd(b, c) BIO_ctrl(b, BIO_C_GET_FD, 0, (char *)(c))

/* BIO_s_file() */
#define BIO_set_fp(b, fp, c) BIO_ctrl(b, BIO_C_SET_FILE_PTR, c, (char *)(fp))
#define BIO_get_fp(b, fpp) BIO_ctrl(b, BIO_C_GET_FILE_PTR, 0, (char *)(fpp))

/* BIO_s_fd() and BIO_s_file() */
#define BIO_seek(b, ofs) (int)BIO_ctrl(b, BIO_C_FILE_SEEK, ofs, NULL)
#define
 BIO_tell(b) (int)BIO_ctrl(b, BIO_C_FILE_TELL, 0, NULL)

/*
* name is cast to lose const, but might be better to route through a
* function so we can do it safely
*/
#ifdef CONST_STRICT
/*
* If you are wondering why this isn't defined, its because CONST_STRICT is
* purely a compile-time kludge to allow const to be checked.
```

```
*/
int BIO_read_filename(BIO *b, const char *name);
#else
#define BIO_read_filename(b, name) (int)BIO_ctrl(b, BIO_C_SET_FILENAME, \
   BIO_CLOSE | BIO_FP_READ, (char *)(name))
#endif
#define BIO_write_filename(b, name) (int)BIO_ctrl(b, BIO_C_SET_FILENAME, \
   BIO_CLOSE | BIO_FP_WRITE, name)
#define BIO_append_filename(b, name) (int)BIO_ctrl(b, BIO_C_SET_FILENAME, \
   BIO_CLOSE | BIO_FP_APPEND, name)
#define BIO_rw_filename(b, name) (int)BIO_ctrl(b, BIO_C_SET_FILENAME, \
   BIO_CLOSE | BIO_FP_READ | BIO_FP_WRITE, name)

/*
* WARNING WARNING, this ups the reference count on the read bio of the SSL
* structure.  This is because the ssl read BIO is now pointed
 to by the
* next_bio field in the bio.  So when you free the BIO, make sure you are
* doing a BIO_free_all() to catch the underlying BIO.
*/
#define BIO_set_ssl(b, ssl, c) BIO_ctrl(b, BIO_C_SET_SSL, c, (char *)(ssl))
#define BIO_get_ssl(b, sslp) BIO_ctrl(b, BIO_C_GET_SSL, 0, (char *)(sslp))
#define BIO_set_ssl_mode(b, client) BIO_ctrl(b, BIO_C_SSL_MODE, client, NULL)
#define BIO_set_ssl_renegotiate_bytes(b, num) \
   BIO_ctrl(b, BIO_C_SET_SSL_RENEGOTIATE_BYTES, num, NULL)
#define BIO_get_num_renegotiates(b) \
   BIO_ctrl(b, BIO_C_GET_SSL_NUM_RENEGOTIATES, 0, NULL)
#define BIO_set_ssl_renegotiate_timeout(b, seconds) \
   BIO_ctrl(b, BIO_C_SET_SSL_RENEGOTIATE_TIMEOUT, seconds, NULL)

/* defined in evp.h */
/* #define BIO_set_md(b,md)     BIO_ctrl(b,BIO_C_SET_MD,1,(char *)(md)) */

#define BIO_get_mem_data(b, pp) BIO_ctrl(b, BIO_CTRL_INFO, 0, (char *)(pp))
#define BIO_set_mem_buf(b, bm, c) BIO_ctrl(b, BIO_C_SET_BUF_MEM, c, (char *)(bm))
#define BIO_get_mem_ptr(b, pp) BIO_ctrl(b,
 BIO_C_GET_BUF_MEM_PTR, 0, \
   (char *)(pp))
#define BIO_set_mem_eof_return(b, v) \
   BIO_ctrl(b, BIO_C_SET_BUF_MEM_EOF_RETURN, v, NULL)

/* For the BIO_f_buffer() type */
#define BIO_get_buffer_num_lines(b) BIO_ctrl(b, BIO_C_GET_BUFF_NUM_LINES, 0, NULL)
#define BIO_set_buffer_size(b, size) BIO_ctrl(b, BIO_C_SET_BUFF_SIZE, size, NULL)
#define BIO_set_read_buffer_size(b, size) BIO_int_ctrl(b, BIO_C_SET_BUFF_SIZE, size, 0)
#define BIO_set_write_buffer_size(b, size) BIO_int_ctrl(b, BIO_C_SET_BUFF_SIZE, size, 1)
#define BIO_set_buffer_read_data(b, buf, num) BIO_ctrl(b, BIO_C_SET_BUFF_READ_DATA, num, buf)
```

```
/* Don't use the next one unless you know what you are doing :-) */
#define BIO_dup_state(b, ret) BIO_ctrl(b, BIO_CTRL_DUP, 0, (char *)(ret))

#define BIO_reset(b) (int)BIO_ctrl(b, BIO_CTRL_RESET, 0, NULL)
#define BIO_eof(b) (int)BIO_ctrl(b, BIO_CTRL_EOF, 0, NULL)
#define BIO_set_close(b, c) (int)BIO_ctrl(b, BIO_CTRL_SET_CLOSE, (c), NULL)
#define BIO_get_close(b) (int)BIO_ctrl(b, BIO_CTRL_GET_CLOSE,
 0, NULL)
#define BIO_pending(b) (int)BIO_ctrl(b, BIO_CTRL_PENDING, 0, NULL)
#define BIO_wpending(b) (int)BIO_ctrl(b, BIO_CTRL_WPENDING, 0, NULL)
/* ...pending macros have inappropriate return type */
size_t BIO_ctrl_pending(BIO *b);
size_t BIO_ctrl_wpending(BIO *b);
#define BIO_flush(b) (int)BIO_ctrl(b, BIO_CTRL_FLUSH, 0, NULL)
#define BIO_get_info_callback(b, cbp) (int)BIO_ctrl(b, BIO_CTRL_GET_CALLBACK, 0, \
   cbp)
#define BIO_set_info_callback(b, cb) (int)BIO_callback_ctrl(b, BIO_CTRL_SET_CALLBACK, cb)

/* For the BIO_f_buffer() type */
#define BIO_buffer_get_num_lines(b) BIO_ctrl(b, BIO_CTRL_GET, 0, NULL)
#define BIO_buffer_peek(b, s, l) BIO_ctrl(b, BIO_CTRL_PEEK, (l), (s))

/* For BIO_s_bio() */
#define BIO_set_write_buf_size(b, size) (int)BIO_ctrl(b, BIO_C_SET_WRITE_BUF_SIZE, size, NULL)
#define BIO_get_write_buf_size(b, size) (size_t)BIO_ctrl(b, BIO_C_GET_WRITE_BUF_SIZE, size, NULL)
#define BIO_make_bio_pair(b1, b2) (int)BIO_ctrl(b1, BIO_C_MAKE_BIO_PAIR, 0, b2)
#define
 BIO_destroy_bio_pair(b) (int)BIO_ctrl(b, BIO_C_DESTROY_BIO_PAIR, 0, NULL)
#define BIO_shutdown_wr(b) (int)BIO_ctrl(b, BIO_C_SHUTDOWN_WR, 0, NULL)
/* macros with inappropriate type -- but ...pending macros use int too: */
#define BIO_get_write_guarantee(b) (int)BIO_ctrl(b, BIO_C_GET_WRITE_GUARANTEE, 0, NULL)
#define BIO_get_read_request(b) (int)BIO_ctrl(b, BIO_C_GET_READ_REQUEST, 0, NULL)
size_t BIO_ctrl_get_write_guarantee(BIO *b);
size_t BIO_ctrl_get_read_request(BIO *b);
int BIO_ctrl_reset_read_request(BIO *b);

/* ctrl macros for dgram */
#define BIO_ctrl_dgram_connect(b, peer) \
   (int)BIO_ctrl(b, BIO_CTRL_DGRAM_CONNECT, 0, (char *)(peer))
#define BIO_ctrl_set_connected(b, peer) \
   (int)BIO_ctrl(b, BIO_CTRL_DGRAM_SET_CONNECTED, 0, (char *)(peer))
#define BIO_dgram_recv_timedout(b) \
   (int)BIO_ctrl(b, BIO_CTRL_DGRAM_GET_RECV_TIMER_EXP, 0, NULL)
#define BIO_dgram_send_timedout(b) \
   (int)BIO_ctrl(b, BIO_CTRL_DGRAM_GET_SEND_TIMER_EXP, 0, NULL)
#define BIO_dgram_get_peer(b,
 peer) \
   (int)BIO_ctrl(b, BIO_CTRL_DGRAM_GET_PEER, 0, (char *)(peer))
```

```
#define BIO_dgram_set_peer(b, peer) \
   (int)BIO_ctrl(b, BIO_CTRL_DGRAM_SET_PEER, 0, (char *)(peer))
#define BIO_dgram_detect_peer_addr(b, peer) \
   (int)BIO_ctrl(b, BIO_CTRL_DGRAM_DETECT_PEER_ADDR, 0, (char *)(peer))
#define BIO_dgram_get_mtu_overhead(b) \
   (unsigned int)BIO_ctrl((b), BIO_CTRL_DGRAM_GET_MTU_OVERHEAD, 0, NULL)
#define BIO_dgram_get_local_addr_cap(b) \
   (int)BIO_ctrl((b), BIO_CTRL_DGRAM_GET_LOCAL_ADDR_CAP, 0, NULL)
#define BIO_dgram_get_local_addr_enable(b, penable) \
   (int)BIO_ctrl((b), BIO_CTRL_DGRAM_GET_LOCAL_ADDR_ENABLE, 0, (char *)(penable))
#define BIO_dgram_set_local_addr_enable(b, enable) \
   (int)BIO_ctrl((b), BIO_CTRL_DGRAM_SET_LOCAL_ADDR_ENABLE, (enable), NULL)
#define BIO_dgram_get_effective_caps(b) \
   (uint32_t)BIO_ctrl((b), BIO_CTRL_DGRAM_GET_EFFECTIVE_CAPS, 0, NULL)
#define BIO_dgram_get_caps(b) \
   (uint32_t)BIO_ctrl((b), BIO_CTRL_DGRAM_GET_CAPS, 0, NULL)
#define
 BIO_dgram_set_caps(b, caps) \
   (int)BIO_ctrl((b), BIO_CTRL_DGRAM_SET_CAPS, (long)(caps), NULL)
#define BIO_dgram_get_no_trunc(b) \
   (unsigned int)BIO_ctrl((b), BIO_CTRL_DGRAM_GET_NO_TRUNC, 0, NULL)
#define BIO_dgram_set_no_trunc(b, enable) \
   (int)BIO_ctrl((b), BIO_CTRL_DGRAM_SET_NO_TRUNC, (enable), NULL)
#define BIO_dgram_get_mtu(b) \
   (unsigned int)BIO_ctrl((b), BIO_CTRL_DGRAM_GET_MTU, 0, NULL)
#define BIO_dgram_set_mtu(b, mtu) \
   (int)BIO_ctrl((b), BIO_CTRL_DGRAM_SET_MTU, (mtu), NULL)
#define BIO_dgram_set0_local_addr(b, addr) \
   (int)BIO_ctrl((b), BIO_CTRL_DGRAM_SET0_LOCAL_ADDR, 0, (addr))

/* ctrl macros for BIO_f_prefix */
#define BIO_set_prefix(b, p) BIO_ctrl((b), BIO_CTRL_SET_PREFIX, 0, (void *)(p))
#define BIO_set_indent(b, i) BIO_ctrl((b), BIO_CTRL_SET_INDENT, (i), NULL)
#define BIO_get_indent(b) BIO_ctrl((b), BIO_CTRL_GET_INDENT, 0, NULL)

#define BIO_get_ex_new_index(l, p, newf, dupf, freef) \
   CRYPTO_get_ex_new_index(CRYPTO_EX_INDEX_BIO, l,
 p, newf, dupf, freef)
int BIO_set_ex_data(BIO *bio, int idx, void *data);
void *BIO_get_ex_data(const BIO *bio, int idx);
uint64_t BIO_number_read(BIO *bio);
uint64_t BIO_number_written(BIO *bio);

/* For BIO_f_asn1() */
int BIO_asn1_set_prefix(BIO *b, asn1_ps_func *prefix,
   asn1_ps_func *prefix_free);
int BIO_asn1_get_prefix(BIO *b, asn1_ps_func **pprefix,
   asn1_ps_func **pprefix_free);
```

```
int BIO_asn1_set_suffix(BIO *b, asn1_ps_func *suffix,
   asn1_ps_func *suffix_free);
int BIO_asn1_get_suffix(BIO *b, asn1_ps_func **psuffix,
   asn1_ps_func **psuffix_free);

const BIO_METHOD *BIO_s_file(void);
BIO *BIO_new_file(const char *filename, const char *mode);
BIO *BIO_new_from_core_bio(OSSL_LIB_CTX *libctx, OSSL_CORE_BIO *corebio);
#ifndef OPENSSL_NO_STDIO
BIO *BIO_new_fp(FILE *stream, int close_flag);
#endif
BIO *BIO_new_ex(OSSL_LIB_CTX *libctx, const BIO_METHOD *method);
BIO *BIO_new(const BIO_METHOD *type);
int BIO_free(BIO *a);
void BIO_set_data(BIO *a, void *ptr);
void *BIO_get_data(BIO
 *a);
void BIO_set_init(BIO *a, int init);
int BIO_get_init(BIO *a);
void BIO_set_shutdown(BIO *a, int shut);
int BIO_get_shutdown(BIO *a);
void BIO_vfree(BIO *a);
int BIO_up_ref(BIO *a);
int BIO_read(BIO *b, void *data, int dlen);
int BIO_read_ex(BIO *b, void *data, size_t dlen, size_t *readbytes);
__owur int BIO_recvmmsg(BIO *b, BIO_MSG *msg,
   size_t stride, size_t num_msg, uint64_t flags,
   size_t *msgs_processed);
int BIO_gets(BIO *bp, char *buf, int size);
int BIO_get_line(BIO *bio, char *buf, int size);
int BIO_write(BIO *b, const void *data, int dlen);
int BIO_write_ex(BIO *b, const void *data, size_t dlen, size_t *written);
__owur int BIO_sendmmsg(BIO *b, BIO_MSG *msg,
   size_t stride, size_t num_msg, uint64_t flags,
   size_t *msgs_processed);
__owur int BIO_get_rpoll_descriptor(BIO *b, BIO_POLL_DESCRIPTOR *desc);
__owur int BIO_get_wpoll_descriptor(BIO *b, BIO_POLL_DESCRIPTOR *desc);
int BIO_puts(BIO *bp, const char *buf);
int BIO_indent(BIO *b, int indent, int
 max);
long BIO_ctrl(BIO *bp, int cmd, long larg, void *parg);
long BIO_callback_ctrl(BIO *b, int cmd, BIO_info_cb *fp);
void *BIO_ptr_ctrl(BIO *bp, int cmd, long larg);
long BIO_int_ctrl(BIO *bp, int cmd, long larg, int iarg);
BIO *BIO_push(BIO *b, BIO *append);
BIO *BIO_pop(BIO *b);
void BIO_free_all(BIO *a);
BIO *BIO_find_type(BIO *b, int bio_type);
```

```
BIO *BIO_next(BIO *b);
void BIO_set_next(BIO *b, BIO *next);
BIO *BIO_get_retry_BIO(BIO *bio, int *reason);
int BIO_get_retry_reason(BIO *bio);
void BIO_set_retry_reason(BIO *bio, int reason);
BIO *BIO_dup_chain(BIO *in);

int BIO_nread0(BIO *bio, char **buf);
int BIO_nread(BIO *bio, char **buf, int num);
int BIO_nwrite0(BIO *bio, char **buf);
int BIO_nwrite(BIO *bio, char **buf, int num);

const BIO_METHOD *BIO_s_mem(void);
#ifndef OPENSSL_NO_DGRAM
const BIO_METHOD *BIO_s_dgram_mem(void);
#endif
const BIO_METHOD *BIO_s_secmem(void);
BIO *BIO_new_mem_buf(const void *buf, int len);
#ifndef OPENSSL_NO_SOCK
const BIO_METHOD *BIO_s_socket(void);
const
 BIO_METHOD *BIO_s_connect(void);
const BIO_METHOD *BIO_s_accept(void);
#endif
const BIO_METHOD *BIO_s_fd(void);
const BIO_METHOD *BIO_s_log(void);
const BIO_METHOD *BIO_s_bio(void);
const BIO_METHOD *BIO_s_null(void);
const BIO_METHOD *BIO_f_null(void);
const BIO_METHOD *BIO_f_buffer(void);
const BIO_METHOD *BIO_f_readbuffer(void);
const BIO_METHOD *BIO_f_linebuffer(void);
const BIO_METHOD *BIO_f_nbio_test(void);
const BIO_METHOD *BIO_f_prefix(void);
const BIO_METHOD *BIO_s_core(void);
#ifndef OPENSSL_NO_DGRAM
const BIO_METHOD *BIO_s_dgram_pair(void);
const BIO_METHOD *BIO_s_datagram(void);
int BIO_dgram_non_fatal_error(int error);
BIO *BIO_new_dgram(int fd, int close_flag);
#ifndef OPENSSL_NO_SCTP
const BIO_METHOD *BIO_s_datagram_sctp(void);
BIO *BIO_new_dgram_sctp(int fd, int close_flag);
int BIO_dgram_is_sctp(BIO *bio);
int BIO_dgram_sctp_notification_cb(BIO *b,
   BIO_dgram_sctp_notification_handler_fn handle_notifications,
   void *context);
int BIO_dgram_sctp_wait_for_dry(BIO
```

```
 *b);
int BIO_dgram_sctp_msg_waiting(BIO *b);
#endif
#endif

#ifndef OPENSSL_NO_SOCK
int BIO_sock_should_retry(int i);
int BIO_sock_non_fatal_error(int error);
int BIO_err_is_non_fatal(unsigned int errcode);
int BIO_socket_wait(int fd, int for_read, time_t max_time);
#endif
int BIO_wait(BIO *bio, time_t max_time, unsigned int nap_milliseconds);
int BIO_do_connect_retry(BIO *bio, int timeout, int nap_milliseconds);

int BIO_fd_should_retry(int i);
int BIO_fd_non_fatal_error(int error);
int BIO_dump_cb(int (*cb)(const void *data, size_t len, void *u),
   void *u, const void *s, int len);
int BIO_dump_indent_cb(int (*cb)(const void *data, size_t len, void *u),
   void *u, const void *s, int len, int indent);
int BIO_dump(BIO *b, const void *bytes, int len);
int BIO_dump_indent(BIO *b, const void *bytes, int len, int indent);
#ifndef OPENSSL_NO_STDIO
int BIO_dump_fp(FILE *fp, const void *s, int len);
int BIO_dump_indent_fp(FILE *fp, const void *s, int len, int indent);
#endif
int
 BIO_hex_string(BIO *out, int indent, int width, const void *data,
   int datalen);

#ifndef OPENSSL_NO_SOCK
BIO_ADDR *BIO_ADDR_new(void);
int BIO_ADDR_copy(BIO_ADDR *dst, const BIO_ADDR *src);
BIO_ADDR *BIO_ADDR_dup(const BIO_ADDR *ap);
int BIO_ADDR_rawmake(BIO_ADDR *ap, int family,
   const void *where, size_t wherelen, unsigned short port);
void BIO_ADDR_free(BIO_ADDR *);
void BIO_ADDR_clear(BIO_ADDR *ap);
int BIO_ADDR_family(const BIO_ADDR *ap);
int BIO_ADDR_rawaddress(const BIO_ADDR *ap, void *p, size_t *l);
unsigned short BIO_ADDR_rawport(const BIO_ADDR *ap);
char *BIO_ADDR_hostname_string(const BIO_ADDR *ap, int numeric);
char *BIO_ADDR_service_string(const BIO_ADDR *ap, int numeric);
char *BIO_ADDR_path_string(const BIO_ADDR *ap);

const BIO_ADDRINFO *BIO_ADDRINFO_next(const BIO_ADDRINFO *bai);
int BIO_ADDRINFO_family(const BIO_ADDRINFO *bai);
int BIO_ADDRINFO_socktype(const BIO_ADDRINFO *bai);
```

```
int BIO_ADDRINFO_protocol(const BIO_ADDRINFO *bai);
const BIO_ADDR *BIO_ADDRINFO_address(const
 BIO_ADDRINFO *bai);
void BIO_ADDRINFO_free(BIO_ADDRINFO *bai);

enum BIO_hostserv_priorities {
   BIO_PARSE_PRIO_HOST,
   BIO_PARSE_PRIO_SERV
};
int BIO_parse_hostserv(const char *hostserv, char **host, char **service,
   enum BIO_hostserv_priorities hostserv_prio);
enum BIO_lookup_type {
   BIO_LOOKUP_CLIENT,
   BIO_LOOKUP_SERVER
};
int BIO_lookup(const char *host, const char *service,
   enum BIO_lookup_type lookup_type,
   int family, int socktype, BIO_ADDRINFO **res);
int BIO_lookup_ex(const char *host, const char *service,
   int lookup_type, int family, int socktype, int protocol,
   BIO_ADDRINFO **res);
int BIO_sock_error(int sock);
int BIO_socket_ioctl(int fd, long type, void *arg);
int BIO_socket_nbio(int fd, int mode);
int BIO_sock_init(void);
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define BIO_sock_cleanup() \
   while (0)            \
   continue
#endif
int BIO_set_tcp_ndelay(int sock, int turn_on);
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0
 struct hostent *BIO_gethostbyname(const char *name);
OSSL_DEPRECATEDIN_1_1_0 int BIO_get_port(const char *str, unsigned short *port_ptr);
OSSL_DEPRECATEDIN_1_1_0 int BIO_get_host_ip(const char *str, unsigned char *ip);
OSSL_DEPRECATEDIN_1_1_0 int BIO_get_accept_socket(char *host_port, int mode);
OSSL_DEPRECATEDIN_1_1_0 int BIO_accept(int sock, char **ip_port);
#endif

union BIO_sock_info_u {
   BIO_ADDR *addr;
};
enum BIO_sock_info_type {
   BIO_SOCK_INFO_ADDRESS
};
int BIO_sock_info(int sock,
   enum BIO_sock_info_type type, union BIO_sock_info_u *info);
```

```
#define BIO_SOCK_REUSEADDR 0x01
#define BIO_SOCK_V6_ONLY 0x02
#define BIO_SOCK_KEEPALIVE 0x04
#define BIO_SOCK_NONBLOCK 0x08
#define BIO_SOCK_NODELAY 0x10
#define BIO_SOCK_TFO 0x20

int BIO_socket(int domain, int socktype, int protocol, int options);
int BIO_connect(int sock, const BIO_ADDR *addr, int options);
int BIO_bind(int sock, const BIO_ADDR *addr, int options);
int BIO_listen(int sock, const BIO_ADDR *addr, int options);
int
 BIO_accept_ex(int accept_sock, BIO_ADDR *addr, int options);
int BIO_closesocket(int sock);

BIO *BIO_new_socket(int sock, int close_flag);
BIO *BIO_new_connect(const char *host_port);
BIO *BIO_new_accept(const char *host_port);
#endif /* OPENSSL_NO_SOCK*/

BIO *BIO_new_fd(int fd, int close_flag);

int BIO_new_bio_pair(BIO **bio1, size_t writebuf1,
   BIO **bio2, size_t writebuf2);
#ifndef OPENSSL_NO_DGRAM
int BIO_new_bio_dgram_pair(BIO **bio1, size_t writebuf1,
   BIO **bio2, size_t writebuf2);
#endif

/*
* If successful, returns 1 and in *bio1, *bio2 two BIO pair endpoints.
* Otherwise returns 0 and sets *bio1 and *bio2 to NULL. Size 0 uses default
* value.
*/

void BIO_copy_next_retry(BIO *b);

/*
* long BIO_ghbn_ctrl(int cmd,int iarg,char *parg);
*/

#define ossl_bio__attr__(x)
#if defined(__GNUC__) && defined(__STDC_VERSION__)    \
   && !defined(__MINGW32__) && !defined(__MINGW64__) \
   && !defined(__APPLE__)
/*
* Because we support the 'z' modifier, which
```

```
 made its appearance in C99,
* we can't use __attribute__ with pre C99 dialects.
*/
#if __STDC_VERSION__ >= 199901L
#undef ossl_bio__attr__
#define ossl_bio__attr__ __attribute__
#if __GNUC__ * 10 + __GNUC_MINOR__ >= 44
#define ossl_bio__printf__ __gnu_printf__
#else
#define ossl_bio__printf__ __printf__
#endif
#endif
#endif
int BIO_printf(BIO *bio, const char *format, ...)
   ossl_bio__attr__((__format__(ossl_bio__printf__, 2, 3)));
int BIO_vprintf(BIO *bio, const char *format, va_list args)
   ossl_bio__attr__((__format__(ossl_bio__printf__, 2, 0)));
int BIO_snprintf(char *buf, size_t n, const char *format, ...)
   ossl_bio__attr__((__format__(ossl_bio__printf__, 3, 4)));
int BIO_vsnprintf(char *buf, size_t n, const char *format, va_list args)
   ossl_bio__attr__((__format__(ossl_bio__printf__, 3, 0)));
#undef ossl_bio__attr__
#undef ossl_bio__printf__

BIO_METHOD *BIO_meth_new(int type, const char *name);
void BIO_meth_free(BIO_METHOD *biom);
int BIO_meth_set_write(BIO_METHOD
 *biom,
   int (*write)(BIO *, const char *, int));
int BIO_meth_set_write_ex(BIO_METHOD *biom,
   int (*bwrite)(BIO *, const char *, size_t, size_t *));
int BIO_meth_set_sendmmsg(BIO_METHOD *biom,
   int (*f)(BIO *, BIO_MSG *, size_t, size_t,
       uint64_t, size_t *));
int BIO_meth_set_read(BIO_METHOD *biom,
   int (*read)(BIO *, char *, int));
int BIO_meth_set_read_ex(BIO_METHOD *biom,
   int (*bread)(BIO *, char *, size_t, size_t *));
int BIO_meth_set_recvmmsg(BIO_METHOD *biom,
   int (*f)(BIO *, BIO_MSG *, size_t, size_t,
       uint64_t, size_t *));
int BIO_meth_set_puts(BIO_METHOD *biom,
   int (*puts)(BIO *, const char *));
int BIO_meth_set_gets(BIO_METHOD *biom,
   int (*ossl_gets)(BIO *, char *, int));
int BIO_meth_set_ctrl(BIO_METHOD *biom,
   long (*ctrl)(BIO *, int, long, void *));
int BIO_meth_set_create(BIO_METHOD *biom, int (*create)(BIO *));
```

```
int BIO_meth_set_destroy(BIO_METHOD *biom, int (*destroy)(BIO *));
int BIO_meth_set_callback_ctrl(BIO_METHOD *biom,

   long (*callback_ctrl)(BIO *, int,
       BIO_info_cb *));
#ifndef OPENSSL_NO_DEPRECATED_3_5
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_write(const BIO_METHOD *biom))(BIO *, const char *,
   int);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_write_ex(const BIO_METHOD *biom))(BIO *, const char *,
   size_t, size_t *);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_sendmmsg(const BIO_METHOD *biom))(BIO *, BIO_MSG
*,
   size_t, size_t,
   uint64_t, size_t *);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_read(const BIO_METHOD *biom))(BIO *, char *, int);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_read_ex(const BIO_METHOD *biom))(BIO *, char *,
   size_t, size_t *);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_recvmmsg(const BIO_METHOD *biom))(BIO *, BIO_MSG
*,
   size_t, size_t,
   uint64_t, size_t *);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_puts(const BIO_METHOD *biom))(BIO *, const char *);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_gets(const BIO_METHOD *biom))(BIO *, char *, int);
OSSL_DEPRECATEDIN_3_5
 long (*BIO_meth_get_ctrl(const BIO_METHOD *biom))(BIO *, int,
   long, void *);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_create(const BIO_METHOD *bion))(BIO *);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_destroy(const BIO_METHOD *biom))(BIO *);
OSSL_DEPRECATEDIN_3_5 long (*BIO_meth_get_callback_ctrl(const BIO_METHOD *biom))(BIO *, int,
   BIO_info_cb *);
#endif
#ifdef __cplusplus
}
#endif
#endif
/*
* WARNING: do not edit!
* Generated by Makefile from providers/common/include/prov/der_ec.h.in
*
* Copyright 2020-2021 The OpenSSL Project Authors. All Rights Reserved.
*
* Licensed under the Apache License 2.0 (the "License").  You may not use
* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#include "crypto/ec.h"
```

```
#include "internal/der.h"

/* Well known OIDs precompiled */
/* clang-format off */

/*
* ecdsa-with-SHA1 OBJECT IDENTIFIER ::= { id-ecSigType 1 }
*/
#define DER_OID_V_ecdsa_with_SHA1 DER_P_OBJECT, 7, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x04, 0x01
#define DER_OID_SZ_ecdsa_with_SHA1 9
extern const unsigned char ossl_der_oid_ecdsa_with_SHA1[DER_OID_SZ_ecdsa_with_SHA1];

/*
* id-ecPublicKey OBJECT IDENTIFIER ::= { id-publicKeyType 1 }
*/
#define DER_OID_V_id_ecPublicKey DER_P_OBJECT, 7, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x02, 0x01
#define DER_OID_SZ_id_ecPublicKey
 9
extern const unsigned char ossl_der_oid_id_ecPublicKey[DER_OID_SZ_id_ecPublicKey];

/*
* c2pnb163v1  OBJECT IDENTIFIER  ::=  { c-TwoCurve  1 }
*/
#define DER_OID_V_c2pnb163v1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x01
#define DER_OID_SZ_c2pnb163v1 10
extern const unsigned char ossl_der_oid_c2pnb163v1[DER_OID_SZ_c2pnb163v1];

/*
* c2pnb163v2  OBJECT IDENTIFIER  ::=  { c-TwoCurve  2 }
*/
#define DER_OID_V_c2pnb163v2 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x02
#define DER_OID_SZ_c2pnb163v2 10
extern const unsigned char ossl_der_oid_c2pnb163v2[DER_OID_SZ_c2pnb163v2];

/*
* c2pnb163v3  OBJECT IDENTIFIER  ::=  { c-TwoCurve  3 }
*/
#define DER_OID_V_c2pnb163v3 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x03
#define DER_OID_SZ_c2pnb163v3 10
extern const unsigned char ossl_der_oid_c2pnb163v3[DER_OID_SZ_c2pnb163v3];

/*
* c2pnb176w1  OBJECT IDENTIFIER  ::=  { c-TwoCurve  4 }
*/
#define DER_OID_V_c2pnb176w1 DER_P_OBJECT,
 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x04
#define DER_OID_SZ_c2pnb176w1 10
extern const unsigned char ossl_der_oid_c2pnb176w1[DER_OID_SZ_c2pnb176w1];
```

```
/*
* c2tnb191v1  OBJECT IDENTIFIER  ::=  { c-TwoCurve  5 }
*/
#define DER_OID_V_c2tnb191v1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x05
#define DER_OID_SZ_c2tnb191v1 10
extern const unsigned char ossl_der_oid_c2tnb191v1[DER_OID_SZ_c2tnb191v1];

/*
* c2tnb191v2  OBJECT IDENTIFIER  ::=  { c-TwoCurve  6 }
*/
#define DER_OID_V_c2tnb191v2 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x06
#define DER_OID_SZ_c2tnb191v2 10
extern const unsigned char ossl_der_oid_c2tnb191v2[DER_OID_SZ_c2tnb191v2];

/*
* c2tnb191v3  OBJECT IDENTIFIER  ::=  { c-TwoCurve  7 }
*/
#define DER_OID_V_c2tnb191v3 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x07
#define DER_OID_SZ_c2tnb191v3 10
extern const unsigned char ossl_der_oid_c2tnb191v3[DER_OID_SZ_c2tnb191v3];

/*
* c2onb191v4  OBJECT IDENTIFIER
  ::=  { c-TwoCurve  8 }
*/
#define DER_OID_V_c2onb191v4 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x08
#define DER_OID_SZ_c2onb191v4 10
extern const unsigned char ossl_der_oid_c2onb191v4[DER_OID_SZ_c2onb191v4];

/*
* c2onb191v5  OBJECT IDENTIFIER  ::=  { c-TwoCurve  9 }
*/
#define DER_OID_V_c2onb191v5 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x09
#define DER_OID_SZ_c2onb191v5 10
extern const unsigned char ossl_der_oid_c2onb191v5[DER_OID_SZ_c2onb191v5];

/*
* c2pnb208w1  OBJECT IDENTIFIER  ::=  { c-TwoCurve 10 }
*/
#define DER_OID_V_c2pnb208w1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x0A
#define DER_OID_SZ_c2pnb208w1 10
extern const unsigned char ossl_der_oid_c2pnb208w1[DER_OID_SZ_c2pnb208w1];

/*
* c2tnb239v1  OBJECT IDENTIFIER  ::=  { c-TwoCurve 11 }
*/
#define DER_OID_V_c2tnb239v1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x0B
```

```
#define DER_OID_SZ_c2tnb239v1 10
extern const unsigned char ossl_der_oid_c2tnb239v1[DER_OID_SZ_c2tnb239v1];

/*
 * c2tnb239v2  OBJECT IDENTIFIER  ::=  { c-TwoCurve 12 }
*/
#define DER_OID_V_c2tnb239v2 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x0C
#define DER_OID_SZ_c2tnb239v2 10
extern const unsigned char ossl_der_oid_c2tnb239v2[DER_OID_SZ_c2tnb239v2];

/*
* c2tnb239v3  OBJECT IDENTIFIER  ::=  { c-TwoCurve 13 }
*/
#define DER_OID_V_c2tnb239v3 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x0D
#define DER_OID_SZ_c2tnb239v3 10
extern const unsigned char ossl_der_oid_c2tnb239v3[DER_OID_SZ_c2tnb239v3];

/*
* c2onb239v4  OBJECT IDENTIFIER  ::=  { c-TwoCurve 14 }
*/
#define DER_OID_V_c2onb239v4 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x0E
#define DER_OID_SZ_c2onb239v4 10
extern const unsigned char ossl_der_oid_c2onb239v4[DER_OID_SZ_c2onb239v4];

/*
* c2onb239v5  OBJECT IDENTIFIER  ::=  { c-TwoCurve 15 }
*/
#define DER_OID_V_c2onb239v5 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x0F
#define DER_OID_SZ_c2onb239v5
 10
extern const unsigned char ossl_der_oid_c2onb239v5[DER_OID_SZ_c2onb239v5];

/*
* c2pnb272w1  OBJECT IDENTIFIER  ::=  { c-TwoCurve 16 }
*/
#define DER_OID_V_c2pnb272w1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x10
#define DER_OID_SZ_c2pnb272w1 10
extern const unsigned char ossl_der_oid_c2pnb272w1[DER_OID_SZ_c2pnb272w1];

/*
* c2pnb304w1  OBJECT IDENTIFIER  ::=  { c-TwoCurve 17 }
*/
#define DER_OID_V_c2pnb304w1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x11
#define DER_OID_SZ_c2pnb304w1 10
extern const unsigned char ossl_der_oid_c2pnb304w1[DER_OID_SZ_c2pnb304w1];

/*
* c2tnb359v1  OBJECT IDENTIFIER  ::=  { c-TwoCurve 18 }
```

```
*/
#define DER_OID_V_c2tnb359v1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x12
#define DER_OID_SZ_c2tnb359v1 10
extern const unsigned char ossl_der_oid_c2tnb359v1[DER_OID_SZ_c2tnb359v1];

/*
* c2pnb368w1  OBJECT IDENTIFIER  ::=  { c-TwoCurve 19 }
*/
#define DER_OID_V_c2pnb368w1 DER_P_OBJECT,
 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x13
#define DER_OID_SZ_c2pnb368w1 10
extern const unsigned char ossl_der_oid_c2pnb368w1[DER_OID_SZ_c2pnb368w1];

/*
* c2tnb431r1  OBJECT IDENTIFIER  ::=  { c-TwoCurve 20 }
*/
#define DER_OID_V_c2tnb431r1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x14
#define DER_OID_SZ_c2tnb431r1 10
extern const unsigned char ossl_der_oid_c2tnb431r1[DER_OID_SZ_c2tnb431r1];

/*
* prime192v1  OBJECT IDENTIFIER  ::=  { primeCurve  1 }
*/
#define DER_OID_V_prime192v1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x01, 0x01
#define DER_OID_SZ_prime192v1 10
extern const unsigned char ossl_der_oid_prime192v1[DER_OID_SZ_prime192v1];

/*
* prime192v2  OBJECT IDENTIFIER  ::=  { primeCurve  2 }
*/
#define DER_OID_V_prime192v2 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x01, 0x02
#define DER_OID_SZ_prime192v2 10
extern const unsigned char ossl_der_oid_prime192v2[DER_OID_SZ_prime192v2];

/*
* prime192v3  OBJECT IDENTIFIER  ::=
  { primeCurve  3 }
*/
#define DER_OID_V_prime192v3 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x01, 0x03
#define DER_OID_SZ_prime192v3 10
extern const unsigned char ossl_der_oid_prime192v3[DER_OID_SZ_prime192v3];

/*
* prime239v1  OBJECT IDENTIFIER  ::=  { primeCurve  4 }
*/
#define DER_OID_V_prime239v1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x01, 0x04
#define DER_OID_SZ_prime239v1 10
extern const unsigned char ossl_der_oid_prime239v1[DER_OID_SZ_prime239v1];
```

```
/*
* prime239v2  OBJECT IDENTIFIER  ::=  { primeCurve  5 }
*/
#define DER_OID_V_prime239v2 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x01, 0x05
#define DER_OID_SZ_prime239v2 10
extern const unsigned char ossl_der_oid_prime239v2[DER_OID_SZ_prime239v2];

/*
* prime239v3  OBJECT IDENTIFIER  ::=  { primeCurve  6 }
*/
#define DER_OID_V_prime239v3 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x01, 0x06
#define DER_OID_SZ_prime239v3 10
extern const unsigned char ossl_der_oid_prime239v3[DER_OID_SZ_prime239v3];

/*
 * prime256v1  OBJECT IDENTIFIER  ::=  { primeCurve  7 }
*/
#define DER_OID_V_prime256v1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x01, 0x07
#define DER_OID_SZ_prime256v1 10
extern const unsigned char ossl_der_oid_prime256v1[DER_OID_SZ_prime256v1];

/*
* ecdsa-with-SHA224 OBJECT IDENTIFIER ::= { iso(1) member-body(2)
*      us(840) ansi-X9-62(10045) signatures(4) ecdsa-with-SHA2(3) 1 }
*/
#define DER_OID_V_ecdsa_with_SHA224 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x04, 0x03,
0x01
#define DER_OID_SZ_ecdsa_with_SHA224 10
extern const unsigned char ossl_der_oid_ecdsa_with_SHA224[DER_OID_SZ_ecdsa_with_SHA224];

/*
* ecdsa-with-SHA256 OBJECT IDENTIFIER ::= { iso(1) member-body(2)
*      us(840) ansi-X9-62(10045) signatures(4) ecdsa-with-SHA2(3) 2 }
*/
#define DER_OID_V_ecdsa_with_SHA256 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x04, 0x03,
0x02
#define DER_OID_SZ_ecdsa_with_SHA256 10
extern const unsigned char ossl_der_oid_ecdsa_with_SHA256[DER_OID_SZ_ecdsa_with_SHA256];

/*
 * ecdsa-with-SHA384 OBJECT IDENTIFIER ::= { iso(1) member-body(2)
*      us(840) ansi-X9-62(10045) signatures(4) ecdsa-with-SHA2(3) 3 }
*/
#define DER_OID_V_ecdsa_with_SHA384 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x04, 0x03,
0x03
#define DER_OID_SZ_ecdsa_with_SHA384 10
extern const unsigned char ossl_der_oid_ecdsa_with_SHA384[DER_OID_SZ_ecdsa_with_SHA384];
```

```
/*
* ecdsa-with-SHA512 OBJECT IDENTIFIER ::= { iso(1) member-body(2)
*      us(840) ansi-X9-62(10045) signatures(4) ecdsa-with-SHA2(3) 4 }
*/
#define DER_OID_V_ecdsa_with_SHA512 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x04, 0x03,
0x04
#define DER_OID_SZ_ecdsa_with_SHA512 10
extern const unsigned char ossl_der_oid_ecdsa_with_SHA512[DER_OID_SZ_ecdsa_with_SHA512];

/*
* id-ecdsa-with-sha3-224 OBJECT IDENTIFIER ::= { sigAlgs 9 }
*/
#define DER_OID_V_id_ecdsa_with_sha3_224 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x09
#define DER_OID_SZ_id_ecdsa_with_sha3_224
 11
extern const unsigned char ossl_der_oid_id_ecdsa_with_sha3_224[DER_OID_SZ_id_ecdsa_with_sha3_224];

/*
* id-ecdsa-with-sha3-256 OBJECT IDENTIFIER ::= { sigAlgs 10 }
*/
#define DER_OID_V_id_ecdsa_with_sha3_256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x0A
#define DER_OID_SZ_id_ecdsa_with_sha3_256 11
extern const unsigned char ossl_der_oid_id_ecdsa_with_sha3_256[DER_OID_SZ_id_ecdsa_with_sha3_256];

/*
* id-ecdsa-with-sha3-384 OBJECT IDENTIFIER ::= { sigAlgs 11 }
*/
#define DER_OID_V_id_ecdsa_with_sha3_384 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x0B
#define DER_OID_SZ_id_ecdsa_with_sha3_384 11
extern const unsigned char ossl_der_oid_id_ecdsa_with_sha3_384[DER_OID_SZ_id_ecdsa_with_sha3_384];

/*
* id-ecdsa-with-sha3-512 OBJECT IDENTIFIER ::= { sigAlgs 12 }
*/
#define DER_OID_V_id_ecdsa_with_sha3_512 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x0C
#define DER_OID_SZ_id_ecdsa_with_sha3_512 11
extern const
 unsigned char ossl_der_oid_id_ecdsa_with_sha3_512[DER_OID_SZ_id_ecdsa_with_sha3_512];

/* clang-format on */

/* Subject Public Key Info */
int ossl_DER_w_algorithmIdentifier_EC(WPACKET *pkt, int cont, EC_KEY *ec);
```

/* Signature */
int ossl_DER_w_algorithmIdentifier_ECDSA_with_MD(WPACKET *pkt, int cont,
EC_KEY *ec, int mdnid);
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https://github.com/bitinn/node-fetch
# Blue Oak Model License

Version 1.0.0

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```
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* WARNING: do not edit!
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*/

#include "internal/der.h"

/* Well known OIDs precompiled */
```

```
/* clang-format off */

/*
* id-alg-CMS3DESwrap OBJECT IDENTIFIER ::= {
*     iso(1) member-body(2) us(840) rsadsi(113549) pkcs(1) pkcs-9(9) smime(16) alg(3) 6
* }
*/
#define DER_OID_V_id_alg_CMS3DESwrap DER_P_OBJECT, 11, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01,
0x09, 0x10, 0x03, 0x06
#define DER_OID_SZ_id_alg_CMS3DESwrap 13
extern const unsigned char ossl_der_oid_id_alg_CMS3DESwrap[DER_OID_SZ_id_alg_CMS3DESwrap];

/*
* id-aes128-wrap OBJECT IDENTIFIER ::= { aes 5 }
*/
#define DER_OID_V_id_aes128_wrap
 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x01, 0x05
#define DER_OID_SZ_id_aes128_wrap 11
extern const unsigned char ossl_der_oid_id_aes128_wrap[DER_OID_SZ_id_aes128_wrap];

/*
* id-aes192-wrap OBJECT IDENTIFIER ::= { aes 25 }
*/
#define DER_OID_V_id_aes192_wrap DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x01, 0x19
#define DER_OID_SZ_id_aes192_wrap 11
extern const unsigned char ossl_der_oid_id_aes192_wrap[DER_OID_SZ_id_aes192_wrap];

/*
* id-aes256-wrap OBJECT IDENTIFIER ::= { aes 45 }
*/
#define DER_OID_V_id_aes256_wrap DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x01,
0x2D
#define DER_OID_SZ_id_aes256_wrap 11
extern const unsigned char ossl_der_oid_id_aes256_wrap[DER_OID_SZ_id_aes256_wrap];

/* clang-format on */
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from providers/common/include/prov/der_slh_dsa.h.in
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* https://www.openssl.org/source/license.html
*/

#include "internal/der.h"
#include "crypto/slh_dsa.h"

/* Well known OIDs precompiled */
/* clang-format off */

/*
* id-slh-dsa-sha2-128s OBJECT IDENTIFIER ::= { sigAlgs 20 }
*/
#define DER_OID_V_id_slh_dsa_sha2_128s DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x14
#define DER_OID_SZ_id_slh_dsa_sha2_128s 11
extern const unsigned char ossl_der_oid_id_slh_dsa_sha2_128s[DER_OID_SZ_id_slh_dsa_sha2_128s];

/*
* id-slh-dsa-sha2-128f OBJECT IDENTIFIER ::= { sigAlgs 21 }
*/
#define DER_OID_V_id_slh_dsa_sha2_128f DER_P_OBJECT, 9, 0x60, 0x86,
 0x48, 0x01, 0x65, 0x03, 0x04, 0x03, 0x15
#define DER_OID_SZ_id_slh_dsa_sha2_128f 11
extern const unsigned char ossl_der_oid_id_slh_dsa_sha2_128f[DER_OID_SZ_id_slh_dsa_sha2_128f];

/*
* id-slh-dsa-sha2-192s OBJECT IDENTIFIER ::= { sigAlgs 22 }
*/
#define DER_OID_V_id_slh_dsa_sha2_192s DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x16
#define DER_OID_SZ_id_slh_dsa_sha2_192s 11
```

```
extern const unsigned char ossl_der_oid_id_slh_dsa_sha2_192s[DER_OID_SZ_id_slh_dsa_sha2_192s];

/*
* id-slh-dsa-sha2-192f OBJECT IDENTIFIER ::= { sigAlgs 23 }
*/
#define DER_OID_V_id_slh_dsa_sha2_192f DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x17
#define DER_OID_SZ_id_slh_dsa_sha2_192f 11
extern const unsigned char ossl_der_oid_id_slh_dsa_sha2_192f[DER_OID_SZ_id_slh_dsa_sha2_192f];

/*
* id-slh-dsa-sha2-256s OBJECT IDENTIFIER ::= { sigAlgs 24 }
*/
#define DER_OID_V_id_slh_dsa_sha2_256s DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x18
#define DER_OID_SZ_id_slh_dsa_sha2_256s
 11
extern const unsigned char ossl_der_oid_id_slh_dsa_sha2_256s[DER_OID_SZ_id_slh_dsa_sha2_256s];

/*
* id-slh-dsa-sha2-256f OBJECT IDENTIFIER ::= { sigAlgs 25 }
*/
#define DER_OID_V_id_slh_dsa_sha2_256f DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x19
#define DER_OID_SZ_id_slh_dsa_sha2_256f 11
extern const unsigned char ossl_der_oid_id_slh_dsa_sha2_256f[DER_OID_SZ_id_slh_dsa_sha2_256f];

/*
* id-slh-dsa-shake-128s OBJECT IDENTIFIER ::= { sigAlgs 26 }
*/
#define DER_OID_V_id_slh_dsa_shake_128s DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x1A
#define DER_OID_SZ_id_slh_dsa_shake_128s 11
extern const unsigned char ossl_der_oid_id_slh_dsa_shake_128s[DER_OID_SZ_id_slh_dsa_shake_128s];

/*
* id-slh-dsa-shake-128f OBJECT IDENTIFIER ::= { sigAlgs 27 }
*/
#define DER_OID_V_id_slh_dsa_shake_128f DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x1B
#define DER_OID_SZ_id_slh_dsa_shake_128f 11
extern const
 unsigned char ossl_der_oid_id_slh_dsa_shake_128f[DER_OID_SZ_id_slh_dsa_shake_128f];

/*
* id-slh-dsa-shake-192s OBJECT IDENTIFIER ::= { sigAlgs 28 }
*/
#define DER_OID_V_id_slh_dsa_shake_192s DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
```

```
0x03, 0x1C
#define DER_OID_SZ_id_slh_dsa_shake_192s 11
extern const unsigned char ossl_der_oid_id_slh_dsa_shake_192s[DER_OID_SZ_id_slh_dsa_shake_192s];

/*
* id-slh-dsa-shake-192f OBJECT IDENTIFIER ::= { sigAlgs 29 }
*/
#define DER_OID_V_id_slh_dsa_shake_192f DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x1D
#define DER_OID_SZ_id_slh_dsa_shake_192f 11
extern const unsigned char ossl_der_oid_id_slh_dsa_shake_192f[DER_OID_SZ_id_slh_dsa_shake_192f];

/*
* id-slh-dsa-shake-256s OBJECT IDENTIFIER ::= { sigAlgs 30 }
*/
#define DER_OID_V_id_slh_dsa_shake_256s DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x1E
#define DER_OID_SZ_id_slh_dsa_shake_256s 11
extern const unsigned char ossl_der_oid_id_slh_dsa_shake_256s[DER_OID_SZ_id_slh_dsa_shake_256s];

/*
 * id-slh-dsa-shake-256f OBJECT IDENTIFIER ::= { sigAlgs 31 }
*/
#define DER_OID_V_id_slh_dsa_shake_256f DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x1F
#define DER_OID_SZ_id_slh_dsa_shake_256f 11
extern const unsigned char ossl_der_oid_id_slh_dsa_shake_256f[DER_OID_SZ_id_slh_dsa_shake_256f];

/* clang-format on */

int ossl_DER_w_algorithmIdentifier_SLH_DSA(WPACKET *pkt, int tag, SLH_DSA_KEY *key);
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/x509_acert.h.in
*
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_X509_ACERT_H
```

```
#define OPENSSL_X509_ACERT_H
#pragma once

#include <openssl/x509v3.h>
#include <openssl/x509.h>
#include <openssl/pem.h>

typedef struct X509_acert_st X509_ACERT;
typedef struct X509_acert_info_st X509_ACERT_INFO;
typedef struct ossl_object_digest_info_st OSSL_OBJECT_DIGEST_INFO;
typedef struct ossl_issuer_serial_st OSSL_ISSUER_SERIAL;
typedef struct X509_acert_issuer_v2form_st X509_ACERT_ISSUER_V2FORM;

DECLARE_ASN1_FUNCTIONS(X509_ACERT)
DECLARE_ASN1_DUP_FUNCTION(X509_ACERT)
DECLARE_ASN1_ITEM(X509_ACERT_INFO)
DECLARE_ASN1_ALLOC_FUNCTIONS(X509_ACERT_INFO)
DECLARE_ASN1_ALLOC_FUNCTIONS(OSSL_OBJECT_DIGEST_INFO)
DECLARE_ASN1_ALLOC_FUNCTIONS(OSSL_ISSUER_SERIAL)
DECLARE_ASN1_ALLOC_FUNCTIONS(X509_ACERT_ISSUER_V2FORM)

#ifndef
 OPENSSL_NO_STDIO
X509_ACERT *d2i_X509_ACERT_fp(FILE *fp, X509_ACERT **acert);
int i2d_X509_ACERT_fp(FILE *fp, const X509_ACERT *acert);
#endif

DECLARE_PEM_rw(X509_ACERT, X509_ACERT)

X509_ACERT *d2i_X509_ACERT_bio(BIO *bp, X509_ACERT **acert);
int i2d_X509_ACERT_bio(BIO *bp, const X509_ACERT *acert);

int X509_ACERT_sign(X509_ACERT *x, EVP_PKEY *pkey, const EVP_MD *md);
int X509_ACERT_sign_ctx(X509_ACERT *x, EVP_MD_CTX *ctx);
int X509_ACERT_verify(X509_ACERT *a, EVP_PKEY *r);

#define X509_ACERT_VERSION_2 1

const GENERAL_NAMES *X509_ACERT_get0_holder_entityName(const X509_ACERT *x);
const OSSL_ISSUER_SERIAL *X509_ACERT_get0_holder_baseCertId(const X509_ACERT *x);
const OSSL_OBJECT_DIGEST_INFO *X509_ACERT_get0_holder_digest(const X509_ACERT *x);
const X509_NAME
 *X509_ACERT_get0_issuerName(const X509_ACERT *x);
long X509_ACERT_get_version(const X509_ACERT *x);
void X509_ACERT_get0_signature(const X509_ACERT *x,
   const ASN1_BIT_STRING **psig,
   const X509_ALGOR **palg);
int X509_ACERT_get_signature_nid(const X509_ACERT *x);
```

```
const X509_ALGOR *X509_ACERT_get0_info_sigalg(const X509_ACERT *x);
const ASN1_INTEGER *X509_ACERT_get0_serialNumber(const X509_ACERT *x);
const ASN1_TIME *X509_ACERT_get0_notBefore(const X509_ACERT *x);
const ASN1_TIME *X509_ACERT_get0_notAfter(const X509_ACERT *x);
const ASN1_BIT_STRING *X509_ACERT_get0_issuerUID(const X509_ACERT *x);

int X509_ACERT_print(BIO *bp, X509_ACERT *x);
int X509_ACERT_print_ex(BIO *bp, X509_ACERT *x, unsigned long nmflags,
   unsigned long cflag);

int X509_ACERT_get_attr_count(const X509_ACERT *x);
int X509_ACERT_get_attr_by_NID(const X509_ACERT *x, int nid, int lastpos);
int X509_ACERT_get_attr_by_OBJ(const X509_ACERT *x, const ASN1_OBJECT *obj,
   int lastpos);
X509_ATTRIBUTE *X509_ACERT_get_attr(const
 X509_ACERT *x, int loc);
X509_ATTRIBUTE *X509_ACERT_delete_attr(X509_ACERT *x, int loc);

void *X509_ACERT_get_ext_d2i(const X509_ACERT *x, int nid, int *crit, int *idx);
int X509_ACERT_add1_ext_i2d(X509_ACERT *x, int nid, void *value, int crit,
   unsigned long flags);
const STACK_OF(X509_EXTENSION) *X509_ACERT_get0_extensions(const X509_ACERT *x);

#define OSSL_OBJECT_DIGEST_INFO_PUBLIC_KEY 0
#define OSSL_OBJECT_DIGEST_INFO_PUBLIC_KEY_CERT 1
#define OSSL_OBJECT_DIGEST_INFO_OTHER 2 /* must not be used in RFC 5755 profile */
int X509_ACERT_set_version(X509_ACERT *x, long version);
void X509_ACERT_set0_holder_entityName(X509_ACERT *x, GENERAL_NAMES *name);
void X509_ACERT_set0_holder_baseCertId(X509_ACERT *x, OSSL_ISSUER_SERIAL *isss);
void X509_ACERT_set0_holder_digest(X509_ACERT *x,
   OSSL_OBJECT_DIGEST_INFO *dinfo);

int X509_ACERT_add1_attr(X509_ACERT *x, X509_ATTRIBUTE *attr);
int X509_ACERT_add1_attr_by_OBJ(X509_ACERT *x, const ASN1_OBJECT *obj,
   int type,
 const void *bytes, int len);
int X509_ACERT_add1_attr_by_NID(X509_ACERT *x, int nid, int type,
   const void *bytes, int len);
int X509_ACERT_add1_attr_by_txt(X509_ACERT *x, const char *attrname, int type,
   const unsigned char *bytes, int len);
int X509_ACERT_add_attr_nconf(CONF *conf, const char *section,
   X509_ACERT *acert);

int X509_ACERT_set1_issuerName(X509_ACERT *x, const X509_NAME *name);
int X509_ACERT_set1_serialNumber(X509_ACERT *x, const ASN1_INTEGER *serial);
int X509_ACERT_set1_notBefore(X509_ACERT *x, const ASN1_GENERALIZEDTIME *time);
int X509_ACERT_set1_notAfter(X509_ACERT *x, const ASN1_GENERALIZEDTIME *time);
```

```
void OSSL_OBJECT_DIGEST_INFO_get0_digest(const OSSL_OBJECT_DIGEST_INFO *o,
   int *digestedObjectType,
   const X509_ALGOR **digestAlgorithm,
   const ASN1_BIT_STRING **digest);

int OSSL_OBJECT_DIGEST_INFO_set1_digest(OSSL_OBJECT_DIGEST_INFO *o,
   int digestedObjectType,
   X509_ALGOR *digestAlgorithm,
   ASN1_BIT_STRING *digest);

const X509_NAME
 *OSSL_ISSUER_SERIAL_get0_issuer(const OSSL_ISSUER_SERIAL *isss);
const ASN1_INTEGER *OSSL_ISSUER_SERIAL_get0_serial(const OSSL_ISSUER_SERIAL *isss);
const ASN1_BIT_STRING *OSSL_ISSUER_SERIAL_get0_issuerUID(const OSSL_ISSUER_SERIAL *isss);

int OSSL_ISSUER_SERIAL_set1_issuer(OSSL_ISSUER_SERIAL *isss,
   const X509_NAME *issuer);
int OSSL_ISSUER_SERIAL_set1_serial(OSSL_ISSUER_SERIAL *isss,
   const ASN1_INTEGER *serial);
int OSSL_ISSUER_SERIAL_set1_issuerUID(OSSL_ISSUER_SERIAL *isss,
   const ASN1_BIT_STRING *uid);

#define OSSL_IETFAS_OCTETS 0
#define OSSL_IETFAS_OID 1
#define OSSL_IETFAS_STRING 2

typedef struct OSSL_IETF_ATTR_SYNTAX_VALUE_st OSSL_IETF_ATTR_SYNTAX_VALUE;
typedef struct OSSL_IETF_ATTR_SYNTAX_st OSSL_IETF_ATTR_SYNTAX;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_IETF_ATTR_SYNTAX_VALUE,
OSSL_IETF_ATTR_SYNTAX_VALUE, OSSL_IETF_ATTR_SYNTAX_VALUE)
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk))
#define
 sk_OSSL_IETF_ATTR_SYNTAX_VALUE_value(sk, idx) ((OSSL_IETF_ATTR_SYNTAX_VALUE
*)OPENSSL_sk_value(ossl_check_const_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk), (idx)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_new(cmp)
((STACK_OF(OSSL_IETF_ATTR_SYNTAX_VALUE)
*)OPENSSL_sk_new(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_compfunc_type(cmp)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_new_null()
((STACK_OF(OSSL_IETF_ATTR_SYNTAX_VALUE) *)OPENSSL_sk_new_null())
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_new_reserve(cmp, n)
((STACK_OF(OSSL_IETF_ATTR_SYNTAX_VALUE)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_compfunc_type(cmp), (n)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk), (n))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk))
```

```
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk))
#define
 sk_OSSL_IETF_ATTR_SYNTAX_VALUE_delete(sk, i) ((OSSL_IETF_ATTR_SYNTAX_VALUE
*)OPENSSL_sk_delete(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk), (i)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_delete_ptr(sk, ptr) ((OSSL_IETF_ATTR_SYNTAX_VALUE
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_type(ptr)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_type(ptr))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_type(ptr))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_pop(sk) ((OSSL_IETF_ATTR_SYNTAX_VALUE
*)OPENSSL_sk_pop(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_shift(sk) ((OSSL_IETF_ATTR_SYNTAX_VALUE
*)OPENSSL_sk_shift(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk)))
#define
 sk_OSSL_IETF_ATTR_SYNTAX_VALUE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),ossl_check_OSSL_IET
F_ATTR_SYNTAX_VALUE_freefunc_type(freefunc))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_type(ptr), (idx))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_set(sk, idx, ptr) ((OSSL_IETF_ATTR_SYNTAX_VALUE
*)OPENSSL_sk_set(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk), (idx),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_type(ptr)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_type(ptr))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_type(ptr))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_find_all(sk,
 ptr, pnum) OPENSSL_sk_find_all(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_type(ptr), pnum)
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_dup(sk)
((STACK_OF(OSSL_IETF_ATTR_SYNTAX_VALUE)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_IETF_ATTR_SYNTAX_VALUE)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_copyfunc_type(copyfunc),
```

```
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_freefunc_type(freefunc)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_set_cmp_func(sk, cmp)
((sk_OSSL_IETF_ATTR_SYNTAX_VALUE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_IETF_
ATTR_SYNTAX_VALUE_sk_type(sk),
 ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_compfunc_type(cmp)))

/* clang-format on */

DECLARE_ASN1_ITEM(OSSL_IETF_ATTR_SYNTAX_VALUE)
DECLARE_ASN1_ALLOC_FUNCTIONS(OSSL_IETF_ATTR_SYNTAX_VALUE)
DECLARE_ASN1_FUNCTIONS(OSSL_IETF_ATTR_SYNTAX)

const GENERAL_NAMES *
OSSL_IETF_ATTR_SYNTAX_get0_policyAuthority(const OSSL_IETF_ATTR_SYNTAX *a);
void OSSL_IETF_ATTR_SYNTAX_set0_policyAuthority(OSSL_IETF_ATTR_SYNTAX *a,
  GENERAL_NAMES *names);

int OSSL_IETF_ATTR_SYNTAX_get_value_num(const OSSL_IETF_ATTR_SYNTAX *a);
void *OSSL_IETF_ATTR_SYNTAX_get0_value(const OSSL_IETF_ATTR_SYNTAX *a,
  int ind, int *type);
int OSSL_IETF_ATTR_SYNTAX_add1_value(OSSL_IETF_ATTR_SYNTAX *a, int type,
  void *data);
int OSSL_IETF_ATTR_SYNTAX_print(BIO *bp, OSSL_IETF_ATTR_SYNTAX *a, int indent);

struct TARGET_CERT_st {
  OSSL_ISSUER_SERIAL *targetCertificate;
  GENERAL_NAME *targetName;
  OSSL_OBJECT_DIGEST_INFO *certDigestInfo;
};

typedef
 struct TARGET_CERT_st OSSL_TARGET_CERT;

#define OSSL_TGT_TARGET_NAME 0
#define OSSL_TGT_TARGET_GROUP 1
#define OSSL_TGT_TARGET_CERT 2

typedef struct TARGET_st {
  int type;
  union {
    GENERAL_NAME *targetName;
    GENERAL_NAME *targetGroup;
    OSSL_TARGET_CERT *targetCert;
  } choice;
} OSSL_TARGET;

typedef STACK_OF(OSSL_TARGET) OSSL_TARGETS;
typedef STACK_OF(OSSL_TARGETS) OSSL_TARGETING_INFORMATION;
```

```
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_TARGET, OSSL_TARGET, OSSL_TARGET)
#define sk_OSSL_TARGET_num(sk) OPENSSL_sk_num(ossl_check_const_OSSL_TARGET_sk_type(sk))
#define sk_OSSL_TARGET_value(sk, idx) ((OSSL_TARGET
*)OPENSSL_sk_value(ossl_check_const_OSSL_TARGET_sk_type(sk), (idx)))
#define sk_OSSL_TARGET_new(cmp) ((STACK_OF(OSSL_TARGET)
*)OPENSSL_sk_new(ossl_check_OSSL_TARGET_compfunc_type(cmp)))
#define sk_OSSL_TARGET_new_null() ((STACK_OF(OSSL_TARGET) *)OPENSSL_sk_new_null())
#define sk_OSSL_TARGET_new_reserve(cmp, n) ((STACK_OF(OSSL_TARGET)
 *)OPENSSL_sk_new_reserve(ossl_check_OSSL_TARGET_compfunc_type(cmp), (n)))
#define sk_OSSL_TARGET_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_OSSL_TARGET_sk_type(sk), (n))
#define sk_OSSL_TARGET_free(sk) OPENSSL_sk_free(ossl_check_OSSL_TARGET_sk_type(sk))
#define sk_OSSL_TARGET_zero(sk) OPENSSL_sk_zero(ossl_check_OSSL_TARGET_sk_type(sk))
#define sk_OSSL_TARGET_delete(sk, i) ((OSSL_TARGET
*)OPENSSL_sk_delete(ossl_check_OSSL_TARGET_sk_type(sk), (i)))
#define sk_OSSL_TARGET_delete_ptr(sk, ptr) ((OSSL_TARGET
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_TARGET_sk_type(sk), ossl_check_OSSL_TARGET_type(ptr)))
#define sk_OSSL_TARGET_push(sk, ptr) OPENSSL_sk_push(ossl_check_OSSL_TARGET_sk_type(sk),
ossl_check_OSSL_TARGET_type(ptr))
#define sk_OSSL_TARGET_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_OSSL_TARGET_sk_type(sk),
ossl_check_OSSL_TARGET_type(ptr))
#define sk_OSSL_TARGET_pop(sk) ((OSSL_TARGET
*)OPENSSL_sk_pop(ossl_check_OSSL_TARGET_sk_type(sk)))
#define sk_OSSL_TARGET_shift(sk)
 ((OSSL_TARGET *)OPENSSL_sk_shift(ossl_check_OSSL_TARGET_sk_type(sk)))
#define sk_OSSL_TARGET_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_TARGET_sk_type(sk),ossl_check_OSSL_TARGET_freefunc_type(fre
efunc))
#define sk_OSSL_TARGET_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_OSSL_TARGET_sk_type(sk),
ossl_check_OSSL_TARGET_type(ptr), (idx))
#define sk_OSSL_TARGET_set(sk, idx, ptr) ((OSSL_TARGET
*)OPENSSL_sk_set(ossl_check_OSSL_TARGET_sk_type(sk), (idx), ossl_check_OSSL_TARGET_type(ptr)))
#define sk_OSSL_TARGET_find(sk, ptr) OPENSSL_sk_find(ossl_check_OSSL_TARGET_sk_type(sk),
ossl_check_OSSL_TARGET_type(ptr))
#define sk_OSSL_TARGET_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_OSSL_TARGET_sk_type(sk),
ossl_check_OSSL_TARGET_type(ptr))
#define sk_OSSL_TARGET_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_TARGET_sk_type(sk), ossl_check_OSSL_TARGET_type(ptr), pnum)
#define sk_OSSL_TARGET_sort(sk) OPENSSL_sk_sort(ossl_check_OSSL_TARGET_sk_type(sk))
#define sk_OSSL_TARGET_is_sorted(sk)
 OPENSSL_sk_is_sorted(ossl_check_const_OSSL_TARGET_sk_type(sk))
#define sk_OSSL_TARGET_dup(sk) ((STACK_OF(OSSL_TARGET)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_TARGET_sk_type(sk)))
#define sk_OSSL_TARGET_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OSSL_TARGET)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_TARGET_sk_type(sk),
ossl_check_OSSL_TARGET_copyfunc_type(copyfunc), ossl_check_OSSL_TARGET_freefunc_type(freefunc)))
#define sk_OSSL_TARGET_set_cmp_func(sk, cmp)
```

```
((sk_OSSL_TARGET_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_TARGET_sk_type(sk),
ossl_check_OSSL_TARGET_compfunc_type(cmp)))

/* clang-format on */

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_TARGETS, OSSL_TARGETS, OSSL_TARGETS)
#define sk_OSSL_TARGETS_num(sk) OPENSSL_sk_num(ossl_check_const_OSSL_TARGETS_sk_type(sk))
#define sk_OSSL_TARGETS_value(sk, idx) ((OSSL_TARGETS
*)OPENSSL_sk_value(ossl_check_const_OSSL_TARGETS_sk_type(sk), (idx)))
#define sk_OSSL_TARGETS_new(cmp) ((STACK_OF(OSSL_TARGETS)
 *)OPENSSL_sk_new(ossl_check_OSSL_TARGETS_compfunc_type(cmp)))
#define sk_OSSL_TARGETS_new_null() ((STACK_OF(OSSL_TARGETS) *)OPENSSL_sk_new_null())
#define sk_OSSL_TARGETS_new_reserve(cmp, n) ((STACK_OF(OSSL_TARGETS)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_TARGETS_compfunc_type(cmp), (n)))
#define sk_OSSL_TARGETS_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_OSSL_TARGETS_sk_type(sk),
(n))
#define sk_OSSL_TARGETS_free(sk) OPENSSL_sk_free(ossl_check_OSSL_TARGETS_sk_type(sk))
#define sk_OSSL_TARGETS_zero(sk) OPENSSL_sk_zero(ossl_check_OSSL_TARGETS_sk_type(sk))
#define sk_OSSL_TARGETS_delete(sk, i) ((OSSL_TARGETS
*)OPENSSL_sk_delete(ossl_check_OSSL_TARGETS_sk_type(sk), (i)))
#define sk_OSSL_TARGETS_delete_ptr(sk, ptr) ((OSSL_TARGETS
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_TARGETS_sk_type(sk), ossl_check_OSSL_TARGETS_type(ptr)))
#define sk_OSSL_TARGETS_push(sk, ptr) OPENSSL_sk_push(ossl_check_OSSL_TARGETS_sk_type(sk),
ossl_check_OSSL_TARGETS_type(ptr))
#define sk_OSSL_TARGETS_unshift(sk,
 ptr) OPENSSL_sk_unshift(ossl_check_OSSL_TARGETS_sk_type(sk), ossl_check_OSSL_TARGETS_type(ptr))
#define sk_OSSL_TARGETS_pop(sk) ((OSSL_TARGETS
*)OPENSSL_sk_pop(ossl_check_OSSL_TARGETS_sk_type(sk)))
#define sk_OSSL_TARGETS_shift(sk) ((OSSL_TARGETS
*)OPENSSL_sk_shift(ossl_check_OSSL_TARGETS_sk_type(sk)))
#define sk_OSSL_TARGETS_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_TARGETS_sk_type(sk),ossl_check_OSSL_TARGETS_freefunc_type(
freefunc))
#define sk_OSSL_TARGETS_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_OSSL_TARGETS_sk_type(sk),
ossl_check_OSSL_TARGETS_type(ptr), (idx))
#define sk_OSSL_TARGETS_set(sk, idx, ptr) ((OSSL_TARGETS
*)OPENSSL_sk_set(ossl_check_OSSL_TARGETS_sk_type(sk), (idx), ossl_check_OSSL_TARGETS_type(ptr)))
#define sk_OSSL_TARGETS_find(sk, ptr) OPENSSL_sk_find(ossl_check_OSSL_TARGETS_sk_type(sk),
ossl_check_OSSL_TARGETS_type(ptr))
#define sk_OSSL_TARGETS_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_OSSL_TARGETS_sk_type(sk),
ossl_check_OSSL_TARGETS_type(ptr))
#define
 sk_OSSL_TARGETS_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_OSSL_TARGETS_sk_type(sk),
ossl_check_OSSL_TARGETS_type(ptr), pnum)
#define sk_OSSL_TARGETS_sort(sk) OPENSSL_sk_sort(ossl_check_OSSL_TARGETS_sk_type(sk))
#define sk_OSSL_TARGETS_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_TARGETS_sk_type(sk))
```

```
#define sk_OSSL_TARGETS_dup(sk) ((STACK_OF(OSSL_TARGETS)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_TARGETS_sk_type(sk)))
#define sk_OSSL_TARGETS_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OSSL_TARGETS)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_TARGETS_sk_type(sk),
ossl_check_OSSL_TARGETS_copyfunc_type(copyfunc), ossl_check_OSSL_TARGETS_freefunc_type(freefunc)))
#define sk_OSSL_TARGETS_set_cmp_func(sk, cmp)
((sk_OSSL_TARGETS_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_TARGETS_sk_type(sk),
ossl_check_OSSL_TARGETS_compfunc_type(cmp)))

/* clang-format on */

DECLARE_ASN1_FUNCTIONS(OSSL_TARGET)
DECLARE_ASN1_FUNCTIONS(OSSL_TARGETS)
DECLARE_ASN1_FUNCTIONS(OSSL_TARGETING_INFORMATION)

typedef
 STACK_OF(OSSL_ISSUER_SERIAL) OSSL_AUTHORITY_ATTRIBUTE_ID_SYNTAX;
DECLARE_ASN1_FUNCTIONS(OSSL_AUTHORITY_ATTRIBUTE_ID_SYNTAX)

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_ISSUER_SERIAL, OSSL_ISSUER_SERIAL,
OSSL_ISSUER_SERIAL)
#define sk_OSSL_ISSUER_SERIAL_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_ISSUER_SERIAL_sk_type(sk))
#define sk_OSSL_ISSUER_SERIAL_value(sk, idx) ((OSSL_ISSUER_SERIAL
*)OPENSSL_sk_value(ossl_check_const_OSSL_ISSUER_SERIAL_sk_type(sk), (idx)))
#define sk_OSSL_ISSUER_SERIAL_new(cmp) ((STACK_OF(OSSL_ISSUER_SERIAL)
*)OPENSSL_sk_new(ossl_check_OSSL_ISSUER_SERIAL_compfunc_type(cmp)))
#define sk_OSSL_ISSUER_SERIAL_new_null() ((STACK_OF(OSSL_ISSUER_SERIAL)
*)OPENSSL_sk_new_null())
#define sk_OSSL_ISSUER_SERIAL_new_reserve(cmp, n) ((STACK_OF(OSSL_ISSUER_SERIAL)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_ISSUER_SERIAL_compfunc_type(cmp), (n)))
#define sk_OSSL_ISSUER_SERIAL_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),
 (n))
#define sk_OSSL_ISSUER_SERIAL_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk))
#define sk_OSSL_ISSUER_SERIAL_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk))
#define sk_OSSL_ISSUER_SERIAL_delete(sk, i) ((OSSL_ISSUER_SERIAL
*)OPENSSL_sk_delete(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk), (i)))
#define sk_OSSL_ISSUER_SERIAL_delete_ptr(sk, ptr) ((OSSL_ISSUER_SERIAL
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),
ossl_check_OSSL_ISSUER_SERIAL_type(ptr)))
#define sk_OSSL_ISSUER_SERIAL_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),
ossl_check_OSSL_ISSUER_SERIAL_type(ptr))
#define sk_OSSL_ISSUER_SERIAL_unshift(sk, ptr)
```

```
OPENSSL_sk_unshift(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),
ossl_check_OSSL_ISSUER_SERIAL_type(ptr))
#define sk_OSSL_ISSUER_SERIAL_pop(sk) ((OSSL_ISSUER_SERIAL
*)OPENSSL_sk_pop(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk)))
#define sk_OSSL_ISSUER_SERIAL_shift(sk)
 ((OSSL_ISSUER_SERIAL *)OPENSSL_sk_shift(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk)))
#define sk_OSSL_ISSUER_SERIAL_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),ossl_check_OSSL_ISSUER_SERIAL_
freefunc_type(freefunc))
#define sk_OSSL_ISSUER_SERIAL_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),
ossl_check_OSSL_ISSUER_SERIAL_type(ptr), (idx))
#define sk_OSSL_ISSUER_SERIAL_set(sk, idx, ptr) ((OSSL_ISSUER_SERIAL
*)OPENSSL_sk_set(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk), (idx),
ossl_check_OSSL_ISSUER_SERIAL_type(ptr)))
#define sk_OSSL_ISSUER_SERIAL_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),
ossl_check_OSSL_ISSUER_SERIAL_type(ptr))
#define sk_OSSL_ISSUER_SERIAL_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),
ossl_check_OSSL_ISSUER_SERIAL_type(ptr))
#define sk_OSSL_ISSUER_SERIAL_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),
 ossl_check_OSSL_ISSUER_SERIAL_type(ptr), pnum)
#define sk_OSSL_ISSUER_SERIAL_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk))
#define sk_OSSL_ISSUER_SERIAL_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_ISSUER_SERIAL_sk_type(sk))
#define sk_OSSL_ISSUER_SERIAL_dup(sk) ((STACK_OF(OSSL_ISSUER_SERIAL)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_ISSUER_SERIAL_sk_type(sk)))
#define sk_OSSL_ISSUER_SERIAL_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OSSL_ISSUER_SERIAL)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_ISSUER_SERIAL_sk_type(sk),
ossl_check_OSSL_ISSUER_SERIAL_copyfunc_type(copyfunc),
ossl_check_OSSL_ISSUER_SERIAL_freefunc_type(freefunc)))
#define sk_OSSL_ISSUER_SERIAL_set_cmp_func(sk, cmp)
((sk_OSSL_ISSUER_SERIAL_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_ISSUER_SERIAL_sk_
type(sk), ossl_check_OSSL_ISSUER_SERIAL_compfunc_type(cmp)))

/* clang-format on */

#endif
```

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```
{
 'variables': {
  'openssl_sources': [
    'openssl/ssl/bio_ssl.c',
    'openssl/ssl/d1_lib.c',
    'openssl/ssl/d1_msg.c',
    'openssl/ssl/d1_srtp.c',
    'openssl/ssl/methods.c',
    'openssl/ssl/pqueue.c',
    'openssl/ssl/priority_queue.c',
    'openssl/ssl/s3_enc.c',
    'openssl/ssl/s3_lib.c',
    'openssl/ssl/s3_msg.c',
    'openssl/ssl/ssl_asn1.c',
    'openssl/ssl/ssl_cert.c',
    'openssl/ssl/ssl_cert_comp.c',
    'openssl/ssl/ssl_ciph.c',
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  'openssl/providers/implementations/ciphers/cipher_blowfish.c',
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  'openssl/providers/implementations/kdfs/pvkkdf.c',
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  'openssl/providers/legacyprov.c',
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  './config/archs/BSD-x86/asm_avx2/crypto/aes/aesni-x86.S',
  './config/archs/BSD-x86/asm_avx2/crypto/aes/vpaes-x86.S',
  './config/archs/BSD-x86/asm_avx2/crypto/bf/bf-586.S',
  './config/archs/BSD-x86/asm_avx2/crypto/bn/bn-586.S',
  './config/archs/BSD-x86/asm_avx2/crypto/bn/co-586.S',
  './config/archs/BSD-x86/asm_avx2/crypto/bn/x86-gf2m.S',
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  './config/archs/BSD-x86/asm_avx2/crypto/chacha/chacha-x86.S',
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  './config/archs/BSD-x86/asm_avx2/providers/common/der/der_digests_gen.c',
  './config/archs/BSD-x86/asm_avx2/providers/common/der/der_dsa_gen.c',
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  'OPENSSL_BN_ASM_MONT',
  'OPENSSL_BN_ASM_PART_WORDS',
  'OPENSSL_CPUID_OBJ',
  'OPENSSL_IA32_SSE2',
  'PADLOCK_ASM',
  'POLY1305_ASM',
  'RC4_ASM',
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  './crypto',
  './crypto/include/internal',
  './providers/common/include',
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 'libraries': ['<@(openssl_ex_libs_BSD-x86)'],
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  'defines': ['<@(openssl_defines_BSD-x86)'],
 },
}
```

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Version 1.0.0

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'openssl/crypto/hmac/hmac.c',
'openssl/crypto/lhash/lhash.c',
'openssl/crypto/asn1_dsa.c',
'openssl/crypto/bsearch.c',
'openssl/crypto/context.c',
'openssl/crypto/core_algorithm.c',
'openssl/crypto/core_fetch.c',
'openssl/crypto/core_namemap.c',
'openssl/crypto/cpuid.c',
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'openssl/crypto/ctype.c',
'openssl/crypto/der_writer.c',
'openssl/crypto/ex_data.c',
'openssl/crypto/initthread.c',
'openssl/crypto/mem_clr.c',
'openssl/crypto/o_str.c',
'openssl/crypto/packet.c',
'openssl/crypto/param_build.c',
'openssl/crypto/param_build_set.c',
'openssl/crypto/params.c',
'openssl/crypto/params_dup.c',
'openssl/crypto/params_from_text.c',
'openssl/crypto/provider_core.c',
'openssl/crypto/provider_predefined.c',
'openssl/crypto/self_test_core.c',
'openssl/crypto/sparse_array.c',
'openssl/crypto/threads_lib.c',
'openssl/crypto/threads_none.c',
'openssl/crypto/threads_pthread.c',
'openssl/crypto/threads_win.c',
'openssl/crypto/time.c',
'openssl/crypto/ml_dsa/ml_dsa_encoders.c',

'openssl/crypto/ml_dsa/ml_dsa_key.c',
'openssl/crypto/ml_dsa/ml_dsa_key_compress.c',
'openssl/crypto/ml_dsa/ml_dsa_matrix.c',
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'openssl/crypto/ml_dsa/ml_dsa_params.c',
'openssl/crypto/ml_dsa/ml_dsa_sample.c',
'openssl/crypto/ml_dsa/ml_dsa_sign.c',
'openssl/crypto/ml_kem/ml_kem.c',
'openssl/crypto/modes/cbc128.c',
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'openssl/crypto/modes/ctr128.c',
'openssl/crypto/modes/gcm128.c',
'openssl/crypto/modes/ofb128.c',
'openssl/crypto/modes/wrap128.c',
'openssl/crypto/modes/xts128.c',
'openssl/crypto/modes/xts128gb.c',
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'openssl/crypto/property/property_string.c',
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'openssl/crypto/rsa/rsa_lib.c',
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'openssl/crypto/rsa/rsa_pss.c',
'openssl/crypto/rsa/rsa_schemes.c',
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'openssl/crypto/sha/sha3.c',
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'openssl/providers/implementations/signature/ml_dsa_sig.c',
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'openssl/providers/implementations/signature/slh_dsa_sig.c',
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'openssl/providers/implementations/skeymgmt/generic.c',
'openssl/ssl/record/methods/ssl3_cbc.c',
'openssl/providers/common/der/der_dsa_key.c',
'openssl/providers/common/der/der_dsa_sig.c',

```
  'openssl/providers/common/der/der_ec_key.c',
  'openssl/providers/common/der/der_ec_sig.c',
  'openssl/providers/common/der/der_ecx_key.c',
  'openssl/providers/common/der/der_ml_dsa_key.c',
  'openssl/providers/common/der/der_rsa_key.c',
  'openssl/providers/common/der/der_slh_dsa_key.c',
  'openssl/providers/common/provider_ctx.c',
  'openssl/providers/common/provider_err.c',
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  'openssl/providers/implementations/ciphers/ciphercommon_ccm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm_hw.c',
  'openssl/providers/implementations/ciphers/ciphercommon_gcm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_gcm_hw.c',
  'openssl/providers/implementations/ciphers/ciphercommon_hw.c',
  'openssl/providers/implementations/digests/digestcommon.c',
  'openssl/ssl/record/methods/tls_pad.c',
  'openssl/providers/fips/fips_entry.c',

],
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  './config/archs/BSD-x86/no-asm/providers/common/der/der_sm2_gen.c',
  './config/archs/BSD-x86/no-asm/providers/common/der/der_digests_gen.c',
  './config/archs/BSD-x86/no-asm/providers/common/der/der_dsa_gen.c',
  './config/archs/BSD-x86/no-asm/providers/common/der/der_ec_gen.c',
   './config/archs/BSD-x86/no-asm/providers/common/der/der_ecx_gen.c',
  './config/archs/BSD-x86/no-asm/providers/common/der/der_ml_dsa_gen.c',
  './config/archs/BSD-x86/no-asm/providers/common/der/der_rsa_gen.c',
  './config/archs/BSD-x86/no-asm/providers/common/der/der_slh_dsa_gen.c',
  './config/archs/BSD-x86/no-asm/providers/common/der/der_wrap_gen.c',
  './config/archs/BSD-x86/no-asm/providers/legacy.ld',
  './config/archs/BSD-x86/no-asm/providers/fips.ld',

],
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```

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    '-pthread',
  ],
  'linker_script': ''
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  './crypto',
  './crypto/include/internal',
  './providers/common/include',
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 'cflags': ['<@(openssl_cflags_BSD-x86)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86)'],

 'sources': ['<@(openssl_sources)', '<@(openssl_sources_BSD-x86)'],
 'direct_dependent_settings': {
  'include_dirs': ['./include', '.'],
  'defines': ['<@(openssl_defines_BSD-x86)'],
 },
}
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/safestack.h.in
```

```
*
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* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_SAFESTACK_H
#define OPENSSL_SAFESTACK_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_SAFESTACK_H
#endif

#include <openssl/stack.h>
#include <openssl/e_os2.h>

#ifdef __cplusplus
extern "C" {
#endif

#define STACK_OF(type) struct stack_st_##type

/* Helper macro for internal use */
#define SKM_DEFINE_STACK_OF_INTERNAL(t1, t2, t3)                                                \
  STACK_OF(t1);
                                \
  typedef int (*sk_##t1##_compfunc)(const t3 *const *a, const t3 *const *b);                    \
  typedef void (*sk_##t1##_freefunc)(t3 * a);                                                   \
  typedef t3 *(*sk_##t1##_copyfunc)(const t3 *a);                                               \
  static ossl_unused ossl_inline t2 *ossl_check_##t1##_type(t2 *ptr)                            \
  {                                                                                             \
    return ptr;                                                                                 \
  }                                                                                             \
  static ossl_unused ossl_inline const OPENSSL_STACK *ossl_check_const_##t1##_sk_type(const
STACK_OF(t1) *sk) \
  {
                                                \
    return (const OPENSSL_STACK *)sk;                                                           \
  }                                                                                             \
```

```
  static ossl_unused ossl_inline OPENSSL_STACK *ossl_check_##t1##_sk_type(STACK_OF(t1) *sk)
\
  {                                                                    \
      return (OPENSSL_STACK *)sk;                                      \
  }                                                                    \
  static ossl_unused ossl_inline OPENSSL_sk_compfunc ossl_check_##t1##_compfunc_type(sk_##t1##_compfunc
cmp)  \
  {                                                                    \
      return (OPENSSL_sk_compfunc)cmp;
                                                                       \
  }                                                                    \
  static ossl_unused ossl_inline OPENSSL_sk_copyfunc ossl_check_##t1##_copyfunc_type(sk_##t1##_copyfunc
cpy)  \
  {                                                                    \
      return (OPENSSL_sk_copyfunc)cpy;                                 \
  }                                                                    \
  static ossl_unused ossl_inline OPENSSL_sk_freefunc ossl_check_##t1##_freefunc_type(sk_##t1##_freefunc fr)
\
  {                                                                    \
      return (OPENSSL_sk_freefunc)fr;
       \
  }

#define SKM_DEFINE_STACK_OF(t1, t2, t3)                                                    \
  STACK_OF(t1);                                                                            \
  typedef int (*sk_##t1##_compfunc)(const t3 *const *a, const t3 *const *b);               \
  typedef void (*sk_##t1##_freefunc)(t3 * a);                                              \
  typedef t3 *(*sk_##t1##_copyfunc)(const t3 *a);                                          \
  static ossl_unused ossl_inline int sk_##t1##_num(const STACK_OF(t1) *sk)                 \
  {                                                                                        \
      return OPENSSL_sk_num((const OPENSSL_STACK *)sk);
            \
  }                                                                                        \
  static ossl_unused ossl_inline t2 *sk_##t1##_value(const STACK_OF(t1) *sk, int idx)      \
  {                                                                                        \
      return (t2 *)OPENSSL_sk_value((const OPENSSL_STACK *)sk, idx);                       \
  }                                                                                        \
  static ossl_unused ossl_inline STACK_OF(t1) *sk_##t1##_new(sk_##t1##_compfunc compare)
 \
  {                                                                                        \
      return (STACK_OF(t1) *)OPENSSL_sk_new((OPENSSL_sk_compfunc)compare);
            \
  }                                                                                        \
  static ossl_unused ossl_inline STACK_OF(t1) *sk_##t1##_new_null(void)                    \
  {                                                                                        \
      return (STACK_OF(t1) *)OPENSSL_sk_new_null();                                        \
  }                                                                                        \
  static ossl_unused ossl_inline STACK_OF(t1) *sk_##t1##_new_reserve(sk_##t1##_compfunc compare, int n)
```

```
    \
{                                                                   \
   return (STACK_OF(t1) *)OPENSSL_sk_new_reserve((OPENSSL_sk_compfunc)compare, n);
        \
}                                                                   \
static ossl_unused ossl_inline int sk_##t1##_reserve(STACK_OF(t1) *sk, int n)                    \
{                                                                   \
   return OPENSSL_sk_reserve((OPENSSL_STACK *)sk, n);                                   \
}                                                                   \
static ossl_unused ossl_inline void sk_##t1##_free(STACK_OF(t1) *sk)                    \
{                                                                   \
   OPENSSL_sk_free((OPENSSL_STACK *)sk);
        \
}                                                                   \
static ossl_unused ossl_inline void sk_##t1##_zero(STACK_OF(t1) *sk)                    \
{                                                                   \
   OPENSSL_sk_zero((OPENSSL_STACK *)sk);                                   \
}                                                                   \
static ossl_unused ossl_inline t2 *sk_##t1##_delete(STACK_OF(t1) *sk, int i)                    \
{                                                                   \
   return (t2 *)OPENSSL_sk_delete((OPENSSL_STACK *)sk, i);
        \
}                                                                   \
static ossl_unused ossl_inline t2 *sk_##t1##_delete_ptr(STACK_OF(t1) *sk, t2 *ptr)                    \
{                                                                   \
   return (t2 *)OPENSSL_sk_delete_ptr((OPENSSL_STACK *)sk,                    \
      (const void *)ptr);                                                   \
}                                                                   \
static ossl_unused ossl_inline int sk_##t1##_push(STACK_OF(t1) *sk, t2 *ptr)                    \
{
        \
   return OPENSSL_sk_push((OPENSSL_STACK *)sk, (const void *)ptr);                    \
}                                                                   \
static ossl_unused ossl_inline int sk_##t1##_unshift(STACK_OF(t1) *sk, t2 *ptr)                    \
{                                                                   \
   return OPENSSL_sk_unshift((OPENSSL_STACK *)sk, (const void *)ptr);                    \
}                                                                   \
static ossl_unused ossl_inline t2 *sk_##t1##_pop(STACK_OF(t1) *sk)                    \
{
        \
   return (t2 *)OPENSSL_sk_pop((OPENSSL_STACK *)sk);                                   \
}                                                                   \
static ossl_unused ossl_inline t2 *sk_##t1##_shift(STACK_OF(t1) *sk)                    \
{                                                                   \
   return (t2 *)OPENSSL_sk_shift((OPENSSL_STACK *)sk);                                   \
}                                                                   \
static ossl_unused ossl_inline void sk_##t1##_pop_free(STACK_OF(t1) *sk, sk_##t1##_freefunc freefunc)
 \
```

```
{
        \
    OPENSSL_sk_pop_free((OPENSSL_STACK *)sk, (OPENSSL_sk_freefunc)freefunc);
\
}                                                                       \
static ossl_unused ossl_inline int sk_##t1##_insert(STACK_OF(t1) *sk, t2 *ptr, int idx)                \
{                                                                       \
    return OPENSSL_sk_insert((OPENSSL_STACK *)sk, (const void *)ptr, idx);                            \
}                                                                       \
static ossl_unused ossl_inline t2 *sk_##t1##_set(STACK_OF(t1) *sk, int idx, t2 *ptr)                  \
{
        \
    return (t2 *)OPENSSL_sk_set((OPENSSL_STACK *)sk, idx, (const void *)ptr);                         \
}                                                                       \
static ossl_unused ossl_inline int sk_##t1##_find(STACK_OF(t1) *sk, t2 *ptr)                          \
{                                                                       \
    return OPENSSL_sk_find((OPENSSL_STACK *)sk, (const void *)ptr);                                   \
}                                                                       \
static ossl_unused ossl_inline int sk_##t1##_find_ex(STACK_OF(t1) *sk, t2 *ptr)                       \
{
        \
    return OPENSSL_sk_find_ex((OPENSSL_STACK *)sk, (const void *)ptr);                                \
}                                                                       \
static ossl_unused ossl_inline int sk_##t1##_find_all(STACK_OF(t1) *sk, t2 *ptr, int *pnum)           \
{                                                                       \
    return OPENSSL_sk_find_all((OPENSSL_STACK *)sk, (const void *)ptr, pnum);                         \
}                                                                       \
static ossl_unused ossl_inline void sk_##t1##_sort(STACK_OF(t1) *sk)                                  \
{
        \
    OPENSSL_sk_sort((OPENSSL_STACK *)sk);                                                             \
}                                                                       \
static ossl_unused ossl_inline int sk_##t1##_is_sorted(const STACK_OF(t1) *sk)                        \
{                                                                       \
    return OPENSSL_sk_is_sorted((const OPENSSL_STACK *)sk);                                           \
}                                                                       \
static ossl_unused ossl_inline STACK_OF(t1) *sk_##t1##_dup(const STACK_OF(t1) *sk)
\
{
        \
    return (STACK_OF(t1) *)OPENSSL_sk_dup((const OPENSSL_STACK *)sk);                                 \
}                                                                       \
static ossl_unused ossl_inline STACK_OF(t1) *sk_##t1##_deep_copy(const STACK_OF(t1) *sk,
\
    sk_##t1##_copyfunc copyfunc,                                        \
    sk_##t1##_freefunc freefunc)                                        \
{                                                                       \
    return (STACK_OF(t1) *)OPENSSL_sk_deep_copy((const OPENSSL_STACK *)sk,
```

```
 \
        (OPENSSL_sk_copyfunc)copyfunc,
           \
        (OPENSSL_sk_freefunc)freefunc);                                                    \
   }                                                                                       \
   static ossl_unused ossl_inline sk_##t1##_compfunc sk_##t1##_set_cmp_func(STACK_OF(t1) *sk,
sk_##t1##_compfunc compare) \
   {                                                                                       \
      return (sk_##t1##_compfunc)OPENSSL_sk_set_cmp_func((OPENSSL_STACK *)sk,
(OPENSSL_sk_compfunc)compare);            \
   }

#define DEFINE_STACK_OF(t) SKM_DEFINE_STACK_OF(t, t, t)
#define DEFINE_STACK_OF_CONST(t) SKM_DEFINE_STACK_OF(t, const t, t)
#define DEFINE_SPECIAL_STACK_OF(t1, t2) SKM_DEFINE_STACK_OF(t1, t2, t2)
#define DEFINE_SPECIAL_STACK_OF_CONST(t1, t2) \
   SKM_DEFINE_STACK_OF(t1, const t2, t2)

/*-
* Strings are special: normally an lhash entry will point to
 a single
* (somewhat) mutable object. In the case of strings:
*
* a) Instead of a single char, there is an array of chars, NUL-terminated.
* b) The string may have be immutable.
*
* So, they need their own declarations. Especially important for
* type-checking tools, such as Deputy.
*
* In practice, however, it appears to be hard to have a const
* string. For now, I'm settling for dealing with the fact it is a
* string at all.
*/
typedef char *OPENSSL_STRING;
typedef const char *OPENSSL_CSTRING;

/*-
* Confusingly, LHASH_OF(STRING) deals with char ** throughout, but
* STACK_OF(STRING) is really more like STACK_OF(char), only, as mentioned
* above, instead of a single char each entry is a NUL-terminated array of
* chars. So, we have to implement STRING specially for STACK_OF. This is
* dealt with in the autogenerated macros below.
*/
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OPENSSL_STRING, char, char)
#define sk_OPENSSL_STRING_num(sk)
OPENSSL_sk_num(ossl_check_const_OPENSSL_STRING_sk_type(sk))
#define
```

```
 sk_OPENSSL_STRING_value(sk, idx) ((char
*)OPENSSL_sk_value(ossl_check_const_OPENSSL_STRING_sk_type(sk), (idx)))
#define sk_OPENSSL_STRING_new(cmp) ((STACK_OF(OPENSSL_STRING)
*)OPENSSL_sk_new(ossl_check_OPENSSL_STRING_compfunc_type(cmp)))
#define sk_OPENSSL_STRING_new_null() ((STACK_OF(OPENSSL_STRING) *)OPENSSL_sk_new_null())
#define sk_OPENSSL_STRING_new_reserve(cmp, n) ((STACK_OF(OPENSSL_STRING)
*)OPENSSL_sk_new_reserve(ossl_check_OPENSSL_STRING_compfunc_type(cmp), (n)))
#define sk_OPENSSL_STRING_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OPENSSL_STRING_sk_type(sk), (n))
#define sk_OPENSSL_STRING_free(sk) OPENSSL_sk_free(ossl_check_OPENSSL_STRING_sk_type(sk))
#define sk_OPENSSL_STRING_zero(sk) OPENSSL_sk_zero(ossl_check_OPENSSL_STRING_sk_type(sk))
#define sk_OPENSSL_STRING_delete(sk, i) ((char
*)OPENSSL_sk_delete(ossl_check_OPENSSL_STRING_sk_type(sk), (i)))
#define sk_OPENSSL_STRING_delete_ptr(sk, ptr) ((char
*)OPENSSL_sk_delete_ptr(ossl_check_OPENSSL_STRING_sk_type(sk),
 ossl_check_OPENSSL_STRING_type(ptr)))
#define sk_OPENSSL_STRING_push(sk, ptr) OPENSSL_sk_push(ossl_check_OPENSSL_STRING_sk_type(sk),
ossl_check_OPENSSL_STRING_type(ptr))
#define sk_OPENSSL_STRING_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OPENSSL_STRING_sk_type(sk), ossl_check_OPENSSL_STRING_type(ptr))
#define sk_OPENSSL_STRING_pop(sk) ((char
*)OPENSSL_sk_pop(ossl_check_OPENSSL_STRING_sk_type(sk)))
#define sk_OPENSSL_STRING_shift(sk) ((char
*)OPENSSL_sk_shift(ossl_check_OPENSSL_STRING_sk_type(sk)))
#define sk_OPENSSL_STRING_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OPENSSL_STRING_sk_type(sk),ossl_check_OPENSSL_STRING_freefunc_
type(freefunc))
#define sk_OPENSSL_STRING_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OPENSSL_STRING_sk_type(sk), ossl_check_OPENSSL_STRING_type(ptr),
(idx))
#define sk_OPENSSL_STRING_set(sk, idx, ptr) ((char
*)OPENSSL_sk_set(ossl_check_OPENSSL_STRING_sk_type(sk), (idx),
ossl_check_OPENSSL_STRING_type(ptr)))
#define
 sk_OPENSSL_STRING_find(sk, ptr) OPENSSL_sk_find(ossl_check_OPENSSL_STRING_sk_type(sk),
ossl_check_OPENSSL_STRING_type(ptr))
#define sk_OPENSSL_STRING_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OPENSSL_STRING_sk_type(sk), ossl_check_OPENSSL_STRING_type(ptr))
#define sk_OPENSSL_STRING_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OPENSSL_STRING_sk_type(sk), ossl_check_OPENSSL_STRING_type(ptr),
pnum)
#define sk_OPENSSL_STRING_sort(sk) OPENSSL_sk_sort(ossl_check_OPENSSL_STRING_sk_type(sk))
#define sk_OPENSSL_STRING_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OPENSSL_STRING_sk_type(sk))
#define sk_OPENSSL_STRING_dup(sk) ((STACK_OF(OPENSSL_STRING)
*)OPENSSL_sk_dup(ossl_check_const_OPENSSL_STRING_sk_type(sk)))
#define sk_OPENSSL_STRING_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OPENSSL_STRING)
*)OPENSSL_sk_deep_copy(ossl_check_const_OPENSSL_STRING_sk_type(sk),
```

```
ossl_check_OPENSSL_STRING_copyfunc_type(copyfunc),
ossl_check_OPENSSL_STRING_freefunc_type(freefunc)))
#define
 sk_OPENSSL_STRING_set_cmp_func(sk, cmp)
((sk_OPENSSL_STRING_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OPENSSL_STRING_sk_type(sk),
ossl_check_OPENSSL_STRING_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(OPENSSL_CSTRING, const char, char)
#define sk_OPENSSL_CSTRING_num(sk)
OPENSSL_sk_num(ossl_check_const_OPENSSL_CSTRING_sk_type(sk))
#define sk_OPENSSL_CSTRING_value(sk, idx) ((const char
*)OPENSSL_sk_value(ossl_check_const_OPENSSL_CSTRING_sk_type(sk), (idx)))
#define sk_OPENSSL_CSTRING_new(cmp) ((STACK_OF(OPENSSL_CSTRING)
*)OPENSSL_sk_new(ossl_check_OPENSSL_CSTRING_compfunc_type(cmp)))
#define sk_OPENSSL_CSTRING_new_null() ((STACK_OF(OPENSSL_CSTRING) *)OPENSSL_sk_new_null())
#define sk_OPENSSL_CSTRING_new_reserve(cmp, n) ((STACK_OF(OPENSSL_CSTRING)
*)OPENSSL_sk_new_reserve(ossl_check_OPENSSL_CSTRING_compfunc_type(cmp), (n)))
#define sk_OPENSSL_CSTRING_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OPENSSL_CSTRING_sk_type(sk), (n))
#define sk_OPENSSL_CSTRING_free(sk) OPENSSL_sk_free(ossl_check_OPENSSL_CSTRING_sk_type(sk))
#define
 sk_OPENSSL_CSTRING_zero(sk) OPENSSL_sk_zero(ossl_check_OPENSSL_CSTRING_sk_type(sk))
#define sk_OPENSSL_CSTRING_delete(sk, i) ((const char
*)OPENSSL_sk_delete(ossl_check_OPENSSL_CSTRING_sk_type(sk), (i)))
#define sk_OPENSSL_CSTRING_delete_ptr(sk, ptr) ((const char
*)OPENSSL_sk_delete_ptr(ossl_check_OPENSSL_CSTRING_sk_type(sk),
ossl_check_OPENSSL_CSTRING_type(ptr)))
#define sk_OPENSSL_CSTRING_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OPENSSL_CSTRING_sk_type(sk), ossl_check_OPENSSL_CSTRING_type(ptr))
#define sk_OPENSSL_CSTRING_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OPENSSL_CSTRING_sk_type(sk),
ossl_check_OPENSSL_CSTRING_type(ptr))
#define sk_OPENSSL_CSTRING_pop(sk) ((const char
*)OPENSSL_sk_pop(ossl_check_OPENSSL_CSTRING_sk_type(sk)))
#define sk_OPENSSL_CSTRING_shift(sk) ((const char
*)OPENSSL_sk_shift(ossl_check_OPENSSL_CSTRING_sk_type(sk)))
#define sk_OPENSSL_CSTRING_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OPENSSL_CSTRING_sk_type(sk),ossl_check_OPENSSL_CSTRING_freefu
nc_type(freefunc))
#define
 sk_OPENSSL_CSTRING_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OPENSSL_CSTRING_sk_type(sk), ossl_check_OPENSSL_CSTRING_type(ptr),
(idx))
#define sk_OPENSSL_CSTRING_set(sk, idx, ptr) ((const char
*)OPENSSL_sk_set(ossl_check_OPENSSL_CSTRING_sk_type(sk), (idx),
ossl_check_OPENSSL_CSTRING_type(ptr)))
#define sk_OPENSSL_CSTRING_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OPENSSL_CSTRING_sk_type(sk), ossl_check_OPENSSL_CSTRING_type(ptr))
#define sk_OPENSSL_CSTRING_find_ex(sk, ptr)
```

```
OPENSSL_sk_find_ex(ossl_check_OPENSSL_CSTRING_sk_type(sk),
ossl_check_OPENSSL_CSTRING_type(ptr))
#define sk_OPENSSL_CSTRING_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OPENSSL_CSTRING_sk_type(sk),
ossl_check_OPENSSL_CSTRING_type(ptr), pnum)
#define sk_OPENSSL_CSTRING_sort(sk) OPENSSL_sk_sort(ossl_check_OPENSSL_CSTRING_sk_type(sk))
#define sk_OPENSSL_CSTRING_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OPENSSL_CSTRING_sk_type(sk))
#define
 sk_OPENSSL_CSTRING_dup(sk) ((STACK_OF(OPENSSL_CSTRING)
*)OPENSSL_sk_dup(ossl_check_const_OPENSSL_CSTRING_sk_type(sk)))
#define sk_OPENSSL_CSTRING_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OPENSSL_CSTRING)
*)OPENSSL_sk_deep_copy(ossl_check_const_OPENSSL_CSTRING_sk_type(sk),
ossl_check_OPENSSL_CSTRING_copyfunc_type(copyfunc),
ossl_check_OPENSSL_CSTRING_freefunc_type(freefunc)))
#define sk_OPENSSL_CSTRING_set_cmp_func(sk, cmp)
((sk_OPENSSL_CSTRING_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OPENSSL_CSTRING_sk_type(s
k), ossl_check_OPENSSL_CSTRING_compfunc_type(cmp)))

/* clang-format on */

#if !defined(OPENSSL_NO_DEPRECATED_3_0)
/*
* This is not used by OpenSSL.  A block of bytes,  NOT nul-terminated.
* These should also be distinguished from "normal" stacks.
*/
typedef void *OPENSSL_BLOCK;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OPENSSL_BLOCK, void, void)
#define sk_OPENSSL_BLOCK_num(sk) OPENSSL_sk_num(ossl_check_const_OPENSSL_BLOCK_sk_type(sk))
#define
 sk_OPENSSL_BLOCK_value(sk, idx) ((void
*)OPENSSL_sk_value(ossl_check_const_OPENSSL_BLOCK_sk_type(sk), (idx)))
#define sk_OPENSSL_BLOCK_new(cmp) ((STACK_OF(OPENSSL_BLOCK)
*)OPENSSL_sk_new(ossl_check_OPENSSL_BLOCK_compfunc_type(cmp)))
#define sk_OPENSSL_BLOCK_new_null() ((STACK_OF(OPENSSL_BLOCK) *)OPENSSL_sk_new_null())
#define sk_OPENSSL_BLOCK_new_reserve(cmp, n) ((STACK_OF(OPENSSL_BLOCK)
*)OPENSSL_sk_new_reserve(ossl_check_OPENSSL_BLOCK_compfunc_type(cmp), (n)))
#define sk_OPENSSL_BLOCK_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OPENSSL_BLOCK_sk_type(sk), (n))
#define sk_OPENSSL_BLOCK_free(sk) OPENSSL_sk_free(ossl_check_OPENSSL_BLOCK_sk_type(sk))
#define sk_OPENSSL_BLOCK_zero(sk) OPENSSL_sk_zero(ossl_check_OPENSSL_BLOCK_sk_type(sk))
#define sk_OPENSSL_BLOCK_delete(sk, i) ((void
*)OPENSSL_sk_delete(ossl_check_OPENSSL_BLOCK_sk_type(sk), (i)))
#define sk_OPENSSL_BLOCK_delete_ptr(sk, ptr) ((void
*)OPENSSL_sk_delete_ptr(ossl_check_OPENSSL_BLOCK_sk_type(sk),
ossl_check_OPENSSL_BLOCK_type(ptr)))
#define
```

```
 sk_OPENSSL_BLOCK_push(sk, ptr) OPENSSL_sk_push(ossl_check_OPENSSL_BLOCK_sk_type(sk),
ossl_check_OPENSSL_BLOCK_type(ptr))
#define sk_OPENSSL_BLOCK_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OPENSSL_BLOCK_sk_type(sk), ossl_check_OPENSSL_BLOCK_type(ptr))
#define sk_OPENSSL_BLOCK_pop(sk) ((void
*)OPENSSL_sk_pop(ossl_check_OPENSSL_BLOCK_sk_type(sk)))
#define sk_OPENSSL_BLOCK_shift(sk) ((void
*)OPENSSL_sk_shift(ossl_check_OPENSSL_BLOCK_sk_type(sk)))
#define sk_OPENSSL_BLOCK_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OPENSSL_BLOCK_sk_type(sk),ossl_check_OPENSSL_BLOCK_freefunc_t
ype(freefunc))
#define sk_OPENSSL_BLOCK_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OPENSSL_BLOCK_sk_type(sk), ossl_check_OPENSSL_BLOCK_type(ptr),
(idx))
#define sk_OPENSSL_BLOCK_set(sk, idx, ptr) ((void
*)OPENSSL_sk_set(ossl_check_OPENSSL_BLOCK_sk_type(sk), (idx),
ossl_check_OPENSSL_BLOCK_type(ptr)))
#define sk_OPENSSL_BLOCK_find(sk, ptr) OPENSSL_sk_find(ossl_check_OPENSSL_BLOCK_sk_type(sk),
 ossl_check_OPENSSL_BLOCK_type(ptr))
#define sk_OPENSSL_BLOCK_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OPENSSL_BLOCK_sk_type(sk), ossl_check_OPENSSL_BLOCK_type(ptr))
#define sk_OPENSSL_BLOCK_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OPENSSL_BLOCK_sk_type(sk), ossl_check_OPENSSL_BLOCK_type(ptr),
pnum)
#define sk_OPENSSL_BLOCK_sort(sk) OPENSSL_sk_sort(ossl_check_OPENSSL_BLOCK_sk_type(sk))
#define sk_OPENSSL_BLOCK_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OPENSSL_BLOCK_sk_type(sk))
#define sk_OPENSSL_BLOCK_dup(sk) ((STACK_OF(OPENSSL_BLOCK)
*)OPENSSL_sk_dup(ossl_check_const_OPENSSL_BLOCK_sk_type(sk)))
#define sk_OPENSSL_BLOCK_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OPENSSL_BLOCK)
*)OPENSSL_sk_deep_copy(ossl_check_const_OPENSSL_BLOCK_sk_type(sk),
ossl_check_OPENSSL_BLOCK_copyfunc_type(copyfunc),
ossl_check_OPENSSL_BLOCK_freefunc_type(freefunc)))
#define sk_OPENSSL_BLOCK_set_cmp_func(sk, cmp)
((sk_OPENSSL_BLOCK_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OPENSSL_BLOCK_sk_type(sk),
 ossl_check_OPENSSL_BLOCK_compfunc_type(cmp)))

/* clang-format on */
#endif

#ifdef __cplusplus
}
#endif
#endif
```

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```
import './required-module.mjs';
```

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File: vendor/json/upstream/single_include/nlohmann/json.hpp (only for ICU4C)

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=== src/compat.h src/compat-inl.h ===

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- on-exit-leak-free,
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/*
* WARNING: do not edit!
* Generated by Makefile from providers/common/include/prov/der_rsa.h.in
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*/

#include "crypto/rsa.h"
#include "internal/der.h"

/* Well known OIDs precompiled */
/* clang-format off */

/*
* hashAlgs OBJECT IDENTIFIER ::= { nistAlgorithms 2 }
*/
#define DER_OID_V_hashAlgs DER_P_OBJECT, 8, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02
#define DER_OID_SZ_hashAlgs 10
extern const unsigned char ossl_der_oid_hashAlgs[DER_OID_SZ_hashAlgs];

/*
* rsaEncryption    OBJECT IDENTIFIER ::= { pkcs-1 1 }
*/
#define DER_OID_V_rsaEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01, 0x01, 0x01
#define DER_OID_SZ_rsaEncryption 11
extern
 const unsigned char ossl_der_oid_rsaEncryption[DER_OID_SZ_rsaEncryption];

/*
* id-RSAES-OAEP    OBJECT IDENTIFIER ::= { pkcs-1 7 }
*/
#define DER_OID_V_id_RSAES_OAEP DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01, 0x01,
0x07
#define DER_OID_SZ_id_RSAES_OAEP 11
extern const unsigned char ossl_der_oid_id_RSAES_OAEP[DER_OID_SZ_id_RSAES_OAEP];

/*
* id-pSpecified    OBJECT IDENTIFIER ::= { pkcs-1 9 }
```

```
*/
#define DER_OID_V_id_pSpecified DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01, 0x01, 0x09
#define DER_OID_SZ_id_pSpecified 11
extern const unsigned char ossl_der_oid_id_pSpecified[DER_OID_SZ_id_pSpecified];

/*
* id-RSASSA-PSS    OBJECT IDENTIFIER ::= { pkcs-1 10 }
*/
#define DER_OID_V_id_RSASSA_PSS DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01, 0x01,
0x0A
#define DER_OID_SZ_id_RSASSA_PSS 11
extern const unsigned char ossl_der_oid_id_RSASSA_PSS[DER_OID_SZ_id_RSASSA_PSS];

/*
* md2WithRSAEncryption         OBJECT IDENTIFIER ::= { pkcs-1 2 }
 */
#define DER_OID_V_md2WithRSAEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01,
0x01, 0x02
#define DER_OID_SZ_md2WithRSAEncryption 11
extern const unsigned char ossl_der_oid_md2WithRSAEncryption[DER_OID_SZ_md2WithRSAEncryption];

/*
* md5WithRSAEncryption         OBJECT IDENTIFIER ::= { pkcs-1 4 }
*/
#define DER_OID_V_md5WithRSAEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01,
0x01, 0x04
#define DER_OID_SZ_md5WithRSAEncryption 11
extern const unsigned char ossl_der_oid_md5WithRSAEncryption[DER_OID_SZ_md5WithRSAEncryption];

/*
* sha1WithRSAEncryption        OBJECT IDENTIFIER ::= { pkcs-1 5 }
*/
#define DER_OID_V_sha1WithRSAEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01,
0x01, 0x05
#define DER_OID_SZ_sha1WithRSAEncryption 11
extern const unsigned char ossl_der_oid_sha1WithRSAEncryption[DER_OID_SZ_sha1WithRSAEncryption];

/*
* sha224WithRSAEncryption      OBJECT IDENTIFIER ::= { pkcs-1 14 }
*/
#define DER_OID_V_sha224WithRSAEncryption
 DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01, 0x01, 0x0E
#define DER_OID_SZ_sha224WithRSAEncryption 11
extern const unsigned char ossl_der_oid_sha224WithRSAEncryption[DER_OID_SZ_sha224WithRSAEncryption];

/*
* sha256WithRSAEncryption      OBJECT IDENTIFIER ::= { pkcs-1 11 }
*/
```

```
#define DER_OID_V_sha256WithRSAEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D,
0x01, 0x01, 0x0B
#define DER_OID_SZ_sha256WithRSAEncryption 11
extern const unsigned char ossl_der_oid_sha256WithRSAEncryption[DER_OID_SZ_sha256WithRSAEncryption];

/*
* sha384WithRSAEncryption      OBJECT IDENTIFIER ::= { pkcs-1 12 }
*/
#define DER_OID_V_sha384WithRSAEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D,
0x01, 0x01, 0x0C
#define DER_OID_SZ_sha384WithRSAEncryption 11
extern const unsigned char ossl_der_oid_sha384WithRSAEncryption[DER_OID_SZ_sha384WithRSAEncryption];

/*
* sha512WithRSAEncryption      OBJECT IDENTIFIER ::= { pkcs-1 13 }
*/
#define DER_OID_V_sha512WithRSAEncryption
 DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01, 0x01, 0x0D
#define DER_OID_SZ_sha512WithRSAEncryption 11
extern const unsigned char ossl_der_oid_sha512WithRSAEncryption[DER_OID_SZ_sha512WithRSAEncryption];

/*
* sha512-224WithRSAEncryption  OBJECT IDENTIFIER ::= { pkcs-1 15 }
*/
#define DER_OID_V_sha512_224WithRSAEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D,
0x01, 0x01, 0x0F
#define DER_OID_SZ_sha512_224WithRSAEncryption 11
extern const unsigned char
ossl_der_oid_sha512_224WithRSAEncryption[DER_OID_SZ_sha512_224WithRSAEncryption];

/*
* sha512-256WithRSAEncryption  OBJECT IDENTIFIER ::= { pkcs-1 16 }
*/
#define DER_OID_V_sha512_256WithRSAEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D,
0x01, 0x01, 0x10
#define DER_OID_SZ_sha512_256WithRSAEncryption 11
extern const unsigned char
ossl_der_oid_sha512_256WithRSAEncryption[DER_OID_SZ_sha512_256WithRSAEncryption];

/*
* id-mgf1    OBJECT IDENTIFIER ::= { pkcs-1 8 }
*/
#define
 DER_OID_V_id_mgf1 DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01, 0x01, 0x08
#define DER_OID_SZ_id_mgf1 11
extern const unsigned char ossl_der_oid_id_mgf1[DER_OID_SZ_id_mgf1];

/*
```

```
* id-rsassa-pkcs1-v1_5-with-sha3-224 OBJECT IDENTIFIER ::= { sigAlgs 13 }
*/
#define DER_OID_V_id_rsassa_pkcs1_v1_5_with_sha3_224 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65,
0x03, 0x04, 0x03, 0x0D
#define DER_OID_SZ_id_rsassa_pkcs1_v1_5_with_sha3_224 11
extern const unsigned char
ossl_der_oid_id_rsassa_pkcs1_v1_5_with_sha3_224[DER_OID_SZ_id_rsassa_pkcs1_v1_5_with_sha3_224];

/*
* id-rsassa-pkcs1-v1_5-with-sha3-256 OBJECT IDENTIFIER ::= { sigAlgs 14 }
*/
#define DER_OID_V_id_rsassa_pkcs1_v1_5_with_sha3_256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65,
0x03, 0x04, 0x03, 0x0E
#define DER_OID_SZ_id_rsassa_pkcs1_v1_5_with_sha3_256 11
extern const unsigned char
ossl_der_oid_id_rsassa_pkcs1_v1_5_with_sha3_256[DER_OID_SZ_id_rsassa_pkcs1_v1_5_with_sha3_256];

/*
* id-rsassa-pkcs1-v1_5-with-sha3-384
 OBJECT IDENTIFIER ::= { sigAlgs 15 }
*/
#define DER_OID_V_id_rsassa_pkcs1_v1_5_with_sha3_384 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65,
0x03, 0x04, 0x03, 0x0F
#define DER_OID_SZ_id_rsassa_pkcs1_v1_5_with_sha3_384 11
extern const unsigned char
ossl_der_oid_id_rsassa_pkcs1_v1_5_with_sha3_384[DER_OID_SZ_id_rsassa_pkcs1_v1_5_with_sha3_384];

/*
* id-rsassa-pkcs1-v1_5-with-sha3-512 OBJECT IDENTIFIER ::= { sigAlgs 16 }
*/
#define DER_OID_V_id_rsassa_pkcs1_v1_5_with_sha3_512 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65,
0x03, 0x04, 0x03, 0x10
#define DER_OID_SZ_id_rsassa_pkcs1_v1_5_with_sha3_512 11
extern const unsigned char
ossl_der_oid_id_rsassa_pkcs1_v1_5_with_sha3_512[DER_OID_SZ_id_rsassa_pkcs1_v1_5_with_sha3_512];

/*
* md4WithRSAEncryption OBJECT IDENTIFIER ::= { pkcs-1 3 }
*/
#define DER_OID_V_md4WithRSAEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01,
0x01, 0x03
#define DER_OID_SZ_md4WithRSAEncryption 11
extern const unsigned char ossl_der_oid_md4WithRSAEncryption[DER_OID_SZ_md4WithRSAEncryption];

/*
 * ripemd160WithRSAEncryption    OBJECT IDENTIFIER ::= {
*     iso(1) identified-organization(3) teletrust(36) algorithm(3) signatureAlgorithm(3) rsaSignature(1) 2
* }
```

```
*/
#define DER_OID_V_ripemd160WithRSAEncryption DER_P_OBJECT, 6, 0x2B, 0x24, 0x03, 0x03, 0x01, 0x02
#define DER_OID_SZ_ripemd160WithRSAEncryption 8
extern const unsigned char
ossl_der_oid_ripemd160WithRSAEncryption[DER_OID_SZ_ripemd160WithRSAEncryption];

/*
* mdc2WithRSASignature OBJECT IDENTIFIER ::= {
*     iso(1) identified-organization(3) oiw(14) secsig(3) algorithms(2) mdc2WithRSASignature(14)
* }
*/
#define DER_OID_V_mdc2WithRSASignature DER_P_OBJECT, 5, 0x2B, 0x0E, 0x03, 0x02, 0x0E
#define DER_OID_SZ_mdc2WithRSASignature 7
extern const unsigned char ossl_der_oid_mdc2WithRSASignature[DER_OID_SZ_mdc2WithRSASignature];

/* clang-format on */

/* PSS parameters */
int ossl_DER_w_RSASSA_PSS_params(WPACKET *pkt, int tag,
   const RSA_PSS_PARAMS_30 *pss);
/*
 Subject Public Key Info */
int ossl_DER_w_algorithmIdentifier_RSA(WPACKET *pkt, int tag, RSA *rsa);
int ossl_DER_w_algorithmIdentifier_RSA_PSS(WPACKET *pkt, int tag,
   int rsa_type,
   const RSA_PSS_PARAMS_30 *pss);
/* Signature */
int ossl_DER_w_algorithmIdentifier_MDWithRSAEncryption(WPACKET *pkt, int tag,
   int mdnid);
{
 'variables': {
   'openssl_defines_BSD-x86_64': [
     'NDEBUG',
     'L_ENDIAN',
     'OPENSSL_BUILDING_OPENSSL',
     'OPENSSL_PIC',
   ],
   'openssl_cflags_BSD-x86_64': [
     '-Wall -O3',
     '-pthread',
     '-Wall -O3',
   ],
   'openssl_ex_libs_BSD-x86_64': [
     '-pthread',
   ],
   'openssl_cli_srcs_BSD-x86_64': [
     'openssl/apps/lib/cmp_mock_srv.c',
     'openssl/apps/asn1parse.c',
```

```
'openssl/apps/ca.c',
'openssl/apps/ciphers.c',
'openssl/apps/cmp.c',
'openssl/apps/cms.c',
'openssl/apps/crl.c',
'openssl/apps/crl2pkcs7.c',
'openssl/apps/dgst.c',
'openssl/apps/dhparam.c',
'openssl/apps/dsa.c',
'openssl/apps/dsaparam.c',
'openssl/apps/ec.c',
'openssl/apps/ecparam.c',
'openssl/apps/enc.c',
'openssl/apps/engine.c',
'openssl/apps/errstr.c',
'openssl/apps/fipsinstall.c',
'openssl/apps/gendsa.c',
'openssl/apps/genpkey.c',
'openssl/apps/genrsa.c',
 'openssl/apps/info.c',
'openssl/apps/kdf.c',
'openssl/apps/list.c',
'openssl/apps/mac.c',
'openssl/apps/nseq.c',
'openssl/apps/ocsp.c',
'openssl/apps/openssl.c',
'openssl/apps/passwd.c',
'openssl/apps/pkcs12.c',
'openssl/apps/pkcs7.c',
'openssl/apps/pkcs8.c',
'openssl/apps/pkey.c',
'openssl/apps/pkeyparam.c',
'openssl/apps/pkeyutl.c',
'openssl/apps/prime.c',
'./config/archs/BSD-x86_64/no-asm/apps/progs.c',
'openssl/apps/rand.c',
'openssl/apps/rehash.c',
'openssl/apps/req.c',
'openssl/apps/rsa.c',
'openssl/apps/rsautl.c',
'openssl/apps/s_client.c',
'openssl/apps/s_server.c',
'openssl/apps/s_time.c',
'openssl/apps/sess_id.c',
'openssl/apps/skeyutl.c',
'openssl/apps/smime.c',
'openssl/apps/speed.c',
'openssl/apps/spkac.c',
```

```
    'openssl/apps/srp.c',
    'openssl/apps/storeutl.c',
    'openssl/apps/ts.c',
    'openssl/apps/verify.c',
     'openssl/apps/version.c',
    'openssl/apps/x509.c',
    'openssl/apps/lib/app_libctx.c',
    'openssl/apps/lib/app_params.c',
    'openssl/apps/lib/app_provider.c',
    'openssl/apps/lib/app_rand.c',
    'openssl/apps/lib/app_x509.c',
    'openssl/apps/lib/apps.c',
    'openssl/apps/lib/apps_opt_printf.c',
    'openssl/apps/lib/apps_ui.c',
    'openssl/apps/lib/columns.c',
    'openssl/apps/lib/engine.c',
    'openssl/apps/lib/engine_loader.c',
    'openssl/apps/lib/fmt.c',
    'openssl/apps/lib/http_server.c',
    'openssl/apps/lib/log.c',
    'openssl/apps/lib/names.c',
    'openssl/apps/lib/opt.c',
    'openssl/apps/lib/s_cb.c',
    'openssl/apps/lib/s_socket.c',
    'openssl/apps/lib/tlssrp_depr.c',
  ],
 },
 'defines': ['<@(openssl_defines_BSD-x86_64)'],
 'include_dirs': [
   './include',
 ],
 'cflags' : ['<@(openssl_cflags_BSD-x86_64)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86_64)'],
 'sources': ['<@(openssl_cli_srcs_BSD-x86_64)'],
}
```

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```
Gnomovision version 69, Copyright (C) 19xx name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

The hypothetical commands `show w' and `show c' should show the
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program.

You should also get your employer (if you work as a programmer) or your
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necessary. Here a sample; alter
the names:

```
Yoyodyne, Inc., hereby disclaims all copyright interest in the
program `Gnomovision' (a program to direct compilers to make passes
at assemblers) written by James Hacker.

<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

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 "AFL-1.2",
 "AFL-2.0",
 "AFL-2.1",
 "AFL-3.0",
 "AGPL-1.0-only",
 "AGPL-1.0-or-later",
 "AGPL-3.0-only",
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 "ALGLIB-Documentation",
 "AMD-newlib",
 "AMDPLPA",
 "AML",
 "AML-glslang",
 "AMPAS",
 "ANTLR-PD",
 "ANTLR-PD-fallback",
 "APAFML",
 "APL-1.0",
 "APSL-1.0",
 "APSL-1.1",
 "APSL-1.2",
 "APSL-2.0",
 "ASWF-Digital-Assets-1.0",
 "ASWF-Digital-Assets-1.1",
 "Abstyles",
 "AdaCore-doc",
 "Adobe-2006",
 "Adobe-Display-PostScript",
 "Adobe-Glyph",

"Adobe-Utopia",
"Advanced-Cryptics-Dictionary",
"Afmparse",
"Aladdin",
"Apache-1.0",
"Apache-1.1",
"Apache-2.0",
"App-s2p",
"Arphic-1999",
"Artistic-1.0",
"Artistic-1.0-Perl",
"Artistic-1.0-cl8",
"Artistic-2.0",
"Artistic-dist",
"Aspell-RU",
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"BSD-2-Clause",
"BSD-2-Clause-Darwin",
"BSD-2-Clause-Patent",
"BSD-2-Clause-Views",
"BSD-2-Clause-first-lines",
"BSD-2-Clause-pkgconf-disclaimer",
"BSD-3-Clause",
"BSD-3-Clause-Attribution",
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"BSD-3-Clause-No-Military-License",
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"Barr",
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"Bitstream-Charter",
"Bitstream-Vera",
"BlueOak-1.0.0",
"Boehm-GC",
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"Borceux",
"Brian-Gladman-2-Clause",
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"Buddy",
"C-UDA-1.0",
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"CAPEC-tou",
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"CC-SA-1.0",
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"CDLA-Permissive-2.0",
"CDLA-Sharing-1.0",
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"CPL-1.0",
"CPOL-1.02",
"CUA-OPL-1.0",
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"Caldera-no-preamble",
"Catharon",
"ClArtistic",
"Clips",
"Community-Spec-1.0",
"Condor-1.1",
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"CrystalStacker",
"Cube",
"D-FSL-1.0",
"DEC-3-Clause",
"DL-DE-BY-2.0",
"DL-DE-ZERO-2.0",
"DOC",
"DRL-1.0",
"DRL-1.1",
"DSDP",
"DocBook-DTD",
"DocBook-Schema",
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"Dotseqn",
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"ECL-2.0",
"EFL-1.0",
"EFL-2.0",
"EPICS",
"EPL-1.0",
"EPL-2.0",
"ESA-PL-permissive-2.4",
"ESA-PL-strong-copyleft-2.4",

"ESA-PL-weak-copyleft-2.4",
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"EUPL-1.0",
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"EUPL-1.2",
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"ErlPL-1.1",
"Eurosym",
"FBM",
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"FSFULLR",
"FSFULLRSD",
"FSFULLRWD",
"FSL-1.1-ALv2",
"FSL-1.1-MIT",
"FTL",
"Fair",
"Ferguson-Twofish",
"Frameworx-1.0",
"FreeBSD-DOC",
"FreeImage",
"Furuseth",
"GCR-docs",
"GD",
"GFDL-1.1-invariants-only",
"GFDL-1.1-invariants-or-later",
"GFDL-1.1-no-invariants-only",
"GFDL-1.1-no-invariants-or-later",
"GFDL-1.1-only",
"GFDL-1.1-or-later",
"GFDL-1.2-invariants-only",
"GFDL-1.2-invariants-or-later",
"GFDL-1.2-no-invariants-only",
"GFDL-1.2-no-invariants-or-later",
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"GFDL-1.2-or-later",
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"GFDL-1.3-invariants-or-later",
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"GFDL-1.3-no-invariants-or-later",
"GFDL-1.3-only",
"GFDL-1.3-or-later",
"GL2PS",
"GLWTPL",

"GPL-1.0-only",
"GPL-1.0-or-later",
"GPL-2.0-only",
"GPL-2.0-or-later",
"GPL-3.0-only",
"GPL-3.0-or-later",
"Game-Programming-Gems",
"Giftware",
"Glide",
"Glulxe",
"Graphics-Gems",
"Gutmann",
"HDF5",
"HIDAPI",
"HP-1986",
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```
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* this file except in compliance with the License.  You can obtain a copy
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* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_COMP_H
#define OPENSSL_COMP_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_COMP_H
#endif

#include <openssl/opensslconf.h>

#include <openssl/crypto.h>
#include <openssl/comperr.h>
#ifdef __cplusplus
extern "C" {
#endif

#ifndef OPENSSL_NO_COMP

COMP_CTX *COMP_CTX_new(COMP_METHOD *meth);
```

```
const COMP_METHOD *COMP_CTX_get_method(const COMP_CTX *ctx);
int COMP_CTX_get_type(const COMP_CTX *comp);
int COMP_get_type(const COMP_METHOD *meth);
const char *COMP_get_name(const COMP_METHOD *meth);
void COMP_CTX_free(COMP_CTX *ctx);

int COMP_compress_block(COMP_CTX
 *ctx, unsigned char *out, int olen,
   unsigned char *in, int ilen);
int COMP_expand_block(COMP_CTX *ctx, unsigned char *out, int olen,
   unsigned char *in, int ilen);

COMP_METHOD *COMP_zlib(void);
COMP_METHOD *COMP_zlib_oneshot(void);
COMP_METHOD *COMP_brotli(void);
COMP_METHOD *COMP_brotli_oneshot(void);
COMP_METHOD *COMP_zstd(void);
COMP_METHOD *COMP_zstd_oneshot(void);

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define COMP_zlib_cleanup() \
   while (0)            \
   continue
#endif

#ifdef OPENSSL_BIO_H
const BIO_METHOD *BIO_f_zlib(void);
const BIO_METHOD *BIO_f_brotli(void);
const BIO_METHOD *BIO_f_zstd(void);
#endif

#endif

typedef struct ssl_comp_st SSL_COMP;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(SSL_COMP, SSL_COMP, SSL_COMP)
#define sk_SSL_COMP_num(sk) OPENSSL_sk_num(ossl_check_const_SSL_COMP_sk_type(sk))
#define sk_SSL_COMP_value(sk, idx) ((SSL_COMP
*)OPENSSL_sk_value(ossl_check_const_SSL_COMP_sk_type(sk), (idx)))
#define sk_SSL_COMP_new(cmp) ((STACK_OF(SSL_COMP)
 *)OPENSSL_sk_new(ossl_check_SSL_COMP_compfunc_type(cmp)))
#define sk_SSL_COMP_new_null() ((STACK_OF(SSL_COMP) *)OPENSSL_sk_new_null())
#define sk_SSL_COMP_new_reserve(cmp, n) ((STACK_OF(SSL_COMP)
*)OPENSSL_sk_new_reserve(ossl_check_SSL_COMP_compfunc_type(cmp), (n)))
#define sk_SSL_COMP_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_SSL_COMP_sk_type(sk), (n))
#define sk_SSL_COMP_free(sk) OPENSSL_sk_free(ossl_check_SSL_COMP_sk_type(sk))
#define sk_SSL_COMP_zero(sk) OPENSSL_sk_zero(ossl_check_SSL_COMP_sk_type(sk))
```

```
#define sk_SSL_COMP_delete(sk, i) ((SSL_COMP *)OPENSSL_sk_delete(ossl_check_SSL_COMP_sk_type(sk),
(i)))
#define sk_SSL_COMP_delete_ptr(sk, ptr) ((SSL_COMP
*)OPENSSL_sk_delete_ptr(ossl_check_SSL_COMP_sk_type(sk), ossl_check_SSL_COMP_type(ptr)))
#define sk_SSL_COMP_push(sk, ptr) OPENSSL_sk_push(ossl_check_SSL_COMP_sk_type(sk),
ossl_check_SSL_COMP_type(ptr))
#define sk_SSL_COMP_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_SSL_COMP_sk_type(sk),
ossl_check_SSL_COMP_type(ptr))
#define
 sk_SSL_COMP_pop(sk) ((SSL_COMP *)OPENSSL_sk_pop(ossl_check_SSL_COMP_sk_type(sk)))
#define sk_SSL_COMP_shift(sk) ((SSL_COMP *)OPENSSL_sk_shift(ossl_check_SSL_COMP_sk_type(sk)))
#define sk_SSL_COMP_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_SSL_COMP_sk_type(sk),ossl_check_SSL_COMP_freefunc_type(freefunc))
#define sk_SSL_COMP_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_SSL_COMP_sk_type(sk),
ossl_check_SSL_COMP_type(ptr), (idx))
#define sk_SSL_COMP_set(sk, idx, ptr) ((SSL_COMP *)OPENSSL_sk_set(ossl_check_SSL_COMP_sk_type(sk),
(idx), ossl_check_SSL_COMP_type(ptr)))
#define sk_SSL_COMP_find(sk, ptr) OPENSSL_sk_find(ossl_check_SSL_COMP_sk_type(sk),
ossl_check_SSL_COMP_type(ptr))
#define sk_SSL_COMP_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_SSL_COMP_sk_type(sk),
ossl_check_SSL_COMP_type(ptr))
#define sk_SSL_COMP_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_SSL_COMP_sk_type(sk),
ossl_check_SSL_COMP_type(ptr), pnum)
#define sk_SSL_COMP_sort(sk) OPENSSL_sk_sort(ossl_check_SSL_COMP_sk_type(sk))
#define
 sk_SSL_COMP_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_SSL_COMP_sk_type(sk))
#define sk_SSL_COMP_dup(sk) ((STACK_OF(SSL_COMP)
*)OPENSSL_sk_dup(ossl_check_const_SSL_COMP_sk_type(sk)))
#define sk_SSL_COMP_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(SSL_COMP)
*)OPENSSL_sk_deep_copy(ossl_check_const_SSL_COMP_sk_type(sk),
ossl_check_SSL_COMP_copyfunc_type(copyfunc), ossl_check_SSL_COMP_freefunc_type(freefunc)))
#define sk_SSL_COMP_set_cmp_func(sk, cmp)
((sk_SSL_COMP_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_SSL_COMP_sk_type(sk),
ossl_check_SSL_COMP_compfunc_type(cmp)))

/* clang-format on */

#ifdef __cplusplus
}
#endif
#endif
```

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```
#ifndef SRC_PERMISSION_PERMISSION_BASE_H_
#define SRC_PERMISSION_PERMISSION_BASE_H_

#if defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS

#include <map>
#include <string>
#include <string_view>
#include "v8.h"

namespace node {

class Environment;

namespace permission {

#define FILESYSTEM_PERMISSIONS(V)                                    \
  V(FileSystem, "fs", PermissionsRoot, "")                           \
  V(FileSystemRead, "fs.read", FileSystem, "--allow-fs-read")        \
  V(FileSystemWrite, "fs.write", FileSystem, "--allow-fs-write")

#define CHILD_PROCESS_PERMISSIONS(V)                                 \
  V(ChildProcess, "child", PermissionsRoot, "--allow-child-process")

#define WASI_PERMISSIONS(V) V(WASI, "wasi", PermissionsRoot, "--allow-wasi")

#define WORKER_THREADS_PERMISSIONS(V)                                \
  V(WorkerThreads, "worker", PermissionsRoot, "--allow-worker")

#define INSPECTOR_PERMISSIONS(V) V(Inspector,
  "inspector", PermissionsRoot, "")

#define ADDON_PERMISSIONS(V)                                         \
  V(Addon, "addon", PermissionsRoot, "--allow-addons")
```

```
#define PERMISSIONS(V)                                          \
 FILESYSTEM_PERMISSIONS(V)                                      \
 CHILD_PROCESS_PERMISSIONS(V)                                   \
 WASI_PERMISSIONS(V)                                            \
 WORKER_THREADS_PERMISSIONS(V)                                  \
 INSPECTOR_PERMISSIONS(V)                                       \
 ADDON_PERMISSIONS(V)

#define V(name, _, __, ___) k##name,
enum class PermissionScope {
 kPermissionsRoot = -1,
 PERMISSIONS(V) kPermissionsCount
};
#undef V

class PermissionBase {
public:
 virtual void Apply(Environment* env,
                    const std::vector<std::string>& allow,
                    PermissionScope scope)
 = 0;
 virtual bool is_granted(Environment* env,
                         PermissionScope perm,
                         const std::string_view& param = "") const = 0;
};

}  // namespace permission

}  // namespace node

#endif  // defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
#endif  // SRC_PERMISSION_PERMISSION_BASE_H_
```

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```
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OR OTHER TORTIOUS ACTION, ARISING OUT OF OR IN CONNECTION WITH THE
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/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/asn1t.h.in
*
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*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_ASN1T_H
#define OPENSSL_ASN1T_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_ASN1T_H
#endif

#include <stddef.h>
#include <openssl/e_os2.h>
#include <openssl/asn1.h>

#ifdef OPENSSL_BUILD_SHLIBCRYPTO
#undef OPENSSL_EXTERN
#define OPENSSL_EXTERN OPENSSL_EXPORT
#endif

/* ASN1 template defines, structures and functions */

#ifdef __cplusplus
extern "C" {
#endif

/*-
* These are the possible values for the itype field of the
* ASN1_ITEM structure and determine how it
```

```
 is interpreted.
*
* For PRIMITIVE types the underlying type
* determines the behaviour if items is NULL.
*
* Otherwise templates must contain a single
* template and the type is treated in the
* same way as the type specified in the template.
*
* For SEQUENCE types the templates field points
* to the members, the size field is the
* structure size.
*
* For CHOICE types the templates field points
* to each possible member (typically a union)
* and the 'size' field is the offset of the
* selector.
*
* The 'funcs' field is used for application-specific
* data and functions.
*
* The EXTERN type uses a new style d2i/i2d.
* The new style should be used where possible
* because it avoids things like the d2i IMPLICIT
* hack.
*
* MSTRING is a multiple string type, it is used
* for a CHOICE of character strings where the
* actual strings all occupy an ASN1_STRING
* structure. In this case the 'utype' field
* has a special meaning, it is used as a mask
* of acceptable
 types using the B_ASN1 constants.
*
* NDEF_SEQUENCE is the same as SEQUENCE except
* that it will use indefinite length constructed
* encoding if requested.
*
*/

#define ASN1_ITYPE_PRIMITIVE 0x0
#define ASN1_ITYPE_SEQUENCE 0x1
#define ASN1_ITYPE_CHOICE 0x2
/* unused value                    0x3 */
#define ASN1_ITYPE_EXTERN 0x4
#define ASN1_ITYPE_MSTRING 0x5
#define ASN1_ITYPE_NDEF_SEQUENCE 0x6
```

```
/* Macro to obtain ASN1_ADB pointer from a type (only used internally) */
#define ASN1_ADB_ptr(iptr) ((const ASN1_ADB *)((iptr)()))

/* Macros for start and end of ASN1_ITEM definition */

#define ASN1_ITEM_start(itname)        \
   const ASN1_ITEM *itname##_it(void) \
   {                                  \
      static const ASN1_ITEM local_it = {

#define static_ASN1_ITEM_start(itname) \
   static ASN1_ITEM_start(itname)

#define ASN1_ITEM_end(itname) \
   }                          \
   ;                          \
   return &local_it;          \
   }

/* Macros to aid
 ASN1 template writing */

#define ASN1_ITEM_TEMPLATE(tname) \
   static const ASN1_TEMPLATE tname##_item_tt

#define ASN1_ITEM_TEMPLATE_END(tname) \
   ;                                  \
   ASN1_ITEM_start(tname)             \
      ASN1_ITYPE_PRIMITIVE,           \
      -1,                             \
      &tname##_item_tt,               \
      0,                              \
      NULL,                           \
      0,                              \
      #tname ASN1_ITEM_end(tname)
#define static_ASN1_ITEM_TEMPLATE_END(tname) \
   ;                                         \
   static_ASN1_ITEM_start(tname)             \
      ASN1_ITYPE_PRIMITIVE,                  \
      -1,                                    \
      &tname##_item_tt,                      \
      0,                                     \
      NULL,                                  \
      0,                                     \
      #tname ASN1_ITEM_end(tname)

/* This is a ASN1 type which just
```

```
 embeds a template */

/*-
* This pair helps declare a SEQUENCE. We can do:
*
*      ASN1_SEQUENCE(stname) = {
*              ... SEQUENCE components ...
*      } ASN1_SEQUENCE_END(stname)
*
*      This will produce an ASN1_ITEM called stname_it
*      for a structure called stname.
*
*      If you want the same structure but a different
*      name then use:
*
*      ASN1_SEQUENCE(itname) = {
*              ... SEQUENCE components ...
*      } ASN1_SEQUENCE_END_name(stname, itname)
*
*      This will create an item called itname_it using
*      a structure called stname.
*/

#define ASN1_SEQUENCE(tname) \
   static const ASN1_TEMPLATE tname##_seq_tt[]

#define ASN1_SEQUENCE_END(stname) ASN1_SEQUENCE_END_name(stname, stname)

#define static_ASN1_SEQUENCE_END(stname) static_ASN1_SEQUENCE_END_name(stname, stname)

#define ASN1_SEQUENCE_END_name(stname, tname)          \
   ;                                                   \
   ASN1_ITEM_start(tname)
                \
      ASN1_ITYPE_SEQUENCE,                             \
      V_ASN1_SEQUENCE,                                 \
      tname##_seq_tt,                                  \
      sizeof(tname##_seq_tt) / sizeof(ASN1_TEMPLATE), \
      NULL,                                            \
      sizeof(stname),                                  \
      #tname ASN1_ITEM_end(tname)

#define static_ASN1_SEQUENCE_END_name(stname, tname)    \
   ;                                                   \
   static_ASN1_ITEM_start(tname)                       \
      ASN1_ITYPE_SEQUENCE,                             \
      V_ASN1_SEQUENCE,                                 \
      tname##_seq_tt,                                  \
```

```
        sizeof(tname##_seq_tt) / sizeof(ASN1_TEMPLATE), \
        NULL,                                           \
        sizeof(stname),                                 \
        #stname ASN1_ITEM_end(tname)

#define ASN1_NDEF_SEQUENCE(tname) \
    ASN1_SEQUENCE(tname)

#define ASN1_NDEF_SEQUENCE_cb(tname, cb) \
   ASN1_SEQUENCE_cb(tname, cb)

#define ASN1_SEQUENCE_cb(tname, cb)                                 \
   static const ASN1_AUX tname##_aux = { NULL, 0, 0, 0, cb, 0, NULL }; \
   ASN1_SEQUENCE(tname)

#define ASN1_SEQUENCE_const_cb(tname, const_cb)                                     \
   static const ASN1_AUX tname##_aux = { NULL, ASN1_AFLG_CONST_CB, 0, 0, NULL, 0, const_cb }; \
   ASN1_SEQUENCE(tname)

#define ASN1_SEQUENCE_cb_const_cb(tname, cb, const_cb)                              \
   static const ASN1_AUX tname##_aux = { NULL, ASN1_AFLG_CONST_CB, 0, 0, cb, 0, const_cb }; \
   ASN1_SEQUENCE(tname)

#define ASN1_SEQUENCE_ref(tname, cb)                                                                          \
   static const ASN1_AUX tname##_aux = { NULL, ASN1_AFLG_REFCOUNT, offsetof(tname, references),
offsetof(tname, lock), cb, 0, NULL }; \
   ASN1_SEQUENCE(tname)

#define
 ASN1_SEQUENCE_enc(tname, enc, cb)                                                    \
   static const ASN1_AUX tname##_aux = { NULL, ASN1_AFLG_ENCODING, 0, 0, cb, offsetof(tname, enc),
NULL }; \
   ASN1_SEQUENCE(tname)

#define ASN1_NDEF_SEQUENCE_END(tname)                   \
   ;                                                    \
   ASN1_ITEM_start(tname)                               \
        ASN1_ITYPE_NDEF_SEQUENCE,                       \
        V_ASN1_SEQUENCE,                                \
        tname##_seq_tt,                                 \
        sizeof(tname##_seq_tt) / sizeof(ASN1_TEMPLATE), \
        NULL,                                           \
        sizeof(tname),                                  \
        #tname ASN1_ITEM_end(tname)
#define static_ASN1_NDEF_SEQUENCE_END(tname)            \
   ;                                                    \
   static_ASN1_ITEM_start(tname)                        \
        ASN1_ITYPE_NDEF_SEQUENCE,
```

```
                \
    V_ASN1_SEQUENCE,                        \
    tname##_seq_tt,                         \
    sizeof(tname##_seq_tt) / sizeof(ASN1_TEMPLATE), \
    NULL,                                   \
    sizeof(tname),                          \
    #tname ASN1_ITEM_end(tname)

#define ASN1_SEQUENCE_END_enc(stname, tname) ASN1_SEQUENCE_END_ref(stname, tname)

#define ASN1_SEQUENCE_END_cb(stname, tname) ASN1_SEQUENCE_END_ref(stname, tname)
#define static_ASN1_SEQUENCE_END_cb(stname, tname) static_ASN1_SEQUENCE_END_ref(stname, tname)

#define ASN1_SEQUENCE_END_ref(stname, tname)          \
  ;                                       \
  ASN1_ITEM_start(tname)                          \
    ASN1_ITYPE_SEQUENCE,                          \
    V_ASN1_SEQUENCE,                        \
    tname##_seq_tt,                         \
    sizeof(tname##_seq_tt)
 / sizeof(ASN1_TEMPLATE), \
    &tname##_aux,                           \
    sizeof(stname),                         \
    #tname ASN1_ITEM_end(tname)
#define static_ASN1_SEQUENCE_END_ref(stname, tname)     \
  ;                                       \
  static_ASN1_ITEM_start(tname)                   \
    ASN1_ITYPE_SEQUENCE,                          \
    V_ASN1_SEQUENCE,                        \
    tname##_seq_tt,                         \
    sizeof(tname##_seq_tt) / sizeof(ASN1_TEMPLATE), \
    &tname##_aux,                           \
    sizeof(stname),                         \
    #stname ASN1_ITEM_end(tname)

#define ASN1_NDEF_SEQUENCE_END_cb(stname, tname)       \
  ;                                       \
  ASN1_ITEM_start(tname)                          \
    ASN1_ITYPE_NDEF_SEQUENCE,                     \
    V_ASN1_SEQUENCE,
                    \
    tname##_seq_tt,                         \
    sizeof(tname##_seq_tt) / sizeof(ASN1_TEMPLATE), \
    &tname##_aux,                           \
    sizeof(stname),                         \
    #stname ASN1_ITEM_end(tname)

/*-
```

```
* This pair helps declare a CHOICE type. We can do:
*
*     ASN1_CHOICE(chname) = {
*             ... CHOICE options ...
*     ASN1_CHOICE_END(chname)
*
*     This will produce an ASN1_ITEM called chname_it
*     for a structure called chname. The structure
*     definition must look like this:
*     typedef struct {
*             int type;
*             union {
*                     ASN1_SOMETHING *opt1;
*                     ASN1_SOMEOTHER *opt2;
*             } value;
*     } chname;
*
*     the name of the selector must be 'type'.
*     to use an alternative selector name use the
*     ASN1_CHOICE_END_selector() version.
*/

#define ASN1_CHOICE(tname)
 \
   static const ASN1_TEMPLATE tname##_ch_tt[]

#define ASN1_CHOICE_cb(tname, cb)                                   \
   static const ASN1_AUX tname##_aux = { NULL, 0, 0, 0, cb, 0, NULL }; \
   ASN1_CHOICE(tname)

#define ASN1_CHOICE_END(stname) ASN1_CHOICE_END_name(stname, stname)

#define static_ASN1_CHOICE_END(stname) static_ASN1_CHOICE_END_name(stname, stname)

#define ASN1_CHOICE_END_name(stname, tname) ASN1_CHOICE_END_selector(stname, tname, type)

#define static_ASN1_CHOICE_END_name(stname, tname) static_ASN1_CHOICE_END_selector(stname, tname,
type)

#define ASN1_CHOICE_END_selector(stname, tname, selname) \
   ;                                          \
   ASN1_ITEM_start(tname)                             \
      ASN1_ITYPE_CHOICE,                              \
      offsetof(stname, selname),                      \
      tname##_ch_tt,                                  \
      sizeof(tname##_ch_tt) / sizeof(ASN1_TEMPLATE),
 \
      NULL,                                           \
```

```
    sizeof(stname),                                 \
    #stname ASN1_ITEM_end(tname)

#define static_ASN1_CHOICE_END_selector(stname, tname, selname) \
  ;                                                 \
  static_ASN1_ITEM_start(tname)                             \
    ASN1_ITYPE_CHOICE,                                      \
    offsetof(stname, selname),                              \
    tname##_ch_tt,                                          \
    sizeof(tname##_ch_tt) / sizeof(ASN1_TEMPLATE),          \
    NULL,                                                   \
    sizeof(stname),                                         \
    #stname ASN1_ITEM_end(tname)

#define ASN1_CHOICE_END_cb(stname, tname, selname)     \
  ;                                                 \
  ASN1_ITEM_start(tname)                                    \
    ASN1_ITYPE_CHOICE,
            \
    offsetof(stname, selname),                              \
    tname##_ch_tt,                                          \
    sizeof(tname##_ch_tt) / sizeof(ASN1_TEMPLATE), \
    &tname##_aux,                                           \
    sizeof(stname),                                         \
    #stname ASN1_ITEM_end(tname)

/* This helps with the template wrapper form of ASN1_ITEM */

#define ASN1_EX_TEMPLATE_TYPE(flags, tag, name, type) { \
  (flags), (tag), 0,                                \
  #name, ASN1_ITEM_ref(type)                                \
}

/* These help with SEQUENCE or CHOICE components */

/* used to declare other types */

#define ASN1_EX_TYPE(flags, tag, stname, field, type) { \
  (flags), (tag), offsetof(stname, field),                  \
  #field, ASN1_ITEM_ref(type)                               \
}

/* implicit and explicit helper macros */

#define ASN1_IMP_EX(stname, field, type, tag, ex) \
  ASN1_EX_TYPE(ASN1_TFLG_IMPLICIT | (ex), tag, stname, field,
 type)
```

```
#define ASN1_EXP_EX(stname, field, type, tag, ex) \
   ASN1_EX_TYPE(ASN1_TFLG_EXPLICIT | (ex), tag, stname, field, type)

/* Any defined by macros: the field used is in the table itself */

#define ASN1_ADB_OBJECT(tblname) { ASN1_TFLG_ADB_OID, -1, 0, #tblname, tblname##_adb }
#define ASN1_ADB_INTEGER(tblname) { ASN1_TFLG_ADB_INT, -1, 0, #tblname, tblname##_adb }

/* Plain simple type */
#define ASN1_SIMPLE(stname, field, type) ASN1_EX_TYPE(0, 0, stname, field, type)
/* Embedded simple type */
#define ASN1_EMBED(stname, field, type) ASN1_EX_TYPE(ASN1_TFLG_EMBED, 0, stname, field, type)

/* OPTIONAL simple type */
#define ASN1_OPT(stname, field, type) ASN1_EX_TYPE(ASN1_TFLG_OPTIONAL, 0, stname, field, type)
#define ASN1_OPT_EMBED(stname, field, type) ASN1_EX_TYPE(ASN1_TFLG_OPTIONAL |
ASN1_TFLG_EMBED, 0, stname, field, type)

/* IMPLICIT tagged simple type */
#define ASN1_IMP(stname, field, type, tag) ASN1_IMP_EX(stname, field, type, tag, 0)
#define ASN1_IMP_EMBED(stname, field,
 type, tag) ASN1_IMP_EX(stname, field, type, tag, ASN1_TFLG_EMBED)

/* IMPLICIT tagged OPTIONAL simple type */
#define ASN1_IMP_OPT(stname, field, type, tag) ASN1_IMP_EX(stname, field, type, tag,
ASN1_TFLG_OPTIONAL)
#define ASN1_IMP_OPT_EMBED(stname, field, type, tag) ASN1_IMP_EX(stname, field, type, tag,
ASN1_TFLG_OPTIONAL | ASN1_TFLG_EMBED)

/* Same as above but EXPLICIT */

#define ASN1_EXP(stname, field, type, tag) ASN1_EXP_EX(stname, field, type, tag, 0)
#define ASN1_EXP_EMBED(stname, field, type, tag) ASN1_EXP_EX(stname, field, type, tag,
ASN1_TFLG_EMBED)
#define ASN1_EXP_OPT(stname, field, type, tag) ASN1_EXP_EX(stname, field, type, tag,
ASN1_TFLG_OPTIONAL)
#define ASN1_EXP_OPT_EMBED(stname, field, type, tag) ASN1_EXP_EX(stname, field, type, tag,
ASN1_TFLG_OPTIONAL | ASN1_TFLG_EMBED)

/* SEQUENCE OF type */
#define ASN1_SEQUENCE_OF(stname, field, type) \
   ASN1_EX_TYPE(ASN1_TFLG_SEQUENCE_OF, 0, stname, field, type)

/* OPTIONAL SEQUENCE OF */
#define ASN1_SEQUENCE_OF_OPT(stname,
 field, type) \
   ASN1_EX_TYPE(ASN1_TFLG_SEQUENCE_OF | ASN1_TFLG_OPTIONAL, 0, stname, field, type)
```

```
/* Same as above but for SET OF */

#define ASN1_SET_OF(stname, field, type) \
   ASN1_EX_TYPE(ASN1_TFLG_SET_OF, 0, stname, field, type)

#define ASN1_SET_OF_OPT(stname, field, type) \
   ASN1_EX_TYPE(ASN1_TFLG_SET_OF | ASN1_TFLG_OPTIONAL, 0, stname, field, type)

/* Finally compound types of SEQUENCE, SET, IMPLICIT, EXPLICIT and OPTIONAL */

#define ASN1_IMP_SET_OF(stname, field, type, tag) \
   ASN1_IMP_EX(stname, field, type, tag, ASN1_TFLG_SET_OF)

#define ASN1_EXP_SET_OF(stname, field, type, tag) \
   ASN1_EXP_EX(stname, field, type, tag, ASN1_TFLG_SET_OF)

#define ASN1_IMP_SET_OF_OPT(stname, field, type, tag) \
   ASN1_IMP_EX(stname, field, type, tag, ASN1_TFLG_SET_OF | ASN1_TFLG_OPTIONAL)

#define ASN1_EXP_SET_OF_OPT(stname, field, type, tag) \
   ASN1_EXP_EX(stname, field, type, tag, ASN1_TFLG_SET_OF | ASN1_TFLG_OPTIONAL)

#define ASN1_IMP_SEQUENCE_OF(stname, field, type,
 tag) \
   ASN1_IMP_EX(stname, field, type, tag, ASN1_TFLG_SEQUENCE_OF)

#define ASN1_IMP_SEQUENCE_OF_OPT(stname, field, type, tag) \
   ASN1_IMP_EX(stname, field, type, tag, ASN1_TFLG_SEQUENCE_OF | ASN1_TFLG_OPTIONAL)

#define ASN1_EXP_SEQUENCE_OF(stname, field, type, tag) \
   ASN1_EXP_EX(stname, field, type, tag, ASN1_TFLG_SEQUENCE_OF)

#define ASN1_EXP_SEQUENCE_OF_OPT(stname, field, type, tag) \
   ASN1_EXP_EX(stname, field, type, tag, ASN1_TFLG_SEQUENCE_OF | ASN1_TFLG_OPTIONAL)

/* EXPLICIT using indefinite length constructed form */
#define ASN1_NDEF_EXP(stname, field, type, tag) \
   ASN1_EXP_EX(stname, field, type, tag, ASN1_TFLG_NDEF)

/* EXPLICIT OPTIONAL using indefinite length constructed form */
#define ASN1_NDEF_EXP_OPT(stname, field, type, tag) \
   ASN1_EXP_EX(stname, field, type, tag, ASN1_TFLG_OPTIONAL | ASN1_TFLG_NDEF)

/* Macros for the ASN1_ADB structure */

#define ASN1_ADB(name) \
   static const ASN1_ADB_TABLE name##_adbtbl[]
```

```
#define ASN1_ADB_END(name,
 flags, field, adb_cb, def, none) \
  ;                                          \
  static const ASN1_ITEM *name##_adb(void)              \
  {                                          \
     static const ASN1_ADB internal_adb = {             \
        flags,                                  \
        offsetof(name, field),                        \
        adb_cb,                                   \
        name##_adbtbl,                                \
        sizeof(name##_adbtbl) / sizeof(ASN1_ADB_TABLE), \
        def,                                    \
        none                                      \
     };                                          \
     return (const ASN1_ITEM *)&internal_adb;           \
  }                                          \
  void dummy_function(void)

#define ADB_ENTRY(val, template) { val, template }

#define ASN1_ADB_TEMPLATE(name)
 \
  static const ASN1_TEMPLATE name##_tt

/*
* This is the ASN1 template structure that defines a wrapper round the
* actual type. It determines the actual position of the field in the value
* structure, various flags such as OPTIONAL and the field name.
*/

struct ASN1_TEMPLATE_st {
  unsigned long flags; /* Various flags */
  long tag; /* tag, not used if no tagging */
  unsigned long offset; /* Offset of this field in structure */
  const char *field_name; /* Field name */
  ASN1_ITEM_EXP *item; /* Relevant ASN1_ITEM or ASN1_ADB */
};

/* Macro to extract ASN1_ITEM and ASN1_ADB pointer from ASN1_TEMPLATE */

#define ASN1_TEMPLATE_item(t) (t->item_ptr)
#define ASN1_TEMPLATE_adb(t) (t->item_ptr)

typedef struct ASN1_ADB_TABLE_st ASN1_ADB_TABLE;
typedef struct ASN1_ADB_st ASN1_ADB;

struct ASN1_ADB_st {
  unsigned long flags; /* Various flags */
```

```
  unsigned long offset; /* Offset of selector field */
  int (*adb_cb)(long *psel); /* Application
 callback */
  const ASN1_ADB_TABLE *tbl; /* Table of possible types */
  long tblcount; /* Number of entries in tbl */
  const ASN1_TEMPLATE *default_tt; /* Type to use if no match */
  const ASN1_TEMPLATE *null_tt; /* Type to use if selector is NULL */
};

struct ASN1_ADB_TABLE_st {
  long value; /* NID for an object or value for an int */
  const ASN1_TEMPLATE tt; /* item for this value */
};

/* template flags */

/* Field is optional */
#define ASN1_TFLG_OPTIONAL (0x1)

/* Field is a SET OF */
#define ASN1_TFLG_SET_OF (0x1 << 1)

/* Field is a SEQUENCE OF */
#define ASN1_TFLG_SEQUENCE_OF (0x2 << 1)

/*
* Special case: this refers to a SET OF that will be sorted into DER order
* when encoded *and* the corresponding STACK will be modified to match the
* new order.
*/
#define ASN1_TFLG_SET_ORDER (0x3 << 1)

/* Mask for SET OF or SEQUENCE OF */
#define ASN1_TFLG_SK_MASK (0x3 << 1)

/*
* These flags mean the tag should be taken from the tag field. If EXPLICIT
* then the
 underlying type is used for the inner tag.
*/

/* IMPLICIT tagging */
#define ASN1_TFLG_IMPTAG (0x1 << 3)

/* EXPLICIT tagging, inner tag from underlying type */
#define ASN1_TFLG_EXPTAG (0x2 << 3)

#define ASN1_TFLG_TAG_MASK (0x3 << 3)
```

```
/* context specific IMPLICIT */
#define ASN1_TFLG_IMPLICIT (ASN1_TFLG_IMPTAG | ASN1_TFLG_CONTEXT)

/* context specific EXPLICIT */
#define ASN1_TFLG_EXPLICIT (ASN1_TFLG_EXPTAG | ASN1_TFLG_CONTEXT)

/*
* If tagging is in force these determine the type of tag to use. Otherwise
* the tag is determined by the underlying type. These values reflect the
* actual octet format.
*/

/* Universal tag */
#define ASN1_TFLG_UNIVERSAL (0x0 << 6)
/* Application tag */
#define ASN1_TFLG_APPLICATION (0x1 << 6)
/* Context specific tag */
#define ASN1_TFLG_CONTEXT (0x2 << 6)
/* Private tag */
#define ASN1_TFLG_PRIVATE (0x3 << 6)

#define ASN1_TFLG_TAG_CLASS (0x3 << 6)

/*
* These are for ANY DEFINED BY type. In this case the 'item' field points to
* an ASN1_ADB structure
 which contains a table of values to decode the
* relevant type
*/

#define ASN1_TFLG_ADB_MASK (0x3 << 8)

#define ASN1_TFLG_ADB_OID (0x1 << 8)

#define ASN1_TFLG_ADB_INT (0x1 << 9)

/*
* This flag when present in a SEQUENCE OF, SET OF or EXPLICIT causes
* indefinite length constructed encoding to be used if required.
*/

#define ASN1_TFLG_NDEF (0x1 << 11)

/* Field is embedded and not a pointer */
#define ASN1_TFLG_EMBED (0x1 << 12)

/* This is the actual ASN1 item itself */
```

```
struct ASN1_ITEM_st {
   char itype; /* The item type, primitive, SEQUENCE, CHOICE
                * or extern */
   long utype; /* underlying type */
   const ASN1_TEMPLATE *templates; /* If SEQUENCE or CHOICE this contains
                                    * the contents */
   long tcount; /* Number of templates if SEQUENCE or CHOICE */
   const void *funcs; /* further data and type-specific functions */
   /* funcs can be ASN1_PRIMITIVE_FUNCS*, ASN1_EXTERN_FUNCS*, or ASN1_AUX* */
   long
 size; /* Structure size (usually) */
   const char *sname; /* Structure name */
};

/*
* Cache for ASN1 tag and length, so we don't keep re-reading it for things
* like CHOICE
*/

struct ASN1_TLC_st {
   char valid; /* Values below are valid */
   int ret; /* return value */
   long plen; /* length */
   int ptag; /* class value */
   int pclass; /* class value */
   int hdrlen; /* header length */
};

/* Typedefs for ASN1 function pointers */
typedef int ASN1_ex_d2i(ASN1_VALUE **pval, const unsigned char **in, long len,
   const ASN1_ITEM *it, int tag, int aclass, char opt,
   ASN1_TLC *ctx);

typedef int ASN1_ex_d2i_ex(ASN1_VALUE **pval, const unsigned char **in, long len,
   const ASN1_ITEM *it, int tag, int aclass, char opt,
   ASN1_TLC *ctx, OSSL_LIB_CTX *libctx,
   const char *propq);
typedef int ASN1_ex_i2d(const ASN1_VALUE **pval, unsigned char **out,
   const ASN1_ITEM *it, int tag, int aclass);
typedef int ASN1_ex_new_func(ASN1_VALUE **pval, const ASN1_ITEM
 *it);
typedef int ASN1_ex_new_ex_func(ASN1_VALUE **pval, const ASN1_ITEM *it,
   OSSL_LIB_CTX *libctx, const char *propq);
typedef void ASN1_ex_free_func(ASN1_VALUE **pval, const ASN1_ITEM *it);

typedef int ASN1_ex_print_func(BIO *out, const ASN1_VALUE **pval,
   int indent, const char *fname,
```

```
   const ASN1_PCTX *pctx);

typedef int ASN1_primitive_i2c(const ASN1_VALUE **pval, unsigned char *cont,
   int *putype, const ASN1_ITEM *it);
typedef int ASN1_primitive_c2i(ASN1_VALUE **pval, const unsigned char *cont,
   int len, int utype, char *free_cont,
   const ASN1_ITEM *it);
typedef int ASN1_primitive_print(BIO *out, const ASN1_VALUE **pval,
   const ASN1_ITEM *it, int indent,
   const ASN1_PCTX *pctx);

typedef struct ASN1_EXTERN_FUNCS_st {
   void *app_data;
   ASN1_ex_new_func *asn1_ex_new;
   ASN1_ex_free_func *asn1_ex_free;
   ASN1_ex_free_func *asn1_ex_clear;
   ASN1_ex_d2i *asn1_ex_d2i;
   ASN1_ex_i2d *asn1_ex_i2d;
   ASN1_ex_print_func *asn1_ex_print;
   ASN1_ex_new_ex_func
 *asn1_ex_new_ex;
   ASN1_ex_d2i_ex *asn1_ex_d2i_ex;
} ASN1_EXTERN_FUNCS;

typedef struct ASN1_PRIMITIVE_FUNCS_st {
   void *app_data;
   unsigned long flags;
   ASN1_ex_new_func *prim_new;
   ASN1_ex_free_func *prim_free;
   ASN1_ex_free_func *prim_clear;
   ASN1_primitive_c2i *prim_c2i;
   ASN1_primitive_i2c *prim_i2c;
   ASN1_primitive_print *prim_print;
} ASN1_PRIMITIVE_FUNCS;

/*
* This is the ASN1_AUX structure: it handles various miscellaneous
* requirements. For example the use of reference counts and an informational
* callback. The "informational callback" is called at various points during
* the ASN1 encoding and decoding. It can be used to provide minor
* customisation of the structures used. This is most useful where the
* supplied routines *almost* do the right thing but need some extra help at
* a few points. If the callback returns zero then it is assumed a fatal
* error has occurred and the main operation should be abandoned. If major
* changes
 in the default behaviour are required then an external type is
* more appropriate.
* For the operations ASN1_OP_I2D_PRE, ASN1_OP_I2D_POST, ASN1_OP_PRINT_PRE, and
```

```
* ASN1_OP_PRINT_POST, meanwhile a variant of the callback with const parameter
* 'in' is provided to make clear statically that its input is not modified. If
* and only if this variant is in use the flag ASN1_AFLG_CONST_CB must be set.
*/

typedef int ASN1_aux_cb(int operation, ASN1_VALUE **in, const ASN1_ITEM *it,
   void *exarg);
typedef int ASN1_aux_const_cb(int operation, const ASN1_VALUE **in,
   const ASN1_ITEM *it, void *exarg);

typedef struct ASN1_AUX_st {
   void *app_data;
   int flags;
   int ref_offset; /* Offset of reference value */
   int ref_lock; /* Offset of lock value */
   ASN1_aux_cb *asn1_cb;
   int enc_offset; /* Offset of ASN1_ENCODING structure */
   ASN1_aux_const_cb *asn1_const_cb; /* for ASN1_OP_I2D_ and ASN1_OP_PRINT_ */
} ASN1_AUX;

/* For print related callbacks exarg points
 to this structure */
typedef struct ASN1_PRINT_ARG_st {
   BIO *out;
   int indent;
   const ASN1_PCTX *pctx;
} ASN1_PRINT_ARG;

/* For streaming related callbacks exarg points to this structure */
typedef struct ASN1_STREAM_ARG_st {
   /* BIO to stream through */
   BIO *out;
   /* BIO with filters appended */
   BIO *ndef_bio;
   /* Streaming I/O boundary */
   unsigned char **boundary;
} ASN1_STREAM_ARG;

/* Flags in ASN1_AUX */

/* Use a reference count */
#define ASN1_AFLG_REFCOUNT 1
/* Save the encoding of structure (useful for signatures) */
#define ASN1_AFLG_ENCODING 2
/* The Sequence length is invalid */
#define ASN1_AFLG_BROKEN 4
/* Use the new asn1_const_cb */
#define ASN1_AFLG_CONST_CB 8
```

```
/* operation values for asn1_cb */

#define ASN1_OP_NEW_PRE 0
#define ASN1_OP_NEW_POST 1
#define ASN1_OP_FREE_PRE 2
#define ASN1_OP_FREE_POST 3
#define ASN1_OP_D2I_PRE 4
#define ASN1_OP_D2I_POST 5
#define ASN1_OP_I2D_PRE 6
#define ASN1_OP_I2D_POST 7
#define ASN1_OP_PRINT_PRE 8
#define
 ASN1_OP_PRINT_POST 9
#define ASN1_OP_STREAM_PRE 10
#define ASN1_OP_STREAM_POST 11
#define ASN1_OP_DETACHED_PRE 12
#define ASN1_OP_DETACHED_POST 13
#define ASN1_OP_DUP_PRE 14
#define ASN1_OP_DUP_POST 15
#define ASN1_OP_GET0_LIBCTX 16
#define ASN1_OP_GET0_PROPQ 17

/* Macro to implement a primitive type */
#define IMPLEMENT_ASN1_TYPE(stname) IMPLEMENT_ASN1_TYPE_ex(stname, stname, 0)
#define IMPLEMENT_ASN1_TYPE_ex(itname, vname, ex) \
   ASN1_ITEM_start(itname)                    \
      ASN1_ITYPE_PRIMITIVE,                   \
      V_##vname, NULL, 0, NULL, ex, #itname ASN1_ITEM_end(itname)

/* Macro to implement a multi string type */
#define IMPLEMENT_ASN1_MSTRING(itname, mask) \
   ASN1_ITEM_start(itname)                \
      ASN1_ITYPE_MSTRING,                 \
      mask, NULL, 0, NULL, sizeof(ASN1_STRING), #itname ASN1_ITEM_end(itname)

#define IMPLEMENT_EXTERN_ASN1(sname, tag, fptrs) \
   ASN1_ITEM_start(sname)                    \
      ASN1_ITYPE_EXTERN,
                  \
      tag,                              \
      NULL,                                 \
      0,                                \
      &fptrs,                              \
      0,                                \
      #sname ASN1_ITEM_end(sname)

/* Macro to implement standard functions in terms of ASN1_ITEM structures */
```

```
#define IMPLEMENT_ASN1_FUNCTIONS(stname) IMPLEMENT_ASN1_FUNCTIONS_fname(stname, stname,
stname)

#define IMPLEMENT_ASN1_FUNCTIONS_name(stname, itname)
IMPLEMENT_ASN1_FUNCTIONS_fname(stname, itname, itname)

#define IMPLEMENT_ASN1_FUNCTIONS_ENCODE_name(stname, itname) \
   IMPLEMENT_ASN1_FUNCTIONS_ENCODE_fname(stname, itname, itname)

#define IMPLEMENT_STATIC_ASN1_ALLOC_FUNCTIONS(stname) \
   IMPLEMENT_ASN1_ALLOC_FUNCTIONS_pfname(static, stname, stname, stname)

#define IMPLEMENT_ASN1_ALLOC_FUNCTIONS(stname) \
   IMPLEMENT_ASN1_ALLOC_FUNCTIONS_fname(stname, stname, stname)

#define IMPLEMENT_ASN1_ALLOC_FUNCTIONS_pfname(pre,
 stname, itname, fname) \
   pre stname *fname##_new(void)                                  \
   {                                                              \
      return (stname *)ASN1_item_new(ASN1_ITEM_rptr(itname));          \
   }                                                              \
   pre void fname##_free(stname *a)                               \
   {                                                              \
      ASN1_item_free((ASN1_VALUE *)a, ASN1_ITEM_rptr(itname));         \
   }

#define IMPLEMENT_ASN1_ALLOC_FUNCTIONS_fname(stname, itname, fname) \
   stname *fname##_new(void)                                      \
   {                                                              \
      return (stname *)ASN1_item_new(ASN1_ITEM_rptr(itname));     \
   }                                                              \
   void fname##_free(stname *a)
                  \
   {                                                              \
      ASN1_item_free((ASN1_VALUE *)a, ASN1_ITEM_rptr(itname));    \
   }

#define IMPLEMENT_ASN1_FUNCTIONS_fname(stname, itname, fname)    \
   IMPLEMENT_ASN1_ENCODE_FUNCTIONS_fname(stname, itname, fname) \
   IMPLEMENT_ASN1_ALLOC_FUNCTIONS_fname(stname, itname, fname)

#define IMPLEMENT_ASN1_ENCODE_FUNCTIONS_fname(stname, itname, fname)                    \
   stname *d2i_##fname(stname **a, const unsigned char **in, long len)                  \
   {                                                                                    \
      return (stname *)ASN1_item_d2i((ASN1_VALUE **)a, in, len, ASN1_ITEM_rptr(itname)); \
   }                                                                                    \
   int i2d_##fname(const stname *a, unsigned char **out)                                \
```

```
  {
                \
     return ASN1_item_i2d((const ASN1_VALUE *)a, out, ASN1_ITEM_rptr(itname));          \
  }

#define IMPLEMENT_ASN1_NDEF_FUNCTION(stname)                                    \
  int i2d_##stname##_NDEF(const stname *a, unsigned char **out)                   \
  {                                                                   \
     return ASN1_item_ndef_i2d((const ASN1_VALUE *)a, out, ASN1_ITEM_rptr(stname)); \
  }

#define IMPLEMENT_STATIC_ASN1_ENCODE_FUNCTIONS(stname)           \
  static stname *d2i_##stname(stname **a,                    \
     const unsigned char **in, long len)                     \
  {                                                 \
     return (stname *)ASN1_item_d2i((ASN1_VALUE **)a, in, len, \
        ASN1_ITEM_rptr(stname));                             \
  }                                                 \
  static int i2d_##stname(const stname *a,
 unsigned char **out) \
  {                                                 \
     return ASN1_item_i2d((const ASN1_VALUE *)a, out,          \
        ASN1_ITEM_rptr(stname));                             \
  }

#define IMPLEMENT_ASN1_DUP_FUNCTION(stname)              \
  stname *stname##_dup(const stname *x)               \
  {                                         \
     return ASN1_item_dup(ASN1_ITEM_rptr(stname), x); \
  }

#define IMPLEMENT_ASN1_PRINT_FUNCTION(stname) \
  IMPLEMENT_ASN1_PRINT_FUNCTION_fname(stname, stname, stname)

#define IMPLEMENT_ASN1_PRINT_FUNCTION_fname(stname, itname, fname) \
  int fname##_print_ctx(BIO *out, const stname *x, int indent,   \
     const ASN1_PCTX *pctx)                              \
  {                                                 \
     return ASN1_item_print(out, (const ASN1_VALUE *)x, indent, \
        ASN1_ITEM_rptr(itname), pctx);
    \
  }

/* external definitions for primitive types */

DECLARE_ASN1_ITEM(ASN1_BOOLEAN)
DECLARE_ASN1_ITEM(ASN1_TBOOLEAN)
DECLARE_ASN1_ITEM(ASN1_FBOOLEAN)
```

```
DECLARE_ASN1_ITEM(ASN1_SEQUENCE)
DECLARE_ASN1_ITEM(CBIGNUM)
DECLARE_ASN1_ITEM(BIGNUM)
DECLARE_ASN1_ITEM(INT32)
DECLARE_ASN1_ITEM(ZINT32)
DECLARE_ASN1_ITEM(UINT32)
DECLARE_ASN1_ITEM(ZUINT32)
DECLARE_ASN1_ITEM(INT64)
DECLARE_ASN1_ITEM(ZINT64)
DECLARE_ASN1_ITEM(UINT64)
DECLARE_ASN1_ITEM(ZUINT64)

#ifndef OPENSSL_NO_DEPRECATED_3_0
/*
* LONG and ZLONG are strongly discouraged for use as stored data, as the
* underlying C type (long) differs in size depending on the architecture.
* They are designed with 32-bit longs in mind.
*/
DECLARE_ASN1_ITEM(LONG)
DECLARE_ASN1_ITEM(ZLONG)
#endif

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ASN1_VALUE, ASN1_VALUE, ASN1_VALUE)
#define sk_ASN1_VALUE_num(sk) OPENSSL_sk_num(ossl_check_const_ASN1_VALUE_sk_type(sk))
#define sk_ASN1_VALUE_value(sk, idx) ((ASN1_VALUE
*)OPENSSL_sk_value(ossl_check_const_ASN1_VALUE_sk_type(sk),
 (idx)))
#define sk_ASN1_VALUE_new(cmp) ((STACK_OF(ASN1_VALUE)
*)OPENSSL_sk_new(ossl_check_ASN1_VALUE_compfunc_type(cmp)))
#define sk_ASN1_VALUE_new_null() ((STACK_OF(ASN1_VALUE) *)OPENSSL_sk_new_null())
#define sk_ASN1_VALUE_new_reserve(cmp, n) ((STACK_OF(ASN1_VALUE)
*)OPENSSL_sk_new_reserve(ossl_check_ASN1_VALUE_compfunc_type(cmp), (n)))
#define sk_ASN1_VALUE_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_ASN1_VALUE_sk_type(sk), (n))
#define sk_ASN1_VALUE_free(sk) OPENSSL_sk_free(ossl_check_ASN1_VALUE_sk_type(sk))
#define sk_ASN1_VALUE_zero(sk) OPENSSL_sk_zero(ossl_check_ASN1_VALUE_sk_type(sk))
#define sk_ASN1_VALUE_delete(sk, i) ((ASN1_VALUE
*)OPENSSL_sk_delete(ossl_check_ASN1_VALUE_sk_type(sk), (i)))
#define sk_ASN1_VALUE_delete_ptr(sk, ptr) ((ASN1_VALUE
*)OPENSSL_sk_delete_ptr(ossl_check_ASN1_VALUE_sk_type(sk), ossl_check_ASN1_VALUE_type(ptr)))
#define sk_ASN1_VALUE_push(sk, ptr) OPENSSL_sk_push(ossl_check_ASN1_VALUE_sk_type(sk),
ossl_check_ASN1_VALUE_type(ptr))
#define
 sk_ASN1_VALUE_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_ASN1_VALUE_sk_type(sk),
ossl_check_ASN1_VALUE_type(ptr))
#define sk_ASN1_VALUE_pop(sk) ((ASN1_VALUE
*)OPENSSL_sk_pop(ossl_check_ASN1_VALUE_sk_type(sk)))
#define sk_ASN1_VALUE_shift(sk) ((ASN1_VALUE
```

```
*)OPENSSL_sk_shift(ossl_check_ASN1_VALUE_sk_type(sk)))
#define sk_ASN1_VALUE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASN1_VALUE_sk_type(sk),ossl_check_ASN1_VALUE_freefunc_type(freef
unc))
#define sk_ASN1_VALUE_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_ASN1_VALUE_sk_type(sk),
ossl_check_ASN1_VALUE_type(ptr), (idx))
#define sk_ASN1_VALUE_set(sk, idx, ptr) ((ASN1_VALUE
*)OPENSSL_sk_set(ossl_check_ASN1_VALUE_sk_type(sk), (idx), ossl_check_ASN1_VALUE_type(ptr)))
#define sk_ASN1_VALUE_find(sk, ptr) OPENSSL_sk_find(ossl_check_ASN1_VALUE_sk_type(sk),
ossl_check_ASN1_VALUE_type(ptr))
#define sk_ASN1_VALUE_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_ASN1_VALUE_sk_type(sk),
ossl_check_ASN1_VALUE_type(ptr))
#define
 sk_ASN1_VALUE_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_ASN1_VALUE_sk_type(sk),
ossl_check_ASN1_VALUE_type(ptr), pnum)
#define sk_ASN1_VALUE_sort(sk) OPENSSL_sk_sort(ossl_check_ASN1_VALUE_sk_type(sk))
#define sk_ASN1_VALUE_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_ASN1_VALUE_sk_type(sk))
#define sk_ASN1_VALUE_dup(sk) ((STACK_OF(ASN1_VALUE)
*)OPENSSL_sk_dup(ossl_check_const_ASN1_VALUE_sk_type(sk)))
#define sk_ASN1_VALUE_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ASN1_VALUE)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASN1_VALUE_sk_type(sk),
ossl_check_ASN1_VALUE_copyfunc_type(copyfunc), ossl_check_ASN1_VALUE_freefunc_type(freefunc)))
#define sk_ASN1_VALUE_set_cmp_func(sk, cmp)
((sk_ASN1_VALUE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASN1_VALUE_sk_type(sk),
ossl_check_ASN1_VALUE_compfunc_type(cmp)))

/* clang-format on */

/* Functions used internally by the ASN1 code */

int ASN1_item_ex_new(ASN1_VALUE **pval, const ASN1_ITEM *it);
void ASN1_item_ex_free(ASN1_VALUE
 **pval, const ASN1_ITEM *it);

int ASN1_item_ex_d2i(ASN1_VALUE **pval, const unsigned char **in, long len,
   const ASN1_ITEM *it, int tag, int aclass, char opt,
   ASN1_TLC *ctx);

int ASN1_item_ex_i2d(const ASN1_VALUE **pval, unsigned char **out,
   const ASN1_ITEM *it, int tag, int aclass);

/* Legacy compatibility */
#define IMPLEMENT_ASN1_FUNCTIONS_const(name) IMPLEMENT_ASN1_FUNCTIONS(name)
#define IMPLEMENT_ASN1_ENCODE_FUNCTIONS_const_fname(stname, itname, fname) \
   IMPLEMENT_ASN1_ENCODE_FUNCTIONS_fname(stname, itname, fname)

#ifdef __cplusplus
}
```

```
#endif
#endif
#ifndef SRC_PERMISSION_PERMISSION_H_
#define SRC_PERMISSION_PERMISSION_H_

#if defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS

#include "debug_utils.h"
#include "node_options.h"
#include "permission/addon_permission.h"
#include "permission/child_process_permission.h"
#include "permission/fs_permission.h"
#include "permission/inspector_permission.h"
#include "permission/permission_base.h"
#include "permission/wasi_permission.h"
#include "permission/worker_permission.h"
#include "v8.h"

#include <string_view>
#include <unordered_map>

namespace node {

class Environment;

namespace fs {
class FSReqBase;
}

namespace permission {

#define THROW_IF_INSUFFICIENT_PERMISSIONS(env, perm, resource, ...)            \
 do {                                                                          \
   node::Environment* env__ = (env);                                           \
   const node::permission::PermissionScope perm__ = (perm);                    \
   const auto resource__ = (resource);
                                                                               \
   if (!env__->permission()->is_granted(env__, perm__, resource__))            \
      [[unlikely]] {                                                           \
     node::permission::Permission::ThrowAccessDenied(                          \
        env__, perm__, resource__);                                            \
     return __VA_ARGS__;                                                       \
   }                                                                           \
 } while (0)

#define ASYNC_THROW_IF_INSUFFICIENT_PERMISSIONS(                               \
   env, wrap, perm, resource, ...)                                             \
 do {                                                                          \
```

```
  node::Environment* env__ = (env);                                   \
  const node::permission::PermissionScope perm__ = (perm);                  \
  const auto resource__ = (resource);
                                \
  if (!env__->permission()->is_granted(env__, perm__, resource__))          \
      [[unlikely]] {                                                  \
    node::permission::Permission::AsyncThrowAccessDenied(                   \
        env__, (wrap), perm__, resource__);                               \
    return __VA_ARGS__;                                                 \
  }                                                                 \
} while (0)

#define ERR_ACCESS_DENIED_IF_INSUFFICIENT_PERMISSIONS(                          \
  env, perm, resource, args, ...)                                     \
 do {                                                               \
  node::Environment* env__ = (env);                                   \
  const node::permission::PermissionScope perm__ = (perm);                  \
  const auto resource__ = (resource);
                \
  if (!env__->permission()->is_granted(env__, perm__, resource__))          \
      [[unlikely]] {                                                  \
    Local<Value> err_access;                                          \
    if (node::permission::CreateAccessDeniedError(env__, perm__, resource__) \
          .ToLocal(&err_access)) {                                    \
      args.GetReturnValue().Set(err_access);                              \
    } else {                                                          \
      args.GetReturnValue().Set(UV_EACCES);                               \
    }                                                                 \
    return __VA_ARGS__;                                               \
  }                                                                 \
} while (0)

#define SET_INSUFFICIENT_PERMISSION_ERROR_CALLBACK(scope)
    \
 void InsufficientPermissionError(std::string_view resource) {              \
  v8::HandleScope handle_scope(env()->isolate());                     \
  v8::Context::Scope context_scope(env()->context());                 \
  v8::Local<v8::Value> arg;                                           \
  if (!permission::CreateAccessDeniedError(env(), (scope), resource)        \
          .ToLocal(&arg)) {                                           \
  }                                                                 \
  MakeCallback(env()->oncomplete_string(), 1, &arg);                  \
 }

class Permission {
public:
 Permission();
```

```
 FORCE_INLINE bool is_granted(Environment* env,
                              const PermissionScope permission,
                              const std::string_view& res = "") const {
  if (!enabled_) [[likely]] {
    return true;
  }
  return is_scope_granted(env, permission, res);
 }

 FORCE_INLINE bool enabled() const { return enabled_; }

 static PermissionScope StringToPermission(const std::string& perm);
 static const char* PermissionToString(PermissionScope perm);
 static void ThrowAccessDenied(Environment* env,
                               PermissionScope perm,
                               const std::string_view& res);
 static void AsyncThrowAccessDenied(Environment* env,
                                    fs::FSReqBase* req_wrap,
                                    PermissionScope perm,
                                    const std::string_view& res);

 // CLI Call
 void Apply(Environment* env,
            const std::vector<std::string>& allow,
            PermissionScope scope);
 void EnablePermissions();

private:
 COLD_NOINLINE bool is_scope_granted(Environment* env,
                                     const PermissionScope permission,
                                     const std::string_view& res = "") const {
  auto perm_node
 = nodes_.find(permission);
  if (perm_node != nodes_.end()) {
    return perm_node->second->is_granted(env, permission, res);
  }
  return false;
 }

 std::unordered_map<PermissionScope, std::shared_ptr<PermissionBase>> nodes_;
 bool enabled_;
};

}  // namespace permission

}  // namespace node

#endif  // defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
```

#endif // SRC_PERMISSION_PERMISSION_H_
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A. HISTORY OF THE SOFTWARE
==========

Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations, which became
Zope Corporation. In 2001, the Python Software Foundation (PSF, see
https://www.python.org/psf/) was formed, a non-profit organization
created specifically to own Python-related Intellectual Property.
Zope Corporation was a sponsoring member of the PSF.

All
Python releases are Open Source (see http://www.opensource.org for
the Open Source Definition). Historically, most, but not all, Python
releases have also been GPL-compatible; the table below summarizes
the various releases.

| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
| 2.2 and above | 2.1.1 | 2001-now | PSF | yes |

Footnotes:

(1) GPL-compatible doesn't mean that we're distributing Python under the GPL. All Python licenses, unlike the GPL, let you distribute a modified version without making your changes open source. The GPL-compatible licenses make it possible to combine Python with other software that is released under the GPL; the others don't.

(2) According to Richard Stallman, 1.6.1 is not GPL-compatible, because its license has a choice of law clause. According to CNRI, however, Stallman's lawyer has told CNRI's lawyer that 1.6.1 is "not incompatible" with the GPL.

Thanks to the many outside volunteers who have worked under Guido's direction to make these releases possible.

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# Protected File

Example of a protected file to be used in the PolicyDenyFs module
(The MIT License)

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{
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  'openssl/ssl/d1_msg.c',
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    './config/archs/BSD-x86_64/no-asm/providers/common/der/der_dsa_gen.c',
    './config/archs/BSD-x86_64/no-asm/providers/common/der/der_ec_gen.c',
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'openssl/providers/implementations/keymgmt/rsa_kmgmt.c',
'openssl/providers/implementations/keymgmt/slh_dsa_kmgmt.c',
'openssl/providers/implementations/macs/cmac_prov.c',
'openssl/providers/implementations/macs/gmac_prov.c',
'openssl/providers/implementations/macs/hmac_prov.c',
'openssl/providers/implementations/macs/kmac_prov.c',
'openssl/providers/implementations/rands/drbg.c',
'openssl/providers/implementations/rands/drbg_ctr.c',
'openssl/providers/implementations/rands/drbg_hash.c',
'openssl/providers/implementations/rands/drbg_hmac.c',
'openssl/providers/implementations/rands/fips_crng_test.c',
'openssl/providers/implementations/rands/test_rng.c',
'openssl/providers/implementations/signature/dsa_sig.c',
'openssl/providers/implementations/signature/ecdsa_sig.c',
'openssl/providers/implementations/signature/eddsa_sig.c',
'openssl/providers/implementations/signature/mac_legacy_sig.c',
'openssl/providers/implementations/signature/ml_dsa_sig.c',
'openssl/providers/implementations/signature/rsa_sig.c',
'openssl/providers/implementations/signature/slh_dsa_sig.c',
'openssl/providers/implementations/skeymgmt/aes_skmgmt.c',
'openssl/providers/implementations/skeymgmt/generic.c',
'openssl/ssl/record/methods/ssl3_cbc.c',
'openssl/providers/common/der/der_dsa_key.c',
'openssl/providers/common/der/der_dsa_sig.c',
'openssl/providers/common/der/der_ec_key.c',
'openssl/providers/common/der/der_ec_sig.c',
'openssl/providers/common/der/der_ecx_key.c',
'openssl/providers/common/der/der_ml_dsa_key.c',
'openssl/providers/common/der/der_rsa_key.c',
'openssl/providers/common/der/der_slh_dsa_key.c',
'openssl/providers/common/provider_ctx.c',
'openssl/providers/common/provider_err.c',
'openssl/providers/implementations/ciphers/ciphercommon.c',

```
  'openssl/providers/implementations/ciphers/ciphercommon_block.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm_hw.c',
  'openssl/providers/implementations/ciphers/ciphercommon_gcm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_gcm_hw.c',
  'openssl/providers/implementations/ciphers/ciphercommon_hw.c',
  'openssl/providers/implementations/digests/digestcommon.c',
  'openssl/ssl/record/methods/tls_pad.c',
  'openssl/providers/fips/fips_entry.c',

],
'openssl_sources_BSD-x86_64': [
  './config/archs/BSD-x86_64/asm_avx2/crypto/aes/aes-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/aes/aesni-mb-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/aes/aesni-sha1-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/aes/aesni-sha256-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/aes/aesni-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/aes/aesni-xts-avx512.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/aes/bsaes-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/aes/vpaes-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-2k-avx512.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-2k-avxifma.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-3k-avx512.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-3k-avxifma.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-4k-avx512.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-4k-avxifma.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-avx2.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/x86_64-gf2m.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/x86_64-mont.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/x86_64-mont5.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/camellia/cmll-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/chacha/chacha-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/ec/ecp_nistz256-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/ec/x25519-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/params_idx.c',
  './config/archs/BSD-x86_64/asm_avx2/crypto/x86_64cpuid.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/md5/md5-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/modes/aes-gcm-avx512.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/modes/aesni-gcm-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/modes/ghash-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/poly1305/poly1305-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/rc4/rc4-md5-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/rc4/rc4-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/sha/keccak1600-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/sha/sha1-mb-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/sha/sha1-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/sha/sha256-mb-x86_64.s',
```

```
    './config/archs/BSD-x86_64/asm_avx2/crypto/sha/sha256-x86_64.s',
    './config/archs/BSD-x86_64/asm_avx2/crypto/sha/sha512-x86_64.s',
    './config/archs/BSD-x86_64/asm_avx2/crypto/whrlpool/wp-x86_64.s',
    './config/archs/BSD-x86_64/asm_avx2/engines/e_padlock-x86_64.s',
    './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_sm2_gen.c',
    './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_digests_gen.c',
    './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_dsa_gen.c',
    './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_ec_gen.c',
    './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_ecx_gen.c',
    './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_ml_dsa_gen.c',
    './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_rsa_gen.c',
    './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_slh_dsa_gen.c',
    './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_wrap_gen.c',
    './config/archs/BSD-x86_64/asm_avx2/providers/legacy.ld',
    './config/archs/BSD-x86_64/asm_avx2/providers/fips.ld',

  ],
  'openssl_defines_BSD-x86_64': [
    'NDEBUG',
    'L_ENDIAN',
    'OPENSSL_BUILDING_OPENSSL',
    'AES_ASM',
    'BSAES_ASM',
    'ECP_NISTZ256_ASM',
    'FIPS_MODULE',
    'GHASH_ASM',
    'KECCAK1600_ASM',
    'OPENSSL_BN_ASM_GF2m',
    'OPENSSL_BN_ASM_MONT',
    'OPENSSL_BN_ASM_MONT5',
    'OPENSSL_CPUID_OBJ',
    'OPENSSL_IA32_SSE2',
    'SHA1_ASM',
    'SHA256_ASM',
    'SHA512_ASM',
    'VPAES_ASM',
    'X25519_ASM',
    'FIPS_MODULE',
  ],
  'openssl_cflags_BSD-x86_64': [
    '-Wa,--noexecstack',
    '-Wall -O3',
    '-pthread',
    '-Wall -O3',
  ],
  'openssl_ex_libs_BSD-x86_64':
[
    '-pthread',
```

```
  ],
  'linker_script': ''
 },
 'include_dirs': [
  '.',
  './include',
  './crypto',
  './crypto/include/internal',
  './providers/common/include',
 ],
 'defines': ['<@(openssl_defines_BSD-x86_64)'],
 'cflags': ['<@(openssl_cflags_BSD-x86_64)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86_64)'],

 'sources': ['<@(openssl_sources)', '<@(openssl_sources_BSD-x86_64)'],
 'direct_dependent_settings': {
  'include_dirs': ['./include', '.'],
  'defines': ['<@(openssl_defines_BSD-x86_64)'],
 },
}
```

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```
/*
* WARNING: do not edit!
* Generated by util/mkbuildinf.pl
*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#define PLATFORM "platform: BSD-x86"
#define DATE "built on: Tue Jan 27 17:25:31 2026 UTC"

/*
* Generate compiler_flags as an array of individual characters. This is a
* workaround for the situation where CFLAGS gets too long for a C90 string
* literal
*/
static const char compiler_flags[] = {
   'c','o','m','p','i','l','e','r',':',' ','g','c','c',' ','-','f',
   'P','I','C',' ','-','p','t','h','r','e','a','d',' ','-','W','a',
   ',','-','-','n','o','e','x','e','c','s','t','a','c','k',' ','-',
   'W','a','l','l',' ','-','O','3',' ','-','f','o','m','i','t','-',
   'f','r','a','m','e','-','p','o','i','n','t','e','r','
 ','-','D',
   'L','_','E','N','D','I','A','N',' ','-','D','O','P','E','N','S',
   'S','L','_','P','I','C',' ','-','D','_','T','H','R','E','A','D',
```

```
  '_','S','A','F','E',' ','-','D','_','R','E','E','N','T','R','A',
  'N','T',' ','-','D','O','P','E','N','S','S','L','_','B','U','I',
  'L','D','I','N','G','_','O','P','E','N','S','S','L',' ','-','D',
  'N','D','E','B','U','G','\0'
};
/*-
* WARNING: do not edit!
* Generated by Makefile from include/openssl/crmf.h.in
*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*
* CRMF (RFC 4211) implementation by M. Peylo, M. Viljanen, and D. von Oheimb.
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_CRMF_H
#define OPENSSL_CRMF_H

#include <openssl/opensslconf.h>

#ifndef OPENSSL_NO_CRMF
#include <openssl/opensslv.h>
#include <openssl/safestack.h>
#include <openssl/crmferr.h>
#include <openssl/x509v3.h> /* for GENERAL_NAME etc. */
#include <openssl/cms.h>

/* explicit #includes not strictly needed since implied by the above: */
#include <openssl/types.h>
#include <openssl/x509.h>

#ifdef
 __cplusplus
extern "C" {
#endif

#define OSSL_CRMF_POPOPRIVKEY_THISMESSAGE 0
#define OSSL_CRMF_POPOPRIVKEY_SUBSEQUENTMESSAGE 1
```

```
#define OSSL_CRMF_POPOPRIVKEY_DHMAC 2
#define OSSL_CRMF_POPOPRIVKEY_AGREEMAC 3
#define OSSL_CRMF_POPOPRIVKEY_ENCRYPTEDKEY 4

#define OSSL_CRMF_SUBSEQUENTMESSAGE_ENCRCERT 0
#define OSSL_CRMF_SUBSEQUENTMESSAGE_CHALLENGERESP 1
typedef struct ossl_crmf_encryptedvalue_st OSSL_CRMF_ENCRYPTEDVALUE;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_ENCRYPTEDVALUE)

typedef struct ossl_crmf_encryptedkey_st OSSL_CRMF_ENCRYPTEDKEY;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_ENCRYPTEDKEY)

typedef struct ossl_crmf_msg_st OSSL_CRMF_MSG;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_MSG)
DECLARE_ASN1_DUP_FUNCTION(OSSL_CRMF_MSG)
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CRMF_MSG, OSSL_CRMF_MSG, OSSL_CRMF_MSG)
#define sk_OSSL_CRMF_MSG_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_CRMF_MSG_sk_type(sk))
#define sk_OSSL_CRMF_MSG_value(sk, idx) ((OSSL_CRMF_MSG
*)OPENSSL_sk_value(ossl_check_const_OSSL_CRMF_MSG_sk_type(sk),
 (idx)))
#define sk_OSSL_CRMF_MSG_new(cmp) ((STACK_OF(OSSL_CRMF_MSG)
*)OPENSSL_sk_new(ossl_check_OSSL_CRMF_MSG_compfunc_type(cmp)))
#define sk_OSSL_CRMF_MSG_new_null() ((STACK_OF(OSSL_CRMF_MSG) *)OPENSSL_sk_new_null())
#define sk_OSSL_CRMF_MSG_new_reserve(cmp, n) ((STACK_OF(OSSL_CRMF_MSG)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CRMF_MSG_compfunc_type(cmp), (n)))
#define sk_OSSL_CRMF_MSG_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_CRMF_MSG_sk_type(sk), (n))
#define sk_OSSL_CRMF_MSG_free(sk) OPENSSL_sk_free(ossl_check_OSSL_CRMF_MSG_sk_type(sk))
#define sk_OSSL_CRMF_MSG_zero(sk) OPENSSL_sk_zero(ossl_check_OSSL_CRMF_MSG_sk_type(sk))
#define sk_OSSL_CRMF_MSG_delete(sk, i) ((OSSL_CRMF_MSG
*)OPENSSL_sk_delete(ossl_check_OSSL_CRMF_MSG_sk_type(sk), (i)))
#define sk_OSSL_CRMF_MSG_delete_ptr(sk, ptr) ((OSSL_CRMF_MSG
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CRMF_MSG_sk_type(sk),
ossl_check_OSSL_CRMF_MSG_type(ptr)))
#define sk_OSSL_CRMF_MSG_push(sk, ptr)
 OPENSSL_sk_push(ossl_check_OSSL_CRMF_MSG_sk_type(sk), ossl_check_OSSL_CRMF_MSG_type(ptr))
#define sk_OSSL_CRMF_MSG_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CRMF_MSG_sk_type(sk), ossl_check_OSSL_CRMF_MSG_type(ptr))
#define sk_OSSL_CRMF_MSG_pop(sk) ((OSSL_CRMF_MSG
*)OPENSSL_sk_pop(ossl_check_OSSL_CRMF_MSG_sk_type(sk)))
#define sk_OSSL_CRMF_MSG_shift(sk) ((OSSL_CRMF_MSG
*)OPENSSL_sk_shift(ossl_check_OSSL_CRMF_MSG_sk_type(sk)))
#define sk_OSSL_CRMF_MSG_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CRMF_MSG_sk_type(sk),ossl_check_OSSL_CRMF_MSG_freefunc_t
ype(freefunc))
#define sk_OSSL_CRMF_MSG_insert(sk, ptr, idx)
```

```
OPENSSL_sk_insert(ossl_check_OSSL_CRMF_MSG_sk_type(sk), ossl_check_OSSL_CRMF_MSG_type(ptr),
(idx))
#define sk_OSSL_CRMF_MSG_set(sk, idx, ptr) ((OSSL_CRMF_MSG
*)OPENSSL_sk_set(ossl_check_OSSL_CRMF_MSG_sk_type(sk), (idx),
ossl_check_OSSL_CRMF_MSG_type(ptr)))
#define sk_OSSL_CRMF_MSG_find(sk, ptr) OPENSSL_sk_find(ossl_check_OSSL_CRMF_MSG_sk_type(sk),
ossl_check_OSSL_CRMF_MSG_type(ptr))
#define
 sk_OSSL_CRMF_MSG_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_OSSL_CRMF_MSG_sk_type(sk),
ossl_check_OSSL_CRMF_MSG_type(ptr))
#define sk_OSSL_CRMF_MSG_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CRMF_MSG_sk_type(sk), ossl_check_OSSL_CRMF_MSG_type(ptr),
pnum)
#define sk_OSSL_CRMF_MSG_sort(sk) OPENSSL_sk_sort(ossl_check_OSSL_CRMF_MSG_sk_type(sk))
#define sk_OSSL_CRMF_MSG_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CRMF_MSG_sk_type(sk))
#define sk_OSSL_CRMF_MSG_dup(sk) ((STACK_OF(OSSL_CRMF_MSG)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CRMF_MSG_sk_type(sk)))
#define sk_OSSL_CRMF_MSG_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OSSL_CRMF_MSG)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CRMF_MSG_sk_type(sk),
ossl_check_OSSL_CRMF_MSG_copyfunc_type(copyfunc),
ossl_check_OSSL_CRMF_MSG_freefunc_type(freefunc)))
#define sk_OSSL_CRMF_MSG_set_cmp_func(sk, cmp)
((sk_OSSL_CRMF_MSG_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_CRMF_MSG_sk_type(sk),
 ossl_check_OSSL_CRMF_MSG_compfunc_type(cmp)))

/* clang-format on */
typedef struct ossl_crmf_attributetypeandvalue_st OSSL_CRMF_ATTRIBUTETYPEANDVALUE;
void OSSL_CRMF_ATTRIBUTETYPEANDVALUE_free(OSSL_CRMF_ATTRIBUTETYPEANDVALUE *v);
DECLARE_ASN1_DUP_FUNCTION(OSSL_CRMF_ATTRIBUTETYPEANDVALUE)
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CRMF_ATTRIBUTETYPEANDVALUE,
OSSL_CRMF_ATTRIBUTETYPEANDVALUE, OSSL_CRMF_ATTRIBUTETYPEANDVALUE)
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_value(sk, idx)
((OSSL_CRMF_ATTRIBUTETYPEANDVALUE
*)OPENSSL_sk_value(ossl_check_const_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk), (idx)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_new(cmp)
((STACK_OF(OSSL_CRMF_ATTRIBUTETYPEANDVALUE)
*)OPENSSL_sk_new(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_compfunc_type(cmp)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_new_null()
((STACK_OF(OSSL_CRMF_ATTRIBUTETYPEANDVALUE)
 *)OPENSSL_sk_new_null())
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_new_reserve(cmp, n)
((STACK_OF(OSSL_CRMF_ATTRIBUTETYPEANDVALUE)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_compfunc_type(cmp),
(n)))
```

```
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk), (n))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_delete(sk, i)
((OSSL_CRMF_ATTRIBUTETYPEANDVALUE
*)OPENSSL_sk_delete(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk), (i)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_delete_ptr(sk, ptr)
((OSSL_CRMF_ATTRIBUTETYPEANDVALUE
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
 ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_type(ptr)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_type(ptr))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_type(ptr))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_pop(sk)
((OSSL_CRMF_ATTRIBUTETYPEANDVALUE
*)OPENSSL_sk_pop(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_shift(sk)
((OSSL_CRMF_ATTRIBUTETYPEANDVALUE
*)OPENSSL_sk_shift(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),ossl_check_OS
SL_CRMF_ATTRIBUTETYPEANDVALUE_freefunc_type(freefunc))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_insert(sk,
 ptr, idx) OPENSSL_sk_insert(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_type(ptr), (idx))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_set(sk, idx, ptr)
((OSSL_CRMF_ATTRIBUTETYPEANDVALUE
*)OPENSSL_sk_set(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk), (idx),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_type(ptr)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_type(ptr))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_type(ptr))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_type(ptr), pnum)
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sort(sk)
 OPENSSL_sk_sort(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk))
```

```
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_dup(sk)
((STACK_OF(OSSL_CRMF_ATTRIBUTETYPEANDVALUE)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_CRMF_ATTRIBUTETYPEANDVALUE)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_copyfunc_type(copyfunc),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_freefunc_type(freefunc)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_set_cmp_func(sk, cmp)
((sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_
CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_compfunc_type(cmp)))

/*
 clang-format on */

typedef struct ossl_crmf_pbmparameter_st OSSL_CRMF_PBMPARAMETER;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_PBMPARAMETER)
typedef struct ossl_crmf_poposigningkey_st OSSL_CRMF_POPOSIGNINGKEY;
typedef struct ossl_crmf_certrequest_st OSSL_CRMF_CERTREQUEST;
typedef struct ossl_crmf_certid_st OSSL_CRMF_CERTID;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_CERTID)
DECLARE_ASN1_DUP_FUNCTION(OSSL_CRMF_CERTID)
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CRMF_CERTID, OSSL_CRMF_CERTID,
OSSL_CRMF_CERTID)
#define sk_OSSL_CRMF_CERTID_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_CRMF_CERTID_sk_type(sk))
#define sk_OSSL_CRMF_CERTID_value(sk, idx) ((OSSL_CRMF_CERTID
*)OPENSSL_sk_value(ossl_check_const_OSSL_CRMF_CERTID_sk_type(sk), (idx)))
#define sk_OSSL_CRMF_CERTID_new(cmp) ((STACK_OF(OSSL_CRMF_CERTID)
*)OPENSSL_sk_new(ossl_check_OSSL_CRMF_CERTID_compfunc_type(cmp)))
#define sk_OSSL_CRMF_CERTID_new_null() ((STACK_OF(OSSL_CRMF_CERTID)
*)OPENSSL_sk_new_null())
#define sk_OSSL_CRMF_CERTID_new_reserve(cmp,
 n) ((STACK_OF(OSSL_CRMF_CERTID)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CRMF_CERTID_compfunc_type(cmp), (n)))
#define sk_OSSL_CRMF_CERTID_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_CRMF_CERTID_sk_type(sk), (n))
#define sk_OSSL_CRMF_CERTID_free(sk) OPENSSL_sk_free(ossl_check_OSSL_CRMF_CERTID_sk_type(sk))
#define sk_OSSL_CRMF_CERTID_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_CRMF_CERTID_sk_type(sk))
#define sk_OSSL_CRMF_CERTID_delete(sk, i) ((OSSL_CRMF_CERTID
*)OPENSSL_sk_delete(ossl_check_OSSL_CRMF_CERTID_sk_type(sk), (i)))
#define sk_OSSL_CRMF_CERTID_delete_ptr(sk, ptr) ((OSSL_CRMF_CERTID
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CRMF_CERTID_sk_type(sk),
ossl_check_OSSL_CRMF_CERTID_type(ptr)))
#define sk_OSSL_CRMF_CERTID_push(sk, ptr)
```

```
OPENSSL_sk_push(ossl_check_OSSL_CRMF_CERTID_sk_type(sk),
ossl_check_OSSL_CRMF_CERTID_type(ptr))
#define sk_OSSL_CRMF_CERTID_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CRMF_CERTID_sk_type(sk),
ossl_check_OSSL_CRMF_CERTID_type(ptr))
#define
 sk_OSSL_CRMF_CERTID_pop(sk) ((OSSL_CRMF_CERTID
*)OPENSSL_sk_pop(ossl_check_OSSL_CRMF_CERTID_sk_type(sk)))
#define sk_OSSL_CRMF_CERTID_shift(sk) ((OSSL_CRMF_CERTID
*)OPENSSL_sk_shift(ossl_check_OSSL_CRMF_CERTID_sk_type(sk)))
#define sk_OSSL_CRMF_CERTID_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CRMF_CERTID_sk_type(sk),ossl_check_OSSL_CRMF_CERTID_fre
efunc_type(freefunc))
#define sk_OSSL_CRMF_CERTID_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_CRMF_CERTID_sk_type(sk),
ossl_check_OSSL_CRMF_CERTID_type(ptr), (idx))
#define sk_OSSL_CRMF_CERTID_set(sk, idx, ptr) ((OSSL_CRMF_CERTID
*)OPENSSL_sk_set(ossl_check_OSSL_CRMF_CERTID_sk_type(sk), (idx),
ossl_check_OSSL_CRMF_CERTID_type(ptr)))
#define sk_OSSL_CRMF_CERTID_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_CRMF_CERTID_sk_type(sk),
ossl_check_OSSL_CRMF_CERTID_type(ptr))
#define sk_OSSL_CRMF_CERTID_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_CRMF_CERTID_sk_type(sk),
ossl_check_OSSL_CRMF_CERTID_type(ptr))
#define
 sk_OSSL_CRMF_CERTID_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CRMF_CERTID_sk_type(sk),
ossl_check_OSSL_CRMF_CERTID_type(ptr), pnum)
#define sk_OSSL_CRMF_CERTID_sort(sk) OPENSSL_sk_sort(ossl_check_OSSL_CRMF_CERTID_sk_type(sk))
#define sk_OSSL_CRMF_CERTID_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CRMF_CERTID_sk_type(sk))
#define sk_OSSL_CRMF_CERTID_dup(sk) ((STACK_OF(OSSL_CRMF_CERTID)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CRMF_CERTID_sk_type(sk)))
#define sk_OSSL_CRMF_CERTID_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OSSL_CRMF_CERTID)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CRMF_CERTID_sk_type(sk),
ossl_check_OSSL_CRMF_CERTID_copyfunc_type(copyfunc),
ossl_check_OSSL_CRMF_CERTID_freefunc_type(freefunc)))
#define sk_OSSL_CRMF_CERTID_set_cmp_func(sk, cmp)
((sk_OSSL_CRMF_CERTID_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_CRMF_CERTID_sk_typ
e(sk), ossl_check_OSSL_CRMF_CERTID_compfunc_type(cmp)))

/* clang-format on */

typedef struct
 ossl_crmf_pkipublicationinfo_st OSSL_CRMF_PKIPUBLICATIONINFO;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_PKIPUBLICATIONINFO)
typedef struct ossl_crmf_singlepubinfo_st OSSL_CRMF_SINGLEPUBINFO;
```

```
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_SINGLEPUBINFO)
typedef struct ossl_crmf_certtemplate_st OSSL_CRMF_CERTTEMPLATE;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_CERTTEMPLATE)
DECLARE_ASN1_DUP_FUNCTION(OSSL_CRMF_CERTTEMPLATE)
typedef STACK_OF(OSSL_CRMF_MSG) OSSL_CRMF_MSGS;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_MSGS)

typedef struct ossl_crmf_optionalvalidity_st OSSL_CRMF_OPTIONALVALIDITY;

/* crmf_pbm.c */
OSSL_CRMF_PBMPARAMETER *OSSL_CRMF_pbmp_new(OSSL_LIB_CTX *libctx, size_t slen,
   int owfnid, size_t itercnt,
   int macnid);
int OSSL_CRMF_pbm_new(OSSL_LIB_CTX *libctx, const char *propq,
   const OSSL_CRMF_PBMPARAMETER *pbmp,
   const unsigned char *msg, size_t msglen,
   const unsigned char *sec, size_t seclen,
   unsigned char **mac, size_t *maclen);

/* crmf_lib.c */
int OSSL_CRMF_MSG_set1_regCtrl_regToken(OSSL_CRMF_MSG
 *msg,
   const ASN1_UTF8STRING *tok);
ASN1_UTF8STRING
*OSSL_CRMF_MSG_get0_regCtrl_regToken(const OSSL_CRMF_MSG *msg);
int OSSL_CRMF_MSG_set1_regCtrl_authenticator(OSSL_CRMF_MSG *msg,
   const ASN1_UTF8STRING *auth);
ASN1_UTF8STRING
*OSSL_CRMF_MSG_get0_regCtrl_authenticator(const OSSL_CRMF_MSG *msg);
int OSSL_CRMF_MSG_PKIPublicationInfo_push0_SinglePubInfo(OSSL_CRMF_PKIPUBLICATIONINFO *pi,
   OSSL_CRMF_SINGLEPUBINFO *spi);
#define OSSL_CRMF_PUB_METHOD_DONTCARE 0
#define OSSL_CRMF_PUB_METHOD_X500 1
#define OSSL_CRMF_PUB_METHOD_WEB 2
#define OSSL_CRMF_PUB_METHOD_LDAP 3
int OSSL_CRMF_MSG_set0_SinglePubInfo(OSSL_CRMF_SINGLEPUBINFO *spi,
   int method, GENERAL_NAME *nm);
#define OSSL_CRMF_PUB_ACTION_DONTPUBLISH 0
#define OSSL_CRMF_PUB_ACTION_PLEASEPUBLISH 1
int OSSL_CRMF_MSG_set_PKIPublicationInfo_action(OSSL_CRMF_PKIPUBLICATIONINFO *pi,
   int action);
int OSSL_CRMF_MSG_set1_regCtrl_pkiPublicationInfo(OSSL_CRMF_MSG *msg,
   const OSSL_CRMF_PKIPUBLICATIONINFO *pi);
OSSL_CRMF_PKIPUBLICATIONINFO
*OSSL_CRMF_MSG_get0_regCtrl_pkiPublicationInfo(const
 OSSL_CRMF_MSG *msg);
int OSSL_CRMF_MSG_set1_regCtrl_protocolEncrKey(OSSL_CRMF_MSG *msg,
   const X509_PUBKEY *pubkey);
```

```
X509_PUBKEY
*OSSL_CRMF_MSG_get0_regCtrl_protocolEncrKey(const OSSL_CRMF_MSG *msg);
int OSSL_CRMF_MSG_set1_regCtrl_oldCertID(OSSL_CRMF_MSG *msg,
   const OSSL_CRMF_CERTID *cid);
OSSL_CRMF_CERTID
*OSSL_CRMF_MSG_get0_regCtrl_oldCertID(const OSSL_CRMF_MSG *msg);
OSSL_CRMF_CERTID *OSSL_CRMF_CERTID_gen(const X509_NAME *issuer,
   const ASN1_INTEGER *serial);

int OSSL_CRMF_MSG_set1_regInfo_utf8Pairs(OSSL_CRMF_MSG *msg,
   const ASN1_UTF8STRING *utf8pairs);
ASN1_UTF8STRING
*OSSL_CRMF_MSG_get0_regInfo_utf8Pairs(const OSSL_CRMF_MSG *msg);
int OSSL_CRMF_MSG_set1_regInfo_certReq(OSSL_CRMF_MSG *msg,
   const OSSL_CRMF_CERTREQUEST *cr);
OSSL_CRMF_CERTREQUEST
*OSSL_CRMF_MSG_get0_regInfo_certReq(const OSSL_CRMF_MSG *msg);

int OSSL_CRMF_MSG_set0_validity(OSSL_CRMF_MSG *crm,
   ASN1_TIME *notBefore, ASN1_TIME *notAfter);
int
 OSSL_CRMF_MSG_set_certReqId(OSSL_CRMF_MSG *crm, int rid);
int OSSL_CRMF_MSG_get_certReqId(const OSSL_CRMF_MSG *crm);
int OSSL_CRMF_MSG_set0_extensions(OSSL_CRMF_MSG *crm, X509_EXTENSIONS *exts);

int OSSL_CRMF_MSG_push0_extension(OSSL_CRMF_MSG *crm, X509_EXTENSION *ext);
#define OSSL_CRMF_POPO_NONE -1
#define OSSL_CRMF_POPO_RAVERIFIED 0
#define OSSL_CRMF_POPO_SIGNATURE 1
#define OSSL_CRMF_POPO_KEYENC 2
#define OSSL_CRMF_POPO_KEYAGREE 3
int OSSL_CRMF_MSG_create_popo(int meth, OSSL_CRMF_MSG *crm,
   EVP_PKEY *pkey, const EVP_MD *digest,
   OSSL_LIB_CTX *libctx, const char *propq);
int OSSL_CRMF_MSGS_verify_popo(const OSSL_CRMF_MSGS *reqs,
   int rid, int acceptRAVerified,
   OSSL_LIB_CTX *libctx, const char *propq);
OSSL_CRMF_CERTTEMPLATE *OSSL_CRMF_MSG_get0_tmpl(const OSSL_CRMF_MSG *crm);
X509_PUBKEY
*OSSL_CRMF_CERTTEMPLATE_get0_publicKey(const OSSL_CRMF_CERTTEMPLATE *tmpl);
const X509_NAME *OSSL_CRMF_CERTTEMPLATE_get0_subject(const OSSL_CRMF_CERTTEMPLATE
*tmpl);
const
 X509_NAME *OSSL_CRMF_CERTTEMPLATE_get0_issuer(const OSSL_CRMF_CERTTEMPLATE *tmpl);
const ASN1_INTEGER *OSSL_CRMF_CERTTEMPLATE_get0_serialNumber(const
OSSL_CRMF_CERTTEMPLATE *tmpl);
X509_EXTENSIONS
*OSSL_CRMF_CERTTEMPLATE_get0_extensions(const OSSL_CRMF_CERTTEMPLATE *tmpl);
```

```
const X509_NAME *OSSL_CRMF_CERTID_get0_issuer(const OSSL_CRMF_CERTID *cid);
const ASN1_INTEGER *OSSL_CRMF_CERTID_get0_serialNumber(const OSSL_CRMF_CERTID *cid);
int OSSL_CRMF_CERTTEMPLATE_fill(OSSL_CRMF_CERTTEMPLATE *tmpl,
   EVP_PKEY *pubkey,
   const X509_NAME *subject,
   const X509_NAME *issuer,
   const ASN1_INTEGER *serial);
X509 *OSSL_CRMF_ENCRYPTEDVALUE_get1_encCert(const OSSL_CRMF_ENCRYPTEDVALUE *ecert,
   OSSL_LIB_CTX *libctx, const char *propq,
   EVP_PKEY *pkey);
X509 *OSSL_CRMF_ENCRYPTEDKEY_get1_encCert(const OSSL_CRMF_ENCRYPTEDKEY *ecert,
   OSSL_LIB_CTX *libctx, const char *propq,
   EVP_PKEY *pkey, unsigned int flags);
unsigned char *OSSL_CRMF_ENCRYPTEDVALUE_decrypt(const OSSL_CRMF_ENCRYPTEDVALUE
 *enc,
   OSSL_LIB_CTX *libctx, const char *propq,
   EVP_PKEY *pkey, int *outlen);
EVP_PKEY *OSSL_CRMF_ENCRYPTEDKEY_get1_pkey(const OSSL_CRMF_ENCRYPTEDKEY
*encryptedKey,
   X509_STORE *ts, STACK_OF(X509) *extra, EVP_PKEY *pkey,
   X509 *cert, ASN1_OCTET_STRING *secret,
   OSSL_LIB_CTX *libctx, const char *propq);
int OSSL_CRMF_MSG_centralkeygen_requested(const OSSL_CRMF_MSG *crm, const X509_REQ *p10cr);
#ifndef OPENSSL_NO_CMS
OSSL_CRMF_ENCRYPTEDKEY *OSSL_CRMF_ENCRYPTEDKEY_init_envdata(CMS_EnvelopedData
*envdata);
#endif

#ifdef __cplusplus
}
#endif
#endif /* !defined(OPENSSL_NO_CRMF) */
#endif /* !defined(OPENSSL_CRMF_H) */
#ifndef SRC_PERMISSION_FS_PERMISSION_H_
#define SRC_PERMISSION_FS_PERMISSION_H_

#if defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS

#include "v8.h"

#include <unordered_map>
#include "permission/permission_base.h"
#include "util.h"

namespace node {

namespace permission {
```

```
class FSPermission final : public PermissionBase {
public:
 void Apply(Environment* env,
            const std::vector<std::string>& allow,
            PermissionScope scope) override;
 bool is_granted(Environment* env,
                 PermissionScope perm,
                 const std::string_view& param) const override;

 struct RadixTree {
   struct Node {
     std::string prefix;
     std::unordered_map<char, Node*> children;
     Node* wildcard_child;
     bool is_leaf;

     explicit Node(const std::string& pre)
         : prefix(pre), wildcard_child(nullptr), is_leaf(false) {}

     Node() : wildcard_child(nullptr), is_leaf(false) {}

     Node* CreateChild(const std::string& path_prefix)
 {
       if (path_prefix.empty() && !is_leaf) {
         is_leaf = true;
         return this;
       }

       CHECK(!path_prefix.empty());
       char label = path_prefix[0];

       Node* child = children[label];
       if (child == nullptr) {
         children[label] = new Node(path_prefix);
         return children[label];
       }

       // swap prefix
       size_t i = 0;
       size_t prefix_len = path_prefix.length();
       for (; i < child->prefix.length(); ++i) {
         if (i > prefix_len || path_prefix[i] != child->prefix[i]) {
           std::string parent_prefix = child->prefix.substr(0, i);
           std::string child_prefix = child->prefix.substr(i);

           child->prefix = child_prefix;
           Node* split_child = new Node(parent_prefix);
           split_child->children[child_prefix[0]] = child;
```

```
        children[parent_prefix[0]] = split_child;

        return split_child->CreateChild(path_prefix.substr(i));
      }

  }
    child->is_leaf = true;
    return child->CreateChild(path_prefix.substr(i));
  }

  Node* CreateWildcardChild() {
    if (wildcard_child != nullptr) {
      return wildcard_child;
    }
    wildcard_child = new Node();
    return wildcard_child;
  }

  Node* NextNode(const std::string& path, size_t idx) const {
    if (idx >= path.length()) {
      return nullptr;
    }

    // wildcard node takes precedence
    if (children.size() > 1) {
      auto it = children.find('*');
      if (it != children.end()) {
        return it->second;
      }
    }

    auto it = children.find(path[idx]);
    if (it == children.end()) {
      return nullptr;
    }
    auto child = it->second;
    // match prefix
    size_t prefix_len = child->prefix.length();
    for (size_t i = 0; i < path.length(); ++i) {
      if (i >= prefix_len || child->prefix[i] == '*') {
        return
child;
      }

      // Handle optional trailing
      // path = /home/subdirectory
      // child = subdirectory/*
      if (idx >= path.length() &&
```

```
            child->prefix[i] == node::kPathSeparator) {
          continue;
        }

        if (path[idx++] != child->prefix[i]) {
          return nullptr;
        }
      }
      return child;
    }

    // A node can be a *end* node and have children
    // E.g: */slower*, */slown* are inserted:
    // /slow
    // ---> er
    // ---> n
    // If */slow* is inserted right after, it will create an
    // empty node
    // /slow
    // ---> '\000' ASCII (0) || \0
    // ---> er
    // ---> n
    bool IsEndNode() const {
      if (children.empty()) {
        return true;
      }
      return is_leaf;
    }
  };

  RadixTree();
  ~RadixTree();
  void Insert(const std::string& s);
  bool Lookup(const std::string_view& s) const { return Lookup(s, false);
}
  bool Lookup(const std::string_view& s, bool when_empty_return) const;

 private:
  Node* root_node_;
};

private:
 void GrantAccess(PermissionScope scope, const std::string& param);
 // fs granted on startup
 RadixTree granted_in_fs_;
 RadixTree granted_out_fs_;

 bool deny_all_in_ = true;
```

```
 bool deny_all_out_ = true;

 bool allow_all_in_ = false;
 bool allow_all_out_ = false;
};

}  // namespace permission

}  // namespace node

#endif  // defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
#endif  // SRC_PERMISSION_FS_PERMISSION_H_
```

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/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_OCSP_H
#define OPENSSL_OCSP_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_OCSP_H
#endif

#include <openssl/opensslconf.h>
#include <openssl/http.h>
#include <openssl/asn1.h>

/*
* These definitions are outside the OPENSSL_NO_OCSP guard because although for
* historical reasons they have OCSP_* names, they can actually be used
* independently of OCSP. E.g. see RFC5280
*/
```

```
/*-
*   CRLReason ::= ENUMERATED {
*       unspecified             (0),
*       keyCompromise
         (1),
*       cACompromise            (2),
*       affiliationChanged      (3),
*       superseded              (4),
*       cessationOfOperation    (5),
*       certificateHold         (6),
*       -- value 7 is not used
*       removeFromCRL           (8),
*       privilegeWithdrawn      (9),
*       aACompromise            (10) }
*/
#define OCSP_REVOKED_STATUS_NOSTATUS -1
#define OCSP_REVOKED_STATUS_UNSPECIFIED 0
#define OCSP_REVOKED_STATUS_KEYCOMPROMISE 1
#define OCSP_REVOKED_STATUS_CACOMPROMISE 2
#define OCSP_REVOKED_STATUS_AFFILIATIONCHANGED 3
#define OCSP_REVOKED_STATUS_SUPERSEDED 4
#define OCSP_REVOKED_STATUS_CESSATIONOFOPERATION 5
#define OCSP_REVOKED_STATUS_CERTIFICATEHOLD 6
#define OCSP_REVOKED_STATUS_REMOVEFROMCRL 8
#define OCSP_REVOKED_STATUS_PRIVILEGEWITHDRAWN 9
#define OCSP_REVOKED_STATUS_AACOMPROMISE 10

#ifndef OPENSSL_NO_OCSP

#include <openssl/x509.h>
#include <openssl/x509v3.h>
#include <openssl/safestack.h>
#include <openssl/ocsperr.h>

#ifdef
 __cplusplus
extern "C" {
#endif

/* Various flags and values */

#define OCSP_DEFAULT_NONCE_LENGTH 16

#define OCSP_NOCERTS 0x1
#define OCSP_NOINTERN 0x2
#define OCSP_NOSIGS 0x4
#define OCSP_NOCHAIN 0x8
#define OCSP_NOVERIFY 0x10
```

```
#define OCSP_NOEXPLICIT 0x20
#define OCSP_NOCASIGN 0x40
#define OCSP_NODELEGATED 0x80
#define OCSP_NOCHECKS 0x100
#define OCSP_TRUSTOTHER 0x200
#define OCSP_RESPID_KEY 0x400
#define OCSP_NOTIME 0x800
#define OCSP_PARTIAL_CHAIN 0x1000

typedef struct ocsp_cert_id_st OCSP_CERTID;
typedef struct ocsp_one_request_st OCSP_ONEREQ;
typedef struct ocsp_req_info_st OCSP_REQINFO;
typedef struct ocsp_signature_st OCSP_SIGNATURE;
typedef struct ocsp_request_st OCSP_REQUEST;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OCSP_CERTID, OCSP_CERTID, OCSP_CERTID)
#define sk_OCSP_CERTID_num(sk) OPENSSL_sk_num(ossl_check_const_OCSP_CERTID_sk_type(sk))
#define sk_OCSP_CERTID_value(sk, idx) ((OCSP_CERTID
*)OPENSSL_sk_value(ossl_check_const_OCSP_CERTID_sk_type(sk),
 (idx)))
#define sk_OCSP_CERTID_new(cmp) ((STACK_OF(OCSP_CERTID)
*)OPENSSL_sk_new(ossl_check_OCSP_CERTID_compfunc_type(cmp)))
#define sk_OCSP_CERTID_new_null() ((STACK_OF(OCSP_CERTID) *)OPENSSL_sk_new_null())
#define sk_OCSP_CERTID_new_reserve(cmp, n) ((STACK_OF(OCSP_CERTID)
*)OPENSSL_sk_new_reserve(ossl_check_OCSP_CERTID_compfunc_type(cmp), (n)))
#define sk_OCSP_CERTID_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_OCSP_CERTID_sk_type(sk), (n))
#define sk_OCSP_CERTID_free(sk) OPENSSL_sk_free(ossl_check_OCSP_CERTID_sk_type(sk))
#define sk_OCSP_CERTID_zero(sk) OPENSSL_sk_zero(ossl_check_OCSP_CERTID_sk_type(sk))
#define sk_OCSP_CERTID_delete(sk, i) ((OCSP_CERTID
*)OPENSSL_sk_delete(ossl_check_OCSP_CERTID_sk_type(sk), (i)))
#define sk_OCSP_CERTID_delete_ptr(sk, ptr) ((OCSP_CERTID
*)OPENSSL_sk_delete_ptr(ossl_check_OCSP_CERTID_sk_type(sk), ossl_check_OCSP_CERTID_type(ptr)))
#define sk_OCSP_CERTID_push(sk, ptr) OPENSSL_sk_push(ossl_check_OCSP_CERTID_sk_type(sk),
ossl_check_OCSP_CERTID_type(ptr))
#define
 sk_OCSP_CERTID_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_OCSP_CERTID_sk_type(sk),
ossl_check_OCSP_CERTID_type(ptr))
#define sk_OCSP_CERTID_pop(sk) ((OCSP_CERTID
*)OPENSSL_sk_pop(ossl_check_OCSP_CERTID_sk_type(sk)))
#define sk_OCSP_CERTID_shift(sk) ((OCSP_CERTID
*)OPENSSL_sk_shift(ossl_check_OCSP_CERTID_sk_type(sk)))
#define sk_OCSP_CERTID_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OCSP_CERTID_sk_type(sk),ossl_check_OCSP_CERTID_freefunc_type(freef
unc))
#define sk_OCSP_CERTID_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_OCSP_CERTID_sk_type(sk),
ossl_check_OCSP_CERTID_type(ptr), (idx))
#define sk_OCSP_CERTID_set(sk, idx, ptr) ((OCSP_CERTID
```

```
*)OPENSSL_sk_set(ossl_check_OCSP_CERTID_sk_type(sk), (idx), ossl_check_OCSP_CERTID_type(ptr)))
#define sk_OCSP_CERTID_find(sk, ptr) OPENSSL_sk_find(ossl_check_OCSP_CERTID_sk_type(sk),
ossl_check_OCSP_CERTID_type(ptr))
#define sk_OCSP_CERTID_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_OCSP_CERTID_sk_type(sk),
ossl_check_OCSP_CERTID_type(ptr))
#define
 sk_OCSP_CERTID_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_OCSP_CERTID_sk_type(sk),
ossl_check_OCSP_CERTID_type(ptr), pnum)
#define sk_OCSP_CERTID_sort(sk) OPENSSL_sk_sort(ossl_check_OCSP_CERTID_sk_type(sk))
#define sk_OCSP_CERTID_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OCSP_CERTID_sk_type(sk))
#define sk_OCSP_CERTID_dup(sk) ((STACK_OF(OCSP_CERTID)
*)OPENSSL_sk_dup(ossl_check_const_OCSP_CERTID_sk_type(sk)))
#define sk_OCSP_CERTID_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OCSP_CERTID)
*)OPENSSL_sk_deep_copy(ossl_check_const_OCSP_CERTID_sk_type(sk),
ossl_check_OCSP_CERTID_copyfunc_type(copyfunc), ossl_check_OCSP_CERTID_freefunc_type(freefunc)))
#define sk_OCSP_CERTID_set_cmp_func(sk, cmp)
((sk_OCSP_CERTID_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OCSP_CERTID_sk_type(sk),
ossl_check_OCSP_CERTID_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(OCSP_ONEREQ, OCSP_ONEREQ, OCSP_ONEREQ)
#define sk_OCSP_ONEREQ_num(sk) OPENSSL_sk_num(ossl_check_const_OCSP_ONEREQ_sk_type(sk))
#define
 sk_OCSP_ONEREQ_value(sk, idx) ((OCSP_ONEREQ
*)OPENSSL_sk_value(ossl_check_const_OCSP_ONEREQ_sk_type(sk), (idx)))
#define sk_OCSP_ONEREQ_new(cmp) ((STACK_OF(OCSP_ONEREQ)
*)OPENSSL_sk_new(ossl_check_OCSP_ONEREQ_compfunc_type(cmp)))
#define sk_OCSP_ONEREQ_new_null() ((STACK_OF(OCSP_ONEREQ) *)OPENSSL_sk_new_null())
#define sk_OCSP_ONEREQ_new_reserve(cmp, n) ((STACK_OF(OCSP_ONEREQ)
*)OPENSSL_sk_new_reserve(ossl_check_OCSP_ONEREQ_compfunc_type(cmp), (n)))
#define sk_OCSP_ONEREQ_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_OCSP_ONEREQ_sk_type(sk), (n))
#define sk_OCSP_ONEREQ_free(sk) OPENSSL_sk_free(ossl_check_OCSP_ONEREQ_sk_type(sk))
#define sk_OCSP_ONEREQ_zero(sk) OPENSSL_sk_zero(ossl_check_OCSP_ONEREQ_sk_type(sk))
#define sk_OCSP_ONEREQ_delete(sk, i) ((OCSP_ONEREQ
*)OPENSSL_sk_delete(ossl_check_OCSP_ONEREQ_sk_type(sk), (i)))
#define sk_OCSP_ONEREQ_delete_ptr(sk, ptr) ((OCSP_ONEREQ
*)OPENSSL_sk_delete_ptr(ossl_check_OCSP_ONEREQ_sk_type(sk),
 ossl_check_OCSP_ONEREQ_type(ptr)))
#define sk_OCSP_ONEREQ_push(sk, ptr) OPENSSL_sk_push(ossl_check_OCSP_ONEREQ_sk_type(sk),
ossl_check_OCSP_ONEREQ_type(ptr))
#define sk_OCSP_ONEREQ_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_OCSP_ONEREQ_sk_type(sk),
ossl_check_OCSP_ONEREQ_type(ptr))
#define sk_OCSP_ONEREQ_pop(sk) ((OCSP_ONEREQ
*)OPENSSL_sk_pop(ossl_check_OCSP_ONEREQ_sk_type(sk)))
#define sk_OCSP_ONEREQ_shift(sk) ((OCSP_ONEREQ
*)OPENSSL_sk_shift(ossl_check_OCSP_ONEREQ_sk_type(sk)))
#define sk_OCSP_ONEREQ_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OCSP_ONEREQ_sk_type(sk),ossl_check_OCSP_ONEREQ_freefunc_type(fr
eefunc))
```

```
#define sk_OCSP_ONEREQ_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_OCSP_ONEREQ_sk_type(sk),
ossl_check_OCSP_ONEREQ_type(ptr), (idx))
#define sk_OCSP_ONEREQ_set(sk, idx, ptr) ((OCSP_ONEREQ
*)OPENSSL_sk_set(ossl_check_OCSP_ONEREQ_sk_type(sk), (idx), ossl_check_OCSP_ONEREQ_type(ptr)))
#define sk_OCSP_ONEREQ_find(sk, ptr) OPENSSL_sk_find(ossl_check_OCSP_ONEREQ_sk_type(sk),
 ossl_check_OCSP_ONEREQ_type(ptr))
#define sk_OCSP_ONEREQ_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_OCSP_ONEREQ_sk_type(sk),
ossl_check_OCSP_ONEREQ_type(ptr))
#define sk_OCSP_ONEREQ_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OCSP_ONEREQ_sk_type(sk), ossl_check_OCSP_ONEREQ_type(ptr), pnum)
#define sk_OCSP_ONEREQ_sort(sk) OPENSSL_sk_sort(ossl_check_OCSP_ONEREQ_sk_type(sk))
#define sk_OCSP_ONEREQ_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OCSP_ONEREQ_sk_type(sk))
#define sk_OCSP_ONEREQ_dup(sk) ((STACK_OF(OCSP_ONEREQ)
*)OPENSSL_sk_dup(ossl_check_const_OCSP_ONEREQ_sk_type(sk)))
#define sk_OCSP_ONEREQ_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OCSP_ONEREQ)
*)OPENSSL_sk_deep_copy(ossl_check_const_OCSP_ONEREQ_sk_type(sk),
ossl_check_OCSP_ONEREQ_copyfunc_type(copyfunc), ossl_check_OCSP_ONEREQ_freefunc_type(freefunc)))
#define sk_OCSP_ONEREQ_set_cmp_func(sk, cmp)
((sk_OCSP_ONEREQ_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OCSP_ONEREQ_sk_type(sk),
ossl_check_OCSP_ONEREQ_compfunc_type(cmp)))

/*
 clang-format on */

#define OCSP_RESPONSE_STATUS_SUCCESSFUL 0
#define OCSP_RESPONSE_STATUS_MALFORMEDREQUEST 1
#define OCSP_RESPONSE_STATUS_INTERNALERROR 2
#define OCSP_RESPONSE_STATUS_TRYLATER 3
#define OCSP_RESPONSE_STATUS_SIGREQUIRED 5
#define OCSP_RESPONSE_STATUS_UNAUTHORIZED 6

typedef struct ocsp_resp_bytes_st OCSP_RESPBYTES;

#define V_OCSP_RESPID_NAME 0
#define V_OCSP_RESPID_KEY 1

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OCSP_RESPID, OCSP_RESPID, OCSP_RESPID)
#define sk_OCSP_RESPID_num(sk) OPENSSL_sk_num(ossl_check_const_OCSP_RESPID_sk_type(sk))
#define sk_OCSP_RESPID_value(sk, idx) ((OCSP_RESPID
*)OPENSSL_sk_value(ossl_check_const_OCSP_RESPID_sk_type(sk), (idx)))
#define sk_OCSP_RESPID_new(cmp) ((STACK_OF(OCSP_RESPID)
*)OPENSSL_sk_new(ossl_check_OCSP_RESPID_compfunc_type(cmp)))
#define sk_OCSP_RESPID_new_null() ((STACK_OF(OCSP_RESPID) *)OPENSSL_sk_new_null())
#define sk_OCSP_RESPID_new_reserve(cmp, n) ((STACK_OF(OCSP_RESPID)
 *)OPENSSL_sk_new_reserve(ossl_check_OCSP_RESPID_compfunc_type(cmp), (n)))
#define sk_OCSP_RESPID_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_OCSP_RESPID_sk_type(sk), (n))
```

```
#define sk_OCSP_RESPID_free(sk) OPENSSL_sk_free(ossl_check_OCSP_RESPID_sk_type(sk))
#define sk_OCSP_RESPID_zero(sk) OPENSSL_sk_zero(ossl_check_OCSP_RESPID_sk_type(sk))
#define sk_OCSP_RESPID_delete(sk, i) ((OCSP_RESPID
*)OPENSSL_sk_delete(ossl_check_OCSP_RESPID_sk_type(sk), (i)))
#define sk_OCSP_RESPID_delete_ptr(sk, ptr) ((OCSP_RESPID
*)OPENSSL_sk_delete_ptr(ossl_check_OCSP_RESPID_sk_type(sk), ossl_check_OCSP_RESPID_type(ptr)))
#define sk_OCSP_RESPID_push(sk, ptr) OPENSSL_sk_push(ossl_check_OCSP_RESPID_sk_type(sk),
ossl_check_OCSP_RESPID_type(ptr))
#define sk_OCSP_RESPID_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_OCSP_RESPID_sk_type(sk),
ossl_check_OCSP_RESPID_type(ptr))
#define sk_OCSP_RESPID_pop(sk) ((OCSP_RESPID
*)OPENSSL_sk_pop(ossl_check_OCSP_RESPID_sk_type(sk)))
#define sk_OCSP_RESPID_shift(sk) ((OCSP_RESPID
 *)OPENSSL_sk_shift(ossl_check_OCSP_RESPID_sk_type(sk)))
#define sk_OCSP_RESPID_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OCSP_RESPID_sk_type(sk),ossl_check_OCSP_RESPID_freefunc_type(freef
unc))
#define sk_OCSP_RESPID_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_OCSP_RESPID_sk_type(sk),
ossl_check_OCSP_RESPID_type(ptr), (idx))
#define sk_OCSP_RESPID_set(sk, idx, ptr) ((OCSP_RESPID
*)OPENSSL_sk_set(ossl_check_OCSP_RESPID_sk_type(sk), (idx), ossl_check_OCSP_RESPID_type(ptr)))
#define sk_OCSP_RESPID_find(sk, ptr) OPENSSL_sk_find(ossl_check_OCSP_RESPID_sk_type(sk),
ossl_check_OCSP_RESPID_type(ptr))
#define sk_OCSP_RESPID_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_OCSP_RESPID_sk_type(sk),
ossl_check_OCSP_RESPID_type(ptr))
#define sk_OCSP_RESPID_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OCSP_RESPID_sk_type(sk), ossl_check_OCSP_RESPID_type(ptr), pnum)
#define sk_OCSP_RESPID_sort(sk) OPENSSL_sk_sort(ossl_check_OCSP_RESPID_sk_type(sk))
#define sk_OCSP_RESPID_is_sorted(sk)
 OPENSSL_sk_is_sorted(ossl_check_const_OCSP_RESPID_sk_type(sk))
#define sk_OCSP_RESPID_dup(sk) ((STACK_OF(OCSP_RESPID)
*)OPENSSL_sk_dup(ossl_check_const_OCSP_RESPID_sk_type(sk)))
#define sk_OCSP_RESPID_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OCSP_RESPID)
*)OPENSSL_sk_deep_copy(ossl_check_const_OCSP_RESPID_sk_type(sk),
ossl_check_OCSP_RESPID_copyfunc_type(copyfunc), ossl_check_OCSP_RESPID_freefunc_type(freefunc)))
#define sk_OCSP_RESPID_set_cmp_func(sk, cmp)
((sk_OCSP_RESPID_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OCSP_RESPID_sk_type(sk),
ossl_check_OCSP_RESPID_compfunc_type(cmp)))

/* clang-format on */

typedef struct ocsp_revoked_info_st OCSP_REVOKEDINFO;

#define V_OCSP_CERTSTATUS_GOOD 0
#define V_OCSP_CERTSTATUS_REVOKED 1
#define V_OCSP_CERTSTATUS_UNKNOWN 2

typedef struct ocsp_cert_status_st OCSP_CERTSTATUS;
```

```
typedef struct ocsp_single_response_st OCSP_SINGLERESP;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OCSP_SINGLERESP, OCSP_SINGLERESP, OCSP_SINGLERESP)
#define
 sk_OCSP_SINGLERESP_num(sk) OPENSSL_sk_num(ossl_check_const_OCSP_SINGLERESP_sk_type(sk))
#define sk_OCSP_SINGLERESP_value(sk, idx) ((OCSP_SINGLERESP
*)OPENSSL_sk_value(ossl_check_const_OCSP_SINGLERESP_sk_type(sk), (idx)))
#define sk_OCSP_SINGLERESP_new(cmp) ((STACK_OF(OCSP_SINGLERESP)
*)OPENSSL_sk_new(ossl_check_OCSP_SINGLERESP_compfunc_type(cmp)))
#define sk_OCSP_SINGLERESP_new_null() ((STACK_OF(OCSP_SINGLERESP) *)OPENSSL_sk_new_null())
#define sk_OCSP_SINGLERESP_new_reserve(cmp, n) ((STACK_OF(OCSP_SINGLERESP)
*)OPENSSL_sk_new_reserve(ossl_check_OCSP_SINGLERESP_compfunc_type(cmp), (n)))
#define sk_OCSP_SINGLERESP_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OCSP_SINGLERESP_sk_type(sk), (n))
#define sk_OCSP_SINGLERESP_free(sk) OPENSSL_sk_free(ossl_check_OCSP_SINGLERESP_sk_type(sk))
#define sk_OCSP_SINGLERESP_zero(sk) OPENSSL_sk_zero(ossl_check_OCSP_SINGLERESP_sk_type(sk))
#define sk_OCSP_SINGLERESP_delete(sk, i) ((OCSP_SINGLERESP
*)OPENSSL_sk_delete(ossl_check_OCSP_SINGLERESP_sk_type(sk),
 (i)))
#define sk_OCSP_SINGLERESP_delete_ptr(sk, ptr) ((OCSP_SINGLERESP
*)OPENSSL_sk_delete_ptr(ossl_check_OCSP_SINGLERESP_sk_type(sk),
ossl_check_OCSP_SINGLERESP_type(ptr)))
#define sk_OCSP_SINGLERESP_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OCSP_SINGLERESP_sk_type(sk), ossl_check_OCSP_SINGLERESP_type(ptr))
#define sk_OCSP_SINGLERESP_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OCSP_SINGLERESP_sk_type(sk),
ossl_check_OCSP_SINGLERESP_type(ptr))
#define sk_OCSP_SINGLERESP_pop(sk) ((OCSP_SINGLERESP
*)OPENSSL_sk_pop(ossl_check_OCSP_SINGLERESP_sk_type(sk)))
#define sk_OCSP_SINGLERESP_shift(sk) ((OCSP_SINGLERESP
*)OPENSSL_sk_shift(ossl_check_OCSP_SINGLERESP_sk_type(sk)))
#define sk_OCSP_SINGLERESP_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OCSP_SINGLERESP_sk_type(sk),ossl_check_OCSP_SINGLERESP_freefun
c_type(freefunc))
#define sk_OCSP_SINGLERESP_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OCSP_SINGLERESP_sk_type(sk), ossl_check_OCSP_SINGLERESP_type(ptr),
 (idx))
#define sk_OCSP_SINGLERESP_set(sk, idx, ptr) ((OCSP_SINGLERESP
*)OPENSSL_sk_set(ossl_check_OCSP_SINGLERESP_sk_type(sk), (idx),
ossl_check_OCSP_SINGLERESP_type(ptr)))
#define sk_OCSP_SINGLERESP_find(sk, ptr) OPENSSL_sk_find(ossl_check_OCSP_SINGLERESP_sk_type(sk),
ossl_check_OCSP_SINGLERESP_type(ptr))
#define sk_OCSP_SINGLERESP_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OCSP_SINGLERESP_sk_type(sk),
ossl_check_OCSP_SINGLERESP_type(ptr))
#define sk_OCSP_SINGLERESP_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OCSP_SINGLERESP_sk_type(sk),
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ossl_check_OCSP_SINGLERESP_type(ptr), pnum)
#define sk_OCSP_SINGLERESP_sort(sk) OPENSSL_sk_sort(ossl_check_OCSP_SINGLERESP_sk_type(sk))
#define sk_OCSP_SINGLERESP_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OCSP_SINGLERESP_sk_type(sk))
#define sk_OCSP_SINGLERESP_dup(sk) ((STACK_OF(OCSP_SINGLERESP)
*)OPENSSL_sk_dup(ossl_check_const_OCSP_SINGLERESP_sk_type(sk)))
#define sk_OCSP_SINGLERESP_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OCSP_SINGLERESP)
 *)OPENSSL_sk_deep_copy(ossl_check_const_OCSP_SINGLERESP_sk_type(sk),
ossl_check_OCSP_SINGLERESP_copyfunc_type(copyfunc),
ossl_check_OCSP_SINGLERESP_freefunc_type(freefunc)))
#define sk_OCSP_SINGLERESP_set_cmp_func(sk, cmp)
((sk_OCSP_SINGLERESP_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OCSP_SINGLERESP_sk_type(sk
), ossl_check_OCSP_SINGLERESP_compfunc_type(cmp)))

/* clang-format on */

typedef struct ocsp_response_data_st OCSP_RESPDATA;

typedef struct ocsp_basic_response_st OCSP_BASICRESP;

typedef struct ocsp_crl_id_st OCSP_CRLID;
typedef struct ocsp_service_locator_st OCSP_SERVICELOC;

#define PEM_STRING_OCSP_REQUEST "OCSP REQUEST"
#define PEM_STRING_OCSP_RESPONSE "OCSP RESPONSE"

#define d2i_OCSP_REQUEST_bio(bp, p) ASN1_d2i_bio_of(OCSP_REQUEST, OCSP_REQUEST_new,
d2i_OCSP_REQUEST, bp, p)

#define d2i_OCSP_RESPONSE_bio(bp, p) ASN1_d2i_bio_of(OCSP_RESPONSE, OCSP_RESPONSE_new,
d2i_OCSP_RESPONSE, bp, p)

#define PEM_read_bio_OCSP_REQUEST(bp, x, cb) (OCSP_REQUEST *)PEM_ASN1_read_bio(
 \
  (d2i_of_void *)d2i_OCSP_REQUEST, PEM_STRING_OCSP_REQUEST,                    \
  bp, (char **)(x), cb, NULL)

#define PEM_read_bio_OCSP_RESPONSE(bp, x, cb) (OCSP_RESPONSE *)PEM_ASN1_read_bio( \
  (d2i_of_void *)d2i_OCSP_RESPONSE, PEM_STRING_OCSP_RESPONSE,                  \
  bp, (char **)(x), cb, NULL)

#define PEM_write_bio_OCSP_REQUEST(bp, o)                                    \
  PEM_ASN1_write_bio((i2d_of_void *)i2d_OCSP_REQUEST, PEM_STRING_OCSP_REQUEST, \
     bp, (char *)(o), NULL, NULL, 0, NULL, NULL)

#define PEM_write_bio_OCSP_RESPONSE(bp, o)                                   \
  PEM_ASN1_write_bio((i2d_of_void *)i2d_OCSP_RESPONSE, PEM_STRING_OCSP_RESPONSE, \
     bp, (char *)(o), NULL, NULL, 0, NULL, NULL)
```

```
#define i2d_OCSP_RESPONSE_bio(bp, o) ASN1_i2d_bio_of(OCSP_RESPONSE, i2d_OCSP_RESPONSE, bp, o)

#define i2d_OCSP_REQUEST_bio(bp, o) ASN1_i2d_bio_of(OCSP_REQUEST, i2d_OCSP_REQUEST, bp, o)

#define ASN1_BIT_STRING_digest(data,
 type, md, len) \
   ASN1_item_digest(ASN1_ITEM_rptr(ASN1_BIT_STRING), type, data, md, len)

#define OCSP_CERTSTATUS_dup(cs)                                \
   (OCSP_CERTSTATUS *)ASN1_dup((i2d_of_void *)i2d_OCSP_CERTSTATUS, \
      (d2i_of_void *)d2i_OCSP_CERTSTATUS, (char *)(cs))

DECLARE_ASN1_DUP_FUNCTION(OCSP_CERTID)

OSSL_HTTP_REQ_CTX *OCSP_sendreq_new(BIO *io, const char *path,
   const OCSP_REQUEST *req, int buf_size);
OCSP_RESPONSE *OCSP_sendreq_bio(BIO *b, const char *path, OCSP_REQUEST *req);

#ifndef OPENSSL_NO_DEPRECATED_3_0
typedef OSSL_HTTP_REQ_CTX OCSP_REQ_CTX;
#define OCSP_REQ_CTX_new(io, buf_size) \
   OSSL_HTTP_REQ_CTX_new(io, io, buf_size)
#define OCSP_REQ_CTX_free OSSL_HTTP_REQ_CTX_free
#define OCSP_REQ_CTX_http(rctx, op, path) \
   (OSSL_HTTP_REQ_CTX_set_expected(rctx, NULL, 1 /* asn1 */, 0, 0) &&
OSSL_HTTP_REQ_CTX_set_request_line(rctx, strcmp(op, "POST") == 0, NULL, NULL, path))
#define OCSP_REQ_CTX_add1_header OSSL_HTTP_REQ_CTX_add1_header
#define OCSP_REQ_CTX_i2d(r,
 it, req) \
   OSSL_HTTP_REQ_CTX_set1_req(r, "application/ocsp-request", it, req)
#define OCSP_REQ_CTX_set1_req(r, req) \
   OCSP_REQ_CTX_i2d(r, ASN1_ITEM_rptr(OCSP_REQUEST), (ASN1_VALUE *)(req))
#define OCSP_REQ_CTX_nbio OSSL_HTTP_REQ_CTX_nbio
#define OCSP_REQ_CTX_nbio_d2i OSSL_HTTP_REQ_CTX_nbio_d2i
#define OCSP_sendreq_nbio(p, r)                        \
   OSSL_HTTP_REQ_CTX_nbio_d2i(r, (ASN1_VALUE **)(p), \
      ASN1_ITEM_rptr(OCSP_RESPONSE))
#define OCSP_REQ_CTX_get0_mem_bio OSSL_HTTP_REQ_CTX_get0_mem_bio
#define OCSP_set_max_response_length OSSL_HTTP_REQ_CTX_set_max_response_length
#endif

OCSP_CERTID *OCSP_cert_to_id(const EVP_MD *dgst, const X509 *subject,
   const X509 *issuer);

OCSP_CERTID *OCSP_cert_id_new(const EVP_MD *dgst,
   const X509_NAME *issuerName,
   const ASN1_BIT_STRING *issuerKey,
```

```
   const ASN1_INTEGER *serialNumber);

OCSP_ONEREQ *OCSP_request_add0_id(OCSP_REQUEST *req, OCSP_CERTID *cid);

int OCSP_request_add1_nonce(OCSP_REQUEST *req,
 unsigned char *val, int len);
int OCSP_basic_add1_nonce(OCSP_BASICRESP *resp, unsigned char *val, int len);
int OCSP_check_nonce(OCSP_REQUEST *req, OCSP_BASICRESP *bs);
int OCSP_copy_nonce(OCSP_BASICRESP *resp, OCSP_REQUEST *req);

int OCSP_request_set1_name(OCSP_REQUEST *req, const X509_NAME *nm);
int OCSP_request_add1_cert(OCSP_REQUEST *req, X509 *cert);

int OCSP_request_sign(OCSP_REQUEST *req,
   X509 *signer,
   EVP_PKEY *key,
   const EVP_MD *dgst,
   STACK_OF(X509) *certs, unsigned long flags);

int OCSP_response_status(OCSP_RESPONSE *resp);
OCSP_BASICRESP *OCSP_response_get1_basic(OCSP_RESPONSE *resp);

const ASN1_OCTET_STRING *OCSP_resp_get0_signature(const OCSP_BASICRESP *bs);
const X509_ALGOR *OCSP_resp_get0_tbs_sigalg(const OCSP_BASICRESP *bs);
const OCSP_RESPDATA *OCSP_resp_get0_respdata(const OCSP_BASICRESP *bs);
int OCSP_resp_get0_signer(OCSP_BASICRESP *bs, X509 **signer,
   STACK_OF(X509) *extra_certs);

int OCSP_resp_count(OCSP_BASICRESP *bs);
OCSP_SINGLERESP *OCSP_resp_get0(OCSP_BASICRESP
 *bs, int idx);
const ASN1_GENERALIZEDTIME *OCSP_resp_get0_produced_at(const OCSP_BASICRESP *bs);
const STACK_OF(X509) *OCSP_resp_get0_certs(const OCSP_BASICRESP *bs);
int OCSP_resp_get0_id(const OCSP_BASICRESP *bs,
   const ASN1_OCTET_STRING **pid,
   const X509_NAME **pname);
int OCSP_resp_get1_id(const OCSP_BASICRESP *bs,
   ASN1_OCTET_STRING **pid,
   X509_NAME **pname);

int OCSP_resp_find(OCSP_BASICRESP *bs, OCSP_CERTID *id, int last);
int OCSP_single_get0_status(OCSP_SINGLERESP *single, int *reason,
   ASN1_GENERALIZEDTIME **revtime,
   ASN1_GENERALIZEDTIME **thisupd,
   ASN1_GENERALIZEDTIME **nextupd);
int OCSP_resp_find_status(OCSP_BASICRESP *bs, OCSP_CERTID *id, int *status,
   int *reason,
   ASN1_GENERALIZEDTIME **revtime,
```

```
   ASN1_GENERALIZEDTIME **thisupd,
   ASN1_GENERALIZEDTIME **nextupd);
int OCSP_check_validity(ASN1_GENERALIZEDTIME *thisupd,
   ASN1_GENERALIZEDTIME *nextupd, long sec, long maxsec);

int OCSP_request_verify(OCSP_REQUEST
 *req, STACK_OF(X509) *certs,
   X509_STORE *store, unsigned long flags);

#define OCSP_parse_url(url, host, port, path, ssl) \
   OSSL_HTTP_parse_url(url, ssl, NULL, host, port, NULL, path, NULL, NULL)

int OCSP_id_issuer_cmp(const OCSP_CERTID *a, const OCSP_CERTID *b);
int OCSP_id_cmp(const OCSP_CERTID *a, const OCSP_CERTID *b);

int OCSP_request_onereq_count(OCSP_REQUEST *req);
OCSP_ONEREQ *OCSP_request_onereq_get0(OCSP_REQUEST *req, int i);
OCSP_CERTID *OCSP_onereq_get0_id(OCSP_ONEREQ *one);
int OCSP_id_get0_info(ASN1_OCTET_STRING **piNameHash, ASN1_OBJECT **pmd,
   ASN1_OCTET_STRING **pikeyHash,
   ASN1_INTEGER **pserial, OCSP_CERTID *cid);
int OCSP_request_is_signed(OCSP_REQUEST *req);
OCSP_RESPONSE *OCSP_response_create(int status, OCSP_BASICRESP *bs);
OCSP_SINGLERESP *OCSP_basic_add1_status(OCSP_BASICRESP *rsp,
   OCSP_CERTID *cid,
   int status, int reason,
   ASN1_TIME *revtime,
   ASN1_TIME *thisupd,
   ASN1_TIME *nextupd);
int OCSP_basic_add1_cert(OCSP_BASICRESP
 *resp, X509 *cert);
int OCSP_basic_sign(OCSP_BASICRESP *brsp,
   X509 *signer, EVP_PKEY *key, const EVP_MD *dgst,
   STACK_OF(X509) *certs, unsigned long flags);
int OCSP_basic_sign_ctx(OCSP_BASICRESP *brsp,
   X509 *signer, EVP_MD_CTX *ctx,
   STACK_OF(X509) *certs, unsigned long flags);
int OCSP_RESPID_set_by_name(OCSP_RESPID *respid, X509 *cert);
int OCSP_RESPID_set_by_key_ex(OCSP_RESPID *respid, X509 *cert,
   OSSL_LIB_CTX *libctx, const char *propq);
int OCSP_RESPID_set_by_key(OCSP_RESPID *respid, X509 *cert);
int OCSP_RESPID_match_ex(OCSP_RESPID *respid, X509 *cert, OSSL_LIB_CTX *libctx,
   const char *propq);
int OCSP_RESPID_match(OCSP_RESPID *respid, X509 *cert);

X509_EXTENSION *OCSP_crlID_new(const char *url, long *n, char *tim);

X509_EXTENSION *OCSP_accept_responses_new(char **oids);
```

```
X509_EXTENSION *OCSP_archive_cutoff_new(char *tim);

X509_EXTENSION *OCSP_url_svcloc_new(const X509_NAME *issuer, const char **urls);

int OCSP_REQUEST_get_ext_count(OCSP_REQUEST *x);
int
 OCSP_REQUEST_get_ext_by_NID(OCSP_REQUEST *x, int nid, int lastpos);
int OCSP_REQUEST_get_ext_by_OBJ(OCSP_REQUEST *x, const ASN1_OBJECT *obj,
   int lastpos);
int OCSP_REQUEST_get_ext_by_critical(OCSP_REQUEST *x, int crit, int lastpos);
X509_EXTENSION *OCSP_REQUEST_get_ext(OCSP_REQUEST *x, int loc);
X509_EXTENSION *OCSP_REQUEST_delete_ext(OCSP_REQUEST *x, int loc);
void *OCSP_REQUEST_get1_ext_d2i(OCSP_REQUEST *x, int nid, int *crit,
   int *idx);
int OCSP_REQUEST_add1_ext_i2d(OCSP_REQUEST *x, int nid, void *value, int crit,
   unsigned long flags);
int OCSP_REQUEST_add_ext(OCSP_REQUEST *x, X509_EXTENSION *ex, int loc);

int OCSP_ONEREQ_get_ext_count(OCSP_ONEREQ *x);
int OCSP_ONEREQ_get_ext_by_NID(OCSP_ONEREQ *x, int nid, int lastpos);
int OCSP_ONEREQ_get_ext_by_OBJ(OCSP_ONEREQ *x, const ASN1_OBJECT *obj, int lastpos);
int OCSP_ONEREQ_get_ext_by_critical(OCSP_ONEREQ *x, int crit, int lastpos);
X509_EXTENSION *OCSP_ONEREQ_get_ext(OCSP_ONEREQ *x, int loc);
X509_EXTENSION *OCSP_ONEREQ_delete_ext(OCSP_ONEREQ
 *x, int loc);
void *OCSP_ONEREQ_get1_ext_d2i(OCSP_ONEREQ *x, int nid, int *crit, int *idx);
int OCSP_ONEREQ_add1_ext_i2d(OCSP_ONEREQ *x, int nid, void *value, int crit,
   unsigned long flags);
int OCSP_ONEREQ_add_ext(OCSP_ONEREQ *x, X509_EXTENSION *ex, int loc);

int OCSP_BASICRESP_get_ext_count(OCSP_BASICRESP *x);
int OCSP_BASICRESP_get_ext_by_NID(OCSP_BASICRESP *x, int nid, int lastpos);
int OCSP_BASICRESP_get_ext_by_OBJ(OCSP_BASICRESP *x, const ASN1_OBJECT *obj,
   int lastpos);
int OCSP_BASICRESP_get_ext_by_critical(OCSP_BASICRESP *x, int crit,
   int lastpos);
X509_EXTENSION *OCSP_BASICRESP_get_ext(OCSP_BASICRESP *x, int loc);
X509_EXTENSION *OCSP_BASICRESP_delete_ext(OCSP_BASICRESP *x, int loc);
void *OCSP_BASICRESP_get1_ext_d2i(OCSP_BASICRESP *x, int nid, int *crit,
   int *idx);
int OCSP_BASICRESP_add1_ext_i2d(OCSP_BASICRESP *x, int nid, void *value,
   int crit, unsigned long flags);
int OCSP_BASICRESP_add_ext(OCSP_BASICRESP *x, X509_EXTENSION *ex,
 int loc);

int OCSP_SINGLERESP_get_ext_count(OCSP_SINGLERESP *x);
int OCSP_SINGLERESP_get_ext_by_NID(OCSP_SINGLERESP *x, int nid, int lastpos);
```

```
int OCSP_SINGLERESP_get_ext_by_OBJ(OCSP_SINGLERESP *x, const ASN1_OBJECT *obj,
   int lastpos);
int OCSP_SINGLERESP_get_ext_by_critical(OCSP_SINGLERESP *x, int crit,
   int lastpos);
X509_EXTENSION *OCSP_SINGLERESP_get_ext(OCSP_SINGLERESP *x, int loc);
X509_EXTENSION *OCSP_SINGLERESP_delete_ext(OCSP_SINGLERESP *x, int loc);
void *OCSP_SINGLERESP_get1_ext_d2i(OCSP_SINGLERESP *x, int nid, int *crit,
   int *idx);
int OCSP_SINGLERESP_add1_ext_i2d(OCSP_SINGLERESP *x, int nid, void *value,
   int crit, unsigned long flags);
int OCSP_SINGLERESP_add_ext(OCSP_SINGLERESP *x, X509_EXTENSION *ex, int loc);
const OCSP_CERTID *OCSP_SINGLERESP_get0_id(const OCSP_SINGLERESP *x);

DECLARE_ASN1_FUNCTIONS(OCSP_SINGLERESP)
DECLARE_ASN1_FUNCTIONS(OCSP_CERTSTATUS)
DECLARE_ASN1_FUNCTIONS(OCSP_REVOKEDINFO)
DECLARE_ASN1_FUNCTIONS(OCSP_BASICRESP)
DECLARE_ASN1_FUNCTIONS(OCSP_RESPDATA)
DECLARE_ASN1_FUNCTIONS(OCSP_RESPID)
DECLARE_ASN1_FUNCTIONS(OCSP_RESPONSE)
DECLARE_ASN1_FUNCTIONS(OCSP_RESPBYTES)
DECLARE_ASN1_FUNCTIONS(OCSP_ONEREQ)
DECLARE_ASN1_FUNCTIONS(OCSP_CERTID)
DECLARE_ASN1_FUNCTIONS(OCSP_REQUEST)
DECLARE_ASN1_FUNCTIONS(OCSP_SIGNATURE)
DECLARE_ASN1_FUNCTIONS(OCSP_REQINFO)
DECLARE_ASN1_FUNCTIONS(OCSP_CRLID)
DECLARE_ASN1_FUNCTIONS(OCSP_SERVICELOC)

const
 char *OCSP_response_status_str(long s);
const char *OCSP_cert_status_str(long s);
const char *OCSP_crl_reason_str(long s);

int OCSP_REQUEST_print(BIO *bp, OCSP_REQUEST *a, unsigned long flags);
int OCSP_RESPONSE_print(BIO *bp, OCSP_RESPONSE *o, unsigned long flags);

int OCSP_basic_verify(OCSP_BASICRESP *bs, STACK_OF(X509) *certs,
   X509_STORE *st, unsigned long flags);

#ifdef __cplusplus
}
#endif
#endif /* !defined(OPENSSL_NO_OCSP) */
#endif
```

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```
{
 'variables': {
   'openssl_defines_BSD-x86_64': [
     'NDEBUG',
     'L_ENDIAN',
     'OPENSSL_BUILDING_OPENSSL',
     'AES_ASM',
     'BSAES_ASM',
     'CMLL_ASM',
     'ECP_NISTZ256_ASM',
     'GHASH_ASM',
     'KECCAK1600_ASM',
     'MD5_ASM',
     'OPENSSL_BN_ASM_GF2m',
     'OPENSSL_BN_ASM_MONT',
     'OPENSSL_BN_ASM_MONT5',
     'OPENSSL_CPUID_OBJ',
     'OPENSSL_IA32_SSE2',
     'PADLOCK_ASM',
     'POLY1305_ASM',
     'RC4_ASM',
     'SHA1_ASM',
     'SHA256_ASM',
     'SHA512_ASM',
     'VPAES_ASM',
     'WHIRLPOOL_ASM',
     'X25519_ASM',
     'OPENSSL_PIC',
   ],
```

```
'openssl_cflags_BSD-x86_64': [
  '-Wa,--noexecstack',
  '-Wall -O3',
  '-pthread',
  '-Wall -O3',
],
'openssl_ex_libs_BSD-x86_64': [
  '-pthread',
],
'openssl_cli_srcs_BSD-x86_64': [
  'openssl/apps/lib/cmp_mock_srv.c',
  'openssl/apps/asn1parse.c',
  'openssl/apps/ca.c',
  'openssl/apps/ciphers.c',
  'openssl/apps/cmp.c',

 'openssl/apps/cms.c',
  'openssl/apps/crl.c',
  'openssl/apps/crl2pkcs7.c',
  'openssl/apps/dgst.c',
  'openssl/apps/dhparam.c',
  'openssl/apps/dsa.c',
  'openssl/apps/dsaparam.c',
  'openssl/apps/ec.c',
  'openssl/apps/ecparam.c',
  'openssl/apps/enc.c',
  'openssl/apps/engine.c',
  'openssl/apps/errstr.c',
  'openssl/apps/fipsinstall.c',
  'openssl/apps/gendsa.c',
  'openssl/apps/genpkey.c',
  'openssl/apps/genrsa.c',
  'openssl/apps/info.c',
  'openssl/apps/kdf.c',
  'openssl/apps/list.c',
  'openssl/apps/mac.c',
  'openssl/apps/nseq.c',
  'openssl/apps/ocsp.c',
  'openssl/apps/openssl.c',
  'openssl/apps/passwd.c',
  'openssl/apps/pkcs12.c',
  'openssl/apps/pkcs7.c',
  'openssl/apps/pkcs8.c',
  'openssl/apps/pkey.c',
  'openssl/apps/pkeyparam.c',
  'openssl/apps/pkeyutl.c',
  'openssl/apps/prime.c',
  './config/archs/BSD-x86_64/asm/apps/progs.c',
```

```
    'openssl/apps/rand.c',
     'openssl/apps/rehash.c',
    'openssl/apps/req.c',
    'openssl/apps/rsa.c',
    'openssl/apps/rsautl.c',
    'openssl/apps/s_client.c',
    'openssl/apps/s_server.c',
    'openssl/apps/s_time.c',
    'openssl/apps/sess_id.c',
    'openssl/apps/skeyutl.c',
    'openssl/apps/smime.c',
    'openssl/apps/speed.c',
    'openssl/apps/spkac.c',
    'openssl/apps/srp.c',
    'openssl/apps/storeutl.c',
    'openssl/apps/ts.c',
    'openssl/apps/verify.c',
    'openssl/apps/version.c',
    'openssl/apps/x509.c',
    'openssl/apps/lib/app_libctx.c',
    'openssl/apps/lib/app_params.c',
    'openssl/apps/lib/app_provider.c',
    'openssl/apps/lib/app_rand.c',
    'openssl/apps/lib/app_x509.c',
    'openssl/apps/lib/apps.c',
    'openssl/apps/lib/apps_opt_printf.c',
    'openssl/apps/lib/apps_ui.c',
    'openssl/apps/lib/columns.c',
    'openssl/apps/lib/engine.c',
    'openssl/apps/lib/engine_loader.c',
    'openssl/apps/lib/fmt.c',
     'openssl/apps/lib/http_server.c',
    'openssl/apps/lib/log.c',
    'openssl/apps/lib/names.c',
    'openssl/apps/lib/opt.c',
    'openssl/apps/lib/s_cb.c',
    'openssl/apps/lib/s_socket.c',
    'openssl/apps/lib/tlssrp_depr.c',
  ],
},
'defines': ['<@(openssl_defines_BSD-x86_64)'],
'include_dirs': [
  './include',
],
'cflags' : ['<@(openssl_cflags_BSD-x86_64)'],
'libraries': ['<@(openssl_ex_libs_BSD-x86_64)'],
'sources': ['<@(openssl_cli_srcs_BSD-x86_64)'],
}
```

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```
/*
* WARNING: do not edit!
* Generated by configdata.pm from Configurations/common0.tmpl, Configurations/unix-Makefile.tmpl
* via Makefile.in
*
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*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#ifndef OPENSSL_CONFIGURATION_H
#define OPENSSL_CONFIGURATION_H
#pragma once

#ifdef __cplusplus
extern "C" {
```

```
#endif

#ifdef OPENSSL_ALGORITHM_DEFINES
#error OPENSSL_ALGORITHM_DEFINES no longer supported
#endif

/*
* OpenSSL was configured with the following options:
*/

/* clang-format off */
# define OPENSSL_CONFIGURED_API 30500
# ifndef OPENSSL_RAND_SEED_OS
#  define OPENSSL_RAND_SEED_OS
# endif
# ifndef OPENSSL_THREADS
#  define OPENSSL_THREADS
# endif
# ifndef OPENSSL_NO_AFALGENG
#  define OPENSSL_NO_AFALGENG
#
 endif
# ifndef OPENSSL_NO_ASAN
#  define OPENSSL_NO_ASAN
# endif
# ifndef OPENSSL_NO_BROTLI
#  define OPENSSL_NO_BROTLI
# endif
# ifndef OPENSSL_NO_BROTLI_DYNAMIC
#  define OPENSSL_NO_BROTLI_DYNAMIC
# endif
# ifndef OPENSSL_NO_COMP
#  define OPENSSL_NO_COMP
# endif
# ifndef OPENSSL_NO_CRYPTO_MDEBUG
#  define OPENSSL_NO_CRYPTO_MDEBUG
# endif
# ifndef OPENSSL_NO_CRYPTO_MDEBUG_BACKTRACE
#  define OPENSSL_NO_CRYPTO_MDEBUG_BACKTRACE
# endif
# ifndef OPENSSL_NO_DEMOS
#  define OPENSSL_NO_DEMOS
# endif
# ifndef OPENSSL_NO_EC_NISTP_64_GCC_128
#  define OPENSSL_NO_EC_NISTP_64_GCC_128
# endif
# ifndef OPENSSL_NO_EGD
#  define OPENSSL_NO_EGD
```

```
# endif
# ifndef OPENSSL_NO_EXTERNAL_TESTS
#  define OPENSSL_NO_EXTERNAL_TESTS
# endif
# ifndef OPENSSL_NO_FIPS_JITTER
#  define OPENSSL_NO_FIPS_JITTER
# endif
# ifndef OPENSSL_NO_FUZZ_AFL
#  define OPENSSL_NO_FUZZ_AFL
# endif
# ifndef OPENSSL_NO_FUZZ_LIBFUZZER
#  define OPENSSL_NO_FUZZ_LIBFUZZER
# endif
# ifndef OPENSSL_NO_H3DEMO
#  define OPENSSL_NO_H3DEMO
#
 endif
# ifndef OPENSSL_NO_HQINTEROP
#  define OPENSSL_NO_HQINTEROP
# endif
# ifndef OPENSSL_NO_JITTER
#  define OPENSSL_NO_JITTER
# endif
# ifndef OPENSSL_NO_KTLS
#  define OPENSSL_NO_KTLS
# endif
# ifndef OPENSSL_NO_LOADERENG
#  define OPENSSL_NO_LOADERENG
# endif
# ifndef OPENSSL_NO_MD2
#  define OPENSSL_NO_MD2
# endif
# ifndef OPENSSL_NO_MSAN
#  define OPENSSL_NO_MSAN
# endif
# ifndef OPENSSL_NO_PIE
#  define OPENSSL_NO_PIE
# endif
# ifndef OPENSSL_NO_RC5
#  define OPENSSL_NO_RC5
# endif
# ifndef OPENSSL_NO_SCTP
#  define OPENSSL_NO_SCTP
# endif
# ifndef OPENSSL_NO_SSL3
#  define OPENSSL_NO_SSL3
# endif
# ifndef OPENSSL_NO_SSL3_METHOD
```

```
#  define OPENSSL_NO_SSL3_METHOD
# endif
# ifndef OPENSSL_NO_SSLKEYLOG
#  define OPENSSL_NO_SSLKEYLOG
# endif
# ifndef OPENSSL_NO_TFO
#  define OPENSSL_NO_TFO
# endif
# ifndef OPENSSL_NO_TRACE
#  define OPENSSL_NO_TRACE
# endif
# ifndef OPENSSL_NO_UBSAN
#  define OPENSSL_NO_UBSAN
# endif
# ifndef OPENSSL_NO_UNIT_TEST
#  define OPENSSL_NO_UNIT_TEST
#
 endif
# ifndef OPENSSL_NO_UPLINK
#  define OPENSSL_NO_UPLINK
# endif
# ifndef OPENSSL_NO_WEAK_SSL_CIPHERS
#  define OPENSSL_NO_WEAK_SSL_CIPHERS
# endif
# ifndef OPENSSL_NO_WINSTORE
#  define OPENSSL_NO_WINSTORE
# endif
# ifndef OPENSSL_NO_ZLIB
#  define OPENSSL_NO_ZLIB
# endif
# ifndef OPENSSL_NO_ZLIB_DYNAMIC
#  define OPENSSL_NO_ZLIB_DYNAMIC
# endif
# ifndef OPENSSL_NO_ZSTD
#  define OPENSSL_NO_ZSTD
# endif
# ifndef OPENSSL_NO_ZSTD_DYNAMIC
#  define OPENSSL_NO_ZSTD_DYNAMIC
# endif
# ifndef OPENSSL_NO_DYNAMIC_ENGINE
#  define OPENSSL_NO_DYNAMIC_ENGINE
# endif

/* clang-format on */

/* Generate 80386 code? */
/* clang-format off */
# undef I386_ONLY
```

```
/* clang-format on */

/*
* The following are cipher-specific, but are part of the public API.
*/
#if !defined(OPENSSL_SYS_UEFI)
   /* clang-format off */
#  undef BN_LLONG
   /* clang-format on */
   /* Only one for the following should be defined */
   /* clang-format off */
#  define SIXTY_FOUR_BIT_LONG
   /* clang-format on
 */
   /* clang-format off */
#  undef SIXTY_FOUR_BIT
   /* clang-format on */
   /* clang-format off */
#  undef THIRTY_TWO_BIT
/* clang-format on */
#endif

/* clang-format off */
# define RC4_INT unsigned int
/* clang-format on */

#if defined(OPENSSL_NO_COMP) || (defined(OPENSSL_NO_BROTLI) && defined(OPENSSL_NO_ZSTD) &&
defined(OPENSSL_NO_ZLIB))
#define OPENSSL_NO_COMP_ALG
#else
#undef OPENSSL_NO_COMP_ALG
#endif

#ifdef __cplusplus
}
#endif

#endif /* OPENSSL_CONFIGURATION_H */
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/pkcs7.h.in
*
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*
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_PKCS7_H
```

```
#define OPENSSL_PKCS7_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_PKCS7_H
#endif

#include <openssl/asn1.h>
#include <openssl/bio.h>
#include <openssl/e_os2.h>

#include <openssl/symhacks.h>
#include <openssl/types.h>
#include <openssl/pkcs7err.h>
#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif

#ifdef __cplusplus
extern "C" {
#endif

/*-
Encryption_ID           DES-CBC
Digest_ID               MD5
Digest_Encryption_ID    rsaEncryption
Key_Encryption_ID
      rsaEncryption
*/

typedef struct PKCS7_CTX_st {
  OSSL_LIB_CTX *libctx;
  char *propq;
} PKCS7_CTX;

typedef struct pkcs7_issuer_and_serial_st {
  X509_NAME *issuer;
  ASN1_INTEGER *serial;
} PKCS7_ISSUER_AND_SERIAL;

typedef struct pkcs7_signer_info_st {
  ASN1_INTEGER *version; /* version 1 */
  PKCS7_ISSUER_AND_SERIAL *issuer_and_serial;
  X509_ALGOR *digest_alg;
  STACK_OF(X509_ATTRIBUTE) *auth_attr; /* [ 0 ] */
  X509_ALGOR *digest_enc_alg; /* confusing name, actually used for signing */
  ASN1_OCTET_STRING *enc_digest; /* confusing name, actually signature */
```

```
  STACK_OF(X509_ATTRIBUTE) *unauth_attr; /* [ 1 ] */
  /* The private key to sign with */
  EVP_PKEY *pkey;
  const PKCS7_CTX *ctx;
} PKCS7_SIGNER_INFO;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(PKCS7_SIGNER_INFO, PKCS7_SIGNER_INFO,
PKCS7_SIGNER_INFO)
#define sk_PKCS7_SIGNER_INFO_num(sk)
OPENSSL_sk_num(ossl_check_const_PKCS7_SIGNER_INFO_sk_type(sk))
#define sk_PKCS7_SIGNER_INFO_value(sk,
 idx) ((PKCS7_SIGNER_INFO *)OPENSSL_sk_value(ossl_check_const_PKCS7_SIGNER_INFO_sk_type(sk),
(idx)))
#define sk_PKCS7_SIGNER_INFO_new(cmp) ((STACK_OF(PKCS7_SIGNER_INFO)
*)OPENSSL_sk_new(ossl_check_PKCS7_SIGNER_INFO_compfunc_type(cmp)))
#define sk_PKCS7_SIGNER_INFO_new_null() ((STACK_OF(PKCS7_SIGNER_INFO)
*)OPENSSL_sk_new_null())
#define sk_PKCS7_SIGNER_INFO_new_reserve(cmp, n) ((STACK_OF(PKCS7_SIGNER_INFO)
*)OPENSSL_sk_new_reserve(ossl_check_PKCS7_SIGNER_INFO_compfunc_type(cmp), (n)))
#define sk_PKCS7_SIGNER_INFO_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk), (n))
#define sk_PKCS7_SIGNER_INFO_free(sk)
OPENSSL_sk_free(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk))
#define sk_PKCS7_SIGNER_INFO_zero(sk)
OPENSSL_sk_zero(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk))
#define sk_PKCS7_SIGNER_INFO_delete(sk, i) ((PKCS7_SIGNER_INFO
*)OPENSSL_sk_delete(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk), (i)))
#define sk_PKCS7_SIGNER_INFO_delete_ptr(sk, ptr) ((PKCS7_SIGNER_INFO
*)OPENSSL_sk_delete_ptr(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk),
 ossl_check_PKCS7_SIGNER_INFO_type(ptr)))
#define sk_PKCS7_SIGNER_INFO_push(sk, ptr)
OPENSSL_sk_push(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk),
ossl_check_PKCS7_SIGNER_INFO_type(ptr))
#define sk_PKCS7_SIGNER_INFO_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk),
ossl_check_PKCS7_SIGNER_INFO_type(ptr))
#define sk_PKCS7_SIGNER_INFO_pop(sk) ((PKCS7_SIGNER_INFO
*)OPENSSL_sk_pop(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk)))
#define sk_PKCS7_SIGNER_INFO_shift(sk) ((PKCS7_SIGNER_INFO
*)OPENSSL_sk_shift(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk)))
#define sk_PKCS7_SIGNER_INFO_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk),ossl_check_PKCS7_SIGNER_INFO_fr
eefunc_type(freefunc))
#define sk_PKCS7_SIGNER_INFO_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk),
ossl_check_PKCS7_SIGNER_INFO_type(ptr), (idx))
#define sk_PKCS7_SIGNER_INFO_set(sk, idx, ptr)
```

```
 ((PKCS7_SIGNER_INFO *)OPENSSL_sk_set(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk), (idx),
ossl_check_PKCS7_SIGNER_INFO_type(ptr)))
#define sk_PKCS7_SIGNER_INFO_find(sk, ptr)
OPENSSL_sk_find(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk),
ossl_check_PKCS7_SIGNER_INFO_type(ptr))
#define sk_PKCS7_SIGNER_INFO_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk),
ossl_check_PKCS7_SIGNER_INFO_type(ptr))
#define sk_PKCS7_SIGNER_INFO_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk),
ossl_check_PKCS7_SIGNER_INFO_type(ptr), pnum)
#define sk_PKCS7_SIGNER_INFO_sort(sk) OPENSSL_sk_sort(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk))
#define sk_PKCS7_SIGNER_INFO_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_PKCS7_SIGNER_INFO_sk_type(sk))
#define sk_PKCS7_SIGNER_INFO_dup(sk) ((STACK_OF(PKCS7_SIGNER_INFO)
*)OPENSSL_sk_dup(ossl_check_const_PKCS7_SIGNER_INFO_sk_type(sk)))
#define sk_PKCS7_SIGNER_INFO_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(PKCS7_SIGNER_INFO)
 *)OPENSSL_sk_deep_copy(ossl_check_const_PKCS7_SIGNER_INFO_sk_type(sk),
ossl_check_PKCS7_SIGNER_INFO_copyfunc_type(copyfunc),
ossl_check_PKCS7_SIGNER_INFO_freefunc_type(freefunc)))
#define sk_PKCS7_SIGNER_INFO_set_cmp_func(sk, cmp)
((sk_PKCS7_SIGNER_INFO_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_PKCS7_SIGNER_INFO_sk_ty
pe(sk), ossl_check_PKCS7_SIGNER_INFO_compfunc_type(cmp)))

/* clang-format on */

typedef struct pkcs7_recip_info_st {
   ASN1_INTEGER *version; /* version 0 */
   PKCS7_ISSUER_AND_SERIAL *issuer_and_serial;
   X509_ALGOR *key_enc_algor;
   ASN1_OCTET_STRING *enc_key;
   X509 *cert; /* get the pub-key from this */
   const PKCS7_CTX *ctx;
} PKCS7_RECIP_INFO;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(PKCS7_RECIP_INFO, PKCS7_RECIP_INFO, PKCS7_RECIP_INFO)
#define sk_PKCS7_RECIP_INFO_num(sk)
OPENSSL_sk_num(ossl_check_const_PKCS7_RECIP_INFO_sk_type(sk))
#define sk_PKCS7_RECIP_INFO_value(sk, idx) ((PKCS7_RECIP_INFO
*)OPENSSL_sk_value(ossl_check_const_PKCS7_RECIP_INFO_sk_type(sk),
 (idx)))
#define sk_PKCS7_RECIP_INFO_new(cmp) ((STACK_OF(PKCS7_RECIP_INFO)
*)OPENSSL_sk_new(ossl_check_PKCS7_RECIP_INFO_compfunc_type(cmp)))
#define sk_PKCS7_RECIP_INFO_new_null() ((STACK_OF(PKCS7_RECIP_INFO) *)OPENSSL_sk_new_null())
#define sk_PKCS7_RECIP_INFO_new_reserve(cmp, n) ((STACK_OF(PKCS7_RECIP_INFO)
*)OPENSSL_sk_new_reserve(ossl_check_PKCS7_RECIP_INFO_compfunc_type(cmp), (n)))
#define sk_PKCS7_RECIP_INFO_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_PKCS7_RECIP_INFO_sk_type(sk), (n))
```

```
#define sk_PKCS7_RECIP_INFO_free(sk) OPENSSL_sk_free(ossl_check_PKCS7_RECIP_INFO_sk_type(sk))
#define sk_PKCS7_RECIP_INFO_zero(sk) OPENSSL_sk_zero(ossl_check_PKCS7_RECIP_INFO_sk_type(sk))
#define sk_PKCS7_RECIP_INFO_delete(sk, i) ((PKCS7_RECIP_INFO
*)OPENSSL_sk_delete(ossl_check_PKCS7_RECIP_INFO_sk_type(sk), (i)))
#define sk_PKCS7_RECIP_INFO_delete_ptr(sk, ptr) ((PKCS7_RECIP_INFO
*)OPENSSL_sk_delete_ptr(ossl_check_PKCS7_RECIP_INFO_sk_type(sk),
ossl_check_PKCS7_RECIP_INFO_type(ptr)))
#define
 sk_PKCS7_RECIP_INFO_push(sk, ptr) OPENSSL_sk_push(ossl_check_PKCS7_RECIP_INFO_sk_type(sk),
ossl_check_PKCS7_RECIP_INFO_type(ptr))
#define sk_PKCS7_RECIP_INFO_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_PKCS7_RECIP_INFO_sk_type(sk),
ossl_check_PKCS7_RECIP_INFO_type(ptr))
#define sk_PKCS7_RECIP_INFO_pop(sk) ((PKCS7_RECIP_INFO
*)OPENSSL_sk_pop(ossl_check_PKCS7_RECIP_INFO_sk_type(sk)))
#define sk_PKCS7_RECIP_INFO_shift(sk) ((PKCS7_RECIP_INFO
*)OPENSSL_sk_shift(ossl_check_PKCS7_RECIP_INFO_sk_type(sk)))
#define sk_PKCS7_RECIP_INFO_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_PKCS7_RECIP_INFO_sk_type(sk),ossl_check_PKCS7_RECIP_INFO_freefu
nc_type(freefunc))
#define sk_PKCS7_RECIP_INFO_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_PKCS7_RECIP_INFO_sk_type(sk),
ossl_check_PKCS7_RECIP_INFO_type(ptr), (idx))
#define sk_PKCS7_RECIP_INFO_set(sk, idx, ptr) ((PKCS7_RECIP_INFO
*)OPENSSL_sk_set(ossl_check_PKCS7_RECIP_INFO_sk_type(sk), (idx),
ossl_check_PKCS7_RECIP_INFO_type(ptr)))
#define
 sk_PKCS7_RECIP_INFO_find(sk, ptr) OPENSSL_sk_find(ossl_check_PKCS7_RECIP_INFO_sk_type(sk),
ossl_check_PKCS7_RECIP_INFO_type(ptr))
#define sk_PKCS7_RECIP_INFO_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_PKCS7_RECIP_INFO_sk_type(sk),
ossl_check_PKCS7_RECIP_INFO_type(ptr))
#define sk_PKCS7_RECIP_INFO_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_PKCS7_RECIP_INFO_sk_type(sk),
ossl_check_PKCS7_RECIP_INFO_type(ptr), pnum)
#define sk_PKCS7_RECIP_INFO_sort(sk) OPENSSL_sk_sort(ossl_check_PKCS7_RECIP_INFO_sk_type(sk))
#define sk_PKCS7_RECIP_INFO_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_PKCS7_RECIP_INFO_sk_type(sk))
#define sk_PKCS7_RECIP_INFO_dup(sk) ((STACK_OF(PKCS7_RECIP_INFO)
*)OPENSSL_sk_dup(ossl_check_const_PKCS7_RECIP_INFO_sk_type(sk)))
#define sk_PKCS7_RECIP_INFO_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(PKCS7_RECIP_INFO)
*)OPENSSL_sk_deep_copy(ossl_check_const_PKCS7_RECIP_INFO_sk_type(sk),
ossl_check_PKCS7_RECIP_INFO_copyfunc_type(copyfunc),
 ossl_check_PKCS7_RECIP_INFO_freefunc_type(freefunc)))
#define sk_PKCS7_RECIP_INFO_set_cmp_func(sk, cmp)
((sk_PKCS7_RECIP_INFO_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_PKCS7_RECIP_INFO_sk_type(s
k), ossl_check_PKCS7_RECIP_INFO_compfunc_type(cmp)))
```

```
/* clang-format on */

typedef struct pkcs7_signed_st {
   ASN1_INTEGER *version; /* version 1 */
   STACK_OF(X509_ALGOR) *md_algs; /* md used */
   STACK_OF(X509) *cert; /* [ 0 ] */ /* name should be 'certificates' */
   STACK_OF(X509_CRL) *crl; /* [ 1 ] */ /* name should be 'crls' */
   STACK_OF(PKCS7_SIGNER_INFO) *signer_info;
   struct pkcs7_st *contents;
} PKCS7_SIGNED;
/*
* The above structure is very very similar to PKCS7_SIGN_ENVELOPE. How about
* merging the two
*/

typedef struct pkcs7_enc_content_st {
   ASN1_OBJECT *content_type;
   X509_ALGOR *algorithm;
   ASN1_OCTET_STRING *enc_data; /* [ 0 ] */
   const EVP_CIPHER *cipher;
   const PKCS7_CTX *ctx;
} PKCS7_ENC_CONTENT;

typedef struct pkcs7_enveloped_st
 {
   ASN1_INTEGER *version; /* version 0 */
   STACK_OF(PKCS7_RECIP_INFO) *recipientinfo;
   PKCS7_ENC_CONTENT *enc_data;
} PKCS7_ENVELOPE;

typedef struct pkcs7_signedandenveloped_st {
   ASN1_INTEGER *version; /* version 1 */
   STACK_OF(X509_ALGOR) *md_algs; /* md used */
   STACK_OF(X509) *cert; /* [ 0 ] */ /* name should be 'certificates' */
   STACK_OF(X509_CRL) *crl; /* [ 1 ] */ /* name should be 'crls' */
   STACK_OF(PKCS7_SIGNER_INFO) *signer_info;
   PKCS7_ENC_CONTENT *enc_data;
   STACK_OF(PKCS7_RECIP_INFO) *recipientinfo;
} PKCS7_SIGN_ENVELOPE;

typedef struct pkcs7_digest_st {
   ASN1_INTEGER *version; /* version 0 */
   X509_ALGOR *md; /* md used */
   struct pkcs7_st *contents;
   ASN1_OCTET_STRING *digest;
} PKCS7_DIGEST;

typedef struct pkcs7_encrypted_st {
```

```
   ASN1_INTEGER *version; /* version 0 */
   PKCS7_ENC_CONTENT *enc_data;
} PKCS7_ENCRYPT;

typedef struct pkcs7_st {
   /*
    * The following is non NULL if it contains ASN1 encoding of this

  * structure
    */
   unsigned char *asn1;
   long length;
#define PKCS7_S_HEADER 0
#define PKCS7_S_BODY 1
#define PKCS7_S_TAIL 2
   int state; /* used during processing */
   int detached;
   ASN1_OBJECT *type;
   /* content as defined by the type */
   /*
    * all encryption/message digests are applied to the 'contents', leaving
    * out the 'type' field.
    */
   union {
      char *ptr;
      /* NID_pkcs7_data */
      ASN1_OCTET_STRING *data;
      /* NID_pkcs7_signed */
      PKCS7_SIGNED *sign; /* field name 'signed' would clash with C keyword */
      /* NID_pkcs7_enveloped */
      PKCS7_ENVELOPE *enveloped;
      /* NID_pkcs7_signedAndEnveloped */
      PKCS7_SIGN_ENVELOPE *signed_and_enveloped;
      /* NID_pkcs7_digest */
      PKCS7_DIGEST *digest;
      /* NID_pkcs7_encrypted */
      PKCS7_ENCRYPT *encrypted;
      /* Anything else */
      ASN1_TYPE *other;
   } d;
   PKCS7_CTX ctx;
} PKCS7;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(PKCS7,
 PKCS7, PKCS7)
#define sk_PKCS7_num(sk) OPENSSL_sk_num(ossl_check_const_PKCS7_sk_type(sk))
#define sk_PKCS7_value(sk, idx) ((PKCS7 *)OPENSSL_sk_value(ossl_check_const_PKCS7_sk_type(sk), (idx)))
#define sk_PKCS7_new(cmp) ((STACK_OF(PKCS7)
```

```
*)OPENSSL_sk_new(ossl_check_PKCS7_compfunc_type(cmp)))
#define sk_PKCS7_new_null() ((STACK_OF(PKCS7) *)OPENSSL_sk_new_null())
#define sk_PKCS7_new_reserve(cmp, n) ((STACK_OF(PKCS7)
*)OPENSSL_sk_new_reserve(ossl_check_PKCS7_compfunc_type(cmp), (n)))
#define sk_PKCS7_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_PKCS7_sk_type(sk), (n))
#define sk_PKCS7_free(sk) OPENSSL_sk_free(ossl_check_PKCS7_sk_type(sk))
#define sk_PKCS7_zero(sk) OPENSSL_sk_zero(ossl_check_PKCS7_sk_type(sk))
#define sk_PKCS7_delete(sk, i) ((PKCS7 *)OPENSSL_sk_delete(ossl_check_PKCS7_sk_type(sk), (i)))
#define sk_PKCS7_delete_ptr(sk, ptr) ((PKCS7 *)OPENSSL_sk_delete_ptr(ossl_check_PKCS7_sk_type(sk),
ossl_check_PKCS7_type(ptr)))
#define sk_PKCS7_push(sk, ptr) OPENSSL_sk_push(ossl_check_PKCS7_sk_type(sk),
 ossl_check_PKCS7_type(ptr))
#define sk_PKCS7_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_PKCS7_sk_type(sk),
ossl_check_PKCS7_type(ptr))
#define sk_PKCS7_pop(sk) ((PKCS7 *)OPENSSL_sk_pop(ossl_check_PKCS7_sk_type(sk)))
#define sk_PKCS7_shift(sk) ((PKCS7 *)OPENSSL_sk_shift(ossl_check_PKCS7_sk_type(sk)))
#define sk_PKCS7_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_PKCS7_sk_type(sk),ossl_check_PKCS7_freefunc_type(freefunc))
#define sk_PKCS7_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_PKCS7_sk_type(sk),
ossl_check_PKCS7_type(ptr), (idx))
#define sk_PKCS7_set(sk, idx, ptr) ((PKCS7 *)OPENSSL_sk_set(ossl_check_PKCS7_sk_type(sk), (idx),
ossl_check_PKCS7_type(ptr)))
#define sk_PKCS7_find(sk, ptr) OPENSSL_sk_find(ossl_check_PKCS7_sk_type(sk),
ossl_check_PKCS7_type(ptr))
#define sk_PKCS7_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_PKCS7_sk_type(sk),
ossl_check_PKCS7_type(ptr))
#define sk_PKCS7_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_PKCS7_sk_type(sk),
 ossl_check_PKCS7_type(ptr), pnum)
#define sk_PKCS7_sort(sk) OPENSSL_sk_sort(ossl_check_PKCS7_sk_type(sk))
#define sk_PKCS7_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_PKCS7_sk_type(sk))
#define sk_PKCS7_dup(sk) ((STACK_OF(PKCS7) *)OPENSSL_sk_dup(ossl_check_const_PKCS7_sk_type(sk)))
#define sk_PKCS7_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(PKCS7)
*)OPENSSL_sk_deep_copy(ossl_check_const_PKCS7_sk_type(sk),
ossl_check_PKCS7_copyfunc_type(copyfunc), ossl_check_PKCS7_freefunc_type(freefunc)))
#define sk_PKCS7_set_cmp_func(sk, cmp)
((sk_PKCS7_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_PKCS7_sk_type(sk),
ossl_check_PKCS7_compfunc_type(cmp)))

/* clang-format on */

#define PKCS7_OP_SET_DETACHED_SIGNATURE 1
#define PKCS7_OP_GET_DETACHED_SIGNATURE 2

#define PKCS7_get_signed_attributes(si) ((si)->auth_attr)
#define PKCS7_get_attributes(si) ((si)->unauth_attr)

#define PKCS7_type_is_signed(a) (OBJ_obj2nid((a)->type) == NID_pkcs7_signed)
#define PKCS7_type_is_encrypted(a)
```

```
 (OBJ_obj2nid((a)->type) == NID_pkcs7_encrypted)
#define PKCS7_type_is_enveloped(a) (OBJ_obj2nid((a)->type) == NID_pkcs7_enveloped)
#define PKCS7_type_is_signedAndEnveloped(a) \
   (OBJ_obj2nid((a)->type) == NID_pkcs7_signedAndEnveloped)
#define PKCS7_type_is_data(a) (OBJ_obj2nid((a)->type) == NID_pkcs7_data)
#define PKCS7_type_is_digest(a) (OBJ_obj2nid((a)->type) == NID_pkcs7_digest)

#define PKCS7_set_detached(p, v) \
   PKCS7_ctrl(p, PKCS7_OP_SET_DETACHED_SIGNATURE, v, NULL)
#define PKCS7_get_detached(p) \
   PKCS7_ctrl(p, PKCS7_OP_GET_DETACHED_SIGNATURE, 0, NULL)

#define PKCS7_is_detached(p7) (PKCS7_type_is_signed(p7) && PKCS7_get_detached(p7))

/* S/MIME related flags */

#define PKCS7_TEXT 0x1
#define PKCS7_NOCERTS 0x2
#define PKCS7_NOSIGS 0x4
#define PKCS7_NOCHAIN 0x8
#define PKCS7_NOINTERN 0x10
#define PKCS7_NOVERIFY 0x20
#define PKCS7_DETACHED 0x40
#define PKCS7_BINARY 0x80
#define PKCS7_NOATTR 0x100
#define PKCS7_NOSMIMECAP 0x200
#define PKCS7_NOOLDMIMETYPE
 0x400
#define PKCS7_CRLFEOL 0x800
#define PKCS7_STREAM 0x1000
#define PKCS7_NOCRL 0x2000
#define PKCS7_PARTIAL 0x4000
#define PKCS7_REUSE_DIGEST 0x8000
#define PKCS7_NO_DUAL_CONTENT 0x10000

/* Flags: for compatibility with older code */

#define SMIME_TEXT PKCS7_TEXT
#define SMIME_NOCERTS PKCS7_NOCERTS
#define SMIME_NOSIGS PKCS7_NOSIGS
#define SMIME_NOCHAIN PKCS7_NOCHAIN
#define SMIME_NOINTERN PKCS7_NOINTERN
#define SMIME_NOVERIFY PKCS7_NOVERIFY
#define SMIME_DETACHED PKCS7_DETACHED
#define SMIME_BINARY PKCS7_BINARY
#define SMIME_NOATTR PKCS7_NOATTR

/* CRLF ASCII canonicalisation */
```

```
#define SMIME_ASCIICRLF 0x80000

DECLARE_ASN1_FUNCTIONS(PKCS7_ISSUER_AND_SERIAL)

int PKCS7_ISSUER_AND_SERIAL_digest(PKCS7_ISSUER_AND_SERIAL *data,
   const EVP_MD *type, unsigned char *md,
   unsigned int *len);
#ifndef OPENSSL_NO_STDIO
PKCS7 *d2i_PKCS7_fp(FILE *fp, PKCS7 **p7);
int i2d_PKCS7_fp(FILE *fp, const PKCS7 *p7);
#endif
DECLARE_ASN1_DUP_FUNCTION(PKCS7)
PKCS7 *d2i_PKCS7_bio(BIO *bp, PKCS7
 **p7);
int i2d_PKCS7_bio(BIO *bp, const PKCS7 *p7);
int i2d_PKCS7_bio_stream(BIO *out, PKCS7 *p7, BIO *in, int flags);
int PEM_write_bio_PKCS7_stream(BIO *out, PKCS7 *p7, BIO *in, int flags);

DECLARE_ASN1_FUNCTIONS(PKCS7_SIGNER_INFO)
DECLARE_ASN1_FUNCTIONS(PKCS7_RECIP_INFO)
DECLARE_ASN1_FUNCTIONS(PKCS7_SIGNED)
DECLARE_ASN1_FUNCTIONS(PKCS7_ENC_CONTENT)
DECLARE_ASN1_FUNCTIONS(PKCS7_ENVELOPE)
DECLARE_ASN1_FUNCTIONS(PKCS7_SIGN_ENVELOPE)
DECLARE_ASN1_FUNCTIONS(PKCS7_DIGEST)
DECLARE_ASN1_FUNCTIONS(PKCS7_ENCRYPT)
DECLARE_ASN1_FUNCTIONS(PKCS7)
PKCS7 *PKCS7_new_ex(OSSL_LIB_CTX *libctx, const char *propq);

DECLARE_ASN1_ITEM(PKCS7_ATTR_SIGN)
DECLARE_ASN1_ITEM(PKCS7_ATTR_VERIFY)

DECLARE_ASN1_NDEF_FUNCTION(PKCS7)
DECLARE_ASN1_PRINT_FUNCTION(PKCS7)

long PKCS7_ctrl(PKCS7 *p7, int cmd, long larg, char *parg);

int PKCS7_type_is_other(PKCS7 *p7);
int PKCS7_set_type(PKCS7 *p7, int type);
int PKCS7_set0_type_other(PKCS7 *p7, int type, ASN1_TYPE *other);
int PKCS7_set_content(PKCS7 *p7, PKCS7 *p7_data);
int
 PKCS7_SIGNER_INFO_set(PKCS7_SIGNER_INFO *p7i, X509 *x509, EVP_PKEY *pkey,
   const EVP_MD *dgst);
int PKCS7_SIGNER_INFO_sign(PKCS7_SIGNER_INFO *si);
int PKCS7_add_signer(PKCS7 *p7, PKCS7_SIGNER_INFO *p7i);
int PKCS7_add_certificate(PKCS7 *p7, X509 *cert);
int PKCS7_add_crl(PKCS7 *p7, X509_CRL *crl);
```

```
int PKCS7_content_new(PKCS7 *p7, int nid);
int PKCS7_dataVerify(X509_STORE *cert_store, X509_STORE_CTX *ctx,
   BIO *bio, PKCS7 *p7, PKCS7_SIGNER_INFO *si);
int PKCS7_signatureVerify(BIO *bio, PKCS7 *p7, PKCS7_SIGNER_INFO *si,
   X509 *signer);

BIO *PKCS7_dataInit(PKCS7 *p7, BIO *bio);
int PKCS7_dataFinal(PKCS7 *p7, BIO *bio);
BIO *PKCS7_dataDecode(PKCS7 *p7, EVP_PKEY *pkey, BIO *in_bio, X509 *pcert);

PKCS7_SIGNER_INFO *PKCS7_add_signature(PKCS7 *p7, X509 *x509,
   EVP_PKEY *pkey, const EVP_MD *dgst);
X509 *PKCS7_cert_from_signer_info(PKCS7 *p7, PKCS7_SIGNER_INFO *si);
int PKCS7_set_digest(PKCS7 *p7, const EVP_MD *md);
STACK_OF(PKCS7_SIGNER_INFO) *PKCS7_get_signer_info(PKCS7
 *p7);

PKCS7_RECIP_INFO *PKCS7_add_recipient(PKCS7 *p7, X509 *x509);
void PKCS7_SIGNER_INFO_get0_algs(PKCS7_SIGNER_INFO *si, EVP_PKEY **pk,
   X509_ALGOR **pdig, X509_ALGOR **psig);
void PKCS7_RECIP_INFO_get0_alg(PKCS7_RECIP_INFO *ri, X509_ALGOR **penc);
int PKCS7_add_recipient_info(PKCS7 *p7, PKCS7_RECIP_INFO *ri);
int PKCS7_RECIP_INFO_set(PKCS7_RECIP_INFO *p7i, X509 *x509);
int PKCS7_set_cipher(PKCS7 *p7, const EVP_CIPHER *cipher);
int PKCS7_stream(unsigned char ***boundary, PKCS7 *p7);

PKCS7_ISSUER_AND_SERIAL *PKCS7_get_issuer_and_serial(PKCS7 *p7, int idx);
ASN1_OCTET_STRING *PKCS7_get_octet_string(PKCS7 *p7);
ASN1_OCTET_STRING *PKCS7_digest_from_attributes(STACK_OF(X509_ATTRIBUTE) *sk);
int PKCS7_add_signed_attribute(PKCS7_SIGNER_INFO *p7si, int nid, int type,
   void *data);
int PKCS7_add_attribute(PKCS7_SIGNER_INFO *p7si, int nid, int atrtype,
   void *value);
ASN1_TYPE *PKCS7_get_attribute(const PKCS7_SIGNER_INFO *si, int nid);
ASN1_TYPE *PKCS7_get_signed_attribute(const PKCS7_SIGNER_INFO
 *si, int nid);
int PKCS7_set_signed_attributes(PKCS7_SIGNER_INFO *p7si,
   STACK_OF(X509_ATTRIBUTE) *sk);
int PKCS7_set_attributes(PKCS7_SIGNER_INFO *p7si,
   STACK_OF(X509_ATTRIBUTE) *sk);

PKCS7 *PKCS7_sign(X509 *signcert, EVP_PKEY *pkey, STACK_OF(X509) *certs,
   BIO *data, int flags);
PKCS7 *PKCS7_sign_ex(X509 *signcert, EVP_PKEY *pkey, STACK_OF(X509) *certs,
   BIO *data, int flags, OSSL_LIB_CTX *libctx,
   const char *propq);

PKCS7_SIGNER_INFO *PKCS7_sign_add_signer(PKCS7 *p7,
```

```
   X509 *signcert, EVP_PKEY *pkey,
   const EVP_MD *md, int flags);

int PKCS7_final(PKCS7 *p7, BIO *data, int flags);
int PKCS7_verify(PKCS7 *p7, STACK_OF(X509) *certs, X509_STORE *store,
   BIO *indata, BIO *out, int flags);
STACK_OF(X509) *PKCS7_get0_signers(PKCS7 *p7, STACK_OF(X509) *certs,
   int flags);
PKCS7 *PKCS7_encrypt(STACK_OF(X509) *certs, BIO *in, const EVP_CIPHER *cipher,
   int flags);
PKCS7 *PKCS7_encrypt_ex(STACK_OF(X509) *certs, BIO *in,
   const EVP_CIPHER *cipher,
 int flags,
   OSSL_LIB_CTX *libctx, const char *propq);
int PKCS7_decrypt(PKCS7 *p7, EVP_PKEY *pkey, X509 *cert, BIO *data,
   int flags);

int PKCS7_add_attrib_smimecap(PKCS7_SIGNER_INFO *si,
   STACK_OF(X509_ALGOR) *cap);
STACK_OF(X509_ALGOR) *PKCS7_get_smimecap(PKCS7_SIGNER_INFO *si);
int PKCS7_simple_smimecap(STACK_OF(X509_ALGOR) *sk, int nid, int arg);

int PKCS7_add_attrib_content_type(PKCS7_SIGNER_INFO *si, ASN1_OBJECT *coid);
int PKCS7_add0_attrib_signing_time(PKCS7_SIGNER_INFO *si, ASN1_TIME *t);
int PKCS7_add1_attrib_digest(PKCS7_SIGNER_INFO *si,
   const unsigned char *md, int mdlen);

int SMIME_write_PKCS7(BIO *bio, PKCS7 *p7, BIO *data, int flags);
PKCS7 *SMIME_read_PKCS7_ex(BIO *bio, BIO **bcont, PKCS7 **p7);
PKCS7 *SMIME_read_PKCS7(BIO *bio, BIO **bcont);

BIO *BIO_new_PKCS7(BIO *out, PKCS7 *p7);

#ifdef __cplusplus
}
#endif
#endif
```

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```
/*
* WARNING: do not edit!
* Generated by configdata.pm from Configurations/common0.tmpl, Configurations/unix-Makefile.tmpl
* via Makefile.in
*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#ifndef OPENSSL_CONFIGURATION_H
#define OPENSSL_CONFIGURATION_H
#pragma once

#ifdef __cplusplus
extern "C" {
#endif

#ifdef OPENSSL_ALGORITHM_DEFINES
#error OPENSSL_ALGORITHM_DEFINES no longer supported
#endif

/*
* OpenSSL was configured with the following options:
*/

/* clang-format off */
# define OPENSSL_CONFIGURED_API 30500
# ifndef OPENSSL_RAND_SEED_OS
#  define OPENSSL_RAND_SEED_OS
# endif
# ifndef OPENSSL_THREADS
#  define OPENSSL_THREADS
# endif
```

```
# ifndef OPENSSL_NO_AFALGENG
#  define OPENSSL_NO_AFALGENG
#
 endif
# ifndef OPENSSL_NO_ASAN
#  define OPENSSL_NO_ASAN
# endif
# ifndef OPENSSL_NO_ASM
#  define OPENSSL_NO_ASM
# endif
# ifndef OPENSSL_NO_BROTLI
#  define OPENSSL_NO_BROTLI
# endif
# ifndef OPENSSL_NO_BROTLI_DYNAMIC
#  define OPENSSL_NO_BROTLI_DYNAMIC
# endif
# ifndef OPENSSL_NO_COMP
#  define OPENSSL_NO_COMP
# endif
# ifndef OPENSSL_NO_CRYPTO_MDEBUG
#  define OPENSSL_NO_CRYPTO_MDEBUG
# endif
# ifndef OPENSSL_NO_CRYPTO_MDEBUG_BACKTRACE
#  define OPENSSL_NO_CRYPTO_MDEBUG_BACKTRACE
# endif
# ifndef OPENSSL_NO_DEMOS
#  define OPENSSL_NO_DEMOS
# endif
# ifndef OPENSSL_NO_EC_NISTP_64_GCC_128
#  define OPENSSL_NO_EC_NISTP_64_GCC_128
# endif
# ifndef OPENSSL_NO_EGD
#  define OPENSSL_NO_EGD
# endif
# ifndef OPENSSL_NO_EXTERNAL_TESTS
#  define OPENSSL_NO_EXTERNAL_TESTS
# endif
# ifndef OPENSSL_NO_FIPS_JITTER
#  define OPENSSL_NO_FIPS_JITTER
# endif
# ifndef OPENSSL_NO_FUZZ_AFL
#  define OPENSSL_NO_FUZZ_AFL
# endif
# ifndef OPENSSL_NO_FUZZ_LIBFUZZER
#  define OPENSSL_NO_FUZZ_LIBFUZZER
#
 endif
# ifndef OPENSSL_NO_H3DEMO
```

```
#  define OPENSSL_NO_H3DEMO
# endif
# ifndef OPENSSL_NO_HQINTEROP
#  define OPENSSL_NO_HQINTEROP
# endif
# ifndef OPENSSL_NO_JITTER
#  define OPENSSL_NO_JITTER
# endif
# ifndef OPENSSL_NO_KTLS
#  define OPENSSL_NO_KTLS
# endif
# ifndef OPENSSL_NO_LOADERENG
#  define OPENSSL_NO_LOADERENG
# endif
# ifndef OPENSSL_NO_MD2
#  define OPENSSL_NO_MD2
# endif
# ifndef OPENSSL_NO_MSAN
#  define OPENSSL_NO_MSAN
# endif
# ifndef OPENSSL_NO_PIE
#  define OPENSSL_NO_PIE
# endif
# ifndef OPENSSL_NO_RC5
#  define OPENSSL_NO_RC5
# endif
# ifndef OPENSSL_NO_SCTP
#  define OPENSSL_NO_SCTP
# endif
# ifndef OPENSSL_NO_SSL3
#  define OPENSSL_NO_SSL3
# endif
# ifndef OPENSSL_NO_SSL3_METHOD
#  define OPENSSL_NO_SSL3_METHOD
# endif
# ifndef OPENSSL_NO_SSLKEYLOG
#  define OPENSSL_NO_SSLKEYLOG
# endif
# ifndef OPENSSL_NO_TFO
#  define OPENSSL_NO_TFO
# endif
# ifndef OPENSSL_NO_TRACE
#  define OPENSSL_NO_TRACE
# endif
# ifndef OPENSSL_NO_UBSAN
#  define OPENSSL_NO_UBSAN
# endif
#
```

```
 ifndef OPENSSL_NO_UNIT_TEST
#  define OPENSSL_NO_UNIT_TEST
# endif
# ifndef OPENSSL_NO_UPLINK
#  define OPENSSL_NO_UPLINK
# endif
# ifndef OPENSSL_NO_WEAK_SSL_CIPHERS
#  define OPENSSL_NO_WEAK_SSL_CIPHERS
# endif
# ifndef OPENSSL_NO_WINSTORE
#  define OPENSSL_NO_WINSTORE
# endif
# ifndef OPENSSL_NO_ZLIB
#  define OPENSSL_NO_ZLIB
# endif
# ifndef OPENSSL_NO_ZLIB_DYNAMIC
#  define OPENSSL_NO_ZLIB_DYNAMIC
# endif
# ifndef OPENSSL_NO_ZSTD
#  define OPENSSL_NO_ZSTD
# endif
# ifndef OPENSSL_NO_ZSTD_DYNAMIC
#  define OPENSSL_NO_ZSTD_DYNAMIC
# endif
# ifndef OPENSSL_NO_DYNAMIC_ENGINE
#  define OPENSSL_NO_DYNAMIC_ENGINE
# endif

/* clang-format on */

/* Generate 80386 code? */
/* clang-format off */
# undef I386_ONLY
/* clang-format on */

/*
* The following are cipher-specific, but are part of the public API.
*/
#if !defined(OPENSSL_SYS_UEFI)
   /* clang-format off */
#  undef BN_LLONG
   /* clang-format on */
   /* Only one for the following should be defined */
   /* clang-format off
 */
#  define SIXTY_FOUR_BIT_LONG
   /* clang-format on */
   /* clang-format off */
```

```
#  undef SIXTY_FOUR_BIT
   /* clang-format on */
   /* clang-format off */
#  undef THIRTY_TWO_BIT
/* clang-format on */
#endif

/* clang-format off */
# define RC4_INT unsigned int
/* clang-format on */

#if defined(OPENSSL_NO_COMP) || (defined(OPENSSL_NO_BROTLI) && defined(OPENSSL_NO_ZSTD) &&
defined(OPENSSL_NO_ZLIB))
#define OPENSSL_NO_COMP_ALG
#else
#undef OPENSSL_NO_COMP_ALG
#endif

#ifdef __cplusplus
}
#endif

#endif /* OPENSSL_CONFIGURATION_H */
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/conf.h.in
*
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_CONF_H
#define OPENSSL_CONF_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_CONF_H
#endif

#include <openssl/bio.h>
#include <openssl/lhash.h>
#include <openssl/safestack.h>
#include <openssl/e_os2.h>
#include <openssl/types.h>
```

```
#include <openssl/conferr.h>
#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif

#ifdef __cplusplus
extern "C" {
#endif

typedef struct {
   char *section;
   char *name;
   char *value;
} CONF_VALUE;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(CONF_VALUE,
 CONF_VALUE, CONF_VALUE)
#define sk_CONF_VALUE_num(sk) OPENSSL_sk_num(ossl_check_const_CONF_VALUE_sk_type(sk))
#define sk_CONF_VALUE_value(sk, idx) ((CONF_VALUE
*)OPENSSL_sk_value(ossl_check_const_CONF_VALUE_sk_type(sk), (idx)))
#define sk_CONF_VALUE_new(cmp) ((STACK_OF(CONF_VALUE)
*)OPENSSL_sk_new(ossl_check_CONF_VALUE_compfunc_type(cmp)))
#define sk_CONF_VALUE_new_null() ((STACK_OF(CONF_VALUE) *)OPENSSL_sk_new_null())
#define sk_CONF_VALUE_new_reserve(cmp, n) ((STACK_OF(CONF_VALUE)
*)OPENSSL_sk_new_reserve(ossl_check_CONF_VALUE_compfunc_type(cmp), (n)))
#define sk_CONF_VALUE_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_CONF_VALUE_sk_type(sk), (n))
#define sk_CONF_VALUE_free(sk) OPENSSL_sk_free(ossl_check_CONF_VALUE_sk_type(sk))
#define sk_CONF_VALUE_zero(sk) OPENSSL_sk_zero(ossl_check_CONF_VALUE_sk_type(sk))
#define sk_CONF_VALUE_delete(sk, i) ((CONF_VALUE
*)OPENSSL_sk_delete(ossl_check_CONF_VALUE_sk_type(sk), (i)))
#define sk_CONF_VALUE_delete_ptr(sk, ptr) ((CONF_VALUE
 *)OPENSSL_sk_delete_ptr(ossl_check_CONF_VALUE_sk_type(sk), ossl_check_CONF_VALUE_type(ptr)))
#define sk_CONF_VALUE_push(sk, ptr) OPENSSL_sk_push(ossl_check_CONF_VALUE_sk_type(sk),
ossl_check_CONF_VALUE_type(ptr))
#define sk_CONF_VALUE_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_CONF_VALUE_sk_type(sk),
ossl_check_CONF_VALUE_type(ptr))
#define sk_CONF_VALUE_pop(sk) ((CONF_VALUE
*)OPENSSL_sk_pop(ossl_check_CONF_VALUE_sk_type(sk)))
#define sk_CONF_VALUE_shift(sk) ((CONF_VALUE
*)OPENSSL_sk_shift(ossl_check_CONF_VALUE_sk_type(sk)))
#define sk_CONF_VALUE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_CONF_VALUE_sk_type(sk),ossl_check_CONF_VALUE_freefunc_type(freef
unc))
#define sk_CONF_VALUE_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_CONF_VALUE_sk_type(sk),
ossl_check_CONF_VALUE_type(ptr), (idx))
#define sk_CONF_VALUE_set(sk, idx, ptr) ((CONF_VALUE
*)OPENSSL_sk_set(ossl_check_CONF_VALUE_sk_type(sk), (idx), ossl_check_CONF_VALUE_type(ptr)))
```

```
#define sk_CONF_VALUE_find(sk,
 ptr) OPENSSL_sk_find(ossl_check_CONF_VALUE_sk_type(sk), ossl_check_CONF_VALUE_type(ptr))
#define sk_CONF_VALUE_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_CONF_VALUE_sk_type(sk),
ossl_check_CONF_VALUE_type(ptr))
#define sk_CONF_VALUE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_CONF_VALUE_sk_type(sk), ossl_check_CONF_VALUE_type(ptr), pnum)
#define sk_CONF_VALUE_sort(sk) OPENSSL_sk_sort(ossl_check_CONF_VALUE_sk_type(sk))
#define sk_CONF_VALUE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_CONF_VALUE_sk_type(sk))
#define sk_CONF_VALUE_dup(sk) ((STACK_OF(CONF_VALUE)
*)OPENSSL_sk_dup(ossl_check_const_CONF_VALUE_sk_type(sk)))
#define sk_CONF_VALUE_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(CONF_VALUE)
*)OPENSSL_sk_deep_copy(ossl_check_const_CONF_VALUE_sk_type(sk),
ossl_check_CONF_VALUE_copyfunc_type(copyfunc), ossl_check_CONF_VALUE_freefunc_type(freefunc)))
#define sk_CONF_VALUE_set_cmp_func(sk, cmp)
((sk_CONF_VALUE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_CONF_VALUE_sk_type(sk),
 ossl_check_CONF_VALUE_compfunc_type(cmp)))
DEFINE_LHASH_OF_INTERNAL(CONF_VALUE);
#define lh_CONF_VALUE_new(hfn, cmp) ((LHASH_OF(CONF_VALUE)
*)OPENSSL_LH_set_thunks(OPENSSL_LH_new(ossl_check_CONF_VALUE_lh_hashfunc_type(hfn),
ossl_check_CONF_VALUE_lh_compfunc_type(cmp)), lh_CONF_VALUE_hash_thunk,
lh_CONF_VALUE_comp_thunk, lh_CONF_VALUE_doall_thunk, lh_CONF_VALUE_doall_arg_thunk))
#define lh_CONF_VALUE_free(lh) OPENSSL_LH_free(ossl_check_CONF_VALUE_lh_type(lh))
#define lh_CONF_VALUE_flush(lh) OPENSSL_LH_flush(ossl_check_CONF_VALUE_lh_type(lh))
#define lh_CONF_VALUE_insert(lh, ptr) ((CONF_VALUE
*)OPENSSL_LH_insert(ossl_check_CONF_VALUE_lh_type(lh),
ossl_check_CONF_VALUE_lh_plain_type(ptr)))
#define lh_CONF_VALUE_delete(lh, ptr) ((CONF_VALUE
*)OPENSSL_LH_delete(ossl_check_CONF_VALUE_lh_type(lh),
ossl_check_const_CONF_VALUE_lh_plain_type(ptr)))
#define lh_CONF_VALUE_retrieve(lh, ptr) ((CONF_VALUE
*)OPENSSL_LH_retrieve(ossl_check_CONF_VALUE_lh_type(lh),
ossl_check_const_CONF_VALUE_lh_plain_type(ptr)))
#define
 lh_CONF_VALUE_error(lh) OPENSSL_LH_error(ossl_check_CONF_VALUE_lh_type(lh))
#define lh_CONF_VALUE_num_items(lh) OPENSSL_LH_num_items(ossl_check_CONF_VALUE_lh_type(lh))
#define lh_CONF_VALUE_node_stats_bio(lh, out)
OPENSSL_LH_node_stats_bio(ossl_check_const_CONF_VALUE_lh_type(lh), out)
#define lh_CONF_VALUE_node_usage_stats_bio(lh, out)
OPENSSL_LH_node_usage_stats_bio(ossl_check_const_CONF_VALUE_lh_type(lh), out)
#define lh_CONF_VALUE_stats_bio(lh, out)
OPENSSL_LH_stats_bio(ossl_check_const_CONF_VALUE_lh_type(lh), out)
#define lh_CONF_VALUE_get_down_load(lh)
OPENSSL_LH_get_down_load(ossl_check_CONF_VALUE_lh_type(lh))
#define lh_CONF_VALUE_set_down_load(lh, dl)
OPENSSL_LH_set_down_load(ossl_check_CONF_VALUE_lh_type(lh), dl)
#define lh_CONF_VALUE_doall(lh, dfn) OPENSSL_LH_doall(ossl_check_CONF_VALUE_lh_type(lh),
ossl_check_CONF_VALUE_lh_doallfunc_type(dfn))
```

```
/* clang-format on */

struct conf_st;
struct conf_method_st;
typedef struct conf_method_st CONF_METHOD;

#ifndef
 OPENSSL_NO_DEPRECATED_3_0
#include <openssl/conftypes.h>
#endif

/* Module definitions */
typedef struct conf_imodule_st CONF_IMODULE;
typedef struct conf_module_st CONF_MODULE;

STACK_OF(CONF_MODULE);
STACK_OF(CONF_IMODULE);

/* DSO module function typedefs */
typedef int conf_init_func(CONF_IMODULE *md, const CONF *cnf);
typedef void conf_finish_func(CONF_IMODULE *md);

#define CONF_MFLAGS_IGNORE_ERRORS 0x1
#define CONF_MFLAGS_IGNORE_RETURN_CODES 0x2
#define CONF_MFLAGS_SILENT 0x4
#define CONF_MFLAGS_NO_DSO 0x8
#define CONF_MFLAGS_IGNORE_MISSING_FILE 0x10
#define CONF_MFLAGS_DEFAULT_SECTION 0x20

int CONF_set_default_method(CONF_METHOD *meth);
void CONF_set_nconf(CONF *conf, LHASH_OF(CONF_VALUE) *hash);
LHASH_OF(CONF_VALUE) *CONF_load(LHASH_OF(CONF_VALUE) *conf, const char *file,
   long *eline);
#ifndef OPENSSL_NO_STDIO
LHASH_OF(CONF_VALUE) *CONF_load_fp(LHASH_OF(CONF_VALUE) *conf, FILE *fp,
   long *eline);
#endif
LHASH_OF(CONF_VALUE) *CONF_load_bio(LHASH_OF(CONF_VALUE)
 *conf, BIO *bp,
   long *eline);
STACK_OF(CONF_VALUE) *CONF_get_section(LHASH_OF(CONF_VALUE) *conf,
   const char *section);
char *CONF_get_string(LHASH_OF(CONF_VALUE) *conf, const char *group,
   const char *name);
long CONF_get_number(LHASH_OF(CONF_VALUE) *conf, const char *group,
   const char *name);
void CONF_free(LHASH_OF(CONF_VALUE) *conf);
```

```
#ifndef OPENSSL_NO_STDIO
int CONF_dump_fp(LHASH_OF(CONF_VALUE) *conf, FILE *out);
#endif
int CONF_dump_bio(LHASH_OF(CONF_VALUE) *conf, BIO *out);
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 void OPENSSL_config(const char *config_name);
#endif

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define OPENSSL_no_config() \
   OPENSSL_init_crypto(OPENSSL_INIT_NO_LOAD_CONFIG, NULL)
#endif

/*
* New conf code.  The semantics are different from the functions above. If
* that wasn't the case, the above functions would have been replaced
*/

CONF *NCONF_new_ex(OSSL_LIB_CTX *libctx, CONF_METHOD *meth);
OSSL_LIB_CTX *NCONF_get0_libctx(const
 CONF *conf);
CONF *NCONF_new(CONF_METHOD *meth);
CONF_METHOD *NCONF_default(void);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 CONF_METHOD *NCONF_WIN32(void);
#endif
void NCONF_free(CONF *conf);
void NCONF_free_data(CONF *conf);

int NCONF_load(CONF *conf, const char *file, long *eline);
#ifndef OPENSSL_NO_STDIO
int NCONF_load_fp(CONF *conf, FILE *fp, long *eline);
#endif
int NCONF_load_bio(CONF *conf, BIO *bp, long *eline);
STACK_OF(OPENSSL_CSTRING) *NCONF_get_section_names(const CONF *conf);
STACK_OF(CONF_VALUE) *NCONF_get_section(const CONF *conf,
   const char *section);
char *NCONF_get_string(const CONF *conf, const char *group, const char *name);
int NCONF_get_number_e(const CONF *conf, const char *group, const char *name,
   long *result);
#ifndef OPENSSL_NO_STDIO
int NCONF_dump_fp(const CONF *conf, FILE *out);
#endif
int NCONF_dump_bio(const CONF *conf, BIO *out);

#define NCONF_get_number(c, g, n, r) NCONF_get_number_e(c, g, n, r)

/* Module functions */
```

```
int
 CONF_modules_load(const CONF *cnf, const char *appname,
   unsigned long flags);
int CONF_modules_load_file_ex(OSSL_LIB_CTX *libctx, const char *filename,
   const char *appname, unsigned long flags);
int CONF_modules_load_file(const char *filename, const char *appname,
   unsigned long flags);
void CONF_modules_unload(int all);
void CONF_modules_finish(void);
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define CONF_modules_free() \
   while (0)             \
   continue
#endif
int CONF_module_add(const char *name, conf_init_func *ifunc,
   conf_finish_func *ffunc);

const char *CONF_imodule_get_name(const CONF_IMODULE *md);
const char *CONF_imodule_get_value(const CONF_IMODULE *md);
void *CONF_imodule_get_usr_data(const CONF_IMODULE *md);
void CONF_imodule_set_usr_data(CONF_IMODULE *md, void *usr_data);
CONF_MODULE *CONF_imodule_get_module(const CONF_IMODULE *md);
unsigned long CONF_imodule_get_flags(const CONF_IMODULE *md);
void CONF_imodule_set_flags(CONF_IMODULE *md, unsigned
 long flags);
void *CONF_module_get_usr_data(CONF_MODULE *pmod);
void CONF_module_set_usr_data(CONF_MODULE *pmod, void *usr_data);

char *CONF_get1_default_config_file(void);

int CONF_parse_list(const char *list, int sep, int nospc,
   int (*list_cb)(const char *elem, int len, void *usr),
   void *arg);

void OPENSSL_load_builtin_modules(void);

#ifdef __cplusplus
}
#endif
#endif
/* clang-format off */
/* WARNING: do not edit! */
/* Generated by Makefile from include/crypto/dso_conf.h.in */
/* clang-format on */
/*
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*
```

```
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#ifndef OSSL_CRYPTO_DSO_CONF_H
#define OSSL_CRYPTO_DSO_CONF_H
#pragma once

/* clang-format off */
# define DSO_DLFCN
# define HAVE_DLFCN_H
/* clang-format on */
/* clang-format off */
# define DSO_EXTENSION ".so"
/* clang-format on */
#endif
UNRECOGNIZED LICENSE; MD5 sum: 1a764bd2bad6848ffc9fd3bca773138d
/*
* WARNING: do not edit!
* Generated by Makefile from providers/common/include/prov/der_ecx.h.in
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#include "internal/der.h"
#include "crypto/ecx.h"

/* Well known OIDs precompiled */
/* clang-format off */

/*
* id-X25519       OBJECT IDENTIFIER ::= { id-edwards-curve-algs 110 }
*/
#define DER_OID_V_id_X25519 DER_P_OBJECT, 3, 0x2B, 0x65, 0x6E
#define DER_OID_SZ_id_X25519 5
extern const unsigned char ossl_der_oid_id_X25519[DER_OID_SZ_id_X25519];

/*
* id-X448         OBJECT IDENTIFIER ::= { id-edwards-curve-algs 111 }
*/
#define DER_OID_V_id_X448 DER_P_OBJECT, 3, 0x2B, 0x65, 0x6F
```

```
#define DER_OID_SZ_id_X448 5
extern const unsigned char ossl_der_oid_id_X448[DER_OID_SZ_id_X448];

/*
 * id-Ed25519       OBJECT IDENTIFIER ::= { id-edwards-curve-algs 112 }
*/
#define DER_OID_V_id_Ed25519 DER_P_OBJECT, 3, 0x2B, 0x65, 0x70
#define DER_OID_SZ_id_Ed25519 5
extern const unsigned char ossl_der_oid_id_Ed25519[DER_OID_SZ_id_Ed25519];

/*
* id-Ed448         OBJECT IDENTIFIER ::= { id-edwards-curve-algs 113 }
*/
#define DER_OID_V_id_Ed448 DER_P_OBJECT, 3, 0x2B, 0x65, 0x71
#define DER_OID_SZ_id_Ed448 5
extern const unsigned char ossl_der_oid_id_Ed448[DER_OID_SZ_id_Ed448];

/* clang-format on */

int ossl_DER_w_algorithmIdentifier_ED25519(WPACKET *pkt, int cont, ECX_KEY *ec);
int ossl_DER_w_algorithmIdentifier_ED448(WPACKET *pkt, int cont, ECX_KEY *ec);
int ossl_DER_w_algorithmIdentifier_X25519(WPACKET *pkt, int cont, ECX_KEY *ec);
int ossl_DER_w_algorithmIdentifier_X448(WPACKET *pkt, int cont, ECX_KEY *ec);
```

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```
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/* WARNING: do not edit! */
/* Generated by Makefile from include/crypto/bn_conf.h.in */
/* clang-format on */
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#ifndef OSSL_CRYPTO_BN_CONF_H
#define OSSL_CRYPTO_BN_CONF_H
```

```
#pragma once

/*
* The contents of this file are not used in the UEFI build, as
* both 32-bit and 64-bit builds are supported from a single run
* of the Configure script.
*/

/* Should we define BN_DIV2W here? */

/* Only one for the following should be defined */
/* clang-format off */
#undef SIXTY_FOUR_BIT_LONG
   /* clang-format on */
   /* clang-format off */
#undef SIXTY_FOUR_BIT
   /* clang-format on */
   /* clang-format off */
#define THIRTY_TWO_BIT
/*
 clang-format on */

#endif
```

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```
{
 'variables': {
   'openssl_defines_BSD-x86_64': [
     'NDEBUG',
     'L_ENDIAN',
     'OPENSSL_BUILDING_OPENSSL',
     'AES_ASM',
     'BSAES_ASM',
     'CMLL_ASM',
     'ECP_NISTZ256_ASM',
     'GHASH_ASM',
     'KECCAK1600_ASM',
     'MD5_ASM',
     'OPENSSL_BN_ASM_GF2m',
     'OPENSSL_BN_ASM_MONT',
     'OPENSSL_BN_ASM_MONT5',
     'OPENSSL_CPUID_OBJ',
     'OPENSSL_IA32_SSE2',
     'PADLOCK_ASM',
     'POLY1305_ASM',
     'RC4_ASM',
     'SHA1_ASM',
     'SHA256_ASM',
     'SHA512_ASM',
     'VPAES_ASM',
     'WHIRLPOOL_ASM',
     'X25519_ASM',
     'OPENSSL_PIC',
   ],
   'openssl_cflags_BSD-x86_64': [
     '-Wa,--noexecstack',
     '-Wall -O3',
     '-pthread',
     '-Wall -O3',
   ],
   'openssl_ex_libs_BSD-x86_64': [
     '-pthread',
   ],
   'openssl_cli_srcs_BSD-x86_64': [
     'openssl/apps/lib/cmp_mock_srv.c',
     'openssl/apps/asn1parse.c',
     'openssl/apps/ca.c',
     'openssl/apps/ciphers.c',
     'openssl/apps/cmp.c',
```

'openssl/apps/cms.c',
'openssl/apps/crl.c',
'openssl/apps/crl2pkcs7.c',
'openssl/apps/dgst.c',
'openssl/apps/dhparam.c',
'openssl/apps/dsa.c',
'openssl/apps/dsaparam.c',
'openssl/apps/ec.c',
'openssl/apps/ecparam.c',
'openssl/apps/enc.c',
'openssl/apps/engine.c',
'openssl/apps/errstr.c',
'openssl/apps/fipsinstall.c',
'openssl/apps/gendsa.c',
'openssl/apps/genpkey.c',
'openssl/apps/genrsa.c',
'openssl/apps/info.c',
'openssl/apps/kdf.c',
'openssl/apps/list.c',
'openssl/apps/mac.c',
'openssl/apps/nseq.c',
'openssl/apps/ocsp.c',
'openssl/apps/openssl.c',
'openssl/apps/passwd.c',
'openssl/apps/pkcs12.c',
'openssl/apps/pkcs7.c',
'openssl/apps/pkcs8.c',
'openssl/apps/pkey.c',
'openssl/apps/pkeyparam.c',
'openssl/apps/pkeyutl.c',
'openssl/apps/prime.c',
'./config/archs/BSD-x86_64/asm_avx2/apps/progs.c',

'openssl/apps/rand.c',
'openssl/apps/rehash.c',
'openssl/apps/req.c',
'openssl/apps/rsa.c',
'openssl/apps/rsautl.c',
'openssl/apps/s_client.c',
'openssl/apps/s_server.c',
'openssl/apps/s_time.c',
'openssl/apps/sess_id.c',
'openssl/apps/skeyutl.c',
'openssl/apps/smime.c',
'openssl/apps/speed.c',
'openssl/apps/spkac.c',
'openssl/apps/srp.c',
'openssl/apps/storeutl.c',

```
    'openssl/apps/ts.c',
    'openssl/apps/verify.c',
    'openssl/apps/version.c',
    'openssl/apps/x509.c',
    'openssl/apps/lib/app_libctx.c',
    'openssl/apps/lib/app_params.c',
    'openssl/apps/lib/app_provider.c',
    'openssl/apps/lib/app_rand.c',
    'openssl/apps/lib/app_x509.c',
    'openssl/apps/lib/apps.c',
    'openssl/apps/lib/apps_opt_printf.c',
    'openssl/apps/lib/apps_ui.c',
    'openssl/apps/lib/columns.c',
    'openssl/apps/lib/engine.c',
    'openssl/apps/lib/engine_loader.c',
    'openssl/apps/lib/fmt.c',
     'openssl/apps/lib/http_server.c',
    'openssl/apps/lib/log.c',
    'openssl/apps/lib/names.c',
    'openssl/apps/lib/opt.c',
    'openssl/apps/lib/s_cb.c',
    'openssl/apps/lib/s_socket.c',
    'openssl/apps/lib/tlssrp_depr.c',
  ],
 },
 'defines': ['<@(openssl_defines_BSD-x86_64)'],
 'include_dirs': [
   './include',
 ],
 'cflags' : ['<@(openssl_cflags_BSD-x86_64)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86_64)'],
 'sources': ['<@(openssl_cli_srcs_BSD-x86_64)'],
}
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/srp.h.in
*
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*
* Originally written by Christophe Renou and Peter Sylvester,
* for the EdelKey project.
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_SRP_H
#define OPENSSL_SRP_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_SRP_H
#endif

#include <openssl/opensslconf.h>

#ifndef OPENSSL_NO_SRP
#include <stdio.h>
#include <string.h>
#include <openssl/safestack.h>
#include <openssl/bn.h>
#include <openssl/crypto.h>

#ifdef __cplusplus
extern "C" {
#endif

#ifndef OPENSSL_NO_DEPRECATED_3_0

typedef
 struct SRP_gN_cache_st {
   char *b64_bn;
   BIGNUM *bn;
```

```
} SRP_gN_cache;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(SRP_gN_cache, SRP_gN_cache, SRP_gN_cache)
#define sk_SRP_gN_cache_num(sk) OPENSSL_sk_num(ossl_check_const_SRP_gN_cache_sk_type(sk))
#define sk_SRP_gN_cache_value(sk, idx) ((SRP_gN_cache
*)OPENSSL_sk_value(ossl_check_const_SRP_gN_cache_sk_type(sk), (idx)))
#define sk_SRP_gN_cache_new(cmp) ((STACK_OF(SRP_gN_cache)
*)OPENSSL_sk_new(ossl_check_SRP_gN_cache_compfunc_type(cmp)))
#define sk_SRP_gN_cache_new_null() ((STACK_OF(SRP_gN_cache) *)OPENSSL_sk_new_null())
#define sk_SRP_gN_cache_new_reserve(cmp, n) ((STACK_OF(SRP_gN_cache)
*)OPENSSL_sk_new_reserve(ossl_check_SRP_gN_cache_compfunc_type(cmp), (n)))
#define sk_SRP_gN_cache_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_SRP_gN_cache_sk_type(sk), (n))
#define sk_SRP_gN_cache_free(sk) OPENSSL_sk_free(ossl_check_SRP_gN_cache_sk_type(sk))
#define sk_SRP_gN_cache_zero(sk) OPENSSL_sk_zero(ossl_check_SRP_gN_cache_sk_type(sk))
#define
 sk_SRP_gN_cache_delete(sk, i) ((SRP_gN_cache
*)OPENSSL_sk_delete(ossl_check_SRP_gN_cache_sk_type(sk), (i)))
#define sk_SRP_gN_cache_delete_ptr(sk, ptr) ((SRP_gN_cache
*)OPENSSL_sk_delete_ptr(ossl_check_SRP_gN_cache_sk_type(sk), ossl_check_SRP_gN_cache_type(ptr)))
#define sk_SRP_gN_cache_push(sk, ptr) OPENSSL_sk_push(ossl_check_SRP_gN_cache_sk_type(sk),
ossl_check_SRP_gN_cache_type(ptr))
#define sk_SRP_gN_cache_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_SRP_gN_cache_sk_type(sk),
ossl_check_SRP_gN_cache_type(ptr))
#define sk_SRP_gN_cache_pop(sk) ((SRP_gN_cache
*)OPENSSL_sk_pop(ossl_check_SRP_gN_cache_sk_type(sk)))
#define sk_SRP_gN_cache_shift(sk) ((SRP_gN_cache
*)OPENSSL_sk_shift(ossl_check_SRP_gN_cache_sk_type(sk)))
#define sk_SRP_gN_cache_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_SRP_gN_cache_sk_type(sk),ossl_check_SRP_gN_cache_freefunc_type(freefu
nc))
#define sk_SRP_gN_cache_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_SRP_gN_cache_sk_type(sk),
 ossl_check_SRP_gN_cache_type(ptr), (idx))
#define sk_SRP_gN_cache_set(sk, idx, ptr) ((SRP_gN_cache
*)OPENSSL_sk_set(ossl_check_SRP_gN_cache_sk_type(sk), (idx), ossl_check_SRP_gN_cache_type(ptr)))
#define sk_SRP_gN_cache_find(sk, ptr) OPENSSL_sk_find(ossl_check_SRP_gN_cache_sk_type(sk),
ossl_check_SRP_gN_cache_type(ptr))
#define sk_SRP_gN_cache_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_SRP_gN_cache_sk_type(sk),
ossl_check_SRP_gN_cache_type(ptr))
#define sk_SRP_gN_cache_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_SRP_gN_cache_sk_type(sk), ossl_check_SRP_gN_cache_type(ptr), pnum)
#define sk_SRP_gN_cache_sort(sk) OPENSSL_sk_sort(ossl_check_SRP_gN_cache_sk_type(sk))
#define sk_SRP_gN_cache_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_SRP_gN_cache_sk_type(sk))
#define sk_SRP_gN_cache_dup(sk) ((STACK_OF(SRP_gN_cache)
*)OPENSSL_sk_dup(ossl_check_const_SRP_gN_cache_sk_type(sk)))
#define sk_SRP_gN_cache_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(SRP_gN_cache)
 *)OPENSSL_sk_deep_copy(ossl_check_const_SRP_gN_cache_sk_type(sk),
ossl_check_SRP_gN_cache_copyfunc_type(copyfunc), ossl_check_SRP_gN_cache_freefunc_type(freefunc)))
#define sk_SRP_gN_cache_set_cmp_func(sk, cmp)
```

```
((sk_SRP_gN_cache_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_SRP_gN_cache_sk_type(sk),
ossl_check_SRP_gN_cache_compfunc_type(cmp)))

/* clang-format on */

typedef struct SRP_user_pwd_st {
  /* Owned by us. */
  char *id;
  BIGNUM *s;
  BIGNUM *v;
  /* Not owned by us. */
  const BIGNUM *g;
  const BIGNUM *N;
  /* Owned by us. */
  char *info;
} SRP_user_pwd;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(SRP_user_pwd, SRP_user_pwd, SRP_user_pwd)
#define sk_SRP_user_pwd_num(sk) OPENSSL_sk_num(ossl_check_const_SRP_user_pwd_sk_type(sk))
#define sk_SRP_user_pwd_value(sk, idx) ((SRP_user_pwd
*)OPENSSL_sk_value(ossl_check_const_SRP_user_pwd_sk_type(sk), (idx)))
#define sk_SRP_user_pwd_new(cmp) ((STACK_OF(SRP_user_pwd)
*)OPENSSL_sk_new(ossl_check_SRP_user_pwd_compfunc_type(cmp)))
#define
 sk_SRP_user_pwd_new_null() ((STACK_OF(SRP_user_pwd) *)OPENSSL_sk_new_null())
#define sk_SRP_user_pwd_new_reserve(cmp, n) ((STACK_OF(SRP_user_pwd)
*)OPENSSL_sk_new_reserve(ossl_check_SRP_user_pwd_compfunc_type(cmp), (n)))
#define sk_SRP_user_pwd_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_SRP_user_pwd_sk_type(sk), (n))
#define sk_SRP_user_pwd_free(sk) OPENSSL_sk_free(ossl_check_SRP_user_pwd_sk_type(sk))
#define sk_SRP_user_pwd_zero(sk) OPENSSL_sk_zero(ossl_check_SRP_user_pwd_sk_type(sk))
#define sk_SRP_user_pwd_delete(sk, i) ((SRP_user_pwd
*)OPENSSL_sk_delete(ossl_check_SRP_user_pwd_sk_type(sk), (i)))
#define sk_SRP_user_pwd_delete_ptr(sk, ptr) ((SRP_user_pwd
*)OPENSSL_sk_delete_ptr(ossl_check_SRP_user_pwd_sk_type(sk), ossl_check_SRP_user_pwd_type(ptr)))
#define sk_SRP_user_pwd_push(sk, ptr) OPENSSL_sk_push(ossl_check_SRP_user_pwd_sk_type(sk),
ossl_check_SRP_user_pwd_type(ptr))
#define sk_SRP_user_pwd_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_SRP_user_pwd_sk_type(sk),
 ossl_check_SRP_user_pwd_type(ptr))
#define sk_SRP_user_pwd_pop(sk) ((SRP_user_pwd
*)OPENSSL_sk_pop(ossl_check_SRP_user_pwd_sk_type(sk)))
#define sk_SRP_user_pwd_shift(sk) ((SRP_user_pwd
*)OPENSSL_sk_shift(ossl_check_SRP_user_pwd_sk_type(sk)))
#define sk_SRP_user_pwd_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_SRP_user_pwd_sk_type(sk),ossl_check_SRP_user_pwd_freefunc_type(freefu
nc))
#define sk_SRP_user_pwd_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_SRP_user_pwd_sk_type(sk),
ossl_check_SRP_user_pwd_type(ptr), (idx))
#define sk_SRP_user_pwd_set(sk, idx, ptr) ((SRP_user_pwd
```

```
*)OPENSSL_sk_set(ossl_check_SRP_user_pwd_sk_type(sk), (idx), ossl_check_SRP_user_pwd_type(ptr)))
#define sk_SRP_user_pwd_find(sk, ptr) OPENSSL_sk_find(ossl_check_SRP_user_pwd_sk_type(sk),
ossl_check_SRP_user_pwd_type(ptr))
#define sk_SRP_user_pwd_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_SRP_user_pwd_sk_type(sk),
ossl_check_SRP_user_pwd_type(ptr))
#define sk_SRP_user_pwd_find_all(sk,
 ptr, pnum) OPENSSL_sk_find_all(ossl_check_SRP_user_pwd_sk_type(sk), ossl_check_SRP_user_pwd_type(ptr),
pnum)
#define sk_SRP_user_pwd_sort(sk) OPENSSL_sk_sort(ossl_check_SRP_user_pwd_sk_type(sk))
#define sk_SRP_user_pwd_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_SRP_user_pwd_sk_type(sk))
#define sk_SRP_user_pwd_dup(sk) ((STACK_OF(SRP_user_pwd)
*)OPENSSL_sk_dup(ossl_check_const_SRP_user_pwd_sk_type(sk)))
#define sk_SRP_user_pwd_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(SRP_user_pwd)
*)OPENSSL_sk_deep_copy(ossl_check_const_SRP_user_pwd_sk_type(sk),
ossl_check_SRP_user_pwd_copyfunc_type(copyfunc), ossl_check_SRP_user_pwd_freefunc_type(freefunc)))
#define sk_SRP_user_pwd_set_cmp_func(sk, cmp)
((sk_SRP_user_pwd_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_SRP_user_pwd_sk_type(sk),
ossl_check_SRP_user_pwd_compfunc_type(cmp)))

/* clang-format on */

OSSL_DEPRECATEDIN_3_0
SRP_user_pwd *SRP_user_pwd_new(void);
OSSL_DEPRECATEDIN_3_0
void SRP_user_pwd_free(SRP_user_pwd
 *user_pwd);

OSSL_DEPRECATEDIN_3_0
void SRP_user_pwd_set_gN(SRP_user_pwd *user_pwd, const BIGNUM *g,
   const BIGNUM *N);
OSSL_DEPRECATEDIN_3_0
int SRP_user_pwd_set1_ids(SRP_user_pwd *user_pwd, const char *id,
   const char *info);
OSSL_DEPRECATEDIN_3_0
int SRP_user_pwd_set0_sv(SRP_user_pwd *user_pwd, BIGNUM *s, BIGNUM *v);

typedef struct SRP_VBASE_st {
   STACK_OF(SRP_user_pwd) *users_pwd;
   STACK_OF(SRP_gN_cache) *gN_cache;
   /* to simulate a user */
   char *seed_key;
   const BIGNUM *default_g;
   const BIGNUM *default_N;
} SRP_VBASE;

/*
* Internal structure storing N and g pair
*/
```

```
typedef struct SRP_gN_st {
   char *id;
   const BIGNUM *g;
   const BIGNUM *N;
} SRP_gN;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(SRP_gN, SRP_gN, SRP_gN)
#define sk_SRP_gN_num(sk) OPENSSL_sk_num(ossl_check_const_SRP_gN_sk_type(sk))
#define sk_SRP_gN_value(sk, idx) ((SRP_gN *)OPENSSL_sk_value(ossl_check_const_SRP_gN_sk_type(sk),
(idx)))
#define sk_SRP_gN_new(cmp) ((STACK_OF(SRP_gN)
 *)OPENSSL_sk_new(ossl_check_SRP_gN_compfunc_type(cmp)))
#define sk_SRP_gN_new_null() ((STACK_OF(SRP_gN) *)OPENSSL_sk_new_null())
#define sk_SRP_gN_new_reserve(cmp, n) ((STACK_OF(SRP_gN)
*)OPENSSL_sk_new_reserve(ossl_check_SRP_gN_compfunc_type(cmp), (n)))
#define sk_SRP_gN_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_SRP_gN_sk_type(sk), (n))
#define sk_SRP_gN_free(sk) OPENSSL_sk_free(ossl_check_SRP_gN_sk_type(sk))
#define sk_SRP_gN_zero(sk) OPENSSL_sk_zero(ossl_check_SRP_gN_sk_type(sk))
#define sk_SRP_gN_delete(sk, i) ((SRP_gN *)OPENSSL_sk_delete(ossl_check_SRP_gN_sk_type(sk), (i)))
#define sk_SRP_gN_delete_ptr(sk, ptr) ((SRP_gN *)OPENSSL_sk_delete_ptr(ossl_check_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_type(ptr)))
#define sk_SRP_gN_push(sk, ptr) OPENSSL_sk_push(ossl_check_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_type(ptr))
#define sk_SRP_gN_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_type(ptr))
#define sk_SRP_gN_pop(sk) ((SRP_gN *)OPENSSL_sk_pop(ossl_check_SRP_gN_sk_type(sk)))
#define
 sk_SRP_gN_shift(sk) ((SRP_gN *)OPENSSL_sk_shift(ossl_check_SRP_gN_sk_type(sk)))
#define sk_SRP_gN_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_SRP_gN_sk_type(sk),ossl_check_SRP_gN_freefunc_type(freefunc))
#define sk_SRP_gN_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_type(ptr), (idx))
#define sk_SRP_gN_set(sk, idx, ptr) ((SRP_gN *)OPENSSL_sk_set(ossl_check_SRP_gN_sk_type(sk), (idx),
ossl_check_SRP_gN_type(ptr)))
#define sk_SRP_gN_find(sk, ptr) OPENSSL_sk_find(ossl_check_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_type(ptr))
#define sk_SRP_gN_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_type(ptr))
#define sk_SRP_gN_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_type(ptr), pnum)
#define sk_SRP_gN_sort(sk) OPENSSL_sk_sort(ossl_check_SRP_gN_sk_type(sk))
#define sk_SRP_gN_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_SRP_gN_sk_type(sk))
#define
 sk_SRP_gN_dup(sk) ((STACK_OF(SRP_gN) *)OPENSSL_sk_dup(ossl_check_const_SRP_gN_sk_type(sk)))
#define sk_SRP_gN_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(SRP_gN)
*)OPENSSL_sk_deep_copy(ossl_check_const_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_copyfunc_type(copyfunc), ossl_check_SRP_gN_freefunc_type(freefunc)))
#define sk_SRP_gN_set_cmp_func(sk, cmp)
```

```
((sk_SRP_gN_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_compfunc_type(cmp)))

/* clang-format on */

OSSL_DEPRECATEDIN_3_0
SRP_VBASE *SRP_VBASE_new(char *seed_key);
OSSL_DEPRECATEDIN_3_0
void SRP_VBASE_free(SRP_VBASE *vb);
OSSL_DEPRECATEDIN_3_0
int SRP_VBASE_init(SRP_VBASE *vb, char *verifier_file);

OSSL_DEPRECATEDIN_3_0
int SRP_VBASE_add0_user(SRP_VBASE *vb, SRP_user_pwd *user_pwd);

/* NOTE: unlike in SRP_VBASE_get_by_user, caller owns the returned pointer.*/
OSSL_DEPRECATEDIN_3_0
SRP_user_pwd *SRP_VBASE_get1_by_user(SRP_VBASE *vb, char *username);

OSSL_DEPRECATEDIN_3_0
char
 *SRP_create_verifier_ex(const char *user, const char *pass, char **salt,
   char **verifier, const char *N, const char *g,
   OSSL_LIB_CTX *libctx, const char *propq);
OSSL_DEPRECATEDIN_3_0
char *SRP_create_verifier(const char *user, const char *pass, char **salt,
   char **verifier, const char *N, const char *g);
OSSL_DEPRECATEDIN_3_0
int SRP_create_verifier_BN_ex(const char *user, const char *pass, BIGNUM **salt,
   BIGNUM **verifier, const BIGNUM *N,
   const BIGNUM *g, OSSL_LIB_CTX *libctx,
   const char *propq);
OSSL_DEPRECATEDIN_3_0
int SRP_create_verifier_BN(const char *user, const char *pass, BIGNUM **salt,
   BIGNUM **verifier, const BIGNUM *N,
   const BIGNUM *g);

#define SRP_NO_ERROR 0
#define SRP_ERR_VBASE_INCOMPLETE_FILE 1
#define SRP_ERR_VBASE_BN_LIB 2
#define SRP_ERR_OPEN_FILE 3
#define SRP_ERR_MEMORY 4

#define DB_srptype 0
#define DB_srpverifier 1
#define DB_srpsalt 2
#define DB_srpid 3
#define DB_srpgN 4
```

```
#define DB_srpinfo 5
#undef DB_NUMBER
#define DB_NUMBER
 6

#define DB_SRP_INDEX 'I'
#define DB_SRP_VALID 'V'
#define DB_SRP_REVOKED 'R'
#define DB_SRP_MODIF 'v'

/* see srp.c */
OSSL_DEPRECATEDIN_3_0
char *SRP_check_known_gN_param(const BIGNUM *g, const BIGNUM *N);
OSSL_DEPRECATEDIN_3_0
SRP_gN *SRP_get_default_gN(const char *id);

/* server side .... */
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_server_key(const BIGNUM *A, const BIGNUM *v, const BIGNUM *u,
   const BIGNUM *b, const BIGNUM *N);
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_B_ex(const BIGNUM *b, const BIGNUM *N, const BIGNUM *g,
   const BIGNUM *v, OSSL_LIB_CTX *libctx, const char *propq);
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_B(const BIGNUM *b, const BIGNUM *N, const BIGNUM *g,
   const BIGNUM *v);

OSSL_DEPRECATEDIN_3_0
int SRP_Verify_A_mod_N(const BIGNUM *A, const BIGNUM *N);
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_u_ex(const BIGNUM *A, const BIGNUM *B, const BIGNUM *N,
   OSSL_LIB_CTX *libctx, const char *propq);
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_u(const BIGNUM *A,
 const BIGNUM *B, const BIGNUM *N);

/* client side .... */

OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_x_ex(const BIGNUM *s, const char *user, const char *pass,
   OSSL_LIB_CTX *libctx, const char *propq);
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_x(const BIGNUM *s, const char *user, const char *pass);
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_A(const BIGNUM *a, const BIGNUM *N, const BIGNUM *g);
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_client_key_ex(const BIGNUM *N, const BIGNUM *B, const BIGNUM *g,
   const BIGNUM *x, const BIGNUM *a, const BIGNUM *u,
```

```
   OSSL_LIB_CTX *libctx, const char *propq);
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_client_key(const BIGNUM *N, const BIGNUM *B, const BIGNUM *g,
   const BIGNUM *x, const BIGNUM *a, const BIGNUM *u);
OSSL_DEPRECATEDIN_3_0
int SRP_Verify_B_mod_N(const BIGNUM *B, const BIGNUM *N);

#define SRP_MINIMAL_N 1024

#endif /* OPENSSL_NO_DEPRECATED_3_0 */

/* This method ignores the configured seed and fails for an unknown user. */
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0
SRP_user_pwd
 *SRP_VBASE_get_by_user(SRP_VBASE *vb, char *username);
#endif

#ifdef __cplusplus
}
#endif
#endif

#endif
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// found in the LICENSE file.

#ifndef V8_COMPILER_TURBOSHAFT_COPYING_PHASE_H_
#define V8_COMPILER_TURBOSHAFT_COPYING_PHASE_H_

#include <algorithm>
#include <cstddef>
#include <cstdint>
#include <utility>

#include "src/base/iterator.h"
#include "src/base/logging.h"
#include "src/base/small-vector.h"
#include "src/base/vector.h"
#include "src/codegen/optimized-compilation-info.h"
#include "src/compiler/node-origin-table.h"
#include "src/compiler/turboshaft/assembler.h"
#include "src/compiler/turboshaft/graph.h"
#include "src/compiler/turboshaft/index.h"
#include "src/compiler/turboshaft/operations.h"
#include "src/compiler/turboshaft/phase.h"
#include "src/compiler/turboshaft/reducer-traits.h"
```

```
#include "src/compiler/turboshaft/representations.h"
#include "src/compiler/turboshaft/snapshot-table.h"
#include "src/compiler/turboshaft/variable-reducer.h"
#include
 "src/zone/zone-containers.h"

namespace v8::internal::compiler::turboshaft {

using MaybeVariable = base::Optional<Variable>;

V8_EXPORT_PRIVATE int CountDecimalDigits(uint32_t value);
struct PaddingSpace {
 int spaces;
};
V8_EXPORT_PRIVATE std::ostream& operator<<(std::ostream& os,
                                           PaddingSpace padding);

template <typename Next>
class ReducerBaseForwarder;

template <typename Derived, typename Base>
class OutputGraphAssembler : public Base {
#define FRIEND(op) friend struct op##Op;
 TURBOSHAFT_OPERATION_LIST(FRIEND)
#undef FRIEND
 template <size_t I, class D>
 friend struct FixedArityOperationT;

 OpIndex Map(OpIndex index) { return derived_this()->MapToNewGraph(index); }

 OptionalOpIndex Map(OptionalOpIndex index) {
   return derived_this()->MapToNewGraph(index);
 }

 template <size_t N>
 base::SmallVector<OpIndex, N> Map(base::Vector<const OpIndex> indices) {
   return derived_this()->template MapToNewGraph<N>(indices);
  }

public:
#define ASSEMBLE(operation)                                          \
 OpIndex AssembleOutputGraph##operation(const operation##Op& op) { \
   return op.Explode(                                          \
       [a = assembler()](auto... args) {                       \
         return a->Reduce##operation(args...);                 \
       },                                                      \
       *this);                                                 \
 }
```

```
 TURBOSHAFT_OPERATION_LIST(ASSEMBLE)
#undef ASSEMBLE

private:
 Derived* derived_this() { return static_cast<Derived*>(this); }
 Assembler<typename Base::ReducerList>* assembler() {
   return &derived_this()->Asm();
 }
};

template <class AfterNext>
class GraphVisitor : public OutputGraphAssembler<GraphVisitor<AfterNext>,
                                    VariableReducer<AfterNext>> {
 template <typename N>
 friend class ReducerBaseForwarder;

public:
 using Next
 = VariableReducer<AfterNext>;
 TURBOSHAFT_REDUCER_BOILERPLATE(CopyingPhase)

 GraphVisitor()
     : input_graph_(Asm().modifiable_input_graph()),
       current_input_block_(nullptr),
       op_mapping_(Asm().input_graph().op_id_count(), OpIndex::Invalid(),
                   Asm().phase_zone(), &Asm().input_graph()),
       block_mapping_(Asm().input_graph().block_count(), nullptr,
                      Asm().phase_zone()),
       blocks_needing_variables_(Asm().input_graph().block_count(),
                                 Asm().phase_zone()),
       old_opindex_to_variables(Asm().input_graph().op_id_count(),
                                Asm().phase_zone(), &Asm().input_graph()),
       blocks_to_clone_(Asm().phase_zone()) {
   Asm().output_graph().Reset();
 }

 // `trace_reduction` is a template parameter to avoid paying for tracing at
 // runtime.
 template <bool trace_reduction>
 void VisitGraph() {
   Asm().Analyze();

   // Creating initial old-to-new Block
 mapping.
   for (Block& input_block : Asm().modifiable_input_graph().blocks()) {
     block_mapping_[input_block.index()] = Asm().output_graph().NewBlock(
         input_block.IsLoop() ? Block::Kind::kLoopHeader : Block::Kind::kMerge,
         &input_block);
```

```
  }

  // Visiting the graph.
  VisitAllBlocks<trace_reduction>();

  Finalize();
}

void Bind(Block* block) {
  Next::Bind(block);
  block->SetOrigin(current_input_block());
}

void Finalize() {
  // Updating the source_positions.
  if (!Asm().input_graph().source_positions().empty()) {
    for (OpIndex index : Asm().output_graph().AllOperationIndices()) {
      OpIndex origin = Asm().output_graph().operation_origins()[index];
      Asm().output_graph().source_positions()[index] =
          Asm().input_graph().source_positions()[origin];
    }
  }
  // Updating the operation origins.
  NodeOriginTable* origins = PipelineData::Get().node_origins();
  if (origins) {
    for (OpIndex
index : Asm().output_graph().AllOperationIndices()) {
      OpIndex origin = Asm().output_graph().operation_origins()[index];
      origins->SetNodeOrigin(index.id(), origin.id());
    }
  }

  input_graph_.SwapWithCompanion();
}

const Block* current_input_block() { return current_input_block_; }

bool* turn_loop_without_backedge_into_merge() {
  return &turn_loop_without_backedge_into_merge_;
}

// Emits a Goto to a cloned version of {input_block}, assuming that the only
// predecessor of this cloned copy will be the current block. {input_block} is
// not cloned right away (because this would recursively call VisitBlockBody,
// which could cause stack overflows), and is instead added to the
// {blocks_to_clone_} stack, whose blocks will be cloned once the current
// block has been fully visited.
void CloneBlockAndGoto(const Block* input_block) {
```

```
  Block* new_block =
      Asm().output_graph().NewBlock(input_block->kind(), input_block);

  //
 Computing which input of Phi operations to use when visiting
  // {input_block} (since {input_block} doesn't really have predecessors
  // anymore).
  int added_block_phi_input = input_block->GetPredecessorIndex(
      Asm().current_block()->OriginForBlockEnd());

  // There is no guarantees that {input_block} will be entirely removed just
  // because it's cloned/inlined, since it's possible that it has predecessors
  // for which this optimization didn't apply. As a result, we add it to
  // {blocks_needing_variables_}, so that if it's ever generated
  // normally, Variables are used when emitting its content, so that
  // they can later be merged when control flow merges with the current
  // version of {input_block} that we just cloned.
  blocks_needing_variables_.Add(input_block->index().id());

  Asm().Goto(new_block);

  blocks_to_clone_.push_back({input_block, added_block_phi_input, new_block});
 }

 // Visits and emits {input_block} right now (ie,
 in the current block). This
 // should not be called recursively in order to avoid stack overflow (ie,
 // processing {input_block} should never lead to calling CloneAndInlingBlock).
 void CloneAndInlineBlock(const Block* input_block) {
  if (Asm().generating_unreachable_operations()) return;

#ifdef DEBUG
  // Making sure that we didn't call CloneAndInlineBlock recursively.
  DCHECK(!is_in_recursive_inlining_);
  ScopedModification<bool> recursive_guard(&is_in_recursive_inlining_, true);
#endif

  // Computing which input of Phi operations to use when visiting
  // {input_block} (since {input_block} doesn't really have predecessors
  // anymore).
  int added_block_phi_input = input_block->GetPredecessorIndex(
      Asm().current_block()->OriginForBlockEnd());

  // There is no guarantees that {input_block} will be entirely removed just
  // because it's cloned/inlined, since it's possible that it has predecessors
  // for which this optimization didn't apply.
 As a result, we add it to
  // {blocks_needing_variables_}, so that if it's ever generated
```

```
  // normally, Variables are used when emitting its content, so that
  // they can later be merged when control flow merges with the current
  // version of {input_block} that we just cloned.
  blocks_needing_variables_.Add(input_block->index().id());

  ScopedModification<bool> set_true(&current_block_needs_variables_, true);
  VisitBlockBody<CanHavePhis::kYes, ForCloning::kYes, false>(
      input_block, added_block_phi_input);
}

// {InlineOp} introduces two limitations unlike {CloneAndInlineBlock}:
// 1. The input operation must not be emitted anymore as part of its
// regular input block;
// 2. {InlineOp} must not be used multiple times for the same input op.
bool InlineOp(OpIndex index, const Block* input_block) {
  return VisitOpAndUpdateMapping<false>(index, input_block);
}

template <bool can_be_invalid = false>
OpIndex MapToNewGraph(OpIndex old_index,
int predecessor_index = -1) {
  DCHECK(old_index.valid());
  OpIndex result = op_mapping_[old_index];

  if (!result.valid()) {
    // {op_mapping} doesn't have a mapping for {old_index}. The
    // VariableReducer should provide the mapping.
    MaybeVariable var = GetVariableFor(old_index);
    if constexpr (can_be_invalid) {
      if (!var.has_value()) {
        return OpIndex::Invalid();
      }
    }
    DCHECK(var.has_value());
    if (predecessor_index == -1) {
      result = Asm().GetVariable(var.value());
    } else {
      result = Asm().GetPredecessorValue(var.value(), predecessor_index);
    }
  }

  DCHECK_IMPLIES(!can_be_invalid, result.valid());
  return result;
}

Block* MapToNewGraph(const Block* block) const {
  Block* new_block = block_mapping_[block->index()];
  DCHECK_NOT_NULL(new_block);
```

```
  return new_block;
}

// The block from the input graph that corresponds to the current block as a
// branch destination.
Such a block might not exist, and this function uses a
// trick to compute such a block in almost all cases, but might rarely fail
// and return `nullptr` instead.
const Block* OriginForBlockStart(Block* block) const {
  // Check that `block->origin_` is still valid as a block start and was not
  // changed to a semantically different block when inlining blocks.
  const Block* origin = block->origin_;
  if (origin && MapToNewGraph(origin) == block) return origin;
  return nullptr;
}

// Clone all of the blocks in {sub_graph} (which should be Blocks of the input
// graph). If `keep_loop_kinds` is true, the loop headers are preserved, and
// otherwise they are marked as Merge. An initial GotoOp jumping to the 1st
// block of `sub_graph` is always emitted. The output Block corresponding to
// the 1st block of `sub_graph` is returned.
template <class Set>
Block* CloneSubGraph(Set sub_graph, bool keep_loop_kinds,
                     bool is_loop_after_peeling
= false) {
  // The BlockIndex of the blocks of `sub_graph` should be sorted so that
  // visiting them in order is correct (all of the predecessors of a block
  // should always be visited before the block itself).
  DCHECK(std::is_sorted(sub_graph.begin(), sub_graph.end(),
                        [](const Block* a, const Block* b) {
                          return a->index().id() <= b->index().id();
                        }));

  // 1. Create new blocks, and update old->new mapping. This is required to
  // emit multiple times the blocks of {sub_graph}: if a block `B1` in
  // {sub_graph} ends with a Branch/Goto to a block `B2` that is also in
  // {sub_graph}, then this Branch/Goto should go to the version of `B2` that
  // this CloneSubGraph will insert, rather than to a version inserted by a
  // previous call to CloneSubGraph or the version that the regular
  // VisitAllBlock function will emit.
  ZoneVector<Block*> old_mappings(sub_graph.size(),
Asm().phase_zone());
  for (auto&& [input_block, old_mapping] :
       base::zip(sub_graph, old_mappings)) {
    old_mapping = block_mapping_[input_block->index()];
    Block::Kind kind = keep_loop_kinds && input_block->IsLoop()
                       ? Block::Kind::kLoopHeader
                       : Block::Kind::kMerge;
```

```
    block_mapping_[input_block->index()] =
        Asm().output_graph().NewBlock(kind, input_block);
  }

  // 2. Visit block in correct order (begin to end)

  // Emit a goto to 1st block.
  Block* start = block_mapping_[(*sub_graph.begin())->index()];
#ifdef DEBUG
  if (is_loop_after_peeling) start->set_has_peeled_iteration();
#endif
  Asm().Goto(start);
  // Visiting `sub_graph`.
  for (const Block* block : sub_graph) {
    blocks_needing_variables_.Add(block->index().id());
    VisitBlock<false>(block);
    ProcessWaitingCloningAndInlining<false>();
  }

  // 3. Restore initial old->new mapping
  for (auto&&
[input_block, old_mapping] :
      base::zip(sub_graph, old_mappings)) {
    block_mapping_[input_block->index()] = old_mapping;
  }

  return start;
}

template <bool can_be_invalid = false>
OptionalOpIndex MapToNewGraph(OptionalOpIndex old_index,
                              int predecessor_index = -1) {
  if (!old_index.has_value()) return OptionalOpIndex::Invalid();
  return MapToNewGraph<can_be_invalid>(old_index.value(), predecessor_index);
}

template <size_t expected_size>
base::SmallVector<OpIndex, expected_size> MapToNewGraph(
    base::Vector<const OpIndex> inputs) {
  base::SmallVector<OpIndex, expected_size> result;
  for (OpIndex input : inputs) {
    result.push_back(MapToNewGraph(input));
  }
  return result;
}

private:
 template <bool trace_reduction>
```

```
void VisitAllBlocks() {
  base::SmallVector<const Block*, 128> visit_stack;

  visit_stack.push_back(&Asm().input_graph().StartBlock());
  while (!visit_stack.empty())
{
    const Block* block = visit_stack.back();
    visit_stack.pop_back();
    VisitBlock<trace_reduction>(block);
    ProcessWaitingCloningAndInlining<trace_reduction>();

    for (Block* child = block->LastChild(); child != nullptr;
         child = child->NeighboringChild()) {
      visit_stack.push_back(child);
    }
  }
}

template <bool trace_reduction>
void VisitBlock(const Block* input_block) {
  current_block_needs_variables_ =
      blocks_needing_variables_.Contains(input_block->index().id());
  if constexpr (trace_reduction) {
    std::cout << "\nold " << PrintAsBlockHeader{*input_block} << "\n";
    std::cout << "new "
              << PrintAsBlockHeader{*MapToNewGraph(input_block),
                                    Asm().output_graph().next_block_index()}
              << "\n";
  }
  Block* new_block = MapToNewGraph(input_block);
  if (Asm().Bind(new_block)) {
    VisitBlockBody<CanHavePhis::kYes, ForCloning::kNo, trace_reduction>(
        input_block);
    if constexpr (trace_reduction) TraceBlockFinished();
  } else {
    if constexpr (trace_reduction) TraceBlockUnreachable();
  }

  // If we eliminate a loop backedge, we need to turn the loop into a
  // single-predecessor merge block.
  if (!turn_loop_without_backedge_into_merge_) return;
  const Operation& last_op = input_block->LastOperation(Asm().input_graph());
  if (auto* final_goto = last_op.TryCast<GotoOp>()) {
    if (final_goto->destination->IsLoop()) {
      if (input_block->index() >= final_goto->destination->index()) {
        Asm().FinalizeLoop(MapToNewGraph(final_goto->destination));
      } else {
        // We have a forward jump to a loop, rather than a backedge. We
```

```
        // don't need to do anything.
      }
    }
  }
}

enum class CanHavePhis { kNo, kYes };
enum class ForCloning { kNo, kYes };

template <CanHavePhis can_have_phis, ForCloning for_cloning,
          bool trace_reduction>
 void VisitBlockBody(const Block* input_block,
                     int added_block_phi_input = -1) {
  DCHECK_NOT_NULL(Asm().current_block());
  current_input_block_ = input_block;

  // Phis could be mutually recursive, for instance (in a loop header):
  //
  //     p1 = phi(a, p2)
  //     p2 = phi(b, p1)
  //
  // In this case, if we are currently unrolling the loop and visiting this
  // loop header that is now part of the loop body, then if we visit Phis
  // and emit new mapping (with CreateOldToNewMapping) as we go along, we
  // would visit p1 and emit a mapping saying "p1 = p2", and use this
  // mapping when visiting p2, then we'd map p2 to p2 instead of p1. To
  // overcome this issue, we first visit the Phis of the loop, emit the new
  // phis, and record the new mapping in a side-table ({new_phi_values}).
  // Then, we visit all of the operations of the loop and commit the new
  // mappings: phis were emitted before using the old
mapping, and all of
  // the other operations will use the new mapping (as they should).
  //
  // Note that Phis are not always at the begining of blocks, but when they
  // aren't, they can't have inputs from the current block (except on their
  // backedge for loop phis, but they start as PendingLoopPhis without
  // backedge input), so visiting all Phis first is safe.

  // Visiting Phis and collecting their new OpIndices.
  base::SmallVector<OpIndex, 64> new_phi_values;
  if constexpr (can_have_phis == CanHavePhis::kYes) {
    for (OpIndex index : Asm().input_graph().OperationIndices(*input_block)) {
      if (ShouldSkipOperation(Asm().input_graph().Get(index))) continue;
      DCHECK_NOT_NULL(Asm().current_block());
      if (Asm().input_graph().Get(index).template Is<PhiOp>()) {
        OpIndex new_index;
        if constexpr (for_cloning == ForCloning::kYes) {
          // When cloning a block, it only has a single predecessor, and Phis
```

```
    // should therefore be removed and be replaced by the input
        // corresponding to this predecessor.
        DCHECK_NE(added_block_phi_input, -1);
        // This Phi has been cloned/inlined, and has thus now a single
        // predecessor, and shouldn't be a Phi anymore.
        new_index = MapToNewGraph(
            Asm().input_graph().Get(index).input(added_block_phi_input));
      } else {
        new_index =
            VisitOpNoMappingUpdate<trace_reduction>(index, input_block);
      }
      new_phi_values.push_back(new_index);
      if (!Asm().current_block()) {
        // A reducer has detected, based on the Phis of the block that were
        // visited so far, that we are in unreachable code (or, less likely,
        // decided, based on some Phis only, to jump away from this block?).
        return;
      }
    }
  }
}
DCHECK_NOT_NULL(Asm().current_block());

// Visiting everything,
updating Phi mappings, and emitting non-phi
// operations.
int phi_num = 0;
bool stopped_early = false;
for (OpIndex index : base::IterateWithoutLast(
        Asm().input_graph().OperationIndices(*input_block))) {
  if (ShouldSkipOperation(Asm().input_graph().Get(index))) continue;
  const Operation& op = Asm().input_graph().Get(index);
  if constexpr (can_have_phis == CanHavePhis::kYes) {
    if (op.Is<PhiOp>()) {
      CreateOldToNewMapping(index, new_phi_values[phi_num++]);
      continue;
    }
  }
  // Blocks with a single predecessor (for which CanHavePhis might be kNo)
  // can still have phis if they used to be loop header that were turned
  // into regular blocks.
  DCHECK_IMPLIES(op.Is<PhiOp>(), op.input_count == 1);

  if (!VisitOpAndUpdateMapping<trace_reduction>(index, input_block)) {
    stopped_early = true;
    break;
  }
```

```
  }
  // If the last operation of the loop above (= the
one-before-last operation
  // of the block) was lowered to an unconditional deopt/trap/something like
  // that, then current_block will now be null, and there is no need visit the
  // last operation of the block.
  if (stopped_early || Asm().current_block() == nullptr) return;

  // The final operation (which should be a block terminator) of the block
  // is processed separately, because if it's a Goto to a block with a
  // single predecessor, we'll inline it. (we could have had a check `if (op
  // is a Goto)` in the loop above, but since this can only be true for the
  // last operation, we instead extracted it here to make things faster).
  const Operation& terminator =
      input_block->LastOperation(Asm().input_graph());
  DCHECK(terminator.IsBlockTerminator());
  VisitBlockTerminator<trace_reduction>(terminator, input_block);
}

template <bool trace_reduction>
bool VisitOpAndUpdateMapping(OpIndex index, const Block* input_block) {
  if (Asm().current_block()
== nullptr) return false;
  OpIndex new_index =
      VisitOpNoMappingUpdate<trace_reduction>(index, input_block);
  const Operation& op = Asm().input_graph().Get(index);
  if (CanBeUsedAsInput(op) && new_index.valid()) {
    CreateOldToNewMapping(index, new_index);
  }
  return true;
}

template <bool trace_reduction>
OpIndex VisitOpNoMappingUpdate(OpIndex index, const Block* input_block) {
  Block* current_block = Asm().current_block();
  DCHECK_NOT_NULL(current_block);
  Asm().SetCurrentOrigin(index);
  current_block->SetOrigin(input_block);
  OpIndex first_output_index = Asm().output_graph().next_operation_index();
  USE(first_output_index);
  const Operation& op = Asm().input_graph().Get(index);
  if constexpr (trace_reduction) TraceReductionStart(index);
  if (ShouldSkipOperation(op)) {
    if constexpr (trace_reduction) TraceOperationSkipped();
    return OpIndex::Invalid();
  }
  OpIndex new_index;
  switch (op.opcode)
```

```
 {
#define EMIT_INSTR_CASE(Name)                                    \
 case Opcode::k##Name:                                           \
   if (MayThrow(Opcode::k##Name)) return OpIndex::Invalid();            \
   new_index = Asm().ReduceInputGraph##Name(index, op.Cast<Name##Op>()); \
   break;
     TURBOSHAFT_OPERATION_LIST(EMIT_INSTR_CASE)
#undef EMIT_INSTR_CASE
   }
   if constexpr (trace_reduction) {
     if (CanBeUsedAsInput(op) && !new_index.valid()) {
       TraceOperationSkipped();
     } else {
       TraceReductionResult(current_block, first_output_index, new_index);
     }
   }
#ifdef DEBUG
   DCHECK_IMPLIES(new_index.valid(),
                  Asm().output_graph().BelongsToThisGraph(new_index));
   if (V8_UNLIKELY(v8_flags.turboshaft_verify_reductions)) {
     if (new_index.valid()) {
       const Operation& new_op = Asm().output_graph().Get(new_index);
       if (!new_op.Is<TupleOp>()) {
         // Checking that the outputs_rep
 of the new operation are the same as
         // the old operation. (except for tuples, since they don't have
         // outputs_rep)
         DCHECK_EQ(new_op.outputs_rep().size(), op.outputs_rep().size());
         for (size_t i = 0; i < new_op.outputs_rep().size(); ++i) {
           DCHECK(new_op.outputs_rep()[i].AllowImplicitRepresentationChangeTo(
               op.outputs_rep()[i]));
         }
       }
       Asm().Verify(index, new_index);
     }
   }
#endif  // DEBUG
   return new_index;
 }

 template <bool trace_reduction>
 void VisitBlockTerminator(const Operation& terminator,
                           const Block* input_block) {
   if (Asm().CanAutoInlineBlocksWithSinglePredecessor() &&
       terminator.Is<GotoOp>()) {
     Block* destination = terminator.Cast<GotoOp>().destination;
     if (destination->PredecessorCount() == 1) {
       block_to_inline_now_ = destination;
```

```
      return;
    }
  }
  // Just going through the regular VisitOp
function.
  OpIndex index = Asm().input_graph().Index(terminator);
  VisitOpAndUpdateMapping<trace_reduction>(index, input_block);
}

template <bool trace_reduction>
void ProcessWaitingCloningAndInlining() {
  InlineWaitingBlock<trace_reduction>();
  while (!blocks_to_clone_.empty()) {
    BlockToClone item = blocks_to_clone_.back();
    blocks_to_clone_.pop_back();
    DoCloneBlock<trace_reduction>(
        item.input_block, item.added_block_phi_input, item.new_output_block);
    InlineWaitingBlock<trace_reduction>();
  }
}

template <bool trace_reduction>
void InlineWaitingBlock() {
  while (block_to_inline_now_) {
    Block* input_block = block_to_inline_now_;
    block_to_inline_now_ = nullptr;
    ScopedModification<bool> set_true(&current_block_needs_variables_, true);
    if constexpr (trace_reduction) {
      std::cout << "Inlining " << PrintAsBlockHeader{*input_block} << "\n";
    }
    VisitBlockBody<CanHavePhis::kNo, ForCloning::kNo,
trace_reduction>(
        input_block);
  }
}

template <bool trace_reduction>
void DoCloneBlock(const Block* input_block, int added_block_phi_input,
                  Block* output_block) {
  DCHECK_EQ(output_block->PredecessorCount(), 1);
  if constexpr (trace_reduction) {
    std::cout << "\nCloning old " << PrintAsBlockHeader{*input_block} << "\n";
    std::cout << "As new "
              << PrintAsBlockHeader{*output_block,
                                    Asm().output_graph().next_block_index()}
              << "\n";
  }
```

```
  ScopedModification<bool> set_true(&current_block_needs_variables_, true);

  Asm().BindReachable(output_block);
  VisitBlockBody<CanHavePhis::kYes, ForCloning::kYes, trace_reduction>(
      input_block, added_block_phi_input);

  if constexpr (trace_reduction) TraceBlockFinished();
}

void TraceReductionStart(OpIndex index) {
  std::cout << " o" << index.id() << ": "
            << PaddingSpace{5 - CountDecimalDigits(index.id())}
             << OperationPrintStyle{Asm().input_graph().Get(index), "#o"}
            << "\n";
}
void TraceOperationSkipped() { std::cout << "> skipped\n\n"; }
void TraceBlockUnreachable() { std::cout << "> unreachable\n\n"; }
void TraceReductionResult(Block* current_block, OpIndex first_output_index,
                          OpIndex new_index) {
  if (new_index < first_output_index) {
    // The operation was replaced with an already existing one.
    std::cout << "> #n" << new_index.id() << "\n";
  }
  bool before_arrow = new_index >= first_output_index;
  for (const Operation& op : Asm().output_graph().operations(
           first_output_index, Asm().output_graph().next_operation_index())) {
    OpIndex index = Asm().output_graph().Index(op);
    const char* prefix;
    if (index == new_index) {
      prefix = ">";
      before_arrow = false;
    } else if (before_arrow) {
      prefix = "  ";
    } else {

  prefix = "   ";
    }
    std::cout << prefix << " n" << index.id() << ": "
              << PaddingSpace{5 - CountDecimalDigits(index.id())}
              << OperationPrintStyle{Asm().output_graph().Get(index), "#n"}
              << "\n";
    if (op.IsBlockTerminator() && Asm().current_block() &&
        Asm().current_block() != current_block) {
      current_block = &Asm().output_graph().Get(
          BlockIndex(current_block->index().id() + 1));
      std::cout << "new " << PrintAsBlockHeader{*current_block} << "\n";
    }
  }
```

```
  std::cout << "\n";
}
void TraceBlockFinished() { std::cout << "\n"; }

// These functions take an operation from the old graph and use the assembler
// to emit a corresponding operation in the new graph, translating inputs and
// blocks accordingly.
V8_INLINE OpIndex AssembleOutputGraphGoto(const GotoOp& op) {
  Block* destination = MapToNewGraph(op.destination);
  if (op.is_backedge) {
    DCHECK(destination->IsBound());
     DCHECK(destination->IsLoop());
    FixLoopPhis(op.destination);
  }
  // It is important that we first fix loop phis and then reduce the `Goto`,
  // because reducing the `Goto` can have side effects, in particular, it can
  // modify affect the SnapshotTable of `VariableReducer`, which is also used
  // by `FixLoopPhis()`.
  Asm().ReduceGoto(destination, op.is_backedge);
  return OpIndex::Invalid();
}
V8_INLINE OpIndex AssembleOutputGraphBranch(const BranchOp& op) {
  Block* if_true = MapToNewGraph(op.if_true);
  Block* if_false = MapToNewGraph(op.if_false);
  return Asm().ReduceBranch(MapToNewGraph(op.condition()), if_true, if_false,
                            op.hint);
}
OpIndex AssembleOutputGraphSwitch(const SwitchOp& op) {
  base::SmallVector<SwitchOp::Case, 16> cases;
  for (SwitchOp::Case c : op.cases) {
    cases.emplace_back(c.value, MapToNewGraph(c.destination), c.hint);
  }
  return Asm().ReduceSwitch(
      MapToNewGraph(op.input()),
       Asm().graph_zone()->CloneVector(base::VectorOf(cases)),
      MapToNewGraph(op.default_case), op.default_hint);
}
OpIndex AssembleOutputGraphPhi(const PhiOp& op) {
  if (op.input_count == 1) {
    // If, in the previous CopyingPhase, a loop header was turned into a
    // regular blocks, its PendingLoopPhis became Phis with a single input. We
    // can now just get rid of these Phis.
    return MapToNewGraph(op.input(0));
  }

  OpIndex ig_index = Asm().input_graph().Index(op);
  if (Asm().current_block()->IsLoop()) {
    DCHECK_EQ(op.input_count, 2);
```

```
    if (ig_index == op.input(PhiOp::kLoopPhiBackEdgeIndex)) {
      // Avoid emitting a Loop Phi which points to itself, instead
      // emit it's 0'th input.
      return MapToNewGraph(op.input(0));
    }
    return Asm().PendingLoopPhi(MapToNewGraph(op.input(0)), op.rep);
  }

  base::Vector<const OpIndex> old_inputs = op.inputs();
  base::SmallVector<OpIndex, 64>
new_inputs;
  int predecessor_count = Asm().current_block()->PredecessorCount();
  Block* old_pred = current_input_block_->LastPredecessor();
  Block* new_pred = Asm().current_block()->LastPredecessor();
  // Control predecessors might be missing after the optimization phase. So we
  // need to skip phi inputs that belong to control predecessors that have no
  // equivalent in the new graph.

  // We first assume that the order if the predecessors of the current block
  // did not change. If it did, {new_pred} won't be nullptr at the end of this
  // loop, and we'll instead fall back to the slower code below to compute the
  // inputs of the Phi.
  int predecessor_index = predecessor_count - 1;
  for (OpIndex input : base::Reversed(old_inputs)) {
    if (new_pred && new_pred->OriginForBlockEnd() == old_pred) {
      // Phis inputs have to come from predecessors. We thus have to
      // MapToNewGraph with {predecessor_index} so that we get an OpIndex that
       // is from a predecessor rather than one that comes from a Variable
      // merged in the current block.
      new_inputs.push_back(MapToNewGraph(input, predecessor_index));
      new_pred = new_pred->NeighboringPredecessor();
      predecessor_index--;
    }
    old_pred = old_pred->NeighboringPredecessor();
  }
  DCHECK_IMPLIES(new_pred == nullptr, old_pred == nullptr);

  if (new_pred != nullptr) {
    // If {new_pred} is not nullptr, then the order of the predecessors
    // changed. This should only happen with blocks that were introduced in
    // the previous graph. For instance, consider this (partial) dominator
    // tree:
    //
    //      7
    //       8
    //       10
    //      9
    //      11
```

```
    //
    // Where the predecessors of block 11 are blocks 9 and 10 (in that order).
    // In dominator visit order, block 10 will be visited before block 9.
    // Since blocks are added to predecessors when the predecessors
 are
    // visited, it means that in the new graph, the predecessors of block 11
    // are [10, 9] rather than [9, 10].
    // To account for this, we reorder the inputs of the Phi, and get rid of
    // inputs from blocks that vanished.

#ifdef DEBUG
    // To check that indices are set properly, we zap them in debug builds.
    for (auto& block : Asm().modifiable_input_graph().blocks()) {
      block.clear_custom_data();
    }
#endif
    uint32_t pos = current_input_block_->PredecessorCount() - 1;
    for (old_pred = current_input_block_->LastPredecessor();
         old_pred != nullptr; old_pred = old_pred->NeighboringPredecessor()) {
      // Store the current index of the {old_pred}.
      old_pred->set_custom_data(pos--, Block::CustomDataKind::kPhiInputIndex);
    }

    // Filling {new_inputs}: we iterate the new predecessors, and, for each
    // predecessor, we check the index of the input corresponding to the old
    // predecessor, and
 we put it next in {new_inputs}.
    new_inputs.clear();
    int predecessor_index = predecessor_count - 1;
    for (new_pred = Asm().current_block()->LastPredecessor();
         new_pred != nullptr; new_pred = new_pred->NeighboringPredecessor()) {
      const Block* origin = new_pred->OriginForBlockEnd();
      DCHECK_NOT_NULL(origin);
      OpIndex input = old_inputs[origin->get_custom_data(
          Block::CustomDataKind::kPhiInputIndex)];
      // Phis inputs have to come from predecessors. We thus have to
      // MapToNewGraph with {predecessor_index} so that we get an OpIndex that
      // is from a predecessor rather than one that comes from a Variable
      // merged in the current block.
      new_inputs.push_back(MapToNewGraph(input, predecessor_index));
      predecessor_index--;
    }
  }

  DCHECK_EQ(new_inputs.size(), Asm().current_block()->PredecessorCount());

  if (new_inputs.size() == 1) {
    // This Operation used to be a Phi
```

```
 in a Merge, but since one (or more) of
    // the inputs of the merge have been removed, there is no need for a Phi
    // anymore.
    return new_inputs[0];
  }

  std::reverse(new_inputs.begin(), new_inputs.end());
  return Asm().ReducePhi(base::VectorOf(new_inputs), op.rep);
 }
 OpIndex AssembleOutputGraphPendingLoopPhi(const PendingLoopPhiOp& op) {
  UNREACHABLE();
 }
 V8_INLINE OpIndex AssembleOutputGraphFrameState(const FrameStateOp& op) {
  auto inputs = MapToNewGraph<32>(op.inputs());
  return Asm().ReduceFrameState(base::VectorOf(inputs), op.inlined, op.data);
 }
 OpIndex AssembleOutputGraphCall(const CallOp& op) {
  OpIndex callee = MapToNewGraph(op.callee());
  OptionalOpIndex frame_state = MapToNewGraph(op.frame_state());
  auto arguments = MapToNewGraph<16>(op.arguments());
  return Asm().ReduceCall(callee, frame_state, base::VectorOf(arguments),
                          op.descriptor, op.Effects());
 }
 OpIndex AssembleOutputGraphDidntThrow(const
 DidntThrowOp& op) {
  const Operation& throwing_operation =
      Asm().input_graph().Get(op.throwing_operation());
  OpIndex result;
  switch (throwing_operation.opcode) {
#define CASE(Name)                                          \
 case Opcode::k##Name:                                      \
  result = Asm().ReduceInputGraph##Name(                    \
      op.throwing_operation(), throwing_operation.Cast<Name##Op>()); \
  break;
    TURBOSHAFT_THROWING_OPERATIONS_LIST(CASE)
#undef CASE
    default:
      UNREACHABLE();
  }
  return result;
 }
 OpIndex AssembleOutputGraphCheckException(const CheckExceptionOp& op) {
  Graph::OpIndexIterator it(op.didnt_throw_block->begin(),
                            &Asm().input_graph());
  Graph::OpIndexIterator end(op.didnt_throw_block->end(),
                             &Asm().input_graph());
  // To translate `CheckException` to the new graph, we reduce the throwing
```

```
 // operation (actually it's `DidntThrow` operation, but that triggers the
 // actual reduction) with a catch scope. If the reduction replaces the
 // throwing operation with other throwing operations, all of them will be
 // connected to the provided catch block. The reduction should automatically
 // bind a block that represents non-throwing control flow of the original
 // operation, so we can inline the rest of the `didnt_throw` block.
 {
  CatchScope scope(Asm(), MapToNewGraph(op.catch_block));
  DCHECK(Asm().input_graph().Get(*it).template Is<DidntThrowOp>());
  if (!Asm().InlineOp(*it, op.didnt_throw_block)) {
    return OpIndex::Invalid();
  }
  ++it;
 }
 for (; it != end; ++it) {
  // Using `InlineOp` requires that the inlined operation is not emitted
  // multiple times. This is the case here because we just removed the
  // single predecessor of `didnt_throw_block`.
  if (!Asm().InlineOp(*it, op.didnt_throw_block))
{
    break;
  }
 }
 return OpIndex::Invalid();
}

void CreateOldToNewMapping(OpIndex old_index, OpIndex new_index) {
 DCHECK(old_index.valid());
 DCHECK(Asm().input_graph().BelongsToThisGraph(old_index));
 DCHECK_IMPLIES(new_index.valid(),
             Asm().output_graph().BelongsToThisGraph(new_index));

 if (current_block_needs_variables_) {
  MaybeVariable var = GetVariableFor(old_index);
  if (!var.has_value()) {
    MaybeRegisterRepresentation rep =
        Asm().input_graph().Get(old_index).outputs_rep().size() == 1
            ? static_cast<const MaybeRegisterRepresentation&>(
                Asm().input_graph().Get(old_index).outputs_rep()[0])
            : MaybeRegisterRepresentation::None();
    var = Asm().NewLoopInvariantVariable(rep);
    SetVariableFor(old_index, *var);
  }
  Asm().SetVariable(*var, new_index);
  return;
 }

 DCHECK(!op_mapping_[old_index].valid());
```

```
  op_mapping_[old_index] = new_index;
}

MaybeVariable GetVariableFor(OpIndex old_index) const {
  return old_opindex_to_variables[old_index];
}

void SetVariableFor(OpIndex old_index, MaybeVariable var) {
  DCHECK(!old_opindex_to_variables[old_index].has_value());
  old_opindex_to_variables[old_index] = var;
}

void FixLoopPhis(Block* input_graph_loop) {
  DCHECK(input_graph_loop->IsLoop());
  Block* output_graph_loop = MapToNewGraph(input_graph_loop);
  DCHECK(output_graph_loop->IsLoop());
  for (const Operation& op : Asm().input_graph().operations(
          input_graph_loop->begin(), input_graph_loop->end())) {
    if (auto* input_phi = op.TryCast<PhiOp>()) {
      OpIndex phi_index =
         MapToNewGraph<true>(Asm().input_graph().Index(*input_phi));
      if (!phi_index.valid() || !output_graph_loop->Contains(phi_index)) {
        // Unused phis are skipped, so they are not be mapped to anything in
        // the new graph. If the phi is
reduced to an operation from a
        // different block, then there is no loop phi in the current loop
        // header to take care of.
        continue;
      }
      Asm().FixLoopPhi(*input_phi, phi_index, output_graph_loop);
    }
  }
}

Graph& input_graph_;

const Block* current_input_block_;

// Mappings from old OpIndices to new OpIndices.
FixedOpIndexSidetable<OpIndex> op_mapping_;

// Mappings from old blocks to new blocks.
FixedBlockSidetable<Block*> block_mapping_;

// {current_block_needs_variables_} is set to true if the current block should
// use Variables to map old to new OpIndex rather than just {op_mapping}. This
// is typically the case when the block has been cloned.
```

```
 bool current_block_needs_variables_ = false;

 // When {turn_loop_without_backedge_into_merge_} is true (the default), when
 // processing an input block that ended with a loop backedge but doesn't
 // anymore, the loop header is turned into a regular merge. This
 can be turned
 // off when unrolling a loop for instance.
 bool turn_loop_without_backedge_into_merge_ = true;

 // Set of Blocks for which Variables should be used rather than
 // {op_mapping}.
 BitVector blocks_needing_variables_;

 // Mapping from old OpIndex to Variables.
 FixedOpIndexSidetable<MaybeVariable> old_opindex_to_variables;

 // When the last operation of a Block is a Goto to a Block with a single
 // predecessor, we always inline the destination into the current block. To
 // avoid making this process recursive (which could lead to stack overflows),
 // we set the variable {block_to_inline_now_} instead. Right after we're done
 // visiting a Block, the function ProcessWaitingCloningAndInlining will inline
 // {block_to_inline_now_} (if it's set) in a non-recursive way.
 Block* block_to_inline_now_ = nullptr;

 // When a Reducer wants to clone a block (for instance,
 // BranchEliminationReducer, in order to remove Phis or to replace a Branch by
 // a
 Goto), this block is not cloned right away, in order to avoid recursion
 // (which could lead to stack overflows). Instead, we add this block to
 // {blocks_to_clone_}. Right after we're done visiting a Block, the function
 // ProcessWaitingCloningAndInlining will actually clone the blocks in
 // {blocks_to_clone_} in a non-recursive way.
 struct BlockToClone {
   const Block* input_block;
   int added_block_phi_input;
   Block* new_output_block;
 };
 ZoneVector<BlockToClone> blocks_to_clone_;

#ifdef DEBUG
 // Recursively inlining blocks is still allowed (mainly for
 // LoopUnrollingReducer), but it shouldn't be actually recursive. This is
 // checked by the {is_in_recursive_inlining_}, which is set to true while
 // recursively inlining a block. Trying to inline a block while
 // {is_in_recursive_inlining_} is true will lead to a DCHECK failure.
 bool is_in_recursive_inlining_ = false;
#endif
 };
```

```
template <template <class> class... Reducers>
class TSAssembler;

template
 <template <class> class... Reducers>
class CopyingPhaseImpl {
public:
 static void Run(Graph& input_graph, Zone* phase_zone,
                 bool trace_reductions = false) {
   TSAssembler<GraphVisitor, Reducers...> phase(
       input_graph, input_graph.GetOrCreateCompanion(), phase_zone);
#ifdef DEBUG
   if (trace_reductions) {
     phase.template VisitGraph<true>();
   } else {
     phase.template VisitGraph<false>();
   }
#else
   phase.template VisitGraph<false>();
#endif  // DEBUG
 }
};

template <template <typename> typename... Reducers>
class CopyingPhase {
public:
 static void Run(Zone* phase_zone) {
   PipelineData& data = PipelineData::Get();
   Graph& input_graph = data.graph();
   CopyingPhaseImpl<Reducers...>::Run(
       input_graph, phase_zone, data.info()->turboshaft_trace_reduction());
 }
};

}  // namespace v8::internal::compiler::turboshaft

#endif  // V8_COMPILER_TURBOSHAFT_COPYING_PHASE_H_
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Version 1.0.0

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*/

#include "crypto/ec.h"
#include "internal/der.h"

/* Well known OIDs precompiled */
/* clang-format off */

/*
* sm2-with-SM3 OBJECT IDENTIFIER ::= { sm-scheme 501 }
*/
#define DER_OID_V_sm2_with_SM3 DER_P_OBJECT, 8, 0x2A, 0x81, 0x1C, 0xCF, 0x55, 0x01, 0x83, 0x75
#define DER_OID_SZ_sm2_with_SM3 10
extern const unsigned char ossl_der_oid_sm2_with_SM3[DER_OID_SZ_sm2_with_SM3];

/*
* curveSM2 OBJECT IDENTIFIER ::= { sm-scheme 301 }
*/
#define DER_OID_V_curveSM2 DER_P_OBJECT, 8, 0x2A, 0x81, 0x1C, 0xCF, 0x55, 0x01, 0x82, 0x2D
#define DER_OID_SZ_curveSM2 10
extern
```

```
 const unsigned char ossl_der_oid_curveSM2[DER_OID_SZ_curveSM2];

/* clang-format on */

/* Subject Public Key Info */
int ossl_DER_w_algorithmIdentifier_SM2(WPACKET *pkt, int cont, EC_KEY *ec);
/* Signature */
int ossl_DER_w_algorithmIdentifier_SM2_with_MD(WPACKET *pkt, int cont,
   EC_KEY *ec, int mdnid);
```

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```
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```

```
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*/

#include "internal/der.h"
#include "crypto/ml_dsa.h"

/* Well known OIDs precompiled */
/* clang-format off */

/*
* id-ml-dsa-44 OBJECT IDENTIFIER ::= { sigAlgs 17 }
*/
#define DER_OID_V_id_ml_dsa_44 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x03, 0x11
#define DER_OID_SZ_id_ml_dsa_44 11
extern const unsigned char ossl_der_oid_id_ml_dsa_44[DER_OID_SZ_id_ml_dsa_44];

/*
* id-ml-dsa-65 OBJECT IDENTIFIER ::= { sigAlgs 18 }
*/
#define DER_OID_V_id_ml_dsa_65 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x03, 0x12
#define DER_OID_SZ_id_ml_dsa_65
 11
extern const unsigned char ossl_der_oid_id_ml_dsa_65[DER_OID_SZ_id_ml_dsa_65];

/*
* id-ml-dsa-87 OBJECT IDENTIFIER ::= { sigAlgs 19 }
*/
#define DER_OID_V_id_ml_dsa_87 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x03, 0x13
#define DER_OID_SZ_id_ml_dsa_87 11
extern const unsigned char ossl_der_oid_id_ml_dsa_87[DER_OID_SZ_id_ml_dsa_87];

/* clang-format on */

int ossl_DER_w_algorithmIdentifier_ML_DSA(WPACKET *pkt, int tag, ML_DSA_KEY *key);
```

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*/

```
#ifndef UV_BSD_H
#define UV_BSD_H

#define UV_PLATFORM_FS_EVENT_FIELDS                                  \
 uv__io_t event_watcher;                                             \

#define UV_IO_PRIVATE_PLATFORM_FIELDS                                \
 int rcount;                                                         \
 int wcount;                                                         \

#define UV_HAVE_KQUEUE 1

#endif /* UV_BSD_H */
```

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- PCRE test suite, located in test/mjsunit/third_party/regexp-pcre/regexp-pcre.js. This is based on the test suite from PCRE-7.3, which is copyrighted by the University of Cambridge and Google, Inc. The copyright notice and license are embedded in regexp-pcre.js.

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- Valgrind client API header, located at src/third_party/valgrind/valgrind.h This is released under the BSD license.

- The Wasm C/C++ API headers, located at third_party/wasm-api/wasm.{h,hh} This is released under the Apache license. The API's upstream prototype implementation also formed the basis of V8's implementation in src/wasm/c-api.cc.

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```
#ifndef SRC_PERMISSION_WASI_PERMISSION_H_
#define SRC_PERMISSION_WASI_PERMISSION_H_

#if defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS

#include <vector>
#include "permission/permission_base.h"

namespace node {

namespace permission {

class WASIPermission final : public PermissionBase {
public:
 void Apply(Environment* env,
            const std::vector<std::string>& allow,
            PermissionScope scope) override;
 bool is_granted(Environment* env,
                 PermissionScope perm,
                 const std::string_view& param = "") const override;
```

```
private:
 bool deny_all_;
};

}  // namespace permission

}  // namespace node

#endif  // defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
#endif  // SRC_PERMISSION_WASI_PERMISSION_H_
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```
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*/
/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_CORE_NAMES_H
#define OPENSSL_CORE_NAMES_H
#pragma once

#ifdef __cplusplus
extern "C" {
#endif
```

```
/* OSSL_CIPHER_PARAM_CTS_MODE Values */
#define OSSL_CIPHER_CTS_MODE_CS1 "CS1"
#define OSSL_CIPHER_CTS_MODE_CS2 "CS2"
#define OSSL_CIPHER_CTS_MODE_CS3 "CS3"

/* Known CIPHER names (not a complete list) */
#define OSSL_CIPHER_NAME_AES_128_GCM_SIV "AES-128-GCM-SIV"
#define OSSL_CIPHER_NAME_AES_192_GCM_SIV "AES-192-GCM-SIV"
#define OSSL_CIPHER_NAME_AES_256_GCM_SIV "AES-256-GCM-SIV"

/* Known DIGEST names (not a complete
 list) */
#define OSSL_DIGEST_NAME_MD5 "MD5"
#define OSSL_DIGEST_NAME_MD5_SHA1 "MD5-SHA1"
#define OSSL_DIGEST_NAME_SHA1 "SHA1"
#define OSSL_DIGEST_NAME_SHA2_224 "SHA2-224"
#define OSSL_DIGEST_NAME_SHA2_256 "SHA2-256"
#define OSSL_DIGEST_NAME_SHA2_256_192 "SHA2-256/192"
#define OSSL_DIGEST_NAME_SHA2_384 "SHA2-384"
#define OSSL_DIGEST_NAME_SHA2_512 "SHA2-512"
#define OSSL_DIGEST_NAME_SHA2_512_224 "SHA2-512/224"
#define OSSL_DIGEST_NAME_SHA2_512_256 "SHA2-512/256"
#define OSSL_DIGEST_NAME_MD2 "MD2"
#define OSSL_DIGEST_NAME_MD4 "MD4"
#define OSSL_DIGEST_NAME_MDC2 "MDC2"
#define OSSL_DIGEST_NAME_RIPEMD160 "RIPEMD160"
#define OSSL_DIGEST_NAME_SHA3_224 "SHA3-224"
#define OSSL_DIGEST_NAME_SHA3_256 "SHA3-256"
#define OSSL_DIGEST_NAME_SHA3_384 "SHA3-384"
#define OSSL_DIGEST_NAME_SHA3_512 "SHA3-512"
#define OSSL_DIGEST_NAME_KECCAK_KMAC128 "KECCAK-KMAC-128"
#define OSSL_DIGEST_NAME_KECCAK_KMAC256 "KECCAK-KMAC-256"
#define OSSL_DIGEST_NAME_SM3 "SM3"

/* Known MAC names */
#define OSSL_MAC_NAME_BLAKE2BMAC
 "BLAKE2BMAC"
#define OSSL_MAC_NAME_BLAKE2SMAC "BLAKE2SMAC"
#define OSSL_MAC_NAME_CMAC "CMAC"
#define OSSL_MAC_NAME_GMAC "GMAC"
#define OSSL_MAC_NAME_HMAC "HMAC"
#define OSSL_MAC_NAME_KMAC128 "KMAC128"
#define OSSL_MAC_NAME_KMAC256 "KMAC256"
#define OSSL_MAC_NAME_POLY1305 "POLY1305"
#define OSSL_MAC_NAME_SIPHASH "SIPHASH"

/* Known KDF names */
#define OSSL_KDF_NAME_HKDF "HKDF"
```

```
#define OSSL_KDF_NAME_TLS1_3_KDF "TLS13-KDF"
#define OSSL_KDF_NAME_PBKDF1 "PBKDF1"
#define OSSL_KDF_NAME_PBKDF2 "PBKDF2"
#define OSSL_KDF_NAME_SCRYPT "SCRYPT"
#define OSSL_KDF_NAME_SSHKDF "SSHKDF"
#define OSSL_KDF_NAME_SSKDF "SSKDF"
#define OSSL_KDF_NAME_TLS1_PRF "TLS1-PRF"
#define OSSL_KDF_NAME_X942KDF_ASN1 "X942KDF-ASN1"
#define OSSL_KDF_NAME_X942KDF_CONCAT "X942KDF-CONCAT"
#define OSSL_KDF_NAME_X963KDF "X963KDF"
#define OSSL_KDF_NAME_KBKDF "KBKDF"
#define OSSL_KDF_NAME_KRB5KDF "KRB5KDF"
#define OSSL_KDF_NAME_HMACDRBGKDF "HMAC-DRBG-KDF"

/* RSA padding modes */
#define OSSL_PKEY_RSA_PAD_MODE_NONE "none"
#define
 OSSL_PKEY_RSA_PAD_MODE_PKCSV15 "pkcs1"
#define OSSL_PKEY_RSA_PAD_MODE_OAEP "oaep"
#define OSSL_PKEY_RSA_PAD_MODE_X931 "x931"
#define OSSL_PKEY_RSA_PAD_MODE_PSS "pss"

/* RSA pss padding salt length */
#define OSSL_PKEY_RSA_PSS_SALT_LEN_DIGEST "digest"
#define OSSL_PKEY_RSA_PSS_SALT_LEN_MAX "max"
#define OSSL_PKEY_RSA_PSS_SALT_LEN_AUTO "auto"
#define OSSL_PKEY_RSA_PSS_SALT_LEN_AUTO_DIGEST_MAX "auto-digestmax"

/* OSSL_PKEY_PARAM_EC_ENCODING values */
#define OSSL_PKEY_EC_ENCODING_EXPLICIT "explicit"
#define OSSL_PKEY_EC_ENCODING_GROUP "named_curve"

#define OSSL_PKEY_EC_POINT_CONVERSION_FORMAT_UNCOMPRESSED "uncompressed"
#define OSSL_PKEY_EC_POINT_CONVERSION_FORMAT_COMPRESSED "compressed"
#define OSSL_PKEY_EC_POINT_CONVERSION_FORMAT_HYBRID "hybrid"

#define OSSL_PKEY_EC_GROUP_CHECK_DEFAULT "default"
#define OSSL_PKEY_EC_GROUP_CHECK_NAMED "named"
#define OSSL_PKEY_EC_GROUP_CHECK_NAMED_NIST "named-nist"

/* PROV_SKEY well known key types */
#define OSSL_SKEY_TYPE_GENERIC "GENERIC-SECRET"
#define
 OSSL_SKEY_TYPE_AES "AES"

/* OSSL_KEM_PARAM_OPERATION values */
#define OSSL_KEM_PARAM_OPERATION_RSASVE "RSASVE"
#define OSSL_KEM_PARAM_OPERATION_DHKEM "DHKEM"
```

```
/* Provider configuration variables */
#define OSSL_PKEY_RETAIN_SEED "pkey_retain_seed"

/* Parameter name definitions - generated by util/perl/OpenSSL/paramnames.pm */
/* clang-format off */
# define OSSL_ALG_PARAM_ALGORITHM_ID "algorithm-id"
# define OSSL_ALG_PARAM_ALGORITHM_ID_PARAMS "algorithm-id-params"
# define OSSL_ALG_PARAM_CIPHER "cipher"
# define OSSL_ALG_PARAM_DIGEST "digest"
# define OSSL_ALG_PARAM_ENGINE "engine"
# define OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR "fips-indicator"
# define OSSL_ALG_PARAM_MAC "mac"
# define OSSL_ALG_PARAM_PROPERTIES "properties"
# define OSSL_ASYM_CIPHER_PARAM_DIGEST OSSL_PKEY_PARAM_DIGEST
# define OSSL_ASYM_CIPHER_PARAM_ENGINE OSSL_PKEY_PARAM_ENGINE
# define OSSL_ASYM_CIPHER_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_ASYM_CIPHER_PARAM_FIPS_KEY_CHECK
 OSSL_PKEY_PARAM_FIPS_KEY_CHECK
# define OSSL_ASYM_CIPHER_PARAM_FIPS_RSA_PKCS15_PAD_DISABLED
OSSL_PROV_PARAM_RSA_PKCS15_PAD_DISABLED
# define OSSL_ASYM_CIPHER_PARAM_IMPLICIT_REJECTION "implicit-rejection"
# define OSSL_ASYM_CIPHER_PARAM_MGF1_DIGEST OSSL_PKEY_PARAM_MGF1_DIGEST
# define OSSL_ASYM_CIPHER_PARAM_MGF1_DIGEST_PROPS
OSSL_PKEY_PARAM_MGF1_PROPERTIES
# define OSSL_ASYM_CIPHER_PARAM_OAEP_DIGEST OSSL_ALG_PARAM_DIGEST
# define OSSL_ASYM_CIPHER_PARAM_OAEP_DIGEST_PROPS "digest-props"
# define OSSL_ASYM_CIPHER_PARAM_OAEP_LABEL "oaep-label"
# define OSSL_ASYM_CIPHER_PARAM_PAD_MODE OSSL_PKEY_PARAM_PAD_MODE
# define OSSL_ASYM_CIPHER_PARAM_PROPERTIES OSSL_PKEY_PARAM_PROPERTIES
# define OSSL_ASYM_CIPHER_PARAM_TLS_CLIENT_VERSION "tls-client-version"
# define OSSL_ASYM_CIPHER_PARAM_TLS_NEGOTIATED_VERSION "tls-negotiated-version"
# define OSSL_CAPABILITY_TLS_GROUP_ALG "tls-group-alg"
# define OSSL_CAPABILITY_TLS_GROUP_ID "tls-group-id"
# define OSSL_CAPABILITY_TLS_GROUP_IS_KEM
 "tls-group-is-kem"
# define OSSL_CAPABILITY_TLS_GROUP_MAX_DTLS "tls-max-dtls"
# define OSSL_CAPABILITY_TLS_GROUP_MAX_TLS "tls-max-tls"
# define OSSL_CAPABILITY_TLS_GROUP_MIN_DTLS "tls-min-dtls"
# define OSSL_CAPABILITY_TLS_GROUP_MIN_TLS "tls-min-tls"
# define OSSL_CAPABILITY_TLS_GROUP_NAME "tls-group-name"
# define OSSL_CAPABILITY_TLS_GROUP_NAME_INTERNAL "tls-group-name-internal"
# define OSSL_CAPABILITY_TLS_GROUP_SECURITY_BITS "tls-group-sec-bits"
# define OSSL_CAPABILITY_TLS_SIGALG_CODE_POINT "tls-sigalg-code-point"
# define OSSL_CAPABILITY_TLS_SIGALG_HASH_NAME "tls-sigalg-hash-name"
# define OSSL_CAPABILITY_TLS_SIGALG_HASH_OID "tls-sigalg-hash-oid"
# define OSSL_CAPABILITY_TLS_SIGALG_IANA_NAME "tls-sigalg-iana-name"
```

```
# define OSSL_CAPABILITY_TLS_SIGALG_KEYTYPE "tls-sigalg-keytype"
# define OSSL_CAPABILITY_TLS_SIGALG_KEYTYPE_OID "tls-sigalg-keytype-oid"
# define OSSL_CAPABILITY_TLS_SIGALG_MAX_DTLS "tls-max-dtls"
# define OSSL_CAPABILITY_TLS_SIGALG_MAX_TLS "tls-max-tls"
# define
 OSSL_CAPABILITY_TLS_SIGALG_MIN_DTLS "tls-min-dtls"
# define OSSL_CAPABILITY_TLS_SIGALG_MIN_TLS "tls-min-tls"
# define OSSL_CAPABILITY_TLS_SIGALG_NAME "tls-sigalg-name"
# define OSSL_CAPABILITY_TLS_SIGALG_OID "tls-sigalg-oid"
# define OSSL_CAPABILITY_TLS_SIGALG_SECURITY_BITS "tls-sigalg-sec-bits"
# define OSSL_CAPABILITY_TLS_SIGALG_SIG_NAME "tls-sigalg-sig-name"
# define OSSL_CAPABILITY_TLS_SIGALG_SIG_OID "tls-sigalg-sig-oid"
# define OSSL_CIPHER_PARAM_AEAD "aead"
# define OSSL_CIPHER_PARAM_AEAD_IVLEN OSSL_CIPHER_PARAM_IVLEN
# define OSSL_CIPHER_PARAM_AEAD_IV_GENERATED "iv-generated"
# define OSSL_CIPHER_PARAM_AEAD_MAC_KEY "mackey"
# define OSSL_CIPHER_PARAM_AEAD_TAG "tag"
# define OSSL_CIPHER_PARAM_AEAD_TAGLEN "taglen"
# define OSSL_CIPHER_PARAM_AEAD_TLS1_AAD "tlsaad"
# define OSSL_CIPHER_PARAM_AEAD_TLS1_AAD_PAD "tlsaadpad"
# define OSSL_CIPHER_PARAM_AEAD_TLS1_GET_IV_GEN "tlsivgen"
# define OSSL_CIPHER_PARAM_AEAD_TLS1_IV_FIXED "tlsivfixed"
# define OSSL_CIPHER_PARAM_AEAD_TLS1_SET_IV_INV
 "tlsivinv"
# define OSSL_CIPHER_PARAM_ALGORITHM_ID OSSL_ALG_PARAM_ALGORITHM_ID
# define OSSL_CIPHER_PARAM_ALGORITHM_ID_PARAMS
OSSL_ALG_PARAM_ALGORITHM_ID_PARAMS
# define OSSL_CIPHER_PARAM_ALGORITHM_ID_PARAMS_OLD "alg_id_param"
# define OSSL_CIPHER_PARAM_BLOCK_SIZE "blocksize"
# define OSSL_CIPHER_PARAM_CTS "cts"
# define OSSL_CIPHER_PARAM_CTS_MODE "cts_mode"
# define OSSL_CIPHER_PARAM_CUSTOM_IV "custom-iv"
# define OSSL_CIPHER_PARAM_DECRYPT_ONLY "decrypt-only"
# define OSSL_CIPHER_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_CIPHER_PARAM_FIPS_ENCRYPT_CHECK "encrypt-check"
# define OSSL_CIPHER_PARAM_HAS_RAND_KEY "has-randkey"
# define OSSL_CIPHER_PARAM_IV "iv"
# define OSSL_CIPHER_PARAM_IVLEN "ivlen"
# define OSSL_CIPHER_PARAM_KEYLEN "keylen"
# define OSSL_CIPHER_PARAM_MODE "mode"
# define OSSL_CIPHER_PARAM_NUM "num"
# define OSSL_CIPHER_PARAM_PADDING "padding"
# define OSSL_CIPHER_PARAM_PIPELINE_AEAD_TAG "pipeline-tag"
# define OSSL_CIPHER_PARAM_RANDOM_KEY
 "randkey"
# define OSSL_CIPHER_PARAM_RC2_KEYBITS "keybits"
# define OSSL_CIPHER_PARAM_ROUNDS "rounds"
```

```
# define OSSL_CIPHER_PARAM_SPEED "speed"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK "tls-multi"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK_AAD "tls1multi_aad"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK_AAD_PACKLEN "tls1multi_aadpacklen"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK_ENC "tls1multi_enc"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK_ENC_IN "tls1multi_encin"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK_ENC_LEN "tls1multi_enclen"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK_INTERLEAVE "tls1multi_interleave"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK_MAX_BUFSIZE "tls1multi_maxbufsz"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK_MAX_SEND_FRAGMENT "tls1multi_maxsndfrag"
# define OSSL_CIPHER_PARAM_TLS_MAC "tls-mac"
# define OSSL_CIPHER_PARAM_TLS_MAC_SIZE "tls-mac-size"
# define OSSL_CIPHER_PARAM_TLS_VERSION "tls-version"
# define OSSL_CIPHER_PARAM_UPDATED_IV "updated-iv"
# define
 OSSL_CIPHER_PARAM_USE_BITS "use-bits"
# define OSSL_CIPHER_PARAM_XTS_STANDARD "xts_standard"
# define OSSL_DECODER_PARAM_PROPERTIES OSSL_ALG_PARAM_PROPERTIES
# define OSSL_DIGEST_PARAM_ALGID_ABSENT "algid-absent"
# define OSSL_DIGEST_PARAM_BLOCK_SIZE "blocksize"
# define OSSL_DIGEST_PARAM_MICALG "micalg"
# define OSSL_DIGEST_PARAM_PAD_TYPE "pad-type"
# define OSSL_DIGEST_PARAM_SIZE "size"
# define OSSL_DIGEST_PARAM_SSL3_MS "ssl3-ms"
# define OSSL_DIGEST_PARAM_XOF "xof"
# define OSSL_DIGEST_PARAM_XOFLEN "xoflen"
# define OSSL_DRBG_PARAM_CIPHER OSSL_ALG_PARAM_CIPHER
# define OSSL_DRBG_PARAM_DIGEST OSSL_ALG_PARAM_DIGEST
# define OSSL_DRBG_PARAM_ENTROPY_REQUIRED "entropy_required"
# define OSSL_DRBG_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_DRBG_PARAM_FIPS_DIGEST_CHECK OSSL_PKEY_PARAM_FIPS_DIGEST_CHECK
# define OSSL_DRBG_PARAM_MAC OSSL_ALG_PARAM_MAC
# define OSSL_DRBG_PARAM_MAX_ADINLEN "max_adinlen"
# define OSSL_DRBG_PARAM_MAX_ENTROPYLEN "max_entropylen"
#
 define OSSL_DRBG_PARAM_MAX_LENGTH "maxium_length"
# define OSSL_DRBG_PARAM_MAX_NONCELEN "max_noncelen"
# define OSSL_DRBG_PARAM_MAX_PERSLEN "max_perslen"
# define OSSL_DRBG_PARAM_MIN_ENTROPYLEN "min_entropylen"
# define OSSL_DRBG_PARAM_MIN_LENGTH "minium_length"
# define OSSL_DRBG_PARAM_MIN_NONCELEN "min_noncelen"
# define OSSL_DRBG_PARAM_PREDICTION_RESISTANCE "prediction_resistance"
# define OSSL_DRBG_PARAM_PROPERTIES OSSL_ALG_PARAM_PROPERTIES
# define OSSL_DRBG_PARAM_RANDOM_DATA "random_data"
# define OSSL_DRBG_PARAM_RESEED_COUNTER "reseed_counter"
# define OSSL_DRBG_PARAM_RESEED_REQUESTS "reseed_requests"
# define OSSL_DRBG_PARAM_RESEED_TIME "reseed_time"
```

```
# define OSSL_DRBG_PARAM_RESEED_TIME_INTERVAL "reseed_time_interval"
# define OSSL_DRBG_PARAM_SIZE "size"
# define OSSL_DRBG_PARAM_USE_DF "use_derivation_function"
# define OSSL_ENCODER_PARAM_CIPHER OSSL_ALG_PARAM_CIPHER
# define OSSL_ENCODER_PARAM_ENCRYPT_LEVEL "encrypt-level"
# define OSSL_ENCODER_PARAM_PROPERTIES OSSL_ALG_PARAM_PROPERTIES
#
 define OSSL_ENCODER_PARAM_SAVE_PARAMETERS "save-parameters"
# define OSSL_EXCHANGE_PARAM_EC_ECDH_COFACTOR_MODE "ecdh-cofactor-mode"
# define OSSL_EXCHANGE_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_EXCHANGE_PARAM_FIPS_DIGEST_CHECK OSSL_PKEY_PARAM_FIPS_DIGEST_CHECK
# define OSSL_EXCHANGE_PARAM_FIPS_ECDH_COFACTOR_CHECK
OSSL_PROV_PARAM_ECDH_COFACTOR_CHECK
# define OSSL_EXCHANGE_PARAM_FIPS_KEY_CHECK OSSL_PKEY_PARAM_FIPS_KEY_CHECK
# define OSSL_EXCHANGE_PARAM_KDF_DIGEST "kdf-digest"
# define OSSL_EXCHANGE_PARAM_KDF_DIGEST_PROPS "kdf-digest-props"
# define OSSL_EXCHANGE_PARAM_KDF_OUTLEN "kdf-outlen"
# define OSSL_EXCHANGE_PARAM_KDF_TYPE "kdf-type"
# define OSSL_EXCHANGE_PARAM_KDF_UKM "kdf-ukm"
# define OSSL_EXCHANGE_PARAM_PAD "pad"
# define OSSL_GEN_PARAM_ITERATION "iteration"
# define OSSL_GEN_PARAM_POTENTIAL "potential"
# define OSSL_KDF_PARAM_ARGON2_AD "ad"
# define OSSL_KDF_PARAM_ARGON2_LANES "lanes"
# define OSSL_KDF_PARAM_ARGON2_MEMCOST
 "memcost"
# define OSSL_KDF_PARAM_ARGON2_VERSION "version"
# define OSSL_KDF_PARAM_CEK_ALG "cekalg"
# define OSSL_KDF_PARAM_CIPHER OSSL_ALG_PARAM_CIPHER
# define OSSL_KDF_PARAM_CONSTANT "constant"
# define OSSL_KDF_PARAM_DATA "data"
# define OSSL_KDF_PARAM_DIGEST OSSL_ALG_PARAM_DIGEST
# define OSSL_KDF_PARAM_EARLY_CLEAN "early_clean"
# define OSSL_KDF_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_KDF_PARAM_FIPS_DIGEST_CHECK OSSL_PKEY_PARAM_FIPS_DIGEST_CHECK
# define OSSL_KDF_PARAM_FIPS_EMS_CHECK "ems_check"
# define OSSL_KDF_PARAM_FIPS_KEY_CHECK OSSL_PKEY_PARAM_FIPS_KEY_CHECK
# define OSSL_KDF_PARAM_HMACDRBG_ENTROPY "entropy"
# define OSSL_KDF_PARAM_HMACDRBG_NONCE "nonce"
# define OSSL_KDF_PARAM_INFO "info"
# define OSSL_KDF_PARAM_ITER "iter"
# define OSSL_KDF_PARAM_KBKDF_R "r"
# define OSSL_KDF_PARAM_KBKDF_USE_L "use-l"
# define OSSL_KDF_PARAM_KBKDF_USE_SEPARATOR "use-separator"
# define OSSL_KDF_PARAM_KEY "key"
# define OSSL_KDF_PARAM_LABEL
```

```
 "label"
# define OSSL_KDF_PARAM_MAC OSSL_ALG_PARAM_MAC
# define OSSL_KDF_PARAM_MAC_SIZE "maclen"
# define OSSL_KDF_PARAM_MODE "mode"
# define OSSL_KDF_PARAM_PASSWORD "pass"
# define OSSL_KDF_PARAM_PKCS12_ID "id"
# define OSSL_KDF_PARAM_PKCS5 "pkcs5"
# define OSSL_KDF_PARAM_PREFIX "prefix"
# define OSSL_KDF_PARAM_PROPERTIES OSSL_ALG_PARAM_PROPERTIES
# define OSSL_KDF_PARAM_SALT "salt"
# define OSSL_KDF_PARAM_SCRYPT_MAXMEM "maxmem_bytes"
# define OSSL_KDF_PARAM_SCRYPT_N "n"
# define OSSL_KDF_PARAM_SCRYPT_P "p"
# define OSSL_KDF_PARAM_SCRYPT_R "r"
# define OSSL_KDF_PARAM_SECRET "secret"
# define OSSL_KDF_PARAM_SEED "seed"
# define OSSL_KDF_PARAM_SIZE "size"
# define OSSL_KDF_PARAM_SSHKDF_SESSION_ID "session_id"
# define OSSL_KDF_PARAM_SSHKDF_TYPE "type"
# define OSSL_KDF_PARAM_SSHKDF_XCGHASH "xcghash"
# define OSSL_KDF_PARAM_THREADS "threads"
# define OSSL_KDF_PARAM_UKM "ukm"
# define OSSL_KDF_PARAM_X942_ACVPINFO "acvp-info"
# define OSSL_KDF_PARAM_X942_PARTYUINFO "partyu-info"
#
 define OSSL_KDF_PARAM_X942_PARTYVINFO "partyv-info"
# define OSSL_KDF_PARAM_X942_SUPP_PRIVINFO "supp-privinfo"
# define OSSL_KDF_PARAM_X942_SUPP_PUBINFO "supp-pubinfo"
# define OSSL_KDF_PARAM_X942_USE_KEYBITS "use-keybits"
# define OSSL_KEM_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_KEM_PARAM_FIPS_KEY_CHECK OSSL_PKEY_PARAM_FIPS_KEY_CHECK
# define OSSL_KEM_PARAM_IKME "ikme"
# define OSSL_KEM_PARAM_OPERATION "operation"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_BLOCK_PADDING "block_padding"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_HS_PADDING "hs_padding"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_MAX_EARLY_DATA "max_early_data"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_MAX_FRAG_LEN "max_frag_len"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_MODE "mode"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_OPTIONS "options"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_READ_AHEAD "read_ahead"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_STREAM_MAC "stream_mac"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_TLSTREE
 "tlstree"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_USE_ETM "use_etm"
# define OSSL_LIBSSL_RECORD_LAYER_READ_BUFFER_LEN "read_buffer_len"
# define OSSL_MAC_PARAM_BLOCK_SIZE "block-size"
# define OSSL_MAC_PARAM_CIPHER OSSL_ALG_PARAM_CIPHER
```

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# define OSSL_MAC_PARAM_CUSTOM "custom"
# define OSSL_MAC_PARAM_C_ROUNDS "c-rounds"
# define OSSL_MAC_PARAM_DIGEST OSSL_ALG_PARAM_DIGEST
# define OSSL_MAC_PARAM_DIGEST_NOINIT "digest-noinit"
# define OSSL_MAC_PARAM_DIGEST_ONESHOT "digest-oneshot"
# define OSSL_MAC_PARAM_D_ROUNDS "d-rounds"
# define OSSL_MAC_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_MAC_PARAM_FIPS_KEY_CHECK OSSL_PKEY_PARAM_FIPS_KEY_CHECK
# define OSSL_MAC_PARAM_FIPS_NO_SHORT_MAC OSSL_PROV_PARAM_NO_SHORT_MAC
# define OSSL_MAC_PARAM_IV "iv"
# define OSSL_MAC_PARAM_KEY "key"
# define OSSL_MAC_PARAM_PROPERTIES OSSL_ALG_PARAM_PROPERTIES
# define OSSL_MAC_PARAM_SALT "salt"
# define OSSL_MAC_PARAM_SIZE "size"
# define OSSL_MAC_PARAM_TLS_DATA_SIZE
 "tls-data-size"
# define OSSL_MAC_PARAM_XOF "xof"
# define OSSL_OBJECT_PARAM_DATA "data"
# define OSSL_OBJECT_PARAM_DATA_STRUCTURE "data-structure"
# define OSSL_OBJECT_PARAM_DATA_TYPE "data-type"
# define OSSL_OBJECT_PARAM_DESC "desc"
# define OSSL_OBJECT_PARAM_INPUT_TYPE "input-type"
# define OSSL_OBJECT_PARAM_REFERENCE "reference"
# define OSSL_OBJECT_PARAM_TYPE "type"
# define OSSL_PASSPHRASE_PARAM_INFO "info"
# define OSSL_PKEY_PARAM_ALGORITHM_ID OSSL_ALG_PARAM_ALGORITHM_ID
# define OSSL_PKEY_PARAM_ALGORITHM_ID_PARAMS
OSSL_ALG_PARAM_ALGORITHM_ID_PARAMS
# define OSSL_PKEY_PARAM_BITS "bits"
# define OSSL_PKEY_PARAM_CIPHER OSSL_ALG_PARAM_CIPHER
# define OSSL_PKEY_PARAM_DEFAULT_DIGEST "default-digest"
# define OSSL_PKEY_PARAM_DHKEM_IKM "dhkem-ikm"
# define OSSL_PKEY_PARAM_DH_GENERATOR "safeprime-generator"
# define OSSL_PKEY_PARAM_DH_PRIV_LEN "priv_len"
# define OSSL_PKEY_PARAM_DIGEST OSSL_ALG_PARAM_DIGEST
# define OSSL_PKEY_PARAM_DIGEST_SIZE "digest-size"
# define OSSL_PKEY_PARAM_DIST_ID
 "distid"
# define OSSL_PKEY_PARAM_EC_A "a"
# define OSSL_PKEY_PARAM_EC_B "b"
# define OSSL_PKEY_PARAM_EC_CHAR2_M "m"
# define OSSL_PKEY_PARAM_EC_CHAR2_PP_K1 "k1"
# define OSSL_PKEY_PARAM_EC_CHAR2_PP_K2 "k2"
# define OSSL_PKEY_PARAM_EC_CHAR2_PP_K3 "k3"
# define OSSL_PKEY_PARAM_EC_CHAR2_TP_BASIS "tp"
# define OSSL_PKEY_PARAM_EC_CHAR2_TYPE "basis-type"
# define OSSL_PKEY_PARAM_EC_COFACTOR "cofactor"
```

```
# define OSSL_PKEY_PARAM_EC_DECODED_FROM_EXPLICIT_PARAMS "decoded-from-explicit"
# define OSSL_PKEY_PARAM_EC_ENCODING "encoding"
# define OSSL_PKEY_PARAM_EC_FIELD_TYPE "field-type"
# define OSSL_PKEY_PARAM_EC_GENERATOR "generator"
# define OSSL_PKEY_PARAM_EC_GROUP_CHECK_TYPE "group-check"
# define OSSL_PKEY_PARAM_EC_INCLUDE_PUBLIC "include-public"
# define OSSL_PKEY_PARAM_EC_ORDER "order"
# define OSSL_PKEY_PARAM_EC_P "p"
# define OSSL_PKEY_PARAM_EC_POINT_CONVERSION_FORMAT "point-format"
# define OSSL_PKEY_PARAM_EC_PUB_X "qx"
# define OSSL_PKEY_PARAM_EC_PUB_Y "qy"
# define
 OSSL_PKEY_PARAM_EC_SEED "seed"
# define OSSL_PKEY_PARAM_ENCODED_PUBLIC_KEY "encoded-pub-key"
# define OSSL_PKEY_PARAM_ENGINE OSSL_ALG_PARAM_ENGINE
# define OSSL_PKEY_PARAM_FFC_COFACTOR "j"
# define OSSL_PKEY_PARAM_FFC_DIGEST OSSL_PKEY_PARAM_DIGEST
# define OSSL_PKEY_PARAM_FFC_DIGEST_PROPS OSSL_PKEY_PARAM_PROPERTIES
# define OSSL_PKEY_PARAM_FFC_G "g"
# define OSSL_PKEY_PARAM_FFC_GINDEX "gindex"
# define OSSL_PKEY_PARAM_FFC_H "hindex"
# define OSSL_PKEY_PARAM_FFC_P "p"
# define OSSL_PKEY_PARAM_FFC_PBITS "pbits"
# define OSSL_PKEY_PARAM_FFC_PCOUNTER "pcounter"
# define OSSL_PKEY_PARAM_FFC_Q "q"
# define OSSL_PKEY_PARAM_FFC_QBITS "qbits"
# define OSSL_PKEY_PARAM_FFC_SEED "seed"
# define OSSL_PKEY_PARAM_FFC_TYPE "type"
# define OSSL_PKEY_PARAM_FFC_VALIDATE_G "validate-g"
# define OSSL_PKEY_PARAM_FFC_VALIDATE_LEGACY "validate-legacy"
# define OSSL_PKEY_PARAM_FFC_VALIDATE_PQ "validate-pq"
# define OSSL_PKEY_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_PKEY_PARAM_FIPS_DIGEST_CHECK
 "digest-check"
# define OSSL_PKEY_PARAM_FIPS_KEY_CHECK "key-check"
# define OSSL_PKEY_PARAM_FIPS_SIGN_CHECK "sign-check"
# define OSSL_PKEY_PARAM_GROUP_NAME "group"
# define OSSL_PKEY_PARAM_IMPLICIT_REJECTION "implicit-rejection"
# define OSSL_PKEY_PARAM_MANDATORY_DIGEST "mandatory-digest"
# define OSSL_PKEY_PARAM_MASKGENFUNC "mgf"
# define OSSL_PKEY_PARAM_MAX_SIZE "max-size"
# define OSSL_PKEY_PARAM_MGF1_DIGEST "mgf1-digest"
# define OSSL_PKEY_PARAM_MGF1_PROPERTIES "mgf1-properties"
# define OSSL_PKEY_PARAM_ML_DSA_INPUT_FORMATS "ml-dsa.input_formats"
# define OSSL_PKEY_PARAM_ML_DSA_OUTPUT_FORMATS "ml-dsa.output_formats"
# define OSSL_PKEY_PARAM_ML_DSA_PREFER_SEED "ml-dsa.prefer_seed"
# define OSSL_PKEY_PARAM_ML_DSA_RETAIN_SEED "ml-dsa.retain_seed"
```

```
# define OSSL_PKEY_PARAM_ML_DSA_SEED "seed"
# define OSSL_PKEY_PARAM_ML_KEM_IMPORT_PCT_TYPE "ml-kem.import_pct_type"
# define OSSL_PKEY_PARAM_ML_KEM_INPUT_FORMATS "ml-kem.input_formats"
# define OSSL_PKEY_PARAM_ML_KEM_OUTPUT_FORMATS
 "ml-kem.output_formats"
# define OSSL_PKEY_PARAM_ML_KEM_PREFER_SEED "ml-kem.prefer_seed"
# define OSSL_PKEY_PARAM_ML_KEM_RETAIN_SEED "ml-kem.retain_seed"
# define OSSL_PKEY_PARAM_ML_KEM_SEED "seed"
# define OSSL_PKEY_PARAM_PAD_MODE "pad-mode"
# define OSSL_PKEY_PARAM_PRIV_KEY "priv"
# define OSSL_PKEY_PARAM_PROPERTIES OSSL_ALG_PARAM_PROPERTIES
# define OSSL_PKEY_PARAM_PUB_KEY "pub"
# define OSSL_PKEY_PARAM_RSA_BITS OSSL_PKEY_PARAM_BITS
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT "rsa-coefficient"
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT1 "rsa-coefficient1"
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT2 "rsa-coefficient2"
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT3 "rsa-coefficient3"
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT4 "rsa-coefficient4"
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT5 "rsa-coefficient5"
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT6 "rsa-coefficient6"
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT7 "rsa-coefficient7"
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT8 "rsa-coefficient8"
#
 define OSSL_PKEY_PARAM_RSA_COEFFICIENT9 "rsa-coefficient9"
# define OSSL_PKEY_PARAM_RSA_D "d"
# define OSSL_PKEY_PARAM_RSA_DERIVE_FROM_PQ "rsa-derive-from-pq"
# define OSSL_PKEY_PARAM_RSA_DIGEST OSSL_PKEY_PARAM_DIGEST
# define OSSL_PKEY_PARAM_RSA_DIGEST_PROPS OSSL_PKEY_PARAM_PROPERTIES
# define OSSL_PKEY_PARAM_RSA_E "e"
# define OSSL_PKEY_PARAM_RSA_EXPONENT "rsa-exponent"
# define OSSL_PKEY_PARAM_RSA_EXPONENT1 "rsa-exponent1"
# define OSSL_PKEY_PARAM_RSA_EXPONENT10 "rsa-exponent10"
# define OSSL_PKEY_PARAM_RSA_EXPONENT2 "rsa-exponent2"
# define OSSL_PKEY_PARAM_RSA_EXPONENT3 "rsa-exponent3"
# define OSSL_PKEY_PARAM_RSA_EXPONENT4 "rsa-exponent4"
# define OSSL_PKEY_PARAM_RSA_EXPONENT5 "rsa-exponent5"
# define OSSL_PKEY_PARAM_RSA_EXPONENT6 "rsa-exponent6"
# define OSSL_PKEY_PARAM_RSA_EXPONENT7 "rsa-exponent7"
# define OSSL_PKEY_PARAM_RSA_EXPONENT8 "rsa-exponent8"
# define OSSL_PKEY_PARAM_RSA_EXPONENT9 "rsa-exponent9"
# define OSSL_PKEY_PARAM_RSA_FACTOR "rsa-factor"
# define OSSL_PKEY_PARAM_RSA_FACTOR1
 "rsa-factor1"
# define OSSL_PKEY_PARAM_RSA_FACTOR10 "rsa-factor10"
# define OSSL_PKEY_PARAM_RSA_FACTOR2 "rsa-factor2"
# define OSSL_PKEY_PARAM_RSA_FACTOR3 "rsa-factor3"
# define OSSL_PKEY_PARAM_RSA_FACTOR4 "rsa-factor4"
# define OSSL_PKEY_PARAM_RSA_FACTOR5 "rsa-factor5"
```

```
# define OSSL_PKEY_PARAM_RSA_FACTOR6 "rsa-factor6"
# define OSSL_PKEY_PARAM_RSA_FACTOR7 "rsa-factor7"
# define OSSL_PKEY_PARAM_RSA_FACTOR8 "rsa-factor8"
# define OSSL_PKEY_PARAM_RSA_FACTOR9 "rsa-factor9"
# define OSSL_PKEY_PARAM_RSA_MASKGENFUNC OSSL_PKEY_PARAM_MASKGENFUNC
# define OSSL_PKEY_PARAM_RSA_MGF1_DIGEST OSSL_PKEY_PARAM_MGF1_DIGEST
# define OSSL_PKEY_PARAM_RSA_N "n"
# define OSSL_PKEY_PARAM_RSA_PRIMES "primes"
# define OSSL_PKEY_PARAM_RSA_PSS_SALTLEN "saltlen"
# define OSSL_PKEY_PARAM_RSA_TEST_P1 "p1"
# define OSSL_PKEY_PARAM_RSA_TEST_P2 "p2"
# define OSSL_PKEY_PARAM_RSA_TEST_Q1 "q1"
# define OSSL_PKEY_PARAM_RSA_TEST_Q2 "q2"
# define OSSL_PKEY_PARAM_RSA_TEST_XP "xp"
# define OSSL_PKEY_PARAM_RSA_TEST_XP1
 "xp1"
# define OSSL_PKEY_PARAM_RSA_TEST_XP2 "xp2"
# define OSSL_PKEY_PARAM_RSA_TEST_XQ "xq"
# define OSSL_PKEY_PARAM_RSA_TEST_XQ1 "xq1"
# define OSSL_PKEY_PARAM_RSA_TEST_XQ2 "xq2"
# define OSSL_PKEY_PARAM_SECURITY_BITS "security-bits"
# define OSSL_PKEY_PARAM_SLH_DSA_SEED "seed"
# define OSSL_PKEY_PARAM_USE_COFACTOR_ECDH OSSL_PKEY_PARAM_USE_COFACTOR_FLAG
# define OSSL_PKEY_PARAM_USE_COFACTOR_FLAG "use-cofactor-flag"
# define OSSL_PROV_PARAM_BUILDINFO "buildinfo"
# define OSSL_PROV_PARAM_CORE_MODULE_FILENAME "module-filename"
# define OSSL_PROV_PARAM_CORE_PROV_NAME "provider-name"
# define OSSL_PROV_PARAM_CORE_VERSION "openssl-version"
# define OSSL_PROV_PARAM_DRBG_TRUNC_DIGEST "drbg-no-trunc-md"
# define OSSL_PROV_PARAM_DSA_SIGN_DISABLED "dsa-sign-disabled"
# define OSSL_PROV_PARAM_ECDH_COFACTOR_CHECK "ecdh-cofactor-check"
# define OSSL_PROV_PARAM_HKDF_DIGEST_CHECK "hkdf-digest-check"
# define OSSL_PROV_PARAM_HKDF_KEY_CHECK "hkdf-key-check"
# define OSSL_PROV_PARAM_HMAC_KEY_CHECK
 "hmac-key-check"
# define OSSL_PROV_PARAM_KBKDF_KEY_CHECK "kbkdf-key-check"
# define OSSL_PROV_PARAM_KMAC_KEY_CHECK "kmac-key-check"
# define OSSL_PROV_PARAM_NAME "name"
# define OSSL_PROV_PARAM_NO_SHORT_MAC "no-short-mac"
# define OSSL_PROV_PARAM_PBKDF2_LOWER_BOUND_CHECK "pbkdf2-lower-bound-check"
# define OSSL_PROV_PARAM_RSA_PKCS15_PAD_DISABLED "rsa-pkcs15-pad-disabled"
# define OSSL_PROV_PARAM_RSA_PSS_SALTLEN_CHECK "rsa-pss-saltlen-check"
# define OSSL_PROV_PARAM_RSA_SIGN_X931_PAD_DISABLED "rsa-sign-x931-pad-disabled"
# define OSSL_PROV_PARAM_SECURITY_CHECKS "security-checks"
# define OSSL_PROV_PARAM_SELF_TEST_DESC "st-desc"
# define OSSL_PROV_PARAM_SELF_TEST_PHASE "st-phase"
# define OSSL_PROV_PARAM_SELF_TEST_TYPE "st-type"
# define OSSL_PROV_PARAM_SIGNATURE_DIGEST_CHECK "signature-digest-check"
```

```
# define OSSL_PROV_PARAM_SSHKDF_DIGEST_CHECK "sshkdf-digest-check"
# define OSSL_PROV_PARAM_SSHKDF_KEY_CHECK "sshkdf-key-check"
# define OSSL_PROV_PARAM_SSKDF_DIGEST_CHECK "sskdf-digest-check"
#
 define OSSL_PROV_PARAM_SSKDF_KEY_CHECK "sskdf-key-check"
# define OSSL_PROV_PARAM_STATUS "status"
# define OSSL_PROV_PARAM_TDES_ENCRYPT_DISABLED "tdes-encrypt-disabled"
# define OSSL_PROV_PARAM_TLS13_KDF_DIGEST_CHECK "tls13-kdf-digest-check"
# define OSSL_PROV_PARAM_TLS13_KDF_KEY_CHECK "tls13-kdf-key-check"
# define OSSL_PROV_PARAM_TLS1_PRF_DIGEST_CHECK "tls1-prf-digest-check"
# define OSSL_PROV_PARAM_TLS1_PRF_EMS_CHECK "tls1-prf-ems-check"
# define OSSL_PROV_PARAM_TLS1_PRF_KEY_CHECK "tls1-prf-key-check"
# define OSSL_PROV_PARAM_VERSION "version"
# define OSSL_PROV_PARAM_X942KDF_KEY_CHECK "x942kdf-key-check"
# define OSSL_PROV_PARAM_X963KDF_DIGEST_CHECK "x963kdf-digest-check"
# define OSSL_PROV_PARAM_X963KDF_KEY_CHECK "x963kdf-key-check"
# define OSSL_RAND_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_RAND_PARAM_GENERATE "generate"
# define OSSL_RAND_PARAM_MAX_REQUEST "max_request"
# define OSSL_RAND_PARAM_STATE "state"
# define OSSL_RAND_PARAM_STRENGTH
 "strength"
# define OSSL_RAND_PARAM_TEST_ENTROPY "test_entropy"
# define OSSL_RAND_PARAM_TEST_NONCE "test_nonce"
# define OSSL_SIGNATURE_PARAM_ADD_RANDOM "additional-random"
# define OSSL_SIGNATURE_PARAM_ALGORITHM_ID OSSL_PKEY_PARAM_ALGORITHM_ID
# define OSSL_SIGNATURE_PARAM_ALGORITHM_ID_PARAMS
OSSL_PKEY_PARAM_ALGORITHM_ID_PARAMS
# define OSSL_SIGNATURE_PARAM_CONTEXT_STRING "context-string"
# define OSSL_SIGNATURE_PARAM_DETERMINISTIC "deterministic"
# define OSSL_SIGNATURE_PARAM_DIGEST OSSL_PKEY_PARAM_DIGEST
# define OSSL_SIGNATURE_PARAM_DIGEST_SIZE OSSL_PKEY_PARAM_DIGEST_SIZE
# define OSSL_SIGNATURE_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_SIGNATURE_PARAM_FIPS_DIGEST_CHECK
OSSL_PKEY_PARAM_FIPS_DIGEST_CHECK
# define OSSL_SIGNATURE_PARAM_FIPS_KEY_CHECK OSSL_PKEY_PARAM_FIPS_KEY_CHECK
# define OSSL_SIGNATURE_PARAM_FIPS_RSA_PSS_SALTLEN_CHECK "rsa-pss-saltlen-check"
# define OSSL_SIGNATURE_PARAM_FIPS_SIGN_CHECK OSSL_PKEY_PARAM_FIPS_SIGN_CHECK
#
 define OSSL_SIGNATURE_PARAM_FIPS_SIGN_X931_PAD_CHECK "sign-x931-pad-check"
# define OSSL_SIGNATURE_PARAM_FIPS_VERIFY_MESSAGE "verify-message"
# define OSSL_SIGNATURE_PARAM_INSTANCE "instance"
# define OSSL_SIGNATURE_PARAM_KAT "kat"
# define OSSL_SIGNATURE_PARAM_MESSAGE_ENCODING "message-encoding"
# define OSSL_SIGNATURE_PARAM_MGF1_DIGEST OSSL_PKEY_PARAM_MGF1_DIGEST
# define OSSL_SIGNATURE_PARAM_MGF1_PROPERTIES OSSL_PKEY_PARAM_MGF1_PROPERTIES
```

```
# define OSSL_SIGNATURE_PARAM_MU "mu"
# define OSSL_SIGNATURE_PARAM_NONCE_TYPE "nonce-type"
# define OSSL_SIGNATURE_PARAM_PAD_MODE OSSL_PKEY_PARAM_PAD_MODE
# define OSSL_SIGNATURE_PARAM_PROPERTIES OSSL_PKEY_PARAM_PROPERTIES
# define OSSL_SIGNATURE_PARAM_PSS_SALTLEN "saltlen"
# define OSSL_SIGNATURE_PARAM_SIGNATURE "signature"
# define OSSL_SIGNATURE_PARAM_TEST_ENTROPY "test-entropy"
# define OSSL_SKEY_PARAM_KEY_LENGTH "key-length"
# define OSSL_SKEY_PARAM_RAW_BYTES "raw-bytes"
# define OSSL_STORE_PARAM_ALIAS "alias"
# define OSSL_STORE_PARAM_DIGEST
 "digest"
# define OSSL_STORE_PARAM_EXPECT "expect"
# define OSSL_STORE_PARAM_FINGERPRINT "fingerprint"
# define OSSL_STORE_PARAM_INPUT_TYPE "input-type"
# define OSSL_STORE_PARAM_ISSUER "name"
# define OSSL_STORE_PARAM_PROPERTIES "properties"
# define OSSL_STORE_PARAM_SERIAL "serial"
# define OSSL_STORE_PARAM_SUBJECT "subject"
/* clang-format on */

#ifdef __cplusplus
}
#endif

#endif
{
 'variables': {
   'openssl_defines_BSD-x86': [
     'NDEBUG',
     'L_ENDIAN',
     'OPENSSL_BUILDING_OPENSSL',
     'AES_ASM',
     'CMLL_ASM',
     'DES_ASM',
     'ECP_NISTZ256_ASM',
     'GHASH_ASM',
     'MD5_ASM',
     'OPENSSL_BN_ASM_GF2m',
     'OPENSSL_BN_ASM_MONT',
     'OPENSSL_BN_ASM_PART_WORDS',
     'OPENSSL_CPUID_OBJ',
     'OPENSSL_IA32_SSE2',
     'PADLOCK_ASM',
     'POLY1305_ASM',
     'RC4_ASM',
     'RMD160_ASM',
     'SHA1_ASM',
```

```
  'SHA256_ASM',
  'SHA512_ASM',
  'VPAES_ASM',
  'WHIRLPOOL_ASM',
  'OPENSSL_PIC',
],
'openssl_cflags_BSD-x86': [
  '-Wa,--noexecstack',
  '-Wall -O3 -fomit-frame-pointer',
  '-pthread',
  '-Wall -O3 -fomit-frame-pointer',
],
'openssl_ex_libs_BSD-x86': [
  '-pthread',
],
'openssl_cli_srcs_BSD-x86': [
  'openssl/apps/lib/cmp_mock_srv.c',
  'openssl/apps/asn1parse.c',
  'openssl/apps/ca.c',
  'openssl/apps/ciphers.c',
  'openssl/apps/cmp.c',
   'openssl/apps/cms.c',
  'openssl/apps/crl.c',
  'openssl/apps/crl2pkcs7.c',
  'openssl/apps/dgst.c',
  'openssl/apps/dhparam.c',
  'openssl/apps/dsa.c',
  'openssl/apps/dsaparam.c',
  'openssl/apps/ec.c',
  'openssl/apps/ecparam.c',
  'openssl/apps/enc.c',
  'openssl/apps/engine.c',
  'openssl/apps/errstr.c',
  'openssl/apps/fipsinstall.c',
  'openssl/apps/gendsa.c',
  'openssl/apps/genpkey.c',
  'openssl/apps/genrsa.c',
  'openssl/apps/info.c',
  'openssl/apps/kdf.c',
  'openssl/apps/list.c',
  'openssl/apps/mac.c',
  'openssl/apps/nseq.c',
  'openssl/apps/ocsp.c',
  'openssl/apps/openssl.c',
  'openssl/apps/passwd.c',
  'openssl/apps/pkcs12.c',
  'openssl/apps/pkcs7.c',
  'openssl/apps/pkcs8.c',
```

```
    'openssl/apps/pkey.c',
    'openssl/apps/pkeyparam.c',
    'openssl/apps/pkeyutl.c',
    'openssl/apps/prime.c',
    './config/archs/BSD-x86/asm_avx2/apps/progs.c',
     'openssl/apps/rand.c',
    'openssl/apps/rehash.c',
    'openssl/apps/req.c',
    'openssl/apps/rsa.c',
    'openssl/apps/rsautl.c',
    'openssl/apps/s_client.c',
    'openssl/apps/s_server.c',
    'openssl/apps/s_time.c',
    'openssl/apps/sess_id.c',
    'openssl/apps/skeyutl.c',
    'openssl/apps/smime.c',
    'openssl/apps/speed.c',
    'openssl/apps/spkac.c',
    'openssl/apps/srp.c',
    'openssl/apps/storeutl.c',
    'openssl/apps/ts.c',
    'openssl/apps/verify.c',
    'openssl/apps/version.c',
    'openssl/apps/x509.c',
    'openssl/apps/lib/app_libctx.c',
    'openssl/apps/lib/app_params.c',
    'openssl/apps/lib/app_provider.c',
    'openssl/apps/lib/app_rand.c',
    'openssl/apps/lib/app_x509.c',
    'openssl/apps/lib/apps.c',
    'openssl/apps/lib/apps_opt_printf.c',
    'openssl/apps/lib/apps_ui.c',
    'openssl/apps/lib/columns.c',
    'openssl/apps/lib/engine.c',
    'openssl/apps/lib/engine_loader.c',
     'openssl/apps/lib/fmt.c',
    'openssl/apps/lib/http_server.c',
    'openssl/apps/lib/log.c',
    'openssl/apps/lib/names.c',
    'openssl/apps/lib/opt.c',
    'openssl/apps/lib/s_cb.c',
    'openssl/apps/lib/s_socket.c',
    'openssl/apps/lib/tlssrp_depr.c',
  ],
},
'defines': ['<@(openssl_defines_BSD-x86)'],
'include_dirs': [
  './include',
```

```
 ],
 'cflags' : ['<@(openssl_cflags_BSD-x86)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86)'],
 'sources': ['<@(openssl_cli_srcs_BSD-x86)'],
}
```

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---

This library is a fork of 'better-json-errors' by Kat Marchn, extended and
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```
/*
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*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

/*
* Header for dynamic hash table routines Author - Eric Young
*/

#ifndef OPENSSL_LHASH_H
#define OPENSSL_LHASH_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_LHASH_H
#endif

#include <openssl/e_os2.h>
#include <openssl/bio.h>
#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif

#ifdef __cplusplus
extern "C" {
#endif

typedef struct lhash_node_st OPENSSL_LH_NODE;
typedef int (*OPENSSL_LH_COMPFUNC)(const void *, const void *);
typedef int (*OPENSSL_LH_COMPFUNCTHUNK)(const void *, const void *, OPENSSL_LH_COMPFUNC
cfn);
typedef unsigned long (*OPENSSL_LH_HASHFUNC)(const
```

```
 void *);
typedef unsigned long (*OPENSSL_LH_HASHFUNCTHUNK)(const void *, OPENSSL_LH_HASHFUNC hfn);
typedef void (*OPENSSL_LH_DOALL_FUNC)(void *);
typedef void (*OPENSSL_LH_DOALL_FUNC_THUNK)(void *, OPENSSL_LH_DOALL_FUNC doall);
typedef void (*OPENSSL_LH_DOALL_FUNCARG)(void *, void *);
typedef void (*OPENSSL_LH_DOALL_FUNCARG_THUNK)(void *, void *,
OPENSSL_LH_DOALL_FUNCARG doall);
typedef struct lhash_st OPENSSL_LHASH;

/*
* Macros for declaring and implementing type-safe wrappers for LHASH
* callbacks. This way, callbacks can be provided to LHASH structures without
* function pointer casting and the macro-defined callbacks provide
* per-variable casting before deferring to the underlying type-specific
* callbacks. NB: It is possible to place a "static" in front of both the
* DECLARE and IMPLEMENT macros if the functions are strictly internal.
*/

/* First: "hash" functions */
#define DECLARE_LHASH_HASH_FN(name, o_type) \
   unsigned long name##_LHASH_HASH(const void *);
#define
 IMPLEMENT_LHASH_HASH_FN(name, o_type)        \
   unsigned long name##_LHASH_HASH(const void *arg) \
   {                                            \
       const o_type *a = arg;                   \
       return name##_hash(a);                   \
   }
#define LHASH_HASH_FN(name) name##_LHASH_HASH

/* Second: "compare" functions */
#define DECLARE_LHASH_COMP_FN(name, o_type) \
   int name##_LHASH_COMP(const void *, const void *);
#define IMPLEMENT_LHASH_COMP_FN(name, o_type)                \
   int name##_LHASH_COMP(const void *arg1, const void *arg2) \
   {                                                         \
       const o_type *a = arg1;                               \
       const o_type *b = arg2;                               \
       return name##_cmp(a, b);                              \
   }
#define LHASH_COMP_FN(name) name##_LHASH_COMP

/* Fourth: "doall_arg" functions */
#define DECLARE_LHASH_DOALL_ARG_FN(name, o_type, a_type) \
   void
 name##_LHASH_DOALL_ARG(void *, void *);
#define IMPLEMENT_LHASH_DOALL_ARG_FN(name, o_type, a_type) \
   void name##_LHASH_DOALL_ARG(void *arg1, void *arg2)    \
```

```
  {                                       \
    o_type *a = arg1;                     \
    a_type *b = arg2;                     \
    name##_doall_arg(a, b);                   \
  }
#define LHASH_DOALL_ARG_FN(name) name##_LHASH_DOALL_ARG

#define LH_LOAD_MULT 256

int OPENSSL_LH_error(OPENSSL_LHASH *lh);
OPENSSL_LHASH *OPENSSL_LH_new(OPENSSL_LH_HASHFUNC h, OPENSSL_LH_COMPFUNC c);
OPENSSL_LHASH *OPENSSL_LH_set_thunks(OPENSSL_LHASH *lh,
  OPENSSL_LH_HASHFUNCTHUNK hw,
  OPENSSL_LH_COMPFUNCTHUNK cw,
  OPENSSL_LH_DOALL_FUNC_THUNK daw,
  OPENSSL_LH_DOALL_FUNCARG_THUNK daaw);
void OPENSSL_LH_free(OPENSSL_LHASH *lh);
void OPENSSL_LH_flush(OPENSSL_LHASH *lh);
void *OPENSSL_LH_insert(OPENSSL_LHASH *lh, void *data);
void *OPENSSL_LH_delete(OPENSSL_LHASH *lh, const
 void *data);
void *OPENSSL_LH_retrieve(OPENSSL_LHASH *lh, const void *data);
void OPENSSL_LH_doall(OPENSSL_LHASH *lh, OPENSSL_LH_DOALL_FUNC func);
void OPENSSL_LH_doall_arg(OPENSSL_LHASH *lh,
  OPENSSL_LH_DOALL_FUNCARG func, void *arg);
void OPENSSL_LH_doall_arg_thunk(OPENSSL_LHASH *lh,
  OPENSSL_LH_DOALL_FUNCARG_THUNK daaw,
  OPENSSL_LH_DOALL_FUNCARG fn, void *arg);

unsigned long OPENSSL_LH_strhash(const char *c);
unsigned long OPENSSL_LH_num_items(const OPENSSL_LHASH *lh);
unsigned long OPENSSL_LH_get_down_load(const OPENSSL_LHASH *lh);
void OPENSSL_LH_set_down_load(OPENSSL_LHASH *lh, unsigned long down_load);

#ifndef OPENSSL_NO_STDIO
#ifndef OPENSSL_NO_DEPRECATED_3_1
OSSL_DEPRECATEDIN_3_1 void OPENSSL_LH_stats(const OPENSSL_LHASH *lh, FILE *fp);
OSSL_DEPRECATEDIN_3_1 void OPENSSL_LH_node_stats(const OPENSSL_LHASH *lh, FILE *fp);
OSSL_DEPRECATEDIN_3_1 void OPENSSL_LH_node_usage_stats(const OPENSSL_LHASH *lh, FILE *fp);
#endif
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_1
OSSL_DEPRECATEDIN_3_1
 void OPENSSL_LH_stats_bio(const OPENSSL_LHASH *lh, BIO *out);
OSSL_DEPRECATEDIN_3_1 void OPENSSL_LH_node_stats_bio(const OPENSSL_LHASH *lh, BIO *out);
OSSL_DEPRECATEDIN_3_1 void OPENSSL_LH_node_usage_stats_bio(const OPENSSL_LHASH *lh, BIO
*out);
#endif
```

```
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define _LHASH OPENSSL_LHASH
#define LHASH_NODE OPENSSL_LH_NODE
#define lh_error OPENSSL_LH_error
#define lh_new OPENSSL_LH_new
#define lh_free OPENSSL_LH_free
#define lh_insert OPENSSL_LH_insert
#define lh_delete OPENSSL_LH_delete
#define lh_retrieve OPENSSL_LH_retrieve
#define lh_doall OPENSSL_LH_doall
#define lh_doall_arg OPENSSL_LH_doall_arg
#define lh_strhash OPENSSL_LH_strhash
#define lh_num_items OPENSSL_LH_num_items
#ifndef OPENSSL_NO_STDIO
#define lh_stats OPENSSL_LH_stats
#define lh_node_stats OPENSSL_LH_node_stats
#define lh_node_usage_stats OPENSSL_LH_node_usage_stats
#endif
#define lh_stats_bio OPENSSL_LH_stats_bio
#define lh_node_stats_bio OPENSSL_LH_node_stats_bio
#define
 lh_node_usage_stats_bio OPENSSL_LH_node_usage_stats_bio
#endif

/* Type checking... */

#define LHASH_OF(type) struct lhash_st_##type

/* Helper macro for internal use */
#define DEFINE_LHASH_OF_INTERNAL(type)                                                  \
  LHASH_OF(type)                                                                        \
  {                                                                                     \
     union lh_##type##_dummy {                                                          \
        void *d1;                                                                       \
        unsigned long d2;                                                               \
        int d3;                                                                         \
     } dummy;
                                                                                        \
  };                                                                                    \
  typedef int (*lh_##type##_compfunc)(const type *a, const type *b);                    \
  typedef unsigned long (*lh_##type##_hashfunc)(const type *a);                         \
  typedef void (*lh_##type##_doallfunc)(type * a);                                      \
  static ossl_inline unsigned long lh_##type##_hash_thunk(const void *data, OPENSSL_LH_HASHFUNC hfn)
 \
  {                                                                                     \
     unsigned long (*hfn_conv)(const type *) = (unsigned long (*)(const type *))hfn;    \
     return hfn_conv((const type *)data);                                               \
```

```
}
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_inline int lh_##type##_comp_thunk(const void *da, const void *db, OPENSSL_LH_COMPFUNC cfn)
\
{                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
    int (*cfn_conv)(const type *, const type *) = (int (*)(const type *, const type *))cfn;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
    return cfn_conv((const type *)da, (const type *)db);                                                                                                                                                                                                                                                                                                                                                
}                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_inline void lh_##type##_doall_thunk(void *node, OPENSSL_LH_DOALL_FUNC doall)
{                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
    void (*doall_conv)(type *) = (void (*)(type *))doall;                                                                                                                                                                                                                                                                                                                                                
     doall_conv((type *)node);                                                                                                                                                                                                                                                                                                                                                                                                                                
}                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_inline void lh_##type##_doall_arg_thunk(void *node, void *arg, OPENSSL_LH_DOALL_FUNCARG doall) \
{                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
    void (*doall_conv)(type *, void *) = (void (*)(type *, void *))doall;                                                                                                                                                                                                                                                                                                                                
    doall_conv((type *)node, arg);                                                                                                                                                                                                                                                                                                                                                                                                                                
}                                                                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_unused ossl_inline type *                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
ossl_check_##type##_lh_plain_type(type *ptr)
        \
{                                                                                                                                                                                                                                                                                                                                                                                                                                                
    return ptr;                                                                                                                                                                                                                                                                                                                                                                                                                                                
}                                                                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_unused ossl_inline const type *                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
ossl_check_const_##type##_lh_plain_type(const type *ptr)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
{                                                                                                                                                                                                                                                                                                                                                                                                                                                
    return ptr;                                                                                                                                                                                                                                                                                                                                                                                                                                                
}                                                                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_unused ossl_inline const OPENSSL_LHASH *
                        \
ossl_check_const_##type##_lh_type(const LHASH_OF(type) *lh)                                                                                                                                                                                                                                                                                                                                                                                                                                                
{                                                                                                                                                                                                                                                                                                                                                                                                                                                
    return (const OPENSSL_LHASH *)lh;                                                                                                                                                                                                                                                                                                                                                                                                                                                
}                                                                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_unused ossl_inline OPENSSL_LHASH *                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
ossl_check_##type##_lh_type(LHASH_OF(type) *lh)                                                                                                                                                                                                                                                                                                                                                                                                                                                
{                                                                                                                                                                                                                                                                                                                                                                                                                                                
    return (OPENSSL_LHASH *)lh;                                                                                                                                                                                                                                                                                                                                                                                                                                                
}
                                        \
static ossl_unused ossl_inline OPENSSL_LH_COMPFUNC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
ossl_check_##type##_lh_compfunc_type(lh_##type##_compfunc cmp)                                                                                                                                                                                                                                                                                                                                                                                                                                                
{                                                                                                                                                                                                                                                                                                                                                                                                                                                
    return (OPENSSL_LH_COMPFUNC)cmp;                                                                                                                                                                                                                                                                                                                                                                                                                                                
}                                                                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_unused ossl_inline OPENSSL_LH_HASHFUNC                                                                                                                                                                                                                                                                                                                                                                                                                                                
```

```
  ossl_check_##type##_lh_hashfunc_type(lh_##type##_hashfunc hfn)                                    \
  {                                                                                                  \
     return (OPENSSL_LH_HASHFUNC)hfn;
                                                                                                     \
  }                                                                                                  \
  static ossl_unused ossl_inline OPENSSL_LH_DOALL_FUNC                                               \
  ossl_check_##type##_lh_doallfunc_type(lh_##type##_doallfunc dfn)                                   \
  {                                                                                                  \
     return (OPENSSL_LH_DOALL_FUNC)dfn;                                                              \
  }                                                                                                  \
  LHASH_OF(type)

#ifndef OPENSSL_NO_DEPRECATED_3_1
#define DEFINE_LHASH_OF_DEPRECATED(type)                                                             \
  static ossl_unused ossl_inline void                                                                \
  lh_##type##_node_stats_bio(const LHASH_OF(type)
 *lh, BIO *out)       \
  {                                                                                                  \
     OPENSSL_LH_node_stats_bio((const OPENSSL_LHASH *)lh, out);       \
  }                                                                                                  \
  static ossl_unused ossl_inline void                                                                \
  lh_##type##_node_usage_stats_bio(const LHASH_OF(type) *lh, BIO *out) \
  {                                                                                                  \
     OPENSSL_LH_node_usage_stats_bio((const OPENSSL_LHASH *)lh, out); \
  }                                                                                                  \
  static ossl_unused ossl_inline void                                                                \
  lh_##type##_stats_bio(const LHASH_OF(type) *lh, BIO *out)           \
  {                                                                                                  \
     OPENSSL_LH_stats_bio((const OPENSSL_LHASH *)lh, out);           \
  }
#else
#define DEFINE_LHASH_OF_DEPRECATED(type)
#endif

#define DEFINE_LHASH_OF_EX(type)
                                                                                                     \
  LHASH_OF(type)                                                                                     \
  {                                                                                                  \
     union lh_##type##_dummy {                                                                       \
        void *d1;                                                                                    \
        unsigned long d2;                                                                            \
        int d3;                                                                                      \
     } dummy;                                                                                        \
  };
                                                                                                     \
  static unsigned long                                                                               \
  lh_##type##_hfn_thunk(const void *data, OPENSSL_LH_HASHFUNC hfn)                                   \
  {                                                                                                  \
```

```
    unsigned long (*hfn_conv)(const type *) = (unsigned long (*)(const type *))hfn;                    \
    return hfn_conv((const type *)data);                                                               \
}                                                                                                      \
static int lh_##type##_cfn_thunk(const void *da, const void *db, OPENSSL_LH_COMPFUNC cfn)
  \
{
                                                                                                       \
    int (*cfn_conv)(const type *, const type *) = (int (*)(const type *, const type *))cfn;            \
    return cfn_conv((const type *)da, (const type *)db);                                               \
}                                                                                                      \
static ossl_unused ossl_inline void                                                                    \
lh_##type##_free(LHASH_OF(type) *lh)                                                                   \
{                                                                                                      \
    OPENSSL_LH_free((OPENSSL_LHASH *)lh);                                                              \
}
                                                                                                       \
static ossl_unused ossl_inline void                                                                    \
lh_##type##_flush(LHASH_OF(type) *lh)                                                                  \
{                                                                                                      \
    OPENSSL_LH_flush((OPENSSL_LHASH *)lh);                                                             \
}                                                                                                      \
static ossl_unused ossl_inline type *                                                                  \
lh_##type##_insert(LHASH_OF(type) *lh, type *d)                                                        \
{
                                                                                                       \
    return (type *)OPENSSL_LH_insert((OPENSSL_LHASH *)lh, d);                                          \
}                                                                                                      \
static ossl_unused ossl_inline type *                                                                  \
lh_##type##_delete(LHASH_OF(type) *lh, const type *d)                                                  \
{                                                                                                      \
    return (type *)OPENSSL_LH_delete((OPENSSL_LHASH *)lh, d);                                          \
}                                                                                                      \
static ossl_unused
ossl_inline type *                                                                                     \
lh_##type##_retrieve(LHASH_OF(type) *lh, const type *d)                                                \
{                                                                                                      \
    return (type *)OPENSSL_LH_retrieve((OPENSSL_LHASH *)lh, d);                                        \
}                                                                                                      \
static ossl_unused ossl_inline int                                                                     \
lh_##type##_error(LHASH_OF(type) *lh)                                                                  \
{                                                                                                      \
    return
OPENSSL_LH_error((OPENSSL_LHASH *)lh);                                                                 \
}                                                                                                      \
static ossl_unused ossl_inline unsigned long                                                           \
lh_##type##_num_items(LHASH_OF(type) *lh)                                                              \
{                                                                                                      \
    return OPENSSL_LH_num_items((OPENSSL_LHASH *)lh);                                                  \
```

```
  }                                                                                                   \
  static ossl_unused ossl_inline unsigned long                                                        \
  lh_##type##_get_down_load(LHASH_OF(type)
*lh)                                                                                                  \
  {                                                                                                   \
      return OPENSSL_LH_get_down_load((OPENSSL_LHASH *)lh);                                           \
  }                                                                                                   \
  static ossl_unused ossl_inline void                                                                 \
  lh_##type##_set_down_load(LHASH_OF(type) *lh, unsigned long dl)                                     \
  {                                                                                                   \
      OPENSSL_LH_set_down_load((OPENSSL_LHASH *)lh, dl);                                              \
  }
                                                                                                      \
  static ossl_unused ossl_inline void                                                                 \
  lh_##type##_doall_thunk(void *node, OPENSSL_LH_DOALL_FUNC doall)                                    \
  {                                                                                                   \
      void (*doall_conv)(type *) = (void (*)(type *))doall;                                           \
      doall_conv((type *)node);                                                                       \
  }                                                                                                   \
  static ossl_unused ossl_inline void                                                                 \
  lh_##type##_doall_arg_thunk(void
*node, void *arg, OPENSSL_LH_DOALL_FUNCARG doall)                                                     \
  {                                                                                                   \
      void (*doall_conv)(type *, void *) = (void (*)(type *, void *))doall;                           \
      doall_conv((type *)node, arg);                                                                  \
  }                                                                                                   \
  static ossl_unused ossl_inline void                                                                 \
  lh_##type##_doall(LHASH_OF(type) *lh, void (*doall)(type *))                                        \
  {                                                                                                   \
      OPENSSL_LH_doall((OPENSSL_LHASH
*)lh, (OPENSSL_LH_DOALL_FUNC)doall);                                                                  \
  }                                                                                                   \
  static ossl_unused ossl_inline LHASH_OF(type) *                                                     \
  lh_##type##_new(unsigned long (*hfn)(const type *),                                                 \
      int (*cfn)(const type *, const type *))                                                         \
  {                                                                                                   \
      return (LHASH_OF(type)
*)OPENSSL_LH_set_thunks(OPENSSL_LH_new((OPENSSL_LH_HASHFUNC)hfn,
(OPENSSL_LH_COMPFUNC)cfn), \
          lh_##type##_hfn_thunk, lh_##type##_cfn_thunk,                                               \
          lh_##type##_doall_thunk,
                                                                                                      \
          lh_##type##_doall_arg_thunk);                                                               \
  }                                                                                                   \
  static ossl_unused ossl_inline void                                                                 \
  lh_##type##_doall_arg(LHASH_OF(type) *lh,                                                           \
      void (*doallarg)(type *, void *), void *arg)                                                    \
  {                                                                                                   \
```

```
    OPENSSL_LH_doall_arg((OPENSSL_LHASH *)lh,                                                    \
        (OPENSSL_LH_DOALL_FUNCARG)doallarg,
 arg);                                                  \
  }                                                                                              \
  LHASH_OF(type)

#define DEFINE_LHASH_OF(type)       \
  DEFINE_LHASH_OF_EX(type);       \
  DEFINE_LHASH_OF_DEPRECATED(type) \
  LHASH_OF(type)

#define IMPLEMENT_LHASH_DOALL_ARG_CONST(type, argtype) \
  int_implement_lhash_doall(type, argtype, const type)

#define IMPLEMENT_LHASH_DOALL_ARG(type, argtype) \
  int_implement_lhash_doall(type, argtype, type)

#define int_implement_lhash_doall(type, argtype, cbargtype)                          \
  static ossl_unused ossl_inline void                                          \
  lh_##type##_doall_##argtype##_thunk(void *node, void *arg, OPENSSL_LH_DOALL_FUNCARG fn) \
  {                                                                            \
    void
 (*fn_conv)(cbargtype *, argtype *) = (void (*)(cbargtype *, argtype *))fn;     \
    fn_conv((cbargtype *)node, (argtype *)arg);                                  \
  }                                                                            \
  static ossl_unused ossl_inline void                                          \
  lh_##type##_doall_##argtype(LHASH_OF(type) *lh,                              \
    void (*fn)(cbargtype *, argtype *),                                        \
    argtype *arg)                                                              \
  {                                                                            \
    OPENSSL_LH_doall_arg_thunk((OPENSSL_LHASH *)lh,                                  \
        lh_##type##_doall_##argtype##_thunk,                                   \
        (OPENSSL_LH_DOALL_FUNCARG)fn,
            \
        (void *)arg);                                                          \
  }                                                                            \
  LHASH_OF(type)

/* clang-format off */
DEFINE_LHASH_OF_INTERNAL(OPENSSL_STRING);
#define lh_OPENSSL_STRING_new(hfn, cmp) ((LHASH_OF(OPENSSL_STRING)
*)OPENSSL_LH_set_thunks(OPENSSL_LH_new(ossl_check_OPENSSL_STRING_lh_hashfunc_type(hfn),
ossl_check_OPENSSL_STRING_lh_compfunc_type(cmp)), lh_OPENSSL_STRING_hash_thunk,
lh_OPENSSL_STRING_comp_thunk, lh_OPENSSL_STRING_doall_thunk,
lh_OPENSSL_STRING_doall_arg_thunk))
#define lh_OPENSSL_STRING_free(lh) OPENSSL_LH_free(ossl_check_OPENSSL_STRING_lh_type(lh))
#define lh_OPENSSL_STRING_flush(lh) OPENSSL_LH_flush(ossl_check_OPENSSL_STRING_lh_type(lh))
#define lh_OPENSSL_STRING_insert(lh, ptr) ((OPENSSL_STRING
```

```
*)OPENSSL_LH_insert(ossl_check_OPENSSL_STRING_lh_type(lh),
ossl_check_OPENSSL_STRING_lh_plain_type(ptr)))
#define lh_OPENSSL_STRING_delete(lh,
 ptr) ((OPENSSL_STRING *)OPENSSL_LH_delete(ossl_check_OPENSSL_STRING_lh_type(lh),
ossl_check_const_OPENSSL_STRING_lh_plain_type(ptr)))
#define lh_OPENSSL_STRING_retrieve(lh, ptr) ((OPENSSL_STRING
*)OPENSSL_LH_retrieve(ossl_check_OPENSSL_STRING_lh_type(lh),
ossl_check_const_OPENSSL_STRING_lh_plain_type(ptr)))
#define lh_OPENSSL_STRING_error(lh) OPENSSL_LH_error(ossl_check_OPENSSL_STRING_lh_type(lh))
#define lh_OPENSSL_STRING_num_items(lh)
OPENSSL_LH_num_items(ossl_check_OPENSSL_STRING_lh_type(lh))
#define lh_OPENSSL_STRING_node_stats_bio(lh, out)
OPENSSL_LH_node_stats_bio(ossl_check_const_OPENSSL_STRING_lh_type(lh), out)
#define lh_OPENSSL_STRING_node_usage_stats_bio(lh, out)
OPENSSL_LH_node_usage_stats_bio(ossl_check_const_OPENSSL_STRING_lh_type(lh), out)
#define lh_OPENSSL_STRING_stats_bio(lh, out)
OPENSSL_LH_stats_bio(ossl_check_const_OPENSSL_STRING_lh_type(lh), out)
#define lh_OPENSSL_STRING_get_down_load(lh)
OPENSSL_LH_get_down_load(ossl_check_OPENSSL_STRING_lh_type(lh))
#define
 lh_OPENSSL_STRING_set_down_load(lh, dl)
OPENSSL_LH_set_down_load(ossl_check_OPENSSL_STRING_lh_type(lh), dl)
#define lh_OPENSSL_STRING_doall(lh, dfn) OPENSSL_LH_doall(ossl_check_OPENSSL_STRING_lh_type(lh),
ossl_check_OPENSSL_STRING_lh_doallfunc_type(dfn))
DEFINE_LHASH_OF_INTERNAL(OPENSSL_CSTRING);
#define lh_OPENSSL_CSTRING_new(hfn, cmp) ((LHASH_OF(OPENSSL_CSTRING)
*)OPENSSL_LH_set_thunks(OPENSSL_LH_new(ossl_check_OPENSSL_CSTRING_lh_hashfunc_type(hfn),
ossl_check_OPENSSL_CSTRING_lh_compfunc_type(cmp)), lh_OPENSSL_CSTRING_hash_thunk,
lh_OPENSSL_CSTRING_comp_thunk, lh_OPENSSL_CSTRING_doall_thunk,
lh_OPENSSL_CSTRING_doall_arg_thunk))
#define lh_OPENSSL_CSTRING_free(lh) OPENSSL_LH_free(ossl_check_OPENSSL_CSTRING_lh_type(lh))
#define lh_OPENSSL_CSTRING_flush(lh) OPENSSL_LH_flush(ossl_check_OPENSSL_CSTRING_lh_type(lh))
#define lh_OPENSSL_CSTRING_insert(lh, ptr) ((OPENSSL_CSTRING
*)OPENSSL_LH_insert(ossl_check_OPENSSL_CSTRING_lh_type(lh),
ossl_check_OPENSSL_CSTRING_lh_plain_type(ptr)))
#define
 lh_OPENSSL_CSTRING_delete(lh, ptr) ((OPENSSL_CSTRING
*)OPENSSL_LH_delete(ossl_check_OPENSSL_CSTRING_lh_type(lh),
ossl_check_const_OPENSSL_CSTRING_lh_plain_type(ptr)))
#define lh_OPENSSL_CSTRING_retrieve(lh, ptr) ((OPENSSL_CSTRING
*)OPENSSL_LH_retrieve(ossl_check_OPENSSL_CSTRING_lh_type(lh),
ossl_check_const_OPENSSL_CSTRING_lh_plain_type(ptr)))
#define lh_OPENSSL_CSTRING_error(lh) OPENSSL_LH_error(ossl_check_OPENSSL_CSTRING_lh_type(lh))
#define lh_OPENSSL_CSTRING_num_items(lh)
OPENSSL_LH_num_items(ossl_check_OPENSSL_CSTRING_lh_type(lh))
#define lh_OPENSSL_CSTRING_node_stats_bio(lh, out)
OPENSSL_LH_node_stats_bio(ossl_check_const_OPENSSL_CSTRING_lh_type(lh), out)
#define lh_OPENSSL_CSTRING_node_usage_stats_bio(lh, out)
```

```
OPENSSL_LH_node_usage_stats_bio(ossl_check_const_OPENSSL_CSTRING_lh_type(lh), out)
#define lh_OPENSSL_CSTRING_stats_bio(lh, out)
OPENSSL_LH_stats_bio(ossl_check_const_OPENSSL_CSTRING_lh_type(lh), out)
#define lh_OPENSSL_CSTRING_get_down_load(lh)
OPENSSL_LH_get_down_load(ossl_check_OPENSSL_CSTRING_lh_type(lh))
#define
 lh_OPENSSL_CSTRING_set_down_load(lh, dl)
OPENSSL_LH_set_down_load(ossl_check_OPENSSL_CSTRING_lh_type(lh), dl)
#define lh_OPENSSL_CSTRING_doall(lh, dfn)
OPENSSL_LH_doall(ossl_check_OPENSSL_CSTRING_lh_type(lh),
ossl_check_OPENSSL_CSTRING_lh_doallfunc_type(dfn))

/* clang-format on */

#ifdef __cplusplus
}
#endif

#endif
{
 'variables': {
   'openssl_sources': [
     'openssl/crypto/aes/aes_ecb.c',
     'openssl/crypto/aes/aes_misc.c',
     'openssl/crypto/bn/bn_add.c',
     'openssl/crypto/bn/bn_blind.c',
     'openssl/crypto/bn/bn_const.c',
     'openssl/crypto/bn/bn_conv.c',
     'openssl/crypto/bn/bn_ctx.c',
     'openssl/crypto/bn/bn_dh.c',
     'openssl/crypto/bn/bn_div.c',
     'openssl/crypto/bn/bn_exp.c',
     'openssl/crypto/bn/bn_exp2.c',
     'openssl/crypto/bn/bn_gcd.c',
     'openssl/crypto/bn/bn_gf2m.c',
     'openssl/crypto/bn/bn_intern.c',
     'openssl/crypto/bn/bn_kron.c',
     'openssl/crypto/bn/bn_lib.c',
     'openssl/crypto/bn/bn_mod.c',
     'openssl/crypto/bn/bn_mont.c',
     'openssl/crypto/bn/bn_mpi.c',
     'openssl/crypto/bn/bn_mul.c',
     'openssl/crypto/bn/bn_nist.c',
     'openssl/crypto/bn/bn_prime.c',
     'openssl/crypto/bn/bn_rand.c',
     'openssl/crypto/bn/bn_recp.c',
     'openssl/crypto/bn/bn_rsa_fips186_4.c',
     'openssl/crypto/bn/bn_shift.c',
```

'openssl/crypto/bn/bn_sqr.c',
'openssl/crypto/bn/bn_sqrt.c',
'openssl/crypto/bn/bn_word.c',
'openssl/crypto/buffer/buffer.c',
'openssl/crypto/cmac/cmac.c',
'openssl/crypto/des/ecb3_enc.c',
'openssl/crypto/des/set_key.c',
'openssl/crypto/dh/dh_backend.c',
'openssl/crypto/dh/dh_check.c',
'openssl/crypto/dh/dh_gen.c',
'openssl/crypto/dh/dh_group_params.c',
'openssl/crypto/dh/dh_kdf.c',
'openssl/crypto/dh/dh_key.c',
'openssl/crypto/dh/dh_lib.c',
'openssl/crypto/dsa/dsa_backend.c',
'openssl/crypto/dsa/dsa_check.c',
'openssl/crypto/dsa/dsa_gen.c',
'openssl/crypto/dsa/dsa_key.c',
'openssl/crypto/dsa/dsa_lib.c',
'openssl/crypto/dsa/dsa_ossl.c',
'openssl/crypto/dsa/dsa_sign.c',
'openssl/crypto/dsa/dsa_vrf.c',
'openssl/crypto/ec/curve448/arch_32/f_impl32.c',
'openssl/crypto/ec/curve448/arch_64/f_impl64.c',
'openssl/crypto/ec/curve448/curve448.c',
'openssl/crypto/ec/curve448/curve448_tables.c',
'openssl/crypto/ec/curve448/eddsa.c',
'openssl/crypto/ec/curve448/f_generic.c',
'openssl/crypto/ec/curve448/scalar.c',
'openssl/crypto/ec/curve25519.c',
'openssl/crypto/ec/ec2_oct.c',
'openssl/crypto/ec/ec2_smpl.c',
'openssl/crypto/ec/ec_asn1.c',
'openssl/crypto/ec/ec_backend.c',
'openssl/crypto/ec/ec_check.c',
'openssl/crypto/ec/ec_curve.c',
'openssl/crypto/ec/ec_cvt.c',
'openssl/crypto/ec/ec_key.c',
'openssl/crypto/ec/ec_kmeth.c',
'openssl/crypto/ec/ec_lib.c',
'openssl/crypto/ec/ec_mult.c',
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'openssl/crypto/ec/ecdsa_ossl.c',
'openssl/crypto/ec/ecdsa_sign.c',
'openssl/crypto/ec/ecdsa_vrf.c',
'openssl/crypto/ec/ecp_mont.c',

'openssl/crypto/ec/ecp_nist.c',
'openssl/crypto/ec/ecp_nistz256.c',
'openssl/crypto/ec/ecp_oct.c',
'openssl/crypto/ec/ecp_smpl.c',
'openssl/crypto/ec/ecx_backend.c',
'openssl/crypto/ec/ecx_key.c',
'openssl/crypto/evp/asymcipher.c',
'openssl/crypto/evp/dh_support.c',
'openssl/crypto/evp/digest.c',
'openssl/crypto/evp/ec_support.c',
'openssl/crypto/evp/evp_enc.c',
'openssl/crypto/evp/evp_fetch.c',
'openssl/crypto/evp/evp_lib.c',
'openssl/crypto/evp/evp_rand.c',
'openssl/crypto/evp/evp_utils.c',
'openssl/crypto/evp/exchange.c',
'openssl/crypto/evp/kdf_lib.c',
'openssl/crypto/evp/kdf_meth.c',
'openssl/crypto/evp/kem.c',
'openssl/crypto/evp/keymgmt_lib.c',
'openssl/crypto/evp/keymgmt_meth.c',
'openssl/crypto/evp/mac_lib.c',
'openssl/crypto/evp/mac_meth.c',
'openssl/crypto/evp/p_lib.c',
'openssl/crypto/evp/pmeth_check.c',
'openssl/crypto/evp/pmeth_gn.c',
'openssl/crypto/evp/pmeth_lib.c',
'openssl/crypto/evp/s_lib.c',
'openssl/crypto/evp/signature.c',
'openssl/crypto/evp/skeymgmt_meth.c',
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'openssl/crypto/ffc/ffc_key_generate.c',
'openssl/crypto/ffc/ffc_key_validate.c',
'openssl/crypto/ffc/ffc_params.c',
'openssl/crypto/ffc/ffc_params_generate.c',
'openssl/crypto/ffc/ffc_params_validate.c',
'openssl/crypto/hashtable/hashfunc.c',
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'openssl/crypto/hmac/hmac.c',
'openssl/crypto/lhash/lhash.c',
'openssl/crypto/asn1_dsa.c',
'openssl/crypto/bsearch.c',
'openssl/crypto/context.c',
'openssl/crypto/core_algorithm.c',
'openssl/crypto/core_fetch.c',
'openssl/crypto/core_namemap.c',
'openssl/crypto/cpuid.c',

'openssl/crypto/cryptlib.c',
'openssl/crypto/ctype.c',
'openssl/crypto/der_writer.c',
'openssl/crypto/ex_data.c',
'openssl/crypto/initthread.c',
'openssl/crypto/o_str.c',
'openssl/crypto/packet.c',
'openssl/crypto/param_build.c',
'openssl/crypto/param_build_set.c',
'openssl/crypto/params.c',
'openssl/crypto/params_dup.c',
'openssl/crypto/params_from_text.c',
'openssl/crypto/provider_core.c',
'openssl/crypto/provider_predefined.c',
'openssl/crypto/self_test_core.c',
'openssl/crypto/sparse_array.c',
'openssl/crypto/threads_lib.c',
'openssl/crypto/threads_none.c',
'openssl/crypto/threads_pthread.c',
'openssl/crypto/threads_win.c',
'openssl/crypto/time.c',
'openssl/crypto/ml_dsa/ml_dsa_encoders.c',
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'openssl/crypto/modes/ofb128.c',
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'openssl/crypto/modes/xts128gb.c',
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'openssl/crypto/rsa/rsa_oaep.c',
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'openssl/crypto/thread/arch.c',
'openssl/crypto/thread/internal.c',
'openssl/providers/common/der/der_rsa_sig.c',
'openssl/providers/common/bio_prov.c',
'openssl/providers/common/capabilities.c',
'openssl/providers/common/digest_to_nid.c',
'openssl/providers/common/provider_seeding.c',
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'openssl/providers/implementations/ciphers/cipher_aes.c',
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'openssl/providers/implementations/ciphers/cipher_aes_xts_hw.c',
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'openssl/providers/implementations/digests/sha3_prov.c',
'openssl/providers/implementations/exchange/dh_exch.c',
'openssl/providers/implementations/exchange/ecdh_exch.c',
'openssl/providers/implementations/exchange/ecx_exch.c',
'openssl/providers/implementations/exchange/kdf_exch.c',
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'openssl/providers/implementations/kdfs/pbkdf2.c',
'openssl/providers/implementations/kdfs/pbkdf2_fips.c',
'openssl/providers/implementations/kdfs/sshkdf.c',
'openssl/providers/implementations/kdfs/sskdf.c',
'openssl/providers/implementations/kdfs/tls1_prf.c',
'openssl/providers/implementations/kdfs/x942kdf.c',
'openssl/providers/implementations/kem/ml_kem_kem.c',
'openssl/providers/implementations/kem/mlx_kem.c',
'openssl/providers/implementations/kem/rsa_kem.c',
'openssl/providers/implementations/keymgmt/dh_kmgmt.c',
'openssl/providers/implementations/keymgmt/dsa_kmgmt.c',
'openssl/providers/implementations/keymgmt/ec_kmgmt.c',
'openssl/providers/implementations/keymgmt/ecx_kmgmt.c',
'openssl/providers/implementations/keymgmt/kdf_legacy_kmgmt.c',
'openssl/providers/implementations/keymgmt/mac_legacy_kmgmt.c',
'openssl/providers/implementations/keymgmt/ml_dsa_kmgmt.c',
'openssl/providers/implementations/keymgmt/ml_kem_kmgmt.c',
'openssl/providers/implementations/keymgmt/mlx_kmgmt.c',

```
  'openssl/providers/implementations/keymgmt/rsa_kmgmt.c',
  'openssl/providers/implementations/keymgmt/slh_dsa_kmgmt.c',
   'openssl/providers/implementations/macs/cmac_prov.c',
  'openssl/providers/implementations/macs/gmac_prov.c',
  'openssl/providers/implementations/macs/hmac_prov.c',
  'openssl/providers/implementations/macs/kmac_prov.c',
  'openssl/providers/implementations/rands/drbg.c',
  'openssl/providers/implementations/rands/drbg_ctr.c',
  'openssl/providers/implementations/rands/drbg_hash.c',
  'openssl/providers/implementations/rands/drbg_hmac.c',
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  'openssl/providers/implementations/rands/test_rng.c',
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  'openssl/providers/implementations/signature/ecdsa_sig.c',
  'openssl/providers/implementations/signature/eddsa_sig.c',
  'openssl/providers/implementations/signature/mac_legacy_sig.c',
  'openssl/providers/implementations/signature/ml_dsa_sig.c',
  'openssl/providers/implementations/signature/rsa_sig.c',
   'openssl/providers/implementations/signature/slh_dsa_sig.c',
  'openssl/providers/implementations/skeymgmt/aes_skmgmt.c',
  'openssl/providers/implementations/skeymgmt/generic.c',
  'openssl/ssl/record/methods/ssl3_cbc.c',
  'openssl/providers/common/der/der_dsa_key.c',
  'openssl/providers/common/der/der_dsa_sig.c',
  'openssl/providers/common/der/der_ec_key.c',
  'openssl/providers/common/der/der_ec_sig.c',
  'openssl/providers/common/der/der_ecx_key.c',
  'openssl/providers/common/der/der_ml_dsa_key.c',
  'openssl/providers/common/der/der_rsa_key.c',
  'openssl/providers/common/der/der_slh_dsa_key.c',
  'openssl/providers/common/provider_ctx.c',
  'openssl/providers/common/provider_err.c',
  'openssl/providers/implementations/ciphers/ciphercommon.c',
  'openssl/providers/implementations/ciphers/ciphercommon_block.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm_hw.c',
   'openssl/providers/implementations/ciphers/ciphercommon_gcm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_gcm_hw.c',
  'openssl/providers/implementations/ciphers/ciphercommon_hw.c',
  'openssl/providers/implementations/digests/digestcommon.c',
  'openssl/ssl/record/methods/tls_pad.c',
  'openssl/providers/fips/fips_entry.c',

],
'openssl_sources_BSD-x86': [
  './config/archs/BSD-x86/asm_avx2/crypto/aes/aes-586.S',
  './config/archs/BSD-x86/asm_avx2/crypto/aes/aesni-x86.S',
  './config/archs/BSD-x86/asm_avx2/crypto/aes/vpaes-x86.S',
```

```
    './config/archs/BSD-x86/asm_avx2/crypto/bf/bf-586.S',
    './config/archs/BSD-x86/asm_avx2/crypto/bn/bn-586.S',
    './config/archs/BSD-x86/asm_avx2/crypto/bn/co-586.S',
    './config/archs/BSD-x86/asm_avx2/crypto/bn/x86-gf2m.S',
    './config/archs/BSD-x86/asm_avx2/crypto/bn/x86-mont.S',
    './config/archs/BSD-x86/asm_avx2/crypto/camellia/cmll-x86.S',
     './config/archs/BSD-x86/asm_avx2/crypto/chacha/chacha-x86.S',
    './config/archs/BSD-x86/asm_avx2/crypto/des/crypt586.S',
    './config/archs/BSD-x86/asm_avx2/crypto/des/des-586.S',
    './config/archs/BSD-x86/asm_avx2/crypto/ec/ecp_nistz256-x86.S',
    './config/archs/BSD-x86/asm_avx2/crypto/params_idx.c',
    './config/archs/BSD-x86/asm_avx2/crypto/x86cpuid.S',
    './config/archs/BSD-x86/asm_avx2/crypto/md5/md5-586.S',
    './config/archs/BSD-x86/asm_avx2/crypto/modes/ghash-x86.S',
    './config/archs/BSD-x86/asm_avx2/crypto/poly1305/poly1305-x86.S',
    './config/archs/BSD-x86/asm_avx2/crypto/rc4/rc4-586.S',
    './config/archs/BSD-x86/asm_avx2/crypto/ripemd/rmd-586.S',
    './config/archs/BSD-x86/asm_avx2/crypto/sha/sha1-586.S',
    './config/archs/BSD-x86/asm_avx2/crypto/sha/sha256-586.S',
    './config/archs/BSD-x86/asm_avx2/crypto/sha/sha512-586.S',
    './config/archs/BSD-x86/asm_avx2/crypto/whrlpool/wp-mmx.S',
     './config/archs/BSD-x86/asm_avx2/engines/e_padlock-x86.S',
    './config/archs/BSD-x86/asm_avx2/providers/common/der/der_sm2_gen.c',
    './config/archs/BSD-x86/asm_avx2/providers/common/der/der_digests_gen.c',
    './config/archs/BSD-x86/asm_avx2/providers/common/der/der_dsa_gen.c',
    './config/archs/BSD-x86/asm_avx2/providers/common/der/der_ec_gen.c',
    './config/archs/BSD-x86/asm_avx2/providers/common/der/der_ecx_gen.c',
    './config/archs/BSD-x86/asm_avx2/providers/common/der/der_ml_dsa_gen.c',
    './config/archs/BSD-x86/asm_avx2/providers/common/der/der_rsa_gen.c',
    './config/archs/BSD-x86/asm_avx2/providers/common/der/der_slh_dsa_gen.c',
    './config/archs/BSD-x86/asm_avx2/providers/common/der/der_wrap_gen.c',
    './config/archs/BSD-x86/asm_avx2/providers/legacy.ld',
    './config/archs/BSD-x86/asm_avx2/providers/fips.ld',

  ],
  'openssl_defines_BSD-x86': [
    'NDEBUG',
    'L_ENDIAN',
    'OPENSSL_BUILDING_OPENSSL',

 'AES_ASM',
    'DES_ASM',
    'ECP_NISTZ256_ASM',
    'FIPS_MODULE',
    'GHASH_ASM',
    'OPENSSL_BN_ASM_GF2m',
    'OPENSSL_BN_ASM_MONT',
    'OPENSSL_BN_ASM_PART_WORDS',
```

```
    'OPENSSL_CPUID_OBJ',
    'OPENSSL_IA32_SSE2',
    'SHA1_ASM',
    'SHA256_ASM',
    'SHA512_ASM',
    'VPAES_ASM',
    'FIPS_MODULE',
  ],
  'openssl_cflags_BSD-x86': [
    '-Wa,--noexecstack',
    '-Wall -O3 -fomit-frame-pointer',
    '-pthread',
    '-Wall -O3 -fomit-frame-pointer',
  ],
  'openssl_ex_libs_BSD-x86': [
    '-pthread',
  ],
  'linker_script': ''
 },
 'include_dirs': [
  '.',
  './include',
  './crypto',
  './crypto/include/internal',
  './providers/common/include',
 ],
 'defines': ['<@(openssl_defines_BSD-x86)'],
 'cflags': ['<@(openssl_cflags_BSD-x86)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86)'],

 'sources': ['<@(openssl_sources)', '<@(openssl_sources_BSD-x86)'],
 'direct_dependent_settings': {
  'include_dirs': ['./include',
 '.'],
  'defines': ['<@(openssl_defines_BSD-x86)'],
 },
}
```

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```
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* WARNING: do not edit!
* Generated by util/mkbuildinf.pl
*
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* https://www.openssl.org/source/license.html
*/

#define PLATFORM "platform: BSD-x86_64"
#define DATE "built on: Tue Jan 27 17:27:07 2026 UTC"

/*
* Generate compiler_flags as an array of individual characters. This is a
* workaround for the situation where CFLAGS gets too long for a C90 string
* literal
*/
static const char compiler_flags[] = {
   'c','o','m','p','i','l','e','r',':',' ','c','c',' ','-','f','P',
   'I','C',' ','-','p','t','h','r','e','a','d',' ','-','W','a','l',
   'l',' ','-','O','3',' ','-','D','L','_','E','N','D','I','A','N',
   ' ','-','D','O','P','E','N','S','S','L','_','P','I','C',' ','-',
   'D','_','T','H','R','E','A','D','_','S','A','F','E','
 ','-','D',
   '_','R','E','E','N','T','R','A','N','T',' ','-','D','O','P','E',
   'N','S','S','L','_','B','U','I','L','D','I','N','G','_','O','P',
   'E','N','S','S','L',' ','-','D','N','D','E','B','U','G','\0'
};
{
   global:
       OSSL_provider_init;
   local: *;
};
```

```
/*
* WARNING: do not edit!
* Generated by configdata.pm from Configurations/common0.tmpl, Configurations/unix-Makefile.tmpl
* via Makefile.in
*
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* https://www.openssl.org/source/license.html
*/

#ifndef OPENSSL_CONFIGURATION_H
#define OPENSSL_CONFIGURATION_H
#pragma once

#ifdef __cplusplus
extern "C" {
#endif

#ifdef OPENSSL_ALGORITHM_DEFINES
#error OPENSSL_ALGORITHM_DEFINES no longer supported
#endif

/*
* OpenSSL was configured with the following options:
*/

/* clang-format off */
# define OPENSSL_CONFIGURED_API 30500
# ifndef OPENSSL_RAND_SEED_OS
#  define OPENSSL_RAND_SEED_OS
# endif
# ifndef OPENSSL_THREADS
#  define OPENSSL_THREADS
# endif
# ifndef OPENSSL_NO_AFALGENG
#  define OPENSSL_NO_AFALGENG
#
 endif
# ifndef OPENSSL_NO_ASAN
#  define OPENSSL_NO_ASAN
# endif
# ifndef OPENSSL_NO_ASM
#  define OPENSSL_NO_ASM
# endif
# ifndef OPENSSL_NO_BROTLI
```

```
#  define OPENSSL_NO_BROTLI
# endif
# ifndef OPENSSL_NO_BROTLI_DYNAMIC
#  define OPENSSL_NO_BROTLI_DYNAMIC
# endif
# ifndef OPENSSL_NO_COMP
#  define OPENSSL_NO_COMP
# endif
# ifndef OPENSSL_NO_CRYPTO_MDEBUG
#  define OPENSSL_NO_CRYPTO_MDEBUG
# endif
# ifndef OPENSSL_NO_CRYPTO_MDEBUG_BACKTRACE
#  define OPENSSL_NO_CRYPTO_MDEBUG_BACKTRACE
# endif
# ifndef OPENSSL_NO_DEMOS
#  define OPENSSL_NO_DEMOS
# endif
# ifndef OPENSSL_NO_EC_NISTP_64_GCC_128
#  define OPENSSL_NO_EC_NISTP_64_GCC_128
# endif
# ifndef OPENSSL_NO_EGD
#  define OPENSSL_NO_EGD
# endif
# ifndef OPENSSL_NO_EXTERNAL_TESTS
#  define OPENSSL_NO_EXTERNAL_TESTS
# endif
# ifndef OPENSSL_NO_FIPS_JITTER
#  define OPENSSL_NO_FIPS_JITTER
# endif
# ifndef OPENSSL_NO_FUZZ_AFL
#  define OPENSSL_NO_FUZZ_AFL
# endif
# ifndef OPENSSL_NO_FUZZ_LIBFUZZER
#  define OPENSSL_NO_FUZZ_LIBFUZZER
#
 endif
# ifndef OPENSSL_NO_H3DEMO
#  define OPENSSL_NO_H3DEMO
# endif
# ifndef OPENSSL_NO_HQINTEROP
#  define OPENSSL_NO_HQINTEROP
# endif
# ifndef OPENSSL_NO_JITTER
#  define OPENSSL_NO_JITTER
# endif
# ifndef OPENSSL_NO_KTLS
#  define OPENSSL_NO_KTLS
# endif
```

```
# ifndef OPENSSL_NO_LOADERENG
#  define OPENSSL_NO_LOADERENG
# endif
# ifndef OPENSSL_NO_MD2
#  define OPENSSL_NO_MD2
# endif
# ifndef OPENSSL_NO_MSAN
#  define OPENSSL_NO_MSAN
# endif
# ifndef OPENSSL_NO_PIE
#  define OPENSSL_NO_PIE
# endif
# ifndef OPENSSL_NO_RC5
#  define OPENSSL_NO_RC5
# endif
# ifndef OPENSSL_NO_SCTP
#  define OPENSSL_NO_SCTP
# endif
# ifndef OPENSSL_NO_SSL3
#  define OPENSSL_NO_SSL3
# endif
# ifndef OPENSSL_NO_SSL3_METHOD
#  define OPENSSL_NO_SSL3_METHOD
# endif
# ifndef OPENSSL_NO_SSLKEYLOG
#  define OPENSSL_NO_SSLKEYLOG
# endif
# ifndef OPENSSL_NO_TFO
#  define OPENSSL_NO_TFO
# endif
# ifndef OPENSSL_NO_TRACE
#  define OPENSSL_NO_TRACE
# endif
# ifndef OPENSSL_NO_UBSAN
#  define OPENSSL_NO_UBSAN
# endif
#
 ifndef OPENSSL_NO_UNIT_TEST
#  define OPENSSL_NO_UNIT_TEST
# endif
# ifndef OPENSSL_NO_UPLINK
#  define OPENSSL_NO_UPLINK
# endif
# ifndef OPENSSL_NO_WEAK_SSL_CIPHERS
#  define OPENSSL_NO_WEAK_SSL_CIPHERS
# endif
# ifndef OPENSSL_NO_WINSTORE
#  define OPENSSL_NO_WINSTORE
```

```
# endif
# ifndef OPENSSL_NO_ZLIB
#  define OPENSSL_NO_ZLIB
# endif
# ifndef OPENSSL_NO_ZLIB_DYNAMIC
#  define OPENSSL_NO_ZLIB_DYNAMIC
# endif
# ifndef OPENSSL_NO_ZSTD
#  define OPENSSL_NO_ZSTD
# endif
# ifndef OPENSSL_NO_ZSTD_DYNAMIC
#  define OPENSSL_NO_ZSTD_DYNAMIC
# endif
# ifndef OPENSSL_NO_DYNAMIC_ENGINE
#  define OPENSSL_NO_DYNAMIC_ENGINE
# endif

/* clang-format on */

/* Generate 80386 code? */
/* clang-format off */
# undef I386_ONLY
/* clang-format on */

/*
* The following are cipher-specific, but are part of the public API.
*/
#if !defined(OPENSSL_SYS_UEFI)
   /* clang-format off */
#  define BN_LLONG
   /* clang-format on */
   /* Only one for the following should be defined */
   /* clang-format off
 */
#  undef SIXTY_FOUR_BIT_LONG
   /* clang-format on */
   /* clang-format off */
#  undef SIXTY_FOUR_BIT
   /* clang-format on */
   /* clang-format off */
#  define THIRTY_TWO_BIT
/* clang-format on */
#endif

/* clang-format off */
# define RC4_INT unsigned int
/* clang-format on */
```

```
#if defined(OPENSSL_NO_COMP) || (defined(OPENSSL_NO_BROTLI) && defined(OPENSSL_NO_ZSTD) &&
defined(OPENSSL_NO_ZLIB))
#define OPENSSL_NO_COMP_ALG
#else
#undef OPENSSL_NO_COMP_ALG
#endif

#ifdef __cplusplus
}
#endif

#endif /* OPENSSL_CONFIGURATION_H */
```

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the
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a) Accompany
the work with the complete corresponding
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b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a

copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

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<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

That's all there is to it!

```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/x509.h.in
*
* Copyright 1995-2024 The OpenSSL Project Authors. All Rights Reserved.
* Copyright (c) 2002, Oracle and/or its affiliates. All rights reserved
*
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_X509_H
#define OPENSSL_X509_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_X509_H
#endif
```

```
#include <openssl/e_os2.h>
#include <openssl/types.h>
#include <openssl/symhacks.h>
#include <openssl/buffer.h>
#include <openssl/evp.h>
#include <openssl/bio.h>
#include <openssl/asn1.h>
#include <openssl/safestack.h>
#include <openssl/ec.h>

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#include <openssl/rsa.h>
#include
 <openssl/dsa.h>
#include <openssl/dh.h>
#endif

#include <openssl/sha.h>
#include <openssl/x509err.h>
#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif

#ifdef __cplusplus
extern "C" {
#endif

/* Needed stacks for types defined in other headers */
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_NAME, X509_NAME, X509_NAME)
#define sk_X509_NAME_num(sk) OPENSSL_sk_num(ossl_check_const_X509_NAME_sk_type(sk))
#define sk_X509_NAME_value(sk, idx) ((X509_NAME
*)OPENSSL_sk_value(ossl_check_const_X509_NAME_sk_type(sk), (idx)))
#define sk_X509_NAME_new(cmp) ((STACK_OF(X509_NAME)
*)OPENSSL_sk_new(ossl_check_X509_NAME_compfunc_type(cmp)))
#define sk_X509_NAME_new_null() ((STACK_OF(X509_NAME) *)OPENSSL_sk_new_null())
#define sk_X509_NAME_new_reserve(cmp, n) ((STACK_OF(X509_NAME)
*)OPENSSL_sk_new_reserve(ossl_check_X509_NAME_compfunc_type(cmp), (n)))
#define sk_X509_NAME_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_NAME_sk_type(sk), (n))
#define sk_X509_NAME_free(sk) OPENSSL_sk_free(ossl_check_X509_NAME_sk_type(sk))
#define
 sk_X509_NAME_zero(sk) OPENSSL_sk_zero(ossl_check_X509_NAME_sk_type(sk))
#define sk_X509_NAME_delete(sk, i) ((X509_NAME
*)OPENSSL_sk_delete(ossl_check_X509_NAME_sk_type(sk), (i)))
#define sk_X509_NAME_delete_ptr(sk, ptr) ((X509_NAME
*)OPENSSL_sk_delete_ptr(ossl_check_X509_NAME_sk_type(sk), ossl_check_X509_NAME_type(ptr)))
#define sk_X509_NAME_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_NAME_sk_type(sk),
ossl_check_X509_NAME_type(ptr))
```

```
#define sk_X509_NAME_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_NAME_sk_type(sk),
ossl_check_X509_NAME_type(ptr))
#define sk_X509_NAME_pop(sk) ((X509_NAME *)OPENSSL_sk_pop(ossl_check_X509_NAME_sk_type(sk)))
#define sk_X509_NAME_shift(sk) ((X509_NAME *)OPENSSL_sk_shift(ossl_check_X509_NAME_sk_type(sk)))
#define sk_X509_NAME_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_NAME_sk_type(sk),ossl_check_X509_NAME_freefunc_type(freefunc)
)
#define sk_X509_NAME_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_NAME_sk_type(sk),
 ossl_check_X509_NAME_type(ptr), (idx))
#define sk_X509_NAME_set(sk, idx, ptr) ((X509_NAME
*)OPENSSL_sk_set(ossl_check_X509_NAME_sk_type(sk), (idx), ossl_check_X509_NAME_type(ptr)))
#define sk_X509_NAME_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_NAME_sk_type(sk),
ossl_check_X509_NAME_type(ptr))
#define sk_X509_NAME_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_NAME_sk_type(sk),
ossl_check_X509_NAME_type(ptr))
#define sk_X509_NAME_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_X509_NAME_sk_type(sk),
ossl_check_X509_NAME_type(ptr), pnum)
#define sk_X509_NAME_sort(sk) OPENSSL_sk_sort(ossl_check_X509_NAME_sk_type(sk))
#define sk_X509_NAME_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_X509_NAME_sk_type(sk))
#define sk_X509_NAME_dup(sk) ((STACK_OF(X509_NAME)
*)OPENSSL_sk_dup(ossl_check_const_X509_NAME_sk_type(sk)))
#define sk_X509_NAME_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_NAME)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_NAME_sk_type(sk),
 ossl_check_X509_NAME_copyfunc_type(copyfunc), ossl_check_X509_NAME_freefunc_type(freefunc)))
#define sk_X509_NAME_set_cmp_func(sk, cmp)
((sk_X509_NAME_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_NAME_sk_type(sk),
ossl_check_X509_NAME_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(X509, X509, X509)
#define sk_X509_num(sk) OPENSSL_sk_num(ossl_check_const_X509_sk_type(sk))
#define sk_X509_value(sk, idx) ((X509 *)OPENSSL_sk_value(ossl_check_const_X509_sk_type(sk), (idx)))
#define sk_X509_new(cmp) ((STACK_OF(X509) *)OPENSSL_sk_new(ossl_check_X509_compfunc_type(cmp)))
#define sk_X509_new_null() ((STACK_OF(X509) *)OPENSSL_sk_new_null())
#define sk_X509_new_reserve(cmp, n) ((STACK_OF(X509)
*)OPENSSL_sk_new_reserve(ossl_check_X509_compfunc_type(cmp), (n)))
#define sk_X509_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_sk_type(sk), (n))
#define sk_X509_free(sk) OPENSSL_sk_free(ossl_check_X509_sk_type(sk))
#define sk_X509_zero(sk) OPENSSL_sk_zero(ossl_check_X509_sk_type(sk))
#define
 sk_X509_delete(sk, i) ((X509 *)OPENSSL_sk_delete(ossl_check_X509_sk_type(sk), (i)))
#define sk_X509_delete_ptr(sk, ptr) ((X509 *)OPENSSL_sk_delete_ptr(ossl_check_X509_sk_type(sk),
ossl_check_X509_type(ptr)))
#define sk_X509_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_sk_type(sk), ossl_check_X509_type(ptr))
#define sk_X509_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_sk_type(sk),
ossl_check_X509_type(ptr))
#define sk_X509_pop(sk) ((X509 *)OPENSSL_sk_pop(ossl_check_X509_sk_type(sk)))
#define sk_X509_shift(sk) ((X509 *)OPENSSL_sk_shift(ossl_check_X509_sk_type(sk)))
#define sk_X509_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_sk_type(sk),ossl_check_X509_freefunc_type(freefunc))
```

```
#define sk_X509_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_sk_type(sk),
ossl_check_X509_type(ptr), (idx))
#define sk_X509_set(sk, idx, ptr) ((X509 *)OPENSSL_sk_set(ossl_check_X509_sk_type(sk), (idx),
ossl_check_X509_type(ptr)))
#define sk_X509_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_sk_type(sk),
 ossl_check_X509_type(ptr))
#define sk_X509_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_sk_type(sk),
ossl_check_X509_type(ptr))
#define sk_X509_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_X509_sk_type(sk),
ossl_check_X509_type(ptr), pnum)
#define sk_X509_sort(sk) OPENSSL_sk_sort(ossl_check_X509_sk_type(sk))
#define sk_X509_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_X509_sk_type(sk))
#define sk_X509_dup(sk) ((STACK_OF(X509) *)OPENSSL_sk_dup(ossl_check_const_X509_sk_type(sk)))
#define sk_X509_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_sk_type(sk), ossl_check_X509_copyfunc_type(copyfunc),
ossl_check_X509_freefunc_type(freefunc)))
#define sk_X509_set_cmp_func(sk, cmp)
((sk_X509_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_sk_type(sk),
ossl_check_X509_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(X509_REVOKED, X509_REVOKED, X509_REVOKED)
#define sk_X509_REVOKED_num(sk)
 OPENSSL_sk_num(ossl_check_const_X509_REVOKED_sk_type(sk))
#define sk_X509_REVOKED_value(sk, idx) ((X509_REVOKED
*)OPENSSL_sk_value(ossl_check_const_X509_REVOKED_sk_type(sk), (idx)))
#define sk_X509_REVOKED_new(cmp) ((STACK_OF(X509_REVOKED)
*)OPENSSL_sk_new(ossl_check_X509_REVOKED_compfunc_type(cmp)))
#define sk_X509_REVOKED_new_null() ((STACK_OF(X509_REVOKED) *)OPENSSL_sk_new_null())
#define sk_X509_REVOKED_new_reserve(cmp, n) ((STACK_OF(X509_REVOKED)
*)OPENSSL_sk_new_reserve(ossl_check_X509_REVOKED_compfunc_type(cmp), (n)))
#define sk_X509_REVOKED_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_REVOKED_sk_type(sk),
(n))
#define sk_X509_REVOKED_free(sk) OPENSSL_sk_free(ossl_check_X509_REVOKED_sk_type(sk))
#define sk_X509_REVOKED_zero(sk) OPENSSL_sk_zero(ossl_check_X509_REVOKED_sk_type(sk))
#define sk_X509_REVOKED_delete(sk, i) ((X509_REVOKED
*)OPENSSL_sk_delete(ossl_check_X509_REVOKED_sk_type(sk), (i)))
#define sk_X509_REVOKED_delete_ptr(sk, ptr) ((X509_REVOKED
*)OPENSSL_sk_delete_ptr(ossl_check_X509_REVOKED_sk_type(sk),
 ossl_check_X509_REVOKED_type(ptr)))
#define sk_X509_REVOKED_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_REVOKED_sk_type(sk),
ossl_check_X509_REVOKED_type(ptr))
#define sk_X509_REVOKED_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_REVOKED_sk_type(sk),
ossl_check_X509_REVOKED_type(ptr))
#define sk_X509_REVOKED_pop(sk) ((X509_REVOKED
*)OPENSSL_sk_pop(ossl_check_X509_REVOKED_sk_type(sk)))
#define sk_X509_REVOKED_shift(sk) ((X509_REVOKED
*)OPENSSL_sk_shift(ossl_check_X509_REVOKED_sk_type(sk)))
#define sk_X509_REVOKED_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_REVOKED_sk_type(sk),ossl_check_X509_REVOKED_freefunc_type(
```

```
freefunc))
#define sk_X509_REVOKED_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_REVOKED_sk_type(sk),
ossl_check_X509_REVOKED_type(ptr), (idx))
#define sk_X509_REVOKED_set(sk, idx, ptr) ((X509_REVOKED
*)OPENSSL_sk_set(ossl_check_X509_REVOKED_sk_type(sk), (idx), ossl_check_X509_REVOKED_type(ptr)))
#define
 sk_X509_REVOKED_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_REVOKED_sk_type(sk),
ossl_check_X509_REVOKED_type(ptr))
#define sk_X509_REVOKED_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_REVOKED_sk_type(sk),
ossl_check_X509_REVOKED_type(ptr))
#define sk_X509_REVOKED_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_X509_REVOKED_sk_type(sk), ossl_check_X509_REVOKED_type(ptr),
pnum)
#define sk_X509_REVOKED_sort(sk) OPENSSL_sk_sort(ossl_check_X509_REVOKED_sk_type(sk))
#define sk_X509_REVOKED_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_X509_REVOKED_sk_type(sk))
#define sk_X509_REVOKED_dup(sk) ((STACK_OF(X509_REVOKED)
*)OPENSSL_sk_dup(ossl_check_const_X509_REVOKED_sk_type(sk)))
#define sk_X509_REVOKED_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_REVOKED)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_REVOKED_sk_type(sk),
ossl_check_X509_REVOKED_copyfunc_type(copyfunc),
ossl_check_X509_REVOKED_freefunc_type(freefunc)))
#define sk_X509_REVOKED_set_cmp_func(sk, cmp)
((sk_X509_REVOKED_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_REVOKED_sk_type(sk),
 ossl_check_X509_REVOKED_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(X509_CRL, X509_CRL, X509_CRL)
#define sk_X509_CRL_num(sk) OPENSSL_sk_num(ossl_check_const_X509_CRL_sk_type(sk))
#define sk_X509_CRL_value(sk, idx) ((X509_CRL
*)OPENSSL_sk_value(ossl_check_const_X509_CRL_sk_type(sk), (idx)))
#define sk_X509_CRL_new(cmp) ((STACK_OF(X509_CRL)
*)OPENSSL_sk_new(ossl_check_X509_CRL_compfunc_type(cmp)))
#define sk_X509_CRL_new_null() ((STACK_OF(X509_CRL) *)OPENSSL_sk_new_null())
#define sk_X509_CRL_new_reserve(cmp, n) ((STACK_OF(X509_CRL)
*)OPENSSL_sk_new_reserve(ossl_check_X509_CRL_compfunc_type(cmp), (n)))
#define sk_X509_CRL_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_CRL_sk_type(sk), (n))
#define sk_X509_CRL_free(sk) OPENSSL_sk_free(ossl_check_X509_CRL_sk_type(sk))
#define sk_X509_CRL_zero(sk) OPENSSL_sk_zero(ossl_check_X509_CRL_sk_type(sk))
#define sk_X509_CRL_delete(sk, i) ((X509_CRL *)OPENSSL_sk_delete(ossl_check_X509_CRL_sk_type(sk),
 (i)))
#define sk_X509_CRL_delete_ptr(sk, ptr) ((X509_CRL
*)OPENSSL_sk_delete_ptr(ossl_check_X509_CRL_sk_type(sk), ossl_check_X509_CRL_type(ptr)))
#define sk_X509_CRL_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_CRL_sk_type(sk),
ossl_check_X509_CRL_type(ptr))
#define sk_X509_CRL_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_CRL_sk_type(sk),
ossl_check_X509_CRL_type(ptr))
#define sk_X509_CRL_pop(sk) ((X509_CRL *)OPENSSL_sk_pop(ossl_check_X509_CRL_sk_type(sk)))
#define sk_X509_CRL_shift(sk) ((X509_CRL *)OPENSSL_sk_shift(ossl_check_X509_CRL_sk_type(sk)))
#define sk_X509_CRL_pop_free(sk, freefunc)
```

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OPENSSL_sk_pop_free(ossl_check_X509_CRL_sk_type(sk),ossl_check_X509_CRL_freefunc_type(freefunc))
#define sk_X509_CRL_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_CRL_sk_type(sk),
ossl_check_X509_CRL_type(ptr), (idx))
#define sk_X509_CRL_set(sk, idx, ptr) ((X509_CRL *)OPENSSL_sk_set(ossl_check_X509_CRL_sk_type(sk),
(idx), ossl_check_X509_CRL_type(ptr)))
#define
 sk_X509_CRL_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_CRL_sk_type(sk),
ossl_check_X509_CRL_type(ptr))
#define sk_X509_CRL_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_CRL_sk_type(sk),
ossl_check_X509_CRL_type(ptr))
#define sk_X509_CRL_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_X509_CRL_sk_type(sk),
ossl_check_X509_CRL_type(ptr), pnum)
#define sk_X509_CRL_sort(sk) OPENSSL_sk_sort(ossl_check_X509_CRL_sk_type(sk))
#define sk_X509_CRL_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_X509_CRL_sk_type(sk))
#define sk_X509_CRL_dup(sk) ((STACK_OF(X509_CRL)
*)OPENSSL_sk_dup(ossl_check_const_X509_CRL_sk_type(sk)))
#define sk_X509_CRL_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_CRL)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_CRL_sk_type(sk),
ossl_check_X509_CRL_copyfunc_type(copyfunc), ossl_check_X509_CRL_freefunc_type(freefunc)))
#define sk_X509_CRL_set_cmp_func(sk, cmp)
((sk_X509_CRL_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_CRL_sk_type(sk),
 ossl_check_X509_CRL_compfunc_type(cmp)))

/* clang-format on */

/* Flags for X509_get_signature_info() */
/* Signature info is valid */
#define X509_SIG_INFO_VALID 0x1
/* Signature is suitable for TLS use */
#define X509_SIG_INFO_TLS 0x2

#define X509_FILETYPE_PEM 1
#define X509_FILETYPE_ASN1 2
#define X509_FILETYPE_DEFAULT 3

/*-
* <https://datatracker.ietf.org/doc/html/rfc5280#section-4.2.1.3>:
* The KeyUsage BITSTRING is treated as a little-endian integer, hence bit `0`
* is 0x80, while bit `7` is 0x01 (the LSB of the integer value), bit `8` is
* then the MSB of the second octet, or 0x8000.
*/
#define X509v3_KU_DIGITAL_SIGNATURE 0x0080 /* (0) */
#define X509v3_KU_NON_REPUDIATION 0x0040 /* (1) */
#define X509v3_KU_KEY_ENCIPHERMENT 0x0020 /* (2) */
#define X509v3_KU_DATA_ENCIPHERMENT 0x0010 /* (3) */
#define X509v3_KU_KEY_AGREEMENT 0x0008 /* (4) */
#define X509v3_KU_KEY_CERT_SIGN 0x0004 /* (5) */
#define X509v3_KU_CRL_SIGN 0x0002 /* (6) */
```

```
#define X509v3_KU_ENCIPHER_ONLY
 0x0001 /* (7) */
#define X509v3_KU_DECIPHER_ONLY 0x8000 /* (8) */
#ifndef OPENSSL_NO_DEPRECATED_3_4
#define X509v3_KU_UNDEF 0xffff /* vestigial, not used */
#endif

struct X509_algor_st {
   ASN1_OBJECT *algorithm;
   ASN1_TYPE *parameter;
} /* X509_ALGOR */;

typedef STACK_OF(X509_ALGOR) X509_ALGORS;

typedef struct X509_val_st {
   ASN1_TIME *notBefore;
   ASN1_TIME *notAfter;
} X509_VAL;

typedef struct X509_sig_st X509_SIG;

typedef struct X509_name_entry_st X509_NAME_ENTRY;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_NAME_ENTRY, X509_NAME_ENTRY,
X509_NAME_ENTRY)
#define sk_X509_NAME_ENTRY_num(sk)
OPENSSL_sk_num(ossl_check_const_X509_NAME_ENTRY_sk_type(sk))
#define sk_X509_NAME_ENTRY_value(sk, idx) ((X509_NAME_ENTRY
*)OPENSSL_sk_value(ossl_check_const_X509_NAME_ENTRY_sk_type(sk), (idx)))
#define sk_X509_NAME_ENTRY_new(cmp) ((STACK_OF(X509_NAME_ENTRY)
*)OPENSSL_sk_new(ossl_check_X509_NAME_ENTRY_compfunc_type(cmp)))
#define sk_X509_NAME_ENTRY_new_null() ((STACK_OF(X509_NAME_ENTRY)
 *)OPENSSL_sk_new_null())
#define sk_X509_NAME_ENTRY_new_reserve(cmp, n) ((STACK_OF(X509_NAME_ENTRY)
*)OPENSSL_sk_new_reserve(ossl_check_X509_NAME_ENTRY_compfunc_type(cmp), (n)))
#define sk_X509_NAME_ENTRY_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_X509_NAME_ENTRY_sk_type(sk), (n))
#define sk_X509_NAME_ENTRY_free(sk) OPENSSL_sk_free(ossl_check_X509_NAME_ENTRY_sk_type(sk))
#define sk_X509_NAME_ENTRY_zero(sk) OPENSSL_sk_zero(ossl_check_X509_NAME_ENTRY_sk_type(sk))
#define sk_X509_NAME_ENTRY_delete(sk, i) ((X509_NAME_ENTRY
*)OPENSSL_sk_delete(ossl_check_X509_NAME_ENTRY_sk_type(sk), (i)))
#define sk_X509_NAME_ENTRY_delete_ptr(sk, ptr) ((X509_NAME_ENTRY
*)OPENSSL_sk_delete_ptr(ossl_check_X509_NAME_ENTRY_sk_type(sk),
ossl_check_X509_NAME_ENTRY_type(ptr)))
#define sk_X509_NAME_ENTRY_push(sk, ptr)
OPENSSL_sk_push(ossl_check_X509_NAME_ENTRY_sk_type(sk),
ossl_check_X509_NAME_ENTRY_type(ptr))
```

```
#define sk_X509_NAME_ENTRY_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_X509_NAME_ENTRY_sk_type(sk),
 ossl_check_X509_NAME_ENTRY_type(ptr))
#define sk_X509_NAME_ENTRY_pop(sk) ((X509_NAME_ENTRY
*)OPENSSL_sk_pop(ossl_check_X509_NAME_ENTRY_sk_type(sk)))
#define sk_X509_NAME_ENTRY_shift(sk) ((X509_NAME_ENTRY
*)OPENSSL_sk_shift(ossl_check_X509_NAME_ENTRY_sk_type(sk)))
#define sk_X509_NAME_ENTRY_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_NAME_ENTRY_sk_type(sk),ossl_check_X509_NAME_ENTRY_freef
unc_type(freefunc))
#define sk_X509_NAME_ENTRY_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_X509_NAME_ENTRY_sk_type(sk),
ossl_check_X509_NAME_ENTRY_type(ptr), (idx))
#define sk_X509_NAME_ENTRY_set(sk, idx, ptr) ((X509_NAME_ENTRY
*)OPENSSL_sk_set(ossl_check_X509_NAME_ENTRY_sk_type(sk), (idx),
ossl_check_X509_NAME_ENTRY_type(ptr)))
#define sk_X509_NAME_ENTRY_find(sk, ptr)
OPENSSL_sk_find(ossl_check_X509_NAME_ENTRY_sk_type(sk),
ossl_check_X509_NAME_ENTRY_type(ptr))
#define sk_X509_NAME_ENTRY_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_X509_NAME_ENTRY_sk_type(sk),
 ossl_check_X509_NAME_ENTRY_type(ptr))
#define sk_X509_NAME_ENTRY_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_X509_NAME_ENTRY_sk_type(sk),
ossl_check_X509_NAME_ENTRY_type(ptr), pnum)
#define sk_X509_NAME_ENTRY_sort(sk) OPENSSL_sk_sort(ossl_check_X509_NAME_ENTRY_sk_type(sk))
#define sk_X509_NAME_ENTRY_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_X509_NAME_ENTRY_sk_type(sk))
#define sk_X509_NAME_ENTRY_dup(sk) ((STACK_OF(X509_NAME_ENTRY)
*)OPENSSL_sk_dup(ossl_check_const_X509_NAME_ENTRY_sk_type(sk)))
#define sk_X509_NAME_ENTRY_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_NAME_ENTRY)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_NAME_ENTRY_sk_type(sk),
ossl_check_X509_NAME_ENTRY_copyfunc_type(copyfunc),
ossl_check_X509_NAME_ENTRY_freefunc_type(freefunc)))
#define sk_X509_NAME_ENTRY_set_cmp_func(sk, cmp)
((sk_X509_NAME_ENTRY_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_NAME_ENTRY_sk_type
(sk), ossl_check_X509_NAME_ENTRY_compfunc_type(cmp)))

/* clang-format on */

#define
 X509_EX_V_NETSCAPE_HACK 0x8000
#define X509_EX_V_INIT 0x0001
typedef struct X509_extension_st X509_EXTENSION;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_EXTENSION, X509_EXTENSION, X509_EXTENSION)
#define sk_X509_EXTENSION_num(sk) OPENSSL_sk_num(ossl_check_const_X509_EXTENSION_sk_type(sk))
#define sk_X509_EXTENSION_value(sk, idx) ((X509_EXTENSION
```

```
*)OPENSSL_sk_value(ossl_check_const_X509_EXTENSION_sk_type(sk), (idx)))
#define sk_X509_EXTENSION_new(cmp) ((STACK_OF(X509_EXTENSION)
*)OPENSSL_sk_new(ossl_check_X509_EXTENSION_compfunc_type(cmp)))
#define sk_X509_EXTENSION_new_null() ((STACK_OF(X509_EXTENSION) *)OPENSSL_sk_new_null())
#define sk_X509_EXTENSION_new_reserve(cmp, n) ((STACK_OF(X509_EXTENSION)
*)OPENSSL_sk_new_reserve(ossl_check_X509_EXTENSION_compfunc_type(cmp), (n)))
#define sk_X509_EXTENSION_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_X509_EXTENSION_sk_type(sk), (n))
#define sk_X509_EXTENSION_free(sk) OPENSSL_sk_free(ossl_check_X509_EXTENSION_sk_type(sk))
#define
 sk_X509_EXTENSION_zero(sk) OPENSSL_sk_zero(ossl_check_X509_EXTENSION_sk_type(sk))
#define sk_X509_EXTENSION_delete(sk, i) ((X509_EXTENSION
*)OPENSSL_sk_delete(ossl_check_X509_EXTENSION_sk_type(sk), (i)))
#define sk_X509_EXTENSION_delete_ptr(sk, ptr) ((X509_EXTENSION
*)OPENSSL_sk_delete_ptr(ossl_check_X509_EXTENSION_sk_type(sk),
ossl_check_X509_EXTENSION_type(ptr)))
#define sk_X509_EXTENSION_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_EXTENSION_sk_type(sk),
ossl_check_X509_EXTENSION_type(ptr))
#define sk_X509_EXTENSION_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_X509_EXTENSION_sk_type(sk), ossl_check_X509_EXTENSION_type(ptr))
#define sk_X509_EXTENSION_pop(sk) ((X509_EXTENSION
*)OPENSSL_sk_pop(ossl_check_X509_EXTENSION_sk_type(sk)))
#define sk_X509_EXTENSION_shift(sk) ((X509_EXTENSION
*)OPENSSL_sk_shift(ossl_check_X509_EXTENSION_sk_type(sk)))
#define sk_X509_EXTENSION_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_EXTENSION_sk_type(sk),ossl_check_X509_EXTENSION_freefunc_t
ype(freefunc))
#define
 sk_X509_EXTENSION_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_EXTENSION_sk_type(sk),
ossl_check_X509_EXTENSION_type(ptr), (idx))
#define sk_X509_EXTENSION_set(sk, idx, ptr) ((X509_EXTENSION
*)OPENSSL_sk_set(ossl_check_X509_EXTENSION_sk_type(sk), (idx),
ossl_check_X509_EXTENSION_type(ptr)))
#define sk_X509_EXTENSION_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_EXTENSION_sk_type(sk),
ossl_check_X509_EXTENSION_type(ptr))
#define sk_X509_EXTENSION_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_X509_EXTENSION_sk_type(sk), ossl_check_X509_EXTENSION_type(ptr))
#define sk_X509_EXTENSION_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_X509_EXTENSION_sk_type(sk), ossl_check_X509_EXTENSION_type(ptr),
pnum)
#define sk_X509_EXTENSION_sort(sk) OPENSSL_sk_sort(ossl_check_X509_EXTENSION_sk_type(sk))
#define sk_X509_EXTENSION_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_X509_EXTENSION_sk_type(sk))
#define sk_X509_EXTENSION_dup(sk) ((STACK_OF(X509_EXTENSION)
 *)OPENSSL_sk_dup(ossl_check_const_X509_EXTENSION_sk_type(sk)))
#define sk_X509_EXTENSION_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_EXTENSION)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_EXTENSION_sk_type(sk),
ossl_check_X509_EXTENSION_copyfunc_type(copyfunc),
```

```
ossl_check_X509_EXTENSION_freefunc_type(freefunc)))
#define sk_X509_EXTENSION_set_cmp_func(sk, cmp)
((sk_X509_EXTENSION_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_EXTENSION_sk_type(sk),
ossl_check_X509_EXTENSION_compfunc_type(cmp)))

/* clang-format on */
typedef STACK_OF(X509_EXTENSION) X509_EXTENSIONS;
typedef struct x509_attributes_st X509_ATTRIBUTE;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_ATTRIBUTE, X509_ATTRIBUTE, X509_ATTRIBUTE)
#define sk_X509_ATTRIBUTE_num(sk) OPENSSL_sk_num(ossl_check_const_X509_ATTRIBUTE_sk_type(sk))
#define sk_X509_ATTRIBUTE_value(sk, idx) ((X509_ATTRIBUTE
*)OPENSSL_sk_value(ossl_check_const_X509_ATTRIBUTE_sk_type(sk), (idx)))
#define sk_X509_ATTRIBUTE_new(cmp)
 ((STACK_OF(X509_ATTRIBUTE)
*)OPENSSL_sk_new(ossl_check_X509_ATTRIBUTE_compfunc_type(cmp)))
#define sk_X509_ATTRIBUTE_new_null() ((STACK_OF(X509_ATTRIBUTE) *)OPENSSL_sk_new_null())
#define sk_X509_ATTRIBUTE_new_reserve(cmp, n) ((STACK_OF(X509_ATTRIBUTE)
*)OPENSSL_sk_new_reserve(ossl_check_X509_ATTRIBUTE_compfunc_type(cmp), (n)))
#define sk_X509_ATTRIBUTE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_X509_ATTRIBUTE_sk_type(sk), (n))
#define sk_X509_ATTRIBUTE_free(sk) OPENSSL_sk_free(ossl_check_X509_ATTRIBUTE_sk_type(sk))
#define sk_X509_ATTRIBUTE_zero(sk) OPENSSL_sk_zero(ossl_check_X509_ATTRIBUTE_sk_type(sk))
#define sk_X509_ATTRIBUTE_delete(sk, i) ((X509_ATTRIBUTE
*)OPENSSL_sk_delete(ossl_check_X509_ATTRIBUTE_sk_type(sk), (i)))
#define sk_X509_ATTRIBUTE_delete_ptr(sk, ptr) ((X509_ATTRIBUTE
*)OPENSSL_sk_delete_ptr(ossl_check_X509_ATTRIBUTE_sk_type(sk),
ossl_check_X509_ATTRIBUTE_type(ptr)))
#define sk_X509_ATTRIBUTE_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_ATTRIBUTE_sk_type(sk),
ossl_check_X509_ATTRIBUTE_type(ptr))
#define
 sk_X509_ATTRIBUTE_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_ATTRIBUTE_sk_type(sk),
ossl_check_X509_ATTRIBUTE_type(ptr))
#define sk_X509_ATTRIBUTE_pop(sk) ((X509_ATTRIBUTE
*)OPENSSL_sk_pop(ossl_check_X509_ATTRIBUTE_sk_type(sk)))
#define sk_X509_ATTRIBUTE_shift(sk) ((X509_ATTRIBUTE
*)OPENSSL_sk_shift(ossl_check_X509_ATTRIBUTE_sk_type(sk)))
#define sk_X509_ATTRIBUTE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_ATTRIBUTE_sk_type(sk),ossl_check_X509_ATTRIBUTE_freefunc_t
ype(freefunc))
#define sk_X509_ATTRIBUTE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_X509_ATTRIBUTE_sk_type(sk), ossl_check_X509_ATTRIBUTE_type(ptr),
(idx))
#define sk_X509_ATTRIBUTE_set(sk, idx, ptr) ((X509_ATTRIBUTE
*)OPENSSL_sk_set(ossl_check_X509_ATTRIBUTE_sk_type(sk), (idx),
ossl_check_X509_ATTRIBUTE_type(ptr)))
#define sk_X509_ATTRIBUTE_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_ATTRIBUTE_sk_type(sk),
ossl_check_X509_ATTRIBUTE_type(ptr))
```

```
#define
 sk_X509_ATTRIBUTE_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_ATTRIBUTE_sk_type(sk),
ossl_check_X509_ATTRIBUTE_type(ptr))
#define sk_X509_ATTRIBUTE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_X509_ATTRIBUTE_sk_type(sk), ossl_check_X509_ATTRIBUTE_type(ptr),
pnum)
#define sk_X509_ATTRIBUTE_sort(sk) OPENSSL_sk_sort(ossl_check_X509_ATTRIBUTE_sk_type(sk))
#define sk_X509_ATTRIBUTE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_X509_ATTRIBUTE_sk_type(sk))
#define sk_X509_ATTRIBUTE_dup(sk) ((STACK_OF(X509_ATTRIBUTE)
*)OPENSSL_sk_dup(ossl_check_const_X509_ATTRIBUTE_sk_type(sk)))
#define sk_X509_ATTRIBUTE_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_ATTRIBUTE)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_ATTRIBUTE_sk_type(sk),
ossl_check_X509_ATTRIBUTE_copyfunc_type(copyfunc),
ossl_check_X509_ATTRIBUTE_freefunc_type(freefunc)))
#define sk_X509_ATTRIBUTE_set_cmp_func(sk, cmp)
((sk_X509_ATTRIBUTE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_ATTRIBUTE_sk_type(sk),
 ossl_check_X509_ATTRIBUTE_compfunc_type(cmp)))

/* clang-format on */
typedef struct X509_req_info_st X509_REQ_INFO;
typedef struct X509_req_st X509_REQ;
typedef struct x509_cert_aux_st X509_CERT_AUX;
typedef struct x509_cinf_st X509_CINF;

/* Flags for X509_print_ex() */

#define X509_FLAG_COMPAT 0
#define X509_FLAG_NO_HEADER 1L
#define X509_FLAG_NO_VERSION (1L << 1)
#define X509_FLAG_NO_SERIAL (1L << 2)
#define X509_FLAG_NO_SIGNAME (1L << 3)
#define X509_FLAG_NO_ISSUER (1L << 4)
#define X509_FLAG_NO_VALIDITY (1L << 5)
#define X509_FLAG_NO_SUBJECT (1L << 6)
#define X509_FLAG_NO_PUBKEY (1L << 7)
#define X509_FLAG_NO_EXTENSIONS (1L << 8)
#define X509_FLAG_NO_SIGDUMP (1L << 9)
#define X509_FLAG_NO_AUX (1L << 10)
#define X509_FLAG_NO_ATTRIBUTES (1L << 11)
#define X509_FLAG_NO_IDS (1L << 12)
#define X509_FLAG_EXTENSIONS_ONLY_KID (1L << 13)

/* Flags specific to X509_NAME_print_ex() */

/* The field separator information */

#define XN_FLAG_SEP_MASK (0xf << 16)
```

```
#define XN_FLAG_COMPAT 0 /*
 Traditional; use old X509_NAME_print */
#define XN_FLAG_SEP_COMMA_PLUS (1 << 16) /* RFC2253 ,+ */
#define XN_FLAG_SEP_CPLUS_SPC (2 << 16) /* ,+ spaced: more readable */
#define XN_FLAG_SEP_SPLUS_SPC (3 << 16) /* ;+ spaced */
#define XN_FLAG_SEP_MULTILINE (4 << 16) /* One line per field */

#define XN_FLAG_DN_REV (1 << 20) /* Reverse DN order */

/* How the field name is shown */

#define XN_FLAG_FN_MASK (0x3 << 21)

#define XN_FLAG_FN_SN 0 /* Object short name */
#define XN_FLAG_FN_LN (1 << 21) /* Object long name */
#define XN_FLAG_FN_OID (2 << 21) /* Always use OIDs */
#define XN_FLAG_FN_NONE (3 << 21) /* No field names */

#define XN_FLAG_SPC_EQ (1 << 23) /* Put spaces round '=' */

/*
* This determines if we dump fields we don't recognise: RFC2253 requires
* this.
*/

#define XN_FLAG_DUMP_UNKNOWN_FIELDS (1 << 24)

#define XN_FLAG_FN_ALIGN (1 << 25) /* Align field names to 20 \
                                    * characters */

/* Complete set of RFC2253 flags */

#define XN_FLAG_RFC2253
 (ASN1_STRFLGS_RFC2253 | XN_FLAG_SEP_COMMA_PLUS | XN_FLAG_DN_REV | XN_FLAG_FN_SN |
XN_FLAG_DUMP_UNKNOWN_FIELDS)

/* readable oneline form */

#define XN_FLAG_ONELINE (ASN1_STRFLGS_RFC2253 | ASN1_STRFLGS_ESC_QUOTE |
XN_FLAG_SEP_CPLUS_SPC | XN_FLAG_SPC_EQ | XN_FLAG_FN_SN)

/* readable multiline form */

#define XN_FLAG_MULTILINE (ASN1_STRFLGS_ESC_CTRL | ASN1_STRFLGS_ESC_MSB |
XN_FLAG_SEP_MULTILINE | XN_FLAG_SPC_EQ | XN_FLAG_FN_LN | XN_FLAG_FN_ALIGN)

typedef struct X509_crl_info_st X509_CRL_INFO;
```

```
typedef struct private_key_st {
  int version;
  /* The PKCS#8 data types */
  X509_ALGOR *enc_algor;
  ASN1_OCTET_STRING *enc_pkey; /* encrypted pub key */
  /* When decrypted, the following will not be NULL */
  EVP_PKEY *dec_pkey;
  /* used to encrypt and decrypt */
  int key_length;
  char *key_data;
  int key_free; /* true if we should auto free key_data */
  /* expanded version of 'enc_algor' */
  EVP_CIPHER_INFO cipher;
} X509_PKEY;

typedef struct X509_info_st
 {
  X509 *x509;
  X509_CRL *crl;
  X509_PKEY *x_pkey;
  EVP_CIPHER_INFO enc_cipher;
  int enc_len;
  char *enc_data;
} X509_INFO;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_INFO, X509_INFO, X509_INFO)
#define sk_X509_INFO_num(sk) OPENSSL_sk_num(ossl_check_const_X509_INFO_sk_type(sk))
#define sk_X509_INFO_value(sk, idx) ((X509_INFO
*)OPENSSL_sk_value(ossl_check_const_X509_INFO_sk_type(sk), (idx)))
#define sk_X509_INFO_new(cmp) ((STACK_OF(X509_INFO)
*)OPENSSL_sk_new(ossl_check_X509_INFO_compfunc_type(cmp)))
#define sk_X509_INFO_new_null() ((STACK_OF(X509_INFO) *)OPENSSL_sk_new_null())
#define sk_X509_INFO_new_reserve(cmp, n) ((STACK_OF(X509_INFO)
*)OPENSSL_sk_new_reserve(ossl_check_X509_INFO_compfunc_type(cmp), (n)))
#define sk_X509_INFO_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_INFO_sk_type(sk), (n))
#define sk_X509_INFO_free(sk) OPENSSL_sk_free(ossl_check_X509_INFO_sk_type(sk))
#define sk_X509_INFO_zero(sk) OPENSSL_sk_zero(ossl_check_X509_INFO_sk_type(sk))
#define
 sk_X509_INFO_delete(sk, i) ((X509_INFO *)OPENSSL_sk_delete(ossl_check_X509_INFO_sk_type(sk), (i)))
#define sk_X509_INFO_delete_ptr(sk, ptr) ((X509_INFO
*)OPENSSL_sk_delete_ptr(ossl_check_X509_INFO_sk_type(sk), ossl_check_X509_INFO_type(ptr)))
#define sk_X509_INFO_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_INFO_sk_type(sk),
ossl_check_X509_INFO_type(ptr))
#define sk_X509_INFO_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_INFO_sk_type(sk),
ossl_check_X509_INFO_type(ptr))
#define sk_X509_INFO_pop(sk) ((X509_INFO *)OPENSSL_sk_pop(ossl_check_X509_INFO_sk_type(sk)))
#define sk_X509_INFO_shift(sk) ((X509_INFO *)OPENSSL_sk_shift(ossl_check_X509_INFO_sk_type(sk)))
```

```
#define sk_X509_INFO_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_INFO_sk_type(sk),ossl_check_X509_INFO_freefunc_type(freefunc))
#define sk_X509_INFO_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_INFO_sk_type(sk),
ossl_check_X509_INFO_type(ptr), (idx))
#define sk_X509_INFO_set(sk,
 idx, ptr) ((X509_INFO *)OPENSSL_sk_set(ossl_check_X509_INFO_sk_type(sk), (idx),
ossl_check_X509_INFO_type(ptr)))
#define sk_X509_INFO_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_INFO_sk_type(sk),
ossl_check_X509_INFO_type(ptr))
#define sk_X509_INFO_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_INFO_sk_type(sk),
ossl_check_X509_INFO_type(ptr))
#define sk_X509_INFO_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_X509_INFO_sk_type(sk),
ossl_check_X509_INFO_type(ptr), pnum)
#define sk_X509_INFO_sort(sk) OPENSSL_sk_sort(ossl_check_X509_INFO_sk_type(sk))
#define sk_X509_INFO_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_X509_INFO_sk_type(sk))
#define sk_X509_INFO_dup(sk) ((STACK_OF(X509_INFO)
*)OPENSSL_sk_dup(ossl_check_const_X509_INFO_sk_type(sk)))
#define sk_X509_INFO_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_INFO)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_INFO_sk_type(sk),
ossl_check_X509_INFO_copyfunc_type(copyfunc), ossl_check_X509_INFO_freefunc_type(freefunc)))
#define
 sk_X509_INFO_set_cmp_func(sk, cmp)
((sk_X509_INFO_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_INFO_sk_type(sk),
ossl_check_X509_INFO_compfunc_type(cmp)))

/* clang-format on */

/*
* The next 2 structures and their 8 routines are used to manipulate Netscape's
* spki structures - useful if you are writing a CA web page
*/
typedef struct Netscape_spkac_st {
   X509_PUBKEY *pubkey;
   ASN1_IA5STRING *challenge; /* challenge sent in atlas >= PR2 */
} NETSCAPE_SPKAC;

typedef struct Netscape_spki_st {
   NETSCAPE_SPKAC *spkac; /* signed public key and challenge */
   X509_ALGOR sig_algor;
   ASN1_BIT_STRING *signature;
} NETSCAPE_SPKI;

/* Netscape certificate sequence structure */
typedef struct Netscape_certificate_sequence {
   ASN1_OBJECT *type;
   STACK_OF(X509) *certs;
} NETSCAPE_CERT_SEQUENCE;
```

```
/*- Unused (and iv length is wrong)
typedef struct CBCParameter_st
      {
      unsigned char iv[8];
      } CBC_PARAM;
*/

/* Password based encryption structure
 */

typedef struct PBEPARAM_st {
   ASN1_OCTET_STRING *salt;
   ASN1_INTEGER *iter;
} PBEPARAM;

/* Password based encryption V2 structures */

typedef struct PBE2PARAM_st {
   X509_ALGOR *keyfunc;
   X509_ALGOR *encryption;
} PBE2PARAM;

typedef struct PBKDF2PARAM_st {
   /* Usually OCTET STRING but could be anything */
   ASN1_TYPE *salt;
   ASN1_INTEGER *iter;
   ASN1_INTEGER *keylength;
   X509_ALGOR *prf;
} PBKDF2PARAM;

typedef struct {
   X509_ALGOR *keyDerivationFunc;
   X509_ALGOR *messageAuthScheme;
} PBMAC1PARAM;

#ifndef OPENSSL_NO_SCRYPT
typedef struct SCRYPT_PARAMS_st {
   ASN1_OCTET_STRING *salt;
   ASN1_INTEGER *costParameter;
   ASN1_INTEGER *blockSize;
   ASN1_INTEGER *parallelizationParameter;
   ASN1_INTEGER *keyLength;
} SCRYPT_PARAMS;
#endif

#ifdef __cplusplus
}
#endif
```

```
#include <openssl/x509_vfy.h>
#include <openssl/pkcs7.h>

#ifdef __cplusplus
extern "C" {
#endif

#define X509_EXT_PACK_UNKNOWN 1
#define X509_EXT_PACK_STRING 2

#define X509_extract_key(x)
 X509_get_pubkey(x) /*****/
#define X509_REQ_extract_key(a) X509_REQ_get_pubkey(a)
#define X509_name_cmp(a, b) X509_NAME_cmp((a), (b))

void X509_CRL_set_default_method(const X509_CRL_METHOD *meth);
X509_CRL_METHOD *X509_CRL_METHOD_new(int (*crl_init)(X509_CRL *crl),
   int (*crl_free)(X509_CRL *crl),
   int (*crl_lookup)(X509_CRL *crl,
       X509_REVOKED **ret,
       const ASN1_INTEGER *serial,
       const X509_NAME *issuer),
   int (*crl_verify)(X509_CRL *crl,
       EVP_PKEY *pk));
void X509_CRL_METHOD_free(X509_CRL_METHOD *m);

void X509_CRL_set_meth_data(X509_CRL *crl, void *dat);
void *X509_CRL_get_meth_data(X509_CRL *crl);

const char *X509_verify_cert_error_string(long n);

int X509_verify(X509 *a, EVP_PKEY *r);
int X509_self_signed(X509 *cert, int verify_signature);

int X509_REQ_verify_ex(X509_REQ *a, EVP_PKEY *r, OSSL_LIB_CTX *libctx,
   const char *propq);
int X509_REQ_verify(X509_REQ *a, EVP_PKEY *r);
int X509_CRL_verify(X509_CRL *a, EVP_PKEY *r);
int
 NETSCAPE_SPKI_verify(NETSCAPE_SPKI *a, EVP_PKEY *r);

NETSCAPE_SPKI *NETSCAPE_SPKI_b64_decode(const char *str, int len);
char *NETSCAPE_SPKI_b64_encode(NETSCAPE_SPKI *x);
EVP_PKEY *NETSCAPE_SPKI_get_pubkey(NETSCAPE_SPKI *x);
int NETSCAPE_SPKI_set_pubkey(NETSCAPE_SPKI *x, EVP_PKEY *pkey);

int NETSCAPE_SPKI_print(BIO *out, NETSCAPE_SPKI *spki);
```

```
int X509_signature_dump(BIO *bp, const ASN1_STRING *sig, int indent);
int X509_signature_print(BIO *bp, const X509_ALGOR *alg,
   const ASN1_STRING *sig);

int X509_sign(X509 *x, EVP_PKEY *pkey, const EVP_MD *md);
int X509_sign_ctx(X509 *x, EVP_MD_CTX *ctx);
int X509_REQ_sign(X509_REQ *x, EVP_PKEY *pkey, const EVP_MD *md);
int X509_REQ_sign_ctx(X509_REQ *x, EVP_MD_CTX *ctx);
int X509_CRL_sign(X509_CRL *x, EVP_PKEY *pkey, const EVP_MD *md);
int X509_CRL_sign_ctx(X509_CRL *x, EVP_MD_CTX *ctx);
int NETSCAPE_SPKI_sign(NETSCAPE_SPKI *x, EVP_PKEY *pkey, const EVP_MD *md);

int X509_pubkey_digest(const X509 *data, const EVP_MD *type,
   unsigned
 char *md, unsigned int *len);
int X509_digest(const X509 *data, const EVP_MD *type,
   unsigned char *md, unsigned int *len);
ASN1_OCTET_STRING *X509_digest_sig(const X509 *cert,
   EVP_MD **md_used, int *md_is_fallback);
int X509_CRL_digest(const X509_CRL *data, const EVP_MD *type,
   unsigned char *md, unsigned int *len);
int X509_REQ_digest(const X509_REQ *data, const EVP_MD *type,
   unsigned char *md, unsigned int *len);
int X509_NAME_digest(const X509_NAME *data, const EVP_MD *type,
   unsigned char *md, unsigned int *len);

X509 *X509_load_http(const char *url, BIO *bio, BIO *rbio, int timeout);
X509_CRL *X509_CRL_load_http(const char *url, BIO *bio, BIO *rbio, int timeout);
#ifndef OPENSSL_NO_DEPRECATED_3_0
#include <openssl/http.h> /* OSSL_HTTP_REQ_CTX_nbio_d2i */
#define X509_http_nbio(rctx, pcert) \
   OSSL_HTTP_REQ_CTX_nbio_d2i(rctx, pcert, ASN1_ITEM_rptr(X509))
#define X509_CRL_http_nbio(rctx, pcrl) \
   OSSL_HTTP_REQ_CTX_nbio_d2i(rctx, pcrl, ASN1_ITEM_rptr(X509_CRL))
#endif

#ifndef
 OPENSSL_NO_STDIO
X509 *d2i_X509_fp(FILE *fp, X509 **x509);
int i2d_X509_fp(FILE *fp, const X509 *x509);
X509_CRL *d2i_X509_CRL_fp(FILE *fp, X509_CRL **crl);
int i2d_X509_CRL_fp(FILE *fp, const X509_CRL *crl);
X509_REQ *d2i_X509_REQ_fp(FILE *fp, X509_REQ **req);
int i2d_X509_REQ_fp(FILE *fp, const X509_REQ *req);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 RSA *d2i_RSAPrivateKey_fp(FILE *fp, RSA **rsa);
OSSL_DEPRECATEDIN_3_0 int i2d_RSAPrivateKey_fp(FILE *fp, const RSA *rsa);
```

```
OSSL_DEPRECATEDIN_3_0 RSA *d2i_RSAPublicKey_fp(FILE *fp, RSA **rsa);
OSSL_DEPRECATEDIN_3_0 int i2d_RSAPublicKey_fp(FILE *fp, const RSA *rsa);
OSSL_DEPRECATEDIN_3_0 RSA *d2i_RSA_PUBKEY_fp(FILE *fp, RSA **rsa);
OSSL_DEPRECATEDIN_3_0 int i2d_RSA_PUBKEY_fp(FILE *fp, const RSA *rsa);
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
#ifndef OPENSSL_NO_DSA
OSSL_DEPRECATEDIN_3_0 DSA *d2i_DSA_PUBKEY_fp(FILE *fp, DSA **dsa);
OSSL_DEPRECATEDIN_3_0 int i2d_DSA_PUBKEY_fp(FILE *fp, const DSA *dsa);
OSSL_DEPRECATEDIN_3_0
 DSA *d2i_DSAPrivateKey_fp(FILE *fp, DSA **dsa);
OSSL_DEPRECATEDIN_3_0 int i2d_DSAPrivateKey_fp(FILE *fp, const DSA *dsa);
#endif
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
#ifndef OPENSSL_NO_EC
OSSL_DEPRECATEDIN_3_0 EC_KEY *d2i_EC_PUBKEY_fp(FILE *fp, EC_KEY **eckey);
OSSL_DEPRECATEDIN_3_0 int i2d_EC_PUBKEY_fp(FILE *fp, const EC_KEY *eckey);
OSSL_DEPRECATEDIN_3_0 EC_KEY *d2i_ECPrivateKey_fp(FILE *fp, EC_KEY **eckey);
OSSL_DEPRECATEDIN_3_0 int i2d_ECPrivateKey_fp(FILE *fp, const EC_KEY *eckey);
#endif /* OPENSSL_NO_EC */
#endif /* OPENSSL_NO_DEPRECATED_3_0 */
X509_SIG *d2i_PKCS8_fp(FILE *fp, X509_SIG **p8);
int i2d_PKCS8_fp(FILE *fp, const X509_SIG *p8);
X509_PUBKEY *d2i_X509_PUBKEY_fp(FILE *fp, X509_PUBKEY **xpk);
int i2d_X509_PUBKEY_fp(FILE *fp, const X509_PUBKEY *xpk);
PKCS8_PRIV_KEY_INFO *d2i_PKCS8_PRIV_KEY_INFO_fp(FILE *fp,
   PKCS8_PRIV_KEY_INFO **p8inf);
int i2d_PKCS8_PRIV_KEY_INFO_fp(FILE *fp, const PKCS8_PRIV_KEY_INFO *p8inf);
int i2d_PKCS8PrivateKeyInfo_fp(FILE
 *fp, const EVP_PKEY *key);
int i2d_PrivateKey_fp(FILE *fp, const EVP_PKEY *pkey);
EVP_PKEY *d2i_PrivateKey_ex_fp(FILE *fp, EVP_PKEY **a, OSSL_LIB_CTX *libctx,
   const char *propq);
EVP_PKEY *d2i_PrivateKey_fp(FILE *fp, EVP_PKEY **a);
int i2d_PUBKEY_fp(FILE *fp, const EVP_PKEY *pkey);
EVP_PKEY *d2i_PUBKEY_ex_fp(FILE *fp, EVP_PKEY **a, OSSL_LIB_CTX *libctx,
   const char *propq);
EVP_PKEY *d2i_PUBKEY_fp(FILE *fp, EVP_PKEY **a);
#endif

X509 *d2i_X509_bio(BIO *bp, X509 **x509);
int i2d_X509_bio(BIO *bp, const X509 *x509);
X509_CRL *d2i_X509_CRL_bio(BIO *bp, X509_CRL **crl);
int i2d_X509_CRL_bio(BIO *bp, const X509_CRL *crl);
X509_REQ *d2i_X509_REQ_bio(BIO *bp, X509_REQ **req);
int i2d_X509_REQ_bio(BIO *bp, const X509_REQ *req);
#ifndef OPENSSL_NO_DEPRECATED_3_0
```

```
OSSL_DEPRECATEDIN_3_0 RSA *d2i_RSAPrivateKey_bio(BIO *bp, RSA **rsa);
OSSL_DEPRECATEDIN_3_0 int i2d_RSAPrivateKey_bio(BIO *bp, const RSA *rsa);
OSSL_DEPRECATEDIN_3_0 RSA *d2i_RSAPublicKey_bio(BIO *bp, RSA **rsa);
OSSL_DEPRECATEDIN_3_0
 int i2d_RSAPublicKey_bio(BIO *bp, const RSA *rsa);
OSSL_DEPRECATEDIN_3_0 RSA *d2i_RSA_PUBKEY_bio(BIO *bp, RSA **rsa);
OSSL_DEPRECATEDIN_3_0 int i2d_RSA_PUBKEY_bio(BIO *bp, const RSA *rsa);
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
#ifndef OPENSSL_NO_DSA
OSSL_DEPRECATEDIN_3_0 DSA *d2i_DSA_PUBKEY_bio(BIO *bp, DSA **dsa);
OSSL_DEPRECATEDIN_3_0 int i2d_DSA_PUBKEY_bio(BIO *bp, const DSA *dsa);
OSSL_DEPRECATEDIN_3_0 DSA *d2i_DSAPrivateKey_bio(BIO *bp, DSA **dsa);
OSSL_DEPRECATEDIN_3_0 int i2d_DSAPrivateKey_bio(BIO *bp, const DSA *dsa);
#endif
#endif

#ifndef OPENSSL_NO_DEPRECATED_3_0
#ifndef OPENSSL_NO_EC
OSSL_DEPRECATEDIN_3_0 EC_KEY *d2i_EC_PUBKEY_bio(BIO *bp, EC_KEY **eckey);
OSSL_DEPRECATEDIN_3_0 int i2d_EC_PUBKEY_bio(BIO *bp, const EC_KEY *eckey);
OSSL_DEPRECATEDIN_3_0 EC_KEY *d2i_ECPrivateKey_bio(BIO *bp, EC_KEY **eckey);
OSSL_DEPRECATEDIN_3_0 int i2d_ECPrivateKey_bio(BIO *bp, const EC_KEY *eckey);
#endif /* OPENSSL_NO_EC */
#endif /* OPENSSL_NO_DEPRECATED_3_0 */

X509_SIG *d2i_PKCS8_bio(BIO
 *bp, X509_SIG **p8);
int i2d_PKCS8_bio(BIO *bp, const X509_SIG *p8);
X509_PUBKEY *d2i_X509_PUBKEY_bio(BIO *bp, X509_PUBKEY **xpk);
int i2d_X509_PUBKEY_bio(BIO *bp, const X509_PUBKEY *xpk);
PKCS8_PRIV_KEY_INFO *d2i_PKCS8_PRIV_KEY_INFO_bio(BIO *bp,
   PKCS8_PRIV_KEY_INFO **p8inf);
int i2d_PKCS8_PRIV_KEY_INFO_bio(BIO *bp, const PKCS8_PRIV_KEY_INFO *p8inf);
int i2d_PKCS8PrivateKeyInfo_bio(BIO *bp, const EVP_PKEY *key);
int i2d_PrivateKey_bio(BIO *bp, const EVP_PKEY *pkey);
EVP_PKEY *d2i_PrivateKey_ex_bio(BIO *bp, EVP_PKEY **a, OSSL_LIB_CTX *libctx,
   const char *propq);
EVP_PKEY *d2i_PrivateKey_bio(BIO *bp, EVP_PKEY **a);
int i2d_PUBKEY_bio(BIO *bp, const EVP_PKEY *pkey);
EVP_PKEY *d2i_PUBKEY_ex_bio(BIO *bp, EVP_PKEY **a, OSSL_LIB_CTX *libctx,
   const char *propq);
EVP_PKEY *d2i_PUBKEY_bio(BIO *bp, EVP_PKEY **a);

DECLARE_ASN1_DUP_FUNCTION(X509)
DECLARE_ASN1_DUP_FUNCTION(X509_ALGOR)
DECLARE_ASN1_DUP_FUNCTION(X509_ATTRIBUTE)
DECLARE_ASN1_DUP_FUNCTION(X509_CRL)
```

```
DECLARE_ASN1_DUP_FUNCTION(X509_EXTENSION)
DECLARE_ASN1_DUP_FUNCTION(X509_PUBKEY)
DECLARE_ASN1_DUP_FUNCTION(X509_REQ)
DECLARE_ASN1_DUP_FUNCTION(X509_REVOKED)
int
 X509_ALGOR_set0(X509_ALGOR *alg, ASN1_OBJECT *aobj, int ptype,
   void *pval);
void X509_ALGOR_get0(const ASN1_OBJECT **paobj, int *pptype,
   const void **ppval, const X509_ALGOR *algor);
void X509_ALGOR_set_md(X509_ALGOR *alg, const EVP_MD *md);
int X509_ALGOR_cmp(const X509_ALGOR *a, const X509_ALGOR *b);
int X509_ALGOR_copy(X509_ALGOR *dest, const X509_ALGOR *src);

DECLARE_ASN1_DUP_FUNCTION(X509_NAME)
DECLARE_ASN1_DUP_FUNCTION(X509_NAME_ENTRY)

int X509_cmp_time(const ASN1_TIME *s, time_t *t);
int X509_cmp_current_time(const ASN1_TIME *s);
int X509_cmp_timeframe(const X509_VERIFY_PARAM *vpm,
   const ASN1_TIME *start, const ASN1_TIME *end);
ASN1_TIME *X509_time_adj(ASN1_TIME *s, long adj, time_t *t);
ASN1_TIME *X509_time_adj_ex(ASN1_TIME *s,
   int offset_day, long offset_sec, time_t *t);
ASN1_TIME *X509_gmtime_adj(ASN1_TIME *s,
 long adj);

const char *X509_get_default_cert_area(void);
const char *X509_get_default_cert_dir(void);
const char *X509_get_default_cert_file(void);
const char *X509_get_default_cert_dir_env(void);
const char *X509_get_default_cert_file_env(void);
const char *X509_get_default_private_dir(void);

X509_REQ *X509_to_X509_REQ(X509 *x, EVP_PKEY *pkey, const EVP_MD *md);
X509 *X509_REQ_to_X509(X509_REQ *r, int days, EVP_PKEY *pkey);

DECLARE_ASN1_FUNCTIONS(X509_ALGOR)
DECLARE_ASN1_ENCODE_FUNCTIONS(X509_ALGORS, X509_ALGORS, X509_ALGORS)
DECLARE_ASN1_FUNCTIONS(X509_VAL)

DECLARE_ASN1_FUNCTIONS(X509_PUBKEY)

X509_PUBKEY *X509_PUBKEY_new_ex(OSSL_LIB_CTX *libctx, const char *propq);
int X509_PUBKEY_set(X509_PUBKEY **x, EVP_PKEY *pkey);
EVP_PKEY *X509_PUBKEY_get0(const X509_PUBKEY *key);
EVP_PKEY *X509_PUBKEY_get(const X509_PUBKEY *key);
int X509_get_pubkey_parameters(EVP_PKEY *pkey, STACK_OF(X509) *chain);
long X509_get_pathlen(X509 *x);
```

```
DECLARE_ASN1_ENCODE_FUNCTIONS_only(EVP_PKEY, PUBKEY)
EVP_PKEY
 *d2i_PUBKEY_ex(EVP_PKEY **a, const unsigned char **pp, long length,
   OSSL_LIB_CTX *libctx, const char *propq);
#ifndef OPENSSL_NO_DEPRECATED_3_0
DECLARE_ASN1_ENCODE_FUNCTIONS_only_attr(OSSL_DEPRECATEDIN_3_0, RSA, RSA_PUBKEY)
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
#ifndef OPENSSL_NO_DSA
DECLARE_ASN1_ENCODE_FUNCTIONS_only_attr(OSSL_DEPRECATEDIN_3_0, DSA, DSA_PUBKEY)
#endif
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
#ifndef OPENSSL_NO_EC
DECLARE_ASN1_ENCODE_FUNCTIONS_only_attr(OSSL_DEPRECATEDIN_3_0, EC_KEY, EC_PUBKEY)
#endif
#endif

DECLARE_ASN1_FUNCTIONS(X509_SIG)
void X509_SIG_get0(const X509_SIG *sig, const X509_ALGOR **palg,
   const ASN1_OCTET_STRING **pdigest);
void X509_SIG_getm(X509_SIG *sig, X509_ALGOR **palg,
   ASN1_OCTET_STRING **pdigest);

DECLARE_ASN1_FUNCTIONS(X509_REQ_INFO)
DECLARE_ASN1_FUNCTIONS(X509_REQ)
X509_REQ *X509_REQ_new_ex(OSSL_LIB_CTX *libctx, const char *propq);

DECLARE_ASN1_FUNCTIONS(X509_ATTRIBUTE)
X509_ATTRIBUTE *X509_ATTRIBUTE_create(int nid, int atrtype,
 void *value);

DECLARE_ASN1_FUNCTIONS(X509_EXTENSION)
DECLARE_ASN1_ENCODE_FUNCTIONS(X509_EXTENSIONS, X509_EXTENSIONS, X509_EXTENSIONS)

DECLARE_ASN1_FUNCTIONS(X509_NAME_ENTRY)

DECLARE_ASN1_FUNCTIONS(X509_NAME)

int X509_NAME_set(X509_NAME **xn, const X509_NAME *name);

DECLARE_ASN1_FUNCTIONS(X509_CINF)
DECLARE_ASN1_FUNCTIONS(X509)
X509 *X509_new_ex(OSSL_LIB_CTX *libctx, const char *propq);
DECLARE_ASN1_FUNCTIONS(X509_CERT_AUX)

#define X509_get_ex_new_index(l, p, newf, dupf, freef) \
   CRYPTO_get_ex_new_index(CRYPTO_EX_INDEX_X509, l, p, newf, dupf, freef)
```

```
int X509_set_ex_data(X509 *r, int idx, void *arg);
void *X509_get_ex_data(const X509 *r, int idx);
DECLARE_ASN1_ENCODE_FUNCTIONS_only(X509, X509_AUX)

int i2d_re_X509_tbs(X509 *x, unsigned char **pp);

int X509_SIG_INFO_get(const X509_SIG_INFO *siginf, int *mdnid, int *pknid,
   int *secbits, uint32_t *flags);
void X509_SIG_INFO_set(X509_SIG_INFO *siginf, int mdnid, int pknid,
   int secbits, uint32_t flags);

int X509_get_signature_info(X509
 *x, int *mdnid, int *pknid, int *secbits,
   uint32_t *flags);

void X509_get0_signature(const ASN1_BIT_STRING **psig,
   const X509_ALGOR **palg, const X509 *x);
int X509_get_signature_nid(const X509 *x);

void X509_set0_distinguishing_id(X509 *x, ASN1_OCTET_STRING *d_id);
ASN1_OCTET_STRING *X509_get0_distinguishing_id(X509 *x);
void X509_REQ_set0_distinguishing_id(X509_REQ *x, ASN1_OCTET_STRING *d_id);
ASN1_OCTET_STRING *X509_REQ_get0_distinguishing_id(X509_REQ *x);

int X509_alias_set1(X509 *x, const unsigned char *name, int len);
int X509_keyid_set1(X509 *x, const unsigned char *id, int len);
unsigned char *X509_alias_get0(X509 *x, int *len);
unsigned char *X509_keyid_get0(X509 *x, int *len);

DECLARE_ASN1_FUNCTIONS(X509_REVOKED)
DECLARE_ASN1_FUNCTIONS(X509_CRL_INFO)
DECLARE_ASN1_FUNCTIONS(X509_CRL)
X509_CRL *X509_CRL_new_ex(OSSL_LIB_CTX *libctx, const char *propq);

int X509_CRL_add0_revoked(X509_CRL *crl, X509_REVOKED *rev);
int X509_CRL_get0_by_serial(X509_CRL
 *crl,
   X509_REVOKED **ret, const ASN1_INTEGER *serial);
int X509_CRL_get0_by_cert(X509_CRL *crl, X509_REVOKED **ret, X509 *x);

X509_PKEY *X509_PKEY_new(void);
void X509_PKEY_free(X509_PKEY *a);

DECLARE_ASN1_FUNCTIONS(NETSCAPE_SPKI)
DECLARE_ASN1_FUNCTIONS(NETSCAPE_SPKAC)
DECLARE_ASN1_FUNCTIONS(NETSCAPE_CERT_SEQUENCE)

X509_INFO *X509_INFO_new(void);
```

```
void X509_INFO_free(X509_INFO *a);
char *X509_NAME_oneline(const X509_NAME *a, char *buf, int size);

#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0
int ASN1_verify(i2d_of_void *i2d, X509_ALGOR *algor1,
   ASN1_BIT_STRING *signature, char *data, EVP_PKEY *pkey);
OSSL_DEPRECATEDIN_3_0
int ASN1_digest(i2d_of_void *i2d, const EVP_MD *type, char *data,
   unsigned char *md, unsigned int *len);
OSSL_DEPRECATEDIN_3_0
int ASN1_sign(i2d_of_void *i2d, X509_ALGOR *algor1, X509_ALGOR *algor2,
   ASN1_BIT_STRING *signature, char *data, EVP_PKEY *pkey,
   const EVP_MD *type);
#endif
int ASN1_item_digest(const ASN1_ITEM *it, const EVP_MD
 *type, void *data,
   unsigned char *md, unsigned int *len);
int ASN1_item_verify(const ASN1_ITEM *it, const X509_ALGOR *alg,
   const ASN1_BIT_STRING *signature, const void *data,
   EVP_PKEY *pkey);
int ASN1_item_verify_ctx(const ASN1_ITEM *it, const X509_ALGOR *alg,
   const ASN1_BIT_STRING *signature, const void *data,
   EVP_MD_CTX *ctx);
int ASN1_item_sign(const ASN1_ITEM *it, X509_ALGOR *algor1, X509_ALGOR *algor2,
   ASN1_BIT_STRING *signature, const void *data,
   EVP_PKEY *pkey, const EVP_MD *md);
int ASN1_item_sign_ctx(const ASN1_ITEM *it, X509_ALGOR *algor1,
   X509_ALGOR *algor2, ASN1_BIT_STRING *signature,
   const void *data, EVP_MD_CTX *ctx);

#define X509_VERSION_1 0
#define X509_VERSION_2 1
#define X509_VERSION_3 2

long X509_get_version(const X509 *x);
int X509_set_version(X509 *x, long version);
int X509_set_serialNumber(X509 *x, ASN1_INTEGER *serial);
ASN1_INTEGER *X509_get_serialNumber(X509 *x);
const ASN1_INTEGER *X509_get0_serialNumber(const X509
 *x);
int X509_set_issuer_name(X509 *x, const X509_NAME *name);
X509_NAME *X509_get_issuer_name(const X509 *a);
int X509_set_subject_name(X509 *x, const X509_NAME *name);
X509_NAME *X509_get_subject_name(const X509 *a);
const ASN1_TIME *X509_get0_notBefore(const X509 *x);
ASN1_TIME *X509_getm_notBefore(const X509 *x);
int X509_set1_notBefore(X509 *x, const ASN1_TIME *tm);
```

```
const ASN1_TIME *X509_get0_notAfter(const X509 *x);
ASN1_TIME *X509_getm_notAfter(const X509 *x);
int X509_set1_notAfter(X509 *x, const ASN1_TIME *tm);
int X509_set_pubkey(X509 *x, EVP_PKEY *pkey);
int X509_up_ref(X509 *x);
int X509_get_signature_type(const X509 *x);

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define X509_get_notBefore X509_getm_notBefore
#define X509_get_notAfter X509_getm_notAfter
#define X509_set_notBefore X509_set1_notBefore
#define X509_set_notAfter X509_set1_notAfter
#endif

/*
* This one is only used so that a binary form can output, as in
* i2d_X509_PUBKEY(X509_get_X509_PUBKEY(x), &buf)
*/
X509_PUBKEY
 *X509_get_X509_PUBKEY(const X509 *x);
const STACK_OF(X509_EXTENSION) *X509_get0_extensions(const X509 *x);
void X509_get0_uids(const X509 *x, const ASN1_BIT_STRING **piuid,
   const ASN1_BIT_STRING **psuid);
const X509_ALGOR *X509_get0_tbs_sigalg(const X509 *x);

EVP_PKEY *X509_get0_pubkey(const X509 *x);
EVP_PKEY *X509_get_pubkey(X509 *x);
ASN1_BIT_STRING *X509_get0_pubkey_bitstr(const X509 *x);

#define X509_REQ_VERSION_1 0

long X509_REQ_get_version(const X509_REQ *req);
int X509_REQ_set_version(X509_REQ *x, long version);
X509_NAME *X509_REQ_get_subject_name(const X509_REQ *req);
int X509_REQ_set_subject_name(X509_REQ *req, const X509_NAME *name);
void X509_REQ_get0_signature(const X509_REQ *req, const ASN1_BIT_STRING **psig,
   const X509_ALGOR **palg);
void X509_REQ_set0_signature(X509_REQ *req, ASN1_BIT_STRING *psig);
int X509_REQ_set1_signature_algo(X509_REQ *req, X509_ALGOR *palg);
int X509_REQ_get_signature_nid(const X509_REQ *req);
int i2d_re_X509_REQ_tbs(X509_REQ *req,
 unsigned char **pp);
int X509_REQ_set_pubkey(X509_REQ *x, EVP_PKEY *pkey);
EVP_PKEY *X509_REQ_get_pubkey(X509_REQ *req);
EVP_PKEY *X509_REQ_get0_pubkey(const X509_REQ *req);
X509_PUBKEY *X509_REQ_get_X509_PUBKEY(X509_REQ *req);
int X509_REQ_extension_nid(int nid);
int *X509_REQ_get_extension_nids(void);
```

```
void X509_REQ_set_extension_nids(int *nids);
STACK_OF(X509_EXTENSION) *X509_REQ_get_extensions(OSSL_FUTURE_CONST X509_REQ *req);
int X509_REQ_add_extensions_nid(X509_REQ *req,
   const STACK_OF(X509_EXTENSION) *exts, int nid);
int X509_REQ_add_extensions(X509_REQ *req, const STACK_OF(X509_EXTENSION) *ext);
int X509_REQ_get_attr_count(const X509_REQ *req);
int X509_REQ_get_attr_by_NID(const X509_REQ *req, int nid, int lastpos);
int X509_REQ_get_attr_by_OBJ(const X509_REQ *req, const ASN1_OBJECT *obj,
   int lastpos);
X509_ATTRIBUTE *X509_REQ_get_attr(const X509_REQ *req, int loc);
X509_ATTRIBUTE *X509_REQ_delete_attr(X509_REQ *req, int loc);
int X509_REQ_add1_attr(X509_REQ *req, X509_ATTRIBUTE
 *attr);
int X509_REQ_add1_attr_by_OBJ(X509_REQ *req,
   const ASN1_OBJECT *obj, int type,
   const unsigned char *bytes, int len);
int X509_REQ_add1_attr_by_NID(X509_REQ *req,
   int nid, int type,
   const unsigned char *bytes, int len);
int X509_REQ_add1_attr_by_txt(X509_REQ *req,
   const char *attrname, int type,
   const unsigned char *bytes, int len);

#define X509_CRL_VERSION_1 0
#define X509_CRL_VERSION_2 1

int X509_CRL_set_version(X509_CRL *x, long version);
int X509_CRL_set_issuer_name(X509_CRL *x, const X509_NAME *name);
int X509_CRL_set1_lastUpdate(X509_CRL *x, const ASN1_TIME *tm);
int X509_CRL_set1_nextUpdate(X509_CRL *x, const ASN1_TIME *tm);
int X509_CRL_sort(X509_CRL *crl);
int X509_CRL_up_ref(X509_CRL *crl);

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define X509_CRL_set_lastUpdate X509_CRL_set1_lastUpdate
#define X509_CRL_set_nextUpdate X509_CRL_set1_nextUpdate
#endif

long X509_CRL_get_version(const X509_CRL *crl);
const ASN1_TIME *X509_CRL_get0_lastUpdate(const
 X509_CRL *crl);
const ASN1_TIME *X509_CRL_get0_nextUpdate(const X509_CRL *crl);
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 ASN1_TIME *X509_CRL_get_lastUpdate(X509_CRL *crl);
OSSL_DEPRECATEDIN_1_1_0 ASN1_TIME *X509_CRL_get_nextUpdate(X509_CRL *crl);
#endif
X509_NAME *X509_CRL_get_issuer(const X509_CRL *crl);
const STACK_OF(X509_EXTENSION) *X509_CRL_get0_extensions(const X509_CRL *crl);
```

```
STACK_OF(X509_REVOKED) *X509_CRL_get_REVOKED(X509_CRL *crl);
void X509_CRL_get0_signature(const X509_CRL *crl, const ASN1_BIT_STRING **psig,
   const X509_ALGOR **palg);
int X509_CRL_get_signature_nid(const X509_CRL *crl);
int i2d_re_X509_CRL_tbs(X509_CRL *req, unsigned char **pp);

const ASN1_INTEGER *X509_REVOKED_get0_serialNumber(const X509_REVOKED *x);
int X509_REVOKED_set_serialNumber(X509_REVOKED *x, ASN1_INTEGER *serial);
const ASN1_TIME *X509_REVOKED_get0_revocationDate(const X509_REVOKED *x);
int X509_REVOKED_set_revocationDate(X509_REVOKED *r, ASN1_TIME *tm);
const STACK_OF(X509_EXTENSION)
 *
X509_REVOKED_get0_extensions(const X509_REVOKED *r);

X509_CRL *X509_CRL_diff(X509_CRL *base, X509_CRL *newer,
   EVP_PKEY *skey, const EVP_MD *md, unsigned int flags);

int X509_REQ_check_private_key(const X509_REQ *req, EVP_PKEY *pkey);

int X509_check_private_key(const X509 *cert, const EVP_PKEY *pkey);
int X509_chain_check_suiteb(int *perror_depth,
   X509 *x, STACK_OF(X509) *chain,
   unsigned long flags);
int X509_CRL_check_suiteb(X509_CRL *crl, EVP_PKEY *pk, unsigned long flags);
void OSSL_STACK_OF_X509_free(STACK_OF(X509) *certs);
STACK_OF(X509) *X509_chain_up_ref(STACK_OF(X509) *chain);

int X509_issuer_and_serial_cmp(const X509 *a, const X509 *b);
unsigned long X509_issuer_and_serial_hash(X509 *a);

int X509_issuer_name_cmp(const X509 *a, const X509 *b);
unsigned long X509_issuer_name_hash(X509 *a);

int X509_subject_name_cmp(const X509 *a, const X509 *b);
unsigned long X509_subject_name_hash(X509 *x);

#ifndef OPENSSL_NO_MD5
unsigned long X509_issuer_name_hash_old(X509
 *a);
unsigned long X509_subject_name_hash_old(X509 *x);
#endif

#define X509_ADD_FLAG_DEFAULT 0
#define X509_ADD_FLAG_UP_REF 0x1
#define X509_ADD_FLAG_PREPEND 0x2
#define X509_ADD_FLAG_NO_DUP 0x4
#define X509_ADD_FLAG_NO_SS 0x8
int X509_add_cert(STACK_OF(X509) *sk, X509 *cert, int flags);
```

```
int X509_add_certs(STACK_OF(X509) *sk, STACK_OF(X509) *certs, int flags);

int X509_cmp(const X509 *a, const X509 *b);
int X509_NAME_cmp(const X509_NAME *a, const X509_NAME *b);
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define X509_NAME_hash(x) X509_NAME_hash_ex(x, NULL, NULL, NULL)
OSSL_DEPRECATEDIN_3_0 int X509_certificate_type(const X509 *x,
   const EVP_PKEY *pubkey);
#endif
unsigned long X509_NAME_hash_ex(const X509_NAME *x, OSSL_LIB_CTX *libctx,
   const char *propq, int *ok);
unsigned long X509_NAME_hash_old(const X509_NAME *x);

int X509_CRL_cmp(const X509_CRL *a, const X509_CRL *b);
int X509_CRL_match(const X509_CRL *a, const X509_CRL *b);
int X509_aux_print(BIO *out, X509 *x,
 int indent);
#ifndef OPENSSL_NO_STDIO
int X509_print_ex_fp(FILE *bp, X509 *x, unsigned long nmflag,
   unsigned long cflag);
int X509_print_fp(FILE *bp, X509 *x);
int X509_CRL_print_fp(FILE *bp, X509_CRL *x);
int X509_REQ_print_fp(FILE *bp, X509_REQ *req);
int X509_NAME_print_ex_fp(FILE *fp, const X509_NAME *nm, int indent,
   unsigned long flags);
#endif

int X509_NAME_print(BIO *bp, const X509_NAME *name, int obase);
int X509_NAME_print_ex(BIO *out, const X509_NAME *nm, int indent,
   unsigned long flags);
int X509_print_ex(BIO *bp, X509 *x, unsigned long nmflag,
   unsigned long cflag);
int X509_print(BIO *bp, X509 *x);
int X509_ocspid_print(BIO *bp, X509 *x);
int X509_CRL_print_ex(BIO *out, X509_CRL *x, unsigned long nmflag);
int X509_CRL_print(BIO *bp, X509_CRL *x);
int X509_REQ_print_ex(BIO *bp, X509_REQ *x, unsigned long nmflag,
   unsigned long cflag);
int X509_REQ_print(BIO *bp, X509_REQ *req);

int X509_NAME_entry_count(const X509_NAME *name);
int X509_NAME_get_text_by_NID(const
 X509_NAME *name, int nid,
   char *buf, int len);
int X509_NAME_get_text_by_OBJ(const X509_NAME *name, const ASN1_OBJECT *obj,
   char *buf, int len);

/*
```

```
* NOTE: you should be passing -1, not 0 as lastpos. The functions that use
* lastpos, search after that position on.
*/
int X509_NAME_get_index_by_NID(const X509_NAME *name, int nid, int lastpos);
int X509_NAME_get_index_by_OBJ(const X509_NAME *name, const ASN1_OBJECT *obj,
   int lastpos);
X509_NAME_ENTRY *X509_NAME_get_entry(const X509_NAME *name, int loc);
X509_NAME_ENTRY *X509_NAME_delete_entry(X509_NAME *name, int loc);
int X509_NAME_add_entry(X509_NAME *name, const X509_NAME_ENTRY *ne,
   int loc, int set);
int X509_NAME_add_entry_by_OBJ(X509_NAME *name, const ASN1_OBJECT *obj, int type,
   const unsigned char *bytes, int len, int loc,
   int set);
int X509_NAME_add_entry_by_NID(X509_NAME *name, int nid, int type,
   const unsigned char *bytes, int len, int loc,
   int set);
X509_NAME_ENTRY *X509_NAME_ENTRY_create_by_txt(X509_NAME_ENTRY
 **ne,
   const char *field, int type,
   const unsigned char *bytes,
   int len);
X509_NAME_ENTRY *X509_NAME_ENTRY_create_by_NID(X509_NAME_ENTRY **ne, int nid,
   int type,
   const unsigned char *bytes,
   int len);
int X509_NAME_add_entry_by_txt(X509_NAME *name, const char *field, int type,
   const unsigned char *bytes, int len, int loc,
   int set);
X509_NAME_ENTRY *X509_NAME_ENTRY_create_by_OBJ(X509_NAME_ENTRY **ne,
   const ASN1_OBJECT *obj, int type,
   const unsigned char *bytes,
   int len);
int X509_NAME_ENTRY_set_object(X509_NAME_ENTRY *ne, const ASN1_OBJECT *obj);
int X509_NAME_ENTRY_set_data(X509_NAME_ENTRY *ne, int type,
   const unsigned char *bytes, int len);
ASN1_OBJECT *X509_NAME_ENTRY_get_object(const X509_NAME_ENTRY *ne);
ASN1_STRING *X509_NAME_ENTRY_get_data(const X509_NAME_ENTRY *ne);
int X509_NAME_ENTRY_set(const X509_NAME_ENTRY *ne);

int X509_NAME_get0_der(const X509_NAME *nm, const unsigned char **pder,
   size_t *pderlen);

int
 X509v3_get_ext_count(const STACK_OF(X509_EXTENSION) *x);
int X509v3_get_ext_by_NID(const STACK_OF(X509_EXTENSION) *x,
   int nid, int lastpos);
int X509v3_get_ext_by_OBJ(const STACK_OF(X509_EXTENSION) *x,
   const ASN1_OBJECT *obj, int lastpos);
```

```
int X509v3_get_ext_by_critical(const STACK_OF(X509_EXTENSION) *x,
   int crit, int lastpos);
X509_EXTENSION *X509v3_get_ext(const STACK_OF(X509_EXTENSION) *x, int loc);
X509_EXTENSION *X509v3_delete_ext(STACK_OF(X509_EXTENSION) *x, int loc);
STACK_OF(X509_EXTENSION) *X509v3_add_ext(STACK_OF(X509_EXTENSION) **x,
   X509_EXTENSION *ex, int loc);
STACK_OF(X509_EXTENSION) *X509v3_add_extensions(STACK_OF(X509_EXTENSION) **target,
   const STACK_OF(X509_EXTENSION) *exts);

int X509_get_ext_count(const X509 *x);
int X509_get_ext_by_NID(const X509 *x, int nid, int lastpos);
int X509_get_ext_by_OBJ(const X509 *x, const ASN1_OBJECT *obj, int lastpos);
int X509_get_ext_by_critical(const X509 *x, int crit, int lastpos);
X509_EXTENSION *X509_get_ext(const
 X509 *x, int loc);
X509_EXTENSION *X509_delete_ext(X509 *x, int loc);
int X509_add_ext(X509 *x, X509_EXTENSION *ex, int loc);
void *X509_get_ext_d2i(const X509 *x, int nid, int *crit, int *idx);
int X509_add1_ext_i2d(X509 *x, int nid, void *value, int crit,
   unsigned long flags);

int X509_CRL_get_ext_count(const X509_CRL *x);
int X509_CRL_get_ext_by_NID(const X509_CRL *x, int nid, int lastpos);
int X509_CRL_get_ext_by_OBJ(const X509_CRL *x, const ASN1_OBJECT *obj,
   int lastpos);
int X509_CRL_get_ext_by_critical(const X509_CRL *x, int crit, int lastpos);
X509_EXTENSION *X509_CRL_get_ext(const X509_CRL *x, int loc);
X509_EXTENSION *X509_CRL_delete_ext(X509_CRL *x, int loc);
int X509_CRL_add_ext(X509_CRL *x, X509_EXTENSION *ex, int loc);
void *X509_CRL_get_ext_d2i(const X509_CRL *x, int nid, int *crit, int *idx);
int X509_CRL_add1_ext_i2d(X509_CRL *x, int nid, void *value, int crit,
   unsigned long flags);

int X509_REVOKED_get_ext_count(const X509_REVOKED *x);
int
 X509_REVOKED_get_ext_by_NID(const X509_REVOKED *x, int nid, int lastpos);
int X509_REVOKED_get_ext_by_OBJ(const X509_REVOKED *x, const ASN1_OBJECT *obj,
   int lastpos);
int X509_REVOKED_get_ext_by_critical(const X509_REVOKED *x, int crit,
   int lastpos);
X509_EXTENSION *X509_REVOKED_get_ext(const X509_REVOKED *x, int loc);
X509_EXTENSION *X509_REVOKED_delete_ext(X509_REVOKED *x, int loc);
int X509_REVOKED_add_ext(X509_REVOKED *x, X509_EXTENSION *ex, int loc);
void *X509_REVOKED_get_ext_d2i(const X509_REVOKED *x, int nid, int *crit,
   int *idx);
int X509_REVOKED_add1_ext_i2d(X509_REVOKED *x, int nid, void *value, int crit,
   unsigned long flags);
```

```
X509_EXTENSION *X509_EXTENSION_create_by_NID(X509_EXTENSION **ex,
   int nid, int crit,
   ASN1_OCTET_STRING *data);
X509_EXTENSION *X509_EXTENSION_create_by_OBJ(X509_EXTENSION **ex,
   const ASN1_OBJECT *obj, int crit,
   ASN1_OCTET_STRING *data);
int X509_EXTENSION_set_object(X509_EXTENSION *ex, const ASN1_OBJECT *obj);
int
 X509_EXTENSION_set_critical(X509_EXTENSION *ex, int crit);
int X509_EXTENSION_set_data(X509_EXTENSION *ex, ASN1_OCTET_STRING *data);
ASN1_OBJECT *X509_EXTENSION_get_object(X509_EXTENSION *ex);
ASN1_OCTET_STRING *X509_EXTENSION_get_data(X509_EXTENSION *ne);
int X509_EXTENSION_get_critical(const X509_EXTENSION *ex);

int X509at_get_attr_count(const STACK_OF(X509_ATTRIBUTE) *x);
int X509at_get_attr_by_NID(const STACK_OF(X509_ATTRIBUTE) *x, int nid,
   int lastpos);
int X509at_get_attr_by_OBJ(const STACK_OF(X509_ATTRIBUTE) *sk,
   const ASN1_OBJECT *obj, int lastpos);
X509_ATTRIBUTE *X509at_get_attr(const STACK_OF(X509_ATTRIBUTE) *x, int loc);
X509_ATTRIBUTE *X509at_delete_attr(STACK_OF(X509_ATTRIBUTE) *x, int loc);
STACK_OF(X509_ATTRIBUTE) *X509at_add1_attr(STACK_OF(X509_ATTRIBUTE) **x,
   X509_ATTRIBUTE *attr);
STACK_OF(X509_ATTRIBUTE) *X509at_add1_attr_by_OBJ(STACK_OF(X509_ATTRIBUTE)
                                        **x,
   const ASN1_OBJECT *obj,
   int type,
    const unsigned char *bytes,
   int len);
STACK_OF(X509_ATTRIBUTE) *X509at_add1_attr_by_NID(STACK_OF(X509_ATTRIBUTE)
                                        **x,
   int nid, int type,
   const unsigned char *bytes,
   int len);
STACK_OF(X509_ATTRIBUTE) *X509at_add1_attr_by_txt(STACK_OF(X509_ATTRIBUTE)
                                        **x,
   const char *attrname,
   int type,
   const unsigned char *bytes,
   int len);
void *X509at_get0_data_by_OBJ(const STACK_OF(X509_ATTRIBUTE) *x,
   const ASN1_OBJECT *obj, int lastpos, int type);
X509_ATTRIBUTE *X509_ATTRIBUTE_create_by_NID(X509_ATTRIBUTE **attr, int nid,
   int atrtype, const void *data,
   int len);
X509_ATTRIBUTE *X509_ATTRIBUTE_create_by_OBJ(X509_ATTRIBUTE **attr,
   const ASN1_OBJECT *obj,
   int atrtype, const void *data,
```

```
   int len);
X509_ATTRIBUTE *X509_ATTRIBUTE_create_by_txt(X509_ATTRIBUTE **attr,
   const char *atrname, int type,
   const unsigned char *bytes,
   int
 len);
int X509_ATTRIBUTE_set1_object(X509_ATTRIBUTE *attr, const ASN1_OBJECT *obj);
int X509_ATTRIBUTE_set1_data(X509_ATTRIBUTE *attr, int attrtype,
   const void *data, int len);
void *X509_ATTRIBUTE_get0_data(X509_ATTRIBUTE *attr, int idx, int atrtype,
   void *data);
int X509_ATTRIBUTE_count(const X509_ATTRIBUTE *attr);
ASN1_OBJECT *X509_ATTRIBUTE_get0_object(X509_ATTRIBUTE *attr);
ASN1_TYPE *X509_ATTRIBUTE_get0_type(X509_ATTRIBUTE *attr, int idx);

int EVP_PKEY_get_attr_count(const EVP_PKEY *key);
int EVP_PKEY_get_attr_by_NID(const EVP_PKEY *key, int nid, int lastpos);
int EVP_PKEY_get_attr_by_OBJ(const EVP_PKEY *key, const ASN1_OBJECT *obj,
   int lastpos);
X509_ATTRIBUTE *EVP_PKEY_get_attr(const EVP_PKEY *key, int loc);
X509_ATTRIBUTE *EVP_PKEY_delete_attr(EVP_PKEY *key, int loc);
int EVP_PKEY_add1_attr(EVP_PKEY *key, X509_ATTRIBUTE *attr);
int EVP_PKEY_add1_attr_by_OBJ(EVP_PKEY *key,
   const ASN1_OBJECT *obj, int type,
   const unsigned char *bytes, int len);
int EVP_PKEY_add1_attr_by_NID(EVP_PKEY
 *key,
   int nid, int type,
   const unsigned char *bytes, int len);
int EVP_PKEY_add1_attr_by_txt(EVP_PKEY *key,
   const char *attrname, int type,
   const unsigned char *bytes, int len);

/* lookup a cert from a X509 STACK */
X509 *X509_find_by_issuer_and_serial(STACK_OF(X509) *sk, const X509_NAME *name,
   const ASN1_INTEGER *serial);
X509 *X509_find_by_subject(STACK_OF(X509) *sk, const X509_NAME *name);

DECLARE_ASN1_FUNCTIONS(PBEPARAM)
DECLARE_ASN1_FUNCTIONS(PBE2PARAM)
DECLARE_ASN1_FUNCTIONS(PBKDF2PARAM)
DECLARE_ASN1_FUNCTIONS(PBMAC1PARAM)
#ifndef OPENSSL_NO_SCRYPT
DECLARE_ASN1_FUNCTIONS(SCRYPT_PARAMS)
#endif

int PKCS5_pbe_set0_algor(X509_ALGOR *algor, int alg, int iter,
   const unsigned char *salt, int saltlen);
```

```
int PKCS5_pbe_set0_algor_ex(X509_ALGOR *algor, int alg, int iter,
   const unsigned char *salt, int saltlen,
   OSSL_LIB_CTX *libctx);

X509_ALGOR *PKCS5_pbe_set(int alg, int iter,
   const unsigned char *salt, int saltlen);
X509_ALGOR
 *PKCS5_pbe_set_ex(int alg, int iter,
   const unsigned char *salt, int saltlen,
   OSSL_LIB_CTX *libctx);

X509_ALGOR *PKCS5_pbe2_set(const EVP_CIPHER *cipher, int iter,
   unsigned char *salt, int saltlen);
X509_ALGOR *PKCS5_pbe2_set_iv(const EVP_CIPHER *cipher, int iter,
   unsigned char *salt, int saltlen,
   unsigned char *aiv, int prf_nid);
X509_ALGOR *PKCS5_pbe2_set_iv_ex(const EVP_CIPHER *cipher, int iter,
   unsigned char *salt, int saltlen,
   unsigned char *aiv, int prf_nid,
   OSSL_LIB_CTX *libctx);

#ifndef OPENSSL_NO_SCRYPT
X509_ALGOR *PKCS5_pbe2_set_scrypt(const EVP_CIPHER *cipher,
   const unsigned char *salt, int saltlen,
   unsigned char *aiv, uint64_t N, uint64_t r,
   uint64_t p);
#endif

X509_ALGOR *PKCS5_pbkdf2_set(int iter, unsigned char *salt, int saltlen,
   int prf_nid, int keylen);
X509_ALGOR *PKCS5_pbkdf2_set_ex(int iter, unsigned char *salt, int saltlen,
   int prf_nid, int keylen,
   OSSL_LIB_CTX *libctx);

PBKDF2PARAM *PBMAC1_get1_pbkdf2_param(const
 X509_ALGOR *macalg);
/* PKCS#8 utilities */

DECLARE_ASN1_FUNCTIONS(PKCS8_PRIV_KEY_INFO)

EVP_PKEY *EVP_PKCS82PKEY(const PKCS8_PRIV_KEY_INFO *p8);
EVP_PKEY *EVP_PKCS82PKEY_ex(const PKCS8_PRIV_KEY_INFO *p8, OSSL_LIB_CTX *libctx,
   const char *propq);
PKCS8_PRIV_KEY_INFO *EVP_PKEY2PKCS8(const EVP_PKEY *pkey);

int PKCS8_pkey_set0(PKCS8_PRIV_KEY_INFO *priv, ASN1_OBJECT *aobj,
   int version, int ptype, void *pval,
   unsigned char *penc, int penclen);
```

```
int PKCS8_pkey_get0(const ASN1_OBJECT **ppkalg,
   const unsigned char **pk, int *ppklen,
   const X509_ALGOR **pa, const PKCS8_PRIV_KEY_INFO *p8);

const STACK_OF(X509_ATTRIBUTE) *
PKCS8_pkey_get0_attrs(const PKCS8_PRIV_KEY_INFO *p8);
int PKCS8_pkey_add1_attr(PKCS8_PRIV_KEY_INFO *p8, X509_ATTRIBUTE *attr);
int PKCS8_pkey_add1_attr_by_NID(PKCS8_PRIV_KEY_INFO *p8, int nid, int type,
   const unsigned char *bytes, int len);
int PKCS8_pkey_add1_attr_by_OBJ(PKCS8_PRIV_KEY_INFO *p8, const ASN1_OBJECT *obj,
   int type, const unsigned
 char *bytes, int len);

void X509_PUBKEY_set0_public_key(X509_PUBKEY *pub,
   unsigned char *penc, int penclen);
int X509_PUBKEY_set0_param(X509_PUBKEY *pub, ASN1_OBJECT *aobj,
   int ptype, void *pval,
   unsigned char *penc, int penclen);
int X509_PUBKEY_get0_param(ASN1_OBJECT **ppkalg,
   const unsigned char **pk, int *ppklen,
   X509_ALGOR **pa, const X509_PUBKEY *pub);
int X509_PUBKEY_eq(const X509_PUBKEY *a, const X509_PUBKEY *b);

#ifdef __cplusplus
}
#endif
#endif
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/ct.h.in
*
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*
* Licensed under the Apache License 2.0 (the "License").  You may not use
* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_CT_H
#define OPENSSL_CT_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_CT_H
#endif

#include <openssl/opensslconf.h>

#ifndef OPENSSL_NO_CT
#include <openssl/types.h>
```

```
#include <openssl/safestack.h>
#include <openssl/x509.h>
#include <openssl/cterr.h>
#ifdef __cplusplus
extern "C" {
#endif

/* Minimum RSA key size, from RFC6962 */
#define SCT_MIN_RSA_BITS 2048

/* All hashes are SHA256 in v1 of Certificate Transparency */
#define CT_V1_HASHLEN SHA256_DIGEST_LENGTH

/* clang-format
 off */
SKM_DEFINE_STACK_OF_INTERNAL(SCT, SCT, SCT)
#define sk_SCT_num(sk) OPENSSL_sk_num(ossl_check_const_SCT_sk_type(sk))
#define sk_SCT_value(sk, idx) ((SCT *)OPENSSL_sk_value(ossl_check_const_SCT_sk_type(sk), (idx)))
#define sk_SCT_new(cmp) ((STACK_OF(SCT) *)OPENSSL_sk_new(ossl_check_SCT_compfunc_type(cmp)))
#define sk_SCT_new_null() ((STACK_OF(SCT) *)OPENSSL_sk_new_null())
#define sk_SCT_new_reserve(cmp, n) ((STACK_OF(SCT)
*)OPENSSL_sk_new_reserve(ossl_check_SCT_compfunc_type(cmp), (n)))
#define sk_SCT_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_SCT_sk_type(sk), (n))
#define sk_SCT_free(sk) OPENSSL_sk_free(ossl_check_SCT_sk_type(sk))
#define sk_SCT_zero(sk) OPENSSL_sk_zero(ossl_check_SCT_sk_type(sk))
#define sk_SCT_delete(sk, i) ((SCT *)OPENSSL_sk_delete(ossl_check_SCT_sk_type(sk), (i)))
#define sk_SCT_delete_ptr(sk, ptr) ((SCT *)OPENSSL_sk_delete_ptr(ossl_check_SCT_sk_type(sk),
ossl_check_SCT_type(ptr)))
#define sk_SCT_push(sk, ptr) OPENSSL_sk_push(ossl_check_SCT_sk_type(sk),
 ossl_check_SCT_type(ptr))
#define sk_SCT_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_SCT_sk_type(sk), ossl_check_SCT_type(ptr))
#define sk_SCT_pop(sk) ((SCT *)OPENSSL_sk_pop(ossl_check_SCT_sk_type(sk)))
#define sk_SCT_shift(sk) ((SCT *)OPENSSL_sk_shift(ossl_check_SCT_sk_type(sk)))
#define sk_SCT_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_SCT_sk_type(sk),ossl_check_SCT_freefunc_type(freefunc))
#define sk_SCT_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_SCT_sk_type(sk), ossl_check_SCT_type(ptr),
(idx))
#define sk_SCT_set(sk, idx, ptr) ((SCT *)OPENSSL_sk_set(ossl_check_SCT_sk_type(sk), (idx),
ossl_check_SCT_type(ptr)))
#define sk_SCT_find(sk, ptr) OPENSSL_sk_find(ossl_check_SCT_sk_type(sk), ossl_check_SCT_type(ptr))
#define sk_SCT_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_SCT_sk_type(sk), ossl_check_SCT_type(ptr))
#define sk_SCT_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_SCT_sk_type(sk),
ossl_check_SCT_type(ptr), pnum)
#define sk_SCT_sort(sk) OPENSSL_sk_sort(ossl_check_SCT_sk_type(sk))
#define
 sk_SCT_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_SCT_sk_type(sk))
#define sk_SCT_dup(sk) ((STACK_OF(SCT) *)OPENSSL_sk_dup(ossl_check_const_SCT_sk_type(sk)))
#define sk_SCT_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(SCT)
```

```
*)OPENSSL_sk_deep_copy(ossl_check_const_SCT_sk_type(sk), ossl_check_SCT_copyfunc_type(copyfunc),
ossl_check_SCT_freefunc_type(freefunc)))
#define sk_SCT_set_cmp_func(sk, cmp)
((sk_SCT_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_SCT_sk_type(sk),
ossl_check_SCT_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(CTLOG, CTLOG, CTLOG)
#define sk_CTLOG_num(sk) OPENSSL_sk_num(ossl_check_const_CTLOG_sk_type(sk))
#define sk_CTLOG_value(sk, idx) ((CTLOG *)OPENSSL_sk_value(ossl_check_const_CTLOG_sk_type(sk),
(idx)))
#define sk_CTLOG_new(cmp) ((STACK_OF(CTLOG)
*)OPENSSL_sk_new(ossl_check_CTLOG_compfunc_type(cmp)))
#define sk_CTLOG_new_null() ((STACK_OF(CTLOG) *)OPENSSL_sk_new_null())
#define sk_CTLOG_new_reserve(cmp, n)
 ((STACK_OF(CTLOG) *)OPENSSL_sk_new_reserve(ossl_check_CTLOG_compfunc_type(cmp), (n)))
#define sk_CTLOG_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_CTLOG_sk_type(sk), (n))
#define sk_CTLOG_free(sk) OPENSSL_sk_free(ossl_check_CTLOG_sk_type(sk))
#define sk_CTLOG_zero(sk) OPENSSL_sk_zero(ossl_check_CTLOG_sk_type(sk))
#define sk_CTLOG_delete(sk, i) ((CTLOG *)OPENSSL_sk_delete(ossl_check_CTLOG_sk_type(sk), (i)))
#define sk_CTLOG_delete_ptr(sk, ptr) ((CTLOG *)OPENSSL_sk_delete_ptr(ossl_check_CTLOG_sk_type(sk),
ossl_check_CTLOG_type(ptr)))
#define sk_CTLOG_push(sk, ptr) OPENSSL_sk_push(ossl_check_CTLOG_sk_type(sk),
ossl_check_CTLOG_type(ptr))
#define sk_CTLOG_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_CTLOG_sk_type(sk),
ossl_check_CTLOG_type(ptr))
#define sk_CTLOG_pop(sk) ((CTLOG *)OPENSSL_sk_pop(ossl_check_CTLOG_sk_type(sk)))
#define sk_CTLOG_shift(sk) ((CTLOG *)OPENSSL_sk_shift(ossl_check_CTLOG_sk_type(sk)))
#define sk_CTLOG_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_CTLOG_sk_type(sk),ossl_check_CTLOG_freefunc_type(freefunc))
#define
 sk_CTLOG_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_CTLOG_sk_type(sk),
ossl_check_CTLOG_type(ptr), (idx))
#define sk_CTLOG_set(sk, idx, ptr) ((CTLOG *)OPENSSL_sk_set(ossl_check_CTLOG_sk_type(sk), (idx),
ossl_check_CTLOG_type(ptr)))
#define sk_CTLOG_find(sk, ptr) OPENSSL_sk_find(ossl_check_CTLOG_sk_type(sk),
ossl_check_CTLOG_type(ptr))
#define sk_CTLOG_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_CTLOG_sk_type(sk),
ossl_check_CTLOG_type(ptr))
#define sk_CTLOG_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_CTLOG_sk_type(sk),
ossl_check_CTLOG_type(ptr), pnum)
#define sk_CTLOG_sort(sk) OPENSSL_sk_sort(ossl_check_CTLOG_sk_type(sk))
#define sk_CTLOG_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_CTLOG_sk_type(sk))
#define sk_CTLOG_dup(sk) ((STACK_OF(CTLOG)
*)OPENSSL_sk_dup(ossl_check_const_CTLOG_sk_type(sk)))
#define sk_CTLOG_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(CTLOG)
*)OPENSSL_sk_deep_copy(ossl_check_const_CTLOG_sk_type(sk),
 ossl_check_CTLOG_copyfunc_type(copyfunc), ossl_check_CTLOG_freefunc_type(freefunc)))
#define sk_CTLOG_set_cmp_func(sk, cmp)
((sk_CTLOG_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_CTLOG_sk_type(sk),
```

```
ossl_check_CTLOG_compfunc_type(cmp)))

/* clang-format on */

typedef enum {
   CT_LOG_ENTRY_TYPE_NOT_SET = -1,
   CT_LOG_ENTRY_TYPE_X509 = 0,
   CT_LOG_ENTRY_TYPE_PRECERT = 1
} ct_log_entry_type_t;

typedef enum {
   SCT_VERSION_NOT_SET = -1,
   SCT_VERSION_V1 = 0
} sct_version_t;

typedef enum {
   SCT_SOURCE_UNKNOWN,
   SCT_SOURCE_TLS_EXTENSION,
   SCT_SOURCE_X509V3_EXTENSION,
   SCT_SOURCE_OCSP_STAPLED_RESPONSE
} sct_source_t;

typedef enum {
   SCT_VALIDATION_STATUS_NOT_SET,
   SCT_VALIDATION_STATUS_UNKNOWN_LOG,
   SCT_VALIDATION_STATUS_VALID,
   SCT_VALIDATION_STATUS_INVALID,
   SCT_VALIDATION_STATUS_UNVERIFIED,
   SCT_VALIDATION_STATUS_UNKNOWN_VERSION
} sct_validation_status_t;

/******************************************
* CT policy evaluation
 context functions *
******************************************/

/*
* Creates a new, empty policy evaluation context associated with the given
* library context and property query string.
* The caller is responsible for calling CT_POLICY_EVAL_CTX_free when finished
* with the CT_POLICY_EVAL_CTX.
*/
CT_POLICY_EVAL_CTX *CT_POLICY_EVAL_CTX_new_ex(OSSL_LIB_CTX *libctx,
   const char *propq);

/*
* The same as CT_POLICY_EVAL_CTX_new_ex() but the default library
* context and property query string is used.
```

```
*/
CT_POLICY_EVAL_CTX *CT_POLICY_EVAL_CTX_new(void);

/* Deletes a policy evaluation context and anything it owns. */
void CT_POLICY_EVAL_CTX_free(CT_POLICY_EVAL_CTX *ctx);

/* Gets the peer certificate that the SCTs are for */
X509 *CT_POLICY_EVAL_CTX_get0_cert(const CT_POLICY_EVAL_CTX *ctx);

/*
* Sets the certificate associated with the received SCTs.
* Increments the reference count of cert.
* Returns 1 on success, 0 otherwise.
*/
int CT_POLICY_EVAL_CTX_set1_cert(CT_POLICY_EVAL_CTX
 *ctx, X509 *cert);

/* Gets the issuer of the aforementioned certificate */
X509 *CT_POLICY_EVAL_CTX_get0_issuer(const CT_POLICY_EVAL_CTX *ctx);

/*
* Sets the issuer of the certificate associated with the received SCTs.
* Increments the reference count of issuer.
* Returns 1 on success, 0 otherwise.
*/
int CT_POLICY_EVAL_CTX_set1_issuer(CT_POLICY_EVAL_CTX *ctx, X509 *issuer);

/* Gets the CT logs that are trusted sources of SCTs */
const CTLOG_STORE *CT_POLICY_EVAL_CTX_get0_log_store(const CT_POLICY_EVAL_CTX *ctx);

/* Sets the log store that is in use. It must outlive the CT_POLICY_EVAL_CTX. */
void CT_POLICY_EVAL_CTX_set_shared_CTLOG_STORE(CT_POLICY_EVAL_CTX *ctx,
   CTLOG_STORE *log_store);

/*
* Gets the time, in milliseconds since the Unix epoch, that will be used as the
* current time when checking whether an SCT was issued in the future.
* Such SCTs will fail validation, as required by RFC6962.
*/
uint64_t CT_POLICY_EVAL_CTX_get_time(const CT_POLICY_EVAL_CTX
 *ctx);

/*
* Sets the time to evaluate SCTs against, in milliseconds since the Unix epoch.
* If an SCT's timestamp is after this time, it will be interpreted as having
* been issued in the future. RFC6962 states that "TLS clients MUST reject SCTs
* whose timestamp is in the future", so an SCT will not validate in this case.
*/
```

```
void CT_POLICY_EVAL_CTX_set_time(CT_POLICY_EVAL_CTX *ctx, uint64_t time_in_ms);

/*****************
* SCT functions *
*****************/

/*
* Creates a new, blank SCT.
* The caller is responsible for calling SCT_free when finished with the SCT.
*/
SCT *SCT_new(void);

/*
* Creates a new SCT from some base64-encoded strings.
* The caller is responsible for calling SCT_free when finished with the SCT.
*/
SCT *SCT_new_from_base64(unsigned char version,
   const char *logid_base64,
   ct_log_entry_type_t entry_type,
   uint64_t timestamp,
   const char *extensions_base64,
   const char *signature_base64);

/*
* Frees the SCT and the underlying data
 structures.
*/
void SCT_free(SCT *sct);

/*
* Free a stack of SCTs, and the underlying SCTs themselves.
* Intended to be compatible with X509V3_EXT_FREE.
*/
void SCT_LIST_free(STACK_OF(SCT) *a);

/*
* Returns the version of the SCT.
*/
sct_version_t SCT_get_version(const SCT *sct);

/*
* Set the version of an SCT.
* Returns 1 on success, 0 if the version is unrecognized.
*/
__owur int SCT_set_version(SCT *sct, sct_version_t version);

/*
* Returns the log entry type of the SCT.
```

```
*/
ct_log_entry_type_t SCT_get_log_entry_type(const SCT *sct);

/*
* Set the log entry type of an SCT.
* Returns 1 on success, 0 otherwise.
*/
__owur int SCT_set_log_entry_type(SCT *sct, ct_log_entry_type_t entry_type);

/*
* Gets the ID of the log that an SCT came from.
* Ownership of the log ID remains with the SCT.
* Returns the length of the log ID.
*/
size_t SCT_get0_log_id(const SCT *sct, unsigned char **log_id);

/*
* Set the log ID of an SCT to point directly to the *log_id specified.
 * The SCT takes ownership of the specified pointer.
* Returns 1 on success, 0 otherwise.
*/
__owur int SCT_set0_log_id(SCT *sct, unsigned char *log_id, size_t log_id_len);

/*
* Set the log ID of an SCT.
* This makes a copy of the log_id.
* Returns 1 on success, 0 otherwise.
*/
__owur int SCT_set1_log_id(SCT *sct, const unsigned char *log_id,
   size_t log_id_len);

/*
* Returns the timestamp for the SCT (epoch time in milliseconds).
*/
uint64_t SCT_get_timestamp(const SCT *sct);

/*
* Set the timestamp of an SCT (epoch time in milliseconds).
*/
void SCT_set_timestamp(SCT *sct, uint64_t timestamp);

/*
* Return the NID for the signature used by the SCT.
* For CT v1, this will be either NID_sha256WithRSAEncryption or
* NID_ecdsa_with_SHA256 (or NID_undef if incorrect/unset).
*/
int SCT_get_signature_nid(const SCT *sct);
```

```
/*
* Set the signature type of an SCT
* For CT v1, this should be either NID_sha256WithRSAEncryption or
* NID_ecdsa_with_SHA256.
* Returns 1 on
 success, 0 otherwise.
*/
__owur int SCT_set_signature_nid(SCT *sct, int nid);

/*
* Set *ext to point to the extension data for the SCT. ext must not be NULL.
* The SCT retains ownership of this pointer.
* Returns length of the data pointed to.
*/
size_t SCT_get0_extensions(const SCT *sct, unsigned char **ext);

/*
* Set the extensions of an SCT to point directly to the *ext specified.
* The SCT takes ownership of the specified pointer.
*/
void SCT_set0_extensions(SCT *sct, unsigned char *ext, size_t ext_len);

/*
* Set the extensions of an SCT.
* This takes a copy of the ext.
* Returns 1 on success, 0 otherwise.
*/
__owur int SCT_set1_extensions(SCT *sct, const unsigned char *ext,
   size_t ext_len);

/*
* Set *sig to point to the signature for the SCT. sig must not be NULL.
* The SCT retains ownership of this pointer.
* Returns length of the data pointed to.
*/
size_t SCT_get0_signature(const SCT *sct, unsigned char **sig);

/*
* Set the signature of an SCT to point
 directly to the *sig specified.
* The SCT takes ownership of the specified pointer.
*/
void SCT_set0_signature(SCT *sct, unsigned char *sig, size_t sig_len);

/*
* Set the signature of an SCT to be a copy of the *sig specified.
* Returns 1 on success, 0 otherwise.
*/
```

```
__owur int SCT_set1_signature(SCT *sct, const unsigned char *sig,
   size_t sig_len);

/*
* The origin of this SCT, e.g. TLS extension, OCSP response, etc.
*/
sct_source_t SCT_get_source(const SCT *sct);

/*
* Set the origin of this SCT, e.g. TLS extension, OCSP response, etc.
* Returns 1 on success, 0 otherwise.
*/
__owur int SCT_set_source(SCT *sct, sct_source_t source);

/*
* Returns a text string describing the validation status of |sct|.
*/
const char *SCT_validation_status_string(const SCT *sct);

/*
* Pretty-prints an |sct| to |out|.
* It will be indented by the number of spaces specified by |indent|.
* If |logs| is not NULL, it will be used to lookup the CT log that the SCT came
* from, so that the
 log name can be printed.
*/
void SCT_print(const SCT *sct, BIO *out, int indent, const CTLOG_STORE *logs);

/*
* Pretty-prints an |sct_list| to |out|.
* It will be indented by the number of spaces specified by |indent|.
* SCTs will be delimited by |separator|.
* If |logs| is not NULL, it will be used to lookup the CT log that each SCT
* came from, so that the log names can be printed.
*/
void SCT_LIST_print(const STACK_OF(SCT) *sct_list, BIO *out, int indent,
   const char *separator, const CTLOG_STORE *logs);

/*
* Gets the last result of validating this SCT.
* If it has not been validated yet, returns SCT_VALIDATION_STATUS_NOT_SET.
*/
sct_validation_status_t SCT_get_validation_status(const SCT *sct);

/*
* Validates the given SCT with the provided context.
* Sets the "validation_status" field of the SCT.
* Returns 1 if the SCT is valid and the signature verifies.
```

```
* Returns 0 if the SCT is invalid or could not be verified.
* Returns -1 if an error occurs.
*/
__owur
 int SCT_validate(SCT *sct, const CT_POLICY_EVAL_CTX *ctx);

/*
* Validates the given list of SCTs with the provided context.
* Sets the "validation_status" field of each SCT.
* Returns 1 if there are no invalid SCTs and all signatures verify.
* Returns 0 if at least one SCT is invalid or could not be verified.
* Returns a negative integer if an error occurs.
*/
__owur int SCT_LIST_validate(const STACK_OF(SCT) *scts,
   CT_POLICY_EVAL_CTX *ctx);

/**********************************
* SCT parsing and serialization *
**********************************/

/*
* Serialize (to TLS format) a stack of SCTs and return the length.
* "a" must not be NULL.
* If "pp" is NULL, just return the length of what would have been serialized.
* If "pp" is not NULL and "*pp" is null, function will allocate a new pointer
* for data that caller is responsible for freeing (only if function returns
* successfully).
* If "pp" is NULL and "*pp" is not NULL, caller is responsible for ensuring
* that "*pp"
 is large enough to accept all of the serialized data.
* Returns < 0 on error, >= 0 indicating bytes written (or would have been)
* on success.
*/
__owur int i2o_SCT_LIST(const STACK_OF(SCT) *a, unsigned char **pp);

/*
* Convert TLS format SCT list to a stack of SCTs.
* If "a" or "*a" is NULL, a new stack will be created that the caller is
* responsible for freeing (by calling SCT_LIST_free).
* "**pp" and "*pp" must not be NULL.
* Upon success, "*pp" will point to after the last bytes read, and a stack
* will be returned.
* Upon failure, a NULL pointer will be returned, and the position of "*pp" is
* not defined.
*/
STACK_OF(SCT) *o2i_SCT_LIST(STACK_OF(SCT) **a, const unsigned char **pp,
   size_t len);
```

```
/*
* Serialize (to DER format) a stack of SCTs and return the length.
* "a" must not be NULL.
* If "pp" is NULL, just returns the length of what would have been serialized.
* If "pp" is not NULL and "*pp" is null, function will allocate a new pointer
* for data that
 caller is responsible for freeing (only if function returns
* successfully).
* If "pp" is NULL and "*pp" is not NULL, caller is responsible for ensuring
* that "*pp" is large enough to accept all of the serialized data.
* Returns < 0 on error, >= 0 indicating bytes written (or would have been)
* on success.
*/
__owur int i2d_SCT_LIST(const STACK_OF(SCT) *a, unsigned char **pp);

/*
* Parses an SCT list in DER format and returns it.
* If "a" or "*a" is NULL, a new stack will be created that the caller is
* responsible for freeing (by calling SCT_LIST_free).
* "**pp" and "*pp" must not be NULL.
* Upon success, "*pp" will point to after the last bytes read, and a stack
* will be returned.
* Upon failure, a NULL pointer will be returned, and the position of "*pp" is
* not defined.
*/
STACK_OF(SCT) *d2i_SCT_LIST(STACK_OF(SCT) **a, const unsigned char **pp,
   long len);

/*
* Serialize (to TLS format) an |sct| and write it to |out|.
* If |out| is null, no SCT will be output
 but the length will still be returned.
* If |out| points to a null pointer, a string will be allocated to hold the
* TLS-format SCT. It is the responsibility of the caller to free it.
* If |out| points to an allocated string, the TLS-format SCT will be written
* to it.
* The length of the SCT in TLS format will be returned.
*/
__owur int i2o_SCT(const SCT *sct, unsigned char **out);

/*
* Parses an SCT in TLS format and returns it.
* If |psct| is not null, it will end up pointing to the parsed SCT. If it
* already points to a non-null pointer, the pointer will be free'd.
* |in| should be a pointer to a string containing the TLS-format SCT.
* |in| will be advanced to the end of the SCT if parsing succeeds.
* |len| should be the length of the SCT in |in|.
* Returns NULL if an error occurs.
```

```
* If the SCT is an unsupported version, only the SCT's 'sct' and 'sct_len'
* fields will be populated (with |in| and |len| respectively).
*/
SCT *o2i_SCT(SCT **psct, const unsigned
 char **in, size_t len);

/********************
* CT log functions *
********************/

/*
* Creates a new CT log instance with the given |public_key| and |name| and
* associates it with the give library context |libctx| and property query
* string |propq|.
* Takes ownership of |public_key| but copies |name|.
* Returns NULL if malloc fails or if |public_key| cannot be converted to DER.
* Should be deleted by the caller using CTLOG_free when no longer needed.
*/
CTLOG *CTLOG_new_ex(EVP_PKEY *public_key, const char *name, OSSL_LIB_CTX *libctx,
   const char *propq);

/*
* The same as CTLOG_new_ex except that the default library context and
* property query string are used.
*/
CTLOG *CTLOG_new(EVP_PKEY *public_key, const char *name);

/*
* Creates a new CTLOG instance with the base64-encoded SubjectPublicKeyInfo DER
* in |pkey_base64| and associated with the given library context |libctx| and
* property query string |propq|. The |name| is a string to help users identify
 * this log.
* Returns 1 on success, 0 on failure.
* Should be deleted by the caller using CTLOG_free when no longer needed.
*/
int CTLOG_new_from_base64_ex(CTLOG **ct_log, const char *pkey_base64,
   const char *name, OSSL_LIB_CTX *libctx,
   const char *propq);

/*
* The same as CTLOG_new_from_base64_ex() except that the default
* library context and property query string are used.
* Returns 1 on success, 0 on failure.
*/
int CTLOG_new_from_base64(CTLOG **ct_log,
   const char *pkey_base64, const char *name);

/*
```

```
* Deletes a CT log instance and its fields.
*/
void CTLOG_free(CTLOG *log);

/* Gets the name of the CT log */
const char *CTLOG_get0_name(const CTLOG *log);
/* Gets the ID of the CT log */
void CTLOG_get0_log_id(const CTLOG *log, const uint8_t **log_id,
   size_t *log_id_len);
/* Gets the public key of the CT log */
EVP_PKEY *CTLOG_get0_public_key(const CTLOG *log);

/***************************
* CT log store functions *
***************************/

/*
* Creates
 a new CT log store and associates it with the given libctx and
* property query string.
* Should be deleted by the caller using CTLOG_STORE_free when no longer needed.
*/
CTLOG_STORE *CTLOG_STORE_new_ex(OSSL_LIB_CTX *libctx, const char *propq);

/*
* Same as CTLOG_STORE_new_ex except that the default libctx and
* property query string are used.
* Should be deleted by the caller using CTLOG_STORE_free when no longer needed.
*/
CTLOG_STORE *CTLOG_STORE_new(void);

/*
* Deletes a CT log store and all of the CT log instances held within.
*/
void CTLOG_STORE_free(CTLOG_STORE *store);

/*
* Finds a CT log in the store based on its log ID.
* Returns the CT log, or NULL if no match is found.
*/
const CTLOG *CTLOG_STORE_get0_log_by_id(const CTLOG_STORE *store,
   const uint8_t *log_id,
   size_t log_id_len);

/*
* Loads a CT log list into a |store| from a |file|.
* Returns 1 if loading is successful, or 0 otherwise.
*/
```

```
__owur int CTLOG_STORE_load_file(CTLOG_STORE *store,
 const char *file);

/*
* Loads the default CT log list into a |store|.
* Returns 1 if loading is successful, or 0 otherwise.
*/
__owur int CTLOG_STORE_load_default_file(CTLOG_STORE *store);

#ifdef __cplusplus
}
#endif
#endif
#endif
/*
* Copyright 1995-2023 The OpenSSL Project Authors. All Rights Reserved.
*
* Licensed under the Apache License 2.0 (the "License").  You may not use
* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_ERR_H
#define OPENSSL_ERR_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_ERR_H
#endif

#include <openssl/e_os2.h>

#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#include <stdlib.h>
#endif

#include <openssl/types.h>
#include <openssl/bio.h>
#include <openssl/lhash.h>
#include <openssl/cryptoerr_legacy.h>
```

```
#ifdef __cplusplus
extern "C" {
#endif

#ifndef OPENSSL_NO_DEPRECATED_3_0
#ifndef OPENSSL_NO_FILENAMES
#define ERR_PUT_error(l, f, r, fn, ln) ERR_put_error(l, f, r, fn, ln)
#else
#define ERR_PUT_error(l, f, r, fn, ln) ERR_put_error(l, f, r, NULL, 0)
#endif
#endif

#include
 <limits.h>
#include <errno.h>

#define ERR_TXT_MALLOCED 0x01
#define ERR_TXT_STRING 0x02

#if !defined(OPENSSL_NO_DEPRECATED_3_0) || defined(OSSL_FORCE_ERR_STATE)
#define ERR_FLAG_MARK 0x01
#define ERR_FLAG_CLEAR 0x02

#define ERR_NUM_ERRORS 16
struct err_state_st {
   int err_flags[ERR_NUM_ERRORS];
   int err_marks[ERR_NUM_ERRORS];
   unsigned long err_buffer[ERR_NUM_ERRORS];
   char *err_data[ERR_NUM_ERRORS];
   size_t err_data_size[ERR_NUM_ERRORS];
   int err_data_flags[ERR_NUM_ERRORS];
   char *err_file[ERR_NUM_ERRORS];
   int err_line[ERR_NUM_ERRORS];
   char *err_func[ERR_NUM_ERRORS];
   int top, bottom;
};
#endif

/* library */
#define ERR_LIB_NONE 1
#define ERR_LIB_SYS 2
#define ERR_LIB_BN 3
#define ERR_LIB_RSA 4
#define ERR_LIB_DH 5
#define ERR_LIB_EVP 6
#define ERR_LIB_BUF 7
#define ERR_LIB_OBJ 8
#define ERR_LIB_PEM 9
```

```
#define ERR_LIB_DSA 10
#define ERR_LIB_X509 11
/* #define ERR_LIB_METH         12 */
#define ERR_LIB_ASN1 13
#define ERR_LIB_CONF
 14
#define ERR_LIB_CRYPTO 15
#define ERR_LIB_EC 16
#define ERR_LIB_SSL 20
/* #define ERR_LIB_SSL23        21 */
/* #define ERR_LIB_SSL2         22 */
/* #define ERR_LIB_SSL3         23 */
/* #define ERR_LIB_RSAREF       30 */
/* #define ERR_LIB_PROXY        31 */
#define ERR_LIB_BIO 32
#define ERR_LIB_PKCS7 33
#define ERR_LIB_X509V3 34
#define ERR_LIB_PKCS12 35
#define ERR_LIB_RAND 36
#define ERR_LIB_DSO 37
#define ERR_LIB_ENGINE 38
#define ERR_LIB_OCSP 39
#define ERR_LIB_UI 40
#define ERR_LIB_COMP 41
#define ERR_LIB_ECDSA 42
#define ERR_LIB_ECDH 43
#define ERR_LIB_OSSL_STORE 44
#define ERR_LIB_FIPS 45
#define ERR_LIB_CMS 46
#define ERR_LIB_TS 47
#define ERR_LIB_HMAC 48
/* # define ERR_LIB_JPAKE       49 */
#define ERR_LIB_CT 50
#define ERR_LIB_ASYNC 51
#define ERR_LIB_KDF 52
#define ERR_LIB_SM2 53
#define ERR_LIB_ESS 54
#define ERR_LIB_PROP 55
#define ERR_LIB_CRMF 56
#define ERR_LIB_PROV 57
#define ERR_LIB_CMP 58
#define ERR_LIB_OSSL_ENCODER 59
#define ERR_LIB_OSSL_DECODER 60
#define
 ERR_LIB_HTTP 61

#define ERR_LIB_USER 128
```

```
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define ASN1err(f, r) ERR_raise_data(ERR_LIB_ASN1, (r), NULL)
#define ASYNCerr(f, r) ERR_raise_data(ERR_LIB_ASYNC, (r), NULL)
#define BIOerr(f, r) ERR_raise_data(ERR_LIB_BIO, (r), NULL)
#define BNerr(f, r) ERR_raise_data(ERR_LIB_BN, (r), NULL)
#define BUFerr(f, r) ERR_raise_data(ERR_LIB_BUF, (r), NULL)
#define CMPerr(f, r) ERR_raise_data(ERR_LIB_CMP, (r), NULL)
#define CMSerr(f, r) ERR_raise_data(ERR_LIB_CMS, (r), NULL)
#define COMPerr(f, r) ERR_raise_data(ERR_LIB_COMP, (r), NULL)
#define CONFerr(f, r) ERR_raise_data(ERR_LIB_CONF, (r), NULL)
#define CRMFerr(f, r) ERR_raise_data(ERR_LIB_CRMF, (r), NULL)
#define CRYPTOerr(f, r) ERR_raise_data(ERR_LIB_CRYPTO, (r), NULL)
#define CTerr(f, r) ERR_raise_data(ERR_LIB_CT, (r), NULL)
#define DHerr(f, r) ERR_raise_data(ERR_LIB_DH, (r), NULL)
#define DSAerr(f, r) ERR_raise_data(ERR_LIB_DSA, (r), NULL)
#define DSOerr(f, r) ERR_raise_data(ERR_LIB_DSO, (r), NULL)
#define
 ECDHerr(f, r) ERR_raise_data(ERR_LIB_ECDH, (r), NULL)
#define ECDSAerr(f, r) ERR_raise_data(ERR_LIB_ECDSA, (r), NULL)
#define ECerr(f, r) ERR_raise_data(ERR_LIB_EC, (r), NULL)
#define ENGINEerr(f, r) ERR_raise_data(ERR_LIB_ENGINE, (r), NULL)
#define ESSerr(f, r) ERR_raise_data(ERR_LIB_ESS, (r), NULL)
#define EVPerr(f, r) ERR_raise_data(ERR_LIB_EVP, (r), NULL)
#define FIPSerr(f, r) ERR_raise_data(ERR_LIB_FIPS, (r), NULL)
#define HMACerr(f, r) ERR_raise_data(ERR_LIB_HMAC, (r), NULL)
#define HTTPerr(f, r) ERR_raise_data(ERR_LIB_HTTP, (r), NULL)
#define KDFerr(f, r) ERR_raise_data(ERR_LIB_KDF, (r), NULL)
#define OBJerr(f, r) ERR_raise_data(ERR_LIB_OBJ, (r), NULL)
#define OCSPerr(f, r) ERR_raise_data(ERR_LIB_OCSP, (r), NULL)
#define OSSL_STOREerr(f, r) ERR_raise_data(ERR_LIB_OSSL_STORE, (r), NULL)
#define PEMerr(f, r) ERR_raise_data(ERR_LIB_PEM, (r), NULL)
#define PKCS12err(f, r) ERR_raise_data(ERR_LIB_PKCS12, (r), NULL)
#define PKCS7err(f, r) ERR_raise_data(ERR_LIB_PKCS7, (r), NULL)
#define
 PROPerr(f, r) ERR_raise_data(ERR_LIB_PROP, (r), NULL)
#define PROVerr(f, r) ERR_raise_data(ERR_LIB_PROV, (r), NULL)
#define RANDerr(f, r) ERR_raise_data(ERR_LIB_RAND, (r), NULL)
#define RSAerr(f, r) ERR_raise_data(ERR_LIB_RSA, (r), NULL)
#define KDFerr(f, r) ERR_raise_data(ERR_LIB_KDF, (r), NULL)
#define SM2err(f, r) ERR_raise_data(ERR_LIB_SM2, (r), NULL)
#define SSLerr(f, r) ERR_raise_data(ERR_LIB_SSL, (r), NULL)
#define SYSerr(f, r) ERR_raise_data(ERR_LIB_SYS, (r), NULL)
#define TSerr(f, r) ERR_raise_data(ERR_LIB_TS, (r), NULL)
#define UIerr(f, r) ERR_raise_data(ERR_LIB_UI, (r), NULL)
#define X509V3err(f, r) ERR_raise_data(ERR_LIB_X509V3, (r), NULL)
#define X509err(f, r) ERR_raise_data(ERR_LIB_X509, (r), NULL)
#endif
```

```
/*-
* The error code packs differently depending on if it records a system
* error or an OpenSSL error.
*
* A system error packs like this (we follow POSIX and only allow positive
* numbers that fit in an |int|):
*
* +-+-----------------------------------------------------------+
 * |1|                    system error number                    |
* +-+-----------------------------------------------------------+
*
* An OpenSSL error packs like this:
*
* <---------------------------- 32 bits --------------------------->
*    <--- 8 bits --->< ------------------ 23 bits ------------------>
* +-+---------------+-------------------------------------------+
* |0|    library    |                   reason                  |
* +-+---------------+-------------------------------------------+
*
* A few of the reason bits are reserved as flags with special meaning:
*
*                  <5 bits-<>--------- 19 bits ------------------>
*                 +-------+-+-----------------------------------+
*                 | rflags| |         reason                    |
*                 +-------+-+-----------------------------------+
*                        ^
*                        |
*                        ERR_RFLAG_FATAL
 = ERR_R_FATAL
*
* The reason flags are part of the overall reason code for practical
* reasons, as they provide an easy way to place different types of
* reason codes in different numeric ranges.
*
* The currently known reason flags are:
*
* ERR_RFLAG_FATAL      Flags that the reason code is considered fatal.
*                      For backward compatibility reasons, this flag
*                      is also the code for ERR_R_FATAL (that reason
*                      code served the dual purpose of flag and reason
*                      code in one in pre-3.0 OpenSSL).
* ERR_RFLAG_COMMON     Flags that the reason code is common to all
*                      libraries.  All ERR_R_ macros must use this flag,
*                      and no other _R_ macro is allowed to use it.
*/

/* Macros to help decode recorded system errors */
#define ERR_SYSTEM_FLAG ((unsigned int)INT_MAX + 1)
```

```
#define ERR_SYSTEM_MASK ((unsigned int)INT_MAX)

/*
* Macros to help decode recorded
 OpenSSL errors
* As expressed above, RFLAGS and REASON overlap by one bit to allow
* ERR_R_FATAL to use ERR_RFLAG_FATAL as its reason code.
*/
#define ERR_LIB_OFFSET 23L
#define ERR_LIB_MASK 0xFF
#define ERR_RFLAGS_OFFSET 18L
#define ERR_RFLAGS_MASK 0x1F
#define ERR_REASON_MASK 0X7FFFFF

/*
* Reason flags are defined pre-shifted to easily combine with the reason
* number.
*/
#define ERR_RFLAG_FATAL (0x1 << ERR_RFLAGS_OFFSET)
#define ERR_RFLAG_COMMON (0x2 << ERR_RFLAGS_OFFSET)

#define ERR_SYSTEM_ERROR(errcode) (((errcode) & ERR_SYSTEM_FLAG) != 0)

static ossl_unused ossl_inline int ERR_GET_LIB(unsigned long errcode)
{
  if (ERR_SYSTEM_ERROR(errcode))
      return ERR_LIB_SYS;
  return (errcode >> ERR_LIB_OFFSET) & ERR_LIB_MASK;
}

static ossl_unused ossl_inline int ERR_GET_RFLAGS(unsigned long errcode)
{
  if (ERR_SYSTEM_ERROR(errcode))
      return 0;
  return errcode & (ERR_RFLAGS_MASK << ERR_RFLAGS_OFFSET);
}

static ossl_unused ossl_inline int ERR_GET_REASON(unsigned
 long errcode)
{
  if (ERR_SYSTEM_ERROR(errcode))
      return errcode & ERR_SYSTEM_MASK;
  return errcode & ERR_REASON_MASK;
}

static ossl_unused ossl_inline int ERR_FATAL_ERROR(unsigned long errcode)
{
  return (ERR_GET_RFLAGS(errcode) & ERR_RFLAG_FATAL) != 0;
```

```
}

static ossl_unused ossl_inline int ERR_COMMON_ERROR(unsigned long errcode)
{
  return (ERR_GET_RFLAGS(errcode) & ERR_RFLAG_COMMON) != 0;
}

/*
* ERR_PACK is a helper macro to properly pack OpenSSL error codes and may
* only be used for that purpose.  System errors are packed internally.
* ERR_PACK takes reason flags and reason code combined in |reason|.
* ERR_PACK ignores |func|, that parameter is just legacy from pre-3.0 OpenSSL.
*/
#define ERR_PACK(lib, func, reason) \
  ((((unsigned long)(lib) & ERR_LIB_MASK) << ERR_LIB_OFFSET) | (((unsigned long)(reason) &
ERR_REASON_MASK)))

#ifndef OPENSSL_NO_DEPRECATED_3_0
#define SYS_F_FOPEN 0
#define SYS_F_CONNECT 0
#define SYS_F_GETSERVBYNAME 0
#define SYS_F_SOCKET
 0
#define SYS_F_IOCTLSOCKET 0
#define SYS_F_BIND 0
#define SYS_F_LISTEN 0
#define SYS_F_ACCEPT 0
#define SYS_F_WSASTARTUP 0
#define SYS_F_OPENDIR 0
#define SYS_F_FREAD 0
#define SYS_F_GETADDRINFO 0
#define SYS_F_GETNAMEINFO 0
#define SYS_F_SETSOCKOPT 0
#define SYS_F_GETSOCKOPT 0
#define SYS_F_GETSOCKNAME 0
#define SYS_F_GETHOSTBYNAME 0
#define SYS_F_FFLUSH 0
#define SYS_F_OPEN 0
#define SYS_F_CLOSE 0
#define SYS_F_IOCTL 0
#define SYS_F_STAT 0
#define SYS_F_FCNTL 0
#define SYS_F_FSTAT 0
#define SYS_F_SENDFILE 0
#endif

/*
* All ERR_R_ codes must be combined with ERR_RFLAG_COMMON.
```

```
*/

/* "we came from here" global reason codes, range 1..255 */
#define ERR_R_SYS_LIB (ERR_LIB_SYS /* 2 */ | ERR_RFLAG_COMMON)
#define ERR_R_BN_LIB (ERR_LIB_BN /* 3 */ | ERR_RFLAG_COMMON)
#define ERR_R_RSA_LIB (ERR_LIB_RSA /* 4 */ | ERR_RFLAG_COMMON)
#define ERR_R_DH_LIB (ERR_LIB_DH /* 5 */ | ERR_RFLAG_COMMON)
#define ERR_R_EVP_LIB (ERR_LIB_EVP /* 6 */ | ERR_RFLAG_COMMON)
#define ERR_R_BUF_LIB (ERR_LIB_BUF
 /* 7 */ | ERR_RFLAG_COMMON)
#define ERR_R_OBJ_LIB (ERR_LIB_OBJ /* 8 */ | ERR_RFLAG_COMMON)
#define ERR_R_PEM_LIB (ERR_LIB_PEM /* 9 */ | ERR_RFLAG_COMMON)
#define ERR_R_DSA_LIB (ERR_LIB_DSA /* 10 */ | ERR_RFLAG_COMMON)
#define ERR_R_X509_LIB (ERR_LIB_X509 /* 11 */ | ERR_RFLAG_COMMON)
#define ERR_R_ASN1_LIB (ERR_LIB_ASN1 /* 13 */ | ERR_RFLAG_COMMON)
#define ERR_R_CONF_LIB (ERR_LIB_CONF /* 14 */ | ERR_RFLAG_COMMON)
#define ERR_R_CRYPTO_LIB (ERR_LIB_CRYPTO /* 15 */ | ERR_RFLAG_COMMON)
#define ERR_R_EC_LIB (ERR_LIB_EC /* 16 */ | ERR_RFLAG_COMMON)
#define ERR_R_SSL_LIB (ERR_LIB_SSL /* 20 */ | ERR_RFLAG_COMMON)
#define ERR_R_BIO_LIB (ERR_LIB_BIO /* 32 */ | ERR_RFLAG_COMMON)
#define ERR_R_PKCS7_LIB (ERR_LIB_PKCS7 /* 33 */ | ERR_RFLAG_COMMON)
#define ERR_R_X509V3_LIB (ERR_LIB_X509V3 /* 34 */ | ERR_RFLAG_COMMON)
#define ERR_R_PKCS12_LIB (ERR_LIB_PKCS12 /* 35 */ | ERR_RFLAG_COMMON)
#define ERR_R_RAND_LIB (ERR_LIB_RAND /* 36 */ | ERR_RFLAG_COMMON)
#define ERR_R_DSO_LIB (ERR_LIB_DSO /* 37 */
 | ERR_RFLAG_COMMON)
#define ERR_R_ENGINE_LIB (ERR_LIB_ENGINE /* 38 */ | ERR_RFLAG_COMMON)
#define ERR_R_UI_LIB (ERR_LIB_UI /* 40 */ | ERR_RFLAG_COMMON)
#define ERR_R_ECDSA_LIB (ERR_LIB_ECDSA /* 42 */ | ERR_RFLAG_COMMON)
#define ERR_R_OSSL_STORE_LIB (ERR_LIB_OSSL_STORE /* 44 */ | ERR_RFLAG_COMMON)
#define ERR_R_CMS_LIB (ERR_LIB_CMS /* 46 */ | ERR_RFLAG_COMMON)
#define ERR_R_TS_LIB (ERR_LIB_TS /* 47 */ | ERR_RFLAG_COMMON)
#define ERR_R_CT_LIB (ERR_LIB_CT /* 50 */ | ERR_RFLAG_COMMON)
#define ERR_R_PROV_LIB (ERR_LIB_PROV /* 57 */ | ERR_RFLAG_COMMON)
#define ERR_R_ESS_LIB (ERR_LIB_ESS /* 54 */ | ERR_RFLAG_COMMON)
#define ERR_R_CMP_LIB (ERR_LIB_CMP /* 58 */ | ERR_RFLAG_COMMON)
#define ERR_R_OSSL_ENCODER_LIB (ERR_LIB_OSSL_ENCODER /* 59 */ | ERR_RFLAG_COMMON)
#define ERR_R_OSSL_DECODER_LIB (ERR_LIB_OSSL_DECODER /* 60 */ | ERR_RFLAG_COMMON)

/* Other common error codes, range 256..2^ERR_RFLAGS_OFFSET-1 */
#define ERR_R_FATAL (ERR_RFLAG_FATAL | ERR_RFLAG_COMMON)
#define ERR_R_MALLOC_FAILURE (256
 | ERR_R_FATAL)
#define ERR_R_SHOULD_NOT_HAVE_BEEN_CALLED (257 | ERR_R_FATAL)
#define ERR_R_PASSED_NULL_PARAMETER (258 | ERR_R_FATAL)
#define ERR_R_INTERNAL_ERROR (259 | ERR_R_FATAL)
#define ERR_R_DISABLED (260 | ERR_R_FATAL)
#define ERR_R_INIT_FAIL (261 | ERR_R_FATAL)
```

```
#define ERR_R_PASSED_INVALID_ARGUMENT (262 | ERR_RFLAG_COMMON)
#define ERR_R_OPERATION_FAIL (263 | ERR_R_FATAL)
#define ERR_R_INVALID_PROVIDER_FUNCTIONS (264 | ERR_R_FATAL)
#define ERR_R_INTERRUPTED_OR_CANCELLED (265 | ERR_RFLAG_COMMON)
#define ERR_R_NESTED_ASN1_ERROR (266 | ERR_RFLAG_COMMON)
#define ERR_R_MISSING_ASN1_EOS (267 | ERR_RFLAG_COMMON)
#define ERR_R_UNSUPPORTED (268 | ERR_RFLAG_COMMON)
#define ERR_R_FETCH_FAILED (269 | ERR_RFLAG_COMMON)
#define ERR_R_INVALID_PROPERTY_DEFINITION (270 | ERR_RFLAG_COMMON)
#define ERR_R_UNABLE_TO_GET_READ_LOCK (271 | ERR_R_FATAL)
#define ERR_R_UNABLE_TO_GET_WRITE_LOCK (272 | ERR_R_FATAL)

typedef struct ERR_string_data_st {
  unsigned long error;
  const char *string;
} ERR_STRING_DATA;

/*
 clang-format off */
DEFINE_LHASH_OF_INTERNAL(ERR_STRING_DATA);
#define lh_ERR_STRING_DATA_new(hfn, cmp) ((LHASH_OF(ERR_STRING_DATA)
*)OPENSSL_LH_set_thunks(OPENSSL_LH_new(ossl_check_ERR_STRING_DATA_lh_hashfunc_type(hfn),
ossl_check_ERR_STRING_DATA_lh_compfunc_type(cmp)), lh_ERR_STRING_DATA_hash_thunk,
lh_ERR_STRING_DATA_comp_thunk, lh_ERR_STRING_DATA_doall_thunk,
lh_ERR_STRING_DATA_doall_arg_thunk))
#define lh_ERR_STRING_DATA_free(lh) OPENSSL_LH_free(ossl_check_ERR_STRING_DATA_lh_type(lh))
#define lh_ERR_STRING_DATA_flush(lh) OPENSSL_LH_flush(ossl_check_ERR_STRING_DATA_lh_type(lh))
#define lh_ERR_STRING_DATA_insert(lh, ptr) ((ERR_STRING_DATA
*)OPENSSL_LH_insert(ossl_check_ERR_STRING_DATA_lh_type(lh),
ossl_check_ERR_STRING_DATA_lh_plain_type(ptr)))
#define lh_ERR_STRING_DATA_delete(lh, ptr) ((ERR_STRING_DATA
*)OPENSSL_LH_delete(ossl_check_ERR_STRING_DATA_lh_type(lh),
ossl_check_const_ERR_STRING_DATA_lh_plain_type(ptr)))
#define lh_ERR_STRING_DATA_retrieve(lh, ptr) ((ERR_STRING_DATA
 *)OPENSSL_LH_retrieve(ossl_check_ERR_STRING_DATA_lh_type(lh),
ossl_check_const_ERR_STRING_DATA_lh_plain_type(ptr)))
#define lh_ERR_STRING_DATA_error(lh) OPENSSL_LH_error(ossl_check_ERR_STRING_DATA_lh_type(lh))
#define lh_ERR_STRING_DATA_num_items(lh)
OPENSSL_LH_num_items(ossl_check_ERR_STRING_DATA_lh_type(lh))
#define lh_ERR_STRING_DATA_node_stats_bio(lh, out)
OPENSSL_LH_node_stats_bio(ossl_check_const_ERR_STRING_DATA_lh_type(lh), out)
#define lh_ERR_STRING_DATA_node_usage_stats_bio(lh, out)
OPENSSL_LH_node_usage_stats_bio(ossl_check_const_ERR_STRING_DATA_lh_type(lh), out)
#define lh_ERR_STRING_DATA_stats_bio(lh, out)
OPENSSL_LH_stats_bio(ossl_check_const_ERR_STRING_DATA_lh_type(lh), out)
#define lh_ERR_STRING_DATA_get_down_load(lh)
OPENSSL_LH_get_down_load(ossl_check_ERR_STRING_DATA_lh_type(lh))
#define lh_ERR_STRING_DATA_set_down_load(lh, dl)
```

```
OPENSSL_LH_set_down_load(ossl_check_ERR_STRING_DATA_lh_type(lh), dl)
#define lh_ERR_STRING_DATA_doall(lh, dfn)
OPENSSL_LH_doall(ossl_check_ERR_STRING_DATA_lh_type(lh),
 ossl_check_ERR_STRING_DATA_lh_doallfunc_type(dfn))

/* clang-format on */

/* 12 lines and some on an 80 column terminal */
#define ERR_MAX_DATA_SIZE 1024

/* Building blocks */
void ERR_new(void);
void ERR_set_debug(const char *file, int line, const char *func);
void ERR_set_error(int lib, int reason, const char *fmt, ...);
void ERR_vset_error(int lib, int reason, const char *fmt, va_list args);

/* Main error raising functions */
#define ERR_raise(lib, reason) ERR_raise_data((lib), (reason), NULL)
#define ERR_raise_data                                  \
   (ERR_new(),                                          \
       ERR_set_debug(OPENSSL_FILE, OPENSSL_LINE, OPENSSL_FUNC), \
       ERR_set_error)

#ifndef OPENSSL_NO_DEPRECATED_3_0
/* Backward compatibility */
#define ERR_put_error(lib, func, reason, file, line) \
   (ERR_new(),                                  \
       ERR_set_debug((file), (line), OPENSSL_FUNC), \

      ERR_set_error((lib), (reason), NULL))
#endif

void ERR_set_error_data(char *data, int flags);

unsigned long ERR_get_error(void);
unsigned long ERR_get_error_all(const char **file, int *line,
   const char **func,
   const char **data, int *flags);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0
unsigned long ERR_get_error_line(const char **file, int *line);
OSSL_DEPRECATEDIN_3_0
unsigned long ERR_get_error_line_data(const char **file, int *line,
   const char **data, int *flags);
#endif
unsigned long ERR_peek_error(void);
unsigned long ERR_peek_error_line(const char **file, int *line);
unsigned long ERR_peek_error_func(const char **func);
```

```
unsigned long ERR_peek_error_data(const char **data, int *flags);
unsigned long ERR_peek_error_all(const char **file, int *line,
   const char **func,
   const char **data, int *flags);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0
unsigned long ERR_peek_error_line_data(const char **file, int *line,
   const char **data,
 int *flags);
#endif
unsigned long ERR_peek_last_error(void);
unsigned long ERR_peek_last_error_line(const char **file, int *line);
unsigned long ERR_peek_last_error_func(const char **func);
unsigned long ERR_peek_last_error_data(const char **data, int *flags);
unsigned long ERR_peek_last_error_all(const char **file, int *line,
   const char **func,
   const char **data, int *flags);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0
unsigned long ERR_peek_last_error_line_data(const char **file, int *line,
   const char **data, int *flags);
#endif

void ERR_clear_error(void);

char *ERR_error_string(unsigned long e, char *buf);
void ERR_error_string_n(unsigned long e, char *buf, size_t len);
const char *ERR_lib_error_string(unsigned long e);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 const char *ERR_func_error_string(unsigned long e);
#endif
const char *ERR_reason_error_string(unsigned long e);

void ERR_print_errors_cb(int (*cb)(const char *str, size_t len, void *u),
    void *u);
#ifndef OPENSSL_NO_STDIO
void ERR_print_errors_fp(FILE *fp);
#endif
void ERR_print_errors(BIO *bp);

void ERR_add_error_data(int num, ...);
void ERR_add_error_vdata(int num, va_list args);
void ERR_add_error_txt(const char *sepr, const char *txt);
void ERR_add_error_mem_bio(const char *sep, BIO *bio);

int ERR_load_strings(int lib, ERR_STRING_DATA *str);
int ERR_load_strings_const(const ERR_STRING_DATA *str);
int ERR_unload_strings(int lib, ERR_STRING_DATA *str);
```

```
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define ERR_load_crypto_strings() \
   OPENSSL_init_crypto(OPENSSL_INIT_LOAD_CRYPTO_STRINGS, NULL)
#define ERR_free_strings() \
   while (0)            \
   continue
#endif
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 void ERR_remove_thread_state(void *);
#endif
#ifndef OPENSSL_NO_DEPRECATED_1_0_0
OSSL_DEPRECATEDIN_1_0_0 void ERR_remove_state(unsigned long pid);
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 ERR_STATE *ERR_get_state(void);
#endif

int
 ERR_get_next_error_library(void);

int ERR_set_mark(void);
int ERR_pop_to_mark(void);
int ERR_clear_last_mark(void);
int ERR_count_to_mark(void);
int ERR_pop(void);

ERR_STATE *OSSL_ERR_STATE_new(void);
void OSSL_ERR_STATE_save(ERR_STATE *es);
void OSSL_ERR_STATE_save_to_mark(ERR_STATE *es);
void OSSL_ERR_STATE_restore(const ERR_STATE *es);
void OSSL_ERR_STATE_free(ERR_STATE *es);

#ifdef __cplusplus
}
#endif

#endif
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/ssl.h.in
*
* Copyright 1995-2025 The OpenSSL Project Authors. All Rights Reserved.
* Copyright (c) 2002, Oracle and/or its affiliates. All rights reserved
* Copyright 2005 Nokia. All rights reserved.
*
* Licensed under the Apache License 2.0 (the "License").  You may not use
* this file except in compliance with the License.  You can obtain a copy
```

```
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_SSL_H
#define OPENSSL_SSL_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_SSL_H
#endif

#include <openssl/e_os2.h>
#include <openssl/e_ostime.h>
#include <openssl/opensslconf.h>
#include <openssl/comp.h>
#include <openssl/bio.h>
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#include <openssl/x509.h>
#include <openssl/crypto.h>
#include <openssl/buffer.h>
#endif
#include
 <openssl/lhash.h>
#include <openssl/pem.h>
#include <openssl/hmac.h>
#include <openssl/async.h>

#include <openssl/safestack.h>
#include <openssl/symhacks.h>
#include <openssl/ct.h>
#include <openssl/sslerr.h>
#include <openssl/prov_ssl.h>
#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif

#ifdef __cplusplus
extern "C" {
#endif

/* OpenSSL version number for ASN.1 encoding of the session information */
/*-
```

```
* Version 0 - initial version
* Version 1 - added the optional peer certificate
*/
#define SSL_SESSION_ASN1_VERSION 0x0001

#define SSL_MAX_SSL_SESSION_ID_LENGTH 32
#define SSL_MAX_SID_CTX_LENGTH 32

#define SSL_MIN_RSA_MODULUS_LENGTH_IN_BYTES (512 / 8)
#define SSL_MAX_KEY_ARG_LENGTH 8
/* SSL_MAX_MASTER_KEY_LENGTH is defined in prov_ssl.h */

/* The maximum number of encrypt/decrypt pipelines we can support */
#define SSL_MAX_PIPELINES 32

/* text strings for the ciphers */

/* These are used to specify which ciphers to use and not to use */

#define SSL_TXT_LOW "LOW"
#define
 SSL_TXT_MEDIUM "MEDIUM"
#define SSL_TXT_HIGH "HIGH"
#define SSL_TXT_FIPS "FIPS"

#define SSL_TXT_aNULL "aNULL"
#define SSL_TXT_eNULL "eNULL"
#define SSL_TXT_NULL "NULL"

#define SSL_TXT_kRSA "kRSA"
#define SSL_TXT_kDHr "kDHr" /* this cipher class has been removed */
#define SSL_TXT_kDHd "kDHd" /* this cipher class has been removed */
#define SSL_TXT_kDH "kDH" /* this cipher class has been removed */
#define SSL_TXT_kEDH "kEDH" /* alias for kDHE */
#define SSL_TXT_kDHE "kDHE"
#define SSL_TXT_kECDHr "kECDHr" /* this cipher class has been removed */
#define SSL_TXT_kECDHe "kECDHe" /* this cipher class has been removed */
#define SSL_TXT_kECDH "kECDH" /* this cipher class has been removed */
#define SSL_TXT_kEECDH "kEECDH" /* alias for kECDHE */
#define SSL_TXT_kECDHE "kECDHE"
#define SSL_TXT_kPSK "kPSK"
#define SSL_TXT_kRSAPSK "kRSAPSK"
#define SSL_TXT_kECDHEPSK "kECDHEPSK"
#define SSL_TXT_kDHEPSK "kDHEPSK"
#define SSL_TXT_kGOST "kGOST"
#define SSL_TXT_kGOST18 "kGOST18"
#define SSL_TXT_kSRP
```

```
 "kSRP"

#define SSL_TXT_aRSA "aRSA"
#define SSL_TXT_aDSS "aDSS"
#define SSL_TXT_aDH "aDH" /* this cipher class has been removed */
#define SSL_TXT_aECDH "aECDH" /* this cipher class has been removed */
#define SSL_TXT_aECDSA "aECDSA"
#define SSL_TXT_aPSK "aPSK"
#define SSL_TXT_aGOST94 "aGOST94"
#define SSL_TXT_aGOST01 "aGOST01"
#define SSL_TXT_aGOST12 "aGOST12"
#define SSL_TXT_aGOST "aGOST"
#define SSL_TXT_aSRP "aSRP"

#define SSL_TXT_DSS "DSS"
#define SSL_TXT_DH "DH"
#define SSL_TXT_DHE "DHE" /* same as "kDHE:-ADH" */
#define SSL_TXT_EDH "EDH" /* alias for DHE */
#define SSL_TXT_ADH "ADH"
#define SSL_TXT_RSA "RSA"
#define SSL_TXT_ECDH "ECDH"
#define SSL_TXT_EECDH "EECDH" /* alias for ECDHE" */
#define SSL_TXT_ECDHE "ECDHE" /* same as "kECDHE:-AECDH" */
#define SSL_TXT_AECDH "AECDH"
#define SSL_TXT_ECDSA "ECDSA"
#define SSL_TXT_PSK "PSK"
#define SSL_TXT_SRP "SRP"

#define SSL_TXT_DES "DES"
#define SSL_TXT_3DES "3DES"
#define SSL_TXT_RC4 "RC4"
#define SSL_TXT_RC2 "RC2"
#define
 SSL_TXT_IDEA "IDEA"
#define SSL_TXT_SEED "SEED"
#define SSL_TXT_AES128 "AES128"
#define SSL_TXT_AES256 "AES256"
#define SSL_TXT_AES "AES"
#define SSL_TXT_AES_GCM "AESGCM"
#define SSL_TXT_AES_CCM "AESCCM"
#define SSL_TXT_AES_CCM_8 "AESCCM8"
#define SSL_TXT_CAMELLIA128 "CAMELLIA128"
#define SSL_TXT_CAMELLIA256 "CAMELLIA256"
#define SSL_TXT_CAMELLIA "CAMELLIA"
#define SSL_TXT_CHACHA20 "CHACHA20"
#define SSL_TXT_GOST "GOST89"
#define SSL_TXT_ARIA "ARIA"
#define SSL_TXT_ARIA_GCM "ARIAGCM"
```

```
#define SSL_TXT_ARIA128 "ARIA128"
#define SSL_TXT_ARIA256 "ARIA256"
#define SSL_TXT_GOST2012_GOST8912_GOST8912 "GOST2012-GOST8912-GOST8912"
#define SSL_TXT_CBC "CBC"

#define SSL_TXT_MD5 "MD5"
#define SSL_TXT_SHA1 "SHA1"
#define SSL_TXT_SHA "SHA" /* same as "SHA1" */
#define SSL_TXT_GOST94 "GOST94"
#define SSL_TXT_GOST89MAC "GOST89MAC"
#define SSL_TXT_GOST12 "GOST12"
#define SSL_TXT_GOST89MAC12 "GOST89MAC12"
#define SSL_TXT_SHA256 "SHA256"
#define SSL_TXT_SHA384 "SHA384"

#define SSL_TXT_SSLV3 "SSLv3"
#define
 SSL_TXT_TLSV1 "TLSv1"
#define SSL_TXT_TLSV1_1 "TLSv1.1"
#define SSL_TXT_TLSV1_2 "TLSv1.2"

#define SSL_TXT_ALL "ALL"

/*-
* COMPLEMENTOF* definitions. These identifiers are used to (de-select)
* ciphers normally not being used.
* Example: "RC4" will activate all ciphers using RC4 including ciphers
* without authentication, which would normally disabled by DEFAULT (due
* the "!ADH" being part of default). Therefore "RC4:!COMPLEMENTOFDEFAULT"
* will make sure that it is also disabled in the specific selection.
* COMPLEMENTOF* identifiers are portable between version, as adjustments
* to the default cipher setup will also be included here.
*
* COMPLEMENTOFDEFAULT does not experience the same special treatment that
* DEFAULT gets, as only selection is being done and no sorting as needed
* for DEFAULT.
*/
#define SSL_TXT_CMPALL "COMPLEMENTOFALL"
#define SSL_TXT_CMPDEF "COMPLEMENTOFDEFAULT"

/*
* The following cipher list is used by default. It also is substituted when
* an
 application-defined cipher list string starts with 'DEFAULT'.
* This applies to ciphersuites for TLSv1.2 and below.
* DEPRECATED IN 3.0.0, in favor of OSSL_default_cipher_list()
* Update both macro and function simultaneously
*/
```

```
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define SSL_DEFAULT_CIPHER_LIST "ALL:!COMPLEMENTOFDEFAULT:!eNULL"
/*
* This is the default set of TLSv1.3 ciphersuites
* DEPRECATED IN 3.0.0, in favor of OSSL_default_ciphersuites()
* Update both macro and function simultaneously
*/
#define TLS_DEFAULT_CIPHERSUITES "TLS_AES_256_GCM_SHA384:"      \
                                 "TLS_CHACHA20_POLY1305_SHA256:" \
                                 "TLS_AES_128_GCM_SHA256"
#endif
/*
* As of OpenSSL 1.0.0, ssl_create_cipher_list() in ssl/ssl_ciph.c always
* starts with a reasonable order, and all we have to do for DEFAULT is
* throwing out anonymous and unencrypted ciphersuites! (The latter are not
* actually enabled by ALL, but "ALL:RSA" would enable some of them.)
 */

/* Used in SSL_set_shutdown()/SSL_get_shutdown(); */
#define SSL_SENT_SHUTDOWN 1
#define SSL_RECEIVED_SHUTDOWN 2

#ifdef __cplusplus
}
#endif

#ifdef __cplusplus
extern "C" {
#endif

#define SSL_FILETYPE_ASN1 X509_FILETYPE_ASN1
#define SSL_FILETYPE_PEM X509_FILETYPE_PEM

/*
* This is needed to stop compilers complaining about the 'struct ssl_st *'
* function parameters used to prototype callbacks in SSL_CTX.
*/
typedef struct ssl_st *ssl_crock_st;
typedef struct tls_session_ticket_ext_st TLS_SESSION_TICKET_EXT;
typedef struct ssl_method_st SSL_METHOD;
typedef struct ssl_cipher_st SSL_CIPHER;
typedef struct ssl_session_st SSL_SESSION;
typedef struct tls_sigalgs_st TLS_SIGALGS;
typedef struct ssl_conf_ctx_st SSL_CONF_CTX;

STACK_OF(SSL_CIPHER);

/* SRTP protection profiles for use with the use_srtp extension (RFC 5764)*/
```

```
typedef struct srtp_protection_profile_st {
   const char *name;
   unsigned long id;
} SRTP_PROTECTION_PROFILE;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(SRTP_PROTECTION_PROFILE,
 SRTP_PROTECTION_PROFILE, SRTP_PROTECTION_PROFILE)
#define sk_SRTP_PROTECTION_PROFILE_num(sk)
OPENSSL_sk_num(ossl_check_const_SRTP_PROTECTION_PROFILE_sk_type(sk))
#define sk_SRTP_PROTECTION_PROFILE_value(sk, idx) ((SRTP_PROTECTION_PROFILE
*)OPENSSL_sk_value(ossl_check_const_SRTP_PROTECTION_PROFILE_sk_type(sk), (idx)))
#define sk_SRTP_PROTECTION_PROFILE_new(cmp) ((STACK_OF(SRTP_PROTECTION_PROFILE)
*)OPENSSL_sk_new(ossl_check_SRTP_PROTECTION_PROFILE_compfunc_type(cmp)))
#define sk_SRTP_PROTECTION_PROFILE_new_null() ((STACK_OF(SRTP_PROTECTION_PROFILE)
*)OPENSSL_sk_new_null())
#define sk_SRTP_PROTECTION_PROFILE_new_reserve(cmp, n)
((STACK_OF(SRTP_PROTECTION_PROFILE)
*)OPENSSL_sk_new_reserve(ossl_check_SRTP_PROTECTION_PROFILE_compfunc_type(cmp), (n)))
#define sk_SRTP_PROTECTION_PROFILE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk), (n))
#define sk_SRTP_PROTECTION_PROFILE_free(sk)
OPENSSL_sk_free(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk))
#define
 sk_SRTP_PROTECTION_PROFILE_zero(sk)
OPENSSL_sk_zero(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk))
#define sk_SRTP_PROTECTION_PROFILE_delete(sk, i) ((SRTP_PROTECTION_PROFILE
*)OPENSSL_sk_delete(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk), (i)))
#define sk_SRTP_PROTECTION_PROFILE_delete_ptr(sk, ptr) ((SRTP_PROTECTION_PROFILE
*)OPENSSL_sk_delete_ptr(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk),
ossl_check_SRTP_PROTECTION_PROFILE_type(ptr)))
#define sk_SRTP_PROTECTION_PROFILE_push(sk, ptr)
OPENSSL_sk_push(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk),
ossl_check_SRTP_PROTECTION_PROFILE_type(ptr))
#define sk_SRTP_PROTECTION_PROFILE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk),
ossl_check_SRTP_PROTECTION_PROFILE_type(ptr))
#define sk_SRTP_PROTECTION_PROFILE_pop(sk) ((SRTP_PROTECTION_PROFILE
*)OPENSSL_sk_pop(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk)))
#define sk_SRTP_PROTECTION_PROFILE_shift(sk) ((SRTP_PROTECTION_PROFILE
 *)OPENSSL_sk_shift(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk)))
#define sk_SRTP_PROTECTION_PROFILE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk),ossl_check_SRTP_PROTECTI
ON_PROFILE_freefunc_type(freefunc))
#define sk_SRTP_PROTECTION_PROFILE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk),
ossl_check_SRTP_PROTECTION_PROFILE_type(ptr), (idx))
#define sk_SRTP_PROTECTION_PROFILE_set(sk, idx, ptr) ((SRTP_PROTECTION_PROFILE
*)OPENSSL_sk_set(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk), (idx),
```

```
ossl_check_SRTP_PROTECTION_PROFILE_type(ptr)))
#define sk_SRTP_PROTECTION_PROFILE_find(sk, ptr)
OPENSSL_sk_find(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk),
ossl_check_SRTP_PROTECTION_PROFILE_type(ptr))
#define sk_SRTP_PROTECTION_PROFILE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk),
ossl_check_SRTP_PROTECTION_PROFILE_type(ptr))
#define sk_SRTP_PROTECTION_PROFILE_find_all(sk,
 ptr, pnum) OPENSSL_sk_find_all(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk),
ossl_check_SRTP_PROTECTION_PROFILE_type(ptr), pnum)
#define sk_SRTP_PROTECTION_PROFILE_sort(sk)
OPENSSL_sk_sort(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk))
#define sk_SRTP_PROTECTION_PROFILE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_SRTP_PROTECTION_PROFILE_sk_type(sk))
#define sk_SRTP_PROTECTION_PROFILE_dup(sk) ((STACK_OF(SRTP_PROTECTION_PROFILE)
*)OPENSSL_sk_dup(ossl_check_const_SRTP_PROTECTION_PROFILE_sk_type(sk)))
#define sk_SRTP_PROTECTION_PROFILE_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(SRTP_PROTECTION_PROFILE)
*)OPENSSL_sk_deep_copy(ossl_check_const_SRTP_PROTECTION_PROFILE_sk_type(sk),
ossl_check_SRTP_PROTECTION_PROFILE_copyfunc_type(copyfunc),
ossl_check_SRTP_PROTECTION_PROFILE_freefunc_type(freefunc)))
#define sk_SRTP_PROTECTION_PROFILE_set_cmp_func(sk, cmp)
((sk_SRTP_PROTECTION_PROFILE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_SRTP_PROTECTION
_PROFILE_sk_type(sk), ossl_check_SRTP_PROTECTION_PROFILE_compfunc_type(cmp)))

/*
 clang-format on */

typedef int (*tls_session_ticket_ext_cb_fn)(SSL *s, const unsigned char *data,
   int len, void *arg);
typedef int (*tls_session_secret_cb_fn)(SSL *s, void *secret, int *secret_len,
   STACK_OF(SSL_CIPHER) *peer_ciphers,
   const SSL_CIPHER **cipher, void *arg);

/* Extension context codes */
/* This extension is only allowed in TLS */
#define SSL_EXT_TLS_ONLY 0x00001
/* This extension is only allowed in DTLS */
#define SSL_EXT_DTLS_ONLY 0x00002
/* Some extensions may be allowed in DTLS but we don't implement them for it */
#define SSL_EXT_TLS_IMPLEMENTATION_ONLY 0x00004
/* Most extensions are not defined for SSLv3 but EXT_TYPE_renegotiate is */
#define SSL_EXT_SSL3_ALLOWED 0x00008
/* Extension is only defined for TLS1.2 and below */
#define SSL_EXT_TLS1_2_AND_BELOW_ONLY 0x00010
/* Extension is only defined for TLS1.3 and above */
#define SSL_EXT_TLS1_3_ONLY 0x00020
/* Ignore this extension during parsing if we are resuming
```

```
 */
#define SSL_EXT_IGNORE_ON_RESUMPTION 0x00040
#define SSL_EXT_CLIENT_HELLO 0x00080
/* Really means TLS1.2 or below */
#define SSL_EXT_TLS1_2_SERVER_HELLO 0x00100
#define SSL_EXT_TLS1_3_SERVER_HELLO 0x00200
#define SSL_EXT_TLS1_3_ENCRYPTED_EXTENSIONS 0x00400
#define SSL_EXT_TLS1_3_HELLO_RETRY_REQUEST 0x00800
#define SSL_EXT_TLS1_3_CERTIFICATE 0x01000
#define SSL_EXT_TLS1_3_NEW_SESSION_TICKET 0x02000
#define SSL_EXT_TLS1_3_CERTIFICATE_REQUEST 0x04000
#define SSL_EXT_TLS1_3_CERTIFICATE_COMPRESSION 0x08000
/* When sending a raw public key in a certificate message */
#define SSL_EXT_TLS1_3_RAW_PUBLIC_KEY 0x10000

/* Typedefs for handling custom extensions */

typedef int (*custom_ext_add_cb)(SSL *s, unsigned int ext_type,
   const unsigned char **out, size_t *outlen,
   int *al, void *add_arg);

typedef void (*custom_ext_free_cb)(SSL *s, unsigned int ext_type,
   const unsigned char *out, void *add_arg);

typedef int (*custom_ext_parse_cb)(SSL *s, unsigned int ext_type,
   const
 unsigned char *in, size_t inlen,
   int *al, void *parse_arg);

typedef int (*SSL_custom_ext_add_cb_ex)(SSL *s, unsigned int ext_type,
   unsigned int context,
   const unsigned char **out,
   size_t *outlen, X509 *x,
   size_t chainidx,
   int *al, void *add_arg);

typedef void (*SSL_custom_ext_free_cb_ex)(SSL *s, unsigned int ext_type,
   unsigned int context,
   const unsigned char *out,
   void *add_arg);

typedef int (*SSL_custom_ext_parse_cb_ex)(SSL *s, unsigned int ext_type,
   unsigned int context,
   const unsigned char *in,
   size_t inlen, X509 *x,
   size_t chainidx,
   int *al, void *parse_arg);
```

```
/* Typedef for verification callback */
typedef int (*SSL_verify_cb)(int preverify_ok, X509_STORE_CTX *x509_ctx);

/* Typedef for SSL async callback */
typedef int (*SSL_async_callback_fn)(SSL *s, void *arg);

#define SSL_OP_BIT(n) ((uint64_t)1 << (uint64_t)n)

/*
* SSL/TLS connection options.
*/
/* Disable Extended master secret */
#define SSL_OP_NO_EXTENDED_MASTER_SECRET
 SSL_OP_BIT(0)
/* Cleanse plaintext copies of data delivered to the application */
#define SSL_OP_CLEANSE_PLAINTEXT SSL_OP_BIT(1)
/* Allow initial connection to servers that don't support RI */
#define SSL_OP_LEGACY_SERVER_CONNECT SSL_OP_BIT(2)
/* Enable support for Kernel TLS */
#define SSL_OP_ENABLE_KTLS SSL_OP_BIT(3)
#define SSL_OP_TLSEXT_PADDING SSL_OP_BIT(4)
#define SSL_OP_SAFARI_ECDHE_ECDSA_BUG SSL_OP_BIT(6)
#define SSL_OP_IGNORE_UNEXPECTED_EOF SSL_OP_BIT(7)
#define SSL_OP_ALLOW_CLIENT_RENEGOTIATION SSL_OP_BIT(8)
#define SSL_OP_DISABLE_TLSEXT_CA_NAMES SSL_OP_BIT(9)
/* In TLSv1.3 allow a non-(ec)dhe based kex_mode */
#define SSL_OP_ALLOW_NO_DHE_KEX SSL_OP_BIT(10)
/*
* Disable SSL 3.0/TLS 1.0 CBC vulnerability workaround that was added
* in OpenSSL 0.9.6d.  Usually (depending on the application protocol)
* the workaround is not needed.  Unfortunately some broken SSL/TLS
* implementations cannot handle it at all, which is why we include it
* in SSL_OP_ALL. Added in 0.9.6e
 */
#define SSL_OP_DONT_INSERT_EMPTY_FRAGMENTS SSL_OP_BIT(11)
/* DTLS options */
#define SSL_OP_NO_QUERY_MTU SSL_OP_BIT(12)
/* Turn on Cookie Exchange (on relevant for servers) */
#define SSL_OP_COOKIE_EXCHANGE SSL_OP_BIT(13)
/* Don't use RFC4507 ticket extension */
#define SSL_OP_NO_TICKET SSL_OP_BIT(14)
#ifndef OPENSSL_NO_DTLS1_METHOD
/*
* Use Cisco's version identifier of DTLS_BAD_VER
* (only with deprecated DTLSv1_client_method())
*/
#define SSL_OP_CISCO_ANYCONNECT SSL_OP_BIT(15)
#endif
```

```
/* As server, disallow session resumption on renegotiation */
#define SSL_OP_NO_SESSION_RESUMPTION_ON_RENEGOTIATION SSL_OP_BIT(16)
/* Don't use compression even if supported */
#define SSL_OP_NO_COMPRESSION SSL_OP_BIT(17)
/* Permit unsafe legacy renegotiation */
#define SSL_OP_ALLOW_UNSAFE_LEGACY_RENEGOTIATION SSL_OP_BIT(18)
/* Disable encrypt-then-mac */
#define SSL_OP_NO_ENCRYPT_THEN_MAC SSL_OP_BIT(19)
/*
* Enable TLSv1.3 Compatibility mode. This is on by default. A future
* version of OpenSSL
 may have this disabled by default.
*/
#define SSL_OP_ENABLE_MIDDLEBOX_COMPAT SSL_OP_BIT(20)
/*
* Prioritize Chacha20Poly1305 when client does.
* Modifies SSL_OP_CIPHER_SERVER_PREFERENCE
*/
#define SSL_OP_PRIORITIZE_CHACHA SSL_OP_BIT(21)
/*
* Set on servers to choose the cipher according to server's preferences.
*/
#define SSL_OP_CIPHER_SERVER_PREFERENCE SSL_OP_BIT(22)
/*
* If set, a server will allow a client to issue an SSLv3.0 version
* number as latest version supported in the premaster secret, even when
* TLSv1.0 (version 3.1) was announced in the client hello. Normally
* this is forbidden to prevent version rollback attacks.
*/
#define SSL_OP_TLS_ROLLBACK_BUG SSL_OP_BIT(23)
/*
* Switches off automatic TLSv1.3 anti-replay protection for early data.
* This is a server-side option only (no effect on the client).
*/
#define SSL_OP_NO_ANTI_REPLAY SSL_OP_BIT(24)
#define SSL_OP_NO_SSLv3 SSL_OP_BIT(25)
#define SSL_OP_NO_TLSv1 SSL_OP_BIT(26)
#define SSL_OP_NO_TLSv1_2 SSL_OP_BIT(27)
#define
 SSL_OP_NO_TLSv1_1 SSL_OP_BIT(28)
#define SSL_OP_NO_TLSv1_3 SSL_OP_BIT(29)
#define SSL_OP_NO_DTLSv1 SSL_OP_BIT(26)
#define SSL_OP_NO_DTLSv1_2 SSL_OP_BIT(27)
/* Disallow all renegotiation */
#define SSL_OP_NO_RENEGOTIATION SSL_OP_BIT(30)
/*
* Make server add server-hello extension from early version of
* cryptopro draft, when GOST ciphersuite is negotiated. Required for
```

```
* interoperability with CryptoPro CSP 3.x
*/
#define SSL_OP_CRYPTOPRO_TLSEXT_BUG SSL_OP_BIT(31)
/*
* Disable RFC8879 certificate compression
* SSL_OP_NO_TX_CERTIFICATE_COMPRESSION: don't send compressed certificates,
*     and ignore the extension when received.
* SSL_OP_NO_RX_CERTIFICATE_COMPRESSION: don't send the extension, and
*     subsequently indicating that receiving is not supported
*/
#define SSL_OP_NO_TX_CERTIFICATE_COMPRESSION SSL_OP_BIT(32)
#define SSL_OP_NO_RX_CERTIFICATE_COMPRESSION SSL_OP_BIT(33)
/* Enable KTLS TX zerocopy on Linux */
#define SSL_OP_ENABLE_KTLS_TX_ZEROCOPY_SENDFILE
 SSL_OP_BIT(34)

#define SSL_OP_PREFER_NO_DHE_KEX SSL_OP_BIT(35)

/*
* Option "collections."
*/
#define SSL_OP_NO_SSL_MASK                              \
   (SSL_OP_NO_SSLv3 | SSL_OP_NO_TLSv1 | SSL_OP_NO_TLSv1_1 \
      | SSL_OP_NO_TLSv1_2 | SSL_OP_NO_TLSv1_3)
#define SSL_OP_NO_DTLS_MASK \
   (SSL_OP_NO_DTLSv1 | SSL_OP_NO_DTLSv1_2)

/* Various bug workarounds that should be rather harmless. */
#define SSL_OP_ALL                                      \
   (SSL_OP_CRYPTOPRO_TLSEXT_BUG | SSL_OP_DONT_INSERT_EMPTY_FRAGMENTS \
      | SSL_OP_TLSEXT_PADDING | SSL_OP_SAFARI_ECDHE_ECDSA_BUG)

/*
* OBSOLETE OPTIONS retained for compatibility
*/

#define SSL_OP_MICROSOFT_SESS_ID_BUG 0x0
#define SSL_OP_NETSCAPE_CHALLENGE_BUG 0x0
#define SSL_OP_NETSCAPE_REUSE_CIPHER_CHANGE_BUG 0x0
#define SSL_OP_SSLREF2_REUSE_CERT_TYPE_BUG 0x0
#define SSL_OP_MICROSOFT_BIG_SSLV3_BUFFER 0x0
#define SSL_OP_MSIE_SSLV2_RSA_PADDING 0x0
#define SSL_OP_SSLEAY_080_CLIENT_DH_BUG 0x0
#define
 SSL_OP_TLS_D5_BUG 0x0
#define SSL_OP_TLS_BLOCK_PADDING_BUG 0x0
#define SSL_OP_SINGLE_ECDH_USE 0x0
#define SSL_OP_SINGLE_DH_USE 0x0
```

```
#define SSL_OP_EPHEMERAL_RSA 0x0
#define SSL_OP_NO_SSLv2 0x0
#define SSL_OP_PKCS1_CHECK_1 0x0
#define SSL_OP_PKCS1_CHECK_2 0x0
#define SSL_OP_NETSCAPE_CA_DN_BUG 0x0
#define SSL_OP_NETSCAPE_DEMO_CIPHER_CHANGE_BUG 0x0

/*
* Allow SSL_write(..., n) to return r with 0 < r < n (i.e. report success
* when just a single record has been written):
*/
#define SSL_MODE_ENABLE_PARTIAL_WRITE 0x00000001U
/*
* Make it possible to retry SSL_write() with changed buffer location (buffer
* contents must stay the same!); this is not the default to avoid the
* misconception that non-blocking SSL_write() behaves like non-blocking
* write():
*/
#define SSL_MODE_ACCEPT_MOVING_WRITE_BUFFER 0x00000002U
/*
* Never bother the application with retries if the transport is blocking:
*/
#define SSL_MODE_AUTO_RETRY 0x00000004U
/* Don't attempt to automatically build certificate chain
 */
#define SSL_MODE_NO_AUTO_CHAIN 0x00000008U
/*
* Save RAM by releasing read and write buffers when they're empty. (SSL3 and
* TLS only.) Released buffers are freed.
*/
#define SSL_MODE_RELEASE_BUFFERS 0x00000010U
/*
* Send the current time in the Random fields of the ClientHello and
* ServerHello records for compatibility with hypothetical implementations
* that require it.
*/
#define SSL_MODE_SEND_CLIENTHELLO_TIME 0x00000020U
#define SSL_MODE_SEND_SERVERHELLO_TIME 0x00000040U
/*
* Send TLS_FALLBACK_SCSV in the ClientHello. To be set only by applications
* that reconnect with a downgraded protocol version; see
* draft-ietf-tls-downgrade-scsv-00 for details. DO NOT ENABLE THIS if your
* application attempts a normal handshake. Only use this in explicit
* fallback retries, following the guidance in
* draft-ietf-tls-downgrade-scsv-00.
*/
#define SSL_MODE_SEND_FALLBACK_SCSV 0x00000080U
/*
```

```
* Support Asynchronous operation
*/
#define SSL_MODE_ASYNC 0x00000100U

/*
* When
 using DTLS/SCTP, include the terminating zero in the label
* used for computing the endpoint-pair shared secret. Required for
* interoperability with implementations having this bug like these
* older version of OpenSSL:
* - OpenSSL 1.0.0 series
* - OpenSSL 1.0.1 series
* - OpenSSL 1.0.2 series
* - OpenSSL 1.1.0 series
* - OpenSSL 1.1.1 and 1.1.1a
*/
#define SSL_MODE_DTLS_SCTP_LABEL_LENGTH_BUG 0x00000400U

/* Cert related flags */
/*
* Many implementations ignore some aspects of the TLS standards such as
* enforcing certificate chain algorithms. When this is set we enforce them.
*/
#define SSL_CERT_FLAG_TLS_STRICT 0x00000001U

/* Suite B modes, takes same values as certificate verify flags */
#define SSL_CERT_FLAG_SUITEB_128_LOS_ONLY 0x10000
/* Suite B 192 bit only mode */
#define SSL_CERT_FLAG_SUITEB_192_LOS 0x20000
/* Suite B 128 bit mode allowing 192 bit algorithms */
#define SSL_CERT_FLAG_SUITEB_128_LOS 0x30000

/* Perform all sorts of protocol violations for testing
 purposes */
#define SSL_CERT_FLAG_BROKEN_PROTOCOL 0x10000000

/* Flags for building certificate chains */
/* Treat any existing certificates as untrusted CAs */
#define SSL_BUILD_CHAIN_FLAG_UNTRUSTED 0x1
/* Don't include root CA in chain */
#define SSL_BUILD_CHAIN_FLAG_NO_ROOT 0x2
/* Just check certificates already there */
#define SSL_BUILD_CHAIN_FLAG_CHECK 0x4
/* Ignore verification errors */
#define SSL_BUILD_CHAIN_FLAG_IGNORE_ERROR 0x8
/* Clear verification errors from queue */
#define SSL_BUILD_CHAIN_FLAG_CLEAR_ERROR 0x10
```

```
/* Flags returned by SSL_check_chain */
/* Certificate can be used with this session */
#define CERT_PKEY_VALID 0x1
/* Certificate can also be used for signing */
#define CERT_PKEY_SIGN 0x2
/* EE certificate signing algorithm OK */
#define CERT_PKEY_EE_SIGNATURE 0x10
/* CA signature algorithms OK */
#define CERT_PKEY_CA_SIGNATURE 0x20
/* EE certificate parameters OK */
#define CERT_PKEY_EE_PARAM 0x40
/* CA certificate parameters OK */
#define CERT_PKEY_CA_PARAM
 0x80
/* Signing explicitly allowed as opposed to SHA1 fallback */
#define CERT_PKEY_EXPLICIT_SIGN 0x100
/* Client CA issuer names match (always set for server cert) */
#define CERT_PKEY_ISSUER_NAME 0x200
/* Cert type matches client types (always set for server cert) */
#define CERT_PKEY_CERT_TYPE 0x400
/* Cert chain suitable to Suite B */
#define CERT_PKEY_SUITEB 0x800
/* Cert pkey valid for raw public key use */
#define CERT_PKEY_RPK 0x1000

#define SSL_CONF_FLAG_CMDLINE 0x1
#define SSL_CONF_FLAG_FILE 0x2
#define SSL_CONF_FLAG_CLIENT 0x4
#define SSL_CONF_FLAG_SERVER 0x8
#define SSL_CONF_FLAG_SHOW_ERRORS 0x10
#define SSL_CONF_FLAG_CERTIFICATE 0x20
#define SSL_CONF_FLAG_REQUIRE_PRIVATE 0x40
/* Configuration value types */
#define SSL_CONF_TYPE_UNKNOWN 0x0
#define SSL_CONF_TYPE_STRING 0x1
#define SSL_CONF_TYPE_FILE 0x2
#define SSL_CONF_TYPE_DIR 0x3
#define SSL_CONF_TYPE_NONE 0x4
#define SSL_CONF_TYPE_STORE 0x5

/* Maximum length of the application-controlled segment of a a TLSv1.3 cookie
 */
#define SSL_COOKIE_LENGTH 4096

/*
* Note: SSL[_CTX]_set_{options,mode} use |= op on the previous value, they
* cannot be used to clear bits.
*/
```

```
uint64_t SSL_CTX_get_options(const SSL_CTX *ctx);
uint64_t SSL_get_options(const SSL *s);
uint64_t SSL_CTX_clear_options(SSL_CTX *ctx, uint64_t op);
uint64_t SSL_clear_options(SSL *s, uint64_t op);
uint64_t SSL_CTX_set_options(SSL_CTX *ctx, uint64_t op);
uint64_t SSL_set_options(SSL *s, uint64_t op);

#define SSL_CTX_set_mode(ctx, op) \
  SSL_CTX_ctrl((ctx), SSL_CTRL_MODE, (op), NULL)
#define SSL_CTX_clear_mode(ctx, op) \
  SSL_CTX_ctrl((ctx), SSL_CTRL_CLEAR_MODE, (op), NULL)
#define SSL_CTX_get_mode(ctx) \
  SSL_CTX_ctrl((ctx), SSL_CTRL_MODE, 0, NULL)
#define SSL_clear_mode(ssl, op) \
  SSL_ctrl((ssl), SSL_CTRL_CLEAR_MODE, (op), NULL)
#define SSL_set_mode(ssl, op) \
  SSL_ctrl((ssl), SSL_CTRL_MODE, (op), NULL)
#define SSL_get_mode(ssl) \
  SSL_ctrl((ssl), SSL_CTRL_MODE, 0, NULL)
#define SSL_set_mtu(ssl, mtu) \
  SSL_ctrl((ssl),
 SSL_CTRL_SET_MTU, (mtu), NULL)
#define DTLS_set_link_mtu(ssl, mtu) \
  SSL_ctrl((ssl), DTLS_CTRL_SET_LINK_MTU, (mtu), NULL)
#define DTLS_get_link_min_mtu(ssl) \
  SSL_ctrl((ssl), DTLS_CTRL_GET_LINK_MIN_MTU, 0, NULL)

#define SSL_get_secure_renegotiation_support(ssl) \
  SSL_ctrl((ssl), SSL_CTRL_GET_RI_SUPPORT, 0, NULL)

#define SSL_CTX_set_cert_flags(ctx, op) \
  SSL_CTX_ctrl((ctx), SSL_CTRL_CERT_FLAGS, (op), NULL)
#define SSL_set_cert_flags(s, op) \
  SSL_ctrl((s), SSL_CTRL_CERT_FLAGS, (op), NULL)
#define SSL_CTX_clear_cert_flags(ctx, op) \
  SSL_CTX_ctrl((ctx), SSL_CTRL_CLEAR_CERT_FLAGS, (op), NULL)
#define SSL_clear_cert_flags(s, op) \
  SSL_ctrl((s), SSL_CTRL_CLEAR_CERT_FLAGS, (op), NULL)

void SSL_CTX_set_msg_callback(SSL_CTX *ctx,
  void (*cb)(int write_p, int version,
     int content_type, const void *buf,
     size_t len, SSL *ssl, void *arg));
void SSL_set_msg_callback(SSL *ssl,
  void (*cb)(int write_p, int version,
     int content_type,
```

```
 const void *buf,
      size_t len, SSL *ssl, void *arg));
#define SSL_CTX_set_msg_callback_arg(ctx, arg) SSL_CTX_ctrl((ctx),
SSL_CTRL_SET_MSG_CALLBACK_ARG, 0, (arg))
#define SSL_set_msg_callback_arg(ssl, arg) SSL_ctrl((ssl), SSL_CTRL_SET_MSG_CALLBACK_ARG, 0, (arg))

#define SSL_get_extms_support(s) \
   SSL_ctrl((s), SSL_CTRL_GET_EXTMS_SUPPORT, 0, NULL)

#ifndef OPENSSL_NO_SRP
/* see tls_srp.c */
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 __owur int SSL_SRP_CTX_init(SSL *s);
OSSL_DEPRECATEDIN_3_0 __owur int SSL_CTX_SRP_CTX_init(SSL_CTX *ctx);
OSSL_DEPRECATEDIN_3_0 int SSL_SRP_CTX_free(SSL *ctx);
OSSL_DEPRECATEDIN_3_0 int SSL_CTX_SRP_CTX_free(SSL_CTX *ctx);
OSSL_DEPRECATEDIN_3_0 __owur int SSL_srp_server_param_with_username(SSL *s,
   int *ad);
OSSL_DEPRECATEDIN_3_0 __owur int SRP_Calc_A_param(SSL *s);
#endif
#endif

/* 100k max cert list */
#define SSL_MAX_CERT_LIST_DEFAULT (1024 * 100)

#define SSL_SESSION_CACHE_MAX_SIZE_DEFAULT (1024 * 20)

/*
* This callback type
 is used inside SSL_CTX, SSL, and in the functions that
* set them. It is used to override the generation of SSL/TLS session IDs in
* a server. Return value should be zero on an error, non-zero to proceed.
* Also, callbacks should themselves check if the id they generate is unique
* otherwise the SSL handshake will fail with an error - callbacks can do
* this using the 'ssl' value they're passed by;
* SSL_has_matching_session_id(ssl, id, *id_len) The length value passed in
* is set at the maximum size the session ID can be. In SSLv3/TLSv1 it is 32
* bytes. The callback can alter this length to be less if desired. It is
* also an error for the callback to set the size to zero.
*/
typedef int (*GEN_SESSION_CB)(SSL *ssl, unsigned char *id,
   unsigned int *id_len);

#define SSL_SESS_CACHE_OFF 0x0000
#define SSL_SESS_CACHE_CLIENT 0x0001
#define SSL_SESS_CACHE_SERVER 0x0002
#define SSL_SESS_CACHE_BOTH (SSL_SESS_CACHE_CLIENT | SSL_SESS_CACHE_SERVER)
#define SSL_SESS_CACHE_NO_AUTO_CLEAR
```

```
 0x0080
/* enough comments already ... see SSL_CTX_set_session_cache_mode(3) */
#define SSL_SESS_CACHE_NO_INTERNAL_LOOKUP 0x0100
#define SSL_SESS_CACHE_NO_INTERNAL_STORE 0x0200
#define SSL_SESS_CACHE_NO_INTERNAL \
   (SSL_SESS_CACHE_NO_INTERNAL_LOOKUP | SSL_SESS_CACHE_NO_INTERNAL_STORE)
#define SSL_SESS_CACHE_UPDATE_TIME 0x0400

LHASH_OF(SSL_SESSION) *SSL_CTX_sessions(SSL_CTX *ctx);
#define SSL_CTX_sess_number(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_NUMBER, 0, NULL)
#define SSL_CTX_sess_connect(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_CONNECT, 0, NULL)
#define SSL_CTX_sess_connect_good(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_CONNECT_GOOD, 0, NULL)
#define SSL_CTX_sess_connect_renegotiate(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_CONNECT_RENEGOTIATE, 0, NULL)
#define SSL_CTX_sess_accept(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_ACCEPT, 0, NULL)
#define SSL_CTX_sess_accept_renegotiate(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_ACCEPT_RENEGOTIATE, 0, NULL)
#define SSL_CTX_sess_accept_good(ctx)
 \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_ACCEPT_GOOD, 0, NULL)
#define SSL_CTX_sess_hits(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_HIT, 0, NULL)
#define SSL_CTX_sess_cb_hits(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_CB_HIT, 0, NULL)
#define SSL_CTX_sess_misses(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_MISSES, 0, NULL)
#define SSL_CTX_sess_timeouts(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_TIMEOUTS, 0, NULL)
#define SSL_CTX_sess_cache_full(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_CACHE_FULL, 0, NULL)

void SSL_CTX_sess_set_new_cb(SSL_CTX *ctx,
   int (*new_session_cb)(struct ssl_st *ssl,
      SSL_SESSION *sess));
int (*SSL_CTX_sess_get_new_cb(SSL_CTX *ctx))(struct ssl_st *ssl,
   SSL_SESSION *sess);
void SSL_CTX_sess_set_remove_cb(SSL_CTX *ctx,
   void (*remove_session_cb)(struct ssl_ctx_st
                             *ctx,
      SSL_SESSION *sess));
void (*SSL_CTX_sess_get_remove_cb(SSL_CTX *ctx))(struct ssl_ctx_st *ctx,
   SSL_SESSION *sess);
void
```

```
 SSL_CTX_sess_set_get_cb(SSL_CTX *ctx,
   SSL_SESSION *(*get_session_cb)(struct ssl_st
                                  *ssl,
       const unsigned char
           *data,
       int len,
       int *copy));
SSL_SESSION *(*SSL_CTX_sess_get_get_cb(SSL_CTX *ctx))(struct ssl_st *ssl,
   const unsigned char *data,
   int len, int *copy);
void SSL_CTX_set_info_callback(SSL_CTX *ctx,
   void (*cb)(const SSL *ssl, int type, int val));
void (*SSL_CTX_get_info_callback(SSL_CTX *ctx))(const SSL *ssl, int type,
   int val);
void SSL_CTX_set_client_cert_cb(SSL_CTX *ctx,
   int (*client_cert_cb)(SSL *ssl, X509 **x509,
       EVP_PKEY **pkey));
int (*SSL_CTX_get_client_cert_cb(SSL_CTX *ctx))(SSL *ssl, X509 **x509,
   EVP_PKEY **pkey);
#ifndef OPENSSL_NO_ENGINE
__owur int SSL_CTX_set_client_cert_engine(SSL_CTX *ctx, ENGINE *e);
#endif
void SSL_CTX_set_cookie_generate_cb(SSL_CTX *ctx,
   int (*app_gen_cookie_cb)(SSL *ssl,
       unsigned char
           *cookie,
       unsigned int
            *cookie_len));
void SSL_CTX_set_cookie_verify_cb(SSL_CTX *ctx,
   int (*app_verify_cookie_cb)(SSL *ssl,
       const unsigned char *cookie,
       unsigned int
           cookie_len));

void SSL_CTX_set_stateless_cookie_generate_cb(
   SSL_CTX *ctx,
   int (*gen_stateless_cookie_cb)(SSL *ssl,
       unsigned char *cookie,
       size_t *cookie_len));
void SSL_CTX_set_stateless_cookie_verify_cb(
   SSL_CTX *ctx,
   int (*verify_stateless_cookie_cb)(SSL *ssl,
       const unsigned char *cookie,
       size_t cookie_len));
#ifndef OPENSSL_NO_NEXTPROTONEG

typedef int (*SSL_CTX_npn_advertised_cb_func)(SSL *ssl,
   const unsigned char **out,
```

```
   unsigned int *outlen,
   void *arg);
void SSL_CTX_set_next_protos_advertised_cb(SSL_CTX *s,
   SSL_CTX_npn_advertised_cb_func cb,
   void *arg);
#define SSL_CTX_set_npn_advertised_cb SSL_CTX_set_next_protos_advertised_cb

typedef int (*SSL_CTX_npn_select_cb_func)(SSL *s,
   unsigned char **out,
   unsigned char *outlen,
    const unsigned char *in,
   unsigned int inlen,
   void *arg);
void SSL_CTX_set_next_proto_select_cb(SSL_CTX *s,
   SSL_CTX_npn_select_cb_func cb,
   void *arg);
#define SSL_CTX_set_npn_select_cb SSL_CTX_set_next_proto_select_cb

void SSL_get0_next_proto_negotiated(const SSL *s, const unsigned char **data,
   unsigned *len);
#define SSL_get0_npn_negotiated SSL_get0_next_proto_negotiated
#endif

__owur int SSL_select_next_proto(unsigned char **out, unsigned char *outlen,
   const unsigned char *in, unsigned int inlen,
   const unsigned char *client,
   unsigned int client_len);

#define OPENSSL_NPN_UNSUPPORTED 0
#define OPENSSL_NPN_NEGOTIATED 1
#define OPENSSL_NPN_NO_OVERLAP 2

__owur int SSL_CTX_set_alpn_protos(SSL_CTX *ctx, const unsigned char *protos,
   unsigned int protos_len);
__owur int SSL_set_alpn_protos(SSL *ssl, const unsigned char *protos,
   unsigned int protos_len);
typedef int (*SSL_CTX_alpn_select_cb_func)(SSL *ssl,
   const unsigned char **out,
   unsigned
 char *outlen,
   const unsigned char *in,
   unsigned int inlen,
   void *arg);
void SSL_CTX_set_alpn_select_cb(SSL_CTX *ctx,
   SSL_CTX_alpn_select_cb_func cb,
   void *arg);
void SSL_get0_alpn_selected(const SSL *ssl, const unsigned char **data,
   unsigned int *len);
```

```
#ifndef OPENSSL_NO_PSK
/*
* the maximum length of the buffer given to callbacks containing the
* resulting identity/psk
*/
#define PSK_MAX_IDENTITY_LEN 256
#define PSK_MAX_PSK_LEN 512
typedef unsigned int (*SSL_psk_client_cb_func)(SSL *ssl,
   const char *hint,
   char *identity,
   unsigned int max_identity_len,
   unsigned char *psk,
   unsigned int max_psk_len);
void SSL_CTX_set_psk_client_callback(SSL_CTX *ctx, SSL_psk_client_cb_func cb);
void SSL_set_psk_client_callback(SSL *ssl, SSL_psk_client_cb_func cb);

typedef unsigned int (*SSL_psk_server_cb_func)(SSL *ssl,
   const char *identity,
   unsigned char *psk,
   unsigned int max_psk_len);
void SSL_CTX_set_psk_server_callback(SSL_CTX *ctx,
 SSL_psk_server_cb_func cb);
void SSL_set_psk_server_callback(SSL *ssl, SSL_psk_server_cb_func cb);

__owur int SSL_CTX_use_psk_identity_hint(SSL_CTX *ctx, const char *identity_hint);
__owur int SSL_use_psk_identity_hint(SSL *s, const char *identity_hint);
const char *SSL_get_psk_identity_hint(const SSL *s);
const char *SSL_get_psk_identity(const SSL *s);
#endif

typedef int (*SSL_psk_find_session_cb_func)(SSL *ssl,
   const unsigned char *identity,
   size_t identity_len,
   SSL_SESSION **sess);
typedef int (*SSL_psk_use_session_cb_func)(SSL *ssl, const EVP_MD *md,
   const unsigned char **id,
   size_t *idlen,
   SSL_SESSION **sess);

void SSL_set_psk_find_session_callback(SSL *s, SSL_psk_find_session_cb_func cb);
void SSL_CTX_set_psk_find_session_callback(SSL_CTX *ctx,
   SSL_psk_find_session_cb_func cb);
void SSL_set_psk_use_session_callback(SSL *s, SSL_psk_use_session_cb_func cb);
void SSL_CTX_set_psk_use_session_callback(SSL_CTX *ctx,
   SSL_psk_use_session_cb_func cb);

/*
```

```
 Register callbacks to handle custom TLS Extensions for client or server. */

__owur int SSL_CTX_has_client_custom_ext(const SSL_CTX *ctx,
   unsigned int ext_type);

__owur int SSL_CTX_add_client_custom_ext(SSL_CTX *ctx,
   unsigned int ext_type,
   custom_ext_add_cb add_cb,
   custom_ext_free_cb free_cb,
   void *add_arg,
   custom_ext_parse_cb parse_cb,
   void *parse_arg);

__owur int SSL_CTX_add_server_custom_ext(SSL_CTX *ctx,
   unsigned int ext_type,
   custom_ext_add_cb add_cb,
   custom_ext_free_cb free_cb,
   void *add_arg,
   custom_ext_parse_cb parse_cb,
   void *parse_arg);

__owur int SSL_CTX_add_custom_ext(SSL_CTX *ctx, unsigned int ext_type,
   unsigned int context,
   SSL_custom_ext_add_cb_ex add_cb,
   SSL_custom_ext_free_cb_ex free_cb,
   void *add_arg,
   SSL_custom_ext_parse_cb_ex parse_cb,
   void *parse_arg);

__owur int SSL_extension_supported(unsigned int ext_type);

#define SSL_NOTHING 1
#define SSL_WRITING 2
#define SSL_READING 3
#define
 SSL_X509_LOOKUP 4
#define SSL_ASYNC_PAUSED 5
#define SSL_ASYNC_NO_JOBS 6
#define SSL_CLIENT_HELLO_CB 7
#define SSL_RETRY_VERIFY 8

/* These will only be used when doing non-blocking IO */
#define SSL_want_nothing(s) (SSL_want(s) == SSL_NOTHING)
#define SSL_want_read(s) (SSL_want(s) == SSL_READING)
#define SSL_want_write(s) (SSL_want(s) == SSL_WRITING)
#define SSL_want_x509_lookup(s) (SSL_want(s) == SSL_X509_LOOKUP)
#define SSL_want_retry_verify(s) (SSL_want(s) == SSL_RETRY_VERIFY)
#define SSL_want_async(s) (SSL_want(s) == SSL_ASYNC_PAUSED)
```

```
#define SSL_want_async_job(s) (SSL_want(s) == SSL_ASYNC_NO_JOBS)
#define SSL_want_client_hello_cb(s) (SSL_want(s) == SSL_CLIENT_HELLO_CB)

#define SSL_MAC_FLAG_READ_MAC_STREAM 1
#define SSL_MAC_FLAG_WRITE_MAC_STREAM 2
#define SSL_MAC_FLAG_READ_MAC_TLSTREE 4
#define SSL_MAC_FLAG_WRITE_MAC_TLSTREE 8

/*
* A callback for logging out TLS key material. This callback should log out
* |line| followed by a newline.
*/
typedef void (*SSL_CTX_keylog_cb_func)(const
 SSL *ssl, const char *line);

/*
* SSL_CTX_set_keylog_callback configures a callback to log key material. This
* is intended for debugging use with tools like Wireshark. The cb function
* should log line followed by a newline.
*/
void SSL_CTX_set_keylog_callback(SSL_CTX *ctx, SSL_CTX_keylog_cb_func cb);

/*
* SSL_CTX_get_keylog_callback returns the callback configured by
* SSL_CTX_set_keylog_callback.
*/
SSL_CTX_keylog_cb_func SSL_CTX_get_keylog_callback(const SSL_CTX *ctx);

int SSL_CTX_set_max_early_data(SSL_CTX *ctx, uint32_t max_early_data);
uint32_t SSL_CTX_get_max_early_data(const SSL_CTX *ctx);
int SSL_set_max_early_data(SSL *s, uint32_t max_early_data);
uint32_t SSL_get_max_early_data(const SSL *s);
int SSL_CTX_set_recv_max_early_data(SSL_CTX *ctx, uint32_t recv_max_early_data);
uint32_t SSL_CTX_get_recv_max_early_data(const SSL_CTX *ctx);
int SSL_set_recv_max_early_data(SSL *s, uint32_t recv_max_early_data);
uint32_t SSL_get_recv_max_early_data(const SSL *s);

#ifdef
 __cplusplus
}
#endif

#include <openssl/ssl2.h>
#include <openssl/ssl3.h>
#include <openssl/tls1.h> /* This is mostly sslv3 with a few tweaks */
#include <openssl/dtls1.h> /* Datagram TLS */
#include <openssl/srtp.h> /* Support for the use_srtp extension */
#include <openssl/quic.h>
```

```
#ifdef __cplusplus
extern "C" {
#endif

/*
* These need to be after the above set of includes due to a compiler bug
* in VisualStudio 2015
*/
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(SSL_CIPHER, const SSL_CIPHER, SSL_CIPHER)
#define sk_SSL_CIPHER_num(sk) OPENSSL_sk_num(ossl_check_const_SSL_CIPHER_sk_type(sk))
#define sk_SSL_CIPHER_value(sk, idx) ((const SSL_CIPHER
*)OPENSSL_sk_value(ossl_check_const_SSL_CIPHER_sk_type(sk), (idx)))
#define sk_SSL_CIPHER_new(cmp) ((STACK_OF(SSL_CIPHER)
*)OPENSSL_sk_new(ossl_check_SSL_CIPHER_compfunc_type(cmp)))
#define sk_SSL_CIPHER_new_null() ((STACK_OF(SSL_CIPHER) *)OPENSSL_sk_new_null())
#define sk_SSL_CIPHER_new_reserve(cmp, n) ((STACK_OF(SSL_CIPHER)
 *)OPENSSL_sk_new_reserve(ossl_check_SSL_CIPHER_compfunc_type(cmp), (n)))
#define sk_SSL_CIPHER_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_SSL_CIPHER_sk_type(sk), (n))
#define sk_SSL_CIPHER_free(sk) OPENSSL_sk_free(ossl_check_SSL_CIPHER_sk_type(sk))
#define sk_SSL_CIPHER_zero(sk) OPENSSL_sk_zero(ossl_check_SSL_CIPHER_sk_type(sk))
#define sk_SSL_CIPHER_delete(sk, i) ((const SSL_CIPHER
*)OPENSSL_sk_delete(ossl_check_SSL_CIPHER_sk_type(sk), (i)))
#define sk_SSL_CIPHER_delete_ptr(sk, ptr) ((const SSL_CIPHER
*)OPENSSL_sk_delete_ptr(ossl_check_SSL_CIPHER_sk_type(sk), ossl_check_SSL_CIPHER_type(ptr)))
#define sk_SSL_CIPHER_push(sk, ptr) OPENSSL_sk_push(ossl_check_SSL_CIPHER_sk_type(sk),
ossl_check_SSL_CIPHER_type(ptr))
#define sk_SSL_CIPHER_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_SSL_CIPHER_sk_type(sk),
ossl_check_SSL_CIPHER_type(ptr))
#define sk_SSL_CIPHER_pop(sk) ((const SSL_CIPHER
*)OPENSSL_sk_pop(ossl_check_SSL_CIPHER_sk_type(sk)))
#define sk_SSL_CIPHER_shift(sk) ((const SSL_CIPHER
 *)OPENSSL_sk_shift(ossl_check_SSL_CIPHER_sk_type(sk)))
#define sk_SSL_CIPHER_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_SSL_CIPHER_sk_type(sk),ossl_check_SSL_CIPHER_freefunc_type(freefunc
))
#define sk_SSL_CIPHER_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_SSL_CIPHER_sk_type(sk),
ossl_check_SSL_CIPHER_type(ptr), (idx))
#define sk_SSL_CIPHER_set(sk, idx, ptr) ((const SSL_CIPHER
*)OPENSSL_sk_set(ossl_check_SSL_CIPHER_sk_type(sk), (idx), ossl_check_SSL_CIPHER_type(ptr)))
#define sk_SSL_CIPHER_find(sk, ptr) OPENSSL_sk_find(ossl_check_SSL_CIPHER_sk_type(sk),
ossl_check_SSL_CIPHER_type(ptr))
#define sk_SSL_CIPHER_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_SSL_CIPHER_sk_type(sk),
ossl_check_SSL_CIPHER_type(ptr))
#define sk_SSL_CIPHER_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_SSL_CIPHER_sk_type(sk),
ossl_check_SSL_CIPHER_type(ptr), pnum)
#define sk_SSL_CIPHER_sort(sk) OPENSSL_sk_sort(ossl_check_SSL_CIPHER_sk_type(sk))
```

```
#define sk_SSL_CIPHER_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_SSL_CIPHER_sk_type(sk))
#define
 sk_SSL_CIPHER_dup(sk) ((STACK_OF(SSL_CIPHER)
*)OPENSSL_sk_dup(ossl_check_const_SSL_CIPHER_sk_type(sk)))
#define sk_SSL_CIPHER_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(SSL_CIPHER)
*)OPENSSL_sk_deep_copy(ossl_check_const_SSL_CIPHER_sk_type(sk),
ossl_check_SSL_CIPHER_copyfunc_type(copyfunc), ossl_check_SSL_CIPHER_freefunc_type(freefunc)))
#define sk_SSL_CIPHER_set_cmp_func(sk, cmp)
((sk_SSL_CIPHER_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_SSL_CIPHER_sk_type(sk),
ossl_check_SSL_CIPHER_compfunc_type(cmp)))

/* clang-format on */

/* compatibility */
#define SSL_set_app_data(s, arg) (SSL_set_ex_data(s, 0, (char *)(arg)))
#define SSL_get_app_data(s) (SSL_get_ex_data(s, 0))
#define SSL_SESSION_set_app_data(s, a) (SSL_SESSION_set_ex_data(s, 0, \
   (char *)(a)))
#define SSL_SESSION_get_app_data(s) (SSL_SESSION_get_ex_data(s, 0))
#define SSL_CTX_get_app_data(ctx) (SSL_CTX_get_ex_data(ctx, 0))
#define SSL_CTX_set_app_data(ctx,
 arg) (SSL_CTX_set_ex_data(ctx, 0, \
   (char *)(arg)))
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 void SSL_set_debug(SSL *s, int debug);
#endif

/* TLSv1.3 KeyUpdate message types */
/* -1 used so that this is an invalid value for the on-the-wire protocol */
#define SSL_KEY_UPDATE_NONE -1
/* Values as defined for the on-the-wire protocol */
#define SSL_KEY_UPDATE_NOT_REQUESTED 0
#define SSL_KEY_UPDATE_REQUESTED 1

/*
* The valid handshake states (one for each type message sent and one for each
* type of message received). There are also two "special" states:
* TLS = TLS or DTLS state
* DTLS = DTLS specific state
* CR/SR = Client Read/Server Read
* CW/SW = Client Write/Server Write
*
* The "special" states are:
* TLS_ST_BEFORE = No handshake has been initiated yet
* TLS_ST_OK = A handshake has been successfully completed
*/
typedef enum {
   TLS_ST_BEFORE,
```

TLS_ST_OK,
DTLS_ST_CR_HELLO_VERIFY_REQUEST,
TLS_ST_CR_SRVR_HELLO,
TLS_ST_CR_CERT,

TLS_ST_CR_COMP_CERT,
TLS_ST_CR_CERT_STATUS,
TLS_ST_CR_KEY_EXCH,
TLS_ST_CR_CERT_REQ,
TLS_ST_CR_SRVR_DONE,
TLS_ST_CR_SESSION_TICKET,
TLS_ST_CR_CHANGE,
TLS_ST_CR_FINISHED,
TLS_ST_CW_CLNT_HELLO,
TLS_ST_CW_CERT,
TLS_ST_CW_COMP_CERT,
TLS_ST_CW_KEY_EXCH,
TLS_ST_CW_CERT_VRFY,
TLS_ST_CW_CHANGE,
TLS_ST_CW_NEXT_PROTO,
TLS_ST_CW_FINISHED,
TLS_ST_SW_HELLO_REQ,
TLS_ST_SR_CLNT_HELLO,
DTLS_ST_SW_HELLO_VERIFY_REQUEST,
TLS_ST_SW_SRVR_HELLO,
TLS_ST_SW_CERT,
TLS_ST_SW_COMP_CERT,
TLS_ST_SW_KEY_EXCH,
TLS_ST_SW_CERT_REQ,
TLS_ST_SW_SRVR_DONE,
TLS_ST_SR_CERT,
TLS_ST_SR_COMP_CERT,
TLS_ST_SR_KEY_EXCH,
TLS_ST_SR_CERT_VRFY,
TLS_ST_SR_NEXT_PROTO,
TLS_ST_SR_CHANGE,
TLS_ST_SR_FINISHED,
TLS_ST_SW_SESSION_TICKET,
TLS_ST_SW_CERT_STATUS,
TLS_ST_SW_CHANGE,
TLS_ST_SW_FINISHED,
TLS_ST_SW_ENCRYPTED_EXTENSIONS,
TLS_ST_CR_ENCRYPTED_EXTENSIONS,
TLS_ST_CR_CERT_VRFY,
TLS_ST_SW_CERT_VRFY,
TLS_ST_CR_HELLO_REQ,
TLS_ST_SW_KEY_UPDATE,
TLS_ST_CW_KEY_UPDATE,

```
  TLS_ST_SR_KEY_UPDATE,
  TLS_ST_CR_KEY_UPDATE,
  TLS_ST_EARLY_DATA,
  TLS_ST_PENDING_EARLY_DATA_END,
  TLS_ST_CW_END_OF_EARLY_DATA,
  TLS_ST_SR_END_OF_EARLY_DATA
} OSSL_HANDSHAKE_STATE;

/*
* Most of the following state values are no longer used and are defined to be
* the closest equivalent value in the current state machine code. Not all
* defines have an equivalent and are set to a dummy value (-1). SSL_ST_CONNECT
* and SSL_ST_ACCEPT are still in use in the definition of SSL_CB_ACCEPT_LOOP,
* SSL_CB_ACCEPT_EXIT, SSL_CB_CONNECT_LOOP and SSL_CB_CONNECT_EXIT.
*/

#define SSL_ST_CONNECT 0x1000
#define SSL_ST_ACCEPT 0x2000

#define SSL_ST_MASK 0x0FFF

#define SSL_CB_LOOP 0x01
#define SSL_CB_EXIT 0x02
#define SSL_CB_READ 0x04
#define SSL_CB_WRITE 0x08
#define SSL_CB_ALERT 0x4000 /* used in callback */
#define SSL_CB_READ_ALERT (SSL_CB_ALERT | SSL_CB_READ)
#define SSL_CB_WRITE_ALERT
 (SSL_CB_ALERT | SSL_CB_WRITE)
#define SSL_CB_ACCEPT_LOOP (SSL_ST_ACCEPT | SSL_CB_LOOP)
#define SSL_CB_ACCEPT_EXIT (SSL_ST_ACCEPT | SSL_CB_EXIT)
#define SSL_CB_CONNECT_LOOP (SSL_ST_CONNECT | SSL_CB_LOOP)
#define SSL_CB_CONNECT_EXIT (SSL_ST_CONNECT | SSL_CB_EXIT)
#define SSL_CB_HANDSHAKE_START 0x10
#define SSL_CB_HANDSHAKE_DONE 0x20

/* Is the SSL_connection established? */
#define SSL_in_connect_init(a) (SSL_in_init(a) && !SSL_is_server(a))
#define SSL_in_accept_init(a) (SSL_in_init(a) && SSL_is_server(a))
int SSL_in_init(const SSL *s);
int SSL_in_before(const SSL *s);
int SSL_is_init_finished(const SSL *s);

/*
* The following 3 states are kept in ssl->rlayer.rstate when reads fail, you
* should not need these
*/
#define SSL_ST_READ_HEADER 0xF0
```

```
#define SSL_ST_READ_BODY 0xF1
#define SSL_ST_READ_DONE 0xF2

/*-
* Obtain latest Finished message
*   -- that we sent (SSL_get_finished)
*   -- that we expected from peer (SSL_get_peer_finished).
* Returns length (0 == no Finished so far),
 copies up to 'count' bytes.
*/
size_t SSL_get_finished(const SSL *s, void *buf, size_t count);
size_t SSL_get_peer_finished(const SSL *s, void *buf, size_t count);

/*
* use either SSL_VERIFY_NONE or SSL_VERIFY_PEER, the last 3 options are
* 'ored' with SSL_VERIFY_PEER if they are desired
*/
#define SSL_VERIFY_NONE 0x00
#define SSL_VERIFY_PEER 0x01
#define SSL_VERIFY_FAIL_IF_NO_PEER_CERT 0x02
#define SSL_VERIFY_CLIENT_ONCE 0x04
#define SSL_VERIFY_POST_HANDSHAKE 0x08

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define OpenSSL_add_ssl_algorithms() SSL_library_init()
#define SSLeay_add_ssl_algorithms() SSL_library_init()
#endif

/* More backward compatibility */
#define SSL_get_cipher(s) \
   SSL_CIPHER_get_name(SSL_get_current_cipher(s))
#define SSL_get_cipher_bits(s, np) \
   SSL_CIPHER_get_bits(SSL_get_current_cipher(s), np)
#define SSL_get_cipher_version(s) \
   SSL_CIPHER_get_version(SSL_get_current_cipher(s))
#define SSL_get_cipher_name(s) \
   SSL_CIPHER_get_name(SSL_get_current_cipher(s))
#define
 SSL_get_time(a) SSL_SESSION_get_time(a)
#define SSL_set_time(a, b) SSL_SESSION_set_time((a), (b))
#define SSL_get_timeout(a) SSL_SESSION_get_timeout(a)
#define SSL_set_timeout(a, b) SSL_SESSION_set_timeout((a), (b))

#define d2i_SSL_SESSION_bio(bp, s_id) ASN1_d2i_bio_of(SSL_SESSION, SSL_SESSION_new,
d2i_SSL_SESSION, bp, s_id)
#define i2d_SSL_SESSION_bio(bp, s_id) ASN1_i2d_bio_of(SSL_SESSION, i2d_SSL_SESSION, bp, s_id)

DECLARE_PEM_rw(SSL_SESSION, SSL_SESSION)
```

```
#define SSL_AD_REASON_OFFSET 1000 /* offset to get SSL_R_... value \
                                   * from SSL_AD_... */
/* These alert types are for SSLv3 and TLSv1 */
#define SSL_AD_CLOSE_NOTIFY SSL3_AD_CLOSE_NOTIFY
/* fatal */
#define SSL_AD_UNEXPECTED_MESSAGE SSL3_AD_UNEXPECTED_MESSAGE
/* fatal */
#define SSL_AD_BAD_RECORD_MAC SSL3_AD_BAD_RECORD_MAC
#define SSL_AD_DECRYPTION_FAILED TLS1_AD_DECRYPTION_FAILED
#define SSL_AD_RECORD_OVERFLOW TLS1_AD_RECORD_OVERFLOW
/* fatal */
#define SSL_AD_DECOMPRESSION_FAILURE
 SSL3_AD_DECOMPRESSION_FAILURE
/* fatal */
#define SSL_AD_HANDSHAKE_FAILURE SSL3_AD_HANDSHAKE_FAILURE
/* Not for TLS */
#define SSL_AD_NO_CERTIFICATE SSL3_AD_NO_CERTIFICATE
#define SSL_AD_BAD_CERTIFICATE SSL3_AD_BAD_CERTIFICATE
#define SSL_AD_UNSUPPORTED_CERTIFICATE SSL3_AD_UNSUPPORTED_CERTIFICATE
#define SSL_AD_CERTIFICATE_REVOKED SSL3_AD_CERTIFICATE_REVOKED
#define SSL_AD_CERTIFICATE_EXPIRED SSL3_AD_CERTIFICATE_EXPIRED
#define SSL_AD_CERTIFICATE_UNKNOWN SSL3_AD_CERTIFICATE_UNKNOWN
/* fatal */
#define SSL_AD_ILLEGAL_PARAMETER SSL3_AD_ILLEGAL_PARAMETER
/* fatal */
#define SSL_AD_UNKNOWN_CA TLS1_AD_UNKNOWN_CA
/* fatal */
#define SSL_AD_ACCESS_DENIED TLS1_AD_ACCESS_DENIED
/* fatal */
#define SSL_AD_DECODE_ERROR TLS1_AD_DECODE_ERROR
#define SSL_AD_DECRYPT_ERROR TLS1_AD_DECRYPT_ERROR
/* fatal */
#define SSL_AD_EXPORT_RESTRICTION TLS1_AD_EXPORT_RESTRICTION
/* fatal */
#define SSL_AD_PROTOCOL_VERSION TLS1_AD_PROTOCOL_VERSION
/* fatal */
#define SSL_AD_INSUFFICIENT_SECURITY TLS1_AD_INSUFFICIENT_SECURITY
/*
 fatal */
#define SSL_AD_INTERNAL_ERROR TLS1_AD_INTERNAL_ERROR
#define SSL_AD_USER_CANCELLED TLS1_AD_USER_CANCELLED
#define SSL_AD_NO_RENEGOTIATION TLS1_AD_NO_RENEGOTIATION
#define SSL_AD_MISSING_EXTENSION TLS13_AD_MISSING_EXTENSION
#define SSL_AD_CERTIFICATE_REQUIRED TLS13_AD_CERTIFICATE_REQUIRED
#define SSL_AD_UNSUPPORTED_EXTENSION TLS1_AD_UNSUPPORTED_EXTENSION
#define SSL_AD_CERTIFICATE_UNOBTAINABLE TLS1_AD_CERTIFICATE_UNOBTAINABLE
#define SSL_AD_UNRECOGNIZED_NAME TLS1_AD_UNRECOGNIZED_NAME
#define SSL_AD_BAD_CERTIFICATE_STATUS_RESPONSE
```

```
TLS1_AD_BAD_CERTIFICATE_STATUS_RESPONSE
#define SSL_AD_BAD_CERTIFICATE_HASH_VALUE TLS1_AD_BAD_CERTIFICATE_HASH_VALUE
/* fatal */
#define SSL_AD_UNKNOWN_PSK_IDENTITY TLS1_AD_UNKNOWN_PSK_IDENTITY
/* fatal */
#define SSL_AD_INAPPROPRIATE_FALLBACK TLS1_AD_INAPPROPRIATE_FALLBACK
#define SSL_AD_NO_APPLICATION_PROTOCOL TLS1_AD_NO_APPLICATION_PROTOCOL
#define SSL_ERROR_NONE 0
#define SSL_ERROR_SSL 1
#define SSL_ERROR_WANT_READ 2
#define
 SSL_ERROR_WANT_WRITE 3
#define SSL_ERROR_WANT_X509_LOOKUP 4
#define SSL_ERROR_SYSCALL 5 /* look at error stack/return \
                        * value/errno */
#define SSL_ERROR_ZERO_RETURN 6
#define SSL_ERROR_WANT_CONNECT 7
#define SSL_ERROR_WANT_ACCEPT 8
#define SSL_ERROR_WANT_ASYNC 9
#define SSL_ERROR_WANT_ASYNC_JOB 10
#define SSL_ERROR_WANT_CLIENT_HELLO_CB 11
#define SSL_ERROR_WANT_RETRY_VERIFY 12

#ifndef OPENSSL_NO_DEPRECATED_3_0
#define SSL_CTRL_SET_TMP_DH 3
#define SSL_CTRL_SET_TMP_ECDH 4
#define SSL_CTRL_SET_TMP_DH_CB 6
#endif

#define SSL_CTRL_GET_CLIENT_CERT_REQUEST 9
#define SSL_CTRL_GET_NUM_RENEGOTIATIONS 10
#define SSL_CTRL_CLEAR_NUM_RENEGOTIATIONS 11
#define SSL_CTRL_GET_TOTAL_RENEGOTIATIONS 12
#define SSL_CTRL_GET_FLAGS 13
#define SSL_CTRL_EXTRA_CHAIN_CERT 14
#define SSL_CTRL_SET_MSG_CALLBACK 15
#define SSL_CTRL_SET_MSG_CALLBACK_ARG 16
/* only applies to datagram connections */
#define SSL_CTRL_SET_MTU 17
/* Stats */
#define SSL_CTRL_SESS_NUMBER 20
#define SSL_CTRL_SESS_CONNECT
 21
#define SSL_CTRL_SESS_CONNECT_GOOD 22
#define SSL_CTRL_SESS_CONNECT_RENEGOTIATE 23
#define SSL_CTRL_SESS_ACCEPT 24
#define SSL_CTRL_SESS_ACCEPT_GOOD 25
#define SSL_CTRL_SESS_ACCEPT_RENEGOTIATE 26
```

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#define SSL_CTRL_SESS_HIT 27
#define SSL_CTRL_SESS_CB_HIT 28
#define SSL_CTRL_SESS_MISSES 29
#define SSL_CTRL_SESS_TIMEOUTS 30
#define SSL_CTRL_SESS_CACHE_FULL 31
#define SSL_CTRL_MODE 33
#define SSL_CTRL_GET_READ_AHEAD 40
#define SSL_CTRL_SET_READ_AHEAD 41
#define SSL_CTRL_SET_SESS_CACHE_SIZE 42
#define SSL_CTRL_GET_SESS_CACHE_SIZE 43
#define SSL_CTRL_SET_SESS_CACHE_MODE 44
#define SSL_CTRL_GET_SESS_CACHE_MODE 45
#define SSL_CTRL_GET_MAX_CERT_LIST 50
#define SSL_CTRL_SET_MAX_CERT_LIST 51
#define SSL_CTRL_SET_MAX_SEND_FRAGMENT 52
/* see tls1.h for macros based on these */
#define SSL_CTRL_SET_TLSEXT_SERVERNAME_CB 53
#define SSL_CTRL_SET_TLSEXT_SERVERNAME_ARG 54
#define SSL_CTRL_SET_TLSEXT_HOSTNAME 55
#define SSL_CTRL_SET_TLSEXT_DEBUG_CB 56
#define SSL_CTRL_SET_TLSEXT_DEBUG_ARG
 57
#define SSL_CTRL_GET_TLSEXT_TICKET_KEYS 58
#define SSL_CTRL_SET_TLSEXT_TICKET_KEYS 59
/*# define SSL_CTRL_SET_TLSEXT_OPAQUE_PRF_INPUT    60 */
/*# define SSL_CTRL_SET_TLSEXT_OPAQUE_PRF_INPUT_CB 61 */
/*# define SSL_CTRL_SET_TLSEXT_OPAQUE_PRF_INPUT_CB_ARG 62 */
#define SSL_CTRL_SET_TLSEXT_STATUS_REQ_CB 63
#define SSL_CTRL_SET_TLSEXT_STATUS_REQ_CB_ARG 64
#define SSL_CTRL_SET_TLSEXT_STATUS_REQ_TYPE 65
#define SSL_CTRL_GET_TLSEXT_STATUS_REQ_EXTS 66
#define SSL_CTRL_SET_TLSEXT_STATUS_REQ_EXTS 67
#define SSL_CTRL_GET_TLSEXT_STATUS_REQ_IDS 68
#define SSL_CTRL_SET_TLSEXT_STATUS_REQ_IDS 69
#define SSL_CTRL_GET_TLSEXT_STATUS_REQ_OCSP_RESP 70
#define SSL_CTRL_SET_TLSEXT_STATUS_REQ_OCSP_RESP 71
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define SSL_CTRL_SET_TLSEXT_TICKET_KEY_CB 72
#endif
#define SSL_CTRL_SET_TLS_EXT_SRP_USERNAME_CB 75
#define SSL_CTRL_SET_SRP_VERIFY_PARAM_CB 76
#define SSL_CTRL_SET_SRP_GIVE_CLIENT_PWD_CB 77
#define SSL_CTRL_SET_SRP_ARG 78
#define SSL_CTRL_SET_TLS_EXT_SRP_USERNAME 79
#define
 SSL_CTRL_SET_TLS_EXT_SRP_STRENGTH 80
#define SSL_CTRL_SET_TLS_EXT_SRP_PASSWORD 81
#define DTLS_CTRL_GET_TIMEOUT 73
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#define DTLS_CTRL_HANDLE_TIMEOUT 74
#define SSL_CTRL_GET_RI_SUPPORT 76
#define SSL_CTRL_CLEAR_MODE 78
#define SSL_CTRL_SET_NOT_RESUMABLE_SESS_CB 79
#define SSL_CTRL_GET_EXTRA_CHAIN_CERTS 82
#define SSL_CTRL_CLEAR_EXTRA_CHAIN_CERTS 83
#define SSL_CTRL_CHAIN 88
#define SSL_CTRL_CHAIN_CERT 89
#define SSL_CTRL_GET_GROUPS 90
#define SSL_CTRL_SET_GROUPS 91
#define SSL_CTRL_SET_GROUPS_LIST 92
#define SSL_CTRL_GET_SHARED_GROUP 93
#define SSL_CTRL_SET_SIGALGS 97
#define SSL_CTRL_SET_SIGALGS_LIST 98
#define SSL_CTRL_CERT_FLAGS 99
#define SSL_CTRL_CLEAR_CERT_FLAGS 100
#define SSL_CTRL_SET_CLIENT_SIGALGS 101
#define SSL_CTRL_SET_CLIENT_SIGALGS_LIST 102
#define SSL_CTRL_GET_CLIENT_CERT_TYPES 103
#define SSL_CTRL_SET_CLIENT_CERT_TYPES 104
#define SSL_CTRL_BUILD_CERT_CHAIN 105
#define SSL_CTRL_SET_VERIFY_CERT_STORE 106
#define SSL_CTRL_SET_CHAIN_CERT_STORE 107
#define SSL_CTRL_GET_PEER_SIGNATURE_NID
 108
#define SSL_CTRL_GET_PEER_TMP_KEY 109
#define SSL_CTRL_GET_RAW_CIPHERLIST 110
#define SSL_CTRL_GET_EC_POINT_FORMATS 111
#define SSL_CTRL_GET_CHAIN_CERTS 115
#define SSL_CTRL_SELECT_CURRENT_CERT 116
#define SSL_CTRL_SET_CURRENT_CERT 117
#define SSL_CTRL_SET_DH_AUTO 118
#define DTLS_CTRL_SET_LINK_MTU 120
#define DTLS_CTRL_GET_LINK_MIN_MTU 121
#define SSL_CTRL_GET_EXTMS_SUPPORT 122
#define SSL_CTRL_SET_MIN_PROTO_VERSION 123
#define SSL_CTRL_SET_MAX_PROTO_VERSION 124
#define SSL_CTRL_SET_SPLIT_SEND_FRAGMENT 125
#define SSL_CTRL_SET_MAX_PIPELINES 126
#define SSL_CTRL_GET_TLSEXT_STATUS_REQ_TYPE 127
#define SSL_CTRL_GET_TLSEXT_STATUS_REQ_CB 128
#define SSL_CTRL_GET_TLSEXT_STATUS_REQ_CB_ARG 129
#define SSL_CTRL_GET_MIN_PROTO_VERSION 130
#define SSL_CTRL_GET_MAX_PROTO_VERSION 131
#define SSL_CTRL_GET_SIGNATURE_NID 132
#define SSL_CTRL_GET_TMP_KEY 133
#define SSL_CTRL_GET_NEGOTIATED_GROUP 134
#define SSL_CTRL_GET_IANA_GROUPS 135
```

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#define SSL_CTRL_SET_RETRY_VERIFY 136
#define
 SSL_CTRL_GET_VERIFY_CERT_STORE 137
#define SSL_CTRL_GET_CHAIN_CERT_STORE 138
#define SSL_CTRL_GET0_IMPLEMENTED_GROUPS 139
#define SSL_CTRL_GET_SIGNATURE_NAME 140
#define SSL_CTRL_GET_PEER_SIGNATURE_NAME 141
#define SSL_CERT_SET_FIRST 1
#define SSL_CERT_SET_NEXT 2
#define SSL_CERT_SET_SERVER 3
#define DTLSv1_get_timeout(ssl, arg) \
   SSL_ctrl(ssl, DTLS_CTRL_GET_TIMEOUT, 0, (void *)(arg))
#define DTLSv1_handle_timeout(ssl) \
   SSL_ctrl(ssl, DTLS_CTRL_HANDLE_TIMEOUT, 0, NULL)
#define SSL_num_renegotiations(ssl) \
   SSL_ctrl((ssl), SSL_CTRL_GET_NUM_RENEGOTIATIONS, 0, NULL)
#define SSL_clear_num_renegotiations(ssl) \
   SSL_ctrl((ssl), SSL_CTRL_CLEAR_NUM_RENEGOTIATIONS, 0, NULL)
#define SSL_total_renegotiations(ssl) \
   SSL_ctrl((ssl), SSL_CTRL_GET_TOTAL_RENEGOTIATIONS, 0, NULL)
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define SSL_CTX_set_tmp_dh(ctx, dh) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_TMP_DH, 0, (char *)(dh))
#endif
#define SSL_CTX_set_dh_auto(ctx, onoff) \
   SSL_CTX_ctrl(ctx,
 SSL_CTRL_SET_DH_AUTO, onoff, NULL)
#define SSL_set_dh_auto(s, onoff) \
   SSL_ctrl(s, SSL_CTRL_SET_DH_AUTO, onoff, NULL)
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define SSL_set_tmp_dh(ssl, dh) \
   SSL_ctrl(ssl, SSL_CTRL_SET_TMP_DH, 0, (char *)(dh))
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define SSL_CTX_set_tmp_ecdh(ctx, ecdh) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_TMP_ECDH, 0, (char *)(ecdh))
#define SSL_set_tmp_ecdh(ssl, ecdh) \
   SSL_ctrl(ssl, SSL_CTRL_SET_TMP_ECDH, 0, (char *)(ecdh))
#endif
#define SSL_CTX_add_extra_chain_cert(ctx, x509) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_EXTRA_CHAIN_CERT, 0, (char *)(x509))
#define SSL_CTX_get_extra_chain_certs(ctx, px509) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_EXTRA_CHAIN_CERTS, 0, px509)
#define SSL_CTX_get_extra_chain_certs_only(ctx, px509) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_EXTRA_CHAIN_CERTS, 1, px509)
#define SSL_CTX_clear_extra_chain_certs(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_CLEAR_EXTRA_CHAIN_CERTS, 0, NULL)
#define SSL_CTX_set0_chain(ctx, sk)
```

```
 \
   SSL_CTX_ctrl(ctx, SSL_CTRL_CHAIN, 0, (char *)(sk))
#define SSL_CTX_set1_chain(ctx, sk) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_CHAIN, 1, (char *)(sk))
#define SSL_CTX_add0_chain_cert(ctx, x509) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_CHAIN_CERT, 0, (char *)(x509))
#define SSL_CTX_add1_chain_cert(ctx, x509) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_CHAIN_CERT, 1, (char *)(x509))
#define SSL_CTX_get0_chain_certs(ctx, px509) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_CHAIN_CERTS, 0, px509)
#define SSL_CTX_clear_chain_certs(ctx) \
   SSL_CTX_set0_chain(ctx, NULL)
#define SSL_CTX_build_cert_chain(ctx, flags) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_BUILD_CERT_CHAIN, flags, NULL)
#define SSL_CTX_select_current_cert(ctx, x509) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SELECT_CURRENT_CERT, 0, (char *)(x509))
#define SSL_CTX_set_current_cert(ctx, op) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_CURRENT_CERT, op, NULL)
#define SSL_CTX_set0_verify_cert_store(ctx, st) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_VERIFY_CERT_STORE, 0, (char *)(st))
#define
 SSL_CTX_set1_verify_cert_store(ctx, st) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_VERIFY_CERT_STORE, 1, (char *)(st))
#define SSL_CTX_get0_verify_cert_store(ctx, st) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_VERIFY_CERT_STORE, 0, (char *)(st))
#define SSL_CTX_set0_chain_cert_store(ctx, st) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_CHAIN_CERT_STORE, 0, (char *)(st))
#define SSL_CTX_set1_chain_cert_store(ctx, st) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_CHAIN_CERT_STORE, 1, (char *)(st))
#define SSL_CTX_get0_chain_cert_store(ctx, st) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_CHAIN_CERT_STORE, 0, (char *)(st))
#define SSL_set0_chain(s, sk) \
   SSL_ctrl(s, SSL_CTRL_CHAIN, 0, (char *)(sk))
#define SSL_set1_chain(s, sk) \
   SSL_ctrl(s, SSL_CTRL_CHAIN, 1, (char *)(sk))
#define SSL_add0_chain_cert(s, x509) \
   SSL_ctrl(s, SSL_CTRL_CHAIN_CERT, 0, (char *)(x509))
#define SSL_add1_chain_cert(s, x509) \
   SSL_ctrl(s, SSL_CTRL_CHAIN_CERT, 1, (char *)(x509))
#define SSL_get0_chain_certs(s, px509) \
   SSL_ctrl(s,
 SSL_CTRL_GET_CHAIN_CERTS, 0, px509)
#define SSL_clear_chain_certs(s) \
   SSL_set0_chain(s, NULL)
#define SSL_build_cert_chain(s, flags) \
   SSL_ctrl(s, SSL_CTRL_BUILD_CERT_CHAIN, flags, NULL)
#define SSL_select_current_cert(s, x509) \
   SSL_ctrl(s, SSL_CTRL_SELECT_CURRENT_CERT, 0, (char *)(x509))
```

```
#define SSL_set_current_cert(s, op) \
   SSL_ctrl(s, SSL_CTRL_SET_CURRENT_CERT, op, NULL)
#define SSL_set0_verify_cert_store(s, st) \
   SSL_ctrl(s, SSL_CTRL_SET_VERIFY_CERT_STORE, 0, (char *)(st))
#define SSL_set1_verify_cert_store(s, st) \
   SSL_ctrl(s, SSL_CTRL_SET_VERIFY_CERT_STORE, 1, (char *)(st))
#define SSL_get0_verify_cert_store(s, st) \
   SSL_ctrl(s, SSL_CTRL_GET_VERIFY_CERT_STORE, 0, (char *)(st))
#define SSL_set0_chain_cert_store(s, st) \
   SSL_ctrl(s, SSL_CTRL_SET_CHAIN_CERT_STORE, 0, (char *)(st))
#define SSL_set1_chain_cert_store(s, st) \
   SSL_ctrl(s, SSL_CTRL_SET_CHAIN_CERT_STORE, 1, (char *)(st))
#define SSL_get0_chain_cert_store(s, st) \
   SSL_ctrl(s,
 SSL_CTRL_GET_CHAIN_CERT_STORE, 0, (char *)(st))

#define SSL_get1_groups(s, glist) \
   SSL_ctrl(s, SSL_CTRL_GET_GROUPS, 0, (int *)(glist))
#define SSL_get0_iana_groups(s, plst) \
   SSL_ctrl(s, SSL_CTRL_GET_IANA_GROUPS, 0, (uint16_t **)(plst))
#define SSL_CTX_set1_groups(ctx, glist, glistlen) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_GROUPS, glistlen, (int *)(glist))
#define SSL_CTX_set1_groups_list(ctx, s) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_GROUPS_LIST, 0, (char *)(s))
#define SSL_CTX_get0_implemented_groups(ctx, all, out)       \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET0_IMPLEMENTED_GROUPS, all, \
      (STACK_OF(OPENSSL_CSTRING) *)(out))
#define SSL_set1_groups(s, glist, glistlen) \
   SSL_ctrl(s, SSL_CTRL_SET_GROUPS, glistlen, (char *)(glist))
#define SSL_set1_groups_list(s, str) \
   SSL_ctrl(s, SSL_CTRL_SET_GROUPS_LIST, 0, (char *)(str))
#define SSL_get_shared_group(s, n) \
   SSL_ctrl(s, SSL_CTRL_GET_SHARED_GROUP, n, NULL)
#define SSL_get_negotiated_group(s) \
   SSL_ctrl(s, SSL_CTRL_GET_NEGOTIATED_GROUP,
 0, NULL)
#define SSL_CTX_set1_sigalgs(ctx, slist, slistlen) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_SIGALGS, slistlen, (int *)(slist))
#define SSL_CTX_set1_sigalgs_list(ctx, s) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_SIGALGS_LIST, 0, (char *)(s))
#define SSL_set1_sigalgs(s, slist, slistlen) \
   SSL_ctrl(s, SSL_CTRL_SET_SIGALGS, slistlen, (int *)(slist))
#define SSL_set1_sigalgs_list(s, str) \
   SSL_ctrl(s, SSL_CTRL_SET_SIGALGS_LIST, 0, (char *)(str))
#define SSL_CTX_set1_client_sigalgs(ctx, slist, slistlen) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_CLIENT_SIGALGS, slistlen, (int *)(slist))
#define SSL_CTX_set1_client_sigalgs_list(ctx, s) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_CLIENT_SIGALGS_LIST, 0, (char *)(s))
```

```
#define SSL_set1_client_sigalgs(s, slist, slistlen) \
   SSL_ctrl(s, SSL_CTRL_SET_CLIENT_SIGALGS, slistlen, (int *)(slist))
#define SSL_set1_client_sigalgs_list(s, str) \
   SSL_ctrl(s, SSL_CTRL_SET_CLIENT_SIGALGS_LIST, 0, (char *)(str))
#define SSL_get0_certificate_types(s,
 clist) \
   SSL_ctrl(s, SSL_CTRL_GET_CLIENT_CERT_TYPES, 0, (char *)(clist))
#define SSL_CTX_set1_client_certificate_types(ctx, clist, clistlen) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_CLIENT_CERT_TYPES, clistlen,     \
       (char *)(clist))
#define SSL_set1_client_certificate_types(s, clist, clistlen) \
   SSL_ctrl(s, SSL_CTRL_SET_CLIENT_CERT_TYPES, clistlen, (char *)(clist))
#define SSL_get0_signature_name(s, str) \
   SSL_ctrl(s, SSL_CTRL_GET_SIGNATURE_NAME, 0, (1 ? (str) : (const char **)NULL))
#define SSL_get_signature_nid(s, pn) \
   SSL_ctrl(s, SSL_CTRL_GET_SIGNATURE_NID, 0, pn)
#define SSL_get0_peer_signature_name(s, str) \
   SSL_ctrl(s, SSL_CTRL_GET_PEER_SIGNATURE_NAME, 0, (1 ? (str) : (const char **)NULL))
#define SSL_get_peer_signature_nid(s, pn) \
   SSL_ctrl(s, SSL_CTRL_GET_PEER_SIGNATURE_NID, 0, pn)
#define SSL_get_peer_tmp_key(s, pk) \
   SSL_ctrl(s, SSL_CTRL_GET_PEER_TMP_KEY, 0, pk)
#define SSL_get_tmp_key(s, pk) \
   SSL_ctrl(s, SSL_CTRL_GET_TMP_KEY,
 0, pk)
#define SSL_get0_raw_cipherlist(s, plst) \
   SSL_ctrl(s, SSL_CTRL_GET_RAW_CIPHERLIST, 0, plst)
#define SSL_get0_ec_point_formats(s, plst) \
   SSL_ctrl(s, SSL_CTRL_GET_EC_POINT_FORMATS, 0, plst)
#define SSL_CTX_set_min_proto_version(ctx, version) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_MIN_PROTO_VERSION, version, NULL)
#define SSL_CTX_set_max_proto_version(ctx, version) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_MAX_PROTO_VERSION, version, NULL)
#define SSL_CTX_get_min_proto_version(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_MIN_PROTO_VERSION, 0, NULL)
#define SSL_CTX_get_max_proto_version(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_MAX_PROTO_VERSION, 0, NULL)
#define SSL_set_min_proto_version(s, version) \
   SSL_ctrl(s, SSL_CTRL_SET_MIN_PROTO_VERSION, version, NULL)
#define SSL_set_max_proto_version(s, version) \
   SSL_ctrl(s, SSL_CTRL_SET_MAX_PROTO_VERSION, version, NULL)
#define SSL_get_min_proto_version(s) \
   SSL_ctrl(s, SSL_CTRL_GET_MIN_PROTO_VERSION, 0, NULL)
#define
 SSL_get_max_proto_version(s) \
   SSL_ctrl(s, SSL_CTRL_GET_MAX_PROTO_VERSION, 0, NULL)

const char *SSL_get0_group_name(SSL *s);
```

```
const char *SSL_group_to_name(SSL *s, int id);

/* Backwards compatibility, original 1.1.0 names */
#define SSL_CTRL_GET_SERVER_TMP_KEY \
   SSL_CTRL_GET_PEER_TMP_KEY
#define SSL_get_server_tmp_key(s, pk) \
   SSL_get_peer_tmp_key(s, pk)

int SSL_set0_tmp_dh_pkey(SSL *s, EVP_PKEY *dhpkey);
int SSL_CTX_set0_tmp_dh_pkey(SSL_CTX *ctx, EVP_PKEY *dhpkey);

/*
* The following symbol names are old and obsolete. They are kept
* for compatibility reasons only and should not be used anymore.
*/
#define SSL_CTRL_GET_CURVES SSL_CTRL_GET_GROUPS
#define SSL_CTRL_SET_CURVES SSL_CTRL_SET_GROUPS
#define SSL_CTRL_SET_CURVES_LIST SSL_CTRL_SET_GROUPS_LIST
#define SSL_CTRL_GET_SHARED_CURVE SSL_CTRL_GET_SHARED_GROUP

#define SSL_get1_curves SSL_get1_groups
#define SSL_CTX_set1_curves SSL_CTX_set1_groups
#define SSL_CTX_set1_curves_list SSL_CTX_set1_groups_list
#define SSL_set1_curves
 SSL_set1_groups
#define SSL_set1_curves_list SSL_set1_groups_list
#define SSL_get_shared_curve SSL_get_shared_group

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
/* Provide some compatibility macros for removed functionality. */
#define SSL_CTX_need_tmp_RSA(ctx) 0
#define SSL_CTX_set_tmp_rsa(ctx, rsa) 1
#define SSL_need_tmp_RSA(ssl) 0
#define SSL_set_tmp_rsa(ssl, rsa) 1
#define SSL_CTX_set_ecdh_auto(dummy, onoff) ((onoff) != 0)
#define SSL_set_ecdh_auto(dummy, onoff) ((onoff) != 0)
/*
* We "pretend" to call the callback to avoid warnings about unused static
* functions.
*/
#define SSL_CTX_set_tmp_rsa_callback(ctx, cb) \
   while (0)                              \
   (cb)(NULL, 0, 0)
#define SSL_set_tmp_rsa_callback(ssl, cb) \
   while (0)                          \
   (cb)(NULL, 0, 0)
#endif
__owur const BIO_METHOD *BIO_f_ssl(void);
```

```
__owur BIO *BIO_new_ssl(SSL_CTX *ctx, int client);
__owur BIO *BIO_new_ssl_connect(SSL_CTX *ctx);
__owur BIO *BIO_new_buffer_ssl_connect(SSL_CTX
 *ctx);
__owur int BIO_ssl_copy_session_id(BIO *to, BIO *from);
void BIO_ssl_shutdown(BIO *ssl_bio);

__owur int SSL_CTX_set_cipher_list(SSL_CTX *, const char *str);
__owur SSL_CTX *SSL_CTX_new(const SSL_METHOD *meth);
__owur SSL_CTX *SSL_CTX_new_ex(OSSL_LIB_CTX *libctx, const char *propq,
   const SSL_METHOD *meth);
int SSL_CTX_up_ref(SSL_CTX *ctx);
void SSL_CTX_free(SSL_CTX *);
__owur long SSL_CTX_set_timeout(SSL_CTX *ctx, long t);
__owur long SSL_CTX_get_timeout(const SSL_CTX *ctx);
__owur X509_STORE *SSL_CTX_get_cert_store(const SSL_CTX *);
void SSL_CTX_set_cert_store(SSL_CTX *, X509_STORE *);
void SSL_CTX_set1_cert_store(SSL_CTX *, X509_STORE *);
__owur int SSL_want(const SSL *s);
__owur int SSL_clear(SSL *s);

#ifndef OPENSSL_NO_DEPRECATED_3_4
OSSL_DEPRECATEDIN_3_4_FOR("not Y2038-safe, replace with SSL_CTX_flush_sessions_ex()")
void SSL_CTX_flush_sessions(SSL_CTX *ctx, long tm);
#endif
void SSL_CTX_flush_sessions_ex(SSL_CTX *ctx, time_t tm);

__owur const SSL_CIPHER *SSL_get_current_cipher(const
 SSL *s);
__owur const SSL_CIPHER *SSL_get_pending_cipher(const SSL *s);
__owur int SSL_CIPHER_get_bits(const SSL_CIPHER *c, int *alg_bits);
__owur const char *SSL_CIPHER_get_version(const SSL_CIPHER *c);
__owur const char *SSL_CIPHER_get_name(const SSL_CIPHER *c);
__owur const char *SSL_CIPHER_standard_name(const SSL_CIPHER *c);
__owur const char *OPENSSL_cipher_name(const char *rfc_name);
__owur uint32_t SSL_CIPHER_get_id(const SSL_CIPHER *c);
__owur uint16_t SSL_CIPHER_get_protocol_id(const SSL_CIPHER *c);
__owur int SSL_CIPHER_get_kx_nid(const SSL_CIPHER *c);
__owur int SSL_CIPHER_get_auth_nid(const SSL_CIPHER *c);
__owur const EVP_MD *SSL_CIPHER_get_handshake_digest(const SSL_CIPHER *c);
__owur int SSL_CIPHER_is_aead(const SSL_CIPHER *c);

__owur int SSL_get_fd(const SSL *s);
__owur int SSL_get_rfd(const SSL *s);
__owur int SSL_get_wfd(const SSL *s);
__owur const char *SSL_get_cipher_list(const SSL *s, int n);
__owur char *SSL_get_shared_ciphers(const SSL *s,
```

```
 char *buf, int size);
__owur int SSL_get_read_ahead(const SSL *s);
__owur int SSL_pending(const SSL *s);
__owur int SSL_has_pending(const SSL *s);
#ifndef OPENSSL_NO_SOCK
__owur int SSL_set_fd(SSL *s, int fd);
__owur int SSL_set_rfd(SSL *s, int fd);
__owur int SSL_set_wfd(SSL *s, int fd);
#endif
void SSL_set0_rbio(SSL *s, BIO *rbio);
void SSL_set0_wbio(SSL *s, BIO *wbio);
void SSL_set_bio(SSL *s, BIO *rbio, BIO *wbio);
__owur BIO *SSL_get_rbio(const SSL *s);
__owur BIO *SSL_get_wbio(const SSL *s);
__owur int SSL_set_cipher_list(SSL *s, const char *str);
__owur int SSL_CTX_set_ciphersuites(SSL_CTX *ctx, const char *str);
__owur int SSL_set_ciphersuites(SSL *s, const char *str);
void SSL_set_read_ahead(SSL *s, int yes);
__owur int SSL_get_verify_mode(const SSL *s);
__owur int SSL_get_verify_depth(const SSL *s);
__owur SSL_verify_cb SSL_get_verify_callback(const SSL *s);
void SSL_set_verify(SSL *s, int mode, SSL_verify_cb callback);
void SSL_set_verify_depth(SSL *s, int depth);
void SSL_set_cert_cb(SSL
 *s, int (*cb)(SSL *ssl, void *arg), void *arg);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 __owur int SSL_use_RSAPrivateKey(SSL *ssl, RSA *rsa);
OSSL_DEPRECATEDIN_3_0
__owur int SSL_use_RSAPrivateKey_ASN1(SSL *ssl,
   const unsigned char *d, long len);
#endif
__owur int SSL_use_PrivateKey(SSL *ssl, EVP_PKEY *pkey);
__owur int SSL_use_PrivateKey_ASN1(int pk, SSL *ssl, const unsigned char *d,
   long len);
__owur int SSL_use_certificate(SSL *ssl, X509 *x);
__owur int SSL_use_certificate_ASN1(SSL *ssl, const unsigned char *d, int len);
__owur int SSL_use_cert_and_key(SSL *ssl, X509 *x509, EVP_PKEY *privatekey,
   STACK_OF(X509) *chain, int override);

/* serverinfo file format versions */
#define SSL_SERVERINFOV1 1
#define SSL_SERVERINFOV2 2

/* Set serverinfo data for the current active cert. */
__owur int SSL_CTX_use_serverinfo(SSL_CTX *ctx, const unsigned char *serverinfo,
   size_t serverinfo_length);
__owur int SSL_CTX_use_serverinfo_ex(SSL_CTX *ctx,
```

```
 unsigned int version,
   const unsigned char *serverinfo,
   size_t serverinfo_length);
__owur int SSL_CTX_use_serverinfo_file(SSL_CTX *ctx, const char *file);

#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0
__owur int SSL_use_RSAPrivateKey_file(SSL *ssl, const char *file, int type);
#endif

__owur int SSL_use_PrivateKey_file(SSL *ssl, const char *file, int type);
__owur int SSL_use_certificate_file(SSL *ssl, const char *file, int type);

#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0
__owur int SSL_CTX_use_RSAPrivateKey_file(SSL_CTX *ctx, const char *file,
   int type);
#endif
__owur int SSL_CTX_use_PrivateKey_file(SSL_CTX *ctx, const char *file,
   int type);
__owur int SSL_CTX_use_certificate_file(SSL_CTX *ctx, const char *file,
   int type);
/* PEM type */
__owur int SSL_CTX_use_certificate_chain_file(SSL_CTX *ctx, const char *file);
__owur int SSL_use_certificate_chain_file(SSL *ssl, const char *file);
__owur STACK_OF(X509_NAME) *SSL_load_client_CA_file(const
 char *file);
__owur STACK_OF(X509_NAME) *SSL_load_client_CA_file_ex(const char *file, OSSL_LIB_CTX *libctx,
   const char *propq);
__owur int SSL_add_file_cert_subjects_to_stack(STACK_OF(X509_NAME) *stackCAs,
   const char *file);
int SSL_add_dir_cert_subjects_to_stack(STACK_OF(X509_NAME) *stackCAs,
   const char *dir);
int SSL_add_store_cert_subjects_to_stack(STACK_OF(X509_NAME) *stackCAs,
   const char *uri);

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define SSL_load_error_strings()                \
   OPENSSL_init_ssl(OPENSSL_INIT_LOAD_SSL_STRINGS \
         | OPENSSL_INIT_LOAD_CRYPTO_STRINGS,    \
      NULL)
#endif

__owur const char *SSL_state_string(const SSL *s);
__owur const char *SSL_rstate_string(const SSL *s);
__owur const char *SSL_state_string_long(const SSL *s);
__owur const char *SSL_rstate_string_long(const SSL *s);
```

```
#ifndef OPENSSL_NO_DEPRECATED_3_4
OSSL_DEPRECATEDIN_3_4_FOR("not Y2038-safe, replace with SSL_SESSION_get_time_ex()")
__owur long SSL_SESSION_get_time(const
 SSL_SESSION *s);
OSSL_DEPRECATEDIN_3_4_FOR("not Y2038-safe, replace with SSL_SESSION_set_time_ex()")
__owur long SSL_SESSION_set_time(SSL_SESSION *s, long t);
#endif
__owur long SSL_SESSION_get_timeout(const SSL_SESSION *s);
__owur long SSL_SESSION_set_timeout(SSL_SESSION *s, long t);
__owur int SSL_SESSION_get_protocol_version(const SSL_SESSION *s);
__owur int SSL_SESSION_set_protocol_version(SSL_SESSION *s, int version);

__owur time_t SSL_SESSION_get_time_ex(const SSL_SESSION *s);
__owur time_t SSL_SESSION_set_time_ex(SSL_SESSION *s, time_t t);

__owur const char *SSL_SESSION_get0_hostname(const SSL_SESSION *s);
__owur int SSL_SESSION_set1_hostname(SSL_SESSION *s, const char *hostname);
void SSL_SESSION_get0_alpn_selected(const SSL_SESSION *s,
   const unsigned char **alpn,
   size_t *len);
__owur int SSL_SESSION_set1_alpn_selected(SSL_SESSION *s,
   const unsigned char *alpn,
   size_t len);
__owur const SSL_CIPHER *SSL_SESSION_get0_cipher(const SSL_SESSION *s);
__owur
 int SSL_SESSION_set_cipher(SSL_SESSION *s, const SSL_CIPHER *cipher);
__owur int SSL_SESSION_has_ticket(const SSL_SESSION *s);
__owur unsigned long SSL_SESSION_get_ticket_lifetime_hint(const SSL_SESSION *s);
void SSL_SESSION_get0_ticket(const SSL_SESSION *s, const unsigned char **tick,
   size_t *len);
__owur uint32_t SSL_SESSION_get_max_early_data(const SSL_SESSION *s);
__owur int SSL_SESSION_set_max_early_data(SSL_SESSION *s,
   uint32_t max_early_data);
__owur int SSL_copy_session_id(SSL *to, const SSL *from);
__owur X509 *SSL_SESSION_get0_peer(SSL_SESSION *s);
__owur int SSL_SESSION_set1_id_context(SSL_SESSION *s,
   const unsigned char *sid_ctx,
   unsigned int sid_ctx_len);
__owur int SSL_SESSION_set1_id(SSL_SESSION *s, const unsigned char *sid,
   unsigned int sid_len);
__owur int SSL_SESSION_is_resumable(const SSL_SESSION *s);

__owur SSL_SESSION *SSL_SESSION_new(void);
__owur SSL_SESSION *SSL_SESSION_dup(const SSL_SESSION *src);
const unsigned char *SSL_SESSION_get_id(const
 SSL_SESSION *s,
   unsigned int *len);
const unsigned char *SSL_SESSION_get0_id_context(const SSL_SESSION *s,
```

```
   unsigned int *len);
__owur unsigned int SSL_SESSION_get_compress_id(const SSL_SESSION *s);
#ifndef OPENSSL_NO_STDIO
int SSL_SESSION_print_fp(FILE *fp, const SSL_SESSION *ses);
#endif
int SSL_SESSION_print(BIO *fp, const SSL_SESSION *ses);
int SSL_SESSION_print_keylog(BIO *bp, const SSL_SESSION *x);
int SSL_SESSION_up_ref(SSL_SESSION *ses);
void SSL_SESSION_free(SSL_SESSION *ses);
__owur int i2d_SSL_SESSION(const SSL_SESSION *in, unsigned char **pp);
__owur int SSL_set_session(SSL *to, SSL_SESSION *session);
int SSL_CTX_add_session(SSL_CTX *ctx, SSL_SESSION *session);
int SSL_CTX_remove_session(SSL_CTX *ctx, SSL_SESSION *session);
__owur int SSL_CTX_set_generate_session_id(SSL_CTX *ctx, GEN_SESSION_CB cb);
__owur int SSL_set_generate_session_id(SSL *s, GEN_SESSION_CB cb);
__owur int SSL_has_matching_session_id(const SSL *s,
   const unsigned char *id,
   unsigned
 int id_len);
SSL_SESSION *d2i_SSL_SESSION(SSL_SESSION **a, const unsigned char **pp,
   long length);
SSL_SESSION *d2i_SSL_SESSION_ex(SSL_SESSION **a, const unsigned char **pp,
   long length, OSSL_LIB_CTX *libctx,
   const char *propq);

#ifdef OPENSSL_X509_H
__owur X509 *SSL_get0_peer_certificate(const SSL *s);
__owur X509 *SSL_get1_peer_certificate(const SSL *s);
/* Deprecated in 3.0.0 */
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define SSL_get_peer_certificate SSL_get1_peer_certificate
#endif
#endif

__owur STACK_OF(X509) *SSL_get_peer_cert_chain(const SSL *s);

__owur int SSL_CTX_get_verify_mode(const SSL_CTX *ctx);
__owur int SSL_CTX_get_verify_depth(const SSL_CTX *ctx);
__owur SSL_verify_cb SSL_CTX_get_verify_callback(const SSL_CTX *ctx);
void SSL_CTX_set_verify(SSL_CTX *ctx, int mode, SSL_verify_cb callback);
void SSL_CTX_set_verify_depth(SSL_CTX *ctx, int depth);
void SSL_CTX_set_cert_verify_callback(SSL_CTX *ctx,
   int (*cb)(X509_STORE_CTX *, void *),
   void *arg);
void SSL_CTX_set_cert_cb(SSL_CTX
 *c, int (*cb)(SSL *ssl, void *arg),
   void *arg);
#ifndef OPENSSL_NO_DEPRECATED_3_0
```

```
OSSL_DEPRECATEDIN_3_0
__owur int SSL_CTX_use_RSAPrivateKey(SSL_CTX *ctx, RSA *rsa);
OSSL_DEPRECATEDIN_3_0
__owur int SSL_CTX_use_RSAPrivateKey_ASN1(SSL_CTX *ctx, const unsigned char *d,
  long len);
#endif
__owur int SSL_CTX_use_PrivateKey(SSL_CTX *ctx, EVP_PKEY *pkey);
__owur int SSL_CTX_use_PrivateKey_ASN1(int pk, SSL_CTX *ctx,
  const unsigned char *d, long len);
__owur int SSL_CTX_use_certificate(SSL_CTX *ctx, X509 *x);
__owur int SSL_CTX_use_certificate_ASN1(SSL_CTX *ctx, int len,
  const unsigned char *d);
__owur int SSL_CTX_use_cert_and_key(SSL_CTX *ctx, X509 *x509, EVP_PKEY *privatekey,
  STACK_OF(X509) *chain, int override);

void SSL_CTX_set_default_passwd_cb(SSL_CTX *ctx, pem_password_cb *cb);
void SSL_CTX_set_default_passwd_cb_userdata(SSL_CTX *ctx, void *u);
pem_password_cb *SSL_CTX_get_default_passwd_cb(SSL_CTX *ctx);
void *SSL_CTX_get_default_passwd_cb_userdata(SSL_CTX
 *ctx);
void SSL_set_default_passwd_cb(SSL *s, pem_password_cb *cb);
void SSL_set_default_passwd_cb_userdata(SSL *s, void *u);
pem_password_cb *SSL_get_default_passwd_cb(SSL *s);
void *SSL_get_default_passwd_cb_userdata(SSL *s);

__owur int SSL_CTX_check_private_key(const SSL_CTX *ctx);
__owur int SSL_check_private_key(const SSL *ctx);

__owur int SSL_CTX_set_session_id_context(SSL_CTX *ctx,
  const unsigned char *sid_ctx,
  unsigned int sid_ctx_len);

SSL *SSL_new(SSL_CTX *ctx);
int SSL_up_ref(SSL *s);
int SSL_is_dtls(const SSL *s);
int SSL_is_tls(const SSL *s);
int SSL_is_quic(const SSL *s);
__owur int SSL_set_session_id_context(SSL *ssl, const unsigned char *sid_ctx,
  unsigned int sid_ctx_len);

__owur int SSL_CTX_set_purpose(SSL_CTX *ctx, int purpose);
__owur int SSL_set_purpose(SSL *ssl, int purpose);
__owur int SSL_CTX_set_trust(SSL_CTX *ctx, int trust);
__owur int SSL_set_trust(SSL *ssl, int trust);

__owur int SSL_set1_host(SSL *s, const char *host);
__owur
```

```
 int SSL_add1_host(SSL *s, const char *host);
__owur const char *SSL_get0_peername(SSL *s);
void SSL_set_hostflags(SSL *s, unsigned int flags);

__owur int SSL_CTX_dane_enable(SSL_CTX *ctx);
__owur int SSL_CTX_dane_mtype_set(SSL_CTX *ctx, const EVP_MD *md,
   uint8_t mtype, uint8_t ord);
__owur int SSL_dane_enable(SSL *s, const char *basedomain);
__owur int SSL_dane_tlsa_add(SSL *s, uint8_t usage, uint8_t selector,
   uint8_t mtype, const unsigned char *data, size_t dlen);
__owur int SSL_get0_dane_authority(SSL *s, X509 **mcert, EVP_PKEY **mspki);
__owur int SSL_get0_dane_tlsa(SSL *s, uint8_t *usage, uint8_t *selector,
   uint8_t *mtype, const unsigned char **data,
   size_t *dlen);
/*
* Bridge opacity barrier between libcrypt and libssl, also needed to support
* offline testing in test/danetest.c
*/
SSL_DANE *SSL_get0_dane(SSL *ssl);
/*
* DANE flags
*/
unsigned long SSL_CTX_dane_set_flags(SSL_CTX *ctx, unsigned long flags);
unsigned long SSL_CTX_dane_clear_flags(SSL_CTX *ctx,
 unsigned long flags);
unsigned long SSL_dane_set_flags(SSL *ssl, unsigned long flags);
unsigned long SSL_dane_clear_flags(SSL *ssl, unsigned long flags);

__owur int SSL_CTX_set1_param(SSL_CTX *ctx, X509_VERIFY_PARAM *vpm);
__owur int SSL_set1_param(SSL *ssl, X509_VERIFY_PARAM *vpm);

__owur X509_VERIFY_PARAM *SSL_CTX_get0_param(SSL_CTX *ctx);
__owur X509_VERIFY_PARAM *SSL_get0_param(SSL *ssl);

#ifndef OPENSSL_NO_SRP
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 int SSL_CTX_set_srp_username(SSL_CTX *ctx, char *name);
OSSL_DEPRECATEDIN_3_0 int SSL_CTX_set_srp_password(SSL_CTX *ctx, char *password);
OSSL_DEPRECATEDIN_3_0 int SSL_CTX_set_srp_strength(SSL_CTX *ctx, int strength);
OSSL_DEPRECATEDIN_3_0
int SSL_CTX_set_srp_client_pwd_callback(SSL_CTX *ctx,
   char *(*cb)(SSL *, void *));
OSSL_DEPRECATEDIN_3_0
int SSL_CTX_set_srp_verify_param_callback(SSL_CTX *ctx,
   int (*cb)(SSL *, void *));
OSSL_DEPRECATEDIN_3_0
int SSL_CTX_set_srp_username_callback(SSL_CTX *ctx,
   int (*cb)(SSL
```

```
 *, int *, void *));
OSSL_DEPRECATEDIN_3_0 int SSL_CTX_set_srp_cb_arg(SSL_CTX *ctx, void *arg);

OSSL_DEPRECATEDIN_3_0
int SSL_set_srp_server_param(SSL *s, const BIGNUM *N, const BIGNUM *g,
   BIGNUM *sa, BIGNUM *v, char *info);
OSSL_DEPRECATEDIN_3_0
int SSL_set_srp_server_param_pw(SSL *s, const char *user, const char *pass,
   const char *grp);

OSSL_DEPRECATEDIN_3_0 __owur BIGNUM *SSL_get_srp_g(SSL *s);
OSSL_DEPRECATEDIN_3_0 __owur BIGNUM *SSL_get_srp_N(SSL *s);

OSSL_DEPRECATEDIN_3_0 __owur char *SSL_get_srp_username(SSL *s);
OSSL_DEPRECATEDIN_3_0 __owur char *SSL_get_srp_userinfo(SSL *s);
#endif
#endif

/*
* ClientHello callback and helpers.
*/

#define SSL_CLIENT_HELLO_SUCCESS 1
#define SSL_CLIENT_HELLO_ERROR 0
#define SSL_CLIENT_HELLO_RETRY (-1)

typedef int (*SSL_client_hello_cb_fn)(SSL *s, int *al, void *arg);
void SSL_CTX_set_client_hello_cb(SSL_CTX *c, SSL_client_hello_cb_fn cb,
   void *arg);
typedef int (*SSL_new_pending_conn_cb_fn)(SSL_CTX *ctx, SSL *new_ssl,

   void *arg);
void SSL_CTX_set_new_pending_conn_cb(SSL_CTX *c, SSL_new_pending_conn_cb_fn cb,
   void *arg);

int SSL_client_hello_isv2(SSL *s);
unsigned int SSL_client_hello_get0_legacy_version(SSL *s);
size_t SSL_client_hello_get0_random(SSL *s, const unsigned char **out);
size_t SSL_client_hello_get0_session_id(SSL *s, const unsigned char **out);
size_t SSL_client_hello_get0_ciphers(SSL *s, const unsigned char **out);
size_t SSL_client_hello_get0_compression_methods(SSL *s,
   const unsigned char **out);
int SSL_client_hello_get1_extensions_present(SSL *s, int **out, size_t *outlen);
int SSL_client_hello_get_extension_order(SSL *s, uint16_t *exts,
   size_t *num_exts);
int SSL_client_hello_get0_ext(SSL *s, unsigned int type,
   const unsigned char **out, size_t *outlen);
```

```
void SSL_certs_clear(SSL *s);
void SSL_free(SSL *ssl);
#ifdef OSSL_ASYNC_FD
/*
* Windows application developer has to include windows.h to use these.
*/
__owur int SSL_waiting_for_async(SSL *s);
__owur int SSL_get_all_async_fds(SSL
 *s, OSSL_ASYNC_FD *fds, size_t *numfds);
__owur int SSL_get_changed_async_fds(SSL *s, OSSL_ASYNC_FD *addfd,
   size_t *numaddfds, OSSL_ASYNC_FD *delfd,
   size_t *numdelfds);
__owur int SSL_CTX_set_async_callback(SSL_CTX *ctx, SSL_async_callback_fn callback);
__owur int SSL_CTX_set_async_callback_arg(SSL_CTX *ctx, void *arg);
__owur int SSL_set_async_callback(SSL *s, SSL_async_callback_fn callback);
__owur int SSL_set_async_callback_arg(SSL *s, void *arg);
__owur int SSL_get_async_status(SSL *s, int *status);

#endif
__owur int SSL_accept(SSL *ssl);
__owur int SSL_stateless(SSL *s);
__owur int SSL_connect(SSL *ssl);
__owur int SSL_read(SSL *ssl, void *buf, int num);
__owur int SSL_read_ex(SSL *ssl, void *buf, size_t num, size_t *readbytes);

#define SSL_READ_EARLY_DATA_ERROR 0
#define SSL_READ_EARLY_DATA_SUCCESS 1
#define SSL_READ_EARLY_DATA_FINISH 2

__owur int SSL_read_early_data(SSL *s, void *buf, size_t num,
   size_t *readbytes);
__owur int SSL_peek(SSL
 *ssl, void *buf, int num);
__owur int SSL_peek_ex(SSL *ssl, void *buf, size_t num, size_t *readbytes);
__owur ossl_ssize_t SSL_sendfile(SSL *s, int fd, off_t offset, size_t size,
   int flags);
__owur int SSL_write(SSL *ssl, const void *buf, int num);
__owur int SSL_write_ex(SSL *s, const void *buf, size_t num, size_t *written);
__owur int SSL_write_early_data(SSL *s, const void *buf, size_t num,
   size_t *written);
long SSL_ctrl(SSL *ssl, int cmd, long larg, void *parg);
long SSL_callback_ctrl(SSL *, int, void (*)(void));
long SSL_CTX_ctrl(SSL_CTX *ctx, int cmd, long larg, void *parg);
long SSL_CTX_callback_ctrl(SSL_CTX *, int, void (*)(void));

#define SSL_WRITE_FLAG_CONCLUDE (1U << 0)

__owur int SSL_write_ex2(SSL *s, const void *buf, size_t num,
```

```
   uint64_t flags,
   size_t *written);

#define SSL_EARLY_DATA_NOT_SENT 0
#define SSL_EARLY_DATA_REJECTED 1
#define SSL_EARLY_DATA_ACCEPTED 2

__owur int SSL_get_early_data_status(const SSL *s);

__owur int SSL_get_error(const SSL *s,
 int ret_code);
__owur const char *SSL_get_version(const SSL *s);
__owur int SSL_get_handshake_rtt(const SSL *s, uint64_t *rtt);

/* This sets the 'default' SSL version that SSL_new() will create */
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0
__owur int SSL_CTX_set_ssl_version(SSL_CTX *ctx, const SSL_METHOD *meth);
#endif

#ifndef OPENSSL_NO_SSL3_METHOD
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *SSLv3_method(void); /* SSLv3 */
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *SSLv3_server_method(void);
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *SSLv3_client_method(void);
#endif
#endif

#define SSLv23_method TLS_method
#define SSLv23_server_method TLS_server_method
#define SSLv23_client_method TLS_client_method

/* Negotiate highest available SSL/TLS version */
__owur const SSL_METHOD *TLS_method(void);
__owur const SSL_METHOD *TLS_server_method(void);
__owur const SSL_METHOD *TLS_client_method(void);

#ifndef OPENSSL_NO_TLS1_METHOD
#ifndef
 OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_method(void); /* TLSv1.0 */
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_server_method(void);
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_client_method(void);
#endif
#endif

#ifndef OPENSSL_NO_TLS1_1_METHOD
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
```

```
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_1_method(void); /* TLSv1.1 */
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_1_server_method(void);
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_1_client_method(void);
#endif
#endif

#ifndef OPENSSL_NO_TLS1_2_METHOD
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_2_method(void); /* TLSv1.2 */
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_2_server_method(void);
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_2_client_method(void);
#endif
#endif

#ifndef OPENSSL_NO_DTLS1_METHOD
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0
 __owur const SSL_METHOD *DTLSv1_method(void); /* DTLSv1.0 */
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *DTLSv1_server_method(void);
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *DTLSv1_client_method(void);
#endif
#endif

#ifndef OPENSSL_NO_DTLS1_2_METHOD
/* DTLSv1.2 */
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *DTLSv1_2_method(void);
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *DTLSv1_2_server_method(void);
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *DTLSv1_2_client_method(void);
#endif
#endif

__owur const SSL_METHOD *DTLS_method(void); /* DTLS 1.0 and 1.2 */
__owur const SSL_METHOD *DTLS_server_method(void); /* DTLS 1.0 and 1.2 */
__owur const SSL_METHOD *DTLS_client_method(void); /* DTLS 1.0 and 1.2 */

__owur size_t DTLS_get_data_mtu(const SSL *s);

__owur STACK_OF(SSL_CIPHER) *SSL_get_ciphers(const SSL *s);
__owur STACK_OF(SSL_CIPHER) *SSL_CTX_get_ciphers(const SSL_CTX *ctx);
__owur STACK_OF(SSL_CIPHER)
 *SSL_get_client_ciphers(const SSL *s);
__owur STACK_OF(SSL_CIPHER) *SSL_get1_supported_ciphers(SSL *s);

__owur int SSL_do_handshake(SSL *s);
int SSL_key_update(SSL *s, int updatetype);
int SSL_get_key_update_type(const SSL *s);
int SSL_renegotiate(SSL *s);
```

```
int SSL_renegotiate_abbreviated(SSL *s);
__owur int SSL_renegotiate_pending(const SSL *s);
int SSL_new_session_ticket(SSL *s);
int SSL_shutdown(SSL *s);
__owur int SSL_verify_client_post_handshake(SSL *s);
void SSL_CTX_set_post_handshake_auth(SSL_CTX *ctx, int val);
void SSL_set_post_handshake_auth(SSL *s, int val);

__owur const SSL_METHOD *SSL_CTX_get_ssl_method(const SSL_CTX *ctx);
__owur const SSL_METHOD *SSL_get_ssl_method(const SSL *s);
__owur int SSL_set_ssl_method(SSL *s, const SSL_METHOD *method);
__owur const char *SSL_alert_type_string_long(int value);
__owur const char *SSL_alert_type_string(int value);
__owur const char *SSL_alert_desc_string_long(int value);
__owur const char *SSL_alert_desc_string(int value);

void
 SSL_set0_CA_list(SSL *s, STACK_OF(X509_NAME) *name_list);
void SSL_CTX_set0_CA_list(SSL_CTX *ctx, STACK_OF(X509_NAME) *name_list);
__owur const STACK_OF(X509_NAME) *SSL_get0_CA_list(const SSL *s);
__owur const STACK_OF(X509_NAME) *SSL_CTX_get0_CA_list(const SSL_CTX *ctx);
__owur int SSL_add1_to_CA_list(SSL *ssl, const X509 *x);
__owur int SSL_CTX_add1_to_CA_list(SSL_CTX *ctx, const X509 *x);
__owur const STACK_OF(X509_NAME) *SSL_get0_peer_CA_list(const SSL *s);

void SSL_set_client_CA_list(SSL *s, STACK_OF(X509_NAME) *name_list);
void SSL_CTX_set_client_CA_list(SSL_CTX *ctx, STACK_OF(X509_NAME) *name_list);
__owur STACK_OF(X509_NAME) *SSL_get_client_CA_list(const SSL *s);
__owur STACK_OF(X509_NAME) *SSL_CTX_get_client_CA_list(const SSL_CTX *s);
__owur int SSL_add_client_CA(SSL *ssl, X509 *x);
__owur int SSL_CTX_add_client_CA(SSL_CTX *ctx, X509 *x);

void SSL_set_connect_state(SSL *s);
void SSL_set_accept_state(SSL *s);

__owur long SSL_get_default_timeout(const SSL *s);

#ifndef
 OPENSSL_NO_DEPRECATED_1_1_0
#define SSL_library_init() OPENSSL_init_ssl(0, NULL)
#endif

__owur char *SSL_CIPHER_description(const SSL_CIPHER *, char *buf, int size);
__owur STACK_OF(X509_NAME) *SSL_dup_CA_list(const STACK_OF(X509_NAME) *sk);

__owur SSL *SSL_dup(SSL *ssl);

__owur X509 *SSL_get_certificate(const SSL *ssl);
```

```
/*
* EVP_PKEY
*/
struct evp_pkey_st *SSL_get_privatekey(const SSL *ssl);

__owur X509 *SSL_CTX_get0_certificate(const SSL_CTX *ctx);
__owur EVP_PKEY *SSL_CTX_get0_privatekey(const SSL_CTX *ctx);

void SSL_CTX_set_quiet_shutdown(SSL_CTX *ctx, int mode);
__owur int SSL_CTX_get_quiet_shutdown(const SSL_CTX *ctx);
void SSL_set_quiet_shutdown(SSL *ssl, int mode);
__owur int SSL_get_quiet_shutdown(const SSL *ssl);
void SSL_set_shutdown(SSL *ssl, int mode);
__owur int SSL_get_shutdown(const SSL *ssl);
__owur int SSL_version(const SSL *ssl);
__owur int SSL_client_version(const SSL *s);
__owur int SSL_CTX_set_default_verify_paths(SSL_CTX *ctx);
__owur int SSL_CTX_set_default_verify_dir(SSL_CTX
 *ctx);
__owur int SSL_CTX_set_default_verify_file(SSL_CTX *ctx);
__owur int SSL_CTX_set_default_verify_store(SSL_CTX *ctx);
__owur int SSL_CTX_load_verify_file(SSL_CTX *ctx, const char *CAfile);
__owur int SSL_CTX_load_verify_dir(SSL_CTX *ctx, const char *CApath);
__owur int SSL_CTX_load_verify_store(SSL_CTX *ctx, const char *CAstore);
__owur int SSL_CTX_load_verify_locations(SSL_CTX *ctx,
   const char *CAfile,
   const char *CApath);
#define SSL_get0_session SSL_get_session /* just peek at pointer */
__owur SSL_SESSION *SSL_get_session(const SSL *ssl);
__owur SSL_SESSION *SSL_get1_session(SSL *ssl); /* obtain a reference count */
__owur SSL_CTX *SSL_get_SSL_CTX(const SSL *ssl);
SSL_CTX *SSL_set_SSL_CTX(SSL *ssl, SSL_CTX *ctx);
void SSL_set_info_callback(SSL *ssl,
   void (*cb)(const SSL *ssl, int type, int val));
void (*SSL_get_info_callback(const SSL *ssl))(const SSL *ssl, int type,
   int val);
__owur OSSL_HANDSHAKE_STATE SSL_get_state(const SSL *ssl);

void
 SSL_set_verify_result(SSL *ssl, long v);
__owur long SSL_get_verify_result(const SSL *ssl);
__owur STACK_OF(X509) *SSL_get0_verified_chain(const SSL *s);

__owur size_t SSL_get_client_random(const SSL *ssl, unsigned char *out,
   size_t outlen);
__owur size_t SSL_get_server_random(const SSL *ssl, unsigned char *out,
   size_t outlen);
__owur size_t SSL_SESSION_get_master_key(const SSL_SESSION *sess,
```

```
   unsigned char *out, size_t outlen);
__owur int SSL_SESSION_set1_master_key(SSL_SESSION *sess,
   const unsigned char *in, size_t len);
uint8_t SSL_SESSION_get_max_fragment_length(const SSL_SESSION *sess);

#define SSL_get_ex_new_index(l, p, newf, dupf, freef) \
   CRYPTO_get_ex_new_index(CRYPTO_EX_INDEX_SSL, l, p, newf, dupf, freef)
__owur int SSL_set_ex_data(SSL *ssl, int idx, void *data);
void *SSL_get_ex_data(const SSL *ssl, int idx);
#define SSL_SESSION_get_ex_new_index(l, p, newf, dupf, freef) \
   CRYPTO_get_ex_new_index(CRYPTO_EX_INDEX_SSL_SESSION, l, p, newf, dupf,
 freef)
__owur int SSL_SESSION_set_ex_data(SSL_SESSION *ss, int idx, void *data);
void *SSL_SESSION_get_ex_data(const SSL_SESSION *ss, int idx);
#define SSL_CTX_get_ex_new_index(l, p, newf, dupf, freef) \
   CRYPTO_get_ex_new_index(CRYPTO_EX_INDEX_SSL_CTX, l, p, newf, dupf, freef)
__owur int SSL_CTX_set_ex_data(SSL_CTX *ssl, int idx, void *data);
void *SSL_CTX_get_ex_data(const SSL_CTX *ssl, int idx);

__owur int SSL_get_ex_data_X509_STORE_CTX_idx(void);

#define SSL_CTX_sess_set_cache_size(ctx, t) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_SESS_CACHE_SIZE, t, NULL)
#define SSL_CTX_sess_get_cache_size(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_SESS_CACHE_SIZE, 0, NULL)
#define SSL_CTX_set_session_cache_mode(ctx, m) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_SESS_CACHE_MODE, m, NULL)
#define SSL_CTX_get_session_cache_mode(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_SESS_CACHE_MODE, 0, NULL)

#define SSL_CTX_get_default_read_ahead(ctx) SSL_CTX_get_read_ahead(ctx)
#define SSL_CTX_set_default_read_ahead(ctx,
 m) SSL_CTX_set_read_ahead(ctx, m)
#define SSL_CTX_get_read_ahead(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_READ_AHEAD, 0, NULL)
#define SSL_CTX_set_read_ahead(ctx, m) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_READ_AHEAD, m, NULL)
#define SSL_CTX_get_max_cert_list(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_MAX_CERT_LIST, 0, NULL)
#define SSL_CTX_set_max_cert_list(ctx, m) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_MAX_CERT_LIST, m, NULL)
#define SSL_get_max_cert_list(ssl) \
   SSL_ctrl(ssl, SSL_CTRL_GET_MAX_CERT_LIST, 0, NULL)
#define SSL_set_max_cert_list(ssl, m) \
   SSL_ctrl(ssl, SSL_CTRL_SET_MAX_CERT_LIST, m, NULL)

#define SSL_CTX_set_max_send_fragment(ctx, m) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_MAX_SEND_FRAGMENT, m, NULL)
```

```
#define SSL_set_max_send_fragment(ssl, m) \
   SSL_ctrl(ssl, SSL_CTRL_SET_MAX_SEND_FRAGMENT, m, NULL)
#define SSL_CTX_set_split_send_fragment(ctx, m) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_SPLIT_SEND_FRAGMENT, m, NULL)
#define SSL_set_split_send_fragment(ssl, m) \

   SSL_ctrl(ssl, SSL_CTRL_SET_SPLIT_SEND_FRAGMENT, m, NULL)
#define SSL_CTX_set_max_pipelines(ctx, m) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_MAX_PIPELINES, m, NULL)
#define SSL_set_max_pipelines(ssl, m) \
   SSL_ctrl(ssl, SSL_CTRL_SET_MAX_PIPELINES, m, NULL)
#define SSL_set_retry_verify(ssl) \
   (SSL_ctrl(ssl, SSL_CTRL_SET_RETRY_VERIFY, 0, NULL) > 0)

void SSL_CTX_set_default_read_buffer_len(SSL_CTX *ctx, size_t len);
void SSL_set_default_read_buffer_len(SSL *s, size_t len);

#ifndef OPENSSL_NO_DH
#ifndef OPENSSL_NO_DEPRECATED_3_0
/* NB: the |keylength| is only applicable when is_export is true */
OSSL_DEPRECATEDIN_3_0
void SSL_CTX_set_tmp_dh_callback(SSL_CTX *ctx,
   DH *(*dh)(SSL *ssl, int is_export,
       int keylength));
OSSL_DEPRECATEDIN_3_0
void SSL_set_tmp_dh_callback(SSL *ssl,
   DH *(*dh)(SSL *ssl, int is_export,
       int keylength));
#endif
#endif

__owur const COMP_METHOD *SSL_get_current_compression(const SSL *s);
__owur const COMP_METHOD *SSL_get_current_expansion(const
 SSL *s);
__owur const char *SSL_COMP_get_name(const COMP_METHOD *comp);
__owur const char *SSL_COMP_get0_name(const SSL_COMP *comp);
__owur int SSL_COMP_get_id(const SSL_COMP *comp);
STACK_OF(SSL_COMP) *SSL_COMP_get_compression_methods(void);
__owur STACK_OF(SSL_COMP) *SSL_COMP_set0_compression_methods(STACK_OF(SSL_COMP)
       *meths);
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define SSL_COMP_free_compression_methods() \
   while (0)                           \
   continue
#endif
__owur int SSL_COMP_add_compression_method(int id, COMP_METHOD *cm);

const SSL_CIPHER *SSL_CIPHER_find(SSL *ssl, const unsigned char *ptr);
```

```
int SSL_CIPHER_get_cipher_nid(const SSL_CIPHER *c);
int SSL_CIPHER_get_digest_nid(const SSL_CIPHER *c);
int SSL_bytes_to_cipher_list(SSL *s, const unsigned char *bytes, size_t len,
   int isv2format, STACK_OF(SSL_CIPHER) **sk,
   STACK_OF(SSL_CIPHER) **scsvs);

/* TLS extensions functions */
__owur int SSL_set_session_ticket_ext(SSL *s, void *ext_data, int ext_len);

__owur
 int SSL_set_session_ticket_ext_cb(SSL *s,
   tls_session_ticket_ext_cb_fn cb,
   void *arg);

/* Pre-shared secret session resumption functions */
__owur int SSL_set_session_secret_cb(SSL *s,
   tls_session_secret_cb_fn session_secret_cb,
   void *arg);

void SSL_CTX_set_not_resumable_session_callback(SSL_CTX *ctx,
   int (*cb)(SSL *ssl,
       int
           is_forward_secure));

void SSL_set_not_resumable_session_callback(SSL *ssl,
   int (*cb)(SSL *ssl,
       int is_forward_secure));

void SSL_CTX_set_record_padding_callback(SSL_CTX *ctx,
   size_t (*cb)(SSL *ssl, int type,
       size_t len, void *arg));
void SSL_CTX_set_record_padding_callback_arg(SSL_CTX *ctx, void *arg);
void *SSL_CTX_get_record_padding_callback_arg(const SSL_CTX *ctx);
int SSL_CTX_set_block_padding(SSL_CTX *ctx, size_t block_size);
int SSL_CTX_set_block_padding_ex(SSL_CTX *ctx, size_t app_block_size,
   size_t hs_block_size);

int SSL_set_record_padding_callback(SSL *ssl,
   size_t (*cb)(SSL
 *ssl, int type,
       size_t len, void *arg));
void SSL_set_record_padding_callback_arg(SSL *ssl, void *arg);
void *SSL_get_record_padding_callback_arg(const SSL *ssl);
int SSL_set_block_padding(SSL *ssl, size_t block_size);
int SSL_set_block_padding_ex(SSL *ssl, size_t app_block_size,
   size_t hs_block_size);
int SSL_set_num_tickets(SSL *s, size_t num_tickets);
size_t SSL_get_num_tickets(const SSL *s);
```

```
int SSL_CTX_set_num_tickets(SSL_CTX *ctx, size_t num_tickets);
size_t SSL_CTX_get_num_tickets(const SSL_CTX *ctx);

/* QUIC support */
int SSL_handle_events(SSL *s);
__owur int SSL_get_event_timeout(SSL *s, struct timeval *tv, int *is_infinite);
__owur int SSL_get_rpoll_descriptor(SSL *s, BIO_POLL_DESCRIPTOR *desc);
__owur int SSL_get_wpoll_descriptor(SSL *s, BIO_POLL_DESCRIPTOR *desc);
__owur int SSL_net_read_desired(SSL *s);
__owur int SSL_net_write_desired(SSL *s);
__owur int SSL_set_blocking_mode(SSL *s, int blocking);
__owur int SSL_get_blocking_mode(SSL *s);
__owur int
 SSL_set1_initial_peer_addr(SSL *s, const BIO_ADDR *peer_addr);
__owur SSL *SSL_get0_connection(SSL *s);
__owur int SSL_is_connection(SSL *s);

__owur int SSL_is_listener(SSL *ssl);
__owur SSL *SSL_get0_listener(SSL *s);
#define SSL_LISTENER_FLAG_NO_VALIDATE (1UL << 1)
__owur SSL *SSL_new_listener(SSL_CTX *ctx, uint64_t flags);
__owur SSL *SSL_new_listener_from(SSL *ssl, uint64_t flags);
__owur SSL *SSL_new_from_listener(SSL *ssl, uint64_t flags);
#define SSL_ACCEPT_CONNECTION_NO_BLOCK (1UL << 0)
__owur SSL *SSL_accept_connection(SSL *ssl, uint64_t flags);
__owur size_t SSL_get_accept_connection_queue_len(SSL *ssl);
__owur int SSL_listen(SSL *ssl);

__owur int SSL_is_domain(SSL *s);
__owur SSL *SSL_get0_domain(SSL *s);
__owur SSL *SSL_new_domain(SSL_CTX *ctx, uint64_t flags);

#define SSL_DOMAIN_FLAG_SINGLE_THREAD (1U << 0)
#define SSL_DOMAIN_FLAG_MULTI_THREAD (1U << 1)
#define SSL_DOMAIN_FLAG_THREAD_ASSISTED (1U << 2)
#define SSL_DOMAIN_FLAG_BLOCKING (1U << 3)
#define SSL_DOMAIN_FLAG_LEGACY_BLOCKING
 (1U << 4)

__owur int SSL_CTX_set_domain_flags(SSL_CTX *ctx, uint64_t domain_flags);
__owur int SSL_CTX_get_domain_flags(const SSL_CTX *ctx, uint64_t *domain_flags);
__owur int SSL_get_domain_flags(const SSL *ssl, uint64_t *domain_flags);

#define SSL_STREAM_TYPE_NONE 0
#define SSL_STREAM_TYPE_READ (1U << 0)
#define SSL_STREAM_TYPE_WRITE (1U << 1)
#define SSL_STREAM_TYPE_BIDI (SSL_STREAM_TYPE_READ | SSL_STREAM_TYPE_WRITE)
__owur int SSL_get_stream_type(SSL *s);
```

```
__owur uint64_t SSL_get_stream_id(SSL *s);
__owur int SSL_is_stream_local(SSL *s);

#define SSL_DEFAULT_STREAM_MODE_NONE 0
#define SSL_DEFAULT_STREAM_MODE_AUTO_BIDI 1
#define SSL_DEFAULT_STREAM_MODE_AUTO_UNI 2
__owur int SSL_set_default_stream_mode(SSL *s, uint32_t mode);

#define SSL_STREAM_FLAG_UNI (1U << 0)
#define SSL_STREAM_FLAG_NO_BLOCK (1U << 1)
#define SSL_STREAM_FLAG_ADVANCE (1U << 2)
__owur SSL *SSL_new_stream(SSL *s, uint64_t flags);

#define SSL_INCOMING_STREAM_POLICY_AUTO 0
#define SSL_INCOMING_STREAM_POLICY_ACCEPT
 1
#define SSL_INCOMING_STREAM_POLICY_REJECT 2
__owur int SSL_set_incoming_stream_policy(SSL *s, int policy, uint64_t aec);

#define SSL_ACCEPT_STREAM_NO_BLOCK (1U << 0)
__owur SSL *SSL_accept_stream(SSL *s, uint64_t flags);
__owur size_t SSL_get_accept_stream_queue_len(SSL *s);

#ifndef OPENSSL_NO_QUIC
__owur int SSL_inject_net_dgram(SSL *s, const unsigned char *buf,
   size_t buf_len,
   const BIO_ADDR *peer,
   const BIO_ADDR *local);
#endif

typedef struct ssl_shutdown_ex_args_st {
   uint64_t quic_error_code;
   const char *quic_reason;
} SSL_SHUTDOWN_EX_ARGS;

#define SSL_SHUTDOWN_FLAG_RAPID (1U << 0)
#define SSL_SHUTDOWN_FLAG_NO_STREAM_FLUSH (1U << 1)
#define SSL_SHUTDOWN_FLAG_NO_BLOCK (1U << 2)
#define SSL_SHUTDOWN_FLAG_WAIT_PEER (1U << 3)

__owur int SSL_shutdown_ex(SSL *ssl, uint64_t flags,
   const SSL_SHUTDOWN_EX_ARGS *args,
   size_t args_len);

__owur int SSL_stream_conclude(SSL *ssl, uint64_t flags);

typedef struct ssl_stream_reset_args_st {
```

```
   uint64_t
 quic_error_code;
} SSL_STREAM_RESET_ARGS;

__owur int SSL_stream_reset(SSL *ssl,
   const SSL_STREAM_RESET_ARGS *args,
   size_t args_len);

#define SSL_STREAM_STATE_NONE 0
#define SSL_STREAM_STATE_OK 1
#define SSL_STREAM_STATE_WRONG_DIR 2
#define SSL_STREAM_STATE_FINISHED 3
#define SSL_STREAM_STATE_RESET_LOCAL 4
#define SSL_STREAM_STATE_RESET_REMOTE 5
#define SSL_STREAM_STATE_CONN_CLOSED 6
__owur int SSL_get_stream_read_state(SSL *ssl);
__owur int SSL_get_stream_write_state(SSL *ssl);

__owur int SSL_get_stream_read_error_code(SSL *ssl, uint64_t *app_error_code);
__owur int SSL_get_stream_write_error_code(SSL *ssl, uint64_t *app_error_code);

#define SSL_CONN_CLOSE_FLAG_LOCAL (1U << 0)
#define SSL_CONN_CLOSE_FLAG_TRANSPORT (1U << 1)

typedef struct ssl_conn_close_info_st {
   uint64_t error_code, frame_type;
   const char *reason;
   size_t reason_len;
   uint32_t flags;
} SSL_CONN_CLOSE_INFO;

__owur int SSL_get_conn_close_info(SSL *ssl,
   SSL_CONN_CLOSE_INFO *info,
    size_t info_len);

#define SSL_VALUE_CLASS_GENERIC 0
#define SSL_VALUE_CLASS_FEATURE_REQUEST 1
#define SSL_VALUE_CLASS_FEATURE_PEER_REQUEST 2
#define SSL_VALUE_CLASS_FEATURE_NEGOTIATED 3

#define SSL_VALUE_NONE 0
#define SSL_VALUE_QUIC_STREAM_BIDI_LOCAL_AVAIL 1
#define SSL_VALUE_QUIC_STREAM_BIDI_REMOTE_AVAIL 2
#define SSL_VALUE_QUIC_STREAM_UNI_LOCAL_AVAIL 3
#define SSL_VALUE_QUIC_STREAM_UNI_REMOTE_AVAIL 4
#define SSL_VALUE_QUIC_IDLE_TIMEOUT 5
#define SSL_VALUE_EVENT_HANDLING_MODE 6
#define SSL_VALUE_STREAM_WRITE_BUF_SIZE 7
```

```
#define SSL_VALUE_STREAM_WRITE_BUF_USED 8
#define SSL_VALUE_STREAM_WRITE_BUF_AVAIL 9

#define SSL_VALUE_EVENT_HANDLING_MODE_INHERIT 0
#define SSL_VALUE_EVENT_HANDLING_MODE_IMPLICIT 1
#define SSL_VALUE_EVENT_HANDLING_MODE_EXPLICIT 2

int SSL_get_value_uint(SSL *s, uint32_t class_, uint32_t id, uint64_t *v);
int SSL_set_value_uint(SSL *s, uint32_t class_, uint32_t id, uint64_t v);

#define SSL_get_generic_value_uint(ssl, id, v) \
  SSL_get_value_uint((ssl), SSL_VALUE_CLASS_GENERIC,
 (id), (v))
#define SSL_set_generic_value_uint(ssl, id, v) \
  SSL_set_value_uint((ssl), SSL_VALUE_CLASS_GENERIC, (id), (v))
#define SSL_get_feature_request_uint(ssl, id, v) \
  SSL_get_value_uint((ssl), SSL_VALUE_CLASS_FEATURE_REQUEST, (id), (v))
#define SSL_set_feature_request_uint(ssl, id, v) \
  SSL_set_value_uint((ssl), SSL_VALUE_CLASS_FEATURE_REQUEST, (id), (v))
#define SSL_get_feature_peer_request_uint(ssl, id, v) \
  SSL_get_value_uint((ssl), SSL_VALUE_CLASS_FEATURE_PEER_REQUEST, (id), (v))
#define SSL_get_feature_negotiated_uint(ssl, id, v) \
  SSL_get_value_uint((ssl), SSL_VALUE_CLASS_FEATURE_NEGOTIATED, (id), (v))

#define SSL_get_quic_stream_bidi_local_avail(ssl, value)                \
  SSL_get_generic_value_uint((ssl), SSL_VALUE_QUIC_STREAM_BIDI_LOCAL_AVAIL, \
     (value))
#define SSL_get_quic_stream_bidi_remote_avail(ssl, value)               \
  SSL_get_generic_value_uint((ssl), SSL_VALUE_QUIC_STREAM_BIDI_REMOTE_AVAIL, \
      (value))
#define SSL_get_quic_stream_uni_local_avail(ssl, value)                 \
  SSL_get_generic_value_uint((ssl), SSL_VALUE_QUIC_STREAM_UNI_LOCAL_AVAIL, \
     (value))
#define SSL_get_quic_stream_uni_remote_avail(ssl, value)                \
  SSL_get_generic_value_uint((ssl), SSL_VALUE_QUIC_STREAM_UNI_REMOTE_AVAIL, \
     (value))

#define SSL_get_event_handling_mode(ssl, value)                         \
  SSL_get_generic_value_uint((ssl), SSL_VALUE_EVENT_HANDLING_MODE, \
     (value))
#define SSL_set_event_handling_mode(ssl, value)                         \
  SSL_set_generic_value_uint((ssl), SSL_VALUE_EVENT_HANDLING_MODE, \
     (value))

#define SSL_get_stream_write_buf_size(ssl, value)                       \
  SSL_get_generic_value_uint((ssl), SSL_VALUE_STREAM_WRITE_BUF_SIZE, \
     (value))
#define SSL_get_stream_write_buf_used(ssl, value)                       \
```

```
  SSL_get_generic_value_uint((ssl), SSL_VALUE_STREAM_WRITE_BUF_USED, \
      (value))
#define SSL_get_stream_write_buf_avail(ssl, value)                    \
  SSL_get_generic_value_uint((ssl), SSL_VALUE_STREAM_WRITE_BUF_AVAIL, \
     (value))

#define SSL_POLL_EVENT_NONE 0

#define SSL_POLL_EVENT_F (1U << 0) /* F   (Failure) */
#define SSL_POLL_EVENT_EL (1U << 1) /* EL  (Exception on Listener) */
#define SSL_POLL_EVENT_EC (1U << 2) /* EC  (Exception on Conn) */
#define SSL_POLL_EVENT_ECD (1U << 3) /* ECD (Exception on Conn Drained) */
#define SSL_POLL_EVENT_ER (1U << 4) /* ER  (Exception on Read) */
#define SSL_POLL_EVENT_EW (1U << 5) /* EW  (Exception on Write) */
#define SSL_POLL_EVENT_R (1U << 6) /* R   (Readable) */
#define SSL_POLL_EVENT_W (1U << 7) /* W   (Writable) */
#define SSL_POLL_EVENT_IC (1U << 8) /* IC  (Incoming Connection) */
#define SSL_POLL_EVENT_ISB (1U << 9) /* ISB (Incoming Stream: Bidi) */
#define SSL_POLL_EVENT_ISU (1U << 10) /* ISU (Incoming Stream: Uni) */
#define SSL_POLL_EVENT_OSB (1U << 11) /* OSB (Outgoing Stream: Bidi)
 */
#define SSL_POLL_EVENT_OSU (1U << 12) /* OSU (Outgoing Stream: Uni) */

#define SSL_POLL_EVENT_RW (SSL_POLL_EVENT_R | SSL_POLL_EVENT_W)
#define SSL_POLL_EVENT_RE (SSL_POLL_EVENT_R | SSL_POLL_EVENT_ER)
#define SSL_POLL_EVENT_WE (SSL_POLL_EVENT_W | SSL_POLL_EVENT_EW)
#define SSL_POLL_EVENT_RWE (SSL_POLL_EVENT_RE | SSL_POLL_EVENT_WE)
#define SSL_POLL_EVENT_E (SSL_POLL_EVENT_EL | SSL_POLL_EVENT_EC \
  | SSL_POLL_EVENT_ER | SSL_POLL_EVENT_EW)
#define SSL_POLL_EVENT_IS (SSL_POLL_EVENT_ISB | SSL_POLL_EVENT_ISU)
#define SSL_POLL_EVENT_ISE (SSL_POLL_EVENT_IS | SSL_POLL_EVENT_EC)
#define SSL_POLL_EVENT_I (SSL_POLL_EVENT_IS | SSL_POLL_EVENT_IC)
#define SSL_POLL_EVENT_OS (SSL_POLL_EVENT_OSB | SSL_POLL_EVENT_OSU)
#define SSL_POLL_EVENT_OSE (SSL_POLL_EVENT_OS | SSL_POLL_EVENT_EC)

typedef struct ssl_poll_item_st {
  BIO_POLL_DESCRIPTOR desc;
  uint64_t events, revents;
} SSL_POLL_ITEM;

#define SSL_POLL_FLAG_NO_HANDLE_EVENTS (1U << 0)

__owur int SSL_poll(SSL_POLL_ITEM *items,
  size_t
 num_items,
  size_t stride,
  const struct timeval *timeout,
  uint64_t flags,
```

```
   size_t *result_count);

static ossl_inline ossl_unused BIO_POLL_DESCRIPTOR
SSL_as_poll_descriptor(SSL *s)
{
   BIO_POLL_DESCRIPTOR d;

   d.type = BIO_POLL_DESCRIPTOR_TYPE_SSL;
   d.value.ssl = s;
   return d;
}

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define SSL_cache_hit(s) SSL_session_reused(s)
#endif

__owur int SSL_session_reused(const SSL *s);
__owur int SSL_is_server(const SSL *s);

__owur __owur SSL_CONF_CTX *SSL_CONF_CTX_new(void);
int SSL_CONF_CTX_finish(SSL_CONF_CTX *cctx);
void SSL_CONF_CTX_free(SSL_CONF_CTX *cctx);
unsigned int SSL_CONF_CTX_set_flags(SSL_CONF_CTX *cctx, unsigned int flags);
__owur unsigned int SSL_CONF_CTX_clear_flags(SSL_CONF_CTX *cctx,
   unsigned int flags);
__owur int SSL_CONF_CTX_set1_prefix(SSL_CONF_CTX *cctx, const char *pre);

void SSL_CONF_CTX_set_ssl(SSL_CONF_CTX *cctx, SSL *ssl);
void SSL_CONF_CTX_set_ssl_ctx(SSL_CONF_CTX *cctx, SSL_CTX *ctx);

__owur int
 SSL_CONF_cmd(SSL_CONF_CTX *cctx, const char *cmd, const char *value);
__owur int SSL_CONF_cmd_argv(SSL_CONF_CTX *cctx, int *pargc, char ***pargv);
__owur int SSL_CONF_cmd_value_type(SSL_CONF_CTX *cctx, const char *cmd);

void SSL_add_ssl_module(void);
int SSL_config(SSL *s, const char *name);
int SSL_CTX_config(SSL_CTX *ctx, const char *name);

#ifndef OPENSSL_NO_SSL_TRACE
void SSL_trace(int write_p, int version, int content_type,
   const void *buf, size_t len, SSL *ssl, void *arg);
#endif

#ifndef OPENSSL_NO_SOCK
int DTLSv1_listen(SSL *s, BIO_ADDR *client);
#endif
```

```
#ifndef OPENSSL_NO_CT

/*
* A callback for verifying that the received SCTs are sufficient.
* Expected to return 1 if they are sufficient, otherwise 0.
* May return a negative integer if an error occurs.
* A connection should be aborted if the SCTs are deemed insufficient.
*/
typedef int (*ssl_ct_validation_cb)(const CT_POLICY_EVAL_CTX *ctx,
   const STACK_OF(SCT) *scts, void *arg);

/*
* Sets a |callback| that is
 invoked upon receipt of ServerHelloDone to validate
* the received SCTs.
* If the callback returns a non-positive result, the connection is terminated.
* Call this function before beginning a handshake.
* If a NULL |callback| is provided, SCT validation is disabled.
* |arg| is arbitrary userdata that will be passed to the callback whenever it
* is invoked. Ownership of |arg| remains with the caller.
*
* NOTE: A side-effect of setting a CT callback is that an OCSP stapled response
*       will be requested.
*/
int SSL_set_ct_validation_callback(SSL *s, ssl_ct_validation_cb callback,
   void *arg);
int SSL_CTX_set_ct_validation_callback(SSL_CTX *ctx,
   ssl_ct_validation_cb callback,
   void *arg);
#define SSL_disable_ct(s) \
   ((void)SSL_set_validation_callback((s), NULL, NULL))
#define SSL_CTX_disable_ct(ctx) \
   ((void)SSL_CTX_set_validation_callback((ctx), NULL, NULL))

/*
* The validation type enumerates the available behaviours of the built-in SSL
* CT validation
 callback selected via SSL_enable_ct() and SSL_CTX_enable_ct().
* The underlying callback is a static function in libssl.
*/
enum {
   SSL_CT_VALIDATION_PERMISSIVE = 0,
   SSL_CT_VALIDATION_STRICT
};

/*
* Enable CT by setting up a callback that implements one of the built-in
* validation variants.  The SSL_CT_VALIDATION_PERMISSIVE variant always
```

```
* continues the handshake, the application can make appropriate decisions at
* handshake completion.  The SSL_CT_VALIDATION_STRICT variant requires at
* least one valid SCT, or else handshake termination will be requested.  The
* handshake may continue anyway if SSL_VERIFY_NONE is in effect.
*/
int SSL_enable_ct(SSL *s, int validation_mode);
int SSL_CTX_enable_ct(SSL_CTX *ctx, int validation_mode);

/*
* Report whether a non-NULL callback is enabled.
*/
int SSL_ct_is_enabled(const SSL *s);
int SSL_CTX_ct_is_enabled(const SSL_CTX *ctx);

/* Gets the SCTs received from a connection */
const STACK_OF(SCT) *SSL_get0_peer_scts(SSL *s);

/*
 * Loads the CT log list from the default location.
* If a CTLOG_STORE has previously been set using SSL_CTX_set_ctlog_store,
* the log information loaded from this file will be appended to the
* CTLOG_STORE.
* Returns 1 on success, 0 otherwise.
*/
int SSL_CTX_set_default_ctlog_list_file(SSL_CTX *ctx);

/*
* Loads the CT log list from the specified file path.
* If a CTLOG_STORE has previously been set using SSL_CTX_set_ctlog_store,
* the log information loaded from this file will be appended to the
* CTLOG_STORE.
* Returns 1 on success, 0 otherwise.
*/
int SSL_CTX_set_ctlog_list_file(SSL_CTX *ctx, const char *path);

/*
* Sets the CT log list used by all SSL connections created from this SSL_CTX.
* Ownership of the CTLOG_STORE is transferred to the SSL_CTX.
*/
void SSL_CTX_set0_ctlog_store(SSL_CTX *ctx, CTLOG_STORE *logs);

/*
* Gets the CT log list used by all SSL connections created from this SSL_CTX.
* This will be NULL unless one of the following functions has
 been called:
* - SSL_CTX_set_default_ctlog_list_file
* - SSL_CTX_set_ctlog_list_file
* - SSL_CTX_set_ctlog_store
```

```
*/
const CTLOG_STORE *SSL_CTX_get0_ctlog_store(const SSL_CTX *ctx);

#endif /* OPENSSL_NO_CT */

/* What the "other" parameter contains in security callback */
/* Mask for type */
#define SSL_SECOP_OTHER_TYPE 0xffff0000
#define SSL_SECOP_OTHER_NONE 0
#define SSL_SECOP_OTHER_CIPHER (1 << 16)
#define SSL_SECOP_OTHER_CURVE (2 << 16)
#define SSL_SECOP_OTHER_DH (3 << 16)
#define SSL_SECOP_OTHER_PKEY (4 << 16)
#define SSL_SECOP_OTHER_SIGALG (5 << 16)
#define SSL_SECOP_OTHER_CERT (6 << 16)

/* Indicated operation refers to peer key or certificate */
#define SSL_SECOP_PEER 0x1000

/* Values for "op" parameter in security callback */

/* Called to filter ciphers */
/* Ciphers client supports */
#define SSL_SECOP_CIPHER_SUPPORTED (1 | SSL_SECOP_OTHER_CIPHER)
/* Cipher shared by client/server */
#define SSL_SECOP_CIPHER_SHARED (2 | SSL_SECOP_OTHER_CIPHER)
/* Sanity check of cipher
 server selects */
#define SSL_SECOP_CIPHER_CHECK (3 | SSL_SECOP_OTHER_CIPHER)
/* Curves supported by client */
#define SSL_SECOP_CURVE_SUPPORTED (4 | SSL_SECOP_OTHER_CURVE)
/* Curves shared by client/server */
#define SSL_SECOP_CURVE_SHARED (5 | SSL_SECOP_OTHER_CURVE)
/* Sanity check of curve server selects */
#define SSL_SECOP_CURVE_CHECK (6 | SSL_SECOP_OTHER_CURVE)
/* Temporary DH key */
#define SSL_SECOP_TMP_DH (7 | SSL_SECOP_OTHER_PKEY)
/* SSL/TLS version */
#define SSL_SECOP_VERSION (9 | SSL_SECOP_OTHER_NONE)
/* Session tickets */
#define SSL_SECOP_TICKET (10 | SSL_SECOP_OTHER_NONE)
/* Supported signature algorithms sent to peer */
#define SSL_SECOP_SIGALG_SUPPORTED (11 | SSL_SECOP_OTHER_SIGALG)
/* Shared signature algorithm */
#define SSL_SECOP_SIGALG_SHARED (12 | SSL_SECOP_OTHER_SIGALG)
/* Sanity check signature algorithm allowed */
#define SSL_SECOP_SIGALG_CHECK (13 | SSL_SECOP_OTHER_SIGALG)
/* Used to get mask of supported public key signature algorithms */
```

```
#define SSL_SECOP_SIGALG_MASK
 (14 | SSL_SECOP_OTHER_SIGALG)
/* Use to see if compression is allowed */
#define SSL_SECOP_COMPRESSION (15 | SSL_SECOP_OTHER_NONE)
/* EE key in certificate */
#define SSL_SECOP_EE_KEY (16 | SSL_SECOP_OTHER_CERT)
/* CA key in certificate */
#define SSL_SECOP_CA_KEY (17 | SSL_SECOP_OTHER_CERT)
/* CA digest algorithm in certificate */
#define SSL_SECOP_CA_MD (18 | SSL_SECOP_OTHER_CERT)
/* Peer EE key in certificate */
#define SSL_SECOP_PEER_EE_KEY (SSL_SECOP_EE_KEY | SSL_SECOP_PEER)
/* Peer CA key in certificate */
#define SSL_SECOP_PEER_CA_KEY (SSL_SECOP_CA_KEY | SSL_SECOP_PEER)
/* Peer CA digest algorithm in certificate */
#define SSL_SECOP_PEER_CA_MD (SSL_SECOP_CA_MD | SSL_SECOP_PEER)

void SSL_set_security_level(SSL *s, int level);
__owur int SSL_get_security_level(const SSL *s);
void SSL_set_security_callback(SSL *s,
   int (*cb)(const SSL *s, const SSL_CTX *ctx,
       int op, int bits, int nid,
       void *other, void *ex));
int (*SSL_get_security_callback(const SSL
 *s))(const SSL *s,
   const SSL_CTX *ctx, int op,
   int bits, int nid, void *other,
   void *ex);
void SSL_set0_security_ex_data(SSL *s, void *ex);
__owur void *SSL_get0_security_ex_data(const SSL *s);

void SSL_CTX_set_security_level(SSL_CTX *ctx, int level);
__owur int SSL_CTX_get_security_level(const SSL_CTX *ctx);
void SSL_CTX_set_security_callback(SSL_CTX *ctx,
   int (*cb)(const SSL *s, const SSL_CTX *ctx,
       int op, int bits, int nid,
       void *other, void *ex));
int (*SSL_CTX_get_security_callback(const SSL_CTX *ctx))(const SSL *s,
   const SSL_CTX *ctx,
   int op, int bits,
   int nid,
   void *other,
   void *ex);
void SSL_CTX_set0_security_ex_data(SSL_CTX *ctx, void *ex);
__owur void *SSL_CTX_get0_security_ex_data(const SSL_CTX *ctx);

/* OPENSSL_INIT flag 0x010000 reserved for internal use */
#define OPENSSL_INIT_NO_LOAD_SSL_STRINGS 0x00100000L
```

```
#define OPENSSL_INIT_LOAD_SSL_STRINGS 0x00200000L

#define OPENSSL_INIT_SSL_DEFAULT \
   (OPENSSL_INIT_LOAD_SSL_STRINGS
 | OPENSSL_INIT_LOAD_CRYPTO_STRINGS)

int OPENSSL_init_ssl(uint64_t opts, const OPENSSL_INIT_SETTINGS *settings);

#ifndef OPENSSL_NO_UNIT_TEST
__owur const struct openssl_ssl_test_functions *SSL_test_functions(void);
#endif

__owur int SSL_free_buffers(SSL *ssl);
__owur int SSL_alloc_buffers(SSL *ssl);

/* Status codes passed to the decrypt session ticket callback. Some of these
* are for internal use only and are never passed to the callback. */
typedef int SSL_TICKET_STATUS;

/* Support for ticket appdata */
/* fatal error, malloc failure */
#define SSL_TICKET_FATAL_ERR_MALLOC 0
/* fatal error, either from parsing or decrypting the ticket */
#define SSL_TICKET_FATAL_ERR_OTHER 1
/* No ticket present */
#define SSL_TICKET_NONE 2
/* Empty ticket present */
#define SSL_TICKET_EMPTY 3
/* the ticket couldn't be decrypted */
#define SSL_TICKET_NO_DECRYPT 4
/* a ticket was successfully decrypted */
#define SSL_TICKET_SUCCESS 5
/* same as above but the ticket needs to be renewed */
#define
 SSL_TICKET_SUCCESS_RENEW 6

/* Return codes for the decrypt session ticket callback */
typedef int SSL_TICKET_RETURN;

/* An error occurred */
#define SSL_TICKET_RETURN_ABORT 0
/* Do not use the ticket, do not send a renewed ticket to the client */
#define SSL_TICKET_RETURN_IGNORE 1
/* Do not use the ticket, send a renewed ticket to the client */
#define SSL_TICKET_RETURN_IGNORE_RENEW 2
/* Use the ticket, do not send a renewed ticket to the client */
#define SSL_TICKET_RETURN_USE 3
/* Use the ticket, send a renewed ticket to the client */
```

```
#define SSL_TICKET_RETURN_USE_RENEW 4

typedef int (*SSL_CTX_generate_session_ticket_fn)(SSL *s, void *arg);
typedef SSL_TICKET_RETURN (*SSL_CTX_decrypt_session_ticket_fn)(SSL *s, SSL_SESSION *ss,
   const unsigned char *keyname,
   size_t keyname_length,
   SSL_TICKET_STATUS status,
   void *arg);
int SSL_CTX_set_session_ticket_cb(SSL_CTX *ctx,
   SSL_CTX_generate_session_ticket_fn gen_cb,
   SSL_CTX_decrypt_session_ticket_fn dec_cb,
    void *arg);
int SSL_SESSION_set1_ticket_appdata(SSL_SESSION *ss, const void *data, size_t len);
int SSL_SESSION_get0_ticket_appdata(SSL_SESSION *ss, void **data, size_t *len);

typedef unsigned int (*DTLS_timer_cb)(SSL *s, unsigned int timer_us);

void DTLS_set_timer_cb(SSL *s, DTLS_timer_cb cb);

typedef int (*SSL_allow_early_data_cb_fn)(SSL *s, void *arg);
void SSL_CTX_set_allow_early_data_cb(SSL_CTX *ctx,
   SSL_allow_early_data_cb_fn cb,
   void *arg);
void SSL_set_allow_early_data_cb(SSL *s,
   SSL_allow_early_data_cb_fn cb,
   void *arg);

/* store the default cipher strings inside the library */
const char *OSSL_default_cipher_list(void);
const char *OSSL_default_ciphersuites(void);

/* RFC8879 Certificate compression APIs */

int SSL_CTX_compress_certs(SSL_CTX *ctx, int alg);
int SSL_compress_certs(SSL *ssl, int alg);

int SSL_CTX_set1_cert_comp_preference(SSL_CTX *ctx, int *algs, size_t len);
int SSL_set1_cert_comp_preference(SSL *ssl, int *algs, size_t len);

int SSL_CTX_set1_compressed_cert(SSL_CTX
 *ctx, int algorithm, unsigned char *comp_data,
   size_t comp_length, size_t orig_length);
int SSL_set1_compressed_cert(SSL *ssl, int algorithm, unsigned char *comp_data,
   size_t comp_length, size_t orig_length);
size_t SSL_CTX_get1_compressed_cert(SSL_CTX *ctx, int alg, unsigned char **data, size_t *orig_len);
size_t SSL_get1_compressed_cert(SSL *ssl, int alg, unsigned char **data, size_t *orig_len);

__owur int SSL_add_expected_rpk(SSL *s, EVP_PKEY *rpk);
```

```
__owur EVP_PKEY *SSL_get0_peer_rpk(const SSL *s);
__owur EVP_PKEY *SSL_SESSION_get0_peer_rpk(SSL_SESSION *s);
__owur int SSL_get_negotiated_client_cert_type(const SSL *s);
__owur int SSL_get_negotiated_server_cert_type(const SSL *s);

__owur int SSL_set1_client_cert_type(SSL *s, const unsigned char *val, size_t len);
__owur int SSL_set1_server_cert_type(SSL *s, const unsigned char *val, size_t len);
__owur int SSL_CTX_set1_client_cert_type(SSL_CTX *ctx, const unsigned char *val, size_t len);
__owur
 int SSL_CTX_set1_server_cert_type(SSL_CTX *ctx, const unsigned char *val, size_t len);
__owur int SSL_get0_client_cert_type(const SSL *s, unsigned char **t, size_t *len);
__owur int SSL_get0_server_cert_type(const SSL *s, unsigned char **t, size_t *len);
__owur int SSL_CTX_get0_client_cert_type(const SSL_CTX *ctx, unsigned char **t, size_t *len);
__owur int SSL_CTX_get0_server_cert_type(const SSL_CTX *s, unsigned char **t, size_t *len);

/*
* Protection level. For <= TLSv1.2 only "NONE" and "APPLICATION" are used.
*/
#define OSSL_RECORD_PROTECTION_LEVEL_NONE 0
#define OSSL_RECORD_PROTECTION_LEVEL_EARLY 1
#define OSSL_RECORD_PROTECTION_LEVEL_HANDSHAKE 2
#define OSSL_RECORD_PROTECTION_LEVEL_APPLICATION 3

int SSL_set_quic_tls_cbs(SSL *s, const OSSL_DISPATCH *qtdis, void *arg);
int SSL_set_quic_tls_transport_params(SSL *s,
   const unsigned char *params,
   size_t params_len);

int SSL_set_quic_tls_early_data_enabled(SSL *s, int enabled);

#ifdef __cplusplus
}
#endif
#endif
```

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```
/*
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*
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* https://www.openssl.org/source/license.html
*/

#include "function.h"

extern int asn1parse_main(int argc, char *argv[]);
extern int ca_main(int argc, char *argv[]);
extern int ciphers_main(int argc, char *argv[]);
extern int cmp_main(int argc, char *argv[]);
extern int cms_main(int argc, char *argv[]);
extern int crl_main(int argc, char *argv[]);
extern int crl2pkcs7_main(int argc, char *argv[]);
extern int dgst_main(int argc, char *argv[]);
extern int dhparam_main(int argc, char *argv[]);
extern int dsa_main(int argc, char *argv[]);
extern int dsaparam_main(int argc, char *argv[]);
extern int ec_main(int argc, char *argv[]);
extern int ecparam_main(int
```

```
 argc, char *argv[]);
extern int enc_main(int argc, char *argv[]);
extern int engine_main(int argc, char *argv[]);
extern int errstr_main(int argc, char *argv[]);
extern int fipsinstall_main(int argc, char *argv[]);
extern int gendsa_main(int argc, char *argv[]);
extern int genpkey_main(int argc, char *argv[]);
extern int genrsa_main(int argc, char *argv[]);
extern int help_main(int argc, char *argv[]);
extern int info_main(int argc, char *argv[]);
extern int kdf_main(int argc, char *argv[]);
extern int list_main(int argc, char *argv[]);
extern int mac_main(int argc, char *argv[]);
extern int nseq_main(int argc, char *argv[]);
extern int ocsp_main(int argc, char *argv[]);
extern int passwd_main(int argc, char *argv[]);
extern int pkcs12_main(int argc, char *argv[]);
extern int pkcs7_main(int argc, char *argv[]);
extern int pkcs8_main(int argc, char *argv[]);
extern int pkey_main(int argc, char *argv[]);
extern int pkeyparam_main(int argc, char *argv[]);
extern int pkeyutl_main(int
 argc, char *argv[]);
extern int prime_main(int argc, char *argv[]);
extern int rand_main(int argc, char *argv[]);
extern int rehash_main(int argc, char *argv[]);
extern int req_main(int argc, char *argv[]);
extern int rsa_main(int argc, char *argv[]);
extern int rsautl_main(int argc, char *argv[]);
extern int s_client_main(int argc, char *argv[]);
extern int s_server_main(int argc, char *argv[]);
extern int s_time_main(int argc, char *argv[]);
extern int sess_id_main(int argc, char *argv[]);
extern int skeyutl_main(int argc, char *argv[]);
extern int smime_main(int argc, char *argv[]);
extern int speed_main(int argc, char *argv[]);
extern int spkac_main(int argc, char *argv[]);
extern int srp_main(int argc, char *argv[]);
extern int storeutl_main(int argc, char *argv[]);
extern int ts_main(int argc, char *argv[]);
extern int verify_main(int argc, char *argv[]);
extern int version_main(int argc, char *argv[]);
extern int x509_main(int argc, char *argv[]);

extern const OPTIONS asn1parse_options[];
extern
 const OPTIONS ca_options[];
extern const OPTIONS ciphers_options[];
```

```
extern const OPTIONS cmp_options[];
extern const OPTIONS cms_options[];
extern const OPTIONS crl_options[];
extern const OPTIONS crl2pkcs7_options[];
extern const OPTIONS dgst_options[];
extern const OPTIONS dhparam_options[];
extern const OPTIONS dsa_options[];
extern const OPTIONS dsaparam_options[];
extern const OPTIONS ec_options[];
extern const OPTIONS ecparam_options[];
extern const OPTIONS enc_options[];
extern const OPTIONS engine_options[];
extern const OPTIONS errstr_options[];
extern const OPTIONS fipsinstall_options[];
extern const OPTIONS gendsa_options[];
extern const OPTIONS genpkey_options[];
extern const OPTIONS genrsa_options[];
extern const OPTIONS help_options[];
extern const OPTIONS info_options[];
extern const OPTIONS kdf_options[];
extern const OPTIONS list_options[];
extern const OPTIONS mac_options[];
extern const OPTIONS nseq_options[];
extern const OPTIONS ocsp_options[];
extern
 const OPTIONS passwd_options[];
extern const OPTIONS pkcs12_options[];
extern const OPTIONS pkcs7_options[];
extern const OPTIONS pkcs8_options[];
extern const OPTIONS pkey_options[];
extern const OPTIONS pkeyparam_options[];
extern const OPTIONS pkeyutl_options[];
extern const OPTIONS prime_options[];
extern const OPTIONS rand_options[];
extern const OPTIONS rehash_options[];
extern const OPTIONS req_options[];
extern const OPTIONS rsa_options[];
extern const OPTIONS rsautl_options[];
extern const OPTIONS s_client_options[];
extern const OPTIONS s_server_options[];
extern const OPTIONS s_time_options[];
extern const OPTIONS sess_id_options[];
extern const OPTIONS skeyutl_options[];
extern const OPTIONS smime_options[];
extern const OPTIONS speed_options[];
extern const OPTIONS spkac_options[];
extern const OPTIONS srp_options[];
extern const OPTIONS storeutl_options[];
```

```
extern const OPTIONS ts_options[];
extern const OPTIONS verify_options[];
extern const OPTIONS version_options[];
extern
 const OPTIONS x509_options[];

extern FUNCTION functions[];
```

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```
{
 'variables': {
   'openssl_sources': [
     'openssl/crypto/aes/aes_ecb.c',
     'openssl/crypto/aes/aes_misc.c',
```

'openssl/crypto/bn/asm/x86_64-gcc.c',
'openssl/crypto/bn/bn_add.c',
'openssl/crypto/bn/bn_blind.c',
'openssl/crypto/bn/bn_const.c',
'openssl/crypto/bn/bn_conv.c',
'openssl/crypto/bn/bn_ctx.c',
'openssl/crypto/bn/bn_dh.c',
'openssl/crypto/bn/bn_div.c',
'openssl/crypto/bn/bn_exp.c',
'openssl/crypto/bn/bn_exp2.c',
'openssl/crypto/bn/bn_gcd.c',
'openssl/crypto/bn/bn_gf2m.c',
'openssl/crypto/bn/bn_intern.c',
'openssl/crypto/bn/bn_kron.c',
'openssl/crypto/bn/bn_lib.c',
'openssl/crypto/bn/bn_mod.c',
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'openssl/crypto/bn/bn_rsa_fips186_4.c',
'openssl/crypto/bn/bn_shift.c',
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'openssl/crypto/bn/bn_word.c',
'openssl/crypto/bn/rsaz_exp.c',
'openssl/crypto/bn/rsaz_exp_x2.c',
'openssl/crypto/buffer/buffer.c',
'openssl/crypto/cmac/cmac.c',
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'openssl/crypto/des/ecb3_enc.c',
'openssl/crypto/des/fcrypt_b.c',
'openssl/crypto/des/set_key.c',
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'openssl/crypto/evp/digest.c',
'openssl/crypto/evp/ec_support.c',
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'openssl/crypto/ffc/ffc_params_generate.c',
'openssl/crypto/ffc/ffc_params_validate.c',
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'openssl/crypto/packet.c',
'openssl/crypto/param_build.c',
'openssl/crypto/param_build_set.c',
'openssl/crypto/params.c',
'openssl/crypto/params_dup.c',
'openssl/crypto/params_from_text.c',
'openssl/crypto/provider_core.c',
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'openssl/crypto/property/property.c',
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'openssl/crypto/thread/api.c',
'openssl/crypto/thread/arch.c',
'openssl/crypto/thread/internal.c',
'openssl/providers/common/der/der_rsa_sig.c',
'openssl/providers/common/bio_prov.c',
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'openssl/providers/fips/fipsprov.c',
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'openssl/providers/implementations/kdfs/pbkdf2_fips.c',
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'openssl/providers/implementations/signature/ecdsa_sig.c',
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'openssl/providers/implementations/signature/mac_legacy_sig.c',
'openssl/providers/implementations/signature/ml_dsa_sig.c',
'openssl/providers/implementations/signature/rsa_sig.c',
'openssl/providers/implementations/signature/slh_dsa_sig.c',
'openssl/providers/implementations/skeymgmt/aes_skmgmt.c',
'openssl/providers/implementations/skeymgmt/generic.c',

```
  'openssl/ssl/record/methods/ssl3_cbc.c',
  'openssl/providers/common/der/der_dsa_key.c',
  'openssl/providers/common/der/der_dsa_sig.c',
  'openssl/providers/common/der/der_ec_key.c',
  'openssl/providers/common/der/der_ec_sig.c',
  'openssl/providers/common/der/der_ecx_key.c',
  'openssl/providers/common/der/der_ml_dsa_key.c',
  'openssl/providers/common/der/der_rsa_key.c',
  'openssl/providers/common/der/der_slh_dsa_key.c',
  'openssl/providers/common/provider_ctx.c',
  'openssl/providers/common/provider_err.c',
  'openssl/providers/implementations/ciphers/ciphercommon.c',
   'openssl/providers/implementations/ciphers/ciphercommon_block.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm_hw.c',
  'openssl/providers/implementations/ciphers/ciphercommon_gcm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_gcm_hw.c',
  'openssl/providers/implementations/ciphers/ciphercommon_hw.c',
  'openssl/providers/implementations/digests/digestcommon.c',
  'openssl/ssl/record/methods/tls_pad.c',
  'openssl/providers/fips/fips_entry.c',

],
'openssl_sources_BSD-x86_64': [
  './config/archs/BSD-x86_64/asm/crypto/aes/aes-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/aesni-mb-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/aesni-sha1-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/aesni-sha256-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/aesni-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/aesni-xts-avx512.s',
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  './config/archs/BSD-x86_64/asm/crypto/aes/vpaes-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-2k-avx512.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-2k-avxifma.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-3k-avx512.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-3k-avxifma.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-4k-avx512.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-4k-avxifma.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-avx2.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/x86_64-gf2m.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/x86_64-mont.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/x86_64-mont5.s',
  './config/archs/BSD-x86_64/asm/crypto/camellia/cmll-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/chacha/chacha-x86_64.s',
   './config/archs/BSD-x86_64/asm/crypto/ec/ecp_nistz256-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/ec/x25519-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/params_idx.c',
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  './config/archs/BSD-x86_64/asm/crypto/x86_64cpuid.s',
  './config/archs/BSD-x86_64/asm/crypto/md5/md5-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/modes/aes-gcm-avx512.s',
  './config/archs/BSD-x86_64/asm/crypto/modes/aesni-gcm-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/modes/ghash-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/poly1305/poly1305-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/rc4/rc4-md5-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/rc4/rc4-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/sha/keccak1600-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/sha/sha1-mb-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/sha/sha1-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/sha/sha256-mb-x86_64.s',
   './config/archs/BSD-x86_64/asm/crypto/sha/sha256-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/sha/sha512-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/whrlpool/wp-x86_64.s',
  './config/archs/BSD-x86_64/asm/engines/e_padlock-x86_64.s',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_sm2_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_digests_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_dsa_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_ec_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_ecx_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_ml_dsa_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_rsa_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_slh_dsa_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_wrap_gen.c',
  './config/archs/BSD-x86_64/asm/providers/legacy.ld',
   './config/archs/BSD-x86_64/asm/providers/fips.ld',

],
'openssl_defines_BSD-x86_64': [
  'NDEBUG',
  'L_ENDIAN',
  'OPENSSL_BUILDING_OPENSSL',
  'AES_ASM',
  'BSAES_ASM',
  'ECP_NISTZ256_ASM',
  'FIPS_MODULE',
  'GHASH_ASM',
  'KECCAK1600_ASM',
  'OPENSSL_BN_ASM_GF2m',
  'OPENSSL_BN_ASM_MONT',
  'OPENSSL_BN_ASM_MONT5',
  'OPENSSL_CPUID_OBJ',
  'OPENSSL_IA32_SSE2',
  'SHA1_ASM',
  'SHA256_ASM',
  'SHA512_ASM',
  'VPAES_ASM',
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```
    'X25519_ASM',
    'FIPS_MODULE',
  ],
  'openssl_cflags_BSD-x86_64': [
    '-Wa,--noexecstack',
    '-Wall -O3',
    '-pthread',
    '-Wall -O3',
  ],
  'openssl_ex_libs_BSD-x86_64': [
    '-pthread',
  ],
  'linker_script': ''
 },
 'include_dirs': [
  '.',
  './include',
  './crypto',
  './crypto/include/internal',
  './providers/common/include',
 ],
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 'cflags': ['<@(openssl_cflags_BSD-x86_64)'],
  'libraries': ['<@(openssl_ex_libs_BSD-x86_64)'],

 'sources': ['<@(openssl_sources)', '<@(openssl_sources_BSD-x86_64)'],
 'direct_dependent_settings': {
  'include_dirs': ['./include', '.'],
  'defines': ['<@(openssl_defines_BSD-x86_64)'],
 },
}
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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/internal/param_names.h.in
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*/
/* clang-format off */

/* clang-format on */

int ossl_param_find_pidx(const char *s);

/* Parameter name definitions - generated by util/perl/OpenSSL/paramnames.pm */
/* clang-format off */
#define NUM_PIDX 346

#define PIDX_ALG_PARAM_ALGORITHM_ID 0
#define PIDX_ALG_PARAM_ALGORITHM_ID_PARAMS 1
#define PIDX_ALG_PARAM_CIPHER 2
#define PIDX_ALG_PARAM_DIGEST 3
#define PIDX_ALG_PARAM_ENGINE 4
#define PIDX_ALG_PARAM_FIPS_APPROVED_INDICATOR 5
#define PIDX_ALG_PARAM_MAC 6
#define PIDX_ALG_PARAM_PROPERTIES 7
#define PIDX_ASYM_CIPHER_PARAM_DIGEST PIDX_PKEY_PARAM_DIGEST
#define PIDX_ASYM_CIPHER_PARAM_ENGINE
 PIDX_PKEY_PARAM_ENGINE
#define PIDX_ASYM_CIPHER_PARAM_FIPS_APPROVED_INDICATOR
PIDX_ALG_PARAM_FIPS_APPROVED_INDICATOR
#define PIDX_ASYM_CIPHER_PARAM_FIPS_KEY_CHECK PIDX_PKEY_PARAM_FIPS_KEY_CHECK
#define PIDX_ASYM_CIPHER_PARAM_FIPS_RSA_PKCS15_PAD_DISABLED
PIDX_PROV_PARAM_RSA_PKCS15_PAD_DISABLED
#define PIDX_ASYM_CIPHER_PARAM_IMPLICIT_REJECTION 8
#define PIDX_ASYM_CIPHER_PARAM_MGF1_DIGEST PIDX_PKEY_PARAM_MGF1_DIGEST
#define PIDX_ASYM_CIPHER_PARAM_MGF1_DIGEST_PROPS
PIDX_PKEY_PARAM_MGF1_PROPERTIES
#define PIDX_ASYM_CIPHER_PARAM_OAEP_DIGEST PIDX_ALG_PARAM_DIGEST
#define PIDX_ASYM_CIPHER_PARAM_OAEP_DIGEST_PROPS 9
#define PIDX_ASYM_CIPHER_PARAM_OAEP_LABEL 10
#define PIDX_ASYM_CIPHER_PARAM_PAD_MODE PIDX_PKEY_PARAM_PAD_MODE
#define PIDX_ASYM_CIPHER_PARAM_PROPERTIES PIDX_PKEY_PARAM_PROPERTIES
#define PIDX_ASYM_CIPHER_PARAM_TLS_CLIENT_VERSION 11
#define PIDX_ASYM_CIPHER_PARAM_TLS_NEGOTIATED_VERSION 12
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#define PIDX_CAPABILITY_TLS_GROUP_ALG 13
#define PIDX_CAPABILITY_TLS_GROUP_ID
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#define PIDX_CAPABILITY_TLS_GROUP_IS_KEM 15
#define PIDX_CAPABILITY_TLS_GROUP_MAX_DTLS 16
#define PIDX_CAPABILITY_TLS_GROUP_MAX_TLS 17
#define PIDX_CAPABILITY_TLS_GROUP_MIN_DTLS 18
#define PIDX_CAPABILITY_TLS_GROUP_MIN_TLS 19
#define PIDX_CAPABILITY_TLS_GROUP_NAME 20
#define PIDX_CAPABILITY_TLS_GROUP_NAME_INTERNAL 21
#define PIDX_CAPABILITY_TLS_GROUP_SECURITY_BITS 22
#define PIDX_CAPABILITY_TLS_SIGALG_CODE_POINT 23
#define PIDX_CAPABILITY_TLS_SIGALG_HASH_NAME 24
#define PIDX_CAPABILITY_TLS_SIGALG_HASH_OID 25
#define PIDX_CAPABILITY_TLS_SIGALG_IANA_NAME 26
#define PIDX_CAPABILITY_TLS_SIGALG_KEYTYPE 27
#define PIDX_CAPABILITY_TLS_SIGALG_KEYTYPE_OID 28
#define PIDX_CAPABILITY_TLS_SIGALG_MAX_DTLS 16
#define PIDX_CAPABILITY_TLS_SIGALG_MAX_TLS 17
#define PIDX_CAPABILITY_TLS_SIGALG_MIN_DTLS 18
#define PIDX_CAPABILITY_TLS_SIGALG_MIN_TLS 19
#define PIDX_CAPABILITY_TLS_SIGALG_NAME 29
#define PIDX_CAPABILITY_TLS_SIGALG_OID 30
#define PIDX_CAPABILITY_TLS_SIGALG_SECURITY_BITS 31
#define
 PIDX_CAPABILITY_TLS_SIGALG_SIG_NAME 32
#define PIDX_CAPABILITY_TLS_SIGALG_SIG_OID 33
#define PIDX_CIPHER_PARAM_AEAD 34
#define PIDX_CIPHER_PARAM_AEAD_IVLEN PIDX_CIPHER_PARAM_IVLEN
#define PIDX_CIPHER_PARAM_AEAD_IV_GENERATED 35
#define PIDX_CIPHER_PARAM_AEAD_MAC_KEY 36
#define PIDX_CIPHER_PARAM_AEAD_TAG 37
#define PIDX_CIPHER_PARAM_AEAD_TAGLEN 38
#define PIDX_CIPHER_PARAM_AEAD_TLS1_AAD 39
#define PIDX_CIPHER_PARAM_AEAD_TLS1_AAD_PAD 40
#define PIDX_CIPHER_PARAM_AEAD_TLS1_GET_IV_GEN 41
#define PIDX_CIPHER_PARAM_AEAD_TLS1_IV_FIXED 42
#define PIDX_CIPHER_PARAM_AEAD_TLS1_SET_IV_INV 43
#define PIDX_CIPHER_PARAM_ALGORITHM_ID PIDX_ALG_PARAM_ALGORITHM_ID
#define PIDX_CIPHER_PARAM_ALGORITHM_ID_PARAMS
PIDX_ALG_PARAM_ALGORITHM_ID_PARAMS
#define PIDX_CIPHER_PARAM_ALGORITHM_ID_PARAMS_OLD 44
#define PIDX_CIPHER_PARAM_BLOCK_SIZE 45
#define PIDX_CIPHER_PARAM_CTS 46
#define PIDX_CIPHER_PARAM_CTS_MODE 47
#define PIDX_CIPHER_PARAM_CUSTOM_IV 48
#define PIDX_CIPHER_PARAM_DECRYPT_ONLY 49
#define PIDX_CIPHER_PARAM_FIPS_APPROVED_INDICATOR
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#define PIDX_CIPHER_PARAM_FIPS_ENCRYPT_CHECK 50
#define PIDX_CIPHER_PARAM_HAS_RAND_KEY 51
#define PIDX_CIPHER_PARAM_IV 52
#define PIDX_CIPHER_PARAM_IVLEN 53
#define PIDX_CIPHER_PARAM_KEYLEN 54
#define PIDX_CIPHER_PARAM_MODE 55
#define PIDX_CIPHER_PARAM_NUM 56
#define PIDX_CIPHER_PARAM_PADDING 57
#define PIDX_CIPHER_PARAM_PIPELINE_AEAD_TAG 58
#define PIDX_CIPHER_PARAM_RANDOM_KEY 59
#define PIDX_CIPHER_PARAM_RC2_KEYBITS 60
#define PIDX_CIPHER_PARAM_ROUNDS 61
#define PIDX_CIPHER_PARAM_SPEED 62
#define PIDX_CIPHER_PARAM_TLS1_MULTIBLOCK 63
#define PIDX_CIPHER_PARAM_TLS1_MULTIBLOCK_AAD 64
#define PIDX_CIPHER_PARAM_TLS1_MULTIBLOCK_AAD_PACKLEN 65
#define PIDX_CIPHER_PARAM_TLS1_MULTIBLOCK_ENC 66
#define PIDX_CIPHER_PARAM_TLS1_MULTIBLOCK_ENC_IN 67
#define PIDX_CIPHER_PARAM_TLS1_MULTIBLOCK_ENC_LEN 68
#define PIDX_CIPHER_PARAM_TLS1_MULTIBLOCK_INTERLEAVE 69
#define PIDX_CIPHER_PARAM_TLS1_MULTIBLOCK_MAX_BUFSIZE 70
#define PIDX_CIPHER_PARAM_TLS1_MULTIBLOCK_MAX_SEND_FRAGMENT
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#define PIDX_CIPHER_PARAM_TLS_MAC 72
#define PIDX_CIPHER_PARAM_TLS_MAC_SIZE 73
#define PIDX_CIPHER_PARAM_TLS_VERSION 74
#define PIDX_CIPHER_PARAM_UPDATED_IV 75
#define PIDX_CIPHER_PARAM_USE_BITS 76
#define PIDX_CIPHER_PARAM_XTS_STANDARD 77
#define PIDX_DECODER_PARAM_PROPERTIES PIDX_ALG_PARAM_PROPERTIES
#define PIDX_DIGEST_PARAM_ALGID_ABSENT 78
#define PIDX_DIGEST_PARAM_BLOCK_SIZE 45
#define PIDX_DIGEST_PARAM_MICALG 79
#define PIDX_DIGEST_PARAM_PAD_TYPE 80
#define PIDX_DIGEST_PARAM_SIZE 81
#define PIDX_DIGEST_PARAM_SSL3_MS 82
#define PIDX_DIGEST_PARAM_XOF 83
#define PIDX_DIGEST_PARAM_XOFLEN 84
#define PIDX_DRBG_PARAM_CIPHER PIDX_ALG_PARAM_CIPHER
#define PIDX_DRBG_PARAM_DIGEST PIDX_ALG_PARAM_DIGEST
#define PIDX_DRBG_PARAM_ENTROPY_REQUIRED 85
#define PIDX_DRBG_PARAM_FIPS_APPROVED_INDICATOR
PIDX_ALG_PARAM_FIPS_APPROVED_INDICATOR
#define PIDX_DRBG_PARAM_FIPS_DIGEST_CHECK PIDX_PKEY_PARAM_FIPS_DIGEST_CHECK
#define PIDX_DRBG_PARAM_MAC PIDX_ALG_PARAM_MAC
#define
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#define PIDX_DRBG_PARAM_MAX_ENTROPYLEN 87
#define PIDX_DRBG_PARAM_MAX_LENGTH 88
#define PIDX_DRBG_PARAM_MAX_NONCELEN 89
#define PIDX_DRBG_PARAM_MAX_PERSLEN 90
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#define PIDX_DRBG_PARAM_MIN_NONCELEN 93
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#define PIDX_DRBG_PARAM_PROPERTIES PIDX_ALG_PARAM_PROPERTIES
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#define PIDX_DRBG_PARAM_RESEED_COUNTER 96
#define PIDX_DRBG_PARAM_RESEED_REQUESTS 97
#define PIDX_DRBG_PARAM_RESEED_TIME 98
#define PIDX_DRBG_PARAM_RESEED_TIME_INTERVAL 99
#define PIDX_DRBG_PARAM_SIZE 81
#define PIDX_DRBG_PARAM_USE_DF 100
#define PIDX_ENCODER_PARAM_CIPHER PIDX_ALG_PARAM_CIPHER
#define PIDX_ENCODER_PARAM_ENCRYPT_LEVEL 101
#define PIDX_ENCODER_PARAM_PROPERTIES PIDX_ALG_PARAM_PROPERTIES
#define PIDX_ENCODER_PARAM_SAVE_PARAMETERS 102
#define PIDX_EXCHANGE_PARAM_EC_ECDH_COFACTOR_MODE 103
#define PIDX_EXCHANGE_PARAM_FIPS_APPROVED_INDICATOR
PIDX_ALG_PARAM_FIPS_APPROVED_INDICATOR
#define PIDX_EXCHANGE_PARAM_FIPS_DIGEST_CHECK PIDX_PKEY_PARAM_FIPS_DIGEST_CHECK
#define PIDX_EXCHANGE_PARAM_FIPS_ECDH_COFACTOR_CHECK
PIDX_PROV_PARAM_ECDH_COFACTOR_CHECK
#define PIDX_EXCHANGE_PARAM_FIPS_KEY_CHECK PIDX_PKEY_PARAM_FIPS_KEY_CHECK
#define PIDX_EXCHANGE_PARAM_KDF_DIGEST 104
#define PIDX_EXCHANGE_PARAM_KDF_DIGEST_PROPS 105
#define PIDX_EXCHANGE_PARAM_KDF_OUTLEN 106
#define PIDX_EXCHANGE_PARAM_KDF_TYPE 107
#define PIDX_EXCHANGE_PARAM_KDF_UKM 108
#define PIDX_EXCHANGE_PARAM_PAD 109
#define PIDX_GEN_PARAM_ITERATION 110
#define PIDX_GEN_PARAM_POTENTIAL 111
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#define PIDX_KDF_PARAM_ARGON2_LANES 113
#define PIDX_KDF_PARAM_ARGON2_MEMCOST 114
#define PIDX_KDF_PARAM_ARGON2_VERSION 115
#define PIDX_KDF_PARAM_CEK_ALG 116
#define PIDX_KDF_PARAM_CIPHER PIDX_ALG_PARAM_CIPHER
#define PIDX_KDF_PARAM_CONSTANT 117
#define PIDX_KDF_PARAM_DATA 118
#define PIDX_KDF_PARAM_DIGEST PIDX_ALG_PARAM_DIGEST
#define
PIDX_KDF_PARAM_EARLY_CLEAN 119
#define PIDX_KDF_PARAM_FIPS_APPROVED_INDICATOR

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#define PIDX_KDF_PARAM_FIPS_DIGEST_CHECK PIDX_PKEY_PARAM_FIPS_DIGEST_CHECK
#define PIDX_KDF_PARAM_FIPS_EMS_CHECK 120
#define PIDX_KDF_PARAM_FIPS_KEY_CHECK PIDX_PKEY_PARAM_FIPS_KEY_CHECK
#define PIDX_KDF_PARAM_HMACDRBG_ENTROPY 121
#define PIDX_KDF_PARAM_HMACDRBG_NONCE 122
#define PIDX_KDF_PARAM_INFO 123
#define PIDX_KDF_PARAM_ITER 124
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#define PIDX_KDF_PARAM_KBKDF_USE_L 126
#define PIDX_KDF_PARAM_KBKDF_USE_SEPARATOR 127
#define PIDX_KDF_PARAM_KEY 128
#define PIDX_KDF_PARAM_LABEL 129
#define PIDX_KDF_PARAM_MAC PIDX_ALG_PARAM_MAC
#define PIDX_KDF_PARAM_MAC_SIZE 130
#define PIDX_KDF_PARAM_MODE 55
#define PIDX_KDF_PARAM_PASSWORD 131
#define PIDX_KDF_PARAM_PKCS12_ID 132
#define PIDX_KDF_PARAM_PKCS5 133
#define PIDX_KDF_PARAM_PREFIX 134
#define PIDX_KDF_PARAM_PROPERTIES PIDX_ALG_PARAM_PROPERTIES
#define PIDX_KDF_PARAM_SALT 135
#define
 PIDX_KDF_PARAM_SCRYPT_MAXMEM 136
#define PIDX_KDF_PARAM_SCRYPT_N 137
#define PIDX_KDF_PARAM_SCRYPT_P 138
#define PIDX_KDF_PARAM_SCRYPT_R 125
#define PIDX_KDF_PARAM_SECRET 139
#define PIDX_KDF_PARAM_SEED 140
#define PIDX_KDF_PARAM_SIZE 81
#define PIDX_KDF_PARAM_SSHKDF_SESSION_ID 141
#define PIDX_KDF_PARAM_SSHKDF_TYPE 142
#define PIDX_KDF_PARAM_SSHKDF_XCGHASH 143
#define PIDX_KDF_PARAM_THREADS 144
#define PIDX_KDF_PARAM_UKM 145
#define PIDX_KDF_PARAM_X942_ACVPINFO 146
#define PIDX_KDF_PARAM_X942_PARTYUINFO 147
#define PIDX_KDF_PARAM_X942_PARTYVINFO 148
#define PIDX_KDF_PARAM_X942_SUPP_PRIVINFO 149
#define PIDX_KDF_PARAM_X942_SUPP_PUBINFO 150
#define PIDX_KDF_PARAM_X942_USE_KEYBITS 151
#define PIDX_KEM_PARAM_FIPS_APPROVED_INDICATOR
PIDX_ALG_PARAM_FIPS_APPROVED_INDICATOR
#define PIDX_KEM_PARAM_FIPS_KEY_CHECK PIDX_PKEY_PARAM_FIPS_KEY_CHECK
#define PIDX_KEM_PARAM_IKME 152
#define PIDX_KEM_PARAM_OPERATION 153
#define PIDX_LIBSSL_RECORD_LAYER_PARAM_BLOCK_PADDING 154
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#define PIDX_LIBSSL_RECORD_LAYER_PARAM_MAX_FRAG_LEN 157
#define PIDX_LIBSSL_RECORD_LAYER_PARAM_MODE 55
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#define PIDX_LIBSSL_RECORD_LAYER_PARAM_STREAM_MAC 160
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#define PIDX_LIBSSL_RECORD_LAYER_PARAM_USE_ETM 162
#define PIDX_LIBSSL_RECORD_LAYER_READ_BUFFER_LEN 163
#define PIDX_MAC_PARAM_BLOCK_SIZE 164
#define PIDX_MAC_PARAM_CIPHER PIDX_ALG_PARAM_CIPHER
#define PIDX_MAC_PARAM_CUSTOM 165
#define PIDX_MAC_PARAM_C_ROUNDS 166
#define PIDX_MAC_PARAM_DIGEST PIDX_ALG_PARAM_DIGEST
#define PIDX_MAC_PARAM_DIGEST_NOINIT 167
#define PIDX_MAC_PARAM_DIGEST_ONESHOT 168
#define PIDX_MAC_PARAM_D_ROUNDS 169
#define PIDX_MAC_PARAM_FIPS_APPROVED_INDICATOR
PIDX_ALG_PARAM_FIPS_APPROVED_INDICATOR
#define PIDX_MAC_PARAM_FIPS_KEY_CHECK PIDX_PKEY_PARAM_FIPS_KEY_CHECK
#define
PIDX_MAC_PARAM_FIPS_NO_SHORT_MAC PIDX_PROV_PARAM_NO_SHORT_MAC
#define PIDX_MAC_PARAM_IV 52
#define PIDX_MAC_PARAM_KEY 128
#define PIDX_MAC_PARAM_PROPERTIES PIDX_ALG_PARAM_PROPERTIES
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#define PIDX_PKEY_PARAM_ALGORITHM_ID_PARAMS
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#define PIDX_PKEY_PARAM_CIPHER PIDX_ALG_PARAM_CIPHER
#define PIDX_PKEY_PARAM_DEFAULT_DIGEST 177
#define PIDX_PKEY_PARAM_DHKEM_IKM 178
#define PIDX_PKEY_PARAM_DH_GENERATOR 179
#define PIDX_PKEY_PARAM_DH_PRIV_LEN

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#define PIDX_PKEY_PARAM_DIGEST PIDX_ALG_PARAM_DIGEST
#define PIDX_PKEY_PARAM_DIGEST_SIZE 181
#define PIDX_PKEY_PARAM_DIST_ID 182
#define PIDX_PKEY_PARAM_EC_A 183
#define PIDX_PKEY_PARAM_EC_B 184
#define PIDX_PKEY_PARAM_EC_CHAR2_M 185
#define PIDX_PKEY_PARAM_EC_CHAR2_PP_K1 186
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#define PIDX_PKEY_PARAM_EC_CHAR2_TP_BASIS 189
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#define PIDX_PKEY_PARAM_EC_ENCODING 193
#define PIDX_PKEY_PARAM_EC_FIELD_TYPE 194
#define PIDX_PKEY_PARAM_EC_GENERATOR 195
#define PIDX_PKEY_PARAM_EC_GROUP_CHECK_TYPE 196
#define PIDX_PKEY_PARAM_EC_INCLUDE_PUBLIC 197
#define PIDX_PKEY_PARAM_EC_ORDER 198
#define PIDX_PKEY_PARAM_EC_P 138
#define PIDX_PKEY_PARAM_EC_POINT_CONVERSION_FORMAT 199
#define PIDX_PKEY_PARAM_EC_PUB_X 200
#define PIDX_PKEY_PARAM_EC_PUB_Y 201
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#define PIDX_SIGNATURE_PARAM_CONTEXT_STRING 328
#define PIDX_SIGNATURE_PARAM_DETERMINISTIC 329
#define PIDX_SIGNATURE_PARAM_DIGEST PIDX_PKEY_PARAM_DIGEST
#define PIDX_SIGNATURE_PARAM_DIGEST_SIZE PIDX_PKEY_PARAM_DIGEST_SIZE
#define PIDX_SIGNATURE_PARAM_FIPS_APPROVED_INDICATOR
PIDX_ALG_PARAM_FIPS_APPROVED_INDICATOR
#define PIDX_SIGNATURE_PARAM_FIPS_DIGEST_CHECK PIDX_PKEY_PARAM_FIPS_DIGEST_CHECK
#define PIDX_SIGNATURE_PARAM_FIPS_KEY_CHECK PIDX_PKEY_PARAM_FIPS_KEY_CHECK

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#define PIDX_SIGNATURE_PARAM_FIPS_RSA_PSS_SALTLEN_CHECK 300
#define PIDX_SIGNATURE_PARAM_FIPS_SIGN_CHECK PIDX_PKEY_PARAM_FIPS_SIGN_CHECK
#define PIDX_SIGNATURE_PARAM_FIPS_SIGN_X931_PAD_CHECK 330
#define PIDX_SIGNATURE_PARAM_FIPS_VERIFY_MESSAGE 331
#define PIDX_SIGNATURE_PARAM_INSTANCE 332
#define PIDX_SIGNATURE_PARAM_KAT 333
#define PIDX_SIGNATURE_PARAM_MESSAGE_ENCODING 334
#define PIDX_SIGNATURE_PARAM_MGF1_DIGEST PIDX_PKEY_PARAM_MGF1_DIGEST
#define PIDX_SIGNATURE_PARAM_MGF1_PROPERTIES PIDX_PKEY_PARAM_MGF1_PROPERTIES
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#define PIDX_SIGNATURE_PARAM_PAD_MODE PIDX_PKEY_PARAM_PAD_MODE
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#define PIDX_STORE_PARAM_FINGERPRINT 343
#define PIDX_STORE_PARAM_INPUT_TYPE 174
#define PIDX_STORE_PARAM_ISSUER 296
#define PIDX_STORE_PARAM_PROPERTIES 7
#define PIDX_STORE_PARAM_SERIAL 344
#define PIDX_STORE_PARAM_SUBJECT 345
/* clang-format on */
/*
* WARNING: do not edit!
* Generated by util/mkbuildinf.pl
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*/

#define PLATFORM "platform: BSD-x86_64"
#define DATE "built on: Tue Jan 27 17:26:21 2026 UTC"

/*
* Generate compiler_flags as an array of individual characters. This is a
* workaround for the situation where CFLAGS gets too long for a C90 string
* literal
```

```
*/
static const char compiler_flags[] = {
   'c','o','m','p','i','l','e','r',':',' ','g','c','c',' ','-','f',
   'P','I','C',' ','-','p','t','h','r','e','a','d',' ','-','W','a',
   ',','-','-','n','o','e','x','e','c','s','t','a','c','k',' ','-',
   'W','a','l','l',' ','-','O','3',' ','-','D','L','_','E','N','D',
   'I','A','N',' ','-','D','O','P','E','N','S','S','L','_','P','I',
    'C',' ','-','D','_','T','H','R','E','A','D','_','S','A','F','E',
   ' ','-','D','_','R','E','E','N','T','R','A','N','T',' ','-','D',
   'O','P','E','N','S','S','L','_','B','U','I','L','D','I','N','G',
   '_','O','P','E','N','S','S','L',' ','-','D','N','D','E','B','U',
   'G','\0'
};
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/opensslv.h.in
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*/

#ifndef OPENSSL_OPENSSLV_H
#define OPENSSL_OPENSSLV_H
#pragma once

#ifdef __cplusplus
extern "C" {
#endif

/*
* SECTION 1: VERSION DATA.  These will change for each release
*/

/*
* Base version macros
*
* These macros express version number MAJOR.MINOR.PATCH exactly
*/
/* clang-format off */
# define OPENSSL_VERSION_MAJOR  3
/* clang-format on */
/* clang-format off */
# define OPENSSL_VERSION_MINOR  5
/* clang-format on */
```

```
/* clang-format off */
# define OPENSSL_VERSION_PATCH  5
/* clang-format on */

/*
* Additional version information
*
* These are also part
 of the new version scheme, but aren't part
* of the version number itself.
*/

/* Could be: #define OPENSSL_VERSION_PRE_RELEASE "-alpha.1" */
/* clang-format off */
# define OPENSSL_VERSION_PRE_RELEASE ""
/* clang-format on */
/* Could be: #define OPENSSL_VERSION_BUILD_METADATA "+fips" */
/* Could be: #define OPENSSL_VERSION_BUILD_METADATA "+vendor.1" */
/* clang-format off */
# define OPENSSL_VERSION_BUILD_METADATA ""
/* clang-format on */

/*
* Note: The OpenSSL Project will never define OPENSSL_VERSION_BUILD_METADATA
* to be anything but the empty string.  Its use is entirely reserved for
* others
*/

/*
* Shared library version
*
* This is strictly to express ABI version, which may or may not
* be related to the API version expressed with the macros above.
* This is defined in free form.
*/
/* clang-format off */
# define OPENSSL_SHLIB_VERSION 3
/* clang-format on */

/*
* SECTION 2: USEFUL MACROS
*/

/* For checking general API compatibility when preprocessing */
#define
 OPENSSL_VERSION_PREREQ(maj, min) \
   ((OPENSSL_VERSION_MAJOR << 16) + OPENSSL_VERSION_MINOR >= ((maj) << 16) + (min))
```

```
/*
* Macros to get the version in easily digested string form, both the short
* "MAJOR.MINOR.PATCH" variant (where MAJOR, MINOR and PATCH are replaced
* with the values from the corresponding OPENSSL_VERSION_ macros) and the
* longer variant with OPENSSL_VERSION_PRE_RELEASE_STR and
* OPENSSL_VERSION_BUILD_METADATA_STR appended.
*/
/* clang-format off */
# define OPENSSL_VERSION_STR "3.5.5"
/* clang-format on */
/* clang-format off */
# define OPENSSL_FULL_VERSION_STR "3.5.5"
/* clang-format on */

/*
* SECTION 3: ADDITIONAL METADATA
*
* These strings are defined separately to allow them to be parsable.
*/
/* clang-format off */
# define OPENSSL_RELEASE_DATE "27 Jan 2026"
/* clang-format on */

/*
* SECTION 4: BACKWARD COMPATIBILITY
*/

/* clang-format off */
# define OPENSSL_VERSION_TEXT "OpenSSL 3.5.5 27 Jan 2026"
/* clang-format on */

/* clang-format
 off */
/* Synthesize OPENSSL_VERSION_NUMBER with the layout 0xMNN00PP0L */
# define OPENSSL_VERSION_NUMBER         \
   ( (OPENSSL_VERSION_MAJOR<<28)       \
    |(OPENSSL_VERSION_MINOR<<20)       \
    |(OPENSSL_VERSION_PATCH<<4)        \
    |0x0L )
/* clang-format on */

#ifdef __cplusplus
}
#endif

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_OPENSSLV_H
```

#endif

#endif /* OPENSSL_OPENSSLV_H */
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```
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  distributed under the License is distributed on an "AS IS" BASIS,
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  limitations under the License.
#ifndef SRC_PERMISSION_ADDON_PERMISSION_H_
#define SRC_PERMISSION_ADDON_PERMISSION_H_

#if defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS

#include <string>
#include "permission/permission_base.h"

namespace node {

namespace permission {

class AddonPermission final : public PermissionBase {
public:
 void Apply(Environment* env,
          const std::vector<std::string>& allow,
          PermissionScope scope) override;
 bool is_granted(Environment* env,
               PermissionScope perm,
               const std::string_view& param = "") const override;

private:
 bool deny_all_;
};

}  // namespace permission

}  // namespace node

#endif  // defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
#endif  // SRC_PERMISSION_ADDON_PERMISSION_H_
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/cmp.h.in
*
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
```

```
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_CMP_H
#define OPENSSL_CMP_H

#include <openssl/opensslconf.h>
#ifndef OPENSSL_NO_CMP

#include <openssl/crmf.h>
#include <openssl/cmperr.h>
#include <openssl/cmp_util.h>
#include <openssl/http.h>

/* explicit #includes not strictly needed since implied by the above: */
#include <openssl/types.h>
#include <openssl/safestack.h>
#include <openssl/x509.h>
#include <openssl/x509v3.h>

#ifdef __cplusplus
extern "C" {
#endif

#define OSSL_CMP_PVNO_2 2
#define
 OSSL_CMP_PVNO_3 3
#define OSSL_CMP_PVNO OSSL_CMP_PVNO_2 /* v2 is the default */

/*-
*   PKIFailureInfo ::= BIT STRING {
*   -- since we can fail in more than one way!
*   -- More codes may be added in the future if/when required.
*       badAlg              (0),
*       -- unrecognized or unsupported Algorithm Identifier
*       badMessageCheck     (1),
*       -- integrity check failed (e.g., signature did not verify)
*       badRequest          (2),
*       -- transaction not permitted or supported
*       badTime             (3),
*       -- messageTime was not sufficiently close to the system time,
*       -- as defined by local policy
*       badCertId           (4),
*       -- no certificate could be found matching the provided criteria
*       badDataFormat       (5),
```

```
*       -- the data submitted has the wrong format
*       wrongAuthority      (6),
*       -- the authority indicated in the request is different from the
*       -- one creating the response
 token
*       incorrectData       (7),
*       -- the requester's data is incorrect (for notary services)
*       missingTimeStamp    (8),
*       -- when the timestamp is missing but should be there
*       -- (by policy)
*       badPOP              (9),
*       -- the proof-of-possession failed
*       certRevoked         (10),
*         -- the certificate has already been revoked
*       certConfirmed       (11),
*         -- the certificate has already been confirmed
*       wrongIntegrity      (12),
*         -- invalid integrity, password based instead of signature or
*         -- vice versa
*       badRecipientNonce   (13),
*         -- invalid recipient nonce, either missing or wrong value
*       timeNotAvailable    (14),
*         -- the TSA's time source is not available
*       unacceptedPolicy    (15),
*         -- the requested TSA policy is not supported by the TSA.
*       unacceptedExtension (16),
*         -- the requested extension is not
 supported by the TSA.
*       addInfoNotAvailable (17),
*         -- the additional information requested could not be
*         -- understood or is not available
*       badSenderNonce      (18),
*         -- invalid sender nonce, either missing or wrong size
*       badCertTemplate     (19),
*         -- invalid cert. template or missing mandatory information
*       signerNotTrusted    (20),
*         -- signer of the message unknown or not trusted
*       transactionIdInUse  (21),
*         -- the transaction identifier is already in use
*       unsupportedVersion  (22),
*         -- the version of the message is not supported
*       notAuthorized       (23),
*         -- the sender was not authorized to make the preceding
*         -- request or perform the preceding action
*       systemUnavail       (24),
*       -- the request cannot be handled due to system unavailability
*       systemFailure       (25),
*       -- the request cannot be handled
```

```
 due to system failure
*       duplicateCertReq    (26)
*       -- certificate cannot be issued because a duplicate
*       -- certificate already exists
*   }
*/
#define OSSL_CMP_PKIFAILUREINFO_badAlg 0
#define OSSL_CMP_PKIFAILUREINFO_badMessageCheck 1
#define OSSL_CMP_PKIFAILUREINFO_badRequest 2
#define OSSL_CMP_PKIFAILUREINFO_badTime 3
#define OSSL_CMP_PKIFAILUREINFO_badCertId 4
#define OSSL_CMP_PKIFAILUREINFO_badDataFormat 5
#define OSSL_CMP_PKIFAILUREINFO_wrongAuthority 6
#define OSSL_CMP_PKIFAILUREINFO_incorrectData 7
#define OSSL_CMP_PKIFAILUREINFO_missingTimeStamp 8
#define OSSL_CMP_PKIFAILUREINFO_badPOP 9
#define OSSL_CMP_PKIFAILUREINFO_certRevoked 10
#define OSSL_CMP_PKIFAILUREINFO_certConfirmed 11
#define OSSL_CMP_PKIFAILUREINFO_wrongIntegrity 12
#define OSSL_CMP_PKIFAILUREINFO_badRecipientNonce 13
#define OSSL_CMP_PKIFAILUREINFO_timeNotAvailable 14
#define OSSL_CMP_PKIFAILUREINFO_unacceptedPolicy 15
#define OSSL_CMP_PKIFAILUREINFO_unacceptedExtension 16
#define OSSL_CMP_PKIFAILUREINFO_addInfoNotAvailable
 17
#define OSSL_CMP_PKIFAILUREINFO_badSenderNonce 18
#define OSSL_CMP_PKIFAILUREINFO_badCertTemplate 19
#define OSSL_CMP_PKIFAILUREINFO_signerNotTrusted 20
#define OSSL_CMP_PKIFAILUREINFO_transactionIdInUse 21
#define OSSL_CMP_PKIFAILUREINFO_unsupportedVersion 22
#define OSSL_CMP_PKIFAILUREINFO_notAuthorized 23
#define OSSL_CMP_PKIFAILUREINFO_systemUnavail 24
#define OSSL_CMP_PKIFAILUREINFO_systemFailure 25
#define OSSL_CMP_PKIFAILUREINFO_duplicateCertReq 26
#define OSSL_CMP_PKIFAILUREINFO_MAX 26
#define OSSL_CMP_PKIFAILUREINFO_MAX_BIT_PATTERN \
   ((1 << (OSSL_CMP_PKIFAILUREINFO_MAX + 1)) - 1)
#if OSSL_CMP_PKIFAILUREINFO_MAX_BIT_PATTERN > INT_MAX
#error CMP_PKIFAILUREINFO_MAX bit pattern does not fit in type int
#endif
typedef ASN1_BIT_STRING OSSL_CMP_PKIFAILUREINFO;

#define OSSL_CMP_CTX_FAILINFO_badAlg (1 << 0)
#define OSSL_CMP_CTX_FAILINFO_badMessageCheck (1 << 1)
#define OSSL_CMP_CTX_FAILINFO_badRequest (1 << 2)
#define OSSL_CMP_CTX_FAILINFO_badTime
 (1 << 3)
#define OSSL_CMP_CTX_FAILINFO_badCertId (1 << 4)
```

```
#define OSSL_CMP_CTX_FAILINFO_badDataFormat (1 << 5)
#define OSSL_CMP_CTX_FAILINFO_wrongAuthority (1 << 6)
#define OSSL_CMP_CTX_FAILINFO_incorrectData (1 << 7)
#define OSSL_CMP_CTX_FAILINFO_missingTimeStamp (1 << 8)
#define OSSL_CMP_CTX_FAILINFO_badPOP (1 << 9)
#define OSSL_CMP_CTX_FAILINFO_certRevoked (1 << 10)
#define OSSL_CMP_CTX_FAILINFO_certConfirmed (1 << 11)
#define OSSL_CMP_CTX_FAILINFO_wrongIntegrity (1 << 12)
#define OSSL_CMP_CTX_FAILINFO_badRecipientNonce (1 << 13)
#define OSSL_CMP_CTX_FAILINFO_timeNotAvailable (1 << 14)
#define OSSL_CMP_CTX_FAILINFO_unacceptedPolicy (1 << 15)
#define OSSL_CMP_CTX_FAILINFO_unacceptedExtension (1 << 16)
#define OSSL_CMP_CTX_FAILINFO_addInfoNotAvailable (1 << 17)
#define OSSL_CMP_CTX_FAILINFO_badSenderNonce (1 << 18)
#define OSSL_CMP_CTX_FAILINFO_badCertTemplate (1 << 19)
#define OSSL_CMP_CTX_FAILINFO_signerNotTrusted (1 << 20)
#define OSSL_CMP_CTX_FAILINFO_transactionIdInUse (1
 << 21)
#define OSSL_CMP_CTX_FAILINFO_unsupportedVersion (1 << 22)
#define OSSL_CMP_CTX_FAILINFO_notAuthorized (1 << 23)
#define OSSL_CMP_CTX_FAILINFO_systemUnavail (1 << 24)
#define OSSL_CMP_CTX_FAILINFO_systemFailure (1 << 25)
#define OSSL_CMP_CTX_FAILINFO_duplicateCertReq (1 << 26)

/*-
*   PKIStatus ::= INTEGER {
*       accepted                (0),
*       -- you got exactly what you asked for
*       grantedWithMods         (1),
*       -- you got something like what you asked for; the
*       -- requester is responsible for ascertaining the differences
*       rejection               (2),
*       -- you don't get it, more information elsewhere in the message
*       waiting                 (3),
*       -- the request body part has not yet been processed; expect to
*       -- hear more later (note: proper handling of this status
*       -- response MAY use the polling req/rep PKIMessages specified
*       -- in Section 5.3.22; alternatively, polling in the underlying
*
        -- transport layer MAY have some utility in this regard)
*       revocationWarning       (4),
*       -- this message contains a warning that a revocation is
*       -- imminent
*       revocationNotification (5),
*       -- notification that a revocation has occurred
*       keyUpdateWarning        (6)
*       -- update already done for the oldCertId specified in
*       -- CertReqMsg
```

```
*   }
*/
#define OSSL_CMP_PKISTATUS_request -3
#define OSSL_CMP_PKISTATUS_trans -2
#define OSSL_CMP_PKISTATUS_unspecified -1
#define OSSL_CMP_PKISTATUS_accepted 0
#define OSSL_CMP_PKISTATUS_grantedWithMods 1
#define OSSL_CMP_PKISTATUS_rejection 2
#define OSSL_CMP_PKISTATUS_waiting 3
#define OSSL_CMP_PKISTATUS_revocationWarning 4
#define OSSL_CMP_PKISTATUS_revocationNotification 5
#define OSSL_CMP_PKISTATUS_keyUpdateWarning 6
typedef ASN1_INTEGER OSSL_CMP_PKISTATUS;

DECLARE_ASN1_ITEM(OSSL_CMP_PKISTATUS)

#define OSSL_CMP_CERTORENCCERT_CERTIFICATE 0
#define OSSL_CMP_CERTORENCCERT_ENCRYPTEDCERT
 1

/* data type declarations */
typedef struct ossl_cmp_ctx_st OSSL_CMP_CTX;
typedef struct ossl_cmp_pkiheader_st OSSL_CMP_PKIHEADER;
DECLARE_ASN1_FUNCTIONS(OSSL_CMP_PKIHEADER)
typedef struct ossl_cmp_msg_st OSSL_CMP_MSG;
DECLARE_ASN1_DUP_FUNCTION(OSSL_CMP_MSG)
DECLARE_ASN1_ENCODE_FUNCTIONS(OSSL_CMP_MSG, OSSL_CMP_MSG, OSSL_CMP_MSG)
typedef struct ossl_cmp_certstatus_st OSSL_CMP_CERTSTATUS;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CMP_CERTSTATUS, OSSL_CMP_CERTSTATUS,
OSSL_CMP_CERTSTATUS)
#define sk_OSSL_CMP_CERTSTATUS_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_CMP_CERTSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CERTSTATUS_value(sk, idx) ((OSSL_CMP_CERTSTATUS
*)OPENSSL_sk_value(ossl_check_const_OSSL_CMP_CERTSTATUS_sk_type(sk), (idx)))
#define sk_OSSL_CMP_CERTSTATUS_new(cmp) ((STACK_OF(OSSL_CMP_CERTSTATUS)
*)OPENSSL_sk_new(ossl_check_OSSL_CMP_CERTSTATUS_compfunc_type(cmp)))
#define sk_OSSL_CMP_CERTSTATUS_new_null() ((STACK_OF(OSSL_CMP_CERTSTATUS)
*)OPENSSL_sk_new_null())
#define
 sk_OSSL_CMP_CERTSTATUS_new_reserve(cmp, n) ((STACK_OF(OSSL_CMP_CERTSTATUS)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CMP_CERTSTATUS_compfunc_type(cmp), (n)))
#define sk_OSSL_CMP_CERTSTATUS_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk), (n))
#define sk_OSSL_CMP_CERTSTATUS_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CERTSTATUS_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk))
```

```
#define sk_OSSL_CMP_CERTSTATUS_delete(sk, i) ((OSSL_CMP_CERTSTATUS
*)OPENSSL_sk_delete(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk), (i)))
#define sk_OSSL_CMP_CERTSTATUS_delete_ptr(sk, ptr) ((OSSL_CMP_CERTSTATUS
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CERTSTATUS_type(ptr)))
#define sk_OSSL_CMP_CERTSTATUS_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CERTSTATUS_type(ptr))
#define sk_OSSL_CMP_CERTSTATUS_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk),
 ossl_check_OSSL_CMP_CERTSTATUS_type(ptr))
#define sk_OSSL_CMP_CERTSTATUS_pop(sk) ((OSSL_CMP_CERTSTATUS
*)OPENSSL_sk_pop(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk)))
#define sk_OSSL_CMP_CERTSTATUS_shift(sk) ((OSSL_CMP_CERTSTATUS
*)OPENSSL_sk_shift(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk)))
#define sk_OSSL_CMP_CERTSTATUS_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk),ossl_check_OSSL_CMP_CERTST
ATUS_freefunc_type(freefunc))
#define sk_OSSL_CMP_CERTSTATUS_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CERTSTATUS_type(ptr), (idx))
#define sk_OSSL_CMP_CERTSTATUS_set(sk, idx, ptr) ((OSSL_CMP_CERTSTATUS
*)OPENSSL_sk_set(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk), (idx),
ossl_check_OSSL_CMP_CERTSTATUS_type(ptr)))
#define sk_OSSL_CMP_CERTSTATUS_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CERTSTATUS_type(ptr))
#define
 sk_OSSL_CMP_CERTSTATUS_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CERTSTATUS_type(ptr))
#define sk_OSSL_CMP_CERTSTATUS_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CERTSTATUS_type(ptr), pnum)
#define sk_OSSL_CMP_CERTSTATUS_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CERTSTATUS_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CMP_CERTSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CERTSTATUS_dup(sk) ((STACK_OF(OSSL_CMP_CERTSTATUS)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CMP_CERTSTATUS_sk_type(sk)))
#define sk_OSSL_CMP_CERTSTATUS_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_CMP_CERTSTATUS)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CMP_CERTSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CERTSTATUS_copyfunc_type(copyfunc),
ossl_check_OSSL_CMP_CERTSTATUS_freefunc_type(freefunc)))
#define sk_OSSL_CMP_CERTSTATUS_set_cmp_func(sk,
 cmp)
((sk_OSSL_CMP_CERTSTATUS_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_CMP_CERTSTAT
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US_sk_type(sk), ossl_check_OSSL_CMP_CERTSTATUS_compfunc_type(cmp)))

/* clang-format on */
typedef struct ossl_cmp_itav_st OSSL_CMP_ITAV;
DECLARE_ASN1_DUP_FUNCTION(OSSL_CMP_ITAV)
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CMP_ITAV, OSSL_CMP_ITAV, OSSL_CMP_ITAV)
#define sk_OSSL_CMP_ITAV_num(sk) OPENSSL_sk_num(ossl_check_const_OSSL_CMP_ITAV_sk_type(sk))
#define sk_OSSL_CMP_ITAV_value(sk, idx) ((OSSL_CMP_ITAV
*)OPENSSL_sk_value(ossl_check_const_OSSL_CMP_ITAV_sk_type(sk), (idx)))
#define sk_OSSL_CMP_ITAV_new(cmp) ((STACK_OF(OSSL_CMP_ITAV)
*)OPENSSL_sk_new(ossl_check_OSSL_CMP_ITAV_compfunc_type(cmp)))
#define sk_OSSL_CMP_ITAV_new_null() ((STACK_OF(OSSL_CMP_ITAV) *)OPENSSL_sk_new_null())
#define sk_OSSL_CMP_ITAV_new_reserve(cmp, n) ((STACK_OF(OSSL_CMP_ITAV)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CMP_ITAV_compfunc_type(cmp), (n)))
#define sk_OSSL_CMP_ITAV_reserve(sk,
 n) OPENSSL_sk_reserve(ossl_check_OSSL_CMP_ITAV_sk_type(sk), (n))
#define sk_OSSL_CMP_ITAV_free(sk) OPENSSL_sk_free(ossl_check_OSSL_CMP_ITAV_sk_type(sk))
#define sk_OSSL_CMP_ITAV_zero(sk) OPENSSL_sk_zero(ossl_check_OSSL_CMP_ITAV_sk_type(sk))
#define sk_OSSL_CMP_ITAV_delete(sk, i) ((OSSL_CMP_ITAV
*)OPENSSL_sk_delete(ossl_check_OSSL_CMP_ITAV_sk_type(sk), (i)))
#define sk_OSSL_CMP_ITAV_delete_ptr(sk, ptr) ((OSSL_CMP_ITAV
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CMP_ITAV_sk_type(sk),
ossl_check_OSSL_CMP_ITAV_type(ptr)))
#define sk_OSSL_CMP_ITAV_push(sk, ptr) OPENSSL_sk_push(ossl_check_OSSL_CMP_ITAV_sk_type(sk),
ossl_check_OSSL_CMP_ITAV_type(ptr))
#define sk_OSSL_CMP_ITAV_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CMP_ITAV_sk_type(sk), ossl_check_OSSL_CMP_ITAV_type(ptr))
#define sk_OSSL_CMP_ITAV_pop(sk) ((OSSL_CMP_ITAV
*)OPENSSL_sk_pop(ossl_check_OSSL_CMP_ITAV_sk_type(sk)))
#define sk_OSSL_CMP_ITAV_shift(sk) ((OSSL_CMP_ITAV
*)OPENSSL_sk_shift(ossl_check_OSSL_CMP_ITAV_sk_type(sk)))
#define
 sk_OSSL_CMP_ITAV_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CMP_ITAV_sk_type(sk),ossl_check_OSSL_CMP_ITAV_freefunc_ty
pe(freefunc))
#define sk_OSSL_CMP_ITAV_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_CMP_ITAV_sk_type(sk), ossl_check_OSSL_CMP_ITAV_type(ptr),
(idx))
#define sk_OSSL_CMP_ITAV_set(sk, idx, ptr) ((OSSL_CMP_ITAV
*)OPENSSL_sk_set(ossl_check_OSSL_CMP_ITAV_sk_type(sk), (idx),
ossl_check_OSSL_CMP_ITAV_type(ptr)))
#define sk_OSSL_CMP_ITAV_find(sk, ptr) OPENSSL_sk_find(ossl_check_OSSL_CMP_ITAV_sk_type(sk),
ossl_check_OSSL_CMP_ITAV_type(ptr))
#define sk_OSSL_CMP_ITAV_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_CMP_ITAV_sk_type(sk), ossl_check_OSSL_CMP_ITAV_type(ptr))
#define sk_OSSL_CMP_ITAV_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CMP_ITAV_sk_type(sk), ossl_check_OSSL_CMP_ITAV_type(ptr),
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pnum)
#define sk_OSSL_CMP_ITAV_sort(sk) OPENSSL_sk_sort(ossl_check_OSSL_CMP_ITAV_sk_type(sk))
#define sk_OSSL_CMP_ITAV_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CMP_ITAV_sk_type(sk))
#define
 sk_OSSL_CMP_ITAV_dup(sk) ((STACK_OF(OSSL_CMP_ITAV)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CMP_ITAV_sk_type(sk)))
#define sk_OSSL_CMP_ITAV_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OSSL_CMP_ITAV)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CMP_ITAV_sk_type(sk),
ossl_check_OSSL_CMP_ITAV_copyfunc_type(copyfunc),
ossl_check_OSSL_CMP_ITAV_freefunc_type(freefunc)))
#define sk_OSSL_CMP_ITAV_set_cmp_func(sk, cmp)
((sk_OSSL_CMP_ITAV_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_CMP_ITAV_sk_type(sk),
ossl_check_OSSL_CMP_ITAV_compfunc_type(cmp)))

/* clang-format on */

typedef struct ossl_cmp_crlstatus_st OSSL_CMP_CRLSTATUS;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CMP_CRLSTATUS, OSSL_CMP_CRLSTATUS,
OSSL_CMP_CRLSTATUS)
#define sk_OSSL_CMP_CRLSTATUS_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_CMP_CRLSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CRLSTATUS_value(sk, idx) ((OSSL_CMP_CRLSTATUS
*)OPENSSL_sk_value(ossl_check_const_OSSL_CMP_CRLSTATUS_sk_type(sk),
 (idx)))
#define sk_OSSL_CMP_CRLSTATUS_new(cmp) ((STACK_OF(OSSL_CMP_CRLSTATUS)
*)OPENSSL_sk_new(ossl_check_OSSL_CMP_CRLSTATUS_compfunc_type(cmp)))
#define sk_OSSL_CMP_CRLSTATUS_new_null() ((STACK_OF(OSSL_CMP_CRLSTATUS)
*)OPENSSL_sk_new_null())
#define sk_OSSL_CMP_CRLSTATUS_new_reserve(cmp, n) ((STACK_OF(OSSL_CMP_CRLSTATUS)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CMP_CRLSTATUS_compfunc_type(cmp), (n)))
#define sk_OSSL_CMP_CRLSTATUS_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk), (n))
#define sk_OSSL_CMP_CRLSTATUS_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CRLSTATUS_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CRLSTATUS_delete(sk, i) ((OSSL_CMP_CRLSTATUS
*)OPENSSL_sk_delete(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk), (i)))
#define sk_OSSL_CMP_CRLSTATUS_delete_ptr(sk, ptr) ((OSSL_CMP_CRLSTATUS
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk),
 ossl_check_OSSL_CMP_CRLSTATUS_type(ptr)))
#define sk_OSSL_CMP_CRLSTATUS_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CRLSTATUS_type(ptr))
#define sk_OSSL_CMP_CRLSTATUS_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk),
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ossl_check_OSSL_CMP_CRLSTATUS_type(ptr))
#define sk_OSSL_CMP_CRLSTATUS_pop(sk) ((OSSL_CMP_CRLSTATUS
*)OPENSSL_sk_pop(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk)))
#define sk_OSSL_CMP_CRLSTATUS_shift(sk) ((OSSL_CMP_CRLSTATUS
*)OPENSSL_sk_shift(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk)))
#define sk_OSSL_CMP_CRLSTATUS_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk),ossl_check_OSSL_CMP_CRLSTAT
US_freefunc_type(freefunc))
#define sk_OSSL_CMP_CRLSTATUS_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CRLSTATUS_type(ptr), (idx))
#define sk_OSSL_CMP_CRLSTATUS_set(sk, idx, ptr) ((OSSL_CMP_CRLSTATUS
 *)OPENSSL_sk_set(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk), (idx),
ossl_check_OSSL_CMP_CRLSTATUS_type(ptr)))
#define sk_OSSL_CMP_CRLSTATUS_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CRLSTATUS_type(ptr))
#define sk_OSSL_CMP_CRLSTATUS_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CRLSTATUS_type(ptr))
#define sk_OSSL_CMP_CRLSTATUS_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CRLSTATUS_type(ptr), pnum)
#define sk_OSSL_CMP_CRLSTATUS_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CRLSTATUS_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CMP_CRLSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CRLSTATUS_dup(sk) ((STACK_OF(OSSL_CMP_CRLSTATUS)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CMP_CRLSTATUS_sk_type(sk)))
#define sk_OSSL_CMP_CRLSTATUS_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_CMP_CRLSTATUS)
 *)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CMP_CRLSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CRLSTATUS_copyfunc_type(copyfunc),
ossl_check_OSSL_CMP_CRLSTATUS_freefunc_type(freefunc)))
#define sk_OSSL_CMP_CRLSTATUS_set_cmp_func(sk, cmp)
((sk_OSSL_CMP_CRLSTATUS_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_CMP_CRLSTATUS
_sk_type(sk), ossl_check_OSSL_CMP_CRLSTATUS_compfunc_type(cmp)))

/* clang-format on */

typedef OSSL_CRMF_ATTRIBUTETYPEANDVALUE OSSL_CMP_ATAV;
#define OSSL_CMP_ATAV_free OSSL_CRMF_ATTRIBUTETYPEANDVALUE_free
typedef STACK_OF(OSSL_CRMF_ATTRIBUTETYPEANDVALUE) OSSL_CMP_ATAVS;
DECLARE_ASN1_FUNCTIONS(OSSL_CMP_ATAVS)
#define stack_st_OSSL_CMP_ATAV stack_st_OSSL_CRMF_ATTRIBUTETYPEANDVALUE
#define sk_OSSL_CMP_ATAV_num sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_num
#define sk_OSSL_CMP_ATAV_value sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_value
#define sk_OSSL_CMP_ATAV_push sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_push
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#define sk_OSSL_CMP_ATAV_pop_free sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_pop_free

typedef
 struct ossl_cmp_revrepcontent_st OSSL_CMP_REVREPCONTENT;
typedef struct ossl_cmp_pkisi_st OSSL_CMP_PKISI;
DECLARE_ASN1_FUNCTIONS(OSSL_CMP_PKISI)
DECLARE_ASN1_DUP_FUNCTION(OSSL_CMP_PKISI)
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CMP_PKISI, OSSL_CMP_PKISI, OSSL_CMP_PKISI)
#define sk_OSSL_CMP_PKISI_num(sk) OPENSSL_sk_num(ossl_check_const_OSSL_CMP_PKISI_sk_type(sk))
#define sk_OSSL_CMP_PKISI_value(sk, idx) ((OSSL_CMP_PKISI
*)OPENSSL_sk_value(ossl_check_const_OSSL_CMP_PKISI_sk_type(sk), (idx)))
#define sk_OSSL_CMP_PKISI_new(cmp) ((STACK_OF(OSSL_CMP_PKISI)
*)OPENSSL_sk_new(ossl_check_OSSL_CMP_PKISI_compfunc_type(cmp)))
#define sk_OSSL_CMP_PKISI_new_null() ((STACK_OF(OSSL_CMP_PKISI) *)OPENSSL_sk_new_null())
#define sk_OSSL_CMP_PKISI_new_reserve(cmp, n) ((STACK_OF(OSSL_CMP_PKISI)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CMP_PKISI_compfunc_type(cmp), (n)))
#define sk_OSSL_CMP_PKISI_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_OSSL_CMP_PKISI_sk_type(sk),
 (n))
#define sk_OSSL_CMP_PKISI_free(sk) OPENSSL_sk_free(ossl_check_OSSL_CMP_PKISI_sk_type(sk))
#define sk_OSSL_CMP_PKISI_zero(sk) OPENSSL_sk_zero(ossl_check_OSSL_CMP_PKISI_sk_type(sk))
#define sk_OSSL_CMP_PKISI_delete(sk, i) ((OSSL_CMP_PKISI
*)OPENSSL_sk_delete(ossl_check_OSSL_CMP_PKISI_sk_type(sk), (i)))
#define sk_OSSL_CMP_PKISI_delete_ptr(sk, ptr) ((OSSL_CMP_PKISI
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CMP_PKISI_sk_type(sk),
ossl_check_OSSL_CMP_PKISI_type(ptr)))
#define sk_OSSL_CMP_PKISI_push(sk, ptr) OPENSSL_sk_push(ossl_check_OSSL_CMP_PKISI_sk_type(sk),
ossl_check_OSSL_CMP_PKISI_type(ptr))
#define sk_OSSL_CMP_PKISI_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CMP_PKISI_sk_type(sk), ossl_check_OSSL_CMP_PKISI_type(ptr))
#define sk_OSSL_CMP_PKISI_pop(sk) ((OSSL_CMP_PKISI
*)OPENSSL_sk_pop(ossl_check_OSSL_CMP_PKISI_sk_type(sk)))
#define sk_OSSL_CMP_PKISI_shift(sk) ((OSSL_CMP_PKISI
*)OPENSSL_sk_shift(ossl_check_OSSL_CMP_PKISI_sk_type(sk)))
#define sk_OSSL_CMP_PKISI_pop_free(sk,
 freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CMP_PKISI_sk_type(sk),ossl_check_OSSL_CMP_PKISI_freefunc_ty
pe(freefunc))
#define sk_OSSL_CMP_PKISI_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_CMP_PKISI_sk_type(sk), ossl_check_OSSL_CMP_PKISI_type(ptr),
(idx))
#define sk_OSSL_CMP_PKISI_set(sk, idx, ptr) ((OSSL_CMP_PKISI
*)OPENSSL_sk_set(ossl_check_OSSL_CMP_PKISI_sk_type(sk), (idx),
ossl_check_OSSL_CMP_PKISI_type(ptr)))
#define sk_OSSL_CMP_PKISI_find(sk, ptr) OPENSSL_sk_find(ossl_check_OSSL_CMP_PKISI_sk_type(sk),
ossl_check_OSSL_CMP_PKISI_type(ptr))
#define sk_OSSL_CMP_PKISI_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_CMP_PKISI_sk_type(sk), ossl_check_OSSL_CMP_PKISI_type(ptr))
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#define sk_OSSL_CMP_PKISI_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CMP_PKISI_sk_type(sk), ossl_check_OSSL_CMP_PKISI_type(ptr),
pnum)
#define sk_OSSL_CMP_PKISI_sort(sk) OPENSSL_sk_sort(ossl_check_OSSL_CMP_PKISI_sk_type(sk))
#define sk_OSSL_CMP_PKISI_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CMP_PKISI_sk_type(sk))
#define
 sk_OSSL_CMP_PKISI_dup(sk) ((STACK_OF(OSSL_CMP_PKISI)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CMP_PKISI_sk_type(sk)))
#define sk_OSSL_CMP_PKISI_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OSSL_CMP_PKISI)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CMP_PKISI_sk_type(sk),
ossl_check_OSSL_CMP_PKISI_copyfunc_type(copyfunc),
ossl_check_OSSL_CMP_PKISI_freefunc_type(freefunc)))
#define sk_OSSL_CMP_PKISI_set_cmp_func(sk, cmp)
((sk_OSSL_CMP_PKISI_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_CMP_PKISI_sk_type(sk),
ossl_check_OSSL_CMP_PKISI_compfunc_type(cmp)))

/* clang-format on */
typedef struct ossl_cmp_certrepmessage_st OSSL_CMP_CERTREPMESSAGE;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CMP_CERTREPMESSAGE,
OSSL_CMP_CERTREPMESSAGE, OSSL_CMP_CERTREPMESSAGE)
#define sk_OSSL_CMP_CERTREPMESSAGE_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_CMP_CERTREPMESSAGE_sk_type(sk))
#define sk_OSSL_CMP_CERTREPMESSAGE_value(sk, idx) ((OSSL_CMP_CERTREPMESSAGE
 *)OPENSSL_sk_value(ossl_check_const_OSSL_CMP_CERTREPMESSAGE_sk_type(sk), (idx)))
#define sk_OSSL_CMP_CERTREPMESSAGE_new(cmp) ((STACK_OF(OSSL_CMP_CERTREPMESSAGE)
*)OPENSSL_sk_new(ossl_check_OSSL_CMP_CERTREPMESSAGE_compfunc_type(cmp)))
#define sk_OSSL_CMP_CERTREPMESSAGE_new_null() ((STACK_OF(OSSL_CMP_CERTREPMESSAGE)
*)OPENSSL_sk_new_null())
#define sk_OSSL_CMP_CERTREPMESSAGE_new_reserve(cmp, n)
((STACK_OF(OSSL_CMP_CERTREPMESSAGE)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CMP_CERTREPMESSAGE_compfunc_type(cmp), (n)))
#define sk_OSSL_CMP_CERTREPMESSAGE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk), (n))
#define sk_OSSL_CMP_CERTREPMESSAGE_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk))
#define sk_OSSL_CMP_CERTREPMESSAGE_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk))
#define sk_OSSL_CMP_CERTREPMESSAGE_delete(sk, i) ((OSSL_CMP_CERTREPMESSAGE
*)OPENSSL_sk_delete(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
 (i)))
#define sk_OSSL_CMP_CERTREPMESSAGE_delete_ptr(sk, ptr) ((OSSL_CMP_CERTREPMESSAGE
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
ossl_check_OSSL_CMP_CERTREPMESSAGE_type(ptr)))
#define sk_OSSL_CMP_CERTREPMESSAGE_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
ossl_check_OSSL_CMP_CERTREPMESSAGE_type(ptr))
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#define sk_OSSL_CMP_CERTREPMESSAGE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
ossl_check_OSSL_CMP_CERTREPMESSAGE_type(ptr))
#define sk_OSSL_CMP_CERTREPMESSAGE_pop(sk) ((OSSL_CMP_CERTREPMESSAGE
*)OPENSSL_sk_pop(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk)))
#define sk_OSSL_CMP_CERTREPMESSAGE_shift(sk) ((OSSL_CMP_CERTREPMESSAGE
*)OPENSSL_sk_shift(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk)))
#define sk_OSSL_CMP_CERTREPMESSAGE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),ossl_check_OSSL_CMP_CE
RTREPMESSAGE_freefunc_type(freefunc))
#define
 sk_OSSL_CMP_CERTREPMESSAGE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
ossl_check_OSSL_CMP_CERTREPMESSAGE_type(ptr), (idx))
#define sk_OSSL_CMP_CERTREPMESSAGE_set(sk, idx, ptr) ((OSSL_CMP_CERTREPMESSAGE
*)OPENSSL_sk_set(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk), (idx),
ossl_check_OSSL_CMP_CERTREPMESSAGE_type(ptr)))
#define sk_OSSL_CMP_CERTREPMESSAGE_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
ossl_check_OSSL_CMP_CERTREPMESSAGE_type(ptr))
#define sk_OSSL_CMP_CERTREPMESSAGE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
ossl_check_OSSL_CMP_CERTREPMESSAGE_type(ptr))
#define sk_OSSL_CMP_CERTREPMESSAGE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
ossl_check_OSSL_CMP_CERTREPMESSAGE_type(ptr), pnum)
#define sk_OSSL_CMP_CERTREPMESSAGE_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk))
#define
 sk_OSSL_CMP_CERTREPMESSAGE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CMP_CERTREPMESSAGE_sk_type(sk))
#define sk_OSSL_CMP_CERTREPMESSAGE_dup(sk) ((STACK_OF(OSSL_CMP_CERTREPMESSAGE)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CMP_CERTREPMESSAGE_sk_type(sk)))
#define sk_OSSL_CMP_CERTREPMESSAGE_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_CMP_CERTREPMESSAGE)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
ossl_check_OSSL_CMP_CERTREPMESSAGE_copyfunc_type(copyfunc),
ossl_check_OSSL_CMP_CERTREPMESSAGE_freefunc_type(freefunc)))
#define sk_OSSL_CMP_CERTREPMESSAGE_set_cmp_func(sk, cmp)
((sk_OSSL_CMP_CERTREPMESSAGE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_CMP_CERT
REPMESSAGE_sk_type(sk), ossl_check_OSSL_CMP_CERTREPMESSAGE_compfunc_type(cmp)))

/* clang-format on */
typedef struct ossl_cmp_pollrep_st OSSL_CMP_POLLREP;
typedef STACK_OF(OSSL_CMP_POLLREP) OSSL_CMP_POLLREPCONTENT;
typedef struct ossl_cmp_certresponse_st OSSL_CMP_CERTRESPONSE;
/* clang-format
```

```
 off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CMP_CERTRESPONSE, OSSL_CMP_CERTRESPONSE,
OSSL_CMP_CERTRESPONSE)
#define sk_OSSL_CMP_CERTRESPONSE_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_CMP_CERTRESPONSE_sk_type(sk))
#define sk_OSSL_CMP_CERTRESPONSE_value(sk, idx) ((OSSL_CMP_CERTRESPONSE
*)OPENSSL_sk_value(ossl_check_const_OSSL_CMP_CERTRESPONSE_sk_type(sk), (idx)))
#define sk_OSSL_CMP_CERTRESPONSE_new(cmp) ((STACK_OF(OSSL_CMP_CERTRESPONSE)
*)OPENSSL_sk_new(ossl_check_OSSL_CMP_CERTRESPONSE_compfunc_type(cmp)))
#define sk_OSSL_CMP_CERTRESPONSE_new_null() ((STACK_OF(OSSL_CMP_CERTRESPONSE)
*)OPENSSL_sk_new_null())
#define sk_OSSL_CMP_CERTRESPONSE_new_reserve(cmp, n) ((STACK_OF(OSSL_CMP_CERTRESPONSE)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CMP_CERTRESPONSE_compfunc_type(cmp), (n)))
#define sk_OSSL_CMP_CERTRESPONSE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk), (n))
#define sk_OSSL_CMP_CERTRESPONSE_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk))
#define
 sk_OSSL_CMP_CERTRESPONSE_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk))
#define sk_OSSL_CMP_CERTRESPONSE_delete(sk, i) ((OSSL_CMP_CERTRESPONSE
*)OPENSSL_sk_delete(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk), (i)))
#define sk_OSSL_CMP_CERTRESPONSE_delete_ptr(sk, ptr) ((OSSL_CMP_CERTRESPONSE
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk),
ossl_check_OSSL_CMP_CERTRESPONSE_type(ptr)))
#define sk_OSSL_CMP_CERTRESPONSE_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk),
ossl_check_OSSL_CMP_CERTRESPONSE_type(ptr))
#define sk_OSSL_CMP_CERTRESPONSE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk),
ossl_check_OSSL_CMP_CERTRESPONSE_type(ptr))
#define sk_OSSL_CMP_CERTRESPONSE_pop(sk) ((OSSL_CMP_CERTRESPONSE
*)OPENSSL_sk_pop(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk)))
#define sk_OSSL_CMP_CERTRESPONSE_shift(sk) ((OSSL_CMP_CERTRESPONSE
*)OPENSSL_sk_shift(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk)))
#define
 sk_OSSL_CMP_CERTRESPONSE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk),ossl_check_OSSL_CMP_CERT
RESPONSE_freefunc_type(freefunc))
#define sk_OSSL_CMP_CERTRESPONSE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk),
ossl_check_OSSL_CMP_CERTRESPONSE_type(ptr), (idx))
#define sk_OSSL_CMP_CERTRESPONSE_set(sk, idx, ptr) ((OSSL_CMP_CERTRESPONSE
*)OPENSSL_sk_set(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk), (idx),
ossl_check_OSSL_CMP_CERTRESPONSE_type(ptr)))
#define sk_OSSL_CMP_CERTRESPONSE_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk),
ossl_check_OSSL_CMP_CERTRESPONSE_type(ptr))
```

```
#define sk_OSSL_CMP_CERTRESPONSE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk),
ossl_check_OSSL_CMP_CERTRESPONSE_type(ptr))
#define sk_OSSL_CMP_CERTRESPONSE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk),
 ossl_check_OSSL_CMP_CERTRESPONSE_type(ptr), pnum)
#define sk_OSSL_CMP_CERTRESPONSE_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk))
#define sk_OSSL_CMP_CERTRESPONSE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CMP_CERTRESPONSE_sk_type(sk))
#define sk_OSSL_CMP_CERTRESPONSE_dup(sk) ((STACK_OF(OSSL_CMP_CERTRESPONSE)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CMP_CERTRESPONSE_sk_type(sk)))
#define sk_OSSL_CMP_CERTRESPONSE_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_CMP_CERTRESPONSE)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CMP_CERTRESPONSE_sk_type(sk),
ossl_check_OSSL_CMP_CERTRESPONSE_copyfunc_type(copyfunc),
ossl_check_OSSL_CMP_CERTRESPONSE_freefunc_type(freefunc)))
#define sk_OSSL_CMP_CERTRESPONSE_set_cmp_func(sk, cmp)
((sk_OSSL_CMP_CERTRESPONSE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_CMP_CERTRE
SPONSE_sk_type(sk), ossl_check_OSSL_CMP_CERTRESPONSE_compfunc_type(cmp)))

/* clang-format on */
typedef STACK_OF(ASN1_UTF8STRING) OSSL_CMP_PKIFREETEXT;

/*
 * function DECLARATIONS
*/

/* from cmp_asn.c */
OSSL_CMP_ITAV *OSSL_CMP_ITAV_create(ASN1_OBJECT *type, ASN1_TYPE *value);
void OSSL_CMP_ITAV_set0(OSSL_CMP_ITAV *itav, ASN1_OBJECT *type,
   ASN1_TYPE *value);
ASN1_OBJECT *OSSL_CMP_ITAV_get0_type(const OSSL_CMP_ITAV *itav);
ASN1_TYPE *OSSL_CMP_ITAV_get0_value(const OSSL_CMP_ITAV *itav);
int OSSL_CMP_ITAV_push0_stack_item(STACK_OF(OSSL_CMP_ITAV) **sk_p,
   OSSL_CMP_ITAV *itav);
void OSSL_CMP_ITAV_free(OSSL_CMP_ITAV *itav);

OSSL_CMP_ITAV *OSSL_CMP_ITAV_new0_certProfile(STACK_OF(ASN1_UTF8STRING)
       *certProfile);
int OSSL_CMP_ITAV_get0_certProfile(const OSSL_CMP_ITAV *itav,
   STACK_OF(ASN1_UTF8STRING) **out);
OSSL_CMP_ITAV *OSSL_CMP_ITAV_new_caCerts(const STACK_OF(X509) *caCerts);
int OSSL_CMP_ITAV_get0_caCerts(const OSSL_CMP_ITAV *itav, STACK_OF(X509) **out);

OSSL_CMP_ITAV *OSSL_CMP_ITAV_new_rootCaCert(const X509 *rootCaCert);
int OSSL_CMP_ITAV_get0_rootCaCert(const OSSL_CMP_ITAV *itav, X509 **out);
OSSL_CMP_ITAV
```

```
 *OSSL_CMP_ITAV_new_rootCaKeyUpdate(const X509 *newWithNew,
   const X509 *newWithOld,
   const X509 *oldWithNew);
int OSSL_CMP_ITAV_get0_rootCaKeyUpdate(const OSSL_CMP_ITAV *itav,
   X509 **newWithNew,
   X509 **newWithOld,
   X509 **oldWithNew);

OSSL_CMP_CRLSTATUS *OSSL_CMP_CRLSTATUS_create(const X509_CRL *crl,
   const X509 *cert, int only_DN);
OSSL_CMP_CRLSTATUS *OSSL_CMP_CRLSTATUS_new1(const DIST_POINT_NAME *dpn,
   const GENERAL_NAMES *issuer,
   const ASN1_TIME *thisUpdate);
int OSSL_CMP_CRLSTATUS_get0(const OSSL_CMP_CRLSTATUS *crlstatus,
   DIST_POINT_NAME **dpn, GENERAL_NAMES **issuer,
   ASN1_TIME **thisUpdate);
void OSSL_CMP_CRLSTATUS_free(OSSL_CMP_CRLSTATUS *crlstatus);
OSSL_CMP_ITAV
*OSSL_CMP_ITAV_new0_crlStatusList(STACK_OF(OSSL_CMP_CRLSTATUS) *crlStatusList);
int OSSL_CMP_ITAV_get0_crlStatusList(const OSSL_CMP_ITAV *itav,
   STACK_OF(OSSL_CMP_CRLSTATUS) **out);
OSSL_CMP_ITAV *OSSL_CMP_ITAV_new_crls(const X509_CRL *crls);
int OSSL_CMP_ITAV_get0_crls(const OSSL_CMP_ITAV
 *it, STACK_OF(X509_CRL) **out);
OSSL_CMP_ITAV
*OSSL_CMP_ITAV_new0_certReqTemplate(OSSL_CRMF_CERTTEMPLATE *certTemplate,
   OSSL_CMP_ATAVS *keySpec);
int OSSL_CMP_ITAV_get1_certReqTemplate(const OSSL_CMP_ITAV *itav,
   OSSL_CRMF_CERTTEMPLATE **certTemplate,
   OSSL_CMP_ATAVS **keySpec);

OSSL_CMP_ATAV *OSSL_CMP_ATAV_create(ASN1_OBJECT *type, ASN1_TYPE *value);
void OSSL_CMP_ATAV_set0(OSSL_CMP_ATAV *itav, ASN1_OBJECT *type,
   ASN1_TYPE *value);
ASN1_OBJECT *OSSL_CMP_ATAV_get0_type(const OSSL_CMP_ATAV *itav);
ASN1_TYPE *OSSL_CMP_ATAV_get0_value(const OSSL_CMP_ATAV *itav);
OSSL_CMP_ATAV *OSSL_CMP_ATAV_new_algId(const X509_ALGOR *alg);
X509_ALGOR *OSSL_CMP_ATAV_get0_algId(const OSSL_CMP_ATAV *atav);
OSSL_CMP_ATAV *OSSL_CMP_ATAV_new_rsaKeyLen(int len);
int OSSL_CMP_ATAV_get_rsaKeyLen(const OSSL_CMP_ATAV *atav);
int OSSL_CMP_ATAV_push1(OSSL_CMP_ATAVS **sk_p, const OSSL_CMP_ATAV *atav);

void OSSL_CMP_MSG_free(OSSL_CMP_MSG *msg);

/* from cmp_ctx.c */
OSSL_CMP_CTX *OSSL_CMP_CTX_new(OSSL_LIB_CTX
 *libctx, const char *propq);
void OSSL_CMP_CTX_free(OSSL_CMP_CTX *ctx);
```

```
int OSSL_CMP_CTX_reinit(OSSL_CMP_CTX *ctx);
OSSL_LIB_CTX *OSSL_CMP_CTX_get0_libctx(const OSSL_CMP_CTX *ctx);
const char *OSSL_CMP_CTX_get0_propq(const OSSL_CMP_CTX *ctx);
/* CMP general options: */
#define OSSL_CMP_OPT_LOG_VERBOSITY 0
/* CMP transfer options: */
#define OSSL_CMP_OPT_KEEP_ALIVE 10
#define OSSL_CMP_OPT_MSG_TIMEOUT 11
#define OSSL_CMP_OPT_TOTAL_TIMEOUT 12
#define OSSL_CMP_OPT_USE_TLS 13
/* CMP request options: */
#define OSSL_CMP_OPT_VALIDITY_DAYS 20
#define OSSL_CMP_OPT_SUBJECTALTNAME_NODEFAULT 21
#define OSSL_CMP_OPT_SUBJECTALTNAME_CRITICAL 22
#define OSSL_CMP_OPT_POLICIES_CRITICAL 23
#define OSSL_CMP_OPT_POPO_METHOD 24
#define OSSL_CMP_OPT_IMPLICIT_CONFIRM 25
#define OSSL_CMP_OPT_DISABLE_CONFIRM 26
#define OSSL_CMP_OPT_REVOCATION_REASON 27
/* CMP protection options: */
#define OSSL_CMP_OPT_UNPROTECTED_SEND 30
#define OSSL_CMP_OPT_UNPROTECTED_ERRORS 31
#define OSSL_CMP_OPT_OWF_ALGNID
 32
#define OSSL_CMP_OPT_MAC_ALGNID 33
#define OSSL_CMP_OPT_DIGEST_ALGNID 34
#define OSSL_CMP_OPT_IGNORE_KEYUSAGE 35
#define OSSL_CMP_OPT_PERMIT_TA_IN_EXTRACERTS_FOR_IR 36
#define OSSL_CMP_OPT_NO_CACHE_EXTRACERTS 37
int OSSL_CMP_CTX_set_option(OSSL_CMP_CTX *ctx, int opt, int val);
int OSSL_CMP_CTX_get_option(const OSSL_CMP_CTX *ctx, int opt);
/* CMP-specific callback for logging and outputting the error queue: */
int OSSL_CMP_CTX_set_log_cb(OSSL_CMP_CTX *ctx, OSSL_CMP_log_cb_t cb);
#define OSSL_CMP_CTX_set_log_verbosity(ctx, level) \
   OSSL_CMP_CTX_set_option(ctx, OSSL_CMP_OPT_LOG_VERBOSITY, level)
void OSSL_CMP_CTX_print_errors(const OSSL_CMP_CTX *ctx);
/* message transfer: */
int OSSL_CMP_CTX_set1_serverPath(OSSL_CMP_CTX *ctx, const char *path);
int OSSL_CMP_CTX_set1_server(OSSL_CMP_CTX *ctx, const char *address);
int OSSL_CMP_CTX_set_serverPort(OSSL_CMP_CTX *ctx, int port);
int OSSL_CMP_CTX_set1_proxy(OSSL_CMP_CTX *ctx, const char *name);
int OSSL_CMP_CTX_set1_no_proxy(OSSL_CMP_CTX
 *ctx, const char *names);
#ifndef OPENSSL_NO_HTTP
int OSSL_CMP_CTX_set_http_cb(OSSL_CMP_CTX *ctx, OSSL_HTTP_bio_cb_t cb);
int OSSL_CMP_CTX_set_http_cb_arg(OSSL_CMP_CTX *ctx, void *arg);
void *OSSL_CMP_CTX_get_http_cb_arg(const OSSL_CMP_CTX *ctx);
#endif
```

```
typedef OSSL_CMP_MSG *(*OSSL_CMP_transfer_cb_t)(OSSL_CMP_CTX *ctx,
   const OSSL_CMP_MSG *req);
int OSSL_CMP_CTX_set_transfer_cb(OSSL_CMP_CTX *ctx, OSSL_CMP_transfer_cb_t cb);
int OSSL_CMP_CTX_set_transfer_cb_arg(OSSL_CMP_CTX *ctx, void *arg);
void *OSSL_CMP_CTX_get_transfer_cb_arg(const OSSL_CMP_CTX *ctx);
/* server authentication: */
int OSSL_CMP_CTX_set1_srvCert(OSSL_CMP_CTX *ctx, X509 *cert);
int OSSL_CMP_CTX_set1_expected_sender(OSSL_CMP_CTX *ctx, const X509_NAME *name);
int OSSL_CMP_CTX_set0_trustedStore(OSSL_CMP_CTX *ctx, X509_STORE *store);
#define OSSL_CMP_CTX_set0_trusted OSSL_CMP_CTX_set0_trustedStore
X509_STORE *OSSL_CMP_CTX_get0_trustedStore(const OSSL_CMP_CTX *ctx);
#define OSSL_CMP_CTX_get0_trusted OSSL_CMP_CTX_get0_trustedStore
int
 OSSL_CMP_CTX_set1_untrusted(OSSL_CMP_CTX *ctx, STACK_OF(X509) *certs);
STACK_OF(X509) *OSSL_CMP_CTX_get0_untrusted(const OSSL_CMP_CTX *ctx);
/* client authentication: */
int OSSL_CMP_CTX_set1_cert(OSSL_CMP_CTX *ctx, X509 *cert);
int OSSL_CMP_CTX_build_cert_chain(OSSL_CMP_CTX *ctx, X509_STORE *own_trusted,
   STACK_OF(X509) *candidates);
int OSSL_CMP_CTX_set1_pkey(OSSL_CMP_CTX *ctx, EVP_PKEY *pkey);
int OSSL_CMP_CTX_set1_referenceValue(OSSL_CMP_CTX *ctx,
   const unsigned char *ref, int len);
int OSSL_CMP_CTX_set1_secretValue(OSSL_CMP_CTX *ctx,
   const unsigned char *sec, int len);
/* CMP message header and extra certificates: */
int OSSL_CMP_CTX_set1_recipient(OSSL_CMP_CTX *ctx, const X509_NAME *name);
int OSSL_CMP_CTX_push0_geninfo_ITAV(OSSL_CMP_CTX *ctx, OSSL_CMP_ITAV *itav);
int OSSL_CMP_CTX_reset_geninfo_ITAVs(OSSL_CMP_CTX *ctx);
STACK_OF(OSSL_CMP_ITAV)
*OSSL_CMP_CTX_get0_geninfo_ITAVs(const OSSL_CMP_CTX *ctx);
int OSSL_CMP_CTX_set1_extraCertsOut(OSSL_CMP_CTX *ctx,
    STACK_OF(X509) *extraCertsOut);
/* certificate template: */
int OSSL_CMP_CTX_set0_newPkey(OSSL_CMP_CTX *ctx, int priv, EVP_PKEY *pkey);
EVP_PKEY *OSSL_CMP_CTX_get0_newPkey(const OSSL_CMP_CTX *ctx, int priv);
int OSSL_CMP_CTX_set1_issuer(OSSL_CMP_CTX *ctx, const X509_NAME *name);
int OSSL_CMP_CTX_set1_serialNumber(OSSL_CMP_CTX *ctx, const ASN1_INTEGER *sn);
int OSSL_CMP_CTX_set1_subjectName(OSSL_CMP_CTX *ctx, const X509_NAME *name);
int OSSL_CMP_CTX_push1_subjectAltName(OSSL_CMP_CTX *ctx,
   const GENERAL_NAME *name);
int OSSL_CMP_CTX_set0_reqExtensions(OSSL_CMP_CTX *ctx, X509_EXTENSIONS *exts);
int OSSL_CMP_CTX_reqExtensions_have_SAN(OSSL_CMP_CTX *ctx);
int OSSL_CMP_CTX_push0_policy(OSSL_CMP_CTX *ctx, POLICYINFO *pinfo);
int OSSL_CMP_CTX_set1_oldCert(OSSL_CMP_CTX *ctx, X509 *cert);
int OSSL_CMP_CTX_set1_p10CSR(OSSL_CMP_CTX *ctx, const X509_REQ *csr);
/* misc body contents: */
int OSSL_CMP_CTX_push0_genm_ITAV(OSSL_CMP_CTX *ctx, OSSL_CMP_ITAV *itav);
/* certificate confirmation:
```

```
 */
typedef int (*OSSL_CMP_certConf_cb_t)(OSSL_CMP_CTX *ctx, X509 *cert,
   int fail_info, const char **txt);
int OSSL_CMP_certConf_cb(OSSL_CMP_CTX *ctx, X509 *cert, int fail_info,
   const char **text);
int OSSL_CMP_CTX_set_certConf_cb(OSSL_CMP_CTX *ctx, OSSL_CMP_certConf_cb_t cb);
int OSSL_CMP_CTX_set_certConf_cb_arg(OSSL_CMP_CTX *ctx, void *arg);
void *OSSL_CMP_CTX_get_certConf_cb_arg(const OSSL_CMP_CTX *ctx);
/* result fetching: */
int OSSL_CMP_CTX_get_status(const OSSL_CMP_CTX *ctx);
OSSL_CMP_PKIFREETEXT *OSSL_CMP_CTX_get0_statusString(const OSSL_CMP_CTX *ctx);
int OSSL_CMP_CTX_get_failInfoCode(const OSSL_CMP_CTX *ctx);
#define OSSL_CMP_PKISI_BUFLEN 1024
X509 *OSSL_CMP_CTX_get0_validatedSrvCert(const OSSL_CMP_CTX *ctx);
X509 *OSSL_CMP_CTX_get0_newCert(const OSSL_CMP_CTX *ctx);
STACK_OF(X509) *OSSL_CMP_CTX_get1_newChain(const OSSL_CMP_CTX *ctx);
STACK_OF(X509) *OSSL_CMP_CTX_get1_caPubs(const OSSL_CMP_CTX *ctx);
STACK_OF(X509) *OSSL_CMP_CTX_get1_extraCertsIn(const OSSL_CMP_CTX *ctx);
int
 OSSL_CMP_CTX_set1_transactionID(OSSL_CMP_CTX *ctx,
   const ASN1_OCTET_STRING *id);
int OSSL_CMP_CTX_set1_senderNonce(OSSL_CMP_CTX *ctx,
   const ASN1_OCTET_STRING *nonce);

/* from cmp_status.c */
char *OSSL_CMP_CTX_snprint_PKIStatus(const OSSL_CMP_CTX *ctx, char *buf,
   size_t bufsize);
char *OSSL_CMP_snprint_PKIStatusInfo(const OSSL_CMP_PKISI *statusInfo,
   char *buf, size_t bufsize);
OSSL_CMP_PKISI *
OSSL_CMP_STATUSINFO_new(int status, int fail_info, const char *text);

/* from cmp_hdr.c */
ASN1_OCTET_STRING *OSSL_CMP_HDR_get0_transactionID(const OSSL_CMP_PKIHEADER *hdr);
ASN1_OCTET_STRING *OSSL_CMP_HDR_get0_recipNonce(const OSSL_CMP_PKIHEADER *hdr);
STACK_OF(OSSL_CMP_ITAV)
*OSSL_CMP_HDR_get0_geninfo_ITAVs(const OSSL_CMP_PKIHEADER *hdr);

/* from cmp_msg.c */
OSSL_CMP_PKIHEADER *OSSL_CMP_MSG_get0_header(const OSSL_CMP_MSG *msg);
int OSSL_CMP_MSG_get_bodytype(const OSSL_CMP_MSG *msg);
X509_PUBKEY *OSSL_CMP_MSG_get0_certreq_publickey(const OSSL_CMP_MSG *msg);
int OSSL_CMP_MSG_update_transactionID(OSSL_CMP_CTX
 *ctx, OSSL_CMP_MSG *msg);
int OSSL_CMP_MSG_update_recipNonce(OSSL_CMP_CTX *ctx, OSSL_CMP_MSG *msg);
OSSL_CRMF_MSG *OSSL_CMP_CTX_setup_CRM(OSSL_CMP_CTX *ctx, int for_KUR, int rid);
OSSL_CMP_MSG *OSSL_CMP_MSG_read(const char *file, OSSL_LIB_CTX *libctx,
   const char *propq);
```

```
int OSSL_CMP_MSG_write(const char *file, const OSSL_CMP_MSG *msg);
OSSL_CMP_MSG *d2i_OSSL_CMP_MSG_bio(BIO *bio, OSSL_CMP_MSG **msg);
int i2d_OSSL_CMP_MSG_bio(BIO *bio, const OSSL_CMP_MSG *msg);

/* from cmp_vfy.c */
int OSSL_CMP_validate_msg(OSSL_CMP_CTX *ctx, const OSSL_CMP_MSG *msg);
int OSSL_CMP_validate_cert_path(const OSSL_CMP_CTX *ctx,
   X509_STORE *trusted_store, X509 *cert);

/* from cmp_http.c */
#ifndef OPENSSL_NO_HTTP
OSSL_CMP_MSG *OSSL_CMP_MSG_http_perform(OSSL_CMP_CTX *ctx,
   const OSSL_CMP_MSG *req);
#endif

/* from cmp_server.c */
typedef struct ossl_cmp_srv_ctx_st OSSL_CMP_SRV_CTX;
OSSL_CMP_MSG *OSSL_CMP_SRV_process_request(OSSL_CMP_SRV_CTX *srv_ctx,
   const
 OSSL_CMP_MSG *req);
OSSL_CMP_MSG *OSSL_CMP_CTX_server_perform(OSSL_CMP_CTX *client_ctx,
   const OSSL_CMP_MSG *req);
OSSL_CMP_SRV_CTX *OSSL_CMP_SRV_CTX_new(OSSL_LIB_CTX *libctx, const char *propq);
void OSSL_CMP_SRV_CTX_free(OSSL_CMP_SRV_CTX *srv_ctx);
typedef OSSL_CMP_PKISI *(*OSSL_CMP_SRV_cert_request_cb_t)(OSSL_CMP_SRV_CTX *srv_ctx, const
OSSL_CMP_MSG *req, int certReqId,
   const OSSL_CRMF_MSG *crm, const X509_REQ *p10cr,
   X509 **certOut, STACK_OF(X509) **chainOut, STACK_OF(X509) **caPubs);
typedef OSSL_CMP_PKISI *(*OSSL_CMP_SRV_rr_cb_t)(OSSL_CMP_SRV_CTX *srv_ctx,
   const OSSL_CMP_MSG *req,
   const X509_NAME *issuer,
   const ASN1_INTEGER *serial);
typedef int (*OSSL_CMP_SRV_genm_cb_t)(OSSL_CMP_SRV_CTX *srv_ctx,
   const OSSL_CMP_MSG *req,
   const STACK_OF(OSSL_CMP_ITAV) *in,
   STACK_OF(OSSL_CMP_ITAV) **out);
typedef void (*OSSL_CMP_SRV_error_cb_t)(OSSL_CMP_SRV_CTX *srv_ctx,
   const OSSL_CMP_MSG *req,
   const OSSL_CMP_PKISI *statusInfo,
   const ASN1_INTEGER
 *errorCode,
   const OSSL_CMP_PKIFREETEXT *errDetails);
typedef int (*OSSL_CMP_SRV_certConf_cb_t)(OSSL_CMP_SRV_CTX *srv_ctx,
   const OSSL_CMP_MSG *req,
   int certReqId,
   const ASN1_OCTET_STRING *certHash,
   const OSSL_CMP_PKISI *si);
typedef int (*OSSL_CMP_SRV_pollReq_cb_t)(OSSL_CMP_SRV_CTX *srv_ctx,
```

```
   const OSSL_CMP_MSG *req, int certReqId,
   OSSL_CMP_MSG **certReq,
   int64_t *check_after);
int OSSL_CMP_SRV_CTX_init(OSSL_CMP_SRV_CTX *srv_ctx, void *custom_ctx,
   OSSL_CMP_SRV_cert_request_cb_t process_cert_request,
   OSSL_CMP_SRV_rr_cb_t process_rr,
   OSSL_CMP_SRV_genm_cb_t process_genm,
   OSSL_CMP_SRV_error_cb_t process_error,
   OSSL_CMP_SRV_certConf_cb_t process_certConf,
   OSSL_CMP_SRV_pollReq_cb_t process_pollReq);
typedef int (*OSSL_CMP_SRV_delayed_delivery_cb_t)(OSSL_CMP_SRV_CTX *srv_ctx,
   const OSSL_CMP_MSG *req);
typedef int (*OSSL_CMP_SRV_clean_transaction_cb_t)(OSSL_CMP_SRV_CTX *srv_ctx,
   const ASN1_OCTET_STRING *id);
int OSSL_CMP_SRV_CTX_init_trans(OSSL_CMP_SRV_CTX
 *srv_ctx,
   OSSL_CMP_SRV_delayed_delivery_cb_t delay,
   OSSL_CMP_SRV_clean_transaction_cb_t clean);
OSSL_CMP_CTX *OSSL_CMP_SRV_CTX_get0_cmp_ctx(const OSSL_CMP_SRV_CTX *srv_ctx);
void *OSSL_CMP_SRV_CTX_get0_custom_ctx(const OSSL_CMP_SRV_CTX *srv_ctx);
int OSSL_CMP_SRV_CTX_set_send_unprotected_errors(OSSL_CMP_SRV_CTX *srv_ctx,
   int val);
int OSSL_CMP_SRV_CTX_set_accept_unprotected(OSSL_CMP_SRV_CTX *srv_ctx, int val);
int OSSL_CMP_SRV_CTX_set_accept_raverified(OSSL_CMP_SRV_CTX *srv_ctx, int val);
int OSSL_CMP_SRV_CTX_set_grant_implicit_confirm(OSSL_CMP_SRV_CTX *srv_ctx,
   int val);

/* from cmp_client.c */
X509 *OSSL_CMP_exec_certreq(OSSL_CMP_CTX *ctx, int req_type,
   const OSSL_CRMF_MSG *crm);
#define OSSL_CMP_IR 0
#define OSSL_CMP_CR 2
#define OSSL_CMP_P10CR 4
#define OSSL_CMP_KUR 7
#define OSSL_CMP_GENM 21
#define OSSL_CMP_ERROR 23
#define OSSL_CMP_exec_IR_ses(ctx) \
   OSSL_CMP_exec_certreq(ctx, OSSL_CMP_IR, NULL)
#define OSSL_CMP_exec_CR_ses(ctx)
 \
   OSSL_CMP_exec_certreq(ctx, OSSL_CMP_CR, NULL)
#define OSSL_CMP_exec_P10CR_ses(ctx) \
   OSSL_CMP_exec_certreq(ctx, OSSL_CMP_P10CR, NULL)
#define OSSL_CMP_exec_KUR_ses(ctx) \
   OSSL_CMP_exec_certreq(ctx, OSSL_CMP_KUR, NULL)
int OSSL_CMP_try_certreq(OSSL_CMP_CTX *ctx, int req_type,
   const OSSL_CRMF_MSG *crm, int *checkAfter);
int OSSL_CMP_exec_RR_ses(OSSL_CMP_CTX *ctx);
```

```
STACK_OF(OSSL_CMP_ITAV) *OSSL_CMP_exec_GENM_ses(OSSL_CMP_CTX *ctx);

/* from cmp_genm.c */
int OSSL_CMP_get1_caCerts(OSSL_CMP_CTX *ctx, STACK_OF(X509) **out);
int OSSL_CMP_get1_rootCaKeyUpdate(OSSL_CMP_CTX *ctx,
   const X509 *oldWithOld, X509 **newWithNew,
   X509 **newWithOld, X509 **oldWithNew);
int OSSL_CMP_get1_crlUpdate(OSSL_CMP_CTX *ctx, const X509 *crlcert,
   const X509_CRL *last_crl,
   X509_CRL **crl);
int OSSL_CMP_get1_certReqTemplate(OSSL_CMP_CTX *ctx,
   OSSL_CRMF_CERTTEMPLATE **certTemplate,
   OSSL_CMP_ATAVS **keySpec);

#ifdef __cplusplus
}
#endif
#endif /* !defined(OPENSSL_NO_CMP) */
#endif
 /* !defined(OPENSSL_CMP_H) */
```

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console.log('ok');
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/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/ui.h.in
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*/

```
/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_UI_H
#define OPENSSL_UI_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_UI_H
#endif

#include <openssl/opensslconf.h>

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#include <openssl/crypto.h>
#endif
#include <openssl/safestack.h>
#include <openssl/pem.h>
#include <openssl/types.h>
#include <openssl/uierr.h>

/* For compatibility reasons, the macro OPENSSL_NO_UI is currently retained */
#ifndef OPENSSL_NO_DEPRECATED_3_0
#ifdef OPENSSL_NO_UI_CONSOLE
#define OPENSSL_NO_UI
#endif
#endif

#ifdef
 __cplusplus
extern "C" {
#endif

/*
* All the following functions return -1 or NULL on error and in some cases
* (UI_process()) -2 if interrupted or in some other way cancelled. When
* everything is fine, they return 0, a positive value or a non-NULL pointer,
* all depending on their purpose.
*/

/* Creators and destructor.   */
UI *UI_new(void);
UI *UI_new_method(const UI_METHOD *method);
void UI_free(UI *ui);

/*-
```

```
 The following functions are used to add strings to be printed and prompt
 strings to prompt for data.  The names are UI_{add,dup}_<function>_string
 and UI_{add,dup}_input_boolean.

 UI_{add,dup}_<function>_string have the following meanings:
     add     add a text or prompt string.  The pointers given to these
             functions are used verbatim, no copying is done.
     dup     make a copy of the text or prompt string, then add the copy
             to the collection of strings in the user interface.
     <function>

       The function is a name for the functionality that the given
             string shall be used for.  It can be one of:
                   input   use the string as data prompt.
                   verify  use the string as verification prompt.  This
                         is used to verify a previous input.
                   info    use the string for informational output.
                   error   use the string for error output.
 Honestly, there's currently no difference between info and error for the
 moment.

 UI_{add,dup}_input_boolean have the same semantics for "add" and "dup",
 and are typically used when one wants to prompt for a yes/no response.

 All of the functions in this group take a UI and a prompt string.
 The string input and verify addition functions also take a flag argument,
 a buffer for the result to end up with, a minimum input size and a maximum
 input size (the result buffer MUST be large enough to be able
to contain
 the maximum number of characters).  Additionally, the verify addition
 functions takes another buffer to compare the result against.
 The boolean input functions take an action description string (which should
 be safe to ignore if the expected user action is obvious, for example with
 a dialog box with an OK button and a Cancel button), a string of acceptable
 characters to mean OK and to mean Cancel.  The two last strings are checked
 to make sure they don't have common characters.  Additionally, the same
 flag argument as for the string input is taken, as well as a result buffer.
 The result buffer is required to be at least one byte long.  Depending on
 the answer, the first character from the OK or the Cancel character strings
 will be stored in the first byte of the result buffer.  No NUL will be
 added, so the result is *not* a string.

 On success, the all return an index of the added information.  That index
 is useful when retrieving
 results with UI_get0_result(). */
int UI_add_input_string(UI *ui, const char *prompt, int flags,
   char *result_buf, int minsize, int maxsize);
int UI_dup_input_string(UI *ui, const char *prompt, int flags,
```

```
   char *result_buf, int minsize, int maxsize);
int UI_add_verify_string(UI *ui, const char *prompt, int flags,
   char *result_buf, int minsize, int maxsize,
   const char *test_buf);
int UI_dup_verify_string(UI *ui, const char *prompt, int flags,
   char *result_buf, int minsize, int maxsize,
   const char *test_buf);
int UI_add_input_boolean(UI *ui, const char *prompt, const char *action_desc,
   const char *ok_chars, const char *cancel_chars,
   int flags, char *result_buf);
int UI_dup_input_boolean(UI *ui, const char *prompt, const char *action_desc,
   const char *ok_chars, const char *cancel_chars,
   int flags, char *result_buf);
int UI_add_info_string(UI *ui, const char *text);
int UI_dup_info_string(UI *ui, const char *text);
int UI_add_error_string(UI *ui, const
 char *text);
int UI_dup_error_string(UI *ui, const char *text);

/* These are the possible flags.  They can be or'ed together. */
/* Use to have echoing of input */
#define UI_INPUT_FLAG_ECHO 0x01
/*
* Use a default password.  Where that password is found is completely up to
* the application, it might for example be in the user data set with
* UI_add_user_data().  It is not recommended to have more than one input in
* each UI being marked with this flag, or the application might get
* confused.
*/
#define UI_INPUT_FLAG_DEFAULT_PWD 0x02

/*-
* The user of these routines may want to define flags of their own.  The core
* UI won't look at those, but will pass them on to the method routines.  They
* must use higher bits so they don't get confused with the UI bits above.
* UI_INPUT_FLAG_USER_BASE tells which is the lowest bit to use.  A good
* example of use is this:
*
*    #define MY_UI_FLAG1       (0x01 << UI_INPUT_FLAG_USER_BASE)
*
*/
#define UI_INPUT_FLAG_USER_BASE 16

/*-
 * The following function helps construct a prompt.
* phrase_desc is a textual short description of the phrase to enter,
* for example "pass phrase", and
* object_name is the name of the object
```

```
* (which might be a card name or a file name) or NULL.
* The returned string shall always be allocated on the heap with
* OPENSSL_malloc(), and need to be free'd with OPENSSL_free().
*
* If the ui_method doesn't contain a pointer to a user-defined prompt
* constructor, a default string is built, looking like this:
*
*       "Enter {phrase_desc} for {object_name}:"
*
* So, if phrase_desc has the value "pass phrase" and object_name has
* the value "foo.key", the resulting string is:
*
*       "Enter pass phrase for foo.key:"
*/
char *UI_construct_prompt(UI *ui_method,
   const char *phrase_desc, const char *object_name);

/*
* The following function is used to store a pointer to user-specific data.
* Any previous such pointer will be returned and replaced.
*
* For callback
 purposes, this function makes a lot more sense than using
* ex_data, since the latter requires that different parts of OpenSSL or
* applications share the same ex_data index.
*
* Note that the UI_OpenSSL() method completely ignores the user data. Other
* methods may not, however.
*/
void *UI_add_user_data(UI *ui, void *user_data);
/*
* Alternatively, this function is used to duplicate the user data.
* This uses the duplicator method function.  The destroy function will
* be used to free the user data in this case.
*/
int UI_dup_user_data(UI *ui, void *user_data);
/* We need a user data retrieving function as well.  */
void *UI_get0_user_data(UI *ui);

/* Return the result associated with a prompt given with the index i. */
const char *UI_get0_result(UI *ui, int i);
int UI_get_result_length(UI *ui, int i);

/* When all strings have been added, process the whole thing. */
int UI_process(UI *ui);

/*
* Give a user interface parameterised control commands.  This can be used to
```

```
 * send down an integer, a data pointer or a function pointer, as well as be
* used to get information from a UI.
*/
int UI_ctrl(UI *ui, int cmd, long i, void *p, void (*f)(void));

/* The commands */
/*
* Use UI_CONTROL_PRINT_ERRORS with the value 1 to have UI_process print the
* OpenSSL error stack before printing any info or added error messages and
* before any prompting.
*/
#define UI_CTRL_PRINT_ERRORS 1
/*
* Check if a UI_process() is possible to do again with the same instance of
* a user interface.  This makes UI_ctrl() return 1 if it is redoable, and 0
* if not.
*/
#define UI_CTRL_IS_REDOABLE 2

/* Some methods may use extra data */
#define UI_set_app_data(s, arg) UI_set_ex_data(s, 0, arg)
#define UI_get_app_data(s) UI_get_ex_data(s, 0)

#define UI_get_ex_new_index(l, p, newf, dupf, freef) \
   CRYPTO_get_ex_new_index(CRYPTO_EX_INDEX_UI, l, p, newf, dupf, freef)
int UI_set_ex_data(UI *r, int idx, void *arg);
void *UI_get_ex_data(const UI *r, int idx);

/* Use specific
 methods instead of the built-in one */
void UI_set_default_method(const UI_METHOD *meth);
const UI_METHOD *UI_get_default_method(void);
const UI_METHOD *UI_get_method(UI *ui);
const UI_METHOD *UI_set_method(UI *ui, const UI_METHOD *meth);

#ifndef OPENSSL_NO_UI_CONSOLE

/* The method with all the built-in thingies */
UI_METHOD *UI_OpenSSL(void);

#endif

/*
* NULL method.  Literally does nothing, but may serve as a placeholder
* to avoid internal default.
*/
const UI_METHOD *UI_null(void);
```

```
/* ---------- For method writers ---------- */
/*-
 A method contains a number of functions that implement the low level
 of the User Interface.  The functions are:

     an opener       This function starts a session, maybe by opening
                   a channel to a tty, or by opening a window.
     a writer        This function is called to write a given string,
                   maybe to the tty, maybe as a field label in a
                   window.
     a
 flusher       This function is called to flush everything that
                   has been output so far.  It can be used to actually
                   display a dialog box after it has been built.
     a reader        This function is called to read a given prompt,
                   maybe from the tty, maybe from a field in a
                   window.  Note that it's called with all string
                   structures, not only the prompt ones, so it must
                   check such things itself.
     a closer        This function closes the session, maybe by closing
                   the channel to the tty, or closing the window.

 All these functions are expected to return:

     0       on error.
     1       on success.
     -1       on out-of-band events, for example if some prompting has
             been canceled (by pressing Ctrl-C, for example).  This is
             only checked when returned by the flusher or
 the reader.

 The way this is used, the opener is first called, then the writer for all
 strings, then the flusher, then the reader for all strings and finally the
 closer.  Note that if you want to prompt from a terminal or other command
 line interface, the best is to have the reader also write the prompts
 instead of having the writer do it.  If you want to prompt from a dialog
 box, the writer can be used to build up the contents of the box, and the
 flusher to actually display the box and run the event loop until all data
 has been given, after which the reader only grabs the given data and puts
 them back into the UI strings.

 All method functions take a UI as argument.  Additionally, the writer and
 the reader take a UI_STRING.
*/

/*
* The UI_STRING type is the data structure that contains all the needed info
* about a string or a prompt, including test data for a verification prompt.
```

```
*/
typedef struct ui_string_st UI_STRING;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(UI_STRING,
 UI_STRING, UI_STRING)
#define sk_UI_STRING_num(sk) OPENSSL_sk_num(ossl_check_const_UI_STRING_sk_type(sk))
#define sk_UI_STRING_value(sk, idx) ((UI_STRING
*)OPENSSL_sk_value(ossl_check_const_UI_STRING_sk_type(sk), (idx)))
#define sk_UI_STRING_new(cmp) ((STACK_OF(UI_STRING)
*)OPENSSL_sk_new(ossl_check_UI_STRING_compfunc_type(cmp)))
#define sk_UI_STRING_new_null() ((STACK_OF(UI_STRING) *)OPENSSL_sk_new_null())
#define sk_UI_STRING_new_reserve(cmp, n) ((STACK_OF(UI_STRING)
*)OPENSSL_sk_new_reserve(ossl_check_UI_STRING_compfunc_type(cmp), (n)))
#define sk_UI_STRING_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_UI_STRING_sk_type(sk), (n))
#define sk_UI_STRING_free(sk) OPENSSL_sk_free(ossl_check_UI_STRING_sk_type(sk))
#define sk_UI_STRING_zero(sk) OPENSSL_sk_zero(ossl_check_UI_STRING_sk_type(sk))
#define sk_UI_STRING_delete(sk, i) ((UI_STRING *)OPENSSL_sk_delete(ossl_check_UI_STRING_sk_type(sk),
(i)))
#define sk_UI_STRING_delete_ptr(sk, ptr) ((UI_STRING
*)OPENSSL_sk_delete_ptr(ossl_check_UI_STRING_sk_type(sk),
 ossl_check_UI_STRING_type(ptr)))
#define sk_UI_STRING_push(sk, ptr) OPENSSL_sk_push(ossl_check_UI_STRING_sk_type(sk),
ossl_check_UI_STRING_type(ptr))
#define sk_UI_STRING_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_UI_STRING_sk_type(sk),
ossl_check_UI_STRING_type(ptr))
#define sk_UI_STRING_pop(sk) ((UI_STRING *)OPENSSL_sk_pop(ossl_check_UI_STRING_sk_type(sk)))
#define sk_UI_STRING_shift(sk) ((UI_STRING *)OPENSSL_sk_shift(ossl_check_UI_STRING_sk_type(sk)))
#define sk_UI_STRING_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_UI_STRING_sk_type(sk),ossl_check_UI_STRING_freefunc_type(freefunc))
#define sk_UI_STRING_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_UI_STRING_sk_type(sk),
ossl_check_UI_STRING_type(ptr), (idx))
#define sk_UI_STRING_set(sk, idx, ptr) ((UI_STRING *)OPENSSL_sk_set(ossl_check_UI_STRING_sk_type(sk),
(idx), ossl_check_UI_STRING_type(ptr)))
#define sk_UI_STRING_find(sk, ptr) OPENSSL_sk_find(ossl_check_UI_STRING_sk_type(sk),
 ossl_check_UI_STRING_type(ptr))
#define sk_UI_STRING_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_UI_STRING_sk_type(sk),
ossl_check_UI_STRING_type(ptr))
#define sk_UI_STRING_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_UI_STRING_sk_type(sk),
ossl_check_UI_STRING_type(ptr), pnum)
#define sk_UI_STRING_sort(sk) OPENSSL_sk_sort(ossl_check_UI_STRING_sk_type(sk))
#define sk_UI_STRING_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_UI_STRING_sk_type(sk))
#define sk_UI_STRING_dup(sk) ((STACK_OF(UI_STRING)
*)OPENSSL_sk_dup(ossl_check_const_UI_STRING_sk_type(sk)))
#define sk_UI_STRING_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(UI_STRING)
*)OPENSSL_sk_deep_copy(ossl_check_const_UI_STRING_sk_type(sk),
ossl_check_UI_STRING_copyfunc_type(copyfunc), ossl_check_UI_STRING_freefunc_type(freefunc)))
#define sk_UI_STRING_set_cmp_func(sk, cmp)
```

```
((sk_UI_STRING_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_UI_STRING_sk_type(sk),
ossl_check_UI_STRING_compfunc_type(cmp)))

/*
 clang-format on */

/*
* The different types of strings that are currently supported. This is only
* needed by method authors.
*/
enum UI_string_types {
   UIT_NONE = 0,
   UIT_PROMPT, /* Prompt for a string */
   UIT_VERIFY, /* Prompt for a string and verify */
   UIT_BOOLEAN, /* Prompt for a yes/no response */
   UIT_INFO, /* Send info to the user */
   UIT_ERROR /* Send an error message to the user */
};

/* Create and manipulate methods */
UI_METHOD *UI_create_method(const char *name);
void UI_destroy_method(UI_METHOD *ui_method);
int UI_method_set_opener(UI_METHOD *method, int (*opener)(UI *ui));
int UI_method_set_writer(UI_METHOD *method,
   int (*writer)(UI *ui, UI_STRING *uis));
int UI_method_set_flusher(UI_METHOD *method, int (*flusher)(UI *ui));
int UI_method_set_reader(UI_METHOD *method,
   int (*reader)(UI *ui, UI_STRING *uis));
int UI_method_set_closer(UI_METHOD *method, int (*closer)(UI *ui));
int UI_method_set_data_duplicator(UI_METHOD *method,
   void *(*duplicator)(UI
 *ui, void *ui_data),
   void (*destructor)(UI *ui, void *ui_data));
int UI_method_set_prompt_constructor(UI_METHOD *method,
   char *(*prompt_constructor)(UI *ui,
       const char
           *phrase_desc,
       const char
           *object_name));
int UI_method_set_ex_data(UI_METHOD *method, int idx, void *data);
int (*UI_method_get_opener(const UI_METHOD *method))(UI *);
int (*UI_method_get_writer(const UI_METHOD *method))(UI *, UI_STRING *);
int (*UI_method_get_flusher(const UI_METHOD *method))(UI *);
int (*UI_method_get_reader(const UI_METHOD *method))(UI *, UI_STRING *);
int (*UI_method_get_closer(const UI_METHOD *method))(UI *);
char *(*UI_method_get_prompt_constructor(const UI_METHOD *method))(UI *, const char *, const char *);
void *(*UI_method_get_data_duplicator(const UI_METHOD *method))(UI *, void *);
void (*UI_method_get_data_destructor(const UI_METHOD *method))(UI *, void *);
```

```
const void *UI_method_get_ex_data(const UI_METHOD *method, int idx);

/*
*
 The following functions are helpers for method writers to access relevant
* data from a UI_STRING.
*/

/* Return type of the UI_STRING */
enum UI_string_types UI_get_string_type(UI_STRING *uis);
/* Return input flags of the UI_STRING */
int UI_get_input_flags(UI_STRING *uis);
/* Return the actual string to output (the prompt, info or error) */
const char *UI_get0_output_string(UI_STRING *uis);
/*
* Return the optional action string to output (the boolean prompt
* instruction)
*/
const char *UI_get0_action_string(UI_STRING *uis);
/* Return the result of a prompt */
const char *UI_get0_result_string(UI_STRING *uis);
int UI_get_result_string_length(UI_STRING *uis);
/*
* Return the string to test the result against.  Only useful with verifies.
*/
const char *UI_get0_test_string(UI_STRING *uis);
/* Return the required minimum size of the result */
int UI_get_result_minsize(UI_STRING *uis);
/* Return the required maximum size of the result */
int UI_get_result_maxsize(UI_STRING *uis);
/*
 Set the result of a UI_STRING. */
int UI_set_result(UI *ui, UI_STRING *uis, const char *result);
int UI_set_result_ex(UI *ui, UI_STRING *uis, const char *result, int len);

/* A couple of popular utility functions */
int UI_UTIL_read_pw_string(char *buf, int length, const char *prompt,
   int verify);
int UI_UTIL_read_pw(char *buf, char *buff, int size, const char *prompt,
   int verify);
UI_METHOD *UI_UTIL_wrap_read_pem_callback(pem_password_cb *cb, int rwflag);

#ifdef __cplusplus
}
#endif
#endif
```
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```
{
 'variables': {
   'openssl_defines_BSD-x86': [
     'NDEBUG',
     'L_ENDIAN',
     'OPENSSL_BUILDING_OPENSSL',
     'AES_ASM',
     'CMLL_ASM',
     'DES_ASM',
     'ECP_NISTZ256_ASM',
     'GHASH_ASM',
     'MD5_ASM',
     'OPENSSL_BN_ASM_GF2m',
     'OPENSSL_BN_ASM_MONT',
     'OPENSSL_BN_ASM_PART_WORDS',
     'OPENSSL_CPUID_OBJ',
     'OPENSSL_IA32_SSE2',
     'PADLOCK_ASM',
     'POLY1305_ASM',
     'RC4_ASM',
     'RMD160_ASM',
     'SHA1_ASM',
     'SHA256_ASM',
     'SHA512_ASM',
     'VPAES_ASM',
     'WHIRLPOOL_ASM',
```

```
  'OPENSSL_PIC',
],
'openssl_cflags_BSD-x86': [
  '-Wa,--noexecstack',
  '-Wall -O3 -fomit-frame-pointer',
  '-pthread',
  '-Wall -O3 -fomit-frame-pointer',
],
'openssl_ex_libs_BSD-x86': [
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],
'openssl_cli_srcs_BSD-x86': [
  'openssl/apps/lib/cmp_mock_srv.c',
  'openssl/apps/asn1parse.c',
  'openssl/apps/ca.c',
  'openssl/apps/ciphers.c',
  'openssl/apps/cmp.c',
   'openssl/apps/cms.c',
  'openssl/apps/crl.c',
  'openssl/apps/crl2pkcs7.c',
  'openssl/apps/dgst.c',
  'openssl/apps/dhparam.c',
  'openssl/apps/dsa.c',
  'openssl/apps/dsaparam.c',
  'openssl/apps/ec.c',
  'openssl/apps/ecparam.c',
  'openssl/apps/enc.c',
  'openssl/apps/engine.c',
  'openssl/apps/errstr.c',
  'openssl/apps/fipsinstall.c',
  'openssl/apps/gendsa.c',
  'openssl/apps/genpkey.c',
  'openssl/apps/genrsa.c',
  'openssl/apps/info.c',
  'openssl/apps/kdf.c',
  'openssl/apps/list.c',
  'openssl/apps/mac.c',
  'openssl/apps/nseq.c',
  'openssl/apps/ocsp.c',
  'openssl/apps/openssl.c',
  'openssl/apps/passwd.c',
  'openssl/apps/pkcs12.c',
  'openssl/apps/pkcs7.c',
  'openssl/apps/pkcs8.c',
  'openssl/apps/pkey.c',
  'openssl/apps/pkeyparam.c',
  'openssl/apps/pkeyutl.c',
  'openssl/apps/prime.c',
```

```
    './config/archs/BSD-x86/asm/apps/progs.c',

   'openssl/apps/rand.c',
    'openssl/apps/rehash.c',
    'openssl/apps/req.c',
    'openssl/apps/rsa.c',
    'openssl/apps/rsautl.c',
    'openssl/apps/s_client.c',
    'openssl/apps/s_server.c',
    'openssl/apps/s_time.c',
    'openssl/apps/sess_id.c',
    'openssl/apps/skeyutl.c',
    'openssl/apps/smime.c',
    'openssl/apps/speed.c',
    'openssl/apps/spkac.c',
    'openssl/apps/srp.c',
    'openssl/apps/storeutl.c',
    'openssl/apps/ts.c',
    'openssl/apps/verify.c',
    'openssl/apps/version.c',
    'openssl/apps/x509.c',
    'openssl/apps/lib/app_libctx.c',
    'openssl/apps/lib/app_params.c',
    'openssl/apps/lib/app_provider.c',
    'openssl/apps/lib/app_rand.c',
    'openssl/apps/lib/app_x509.c',
    'openssl/apps/lib/apps.c',
    'openssl/apps/lib/apps_opt_printf.c',
    'openssl/apps/lib/apps_ui.c',
    'openssl/apps/lib/columns.c',
    'openssl/apps/lib/engine.c',
    'openssl/apps/lib/engine_loader.c',

'openssl/apps/lib/fmt.c',
    'openssl/apps/lib/http_server.c',
    'openssl/apps/lib/log.c',
    'openssl/apps/lib/names.c',
    'openssl/apps/lib/opt.c',
    'openssl/apps/lib/s_cb.c',
    'openssl/apps/lib/s_socket.c',
    'openssl/apps/lib/tlssrp_depr.c',
  ],
},
'defines': ['<@(openssl_defines_BSD-x86)'],
'include_dirs': [
  './include',
],
'cflags' : ['<@(openssl_cflags_BSD-x86)'],
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'libraries': ['<@(openssl_ex_libs_BSD-x86)'],
'sources': ['<@(openssl_cli_srcs_BSD-x86)'],
}
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```
#ifndef SRC_PERMISSION_INSPECTOR_PERMISSION_H_
#define SRC_PERMISSION_INSPECTOR_PERMISSION_H_

#if defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS

#include <string>
#include "permission/permission_base.h"

namespace node {

namespace permission {

class InspectorPermission final : public PermissionBase {
public:
 void Apply(Environment* env,
            const std::vector<std::string>& allow,
            PermissionScope scope) override;
 bool is_granted(Environment* env,
                 PermissionScope perm,
                 const std::string_view& param = "") const override;

private:
 bool deny_all_;
};

}  // namespace permission

}  // namespace node

#endif  // defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
#endif  // SRC_PERMISSION_INSPECTOR_PERMISSION_H_
```

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"""

```
/*
* WARNING: do not edit!
* Generated by util/mkbuildinf.pl
*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#define PLATFORM "platform: BSD-x86"
#define DATE "built on: Tue Jan 27 17:25:49 2026 UTC"

/*
* Generate compiler_flags as an array of individual characters. This is a
* workaround for the situation where CFLAGS gets too long for a C90 string
* literal
*/
static const char compiler_flags[] = {
   'c','o','m','p','i','l','e','r',':',' ','.','.','/','c','o','n',
   'f','i','g','/','f','a','k','e','_','g','c','c','.','p','l',' ',
   '-','f','P','I','C',' ','-','p','t','h','r','e','a','d',' ','-',
   'W','a',',','-','-','n','o','e','x','e','c','s','t','a','c','k',
   ' ','-','W','a','l','l','
```

```
 ,'-','O','3',' ','-','f','o','m','i',
   't','-','f','r','a','m','e','-','p','o','i','n','t','e','r',' ',
   '-','D','L','_','E','N','D','I','A','N',' ','-','D','O','P','E',
   'N','S','S','L','_','P','I','C',' ','-','D','_','T','H','R','E',
   'A','D','_','S','A','F','E',' ','-','D','_','R','E','E','N','T',
   'R','A','N','T',' ','-','D','O','P','E','N','S','S','L','_','B',
   'U','I','L','D','I','N','G','_','O','P','E','N','S','S','L',' ',
   '-','D','N','D','E','B','U','G','\0'
};
```

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Tim Koschtzki (tim@debuggable.com)
Felix Geisendrfer (felix@debuggable.com)

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/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/fipskey.h.in
*
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#ifndef OPENSSL_FIPSKEY_H
#define OPENSSL_FIPSKEY_H
#pragma once

#ifdef __cplusplus
extern "C" {
#endif

/*
* The FIPS validation HMAC key, usable as an array initializer.
*/
/* clang-format off */
#define FIPS_KEY_ELEMENTS \
   0xf4, 0x55, 0x66, 0x50, 0xac, 0x31, 0xd3, 0x54, 0x61, 0x61, 0x0b, 0xac, 0x4e, 0xd8, 0x1b, 0x1a, 0x18, 0x1b,
0x2d, 0x8a, 0x43, 0xea, 0x28, 0x54, 0xcb, 0xae, 0x22, 0xca, 0x74, 0x56, 0x08, 0x13
/* clang-format on */

/*
* The FIPS validation key, as a string.
*/
/* clang-format off */
#define FIPS_KEY_STRING "f4556650ac31d35461610bac4ed81b1a181b2d8a43ea2854cbae22ca74560813"
/*
 clang-format on */

/*
* The FIPS provider vendor name, as a string.
*/
/* clang-format off */
#define FIPS_VENDOR "OpenSSL FIPS Provider"
/* clang-format on */
```

```
#ifdef __cplusplus
}
#endif

#endif
{
 'variables': {
   'openssl_sources': [
     'openssl/ssl/bio_ssl.c',
     'openssl/ssl/d1_lib.c',
     'openssl/ssl/d1_msg.c',
     'openssl/ssl/d1_srtp.c',
     'openssl/ssl/methods.c',
     'openssl/ssl/pqueue.c',
     'openssl/ssl/priority_queue.c',
     'openssl/ssl/s3_enc.c',
     'openssl/ssl/s3_lib.c',
     'openssl/ssl/s3_msg.c',
     'openssl/ssl/ssl_asn1.c',
     'openssl/ssl/ssl_cert.c',
     'openssl/ssl/ssl_cert_comp.c',
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     'openssl/ssl/ssl_sess.c',
     'openssl/ssl/ssl_stat.c',
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     'openssl/ssl/quic/quic_demux.c',
     'openssl/ssl/quic/quic_engine.c',
```

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'openssl/crypto/asn1/p5_pbev2.c',
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/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/x509_vfy.h.in
*
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*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */
```

```
/* clang-format on */

#ifndef OPENSSL_X509_VFY_H
#define OPENSSL_X509_VFY_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_X509_VFY_H
#endif

/*
* Protect against recursion, x509.h and x509_vfy.h each include the other.
*/
#ifndef OPENSSL_X509_H
#include <openssl/x509.h>
#endif

#include <openssl/opensslconf.h>
#include <openssl/lhash.h>
#include <openssl/bio.h>
#include <openssl/crypto.h>
#include <openssl/symhacks.h>

#ifdef __cplusplus
extern "C" {
#endif

/*-
SSL_CTX -> X509_STORE

  -> X509_LOOKUP
                ->X509_LOOKUP_METHOD
            -> X509_LOOKUP
                ->X509_LOOKUP_METHOD

SSL     -> X509_STORE_CTX
            ->X509_STORE

The X509_STORE holds the tables etc for verification stuff.
A X509_STORE_CTX is used while validating a single certificate.
The X509_STORE has X509_LOOKUPs for looking up certs.
The X509_STORE then calls a function to actually verify the
certificate chain.
*/

typedef enum {
   X509_LU_NONE = 0,
```

```
  X509_LU_X509,
  X509_LU_CRL
} X509_LOOKUP_TYPE;

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define X509_LU_RETRY -1
#define X509_LU_FAIL 0
#endif

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_LOOKUP, X509_LOOKUP, X509_LOOKUP)
#define sk_X509_LOOKUP_num(sk) OPENSSL_sk_num(ossl_check_const_X509_LOOKUP_sk_type(sk))
#define sk_X509_LOOKUP_value(sk, idx) ((X509_LOOKUP
*)OPENSSL_sk_value(ossl_check_const_X509_LOOKUP_sk_type(sk), (idx)))
#define sk_X509_LOOKUP_new(cmp) ((STACK_OF(X509_LOOKUP)
*)OPENSSL_sk_new(ossl_check_X509_LOOKUP_compfunc_type(cmp)))
#define
 sk_X509_LOOKUP_new_null() ((STACK_OF(X509_LOOKUP) *)OPENSSL_sk_new_null())
#define sk_X509_LOOKUP_new_reserve(cmp, n) ((STACK_OF(X509_LOOKUP)
*)OPENSSL_sk_new_reserve(ossl_check_X509_LOOKUP_compfunc_type(cmp), (n)))
#define sk_X509_LOOKUP_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_LOOKUP_sk_type(sk), (n))
#define sk_X509_LOOKUP_free(sk) OPENSSL_sk_free(ossl_check_X509_LOOKUP_sk_type(sk))
#define sk_X509_LOOKUP_zero(sk) OPENSSL_sk_zero(ossl_check_X509_LOOKUP_sk_type(sk))
#define sk_X509_LOOKUP_delete(sk, i) ((X509_LOOKUP
*)OPENSSL_sk_delete(ossl_check_X509_LOOKUP_sk_type(sk), (i)))
#define sk_X509_LOOKUP_delete_ptr(sk, ptr) ((X509_LOOKUP
*)OPENSSL_sk_delete_ptr(ossl_check_X509_LOOKUP_sk_type(sk), ossl_check_X509_LOOKUP_type(ptr)))
#define sk_X509_LOOKUP_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_LOOKUP_sk_type(sk),
ossl_check_X509_LOOKUP_type(ptr))
#define sk_X509_LOOKUP_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_LOOKUP_sk_type(sk),
 ossl_check_X509_LOOKUP_type(ptr))
#define sk_X509_LOOKUP_pop(sk) ((X509_LOOKUP
*)OPENSSL_sk_pop(ossl_check_X509_LOOKUP_sk_type(sk)))
#define sk_X509_LOOKUP_shift(sk) ((X509_LOOKUP
*)OPENSSL_sk_shift(ossl_check_X509_LOOKUP_sk_type(sk)))
#define sk_X509_LOOKUP_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_LOOKUP_sk_type(sk),ossl_check_X509_LOOKUP_freefunc_type(free
func))
#define sk_X509_LOOKUP_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_LOOKUP_sk_type(sk),
ossl_check_X509_LOOKUP_type(ptr), (idx))
#define sk_X509_LOOKUP_set(sk, idx, ptr) ((X509_LOOKUP
*)OPENSSL_sk_set(ossl_check_X509_LOOKUP_sk_type(sk), (idx), ossl_check_X509_LOOKUP_type(ptr)))
#define sk_X509_LOOKUP_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_LOOKUP_sk_type(sk),
ossl_check_X509_LOOKUP_type(ptr))
#define sk_X509_LOOKUP_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_LOOKUP_sk_type(sk),
ossl_check_X509_LOOKUP_type(ptr))
#define sk_X509_LOOKUP_find_all(sk, ptr, pnum)
```

```
 OPENSSL_sk_find_all(ossl_check_X509_LOOKUP_sk_type(sk), ossl_check_X509_LOOKUP_type(ptr), pnum)
#define sk_X509_LOOKUP_sort(sk) OPENSSL_sk_sort(ossl_check_X509_LOOKUP_sk_type(sk))
#define sk_X509_LOOKUP_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_X509_LOOKUP_sk_type(sk))
#define sk_X509_LOOKUP_dup(sk) ((STACK_OF(X509_LOOKUP)
*)OPENSSL_sk_dup(ossl_check_const_X509_LOOKUP_sk_type(sk)))
#define sk_X509_LOOKUP_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_LOOKUP)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_LOOKUP_sk_type(sk),
ossl_check_X509_LOOKUP_copyfunc_type(copyfunc), ossl_check_X509_LOOKUP_freefunc_type(freefunc)))
#define sk_X509_LOOKUP_set_cmp_func(sk, cmp)
((sk_X509_LOOKUP_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_LOOKUP_sk_type(sk),
ossl_check_X509_LOOKUP_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(X509_OBJECT, X509_OBJECT, X509_OBJECT)
#define sk_X509_OBJECT_num(sk) OPENSSL_sk_num(ossl_check_const_X509_OBJECT_sk_type(sk))
#define sk_X509_OBJECT_value(sk,
 idx) ((X509_OBJECT *)OPENSSL_sk_value(ossl_check_const_X509_OBJECT_sk_type(sk), (idx)))
#define sk_X509_OBJECT_new(cmp) ((STACK_OF(X509_OBJECT)
*)OPENSSL_sk_new(ossl_check_X509_OBJECT_compfunc_type(cmp)))
#define sk_X509_OBJECT_new_null() ((STACK_OF(X509_OBJECT) *)OPENSSL_sk_new_null())
#define sk_X509_OBJECT_new_reserve(cmp, n) ((STACK_OF(X509_OBJECT)
*)OPENSSL_sk_new_reserve(ossl_check_X509_OBJECT_compfunc_type(cmp), (n)))
#define sk_X509_OBJECT_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_OBJECT_sk_type(sk), (n))
#define sk_X509_OBJECT_free(sk) OPENSSL_sk_free(ossl_check_X509_OBJECT_sk_type(sk))
#define sk_X509_OBJECT_zero(sk) OPENSSL_sk_zero(ossl_check_X509_OBJECT_sk_type(sk))
#define sk_X509_OBJECT_delete(sk, i) ((X509_OBJECT
*)OPENSSL_sk_delete(ossl_check_X509_OBJECT_sk_type(sk), (i)))
#define sk_X509_OBJECT_delete_ptr(sk, ptr) ((X509_OBJECT
*)OPENSSL_sk_delete_ptr(ossl_check_X509_OBJECT_sk_type(sk), ossl_check_X509_OBJECT_type(ptr)))
#define sk_X509_OBJECT_push(sk, ptr)
 OPENSSL_sk_push(ossl_check_X509_OBJECT_sk_type(sk), ossl_check_X509_OBJECT_type(ptr))
#define sk_X509_OBJECT_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_OBJECT_sk_type(sk),
ossl_check_X509_OBJECT_type(ptr))
#define sk_X509_OBJECT_pop(sk) ((X509_OBJECT
*)OPENSSL_sk_pop(ossl_check_X509_OBJECT_sk_type(sk)))
#define sk_X509_OBJECT_shift(sk) ((X509_OBJECT
*)OPENSSL_sk_shift(ossl_check_X509_OBJECT_sk_type(sk)))
#define sk_X509_OBJECT_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_OBJECT_sk_type(sk),ossl_check_X509_OBJECT_freefunc_type(freef
unc))
#define sk_X509_OBJECT_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_OBJECT_sk_type(sk),
ossl_check_X509_OBJECT_type(ptr), (idx))
#define sk_X509_OBJECT_set(sk, idx, ptr) ((X509_OBJECT
*)OPENSSL_sk_set(ossl_check_X509_OBJECT_sk_type(sk), (idx), ossl_check_X509_OBJECT_type(ptr)))
#define sk_X509_OBJECT_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_OBJECT_sk_type(sk),
ossl_check_X509_OBJECT_type(ptr))
#define sk_X509_OBJECT_find_ex(sk,
 ptr) OPENSSL_sk_find_ex(ossl_check_X509_OBJECT_sk_type(sk), ossl_check_X509_OBJECT_type(ptr))
#define sk_X509_OBJECT_find_all(sk, ptr, pnum)
```

```
OPENSSL_sk_find_all(ossl_check_X509_OBJECT_sk_type(sk), ossl_check_X509_OBJECT_type(ptr), pnum)
#define sk_X509_OBJECT_sort(sk) OPENSSL_sk_sort(ossl_check_X509_OBJECT_sk_type(sk))
#define sk_X509_OBJECT_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_X509_OBJECT_sk_type(sk))
#define sk_X509_OBJECT_dup(sk) ((STACK_OF(X509_OBJECT)
*)OPENSSL_sk_dup(ossl_check_const_X509_OBJECT_sk_type(sk)))
#define sk_X509_OBJECT_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_OBJECT)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_OBJECT_sk_type(sk),
ossl_check_X509_OBJECT_copyfunc_type(copyfunc), ossl_check_X509_OBJECT_freefunc_type(freefunc)))
#define sk_X509_OBJECT_set_cmp_func(sk, cmp)
((sk_X509_OBJECT_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_OBJECT_sk_type(sk),
ossl_check_X509_OBJECT_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(X509_VERIFY_PARAM,
 X509_VERIFY_PARAM, X509_VERIFY_PARAM)
#define sk_X509_VERIFY_PARAM_num(sk)
OPENSSL_sk_num(ossl_check_const_X509_VERIFY_PARAM_sk_type(sk))
#define sk_X509_VERIFY_PARAM_value(sk, idx) ((X509_VERIFY_PARAM
*)OPENSSL_sk_value(ossl_check_const_X509_VERIFY_PARAM_sk_type(sk), (idx)))
#define sk_X509_VERIFY_PARAM_new(cmp) ((STACK_OF(X509_VERIFY_PARAM)
*)OPENSSL_sk_new(ossl_check_X509_VERIFY_PARAM_compfunc_type(cmp)))
#define sk_X509_VERIFY_PARAM_new_null() ((STACK_OF(X509_VERIFY_PARAM)
*)OPENSSL_sk_new_null())
#define sk_X509_VERIFY_PARAM_new_reserve(cmp, n) ((STACK_OF(X509_VERIFY_PARAM)
*)OPENSSL_sk_new_reserve(ossl_check_X509_VERIFY_PARAM_compfunc_type(cmp), (n)))
#define sk_X509_VERIFY_PARAM_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_X509_VERIFY_PARAM_sk_type(sk), (n))
#define sk_X509_VERIFY_PARAM_free(sk)
OPENSSL_sk_free(ossl_check_X509_VERIFY_PARAM_sk_type(sk))
#define sk_X509_VERIFY_PARAM_zero(sk)
OPENSSL_sk_zero(ossl_check_X509_VERIFY_PARAM_sk_type(sk))
#define sk_X509_VERIFY_PARAM_delete(sk,
 i) ((X509_VERIFY_PARAM *)OPENSSL_sk_delete(ossl_check_X509_VERIFY_PARAM_sk_type(sk), (i)))
#define sk_X509_VERIFY_PARAM_delete_ptr(sk, ptr) ((X509_VERIFY_PARAM
*)OPENSSL_sk_delete_ptr(ossl_check_X509_VERIFY_PARAM_sk_type(sk),
ossl_check_X509_VERIFY_PARAM_type(ptr)))
#define sk_X509_VERIFY_PARAM_push(sk, ptr)
OPENSSL_sk_push(ossl_check_X509_VERIFY_PARAM_sk_type(sk),
ossl_check_X509_VERIFY_PARAM_type(ptr))
#define sk_X509_VERIFY_PARAM_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_X509_VERIFY_PARAM_sk_type(sk),
ossl_check_X509_VERIFY_PARAM_type(ptr))
#define sk_X509_VERIFY_PARAM_pop(sk) ((X509_VERIFY_PARAM
*)OPENSSL_sk_pop(ossl_check_X509_VERIFY_PARAM_sk_type(sk)))
#define sk_X509_VERIFY_PARAM_shift(sk) ((X509_VERIFY_PARAM
*)OPENSSL_sk_shift(ossl_check_X509_VERIFY_PARAM_sk_type(sk)))
#define sk_X509_VERIFY_PARAM_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_VERIFY_PARAM_sk_type(sk),ossl_check_X509_VERIFY_PARAM_
freefunc_type(freefunc))
#define sk_X509_VERIFY_PARAM_insert(sk,
```

```
 ptr, idx) OPENSSL_sk_insert(ossl_check_X509_VERIFY_PARAM_sk_type(sk),
ossl_check_X509_VERIFY_PARAM_type(ptr), (idx))
#define sk_X509_VERIFY_PARAM_set(sk, idx, ptr) ((X509_VERIFY_PARAM
*)OPENSSL_sk_set(ossl_check_X509_VERIFY_PARAM_sk_type(sk), (idx),
ossl_check_X509_VERIFY_PARAM_type(ptr)))
#define sk_X509_VERIFY_PARAM_find(sk, ptr)
OPENSSL_sk_find(ossl_check_X509_VERIFY_PARAM_sk_type(sk),
ossl_check_X509_VERIFY_PARAM_type(ptr))
#define sk_X509_VERIFY_PARAM_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_X509_VERIFY_PARAM_sk_type(sk),
ossl_check_X509_VERIFY_PARAM_type(ptr))
#define sk_X509_VERIFY_PARAM_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_X509_VERIFY_PARAM_sk_type(sk),
ossl_check_X509_VERIFY_PARAM_type(ptr), pnum)
#define sk_X509_VERIFY_PARAM_sort(sk)
OPENSSL_sk_sort(ossl_check_X509_VERIFY_PARAM_sk_type(sk))
#define sk_X509_VERIFY_PARAM_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_X509_VERIFY_PARAM_sk_type(sk))
#define sk_X509_VERIFY_PARAM_dup(sk)
 ((STACK_OF(X509_VERIFY_PARAM)
*)OPENSSL_sk_dup(ossl_check_const_X509_VERIFY_PARAM_sk_type(sk)))
#define sk_X509_VERIFY_PARAM_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_VERIFY_PARAM)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_VERIFY_PARAM_sk_type(sk),
ossl_check_X509_VERIFY_PARAM_copyfunc_type(copyfunc),
ossl_check_X509_VERIFY_PARAM_freefunc_type(freefunc)))
#define sk_X509_VERIFY_PARAM_set_cmp_func(sk, cmp)
((sk_X509_VERIFY_PARAM_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_VERIFY_PARAM_sk_
type(sk), ossl_check_X509_VERIFY_PARAM_compfunc_type(cmp)))

/* clang-format on */

/* This is used for a table of trust checking functions */
typedef struct x509_trust_st {
   int trust;
   int flags;
   int (*check_trust)(struct x509_trust_st *, X509 *, int);
   char *name;
   int arg1;
   void *arg2;
} X509_TRUST;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_TRUST, X509_TRUST, X509_TRUST)
#define sk_X509_TRUST_num(sk) OPENSSL_sk_num(ossl_check_const_X509_TRUST_sk_type(sk))
#define
 sk_X509_TRUST_value(sk, idx) ((X509_TRUST
*)OPENSSL_sk_value(ossl_check_const_X509_TRUST_sk_type(sk), (idx)))
#define sk_X509_TRUST_new(cmp) ((STACK_OF(X509_TRUST)
*)OPENSSL_sk_new(ossl_check_X509_TRUST_compfunc_type(cmp)))
```

```
#define sk_X509_TRUST_new_null() ((STACK_OF(X509_TRUST) *)OPENSSL_sk_new_null())
#define sk_X509_TRUST_new_reserve(cmp, n) ((STACK_OF(X509_TRUST)
*)OPENSSL_sk_new_reserve(ossl_check_X509_TRUST_compfunc_type(cmp), (n)))
#define sk_X509_TRUST_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_TRUST_sk_type(sk), (n))
#define sk_X509_TRUST_free(sk) OPENSSL_sk_free(ossl_check_X509_TRUST_sk_type(sk))
#define sk_X509_TRUST_zero(sk) OPENSSL_sk_zero(ossl_check_X509_TRUST_sk_type(sk))
#define sk_X509_TRUST_delete(sk, i) ((X509_TRUST
*)OPENSSL_sk_delete(ossl_check_X509_TRUST_sk_type(sk), (i)))
#define sk_X509_TRUST_delete_ptr(sk, ptr) ((X509_TRUST
*)OPENSSL_sk_delete_ptr(ossl_check_X509_TRUST_sk_type(sk), ossl_check_X509_TRUST_type(ptr)))
#define sk_X509_TRUST_push(sk,
 ptr) OPENSSL_sk_push(ossl_check_X509_TRUST_sk_type(sk), ossl_check_X509_TRUST_type(ptr))
#define sk_X509_TRUST_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_TRUST_sk_type(sk),
ossl_check_X509_TRUST_type(ptr))
#define sk_X509_TRUST_pop(sk) ((X509_TRUST *)OPENSSL_sk_pop(ossl_check_X509_TRUST_sk_type(sk)))
#define sk_X509_TRUST_shift(sk) ((X509_TRUST
*)OPENSSL_sk_shift(ossl_check_X509_TRUST_sk_type(sk)))
#define sk_X509_TRUST_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_TRUST_sk_type(sk),ossl_check_X509_TRUST_freefunc_type(freefunc
))
#define sk_X509_TRUST_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_TRUST_sk_type(sk),
ossl_check_X509_TRUST_type(ptr), (idx))
#define sk_X509_TRUST_set(sk, idx, ptr) ((X509_TRUST
*)OPENSSL_sk_set(ossl_check_X509_TRUST_sk_type(sk), (idx), ossl_check_X509_TRUST_type(ptr)))
#define sk_X509_TRUST_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_TRUST_sk_type(sk),
ossl_check_X509_TRUST_type(ptr))
#define sk_X509_TRUST_find_ex(sk,
 ptr) OPENSSL_sk_find_ex(ossl_check_X509_TRUST_sk_type(sk), ossl_check_X509_TRUST_type(ptr))
#define sk_X509_TRUST_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_X509_TRUST_sk_type(sk),
ossl_check_X509_TRUST_type(ptr), pnum)
#define sk_X509_TRUST_sort(sk) OPENSSL_sk_sort(ossl_check_X509_TRUST_sk_type(sk))
#define sk_X509_TRUST_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_X509_TRUST_sk_type(sk))
#define sk_X509_TRUST_dup(sk) ((STACK_OF(X509_TRUST)
*)OPENSSL_sk_dup(ossl_check_const_X509_TRUST_sk_type(sk)))
#define sk_X509_TRUST_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_TRUST)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_TRUST_sk_type(sk),
ossl_check_X509_TRUST_copyfunc_type(copyfunc), ossl_check_X509_TRUST_freefunc_type(freefunc)))
#define sk_X509_TRUST_set_cmp_func(sk, cmp)
((sk_X509_TRUST_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_TRUST_sk_type(sk),
ossl_check_X509_TRUST_compfunc_type(cmp)))

/* clang-format on */

/* standard trust ids */
#define X509_TRUST_DEFAULT
 0 /* Only valid in purpose settings */
#define X509_TRUST_COMPAT 1
#define X509_TRUST_SSL_CLIENT 2
```

```
#define X509_TRUST_SSL_SERVER 3
#define X509_TRUST_EMAIL 4
#define X509_TRUST_OBJECT_SIGN 5
#define X509_TRUST_OCSP_SIGN 6
#define X509_TRUST_OCSP_REQUEST 7
#define X509_TRUST_TSA 8
/* Keep these up to date! */
#define X509_TRUST_MIN 1
#define X509_TRUST_MAX 8

/* trust_flags values */
#define X509_TRUST_DYNAMIC (1U << 0)
#define X509_TRUST_DYNAMIC_NAME (1U << 1)
/* No compat trust if self-signed, preempts "DO_SS" */
#define X509_TRUST_NO_SS_COMPAT (1U << 2)
/* Compat trust if no explicit accepted trust EKUs */
#define X509_TRUST_DO_SS_COMPAT (1U << 3)
/* Accept "anyEKU" as a wildcard rejection OID and as a wildcard trust OID */
#define X509_TRUST_OK_ANY_EKU (1U << 4)

/* check_trust return codes */
#define X509_TRUST_TRUSTED 1
#define X509_TRUST_REJECTED 2
#define X509_TRUST_UNTRUSTED 3

int X509_TRUST_set(int *t, int trust);
int X509_TRUST_get_count(void);
X509_TRUST *X509_TRUST_get0(int
 idx);
int X509_TRUST_get_by_id(int id);
int X509_TRUST_add(int id, int flags, int (*ck)(X509_TRUST *, X509 *, int),
   const char *name, int arg1, void *arg2);
void X509_TRUST_cleanup(void);
int X509_TRUST_get_flags(const X509_TRUST *xp);
char *X509_TRUST_get0_name(const X509_TRUST *xp);
int X509_TRUST_get_trust(const X509_TRUST *xp);

int X509_trusted(const X509 *x);
int X509_add1_trust_object(X509 *x, const ASN1_OBJECT *obj);
int X509_add1_reject_object(X509 *x, const ASN1_OBJECT *obj);
void X509_trust_clear(X509 *x);
void X509_reject_clear(X509 *x);
STACK_OF(ASN1_OBJECT) *X509_get0_trust_objects(X509 *x);
STACK_OF(ASN1_OBJECT) *X509_get0_reject_objects(X509 *x);

int (*X509_TRUST_set_default(int (*trust)(int, X509 *, int)))(int, X509 *,
   int);
int X509_check_trust(X509 *x, int id, int flags);
```

```
int X509_verify_cert(X509_STORE_CTX *ctx);
int X509_STORE_CTX_verify(X509_STORE_CTX *ctx);
STACK_OF(X509) *X509_build_chain(X509 *target, STACK_OF(X509) *certs,
   X509_STORE
 *store, int with_self_signed,
   OSSL_LIB_CTX *libctx, const char *propq);

int X509_STORE_set_depth(X509_STORE *store, int depth);

typedef int (*X509_STORE_CTX_verify_cb)(int, X509_STORE_CTX *);
int X509_STORE_CTX_print_verify_cb(int ok, X509_STORE_CTX *ctx);
typedef int (*X509_STORE_CTX_verify_fn)(X509_STORE_CTX *);
typedef int (*X509_STORE_CTX_get_issuer_fn)(X509 **issuer,
   X509_STORE_CTX *ctx, X509 *x);
typedef int (*X509_STORE_CTX_check_issued_fn)(X509_STORE_CTX *ctx,
   X509 *x, X509 *issuer);
typedef int (*X509_STORE_CTX_check_revocation_fn)(X509_STORE_CTX *ctx);
typedef int (*X509_STORE_CTX_get_crl_fn)(X509_STORE_CTX *ctx,
   X509_CRL **crl, X509 *x);
typedef int (*X509_STORE_CTX_check_crl_fn)(X509_STORE_CTX *ctx, X509_CRL *crl);
typedef int (*X509_STORE_CTX_cert_crl_fn)(X509_STORE_CTX *ctx,
   X509_CRL *crl, X509 *x);
typedef int (*X509_STORE_CTX_check_policy_fn)(X509_STORE_CTX *ctx);
typedef STACK_OF(X509)
   *(*X509_STORE_CTX_lookup_certs_fn)(X509_STORE_CTX
 *ctx,
       const X509_NAME *nm);
typedef STACK_OF(X509_CRL)
   *(*X509_STORE_CTX_lookup_crls_fn)(const X509_STORE_CTX *ctx,
       const X509_NAME *nm);
typedef int (*X509_STORE_CTX_cleanup_fn)(X509_STORE_CTX *ctx);

void X509_STORE_CTX_set_depth(X509_STORE_CTX *ctx, int depth);

#define X509_STORE_CTX_set_app_data(ctx, data) \
   X509_STORE_CTX_set_ex_data(ctx, 0, data)
#define X509_STORE_CTX_get_app_data(ctx) \
   X509_STORE_CTX_get_ex_data(ctx, 0)

#define X509_L_FILE_LOAD 1
#define X509_L_ADD_DIR 2
#define X509_L_ADD_STORE 3
#define X509_L_LOAD_STORE 4

#define X509_LOOKUP_load_file(x, name, type) \
   X509_LOOKUP_ctrl((x), X509_L_FILE_LOAD, (name), (long)(type), NULL)
```

```
#define X509_LOOKUP_add_dir(x, name, type) \
   X509_LOOKUP_ctrl((x), X509_L_ADD_DIR, (name), (long)(type), NULL)

#define X509_LOOKUP_add_store(x, name) \
   X509_LOOKUP_ctrl((x), X509_L_ADD_STORE, (name), 0, NULL)

#define X509_LOOKUP_load_store(x, name) \
   X509_LOOKUP_ctrl((x), X509_L_LOAD_STORE, (name),
 0, NULL)

#define X509_LOOKUP_load_file_ex(x, name, type, libctx, propq)            \
   X509_LOOKUP_ctrl_ex((x), X509_L_FILE_LOAD, (name), (long)(type), NULL, \
       (libctx), (propq))

#define X509_LOOKUP_load_store_ex(x, name, libctx, propq)        \
   X509_LOOKUP_ctrl_ex((x), X509_L_LOAD_STORE, (name), 0, NULL, \
       (libctx), (propq))

#define X509_LOOKUP_add_store_ex(x, name, libctx, propq)        \
   X509_LOOKUP_ctrl_ex((x), X509_L_ADD_STORE, (name), 0, NULL, \
       (libctx), (propq))

#define X509_V_OK 0
#define X509_V_ERR_UNSPECIFIED 1
#define X509_V_ERR_UNABLE_TO_GET_ISSUER_CERT 2
#define X509_V_ERR_UNABLE_TO_GET_CRL 3
#define X509_V_ERR_UNABLE_TO_DECRYPT_CERT_SIGNATURE 4
#define X509_V_ERR_UNABLE_TO_DECRYPT_CRL_SIGNATURE 5
#define X509_V_ERR_UNABLE_TO_DECODE_ISSUER_PUBLIC_KEY 6
#define X509_V_ERR_CERT_SIGNATURE_FAILURE 7
#define X509_V_ERR_CRL_SIGNATURE_FAILURE 8
#define X509_V_ERR_CERT_NOT_YET_VALID 9
#define X509_V_ERR_CERT_HAS_EXPIRED 10
#define X509_V_ERR_CRL_NOT_YET_VALID
 11
#define X509_V_ERR_CRL_HAS_EXPIRED 12
#define X509_V_ERR_ERROR_IN_CERT_NOT_BEFORE_FIELD 13
#define X509_V_ERR_ERROR_IN_CERT_NOT_AFTER_FIELD 14
#define X509_V_ERR_ERROR_IN_CRL_LAST_UPDATE_FIELD 15
#define X509_V_ERR_ERROR_IN_CRL_NEXT_UPDATE_FIELD 16
#define X509_V_ERR_OUT_OF_MEM 17
#define X509_V_ERR_DEPTH_ZERO_SELF_SIGNED_CERT 18
#define X509_V_ERR_SELF_SIGNED_CERT_IN_CHAIN 19
#define X509_V_ERR_UNABLE_TO_GET_ISSUER_CERT_LOCALLY 20
#define X509_V_ERR_UNABLE_TO_VERIFY_LEAF_SIGNATURE 21
#define X509_V_ERR_CERT_CHAIN_TOO_LONG 22
#define X509_V_ERR_CERT_REVOKED 23
#define X509_V_ERR_NO_ISSUER_PUBLIC_KEY 24
```

```
#define X509_V_ERR_PATH_LENGTH_EXCEEDED 25
#define X509_V_ERR_INVALID_PURPOSE 26
#define X509_V_ERR_CERT_UNTRUSTED 27
#define X509_V_ERR_CERT_REJECTED 28

/* These are 'informational' when looking for issuer cert */
#define X509_V_ERR_SUBJECT_ISSUER_MISMATCH 29
#define X509_V_ERR_AKID_SKID_MISMATCH 30
#define X509_V_ERR_AKID_ISSUER_SERIAL_MISMATCH 31
#define X509_V_ERR_KEYUSAGE_NO_CERTSIGN
 32
#define X509_V_ERR_UNABLE_TO_GET_CRL_ISSUER 33
#define X509_V_ERR_UNHANDLED_CRITICAL_EXTENSION 34
#define X509_V_ERR_KEYUSAGE_NO_CRL_SIGN 35
#define X509_V_ERR_UNHANDLED_CRITICAL_CRL_EXTENSION 36
#define X509_V_ERR_INVALID_NON_CA 37
#define X509_V_ERR_PROXY_PATH_LENGTH_EXCEEDED 38
#define X509_V_ERR_KEYUSAGE_NO_DIGITAL_SIGNATURE 39
#define X509_V_ERR_PROXY_CERTIFICATES_NOT_ALLOWED 40
#define X509_V_ERR_INVALID_EXTENSION 41
#define X509_V_ERR_INVALID_POLICY_EXTENSION 42
#define X509_V_ERR_NO_EXPLICIT_POLICY 43
#define X509_V_ERR_DIFFERENT_CRL_SCOPE 44
#define X509_V_ERR_UNSUPPORTED_EXTENSION_FEATURE 45
#define X509_V_ERR_UNNESTED_RESOURCE 46
#define X509_V_ERR_PERMITTED_VIOLATION 47
#define X509_V_ERR_EXCLUDED_VIOLATION 48
#define X509_V_ERR_SUBTREE_MINMAX 49
/* The application is not happy */
#define X509_V_ERR_APPLICATION_VERIFICATION 50
#define X509_V_ERR_UNSUPPORTED_CONSTRAINT_TYPE 51
#define X509_V_ERR_UNSUPPORTED_CONSTRAINT_SYNTAX 52
#define X509_V_ERR_UNSUPPORTED_NAME_SYNTAX
 53
#define X509_V_ERR_CRL_PATH_VALIDATION_ERROR 54
/* Another issuer check debug option */
#define X509_V_ERR_PATH_LOOP 55
/* Suite B mode algorithm violation */
#define X509_V_ERR_SUITE_B_INVALID_VERSION 56
#define X509_V_ERR_SUITE_B_INVALID_ALGORITHM 57
#define X509_V_ERR_SUITE_B_INVALID_CURVE 58
#define X509_V_ERR_SUITE_B_INVALID_SIGNATURE_ALGORITHM 59
#define X509_V_ERR_SUITE_B_LOS_NOT_ALLOWED 60
#define X509_V_ERR_SUITE_B_CANNOT_SIGN_P_384_WITH_P_256 61
/* Host, email and IP check errors */
#define X509_V_ERR_HOSTNAME_MISMATCH 62
#define X509_V_ERR_EMAIL_MISMATCH 63
#define X509_V_ERR_IP_ADDRESS_MISMATCH 64
```

```
/* DANE TLSA errors */
#define X509_V_ERR_DANE_NO_MATCH 65
/* security level errors */
#define X509_V_ERR_EE_KEY_TOO_SMALL 66
#define X509_V_ERR_CA_KEY_TOO_SMALL 67
#define X509_V_ERR_CA_MD_TOO_WEAK 68
/* Caller error */
#define X509_V_ERR_INVALID_CALL 69
/* Issuer lookup error */
#define X509_V_ERR_STORE_LOOKUP 70
/* Certificate transparency */
#define
 X509_V_ERR_NO_VALID_SCTS 71

#define X509_V_ERR_PROXY_SUBJECT_NAME_VIOLATION 72
/* OCSP status errors */
#define X509_V_ERR_OCSP_VERIFY_NEEDED 73 /* Need OCSP verification */
#define X509_V_ERR_OCSP_VERIFY_FAILED 74 /* Couldn't verify cert through OCSP */
#define X509_V_ERR_OCSP_CERT_UNKNOWN 75 /* Certificate wasn't recognized by the OCSP responder */

#define X509_V_ERR_UNSUPPORTED_SIGNATURE_ALGORITHM 76
#define X509_V_ERR_SIGNATURE_ALGORITHM_MISMATCH 77

/* Errors in case a check in X509_V_FLAG_X509_STRICT mode fails */
#define X509_V_ERR_SIGNATURE_ALGORITHM_INCONSISTENCY 78
#define X509_V_ERR_INVALID_CA 79
#define X509_V_ERR_PATHLEN_INVALID_FOR_NON_CA 80
#define X509_V_ERR_PATHLEN_WITHOUT_KU_KEY_CERT_SIGN 81
#define X509_V_ERR_KU_KEY_CERT_SIGN_INVALID_FOR_NON_CA 82
#define X509_V_ERR_ISSUER_NAME_EMPTY 83
#define X509_V_ERR_SUBJECT_NAME_EMPTY 84
#define X509_V_ERR_MISSING_AUTHORITY_KEY_IDENTIFIER 85
#define X509_V_ERR_MISSING_SUBJECT_KEY_IDENTIFIER 86
#define X509_V_ERR_EMPTY_SUBJECT_ALT_NAME
 87
#define X509_V_ERR_EMPTY_SUBJECT_SAN_NOT_CRITICAL 88
#define X509_V_ERR_CA_BCONS_NOT_CRITICAL 89
#define X509_V_ERR_AUTHORITY_KEY_IDENTIFIER_CRITICAL 90
#define X509_V_ERR_SUBJECT_KEY_IDENTIFIER_CRITICAL 91
#define X509_V_ERR_CA_CERT_MISSING_KEY_USAGE 92
#define X509_V_ERR_EXTENSIONS_REQUIRE_VERSION_3 93
#define X509_V_ERR_EC_KEY_EXPLICIT_PARAMS 94
#define X509_V_ERR_RPK_UNTRUSTED 95

/* Certificate verify flags */
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define X509_V_FLAG_CB_ISSUER_CHECK 0x0 /* Deprecated */
#endif
```

```
/* Use check time instead of current time */
#define X509_V_FLAG_USE_CHECK_TIME 0x2
/* Lookup CRLs */
#define X509_V_FLAG_CRL_CHECK 0x4
/* Lookup CRLs for whole chain */
#define X509_V_FLAG_CRL_CHECK_ALL 0x8
/* Ignore unhandled critical extensions */
#define X509_V_FLAG_IGNORE_CRITICAL 0x10
/* Disable workarounds for broken certificates */
#define X509_V_FLAG_X509_STRICT 0x20
/* Enable proxy certificate validation */
#define X509_V_FLAG_ALLOW_PROXY_CERTS 0x40
/*
 Enable policy checking */
#define X509_V_FLAG_POLICY_CHECK 0x80
/* Policy variable require-explicit-policy */
#define X509_V_FLAG_EXPLICIT_POLICY 0x100
/* Policy variable inhibit-any-policy */
#define X509_V_FLAG_INHIBIT_ANY 0x200
/* Policy variable inhibit-policy-mapping */
#define X509_V_FLAG_INHIBIT_MAP 0x400
/* Notify callback that policy is OK */
#define X509_V_FLAG_NOTIFY_POLICY 0x800
/* Extended CRL features such as indirect CRLs, alternate CRL signing keys */
#define X509_V_FLAG_EXTENDED_CRL_SUPPORT 0x1000
/* Delta CRL support */
#define X509_V_FLAG_USE_DELTAS 0x2000
/* Check self-signed CA signature */
#define X509_V_FLAG_CHECK_SS_SIGNATURE 0x4000
/* Use trusted store first */
#define X509_V_FLAG_TRUSTED_FIRST 0x8000
/* Suite B 128 bit only mode: not normally used */
#define X509_V_FLAG_SUITEB_128_LOS_ONLY 0x10000
/* Suite B 192 bit only mode */
#define X509_V_FLAG_SUITEB_192_LOS 0x20000
/* Suite B 128 bit mode allowing 192 bit algorithms */
#define X509_V_FLAG_SUITEB_128_LOS
 0x30000
/* Allow partial chains if at least one certificate is in trusted store */
#define X509_V_FLAG_PARTIAL_CHAIN 0x80000
/*
* If the initial chain is not trusted, do not attempt to build an alternative
* chain. Alternate chain checking was introduced in 1.1.0. Setting this flag
* will force the behaviour to match that of previous versions.
*/
#define X509_V_FLAG_NO_ALT_CHAINS 0x100000
/* Do not check certificate/CRL validity against current time */
#define X509_V_FLAG_NO_CHECK_TIME 0x200000
```

```
#define X509_VP_FLAG_DEFAULT 0x1
#define X509_VP_FLAG_OVERWRITE 0x2
#define X509_VP_FLAG_RESET_FLAGS 0x4
#define X509_VP_FLAG_LOCKED 0x8
#define X509_VP_FLAG_ONCE 0x10

/* Internal use: mask of policy related options */
#define X509_V_FLAG_POLICY_MASK (X509_V_FLAG_POLICY_CHECK \
   | X509_V_FLAG_EXPLICIT_POLICY                    \
   | X509_V_FLAG_INHIBIT_ANY                        \
   | X509_V_FLAG_INHIBIT_MAP)

int X509_OBJECT_idx_by_subject(STACK_OF(X509_OBJECT) *h, X509_LOOKUP_TYPE
 type,
   const X509_NAME *name);
X509_OBJECT *X509_OBJECT_retrieve_by_subject(STACK_OF(X509_OBJECT) *h,
   X509_LOOKUP_TYPE type,
   const X509_NAME *name);
X509_OBJECT *X509_OBJECT_retrieve_match(STACK_OF(X509_OBJECT) *h,
   X509_OBJECT *x);
int X509_OBJECT_up_ref_count(X509_OBJECT *a);
X509_OBJECT *X509_OBJECT_new(void);
void X509_OBJECT_free(X509_OBJECT *a);
X509_LOOKUP_TYPE X509_OBJECT_get_type(const X509_OBJECT *a);
X509 *X509_OBJECT_get0_X509(const X509_OBJECT *a);
int X509_OBJECT_set1_X509(X509_OBJECT *a, X509 *obj);
X509_CRL *X509_OBJECT_get0_X509_CRL(const X509_OBJECT *a);
int X509_OBJECT_set1_X509_CRL(X509_OBJECT *a, X509_CRL *obj);
X509_STORE *X509_STORE_new(void);
void X509_STORE_free(X509_STORE *xs);
int X509_STORE_lock(X509_STORE *xs);
int X509_STORE_unlock(X509_STORE *xs);
int X509_STORE_up_ref(X509_STORE *xs);
STACK_OF(X509_OBJECT) *X509_STORE_get0_objects(const X509_STORE *xs);
STACK_OF(X509_OBJECT) *X509_STORE_get1_objects(X509_STORE *xs);
STACK_OF(X509)
 *X509_STORE_get1_all_certs(X509_STORE *xs);
STACK_OF(X509) *X509_STORE_CTX_get1_certs(X509_STORE_CTX *xs,
   const X509_NAME *nm);
STACK_OF(X509_CRL) *X509_STORE_CTX_get1_crls(const X509_STORE_CTX *st,
   const X509_NAME *nm);
int X509_STORE_set_flags(X509_STORE *xs, unsigned long flags);
int X509_STORE_set_purpose(X509_STORE *xs, int purpose);
int X509_STORE_set_trust(X509_STORE *xs, int trust);
int X509_STORE_set1_param(X509_STORE *xs, const X509_VERIFY_PARAM *pm);
X509_VERIFY_PARAM *X509_STORE_get0_param(const X509_STORE *xs);
```

```
void X509_STORE_set_verify(X509_STORE *xs, X509_STORE_CTX_verify_fn verify);
#define X509_STORE_set_verify_func(ctx, func) \
   X509_STORE_set_verify((ctx), (func))
void X509_STORE_CTX_set_verify(X509_STORE_CTX *ctx,
   X509_STORE_CTX_verify_fn verify);
X509_STORE_CTX_verify_fn X509_STORE_get_verify(const X509_STORE *xs);
void X509_STORE_set_verify_cb(X509_STORE *xs,
   X509_STORE_CTX_verify_cb verify_cb);
#define X509_STORE_set_verify_cb_func(ctx,
 func) \
   X509_STORE_set_verify_cb((ctx), (func))
X509_STORE_CTX_verify_cb X509_STORE_get_verify_cb(const X509_STORE *xs);
void X509_STORE_set_get_issuer(X509_STORE *xs,
   X509_STORE_CTX_get_issuer_fn get_issuer);
X509_STORE_CTX_get_issuer_fn X509_STORE_get_get_issuer(const X509_STORE *xs);
void X509_STORE_set_check_issued(X509_STORE *xs,
   X509_STORE_CTX_check_issued_fn check_issued);
X509_STORE_CTX_check_issued_fn X509_STORE_get_check_issued(const X509_STORE *s);
void X509_STORE_set_check_revocation(X509_STORE *xs,
   X509_STORE_CTX_check_revocation_fn check_revocation);
X509_STORE_CTX_check_revocation_fn
X509_STORE_get_check_revocation(const X509_STORE *xs);
void X509_STORE_set_get_crl(X509_STORE *xs,
   X509_STORE_CTX_get_crl_fn get_crl);
X509_STORE_CTX_get_crl_fn X509_STORE_get_get_crl(const X509_STORE *xs);
void X509_STORE_set_check_crl(X509_STORE *xs,
   X509_STORE_CTX_check_crl_fn check_crl);
X509_STORE_CTX_check_crl_fn X509_STORE_get_check_crl(const X509_STORE *xs);
void
 X509_STORE_set_cert_crl(X509_STORE *xs,
   X509_STORE_CTX_cert_crl_fn cert_crl);
X509_STORE_CTX_cert_crl_fn X509_STORE_get_cert_crl(const X509_STORE *xs);
void X509_STORE_set_check_policy(X509_STORE *xs,
   X509_STORE_CTX_check_policy_fn check_policy);
X509_STORE_CTX_check_policy_fn X509_STORE_get_check_policy(const X509_STORE *s);
void X509_STORE_set_lookup_certs(X509_STORE *xs,
   X509_STORE_CTX_lookup_certs_fn lookup_certs);
X509_STORE_CTX_lookup_certs_fn X509_STORE_get_lookup_certs(const X509_STORE *s);
void X509_STORE_set_lookup_crls(X509_STORE *xs,
   X509_STORE_CTX_lookup_crls_fn lookup_crls);
#define X509_STORE_set_lookup_crls_cb(ctx, func) \
   X509_STORE_set_lookup_crls((ctx), (func))
X509_STORE_CTX_lookup_crls_fn X509_STORE_get_lookup_crls(const X509_STORE *xs);
void X509_STORE_set_cleanup(X509_STORE *xs,
   X509_STORE_CTX_cleanup_fn cleanup);
X509_STORE_CTX_cleanup_fn X509_STORE_get_cleanup(const X509_STORE *xs);

#define X509_STORE_get_ex_new_index(l, p, newf, dupf,
```

```
 freef) \
   CRYPTO_get_ex_new_index(CRYPTO_EX_INDEX_X509_STORE, l, p, newf, dupf, freef)
int X509_STORE_set_ex_data(X509_STORE *xs, int idx, void *data);
void *X509_STORE_get_ex_data(const X509_STORE *xs, int idx);

X509_STORE_CTX *X509_STORE_CTX_new_ex(OSSL_LIB_CTX *libctx, const char *propq);
X509_STORE_CTX *X509_STORE_CTX_new(void);

int X509_STORE_CTX_get1_issuer(X509 **issuer, X509_STORE_CTX *ctx, X509 *x);

void X509_STORE_CTX_free(X509_STORE_CTX *ctx);
int X509_STORE_CTX_init(X509_STORE_CTX *ctx, X509_STORE *trust_store,
   X509 *target, STACK_OF(X509) *untrusted);
int X509_STORE_CTX_init_rpk(X509_STORE_CTX *ctx, X509_STORE *trust_store,
   EVP_PKEY *rpk);
void X509_STORE_CTX_set0_trusted_stack(X509_STORE_CTX *ctx, STACK_OF(X509) *sk);
void X509_STORE_CTX_cleanup(X509_STORE_CTX *ctx);

X509_STORE *X509_STORE_CTX_get0_store(const X509_STORE_CTX *ctx);
X509 *X509_STORE_CTX_get0_cert(const X509_STORE_CTX *ctx);
EVP_PKEY *X509_STORE_CTX_get0_rpk(const X509_STORE_CTX *ctx);
STACK_OF(X509)
 *X509_STORE_CTX_get0_untrusted(const X509_STORE_CTX *ctx);
void X509_STORE_CTX_set0_untrusted(X509_STORE_CTX *ctx, STACK_OF(X509) *sk);
void X509_STORE_CTX_set_verify_cb(X509_STORE_CTX *ctx,
   X509_STORE_CTX_verify_cb verify);
X509_STORE_CTX_verify_cb X509_STORE_CTX_get_verify_cb(const X509_STORE_CTX *ctx);
X509_STORE_CTX_verify_fn X509_STORE_CTX_get_verify(const X509_STORE_CTX *ctx);
X509_STORE_CTX_get_issuer_fn X509_STORE_CTX_get_get_issuer(const X509_STORE_CTX *ctx);
X509_STORE_CTX_check_issued_fn X509_STORE_CTX_get_check_issued(const X509_STORE_CTX *ctx);
X509_STORE_CTX_check_revocation_fn X509_STORE_CTX_get_check_revocation(const X509_STORE_CTX
*ctx);
void X509_STORE_CTX_set_get_crl(X509_STORE_CTX *ctx,
   X509_STORE_CTX_get_crl_fn get_crl);
X509_STORE_CTX_get_crl_fn X509_STORE_CTX_get_get_crl(const X509_STORE_CTX *ctx);
X509_STORE_CTX_check_crl_fn X509_STORE_CTX_get_check_crl(const X509_STORE_CTX *ctx);
X509_STORE_CTX_cert_crl_fn X509_STORE_CTX_get_cert_crl(const
 X509_STORE_CTX *ctx);
X509_STORE_CTX_check_policy_fn X509_STORE_CTX_get_check_policy(const X509_STORE_CTX *ctx);
X509_STORE_CTX_lookup_certs_fn X509_STORE_CTX_get_lookup_certs(const X509_STORE_CTX *ctx);
X509_STORE_CTX_lookup_crls_fn X509_STORE_CTX_get_lookup_crls(const X509_STORE_CTX *ctx);
X509_STORE_CTX_cleanup_fn X509_STORE_CTX_get_cleanup(const X509_STORE_CTX *ctx);

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define X509_STORE_CTX_get_chain X509_STORE_CTX_get0_chain
#define X509_STORE_CTX_set_chain X509_STORE_CTX_set0_untrusted
#define X509_STORE_CTX_trusted_stack X509_STORE_CTX_set0_trusted_stack
#define X509_STORE_get_by_subject X509_STORE_CTX_get_by_subject
```

```
#define X509_STORE_get1_certs X509_STORE_CTX_get1_certs
#define X509_STORE_get1_crls X509_STORE_CTX_get1_crls
/* the following macro is misspelled; use X509_STORE_get1_certs instead */
#define X509_STORE_get1_cert X509_STORE_CTX_get1_certs
/* the following macro is misspelled; use X509_STORE_get1_crls instead */
#define X509_STORE_get1_crl
 X509_STORE_CTX_get1_crls
#endif

X509_LOOKUP *X509_STORE_add_lookup(X509_STORE *xs, X509_LOOKUP_METHOD *m);
X509_LOOKUP_METHOD *X509_LOOKUP_hash_dir(void);
X509_LOOKUP_METHOD *X509_LOOKUP_file(void);
X509_LOOKUP_METHOD *X509_LOOKUP_store(void);

typedef int (*X509_LOOKUP_ctrl_fn)(X509_LOOKUP *ctx, int cmd, const char *argc,
   long argl, char **ret);
typedef int (*X509_LOOKUP_ctrl_ex_fn)(
   X509_LOOKUP *ctx, int cmd, const char *argc, long argl, char **ret,
   OSSL_LIB_CTX *libctx, const char *propq);

typedef int (*X509_LOOKUP_get_by_subject_fn)(X509_LOOKUP *ctx,
   X509_LOOKUP_TYPE type,
   const X509_NAME *name,
   X509_OBJECT *ret);
typedef int (*X509_LOOKUP_get_by_subject_ex_fn)(X509_LOOKUP *ctx,
   X509_LOOKUP_TYPE type,
   const X509_NAME *name,
   X509_OBJECT *ret,
   OSSL_LIB_CTX *libctx,
   const char *propq);
typedef int (*X509_LOOKUP_get_by_issuer_serial_fn)(X509_LOOKUP *ctx,
   X509_LOOKUP_TYPE type,
   const X509_NAME *name,
   const ASN1_INTEGER
 *serial,
   X509_OBJECT *ret);
typedef int (*X509_LOOKUP_get_by_fingerprint_fn)(X509_LOOKUP *ctx,
   X509_LOOKUP_TYPE type,
   const unsigned char *bytes,
   int len,
   X509_OBJECT *ret);
typedef int (*X509_LOOKUP_get_by_alias_fn)(X509_LOOKUP *ctx,
   X509_LOOKUP_TYPE type,
   const char *str,
   int len,
   X509_OBJECT *ret);

X509_LOOKUP_METHOD *X509_LOOKUP_meth_new(const char *name);
```

```
void X509_LOOKUP_meth_free(X509_LOOKUP_METHOD *method);

int X509_LOOKUP_meth_set_new_item(X509_LOOKUP_METHOD *method,
   int (*new_item)(X509_LOOKUP *ctx));
int (*X509_LOOKUP_meth_get_new_item(const X509_LOOKUP_METHOD *method))(X509_LOOKUP *ctx);

int X509_LOOKUP_meth_set_free(X509_LOOKUP_METHOD *method,
   void (*free_fn)(X509_LOOKUP *ctx));
void (*X509_LOOKUP_meth_get_free(const X509_LOOKUP_METHOD *method))(X509_LOOKUP *ctx);

int X509_LOOKUP_meth_set_init(X509_LOOKUP_METHOD *method,
   int (*init)(X509_LOOKUP *ctx));
int (*X509_LOOKUP_meth_get_init(const X509_LOOKUP_METHOD *method))(X509_LOOKUP
 *ctx);

int X509_LOOKUP_meth_set_shutdown(X509_LOOKUP_METHOD *method,
   int (*shutdown)(X509_LOOKUP *ctx));
int (*X509_LOOKUP_meth_get_shutdown(const X509_LOOKUP_METHOD *method))(X509_LOOKUP *ctx);

int X509_LOOKUP_meth_set_ctrl(X509_LOOKUP_METHOD *method,
   X509_LOOKUP_ctrl_fn ctrl_fn);
X509_LOOKUP_ctrl_fn X509_LOOKUP_meth_get_ctrl(const X509_LOOKUP_METHOD *method);

int X509_LOOKUP_meth_set_get_by_subject(X509_LOOKUP_METHOD *method,
   X509_LOOKUP_get_by_subject_fn fn);
X509_LOOKUP_get_by_subject_fn X509_LOOKUP_meth_get_get_by_subject(
   const X509_LOOKUP_METHOD *method);

int X509_LOOKUP_meth_set_get_by_issuer_serial(X509_LOOKUP_METHOD *method,
   X509_LOOKUP_get_by_issuer_serial_fn fn);
X509_LOOKUP_get_by_issuer_serial_fn X509_LOOKUP_meth_get_get_by_issuer_serial(
   const X509_LOOKUP_METHOD *method);

int X509_LOOKUP_meth_set_get_by_fingerprint(X509_LOOKUP_METHOD *method,
   X509_LOOKUP_get_by_fingerprint_fn fn);
X509_LOOKUP_get_by_fingerprint_fn X509_LOOKUP_meth_get_get_by_fingerprint(
    const X509_LOOKUP_METHOD *method);

int X509_LOOKUP_meth_set_get_by_alias(X509_LOOKUP_METHOD *method,
   X509_LOOKUP_get_by_alias_fn fn);
X509_LOOKUP_get_by_alias_fn X509_LOOKUP_meth_get_get_by_alias(
   const X509_LOOKUP_METHOD *method);

int X509_STORE_add_cert(X509_STORE *xs, X509 *x);
int X509_STORE_add_crl(X509_STORE *xs, X509_CRL *x);

int X509_STORE_CTX_get_by_subject(const X509_STORE_CTX *vs,
   X509_LOOKUP_TYPE type,
```

```
   const X509_NAME *name, X509_OBJECT *ret);
X509_OBJECT *X509_STORE_CTX_get_obj_by_subject(X509_STORE_CTX *vs,
   X509_LOOKUP_TYPE type,
   const X509_NAME *name);

int X509_LOOKUP_ctrl(X509_LOOKUP *ctx, int cmd, const char *argc,
   long argl, char **ret);
int X509_LOOKUP_ctrl_ex(X509_LOOKUP *ctx, int cmd, const char *argc, long argl,
   char **ret, OSSL_LIB_CTX *libctx, const char *propq);

int X509_load_cert_file(X509_LOOKUP *ctx, const char *file, int type);
int X509_load_cert_file_ex(X509_LOOKUP *ctx, const char *file,
 int type,
   OSSL_LIB_CTX *libctx, const char *propq);
int X509_load_crl_file(X509_LOOKUP *ctx, const char *file, int type);
int X509_load_cert_crl_file(X509_LOOKUP *ctx, const char *file, int type);
int X509_load_cert_crl_file_ex(X509_LOOKUP *ctx, const char *file, int type,
   OSSL_LIB_CTX *libctx, const char *propq);

X509_LOOKUP *X509_LOOKUP_new(X509_LOOKUP_METHOD *method);
void X509_LOOKUP_free(X509_LOOKUP *ctx);
int X509_LOOKUP_init(X509_LOOKUP *ctx);
int X509_LOOKUP_by_subject(X509_LOOKUP *ctx, X509_LOOKUP_TYPE type,
   const X509_NAME *name, X509_OBJECT *ret);
int X509_LOOKUP_by_subject_ex(X509_LOOKUP *ctx, X509_LOOKUP_TYPE type,
   const X509_NAME *name, X509_OBJECT *ret,
   OSSL_LIB_CTX *libctx, const char *propq);
int X509_LOOKUP_by_issuer_serial(X509_LOOKUP *ctx, X509_LOOKUP_TYPE type,
   const X509_NAME *name,
   const ASN1_INTEGER *serial,
   X509_OBJECT *ret);
int X509_LOOKUP_by_fingerprint(X509_LOOKUP *ctx, X509_LOOKUP_TYPE type,
   const unsigned char *bytes,
 int len,
   X509_OBJECT *ret);
int X509_LOOKUP_by_alias(X509_LOOKUP *ctx, X509_LOOKUP_TYPE type,
   const char *str, int len, X509_OBJECT *ret);
int X509_LOOKUP_set_method_data(X509_LOOKUP *ctx, void *data);
void *X509_LOOKUP_get_method_data(const X509_LOOKUP *ctx);
X509_STORE *X509_LOOKUP_get_store(const X509_LOOKUP *ctx);
int X509_LOOKUP_shutdown(X509_LOOKUP *ctx);

int X509_STORE_load_file(X509_STORE *xs, const char *file);
int X509_STORE_load_path(X509_STORE *xs, const char *path);
int X509_STORE_load_store(X509_STORE *xs, const char *store);
int X509_STORE_load_locations(X509_STORE *s, const char *file, const char *dir);
int X509_STORE_set_default_paths(X509_STORE *xs);
```

```
int X509_STORE_load_file_ex(X509_STORE *xs, const char *file,
   OSSL_LIB_CTX *libctx, const char *propq);
int X509_STORE_load_store_ex(X509_STORE *xs, const char *store,
   OSSL_LIB_CTX *libctx, const char *propq);
int X509_STORE_load_locations_ex(X509_STORE *xs,
   const char *file, const char *dir,
   OSSL_LIB_CTX
 *libctx, const char *propq);
int X509_STORE_set_default_paths_ex(X509_STORE *xs,
   OSSL_LIB_CTX *libctx, const char *propq);

#define X509_STORE_CTX_get_ex_new_index(l, p, newf, dupf, freef) \
   CRYPTO_get_ex_new_index(CRYPTO_EX_INDEX_X509_STORE_CTX, l, p, newf, dupf, freef)
int X509_STORE_CTX_set_ex_data(X509_STORE_CTX *ctx, int idx, void *data);
void *X509_STORE_CTX_get_ex_data(const X509_STORE_CTX *ctx, int idx);
int X509_STORE_CTX_get_error(const X509_STORE_CTX *ctx);
void X509_STORE_CTX_set_error(X509_STORE_CTX *ctx, int s);
int X509_STORE_CTX_get_error_depth(const X509_STORE_CTX *ctx);
void X509_STORE_CTX_set_error_depth(X509_STORE_CTX *ctx, int depth);
X509 *X509_STORE_CTX_get_current_cert(const X509_STORE_CTX *ctx);
void X509_STORE_CTX_set_current_cert(X509_STORE_CTX *ctx, X509 *x);
X509 *X509_STORE_CTX_get0_current_issuer(const X509_STORE_CTX *ctx);
X509_CRL *X509_STORE_CTX_get0_current_crl(const X509_STORE_CTX *ctx);
X509_STORE_CTX *X509_STORE_CTX_get0_parent_ctx(const
 X509_STORE_CTX *ctx);
STACK_OF(X509) *X509_STORE_CTX_get0_chain(const X509_STORE_CTX *ctx);
STACK_OF(X509) *X509_STORE_CTX_get1_chain(const X509_STORE_CTX *ctx);
void X509_STORE_CTX_set_cert(X509_STORE_CTX *ctx, X509 *target);
void X509_STORE_CTX_set0_rpk(X509_STORE_CTX *ctx, EVP_PKEY *target);
void X509_STORE_CTX_set0_verified_chain(X509_STORE_CTX *c, STACK_OF(X509) *sk);
void X509_STORE_CTX_set0_crls(X509_STORE_CTX *ctx, STACK_OF(X509_CRL) *sk);
int X509_STORE_CTX_set_purpose(X509_STORE_CTX *ctx, int purpose);
int X509_STORE_CTX_set_trust(X509_STORE_CTX *ctx, int trust);
int X509_STORE_CTX_purpose_inherit(X509_STORE_CTX *ctx, int def_purpose,
   int purpose, int trust);
void X509_STORE_CTX_set_flags(X509_STORE_CTX *ctx, unsigned long flags);
void X509_STORE_CTX_set_time(X509_STORE_CTX *ctx, unsigned long flags,
   time_t t);
void X509_STORE_CTX_set_current_reasons(X509_STORE_CTX *ctx,
   unsigned int current_reasons);

X509_POLICY_TREE *X509_STORE_CTX_get0_policy_tree(const
 X509_STORE_CTX *ctx);
int X509_STORE_CTX_get_explicit_policy(const X509_STORE_CTX *ctx);
int X509_STORE_CTX_get_num_untrusted(const X509_STORE_CTX *ctx);

X509_VERIFY_PARAM *X509_STORE_CTX_get0_param(const X509_STORE_CTX *ctx);
void X509_STORE_CTX_set0_param(X509_STORE_CTX *ctx, X509_VERIFY_PARAM *param);
```

```
int X509_STORE_CTX_set_default(X509_STORE_CTX *ctx, const char *name);

/*
* Bridge opacity barrier between libcrypt and libssl, also needed to support
* offline testing in test/danetest.c
*/
void X509_STORE_CTX_set0_dane(X509_STORE_CTX *ctx, SSL_DANE *dane);
#define DANE_FLAG_NO_DANE_EE_NAMECHECKS (1L << 0)

/* X509_VERIFY_PARAM functions */

X509_VERIFY_PARAM *X509_VERIFY_PARAM_new(void);
void X509_VERIFY_PARAM_free(X509_VERIFY_PARAM *param);
int X509_VERIFY_PARAM_inherit(X509_VERIFY_PARAM *to,
   const X509_VERIFY_PARAM *from);
int X509_VERIFY_PARAM_set1(X509_VERIFY_PARAM *to,
   const X509_VERIFY_PARAM *from);
int X509_VERIFY_PARAM_set1_name(X509_VERIFY_PARAM *param, const
 char *name);
int X509_VERIFY_PARAM_set_flags(X509_VERIFY_PARAM *param,
   unsigned long flags);
int X509_VERIFY_PARAM_clear_flags(X509_VERIFY_PARAM *param,
   unsigned long flags);
unsigned long X509_VERIFY_PARAM_get_flags(const X509_VERIFY_PARAM *param);
int X509_VERIFY_PARAM_set_purpose(X509_VERIFY_PARAM *param, int purpose);
int X509_VERIFY_PARAM_get_purpose(const X509_VERIFY_PARAM *param);
int X509_VERIFY_PARAM_set_trust(X509_VERIFY_PARAM *param, int trust);
void X509_VERIFY_PARAM_set_depth(X509_VERIFY_PARAM *param, int depth);
void X509_VERIFY_PARAM_set_auth_level(X509_VERIFY_PARAM *param, int auth_level);
time_t X509_VERIFY_PARAM_get_time(const X509_VERIFY_PARAM *param);
void X509_VERIFY_PARAM_set_time(X509_VERIFY_PARAM *param, time_t t);
int X509_VERIFY_PARAM_add0_policy(X509_VERIFY_PARAM *param,
   ASN1_OBJECT *policy);
int X509_VERIFY_PARAM_set1_policies(X509_VERIFY_PARAM *param,
   STACK_OF(ASN1_OBJECT) *policies);

int X509_VERIFY_PARAM_set_inh_flags(X509_VERIFY_PARAM *param,
    uint32_t flags);
uint32_t X509_VERIFY_PARAM_get_inh_flags(const X509_VERIFY_PARAM *param);

char *X509_VERIFY_PARAM_get0_host(X509_VERIFY_PARAM *param, int idx);
int X509_VERIFY_PARAM_set1_host(X509_VERIFY_PARAM *param,
   const char *name, size_t namelen);
int X509_VERIFY_PARAM_add1_host(X509_VERIFY_PARAM *param,
   const char *name, size_t namelen);
void X509_VERIFY_PARAM_set_hostflags(X509_VERIFY_PARAM *param,
   unsigned int flags);
unsigned int X509_VERIFY_PARAM_get_hostflags(const X509_VERIFY_PARAM *param);
```

```
char *X509_VERIFY_PARAM_get0_peername(const X509_VERIFY_PARAM *param);
void X509_VERIFY_PARAM_move_peername(X509_VERIFY_PARAM *, X509_VERIFY_PARAM *);
char *X509_VERIFY_PARAM_get0_email(X509_VERIFY_PARAM *param);
int X509_VERIFY_PARAM_set1_email(X509_VERIFY_PARAM *param,
   const char *email, size_t emaillen);
char *X509_VERIFY_PARAM_get1_ip_asc(X509_VERIFY_PARAM *param);
int X509_VERIFY_PARAM_set1_ip(X509_VERIFY_PARAM *param,
   const unsigned char *ip, size_t
 iplen);
int X509_VERIFY_PARAM_set1_ip_asc(X509_VERIFY_PARAM *param,
   const char *ipasc);

int X509_VERIFY_PARAM_get_depth(const X509_VERIFY_PARAM *param);
int X509_VERIFY_PARAM_get_auth_level(const X509_VERIFY_PARAM *param);
const char *X509_VERIFY_PARAM_get0_name(const X509_VERIFY_PARAM *param);

int X509_VERIFY_PARAM_add0_table(X509_VERIFY_PARAM *param);
int X509_VERIFY_PARAM_get_count(void);
const X509_VERIFY_PARAM *X509_VERIFY_PARAM_get0(int id);
const X509_VERIFY_PARAM *X509_VERIFY_PARAM_lookup(const char *name);
void X509_VERIFY_PARAM_table_cleanup(void);

/* Non positive return values are errors */
#define X509_PCY_TREE_FAILURE -2 /* Failure to satisfy explicit policy */
#define X509_PCY_TREE_INVALID -1 /* Inconsistent or invalid extensions */
#define X509_PCY_TREE_INTERNAL 0 /* Internal error, most likely malloc */

/*
* Positive return values form a bit mask, all but the first are internal to
* the library and don't appear in results from X509_policy_check().
*/
#define
 X509_PCY_TREE_VALID 1 /* The policy tree is valid */
#define X509_PCY_TREE_EMPTY 2 /* The policy tree is empty */
#define X509_PCY_TREE_EXPLICIT 4 /* Explicit policy required */

int X509_policy_check(X509_POLICY_TREE **ptree, int *pexplicit_policy,
   STACK_OF(X509) *certs,
   STACK_OF(ASN1_OBJECT) *policy_oids, unsigned int flags);

void X509_policy_tree_free(X509_POLICY_TREE *tree);

int X509_policy_tree_level_count(const X509_POLICY_TREE *tree);
X509_POLICY_LEVEL *X509_policy_tree_get0_level(const X509_POLICY_TREE *tree,
   int i);

STACK_OF(X509_POLICY_NODE)
*X509_policy_tree_get0_policies(const X509_POLICY_TREE *tree);
```

```
STACK_OF(X509_POLICY_NODE)
*X509_policy_tree_get0_user_policies(const X509_POLICY_TREE *tree);

int X509_policy_level_node_count(X509_POLICY_LEVEL *level);

X509_POLICY_NODE *X509_policy_level_get0_node(const X509_POLICY_LEVEL *level,
   int i);

const ASN1_OBJECT *X509_policy_node_get0_policy(const X509_POLICY_NODE *node);

STACK_OF(POLICYQUALINFO)
*X509_policy_node_get0_qualifiers(const
 X509_POLICY_NODE *node);
const X509_POLICY_NODE *X509_policy_node_get0_parent(const X509_POLICY_NODE *node);

#ifdef __cplusplus
}
#endif
#endif
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/x509v3.h.in
*
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*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_X509V3_H
#define OPENSSL_X509V3_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_X509V3_H
```

```
#endif

#include <openssl/bio.h>
#include <openssl/x509.h>
#include <openssl/conf.h>
#include <openssl/x509v3err.h>
#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif

#ifdef __cplusplus
extern "C" {
#endif

/* Forward reference */
struct v3_ext_method;
struct v3_ext_ctx;

/* Useful typedefs */

typedef void *(*X509V3_EXT_NEW)(void);
typedef void (*X509V3_EXT_FREE)(void *);
typedef
 void *(*X509V3_EXT_D2I)(void *, const unsigned char **, long);
typedef int (*X509V3_EXT_I2D)(const void *, unsigned char **);
typedef STACK_OF(CONF_VALUE) *(*X509V3_EXT_I2V)(const struct v3_ext_method *method, void *ext,
   STACK_OF(CONF_VALUE) *extlist);
typedef void *(*X509V3_EXT_V2I)(const struct v3_ext_method *method,
   struct v3_ext_ctx *ctx,
   STACK_OF(CONF_VALUE) *values);
typedef char *(*X509V3_EXT_I2S)(const struct v3_ext_method *method,
   void *ext);
typedef void *(*X509V3_EXT_S2I)(const struct v3_ext_method *method,
   struct v3_ext_ctx *ctx, const char *str);
typedef int (*X509V3_EXT_I2R)(const struct v3_ext_method *method, void *ext,
   BIO *out, int indent);
typedef void *(*X509V3_EXT_R2I)(const struct v3_ext_method *method,
   struct v3_ext_ctx *ctx, const char *str);

/* V3 extension structure */

struct v3_ext_method {
   int ext_nid;
   int ext_flags;
   /* If this is set the following four fields are ignored */
   ASN1_ITEM_EXP *it;
   /* Old style
```

```
 ASN1 calls */
   X509V3_EXT_NEW ext_new;
   X509V3_EXT_FREE ext_free;
   X509V3_EXT_D2I d2i;
   X509V3_EXT_I2D i2d;
   /* The following pair is used for string extensions */
   X509V3_EXT_I2S i2s;
   X509V3_EXT_S2I s2i;
   /* The following pair is used for multi-valued extensions */
   X509V3_EXT_I2V i2v;
   X509V3_EXT_V2I v2i;
   /* The following are used for raw extensions */
   X509V3_EXT_I2R i2r;
   X509V3_EXT_R2I r2i;
   void *usr_data; /* Any extension specific data */
};

typedef struct X509V3_CONF_METHOD_st {
   char *(*get_string)(void *db, const char *section, const char *value);
   STACK_OF(CONF_VALUE) *(*get_section)(void *db, const char *section);
   void (*free_string)(void *db, char *string);
   void (*free_section)(void *db, STACK_OF(CONF_VALUE) *section);
} X509V3_CONF_METHOD;

/* Context specific info for producing X509 v3 extensions*/
struct v3_ext_ctx {
#define X509V3_CTX_TEST 0x1
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define CTX_TEST X509V3_CTX_TEST
#endif
#define
 X509V3_CTX_REPLACE 0x2
   int flags;
   X509 *issuer_cert;
   X509 *subject_cert;
   X509_REQ *subject_req;
   X509_CRL *crl;
   X509V3_CONF_METHOD *db_meth;
   void *db;
   EVP_PKEY *issuer_pkey;
   /* Maybe more here */
};

typedef struct v3_ext_method X509V3_EXT_METHOD;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509V3_EXT_METHOD, X509V3_EXT_METHOD,
X509V3_EXT_METHOD)
```

```
#define sk_X509V3_EXT_METHOD_num(sk)
OPENSSL_sk_num(ossl_check_const_X509V3_EXT_METHOD_sk_type(sk))
#define sk_X509V3_EXT_METHOD_value(sk, idx) ((X509V3_EXT_METHOD
*)OPENSSL_sk_value(ossl_check_const_X509V3_EXT_METHOD_sk_type(sk), (idx)))
#define sk_X509V3_EXT_METHOD_new(cmp) ((STACK_OF(X509V3_EXT_METHOD)
*)OPENSSL_sk_new(ossl_check_X509V3_EXT_METHOD_compfunc_type(cmp)))
#define sk_X509V3_EXT_METHOD_new_null() ((STACK_OF(X509V3_EXT_METHOD)
*)OPENSSL_sk_new_null())
#define sk_X509V3_EXT_METHOD_new_reserve(cmp, n) ((STACK_OF(X509V3_EXT_METHOD)
*)OPENSSL_sk_new_reserve(ossl_check_X509V3_EXT_METHOD_compfunc_type(cmp),
 (n)))
#define sk_X509V3_EXT_METHOD_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_X509V3_EXT_METHOD_sk_type(sk), (n))
#define sk_X509V3_EXT_METHOD_free(sk)
OPENSSL_sk_free(ossl_check_X509V3_EXT_METHOD_sk_type(sk))
#define sk_X509V3_EXT_METHOD_zero(sk)
OPENSSL_sk_zero(ossl_check_X509V3_EXT_METHOD_sk_type(sk))
#define sk_X509V3_EXT_METHOD_delete(sk, i) ((X509V3_EXT_METHOD
*)OPENSSL_sk_delete(ossl_check_X509V3_EXT_METHOD_sk_type(sk), (i)))
#define sk_X509V3_EXT_METHOD_delete_ptr(sk, ptr) ((X509V3_EXT_METHOD
*)OPENSSL_sk_delete_ptr(ossl_check_X509V3_EXT_METHOD_sk_type(sk),
ossl_check_X509V3_EXT_METHOD_type(ptr)))
#define sk_X509V3_EXT_METHOD_push(sk, ptr)
OPENSSL_sk_push(ossl_check_X509V3_EXT_METHOD_sk_type(sk),
ossl_check_X509V3_EXT_METHOD_type(ptr))
#define sk_X509V3_EXT_METHOD_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_X509V3_EXT_METHOD_sk_type(sk),
ossl_check_X509V3_EXT_METHOD_type(ptr))
#define sk_X509V3_EXT_METHOD_pop(sk) ((X509V3_EXT_METHOD
*)OPENSSL_sk_pop(ossl_check_X509V3_EXT_METHOD_sk_type(sk)))
#define
 sk_X509V3_EXT_METHOD_shift(sk) ((X509V3_EXT_METHOD
*)OPENSSL_sk_shift(ossl_check_X509V3_EXT_METHOD_sk_type(sk)))
#define sk_X509V3_EXT_METHOD_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509V3_EXT_METHOD_sk_type(sk),ossl_check_X509V3_EXT_METHOD
_freefunc_type(freefunc))
#define sk_X509V3_EXT_METHOD_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_X509V3_EXT_METHOD_sk_type(sk),
ossl_check_X509V3_EXT_METHOD_type(ptr), (idx))
#define sk_X509V3_EXT_METHOD_set(sk, idx, ptr) ((X509V3_EXT_METHOD
*)OPENSSL_sk_set(ossl_check_X509V3_EXT_METHOD_sk_type(sk), (idx),
ossl_check_X509V3_EXT_METHOD_type(ptr)))
#define sk_X509V3_EXT_METHOD_find(sk, ptr)
OPENSSL_sk_find(ossl_check_X509V3_EXT_METHOD_sk_type(sk),
ossl_check_X509V3_EXT_METHOD_type(ptr))
#define sk_X509V3_EXT_METHOD_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_X509V3_EXT_METHOD_sk_type(sk),
ossl_check_X509V3_EXT_METHOD_type(ptr))
```

```
#define sk_X509V3_EXT_METHOD_find_all(sk, ptr,
 pnum) OPENSSL_sk_find_all(ossl_check_X509V3_EXT_METHOD_sk_type(sk),
ossl_check_X509V3_EXT_METHOD_type(ptr), pnum)
#define sk_X509V3_EXT_METHOD_sort(sk)
OPENSSL_sk_sort(ossl_check_X509V3_EXT_METHOD_sk_type(sk))
#define sk_X509V3_EXT_METHOD_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_X509V3_EXT_METHOD_sk_type(sk))
#define sk_X509V3_EXT_METHOD_dup(sk) ((STACK_OF(X509V3_EXT_METHOD)
*)OPENSSL_sk_dup(ossl_check_const_X509V3_EXT_METHOD_sk_type(sk)))
#define sk_X509V3_EXT_METHOD_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(X509V3_EXT_METHOD)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509V3_EXT_METHOD_sk_type(sk),
ossl_check_X509V3_EXT_METHOD_copyfunc_type(copyfunc),
ossl_check_X509V3_EXT_METHOD_freefunc_type(freefunc)))
#define sk_X509V3_EXT_METHOD_set_cmp_func(sk, cmp)
((sk_X509V3_EXT_METHOD_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509V3_EXT_METHOD_sk
_type(sk), ossl_check_X509V3_EXT_METHOD_compfunc_type(cmp)))

/* clang-format on */

/* ext_flags values */
#define X509V3_EXT_DYNAMIC
 0x1
#define X509V3_EXT_CTX_DEP 0x2
#define X509V3_EXT_MULTILINE 0x4

typedef BIT_STRING_BITNAME ENUMERATED_NAMES;

typedef struct BASIC_CONSTRAINTS_st {
  int ca;
  ASN1_INTEGER *pathlen;
} BASIC_CONSTRAINTS;

typedef struct OSSL_BASIC_ATTR_CONSTRAINTS_st {
  int authority;
  ASN1_INTEGER *pathlen;
} OSSL_BASIC_ATTR_CONSTRAINTS;

typedef struct PKEY_USAGE_PERIOD_st {
  ASN1_GENERALIZEDTIME *notBefore;
  ASN1_GENERALIZEDTIME *notAfter;
} PKEY_USAGE_PERIOD;

typedef struct otherName_st {
  ASN1_OBJECT *type_id;
  ASN1_TYPE *value;
} OTHERNAME;
```

```
typedef struct EDIPartyName_st {
   ASN1_STRING *nameAssigner;
   ASN1_STRING *partyName;
} EDIPARTYNAME;

typedef struct GENERAL_NAME_st {
#define GEN_OTHERNAME 0
#define GEN_EMAIL 1
#define GEN_DNS 2
#define GEN_X400 3
#define GEN_DIRNAME 4
#define GEN_EDIPARTY 5
#define GEN_URI 6
#define GEN_IPADD 7
#define GEN_RID 8
   int type;
   union {
       char *ptr;
       OTHERNAME *otherName; /* otherName */
       ASN1_IA5STRING
 *rfc822Name;
       ASN1_IA5STRING *dNSName;
       ASN1_STRING *x400Address;
       X509_NAME *directoryName;
       EDIPARTYNAME *ediPartyName;
       ASN1_IA5STRING *uniformResourceIdentifier;
       ASN1_OCTET_STRING *iPAddress;
       ASN1_OBJECT *registeredID;
       /* Old names */
       ASN1_OCTET_STRING *ip; /* iPAddress */
       X509_NAME *dirn; /* dirn */
       ASN1_IA5STRING *ia5; /* rfc822Name, dNSName,
                         * uniformResourceIdentifier */
       ASN1_OBJECT *rid; /* registeredID */
       ASN1_TYPE *other; /* x400Address */
   } d;
} GENERAL_NAME;

typedef struct ACCESS_DESCRIPTION_st {
   ASN1_OBJECT *method;
   GENERAL_NAME *location;
} ACCESS_DESCRIPTION;

int GENERAL_NAME_set1_X509_NAME(GENERAL_NAME **tgt, const X509_NAME *src);

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ACCESS_DESCRIPTION, ACCESS_DESCRIPTION,
ACCESS_DESCRIPTION)
```

```
#define sk_ACCESS_DESCRIPTION_num(sk)
OPENSSL_sk_num(ossl_check_const_ACCESS_DESCRIPTION_sk_type(sk))
#define
 sk_ACCESS_DESCRIPTION_value(sk, idx) ((ACCESS_DESCRIPTION
*)OPENSSL_sk_value(ossl_check_const_ACCESS_DESCRIPTION_sk_type(sk), (idx)))
#define sk_ACCESS_DESCRIPTION_new(cmp) ((STACK_OF(ACCESS_DESCRIPTION)
*)OPENSSL_sk_new(ossl_check_ACCESS_DESCRIPTION_compfunc_type(cmp)))
#define sk_ACCESS_DESCRIPTION_new_null() ((STACK_OF(ACCESS_DESCRIPTION)
*)OPENSSL_sk_new_null())
#define sk_ACCESS_DESCRIPTION_new_reserve(cmp, n) ((STACK_OF(ACCESS_DESCRIPTION)
*)OPENSSL_sk_new_reserve(ossl_check_ACCESS_DESCRIPTION_compfunc_type(cmp), (n)))
#define sk_ACCESS_DESCRIPTION_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_ACCESS_DESCRIPTION_sk_type(sk), (n))
#define sk_ACCESS_DESCRIPTION_free(sk)
OPENSSL_sk_free(ossl_check_ACCESS_DESCRIPTION_sk_type(sk))
#define sk_ACCESS_DESCRIPTION_zero(sk)
OPENSSL_sk_zero(ossl_check_ACCESS_DESCRIPTION_sk_type(sk))
#define sk_ACCESS_DESCRIPTION_delete(sk, i) ((ACCESS_DESCRIPTION
*)OPENSSL_sk_delete(ossl_check_ACCESS_DESCRIPTION_sk_type(sk), (i)))
#define
 sk_ACCESS_DESCRIPTION_delete_ptr(sk, ptr) ((ACCESS_DESCRIPTION
*)OPENSSL_sk_delete_ptr(ossl_check_ACCESS_DESCRIPTION_sk_type(sk),
ossl_check_ACCESS_DESCRIPTION_type(ptr)))
#define sk_ACCESS_DESCRIPTION_push(sk, ptr)
OPENSSL_sk_push(ossl_check_ACCESS_DESCRIPTION_sk_type(sk),
ossl_check_ACCESS_DESCRIPTION_type(ptr))
#define sk_ACCESS_DESCRIPTION_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_ACCESS_DESCRIPTION_sk_type(sk),
ossl_check_ACCESS_DESCRIPTION_type(ptr))
#define sk_ACCESS_DESCRIPTION_pop(sk) ((ACCESS_DESCRIPTION
*)OPENSSL_sk_pop(ossl_check_ACCESS_DESCRIPTION_sk_type(sk)))
#define sk_ACCESS_DESCRIPTION_shift(sk) ((ACCESS_DESCRIPTION
*)OPENSSL_sk_shift(ossl_check_ACCESS_DESCRIPTION_sk_type(sk)))
#define sk_ACCESS_DESCRIPTION_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ACCESS_DESCRIPTION_sk_type(sk),ossl_check_ACCESS_DESCRIPTIO
N_freefunc_type(freefunc))
#define sk_ACCESS_DESCRIPTION_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_ACCESS_DESCRIPTION_sk_type(sk),
 ossl_check_ACCESS_DESCRIPTION_type(ptr), (idx))
#define sk_ACCESS_DESCRIPTION_set(sk, idx, ptr) ((ACCESS_DESCRIPTION
*)OPENSSL_sk_set(ossl_check_ACCESS_DESCRIPTION_sk_type(sk), (idx),
ossl_check_ACCESS_DESCRIPTION_type(ptr)))
#define sk_ACCESS_DESCRIPTION_find(sk, ptr)
OPENSSL_sk_find(ossl_check_ACCESS_DESCRIPTION_sk_type(sk),
ossl_check_ACCESS_DESCRIPTION_type(ptr))
#define sk_ACCESS_DESCRIPTION_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_ACCESS_DESCRIPTION_sk_type(sk),
ossl_check_ACCESS_DESCRIPTION_type(ptr))
```

```
#define sk_ACCESS_DESCRIPTION_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ACCESS_DESCRIPTION_sk_type(sk),
ossl_check_ACCESS_DESCRIPTION_type(ptr), pnum)
#define sk_ACCESS_DESCRIPTION_sort(sk)
OPENSSL_sk_sort(ossl_check_ACCESS_DESCRIPTION_sk_type(sk))
#define sk_ACCESS_DESCRIPTION_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_ACCESS_DESCRIPTION_sk_type(sk))
#define sk_ACCESS_DESCRIPTION_dup(sk) ((STACK_OF(ACCESS_DESCRIPTION)
*)OPENSSL_sk_dup(ossl_check_const_ACCESS_DESCRIPTION_sk_type(sk)))
#define
 sk_ACCESS_DESCRIPTION_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ACCESS_DESCRIPTION)
*)OPENSSL_sk_deep_copy(ossl_check_const_ACCESS_DESCRIPTION_sk_type(sk),
ossl_check_ACCESS_DESCRIPTION_copyfunc_type(copyfunc),
ossl_check_ACCESS_DESCRIPTION_freefunc_type(freefunc)))
#define sk_ACCESS_DESCRIPTION_set_cmp_func(sk, cmp)
((sk_ACCESS_DESCRIPTION_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ACCESS_DESCRIPTION_s
k_type(sk), ossl_check_ACCESS_DESCRIPTION_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(GENERAL_NAME, GENERAL_NAME, GENERAL_NAME)
#define sk_GENERAL_NAME_num(sk) OPENSSL_sk_num(ossl_check_const_GENERAL_NAME_sk_type(sk))
#define sk_GENERAL_NAME_value(sk, idx) ((GENERAL_NAME
*)OPENSSL_sk_value(ossl_check_const_GENERAL_NAME_sk_type(sk), (idx)))
#define sk_GENERAL_NAME_new(cmp) ((STACK_OF(GENERAL_NAME)
*)OPENSSL_sk_new(ossl_check_GENERAL_NAME_compfunc_type(cmp)))
#define sk_GENERAL_NAME_new_null() ((STACK_OF(GENERAL_NAME) *)OPENSSL_sk_new_null())
#define
 sk_GENERAL_NAME_new_reserve(cmp, n) ((STACK_OF(GENERAL_NAME)
*)OPENSSL_sk_new_reserve(ossl_check_GENERAL_NAME_compfunc_type(cmp), (n)))
#define sk_GENERAL_NAME_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_GENERAL_NAME_sk_type(sk),
(n))
#define sk_GENERAL_NAME_free(sk) OPENSSL_sk_free(ossl_check_GENERAL_NAME_sk_type(sk))
#define sk_GENERAL_NAME_zero(sk) OPENSSL_sk_zero(ossl_check_GENERAL_NAME_sk_type(sk))
#define sk_GENERAL_NAME_delete(sk, i) ((GENERAL_NAME
*)OPENSSL_sk_delete(ossl_check_GENERAL_NAME_sk_type(sk), (i)))
#define sk_GENERAL_NAME_delete_ptr(sk, ptr) ((GENERAL_NAME
*)OPENSSL_sk_delete_ptr(ossl_check_GENERAL_NAME_sk_type(sk),
ossl_check_GENERAL_NAME_type(ptr)))
#define sk_GENERAL_NAME_push(sk, ptr) OPENSSL_sk_push(ossl_check_GENERAL_NAME_sk_type(sk),
ossl_check_GENERAL_NAME_type(ptr))
#define sk_GENERAL_NAME_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_GENERAL_NAME_sk_type(sk), ossl_check_GENERAL_NAME_type(ptr))
#define sk_GENERAL_NAME_pop(sk) ((GENERAL_NAME
 *)OPENSSL_sk_pop(ossl_check_GENERAL_NAME_sk_type(sk)))
#define sk_GENERAL_NAME_shift(sk) ((GENERAL_NAME
*)OPENSSL_sk_shift(ossl_check_GENERAL_NAME_sk_type(sk)))
#define sk_GENERAL_NAME_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_GENERAL_NAME_sk_type(sk),ossl_check_GENERAL_NAME_freefunc_ty
pe(freefunc))
#define sk_GENERAL_NAME_insert(sk, ptr, idx)
```

```
OPENSSL_sk_insert(ossl_check_GENERAL_NAME_sk_type(sk), ossl_check_GENERAL_NAME_type(ptr),
(idx))
#define sk_GENERAL_NAME_set(sk, idx, ptr) ((GENERAL_NAME
*)OPENSSL_sk_set(ossl_check_GENERAL_NAME_sk_type(sk), (idx),
ossl_check_GENERAL_NAME_type(ptr)))
#define sk_GENERAL_NAME_find(sk, ptr) OPENSSL_sk_find(ossl_check_GENERAL_NAME_sk_type(sk),
ossl_check_GENERAL_NAME_type(ptr))
#define sk_GENERAL_NAME_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_GENERAL_NAME_sk_type(sk), ossl_check_GENERAL_NAME_type(ptr))
#define sk_GENERAL_NAME_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_GENERAL_NAME_sk_type(sk), ossl_check_GENERAL_NAME_type(ptr),
 pnum)
#define sk_GENERAL_NAME_sort(sk) OPENSSL_sk_sort(ossl_check_GENERAL_NAME_sk_type(sk))
#define sk_GENERAL_NAME_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_GENERAL_NAME_sk_type(sk))
#define sk_GENERAL_NAME_dup(sk) ((STACK_OF(GENERAL_NAME)
*)OPENSSL_sk_dup(ossl_check_const_GENERAL_NAME_sk_type(sk)))
#define sk_GENERAL_NAME_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(GENERAL_NAME)
*)OPENSSL_sk_deep_copy(ossl_check_const_GENERAL_NAME_sk_type(sk),
ossl_check_GENERAL_NAME_copyfunc_type(copyfunc),
ossl_check_GENERAL_NAME_freefunc_type(freefunc)))
#define sk_GENERAL_NAME_set_cmp_func(sk, cmp)
((sk_GENERAL_NAME_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_GENERAL_NAME_sk_type(sk),
ossl_check_GENERAL_NAME_compfunc_type(cmp)))

/* clang-format on */

typedef STACK_OF(ACCESS_DESCRIPTION) AUTHORITY_INFO_ACCESS;
typedef STACK_OF(ASN1_OBJECT) EXTENDED_KEY_USAGE;
typedef STACK_OF(ASN1_INTEGER) TLS_FEATURE;
typedef STACK_OF(GENERAL_NAME) GENERAL_NAMES;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(GENERAL_NAMES,
 GENERAL_NAMES, GENERAL_NAMES)
#define sk_GENERAL_NAMES_num(sk)
OPENSSL_sk_num(ossl_check_const_GENERAL_NAMES_sk_type(sk))
#define sk_GENERAL_NAMES_value(sk, idx) ((GENERAL_NAMES
*)OPENSSL_sk_value(ossl_check_const_GENERAL_NAMES_sk_type(sk), (idx)))
#define sk_GENERAL_NAMES_new(cmp) ((STACK_OF(GENERAL_NAMES)
*)OPENSSL_sk_new(ossl_check_GENERAL_NAMES_compfunc_type(cmp)))
#define sk_GENERAL_NAMES_new_null() ((STACK_OF(GENERAL_NAMES) *)OPENSSL_sk_new_null())
#define sk_GENERAL_NAMES_new_reserve(cmp, n) ((STACK_OF(GENERAL_NAMES)
*)OPENSSL_sk_new_reserve(ossl_check_GENERAL_NAMES_compfunc_type(cmp), (n)))
#define sk_GENERAL_NAMES_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_GENERAL_NAMES_sk_type(sk), (n))
#define sk_GENERAL_NAMES_free(sk) OPENSSL_sk_free(ossl_check_GENERAL_NAMES_sk_type(sk))
#define sk_GENERAL_NAMES_zero(sk) OPENSSL_sk_zero(ossl_check_GENERAL_NAMES_sk_type(sk))
```

```
#define sk_GENERAL_NAMES_delete(sk, i) ((GENERAL_NAMES
*)OPENSSL_sk_delete(ossl_check_GENERAL_NAMES_sk_type(sk),
 (i)))
#define sk_GENERAL_NAMES_delete_ptr(sk, ptr) ((GENERAL_NAMES
*)OPENSSL_sk_delete_ptr(ossl_check_GENERAL_NAMES_sk_type(sk),
ossl_check_GENERAL_NAMES_type(ptr)))
#define sk_GENERAL_NAMES_push(sk, ptr) OPENSSL_sk_push(ossl_check_GENERAL_NAMES_sk_type(sk),
ossl_check_GENERAL_NAMES_type(ptr))
#define sk_GENERAL_NAMES_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_GENERAL_NAMES_sk_type(sk), ossl_check_GENERAL_NAMES_type(ptr))
#define sk_GENERAL_NAMES_pop(sk) ((GENERAL_NAMES
*)OPENSSL_sk_pop(ossl_check_GENERAL_NAMES_sk_type(sk)))
#define sk_GENERAL_NAMES_shift(sk) ((GENERAL_NAMES
*)OPENSSL_sk_shift(ossl_check_GENERAL_NAMES_sk_type(sk)))
#define sk_GENERAL_NAMES_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_GENERAL_NAMES_sk_type(sk),ossl_check_GENERAL_NAMES_freefunc
_type(freefunc))
#define sk_GENERAL_NAMES_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_GENERAL_NAMES_sk_type(sk), ossl_check_GENERAL_NAMES_type(ptr),
(idx))
#define sk_GENERAL_NAMES_set(sk,
 idx, ptr) ((GENERAL_NAMES *)OPENSSL_sk_set(ossl_check_GENERAL_NAMES_sk_type(sk), (idx),
ossl_check_GENERAL_NAMES_type(ptr)))
#define sk_GENERAL_NAMES_find(sk, ptr) OPENSSL_sk_find(ossl_check_GENERAL_NAMES_sk_type(sk),
ossl_check_GENERAL_NAMES_type(ptr))
#define sk_GENERAL_NAMES_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_GENERAL_NAMES_sk_type(sk), ossl_check_GENERAL_NAMES_type(ptr))
#define sk_GENERAL_NAMES_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_GENERAL_NAMES_sk_type(sk), ossl_check_GENERAL_NAMES_type(ptr),
pnum)
#define sk_GENERAL_NAMES_sort(sk) OPENSSL_sk_sort(ossl_check_GENERAL_NAMES_sk_type(sk))
#define sk_GENERAL_NAMES_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_GENERAL_NAMES_sk_type(sk))
#define sk_GENERAL_NAMES_dup(sk) ((STACK_OF(GENERAL_NAMES)
*)OPENSSL_sk_dup(ossl_check_const_GENERAL_NAMES_sk_type(sk)))
#define sk_GENERAL_NAMES_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(GENERAL_NAMES)
*)OPENSSL_sk_deep_copy(ossl_check_const_GENERAL_NAMES_sk_type(sk),
 ossl_check_GENERAL_NAMES_copyfunc_type(copyfunc),
ossl_check_GENERAL_NAMES_freefunc_type(freefunc)))
#define sk_GENERAL_NAMES_set_cmp_func(sk, cmp)
((sk_GENERAL_NAMES_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_GENERAL_NAMES_sk_type(sk),
ossl_check_GENERAL_NAMES_compfunc_type(cmp)))

/* clang-format on */

typedef struct DIST_POINT_NAME_st {
   int type;
   union {
```

```
    GENERAL_NAMES *fullname;
    STACK_OF(X509_NAME_ENTRY) *relativename;
  } name;
  /* If relativename then this contains the full distribution point name */
  X509_NAME *dpname;
} DIST_POINT_NAME;
DECLARE_ASN1_DUP_FUNCTION(DIST_POINT_NAME)
/* All existing reasons */
#define CRLDP_ALL_REASONS 0x807f

#define CRL_REASON_NONE -1
#define CRL_REASON_UNSPECIFIED 0
#define CRL_REASON_KEY_COMPROMISE 1
#define CRL_REASON_CA_COMPROMISE 2
#define CRL_REASON_AFFILIATION_CHANGED 3
#define CRL_REASON_SUPERSEDED 4
#define CRL_REASON_CESSATION_OF_OPERATION 5
#define CRL_REASON_CERTIFICATE_HOLD 6
#define CRL_REASON_REMOVE_FROM_CRL
 8
#define CRL_REASON_PRIVILEGE_WITHDRAWN 9
#define CRL_REASON_AA_COMPROMISE 10

struct DIST_POINT_st {
  DIST_POINT_NAME *distpoint;
  ASN1_BIT_STRING *reasons;
  GENERAL_NAMES *CRLissuer;
  int dp_reasons;
};

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(DIST_POINT, DIST_POINT, DIST_POINT)
#define sk_DIST_POINT_num(sk) OPENSSL_sk_num(ossl_check_const_DIST_POINT_sk_type(sk))
#define sk_DIST_POINT_value(sk, idx) ((DIST_POINT
*)OPENSSL_sk_value(ossl_check_const_DIST_POINT_sk_type(sk), (idx)))
#define sk_DIST_POINT_new(cmp) ((STACK_OF(DIST_POINT)
*)OPENSSL_sk_new(ossl_check_DIST_POINT_compfunc_type(cmp)))
#define sk_DIST_POINT_new_null() ((STACK_OF(DIST_POINT) *)OPENSSL_sk_new_null())
#define sk_DIST_POINT_new_reserve(cmp, n) ((STACK_OF(DIST_POINT)
*)OPENSSL_sk_new_reserve(ossl_check_DIST_POINT_compfunc_type(cmp), (n)))
#define sk_DIST_POINT_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_DIST_POINT_sk_type(sk), (n))
#define sk_DIST_POINT_free(sk) OPENSSL_sk_free(ossl_check_DIST_POINT_sk_type(sk))
#define
 sk_DIST_POINT_zero(sk) OPENSSL_sk_zero(ossl_check_DIST_POINT_sk_type(sk))
#define sk_DIST_POINT_delete(sk, i) ((DIST_POINT
*)OPENSSL_sk_delete(ossl_check_DIST_POINT_sk_type(sk), (i)))
#define sk_DIST_POINT_delete_ptr(sk, ptr) ((DIST_POINT
*)OPENSSL_sk_delete_ptr(ossl_check_DIST_POINT_sk_type(sk), ossl_check_DIST_POINT_type(ptr)))
```

```
#define sk_DIST_POINT_push(sk, ptr) OPENSSL_sk_push(ossl_check_DIST_POINT_sk_type(sk),
ossl_check_DIST_POINT_type(ptr))
#define sk_DIST_POINT_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_DIST_POINT_sk_type(sk),
ossl_check_DIST_POINT_type(ptr))
#define sk_DIST_POINT_pop(sk) ((DIST_POINT *)OPENSSL_sk_pop(ossl_check_DIST_POINT_sk_type(sk)))
#define sk_DIST_POINT_shift(sk) ((DIST_POINT *)OPENSSL_sk_shift(ossl_check_DIST_POINT_sk_type(sk)))
#define sk_DIST_POINT_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_DIST_POINT_sk_type(sk),ossl_check_DIST_POINT_freefunc_type(freefunc)
)
#define sk_DIST_POINT_insert(sk,
 ptr, idx) OPENSSL_sk_insert(ossl_check_DIST_POINT_sk_type(sk), ossl_check_DIST_POINT_type(ptr), (idx))
#define sk_DIST_POINT_set(sk, idx, ptr) ((DIST_POINT
*)OPENSSL_sk_set(ossl_check_DIST_POINT_sk_type(sk), (idx), ossl_check_DIST_POINT_type(ptr)))
#define sk_DIST_POINT_find(sk, ptr) OPENSSL_sk_find(ossl_check_DIST_POINT_sk_type(sk),
ossl_check_DIST_POINT_type(ptr))
#define sk_DIST_POINT_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_DIST_POINT_sk_type(sk),
ossl_check_DIST_POINT_type(ptr))
#define sk_DIST_POINT_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_DIST_POINT_sk_type(sk),
ossl_check_DIST_POINT_type(ptr), pnum)
#define sk_DIST_POINT_sort(sk) OPENSSL_sk_sort(ossl_check_DIST_POINT_sk_type(sk))
#define sk_DIST_POINT_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_DIST_POINT_sk_type(sk))
#define sk_DIST_POINT_dup(sk) ((STACK_OF(DIST_POINT)
*)OPENSSL_sk_dup(ossl_check_const_DIST_POINT_sk_type(sk)))
#define sk_DIST_POINT_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(DIST_POINT)
 *)OPENSSL_sk_deep_copy(ossl_check_const_DIST_POINT_sk_type(sk),
ossl_check_DIST_POINT_copyfunc_type(copyfunc), ossl_check_DIST_POINT_freefunc_type(freefunc)))
#define sk_DIST_POINT_set_cmp_func(sk, cmp)
((sk_DIST_POINT_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_DIST_POINT_sk_type(sk),
ossl_check_DIST_POINT_compfunc_type(cmp)))

/* clang-format on */

typedef STACK_OF(DIST_POINT) CRL_DIST_POINTS;

struct AUTHORITY_KEYID_st {
   ASN1_OCTET_STRING *keyid;
   GENERAL_NAMES *issuer;
   ASN1_INTEGER *serial;
};

/* Strong extranet structures */

typedef struct SXNET_ID_st {
   ASN1_INTEGER *zone;
   ASN1_OCTET_STRING *user;
} SXNETID;

/* clang-format off */
```

```
SKM_DEFINE_STACK_OF_INTERNAL(SXNETID, SXNETID, SXNETID)
#define sk_SXNETID_num(sk) OPENSSL_sk_num(ossl_check_const_SXNETID_sk_type(sk))
#define sk_SXNETID_value(sk, idx) ((SXNETID
*)OPENSSL_sk_value(ossl_check_const_SXNETID_sk_type(sk), (idx)))
#define sk_SXNETID_new(cmp) ((STACK_OF(SXNETID)
*)OPENSSL_sk_new(ossl_check_SXNETID_compfunc_type(cmp)))
#define
 sk_SXNETID_new_null() ((STACK_OF(SXNETID) *)OPENSSL_sk_new_null())
#define sk_SXNETID_new_reserve(cmp, n) ((STACK_OF(SXNETID)
*)OPENSSL_sk_new_reserve(ossl_check_SXNETID_compfunc_type(cmp), (n)))
#define sk_SXNETID_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_SXNETID_sk_type(sk), (n))
#define sk_SXNETID_free(sk) OPENSSL_sk_free(ossl_check_SXNETID_sk_type(sk))
#define sk_SXNETID_zero(sk) OPENSSL_sk_zero(ossl_check_SXNETID_sk_type(sk))
#define sk_SXNETID_delete(sk, i) ((SXNETID *)OPENSSL_sk_delete(ossl_check_SXNETID_sk_type(sk), (i)))
#define sk_SXNETID_delete_ptr(sk, ptr) ((SXNETID
*)OPENSSL_sk_delete_ptr(ossl_check_SXNETID_sk_type(sk), ossl_check_SXNETID_type(ptr)))
#define sk_SXNETID_push(sk, ptr) OPENSSL_sk_push(ossl_check_SXNETID_sk_type(sk),
ossl_check_SXNETID_type(ptr))
#define sk_SXNETID_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_SXNETID_sk_type(sk),
ossl_check_SXNETID_type(ptr))
#define sk_SXNETID_pop(sk) ((SXNETID *)OPENSSL_sk_pop(ossl_check_SXNETID_sk_type(sk)))
#define
 sk_SXNETID_shift(sk) ((SXNETID *)OPENSSL_sk_shift(ossl_check_SXNETID_sk_type(sk)))
#define sk_SXNETID_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_SXNETID_sk_type(sk),ossl_check_SXNETID_freefunc_type(freefunc))
#define sk_SXNETID_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_SXNETID_sk_type(sk),
ossl_check_SXNETID_type(ptr), (idx))
#define sk_SXNETID_set(sk, idx, ptr) ((SXNETID *)OPENSSL_sk_set(ossl_check_SXNETID_sk_type(sk), (idx),
ossl_check_SXNETID_type(ptr)))
#define sk_SXNETID_find(sk, ptr) OPENSSL_sk_find(ossl_check_SXNETID_sk_type(sk),
ossl_check_SXNETID_type(ptr))
#define sk_SXNETID_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_SXNETID_sk_type(sk),
ossl_check_SXNETID_type(ptr))
#define sk_SXNETID_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_SXNETID_sk_type(sk),
ossl_check_SXNETID_type(ptr), pnum)
#define sk_SXNETID_sort(sk) OPENSSL_sk_sort(ossl_check_SXNETID_sk_type(sk))
#define sk_SXNETID_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_SXNETID_sk_type(sk))
#define
 sk_SXNETID_dup(sk) ((STACK_OF(SXNETID)
*)OPENSSL_sk_dup(ossl_check_const_SXNETID_sk_type(sk)))
#define sk_SXNETID_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(SXNETID)
*)OPENSSL_sk_deep_copy(ossl_check_const_SXNETID_sk_type(sk),
ossl_check_SXNETID_copyfunc_type(copyfunc), ossl_check_SXNETID_freefunc_type(freefunc)))
#define sk_SXNETID_set_cmp_func(sk, cmp)
((sk_SXNETID_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_SXNETID_sk_type(sk),
ossl_check_SXNETID_compfunc_type(cmp)))

/* clang-format on */
```

```
typedef struct SXNET_st {
   ASN1_INTEGER *version;
   STACK_OF(SXNETID) *ids;
} SXNET;

typedef struct ISSUER_SIGN_TOOL_st {
   ASN1_UTF8STRING *signTool;
   ASN1_UTF8STRING *cATool;
   ASN1_UTF8STRING *signToolCert;
   ASN1_UTF8STRING *cAToolCert;
} ISSUER_SIGN_TOOL;

typedef struct NOTICEREF_st {
   ASN1_STRING *organization;
   STACK_OF(ASN1_INTEGER) *noticenos;
} NOTICEREF;

typedef struct USERNOTICE_st {
   NOTICEREF *noticeref;
    ASN1_STRING *exptext;
} USERNOTICE;

typedef struct POLICYQUALINFO_st {
   ASN1_OBJECT *pqualid;
   union {
       ASN1_IA5STRING *cpsuri;
       USERNOTICE *usernotice;
       ASN1_TYPE *other;
   } d;
} POLICYQUALINFO;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(POLICYQUALINFO, POLICYQUALINFO, POLICYQUALINFO)
#define sk_POLICYQUALINFO_num(sk)
OPENSSL_sk_num(ossl_check_const_POLICYQUALINFO_sk_type(sk))
#define sk_POLICYQUALINFO_value(sk, idx) ((POLICYQUALINFO
*)OPENSSL_sk_value(ossl_check_const_POLICYQUALINFO_sk_type(sk), (idx)))
#define sk_POLICYQUALINFO_new(cmp) ((STACK_OF(POLICYQUALINFO)
*)OPENSSL_sk_new(ossl_check_POLICYQUALINFO_compfunc_type(cmp)))
#define sk_POLICYQUALINFO_new_null() ((STACK_OF(POLICYQUALINFO) *)OPENSSL_sk_new_null())
#define sk_POLICYQUALINFO_new_reserve(cmp, n) ((STACK_OF(POLICYQUALINFO)
*)OPENSSL_sk_new_reserve(ossl_check_POLICYQUALINFO_compfunc_type(cmp), (n)))
#define sk_POLICYQUALINFO_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_POLICYQUALINFO_sk_type(sk),
 (n))
#define sk_POLICYQUALINFO_free(sk) OPENSSL_sk_free(ossl_check_POLICYQUALINFO_sk_type(sk))
#define sk_POLICYQUALINFO_zero(sk) OPENSSL_sk_zero(ossl_check_POLICYQUALINFO_sk_type(sk))
```

```
#define sk_POLICYQUALINFO_delete(sk, i) ((POLICYQUALINFO
*)OPENSSL_sk_delete(ossl_check_POLICYQUALINFO_sk_type(sk), (i)))
#define sk_POLICYQUALINFO_delete_ptr(sk, ptr) ((POLICYQUALINFO
*)OPENSSL_sk_delete_ptr(ossl_check_POLICYQUALINFO_sk_type(sk),
ossl_check_POLICYQUALINFO_type(ptr)))
#define sk_POLICYQUALINFO_push(sk, ptr) OPENSSL_sk_push(ossl_check_POLICYQUALINFO_sk_type(sk),
ossl_check_POLICYQUALINFO_type(ptr))
#define sk_POLICYQUALINFO_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_POLICYQUALINFO_sk_type(sk), ossl_check_POLICYQUALINFO_type(ptr))
#define sk_POLICYQUALINFO_pop(sk) ((POLICYQUALINFO
*)OPENSSL_sk_pop(ossl_check_POLICYQUALINFO_sk_type(sk)))
#define sk_POLICYQUALINFO_shift(sk) ((POLICYQUALINFO
*)OPENSSL_sk_shift(ossl_check_POLICYQUALINFO_sk_type(sk)))
#define sk_POLICYQUALINFO_pop_free(sk,
 freefunc)
OPENSSL_sk_pop_free(ossl_check_POLICYQUALINFO_sk_type(sk),ossl_check_POLICYQUALINFO_freefunc
_type(freefunc))
#define sk_POLICYQUALINFO_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_POLICYQUALINFO_sk_type(sk), ossl_check_POLICYQUALINFO_type(ptr),
(idx))
#define sk_POLICYQUALINFO_set(sk, idx, ptr) ((POLICYQUALINFO
*)OPENSSL_sk_set(ossl_check_POLICYQUALINFO_sk_type(sk), (idx),
ossl_check_POLICYQUALINFO_type(ptr)))
#define sk_POLICYQUALINFO_find(sk, ptr) OPENSSL_sk_find(ossl_check_POLICYQUALINFO_sk_type(sk),
ossl_check_POLICYQUALINFO_type(ptr))
#define sk_POLICYQUALINFO_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_POLICYQUALINFO_sk_type(sk),
ossl_check_POLICYQUALINFO_type(ptr))
#define sk_POLICYQUALINFO_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_POLICYQUALINFO_sk_type(sk), ossl_check_POLICYQUALINFO_type(ptr),
pnum)
#define sk_POLICYQUALINFO_sort(sk) OPENSSL_sk_sort(ossl_check_POLICYQUALINFO_sk_type(sk))
#define sk_POLICYQUALINFO_is_sorted(sk)
 OPENSSL_sk_is_sorted(ossl_check_const_POLICYQUALINFO_sk_type(sk))
#define sk_POLICYQUALINFO_dup(sk) ((STACK_OF(POLICYQUALINFO)
*)OPENSSL_sk_dup(ossl_check_const_POLICYQUALINFO_sk_type(sk)))
#define sk_POLICYQUALINFO_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(POLICYQUALINFO)
*)OPENSSL_sk_deep_copy(ossl_check_const_POLICYQUALINFO_sk_type(sk),
ossl_check_POLICYQUALINFO_copyfunc_type(copyfunc),
ossl_check_POLICYQUALINFO_freefunc_type(freefunc)))
#define sk_POLICYQUALINFO_set_cmp_func(sk, cmp)
((sk_POLICYQUALINFO_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_POLICYQUALINFO_sk_type(sk),
ossl_check_POLICYQUALINFO_compfunc_type(cmp)))

/* clang-format on */

typedef struct POLICYINFO_st {
  ASN1_OBJECT *policyid;
```

```
   STACK_OF(POLICYQUALINFO) *qualifiers;
} POLICYINFO;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(POLICYINFO, POLICYINFO, POLICYINFO)
#define sk_POLICYINFO_num(sk) OPENSSL_sk_num(ossl_check_const_POLICYINFO_sk_type(sk))
#define sk_POLICYINFO_value(sk, idx) ((POLICYINFO
 *)OPENSSL_sk_value(ossl_check_const_POLICYINFO_sk_type(sk), (idx)))
#define sk_POLICYINFO_new(cmp) ((STACK_OF(POLICYINFO)
*)OPENSSL_sk_new(ossl_check_POLICYINFO_compfunc_type(cmp)))
#define sk_POLICYINFO_new_null() ((STACK_OF(POLICYINFO) *)OPENSSL_sk_new_null())
#define sk_POLICYINFO_new_reserve(cmp, n) ((STACK_OF(POLICYINFO)
*)OPENSSL_sk_new_reserve(ossl_check_POLICYINFO_compfunc_type(cmp), (n)))
#define sk_POLICYINFO_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_POLICYINFO_sk_type(sk), (n))
#define sk_POLICYINFO_free(sk) OPENSSL_sk_free(ossl_check_POLICYINFO_sk_type(sk))
#define sk_POLICYINFO_zero(sk) OPENSSL_sk_zero(ossl_check_POLICYINFO_sk_type(sk))
#define sk_POLICYINFO_delete(sk, i) ((POLICYINFO
*)OPENSSL_sk_delete(ossl_check_POLICYINFO_sk_type(sk), (i)))
#define sk_POLICYINFO_delete_ptr(sk, ptr) ((POLICYINFO
*)OPENSSL_sk_delete_ptr(ossl_check_POLICYINFO_sk_type(sk), ossl_check_POLICYINFO_type(ptr)))
#define sk_POLICYINFO_push(sk, ptr) OPENSSL_sk_push(ossl_check_POLICYINFO_sk_type(sk),
 ossl_check_POLICYINFO_type(ptr))
#define sk_POLICYINFO_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_POLICYINFO_sk_type(sk),
ossl_check_POLICYINFO_type(ptr))
#define sk_POLICYINFO_pop(sk) ((POLICYINFO *)OPENSSL_sk_pop(ossl_check_POLICYINFO_sk_type(sk)))
#define sk_POLICYINFO_shift(sk) ((POLICYINFO
*)OPENSSL_sk_shift(ossl_check_POLICYINFO_sk_type(sk)))
#define sk_POLICYINFO_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_POLICYINFO_sk_type(sk),ossl_check_POLICYINFO_freefunc_type(freefun
c))
#define sk_POLICYINFO_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_POLICYINFO_sk_type(sk),
ossl_check_POLICYINFO_type(ptr), (idx))
#define sk_POLICYINFO_set(sk, idx, ptr) ((POLICYINFO
*)OPENSSL_sk_set(ossl_check_POLICYINFO_sk_type(sk), (idx), ossl_check_POLICYINFO_type(ptr)))
#define sk_POLICYINFO_find(sk, ptr) OPENSSL_sk_find(ossl_check_POLICYINFO_sk_type(sk),
ossl_check_POLICYINFO_type(ptr))
#define sk_POLICYINFO_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_POLICYINFO_sk_type(sk),
 ossl_check_POLICYINFO_type(ptr))
#define sk_POLICYINFO_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_POLICYINFO_sk_type(sk),
ossl_check_POLICYINFO_type(ptr), pnum)
#define sk_POLICYINFO_sort(sk) OPENSSL_sk_sort(ossl_check_POLICYINFO_sk_type(sk))
#define sk_POLICYINFO_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_POLICYINFO_sk_type(sk))
#define sk_POLICYINFO_dup(sk) ((STACK_OF(POLICYINFO)
*)OPENSSL_sk_dup(ossl_check_const_POLICYINFO_sk_type(sk)))
#define sk_POLICYINFO_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(POLICYINFO)
*)OPENSSL_sk_deep_copy(ossl_check_const_POLICYINFO_sk_type(sk),
ossl_check_POLICYINFO_copyfunc_type(copyfunc), ossl_check_POLICYINFO_freefunc_type(freefunc)))
#define sk_POLICYINFO_set_cmp_func(sk, cmp)
```

```
((sk_POLICYINFO_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_POLICYINFO_sk_type(sk),
ossl_check_POLICYINFO_compfunc_type(cmp)))

/* clang-format on */

typedef STACK_OF(POLICYINFO) CERTIFICATEPOLICIES;

typedef struct POLICY_MAPPING_st {
   ASN1_OBJECT
 *issuerDomainPolicy;
   ASN1_OBJECT *subjectDomainPolicy;
} POLICY_MAPPING;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(POLICY_MAPPING, POLICY_MAPPING, POLICY_MAPPING)
#define sk_POLICY_MAPPING_num(sk)
OPENSSL_sk_num(ossl_check_const_POLICY_MAPPING_sk_type(sk))
#define sk_POLICY_MAPPING_value(sk, idx) ((POLICY_MAPPING
*)OPENSSL_sk_value(ossl_check_const_POLICY_MAPPING_sk_type(sk), (idx)))
#define sk_POLICY_MAPPING_new(cmp) ((STACK_OF(POLICY_MAPPING)
*)OPENSSL_sk_new(ossl_check_POLICY_MAPPING_compfunc_type(cmp)))
#define sk_POLICY_MAPPING_new_null() ((STACK_OF(POLICY_MAPPING) *)OPENSSL_sk_new_null())
#define sk_POLICY_MAPPING_new_reserve(cmp, n) ((STACK_OF(POLICY_MAPPING)
*)OPENSSL_sk_new_reserve(ossl_check_POLICY_MAPPING_compfunc_type(cmp), (n)))
#define sk_POLICY_MAPPING_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_POLICY_MAPPING_sk_type(sk), (n))
#define sk_POLICY_MAPPING_free(sk) OPENSSL_sk_free(ossl_check_POLICY_MAPPING_sk_type(sk))
#define sk_POLICY_MAPPING_zero(sk) OPENSSL_sk_zero(ossl_check_POLICY_MAPPING_sk_type(sk))
#define
 sk_POLICY_MAPPING_delete(sk, i) ((POLICY_MAPPING
*)OPENSSL_sk_delete(ossl_check_POLICY_MAPPING_sk_type(sk), (i)))
#define sk_POLICY_MAPPING_delete_ptr(sk, ptr) ((POLICY_MAPPING
*)OPENSSL_sk_delete_ptr(ossl_check_POLICY_MAPPING_sk_type(sk),
ossl_check_POLICY_MAPPING_type(ptr)))
#define sk_POLICY_MAPPING_push(sk, ptr) OPENSSL_sk_push(ossl_check_POLICY_MAPPING_sk_type(sk),
ossl_check_POLICY_MAPPING_type(ptr))
#define sk_POLICY_MAPPING_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_POLICY_MAPPING_sk_type(sk), ossl_check_POLICY_MAPPING_type(ptr))
#define sk_POLICY_MAPPING_pop(sk) ((POLICY_MAPPING
*)OPENSSL_sk_pop(ossl_check_POLICY_MAPPING_sk_type(sk)))
#define sk_POLICY_MAPPING_shift(sk) ((POLICY_MAPPING
*)OPENSSL_sk_shift(ossl_check_POLICY_MAPPING_sk_type(sk)))
#define sk_POLICY_MAPPING_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_POLICY_MAPPING_sk_type(sk),ossl_check_POLICY_MAPPING_freefunc
_type(freefunc))
#define sk_POLICY_MAPPING_insert(sk,
 ptr, idx) OPENSSL_sk_insert(ossl_check_POLICY_MAPPING_sk_type(sk),
ossl_check_POLICY_MAPPING_type(ptr), (idx))
```

```
#define sk_POLICY_MAPPING_set(sk, idx, ptr) ((POLICY_MAPPING
*)OPENSSL_sk_set(ossl_check_POLICY_MAPPING_sk_type(sk), (idx),
ossl_check_POLICY_MAPPING_type(ptr)))
#define sk_POLICY_MAPPING_find(sk, ptr) OPENSSL_sk_find(ossl_check_POLICY_MAPPING_sk_type(sk),
ossl_check_POLICY_MAPPING_type(ptr))
#define sk_POLICY_MAPPING_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_POLICY_MAPPING_sk_type(sk), ossl_check_POLICY_MAPPING_type(ptr))
#define sk_POLICY_MAPPING_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_POLICY_MAPPING_sk_type(sk), ossl_check_POLICY_MAPPING_type(ptr),
pnum)
#define sk_POLICY_MAPPING_sort(sk) OPENSSL_sk_sort(ossl_check_POLICY_MAPPING_sk_type(sk))
#define sk_POLICY_MAPPING_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_POLICY_MAPPING_sk_type(sk))
#define sk_POLICY_MAPPING_dup(sk) ((STACK_OF(POLICY_MAPPING)
*)OPENSSL_sk_dup(ossl_check_const_POLICY_MAPPING_sk_type(sk)))
#define
 sk_POLICY_MAPPING_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(POLICY_MAPPING)
*)OPENSSL_sk_deep_copy(ossl_check_const_POLICY_MAPPING_sk_type(sk),
ossl_check_POLICY_MAPPING_copyfunc_type(copyfunc),
ossl_check_POLICY_MAPPING_freefunc_type(freefunc)))
#define sk_POLICY_MAPPING_set_cmp_func(sk, cmp)
((sk_POLICY_MAPPING_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_POLICY_MAPPING_sk_type(sk),
ossl_check_POLICY_MAPPING_compfunc_type(cmp)))

/* clang-format on */

typedef STACK_OF(POLICY_MAPPING) POLICY_MAPPINGS;

typedef struct GENERAL_SUBTREE_st {
   GENERAL_NAME *base;
   ASN1_INTEGER *minimum;
   ASN1_INTEGER *maximum;
} GENERAL_SUBTREE;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(GENERAL_SUBTREE, GENERAL_SUBTREE,
GENERAL_SUBTREE)
#define sk_GENERAL_SUBTREE_num(sk)
OPENSSL_sk_num(ossl_check_const_GENERAL_SUBTREE_sk_type(sk))
#define sk_GENERAL_SUBTREE_value(sk, idx) ((GENERAL_SUBTREE
*)OPENSSL_sk_value(ossl_check_const_GENERAL_SUBTREE_sk_type(sk),
 (idx)))
#define sk_GENERAL_SUBTREE_new(cmp) ((STACK_OF(GENERAL_SUBTREE)
*)OPENSSL_sk_new(ossl_check_GENERAL_SUBTREE_compfunc_type(cmp)))
#define sk_GENERAL_SUBTREE_new_null() ((STACK_OF(GENERAL_SUBTREE)
*)OPENSSL_sk_new_null())
#define sk_GENERAL_SUBTREE_new_reserve(cmp, n) ((STACK_OF(GENERAL_SUBTREE)
*)OPENSSL_sk_new_reserve(ossl_check_GENERAL_SUBTREE_compfunc_type(cmp), (n)))
```

```
#define sk_GENERAL_SUBTREE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_GENERAL_SUBTREE_sk_type(sk), (n))
#define sk_GENERAL_SUBTREE_free(sk) OPENSSL_sk_free(ossl_check_GENERAL_SUBTREE_sk_type(sk))
#define sk_GENERAL_SUBTREE_zero(sk) OPENSSL_sk_zero(ossl_check_GENERAL_SUBTREE_sk_type(sk))
#define sk_GENERAL_SUBTREE_delete(sk, i) ((GENERAL_SUBTREE
*)OPENSSL_sk_delete(ossl_check_GENERAL_SUBTREE_sk_type(sk), (i)))
#define sk_GENERAL_SUBTREE_delete_ptr(sk, ptr) ((GENERAL_SUBTREE
*)OPENSSL_sk_delete_ptr(ossl_check_GENERAL_SUBTREE_sk_type(sk),
ossl_check_GENERAL_SUBTREE_type(ptr)))
#define sk_GENERAL_SUBTREE_push(sk,
 ptr) OPENSSL_sk_push(ossl_check_GENERAL_SUBTREE_sk_type(sk),
ossl_check_GENERAL_SUBTREE_type(ptr))
#define sk_GENERAL_SUBTREE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_GENERAL_SUBTREE_sk_type(sk),
ossl_check_GENERAL_SUBTREE_type(ptr))
#define sk_GENERAL_SUBTREE_pop(sk) ((GENERAL_SUBTREE
*)OPENSSL_sk_pop(ossl_check_GENERAL_SUBTREE_sk_type(sk)))
#define sk_GENERAL_SUBTREE_shift(sk) ((GENERAL_SUBTREE
*)OPENSSL_sk_shift(ossl_check_GENERAL_SUBTREE_sk_type(sk)))
#define sk_GENERAL_SUBTREE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_GENERAL_SUBTREE_sk_type(sk),ossl_check_GENERAL_SUBTREE_free
func_type(freefunc))
#define sk_GENERAL_SUBTREE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_GENERAL_SUBTREE_sk_type(sk),
ossl_check_GENERAL_SUBTREE_type(ptr), (idx))
#define sk_GENERAL_SUBTREE_set(sk, idx, ptr) ((GENERAL_SUBTREE
*)OPENSSL_sk_set(ossl_check_GENERAL_SUBTREE_sk_type(sk), (idx),
ossl_check_GENERAL_SUBTREE_type(ptr)))
#define sk_GENERAL_SUBTREE_find(sk, ptr)
 OPENSSL_sk_find(ossl_check_GENERAL_SUBTREE_sk_type(sk),
ossl_check_GENERAL_SUBTREE_type(ptr))
#define sk_GENERAL_SUBTREE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_GENERAL_SUBTREE_sk_type(sk),
ossl_check_GENERAL_SUBTREE_type(ptr))
#define sk_GENERAL_SUBTREE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_GENERAL_SUBTREE_sk_type(sk),
ossl_check_GENERAL_SUBTREE_type(ptr), pnum)
#define sk_GENERAL_SUBTREE_sort(sk) OPENSSL_sk_sort(ossl_check_GENERAL_SUBTREE_sk_type(sk))
#define sk_GENERAL_SUBTREE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_GENERAL_SUBTREE_sk_type(sk))
#define sk_GENERAL_SUBTREE_dup(sk) ((STACK_OF(GENERAL_SUBTREE)
*)OPENSSL_sk_dup(ossl_check_const_GENERAL_SUBTREE_sk_type(sk)))
#define sk_GENERAL_SUBTREE_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(GENERAL_SUBTREE)
*)OPENSSL_sk_deep_copy(ossl_check_const_GENERAL_SUBTREE_sk_type(sk),
ossl_check_GENERAL_SUBTREE_copyfunc_type(copyfunc),
ossl_check_GENERAL_SUBTREE_freefunc_type(freefunc)))
#define sk_GENERAL_SUBTREE_set_cmp_func(sk,
```

```
 cmp)
((sk_GENERAL_SUBTREE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_GENERAL_SUBTREE_sk_type
(sk), ossl_check_GENERAL_SUBTREE_compfunc_type(cmp)))

/* clang-format on */

struct NAME_CONSTRAINTS_st {
   STACK_OF(GENERAL_SUBTREE) *permittedSubtrees;
   STACK_OF(GENERAL_SUBTREE) *excludedSubtrees;
};

typedef struct POLICY_CONSTRAINTS_st {
   ASN1_INTEGER *requireExplicitPolicy;
   ASN1_INTEGER *inhibitPolicyMapping;
} POLICY_CONSTRAINTS;

/* Proxy certificate structures, see RFC 3820 */
typedef struct PROXY_POLICY_st {
   ASN1_OBJECT *policyLanguage;
   ASN1_OCTET_STRING *policy;
} PROXY_POLICY;

typedef struct PROXY_CERT_INFO_EXTENSION_st {
   ASN1_INTEGER *pcPathLengthConstraint;
   PROXY_POLICY *proxyPolicy;
} PROXY_CERT_INFO_EXTENSION;

DECLARE_ASN1_FUNCTIONS(PROXY_POLICY)
DECLARE_ASN1_FUNCTIONS(PROXY_CERT_INFO_EXTENSION)

struct ISSUING_DIST_POINT_st {
   DIST_POINT_NAME *distpoint;
   int onlyuser;
   int onlyCA;
   ASN1_BIT_STRING *onlysomereasons;
    int indirectCRL;
   int onlyattr;
};

/* Values in idp_flags field */
/* IDP present */
#define IDP_PRESENT 0x1
/* IDP values inconsistent */
#define IDP_INVALID 0x2
/* onlyuser true */
#define IDP_ONLYUSER 0x4
/* onlyCA true */
#define IDP_ONLYCA 0x8
```

```
/* onlyattr true */
#define IDP_ONLYATTR 0x10
/* indirectCRL true */
#define IDP_INDIRECT 0x20
/* onlysomereasons present */
#define IDP_REASONS 0x40

#define X509V3_conf_err(val) ERR_add_error_data(6, \
   "section:", (val)->section,                    \
   ",name:", (val)->name, ",value:", (val)->value)

#define X509V3_set_ctx_test(ctx) \
   X509V3_set_ctx(ctx, NULL, NULL, NULL, NULL, X509V3_CTX_TEST)
#define X509V3_set_ctx_nodb(ctx) (ctx)->db = NULL;

#define EXT_BITSTRING(nid, table) { nid, 0, ASN1_ITEM_ref(ASN1_BIT_STRING), \
   0, 0, 0, 0,                                                \
   0, 0,                                                      \
   (X509V3_EXT_I2V)i2v_ASN1_BIT_STRING,
                                \
   (X509V3_EXT_V2I)v2i_ASN1_BIT_STRING,                       \
   NULL, NULL,                                                \
   table }

#define EXT_IA5STRING(nid) { nid, 0, ASN1_ITEM_ref(ASN1_IA5STRING), \
   0, 0, 0, 0,                                        \
   (X509V3_EXT_I2S)i2s_ASN1_IA5STRING,                \
   (X509V3_EXT_S2I)s2i_ASN1_IA5STRING,                \
   0, 0, 0, 0,                                        \
   NULL }

#define EXT_UTF8STRING(nid) { nid, 0, ASN1_ITEM_ref(ASN1_UTF8STRING), \
   0, 0, 0, 0,                                        \
   (X509V3_EXT_I2S)i2s_ASN1_UTF8STRING,               \
   (X509V3_EXT_S2I)s2i_ASN1_UTF8STRING,               \
   0, 0, 0, 0,                                        \
   NULL }

/* clang-format off */
# define EXT_END { -1, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0}
/* clang-format on */

/* X509_PURPOSE stuff */

#define EXFLAG_BCONS 0x1
#define EXFLAG_KUSAGE 0x2
#define EXFLAG_XKUSAGE 0x4
```

```
#define EXFLAG_NSCERT 0x8

#define EXFLAG_CA 0x10
#define EXFLAG_SI 0x20 /* self-issued, maybe not self-signed */
#define EXFLAG_V1 0x40
#define EXFLAG_INVALID 0x80
/* EXFLAG_SET is set to indicate that some values have been precomputed */
#define EXFLAG_SET 0x100
#define EXFLAG_CRITICAL 0x200
#define EXFLAG_PROXY 0x400

#define EXFLAG_INVALID_POLICY 0x800
#define EXFLAG_FRESHEST 0x1000
#define EXFLAG_SS 0x2000 /* cert is apparently self-signed */

#define EXFLAG_BCONS_CRITICAL 0x10000
#define EXFLAG_AKID_CRITICAL 0x20000
#define EXFLAG_SKID_CRITICAL 0x40000
#define EXFLAG_SAN_CRITICAL 0x80000
#define EXFLAG_NO_FINGERPRINT 0x100000

/* https://datatracker.ietf.org/doc/html/rfc5280#section-4.2.1.3 */
#define KU_DIGITAL_SIGNATURE X509v3_KU_DIGITAL_SIGNATURE
#define KU_NON_REPUDIATION X509v3_KU_NON_REPUDIATION
#define KU_KEY_ENCIPHERMENT
 X509v3_KU_KEY_ENCIPHERMENT
#define KU_DATA_ENCIPHERMENT X509v3_KU_DATA_ENCIPHERMENT
#define KU_KEY_AGREEMENT X509v3_KU_KEY_AGREEMENT
#define KU_KEY_CERT_SIGN X509v3_KU_KEY_CERT_SIGN
#define KU_CRL_SIGN X509v3_KU_CRL_SIGN
#define KU_ENCIPHER_ONLY X509v3_KU_ENCIPHER_ONLY
#define KU_DECIPHER_ONLY X509v3_KU_DECIPHER_ONLY

#define NS_SSL_CLIENT 0x80
#define NS_SSL_SERVER 0x40
#define NS_SMIME 0x20
#define NS_OBJSIGN 0x10
#define NS_SSL_CA 0x04
#define NS_SMIME_CA 0x02
#define NS_OBJSIGN_CA 0x01
#define NS_ANY_CA (NS_SSL_CA | NS_SMIME_CA | NS_OBJSIGN_CA)

#define XKU_SSL_SERVER 0x1
#define XKU_SSL_CLIENT 0x2
#define XKU_SMIME 0x4
#define XKU_CODE_SIGN 0x8
#define XKU_SGC 0x10 /* Netscape or MS Server-Gated Crypto */
#define XKU_OCSP_SIGN 0x20
```

```
#define XKU_TIMESTAMP 0x40
#define XKU_DVCS 0x80
#define XKU_ANYEKU 0x100

#define X509_PURPOSE_DYNAMIC 0x1
#define X509_PURPOSE_DYNAMIC_NAME 0x2

typedef struct x509_purpose_st {
   int purpose;
   int trust; /* Default trust ID */
   int flags;

  int (*check_purpose)(const struct x509_purpose_st *, const X509 *, int);
   char *name;
   char *sname;
   void *usr_data;
} X509_PURPOSE;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_PURPOSE, X509_PURPOSE, X509_PURPOSE)
#define sk_X509_PURPOSE_num(sk) OPENSSL_sk_num(ossl_check_const_X509_PURPOSE_sk_type(sk))
#define sk_X509_PURPOSE_value(sk, idx) ((X509_PURPOSE
*)OPENSSL_sk_value(ossl_check_const_X509_PURPOSE_sk_type(sk), (idx)))
#define sk_X509_PURPOSE_new(cmp) ((STACK_OF(X509_PURPOSE)
*)OPENSSL_sk_new(ossl_check_X509_PURPOSE_compfunc_type(cmp)))
#define sk_X509_PURPOSE_new_null() ((STACK_OF(X509_PURPOSE) *)OPENSSL_sk_new_null())
#define sk_X509_PURPOSE_new_reserve(cmp, n) ((STACK_OF(X509_PURPOSE)
*)OPENSSL_sk_new_reserve(ossl_check_X509_PURPOSE_compfunc_type(cmp), (n)))
#define sk_X509_PURPOSE_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_PURPOSE_sk_type(sk), (n))
#define sk_X509_PURPOSE_free(sk) OPENSSL_sk_free(ossl_check_X509_PURPOSE_sk_type(sk))
#define sk_X509_PURPOSE_zero(sk)
 OPENSSL_sk_zero(ossl_check_X509_PURPOSE_sk_type(sk))
#define sk_X509_PURPOSE_delete(sk, i) ((X509_PURPOSE
*)OPENSSL_sk_delete(ossl_check_X509_PURPOSE_sk_type(sk), (i)))
#define sk_X509_PURPOSE_delete_ptr(sk, ptr) ((X509_PURPOSE
*)OPENSSL_sk_delete_ptr(ossl_check_X509_PURPOSE_sk_type(sk), ossl_check_X509_PURPOSE_type(ptr)))
#define sk_X509_PURPOSE_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_PURPOSE_sk_type(sk),
ossl_check_X509_PURPOSE_type(ptr))
#define sk_X509_PURPOSE_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_PURPOSE_sk_type(sk),
ossl_check_X509_PURPOSE_type(ptr))
#define sk_X509_PURPOSE_pop(sk) ((X509_PURPOSE
*)OPENSSL_sk_pop(ossl_check_X509_PURPOSE_sk_type(sk)))
#define sk_X509_PURPOSE_shift(sk) ((X509_PURPOSE
*)OPENSSL_sk_shift(ossl_check_X509_PURPOSE_sk_type(sk)))
#define sk_X509_PURPOSE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_PURPOSE_sk_type(sk),ossl_check_X509_PURPOSE_freefunc_type(fr
eefunc))
#define sk_X509_PURPOSE_insert(sk, ptr,
```

```
 idx) OPENSSL_sk_insert(ossl_check_X509_PURPOSE_sk_type(sk), ossl_check_X509_PURPOSE_type(ptr),
(idx))
#define sk_X509_PURPOSE_set(sk, idx, ptr) ((X509_PURPOSE
*)OPENSSL_sk_set(ossl_check_X509_PURPOSE_sk_type(sk), (idx), ossl_check_X509_PURPOSE_type(ptr)))
#define sk_X509_PURPOSE_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_PURPOSE_sk_type(sk),
ossl_check_X509_PURPOSE_type(ptr))
#define sk_X509_PURPOSE_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_PURPOSE_sk_type(sk),
ossl_check_X509_PURPOSE_type(ptr))
#define sk_X509_PURPOSE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_X509_PURPOSE_sk_type(sk), ossl_check_X509_PURPOSE_type(ptr), pnum)
#define sk_X509_PURPOSE_sort(sk) OPENSSL_sk_sort(ossl_check_X509_PURPOSE_sk_type(sk))
#define sk_X509_PURPOSE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_X509_PURPOSE_sk_type(sk))
#define sk_X509_PURPOSE_dup(sk) ((STACK_OF(X509_PURPOSE)
*)OPENSSL_sk_dup(ossl_check_const_X509_PURPOSE_sk_type(sk)))
#define sk_X509_PURPOSE_deep_copy(sk,
 copyfunc, freefunc) ((STACK_OF(X509_PURPOSE)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_PURPOSE_sk_type(sk),
ossl_check_X509_PURPOSE_copyfunc_type(copyfunc), ossl_check_X509_PURPOSE_freefunc_type(freefunc)))
#define sk_X509_PURPOSE_set_cmp_func(sk, cmp)
((sk_X509_PURPOSE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_PURPOSE_sk_type(sk),
ossl_check_X509_PURPOSE_compfunc_type(cmp)))

/* clang-format on */

#define X509_PURPOSE_DEFAULT_ANY 0
#define X509_PURPOSE_SSL_CLIENT 1
#define X509_PURPOSE_SSL_SERVER 2
#define X509_PURPOSE_NS_SSL_SERVER 3
#define X509_PURPOSE_SMIME_SIGN 4
#define X509_PURPOSE_SMIME_ENCRYPT 5
#define X509_PURPOSE_CRL_SIGN 6
#define X509_PURPOSE_ANY 7
#define X509_PURPOSE_OCSP_HELPER 8
#define X509_PURPOSE_TIMESTAMP_SIGN 9
#define X509_PURPOSE_CODE_SIGN 10

#define X509_PURPOSE_MIN 1
#define X509_PURPOSE_MAX 10

/* Flags for X509V3_EXT_print() */

#define X509V3_EXT_UNKNOWN_MASK (0xfL << 16)
/* Return error for unknown extensions */
#define X509V3_EXT_DEFAULT
 0
/* Print error for unknown extensions */
#define X509V3_EXT_ERROR_UNKNOWN (1L << 16)
```

```
/* ASN1 parse unknown extensions */
#define X509V3_EXT_PARSE_UNKNOWN (2L << 16)
/* BIO_dump unknown extensions */
#define X509V3_EXT_DUMP_UNKNOWN (3L << 16)

/* Flags for X509V3_add1_i2d */

#define X509V3_ADD_OP_MASK 0xfL
#define X509V3_ADD_DEFAULT 0L
#define X509V3_ADD_APPEND 1L
#define X509V3_ADD_REPLACE 2L
#define X509V3_ADD_REPLACE_EXISTING 3L
#define X509V3_ADD_KEEP_EXISTING 4L
#define X509V3_ADD_DELETE 5L
#define X509V3_ADD_SILENT 0x10

DECLARE_ASN1_FUNCTIONS(BASIC_CONSTRAINTS)
DECLARE_ASN1_FUNCTIONS(OSSL_BASIC_ATTR_CONSTRAINTS)

DECLARE_ASN1_FUNCTIONS(SXNET)
DECLARE_ASN1_FUNCTIONS(SXNETID)

DECLARE_ASN1_FUNCTIONS(ISSUER_SIGN_TOOL)

int SXNET_add_id_asc(SXNET **psx, const char *zone, const char *user, int userlen);
int SXNET_add_id_ulong(SXNET **psx, unsigned long lzone, const char *user,
   int userlen);
int SXNET_add_id_INTEGER(SXNET **psx, ASN1_INTEGER *izone, const char *user,
   int
 userlen);

ASN1_OCTET_STRING *SXNET_get_id_asc(SXNET *sx, const char *zone);
ASN1_OCTET_STRING *SXNET_get_id_ulong(SXNET *sx, unsigned long lzone);
ASN1_OCTET_STRING *SXNET_get_id_INTEGER(SXNET *sx, ASN1_INTEGER *zone);

DECLARE_ASN1_FUNCTIONS(AUTHORITY_KEYID)

DECLARE_ASN1_FUNCTIONS(PKEY_USAGE_PERIOD)

DECLARE_ASN1_FUNCTIONS(GENERAL_NAME)
DECLARE_ASN1_DUP_FUNCTION(GENERAL_NAME)
int GENERAL_NAME_cmp(GENERAL_NAME *a, GENERAL_NAME *b);

ASN1_BIT_STRING *v2i_ASN1_BIT_STRING(X509V3_EXT_METHOD *method,
   X509V3_CTX *ctx,
   STACK_OF(CONF_VALUE) *nval);
STACK_OF(CONF_VALUE) *i2v_ASN1_BIT_STRING(X509V3_EXT_METHOD *method,
   ASN1_BIT_STRING *bits,
```

```
  STACK_OF(CONF_VALUE) *extlist);
char *i2s_ASN1_IA5STRING(X509V3_EXT_METHOD *method, ASN1_IA5STRING *ia5);
ASN1_IA5STRING *s2i_ASN1_IA5STRING(X509V3_EXT_METHOD *method,
  X509V3_CTX *ctx, const char *str);
char *i2s_ASN1_UTF8STRING(X509V3_EXT_METHOD *method, ASN1_UTF8STRING *utf8);
ASN1_UTF8STRING *s2i_ASN1_UTF8STRING(X509V3_EXT_METHOD *method,
   X509V3_CTX *ctx, const char *str);

STACK_OF(CONF_VALUE) *i2v_GENERAL_NAME(X509V3_EXT_METHOD *method,
  GENERAL_NAME *gen,
  STACK_OF(CONF_VALUE) *ret);
int GENERAL_NAME_print(BIO *out, GENERAL_NAME *gen);

DECLARE_ASN1_FUNCTIONS(GENERAL_NAMES)

STACK_OF(CONF_VALUE) *i2v_GENERAL_NAMES(X509V3_EXT_METHOD *method,
  GENERAL_NAMES *gen,
  STACK_OF(CONF_VALUE) *extlist);
GENERAL_NAMES *v2i_GENERAL_NAMES(const X509V3_EXT_METHOD *method,
  X509V3_CTX *ctx, STACK_OF(CONF_VALUE) *nval);

DECLARE_ASN1_FUNCTIONS(OTHERNAME)
DECLARE_ASN1_FUNCTIONS(EDIPARTYNAME)
int OTHERNAME_cmp(OTHERNAME *a, OTHERNAME *b);
void GENERAL_NAME_set0_value(GENERAL_NAME *a, int type, void *value);
void *GENERAL_NAME_get0_value(const GENERAL_NAME *a, int *ptype);
int GENERAL_NAME_set0_othername(GENERAL_NAME *gen,
  ASN1_OBJECT *oid, ASN1_TYPE *value);
int GENERAL_NAME_get0_otherName(const GENERAL_NAME *gen,
  ASN1_OBJECT **poid, ASN1_TYPE **pvalue);

char *i2s_ASN1_OCTET_STRING(X509V3_EXT_METHOD *method,
   const ASN1_OCTET_STRING *ia5);
ASN1_OCTET_STRING *s2i_ASN1_OCTET_STRING(X509V3_EXT_METHOD *method,
  X509V3_CTX *ctx, const char *str);

DECLARE_ASN1_FUNCTIONS(EXTENDED_KEY_USAGE)
int i2a_ACCESS_DESCRIPTION(BIO *bp, const ACCESS_DESCRIPTION *a);

DECLARE_ASN1_ALLOC_FUNCTIONS(TLS_FEATURE)

DECLARE_ASN1_FUNCTIONS(CERTIFICATEPOLICIES)
DECLARE_ASN1_FUNCTIONS(POLICYINFO)
DECLARE_ASN1_FUNCTIONS(POLICYQUALINFO)
DECLARE_ASN1_FUNCTIONS(USERNOTICE)
DECLARE_ASN1_FUNCTIONS(NOTICEREF)

DECLARE_ASN1_FUNCTIONS(CRL_DIST_POINTS)
```

```
DECLARE_ASN1_FUNCTIONS(DIST_POINT)
DECLARE_ASN1_FUNCTIONS(DIST_POINT_NAME)
DECLARE_ASN1_FUNCTIONS(ISSUING_DIST_POINT)

int DIST_POINT_set_dpname(DIST_POINT_NAME *dpn, const X509_NAME *iname);

int NAME_CONSTRAINTS_check(X509 *x, NAME_CONSTRAINTS *nc);
int NAME_CONSTRAINTS_check_CN(X509 *x, NAME_CONSTRAINTS *nc);

DECLARE_ASN1_FUNCTIONS(ACCESS_DESCRIPTION)
DECLARE_ASN1_FUNCTIONS(AUTHORITY_INFO_ACCESS)

DECLARE_ASN1_ITEM(POLICY_MAPPING)
DECLARE_ASN1_ALLOC_FUNCTIONS(POLICY_MAPPING)
DECLARE_ASN1_ITEM(POLICY_MAPPINGS)

DECLARE_ASN1_ITEM(GENERAL_SUBTREE)
DECLARE_ASN1_ALLOC_FUNCTIONS(GENERAL_SUBTREE)

DECLARE_ASN1_ITEM(NAME_CONSTRAINTS)
DECLARE_ASN1_ALLOC_FUNCTIONS(NAME_CONSTRAINTS)

DECLARE_ASN1_ALLOC_FUNCTIONS(POLICY_CONSTRAINTS)
DECLARE_ASN1_ITEM(POLICY_CONSTRAINTS)

GENERAL_NAME
 *a2i_GENERAL_NAME(GENERAL_NAME *out,
   const X509V3_EXT_METHOD *method,
   X509V3_CTX *ctx, int gen_type,
   const char *value, int is_nc);

#ifdef OPENSSL_CONF_H
GENERAL_NAME *v2i_GENERAL_NAME(const X509V3_EXT_METHOD *method,
   X509V3_CTX *ctx, CONF_VALUE *cnf);
GENERAL_NAME *v2i_GENERAL_NAME_ex(GENERAL_NAME *out,
   const X509V3_EXT_METHOD *method,
   X509V3_CTX *ctx, CONF_VALUE *cnf,
   int is_nc);

void X509V3_conf_free(CONF_VALUE *val);

X509_EXTENSION *X509V3_EXT_nconf_nid(CONF *conf, X509V3_CTX *ctx, int ext_nid,
   const char *value);
X509_EXTENSION *X509V3_EXT_nconf(CONF *conf, X509V3_CTX *ctx, const char *name,
   const char *value);
int X509V3_EXT_add_nconf_sk(CONF
 *conf, X509V3_CTX *ctx, const char *section,
   STACK_OF(X509_EXTENSION) **sk);
```

```
int X509V3_EXT_add_nconf(CONF *conf, X509V3_CTX *ctx, const char *section,
   X509 *cert);
int X509V3_EXT_REQ_add_nconf(CONF *conf, X509V3_CTX *ctx, const char *section,
   X509_REQ *req);
int X509V3_EXT_CRL_add_nconf(CONF *conf, X509V3_CTX *ctx, const char *section,
   X509_CRL *crl);

X509_EXTENSION *X509V3_EXT_conf_nid(LHASH_OF(CONF_VALUE) *conf,
   X509V3_CTX *ctx, int ext_nid,
   const char *value);
X509_EXTENSION *X509V3_EXT_conf(LHASH_OF(CONF_VALUE) *conf, X509V3_CTX *ctx,
   const char *name, const char *value);
int X509V3_EXT_add_conf(LHASH_OF(CONF_VALUE) *conf, X509V3_CTX *ctx,
   const char *section, X509 *cert);
int X509V3_EXT_REQ_add_conf(LHASH_OF(CONF_VALUE) *conf, X509V3_CTX *ctx,
   const char *section, X509_REQ *req);
int X509V3_EXT_CRL_add_conf(LHASH_OF(CONF_VALUE) *conf, X509V3_CTX *ctx,
   const char *section, X509_CRL *crl);

int X509V3_add_value_bool_nf(const char
 *name, int asn1_bool,
   STACK_OF(CONF_VALUE) **extlist);
int X509V3_get_value_bool(const CONF_VALUE *value, int *asn1_bool);
int X509V3_get_value_int(const CONF_VALUE *value, ASN1_INTEGER **aint);
void X509V3_set_nconf(X509V3_CTX *ctx, CONF *conf);
void X509V3_set_conf_lhash(X509V3_CTX *ctx, LHASH_OF(CONF_VALUE) *lhash);
#endif

char *X509V3_get_string(X509V3_CTX *ctx, const char *name, const char *section);
STACK_OF(CONF_VALUE) *X509V3_get_section(X509V3_CTX *ctx, const char *section);
void X509V3_string_free(X509V3_CTX *ctx, char *str);
void X509V3_section_free(X509V3_CTX *ctx, STACK_OF(CONF_VALUE) *section);
void X509V3_set_ctx(X509V3_CTX *ctx, X509 *issuer, X509 *subject,
   X509_REQ *req, X509_CRL *crl, int flags);
/* For API backward compatibility, this is separate from X509V3_set_ctx(): */
int X509V3_set_issuer_pkey(X509V3_CTX *ctx, EVP_PKEY *pkey);

int X509V3_add_value(const char *name, const char *value,
   STACK_OF(CONF_VALUE) **extlist);
int X509V3_add_value_uchar(const
 char *name, const unsigned char *value,
   STACK_OF(CONF_VALUE) **extlist);
int X509V3_add_value_bool(const char *name, int asn1_bool,
   STACK_OF(CONF_VALUE) **extlist);
int X509V3_add_value_int(const char *name, const ASN1_INTEGER *aint,
   STACK_OF(CONF_VALUE) **extlist);
char *i2s_ASN1_INTEGER(X509V3_EXT_METHOD *meth, const ASN1_INTEGER *aint);
ASN1_INTEGER *s2i_ASN1_INTEGER(X509V3_EXT_METHOD *meth, const char *value);
```

```
char *i2s_ASN1_ENUMERATED(X509V3_EXT_METHOD *meth, const ASN1_ENUMERATED *aint);
char *i2s_ASN1_ENUMERATED_TABLE(X509V3_EXT_METHOD *meth,
   const ASN1_ENUMERATED *aint);
int X509V3_EXT_add(X509V3_EXT_METHOD *ext);
int X509V3_EXT_add_list(X509V3_EXT_METHOD *extlist);
int X509V3_EXT_add_alias(int nid_to, int nid_from);
void X509V3_EXT_cleanup(void);

const X509V3_EXT_METHOD *X509V3_EXT_get(X509_EXTENSION *ext);
const X509V3_EXT_METHOD *X509V3_EXT_get_nid(int nid);
int X509V3_add_standard_extensions(void);
STACK_OF(CONF_VALUE) *X509V3_parse_list(const char *line);
void
 *X509V3_EXT_d2i(X509_EXTENSION *ext);
void *X509V3_get_d2i(const STACK_OF(X509_EXTENSION) *x, int nid, int *crit,
   int *idx);

X509_EXTENSION *X509V3_EXT_i2d(int ext_nid, int crit, void *ext_struc);
int X509V3_add1_i2d(STACK_OF(X509_EXTENSION) **x, int nid, void *value,
   int crit, unsigned long flags);

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
/* The new declarations are in crypto.h, but the old ones were here. */
#define hex_to_string OPENSSL_buf2hexstr
#define string_to_hex OPENSSL_hexstr2buf
#endif

void X509V3_EXT_val_prn(BIO *out, STACK_OF(CONF_VALUE) *val, int indent,
   int ml);
int X509V3_EXT_print(BIO *out, X509_EXTENSION *ext, unsigned long flag,
   int indent);
#ifndef OPENSSL_NO_STDIO
int X509V3_EXT_print_fp(FILE *out, X509_EXTENSION *ext, int flag, int indent);
#endif
int X509V3_extensions_print(BIO *out, const char *title,
   const STACK_OF(X509_EXTENSION) *exts,
   unsigned long flag, int indent);

int X509_check_ca(X509 *x);
int X509_check_purpose(X509 *x,
 int id, int ca);
int X509_supported_extension(X509_EXTENSION *ex);
int X509_check_issued(X509 *issuer, X509 *subject);
int X509_check_akid(const X509 *issuer, const AUTHORITY_KEYID *akid);
void X509_set_proxy_flag(X509 *x);
void X509_set_proxy_pathlen(X509 *x, long l);
long X509_get_proxy_pathlen(X509 *x);
```

```
uint32_t X509_get_extension_flags(X509 *x);
uint32_t X509_get_key_usage(X509 *x);
uint32_t X509_get_extended_key_usage(X509 *x);
const ASN1_OCTET_STRING *X509_get0_subject_key_id(X509 *x);
const ASN1_OCTET_STRING *X509_get0_authority_key_id(X509 *x);
const GENERAL_NAMES *X509_get0_authority_issuer(X509 *x);
const ASN1_INTEGER *X509_get0_authority_serial(X509 *x);

int X509_PURPOSE_get_count(void);
int X509_PURPOSE_get_unused_id(OSSL_LIB_CTX *libctx);
int X509_PURPOSE_get_by_sname(const char *sname);
int X509_PURPOSE_get_by_id(int id);
int X509_PURPOSE_add(int id, int trust, int flags,
   int (*ck)(const X509_PURPOSE *, const X509 *, int),
   const char *name, const char *sname,
 void *arg);
void X509_PURPOSE_cleanup(void);

X509_PURPOSE *X509_PURPOSE_get0(int idx);
int X509_PURPOSE_get_id(const X509_PURPOSE *);
char *X509_PURPOSE_get0_name(const X509_PURPOSE *xp);
char *X509_PURPOSE_get0_sname(const X509_PURPOSE *xp);
int X509_PURPOSE_get_trust(const X509_PURPOSE *xp);
int X509_PURPOSE_set(int *p, int purpose);

STACK_OF(OPENSSL_STRING) *X509_get1_email(X509 *x);
STACK_OF(OPENSSL_STRING) *X509_REQ_get1_email(X509_REQ *x);
void X509_email_free(STACK_OF(OPENSSL_STRING) *sk);
STACK_OF(OPENSSL_STRING) *X509_get1_ocsp(X509 *x);

/* Flags for X509_check_* functions */

/*
* Always check subject name for host match even if subject alt names present
*/
#define X509_CHECK_FLAG_ALWAYS_CHECK_SUBJECT 0x1
/* Disable wildcard matching for dnsName fields and common name. */
#define X509_CHECK_FLAG_NO_WILDCARDS 0x2
/* Wildcards must not match a partial label. */
#define X509_CHECK_FLAG_NO_PARTIAL_WILDCARDS 0x4
/* Allow (non-partial) wildcards to match multiple labels. */
#define
 X509_CHECK_FLAG_MULTI_LABEL_WILDCARDS 0x8
/* Constraint verifier subdomain patterns to match a single labels. */
#define X509_CHECK_FLAG_SINGLE_LABEL_SUBDOMAINS 0x10
/* Never check the subject CN */
#define X509_CHECK_FLAG_NEVER_CHECK_SUBJECT 0x20
/*
```

```
* Match reference identifiers starting with "." to any sub-domain.
* This is a non-public flag, turned on implicitly when the subject
* reference identity is a DNS name.
*/
#define _X509_CHECK_FLAG_DOT_SUBDOMAINS 0x8000

int X509_check_host(X509 *x, const char *chk, size_t chklen,
   unsigned int flags, char **peername);
int X509_check_email(X509 *x, const char *chk, size_t chklen,
   unsigned int flags);
int X509_check_ip(X509 *x, const unsigned char *chk, size_t chklen,
   unsigned int flags);
int X509_check_ip_asc(X509 *x, const char *ipasc, unsigned int flags);

ASN1_OCTET_STRING *a2i_IPADDRESS(const char *ipasc);
ASN1_OCTET_STRING *a2i_IPADDRESS_NC(const char *ipasc);
int X509V3_NAME_from_section(X509_NAME *nm, STACK_OF(CONF_VALUE)
 *dn_sk,
   unsigned long chtype);

void X509_POLICY_NODE_print(BIO *out, X509_POLICY_NODE *node, int indent);
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_POLICY_NODE, X509_POLICY_NODE,
X509_POLICY_NODE)
#define sk_X509_POLICY_NODE_num(sk)
OPENSSL_sk_num(ossl_check_const_X509_POLICY_NODE_sk_type(sk))
#define sk_X509_POLICY_NODE_value(sk, idx) ((X509_POLICY_NODE
*)OPENSSL_sk_value(ossl_check_const_X509_POLICY_NODE_sk_type(sk), (idx)))
#define sk_X509_POLICY_NODE_new(cmp) ((STACK_OF(X509_POLICY_NODE)
*)OPENSSL_sk_new(ossl_check_X509_POLICY_NODE_compfunc_type(cmp)))
#define sk_X509_POLICY_NODE_new_null() ((STACK_OF(X509_POLICY_NODE)
*)OPENSSL_sk_new_null())
#define sk_X509_POLICY_NODE_new_reserve(cmp, n) ((STACK_OF(X509_POLICY_NODE)
*)OPENSSL_sk_new_reserve(ossl_check_X509_POLICY_NODE_compfunc_type(cmp), (n)))
#define sk_X509_POLICY_NODE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_X509_POLICY_NODE_sk_type(sk), (n))
#define sk_X509_POLICY_NODE_free(sk) OPENSSL_sk_free(ossl_check_X509_POLICY_NODE_sk_type(sk))
#define
 sk_X509_POLICY_NODE_zero(sk) OPENSSL_sk_zero(ossl_check_X509_POLICY_NODE_sk_type(sk))
#define sk_X509_POLICY_NODE_delete(sk, i) ((X509_POLICY_NODE
*)OPENSSL_sk_delete(ossl_check_X509_POLICY_NODE_sk_type(sk), (i)))
#define sk_X509_POLICY_NODE_delete_ptr(sk, ptr) ((X509_POLICY_NODE
*)OPENSSL_sk_delete_ptr(ossl_check_X509_POLICY_NODE_sk_type(sk),
ossl_check_X509_POLICY_NODE_type(ptr)))
#define sk_X509_POLICY_NODE_push(sk, ptr)
OPENSSL_sk_push(ossl_check_X509_POLICY_NODE_sk_type(sk),
ossl_check_X509_POLICY_NODE_type(ptr))
#define sk_X509_POLICY_NODE_unshift(sk, ptr)
```

```
OPENSSL_sk_unshift(ossl_check_X509_POLICY_NODE_sk_type(sk),
ossl_check_X509_POLICY_NODE_type(ptr))
#define sk_X509_POLICY_NODE_pop(sk) ((X509_POLICY_NODE
*)OPENSSL_sk_pop(ossl_check_X509_POLICY_NODE_sk_type(sk)))
#define sk_X509_POLICY_NODE_shift(sk) ((X509_POLICY_NODE
*)OPENSSL_sk_shift(ossl_check_X509_POLICY_NODE_sk_type(sk)))
#define sk_X509_POLICY_NODE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_POLICY_NODE_sk_type(sk),ossl_check_X509_POLICY_NODE_free
func_type(freefunc))
#define sk_X509_POLICY_NODE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_X509_POLICY_NODE_sk_type(sk),
ossl_check_X509_POLICY_NODE_type(ptr), (idx))
#define sk_X509_POLICY_NODE_set(sk, idx, ptr) ((X509_POLICY_NODE
*)OPENSSL_sk_set(ossl_check_X509_POLICY_NODE_sk_type(sk), (idx),
ossl_check_X509_POLICY_NODE_type(ptr)))
#define sk_X509_POLICY_NODE_find(sk, ptr)
OPENSSL_sk_find(ossl_check_X509_POLICY_NODE_sk_type(sk),
ossl_check_X509_POLICY_NODE_type(ptr))
#define sk_X509_POLICY_NODE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_X509_POLICY_NODE_sk_type(sk),
ossl_check_X509_POLICY_NODE_type(ptr))
#define sk_X509_POLICY_NODE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_X509_POLICY_NODE_sk_type(sk),
ossl_check_X509_POLICY_NODE_type(ptr), pnum)
#define sk_X509_POLICY_NODE_sort(sk) OPENSSL_sk_sort(ossl_check_X509_POLICY_NODE_sk_type(sk))
#define sk_X509_POLICY_NODE_is_sorted(sk)
 OPENSSL_sk_is_sorted(ossl_check_const_X509_POLICY_NODE_sk_type(sk))
#define sk_X509_POLICY_NODE_dup(sk) ((STACK_OF(X509_POLICY_NODE)
*)OPENSSL_sk_dup(ossl_check_const_X509_POLICY_NODE_sk_type(sk)))
#define sk_X509_POLICY_NODE_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_POLICY_NODE)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_POLICY_NODE_sk_type(sk),
ossl_check_X509_POLICY_NODE_copyfunc_type(copyfunc),
ossl_check_X509_POLICY_NODE_freefunc_type(freefunc)))
#define sk_X509_POLICY_NODE_set_cmp_func(sk, cmp)
((sk_X509_POLICY_NODE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_POLICY_NODE_sk_type
(sk), ossl_check_X509_POLICY_NODE_compfunc_type(cmp)))

/* clang-format on */

#ifndef OPENSSL_NO_RFC3779
typedef struct ASRange_st {
  ASN1_INTEGER *min, *max;
} ASRange;

#define ASIdOrRange_id 0
#define ASIdOrRange_range 1

typedef struct ASIdOrRange_st {
```

```
  int type;
  union {
     ASN1_INTEGER *id;
     ASRange *range;
  } u;
} ASIdOrRange;

/* clang-format
 off */
SKM_DEFINE_STACK_OF_INTERNAL(ASIdOrRange, ASIdOrRange, ASIdOrRange)
#define sk_ASIdOrRange_num(sk) OPENSSL_sk_num(ossl_check_const_ASIdOrRange_sk_type(sk))
#define sk_ASIdOrRange_value(sk, idx) ((ASIdOrRange
*)OPENSSL_sk_value(ossl_check_const_ASIdOrRange_sk_type(sk), (idx)))
#define sk_ASIdOrRange_new(cmp) ((STACK_OF(ASIdOrRange)
*)OPENSSL_sk_new(ossl_check_ASIdOrRange_compfunc_type(cmp)))
#define sk_ASIdOrRange_new_null() ((STACK_OF(ASIdOrRange) *)OPENSSL_sk_new_null())
#define sk_ASIdOrRange_new_reserve(cmp, n) ((STACK_OF(ASIdOrRange)
*)OPENSSL_sk_new_reserve(ossl_check_ASIdOrRange_compfunc_type(cmp), (n)))
#define sk_ASIdOrRange_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_ASIdOrRange_sk_type(sk), (n))
#define sk_ASIdOrRange_free(sk) OPENSSL_sk_free(ossl_check_ASIdOrRange_sk_type(sk))
#define sk_ASIdOrRange_zero(sk) OPENSSL_sk_zero(ossl_check_ASIdOrRange_sk_type(sk))
#define sk_ASIdOrRange_delete(sk, i) ((ASIdOrRange
*)OPENSSL_sk_delete(ossl_check_ASIdOrRange_sk_type(sk), (i)))
#define
 sk_ASIdOrRange_delete_ptr(sk, ptr) ((ASIdOrRange
*)OPENSSL_sk_delete_ptr(ossl_check_ASIdOrRange_sk_type(sk), ossl_check_ASIdOrRange_type(ptr)))
#define sk_ASIdOrRange_push(sk, ptr) OPENSSL_sk_push(ossl_check_ASIdOrRange_sk_type(sk),
ossl_check_ASIdOrRange_type(ptr))
#define sk_ASIdOrRange_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_ASIdOrRange_sk_type(sk),
ossl_check_ASIdOrRange_type(ptr))
#define sk_ASIdOrRange_pop(sk) ((ASIdOrRange *)OPENSSL_sk_pop(ossl_check_ASIdOrRange_sk_type(sk)))
#define sk_ASIdOrRange_shift(sk) ((ASIdOrRange *)OPENSSL_sk_shift(ossl_check_ASIdOrRange_sk_type(sk)))
#define sk_ASIdOrRange_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASIdOrRange_sk_type(sk),ossl_check_ASIdOrRange_freefunc_type(freefunc)
)
#define sk_ASIdOrRange_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_ASIdOrRange_sk_type(sk),
ossl_check_ASIdOrRange_type(ptr), (idx))
#define sk_ASIdOrRange_set(sk, idx, ptr) ((ASIdOrRange
*)OPENSSL_sk_set(ossl_check_ASIdOrRange_sk_type(sk),
 (idx), ossl_check_ASIdOrRange_type(ptr)))
#define sk_ASIdOrRange_find(sk, ptr) OPENSSL_sk_find(ossl_check_ASIdOrRange_sk_type(sk),
ossl_check_ASIdOrRange_type(ptr))
#define sk_ASIdOrRange_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_ASIdOrRange_sk_type(sk),
ossl_check_ASIdOrRange_type(ptr))
#define sk_ASIdOrRange_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_ASIdOrRange_sk_type(sk),
ossl_check_ASIdOrRange_type(ptr), pnum)
#define sk_ASIdOrRange_sort(sk) OPENSSL_sk_sort(ossl_check_ASIdOrRange_sk_type(sk))
#define sk_ASIdOrRange_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_ASIdOrRange_sk_type(sk))
```

```
#define sk_ASIdOrRange_dup(sk) ((STACK_OF(ASIdOrRange)
*)OPENSSL_sk_dup(ossl_check_const_ASIdOrRange_sk_type(sk)))
#define sk_ASIdOrRange_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ASIdOrRange)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASIdOrRange_sk_type(sk),
ossl_check_ASIdOrRange_copyfunc_type(copyfunc), ossl_check_ASIdOrRange_freefunc_type(freefunc)))
#define sk_ASIdOrRange_set_cmp_func(sk,
 cmp) ((sk_ASIdOrRange_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASIdOrRange_sk_type(sk),
ossl_check_ASIdOrRange_compfunc_type(cmp)))

/* clang-format on */

typedef STACK_OF(ASIdOrRange) ASIdOrRanges;

#define ASIdentifierChoice_inherit 0
#define ASIdentifierChoice_asIdsOrRanges 1

typedef struct ASIdentifierChoice_st {
  int type;
  union {
      ASN1_NULL *inherit;
      ASIdOrRanges *asIdsOrRanges;
  } u;
} ASIdentifierChoice;

typedef struct ASIdentifiers_st {
  ASIdentifierChoice *asnum, *rdi;
} ASIdentifiers;

DECLARE_ASN1_FUNCTIONS(ASRange)
DECLARE_ASN1_FUNCTIONS(ASIdOrRange)
DECLARE_ASN1_FUNCTIONS(ASIdentifierChoice)
DECLARE_ASN1_FUNCTIONS(ASIdentifiers)

typedef struct IPAddressRange_st {
  ASN1_BIT_STRING *min, *max;
} IPAddressRange;

#define IPAddressOrRange_addressPrefix 0
#define IPAddressOrRange_addressRange 1

typedef struct IPAddressOrRange_st {
  int type;
  union {
      ASN1_BIT_STRING *addressPrefix;
      IPAddressRange
 *addressRange;
  } u;
} IPAddressOrRange;
```

```
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(IPAddressOrRange, IPAddressOrRange, IPAddressOrRange)
#define sk_IPAddressOrRange_num(sk) OPENSSL_sk_num(ossl_check_const_IPAddressOrRange_sk_type(sk))
#define sk_IPAddressOrRange_value(sk, idx) ((IPAddressOrRange
*)OPENSSL_sk_value(ossl_check_const_IPAddressOrRange_sk_type(sk), (idx)))
#define sk_IPAddressOrRange_new(cmp) ((STACK_OF(IPAddressOrRange)
*)OPENSSL_sk_new(ossl_check_IPAddressOrRange_compfunc_type(cmp)))
#define sk_IPAddressOrRange_new_null() ((STACK_OF(IPAddressOrRange) *)OPENSSL_sk_new_null())
#define sk_IPAddressOrRange_new_reserve(cmp, n) ((STACK_OF(IPAddressOrRange)
*)OPENSSL_sk_new_reserve(ossl_check_IPAddressOrRange_compfunc_type(cmp), (n)))
#define sk_IPAddressOrRange_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_IPAddressOrRange_sk_type(sk),
(n))
#define sk_IPAddressOrRange_free(sk) OPENSSL_sk_free(ossl_check_IPAddressOrRange_sk_type(sk))
#define sk_IPAddressOrRange_zero(sk)
 OPENSSL_sk_zero(ossl_check_IPAddressOrRange_sk_type(sk))
#define sk_IPAddressOrRange_delete(sk, i) ((IPAddressOrRange
*)OPENSSL_sk_delete(ossl_check_IPAddressOrRange_sk_type(sk), (i)))
#define sk_IPAddressOrRange_delete_ptr(sk, ptr) ((IPAddressOrRange
*)OPENSSL_sk_delete_ptr(ossl_check_IPAddressOrRange_sk_type(sk),
ossl_check_IPAddressOrRange_type(ptr)))
#define sk_IPAddressOrRange_push(sk, ptr) OPENSSL_sk_push(ossl_check_IPAddressOrRange_sk_type(sk),
ossl_check_IPAddressOrRange_type(ptr))
#define sk_IPAddressOrRange_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_IPAddressOrRange_sk_type(sk),
ossl_check_IPAddressOrRange_type(ptr))
#define sk_IPAddressOrRange_pop(sk) ((IPAddressOrRange
*)OPENSSL_sk_pop(ossl_check_IPAddressOrRange_sk_type(sk)))
#define sk_IPAddressOrRange_shift(sk) ((IPAddressOrRange
*)OPENSSL_sk_shift(ossl_check_IPAddressOrRange_sk_type(sk)))
#define sk_IPAddressOrRange_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_IPAddressOrRange_sk_type(sk),ossl_check_IPAddressOrRange_freefunc_typ
e(freefunc))
#define
 sk_IPAddressOrRange_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_IPAddressOrRange_sk_type(sk),
ossl_check_IPAddressOrRange_type(ptr), (idx))
#define sk_IPAddressOrRange_set(sk, idx, ptr) ((IPAddressOrRange
*)OPENSSL_sk_set(ossl_check_IPAddressOrRange_sk_type(sk), (idx), ossl_check_IPAddressOrRange_type(ptr)))
#define sk_IPAddressOrRange_find(sk, ptr) OPENSSL_sk_find(ossl_check_IPAddressOrRange_sk_type(sk),
ossl_check_IPAddressOrRange_type(ptr))
#define sk_IPAddressOrRange_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_IPAddressOrRange_sk_type(sk), ossl_check_IPAddressOrRange_type(ptr))
#define sk_IPAddressOrRange_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_IPAddressOrRange_sk_type(sk), ossl_check_IPAddressOrRange_type(ptr),
pnum)
#define sk_IPAddressOrRange_sort(sk) OPENSSL_sk_sort(ossl_check_IPAddressOrRange_sk_type(sk))
#define sk_IPAddressOrRange_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_IPAddressOrRange_sk_type(sk))
#define
```

```
 sk_IPAddressOrRange_dup(sk) ((STACK_OF(IPAddressOrRange)
*)OPENSSL_sk_dup(ossl_check_const_IPAddressOrRange_sk_type(sk)))
#define sk_IPAddressOrRange_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(IPAddressOrRange)
*)OPENSSL_sk_deep_copy(ossl_check_const_IPAddressOrRange_sk_type(sk),
ossl_check_IPAddressOrRange_copyfunc_type(copyfunc),
ossl_check_IPAddressOrRange_freefunc_type(freefunc)))
#define sk_IPAddressOrRange_set_cmp_func(sk, cmp)
((sk_IPAddressOrRange_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_IPAddressOrRange_sk_type(sk),
ossl_check_IPAddressOrRange_compfunc_type(cmp)))

/* clang-format on */

typedef STACK_OF(IPAddressOrRange) IPAddressOrRanges;

#define IPAddressChoice_inherit 0
#define IPAddressChoice_addressesOrRanges 1

typedef struct IPAddressChoice_st {
  int type;
  union {
     ASN1_NULL *inherit;
     IPAddressOrRanges *addressesOrRanges;
  } u;
} IPAddressChoice;

typedef struct IPAddressFamily_st {
  ASN1_OCTET_STRING *addressFamily;
   IPAddressChoice *ipAddressChoice;
} IPAddressFamily;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(IPAddressFamily, IPAddressFamily, IPAddressFamily)
#define sk_IPAddressFamily_num(sk) OPENSSL_sk_num(ossl_check_const_IPAddressFamily_sk_type(sk))
#define sk_IPAddressFamily_value(sk, idx) ((IPAddressFamily
*)OPENSSL_sk_value(ossl_check_const_IPAddressFamily_sk_type(sk), (idx)))
#define sk_IPAddressFamily_new(cmp) ((STACK_OF(IPAddressFamily)
*)OPENSSL_sk_new(ossl_check_IPAddressFamily_compfunc_type(cmp)))
#define sk_IPAddressFamily_new_null() ((STACK_OF(IPAddressFamily) *)OPENSSL_sk_new_null())
#define sk_IPAddressFamily_new_reserve(cmp, n) ((STACK_OF(IPAddressFamily)
*)OPENSSL_sk_new_reserve(ossl_check_IPAddressFamily_compfunc_type(cmp), (n)))
#define sk_IPAddressFamily_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_IPAddressFamily_sk_type(sk), (n))
#define sk_IPAddressFamily_free(sk) OPENSSL_sk_free(ossl_check_IPAddressFamily_sk_type(sk))
#define sk_IPAddressFamily_zero(sk)
 OPENSSL_sk_zero(ossl_check_IPAddressFamily_sk_type(sk))
#define sk_IPAddressFamily_delete(sk, i) ((IPAddressFamily
*)OPENSSL_sk_delete(ossl_check_IPAddressFamily_sk_type(sk), (i)))
#define sk_IPAddressFamily_delete_ptr(sk, ptr) ((IPAddressFamily
*)OPENSSL_sk_delete_ptr(ossl_check_IPAddressFamily_sk_type(sk), ossl_check_IPAddressFamily_type(ptr)))
```

```
#define sk_IPAddressFamily_push(sk, ptr) OPENSSL_sk_push(ossl_check_IPAddressFamily_sk_type(sk),
ossl_check_IPAddressFamily_type(ptr))
#define sk_IPAddressFamily_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_IPAddressFamily_sk_type(sk),
ossl_check_IPAddressFamily_type(ptr))
#define sk_IPAddressFamily_pop(sk) ((IPAddressFamily
*)OPENSSL_sk_pop(ossl_check_IPAddressFamily_sk_type(sk)))
#define sk_IPAddressFamily_shift(sk) ((IPAddressFamily
*)OPENSSL_sk_shift(ossl_check_IPAddressFamily_sk_type(sk)))
#define sk_IPAddressFamily_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_IPAddressFamily_sk_type(sk),ossl_check_IPAddressFamily_freefunc_type(fre
efunc))
#define
 sk_IPAddressFamily_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_IPAddressFamily_sk_type(sk),
ossl_check_IPAddressFamily_type(ptr), (idx))
#define sk_IPAddressFamily_set(sk, idx, ptr) ((IPAddressFamily
*)OPENSSL_sk_set(ossl_check_IPAddressFamily_sk_type(sk), (idx), ossl_check_IPAddressFamily_type(ptr)))
#define sk_IPAddressFamily_find(sk, ptr) OPENSSL_sk_find(ossl_check_IPAddressFamily_sk_type(sk),
ossl_check_IPAddressFamily_type(ptr))
#define sk_IPAddressFamily_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_IPAddressFamily_sk_type(sk),
ossl_check_IPAddressFamily_type(ptr))
#define sk_IPAddressFamily_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_IPAddressFamily_sk_type(sk), ossl_check_IPAddressFamily_type(ptr), pnum)
#define sk_IPAddressFamily_sort(sk) OPENSSL_sk_sort(ossl_check_IPAddressFamily_sk_type(sk))
#define sk_IPAddressFamily_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_IPAddressFamily_sk_type(sk))
#define sk_IPAddressFamily_dup(sk) ((STACK_OF(IPAddressFamily)
 *)OPENSSL_sk_dup(ossl_check_const_IPAddressFamily_sk_type(sk)))
#define sk_IPAddressFamily_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(IPAddressFamily)
*)OPENSSL_sk_deep_copy(ossl_check_const_IPAddressFamily_sk_type(sk),
ossl_check_IPAddressFamily_copyfunc_type(copyfunc), ossl_check_IPAddressFamily_freefunc_type(freefunc)))
#define sk_IPAddressFamily_set_cmp_func(sk, cmp)
((sk_IPAddressFamily_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_IPAddressFamily_sk_type(sk),
ossl_check_IPAddressFamily_compfunc_type(cmp)))

/* clang-format on */

typedef STACK_OF(IPAddressFamily) IPAddrBlocks;

DECLARE_ASN1_FUNCTIONS(IPAddressRange)
DECLARE_ASN1_FUNCTIONS(IPAddressOrRange)
DECLARE_ASN1_FUNCTIONS(IPAddressChoice)
DECLARE_ASN1_FUNCTIONS(IPAddressFamily)

/*
* API tag for elements of the ASIdentifer SEQUENCE.
*/
#define V3_ASID_ASNUM 0
#define V3_ASID_RDI 1
```

```
/*
* AFI values, assigned by IANA.  It'd be nice to make the AFI
* handling code totally generic, but there are too
 many little things
* that would need to be defined for other address families for it to
* be worth the trouble.
*/
#define IANA_AFI_IPV4 1
#define IANA_AFI_IPV6 2

/*
* Utilities to construct and extract values from RFC3779 extensions,
* since some of the encodings (particularly for IP address prefixes
* and ranges) are a bit tedious to work with directly.
*/
int X509v3_asid_add_inherit(ASIdentifiers *asid, int which);
int X509v3_asid_add_id_or_range(ASIdentifiers *asid, int which,
   ASN1_INTEGER *min, ASN1_INTEGER *max);
int X509v3_addr_add_inherit(IPAddrBlocks *addr,
   const unsigned afi, const unsigned *safi);
int X509v3_addr_add_prefix(IPAddrBlocks *addr,
   const unsigned afi, const unsigned *safi,
   unsigned char *a, const int prefixlen);
int X509v3_addr_add_range(IPAddrBlocks *addr,
   const unsigned afi, const unsigned *safi,
   unsigned char *min, unsigned char *max);
unsigned X509v3_addr_get_afi(const IPAddressFamily *f);
int X509v3_addr_get_range(IPAddressOrRange
 *aor, const unsigned afi,
   unsigned char *min, unsigned char *max,
   const int length);

/*
* Canonical forms.
*/
int X509v3_asid_is_canonical(ASIdentifiers *asid);
int X509v3_addr_is_canonical(IPAddrBlocks *addr);
int X509v3_asid_canonize(ASIdentifiers *asid);
int X509v3_addr_canonize(IPAddrBlocks *addr);

/*
* Tests for inheritance and containment.
*/
int X509v3_asid_inherits(ASIdentifiers *asid);
int X509v3_addr_inherits(IPAddrBlocks *addr);
int X509v3_asid_subset(ASIdentifiers *a, ASIdentifiers *b);
int X509v3_addr_subset(IPAddrBlocks *a, IPAddrBlocks *b);
```

```
/*
* Check whether RFC 3779 extensions nest properly in chains.
*/
int X509v3_asid_validate_path(X509_STORE_CTX *);
int X509v3_addr_validate_path(X509_STORE_CTX *);
int X509v3_asid_validate_resource_set(STACK_OF(X509) *chain,
   ASIdentifiers *ext,
   int allow_inheritance);
int X509v3_addr_validate_resource_set(STACK_OF(X509) *chain,
   IPAddrBlocks *ext, int allow_inheritance);

#endif /* OPENSSL_NO_RFC3779
 */

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ASN1_STRING, ASN1_STRING, ASN1_STRING)
#define sk_ASN1_STRING_num(sk) OPENSSL_sk_num(ossl_check_const_ASN1_STRING_sk_type(sk))
#define sk_ASN1_STRING_value(sk, idx) ((ASN1_STRING
*)OPENSSL_sk_value(ossl_check_const_ASN1_STRING_sk_type(sk), (idx)))
#define sk_ASN1_STRING_new(cmp) ((STACK_OF(ASN1_STRING)
*)OPENSSL_sk_new(ossl_check_ASN1_STRING_compfunc_type(cmp)))
#define sk_ASN1_STRING_new_null() ((STACK_OF(ASN1_STRING) *)OPENSSL_sk_new_null())
#define sk_ASN1_STRING_new_reserve(cmp, n) ((STACK_OF(ASN1_STRING)
*)OPENSSL_sk_new_reserve(ossl_check_ASN1_STRING_compfunc_type(cmp), (n)))
#define sk_ASN1_STRING_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_ASN1_STRING_sk_type(sk), (n))
#define sk_ASN1_STRING_free(sk) OPENSSL_sk_free(ossl_check_ASN1_STRING_sk_type(sk))
#define sk_ASN1_STRING_zero(sk) OPENSSL_sk_zero(ossl_check_ASN1_STRING_sk_type(sk))
#define sk_ASN1_STRING_delete(sk, i) ((ASN1_STRING
*)OPENSSL_sk_delete(ossl_check_ASN1_STRING_sk_type(sk),
 (i)))
#define sk_ASN1_STRING_delete_ptr(sk, ptr) ((ASN1_STRING
*)OPENSSL_sk_delete_ptr(ossl_check_ASN1_STRING_sk_type(sk), ossl_check_ASN1_STRING_type(ptr)))
#define sk_ASN1_STRING_push(sk, ptr) OPENSSL_sk_push(ossl_check_ASN1_STRING_sk_type(sk),
ossl_check_ASN1_STRING_type(ptr))
#define sk_ASN1_STRING_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_ASN1_STRING_sk_type(sk),
ossl_check_ASN1_STRING_type(ptr))
#define sk_ASN1_STRING_pop(sk) ((ASN1_STRING
*)OPENSSL_sk_pop(ossl_check_ASN1_STRING_sk_type(sk)))
#define sk_ASN1_STRING_shift(sk) ((ASN1_STRING
*)OPENSSL_sk_shift(ossl_check_ASN1_STRING_sk_type(sk)))
#define sk_ASN1_STRING_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASN1_STRING_sk_type(sk),ossl_check_ASN1_STRING_freefunc_type(freef
unc))
#define sk_ASN1_STRING_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_ASN1_STRING_sk_type(sk),
ossl_check_ASN1_STRING_type(ptr), (idx))
#define sk_ASN1_STRING_set(sk, idx, ptr) ((ASN1_STRING
*)OPENSSL_sk_set(ossl_check_ASN1_STRING_sk_type(sk),
```

```
 (idx), ossl_check_ASN1_STRING_type(ptr)))
#define sk_ASN1_STRING_find(sk, ptr) OPENSSL_sk_find(ossl_check_ASN1_STRING_sk_type(sk),
ossl_check_ASN1_STRING_type(ptr))
#define sk_ASN1_STRING_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_ASN1_STRING_sk_type(sk),
ossl_check_ASN1_STRING_type(ptr))
#define sk_ASN1_STRING_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ASN1_STRING_sk_type(sk), ossl_check_ASN1_STRING_type(ptr), pnum)
#define sk_ASN1_STRING_sort(sk) OPENSSL_sk_sort(ossl_check_ASN1_STRING_sk_type(sk))
#define sk_ASN1_STRING_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_ASN1_STRING_sk_type(sk))
#define sk_ASN1_STRING_dup(sk) ((STACK_OF(ASN1_STRING)
*)OPENSSL_sk_dup(ossl_check_const_ASN1_STRING_sk_type(sk)))
#define sk_ASN1_STRING_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ASN1_STRING)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASN1_STRING_sk_type(sk),
ossl_check_ASN1_STRING_copyfunc_type(copyfunc), ossl_check_ASN1_STRING_freefunc_type(freefunc)))
#define
 sk_ASN1_STRING_set_cmp_func(sk, cmp)
((sk_ASN1_STRING_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASN1_STRING_sk_type(sk),
ossl_check_ASN1_STRING_compfunc_type(cmp)))

/* clang-format on */

/*
* Admission Syntax
*/
typedef struct NamingAuthority_st NAMING_AUTHORITY;
typedef struct ProfessionInfo_st PROFESSION_INFO;
typedef struct Admissions_st ADMISSIONS;
typedef struct AdmissionSyntax_st ADMISSION_SYNTAX;
DECLARE_ASN1_FUNCTIONS(NAMING_AUTHORITY)
DECLARE_ASN1_FUNCTIONS(PROFESSION_INFO)
DECLARE_ASN1_FUNCTIONS(ADMISSIONS)
DECLARE_ASN1_FUNCTIONS(ADMISSION_SYNTAX)
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(PROFESSION_INFO, PROFESSION_INFO, PROFESSION_INFO)
#define sk_PROFESSION_INFO_num(sk)
OPENSSL_sk_num(ossl_check_const_PROFESSION_INFO_sk_type(sk))
#define sk_PROFESSION_INFO_value(sk, idx) ((PROFESSION_INFO
*)OPENSSL_sk_value(ossl_check_const_PROFESSION_INFO_sk_type(sk), (idx)))
#define sk_PROFESSION_INFO_new(cmp) ((STACK_OF(PROFESSION_INFO)
*)OPENSSL_sk_new(ossl_check_PROFESSION_INFO_compfunc_type(cmp)))
#define
 sk_PROFESSION_INFO_new_null() ((STACK_OF(PROFESSION_INFO) *)OPENSSL_sk_new_null())
#define sk_PROFESSION_INFO_new_reserve(cmp, n) ((STACK_OF(PROFESSION_INFO)
*)OPENSSL_sk_new_reserve(ossl_check_PROFESSION_INFO_compfunc_type(cmp), (n)))
#define sk_PROFESSION_INFO_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_PROFESSION_INFO_sk_type(sk), (n))
#define sk_PROFESSION_INFO_free(sk) OPENSSL_sk_free(ossl_check_PROFESSION_INFO_sk_type(sk))
```

```
#define sk_PROFESSION_INFO_zero(sk) OPENSSL_sk_zero(ossl_check_PROFESSION_INFO_sk_type(sk))
#define sk_PROFESSION_INFO_delete(sk, i) ((PROFESSION_INFO
*)OPENSSL_sk_delete(ossl_check_PROFESSION_INFO_sk_type(sk), (i)))
#define sk_PROFESSION_INFO_delete_ptr(sk, ptr) ((PROFESSION_INFO
*)OPENSSL_sk_delete_ptr(ossl_check_PROFESSION_INFO_sk_type(sk),
ossl_check_PROFESSION_INFO_type(ptr)))
#define sk_PROFESSION_INFO_push(sk, ptr)
OPENSSL_sk_push(ossl_check_PROFESSION_INFO_sk_type(sk), ossl_check_PROFESSION_INFO_type(ptr))
#define
 sk_PROFESSION_INFO_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_PROFESSION_INFO_sk_type(sk),
ossl_check_PROFESSION_INFO_type(ptr))
#define sk_PROFESSION_INFO_pop(sk) ((PROFESSION_INFO
*)OPENSSL_sk_pop(ossl_check_PROFESSION_INFO_sk_type(sk)))
#define sk_PROFESSION_INFO_shift(sk) ((PROFESSION_INFO
*)OPENSSL_sk_shift(ossl_check_PROFESSION_INFO_sk_type(sk)))
#define sk_PROFESSION_INFO_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_PROFESSION_INFO_sk_type(sk),ossl_check_PROFESSION_INFO_freefun
c_type(freefunc))
#define sk_PROFESSION_INFO_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_PROFESSION_INFO_sk_type(sk), ossl_check_PROFESSION_INFO_type(ptr),
(idx))
#define sk_PROFESSION_INFO_set(sk, idx, ptr) ((PROFESSION_INFO
*)OPENSSL_sk_set(ossl_check_PROFESSION_INFO_sk_type(sk), (idx),
ossl_check_PROFESSION_INFO_type(ptr)))
#define sk_PROFESSION_INFO_find(sk, ptr) OPENSSL_sk_find(ossl_check_PROFESSION_INFO_sk_type(sk),
ossl_check_PROFESSION_INFO_type(ptr))
#define sk_PROFESSION_INFO_find_ex(sk,
 ptr) OPENSSL_sk_find_ex(ossl_check_PROFESSION_INFO_sk_type(sk),
ossl_check_PROFESSION_INFO_type(ptr))
#define sk_PROFESSION_INFO_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_PROFESSION_INFO_sk_type(sk),
ossl_check_PROFESSION_INFO_type(ptr), pnum)
#define sk_PROFESSION_INFO_sort(sk) OPENSSL_sk_sort(ossl_check_PROFESSION_INFO_sk_type(sk))
#define sk_PROFESSION_INFO_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_PROFESSION_INFO_sk_type(sk))
#define sk_PROFESSION_INFO_dup(sk) ((STACK_OF(PROFESSION_INFO)
*)OPENSSL_sk_dup(ossl_check_const_PROFESSION_INFO_sk_type(sk)))
#define sk_PROFESSION_INFO_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(PROFESSION_INFO)
*)OPENSSL_sk_deep_copy(ossl_check_const_PROFESSION_INFO_sk_type(sk),
ossl_check_PROFESSION_INFO_copyfunc_type(copyfunc),
ossl_check_PROFESSION_INFO_freefunc_type(freefunc)))
#define sk_PROFESSION_INFO_set_cmp_func(sk, cmp)
((sk_PROFESSION_INFO_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_PROFESSION_INFO_sk_type(sk)
,
 ossl_check_PROFESSION_INFO_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(ADMISSIONS, ADMISSIONS, ADMISSIONS)
#define sk_ADMISSIONS_num(sk) OPENSSL_sk_num(ossl_check_const_ADMISSIONS_sk_type(sk))
#define sk_ADMISSIONS_value(sk, idx) ((ADMISSIONS
```

```
*)OPENSSL_sk_value(ossl_check_const_ADMISSIONS_sk_type(sk), (idx)))
#define sk_ADMISSIONS_new(cmp) ((STACK_OF(ADMISSIONS)
*)OPENSSL_sk_new(ossl_check_ADMISSIONS_compfunc_type(cmp)))
#define sk_ADMISSIONS_new_null() ((STACK_OF(ADMISSIONS) *)OPENSSL_sk_new_null())
#define sk_ADMISSIONS_new_reserve(cmp, n) ((STACK_OF(ADMISSIONS)
*)OPENSSL_sk_new_reserve(ossl_check_ADMISSIONS_compfunc_type(cmp), (n)))
#define sk_ADMISSIONS_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_ADMISSIONS_sk_type(sk), (n))
#define sk_ADMISSIONS_free(sk) OPENSSL_sk_free(ossl_check_ADMISSIONS_sk_type(sk))
#define sk_ADMISSIONS_zero(sk) OPENSSL_sk_zero(ossl_check_ADMISSIONS_sk_type(sk))
#define sk_ADMISSIONS_delete(sk, i) ((ADMISSIONS
*)OPENSSL_sk_delete(ossl_check_ADMISSIONS_sk_type(sk),
 (i)))
#define sk_ADMISSIONS_delete_ptr(sk, ptr) ((ADMISSIONS
*)OPENSSL_sk_delete_ptr(ossl_check_ADMISSIONS_sk_type(sk), ossl_check_ADMISSIONS_type(ptr)))
#define sk_ADMISSIONS_push(sk, ptr) OPENSSL_sk_push(ossl_check_ADMISSIONS_sk_type(sk),
ossl_check_ADMISSIONS_type(ptr))
#define sk_ADMISSIONS_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_ADMISSIONS_sk_type(sk),
ossl_check_ADMISSIONS_type(ptr))
#define sk_ADMISSIONS_pop(sk) ((ADMISSIONS
*)OPENSSL_sk_pop(ossl_check_ADMISSIONS_sk_type(sk)))
#define sk_ADMISSIONS_shift(sk) ((ADMISSIONS
*)OPENSSL_sk_shift(ossl_check_ADMISSIONS_sk_type(sk)))
#define sk_ADMISSIONS_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ADMISSIONS_sk_type(sk),ossl_check_ADMISSIONS_freefunc_type(freefun
c))
#define sk_ADMISSIONS_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_ADMISSIONS_sk_type(sk),
ossl_check_ADMISSIONS_type(ptr), (idx))
#define sk_ADMISSIONS_set(sk, idx, ptr) ((ADMISSIONS
*)OPENSSL_sk_set(ossl_check_ADMISSIONS_sk_type(sk),
 (idx), ossl_check_ADMISSIONS_type(ptr)))
#define sk_ADMISSIONS_find(sk, ptr) OPENSSL_sk_find(ossl_check_ADMISSIONS_sk_type(sk),
ossl_check_ADMISSIONS_type(ptr))
#define sk_ADMISSIONS_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_ADMISSIONS_sk_type(sk),
ossl_check_ADMISSIONS_type(ptr))
#define sk_ADMISSIONS_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_ADMISSIONS_sk_type(sk),
ossl_check_ADMISSIONS_type(ptr), pnum)
#define sk_ADMISSIONS_sort(sk) OPENSSL_sk_sort(ossl_check_ADMISSIONS_sk_type(sk))
#define sk_ADMISSIONS_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_ADMISSIONS_sk_type(sk))
#define sk_ADMISSIONS_dup(sk) ((STACK_OF(ADMISSIONS)
*)OPENSSL_sk_dup(ossl_check_const_ADMISSIONS_sk_type(sk)))
#define sk_ADMISSIONS_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ADMISSIONS)
*)OPENSSL_sk_deep_copy(ossl_check_const_ADMISSIONS_sk_type(sk),
ossl_check_ADMISSIONS_copyfunc_type(copyfunc), ossl_check_ADMISSIONS_freefunc_type(freefunc)))
#define sk_ADMISSIONS_set_cmp_func(sk,
 cmp) ((sk_ADMISSIONS_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ADMISSIONS_sk_type(sk),
ossl_check_ADMISSIONS_compfunc_type(cmp)))

/* clang-format on */
```

```
typedef STACK_OF(PROFESSION_INFO) PROFESSION_INFOS;

const ASN1_OBJECT *NAMING_AUTHORITY_get0_authorityId(
   const NAMING_AUTHORITY *n);
const ASN1_IA5STRING *NAMING_AUTHORITY_get0_authorityURL(
   const NAMING_AUTHORITY *n);
const ASN1_STRING *NAMING_AUTHORITY_get0_authorityText(
   const NAMING_AUTHORITY *n);
void NAMING_AUTHORITY_set0_authorityId(NAMING_AUTHORITY *n,
   ASN1_OBJECT *namingAuthorityId);
void NAMING_AUTHORITY_set0_authorityURL(NAMING_AUTHORITY *n,
   ASN1_IA5STRING *namingAuthorityUrl);
void NAMING_AUTHORITY_set0_authorityText(NAMING_AUTHORITY *n,
   ASN1_STRING *namingAuthorityText);

const GENERAL_NAME *ADMISSION_SYNTAX_get0_admissionAuthority(
   const ADMISSION_SYNTAX *as);
void ADMISSION_SYNTAX_set0_admissionAuthority(
   ADMISSION_SYNTAX *as, GENERAL_NAME *aa);
const STACK_OF(ADMISSIONS) *ADMISSION_SYNTAX_get0_contentsOfAdmissions(
    const ADMISSION_SYNTAX *as);
void ADMISSION_SYNTAX_set0_contentsOfAdmissions(
   ADMISSION_SYNTAX *as, STACK_OF(ADMISSIONS) *a);
const GENERAL_NAME *ADMISSIONS_get0_admissionAuthority(const ADMISSIONS *a);
void ADMISSIONS_set0_admissionAuthority(ADMISSIONS *a, GENERAL_NAME *aa);
const NAMING_AUTHORITY *ADMISSIONS_get0_namingAuthority(const ADMISSIONS *a);
void ADMISSIONS_set0_namingAuthority(ADMISSIONS *a, NAMING_AUTHORITY *na);
const PROFESSION_INFOS *ADMISSIONS_get0_professionInfos(const ADMISSIONS *a);
void ADMISSIONS_set0_professionInfos(ADMISSIONS *a, PROFESSION_INFOS *pi);
const ASN1_OCTET_STRING *PROFESSION_INFO_get0_addProfessionInfo(
   const PROFESSION_INFO *pi);
void PROFESSION_INFO_set0_addProfessionInfo(
   PROFESSION_INFO *pi, ASN1_OCTET_STRING *aos);
const NAMING_AUTHORITY *PROFESSION_INFO_get0_namingAuthority(
   const PROFESSION_INFO *pi);
void PROFESSION_INFO_set0_namingAuthority(
   PROFESSION_INFO *pi, NAMING_AUTHORITY
 *na);
const STACK_OF(ASN1_STRING) *PROFESSION_INFO_get0_professionItems(
   const PROFESSION_INFO *pi);
void PROFESSION_INFO_set0_professionItems(
   PROFESSION_INFO *pi, STACK_OF(ASN1_STRING) *as);
const STACK_OF(ASN1_OBJECT) *PROFESSION_INFO_get0_professionOIDs(
   const PROFESSION_INFO *pi);
void PROFESSION_INFO_set0_professionOIDs(
   PROFESSION_INFO *pi, STACK_OF(ASN1_OBJECT) *po);
const ASN1_PRINTABLESTRING *PROFESSION_INFO_get0_registrationNumber(
   const PROFESSION_INFO *pi);
```

```
void PROFESSION_INFO_set0_registrationNumber(
   PROFESSION_INFO *pi, ASN1_PRINTABLESTRING *rn);

int OSSL_GENERAL_NAMES_print(BIO *out, GENERAL_NAMES *gens, int indent);

typedef STACK_OF(X509_ATTRIBUTE) OSSL_ATTRIBUTES_SYNTAX;
DECLARE_ASN1_FUNCTIONS(OSSL_ATTRIBUTES_SYNTAX)

typedef STACK_OF(USERNOTICE) OSSL_USER_NOTICE_SYNTAX;
DECLARE_ASN1_FUNCTIONS(OSSL_USER_NOTICE_SYNTAX)

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(USERNOTICE, USERNOTICE, USERNOTICE)
#define sk_USERNOTICE_num(sk) OPENSSL_sk_num(ossl_check_const_USERNOTICE_sk_type(sk))
#define
 sk_USERNOTICE_value(sk, idx) ((USERNOTICE
*)OPENSSL_sk_value(ossl_check_const_USERNOTICE_sk_type(sk), (idx)))
#define sk_USERNOTICE_new(cmp) ((STACK_OF(USERNOTICE)
*)OPENSSL_sk_new(ossl_check_USERNOTICE_compfunc_type(cmp)))
#define sk_USERNOTICE_new_null() ((STACK_OF(USERNOTICE) *)OPENSSL_sk_new_null())
#define sk_USERNOTICE_new_reserve(cmp, n) ((STACK_OF(USERNOTICE)
*)OPENSSL_sk_new_reserve(ossl_check_USERNOTICE_compfunc_type(cmp), (n)))
#define sk_USERNOTICE_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_USERNOTICE_sk_type(sk), (n))
#define sk_USERNOTICE_free(sk) OPENSSL_sk_free(ossl_check_USERNOTICE_sk_type(sk))
#define sk_USERNOTICE_zero(sk) OPENSSL_sk_zero(ossl_check_USERNOTICE_sk_type(sk))
#define sk_USERNOTICE_delete(sk, i) ((USERNOTICE
*)OPENSSL_sk_delete(ossl_check_USERNOTICE_sk_type(sk), (i)))
#define sk_USERNOTICE_delete_ptr(sk, ptr) ((USERNOTICE
*)OPENSSL_sk_delete_ptr(ossl_check_USERNOTICE_sk_type(sk), ossl_check_USERNOTICE_type(ptr)))
#define
 sk_USERNOTICE_push(sk, ptr) OPENSSL_sk_push(ossl_check_USERNOTICE_sk_type(sk),
ossl_check_USERNOTICE_type(ptr))
#define sk_USERNOTICE_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_USERNOTICE_sk_type(sk),
ossl_check_USERNOTICE_type(ptr))
#define sk_USERNOTICE_pop(sk) ((USERNOTICE
*)OPENSSL_sk_pop(ossl_check_USERNOTICE_sk_type(sk)))
#define sk_USERNOTICE_shift(sk) ((USERNOTICE
*)OPENSSL_sk_shift(ossl_check_USERNOTICE_sk_type(sk)))
#define sk_USERNOTICE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_USERNOTICE_sk_type(sk),ossl_check_USERNOTICE_freefunc_type(freefu
nc))
#define sk_USERNOTICE_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_USERNOTICE_sk_type(sk),
ossl_check_USERNOTICE_type(ptr), (idx))
#define sk_USERNOTICE_set(sk, idx, ptr) ((USERNOTICE
*)OPENSSL_sk_set(ossl_check_USERNOTICE_sk_type(sk), (idx), ossl_check_USERNOTICE_type(ptr)))
#define sk_USERNOTICE_find(sk, ptr) OPENSSL_sk_find(ossl_check_USERNOTICE_sk_type(sk),
ossl_check_USERNOTICE_type(ptr))
#define
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 sk_USERNOTICE_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_USERNOTICE_sk_type(sk),
ossl_check_USERNOTICE_type(ptr))
#define sk_USERNOTICE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_USERNOTICE_sk_type(sk), ossl_check_USERNOTICE_type(ptr), pnum)
#define sk_USERNOTICE_sort(sk) OPENSSL_sk_sort(ossl_check_USERNOTICE_sk_type(sk))
#define sk_USERNOTICE_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_USERNOTICE_sk_type(sk))
#define sk_USERNOTICE_dup(sk) ((STACK_OF(USERNOTICE)
*)OPENSSL_sk_dup(ossl_check_const_USERNOTICE_sk_type(sk)))
#define sk_USERNOTICE_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(USERNOTICE)
*)OPENSSL_sk_deep_copy(ossl_check_const_USERNOTICE_sk_type(sk),
ossl_check_USERNOTICE_copyfunc_type(copyfunc), ossl_check_USERNOTICE_freefunc_type(freefunc)))
#define sk_USERNOTICE_set_cmp_func(sk, cmp)
((sk_USERNOTICE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_USERNOTICE_sk_type(sk),
ossl_check_USERNOTICE_compfunc_type(cmp)))

/* clang-format on */

typedef
 struct OSSL_ROLE_SPEC_CERT_ID_st {
   GENERAL_NAME *roleName;
   GENERAL_NAME *roleCertIssuer;
   ASN1_INTEGER *roleCertSerialNumber;
   GENERAL_NAMES *roleCertLocator;
} OSSL_ROLE_SPEC_CERT_ID;

DECLARE_ASN1_FUNCTIONS(OSSL_ROLE_SPEC_CERT_ID)

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_ROLE_SPEC_CERT_ID, OSSL_ROLE_SPEC_CERT_ID,
OSSL_ROLE_SPEC_CERT_ID)
#define sk_OSSL_ROLE_SPEC_CERT_ID_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk))
#define sk_OSSL_ROLE_SPEC_CERT_ID_value(sk, idx) ((OSSL_ROLE_SPEC_CERT_ID
*)OPENSSL_sk_value(ossl_check_const_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk), (idx)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_new(cmp) ((STACK_OF(OSSL_ROLE_SPEC_CERT_ID)
*)OPENSSL_sk_new(ossl_check_OSSL_ROLE_SPEC_CERT_ID_compfunc_type(cmp)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_new_null() ((STACK_OF(OSSL_ROLE_SPEC_CERT_ID)
*)OPENSSL_sk_new_null())
#define sk_OSSL_ROLE_SPEC_CERT_ID_new_reserve(cmp, n) ((STACK_OF(OSSL_ROLE_SPEC_CERT_ID)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_ROLE_SPEC_CERT_ID_compfunc_type(cmp),
 (n)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk), (n))
#define sk_OSSL_ROLE_SPEC_CERT_ID_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk))
#define sk_OSSL_ROLE_SPEC_CERT_ID_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk))
#define sk_OSSL_ROLE_SPEC_CERT_ID_delete(sk, i) ((OSSL_ROLE_SPEC_CERT_ID
```

```
*)OPENSSL_sk_delete(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk), (i)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_delete_ptr(sk, ptr) ((OSSL_ROLE_SPEC_CERT_ID
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_type(ptr)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_type(ptr))
#define sk_OSSL_ROLE_SPEC_CERT_ID_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),
 ossl_check_OSSL_ROLE_SPEC_CERT_ID_type(ptr))
#define sk_OSSL_ROLE_SPEC_CERT_ID_pop(sk) ((OSSL_ROLE_SPEC_CERT_ID
*)OPENSSL_sk_pop(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_shift(sk) ((OSSL_ROLE_SPEC_CERT_ID
*)OPENSSL_sk_shift(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),ossl_check_OSSL_ROLE_SPE
C_CERT_ID_freefunc_type(freefunc))
#define sk_OSSL_ROLE_SPEC_CERT_ID_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_type(ptr), (idx))
#define sk_OSSL_ROLE_SPEC_CERT_ID_set(sk, idx, ptr) ((OSSL_ROLE_SPEC_CERT_ID
*)OPENSSL_sk_set(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk), (idx),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_type(ptr)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_type(ptr))
#define
 sk_OSSL_ROLE_SPEC_CERT_ID_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_type(ptr))
#define sk_OSSL_ROLE_SPEC_CERT_ID_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_type(ptr), pnum)
#define sk_OSSL_ROLE_SPEC_CERT_ID_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk))
#define sk_OSSL_ROLE_SPEC_CERT_ID_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk))
#define sk_OSSL_ROLE_SPEC_CERT_ID_dup(sk) ((STACK_OF(OSSL_ROLE_SPEC_CERT_ID)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_ROLE_SPEC_CERT_ID)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_copyfunc_type(copyfunc),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_freefunc_type(freefunc)))
#define
 sk_OSSL_ROLE_SPEC_CERT_ID_set_cmp_func(sk, cmp)
((sk_OSSL_ROLE_SPEC_CERT_ID_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_ROLE_SPEC_C
ERT_ID_sk_type(sk), ossl_check_OSSL_ROLE_SPEC_CERT_ID_compfunc_type(cmp)))
```

```
/* clang-format on */

typedef STACK_OF(OSSL_ROLE_SPEC_CERT_ID) OSSL_ROLE_SPEC_CERT_ID_SYNTAX;

DECLARE_ASN1_FUNCTIONS(OSSL_ROLE_SPEC_CERT_ID_SYNTAX)
typedef struct OSSL_HASH_st {
  X509_ALGOR *algorithmIdentifier;
  ASN1_BIT_STRING *hashValue;
} OSSL_HASH;

typedef struct OSSL_INFO_SYNTAX_POINTER_st {
  GENERAL_NAMES *name;
  OSSL_HASH *hash;
} OSSL_INFO_SYNTAX_POINTER;

#define OSSL_INFO_SYNTAX_TYPE_CONTENT 0
#define OSSL_INFO_SYNTAX_TYPE_POINTER 1

typedef struct OSSL_INFO_SYNTAX_st {
  int type;
  union {
     ASN1_STRING *content;
     OSSL_INFO_SYNTAX_POINTER *pointer;
  } choice;
} OSSL_INFO_SYNTAX;

typedef struct OSSL_PRIVILEGE_POLICY_ID_st {
  ASN1_OBJECT *privilegePolicy;
  OSSL_INFO_SYNTAX
 *privPolSyntax;
} OSSL_PRIVILEGE_POLICY_ID;

typedef struct OSSL_ATTRIBUTE_DESCRIPTOR_st {
  ASN1_OBJECT *identifier;
  ASN1_STRING *attributeSyntax;
  ASN1_UTF8STRING *name;
  ASN1_UTF8STRING *description;
  OSSL_PRIVILEGE_POLICY_ID *dominationRule;
} OSSL_ATTRIBUTE_DESCRIPTOR;

DECLARE_ASN1_FUNCTIONS(OSSL_HASH)
DECLARE_ASN1_FUNCTIONS(OSSL_INFO_SYNTAX)
DECLARE_ASN1_FUNCTIONS(OSSL_INFO_SYNTAX_POINTER)
DECLARE_ASN1_FUNCTIONS(OSSL_PRIVILEGE_POLICY_ID)
DECLARE_ASN1_FUNCTIONS(OSSL_ATTRIBUTE_DESCRIPTOR)

typedef struct OSSL_TIME_SPEC_ABSOLUTE_st {
```

```
  ASN1_GENERALIZEDTIME *startTime;
  ASN1_GENERALIZEDTIME *endTime;
} OSSL_TIME_SPEC_ABSOLUTE;

typedef struct OSSL_DAY_TIME_st {
  ASN1_INTEGER *hour;
  ASN1_INTEGER *minute;
  ASN1_INTEGER *second;
} OSSL_DAY_TIME;

typedef struct OSSL_DAY_TIME_BAND_st {
  OSSL_DAY_TIME *startDayTime;
  OSSL_DAY_TIME *endDayTime;
} OSSL_DAY_TIME_BAND;

#define OSSL_NAMED_DAY_TYPE_INT 0
#define OSSL_NAMED_DAY_TYPE_BIT 1
#define OSSL_NAMED_DAY_INT_SUN
 1
#define OSSL_NAMED_DAY_INT_MON 2
#define OSSL_NAMED_DAY_INT_TUE 3
#define OSSL_NAMED_DAY_INT_WED 4
#define OSSL_NAMED_DAY_INT_THU 5
#define OSSL_NAMED_DAY_INT_FRI 6
#define OSSL_NAMED_DAY_INT_SAT 7
#define OSSL_NAMED_DAY_BIT_SUN 0
#define OSSL_NAMED_DAY_BIT_MON 1
#define OSSL_NAMED_DAY_BIT_TUE 2
#define OSSL_NAMED_DAY_BIT_WED 3
#define OSSL_NAMED_DAY_BIT_THU 4
#define OSSL_NAMED_DAY_BIT_FRI 5
#define OSSL_NAMED_DAY_BIT_SAT 6

typedef struct OSSL_NAMED_DAY_st {
  int type;
  union {
     ASN1_INTEGER *intNamedDays;
     ASN1_BIT_STRING *bitNamedDays;
  } choice;
} OSSL_NAMED_DAY;

#define OSSL_TIME_SPEC_X_DAY_OF_FIRST 0
#define OSSL_TIME_SPEC_X_DAY_OF_SECOND 1
#define OSSL_TIME_SPEC_X_DAY_OF_THIRD 2
#define OSSL_TIME_SPEC_X_DAY_OF_FOURTH 3
#define OSSL_TIME_SPEC_X_DAY_OF_FIFTH 4

typedef struct OSSL_TIME_SPEC_X_DAY_OF_st {
```

```
  int type;
  union {
     OSSL_NAMED_DAY *first;
     OSSL_NAMED_DAY *second;
     OSSL_NAMED_DAY *third;
     OSSL_NAMED_DAY
 *fourth;
     OSSL_NAMED_DAY *fifth;
  } choice;
} OSSL_TIME_SPEC_X_DAY_OF;

#define OSSL_TIME_SPEC_DAY_TYPE_INT 0
#define OSSL_TIME_SPEC_DAY_TYPE_BIT 1
#define OSSL_TIME_SPEC_DAY_TYPE_DAY_OF 2
#define OSSL_TIME_SPEC_DAY_BIT_SUN 0
#define OSSL_TIME_SPEC_DAY_BIT_MON 1
#define OSSL_TIME_SPEC_DAY_BIT_TUE 2
#define OSSL_TIME_SPEC_DAY_BIT_WED 3
#define OSSL_TIME_SPEC_DAY_BIT_THU 4
#define OSSL_TIME_SPEC_DAY_BIT_FRI 5
#define OSSL_TIME_SPEC_DAY_BIT_SAT 6
#define OSSL_TIME_SPEC_DAY_INT_SUN 1
#define OSSL_TIME_SPEC_DAY_INT_MON 2
#define OSSL_TIME_SPEC_DAY_INT_TUE 3
#define OSSL_TIME_SPEC_DAY_INT_WED 4
#define OSSL_TIME_SPEC_DAY_INT_THU 5
#define OSSL_TIME_SPEC_DAY_INT_FRI 6
#define OSSL_TIME_SPEC_DAY_INT_SAT 7

typedef struct OSSL_TIME_SPEC_DAY_st {
  int type;
  union {
     STACK_OF(ASN1_INTEGER) *intDay;
     ASN1_BIT_STRING *bitDay;
     OSSL_TIME_SPEC_X_DAY_OF *dayOf;
  } choice;
} OSSL_TIME_SPEC_DAY;

#define OSSL_TIME_SPEC_WEEKS_TYPE_ALL 0
#define OSSL_TIME_SPEC_WEEKS_TYPE_INT
 1
#define OSSL_TIME_SPEC_WEEKS_TYPE_BIT 2
#define OSSL_TIME_SPEC_BIT_WEEKS_1 0
#define OSSL_TIME_SPEC_BIT_WEEKS_2 1
#define OSSL_TIME_SPEC_BIT_WEEKS_3 2
#define OSSL_TIME_SPEC_BIT_WEEKS_4 3
#define OSSL_TIME_SPEC_BIT_WEEKS_5 4
```

```
typedef struct OSSL_TIME_SPEC_WEEKS_st {
  int type;
  union {
     ASN1_NULL *allWeeks;
     STACK_OF(ASN1_INTEGER) *intWeek;
     ASN1_BIT_STRING *bitWeek;
  } choice;
} OSSL_TIME_SPEC_WEEKS;

#define OSSL_TIME_SPEC_MONTH_TYPE_ALL 0
#define OSSL_TIME_SPEC_MONTH_TYPE_INT 1
#define OSSL_TIME_SPEC_MONTH_TYPE_BIT 2
#define OSSL_TIME_SPEC_INT_MONTH_JAN 1
#define OSSL_TIME_SPEC_INT_MONTH_FEB 2
#define OSSL_TIME_SPEC_INT_MONTH_MAR 3
#define OSSL_TIME_SPEC_INT_MONTH_APR 4
#define OSSL_TIME_SPEC_INT_MONTH_MAY 5
#define OSSL_TIME_SPEC_INT_MONTH_JUN 6
#define OSSL_TIME_SPEC_INT_MONTH_JUL 7
#define OSSL_TIME_SPEC_INT_MONTH_AUG 8
#define OSSL_TIME_SPEC_INT_MONTH_SEP 9
#define OSSL_TIME_SPEC_INT_MONTH_OCT 10
#define OSSL_TIME_SPEC_INT_MONTH_NOV
 11
#define OSSL_TIME_SPEC_INT_MONTH_DEC 12
#define OSSL_TIME_SPEC_BIT_MONTH_JAN 0
#define OSSL_TIME_SPEC_BIT_MONTH_FEB 1
#define OSSL_TIME_SPEC_BIT_MONTH_MAR 2
#define OSSL_TIME_SPEC_BIT_MONTH_APR 3
#define OSSL_TIME_SPEC_BIT_MONTH_MAY 4
#define OSSL_TIME_SPEC_BIT_MONTH_JUN 5
#define OSSL_TIME_SPEC_BIT_MONTH_JUL 6
#define OSSL_TIME_SPEC_BIT_MONTH_AUG 7
#define OSSL_TIME_SPEC_BIT_MONTH_SEP 8
#define OSSL_TIME_SPEC_BIT_MONTH_OCT 9
#define OSSL_TIME_SPEC_BIT_MONTH_NOV 10
#define OSSL_TIME_SPEC_BIT_MONTH_DEC 11

typedef struct OSSL_TIME_SPEC_MONTH_st {
  int type;
  union {
     ASN1_NULL *allMonths;
     STACK_OF(ASN1_INTEGER) *intMonth;
     ASN1_BIT_STRING *bitMonth;
  } choice;
} OSSL_TIME_SPEC_MONTH;

typedef struct OSSL_TIME_PERIOD_st {
```

```
  STACK_OF(OSSL_DAY_TIME_BAND) *timesOfDay;
  OSSL_TIME_SPEC_DAY *days;
  OSSL_TIME_SPEC_WEEKS *weeks;
  OSSL_TIME_SPEC_MONTH *months;
  STACK_OF(ASN1_INTEGER) *years;
} OSSL_TIME_PERIOD;

#define OSSL_TIME_SPEC_TIME_TYPE_ABSOLUTE
 0
#define OSSL_TIME_SPEC_TIME_TYPE_PERIODIC 1

typedef struct OSSL_TIME_SPEC_TIME_st {
  int type;
  union {
     OSSL_TIME_SPEC_ABSOLUTE *absolute;
     STACK_OF(OSSL_TIME_PERIOD) *periodic;
  } choice;
} OSSL_TIME_SPEC_TIME;

typedef struct OSSL_TIME_SPEC_st {
  OSSL_TIME_SPEC_TIME *time;
  ASN1_BOOLEAN notThisTime;
  ASN1_INTEGER *timeZone;
} OSSL_TIME_SPEC;

DECLARE_ASN1_FUNCTIONS(OSSL_DAY_TIME)
DECLARE_ASN1_FUNCTIONS(OSSL_DAY_TIME_BAND)
DECLARE_ASN1_FUNCTIONS(OSSL_TIME_SPEC_DAY)
DECLARE_ASN1_FUNCTIONS(OSSL_TIME_SPEC_WEEKS)
DECLARE_ASN1_FUNCTIONS(OSSL_TIME_SPEC_MONTH)
DECLARE_ASN1_FUNCTIONS(OSSL_NAMED_DAY)
DECLARE_ASN1_FUNCTIONS(OSSL_TIME_SPEC_X_DAY_OF)
DECLARE_ASN1_FUNCTIONS(OSSL_TIME_SPEC_ABSOLUTE)
DECLARE_ASN1_FUNCTIONS(OSSL_TIME_SPEC_TIME)
DECLARE_ASN1_FUNCTIONS(OSSL_TIME_SPEC)
DECLARE_ASN1_FUNCTIONS(OSSL_TIME_PERIOD)

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_TIME_PERIOD, OSSL_TIME_PERIOD,
OSSL_TIME_PERIOD)
#define sk_OSSL_TIME_PERIOD_num(sk)
 OPENSSL_sk_num(ossl_check_const_OSSL_TIME_PERIOD_sk_type(sk))
#define sk_OSSL_TIME_PERIOD_value(sk, idx) ((OSSL_TIME_PERIOD
*)OPENSSL_sk_value(ossl_check_const_OSSL_TIME_PERIOD_sk_type(sk), (idx)))
#define sk_OSSL_TIME_PERIOD_new(cmp) ((STACK_OF(OSSL_TIME_PERIOD)
*)OPENSSL_sk_new(ossl_check_OSSL_TIME_PERIOD_compfunc_type(cmp)))
#define sk_OSSL_TIME_PERIOD_new_null() ((STACK_OF(OSSL_TIME_PERIOD)
*)OPENSSL_sk_new_null())
```

```
#define sk_OSSL_TIME_PERIOD_new_reserve(cmp, n) ((STACK_OF(OSSL_TIME_PERIOD)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_TIME_PERIOD_compfunc_type(cmp), (n)))
#define sk_OSSL_TIME_PERIOD_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_TIME_PERIOD_sk_type(sk), (n))
#define sk_OSSL_TIME_PERIOD_free(sk) OPENSSL_sk_free(ossl_check_OSSL_TIME_PERIOD_sk_type(sk))
#define sk_OSSL_TIME_PERIOD_zero(sk) OPENSSL_sk_zero(ossl_check_OSSL_TIME_PERIOD_sk_type(sk))
#define sk_OSSL_TIME_PERIOD_delete(sk, i) ((OSSL_TIME_PERIOD
*)OPENSSL_sk_delete(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),
 (i)))
#define sk_OSSL_TIME_PERIOD_delete_ptr(sk, ptr) ((OSSL_TIME_PERIOD
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),
ossl_check_OSSL_TIME_PERIOD_type(ptr)))
#define sk_OSSL_TIME_PERIOD_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),
ossl_check_OSSL_TIME_PERIOD_type(ptr))
#define sk_OSSL_TIME_PERIOD_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),
ossl_check_OSSL_TIME_PERIOD_type(ptr))
#define sk_OSSL_TIME_PERIOD_pop(sk) ((OSSL_TIME_PERIOD
*)OPENSSL_sk_pop(ossl_check_OSSL_TIME_PERIOD_sk_type(sk)))
#define sk_OSSL_TIME_PERIOD_shift(sk) ((OSSL_TIME_PERIOD
*)OPENSSL_sk_shift(ossl_check_OSSL_TIME_PERIOD_sk_type(sk)))
#define sk_OSSL_TIME_PERIOD_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),ossl_check_OSSL_TIME_PERIOD_freef
unc_type(freefunc))
#define sk_OSSL_TIME_PERIOD_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),
ossl_check_OSSL_TIME_PERIOD_type(ptr),
 (idx))
#define sk_OSSL_TIME_PERIOD_set(sk, idx, ptr) ((OSSL_TIME_PERIOD
*)OPENSSL_sk_set(ossl_check_OSSL_TIME_PERIOD_sk_type(sk), (idx),
ossl_check_OSSL_TIME_PERIOD_type(ptr)))
#define sk_OSSL_TIME_PERIOD_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),
ossl_check_OSSL_TIME_PERIOD_type(ptr))
#define sk_OSSL_TIME_PERIOD_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),
ossl_check_OSSL_TIME_PERIOD_type(ptr))
#define sk_OSSL_TIME_PERIOD_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),
ossl_check_OSSL_TIME_PERIOD_type(ptr), pnum)
#define sk_OSSL_TIME_PERIOD_sort(sk) OPENSSL_sk_sort(ossl_check_OSSL_TIME_PERIOD_sk_type(sk))
#define sk_OSSL_TIME_PERIOD_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_TIME_PERIOD_sk_type(sk))
#define sk_OSSL_TIME_PERIOD_dup(sk) ((STACK_OF(OSSL_TIME_PERIOD)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_TIME_PERIOD_sk_type(sk)))
#define sk_OSSL_TIME_PERIOD_deep_copy(sk,
```

```
 copyfunc, freefunc) ((STACK_OF(OSSL_TIME_PERIOD)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_TIME_PERIOD_sk_type(sk),
ossl_check_OSSL_TIME_PERIOD_copyfunc_type(copyfunc),
ossl_check_OSSL_TIME_PERIOD_freefunc_type(freefunc)))
#define sk_OSSL_TIME_PERIOD_set_cmp_func(sk, cmp)
((sk_OSSL_TIME_PERIOD_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_TIME_PERIOD_sk_type
(sk), ossl_check_OSSL_TIME_PERIOD_compfunc_type(cmp)))

/* clang-format on */

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_DAY_TIME_BAND, OSSL_DAY_TIME_BAND,
OSSL_DAY_TIME_BAND)
#define sk_OSSL_DAY_TIME_BAND_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_DAY_TIME_BAND_sk_type(sk))
#define sk_OSSL_DAY_TIME_BAND_value(sk, idx) ((OSSL_DAY_TIME_BAND
*)OPENSSL_sk_value(ossl_check_const_OSSL_DAY_TIME_BAND_sk_type(sk), (idx)))
#define sk_OSSL_DAY_TIME_BAND_new(cmp) ((STACK_OF(OSSL_DAY_TIME_BAND)
*)OPENSSL_sk_new(ossl_check_OSSL_DAY_TIME_BAND_compfunc_type(cmp)))
#define sk_OSSL_DAY_TIME_BAND_new_null() ((STACK_OF(OSSL_DAY_TIME_BAND)
 *)OPENSSL_sk_new_null())
#define sk_OSSL_DAY_TIME_BAND_new_reserve(cmp, n) ((STACK_OF(OSSL_DAY_TIME_BAND)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_DAY_TIME_BAND_compfunc_type(cmp), (n)))
#define sk_OSSL_DAY_TIME_BAND_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk), (n))
#define sk_OSSL_DAY_TIME_BAND_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk))
#define sk_OSSL_DAY_TIME_BAND_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk))
#define sk_OSSL_DAY_TIME_BAND_delete(sk, i) ((OSSL_DAY_TIME_BAND
*)OPENSSL_sk_delete(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk), (i)))
#define sk_OSSL_DAY_TIME_BAND_delete_ptr(sk, ptr) ((OSSL_DAY_TIME_BAND
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk),
ossl_check_OSSL_DAY_TIME_BAND_type(ptr)))
#define sk_OSSL_DAY_TIME_BAND_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk),
ossl_check_OSSL_DAY_TIME_BAND_type(ptr))
#define sk_OSSL_DAY_TIME_BAND_unshift(sk,
 ptr) OPENSSL_sk_unshift(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk),
ossl_check_OSSL_DAY_TIME_BAND_type(ptr))
#define sk_OSSL_DAY_TIME_BAND_pop(sk) ((OSSL_DAY_TIME_BAND
*)OPENSSL_sk_pop(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk)))
#define sk_OSSL_DAY_TIME_BAND_shift(sk) ((OSSL_DAY_TIME_BAND
*)OPENSSL_sk_shift(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk)))
#define sk_OSSL_DAY_TIME_BAND_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk),ossl_check_OSSL_DAY_TIME_BA
ND_freefunc_type(freefunc))
#define sk_OSSL_DAY_TIME_BAND_insert(sk, ptr, idx)
```

```
OPENSSL_sk_insert(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk),
ossl_check_OSSL_DAY_TIME_BAND_type(ptr), (idx))
#define sk_OSSL_DAY_TIME_BAND_set(sk, idx, ptr) ((OSSL_DAY_TIME_BAND
*)OPENSSL_sk_set(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk), (idx),
ossl_check_OSSL_DAY_TIME_BAND_type(ptr)))
#define sk_OSSL_DAY_TIME_BAND_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk),
ossl_check_OSSL_DAY_TIME_BAND_type(ptr))
#define
 sk_OSSL_DAY_TIME_BAND_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk),
ossl_check_OSSL_DAY_TIME_BAND_type(ptr))
#define sk_OSSL_DAY_TIME_BAND_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk),
ossl_check_OSSL_DAY_TIME_BAND_type(ptr), pnum)
#define sk_OSSL_DAY_TIME_BAND_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk))
#define sk_OSSL_DAY_TIME_BAND_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_DAY_TIME_BAND_sk_type(sk))
#define sk_OSSL_DAY_TIME_BAND_dup(sk) ((STACK_OF(OSSL_DAY_TIME_BAND)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_DAY_TIME_BAND_sk_type(sk)))
#define sk_OSSL_DAY_TIME_BAND_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_DAY_TIME_BAND)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_DAY_TIME_BAND_sk_type(sk),
ossl_check_OSSL_DAY_TIME_BAND_copyfunc_type(copyfunc),
ossl_check_OSSL_DAY_TIME_BAND_freefunc_type(freefunc)))
#define sk_OSSL_DAY_TIME_BAND_set_cmp_func(sk,
 cmp)
((sk_OSSL_DAY_TIME_BAND_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_DAY_TIME_BAND
_sk_type(sk), ossl_check_OSSL_DAY_TIME_BAND_compfunc_type(cmp)))

/* clang-format on */

/* Attribute Type and Value */
typedef struct atav_st {
   ASN1_OBJECT *type;
   ASN1_TYPE *value;
} OSSL_ATAV;

typedef struct ATTRIBUTE_TYPE_MAPPING_st {
   ASN1_OBJECT *local;
   ASN1_OBJECT *remote;
} OSSL_ATTRIBUTE_TYPE_MAPPING;

typedef struct ATTRIBUTE_VALUE_MAPPING_st {
   OSSL_ATAV *local;
   OSSL_ATAV *remote;
} OSSL_ATTRIBUTE_VALUE_MAPPING;
```

```
#define OSSL_ATTR_MAP_TYPE 0
#define OSSL_ATTR_MAP_VALUE 1

typedef struct ATTRIBUTE_MAPPING_st {
  int type;
  union {
     OSSL_ATTRIBUTE_TYPE_MAPPING *typeMappings;
     OSSL_ATTRIBUTE_VALUE_MAPPING *typeValueMappings;
  } choice;
} OSSL_ATTRIBUTE_MAPPING;

typedef STACK_OF(OSSL_ATTRIBUTE_MAPPING) OSSL_ATTRIBUTE_MAPPINGS;
DECLARE_ASN1_FUNCTIONS(OSSL_ATAV)
DECLARE_ASN1_FUNCTIONS(OSSL_ATTRIBUTE_TYPE_MAPPING)
DECLARE_ASN1_FUNCTIONS(OSSL_ATTRIBUTE_VALUE_MAPPING)
DECLARE_ASN1_FUNCTIONS(OSSL_ATTRIBUTE_MAPPING)
DECLARE_ASN1_FUNCTIONS(OSSL_ATTRIBUTE_MAPPINGS)

/*
 clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_ATTRIBUTE_MAPPING, OSSL_ATTRIBUTE_MAPPING,
OSSL_ATTRIBUTE_MAPPING)
#define sk_OSSL_ATTRIBUTE_MAPPING_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_ATTRIBUTE_MAPPING_sk_type(sk))
#define sk_OSSL_ATTRIBUTE_MAPPING_value(sk, idx) ((OSSL_ATTRIBUTE_MAPPING
*)OPENSSL_sk_value(ossl_check_const_OSSL_ATTRIBUTE_MAPPING_sk_type(sk), (idx)))
#define sk_OSSL_ATTRIBUTE_MAPPING_new(cmp) ((STACK_OF(OSSL_ATTRIBUTE_MAPPING)
*)OPENSSL_sk_new(ossl_check_OSSL_ATTRIBUTE_MAPPING_compfunc_type(cmp)))
#define sk_OSSL_ATTRIBUTE_MAPPING_new_null() ((STACK_OF(OSSL_ATTRIBUTE_MAPPING)
*)OPENSSL_sk_new_null())
#define sk_OSSL_ATTRIBUTE_MAPPING_new_reserve(cmp, n)
((STACK_OF(OSSL_ATTRIBUTE_MAPPING)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_ATTRIBUTE_MAPPING_compfunc_type(cmp), (n)))
#define sk_OSSL_ATTRIBUTE_MAPPING_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
 (n))
#define sk_OSSL_ATTRIBUTE_MAPPING_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk))
#define sk_OSSL_ATTRIBUTE_MAPPING_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk))
#define sk_OSSL_ATTRIBUTE_MAPPING_delete(sk, i) ((OSSL_ATTRIBUTE_MAPPING
*)OPENSSL_sk_delete(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk), (i)))
#define sk_OSSL_ATTRIBUTE_MAPPING_delete_ptr(sk, ptr) ((OSSL_ATTRIBUTE_MAPPING
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
ossl_check_OSSL_ATTRIBUTE_MAPPING_type(ptr)))
#define sk_OSSL_ATTRIBUTE_MAPPING_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
```

```
ossl_check_OSSL_ATTRIBUTE_MAPPING_type(ptr))
#define sk_OSSL_ATTRIBUTE_MAPPING_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
ossl_check_OSSL_ATTRIBUTE_MAPPING_type(ptr))
#define sk_OSSL_ATTRIBUTE_MAPPING_pop(sk) ((OSSL_ATTRIBUTE_MAPPING
*)OPENSSL_sk_pop(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk)))
#define
 sk_OSSL_ATTRIBUTE_MAPPING_shift(sk) ((OSSL_ATTRIBUTE_MAPPING
*)OPENSSL_sk_shift(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk)))
#define sk_OSSL_ATTRIBUTE_MAPPING_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),ossl_check_OSSL_ATTRIBUT
E_MAPPING_freefunc_type(freefunc))
#define sk_OSSL_ATTRIBUTE_MAPPING_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
ossl_check_OSSL_ATTRIBUTE_MAPPING_type(ptr), (idx))
#define sk_OSSL_ATTRIBUTE_MAPPING_set(sk, idx, ptr) ((OSSL_ATTRIBUTE_MAPPING
*)OPENSSL_sk_set(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk), (idx),
ossl_check_OSSL_ATTRIBUTE_MAPPING_type(ptr)))
#define sk_OSSL_ATTRIBUTE_MAPPING_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
ossl_check_OSSL_ATTRIBUTE_MAPPING_type(ptr))
#define sk_OSSL_ATTRIBUTE_MAPPING_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
 ossl_check_OSSL_ATTRIBUTE_MAPPING_type(ptr))
#define sk_OSSL_ATTRIBUTE_MAPPING_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
ossl_check_OSSL_ATTRIBUTE_MAPPING_type(ptr), pnum)
#define sk_OSSL_ATTRIBUTE_MAPPING_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk))
#define sk_OSSL_ATTRIBUTE_MAPPING_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_ATTRIBUTE_MAPPING_sk_type(sk))
#define sk_OSSL_ATTRIBUTE_MAPPING_dup(sk) ((STACK_OF(OSSL_ATTRIBUTE_MAPPING)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_ATTRIBUTE_MAPPING_sk_type(sk)))
#define sk_OSSL_ATTRIBUTE_MAPPING_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_ATTRIBUTE_MAPPING)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
ossl_check_OSSL_ATTRIBUTE_MAPPING_copyfunc_type(copyfunc),
ossl_check_OSSL_ATTRIBUTE_MAPPING_freefunc_type(freefunc)))
#define sk_OSSL_ATTRIBUTE_MAPPING_set_cmp_func(sk, cmp)
((sk_OSSL_ATTRIBUTE_MAPPING_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_ATTRIBUTE_
MAPPING_sk_type(sk),
 ossl_check_OSSL_ATTRIBUTE_MAPPING_compfunc_type(cmp)))

/* clang-format on */

#define OSSL_AAA_ATTRIBUTE_TYPE 0
#define OSSL_AAA_ATTRIBUTE_VALUES 1
```

```
typedef struct ALLOWED_ATTRIBUTES_CHOICE_st {
  int type;
  union {
     ASN1_OBJECT *attributeType;
     X509_ATTRIBUTE *attributeTypeandValues;
  } choice;
} OSSL_ALLOWED_ATTRIBUTES_CHOICE;

typedef struct ALLOWED_ATTRIBUTES_ITEM_st {
  STACK_OF(OSSL_ALLOWED_ATTRIBUTES_CHOICE) *attributes;
  GENERAL_NAME *holderDomain;
} OSSL_ALLOWED_ATTRIBUTES_ITEM;

typedef STACK_OF(OSSL_ALLOWED_ATTRIBUTES_ITEM) OSSL_ALLOWED_ATTRIBUTES_SYNTAX;

DECLARE_ASN1_FUNCTIONS(OSSL_ALLOWED_ATTRIBUTES_CHOICE)
DECLARE_ASN1_FUNCTIONS(OSSL_ALLOWED_ATTRIBUTES_ITEM)
DECLARE_ASN1_FUNCTIONS(OSSL_ALLOWED_ATTRIBUTES_SYNTAX)

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_ALLOWED_ATTRIBUTES_CHOICE,
OSSL_ALLOWED_ATTRIBUTES_CHOICE, OSSL_ALLOWED_ATTRIBUTES_CHOICE)
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_num(sk)
 OPENSSL_sk_num(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_value(sk, idx)
((OSSL_ALLOWED_ATTRIBUTES_CHOICE
*)OPENSSL_sk_value(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk), (idx)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_new(cmp)
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_CHOICE)
*)OPENSSL_sk_new(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_compfunc_type(cmp)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_new_null()
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_CHOICE) *)OPENSSL_sk_new_null())
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_new_reserve(cmp, n)
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_CHOICE)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_compfunc_type(cmp),
(n)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk), (n))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk))
#define
 sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_delete(sk, i)
((OSSL_ALLOWED_ATTRIBUTES_CHOICE
*)OPENSSL_sk_delete(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk), (i)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_delete_ptr(sk, ptr)
((OSSL_ALLOWED_ATTRIBUTES_CHOICE
```

```
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_type(ptr)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_type(ptr))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_type(ptr))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_pop(sk) ((OSSL_ALLOWED_ATTRIBUTES_CHOICE
 *)OPENSSL_sk_pop(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_shift(sk)
((OSSL_ALLOWED_ATTRIBUTES_CHOICE
*)OPENSSL_sk_shift(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),ossl_check_OSSL
_ALLOWED_ATTRIBUTES_CHOICE_freefunc_type(freefunc))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_type(ptr), (idx))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_set(sk, idx, ptr)
((OSSL_ALLOWED_ATTRIBUTES_CHOICE
*)OPENSSL_sk_set(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk), (idx),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_type(ptr)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_type(ptr))
#define
 sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_type(ptr))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_type(ptr), pnum)
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_dup(sk)
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_CHOICE)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_CHOICE)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
 ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_copyfunc_type(copyfunc),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_freefunc_type(freefunc)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_set_cmp_func(sk, cmp)
((sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_A
LLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
```

```
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_compfunc_type(cmp)))

/* clang-format on */

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_ALLOWED_ATTRIBUTES_ITEM,
OSSL_ALLOWED_ATTRIBUTES_ITEM, OSSL_ALLOWED_ATTRIBUTES_ITEM)
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_value(sk, idx) ((OSSL_ALLOWED_ATTRIBUTES_ITEM
*)OPENSSL_sk_value(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk), (idx)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_new(cmp)
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_ITEM)
 *)OPENSSL_sk_new(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_compfunc_type(cmp)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_new_null()
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_ITEM) *)OPENSSL_sk_new_null())
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_new_reserve(cmp, n)
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_ITEM)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_compfunc_type(cmp), (n)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk), (n))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_delete(sk, i) ((OSSL_ALLOWED_ATTRIBUTES_ITEM
*)OPENSSL_sk_delete(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk), (i)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_delete_ptr(sk, ptr)
((OSSL_ALLOWED_ATTRIBUTES_ITEM
 *)OPENSSL_sk_delete_ptr(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_type(ptr)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_type(ptr))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_type(ptr))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_pop(sk) ((OSSL_ALLOWED_ATTRIBUTES_ITEM
*)OPENSSL_sk_pop(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_shift(sk) ((OSSL_ALLOWED_ATTRIBUTES_ITEM
*)OPENSSL_sk_shift(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),ossl_check_OSSL_A
LLOWED_ATTRIBUTES_ITEM_freefunc_type(freefunc))
#define
 sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_type(ptr), (idx))
```

```
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_set(sk, idx, ptr)
((OSSL_ALLOWED_ATTRIBUTES_ITEM
*)OPENSSL_sk_set(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk), (idx),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_type(ptr)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_type(ptr))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_type(ptr))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_type(ptr), pnum)
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_sort(sk)
 OPENSSL_sk_sort(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_dup(sk)
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_ITEM)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_ITEM)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_copyfunc_type(copyfunc),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_freefunc_type(freefunc)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_set_cmp_func(sk, cmp)
((sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_ALL
OWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_compfunc_type(cmp)))

/* clang-format on */

typedef struct AA_DIST_POINT_st
 {
   DIST_POINT_NAME *distpoint;
   ASN1_BIT_STRING *reasons;
   int dp_reasons;
   ASN1_BOOLEAN indirectCRL;
   ASN1_BOOLEAN containsUserAttributeCerts;
   ASN1_BOOLEAN containsAACerts;
   ASN1_BOOLEAN containsSOAPublicKeyCerts;
} OSSL_AA_DIST_POINT;

DECLARE_ASN1_FUNCTIONS(OSSL_AA_DIST_POINT)

#ifdef __cplusplus
}
#endif
```

#endif
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/* clang-format off */
/* WARNING: do not edit! */
/* Generated by Makefile from include/crypto/bn_conf.h.in */
/* clang-format on */
/*
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*/

#ifndef OSSL_CRYPTO_BN_CONF_H
#define OSSL_CRYPTO_BN_CONF_H
#pragma once

/*
* The contents of this file are not used in the UEFI build, as

```
* both 32-bit and 64-bit builds are supported from a single run
* of the Configure script.
*/

/* Should we define BN_DIV2W here? */

/* Only one for the following should be defined */
/* clang-format off */
#define SIXTY_FOUR_BIT_LONG
   /* clang-format on */
   /* clang-format off */
#undef SIXTY_FOUR_BIT
   /* clang-format on */
   /* clang-format off */
#undef THIRTY_TWO_BIT
/*
 clang-format on */

#endif
```

# 1.3342 tzdata 2026a-1.el9

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# 1.3344 openjdk-jre 17.0.18-r3

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## xwd v1.0.7

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---
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graphics library

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include/GL/glxext.h
include/GL/wglxext.h :

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# 1.3358 ca-certificates 20251003-r4

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```
#!/usr/bin/env perl
# ******************************************************************************
# *                          _   _ ____  _
```

```
# *  Project                     ___| | | |  _ \| |
# *                            / __| | | | |_) | |
# *                           | (__| |_| |  _ <| |___
# *                            \___|\___/|_| \_\_____|
# *
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# ***************************************************************************
# This Perl script creates a fresh ca-bundle.crt file for use with libcurl.
# It downloads certdata.txt from Mozilla's source tree (see URL below),
# then parses certdata.txt and extracts CA Root Certificates into PEM format.
# These are then processed with the OpenSSL commandline tool to produce the
# final ca-bundle.crt file.
# The script is based on the parse-certs script written by Roland Krikava.
# This Perl script works on almost any platform since its only external
# dependency is the OpenSSL commandline tool for optional text listing.
# Hacked by Guenter Knauf.
#
```

Found in path(s):
* /ee722aa868591f33d5a7585909e3a57129e37977-1-tar-gz/ca-certificates-ee722aa868591f33d5a7585909e3a57129e37977/mk-ca-bundle.pl
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```
/* c_rehash.c - Create hash symlinks for certificates
* C implementation based on the original Perl and shell versions
*
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*/
```

Found in path(s):
* /ee722aa868591f33d5a7585909e3a57129e37977-1-tar-gz/ca-certificates-ee722aa868591f33d5a7585909e3a57129e37977/c_rehash.c

# 1.3359 glibc 2.43-r2

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# 1.3361 minimatch 10.2.5

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jseward@bzip.org
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# 1.3364 ca-certificates 20251003-r4

## 1.3364.1 Available under license :

```
package:
 name: py3-license-expression
 version: "30.4.4"
 epoch: 3 # go/wolfi-rsc/py3-license-expression
 description: license-expression is a comprehensive utility library to parse, compare, simplify and normalize license
expressions (such as SPDX license expressions) using boolean logic.
 copyright:
   - license: Apache-2.0
 dependencies:
   provider-priority: 0
 resources:
   cpu: "2"
   memory: 4Gi

vars:
 pypi-package: license-expression
 import: license_expression

data:
 - name: py-versions
   items:
     3.10: '310'
     3.11: '311'
     3.12: '312'
     3.13: '313'

environment:
 contents:
   packages:
     - py3-supported-build-base
```

```
pipeline:
 - uses: git-checkout
   with:
     repository: https://github.com/nexB/license-expression
     tag: v${{package.version}}
     expected-commit: a3c00c09986bcca1240afd5b1844b56de3f581c1

subpackages:
 - range: py-versions
   name: py${{range.key}}-${{vars.pypi-package}}
   description: python${{range.key}}
 version of ${{vars.pypi-package}}
   dependencies:
     provider-priority: ${{range.value}}
     provides:
       - ${{package.name}}
       - py3-${{vars.pypi-package}}
     runtime:
       - py${{range.key}}-boolean.py
   pipeline:
     - uses: py/pip-build-install
       with:
         python: python${{range.key}}
     - uses: strip
   test:
     pipeline:
       - uses: test/tw/pip-check
       - uses: python/import
         with:
           python: python${{range.key}}
           imports: |
             import ${{vars.import}}

 - name: py3-supported-${{vars.pypi-package}}
   description: meta package providing ${{vars.pypi-package}} for supported python versions.
   dependencies:
     runtime:
       - py3.10-${{vars.pypi-package}}
       - py3.11-${{vars.pypi-package}}
       - py3.12-${{vars.pypi-package}}
       - py3.13-${{vars.pypi-package}}
   test:
     pipeline:
       - uses: test/metapackage

test:
 pipeline:
```

```
  - uses: python/import

    with:
      imports: |
        import ${{vars.import}}

update:
 enabled: true
 github:
   identifier: nexB/license-expression
   strip-prefix: v
```

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```
package:
 name: libart-lgpl
 version: 2.3.21
 epoch: 5 # go/wolfi-rsc/libart-lgpl
 description: A library for high-performance 2D graphics
 copyright:
   - license: LGPL-2.0-or-later
 resources:
   cpu: "1"
   memory: 4Gi

var-transforms:
 - from: ${{package.version}}
   match: ^(\d+)\.(\d+)\.(\d+)$
   replace: LIBART_LGPL_${1}_${2}_$3
   to: tag-name

environment:
 contents:
   packages:
     - autoconf
     - automake
     - build-base
     - busybox
     - ca-certificates-bundle
     - libtool

pipeline:
 - uses: git-checkout
```

```
  with:
    repository: https://gitlab.gnome.org/Archive/libart_lgpl
    tag: ${{vars.tag-name}}
    expected-commit: 7119bfe163a5a5325405acb7eab1b16152e8032a

- runs: autoreconf -vif

- uses: autoconf/configure
  with:
    opts: |
      --disable-static

- uses: autoconf/make

- uses: autoconf/make-install

- uses: strip

subpackages:
- name: libart-lgpl-dev
  pipeline:
    - uses: split/dev
  dependencies:
     runtime:
      - libart-lgpl
  description: libart-lgpl dev
  test:
    environment:
      contents:
        packages:
          - build-base
          - pkgconf
    pipeline:
      - runs: |
          libart2-config --version
      - uses: test/pkgconf
      - uses: test/tw/ldd-check
      - uses: test/tw/devpackage
      - name: Test compile and link against libart
        runs: |
          set -euo pipefail

          tee test.c <<'EOF'
          #include <libart_lgpl/libart.h>
          #include <stdio.h>
          int main() {
              double affine[6];
              art_affine_identity(affine);
```

```
            /* Identity matrix should be [1,0,0,1,0,0] */
            if (affine[0] != 1.0 || affine[3] != 1.0) {
                fprintf(stderr, "FAIL: unexpected identity affine\n");
                return 1;
            }
            printf("SUCCESS: libart affine identity works\n");
            return
 0;
        }
        EOF

        gcc $(pkg-config --cflags libart-2.0) test.c -o test $(pkg-config --libs libart-2.0)
        ./test

update:
 enabled: true
 release-monitor:
   identifier: 21864

test:
 environment:
   contents:
     packages:
       - libart-lgpl-dev
       - build-base
       - pkgconf
 pipeline:
   - uses: test/tw/ldd-check
   - name: Test library compilation and linking
     runs: |
       set -euo pipefail

       tee test.c <<'EOF'
       #include <libart_lgpl/libart.h>
       #include <stdio.h>
       int main() {
           double affine[6];
           art_affine_identity(affine);
           /* Identity matrix should be [1,0,0,1,0,0] */
           if (affine[0] != 1.0 || affine[3] != 1.0) {
               fprintf(stderr, "FAIL: unexpected identity affine\n");
               return 1;
           }
           printf("SUCCESS: libart compile and link works\n");
           return 0;
       }
       EOF
```

```
gcc $(pkg-config
--cflags libart-2.0) test.c -o test $(pkg-config --libs libart-2.0)
./test
```

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```
package:
 name: perl-software-license
 version: "0.104007"
 epoch: 0
 description: "Packages that provide templated software licenses"
 copyright:
   - license: GPL-1.0-or-later OR Artistic-1.0-Perl
 dependencies:
   runtime:
     - perl
     - perl-data-section
     - perl-text-template
 resources:
   cpu: "2"
   memory: 4Gi

environment:
 contents:
   packages:
     - build-base
     - perl
     - perl-data-section
     - perl-text-template
     - perl-try-tiny

pipeline:
```

```
 - uses: fetch
   with:
     uri: https://cpan.metacpan.org/authors/id/L/LE/LEONT/Software-License-${{package.version}}.tar.gz
     expected-sha256: 81462da3cd9e745901f29ff006c4c804cc9db017ccf45154b3cd9558540bc191

 - uses: perl/make

 - uses: autoconf/make

 - uses: autoconf/make
   with:
     opts: test

 - uses: autoconf/make-install

 - uses: perl/cleanup

 - uses: strip

subpackages:
 - name: ${{package.name}}-doc
   pipeline:
     - uses: split/alldocs
   description: Documentation
 for ${{package.name}}
   test:
     pipeline:
       - uses: test/docs

test:
 pipeline:
   - uses: test/no-docs
   - uses: test/perl-module-check
     with:
       modules: Software::License

update:
 enabled: true
 release-monitor:
   identifier: 3325
package:
 name: go-licenses
 version: "2.0.1"
 epoch: 6 # CVE-2026-32280
 description: A lightweight tool to report on the licenses used by a Go package and its dependencies. Highlight!
Versioned external URL to licenses can be found at the same time.
 copyright:
   - license: Apache-2.0
```

```
pipeline:
 - uses: git-checkout
   with:
     repository: https://github.com/google/go-licenses
     tag: v${{package.version}}
     expected-commit: 3e084b0caf710f7bfead967567539214f598c0a2

 - uses: go/build
   with:
     modroot: .
     packages: .
     output: go-licenses

update:
 enabled: true
 github:
   identifier: google/go-licenses
   strip-prefix: v

test:
 pipeline:
   # AUTOGENERATED
   - runs: |
       go-licenses --help

environment:
 contents:
   packages:
     - go-1.25
```

# 1.3365 golang-jwt 4.5.2

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# 1.3366 msgp 1.2.5

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# 1.3367 fwd 1.1.3-0.20240916144458-20a13a1f6b7c

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# 1.3368 minio-go 7.0.91

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*/

package minio

import (
 "bytes"
 "context"
```

```
 "encoding/xml"
 "fmt"
 "net/http"
 "net/url"

 "github.com/minio/minio-go/v7/pkg/s3utils"
)

// objectLegalHold - object legal hold specified in
// https://docs.aws.amazon.com/AmazonS3/latest/API/archive-RESTObjectPUTLegalHold.html
type objectLegalHold struct {
 XMLNS   string          `xml:"xmlns,attr,omitempty"`
 XMLName
 xml.Name        `xml:"LegalHold"`
 Status  LegalHoldStatus `xml:"Status,omitempty"`
}

// PutObjectLegalHoldOptions represents options specified by user for PutObjectLegalHold call
type PutObjectLegalHoldOptions struct {
 VersionID string
 Status    *LegalHoldStatus
}

// GetObjectLegalHoldOptions represents options specified by user for GetObjectLegalHold call
type GetObjectLegalHoldOptions struct {
 VersionID string
}

// LegalHoldStatus - object legal hold status.
type LegalHoldStatus string

const (
 // LegalHoldEnabled indicates legal hold is enabled
 LegalHoldEnabled LegalHoldStatus = "ON"

 // LegalHoldDisabled indicates legal hold is disabled
 LegalHoldDisabled LegalHoldStatus = "OFF"
)

func (r LegalHoldStatus) String() string {
 return string(r)
}

// IsValid - check whether this legal hold status is valid or not.
func (r LegalHoldStatus) IsValid() bool {
 return r == LegalHoldEnabled || r == LegalHoldDisabled
}
```

```
func newObjectLegalHold(status *LegalHoldStatus)
 (*objectLegalHold, error) {
 if status == nil {
  return nil, fmt.Errorf("Status not set")
 }
 if !status.IsValid() {
  return nil, fmt.Errorf("invalid legal hold status `%v`", status)
 }
 legalHold := &objectLegalHold{
  Status: *status,
 }
 return legalHold, nil
}

// PutObjectLegalHold : sets object legal hold for a given object and versionID.
func (c *Client) PutObjectLegalHold(ctx context.Context, bucketName, objectName string, opts
PutObjectLegalHoldOptions) error {
 // Input validation.
 if err := s3utils.CheckValidBucketName(bucketName); err != nil {
  return err
 }

 if err := s3utils.CheckValidObjectName(objectName); err != nil {
  return err
 }

 // Get resources properly escaped and lined up before
 // using them in http request.
 urlValues := make(url.Values)
 urlValues.Set("legal-hold", "")

 if opts.VersionID != "" {
  urlValues.Set("versionId", opts.VersionID)
 }

 lh, err := newObjectLegalHold(opts.Status)
 if err != nil {
  return err
 }

 lhData, err := xml.Marshal(lh)
 if
 err != nil {
  return err
 }

 reqMetadata := requestMetadata{
  bucketName:       bucketName,
```

```
 objectName:       objectName,
 queryValues:      urlValues,
 contentBody:      bytes.NewReader(lhData),
 contentLength:    int64(len(lhData)),
 contentMD5Base64: sumMD5Base64(lhData),
 contentSHA256Hex: sum256Hex(lhData),
}

// Execute PUT Object Legal Hold.
resp, err := c.executeMethod(ctx, http.MethodPut, reqMetadata)
defer closeResponse(resp)
if err != nil {
 return err
}
if resp != nil {
 if resp.StatusCode != http.StatusOK && resp.StatusCode != http.StatusNoContent {
  return httpRespToErrorResponse(resp, bucketName, objectName)
 }
}
return nil
}

// GetObjectLegalHold gets legal-hold status of given object.
func (c *Client) GetObjectLegalHold(ctx context.Context, bucketName, objectName string, opts
GetObjectLegalHoldOptions) (status *LegalHoldStatus, err error) {
 // Input validation.
 if err := s3utils.CheckValidBucketName(bucketName); err != nil {
  return
 nil, err
 }

 if err := s3utils.CheckValidObjectName(objectName); err != nil {
  return nil, err
 }
 urlValues := make(url.Values)
 urlValues.Set("legal-hold", "")

 if opts.VersionID != "" {
  urlValues.Set("versionId", opts.VersionID)
 }

 // Execute GET on bucket to list objects.
 resp, err := c.executeMethod(ctx, http.MethodGet, requestMetadata{
  bucketName:       bucketName,
  objectName:       objectName,
  queryValues:      urlValues,
  contentSHA256Hex: emptySHA256Hex,
 })
```

```
 defer closeResponse(resp)
 if err != nil {
  return nil, err
 }
 if resp != nil {
  if resp.StatusCode != http.StatusOK {
   return nil, httpRespToErrorResponse(resp, bucketName, objectName)
  }
 }
 lh := &objectLegalHold{}
 if err = xml.NewDecoder(resp.Body).Decode(lh); err != nil {
  return nil, err
 }

 return &lh.Status, nil
}
```

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# 1.3369 vim 2:8.2.2637-23.el9_7.1

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That's all there is to it!
*uganda.txt* For Vim version 8.2. Last change: 2020 Jan 08

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 A few minor changes have been made since he checked it, but that should not
 make a difference.

- If you link Vim with a library that goes under the GNU GPL, this limits
 further
 distribution to the GNU GPL.  Also when you didn't actually change
 anything in Vim.

- Once a change is included that goes under the GNU GPL, this forces all
 further changes to also be made under the GNU GPL or a compatible license.

- If you distribute a modified version of Vim, you can include your name and
 contact information with the "--with-modified-by" configure argument or the
 MODIFIED_BY define.

==========
Kibaale Children's Centre  *kcc* *Kibaale*  *charity*

Kibaale Children's Centre (KCC) is located in Kibaale, a small town in the
south of Uganda, near Tanzania, in East Africa.  The area is known as Rakai
District.  The population is mostly farmers.  Although people are poor, there
is enough food.  But this district is suffering from AIDS more than any other
part of the world.  Some say that it started there.  Estimations are that 10
to 30% of the Ugandans are infected with HIV.  Because parents
 die, there are
many orphans.  In this district about 60,000 children have lost one or both
parents, out of a population of 350,000.  And this is still continuing.

The children need a lot of help.  The KCC is working hard to provide the needy
with food, medical care and education.  Food and medical care to keep them
healthy now, and education so that they can take care of themselves in the
future.  KCC works on a Christian base, but help is given to children of any
religion.

The key to solving the problems in this area is education.  This has been
neglected in the past years with president Idi Amin and the following civil
wars.  Now that the government is stable again, the children and parents have
to learn how to take care of themselves and how to avoid infections.  There is
also help for people who are ill and hungry, but the primary goal is to
prevent people from getting ill and to teach them how to grow healthy food.

Most of the orphans are living in an extended family.  An uncle

or older
sister is taking care of them. Because these families are big and the income (if any) is low, a child is lucky if it gets healthy food. Clothes, medical care and schooling is beyond its reach. To help these needy children, a sponsorship program was put into place. A child can be financially adopted. For a few dollars a month KCC sees to it that the child gets indispensable items, is healthy, goes to school and KCC takes care of anything else that needs to be done for the child and the family that supports it.

Besides helping the child directly, the environment where the child grows up needs to be improved. KCC helps schools to improve their teaching methods. There is a demonstration school at the centre and teacher trainings are given. Health workers are being trained, hygiene education is carried out and households are stimulated to build a proper latrine. I helped setting up a production site for cement slabs. These are used to build a good latrine. They are sold
below cost price.

There is a small clinic at the project, which provides children and their family with medical help. When needed, transport to a hospital is offered. Immunization programs are carried out and help is provided when an epidemic is breaking out (measles and cholera have been a problem).

*donate*

Summer 1994 to summer 1995 I spent a whole year at the centre, working as a volunteer. I have helped to expand the centre and worked in the area of water and sanitation. I learned that the help that the KCC provides really helps. When I came back to Holland, I wanted to continue supporting KCC. To do this I'm raising funds and organizing the sponsorship program. Please consider one of these possibilities:

1. Sponsor a child in primary school: 17 euro a month (or more).
2. Sponsor a child in secondary school: 25 euro a month (or more).
3. Sponsor the clinic: Any amount a month or quarter
4. A one-time donation

Compared with other organizations that do child sponsorship
the amounts are
very low. This is because the money goes directly to the centre. Less than 5% is used for administration. This is possible because this is a small organization that works with volunteers. If you would like to sponsor a child, you should have the intention to do this for at least one year.

How do you know that the money will be spent right? First of all you have my personal guarantee as the author of Vim. I trust the people that are working at the centre, I know them personally. Furthermore, the centre has been co-sponsored and inspected by World Vision, Save the Children Fund and is now under the supervision of Pacific Academy Outreach Society. The centre is visited about once a year to check the progress (at our own cost). I have

visited the centre myself many times, starting in 1993. The visit reports are on the ICCF web site.

If you have any further questions, send me e-mail: <Bram@vim.org>.

The address of the centre is:
Kibaale Children's Centre
p.o.
box 1658
Masaka, Uganda, East Africa

Sending money: *iccf-donations*

Check the ICCF web site for the latest information! See |iccf| for the URL.

USA: The methods mentioned below can be used.
Sending a check to the Nehemiah Group Outreach Society (NGOS) is no longer possible, unfortunately. We are looking for another way to get you an IRS tax receipt.
For sponsoring a child contact KCF in Canada (see below). US checks can be sent to them to lower banking costs.

Canada: Contact Kibaale Children's Fund (KCF) in Surrey, Canada. They take care of the Canadian sponsors for the children in Kibaale. KCF forwards 100% of the money to the project in Uganda. You can send them a one time donation directly.
Please send me a note so that I know what has been donated because of Vim. Ask KCF for information about sponsorship.
Kibaale Children's Fund c/o Pacific Academy
10238-168 Street
Surrey, B.C. V4N 1Z4
Canada
Phone: 604-581-5353
If you make a donation to Kibaale Children's Fund (KCF) you will receive a tax receipt which can be submitted with your tax return.

Holland: Transfer to the account of "Stichting ICCF Holland" in Lisse.
This will allow for tax deduction if you live in Holland.
Postbank, nr. 4548774
IBAN: NL95 INGB 0004 5487 74

Germany: It is possible to make donations that allow for a tax return.
Check the ICCF web site for the latest information:
http://iccf-holland.org/germany.html

World:  Use a postal money order.  That should be possible from any
country, mostly from the post office.  Use this name (which is
in my passport): "Abraham Moolenaar".  Use Euro for the
currency if possible.

Europe:  Use a bank transfer if possible.  Your bank should have a form
that you can use for this.  See "Others" below for the swift
code and IBAN number.
Any other method should work.  Ask for information about
sponsorship.

Credit Card: You can use PayPal to send money with a Credit
card.  This is
the most widely used Internet based payment system.  It's
really simple to use.  Use this link to find more info:
https://www.paypal.com/en_US/mrb/pal=XAC62PML3GF8Q
The e-mail address for sending the money to is:
Bram@iccf-holland.org
For amounts above 400 Euro ($500) sending a check is
preferred.

Others:  Transfer to one of these accounts if possible:
Postbank, account 4548774
Swift code: INGB NL 2A
IBAN: NL95 INGB 0004 5487 74
under the name "stichting ICCF Holland", Lisse
If that doesn't work:
Rabobank Lisse, account 3765.05.117
Swift code: RABO NL 2U
under the name "Bram Moolenaar", Lisse
Otherwise, send a check in euro or US dollars to the address
below.  Minimal amount: $70 (my bank does not accept smaller
amounts for foreign check, sorry)

Address to send checks to:
Bram Moolenaar
Finsterruetihof 1
8134 Adliswil
Switzerland

This address is expected to be valid for a long time.

vim:tw=78:ts=8:noet:ft=help:norl:
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VIM LICENSE

I) There are no restrictions on distributing unmodified copies of Vim except that they must include this license text. You can also distribute unmodified parts of Vim, likewise unrestricted except that they must include this license text. You are also allowed to include executables that you made from the unmodified Vim sources, plus your own usage examples and Vim scripts.

II) It is allowed to distribute a modified (or extended) version of Vim, including executables and/or source code, when the following four conditions are met:
1) This license text must be included unmodified.
2) The modified Vim must be distributed in one of the following five ways:
a) If you make changes to Vim yourself, you must clearly describe in the distribution how to contact you. When the maintainer asks you (in any way) for a copy of the modified Vim you distributed, you must make your changes, including source code, available
to the
maintainer without fee. The maintainer reserves the right to include your changes in the official version of Vim. What the maintainer will do with your changes and under what license they will be distributed is negotiable. If there has been no negotiation then this license, or a later version, also applies to your changes. The current maintainer is Bram Moolenaar <Bram@vim.org>. If this changes it will be announced in appropriate places (most likely vim.sf.net, www.vim.org and/or comp.editors). When it is completely impossible to contact the maintainer, the obligation to send him your changes ceases. Once the maintainer has confirmed that he has received your changes they will not have to be sent again.
b) If you have received a modified Vim that was distributed as mentioned under a) you are allowed to further distribute it unmodified,
as mentioned at I). If you make additional changes the
text under a) applies to those changes.
c) Provide all the changes, including source code, with every copy of the modified Vim you distribute. This may be done in the form of a context diff. You can choose what license to use for new code you add. The changes and their license must not restrict others from making their own changes to the official version of Vim.
d) When you have a modified Vim which includes changes as mentioned under c), you can distribute it without the source code for the changes if the following three conditions are met:
- The license that applies to the changes permits you to distribute the changes to the Vim maintainer without fee or restriction, and

permits the Vim maintainer to include the changes in the official
version of Vim without fee or restriction.
- You
keep the changes for at least three years after last
distributing the corresponding modified Vim. When the maintainer
or someone who you distributed the modified Vim to asks you (in
any way) for the changes within this period, you must make them
available to him.
- You clearly describe in the distribution how to contact you. This
contact information must remain valid for at least three years
after last distributing the corresponding modified Vim, or as long
as possible.

e) When the GNU General Public License (GPL) applies to the changes,
you can distribute the modified Vim under the GNU GPL version 2 or
any later version.

3) A message must be added, at least in the output of the ":version"
command and in the intro screen, such that the user of the modified Vim
is able to see that it was modified. When distributing as mentioned
under 2)e) adding
the message is only required for as far as this does
not conflict with the license used for the changes.

4) The contact information as required under 2)a) and 2)d) must not be
removed or changed, except that the person himself can make
corrections.

III) If you distribute a modified version of Vim, you are encouraged to use
the Vim license for your changes and make them available to the
maintainer, including the source code. The preferred way to do this is
by e-mail or by uploading the files to a server and e-mailing the URL.
If the number of changes is small (e.g., a modified Makefile) e-mailing a
context diff will do. The e-mail address to be used is
<maintainer@vim.org>

IV) It is not allowed to remove this license from the distribution of the Vim
sources, parts of it or from a modified version. You may use this
license for previous Vim releases instead of the license that they came
with, at your option.

# 1.3370 grub2 1:2.06-114.el9_7.1.alma.1

## 1.3370.1 Available under license :

Please email the following information to fsf-records@gnu.org, and we
will send you the assignment form that covers your program.

Please use your full legal name (in ASCII characters) as the subject
line of the message.

[What is the name of the program or package you're contributing?]

[Will this become part of a larger GNU package?  If so, what package?]

[Did you copy any files or text written by someone else into the
program?  Even if that material is free software, we need to know
about it.]

[Do you have an employer who might have a basis to claim to own
your changes?  Do you attend a school which might make such a claim?]

[What country are you a citizen of?]

[What year were you born?]

[Please write your email address here.]

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@center Version 2.1, February 1999

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of this license document, but changing it is not allowed.

[This is the first released version of the Lesser GPL. It also counts
as the successor of the GNU Library Public License, version 2, hence the
version number 2.1.]
@end display

@subheading Preamble

The licenses for most software are designed to take away your
freedom to share and change it. By contrast, the GNU General Public
Licenses are intended to guarantee your freedom to share and change
free software---to make sure the software is free for all its users.

This license, the Lesser General Public License, applies to some
specially designated software---typically
libraries---of the Free
Software Foundation and other authors who decide to use it. You can use
it too, but we suggest you first think carefully about whether this
license or the ordinary General Public License is the better strategy to
use in any particular case, based on the explanations below.

When we speak of free software, we are referring to freedom of use,
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for this service if you wish); that you receive source code or can get
it if you want it; that you can change the software and use pieces of it
in new free programs; and that you are informed that you can do these
things.

To protect your rights, we need to make restrictions that forbid
distributors to deny you these rights or to ask you to surrender these
rights. These restrictions translate to certain responsibilities for
you if you distribute copies of the library
or if you modify it.

For example, if you distribute copies of the library, whether gratis
or for a fee, you must give the recipients all the rights that we gave
you. You must make sure that they, too, receive or can get the source
code. If you link other code with the library, you must provide
complete object files to the recipients, so that they can relink them
with the library after making changes to the library and recompiling
it. And you must show them these terms so they know their rights.

We protect your rights with a two-step method: (1) we copyright the

library, and (2) we offer you this license, which gives you legal permission to copy, distribute and/or modify the library.

To protect each distributor, we want to make it very clear that there is no warranty for the free library. Also, if the library is modified by someone else and passed on, the recipients should know that what they have is not the original version, so that the original author's reputation will not be affected by problems that might be introduced by others.

Finally, software patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder. Therefore, we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the @dfn{Lesser} General Public License because it does @emph{Less} to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the

same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a ``work based on the library'' and a ``work that uses the library''. The former
contains code derived from the library, whereas the latter must be combined with the library in order to run.

@subheading TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

@enumerate 0
@item
This License Agreement applies to any software library or other program which contains a notice placed by the copyright holder or other authorized party saying it may be distributed under the terms of this Lesser General Public License (also called ``this License''). Each licensee is addressed as ``you''.

A ``library'' means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The ``Library'', below, refers to any such software library or work which has been distributed under these terms. A ``work based on the Library'' means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it,
either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term ``modification''.)

``Source code'' for a work means the preferred form of the work for making modifications to it. For a library, complete source code means

all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

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You may copy and distribute
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complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

@item
You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

@enumerate a
@item
The modified work must itself be a software library.

@item
You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

@item
You must
cause the whole of the work to be licensed at no
charge to all third parties under the terms of this License.

@item
If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses

the facility, other than as an argument passed when the facility
is invoked, then you must make a good faith effort to ensure that,
in the event an application does not supply such function or
table, the facility still operates, and performs whatever part of
its purpose remains meaningful.

(For example, a function in a library to compute square roots has
a purpose that is entirely well-defined independent of the
application. Therefore, Subsection 2d requires that any
application-supplied function or table used by this function must
be optional: if the application does not supply it, the square
root function must still compute square roots.)
@end enumerate

These requirements apply to the modified work as a whole. If
identifiable sections
of that work are not derived from the Library,
and can be reasonably considered independent and separate works in
themselves, then this License, and its terms, do not apply to those
sections when you distribute them as separate works. But when you
distribute the same sections as part of a whole which is a work based
on the Library, the distribution of the whole must be on the terms of
this License, whose permissions for other licensees extend to the
entire whole, and thus to each and every part regardless of who wrote
it.

Thus, it is not the intent of this section to claim rights or contest
your rights to work written entirely by you; rather, the intent is to
exercise the right to control the distribution of derivative or
collective works based on the Library.

In addition, mere aggregation of another work not based on the Library
with the Library (or with a work based on the Library) on a volume of
a storage or distribution medium does not bring the other work under
the scope of this
License.

@item
You may opt to apply the terms of the ordinary GNU General Public
License instead of this License to a given copy of the Library. To do
this, you must alter all the notices that refer to this License, so
that they refer to the ordinary GNU General Public License, version 2,
instead of to this License. (If a newer version than version 2 of the
ordinary GNU General Public License has appeared, then you can specify
that version instead if you wish.) Do not make any other change in
these notices.

Once this change is made in a given copy, it is irreversible for

that copy, so the ordinary GNU General Public License applies to all
subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of
the Library into a program that is not a library.

@item
You may copy and distribute the Library (or a portion or
derivative of it, under Section 2) in object code or executable form
under the terms of Sections 1 and
2 above provided that you accompany
it with the complete corresponding machine-readable source code, which
must be distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

If distribution of object code is made by offering access to copy
from a designated place, then offering equivalent access to copy the
source code from the same place satisfies the requirement to
distribute the source code, even though third parties are not
compelled to copy the source along with the object code.

@item
A program that contains no derivative of any portion of the
Library, but is designed to work with the Library by being compiled or
linked with it, is called a ``work that uses the Library''. Such a
work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

However, linking a ``work that uses the Library'' with the Library
creates an executable that is a derivative of the Library (because
it
contains portions of the Library), rather than a ``work that uses the
library''. The executable is therefore covered by this License.
Section 6 states terms for distribution of such executables.

When a ``work that uses the Library'' uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library. The
threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small inline
functions (ten lines or less in length), then the use of the object
file is unrestricted, regardless of whether it is legally a derivative
work. (Executables containing this object code plus portions of the
Library will still fall under Section 6.)

Otherwise,
if the work is a derivative of the Library, you may
distribute the object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.

@item
As an exception to the Sections above, you may also combine or
link a ``work that uses the Library'' with the Library to produce a
work containing portions of the Library, and distribute that work
under terms of your choice, provided that the terms permit
modification of the work for the customer's own use and reverse
engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the
Library is used in it and that the Library and its use are covered by
this License. You must supply a copy of this License. If the work
during execution displays copyright notices, you must include the
copyright notice for the Library among them, as well as a reference
directing the user to the copy of
this License. Also, you must do one
of these things:

@enumerate a
@item
Accompany the work with the complete corresponding
machine-readable source code for the Library including whatever
changes were used in the work (which must be distributed under
Sections 1 and 2 above); and, if the work is an executable linked
with the Library, with the complete machine-readable ``work that
uses the Library'', as object code and/or source code, so that the
user can modify the Library and then relink to produce a modified
executable containing the modified Library. (It is understood
that the user who changes the contents of definitions files in the
Library will not necessarily be able to recompile the application
to use the modified definitions.)

@item
Use a suitable shared library mechanism for linking with the Library. A
suitable mechanism is one that (1) uses at run time a copy of the
library already present on the user's computer system, rather than
copying library functions into the executable,
and (2) will operate
properly with a modified version of the library, if the user installs
one, as long as the modified version is interface-compatible with the
version that the work was made with.

@item
Accompany the work with a written offer, valid for at
least three years, to give the same user the materials
specified in Subsection 6a, above, for a charge no more
than the cost of performing this distribution.

@item
If distribution of the work is made by offering access to copy
from a designated place, offer equivalent access to copy the above
specified materials from the same place.

@item
Verify that the user has already received a copy of these
materials or that you have already sent this user a copy.
@end enumerate

For an executable, the required form of the ``work that uses the
Library" must include any data and utility programs needed for
reproducing the executable from it. However, as a special exception,
the materials to be distributed need not include anything that
is
normally distributed (in either source or binary form) with the major
components (compiler, kernel, and so on) of the operating system on
which the executable runs, unless that component itself accompanies the
executable.

It may happen that this requirement contradicts the license
restrictions of other proprietary libraries that do not normally
accompany the operating system. Such a contradiction means you cannot
use both them and the Library together in an executable that you
distribute.

@item
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/* Extract the last component (base name) of a file name.

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#ifndef _BASENAME_LGPL_H

```
#define _BASENAME_LGPL_H

#include <stddef.h>

#ifndef DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif


/*
 Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
          FILENAME      RESULT
          "foo.c"       "foo.c"
          "foo/bar.c"   "bar.c"
          "/foo/bar.c"  "bar.c"
          "foo/bar/"    "bar/"
          "foo/bar//"   "bar//"
          "/"           ""
          "//"          ""
          ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(), defined in <string.h>, does
      not consider trailing slashes to be part of the component:

 FILENAME      RESULT
          "foo/bar/"    ""
          "foo/bar//"   ""
    * The 'basename' command eliminates trailing slashes and for a root
      produces a non-empty result:
          FILENAME      RESULT
          "foo/bar/"    "bar"
          "foo/bar//"   "bar"
          "/"           "/"
          "//"          "/"
*/
```

```
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;


#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
```

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* Keep the copyright and release the program yourself under the GNU GPL. (This alternative is too impractical for contributions to a preexisting FSF-copyrighted GNU program.)

* Put the code in the public domain. Then there is nothing to stop hoarding of modified versions, but we
can still use the program in GNU.

Most of these alternatives require a signed piece of paper, or in some cases a digital signature, to make it happen.

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You're giving us a gift in the first place.

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If you are employed to do programming, or have made an agreement with your employer that says it owns programs you write, we need a signed piece of paper from your employer disclaiming rights to the program. It should be signed by a vice president or general manager of the company. If you can't get at them, it is almost as good to find someone who signs licenses for software that is purchased. Here is a sample wording:

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<signature of Mo Ghoul>, 1 April 1987

Mo Ghoul, President of Vice, Digital Simulation Corp.

The description of what the program does is just to make it clearer
what the disclaimer covers.

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what you did was change an existing program, it should say this:

...in the changes and enhancements made by Hugh Hacker to the
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```
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*
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*/

#ifndef GRUB_BSD_CPU_HEADER
#define GRUB_BSD_CPU_HEADER 1

#include <grub/types.h>
```

```
#include <grub/relocator.h>

#include <grub/i386/freebsd_reboot.h>
#include <grub/i386/netbsd_reboot.h>
#include <grub/i386/openbsd_reboot.h>
#include <grub/i386/freebsd_linker.h>
#include
 <grub/i386/netbsd_bootinfo.h>
#include <grub/i386/openbsd_bootarg.h>

enum bsd_kernel_types
 {
   KERNEL_TYPE_NONE,
   KERNEL_TYPE_FREEBSD,
   KERNEL_TYPE_OPENBSD,
   KERNEL_TYPE_NETBSD,
 };

#define GRUB_BSD_TEMP_BUFFER   0x80000

#define FREEBSD_B_DEVMAGIC OPENBSD_B_DEVMAGIC
#define FREEBSD_B_SLICESHIFT OPENBSD_B_CTRLSHIFT
#define FREEBSD_B_UNITSHIFT OPENBSD_B_UNITSHIFT
#define FREEBSD_B_PARTSHIFT OPENBSD_B_PARTSHIFT
#define FREEBSD_B_TYPESHIFT OPENBSD_B_TYPESHIFT

#define FREEBSD_MODTYPE_KERNEL  "elf kernel"
#define FREEBSD_MODTYPE_KERNEL64 "elf64 kernel"
#define FREEBSD_MODTYPE_ELF_MODULE "elf module"
#define FREEBSD_MODTYPE_ELF_MODULE_OBJ "elf obj module"
#define FREEBSD_MODTYPE_RAW  "raw"

#define FREEBSD_BOOTINFO_VERSION 1

struct grub_freebsd_bootinfo
{
 grub_uint32_t version;
 grub_uint8_t unused1[44];
 grub_uint32_t length;
 grub_uint8_t unused2;
 grub_uint8_t boot_device;
 grub_uint8_t unused3[18];
 grub_uint32_t kern_end;
 grub_uint32_t environment;
  grub_uint32_t tags;
} GRUB_PACKED;

struct freebsd_tag_header
```

```
{
 grub_uint32_t type;
 grub_uint32_t len;
};

grub_err_t grub_freebsd_load_elfmodule32 (struct grub_relocator *relocator,
       grub_file_t file, int argc,
       char *argv[], grub_addr_t *kern_end);
grub_err_t grub_freebsd_load_elfmodule_obj64 (struct grub_relocator *relocator,
           grub_file_t file, int argc,
           char *argv[],
           grub_addr_t *kern_end);
grub_err_t grub_freebsd_load_elf_meta32 (struct grub_relocator *relocator,
      grub_file_t file,
      const char *filename,
      grub_addr_t *kern_end);
grub_err_t grub_freebsd_load_elf_meta64 (struct grub_relocator *relocator,
      grub_file_t file,
      const char *filename,
      grub_addr_t *kern_end);

grub_err_t grub_netbsd_load_elf_meta32 (struct grub_relocator *relocator,
     grub_file_t file,
     const char *filename,
     grub_addr_t *kern_end);
grub_err_t grub_netbsd_load_elf_meta64 (struct grub_relocator *relocator,
     grub_file_t
 file,
     const char *filename,
     grub_addr_t *kern_end);

grub_err_t grub_bsd_add_meta (grub_uint32_t type,
         const void *data, grub_uint32_t len);
grub_err_t grub_freebsd_add_meta_module (const char *filename, const char *type,
      int argc, char **argv,
      grub_addr_t addr, grub_uint32_t size);

struct grub_openbsd_ramdisk_descriptor
{
 grub_size_t max_size;
 grub_uint8_t *target;
 grub_uint32_t *size;
};

grub_err_t grub_openbsd_find_ramdisk32 (grub_file_t file,
     const char *filename,
     grub_addr_t kern_start,
     void *kern_chunk_src,
```

```
    struct grub_openbsd_ramdisk_descriptor *desc);
grub_err_t grub_openbsd_find_ramdisk64 (grub_file_t file,
    const char *filename,
    grub_addr_t kern_start,
    void *kern_chunk_src,
    struct grub_openbsd_ramdisk_descriptor *desc);

extern grub_uint8_t grub_bsd64_trampoline_start, grub_bsd64_trampoline_end;
extern grub_uint32_t grub_bsd64_trampoline_selfjump;
extern grub_uint32_t grub_bsd64_trampoline_gdt;

#endif
 /* ! GRUB_BSD_CPU_HEADER */
```

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Description:
realpath, canonicalize_file_name: Provide canonical absolute file name

Files:
lib/canonicalize-lgpl.c
m4/canonicalize.m4
m4/double-slash-root.m4
m4/lstat.m4

Depends-on:
extensions
stdlib
nocrash
double-slash-root [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
eloop-threshold  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
errno  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
fcntl-h  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
filename  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
idx  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
intprops  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
libc-config  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME
 = 1]
memmove  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]

mempcpy [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
pathmax [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
rawmemchr [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
readlink [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
scratch_buffer [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
stat [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
stdbool [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
sys_stat [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
unistd [test $HAVE_CANONICALIZE_FILE_NAME = 0
|| test $REPLACE_CANONICALIZE_FILE_NAME = 1]

configure.ac:
gl_CANONICALIZE_LGPL
gl_CONDITIONAL([GL_COND_OBJ_CANONICALIZE_LGPL],
[test $HAVE_CANONICALIZE_FILE_NAME = 0 || test $REPLACE_CANONICALIZE_FILE_NAME =
1])
gl_MODULE_INDICATOR([canonicalize-lgpl])
gl_STDLIB_MODULE_INDICATOR([canonicalize_file_name])
gl_STDLIB_MODULE_INDICATOR([realpath])

Makefile.am:
if GL_COND_OBJ_CANONICALIZE_LGPL
lib_SOURCES += canonicalize-lgpl.c
endif

Include:
<stdlib.h>

License:
LGPLv2+

Maintainer:
all
Description:
Concatenate two arbitrary file names.

Files:
lib/filenamecat.h
lib/filenamecat-lgpl.c
m4/filenamecat.m4

Depends-on:
c99
basename-lgpl
filename
malloc-posix

configure.ac:
gl_FILE_NAME_CONCAT_LGPL

Makefile.am:
lib_SOURCES += filenamecat-lgpl.c

Include:
"filenamecat.h"

License:
LGPLv2+

Maintainer:
Jim Meyering
Files:
tests/test-update-copyright.sh

Depends-on:

configure.ac:
abs_aux_dir=`cd "$ac_aux_dir"; pwd`
AC_SUBST([abs_aux_dir])

Makefile.am:
TESTS += test-update-copyright.sh
TESTS_ENVIRONMENT += abs_aux_dir='$(abs_aux_dir)'

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@page
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and a brief idea of what it does.}
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Ty Coon, President of Vice
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Files:
doc/fdl.texi

Depends-on:

configure.ac:

Makefile.am:

Include:

License:
unmodifiable license text

Maintainer:
all
Description:
Help make libraries relocatable, that is, to allow them to function
properly when copied to an arbitrary directory.

Files:
doc/relocatable.texi
lib/relocatable.h
lib/relocatable.c
lib/relocatable.valgrind
m4/relocatable-lib.m4

Depends-on:
strdup

configure.ac:
```
gl_RELOCATABLE_LIBRARY
if test $RELOCATABLE = yes; then
 AC_LIBOBJ([relocatable])
fi
```

Makefile.am:
```
DEFS += -DNO_XMALLOC
```

Include:
"relocatable.h"

License:
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Maintainer:
Ben Pfaff
Description:
Extract specific portions of filenames.

Files:
lib/dirname.h
lib/dirname-lgpl.c
lib/stripslash.c

Depends-on:
basename-lgpl
double-slash-root
filename

malloc-posix
stdbool

configure.ac:

Makefile.am:
lib_SOURCES += dirname-lgpl.c stripslash.c

Include:
"dirname.h"

License:
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Maintainer:
Jim Meyering, Eric Blake

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<one line to give the program's name and a brief idea of what it does.>
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when it starts in an interactive mode:

Gnomovision version 69, Copyright (C) year name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute
it
under certain conditions; type `show c' for details.

The hypothetical commands `show w' and `show c' should show the appropriate
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mouse-clicks or menu items--whatever suits your program.

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school, if any, to sign a "copyright disclaimer" for the program, if
necessary. Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the program
`Gnomovision' (which makes passes at compilers) written by James Hacker.

<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice

This General Public License does not permit incorporating your program into
proprietary programs. If your program is a subroutine library, you may
consider it more useful to permit linking proprietary applications with the
library. If this
is what you want to do, use the GNU Lesser General
Public License instead of this License.
Files:
tests/test-canonicalize-lgpl.c
tests/signature.h
tests/null-ptr.h
tests/macros.h

Depends-on:
ignore-value
same-inode
symlink

configure.ac:

Makefile.am:
TESTS += test-canonicalize-lgpl
check_PROGRAMS += test-canonicalize-lgpl
test_canonicalize_lgpl_LDADD = $(LDADD) $(LIBINTL)

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dnl This file is free software; the Free Software Foundation
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dnl with or without modifications, as long as this notice is preserved.
Description:
Extract the last component (base name) of a file name.

Files:
lib/basename-lgpl.h
lib/basename-lgpl.c

Depends-on:
double-slash-root
filename
stdbool

configure.ac:

Makefile.am:
lib_SOURCES += basename-lgpl.c

Include:
"basename-lgpl.h"

License:
LGPLv2+

Maintainer:
all

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Version 3, 29 June 2007

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customarily used for software interchange.

b) Convey the object code in, or embodied in, a physical product
(including a physical distribution medium), accompanied by a
written offer, valid for at least three years
and valid for as
long as you offer spare parts or customer support for that product
model, to give anyone who possesses the object code either (1) a
copy of the Corresponding Source for all the software in the
product that is covered by this License, on a durable physical
medium customarily used for software interchange, for a price no
more than your reasonable cost of physically performing this
conveying of source, or (2) access to copy the
Corresponding Source from a network server at no charge.

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alternative is allowed only occasionally and noncommercially, and
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with subsection 6b.

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the same way through the same place at no
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Files:
tests/test-getcwd-lgpl.c
tests/signature.h
tests/macros.h

Depends-on:

configure.ac:

Makefile.am:
TESTS += test-getcwd-lgpl
check_PROGRAMS += test-getcwd-lgpl
test_getcwd_lgpl_LDADD = $(LDADD) $(LIBINTL)
Description:
Ensure getcwd(NULL, 0) returns a buffer allocated by the malloc() function.

Files:
lib/getcwd-lgpl.c
m4/getcwd.m4

Depends-on:
unistd
free-posix [test $REPLACE_GETCWD = 1]
strdup [test $REPLACE_GETCWD = 1]

configure.ac:
gl_FUNC_GETCWD_LGPL
gl_CONDITIONAL([GL_COND_OBJ_GETCWD_LGPL], [test $REPLACE_GETCWD = 1])
gl_UNISTD_MODULE_INDICATOR([getcwd])

Makefile.am:
if GL_COND_OBJ_GETCWD_LGPL
lib_SOURCES += getcwd-lgpl.c
endif

Include:
<unistd.h>

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```

Description:
Locating a program in PATH (LGPLed version).

Files:
lib/findprog.h
lib/findprog.c
lib/findprog-lgpl.c
m4/findprog.m4
m4/eaccess.m4

Depends-on:
stdbool
sys_stat
strdup
concat-filename
access
stat
unistd

configure.ac:
gl_FINDPROG
gl_MODULE_INDICATOR([findprog-lgpl])

Makefile.am:
lib_SOURCES += findprog.h findprog-lgpl.c

Include:
"findprog.h"

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# 1.3371 lodash 4.18.1

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# 1.3372 commons-logging 1.3.5

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# 1.3387 smtp-address-parser 1.1.0

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# 1.3388 object.fromentries 2.0.8

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# 1.3389 is-number-object 1.1.1

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# 1.3390 @types/react-is 18.2.1

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# 1.3392 @mui/material 5.14.8

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# 1.3394 async-function 1.0.0

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# 1.3395 which-module 2.0.1

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# 1.3397 set-function-name 2.0.2

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# 1.3400 stack-utils 2.0.6

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# 1.3401 tinymce-i18n 23.8.28

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# 1.3405 tcompare 5.0.7

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# 1.3406 optionator 0.9.4

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# 1.3407 diff 4.0.4

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# 1.3420 @fullcalendar/list 6.1.8

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# 1.3424 @actions/io 2.0.0

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# 1.3427 object.values 1.2.1

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# 1.3432 html-react-parser 4.2.2

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# 1.3433 es-to-primitive 1.3.0

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# 1.3434 string-prototype-trimstart 1.0.8

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# 1.3435 zod 3.22.2

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# 1.3436 unbox-primitive 1.1.0

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# 1.3438 tsconfig-paths 3.15.0

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# 1.3439 @octokit/rest 22.0.1

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# 1.3441 @simple-libs/child-process-utils 1.0.2

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# 1.3443 electron-to-chromium 1.5.321

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# 1.3444 @mui/icons-material 5.14.8

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# 1.3445 @iarna/toml 3.0.0

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# 1.3447 yallist 3.1.1

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# 1.3448 has-tostringtag 1.0.2

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# 1.3449 jquery-ui-touch-punch 0.2.3

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# 1.3450 @tufjs/repo-mock 4.0.1

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# 1.3452 node-releases 2.0.36

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# 1.3453 railroad-diagrams 1.0.0

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# 1.3454 @hello-pangea/dnd 16.3.0

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# 1.3458 @babel/traverse 7.22.15

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# 1.3461 array.prototype.findlastindex 1.2.6

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# 1.3465 mdn-data 2.27.1

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# 1.3469 @types/react 18.2.21

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# 1.3472 minify-registry-metadata 4.0.0

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# 1.3473 parse-github-repo-url 1.4.1

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# 1.3475 eslint-visitor-keys 3.4.3

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# 1.3477 @mui/private-theming 5.14.8

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# 1.3483 babel-plugin-transform-runtime 7.22.15

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# 1.3485 stacktrace-gps/node_modules/source-map 0.5.6

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# 1.3487 @actions/exec 2.0.0

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# 1.3492 es-abstract 1.24.1

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# 1.3505 @csstools/css-syntax-patches-for-csstree 1.0.29

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# 1.3506 tar 7.5.11

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# 1.3509 floatthead 2.2.5

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# 1.3513 is-map 2.0.3

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# 1.3514 @mui/types 7.2.4

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# 1.3515 @mui/x-license-pro 6.10.2

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# Change Log

All notable changes to this project will be documented in this file.
See [Conventional Commits](https://conventionalcommits.org) for commit guidelines.

## 6.10.2

_Jul 27, 2023_

We'd like to offer a big thanks to the 13 contributors who made this release possible. Here are some highlights :

- Improve scatter charts performance
- Redesigned component API documentation and side navigation
- Bugfixes

### Data Grid

#### `@mui/x-data-grid@v6.10.2`

- [DataGrid] Fix quick filter & aggregation error (#9729) @romgrk
- [DataGrid] Fix row click propagation causing error in nested grid (#9741) @cherniavskii
- [DataGrid] Keep focused cell in the DOM (#7357) @yaredtsy
- [l10n] Improve Finnish (fi-FI) locale (#9746) @sambbaahh

#### `@mui/x-data-grid-pro@v6.10.2` [![pro](https://mui.com/r/x-pro-svg)](https://mui.com/r/x-pro-svg-link)

Same changes as in `@mui/x-data-grid@v6.10.2`.

#### `@mui/x-data-grid-premium@v6.10.2` [![premium](https://mui.com/r/x-premium-svg)](https://mui.com/r/x-premium-svg-link)

Same
changes as in `@mui/x-data-grid-pro@v6.10.2`, plus:

- [DataGridPremium] Allow to customize grouping cell offset (#9417) @cherniavskii

### Date Pickers

#### `@mui/x-date-pickers@v6.10.2`

- [pickers] Remove the `endOfDate` from `DigitalClock` timeOptions (#9800) @noraleonte

#### `@mui/x-date-pickers-pro@v6.10.2` [![pro](https://mui.com/r/x-pro-svg)](https://mui.com/r/x-pro-svg-link)

Same changes as in `@mui/x-date-pickers@v6.10.2`.

### Charts / `@mui/x-charts@v6.0.0-alpha.5`

- [charts] Improve JSDoc for axis-related props (#9779) @flaviendelangle
- [charts] Improve performances of Scatter component (#9527) @flaviendelangle

### Docs

- [docs] Add `pnpm` in more places @oliviertassinari
- [docs] Add `pnpm` installation instructions for MUI X (#9707) @richbustos
- [docs] Align pickers "uncontrolled vs controlled" sections (#9772) @LukasTy
- [docs] Apply style guide to the data grid Layout page (#9673) @richbustos
- [docs] Differentiate between packages
in `slotProps` docs (#9668) @cherniavskii
- [docs] Fix charts width in axis pages (#9801) @alexfauquette
- [docs] Fix wrong prop name in the Editing page (#9753) @m4theushw
- [docs] New component API page and side nav design (#9187) @alexfauquette
- [docs] Update overview page with up to date information about the plans (#9512) @joserodolfofreitas

### Core

- [core] Use PR charts version in preview (#9787) @alexfauquette
- [license] Allow overriding the license on specific parts of the page (#9717) @Janpot
- [license] Throw in dev mode after 30 days (#9701) @oliviertassinari
- [license] Only throw in dev mode (#9803) @oliviertassinari
- [test] Fail the CI when new unexpected files are created (#9728) @oliviertassinari

## 6.10.1

_Jul 20, 2023_

We'd like to offer a big thanks to the 11 contributors who made this release possible. Here are some highlights :

- Fix CSV export for values containing double quotes
- Improve tree data performance
- Bugfixes
- Documentation improvements

### Data Grid

#### `@mui/x-data-grid@v6.10.1`

- [DataGrid] Filtering performance: compile filter applier with `eval` (#9635) @romgrk
- [DataGrid] Fix CSV export for values containing double quotes (#9667) @cherniavskii
- [DataGrid] Fix column type change not working correctly (#9594) @cherniavskii
- [DataGrid] Fix quick filter `undefined` row error (#9708) @romgrk
- [DataGrid] Prevent `viewportOuterSize.height` going negative (#9664) @gitstart
- [DataGrid] Update focused cell on page change via keyboard (#9203) @m4theushw
- [DataGrid] Wait for remote stylesheets to load before print (#9665) @cherniavskii

#### `@mui/x-data-grid-pro@v6.10.1` [![pro](https://mui.com/r/x-pro-svg)](https://mui.com/r/x-pro-svg-link)

Same changes as in `@mui/x-data-grid@v6.10.1`, plus:

- [DataGridPro] Improve tree data performance (#9682) @cherniavskii
- [DataGridPro] Prevent affecting cells from child DataGrid when resizing a column (#9670) @m4theushw

#### `@mui/x-data-grid-premium@v6.10.1` [![premium](https://mui.com/r/x-premium-svg)](https://mui.com/r/x-premium-svg-link)

Same changes as in `@mui/x-data-grid-pro@v6.10.1`.

### Date Pickers

#### `@mui/x-date-pickers@v6.10.1`

- [fields] Fix `format` and `value` update order (#9715) @LukasTy
- [pickers] Remove `require` usage in comment (#9675) @LukasTy

#### `@mui/x-date-pickers-pro@v6.10.1` [![pro](https://mui.com/r/x-pro-svg)](https://mui.com/r/x-pro-svg-link)

Same changes as in `@mui/x-date-pickers@v6.10.1`.

### Charts / `@mui/x-charts@v6.0.0-alpha.4`

- [charts] Fix blinking in responsive charts and extremums computation for line charts (#9734) @alexfauquette
- [charts] Use ESM with imports (#9645) @alexfauquette

### Docs

- [docs] Add additional note for license key installation on Next.js (#9575) @joserodolfofreitas
- [docs] Add paragraph about managing focus of custom edit components (#9658) @m4theushw
- [docs] Add unsorted icon slot to the custom sort icons demo (#9169) @d4rekanguok
- [docs] Disable ad for onboarding
 pages (#9700) @oliviertassinari
- [docs] Disabling ads without toolbar has no effect @oliviertassinari
- [docs] Fix Date Pickers usage to Title Case (#9680) @richbustos
- [docs] Fix sorting in `CustomSortIcons` demo (#9656) @MBilalShafi
- [docs] Improve the UI for pickers introduction (#9644) @alexfauquette
- [docs] Improve the demo design @oliviertassinari
- [docs] Localization progress, polish (#9672) @oliviertassinari
- [docs] Normalize the WIP items (#9671) @oliviertassinari

### Core

- [core] Add `validate` command (#9714) @romgrk
- [CHANGELOG] Update generator to new format @oliviertassinari

## 6.10.0

_Jul 13, 2023_

We'd like to offer a big thanks to the 10 contributors who made this release possible. Here are some highlights :

- Improve data grid filtering performance
- Include column groups in the CSV export
- Improve Polish (pl-PL) locale for the data grid
- Improve Norwegian (nb-NO) locale for the pickers

### Data Grid

#### `@mui/x-data-grid@6.10.0`

- [DataGrid]
 Allow to exclude hidden columns from the quick filter (#9610) @cherniavskii
- [DataGrid] Filtering performance: remove indirection (#9334) @romgrk
- [DataGrid] Fix props propagation on `GridToolbarQuickFilter` component (#9633) @giladappsforce
- [DataGrid] Fix quick filter input lag (#9630) @cherniavskii
- [DataGrid] Include column groups in the CSV export (#9585) @cherniavskii
- [DataGrid] Make `rowExpansionChange` event public (#9611) @MBilalShafi
- [l10n] Improve Polish (pl-PL) locale (#9625) @ch1llysense

#### `@mui/x-data-grid-pro@6.10.0` [![pro](https://mui.com/r/x-pro-svg)](https://mui.com/r/x-pro-svg-link)

Same changes as in `@mui/x-data-grid@6.10.0`.

#### `@mui/x-data-grid-premium@6.10.0` [![premium](https://mui.com/r/x-premium-svg)](https://mui.com/r/x-premium-svg-link)

Same changes as in `@mui/x-data-grid-pro@6.10.0`.

### Date Pickers

#### `@mui/x-date-pickers@6.10.0`

- [pickers] Fix date calendar issues (#9652) @LukasTy
- [l10n] Improve Norwegian (nb-NO) locale (#9608)
 @JosteinBrevik

#### `@mui/x-date-pickers-pro@6.10.0` [![pro](https://mui.com/r/x-pro-svg)](https://mui.com/r/x-pro-svg-link)

Same changes as in `@mui/x-date-pickers@6.10.0`.

### Charts / `@mui/x-charts@6.0.0-alpha.3`

- [charts] Allow configuring bar size (#9632) @alexfauquette
- [charts] Simplify custom components creation (#9561) @alexfauquette

### Docs

- [docs] Add slot components usage alert (#9660) @LukasTy
- [docs] Fix casing Cell selection @oliviertassinari

### Core

- [core] Disambiguate eslint plugin name @oliviertassinari
- [core] Update priority support issue template and prompt (#9574) @DanailH
- [CHANGELOG] Clarify each plan (#9446) @oliviertassinari
- [license] Fix error terminology (#9614) @oliviertassinari

## 6.9.2

_Jul 6, 2023_

We'd like to offer a big thanks to the 11 contributors who made this release possible. Here are some highlights :

- Auto-scroll when making range selection (#8661) @m4theushw

- New page: Components lifecycle (#8372) @flaviendelangle

  Clarify pickers events and value updates in a [single docs page](https://mui.com/x/react-date-pickers/lifecycle/).

- Add pie chart component

They are fresh from the code editor. You can visit [pie charts docs](https://mui.com/x/react-charts/pie/) or their [demo page](https://mui.com/x/react-charts/pie-demo/).

<img width="380" alt="pie-charts" src="https://github.com/mui/mui-x/assets/13808724/fe908c45-803c-4316-b913-dbd2f9f0551e">

- Bugfixes

- Documentation improvements

### Data Grid

#### `@mui/x-data-grid@6.9.2`

- [DataGrid] Fix `RangeError` when using flex columns (#9554) @cherniavskii
- [DataGrid] Fix React 17 editing bug (#9530) @romgrk
- [DataGrid] Use `getRowId` in filtering (#9564) @romgrk
- [DataGrid] Correctly reflect `TablePagination`'s `rowsPerPageOptions` shape to `pageSizeOptions` (#9438) @burakkgunduzz
- [l10n] Improve Spanish (es-ES) locale (#9500) @fufex

#### `@mui/x-data-grid-pro@6.9.2` [![pro](https://mui.com/r/x-pro-svg)](https://mui.com/r/x-pro-svg-link)

Same changes as in `@mui/x-data-grid@6.9.2`.

#### `@mui/x-data-grid-premium@6.9.2` [![premium](https://mui.com/r/x-premium-svg)](https://mui.com/r/x-premium-svg-link)

Same changes as in `@mui/x-data-grid-pro@6.9.2`, plus:

- [DataGridPremium] Auto-scroll when making range selection (#8661) @m4theushw

### Date Pickers

#### `@mui/x-date-pickers@6.9.2`

- [pickers] Forward digital clock classes (#9555) @YoonjiJang
- [pickers] Rename `internal` folder to `internals` on `@mui/x-date-picker-pro` (#9571) @flaviendelangle

#### `@mui/x-date-pickers-pro@6.9.2` [![pro](https://mui.com/r/x-pro-svg)](https://mui.com/r/x-pro-svg-link)

Same changes as in `@mui/x-date-pickers@6.9.2`.

### Charts / `@mui/x-charts@6.0.0-alpha.2`

- [charts] Add pie chart component (#9395) @alexfauquette

### Docs

- [docs] Add pickers playground (#9164) @LukasTy
- [docs] Fix API links for pickers (#9573) @alexfauquette
- [docs] Fix demos with `ToggleButtonGroup` (#9548) @flaviendelangle
- [docs] Fix typos
 in pagination documentation page (#9332) @RatherBeLunar
- [docs] Hide ads on paid content @oliviertassinari
- [docs] Move the charts in the sidebar (#9437) @flaviendelangle
- [docs] New page: Components lifecycle (#8372) @flaviendelangle
- [docs] Remove outdated header tag @oliviertassinari

### Core

- [core] Fix typo in priority support @oliviertassinari
- [core] Remove mention of Crowdin @oliviertassinari

## 6.9.1

_Jun 30, 2023_

We'd like to offer a big thanks to the 13 contributors who made this release possible. Here are some highlights :

- Add experimental API for faster filtering performance
- Add Chinese (Hong Kong) (zh-HK) locale on the pickers
- Improve Romanian (ro-RO) and Hungarian (hu-HU) translations on the pickers and the data grid
- Bugfixes
- Documentation improvements

### Data Grid

#### `@mui/x-data-grid@6.9.1`

- [DataGrid] Add Joy UI `tooltip` and `loadingOverlay` slots (#9028) @cherniavskii
- [DataGrid] Add section about enabling pagination on Pro and
 Premium (#8759) @joserodolfofreitas
- [DataGrid] Don't forward `editCellState` prop to DOM element (#9501) @m4theushw
- [DataGrid] Add experimental API for faster filtering performance (#9254) @romgrk
- [DataGrid] Fix `nextFieldToFocus` to always be a visible column field when <kbd>Tab</kbd> key is pressed (#8314) @yaredtsy
- [DataGrid] Fix `Maximum call stack size exceeded` error when using fractional width (#9516) @cherniavskii
- [l10n] Improve Romanian (ro-RO) and Hungarian (hu-HU) translations (#9436) @noraleonte

#### `@mui/x-data-grid-pro@6.9.1` [![pro](https://mui.com/r/x-pro-svg)](https://mui.com/r/x-pro-svg-link)

Same changes as in `@mui/x-data-grid@6.9.1`, plus:

- [DataGridPro] Don't throw error in column pinning (#9507) @romgrk
- [DataGridPro] Fix bug with `checkboxSelection` and treeData/grouping (#9418) @romgrk

#### `@mui/x-data-grid-premium@6.9.1` [![premium](https://mui.com/r/x-premium-svg)](https://mui.com/r/x-premium-svg-link)

Same changes as in `@mui/x-data-grid-pro@6.9.1`.

### Date Pickers

#### `@mui/x-date-pickers@6.9.1`

- [DateTimePicker] Scroll to Digital Clock section only when selection changes (#9434) @LukasTy
- [pickers] Handle `keyDown` only when input is focused (#9481) @LukasTy
- [pickers] Add `referenceDate` prop on `TimeClock`, `DigitalClock` and `MultiSectionDigitalClock` (#9356) @flaviendelangle
- [l10n] Add Chinese (Hong Kong) (zh-HK) locale (#9468) @samchiu90
- [l10n] Improve Romanian (ro-RO) translations (#9436) @noraleonte

#### `@mui/x-date-pickers-pro@6.9.1` [![pro](https://mui.com/r/x-pro-svg)](https://mui.com/r/x-pro-svg-link)

Same changes as in `@mui/x-date-pickers@6.9.1`.

### Charts / `@mui/x-charts@6.0.0-alpha.1`

- [charts] Take responsive container from data grid (#9497) @alexfauquette
- [charts] Update README.md (#9426) @alexfauquette
- [charts] Fix typo and small refactor (#9526) @flaviendelangle

### Docs

- [docs] Add a recipe limiting to one expanded detail panel at a time (#9488) @cherniavskii
- [docs] Add missing upcoming flag without issue (#9449) @oliviertassinari
- [docs] Fix 301 when opening the charts @oliviertassinari
- [docs] Fix 404 link (#9435) @alexfauquette
- [docs] Fix `productId` logic (#9451) @oliviertassinari
- [docs] Update charts overview.md (#9429) @brentertz
- [docs] Avoid systematic usage of `"bg": "inline"` (#9499) @alexfauquette
- [docs] Display plan icon in ToC (#9490) @cherniavskii
- [docs] Remove "product" markdown header (#9517) @oliviertassinari

### Core

- [core] Add `edit-mode` to priority support action (#9483) @DanailH
- [core] Fix priority support prompt action (#9472) @DanailH
- [core] Update `uses` for priority support action (#9480) @DanailH

- [core] Bumb update monorepo (#9476) @alexfauquette
- [CHANGELOG] Fix media quality (#9439) @oliviertassinari
- [CHANGELOG] Remove height img attribute @oliviertassinari
- [test] Skip flaky row pinning tests in JSDOM (#9511) @cherniavskii

## 6.9.0

_Jun 22, 2023_

We'd like to offer a big thanks to the 11 contributors
who made this release possible. Here are some highlights :

- We released a new open-source package: `@mui/x-charts`. This package aims at simplifying the integration of charts into your dashboards.

<img width="512" alt="charts" src="https://github.com/mui/mui-x/assets/3165635/41201d3c-16a4-442d-a230-68356e6b433d">

It already contains [line](https://mui.com/x/react-charts/lines/), [bar](https://mui.com/x/react-charts/bars/), and [scatter](https://mui.com/x/react-charts/scatter/) charts, with basic customization features. Check out the [documentation](https://mui.com/x/react-charts/) to see what it can do, and open issues to get the feature you need implemented.

- Introducing UTC and timezone support for pickers.

<img width="774" src="https://github.com/mui/mui-x/assets/3165635/ad95a404-ee67-4aff-b996-ad6cbb322348">

Visit the [documentation](https://mui.com/x/react-date-pickers/timezone/) to learn how to use it.

- Improve Brazilian Portuguese (pt-BR) on the
data grid
- Improve Czech (cs-CZ) locale on the pickers
- Performance improvements
- Bugfixes
- Documentation improvements

### Data Grid

#### `@mui/x-data-grid@6.9.0`

- [DataGrid] Filtering performance: use unmemoized selectors by default (#9287) @romgrk
- [DataGrid] Use container dimensions from `getComputedStyle` (#9236) @m4theushw
- [l10n] Improve Brazilian Portuguese (pt-BR) locale (#9404) @julioAz

#### `@mui/x-data-grid-pro@6.9.0` [![pro](https://mui.com/r/x-pro-svg)](https://mui.com/r/x-pro-svg-link)

Same changes as in `@mui/x-data-grid@6.9.0`.

#### `@mui/x-data-grid-premium@6.9.0` [![premium](https://mui.com/r/x-premium-svg)](https://mui.com/r/x-premium-svg-link)

Same changes as in `@mui/x-data-grid-pro@6.9.0`.

### Date Pickers

#### `@mui/x-date-pickers@6.9.0`

- [fields] Ensure `minutesStep` is respected by fields arrows up/down (#9338) @alexfauquette
- [fields] Reset internal state when `referenceValue` changes (#9390) @adrianmxb
- [l10n] Improve Czech (cs-CZ) locale
 (#9397) @radimkafka
- [pickers] Add proper support for UTC and timezones (#8261) @flaviendelangle
- [pickers] Fix field section selection on `DateTimePicker` (#9342) @LukasTy
- [pickers] Reduce date range calendar vertical border width (#9368) @oliviertassinari
- [pickers] Reset fields internal state when pasting value (#9385) @alexfauquette

#### `@mui/x-date-pickers-pro@6.9.0` [![pro](https://mui.com/r/x-pro-svg)](https://mui.com/r/x-pro-svg-link)

Same changes as in `@mui/x-date-pickers@6.9.0`.

### Charts / `@mui/x-charts@6.0.0-alpha.0`

- [charts] Allow to customize colors based on the theme mode (#9006) @alexfauquette
- [charts] Prepare the charts release (#9361) @alexfauquette
- [charts] Various improvements of charts docs (#9341) @alexfauquette

### Docs

- [docs] Add examples of using different time view renderers (#9360) @LukasTy
- [docs] Add recipe for single-click editing (#8365) @m4theushw
- [docs] Fix Base UI references (#9349) @oliviertassinari
- [docs] Fix random screenshot
 generation (#9364) @cherniavskii
- [docs] Remove random generation from chart doc example (#9343) @flaviendelangle
- [docs] Sync h1 with sidenav link (#9252) @oliviertassinari
- [docs] Use the mui-x Stack Overflow tag (#9352) @oliviertassinari

### Core

- [core] Add PR template and update the contributions guide (#9329) @DanailH
- [core] Bump monorepo (#9420) @LukasTy
- [core] Fix file typo (#9421) @DanailH
- [core] Fix proptypes (#9396) @LukasTy
- [core] Move old release notes in `CHANGELOG.old.md` (#9269) @flaviendelangle
- [core] Add priority support issue template (#8928) @DanailH

## 6.8.0

_Jun 16, 2023_

We'd like to offer a big thanks to the 13 contributors who made this release possible. Here are some highlights :

- Add Greek (el-GR) locale on Pickers and improve on Data Grid
- Performance improvements
- Bugfixes
- Documentation improvements

### Data Grid

#### `@mui/x-data-grid@6.8.0`

- [DataGrid] Add missing styles to `overridesResolver` (#9248) @mrmuhammadali
- [DataGrid] Keep column header menu icon always visible on touch devices (#9076) @cherniavskii
- [DataGrid] Correct the type for single digit edited number value (#9282) @MBilalShafi
- [DataGrid] Correct the type for single digit edited number for row edit (#9348) @MBilalShafi
- [DataGrid] Filtering performance: cache values (#9284) @romgrk
- [DataGrid] Fix tabbing between `actions` cells in edit mode (#9321) @md250721
- [DataGrid] Make autocompletion work for `GridColDef['type']` (#9320) @cherniavskii
- [DataGrid] Polish shortcut logic (#9220) @oliviertassinari
- [DataGrid] Row reordering fix for different row heights (#7006) @yaredtsy
- [DataGrid] Scroll performance improvements (#9037) @romgrk
- [l10n] Improve Greek (el-GR) locale (#9292) @clytras

#### `@mui/x-data-grid-pro@6.8.0` [![pro](https://mui.com/r/x-pro-svg)](https://mui.com/r/x-pro-svg-link)

Same changes as in `@mui/x-data-grid@6.8.0`.

#### `@mui/x-data-grid-premium@6.8.0` [![premium](https://mui.com/r/x-premium-svg)](https://mui.com/r/x-premium-svg-link)

Same changes as in `@mui/x-data-grid-pro@6.8.0`.

### Date Pickers

#### `@mui/x-date-pickers@6.8.0`

- [l10n] Add Greek (el-GR) locale (#9293) @clytras
- [pickers] Add a `referenceDate` prop on `DateCalendar`, `MonthCalendar` and `YearCalendar` (#9260) @flaviendelangle
- [pickers] Close the calendar when a shortcut is selected (#9080) @flaviendelangle
- [pickers] Fix disabling for digital clock (#9300) @alexfauquette

#### `@mui/x-date-pickers-pro@6.8.0` [![pro](https://mui.com/r/x-pro-svg)](https://mui.com/r/x-pro-svg-link)

Same changes as in `@mui/x-date-pickers@6.8.0`.

### Docs

- [docs] Add header filters to the popular features demo (#9069) @MBilalShafi
- [docs] Fix `Date Calendar` dynamic data demo (#9290) @benzler
- [docs] Fix Data Grid header filter link (#9225) @oliviertassinari
- [docs] Fix missing docs version warning (#9221) @oliviertassinari
- [docs] Improve Chart overview (#9333) @oliviertassinari
- [docs] Improve Next.js license
 installation guide (#8975) @oliviertassinari
- [docs] Link pagination documentation to the migration guide (#9296) @MBilalShafi
- [docs] One step toward components -> slots (#9251) @oliviertassinari
- [docs] Improve and reorganize sections on editing page (#8431) @joserodolfofreitas
- [docs] Add clipboard paste to popular features demo (#9029) @cherniavskii

### Core

- [core] Polish event name (#9336) @oliviertassinari
- [core] Re-enable `Argos` CI step (#9301) @LukasTy
- [core] Upgrade Node.js to v18 on CircleCI, CodeSandbox and Netlify (#9319) @ZeeshanTamboli
- [core] Upgrade Node.js v18 for l10n GitHub CI (#9355) @ZeeshanTamboli
- [charts] Add demonstration pages based on Recharts demo (#9175) @alexfauquette
- [charts] Add legend (#9024) @alexfauquette
- [charts] Complete the docs to introduce charts (#9153) @alexfauquette
- [charts] Manage elements highlights (#9242) @alexfauquette
- [charts] Prefix subcomponents with `Charts` (#9314) @alexfauquette
- [license] Improve annual license
 expiration message (#9135) @oliviertassinari

## 6.7.0

_Jun 9, 2023_

We'd like to offer a big thanks to the 12 contributors who made this release possible. Here are some highlights :

- Improve the default `format` prop value on the pickers.

 Here are a few examples:

 ```tsx
 <TimePicker views={['hours', 'minutes', 'seconds']} ampm />
 // Format before v6.7.0: `hh:mm aa`
 // Format after v6.7.0: `hh:mm:ss aa`

 <DatePicker views={['year']} />
 ```

```
// Format before v6.7.0: `MM/DD/YYYY`
// Format after v6.7.0: `YYYY`

<DateTimePicker views={['day', 'hours', 'minutes']} ampm />
// Format before v6.7.0: `MM/DD/YYYY hh:mm aa`
// Format after v6.7.0: `DD hh:mm aa`
```

- Add Romanian (ro-RO) locale on the pickers
- Improve German (de-DE) locale on the pickers
- Improve Czech (cs-CZ), German (de-DE) and Turkish (tr-TR) locales on the data grid
- Performance improvements
- Bugfixes
- Documentation improvements

### Data Grid

#### `@mui/x-data-grid@6.7.0`

- [DataGrid]
  Allow overflowing grid root element (#9179) @cherniavskii
- [DataGrid] Fix module augmentation error when using `@mui/lab` (#9235) @cherniavskii
- [DataGrid] Fix row with ids matching `Object` prototype (#9265) @romgrk
- [DataGrid] Fix `sortModel` and `filterModel` resetting when columns change (#9239) @alexgonch
- [DataGrid] Improve grouping performance for large datasets (#9200) @romgrk
- [DataGrid] Increase threshold to trigger memory leak warning (#9263) @m4theushw
- [DataGrid] Update data grid migration guide to include updated type (#9272) @MBilalShafi
- [l10n] Improve Czech (cs-CZ) locale (#9266) @MartinSkarpa
- [l10n] Improve German (de-DE) locale (#9259) @ximex
- [l10n] Improve Turkish (tr-TR) locale (#9237) @MCErtan

#### `@mui/x-data-grid-pro@6.7.0` [![pro](https://mui.com/r/x-pro-svg)](https://mui.com/r/x-pro-svg-link)

Same changes as in `@mui/x-data-grid@6.7.0`, plus:

- [DataGridPro] Improve header filter menu visuals (#9181) @MBilalShafi

#### `@mui/x-data-grid-premium@6.7.0`
[![premium](https://mui.com/r/x-premium-svg)](https://mui.com/r/x-premium-svg-link)

Same changes as in `@mui/x-data-grid-pro@6.7.0`, plus:

- [DataGridPremium] Remove last line break on clipboard paste (#9163) @cherniavskii

### Pickers

#### `@mui/x-date-pickers@6.7.0`

- [l10n] Add Romanian (ro-RO) locale (#9257) @ximex
- [l10n] Improve German (de-DE) locale (#9258) @ximex
- [pickers] Apply dynamic default format depending on views for all desktop and mobile pickers (#9126) @flaviendelangle

#### `@mui/x-date-pickers-pro@6.7.0` [![pro](https://mui.com/r/x-pro-svg)](https://mui.com/r/x-pro-svg-link)

Same changes as in `@mui/x-date-pickers@6.7.0`, plus:

- [pickers] Update `DateRangePickerDay` props JSDoc (#9191) @stevus

### Docs

- [docs] Fix missing props on the `GridFilterPanel` API page (#9180) @cherniavskii
- [docs] Fix overview page typo (#9230) @LukasTy
- [docs] Fix version redirect (#9273) @alexfauquette

### Core

- [core] Temporarily remove the Argos upload on
 the regression testing (#9267) @flaviendelangle
- [charts] Add clip-path to avoid charts overflow (#9012) @alexfauquette
- [charts] Add style customization on bar (#8935) @alexfauquette
- [charts] Enforce axis `min`/`max` over the `nice()` method (#9189) @alexfauquette
- [charts] Improve axis label and ticks label alignements (#9190) @alexfauquette
- [charts] Simplify the switch between responsive and fix dimensions (#9151) @alexfauquette

## 6.6.0

_Jun 1, 2023_

We'd like to offer a big thanks to the 15 contributors who made this release possible. Here are some highlights :

- New date time picking UI on [`DesktopDateTimePicker`](https://mui.com/x/react-date-pickers/date-time-picker/)

<img src="https://github.com/mui/mui-x/assets/3165635/4e1fe9f9-03eb-4f23-99dd-80212b21fb23" width="840" height="506" />

- Performance improvements
- Bugfixes
- Documentation improvements
- Improve Dutch (nl-NL) and French (fr-FR) locales on the data grid
- Add Vietnamese (vi-VN) locale on the
 pickers

### `@mui/x-data-grid@6.6.0` / `@mui/x-data-grid-pro@6.6.0` / `@mui/x-data-grid-premium@6.6.0`

#### Changes

- [DataGrid] Support data attributes (#8845) @romgrk
- [DataGrid] Avoid allocations in `hydrateRowsMeta` (#9121) @romgrk
- [DataGrid] Fix filter input select accessibility (#9018) @Jul13nT
- [DataGrid] Fix accessibility issues in panels and toolbar buttons (#8862) @romgrk
- [DataGrid] Fix `onCellEditStop` not invoked (#8857) @romgrk
- [DataGridPro] Fix auto-scroll when reordering columns (#8856) @m4theushw
- [DataGridPro] Fix row ID type casting in detail panels lookup (#8976) @minchaej
- [DataGridPro] Emit `columnWidthChange` event on `touchEnd` of column resize (#8669) @MBilalShafi
- [DataGridPro] Do not apply filters on `rowExpansionChange` (#8671) @cherniavskii
- [DataGridPro] Prevent click event on sorting after a resize (#9117) @romgrk
- [DataGridPremium] Improve Excel export interface (#9128) @TiagoPortfolio
- [l10n] Improve Dutch (nl-NL) locale (#9043) @thedutchruben
-
[l10n] Improve French (fr-FR) locale (#9109) @Jul13nT

### `@mui/x-date-pickers@6.6.0` / `@mui/x-date-pickers-pro@6.6.0`

#### Changes

- [fields] Allow to explicitly define the reference value and improve its default value (#9019) @flaviendelangle
- [l10n] Add Vietnamese (vi-VN) locale (#9099) @nhannt201
- [pickers] Add `DigitalClock` to `DesktopDateTimePicker` (#8946) @LukasTy
- [pickers] Add support for timezones on the adapters (#9068) @flaviendelangle
- [pickers] Fix `MonthCalendar` and `YearCalendar` disabled validation (#9149) @LukasTy
- [pickers] Fix bug when fields have a unique section (#9110) @alexfauquette
- [pickers] Fix focus jumping on Safari (#9072) @LukasTy
- [pickers] Use the locale start of the week in `getWeekArray` (#9176) @flaviendelangle

### Docs

- [docs] Add single input range picker demo (#9159) @LukasTy
- [docs] Align `DateCalendar` demo views with labels (#9152) @LukasTy
- [docs] Clarify the peer dependency with React (#9067) @oliviertassinari
-
[docs] Fix Norwegian locale typo (#9168) @LukasTy
- [docs] Fix column menu item demo (#9071) @MBilalShafi
- [docs] Improve localization table progress bars (#9033) @noraleonte
- [docs] Smooth performance animation (#8986) @oliviertassinari
- [docs] Use responsive time and date time pickers and the views sections (#9127) @flaviendelangle
- [docs] Reduce layout shift in grid demo (#9132) @oliviertassinari
- [docs] Fix tree data children lazy-loading demo (#8840) @yaredtsy
- [docs] Improve filtering docs discoverability (#9074) @MBilalShafi

### Core

- [core] Allow string literals as keys in `localesText` (#9045) @MBilalShafi
- [core] Fix `randomInt` producing values exceeding `max` value (#9086) @cherniavskii

- [core] Fix flaky test on `dateWithTimezone` adapter test (#9129) @flaviendelangle
- [core] Lock `@types/node` on v18 (#9107) @LukasTy
- [core] Remove `cross-fetch` dependency (#9108) @LukasTy
- [core] Remove `createDetectElementResize()` replaced with `ResizeObserver` (#9015) @oliviertassinari
-
 [core] Upgrade monorepo (#9027) @m4theushw
- [core] Upgrade monorepo (#9106) @LukasTy
- [charts] Fix proptypes (#9125) @LukasTy
- [charts] Generate the charts proptypes (#9010) @alexfauquette
- [charts] Manage series stacking (#8888) @alexfauquette
- [license] List side effects in the license package (#9092) @cherniavskii

## 6.5.0

_May 19, 2023_

We'd like to offer a big thanks to the 10 contributors who made this release possible. Here are some highlights :

-  Introduce filtering on column headers for `DataGridPro` and `DataGridPremium`:

 <img src="https://github.com/mui/mui-x/releases/download/v6.5.0/recording.gif" width="840" height="506" />

 See [the documentation](https://mui.com/x/react-data-grid/filtering/header-filters/) for more information

-  Improve Hebrew (he-IL) and Czech (cs-CZ) locales
-  Support for editing on pinned rows
-  Performance improvements
-  Bugfixes
-  Documentation improvements

### `@mui/x-data-grid@6.5.0` / `@mui/x-data-grid-pro@6.5.0`
 / `@mui/x-data-grid-premium@6.5.0`

#### Changes

- [DataGrid] Fix grid size calculation when `.MuiDataGrid-main` has border (#8882) @cherniavskii
- [DataGridPro] Filtering on Column Header (#7760) @MBilalShafi
- [DataGridPro] Improve `treeData` and `rowGrouping` performance (#8990) @MBilalShafi
- [DataGridPro] Support pinned rows editing (#8921) @cherniavskii
- [l10n] Improve Hebrew (he-IL) locale (#8943) @Itzik-Tech
- [l10n] Improve Czech (cs-CZ) locale (#8829) @harastaivan
- [l10n] Improve Czech (cs-CZ) locale (#8956) @davidzemancz

### `@mui/x-date-pickers@6.5.0` / `@mui/x-date-pickers-pro@6.5.0`

#### Changes

- [fields] Select the first section instead of last when clicking right of content (#9005) @noraleonte

- [fields] Refactor prop drilling in fields (#8660) @flaviendelangle
- [pickers] Allow to render the months before `currentMonth` instead of the one after (#8592) @flaviendelangle
- [pickers] Fix view management when `openTo` or `views` is modified (#8997) @alexfauquette
-
 [l10n] Improve Czech (cs-CZ) locale (#8829) @harastaivan

### Docs

- [docs] Clarify what Controlled / Uncontrolled means (#8926) @flaviendelangle
- [docs] Fix docs using wrong service worker (#9030) @cherniavskii
- [docs] Remove prop-types from JS demos (#9008) @flaviendelangle

### Core

- [core] Add assertion about checkbox rerenders (#8974) @oliviertassinari
- [core] Allow selecting a section by type in field tests (#9009) @flaviendelangle
- [core] Fix `yarn.lock` (#8988) @flaviendelangle
- [core] Fix flacky adapter test (#8995) @flaviendelangle
- [charts] Clean the axis rendering (#8948) @alexfauquette
- [DataGrid] Memoize root props for better performance (#8942) @romgrk
- [test] Skip flaky unit tests in JSDOM (#8994) @cherniavskii

## 6.4.0

_May 12, 2023_

We'd like to offer a big thanks to the 12 contributors who made this release possible. Here are some highlights :

-  Introduce clipboard paste support for `DataGridPremium`:

 https://github.com/mui/mui-x/assets/13808724/abfcb5c6-9db6-4677-9ba7-ae97de441080

  See [the documentation](https://mui.com/x/react-data-grid/clipboard/#clipboard-paste) for more information

-  Improve French (fr-FR), German (de-DE), Portuguese (pt-BR) and Ukrainian (uk-UA) locales on the data grid
-  Add Slovak (sk-SK) locale on the pickers
-  Bugfixes
-  Documentation improvements

### `@mui/x-data-grid@6.4.0` / `@mui/x-data-grid-pro@6.4.0` / `@mui/x-data-grid-premium@6.4.0`

#### Changes

- [DataGrid] Fix DataGrid rendering in JSDOM (#8968) @cherniavskii
- [DataGrid] Fix layout when rendered inside a parent with `display: grid` (#8577) @cherniavskii
- [DataGrid] Add Joy UI icon slots (#8940) @siriwatknp
- [DataGrid] Add Joy UI pagination slot (#8871) @cherniavskii
- [DataGrid] Extract `baseChip` slot (#8748) @cherniavskii

- [DataGridPremium] Implement Clipboard import (#7389) @cherniavskii
- [l10n] Improve French (fr-FR) locale (#8825) @allereaugabriel
- [l10n] Improve German (de-DE) locale (#8898) @marcauberer
- [l10n]
 Improve Portuguese (pt-BR) locale (#8960) @Sorriso337
- [l10n] Improve Ukrainian (uk-UA) locale (#8863) @Neonin

### `@mui/x-date-pickers@6.4.0` / `@mui/x-date-pickers-pro@6.4.0`

#### Changes

- [pickers] Fix trailing zeros inconsistency in `LuxonAdapter` (#8955) @alexfauquette
- [pickers] Stop using deprecated adapter methods (#8735) @flaviendelangle
- [pickers] Strictly type the `adapterLocale` prop of `LocalizationProvider` (#8780) @flaviendelangle
- [l10n] Add Slovak (sk-SK) locale (#8875) @MatejFacko

### Docs

- [docs] Fix date pickers typo in the docs (#8939) @richbustos
- [docs] Fix master detail demo (#8894) @m4theushw
- [docs] Fix typo in clipboard docs (#8971) @MBilalShafi
- [docs] Reduce list of dependencies in Codesandbox/Stackblitz demos (#8535) @cherniavskii

### Core

- [core] Improve testing of the adapters (#8789) @flaviendelangle
- [core] Update license key for tests (#8917) @LukasTy
- [charts] Make introduction docs pages for each chart (#8869) @alexfauquette
- [charts]
 Document Tooltip and Highlighs (#8867) @alexfauquette
- [test] Cover row grouping regression with a unit test (#8870) @cherniavskii
- [test] Fix flaky regression tests (#8954) @cherniavskii

## 6.3.1

_May 5, 2023_

We'd like to offer a big thanks to the 7 contributors who made this release possible. Here are some highlights :

- Bugfixes
- Documentation improvements

### `@mui/x-data-grid@6.3.1` / `@mui/x-data-grid-pro@6.3.1` / `@mui/x-data-grid-premium@6.3.1`

#### Changes

- [DataGrid] Fix broken filtering in the value formatter demo (#8621) @cherniavskii
- [DataGrid] Fix falsy filter values not showing in filter button tooltip (#8550) @ithrforu

- [DataGrid] Fix missing watermark in Pro and Premium packages (#8797) @cherniavskii
- [DataGrid] Remove unwarranted warning log (#8847) @romgrk
- [DataGrid] Add Joy UI slots (`Select`, `SelectOption`, `InputLabel`, `FormControl`) (#8747) @cherniavskii
- [DataGridPremium] Fix expanded groups being collapsed after calling `updateRows`
 (#8823) @cherniavskii

### `@mui/x-date-pickers@6.3.1` / `@mui/x-date-pickers-pro@6.3.1`

#### Changes

- [pickers] Fix `minutesStep` validation prop behavior (#8794) @LukasTy
- [pickers] Fix time picker `viewRenderers` overriding (#8830) @LukasTy
- [pickers] Remove last additional character when using LTR (#8848) @alexfauquette

### Docs

- [docs] Fix controlled mode demo on Editing page (#8800) @yaredtsy
- [docs] Fix scrolling demo not working with React 18 (#6489) @cherniavskii
- [docs] Update demo to support agregation on popular feature cell (#8617) @BalaM314
- [docs] Clarify what `<path>` is (#8764) @alexfauquette

### Core

- [core] Do not include playground pages in `yarn typescript` script (#8822) @cherniavskii
- [core] Limit `typescript:ci` step memory limit (#8796) @LukasTy
- [core] Upgrade monorepo (#8835) @cherniavskii
- [test] Use `fake` clock on `MobileDateRangePicker` (#8861) @LukasTy
- [charts] Clean some styling (#8778) @alexfauquette
- [charts] Improve tooltip (#8792)
 @alexfauquette
- [charts] Improvement and docs on axis (#8654) @alexfauquette
- [charts] Defaultize attributes (#8788) @alexfauquette

## 6.3.0

_Apr 28, 2023_

We'd like to offer a big thanks to the 15 contributors who made this release possible. Here are some highlights :

- New [time-picking UI](https://mui.com/x/react-date-pickers/digital-clock/) designed for desktops (#7958) @LukasTy

 <img src="https://user-images.githubusercontent.com/4941090/235072007-de39a397-e4a4-4c98-8e10-5ee4ad440108.gif" width="494" />

- Picker fields [now always include a leading zero](https://mui.com/x/react-date-pickers/adapters-locale/#respect-leading-zeros-in-fields) on digit sections (#8527) @flaviendelangle
- Improve Chinese (zh-CN), French (fr-FR), and Turkish (tr-TR) locales

- Bugfixes
- Documentation improvements

### `@mui/x-data-grid@6.3.0` / `@mui/x-data-grid-pro@6.3.0` / `@mui/x-data-grid-premium@6.3.0`

#### Changes

- [DataGrid] Add overlay classes to `gridClasses` (#8686) @lindapaiste
- [DataGrid] Avoid passing `api` prop to div (#8679) @someden
- [DataGrid] Fix 'ResizeObserver loop limit exceeded' error (#8744) @m4theushw
- [DataGrid] Add Joy UI slots (button and switch) (#8699) @siriwatknp
- [DataGrid] Fix aggregation label alignment (#8694) @joserodolfofreitas
- [DataGridPremium] Fix infinite loop when updating grouped rows (#8693) @cherniavskii
- [DataGridPro] Fix error after updating `columns` and `columnGroupingModel` at once (#8730) @cherniavskii
- [l10n] Improve Chinese (zh-CN) locale (#8753) @SakumyZ
- [l10n] Improve French (fr-FR) locale (#8704) @Jul13nT
- [l10n] Improve Turkish (tr-TR) locale (#8783) @cccaaannn

### `@mui/x-date-pickers@6.3.0` / `@mui/x-date-pickers-pro@6.3.0`

#### Changes

- [fields] Always add leading zeroes on digit sections (#8527) @flaviendelangle
- [fields] Pass the `readOnly` prop to `InputProps` instead of `inputProps` (#8659) @flaviendelangle
- [pickers] Add missing export for `caES` locale (#8782) @flaviendelangle
- [pickers] Add new `DigitalClock` desktop time picking experience (#7958) @LukasTy
- [pickers] Do not use `instanceOf DateTime` in `AdapterLuxon` (#8734) @flaviendelangle
- [pickers] Fix date calendar `selected` & `disabled` day style (#8773) @LukasTy
- [pickers] Migrate `AdapterDateFns` to our repository (#8736) @flaviendelangle
- [pickers] Migrate `AdapterLuxon` to our repository (#8600) @flaviendelangle
- [pickers] Migrate `AdapterMomentHijri` to our repository (#8776) @flaviendelangle
- [pickers] Migrate `AdapterMomentJalaali` and `AdapterDateFnsJalali` to our repository (#8741) @flaviendelangle
- [pickers] Migrate `AdapterMoment` to our repository (#8700) @flaviendelangle
- [pickers] Refactor the validation files (#8622) @flaviendelangle
- [pickers] Use `en dash` instead of `em dash` in multi input range fields (#8738) @flaviendelangle
- [l10n] Improve Chinese (zh-CN) locale (#8753) @SakumyZ
- [l10n] Improve Turkish (tr-TR) locale (#8783) @cccaaannn

### Docs

- [docs] Add icons for charts menu (#8752) @alexfauquette
- [docs] Document the supported formats (#8746) @flaviendelangle
- [docs] Fix Hijri demo (#8698) @alexfauquette
- [docs] Fix `x-codemod` package version in changelog (#8690) @MBilalShafi
- [docs] Fix columns special properties code example (#8414) @mikkelhl

- [docs] Fix error in `minDateTime` `validation` page section (#8777) @LukasTy
- [docs] Update custom field pickers using theme scoping (#8609) @siriwatknp
- [docs] Use community version of data grid for column grouping demo (#7346) @ASchwad
- [docs] Use new `slots` / `slotProps` props in the pickers migration guide (#8341) @flaviendelangle

### Core

- [core] Cleanup picker tests (#8652) @flaviendelangle
- [core] Use `adapter.lib` instead of `adapterName` in `describeAdapters` (#8779) @flaviendelangle
- [charts] Adapt line and scatter plot to the "band" scale type (#8701) @alexfauquette
- [charts] Link the Gantt Charts issue in the docs (#8739) @flaviendelangle

## 6.2.1

_Apr 20, 2023_

We'd like to
 offer a big thanks to the 9 contributors who made this release possible. Here are some highlights :

- Add virtualization to row detail panels (#7969) @yaredtsy
- Bugfixes
- Documentation improvements

### `@mui/x-data-grid@6.2.1` / `@mui/x-data-grid-pro@6.2.1` / `@mui/x-data-grid-premium@6.2.1`

#### Changes

- [DataGrid] Add `getTogglableColumns` to `Hide all` and `Show all` actions (#8496) @MBilalShafi
- [DataGrid] Add Grid + Joy UI experiment page (#8067) @cherniavskii
- [DataGrid] Fix print style when rendering inside Shadow DOM (#8656) @Bwatermelon
- [DataGrid] Replace `GridAutoSizer` with `ResizeObserver` (#8091) @m4theushw
- [DataGrid] Use stable ID for the placeholder filter item (#8603) @m4theushw
- [DataGridPro] Virtualize row detail panels (#7969) @yaredtsy

### `@mui/x-date-pickers@6.2.1` / `@mui/x-date-pickers-pro@6.2.1`

#### Changes

- [pickers] Do not include the time in date components when going to today (#8657) @flaviendelangle
- [pickers] Sync internal state with
 controlled value (#8674) @alexfauquette

### `@mui/x-codemod@6.2.1`

#### Changes

- [codemod] Avoid filter failures on object prototype properties (#8647) @LukasTy

### Docs

- [docs] Add no-op service worker to fix stale cache issue (#8598) @cherniavskii
- [docs] Clarify what `AdapterDayjs` is in the Getting Started page (#8219) @flaviendelangle
- [docs] Fix typo on picker page description (#8611) @maxolasersquad
- [docs] Improve section title in Getting Started page (#8648) @flaviendelangle
- [docs] Inform about input format modification (#8458) @alexfauquette

### Core

- [core] Fix release date (#8618) @flaviendelangle
- [core] Upgrade monorepo (#8668) @MBilalShafi
- [charts] Support Tooltip (#8356) @alexfauquette

## 6.2.0

_Apr 14, 2023_

We'd like to offer a big thanks to the 8 contributors who made this release possible. Here are some highlights :

- Add `@mui/base` as a `peerDependency` of `@mui/x-date-pickers` and `@mui/x-date-pickers-pro` (#8590) @LukasTy

 Both libraries
 were not working correctly if used without `@mui/base`.
 Most package manager should automatically use the `@mui/base` version installed for `@mui/material`.

- The value rendered in the picker or field input no longer has spaces around the `/` characters (#8425) @flaviendelangle

 You can use the `formatDensity='spacious'` prop to add it back.
 More information on [the dedicated doc section](https://mui.com/x/react-date-pickers/custom-field/#change-the-format-density)

- Improve French (fr-FR) and Urdu (ur-PK) and locales.
- Bugfixes
- Documentation improvements

### `@mui/x-data-grid@6.2.0` / `@mui/x-data-grid-pro@6.2.0` / `@mui/x-data-grid-premium@6.2.0`

#### Changes

- [DataGrid] Reset selection state on `checkboxSelection` toggle (#8522) @MBilalShafi
- [DataGrid] Use `baseSelect` slot instead of `baseTextField` with `select={true}` (#8110) @cherniavskii
- [l10n] Improve French (fr-FR) locale (#8537) @allereaugabriel
- [l10n] Improve Urdu (ur-PK) locale (#8513) @SFARPak

###

`@mui/x-date-pickers@6.2.0` / `@mui/x-date-pickers-pro@6.2.0`

#### Changes

- [DateTimePicker] Fix `TimeClock` validation ignoring date by default (#8570) @LukasTy
- [fields] Fix reliance on section order (#8545) @LukasTy
- [fields] Make the space between format separators controllable (#8425) @flaviendelangle
- [pickers] Add `@mui/base` to `peerDependencies` (#8590) @LukasTy
- [pickers] Fix JSDoc for `formatDensity` prop (#8601) @flaviendelangle
- [pickers] Improve value lifecycle on non-controlled pickers (#8312) @flaviendelangle
- [pickers] Migrate `AdapterDayjs` to our repository (#8487) @flaviendelangle

### Docs

- [docs] Fix "Custom day rendering" demo alignment (#8541) @LukasTy
- [docs] Fix **below** typo (#8576) @alexfauquette

### Core

- [core] Optimize `renovate` rules (#8575) @LukasTy
- [core] Upgrade monorepo (#8578) @cherniavskii
- [core] Update last release date (#8569) @DanailH

## 6.1.0

_Apr 10, 2023_

We'd like to offer a big thanks to the 15 contributors who made
this release possible. Here are some highlights :

- Add Catalan (ca-ES), Kazakh (kz-KZ) and improve Spanish (es-ES), Dutch (nl-NL), Hebrew (he-IL), Hungarian (hu-HU), Japanese (ja-JP), Portuguese (pt-BR), and Russian (ru-RU) locales
- Allow to control visibility of columns shown in the columns panel (#8401) @MBilalShafi
- Bugfixes
- Documentation improvements

### `@mui/x-data-grid@6.1.0` / `@mui/x-data-grid-pro@6.1.0` / `@mui/x-data-grid-premium@6.1.0`

#### Changes

- [DataGrid] Allow to control visibility of columns shown in the `ColumnsPanel` component (#8401) @MBilalShafi
- [DataGrid] Fix filters with empty array value not being removed from the filter model (#8501) @cherniavskii
- [DataGrid] Fix memory leaks in development (#8301) @cherniavskii
- [DataGrid] Sync `date` column value when entering edit mode by pressing a digit (#8364) @m4theushw
- [DataGrid] Wrap column menu button with a tooltip (#7890) @cherniavskii
- [l10n] Improve Dutch (nl-NL) locale (#8491) @thedutchruben
-

[l10n] Improve Hungarian (hu-HU) locale (#8486) @PetakCC
- [l10n] Improve Japanese (ja-JP) locale (#8462) @megos
- [l10n] Improve Portuguese (pt-BR) locale (#8480) @pwnedev
- [l10n] Improve Russian (ru-RU) locale (#8510) @alexrapro

### `@mui/x-date-pickers@6.1.0` / `@mui/x-date-pickers-pro@6.1.0`

#### Changes

- [fields] Fix RTL navigation (#8490) @alexfauquette
- [fields] Fix usage of `slotProps.textField.InputProps` (#8428) @flaviendelangle
- [pickers] Fix `componentsProps.dialog` propagation (#8509) @LukasTy
- [pickers] Move `hasError` from `fieldValueManager` to `valueManager` (#8453) @flaviendelangle
- [pickers] Move the adapters interfaces to the X repository (#8412) @flaviendelangle
- [pickers] Update peer dependency versions (#8531) @LukasTy
- [pickers] Fix `isValid` regression (#8543) @LukasTy
- [l10n] Add Catalan (Spain) (ca-ES) and improve Spanish (es-ES) locales (#8498) @makenshikuro
- [l10n] Add Kazakh (kz-KZ) locale (#8451) @zhunus
- [l10n] Improve Dutch (nl-NL)
locale (#8491) @thedutchruben
- [l10n] Improve Hebrew (he-IL) locale (#8464) @soris1989
- [l10n] Improve Japanese (ja-JP) locale (#8462) @megos
- [l10n] Improve Portuguese (pt-BR) locale (#8480) @pwnedev

### Docs

- [docs] Fix 301 redirect (#8524) @alexfauquette
- [docs] Fix 404 links (#8454) @alexfauquette
- [docs] Fix broken API reference link (#8460) @oliviertassinari

### Core

- [core] Avoid 301 links (#8383) @oliviertassinari
- [core] Fix the l10n helper by using danger instead of actions (#8512) @alexfauquette
- [core] Help contributors for l10n PRs (#8503) @alexfauquette
- [core] Remove legacy token (#8457) @oliviertassinari
- [charts] Add a styling system (#8445) @alexfauquette

## 6.0.4

_Mar 30, 2023_

We'd like to offer a big thanks to the 9 contributors who made this release possible. Here are some highlights :

- Add Danish (da-DK), and improve Norwegian (nb-NO), Spanish (es-ES), and Swedish (sv-SE) locales
- Bugfixes
- Documentation improvements

### `@mui/x-data-grid@6.0.4`
/ `@mui/x-data-grid-pro@6.0.4` / `@mui/x-data-grid-premium@6.0.4`

#### Changes

- [DataGrid] Fix column header tooltip not showing when the title is truncated (#8433) @rohitnatesh
- [DataGrid] Fix filter model buttons' display condition (#8415) @MBilalShafi
- [DataGrid] Fix infinite rerender in a flex parent (#8436) @cherniavskii
- [DataGrid] Prevent reopening column menu when clicking in the button while it is open (#8286) @tanuj-22
- [DataGrid] Rename `components` by `slots` in column menu API (#7999) @MBilalShafi
- [DataGrid] Remove hardcoded CSS classes' usages (#8444) @MBilalShafi
- [DataGridPremium] Fix aggregation initial state causing issue with quick filter (#8441) @MBilalShafi
- [l10n] Improve Danish (da-DK) locale (#8368) @BossElijah
- [l10n] Improve Danish (da-DK) locale (#8378) @BossElijah
- [l10n] Improve Norwegian (nb-NO) locale (#8367) @BossElijah
- [l10n] Improve Norwegian (nb-NO) locale (#8409) @BossElijah
- [l10n] Improve Spanish (es-ES) locale (#8420) @martjanz
-
[l10n] Improve Swedish (sv-SE) locale (#8381) @BossElijah

### `@mui/x-date-pickers@6.0.4` / `@mui/x-date-pickers-pro@6.0.4`

#### Changes

- [fields] Add missing tokens to `AdapterDateFnsJalali` (#8402) @flaviendelangle
- [fields] Clean the active date manager (#8370) @flaviendelangle
- [fields] Cleanup `useFieldState` (#8292) @flaviendelangle
- [fields] Only add RTL characters when needed (#8325) @flaviendelangle
- [pickers] Add support for single input fields in range pickers (#7927) @flaviendelangle
- [pickers] Allows non token characters in format (#8256) @alexfauquette
- [pickers] Avoid root imports and move public models to the models folder (#8337) @flaviendelangle
- [pickers] Update `view` when `views` or `openTo` changes (#8361) @LukasTy
- [l10n] Improve Norwegian (nb-NO) locale (#8382) @BossElijah
- [l10n] Add Danish (da-DK) locale (#8379) @BossElijah
- [l10n] Improve Swedish (sv-SE) locale (#8381) @BossElijah

### `@mui/x-codemod@6.0.4`

#### Changes

- [codemod] Fix
`remove-stabilized-experimentalFeatures` codemod (#8289) @alexfauquette

### Docs

- [docs] Fix `GridCellParams` signature in migration guide (#8427) @cherniavskii
- [docs] Fix "Custom field" demos responsive styles (#8408) @LukasTy
- [docs] Remove `label` from demos where it reduces clarity (#8416) @LukasTy

- [docs] Update slots' references in Data Grid migration guide (#8159) @MBilalShafi

### Core

- [charts] Work on typing (#8421) @flaviendelangle

## 6.0.3

_Mar 23, 2023_

We'd like to offer a big thanks to the 11 contributors who made this release possible. Here are some highlights :

- Improve Bulgarian (bg-BG), Persian (fa-IR), Polish (pl-PL), and Dutch (nl-NL) locales
- Bugfixes
- Documentation improvements

### `@mui/x-data-grid@6.0.3` / `@mui/x-data-grid-pro@6.0.3` / `@mui/x-data-grid-premium@6.0.3`

#### Changes

- [DataGrid] Fix overflow calculation issue in column group headers (#8246) @MBilalShafi
- [DataGridPro] Fix column reorder glitches (#8335) @cherniavskii
- [l10n] Improve Bulgarian (bg-BG) locale (#8315) @todevmilen
- [l10n] Improve Persian (fa-IR) locale (#8268) @fakhamatia
- [l10n] improve Dutch (nl-NL) locale (#8317) @developenguin

### `@mui/x-date-pickers@6.0.3` / `@mui/x-date-pickers-pro@6.0.3`

#### Changes

- [fields] Allow to reset the value from the outside (#8287) @flaviendelangle
- [fields] Cleanup section order generation (#8290) @flaviendelangle
- [fields] Fix Safari input selection resetting regression (#8295) @LukasTy
- [fields] Fix editing when all sections are selected (#8330) @flaviendelangle
- [fields] Fix iOS browser scroll jumping when entering data (#8328) @LukasTy
- [fields] New prop `unstableFieldRef` to imperatively interact with the selected sections (#8235) @flaviendelangle
- [pickers] Align date calendar colors (#8318) @LukasTy
- [pickers] Support invalid dates from the field (#8298) @flaviendelangle
- [l10n] Improve Persian (fa-IR) locale (#8268) @fakhamatia
- [l10n] Improve Polish (pl-PL) locale (#8344) @drmats
- [l10n] improve Dutch (nl-NL) locale (#8317) @developenguin

### Docs

- [docs] Create examples of pickers with custom fields (#8034) @flaviendelangle
- [docs] Fix 301 redirections @oliviertassinari

- [docs] Fix link to React's docs @oliviertassinari
- [docs] Fix pro license links to point to the same page (#8303) @LukasTy
- [docs] Give an incentive to upgrade (#8269) @oliviertassinari
- [docs] Improve contrast on data grid navigation (#8239) @oliviertassinari
- [docs] Update shortcuts page to use slotProps (#8288) @dcorb
- [docs] Explain the `shouldDisableTime` migration in more depth (#8348) @LukasTy

### Core

- [core] Remove unused `visx` chart package (#8259) @LukasTy
- [core] Upgrade monorepo (#8331) @cherniavskii
- [charts] Project setup (#8308) @alexfauquette
- [test] Track visual regressions of column menu and filter/column panels (#8095) @cherniavskii

## 6.0.2

_Mar 16, 2023_

We'd like to offer a big thanks to the 10 contributors who made this release possible. Here are
some highlights :

- Fire `onChange` when filling a partial date (#8082) @flaviendelangle
- Support date format like `1st` (`do`) (#8188) @flaviendelangle
- Add Hebrew (he-IL) locale (#8222) @ylarom
- Improve Brazilian Portuguese (pt-BR), German (de-DE), and French (fr-FR) locales
- Documentation improvements
- Bugfixes

### `@mui/x-data-grid@6.0.2` / `@mui/x-data-grid-pro@6.0.2` / `@mui/x-data-grid-premium@6.0.2`

#### Changes

- [DataGrid] Fix <kbd>Space</kbd> triggering edit mode (#8180) @m4theushw
- [DataGrid] Remove warning when adding a custom column type (#8227) @m4theushw
- [l10n] Improve Brazilian Portuguese (pt-BR) locale (#8198) @JoaoSerafim3001

### `@mui/x-date-pickers@6.0.2` / `@mui/x-date-pickers-pro@6.0.2`

#### Changes

- [l10n] Add Hebrew (he-IL) locale (#8222) @ylarom
- [l10n] Improve German (de-DE) locale (#8204) @sebkasanzew
- [l10n] Improve French (fr-FR) locale (#8229) @marvinroger
- [DateRangePicker] Allow overriding `slotProps.textField` (#8201) @LukasTy
-
[fields] Fire `onChange` when filling a partial date (#8082) @flaviendelangle
- [fields] Fix editing in shadow dom (#8254) @flaviendelangle
- [fields] Remove the duplicated warning about invalid adapter (#8187) @flaviendelangle

- [fields] Support date format like `1st` (`do`) (#8188) @flaviendelangle
- [pickers] Fix to avoid selecting sections on mobile picker field (#8228) @LukasTy
- [pickers] Inherit previous and next icons size from their parent button (#8218) @flaviendelangle

### Docs

- [docs] Add a warning in the migration guide for people re-enabling the clock on desktop (#8184) @flaviendelangle
- [docs] Add a warning for `luxon` macro tokens (#8245) @flaviendelangle
- [docs] Complete pickers customization pages (#8066) @alexfauquette
- [docs] Fix 301 redirection @oliviertassinari
- [docs] Fix 404 links to customization Material UI APIs (#8200) @oliviertassinari
- [docs] Fix `moment-hijri` demo (#8255) @LukasTy
- [docs] Improve migration diff (#8240) @oliviertassinari
- [docs]
  Change **What's new** page url to point to announcement blog post (#8186) @joserodolfofreitas
- [docs] Resolve 301 in changelog @oliviertassinari

### Core

- [core] Regen api docs (#8220) @flaviendelangle
- [core] Remove duplicated `/` (#8223) @alexfauquette

## 6.0.1

_Mar 9, 2023_

We'd like to offer a big thanks to the 8 contributors who made this release possible. Here are some highlights :

- Improve French (fr-FR) locale (#8122) @MaherSamiGMC
- Documentation improvements
- Bugfixes

### `@mui/x-data-grid@6.0.1` / `@mui/x-data-grid-pro@6.0.1` / `@mui/x-data-grid-premium@6.0.1`

#### Changes

- [DataGrid] Fix `MenuProps.onClose` being overridden for single select edit component (#8174) @rohitnatesh
- [DataGrid] Simplify `buildPrintWindow` (#8142) @oliviertassinari
- [l10n] Improve French (fr-FR) locale (#8122) @MaherSamiGMC

### `@mui/x-date-pickers@6.0.1` / `@mui/x-date-pickers-pro@6.0.1`

#### Changes

- [pickers] Add a runtime warning when a `renderInput` prop is passed
  to a picker (#8183) @flaviendelangle
- [pickers] Don't pass `ownerState` to the `inputAdornment` slot (#8165) @flaviendelangle

### Docs

- [docs] Fix a typo in the migration guide (#8152) @flaviendelangle
- [docs] Fix package version used in CodeSandbox demos (#8125) @cherniavskii
- [docs] Fix typos across codebase (#8126) @stavares843
- [docs] Improve Data Grid quick filter documentation (#8109) @MBilalShafi
- [docs] Improve link from npm to docs (#8141) @oliviertassinari
- [docs] Remove test sections (#8177) @m4theushw

### Core

- [core] Upgrade monorepo (#8162) @m4theushw

## 6.0.0

_Mar 3, 2023_

We're excited to [announce the first v6 stable release](https://mui.com/blog/mui-x-v6/)!

This is now the officially supported major version, where we'll keep rolling out new features, bug fixes, and improvements.
Migration guides are available with a complete list of the breaking changes:

- [Data Grid](https://mui.com/x/migration/migration-data-grid-v5/)
- [Date Pickers](https://mui.com/x/migration/migration-pickers-v5/)

We'd
like to offer a big thanks to the 12 contributors who made this release possible. Here are some highlights :

- The row pinning is no longer experimental (#8055) @MBilalShafi

You can now use the row pinning without the `experimentalFeatures.rowPinning` flag enabled.

```diff
<DataGridPro
- experimentalFeatures={{ rowPinning: true }}
/>
```

- Improved grid performance by rows and cells memoization (#7846) @m4theushw
- Fields have a distinct visual state when empty (#8069) @LukasTy
- Improve Czech (cs-CZ) locale (#8113) @BlastyCZ
- Improve Arabic (ar-SD) locale (#8100) @atf98
- Documentation improvements
- Bugfixes

### `@mui/x-data-grid@6.0.0` / `@mui/x-data-grid-pro@6.0.0` / `@mui/x-data-grid-premium@6.0.0`

#### Breaking changes

- The `componentsProps` and `slotProps` props are now typed for better DX
- The `cellFocus`, `cellTabIndex` and `editRowsState` props are not passed to the component used in the row slot. You
 can use the new `focusedCell` and `tabbableCell` props instead. For the editing state, use the API methods.
 The flag `experimentalFeatures.rowPinning` is no longer needed.

#### Changes

- [DataGrid] Add typing for `componentsProps` (#7968) @MBilalShafi
- [DataGrid] Allow multiple modules' augmentation (#8098) @MBilalShafi
- [DataGrid] Extract `BaseInputLabel` slot (#8068) @cherniavskii
- [DataGrid] Extract `BaseSelectOption` slot (#8072) @cherniavskii
- [DataGrid] Make possible to memoize rows and cells (#7846) @m4theushw
- [DataGrid] Register `getLocaleText` synchronously (#8029) @m4theushw
- [DataGrid] Start extracting material slots to a separate directory (#8004) @cherniavskii
- [DataGrid] Use `styled` from system (#8032) @siriwatknp
- [DataGridPro] Improve typing for `getColumnForNewFilter` method (#8043) @MBilalShafi
- [DataGridPro] Remove row pinning from experimental features (#8055) @MBilalShafi
- [l10n] Improve Czech (cs-CZ) locale (#8113) @BlastyCZ
- [l10n] Improve Arabic
 (ar-SD) locale (#8100) @atf98

### `@mui/x-date-pickers@6.0.0` / `@mui/x-date-pickers-pro@6.0.0`

#### Breaking changes

On desktop, `DateTimePicker` shows the am/pm controls in the toolbar instead of the clock by default.
It can be overridden by specifying `ampmInClock` prop.

#### Changes

- [DateRangePicker] Generalize the highlight between months (#8079) @alexfauquette
- [fields] Clean the order of the tokens in the `formatTokenMap` of each adapter (#8112) @flaviendelangle
- [fields] Implement empty visual state (#8069) @LukasTy
- [fields] Replace `sectionOrder` state with a memoized variable (#8090) @flaviendelangle
- [pickers] Add support for UTC on `moment` adapter (#8031) @flaviendelangle
- [pickers] Document and deprecate `onClose` callback on static pickers (#8021) @LukasTy
- [pickers] Fix am/pm buttons position and responsiveness (#5149) @alexfauquette
- [pickers] Fix layout `sx` propagation (#8064) @alexfauquette
- [pickers] Increase `moment` peer dependency minimum version
 (#8046) @oliviertassinari
- [pickers] Remove `WrapperVariantContext` (#8088) @LukasTy
- [pickers] Stop using `WrapperVariantContext` in `Clock` (#8083) @LukasTy

### Docs

- [docs] Add `aggregation` experimental flag removal to the migration guide (#8056) @MBilalShafi
- [docs] Add expansion state behavioral change to v6 migration guide (#8108) @MBilalShafi
- [docs] Change default date from 4th of April to 17th of April for readability (#8089) @flaviendelangle
- [docs] Clarify the MIT license restriction for grid pagination (#8045) @arunkp
- [docs] Fix typo replacing "bellow" by "below" (#8080) @TheBox193
- [docs] Link `API object` in the `apiRef` sections (#8106) @MBilalShafi
- [docs] Link to demonstrations in the interfaces API docs (#8028) @cherniavskii
- [docs] Remove the `@next` tag from installation instructions (#8102) @cherniavskii
- [docs] Start enforcing consistency in documentation vocabulary (#6871) @alexfauquette
- [docs] Update accessibility guidelines (#7970) @oliviertassinari
- [docs] Update the DataGrid demo to leverage the latest features (#7863) @joserodolfofreitas
- [docs] Update migration guide for stable release (#8092) @joserodolfofreitas

### Core

- [core] Add modified docs page links in the PR (#7848) @alexfauquette
- [core] Add test on value timezone (#7867) @alexfauquette
- [core] Bump monorepo (#8006) @LukasTy
- [core] Change default branch back to `master` (#8081) @m4theushw
- [core] Upgrade monorepo (#8115) @MBilalShafi
- [core] Mention the use of Support key as an alternative to the OrderID (#6968) @joserodolfofreitas
- [test] Fix flaky tests (#8097) @cherniavskii

## 6.0.0-beta.5

_Feb 23, 2023_

We'd like to offer a big thanks to the 6 contributors who made this release possible. Here are some highlights :

- Add web worker support for Excel export (#7770) @m4theushw
- Add a button to remove all filters on the data grid filter panel (#7326) @MBilalShafi
- Allow to customize options label and value in the data grid `singleSelect` column (#7684) @m4theushw
- Documentation improvements
- Bugfixes

### `@mui/x-data-grid@6.0.0-beta.5` / `@mui/x-data-grid-pro@6.0.0-beta.5` / `@mui/x-data-grid-premium@6.0.0-beta.5`

#### Changes

- [DataGrid] Allow to customize label and value for `singleSelect` (#7684) @m4theushw
- [DataGrid] Fix `ownerState` being `undefined` in theme style overrides (#7964) @lolaignatova
- [DataGrid] Introduce `slots` and deprecate `components` (#7882) @MBilalShafi
- [DataGridPro] Add `Remove All` option in filter panel (#7326) @MBilalShafi
- [DataGridPremium] Add web worker support for Excel export (#7770) @m4theushw

### `@mui/x-date-pickers@6.0.0-beta.5` / `@mui/x-date-pickers-pro@6.0.0-beta.5`

#### Breaking changes

- The `MuiDateSectionName` type was renamed to `FieldSectionType`

#### Changes

- [fields] Fix multi input range fields validation when uncontrolled (#8002) @LukasTy
- [fields] Fix single input time range fields slot props (#7988) @LukasTy
- [fields] Make the `ArrowUp` / `ArrowDown`
 edition only impact the active section (#7993) @flaviendelangle
- [fields] Fix single input range fields clearing (#7995) @flaviendelangle
- [fields] Clean the section object (#8009) @flaviendelangle
- [pickers] Fix `textField` slot `error` prop propagation (#7987) @LukasTy

### `@mui/x-codemod@6.0.0-beta.5`

#### Changes

- [codemod] Add `apiRef.current.getRowIndex` to `DataGrid` renaming codemod (#8001) @MBilalShafi

### Docs

- [docs] Fine tune range fields demos (#7992) @LukasTy
- [docs] Fix a few scroll issues on mobile (#7900) @oliviertassinari
- [docs] Fix inconsistency in the data grid migration guide (#7963) @MBilalShafi

### Core

- [core] Fix `moment` locale on adapter tests (#8020) @flaviendelangle
- [test] Support all adapters on the field tests about the formats (#7996) @flaviendelangle

## 6.0.0-beta.4

_Feb 16, 2023_

We'd like to offer a big thanks to the 8 contributors who made this release possible. Here are some highlights :

- Improve grid performance by reducing
 rerenders (#7857) @cherniavskii
- Documentation improvements
- Bugfixes

### `@mui/x-data-grid@6.0.0-beta.4` / `@mui/x-data-grid-pro@6.0.0-beta.4` / `@mui/x-data-grid-premium@6.0.0-beta.4`

#### Changes

- [DataGrid] Add interface for `singleSelect` column (#7685) @m4theushw
- [DataGrid] Allow to pass props to the `TrapFocus` inside the panel wrapper (#7733) @ivek-Prajapatii
- [DataGrid] Avoid unnecessary rerenders after `updateRows` (#7857) @cherniavskii
- [DataGridPro] Change cursor when dragging a column (#7725) @sai6855
- [DataGridPremium] Fix `leafField` to have correct focus value (#7950) @MBilalShafi

### `@mui/x-date-pickers@6.0.0-beta.4` / `@mui/x-date-pickers-pro@6.0.0-beta.4`

#### Changes

- [DateRangePicker] Fix slide transition by avoiding useless component re-rendering (#7874) @LukasTy
- [fields] Support Backspace key on `Android` (#7842) @flaviendelangle
- [fields] Support escaped characters on `Luxon` (#7888) @flaviendelangle
- [pickers] Prepare new pickers for
 custom fields (#7806) @flaviendelangle

### `@mui/x-codemod@6.0.0-beta.4`

#### Changes

- [codemod] Fix import path (#7952) @LukasTy

### Docs

- [docs] Add an info callout specifying the current state of desktop time view (#7933) @LukasTy
- [docs] Add missing param in `useGridApiEventHandler` examples (#7939) @flaviendelangle
- [docs] Fix markdown table alignments (#7898) @oliviertassinari
- [docs] Improve `DataGrid` migration guide (#7861) @MBilalShafi
- [docs] Update `LocalizationProvider` `dateAdapter` with a link to the doc (#7872) @LukasTy

### Core

- [core] Run editing field tests on all major adapters (#7868) @flaviendelangle

## 6.0.0-beta.3

_Feb 9, 2023_

We'd like to offer a big thanks to the 11 contributors who made this release possible. Here are some highlights :

- Add right-to-left support for the data grid (#6580) @yaredtsy
- Improve grid resize performance (#7864) @cherniavskii
- New codemods for migrating to v6 @MBilalShafi
- Documentation improvements
- Bugfixes

###

`@mui/x-data-grid@6.0.0-beta.3` / `@mui/x-data-grid-pro@6.0.0-beta.3` / `@mui/x-data-grid-premium@6.0.0-beta.3`

#### Changes

- [DataGrid] Add `BaseIconButton` component slot (#7329) @123joshuawu
- [DataGrid] Allow to customize the value displayed in the filter button tooltip (#6956) @ithrforu
- [DataGrid] Improve grid resize performance (#7864) @cherniavskii
- [DataGrid] Make `apiRef.current.getRowWithUpdatedValues` stable (#7788) @m4theushw
- [DataGrid] Support RTL (#6580) @yaredtsy
- [DataGrid] Improve query selectors for selecting cell element (#7354) @yaredtsy
- [l10n] Improve Brazilian Portuguese (pt-BR) locale (#7854) @ed-ateixeira

### `@mui/x-date-pickers@6.0.0-beta.3` / `@mui/x-date-pickers-pro@6.0.0-beta.3`

#### Changes

- [fields] Allow to select year 2000 on 2-digit year section (#7858) @flaviendelangle
- [fields] Fix year editing on `day.js` (#7862) @flaviendelangle
- [fields] Fix year editing on valid date (#7834) @flaviendelangle
- [fields] Reset query when
 pressing `Backspace` or `Delete` (#7855) @flaviendelangle
- [pickers] Clean Popper position on new pickers (#7445) @flaviendelangle
- [pickers] Ditch pickers `skipLibCheck` (#7808) @LukasTy
- [pickers] Improve JSDoc and resulting API docs pages (#7847) @LukasTy

### `@mui/x-codemod@6.0.0-beta.3`

#### Changes

- [codemod] Add more cases to `rename-selectors-and-events` codemod (#7856) @MBilalShafi
- [codemod] Add warning message to the codemods and migration guide (#7813) @MBilalShafi
- [codemod] Add codemod to remove unnecessary `experimentalFeatures` flag (#7836) @MBilalShafi
- [codemod] Rename `GridFilterItem` props (#7483) @MBilalShafi
- [codemod] Rename `linkOperators` to `logicOperators` (#7707) @MBilalShafi
- [codemod] Replace `onCellFocusOut` prop for Data Grid (#7786) @MBilalShafi

### Docs

- [docs] Add a "Whats new in v6" page linked on the sidebar (#7820) @joserodolfofreitas
- [docs] Fix hydration crash in pickers (#7734) @oliviertassinari
- [docs] Remove no longer relevant
 range shortcuts section (#7840) @LukasTy
- [docs] Use `@next` tag in grid and pickers installation instructions (#7814) @cherniavskii

### Core

- [core] Remove `tslint` package leftovers (#7841) @LukasTy

- [test] Use `createDescribes` for `describeValue` and `describeValidation` (#7866) @flaviendelangle

## 6.0.0-beta.2

We'd like to offer a big thanks to the 11 contributors who made this release possible. Here are some highlights :

- Support week day formats in the field components
- Add Hungarian (hu-HU) and Urdu (ur-PK) locales
- Improve French (fr-FR) and Italian (it-IT) locales
- New codemods for migrating to v6
- Documentation improvements
- Bug fixes

### `@mui/x-data-grid@6.0.0-beta.2` / `@mui/x-data-grid-pro@6.0.0-beta.2` / `@mui/x-data-grid-premium@6.0.0-beta.2`

#### Changes

- [DataGrid] Handle non-numeric values returned by `getRowHeight` prop (#7703) @cherniavskii
- [DataGrid] Merge row styles with `componentsProps.row.style` (#7641) @marktoman
- [l10n] Add Hungarian
 (hu-HU) locale (#7776) @noherczeg
- [l10n] Add Urdu (ur-PK) locale (#6866) @MBilalShafi
- [l10n] Improve French (fr-FR) locale (#7777) @ivek-Prajapatii
- [l10n] Improve Italian (it-IT) locale (#7761) @simonecervini

### `@mui/x-date-pickers@6.0.0-beta.2` / `@mui/x-date-pickers-pro@6.0.0-beta.2`

#### Changes

- [fields] Support week day formats (#7392) @flaviendelangle
- [pickers] Allow to initialize and control the `rangePosition` on all range components (#7764) @flaviendelangle
- [pickers] Fix theme augmentation (#7800) @LukasTy
- [pickers] Hide scrollbars in the date calendar container (#7766) @ivek-Prajapatii
- [pickers] Remove the dependency on `rifm` (#7785) @alexfauquette

### `@mui/x-codemod@6.0.0-beta.2`

#### Changes

- [codemod] Add pickers `rename-default-toolbar-title-localeText` codemod (#7752) @LukasTy
- [codemod] Add pickers `rename-inputFormat-prop` codemod (#7736) @LukasTy

### Docs

- [docs] Fix a typo in data grid layout page (#7113) @sfbaker7
- [docs] Fix require

context path to avoid duplicate key creation (#7781) @LukasTy
- [docs] Polish pickers migration docs (#7737) @LukasTy
- [docs] Rename `next` translation docs and remove duplicates with `-next` (#7729) @LukasTy

### Core

- [core] Fix l10n data file (#7804) @flaviendelangle
- [core] Fix Next.js warning (#7754) @oliviertassinari
- [core] Remove unused demos (#7758) @flaviendelangle

## 6.0.0-beta.1

_Jan 27, 2023_

We'd like to offer a big thanks to the 17 contributors who made this release possible. Here are some highlights :

- New shortcuts component for the date pickers (#7154) @alexfauquette
- Add Belarusian (be-BY), Czech (cs-CZ) and Russian (ru-RU) locales
- Improve Spanish (es-ES), Japanese (ja-JP), Slovak (sk-SK), and Vietnamese (vi-VN) locales
- New codemods for migrating to v6
- Documentation improvements
- Bug fixes

### `@mui/x-data-grid@6.0.0-beta.1` / `@mui/x-data-grid-pro@6.0.0-beta.1` / `@mui/x-data-grid-premium@6.0.0-beta.1`

#### Changes

- [DataGrid] Add
`title` attribute to cells (#7682) @thupi
- [DataGrid] Fix `autoHeight` not working properly inside of a flex container (#7701) @cherniavskii
- [DataGrid] Fix grid state not being updated after print preview is closed (#7642) @cherniavskii
- [DataGrid] Fix non-hideable columns visibility toggling (#7637) @cherniavskii
- [DataGrid] Fix scrolling on resize for data grids inside shadow root (#7298) @akiradev
- [l10n] Add Slovak (sk-SK) translation for aggregation functions (#7702) @msidlo
- [l10n] Add missing core locales for `MuiTablePagination` (#7717) @MBilalShafi
- [l10n] Improve Spanish (es-ES) and Vietnamese (vi-VN) locale (#7634) @WiXSL and @SpacerZ
- [l10n] Add Belarusian (be-BY) locale (#7646) @olhalink

### `@mui/x-date-pickers@6.0.0-beta.1` / `@mui/x-date-pickers-pro@6.0.0-beta.1`

#### Changes

- [pickers] Fix `aria-labelledby` assignment to dialog (#7608) @LukasTy
- [pickers] Support `UTC` with `dayjs` (#7610) @flaviendelangle
- [pickers] Update focus when opening a UI view (#7620)
@alexfauquette
- [DateRangePickers] Add shortcuts component (#7154) @alexfauquette

- [l10n] Add Czech (cs-CZ) locale (#7645) @OndrejHj04
- [l10n] Add Russian (ru-RU) locale (#7706) @rstmzh
- [l10n] Improve Japanese (ja-JP) locale (#7624) @makoto14

### `@mui/x-codemod@6.0.0-beta.1`

#### Changes

- [codemod] Add pickers `replace-toolbar-props-by-slot` codemod (#7687) @alexfauquette
- [codemod] Add `GridColumnMenuItemProps` to `column-menu-components-rename` codemod (#7710) @MBilalShafi
- [codemod] Add `headerHeight` prop update to `row-selection-props-rename` codemod (#7711) @MBilalShafi
- [codemod] Add pickers codemod for `components` to `slots` renaming (#7533) @alexfauquette
- [codemod] Add pickers `migrate-to-components-componentsProps` and `replace-arrows-button-slot` codemods (#7698) @alexfauquette
- [codemod] Add data grid codemod renaming `rowsPerPageOptions` prop to `pageSizeOptions` (#7603) @MBilalShafi
- [codemod] Add pickers `rename-should-disable-time` codemod (#7709) @alexfauquette
- [codemod] Add data grid `row-selection-props-rename` codemod (#7485) @MBilalShafi
- [codemod] Add data grid `rename-selectors-and-events` codemod (#7699) @MBilalShafi
- [codemod] Add pickers `replace-tabs-props` codemod (#7639) @alexfauquette

### Docs

- [docs] Add info callout about available component `slots` (#7714) @ivek-Prajapatii
- [docs] Add recipe for pinning grouped column (#7712) @MBilalShafi
- [docs] Fix 404 links to picker API page @oliviertassinari
- [docs] Update `DemoContainer` `components` prop using a codemod (#7574) @alexfauquette

### Core

- [core] Fix `innerslotProps` typo (#7697) @LukasTy
- [core] Upgrade monorepo (#7676) @cherniavskii

## 6.0.0-beta.0

_Jan 19, 2023_

After a long period in alpha, we're glad to announce the first MUI X v6 beta!
We encourage you to try out this version, packed with improvements, bug fixes, and a few highlighted features :

**Data Grid**

- [Access to the API Object in the community version](https://mui.com/x/react-data-grid/api-object/)
- [Improved column menu](https://mui.com/x/react-data-grid/column-menu/)
- [Cell selection range](https://mui.com/x/react-data-grid/cell-selection/) (Premium)

**Date and Time pickers**

- [Fields: the new default input for pickers](https://mui.com/x/react-date-pickers/fields/).
- [Improved layout customization](https://mui.com/x/react-date-pickers/custom-layout/)
- [Edit date ranges with drag and drop](https://mui.com/x/react-date-pickers/date-range-calendar/) (Pro)

You can check the migration guides for the [Data Grid](https://mui.com/x/migration/migration-data-grid-v5/) and [Date Pickers](https://mui.com/x/migration/migration-pickers-v5/) in the documentation.

We'd like to offer a big thanks to the 10 contributors who made this release possible.

- Merge `page` and `pageSize` props into `paginationModel`
- Replace old masked picker components with field based ones
- Improve Swedish (sv-SE) and Italian (it-IT) locales
- Documentation improvements
-
 Bug fixes

### `@mui/x-data-grid@6.0.0-beta.0` / `@mui/x-data-grid-pro@6.0.0-beta.0` / `@mui/x-data-grid-premium@6.0.0-beta.0`

#### Breaking changes

- The `disableExtendRowFullWidth` prop was removed.
 Use `showCellVerticalBorder` or `showColumnVerticalBorder` props to show or hide right border for cells and header cells respectively.

- The `GridCellIdentifier` type was removed. Use `GridCellCoordinates` instead.

- The `singleSelect` column type now has a default value formatter that returns the `label` corresponding to the selected value when `valueOptions` is an array of objects.
 As consequence, any existing value formatter will not be applied to the individual options anymore, but only to the text of the cell.
 It is recommended to migrate `valueOptions` to an array of objects to be able to add a custom label for each value.
 To override the label used for each option when the cell is in edit mode or in the filter panel, the following components now support a `getOptionLabel`
 prop.
 This prop accepts a callback that is called with the item from `valueOptions` and must return the new label.

 - `GridEditSingleSelectCell`
 - `GridFilterInputSingleSelect`
 - `GridFilterInputMultipleSingleSelect`

- The `getGridSingleSelectQuickFilterFn` function was removed.
 You can copy the old function and pass it to the `getApplyQuickFilterFn` property of the `singleSelect` column definition.

- The `page` and `pageSize` props and their respective event handlers `onPageChange` and `onPageSizeChange` were removed.
 Use `paginationModel` and `onPaginationModelChange` instead.

```diff
 <DataGrid
  rows={rows}
   columns={columns}
-  page={page}
-  pageSize={pageSize}
-  onPageChange={handlePageChange}
-  onPageSizeChange={handlePageSizeChange}
+  paginationModel={{ page, pageSize }}
+  onPaginationModelChange={handlePaginationModelChange}
 />
```

- The properties `initialState.pagination.page` and `initialState.pagination.pageSize` were also removed.
 Use `initialState.pagination.paginationModel` instead.

```diff
-initialState={{ pagination: { page: 1, pageSize: 10 } }}
+initialState={{ pagination: { paginationModel: { page: 1, pageSize: 10 } } }}
```

- The `rowsPerPageOptions` prop was renamed to `pageSizeOptions`.

```diff
-<DataGrid rowsPerPageOptions={[10, 20, 50]} />
+<DataGrid pageSizeOptions={[10, 20, 50]} />
```

- The `error` and `onError` props were removed - the grid no longer catches errors during rendering.
 To catch errors that happen during rendering use the [error boundary](https://react.dev/reference/react/Component#catching-rendering-errors-with-an-error-boundary).

- The `components.ErrorOverlay` slot was removed.

- The `GridErrorOverlay` component was removed.

- The `componentError` event was removed.
 Use the [error boundary](https://react.dev/reference/react/Component#catching-rendering-errors-with-an-error-boundary) to catch errors thrown during rendering.

- The `apiRef.current.showError`
 method was removed.
 The UI for errors is no longer handled by the grid.

- The `date` and `dateTime` columns now only support `Date` objects as values.
 To parse a string value, use the [`valueGetter`](https://mui.com/x/react-data-grid/column-definition/#value-getter):

```tsx
<DataGrid
  columns={[
    {
      field: 'date',
      type: 'date',
      valueGetter: (params) => new Date(params.value),
    },
  ]}
/>
```

- The following selectors have been renamed:

 - `gridVisibleSortedRowIdsSelector` renamed to `gridExpandedSortedRowIdsSelector`
 - `gridVisibleSortedRowEntriesSelector` renamed to `gridExpandedSortedRowEntriesSelector`
 - `gridVisibleRowCountSelector` renamed to `gridExpandedRowCountSelector`
 - `gridVisibleSortedTopLevelRowEntriesSelector` renamed to `gridFilteredSortedTopLevelRowEntriesSelector`
 - `gridVisibleTopLevelRowCountSelector` renamed to `gridFilteredTopLevelRowCountSelector`

- The `apiRef.current.getVisibleRowModels`
 method was removed. Use the `gridVisibleSortedRowEntriesSelector` selector instead.

- The `GridRowScrollEndParams["virtualRowsCount"]` parameter was renamed to
`GridRowScrollEndParams["visibleRowsCount"]`.

#### Changes

- [DataGrid] Add default value formatter to `singleSelect` (#7290) @m4theushw
- [DataGrid] Fix flickering on grid scroll (#7549) @cherniavskii
- [DataGrid] Merge `page` and `pageSize` props into `paginationModel` (#7147) @MBilalShafi
- [DataGrid] Only support `Date` as value in `date` and `dateTime` column types (#7594) @cherniavskii
- [DataGrid] Remove error boundary (#7579) @cherniavskii
- [DataGrid] Remove `GridCellIdentifier` redundant type (#7578) @MBilalShafi
- [DataGrid] Remove `disableExtendRowFullWidth` prop (#7373) @MBilalShafi
- [DataGrid] Remove tag limit from `isAnyOf` operator input (#7592) @m4theushw
- [DataGrid] Use v6 terminology (#7473) @DanailH
- [DataGridPremium] Keep focus on first selected cell (#7482) @m4theushw
- [l10n] Update Swedish (sv-SE)
 locale (#7585) @MaanTyringe

### `@mui/x-date-pickers@6.0.0-beta.0` / `@mui/x-date-pickers-pro@6.0.0-beta.0`

#### Breaking changes

- The `showToolbar` prop has been moved to the `toolbar` component slot props:

```diff
 <DatePicker
-  showToolbar
+  slotProps={{
+    toolbar: {
+      hidden: false,
+    }
+  }}
 />
```

- The new pickers have replaced the legacy one.

 If you were using the new pickers with their temporary name, you just have to change your imports.

```diff
-import { Unstable_NextDatePicker as NextDatePicker } from '@mui/x-date-pickers/NextDatePicker';
+import { DatePicker } from '@mui/x-date-pickers/DatePicker';
-import { Unstable_DesktopNextDatePicker as DesktopNextDatePicker } from '@mui/x-date-pickers/DesktopNextDatePicker';
+import { DesktopDatePicker } from '@mui/x-date-pickers/DesktopDatePicker';

 // Same for all the other pickers with an `Unstable_` prefix
```

 If you were still using the legacy picker (`DatePicker`, `DesktopDatePicker`, ...), please take a look at our [migration guide](https://mui.com/x/migration/migration-pickers-v5/#picker-components) for detailed explanations on how to start using the new ones.

- The fields components are no longer unstable

```diff
-import { Unstable_DateField as DateField } from '@mui/x-date-pickers/DateField';
+import { DateField } from '@mui/x-date-pickers/DateField';
```

#### Changes

- [DateRangeCalendar] Ignore `calendars` prop on mobile (#7526) @flaviendelangle
- [DateRangeCalendar] Ignore `showDaysOutsideCurrentMonth` when `calendars > 1` (#7529) @flaviendelangle
- [DateRangePicker] Propagate `rangePosition` to view (#7602) @LukasTy
- [fields] Fix upper boundary on 12-hours sections (#7618) @flaviendelangle
- [fields] Publish value when cleaning the last section of a date (#7519) @flaviendelangle
- [fields] Remove the `Unstable_` prefix for field components (#7185) @flaviendelangle
- [pickers] Add missing `slots` and `slotProps` on the date

range view renderer (#7586) @flaviendelangle
- [pickers] Drop legacy pickers (#7545) @flaviendelangle
- [pickers] Fix day calendar row and column index (#7589) @LukasTy
- [pickers] Go to the default view when opening a picker (#7484) @flaviendelangle
- [pickers] Make sure the `className` and `sx` props are applied to the field / static root of the picker and never to the view (#7600) @flaviendelangle
- [pickers] Rename new pickers (#7575) @flaviendelangle
- [pickers] Rename remaining `components` and `componentSlots` references (#7576) @LukasTy
- [pickers] Replace `showToolbar` with toolbar slot `hidden` prop (#7498) @LukasTy
- [pickers] Spread props to the DOM in `DateCalendar` and `TimeClock` (#7587) @flaviendelangle
- [pickers] Stop using the `WrapperVariantContext` in `DateRangeCalendar` (#7488) @flaviendelangle
- [l10n] Improve Italian (it-IT) locale (#7582) @marikadeveloper

### `@mui/x-codemod@6.0.0-beta.0`

#### Changes

- [codemod] Remove `disableExtendRowFullWidth` prop (#7508)
@MBilalShafi

### Docs

- [docs] Clean-up the `field components` page (#7605) @flaviendelangle
- [docs] List all pickers toolbar pages in api docs side menu (#7577) @LukasTy
- [docs] Remove "Flex layout" docs section and demo (#7477) @cherniavskii
- [docs] Rework the pickers "Getting Started" page (#7140) @flaviendelangle

### Core

- [core] Add missing `status: needs triage` label on RFC @oliviertassinari
- [core] Add release documentation step detailing `x-codemod` package tag change (#7617) @LukasTy
- [core] Fix typo in `CHANGELOG` (#7611) @flaviendelangle
- [test] Fix date range picker tests to work with western time zones (#7581) @m4theushw

## 6.0.0-alpha.15

_Jan 13, 2023_

We'd like to offer a big thanks to the 9 contributors who made this release possible. Here are some highlights :

- Support components and slots for new pickers (#7390) @alexfauquette
- Update `onColumnOrderChange` behavior to match `onRowsOrderChange` (#7385) @DanailH
- Improve Spanish (es-ES) and Belarusian
(be-BY) locales
- Documentation improvements
- Bugfixes

### `@mui/x-data-grid@6.0.0-alpha.15` / `@mui/x-data-grid-pro@6.0.0-alpha.15` / `@mui/x-data-grid-

premium@6.0.0-alpha.15`

#### Breaking changes

- Remove the `onCellFocusOut` prop (#6302) @cherniavskii

 The `onCellFocusOut` prop was removed. Use `componentsProps.cell.onBlur` instead:

```tsx
<DataGrid
  componentsProps={{
    cell: {
      onBlur: (event) => {
        const cellElement = event.currentTarget;
        const field = cellElement.getAttribute('data-field');
        const rowId = cell.parentElement.getAttribute('data-id');
      },
    },
  }}
/>
```

- [DataGrid] Stop exporting editing selector (#7456) @m4theushw

 The `gridEditRowsStateSelector` selector was removed.

- [DataGrid] Rework column headers and virtual scroller positioning (#7001) @cherniavskii

 The `headerHeight` prop was renamed to `columnHeaderHeight`.

- [DataGrid] Remove the `columnTypes` prop (#7309) @cherniavskii

  The `columnTypes` prop was removed. For custom column types see [Custom column types](https://mui.com/x/react-data-grid/column-definition/#custom-column-types) docs.

- [DataGrid] Rename `linkOperators` to `logicOperators` (#7310) @cherniavskii

 The `apiRef.current.setFilterLinkOperator` method was renamed to `apiRef.current.setFilterLogicOperator`.
 The `GridLinkOperator` enum was renamed to `GridLogicOperator`.
 The `GridFilterModel['linkOperator']` was renamed to `GridFilterModel['logicOperator']`.
 The `linkOperators` prop of `GridFilterForm` and `GridFilterPanel` components was renamed to `logicOperators`.
 The `linkOperatorInputProps` prop of `GridFilterForm` component was renamed to `logicOperatorInputProps`.
 The `filterFormProps.linkOperatorInputProps` prop in `GridFilterForm` component was renamed to `filterFormProps.logicOperatorInputProps`.
 The `GridLocaleText['filterPanelLinkOperator']` property was renamed to `GridLocaleText['filterPanelLogicOperator']`.
  The `.MuiDataGrid-filterFormLinkOperatorInput`CSS class was renamed to `.MuiDataGrid-filterFormLogicOperatorInput`.

- [DataGrid] Remove `Alt+C` keyboard shortcut (#7466) @MBilalShafi

 <kbd>Alt</kbd> (or <kbd> Option</kbd>) + <kbd>C</kbd> keyboard shortcut is no longer supported.

#### Changes

- [DataGrid] Fix <kbd>Tab</kbd> between portaled and non-portaled edit components (#7098) @m4theushw
- [DataGrid] Remove the `columnTypes` prop (#7309) @cherniavskii
- [DataGrid] Remove the `onCellFocusOut` prop (#6302) @cherniavskii
- [DataGrid] Rename `linkOperators` to `logicOperators` (#7310) @cherniavskii
- [DataGrid] Rework column headers and virtual scroller positioning (#7001) @cherniavskii
- [DataGrid] Stop exporting editing selector (#7456) @m4theushw
- [DataGrid] Update `onColumnOrderChange` behavior to match `onRowsOrderChange` (#7385) @DanailH
- [DataGrid] Improve Spanish (es-ES) locale (#7447) @Anderssxn
- [DataGrid] Remove Alt+C keyboard shortcut (#7466) @MBilalShafi
- [DataGridPremium]
 Fix Excel export not working with date strings (#7396) @cherniavskii

### `@mui/x-date-pickers@6.0.0-alpha.15` / `@mui/x-date-pickers-pro@6.0.0-alpha.15`

#### Breaking changes

- [pickers] Stop using the `WrapperVariantContext` in `MonthCalendar` and `YearCalendar` (#7382) @flaviendelangle

 The `modeMobile` and `modeDesktop` classes have been removed from the `PickersMonth` and `PickersYear` internal components.

 If you were using those classes on responsive components,
 you can import `DEFAULT_DESKTOP_MODE_MEDIA_QUERY` from `@mui/x-date-pickers` or `@mui/x-date-pickers-pro` (or use your custom media query if any):

```diff
 <GlobalStyles
   styles={{
-    [`.${pickersYearClasses.modeDesktop}`]: {
-      backgroundColor: 'red'
-    }
+    [DEFAULT_DESKTOP_MODE_MEDIA_QUERY]: {
+      [`.${pickersYearClasses.root}`]: {
+        backgroundColor: 'red'
+      }
+    }
-    [`.${pickersYearClasses.modeMobile}`]: {
-      backgroundColor:
'red'
-    }
```

```
+     [DEFAULT_DESKTOP_MODE_MEDIA_QUERY.replace('@media', '@media not')]: {
+       [`.${pickersYearClasses.root}`]: {
+         backgroundColor: 'red'
+       }
+     }
   }}
 />
```

Works exactly the same way for `PickersMonth`.

- [pickers] Refactor `shouldDisableTime` (#7299) @LukasTy

The `shouldDisableTime` prop signature has been changed. Either rename the prop usage to `shouldDisableClock` or refactor usage.

```diff
 <DateTimePicker
-   shouldDisableTime={(timeValue, view) => view === 'hours' && timeValue < 12}
+   shouldDisableClock={(timeValue, view) => view === 'hours' && timeValue < 12}
 />
```

```diff
 <DateTimePicker
-   shouldDisableTime={(timeValue, view) => view === 'hours' && timeValue < 12}
+   shouldDisableTime={(value, view) => view === 'hours' && value.hour() < 12}
 />
```

#### Changes

- [fields] Fix Android editing (#7444) @flaviendelangle
- [pickers] Add Belarusian (be-BY) locale (#7395) @olhalink
- [pickers] Hide am/pm controls when there is no hour view (#7380) @flaviendelangle
- [pickers] Hide the tabs by default on `DesktopNextDateTimePicker` (#7503) @flaviendelangle
- [pickers] Refactor `shouldDisableTime` (#7299) @LukasTy
- [pickers] Remove `WrapperVariantContext` from `DateTimePickerTabs` (#7374) @LukasTy
- [pickers] Stop using the `WrapperVariantContext` in `MonthCalendar` and `YearCalendar` (#7382) @flaviendelangle
- [pickers] Support `components` and `slots` for new pickers (#7390) @alexfauquette
- [pickers] Replace `slotsProps` by `slotProps` (#7528) @alexfauquette

### Docs

- [docs] Fix codesandboxes using `DemoContainer` (#7388) @LukasTy
- [docs] Fix wrong reference to currentView (#7441) @oliviertassinari

- [docs] New page for `DateRangeCalendar` (#7378) @flaviendelangle
- [docs] Update the migration guide with the breaking changes between the legacy and the new pickers (#7345) @flaviendelangle
- [docs] Use new pickers on "Custom components" demos (#7194) @flaviendelangle

###
 Core

- [core] Handle selection edge case (#7350) @oliviertassinari
- [core] Improve license message @oliviertassinari
- [core] Move default `closeOnSelect` to prop definition in `usePickerValue` (#7459) @flaviendelangle
- [core] Move interfaces of UI views to dedicated files (#7458) @flaviendelangle
- [core] Update package used to import LicenseInfo (#7442) @oliviertassinari
- [test] Add a few inheritComponent (#7352) @oliviertassinari

## 6.0.0-alpha.14

_Jan 5, 2023_

We'd like to offer a big thanks to the 8 contributors who made this release possible. Here are some highlights :

- Add `SingleInputTimeRangeField` and `SingleInputDateTimeRangeField` components (#7186) @alexfauquette
- Use grid for modifying pickers layout (#6900) @alexfauquette
- Improve field components editing experience (#7272) @flaviendelangle
- Multiple codemods
- Many documentation improvements
- Bugfixes

### `@mui/x-data-grid@6.0.0-alpha.14` / `@mui/x-data-grid-pro@6.0.0-alpha.14` / `@mui/x-data-grid-premium@6.0.0-alpha.14`

####
 Breaking changes

- [DataGrid] Set default `GridCellParams['value']` type to `unknown` (#6959) @cherniavskii

 The default type of `GridCellParams['value']` was changed from `any` to `unknown`.

#### Changes

- [DataGrid] Fix flickering on mount (#7205) @cherniavskii
- [DataGrid] Fix selected text in cell input not being copied in Firefox (#6593) @cherniavskii
- [DataGrid] Invert generic parameters order (#6874) @DanailH
- [DataGrid] Remove legacy logic for `singleSelect` inside `GridFilterInputValue` (#7386) @m4theushw
- [DataGrid] Remove remaining props from legacy editing API (#7381) @m4theushw
- [DataGrid] Set default `GridCellParams['value']` type to `unknown` (#6959) @cherniavskii

### `@mui/x-date-pickers@6.0.0-alpha.14` / `@mui/x-date-pickers-pro@6.0.0-alpha.14`

#### Breaking changes

- [fields] Rename the `input` slot of the fields to `textField` to avoid confusion (#7369) @flaviendelangle

#### Changes

- [fields] Add `SingleInputTimeRangeField`
 and `SingleInputDateTimeRangeField` components (#7186) @alexfauquette
- [fields] Improve editing (automatic section switch, allow letter editing in digit section, allow numeric editing in letter section) (#7272) @flaviendelangle
- [fields] Rename the `input` slot of the fields to `textField` to avoid confusion (#7369) @flaviendelangle
- [fields] Prevent date change on `TimeField` arrow edition (#7383) @flaviendelangle
- [pickers] Clean some JSDoc descriptions (#7384) @flaviendelangle
- [pickers] Remove redundant `variants` in theme augmentation (#7356) @LukasTy
- [pickers] Remove the `PaperContent` slot from the new pickers (#7342) @flaviendelangle
- [pickers] Use grid for modifying the layout (#6900) @alexfauquette

### `@mui/x-codemod@6.0.0-alpha.14`

#### Changes

- [codemod] Add new codemod for adapter import (#7348) @flaviendelangle
- [codemod] Add new codemod for the value prop renaming on the view components (#7338) @flaviendelangle
- [codemod] Reorganize codemods
 and add rename column menu components codemod (#7368) @MBilalShafi

### Docs

- [docs] Add example to add back the mobile keyboard view (#7347) @flaviendelangle
- [docs] Cleanup the doc pages of the community pickers (#7339) @flaviendelangle
- [docs] Drop security fixes support for v4 (#7322) @oliviertassinari
- [docs] Fix `disablePast` and `disableFuture` definition swap (#7324) @alexfauquette
- [docs] Hide ad for paid docs pages (#7321) @oliviertassinari
- [docs] New page for `TimeClock` (#7280) @flaviendelangle
- [docs] Note the pickers breaking changes supported by the codemod (#7337) @flaviendelangle
- [docs] Redirect translated pages (#7341) @cherniavskii
- [docs] Reorganize v6 pickers migration guide (#7257) @flaviendelangle

### Core

- [core] Apply eslint rule for React component @oliviertassinari
- [core] Apply title capitalization convention @oliviertassinari
- [core] Fix the product license reference name (#7367) @oliviertassinari
- [core] Order the slots alphabetically in
 the JSON files (#7349) @flaviendelangle
- [core] Remove blanklines in `_redirects` @oliviertassinari
- [core] Remove dead prettier config @oliviertassinari

- [core] Sync back with the mono repo (#7351) @oliviertassinari
- [core] Sync monorepo, fix layout scrollbar @oliviertassinari
- [core] Upgrade monorepo (#7307) @LukasTy

## 6.0.0-alpha.13

_Dec 24, 2022_

We'd like to offer a big thanks to the 10 contributors who made this release possible. Here are some highlights :

- New column menu design and API
- Improve Russian (ru-RU) and Korean (ko-KR) locales
- Documentation improvements
- Bugfixes

### `@mui/x-data-grid@6.0.0-alpha.13` / `@mui/x-data-grid-pro@6.0.0-alpha.13` / `@mui/x-data-grid-premium@6.0.0-alpha.13`

#### Breaking changes

- New column menu design and API (#6619) MBilalShafi

The `currentColumn` prop passed to `components.ColumnMenu` was renamed to `colDef`.
The `column` prop passed to the items of the column menu was renamed to `colDef`.
The `DATA_GRID_DEFAULT_SLOTS_COMPONENTS`
export has been removed.
The following components and interfaces were been renamed for consistency:

**Community Package:**

```diff
-<GridFilterMenuItem />
+<GridColumnMenuFilterItem />
```

```diff
-<HideGridColMenuItem />
+<GridColumnMenuHideItem />
```

```diff
-<GridColumnsMenuItem />
+<GridColumnMenuColumnsItem />
```

```diff
-<SortGridMenuItems />
+<GridColumnMenuSortItem />
```

```

```diff
-interface GridFilterItemProps
+interface GridColumnMenuItemProps
```

**Pro package:**

```diff
-<GridColumnPinningMenuItems />
+<GridColumnMenuPinningItem />
```

**Premium package:**

```diff
-<GridAggregationColumnMenuItem />
+<GridColumnMenuAggregationItem />
```

```diff
-<GridRowGroupingColumnMenuItems />
-<GridRowGroupableColumnMenuItems />
+<GridColumnMenuGroupingItem />
```

- Improve column definition typing (#7224) @cherniavskii

The `GridColumns` type was removed. Use `GridColDef[]` instead.
The `GridActionsColDef` interface was removed. Use `GridColDef` instead.
The `GridEnrichedColDef` type was removed. Use `GridColDef` instead.
The `GridStateColDef` type was removed.

If you use it to type `searchPredicate`, use `GridColumnsPanelProps['searchPredicate']` instead.
If you use it to type `getApplyFilterFn`, `GridFilterOperator['getApplyFilterFn']` can be used as replacement.

- Remove GridDensityType enum (#7304) @cherniavskii

The `GridDensityTypes` enum was removed. Use `GridDensity` type instead.

#### Changes

- [DataGrid] Allow disabling of buttons in column panel (#6947) @MBilalShafi
- [DataGrid] Improve column definition typing (#7224) @cherniavskii
- [DataGrid] Improve column menu design and API (#6619) @MBilalShafi
- [DataGrid] Remove `GridDensityType` enum (#7304) @cherniavskii
- [DataGrid] Remove `rowHeight` and `headerHeight` from state (#7199) @DanailH
```

- [DataGrid] Remove column separator to match table styles (#7067) @MBilalShafi
- [DataGrid]
 Update Russian (ru-RU) locale (#7220) @eceluXa
- [DataGridPro] Use row ID as `key` of the detail panels (#7302) @m4theushw
- [DataGridPremium] Fix `exceljs` import with parcel (#7284) @alexfauquette

### `@mui/x-date-pickers@6.0.0-alpha.13` / `@mui/x-date-pickers-pro@6.0.0-alpha.13`

#### Breaking changes

- Require Luxon 3.0.2 or higher (#7249) @flaviendelangle

 `AdapterLuxon` now requires `luxon` in version `3.0.2` or higher in order to work.

 Take a look at the [Upgrading Luxon](https://moment.github.io/luxon/#/upgrading) guide if you are using an older version.

#### Changes

- [DateRangePicker] Fix to propagate `disabled` and `readOnly` on multi input picker (#7135) @LukasTy
- [fields] Fix multi input fields root element props order and types (#7225) @LukasTy
- [fields] Support escaped characters (#7184) @flaviendelangle
- [pickers] Allow to define custom view renderers on the pickers (#7176) @flaviendelangle
- [pickers] Avoid running validation methods several times in `DateCalendar`
 (#7247) @flaviendelangle
- [pickers] Improve Korean (ko-KR) locale (#7266) @hanbin9775
- [pickers] Require Luxon 3.0.2 or higher (#7249) @flaviendelangle
- [pickers] Rework view internals (#7097) @flaviendelangle

### `@mui/x-codemod@6.0.0-alpha.13`

#### Changes

- [codemod] New codemod for view component renaming (#7264) @flaviendelangle

### Docs

- [docs] Fix some selectors not being documented (#7218) @cherniavskii
- [docs] New page for `DateCalendar` (#7053) @flaviendelangle
- [docs] Split selection docs (#7213) @m4theushw

### Core

- [core] Fix API demos callout spacing @oliviertassinari

## 6.0.0-alpha.12

_Dec 16, 2022_

We'd like to offer a big thanks to the 6 contributors who made this release possible. Here are some highlights :

- The `apiRef` prop is now available in the `@mui/x-data-grid` package:

```tsx
const apiRef = useGridApiRef();

return <DataGrid apiRef={apiRef} {...other} />;
```

See [the documentation](https://mui.com/x/react-data-grid/api-object/)
for more information.

- The `DataGridPremium` now supports cell selection:

```tsx
<DataGridPremium unstable_cellSelection />
```

See [the documentation](https://mui.com/x/react-data-grid/cell-selection/) for more information

- Support the Right To Left orientation on the fields components
- Documentation improvements
- Bugfixes

### `@mui/x-data-grid@6.0.0-alpha.12` / `@mui/x-data-grid-pro@6.0.0-alpha.12` / `@mui/x-data-grid-premium@6.0.0-alpha.12`

#### Breaking changes

- The `showCellRightBorder` was renamed to `showCellVerticalBorder`
- The `showColumnRightBorder` was renamed to `showColumnVerticalBorder`
- The `.MuiDataGrid-withBorder` CSS class was renamed to `.MuiDataGrid-withBorderColor` and it only sets `border-color` CSS property now.
- The following undocumented properties from `apiRef` were removed: `footerRef`, `headerRef`, `columnHeadersElementRef`, `columnHeadersContainerElementRef`
- The `GridHeaderPlaceholder` component was removed.
- The `MAX_PAGE_SIZE`
constant was removed.
- The `useGridScrollFn` hook was removed.

#### Changes

- [DataGrid] Display sort column menu items as per `sortingOrder` prop (#7180) @MBilalShafi
- [DataGrid] Support `apiRef` in Community package (#6773) @cherniavskii
- [DataGridPremium] Add support for cell selection (#6567) @m4theushw
- [DataGridPremium] Use separate cache for aggregation columns pre-processor (#7142) @m4theushw

- [DataGridPro] Fix missing border in right-pinned columns (#4197) @cherniavskii
- [DataGridPro] Fix wrong border color on skeleton cells (#7202) @cherniavskii

### `@mui/x-date-pickers@6.0.0-alpha.12` / `@mui/x-date-pickers-pro@6.0.0-alpha.12`

#### Changes

- [fields] Fix bug introduced by RTL in single input range fields (#7189) @alexfauquette
- [fields] Support RTL out of the box (#6715) @alexfauquette
- [pickers] Clean `autoFocus` behavior on fields and new pickers (#7153) @flaviendelangle
- [pickers] Fix label on the new range pickers (#7210) @flaviendelangle
- [pickers]
 Fix wrong component name on `StaticNextDateTime` (#7187) @flaviendelangle

### Docs

- [docs] Add docs section about field placeholders' localization (#7139) @flaviendelangle
- [docs] Create a `DemoGrid` component to unify demos with several components (#7057) @flaviendelangle
- [docs] Document aggregation selectors (#7148) @cherniavskii
- [docs] Fix 301 links to demo pages in API pages (#7197) @oliviertassinari
- [docs] Fix errors and warning in demos (#7209) @LukasTy
- [docs] Use `DemoContainer` and `DemoItem` on every picker demo (#7149) @flaviendelangle

### Core

- [core] Fix broken test (#7179) @flaviendelangle

## 6.0.0-alpha.11

_Dec 8, 2022_

We'd like to offer a big thanks to the 7 contributors who made this release possible. Here are some highlights :

- Add dragging support for the new Date Range Picker (`NextDateRangePicker`) (#6763) @LukasTy
- Improve performance of the `day` view (#7066) @flaviendelangle
- Fix lazy-loading feature not working in `DataGridPremium`
 (#7124) @m4theushw
- Bugfixes

### `@mui/x-data-grid@6.0.0-alpha.11` / `@mui/x-data-grid-pro@6.0.0-alpha.11` / `@mui/x-data-grid-premium@6.0.0-alpha.11`

#### Breaking changes

- The `filterPanelOperators` translation key was renamed to `filterPanelOperator` (#7062) @MBilalShafi
- The `components.Header` slot was removed. Use `components.Toolbar` slot instead (#6999) @cherniavskii

#### Changes

- [DataGrid] Fix rows not rendering properly after height change (#6892) @MBilalShafi
- [DataGrid] Remove `Header` slot (#6999) @cherniavskii
- [DataGrid] Rename `filterPanelOperators` -> `filterPanelOperator` (#7062) @MBilalShafi
- [DataGridPremium] Add support for lazy-loading (#7124) @m4theushw
- [DataGridPremium] Pass `groupId` to aggregation function (#7003) @m4theushw

### `@mui/x-date-pickers@6.0.0-alpha.11` / `@mui/x-date-pickers-pro@6.0.0-alpha.11`

#### Breaking changes

- Remove the callback version of the `action` prop on the `actionBar` slot (#7038) @flaviendelangle

The `action`
prop of the `actionBar` slot is no longer supporting a callback.
Instead, you can pass a callback at the slot level:

```diff
 <DatePicker
   componentsProps={{
-     actionBar: {
-       actions: (variant) => (variant === 'desktop' ? [] : ['clear']),
-     },
+     actionBar: ({ wrapperVariant }) => ({
+       actions: wrapperVariant === 'desktop' ? [] : ['clear'],
+     }),
   }}
 />
```

- The `selectedDays` prop has been removed from the `Day` component (#7066) @flaviendelangle
If you need to access it, you can control the value and pass it to the slot using `componentsProps`:

```tsx
function CustomDay({ selectedDay, ...other }) {
  // do something with 'selectedDay'
  return <PickersDay {...other} />;
}
function App() {
  const [value, setValue] = React.useState(null);
  return (
    <DatePicker
      value={value}
      onChange={(newValue) => setValue(newValue)}
      components={{ Day: CustomDay }}
      componentsProps={{
        day: { selectedDay: value },
      }}
```

```
    />
  );
}
```

- The `currentlySelectingRangeEnd` / `setCurrentlySelectingRangeEnd` props on the Date Range Picker toolbar have been renamed to `rangePosition` / `onRangePositionChange` (#6989) @flaviendelangle

```diff
 const CustomToolbarComponent = props => (
   <div>
-    <button onChange={() => props.setCurrentlySelectingRangeEnd('end')}>Edit end date</button>
+    <button onClick={() => props.onRangePositionChange('end')}>Edit end date</button>
-    <div>Is editing end date: {props.currentlySelectingRangeEnd === 'end'}</div>
+    <div>Is editing end date: {props.rangePosition === 'end'}</div>
   </div>
 )
 <DateRangePicker
   components={{
     Toolbar: CustomToolbarComponent
   }}
 />
```

#### Changes

- [DateRangePicker] Add dragging support to edit range (#6763) @LukasTy
- [pickers] Fix lost props on Date Range Pickers (#7092) @flaviendelangle
- [pickers] Fix toolbar on the new
 range pickers (#6989) @flaviendelangle
- [pickers] Improve performance of `DayCalendar` (#7066) @flaviendelangle
- [pickers] Initialize date without time when selecting year or month (#7120) @LukasTy
- [pickers] Remove the callback version of the `action` prop in the `actionBar` component slot (#7038) @flaviendelangle

### Docs

- [docs] Add `GridCell` change in migration guide (#7087) @MBilalShafi
- [docs] Fix API page ad space regression (#7051) @oliviertassinari
- [docs] Update localization doc to use existing locale (#7102) @LukasTy

### Core

- [core] Add codemod to move l10n translation (#7027) @alexfauquette
- [core] Add notes to remove the legacy pickers internals (#7133) @flaviendelangle
- [core] Remove `internals-fields` imports (#7119) @flaviendelangle
- [core] Remove unused code (#7094) @flaviendelangle
- [core] Sync `ApiPage.js` with monorepo (#7073) @oliviertassinari

- [test] Fix karma-mocha assertion error messages (#7054) @cherniavskii

## 6.0.0-alpha.10

_Dec 1, 2022_

We'd like to offer a big thanks to the 10 contributors who made this release possible. Here are some highlights :

- Improve Ukrainian (uk-UA) and add Urdu (ur-PK) locales
- Documentation improvements
- Bugfixes

### `@mui/x-data-grid@6.0.0-alpha.10` / `@mui/x-data-grid-pro@6.0.0-alpha.10` / `@mui/x-data-grid-premium@6.0.0-alpha.10`

### Breaking changes

- [DataGrid] Removes `GridCell` fallback to `valueToRender` on `null` children (#7023) @MBilalShafi

Returning `null` in `column.renderCell` or `column.renderEditCell` now renders an empty cell instead of the default formatted value.

- [DataGrid] Refactor `GridFilterItem` props (#6985) @MBilalShafi

Properties `columnField` and `operatorValue` of `GridFilterItem` are renamed `field` and `operator`. And `operator` property is now required.

```diff
 filterModel: {
   items: [{
-    columnField: 'rating',
+    field: 'rating',
-    operatorValue: '>',
+    operator: '>', // required
     value: '2.5'
     }],

   },
```

#### Changes

- [DataGrid] Fix row selection when clicking blank cell (#6974) @yami03
- [DataGrid] Refactor `GridFilterItem` props (#6985) @MBilalShafi
- [DataGrid] Removes `<GridCell />` fallback to `valueToRender` on `null` children (#7023) @MBilalShafi
- [DataGridPremium] Fix empty column group in Excel export (#7029) @alexfauquette
- [DataGridPremium] Update cache before hydrating columns (#7040) @m4theushw

- [DataGridPremium] Use custom cell component for grouping cell by default (#6692) @cherniavskii
- [l10n] Improve Ukrainian (uk-UA) locale (#7009) @rettoua

### `@mui/x-date-pickers@6.0.0-alpha.10` / `@mui/x-date-pickers-pro@6.0.0-alpha.10`

#### Breaking changes

- Rename `dateRangeIcon` to `dateIcon` (#7024) @LukasTy

 The `dateRangeIcon` prop has been renamed to `dateIcon`:

```diff
 // Same on all other Date Time Picker variations
 <DateTimePicker
    componentsProps={{
      tabs: {
-       dateRangeIcon: <LightModeIcon />,
+       dateIcon: <LightModeIcon
/>,
      }
    }}
 />
```

#### Changes

- [DateTimePicker] Rename `dateRangeIcon` to `dateIcon` (#7024) @LukasTy
- [pickers] Allow non-controlled usage of `TimeClock` (#6962) @flaviendelangle
- [pickers] Throw error when using adapter from `@date-io` (#6972) @flaviendelangle
- [l10n] Add Urdu (ur-PK) locale (#7007) @MBilalShafi
- [l10n] Improve Ukrainian (uk-UA) locale (#7009) @rettoua

### Docs

- [docs] Add Demos section on the pickers API pages (#6909) @flaviendelangle
- [docs] Add missing pickers migration docs (#7000) @LukasTy
- [docs] Fix broken link (#7048) @flaviendelangle
- [docs] Improve demo about customizing pagination (#6724) @m4theushw
- [docs] Keep track of localization completion (#7002) @alexfauquette
- [docs] Remove `LocalizationProvider` from previews (#6869) @flaviendelangle
- [docs] Remove the statement of support to RTL (#6521) @joserodolfofreitas
- [docs] Rework localization doc pages (#6625) @flaviendelangle
- [docs] Setup GitHub issue template
 for feedbacks about docs (#7026) @alexfauquette
- [docs] Test links with API page ignoring url hash (#7004) @alexfauquette
- [docs] Update API links from clock-picker to time-clock (#6993) @alexfauquette
- [docs] Use new pickers on the validation page (#7047) @flaviendelangle

### Core

- [core] Remove useless type casting in field hooks (#7045) @flaviendelangle
- [test] Sync `test:unit` with monorepo (#6907) @oliviertassinari

## 6.0.0-alpha.9

_Nov 24, 2022_

We'd like to offer a big thanks to the 14 contributors who made this release possible. Here are some highlights :

- Introduce the v6 pickers, built on top of the field components [DatePicker](https://mui.com/x/react-date-pickers/date-picker/), [TimePicker](https://mui.com/x/react-date-pickers/time-picker/), [DateTimePicker](https://mui.com/x/react-date-pickers/date-time-picker/), [DateRangePicker](https://mui.com/x/react-date-pickers/date-range-picker/).

  The old (legacy) components will be removed at the end of the v6
  beta.

- Add support for `theme.vars` in the pickers and the DataGrid (#6784, #6778) @alexfauquette
- Improve DataGrid theme augmentation (#5818) @iigrik
- Documentation improvements
- Bugfixes

### `@mui/x-data-grid@6.0.0-alpha.9` / `@mui/x-data-grid-pro@6.0.0-alpha.9` / `@mui/x-data-grid-premium@6.0.0-alpha.9`

### Breaking changes

- <kbd>Ctrl</kbd> + <kbd>Enter</kbd> will no longer toggle the master detail panel (#6945) @MBilalShafi
  You can restore the old behavior by listening to `cellKeyDown` and calling `apiRef.current.toggleDetailPanel()`.

- Remove unnecessary keyboard navigation events (#6863) @m4theushw
  The `cellNavigationKeyDown` event was removed. Use `cellKeyDown` and check the key provided in the event argument.
  The `columnHeaderNavigationKeyDown` event was removed. Use `columnHeaderKeyDown` and check the key provided in the event argument.

- Rename `rowsScroll` event to `scrollPositionChange` (#6957) @DanailH

#### Changes

- [DataGrid] Add spacing in `GridToolbar`
  for better visibility (#6904) @MBilalShafi
- [DataGrid] Improve typing for the theme in `styleOverrides` (#5818) @iigrik
- [DataGrid] Prevents master detail panel toggle with <kbd>Ctrl</kbd> + <kbd>Enter</kbd> (#6945) @MBilalShafi
- [DataGrid] Remove unnecessary keyboard navigation events (#6863) @m4theushw

- [DataGrid] Rename `ErrorOverlay` to `GridErrorOverlay` (#6946) @MBilalShafi
- [DataGrid] Stop exporting root base state selectors (#6912) @DanailH
- [DataGrid] Support `theme.vars` (#6784) @alexfauquette
- [DataGrid] Rename `rowsScroll` event to `scrollPositionChange` (#6957) @DanailH
- [DataGridPro] Fix lazy-loaded rows not working with `updateRows` API method (#6976) @cherniavskii
- [DataGridPremium] Improve typing for theme in `styleOverrides` (#6920) @m4theushw
- [l10n] Fix translation of `filterOperatorBefore` in Arabic (ar-SD) locale (#6884) @HassanGhazy

### `@mui/x-date-pickers@6.0.0-alpha.9` / `@mui/x-date-pickers-pro@6.0.0-alpha.9`

#### Changes

- [DatePicker]
 Display week number (#6144) @alexfauquette
- [pickers] Clean `PickersCalendarHeader` slots (#6943) @flaviendelangle
- [pickers] Do not loose the translations when using nested `LocalizationProvider` with each a `localeText` prop (#6895) @flaviendelangle
- [pickers] Fix calendar header switch view button hover circle (#6938) @rajendraarora16
- [pickers] Fix focus management (#6914) @alexfauquette
- [pickers] Fix usage with Shadow DOM (#6952) @flaviendelangle
- [pickers] New `MobileDateRangePicker`, `DesktopDateRangePicker`, `DateRangePicker` and `StaticDateRangePicker` based on `MultiInputDateRangeField` (#6888) @flaviendelangle
- [pickers] Support `theme.vars` (#6778) @alexfauquette

### Docs

- [docs] Add new "Expired package version" error type (#6937) @oliviertassinari
- [docs] Add support for API pages of unstable components (#6981) @flaviendelangle
- [docs] Create docs for the new date pickers (#6902) @flaviendelangle
- [docs] Create docs for the new time, date time and date range
 pickers (#6958) @flaviendelangle
- [docs] Fix demos live edit (#6975) @oliviertassinari
- [docs] Fix toggle button bug in demos in Custom Components page (#6913) @01zulfi
- [docs] Remove partial Portuguese and Chinese translations of the pickers pages (#6893) @flaviendelangle

### Core

- [core] Cleanup `describeValidation` (#6942) @flaviendelangle
- [core] Group renovate GitHub Action dependency updates @oliviertassinari
- [core] Introduce `x-codemod` package (#6876) @LukasTy
- [core] Update minimum supported version of Node.js to 14.0.0 (#6966) @cherniavskii
- [core] Upgrade monorepo (#6905) @cherniavskii
- [core] Upgrade node to v14.21 (#6916) @piwysocki
- [core] Upgrade ESLint (#6738) @Janpot
- [test] Test validation on date range view (#6941) @alexfauquette

## 6.0.0-alpha.8

_Nov 17, 2022_

We'd like to offer a big thanks to the 12 contributors who made this release possible. Here are some highlights :

- Support aggregating data from multiple row fields (#6656) @cherniavskii
- Documentation improvements
- Bugfixes

### `@mui/x-data-grid@6.0.0-alpha.8` / `@mui/x-data-grid-pro@6.0.0-alpha.8` / `@mui/x-data-grid-premium@6.0.0-alpha.8`

#### Changes

- [DataGrid] Fix `ErrorOverlay` not receiving defined input props (#6819) @banoth-ravinder
- [DataGrid] Fix conflict with the latest version of `@types/react` (#6797) @izv
- [DataGrid] Make more `apiRef` methods private (#6700) @cherniavskii
- [DataGrid] Provide a clear error message when upgrading (#6685) @oliviertassinari
- [DataGridPremium] Allow to customize the indent of group expansion toggle (#6837) @MBilalShafi
- [DataGridPremium] Support aggregating data from multiple row fields (#6656) @cherniavskii
- [DataGridPro] Fix detail panel not working with `getRowSpacing` prop (#6707) @cherniavskii
- [DataGridPro] Opt-out for column jump back on re-order (#6733) @gavbrennan
- [l10n] Improve Finnish (fi-FI) locale (#6859) @RainoPikkarainen

### `@mui/x-date-pickers@6.0.0-alpha.8` / `@mui/x-date-pickers-pro@6.0.0-alpha.8`

#### Breaking changes

- The `ClockPicker` view component has been renamed to `TimeClock` to better fit its usage:

```diff
-<ClockPicker {...props} />
+<TimeClock {...props} />
```

Component name in the theme has changed as well:

```diff
-MuiClockPicker: {
+MuiTimeClock: {
```

#### Changes

- [pickers] Fix typing and prop drilling on `DateRangeCalendar` and multi input range fields (#6852) @flaviendelangle
- [pickers] Pass the `ampm` prop from the new pickers to their field (#6868) @flaviendelangle

- [pickers] Rename `CalendarPickerView`, `ClockPickerView` and `CalendarOrClockPickerView` (#6855) @flaviendelangle
- [pickers] Rename `ClockPicker` into `TimeClock` (#6851) @flaviendelangle

### Docs

- [docs] Add `dayjs` to the dependencies (#6862) @m4theushw
- [docs] Clarify how the Row Pinning works with other features of the DataGrid (#6853) @cherniavskii
- [docs] Fix typo in Export page (#6848) @m4theushw
- [docs] Group picker pages (#6369) @flaviendelangle
- [docs] Remove default prop and improve format (#6781) @oliviertassinari
- [docs] Sync prism-okaidia.css with source (#6820) @oliviertassinari

### Core

- [core] Convert scripts to ESM (#6789) @LukasTy
- [core] Feedback on branch protection @oliviertassinari
- [core] Fix `test-types` out of memory error (#6850) @LukasTy
- [core] Import from `@mui/utils` instead of `@mui/material/utils` (#6816) @cherniavskii
- [core] Show the whole version to make blame easier @oliviertassinari
- [core] Small changes on new pickers internals (#6840) @flaviendelangle
- [core] Remove prettier scripts (#6815) @Janpot
- [license] Polish error messages (#6881) @oliviertassinari
- [test] Verify `onError` call on the pickers (#6771) @alexfauquette

## 6.0.0-alpha.7

_Nov 10, 2022_

We'd like to offer a big thanks to the 5 contributors who made this release possible. Here are some highlights :

- Removed everything marked as `@deprecated`
- Documentation improvements
- Bugfixes

### `@mui/x-data-grid@6.0.0-alpha.7` / `@mui/x-data-grid-pro@6.0.0-alpha.7` / `@mui/x-data-grid-premium@6.0.0-alpha.7`

#### Changes

- [DataGrid] Fix cell focus causing scroll jump when virtualization enabled (#6785) @yaredtsy
- [DataGrid] Remove items marked as `@deprecated` (#6505) @DanailH

### `@mui/x-date-pickers@6.0.0-alpha.7` / `@mui/x-date-pickers-pro@6.0.0-alpha.7`

#### Changes

- [fields] Rename section names to match the picker view nomenclature (#6779) @flaviendelangle
- [pickers] Fix pickers toolbar styling (#6793) @LukasTy
- [pickers] Improve validation JSDoc descriptions (#6777) @flaviendelangle
- [pickers] New `MobileDateTimePicker`, `DesktopDateTimePicker`, `DateTimePicker` and `StaticDateTimePicker` based on `DateTimeField` (#6767) @flaviendelangle
- [pickers] New `MobileTimePicker`, `DesktopTimePicker`, `TimePicker` and `StaticTimePicker` based on `TimeField` (#6728) @flaviendelangle
- [pickers] Support the `onError` prop and add context on the `onChange` prop (#6731) @flaviendelangle

### Docs

- [docs] Add missing Pro header suffix (#6775) @oliviertassinari
- [docs] Upgrade to Next.js 13 (#6790) @cherniavskii

### Core

- [core] Add OSSF Scorecard action (#6760) @oliviertassinari
- [core] Fix Pinned-Dependencies @oliviertassinari
- [core] Fix Scorecard fail Action @oliviertassinari
- [core] Pin GitHub Action dependencies (#6739) @renovate[bot]
- [core] Remove default access to GitHub action scopes @oliviertassinari
- [test] Fix test case name: Pro-> Premium @oliviertassinari

## 6.0.0-alpha.6

_Nov 4, 2022_

We'd like to offer a big thanks to the 8 contributors who made this release possible. Here are some highlights :

- Allow non-controlled usage of the calendar components (#6643) @flaviendelangle

```tsx
<DateCalendar defaultValue={dayjs()} />
<MonthCalendar defaultValue={dayjs()} />
<YearCalendar defaultValue={dayjs()} />
```

- Add Ukrainian (uk-UA) locale to pickers (#6661) @Dufran
- Documentation improvements
- Bugfixes

### `@mui/x-data-grid@6.0.0-alpha.6`
/ `@mui/x-data-grid-pro@6.0.0-alpha.6` / `@mui/x-data-grid-premium@6.0.0-alpha.6`

#### Breaking changes

- The `disableIgnoreModificationsIfProcessingProps` prop has been removed and its behavior when `true` was

incorporated as the default behavior.
The old behavior can be restored by using `apiRef.current.stopRowEditMode({ ignoreModifications: true })` or `apiRef.current.stopCellEditMode({ ignoreModifications: true })`.

#### Changes

- [DataGrid] Add `rowSelection` prop (#6499) @m4theushw
- [DataGrid] Avoid future regression with React 19 (#6638) @oliviertassinari
- [DataGrid] Refactor `@mui/material` imports to `@mui/utils` (#6569) @LukasTy
- [DataGrid] Remove `disableIgnoreModificationsIfProcessingProps` prop (#6640) @m4theushw
- [DataGrid] Separate private and public `apiRef` properties (#6388) @cherniavskii

### `@mui/x-date-pickers@6.0.0-alpha.6` / `@mui/x-date-pickers-pro@6.0.0-alpha.6`

#### Changes

- [DateRangePicker] Fix input focused style and mobile behaviour
(#6645) @LukasTy
- [fields] Update sections when the locale changes (#6649) @flaviendelangle
- [pickers] Add Ukrainian (uk-UA) locale (#6661) @Dufran
- [pickers] Allow non-controlled usage of the calendar components (#6643) @flaviendelangle
- [pickers] Export other adapters derived from moment or date-fns (#6571) @alexfauquette
- [pickers] New `MobileDatePicker` and `DatePicker` based on `DateField` (#6690) @flaviendelangle
- [pickers] New `StaticDatePicker` component (#6708) @flaviendelangle
- [pickers] Rename `inputFormat` prop to `format` on the new pickers (#6722) @flaviendelangle

### Core

- [core] Fix `typescript:ci` failures (#6705) @LukasTy
- [core] Fixes for upcoming eslint upgrade (#6667) @Janpot
- [core] Pin GitHub Action to digests (#6683) @oliviertassinari

## 6.0.0-alpha.5

_Oct 31, 2022_

We'd like to offer a big thanks to the 9 contributors who made this release possible. Here are some highlights :

- Fix memory leak during unmount of the DataGrid (#6620) @cherniavskii
- New guide for migrating pickers from v5 to v6 (#6472) @flaviendelangle
- Allow to disable the autofocus of the search field when opening the column visibility panel (#6444) @e-cloud
- Bugfixes

### `@mui/x-data-grid@6.0.0-alpha.5` / `@mui/x-data-grid-pro@6.0.0-alpha.5` / `@mui/x-data-grid-premium@6.0.0-alpha.5`

#### Breaking changes

- Stop exporting `gridColumnsSelector` (#6693) @m4theushw

The `gridColumnsSelector` was deprecated during v5 and is now removed from the export list.

Please consider using one of the following selectors as a replacement:

- `gridColumnFieldsSelector`, to obtain the column fields in the order they appear on the screen;
- `gridColumnLookupSelector`, to access column definitions by field;
- `gridColumnVisibilityModelSelector`, for the visibility state of each column.

#### Changes

- [DataGrid] Allow to disable autofocusing the search field in the columns panel (#6444) @e-cloud
- [DataGrid] Fix `setRows` method not persisting new rows
data after `loading` prop change (#6493) @cherniavskii
- [DataGrid] Fix memory leak on grid unmount (#6620) @cherniavskii
- [DataGrid] Rename `GridColumnsState['all']` to `GridColumnsState['orderedFields']` (#6562) @DanailH
- [DataGrid] Remove `React.memo` from `GridCellCheckboxRenderer` (#6655) @mattcorner
- [DataGrid] Stop exporting `gridColumnsSelector` (#6693)
- [l10n] Improve Bulgarian (bg-BG) locale (#6578) @AtanasVA

### `@mui/x-date-pickers@6.0.0-alpha.5` / `@mui/x-date-pickers-pro@6.0.0-alpha.5`

#### Breaking changes

- [pickers] Rename remaining `private` components (#6550) @LukasTy
Previously we had 4 component names with `Private` prefix in order to avoid breaking changes in v5.
These components were renamed:

- `PrivatePickersMonth` -> `MuiPickersMonth`
- `PrivatePickersSlideTransition` -> `MuiPickersSlideTransition`
- `PrivatePickersToolbarText` -> `MuiPickersToolbarText`
- `PrivatePickersYear` -> `MuiPickersYear`

Manual style overriding will need to use
updated classes:

```diff
-.PrivatePickersMonth-root {
+.MuiPickersMonth-root {

-.PrivatePickersSlideTransition-root {
+.MuiPickersSlideTransition-root {

-.PrivatePickersToolbarText-root {
+.MuiPickersToolbarText-root {
```

```
-.PrivatePickersYear-root {
+.MuiPickersYear-root {
```

Component name changes are also reflected in `themeAugmentation`:

```diff
 const theme = createTheme({
   components: {
-    PrivatePickersMonth: {
+    MuiPickersMonth: {
       // overrides
     },
-    PrivatePickersSlideTransition: {
+    MuiPickersSlideTransition: {
       // overrides
     },
-    PrivatePickersToolbarText: {
+    MuiPickersToolbarText: {
      // overrides
     },
-    PrivatePickersYear: {
+    MuiPickersYear: {
       // overrides
     },
   },
 });
```

#### Changes

- [DateTimePicker] Fix toolbar time order when `theme.rtl=true` (#6636) @alexfauquette
- [pickers] Import fixes for mask editing (#6623) @alexfauquette
-
 [pickers] Rename remaining `private` components (#6550) @LukasTy
- [pickers] New `DesktopDatePicker` based on `DateField` (#6548) @flaviendelangle

### Docs

- [docs] Add feedback in next doc (#6591) @alexfauquette
- [docs] Check link validity in PR (#6497) @alexfauquette
- [docs] Disable translations (#6560) @cherniavskii
- [docs] Fix typo in DataGrid demo page (#6632) @banoth-ravinder
- [docs] New page to migrate pickers from v5 to v6 (#6472) @flaviendelangle
- [docs] Remove broken welcome page (#6585) @alexfauquette
- [docs] Mark data grid column group as available (#6660) @alexfauquette
- [docs] Fix double space @oliviertassinari

### Core

- [core] Fix duplicate CodeQL build @oliviertassinari
- [core] Fix spreading on validation page (#6624) @flaviendelangle
- [core] Small TypeScript improvements (#6575) @flaviendelangle
- [core] Upgrade monorepo (#6594) @oliviertassinari
- [core] Change reproduction position (#6621) @oliviertassinari
- [core] Fix permissions in `no-response` workflow
 (#6658) @cherniavskii
- [core] Remove legacy migration function (#6669) @oliviertassinari
- [license] Improve the license content (#6459) @oliviertassinari
- [test] Test Arrow up/down on every token (#6563) @alexfauquette

## 6.0.0-alpha.4

_Oct 20, 2022_

We'd like to offer a big thanks to the 9 contributors who made this release possible. Here are some highlights :

- Manage pickers' toolbar customization with slots
- Bugfixes
- Improve Turkish (tr-TR) locale on the data grid and pickers (#6542) @ramazansancar

### `@mui/x-data-grid@6.0.0-alpha.4` / `@mui/x-data-grid-pro@6.0.0-alpha.4` / `@mui/x-data-grid-premium@6.0.0-alpha.4`

#### Breaking changes

- To avoid confusion with the props that will be added for the cell selection feature, some props related to row selection were renamed to have "row" in their name.
 The renamed props are the following:

| Old name | New name |
| :---------- | :----------
|
| `selectionModel` | `rowSelectionModel` |
| `onSelectionModelChange` | `onRowSelectionModelChange` |
| `disableSelectionOnClick` | `disableRowSelectionOnClick` |
| `disableMultipleSelection` | `disableMultipleRowSelection` |

- The `gridSelectionStateSelector` selector was renamed to `gridRowSelectionStateSelector`.

- The `selectionChange` event was renamed to `rowSelectionChange`.

#### Changes

- [DataGrid] Add `searchPredicate` prop to `GridColumnsPanel` component (#6557) @cherniavskii
- [DataGrid] Support keyboard navigation in column group header (#5947) @alexfauquette

- [DataGrid] Fix grid not updating state on `rowCount` prop change (#5982) @cherniavskii
- [DataGrid] Rename selection props (#6556) @m4theushw
- [l10n] Improve Turkish (tr-TR) locale on the data grid and pickers (#6542) @ramazansancar

### `@mui/x-date-pickers@6.0.0-alpha.4` / `@mui/x-date-pickers-pro@6.0.0-alpha.4`

#### Breaking changes

- The `ToolbarComponent` has been replaced
 by a `Toolbar` component slot.
 You can find more information about this pattern in the [Base UI documentation](https://mui.com/base-ui/getting-started/usage/#shared-props):

```diff
 // Same on all other pickers
 <DatePicker
-  ToolbarComponent: MyToolbar,
+  components={{ Toolbar: MyToolbar }}
 />
```

- The `toolbarPlaceholder` and `toolbarFormat` props have been moved to the `toolbar` components props slot:

```diff
 // Same on all other pickers
 <DatePicker
-  toolbarPlaceholder="__"
-  toolbarFormat="DD / MM / YYYY"
+  componentsProps={{
+    toolbar: {
+      toolbarPlaceholder: '__',
+      toolbarFormat: 'DD / MM / YYYY',
+    }
+  }}
 />
```

- The `toolbarTitle` prop has been moved to the localization object:

```diff
 // Same on all other pickers
 <DatePicker
-  toolbarTitle="Title"
+  localeText={{ toolbarTitle: 'Title' }}
 />
```

- The toolbar related translation keys have been renamed to better fit their usage:

```diff
 <LlocalizationProvider
   localeText={{
-    datePickerDefaultToolbarTitle: 'Date Picker',
+    datePickerToolbarTitle: 'Date Picker',

-    timePickerDefaultToolbarTitle: 'Time Picker',
+    timePickerToolbarTitle: 'Time Picker',

-    dateTimePickerDefaultToolbarTitle: 'Date Time Picker',
+    dateTimePickerToolbarTitle: 'Date Time Picker',

-    dateRangePickerDefaultToolbarTitle: 'Date Range Picker',
+    dateRangePickerToolbarTitle: 'Date Range Picker',
   }}
 />
```

- The `onChange` / `openView` props on the toolbar have been renamed `onViewChange` / `view`

#### Changes

- [fields] Add a `validationError` property to the `onChange` callback (#6539) @flaviendelangle
- [fields] Distinguish start and end input error on multi input fields (#6503) @flaviendelangle
- [pickers] Clean the `Tabs` component slot (#6543) @flaviendelangle
- [pickers] Fix localization of the placeholder (#6547) @alexfauquette
- [pickers] Fix TypeScript issues (#6322)
 @flaviendelangle
- [pickers] Improve error consistency between single and multiple range pickers (#6561) @alexfauquette
- [pickers] Refactor `@mui/material` imports to `@mui/utils` (#6443) @LukasTy
- [pickers] Replace toolbar's props by a component slot (#6445) @flaviendelangle

### Docs

- [docs] Enable inlined preview for disabled date picker (#6477) @oliviertassinari
- [docs] Fix 404 errors (#6541) @alexfauquette
- [docs] Fix broken links on field pages (#6501) @flaviendelangle
- [docs] Improve markdownlint (#6518) @oliviertassinari

### Core

- [core] Run CodeQL only on schedule @oliviertassinari
- [core] Fix trailing spaces and git diff format (#6523) @oliviertassinari
- [core] Harden GitHub Actions permissions (#6396) @step-security-bot
- [core] Improve the playground DX (#6514) @oliviertassinari
- [core] Link Netlify in the danger comment (#6513) @oliviertassinari
- [core] Organize tests for pickers slots (#6546) @flaviendelangle

- [core] Remove outdated `docsearch.js` dependency
 (#6242) @oliviertassinari
- [core] Upgrade monorepo (#6549) @cherniavskii
- [test] Add validation test on range pickers (#6504) @alexfauquette
- [test] Remove BrowserStack (#6263) @DanailH

## 6.0.0-alpha.3

_Oct 13, 2022_

We'd like to offer a big thanks to the 8 contributors who made this release possible. Here are some highlights :

- New components to edit date and time with <kbd>keyboard</kbd>without using any modal or dropdown UI.
 Please check out our [documentation](https://mui.com/x/react-date-pickers/fields/) to discover those new components.

 - [`DateField`](https://mui.com/x/react-date-pickers/date-field/) to edit date
 - [`TimeField`](https://mui.com/x/react-date-pickers/time-field/) to edit time
 - [`DateTimeField`](https://mui.com/x/react-date-pickers/date-time-field/) to edit date and time
 - [`MultiInputDateRangeField` / `SingleInputDateRangeField`](https://mui.com/x/react-date-pickers/date-range-field/) to edit date range
 - [`MultiInputTimeRangeField`](https://mui.com/x/react-date-pickers/time-range-field/)
 to edit time range with two inputs
 - [`MultiInputDateTimeRangeField`](https://mui.com/x/react-date-pickers/date-time-range-field/) to edit date and time range with two inputs

 These components are unstable.
 They might receive breaking changes on their props to have the best components possible by the time of the stable release.

- Allow to limit to one filter per column for `DataGridPro` and `DataGridPremium` (#6333) @MBilalShafi
- New [page describing the validation props on each picker](https://mui.com/x/react-date-pickers/validation/) (#6064) @flaviendelangle
- Documentation improvements
- Bugfixes

### `@mui/x-data-grid@6.0.0-alpha.3` / `@mui/x-data-grid-pro@6.0.0-alpha.3` / `@mui/x-data-grid-premium@6.0.0-alpha.3`

#### Breaking changes

- [DataGrid] Remove legacy editing API

 The editing API that is enabled by default was replaced with a new API that contains better support for server-side persistence, validation and
 customization. This new editing feature was already available in v5 under the `newEditingApi` experimental flag. In v6, this flag can be removed.

```diff
 <DataGrid
-  experimentalFeatures={{ newEditingApi: true }}
 />
```

For users that didn't migrate to the new editing API in v5, additional work may be needed because the new API is not equivalent to the legacy API. Although, some migration steps are available to help in this task.

- The `editCellPropsChange` event was removed. If you still need it please file a new issue so we can propose an alternative.
- The `cellEditCommit` event was removed and the `processRowUpdate` prop can be used in place. More information, check the [docs](https://mui.com/x/react-data-grid/editing/#persistence) section about the topic.
- The `editRowsModel` and `onEditRowsModelChange` props were removed. The [`cellModesModel`](https://mui.com/x/react-data-grid/editing/#controlled-mode) or [`rowModesModel`](https://mui.com/x/react-data-grid/editing/#controlled-mode) props can be used to achieve the same goal.
- The following API methods were removed:
  - Use `apiRef.current.stopCellEditMode` to replace `apiRef.current.commitCellChange`
  - Use `apiRef.current.startCellEditMode` to replace `apiRef.current.setCellMode(id, field, 'edit')`
  - Use `apiRef.current.stopRowEditMode` to replace `apiRef.current.commitRowChange`
  - Use `apiRef.current.startRowMode` to replace `apiRef.current.setRowMode(id, 'edit')`
  - Use the [`cellModesModel`](https://mui.com/x/react-data-grid/editing/#controlled-mode) or [`rowModesModel`](https://mui.com/x/react-data-grid/editing/#controlled-mode) props to replace `apiRef.current.setEditRowsModel`

#### Changes

- [DataGrid] Fix start edit mode with printable character in React 18 (#6257) @m4theushw
- [DataGrid] Remove legacy editing API (#6016) @m4theushw
- [DataGrid] Simplify `useGridApiContext` and `useGridApiRef` type overrides (#6423) @cherniavskii
- [DataGrid] Use generics instead of verbose state overrides (#6409) @cherniavskii
- [DataGridPro] Allow to limit to one filter per column (#6333) @MBilalShafi

### `@mui/x-date-pickers@6.0.0-alpha.3` / `@mui/x-date-pickers-pro@6.0.0-alpha.3`

#### Breaking changes

- All the props used by the mobile and desktop wrappers to override components or components' props have been replaced by component slots. You can find more information about this pattern in the [Base UI documentation](https://mui.com/base-ui/getting-started/usage/#shared-props).

Some of the names have also been prefixed by `desktop` when it was unclear that the behavior was only applied on the desktop version of the pickers (or the responsive version when used on a desktop).

The `DialogProps` prop has been replaced by a `dialog` component props slot on responsive and mobile pickers:

```diff
 // Same on MobileDatePicker, DateTimePicker, MobileDateTimePicker,
 // TimePicker, MobileTimePicker, DateRangePicker and MobileDateRangePicker.
  <DatePicker
-  DialogProps={{ backgroundColor: 'red' }}
+  componentsProps={{ dialog: { backgroundColor: 'red' }}}
 />
```

The `PaperProps` prop has been replaced by a `desktopPaper` component props slot on all responsive and desktop pickers:

```diff
 // Same on DesktopDatePicker, DateTimePicker, DesktopDateTimePicker,
 // TimePicker, DesktopTimePicker, DateRangePicker and DesktopDateRangePicker.
 <DatePicker
-  PaperProps={{ backgroundColor: 'red' }}
+  componentsProps={{ desktopPaper: { backgroundColor: 'red' }}}
 />
```

The `PopperProps` prop has been replaced by a `popper` component props slot on all responsive and desktop pickers:

```diff
 // Same on DesktopDatePicker, DateTimePicker, DesktopDateTimePicker,
 // TimePicker, DesktopTimePicker, DateRangePicker and DesktopDateRangePicker.
 <DatePicker
-  PopperProps={{ onClick: handleClick }}
+  componentsProps={{ popper: { onClick: handleClick }}}
 />
```

The `TransitionComponent`
prop has been replaced by a `DesktopTransition` component slot on all responsive and desktop pickers:

```diff
 // Same on DesktopDatePicker, DateTimePicker, DesktopDateTimePicker,
 // TimePicker, DesktopTimePicker, DateRangePicker and DesktopDateRangePicker.
 <DatePicker
-  TransitionComponent={Fade}
+  components={{ DesktopTransition: Fade }}
 />
```

The `TrapFocusProps` prop has been replaced by a `desktopTrapFocus` component props slot on all responsive and desktop pickers:

```diff
 // Same on DesktopDatePicker, DateTimePicker, DesktopDateTimePicker,
 // TimePicker, DesktopTimePicker, DateRangePicker and DesktopDateRangePicker.
 <DatePicker
-  TrapFocusProps={{ isEnabled: () => false }}
+  componentsProps={{ desktopTrapFocus: { isEnabled: () => false }}}
 />
```

- The view components allowing to pick a date or parts of a date without an input have been renamed to better fit their usage:

```diff
-<CalendarPicker {...props} />
+<DateCalendar
{...props} />
```

```diff
-<DayPicker {...props} />
+<DayCalendar {...props} />
```

```diff
-<CalendarPickerSkeleton {...props} />
+<DayCalendarSkeleton {...props} />
```

```diff
-<MonthPicker {...props} />
+<MonthCalendar {...props} />
```

```diff
-<YearPicker {...props} />
+<YearCalendar {...props} />
```

- Component names in the theme have changed as well:

```diff
-MuiCalendarPicker: {
+MuiDateCalendar: {
```

```diff
-MuiDayPicker: {
+MuiDayCalendar: {
```

```

```diff
-MuiCalendarPickerSkeleton: {
+MuiDayCalendarSkeleton: {
```

```diff
-MuiMonthPicker: {
+MuiMonthCalendar: {
```

```diff
-MuiYearPicker: {
+MuiYearCalendar: {
```

#### Changes

- [DatePicker] Allows to fix the number of week displayed (#6299) @alexfauquette
- [DateRangePicker] Fix calendar day outside of month layout shifting on hover (#6448) @alexfauquette
- [fields] New components: `MultiInputDateTimeRangePicker` and `MultiInputTimeRangePicker` (#6392) @alexfauquette
- [fields] Prepare the field exports for the public release (#6467) @flaviendelangle
- [fields] Support paste in single section (#6422) @alexfauquette
- [pickers] Add field placeholders to the locale (#6337) @flaviendelangle
- [pickers] Do not use `Partial` for `components` and `componentsProps` props (#6463) @flaviendelangle
- [pickers] New component: `DateRangeCalendar` (#6416) @flaviendelangle
- [pickers] Replace the `Picker` prefix in the view component by `Calendar` (eg: `MonthPicker` => `MonthCalendar`) (#6389) @flaviendelangle
- [pickers] Support pasting on fields (#6364) @flaviendelangle
- [pickers] Use slots in the mobile and desktop wrappers instead of `XXXComponent` and `XXXProps` (#6381) @flaviendelangle

### Docs

- [docs] Add migration to DataGrid v6 page (#6235) @m4theushw
- [docs] Create first publishable version of the field doc (#6323) @flaviendelangle
- [docs] Fix trailing spaces in the readme @oliviertassinari
- [docs] New page for the pickers: Validation (#6064) @flaviendelangle
- [docs] Organize migration pages (#6480) @flaviendelangle

### Core

- [core] Add CodeQL workflow (#6387) @DanailH
- [core] Add missing breaking change to the changelog (#6471) @flaviendelangle
- [core] Fix playground structure (#6466) @LukasTy
```

- [core] Fix tests for pasting on fields (#6465) @flaviendelangle
- [core] Remove absolute link (#6420) @flaviendelangle
- [core] Remove unused `react-text-mask` package (#6408) @LukasTy
- [core] Send explicit warning when dayjs locale is not found (#6424) @alexfauquette
- [core] Test validation on textfield and date views (#6265) @alexfauquette
- [test] Sync comment with monorepo @oliviertassinari

## 6.0.0-alpha.2

_Oct 7, 2022_

We'd like to offer a big thanks to the 10 contributors who made this release possible. Here are some highlights :

- Further progress on stabilizing new date field components
- Improve support for theme augmentation in the DataGrid (#6269) @cherniavskii
- Add Japanese
(ja-JP) locale to pickers (#6365) @sho918
- Documentation improvements
- Bugfixes

### `@mui/x-data-grid@6.0.0-alpha.2` / `@mui/x-data-grid-pro@6.0.0-alpha.2` / `@mui/x-data-grid-premium@6.0.0-alpha.2`

#### Breaking changes

- The aggregation is no longer experimental.

You can now use the aggregation without the `experimentalFeatures.aggregation` flag enabled.

```diff
<DataGridPremium
- experimentalFeatures={{ aggregation: true }}
/>
```

The aggregation of the columns through the column menu is now enabled by default on `DataGridPremium`. You can set `disableAggregation={true}` to disable it.

#### Changes

- [DataGrid] Add filter item ID to `.MuiDataGrid-filterForm` (#6313) @m4theushw
- [DataGrid] Add missing `valueOptions` (#6401) @DanailH
- [DataGrid] Don't start edit mode when pressing Shift + Space (#6228) @m4theushw
- [DataGrid] Fix error when using column grouping with all columns hidden (#6405) @alexfauquette
- [DataGrid] Pass generics to the components
in the theme augmentation (#6269) @cherniavskii
- [DataGridPremium] Remove the aggregation from the experimental features (#6372) @flaviendelangle

### `@mui/x-date-pickers@6.0.0-alpha.2` / `@mui/x-date-pickers-pro@6.0.0-alpha.2`

#### Breaking changes

- The `renderDay` prop has been replaced by a `Day` component slot.
 You can find more information about this pattern in the [Base UI documentation](https://mui.com/base-ui/getting-started/usage/#shared-props).

 ```diff
  // Same for any other date, date time or date range picker.
  <DatePicker
 -  renderDay={(_, dayProps) => <CustomDay {...dayProps} />}
 +  components={{ Day: CustomDay }}
  />
 ```

#### Changes

- [DateRangePicker] Fix the shape of the first selected day when the start date has an hour set (#6403) @flaviendelangle
- [l10n] Add Japanese (ja-JP) locale to pickers (#6365) @sho918
- [DateRangePicker] Force focus to stay on inputs (#6324) @alexfauquette
- [pickers] Improve edition on field components (#6339) @flaviendelangle
-
 [pickers] Improve field selection behaviors (#6317) @flaviendelangle
- [pickers] Replace the `renderDay` prop with a `Day` component slot (#6293) @flaviendelangle

### Docs

- [docs] Apply style guide to Data Grid Aggregation page (#5781) @samuelsycamore
- [docs] Fix code examples of editing cells (#6004) @TiagoPortfolio
- [docs] Fix customized day rendering demo style (#6342) (#6399) @Ambrish-git
- [docs] Implement Style Guide on "Advanced" Data Grid doc pages (#6331) @samuelsycamore
- [docs] Use components instead of demos for `SelectorsDocs` (#6103) @flaviendelangle
- [license] Add new license status 'Out of scope' (#5260) @flaviendelangle

### Core

- [core] Speedup of yarn install in the CI (#6395) @oliviertassinari
- [test] Remove redundant test clean-ups (#6377) @oliviertassinari
- [test] Replace `React.render` with `React.createRoot` in e2e tests (#6393) @m4theushw

## 6.0.0-alpha.1

_Sep 29, 2022_

We'd like to offer a big thanks to the 8 contributors who made

this release possible. Here are some highlights :

- Better support for custom overlays (#5808) @cherniavskii
- Improve print export (#6273) @oliviertassinari
- Reduce confusion when initializing pickers with a date value (#6170) @flaviendelangle
- Documentation improvements
- Bugfixes

### `@mui/x-data-grid@6.0.0-alpha.1` / `@mui/x-data-grid-pro@6.0.0-alpha.1` / `@mui/x-data-grid-premium@6.0.0-alpha.1`

#### Breaking changes

- New internal rows structure for v6 (#4927) @flaviendelangle

Some selectors related to the rows have been renamed to better describe the type of rows they are returning:

```diff
-const result = gridRowsIdToIdLookupSelector(apiRef);
+const result = gridRowsDataRowIdToIdLookupSelector(apiRef);
```

```diff
-const result = gridRowTreeDepthSelector(apiRef);
+const result = gridRowMaximumTreeDepthSelector(apiRef);
```

The format of the tree nodes (the element accessible in `params.node` or with the `apiRef.current.getRowNode` method) have
changed.
You have a new `type` property, which can be useful, for example, to apply custom behavior on groups.
Here is an example of the old and new approach showing how to apply a custom value formatter in groups for the grouping column:

```diff
 <DataGridPremium
   groupingColDef={() => ({
     valueFormatter: (params) => {
       if (params.id == null) {
         return params.value;
       }

       const rowNode = apiRef.current.getRowNode(params.id!)!;
-      if (rowNode.children?.length) {
+      if (rowNode.type === 'group') {
         return `by ${rowNode.groupingKey ?? ''}`;
       }
```

```
      return params.value;
    }
  })}
/>
```

- The `GridFeatureModeConstant` constant no longer exists (#6077) @DanailH

```diff
-import { GridFeatureModeConstant } from '@mui/x-data-grid';
```

#### Changes

- [DataGrid] Fix `GridPagination` props typing (#6238) @cherniavskii
- [DataGrid] Fix `GridRow` not forwarding `ref` to the root element
(#6274) @cherniavskii
- [DataGrid] Fix `undefined` value being showed in filter button tooltip text (#6259) @cherniavskii
- [DataGrid] Fix blank space when changing page with dynamic row height (#6049) @m4theushw
- [DataGrid] New internal rows structure for v6 (#4927) @flaviendelangle
- [DataGrid] Revert cell/row mode if `processRowUpdate` fails (#6185) @m4theushw
- [DataGrid] Rework overlays layout (#5808) @cherniavskii
- [DataGrid] Improve print support (#6273) @oliviertassinari
- [DataGridPremium] Add missing `themeAugmentation` module (#6270) @cherniavskii

### `@mui/x-date-pickers@6.0.0-alpha.1` / `@mui/x-date-pickers-pro@6.0.0-alpha.1`

#### Breaking changes

- The `value` prop of the pickers now expects a parsed value.

Until now, it was possible to provide any format that your date management library was able to parse.
For instance, you could pass `value={new Date()}` when using `AdapterDayjs`.

This brought a lot of confusion so we decided to remove this behavior.
The
format expected by the `value` prop is now the same as for any other prop holding a date.
Here is the syntax to initialize a date picker at the current date for each adapter:

```tsx
// Date-fns
<DatePicker value={new Date()} />;

// Dayjs
import dayjs from 'dayjs';
<DatePicker value={dayjs()} />;

// Moment
```

```
import moment from 'moment';
<DatePicker value={moment()} />;

// Luxon
import { DateTime } from 'luxon';
<DatePicker value={DateTime.now()} />;
```

#### Changes

- [DatePicker] Respect `minDate` and `maxDate` when opening a `DatePicker` or `DateTimePicker` (#6309) @alexfauquette
- [DateTimePicker] Fix validation with `shouldDisableMonth` and `shouldDisableYear` (#6266) @flaviendelangle
- [TimePicker] Add support for `disablePast` and `disableFuture` validation props (#6226) @LukasTy
- [CalendarPicker] Prevent getting focus when `autoFocus=false` (#6304) @alexfauquette
- [DateField] Extend moment adapter to support `expandFormat` and `formatTokenMap` (#6215) @alexfauquette
- [pickers] Allow to control the selected sections (#6209, #6307) @flaviendelangle
- [pickers] Do not loose the value of date sections not present in the format in the new field components (#6141) @flaviendelangle
- [pickers] Do not support unparsed date formats anymore (#6170) @flaviendelangle
- [pickers] Support slots on the `DateField` component (#6048) @flaviendelangle
- [pickers] Support Luxon v3 in `AdapterLuxon` (#6069) @alexfauquette
- [pickers] New components `TimeField` and `DateTimeField` (#6312) @flaviendelangle
- [pickers] Support basic mobile edition on new field components (#5958) @flaviendelangle

### Docs

- [docs] Fix issue in DataGrid/DataGridPro row styling demo (#6264) @MBilalShafi
- [docs] Improve pickers Getting Started examples (#6292) @flaviendelangle
- [docs] Pass model change callbacks in controlled grid editing demos (#6296) @cherniavskii
- [docs] Update the CodeSandbox to use the `next` branch (#6275) @oliviertassinari

### Core

- [core] Fix typing error (#6291) @flaviendelangle
- [core] Fix typo in the state updater of `useField` (#6311) @flaviendelangle
- [core] Remove `GridFeatureModeConstant` (#6077) @DanailH
- [core] Simplify testing architecture (#6043) @flaviendelangle
- [test] Skip test in Chrome non-headless and Edge (#6318) @m4theushw

## 6.0.0-alpha.0

_Sep 22, 2022_

We'd like to offer a big thanks to the 12 contributors who made this release possible. Here are some highlights :

- Add a `localeText` prop to all pickers to customize the translations (#6212) @flaviendelangle
- Add Finnish (fi-FI) locale to the pickers (#6219) @PetroSilenius
- Add Persian (fa-IR) locale to the pickers (#6181) @fakhamatia
- Documentation improvements
- Bugfixes

### `@mui/x-data-grid@6.0.0-alpha.0` / `@mui/x-data-grid-pro@6.0.0-alpha.0` / `@mui/x-data-grid-premium@6.0.0-alpha.0`

#### Breaking changes

- The deprecated `hide` column property has been removed in favor of the `columnVisibilityModel` prop and initial state.

```diff
 <DataGrid
   columns={[
     field: 'id,
-    hide: true,
   ]}
+  initialState={{
+    columns: {
+      columnVisibilityModel: { id: false },
+    },
+  }}
 />
```

You can find more information about this new API on our [documentation](https://mui.com/x/react-data-grid/column-visibility/).

- The `GridEvents` enum is now a TypeScript type.

```diff
-apiRef.current.subscribeEvent(GridEvents.rowClick', handleRowClick);
+apiRef.current.subscribeEvent('rowClick', handleRowClick);
```

#### Changes

- [DataGrid] Do not publish `cellFocusOut` event if the row was removed (#6251) @cherniavskii
- [DataGrid] Fix scroll anchoring with master details (#6054) @oliviertassinari
- [DataGrid] Improve Polish (pl-PL) locale on the data grid (#6245) @grzegorz-bach
- [DataGrid] Remove the `GridEvents` enum (#6003) @flaviendelangle
- [DataGrid] Remove the deprecated `hide` column property (#5999) @flaviendelangle

### `@mui/x-date-pickers@6.0.0-alpha.0`

/ `@mui/x-date-pickers-pro@6.0.0-alpha.0`

#### Breaking changes

- All the deprecated props that allowed you to set the text displayed in the pickers have been removed.

You can now use the `localText` prop available on all picker components:

| Removed prop | Property in the new `localText` prop |
|---|---|
| `endText` | `end` |
| `getClockLabelText` | `clockLabelText` |
| `getHoursClockNumberText` | `hoursClockNumberText` |
| `getMinutesClockNumberText` | `minutesClockNumberText` |
| `getSecondsClockNumberText` | `secondsClockNumberText` |
| `getViewSwitchingButtonText` | `calendarViewSwitchingButtonAriaLabel` |
| `leftArrowButtonText` | `openPreviousView` (or `previousMonth` when the button changes the visible month) |
| `rightArrowButtonText` | `openNextView` (or `nextMonth` when the button changes the visible month) |
| `startText` | `start` |

For instance if you want to replace the `startText` / `endText`

```diff
 <DateRangePicker
-  startText="From"
-  endText="To"
+  localeText={{
+    start: 'From',
+    end: 'To',
+  }}
 />
```

You can find more information about the new api, including how to set those translations on all your components at once in the [documentation](https://mui.com/x/react-date-pickers/localization/)

- The deprecated `locale` prop
of the `LocalizationProvider` component have been renamed `adapterLocale`:

```diff
 <LocalizationProvider
   dateAdapter={AdapterDayjs}
-  locale="fr"
+  adapterLocale="fr"
 >
   {children}
```

```
 </LlocalizationProvider>
```

- The component slots `LeftArrowButton` and `RightArrowButton` have been renamed `PreviousIconButton` and `NextIconButton` to better describe there usage:

```diff
 <DatePicker
   components={{
-    LeftArrowButton: CustomButton,
+    PreviousIconButton: CustomButton,

-    RightArrowButton: CustomButton,
+    NextIconButton: CustomButton,
   }}
   componentsProps={{
-    leftArrowButton: {},
+    previousIconButton: {},

-    rightArrowButton: {},
+    nextIconButton: {},
   }}
 />
```

- The `date` prop has been renamed `value` on `MonthPicker` / `YearPicker`, `ClockPicker` and `CalendarPicker`.

```diff
-<MonthPicker date={dayjs()} onChange={handleMonthChange} />
+<MonthPicker value={dayjs()} onChange={handleMonthChange}
/>

-<YearPicker date={dayjs()} onChange={handleYearChange} />
+<YearPicker value={dayjs()} onChange={handleYearChange} />

-<ClockPicker date={dayjs()} onChange={handleTimeChange} />
+<ClockPicker value={dayjs()} onChange={handleTimeChange} />

-<CalendarPicker date={dayjs()} onChange={handleDateChange} />
+<CalendarPicker value={dayjs()} onChange={handleDateChange} />
```

#### Changes

- [CalendarPicker] Don't move to closest enabled date when `props.date` contains a disabled date (#6146) @flaviendelangle
- [DateRangePicker] Switch to new month when changing the value from the outside (#6166) @flaviendelangle
- [pickers] Add a `localeText` prop to all pickers to customize the translations (#6212) @flaviendelangle

- [pickers] Add Finnish (fi-FI) locale to the pickers (#6219) (#6230) @PetroSilenius
- [pickers] Add Persian (fa-IR) locale to the pickers (#6181) @fakhamatia
- [pickers] Allow nested `LocalizationProvider` (#6011) @flaviendelangle
- [pickers] Clean
 slots on `PickersArrowSwitcher` component (#5890) @flaviendelangle
- [pickers] Fix invalid date error when decreasing `DateField` day (#6071) @alexfauquette
- [pickers] Fix mobile section selection (#6207) @oliviertassinari
- [pickers] Fix usage with Typescript 4.8 (#6229) @flaviendelangle
- [pickers] Improve error message when no adapter context is found (#6211) @flaviendelangle
- [pickers] Remove `valueStr` from the field state (#6142) @flaviendelangle
- [pickers] Remove remaining deprecated locale props (#6233) @flaviendelangle
- [pickers] Rename the `date` prop `value` on `MonthPicker` / `YearPicker`, `ClockPicker` and `CalendarPicker` (#6128) @flaviendelangle
- [pickers] Rename the `onClose` prop of `PickersPopper` `onDismiss` to simplify typing (#6155) @flaviendelangle
- [pickers] Support the `sx` prop on all public component with a root HTML elements (#5944) @flaviendelangle
- [pickers] Unify `PickersMonth` and `PickersYear` behaviors (#6034) @flaviendelangle
- [pickers] Use
 `shouldDisableMonth` and `shouldDisableYear` for date validation (#6066) @flaviendelangle
- [YearPicker] Scroll to the current year even with `autoFocus=false` (#6224) @alexfauquette

### Docs

- [docs] Add automatic vale check (#5429) @alexfauquette
- [docs] Add Pro logo in "column ordering" link (#6127) @alexfauquette
- [docs] Fix 301 link (#6239) @oliviertassinari
- [docs] Fix broken link (#6163) @alexfauquette
- [docs] Fix broken links (#6101) @alexfauquette
- [docs] Fix demonstration date to avoid hydration errors (#6032) @alexfauquette
- [docs] Fix hidden popper in restore state example (#6191) @heyfirst
- [docs] Fix invalid links causing 404 & 301 errors (#6105) @oliviertassinari
- [docs] Fix npm repository url in the pickers `package.json` (#6172) @oliviertassinari
- [docs] Fix typo in linked issue (#6162) @flaviendelangle
- [docs] Import `generateUtilityClass` from `@mui/utils` (#6216) @michaldudak
- [docs] Improve Upgrade plan docs (#6018) @oliviertassinari
- [docs] Link the
 OpenSSF Best Practices card (#6171) @oliviertassinari

### Core

- [core] Add `v5.17.3` changelog to next branch (#6250) @flaviendelangle
- [core] Add link to the security page on the `README` (#6073) @oliviertassinari
- [core] Fix scroll restoration in the docs (#5938) @oliviertassinari
- [core] Remove the Storybook (#6099) @flaviendelangle
- [core] Tag release as `next` in NPM (#6256) @m4theushw
- [core] Update monorepo (#6180) @flaviendelangle
- [core] Use the `next` branch for Prettier (#6097) @flaviendelangle
- [core] Use the official repository for `@mui/monorepo` instead of a fork (#6189) @oliviertassinari
- [test] Fix logic to skip column pinning tests (#6133) @m4theushw

- [test] Hide the date on the print regression test (#6120) @flaviendelangle
- [test] Skip tests for column pinning and dynamic row height (#5997) @m4theushw
- [website] Improve security header @oliviertassinari

## Older versions

Changes before 6.x are listed in our [changelog for older versions](https://github.com/mui/mui-x/blob/HEAD/changelogOld/).

# 1.3516 normalize-package-data 2.5.0

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# 1.3517 platform 1.3.6

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# 1.3518 timepicker 1.14.1

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# 1.3519 @simple-libs/stream-utils 1.2.0

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# 1.3520 is-regex 1.2.1

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# 1.3521 tinymce 6.7.0

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# 1.3522 chartjs-adapter-date-fns 3.0.0

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# 1.3523 @babel/core 7.22.15

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# 1.3524 unist-util-is 4.1.0

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# 1.3531 @actions/http-client 3.0.2

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# 1.3534 electron-to-chromium 1.4.510

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# 1.3535 tldts 7.0.26

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# 1.3537 generator-function 2.0.1

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# 1.3540 buffer-from 1.1.2

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# 1.3588 micromark-util-subtokenize 2.1.0

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# 1.3604 get-intrinsic 1.3.0

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# 1.3605 micromark-util-decode-numeric-character-reference 2.0.2

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# 1.3606 trivial-deferred 1.1.2

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# 1.3608 which-typed-array 1.1.20

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# 1.3609 baseline-browser-mapping 2.10.8

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# 1.3611 available-typed-arrays 1.0.7

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# 1.3612 neo-async 2.6.2

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# 1.3618 quick-lru 4.0.1

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# 1.3623 rrweb-cssom 0.8.0

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# 1.3625 tinyexec 1.0.4

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# 1.3626 queue-microtask 1.2.3

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# 1.3688 mdast-util-to-markdown 2.1.2

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# 1.3689 micromark-util-resolve-all 2.0.1

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# 1.3690 safe-regex-test 1.1.0

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# 1.3691 is-weakset 2.0.4

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# 1.3693 color-support 1.1.3

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# 1.3695 micromark-extension-gfm-task-list-item 2.1.0

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# 1.3696 is-boolean-object 1.2.2

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# 1.3697 array prototype flat 1.3.3

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# 1.3698 to-regex-range 5.0.1

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# 1.3699 own-keys 1.0.1

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# 1.3700 aws-sdk-go-v2 1.41.5

## 1.3700.1 Available under license :

```
// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import (
 "context"
 "fmt"
 awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
```

```
 "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
 "github.com/aws/smithy-go/middleware"
 smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Gets detailed information about the specified license.
func (c *Client) GetLicense(ctx context.Context, params *GetLicenseInput, optFns ...func(*Options))
(*GetLicenseOutput, error) {
 if params == nil {
  params = &GetLicenseInput{}
 }

 result, metadata, err := c.invokeOperation(ctx, "GetLicense", params, optFns,
c.addOperationGetLicenseMiddlewares)
 if err != nil {
  return nil, err
 }

 out := result.(*GetLicenseOutput)
 out.ResultMetadata = metadata
 return out, nil
}

type GetLicenseInput struct {

 // Amazon Resource Name (ARN) of the license.
 //
 // This member is required.
 LicenseArn *string

 // License version.
 Version *string

 noSmithyDocumentSerde
}

type
 GetLicenseOutput struct {

 // License details.
 License *types.License

 // Metadata pertaining to the operation's result.
 ResultMetadata middleware.Metadata

 noSmithyDocumentSerde
}
```

```
func (c *Client) addOperationGetLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
 if err := stack.Serialize.Add(&setOperationInputMiddleware{}, middleware.After); err != nil {
  return err
 }
 err = stack.Serialize.Add(&awsAwsjson11_serializeOpGetLicense{}, middleware.After)
 if err != nil {
  return err
 }
 err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpGetLicense{}, middleware.After)
 if err != nil {
  return err
 }
 if err := addProtocolFinalizerMiddlewares(stack, options, "GetLicense"); err != nil {
  return fmt.Errorf("add protocol finalizers: %v", err)
 }

 if err = addlegacyEndpointContextSetter(stack, options); err != nil {
  return err
 }
 if err = addSetLoggerMiddleware(stack, options); err != nil {
  return err
 }
 if err = addClientRequestID(stack); err
 != nil {
  return err
 }
 if err = addComputeContentLength(stack); err != nil {
  return err
 }
 if err = addResolveEndpointMiddleware(stack, options); err != nil {
  return err
 }
 if err = addComputePayloadSHA256(stack); err != nil {
  return err
 }
 if err = addRetry(stack, options, c); err != nil {
  return err
 }
 if err = addRawResponseToMetadata(stack); err != nil {
  return err
 }
 if err = addRecordResponseTiming(stack); err != nil {
  return err
 }
 if err = addSpanRetryLoop(stack, options); err != nil {
  return err
 }
 if err = addClientUserAgent(stack, options); err != nil {
```

```
 return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
 return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
 return err
}
if err = addSetLegacyContextSigningOptionsMiddleware(stack); err != nil {
 return err
}
if err = addUserAgentRetryMode(stack, options); err != nil {
 return err
}
if err = addCredentialSource(stack,
options); err != nil {
 return err
}
if err = addOpGetLicenseValidationMiddleware(stack); err != nil {
 return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opGetLicense(options.Region), middleware.Before);
err != nil {
 return err
}
if err = addRecursionDetection(stack); err != nil {
 return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
 return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
 return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
 return err
}
if err = addDisableHTTPSMiddleware(stack, options); err != nil {
 return err
}
if err = addInterceptBeforeRetryLoop(stack, options); err != nil {
 return err
}
if err = addInterceptAttempt(stack, options); err != nil {
 return err
}
if err = addInterceptors(stack, options); err != nil {
 return err
```

```
 }
 return nil
}

func newServiceMetadataMiddleware_opGetLicense(region string) *awsmiddleware.RegisterServiceMetadata {
 return
 &awsmiddleware.RegisterServiceMetadata{
  Region:       region,
  ServiceID:     ServiceID,
  OperationName: "GetLicense",
 }
}
// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import (
 "context"
 "fmt"
 awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
 "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
 "github.com/aws/smithy-go/middleware"
 smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Deletes the specified license.
func (c *Client) DeleteLicense(ctx context.Context, params *DeleteLicenseInput, optFns ...func(*Options))
(*DeleteLicenseOutput, error) {
 if params == nil {
  params = &DeleteLicenseInput{}
 }

 result, metadata, err := c.invokeOperation(ctx, "DeleteLicense", params, optFns,
c.addOperationDeleteLicenseMiddlewares)
 if err != nil {
  return nil, err
 }

 out := result.(*DeleteLicenseOutput)
 out.ResultMetadata = metadata
 return out, nil
}

type DeleteLicenseInput struct {

 // Amazon Resource Name (ARN) of the license.
 //
 // This member is required.
```

```
 LicenseArn *string

 // Current version of the license.
 //
 // This member is required.
 SourceVersion
 *string

 noSmithyDocumentSerde
}

type DeleteLicenseOutput struct {

 // Date when the license is deleted.
 DeletionDate *string

 // License status.
 Status types.LicenseDeletionStatus

 // Metadata pertaining to the operation's result.
 ResultMetadata middleware.Metadata

 noSmithyDocumentSerde
}

func (c *Client) addOperationDeleteLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
 if err := stack.Serialize.Add(&setOperationInputMiddleware{}, middleware.After); err != nil {
  return err
 }
 err = stack.Serialize.Add(&awsAwsjson11_serializeOpDeleteLicense{}, middleware.After)
 if err != nil {
  return err
 }
 err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpDeleteLicense{}, middleware.After)
 if err != nil {
  return err
 }
 if err := addProtocolFinalizerMiddlewares(stack, options, "DeleteLicense"); err != nil {
  return fmt.Errorf("add protocol finalizers: %v", err)
 }

 if err = addlegacyEndpointContextSetter(stack, options); err !=
 nil {
  return err
 }
 if err = addSetLoggerMiddleware(stack, options); err != nil {
  return err
 }
```

```
 if err = addClientRequestID(stack); err != nil {
  return err
 }
 if err = addComputeContentLength(stack); err != nil {
  return err
 }
 if err = addResolveEndpointMiddleware(stack, options); err != nil {
  return err
 }
 if err = addComputePayloadSHA256(stack); err != nil {
  return err
 }
 if err = addRetry(stack, options, c); err != nil {
  return err
 }
 if err = addRawResponseToMetadata(stack); err != nil {
  return err
 }
 if err = addRecordResponseTiming(stack); err != nil {
  return err
 }
 if err = addSpanRetryLoop(stack, options); err != nil {
  return err
 }
 if err = addClientUserAgent(stack, options); err != nil {
  return err
 }
 if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
  return err
 }
 if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
  return err
 }
 if err = addSetLegacyContextSigningOptionsMiddleware(stack); err
 != nil {
  return err
 }
 if err = addUserAgentRetryMode(stack, options); err != nil {
  return err
 }
 if err = addCredentialSource(stack, options); err != nil {
  return err
 }
 if err = addOpDeleteLicenseValidationMiddleware(stack); err != nil {
  return err
 }
 if err = stack.Initialize.Add(newServiceMetadataMiddleware_opDeleteLicense(options.Region),
middleware.Before); err != nil {
```

```
 return err
 }
 if err = addRecursionDetection(stack); err != nil {
  return err
 }
 if err = addRequestIDRetrieverMiddleware(stack); err != nil {
  return err
 }
 if err = addResponseErrorMiddleware(stack); err != nil {
  return err
 }
 if err = addRequestResponseLogging(stack, options); err != nil {
  return err
 }
 if err = addDisableHTTPSMiddleware(stack, options); err != nil {
  return err
 }
 if err = addInterceptBeforeRetryLoop(stack, options); err != nil {
  return err
 }
 if err = addInterceptAttempt(stack, options); err != nil {
  return err
 }
 if err = addInterceptors(stack, options); err
 != nil {
  return err
 }
 return nil
}

func newServiceMetadataMiddleware_opDeleteLicense(region string) *awsmiddleware.RegisterServiceMetadata {
 return &awsmiddleware.RegisterServiceMetadata{
  Region:       region,
  ServiceID:     ServiceID,
  OperationName: "DeleteLicense",
 }
}
// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import (
 "context"
 "fmt"
 awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
 "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
 "github.com/aws/smithy-go/middleware"
 smithyhttp "github.com/aws/smithy-go/transport/http"
```

```
)

// Lists the licenses for your account.
func (c *Client) ListLicenses(ctx context.Context, params *ListLicensesInput, optFns ...func(*Options))
(*ListLicensesOutput, error) {
 if params == nil {
  params = &ListLicensesInput{}
 }

 result, metadata, err := c.invokeOperation(ctx, "ListLicenses", params, optFns,
c.addOperationListLicensesMiddlewares)
 if err != nil {
  return nil, err
 }

 out := result.(*ListLicensesOutput)
 out.ResultMetadata = metadata
 return out, nil
}

type ListLicensesInput struct {

 // Filters to scope the results. The following filters are supported:
 //
 //   - Beneficiary
 //
 //   - ProductSKU
 //
 //   - Fingerprint
 //
 //   - Status
 Filters
 []types.Filter

 // Amazon Resource Names (ARNs) of the licenses.
 LicenseArns []string

 // Maximum number of results to return in a single call.
 MaxResults *int32

 // Token for the next set of results.
 NextToken *string

 noSmithyDocumentSerde
}

type ListLicensesOutput struct {
```

```
 // License details.
 Licenses []types.License

 // Token for the next set of results.
 NextToken *string

 // Metadata pertaining to the operation's result.
 ResultMetadata middleware.Metadata

 noSmithyDocumentSerde
}

func (c *Client) addOperationListLicensesMiddlewares(stack *middleware.Stack, options Options) (err error) {
 if err := stack.Serialize.Add(&setOperationInputMiddleware{}, middleware.After); err != nil {
  return err
 }
 err = stack.Serialize.Add(&awsAwsjson11_serializeOpListLicenses{}, middleware.After)
 if err != nil {
  return err
 }
 err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpListLicenses{}, middleware.After)
 if err != nil {
  return err
 }
 if err := addProtocolFinalizerMiddlewares(stack,
 options, "ListLicenses"); err != nil {
  return fmt.Errorf("add protocol finalizers: %v", err)
 }

 if err = addlegacyEndpointContextSetter(stack, options); err != nil {
  return err
 }
 if err = addSetLoggerMiddleware(stack, options); err != nil {
  return err
 }
 if err = addClientRequestID(stack); err != nil {
  return err
 }
 if err = addComputeContentLength(stack); err != nil {
  return err
 }
 if err = addResolveEndpointMiddleware(stack, options); err != nil {
  return err
 }
 if err = addComputePayloadSHA256(stack); err != nil {
  return err
 }
 if err = addRetry(stack, options, c); err != nil {
```

```
 return err
}
if err = addRawResponseToMetadata(stack); err != nil {
 return err
}
if err = addRecordResponseTiming(stack); err != nil {
 return err
}
if err = addSpanRetryLoop(stack, options); err != nil {
 return err
}
if err = addClientUserAgent(stack, options); err != nil {
 return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack);
err != nil {
 return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
 return err
}
if err = addSetLegacyContextSigningOptionsMiddleware(stack); err != nil {
 return err
}
if err = addUserAgentRetryMode(stack, options); err != nil {
 return err
}
if err = addCredentialSource(stack, options); err != nil {
 return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opListLicenses(options.Region), middleware.Before);
err != nil {
 return err
}
if err = addRecursionDetection(stack); err != nil {
 return err
}
if err = addRequestIDRetrieverMiddleware(stack); err != nil {
 return err
}
if err = addResponseErrorMiddleware(stack); err != nil {
 return err
}
if err = addRequestResponseLogging(stack, options); err != nil {
 return err
}
if err = addDisableHTTPSMiddleware(stack, options); err != nil {
 return err
```

```
 }
 if err = addInterceptBeforeRetryLoop(stack, options); err != nil {
  return err
 }
 if err = addInterceptAttempt(stack,
 options); err != nil {
  return err
 }
 if err = addInterceptors(stack, options); err != nil {
  return err
 }
 return nil
}

func newServiceMetadataMiddleware_opListLicenses(region string) *awsmiddleware.RegisterServiceMetadata {
 return &awsmiddleware.RegisterServiceMetadata{
  Region:        region,
  ServiceID:     ServiceID,
  OperationName: "ListLicenses",
 }
}
DeleteLicense
 Initialize stack step
  RegisterServiceMetadata
  legacyEndpointContextSetter
  SetLogger
  OperationInputValidation
 Serialize stack step
  setOperationInput
  ResolveEndpoint
  OperationSerializer
 Build stack step
  ClientRequestID
  ComputeContentLength
  SetCredentialSourceMiddleware
  UserAgent
  RecursionDetection
 Finalize stack step
  spanRetryLoop
  InterceptBeforeRetryLoop
  Retry
  InterceptAttempt
  RetryMetricsHeader
  ResolveAuthScheme
  GetIdentity
  ResolveEndpointV2
  disableHTTPS
  ComputePayloadHash
```

setLegacyContextSigningOptions
Signing
Deserialize stack step
AddRawResponseToMetadata
ErrorCloseResponseBody
CloseResponseBody
ResponseErrorWrapper
RequestIDRetriever
OperationDeserializer
RecordResponseTiming
RequestResponseLogger
GetLicense
Initialize stack step
RegisterServiceMetadata
legacyEndpointContextSetter
SetLogger
OperationInputValidation
Serialize stack step
setOperationInput
ResolveEndpoint
OperationSerializer
Build stack step
ClientRequestID
ComputeContentLength
SetCredentialSourceMiddleware
UserAgent
RecursionDetection
Finalize stack step
spanRetryLoop
InterceptBeforeRetryLoop
Retry
InterceptAttempt
RetryMetricsHeader
ResolveAuthScheme
GetIdentity
ResolveEndpointV2
disableHTTPS
ComputePayloadHash
setLegacyContextSigningOptions
Signing
Deserialize stack step
AddRawResponseToMetadata
ErrorCloseResponseBody
CloseResponseBody
ResponseErrorWrapper
RequestIDRetriever
OperationDeserializer
RecordResponseTiming

RequestResponseLogger
CheckoutBorrowLicense
Initialize stack step
RegisterServiceMetadata
legacyEndpointContextSetter
SetLogger
OperationInputValidation
Serialize stack step
setOperationInput
ResolveEndpoint
OperationSerializer
Build stack step
ClientRequestID
ComputeContentLength
SetCredentialSourceMiddleware
UserAgent
RecursionDetection
Finalize stack step
spanRetryLoop
InterceptBeforeRetryLoop
Retry
InterceptAttempt
RetryMetricsHeader
ResolveAuthScheme
GetIdentity
ResolveEndpointV2
disableHTTPS
ComputePayloadHash
setLegacyContextSigningOptions
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Deserialize stack step
AddRawResponseToMetadata
ErrorCloseResponseBody
CloseResponseBody
ResponseErrorWrapper
RequestIDRetriever
OperationDeserializer
RecordResponseTiming
RequestResponseLogger
ListReceivedLicenses
Initialize stack step
RegisterServiceMetadata
legacyEndpointContextSetter
SetLogger
Serialize stack step
setOperationInput
ResolveEndpoint
OperationSerializer

Build stack step
ClientRequestID
ComputeContentLength
SetCredentialSourceMiddleware
UserAgent
RecursionDetection
Finalize stack step
spanRetryLoop
InterceptBeforeRetryLoop
Retry
InterceptAttempt
RetryMetricsHeader
ResolveAuthScheme
GetIdentity
ResolveEndpointV2
disableHTTPS
ComputePayloadHash
setLegacyContextSigningOptions
Signing
Deserialize stack step
AddRawResponseToMetadata
ErrorCloseResponseBody
CloseResponseBody
ResponseErrorWrapper
RequestIDRetriever
OperationDeserializer
RecordResponseTiming
RequestResponseLogger


```
{
  "smithy": "2.0",
  "shapes": {
    "com.amazonaws.licensemanagerusersubscriptions#AccessDeniedException": {
      "type": "structure",
      "members": {
        "message": {
          "target": "smithy.api#String"
        }
      },
      "traits": {
        "smithy.api#documentation": "<p>You don't have sufficient access to perform this action.</p>",
        "smithy.api#error": "client"
      }
    },
    "com.amazonaws.licensemanagerusersubscriptions#ActiveDirectoryIdentityProvider": {
      "type": "structure",
      "members": {
        "DirectoryId": {
          "target": "com.amazonaws.licensemanagerusersubscriptions#Directory",
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"traits": {
"smithy.api#documentation": " The directory ID for an Active Directory identity provider. "
}
},
"ActiveDirectorySettings":
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ActiveDirectorySettings",
"traits": {
"smithy.api#documentation": " The <code>ActiveDirectorySettings</code> resource contains details about the Active Directory, including network access details such as domain name and IP addresses, and the credential provider for user administration. "
}
},
"ActiveDirectoryType": {
"target": "com.amazonaws.licensemanagerusersubscriptions#ActiveDirectoryType",
"traits": {
"smithy.api#documentation": " The type of Active Directory  either a self-managed Active Directory or an Amazon Web Services Managed Active Directory. "
}
},
"IsSharedActiveDirectory": {
"target": "smithy.api#Boolean",
"traits": {

"smithy.api#documentation": " Whether this directory is shared from an Amazon Web Services Managed Active Directory. The default value is false. "
}
}
},
"traits": {
"smithy.api#documentation": " Details about an Active Directory identity provider. "
}
},
"com.amazonaws.licensemanagerusersubscriptions#ActiveDirectorySettings": {
"type": "structure",
"members": {
"DomainName": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The domain name for the Active Directory. "
}
},
"DomainIpv4List": {
"target": "com.amazonaws.licensemanagerusersubscriptions#IpV4List",
"traits": {
"smithy.api#documentation": " A list of domain IPv4 addresses that are used for the Active Directory. ",
"smithy.api#length": {

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                "min": 1,
                "max": 2
            }
        }
    },
    "DomainIpv6List": {
        "target": "com.amazonaws.licensemanagerusersubscriptions#IpV6List",
        "traits": {
            "smithy.api#documentation": "<p>A list of domain IPv6 addresses that are used for the Active
Directory.</p>",
            "smithy.api#length": {
                "min": 1,
                "max": 2
            }
        }
    },
    "DomainCredentialsProvider": {
        "target": "com.amazonaws.licensemanagerusersubscriptions#CredentialsProvider",
        "traits": {
            "smithy.api#documentation": "<p>Points to the <code>CredentialsProvider</code>
 resource that contains information about the credential provider for user administration.</p>"
        }
    },
    "DomainNetworkSettings": {
        "target": "com.amazonaws.licensemanagerusersubscriptions#DomainNetworkSettings",
        "traits": {
            "smithy.api#documentation": "<p>The <code>DomainNetworkSettings</code> resource contains an
array of subnets that apply for the Active Directory.</p>"
        }
    }
},
"traits": {
    "smithy.api#documentation": "<p>Contains network access and credential details that are needed for user
administration in the Active Directory.</p>"
}
},
"com.amazonaws.licensemanagerusersubscriptions#ActiveDirectoryType": {
    "type": "string",
    "traits": {
        "smithy.api#enum": [
            {
                "name": "SELF_MANAGED",
                 "value": "SELF_MANAGED",
                "documentation": "SELF_MANAGED type of Active Directory"
            },
            {
                "name": "AWS_MANAGED",
                "value": "AWS_MANAGED",
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"documentation": "AWS_MANAGED type of Active Directory"
}
]
}
},
"com.amazonaws.licensemanagerusersubscriptions#Arn": {
"type": "string",
"traits": {
"smithy.api#pattern": "^arn:[a-z0-9-\\.]{1,63}:[a-z0-9-\\.]{1,63}:[a-z0-9-\\.]{1,63}:[a-z0-9-\\.]{1,63}:[a-zA-Z0-9-\\.]{1,510}/[a-zA-Z0-9-\\.]{1,510}$"
}
},
"com.amazonaws.licensemanagerusersubscriptions#AssociateUser": {
"type": "operation",
"input": {
"target": "com.amazonaws.licensemanagerusersubscriptions#AssociateUserRequest"
},
"output": {

"target": "com.amazonaws.licensemanagerusersubscriptions#AssociateUserResponse"
},
"errors": [
{
"target": "com.amazonaws.licensemanagerusersubscriptions#AccessDeniedException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ConflictException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#InternalServerException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ResourceNotFoundException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ServiceQuotaExceededException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ThrottlingException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ValidationException"
}
],
"traits": {
"smithy.api#documentation": " Associates the user to an EC2 instance to utilize user-based subscriptions. <note> Your estimated bill for charges on the number of users and related costs will take 48

hours to appear for billing periods that haven't closed (marked as Pending billing status) in Amazon Web Services Billing. For more information, see <a href=\"https://docs.aws.amazon.com/awsaccountbilling/latest/aboutv2/invoice.html\">Viewing your monthly charges</a> in the Amazon Web Services Billing User Guide. </note>",
            "smithy.api#http": {
                "code": 200,
                "method": "POST",
                "uri": "/user/AssociateUser"
            },
            "smithy.api#idempotent": {}
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#AssociateUserRequest":
{
        "type": "structure",
        "members": {
            "Username": {
                "target": "smithy.api#String",
                "traits": {
                    "smithy.api#documentation": " The user name from the identity provider. ",
                    "smithy.api#required": {}
                }
            },
            "InstanceId": {
                "target": "smithy.api#String",
                "traits": {
                    "smithy.api#documentation": " The ID of the EC2 instance that provides the user-based subscription. ",
                    "smithy.api#required": {}
                }
            },
            "IdentityProvider": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#IdentityProvider",
                "traits": {
                    "smithy.api#documentation": " The identity provider for the user. ",

             "smithy.api#required": {}
                }
            },
            "Domain": {
                "target": "smithy.api#String",
                "traits": {
                    "smithy.api#documentation": " The domain name of the Active Directory that contains information for the user to associate. "
                }
            },
            "Tags": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#Tags",

"traits": {
"smithy.api#documentation": " The tags that apply for the user association. "
}
}
},
"traits": {
"smithy.api#input": {}
}
},
"com.amazonaws.licensemanagerusersubscriptions#AssociateUserResponse": {
"type": "structure",
"members": {
"InstanceUserSummary": {
"target": "com.amazonaws.licensemanagerusersubscriptions#InstanceUserSummary",
"traits": {
"smithy.api#documentation": " Metadata that describes the associate user operation. ",
"smithy.api#required": {}
}
}
},
"traits": {
"smithy.api#output": {}
}
},
"com.amazonaws.licensemanagerusersubscriptions#BoxInteger": {
"type": "integer"
},
"com.amazonaws.licensemanagerusersubscriptions#ConflictException": {
"type": "structure",
"members": {
"message": {
"target": "smithy.api#String"
}
},
"traits": {
"smithy.api#documentation": " The request couldn't be completed because it conflicted with the current state of the resource. ",
"smithy.api#error": "server"
}

},
"com.amazonaws.licensemanagerusersubscriptions#CreateLicenseServerEndpoint": {
"type": "operation",
"input": {
"target": "com.amazonaws.licensemanagerusersubscriptions#CreateLicenseServerEndpointRequest"
},
"output": {
"target": "com.amazonaws.licensemanagerusersubscriptions#CreateLicenseServerEndpointResponse"

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        },
        "errors": [
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#AccessDeniedException"
            },
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#ConflictException"
            },
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#InternalServerException"
            },
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#ResourceNotFoundException"
            },

        {
                "target": "com.amazonaws.licensemanagerusersubscriptions#ServiceQuotaExceededException"
            },
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#ThrottlingException"
            },
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#ValidationException"
            }
        ],
        "traits": {
            "smithy.api#documentation": "<p>Creates a network endpoint for the Remote Desktop Services (RDS)
license server.</p>",
            "smithy.api#http": {
                "code": 200,
                "method": "POST",
                "uri": "/license-server/CreateLicenseServerEndpoint"
            },
            "smithy.api#idempotent": {}
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#CreateLicenseServerEndpointRequest": {
        "type": "structure",
        "members":
 {
            "IdentityProviderArn": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#Arn",
                "traits": {
                    "smithy.api#documentation": "<p>The Amazon Resource Name (ARN) that identifies the
<code>IdentityProvider</code> resource that contains details about a registered identity provider. In the case of
Active Directory, that can be a self-managed Active Directory or an Amazon Web Services Managed Active
Directory that contains user identity details.</p>",
                    "smithy.api#required": {}
```

```
                }
            },
            "LicenseServerSettings": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#LicenseServerSettings",
                "traits": {
                    "smithy.api#documentation": "<p>The <code>LicenseServerSettings</code> resource to create for
the endpoint. The settings include the type of license server and the Secrets Manager
 secret that enables administrators to add or remove users associated with the license server.</p>",
                    "smithy.api#required": {}
                }
            },
            "Tags": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#Tags",
                "traits": {
                    "smithy.api#documentation": "<p>The tags that apply for the license server endpoint.</p>"
                }
            }
        },
        "traits": {
            "smithy.api#input": {}
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#CreateLicenseServerEndpointResponse": {
        "type": "structure",
        "members": {
            "IdentityProviderArn": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#Arn",
                "traits": {
                    "smithy.api#documentation": "<p>The Amazon Resource Name (ARN) of the identity
 provider specified in the request.</p>"
                }
            },
            "LicenseServerEndpointArn": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#Arn",
                "traits": {
                    "smithy.api#documentation": "<p>The ARN of the <code>LicenseServerEndpoint</code>
resource.</p>"
                }
            }
        },
        "traits": {
            "smithy.api#output": {}
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#CredentialsProvider": {
        "type": "union",
        "members": {
            "SecretsManagerCredentialsProvider": {
```

"target": "com.amazonaws.licensemanagerusersubscriptions#SecretsManagerCredentialsProvider",
"traits": {
"smithy.api#documentation": " Identifies the Secrets Manager secret that contains credentials needed for user administration in
the Active Directory. "
}
}
},
"traits": {
"smithy.api#documentation": " Contains information about the credential provider for user administration. "
}
},
"com.amazonaws.licensemanagerusersubscriptions#DeleteLicenseServerEndpoint": {
"type": "operation",
"input": {
"target": "com.amazonaws.licensemanagerusersubscriptions#DeleteLicenseServerEndpointRequest"
},
"output": {
"target": "com.amazonaws.licensemanagerusersubscriptions#DeleteLicenseServerEndpointResponse"
},
"errors": [
{
"target": "com.amazonaws.licensemanagerusersubscriptions#AccessDeniedException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ConflictException"
},
{

"target": "com.amazonaws.licensemanagerusersubscriptions#InternalServerException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ResourceNotFoundException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ServiceQuotaExceededException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ThrottlingException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ValidationException"
}
],
"traits": {
"smithy.api#documentation": " Deletes a <code>LicenseServerEndpoint</code> resource. ",
"smithy.api#http": {

"code": 200,
"method": "POST",
"uri": "/license-server/DeleteLicenseServerEndpoint"

},
"smithy.api#idempotent": {}
}
},
"com.amazonaws.licensemanagerusersubscriptions#DeleteLicenseServerEndpointRequest": {
"type": "structure",
"members": {
"LicenseServerEndpointArn": {
"target": "com.amazonaws.licensemanagerusersubscriptions#Arn",
"traits": {
"smithy.api#documentation": " The Amazon Resource Name (ARN) that identifies the
<code>LicenseServerEndpoint</code> resource to delete. ",
"smithy.api#required": {}
}
},
"ServerType": {
"target": "com.amazonaws.licensemanagerusersubscriptions#ServerType",
"traits": {
"smithy.api#documentation": " The type of License Server that the delete request refers to. ",
"smithy.api#required": {}

}
}
},
"traits": {
"smithy.api#input": {}
}
},
"com.amazonaws.licensemanagerusersubscriptions#DeleteLicenseServerEndpointResponse": {
"type": "structure",
"members": {
"LicenseServerEndpoint": {
"target": "com.amazonaws.licensemanagerusersubscriptions#LicenseServerEndpoint",
"traits": {
"smithy.api#documentation": " Shows details from the <code>LicenseServerEndpoint</code>
resource that was deleted. "
}
}
},
"traits": {
"smithy.api#output": {}
}
},
"com.amazonaws.licensemanagerusersubscriptions#DeregisterIdentityProvider": {

"type": "operation",
"input": {
"target": "com.amazonaws.licensemanagerusersubscriptions#DeregisterIdentityProviderRequest"

},
"output": {
"target": "com.amazonaws.licensemanagerusersubscriptions#DeregisterIdentityProviderResponse"
},
"errors": [
{
"target": "com.amazonaws.licensemanagerusersubscriptions#AccessDeniedException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ConflictException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#InternalServerException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ResourceNotFoundException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ServiceQuotaExceededException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ThrottlingException"

},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ValidationException"
}
],
"traits": {
"smithy.api#documentation": " Deregisters the Active Directory identity provider from License Manager user-based subscriptions. ",
"smithy.api#http": {
"code": 200,
"method": "POST",
"uri": "/identity-provider/DeregisterIdentityProvider"
},
"smithy.api#idempotent": {}
}
},
"com.amazonaws.licensemanagerusersubscriptions#DeregisterIdentityProviderRequest": {
"type": "structure",
"members": {
"IdentityProvider": {
"target": "com.amazonaws.licensemanagerusersubscriptions#IdentityProvider",

"traits": {
"smithy.api#documentation": " An object that specifies details for the Active Directory identity provider. "
}
},
"Product": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The name of the user-based subscription product. Valid values: <code>VISUAL_STUDIO_ENTERPRISE</code> | <code>VISUAL_STUDIO_PROFESSIONAL</code> | <code>OFFICE_PROFESSIONAL_PLUS</code> | <code>REMOTE_DESKTOP_SERVICES</code> "
}
},
"IdentityProviderArn": {
"target": "com.amazonaws.licensemanagerusersubscriptions#Arn",
"traits": {
"smithy.api#documentation": " The Amazon Resource Name (ARN) that identifies the identity provider to deregister. "
}
}
},
"traits": {
"smithy.api#input": {}
}
},

"com.amazonaws.licensemanagerusersubscriptions#DeregisterIdentityProviderResponse": {
"type": "structure",
"members": {
"IdentityProviderSummary": {
"target": "com.amazonaws.licensemanagerusersubscriptions#IdentityProviderSummary",
"traits": {
"smithy.api#documentation": " Metadata that describes the results of an identity provider operation. ",
"smithy.api#required": {}
}
}
},
"traits": {
"smithy.api#output": {}
}
},
"com.amazonaws.licensemanagerusersubscriptions#Directory": {
"type": "string",
"traits": {
"smithy.api#pattern": "^(d|sd)-[0-9a-f]{10}$"
}
},

"com.amazonaws.licensemanagerusersubscriptions#DisassociateUser": {
"type": "operation",
"input": {

"target": "com.amazonaws.licensemanagerusersubscriptions#DisassociateUserRequest"
},
"output": {
"target": "com.amazonaws.licensemanagerusersubscriptions#DisassociateUserResponse"
},
"errors": [
{
"target": "com.amazonaws.licensemanagerusersubscriptions#AccessDeniedException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ConflictException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#InternalServerException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ResourceNotFoundException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ServiceQuotaExceededException"
},
{

"target": "com.amazonaws.licensemanagerusersubscriptions#ThrottlingException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ValidationException"
}
],
"traits": {
"smithy.api#documentation": " Disassociates the user from an EC2 instance providing user-based subscriptions. ",
"smithy.api#http": {
"code": 200,
"method": "POST",
"uri": "/user/DisassociateUser"
},
"smithy.api#idempotent": {}
}
},
"com.amazonaws.licensemanagerusersubscriptions#DisassociateUserRequest": {
"type": "structure",
"members": {
"Username": {

"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The user name from the Active Directory identity provider for the user. "
}
},
"InstanceId": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The ID of the EC2 instance which provides user-based subscriptions. "
}
},
"IdentityProvider": {
"target": "com.amazonaws.licensemanagerusersubscriptions#IdentityProvider",
"traits": {
"smithy.api#documentation": " An object that specifies details for the Active Directory identity provider. "
}
},
"InstanceUserArn": {
"target": "com.amazonaws.licensemanagerusersubscriptions#Arn",
"traits": {
"smithy.api#documentation": " The Amazon Resource Name (ARN) of the user to disassociate from the EC2 instance. "
}
},
"Domain": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The domain name of the Active Directory that contains information for the user to disassociate. "
}
}
},
"traits": {
"smithy.api#input": {}
}
},
"com.amazonaws.licensemanagerusersubscriptions#DisassociateUserResponse": {
"type": "structure",
"members": {
"InstanceUserSummary": {
"target": "com.amazonaws.licensemanagerusersubscriptions#InstanceUserSummary",
"traits": {
"smithy.api#documentation": " Metadata that describes the associate user operation. ",
"smithy.api#required": {}
}

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            }
        },

    "traits": {
            "smithy.api#output": {}
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#DomainNetworkSettings": {
        "type": "structure",
        "members": {
            "Subnets": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#Subnets",
                "traits": {
                    "smithy.api#documentation": "<p>Contains a list of subnets that apply for the Active Directory
domain.</p>",
                    "smithy.api#length": {
                        "min": 1
                    },
                    "smithy.api#required": {}
                }
            }
        },
        "traits": {
            "smithy.api#documentation": "<p>Contains network settings for the Active Directory domain.</p>"
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#Filter": {
        "type": "structure",
        "members":
 {
            "Attribute": {
                "target": "smithy.api#String",
                "traits": {
                    "smithy.api#documentation": "<p>The name of an attribute to use as a filter.</p>"
                }
            },
            "Operation": {
                "target": "smithy.api#String",
                "traits": {
                    "smithy.api#documentation": "<p>The type of search (For example, eq, geq, leq)</p>"
                }
            },
            "Value": {
                "target": "smithy.api#String",
                "traits": {
                    "smithy.api#documentation": "<p>Value of the filter.</p>"
                }
            }
```

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        },
        "traits": {
            "smithy.api#documentation": "<p>A filter name and value pair that is used to return more specific results
from a describe or list operation. You can use filters can be used to match a set
 of resources by specific criteria, such as tags, attributes, or IDs.</p>"
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#FilterList": {
        "type": "list",
        "member": {
            "target": "com.amazonaws.licensemanagerusersubscriptions#Filter"
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#IdentityProvider": {
        "type": "union",
        "members": {
            "ActiveDirectoryIdentityProvider": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#ActiveDirectoryIdentityProvider",
                "traits": {
                    "smithy.api#documentation": "<p>The <code>ActiveDirectoryIdentityProvider</code> resource
contains settings and other details about a specific Active Directory identity provider.</p>"
                }
            }
        },
        "traits": {
            "smithy.api#documentation": "<p>Refers to
 an identity provider.</p>"
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#IdentityProviderSummary": {
        "type": "structure",
        "members": {
            "IdentityProvider": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#IdentityProvider",
                "traits": {
                    "smithy.api#documentation": "<p>The <code>IdentityProvider</code> resource contains information
about an identity provider.</p>",
                    "smithy.api#required": {}
                }
            },
            "Settings": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#Settings",
                "traits": {
                    "smithy.api#documentation": "<p>The <code>Settings</code> resource contains details about the
registered identity providers product related configuration settings, such as the subnets to provision VPC
endpoints.</p>",
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"smithy.api#required": {}
}
},
"Product": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The name of the user-based subscription product. ",
"smithy.api#required": {}
}
},
"Status": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The status of the identity provider. ",
"smithy.api#required": {}
}
},
"IdentityProviderArn": {
"target": "com.amazonaws.licensemanagerusersubscriptions#Arn",
"traits": {
"smithy.api#documentation": " The Amazon Resource Name (ARN) of the identity provider. "
}

},
"FailureMessage": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The failure message associated with an identity provider. "
}
},
"OwnerAccountId": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The AWS Account ID of the owner of this resource. "
}
}
},
"traits": {
"smithy.api#documentation": " Describes an identity provider. "
}
},
"com.amazonaws.licensemanagerusersubscriptions#IdentityProviderSummaryList": {
"type": "list",
"member": {
"target": "com.amazonaws.licensemanagerusersubscriptions#IdentityProviderSummary"
}
},
"com.amazonaws.licensemanagerusersubscriptions#InstanceSummary":

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{
        "type": "structure",
        "members": {
          "InstanceId": {
            "target": "smithy.api#String",
            "traits": {
              "smithy.api#documentation": "<p>The ID of the EC2 instance, which provides user-based
subscriptions.</p>",
              "smithy.api#required": {}
            }
          },
          "Status": {
            "target": "smithy.api#String",
            "traits": {
              "smithy.api#documentation": "<p>The status of an EC2 instance resource.</p>",
              "smithy.api#required": {}
            }
          },
          "Products": {
            "target": "com.amazonaws.licensemanagerusersubscriptions#StringList",
            "traits": {
              "smithy.api#documentation": "<p>A list of provided user-based subscription
products.</p>",
              "smithy.api#required": {}
            }
          },
          "LastStatusCheckDate": {
            "target": "smithy.api#String",
            "traits": {
              "smithy.api#documentation": "<p>The date of the last status check.</p>"
            }
          },
          "StatusMessage": {
            "target": "smithy.api#String",
            "traits": {
              "smithy.api#documentation": "<p>The status message for an EC2 instance.</p>"
            }
          },
          "OwnerAccountId": {
            "target": "smithy.api#String",
            "traits": {
              "smithy.api#documentation": "<p>The AWS Account ID of the owner of this resource.</p>"
            }
          },
          "IdentityProvider": {
            "target": "com.amazonaws.licensemanagerusersubscriptions#IdentityProvider",
             "traits": {
              "smithy.api#documentation": "<p>The <code>IdentityProvider</code> resource specifies details
```

about the identity provider. "
}
}
},
"traits": {
"smithy.api#documentation": " Describes an EC2 instance providing user-based subscriptions. "
}
},
"com.amazonaws.licensemanagerusersubscriptions#InstanceSummaryList": {
"type": "list",
"member": {
"target": "com.amazonaws.licensemanagerusersubscriptions#InstanceSummary"
}
},
"com.amazonaws.licensemanagerusersubscriptions#InstanceUserSummary": {
"type": "structure",
"members": {
"Username": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The user name
from the identity provider for the user. ",
"smithy.api#required": {}
}
},
"InstanceId": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The ID of the EC2 instance that provides user-based
subscriptions. ",
"smithy.api#required": {}
}
},
"IdentityProvider": {
"target": "com.amazonaws.licensemanagerusersubscriptions#IdentityProvider",
"traits": {
"smithy.api#documentation": " The <code>IdentityProvider</code> resource specifies details
about the identity provider. ",
"smithy.api#required": {}
}
},
"Status": {
"target": "smithy.api#String",
"traits": {

"smithy.api#documentation": " The status of a user associated with an EC2 instance. ",
"smithy.api#required": {}
}

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            },
            "InstanceUserArn": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#Arn",
                "traits": {
                    "smithy.api#documentation": "<p>The Amazon Resource Name (ARN) that identifies the instance
user.</p>"
                }
            },
            "StatusMessage": {
                "target": "smithy.api#String",
                "traits": {
                    "smithy.api#documentation": "<p>The status message for users of an EC2 instance.</p>"
                }
            },
            "Domain": {
                "target": "smithy.api#String",
                "traits": {
                    "smithy.api#documentation": "<p>The domain name of the Active Directory that
 contains the user information for the product subscription.</p>"
                }
            },
            "AssociationDate": {
                "target": "smithy.api#String",
                "traits": {
                    "smithy.api#documentation": "<p>The date a user was associated with an EC2 instance.</p>"
                }
            },
            "DisassociationDate": {
                "target": "smithy.api#String",
                "traits": {
                    "smithy.api#documentation": "<p>The date a user was disassociated from an EC2 instance.</p>"
                }
            }
        },
        "traits": {
            "smithy.api#documentation": "<p>Describes users of an EC2 instance providing user-based
subscriptions.</p>"
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#InstanceUserSummaryList": {
        "type": "list",
        "member": {

    "target": "com.amazonaws.licensemanagerusersubscriptions#InstanceUserSummary"
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#InternalServerException": {
        "type": "structure",
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        "members": {
            "message": {
                "target": "smithy.api#String"
            }
        },
        "traits": {
            "smithy.api#documentation": "<p>An exception occurred with the service.</p>",
            "smithy.api#error": "server",
            "smithy.api#httpError": 500
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#IpV4": {
        "type": "string",
        "traits": {
            "smithy.api#pattern": "^(?:(25[0-5]|2[0-4][0-9]|1[0-9][0-9]|[1-9][0-9]|[0-9])(\\.(?!$)|$)){4}$"
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#IpV4List": {
        "type": "list",
        "member": {
            "target": "com.amazonaws.licensemanagerusersubscriptions#IpV4"
         }
    },
    "com.amazonaws.licensemanagerusersubscriptions#IpV6": {
        "type": "string",
        "traits": {
            "smithy.api#pattern": "^([0-9a-fA-F]{1,4}:){7}[0-9a-fA-F]{1,4}|::|::[0-9a-fA-F]{1,4}|([0-9a-fA-
F]{1,4}:){1,7}:|([0-9a-fA-F]{1,4}:){1,6}:[0-9a-fA-F]{1,4}$"
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#IpV6List": {
        "type": "list",
        "member": {
            "target": "com.amazonaws.licensemanagerusersubscriptions#IpV6"
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#LicenseManagerUserSubscriptions": {
        "type": "service",
        "version": "2018-05-10",
        "operations": [
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#AssociateUser"
            },
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#CreateLicenseServerEndpoint"
             },
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#DeleteLicenseServerEndpoint"
```

```
    },
    {
        "target": "com.amazonaws.licensemanagerusersubscriptions#DeregisterIdentityProvider"
    },
    {
        "target": "com.amazonaws.licensemanagerusersubscriptions#DisassociateUser"
    },
    {
        "target": "com.amazonaws.licensemanagerusersubscriptions#ListIdentityProviders"
    },
    {
        "target": "com.amazonaws.licensemanagerusersubscriptions#ListInstances"
    },
    {
        "target": "com.amazonaws.licensemanagerusersubscriptions#ListLicenseServerEndpoints"
    },
    {
        "target": "com.amazonaws.licensemanagerusersubscriptions#ListProductSubscriptions"
    },
    {
        "target": "com.amazonaws.licensemanagerusersubscriptions#ListTagsForResource"
    },
    {
        "target": "com.amazonaws.licensemanagerusersubscriptions#ListUserAssociations"
    },
    {
        "target": "com.amazonaws.licensemanagerusersubscriptions#RegisterIdentityProvider"
    },
    {
        "target": "com.amazonaws.licensemanagerusersubscriptions#StartProductSubscription"
    },
    {
        "target": "com.amazonaws.licensemanagerusersubscriptions#StopProductSubscription"
    },
    {
        "target": "com.amazonaws.licensemanagerusersubscriptions#TagResource"
    },
    {
        "target": "com.amazonaws.licensemanagerusersubscriptions#UntagResource"
    },
    {

        "target": "com.amazonaws.licensemanagerusersubscriptions#UpdateIdentityProviderSettings"
    }
],
"traits": {
    "aws.api#service": {
        "sdkId": "License Manager User Subscriptions",
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"arnNamespace": "license-manager-user-subscriptions",
"cloudTrailEventSource": "license-manager-user-subscriptions.amazonaws.com"
},
"aws.auth#sigv4": {
"name": "license-manager-user-subscriptions"
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"aws.protocols#restJson1": {},
"smithy.api#cors": {
"additionalAllowedHeaders": [
"*",
"content-type",
"x-amz-content-sha256",
"x-amz-user-agent",
"x-amzn-platform-id",
"x-amzn-trace-id",
"content-length",
"x-api-key",
"authorization",
"x-amz-date",
"x-amz-security-token",
"Access-Control-Allow-Headers",
"Access-Control-Allow-Methods",
"Access-Control-Allow-Origin"
],
"additionalExposedHeaders": [
"x-amzn-errortype",
"x-amzn-requestid",
"x-amzn-trace-id"
]
},
"smithy.api#documentation": " With License Manager, you can create user-based subscriptions to utilize licensed software with a per user subscription fee on Amazon EC2 instances. ",
"smithy.api#title": "AWS License Manager User Subscriptions",
"smithy.rules#endpointRuleSet": {
"version": "1.0",
"parameters": {

"Region": {
"builtIn": "AWS::Region",
"required": false,
"documentation": "The AWS region used to dispatch the request.",
"type": "string"
},
"UseDualStack": {
"builtIn": "AWS::UseDualStack",
"required": true,
"default": false,
"documentation": "When true, use the dual-stack endpoint. If the configured endpoint does not

support dual-stack, dispatching the request MAY return an error.",
"type": "boolean"
},
"UseFIPS": {
"builtIn": "AWS::UseFIPS",
"required": true,
"default": false,
"documentation": "When true, send this request to
the FIPS-compliant regional endpoint. If the configured endpoint does not have a FIPS compliant endpoint,
dispatching the request will return an error.",
"type": "boolean"
},
"Endpoint": {
"builtIn": "SDK::Endpoint",
"required": false,
"documentation": "Override the endpoint used to send this request",
"type": "string"
}
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"rules": [
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"conditions": [
{
"fn": "isSet",
"argv": [
{
"ref": "Endpoint"
}
]

}
],
"rules": [
{
"conditions": [
{
"fn": "booleanEquals",
"argv": [
{
"ref": "UseFIPS"
},
true
]
}
],
"error": "Invalid Configuration: FIPS and custom endpoint are not supported",
"type": "error"
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{
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                    "argv": [
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                        "ref": "UseDualStack"
                      },
                      true
                    ]
                  }
                ],
                "error": "Invalid Configuration: Dualstack and custom endpoint are not supported",
                "type": "error"
              },
              {
                "conditions": [],
                "endpoint": {
                  "url": {
                    "ref": "Endpoint"
                  },

            "properties": {},
                  "headers": {}
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                "type": "endpoint"
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            "type": "tree"
            },
            {
              "conditions": [
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                  "fn": "isSet",
                  "argv": [
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                      "ref": "Region"
                    }
                  ]
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              "rules": [
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```

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                "argv": [
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                    "ref": "Region"
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                "assign": "PartitionResult"
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                    "argv": [
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                        "ref": "UseFIPS"
                      },

true
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                  {
                    "fn": "booleanEquals",
                    "argv": [
                      {
                        "ref": "UseDualStack"
                      },
                      true
                    ]
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                "rules": [
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"fn": "booleanEquals",
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                          {
                            "fn": "getAttr",
                            "argv": [
                              {
                                "ref": "PartitionResult"
                              },
                              "supportsFIPS"
                            ]
                          }
```

```
                    ]
                },

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                    "fn": "booleanEquals",
                    "argv": [
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                        {
                            "fn": "getAttr",
                            "argv": [
                                {
                                    "ref": "PartitionResult"
                                },
                                "supportsDualStack"
                            ]
                        }

                ]
                }
            ],
            "rules": [
                {
                    "conditions": [],
                    "endpoint": {
                        "url": "https://license-manager-user-subscriptions-
fips.{Region}.{PartitionResult#dualStackDnsSuffix}",
                        "properties": {},
                        "headers": {}
                    },
                    "type": "endpoint"
                }

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            "type": "tree"
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            "conditions": [],
            "error": "FIPS and DualStack are enabled, but this partition does not support one or
both",
            "type": "error"
        }
    ],
    "type": "tree"
},
{
    "conditions": [
        {
            "fn": "booleanEquals",
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                "argv": [

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            ]
        }
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    "rules": [
        {
            "conditions": [
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                    "fn": "booleanEquals",
                    "argv": [
                        {
                            "fn": "getAttr",
                            "argv": [

        {
                            "ref": "PartitionResult"
                        },
                        "supportsFIPS"
                    ]
                },
                true
            ]
        }
    ],
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            "conditions": [],
            "endpoint": {

"url": "https://license-manager-user-subscriptions-fips.{Region}.{PartitionResult#dnsSuffix}",
                "properties": {},
                "headers": {}
            },
            "type": "endpoint"
        }
    ],
    "type": "tree"
        },
        {
            "conditions": [],
            "error": "FIPS is enabled but this partition does not support FIPS",
            "type": "error"
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                            "argv": [
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                                },
                                true
                            ]
                        }
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            "conditions": [
                                {
                                    "fn": "booleanEquals",
                                    "argv": [
                                        true,
                                        {
                                            "fn": "getAttr",
                                            "argv": [
                                                {
                                                    "ref": "PartitionResult"
                                                },
                                                "supportsDualStack"
                                            ]

             }
                                    ]
                                }
                            ],
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                                {
                                    "conditions": [],
                                    "endpoint": {
                                        "url": "https://license-manager-user-
subscriptions.{Region}.{PartitionResult#dualStackDnsSuffix}",
                                        "properties": {},
                                        "headers": {}
                                    },
                                    "type": "endpoint"
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```

```
                    ],
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                },
                {
                    "conditions": [],
                    "error": "DualStack is enabled but this partition does not support DualStack",
                    "type": "error"
                }
            ],
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            "conditions": [],
            "endpoint": {
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subscriptions.{Region}.{PartitionResult#dnsSuffix}",

            "properties": {},
                "headers": {}
            },
            "type": "endpoint"
        }
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}
],
"type": "tree"
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{
"conditions": [],
"error": "Invalid Configuration: Missing Region",
"type": "error"
}
]
},
"smithy.rules#endpointTests": {
"testCases": [
{
"documentation": "For region us-east-1 with FIPS enabled and DualStack enabled",

"expect": {
"endpoint": {
"url": "https://license-manager-user-subscriptions-fips.us-east-1.api.aws"
}
},
"params": {
"Region": "us-east-1",
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"UseFIPS": true,
"UseDualStack": true
}
},
{
"documentation": "For region us-east-1 with FIPS enabled and DualStack disabled",
"expect": {
"endpoint": {
"url": "https://license-manager-user-subscriptions-fips.us-east-1.amazonaws.com"
}
},
"params": {
"Region": "us-east-1",

"UseFIPS": true,
"UseDualStack": false
}
},
{
"documentation": "For region us-east-1 with FIPS disabled and DualStack enabled",
"expect": {
"endpoint": {
"url": "https://license-manager-user-subscriptions.us-east-1.api.aws"
}
},
"params": {
"Region": "us-east-1",
"UseFIPS": false,
"UseDualStack": true
}
},
{
"documentation": "For region us-east-1 with FIPS disabled and DualStack disabled",
"expect": {

"endpoint": {
"url": "https://license-manager-user-subscriptions.us-east-1.amazonaws.com"
}
},
"params": {
"Region": "us-east-1",
"UseFIPS": false,
"UseDualStack": false
}
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{
"documentation": "For region cn-north-1 with FIPS enabled and DualStack enabled",
"expect": {

"endpoint": {
"url": "https://license-manager-user-subscriptions-fips.cn-north-1.api.amazonwebservices.com.cn"
}
},
"params": {
"Region": "cn-north-1",
"UseFIPS": true,
"UseDualStack": true
}
},
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"documentation": "For region cn-north-1 with FIPS enabled and DualStack disabled",
"expect": {
"endpoint": {
"url": "https://license-manager-user-subscriptions-fips.cn-north-1.amazonaws.com.cn"
}
},
"params": {
"Region": "cn-north-1",
"UseFIPS": true,
"UseDualStack": false
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"documentation": "For region cn-north-1 with FIPS disabled and DualStack enabled",
"expect": {
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}
},
"params": {
"Region": "cn-north-1",
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"UseDualStack": true
}
},
{
"documentation": "For region cn-north-1 with FIPS disabled and DualStack disabled",
"expect": {
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}
},
"params": {
"Region": "cn-north-1",

"UseFIPS":
false,
"UseDualStack": false
}
},
{
"documentation": "For region us-gov-east-1 with FIPS enabled and DualStack enabled",
"expect": {
"endpoint": {
"url": "https://license-manager-user-subscriptions-fips.us-gov-east-1.api.aws"
}
},
"params": {
"Region": "us-gov-east-1",
"UseFIPS": true,
"UseDualStack": true
}
},
{
"documentation": "For region us-gov-east-1 with FIPS enabled and DualStack disabled",
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}
},
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"documentation": "For region us-gov-east-1 with FIPS disabled and DualStack enabled",
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}
},
"params": {
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false,
"UseDualStack": true
}
},
{
"documentation": "For region us-gov-east-1 with FIPS disabled and DualStack disabled",

"expect": {
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"url": "https://license-manager-user-subscriptions.us-gov-east-1.amazonaws.com"
}
},
"params": {
"Region": "us-gov-east-1",
"UseFIPS": false,
"UseDualStack": false
}
},
{
"documentation": "For region us-iso-east-1 with FIPS enabled and DualStack disabled",
"expect": {
"endpoint":
{
"url": "https://license-manager-user-subscriptions-fips.us-iso-east-1.c2s.ic.gov"
}
},
"params": {
"Region": "us-iso-east-1",
"UseFIPS": true,
"UseDualStack": false
}
},
{
"documentation": "For region us-iso-east-1 with FIPS disabled and DualStack disabled",
"expect": {
"endpoint": {
"url": "https://license-manager-user-subscriptions.us-iso-east-1.c2s.ic.gov"
}
},
"params": {
"Region": "us-iso-east-1",
"UseFIPS":
false,
"UseDualStack": false
}
},
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"documentation": "For region us-isob-east-1 with FIPS enabled and DualStack disabled",
"expect": {
"endpoint": {
"url": "https://license-manager-user-subscriptions-fips.us-isob-east-1.sc2s.sgov.gov"
}
},
"params": {
"Region": "us-isob-east-1",

"UseFIPS": true,
"UseDualStack": false
}
},
{
"documentation": "For region us-isob-east-1 with FIPS disabled and DualStack disabled",
"expect": {

"endpoint": {
"url": "https://license-manager-user-subscriptions.us-isob-east-1.sc2s.sgov.gov"
}
},
"params": {
"Region": "us-isob-east-1",
"UseFIPS": false,
"UseDualStack": false
}
},
{
"documentation": "For custom endpoint with region set and fips disabled and dualstack disabled",
"expect": {
"endpoint": {
"url": "https://example.com"
}
},
"params": {
"Region": "us-east-1",
"UseFIPS": false,

"UseDualStack": false,
"Endpoint": "https://example.com"
}
},
{
"documentation": "For custom endpoint with region not set and fips disabled and dualstack disabled",
"expect": {
"endpoint": {
"url": "https://example.com"
}
},
"params": {
"UseFIPS": false,
"UseDualStack": false,
"Endpoint": "https://example.com"
}
},
{

"documentation": "For custom endpoint with fips enabled and dualstack disabled",
"expect": {

"error": "Invalid Configuration: FIPS and custom endpoint are not supported"
},
"params": {
"Region": "us-east-1",
"UseFIPS": true,
"UseDualStack": false,
"Endpoint": "https://example.com"
}
},
{
"documentation": "For custom endpoint with fips disabled and dualstack enabled",
"expect": {
"error": "Invalid Configuration: Dualstack and custom endpoint are not supported"
},
"params": {
"Region": "us-east-1",
"UseFIPS": false,
"UseDualStack": true,
"Endpoint": "https://example.com"
}
},
{
"documentation": "Missing region",
"expect": {
"error": "Invalid Configuration: Missing Region"
}
}
],
"version": "1.0"
}
}
},
"com.amazonaws.licensemanagerusersubscriptions#LicenseServer": {
"type": "structure",
"members": {
"ProvisioningStatus": {
"target":
"com.amazonaws.licensemanagerusersubscriptions#LicenseServerEndpointProvisioningStatus",
"traits": {
"smithy.api#documentation": " The current state of the provisioning process for the RDS license
server. "
}
},
"HealthStatus": {
"target":

"com.amazonaws.licensemanagerusersubscriptions#LicenseServerHealthStatus",
"traits": {
"smithy.api#documentation": " The health status of the RDS license server. "
}
},
"Ipv4Address": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " A list of domain IPv4 addresses that are used for the RDS license server. "
}
},
"Ipv6Address": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " A list of domain IPv6 addresses that are used for the RDS license server. "
}
}
},
"traits": {
"smithy.api#documentation": " Information about a Remote Desktop Services (RDS) license server. "
}
},
"com.amazonaws.licensemanagerusersubscriptions#LicenseServerEndpoint": {
"type": "structure",
"members": {
"IdentityProviderArn": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The Amazon Resource Name (ARN) of the identity provider that's associated with the RDS license server endpoint. "
}
},
"ServerType": {
"target": "com.amazonaws.licensemanagerusersubscriptions#ServerType",
"traits": {
"smithy.api#documentation": " The type of license server. "
}
},
"ServerEndpoint": {
"target": "com.amazonaws.licensemanagerusersubscriptions#ServerEndpoint",
"traits": {
"smithy.api#documentation": " The <code>ServerEndpoint</code> resource contains the network address of the RDS license server endpoint. "
}
},

"StatusMessage": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The message associated with the provisioning status, if there is one. "
}
},
"LicenseServerEndpointId": {
"target": "com.amazonaws.licensemanagerusersubscriptions#LicenseServerEndpointId",
"traits": {
"smithy.api#documentation": " The ID of the license server endpoint. "
}
},
"LicenseServerEndpointArn": {
"target": "com.amazonaws.licensemanagerusersubscriptions#Arn",
"traits": {
"smithy.api#documentation": " The ARN of the <code>ServerEndpoint</code> resource for the RDS license server. "
}
},
"LicenseServerEndpointProvisioningStatus": {
"target": "com.amazonaws.licensemanagerusersubscriptions#LicenseServerEndpointProvisioningStatus",
"traits": {
"smithy.api#documentation": " The current state of the provisioning process for the RDS license server endpoint "
}
},
"LicenseServers": {
"target": "com.amazonaws.licensemanagerusersubscriptions#LicenseServerList",
"traits": {
"smithy.api#documentation": " An array of <code>LicenseServer</code> resources that represent the license servers that are accessed through this endpoint. "
}
},
"CreationTime": {
"target": "smithy.api#Timestamp",

"traits": {
"smithy.api#documentation": " The timestamp when License Manager created the license server endpoint. "
}
}
},
"traits": {
"smithy.api#documentation": " Contains details about a network endpoint for a Remote Desktop Services (RDS) license server. "
}

```
    },
    "com.amazonaws.licensemanagerusersubscriptions#LicenseServerEndpointId": {
        "type": "string"
    },
    "com.amazonaws.licensemanagerusersubscriptions#LicenseServerEndpointList": {
        "type": "list",
        "member": {
            "target": "com.amazonaws.licensemanagerusersubscriptions#LicenseServerEndpoint"
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#LicenseServerEndpointProvisioningStatus": {
        "type": "string",
        "traits": {
            "smithy.api#enum": [
                {

                "name": "PROVISIONING",
                    "value": "PROVISIONING",
                    "documentation": ""
                },
                {
                    "name": "PROVISIONING_FAILED",
                    "value": "PROVISIONING_FAILED",
                    "documentation": ""
                },
                {
                    "name": "PROVISIONED",
                    "value": "PROVISIONED",
                    "documentation": ""
                },
                {
                    "name": "DELETING",
                    "value": "DELETING",
                    "documentation": ""
                },
                {
                    "name": "DELETION_FAILED",
                    "value": "DELETION_FAILED",
                    "documentation": ""
                },
                {
                    "name": "DELETED",

"value": "DELETED",
                    "documentation": ""
                }
            ]
        }
```

```
    },
    "com.amazonaws.licensemanagerusersubscriptions#LicenseServerHealthStatus": {
        "type": "string",
        "traits": {
            "smithy.api#enum": [
                {
                    "name": "HEALTHY",
                    "value": "HEALTHY",
                    "documentation": ""
                },
                {
                    "name": "UNHEALTHY",
                    "value": "UNHEALTHY",
                    "documentation": ""
                },
                {
                    "name": "NOT_APPLICABLE",
                    "value": "NOT_APPLICABLE",
                    "documentation": ""
                }
            ]
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#LicenseServerList": {
        "type": "list",
         "member": {
            "target": "com.amazonaws.licensemanagerusersubscriptions#LicenseServer"
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#LicenseServerSettings": {
        "type": "structure",
        "members": {
            "ServerType": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#ServerType",
                "traits": {
                    "smithy.api#documentation": "<p>The type of license server.</p>",
                    "smithy.api#required": {}
                }
            },
            "ServerSettings": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#ServerSettings",
                "traits": {
                    "smithy.api#documentation": "<p>The <code>ServerSettings</code> resource contains the settings
for your server.</p>",
                    "smithy.api#required": {}
                }
```

}
},
"traits": {
"smithy.api#documentation": " The settings to configure your license server. "
}
},
"com.amazonaws.licensemanagerusersubscriptions#ListIdentityProviders": {
"type": "operation",
"input": {
"target": "com.amazonaws.licensemanagerusersubscriptions#ListIdentityProvidersRequest"
},
"output": {
"target": "com.amazonaws.licensemanagerusersubscriptions#ListIdentityProvidersResponse"
},
"errors": [
{
"target": "com.amazonaws.licensemanagerusersubscriptions#AccessDeniedException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ConflictException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#InternalServerException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ResourceNotFoundException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ServiceQuotaExceededException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ThrottlingException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ValidationException"
}
],
"traits": {
"smithy.api#documentation": " Lists the Active Directory identity providers for user-based subscriptions. ",
"smithy.api#http": {
"code": 200,
"method": "POST",
"uri": "/identity-provider/ListIdentityProviders"
},
"smithy.api#paginated": {
"inputToken": "NextToken",

"outputToken": "NextToken",
"pageSize": "MaxResults",
"items": "IdentityProviderSummaries"
}
}
},
"com.amazonaws.licensemanagerusersubscriptions#ListIdentityProvidersRequest": {
"type": "structure",
"members": {
"MaxResults": {
"target": "com.amazonaws.licensemanagerusersubscriptions#BoxInteger",
"traits": {
"smithy.api#documentation": " The maximum number of results to return from a single request. "
}
},
"Filters": {
"target": "com.amazonaws.licensemanagerusersubscriptions#FilterList",
"traits": {
"smithy.api#documentation": " You can use the following filters to streamline results: <ul> <li> Product </li> <li> DirectoryId </li> </ul>"
}
},
"NextToken": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " A token to specify where to start paginating. This is the nextToken from a previously truncated response. "
}
}
},
"traits": {
"smithy.api#input": {}
}
},
"com.amazonaws.licensemanagerusersubscriptions#ListIdentityProvidersResponse": {
"type": "structure",
"members": {
"IdentityProviderSummaries": {
"target": "com.amazonaws.licensemanagerusersubscriptions#IdentityProviderSummaryList",
"traits": {
"smithy.api#documentation": " An array of <code>IdentityProviderSummary</code> resources that contain details about the Active Directory identity providers that meet the request criteria. ",
"smithy.api#required": {}
}
},
"NextToken": {

"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The next token used for paginated responses. When this field isn't empty, there are additional elements that the service hasn't included in this request. Use this token with the next request to retrieve additional objects. "
}
}
},
"traits": {
"smithy.api#output": {}
}
},
"com.amazonaws.licensemanagerusersubscriptions#ListInstances": {
"type": "operation",
"input": {
"target": "com.amazonaws.licensemanagerusersubscriptions#ListInstancesRequest"
},
"output": {
"target": "com.amazonaws.licensemanagerusersubscriptions#ListInstancesResponse"
},
"errors": [
{
"target": "com.amazonaws.licensemanagerusersubscriptions#AccessDeniedException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ConflictException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#InternalServerException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ResourceNotFoundException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ServiceQuotaExceededException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ThrottlingException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ValidationException"
}
],
"traits": {
"smithy.api#documentation": " Lists the EC2 instances providing user-based subscriptions. ",
"smithy.api#http": {
"code": 200,
"method": "POST",

"uri": "/instance/ListInstances"
},
"smithy.api#paginated": {
"inputToken": "NextToken",
"outputToken": "NextToken",
"pageSize": "MaxResults",
"items": "InstanceSummaries"
}
}
},
"com.amazonaws.licensemanagerusersubscriptions#ListInstancesRequest": {
"type": "structure",
"members": {
"MaxResults": {
"target": "com.amazonaws.licensemanagerusersubscriptions#BoxInteger",
"traits": {
"smithy.api#documentation": " The maximum number of results
to return from a single request. "
}
},
"NextToken": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " A token to specify where to start paginating. This is the nextToken
from a previously truncated response. "
}
},
"Filters": {
"target": "com.amazonaws.licensemanagerusersubscriptions#FilterList",
"traits": {
"smithy.api#documentation": " You can use the following filters to streamline results: <ul>
<li> Status </li> <li> InstanceId </li> </ul>"
}
}
},
"traits": {
"smithy.api#input": {}
}
},
"com.amazonaws.licensemanagerusersubscriptions#ListInstancesResponse": {
"type": "structure",

"members": {
"InstanceSummaries": {
"target": "com.amazonaws.licensemanagerusersubscriptions#InstanceSummaryList",
"traits": {
"smithy.api#documentation": " An array of <code>InstanceSummary</code> resources that
contain details about the instances that provide user-based subscriptions and also meet the request criteria. "

```
            }
          },
          "NextToken": {
            "target": "smithy.api#String",
            "traits": {
              "smithy.api#documentation": "<p>The next token used for paginated responses. When this field isn't empty, there are additional elements that the service hasn't included in this request. Use this token with the next request to retrieve additional objects.</p>"
            }
          }
        },
        "traits": {
          "smithy.api#output": {}
        }
      },
      "com.amazonaws.licensemanagerusersubscriptions#ListLicenseServerEndpoints": {
        "type": "operation",
        "input": {
          "target": "com.amazonaws.licensemanagerusersubscriptions#ListLicenseServerEndpointsRequest"
        },
        "output": {
          "target": "com.amazonaws.licensemanagerusersubscriptions#ListLicenseServerEndpointsResponse"
        },
        "errors": [
          {
            "target": "com.amazonaws.licensemanagerusersubscriptions#AccessDeniedException"
          },
          {
            "target": "com.amazonaws.licensemanagerusersubscriptions#ConflictException"
          },
          {
            "target": "com.amazonaws.licensemanagerusersubscriptions#InternalServerException"
          },
          {
            "target": "com.amazonaws.licensemanagerusersubscriptions#ServiceQuotaExceededException"
          },

      {
            "target": "com.amazonaws.licensemanagerusersubscriptions#ThrottlingException"
          },
          {
            "target": "com.amazonaws.licensemanagerusersubscriptions#ValidationException"
          }
        ],
        "traits": {
          "smithy.api#documentation": "<p>List the Remote Desktop Services (RDS) License Server endpoints </p>",
          "smithy.api#http": {
```

"code": 200,
"method": "POST",
"uri": "/license-server/ListLicenseServerEndpoints"
},
"smithy.api#paginated": {
"inputToken": "NextToken",
"outputToken": "NextToken",
"pageSize": "MaxResults",
"items": "LicenseServerEndpoints"
}
}
},
"com.amazonaws.licensemanagerusersubscriptions#ListLicenseServerEndpointsRequest": {

"type": "structure",
"members": {
"MaxResults": {
"target": "com.amazonaws.licensemanagerusersubscriptions#BoxInteger",
"traits": {
"smithy.api#documentation": " The maximum number of results to return from a single request. ",
"smithy.api#range": {
"min": 1,
"max": 100
}
}
},
"Filters": {
"target": "com.amazonaws.licensemanagerusersubscriptions#FilterList",
"traits": {
"smithy.api#documentation": " You can use the following filters to streamline results: <ul> <li> IdentityProviderArn </li> </ul>"
}
},
"NextToken": {
"target": "smithy.api#String",
"traits": {

"smithy.api#documentation": " A token to specify where to start paginating. This is the nextToken from a previously truncated response. "
}
}
},
"traits": {
"smithy.api#input": {}
}
},
"com.amazonaws.licensemanagerusersubscriptions#ListLicenseServerEndpointsResponse": {

"type": "structure",
"members": {
"LicenseServerEndpoints": {
"target": "com.amazonaws.licensemanagerusersubscriptions#LicenseServerEndpointList",
"traits": {
"smithy.api#documentation": " An array of <code>LicenseServerEndpoint</code> resources that contain detailed information about the RDS License Servers that meet the request criteria. "
}
},
"NextToken": {
"target": "smithy.api#String",
"traits":
{
"smithy.api#documentation": " The next token used for paginated responses. When this field isn't empty, there are additional elements that the service hasn't included in this request. Use this token with the next request to retrieve additional objects. "
}
}
},
"traits": {
"smithy.api#output": {}
}
},
"com.amazonaws.licensemanagerusersubscriptions#ListProductSubscriptions": {
"type": "operation",
"input": {
"target": "com.amazonaws.licensemanagerusersubscriptions#ListProductSubscriptionsRequest"
},
"output": {
"target": "com.amazonaws.licensemanagerusersubscriptions#ListProductSubscriptionsResponse"
},
"errors": [
{
"target": "com.amazonaws.licensemanagerusersubscriptions#AccessDeniedException"
},

{
"target": "com.amazonaws.licensemanagerusersubscriptions#ConflictException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#InternalServerException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ResourceNotFoundException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ServiceQuotaExceededException"
},

```
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#ThrottlingException"
            },
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#ValidationException"
            }
        ],
        "traits": {
            "smithy.api#documentation": "<p>Lists the user-based subscription products available from an identity
provider.</p>",

            "smithy.api#http": {
                "code": 200,
                "method": "POST",
                "uri": "/user/ListProductSubscriptions"
            },
            "smithy.api#paginated": {
                "inputToken": "NextToken",
                "outputToken": "NextToken",
                "pageSize": "MaxResults",
                "items": "ProductUserSummaries"
            }
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#ListProductSubscriptionsRequest": {
        "type": "structure",
        "members": {
            "Product": {
                "target": "smithy.api#String",
                "traits": {
                    "smithy.api#documentation": "<p>The name of the user-based subscription product.</p> <p>Valid
values: <code>VISUAL_STUDIO_ENTERPRISE</code> | <code>VISUAL_STUDIO_PROFESSIONAL</code> |
<code>OFFICE_PROFESSIONAL_PLUS</code> | <code>REMOTE_DESKTOP_SERVICES</code>
 </p>"
                }
            },
            "IdentityProvider": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#IdentityProvider",
                "traits": {
                    "smithy.api#documentation": "<p>An object that specifies details for the identity provider.</p>",
                    "smithy.api#required": {}
                }
            },
            "MaxResults": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#BoxInteger",
                "traits": {
                    "smithy.api#documentation": "<p>The maximum number of results to return from a single
request.</p>"
```

```
            }
        },
        "Filters": {
            "target": "com.amazonaws.licensemanagerusersubscriptions#FilterList",
            "traits": {
                "smithy.api#documentation": "<p>You can use the following filters to streamline
results:</p> <ul> <li> <p>Status</p> </li> <li> <p>Username</p> </li> <li> <p>Domain</p> </li> </ul>"
            }
        },
        "NextToken": {
            "target": "smithy.api#String",
            "traits": {
                "smithy.api#documentation": "<p>A token to specify where to start paginating. This is the nextToken
from a previously truncated response.</p>"
            }
        }
    },
    "traits": {
        "smithy.api#input": {}
    }
},
"com.amazonaws.licensemanagerusersubscriptions#ListProductSubscriptionsResponse": {
    "type": "structure",
    "members": {
        "ProductUserSummaries": {
            "target": "com.amazonaws.licensemanagerusersubscriptions#ProductUserSummaryList",
            "traits": {
                "smithy.api#documentation": "<p>Metadata that describes the list product subscriptions
operation.</p>"
            }
        },
        "NextToken": {
            "target": "smithy.api#String",
            "traits": {
                "smithy.api#documentation": "<p>The next token used for paginated responses. When this field isn't
empty, there are additional elements that the service hasn't included in this request. Use this token with the next
request to retrieve additional objects.</p>"
            }
        }
    },
    "traits": {
        "smithy.api#output": {}
    }
},
"com.amazonaws.licensemanagerusersubscriptions#ListTagsForResource": {
    "type": "operation",
    "input": {
        "target": "com.amazonaws.licensemanagerusersubscriptions#ListTagsForResourceRequest"
```

```
        },
        "output": {
            "target": "com.amazonaws.licensemanagerusersubscriptions#ListTagsForResourceResponse"

    },
        "errors": [
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#InternalServerException"
            },
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#ResourceNotFoundException"
            },
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#ValidationException"
            }
        ],
        "traits": {
            "smithy.api#documentation": "<p>Returns the list of tags for the specified resource.</p>",
            "smithy.api#http": {
                "method": "GET",
                "uri": "/tags/{ResourceArn}"
            },
            "smithy.api#readonly": {}
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#ListTagsForResourceRequest": {
        "type": "structure",
        "members": {
            "ResourceArn": {
                "target":
 "com.amazonaws.licensemanagerusersubscriptions#ResourceArn",
                "traits": {
                    "smithy.api#documentation": "<p>The Amazon Resource Name (ARN) of the resource whose tags
you want to retrieve.</p>",
                    "smithy.api#httpLabel": {},
                    "smithy.api#required": {}
                }
            }
        },
        "traits": {
            "smithy.api#input": {}
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#ListTagsForResourceResponse": {
        "type": "structure",
        "members": {
            "Tags": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#Tags",
```

```
            "traits": {
                "smithy.api#documentation": "<p>The tags for the specified resource.</p>"
            }
        }
    },
    "traits": {
        "smithy.api#output": {}

}
    },
    "com.amazonaws.licensemanagerusersubscriptions#ListUserAssociations": {
        "type": "operation",
        "input": {
            "target": "com.amazonaws.licensemanagerusersubscriptions#ListUserAssociationsRequest"
        },
        "output": {
            "target": "com.amazonaws.licensemanagerusersubscriptions#ListUserAssociationsResponse"
        },
        "errors": [
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#AccessDeniedException"
            },
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#ConflictException"
            },
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#InternalServerException"
            },
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#ResourceNotFoundException"
            },
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#ServiceQuotaExceededException"
            },
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#ThrottlingException"
            },
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#ValidationException"
            }
        ],
        "traits": {
            "smithy.api#documentation": "<p>Lists user associations for an identity provider.</p>",
            "smithy.api#http": {
                "code": 200,
                "method": "POST",
                "uri": "/user/ListUserAssociations"
            },
```

"smithy.api#paginated": {
"inputToken": "NextToken",
"outputToken": "NextToken",
"pageSize": "MaxResults",
"items": "InstanceUserSummaries"
}
}
},
"com.amazonaws.licensemanagerusersubscriptions#ListUserAssociationsRequest": {
"type": "structure",
"members": {
"InstanceId": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The ID of the EC2 instance, which provides user-based subscriptions. ",
"smithy.api#required": {}
}
},
"IdentityProvider": {
"target": "com.amazonaws.licensemanagerusersubscriptions#IdentityProvider",
"traits": {
"smithy.api#documentation": " An object that specifies details for the identity provider. ",
"smithy.api#required": {}
}
},
"MaxResults": {
"target": "com.amazonaws.licensemanagerusersubscriptions#BoxInteger",

"traits": {
"smithy.api#documentation": " The maximum number of results to return from a single request. "
}
},
"Filters": {
"target": "com.amazonaws.licensemanagerusersubscriptions#FilterList",
"traits": {
"smithy.api#documentation": " You can use the following filters to streamline results: <ul> <li> Status </li> <li> Username </li> <li> Domain </li> </ul>"
}
},
"NextToken": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " A token to specify where to start paginating. This is the nextToken from a previously truncated response. "
}
}

```
        },
        "traits": {
            "smithy.api#input": {}
        }

    },
    "com.amazonaws.licensemanagerusersubscriptions#ListUserAssociationsResponse": {
        "type": "structure",
        "members": {
            "InstanceUserSummaries": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#InstanceUserSummaryList",
                "traits": {
                    "smithy.api#documentation": "<p>Metadata that describes the list user association operation.</p>"
                }
            },
            "NextToken": {
                "target": "smithy.api#String",
                "traits": {
                    "smithy.api#documentation": "<p>The next token used for paginated responses. When this field isn't
empty, there are additional elements that the service hasn't included in this request. Use this token with the next
request to retrieve additional objects.</p>"
                }
            }
        },
        "traits": {
            "smithy.api#output":
    {}
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#ProductUserSummary": {
        "type": "structure",
        "members": {
            "Username": {
                "target": "smithy.api#String",
                "traits": {
                    "smithy.api#documentation": "<p>The user name from the identity provider for this product
user.</p>",
                    "smithy.api#required": {}
                }
            },
            "Product": {
                "target": "smithy.api#String",
                "traits": {
                    "smithy.api#documentation": "<p>The name of the user-based subscription product.</p>",
                    "smithy.api#required": {}
                }
            },
            "IdentityProvider": {
```

"target": "com.amazonaws.licensemanagerusersubscriptions#IdentityProvider",
"traits": {

"smithy.api#documentation": " An object that specifies details for the identity provider. ",
"smithy.api#required": {}
}
},
"Status": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The status of a product for this user. ",
"smithy.api#required": {}
}
},
"ProductUserArn": {
"target": "com.amazonaws.licensemanagerusersubscriptions#Arn",
"traits": {
"smithy.api#documentation": " The Amazon Resource Name (ARN) for this product user. "
}
},
"StatusMessage": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The status message for a
product for this user. "
}
},
"Domain": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The domain name of the Active Directory that contains the user
information for the product subscription. "
}
},
"SubscriptionStartDate": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The start date of a subscription. "
}
},
"SubscriptionEndDate": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The end date of a subscription. "
}
}
},
"traits": {

"smithy.api#documentation": " A summary
of the user-based subscription products for a specific user. "
}
},
"com.amazonaws.licensemanagerusersubscriptions#ProductUserSummaryList": {
"type": "list",
"member": {
"target": "com.amazonaws.licensemanagerusersubscriptions#ProductUserSummary"
}
},
"com.amazonaws.licensemanagerusersubscriptions#RdsSalSettings": {
"type": "structure",
"members": {
"RdsSalCredentialsProvider": {
"target": "com.amazonaws.licensemanagerusersubscriptions#CredentialsProvider",
"traits": {
"smithy.api#documentation": " The <code>CredentialsProvider</code> resource contains a
reference to the credentials provider that's used for RDS license server user administration. ",
"smithy.api#required": {}
}
}
},
"traits": {

"smithy.api#documentation": " Server settings that are specific to a Remote Desktop Services (RDS)
license server. "
}
},
"com.amazonaws.licensemanagerusersubscriptions#RegisterIdentityProvider": {
"type": "operation",
"input": {
"target": "com.amazonaws.licensemanagerusersubscriptions#RegisterIdentityProviderRequest"
},
"output": {
"target": "com.amazonaws.licensemanagerusersubscriptions#RegisterIdentityProviderResponse"
},
"errors": [
{
"target": "com.amazonaws.licensemanagerusersubscriptions#AccessDeniedException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ConflictException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#InternalServerException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ResourceNotFoundException"

```
            },
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#ServiceQuotaExceededException"
            },
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#ThrottlingException"
            },
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#ValidationException"
            }
        ],
        "traits": {
            "smithy.api#documentation": "<p>Registers an identity provider for user-based subscriptions.</p>",
            "smithy.api#http": {
                "code": 200,
                "method": "POST",
                "uri": "/identity-provider/RegisterIdentityProvider"
            },
            "smithy.api#idempotent": {}
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#RegisterIdentityProviderRequest":
 {
        "type": "structure",
        "members": {
            "IdentityProvider": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#IdentityProvider",
                "traits": {
                    "smithy.api#documentation": "<p>An object that specifies details for the identity provider to
register.</p>",
                    "smithy.api#required": {}
                }
            },
            "Product": {
                "target": "smithy.api#String",
                "traits": {
                    "smithy.api#documentation": "<p>The name of the user-based subscription product.</p> <p>Valid
values: <code>VISUAL_STUDIO_ENTERPRISE</code> | <code>VISUAL_STUDIO_PROFESSIONAL</code> |
<code>OFFICE_PROFESSIONAL_PLUS</code> | <code>REMOTE_DESKTOP_SERVICES</code> </p>",
                    "smithy.api#required": {}
                }

            },
            "Settings": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#Settings",
                "traits": {
                    "smithy.api#documentation": "<p>The registered identity providers product related configuration
settings such as the subnets to provision VPC endpoints.</p>"
```

```
            }
          },
          "Tags": {
            "target": "com.amazonaws.licensemanagerusersubscriptions#Tags",
            "traits": {
              "smithy.api#documentation": "<p>The tags that apply to the identity provider's registration.</p>"
            }
          }
        },
        "traits": {
          "smithy.api#input": {}
        }
      },
      "com.amazonaws.licensemanagerusersubscriptions#RegisterIdentityProviderResponse": {
        "type": "structure",
        "members": {
          "IdentityProviderSummary": {

        "target": "com.amazonaws.licensemanagerusersubscriptions#IdentityProviderSummary",
            "traits": {
              "smithy.api#documentation": "<p>Metadata that describes the results of an identity provider
operation.</p>",
              "smithy.api#required": {}
            }
          }
        },
        "traits": {
          "smithy.api#output": {}
        }
      },
      "com.amazonaws.licensemanagerusersubscriptions#ResourceArn": {
        "type": "string",
        "traits": {
          "smithy.api#pattern": "^arn:([a-z0-9-\\.]{1,63}):([a-z0-9-\\.]{1,63}):([a-z0-9-\\.]{1,63}):([a-z0-9-
\\.]{1,63}):([a-z0-9-\\.]{1,510})/([a-z0-9-\\.]{1,510})$"
        }
      },
      "com.amazonaws.licensemanagerusersubscriptions#ResourceNotFoundException": {
        "type": "structure",
        "members": {
          "message": {
            "target": "smithy.api#String"

          }
        },
        "traits": {
          "smithy.api#documentation": "<p>The resource couldn't be found.</p>",
          "smithy.api#error": "client",
```

"smithy.api#httpError": 404
}
},
"com.amazonaws.licensemanagerusersubscriptions#SecretsManagerCredentialsProvider": {
"type": "structure",
"members": {
"SecretId": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The ID of the Secrets Manager secret that contains credentials. ",
"smithy.api#length": {
"min": 1
}
}
}
},
"traits": {
"smithy.api#documentation": " Contains a credentials secret that's stored in Secrets Manager. "
}
},
"com.amazonaws.licensemanagerusersubscriptions#SecurityGroup": {
"type": "string",
"traits": {
"smithy.api#length": {
"min": 5,
"max": 200
},
"smithy.api#pattern": "^sg-(([0-9a-z]{8})|([0-9a-z]{17}))$"
}
},
"com.amazonaws.licensemanagerusersubscriptions#ServerEndpoint": {
"type": "structure",
"members": {
"Endpoint": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The network address of the endpoint. "
}
}
},
"traits": {
"smithy.api#documentation": " A network endpoint through which you can access one or more servers. "
}
},
"com.amazonaws.licensemanagerusersubscriptions#ServerSettings": {

"type": "union",

"members": {
"RdsSalSettings": {
"target": "com.amazonaws.licensemanagerusersubscriptions#RdsSalSettings",
"traits": {
"smithy.api#documentation": " The <code>RdsSalSettings</code> resource contains settings to configure a specific Remote Desktop Services (RDS) license server. "
}
}
},
"traits": {
"smithy.api#documentation": " Contains settings for a specific server. "
}
},
"com.amazonaws.licensemanagerusersubscriptions#ServerType": {
"type": "string",
"traits": {
"smithy.api#enum": [
{
"name": "RDS_SAL",
"value": "RDS_SAL",
"documentation": ""
}
]
}
},
"com.amazonaws.licensemanagerusersubscriptions#ServiceQuotaExceededException": {
"type": "structure",
"members": {
"message": {
"target": "smithy.api#String"
}
},
"traits": {
"smithy.api#documentation": " The request failed because a service quota is exceeded. ",
"smithy.api#error": "client"
}
},
"com.amazonaws.licensemanagerusersubscriptions#Settings": {
"type": "structure",
"members": {
"Subnets": {
"target": "com.amazonaws.licensemanagerusersubscriptions#Subnets",
"traits": {
"smithy.api#documentation": " The subnets defined for the registered identity provider. ",
"smithy.api#length": {

"min": 1
},
"smithy.api#required": {}
}

},
"SecurityGroupId": {
"target": "com.amazonaws.licensemanagerusersubscriptions#SecurityGroup",
"traits": {
"smithy.api#documentation": " A security group ID that allows inbound TCP port 1688 communication between resources in your VPC and the VPC endpoint for activation servers. ",
"smithy.api#required": {}
}
}
},
"traits": {
"smithy.api#documentation": " The registered identity providers product related configuration settings such as the subnets to provision VPC endpoints, and the security group ID that is associated with the VPC endpoints. The security group should permit inbound TCP port 1688 communication from resources in the VPC. "
}
},
"com.amazonaws.licensemanagerusersubscriptions#StartProductSubscription": {
"type": "operation",
"input":
{
"target": "com.amazonaws.licensemanagerusersubscriptions#StartProductSubscriptionRequest"
},
"output": {
"target": "com.amazonaws.licensemanagerusersubscriptions#StartProductSubscriptionResponse"
},
"errors": [
{
"target": "com.amazonaws.licensemanagerusersubscriptions#AccessDeniedException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ConflictException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#InternalServerException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ResourceNotFoundException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ServiceQuotaExceededException"
},

{
"target": "com.amazonaws.licensemanagerusersubscriptions#ThrottlingException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ValidationException"
}
],
"traits": {
"smithy.api#documentation": " Starts a product subscription for a user with the specified identity provider. <note> Your estimated bill for charges on the number of users and related costs will take 48 hours to appear for billing periods that haven't closed (marked as Pending billing status) in Amazon Web Services Billing. For more information, see <a href=\"https://docs.aws.amazon.com/awsaccountbilling/latest/aboutv2/invoice.html\">Viewing your monthly charges</a> in the Amazon Web Services Billing User Guide. </note>",
"smithy.api#http": {
"code": 200,
"method": "POST",

"uri": "/user/StartProductSubscription"
}
}
},
"com.amazonaws.licensemanagerusersubscriptions#StartProductSubscriptionRequest": {
"type": "structure",
"members": {
"Username": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The user name from the identity provider of the user. ",
"smithy.api#required": {}
}
},
"IdentityProvider": {
"target": "com.amazonaws.licensemanagerusersubscriptions#IdentityProvider",
"traits": {
"smithy.api#documentation": " An object that specifies details for the identity provider. ",
"smithy.api#required": {}
}
},
"Product": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The name of the user-based subscription product. Valid values: <code>VISUAL_STUDIO_ENTERPRISE</code> | <code>VISUAL_STUDIO_PROFESSIONAL</code> | <code>OFFICE_PROFESSIONAL_PLUS</code> | <code>REMOTE_DESKTOP_SERVICES</code> ",
"smithy.api#required": {}
}
},

"Domain": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The domain name of the Active Directory that contains the user for whom to start the product subscription. "
}
},
"Tags": {
"target": "com.amazonaws.licensemanagerusersubscriptions#Tags",
"traits": {
"smithy.api#documentation": " The tags that apply to the product subscription. "

}
}
},
"traits": {
"smithy.api#input": {}
}
},
"com.amazonaws.licensemanagerusersubscriptions#StartProductSubscriptionResponse": {
"type": "structure",
"members": {
"ProductUserSummary": {
"target": "com.amazonaws.licensemanagerusersubscriptions#ProductUserSummary",
"traits": {
"smithy.api#documentation": " Metadata that describes the start product subscription operation. ",
"smithy.api#required": {}
}
}
},
"traits": {
"smithy.api#output": {}
}
},
"com.amazonaws.licensemanagerusersubscriptions#StopProductSubscription": {
"type": "operation",
"input": {
"target": "com.amazonaws.licensemanagerusersubscriptions#StopProductSubscriptionRequest"
},
"output": {
"target": "com.amazonaws.licensemanagerusersubscriptions#StopProductSubscriptionResponse"
},
"errors": [
{
"target": "com.amazonaws.licensemanagerusersubscriptions#AccessDeniedException"
},
{

"target": "com.amazonaws.licensemanagerusersubscriptions#ConflictException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#InternalServerException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ResourceNotFoundException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ServiceQuotaExceededException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ThrottlingException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ValidationException"
}
],
"traits": {
"smithy.api#documentation": " Stops a product subscription for a user with the specified identity provider. ",
"smithy.api#http": {
"code": 200,
"method": "POST",
"uri": "/user/StopProductSubscription"
}
}
},
"com.amazonaws.licensemanagerusersubscriptions#StopProductSubscriptionRequest": {
"type": "structure",
"members": {
"Username": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The user name from the identity provider for the user. "
}
},
"IdentityProvider": {
"target": "com.amazonaws.licensemanagerusersubscriptions#IdentityProvider",
"traits": {
"smithy.api#documentation": " An object that specifies details for the identity provider. "
}
},
"Product": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The name of the user-based subscription product. Valid

values: <code>VISUAL_STUDIO_ENTERPRISE</code> | <code>VISUAL_STUDIO_PROFESSIONAL</code> | <code>OFFICE_PROFESSIONAL_PLUS</code> | <code>REMOTE_DESKTOP_SERVICES</code> "
}
},
"ProductUserArn": {
"target": "com.amazonaws.licensemanagerusersubscriptions#Arn",
"traits": {
"smithy.api#documentation": " The Amazon Resource Name (ARN) of the product user. "
}
},
"Domain": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The domain name of the Active Directory that contains the user for whom to stop the product subscription. "
}
}
},
"traits": {
"smithy.api#input": {}
}
},
"com.amazonaws.licensemanagerusersubscriptions#StopProductSubscriptionResponse": {
"type": "structure",
"members": {
"ProductUserSummary": {
"target": "com.amazonaws.licensemanagerusersubscriptions#ProductUserSummary",
"traits": {
"smithy.api#documentation": " Metadata that describes the start product subscription operation. ",
"smithy.api#required": {}
}

}
},
"traits": {
"smithy.api#output": {}
}
},
"com.amazonaws.licensemanagerusersubscriptions#StringList": {
"type": "list",
"member": {
"target": "smithy.api#String"
}
},
"com.amazonaws.licensemanagerusersubscriptions#Subnet": {
"type": "string",
"traits": {

"smithy.api#pattern": "^subnet-[a-z0-9]{8,17}"
}
},
"com.amazonaws.licensemanagerusersubscriptions#Subnets": {
"type": "list",
"member": {
"target": "com.amazonaws.licensemanagerusersubscriptions#Subnet"
}
},
"com.amazonaws.licensemanagerusersubscriptions#TagKeyList": {
"type": "list",
"member": {
"target": "smithy.api#String"
},
"traits": {
"smithy.api#length": {

"min": 0,
"max": 50
},
"smithy.api#sensitive": {}
}
},
"com.amazonaws.licensemanagerusersubscriptions#TagResource": {
"type": "operation",
"input": {
"target": "com.amazonaws.licensemanagerusersubscriptions#TagResourceRequest"
},
"output": {
"target": "com.amazonaws.licensemanagerusersubscriptions#TagResourceResponse"
},
"errors": [
{
"target": "com.amazonaws.licensemanagerusersubscriptions#InternalServerException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ResourceNotFoundException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ValidationException"
}
],
"traits": {
"smithy.api#documentation":
" Adds tags to a resource. ",
"smithy.api#http": {
"method": "PUT",
"uri": "/tags/{ResourceArn}"

```
            },
            "smithy.api#idempotent": {}
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#TagResourceRequest": {
        "type": "structure",
        "members": {
            "ResourceArn": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#ResourceArn",
                "traits": {
                    "smithy.api#documentation": "<p>The Amazon Resource Name (ARN) of the resource that you want
to tag.</p>",
                    "smithy.api#httpLabel": {},
                    "smithy.api#required": {}
                }
            },
            "Tags": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#Tags",
                "traits": {
                    "smithy.api#documentation":
 "<p>The tags to apply to the specified resource.</p>",
                    "smithy.api#required": {}
                }
            }
        },
        "traits": {
            "smithy.api#input": {}
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#TagResourceResponse": {
        "type": "structure",
        "members": {},
        "traits": {
            "smithy.api#output": {}
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#Tags": {
        "type": "map",
        "key": {
            "target": "smithy.api#String"
        },
        "value": {
            "target": "smithy.api#String"
        },
        "traits": {
            "smithy.api#length": {
                "min": 0,
                "max": 50
```

```
            },
            "smithy.api#sensitive": {}
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#ThrottlingException":
 {
        "type": "structure",
        "members": {
            "message": {
                "target": "smithy.api#String"
            }
        },
        "traits": {
            "smithy.api#documentation": "<p>The request was denied because of request throttling. Retry the
request.</p>",
            "smithy.api#error": "client"
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#UntagResource": {
        "type": "operation",
        "input": {
            "target": "com.amazonaws.licensemanagerusersubscriptions#UntagResourceRequest"
        },
        "output": {
            "target": "com.amazonaws.licensemanagerusersubscriptions#UntagResourceResponse"
        },
        "errors": [
            {
                "target": "com.amazonaws.licensemanagerusersubscriptions#InternalServerException"
            },
            {

             "target": "com.amazonaws.licensemanagerusersubscriptions#ResourceNotFoundException"
            }
        ],
        "traits": {
            "smithy.api#documentation": "<p>Removes tags from a resource.</p>",
            "smithy.api#http": {
                "method": "DELETE",
                "uri": "/tags/{ResourceArn}"
            },
            "smithy.api#idempotent": {}
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#UntagResourceRequest": {
        "type": "structure",
        "members": {
            "ResourceArn": {
```

"target": "com.amazonaws.licensemanagerusersubscriptions#ResourceArn",
"traits": {
"smithy.api#documentation": " The Amazon Resource Name (ARN) of the resource that you want to remove tags from. ",
"smithy.api#httpLabel": {},
"smithy.api#required": {}

}
},
"TagKeys": {
"target": "com.amazonaws.licensemanagerusersubscriptions#TagKeyList",
"traits": {
"smithy.api#documentation": " The tag keys to remove from the resource. ",
"smithy.api#httpQuery": "tagKeys",
"smithy.api#required": {}
}
}
},
"traits": {
"smithy.api#input": {}
}
},
"com.amazonaws.licensemanagerusersubscriptions#UntagResourceResponse": {
"type": "structure",
"members": {},
"traits": {
"smithy.api#output": {}
}
},
"com.amazonaws.licensemanagerusersubscriptions#UpdateIdentityProviderSettings": {
"type": "operation",
"input": {
"target": "com.amazonaws.licensemanagerusersubscriptions#UpdateIdentityProviderSettingsRequest"
},
"output": {
"target": "com.amazonaws.licensemanagerusersubscriptions#UpdateIdentityProviderSettingsResponse"
},
"errors": [
{
"target": "com.amazonaws.licensemanagerusersubscriptions#AccessDeniedException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#InternalServerException"
},
{
"target": "com.amazonaws.licensemanagerusersubscriptions#ThrottlingException"
},
{

"target": "com.amazonaws.licensemanagerusersubscriptions#ValidationException"
}
],
"traits": {
"smithy.api#documentation": " Updates additional product configuration settings for the registered identity provider. ",
"smithy.api#http": {

"code": 200,
"method": "POST",
"uri": "/identity-provider/UpdateIdentityProviderSettings"
},
"smithy.api#idempotent": {}
}
},
"com.amazonaws.licensemanagerusersubscriptions#UpdateIdentityProviderSettingsRequest": {
"type": "structure",
"members": {
"IdentityProvider": {
"target": "com.amazonaws.licensemanagerusersubscriptions#IdentityProvider"
},
"Product": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The name of the user-based subscription product. Valid values: <code>VISUAL_STUDIO_ENTERPRISE</code> | <code>VISUAL_STUDIO_PROFESSIONAL</code> | <code>OFFICE_PROFESSIONAL_PLUS</code> | <code>REMOTE_DESKTOP_SERVICES</code> "
}
},
"IdentityProviderArn":
{
"target": "com.amazonaws.licensemanagerusersubscriptions#Arn",
"traits": {
"smithy.api#documentation": " The Amazon Resource Name (ARN) of the identity provider to update. "
}
},
"UpdateSettings": {
"target": "com.amazonaws.licensemanagerusersubscriptions#UpdateSettings",
"traits": {
"smithy.api#documentation": " Updates the registered identity providers product related configuration settings. You can update any combination of settings in a single operation such as the: <ul> <li> Subnets which you want to add to provision VPC endpoints. </li> <li> Subnets which you want to remove the VPC endpoints from. </li> <li> Security group ID which permits traffic to the VPC endpoints. </li> </ul>",
"smithy.api#required": {}
}

```
            }
        },
        "traits": {
            "smithy.api#input": {}
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#UpdateIdentityProviderSettingsResponse": {
        "type": "structure",
        "members": {
            "IdentityProviderSummary": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#IdentityProviderSummary",
                "traits": {
                    "smithy.api#required": {}
                }
            }
        },
        "traits": {
            "smithy.api#output": {}
        }
    },
    "com.amazonaws.licensemanagerusersubscriptions#UpdateSettings": {
        "type": "structure",
        "members": {
            "AddSubnets": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#Subnets",
                "traits": {
                    "smithy.api#documentation": "<p>The ID of one
 or more subnets in which License Manager will create a VPC endpoint for products that require connectivity to
activation servers.</p>",
                    "smithy.api#required": {}
                }
            },
            "RemoveSubnets": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#Subnets",
                "traits": {
                    "smithy.api#documentation": "<p>The ID of one or more subnets to remove.</p>",
                    "smithy.api#required": {}
                }
            },
            "SecurityGroupId": {
                "target": "com.amazonaws.licensemanagerusersubscriptions#SecurityGroup",
                "traits": {
                    "smithy.api#documentation": "<p>A security group ID that allows inbound TCP port 1688
communication between resources in your VPC and the VPC endpoints for activation servers.</p>"
                }
            }
        },
```

"traits": {
"smithy.api#documentation": " Updates the registered identity providers product related configuration settings such as the subnets to provision VPC endpoints. "
}
},
"com.amazonaws.licensemanagerusersubscriptions#ValidationException": {
"type": "structure",
"members": {
"message": {
"target": "smithy.api#String"
}
},
"traits": {
"smithy.api#documentation": " A parameter is not valid. ",
"smithy.api#error": "client"
}
}
}
}

```
// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import (
 "context"
 "fmt"
 awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
 "github.com/aws/smithy-go/middleware"
 smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Checks in the specified license. Check in a license when it is no longer in use.
func (c *Client) CheckInLicense(ctx context.Context, params *CheckInLicenseInput, optFns ...func(*Options))
(*CheckInLicenseOutput, error) {
 if params == nil {
  params = &CheckInLicenseInput{}
 }

 result, metadata, err := c.invokeOperation(ctx, "CheckInLicense", params, optFns,
c.addOperationCheckInLicenseMiddlewares)
 if err != nil {
  return nil, err
 }

 out := result.(*CheckInLicenseOutput)
 out.ResultMetadata = metadata
 return out, nil
}
```

```
type CheckInLicenseInput struct {

 // License consumption token.
 //
 // This member is required.
 LicenseConsumptionToken *string

 // License beneficiary.
 Beneficiary *string

 noSmithyDocumentSerde
}

type
 CheckInLicenseOutput struct {
 // Metadata pertaining to the operation's result.
 ResultMetadata middleware.Metadata

 noSmithyDocumentSerde
}

func (c *Client) addOperationCheckInLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
 if err := stack.Serialize.Add(&setOperationInputMiddleware{}, middleware.After); err != nil {
  return err
 }
 err = stack.Serialize.Add(&awsAwsjson11_serializeOpCheckInLicense{}, middleware.After)
 if err != nil {
  return err
 }
 err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpCheckInLicense{}, middleware.After)
 if err != nil {
  return err
 }
 if err := addProtocolFinalizerMiddlewares(stack, options, "CheckInLicense"); err != nil {
  return fmt.Errorf("add protocol finalizers: %v", err)
 }

 if err = addlegacyEndpointContextSetter(stack, options); err != nil {
  return err
 }
 if err = addSetLoggerMiddleware(stack, options); err != nil {
  return err
 }
 if err = addClientRequestID(stack); err != nil {
  return err
 }
 if
```

```
err = addComputeContentLength(stack); err != nil {
 return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
 return err
}
if err = addComputePayloadSHA256(stack); err != nil {
 return err
}
if err = addRetry(stack, options, c); err != nil {
 return err
}
if err = addRawResponseToMetadata(stack); err != nil {
 return err
}
if err = addRecordResponseTiming(stack); err != nil {
 return err
}
if err = addSpanRetryLoop(stack, options); err != nil {
 return err
}
if err = addClientUserAgent(stack, options); err != nil {
 return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
 return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
 return err
}
if err = addSetLegacyContextSigningOptionsMiddleware(stack); err != nil {
 return err
}
if err = addUserAgentRetryMode(stack, options); err != nil {
 return err
}
if err = addCredentialSource(stack, options); err != nil {
 return
err
}
if err = addOpCheckInLicenseValidationMiddleware(stack); err != nil {
 return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCheckInLicense(options.Region),
middleware.Before); err != nil {
 return err
}
if err = addRecursionDetection(stack); err != nil {
```

```
 return err
 }
 if err = addRequestIDRetrieverMiddleware(stack); err != nil {
  return err
 }
 if err = addResponseErrorMiddleware(stack); err != nil {
  return err
 }
 if err = addRequestResponseLogging(stack, options); err != nil {
  return err
 }
 if err = addDisableHTTPSMiddleware(stack, options); err != nil {
  return err
 }
 if err = addInterceptBeforeRetryLoop(stack, options); err != nil {
  return err
 }
 if err = addInterceptAttempt(stack, options); err != nil {
  return err
 }
 if err = addInterceptors(stack, options); err != nil {
  return err
 }
 return nil
}

func newServiceMetadataMiddleware_opCheckInLicense(region string) *awsmiddleware.RegisterServiceMetadata
{
 return &awsmiddleware.RegisterServiceMetadata{
  Region:
       region,
  ServiceID:     ServiceID,
  OperationName: "CheckInLicense",
 }
}
ListLicenses
 Initialize stack step
  RegisterServiceMetadata
  legacyEndpointContextSetter
  SetLogger
 Serialize stack step
  setOperationInput
  ResolveEndpoint
  OperationSerializer
 Build stack step
  ClientRequestID
  ComputeContentLength
  SetCredentialSourceMiddleware
```

```
  UserAgent
  RecursionDetection
 Finalize stack step
  spanRetryLoop
  InterceptBeforeRetryLoop
  Retry
  InterceptAttempt
  RetryMetricsHeader
  ResolveAuthScheme
  GetIdentity
  ResolveEndpointV2
  disableHTTPS
  ComputePayloadHash
  setLegacyContextSigningOptions
  Signing
 Deserialize stack step
  AddRawResponseToMetadata
  ErrorCloseResponseBody
  CloseResponseBody
  ResponseErrorWrapper
  RequestIDRetriever
  OperationDeserializer
  RecordResponseTiming
  RequestResponseLogger
// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import (
 "context"
 "fmt"
 awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
 "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
 "github.com/aws/smithy-go/middleware"
 smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Checks out the specified license for offline use.
func (c *Client) CheckoutBorrowLicense(ctx context.Context, params *CheckoutBorrowLicenseInput, optFns
...func(*Options)) (*CheckoutBorrowLicenseOutput, error) {
 if params == nil {
  params = &CheckoutBorrowLicenseInput{}
 }

 result, metadata, err := c.invokeOperation(ctx, "CheckoutBorrowLicense", params, optFns,
c.addOperationCheckoutBorrowLicenseMiddlewares)
 if err != nil {
  return nil, err
```

```
 }

 out := result.(*CheckoutBorrowLicenseOutput)
 out.ResultMetadata = metadata
 return out, nil
}

type CheckoutBorrowLicenseInput struct {

 // Unique, case-sensitive identifier that you provide to ensure the idempotency of
 //
 the request.
 //
 // This member is required.
 ClientToken *string

 // Digital signature method. The possible value is JSON Web Signature (JWS)
 // algorithm PS384. For more information, see [RFC 7518 Digital Signature with RSASSA-PSS].
 //
 // [RFC 7518 Digital Signature with RSASSA-PSS]: https://tools.ietf.org/html/rfc7518#section-3.5
 //
 // This member is required.
 DigitalSignatureMethod types.DigitalSignatureMethod

 // License entitlements. Partial checkouts are not supported.
 //
 // This member is required.
 Entitlements []types.EntitlementData

 // Amazon Resource Name (ARN) of the license. The license must use the borrow
 // consumption configuration.
 //
 // This member is required.
 LicenseArn *string

 // Information about constraints.
 CheckoutMetadata []types.Metadata

 // Node ID.
 NodeId *string

 noSmithyDocumentSerde
}

type CheckoutBorrowLicenseOutput struct {

 // Information about constraints.
 CheckoutMetadata []types.Metadata
```

```
 // Allowed license entitlements.
 EntitlementsAllowed
 []types.EntitlementData

 // Date and time at which the license checkout expires.
 Expiration *string

 // Date and time at which the license checkout is issued.
 IssuedAt *string

 // Amazon Resource Name (ARN) of the license.
 LicenseArn *string

 // License consumption token.
 LicenseConsumptionToken *string

 // Node ID.
 NodeId *string

 // Signed token.
 SignedToken *string

 // Metadata pertaining to the operation's result.
 ResultMetadata middleware.Metadata

 noSmithyDocumentSerde
}

func (c *Client) addOperationCheckoutBorrowLicenseMiddlewares(stack *middleware.Stack, options Options) (err
error) {
 if err := stack.Serialize.Add(&setOperationInputMiddleware{}, middleware.After); err != nil {
  return err
 }
 err = stack.Serialize.Add(&awsAwsjson11_serializeOpCheckoutBorrowLicense{}, middleware.After)
 if err != nil {
  return err
 }
 err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpCheckoutBorrowLicense{}, middleware.After)
 if err != nil {
  return
 err
 }
 if err := addProtocolFinalizerMiddlewares(stack, options, "CheckoutBorrowLicense"); err != nil {
  return fmt.Errorf("add protocol finalizers: %v", err)
 }

 if err = addlegacyEndpointContextSetter(stack, options); err != nil {
```

```
 return err
}
if err = addSetLoggerMiddleware(stack, options); err != nil {
 return err
}
if err = addClientRequestID(stack); err != nil {
 return err
}
if err = addComputeContentLength(stack); err != nil {
 return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
 return err
}
if err = addComputePayloadSHA256(stack); err != nil {
 return err
}
if err = addRetry(stack, options, c); err != nil {
 return err
}
if err = addRawResponseToMetadata(stack); err != nil {
 return err
}
if err = addRecordResponseTiming(stack); err != nil {
 return err
}
if err = addSpanRetryLoop(stack, options); err != nil {
 return err
}
if err = addClientUserAgent(stack, options); err != nil {
 return err
}
if err =
smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
 return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
 return err
}
if err = addSetLegacyContextSigningOptionsMiddleware(stack); err != nil {
 return err
}
if err = addUserAgentRetryMode(stack, options); err != nil {
 return err
}
if err = addCredentialSource(stack, options); err != nil {
 return err
}
```

```
 if err = addOpCheckoutBorrowLicenseValidationMiddleware(stack); err != nil {
  return err
 }
 if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCheckoutBorrowLicense(options.Region),
middleware.Before); err != nil {
  return err
 }
 if err = addRecursionDetection(stack); err != nil {
  return err
 }
 if err = addRequestIDRetrieverMiddleware(stack); err != nil {
  return err
 }
 if err = addResponseErrorMiddleware(stack); err != nil {
  return err
 }
 if err = addRequestResponseLogging(stack, options); err != nil {
  return err
 }
 if err = addDisableHTTPSMiddleware(stack,
 options); err != nil {
  return err
 }
 if err = addInterceptBeforeRetryLoop(stack, options); err != nil {
  return err
 }
 if err = addInterceptAttempt(stack, options); err != nil {
  return err
 }
 if err = addInterceptors(stack, options); err != nil {
  return err
 }
 return nil
}

func newServiceMetadataMiddleware_opCheckoutBorrowLicense(region string)
*awsmiddleware.RegisterServiceMetadata {
 return &awsmiddleware.RegisterServiceMetadata{
  Region:        region,
  ServiceID:     ServiceID,
  OperationName: "CheckoutBorrowLicense",
 }
}
AssociateLicense
 Initialize stack step
  RegisterServiceMetadata
  legacyEndpointContextSetter
  SetLogger
```

```
  OperationInputValidation
 Serialize stack step
  setOperationInput
  ResolveEndpoint
  OperationSerializer
 Build stack step
  ClientRequestID
  ComputeContentLength
  SetCredentialSourceMiddleware
  UserAgent
  RecursionDetection
 Finalize stack step
  spanRetryLoop
  InterceptBeforeRetryLoop
  Retry
  InterceptAttempt
  RetryMetricsHeader
  ResolveAuthScheme
  GetIdentity
  ResolveEndpointV2
  disableHTTPS
  ComputePayloadHash
  setLegacyContextSigningOptions
  Signing
 Deserialize stack step
  AddRawResponseToMetadata
  ErrorCloseResponseBody
  CloseResponseBody
  ResponseErrorWrapper
  RequestIDRetriever
  OperationDeserializer
  RecordResponseTiming
  RequestResponseLogger
// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import (
 "context"
 "fmt"
 awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
 "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
 "github.com/aws/smithy-go/middleware"
 smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Checks out the specified license.
//
```

```
// If the account that created the license is the same that is performing the
// check out, you must specify the account as the beneficiary.
func (c *Client) CheckoutLicense(ctx context.Context, params *CheckoutLicenseInput, optFns ...func(*Options))
(*CheckoutLicenseOutput, error) {
 if params == nil {
  params = &CheckoutLicenseInput{}
 }

 result, metadata, err := c.invokeOperation(ctx, "CheckoutLicense", params, optFns,
c.addOperationCheckoutLicenseMiddlewares)
 if err != nil {
  return nil, err
 }

 out := result.(*CheckoutLicenseOutput)
 out.ResultMetadata = metadata
 return out, nil
}

type CheckoutLicenseInput struct {

 //
 Checkout type.
 //
 // This member is required.
 CheckoutType types.CheckoutType

 // Unique, case-sensitive identifier that you provide to ensure the idempotency of
 // the request.
 //
 // This member is required.
 ClientToken *string

 // License entitlements.
 //
 // This member is required.
 Entitlements []types.EntitlementData

 // Key fingerprint identifying the license.
 //
 // This member is required.
 KeyFingerprint *string

 // Product SKU.
 //
 // This member is required.
 ProductSKU *string
```

```
 // License beneficiary.
 Beneficiary *string

 // Node ID.
 NodeId *string

 noSmithyDocumentSerde
}

type CheckoutLicenseOutput struct {

 // Checkout type.
 CheckoutType types.CheckoutType

 // Allowed license entitlements.
 EntitlementsAllowed []types.EntitlementData

 // Date and time at which the license checkout expires.
 Expiration *string

 // Date and time at which the license checkout is issued.
 IssuedAt *string

 // Amazon Resource Name (ARN) of the checkout license.
 LicenseArn
 *string

 // License consumption token.
 LicenseConsumptionToken *string

 // Node ID.
 NodeId *string

 // Signed token.
 SignedToken *string

 // Metadata pertaining to the operation's result.
 ResultMetadata middleware.Metadata

 noSmithyDocumentSerde
}

func (c *Client) addOperationCheckoutLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
 if err := stack.Serialize.Add(&setOperationInputMiddleware{}, middleware.After); err != nil {
  return err
 }
 err = stack.Serialize.Add(&awsAwsjson11_serializeOpCheckoutLicense{}, middleware.After)
 if err != nil {
```

```
 return err
}
err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpCheckoutLicense{}, middleware.After)
if err != nil {
 return err
}
if err := addProtocolFinalizerMiddlewares(stack, options, "CheckoutLicense"); err != nil {
 return fmt.Errorf("add protocol finalizers: %v", err)
}

if err = addlegacyEndpointContextSetter(stack, options); err != nil {
 return err
}
if err = addSetLoggerMiddleware(stack,
options); err != nil {
 return err
}
if err = addClientRequestID(stack); err != nil {
 return err
}
if err = addComputeContentLength(stack); err != nil {
 return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
 return err
}
if err = addComputePayloadSHA256(stack); err != nil {
 return err
}
if err = addRetry(stack, options, c); err != nil {
 return err
}
if err = addRawResponseToMetadata(stack); err != nil {
 return err
}
if err = addRecordResponseTiming(stack); err != nil {
 return err
}
if err = addSpanRetryLoop(stack, options); err != nil {
 return err
}
if err = addClientUserAgent(stack, options); err != nil {
 return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
 return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
```

```
 return err
 }
 if err = addSetLegacyContextSigningOptionsMiddleware(stack); err != nil {
  return err
 }
 if err = addUserAgentRetryMode(stack,
 options); err != nil {
  return err
 }
 if err = addCredentialSource(stack, options); err != nil {
  return err
 }
 if err = addOpCheckoutLicenseValidationMiddleware(stack); err != nil {
  return err
 }
 if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCheckoutLicense(options.Region),
middleware.Before); err != nil {
  return err
 }
 if err = addRecursionDetection(stack); err != nil {
  return err
 }
 if err = addRequestIDRetrieverMiddleware(stack); err != nil {
  return err
 }
 if err = addResponseErrorMiddleware(stack); err != nil {
  return err
 }
 if err = addRequestResponseLogging(stack, options); err != nil {
  return err
 }
 if err = addDisableHTTPSMiddleware(stack, options); err != nil {
  return err
 }
 if err = addInterceptBeforeRetryLoop(stack, options); err != nil {
  return err
 }
 if err = addInterceptAttempt(stack, options); err != nil {
  return err
 }
 if err = addInterceptors(stack, options); err != nil {
  return err
 }
 return nil
}

func
```

```
 newServiceMetadataMiddleware_opCheckoutLicense(region string) *awsmiddleware.RegisterServiceMetadata {
 return &awsmiddleware.RegisterServiceMetadata{
  Region:        region,
  ServiceID:     ServiceID,
  OperationName: "CheckoutLicense",
 }
}
name: License Scan

on: [pull_request]



permissions:
 contents: read

jobs:
 licensescan:
   name: License Scan
   runs-on: ubuntu-latest
   strategy:
     matrix:
       python-version: [3.9]

   steps:
     - name: Checkout target
       uses: actions/checkout@v2
       with:
         path: sdkbase
         ref: ${{ github.base_ref }}
     - name: Checkout this ref
       uses: actions/checkout@v2
       with:
         path: new-ref
         fetch-depth: 0
     - name: Get Diff
       run: git --git-dir ./new-ref/.git diff --name-only --diff-filter=ACMRT ${{ github.event.pull_request.base.sha }}
${{ github.sha }} > refDiffFiles.txt
     - name: Get Target Files
       run: git --git-dir ./sdkbase/.git ls-files | grep -xf refDiffFiles.txt - > targetFiles.txt
     - name: Checkout scancode
       uses: actions/checkout@v2
       with:
         repository: nexB/scancode-toolkit
         path: scancode-toolkit
         fetch-depth: 1
     - name: Set up Python
 ${{ matrix.python-version }}
       uses: actions/setup-python@v2
```

```
      with:
        python-version: ${{ matrix.python-version }}
    # ScanCode
    - name: Self-configure scancode
      working-directory: ./scancode-toolkit
      run: ./scancode --help
    - name: Run Scan code on target
      run: cat targetFiles.txt | while read filename; do echo ./sdkbase/$filename; done | xargs ./scancode-
toolkit/scancode -l -n 30 --json-pp - | grep short_name | sort | uniq >> old-licenses.txt
    - name: Run Scan code on pr ref
      run: cat refDiffFiles.txt | while read filename; do echo ./new-ref/$filename; done | xargs ./scancode-
toolkit/scancode -l -n 30 --json-pp - | grep short_name | sort | uniq >> new-licenses.txt
    # compare
    - name: License test
      run: if ! cmp old-licenses.txt new-licenses.txt; then echo "Licenses differ! Failing."; exit -1; else echo "Licenses
are the same. Success."; exit 0; fi
// Code generated by smithy-go-codegen DO NOT EDIT.

package grafana

import (
 "context"
 "fmt"
 awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
 "github.com/aws/aws-sdk-go-v2/service/grafana/types"
 "github.com/aws/smithy-go/middleware"
 smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Assigns a Grafana Enterprise license to a workspace. To upgrade, you must use
// ENTERPRISE for the licenseType , and pass in a valid Grafana Labs token for the
// grafanaToken . Upgrading to Grafana Enterprise incurs additional fees. For more
// information, see [Upgrade a workspace to Grafana Enterprise].
//
// [Upgrade a workspace to Grafana Enterprise]: https://docs.aws.amazon.com/grafana/latest/userguide/upgrade-to-
Grafana-Enterprise.html
func (c *Client) AssociateLicense(ctx context.Context, params *AssociateLicenseInput, optFns ...func(*Options))
(*AssociateLicenseOutput, error) {
 if params == nil {
  params = &AssociateLicenseInput{}
 }

 result, metadata, err := c.invokeOperation(ctx,
 "AssociateLicense", params, optFns, c.addOperationAssociateLicenseMiddlewares)
 if err != nil {
  return nil, err
 }
```

```
 out := result.(*AssociateLicenseOutput)
 out.ResultMetadata = metadata
 return out, nil
}

type AssociateLicenseInput struct {

 // The type of license to associate with the workspace.
 //
 // Amazon Managed Grafana workspaces no longer support Grafana Enterprise free
 // trials.
 //
 // This member is required.
 LicenseType types.LicenseType

 // The ID of the workspace to associate the license with.
 //
 // This member is required.
 WorkspaceId *string

 // A token from Grafana Labs that ties your Amazon Web Services account with a
 // Grafana Labs account. For more information, see [Link your account with Grafana Labs].
 //
 // [Link your account with Grafana Labs]: https://docs.aws.amazon.com/grafana/latest/userguide/upgrade-to-
Grafana-Enterprise.html#AMG-workspace-register-enterprise
 GrafanaToken *string

 noSmithyDocumentSerde
}

type AssociateLicenseOutput
 struct {

 // A structure containing data about the workspace.
 //
 // This member is required.
 Workspace *types.WorkspaceDescription

 // Metadata pertaining to the operation's result.
 ResultMetadata middleware.Metadata

 noSmithyDocumentSerde
}

func (c *Client) addOperationAssociateLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
 if err := stack.Serialize.Add(&setOperationInputMiddleware{}, middleware.After); err != nil {
  return err
 }
```

```
err = stack.Serialize.Add(&awsRestjson1_serializeOpAssociateLicense{}, middleware.After)
if err != nil {
 return err
}
err = stack.Deserialize.Add(&awsRestjson1_deserializeOpAssociateLicense{}, middleware.After)
if err != nil {
 return err
}
if err := addProtocolFinalizerMiddlewares(stack, options, "AssociateLicense"); err != nil {
 return fmt.Errorf("add protocol finalizers: %v", err)
}

if err = addlegacyEndpointContextSetter(stack, options); err != nil {
 return err
}
if err = addSetLoggerMiddleware(stack,
options); err != nil {
 return err
}
if err = addClientRequestID(stack); err != nil {
 return err
}
if err = addComputeContentLength(stack); err != nil {
 return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
 return err
}
if err = addComputePayloadSHA256(stack); err != nil {
 return err
}
if err = addRetry(stack, options, c); err != nil {
 return err
}
if err = addRawResponseToMetadata(stack); err != nil {
 return err
}
if err = addRecordResponseTiming(stack); err != nil {
 return err
}
if err = addSpanRetryLoop(stack, options); err != nil {
 return err
}
if err = addClientUserAgent(stack, options); err != nil {
 return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
 return err
```

```
 }
 if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
  return err
 }
 if err = addSetLegacyContextSigningOptionsMiddleware(stack); err != nil {
  return err
 }
 if err = addUserAgentRetryMode(stack,
 options); err != nil {
  return err
 }
 if err = addCredentialSource(stack, options); err != nil {
  return err
 }
 if err = addOpAssociateLicenseValidationMiddleware(stack); err != nil {
  return err
 }
 if err = stack.Initialize.Add(newServiceMetadataMiddleware_opAssociateLicense(options.Region),
middleware.Before); err != nil {
  return err
 }
 if err = addRecursionDetection(stack); err != nil {
  return err
 }
 if err = addRequestIDRetrieverMiddleware(stack); err != nil {
  return err
 }
 if err = addResponseErrorMiddleware(stack); err != nil {
  return err
 }
 if err = addRequestResponseLogging(stack, options); err != nil {
  return err
 }
 if err = addDisableHTTPSMiddleware(stack, options); err != nil {
  return err
 }
 if err = addInterceptBeforeRetryLoop(stack, options); err != nil {
  return err
 }
 if err = addInterceptAttempt(stack, options); err != nil {
  return err
 }
 if err = addInterceptors(stack, options); err != nil {
  return err
 }
 return nil
}
```

```
func
 newServiceMetadataMiddleware_opAssociateLicense(region string) *awsmiddleware.RegisterServiceMetadata {
 return &awsmiddleware.RegisterServiceMetadata{
  Region:        region,
  ServiceID:     ServiceID,
  OperationName: "AssociateLicense",
 }
}
```

AWS SDK for Go

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CheckInLicense

```
 Initialize stack step
  RegisterServiceMetadata
  legacyEndpointContextSetter
  SetLogger
  OperationInputValidation
 Serialize stack step
  setOperationInput
  ResolveEndpoint
  OperationSerializer
 Build stack step
  ClientRequestID
  ComputeContentLength
  SetCredentialSourceMiddleware
  UserAgent
  RecursionDetection
 Finalize stack step
  spanRetryLoop
  InterceptBeforeRetryLoop
  Retry
  InterceptAttempt
  RetryMetricsHeader
  ResolveAuthScheme
  GetIdentity
  ResolveEndpointV2
  disableHTTPS
  ComputePayloadHash
  setLegacyContextSigningOptions
  Signing
 Deserialize stack step
  AddRawResponseToMetadata
  ErrorCloseResponseBody
  CloseResponseBody
  ResponseErrorWrapper
  RequestIDRetriever
  OperationDeserializer
  RecordResponseTiming
```

```
  RequestResponseLogger
// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import (
 "context"
 "fmt"
 awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
 "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
 "github.com/aws/smithy-go/middleware"
 smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Lists received licenses.
func (c *Client) ListReceivedLicenses(ctx context.Context, params *ListReceivedLicensesInput, optFns
...func(*Options)) (*ListReceivedLicensesOutput, error) {
 if params == nil {
  params = &ListReceivedLicensesInput{}
 }

 result, metadata, err := c.invokeOperation(ctx, "ListReceivedLicenses", params, optFns,
c.addOperationListReceivedLicensesMiddlewares)
 if err != nil {
  return nil, err
 }

 out := result.(*ListReceivedLicensesOutput)
 out.ResultMetadata = metadata
 return out, nil
}

type ListReceivedLicensesInput struct {

 // Filters to scope the results. The following filters are supported:
 //
 //   - ProductSKU
 //
 //   - Status
 //
 //
   - Fingerprint
 //
 //   - IssuerName
 //
 //   - Beneficiary
 Filters []types.Filter
```

```
 // Amazon Resource Names (ARNs) of the licenses.
 LicenseArns []string

 // Maximum number of results to return in a single call.
 MaxResults *int32

 // Token for the next set of results.
 NextToken *string

 noSmithyDocumentSerde
}

type ListReceivedLicensesOutput struct {

 // Received license details.
 Licenses []types.GrantedLicense

 // Token for the next set of results.
 NextToken *string

 // Metadata pertaining to the operation's result.
 ResultMetadata middleware.Metadata

 noSmithyDocumentSerde
}

func (c *Client) addOperationListReceivedLicensesMiddlewares(stack *middleware.Stack, options Options) (err
error) {
 if err := stack.Serialize.Add(&setOperationInputMiddleware{}, middleware.After); err != nil {
  return err
 }
 err = stack.Serialize.Add(&awsAwsjson11_serializeOpListReceivedLicenses{}, middleware.After)
 if err != nil {
  return err
 }
 err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpListReceivedLicenses{},
 middleware.After)
 if err != nil {
  return err
 }
 if err := addProtocolFinalizerMiddlewares(stack, options, "ListReceivedLicenses"); err != nil {
  return fmt.Errorf("add protocol finalizers: %v", err)
 }

 if err = addlegacyEndpointContextSetter(stack, options); err != nil {
  return err
 }
 if err = addSetLoggerMiddleware(stack, options); err != nil {
```

```
 return err
}
if err = addClientRequestID(stack); err != nil {
 return err
}
if err = addComputeContentLength(stack); err != nil {
 return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
 return err
}
if err = addComputePayloadSHA256(stack); err != nil {
 return err
}
if err = addRetry(stack, options, c); err != nil {
 return err
}
if err = addRawResponseToMetadata(stack); err != nil {
 return err
}
if err = addRecordResponseTiming(stack); err != nil {
 return err
}
if err = addSpanRetryLoop(stack, options); err != nil {
 return err
}
if err
= addClientUserAgent(stack, options); err != nil {
 return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
 return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
 return err
}
if err = addSetLegacyContextSigningOptionsMiddleware(stack); err != nil {
 return err
}
if err = addUserAgentRetryMode(stack, options); err != nil {
 return err
}
if err = addCredentialSource(stack, options); err != nil {
 return err
}
if err = stack.Initialize.Add(newServiceMetadataMiddleware_opListReceivedLicenses(options.Region),
middleware.Before); err != nil {
 return err
```

```
 }
 if err = addRecursionDetection(stack); err != nil {
  return err
 }
 if err = addRequestIDRetrieverMiddleware(stack); err != nil {
  return err
 }
 if err = addResponseErrorMiddleware(stack); err != nil {
  return err
 }
 if err = addRequestResponseLogging(stack, options); err != nil {
  return err
 }
 if err = addDisableHTTPSMiddleware(stack, options);
 err != nil {
  return err
 }
 if err = addInterceptBeforeRetryLoop(stack, options); err != nil {
  return err
 }
 if err = addInterceptAttempt(stack, options); err != nil {
  return err
 }
 if err = addInterceptors(stack, options); err != nil {
  return err
 }
 return nil
}

func newServiceMetadataMiddleware_opListReceivedLicenses(region string)
*awsmiddleware.RegisterServiceMetadata {
 return &awsmiddleware.RegisterServiceMetadata{
  Region:       region,
  ServiceID:     ServiceID,
  OperationName: "ListReceivedLicenses",
 }
}
CreateLicense
 Initialize stack step
  RegisterServiceMetadata
  legacyEndpointContextSetter
  SetLogger
  OperationInputValidation
 Serialize stack step
  setOperationInput
  ResolveEndpoint
  OperationSerializer
 Build stack step
```

ClientRequestID
ComputeContentLength
SetCredentialSourceMiddleware
UserAgent
RecursionDetection
Finalize stack step
spanRetryLoop
InterceptBeforeRetryLoop
Retry
InterceptAttempt
RetryMetricsHeader
ResolveAuthScheme
GetIdentity
ResolveEndpointV2
disableHTTPS
ComputePayloadHash
setLegacyContextSigningOptions
Signing
Deserialize stack step
AddRawResponseToMetadata
ErrorCloseResponseBody
CloseResponseBody
ResponseErrorWrapper
RequestIDRetriever
OperationDeserializer
RecordResponseTiming
RequestResponseLogger
DisassociateLicense
Initialize stack step
RegisterServiceMetadata
legacyEndpointContextSetter
SetLogger
OperationInputValidation
Serialize stack step
setOperationInput
ResolveEndpoint
OperationSerializer
Build stack step
ClientRequestID
ComputeContentLength
SetCredentialSourceMiddleware
UserAgent
RecursionDetection
Finalize stack step
spanRetryLoop
InterceptBeforeRetryLoop
Retry
InterceptAttempt

RetryMetricsHeader
ResolveAuthScheme
GetIdentity
ResolveEndpointV2
disableHTTPS
ComputePayloadHash
setLegacyContextSigningOptions
Signing
Deserialize stack step
AddRawResponseToMetadata
ErrorCloseResponseBody
CloseResponseBody
ResponseErrorWrapper
RequestIDRetriever
OperationDeserializer
RecordResponseTiming
RequestResponseLogger


```
{
  "smithy": "2.0",
  "shapes": {
      "com.amazonaws.licensemanagerlinuxsubscriptions#BoxInteger": {
          "type": "integer"
      },
      "com.amazonaws.licensemanagerlinuxsubscriptions#BoxLong": {
          "type": "long"
      },
      "com.amazonaws.licensemanagerlinuxsubscriptions#DeregisterSubscriptionProvider": {
          "type": "operation",
          "input": {
              "target": "com.amazonaws.licensemanagerlinuxsubscriptions#DeregisterSubscriptionProviderRequest"
          },
          "output": {
              "target": "com.amazonaws.licensemanagerlinuxsubscriptions#DeregisterSubscriptionProviderResponse"
          },
          "errors": [
              {
                  "target": "com.amazonaws.licensemanagerlinuxsubscriptions#InternalServerException"
              },
              {
                  "target": "com.amazonaws.licensemanagerlinuxsubscriptions#ResourceNotFoundException"
              },

      {
                  "target": "com.amazonaws.licensemanagerlinuxsubscriptions#ThrottlingException"
              },
              {
                  "target": "com.amazonaws.licensemanagerlinuxsubscriptions#ValidationException"
              }
```

```
        ],
        "traits": {
            "smithy.api#documentation": "<p>Remove a third-party subscription provider from the Bring Your Own License (BYOL) subscriptions \n\t\t\tregistered to your account.</p>",
            "smithy.api#http": {
                "code": 200,
                "method": "POST",
                "uri": "/subscription/DeregisterSubscriptionProvider"
            },
            "smithy.api#idempotent": {}
        }
    },
    "com.amazonaws.licensemanagerlinuxsubscriptions#DeregisterSubscriptionProviderRequest": {
        "type": "structure",
        "members": {
            "SubscriptionProviderArn": {
                "target": "com.amazonaws.licensemanagerlinuxsubscriptions#SubscriptionProviderArn",
                "traits": {
                    "smithy.api#documentation": "<p>The Amazon Resource Name (ARN) of the subscription provider resource to deregister.</p>",
                    "smithy.api#required": {}
                }
            }
        },
        "traits": {
            "smithy.api#input": {}
        }
    },
    "com.amazonaws.licensemanagerlinuxsubscriptions#DeregisterSubscriptionProviderResponse": {
        "type": "structure",
        "members": {},
        "traits": {
            "smithy.api#output": {}
        }
    },
    "com.amazonaws.licensemanagerlinuxsubscriptions#Filter": {
        "type": "structure",
        "members": {
            "Name": {
                "target": "smithy.api#String",
                "traits": {
                    "smithy.api#documentation": "<p>The type of name to filter by.</p>"
                }
            },
            "Values": {
                "target": "com.amazonaws.licensemanagerlinuxsubscriptions#StringList",
                "traits": {
                    "smithy.api#documentation": "<p>One or more values for the name to filter by.</p>"
```

```
                }
            },
            "Operator": {
                "target": "com.amazonaws.licensemanagerlinuxsubscriptions#Operator",
                "traits": {
                    "smithy.api#documentation": "<p>An operator for filtering results.</p>"
                }
            }
        },
        "traits": {
            "smithy.api#documentation": "<p>A filter object that is used to return more specific results from a describe
operation.\n      Filters can be used to match a set of resources by specific criteria.</p>"
        }
    },
    "com.amazonaws.licensemanagerlinuxsubscriptions#FilterList": {
        "type":
 "list",
        "member": {
            "target": "com.amazonaws.licensemanagerlinuxsubscriptions#Filter"
        }
    },
    "com.amazonaws.licensemanagerlinuxsubscriptions#GetRegisteredSubscriptionProvider": {
        "type": "operation",
        "input": {
            "target": "com.amazonaws.licensemanagerlinuxsubscriptions#GetRegisteredSubscriptionProviderRequest"
        },
        "output": {
            "target":
"com.amazonaws.licensemanagerlinuxsubscriptions#GetRegisteredSubscriptionProviderResponse"
        },
        "errors": [
            {
                "target": "com.amazonaws.licensemanagerlinuxsubscriptions#InternalServerException"
            },
            {
                "target": "com.amazonaws.licensemanagerlinuxsubscriptions#ResourceNotFoundException"
            },
            {
                "target": "com.amazonaws.licensemanagerlinuxsubscriptions#ThrottlingException"
             },
            {
                "target": "com.amazonaws.licensemanagerlinuxsubscriptions#ValidationException"
            }
        ],
        "traits": {
            "smithy.api#documentation": "<p>Get details for a Bring Your Own License (BYOL) subscription that's
registered to your account.</p>",
            "smithy.api#http": {
```

"code": 200,
"method": "POST",
"uri": "/subscription/GetRegisteredSubscriptionProvider"
},
"smithy.api#idempotent": {}
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#GetRegisteredSubscriptionProviderRequest": {
"type": "structure",
"members": {
"SubscriptionProviderArn": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#SubscriptionProviderArn",
"traits": {
"smithy.api#documentation":
" The Amazon Resource Name (ARN) of the BYOL registration resource to get details for. ",
"smithy.api#required": {}
}
}
},
"traits": {
"smithy.api#input": {}
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#GetRegisteredSubscriptionProviderResponse": {
"type": "structure",
"members": {
"SubscriptionProviderArn": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#SubscriptionProviderArn",
"traits": {
"smithy.api#documentation": " The Amazon Resource Name (ARN) for the BYOL registration resource specified in the request. "
}
},
"SubscriptionProviderSource": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#SubscriptionProviderSource",

"traits": {
"smithy.api#documentation": " The subscription provider for the BYOL registration resource specified \n\t\t\tin the request. "
}
},
"SecretArn": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#SecretArn",
"traits": {
"smithy.api#documentation": " The Amazon Resource Name (ARN) of the third-party access secret stored in Secrets Manager for the BYOL \n\t\t\tregistration resource specified in the request. "
}
},

"SubscriptionProviderStatus": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#SubscriptionProviderStatus",
"traits": {
"smithy.api#documentation": " The status of the Linux subscription provider access token from the last \n\t\t\tsuccessful subscription data request. "
}
},
"SubscriptionProviderStatusMessage": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The detailed message from your subscription provider token status. "
}
},
"LastSuccessfulDataRetrievalTime": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The timestamp from the last time License Manager retrieved subscription details \n\t\t\tfrom your registered third-party Linux subscription provider. "
}
}
},
"traits": {
"smithy.api#output": {}
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#GetServiceSettings": {
"type": "operation",
"input": {
"target":
"com.amazonaws.licensemanagerlinuxsubscriptions#GetServiceSettingsRequest"
},
"output": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#GetServiceSettingsResponse"
},
"errors": [
{
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#InternalServerException"
},
{
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#ThrottlingException"
},
{
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#ValidationException"
}
],
"traits": {
"smithy.api#documentation": " Lists the Linux subscriptions service settings for your account. ",

"smithy.api#http": {
"code": 200,
"method": "POST",
"uri": "/subscription/GetServiceSettings"

},
"smithy.api#idempotent": {}
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#GetServiceSettingsRequest": {
"type": "structure",
"members": {}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#GetServiceSettingsResponse": {
"type": "structure",
"members": {
"LinuxSubscriptionsDiscovery": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#LinuxSubscriptionsDiscovery",
"traits": {
"smithy.api#documentation": " Lists if discovery has been enabled for Linux subscriptions. "
}
},
"LinuxSubscriptionsDiscoverySettings": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#LinuxSubscriptionsDiscoverySettings",
"traits": {
"smithy.api#documentation": " Lists
the settings defined for Linux subscriptions discovery. The settings include if\n Organizations integration has been enabled, and which Regions data will be aggregated from. "
}
},
"Status": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#Status",
"traits": {
"smithy.api#documentation": " Indicates the status of Linux subscriptions settings being applied. "
}
},
"StatusMessage": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#StringMap",
"traits": {
"smithy.api#documentation": " A message which details the Linux subscriptions service settings current status. "
}
},
"HomeRegions": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#StringList",
"traits": {
"smithy.api#documentation": " The Region in which License Manager displays the aggregated

data for Linux\n subscriptions. "
}
}
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#Instance": {
"type": "structure",
"members": {
"AmiId": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The AMI ID used to launch the instance. "
}
},
"InstanceID": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The instance ID of the resource. "
}
},
"InstanceType": {
"target": "smithy.api#String",
"traits":
{
"smithy.api#documentation": " The instance type of the resource. "
}
},
"AccountID": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The account ID which owns the instance. "
}
},
"Status": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The status of the instance. "
}
},
"Region": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The Region the instance is running in. "
}
},
"UsageOperation": {
"target": "smithy.api#String",

"traits": {
"smithy.api#documentation": " The usage operation of the instance. For more information, see For more information, see\n <a href=\"https://docs.aws.amazon.com/license-manager/latest/userguide/linux-subscriptions-usage-operation.html\">Usage\n operation values</a> in the License Manager User Guide. "
}
},
"ProductCode": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#ProductCodeList",
"traits": {
"smithy.api#documentation": " The product code for the instance. For more information, see <a href=\"https://docs.aws.amazon.com/license-manager/latest/userguide/linux-subscriptions-usage-operation.html\">Usage\n operation values</a> in the License Manager User Guide . "
}
},
"LastUpdatedTime": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The time in which the last discovery updated the instance details. "
}
},
"SubscriptionName": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The name of the license subscription that the instance uses. "
}
},
"OsVersion": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The operating system software version that runs on your instance. "
}
},
"SubscriptionProviderCreateTime": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The timestamp when you registered the third-party Linux subscription \n\t\t\tprovider for the subscription that the instance uses. "
}
},
"SubscriptionProviderUpdateTime": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The timestamp from the last time that the instance synced with the registered \n\t\t\tthird-party Linux subscription provider. "
}

```
            },
            "DualSubscription": {
                "target": "smithy.api#String",
                "traits": {
                    "smithy.api#documentation": "<p>Indicates that you have two different license subscriptions for
\n\t\t\tthe same software on your instance.</p>"
                }
            },
            "RegisteredWithSubscriptionProvider": {
                "target": "smithy.api#String",
                "traits": {

    "smithy.api#documentation": "<p>Indicates that your instance uses a BYOL license subscription from \n\t\t\ta
third-party Linux subscription provider that you've registered with License Manager.</p>"
                }
            }
        },
        "traits": {
            "smithy.api#documentation": "<p>Details discovered information about a running instance using Linux
subscriptions.</p>"
        }
    },
    "com.amazonaws.licensemanagerlinuxsubscriptions#InstanceList": {
        "type": "list",
        "member": {
            "target": "com.amazonaws.licensemanagerlinuxsubscriptions#Instance"
        }
    },
    "com.amazonaws.licensemanagerlinuxsubscriptions#InternalServerException": {
        "type": "structure",
        "members": {
            "message": {
                "target": "smithy.api#String"
            }
        },
        "traits": {
            "smithy.api#documentation":
 "<p>An exception occurred with the service.</p>",
            "smithy.api#error": "server"
        }
    },
    "com.amazonaws.licensemanagerlinuxsubscriptions#LicenseManagerLinuxSubscriptions": {
        "type": "service",
        "version": "2018-05-10",
        "operations": [
            {
                "target": "com.amazonaws.licensemanagerlinuxsubscriptions#DeregisterSubscriptionProvider"
            },
```

```
    {
      "target": "com.amazonaws.licensemanagerlinuxsubscriptions#GetRegisteredSubscriptionProvider"
    },
    {
      "target": "com.amazonaws.licensemanagerlinuxsubscriptions#GetServiceSettings"
    },
    {
      "target": "com.amazonaws.licensemanagerlinuxsubscriptions#ListLinuxSubscriptionInstances"
    },
    {
      "target": "com.amazonaws.licensemanagerlinuxsubscriptions#ListLinuxSubscriptions"
    },
    {
      "target": "com.amazonaws.licensemanagerlinuxsubscriptions#ListRegisteredSubscriptionProviders"
    },
    {
      "target": "com.amazonaws.licensemanagerlinuxsubscriptions#ListTagsForResource"
    },
    {
      "target": "com.amazonaws.licensemanagerlinuxsubscriptions#RegisterSubscriptionProvider"
    },
    {
      "target": "com.amazonaws.licensemanagerlinuxsubscriptions#TagResource"
    },
    {
      "target": "com.amazonaws.licensemanagerlinuxsubscriptions#UntagResource"
    },
    {
      "target": "com.amazonaws.licensemanagerlinuxsubscriptions#UpdateServiceSettings"
    }
  ],
  "traits": {
    "aws.api#service": {
      "sdkId": "License Manager Linux Subscriptions",
      "arnNamespace": "license-manager-linux-subscriptions",
      "cloudTrailEventSource": "license-manager-linux-subscriptions.amazonaws.com"
    },
    "aws.auth#sigv4": {
      "name": "license-manager-linux-subscriptions"
    },
    "aws.protocols#restJson1": {},
    "smithy.api#cors": {
      "additionalAllowedHeaders": [
        "*",
        "content-type",
        "x-amz-content-sha256",
        "x-amz-user-agent",
        "x-amzn-platform-id",
```

"x-amzn-trace-id"
],
"additionalExposedHeaders": [
"x-amzn-errortype",
"x-amzn-requestid",
"x-amzn-trace-id"
]
},
"smithy.api#documentation": " With License Manager,
you can discover and track your commercial Linux subscriptions on running\n Amazon EC2 instances. ",
"smithy.api#title": "AWS License Manager Linux Subscriptions",
"smithy.rules#endpointRuleSet": {
"version": "1.0",
"parameters": {
"Region": {
"builtIn": "AWS::Region",
"required": false,
"documentation": "The AWS region used to dispatch the request.",
"type": "string"
},
"UseDualStack": {
"builtIn": "AWS::UseDualStack",
"required": true,
"default": false,
"documentation": "When true, use the dual-stack endpoint. If the configured endpoint does not support dual-stack, dispatching the request MAY return an error.",
"type": "boolean"
},
"UseFIPS": {
"builtIn": "AWS::UseFIPS",
"required": true,
"default": false,
"documentation": "When true, send this request to the FIPS-compliant regional endpoint. If the configured endpoint does not have a FIPS compliant endpoint, dispatching the request will return an error.",
"type": "boolean"
},
"Endpoint": {
"builtIn": "SDK::Endpoint",
"required": false,
"documentation": "Override the endpoint used to send this request",
"type": "string"
}
},
"rules": [
{
"conditions": [
{
"fn": "isSet",

```
                "argv": [
                  {
                    "ref": "Endpoint"
                  }
                ]
              }
            ],
            "rules": [
              {
                "conditions": [
                  {
                    "fn": "booleanEquals",
                    "argv": [
                      {
                        "ref": "UseFIPS"
                      },
                      true
                    ]
                  }

        ],
                "error": "Invalid Configuration: FIPS and custom endpoint are not supported",
                "type": "error"
              },
              {
                "conditions": [],
                "rules": [
                  {
                    "conditions": [
                      {
                        "fn": "booleanEquals",
                        "argv": [
                          {
                            "ref": "UseDualStack"
                          },
                          true
                        ]

}
                    ],
                    "error": "Invalid Configuration: Dualstack and custom endpoint are not supported",
                    "type": "error"
                  },
                  {
                    "conditions": [],
                    "endpoint": {
                      "url": {
                        "ref": "Endpoint"
```

```
                    },
                    "properties": {},
                    "headers": {}
                },
                "type": "endpoint"
            }
        ],
        "type": "tree"

    }
    ],
    "type": "tree"
},
{
    "conditions": [],
    "rules": [
        {
            "conditions": [
                {
                    "fn": "isSet",
                    "argv": [
                        {
                            "ref": "Region"
                        }
                    ]
                }
            ],
            "rules": [
                {
                    "conditions": [
                        {

    "fn": "aws.partition",
                            "argv": [
                                {
                                    "ref": "Region"
                                }
                            ],
                            "assign": "PartitionResult"
                        }
                    ],
                    "rules": [
                        {
                            "conditions": [
                                {
                                    "fn": "booleanEquals",
                                    "argv": [
                                        {
```

```
                "ref": "UseFIPS"
                },
                true
            ]
        },
        {
            "fn": "booleanEquals",
            "argv": [
                {
                    "ref": "UseDualStack"
                },
                true
            ]
        }

],
        "rules": [
        {
            "conditions": [
                {
                    "fn": "booleanEquals",
                    "argv": [
                        true,
                        {
                            "fn": "getAttr",
                            "argv": [
                                {
                                    "ref": "PartitionResult"

},
                                "supportsFIPS"
                            ]
                        }
                    ]
                },
                {
                    "fn": "booleanEquals",
                    "argv": [
                        true,
                        {
                            "fn": "getAttr",
                            "argv": [

                            {
                                    "ref": "PartitionResult"
                                },
                                "supportsDualStack"
```

```
                    ]
                }
            ]
        }
    ],
    "rules": [
        {
            "conditions": [],

"rules": [
                {
                    "conditions": [],
                    "endpoint": {
                        "url": "https://license-manager-linux-subscriptions-
fips.{Region}.{PartitionResult#dualStackDnsSuffix}",
                        "properties": {},
                        "headers": {}
                    },
                    "type": "endpoint"
                }
            ],

"type": "tree"
        }
    ],
    "type": "tree"
},
{
    "conditions": [],
    "error": "FIPS and DualStack are enabled, but this partition does not support
one or both",

    "type": "error"
}
],
"type": "tree"
},
{

"conditions": [
    {
        "fn": "booleanEquals",
        "argv": [
            {
                "ref": "UseFIPS"
            },
            true
        ]
    }
```

```
                    ],
                    "rules": [
                      {
                        "conditions": [
                          {

                "fn": "booleanEquals",
                            "argv": [
                              {
                                "fn": "getAttr",
                                "argv": [
                                  {
                                    "ref": "PartitionResult"
                                  },
                                  "supportsFIPS"
                                ]
                              },
                              true

                        ]
                          }
                        ],
                        "rules": [
                          {
                            "conditions": [],
                            "rules": [
                              {
                                "conditions": [],
                                "endpoint": {
                                  "url": "https://license-manager-linux-subscriptions-
fips.{Region}.{PartitionResult#dnsSuffix}",

  "properties": {},
                                  "headers": {}
                                },
                                "type": "endpoint"
                              }
                            ],
                            "type": "tree"
                          }
                        ],
                        "type": "tree"
                      },
                      {
                        "conditions": [],
                        "error": "FIPS is enabled
but this partition does not support FIPS",
                        "type": "error"
```

```
                    }
                ],
                "type": "tree"
            },
            {
                "conditions": [
                    {
                        "fn": "booleanEquals",
                        "argv": [
                            {
                                "ref": "UseDualStack"
                            },
                            true

        ]
                    }
                ],
                "rules": [
                    {
                        "conditions": [
                            {
                                "fn": "booleanEquals",
                                "argv": [
                                    true,
                                    {
                                        "fn": "getAttr",
                                        "argv": [
                                            {

                                            "ref": "PartitionResult"
                                            },
                                            "supportsDualStack"
                                        ]
                                    }
                                ]
                            }
                        ],
                        "rules": [
                            {
                                "conditions": [],
                                "rules": [

    {
                                        "conditions": [],
                                        "endpoint": {
                                            "url": "https://license-manager-linux-
subscriptions.{Region}.{PartitionResult#dualStackDnsSuffix}",
                                            "properties": {},
```

"headers": {}
},
"type": "endpoint"
}
],
"type": "tree"

}
],
"type": "tree"
},
{
"conditions": [],
"error": "DualStack is enabled but this partition does not support DualStack",
"type": "error"
}
],
"type": "tree"
},
{
"conditions": [],
"rules": [
{
"conditions": [],
"endpoint": {
"url": "https://license-manager-linux-
subscriptions.{Region}.{PartitionResult#dnsSuffix}",
"properties": {},
"headers": {}
},
"type": "endpoint"
}
],
"type": "tree"
}
],
"type": "tree"
}
}
],
"type": "tree"
},
{
"conditions": [],
"error": "Invalid Configuration: Missing Region",
"type": "error"
}
],
"type": "tree"

```
        }
      ]
    },
    "smithy.rules#endpointTests": {
      "testCases": [
        {
          "documentation": "For region us-east-1 with FIPS enabled and DualStack enabled",
          "expect": {
            "endpoint": {
              "url": "https://license-manager-linux-subscriptions-fips.us-east-1.api.aws"

      }
          },
          "params": {
            "Region": "us-east-1",
            "UseFIPS": true,
            "UseDualStack": true
          }
        },
        {
          "documentation": "For region us-east-1 with FIPS enabled and DualStack disabled",
          "expect": {
            "endpoint": {
              "url": "https://license-manager-linux-subscriptions-fips.us-east-1.amazonaws.com"
            }
          },
          "params": {
            "Region": "us-east-1",
            "UseFIPS": true,
            "UseDualStack": false
          }
        },
        {

       "documentation": "For region us-east-1 with FIPS disabled and DualStack enabled",
          "expect": {
            "endpoint": {
              "url": "https://license-manager-linux-subscriptions.us-east-1.api.aws"
            }
          },
          "params": {
            "Region": "us-east-1",
            "UseFIPS": false,
            "UseDualStack": true
          }
        },
        {
          "documentation": "For region us-east-1 with FIPS disabled and DualStack disabled",
```

"expect": {
"endpoint": {
"url": "https://license-manager-linux-subscriptions.us-east-1.amazonaws.com"
}

},
"params": {
"Region": "us-east-1",
"UseFIPS": false,
"UseDualStack": false
}
},
{
"documentation": "For region cn-north-1 with FIPS enabled and DualStack enabled",
"expect": {
"endpoint": {
"url": "https://license-manager-linux-subscriptions-fips.cn-north-1.api.amazonwebservices.com.cn"
}
},
"params": {
"Region": "cn-north-1",
"UseFIPS": true,
"UseDualStack": true
}
},
{

"documentation": "For region cn-north-1 with FIPS enabled and DualStack disabled",
"expect": {
"endpoint": {
"url": "https://license-manager-linux-subscriptions-fips.cn-north-1.amazonaws.com.cn"
}
},
"params": {
"Region": "cn-north-1",
"UseFIPS": true,
"UseDualStack": false
}
},
{
"documentation": "For region cn-north-1 with FIPS disabled and DualStack enabled",
"expect": {
"endpoint": {
"url": "https://license-manager-linux-subscriptions.cn-north-1.api.amazonwebservices.com.cn"
}
},
"params": {

"Region": "cn-north-1",
"UseFIPS": false,
"UseDualStack": true
}
},
{
"documentation": "For region cn-north-1 with FIPS disabled and DualStack disabled",
"expect": {
"endpoint": {
"url": "https://license-manager-linux-subscriptions.cn-north-1.amazonaws.com.cn"
}
},
"params": {
"Region": "cn-north-1",
"UseFIPS": false,
"UseDualStack": false
}
},
{

"documentation": "For region us-gov-east-1 with FIPS enabled and DualStack enabled",
"expect": {
"endpoint": {
"url": "https://license-manager-linux-subscriptions-fips.us-gov-east-1.api.aws"
}
},
"params": {
"Region": "us-gov-east-1",
"UseFIPS": true,
"UseDualStack": true
}
},
{
"documentation": "For region us-gov-east-1 with FIPS enabled and DualStack disabled",
"expect": {
"endpoint": {
"url": "https://license-manager-linux-subscriptions-fips.us-gov-east-1.amazonaws.com"
}

},
"params": {
"Region": "us-gov-east-1",
"UseFIPS": true,
"UseDualStack": false
}
},
{
"documentation": "For region us-gov-east-1 with FIPS disabled and DualStack enabled",

"expect": {
"endpoint": {
"url": "https://license-manager-linux-subscriptions.us-gov-east-1.api.aws"
}
},
"params": {
"Region": "us-gov-east-1",
"UseFIPS": false,
"UseDualStack": true
}
},
{

"documentation": "For region us-gov-east-1 with FIPS disabled and DualStack disabled",
"expect": {
"endpoint": {
"url": "https://license-manager-linux-subscriptions.us-gov-east-1.amazonaws.com"
}
},
"params": {
"Region": "us-gov-east-1",
"UseFIPS": false,
"UseDualStack": false
}
},
{
"documentation": "For region us-iso-east-1 with FIPS enabled and DualStack disabled",
"expect": {
"endpoint": {
"url": "https://license-manager-linux-subscriptions-fips.us-iso-east-1.c2s.ic.gov"
}

},
"params": {
"Region": "us-iso-east-1",
"UseFIPS": true,
"UseDualStack": false
}
},
{
"documentation": "For region us-iso-east-1 with FIPS disabled and DualStack disabled",
"expect": {
"endpoint": {
"url": "https://license-manager-linux-subscriptions.us-iso-east-1.c2s.ic.gov"
}
},
"params": {
"Region": "us-iso-east-1",

"UseFIPS": false,
"UseDualStack": false
}
},
{

"documentation": "For region us-isob-east-1 with FIPS enabled and DualStack disabled",
"expect": {
"endpoint": {
"url": "https://license-manager-linux-subscriptions-fips.us-isob-east-1.sc2s.sgov.gov"
}
},
"params": {
"Region": "us-isob-east-1",
"UseFIPS": true,
"UseDualStack": false
}
},
{
"documentation": "For region us-isob-east-1 with FIPS disabled and DualStack disabled",
"expect": {
"endpoint": {
"url": "https://license-manager-linux-subscriptions.us-isob-east-1.sc2s.sgov.gov"

}
},
"params": {
"Region": "us-isob-east-1",
"UseFIPS": false,
"UseDualStack": false
}
},
{
"documentation": "For custom endpoint with region set and fips disabled and dualstack disabled",
"expect": {
"endpoint": {
"url": "https://example.com"
}
},
"params": {
"Region": "us-east-1",
"UseFIPS": false,
"UseDualStack": false,
"Endpoint": "https://example.com"
}
},

{
"documentation": "For custom endpoint with region not set and fips disabled and dualstack disabled",
"expect": {
"endpoint": {
"url": "https://example.com"
}
},
"params": {
"UseFIPS": false,
"UseDualStack": false,
"Endpoint": "https://example.com"
}
},
{
"documentation": "For custom endpoint with fips enabled and dualstack disabled",
"expect": {
"error": "Invalid Configuration: FIPS and custom endpoint are not supported"
},
"params": {

"Region": "us-east-1",
"UseFIPS": true,
"UseDualStack": false,
"Endpoint": "https://example.com"
}
},
{
"documentation": "For custom endpoint with fips disabled and dualstack enabled",
"expect": {
"error": "Invalid Configuration: Dualstack and custom endpoint are not supported"
},
"params": {
"Region": "us-east-1",
"UseFIPS": false,
"UseDualStack": true,
"Endpoint": "https://example.com"
}
},
{
"documentation": "Missing region",

"expect": {
"error": "Invalid Configuration: Missing Region"
}
}
],
"version": "1.0"

```
            }
        }
    },
    "com.amazonaws.licensemanagerlinuxsubscriptions#LinuxSubscriptionsDiscovery": {
        "type": "string",
        "traits": {
            "smithy.api#enum": [
                {
                    "name": "Enabled",
                    "value": "Enabled",
                    "documentation": "Enabled LinuxSubscriptionsDiscovery"
                },
                {
                    "name": "Disabled",
                    "value": "Disabled",
                    "documentation": "Disabled LinuxSubscriptionsDiscovery"
                }
            ]
        }
    },
    "com.amazonaws.licensemanagerlinuxsubscriptions#LinuxSubscriptionsDiscoverySettings":
 {
        "type": "structure",
        "members": {
            "SourceRegions": {
                "target": "com.amazonaws.licensemanagerlinuxsubscriptions#StringList",
                "traits": {
                    "smithy.api#documentation": "<p>The Regions in which to discover data for Linux
subscriptions.</p>",
                    "smithy.api#required": {}
                }
            },
            "OrganizationIntegration": {
                "target": "com.amazonaws.licensemanagerlinuxsubscriptions#OrganizationIntegration",
                "traits": {
                    "smithy.api#documentation": "<p>Details if you have enabled resource discovery across your
accounts in Organizations.</p>",
                    "smithy.api#required": {}
                }
            }
        },
        "traits": {
            "smithy.api#documentation": "<p>Lists the settings defined for discovering Linux
 subscriptions.</p>"
        }
    },
    "com.amazonaws.licensemanagerlinuxsubscriptions#ListLinuxSubscriptionInstances": {
        "type": "operation",
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        "input": {
            "target": "com.amazonaws.licensemanagerlinuxsubscriptions#ListLinuxSubscriptionInstancesRequest"
        },
        "output": {
            "target": "com.amazonaws.licensemanagerlinuxsubscriptions#ListLinuxSubscriptionInstancesResponse"
        },
        "errors": [
            {
                "target": "com.amazonaws.licensemanagerlinuxsubscriptions#InternalServerException"
            },
            {
                "target": "com.amazonaws.licensemanagerlinuxsubscriptions#ThrottlingException"
            },
            {
                "target": "com.amazonaws.licensemanagerlinuxsubscriptions#ValidationException"
            }
        ],
        "traits": {
            "smithy.api#documentation": "<p>Lists
 the running Amazon EC2 instances that were discovered with commercial Linux\n      subscriptions.</p>",
            "smithy.api#http": {
                "code": 200,
                "method": "POST",
                "uri": "/subscription/ListLinuxSubscriptionInstances"
            },
            "smithy.api#idempotent": {},
            "smithy.api#paginated": {
                "inputToken": "NextToken",
                "outputToken": "NextToken",
                "pageSize": "MaxResults",
                "items": "Instances"
            }
        }
    },
    "com.amazonaws.licensemanagerlinuxsubscriptions#ListLinuxSubscriptionInstancesRequest": {
        "type": "structure",
        "members": {
            "Filters": {
                "target": "com.amazonaws.licensemanagerlinuxsubscriptions#FilterList",
                "traits": {
                    "smithy.api#documentation": "<p>An array of structures
 that you can use to filter the results by your specified criteria. \n    \tFor example, you can specify
<code>Region</code> in the <code>Name</code>, with the \n    \t<code>contains</code> operator to list all
subscriptions that match a partial string in the \n    \t<code>Value</code>, such as <code>us-west</code>.</p>\n
  <p>For each filter, you can specify one of the following values for the <code>Name</code> key \n    \tto
streamline results:</p>\n        <ul>\n            <li>\n                <p>\n                <code>AccountID</code>\n
</p>\n            </li>\n            <li>\n                <p>\n                <code>AmiID</code>\n                </p>\n            </li>\n
        <li>\n                <p>\n                <code>DualSubscription</code>\n                </p>\n            </li>\n
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<li>\n            <p>\n                <code>InstanceID</code>\n            </p>\n        </li>\n        <li>\n
  <p>\n                <code>InstanceType</code>\n            </p>\n        </li>\n        <li>\n            <p>\n
    <code>ProductCode</code>\n            </p>\n        </li>\n        <li>\n            <p>\n
<code>Region</code>\n            </p>\n        </li>\n        <li>\n            <p>\n
<code>Status</code>\n            </p>\n        </li>\n        <li>\n            <p>\n
<code>UsageOperation</code>\n            </p>\n        </li>\n        </ul>\n        <p>For each filter, you can use
one of the following <code>Operator</code> values to \n  \t\tdefine the behavior of the filter:</p>\n        <ul>\n
    <li>\n            <p>\n                <code>contains</code>\n            </p>\n        </li>\n        <li>\n
<p>\n                <code>equals</code>\n            </p>\n        </li>\n        <li>\n
            <p>\n                <code>Notequal</code>\n            </p>\n        </li>\n        </ul>"
            }
            },
            "MaxResults": {
                "target": "com.amazonaws.licensemanagerlinuxsubscriptions#BoxInteger",
                "traits": {
                    "smithy.api#documentation": "<p>The maximum items to return in a request.</p>"
                }
            },
            "NextToken": {
                "target": "smithy.api#String",
                "traits": {
                    "smithy.api#documentation": "<p>A token to specify where to start paginating. This \n\tis the
nextToken from a previously truncated response.</p>",
                    "smithy.api#length": {
                        "min": 1,
                        "max": 16384
                    }
                }
            }
        },
        "traits": {
            "smithy.api#documentation":
 "NextToken length limit is half of ddb accepted limit.\nIncrease this limit if parameters in request increases."
        }
    },
    "com.amazonaws.licensemanagerlinuxsubscriptions#ListLinuxSubscriptionInstancesResponse": {
        "type": "structure",
        "members": {
            "Instances": {
                "target": "com.amazonaws.licensemanagerlinuxsubscriptions#InstanceList",
                "traits": {
                    "smithy.api#documentation": "<p>An array that contains instance objects.</p>"
                }
            },
            "NextToken": {
                "target": "smithy.api#String",
                "traits": {
                    "smithy.api#documentation": "<p>The next token used for paginated responses. When this \n\tfield
```

isn't empty, there are additional elements that the service hasn't \n\tincluded in this request. Use this token with the next request to retrieve \n\tadditional
objects. "
}
}
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#ListLinuxSubscriptions": {
"type": "operation",
"input": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#ListLinuxSubscriptionsRequest"
},
"output": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#ListLinuxSubscriptionsResponse"
},
"errors": [
{
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#InternalServerException"
},
{
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#ThrottlingException"
},
{
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#ValidationException"
}
],
"traits": {
"smithy.api#documentation":
" Lists the Linux subscriptions that have been discovered. If you have linked your\n organization, the returned results will include data aggregated across your accounts in\n Organizations. ",
"smithy.api#http": {
"code": 200,
"method": "POST",
"uri": "/subscription/ListLinuxSubscriptions"
},
"smithy.api#idempotent": {},
"smithy.api#paginated": {
"inputToken": "NextToken",
"outputToken": "NextToken",
"pageSize": "MaxResults",
"items": "Subscriptions"
}
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#ListLinuxSubscriptionsRequest": {
"type": "structure",
"members": {
"Filters": {

"target": "com.amazonaws.licensemanagerlinuxsubscriptions#FilterList",

"traits": {
"smithy.api#documentation": " An array of structures that you can use to filter the results to those that match one or\n more sets of key-value pairs that you specify. For example, you can filter by the name of\n <code>Subscription</code> with an optional operator to see subscriptions that match,\n partially match, or don't match a certain subscription's name. \n The valid names for this filter are: \n <ul>\n <li>\n \n <code>Subscription</code>\n \n </li>\n </ul>\n The valid Operators for this filter are: \n <ul>\n <li>\n \n <code>contains</code>\n \n </li>\n <li>\n \n <code>equals</code>\n \n </li>\n <li>\n \n <code>Notequal</code>\n \n </li>\n </ul>"
}
},
"MaxResults": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#BoxInteger",
"traits": {
"smithy.api#documentation": " The maximum items to return in a request. "
}
},
"NextToken": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " A token to specify where to start paginating. This \n\tis the nextToken from a previously truncated response. ",
"smithy.api#length": {
"min": 1,
"max": 16384
}
}
}
},
"traits": {
"smithy.api#documentation": "NextToken length limit is half of ddb accepted limit.\nIncrease this limit if parameters in request increases."
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#ListLinuxSubscriptionsResponse": {
"type": "structure",
"members": {
"Subscriptions": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#SubscriptionList",
"traits": {
"smithy.api#documentation": " An array that contains subscription objects. "
}
},
"NextToken": {
"target": "smithy.api#String",

"traits": {
"smithy.api#documentation": " The next token used for paginated responses. When this \n\tfield isn't empty, there are additional elements that the service hasn't \n\tincluded in this request. Use this token with the next request to retrieve \n\tadditional objects. "

}
}
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#ListRegisteredSubscriptionProviders": {
"type": "operation",
"input": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#ListRegisteredSubscriptionProvidersRequest"
},
"output": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#ListRegisteredSubscriptionProvidersResponse"
},
"errors": [
{
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#InternalServerException"
},
{
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#ThrottlingException"
},
{
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#ValidationException"
}
],
"traits": {
"smithy.api#documentation": " List Bring Your Own License (BYOL) subscription registration resources for your account. ",
"smithy.api#http": {
"code": 200,
"method": "POST",
"uri": "/subscription/ListRegisteredSubscriptionProviders"
},
"smithy.api#idempotent": {},
"smithy.api#paginated": {
"inputToken": "NextToken",
"outputToken": "NextToken",
"pageSize": "MaxResults",
"items": "RegisteredSubscriptionProviders"
}
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#ListRegisteredSubscriptionProvidersRequest": {

"type": "structure",
"members": {
"SubscriptionProviderSources": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#SubscriptionProviderSourceList",

"traits": {
"smithy.api#documentation": " To filter your results, specify which subscription providers to return \n\t\t\tin the list. "
}
},
"MaxResults": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#BoxInteger",
"traits": {
"smithy.api#documentation": " The maximum items to return in a request. ",
"smithy.api#range": {
"min": 1,
"max": 100
}
}
},
"NextToken": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " A token to specify where to start paginating. This \n\tis the nextToken from a previously truncated response. "
}
}
},

"traits": {
"smithy.api#input": {}
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#ListRegisteredSubscriptionProvidersResponse": {
"type": "structure",
"members": {
"RegisteredSubscriptionProviders": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#RegisteredSubscriptionProviderList",
"traits": {
"smithy.api#documentation": " The list of BYOL registration resources that fit the criteria \n\t\t\tyou specified in the request. "
}
},
"NextToken": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The next token used for paginated responses. When this \n\tfield isn't empty, there are additional elements that the service hasn't \n\tincluded in this request. Use this token with

the next request to retrieve \n\tadditional objects. "
}
}
},
"traits": {
"smithy.api#output": {}
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#ListTagsForResource": {
"type": "operation",
"input": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#ListTagsForResourceRequest"
},
"output": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#ListTagsForResourceResponse"
},
"errors": [
{
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#InternalServerException"
},
{
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#ResourceNotFoundException"
},
{
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#ValidationException"
}
],
"traits": {
"smithy.api#documentation": " List the metadata tags that are assigned to the \n\t\t\tspecified Amazon Web Services resource. ",
"smithy.api#http": {
"method": "GET",
"uri": "/tags/{resourceArn}"
},
"smithy.api#readonly": {}
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#ListTagsForResourceRequest": {
"type": "structure",
"members": {
"resourceArn": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#SubscriptionProviderArn",
"traits": {
"smithy.api#documentation": " The Amazon Resource Name (ARN) of the resource for which to list metadata tags. ",
"smithy.api#httpLabel": {},
"smithy.api#required": {}

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            }
        }
    },
    "traits": {
        "smithy.api#input": {}
    }
},
"com.amazonaws.licensemanagerlinuxsubscriptions#ListTagsForResourceResponse": {
    "type": "structure",
    "members": {
        "tags": {
            "target": "com.amazonaws.licensemanagerlinuxsubscriptions#Tags",
            "traits": {
                "smithy.api#documentation": "<p>The metadata tags for the requested resource.</p>"
            }
        }
    },
    "traits": {
        "smithy.api#output": {}
    }
},
"com.amazonaws.licensemanagerlinuxsubscriptions#Operator": {
    "type": "string",
    "traits": {
        "smithy.api#enum": [
            {
                "name": "EQUAL",
                "value": "Equal",
                "documentation": "Equal operator"
            },
            {
                "name": "NOT_EQUAL",
                "value": "NotEqual",
                "documentation": "Not equal operator"
            },
            {
                "name": "CONTAINS",
                "value": "Contains",
                "documentation": "Contains operator"
            }
        ],
        "smithy.api#length": {
            "min": 1,
            "max": 20
        }
    }
},
"com.amazonaws.licensemanagerlinuxsubscriptions#OrganizationIntegration": {
```

"type": "string",
"traits": {
"smithy.api#enum": [
{
"name": "Enabled",
"value": "Enabled",
"documentation": "Enabled OrganizationIntegration"
},
{

"name": "Disabled",
"value": "Disabled",
"documentation": "Disabled OrganizationIntegration"
}
]
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#ProductCodeList": {
"type": "list",
"member": {
"target": "smithy.api#String"
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#RegisterSubscriptionProvider": {
"type": "operation",
"input": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#RegisterSubscriptionProviderRequest"
},
"output": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#RegisterSubscriptionProviderResponse"
},
"errors": [
{
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#InternalServerException"
},

{
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#ThrottlingException"
},
{
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#ValidationException"
}
],
"traits": {
"smithy.api#documentation": " Register the supported third-party subscription provider for your Bring Your Own License (BYOL) subscription. ",
"smithy.api#http": {
"code": 200,

"method": "POST",
"uri": "/subscription/RegisterSubscriptionProvider"
},
"smithy.api#idempotent": {}
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#RegisterSubscriptionProviderRequest": {
"type": "structure",
"members": {
"SubscriptionProviderSource": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#SubscriptionProviderSource",
"traits": {
"smithy.api#documentation": " The supported Linux subscription provider to register. ",
"smithy.api#required": {}
}
},
"SecretArn": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#SecretArn",
"traits": {
"smithy.api#documentation": " The Amazon Resource Name (ARN) of the secret where you've stored your subscription provider's access token. For \n\t\t\tRHEL subscriptions managed through the Red Hat Subscription Manager (RHSM), the secret contains \n\t\t\tyour Red Hat Offline token. ",
"smithy.api#required": {}
}
},
"Tags": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#Tags",
"traits": {

"smithy.api#documentation": " The metadata tags to assign to your registered Linux subscription provider \n\t\t\tresource. "
}
}
},
"traits": {
"smithy.api#input": {}
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#RegisterSubscriptionProviderResponse": {
"type": "structure",
"members": {
"SubscriptionProviderSource": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#SubscriptionProviderSource",
"traits": {
"smithy.api#documentation": " The Linux subscription provider that you registered. "
}
},
"SubscriptionProviderArn": {

"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " The Amazon Resource Name (ARN) of
the Linux subscription provider resource that you registered. "
}
},
"SubscriptionProviderStatus": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#SubscriptionProviderStatus",
"traits": {
"smithy.api#documentation": " Indicates the status of the registration action for the Linux
subscription provider \n\t\t\tthat you requested. "
}
}
},
"traits": {
"smithy.api#output": {}
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#RegisteredSubscriptionProvider": {
"type": "structure",
"members": {
"SubscriptionProviderArn": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#SubscriptionProviderArn",
"traits": {
"smithy.api#documentation": " The
Amazon Resource Name (ARN) of the Linux subscription provider resource that you registered. "
}
},
"SubscriptionProviderSource": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#SubscriptionProviderSource",
"traits": {
"smithy.api#documentation": " A supported third-party Linux subscription provider. License
Manager currently supports \n\t\t\tRed Hat subscriptions. "
}
},
"SecretArn": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#SecretArn",
"traits": {
"smithy.api#documentation": " The Amazon Resource Name (ARN) of the Secrets Manager secret
that stores your registered Linux subscription provider \n\t\t\taccess token. For RHEL account subscriptions, this is
the offline token. "
}
},
"SubscriptionProviderStatus": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#SubscriptionProviderStatus",
"traits": {
"smithy.api#documentation": " Indicates the status of your registered Linux subscription provider
access token \n\t\t\tfrom the last time License Manager retrieved subscription data. For RHEL account subscriptions,

\n\t\t\tthis is the status of the offline token. "
}
},
"SubscriptionProviderStatusMessage": {
"target": "smithy.api#String",
"traits": {
"smithy.api#documentation": " A detailed message that's associated with your BYOL subscription \n\t\t\tprovider token status. "
}
},
"LastSuccessfulDataRetrievalTime": {
"target": "smithy.api#String",
"traits": {

"smithy.api#documentation": " The timestamp from the last time that License Manager accessed third-party subscription data \n\t\t\tfor your account from your registered Linux subscription provider. "
}
}
},
"traits": {
"smithy.api#documentation": " A third-party provider for operating system (OS) platform software and license \n\t\t\tsubscriptions, such as Red Hat. When you register a third-party Linux subscription \n\t\t\tprovider, License Manager can get subscription data from the registered provider. "
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#RegisteredSubscriptionProviderList": {
"type": "list",
"member": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#RegisteredSubscriptionProvider"
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#ResourceNotFoundException":
{
"type": "structure",
"members": {
"message": {
"target": "smithy.api#String"
}
},
"traits": {
"smithy.api#documentation": " Unable to find the requested Amazon Web Services resource. ",
"smithy.api#error": "client"
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#SecretArn": {
"type": "string",
"traits": {
"smithy.api#pattern": "^arn:[a-z0-9-\\.]{1,63}:secretsmanager:[a-z0-9-\\.]{0,63}:[a-z0-9-

\\.]{0,63}:secret:[^/]{1,1023}$"
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#Status": {
"type": "string",
"traits": {
"smithy.api#enum": [
{
"name": "InProgress",
"value": "InProgress",
"documentation": "InProgress status"
},
{
"name": "Completed",
"value": "Completed",
"documentation": "Completed status"
},
{
"name": "Successful",
"value": "Successful",
"documentation": "Successful status"
},
{
"name": "Failed",
"value": "Failed",
"documentation": "Failed status"
}
]
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#StringList": {
"type": "list",
"member": {
"target": "smithy.api#String",
"traits": {
"smithy.api#length": {
"min": 1,
"max": 100
}
}
},
"traits": {
"smithy.api#length": {
"min": 1,
"max": 100
},
"smithy.api#uniqueItems": {}
}

```
    },
    "com.amazonaws.licensemanagerlinuxsubscriptions#StringMap": {
        "type": "map",
        "key": {
            "target": "smithy.api#String"
        },
        "value": {
            "target": "smithy.api#String"
        }
    },
    "com.amazonaws.licensemanagerlinuxsubscriptions#Subscription": {
        "type": "structure",
        "members": {
            "Name": {
                "target": "smithy.api#String",
                "traits": {
                    "smithy.api#documentation": "<p>The name of the subscription.</p>"
                }
            },
            "Type": {
                "target": "smithy.api#String",
                "traits": {

    "smithy.api#documentation": "<p>The type of subscription. The type can be subscription-included with
Amazon EC2, Bring Your Own\n      Subscription model (BYOS), or from the Amazon Web Services Marketplace.
Certain subscriptions may use licensing from the\n      Amazon Web Services Marketplace as well as OS licensing
from Amazon EC2 or BYOS.</p>"
                }
            },
            "InstanceCount": {
                "target": "com.amazonaws.licensemanagerlinuxsubscriptions#BoxLong",
                "traits": {
                    "smithy.api#documentation": "<p>The total amount of running instances using this subscription.</p>"
                }
            }
        },
        "traits": {
            "smithy.api#documentation": "<p>An object which details a discovered Linux subscription.</p>"
        }
    },
    "com.amazonaws.licensemanagerlinuxsubscriptions#SubscriptionList": {
        "type": "list",

    "member": {
            "target": "com.amazonaws.licensemanagerlinuxsubscriptions#Subscription"
        }
    },
    "com.amazonaws.licensemanagerlinuxsubscriptions#SubscriptionProviderArn": {
```

"type": "string",
"traits": {
"smithy.api#pattern": "^arn:[a-z0-9-\\.]{1,63}:[a-z0-9-\\.]{1,63}:[a-z0-9-\\.]{1,63}:[a-z0-9-\\.]{1,63}:[a-z0-9-\\.]{1,510}/[a-z0-9-\\.]{1,510}$"
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#SubscriptionProviderSource": {
"type": "string",
"traits": {
"smithy.api#enum": [
{
"name": "RedHat",
"value": "RedHat",
"documentation": "RedHat subscription provider namespace"
}
]
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#SubscriptionProviderSourceList": {
"type":
"list",
"member": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#SubscriptionProviderSource"
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#SubscriptionProviderStatus": {
"type": "string",
"traits": {
"smithy.api#enum": [
{
"name": "ACTIVE",
"value": "ACTIVE",
"documentation": "ACTIVE status"
},
{
"name": "INVALID",
"value": "INVALID",
"documentation": "INVALID status"
},
{
"name": "PENDING",
"value": "PENDING",
"documentation": "PENDING status"
}
]
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#TagKeyList":

```
{
        "type": "list",
        "member": {
            "target": "smithy.api#String"
        },
        "traits": {
            "smithy.api#length": {
                "min": 0,
                "max": 50
            },
            "smithy.api#sensitive": {}
        }
    },
    "com.amazonaws.licensemanagerlinuxsubscriptions#TagResource": {
        "type": "operation",
        "input": {
            "target": "com.amazonaws.licensemanagerlinuxsubscriptions#TagResourceRequest"
        },
        "output": {
            "target": "com.amazonaws.licensemanagerlinuxsubscriptions#TagResourceResponse"
        },
        "errors": [
            {
                "target": "com.amazonaws.licensemanagerlinuxsubscriptions#InternalServerException"
            },
            {
                "target": "com.amazonaws.licensemanagerlinuxsubscriptions#ResourceNotFoundException"

            },
            {
                "target": "com.amazonaws.licensemanagerlinuxsubscriptions#ValidationException"
            }
        ],
        "traits": {
            "smithy.api#documentation": "<p>Add metadata tags to the specified Amazon Web Services
resource.</p>",
            "smithy.api#http": {
                "method": "PUT",
                "uri": "/tags/{resourceArn}"
            },
            "smithy.api#idempotent": {}
        }
    },
    "com.amazonaws.licensemanagerlinuxsubscriptions#TagResourceRequest": {
        "type": "structure",
        "members": {
            "resourceArn": {
                "target": "com.amazonaws.licensemanagerlinuxsubscriptions#SubscriptionProviderArn",
```

"traits": {
"smithy.api#documentation": " The Amazon Resource Name (ARN) of the Amazon Web Services resource to which to add the specified \n\t\t\tmetadata tags. ",
"smithy.api#httpLabel": {},
"smithy.api#required": {}
}
},
"tags": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#Tags",
"traits": {
"smithy.api#documentation": " The metadata tags to assign to the Amazon Web Services resource. Tags are \n\t\t\tformatted as key value pairs. ",
"smithy.api#required": {}
}
}
},
"traits": {
"smithy.api#input": {}
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#TagResourceResponse": {
"type": "structure",
"members": {},
"traits": {
"smithy.api#output": {}
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#Tags": {
"type": "map",
"key":
{
"target": "smithy.api#String"
},
"value": {
"target": "smithy.api#String"
},
"traits": {
"smithy.api#length": {
"min": 0,
"max": 50
},
"smithy.api#sensitive": {}
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#ThrottlingException": {
"type": "structure",
"members": {
"message": {

"target": "smithy.api#String"
}
},
"traits": {
"smithy.api#documentation": " The request was denied due to request throttling. ",
"smithy.api#error": "client"
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#UntagResource": {
"type": "operation",
"input": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#UntagResourceRequest"
},
"output": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#UntagResourceResponse"
},
"errors": [
{
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#InternalServerException"
},
{
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#ResourceNotFoundException"
}
],
"traits": {
"smithy.api#documentation": " Remove one or more metadata tag from the specified Amazon Web Services resource. ",
"smithy.api#http": {
"method": "DELETE",
"uri": "/tags/{resourceArn}"
},
"smithy.api#idempotent": {}
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#UntagResourceRequest": {
"type": "structure",

"members": {
"resourceArn": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#SubscriptionProviderArn",
"traits": {
"smithy.api#documentation": " The Amazon Resource Name (ARN) of the Amazon Web Services resource to remove the metadata tags from. ",
"smithy.api#httpLabel": {},
"smithy.api#required": {}
}
},
"tagKeys": {

"target": "com.amazonaws.licensemanagerlinuxsubscriptions#TagKeyList",
"traits": {
"smithy.api#documentation": " A list of metadata tag keys to remove from the requested
\n\t\t\tresource. ",
"smithy.api#httpQuery": "tagKeys",
"smithy.api#required": {}
}
}
},
"traits": {
"smithy.api#input":
{}
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#UntagResourceResponse": {
"type": "structure",
"members": {},
"traits": {
"smithy.api#output": {}
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#UpdateServiceSettings": {
"type": "operation",
"input": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#UpdateServiceSettingsRequest"
},
"output": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#UpdateServiceSettingsResponse"
},
"errors": [
{
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#InternalServerException"
},
{
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#ThrottlingException"
},
{

"target": "com.amazonaws.licensemanagerlinuxsubscriptions#ValidationException"
}
],
"traits": {
"smithy.api#documentation": " Updates the service settings for Linux subscriptions. ",
"smithy.api#http": {
"code": 200,
"method": "POST",
"uri": "/subscription/UpdateServiceSettings"
},

"smithy.api#idempotent": {}
}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#UpdateServiceSettingsRequest": {
"type": "structure",
"members": {
"LinuxSubscriptionsDiscovery": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#LinuxSubscriptionsDiscovery",
"traits": {
"smithy.api#documentation": " Describes if the discovery of Linux subscriptions is enabled. ",
"smithy.api#required":
{}
}
},
"LinuxSubscriptionsDiscoverySettings": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#LinuxSubscriptionsDiscoverySettings",
"traits": {
"smithy.api#documentation": " The settings defined for Linux subscriptions discovery. The settings include if Organizations\n integration has been enabled, and which Regions data will be aggregated from. ",
"smithy.api#required": {}
}
},
"AllowUpdate": {
"target": "smithy.api#Boolean",
"traits": {
"smithy.api#documentation": " Describes if updates are allowed to the service settings for Linux subscriptions. If you\n allow updates, you can aggregate Linux subscription data in more than one home Region. "
}
}

}
},
"com.amazonaws.licensemanagerlinuxsubscriptions#UpdateServiceSettingsResponse": {
"type": "structure",
"members": {
"LinuxSubscriptionsDiscovery": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#LinuxSubscriptionsDiscovery",
"traits": {
"smithy.api#documentation": " Lists if discovery has been enabled for Linux subscriptions. "
}
},
"LinuxSubscriptionsDiscoverySettings": {
"target": "com.amazonaws.licensemanagerlinuxsubscriptions#LinuxSubscriptionsDiscoverySettings",
"traits": {
"smithy.api#documentation": " The settings defined for Linux subscriptions discovery. The settings include if Organizations\n integration has been enabled, and which Regions data will be aggregated

from. "
                }

    },
            "Status": {
                "target": "com.amazonaws.licensemanagerlinuxsubscriptions#Status",
                "traits": {
                    "smithy.api#documentation": " Indicates the status of Linux subscriptions settings being applied. "
                }
            },
            "StatusMessage": {
                "target": "com.amazonaws.licensemanagerlinuxsubscriptions#StringMap",
                "traits": {
                    "smithy.api#documentation": " A message which details the Linux subscriptions service settings current status. "
                }
            },
            "HomeRegions": {
                "target": "com.amazonaws.licensemanagerlinuxsubscriptions#StringList",
                "traits": {
                    "smithy.api#documentation": " The Region in which License Manager displays the aggregated data for Linux\n      subscriptions. "
                }
             }
          }
      },
      "com.amazonaws.licensemanagerlinuxsubscriptions#ValidationException": {
          "type": "structure",
          "members": {
              "message": {
                  "target": "smithy.api#String"
              }
          },
          "traits": {
              "smithy.api#documentation": " The provided input is not valid. Try your request again. ",
              "smithy.api#error": "client"
          }
      }
  }
}
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CheckoutLicense
 Initialize stack step
  RegisterServiceMetadata
  legacyEndpointContextSetter
  SetLogger
  OperationInputValidation
 Serialize stack step
  setOperationInput
  ResolveEndpoint
  OperationSerializer
 Build stack step
  ClientRequestID
  ComputeContentLength
  SetCredentialSourceMiddleware
  UserAgent
  RecursionDetection
 Finalize stack step
  spanRetryLoop
  InterceptBeforeRetryLoop
  Retry
  InterceptAttempt
  RetryMetricsHeader
  ResolveAuthScheme
  GetIdentity
  ResolveEndpointV2
  disableHTTPS
  ComputePayloadHash

```
  setLegacyContextSigningOptions
  Signing
 Deserialize stack step
  AddRawResponseToMetadata
  ErrorCloseResponseBody
  CloseResponseBody
  ResponseErrorWrapper
  RequestIDRetriever
  OperationDeserializer
  RecordResponseTiming
  RequestResponseLogger
// Code generated by smithy-go-codegen DO NOT EDIT.

package licensemanager

import (
 "context"
 "fmt"
 awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
 "github.com/aws/aws-sdk-go-v2/service/licensemanager/types"
 "github.com/aws/smithy-go/middleware"
 smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Creates a license.
func (c *Client) CreateLicense(ctx context.Context, params *CreateLicenseInput, optFns ...func(*Options))
(*CreateLicenseOutput, error) {
 if params == nil {
  params = &CreateLicenseInput{}
 }

 result, metadata, err := c.invokeOperation(ctx, "CreateLicense", params, optFns,
c.addOperationCreateLicenseMiddlewares)
 if err != nil {
  return nil, err
 }

 out := result.(*CreateLicenseOutput)
 out.ResultMetadata = metadata
 return out, nil
}

type CreateLicenseInput struct {

 // License beneficiary.
 //
 // This member is required.
 Beneficiary *string
```

// Unique, case-sensitive identifier that you provide to ensure the idempotency of
// the request.
//
//
This member is required.
ClientToken *string

// Configuration for consumption of the license. Choose a provisional
// configuration for workloads running with continuous connectivity. Choose a
// borrow configuration for workloads with offline usage.
//
// This member is required.
ConsumptionConfiguration *types.ConsumptionConfiguration

// License entitlements.
//
// This member is required.
Entitlements []types.Entitlement

// Home Region for the license.
//
// This member is required.
HomeRegion *string

// License issuer.
//
// This member is required.
Issuer *types.Issuer

// License name.
//
// This member is required.
LicenseName *string

// Product name.
//
// This member is required.
ProductName *string

// Product SKU.
//
// This member is required.
ProductSKU *string

// Date and time range during which the license is valid, in ISO8601-UTC format.
//
// This member is required.

```
 Validity *types.DatetimeRange

 // Information about
 the license.
 LicenseMetadata []types.Metadata

 // Tags to add to the license. For more information about tagging support in
 // License Manager, see the [TagResource]operation.
 //
 // [TagResource]: https://docs.aws.amazon.com/license-manager/latest/APIReference/API_TagResource.html
 Tags []types.Tag

 noSmithyDocumentSerde
}

type CreateLicenseOutput struct {

 // Amazon Resource Name (ARN) of the license.
 LicenseArn *string

 // License status.
 Status types.LicenseStatus

 // License version.
 Version *string

 // Metadata pertaining to the operation's result.
 ResultMetadata middleware.Metadata

 noSmithyDocumentSerde
}

func (c *Client) addOperationCreateLicenseMiddlewares(stack *middleware.Stack, options Options) (err error) {
 if err := stack.Serialize.Add(&setOperationInputMiddleware{}, middleware.After); err != nil {
  return err
 }
 err = stack.Serialize.Add(&awsAwsjson11_serializeOpCreateLicense{}, middleware.After)
 if err != nil {
  return err
 }
 err = stack.Deserialize.Add(&awsAwsjson11_deserializeOpCreateLicense{},
 middleware.After)
 if err != nil {
  return err
 }
 if err := addProtocolFinalizerMiddlewares(stack, options, "CreateLicense"); err != nil {
  return fmt.Errorf("add protocol finalizers: %v", err)
 }
```

```
if err = addlegacyEndpointContextSetter(stack, options); err != nil {
 return err
}
if err = addSetLoggerMiddleware(stack, options); err != nil {
 return err
}
if err = addClientRequestID(stack); err != nil {
 return err
}
if err = addComputeContentLength(stack); err != nil {
 return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
 return err
}
if err = addComputePayloadSHA256(stack); err != nil {
 return err
}
if err = addRetry(stack, options, c); err != nil {
 return err
}
if err = addRawResponseToMetadata(stack); err != nil {
 return err
}
if err = addRecordResponseTiming(stack); err != nil {
 return err
}
if err = addSpanRetryLoop(stack, options); err != nil {
 return err
}
if
err = addClientUserAgent(stack, options); err != nil {
 return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
 return err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
 return err
}
if err = addSetLegacyContextSigningOptionsMiddleware(stack); err != nil {
 return err
}
if err = addUserAgentRetryMode(stack, options); err != nil {
 return err
}
if err = addCredentialSource(stack, options); err != nil {
```

```
 return err
 }
 if err = addOpCreateLicenseValidationMiddleware(stack); err != nil {
  return err
 }
 if err = stack.Initialize.Add(newServiceMetadataMiddleware_opCreateLicense(options.Region),
middleware.Before); err != nil {
  return err
 }
 if err = addRecursionDetection(stack); err != nil {
  return err
 }
 if err = addRequestIDRetrieverMiddleware(stack); err != nil {
  return err
 }
 if err = addResponseErrorMiddleware(stack); err != nil {
  return err
 }
 if err = addRequestResponseLogging(stack, options);
 err != nil {
  return err
 }
 if err = addDisableHTTPSMiddleware(stack, options); err != nil {
  return err
 }
 if err = addInterceptBeforeRetryLoop(stack, options); err != nil {
  return err
 }
 if err = addInterceptAttempt(stack, options); err != nil {
  return err
 }
 if err = addInterceptors(stack, options); err != nil {
  return err
 }
 return nil
}

func newServiceMetadataMiddleware_opCreateLicense(region string) *awsmiddleware.RegisterServiceMetadata {
 return &awsmiddleware.RegisterServiceMetadata{
  Region:       region,
  ServiceID:     ServiceID,
  OperationName: "CreateLicense",
 }
}
```

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// Code generated by smithy-go-codegen DO NOT EDIT.

package grafana

import (
 "context"
 "fmt"
 awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
 "github.com/aws/aws-sdk-go-v2/service/grafana/types"
 "github.com/aws/smithy-go/middleware"
 smithyhttp "github.com/aws/smithy-go/transport/http"
)

// Removes the Grafana Enterprise license from a workspace.
func (c *Client) DisassociateLicense(ctx context.Context, params *DisassociateLicenseInput, optFns
...func(*Options)) (*DisassociateLicenseOutput, error) {
 if params == nil {
  params = &DisassociateLicenseInput{}
 }

 result, metadata, err := c.invokeOperation(ctx, "DisassociateLicense", params, optFns,
c.addOperationDisassociateLicenseMiddlewares)
 if err != nil {
  return nil, err
 }

 out := result.(*DisassociateLicenseOutput)
 out.ResultMetadata = metadata
 return out, nil
}

type DisassociateLicenseInput struct {

 // The type of license to remove from the workspace.
```

```
 //
 // This member is required.
 LicenseType types.LicenseType

 //
 The ID of the workspace to remove the Grafana Enterprise license from.
 //
 // This member is required.
 WorkspaceId *string

 noSmithyDocumentSerde
}

type DisassociateLicenseOutput struct {

 // A structure containing information about the workspace.
 //
 // This member is required.
 Workspace *types.WorkspaceDescription

 // Metadata pertaining to the operation's result.
 ResultMetadata middleware.Metadata

 noSmithyDocumentSerde
}

func (c *Client) addOperationDisassociateLicenseMiddlewares(stack *middleware.Stack, options Options) (err
error) {
 if err := stack.Serialize.Add(&setOperationInputMiddleware{}, middleware.After); err != nil {
  return err
 }
 err = stack.Serialize.Add(&awsRestjson1_serializeOpDisassociateLicense{}, middleware.After)
 if err != nil {
  return err
 }
 err = stack.Deserialize.Add(&awsRestjson1_deserializeOpDisassociateLicense{}, middleware.After)
 if err != nil {
  return err
 }
 if err := addProtocolFinalizerMiddlewares(stack, options, "DisassociateLicense");
 err != nil {
  return fmt.Errorf("add protocol finalizers: %v", err)
 }

 if err = addlegacyEndpointContextSetter(stack, options); err != nil {
  return err
 }
 if err = addSetLoggerMiddleware(stack, options); err != nil {
```

```
 return err
}
if err = addClientRequestID(stack); err != nil {
 return err
}
if err = addComputeContentLength(stack); err != nil {
 return err
}
if err = addResolveEndpointMiddleware(stack, options); err != nil {
 return err
}
if err = addComputePayloadSHA256(stack); err != nil {
 return err
}
if err = addRetry(stack, options, c); err != nil {
 return err
}
if err = addRawResponseToMetadata(stack); err != nil {
 return err
}
if err = addRecordResponseTiming(stack); err != nil {
 return err
}
if err = addSpanRetryLoop(stack, options); err != nil {
 return err
}
if err = addClientUserAgent(stack, options); err != nil {
 return err
}
if err = smithyhttp.AddErrorCloseResponseBodyMiddleware(stack); err != nil {
 return
err
}
if err = smithyhttp.AddCloseResponseBodyMiddleware(stack); err != nil {
 return err
}
if err = addSetLegacyContextSigningOptionsMiddleware(stack); err != nil {
 return err
}
if err = addUserAgentRetryMode(stack, options); err != nil {
 return err
}
if err = addCredentialSource(stack, options); err != nil {
 return err
}
if err = addOpDisassociateLicenseValidationMiddleware(stack); err != nil {
 return err
}
```

```
 if err = stack.Initialize.Add(newServiceMetadataMiddleware_opDisassociateLicense(options.Region),
middleware.Before); err != nil {
  return err
 }
 if err = addRecursionDetection(stack); err != nil {
  return err
 }
 if err = addRequestIDRetrieverMiddleware(stack); err != nil {
  return err
 }
 if err = addResponseErrorMiddleware(stack); err != nil {
  return err
 }
 if err = addRequestResponseLogging(stack, options); err != nil {
  return err
 }
 if err = addDisableHTTPSMiddleware(stack, options); err != nil {
  return err
 }
 if err = addInterceptBeforeRetryLoop(stack,
 options); err != nil {
  return err
 }
 if err = addInterceptAttempt(stack, options); err != nil {
  return err
 }
 if err = addInterceptors(stack, options); err != nil {
  return err
 }
 return nil
}

func newServiceMetadataMiddleware_opDisassociateLicense(region string)
*awsmiddleware.RegisterServiceMetadata {
 return &awsmiddleware.RegisterServiceMetadata{
  Region:       region,
  ServiceID:     ServiceID,
  OperationName: "DisassociateLicense",
 }
}
```

# 1.3701 smithy-go 1.24.3

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# 1.3702 node-html-parser 6.1.13

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# 1.3704 stringify-entities 4.0.4

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# 1.3705 micromark-util-html-tag-name 2.0.1

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# 1.3707 mdast-util-to-string 4.0.0

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# 1.3708 is-data-view 1.0.2

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# 1.3709 strip-indent 3.0.0

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# 1.3716 hast-util-to-html 9.0.5

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@end macro

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@end macro

@macro copyrightend{}
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AES in
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rijndael-alg-fst.c

@version 3.0 (December 2000)

Optimised ANSI C code for the Rijndael cipher (now AES)

@author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
@author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
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in the event an application does not supply such function or
table, the facility still operates, and performs whatever part of
its purpose remains meaningful.

(For example, a function in a library to compute square roots has
a purpose that is entirely well-defined independent of the
application. Therefore, Subsection 2d requires that any
application-supplied function or table used by this function must
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```
/* nicstar.c  v0.22  Jawaid Bazyar (bazyar@hypermall.com)
* nicstar.c, M. Welsh (matt.welsh@cl.cam.ac.uk)
*
* Hacked October, 1997 by Jawaid Bazyar, Interlink Advertising Services Inc.
*  http://www.hypermall.com/
* 10/1/97 - commented out CFG_PHYIE bit - we don't care when the PHY
* interrupts us (except possibly for removal/insertion of the cable?)
* 10/4/97 - began heavy inline documentation of the code. Corrected typos
* and spelling mistakes.
* 10/5/97 - added code to handle PHY interrupts, disable PHY on
* loss of link, and correctly re-enable PHY when link is
* re-established. (put back CFG_PHYIE)
*
*   Modified to work with the IDT7721 nicstar -- AAL5 (tested) only.
*
* R. D. Rechenmacher <ron@fnal.gov>, Aug. 6, 1997
*
* Linux driver for the IDT77201 NICStAR PCI ATM controller.
* PHY component is expected to be 155 Mbps S/UNI-Lite or IDT 77155;
* see init_nicstar() for PHY initialization to change this. This driver
* expects the Linux ATM stack to support scatter-gather
 lists
* (skb->atm.iovcnt != 0) for Rx skb's passed to vcc->push.
*
```

```
* Implementing minimal-copy of received data:
*   IDT always receives data into a small buffer, then large buffers
*     as needed. This means that data must always be copied to create
*     the linear buffer needed by most non-ATM protocol stacks (e.g. IP)
*     Fix is simple: make large buffers large enough to hold entire
*     SDU, and leave <small_buffer_data> bytes empty at the start. Then
*     copy small buffer contents to head of large buffer.
*   Trick is to avoid fragmenting Linux, due to need for a lot of large
*     buffers. This is done by 2 things:
*       1) skb->destructor / skb->atm.recycle_buffer
*           combined, allow nicstar_free_rx_skb to be called to
*           recycle large data buffers
*       2) skb_clone of received buffers
*   See nicstar_free_rx_skb and linearize_buffer for implementation
*     details.
*
*
*
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*
* M. Welsh, 6 July 1996
*
*
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# Purpose: This test checks SPDX-License-Identifier: tags in all source files against redhat/LICENSES.

load test-lib.bash

SPEC=$BATS_TEST_DIRNAME/../kernel.spec.template

ERRMSG="ERROR: The kernel RPM spec file License: field does not match the licenses available in the source
tree.
Fedora, Centos Stream, and RHEL require that the RPM License field match the licenses in the source tree.  See
https://docs.fedoraproject.org/en-US/legal/license-approval/ for further information.
A list of licenses can be generated by executing the redhat/scripts/license/kspdx.py utility.  New licenses can
be added to the RPM License field only if they are listed in the Allowed Licenses list
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_verify_one_license_tag()
 {
 if [[ $(grep -c '^License:' $SPEC) != "1" ]]; then
    echo "ERROR: The specfile is supposed to have exactly one License: tag!"
    return 1
 fi
}

_verify_spdx_licenses() {
 spec_licenses=`mktemp`
 source_licenses=`mktemp`
 grep '^License:' $SPEC | sed 's,License[[:space:]]*:[[:space:]]*,,' | sed 's, AND ,\n,g' | sed 's,^(\(.*\))$,\1,' | sort -u >
$spec_licenses

 if ! $BATS_TEST_DIRNAME/../scripts/kspdx-tool/kspdx.py $BATS_TEST_DIRNAME/../../ > $source_licenses;
then
    echo "ERROR: Failed to gather SPDX-License-Identifier: information from source files!"
    return 1
 fi
 sort -o $source_licenses $source_licenses
 if ! diff -u $spec_licenses $source_licenses; then
     echo $ERRMSG
     ret=1
 else
```

```
    ret=0
 fi
 rm -f $spec_licenses $source_licenses
 return $ret
}

@test "Verify SPDX-License-Identifier tags" {
 if ! test -x $BATS_TEST_DIRNAME/../scripts/kspdx-tool/kspdx.py ;
 then
    skip "kspdx-tool is missing"
 fi

 run _verify_one_license_tag
 check_status

 _verify_spdx_licenses
 check_status
}
```


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static inline int license_is_gpl_compatible(const char *license)
{
 return (strcmp(license, "GPL") == 0
  || strcmp(license, "GPL v2") == 0
  || strcmp(license, "GPL and additional rights") == 0
  || strcmp(license, "Dual BSD/GPL") == 0
  || strcmp(license, "Dual MIT/GPL") == 0
  || strcmp(license, "Dual MPL/GPL") == 0);
}

#endif
```

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```
-----------------------------------------------------------------------------
                    WIS GO7007SB Public Linux Driver
-----------------------------------------------------------------------------


*** Please see the file RELEASE-NOTES for important last-minute updates ***
```

## 0. OVERVIEW AND LICENSING/DISCLAIMER

This driver kit contains Linux drivers for the WIS GO7007SB multi-format video encoder. Only kernel version 2.6.x is supported. The video stream is available through the Video4Linux2 API and the audio stream is available through the ALSA API (or the OSS emulation layer of the ALSA system).

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## 1. SYSTEM REQUIREMENTS

This driver requires Linux kernel 2.6. Kernel 2.4 is not supported. Using kernel 2.6.10 or later is recommended, as earlier kernels are known to have unstable USB 2.0 support.

A fully built kernel source tree must be available. Typically this will be linked from "/lib/modules/<KERNEL VERSION>/build" for convenience. If this link does not exist, an extra parameter will need to be passed to the `make` command.

All vendor-built kernels should already be configured properly. However, for custom-built kernels, the following options need to be enabled in the kernel as built-in or modules:

CONFIG_HOTPLUG - Support for hot-pluggable devices

CONFIG_MODULES - Enable loadable module support
CONFIG_KMOD - Automatic kernel module loading
CONFIG_FW_LOADER - Hotplug firmware loading support
CONFIG_I2C - I2C support
CONFIG_VIDEO_DEV - Video For Linux
CONFIG_SOUND - Sound card support
CONFIG_SND - Advanced Linux Sound Architecture
CONFIG_USB - Support for Host-side USB
CONFIG_USB_DEVICEFS - USB device filesystem
CONFIG_USB_EHCI_HCD - EHCI
HCD (USB 2.0) support

Additionally, to use the example application, the following options need to be enabled in the ALSA section:

CONFIG_SND_MIXER_OSS - OSS Mixer API
CONFIG_SND_PCM_OSS - OSS PCM (digital audio) API

The hotplug scripts, along with the fxload utility, must also be installed. These scripts can be obtained from <http://linux-hotplug.sourceforge.net/>. Hotplugging is used for loading firmware into the Cypruss EZ-USB chip using fxload and for loading firmware into the driver using the firmware agent.

## 2. COMPILING AND INSTALLING THE DRIVER

Most users should be able to compile the driver by simply running:

```
$ make
```

in the top-level directory of the driver kit. First the kernel modules will be built, followed by the example applications.

If the build system is unable to locate the kernel source tree for the currently-running kernel, or if the module should be built for a kernel other than the currently-running kernel, an additional parameter will need to be passed to make to specify the appropriate kernel source directory:

```
$ make KERNELSRC=/usr/src/linux-2.6.10-custom3
```

Once the compile completes, the driver and firmware files should be installed by running:

```
$ make install
```

The kernel modules will be placed in "/lib/modules/<KERNEL VERSION>/extra"

and the firmware files will be placed in the appropriate hotplug firmware directory, usually /lib/firmware. In addition, USB maps and scripts will be placed in /etc/hotplug/usb to enable fxload to initialize the EZ-USB control chip when the device is connected.

## 3. PAL/SECAM TUNER CONFIGURATION (TV402U-EU only)

The PAL model of the Plextor ConvertX TV402U may require additional configuration to correctly select the appropriate TV frequency band and audio subchannel.

Users with a device other than the Plextor ConvertX TV402U-EU should skip this section.

The wide variety of PAL TV systems used in Europe requires that additional information about
the local TV standards be passed to the driver in order
to properly tune TV channels. The two necessary parameters are (a) the PAL TV band, and (b) the audio subchannel format in use.

In many cases, the appropriate TV band selection is passed to the driver from applications. However, in some cases, the application only specifies that the driver should use PAL but not the specific information about the appropriate TV band. To work around this issue, the correct TV band may be specified in the "force_band" parameter to the wis-sony-tuner module:

| TV band | force_band |
|---|---|
| PAL B/G | B |
| PAL I | I |
| PAL D/K | D |
| SECAM L | L |

If the "force_band" parameter is specified, the driver will ignore any TV band specified by applications and will always use the band provided in the module parameter.

The other parameter that can be specified is the audio subchannel format. There are
several stereo audio carrier systems in use, including NICAM and
three varieties of A2. To receive audio broadcast on one of these stereo carriers, the "force_mpx_mode" parameter must be specified to the wis-sony-tuner module.

| TV band | Audio subcarrier | force_mpx_mode |
|---|---|---|

| | | |
|---|---|---|
| PAL B/G | Mono (default) | 1 |
| PAL B/G | A2 | 2 |
| PAL B/G | NICAM | 3 |
| PAL I | Mono (default) | 4 |
| PAL I | NICAM | 5 |
| PAL D/K | Mono (default) | 6 |
| PAL D/K | A2 (1) | 7 |
| PAL D/K | A2 (2) | 8 |
| PAL D/K | A2 (3) | 9 |
| PAL D/K | NICAM | 10 |
| SECAM L | Mono (default) | 11 |
| SECAM L | NICAM | 12 |

If the "force_mpx_mode" parameter is not specified, the correct mono-only mode will be chosen based on the TV band. However, the tuner will not receive stereo audio or bilingual broadcasts correctly.

To pass the "force_band" or "force_mpx_mode" parameters to the wis-sony-tuner module, the following line must be added to the modprobe configuration file, which varies from one Linux distribution to another.

```
options wis-sony-tuner force_band=B force_mpx_mode=2
```

The above example would force the tuner to the PAL B/G TV band and receive stereo audio broadcasts on the A2 carrier.

To verify that the configuration has been placed in the correct location, execute:

```
$ modprobe -c | grep wis-sony-tuner
```

If the configuration line appears, then modprobe will pass the parameters correctly the next time the wis-sony-tuner module is loaded into the kernel.

## 4. TESTING THE DRIVER

Because few Linux applications are able to correctly capture from Video4Linux2 devices with only compressed formats supported, the new driver should be tested with the "gorecord" application in the apps/ directory.

First connect a video source to the device, such as a DVD player or VCR. This will be captured to a file for testing the driver. If an input source is unavailable, a test file can still be captured, but the video will be

black and the audio will be silent.

This application will auto-detect the V4L2 and ALSA/OSS device names of the hardware and will record video and audio to an AVI file for a specified number of seconds. For example:

```
$ apps/gorecord -duration 60 capture.avi
```

If this application does not successfully record an AVI file, the error messages produced by gorecord and recorded in the system log (usually in /var/log/messages) should provide information to help resolve the problem.

Supplying no parameters to gorecord will cause it to probe the available devices and exit. Use the -help flag for usage information.

## 5. USING THE DRIVER

The V4L2 device implemented by the driver provides a standard compressed format API, within the following criteria:

* Applications that only support the original Video4Linux1 API will not be able to communicate with this driver at all.

* No raw video modes are supported, so applications like xawtv that expect only uncompressed video will not function.

* Supported compression formats are: Motion-JPEG, MPEG1, MPEG2 and MPEG4.

* MPEG video formats are delivered as Video Elementary Streams only. Program Stream (PS), Transport Stream (TS) and Packetized Elementary Stream (PES) formats are not supported.

* Video parameters such as format and input port may not be changed while the encoder is active.

* The audio capture device only functions when the video encoder is actively capturing video. Attempts to read from the audio device when the encoder is inactive will result in an I/O error.

* The native format of the audio device is 48Khz 2-channel 16-bit little-endian PCM, delivered through the ALSA system. No audio compression is implemented in the hardware. ALSA may convert to other uncompressed formats on the fly.

The include/ directory contains a C header file describing non-standard features of the GO7007SB encoder, which are described below:

GO7007IOC_S_COMP_PARAMS, GO7007IOC_G_COMP_PARAMS

These ioctls are used to negotiate general compression parameters.

To query the current parameters, call the GO7007IOC_G_COMP_PARAMS ioctl with a pointer to a struct go7007_comp_params. If the driver is not set to MPEG format, the EINVAL error code will be returned.

To change the current parameters, initialize all fields of a struct go7007_comp_params and call the GO7007_IOC_S_COMP_PARAMS ioctl with a pointer to this structure. The driver will return the current parameters with any necessary changes to conform to the limitations of the hardware or current compression mode. Any or all fields can be set to zero to request a reasonable default value. If the driver is not set to MPEG format, the EINVAL error code will be returned. When I/O is in progress, the EBUSY error code will be returned.

Fields in struct go7007_comp_params:

__u32 gop_size — The maximum number of frames in each Group Of Pictures; i.e. the maximum number of frames minus one between each key frame.

__u32 max_b_frames — The maximum number of sequential bidirectionally-predicted frames. (B-frames are not yet supported.)

enum go7007_aspect_ratio aspect_ratio — The aspect ratio to be encoded in the meta-data of the compressed format.

Choices are:

GO7007_ASPECT_RATIO_1_1
GO7007_ASPECT_RATIO_4_3_NTSC
GO7007_ASPECT_RATIO_4_3_PAL
GO7007_ASPECT_RATIO_16_9_NTSC
GO7007_ASPECT_RATIO_16_9_PAL

__u32 flags — Bit-wise OR of control flags (below)

Flags in struct go7007_comp_params:

GO7007_COMP_CLOSED_GOP Only produce self-contained GOPs, used to produce streams appropriate for random seeking.

GO7007_COMP_OMIT_SEQ_HEADER Omit the stream sequence header.

GO7007IOC_S_MPEG_PARAMS, GO7007IOC_G_MPEG_PARAMS

These ioctls are used to negotiate MPEG-specific stream parameters when the pixelformat has been set to V4L2_PIX_FMT_MPEG.

To query the current parameters, call the GO7007IOC_G_MPEG_PARAMS ioctl with a pointer to a struct go7007_mpeg_params.
If the driver is not set to MPEG format, the EINVAL error code will be returned.

To change the current parameters, initialize all fields of a struct go7007_mpeg_params and call the GO7007_IOC_S_MPEG_PARAMS ioctl with a pointer to this structure. The driver will return the current parameters with any necessary changes to conform to the limitations of the hardware or selected MPEG mode. Any or all fields can be set to zero to request a reasonable default value. If the driver is not set to MPEG format, the EINVAL error code will be returned. When I/O is in progress, the EBUSY error code will be returned.

Fields in struct go7007_mpeg_params:

enum go7007_mpeg_video_standard
mpeg_video_standard The MPEG video standard in which to compress the video.

Choices are:
GO7007_MPEG_VIDEO_MPEG1

GO7007_MPEG_VIDEO_MPEG2
GO7007_MPEG_VIDEO_MPEG4

__u32 flags Bit-wise OR of control flags (below)

__u32 pali The profile and level indication to be stored in the sequence header. This is only used as an indicator to the decoder, and does not affect the MPEG features used in the video stream. Not valid for MPEG1.

Choices for MPEG2 are:
GO7007_MPEG2_PROFILE_MAIN_MAIN

Choices for MPEG4 are:
GO7007_MPEG4_PROFILE_S_L0
GO7007_MPEG4_PROFILE_S_L1

GO7007_MPEG4_PROFILE_S_L2
GO7007_MPEG4_PROFILE_S_L3
GO7007_MPEG4_PROFILE_ARTS_L1
GO7007_MPEG4_PROFILE_ARTS_L2
GO7007_MPEG4_PROFILE_ARTS_L3
GO7007_MPEG4_PROFILE_ARTS_L4
GO7007_MPEG4_PROFILE_AS_L0
GO7007_MPEG4_PROFILE_AS_L1
GO7007_MPEG4_PROFILE_AS_L2
GO7007_MPEG4_PROFILE_AS_L3
GO7007_MPEG4_PROFILE_AS_L4
GO7007_MPEG4_PROFILE_AS_L5

Flags in struct go7007_mpeg_params:

GO7007_MPEG_FORCE_DVD_MODE Force all compression parameters and bitrate control settings to comply

with DVD MPEG2 stream requirements.
This overrides most compression and bitrate settings!

GO7007_MPEG_OMIT_GOP_HEADER Omit the GOP header.

GO7007_MPEG_REPEAT_SEQHEADER Repeat the MPEG sequence header at the start of each GOP.

GO7007IOC_S_BITRATE, GO7007IOC_G_BITRATE

These ioctls are used to set and query the target bitrate value for the compressed video stream. The bitrate may be selected by storing the target bits per second in an int and calling GO7007IOC_S_BITRATE with a pointer to the int. The bitrate may be queried by calling GO7007IOC_G_BITRATE with a pointer to an int where the current bitrate will be stored.

Note that this is the primary means of controlling the video quality for all compression modes, including V4L2_PIX_FMT_MJPEG. The VIDIOC_S_JPEGCOMP ioctl is not supported.

---

Installing the WIS PCI Voyager Driver

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The WIS PCI Voyager driver requires several patches to the Linux 2.6.11.x kernel source tree before compiling the driver. These patches update the in-kernel SAA7134 driver to the newest development version and patch bugs in the TDA8290/TDA8275 tuner driver.

The following patches must be downloaded from Gerd Knorr's website and applied in the order listed:

http://dl.bytesex.org/patches/2.6.11-2/i2c-tuner
http://dl.bytesex.org/patches/2.6.11-2/i2c-tuner2
http://dl.bytesex.org/patches/2.6.11-2/v4l2-api-mpeg
http://dl.bytesex.org/patches/2.6.11-2/saa7134-update

The following patches are included with this SDK and can be applied in any order:

patches/2.6.11/saa7134-voyager.diff
patches/2.6.11/tda8275-newaddr.diff
patches/2.6.11/tda8290-ntsc.diff

Check to make sure the CONFIG_VIDEO_SAA7134 option is enabled in the kernel configuration, and build and install the kernel.

After rebooting into the new kernel, the GO7007 driver can be compiled and installed:

```
$ make SAA7134_BUILD=y
$ make install
$ modprobe saa7134-go7007
```

There will be two V4L video devices associated with the PCI Voyager. The first device (most likely /dev/video0) provides access to the raw video capture mode of the SAA7133 device and is used to configure the source video parameters and tune the TV tuner. This device can be used with xawtv or other V4L(2) video software as a standard uncompressed device.

The second device (most likely /dev/video1) provides access to the compression functions of the GO7007. It can be tested using the gorecord application in the apps/ directory of this SDK:

```
$ apps/gorecord -vdevice /dev/video1 -noaudio test.avi
```

Currently the frame resolution is fixed at 720x480 (NTSC) or 720x576 (PAL), and the video standard must be specified to both the raw and the compressed video devices
(xawtv and gorecord, for example).

---
RELEASE NOTES FOR WIS GO7007SB LINUX DRIVER
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Last updated: 5 November 2005

- Release 0.9.7 includes new support for using udev to run fxload. The install script should automatically detect whether the old hotplug scripts or the new udev rules should be used. To force the use of hotplug, run "make install USE_UDEV=n". To force the use of udev, run "make install USE_UDEV=y".

- Motion detection is supported but undocumented. Try the `modet` app for a demonstration of how to use the facility.

- Using USB2.0 devices such as the TV402U with USB1.1 HCDs or hubs can cause buffer overruns and frame drops, even at low framerates, due to inconsistency in the bitrate control mechanism.

- On devices with an SAA7115, including the Plextor ConvertX, video height values of 96,
128, 160, 192, 256, 320, and 384 do not work in NTSC mode.
All valid heights up to 512 work correctly in PAL mode.

- The WIS Star Trek and PCI Voyager boards have no support yet for audio or the TV tuner.

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```
/* zlib.h -- interface of the 'zlib' general purpose compression
 library
 version 1.2.3, July 18th, 2005

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 Jean-loup Gailly        Mark Adler
 jloup@gzip.org
         madler@alumni.caltech.edu


 The data format used by the zlib library is described by RFCs (Request for
 Comments) 1950 to 1952 in the files http://www.ietf.org/rfc/rfc1950.txt
 (zlib format), rfc1951.txt (deflate format) and rfc1952.txt (gzip format).
*/


-----------------------------------------------------------------------------

//
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//
//
/*
* This code implements the MD5 message-digest algorithm.
* The algorithm is due to Ron Rivest. This code was
* written by Colin Plumb in 1993, no copyright is claimed.
* This code is in the public domain; do with it what you wish.
*
* Equivalent code is available from RSA Data Security, Inc.
* This code has been tested against that, and is equivalent,
* except that you don't need to include two pages of legalese
* with every copy.
```

```
*
* To compute the message digest of a chunk of bytes, declare an
* MD5Context structure, pass it to MD5Init, call MD5Update
 as
* needed on buffers full of bytes, and then call MD5Final, which
* will fill a supplied 16-byte array with the digest.
*/
```

---
---

```
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*
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*
*/
```

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---

```
/*-
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*  code or tables extracted from it, as desired without restriction.
*
*  First, the polynomial itself and its table of feedback terms.  The
*  polynomial is
*  X^32+X^26+X^23+X^22+X^16+X^12+X^11+X^10+X^8+X^7+X^5+X^4+X^2+X^1+X^0
*
*  Note that we take it "backwards" and put the highest-order term in
*  the lowest-order bit.  The X^32 term is "implied"; the LSB is the
*  X^31 term, etc.  The X^0 term (usually shown as "+1") results in
*  the MSB being 1
*
*  Note that the usual hardware shift register implementation, which
*  is what we're using (we're merely optimizing it by doing eight-bit
*  chunks at a time) shifts bits into the lowest-order term.  In our
*  implementation, that means shifting towards the right.  Why do we
*  do it this way?  Because the calculated CRC must be transmitted in
*  order from highest-order
 term to lowest-order term.  UARTs transmit
*  characters in order from LSB to MSB.  By storing the CRC this way
*  we hand it to the UART in the order low-byte to high-byte; the UART
*  sends each low-bit to hight-bit; and the result is transmission bit
*  by bit from highest- to lowest-order term without requiring any bit
*  shuffling on our part.  Reception works similarly
*
*  The feedback terms table consists of 256, 32-bit entries.  Notes
*
*     The table can be generated at runtime if desired; code to do so
*     is shown later.  It might not be obvious, but the feedback
*     terms simply represent the results of eight shift/xor opera
*     tions for all combinations of data and CRC register values
*
*     The values must be right-shifted by eight bits by the "updcrc
*     logic; the shift must be unsigned (bring in zeroes).  On some
*     hardware you could probably optimize the shift in assembler by
*     using byte-swap instructions
*     polynomial
 $edb88320
*



--------------------------------------------------------------------------------


/*
  The AES algorithm Rijndael implemented for block and key sizes of 128,
  192 and 256 bits (16, 24 and 32 bytes) by Brian Gladman.
```

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about the use to which it is being put. I am grateful to Frank Yellin
for some ideas that are used in this implementation.

Dr B. R. Gladman <brg@gladman.uk.net> 1st June 2001.

---

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* hash_32 - 32 bit Fowler/Noll/Vo hash code
*
* Fowler/Noll/Vo hash
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---
/*
* sha1.c
*
* Originally witten by Steve Reid <steve@edmweb.com>
*
* Modified by Aaron D. Gifford <agifford@infowest.com>
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*    ftp://ftp.funet.fi/pub/crypt/hash/sha/sha1.c
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-----------------------------------------------------------------------------

/*
* AES-based functions
*
* - AES Key Wrap Algorithm (128-bit KEK) (RFC3394)
* - One-Key CBC MAC (OMAC1) hash with AES-128
* - AES-128 CTR mode encryption
* - AES-128 EAX mode encryption/decryption
* - AES-128 CBC
*
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 Malinen <jkmaline@cc.hut.fi>
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*/
-----------------------------------------------------------------------------
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* SHA1 hash implementation and interface functions
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*/
-----------------------------------------------------------------------------
/*
* hmac_sha1.c
*
```

```
* Version
 1.0.0
*
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*
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/*
* Author: Malcolm Purvis <malcolmp@ok-labs.com>
* Author: Carlos Dyonisio <medaglia@ok-labs.com>
*/
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/*
* Author: Malcolm Purvis <malcolmp@ok-labs.com>
*
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File: tailq.h

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/*
* Author: Alex Webster
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File: htt_common.h
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File: wlan_nan_msg_common.h
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File: ip_prot.h
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==========
File: ipv4.h
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==========
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==========
File: ol_fw_tx_dbg.h
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==========

File: pktlog_if.h

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==========

File: queue.h

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*/

==========
File: stail_queue.h
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//
//  @(#)queue.h 8.5 (Berkeley) 8/20/94
// $FreeBSD: src/sys/sys/queue.h,v 1.58 2004/04/07 04:19:49 imp Exp $
// $Id: //components/rel/wlanfw_cmn.cnss/1.0/cnss_proc/wlan/fwcommon/include/queue.h#1 $
//

==========
File: targaddrs.h
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==========
File: wal_rx_desc.h
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==========
File: aes_gcm.h
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==========
File: aes_wrap.h
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/*
* AES-based functions
*
*
* - AES Key Wrap Algorithm (128-bit KEK) (RFC3394)
* - One-Key CBC MAC (OMAC1) hash with AES-128
* - AES-128 CTR mode encryption
* - AES-128 EAX mode encryption/decryption
* - AES-128 CBC
*
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==========

File: md5_api.h

```
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* MD5 hash implementation and interface functions
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==========

File: sha1.h

```
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*/
```

==========

File: sha2.h

```
/*
* FILE:    sha2.h
* AUTHOR:  Aaron D. Gifford - http://www.aarongifford.com/
*
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*
* $Id: //depot/sw/branches/qca_rome_main/perf_pwr_offload/drivers/target/include/sha2.h#1
 $
*/
```

==========

File: wal_dfs.h

```
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//
// $Id: //components/rel/wlanfw.cnss/1.0.1/cnss_proc/wlan/fw/target/src/wlan/proto/include/if_ethersubr.h#3 $
//
==========
File: wal_phy_dev.h
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*/
==============================================================================
File:
 wal_dfs.c
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==============================================================================
File:
 ieee_crc32.c
/*
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*  code or tables extracted from it, as desired without restriction.
*
*  First, the polynomial itself and its table of feedback terms.  The
*  polynomial is
*  X^32+X^26+X^23+X^22+X^16+X^12+X^11+X^10+X^8+X^7+X^5+X^4+X^2+X^1+X^0
*
*  Note that we take it "backwards" and put the highest-order term in
*  the lowest-order bit.  The X^32 term is "implied"; the LSB is the
*  X^31 term, etc.  The X^0 term (usually shown as "+1") results in
*  the MSB being 1
*
*  Note that the usual hardware shift register implementation, which
*  is what we're using (we're merely optimizing it by doing eight-bit
*  chunks at a time) shifts bits into the lowest-order term.  In our
*  implementation, that means shifting towards the right.  Why do we
*  do it this way?  Because the calculated CRC must be transmitted in
*  order from highest-order term to lowest-order term.  UARTs transmit
*  characters in
 order from LSB to MSB.  By storing the CRC this way
*  we hand it to the UART in the order low-byte to high-byte; the UART
*  sends each low-bit to hight-bit; and the result is transmission bit
```

```
*  by bit from highest- to lowest-order term without requiring any bit
*  shuffling on our part.  Reception works similarly
*
*  The feedback terms table consists of 256, 32-bit entries.  Notes
*
*      The table can be generated at runtime if desired; code to do so
*      is shown later.  It might not be obvious, but the feedback
*      terms simply represent the results of eight shift/xor opera
*      tions for all combinations of data and CRC register values
*
*      The values must be right-shifted by eight bits by the "updcrc
*      logic; the shift must be unsigned (bring in zeroes).  On some
*      hardware you could probably optimize the shift in assembler by
*      using byte-swap instructions
*      polynomial $edb88320
*
*
* CRC32 code derived from work by Gary S.
 Brown.
*/
==============================================================================
File: aes.c
/*
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*/

/*
* AES (Rijndael) cipher
*
* Modifications to public domain implementation:
* - support only 128-bit keys
* - cleanup
* - use C pre-processor to make it easier to change S table access
* - added option (AES_SMALL_TABLES) for reducing code size by about 8 kB at
*   cost of reduced throughput (quite small difference on Pentium 4,
*   10-25% when using -O1 or -O2 optimization)
*
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```
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*/

/*
* rijndael-alg-fst.c
*
* @version 3.0 (December 2000)
*
* Optimised ANSI C code for the Rijndael cipher (now AES)
*
* @author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
* @author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
* @author Paulo Barreto <paulo.barreto@terra.com.br>
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*/
================================================================================
File: aes_gcm.c
/*
* Galois/Counter Mode (GCM) and GMAC with AES
*
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================================================================================
File: aes_wrap.c
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/*
* AES-based functions
```

```
*
* - AES Key Wrap Algorithm (128-bit KEK) (RFC3394)
* - One-Key CBC MAC (OMAC1) hash with AES-128
* - AES-128 CTR mode encryption
* - AES-128 EAX mode encryption/decryption
* - AES-128 CBC
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/*
* wpa_supplicant/hostapd / common helper functions, etc.
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==============================================================================
File: crypto.h
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/*
* WPA Supplicant / wrapper functions for crypto libraries
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*
* This file defines the cryptographic functions that need to be implemented
* for wpa_supplicant and hostapd. When TLS is not used, internal
* implementation of MD5, SHA1, and AES is used and no external libraries are
* required. When TLS
 is enabled (e.g., by enabling EAP-TLS or EAP-PEAP), the
* crypto library used by the TLS implementation is expected to be used for
* non-TLS needs, too, in order to save space by not implementing these
* functions twice.
*
* Wrapper code for using each crypto library is in its own file (crypto*.c)
* and one of these files is build and linked in to provide the functions
* defined here.
*/

==============================================================================
File: md5.c
//
// $Id: //depot/sw/branches/qca_main_wifi2.0/perf_pwr_offload/drivers/target/src/misc/crypto/md5.c#1 $
//
// This code implements the MD5 message-digest algorithm.
// The algorithm is due to Ron Rivest.  This code was
// written by Colin Plumb in 1993, no copyright is claimed.
// This code is in the public domain; do with it what you wish.
//
// Equivalent code is available from RSA Data Security, Inc.
// This code has been tested against that, and is equivalent,
// except that you don't need to
 include two pages of legalese
// with every copy.
//
// To compute the message digest of a chunk of bytes, declare an
// MD5Context structure, pass it to MD5Init, call MD5Update as
// needed on buffers full of bytes, and then call MD5Final, which
// will fill a supplied 16-byte array with the digest.
//

==============================================================================
```

File: sha1.c

```
/*
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==========

File:
cil.h

```
/* ==========================================================================
* $File: //depot/sw/branches/qca_main_wifi2.0/perf_pwr_offload/drivers/target/include/cil.h $
* $Revision: #1 $
* $Date: 2013/07/12 $
* $Change: 2108597 $
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==========
File:
 dwc_os_dev.h
/* ==========
* $File: //depot/sw/branches/qca_main_wifi2.0/perf_pwr_offload/drivers/target/include/os_dev.h $
* $Revision: #1 $
* $Date: 2013/07/12 $

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File: pcd.h
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* $Revision: #1 $
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// @(#)queue.h 8.5 (Berkeley) 8/20/94
// $FreeBSD: src/sys/sys/queue.h,v 1.58 2004/04/07 04:19:49 imp Exp $
// $Id: //depot/sw/branches/qca_main_wifi2.0/perf_pwr_offload/drivers/target/src/sim_wifi_ip02/include/queue.h#2
$
//
==========
File: platform_cmnos_printf.c
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File: phyOsApiWindowsSem.h
```

```
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==============================================================================
File: phyOsApiWindowsSem.c
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File: phyUtilsStrlcpy.c

/*  $OpenBSD: strlcpy.c,v 1.11 2006/05/05 15:27:38 millert Exp $    */

/*-

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//
// $Id: //components/rel/wlanfw.cnss/1.0.1/cnss_proc/wlan/fw/target/src/wlan/proto/include/if_llc.h#3 $
// $NetBSD: if_llc.h,v 1.12 1999/11/19 20:41:19 thorpej Exp $
// $Id: //components/rel/wlanfw.cnss/1.0.1/cnss_proc/wlan/fw/target/src/wlan/proto/include/if_llc.h#3 $
//

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```
* @(#)if_llc.h 8.1 (Berkeley) 6/10/93
* $FreeBSD: src/sys/net/if_llc.h,v 1.9 2002/09/23 06:25:08 alfred Exp $
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/*
* FILE: sha2.c
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* Copyright (c) 2013 Cozybit, Inc.
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*/
==============================================================================
File: crypto.h
/*
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*/

/*
* WPA Supplicant / wrapper functions for crypto libraries
* Copyright (c) 2004-2005, Jouni Malinen <jkmaline@cc.hut.fi>
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*
* This file defines the cryptographic functions that need to be implemented
* for wpa_supplicant and hostapd. When TLS is not used, internal
* implementation of MD5, SHA1, and AES is used and no external libraries are
* required. When TLS is enabled
 (e.g., by enabling EAP-TLS or EAP-PEAP), the
* crypto library used by the TLS implementation is expected to be used for
* non-TLS needs, too, in order to save space by not implementing these
* functions twice.
*
* Wrapper code for using each crypto library is in its own file (crypto*.c)
* and one of these files is build and linked in to provide the functions
* defined here.
*/
```

==========
File: fils.c

/* WPA/RSN - Shared functions for supplicant and authenticator
 * EAP common peer/server definitions
 * EAP peer state machines (RFC 4137)
 * Copyright (c) 2002-2018, Jouni Malinen <j@w1.fi>
 *
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 */
==========
File: fils.h
/*
* WPA/RSN - Shared functions for supplicant and authenticator
* EAP common peer/server definitions
* EAP
 peer state machines (RFC 4137)
* Copyright (c) 2002-2018, Jouni Malinen <j@w1.fi>
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==========
File: m1_m4_frame.c
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 */
/* RC4 stream cipher
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==========
File: my_nan_sec.c
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* WPA Supplicant - WPA state machine and EAPOL-Key processing
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 <jkmaline@cc.hut.fi>
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==============================================================================
File: mywpa_common.h
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* WPA definitions shared between hostapd and wpa_supplicant
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==============================================================================
```

File: mywpa_ft.c

```
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* WPA Supplicant - IEEE
 802.11r - Fast BSS Transition
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File: mywpa_ft.h

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==========

File: sha256.c

```
/*
```

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==============================================================================
File: sha256-kdf.c
/*
* HMAC-SHA256 KDF (RFC 5295) and HKDF-Expand(SHA256) (RFC 5869)
* Copyright (c) 2014-2017, Jouni Malinen <j@w1.fi>
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*/
==============================================================================
```

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```
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File: sha384.h

```
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```

==========

File: sha384_i.h

```
/*
* SHA-384 internal definitions
* Copyright (c) 2015, Pali Rohr <pali.rohar@gmail.com>
*
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*/
```

==========

File: sha384-internal.c

```
/*
* SHA-384 hash implementation and interface functions
* Copyright (c) 2015, Pali Rohr <pali.rohar@gmail.com>
*
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```

==========

File: sha384-prf.c

```
/*
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```

==========
File: sha512_i.h
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==========
File: sha512-internal.c
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*/
==========
File: stringl.h

/* $OpenBSD: string.h,v 1.17 2006/01/06 18:53:04 millert Exp $ */
/* $NetBSD: string.h,v 1.6 1994/10/26 00:56:30 cgd Exp $ */

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*
* @(#)string.h 5.10 (Berkeley) 3/9/91
*/
```

==========

File: strlcpy.c

```
/* $OpenBSD: strlcpy.c,v
 1.11 2006/05/05 15:27:38 millert Exp $ */

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*/
```

==========

File: lz.c

```
//
// Name:       lz.c
// Author:     Marcus Geelnard
// Description:
 LZ77 coder/decoder implementation.
// Reentrant:   Yes
// $ATH_LICENSE_NULL$
//
// The LZ77 compression scheme is a substitutional compression scheme
// proposed by Abraham Lempel and Jakob Ziv in 1977. It is very simple in
// its design, and uses no fancy bit level compression.
//
// This is my first attempt at an implementation of a LZ77 code/decoder.
//
// The principle of the LZ77 compression algorithm is to store repeated
// occurrences of strings as references to previous occurrences of the same
```

```
// string. The point is that the reference consumes less space than the
// string itself, provided that the string is long enough (in this
// implementation, the string has to be at least 4 bytes long, since the
// minimum coded reference is 3 bytes long). Also note that the term
// "string" refers to any kind of byte sequence (it does not have to be
// an ASCII string, for instance).
//
// The coder uses a brute force approach to finding string matches in the
// history buffer
 (or "sliding window", if you wish), which is very, very
// slow. I recon the complexity is somewhere between O(n^2) and O(n^3),
// depending on the input data.
//
// There is also a faster implementation that uses a large working buffer
// in which a "jump table" is stored, which is used to quickly find
// possible string matches (see the source code for LZ_CompressFast() for
// more information). The faster method is an order of magnitude faster,
// but still quite slow compared to other compression methods.
//
// The upside is that decompression is very fast, and the compression ratio
// is often very good.
//
// The reference to a string is coded as a (length,offset) pair, where the
// length indicates the length of the string, and the offset gives the
// offset from the current data position. To distinguish between string
// references and literal strings (uncompressed bytes), a string reference
// is preceded by a marker byte, which is chosen as the least common byte
// symbol in
 the input data stream (this marker byte is stored in the
// output stream as the first byte).
//
// Occurrences of the marker byte in the stream are encoded as the marker
// byte followed by a zero byte, which means that occurrences of the marker
// byte have to be coded with two bytes.
//
// The lengths and offsets are coded in a variable length fashion, allowing
// values of any magnitude (up to 4294967295 in this implementation).
//
// With this compression scheme, the worst case compression result is
// (257/256)*insize + 1.
//
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//
// Marcus Geelnard
// marcus.geelnard at home.se
//

==========
File: lz.h
//
// Name:        lz.h
// Author:      Marcus Geelnard
// Description: LZ77 coder/decoder interface.
// Reentrant:   Yes
// ----------
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//
// Marcus Geelnard
// marcus.geelnard at home.se
//

==========
File: arm_common_tables.h
/* ----------
*
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*
* $Date:  19. October 2015
* $Revision:  V.1.4.5 a
*
* Project:  CMSIS DSP Library
* Title:  arm_common_tables.h
*
* Description: This file has extern declaration for common tables like Bitreverse, reciprocal etc which are used across different functions
*
* Target Processor: Cortex-M4/Cortex-M3
*
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 */

==============================================================================
File: arm_const_structs.h
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*
* $Date:        19. March 2015
* $Revision:  V.1.4.5
*
* Project:      CMSIS DSP Library
* Title:     arm_const_structs.h
*
* Description: This file has constant structs that are initialized for
*              user convenience.  For example, some can be given as
*              arguments to the arm_cfft_f32() function.
*
* Target Processor: Cortex-M4/Cortex-M3
*
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```

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* ---------- */

==========
File: arm_math.h
/* ----------
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*
* $Date:  20. October 2015
* $Revision:  V1.4.5 b
*
* Project:  CMSIS DSP Library
* Title:  arm_math.h
*
* Description:  Public header file for CMSIS DSP Library
*
* Target Processor: Cortex-M7/Cortex-M4/Cortex-M3/Cortex-M0
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File:
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File: core_cm3.h

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//
// @(#)queue.h 8.5 (Berkeley) 8/20/94
//
$FreeBSD: src/sys/sys/queue.h,v 1.58 2004/04/07 04:19:49 imp Exp $
//

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File: targaddrs.h
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* Galois/Counter Mode (GCM) and GMAC with AES
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File:  aes_wrap.h
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/*
* AES-based functions
*
*
* - AES Key Wrap Algorithm (128-bit KEK) (RFC3394)
* - One-Key CBC MAC (OMAC1) hash with AES-128
* - AES-128 CTR mode encryption
* - AES-128 EAX mode encryption/decryption
* - AES-128 CBC
*
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* SHA1 hash implementation and interface functions
* Copyright (c) 2003-2005, Jouni Malinen <jkmaline@cc.hut.fi>
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==========

File:  sha2.h

```
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* FILE:    sha2.h
* AUTHOR:  Aaron D. Gifford - http://www.aarongifford.com/
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// @(#)queue.h 8.5 (Berkeley) 8/20/94
// $FreeBSD: src/sys/sys/queue.h,v
1.58 2004/04/07 04:19:49 imp Exp $
//

==========
File: ieee_crc32.c
/*
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* code or tables extracted from it, as desired without restriction.
*
* First, the polynomial itself and its table of feedback terms. The
* polynomial is

```
*  X^32+X^26+X^23+X^22+X^16+X^12+X^11+X^10+X^8+X^7+X^5+X^4+X^2+X^1+X^0
*
*  Note that we take it "backwards" and put the highest-order term in
*  the lowest-order bit.  The X^32 term is "implied"; the LSB is the
*  X^31 term, etc.  The X^0 term (usually shown as "+1") results in
*  the MSB being 1
*
*  Note that the usual hardware shift register implementation, which
*  is what we're using (we're merely optimizing it by doing eight-bit
*  chunks at a time) shifts bits into the lowest-order term.  In our
*  implementation, that means shifting towards the right.  Why do we
*  do it this way?  Because the calculated
 CRC must be transmitted in
*  order from highest-order term to lowest-order term.  UARTs transmit
*  characters in order from LSB to MSB.  By storing the CRC this way
*  we hand it to the UART in the order low-byte to high-byte; the UART
*  sends each low-bit to hight-bit; and the result is transmission bit
*  by bit from highest- to lowest-order term without requiring any bit
*  shuffling on our part.  Reception works similarly
*
*  The feedback terms table consists of 256, 32-bit entries.  Notes
*
*     The table can be generated at runtime if desired; code to do so
*     is shown later.  It might not be obvious, but the feedback
*     terms simply represent the results of eight shift/xor opera
*     tions for all combinations of data and CRC register values
*
*     The values must be right-shifted by eight bits by the "updcrc
*     logic; the shift must be unsigned (bring in zeroes).  On some
*     hardware you could probably optimize the shift in assembler
 by
*     using byte-swap instructions
*     polynomial $edb88320
*
*
* CRC32 code derived from work by Gary S. Brown.
*/
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File:  hca_HwComponentBbBase_dfs_phyerr_tlv.cpp
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File:  hca_HwComponentBbBase_dfs_process_radarevent.cpp

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* @(#)if_llc.h 8.1 (Berkeley) 6/10/93
* $FreeBSD: src/sys/net/if_llc.h,v 1.9 2002/09/23 06:25:08 alfred Exp $
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```
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* AES-128/192/256 CTR
*
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File:  aes-siv.c

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File:  aes_siv.h

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```
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 * WPA/RSN - Shared functions for supplicant and authenticator
 * EAP common peer/server definitions
 * EAP peer state machines (RFC 4137)
 * Copyright (c) 2002-2018, Jouni Malinen <j@w1.fi>
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File:  fils.h

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* EAP common peer/server definitions
* EAP peer state machines (RFC 4137)
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File: mywpa_common.c

```
/*
```

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File:  mywpa_common.h

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* HMAC-SHA256 KDF (RFC 5295) and HKDF-Expand(SHA256) (RFC 5869)
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File:  aes.c
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/*
* AES (Rijndael) cipher
*
* Modifications to public domain implementation:
* - support only 128-bit keys
* - cleanup
* - use C pre-processor
 to make it easier to change S table access
* - added option (AES_SMALL_TABLES) for reducing code size by about 8 kB at
*   cost of reduced throughput (quite small difference on Pentium 4,
*   10-25% when using -O1 or -O2 optimization)
*
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/*
* rijndael-alg-fst.c
*
* @version 3.0 (December 2000)
*
* Optimised ANSI C code for the Rijndael cipher (now AES)
```

*
* @author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
* @author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
* @author Paulo Barreto <paulo.barreto@terra.com.br>
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==========
File:  aes_gcm.c
/*
* Galois/Counter Mode (GCM) and GMAC with AES
*
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==========
File:  aes_wrap.c
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/*
* AES-based functions
*
* - AES Key Wrap Algorithm (128-bit KEK) (RFC3394)
* - One-Key CBC MAC (OMAC1) hash with AES-128
* - AES-128 CTR mode encryption
* - AES-128 EAX mode encryption/decryption
* - AES-128 CBC
*
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File:
  common.h
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/*
* wpa_supplicant/hostapd / common helper functions, etc.
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*
* This file defines the cryptographic functions that need to be implemented
* for wpa_supplicant and hostapd. When TLS is not used, internal
* implementation of MD5, SHA1, and AES is used and no external libraries are
* required. When TLS is enabled (e.g., by enabling EAP-TLS or EAP-PEAP), the
* crypto library used by the TLS implementation is expected to be used for
* non-TLS needs, too, in order to save space by not implementing these
* functions twice.
*
* Wrapper code for using each crypto library is in its own file (crypto*.c)
* and one of these files is build and linked in to provide the functions
* defined here.
 */

================================================================================
File:  md5.c
//
// This code implements the MD5 message-digest algorithm.
// The algorithm is due to Ron Rivest.  This code was
// written by Colin Plumb in 1993, no copyright is claimed.
// This code is in the public domain; do with it what you wish.
//
// Equivalent code is available from RSA Data Security, Inc.
// This code has been tested against that, and is equivalent,
// except that you don't need to include two pages of legalese
// with every copy.
//
// To compute the message digest of a chunk of bytes, declare an
// MD5Context structure, pass it to MD5Init, call MD5Update as
// needed on buffers full of bytes, and then call MD5Final, which
// will fill a supplied 16-byte array with the digest.
//

================================================================================
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File: athstartpack.h
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// $NetBSD: if_llc.h,v 1.12 1999/11/19 20:41:19
 thorpej Exp $
// $Id: //depot/sw/qca_main/components/wlan/qca-wifi-fw/1.0/drivers/target/src/wlan/proto/include/if_llc.h#2 $
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*
*  @(#)if_llc.h  8.1 (Berkeley) 6/10/93
 * $FreeBSD: src/sys/net/if_llc.h,v 1.9 2002/09/23 06:25:08 alfred Exp $
*/

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wlan/protocol/src/include/if_llc.h#1

==========
==========
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wlan/protocol/include/if_ethersubr.h#1

==========
==========

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// marcus.geelnard at home.se
//
```

wlan/protocol/support/lz77/lz.h#1
wlan/protocol/support/lz77/lz.c#1

==========
==========

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wlan/mac_core/tests/serflash/flashprog/uncompr.c#1

==========
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//
//  @(#)queue.h 8.5 (Berkeley) 8/20/94
// $FreeBSD: src/sys/sys/queue.h,v 1.58 2004/04/07 04:19:49 imp Exp $
//

wlan/include/queue.h#1

==========
==========

```
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* SHA1 hash implementation and interface functions
* Copyright (c) 2003-2005, Jouni Malinen <jkmaline@cc.hut.fi>
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```

wlan/mac_core/include/sha1.h
wlan/mac_core/romexport/AR900B/hw.1/include/sha1.h
wlan/mac_core/romexport/AR900B/hw.2/include/sha1.h

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```
/*
* FILE:       sha2.h
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*
* $Id: //depot/sw/branches/qca_rome_main/perf_pwr_offload/drivers/target/include/sha2.h#1 $
*/
```

wlan/mac_core/romexport/AR900B/hw.1/include/sha2.h
wlan/mac_core/romexport/AR900B/hw.2/include/sha2.h

==========
==========

```
/*
 * AES-based functions
*
*
* - AES Key Wrap Algorithm (128-bit KEK) (RFC3394)
* - One-Key CBC MAC (OMAC1) hash with AES-128
* - AES-128 CTR mode encryption
* - AES-128 EAX mode encryption/decryption
* - AES-128 CBC
*
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*/
```

wlan/mac_core/include/aes_wrap.h
wlan/mac_core/romexport/AR900B/hw.1/include/aes_wrap.h
wlan/mac_core/romexport/AR900B/hw.2/include/aes_wrap.h

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==========
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* MD5 hash implementation and interface functions
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*/

wlan/mac_core/romexport/AR900B/hw.1/include/md5.h
wlan/mac_core/romexport/AR900B/hw.2/include/md5.h

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==========
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/*
* Common helper macros, etc.
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*/

wlan/mac_core/romexport/AR900B/hw.1/include/seccommon.h
wlan/mac_core/romexport/AR900B/hw.2/include/seccommon.h

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*/

/* Modified by Synopsys, Inc, 12/12/2007 */

wlan/mac_core/include/usb.h
wlan/mac_core/romexport/AR900B/hw.1/include/usb.h
wlan/mac_core/romexport/AR900B/hw.2/include/usb.h

==========
==========

/*
 ==========
*
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* ========== */

wlan/mac_core/include/cil.h
wlan/mac_core/romexport/AR900B/hw.1/include/cil.h
wlan/mac_core/romexport/AR900B/hw.2/include/cil.h
wlan/mac_core/include/dev.h
wlan/mac_core/romexport/AR900B/hw.1/include/dev.h
wlan/mac_core/romexport/AR900B/hw.2/include/dev.h
wlan/mac_core/include/os_dev.h
wlan/mac_core/romexport/AR900B/hw.1/include/os_dev.h
wlan/mac_core/romexport/AR900B/hw.2/include/os_dev.h
wlan/mac_core/include/usb3_hw.h
wlan/mac_core/romexport/AR900B/hw.1/include/usb3_hw.h
wlan/mac_core/romexport/AR900B/hw.2/include/usb3_hw.h
wlan/mac_core/include/pcd.h
wlan/mac_core/romexport/AR900B/hw.1/include/pcd.h
wlan/mac_core/romexport/AR900B/hw.2/include/pcd.h

==========
==========

```
/*
 *  $Header: //source/qcom/qct/core/api/kernel/main/latest/libstd/stringl/stringl.h#13 $
*  $DateTime: 2013/07/24 11:35:54 $
*/

/*  $OpenBSD: string.h,v 1.17 2006/01/06 18:53:04 millert Exp $ */
/*  $NetBSD: string.h,v 1.6 1994/10/26 00:56:30 cgd Exp $   */

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*
*  @(#)string.h    5.10 (Berkeley) 3/9/91
*/
```

wlan/protocol/support/bin2srec/include/stringl/stringl.h

==========

==========

/*
*  $Header: //source/qcom/qct/core/kernel/libstd/main/latest/src/strlcpy.c#1 $
*  $DateTime: 2011/01/07 17:50:19 $
*/

/*  $OpenBSD: strlcpy.c,v 1.11 2006/05/05 15:27:38 millert
 Exp $    */

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wlan/protocol/support/bin2srec/strlcpy.c

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==========

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```
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*
* $Id: sha2.c,v 1.1 2001/11/08 00:01:51 adg Exp adg $
*/
File: LLM_sp_sha2.c

/*
 * FILE:  sha2.h
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*
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*
* $Id: sha2.h,v 1.1 2001/11/08 00:02:01 adg Exp adg $
*/
File: LLM_sp_sha2.h

==========

2.

/* utility to create the register check tables
* this includes inlined list.h safe for userspace.
*
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*
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 Glisse
*    Dave Airlie
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*/
File: comm_lib.h

==========

3.

/* crypto/aes/aes.h -*- mode:C; c-file-style: "eay" -*- */
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* ====================================================================
*
*/
```

File Name list: aes.h, aes_locl.h

==========

4.

```
/* crypto/aes/aes_core.c -*- mode:C; c-file-style: "eay" -*- */
/**
* rijndael-alg-fst.c
*
* @version 3.0 (December 2000)
*
* Optimised ANSI C code for the Rijndael cipher (now AES)
*
* @author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
* @author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
* @author Paulo Barreto <paulo.barreto@terra.com.br>
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*/
File: aes_core.c

==============================================================================

5.

/*==============================================================================

                EDIT HISTORY FOR FILE

 $Header: //depot/asic/msmshared/sec/sec/MSM_SEC.03.03.08.xx/aes.h#1 $
 $DateTime: 2006/12/11 00:43:21 $ $Author: davidf $

when       who     what, where, why
--------   ---     ----------------------------------------------------------
11/12/04   rv      changes to correct LINT errors
02/02/04   rwh     Small mods to open
 source.

==============================================================================*/

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  Dr B. R. Gladman <brg@gladman.uk.net> 1st June 2001.

*/
File: aes.h

/*==============================================================================

                EDIT HISTORY FOR FILE

 $Header: //depot/asic/msmshared/sec/sec/MSM_SEC.03.03.08.xx/aes_tab.h#1 $
 $DateTime: 2006/12/11 00:43:21 $ $Author: davidf $

when       who     what, where, why
--------   ---     ----------------------------------------------------------
11/12/04   rv      changes to correct LINT errors
```

02/02/04
  rwh  Small mods to open source.

==========*/
/*lint -e146 -e303 */
/* 146: Assuming a binary constant */
/* 303: String too long (try +macros) */

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*/
File: aes_tab.h

==========
6.
==========
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#
#
#
==========
File: Conftest.py

==========
7.
==========
/ ***
*
* Fowler/Noll/Vo- hash
*
* The basis of this hash algorithm was taken from an idea sent
* as reviewer comments to the IEEE POSIX P1003.2 committee by:
*
*  Phong Vo (http://www.research.att.com/info/kpv/)
*  Glenn Fowler (http://www.research.att.com/~gsf/)
*
* In a subsequent ballot round:
*
*  Landon Curt Noll (http://www.isthe.com/chongo/)
*
* improved on their algorithm.  Some people tried this hash
* and found that it worked rather well.  In an EMail message
* to Landon, they named it the ``Fowler/Noll/Vo'' or FNV hash.
*
* FNV hashes are designed to be fast while maintaining a low
* collision rate. The FNV speed allows one to quickly hash
lots
* of data while maintaining a reasonable collision rate.  See:
*
*  http://www.isthe.com/chongo/tech/comp/fnv/index.html
*
* for more details as well as other forms of the FNV hash.
*
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*

```
* By:
* chongo <Landon Curt Noll> /\oo/\
*      http://www.isthe.com/chongo/
*
* Share and Enjoy! :-)
*/
```

File: fm_fnv_hash.h, fm_fnv_hash.c

==========
8.
==========

```
/*
 *  $Header: //source/qcom/qct/core/api/kernel/main/latest/libstd/stringl/stringl.h#13 $
*  $DateTime: 2013/07/24 11:35:54 $
*/

/* $OpenBSD: string.h,v 1.17 2006/01/06 18:53:04 millert Exp $ */
/* $NetBSD: string.h,v 1.6 1994/10/26 00:56:30 cgd Exp $ */

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*
```

* @(#)string.h 5.10 (Berkeley) 3/9/91
*/
File: stringl.h

==========
9.
==========
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 * See README for more details.
 */
```

---

```
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*
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* - AES-128 CTR mode encryption
* - AES-128 EAX mode encryption/decryption
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* This file defines the cryptographic functions that need to be implemented
* for wpa_supplicant and hostapd. When TLS is not used, internal
* implementation of MD5, SHA1, and AES is used and no external libraries are
* required. When TLS is enabled (e.g., by enabling EAP-TLS or EAP-PEAP), the
* crypto
 library used by the TLS implementation is expected to be used for
* non-TLS needs, too, in order to save space by not implementing these
* functions twice.
*
* Wrapper code for using each crypto library is in its own file (crypto*.c)
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 *
 *  First, the polynomial itself and its table of feedback terms.  The
 *  polynomial is
 *  X^32+X^26+X^23+X^22+X^16+X^12+X^11+X^10+X^8+X^7+X^5+X^4+X^2+X^1+X^0
 *
 *  Note that we take it "backwards" and put the highest-order term in
 *  the lowest-order bit.  The X^32 term is "implied"; the LSB is the
 *  X^31 term, etc.  The X^0 term (usually shown as "+1") results in
 *  the MSB being 1
 *

```
*  Note that the usual hardware shift register implementation, which
*  is what we're using (we're merely optimizing it by doing
eight-bit
*  chunks at a time) shifts bits into the lowest-order term.  In our
*  implementation, that means shifting towards the right.  Why do we
*  do it this way?  Because the calculated CRC must be transmitted in
*  order from highest-order term to lowest-order term.  UARTs transmit
*  characters in order from LSB to MSB.  By storing the CRC this way
*  we hand it to the UART in the order low-byte to high-byte; the UART
*  sends each low-bit to hight-bit; and the result is transmission bit
*  by bit from highest- to lowest-order term without requiring any bit
*  shuffling on our part.  Reception works similarly
*
*  The feedback terms table consists of 256, 32-bit entries.  Notes
*

*     The table can be generated at runtime if desired; code to do so
*     is shown later.  It might not be obvious, but the feedback
*     terms simply represent the results of eight shift/xor opera
*     tions for all combinations of data and CRC register values
*
*     The values must be right-shifted by eight bits by the "updcrc
*     logic; the shift must be unsigned (bring in zeroes).  On some
*     hardware you could probably optimize the shift in assembler by
*     using byte-swap instructions
*     polynomial $edb88320
*
*
* CRC32
code derived from work by Gary S. Brown.
*/
```

---

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  * AES SIV (RFC 5297)
```

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/* ===== start - public domain SHA256 implementation ===== */

/* This is based on SHA256 implementation in LibTomCrypt that was released into
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---

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* @(#)string.h 5.10 (Berkeley) 3/9/91

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/*
* Author: Malcolm
 Purvis <malcolmp@ok-labs.com>
* Author: Carlos Dyonisio <medaglia@ok-labs.com>
*/
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File: qurt_atomic_ops.h
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/*
* Author: Malcolm Purvis <malcolmp@ok-labs.com>
*
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File: wmi_unified_vendor.h

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File: wmi_version.h

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File: epping_test.h

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File: htc.h

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File: htc_services.h

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File:
 ip_prot.h

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File: ol_fw_tx_dbg.h

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File: queue.h

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File: stail_queue.h

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//
//  @(#)queue.h 8.5 (Berkeley) 8/20/94
// $FreeBSD: src/sys/sys/queue.h,v 1.58 2004/04/07 04:19:49 imp Exp $
// $Id: //components/rel/wlanfw_cmn.cnss/1.0/cnss_proc/wlan/fwcommon/include/queue.h#1 $
//
==========
File:
 targaddrs.h

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File: aes_gcm.h

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File: aes_wrap.h

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/*
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/*
* AES-based functions
*
*
* - AES Key Wrap Algorithm (128-bit KEK) (RFC3394)
* - One-Key CBC MAC (OMAC1) hash with AES-128
* - AES-128 CTR mode encryption
* -
 AES-128 EAX mode encryption/decryption
* - AES-128 CBC
*
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File: sha2.h

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* FILE:  sha2.h
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*
* $Id: //depot/sw/branches/qca_rome_main/perf_pwr_offload/drivers/target/include/sha2.h#1 $
*/
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File: wal_dfs.h

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File: if_ethersubr.h

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//
// $Id: //components/rel/wlanfw.cnss/1.0.1/cnss_proc/wlan/fw/target/src/wlan/proto/include/if_ethersubr.h#3 $
//

==========
File: wal_dfs.c
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==========
File: ieee_crc32.c

```
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 restriction.
*
*  First, the polynomial itself and its table of feedback terms.  The
*  polynomial is
*  X^32+X^26+X^23+X^22+X^16+X^12+X^11+X^10+X^8+X^7+X^5+X^4+X^2+X^1+X^0
*
*  Note that we take it "backwards" and put the highest-order term in
*  the lowest-order bit.  The X^32 term is "implied"; the LSB is the
*  X^31 term, etc.  The X^0 term (usually shown as "+1") results in
*  the MSB being 1
*
*  Note that the usual hardware shift register implementation, which
*  is what we're using (we're merely optimizing it by doing eight-bit
*  chunks at a time) shifts bits into the lowest-order term.  In our
*  implementation, that means shifting towards the right.  Why do we
*  do it this way?  Because the calculated CRC must be transmitted in
*  order from highest-order term to lowest-order term.  UARTs transmit
*  characters in order from LSB to MSB.  By storing the CRC this way
*  we hand it to the UART in the order low-byte to high-byte; the UART
*  sends each low-bit
 to hight-bit; and the result is transmission bit
*  by bit from highest- to lowest-order term without requiring any bit
*  shuffling on our part.  Reception works similarly
*
*  The feedback terms table consists of 256, 32-bit entries.  Notes
*
*     The table can be generated at runtime if desired; code to do so
*     is shown later.  It might not be obvious, but the feedback
*     terms simply represent the results of eight shift/xor opera
*     tions for all combinations of data and CRC register values
*
*     The values must be right-shifted by eight bits by the "updcrc
*     logic; the shift must be unsigned (bring in zeroes).  On some
*     hardware you could probably optimize the shift in assembler by
*     using byte-swap instructions
*     polynomial $edb88320
*
*
* CRC32 code derived from work by Gary S. Brown.
*/
==============================================================================
File: aes.c

/*
```

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/*
* AES (Rijndael) cipher
*
* Modifications to public domain implementation:
* - support only 128-bit keys
* - cleanup
* - use C pre-processor to make it easier to change S table access
* - added option (AES_SMALL_TABLES) for reducing code size by about 8 kB at
*   cost of reduced throughput (quite small difference on Pentium 4,
*   10-25% when using -O1 or -O2 optimization)
*
* Copyright (c) 2003-2005, Jouni Malinen <jkmaline@cc.hut.fi>
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/*
* rijndael-alg-fst.c
*
* @version 3.0 (December 2000)
*
* Optimised ANSI C code for the Rijndael
 cipher (now AES)
*
* @author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
* @author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
* @author Paulo Barreto <paulo.barreto@terra.com.br>
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==========
File: aes_gcm.c

/*
* Galois/Counter Mode (GCM) and GMAC with AES
*
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*/
==========
File: aes_wrap.c

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/*
* AES-based functions
*
* - AES Key Wrap Algorithm (128-bit KEK) (RFC3394)
* - One-Key CBC MAC (OMAC1) hash with AES-128
* - AES-128 CTR mode encryption
* - AES-128 EAX mode encryption/decryption
* - AES-128 CBC
*
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File: common.h

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* wpa_supplicant/hostapd / common helper functions, etc.
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==============================================================================
File: md5.c


//
//
 $Id: //depot/sw/branches/qca_main_wifi2.0/perf_pwr_offload/drivers/target/src/misc/crypto/md5.c#1 $
//
// This code implements the MD5 message-digest algorithm.
// The algorithm is due to Ron Rivest.  This code was
// written by Colin Plumb in 1993, no copyright is claimed.
// This code is in the public domain; do with it what you wish.
//
// Equivalent code is available from RSA Data Security, Inc.
// This code has been tested against that, and is equivalent,
// except that you don't need to include two pages of legalese
// with every copy.
//
// To compute the message digest of a chunk of bytes, declare an
// MD5Context structure, pass it to MD5Init, call MD5Update as
// needed on buffers full of bytes, and then call MD5Final, which
// will fill a supplied 16-byte array with the digest.
//
==============================================================================
File: sha1.c
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* SHA1 hash implementation and interface functions
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File: wmi_tlv_helper.c

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File: platform_cmnos_printf.c

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==========
File: hca_HwComponentBbLithium_dfs_phyerr_tlv.cpp

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==========
File: phyUtilsStrlcpy.c

/* $OpenBSD: strlcpy.c,v 1.11 2006/05/05 15:27:38 millert Exp $ */

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//
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// $NetBSD: if_llc.h,v 1.12 1999/11/19 20:41:19 thorpej Exp $
// $Id: //components/rel/wlanfw.cnss/1.0.1/cnss_proc/wlan/fw/target/src/wlan/proto/include/if_llc.h#3 $
//

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*
* @(#)if_llc.h 8.1 (Berkeley) 6/10/93
* $FreeBSD: src/sys/net/if_llc.h,v 1.9 2002/09/23 06:25:08 alfred Exp $
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File: sha2.c

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File: wlan_p2p_disc_offload.c

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* Wi-Fi Protected Setup - attribute parsing
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File: wlan_p2p_disc_offload_internal.h

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```
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* AES-128/192/256 CTR
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File: aes_siv.h

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File: crypto.h

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* WPA Supplicant / wrapper functions for crypto libraries
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* This file defines the cryptographic
 functions that need to be implemented
* for wpa_supplicant and hostapd. When TLS is not used, internal
* implementation of MD5, SHA1, and AES is used and no external libraries are
* required. When TLS is enabled (e.g., by enabling EAP-TLS or EAP-PEAP), the
* crypto library used by the TLS implementation is expected to be used for
* non-TLS needs, too, in order to save space by not implementing these
* functions twice.
*
* Wrapper code for using each crypto library is in its own file (crypto*.c)
* and one of these files is build and linked in to provide the functions
* defined here.
*/
==============================================================================
File: fils.c


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File:
 mywpa_common.c

* WPA/RSN - Shared functions for supplicant and authenticator
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==============================================================================
File: mywpa_common.h


/*
* WPA definitions shared between hostapd and wpa_supplicant
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File: sha256.c

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 functions
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================================================================================
File: sha256-kdf.c

/*
* HMAC-SHA256 KDF (RFC 5295) and HKDF-Expand(SHA256) (RFC 5869)
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File: sha384.h

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File: sha384_i.h

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* SHA-384 internal definitions
* Copyright (c) 2015, Pali Rohr <pali.rohar@gmail.com>
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File: sha384-internal.c

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* SHA-384 hash implementation and interface functions
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File:
sha384-prf.c

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* SHA384-based KDF (IEEE 802.11ac)
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File: sha512_i.h

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File: sha512-internal.c

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File:
wmi_vendor.h

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File: wlan_module_ids.h

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Firmware provided as part of an XC4000 Linux developers kit by Brian
Mathews <bmathews@xceive.com> to Devin Heitmueller
<dheitmueller@kernellabs.org> on July 1, 2009.

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Firmware provided as part of an XC5000 Linux developers kit by Brian
Mathews <bmathews@xceive.com> to Devin Heitmueller <dheitmueller@linuxtv.org>
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*/
```

==========

File: fils.c

```
/* WPA/RSN - Shared functions for supplicant and authenticator
```

```
* EAP common peer/server definitions
* EAP peer state machines (RFC 4137)
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File: fils.h

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File: mywpa_common.c

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/*
* AES-based functions
*
*
```

```
* - AES Key Wrap Algorithm (128-bit KEK) (RFC3394)
* - One-Key CBC MAC (OMAC1) hash with AES-128
* - AES-128 CTR mode encryption
* - AES-128 EAX mode encryption/decryption
* - AES-128 CBC
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*
* - AES Key Wrap Algorithm (128-bit KEK) (RFC3394)
* - One-Key
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* - AES-128 CTR mode encryption
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 crypto.h

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*
* This file defines the cryptographic functions that need to be implemented
* for wpa_supplicant and hostapd. When TLS is not used, internal
* implementation of MD5, SHA1, and AES is used and no external libraries are
* required. When TLS is enabled (e.g., by enabling EAP-TLS or EAP-PEAP), the
* crypto library used by the TLS implementation is expected to be used
 for
* non-TLS needs, too, in order to save space by not implementing these
* functions twice.
*
* Wrapper code for using each crypto library is in its own file (crypto*.c)
* and one of these files is build and linked in to provide the functions
* defined here.
*/
```

==========

File: suppl_auth_api.h

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File: atomic_ops.h

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File: qurt_atomic_ops.h

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*/
/*
* Author: Malcolm Purvis <malcolmp@ok-labs.com>
*
* This file is only included by the main atomic_ops.h, so all of that
* file's definitions are available.
*/
```

==========

File: ieee_crc32.c

```
/*
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*
*  First, the polynomial itself and its table of feedback terms.  The
*  polynomial is

*  X^32+X^26+X^23+X^22+X^16+X^12+X^11+X^10+X^8+X^7+X^5+X^4+X^2+X^1+X^0
*
*  Note that we take it "backwards" and put the highest-order term in
*  the lowest-order bit.  The X^32 term is "implied"; the LSB is the
*  X^31 term, etc.  The X^0 term (usually shown as "+1") results in
*  the MSB being 1
*
*  Note that the usual hardware shift register implementation, which
*  is what we're using (we're merely optimizing it by doing eight-bit
*  chunks at a time) shifts bits into the lowest-order term.  In our
*  implementation, that means shifting towards the right.  Why do we
*  do it this way?  Because the calculated CRC
 must be transmitted in
*  order from highest-order term to lowest-order term.  UARTs transmit
*  characters in order from LSB to MSB.  By storing the CRC this way
*  we hand it to the UART in the order low-byte to high-byte; the UART
*  sends each low-bit to hight-bit; and the result is transmission bit
*  by bit from highest- to lowest-order term without requiring any bit
*  shuffling on our part.  Reception works similarly
*
*  The feedback terms table consists of 256, 32-bit entries.  Notes
*
*     The table can be generated at runtime if desired; code to do so
*     is shown later.  It might not be obvious, but the feedback
*     terms simply represent the results of eight shift/xor opera
```

```
*      tions for all combinations of data and CRC register values
*
*      The values must be right-shifted by eight bits by the "updcrc
*      logic; the shift must be unsigned (bring in zeroes).  On some
*      hardware you could probably optimize the shift in assembler by
*      using byte-swap instructions
*      polynomial $edb88320
*
*
* CRC32 code derived from work by Gary S. Brown.
*/
```

==========

File: sha2.h

```
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```

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/* $NetBSD: string.h,v 1.6 1994/10/26 00:56:30 cgd Exp $ */
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*
* @(#)string.h 5.10 (Berkeley) 3/9/91
*/

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//  @(#)queue.h 8.5 (Berkeley) 8/20/94
// $FreeBSD: src/sys/sys/queue.h,v 1.58 2004/04/07 04:19:49 imp Exp $

==========

File: phyUtilsStrlcpy.c

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==========

File: sha384_i.h

```
/*
* SHA-384 internal definitions
* Copyright (c) 2015, Pali Rohr <pali.rohar@gmail.com>
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* See README for more details.
*/
```

==========

File: sha384.c

```
/*
* SHA-384 hash implementation and interface functions
* Copyright
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```

==========

File: sha384-prf.c

```
/*
```

```
* SHA384-based KDF (IEEE 802.11ac)
* Copyright (c) 2003-2017, Jouni Malinen <j@w1.fi>
*
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```

==========

File: sha384.h

```
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* Copyright (c) 2015-2017, Jouni Malinen <j@w1.fi>
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```

==========

File: sha256-kdf.c

```
/*
* HMAC-SHA256 KDF (RFC 5295) and HKDF-Expand(SHA256) (RFC 5869)
* Copyright (c) 2014-2017, Jouni Malinen <j@w1.fi>
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```

==========

File: sha512_i.h

```
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```

==========

File: md5.c

```
/*
```

```
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* $ATH_LICENSE_TARGET_C$
*/

//
// This code implements the MD5 message-digest algorithm.
// The algorithm is due to Ron Rivest.  This code was
// written by Colin Plumb in 1993, no copyright is claimed.
// This code is in the public domain; do with it what you wish.
//
// Equivalent code is available from RSA Data Security, Inc.
// This code has been tested against that, and is equivalent,
// except that you don't need to include two
 pages of legalese
// with every copy.
//
// To compute the message digest of a chunk of bytes, declare an
// MD5Context structure, pass it to MD5Init, call MD5Update as
// needed on buffers full of bytes, and then call MD5Final, which
// will fill a supplied 16-byte array with the digest.
//
// This code implements the MD5 message-digest algorithm.
// The algorithm is due to Ron Rivest.  This code was
// written by Colin Plumb in 1993, no copyright is claimed.
// This code is in the public domain; do with it what you wish.
//
// Equivalent code is available from RSA Data Security, Inc.
// This code has been tested against that, and is equivalent,
// except that you don't need to include two pages of legalese
// with every copy.
//
```

==========

File: aes_gcm.h

```
/*
* Galois/Counter Mode (GCM) and GMAC with AES
*
* Copyright (c) 2012, Jouni Malinen <j@w1.fi>
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*/
```

==========

File: md5_api.h

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```

==========

File: wlan_p2p_listen_offload_int.c

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```

==========

File: wlan_p2p_listen_offload_int.h

```
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```

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File: wlan_p2p_listen_offload.c

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```

==========

File: aes-ctr.c

```
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* AES-128/192/256 CTR
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File: m1_m4_frame.c

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/* RC4 stream cipher
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```

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File: my_nan_sec.c

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File: mywpa.c

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File: mywpa_ft.c

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File: mywpa_ft.h

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File:
 wlan_p2p_disc_offload.c

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/*
* Wi-Fi Protected Setup - attribute parsing
* Copyright (c) 2008, Jouni Malinen <j@w1.fi>
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```

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File: wlan_p2p_disc_offload_internal.h

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* Wi-Fi Protected Setup - message definitions
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==========

File:
htt_common.h

```
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File: htt.h

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File: htt_ppdu_stats.h

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File: wdi_ipa.h

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File: wlan_nan_msg_common.h

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File:
 wlan_nan_msg_common_v2.h

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File:aes.c

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/*
* AES (Rijndael) cipher
*
* Modifications to public domain implementation:
* - support only 128-bit keys
* - cleanup
* - use C pre-processor to make it easier to change S table access
* - added option (AES_SMALL_TABLES) for reducing code size by about 8 kB at
*   cost of reduced throughput (quite small difference on Pentium 4,
*   10-25% when using -O1 or -O2 optimization)
*
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/*
* rijndael-alg-fst.c
*
```

* @version 3.0 (December 2000)
*
* Optimised ANSI C code for the Rijndael cipher (now AES)
*
* @author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
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File: wmi_tlv_helper.c

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File: hca_HwComponentBbBase_dfs_phyerr_tlv.cpp

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hca_dfs_radar_report.h
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File: cds_ieee80211_common.h

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File: cds_ieee80211_common_i.h

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File: cds_ieee80211_defines.h

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agere_sta_fw.bin -- 9.48 Hermes I
agere_ap_fw.bin  -- 9.48 Hermes I

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Fast discrete
Fourier and cosine transforms and inverses
author: Monty <xiphmont@mit.edu>
modifications by: Monty
last modification date: Jul 1 1996

/* These Fourier routines were originally based on the Fourier
routines of the same names from the NETLIB bihar and fftpack
fortran libraries developed by Paul N. Swarztrauber at the National
Center for Atmospheric Research in Boulder, CO USA. They have been
reimplemented in C and optimized in a few ways for OggSquish. */

/* As the original fortran libraries are public domain, the C Fourier
routines in this file are hereby released to the public domain as
well. The C routines here produce output exactly equivalent to the
original fortran routines. Of particular interest are the facts
that (like the original fortran), these routines can work on
arbitrary length vectors that need not be powers of two in
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==========

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/*****************************************************************************//**
* @file cmsis_armclang.h
* @brief CMSIS compiler armclang (Arm Compiler 6) header file
* @version V5.3.1

```
* @date     26. March 2020
******************************************************************************/
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*/
```

core_cm0plus.h

```
/******************************************************************************//**
* @file     core_cm0plus.h
* @brief    CMSIS Cortex-M0+ Core Peripheral Access Layer Header File
* @version  V5.0.9
* @date     21. August 2019
******************************************************************************/
/*
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*/
```

cmsis_compiler.h

```
/****************************************************************************//**
* @file     cmsis_compiler.h
* @brief    CMSIS compiler generic header file
* @version  V5.1.0
* @date     09. October 2018
******************************************************************************/
/*
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*/
```

cmsis_version.h

```
/****************************************************************************//**
* @file     cmsis_version.h
* @brief    CMSIS Core(M) Version definitions
* @version  V5.0.4
* @date     23. July 2019
******************************************************************************/
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Firmware provided as part of an XC5000C Linux developers kit by Ramon Cazares
<Ramon.Cazares@CrestaTech.com> to Devin Heitmueller dheitmueller@linuxtv.org
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# 1.3734 icu78-data-full 78.3-r0

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## Commands to generate dependency files
GEN_DEPS.c= $(CC) -E -MM $(DEFS) $(CPPFLAGS)
GEN_DEPS.cc= $(CXX) -E -MM $(DEFS) $(CPPFLAGS)

```
## Flags for position independent code
SHAREDLIBCFLAGS = -fPIC
SHAREDLIBCXXFLAGS = -fPIC
SHAREDLIBCPPFLAGS = -DPIC

## Additional flags when building libraries and with threads
THREADSCPPFLAGS = -D_REENTRANT
LIBCPPFLAGS =

## Compiler switch to embed a runtime search path
LD_RPATH=
LD_RPATH_PRE= -Wl,-rpath,

## Compiler switch to embed a library name
LD_SONAME = -Wl,-soname -Wl,$(notdir $(MIDDLE_SO_TARGET))

## Shared library options
LD_SOOPTIONS= -Wl,-Bsymbolic

## Shared object suffix
SO = so
## Non-shared intermediate object suffix
STATIC_O = ao

## Compilation
 rules
%.$(STATIC_O): $(srcdir)/%.c
 $(COMPILE.c) $(STATICCPPFLAGS) $(STATICCFLAGS) -o $@ $<
%.o: $(srcdir)/%.c
 $(COMPILE.c) $(DYNAMICCPPFLAGS) $(DYNAMICCFLAGS) -o $@ $<

%.$(STATIC_O): $(srcdir)/%.cpp
 $(COMPILE.cc) $(STATICCPPFLAGS) $(STATICCXXFLAGS) -o $@ $<
%.o: $(srcdir)/%.cpp
 $(COMPILE.cc) $(DYNAMICCPPFLAGS) $(DYNAMICCXXFLAGS) -o $@ $<


## Dependency rules
%.d: $(srcdir)/%.c
 @echo "generating dependency information for $<"
 @$(SHELL) -ec '$(GEN_DEPS.c) $< \
  | sed '\"s/\($*\)\.o[ :]*/\1.o $@ : /g'\" > $@; \
  [ -s $@ ] || rm -f $@'

%.d: $(srcdir)/%.cpp
 @echo "generating dependency information for $<"
 @$(SHELL) -ec '$(GEN_DEPS.cc) $< \
  | sed '\"s/\($*\)\.o[ :]*/\1.o $@ : /g'\" > $@; \
```

```
  [ -s $@ ] || rm -f $@'

## Versioned libraries rules

%.$(SO).$(SO_TARGET_VERSION_MAJOR): %.$(SO).$(SO_TARGET_VERSION)
 $(RM) $@ && ln -s ${<F} $@
%.$(SO): %.$(SO).$(SO_TARGET_VERSION_MAJOR)
 $(RM) $@ && ln -s ${*F}.$(SO).$(SO_TARGET_VERSION) $@

##  Bind internal references

# LDflags that pkgdata will use
BIR_LDFLAGS= -Wl,-Bsymbolic

# Dependencies [i.e. map files] for the final library
BIR_DEPS=

## Remove shared library 's'
STATIC_PREFIX_WHEN_USED =
STATIC_PREFIX =

## End BSD-specific setup
```

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JSON parsing library (nlohmann/json)

File: vendor/json/upstream/single_include/nlohmann/json.hpp (only for
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Section: pkg.m4 - Macros to locate and utilise pkg-config.

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## Commands to generate dependency files
GEN_DEPS.c= $(CC) -E -MM $(DEFS) $(CPPFLAGS)
GEN_DEPS.cc= $(CXX) -E -MM $(DEFS) $(CPPFLAGS)

## Flags for position independent code
SHAREDLIBCFLAGS = -fPIC
SHAREDLIBCXXFLAGS = -fPIC
SHAREDLIBCPPFLAGS = -DPIC

## Additional flags when building libraries and with threads
THREADSCPPFLAGS = -D_REENTRANT
LIBCPPFLAGS =

## Compiler switch to embed a runtime search path
LD_RPATH=
LD_RPATH_PRE= -Wl,-rpath,

## Compiler switch to embed a library name
LD_SONAME = -Wl,-soname -Wl,$(notdir $(MIDDLE_SO_TARGET))

## Shared library options
LD_SOOPTIONS= -Wl,-Bsymbolic

## Shared object suffix
SO = so
## Non-shared intermediate object suffix
STATIC_O = ao

## Compilation
 rules
%.$(STATIC_O): $(srcdir)/%.c
 $(COMPILE.c) $(STATICCPPFLAGS) $(STATICCFLAGS) -o $@ $<
%.o: $(srcdir)/%.c
```

```
 $(COMPILE.c) $(DYNAMICCPPFLAGS) $(DYNAMICCFLAGS) -o $@ $<

%.$(STATIC_O): $(srcdir)/%.cpp
 $(COMPILE.cc) $(STATICCPPFLAGS) $(STATICCXXFLAGS) -o $@ $<
%.o: $(srcdir)/%.cpp
 $(COMPILE.cc) $(DYNAMICCPPFLAGS) $(DYNAMICCXXFLAGS) -o $@ $<



## Dependency rules
%.d: $(srcdir)/%.c
 @echo "generating dependency information for $<"
 @$(SHELL) -ec '$(GEN_DEPS.c) $< \
  | sed '\"s/\($*\)\.o[ :]*/\1.o $@ : /g'\" > $@; \
  [ -s $@ ] || rm -f $@'

%.d: $(srcdir)/%.cpp
 @echo "generating dependency information for $<"
 @$(SHELL) -ec '$(GEN_DEPS.cc) $< \
  | sed '\"s/\($*\)\.o[ :]*/\1.o $@ : /g'\" > $@; \
  [ -s $@ ] || rm -f $@'

## Versioned libraries rules

%.$(SO).$(SO_TARGET_VERSION_MAJOR): %.$(SO).$(SO_TARGET_VERSION)
 $(RM) $@ && ln -s ${<F} $@
%.$(SO): %.$(SO).$(SO_TARGET_VERSION_MAJOR)
 $(RM) $@ && ln -s ${*F}.$(SO).$(SO_TARGET_VERSION) $@

##  Bind internal references

# LDflags that pkgdata will use
BIR_LDFLAGS= -Wl,-Bsymbolic

# Dependencies [i.e. map files] for the final library
BIR_DEPS=

## Remove shared library 's'
STATIC_PREFIX_WHEN_USED =
STATIC_PREFIX =

## End BSD-specific setup
```

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JSON parsing library (nlohmann/json)

File: vendor/json/upstream/single_include/nlohmann/json.hpp (only for

ICU4C)

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Section: pkg.m4 - Macros to locate and utilise pkg-config.

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# 1.3754 json-parse-even-better-errors 2.3.1

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# 1.3755 conventional-changelog-writer 6.0.1

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package copyright

import (
 "bytes"
 "internal/testenv"
 "io"
 "io/fs"
 "os"
 "path/filepath"
 "testing"
)

var copyright = []byte("Copyright")

var permitted = [][]byte{
 []byte("// Code generated by "),
 []byte("// Code generated from "),
 []byte("// Created by cgo -cdefs"),
 []byte("// DO NOT EDIT\n// generated by:"),
 []byte("// Empty assembly file"),
 []byte("// Generated using cgo"),
 []byte("// Original source:\n//\thttp://www.zorinaq.com/papers/md5-amd64.html"), // public domain crypto/md5
 []byte("// created by cgo -cdefs"),
 []byte("// go run mkasm.go"),
 []byte("// mkerrors"),
 []byte("// mksys"),
 []byte("// run\n// Code generated by"), // cmd/compile/internal/test/constFold_test.go
 []byte("//go:build !nethttpomithttp2"), // hack to pacify h2_bundle, which drops copyright header
```

```
}

func TestCopyright(t *testing.T) {
 buf
 := make([]byte, 2048)
 filepath.WalkDir(filepath.Join(testenv.GOROOT(t), "src"), func(path string, d fs.DirEntry, err error) error {
  if d.IsDir() && (d.Name() == "testdata" || d.Name() == "vendor") {
   return filepath.SkipDir
  }
  switch filepath.Ext(d.Name()) {
  default:
   return nil
  case ".s", ".go":
   // check
  }

  f, err := os.Open(path)
  if err != nil {
   t.Error(err)
   return nil
  }
  defer f.Close()
  n, err := f.Read(buf)
  if err != nil && err != io.EOF {
   t.Error(err)
   return nil
  }
  b := buf[:n]
  if bytes.Contains(b, copyright) {
   return nil
  }
  for _, ok := range permitted {
   if bytes.HasPrefix(b, ok) {
    return nil
   }
  }
  t.Logf("%.100s %s", b, path)
  t.Errorf("%s: missing copyright notice", path)
  return nil
 })
}
```

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*
* Created: Sat Sep 02 12:17:00 2000 cv
*
* This file contains functions for forcing opened file descriptors to
* binary mode on Windows systems.
*/

#ifndef _BSD_CYGWIN_UTIL_H
#define _BSD_CYGWIN_UTIL_H

#ifdef HAVE_CYGWIN

#undef ERROR
#define is_winnt       (GetVersion() < 0x80000000)

#include <windows.h>
#include <sys/cygwin.h>
#include <io.h>

int binary_open(const char *, int , ...);
int binary_pipe(int fd[2]);
int check_nt_auth(int, struct passwd *);
int check_ntsec(const char *);
void register_9x_service(void);
char **fetch_windows_environment(void);
void free_windows_environment(char **);

#define
 open binary_open
#define pipe binary_pipe

#endif /* HAVE_CYGWIN */

#endif /* _BSD_CYGWIN_UTIL_H */
```

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```
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 *
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 * <http://www.core-sdi.com>
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4)
The Rijndael implementation by Vincent Rijmen, Antoon Bosselaers
and Paulo Barreto is in the public domain and distributed
with the following license:

```
 * @version 3.0 (December 2000)
 *
 * Optimised ANSI C code for the Rijndael cipher (now AES)
 *
 * @author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
 * @author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
 * @author Paulo Barreto <paulo.barreto@terra.com.br>
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```

---

```
$OpenBSD: LICENCE,v 1.19 2004/08/30 09:18:08 markus Exp $
/* $OpenBSD: poll.h,v 1.11 2003/12/10 23:10:08 millert Exp $ */

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/* OPENBSD ORIGINAL: sys/sys/poll.h */

#if !defined(HAVE_POLL) && !defined(HAVE_POLL_H)
#ifndef _COMPAT_POLL_H_
#define _COMPAT_POLL_H_

typedef struct pollfd {
 int fd;
 short events;
 short revents;
```

```
} pollfd_t;

typedef unsigned int nfds_t;

#define POLLIN  0x0001
#define POLLOUT  0x0004
#define POLLERR  0x0008
#define POLLHUP  0x0010
#define POLLNVAL 0x0020
#if 0
/* the following are currently not implemented */
#define POLLPRI  0x0002
#define POLLRDNORM 0x0040
#define POLLNORM POLLRDNORM
#define POLLWRNORM      POLLOUT
#define POLLRDBAND 0x0080
#define POLLWRBAND 0x0100
#endif

#define INFTIM  (-1) /* not
 standard */

int   poll(struct pollfd *, nfds_t, int);
#endif /* !_COMPAT_POLL_H_ */
#endif /* !HAVE_POLL_H */
/* $OpenBSD: poll.h,v 1.11 2003/12/10 23:10:08 millert Exp $ */

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/* OPENBSD ORIGINAL: sys/sys/poll.h */

#if !defined(HAVE_POLL) && !defined(HAVE_POLL_H)
#ifndef _COMPAT_POLL_H_
#define _COMPAT_POLL_H_

typedef struct pollfd {
 int  fd;
 short events;
 short revents;
} pollfd_t;

typedef unsigned int nfds_t;

#define POLLIN  0x0001
#define POLLOUT  0x0004
#define POLLERR  0x0008
#if 0
/* the following are currently not implemented */
#define POLLPRI  0x0002
#define POLLHUP  0x0010
#define POLLNVAL 0x0020
#define POLLRDNORM 0x0040
#define POLLNORM POLLRDNORM
#define POLLWRNORM      POLLOUT
#define POLLRDBAND 0x0080
#define POLLWRBAND 0x0100
#endif

#define INFTIM  (-1) /* not
 standard */

int   poll(struct pollfd *, nfds_t, int);
#endif /* !_COMPAT_POLL_H_ */
#endif /* !HAVE_POLL_H */
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#include "includes.h"

#if !defined(HAVE_STATVFS) || !defined(HAVE_FSTATVFS)

#include <sys/types.h>

#ifdef HAVE_SYS_MOUNT_H
#include <sys/mount.h>
#endif
#ifdef HAVE_SYS_STATFS_H
#include <sys/statfs.h>
#endif
#ifdef
 HAVE_SYS_VFS_H
#include <sys/vfs.h>
#endif

#ifndef HAVE_FSBLKCNT_T
typedef unsigned long fsblkcnt_t;
#endif
#ifndef HAVE_FSFILCNT_T
typedef unsigned long fsfilcnt_t;
#endif

#ifndef ST_RDONLY
#define ST_RDONLY 1
#endif
#ifndef ST_NOSUID
#define ST_NOSUID 2
#endif

 /* as defined in IEEE Std 1003.1, 2004 Edition */
struct statvfs {
 unsigned long f_bsize; /* File system block size. */
 unsigned long f_frsize; /* Fundamental file system block size. */
 fsblkcnt_t f_blocks; /* Total number of blocks on file system in */
    /* units of f_frsize. */
 fsblkcnt_t    f_bfree; /* Total number of free blocks. */
 fsblkcnt_t    f_bavail; /* Number of free blocks available to  */
    /* non-privileged process.  */
```

```
 fsfilcnt_t    f_files; /* Total number of file serial numbers. */
 fsfilcnt_t    f_ffree; /* Total number of free file serial numbers. */
 fsfilcnt_t    f_favail; /* Number of file serial numbers available to */
    /* non-privileged process. */
 unsigned long f_fsid; /*
 File system ID. */
 unsigned long f_flag; /* BBit mask of f_flag values. */
 unsigned long f_namemax;/*  Maximum filename length. */
};
#endif

#ifndef HAVE_STATVFS
int statvfs(const char *, struct statvfs *);
#endif

#ifndef HAVE_FSTATVFS
int fstatvfs(int, struct statvfs *);
#endif
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*/

#ifndef _BSD_MISC_H
#define _BSD_MISC_H

#include "includes.h"

char *ssh_get_progname(char *);
int seed_from_prngd(unsigned char *, size_t);

#ifndef HAVE_SETSID
#define setsid() setpgrp(0, getpid())
#endif
 /* !HAVE_SETSID */

#ifndef HAVE_SETENV
```

```
int setenv(const char *, const char *, int);
#endif /* !HAVE_SETENV */

#ifndef HAVE_SETLOGIN
int setlogin(const char *);
#endif /* !HAVE_SETLOGIN */

#ifndef HAVE_INNETGR
int innetgr(const char *, const char *, const char *, const char *);
#endif /* HAVE_INNETGR */

#if !defined(HAVE_SETEUID) && defined(HAVE_SETREUID)
int seteuid(uid_t);
#endif /* !defined(HAVE_SETEUID) && defined(HAVE_SETREUID) */

#if !defined(HAVE_SETEGID) && defined(HAVE_SETRESGID)
int setegid(uid_t);
#endif /* !defined(HAVE_SETEGID) && defined(HAVE_SETRESGID) */

#if !defined(HAVE_STRERROR) && defined(HAVE_SYS_ERRLIST) && defined(HAVE_SYS_NERR)
const char *strerror(int);
#endif

#if !defined(HAVE_SETLINEBUF)
#define setlinebuf(a) (setvbuf((a), NULL, _IOLBF, 0))
#endif

#ifndef HAVE_UTIMES
#ifndef HAVE_STRUCT_TIMEVAL
struct timeval {
 long tv_sec;
 long tv_usec;
}
#endif /* HAVE_STRUCT_TIMEVAL */

int utimes(char *, struct timeval *);
#endif /* HAVE_UTIMES */

#ifndef AT_FDCWD
#
 define AT_FDCWD (-2)
#endif

#ifndef HAVE_FCHMODAT
int fchmodat(int, const char *, mode_t, int);
#endif

#ifndef HAVE_FCHOWNAT
```

```
int fchownat(int, const char *, uid_t, gid_t, int);
#endif

#ifndef HAVE_TRUNCATE
int truncate (const char *, off_t);
#endif /* HAVE_TRUNCATE */

#ifndef HAVE_STRUCT_TIMESPEC
struct timespec {
 time_t tv_sec;
 long tv_nsec;
};
#endif /* !HAVE_STRUCT_TIMESPEC */

#if !defined(HAVE_NANOSLEEP) && !defined(HAVE_NSLEEP)
# include <time.h>
int nanosleep(const struct timespec *, struct timespec *);
#endif

#ifndef HAVE_UTIMENSAT
# include <time.h>
/* start with the high bits and work down to minimise risk of overlap */
# ifndef AT_SYMLINK_NOFOLLOW
#  define AT_SYMLINK_NOFOLLOW 0x80000000
# endif
int utimensat(int, const char *, const struct timespec[2], int);
#endif /* !HAVE_UTIMENSAT */

#ifndef HAVE_USLEEP
int usleep(unsigned int useconds);
#endif

#ifndef HAVE_TCGETPGRP
pid_t tcgetpgrp(int);
#endif

#ifndef HAVE_TCSENDBREAK
int tcsendbreak(int, int);
#endif

#ifndef
 HAVE_UNSETENV
int unsetenv(const char *);
#endif

#ifndef HAVE_ISBLANK
int isblank(int);
#endif
```

```
#ifndef HAVE_GETPGID
pid_t getpgid(pid_t);
#endif

#ifndef HAVE_PSELECT
int pselect(int, fd_set *, fd_set *, fd_set *, const struct timespec *,
   const sigset_t *);
#endif

#ifndef HAVE_ENDGRENT
# define endgrent() do { } while(0)
#endif

#ifndef HAVE_KRB5_GET_ERROR_MESSAGE
# define krb5_get_error_message krb5_get_err_text
#endif

#ifndef HAVE_KRB5_FREE_ERROR_MESSAGE
# define krb5_free_error_message(a,b) do { } while(0)
#endif

#ifndef HAVE_PLEDGE
int pledge(const char *promises, const char *paths[]);
#endif

/* bsd-err.h */
#ifndef HAVE_ERR
void err(int, const char *, ...) __attribute__((format(printf, 2, 3)));
#endif
#ifndef HAVE_ERRX
void errx(int, const char *, ...) __attribute__((format(printf, 2, 3)));
#endif
#ifndef HAVE_WARN
void warn(const char *, ...) __attribute__((format(printf, 1, 2)));
#endif

#ifndef HAVE_LLABS
long long llabs(long long);
#endif

#if defined(HAVE_DECL_BZERO)
 && HAVE_DECL_BZERO == 0
void bzero(void *, size_t);
#endif

#ifndef HAVE_RAISE
int raise(int);
```

```
#endif

#ifndef HAVE_GETSID
pid_t getsid(pid_t);
#endif

#ifndef HAVE_FLOCK
# define LOCK_SH  0x01
# define LOCK_EX  0x02
# define LOCK_NB  0x04
# define LOCK_UN  0x08
int flock(int, int);
#endif

#ifdef FFLUSH_NULL_BUG
# define fflush(x) (_ssh_compat_fflush(x))
#endif

#ifndef HAVE_LOCALTIME_R
struct tm *localtime_r(const time_t *, struct tm *);
#endif

#ifndef HAVE_REALPATH
#define realpath(x, y) (sftp_realpath((x), (y)))
#endif

#endif /* _BSD_MISC_H */
/* $Id: bsd-cray.h,v 1.12 2005/02/02 06:10:11 dtucker Exp $ */

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* Created: Apr 22 16.34:00 2002 wp
*
* This file contains functions required for proper execution
* on UNICOS systems.
*
*/

#ifndef _BSD_CRAY_H
#define _BSD_CRAY_H

#ifdef _UNICOS

void cray_init_job(struct passwd *);
void cray_job_termination_handler(int);
void cray_login_failure(char *, int );
int cray_access_denied(char *);
extern char cray_tmpdir[];

#define CUSTOM_FAILED_LOGIN 1

#ifndef IA_SSHD
# define IA_SSHD IA_LOGIN
#endif
#ifndef MAXHOSTNAMELEN
#
 define MAXHOSTNAMELEN  64
#endif
#ifndef _CRAYT3E
# define TIOCGPGRP (tIOC|20)
#endif

#endif /* UNICOS */

#endif /* _BSD_CRAY_H */
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#ifndef _BSD_SIGNAL_H
#define _BSD_SIGNAL_H

#include "includes.h"

#include <signal.h>

#ifndef _NSIG
# ifdef NSIG
#  define _NSIG NSIG
# else
#  define _NSIG 128
# endif
#endif

#if !defined(HAVE_STRSIGNAL)
char
 *strsignal(int);
#endif

#endif /* _BSD_SIGNAL_H */
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*/

#ifndef _NEXT_POSIX_H
#define _NEXT_POSIX_H

#ifdef HAVE_NEXT
#include <sys/dir.h>

/* NGROUPS_MAX is behind -lposix.  Use the BSD version which is NGROUPS */
#undef NGROUPS_MAX
#define NGROUPS_MAX NGROUPS

/* NeXT's readdir() is BSD (struct direct) not POSIX (struct dirent) */
#define dirent direct

/* Swap out NeXT's BSD wait() for a more POSIX compliant one */
pid_t posix_wait(int *);
#define wait(a) posix_wait(a)

/* #ifdef wrapped functions that need defining for clean compiling */
pid_t getppid(void);
void vhangup(void);
int innetgr(const char *, const char *, const char *, const char *);

/* TERMCAP */
int tcgetattr(int, struct termios *);
int tcsetattr(int, int,
 const struct termios *);
int tcsetpgrp(int, pid_t);
speed_t cfgetospeed(const struct termios *);
speed_t cfgetispeed(const struct termios *);
int cfsetospeed(struct termios *, int);
int cfsetispeed(struct termios *, int);
#endif /* HAVE_NEXT */
#endif /* _NEXT_POSIX_H */
* Foremost, OpenSSH from which this project is derived.
* Jamie Beverly
* Rafael D'Halleweyn - 2011-06-05 18:56:24 EDT
* Jan-Pieter Cornet ( johnpc ) - 2012-03-23 03:25:52 PDT
* chrysn@fsfe.org
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* dfberger@users.noreply.github.com
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*
```

```
*/

#ifndef _BSD_WAITPID_H
#define _BSD_WAITPID_H

#ifndef HAVE_WAITPID
/* Clean out any potential issues */
#undef WIFEXITED
#undef WIFSTOPPED
#undef WIFSIGNALED

/* Define required functions to mimic a POSIX look and feel */
#define _W_INT(w) (*(int*)&(w)) /* convert union wait to int */
#define WIFEXITED(w) (!((_W_INT(w)) & 0377))
#define WIFSTOPPED(w) ((_W_INT(w)) & 0100)
#define WIFSIGNALED(w) (!WIFEXITED(w) && !WIFSTOPPED(w))
#define WEXITSTATUS(w) (int)(WIFEXITED(w) ? ((_W_INT(w) >> 8) & 0377) : -1)
#define WTERMSIG(w) (int)(WIFSIGNALED(w) ? (_W_INT(w) & 0177) : -1)
#define WCOREFLAG 0x80
#define WCOREDUMP(w) ((_W_INT(w)) & WCOREFLAG)

/* Prototype */
pid_t waitpid(int,
 int *, int);

#endif /* !HAVE_WAITPID */
#endif /* _BSD_WAITPID_H */
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*
* Created: Sat Sep 02 12:17:00 2000 cv
*
* This file contains functions for forcing opened file descriptors to
* binary mode on Windows systems.
*/

#ifndef _BSD_CYGWIN_UTIL_H
#define _BSD_CYGWIN_UTIL_H

#ifdef HAVE_CYGWIN

#undef ERROR

/* Avoid including windows headers. */
typedef void *HANDLE;
#define INVALID_HANDLE_VALUE ((HANDLE) -1)
#define DNLEN 16
#define UNLEN 256

/* Cygwin functions for which declarations are only available when including
  windows headers, so we have to define them here explicitly. */
extern HANDLE cygwin_logon_user (const struct passwd *, const char *);
extern void cygwin_set_impersonation_token (const HANDLE);

#include
 <sys/cygwin.h>
#include <io.h>

#define CYGWIN_SSH_PRIVSEP_USER (cygwin_ssh_privsep_user())
const char *cygwin_ssh_privsep_user();

int binary_open(const char *, int , ...);
int check_ntsec(const char *);
char **fetch_windows_environment(void);
void free_windows_environment(char **);
int cygwin_ug_match_pattern_list(const char *, const char *);

#ifndef NO_BINARY_OPEN
#define open binary_open
#endif

#endif /* HAVE_CYGWIN */

#endif /* _BSD_CYGWIN_UTIL_H */
```

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 * @version 3.0 (December 2000)
 *
 * Optimised ANSI C code for the Rijndael cipher (now AES)
 *
 * @author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
 * @author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
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------
$OpenBSD:
 LICENCE,v 1.20 2017/04/30 23:26:16 djm Exp $
/* $Id: bsd-misc.h,v 1.18 2005/02/25 23:07:38 dtucker Exp $ */

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#ifndef _BSD_MISC_H
#define _BSD_MISC_H

#include "includes.h"

char *ssh_get_progname(char *);

#ifndef HAVE_SETSID
#define setsid() setpgrp(0,
 getpid())
#endif /* !HAVE_SETSID */

#ifndef HAVE_SETENV
int setenv(const char *, const char *, int);
#endif /* !HAVE_SETENV */
```

```
#ifndef HAVE_SETLOGIN
int setlogin(const char *);
#endif /* !HAVE_SETLOGIN */

#ifndef HAVE_INNETGR
int innetgr(const char *, const char *, const char *, const char *);
#endif /* HAVE_INNETGR */

#if !defined(HAVE_SETEUID) && defined(HAVE_SETREUID)
int seteuid(uid_t);
#endif /* !defined(HAVE_SETEUID) && defined(HAVE_SETREUID) */

#if !defined(HAVE_SETEGID) && defined(HAVE_SETRESGID)
int setegid(uid_t);
#endif /* !defined(HAVE_SETEGID) && defined(HAVE_SETRESGID) */

#if !defined(HAVE_STRERROR) && defined(HAVE_SYS_ERRLIST) && defined(HAVE_SYS_NERR)
const char *strerror(int);
#endif


#ifndef HAVE_UTIMES
#ifndef HAVE_STRUCT_TIMEVAL
struct timeval {
 long tv_sec;
 long tv_usec;
}
#endif /* HAVE_STRUCT_TIMEVAL */

int utimes(char *, struct timeval *);
#endif /* HAVE_UTIMES */

#ifndef HAVE_TRUNCATE
int truncate (const char *, off_t);
#endif /* HAVE_TRUNCATE */

#if
 !defined(HAVE_NANOSLEEP) && !defined(HAVE_NSLEEP)
#ifndef HAVE_STRUCT_TIMESPEC
struct timespec {
 time_t tv_sec;
 long tv_nsec;
};
#endif
int nanosleep(const struct timespec *, struct timespec *);
#endif
```

```
#ifndef HAVE_TCGETPGRP
pid_t tcgetpgrp(int);
#endif

#ifndef HAVE_TCSENDBREAK
int tcsendbreak(int, int);
#endif

#ifndef HAVE_UNSETENV
void unsetenv(const char *);
#endif

/* wrapper for signal interface */
typedef void (*mysig_t)(int);
mysig_t mysignal(int sig, mysig_t act);

#define signal(a,b) mysignal(a,b)

#endif /* _BSD_MISC_H */
```

This package was debianized by Jamie Beverly <soupboy@sourceforge.net> on
Wed, 13 Jan 2010 01:08:49 +0300.

It was downloaded from http://pamsshagentauth.sf.net/

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```
/* $Id: bsd-waitpid.h,v 1.5 2003/08/29 16:59:52 mouring Exp $ */

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*/

#ifndef _BSD_WAITPID_H
#define _BSD_WAITPID_H
```

```
#ifndef HAVE_WAITPID
/* Clean out any potental issues */
#undef WIFEXITED
#undef WIFSTOPPED
#undef WIFSIGNALED

/* Define required functions to mimic a POSIX look and feel */
#define _W_INT(w) (*(int*)&(w)) /* convert union wait to int */
#define WIFEXITED(w) (!((_W_INT(w)) & 0377))
#define WIFSTOPPED(w) ((_W_INT(w)) & 0100)
#define WIFSIGNALED(w) (!WIFEXITED(w) && !WIFSTOPPED(w))
#define WEXITSTATUS(w) (int)(WIFEXITED(w) ? ((_W_INT(w) >> 8) & 0377) : -1)
#define WTERMSIG(w) (int)(WIFSIGNALED(w) ? (_W_INT(w) & 0177) : -1)
#define WCOREFLAG 0x80
#define WCOREDUMP(w)
  ((_W_INT(w)) & WCOREFLAG)

/* Prototype */
pid_t waitpid(int, int *, int);

#endif /* !HAVE_WAITPID */
#endif /* _BSD_WAITPID_H */
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```

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#ifndef HAVE_SETRESGID
int setresgid(gid_t, gid_t, gid_t);
#endif
#ifndef HAVE_SETRESUID
int setresuid(uid_t, uid_t, uid_t);
#endif
/* $Id: bsd-nextstep.h,v 1.9 2003/08/29 16:59:52 mouring Exp $ */

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*
```

```
*/

#ifndef _NEXT_POSIX_H
#define _NEXT_POSIX_H

#ifdef HAVE_NEXT
#include <sys/dir.h>

/* NGROUPS_MAX is behind -lposix.  Use the BSD version which is NGROUPS */
#undef NGROUPS_MAX
#define NGROUPS_MAX NGROUPS

/* NeXT's readdir() is BSD (struct direct) not POSIX (struct dirent) */
#define dirent direct

/* Swap out NeXT's BSD wait() for a more POSIX complient one */
pid_t posix_wait(int *);
#define wait(a) posix_wait(a)

/* #ifdef wrapped functions that need defining for clean compiling */
pid_t getppid(void);
void vhangup(void);
int innetgr(const char *, const char *, const char *, const char *);

/* TERMCAP
 */
int tcgetattr(int, struct termios *);
int tcsetattr(int, int, const struct termios *);
int tcsetpgrp(int, pid_t);
speed_t cfgetospeed(const struct termios *);
speed_t cfgetispeed(const struct termios *);
int cfsetospeed(struct termios *, int);
int cfsetispeed(struct termios *, int);
#endif /* HAVE_NEXT */
#endif /* _NEXT_POSIX_H */
```

# 1.3764 libssl3 3.6.2-r1

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# 1.3778 libnghttp2-14 1.68.1-r2

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# 1.3790 serializer 2.7.2

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*/
// is found, then throw a special exception in order to terminate

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*/
// Proprietary
/** The 'document-location()' id (Proprietary). */

Found in path(s):
* /serializer-2-7-2-sources-4-jar/org/apache/xpath/compiler/FunctionTable.java
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*/
/**
* This is a special exception that is used to stop parsing when
* search for an element. For instance, when searching
for xml:stylesheet
* PIs, it is used to stop the parse once the document element is found.
* @see StylesheetPIHandler
* @xsl.usage internal
*/

Found in path(s):
* /serializer-2-7-2-sources-4-jar/org/apache/xml/utils/StopParseException.java
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*/
// Proprietary, built in functions
/** current function string (Proprietary). */

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* /serializer-2-7-2-sources-4-jar/org/apache/xml/serializer/output_text.properties
* /serializer-2-7-2-sources-4-jar/org/apache/xml/serializer/Encodings.properties
* /serializer-2-7-2-sources-4-jar/org/apache/xml/serializer/output_unknown.properties
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/res/XSLTInfo.properties
* /serializer-2-7-2-sources-4-jar/org/apache/xml/serializer/HTMLEntities.properties
* /serializer-2-7-2-sources-4-jar/org/apache/xml/serializer/XMLEntities.properties
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##
#
# $Id: Makefile.inc 468650 2006-10-28 07:03:30Z minchau $
#
#####################################################################
#
#
# Makefile.inc for XSLT compiler #
#
#
#####################################################################

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*/
/**
* Execute the proprietary document-location() function, which returns
* a node set of documents.
* @xsl.usage advanced
 */

Found in path(s):
* /serializer-2-7-2-sources-4-jar/org/apache/xpath/functions/FuncDoclocation.java
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*/
/**
  * Major version number.
  * Version number. This changes only when there is a
  *         significant, externally apparent
 enhancement from
  *         the previous release. 'n' represents the n'th
  *         version.
  *
  *         Clients should carefully consider the implications
  *         of new versions as external interfaces and behaviour
  *         may have changed.
  */
```

Found in path(s):
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/Version.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/processor/XSLProcessorVersion.src
* /serializer-2-7-2-sources-4-jar/org/apache/xml/serializer/Version.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/processor/XSLProcessorVersion.java
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*/
// nodes.readSlot(currentParent, gotslot);
// currentParent = gotslot[1] & 0xFFFF;

Found in path(s):
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* /serializer-2-7-2-sources-4-jar/org/apache/xalan/trace/package.html
* /serializer-2-7-2-sources-4-jar/org/apache/xpath/package.html
*
/serializer-2-7-2-sources-4-jar/org/apache/xalan/res/package.html
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/lib/package.html
* /serializer-2-7-2-sources-4-jar/org/apache/xml/serializer/package.html
* /serializer-2-7-2-sources-4-jar/org/apache/xpath/compiler/package.html

* /serializer-2-7-2-sources-4-jar/org/apache/xpath/res/package.html
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/client/package.html
* /serializer-2-7-2-sources-4-jar/org/apache/xml/utils/package.html
* /serializer-2-7-2-sources-4-jar/org/apache/xpath/axes/package.html
* /serializer-2-7-2-sources-4-jar/org/apache/xpath/patterns/package.html
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/templates/package.html
* /serializer-2-7-2-sources-4-jar/org/apache/xpath/operations/package.html
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/lib/sql/package.html
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xslt/package.html
* /serializer-2-7-2-sources-4-jar/org/apache/xpath/functions/package.html
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 /serializer-2-7-2-sources-4-jar/org/apache/xalan/processor/package.html
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/transformer/package.html
* /serializer-2-7-2-sources-4-jar/org/apache/xpath/objects/package.html
* /serializer-2-7-2-sources-4-jar/org/apache/xpath/domapi/package.html
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*/
/**
* Major version number.
* Version number. This changes only when there is a
*         significant, externally apparent enhancement from
*
         the previous release. 'n' represents the n'th
*         version.
*
*         Clients should carefully consider the implications
*         of new versions as external interfaces and behaviour
*         may have changed.
*/
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* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/dom/SingleNodeCounter.java

*
 /serializer-2-7-2-sources-4-jar/org/apache/xml/serializer/ToXMLSAXHandler.java
* /serializer-2-7-2-sources-4-jar/org/apache/xml/serializer/Encodings.java
* /serializer-2-7-2-sources-4-jar/org/apache/xpath/res/XPATHErrorResources_cs.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/serialize/Serializer.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/transformer/DecimalToRoman.java
* /serializer-2-7-2-sources-4-jar/org/apache/xml/serializer/utils/SerializerMessages_sl.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/transformer/NodeSortKey.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/trax/SecuritySupport.java
* /serializer-2-7-2-sources-4-jar/org/apache/xml/res/XMLErrorResources_sl.java
* /serializer-2-7-2-sources-4-jar/org/apache/xml/serializer/XSLOutputAttributes.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/res/XSLTErrorResources.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/compiler/XslElement.java
*
 /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/runtime/ErrorMessages_ru.java
* /serializer-2-7-2-sources-4-jar/org/apache/xpath/axes/PathComponent.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/trace/TraceListener.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/compiler/LiteralExpr.java
* /serializer-2-7-2-sources-4-jar/org/apache/xml/utils/res/StringArrayWrapper.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/lib/ExsltSets.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/res/XSLTErrorResources_cs.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/transformer/KeyManager.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/runtime/ErrorMessages_it.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/templates/ElemNumber.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/templates/AVTPartXPath.java
* /serializer-2-7-2-sources-4-jar/org/apache/xml/serializer/utils/SerializerMessages_en.java
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 /serializer-2-7-2-sources-4-jar/org/apache/xml/utils/ThreadControllerWrapper.java
* /serializer-2-7-2-sources-4-jar/org/apache/xpath/axes/DescendantIterator.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/transformer/CountersTable.java
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* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/runtime/ErrorMessages_sl.java
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* /serializer-2-7-2-sources-4-jar/org/apache/xml/dtm/ref/ChunkedIntArray.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/compiler/SyntaxTreeNode.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/lib/sql/ObjectFactory.java
*
 /serializer-2-7-2-sources-4-jar/org/apache/xml/utils/res/XResources_zh_TW.java
* /serializer-2-7-2-sources-4-jar/org/apache/xml/utils/DOMHelper.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/compiler/Predicate.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/compiler/Sort.java
* /serializer-2-7-2-sources-4-jar/org/apache/xml/dtm/ref/DTMNodeIterator.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/compiler/Pattern.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/dom/DupFilterIterator.java

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* /serializer-2-7-2-sources-4-jar/org/apache/xalan/lib/sql/ObjectArray.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/runtime/output/WriterOutputBuffer.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/extensions/ObjectFactory.java
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* /serializer-2-7-2-sources-4-jar/org/apache/xml/utils/NSInfo.java
* /serializer-2-7-2-sources-4-jar/org/apache/xml/utils/URI.java
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/serializer-2-7-2-sources-4-jar/org/apache/xalan/templates/ElemAttributeSet.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/dom/ExtendedSAX.java
* /serializer-2-7-2-sources-4-jar/org/apache/xml/dtm/ObjectFactory.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/compiler/Fallback.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/compiler/util/StringType.java

* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/runtime/ErrorMessages_ja.java
* /serializer-2-7-2-sources-4-jar/org/apache/xml/dtm/ref/DTMAxisIteratorBase.java
* /serializer-2-7-2-sources-4-jar/org/apache/xml/utils/UnImplNode.java
* /serializer-2-7-2-sources-4-jar/org/apache/xpath/XPathVisitor.java
* /serializer-2-7-2-sources-4-jar/org/apache/xml/serializer/utils/SystemIDResolver.java
* /serializer-2-7-2-sources-4-jar/org/apache/xml/serializer/SerializerTrace.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/processor/XSLTElementProcessor.java
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/serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/compiler/RelativeLocationPath.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/compiler/Choose.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/cmdline/getopt/GetOptsException.java
* /serializer-2-7-2-sources-4-jar/org/apache/xml/serializer/EmptySerializer.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/compiler/NumberCall.java
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* /serializer-2-7-2-sources-4-jar/org/apache/xml/utils/SerializableLocatorImpl.java
* /serializer-2-7-2-sources-4-jar/org/apache/xpath/patterns/UnionPattern.java
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* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/trax/TransformerFactoryImpl.java
* /serializer-2-7-2-sources-4-jar/org/apache/xpath/operations/UnaryOperation.java
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* /serializer-2-7-2-sources-4-jar/org/apache/xalan/extensions/ExtensionHandlerJavaPackage.java
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* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/runtime/Hashtable.java
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* /serializer-2-7-2-sources-4-jar/org/apache/xml/serializer/OutputPropertyUtils.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/compiler/UseAttributeSets.java
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* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/compiler/util/OutlineableChunkEnd.java
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* /serializer-2-7-2-sources-4-jar/org/apache/xalan/templates/RedundentExprEliminator.java
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* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/dom/AdaptiveResultTreeImpl.java
* /serializer-2-7-2-sources-4-jar/org/apache/xml/dtm/ref/sax2dtm/SAX2RTFDTM.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/compiler/ObjectFactory.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/templates/ElemExsltFunction.java
* /serializer-2-7-2-sources-4-jar/org/apache/xpath/axes/SubContextList.java
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* /serializer-2-7-2-sources-4-jar/org/apache/xalan/res/XSLTErrorResources_pt_BR.java
* /serializer-2-7-2-sources-4-jar/org/apache/xml/utils/FastStringBuffer.java
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* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/cmdline/getopt/IllegalArgumentException.java
* /serializer-2-7-2-sources-4-jar/org/apache/xpath/jaxp/JAXPVariableStack.java
* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/compiler/util/OutlineableChunkStart.java
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 /serializer-2-7-2-sources-4-jar/org/apache/xpath/domapi/XPathResultImpl.java
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* /serializer-2-7-2-sources-4-jar/org/apache/xalan/xsltc/TransletException.java
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* /serializer-2-7-2-sources-4-jar/org/apache/xpath/axes/FilterExprIteratorSimple.java
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# 1.3791 typing-extensions 4.15.0

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A. HISTORY OF THE SOFTWARE
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Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see https://www.cwi.nl) in the Netherlands
as a successor of a language called ABC.  Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see https://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team.  In October of the same
year, the PythonLabs team moved to Digital Creations, which became
Zope Corporation.  In 2001, the Python Software Foundation (PSF, see
https://www.python.org/psf/) was formed, a non-profit organization
created specifically to own Python-related Intellectual Property.
Zope Corporation was a sponsoring member of the PSF.

All

Python releases are Open Source (see https://opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
| 2.2 and above | 2.1.1 | 2001-now | PSF | yes |

Footnotes:

(1) GPL-compatible doesn't mean that we're distributing Python under the GPL. All Python licenses, unlike the GPL, let you distribute a modified version without making your changes open source. The GPL-compatible licenses make it possible to combine Python with other software that is released under the GPL; the others don't.

(2) According to Richard Stallman, 1.6.1 is not GPL-compatible, because its license has a choice of law clause. According to CNRI, however, Stallman's lawyer has told CNRI's lawyer that 1.6.1 is "not incompatible" with the GPL.

Thanks to the many outside volunteers who have worked under Guido's direction to make these releases possible.

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# 1.3792 google-cloud-go-auth 0.20.0

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```

```
package cloud

import (
 "bytes"
 "io/ioutil"
 "os"
 "path/filepath"
 "strings"
 "testing"
)

var sentinels = []string{
 "Copyright",
 "Google",
 `Licensed under the Apache License, Version 2.0 (the "License");`,
}

func TestLicense(t *testing.T) {
 t.Parallel()
 err := filepath.Walk(".", func(path string, fi os.FileInfo, err error) error {
  if err != nil {
   return err
  }

  if ext :=
 filepath.Ext(path); ext != ".go" && ext != ".proto" {
   return nil
  }
  if strings.HasSuffix(path, ".pb.go") {
   // .pb.go files are generated from the proto files.
   // .proto files must have license headers.
   return nil
  }
  if path == "bigtable/cmd/cbt/cbtdoc.go" {
   // Automatically generated.
   return nil
  }

  src, err := ioutil.ReadFile(path)
  if err != nil {
   return nil
  }
  src = src[:140] // Ensure all of the sentinel values are at the top of the file.

  // Find license
  for _, sentinel := range sentinels {
   if !bytes.Contains(src, []byte(sentinel)) {
    t.Errorf("%v: license header not present. want %q", path, sentinel)
```

```
    return nil
   }
  }

  return nil
 })
 if err != nil {
  t.Fatal(err)
 }
}
```

```
# People who have agreed to one of the CLAs and can contribute patches.
# The AUTHORS file lists the copyright holders; this file
# lists people.  For example, Google employees are listed here
# but not in AUTHORS, because Google holds the copyright.
#
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# https://developers.google.com/open-source/cla/corporate
#
# Names should be added to this file as:
#     Name <email address>

# Keep the list alphabetically sorted.

Alexis Hunt <lexer@google.com>
Andreas Litt <andreas.litt@gmail.com>
Andrew Gerrand <adg@golang.org>
Brad Fitzpatrick <bradfitz@golang.org>
Burcu Dogan <jbd@google.com>
Dave Day <djd@golang.org>
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David Symonds <dsymonds@golang.org>
Filippo Valsorda <hi@filippo.io>
Glenn Lewis <gmlewis@google.com>
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# 1.3793 gax-go 2.21.0

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# 1.3794 google-cloud-go-speech 1.33.0

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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package discoveryengine_test

import (
 "context"

 discoveryengine "cloud.google.com/go/discoveryengine/apiv1"
 discoveryenginepb "cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 "google.golang.org/api/iterator"
)

func ExampleNewUserLicenseClient() {
 ctx := context.Background()
 //
 This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
```

```
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleNewUserLicenseRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseRESTClient(ctx)
 if
 err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleUserLicenseClient_BatchUpdateUserLicenses() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &discoveryenginepb.BatchUpdateUserLicensesRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb#BatchUpdateUserLicensesReque
st.
 }
 op, err := c.BatchUpdateUserLicenses(ctx, req)
 if err != nil {
```

```
 //
 TODO: Handle error.
 }

 resp, err := op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleUserLicenseClient_ListUserLicenses() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &discoveryenginepb.ListUserLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb#ListUserLicensesRequest.
 }
 it := c.ListUserLicenses(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done
  {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*discoveryenginepb.ListUserLicensesResponse)
 }
```

```
}

func ExampleUserLicenseClient_CancelOperation() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &longrunningpb.CancelOperationRequest{
  //
 TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#CancelOperationRequest.
 }
 err = c.CancelOperation(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleUserLicenseClient_GetOperation() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &longrunningpb.GetOperationRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#GetOperationRequest.
 }
 resp,
 err := c.GetOperation(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
```

```
 // TODO: Use resp.
 _ = resp
}

func ExampleUserLicenseClient_ListOperations() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &longrunningpb.ListOperationsRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#ListOperationsRequest.
 }
 it := c.ListOperations(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   //
 TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*longrunningpb.ListOperationsResponse)
 }
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

// [START datamanager_v1_generated_UserListGlobalLicenseService_CreateUserListGlobalLicense_sync]

package main

import (
 "context"

 datamanager "cloud.google.com/go/datamanager/apiv1"
 datamanagerpb "cloud.google.com/go/datamanager/apiv1/datamanagerpb"
)

func main() {
 ctx := context.Background()
 // This snippet has been automatically generated and
 should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := datamanager.NewUserListGlobalLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &datamanagerpb.CreateUserListGlobalLicenseRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/datamanager/apiv1/datamanagerpb#CreateUserListGlobalLicenseRequest.
 }
 resp, err := c.CreateUserListGlobalLicense(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

// [END datamanager_v1_generated_UserListGlobalLicenseService_CreateUserListGlobalLicense_sync]
```

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// versions:
//  protoc-gen-go v1.36.11
//  protoc        v6.31.0
// source: google/ads/datamanager/v1/user_list_direct_license_service.proto

package datamanagerpb

import (
 reflect "reflect"
 sync "sync"
 unsafe "unsafe"

 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
 fieldmaskpb
 "google.golang.org/protobuf/types/known/fieldmaskpb"
)

const (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Request to create a
// [UserListDirectLicense][google.ads.datamanager.v1.UserListDirectLicense]
// resource.
type CreateUserListDirectLicenseRequest struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Required. The account that owns the user list being licensed. Should be in
 // the format accountTypes/{ACCOUNT_TYPE}/accounts/{ACCOUNT_ID}
```

```
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Required. The user list direct license to create.
 UserListDirectLicense *UserListDirectLicense
`protobuf:"bytes,2,opt,name=user_list_direct_license,json=userListDirectLicense,proto3"
json:"user_list_direct_license,omitempty"`
 unknownFields
        protoimpl.UnknownFields
 sizeCache            protoimpl.SizeCache
}

func (x *CreateUserListDirectLicenseRequest) Reset() {
 *x = CreateUserListDirectLicenseRequest{}
 mi := &file_google_ads_datamanager_v1_user_list_direct_license_service_proto_msgTypes[0]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *CreateUserListDirectLicenseRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*CreateUserListDirectLicenseRequest) ProtoMessage() {}

func (x *CreateUserListDirectLicenseRequest) ProtoReflect() protoreflect.Message {
 mi := &file_google_ads_datamanager_v1_user_list_direct_license_service_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use CreateUserListDirectLicenseRequest.ProtoReflect.Descriptor instead.
func
 (*CreateUserListDirectLicenseRequest) Descriptor() ([]byte, []int) {
 return file_google_ads_datamanager_v1_user_list_direct_license_service_proto_rawDescGZIP(), []int{0}
}

func (x *CreateUserListDirectLicenseRequest) GetParent() string {
 if x != nil {
  return x.Parent
 }
 return ""
}
```

```
func (x *CreateUserListDirectLicenseRequest) GetUserListDirectLicense() *UserListDirectLicense {
 if x != nil {
  return x.UserListDirectLicense
 }
 return nil
}

// Request to get a
// [UserListDirectLicense][google.ads.datamanager.v1.UserListDirectLicense]
// resource.
type GetUserListDirectLicenseRequest struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Required. The resource name of the user list direct license.
 Name          string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *GetUserListDirectLicenseRequest) Reset() {
 *x = GetUserListDirectLicenseRequest{}
 mi := &file_google_ads_datamanager_v1_user_list_direct_license_service_proto_msgTypes[1]
 ms
 := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *GetUserListDirectLicenseRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*GetUserListDirectLicenseRequest) ProtoMessage() {}

func (x *GetUserListDirectLicenseRequest) ProtoReflect() protoreflect.Message {
 mi := &file_google_ads_datamanager_v1_user_list_direct_license_service_proto_msgTypes[1]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use GetUserListDirectLicenseRequest.ProtoReflect.Descriptor instead.
func (*GetUserListDirectLicenseRequest) Descriptor() ([]byte, []int) {
 return file_google_ads_datamanager_v1_user_list_direct_license_service_proto_rawDescGZIP(), []int{1}
}
```

```
func (x *GetUserListDirectLicenseRequest) GetName() string {
 if x
 != nil {
  return x.Name
 }
 return ""
}

// Request to update a
// [UserListDirectLicense][google.ads.datamanager.v1.UserListDirectLicense]
// resource.
type UpdateUserListDirectLicenseRequest struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Required. The licenses' `name` field is used to identify the license to
 // update.
 UserListDirectLicense *UserListDirectLicense
`protobuf:"bytes,1,opt,name=user_list_direct_license,json=userListDirectLicense,proto3"
json:"user_list_direct_license,omitempty"`
 // Optional. The list of fields to update. The special character `*` is not
 // supported and an `INVALID_UPDATE_MASK` error will be thrown if used.
 UpdateMask    *fieldmaskpb.FieldMask `protobuf:"bytes,2,opt,name=update_mask,json=updateMask,proto3"
json:"update_mask,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *UpdateUserListDirectLicenseRequest) Reset() {
 *x = UpdateUserListDirectLicenseRequest{}
 mi := &file_google_ads_datamanager_v1_user_list_direct_license_service_proto_msgTypes[2]
 ms
 := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *UpdateUserListDirectLicenseRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UpdateUserListDirectLicenseRequest) ProtoMessage() {}

func (x *UpdateUserListDirectLicenseRequest) ProtoReflect() protoreflect.Message {
 mi := &file_google_ads_datamanager_v1_user_list_direct_license_service_proto_msgTypes[2]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
```

```
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use UpdateUserListDirectLicenseRequest.ProtoReflect.Descriptor instead.
func (*UpdateUserListDirectLicenseRequest) Descriptor() ([]byte, []int) {
 return file_google_ads_datamanager_v1_user_list_direct_license_service_proto_rawDescGZIP(), []int{2}
}

func (x *UpdateUserListDirectLicenseRequest) GetUserListDirectLicense()
 *UserListDirectLicense {
 if x != nil {
  return x.UserListDirectLicense
 }
 return nil
}

func (x *UpdateUserListDirectLicenseRequest) GetUpdateMask() *fieldmaskpb.FieldMask {
 if x != nil {
  return x.UpdateMask
 }
 return nil
}

// Request to list all
// [UserListDirectLicense][google.ads.datamanager.v1.UserListDirectLicense]
// resources for a given account.
type ListUserListDirectLicensesRequest struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Required. The account whose licenses are being queried. Should be in the
 // format accountTypes/{ACCOUNT_TYPE}/accounts/{ACCOUNT_ID}
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Optional. A [filter string](https://google.aip.dev/160) to apply to the
 // list request. All fields need to be on the left hand side of each condition
 // (for example: `user_list_id = 123`). Fields must be specified using either
 // all [camel case](https://en.wikipedia.org/wiki/Camel_case) or all [snake
 //
 case](https://en.wikipedia.org/wiki/Snake_case). Don't use a combination of
 // camel case and snake case.
 //
 // **Supported Operations:**
 //
 // - `AND`
 // - `=`
 // - `!=`
 // - `>`
 // - `>=`
```

```
 // - `<`
 // - `<=`
 //
 // **Unsupported Fields:**
 //
 // - `name` (use get method instead)
 // - `historical_pricings` and all its subfields
 // - `pricing.start_time`
 // - `pricing.end_time`
 Filter string `protobuf:"bytes,2,opt,name=filter,proto3" json:"filter,omitempty"`
 // Optional. The maximum number of licenses to return per page. The service
 // may return fewer than this value. If unspecified, at most 50 licenses will
 // be returned. The maximum value is 1000; values above 1000 will be coerced
 // to 1000.
 PageSize int32 `protobuf:"varint,3,opt,name=page_size,json=pageSize,proto3" json:"page_size,omitempty"`
 // Optional. A page token, received from a previous
 // `ListUserListDirectLicense` call. Provide this to retrieve the subsequent
 // page.
 //
 // When paginating,
 all other parameters provided to
 // `ListUserListDirectLicense` must match the call that provided the page
 // token.
 PageToken     string `protobuf:"bytes,4,opt,name=page_token,json=pageToken,proto3"
json:"page_token,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *ListUserListDirectLicensesRequest) Reset() {
 *x = ListUserListDirectLicensesRequest{}
 mi := &file_google_ads_datamanager_v1_user_list_direct_license_service_proto_msgTypes[3]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *ListUserListDirectLicensesRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*ListUserListDirectLicensesRequest) ProtoMessage() {}

func (x *ListUserListDirectLicensesRequest) ProtoReflect() protoreflect.Message {
 mi := &file_google_ads_datamanager_v1_user_list_direct_license_service_proto_msgTypes[3]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo()
```

```
 == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use ListUserListDirectLicensesRequest.ProtoReflect.Descriptor instead.
func (*ListUserListDirectLicensesRequest) Descriptor() ([]byte, []int) {
 return file_google_ads_datamanager_v1_user_list_direct_license_service_proto_rawDescGZIP(), []int{3}
}

func (x *ListUserListDirectLicensesRequest) GetParent() string {
 if x != nil {
  return x.Parent
 }
 return ""
}

func (x *ListUserListDirectLicensesRequest) GetFilter() string {
 if x != nil {
  return x.Filter
 }
 return ""
}

func (x *ListUserListDirectLicensesRequest) GetPageSize() int32 {
 if x != nil {
  return x.PageSize
 }
 return 0
}

func (x *ListUserListDirectLicensesRequest) GetPageToken() string {
 if x != nil {
  return x.PageToken
 }
 return ""
}

// Response from the
// [ListUserListDirectLicensesRequest][google.ads.datamanager.v1.ListUserListDirectLicensesRequest].
type ListUserListDirectLicensesResponse struct
 {
 state protoimpl.MessageState `protogen:"open.v1"`
 // The licenses for the given user list in the request.
 UserListDirectLicenses []*UserListDirectLicense
```

```
`protobuf:"bytes,1,rep,name=user_list_direct_licenses,json=userListDirectLicenses,proto3"
json:"user_list_direct_licenses,omitempty"`
 // A token, which can be sent as `page_token` to retrieve the next page.
 // If this field is omitted, there are no subsequent pages.
 NextPageToken string `protobuf:"bytes,2,opt,name=next_page_token,json=nextPageToken,proto3"
json:"next_page_token,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *ListUserListDirectLicensesResponse) Reset() {
 *x = ListUserListDirectLicensesResponse{}
 mi := &file_google_ads_datamanager_v1_user_list_direct_license_service_proto_msgTypes[4]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *ListUserListDirectLicensesResponse) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func
 (*ListUserListDirectLicensesResponse) ProtoMessage() {}

func (x *ListUserListDirectLicensesResponse) ProtoReflect() protoreflect.Message {
 mi := &file_google_ads_datamanager_v1_user_list_direct_license_service_proto_msgTypes[4]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use ListUserListDirectLicensesResponse.ProtoReflect.Descriptor instead.
func (*ListUserListDirectLicensesResponse) Descriptor() ([]byte, []int) {
 return file_google_ads_datamanager_v1_user_list_direct_license_service_proto_rawDescGZIP(), []int{4}
}

func (x *ListUserListDirectLicensesResponse) GetUserListDirectLicenses() []*UserListDirectLicense {
 if x != nil {
  return x.UserListDirectLicenses
 }
 return nil
}
```

```
func (x *ListUserListDirectLicensesResponse) GetNextPageToken() string {
 if x != nil {
  return x.NextPageToken
 }
 return ""
}

var File_google_ads_datamanager_v1_user_list_direct_license_service_proto
 protoreflect.FileDescriptor

const file_google_ads_datamanager_v1_user_list_direct_license_service_proto_rawDesc = "" +
 "\n" +
"@google/ads/datamanager/v1/user_list_direct_license_service.proto\x12\x19google.ads.datamanager.v1\x1a8googl
e/ads/datamanager/v1/user_list_direct_license.proto\x1a\x1cgoogle/api/annotations.proto\x1a\x17google/api/client.p
roto\x1a\x1fgoogle/api/field_behavior.proto\x1a\x19google/api/resource.proto\x1a
google/protobuf/field_mask.proto\"\xe6\x01\n" +
 "\"CreateUserListDirectLicenseRequest\x12P\n" +
 "\x06parent\x18\x01
\x01(\tB8\xe0A\x02\xfaA2\x120datamanager.googleapis.com/UserListDirectLicenseR\x06parent\x12n\n" +
 "\x18user_list_direct_license\x18\x02
\x01(\v20.google.ads.datamanager.v1.UserListDirectLicenseB\x03\xe0A\x02R\x15userListDirectLicense\"o\n" +
 "\x1fGetUserListDirectLicenseRequest\x12L\n" +
 "\x04name\x18\x01 \x01(\tB8\xe0A\x02\xfaA2\n" +
 "0datamanager.googleapis.com/UserListDirectLicenseR\x04name\"\xd6\x01\n"
 +
 "\"UpdateUserListDirectLicenseRequest\x12n\n" +
 "\x18user_list_direct_license\x18\x01
\x01(\v20.google.ads.datamanager.v1.UserListDirectLicenseB\x03\xe0A\x02R\x15userListDirectLicense\x12@\n"
+
 "\vupdate_mask\x18\x02 \x01(\v2\x1a.google.protobuf.FieldMaskB\x03\xe0A\x01R\n" +
 "updateMask\"\xd8\x01\n" +
 "!ListUserListDirectLicensesRequest\x12P\n" +
 "\x06parent\x18\x01
\x01(\tB8\xe0A\x02\xfaA2\x120datamanager.googleapis.com/UserListDirectLicenseR\x06parent\x12\x1b\n" +
 "\x06filter\x18\x02 \x01(\tB\x03\xe0A\x01R\x06filter\x12 \n" +
 "\tpage_size\x18\x03 \x01(\x05B\x03\xe0A\x01R\bpageSize\x12\"\n" +
 "\n" +
 "page_token\x18\x04 \x01(\tB\x03\xe0A\x01R\tpageToken\"\xb9\x01\n" +
 "\"ListUserListDirectLicensesResponse\x12k\n" +
 "\x19user_list_direct_licenses\x18\x01
\x03(\v20.google.ads.datamanager.v1.UserListDirectLicenseR\x16userListDirectLicenses\x12&\n" +
 "\x0fnext_page_token\x18\x02 \x01(\tR\rnextPageToken2\xf8\b\n" +
 "\x1cUserListDirectLicenseService\x12\x92\x02\n"
 +
"\x1bCreateUserListDirectLicense\x12=.google.ads.datamanager.v1.CreateUserListDirectLicenseRequest\x1a0.goo
gle.ads.datamanager.v1.UserListDirectLicense\"\x81\x01\xdaA\x1fparent,user_list_direct_license\x82\xd3\xe4\x93\
x02Y:\x18user_list_direct_license\"=/v1/{parent=accountTypes/*/accounts/*}/userListDirectLicenses\x12\xd6\x01\
n" +
```

```
"\x18GetUserListDirectLicense\x12:.google.ads.datamanager.v1.GetUserListDirectLicenseRequest\x1a0.google.ads
.datamanager.v1.UserListDirectLicense\"L\xdaA\x04name\x82\xd3\xe4\x93\x02?\x12=/v1/{name=accountTypes/*/
accounts/*/userListDirectLicenses/*}\x12\xb0\x02\n" +
"\x1bUpdateUserListDirectLicense\x12=.google.ads.datamanager.v1.UpdateUserListDirectLicenseRequest\x1a0.go
ogle.ads.datamanager.v1.UserListDirectLicense\"\x9f\x01\xdaA$user_list_direct_license,update_mask\x82\xd3\xe4\
x93\x02r:\x18user_list_direct_license2V/v1/{user_list_direct_license.name=accountTypes/*/accounts/*/userListDir
ectLicenses/*}\x12\xe9\x01\n" +
"\x1aListUserListDirectLicenses\x12<.google.ads.datamanager.v1.ListUserListDirectLicensesRequest\x1a=.google.
ads.datamanager.v1.ListUserListDirectLicensesResponse\"N\xdaA\x06parent\x82\xd3\xe4\x93\x02?\x12=/v1/{pare
nt=accountTypes/*/accounts/*}/userListDirectLicenses\x1aK\xcaA\x1adatamanager.googleapis.com\xd2A+https://
www.googleapis.com/auth/datamanagerB\xde\x01\n"
 +
"\x1dcom.google.ads.datamanager.v1B!UserListDirectLicenseServiceProtoP\x01ZAcloud.google.com/go/datamana
ger/apiv1/datamanagerpb;datamanagerpb\xaa\x02\x19Google.Ads.DataManager.V1\xca\x02\x19Google\\Ads\\Data
Manager\\V1\xea\x02\x1cGoogle::Ads::DataManager::V1b\x06proto3"

var (
 file_google_ads_datamanager_v1_user_list_direct_license_service_proto_rawDescOnce sync.Once
 file_google_ads_datamanager_v1_user_list_direct_license_service_proto_rawDescData []byte
)

func file_google_ads_datamanager_v1_user_list_direct_license_service_proto_rawDescGZIP() []byte {
 file_google_ads_datamanager_v1_user_list_direct_license_service_proto_rawDescOnce.Do(func()
 {
  file_google_ads_datamanager_v1_user_list_direct_license_service_proto_rawDescData =
protoimpl.X.CompressGZIP(unsafe.Slice(unsafe.StringData(file_google_ads_datamanager_v1_user_list_direct_lice
nse_service_proto_rawDesc),
len(file_google_ads_datamanager_v1_user_list_direct_license_service_proto_rawDesc)))
 })
 return file_google_ads_datamanager_v1_user_list_direct_license_service_proto_rawDescData
}

var file_google_ads_datamanager_v1_user_list_direct_license_service_proto_msgTypes =
make([]protoimpl.MessageInfo, 5)
var file_google_ads_datamanager_v1_user_list_direct_license_service_proto_goTypes = []any{
 (*CreateUserListDirectLicenseRequest)(nil), // 0: google.ads.datamanager.v1.CreateUserListDirectLicenseRequest
 (*GetUserListDirectLicenseRequest)(nil),    // 1: google.ads.datamanager.v1.GetUserListDirectLicenseRequest
 (*UpdateUserListDirectLicenseRequest)(nil), // 2: google.ads.datamanager.v1.UpdateUserListDirectLicenseRequest
 (*ListUserListDirectLicensesRequest)(nil),
  // 3: google.ads.datamanager.v1.ListUserListDirectLicensesRequest
 (*ListUserListDirectLicensesResponse)(nil), // 4: google.ads.datamanager.v1.ListUserListDirectLicensesResponse
 (*UserListDirectLicense)(nil),              // 5: google.ads.datamanager.v1.UserListDirectLicense
 (*fieldmaskpb.FieldMask)(nil),              // 6: google.protobuf.FieldMask
}
var file_google_ads_datamanager_v1_user_list_direct_license_service_proto_depIdxs = []int32{
 5, // 0: google.ads.datamanager.v1.CreateUserListDirectLicenseRequest.user_list_direct_license:type_name ->
google.ads.datamanager.v1.UserListDirectLicense
 5, // 1: google.ads.datamanager.v1.UpdateUserListDirectLicenseRequest.user_list_direct_license:type_name ->
```

```
google.ads.datamanager.v1.UserListDirectLicense
 6, // 2: google.ads.datamanager.v1.UpdateUserListDirectLicenseRequest.update_mask:type_name ->
google.protobuf.FieldMask
 5, // 3: google.ads.datamanager.v1.ListUserListDirectLicensesResponse.user_list_direct_licenses:type_name ->
google.ads.datamanager.v1.UserListDirectLicense
 0,
 // 4: google.ads.datamanager.v1.UserListDirectLicenseService.CreateUserListDirectLicense:input_type ->
google.ads.datamanager.v1.CreateUserListDirectLicenseRequest
 1, // 5: google.ads.datamanager.v1.UserListDirectLicenseService.GetUserListDirectLicense:input_type ->
google.ads.datamanager.v1.GetUserListDirectLicenseRequest
 2, // 6: google.ads.datamanager.v1.UserListDirectLicenseService.UpdateUserListDirectLicense:input_type ->
google.ads.datamanager.v1.UpdateUserListDirectLicenseRequest
 3, // 7: google.ads.datamanager.v1.UserListDirectLicenseService.ListUserListDirectLicenses:input_type ->
google.ads.datamanager.v1.ListUserListDirectLicensesRequest
 5, // 8: google.ads.datamanager.v1.UserListDirectLicenseService.CreateUserListDirectLicense:output_type ->
google.ads.datamanager.v1.UserListDirectLicense
 5, // 9: google.ads.datamanager.v1.UserListDirectLicenseService.GetUserListDirectLicense:output_type ->
google.ads.datamanager.v1.UserListDirectLicense
 5,
 // 10: google.ads.datamanager.v1.UserListDirectLicenseService.UpdateUserListDirectLicense:output_type ->
google.ads.datamanager.v1.UserListDirectLicense
 4, // 11: google.ads.datamanager.v1.UserListDirectLicenseService.ListUserListDirectLicenses:output_type ->
google.ads.datamanager.v1.ListUserListDirectLicensesResponse
 8, // [8:12] is the sub-list for method output_type
 4, // [4:8] is the sub-list for method input_type
 4, // [4:4] is the sub-list for extension type_name
 4, // [4:4] is the sub-list for extension extendee
 0, // [0:4] is the sub-list for field type_name
}

func init() { file_google_ads_datamanager_v1_user_list_direct_license_service_proto_init() }
func file_google_ads_datamanager_v1_user_list_direct_license_service_proto_init() {
 if File_google_ads_datamanager_v1_user_list_direct_license_service_proto != nil {
  return
 }
 file_google_ads_datamanager_v1_user_list_direct_license_proto_init()
 type x struct{}
 out := protoimpl.TypeBuilder{
  File:
 protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor:
unsafe.Slice(unsafe.StringData(file_google_ads_datamanager_v1_user_list_direct_license_service_proto_rawDesc),
len(file_google_ads_datamanager_v1_user_list_direct_license_service_proto_rawDesc)),
   NumEnums:      0,
   NumMessages:   5,
   NumExtensions: 0,
   NumServices:   1,
```

```
 },
 GoTypes:          file_google_ads_datamanager_v1_user_list_direct_license_service_proto_goTypes,
 DependencyIndexes: file_google_ads_datamanager_v1_user_list_direct_license_service_proto_depIdxs,
 MessageInfos:      file_google_ads_datamanager_v1_user_list_direct_license_service_proto_msgTypes,
}.Build()
File_google_ads_datamanager_v1_user_list_direct_license_service_proto = out.File
file_google_ads_datamanager_v1_user_list_direct_license_service_proto_goTypes = nil
file_google_ads_datamanager_v1_user_list_direct_license_service_proto_depIdxs = nil
}
```

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// Code generated by protoc-gen-go-grpc. DO NOT EDIT.
// versions:
// - protoc-gen-go-grpc v1.3.0
// - protoc             v6.31.0
// source: google/ads/datamanager/v1/user_list_direct_license_service.proto

package datamanagerpb
```

```
import (
 context "context"

 grpc "google.golang.org/grpc"
 codes "google.golang.org/grpc/codes"
 status "google.golang.org/grpc/status"
)

// This is a compile-time assertion to ensure
 that this generated file
// is compatible with the grpc package it is being compiled against.
// Requires gRPC-Go v1.32.0 or later.
const _ = grpc.SupportPackageIsVersion7

const (
 UserListDirectLicenseService_CreateUserListDirectLicense_FullMethodName =
"/google.ads.datamanager.v1.UserListDirectLicenseService/CreateUserListDirectLicense"
 UserListDirectLicenseService_GetUserListDirectLicense_FullMethodName    =
"/google.ads.datamanager.v1.UserListDirectLicenseService/GetUserListDirectLicense"
 UserListDirectLicenseService_UpdateUserListDirectLicense_FullMethodName =
"/google.ads.datamanager.v1.UserListDirectLicenseService/UpdateUserListDirectLicense"
 UserListDirectLicenseService_ListUserListDirectLicenses_FullMethodName  =
"/google.ads.datamanager.v1.UserListDirectLicenseService/ListUserListDirectLicenses"
)

// UserListDirectLicenseServiceClient is the client API for UserListDirectLicenseService service.
//
// For semantics around ctx use and closing/ending streaming RPCs, please
 refer to https://pkg.go.dev/google.golang.org/grpc/?tab=doc#ClientConn.NewStream.
type UserListDirectLicenseServiceClient interface {
 // Creates a user list direct license.
 //
 // This feature is only available to data partners.
 CreateUserListDirectLicense(ctx context.Context, in *CreateUserListDirectLicenseRequest, opts ...grpc.CallOption)
(*UserListDirectLicense, error)
 // Retrieves a user list direct license.
 //
 // This feature is only available to data partners.
 GetUserListDirectLicense(ctx context.Context, in *GetUserListDirectLicenseRequest, opts ...grpc.CallOption)
(*UserListDirectLicense, error)
 // Updates a user list direct license.
 //
 // This feature is only available to data partners.
 UpdateUserListDirectLicense(ctx context.Context, in *UpdateUserListDirectLicenseRequest, opts
...grpc.CallOption) (*UserListDirectLicense, error)
 // Lists all user list direct licenses owned by the parent account.
 //
 // This feature is only available to data partners.
```

```
 ListUserListDirectLicenses(ctx
 context.Context, in *ListUserListDirectLicensesRequest, opts ...grpc.CallOption)
(*ListUserListDirectLicensesResponse, error)
}

type userListDirectLicenseServiceClient struct {
 cc grpc.ClientConnInterface
}

func NewUserListDirectLicenseServiceClient(cc grpc.ClientConnInterface) UserListDirectLicenseServiceClient {
 return &userListDirectLicenseServiceClient{cc}
}

func (c *userListDirectLicenseServiceClient) CreateUserListDirectLicense(ctx context.Context, in
*CreateUserListDirectLicenseRequest, opts ...grpc.CallOption) (*UserListDirectLicense, error) {
 out := new(UserListDirectLicense)
 err := c.cc.Invoke(ctx, UserListDirectLicenseService_CreateUserListDirectLicense_FullMethodName, in, out,
opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

func (c *userListDirectLicenseServiceClient) GetUserListDirectLicense(ctx context.Context, in
*GetUserListDirectLicenseRequest, opts ...grpc.CallOption) (*UserListDirectLicense, error) {
 out := new(UserListDirectLicense)
 err
 := c.cc.Invoke(ctx, UserListDirectLicenseService_GetUserListDirectLicense_FullMethodName, in, out, opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

func (c *userListDirectLicenseServiceClient) UpdateUserListDirectLicense(ctx context.Context, in
*UpdateUserListDirectLicenseRequest, opts ...grpc.CallOption) (*UserListDirectLicense, error) {
 out := new(UserListDirectLicense)
 err := c.cc.Invoke(ctx, UserListDirectLicenseService_UpdateUserListDirectLicense_FullMethodName, in, out,
opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

func (c *userListDirectLicenseServiceClient) ListUserListDirectLicenses(ctx context.Context, in
*ListUserListDirectLicensesRequest, opts ...grpc.CallOption) (*ListUserListDirectLicensesResponse, error) {
```

```
 out := new(ListUserListDirectLicensesResponse)
 err := c.cc.Invoke(ctx, UserListDirectLicenseService_ListUserListDirectLicenses_FullMethodName, in, out, opts...)
 if err != nil {
  return nil, err
 }
 return
 out, nil
}

// UserListDirectLicenseServiceServer is the server API for UserListDirectLicenseService service.
// All implementations should embed UnimplementedUserListDirectLicenseServiceServer
// for forward compatibility
type UserListDirectLicenseServiceServer interface {
 // Creates a user list direct license.
 //
 // This feature is only available to data partners.
 CreateUserListDirectLicense(context.Context, *CreateUserListDirectLicenseRequest) (*UserListDirectLicense,
error)
 // Retrieves a user list direct license.
 //
 // This feature is only available to data partners.
 GetUserListDirectLicense(context.Context, *GetUserListDirectLicenseRequest) (*UserListDirectLicense, error)
 // Updates a user list direct license.
 //
 // This feature is only available to data partners.
 UpdateUserListDirectLicense(context.Context, *UpdateUserListDirectLicenseRequest) (*UserListDirectLicense,
error)
 // Lists all user list direct licenses owned by the parent account.
 //
 // This feature
 is only available to data partners.
 ListUserListDirectLicenses(context.Context, *ListUserListDirectLicensesRequest)
(*ListUserListDirectLicensesResponse, error)
}

// UnimplementedUserListDirectLicenseServiceServer should be embedded to have forward compatible
implementations.
type UnimplementedUserListDirectLicenseServiceServer struct {
}

func (UnimplementedUserListDirectLicenseServiceServer) CreateUserListDirectLicense(context.Context,
*CreateUserListDirectLicenseRequest) (*UserListDirectLicense, error) {
 return nil, status.Errorf(codes.Unimplemented, "method CreateUserListDirectLicense not implemented")
}
func (UnimplementedUserListDirectLicenseServiceServer) GetUserListDirectLicense(context.Context,
*GetUserListDirectLicenseRequest) (*UserListDirectLicense, error) {
 return nil, status.Errorf(codes.Unimplemented, "method GetUserListDirectLicense not implemented")
}
```

```
func (UnimplementedUserListDirectLicenseServiceServer) UpdateUserListDirectLicense(context.Context,
*UpdateUserListDirectLicenseRequest)
 (*UserListDirectLicense, error) {
 return nil, status.Errorf(codes.Unimplemented, "method UpdateUserListDirectLicense not implemented")
}
func (UnimplementedUserListDirectLicenseServiceServer) ListUserListDirectLicenses(context.Context,
*ListUserListDirectLicensesRequest) (*ListUserListDirectLicensesResponse, error) {
 return nil, status.Errorf(codes.Unimplemented, "method ListUserListDirectLicenses not implemented")
}

// UnsafeUserListDirectLicenseServiceServer may be embedded to opt out of forward compatibility for this service.
// Use of this interface is not recommended, as added methods to UserListDirectLicenseServiceServer will
// result in compilation errors.
type UnsafeUserListDirectLicenseServiceServer interface {
 mustEmbedUnimplementedUserListDirectLicenseServiceServer()
}

func RegisterUserListDirectLicenseServiceServer(s grpc.ServiceRegistrar, srv UserListDirectLicenseServiceServer)
{
 s.RegisterService(&UserListDirectLicenseService_ServiceDesc, srv)
}

func
 _UserListDirectLicenseService_CreateUserListDirectLicense_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(CreateUserListDirectLicenseRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(UserListDirectLicenseServiceServer).CreateUserListDirectLicense(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: UserListDirectLicenseService_CreateUserListDirectLicense_FullMethodName,
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(UserListDirectLicenseServiceServer).CreateUserListDirectLicense(ctx,
req.(*CreateUserListDirectLicenseRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _UserListDirectLicenseService_GetUserListDirectLicense_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{},
 error) {
 in := new(GetUserListDirectLicenseRequest)
 if err := dec(in); err != nil {
```

```
 return nil, err
 }
 if interceptor == nil {
  return srv.(UserListDirectLicenseServiceServer).GetUserListDirectLicense(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: UserListDirectLicenseService_GetUserListDirectLicense_FullMethodName,
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(UserListDirectLicenseServiceServer).GetUserListDirectLicense(ctx,
req.(*GetUserListDirectLicenseRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _UserListDirectLicenseService_UpdateUserListDirectLicense_Handler(srv interface{}, ctx context.Context,
dec func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(UpdateUserListDirectLicenseRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(UserListDirectLicenseServiceServer).UpdateUserListDirectLicense(ctx,
 in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: UserListDirectLicenseService_UpdateUserListDirectLicense_FullMethodName,
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(UserListDirectLicenseServiceServer).UpdateUserListDirectLicense(ctx,
req.(*UpdateUserListDirectLicenseRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _UserListDirectLicenseService_ListUserListDirectLicenses_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(ListUserListDirectLicensesRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(UserListDirectLicenseServiceServer).ListUserListDirectLicenses(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
```

```
  FullMethod: UserListDirectLicenseService_ListUserListDirectLicenses_FullMethodName,
 }
 handler := func(ctx
 context.Context, req interface{}) (interface{}, error) {
  return srv.(UserListDirectLicenseServiceServer).ListUserListDirectLicenses(ctx,
req.(*ListUserListDirectLicensesRequest))
 }
 return interceptor(ctx, in, info, handler)
}

// UserListDirectLicenseService_ServiceDesc is the grpc.ServiceDesc for UserListDirectLicenseService service.
// It's only intended for direct use with grpc.RegisterService,
// and not to be introspected or modified (even as a copy)
var UserListDirectLicenseService_ServiceDesc = grpc.ServiceDesc{
 ServiceName: "google.ads.datamanager.v1.UserListDirectLicenseService",
 HandlerType: (*UserListDirectLicenseServiceServer)(nil),
 Methods: []grpc.MethodDesc{
  {
   MethodName: "CreateUserListDirectLicense",
   Handler:    _UserListDirectLicenseService_CreateUserListDirectLicense_Handler,
  },
  {
   MethodName: "GetUserListDirectLicense",
   Handler:    _UserListDirectLicenseService_GetUserListDirectLicense_Handler,
  },
  {
   MethodName: "UpdateUserListDirectLicense",
   Handler:
    _UserListDirectLicenseService_UpdateUserListDirectLicense_Handler,
  },
  {
   MethodName: "ListUserListDirectLicenses",
   Handler:    _UserListDirectLicenseService_ListUserListDirectLicenses_Handler,
  },
 },
 Streams:  []grpc.StreamDesc{},
 Metadata: "google/ads/datamanager/v1/user_list_direct_license_service.proto",
}
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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.36.11
//  protoc        v6.31.0
// source: google/cloud/discoveryengine/v1/user_license.proto

package discoveryenginepb

import (
 reflect "reflect"
 sync "sync"
 unsafe "unsafe"

 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
 timestamppb
 "google.golang.org/protobuf/types/known/timestamppb"
)

const (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// License assignment state enumeration.
type UserLicense_LicenseAssignmentState int32

const (
 // Default value.
 UserLicense_LICENSE_ASSIGNMENT_STATE_UNSPECIFIED UserLicense_LicenseAssignmentState = 0
 // License assigned to the user.
 UserLicense_ASSIGNED UserLicense_LicenseAssignmentState = 1
 // No license assigned to the user.
 // Deprecated, translated to NO_LICENSE.
 UserLicense_UNASSIGNED UserLicense_LicenseAssignmentState = 2
 // No license assigned to the user.
 UserLicense_NO_LICENSE UserLicense_LicenseAssignmentState = 3
 // User attempted to login but no license assigned to the user.
 // This state is only used for no user first
 time login attempt but cannot
 // get license assigned.
```

```
 // Users already logged in but cannot get license assigned will be assigned
 // NO_LICENSE state(License could be unassigned by admin).
 UserLicense_NO_LICENSE_ATTEMPTED_LOGIN UserLicense_LicenseAssignmentState = 4
)

// Enum value maps for UserLicense_LicenseAssignmentState.
var (
 UserLicense_LicenseAssignmentState_name = map[int32]string{
  0: "LICENSE_ASSIGNMENT_STATE_UNSPECIFIED",
  1: "ASSIGNED",
  2: "UNASSIGNED",
  3: "NO_LICENSE",
  4: "NO_LICENSE_ATTEMPTED_LOGIN",
 }
 UserLicense_LicenseAssignmentState_value = map[string]int32{
  "LICENSE_ASSIGNMENT_STATE_UNSPECIFIED": 0,
  "ASSIGNED":                             1,
  "UNASSIGNED":                           2,
  "NO_LICENSE":                           3,
  "NO_LICENSE_ATTEMPTED_LOGIN":           4,
 }
)

func (x UserLicense_LicenseAssignmentState) Enum() *UserLicense_LicenseAssignmentState {
 p := new(UserLicense_LicenseAssignmentState)
 *p = x
 return p
}

func (x
 UserLicense_LicenseAssignmentState) String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (UserLicense_LicenseAssignmentState) Descriptor() protoreflect.EnumDescriptor {
 return file_google_cloud_discoveryengine_v1_user_license_proto_enumTypes[0].Descriptor()
}

func (UserLicense_LicenseAssignmentState) Type() protoreflect.EnumType {
 return &file_google_cloud_discoveryengine_v1_user_license_proto_enumTypes[0]
}

func (x UserLicense_LicenseAssignmentState) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use UserLicense_LicenseAssignmentState.Descriptor instead.
func (UserLicense_LicenseAssignmentState) EnumDescriptor() ([]byte, []int) {
```

```
 return file_google_cloud_discoveryengine_v1_user_license_proto_rawDescGZIP(), []int{0, 0}
}

// User License information assigned by the admin.
type UserLicense struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Required. Immutable. The user principal
 of the User, could be email address
 // or other prinical identifier. This field is immutable. Admin assign
 // licenses based on the user principal.
 UserPrincipal string `protobuf:"bytes,1,opt,name=user_principal,json=userPrincipal,proto3"
json:"user_principal,omitempty"`
 // Optional. The user profile.
 // We user user full name(First name + Last name) as user profile.
 UserProfile string `protobuf:"bytes,3,opt,name=user_profile,json=userProfile,proto3"
json:"user_profile,omitempty"`
 // Output only. License assignment state of the user.
 // If the user is assigned with a license config, the user loggin will be
 // assigned with the license;
 // If the user's license assignment state is unassigned or unspecified, no
 // license config will be associated to the user;
 LicenseAssignmentState UserLicense_LicenseAssignmentState
`protobuf:"varint,4,opt,name=license_assignment_state,json=licenseAssignmentState,proto3,enum=google.cloud.dis
coveryengine.v1.UserLicense_LicenseAssignmentState"
 json:"license_assignment_state,omitempty"`
 // Optional. The full resource name of the Subscription(LicenseConfig)
 // assigned to the user.
 LicenseConfig string `protobuf:"bytes,5,opt,name=license_config,json=licenseConfig,proto3"
json:"license_config,omitempty"`
 // Output only. User created timestamp.
 CreateTime *timestamppb.Timestamp `protobuf:"bytes,6,opt,name=create_time,json=createTime,proto3"
json:"create_time,omitempty"`
 // Output only. User update timestamp.
 UpdateTime *timestamppb.Timestamp `protobuf:"bytes,7,opt,name=update_time,json=updateTime,proto3"
json:"update_time,omitempty"`
 // Output only. User last logged in time.
 // If the user has not logged in yet, this field will be empty.
 LastLoginTime *timestamppb.Timestamp
`protobuf:"bytes,8,opt,name=last_login_time,json=lastLoginTime,proto3" json:"last_login_time,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *UserLicense) Reset() {
 *x = UserLicense{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_proto_msgTypes[0]
 ms
```

```
 := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *UserLicense) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UserLicense) ProtoMessage() {}

func (x *UserLicense) ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use UserLicense.ProtoReflect.Descriptor instead.
func (*UserLicense) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_proto_rawDescGZIP(), []int{0}
}

func (x *UserLicense) GetUserPrincipal() string {
 if x != nil {
  return x.UserPrincipal
 }
 return ""
}

func (x *UserLicense) GetUserProfile() string {
 if x != nil {
  return x.UserProfile
 }
 return ""
}

func
 (x *UserLicense) GetLicenseAssignmentState() UserLicense_LicenseAssignmentState {
 if x != nil {
  return x.LicenseAssignmentState
 }
 return UserLicense_LICENSE_ASSIGNMENT_STATE_UNSPECIFIED
}
```

```
func (x *UserLicense) GetLicenseConfig() string {
 if x != nil {
  return x.LicenseConfig
 }
 return ""
}

func (x *UserLicense) GetCreateTime() *timestamppb.Timestamp {
 if x != nil {
  return x.CreateTime
 }
 return nil
}

func (x *UserLicense) GetUpdateTime() *timestamppb.Timestamp {
 if x != nil {
  return x.UpdateTime
 }
 return nil
}

func (x *UserLicense) GetLastLoginTime() *timestamppb.Timestamp {
 if x != nil {
  return x.LastLoginTime
 }
 return nil
}

var File_google_cloud_discoveryengine_v1_user_license_proto protoreflect.FileDescriptor

const file_google_cloud_discoveryengine_v1_user_license_proto_rawDesc = "" +
 "\n" +
"2google/cloud/discoveryengine/v1/user_license.proto\x12\x1fgoogle.cloud.discoveryengine.v1\x1a\x1fgoogle/api/f
ield_behavior.proto\x1a\x19google/api/resource.proto\x1a\x1fgoogle/protobuf/timestamp.proto\"\xa6\x05\n"
 +
 "\vUserLicense\x12-\n" +
 "\x0euser_principal\x18\x01 \x01(\tB\x06\xe0A\x05\xe0A\x02R\ruserPrincipal\x12&\n" +
 "\fuser_profile\x18\x03 \x01(\tB\x03\xe0A\x01R\vuserProfile\x12\x82\x01\n" +
 "\x18license_assignment_state\x18\x04
\x01(\x0e2C.google.cloud.discoveryengine.v1.UserLicense.LicenseAssignmentStateB\x03\xe0A\x03R\x16licenseA
ssignmentState\x12[\n" +
 "\x0elicense_config\x18\x05 \x01(\tB4\xe0A\x01\xfaA.\n" +
 ",discoveryengine.googleapis.com/LicenseConfigR\rlicenseConfig\x12@\n" +
 "\vcreate_time\x18\x06 \x01(\v2\x1a.google.protobuf.TimestampB\x03\xe0A\x03R\n" +
 "createTime\x12@\n" +
 "\vupdate_time\x18\a \x01(\v2\x1a.google.protobuf.TimestampB\x03\xe0A\x03R\n" +
 "updateTime\x12G\n" +
```

```
 "\x0flast_login_time\x18\b
\x01(\v2\x1a.google.protobuf.TimestampB\x03\xe0A\x03R\rlastLoginTime\"\x90\x01\n" +
 "\x16LicenseAssignmentState\x12(\n" +
 "$LICENSE_ASSIGNMENT_STATE_UNSPECIFIED\x10\x00\x12\f\n" +
 "\bASSIGNED\x10\x01\x12\x0e\n"
 +
 "\n" +
 "UNASSIGNED\x10\x02\x12\x0e\n" +
 "\n" +
 "NO_LICENSE\x10\x03\x12\x1e\n" +
 "\x1aNO_LICENSE_ATTEMPTED_LOGIN\x10\x04B\x83\x02\n" +
"#com.google.cloud.discoveryengine.v1B\x10UserLicenseProtoP\x01ZMcloud.google.com/go/discoveryengine/api
v1/discoveryenginepb;discoveryenginepb\xa2\x02\x0fDISCOVERYENGINE\xaa\x02\x1fGoogle.Cloud.Discovery
Engine.V1\xca\x02\x1fGoogle\\Cloud\\DiscoveryEngine\\V1\xea\x02\"Google::Cloud::DiscoveryEngine::V1b\x06p
roto3"

var (
 file_google_cloud_discoveryengine_v1_user_license_proto_rawDescOnce sync.Once
 file_google_cloud_discoveryengine_v1_user_license_proto_rawDescData []byte
)

func file_google_cloud_discoveryengine_v1_user_license_proto_rawDescGZIP() []byte {
 file_google_cloud_discoveryengine_v1_user_license_proto_rawDescOnce.Do(func() {
  file_google_cloud_discoveryengine_v1_user_license_proto_rawDescData =
protoimpl.X.CompressGZIP(unsafe.Slice(unsafe.StringData(file_google_cloud_discoveryengine_v1_user_license_p
roto_rawDesc), len(file_google_cloud_discoveryengine_v1_user_license_proto_rawDesc)))
 })
 return
 file_google_cloud_discoveryengine_v1_user_license_proto_rawDescData
}

var file_google_cloud_discoveryengine_v1_user_license_proto_enumTypes = make([]protoimpl.EnumInfo, 1)
var file_google_cloud_discoveryengine_v1_user_license_proto_msgTypes = make([]protoimpl.MessageInfo, 1)
var file_google_cloud_discoveryengine_v1_user_license_proto_goTypes = []any{
 (UserLicense_LicenseAssignmentState)(0), // 0:
google.cloud.discoveryengine.v1.UserLicense.LicenseAssignmentState
 (*UserLicense)(nil),                    // 1: google.cloud.discoveryengine.v1.UserLicense
 (*timestamppb.Timestamp)(nil),          // 2: google.protobuf.Timestamp
}
var file_google_cloud_discoveryengine_v1_user_license_proto_depIdxs = []int32{
 0, // 0: google.cloud.discoveryengine.v1.UserLicense.license_assignment_state:type_name ->
google.cloud.discoveryengine.v1.UserLicense.LicenseAssignmentState
 2, // 1: google.cloud.discoveryengine.v1.UserLicense.create_time:type_name
 -> google.protobuf.Timestamp
 2, // 2: google.cloud.discoveryengine.v1.UserLicense.update_time:type_name -> google.protobuf.Timestamp
 2, // 3: google.cloud.discoveryengine.v1.UserLicense.last_login_time:type_name -> google.protobuf.Timestamp
 4, // [4:4] is the sub-list for method output_type
 4, // [4:4] is the sub-list for method input_type
```

```
 4, // [4:4] is the sub-list for extension type_name
 4, // [4:4] is the sub-list for extension extendee
 0, // [0:4] is the sub-list for field type_name
}

func init() { file_google_cloud_discoveryengine_v1_user_license_proto_init() }
func file_google_cloud_discoveryengine_v1_user_license_proto_init() {
 if File_google_cloud_discoveryengine_v1_user_license_proto != nil {
  return
 }
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor:
unsafe.Slice(unsafe.StringData(file_google_cloud_discoveryengine_v1_user_license_proto_rawDesc),
len(file_google_cloud_discoveryengine_v1_user_license_proto_rawDesc)),
   NumEnums:
     1,
   NumMessages:   1,
   NumExtensions: 0,
   NumServices:   0,
  },
  GoTypes:          file_google_cloud_discoveryengine_v1_user_license_proto_goTypes,
  DependencyIndexes: file_google_cloud_discoveryengine_v1_user_license_proto_depIdxs,
  EnumInfos:         file_google_cloud_discoveryengine_v1_user_license_proto_enumTypes,
  MessageInfos:      file_google_cloud_discoveryengine_v1_user_license_proto_msgTypes,
 }.Build()
 File_google_cloud_discoveryengine_v1_user_license_proto = out.File
 file_google_cloud_discoveryengine_v1_user_license_proto_goTypes = nil
 file_google_cloud_discoveryengine_v1_user_license_proto_depIdxs = nil
}
// Copyright 2026 Google LLC
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// you may not use this file except in compliance with the License.
// You may obtain a copy of the License at
//
//     https://www.apache.org/licenses/LICENSE-2.0
//
// Unless required by applicable law or agreed to in writing, software
// distributed under the License is distributed on an "AS IS" BASIS,
// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
// See the License for the specific language governing permissions and
// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.
```

```
package licensemanager

import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
 "math"
 "net/http"
 "net/url"
 "time"

 licensemanagerpb "cloud.google.com/go/licensemanager/apiv1/licensemanagerpb"
 "cloud.google.com/go/longrunning"
 lroauto "cloud.google.com/go/longrunning/autogen"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 gax "github.com/googleapis/gax-go/v2"
 "github.com/googleapis/gax-go/v2/callctx"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 gtransport
 "google.golang.org/api/transport/grpc"
 httptransport "google.golang.org/api/transport/http"
 locationpb "google.golang.org/genproto/googleapis/cloud/location"
 "google.golang.org/grpc"
 "google.golang.org/grpc/codes"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var newClientHook clientHook

// CallOptions contains the retry settings for each method of Client.
type CallOptions struct {
 ListConfigurations            []gax.CallOption
 GetConfiguration              []gax.CallOption
 CreateConfiguration           []gax.CallOption
 UpdateConfiguration           []gax.CallOption
 DeleteConfiguration           []gax.CallOption
 ListInstances                 []gax.CallOption
 GetInstance                   []gax.CallOption
 DeactivateConfiguration
     []gax.CallOption
 ReactivateConfiguration       []gax.CallOption
 QueryConfigurationLicenseUsage []gax.CallOption
 AggregateUsage                []gax.CallOption
 ListProducts                  []gax.CallOption
```

```
 GetProduct                  []gax.CallOption
 GetLocation                 []gax.CallOption
 ListLocations               []gax.CallOption
 CancelOperation             []gax.CallOption
 DeleteOperation             []gax.CallOption
 GetOperation                []gax.CallOption
 ListOperations              []gax.CallOption
}

func defaultGRPCClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("licensemanager.googleapis.com:443"),
  internaloption.WithDefaultEndpointTemplate("licensemanager.UNIVERSE_DOMAIN:443"),
  internaloption.WithDefaultMTLSEndpoint("licensemanager.mtls.googleapis.com:443"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://licensemanager.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableJwtWithScope(),
  internaloption.EnableNewAuthLibrary(),
  option.WithGRPCDialOption(grpc.WithDefaultCallOptions(
   grpc.MaxCallRecvMsgSize(math.MaxInt32))),
 }
}

func
 defaultCallOptions() *CallOptions {
 return &CallOptions{
  ListConfigurations: []gax.CallOption{
   gax.WithTimeout(60000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnCodes([]codes.Code{
     codes.Unavailable,
    }, gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        10000 * time.Millisecond,
     Multiplier: 1.30,
    })
   }),
  },
  GetConfiguration: []gax.CallOption{
   gax.WithTimeout(60000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnCodes([]codes.Code{
     codes.Unavailable,
    }, gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        10000 * time.Millisecond,
     Multiplier: 1.30,
```

```
  })
 }),
},
CreateConfiguration:
[]gax.CallOption{
 gax.WithTimeout(60000 * time.Millisecond),
},
UpdateConfiguration: []gax.CallOption{
 gax.WithTimeout(60000 * time.Millisecond),
},
DeleteConfiguration: []gax.CallOption{
 gax.WithTimeout(60000 * time.Millisecond),
},
ListInstances: []gax.CallOption{
 gax.WithTimeout(60000 * time.Millisecond),
 gax.WithRetry(func() gax.Retryer {
  return gax.OnCodes([]codes.Code{
   codes.Unavailable,
  }, gax.Backoff{
   Initial:    1000 * time.Millisecond,
   Max:        10000 * time.Millisecond,
   Multiplier: 1.30,
  })
 }),
},
GetInstance: []gax.CallOption{
 gax.WithTimeout(60000 * time.Millisecond),
 gax.WithRetry(func() gax.Retryer {
  return gax.OnCodes([]codes.Code{
   codes.Unavailable,
  }, gax.Backoff{
   Initial:    1000 * time.Millisecond,
   Max:        10000 * time.Millisecond,
   Multiplier: 1.30,
  })
 }),
},
DeactivateConfiguration: []gax.CallOption{},
ReactivateConfiguration:
[]gax.CallOption{},
QueryConfigurationLicenseUsage: []gax.CallOption{
 gax.WithTimeout(60000 * time.Millisecond),
 gax.WithRetry(func() gax.Retryer {
  return gax.OnCodes([]codes.Code{
   codes.Unavailable,
  }, gax.Backoff{
   Initial:    1000 * time.Millisecond,
   Max:        10000 * time.Millisecond,
```

```
    Multiplier: 1.30,
   })
  }),
 },
 AggregateUsage: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
 },
 ListProducts: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnCodes([]codes.Code{
    codes.Unavailable,
   }, gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   })
  }),
 },
 GetProduct: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnCodes([]codes.Code{
    codes.Unavailable,
   }, gax.Backoff{
    Initial:
  1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   })
  }),
 },
 GetLocation:     []gax.CallOption{},
 ListLocations:   []gax.CallOption{},
 CancelOperation: []gax.CallOption{},
 DeleteOperation: []gax.CallOption{},
 GetOperation:    []gax.CallOption{},
 ListOperations:  []gax.CallOption{},
}
}

func defaultRESTCallOptions() *CallOptions {
 return &CallOptions{
  ListConfigurations: []gax.CallOption{
   gax.WithTimeout(60000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    1000 * time.Millisecond,
```

```
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusServiceUnavailable)
  }),
 },
 GetConfiguration: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier:
1.30,
   },
    http.StatusServiceUnavailable)
  }),
 },
 CreateConfiguration: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
 },
 UpdateConfiguration: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
 },
 DeleteConfiguration: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
 },
 ListInstances: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusServiceUnavailable)
  }),
 },
 GetInstance: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusServiceUnavailable)
  }),
```

```
 },
 DeactivateConfiguration:
[]gax.CallOption{},
 ReactivateConfiguration: []gax.CallOption{},
 QueryConfigurationLicenseUsage: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusServiceUnavailable)
  }),
 },
 AggregateUsage: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
 },
 ListProducts: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusServiceUnavailable)
  }),
 },
 GetProduct: []gax.CallOption{
  gax.WithTimeout(60000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:
   1000 * time.Millisecond,
    Max:        10000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusServiceUnavailable)
  }),
 },
 GetLocation:     []gax.CallOption{},
 ListLocations:   []gax.CallOption{},
 CancelOperation: []gax.CallOption{},
 DeleteOperation: []gax.CallOption{},
 GetOperation:    []gax.CallOption{},
 ListOperations:  []gax.CallOption{},
}
```

```
}

// internalClient is an interface that defines the methods available from License Manager API.
type internalClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 ListConfigurations(context.Context, *licensemanagerpb.ListConfigurationsRequest, ...gax.CallOption)
*ConfigurationIterator
 GetConfiguration(context.Context, *licensemanagerpb.GetConfigurationRequest, ...gax.CallOption)
(*licensemanagerpb.Configuration, error)
 CreateConfiguration(context.Context, *licensemanagerpb.CreateConfigurationRequest, ...gax.CallOption)
(*CreateConfigurationOperation, error)
 CreateConfigurationOperation(name
 string) *CreateConfigurationOperation
 UpdateConfiguration(context.Context, *licensemanagerpb.UpdateConfigurationRequest, ...gax.CallOption)
(*UpdateConfigurationOperation, error)
 UpdateConfigurationOperation(name string) *UpdateConfigurationOperation
 DeleteConfiguration(context.Context, *licensemanagerpb.DeleteConfigurationRequest, ...gax.CallOption)
(*DeleteConfigurationOperation, error)
 DeleteConfigurationOperation(name string) *DeleteConfigurationOperation
 ListInstances(context.Context, *licensemanagerpb.ListInstancesRequest, ...gax.CallOption) *InstanceIterator
 GetInstance(context.Context, *licensemanagerpb.GetInstanceRequest, ...gax.CallOption)
(*licensemanagerpb.Instance, error)
 DeactivateConfiguration(context.Context, *licensemanagerpb.DeactivateConfigurationRequest, ...gax.CallOption)
(*DeactivateConfigurationOperation, error)
 DeactivateConfigurationOperation(name string) *DeactivateConfigurationOperation
 ReactivateConfiguration(context.Context,
 *licensemanagerpb.ReactivateConfigurationRequest, ...gax.CallOption) (*ReactivateConfigurationOperation, error)
 ReactivateConfigurationOperation(name string) *ReactivateConfigurationOperation
 QueryConfigurationLicenseUsage(context.Context, *licensemanagerpb.QueryConfigurationLicenseUsageRequest,
...gax.CallOption) (*licensemanagerpb.QueryConfigurationLicenseUsageResponse, error)
 AggregateUsage(context.Context, *licensemanagerpb.AggregateUsageRequest, ...gax.CallOption) *UsageIterator
 ListProducts(context.Context, *licensemanagerpb.ListProductsRequest, ...gax.CallOption) *ProductIterator
 GetProduct(context.Context, *licensemanagerpb.GetProductRequest, ...gax.CallOption)
(*licensemanagerpb.Product, error)
 GetLocation(context.Context, *locationpb.GetLocationRequest, ...gax.CallOption) (*locationpb.Location, error)
 ListLocations(context.Context, *locationpb.ListLocationsRequest, ...gax.CallOption) *LocationIterator
 CancelOperation(context.Context, *longrunningpb.CancelOperationRequest,
 ...gax.CallOption) error
 DeleteOperation(context.Context, *longrunningpb.DeleteOperationRequest, ...gax.CallOption) error
 GetOperation(context.Context, *longrunningpb.GetOperationRequest, ...gax.CallOption)
(*longrunningpb.Operation, error)
 ListOperations(context.Context, *longrunningpb.ListOperationsRequest, ...gax.CallOption) *OperationIterator
}

// Client is a client for interacting with License Manager API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
```

```
method calls.
//
// Service describing handlers for resources
type Client struct {
 // The internal transport-dependent client.
 internalClient internalClient

 // The call options for this service.
 CallOptions *CallOptions

 // LROClient is used internally to handle long-running operations.
 // It is exposed so that its CallOptions can be modified if required.
 // Users should not Close this client.
 LROClient *lroauto.OperationsClient
}

// Wrapper methods
 routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *Client) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *Client) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *Client) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// ListConfigurations lists Configurations in a given project and location.
func (c *Client) ListConfigurations(ctx context.Context, req *licensemanagerpb.ListConfigurationsRequest, opts
...gax.CallOption) *ConfigurationIterator {
 return
 c.internalClient.ListConfigurations(ctx, req, opts...)
}

// GetConfiguration gets details of a single Configuration.
```

```
func (c *Client) GetConfiguration(ctx context.Context, req *licensemanagerpb.GetConfigurationRequest, opts
...gax.CallOption) (*licensemanagerpb.Configuration, error) {
 return c.internalClient.GetConfiguration(ctx, req, opts...)
}

// CreateConfiguration creates a new Configuration in a given project and location.
func (c *Client) CreateConfiguration(ctx context.Context, req *licensemanagerpb.CreateConfigurationRequest, opts
...gax.CallOption) (*CreateConfigurationOperation, error) {
 return c.internalClient.CreateConfiguration(ctx, req, opts...)
}

// CreateConfigurationOperation returns a new CreateConfigurationOperation from a given name.
// The name must be that of a previously created CreateConfigurationOperation, possibly from a different process.
func (c *Client) CreateConfigurationOperation(name string) *CreateConfigurationOperation {
 return c.internalClient.CreateConfigurationOperation(name)
}

//
 UpdateConfiguration updates the parameters of a single Configuration.
func (c *Client) UpdateConfiguration(ctx context.Context, req *licensemanagerpb.UpdateConfigurationRequest,
opts ...gax.CallOption) (*UpdateConfigurationOperation, error) {
 return c.internalClient.UpdateConfiguration(ctx, req, opts...)
}

// UpdateConfigurationOperation returns a new UpdateConfigurationOperation from a given name.
// The name must be that of a previously created UpdateConfigurationOperation, possibly from a different process.
func (c *Client) UpdateConfigurationOperation(name string) *UpdateConfigurationOperation {
 return c.internalClient.UpdateConfigurationOperation(name)
}

// DeleteConfiguration deletes a single Configuration.
func (c *Client) DeleteConfiguration(ctx context.Context, req *licensemanagerpb.DeleteConfigurationRequest, opts
...gax.CallOption) (*DeleteConfigurationOperation, error) {
 return c.internalClient.DeleteConfiguration(ctx, req, opts...)
}

//
 DeleteConfigurationOperation returns a new DeleteConfigurationOperation from a given name.
// The name must be that of a previously created DeleteConfigurationOperation, possibly from a different process.
func (c *Client) DeleteConfigurationOperation(name string) *DeleteConfigurationOperation {
 return c.internalClient.DeleteConfigurationOperation(name)
}

// ListInstances lists Instances in a given project and location.
func (c *Client) ListInstances(ctx context.Context, req *licensemanagerpb.ListInstancesRequest, opts
...gax.CallOption) *InstanceIterator {
 return c.internalClient.ListInstances(ctx, req, opts...)
}
```

```
// GetInstance gets details of a single Instance.
func (c *Client) GetInstance(ctx context.Context, req *licensemanagerpb.GetInstanceRequest, opts
...gax.CallOption) (*licensemanagerpb.Instance, error) {
 return c.internalClient.GetInstance(ctx, req, opts...)
}

// DeactivateConfiguration deactivates the given configuration.
func (c *Client) DeactivateConfiguration(ctx
 context.Context, req *licensemanagerpb.DeactivateConfigurationRequest, opts ...gax.CallOption)
(*DeactivateConfigurationOperation, error) {
 return c.internalClient.DeactivateConfiguration(ctx, req, opts...)
}

// DeactivateConfigurationOperation returns a new DeactivateConfigurationOperation from a given name.
// The name must be that of a previously created DeactivateConfigurationOperation, possibly from a different
process.
func (c *Client) DeactivateConfigurationOperation(name string) *DeactivateConfigurationOperation {
 return c.internalClient.DeactivateConfigurationOperation(name)
}

// ReactivateConfiguration reactivates the given configuration.
func (c *Client) ReactivateConfiguration(ctx context.Context, req
*licensemanagerpb.ReactivateConfigurationRequest, opts ...gax.CallOption) (*ReactivateConfigurationOperation,
error) {
 return c.internalClient.ReactivateConfiguration(ctx, req, opts...)
}

// ReactivateConfigurationOperation returns a new ReactivateConfigurationOperation
 from a given name.
// The name must be that of a previously created ReactivateConfigurationOperation, possibly from a different
process.
func (c *Client) ReactivateConfigurationOperation(name string) *ReactivateConfigurationOperation {
 return c.internalClient.ReactivateConfigurationOperation(name)
}

// QueryConfigurationLicenseUsage license Usage information for a Configuration.
func (c *Client) QueryConfigurationLicenseUsage(ctx context.Context, req
*licensemanagerpb.QueryConfigurationLicenseUsageRequest, opts ...gax.CallOption)
(*licensemanagerpb.QueryConfigurationLicenseUsageResponse, error) {
 return c.internalClient.QueryConfigurationLicenseUsage(ctx, req, opts...)
}

// AggregateUsage aggregates Usage per Instance for a Configuration.
func (c *Client) AggregateUsage(ctx context.Context, req *licensemanagerpb.AggregateUsageRequest, opts
...gax.CallOption) *UsageIterator {
 return c.internalClient.AggregateUsage(ctx, req, opts...)
}
```

```
// ListProducts lists Products in a
 given project and location.
func (c *Client) ListProducts(ctx context.Context, req *licensemanagerpb.ListProductsRequest, opts
...gax.CallOption) *ProductIterator {
 return c.internalClient.ListProducts(ctx, req, opts...)
}

// GetProduct gets details of a single Product.
func (c *Client) GetProduct(ctx context.Context, req *licensemanagerpb.GetProductRequest, opts ...gax.CallOption)
(*licensemanagerpb.Product, error) {
 return c.internalClient.GetProduct(ctx, req, opts...)
}

// GetLocation gets information about a location.
func (c *Client) GetLocation(ctx context.Context, req *locationpb.GetLocationRequest, opts ...gax.CallOption)
(*locationpb.Location, error) {
 return c.internalClient.GetLocation(ctx, req, opts...)
}

// ListLocations lists information about the supported locations for this service.
func (c *Client) ListLocations(ctx context.Context, req *locationpb.ListLocationsRequest, opts ...gax.CallOption)
*LocationIterator {
 return c.internalClient.ListLocations(ctx, req,
 opts...)
}

// CancelOperation is a utility method from google.longrunning.Operations.
func (c *Client) CancelOperation(ctx context.Context, req *longrunningpb.CancelOperationRequest, opts
...gax.CallOption) error {
 return c.internalClient.CancelOperation(ctx, req, opts...)
}

// DeleteOperation is a utility method from google.longrunning.Operations.
func (c *Client) DeleteOperation(ctx context.Context, req *longrunningpb.DeleteOperationRequest, opts
...gax.CallOption) error {
 return c.internalClient.DeleteOperation(ctx, req, opts...)
}

// GetOperation is a utility method from google.longrunning.Operations.
func (c *Client) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest, opts
...gax.CallOption) (*longrunningpb.Operation, error) {
 return c.internalClient.GetOperation(ctx, req, opts...)
}

// ListOperations is a utility method from google.longrunning.Operations.
func (c *Client) ListOperations(ctx context.Context, req *longrunningpb.ListOperationsRequest, opts
```

```
 ...gax.CallOption) *OperationIterator {
 return c.internalClient.ListOperations(ctx, req, opts...)
}

// gRPCClient is a client for interacting with License Manager API over gRPC transport.
//
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type gRPCClient struct {
 // Connection pool of gRPC connections to the service.
 connPool gtransport.ConnPool

 // Points back to the CallOptions field of the containing Client
 CallOptions **CallOptions

 // The gRPC API client.
 client licensemanagerpb.LicenseManagerClient

 // LROClient is used internally to handle long-running operations.
 // It is exposed so that its CallOptions can be modified if required.
 // Users should not Close this client.
 LROClient **lroauto.OperationsClient

 operationsClient longrunningpb.OperationsClient

 locationsClient locationpb.LocationsClient

 // The x-goog-* metadata to be sent with each request.
 xGoogHeaders []string

 logger *slog.Logger
}

//
 NewClient creates a new license manager client based on gRPC.
// The returned client must be Closed when it is done being used to clean up its underlying connections.
//
// Service describing handlers for resources
func NewClient(ctx context.Context, opts ...option.ClientOption) (*Client, error) {
 clientOpts := defaultGRPCClientOptions()
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  clientOpts = append(clientOpts, internaloption.WithTelemetryAttributes(map[string]string{
   "gcp.client.service":  "licensemanager",
   "gcp.client.version":  getVersionClient(),
   "gcp.client.repo":     "googleapis/google-cloud-go",
   "gcp.client.artifact": "cloud.google.com/go/licensemanager/apiv1",
   "gcp.client.language": "go",
   "url.domain":          "licensemanager.googleapis.com",
```

```
 }))
}
if newClientHook != nil {
 hookOpts, err := newClientHook(ctx, clientHookParams{})
 if err != nil {
  return nil, err
 }
 clientOpts = append(clientOpts, hookOpts...)
}

connPool,
err := gtransport.DialPool(ctx, append(clientOpts, opts...)...)
if err != nil {
 return nil, err
}
client := Client{CallOptions: defaultCallOptions()}

c := &gRPCClient{
 connPool:         connPool,
 client:           licensemanagerpb.NewLicenseManagerClient(connPool),
 CallOptions:      &client.CallOptions,
 logger:           internaloption.GetLogger(opts),
 operationsClient: longrunningpb.NewOperationsClient(connPool),
 locationsClient:  locationpb.NewLocationsClient(connPool),
}
c.setGoogleClientInfo()
if gax.IsFeatureEnabled("METRICS") {
 metrics := gax.NewClientMetrics(
  gax.WithTelemetryLogger(c.logger),
  gax.WithTelemetryAttributes(map[string]string{
   gax.ClientService:  "licensemanager",
   gax.ClientVersion:  getVersionClient(),
   gax.ClientArtifact: "cloud.google.com/go/licensemanager/apiv1",
   gax.RPCSystem:      "grpc",
   gax.URLDomain:      "licensemanager.googleapis.com",
  }),
 )

 client.CallOptions.ListConfigurations
= append(client.CallOptions.ListConfigurations, gax.WithClientMetrics(metrics))
 client.CallOptions.GetConfiguration = append(client.CallOptions.GetConfiguration,
gax.WithClientMetrics(metrics))
 client.CallOptions.CreateConfiguration = append(client.CallOptions.CreateConfiguration,
gax.WithClientMetrics(metrics))
 client.CallOptions.UpdateConfiguration = append(client.CallOptions.UpdateConfiguration,
gax.WithClientMetrics(metrics))
 client.CallOptions.DeleteConfiguration = append(client.CallOptions.DeleteConfiguration,
gax.WithClientMetrics(metrics))
```

```
  client.CallOptions.ListInstances = append(client.CallOptions.ListInstances, gax.WithClientMetrics(metrics))
  client.CallOptions.GetInstance = append(client.CallOptions.GetInstance, gax.WithClientMetrics(metrics))
  client.CallOptions.DeactivateConfiguration = append(client.CallOptions.DeactivateConfiguration,
gax.WithClientMetrics(metrics))
  client.CallOptions.ReactivateConfiguration = append(client.CallOptions.ReactivateConfiguration,
 gax.WithClientMetrics(metrics))
  client.CallOptions.QueryConfigurationLicenseUsage =
append(client.CallOptions.QueryConfigurationLicenseUsage, gax.WithClientMetrics(metrics))
  client.CallOptions.AggregateUsage = append(client.CallOptions.AggregateUsage, gax.WithClientMetrics(metrics))
  client.CallOptions.ListProducts = append(client.CallOptions.ListProducts, gax.WithClientMetrics(metrics))
  client.CallOptions.GetProduct = append(client.CallOptions.GetProduct, gax.WithClientMetrics(metrics))
  client.CallOptions.GetLocation = append(client.CallOptions.GetLocation, gax.WithClientMetrics(metrics))
  client.CallOptions.ListLocations = append(client.CallOptions.ListLocations, gax.WithClientMetrics(metrics))
  client.CallOptions.CancelOperation = append(client.CallOptions.CancelOperation, gax.WithClientMetrics(metrics))
  client.CallOptions.DeleteOperation = append(client.CallOptions.DeleteOperation, gax.WithClientMetrics(metrics))
  client.CallOptions.GetOperation = append(client.CallOptions.GetOperation,
 gax.WithClientMetrics(metrics))
  client.CallOptions.ListOperations = append(client.CallOptions.ListOperations, gax.WithClientMetrics(metrics))
 }

 client.internalClient = c

 client.LROClient, err = lroauto.NewOperationsClient(ctx, gtransport.WithConnPool(connPool))
 if err != nil {
  // This error "should not happen", since we are just reusing old connection pool
  // and never actually need to dial.
  // If this does happen, we could leak connp. However, we cannot close conn:
  // If the user invoked the constructor with option.WithGRPCConn,
  // we would close a connection that's still in use.
  // TODO: investigate error conditions.
  return nil, err
 }
 c.LROClient = &client.LROClient
 return &client, nil
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *gRPCClient) Connection() *grpc.ClientConn {
 return c.connPool.Conn()
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
```

```
func (c *gRPCClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "grpc", grpc.Version, "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *gRPCClient) Close() error {
 return c.connPool.Close()
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type restClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // LROClient is used internally to handle long-running operations.
 // It is
 exposed so that its CallOptions can be modified if required.
 // Users should not Close this client.
 LROClient **lroauto.OperationsClient

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing Client
 CallOptions **CallOptions

 logger *slog.Logger
}

// NewRESTClient creates a new license manager rest client.
//
// Service describing handlers for resources
func NewRESTClient(ctx context.Context, opts ...option.ClientOption) (*Client, error) {
 clientOpts := append(defaultRESTClientOptions(), opts...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  clientOpts = append(clientOpts, internaloption.WithTelemetryAttributes(map[string]string{
   "gcp.client.service":  "licensemanager",
   "gcp.client.version":  getVersionClient(),
   "gcp.client.repo":     "googleapis/google-cloud-go",
```

```
  "gcp.client.artifact": "cloud.google.com/go/licensemanager/apiv1",
  "gcp.client.language":
 "go",
  "url.domain":          "licensemanager.googleapis.com",
 }))
 }
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultRESTCallOptions()
 c := &restClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 if gax.IsFeatureEnabled("METRICS") {
  metrics := gax.NewClientMetrics(
   gax.WithTelemetryLogger(c.logger),
   gax.WithTelemetryAttributes(map[string]string{
    gax.ClientService:  "licensemanager",
    gax.ClientVersion:  getVersionClient(),
    gax.ClientArtifact: "cloud.google.com/go/licensemanager/apiv1",
    gax.RPCSystem:      "http",
    gax.URLDomain:      "licensemanager.googleapis.com",
   }),
  )

  callOpts.ListConfigurations = append(callOpts.ListConfigurations, gax.WithClientMetrics(metrics))
  callOpts.GetConfiguration = append(callOpts.GetConfiguration, gax.WithClientMetrics(metrics))
  callOpts.CreateConfiguration
 = append(callOpts.CreateConfiguration, gax.WithClientMetrics(metrics))
  callOpts.UpdateConfiguration = append(callOpts.UpdateConfiguration, gax.WithClientMetrics(metrics))
  callOpts.DeleteConfiguration = append(callOpts.DeleteConfiguration, gax.WithClientMetrics(metrics))
  callOpts.ListInstances = append(callOpts.ListInstances, gax.WithClientMetrics(metrics))
  callOpts.GetInstance = append(callOpts.GetInstance, gax.WithClientMetrics(metrics))
  callOpts.DeactivateConfiguration = append(callOpts.DeactivateConfiguration, gax.WithClientMetrics(metrics))
  callOpts.ReactivateConfiguration = append(callOpts.ReactivateConfiguration, gax.WithClientMetrics(metrics))
  callOpts.QueryConfigurationLicenseUsage = append(callOpts.QueryConfigurationLicenseUsage,
gax.WithClientMetrics(metrics))
  callOpts.AggregateUsage = append(callOpts.AggregateUsage, gax.WithClientMetrics(metrics))
  callOpts.ListProducts = append(callOpts.ListProducts, gax.WithClientMetrics(metrics))
  callOpts.GetProduct
```

```
 = append(callOpts.GetProduct, gax.WithClientMetrics(metrics))
  callOpts.GetLocation = append(callOpts.GetLocation, gax.WithClientMetrics(metrics))
  callOpts.ListLocations = append(callOpts.ListLocations, gax.WithClientMetrics(metrics))
  callOpts.CancelOperation = append(callOpts.CancelOperation, gax.WithClientMetrics(metrics))
  callOpts.DeleteOperation = append(callOpts.DeleteOperation, gax.WithClientMetrics(metrics))
  callOpts.GetOperation = append(callOpts.GetOperation, gax.WithClientMetrics(metrics))
  callOpts.ListOperations = append(callOpts.ListOperations, gax.WithClientMetrics(metrics))
 }

 lroOpts := []option.ClientOption{
  option.WithHTTPClient(httpClient),
  option.WithEndpoint(endpoint),
 }
 opClient, err := lroauto.NewOperationsRESTClient(ctx, lroOpts...)
 if err != nil {
  return nil, err
 }
 c.LROClient = &opClient

 return &Client{internalClient: c, CallOptions: callOpts}, nil
}

func defaultRESTClientOptions() []option.ClientOption
 {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://licensemanager.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://licensemanager.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://licensemanager.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://licensemanager.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *restClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

//
```

```
 Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *restClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *restClient) Connection() *grpc.ClientConn {
 return nil
}
func (c *gRPCClient) ListConfigurations(ctx context.Context, req *licensemanagerpb.ListConfigurationsRequest,
opts ...gax.CallOption) *ConfigurationIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//licensemanager.googleapis.com/%v",
req.GetParent()))
 }
 if
 gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.licensemanager.v1.LicenseManager/ListConfigurations")
 }
 opts =
append((*c.CallOptions).ListConfigurations[0:len((*c.CallOptions).ListConfigurations):len((*c.CallOptions).ListCo
nfigurations)], opts...)
 it := &ConfigurationIterator{}
 req = proto.Clone(req).(*licensemanagerpb.ListConfigurationsRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*licensemanagerpb.Configuration, string, error) {
  resp := &licensemanagerpb.ListConfigurationsResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx, c.client.ListConfigurations,
```

```
 req, settings.GRPC, c.logger, "ListConfigurations")
  return err
 }, opts...)
 if err != nil {
  return nil, "", err
 }

 it.Response = resp
 return resp.GetConfigurations(), resp.GetNextPageToken(), nil
}
fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

func (c *gRPCClient) GetConfiguration(ctx context.Context, req *licensemanagerpb.GetConfigurationRequest, opts
...gax.CallOption) (*licensemanagerpb.Configuration, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx,
 hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//licensemanager.googleapis.com/%v",
req.GetName()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.licensemanager.v1.LicenseManager/GetConfiguration")
 }
 opts =
append((*c.CallOptions).GetConfiguration[0:len((*c.CallOptions).GetConfiguration):len((*c.CallOptions).GetConfi
guration)], opts...)
 var resp *licensemanagerpb.Configuration
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
```

```
  resp, err = executeRPC(ctx, c.client.GetConfiguration, req, settings.GRPC, c.logger, "GetConfiguration")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *gRPCClient) CreateConfiguration(ctx context.Context, req
*licensemanagerpb.CreateConfigurationRequest,
 opts ...gax.CallOption) (*CreateConfigurationOperation, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//licensemanager.googleapis.com/%v",
req.GetParent()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.licensemanager.v1.LicenseManager/CreateConfiguration")
 }
 opts =
append((*c.CallOptions).CreateConfiguration[0:len((*c.CallOptions).CreateConfiguration):len((*c.CallOptions).Cre
ateConfiguration)], opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings)
 error {
  var err error
  resp, err = executeRPC(ctx, c.client.CreateConfiguration, req, settings.GRPC, c.logger, "CreateConfiguration")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return &CreateConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, resp),
 }, nil
}

func (c *gRPCClient) UpdateConfiguration(ctx context.Context, req
*licensemanagerpb.UpdateConfigurationRequest, opts ...gax.CallOption) (*UpdateConfigurationOperation, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "configuration.name",
url.QueryEscape(req.GetConfiguration().GetName()))}
```

```
 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.licensemanager.v1.LicenseManager/UpdateConfiguration")
 }
 opts =
append((*c.CallOptions).UpdateConfiguration[0:len((*c.CallOptions).UpdateConfiguration):len((*c.CallOptions).U
pdateConfiguration)],
 opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.UpdateConfiguration, req, settings.GRPC, c.logger, "UpdateConfiguration")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return &UpdateConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, resp),
 }, nil
}

func (c *gRPCClient) DeleteConfiguration(ctx context.Context, req
*licensemanagerpb.DeleteConfigurationRequest, opts ...gax.CallOption) (*DeleteConfigurationOperation, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx
 = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//licensemanager.googleapis.com/%v",
req.GetName()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.licensemanager.v1.LicenseManager/DeleteConfiguration")
 }
 opts =
append((*c.CallOptions).DeleteConfiguration[0:len((*c.CallOptions).DeleteConfiguration):len((*c.CallOptions).Del
eteConfiguration)], opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.DeleteConfiguration, req, settings.GRPC, c.logger, "DeleteConfiguration")
```

```
 return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return &DeleteConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, resp),
 }, nil
}

func (c *gRPCClient) ListInstances(ctx context.Context, req *licensemanagerpb.ListInstancesRequest,
 opts ...gax.CallOption) *InstanceIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//licensemanager.googleapis.com/%v",
req.GetParent()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.licensemanager.v1.LicenseManager/ListInstances")
 }
 opts =
append((*c.CallOptions).ListInstances[0:len((*c.CallOptions).ListInstances):len((*c.CallOptions).ListInstances)],
opts...)
 it := &InstanceIterator{}
 req = proto.Clone(req).(*licensemanagerpb.ListInstancesRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*licensemanagerpb.Instance,
 string, error) {
  resp := &licensemanagerpb.ListInstancesResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx, c.client.ListInstances, req, settings.GRPC, c.logger, "ListInstances")
   return err
  }, opts...)
  if err != nil {
   return nil, "", err
```

```
  }

  it.Response = resp
  return resp.GetInstances(), resp.GetNextPageToken(), nil
 }
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token
 = req.GetPageToken()

 return it
}

func (c *gRPCClient) GetInstance(ctx context.Context, req *licensemanagerpb.GetInstanceRequest, opts
...gax.CallOption) (*licensemanagerpb.Instance, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//licensemanager.googleapis.com/%v",
req.GetName()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.licensemanager.v1.LicenseManager/GetInstance")
 }
 opts =
append((*c.CallOptions).GetInstance[0:len((*c.CallOptions).GetInstance):len((*c.CallOptions).GetInstance)],
opts...)
 var resp *licensemanagerpb.Instance
 err
 := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.GetInstance, req, settings.GRPC, c.logger, "GetInstance")
  return err
 }, opts...)
 if err != nil {
```

```
  return nil, err
 }
 return resp, nil
}

func (c *gRPCClient) DeactivateConfiguration(ctx context.Context, req
*licensemanagerpb.DeactivateConfigurationRequest, opts ...gax.CallOption) (*DeactivateConfigurationOperation,
error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//licensemanager.googleapis.com/%v",
req.GetName()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx
 = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.licensemanager.v1.LicenseManager/DeactivateConfiguration")
 }
 opts =
append((*c.CallOptions).DeactivateConfiguration[0:len((*c.CallOptions).DeactivateConfiguration):len((*c.CallOpti
ons).DeactivateConfiguration)], opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.DeactivateConfiguration, req, settings.GRPC, c.logger,
"DeactivateConfiguration")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return &DeactivateConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, resp),
 }, nil
}

func (c *gRPCClient) ReactivateConfiguration(ctx context.Context, req
*licensemanagerpb.ReactivateConfigurationRequest, opts ...gax.CallOption) (*ReactivateConfigurationOperation,
error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds
 = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
```

```
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//licensemanager.googleapis.com/%v",
req.GetName()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.licensemanager.v1.LicenseManager/ReactivateConfiguration")
 }
 opts =
append((*c.CallOptions).ReactivateConfiguration[0:len((*c.CallOptions).ReactivateConfiguration):len((*c.CallOpti
ons).ReactivateConfiguration)], opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.ReactivateConfiguration, req, settings.GRPC, c.logger,
"ReactivateConfiguration")
  return err
 }, opts...)
 if
 err != nil {
  return nil, err
 }
 return &ReactivateConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, resp),
 }, nil
}

func (c *gRPCClient) QueryConfigurationLicenseUsage(ctx context.Context, req
*licensemanagerpb.QueryConfigurationLicenseUsageRequest, opts ...gax.CallOption)
(*licensemanagerpb.QueryConfigurationLicenseUsageResponse, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//licensemanager.googleapis.com/%v",
req.GetName()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.licensemanager.v1.LicenseManager/QueryConfigurationLicenseUsage")
 }
 opts
 =
append((*c.CallOptions).QueryConfigurationLicenseUsage[0:len((*c.CallOptions).QueryConfigurationLicenseUsag
e):len((*c.CallOptions).QueryConfigurationLicenseUsage)], opts...)
```

```
 var resp *licensemanagerpb.QueryConfigurationLicenseUsageResponse
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.QueryConfigurationLicenseUsage, req, settings.GRPC, c.logger,
"QueryConfigurationLicenseUsage")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *gRPCClient) AggregateUsage(ctx context.Context, req *licensemanagerpb.AggregateUsageRequest, opts
...gax.CallOption) *UsageIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
 {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//licensemanager.googleapis.com/%v",
req.GetName()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.licensemanager.v1.LicenseManager/AggregateUsage")
 }
 opts =
append((*c.CallOptions).AggregateUsage[0:len((*c.CallOptions).AggregateUsage):len((*c.CallOptions).Aggregate
Usage)], opts...)
 it := &UsageIterator{}
 req = proto.Clone(req).(*licensemanagerpb.AggregateUsageRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*licensemanagerpb.Usage, string, error) {
  resp := &licensemanagerpb.AggregateUsageResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx, func(ctx context.Context, settings
 gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx, c.client.AggregateUsage, req, settings.GRPC, c.logger, "AggregateUsage")
```

```
  return err
 }, opts...)
 if err != nil {
  return nil, "", err
 }

 it.Response = resp
 return resp.GetUsages(), resp.GetNextPageToken(), nil
}
fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

func (c *gRPCClient) ListProducts(ctx context.Context, req *licensemanagerpb.ListProductsRequest, opts
...gax.CallOption) *ProductIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders,
 hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//licensemanager.googleapis.com/%v",
req.GetParent()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.licensemanager.v1.LicenseManager/ListProducts")
 }
 opts =
append((*c.CallOptions).ListProducts[0:len((*c.CallOptions).ListProducts):len((*c.CallOptions).ListProducts)],
opts...)
 it := &ProductIterator{}
 req = proto.Clone(req).(*licensemanagerpb.ListProductsRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*licensemanagerpb.Product, string, error) {
  resp := &licensemanagerpb.ListProductsResponse{}
```

```
 if pageToken != "" {
  req.PageToken = pageToken
 }
 if pageSize > math.MaxInt32 {
  req.PageSize = math.MaxInt32
 }
else if pageSize != 0 {
  req.PageSize = int32(pageSize)
 }
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.ListProducts, req, settings.GRPC, c.logger, "ListProducts")
  return err
 }, opts...)
 if err != nil {
  return nil, "", err
 }

 it.Response = resp
 return resp.GetProducts(), resp.GetNextPageToken(), nil
}
fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

func (c *gRPCClient) GetProduct(ctx context.Context, req *licensemanagerpb.GetProductRequest, opts
...gax.CallOption) (*licensemanagerpb.Product, error)
 {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//licensemanager.googleapis.com/%v",
req.GetName()))
 }
```

```
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.licensemanager.v1.LicenseManager/GetProduct")
 }
 opts = append((*c.CallOptions).GetProduct[0:len((*c.CallOptions).GetProduct):len((*c.CallOptions).GetProduct)],
opts...)
 var resp *licensemanagerpb.Product
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.client.GetProduct, req, settings.GRPC, c.logger, "GetProduct")
  return err
 },
 opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *gRPCClient) GetLocation(ctx context.Context, req *locationpb.GetLocationRequest, opts
...gax.CallOption) (*locationpb.Location, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.cloud.location.Locations/GetLocation")
 }
 opts =
append((*c.CallOptions).GetLocation[0:len((*c.CallOptions).GetLocation):len((*c.CallOptions).GetLocation)],
opts...)
 var resp *locationpb.Location
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.locationsClient.GetLocation, req, settings.GRPC, c.logger, "GetLocation")
  return
 err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *gRPCClient) ListLocations(ctx context.Context, req *locationpb.ListLocationsRequest, opts
...gax.CallOption) *LocationIterator {
```

```
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.cloud.location.Locations/ListLocations")
 }
 opts =
append((*c.CallOptions).ListLocations[0:len((*c.CallOptions).ListLocations):len((*c.CallOptions).ListLocations)],
opts...)
 it := &LocationIterator{}
 req = proto.Clone(req).(*locationpb.ListLocationsRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*locationpb.Location, string, error) {
  resp := &locationpb.ListLocationsResponse{}
  if
 pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx, c.locationsClient.ListLocations, req, settings.GRPC, c.logger, "ListLocations")
   return err
  }, opts...)
  if err != nil {
   return nil, "", err
  }

  it.Response = resp
  return resp.GetLocations(), resp.GetNextPageToken(), nil
 }
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()
```

```
 return it
}

func (c *gRPCClient)
 CancelOperation(ctx context.Context, req *longrunningpb.CancelOperationRequest, opts ...gax.CallOption) error {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.longrunning.Operations/CancelOperation")
 }
 opts =
append((*c.CallOptions).CancelOperation[0:len((*c.CallOptions).CancelOperation):len((*c.CallOptions).CancelOp
eration)], opts...)
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  _, err = executeRPC(ctx, c.operationsClient.CancelOperation, req, settings.GRPC, c.logger, "CancelOperation")
  return err
 }, opts...)
 return err
}

func (c *gRPCClient) DeleteOperation(ctx context.Context, req *longrunningpb.DeleteOperationRequest,
 opts ...gax.CallOption) error {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.longrunning.Operations/DeleteOperation")
 }
 opts =
append((*c.CallOptions).DeleteOperation[0:len((*c.CallOptions).DeleteOperation):len((*c.CallOptions).DeleteOper
ation)], opts...)
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  _, err = executeRPC(ctx, c.operationsClient.DeleteOperation, req, settings.GRPC, c.logger, "DeleteOperation")
  return err
 }, opts...)
 return err
}

func (c *gRPCClient) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest, opts
...gax.CallOption) (*longrunningpb.Operation,
```

```
 error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.longrunning.Operations/GetOperation")
 }
 opts =
append((*c.CallOptions).GetOperation[0:len((*c.CallOptions).GetOperation):len((*c.CallOptions).GetOperation)],
opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.operationsClient.GetOperation, req, settings.GRPC, c.logger, "GetOperation")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *gRPCClient) ListOperations(ctx context.Context, req *longrunningpb.ListOperationsRequest, opts
...gax.CallOption)
 *OperationIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.longrunning.Operations/ListOperations")
 }
 opts =
append((*c.CallOptions).ListOperations[0:len((*c.CallOptions).ListOperations):len((*c.CallOptions).ListOperations
)], opts...)
 it := &OperationIterator{}
 req = proto.Clone(req).(*longrunningpb.ListOperationsRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*longrunningpb.Operation, string, error) {
  resp := &longrunningpb.ListOperationsResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
```

```
  req.PageSize = int32(pageSize)
 }
 err
:= gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.operationsClient.ListOperations, req, settings.GRPC, c.logger, "ListOperations")
  return err
 }, opts...)
 if err != nil {
  return nil, "", err
 }

 it.Response = resp
 return resp.GetOperations(), resp.GetNextPageToken(), nil
}
fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// ListConfigurations lists Configurations in a given project and location.
func (c *restClient) ListConfigurations(ctx context.Context, req *licensemanagerpb.ListConfigurationsRequest,
 opts ...gax.CallOption) *ConfigurationIterator {
 it := &ConfigurationIterator{}
 req = proto.Clone(req).(*licensemanagerpb.ListConfigurationsRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*licensemanagerpb.Configuration, string, error) {
  resp := &licensemanagerpb.ListConfigurationsResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  baseUrl, err := url.Parse(c.endpoint)
```

```
if err != nil {
 return nil, "", err
}
baseUrl.Path += fmt.Sprintf("/v1/%v/configurations", req.GetParent())

params := url.Values{}
params.Add("$alt", "json;enum-encoding=int")
if req.GetFilter() != "" {
 params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
}
if req.GetOrderBy() != "" {
 params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
}
if
req.GetPageSize() != 0 {
 params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
}
if req.GetPageToken() != "" {
 params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
}

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := append(c.xGoogHeaders, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
 if err != nil {
  return err
 }
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "ListConfigurations")
 if err != nil {
  return err
 }
 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, "", e
```

```
 }
 it.Response = resp
 return
resp.GetConfigurations(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// GetConfiguration gets details of a single Configuration.
func (c *restClient) GetConfiguration(ctx context.Context, req *licensemanagerpb.GetConfigurationRequest, opts
...gax.CallOption) (*licensemanagerpb.Configuration, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and
 context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//licensemanager.googleapis.com/%v",
req.GetName()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
```

```
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.licensemanager.v1.LicenseManager/GetConfiguration")
  ctx = callctx.WithTelemetryContext(ctx, "url_template", "/v1/{name=projects/*/locations/*/configurations/*}")
 }
 opts =
append((*c.CallOptions).GetConfiguration[0:len((*c.CallOptions).GetConfiguration):len((*c.CallOptions).GetConfi
guration)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true,
 DiscardUnknown: true}
 resp := &licensemanagerpb.Configuration{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetConfiguration")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// CreateConfiguration creates a new Configuration in a given project and location.
func (c *restClient) CreateConfiguration(ctx context.Context, req *licensemanagerpb.CreateConfigurationRequest,
opts ...gax.CallOption) (*CreateConfigurationOperation, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 body
 := req.GetConfiguration()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
```

```
}

baseUrl, err := url.Parse(c.endpoint)
if err != nil {
 return nil, err
}
baseUrl.Path += fmt.Sprintf("/v1/%v/configurations", req.GetParent())

params := url.Values{}
params.Add("$alt", "json;enum-encoding=int")
params.Add("configurationId", fmt.Sprintf("%v", req.GetConfigurationId()))
if req.GetRequestId() != "" {
 params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
}

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

hds = append(c.xGoogHeaders, hds...)
hds = append(hds, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
 ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//licensemanager.googleapis.com/%v",
req.GetParent()))
}
if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
 ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.licensemanager.v1.LicenseManager/CreateConfiguration")
 ctx = callctx.WithTelemetryContext(ctx, "url_template", "/v1/{parent=projects/*/locations/*}/configurations")
}
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
resp := &longrunningpb.Operation{}
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "CreateConfiguration")
 if err != nil {
```

```
  return err
 }
 if err := unm.Unmarshal(buf, resp);
err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}

override := fmt.Sprintf("/v1/%s", resp.GetName())
return &CreateConfigurationOperation{
 lro:      longrunning.InternalNewOperation(*c.LROClient, resp),
 pollPath: override,
}, nil
}

// UpdateConfiguration updates the parameters of a single Configuration.
func (c *restClient) UpdateConfiguration(ctx context.Context, req *licensemanagerpb.UpdateConfigurationRequest,
opts ...gax.CallOption) (*UpdateConfigurationOperation, error) {
m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
body := req.GetConfiguration()
jsonReq, err := m.Marshal(body)
if err != nil {
 return nil, err
}

baseUrl, err := url.Parse(c.endpoint)
if err != nil {
 return nil, err
}
baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetConfiguration().GetName())

params := url.Values{}
params.Add("$alt", "json;enum-encoding=int")
if req.GetRequestId() != "" {
 params.Add("requestId", fmt.Sprintf("%v",
req.GetRequestId()))
}
if req.GetUpdateMask() != nil {
 field, err := protojson.Marshal(req.GetUpdateMask())
 if err != nil {
  return nil, err
 }
 params.Add("updateMask", string(field[1:len(field)-1]))
```

```
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "configuration.name",
url.QueryEscape(req.GetConfiguration().GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.licensemanager.v1.LicenseManager/UpdateConfiguration")
  ctx = callctx.WithTelemetryContext(ctx, "url_template",
"/v1/{configuration.name=projects/*/locations/*/configurations/*}")
 }
 unm := protojson.UnmarshalOptions{AllowPartial:
 true, DiscardUnknown: true}
 resp := &longrunningpb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("PATCH", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "UpdateConfiguration")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }

 override := fmt.Sprintf("/v1/%s", resp.GetName())
 return &UpdateConfigurationOperation{
```

```
  lro:      longrunning.InternalNewOperation(*c.LROClient, resp),
  pollPath: override,
 }, nil
}

// DeleteConfiguration deletes a single Configuration.
func (c *restClient) DeleteConfiguration(ctx context.Context, req *licensemanagerpb.DeleteConfigurationRequest,
 opts ...gax.CallOption) (*DeleteConfigurationOperation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")
 if req.GetRequestId() != "" {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//licensemanager.googleapis.com/%v",
req.GetName()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING")
 || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.licensemanager.v1.LicenseManager/DeleteConfiguration")
  ctx = callctx.WithTelemetryContext(ctx, "url_template", "/v1/{name=projects/*/locations/*/configurations/*}")
 }
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &longrunningpb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
  if err != nil {
   return err
  }
```

```
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "DeleteConfiguration")
 if err != nil {
  return err
 }
 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}

override := fmt.Sprintf("/v1/%s",
resp.GetName())
return &DeleteConfigurationOperation{
 lro:      longrunning.InternalNewOperation(*c.LROClient, resp),
 pollPath: override,
}, nil
}

// ListInstances lists Instances in a given project and location.
func (c *restClient) ListInstances(ctx context.Context, req *licensemanagerpb.ListInstancesRequest, opts
...gax.CallOption) *InstanceIterator {
 it := &InstanceIterator{}
 req = proto.Clone(req).(*licensemanagerpb.ListInstancesRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*licensemanagerpb.Instance, string, error) {
  resp := &licensemanagerpb.ListInstancesResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
   return nil, "", err
  }
  baseUrl.Path += fmt.Sprintf("/v1/%v/instances",
 req.GetParent())
```

```
 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")
 if req.GetFilter() != "" {
  params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
 }
 if req.GetOrderBy() != "" {
  params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
 }
 if req.GetPageSize() != 0 {
  params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
 }
 if req.GetPageToken() != "" {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header = headers

  buf, err :=
executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "ListInstances")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetInstances(), resp.GetNextPageToken(), nil
}
```

```
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

// GetInstance gets details of a single Instance.
func (c *restClient) GetInstance(ctx context.Context, req *licensemanagerpb.GetInstanceRequest, opts
...gax.CallOption) (*licensemanagerpb.Instance, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if
 err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//licensemanager.googleapis.com/%v",
req.GetName()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.licensemanager.v1.LicenseManager/GetInstance")
  ctx = callctx.WithTelemetryContext(ctx, "url_template",
 "/v1/{name=projects/*/locations/*/instances/*}")
 }
```

```
 opts =
append((*c.CallOptions).GetInstance[0:len((*c.CallOptions).GetInstance):len((*c.CallOptions).GetInstance)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &licensemanagerpb.Instance{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetInstance")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// DeactivateConfiguration deactivates the given configuration.
func (c *restClient) DeactivateConfiguration(ctx context.Context,
 req *licensemanagerpb.DeactivateConfigurationRequest, opts ...gax.CallOption)
(*DeactivateConfigurationOperation, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 jsonReq, err := m.Marshal(req)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:deactivate", req.GetName())
```

```
params := url.Values{}
params.Add("$alt", "json;enum-encoding=int")

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

hds = append(c.xGoogHeaders, hds...)
hds = append(hds, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
 ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//licensemanager.googleapis.com/%v",
req.GetName()))
}
if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
 ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.licensemanager.v1.LicenseManager/DeactivateConfiguration")
 ctx = callctx.WithTelemetryContext(ctx, "url_template",
"/v1/{name=projects/*/locations/*/configurations/*}:deactivate")
}
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
resp := &longrunningpb.Operation{}
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "DeactivateConfiguration")
 if err != nil {
  return err
 }
 if err := unm.Unmarshal(buf,
resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
```

```
  return nil, e
 }

 override := fmt.Sprintf("/v1/%s", resp.GetName())
 return &DeactivateConfigurationOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, resp),
  pollPath: override,
 }, nil
}

// ReactivateConfiguration reactivates the given configuration.
func (c *restClient) ReactivateConfiguration(ctx context.Context, req
*licensemanagerpb.ReactivateConfigurationRequest, opts ...gax.CallOption) (*ReactivateConfigurationOperation,
error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 jsonReq, err := m.Marshal(req)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:reactivate", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context
 metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//licensemanager.googleapis.com/%v",
req.GetName()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.licensemanager.v1.LicenseManager/ReactivateConfiguration")
  ctx = callctx.WithTelemetryContext(ctx, "url_template",
"/v1/{name=projects/*/locations/*/configurations/*}:reactivate")
```

```
 }
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &longrunningpb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings)
 error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "ReactivateConfiguration")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }

 override := fmt.Sprintf("/v1/%s", resp.GetName())
 return &ReactivateConfigurationOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, resp),
  pollPath: override,
 }, nil
}

// QueryConfigurationLicenseUsage license Usage information for a Configuration.
func (c *restClient) QueryConfigurationLicenseUsage(ctx context.Context, req
*licensemanagerpb.QueryConfigurationLicenseUsageRequest, opts ...gax.CallOption)
(*licensemanagerpb.QueryConfigurationLicenseUsageResponse,
 error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:queryLicenseUsage", req.GetName())

 params := url.Values{}
```

```
 params.Add("$alt", "json;enum-encoding=int")
 if req.GetEndTime() != nil {
  field, err := protojson.Marshal(req.GetEndTime())
  if err != nil {
   return nil, err
  }
  params.Add("endTime", string(field[1:len(field)-1]))
 }
 if req.GetStartTime() != nil {
  field, err := protojson.Marshal(req.GetStartTime())
  if err != nil {
   return nil, err
  }
  params.Add("startTime", string(field[1:len(field)-1]))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
 {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//licensemanager.googleapis.com/%v",
req.GetName()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.licensemanager.v1.LicenseManager/QueryConfigurationLicenseUsage")
  ctx = callctx.WithTelemetryContext(ctx, "url_template",
"/v1/{name=projects/*/locations/*/configurations/*}:queryLicenseUsage")
 }
 opts =
append((*c.CallOptions).QueryConfigurationLicenseUsage[0:len((*c.CallOptions).QueryConfigurationLicenseUsag
e):len((*c.CallOptions).QueryConfigurationLicenseUsage)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &licensemanagerpb.QueryConfigurationLicenseUsageResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq,
 err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
```

```
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "QueryConfigurationLicenseUsage")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
}

// AggregateUsage aggregates Usage per Instance for a Configuration.
func (c *restClient) AggregateUsage(ctx context.Context, req *licensemanagerpb.AggregateUsageRequest, opts
...gax.CallOption) *UsageIterator {
 it := &UsageIterator{}
 req = proto.Clone(req).(*licensemanagerpb.AggregateUsageRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*licensemanagerpb.Usage, string, error) {
  resp := &licensemanagerpb.AggregateUsageResponse{}
  if
 pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
   return nil, "", err
  }
  baseUrl.Path += fmt.Sprintf("/v1/%v:aggregateUsage", req.GetName())

  params := url.Values{}
  params.Add("$alt", "json;enum-encoding=int")
  if req.GetEndTime() != nil {
```

```
 field, err := protojson.Marshal(req.GetEndTime())
 if err != nil {
  return nil, "", err
 }
 params.Add("endTime", string(field[1:len(field)-1]))
}
if req.GetFilter() != "" {
 params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
}
if req.GetOrderBy() != "" {
 params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
}
if req.GetPageSize() != 0 {
 params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
}
if req.GetPageToken() != "" {
 params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
}
if
req.GetStartTime() != nil {
 field, err := protojson.Marshal(req.GetStartTime())
 if err != nil {
  return nil, "", err
 }
 params.Add("startTime", string(field[1:len(field)-1]))
}

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := append(c.xGoogHeaders, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
 if err != nil {
  return err
 }
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "AggregateUsage")
 if err != nil {
  return err
 }
 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
```

```
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetUsages(),
resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// ListProducts lists Products in a given project and location.
func (c *restClient) ListProducts(ctx context.Context, req *licensemanagerpb.ListProductsRequest, opts
...gax.CallOption) *ProductIterator {
 it := &ProductIterator{}
 req = proto.Clone(req).(*licensemanagerpb.ListProductsRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*licensemanagerpb.Product, string, error) {
  resp := &licensemanagerpb.ListProductsResponse{}
  if
 pageToken != "" {
  req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
  req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
  req.PageSize = int32(pageSize)
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
  return nil, "", err
```

```
}
baseUrl.Path += fmt.Sprintf("/v1/%v/products", req.GetParent())

params := url.Values{}
params.Add("$alt", "json;enum-encoding=int")
if req.GetFilter() != "" {
 params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
}
if req.GetOrderBy() != "" {
 params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
}
if req.GetPageSize() != 0 {
 params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
}
if req.GetPageToken() != "" {
 params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
}

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := append(c.xGoogHeaders, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
e
:= gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
 if err != nil {
  return err
 }
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "ListProducts")
 if err != nil {
  return err
 }
 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, "", e
}
it.Response = resp
```

```
 return resp.GetProducts(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token
= req.GetPageToken()

return it
}

// GetProduct gets details of a single Product.
func (c *restClient) GetProduct(ctx context.Context, req *licensemanagerpb.GetProductRequest, opts
...gax.CallOption) (*licensemanagerpb.Product, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//licensemanager.googleapis.com/%v",
req.GetName()))
 }
 if
 gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.licensemanager.v1.LicenseManager/GetProduct")
```

```
  ctx = callctx.WithTelemetryContext(ctx, "url_template", "/v1/{name=projects/*/locations/*/products/*}")
 }
 opts = append((*c.CallOptions).GetProduct[0:len((*c.CallOptions).GetProduct):len((*c.CallOptions).GetProduct)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &licensemanagerpb.Product{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetProduct")
  if err != nil {
   return
 err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// GetLocation gets information about a location.
func (c *restClient) GetLocation(ctx context.Context, req *locationpb.GetLocationRequest, opts ...gax.CallOption)
(*locationpb.Location, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()
```

```
 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
 {
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.cloud.location.Locations/GetLocation")
  ctx = callctx.WithTelemetryContext(ctx, "url_template", "/v1/{name=projects/*/locations/*}")
 }
 opts =
append((*c.CallOptions).GetLocation[0:len((*c.CallOptions).GetLocation):len((*c.CallOptions).GetLocation)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &locationpb.Location{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetLocation")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return
 nil, e
 }
 return resp, nil
}

// ListLocations lists information about the supported locations for this service.
func (c *restClient) ListLocations(ctx context.Context, req *locationpb.ListLocationsRequest, opts
```

```
...gax.CallOption) *LocationIterator {
 it := &LocationIterator{}
 req = proto.Clone(req).(*locationpb.ListLocationsRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*locationpb.Location, string, error) {
  resp := &locationpb.ListLocationsResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
   return nil, "", err
  }
  baseUrl.Path += fmt.Sprintf("/v1/%v/locations", req.GetName())

  params := url.Values{}
  params.Add("$alt", "json;enum-encoding=int")
  if req.GetFilter() != ""
 {
   params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
  }
  if req.GetPageSize() != 0 {
   params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
  }
  if req.GetPageToken() != "" {
   params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
  }

  baseUrl.RawQuery = params.Encode()

  // Build HTTP headers from client and context metadata.
  hds := append(c.xGoogHeaders, "Content-Type", "application/json")
  headers := gax.BuildHeaders(ctx, hds...)
  e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   if settings.Path != "" {
    baseUrl.Path = settings.Path
   }
   httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
   if err != nil {
    return err
   }
   httpReq.Header = headers
```

```
  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "ListLocations")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e
!= nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetLocations(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// CancelOperation is a utility method from google.longrunning.Operations.
func (c *restClient) CancelOperation(ctx context.Context, req *longrunningpb.CancelOperationRequest, opts
...gax.CallOption) error {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 jsonReq, err := m.Marshal(req)
 if err != nil {
  return err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:cancel",
```

```
req.GetName())

params := url.Values{}
params.Add("$alt", "json;enum-encoding=int")

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

hds = append(c.xGoogHeaders, hds...)
hds = append(hds, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
 ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.longrunning.Operations/CancelOperation")
 ctx = callctx.WithTelemetryContext(ctx, "url_template", "/v1/{name=projects/*/locations/*/operations/*}:cancel")
}
return gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
 if
err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 _, err = executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "CancelOperation")
 return err
}, opts...)
}

// DeleteOperation is a utility method from google.longrunning.Operations.
func (c *restClient) DeleteOperation(ctx context.Context, req *longrunningpb.DeleteOperationRequest, opts
...gax.CallOption) error {
baseUrl, err := url.Parse(c.endpoint)
if err != nil {
 return err
}
baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

params := url.Values{}
params.Add("$alt", "json;enum-encoding=int")

baseUrl.RawQuery = params.Encode()
```

```
 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") ||
 gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.longrunning.Operations/DeleteOperation")
  ctx = callctx.WithTelemetryContext(ctx, "url_template", "/v1/{name=projects/*/locations/*/operations/*}")
 }
 return gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  _, err = executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "DeleteOperation")
  return err
 }, opts...)
}

// GetOperation is a utility method from google.longrunning.Operations.
func (c *restClient) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest, opts
...gax.CallOption) (*longrunningpb.Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil
 {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
```

```
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.longrunning.Operations/GetOperation")
  ctx = callctx.WithTelemetryContext(ctx, "url_template", "/v1/{name=projects/*/locations/*/operations/*}")
 }
 opts =
append((*c.CallOptions).GetOperation[0:len((*c.CallOptions).GetOperation):len((*c.CallOptions).GetOperation)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown:
 true}
 resp := &longrunningpb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetOperation")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// ListOperations is a utility method from google.longrunning.Operations.
func (c *restClient) ListOperations(ctx context.Context, req *longrunningpb.ListOperationsRequest, opts
...gax.CallOption) *OperationIterator {
 it := &OperationIterator{}
 req = proto.Clone(req).(*longrunningpb.ListOperationsRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true,
 DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*longrunningpb.Operation, string, error) {
```

```
resp := &longrunningpb.ListOperationsResponse{}
if pageToken != "" {
 req.PageToken = pageToken
}
if pageSize > math.MaxInt32 {
 req.PageSize = math.MaxInt32
} else if pageSize != 0 {
 req.PageSize = int32(pageSize)
}
baseUrl, err := url.Parse(c.endpoint)
if err != nil {
 return nil, "", err
}
baseUrl.Path += fmt.Sprintf("/v1/%v/operations", req.GetName())

params := url.Values{}
params.Add("$alt", "json;enum-encoding=int")
if req.GetFilter() != "" {
 params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
}
if req.GetPageSize() != 0 {
 params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
}
if req.GetPageToken() != "" {
 params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
}
if req.GetReturnPartialSuccess() {
 params.Add("returnPartialSuccess", fmt.Sprintf("%v", req.GetReturnPartialSuccess()))
}

baseUrl.RawQuery
= params.Encode()

// Build HTTP headers from client and context metadata.
hds := append(c.xGoogHeaders, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
 if err != nil {
  return err
 }
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "ListOperations")
 if err != nil {
```

```
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetOperations(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if
err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// CreateConfigurationOperation returns a new CreateConfigurationOperation from a given name.
// The name must be that of a previously created CreateConfigurationOperation, possibly from a different process.
func (c *gRPCClient) CreateConfigurationOperation(name string) *CreateConfigurationOperation {
 return &CreateConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
 }
}

// CreateConfigurationOperation returns a new CreateConfigurationOperation from a given name.
// The name must be that of a previously created CreateConfigurationOperation, possibly from a different process.
func (c *restClient) CreateConfigurationOperation(name string)
 *CreateConfigurationOperation {
 override := fmt.Sprintf("/v1/%s", name)
 return &CreateConfigurationOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
  pollPath: override,
```

```
 }
}

// DeactivateConfigurationOperation returns a new DeactivateConfigurationOperation from a given name.
// The name must be that of a previously created DeactivateConfigurationOperation, possibly from a different
process.
func (c *gRPCClient) DeactivateConfigurationOperation(name string) *DeactivateConfigurationOperation {
 return &DeactivateConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
 }
}

// DeactivateConfigurationOperation returns a new DeactivateConfigurationOperation from a given name.
// The name must be that of a previously created DeactivateConfigurationOperation, possibly from a different
process.
func (c *restClient) DeactivateConfigurationOperation(name string) *DeactivateConfigurationOperation
 {
 override := fmt.Sprintf("/v1/%s", name)
 return &DeactivateConfigurationOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
  pollPath: override,
 }
}

// DeleteConfigurationOperation returns a new DeleteConfigurationOperation from a given name.
// The name must be that of a previously created DeleteConfigurationOperation, possibly from a different process.
func (c *gRPCClient) DeleteConfigurationOperation(name string) *DeleteConfigurationOperation {
 return &DeleteConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
 }
}

// DeleteConfigurationOperation returns a new DeleteConfigurationOperation from a given name.
// The name must be that of a previously created DeleteConfigurationOperation, possibly from a different process.
func (c *restClient) DeleteConfigurationOperation(name string) *DeleteConfigurationOperation {
 override := fmt.Sprintf("/v1/%s",
 name)
 return &DeleteConfigurationOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
  pollPath: override,
 }
}

// ReactivateConfigurationOperation returns a new ReactivateConfigurationOperation from a given name.
// The name must be that of a previously created ReactivateConfigurationOperation, possibly from a different
process.
func (c *gRPCClient) ReactivateConfigurationOperation(name string) *ReactivateConfigurationOperation {
 return &ReactivateConfigurationOperation{
```

```
  lro: longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
 }
}

// ReactivateConfigurationOperation returns a new ReactivateConfigurationOperation from a given name.
// The name must be that of a previously created ReactivateConfigurationOperation, possibly from a different
process.
func (c *restClient) ReactivateConfigurationOperation(name string) *ReactivateConfigurationOperation {
 override := fmt.Sprintf("/v1/%s",
 name)
 return &ReactivateConfigurationOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
  pollPath: override,
 }
}

// UpdateConfigurationOperation returns a new UpdateConfigurationOperation from a given name.
// The name must be that of a previously created UpdateConfigurationOperation, possibly from a different process.
func (c *gRPCClient) UpdateConfigurationOperation(name string) *UpdateConfigurationOperation {
 return &UpdateConfigurationOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
 }
}

// UpdateConfigurationOperation returns a new UpdateConfigurationOperation from a given name.
// The name must be that of a previously created UpdateConfigurationOperation, possibly from a different process.
func (c *restClient) UpdateConfigurationOperation(name string) *UpdateConfigurationOperation {
 override := fmt.Sprintf("/v1/%s", name)
 return &UpdateConfigurationOperation{
  lro:
      longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
  pollPath: override,
 }
}
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// You may obtain a copy of the License at
//
//     https://www.apache.org/licenses/LICENSE-2.0
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// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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// limitations under the License.
```

```
// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package datamanager_test

import (
 "context"

 datamanager "cloud.google.com/go/datamanager/apiv1"
 datamanagerpb "cloud.google.com/go/datamanager/apiv1/datamanagerpb"
)

func ExampleUserListDirectLicenseClient_ListUserListDirectLicenses_all() {
 ctx := context.Background()
 // This snippet has been automatically generated and should
 be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := datamanager.NewUserListDirectLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &datamanagerpb.ListUserListDirectLicensesRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/datamanager/apiv1/datamanagerpb#ListUserListDirectLicensesRequest.
 }
 for resp, err := range c.ListUserListDirectLicenses(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}
// Copyright 2026 Google LLC
//
// Licensed under the Apache License, Version 2.0 (the "License");
// you may not use this file except in compliance with the License.
// You may obtain a copy of the License at
//
//     https://www.apache.org/licenses/LICENSE-2.0
//
```

```
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// See the License for the specific language governing permissions and
// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
 "google.golang.org/api/iterator"
)

func ExampleNewLicensesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will
 require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicensesClient_Delete() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()
```

```
 req := &computepb.DeleteLicenseRequest{
  //
 TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#DeleteLicenseRequest.
 }
 op, err := c.Delete(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleLicensesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseRequest.
 }
 resp,
 err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_GetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
```

```
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.GetIamPolicyLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetIamPolicyLicenseRequest.
}
resp, err := c.GetIamPolicy(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleLicensesClient_Insert()
{
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.InsertLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#InsertLicenseRequest.
}
op, err := c.Insert(ctx, req)
if err != nil {
 // TODO: Handle error.
}

err = op.Wait(ctx)
if err != nil {
 // TODO: Handle error.
}
}
```

```
func ExampleLicensesClient_List() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template
 only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.ListLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#ListLicensesRequest.
 }
 it := c.List(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*computepb.LicensesListResponse)
 }
}

func
 ExampleLicensesClient_SetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
```

```
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.SetIamPolicyLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#SetIamPolicyLicenseRequest.
 }
 resp, err := c.SetIamPolicy(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_TestIamPermissions() {
 ctx := context.Background()
 // This snippet has been automatically
 generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.TestIamPermissionsLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseRequest.
 }
 resp, err := c.TestIamPermissions(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_Update() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may
```

```
 require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.UpdateLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#UpdateLicenseRequest.
 }
 op, err := c.Update(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package procurement

import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
 "math"
 "net/http"
```

```
 "net/url"

 procurementpb "cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 gax "github.com/googleapis/gax-go/v2"
 "github.com/googleapis/gax-go/v2/callctx"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 gtransport
 "google.golang.org/api/transport/grpc"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var newLicenseManagementClientHook clientHook

// LicenseManagementCallOptions contains the retry settings for each method of LicenseManagementClient.
type LicenseManagementCallOptions struct {
 GetLicensePool         []gax.CallOption
 UpdateLicensePool      []gax.CallOption
 Assign                 []gax.CallOption
 Unassign               []gax.CallOption
 EnumerateLicensedUsers []gax.CallOption
 GetOperation           []gax.CallOption
}

func defaultLicenseManagementGRPCClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("cloudcommerceconsumerprocurement.googleapis.com:443"),
internaloption.WithDefaultEndpointTemplate("cloudcommerceconsumerprocurement.UNIVERSE_DOMAIN:443")
,
  internaloption.WithDefaultMTLSEndpoint("cloudcommerceconsumerprocurement.mtls.googleapis.com:443"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://cloudcommerceconsumerprocurement.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableJwtWithScope(),
  internaloption.EnableNewAuthLibrary(),
  option.WithGRPCDialOption(grpc.WithDefaultCallOptions(
   grpc.MaxCallRecvMsgSize(math.MaxInt32))),
 }
}

func
 defaultLicenseManagementCallOptions() *LicenseManagementCallOptions {
 return &LicenseManagementCallOptions{
```

```
  GetLicensePool:        []gax.CallOption{},
  UpdateLicensePool:     []gax.CallOption{},
  Assign:                []gax.CallOption{},
  Unassign:              []gax.CallOption{},
  EnumerateLicensedUsers: []gax.CallOption{},
  GetOperation:          []gax.CallOption{},
 }
}

func defaultLicenseManagementRESTCallOptions()
 *LicenseManagementCallOptions {
 return &LicenseManagementCallOptions{
  GetLicensePool:        []gax.CallOption{},
  UpdateLicensePool:     []gax.CallOption{},
  Assign:                []gax.CallOption{},
  Unassign:              []gax.CallOption{},
  EnumerateLicensedUsers: []gax.CallOption{},
  GetOperation:          []gax.CallOption{},
 }
}

// internalLicenseManagementClient is an interface that defines the methods available from Cloud Commerce
Consumer Procurement API.
type internalLicenseManagementClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 GetLicensePool(context.Context, *procurementpb.GetLicensePoolRequest, ...gax.CallOption)
(*procurementpb.LicensePool, error)
 UpdateLicensePool(context.Context, *procurementpb.UpdateLicensePoolRequest, ...gax.CallOption)
(*procurementpb.LicensePool, error)
 Assign(context.Context, *procurementpb.AssignRequest, ...gax.CallOption) (*procurementpb.AssignResponse,
error)
 Unassign(context.Context,
 *procurementpb.UnassignRequest, ...gax.CallOption) (*procurementpb.UnassignResponse, error)
 EnumerateLicensedUsers(context.Context, *procurementpb.EnumerateLicensedUsersRequest, ...gax.CallOption)
*LicensedUserIterator
 GetOperation(context.Context, *longrunningpb.GetOperationRequest, ...gax.CallOption)
(*longrunningpb.Operation, error)
}

// LicenseManagementClient is a client for interacting with Cloud Commerce Consumer Procurement API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// Service for managing licenses.
type LicenseManagementClient struct {
 // The internal transport-dependent client.
```

```
 internalClient internalLicenseManagementClient

 // The call options for this service.
 CallOptions *LicenseManagementCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer
 required.
func (c *LicenseManagementClient) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *LicenseManagementClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicenseManagementClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// GetLicensePool gets the license pool.
func (c *LicenseManagementClient) GetLicensePool(ctx context.Context, req
*procurementpb.GetLicensePoolRequest, opts ...gax.CallOption) (*procurementpb.LicensePool, error) {
 return c.internalClient.GetLicensePool(ctx, req, opts...)
}

// UpdateLicensePool updates the license pool if one
 exists for this Order.
func (c *LicenseManagementClient) UpdateLicensePool(ctx context.Context, req
*procurementpb.UpdateLicensePoolRequest, opts ...gax.CallOption) (*procurementpb.LicensePool, error) {
 return c.internalClient.UpdateLicensePool(ctx, req, opts...)
}

// Assign assigns a license to a user.
func (c *LicenseManagementClient) Assign(ctx context.Context, req *procurementpb.AssignRequest, opts
...gax.CallOption) (*procurementpb.AssignResponse, error) {
 return c.internalClient.Assign(ctx, req, opts...)
}
```

```
// Unassign unassigns a license from a user.
func (c *LicenseManagementClient) Unassign(ctx context.Context, req *procurementpb.UnassignRequest, opts
...gax.CallOption) (*procurementpb.UnassignResponse, error) {
 return c.internalClient.Unassign(ctx, req, opts...)
}

// EnumerateLicensedUsers enumerates all users assigned a license.
func (c *LicenseManagementClient) EnumerateLicensedUsers(ctx context.Context, req
*procurementpb.EnumerateLicensedUsersRequest, opts ...gax.CallOption)
 *LicensedUserIterator {
 return c.internalClient.EnumerateLicensedUsers(ctx, req, opts...)
}

// GetOperation is a utility method from google.longrunning.Operations.
func (c *LicenseManagementClient) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest,
opts ...gax.CallOption) (*longrunningpb.Operation, error) {
 return c.internalClient.GetOperation(ctx, req, opts...)
}

// licenseManagementGRPCClient is a client for interacting with Cloud Commerce Consumer Procurement API
over gRPC transport.
//
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type licenseManagementGRPCClient struct {
 // Connection pool of gRPC connections to the service.
 connPool gtransport.ConnPool

 // Points back to the CallOptions field of the containing LicenseManagementClient
 CallOptions **LicenseManagementCallOptions

 // The gRPC API client.
 licenseManagementClient procurementpb.LicenseManagementServiceClient

 operationsClient
 longrunningpb.OperationsClient

 // The x-goog-* metadata to be sent with each request.
 xGoogHeaders []string

 logger *slog.Logger
}

// NewLicenseManagementClient creates a new license management service client based on gRPC.
// The returned client must be Closed when it is done being used to clean up its underlying connections.
//
// Service for managing licenses.
```

```
func NewLicenseManagementClient(ctx context.Context, opts ...option.ClientOption) (*LicenseManagementClient,
error) {
 clientOpts := defaultLicenseManagementGRPCClientOptions()
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  clientOpts = append(clientOpts, internaloption.WithTelemetryAttributes(map[string]string{
   "gcp.client.service":  "cloudcommerceconsumerprocurement",
   "gcp.client.version":  getVersionClient(),
   "gcp.client.repo":     "googleapis/google-cloud-go",
   "gcp.client.artifact": "cloud.google.com/go/commerce/consumer/procurement/apiv1",
   "gcp.client.language":
 "go",
   "url.domain":          "cloudcommerceconsumerprocurement.googleapis.com",
  }))
 }
 if newLicenseManagementClientHook != nil {
  hookOpts, err := newLicenseManagementClientHook(ctx, clientHookParams{})
  if err != nil {
   return nil, err
  }
  clientOpts = append(clientOpts, hookOpts...)
 }

 connPool, err := gtransport.DialPool(ctx, append(clientOpts, opts...)...)
 if err != nil {
  return nil, err
 }
 client := LicenseManagementClient{CallOptions: defaultLicenseManagementCallOptions()}

 c := &licenseManagementGRPCClient{
  connPool:                connPool,
  licenseManagementClient: procurementpb.NewLicenseManagementServiceClient(connPool),
  CallOptions:             &client.CallOptions,
  logger:                  internaloption.GetLogger(opts),
  operationsClient:        longrunningpb.NewOperationsClient(connPool),
 }
 c.setGoogleClientInfo()
 if gax.IsFeatureEnabled("METRICS") {
  metrics := gax.NewClientMetrics(
   gax.WithTelemetryLogger(c.logger),
   gax.WithTelemetryAttributes(map[string]string{
    gax.ClientService:
  "cloudcommerceconsumerprocurement",
    gax.ClientVersion:  getVersionClient(),
    gax.ClientArtifact: "cloud.google.com/go/commerce/consumer/procurement/apiv1",
    gax.RPCSystem:      "grpc",
    gax.URLDomain:      "cloudcommerceconsumerprocurement.googleapis.com",
   }),
  )
```

```
  client.CallOptions.GetLicensePool = append(client.CallOptions.GetLicensePool, gax.WithClientMetrics(metrics))
  client.CallOptions.UpdateLicensePool = append(client.CallOptions.UpdateLicensePool,
gax.WithClientMetrics(metrics))
  client.CallOptions.Assign = append(client.CallOptions.Assign, gax.WithClientMetrics(metrics))
  client.CallOptions.Unassign = append(client.CallOptions.Unassign, gax.WithClientMetrics(metrics))
  client.CallOptions.EnumerateLicensedUsers = append(client.CallOptions.EnumerateLicensedUsers,
gax.WithClientMetrics(metrics))
  client.CallOptions.GetOperation = append(client.CallOptions.GetOperation, gax.WithClientMetrics(metrics))
 }

 client.internalClient
 = c

 return &client, nil
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *licenseManagementGRPCClient) Connection() *grpc.ClientConn {
 return c.connPool.Conn()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licenseManagementGRPCClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "grpc", grpc.Version, "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licenseManagementGRPCClient) Close() error
 {
 return c.connPool.Close()
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type licenseManagementRESTClient struct {
 // The http endpoint to connect to.
 endpoint string
```

```
 // The http client.
 httpClient *http.Client

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicenseManagementClient
 CallOptions **LicenseManagementCallOptions

 logger *slog.Logger
}

// NewLicenseManagementRESTClient creates a new license management service rest client.
//
// Service for managing licenses.
func NewLicenseManagementRESTClient(ctx context.Context, opts ...option.ClientOption)
(*LicenseManagementClient, error) {
 clientOpts := append(defaultLicenseManagementRESTClientOptions(), opts...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  clientOpts = append(clientOpts, internaloption.WithTelemetryAttributes(map[string]string{
   "gcp.client.service":
  "cloudcommerceconsumerprocurement",
   "gcp.client.version":  getVersionClient(),
   "gcp.client.repo":     "googleapis/google-cloud-go",
   "gcp.client.artifact": "cloud.google.com/go/commerce/consumer/procurement/apiv1",
   "gcp.client.language": "go",
   "url.domain":          "cloudcommerceconsumerprocurement.googleapis.com",
  }))
 }
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicenseManagementRESTCallOptions()
 c := &licenseManagementRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 if gax.IsFeatureEnabled("METRICS") {
  metrics := gax.NewClientMetrics(
   gax.WithTelemetryLogger(c.logger),
   gax.WithTelemetryAttributes(map[string]string{
```

```
    gax.ClientService:  "cloudcommerceconsumerprocurement",
    gax.ClientVersion:  getVersionClient(),
    gax.ClientArtifact:
 "cloud.google.com/go/commerce/consumer/procurement/apiv1",
    gax.RPCSystem:      "http",
    gax.URLDomain:      "cloudcommerceconsumerprocurement.googleapis.com",
   }),
  )

  callOpts.GetLicensePool = append(callOpts.GetLicensePool, gax.WithClientMetrics(metrics))
  callOpts.UpdateLicensePool = append(callOpts.UpdateLicensePool, gax.WithClientMetrics(metrics))
  callOpts.Assign = append(callOpts.Assign, gax.WithClientMetrics(metrics))
  callOpts.Unassign = append(callOpts.Unassign, gax.WithClientMetrics(metrics))
  callOpts.EnumerateLicensedUsers = append(callOpts.EnumerateLicensedUsers, gax.WithClientMetrics(metrics))
  callOpts.GetOperation = append(callOpts.GetOperation, gax.WithClientMetrics(metrics))
 }

 return &LicenseManagementClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicenseManagementRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://cloudcommerceconsumerprocurement.googleapis.com"),
internaloption.WithDefaultEndpointTemplate("https://cloudcommerceconsumerprocurement.UNIVERSE_DOMAI
N"),
  internaloption.WithDefaultMTLSEndpoint("https://cloudcommerceconsumerprocurement.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://cloudcommerceconsumerprocurement.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licenseManagementRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

//
 Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
```

```
func (c *licenseManagementRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licenseManagementRESTClient) Connection() *grpc.ClientConn {
 return nil
}
func (c *licenseManagementGRPCClient) GetLicensePool(ctx context.Context, req
*procurementpb.GetLicensePoolRequest, opts ...gax.CallOption) (*procurementpb.LicensePool, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
 "google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/GetLicensePool")
 }
 opts =
append((*c.CallOptions).GetLicensePool[0:len((*c.CallOptions).GetLicensePool):len((*c.CallOptions).GetLicenseP
ool)], opts...)
 var resp *procurementpb.LicensePool
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.licenseManagementClient.GetLicensePool, req, settings.GRPC, c.logger,
"GetLicensePool")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *licenseManagementGRPCClient) UpdateLicensePool(ctx context.Context, req
*procurementpb.UpdateLicensePoolRequest, opts ...gax.CallOption) (*procurementpb.LicensePool, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "license_pool.name",
url.QueryEscape(req.GetLicensePool().GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if
```

```
 gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/UpdateLicensePool")
 }
 opts =
append((*c.CallOptions).UpdateLicensePool[0:len((*c.CallOptions).UpdateLicensePool):len((*c.CallOptions).Upda
teLicensePool)], opts...)
 var resp *procurementpb.LicensePool
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.licenseManagementClient.UpdateLicensePool, req, settings.GRPC, c.logger,
"UpdateLicensePool")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *licenseManagementGRPCClient) Assign(ctx context.Context, req *procurementpb.AssignRequest, opts
...gax.CallOption) (*procurementpb.AssignResponse, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds
 = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Assign")
 }
 opts = append((*c.CallOptions).Assign[0:len((*c.CallOptions).Assign):len((*c.CallOptions).Assign)], opts...)
 var resp *procurementpb.AssignResponse
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.licenseManagementClient.Assign, req, settings.GRPC, c.logger, "Assign")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *licenseManagementGRPCClient) Unassign(ctx context.Context, req *procurementpb.UnassignRequest,
opts ...gax.CallOption) (*procurementpb.UnassignResponse, error) {
 hds := []string{"x-goog-request-params",
```

```
 fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Unassign")
 }
 opts = append((*c.CallOptions).Unassign[0:len((*c.CallOptions).Unassign):len((*c.CallOptions).Unassign)], opts...)
 var resp *procurementpb.UnassignResponse
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.licenseManagementClient.Unassign, req, settings.GRPC, c.logger, "Unassign")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *licenseManagementGRPCClient) EnumerateLicensedUsers(ctx context.Context, req
*procurementpb.EnumerateLicensedUsersRequest,
 opts ...gax.CallOption) *LicensedUserIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/EnumerateLicensedUsers")
 }
 opts =
append((*c.CallOptions).EnumerateLicensedUsers[0:len((*c.CallOptions).EnumerateLicensedUsers):len((*c.CallOp
tions).EnumerateLicensedUsers)], opts...)
 it := &LicensedUserIterator{}
 req = proto.Clone(req).(*procurementpb.EnumerateLicensedUsersRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*procurementpb.LicensedUser, string, error) {
  resp := &procurementpb.EnumerateLicensedUsersResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if
 pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
```

```
  req.PageSize = int32(pageSize)
 }
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.licenseManagementClient.EnumerateLicensedUsers, req, settings.GRPC, c.logger,
"EnumerateLicensedUsers")
  return err
 }, opts...)
 if err != nil {
  return nil, "", err
 }

 it.Response = resp
 return resp.GetLicensedUsers(), resp.GetNextPageToken(), nil
}
fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

func (c *licenseManagementGRPCClient)
 GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest, opts ...gax.CallOption)
(*longrunningpb.Operation, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.longrunning.Operations/GetOperation")
 }
 opts =
append((*c.CallOptions).GetOperation[0:len((*c.CallOptions).GetOperation):len((*c.CallOptions).GetOperation)],
opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
```

```
  resp, err = executeRPC(ctx, c.operationsClient.GetOperation, req, settings.GRPC, c.logger, "GetOperation")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return
 resp, nil
}

// GetLicensePool gets the license pool.
func (c *licenseManagementRESTClient) GetLicensePool(ctx context.Context, req
*procurementpb.GetLicensePoolRequest, opts ...gax.CallOption) (*procurementpb.LicensePool, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/GetLicensePool")
  ctx
 = callctx.WithTelemetryContext(ctx, "url_template", "/v1/{name=billingAccounts/*/orders/*/licensePool}")
 }
 opts =
append((*c.CallOptions).GetLicensePool[0:len((*c.CallOptions).GetLicensePool):len((*c.CallOptions).GetLicenseP
ool)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &procurementpb.LicensePool{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
```

```
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetLicensePool")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
}

// UpdateLicensePool updates
 the license pool if one exists for this Order.
func (c *licenseManagementRESTClient) UpdateLicensePool(ctx context.Context, req
*procurementpb.UpdateLicensePoolRequest, opts ...gax.CallOption) (*procurementpb.LicensePool, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 body := req.GetLicensePool()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetLicensePool().GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")
 if req.GetUpdateMask() != nil {
  field, err := protojson.Marshal(req.GetUpdateMask())
  if err != nil {
   return nil, err
  }
  params.Add("updateMask", string(field[1:len(field)-1]))
 }
```

```
baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "license_pool.name",
url.QueryEscape(req.GetLicensePool().GetName()))}

hds = append(c.xGoogHeaders, hds...)
hds = append(hds, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/UpdateLicensePool")
  ctx = callctx.WithTelemetryContext(ctx, "url_template",
"/v1/{license_pool.name=billingAccounts/*/orders/*/licensePool}")
 }
opts =
append((*c.CallOptions).UpdateLicensePool[0:len((*c.CallOptions).UpdateLicensePool):len((*c.CallOptions).Upda
teLicensePool)], opts...)
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
resp := &procurementpb.LicensePool{}
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("PATCH",
baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "UpdateLicensePool")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
```

```
 return resp, nil
}

// Assign assigns a license to a user.
func (c *licenseManagementRESTClient) Assign(ctx context.Context, req *procurementpb.AssignRequest, opts
...gax.CallOption) (*procurementpb.AssignResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 jsonReq, err := m.Marshal(req)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:assign", req.GetParent())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery
 = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Assign")
  ctx = callctx.WithTelemetryContext(ctx, "url_template",
"/v1/{parent=billingAccounts/*/orders/*/licensePool}:assign")
 }
 opts = append((*c.CallOptions).Assign[0:len((*c.CallOptions).Assign):len((*c.CallOptions).Assign)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &procurementpb.AssignResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings
 gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
```

```
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Assign")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
}

// Unassign unassigns a license from a user.
func (c *licenseManagementRESTClient) Unassign(ctx context.Context, req *procurementpb.UnassignRequest,
opts ...gax.CallOption) (*procurementpb.UnassignResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 jsonReq, err := m.Marshal(req)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path
 += fmt.Sprintf("/v1/%v:unassign", req.GetParent())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
```

```
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Unassign")
  ctx = callctx.WithTelemetryContext(ctx, "url_template",
"/v1/{parent=billingAccounts/*/orders/*/licensePool}:unassign")
 }
 opts = append((*c.CallOptions).Unassign[0:len((*c.CallOptions).Unassign):len((*c.CallOptions).Unassign)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial:
 true, DiscardUnknown: true}
 resp := &procurementpb.UnassignResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Unassign")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// EnumerateLicensedUsers enumerates all users assigned a license.
func (c *licenseManagementRESTClient) EnumerateLicensedUsers(ctx context.Context, req
*procurementpb.EnumerateLicensedUsersRequest, opts ...gax.CallOption) *LicensedUserIterator {
 it := &LicensedUserIterator{}
 req = proto.Clone(req).(*procurementpb.EnumerateLicensedUsersRequest)
 unm
 := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*procurementpb.LicensedUser, string, error) {
  resp := &procurementpb.EnumerateLicensedUsersResponse{}
```

```
if pageToken != "" {
 req.PageToken = pageToken
}
if pageSize > math.MaxInt32 {
 req.PageSize = math.MaxInt32
} else if pageSize != 0 {
 req.PageSize = int32(pageSize)
}
baseUrl, err := url.Parse(c.endpoint)
if err != nil {
 return nil, "", err
}
baseUrl.Path += fmt.Sprintf("/v1/%v:enumerateLicensedUsers", req.GetParent())

params := url.Values{}
params.Add("$alt", "json;enum-encoding=int")
if req.GetPageSize() != 0 {
 params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
}
if req.GetPageToken() != "" {
 params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
}

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds
:= append(c.xGoogHeaders, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
 if err != nil {
  return err
 }
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "EnumerateLicensedUsers")
 if err != nil {
  return err
 }
 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
```

```
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetLicensedUsers(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken,
nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// GetOperation is a utility method from google.longrunning.Operations.
func (c *licenseManagementRESTClient) GetOperation(ctx context.Context, req
*longrunningpb.GetOperationRequest, opts ...gax.CallOption) (*longrunningpb.Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS")
 || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.longrunning.Operations/GetOperation")
```

```
  ctx = callctx.WithTelemetryContext(ctx, "url_template", "/v1/{name=billingAccounts/*/orders/*/operations/*}")
 }
 opts =
append((*c.CallOptions).GetOperation[0:len((*c.CallOptions).GetOperation):len((*c.CallOptions).GetOperation)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &longrunningpb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetOperation")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf,
 resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}
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```

```
// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package compute_test
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package datamanager_test

import (
 "context"

 datamanager "cloud.google.com/go/datamanager/apiv1"
 datamanagerpb "cloud.google.com/go/datamanager/apiv1/datamanagerpb"
 "google.golang.org/api/iterator"
)

func ExampleNewUserListDirectLicenseClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as
```

```
 a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := datamanager.NewUserListDirectLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleNewUserListDirectLicenseRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := datamanager.NewUserListDirectLicenseRESTClient(ctx)
 if err != nil {
  // TODO:
 Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleUserListDirectLicenseClient_CreateUserListDirectLicense() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := datamanager.NewUserListDirectLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &datamanagerpb.CreateUserListDirectLicenseRequest{
  // TODO: Fill request struct fields.
```

```
 // See
https://pkg.go.dev/cloud.google.com/go/datamanager/apiv1/datamanagerpb#CreateUserListDirectLicenseRequest.
 }
 resp, err := c.CreateUserListDirectLicense(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _
 = resp
}

func ExampleUserListDirectLicenseClient_GetUserListDirectLicense() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := datamanager.NewUserListDirectLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &datamanagerpb.GetUserListDirectLicenseRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/datamanager/apiv1/datamanagerpb#GetUserListDirectLicenseRequest.
 }
 resp, err := c.GetUserListDirectLicense(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleUserListDirectLicenseClient_ListUserListDirectLicenses()
 {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := datamanager.NewUserListDirectLicenseClient(ctx)
 if err != nil {
```

```
 // TODO: Handle error.
 }
 defer c.Close()

 req := &datamanagerpb.ListUserListDirectLicensesRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/datamanager/apiv1/datamanagerpb#ListUserListDirectLicensesRequest.
 }
 it := c.ListUserListDirectLicenses(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying
 RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*datamanagerpb.ListUserListDirectLicensesResponse)
 }
}

func ExampleUserListDirectLicenseClient_UpdateUserListDirectLicense() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := datamanager.NewUserListDirectLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &datamanagerpb.UpdateUserListDirectLicenseRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/datamanager/apiv1/datamanagerpb#UpdateUserListDirectLicenseRequest.
 }
```

```
 resp,
 err := c.UpdateUserListDirectLicense(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.36.11
//  protoc        v6.31.0
// source: google/ads/datamanager/v1/user_list_global_license_type.proto

package datamanagerpb

import (
 reflect "reflect"
 sync "sync"
 unsafe "unsafe"

 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
)

const (
 // Verify
 that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// User list global license types.
```

```
type UserListGlobalLicenseType int32

const (
 // UNSPECIFIED.
 UserListGlobalLicenseType_USER_LIST_GLOBAL_LICENSE_TYPE_UNSPECIFIED
UserListGlobalLicenseType = 0
 // Reseller license.
 UserListGlobalLicenseType_USER_LIST_GLOBAL_LICENSE_TYPE_RESELLER UserListGlobalLicenseType
= 1
 // DataMart Sell Side license.
 UserListGlobalLicenseType_USER_LIST_GLOBAL_LICENSE_TYPE_DATA_MART_SELL_SIDE
UserListGlobalLicenseType = 2
 // DataMart Buy Side license.
 UserListGlobalLicenseType_USER_LIST_GLOBAL_LICENSE_TYPE_DATA_MART_BUY_SIDE
UserListGlobalLicenseType = 3
)

// Enum value maps for UserListGlobalLicenseType.
var (
 UserListGlobalLicenseType_name = map[int32]string{
  0: "USER_LIST_GLOBAL_LICENSE_TYPE_UNSPECIFIED",
  1: "USER_LIST_GLOBAL_LICENSE_TYPE_RESELLER",
  2:
 "USER_LIST_GLOBAL_LICENSE_TYPE_DATA_MART_SELL_SIDE",
  3: "USER_LIST_GLOBAL_LICENSE_TYPE_DATA_MART_BUY_SIDE",
 }
 UserListGlobalLicenseType_value = map[string]int32{
  "USER_LIST_GLOBAL_LICENSE_TYPE_UNSPECIFIED":        0,
  "USER_LIST_GLOBAL_LICENSE_TYPE_RESELLER":           1,
  "USER_LIST_GLOBAL_LICENSE_TYPE_DATA_MART_SELL_SIDE": 2,
  "USER_LIST_GLOBAL_LICENSE_TYPE_DATA_MART_BUY_SIDE":  3,
 }
)

func (x UserListGlobalLicenseType) Enum() *UserListGlobalLicenseType {
 p := new(UserListGlobalLicenseType)
 *p = x
 return p
}

func (x UserListGlobalLicenseType) String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (UserListGlobalLicenseType) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ads_datamanager_v1_user_list_global_license_type_proto_enumTypes[0].Descriptor()
}
```

```
func (UserListGlobalLicenseType) Type() protoreflect.EnumType {
 return &file_google_ads_datamanager_v1_user_list_global_license_type_proto_enumTypes[0]
}

func
 (x UserListGlobalLicenseType) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use UserListGlobalLicenseType.Descriptor instead.
func (UserListGlobalLicenseType) EnumDescriptor() ([]byte, []int) {
 return file_google_ads_datamanager_v1_user_list_global_license_type_proto_rawDescGZIP(), []int{0}
}

var File_google_ads_datamanager_v1_user_list_global_license_type_proto protoreflect.FileDescriptor

const file_google_ads_datamanager_v1_user_list_global_license_type_proto_rawDesc = "" +
 "\n" +
 "=google/ads/datamanager/v1/user_list_global_license_type.proto\x12\x19google.ads.datamanager.v1*\xe3\x01\n"
+
 "\x19UserListGlobalLicenseType\x12-\n" +
 ")USER_LIST_GLOBAL_LICENSE_TYPE_UNSPECIFIED\x10\x00\x12*\n" +
 "&USER_LIST_GLOBAL_LICENSE_TYPE_RESELLER\x10\x01\x125\n" +
 "1USER_LIST_GLOBAL_LICENSE_TYPE_DATA_MART_SELL_SIDE\x10\x02\x124\n" +
 "0USER_LIST_GLOBAL_LICENSE_TYPE_DATA_MART_BUY_SIDE\x10\x03B\xdb\x01\n" +
"\x1dcom.google.ads.datamanager.v1B\x1eUserListGlobalLicenseTypeProtoP\x01ZAcloud.google.com/go/dataman
ager/apiv1/datamanagerpb;datamanagerpb\xaa\x02\x19Google.Ads.DataManager.V1\xca\x02\x19Google\\Ads\\Dat
aManager\\V1\xea\x02\x1cGoogle::Ads::DataManager::V1b\x06proto3"

var
 (
 file_google_ads_datamanager_v1_user_list_global_license_type_proto_rawDescOnce sync.Once
 file_google_ads_datamanager_v1_user_list_global_license_type_proto_rawDescData []byte
)

func file_google_ads_datamanager_v1_user_list_global_license_type_proto_rawDescGZIP() []byte {
 file_google_ads_datamanager_v1_user_list_global_license_type_proto_rawDescOnce.Do(func() {
  file_google_ads_datamanager_v1_user_list_global_license_type_proto_rawDescData =
protoimpl.X.CompressGZIP(unsafe.Slice(unsafe.StringData(file_google_ads_datamanager_v1_user_list_global_lice
nse_type_proto_rawDesc), len(file_google_ads_datamanager_v1_user_list_global_license_type_proto_rawDesc)))
 })
 return file_google_ads_datamanager_v1_user_list_global_license_type_proto_rawDescData
}

var
 file_google_ads_datamanager_v1_user_list_global_license_type_proto_enumTypes = make([]protoimpl.EnumInfo,
1)
var file_google_ads_datamanager_v1_user_list_global_license_type_proto_goTypes = []any{
```

```
 (UserListGlobalLicenseType)(0), // 0: google.ads.datamanager.v1.UserListGlobalLicenseType
}
var file_google_ads_datamanager_v1_user_list_global_license_type_proto_depIdxs = []int32{
 0, // [0:0] is the sub-list for method output_type
 0, // [0:0] is the sub-list for method input_type
 0, // [0:0] is the sub-list for extension type_name
 0, // [0:0] is the sub-list for extension extendee
 0, // [0:0] is the sub-list for field type_name
}

func init() { file_google_ads_datamanager_v1_user_list_global_license_type_proto_init() }
func file_google_ads_datamanager_v1_user_list_global_license_type_proto_init() {
 if File_google_ads_datamanager_v1_user_list_global_license_type_proto != nil {
  return
 }
 type x struct{}
 out := protoimpl.TypeBuilder{
  File:
 protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor:
unsafe.Slice(unsafe.StringData(file_google_ads_datamanager_v1_user_list_global_license_type_proto_rawDesc),
len(file_google_ads_datamanager_v1_user_list_global_license_type_proto_rawDesc)),
   NumEnums:      1,
   NumMessages:   0,
   NumExtensions: 0,
   NumServices:   0,
  },
  GoTypes:          file_google_ads_datamanager_v1_user_list_global_license_type_proto_goTypes,
  DependencyIndexes: file_google_ads_datamanager_v1_user_list_global_license_type_proto_depIdxs,
  EnumInfos:         file_google_ads_datamanager_v1_user_list_global_license_type_proto_enumTypes,
 }.Build()
 File_google_ads_datamanager_v1_user_list_global_license_type_proto = out.File
 file_google_ads_datamanager_v1_user_list_global_license_type_proto_goTypes = nil
 file_google_ads_datamanager_v1_user_list_global_license_type_proto_depIdxs = nil
}
```

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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

// [START datamanager_v1_generated_UserListDirectLicenseService_ListUserListDirectLicenses_sync]

package main

import (
 "context"

 datamanager "cloud.google.com/go/datamanager/apiv1"
 datamanagerpb "cloud.google.com/go/datamanager/apiv1/datamanagerpb"
 "google.golang.org/api/iterator"
)

func main() {
 ctx := context.Background()
 // This snippet has
```

```
been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := datamanager.NewUserListDirectLicenseClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &datamanagerpb.ListUserListDirectLicensesRequest{
 // TODO: Fill request struct fields.
 // See
https://pkg.go.dev/cloud.google.com/go/datamanager/apiv1/datamanagerpb#ListUserListDirectLicensesRequest.
}
it := c.ListUserListDirectLicenses(ctx, req)
for {
 resp, err := it.Next()
 if err == iterator.Done {
  break
 }
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp

 // If you need to access the underlying RPC response,
 // you can do so by casting the `Response` as below.
 //
Otherwise, remove this line. Only populated after
 // first call to Next(). Not safe for concurrent access.
 _ = it.Response.(*datamanagerpb.ListUserListDirectLicensesResponse)
}
}

// [END datamanager_v1_generated_UserListDirectLicenseService_ListUserListDirectLicenses_sync]
// Copyright 2026 Google LLC
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// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package datamanager

import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
 "math"
 "net/http"
 "net/url"

 datamanagerpb "cloud.google.com/go/datamanager/apiv1/datamanagerpb"
 gax "github.com/googleapis/gax-go/v2"
 "github.com/googleapis/gax-go/v2/callctx"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 gtransport
 "google.golang.org/api/transport/grpc"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var newUserListDirectLicenseClientHook clientHook

// UserListDirectLicenseCallOptions contains the retry settings for each method of UserListDirectLicenseClient.
type UserListDirectLicenseCallOptions struct {
 CreateUserListDirectLicense []gax.CallOption
 GetUserListDirectLicense    []gax.CallOption
 UpdateUserListDirectLicense []gax.CallOption
 ListUserListDirectLicenses  []gax.CallOption
}

func defaultUserListDirectLicenseGRPCClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("datamanager.googleapis.com:443"),
  internaloption.WithDefaultEndpointTemplate("datamanager.UNIVERSE_DOMAIN:443"),
  internaloption.WithDefaultMTLSEndpoint("datamanager.mtls.googleapis.com:443"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://datamanager.googleapis.com/"),
```

```
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableJwtWithScope(),
  internaloption.EnableNewAuthLibrary(),
  option.WithGRPCDialOption(grpc.WithDefaultCallOptions(
   grpc.MaxCallRecvMsgSize(math.MaxInt32))),
 }
}

func
 defaultUserListDirectLicenseCallOptions() *UserListDirectLicenseCallOptions {
 return &UserListDirectLicenseCallOptions{
  CreateUserListDirectLicense: []gax.CallOption{},
  GetUserListDirectLicense:    []gax.CallOption{},
  UpdateUserListDirectLicense: []gax.CallOption{},
  ListUserListDirectLicenses:  []gax.CallOption{},
 }
}

func defaultUserListDirectLicenseRESTCallOptions() *UserListDirectLicenseCallOptions {
 return &UserListDirectLicenseCallOptions{
  CreateUserListDirectLicense: []gax.CallOption{},
  GetUserListDirectLicense:    []gax.CallOption{},
  UpdateUserListDirectLicense: []gax.CallOption{},
  ListUserListDirectLicenses:
  []gax.CallOption{},
 }
}

// internalUserListDirectLicenseClient is an interface that defines the methods available from Data Manager API.
type internalUserListDirectLicenseClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 CreateUserListDirectLicense(context.Context, *datamanagerpb.CreateUserListDirectLicenseRequest,
...gax.CallOption) (*datamanagerpb.UserListDirectLicense, error)
 GetUserListDirectLicense(context.Context, *datamanagerpb.GetUserListDirectLicenseRequest, ...gax.CallOption)
(*datamanagerpb.UserListDirectLicense, error)
 UpdateUserListDirectLicense(context.Context, *datamanagerpb.UpdateUserListDirectLicenseRequest,
...gax.CallOption) (*datamanagerpb.UserListDirectLicense, error)
 ListUserListDirectLicenses(context.Context, *datamanagerpb.ListUserListDirectLicensesRequest,
...gax.CallOption) *UserListDirectLicenseIterator
}

// UserListDirectLicenseClient is a client for interacting with Data Manager API.
// Methods, except
 Close, may be called concurrently. However, fields must not be modified concurrently with method calls.
//
// Service for managing user list direct licenses. Delete is not a supported
```

```
// operation for UserListDirectLicenses.  Callers should update the
// license status to DISABLED to instead to deactivate a license.
//
// This feature is only available to data partners.
type UserListDirectLicenseClient struct {
 // The internal transport-dependent client.
 internalClient internalUserListDirectLicenseClient

 // The call options for this service.
 CallOptions *UserListDirectLicenseCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *UserListDirectLicenseClient) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended
 for
// use by Google-written clients.
func (c *UserListDirectLicenseClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *UserListDirectLicenseClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// CreateUserListDirectLicense creates a user list direct license.
//
// This feature is only available to data partners.
func (c *UserListDirectLicenseClient) CreateUserListDirectLicense(ctx context.Context, req
*datamanagerpb.CreateUserListDirectLicenseRequest, opts ...gax.CallOption)
(*datamanagerpb.UserListDirectLicense, error) {
 return c.internalClient.CreateUserListDirectLicense(ctx, req, opts...)
}

// GetUserListDirectLicense retrieves a user list direct license.
//
// This feature is only available to data partners.
```

```
func (c *UserListDirectLicenseClient)
 GetUserListDirectLicense(ctx context.Context, req *datamanagerpb.GetUserListDirectLicenseRequest, opts
...gax.CallOption) (*datamanagerpb.UserListDirectLicense, error) {
 return c.internalClient.GetUserListDirectLicense(ctx, req, opts...)
}

// UpdateUserListDirectLicense updates a user list direct license.
//
// This feature is only available to data partners.
func (c *UserListDirectLicenseClient) UpdateUserListDirectLicense(ctx context.Context, req
*datamanagerpb.UpdateUserListDirectLicenseRequest, opts ...gax.CallOption)
(*datamanagerpb.UserListDirectLicense, error) {
 return c.internalClient.UpdateUserListDirectLicense(ctx, req, opts...)
}

// ListUserListDirectLicenses lists all user list direct licenses owned by the parent account.
//
// This feature is only available to data partners.
func (c *UserListDirectLicenseClient) ListUserListDirectLicenses(ctx context.Context, req
*datamanagerpb.ListUserListDirectLicensesRequest, opts ...gax.CallOption) *UserListDirectLicenseIterator
 {
 return c.internalClient.ListUserListDirectLicenses(ctx, req, opts...)
}

// userListDirectLicenseGRPCClient is a client for interacting with Data Manager API over gRPC transport.
//
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type userListDirectLicenseGRPCClient struct {
 // Connection pool of gRPC connections to the service.
 connPool gtransport.ConnPool

 // Points back to the CallOptions field of the containing UserListDirectLicenseClient
 CallOptions **UserListDirectLicenseCallOptions

 // The gRPC API client.
 userListDirectLicenseClient datamanagerpb.UserListDirectLicenseServiceClient

 // The x-goog-* metadata to be sent with each request.
 xGoogHeaders []string

 logger *slog.Logger
}

// NewUserListDirectLicenseClient creates a new user list direct license service client based on gRPC.
// The returned client must be Closed when it is done being used to clean up its underlying connections.
//
//
```

```
 Service for managing user list direct licenses. Delete is not a supported
// operation for UserListDirectLicenses.  Callers should update the
// license status to DISABLED to instead to deactivate a license.
//
// This feature is only available to data partners.
func NewUserListDirectLicenseClient(ctx context.Context, opts ...option.ClientOption)
(*UserListDirectLicenseClient, error) {
 clientOpts := defaultUserListDirectLicenseGRPCClientOptions()
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  clientOpts = append(clientOpts, internaloption.WithTelemetryAttributes(map[string]string{
   "gcp.client.service":  "datamanager",
   "gcp.client.version":  getVersionClient(),
   "gcp.client.repo":     "googleapis/google-cloud-go",
   "gcp.client.artifact": "cloud.google.com/go/datamanager/apiv1",
   "gcp.client.language": "go",
   "url.domain":          "datamanager.googleapis.com",
  }))
 }
 if newUserListDirectLicenseClientHook != nil {
  hookOpts, err :=
 newUserListDirectLicenseClientHook(ctx, clientHookParams{})
  if err != nil {
   return nil, err
  }
  clientOpts = append(clientOpts, hookOpts...)
 }

 connPool, err := gtransport.DialPool(ctx, append(clientOpts, opts...)...)
 if err != nil {
  return nil, err
 }
 client := UserListDirectLicenseClient{CallOptions: defaultUserListDirectLicenseCallOptions()}

 c := &userListDirectLicenseGRPCClient{
  connPool:                    connPool,
  userListDirectLicenseClient: datamanagerpb.NewUserListDirectLicenseServiceClient(connPool),
  CallOptions:                 &client.CallOptions,
  logger:                      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()
 if gax.IsFeatureEnabled("METRICS") {
  metrics := gax.NewClientMetrics(
   gax.WithTelemetryLogger(c.logger),
   gax.WithTelemetryAttributes(map[string]string{
    gax.ClientService:  "datamanager",
    gax.ClientVersion:  getVersionClient(),
    gax.ClientArtifact: "cloud.google.com/go/datamanager/apiv1",
    gax.RPCSystem:
```

```
      "grpc",
    gax.URLDomain:      "datamanager.googleapis.com",
   }),
  )

  client.CallOptions.CreateUserListDirectLicense = append(client.CallOptions.CreateUserListDirectLicense,
gax.WithClientMetrics(metrics))
  client.CallOptions.GetUserListDirectLicense = append(client.CallOptions.GetUserListDirectLicense,
gax.WithClientMetrics(metrics))
  client.CallOptions.UpdateUserListDirectLicense = append(client.CallOptions.UpdateUserListDirectLicense,
gax.WithClientMetrics(metrics))
  client.CallOptions.ListUserListDirectLicenses = append(client.CallOptions.ListUserListDirectLicenses,
gax.WithClientMetrics(metrics))
 }

 client.internalClient = c

 return &client, nil
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *userListDirectLicenseGRPCClient) Connection() *grpc.ClientConn {
 return c.connPool.Conn()
}

// setGoogleClientInfo sets the name and version
 of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *userListDirectLicenseGRPCClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "grpc", grpc.Version, "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *userListDirectLicenseGRPCClient) Close() error {
 return c.connPool.Close()
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
```

```
type userListDirectLicenseRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders
 []string

 // Points back to the CallOptions field of the containing UserListDirectLicenseClient
 CallOptions **UserListDirectLicenseCallOptions

 logger *slog.Logger
}

// NewUserListDirectLicenseRESTClient creates a new user list direct license service rest client.
//
// Service for managing user list direct licenses. Delete is not a supported
// operation for UserListDirectLicenses.  Callers should update the
// license status to DISABLED to instead to deactivate a license.
//
// This feature is only available to data partners.
func NewUserListDirectLicenseRESTClient(ctx context.Context, opts ...option.ClientOption)
(*UserListDirectLicenseClient, error) {
 clientOpts := append(defaultUserListDirectLicenseRESTClientOptions(), opts...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  clientOpts = append(clientOpts, internaloption.WithTelemetryAttributes(map[string]string{
   "gcp.client.service":  "datamanager",
   "gcp.client.version":  getVersionClient(),
   "gcp.client.repo":
    "googleapis/google-cloud-go",
   "gcp.client.artifact": "cloud.google.com/go/datamanager/apiv1",
   "gcp.client.language": "go",
   "url.domain":         "datamanager.googleapis.com",
  }))
 }
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultUserListDirectLicenseRESTCallOptions()
 c := &userListDirectLicenseRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
```

```
 logger:      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 if gax.IsFeatureEnabled("METRICS") {
  metrics := gax.NewClientMetrics(
   gax.WithTelemetryLogger(c.logger),
   gax.WithTelemetryAttributes(map[string]string{
    gax.ClientService:  "datamanager",
    gax.ClientVersion:  getVersionClient(),
    gax.ClientArtifact: "cloud.google.com/go/datamanager/apiv1",
    gax.RPCSystem:      "http",
    gax.URLDomain:      "datamanager.googleapis.com",
   }),
  )

  callOpts.CreateUserListDirectLicense
 = append(callOpts.CreateUserListDirectLicense, gax.WithClientMetrics(metrics))
  callOpts.GetUserListDirectLicense = append(callOpts.GetUserListDirectLicense, gax.WithClientMetrics(metrics))
  callOpts.UpdateUserListDirectLicense = append(callOpts.UpdateUserListDirectLicense,
gax.WithClientMetrics(metrics))
  callOpts.ListUserListDirectLicenses = append(callOpts.ListUserListDirectLicenses,
gax.WithClientMetrics(metrics))
 }

 return &UserListDirectLicenseClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultUserListDirectLicenseRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://datamanager.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://datamanager.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://datamanager.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://datamanager.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *userListDirectLicenseRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
```

```
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *userListDirectLicenseRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method
 always returns nil.
func (c *userListDirectLicenseRESTClient) Connection() *grpc.ClientConn {
 return nil
}
func (c *userListDirectLicenseGRPCClient) CreateUserListDirectLicense(ctx context.Context, req
*datamanagerpb.CreateUserListDirectLicenseRequest, opts ...gax.CallOption)
(*datamanagerpb.UserListDirectLicense, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//datamanager.googleapis.com/%v",
req.GetParent()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.ads.datamanager.v1.UserListDirectLicenseService/CreateUserListDirectLicense")
 }
 opts =
append((*c.CallOptions).CreateUserListDirectLicense[0:len((*c.CallOptions).CreateUserListDirectLicense):len((*c.
CallOptions).CreateUserListDirectLicense)],
 opts...)
 var resp *datamanagerpb.UserListDirectLicense
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.userListDirectLicenseClient.CreateUserListDirectLicense, req, settings.GRPC,
c.logger, "CreateUserListDirectLicense")
  return err
 }, opts...)
 if err != nil {
  return nil, err
```

```
 }
 return resp, nil
}

func (c *userListDirectLicenseGRPCClient) GetUserListDirectLicense(ctx context.Context, req
*datamanagerpb.GetUserListDirectLicenseRequest, opts ...gax.CallOption)
(*datamanagerpb.UserListDirectLicense, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
 {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//datamanager.googleapis.com/%v",
req.GetName()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.ads.datamanager.v1.UserListDirectLicenseService/GetUserListDirectLicense")
 }
 opts =
append((*c.CallOptions).GetUserListDirectLicense[0:len((*c.CallOptions).GetUserListDirectLicense):len((*c.Call
Options).GetUserListDirectLicense)], opts...)
 var resp *datamanagerpb.UserListDirectLicense
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.userListDirectLicenseClient.GetUserListDirectLicense, req, settings.GRPC, c.logger,
"GetUserListDirectLicense")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *userListDirectLicenseGRPCClient) UpdateUserListDirectLicense(ctx
 context.Context, req *datamanagerpb.UpdateUserListDirectLicenseRequest, opts ...gax.CallOption)
(*datamanagerpb.UserListDirectLicense, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "user_list_direct_license.name",
url.QueryEscape(req.GetUserListDirectLicense().GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
```

```
"google.ads.datamanager.v1.UserListDirectLicenseService/UpdateUserListDirectLicense")
 }
 opts =
append((*c.CallOptions).UpdateUserListDirectLicense[0:len((*c.CallOptions).UpdateUserListDirectLicense):len((*
c.CallOptions).UpdateUserListDirectLicense)], opts...)
 var resp *datamanagerpb.UserListDirectLicense
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp,
 err = executeRPC(ctx, c.userListDirectLicenseClient.UpdateUserListDirectLicense, req, settings.GRPC, c.logger,
"UpdateUserListDirectLicense")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *userListDirectLicenseGRPCClient) ListUserListDirectLicenses(ctx context.Context, req
*datamanagerpb.ListUserListDirectLicensesRequest, opts ...gax.CallOption) *UserListDirectLicenseIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//datamanager.googleapis.com/%v",
req.GetParent()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.ads.datamanager.v1.UserListDirectLicenseService/ListUserListDirectLicenses")
 }
 opts
 =
append((*c.CallOptions).ListUserListDirectLicenses[0:len((*c.CallOptions).ListUserListDirectLicenses):len((*c.Ca
llOptions).ListUserListDirectLicenses)], opts...)
 it := &UserListDirectLicenseIterator{}
 req = proto.Clone(req).(*datamanagerpb.ListUserListDirectLicensesRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*datamanagerpb.UserListDirectLicense, string, error) {
  resp := &datamanagerpb.ListUserListDirectLicensesResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
```

```
  req.PageSize = int32(pageSize)
 }
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.userListDirectLicenseClient.ListUserListDirectLicenses, req, settings.GRPC, c.logger,
"ListUserListDirectLicenses")
  return err
 },
opts...)
 if err != nil {
  return nil, "", err
 }

 it.Response = resp
 return resp.GetUserListDirectLicenses(), resp.GetNextPageToken(), nil
}
fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// CreateUserListDirectLicense creates a user list direct license.
//
// This feature is only available to data partners.
func (c *userListDirectLicenseRESTClient) CreateUserListDirectLicense(ctx context.Context, req
*datamanagerpb.CreateUserListDirectLicenseRequest, opts ...gax.CallOption)
(*datamanagerpb.UserListDirectLicense, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 body
 := req.GetUserListDirectLicense()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
```

```
 return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v/userListDirectLicenses", req.GetParent())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//datamanager.googleapis.com/%v",
req.GetParent()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx,
 "rpc_method", "google.ads.datamanager.v1.UserListDirectLicenseService/CreateUserListDirectLicense")
  ctx = callctx.WithTelemetryContext(ctx, "url_template",
"/v1/{parent=accountTypes/*/accounts/*}/userListDirectLicenses")
 }
 opts =
append((*c.CallOptions).CreateUserListDirectLicense[0:len((*c.CallOptions).CreateUserListDirectLicense):len((*c.
CallOptions).CreateUserListDirectLicense)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &datamanagerpb.UserListDirectLicense{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "CreateUserListDirectLicense")
  if err !=
 nil {
   return err
  }
```

```
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// GetUserListDirectLicense retrieves a user list direct license.
//
// This feature is only available to data partners.
func (c *userListDirectLicenseRESTClient) GetUserListDirectLicense(ctx context.Context, req
*datamanagerpb.GetUserListDirectLicenseRequest, opts ...gax.CallOption)
(*datamanagerpb.UserListDirectLicense, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers
 := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//datamanager.googleapis.com/%v",
req.GetName()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.ads.datamanager.v1.UserListDirectLicenseService/GetUserListDirectLicense")
  ctx = callctx.WithTelemetryContext(ctx, "url_template",
"/v1/{name=accountTypes/*/accounts/*/userListDirectLicenses/*}")
 }
 opts =
```

```
append((*c.CallOptions).GetUserListDirectLicense[0:len((*c.CallOptions).GetUserListDirectLicense):len((*c.Call
Options).GetUserListDirectLicense)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &datamanagerpb.UserListDirectLicense{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path
 != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetUserListDirectLicense")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// UpdateUserListDirectLicense updates a user list direct license.
//
// This feature is only available to data partners.
func (c *userListDirectLicenseRESTClient) UpdateUserListDirectLicense(ctx context.Context, req
*datamanagerpb.UpdateUserListDirectLicenseRequest, opts ...gax.CallOption)
(*datamanagerpb.UserListDirectLicense, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 body := req.GetUserListDirectLicense()
 jsonReq, err := m.Marshal(body)
 if
 err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
```

```
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetUserListDirectLicense().GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")
 if req.GetUpdateMask() != nil {
  field, err := protojson.Marshal(req.GetUpdateMask())
  if err != nil {
   return nil, err
  }
  params.Add("updateMask", string(field[1:len(field)-1]))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "user_list_direct_license.name",
url.QueryEscape(req.GetUserListDirectLicense().GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
 "google.ads.datamanager.v1.UserListDirectLicenseService/UpdateUserListDirectLicense")
  ctx = callctx.WithTelemetryContext(ctx, "url_template",
"/v1/{user_list_direct_license.name=accountTypes/*/accounts/*/userListDirectLicenses/*}")
 }
 opts =
append((*c.CallOptions).UpdateUserListDirectLicense[0:len((*c.CallOptions).UpdateUserListDirectLicense):len((*
c.CallOptions).UpdateUserListDirectLicense)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &datamanagerpb.UserListDirectLicense{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("PATCH", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "UpdateUserListDirectLicense")
```

```
 if err != nil
 {
  return err
  }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
  }

 return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// ListUserListDirectLicenses lists all user list direct licenses owned by the parent account.
//
// This feature is only available to data partners.
func (c *userListDirectLicenseRESTClient) ListUserListDirectLicenses(ctx context.Context, req
*datamanagerpb.ListUserListDirectLicensesRequest, opts ...gax.CallOption) *UserListDirectLicenseIterator {
 it := &UserListDirectLicenseIterator{}
 req = proto.Clone(req).(*datamanagerpb.ListUserListDirectLicensesRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*datamanagerpb.UserListDirectLicense, string, error) {
  resp := &datamanagerpb.ListUserListDirectLicensesResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize =
 math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
   return nil, "", err
  }
  baseUrl.Path += fmt.Sprintf("/v1/%v/userListDirectLicenses", req.GetParent())

  params := url.Values{}
  params.Add("$alt", "json;enum-encoding=int")
  if req.GetFilter() != "" {
   params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
  }
  if req.GetPageSize() != 0 {
```

```
 params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
 }
 if req.GetPageToken() != "" {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET",
baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "ListUserListDirectLicenses")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetUserListDirectLicenses(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}
```

```
 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}
// Copyright 2026 Google LLC
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// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute

import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
 "math"
 "net/http"
 "net/url"
 "time"

 computepb "cloud.google.com/go/compute/apiv1/computepb"
 gax "github.com/googleapis/gax-go/v2"
 "github.com/googleapis/gax-go/v2/callctx"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 httptransport
 "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var newLicensesClientHook clientHook
```

```
// LicensesCallOptions contains the retry settings for each method of LicensesClient.
type LicensesCallOptions struct {
 Delete            []gax.CallOption
 Get               []gax.CallOption
 GetIamPolicy      []gax.CallOption
 Insert            []gax.CallOption
 List              []gax.CallOption
 SetIamPolicy      []gax.CallOption
 TestIamPermissions []gax.CallOption
 Update            []gax.CallOption
}

func defaultLicensesRESTCallOptions() *LicensesCallOptions {
 return &LicensesCallOptions{
  Delete: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  Get: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:
      60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  GetIamPolicy: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  Insert: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  List: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
```

```
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    100 * time.Millisecond,
    Max:        60000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusGatewayTimeout,
    http.StatusServiceUnavailable)
  }),
 },
 SetIamPolicy: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
 },
 TestIamPermissions:
[]gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
 },
 Update: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
 },
}
}

// internalLicensesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicensesClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Delete(context.Context, *computepb.DeleteLicenseRequest, ...gax.CallOption) (*Operation, error)
 Get(context.Context, *computepb.GetLicenseRequest, ...gax.CallOption) (*computepb.License, error)
 GetIamPolicy(context.Context, *computepb.GetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 Insert(context.Context, *computepb.InsertLicenseRequest, ...gax.CallOption) (*Operation, error)
 List(context.Context, *computepb.ListLicensesRequest, ...gax.CallOption) *LicenseIterator
 SetIamPolicy(context.Context, *computepb.SetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
 error)
 TestIamPermissions(context.Context, *computepb.TestIamPermissionsLicenseRequest, ...gax.CallOption)
(*computepb.TestPermissionsResponse, error)
 Update(context.Context, *computepb.UpdateLicenseRequest, ...gax.CallOption) (*Operation, error)
}

// LicensesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// The Licenses API.
type LicensesClient struct {
 // The internal transport-dependent client.
```

```
 internalClient internalLicensesClient

 // The call options for this service.
 CallOptions *LicensesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicensesClient) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application
 in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *LicensesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicensesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// Delete deletes the specified license.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *LicensesClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts ...gax.CallOption)
(*Operation, error) {
 return c.internalClient.Delete(ctx, req, opts...)
}

// Get returns the specified License resource.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
//
 images.
func (c *LicensesClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption)
(*computepb.License, error) {
 return c.internalClient.Get(ctx, req, opts...)
}
```

```
// GetIamPolicy gets the access control policy for a resource. May be empty if no such
// policy or resource exists.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *LicensesClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest, opts
...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.GetIamPolicy(ctx, req, opts...)
}

// Insert create a License resource in the specified project.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *LicensesClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts ...gax.CallOption)
(*Operation, error) {
 return c.internalClient.Insert(ctx,
 req, opts...)
}

// List retrieves the list of licenses
// available in the specified project. This method does not
// get any licenses that belong to other projects, including licenses attached
// to publicly-available images, like Debian 9. If you want to get a list of
// publicly-available licenses, use this method to make a request to the
// respective image project, such as debian-cloud orwindows-cloud.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *LicensesClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts ...gax.CallOption)
*LicenseIterator {
 return c.internalClient.List(ctx, req, opts...)
}

// SetIamPolicy sets the access control policy on the specified resource.
// Replaces any existing policy.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *LicensesClient) SetIamPolicy(ctx context.Context,
 req *computepb.SetIamPolicyLicenseRequest, opts ...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.SetIamPolicy(ctx, req, opts...)
}

// TestIamPermissions returns permissions that a caller has on the specified resource.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
```

```
// images.
func (c *LicensesClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse,
error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}

// Update updates a License resource in the specified project.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *LicensesClient) Update(ctx context.Context, req *computepb.UpdateLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 return c.internalClient.Update(ctx, req, opts...)
}

//
 Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type licensesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // operationClient is used to call the operation-specific management service.
 operationClient *GlobalOperationsClient

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicensesClient
 CallOptions **LicensesCallOptions

 logger *slog.Logger
}

// NewLicensesRESTClient creates a new licenses rest client.
//
// The Licenses API.
func NewLicensesRESTClient(ctx context.Context, opts ...option.ClientOption) (*LicensesClient, error) {
 clientOpts := append(defaultLicensesRESTClientOptions(), opts...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  clientOpts = append(clientOpts, internaloption.WithTelemetryAttributes(map[string]string{
   "gcp.client.service":
  "compute",
   "gcp.client.version":  getVersionClient(),
```

```
  "gcp.client.repo":     "googleapis/google-cloud-go",
  "gcp.client.artifact": "cloud.google.com/go/compute/apiv1",
  "gcp.client.language": "go",
  "url.domain":          "compute.googleapis.com",
 }))
}
httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
if err != nil {
 return nil, err
}

callOpts := defaultLicensesRESTCallOptions()
c := &licensesRESTClient{
 endpoint:    endpoint,
 httpClient:  httpClient,
 CallOptions: &callOpts,
 logger:      internaloption.GetLogger(opts),
}
c.setGoogleClientInfo()

if gax.IsFeatureEnabled("METRICS") {
 metrics := gax.NewClientMetrics(
  gax.WithTelemetryLogger(c.logger),
  gax.WithTelemetryAttributes(map[string]string{
   gax.ClientService:  "compute",
   gax.ClientVersion:  getVersionClient(),
   gax.ClientArtifact: "cloud.google.com/go/compute/apiv1",
   gax.RPCSystem:      "http",
   gax.URLDomain:
     "compute.googleapis.com",
  }),
 )

 callOpts.Delete = append(callOpts.Delete, gax.WithClientMetrics(metrics))
 callOpts.Get = append(callOpts.Get, gax.WithClientMetrics(metrics))
 callOpts.GetIamPolicy = append(callOpts.GetIamPolicy, gax.WithClientMetrics(metrics))
 callOpts.Insert = append(callOpts.Insert, gax.WithClientMetrics(metrics))
 callOpts.List = append(callOpts.List, gax.WithClientMetrics(metrics))
 callOpts.SetIamPolicy = append(callOpts.SetIamPolicy, gax.WithClientMetrics(metrics))
 callOpts.TestIamPermissions = append(callOpts.TestIamPermissions, gax.WithClientMetrics(metrics))
 callOpts.Update = append(callOpts.Update, gax.WithClientMetrics(metrics))
}

o := []option.ClientOption{
 option.WithHTTPClient(httpClient),
 option.WithEndpoint(endpoint),
}
opC, err := NewGlobalOperationsRESTClient(ctx, o...)
```

```
 if err != nil {
  return nil, err
 }
 c.operationClient = opC

 return &LicensesClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicensesRESTClientOptions()
 []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licensesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client",
 gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licensesRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 if err := c.operationClient.Close(); err != nil {
  return err
 }
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licensesRESTClient) Connection() *grpc.ClientConn {
```

```
 return nil
}

// Delete deletes the specified license.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *licensesRESTClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v",
 req.GetProject(), req.GetLicense())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name",
fmt.Sprintf("//compute.googleapis.com/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.cloud.compute.v1.Licenses/Delete")
  ctx
 = callctx.WithTelemetryContext(ctx, "url_template", "/compute/v1/projects/{project}/global/licenses/{license}")
 }
 opts = append((*c.CallOptions).Delete[0:len((*c.CallOptions).Delete):len((*c.CallOptions).Delete)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
```

```
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Delete")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 op := &Operation{
  &globalOperationsHandle{
   c:       c.operationClient,
   proto:
   resp,
   project: req.GetProject(),
  },
 }
 return op, nil
}

// Get returns the specified License resource.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *licensesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption)
(*computepb.License, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
```

```
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
 {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name",
fmt.Sprintf("//compute.googleapis.com/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.cloud.compute.v1.Licenses/Get")
  ctx = callctx.WithTelemetryContext(ctx, "url_template", "/compute/v1/projects/{project}/global/licenses/{license}")
 }
 opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.License{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header
 = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Get")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// GetIamPolicy gets the access control policy for a resource. May be empty if no such
// policy or resource exists.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
```

```
// images.
func (c *licensesRESTClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/getIamPolicy", req.GetProject(),
req.GetResource())

 params := url.Values{}
 if req != nil && req.OptionsRequestedPolicyVersion != nil {
  params.Add("optionsRequestedPolicyVersion",
 fmt.Sprintf("%v", req.GetOptionsRequestedPolicyVersion()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name",
fmt.Sprintf("//compute.googleapis.com/projects/%v/global/licenses/%v", req.GetProject(), req.GetResource()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.cloud.compute.v1.Licenses/GetIamPolicy")
  ctx = callctx.WithTelemetryContext(ctx, "url_template",
"/compute/v1/projects/{project}/global/licenses/{resource}/getIamPolicy")
 }
 opts
 =
append((*c.CallOptions).GetIamPolicy[0:len((*c.CallOptions).GetIamPolicy):len((*c.CallOptions).GetIamPolicy)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
```

```
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetIamPolicy")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
}

// Insert create a License resource in the specified project.
// Caution This resource is intended
// for
 use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *licensesRESTClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetLicenseResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()
```

```
 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "project", url.QueryEscape(req.GetProject()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx,
 hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//compute.googleapis.com/projects/%v",
req.GetProject()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.cloud.compute.v1.Licenses/Insert")
  ctx = callctx.WithTelemetryContext(ctx, "url_template", "/compute/v1/projects/{project}/global/licenses")
 }
 opts = append((*c.CallOptions).Insert[0:len((*c.CallOptions).Insert):len((*c.CallOptions).Insert)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err
 != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Insert")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 op := &Operation{
  &globalOperationsHandle{
   c:       c.operationClient,
```

```
  proto:   resp,
  project: req.GetProject(),
  },
 }
 return op, nil
}

// List retrieves the list of licenses
// available in the specified project. This method does not
// get any licenses that belong to other projects, including licenses attached
// to publicly-available images, like Debian 9. If you want to get a list of
// publicly-available licenses, use this method to make a request to the
// respective image project, such as debian-cloud orwindows-cloud.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
//
 images.
func (c *licensesRESTClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts
...gax.CallOption) *LicenseIterator {
 it := &LicenseIterator{}
 req = proto.Clone(req).(*computepb.ListLicensesRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*computepb.License, string, error) {
  resp := &computepb.LicensesListResponse{}
  if pageToken != "" {
   req.PageToken = proto.String(pageToken)
  }
  if pageSize > math.MaxInt32 {
   req.MaxResults = proto.Uint32(uint32(math.MaxInt32))
  } else if pageSize != 0 {
   req.MaxResults = proto.Uint32(uint32(pageSize))
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
   return nil, "", err
  }
  baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

  params := url.Values{}
  if req != nil && req.Filter != nil {
   params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
  }
  if
 req != nil && req.MaxResults != nil {
   params.Add("maxResults", fmt.Sprintf("%v", req.GetMaxResults()))
  }
  if req != nil && req.OrderBy != nil {
   params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
```

```
 }
 if req != nil && req.PageToken != nil {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }
 if req != nil && req.ReturnPartialSuccess != nil {
  params.Add("returnPartialSuccess", fmt.Sprintf("%v", req.GetReturnPartialSuccess()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx,
c.httpClient, httpReq, c.logger, nil, "List")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetItems(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
```

```
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetMaxResults())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

// SetIamPolicy sets the access control policy on the specified resource.
// Replaces any existing policy.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *licensesRESTClient)
 SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest, opts ...gax.CallOption)
(*computepb.Policy, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetGlobalSetPolicyRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/setIamPolicy", req.GetProject(),
req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name",
fmt.Sprintf("//compute.googleapis.com/projects/%v/global/licenses/%v",
 req.GetProject(), req.GetResource()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.cloud.compute.v1.Licenses/SetIamPolicy")
  ctx = callctx.WithTelemetryContext(ctx, "url_template",
"/compute/v1/projects/{project}/global/licenses/{resource}/setIamPolicy")
```

```
 }
 opts =
append((*c.CallOptions).SetIamPolicy[0:len((*c.CallOptions).SetIamPolicy):len((*c.CallOptions).SetIamPolicy)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header
 = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "SetIamPolicy")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// TestIamPermissions returns permissions that a caller has on the specified resource.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *licensesRESTClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse,
error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetTestPermissionsRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }
```

```
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/testIamPermissions",
 req.GetProject(), req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name",
fmt.Sprintf("//compute.googleapis.com/projects/%v/global/licenses/%v", req.GetProject(), req.GetResource()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.cloud.compute.v1.Licenses/TestIamPermissions")
  ctx = callctx.WithTelemetryContext(ctx, "url_template",
"/compute/v1/projects/{project}/global/licenses/{resource}/testIamPermissions")
 }
 opts
 =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "TestIamPermissions")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
```

```
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
}

// Update updates a License resource in the specified project.
//
 Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *licensesRESTClient) Update(ctx context.Context, req *computepb.UpdateLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
m := protojson.MarshalOptions{AllowPartial: true}
body := req.GetLicenseResource()
jsonReq, err := m.Marshal(body)
if err != nil {
 return nil, err
}

baseUrl, err := url.Parse(c.endpoint)
if err != nil {
 return nil, err
}
baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

params := url.Values{}
if req != nil && req.RequestId != nil {
 params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
}
if req != nil && req.UpdateMask != nil {
 params.Add("updateMask", fmt.Sprintf("%v", req.GetUpdateMask()))
}

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v",
"project", url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

hds = append(c.xGoogHeaders, hds...)
hds = append(hds, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
```

```
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name",
fmt.Sprintf("//compute.googleapis.com/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.cloud.compute.v1.Licenses/Update")
  ctx = callctx.WithTelemetryContext(ctx, "url_template", "/compute/v1/projects/{project}/global/licenses/{license}")
 }
 opts = append((*c.CallOptions).Update[0:len((*c.CallOptions).Update):len((*c.CallOptions).Update)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp
 := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("PATCH", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Update")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 op := &Operation{
  &globalOperationsHandle{
   c:       c.operationClient,
   proto:   resp,
   project: req.GetProject(),
  },
 }
 return op, nil
}
```

```go
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1beta"
 computepb "cloud.google.com/go/compute/apiv1beta/computepb"
 "google.golang.org/api/iterator"
)

func ExampleNewLicensesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 //
 It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicensesClient_Delete() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
```

```
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.DeleteLicenseRequest{
 //
TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#DeleteLicenseRequest.
}
op, err := c.Delete(ctx, req)
if err != nil {
 // TODO: Handle error.
}

err = op.Wait(ctx)
if err != nil {
 // TODO: Handle error.
}
}

func ExampleLicensesClient_Get() {
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.GetLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#GetLicenseRequest.
}
resp,
err := c.Get(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
```

```
 _ = resp
}

func ExampleLicensesClient_GetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetIamPolicyLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#GetIamPolicyLicenseRequest.
 }
 resp, err := c.GetIamPolicy(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_Insert()
 {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.InsertLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#InsertLicenseRequest.
 }
 op, err := c.Insert(ctx, req)
 if err != nil {
```

```
 // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleLicensesClient_List() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded
 as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.ListLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#ListLicensesRequest.
 }
 it := c.List(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _
 = it.Response.(*computepb.LicensesListResponse)
 }
}
```

```
func ExampleLicensesClient_SetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.SetIamPolicyLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#SetIamPolicyLicenseRequest.
 }
 resp, err := c.SetIamPolicy(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_TestIamPermissions() {
 ctx := context.Background()
 //
 This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.TestIamPermissionsLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#TestIamPermissionsLicenseRequest.
 }
 resp, err := c.TestIamPermissions(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
```

```
 _ = resp
}

func ExampleLicensesClient_Update() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require
 modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.UpdateLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#UpdateLicenseRequest.
 }
 op, err := c.Update(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

// [START discoveryengine_v1_generated_UserLicenseService_BatchUpdateUserLicenses_sync]
```

```
package main

import (
 "context"

 discoveryengine "cloud.google.com/go/discoveryengine/apiv1"
 discoveryenginepb "cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb"
)

func main() {
 ctx := context.Background()
 // This snippet has been automatically generated
 and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &discoveryenginepb.BatchUpdateUserLicensesRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb#BatchUpdateUserLicensesReque
st.
 }
 op, err := c.BatchUpdateUserLicenses(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 resp, err := op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

// [END discoveryengine_v1_generated_UserLicenseService_BatchUpdateUserLicenses_sync]
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```

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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.36.11
//  protoc        v6.31.0
// source: google/ads/datamanager/v1/user_list_global_license.proto

package datamanagerpb

import (
 reflect "reflect"
 sync "sync"
 unsafe "unsafe"

 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
)

const
 (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// A user list global license.
//
// This feature is only available to data partners.
type UserListGlobalLicense struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Identifier. The resource name of the user list global license.
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Immutable. ID of the user list being licensed.
 UserListId *int64 `protobuf:"varint,2,opt,name=user_list_id,json=userListId,proto3,oneof"
json:"user_list_id,omitempty"`
 // Output only. Name of the user list being licensed.
 //
```

```
 // This field is read-only.
 UserListDisplayName string
`protobuf:"bytes,3,opt,name=user_list_display_name,json=userListDisplayName,proto3"
json:"user_list_display_name,omitempty"`
 //
 Immutable. Product type of client customer which the user list is being
 // licensed to.
 LicenseType *UserListGlobalLicenseType
`protobuf:"varint,4,opt,name=license_type,json=licenseType,proto3,enum=google.ads.datamanager.v1.UserListGlo
balLicenseType,oneof" json:"license_type,omitempty"`
 // Optional. Status of UserListGlobalLicense - ENABLED or DISABLED.
 Status *UserListLicenseStatus
`protobuf:"varint,5,opt,name=status,proto3,enum=google.ads.datamanager.v1.UserListLicenseStatus,oneof"
json:"status,omitempty"`
 // Optional. UserListGlobalLicense pricing.
 Pricing *UserListLicensePricing `protobuf:"bytes,6,opt,name=pricing,proto3" json:"pricing,omitempty"`
 // Output only. Pricing history of this user list license.
 //
 // This field is read-only.
 HistoricalPricings []*UserListLicensePricing
`protobuf:"bytes,7,rep,name=historical_pricings,json=historicalPricings,proto3"
json:"historical_pricings,omitempty"`
 // Output only. Metrics related to this license
 //
 //
 This field is read-only and only populated if the start and end dates are
 // set in the ListUserListGlobalLicenses call
 Metrics       *UserListLicenseMetrics `protobuf:"bytes,8,opt,name=metrics,proto3" json:"metrics,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *UserListGlobalLicense) Reset() {
 *x = UserListGlobalLicense{}
 mi := &file_google_ads_datamanager_v1_user_list_global_license_proto_msgTypes[0]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *UserListGlobalLicense) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UserListGlobalLicense) ProtoMessage() {}

func (x *UserListGlobalLicense) ProtoReflect() protoreflect.Message {
 mi := &file_google_ads_datamanager_v1_user_list_global_license_proto_msgTypes[0]
 if x != nil {
```

```
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return
 mi.MessageOf(x)
}

// Deprecated: Use UserListGlobalLicense.ProtoReflect.Descriptor instead.
func (*UserListGlobalLicense) Descriptor() ([]byte, []int) {
 return file_google_ads_datamanager_v1_user_list_global_license_proto_rawDescGZIP(), []int{0}
}

func (x *UserListGlobalLicense) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
}

func (x *UserListGlobalLicense) GetUserListId() int64 {
 if x != nil && x.UserListId != nil {
  return *x.UserListId
 }
 return 0
}

func (x *UserListGlobalLicense) GetUserListDisplayName() string {
 if x != nil {
  return x.UserListDisplayName
 }
 return ""
}

func (x *UserListGlobalLicense) GetLicenseType() UserListGlobalLicenseType {
 if x != nil && x.LicenseType != nil {
  return *x.LicenseType
 }
 return UserListGlobalLicenseType_USER_LIST_GLOBAL_LICENSE_TYPE_UNSPECIFIED
}

func (x *UserListGlobalLicense) GetStatus() UserListLicenseStatus {
 if x != nil && x.Status != nil {
  return *x.Status
 }
 return UserListLicenseStatus_USER_LIST_LICENSE_STATUS_UNSPECIFIED
```

```
}

func
 (x *UserListGlobalLicense) GetPricing() *UserListLicensePricing {
 if x != nil {
  return x.Pricing
 }
 return nil
}

func (x *UserListGlobalLicense) GetHistoricalPricings() []*UserListLicensePricing {
 if x != nil {
  return x.HistoricalPricings
 }
 return nil
}

func (x *UserListGlobalLicense) GetMetrics() *UserListLicenseMetrics {
 if x != nil {
  return x.Metrics
 }
 return nil
}

// Information about a customer of a user list global license.  This will
// automatically be created by the system when a customer purchases a global
// license.
type UserListGlobalLicenseCustomerInfo struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Identifier. The resource name of the user list global license customer.
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Output only. ID of the user list being licensed.
 UserListId int64 `protobuf:"varint,2,opt,name=user_list_id,json=userListId,proto3" json:"user_list_id,omitempty"`
 //
 Output only. Name of the user list being licensed.
 UserListDisplayName string
`protobuf:"bytes,3,opt,name=user_list_display_name,json=userListDisplayName,proto3"
json:"user_list_display_name,omitempty"`
 // Output only. Product type of client customer which the user list is being
 // licensed to.
 LicenseType UserListGlobalLicenseType
`protobuf:"varint,4,opt,name=license_type,json=licenseType,proto3,enum=google.ads.datamanager.v1.UserListGlo
balLicenseType" json:"license_type,omitempty"`
 // Output only. Status of UserListDirectLicense - ENABLED or DISABLED.
 Status UserListLicenseStatus
`protobuf:"varint,5,opt,name=status,proto3,enum=google.ads.datamanager.v1.UserListLicenseStatus"
json:"status,omitempty"`
 // Output only. UserListDirectLicense pricing.
```

```
 Pricing *UserListLicensePricing `protobuf:"bytes,6,opt,name=pricing,proto3" json:"pricing,omitempty"`
 // Output only. Product type of client customer which the user list is being
 // licensed to.
 ClientAccountType UserListLicenseClientAccountType
`protobuf:"varint,7,opt,name=client_account_type,json=clientAccountType,proto3,enum=google.ads.datamanager.v
1.UserListLicenseClientAccountType" json:"client_account_type,omitempty"`
 // Output only. ID of client customer which the user list is being licensed
 // to.
 ClientAccountId int64 `protobuf:"varint,8,opt,name=client_account_id,json=clientAccountId,proto3"
json:"client_account_id,omitempty"`
 // Output only. Name of client customer which the user list is being licensed
 // to.
 ClientAccountDisplayName string
`protobuf:"bytes,9,opt,name=client_account_display_name,json=clientAccountDisplayName,proto3"
json:"client_account_display_name,omitempty"`
 // Output only. Pricing history of this user list license.
 HistoricalPricings []*UserListLicensePricing
`protobuf:"bytes,10,rep,name=historical_pricings,json=historicalPricings,proto3"
json:"historical_pricings,omitempty"`
 // Output only. Metrics related to this license
 //
 // This field is only populated if
 the start and end dates are set in the
 // ListUserListGlobalLicenseCustomerInfos call.
 Metrics       *UserListLicenseMetrics `protobuf:"bytes,11,opt,name=metrics,proto3" json:"metrics,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *UserListGlobalLicenseCustomerInfo) Reset() {
 *x = UserListGlobalLicenseCustomerInfo{}
 mi := &file_google_ads_datamanager_v1_user_list_global_license_proto_msgTypes[1]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *UserListGlobalLicenseCustomerInfo) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UserListGlobalLicenseCustomerInfo) ProtoMessage() {}

func (x *UserListGlobalLicenseCustomerInfo) ProtoReflect() protoreflect.Message {
 mi := &file_google_ads_datamanager_v1_user_list_global_license_proto_msgTypes[1]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
```

```
  }
  return
 ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use UserListGlobalLicenseCustomerInfo.ProtoReflect.Descriptor instead.
func (*UserListGlobalLicenseCustomerInfo) Descriptor() ([]byte, []int) {
 return file_google_ads_datamanager_v1_user_list_global_license_proto_rawDescGZIP(), []int{1}
}

func (x *UserListGlobalLicenseCustomerInfo) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
}

func (x *UserListGlobalLicenseCustomerInfo) GetUserListId() int64 {
 if x != nil {
  return x.UserListId
 }
 return 0
}

func (x *UserListGlobalLicenseCustomerInfo) GetUserListDisplayName() string {
 if x != nil {
  return x.UserListDisplayName
 }
 return ""
}

func (x *UserListGlobalLicenseCustomerInfo) GetLicenseType() UserListGlobalLicenseType {
 if x != nil {
  return x.LicenseType
 }
 return UserListGlobalLicenseType_USER_LIST_GLOBAL_LICENSE_TYPE_UNSPECIFIED
}

func (x *UserListGlobalLicenseCustomerInfo) GetStatus() UserListLicenseStatus {
 if x != nil {
  return x.Status
 }
 return
 UserListLicenseStatus_USER_LIST_LICENSE_STATUS_UNSPECIFIED
}
```

```
func (x *UserListGlobalLicenseCustomerInfo) GetPricing() *UserListLicensePricing {
 if x != nil {
  return x.Pricing
 }
 return nil
}

func (x *UserListGlobalLicenseCustomerInfo) GetClientAccountType() UserListLicenseClientAccountType {
 if x != nil {
  return x.ClientAccountType
 }
 return UserListLicenseClientAccountType_USER_LIST_LICENSE_CLIENT_ACCOUNT_TYPE_UNKNOWN
}

func (x *UserListGlobalLicenseCustomerInfo) GetClientAccountId() int64 {
 if x != nil {
  return x.ClientAccountId
 }
 return 0
}

func (x *UserListGlobalLicenseCustomerInfo) GetClientAccountDisplayName() string {
 if x != nil {
  return x.ClientAccountDisplayName
 }
 return ""
}

func (x *UserListGlobalLicenseCustomerInfo) GetHistoricalPricings() []*UserListLicensePricing {
 if x != nil {
  return x.HistoricalPricings
 }
 return nil
}

func (x *UserListGlobalLicenseCustomerInfo) GetMetrics() *UserListLicenseMetrics {
 if x != nil {
  return x.Metrics
 }
 return
 nil
}

var File_google_ads_datamanager_v1_user_list_global_license_proto protoreflect.FileDescriptor

const file_google_ads_datamanager_v1_user_list_global_license_proto_rawDesc = "" +
 "\n" +
"8google/ads/datamanager/v1/user_list_global_license.proto\x12\x19google.ads.datamanager.v1\x1a=google/ads/da
```

tamanager/v1/user_list_global_license_type.proto\x1aEgoogle/ads/datamanager/v1/user_list_license_client_account
_type.proto\x1a9google/ads/datamanager/v1/user_list_license_metrics.proto\x1a9google/ads/datamanager/v1/user_li
st_license_pricing.proto\x1a8google/ads/datamanager/v1/user_list_license_status.proto\x1a\x1fgoogle/api/field_beh
avior.proto\x1a\x19google/api/resource.proto\"\xd1\x06\n" +
 "\x15UserListGlobalLicense\x12\x17\n" +
 "\x04name\x18\x01 \x01(\tB\x03\xe0A\bR\x04name\x12*\n" +
 "\fuser_list_id\x18\x02 \x01(\x03B\x03\xe0A\x05H\x00R\n" +
 "userListId\x88\x01\x01\x128\n" +
 "\x16user_list_display_name\x18\x03 \x01(\tB\x03\xe0A\x03R\x13userListDisplayName\x12a\n" +
 "\flicense_type\x18\x04
\x01(\x0e24.google.ads.datamanager.v1.UserListGlobalLicenseTypeB\x03\xe0A\x05H\x01R\vlicenseType\x88\x01
\x01\x12R\n" +
 "\x06status\x18\x05
\x01(\x0e20.google.ads.datamanager.v1.UserListLicenseStatusB\x03\xe0A\x01H\x02R\x06status\x88\x01\x01\x12
P\n" +
 "\apricing\x18\x06
\x01(\v21.google.ads.datamanager.v1.UserListLicensePricingB\x03\xe0A\x01R\apricing\x12g\n" +
 "\x13historical_pricings\x18\a
\x03(\v21.google.ads.datamanager.v1.UserListLicensePricingB\x03\xe0A\x03R\x12historicalPricings\x12P\n" +
 "\ametrics\x18\b
\x01(\v21.google.ads.datamanager.v1.UserListLicenseMetricsB\x03\xe0A\x03R\ametrics:\xc7\x01\xeaA\xc3\x01\n"
+
"0datamanager.googleapis.com/UserListGlobalLicense\x12`accountTypes/{account_type}/accounts/{account}/user
ListGlobalLicenses/{user_list_global_license}*\x16userListGlobalLicenses2\x15userListGlobalLicenseB\x0f\n" +
 "\r_user_list_idB\x0f\n" +
 "\r_license_typeB\t\n" +
 "\a_status\"\xd3\b\n" +
 "!UserListGlobalLicenseCustomerInfo\x12\x17\n" +
 "\x04name\x18\x01
 \x01(\tB\x03\xe0A\bR\x04name\x12%\n" +
 "\fuser_list_id\x18\x02 \x01(\x03B\x03\xe0A\x03R\n" +
 "userListId\x128\n" +
 "\x16user_list_display_name\x18\x03 \x01(\tB\x03\xe0A\x03R\x13userListDisplayName\x12\\\n" +
 "\flicense_type\x18\x04
\x01(\x0e24.google.ads.datamanager.v1.UserListGlobalLicenseTypeB\x03\xe0A\x03R\vlicenseType\x12M\n" +
 "\x06status\x18\x05
\x01(\x0e20.google.ads.datamanager.v1.UserListLicenseStatusB\x03\xe0A\x03R\x06status\x12P\n" +
 "\apricing\x18\x06
\x01(\v21.google.ads.datamanager.v1.UserListLicensePricingB\x03\xe0A\x03R\apricing\x12p\n" +
 "\x13client_account_type\x18\a
\x01(\x0e2;.google.ads.datamanager.v1.UserListLicenseClientAccountTypeB\x03\xe0A\x03R\x11clientAccountTy
pe\x12/\n" +
 "\x11client_account_id\x18\b \x01(\x03B\x03\xe0A\x03R\x0fclientAccountId\x12B\n" +
 "\x1bclient_account_display_name\x18\t \x01(\tB\x03\xe0A\x03R\x18clientAccountDisplayName\x12g\n" +
 "\x13historical_pricings\x18\n" +
 " \x03(\v21.google.ads.datamanager.v1.UserListLicensePricingB\x03\xe0A\x03R\x12historicalPricings\x12P\n"
 +
 "\ametrics\x18\v

```
\x01(\v21.google.ads.datamanager.v1.UserListLicenseMetricsB\x03\xe0A\x03R\ametrics:\x92\x02\xeaA\x8e\x02\n
" +
"<datamanager.googleapis.com/UserListGlobalLicenseCustomerInfo\x12\x86\x01accountTypes/{account_type}/ac
counts/{account}/userListGlobalLicenses/{user_list_global_license}/customerInfos/{license_customer_info}*\"user
ListGlobalLicenseCustomerInfos2!userListGlobalLicenseCustomerInfoB\xd7\x01\n" +
"\x1dcom.google.ads.datamanager.v1B\x1aUserListGlobalLicenseProtoP\x01ZAcloud.google.com/go/datamanager/
apiv1/datamanagerpb;datamanagerpb\xaa\x02\x19Google.Ads.DataManager.V1\xca\x02\x19Google\\Ads\\DataMan
ager\\V1\xea\x02\x1cGoogle::Ads::DataManager::V1b\x06proto3"

var (
 file_google_ads_datamanager_v1_user_list_global_license_proto_rawDescOnce sync.Once
 file_google_ads_datamanager_v1_user_list_global_license_proto_rawDescData []byte
)

func file_google_ads_datamanager_v1_user_list_global_license_proto_rawDescGZIP()
 []byte {
 file_google_ads_datamanager_v1_user_list_global_license_proto_rawDescOnce.Do(func() {
  file_google_ads_datamanager_v1_user_list_global_license_proto_rawDescData =
protoimpl.X.CompressGZIP(unsafe.Slice(unsafe.StringData(file_google_ads_datamanager_v1_user_list_global_lice
nse_proto_rawDesc), len(file_google_ads_datamanager_v1_user_list_global_license_proto_rawDesc)))
 })
 return file_google_ads_datamanager_v1_user_list_global_license_proto_rawDescData
}

var file_google_ads_datamanager_v1_user_list_global_license_proto_msgTypes = make([]protoimpl.MessageInfo,
2)
var file_google_ads_datamanager_v1_user_list_global_license_proto_goTypes = []any{
 (*UserListGlobalLicense)(nil),            // 0: google.ads.datamanager.v1.UserListGlobalLicense
 (*UserListGlobalLicenseCustomerInfo)(nil), // 1: google.ads.datamanager.v1.UserListGlobalLicenseCustomerInfo
 (UserListGlobalLicenseType)(0),           // 2: google.ads.datamanager.v1.UserListGlobalLicenseType
 (UserListLicenseStatus)(0),
              // 3: google.ads.datamanager.v1.UserListLicenseStatus
 (*UserListLicensePricing)(nil),           // 4: google.ads.datamanager.v1.UserListLicensePricing
 (*UserListLicenseMetrics)(nil),           // 5: google.ads.datamanager.v1.UserListLicenseMetrics
 (UserListLicenseClientAccountType)(0),     // 6: google.ads.datamanager.v1.UserListLicenseClientAccountType
}
var file_google_ads_datamanager_v1_user_list_global_license_proto_depIdxs = []int32{
 2,  // 0: google.ads.datamanager.v1.UserListGlobalLicense.license_type:type_name ->
google.ads.datamanager.v1.UserListGlobalLicenseType
 3,  // 1: google.ads.datamanager.v1.UserListGlobalLicense.status:type_name ->
google.ads.datamanager.v1.UserListLicenseStatus
 4,  // 2: google.ads.datamanager.v1.UserListGlobalLicense.pricing:type_name ->
google.ads.datamanager.v1.UserListLicensePricing
 4,  // 3: google.ads.datamanager.v1.UserListGlobalLicense.historical_pricings:type_name ->
google.ads.datamanager.v1.UserListLicensePricing
 5,
  // 4: google.ads.datamanager.v1.UserListGlobalLicense.metrics:type_name ->
google.ads.datamanager.v1.UserListLicenseMetrics
```

```
 2,  // 5: google.ads.datamanager.v1.UserListGlobalLicenseCustomerInfo.license_type:type_name ->
google.ads.datamanager.v1.UserListGlobalLicenseType
 3,  // 6: google.ads.datamanager.v1.UserListGlobalLicenseCustomerInfo.status:type_name ->
google.ads.datamanager.v1.UserListLicenseStatus
 4,  // 7: google.ads.datamanager.v1.UserListGlobalLicenseCustomerInfo.pricing:type_name ->
google.ads.datamanager.v1.UserListLicensePricing
 6,  // 8: google.ads.datamanager.v1.UserListGlobalLicenseCustomerInfo.client_account_type:type_name ->
google.ads.datamanager.v1.UserListLicenseClientAccountType
 4,  // 9: google.ads.datamanager.v1.UserListGlobalLicenseCustomerInfo.historical_pricings:type_name ->
google.ads.datamanager.v1.UserListLicensePricing
 5,  // 10: google.ads.datamanager.v1.UserListGlobalLicenseCustomerInfo.metrics:type_name ->
google.ads.datamanager.v1.UserListLicenseMetrics
 11,
 // [11:11] is the sub-list for method output_type
 11, // [11:11] is the sub-list for method input_type
 11, // [11:11] is the sub-list for extension type_name
 11, // [11:11] is the sub-list for extension extendee
 0,  // [0:11] is the sub-list for field type_name
}

func init() { file_google_ads_datamanager_v1_user_list_global_license_proto_init() }
func file_google_ads_datamanager_v1_user_list_global_license_proto_init() {
 if File_google_ads_datamanager_v1_user_list_global_license_proto != nil {
  return
 }
 file_google_ads_datamanager_v1_user_list_global_license_type_proto_init()
 file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_init()
 file_google_ads_datamanager_v1_user_list_license_metrics_proto_init()
 file_google_ads_datamanager_v1_user_list_license_pricing_proto_init()
 file_google_ads_datamanager_v1_user_list_license_status_proto_init()
 file_google_ads_datamanager_v1_user_list_global_license_proto_msgTypes[0].OneofWrappers
 = []any{}
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor:
unsafe.Slice(unsafe.StringData(file_google_ads_datamanager_v1_user_list_global_license_proto_rawDesc),
len(file_google_ads_datamanager_v1_user_list_global_license_proto_rawDesc)),
   NumEnums:      0,
   NumMessages:   2,
   NumExtensions: 0,
   NumServices:   0,
  },
  GoTypes:           file_google_ads_datamanager_v1_user_list_global_license_proto_goTypes,
  DependencyIndexes: file_google_ads_datamanager_v1_user_list_global_license_proto_depIdxs,
  MessageInfos:      file_google_ads_datamanager_v1_user_list_global_license_proto_msgTypes,
 }.Build()
```

```
 File_google_ads_datamanager_v1_user_list_global_license_proto = out.File
 file_google_ads_datamanager_v1_user_list_global_license_proto_goTypes = nil
 file_google_ads_datamanager_v1_user_list_global_license_proto_depIdxs = nil
}
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//
//     https://www.apache.org/licenses/LICENSE-2.0
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// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package licensemanager_test

import (
 "context"

 licensemanager "cloud.google.com/go/licensemanager/apiv1"
 licensemanagerpb "cloud.google.com/go/licensemanager/apiv1/licensemanagerpb"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 locationpb "google.golang.org/genproto/googleapis/cloud/location"
)

func ExampleClient_AggregateUsage_all()
 {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.AggregateUsageRequest{
```

```
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#AggregateUsageRequest.
 }
 for resp, err := range c.AggregateUsage(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}

func ExampleClient_ListConfigurations_all() {
 ctx
 := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.ListConfigurationsRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#ListConfigurationsRequest.
 }
 for resp, err := range c.ListConfigurations(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}

func ExampleClient_ListInstances_all() {
 ctx := context.Background()
 // This
 snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
```

```
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.ListInstancesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#ListInstancesRequest.
 }
 for resp, err := range c.ListInstances(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}

func ExampleClient_ListProducts_all() {
 ctx := context.Background()
 // This snippet has been automatically generated and
 should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.ListProductsRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#ListProductsRequest.
 }
 for resp, err := range c.ListProducts(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}

func ExampleClient_ListLocations_all() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
```

```
// It
will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := licensemanager.NewClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &locationpb.ListLocationsRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/google.golang.org/genproto/googleapis/cloud/location#ListLocationsRequest.
}
for resp, err := range c.ListLocations(ctx, req).All() {
 if err != nil {
  // TODO: Handle error and break/return/continue. Iteration will stop after any error.
 }
 // TODO: Use resp.
 _ = resp
}
}

func ExampleClient_ListOperations_all() {
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require
correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := licensemanager.NewClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &longrunningpb.ListOperationsRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#ListOperationsRequest.
}
for resp, err := range c.ListOperations(ctx, req).All() {
 if err != nil {
  // TODO: Handle error and break/return/continue. Iteration will stop after any error.
 }
 // TODO: Use resp.
 _ = resp
```

```
 }
}
// Copyright 2026 Google LLC
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// limitations under the License.

// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.36.11
//  protoc        v6.31.0
// source: google/ads/datamanager/v1/user_list_license_pricing.proto

package datamanagerpb

import (
 reflect "reflect"
 sync "sync"
 unsafe "unsafe"

 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
 timestamppb
 "google.golang.org/protobuf/types/known/timestamppb"
)

const (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// User list pricing buyer approval state.
type UserListLicensePricing_UserListPricingBuyerApprovalState int32

const (
 // UNSPECIFIED.
```

```
 UserListLicensePricing_USER_LIST_PRICING_BUYER_APPROVAL_STATE_UNSPECIFIED
UserListLicensePricing_UserListPricingBuyerApprovalState = 0
 // User list client has not yet accepted the pricing terms set by the user
 // list owner.
 UserListLicensePricing_PENDING UserListLicensePricing_UserListPricingBuyerApprovalState = 1
 // User list client has accepted the pricing terms set by the user list
 // owner.
 UserListLicensePricing_APPROVED UserListLicensePricing_UserListPricingBuyerApprovalState = 2
 // User
 list client has rejected the pricing terms set by the user list
 // owner.
 UserListLicensePricing_REJECTED UserListLicensePricing_UserListPricingBuyerApprovalState = 3
)

// Enum value maps for UserListLicensePricing_UserListPricingBuyerApprovalState.
var (
 UserListLicensePricing_UserListPricingBuyerApprovalState_name = map[int32]string{
  0: "USER_LIST_PRICING_BUYER_APPROVAL_STATE_UNSPECIFIED",
  1: "PENDING",
  2: "APPROVED",
  3: "REJECTED",
 }
 UserListLicensePricing_UserListPricingBuyerApprovalState_value = map[string]int32{
  "USER_LIST_PRICING_BUYER_APPROVAL_STATE_UNSPECIFIED": 0,
  "PENDING":  1,
  "APPROVED": 2,
  "REJECTED": 3,
 }
)

func (x UserListLicensePricing_UserListPricingBuyerApprovalState) Enum()
*UserListLicensePricing_UserListPricingBuyerApprovalState {
 p := new(UserListLicensePricing_UserListPricingBuyerApprovalState)
 *p = x
 return p
}

func (x UserListLicensePricing_UserListPricingBuyerApprovalState) String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(),
 protoreflect.EnumNumber(x))
}

func (UserListLicensePricing_UserListPricingBuyerApprovalState) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ads_datamanager_v1_user_list_license_pricing_proto_enumTypes[0].Descriptor()
}

func (UserListLicensePricing_UserListPricingBuyerApprovalState) Type() protoreflect.EnumType {
 return &file_google_ads_datamanager_v1_user_list_license_pricing_proto_enumTypes[0]
```

```
}

func (x UserListLicensePricing_UserListPricingBuyerApprovalState) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use UserListLicensePricing_UserListPricingBuyerApprovalState.Descriptor instead.
func (UserListLicensePricing_UserListPricingBuyerApprovalState) EnumDescriptor() ([]byte, []int) {
 return file_google_ads_datamanager_v1_user_list_license_pricing_proto_rawDescGZIP(), []int{0, 0}
}

// User list pricing cost type.
type UserListLicensePricing_UserListPricingCostType int32

const (
 // Unspecified.
 UserListLicensePricing_USER_LIST_PRICING_COST_TYPE_UNSPECIFIED
 UserListLicensePricing_UserListPricingCostType = 0
 // Cost per click.
 UserListLicensePricing_CPC UserListLicensePricing_UserListPricingCostType = 1
 // Cost per mille (thousand impressions).
 UserListLicensePricing_CPM UserListLicensePricing_UserListPricingCostType = 2
 // Media share.
 UserListLicensePricing_MEDIA_SHARE UserListLicensePricing_UserListPricingCostType = 3
)

// Enum value maps for UserListLicensePricing_UserListPricingCostType.
var (
 UserListLicensePricing_UserListPricingCostType_name = map[int32]string{
  0: "USER_LIST_PRICING_COST_TYPE_UNSPECIFIED",
  1: "CPC",
  2: "CPM",
  3: "MEDIA_SHARE",
 }
 UserListLicensePricing_UserListPricingCostType_value = map[string]int32{
  "USER_LIST_PRICING_COST_TYPE_UNSPECIFIED": 0,
  "CPC":         1,
  "CPM":         2,
  "MEDIA_SHARE": 3,
 }
)

func (x UserListLicensePricing_UserListPricingCostType) Enum()
*UserListLicensePricing_UserListPricingCostType {
 p := new(UserListLicensePricing_UserListPricingCostType)
 *p
 = x
 return p
```

```
}

func (x UserListLicensePricing_UserListPricingCostType) String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (UserListLicensePricing_UserListPricingCostType) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ads_datamanager_v1_user_list_license_pricing_proto_enumTypes[1].Descriptor()
}

func (UserListLicensePricing_UserListPricingCostType) Type() protoreflect.EnumType {
 return &file_google_ads_datamanager_v1_user_list_license_pricing_proto_enumTypes[1]
}

func (x UserListLicensePricing_UserListPricingCostType) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use UserListLicensePricing_UserListPricingCostType.Descriptor instead.
func (UserListLicensePricing_UserListPricingCostType) EnumDescriptor() ([]byte, []int) {
 return file_google_ads_datamanager_v1_user_list_license_pricing_proto_rawDescGZIP(), []int{0, 1}
}

// A user list license
 pricing.
type UserListLicensePricing struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Output only. The ID of this pricing.
 PricingId int64 `protobuf:"varint,1,opt,name=pricing_id,json=pricingId,proto3" json:"pricing_id,omitempty"`
 // Optional. The cost associated with the model, in micro units (10^-6), in
 // the currency specified by the currency_code field. For example, 2000000
 // means $2 if `currency_code` is `USD`.
 CostMicros *int64 `protobuf:"varint,2,opt,name=cost_micros,json=costMicros,proto3,oneof"
json:"cost_micros,omitempty"`
 // Optional. The currency in which cost and max_cost is specified. Must be a
 // three-letter currency code defined in ISO 4217.
 CurrencyCode *string `protobuf:"bytes,9,opt,name=currency_code,json=currencyCode,proto3,oneof"
json:"currency_code,omitempty"`
 // Output only. Start time of the pricing.
 StartTime *timestamppb.Timestamp `protobuf:"bytes,3,opt,name=start_time,json=startTime,proto3"
json:"start_time,omitempty"`
 // Optional.
 End time of the pricing.
 EndTime *timestamppb.Timestamp `protobuf:"bytes,4,opt,name=end_time,json=endTime,proto3"
json:"end_time,omitempty"`
 // Output only. Whether this pricing is active.
 PricingActive bool `protobuf:"varint,5,opt,name=pricing_active,json=pricingActive,proto3"
json:"pricing_active,omitempty"`
```

```
 // Output only. The buyer approval state of this pricing.
 //
 // This field is read-only.
 BuyerApprovalState UserListLicensePricing_UserListPricingBuyerApprovalState
`protobuf:"varint,6,opt,name=buyer_approval_state,json=buyerApprovalState,proto3,enum=google.ads.datamanager
.v1.UserListLicensePricing_UserListPricingBuyerApprovalState" json:"buyer_approval_state,omitempty"`
 // Immutable. The cost type of this pricing.
 //
 // Can be set only in the `create` operation. Can't be updated for
 // an existing license.
 CostType *UserListLicensePricing_UserListPricingCostType
`protobuf:"varint,7,opt,name=cost_type,json=costType,proto3,enum=google.ads.datamanager.v1.UserListLicensePr
icing_UserListPricingCostType,oneof"
 json:"cost_type,omitempty"`
 // Optional. The maximum CPM a commerce audience can be charged when the
 // MEDIA_SHARE cost type is used. The value is in micro units (10^-6) and in
 // the currency specified by the currency_code field. For example, 2000000
 // means $2 if `currency_code` is `USD`.
 //
 // This is only relevant when cost_type is MEDIA_SHARE.
 // When cost_type is not MEDIA_SHARE, and this field is set, a
 // MAX_COST_NOT_ALLOWED error will be returned.
 // If not set or set to`0`, there is no cap.
 MaxCostMicros *int64 `protobuf:"varint,8,opt,name=max_cost_micros,json=maxCostMicros,proto3,oneof"
json:"max_cost_micros,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *UserListLicensePricing) Reset() {
 *x = UserListLicensePricing{}
 mi := &file_google_ads_datamanager_v1_user_list_license_pricing_proto_msgTypes[0]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func
 (x *UserListLicensePricing) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UserListLicensePricing) ProtoMessage() {}

func (x *UserListLicensePricing) ProtoReflect() protoreflect.Message {
 mi := &file_google_ads_datamanager_v1_user_list_license_pricing_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
```

```
  ms.StoreMessageInfo(mi)
 }
 return ms
}
return mi.MessageOf(x)
}

// Deprecated: Use UserListLicensePricing.ProtoReflect.Descriptor instead.
func (*UserListLicensePricing) Descriptor() ([]byte, []int) {
 return file_google_ads_datamanager_v1_user_list_license_pricing_proto_rawDescGZIP(), []int{0}
}

func (x *UserListLicensePricing) GetPricingId() int64 {
 if x != nil {
  return x.PricingId
 }
 return 0
}

func (x *UserListLicensePricing) GetCostMicros() int64 {
 if x != nil && x.CostMicros != nil {
  return *x.CostMicros
 }
 return 0
}

func (x *UserListLicensePricing)
 GetCurrencyCode() string {
 if x != nil && x.CurrencyCode != nil {
  return *x.CurrencyCode
 }
 return ""
}

func (x *UserListLicensePricing) GetStartTime() *timestamppb.Timestamp {
 if x != nil {
  return x.StartTime
 }
 return nil
}

func (x *UserListLicensePricing) GetEndTime() *timestamppb.Timestamp {
 if x != nil {
  return x.EndTime
 }
 return nil
}
```

```
func (x *UserListLicensePricing) GetPricingActive() bool {
 if x != nil {
  return x.PricingActive
 }
 return false
}

func (x *UserListLicensePricing) GetBuyerApprovalState()
UserListLicensePricing_UserListPricingBuyerApprovalState {
 if x != nil {
  return x.BuyerApprovalState
 }
 return UserListLicensePricing_USER_LIST_PRICING_BUYER_APPROVAL_STATE_UNSPECIFIED
}

func (x *UserListLicensePricing) GetCostType() UserListLicensePricing_UserListPricingCostType {
 if x != nil && x.CostType != nil {
  return *x.CostType
 }
 return UserListLicensePricing_USER_LIST_PRICING_COST_TYPE_UNSPECIFIED
}

func (x *UserListLicensePricing) GetMaxCostMicros()
 int64 {
 if x != nil && x.MaxCostMicros != nil {
  return *x.MaxCostMicros
 }
 return 0
}

var File_google_ads_datamanager_v1_user_list_license_pricing_proto protoreflect.FileDescriptor

const file_google_ads_datamanager_v1_user_list_license_pricing_proto_rawDesc = "" +
 "\n" +
"9google/ads/datamanager/v1/user_list_license_pricing.proto\x12\x19google.ads.datamanager.v1\x1a\x1fgoogle/api
/field_behavior.proto\x1a\x1fgoogle/protobuf/timestamp.proto\"\xa5\a\n" +
 "\x16UserListLicensePricing\x12\"\n" +
 "\n" +
 "pricing_id\x18\x01 \x01(\x03B\x03\xe0A\x03R\tpricingId\x12)\n" +
 "\vcost_micros\x18\x02 \x01(\x03B\x03\xe0A\x01H\x00R\n" +
 "costMicros\x88\x01\x01\x12-\n" +
 "\rcurrency_code\x18\t \x01(\tB\x03\xe0A\x01H\x01R\fcurrencyCode\x88\x01\x01\x12>\n" +
 "\n" +
 "start_time\x18\x03 \x01(\v2\x1a.google.protobuf.TimestampB\x03\xe0A\x03R\tstartTime\x12:\n" +
 "\bend_time\x18\x04 \x01(\v2\x1a.google.protobuf.TimestampB\x03\xe0A\x01R\aendTime\x12*\n" +
 "\x0epricing_active\x18\x05 \x01(\bB\x03\xe0A\x03R\rpricingActive\x12\x8a\x01\n"
 +
 "\x14buyer_approval_state\x18\x06
```

```
\x01(\x0e2S.google.ads.datamanager.v1.UserListLicensePricing.UserListPricingBuyerApprovalStateB\x03\xe0A\x0
3R\x12buyerApprovalState\x12p\n" +
 "\tcost_type\x18\a
\x01(\x0e2I.google.ads.datamanager.v1.UserListLicensePricing.UserListPricingCostTypeB\x03\xe0A\x05H\x02R\b
costType\x88\x01\x01\x120\n" +
 "\x0fmax_cost_micros\x18\b \x01(\x03B\x03\xe0A\x01H\x03R\rmaxCostMicros\x88\x01\x01\"\x84\x01\n" +
 "!UserListPricingBuyerApprovalState\x126\n" +
 "2USER_LIST_PRICING_BUYER_APPROVAL_STATE_UNSPECIFIED\x10\x00\x12\v\n" +
 "\aPENDING\x10\x01\x12\f\n" +
 "\bAPPROVED\x10\x02\x12\f\n" +
 "\bREJECTED\x10\x03\"i\n" +
 "\x17UserListPricingCostType\x12+\n" +
 "'USER_LIST_PRICING_COST_TYPE_UNSPECIFIED\x10\x00\x12\a\n" +
 "\x03CPC\x10\x01\x12\a\n" +
 "\x03CPM\x10\x02\x12\x0f\n" +
 "\vMEDIA_SHARE\x10\x03B\x0e\n" +
 "\f_cost_microsB\x10\n" +
 "\x0e_currency_codeB\f\n" +
 "\n" +
 "_cost_typeB\x12\n" +
 "\x10_max_cost_microsB\xd8\x01\n"
 +
"\x1dcom.google.ads.datamanager.v1B\x1bUserListLicensePricingProtoP\x01ZAcloud.google.com/go/datamanager
/apiv1/datamanagerpb;datamanagerpb\xaa\x02\x19Google.Ads.DataManager.V1\xca\x02\x19Google\\Ads\\DataMa
nager\\V1\xea\x02\x1cGoogle::Ads::DataManager::V1b\x06proto3"

var (
 file_google_ads_datamanager_v1_user_list_license_pricing_proto_rawDescOnce sync.Once
 file_google_ads_datamanager_v1_user_list_license_pricing_proto_rawDescData []byte
)

func file_google_ads_datamanager_v1_user_list_license_pricing_proto_rawDescGZIP() []byte {
 file_google_ads_datamanager_v1_user_list_license_pricing_proto_rawDescOnce.Do(func() {
  file_google_ads_datamanager_v1_user_list_license_pricing_proto_rawDescData =
protoimpl.X.CompressGZIP(unsafe.Slice(unsafe.StringData(file_google_ads_datamanager_v1_user_list_license_pri
cing_proto_rawDesc), len(file_google_ads_datamanager_v1_user_list_license_pricing_proto_rawDesc)))
 })
 return file_google_ads_datamanager_v1_user_list_license_pricing_proto_rawDescData
}

var
 file_google_ads_datamanager_v1_user_list_license_pricing_proto_enumTypes = make([]protoimpl.EnumInfo, 2)
var file_google_ads_datamanager_v1_user_list_license_pricing_proto_msgTypes = make([]protoimpl.MessageInfo,
1)
var file_google_ads_datamanager_v1_user_list_license_pricing_proto_goTypes = []any{
 (UserListLicensePricing_UserListPricingBuyerApprovalState)(0), // 0:
google.ads.datamanager.v1.UserListLicensePricing.UserListPricingBuyerApprovalState
 (UserListLicensePricing_UserListPricingCostType)(0),          // 1:
```

```
google.ads.datamanager.v1.UserListLicensePricing.UserListPricingCostType
 (*UserListLicensePricing)(nil),                    // 2: google.ads.datamanager.v1.UserListLicensePricing
 (*timestamppb.Timestamp)(nil),                     // 3: google.protobuf.Timestamp
}
var file_google_ads_datamanager_v1_user_list_license_pricing_proto_depIdxs = []int32{
 3, // 0: google.ads.datamanager.v1.UserListLicensePricing.start_time:type_name
 -> google.protobuf.Timestamp
 3, // 1: google.ads.datamanager.v1.UserListLicensePricing.end_time:type_name -> google.protobuf.Timestamp
 0, // 2: google.ads.datamanager.v1.UserListLicensePricing.buyer_approval_state:type_name ->
google.ads.datamanager.v1.UserListLicensePricing.UserListPricingBuyerApprovalState
 1, // 3: google.ads.datamanager.v1.UserListLicensePricing.cost_type:type_name ->
google.ads.datamanager.v1.UserListLicensePricing.UserListPricingCostType
 4, // [4:4] is the sub-list for method output_type
 4, // [4:4] is the sub-list for method input_type
 4, // [4:4] is the sub-list for extension type_name
 4, // [4:4] is the sub-list for extension extendee
 0, // [0:4] is the sub-list for field type_name
}

func init() { file_google_ads_datamanager_v1_user_list_license_pricing_proto_init() }
func file_google_ads_datamanager_v1_user_list_license_pricing_proto_init() {
 if File_google_ads_datamanager_v1_user_list_license_pricing_proto != nil {
  return
 }
 file_google_ads_datamanager_v1_user_list_license_pricing_proto_msgTypes[0].OneofWrappers
 = []any{}
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor:
unsafe.Slice(unsafe.StringData(file_google_ads_datamanager_v1_user_list_license_pricing_proto_rawDesc),
len(file_google_ads_datamanager_v1_user_list_license_pricing_proto_rawDesc)),
   NumEnums:      2,
   NumMessages:   1,
   NumExtensions: 0,
   NumServices:   0,
  },
  GoTypes:           file_google_ads_datamanager_v1_user_list_license_pricing_proto_goTypes,
  DependencyIndexes: file_google_ads_datamanager_v1_user_list_license_pricing_proto_depIdxs,
  EnumInfos:         file_google_ads_datamanager_v1_user_list_license_pricing_proto_enumTypes,
  MessageInfos:      file_google_ads_datamanager_v1_user_list_license_pricing_proto_msgTypes,
 }.Build()
 File_google_ads_datamanager_v1_user_list_license_pricing_proto = out.File
 file_google_ads_datamanager_v1_user_list_license_pricing_proto_goTypes
 = nil
 file_google_ads_datamanager_v1_user_list_license_pricing_proto_depIdxs = nil
}
```

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// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1beta"
 computepb "cloud.google.com/go/compute/apiv1beta/computepb"
)

func ExampleNewLicenseCodesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications
 to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicenseCodesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
```

```
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicenseCodesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.GetLicenseCodeRequest{
 // TODO:
Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#GetLicenseCodeRequest.
}
resp, err := c.Get(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleLicenseCodesClient_TestIamPermissions() {
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicenseCodesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.TestIamPermissionsLicenseCodeRequest{
 // TODO: Fill request struct fields.
 // See
https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#TestIamPermissionsLicenseCodeRequest.
}
resp,
err := c.TestIamPermissions(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}
```

```
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// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1beta"
 computepb "cloud.google.com/go/compute/apiv1beta/computepb"
)

func ExampleLicensesClient_List_all() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require
 modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.ListLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1beta/computepb#ListLicensesRequest.
 }
 for resp, err := range c.List(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
```

```
  }
  // TODO: Use resp.
  _ = resp
 }
}
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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.36.11
//  protoc        v6.31.0
// source: google/ai/generativelanguage/v1alpha/permission.proto

package generativelanguagepb

import (
 reflect "reflect"
 sync "sync"
 unsafe "unsafe"

 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
)

const
 (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Defines types of the grantee of this permission.
type Permission_GranteeType int32
```

```
const (
 // The default value. This value is unused.
 Permission_GRANTEE_TYPE_UNSPECIFIED Permission_GranteeType = 0
 // Represents a user. When set, you must provide email_address for the user.
 Permission_USER Permission_GranteeType = 1
 // Represents a group. When set, you must provide email_address for the
 // group.
 Permission_GROUP Permission_GranteeType = 2
 // Represents access to everyone. No extra information is required.
 Permission_EVERYONE Permission_GranteeType = 3
)

// Enum value maps for Permission_GranteeType.
var (
 Permission_GranteeType_name = map[int32]string{
  0: "GRANTEE_TYPE_UNSPECIFIED",
  1:
 "USER",
  2: "GROUP",
  3: "EVERYONE",
 }
 Permission_GranteeType_value = map[string]int32{
  "GRANTEE_TYPE_UNSPECIFIED": 0,
  "USER":                     1,
  "GROUP":                    2,
  "EVERYONE":                 3,
 }
)

func (x Permission_GranteeType) Enum() *Permission_GranteeType {
 p := new(Permission_GranteeType)
 *p = x
 return p
}

func (x Permission_GranteeType) String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_GranteeType) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[0].Descriptor()
}

func (Permission_GranteeType) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[0]
}

func (x Permission_GranteeType) Number() protoreflect.EnumNumber {
```

```
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_GranteeType.Descriptor instead.
func (Permission_GranteeType) EnumDescriptor()
 ([]byte, []int) {
 return file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescGZIP(), []int{0, 0}
}

// Defines the role granted by this permission.
type Permission_Role int32

const (
 // The default value. This value is unused.
 Permission_ROLE_UNSPECIFIED Permission_Role = 0
 // Owner can use, update, share and delete the resource.
 Permission_OWNER Permission_Role = 1
 // Writer can use, update and share the resource.
 Permission_WRITER Permission_Role = 2
 // Reader can use the resource.
 Permission_READER Permission_Role = 3
)

// Enum value maps for Permission_Role.
var (
 Permission_Role_name = map[int32]string{
  0: "ROLE_UNSPECIFIED",
  1: "OWNER",
  2: "WRITER",
  3: "READER",
 }
 Permission_Role_value = map[string]int32{
  "ROLE_UNSPECIFIED": 0,
  "OWNER":            1,
  "WRITER":           2,
  "READER":           3,
 }
)

func (x Permission_Role) Enum() *Permission_Role {
 p := new(Permission_Role)
 *p = x
 return p
}

func (x Permission_Role)
 String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
```

```
}

func (Permission_Role) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[1].Descriptor()
}

func (Permission_Role) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[1]
}

func (x Permission_Role) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_Role.Descriptor instead.
func (Permission_Role) EnumDescriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescGZIP(), []int{0, 1}
}

// Permission resource grants user, group or the rest of the world access to the
// PaLM API resource (e.g. a tuned model, corpus).
//
// A role is a collection of permitted operations that allows users to perform
// specific actions on PaLM API resources. To make them available to users,
//
 groups, or service accounts, you assign roles. When you assign a role, you
// grant permissions that the role contains.
//
// There are three concentric roles. Each role is a superset of the previous
// role's permitted operations:
//
// - reader can use the resource (e.g. tuned model, corpus) for inference
// - writer has reader's permissions and additionally can edit and share
// - owner has writer's permissions and additionally can delete
type Permission struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Output only. Identifier. The permission name. A unique name will be
 // generated on create. Examples:
 //
 // tunedModels/{tuned_model}/permissions/{permission}
 // corpora/{corpus}/permissions/{permission}
 //
 // Output only.
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Optional. Immutable. The type of the grantee.
 GranteeType *Permission_GranteeType
`protobuf:"varint,2,opt,name=grantee_type,json=granteeType,proto3,enum=google.ai.generativelanguage.v1alpha.P
ermission_GranteeType,oneof"
```

```
 json:"grantee_type,omitempty"`
 // Optional. Immutable. The email address of the user of group which this
 // permission refers. Field is not set when permission's grantee type is
 // EVERYONE.
 EmailAddress *string `protobuf:"bytes,3,opt,name=email_address,json=emailAddress,proto3,oneof"
json:"email_address,omitempty"`
 // Required. The role granted by this permission.
 Role          *Permission_Role
`protobuf:"varint,4,opt,name=role,proto3,enum=google.ai.generativelanguage.v1alpha.Permission_Role,oneof"
json:"role,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *Permission) Reset() {
 *x = Permission{}
 mi := &file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes[0]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *Permission) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*Permission) ProtoMessage() {}

func
 (x *Permission) ProtoReflect() protoreflect.Message {
 mi := &file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use Permission.ProtoReflect.Descriptor instead.
func (*Permission) Descriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescGZIP(), []int{0}
}

func (x *Permission) GetName() string {
 if x != nil {
  return x.Name
```

```
 }
 return ""
}

func (x *Permission) GetGranteeType() Permission_GranteeType {
 if x != nil && x.GranteeType != nil {
  return *x.GranteeType
 }
 return Permission_GRANTEE_TYPE_UNSPECIFIED
}

func (x *Permission) GetEmailAddress() string {
 if x != nil && x.EmailAddress != nil {
  return *x.EmailAddress
 }
 return ""
}

func (x *Permission) GetRole() Permission_Role {
 if x != nil && x.Role != nil {
  return
 *x.Role
 }
 return Permission_ROLE_UNSPECIFIED
}

var File_google_ai_generativelanguage_v1alpha_permission_proto protoreflect.FileDescriptor

const file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc = "" +
 "\n" +
"5google/ai/generativelanguage/v1alpha/permission.proto\x12$google.ai.generativelanguage.v1alpha\x1a\x1fgoogle
/api/field_behavior.proto\x1a\x19google/api/resource.proto\"\x87\x05\n" +
 "\n" +
 "Permission\x12\x1a\n" +
 "\x04name\x18\x01 \x01(\tB\x06\xe0A\x03\xe0A\bR\x04name\x12l\n" +
 "\fgrantee_type\x18\x02
\x01(\x0e2<.google.ai.generativelanguage.v1alpha.Permission.GranteeTypeB\x06\xe0A\x01\xe0A\x05H\x00R\vgra
nteeType\x88\x01\x01\x120\n" +
 "\remail_address\x18\x03 \x01(\tB\x06\xe0A\x01\xe0A\x05H\x01R\femailAddress\x88\x01\x01\x12S\n" +
 "\x04role\x18\x04
\x01(\x0e25.google.ai.generativelanguage.v1alpha.Permission.RoleB\x03\xe0A\x02H\x02R\x04role\x88\x01\x01\"
N\n" +
 "\vGranteeType\x12\x1c\n" +
 "\x18GRANTEE_TYPE_UNSPECIFIED\x10\x00\x12\b\n" +
 "\x04USER\x10\x01\x12\t\n"
 +
 "\x05GROUP\x10\x02\x12\f\n" +
 "\bEVERYONE\x10\x03\"?\n" +
```

```
 "\x04Role\x12\x14\n" +
 "\x10ROLE_UNSPECIFIED\x10\x00\x12\t\n" +
 "\x05OWNER\x10\x01\x12\n" +
 "\n" +
 "\x06WRITER\x10\x02\x12\n" +
 "\n" +
 "\x06READER\x10\x03:\xaa\x01\xeaA\xa6\x01\n" +
",generativelanguage.googleapis.com/Permission\x122tunedModels/{tuned_model}/permissions/{permission}\x12)
corpora/{corpus}/permissions/{permission}*\vpermissions2\n" +
 "permissionB\x0f\n" +
 "\r_grantee_typeB\x10\n" +
 "\x0e_email_addressB\a\n" +
 "\x05_roleB\x9d\x01\n" +
"(com.google.ai.generativelanguage.v1alphaB\x0fPermissionProtoP\x01Z^cloud.google.com/go/ai/generativelangua
ge/apiv1alpha/generativelanguagepb;generativelanguagepbb\x06proto3"

var (
 file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescOnce sync.Once
 file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData []byte
)

func file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescGZIP() []byte {
 file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescOnce.Do(func()
 {
  file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData =
protoimpl.X.CompressGZIP(unsafe.Slice(unsafe.StringData(file_google_ai_generativelanguage_v1alpha_permissio
n_proto_rawDesc), len(file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc)))
 })
 return file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData
}

var file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes = make([]protoimpl.EnumInfo, 2)
var file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes = make([]protoimpl.MessageInfo, 1)
var file_google_ai_generativelanguage_v1alpha_permission_proto_goTypes = []any{
 (Permission_GranteeType)(0), // 0: google.ai.generativelanguage.v1alpha.Permission.GranteeType
 (Permission_Role)(0),        // 1: google.ai.generativelanguage.v1alpha.Permission.Role
 (*Permission)(nil),          // 2: google.ai.generativelanguage.v1alpha.Permission
}
var file_google_ai_generativelanguage_v1alpha_permission_proto_depIdxs
 = []int32{
 0, // 0: google.ai.generativelanguage.v1alpha.Permission.grantee_type:type_name ->
google.ai.generativelanguage.v1alpha.Permission.GranteeType
 1, // 1: google.ai.generativelanguage.v1alpha.Permission.role:type_name ->
google.ai.generativelanguage.v1alpha.Permission.Role
 2, // [2:2] is the sub-list for method output_type
 2, // [2:2] is the sub-list for method input_type
 2, // [2:2] is the sub-list for extension type_name
 2, // [2:2] is the sub-list for extension extendee
```

```
 0, // [0:2] is the sub-list for field type_name
}

func init() { file_google_ai_generativelanguage_v1alpha_permission_proto_init() }
func file_google_ai_generativelanguage_v1alpha_permission_proto_init() {
 if File_google_ai_generativelanguage_v1alpha_permission_proto != nil {
  return
 }
 file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes[0].OneofWrappers = []any{}
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath:
 reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor:
unsafe.Slice(unsafe.StringData(file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc),
len(file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc)),
   NumEnums:      2,
   NumMessages:   1,
   NumExtensions: 0,
   NumServices:   0,
  },
  GoTypes:           file_google_ai_generativelanguage_v1alpha_permission_proto_goTypes,
  DependencyIndexes: file_google_ai_generativelanguage_v1alpha_permission_proto_depIdxs,
  EnumInfos:         file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes,
  MessageInfos:      file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes,
 }.Build()
 File_google_ai_generativelanguage_v1alpha_permission_proto = out.File
 file_google_ai_generativelanguage_v1alpha_permission_proto_goTypes = nil
 file_google_ai_generativelanguage_v1alpha_permission_proto_depIdxs = nil
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package discoveryengine
```

```
import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
 "math"
 "net/http"
 "net/url"
 "time"

 discoveryenginepb "cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb"
 "cloud.google.com/go/longrunning"
 lroauto "cloud.google.com/go/longrunning/autogen"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 gax
 "github.com/googleapis/gax-go/v2"
 "github.com/googleapis/gax-go/v2/callctx"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 gtransport "google.golang.org/api/transport/grpc"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/grpc/codes"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var newUserLicenseClientHook clientHook

// UserLicenseCallOptions contains the retry settings for each method of UserLicenseClient.
type UserLicenseCallOptions struct {
 ListUserLicenses        []gax.CallOption
 BatchUpdateUserLicenses []gax.CallOption
 CancelOperation         []gax.CallOption
 GetOperation            []gax.CallOption
 ListOperations          []gax.CallOption
}

func defaultUserLicenseGRPCClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("discoveryengine.googleapis.com:443"),
  internaloption.WithDefaultEndpointTemplate("discoveryengine.UNIVERSE_DOMAIN:443"),
  internaloption.WithDefaultMTLSEndpoint("discoveryengine.mtls.googleapis.com:443"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://discoveryengine.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
```

```
 internaloption.EnableJwtWithScope(),
 internaloption.EnableNewAuthLibrary(),
 option.WithGRPCDialOption(grpc.WithDefaultCallOptions(
  grpc.MaxCallRecvMsgSize(math.MaxInt32))),
 }
}

func
 defaultUserLicenseCallOptions() *UserLicenseCallOptions {
 return &UserLicenseCallOptions{
  ListUserLicenses:       []gax.CallOption{},
  BatchUpdateUserLicenses: []gax.CallOption{},
  CancelOperation: []gax.CallOption{
   gax.WithTimeout(30000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnCodes([]codes.Code{
     codes.Unavailable,
    }, gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:
        10000 * time.Millisecond,
     Multiplier: 1.30,
    })
   }),
  },
  GetOperation: []gax.CallOption{
   gax.WithTimeout(30000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnCodes([]codes.Code{
     codes.Unavailable,
    }, gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        10000 * time.Millisecond,
     Multiplier: 1.30,
    })
   }),
  },
  ListOperations: []gax.CallOption{
   gax.WithTimeout(300000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnCodes([]codes.Code{
     codes.Unavailable,
    }, gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        30000 * time.Millisecond,
     Multiplier: 1.30,
    })
   }),
```

```
  },
 }
}

func defaultUserLicenseRESTCallOptions() *UserLicenseCallOptions {
 return &UserLicenseCallOptions{
  ListUserLicenses:        []gax.CallOption{},
  BatchUpdateUserLicenses: []gax.CallOption{},
  CancelOperation: []gax.CallOption{
   gax.WithTimeout(30000 * time.Millisecond),
   gax.WithRetry(func()
 gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        10000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusServiceUnavailable)
   }),
  },
  GetOperation: []gax.CallOption{
   gax.WithTimeout(30000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        10000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusServiceUnavailable)
   }),
  },
  ListOperations: []gax.CallOption{
   gax.WithTimeout(300000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    1000 * time.Millisecond,
     Max:        30000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusServiceUnavailable)
   }),
  },
 }
}

// internalUserLicenseClient is an interface that defines the methods available from Discovery
 Engine API.
type internalUserLicenseClient interface {
```

```
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 ListUserLicenses(context.Context, *discoveryenginepb.ListUserLicensesRequest, ...gax.CallOption)
*UserLicenseIterator
 BatchUpdateUserLicenses(context.Context, *discoveryenginepb.BatchUpdateUserLicensesRequest,
...gax.CallOption) (*BatchUpdateUserLicensesOperation, error)
 BatchUpdateUserLicensesOperation(name string) *BatchUpdateUserLicensesOperation
 CancelOperation(context.Context, *longrunningpb.CancelOperationRequest, ...gax.CallOption) error
 GetOperation(context.Context, *longrunningpb.GetOperationRequest, ...gax.CallOption)
(*longrunningpb.Operation, error)
 ListOperations(context.Context, *longrunningpb.ListOperationsRequest, ...gax.CallOption) *OperationIterator
}

// UserLicenseClient is a client for interacting with Discovery Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently
 with method calls.
//
// Service for managing User Licenses.
type UserLicenseClient struct {
 // The internal transport-dependent client.
 internalClient internalUserLicenseClient

 // The call options for this service.
 CallOptions *UserLicenseCallOptions

 // LROClient is used internally to handle long-running operations.
 // It is exposed so that its CallOptions can be modified if required.
 // Users should not Close this client.
 LROClient *lroauto.OperationsClient
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *UserLicenseClient) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *UserLicenseClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

//
```

```
 Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *UserLicenseClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// ListUserLicenses lists the User Licenses.
func (c *UserLicenseClient) ListUserLicenses(ctx context.Context, req
*discoveryenginepb.ListUserLicensesRequest, opts ...gax.CallOption) *UserLicenseIterator {
 return c.internalClient.ListUserLicenses(ctx, req, opts...)
}

// BatchUpdateUserLicenses updates the User License.
// This method is used for batch assign/unassign licenses to users.
func (c *UserLicenseClient) BatchUpdateUserLicenses(ctx context.Context, req
*discoveryenginepb.BatchUpdateUserLicensesRequest, opts ...gax.CallOption)
(*BatchUpdateUserLicensesOperation, error) {
 return c.internalClient.BatchUpdateUserLicenses(ctx, req, opts...)
}

// BatchUpdateUserLicensesOperation returns a new BatchUpdateUserLicensesOperation
 from a given name.
// The name must be that of a previously created BatchUpdateUserLicensesOperation, possibly from a different
process.
func (c *UserLicenseClient) BatchUpdateUserLicensesOperation(name string)
*BatchUpdateUserLicensesOperation {
 return c.internalClient.BatchUpdateUserLicensesOperation(name)
}

// CancelOperation is a utility method from google.longrunning.Operations.
func (c *UserLicenseClient) CancelOperation(ctx context.Context, req *longrunningpb.CancelOperationRequest,
opts ...gax.CallOption) error {
 return c.internalClient.CancelOperation(ctx, req, opts...)
}

// GetOperation is a utility method from google.longrunning.Operations.
func (c *UserLicenseClient) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest, opts
...gax.CallOption) (*longrunningpb.Operation, error) {
 return c.internalClient.GetOperation(ctx, req, opts...)
}

// ListOperations is a utility method from google.longrunning.Operations.
func (c *UserLicenseClient)
 ListOperations(ctx context.Context, req *longrunningpb.ListOperationsRequest, opts ...gax.CallOption)
*OperationIterator {
 return c.internalClient.ListOperations(ctx, req, opts...)
```

```
}

// userLicenseGRPCClient is a client for interacting with Discovery Engine API over gRPC transport.
//
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type userLicenseGRPCClient struct {
 // Connection pool of gRPC connections to the service.
 connPool gtransport.ConnPool

 // Points back to the CallOptions field of the containing UserLicenseClient
 CallOptions **UserLicenseCallOptions

 // The gRPC API client.
 userLicenseClient discoveryenginepb.UserLicenseServiceClient

 // LROClient is used internally to handle long-running operations.
 // It is exposed so that its CallOptions can be modified if required.
 // Users should not Close this client.
 LROClient **lroauto.OperationsClient

 operationsClient longrunningpb.OperationsClient

 //
 The x-goog-* metadata to be sent with each request.
 xGoogHeaders []string

 logger *slog.Logger
}

// NewUserLicenseClient creates a new user license service client based on gRPC.
// The returned client must be Closed when it is done being used to clean up its underlying connections.
//
// Service for managing User Licenses.
func NewUserLicenseClient(ctx context.Context, opts ...option.ClientOption) (*UserLicenseClient, error) {
 clientOpts := defaultUserLicenseGRPCClientOptions()
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  clientOpts = append(clientOpts, internaloption.WithTelemetryAttributes(map[string]string{
   "gcp.client.service":  "discoveryengine",
   "gcp.client.version":  getVersionClient(),
   "gcp.client.repo":     "googleapis/google-cloud-go",
   "gcp.client.artifact": "cloud.google.com/go/discoveryengine/apiv1",
   "gcp.client.language": "go",
   "url.domain":          "discoveryengine.googleapis.com",
  }))
 }
 if
```

```
newUserLicenseClientHook != nil {
 hookOpts, err := newUserLicenseClientHook(ctx, clientHookParams{})
 if err != nil {
  return nil, err
 }
 clientOpts = append(clientOpts, hookOpts...)
}

connPool, err := gtransport.DialPool(ctx, append(clientOpts, opts...)...)
if err != nil {
 return nil, err
}
client := UserLicenseClient{CallOptions: defaultUserLicenseCallOptions()}

c := &userLicenseGRPCClient{
 connPool:          connPool,
 userLicenseClient: discoveryenginepb.NewUserLicenseServiceClient(connPool),
 CallOptions:       &client.CallOptions,
 logger:            internaloption.GetLogger(opts),
 operationsClient:  longrunningpb.NewOperationsClient(connPool),
}
c.setGoogleClientInfo()
if gax.IsFeatureEnabled("METRICS") {
 metrics := gax.NewClientMetrics(
  gax.WithTelemetryLogger(c.logger),
  gax.WithTelemetryAttributes(map[string]string{
   gax.ClientService:  "discoveryengine",
   gax.ClientVersion:  getVersionClient(),
   gax.ClientArtifact: "cloud.google.com/go/discoveryengine/apiv1",
   gax.RPCSystem:
     "grpc",
   gax.URLDomain:      "discoveryengine.googleapis.com",
  }),
 )

 client.CallOptions.ListUserLicenses = append(client.CallOptions.ListUserLicenses,
gax.WithClientMetrics(metrics))
 client.CallOptions.BatchUpdateUserLicenses = append(client.CallOptions.BatchUpdateUserLicenses,
gax.WithClientMetrics(metrics))
 client.CallOptions.CancelOperation = append(client.CallOptions.CancelOperation, gax.WithClientMetrics(metrics))
 client.CallOptions.GetOperation = append(client.CallOptions.GetOperation, gax.WithClientMetrics(metrics))
 client.CallOptions.ListOperations = append(client.CallOptions.ListOperations, gax.WithClientMetrics(metrics))
}

client.internalClient = c

client.LROClient, err = lroauto.NewOperationsClient(ctx, gtransport.WithConnPool(connPool))
if err != nil {
```

```
 // This error "should not happen", since we are just reusing old connection pool
 // and never actually need to dial.
 // If this does happen,
we could leak connp. However, we cannot close conn:
 // If the user invoked the constructor with option.WithGRPCConn,
 // we would close a connection that's still in use.
 // TODO: investigate error conditions.
 return nil, err
}
c.LROClient = &client.LROClient
return &client, nil
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *userLicenseGRPCClient) Connection() *grpc.ClientConn {
 return c.connPool.Conn()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *userLicenseGRPCClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "grpc", grpc.Version, "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client",
 gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *userLicenseGRPCClient) Close() error {
 return c.connPool.Close()
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type userLicenseRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client
```

```
 // LROClient is used internally to handle long-running operations.
 // It is exposed so that its CallOptions can be modified if required.
 // Users should not Close this client.
 LROClient **lroauto.OperationsClient

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing UserLicenseClient
 CallOptions **UserLicenseCallOptions

 logger *slog.Logger
}

// NewUserLicenseRESTClient creates a new user license service
 rest client.
//
// Service for managing User Licenses.
func NewUserLicenseRESTClient(ctx context.Context, opts ...option.ClientOption) (*UserLicenseClient, error) {
 clientOpts := append(defaultUserLicenseRESTClientOptions(), opts...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  clientOpts = append(clientOpts, internaloption.WithTelemetryAttributes(map[string]string{
   "gcp.client.service":  "discoveryengine",
   "gcp.client.version":  getVersionClient(),
   "gcp.client.repo":     "googleapis/google-cloud-go",
   "gcp.client.artifact": "cloud.google.com/go/discoveryengine/apiv1",
   "gcp.client.language": "go",
   "url.domain":          "discoveryengine.googleapis.com",
  }))
 }
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultUserLicenseRESTCallOptions()
 c := &userLicenseRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:
      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 if gax.IsFeatureEnabled("METRICS") {
  metrics := gax.NewClientMetrics(
   gax.WithTelemetryLogger(c.logger),
```

```
  gax.WithTelemetryAttributes(map[string]string{
   gax.ClientService:  "discoveryengine",
   gax.ClientVersion:  getVersionClient(),
   gax.ClientArtifact: "cloud.google.com/go/discoveryengine/apiv1",
   gax.RPCSystem:      "http",
   gax.URLDomain:      "discoveryengine.googleapis.com",
  }),
 )

 callOpts.ListUserLicenses = append(callOpts.ListUserLicenses, gax.WithClientMetrics(metrics))
 callOpts.BatchUpdateUserLicenses = append(callOpts.BatchUpdateUserLicenses, gax.WithClientMetrics(metrics))
 callOpts.CancelOperation = append(callOpts.CancelOperation, gax.WithClientMetrics(metrics))
 callOpts.GetOperation = append(callOpts.GetOperation, gax.WithClientMetrics(metrics))
 callOpts.ListOperations = append(callOpts.ListOperations, gax.WithClientMetrics(metrics))
}

lroOpts := []option.ClientOption{
 option.WithHTTPClient(httpClient),
 option.WithEndpoint(endpoint),
}
opClient,
err := lroauto.NewOperationsRESTClient(ctx, lroOpts...)
if err != nil {
 return nil, err
}
c.LROClient = &opClient

return &UserLicenseClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultUserLicenseRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://discoveryengine.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://discoveryengine.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://discoveryengine.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://discoveryengine.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed
 on each request. Intended for
// use by Google-written clients.
func (c *userLicenseRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
```

```
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *userLicenseRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *userLicenseRESTClient) Connection() *grpc.ClientConn {
 return nil
}
func (c *userLicenseGRPCClient) ListUserLicenses(ctx context.Context, req
*discoveryenginepb.ListUserLicensesRequest, opts ...gax.CallOption) *UserLicenseIterator {
 hds := []string{"x-goog-request-params",
 fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//discoveryengine.googleapis.com/%v",
req.GetParent()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.discoveryengine.v1.UserLicenseService/ListUserLicenses")
 }
 opts =
append((*c.CallOptions).ListUserLicenses[0:len((*c.CallOptions).ListUserLicenses):len((*c.CallOptions).ListUser
Licenses)], opts...)
 it := &UserLicenseIterator{}
 req = proto.Clone(req).(*discoveryenginepb.ListUserLicensesRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*discoveryenginepb.UserLicense, string, error) {
  resp := &discoveryenginepb.ListUserLicensesResponse{}
  if
 pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
```

```
  req.PageSize = math.MaxInt32
 } else if pageSize != 0 {
  req.PageSize = int32(pageSize)
 }
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.userLicenseClient.ListUserLicenses, req, settings.GRPC, c.logger,
"ListUserLicenses")
  return err
 }, opts...)
 if err != nil {
  return nil, "", err
 }

 it.Response = resp
 return resp.GetUserLicenses(), resp.GetNextPageToken(), nil
}
fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return
it
}

func (c *userLicenseGRPCClient) BatchUpdateUserLicenses(ctx context.Context, req
*discoveryenginepb.BatchUpdateUserLicensesRequest, opts ...gax.CallOption)
(*BatchUpdateUserLicensesOperation, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//discoveryengine.googleapis.com/%v",
req.GetParent()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
```

```
"google.cloud.discoveryengine.v1.UserLicenseService/BatchUpdateUserLicenses")
 }
 opts =
append((*c.CallOptions).BatchUpdateUserLicenses[0:len((*c.CallOptions).BatchUpdateUserLicenses):len((*c.Call
Options).BatchUpdateUserLicenses)],
 opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.userLicenseClient.BatchUpdateUserLicenses, req, settings.GRPC, c.logger,
"BatchUpdateUserLicenses")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return &BatchUpdateUserLicensesOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, resp),
 }, nil
}

func (c *userLicenseGRPCClient) CancelOperation(ctx context.Context, req
*longrunningpb.CancelOperationRequest, opts ...gax.CallOption) error {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
 "google.longrunning.Operations/CancelOperation")
 }
 opts =
append((*c.CallOptions).CancelOperation[0:len((*c.CallOptions).CancelOperation):len((*c.CallOptions).CancelOp
eration)], opts...)
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  _, err = executeRPC(ctx, c.operationsClient.CancelOperation, req, settings.GRPC, c.logger, "CancelOperation")
  return err
 }, opts...)
 return err
}

func (c *userLicenseGRPCClient) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest,
opts ...gax.CallOption) (*longrunningpb.Operation, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
```

```
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.longrunning.Operations/GetOperation")
 }
 opts
 =
append((*c.CallOptions).GetOperation[0:len((*c.CallOptions).GetOperation):len((*c.CallOptions).GetOperation)],
opts...)
 var resp *longrunningpb.Operation
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.operationsClient.GetOperation, req, settings.GRPC, c.logger, "GetOperation")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *userLicenseGRPCClient) ListOperations(ctx context.Context, req *longrunningpb.ListOperationsRequest,
opts ...gax.CallOption) *OperationIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
 "google.longrunning.Operations/ListOperations")
 }
 opts =
append((*c.CallOptions).ListOperations[0:len((*c.CallOptions).ListOperations):len((*c.CallOptions).ListOperations
)], opts...)
 it := &OperationIterator{}
 req = proto.Clone(req).(*longrunningpb.ListOperationsRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*longrunningpb.Operation, string, error) {
  resp := &longrunningpb.ListOperationsResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
```

```
  var err error
  resp, err = executeRPC(ctx, c.operationsClient.ListOperations, req, settings.GRPC, c.logger, "ListOperations")
  return err
 }, opts...)
 if err != nil {
  return nil, "", err
 }

 it.Response = resp
 return resp.GetOperations(), resp.GetNextPageToken(), nil
}
fetch
:= func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// ListUserLicenses lists the User Licenses.
func (c *userLicenseRESTClient) ListUserLicenses(ctx context.Context, req
*discoveryenginepb.ListUserLicensesRequest, opts ...gax.CallOption) *UserLicenseIterator {
 it := &UserLicenseIterator{}
 req = proto.Clone(req).(*discoveryenginepb.ListUserLicensesRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*discoveryenginepb.UserLicense, string, error) {
  resp := &discoveryenginepb.ListUserLicensesResponse{}
  if pageToken != "" {
   req.PageToken
= pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
   return nil, "", err
```

```
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v/userLicenses", req.GetParent())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")
 if req.GetFilter() != "" {
  params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
 }
 if req.GetPageSize() != 0 {
  params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
 }
 if req.GetPageToken() != "" {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path
= settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "ListUserLicenses")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetUserLicenses(), resp.GetNextPageToken(), nil
}
```

```
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

// BatchUpdateUserLicenses updates the
 User License.
// This method is used for batch assign/unassign licenses to users.
func (c *userLicenseRESTClient) BatchUpdateUserLicenses(ctx context.Context, req
*discoveryenginepb.BatchUpdateUserLicensesRequest, opts ...gax.CallOption)
(*BatchUpdateUserLicensesOperation, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 jsonReq, err := m.Marshal(req)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:batchUpdateUserLicenses", req.GetParent())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING")
 || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//discoveryengine.googleapis.com/%v",
```

```
req.GetParent()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.discoveryengine.v1.UserLicenseService/BatchUpdateUserLicenses")
  ctx = callctx.WithTelemetryContext(ctx, "url_template",
"/v1/{parent=projects/*/locations/*/userStores/*}:batchUpdateUserLicenses")
 }
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &longrunningpb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header
 = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "BatchUpdateUserLicenses")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }

 override := fmt.Sprintf("/v1/%s", resp.GetName())
 return &BatchUpdateUserLicensesOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, resp),
  pollPath: override,
 }, nil
}

// CancelOperation is a utility method from google.longrunning.Operations.
func (c *userLicenseRESTClient) CancelOperation(ctx context.Context, req
*longrunningpb.CancelOperationRequest, opts ...gax.CallOption) error {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
```

```
 jsonReq, err := m.Marshal(req)
 if err != nil {
  return err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v:cancel", req.GetName())

 params := url.Values{}
 params.Add("$alt",
 "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.longrunning.Operations/CancelOperation")
  ctx = callctx.WithTelemetryContext(ctx, "url_template", "/v1/{name=projects/*/operations/*}:cancel")
 }
 return gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header
 = headers

  _, err = executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "CancelOperation")
  return err
 }, opts...)
}

// GetOperation is a utility method from google.longrunning.Operations.
func (c *userLicenseRESTClient) GetOperation(ctx context.Context, req *longrunningpb.GetOperationRequest,
opts ...gax.CallOption) (*longrunningpb.Operation, error) {
```

```
baseUrl, err := url.Parse(c.endpoint)
if err != nil {
 return nil, err
}
baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

params := url.Values{}
params.Add("$alt", "json;enum-encoding=int")

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

hds = append(c.xGoogHeaders, hds...)
hds = append(hds, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING")
|| gax.IsFeatureEnabled("LOGGING") {
 ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.longrunning.Operations/GetOperation")
 ctx = callctx.WithTelemetryContext(ctx, "url_template", "/v1/{name=projects/*/operations/*}")
}
opts =
append((*c.CallOptions).GetOperation[0:len((*c.CallOptions).GetOperation):len((*c.CallOptions).GetOperation)],
opts...)
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
resp := &longrunningpb.Operation{}
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetOperation")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return
```

```
 nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// ListOperations is a utility method from google.longrunning.Operations.
func (c *userLicenseRESTClient) ListOperations(ctx context.Context, req *longrunningpb.ListOperationsRequest,
opts ...gax.CallOption) *OperationIterator {
 it := &OperationIterator{}
 req = proto.Clone(req).(*longrunningpb.ListOperationsRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*longrunningpb.Operation, string, error) {
  resp := &longrunningpb.ListOperationsResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
   return nil, "", err
  }
  baseUrl.Path += fmt.Sprintf("/v1/%v/operations", req.GetName())

  params := url.Values{}
  params.Add("$alt",
"json;enum-encoding=int")
  if req.GetFilter() != "" {
   params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
  }
  if req.GetPageSize() != 0 {
   params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
  }
  if req.GetPageToken() != "" {
   params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
  }
  if req.GetReturnPartialSuccess() {
   params.Add("returnPartialSuccess", fmt.Sprintf("%v", req.GetReturnPartialSuccess()))
  }

  baseUrl.RawQuery = params.Encode()
```

```
 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient,
httpReq, c.logger, nil, "ListOperations")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetOperations(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// BatchUpdateUserLicensesOperation returns a new BatchUpdateUserLicensesOperation from a given name.
```

```
// The name must be that of a previously created BatchUpdateUserLicensesOperation, possibly from a different
process.
func (c *userLicenseGRPCClient) BatchUpdateUserLicensesOperation(name
 string) *BatchUpdateUserLicensesOperation {
 return &BatchUpdateUserLicensesOperation{
  lro: longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
 }
}

// BatchUpdateUserLicensesOperation returns a new BatchUpdateUserLicensesOperation from a given name.
// The name must be that of a previously created BatchUpdateUserLicensesOperation, possibly from a different
process.
func (c *userLicenseRESTClient) BatchUpdateUserLicensesOperation(name string)
*BatchUpdateUserLicensesOperation {
 override := fmt.Sprintf("/v1/%s", name)
 return &BatchUpdateUserLicensesOperation{
  lro:      longrunning.InternalNewOperation(*c.LROClient, &longrunningpb.Operation{Name: name}),
  pollPath: override,
 }
}
// Copyright 2026 Google LLC
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//
//     http://www.apache.org/licenses/LICENSE-2.0
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// distributed under the License is distributed on an "AS IS" BASIS,
// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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// limitations under the License.

// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.36.11
//  protoc        v6.31.0
// source: google/ads/datamanager/v1/user_list_direct_license.proto

package datamanagerpb

import (
 reflect "reflect"
 sync "sync"
 unsafe "unsafe"

 _ "google.golang.org/genproto/googleapis/api/annotations"
```

```
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
)

const
 (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// A user list direct license.
//
// This feature is only available to data partners.
type UserListDirectLicense struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Identifier. The resource name of the user list direct license.
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Immutable. ID of the user list being licensed.
 UserListId *int64 `protobuf:"varint,2,opt,name=user_list_id,json=userListId,proto3,oneof"
json:"user_list_id,omitempty"`
 // Output only. Name of the user list being licensed.
 //
 // This field is read-only.
 UserListDisplayName string
`protobuf:"bytes,3,opt,name=user_list_display_name,json=userListDisplayName,proto3"
json:"user_list_display_name,omitempty"`
 //
 Immutable. Account type of client customer which the user list is being
 // licensed to.
 ClientAccountType *UserListLicenseClientAccountType
`protobuf:"varint,4,opt,name=client_account_type,json=clientAccountType,proto3,enum=google.ads.datamanager.v
1.UserListLicenseClientAccountType,oneof" json:"client_account_type,omitempty"`
 // Immutable. ID of client customer which the user list is being licensed to.
 ClientAccountId *int64 `protobuf:"varint,5,opt,name=client_account_id,json=clientAccountId,proto3,oneof"
json:"client_account_id,omitempty"`
 // Output only. Name of client customer which the user list is being licensed
 // to.
 //
 // This field is read-only.
 ClientAccountDisplayName string
`protobuf:"bytes,6,opt,name=client_account_display_name,json=clientAccountDisplayName,proto3"
json:"client_account_display_name,omitempty"`
 // Optional. Status of UserListDirectLicense - ENABLED or DISABLED.
 Status *UserListLicenseStatus
`protobuf:"varint,7,opt,name=status,proto3,enum=google.ads.datamanager.v1.UserListLicenseStatus,oneof"
```

```
 json:"status,omitempty"`
 // Optional. UserListDirectLicense pricing.
 Pricing *UserListLicensePricing `protobuf:"bytes,8,opt,name=pricing,proto3" json:"pricing,omitempty"`
 // Output only. Pricing history of this user list license.
 //
 // This field is read-only.
 HistoricalPricings []*UserListLicensePricing
`protobuf:"bytes,9,rep,name=historical_pricings,json=historicalPricings,proto3"
json:"historical_pricings,omitempty"`
 // Output only. Metrics related to this license
 //
 // This field is read-only and only populated if the start and end dates are
 // set in the ListUserListDirectLicenses call
 Metrics       *UserListLicenseMetrics `protobuf:"bytes,10,opt,name=metrics,proto3" json:"metrics,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *UserListDirectLicense) Reset() {
 *x = UserListDirectLicense{}
 mi := &file_google_ads_datamanager_v1_user_list_direct_license_proto_msgTypes[0]
 ms
 := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *UserListDirectLicense) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UserListDirectLicense) ProtoMessage() {}

func (x *UserListDirectLicense) ProtoReflect() protoreflect.Message {
 mi := &file_google_ads_datamanager_v1_user_list_direct_license_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use UserListDirectLicense.ProtoReflect.Descriptor instead.
func (*UserListDirectLicense) Descriptor() ([]byte, []int) {
 return file_google_ads_datamanager_v1_user_list_direct_license_proto_rawDescGZIP(), []int{0}
}
```

```
func (x *UserListDirectLicense) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
}

func (x *UserListDirectLicense) GetUserListId() int64 {
 if x != nil && x.UserListId != nil {
  return
 *x.UserListId
 }
 return 0
}

func (x *UserListDirectLicense) GetUserListDisplayName() string {
 if x != nil {
  return x.UserListDisplayName
 }
 return ""
}

func (x *UserListDirectLicense) GetClientAccountType() UserListLicenseClientAccountType {
 if x != nil && x.ClientAccountType != nil {
  return *x.ClientAccountType
 }
 return UserListLicenseClientAccountType_USER_LIST_LICENSE_CLIENT_ACCOUNT_TYPE_UNKNOWN
}

func (x *UserListDirectLicense) GetClientAccountId() int64 {
 if x != nil && x.ClientAccountId != nil {
  return *x.ClientAccountId
 }
 return 0
}

func (x *UserListDirectLicense) GetClientAccountDisplayName() string {
 if x != nil {
  return x.ClientAccountDisplayName
 }
 return ""
}

func (x *UserListDirectLicense) GetStatus() UserListLicenseStatus {
 if x != nil && x.Status != nil {
  return *x.Status
 }
```

```
 return UserListLicenseStatus_USER_LIST_LICENSE_STATUS_UNSPECIFIED
}

func (x *UserListDirectLicense) GetPricing() *UserListLicensePricing {
 if x != nil {
  return
 x.Pricing
 }
 return nil
}

func (x *UserListDirectLicense) GetHistoricalPricings() []*UserListLicensePricing {
 if x != nil {
  return x.HistoricalPricings
 }
 return nil
}

func (x *UserListDirectLicense) GetMetrics() *UserListLicenseMetrics {
 if x != nil {
  return x.Metrics
 }
 return nil
}

var File_google_ads_datamanager_v1_user_list_direct_license_proto protoreflect.FileDescriptor

const file_google_ads_datamanager_v1_user_list_direct_license_proto_rawDesc = "" +
 "\n" +
"8google/ads/datamanager/v1/user_list_direct_license.proto\x12\x19google.ads.datamanager.v1\x1aEgoogle/ads/dat
amanager/v1/user_list_license_client_account_type.proto\x1a9google/ads/datamanager/v1/user_list_license_metrics
.proto\x1a9google/ads/datamanager/v1/user_list_license_pricing.proto\x1a8google/ads/datamanager/v1/user_list_lic
ense_status.proto\x1a\x1fgoogle/api/field_behavior.proto\x1a\x19google/api/resource.proto\"\xfc\a\n" +
 "\x15UserListDirectLicense\x12\x17\n" +
 "\x04name\x18\x01 \x01(\tB\x03\xe0A\bR\x04name\x12*\n"
 +
 "\fuser_list_id\x18\x02 \x01(\x03B\x03\xe0A\x05H\x00R\n" +
 "userListId\x88\x01\x01\x128\n" +
 "\x16user_list_display_name\x18\x03 \x01(\tB\x03\xe0A\x03R\x13userListDisplayName\x12u\n" +
 "\x13client_account_type\x18\x04
\x01(\x0e2;.google.ads.datamanager.v1.UserListLicenseClientAccountTypeB\x03\xe0A\x05H\x01R\x11clientAcco
untType\x88\x01\x01\x124\n" +
 "\x11client_account_id\x18\x05 \x01(\x03B\x03\xe0A\x05H\x02R\x0fclientAccountId\x88\x01\x01\x12B\n" +
 "\x1bclient_account_display_name\x18\x06 \x01(\tB\x03\xe0A\x03R\x18clientAccountDisplayName\x12R\n" +
 "\x06status\x18\a
\x01(\x0e20.google.ads.datamanager.v1.UserListLicenseStatusB\x03\xe0A\x01H\x03R\x06status\x88\x01\x01\x12
P\n" +
 "\apricing\x18\b \x01(\v21.google.ads.datamanager.v1.UserListLicensePricingB\x03\xe0A\x01R\apricing\x12g\n" +
```

```
 "\x13historical_pricings\x18\t
\x03(\v21.google.ads.datamanager.v1.UserListLicensePricingB\x03\xe0A\x03R\x12historicalPricings\x12P\n" +
 "\ametrics\x18\n" +
 "
\x01(\v21.google.ads.datamanager.v1.UserListLicenseMetricsB\x03\xe0A\x03R\ametrics:\xc7\x01\xeaA\xc3\x01\n"
 +
"0datamanager.googleapis.com/UserListDirectLicense\x12`accountTypes/{account_type}/accounts/{account}/user
ListDirectLicenses/{user_list_direct_license}*\x16userListDirectLicenses2\x15userListDirectLicenseB\x0f\n" +
 "\r_user_list_idB\x16\n" +
 "\x14_client_account_typeB\x14\n" +
 "\x12_client_account_idB\t\n" +
 "\a_statusB\xd7\x01\n" +
"\x1dcom.google.ads.datamanager.v1B\x1aUserListDirectLicenseProtoP\x01ZAcloud.google.com/go/datamanager/
apiv1/datamanagerpb;datamanagerpb\xaa\x02\x19Google.Ads.DataManager.V1\xca\x02\x19Google\\Ads\\DataMan
ager\\V1\xea\x02\x1cGoogle::Ads::DataManager::V1b\x06proto3"

var (
 file_google_ads_datamanager_v1_user_list_direct_license_proto_rawDescOnce sync.Once
 file_google_ads_datamanager_v1_user_list_direct_license_proto_rawDescData []byte
)

func file_google_ads_datamanager_v1_user_list_direct_license_proto_rawDescGZIP() []byte {
 file_google_ads_datamanager_v1_user_list_direct_license_proto_rawDescOnce.Do(func()
 {
  file_google_ads_datamanager_v1_user_list_direct_license_proto_rawDescData =
protoimpl.X.CompressGZIP(unsafe.Slice(unsafe.StringData(file_google_ads_datamanager_v1_user_list_direct_lice
nse_proto_rawDesc), len(file_google_ads_datamanager_v1_user_list_direct_license_proto_rawDesc)))
 })
 return file_google_ads_datamanager_v1_user_list_direct_license_proto_rawDescData
}

var file_google_ads_datamanager_v1_user_list_direct_license_proto_msgTypes = make([]protoimpl.MessageInfo,
1)
var file_google_ads_datamanager_v1_user_list_direct_license_proto_goTypes = []any{
 (*UserListDirectLicense)(nil),         // 0: google.ads.datamanager.v1.UserListDirectLicense
 (UserListLicenseClientAccountType)(0), // 1: google.ads.datamanager.v1.UserListLicenseClientAccountType
 (UserListLicenseStatus)(0),            // 2: google.ads.datamanager.v1.UserListLicenseStatus
 (*UserListLicensePricing)(nil),        // 3: google.ads.datamanager.v1.UserListLicensePricing
 (*UserListLicenseMetrics)(nil),
        // 4: google.ads.datamanager.v1.UserListLicenseMetrics
}
var file_google_ads_datamanager_v1_user_list_direct_license_proto_depIdxs = []int32{
 1, // 0: google.ads.datamanager.v1.UserListDirectLicense.client_account_type:type_name ->
google.ads.datamanager.v1.UserListLicenseClientAccountType
 2, // 1: google.ads.datamanager.v1.UserListDirectLicense.status:type_name ->
google.ads.datamanager.v1.UserListLicenseStatus
 3, // 2: google.ads.datamanager.v1.UserListDirectLicense.pricing:type_name ->
google.ads.datamanager.v1.UserListLicensePricing
```

```
 3, // 3: google.ads.datamanager.v1.UserListDirectLicense.historical_pricings:type_name ->
google.ads.datamanager.v1.UserListLicensePricing
 4, // 4: google.ads.datamanager.v1.UserListDirectLicense.metrics:type_name ->
google.ads.datamanager.v1.UserListLicenseMetrics
 5, // [5:5] is the sub-list for method output_type
 5, // [5:5] is the sub-list for method input_type
 5, // [5:5] is the sub-list
 for extension type_name
 5, // [5:5] is the sub-list for extension extendee
 0, // [0:5] is the sub-list for field type_name
}

func init() { file_google_ads_datamanager_v1_user_list_direct_license_proto_init() }
func file_google_ads_datamanager_v1_user_list_direct_license_proto_init() {
 if File_google_ads_datamanager_v1_user_list_direct_license_proto != nil {
  return
 }
 file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_init()
 file_google_ads_datamanager_v1_user_list_license_metrics_proto_init()
 file_google_ads_datamanager_v1_user_list_license_pricing_proto_init()
 file_google_ads_datamanager_v1_user_list_license_status_proto_init()
 file_google_ads_datamanager_v1_user_list_direct_license_proto_msgTypes[0].OneofWrappers = []any{}
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor:
unsafe.Slice(unsafe.StringData(file_google_ads_datamanager_v1_user_list_direct_license_proto_rawDesc),
 len(file_google_ads_datamanager_v1_user_list_direct_license_proto_rawDesc)),
   NumEnums:      0,
   NumMessages:   1,
   NumExtensions: 0,
   NumServices:   0,
  },
  GoTypes:           file_google_ads_datamanager_v1_user_list_direct_license_proto_goTypes,
  DependencyIndexes: file_google_ads_datamanager_v1_user_list_direct_license_proto_depIdxs,
  MessageInfos:      file_google_ads_datamanager_v1_user_list_direct_license_proto_msgTypes,
 }.Build()
 File_google_ads_datamanager_v1_user_list_direct_license_proto = out.File
 file_google_ads_datamanager_v1_user_list_direct_license_proto_goTypes = nil
 file_google_ads_datamanager_v1_user_list_direct_license_proto_depIdxs = nil
}
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```

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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package datamanager_test

import (
 "context"

 datamanager "cloud.google.com/go/datamanager/apiv1"
 datamanagerpb "cloud.google.com/go/datamanager/apiv1/datamanagerpb"
)

func ExampleUserListGlobalLicenseClient_ListUserListGlobalLicenseCustomerInfos_all() {
 ctx := context.Background()
 // This snippet has been automatically generated
 and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := datamanager.NewUserListGlobalLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &datamanagerpb.ListUserListGlobalLicenseCustomerInfosRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/datamanager/apiv1/datamanagerpb#ListUserListGlobalLicenseCustomerInf
osRequest.
 }
 for resp, err := range c.ListUserListGlobalLicenseCustomerInfos(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
```

```
}

func ExampleUserListGlobalLicenseClient_ListUserListGlobalLicenses_all() {
 ctx :=
 context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := datamanager.NewUserListGlobalLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &datamanagerpb.ListUserListGlobalLicensesRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/datamanager/apiv1/datamanagerpb#ListUserListGlobalLicensesRequest.
 }
 for resp, err := range c.ListUserListGlobalLicenses(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

// [START datamanager_v1_generated_UserListGlobalLicenseService_UpdateUserListGlobalLicense_sync]

package main
```

```
import (
 "context"

 datamanager "cloud.google.com/go/datamanager/apiv1"
 datamanagerpb "cloud.google.com/go/datamanager/apiv1/datamanagerpb"
)

func main() {
 ctx := context.Background()
 // This snippet has been automatically generated and
 should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := datamanager.NewUserListGlobalLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &datamanagerpb.UpdateUserListGlobalLicenseRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/datamanager/apiv1/datamanagerpb#UpdateUserListGlobalLicenseRequest.
 }
 resp, err := c.UpdateUserListGlobalLicense(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

// [END datamanager_v1_generated_UserListGlobalLicenseService_UpdateUserListGlobalLicense_sync]
```
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```
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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.36.11
//  protoc        v6.31.0
// source: google/cloud/discoveryengine/v1/user_license_service.proto

package discoveryenginepb

import (
 reflect "reflect"
 sync "sync"
 unsafe "unsafe"

 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 _ "google.golang.org/genproto/googleapis/api/annotations"
 status "google.golang.org/genproto/googleapis/rpc/status"
 protoreflect
 "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
 fieldmaskpb "google.golang.org/protobuf/types/known/fieldmaskpb"
 timestamppb "google.golang.org/protobuf/types/known/timestamppb"
)

const (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Request message for
// [UserLicenseService.ListUserLicenses][google.cloud.discoveryengine.v1.UserLicenseService.ListUserLicenses].
type ListUserLicensesRequest struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Required. The parent [UserStore][] resource name, format:
 // `projects/{project}/locations/{location}/userStores/{user_store_id}`.
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 //
 Optional. Requested page size. Server may return fewer items than
 // requested. If unspecified, defaults to 10. The maximum value is 50; values
 // above 50 will be coerced to 50.
 //
 // If this field is negative, an INVALID_ARGUMENT error is returned.
 PageSize int32 `protobuf:"varint,2,opt,name=page_size,json=pageSize,proto3" json:"page_size,omitempty"`
 // Optional. A page token, received from a previous `ListUserLicenses` call.
 // Provide this to retrieve the subsequent page.
```

```
 //
 // When paginating, all other parameters provided to `ListUserLicenses`
 // must match the call that provided the page token.
 PageToken string `protobuf:"bytes,3,opt,name=page_token,json=pageToken,proto3" json:"page_token,omitempty"`
 // Optional. Filter for the list request.
 //
 // Supported fields:
 //
 // * `license_assignment_state`
 //
 // Examples:
 //
 // * `license_assignment_state = ASSIGNED` to list assigned user licenses.
 // * `license_assignment_state = NO_LICENSE` to list not licensed
 users.
 // * `license_assignment_state = NO_LICENSE_ATTEMPTED_LOGIN` to list users
 // who attempted login but no license assigned.
 // * `license_assignment_state != NO_LICENSE_ATTEMPTED_LOGIN` to filter
 // out users who attempted login but no license assigned.
 Filter        string `protobuf:"bytes,4,opt,name=filter,proto3" json:"filter,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *ListUserLicensesRequest) Reset() {
 *x = ListUserLicensesRequest{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[0]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *ListUserLicensesRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*ListUserLicensesRequest) ProtoMessage() {}

func (x *ListUserLicensesRequest) ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[0]
 if x != nil {
  ms :=
 protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
```

```
}

// Deprecated: Use ListUserLicensesRequest.ProtoReflect.Descriptor instead.
func (*ListUserLicensesRequest) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP(), []int{0}
}

func (x *ListUserLicensesRequest) GetParent() string {
 if x != nil {
  return x.Parent
 }
 return ""
}

func (x *ListUserLicensesRequest) GetPageSize() int32 {
 if x != nil {
  return x.PageSize
 }
 return 0
}

func (x *ListUserLicensesRequest) GetPageToken() string {
 if x != nil {
  return x.PageToken
 }
 return ""
}

func (x *ListUserLicensesRequest) GetFilter() string {
 if x != nil {
  return x.Filter
 }
 return ""
}

// Response message for
// [UserLicenseService.ListUserLicenses][google.cloud.discoveryengine.v1.UserLicenseService.ListUserLicenses].
type ListUserLicensesResponse struct {
 state
 protoimpl.MessageState `protogen:"open.v1"`
 // All the customer's
 // [UserLicense][google.cloud.discoveryengine.v1.UserLicense]s.
 UserLicenses []*UserLicense `protobuf:"bytes,1,rep,name=user_licenses,json=userLicenses,proto3"
json:"user_licenses,omitempty"`
 // A token, which can be sent as `page_token` to retrieve the next page. If
 // this field is omitted, there are no subsequent pages.
 NextPageToken string `protobuf:"bytes,2,opt,name=next_page_token,json=nextPageToken,proto3"
json:"next_page_token,omitempty"`
```

```
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *ListUserLicensesResponse) Reset() {
 *x = ListUserLicensesResponse{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[1]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *ListUserLicensesResponse) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*ListUserLicensesResponse) ProtoMessage() {}

func
 (x *ListUserLicensesResponse) ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[1]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use ListUserLicensesResponse.ProtoReflect.Descriptor instead.
func (*ListUserLicensesResponse) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP(), []int{1}
}

func (x *ListUserLicensesResponse) GetUserLicenses() []*UserLicense {
 if x != nil {
  return x.UserLicenses
 }
 return nil
}

func (x *ListUserLicensesResponse) GetNextPageToken() string {
 if x != nil {
  return x.NextPageToken
 }
 return ""
}
```

```
// Request message for
//
[UserLicenseService.BatchUpdateUserLicenses][google.cloud.discoveryengine.v1.UserLicenseService.BatchUpdat
eUserLicenses]
// method.
type BatchUpdateUserLicensesRequest
 struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Required. The source of the input.
 //
 // Types that are valid to be assigned to Source:
 //
 // *BatchUpdateUserLicensesRequest_InlineSource_
 Source isBatchUpdateUserLicensesRequest_Source `protobuf_oneof:"source"`
 // Required. The parent [UserStore][] resource name, format:
 // `projects/{project}/locations/{location}/userStores/{user_store_id}`.
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Optional. If true, if user licenses removed associated license config, the
 // user license will be deleted. By default which is false, the user license
 // will be updated to unassigned state.
 DeleteUnassignedUserLicenses bool
`protobuf:"varint,4,opt,name=delete_unassigned_user_licenses,json=deleteUnassignedUserLicenses,proto3"
json:"delete_unassigned_user_licenses,omitempty"`
 unknownFields          protoimpl.UnknownFields
 sizeCache              protoimpl.SizeCache
}

func
 (x *BatchUpdateUserLicensesRequest) Reset() {
 *x = BatchUpdateUserLicensesRequest{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[2]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *BatchUpdateUserLicensesRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*BatchUpdateUserLicensesRequest) ProtoMessage() {}

func (x *BatchUpdateUserLicensesRequest) ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[2]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
```

```
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use BatchUpdateUserLicensesRequest.ProtoReflect.Descriptor instead.
func (*BatchUpdateUserLicensesRequest) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP(),
 []int{2}
}

func (x *BatchUpdateUserLicensesRequest) GetSource() isBatchUpdateUserLicensesRequest_Source {
 if x != nil {
  return x.Source
 }
 return nil
}

func (x *BatchUpdateUserLicensesRequest) GetInlineSource() *BatchUpdateUserLicensesRequest_InlineSource {
 if x != nil {
  if x, ok := x.Source.(*BatchUpdateUserLicensesRequest_InlineSource_); ok {
   return x.InlineSource
  }
 }
 return nil
}

func (x *BatchUpdateUserLicensesRequest) GetParent() string {
 if x != nil {
  return x.Parent
 }
 return ""
}

func (x *BatchUpdateUserLicensesRequest) GetDeleteUnassignedUserLicenses() bool {
 if x != nil {
  return x.DeleteUnassignedUserLicenses
 }
 return false
}

type isBatchUpdateUserLicensesRequest_Source interface {
 isBatchUpdateUserLicensesRequest_Source()
}

type BatchUpdateUserLicensesRequest_InlineSource_ struct {
 // The inline source for the input content for document embeddings.
```

```
 InlineSource *BatchUpdateUserLicensesRequest_InlineSource
`protobuf:"bytes,2,opt,name=inline_source,json=inlineSource,proto3,oneof"`
}

func
 (*BatchUpdateUserLicensesRequest_InlineSource_) isBatchUpdateUserLicensesRequest_Source() {}

// Metadata related to the progress of the
//
[UserLicenseService.BatchUpdateUserLicenses][google.cloud.discoveryengine.v1.UserLicenseService.BatchUpdat
eUserLicenses]
// operation. This will be returned by the google.longrunning.Operation.metadata
// field.
type BatchUpdateUserLicensesMetadata struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Operation create time.
 CreateTime *timestamppb.Timestamp `protobuf:"bytes,1,opt,name=create_time,json=createTime,proto3"
json:"create_time,omitempty"`
 // Operation last update time. If the operation is done, this is also the
 // finish time.
 UpdateTime *timestamppb.Timestamp `protobuf:"bytes,2,opt,name=update_time,json=updateTime,proto3"
json:"update_time,omitempty"`
 // Count of user licenses successfully updated.
 SuccessCount int64 `protobuf:"varint,3,opt,name=success_count,json=successCount,proto3"
 json:"success_count,omitempty"`
 // Count of user licenses that failed to be updated.
 FailureCount  int64 `protobuf:"varint,4,opt,name=failure_count,json=failureCount,proto3"
json:"failure_count,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *BatchUpdateUserLicensesMetadata) Reset() {
 *x = BatchUpdateUserLicensesMetadata{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[3]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *BatchUpdateUserLicensesMetadata) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*BatchUpdateUserLicensesMetadata) ProtoMessage() {}

func (x *BatchUpdateUserLicensesMetadata) ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[3]
 if x != nil {
```

```
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return
 ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use BatchUpdateUserLicensesMetadata.ProtoReflect.Descriptor instead.
func (*BatchUpdateUserLicensesMetadata) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP(), []int{3}
}

func (x *BatchUpdateUserLicensesMetadata) GetCreateTime() *timestamppb.Timestamp {
 if x != nil {
  return x.CreateTime
 }
 return nil
}

func (x *BatchUpdateUserLicensesMetadata) GetUpdateTime() *timestamppb.Timestamp {
 if x != nil {
  return x.UpdateTime
 }
 return nil
}

func (x *BatchUpdateUserLicensesMetadata) GetSuccessCount() int64 {
 if x != nil {
  return x.SuccessCount
 }
 return 0
}

func (x *BatchUpdateUserLicensesMetadata) GetFailureCount() int64 {
 if x != nil {
  return x.FailureCount
 }
 return 0
}

// Response message for
//
[UserLicenseService.BatchUpdateUserLicenses][google.cloud.discoveryengine.v1.UserLicenseService.BatchUpdat
eUserLicenses]
// method.
```

```
type
 BatchUpdateUserLicensesResponse struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // UserLicenses successfully updated.
 UserLicenses []*UserLicense `protobuf:"bytes,1,rep,name=user_licenses,json=userLicenses,proto3"
json:"user_licenses,omitempty"`
 // A sample of errors encountered while processing the request.
 ErrorSamples  []*status.Status `protobuf:"bytes,2,rep,name=error_samples,json=errorSamples,proto3"
json:"error_samples,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *BatchUpdateUserLicensesResponse) Reset() {
 *x = BatchUpdateUserLicensesResponse{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[4]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *BatchUpdateUserLicensesResponse) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*BatchUpdateUserLicensesResponse) ProtoMessage() {}

func (x *BatchUpdateUserLicensesResponse)
 ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[4]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use BatchUpdateUserLicensesResponse.ProtoReflect.Descriptor instead.
func (*BatchUpdateUserLicensesResponse) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP(), []int{4}
}

func (x *BatchUpdateUserLicensesResponse) GetUserLicenses() []*UserLicense {
 if x != nil {
  return x.UserLicenses
 }
```

```
 return nil
}

func (x *BatchUpdateUserLicensesResponse) GetErrorSamples() []*status.Status {
 if x != nil {
  return x.ErrorSamples
 }
 return nil
}

// The inline source for the input config for BatchUpdateUserLicenses
// method.
type BatchUpdateUserLicensesRequest_InlineSource struct {
 state protoimpl.MessageState
 `protogen:"open.v1"`
 // Required. A list of user licenses to update. Each user license
 // must have a valid
 // [UserLicense.user_principal][google.cloud.discoveryengine.v1.UserLicense.user_principal].
 UserLicenses []*UserLicense `protobuf:"bytes,1,rep,name=user_licenses,json=userLicenses,proto3"
json:"user_licenses,omitempty"`
 // Optional. The list of fields to update.
 UpdateMask    *fieldmaskpb.FieldMask `protobuf:"bytes,2,opt,name=update_mask,json=updateMask,proto3"
json:"update_mask,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *BatchUpdateUserLicensesRequest_InlineSource) Reset() {
 *x = BatchUpdateUserLicensesRequest_InlineSource{}
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[5]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *BatchUpdateUserLicensesRequest_InlineSource) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*BatchUpdateUserLicensesRequest_InlineSource)
 ProtoMessage() {}

func (x *BatchUpdateUserLicensesRequest_InlineSource) ProtoReflect() protoreflect.Message {
 mi := &file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[5]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
```

```
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use BatchUpdateUserLicensesRequest_InlineSource.ProtoReflect.Descriptor instead.
func (*BatchUpdateUserLicensesRequest_InlineSource) Descriptor() ([]byte, []int) {
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP(), []int{2, 0}
}

func (x *BatchUpdateUserLicensesRequest_InlineSource) GetUserLicenses() []*UserLicense {
 if x != nil {
  return x.UserLicenses
 }
 return nil
}

func (x *BatchUpdateUserLicensesRequest_InlineSource) GetUpdateMask() *fieldmaskpb.FieldMask {
 if x != nil {
  return x.UpdateMask
 }
 return nil
}

var File_google_cloud_discoveryengine_v1_user_license_service_proto
 protoreflect.FileDescriptor

const file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDesc = "" +
 "\n" +
":google/cloud/discoveryengine/v1/user_license_service.proto\x12\x1fgoogle.cloud.discoveryengine.v1\x1a\x1cgoo
gle/api/annotations.proto\x1a\x17google/api/client.proto\x1a\x1fgoogle/api/field_behavior.proto\x1a\x19google/api/
resource.proto\x1a2google/cloud/discoveryengine/v1/user_license.proto\x1a#google/longrunning/operations.proto\x
1a
google/protobuf/field_mask.proto\x1a\x1fgoogle/protobuf/timestamp.proto\x1a\x17google/rpc/status.proto\"\xc6\x0
1\n" +
 "\x17ListUserLicensesRequest\x12H\n" +
 "\x06parent\x18\x01 \x01(\tB0\xe0A\x02\xfaA*\n" +
 "(discoveryengine.googleapis.com/UserStoreR\x06parent\x12 \n" +
 "\tpage_size\x18\x02 \x01(\x05B\x03\xe0A\x01R\bpageSize\x12\"\n" +
 "\n" +
 "page_token\x18\x03 \x01(\tB\x03\xe0A\x01R\tpageToken\x12\x1b\n" +
 "\x06filter\x18\x04 \x01(\tB\x03\xe0A\x01R\x06filter\"\x95\x01\n"
 +
 "\x18ListUserLicensesResponse\x12Q\n" +
 "\ruser_licenses\x18\x01 \x03(\v2,.google.cloud.discoveryengine.v1.UserLicenseR\fuserLicenses\x12&\n" +
 "\x0fnext_page_token\x18\x02 \x01(\tR\rnextPageToken\"\xe0\x03\n" +
 "\x1eBatchUpdateUserLicensesRequest\x12s\n" +
 "\rinline_source\x18\x02
```

```
\x01(\v2L.google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest.InlineSourceH\x00R\finlineSource\x
12H\n" +
 "\x06parent\x18\x01 \x01(\tB0\xe0A\x02\xfaA*\n" +
 "(discoveryengine.googleapis.com/UserStoreR\x06parent\x12J\n" +
 "\x1fdelete_unassigned_user_licenses\x18\x04
\x01(\bB\x03\xe0A\x01R\x1cdeleteUnassignedUserLicenses\x1a\xa8\x01\n" +
 "\fInlineSource\x12V\n" +
 "\ruser_licenses\x18\x01
\x03(\v2,.google.cloud.discoveryengine.v1.UserLicenseB\x03\xe0A\x02R\fuserLicenses\x12@\n" +
 "\vupdate_mask\x18\x02 \x01(\v2\x1a.google.protobuf.FieldMaskB\x03\xe0A\x01R\n" +
 "updateMaskB\b\n" +
 "\x06source\"\xe5\x01\n" +
 "\x1fBatchUpdateUserLicensesMetadata\x12;\n" +
 "\vcreate_time\x18\x01 \x01(\v2\x1a.google.protobuf.TimestampR\n"
 +
 "createTime\x12;\n" +
 "\vupdate_time\x18\x02 \x01(\v2\x1a.google.protobuf.TimestampR\n" +
 "updateTime\x12#\n" +
 "\rsuccess_count\x18\x03 \x01(\x03R\fsuccessCount\x12#\n" +
 "\rfailure_count\x18\x04 \x01(\x03R\ffailureCount\"\xad\x01\n" +
 "\x1fBatchUpdateUserLicensesResponse\x12Q\n" +
 "\ruser_licenses\x18\x01 \x03(\v2,.google.cloud.discoveryengine.v1.UserLicenseR\fuserLicenses\x127\n" +
 "\rerror_samples\x18\x02 \x03(\v2\x12.google.rpc.StatusR\ferrorSamples2\x9a\x05\n" +
 "\x12UserLicenseService\x12\xd7\x01\n" +
"\x10ListUserLicenses\x128.google.cloud.discoveryengine.v1.ListUserLicensesRequest\x1a9.google.cloud.discover
yengine.v1.ListUserLicensesResponse\"N\xdaA\x06parent\x82\xd3\xe4\x93\x02?\x12=/v1/{parent=projects/*/locati
ons/*/userStores/*}/userLicenses\x12\xd5\x02\n" +
"\x17BatchUpdateUserLicenses\x12?.google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest\x1a\x1d.
google.longrunning.Operation\"\xd9\x01\xcaA\x82\x01\n" +
"?google.cloud.discoveryengine.v1.BatchUpdateUserLicensesResponse\x12?google.cloud.discoveryengine.v1.Batc
hUpdateUserLicensesMetadata\x82\xd3\xe4\x93\x02M:\x01*\"H/v1/{parent=projects/*/locations/*/userStores/*}:b
atchUpdateUserLicenses\x1aR\xcaA\x1ediscoveryengine.googleapis.com\xd2A.https://www.googleapis.com/auth/cl
oud-platformB\x8a\x02\n"
 +
"#com.google.cloud.discoveryengine.v1B\x17UserLicenseServiceProtoP\x01ZMcloud.google.com/go/discoveryeng
ine/apiv1/discoveryenginepb;discoveryenginepb\xa2\x02\x0fDISCOVERYENGINE\xaa\x02\x1fGoogle.Cloud.Disc
overyEngine.V1\xca\x02\x1fGoogle\\Cloud\\DiscoveryEngine\\V1\xea\x02\"Google::Cloud::DiscoveryEngine::V1b
\x06proto3"

var (
 file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescOnce sync.Once
 file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescData []byte
)

func file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescGZIP() []byte {
 file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescOnce.Do(func()
 {
  file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescData =
```

```
protoimpl.X.CompressGZIP(unsafe.Slice(unsafe.StringData(file_google_cloud_discoveryengine_v1_user_license_s
ervice_proto_rawDesc), len(file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDesc)))
 })
 return file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDescData
}

var file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes =
make([]protoimpl.MessageInfo, 6)
var file_google_cloud_discoveryengine_v1_user_license_service_proto_goTypes = []any{
 (*ListUserLicensesRequest)(nil),                    // 0: google.cloud.discoveryengine.v1.ListUserLicensesRequest
 (*ListUserLicensesResponse)(nil),                   // 1: google.cloud.discoveryengine.v1.ListUserLicensesResponse
 (*BatchUpdateUserLicensesRequest)(nil),             // 2:
google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest
 (*BatchUpdateUserLicensesMetadata)(nil),
          // 3: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesMetadata
 (*BatchUpdateUserLicensesResponse)(nil),            // 4:
google.cloud.discoveryengine.v1.BatchUpdateUserLicensesResponse
 (*BatchUpdateUserLicensesRequest_InlineSource)(nil), // 5:
google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest.InlineSource
 (*UserLicense)(nil),                                // 6: google.cloud.discoveryengine.v1.UserLicense
 (*timestamppb.Timestamp)(nil),                      // 7: google.protobuf.Timestamp
 (*status.Status)(nil),                              // 8: google.rpc.Status
 (*fieldmaskpb.FieldMask)(nil),                      // 9: google.protobuf.FieldMask
 (*longrunningpb.Operation)(nil),                    // 10: google.longrunning.Operation
}
var file_google_cloud_discoveryengine_v1_user_license_service_proto_depIdxs = []int32{
 6,  // 0: google.cloud.discoveryengine.v1.ListUserLicensesResponse.user_licenses:type_name ->
google.cloud.discoveryengine.v1.UserLicense
 5,
  // 1: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest.inline_source:type_name ->
google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest.InlineSource
 7,  // 2: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesMetadata.create_time:type_name ->
google.protobuf.Timestamp
 7,  // 3: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesMetadata.update_time:type_name ->
google.protobuf.Timestamp
 6,  // 4: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesResponse.user_licenses:type_name ->
google.cloud.discoveryengine.v1.UserLicense
 8,  // 5: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesResponse.error_samples:type_name ->
google.rpc.Status
 6,  // 6: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest.InlineSource.user_licenses:type_name -
> google.cloud.discoveryengine.v1.UserLicense
 9,  // 7: google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest.InlineSource.update_mask:type_name -
> google.protobuf.FieldMask
 0,
  // 8: google.cloud.discoveryengine.v1.UserLicenseService.ListUserLicenses:input_type ->
google.cloud.discoveryengine.v1.ListUserLicensesRequest
 2,  // 9: google.cloud.discoveryengine.v1.UserLicenseService.BatchUpdateUserLicenses:input_type ->
google.cloud.discoveryengine.v1.BatchUpdateUserLicensesRequest
```

```
 1,  // 10: google.cloud.discoveryengine.v1.UserLicenseService.ListUserLicenses:output_type ->
google.cloud.discoveryengine.v1.ListUserLicensesResponse
 10, // 11: google.cloud.discoveryengine.v1.UserLicenseService.BatchUpdateUserLicenses:output_type ->
google.longrunning.Operation
 10, // [10:12] is the sub-list for method output_type
 8,  // [8:10] is the sub-list for method input_type
 8,  // [8:8] is the sub-list for extension type_name
 8,  // [8:8] is the sub-list for extension extendee
 0,  // [0:8] is the sub-list for field type_name
}

func init() { file_google_cloud_discoveryengine_v1_user_license_service_proto_init() }
func file_google_cloud_discoveryengine_v1_user_license_service_proto_init()
 {
 if File_google_cloud_discoveryengine_v1_user_license_service_proto != nil {
  return
 }
 file_google_cloud_discoveryengine_v1_user_license_proto_init()
 file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes[2].OneofWrappers = []any{
  (*BatchUpdateUserLicensesRequest_InlineSource_)(nil),
 }
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor:
unsafe.Slice(unsafe.StringData(file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDesc),
len(file_google_cloud_discoveryengine_v1_user_license_service_proto_rawDesc)),
   NumEnums:      0,
   NumMessages:   6,
   NumExtensions: 0,
   NumServices:   1,
  },
  GoTypes:           file_google_cloud_discoveryengine_v1_user_license_service_proto_goTypes,
  DependencyIndexes: file_google_cloud_discoveryengine_v1_user_license_service_proto_depIdxs,
  MessageInfos:      file_google_cloud_discoveryengine_v1_user_license_service_proto_msgTypes,
 }.Build()
 File_google_cloud_discoveryengine_v1_user_license_service_proto
 = out.File
 file_google_cloud_discoveryengine_v1_user_license_service_proto_goTypes = nil
 file_google_cloud_discoveryengine_v1_user_license_service_proto_depIdxs = nil
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package procurement_test

import (
 "context"

 procurement "cloud.google.com/go/commerce/consumer/procurement/apiv1"
 procurementpb "cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb"
)

func ExampleLicenseManagementClient_EnumerateLicensedUsers_all() {
 ctx := context.Background()
 // This snippet has been automatically
 generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.EnumerateLicensedUsersRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#EnumerateLicense
dUsersRequest.
 }
 for resp, err := range c.EnumerateLicensedUsers(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
```

```
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

// [START datamanager_v1_generated_UserListDirectLicenseService_GetUserListDirectLicense_sync]

package main

import (
 "context"

 datamanager "cloud.google.com/go/datamanager/apiv1"
 datamanagerpb "cloud.google.com/go/datamanager/apiv1/datamanagerpb"
)

func main() {
 ctx := context.Background()
 // This snippet has been automatically generated and should
 be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := datamanager.NewUserListDirectLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &datamanagerpb.GetUserListDirectLicenseRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/datamanager/apiv1/datamanagerpb#GetUserListDirectLicenseRequest.
 }
 resp, err := c.GetUserListDirectLicense(ctx, req)
```

```
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

// [END datamanager_v1_generated_UserListDirectLicenseService_GetUserListDirectLicense_sync]

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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.36.11
//  protoc        v6.31.0
// source: google/ads/datamanager/v1/user_list_license_client_account_type.proto

package datamanagerpb

import (
 reflect "reflect"
 sync "sync"
 unsafe "unsafe"
```

```
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
)

const (
 //
 Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Possible product of a client account for a user list license.
type UserListLicenseClientAccountType int32

const (
 // Unknown.
 UserListLicenseClientAccountType_USER_LIST_LICENSE_CLIENT_ACCOUNT_TYPE_UNKNOWN
UserListLicenseClientAccountType = 0
 // Google Ads customer.
 UserListLicenseClientAccountType_USER_LIST_LICENSE_CLIENT_ACCOUNT_TYPE_GOOGLE_ADS
UserListLicenseClientAccountType = 1
 // Display & Video 360 partner.
UserListLicenseClientAccountType_USER_LIST_LICENSE_CLIENT_ACCOUNT_TYPE_DISPLAY_VIDEO_P
ARTNER UserListLicenseClientAccountType = 2
 // Display & Video 360 advertiser.
UserListLicenseClientAccountType_USER_LIST_LICENSE_CLIENT_ACCOUNT_TYPE_DISPLAY_VIDEO_A
DVERTISER UserListLicenseClientAccountType = 3
 // Google Ad Manager audience
 link.
UserListLicenseClientAccountType_USER_LIST_LICENSE_CLIENT_ACCOUNT_TYPE_GOOGLE_AD_MAN
AGER_AUDIENCE_LINK UserListLicenseClientAccountType = 4
)

// Enum value maps for UserListLicenseClientAccountType.
var (
 UserListLicenseClientAccountType_name = map[int32]string{
  0: "USER_LIST_LICENSE_CLIENT_ACCOUNT_TYPE_UNKNOWN",
  1: "USER_LIST_LICENSE_CLIENT_ACCOUNT_TYPE_GOOGLE_ADS",
  2: "USER_LIST_LICENSE_CLIENT_ACCOUNT_TYPE_DISPLAY_VIDEO_PARTNER",
  3: "USER_LIST_LICENSE_CLIENT_ACCOUNT_TYPE_DISPLAY_VIDEO_ADVERTISER",
  4: "USER_LIST_LICENSE_CLIENT_ACCOUNT_TYPE_GOOGLE_AD_MANAGER_AUDIENCE_LINK",
 }
 UserListLicenseClientAccountType_value = map[string]int32{
  "USER_LIST_LICENSE_CLIENT_ACCOUNT_TYPE_UNKNOWN":                    0,
  "USER_LIST_LICENSE_CLIENT_ACCOUNT_TYPE_GOOGLE_ADS":                 1,
  "USER_LIST_LICENSE_CLIENT_ACCOUNT_TYPE_DISPLAY_VIDEO_PARTNER":      2,
```

```
  "USER_LIST_LICENSE_CLIENT_ACCOUNT_TYPE_DISPLAY_VIDEO_ADVERTISER":        3,
  "USER_LIST_LICENSE_CLIENT_ACCOUNT_TYPE_GOOGLE_AD_MANAGER_AUDIENCE_LINK":
 4,
 }
)

func (x UserListLicenseClientAccountType) Enum() *UserListLicenseClientAccountType {
 p := new(UserListLicenseClientAccountType)
 *p = x
 return p
}

func (x UserListLicenseClientAccountType) String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (UserListLicenseClientAccountType) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_enumTypes[0].Descriptor()
}

func (UserListLicenseClientAccountType) Type() protoreflect.EnumType {
 return &file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_enumTypes[0]
}

func (x UserListLicenseClientAccountType) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use UserListLicenseClientAccountType.Descriptor instead.
func (UserListLicenseClientAccountType) EnumDescriptor() ([]byte, []int) {
 return file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_rawDescGZIP(),
 []int{0}
}

var File_google_ads_datamanager_v1_user_list_license_client_account_type_proto protoreflect.FileDescriptor

const file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_rawDesc = "" +
 "\n" +
"Egoogle/ads/datamanager/v1/user_list_license_client_account_type.proto\x12\x19google.ads.datamanager.v1*\xdb
\x02\n" +
 " UserListLicenseClientAccountType\x121\n" +
 "-USER_LIST_LICENSE_CLIENT_ACCOUNT_TYPE_UNKNOWN\x10\x00\x124\n" +
 "0USER_LIST_LICENSE_CLIENT_ACCOUNT_TYPE_GOOGLE_ADS\x10\x01\x12?\n" +
 ";USER_LIST_LICENSE_CLIENT_ACCOUNT_TYPE_DISPLAY_VIDEO_PARTNER\x10\x02\x12B\n" +
 ">USER_LIST_LICENSE_CLIENT_ACCOUNT_TYPE_DISPLAY_VIDEO_ADVERTISER\x10\x03\x12I\n" +
"EUSER_LIST_LICENSE_CLIENT_ACCOUNT_TYPE_GOOGLE_AD_MANAGER_AUDIENCE_LINK\x10\x
04B\xe2\x01\n" +
"\x1dcom.google.ads.datamanager.v1B%UserListLicenseClientAccountTypeProtoP\x01ZAcloud.google.com/go/dat
```

```
amanager/apiv1/datamanagerpb;datamanagerpb\xaa\x02\x19Google.Ads.DataManager.V1\xca\x02\x19Google\\Ads
\\DataManager\\V1\xea\x02\x1cGoogle::Ads::DataManager::V1b\x06proto3"

var
 (
 file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_rawDescOnce sync.Once
 file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_rawDescData []byte
)

func file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_rawDescGZIP() []byte {
 file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_rawDescOnce.Do(func() {
  file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_rawDescData =
protoimpl.X.CompressGZIP(unsafe.Slice(unsafe.StringData(file_google_ads_datamanager_v1_user_list_license_cli
ent_account_type_proto_rawDesc),
len(file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_rawDesc)))
 })
 return file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_rawDescData
}

var file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_enumTypes
 = make([]protoimpl.EnumInfo, 1)
var file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_goTypes = []any{
 (UserListLicenseClientAccountType)(0), // 0: google.ads.datamanager.v1.UserListLicenseClientAccountType
}
var file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_depIdxs = []int32{
 0, // [0:0] is the sub-list for method output_type
 0, // [0:0] is the sub-list for method input_type
 0, // [0:0] is the sub-list for extension type_name
 0, // [0:0] is the sub-list for extension extendee
 0, // [0:0] is the sub-list for field type_name
}

func init() { file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_init() }
func file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_init() {
 if File_google_ads_datamanager_v1_user_list_license_client_account_type_proto != nil {
  return
 }
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath:
 reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor:
unsafe.Slice(unsafe.StringData(file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_raw
Desc), len(file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_rawDesc)),
   NumEnums:      1,
   NumMessages:   0,
   NumExtensions: 0,
```

```
  NumServices:   0,
 },
 GoTypes:          file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_goTypes,
 DependencyIndexes: file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_depIdxs,
 EnumInfos:         file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_enumTypes,
}.Build()
File_google_ads_datamanager_v1_user_list_license_client_account_type_proto = out.File
file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_goTypes = nil
file_google_ads_datamanager_v1_user_list_license_client_account_type_proto_depIdxs = nil
}
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// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package discoveryengine_test

import (
 "context"

 discoveryengine "cloud.google.com/go/discoveryengine/apiv1"
 discoveryenginepb "cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
)

func ExampleUserLicenseClient_ListUserLicenses_all() {
 ctx := context.Background()
 //
 This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
```

```
 // TODO: Handle error.
 }
 defer c.Close()

 req := &discoveryenginepb.ListUserLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb#ListUserLicensesRequest.
 }
 for resp, err := range c.ListUserLicenses(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}

func ExampleUserLicenseClient_ListOperations_all() {
 ctx := context.Background()
 //
 This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &longrunningpb.ListOperationsRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#ListOperationsRequest.
 }
 for resp, err := range c.ListOperations(ctx, req).All() {
  if err != nil {
   // TODO: Handle error and break/return/continue. Iteration will stop after any error.
  }
  // TODO: Use resp.
  _ = resp
 }
}
// Copyright 2026 Google LLC
//
// Licensed under the Apache License, Version 2.0 (the "License");
// you may not use this file except in compliance with the License.
// You may obtain a copy of the License at
```

```
//
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// Unless required by applicable law or agreed to in writing, software
// distributed under the License is distributed on an "AS IS" BASIS,
// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
// See the License for the specific language governing permissions and
// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package licensemanager_test

import (
 "context"

 licensemanager "cloud.google.com/go/licensemanager/apiv1"
 licensemanagerpb "cloud.google.com/go/licensemanager/apiv1/licensemanagerpb"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 "google.golang.org/api/iterator"
 locationpb "google.golang.org/genproto/googleapis/cloud/location"
)

func
 ExampleNewClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleNewRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
```

```
 c,
 err := licensemanager.NewRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleClient_AggregateUsage() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.AggregateUsageRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#AggregateUsageRequest.
 }
 it := c.AggregateUsage(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if
 err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*licensemanagerpb.AggregateUsageResponse)
 }
}
```

```
func ExampleClient_CreateConfiguration() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.CreateConfigurationRequest{
  // TODO: Fill request
 struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#CreateConfigurationRequest.
 }
 op, err := c.CreateConfiguration(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 resp, err := op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_DeactivateConfiguration() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.DeactivateConfigurationRequest{
  // TODO: Fill request struct fields.
```

```
  // See
https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#DeactivateConfigurationRequest.
 }
 op,
 err := c.DeactivateConfiguration(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 resp, err := op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_DeleteConfiguration() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.DeleteConfigurationRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#DeleteConfigurationRequest.
 }
 op,
 err := c.DeleteConfiguration(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleClient_GetConfiguration() {
```

```
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.GetConfigurationRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#GetConfigurationRequest.
 }
 resp, err := c.GetConfiguration(ctx,
 req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_GetInstance() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.GetInstanceRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#GetInstanceRequest.
 }
 resp, err := c.GetInstance(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
```

```
}

func ExampleClient_GetProduct() {
 ctx := context.Background()
 //
 This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.GetProductRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#GetProductRequest.
 }
 resp, err := c.GetProduct(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_ListConfigurations() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to
 work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.ListConfigurationsRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#ListConfigurationsRequest.
 }
 it := c.ListConfigurations(ctx, req)
 for {
```

```
 resp, err := it.Next()
 if err == iterator.Done {
  break
 }
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp

 // If you need to access the underlying RPC response,
 // you can do so by casting the `Response` as below.
 // Otherwise, remove this line. Only populated after
 // first call to Next(). Not safe for concurrent access.
 _ = it.Response.(*licensemanagerpb.ListConfigurationsResponse)
}
}

func
 ExampleClient_ListInstances() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.ListInstancesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#ListInstancesRequest.
 }
 it := c.ListInstances(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp
```

```
 // If you need to access the
underlying RPC response,
 // you can do so by casting the `Response` as below.
 // Otherwise, remove this line. Only populated after
 // first call to Next(). Not safe for concurrent access.
 _ = it.Response.(*licensemanagerpb.ListInstancesResponse)
}
}

func ExampleClient_ListProducts() {
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := licensemanager.NewClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &licensemanagerpb.ListProductsRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#ListProductsRequest.
}
it
:= c.ListProducts(ctx, req)
for {
 resp, err := it.Next()
 if err == iterator.Done {
  break
 }
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp

 // If you need to access the underlying RPC response,
 // you can do so by casting the `Response` as below.
 // Otherwise, remove this line. Only populated after
 // first call to Next(). Not safe for concurrent access.
 _ = it.Response.(*licensemanagerpb.ListProductsResponse)
}
}

func ExampleClient_QueryConfigurationLicenseUsage() {
```

```
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO:
 Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.QueryConfigurationLicenseUsageRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#QueryConfigurationLicenseUsage
Request.
 }
 resp, err := c.QueryConfigurationLicenseUsage(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_ReactivateConfiguration() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.ReactivateConfigurationRequest{
  //
 TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#ReactivateConfigurationRequest.
 }
 op, err := c.ReactivateConfiguration(ctx, req)
 if err != nil {
```

```
 // TODO: Handle error.
 }

 resp, err := op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_UpdateConfiguration() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &licensemanagerpb.UpdateConfigurationRequest{
  // TODO: Fill request
 struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/licensemanager/apiv1/licensemanagerpb#UpdateConfigurationRequest.
 }
 op, err := c.UpdateConfiguration(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 resp, err := op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_GetLocation() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
```

```
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := licensemanager.NewClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &locationpb.GetLocationRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/google.golang.org/genproto/googleapis/cloud/location#GetLocationRequest.
}
resp,
err := c.GetLocation(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleClient_ListLocations() {
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := licensemanager.NewClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &locationpb.ListLocationsRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/google.golang.org/genproto/googleapis/cloud/location#ListLocationsRequest.
}
it := c.ListLocations(ctx, req)
for {
 resp, err := it.Next()
 if err == iterator.Done {
  break
 }
 if
err != nil {
  // TODO: Handle error.
 }
```

```
 // TODO: Use resp.
 _ = resp

 // If you need to access the underlying RPC response,
 // you can do so by casting the `Response` as below.
 // Otherwise, remove this line. Only populated after
 // first call to Next(). Not safe for concurrent access.
 _ = it.Response.(*locationpb.ListLocationsResponse)
}
}

func ExampleClient_CancelOperation() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &longrunningpb.CancelOperationRequest{
  // TODO: Fill request struct
 fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#CancelOperationRequest.
 }
 err = c.CancelOperation(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleClient_DeleteOperation() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()
```

```
 req := &longrunningpb.DeleteOperationRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#DeleteOperationRequest.
 }
 err = c.DeleteOperation(ctx, req)
 if err != nil {
  //
 TODO: Handle error.
 }
}

func ExampleClient_GetOperation() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &longrunningpb.GetOperationRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#GetOperationRequest.
 }
 resp, err := c.GetOperation(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleClient_ListOperations() {
 ctx := context.Background()
 // This snippet has been automatically generated and
 should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := licensemanager.NewClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
```

```
 defer c.Close()

 req := &longrunningpb.ListOperationsRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#ListOperationsRequest.
 }
 it := c.ListOperations(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next().
 Not safe for concurrent access.
  _ = it.Response.(*longrunningpb.ListOperationsResponse)
 }
}
// Copyright 2025 Google LLC
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//
//     http://www.apache.org/licenses/LICENSE-2.0
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// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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// limitations under the License.

// Code generated by protoc-gen-go-grpc. DO NOT EDIT.
// versions:
// - protoc-gen-go-grpc v1.3.0
// - protoc             v6.31.0
// source: google/cloud/discoveryengine/v1/user_license_service.proto

package discoveryenginepb
```

```
import (
 context "context"

 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 grpc "google.golang.org/grpc"
 codes "google.golang.org/grpc/codes"
 status "google.golang.org/grpc/status"
)

//
 This is a compile-time assertion to ensure that this generated file
// is compatible with the grpc package it is being compiled against.
// Requires gRPC-Go v1.32.0 or later.
const _ = grpc.SupportPackageIsVersion7

const (
 UserLicenseService_ListUserLicenses_FullMethodName        =
"/google.cloud.discoveryengine.v1.UserLicenseService/ListUserLicenses"
 UserLicenseService_BatchUpdateUserLicenses_FullMethodName =
"/google.cloud.discoveryengine.v1.UserLicenseService/BatchUpdateUserLicenses"
)

// UserLicenseServiceClient is the client API for UserLicenseService service.
//
// For semantics around ctx use and closing/ending streaming RPCs, please refer to
https://pkg.go.dev/google.golang.org/grpc/?tab=doc#ClientConn.NewStream.
type UserLicenseServiceClient interface {
 // Lists the User Licenses.
 ListUserLicenses(ctx context.Context, in *ListUserLicensesRequest, opts ...grpc.CallOption)
(*ListUserLicensesResponse, error)
 // Updates the User License.
 // This
 method is used for batch assign/unassign licenses to users.
 BatchUpdateUserLicenses(ctx context.Context, in *BatchUpdateUserLicensesRequest, opts ...grpc.CallOption)
(*longrunningpb.Operation, error)
}

type userLicenseServiceClient struct {
 cc grpc.ClientConnInterface
}

func NewUserLicenseServiceClient(cc grpc.ClientConnInterface) UserLicenseServiceClient {
 return &userLicenseServiceClient{cc}
}

func (c *userLicenseServiceClient) ListUserLicenses(ctx context.Context, in *ListUserLicensesRequest, opts
...grpc.CallOption) (*ListUserLicensesResponse, error) {
 out := new(ListUserLicensesResponse)
```

```
 err := c.cc.Invoke(ctx, UserLicenseService_ListUserLicenses_FullMethodName, in, out, opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

func (c *userLicenseServiceClient) BatchUpdateUserLicenses(ctx context.Context, in
*BatchUpdateUserLicensesRequest, opts ...grpc.CallOption) (*longrunningpb.Operation, error) {
 out := new(longrunningpb.Operation)
 err := c.cc.Invoke(ctx,
 UserLicenseService_BatchUpdateUserLicenses_FullMethodName, in, out, opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

// UserLicenseServiceServer is the server API for UserLicenseService service.
// All implementations should embed UnimplementedUserLicenseServiceServer
// for forward compatibility
type UserLicenseServiceServer interface {
 // Lists the User Licenses.
 ListUserLicenses(context.Context, *ListUserLicensesRequest) (*ListUserLicensesResponse, error)
 // Updates the User License.
 // This method is used for batch assign/unassign licenses to users.
 BatchUpdateUserLicenses(context.Context, *BatchUpdateUserLicensesRequest) (*longrunningpb.Operation, error)
}

// UnimplementedUserLicenseServiceServer should be embedded to have forward compatible implementations.
type UnimplementedUserLicenseServiceServer struct {
}

func (UnimplementedUserLicenseServiceServer) ListUserLicenses(context.Context, *ListUserLicensesRequest)
(*ListUserLicensesResponse, error) {
 return
 nil, status.Errorf(codes.Unimplemented, "method ListUserLicenses not implemented")
}
func (UnimplementedUserLicenseServiceServer) BatchUpdateUserLicenses(context.Context,
*BatchUpdateUserLicensesRequest) (*longrunningpb.Operation, error) {
 return nil, status.Errorf(codes.Unimplemented, "method BatchUpdateUserLicenses not implemented")
}

// UnsafeUserLicenseServiceServer may be embedded to opt out of forward compatibility for this service.
// Use of this interface is not recommended, as added methods to UserLicenseServiceServer will
// result in compilation errors.
type UnsafeUserLicenseServiceServer interface {
 mustEmbedUnimplementedUserLicenseServiceServer()
```

```
}

func RegisterUserLicenseServiceServer(s grpc.ServiceRegistrar, srv UserLicenseServiceServer) {
 s.RegisterService(&UserLicenseService_ServiceDesc, srv)
}

func _UserLicenseService_ListUserLicenses_Handler(srv interface{}, ctx context.Context, dec func(interface{})
error, interceptor grpc.UnaryServerInterceptor) (interface{},
 error) {
 in := new(ListUserLicensesRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(UserLicenseServiceServer).ListUserLicenses(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: UserLicenseService_ListUserLicenses_FullMethodName,
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(UserLicenseServiceServer).ListUserLicenses(ctx, req.(*ListUserLicensesRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _UserLicenseService_BatchUpdateUserLicenses_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(BatchUpdateUserLicensesRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(UserLicenseServiceServer).BatchUpdateUserLicenses(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: UserLicenseService_BatchUpdateUserLicenses_FullMethodName,
 }
 handler
 := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(UserLicenseServiceServer).BatchUpdateUserLicenses(ctx, req.(*BatchUpdateUserLicensesRequest))
 }
 return interceptor(ctx, in, info, handler)
}

// UserLicenseService_ServiceDesc is the grpc.ServiceDesc for UserLicenseService service.
// It's only intended for direct use with grpc.RegisterService,
```

```
// and not to be introspected or modified (even as a copy)
var UserLicenseService_ServiceDesc = grpc.ServiceDesc{
 ServiceName: "google.cloud.discoveryengine.v1.UserLicenseService",
 HandlerType: (*UserLicenseServiceServer)(nil),
 Methods: []grpc.MethodDesc{
  {
   MethodName: "ListUserLicenses",
   Handler:    _UserLicenseService_ListUserLicenses_Handler,
  },
  {
   MethodName: "BatchUpdateUserLicenses",
   Handler:    _UserLicenseService_BatchUpdateUserLicenses_Handler,
  },
 },
 Streams:  []grpc.StreamDesc{},
 Metadata: "google/cloud/discoveryengine/v1/user_license_service.proto",
}
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//     https://www.apache.org/licenses/LICENSE-2.0
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// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package procurement_test

import (
 "context"

 procurement "cloud.google.com/go/commerce/consumer/procurement/apiv1"
 procurementpb "cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb"
 longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
 "google.golang.org/api/iterator"
)

func ExampleNewLicenseManagementClient() {
 ctx
 := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
```

```
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleNewLicenseManagementRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c,
 err := procurement.NewLicenseManagementRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicenseManagementClient_Assign() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.AssignRequest{
  // TODO: Fill request struct fields.
  // See
```

```
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#AssignRequest.
 }
 resp, err := c.Assign(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 //
 TODO: Use resp.
 _ = resp
}

func ExampleLicenseManagementClient_EnumerateLicensedUsers() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.EnumerateLicensedUsersRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#EnumerateLicense
dUsersRequest.
 }
 it := c.EnumerateLicensedUsers(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  //
 TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*procurementpb.EnumerateLicensedUsersResponse)
```

```
 }
}

func ExampleLicenseManagementClient_GetLicensePool() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.GetLicensePoolRequest{
  // TODO: Fill request struct fields.
  //
 See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#GetLicensePoolRe
quest.
 }
 resp, err := c.GetLicensePool(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicenseManagementClient_Unassign() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.UnassignRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#UnassignRequest.
```

```
 }
 resp,
 err := c.Unassign(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicenseManagementClient_UpdateLicensePool() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &procurementpb.UpdateLicensePoolRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#UpdateLicensePoo
lRequest.
 }
 resp, err := c.UpdateLicensePool(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 //
 TODO: Use resp.
 _ = resp
}

func ExampleLicenseManagementClient_GetOperation() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := procurement.NewLicenseManagementClient(ctx)
 if err != nil {
  // TODO: Handle error.
```

```
 }
 defer c.Close()

 req := &longrunningpb.GetOperationRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#GetOperationRequest.
 }
 resp, err := c.GetOperation(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
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// distributed under the License is distributed on an "AS IS" BASIS,
// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute

import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
 "math"
 "net/http"
 "net/url"
 "time"

 computepb "cloud.google.com/go/compute/apiv1beta/computepb"
 gax "github.com/googleapis/gax-go/v2"
 "github.com/googleapis/gax-go/v2/callctx"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
```

```
 httptransport
 "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var newLicensesClientHook clientHook

// LicensesCallOptions contains the retry settings for each method of LicensesClient.
type LicensesCallOptions struct {
 Delete            []gax.CallOption
 Get               []gax.CallOption
 GetIamPolicy      []gax.CallOption
 Insert            []gax.CallOption
 List              []gax.CallOption
 SetIamPolicy      []gax.CallOption
 TestIamPermissions []gax.CallOption
 Update            []gax.CallOption
}

func defaultLicensesRESTCallOptions() *LicensesCallOptions {
 return &LicensesCallOptions{
  Delete: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  Get: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:
       60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  GetIamPolicy: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
```

```
    http.StatusServiceUnavailable)
   }),
  },
  Insert: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  List: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  SetIamPolicy: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  TestIamPermissions:
 []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  Update: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
 }
}

// internalLicensesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicensesClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Delete(context.Context, *computepb.DeleteLicenseRequest, ...gax.CallOption) (*Operation, error)
 Get(context.Context, *computepb.GetLicenseRequest, ...gax.CallOption) (*computepb.License, error)
 GetIamPolicy(context.Context, *computepb.GetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 Insert(context.Context, *computepb.InsertLicenseRequest, ...gax.CallOption) (*Operation, error)
 List(context.Context, *computepb.ListLicensesRequest, ...gax.CallOption) *LicenseIterator
 SetIamPolicy(context.Context, *computepb.SetIamPolicyLicenseRequest, ...gax.CallOption)
 (*computepb.Policy, error)
 TestIamPermissions(context.Context, *computepb.TestIamPermissionsLicenseRequest, ...gax.CallOption)
(*computepb.TestPermissionsResponse, error)
 Update(context.Context, *computepb.UpdateLicenseRequest, ...gax.CallOption) (*Operation, error)
}
```

```
// LicensesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// The Licenses API.
type LicensesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicensesClient

 // The call options for this service.
 CallOptions *LicensesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicensesClient) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application
 in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *LicensesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicensesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// Delete deletes the specified license.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *LicensesClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts ...gax.CallOption)
(*Operation, error) {
 return c.internalClient.Delete(ctx, req, opts...)
}

// Get returns the specified License resource.
```

```
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
//
 images.
func (c *LicensesClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption)
(*computepb.License, error) {
 return c.internalClient.Get(ctx, req, opts...)
}

// GetIamPolicy gets the access control policy for a resource. May be empty if no such
// policy or resource exists.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *LicensesClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest, opts
...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.GetIamPolicy(ctx, req, opts...)
}

// Insert create a License resource in the specified project.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *LicensesClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts ...gax.CallOption)
(*Operation, error) {
 return c.internalClient.Insert(ctx,
 req, opts...)
}

// List retrieves the list of licenses
// available in the specified project. This method does not
// get any licenses that belong to other projects, including licenses attached
// to publicly-available images, like Debian 9. If you want to get a list of
// publicly-available licenses, use this method to make a request to the
// respective image project, such as debian-cloud orwindows-cloud.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *LicensesClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts ...gax.CallOption)
*LicenseIterator {
 return c.internalClient.List(ctx, req, opts...)
}

// SetIamPolicy sets the access control policy on the specified resource.
// Replaces any existing policy.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
```

```
func (c *LicensesClient) SetIamPolicy(ctx context.Context,
 req *computepb.SetIamPolicyLicenseRequest, opts ...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.SetIamPolicy(ctx, req, opts...)
}

// TestIamPermissions returns permissions that a caller has on the specified resource.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *LicensesClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse,
error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}

// Update updates a License resource in the specified project.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *LicensesClient) Update(ctx context.Context, req *computepb.UpdateLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 return c.internalClient.Update(ctx, req, opts...)
}

//
 Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type licensesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // operationClient is used to call the operation-specific management service.
 operationClient *GlobalOperationsClient

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicensesClient
 CallOptions **LicensesCallOptions

 logger *slog.Logger
}

// NewLicensesRESTClient creates a new licenses rest client.
//
```

```
// The Licenses API.
func NewLicensesRESTClient(ctx context.Context, opts ...option.ClientOption) (*LicensesClient, error) {
 clientOpts := append(defaultLicensesRESTClientOptions(), opts...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  clientOpts = append(clientOpts, internaloption.WithTelemetryAttributes(map[string]string{
   "gcp.client.service":
  "compute",
   "gcp.client.version":  getVersionClient(),
   "gcp.client.repo":     "googleapis/google-cloud-go",
   "gcp.client.artifact": "cloud.google.com/go/compute/apiv1beta",
   "gcp.client.language": "go",
   "url.domain":          "compute.googleapis.com",
  }))
 }
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicensesRESTCallOptions()
 c := &licensesRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 if gax.IsFeatureEnabled("METRICS") {
  metrics := gax.NewClientMetrics(
   gax.WithTelemetryLogger(c.logger),
   gax.WithTelemetryAttributes(map[string]string{
    gax.ClientService:  "compute",
    gax.ClientVersion:  getVersionClient(),
    gax.ClientArtifact: "cloud.google.com/go/compute/apiv1beta",
    gax.RPCSystem:      "http",
    gax.URLDomain:
      "compute.googleapis.com",
   }),
  )

  callOpts.Delete = append(callOpts.Delete, gax.WithClientMetrics(metrics))
  callOpts.Get = append(callOpts.Get, gax.WithClientMetrics(metrics))
  callOpts.GetIamPolicy = append(callOpts.GetIamPolicy, gax.WithClientMetrics(metrics))
  callOpts.Insert = append(callOpts.Insert, gax.WithClientMetrics(metrics))
  callOpts.List = append(callOpts.List, gax.WithClientMetrics(metrics))
  callOpts.SetIamPolicy = append(callOpts.SetIamPolicy, gax.WithClientMetrics(metrics))
  callOpts.TestIamPermissions = append(callOpts.TestIamPermissions, gax.WithClientMetrics(metrics))
```

```
 callOpts.Update = append(callOpts.Update, gax.WithClientMetrics(metrics))
 }

 o := []option.ClientOption{
  option.WithHTTPClient(httpClient),
  option.WithEndpoint(endpoint),
 }
 opC, err := NewGlobalOperationsRESTClient(ctx, o...)
 if err != nil {
  return nil, err
 }
 c.operationClient = opC

 return &LicensesClient{internalClient: c, CallOptions: callOpts}, nil
}

func
 defaultLicensesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licensesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client",
 gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licensesRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 if err := c.operationClient.Close(); err != nil {
  return err
```

```
 }
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licensesRESTClient) Connection() *grpc.ClientConn {
 return nil
}

// Delete deletes the specified license.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *licensesRESTClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses/%v",
 req.GetProject(), req.GetLicense())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name",
fmt.Sprintf("//compute.googleapis.com//compute/beta/projects/%v/global/licenses/%v", req.GetProject(),
req.GetLicense()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
 "google.cloud.compute.v1beta.Licenses/Delete")
  ctx = callctx.WithTelemetryContext(ctx, "url_template",
```

```
"/compute/beta/projects/{project}/global/licenses/{license}")
 }
 opts = append((*c.CallOptions).Delete[0:len((*c.CallOptions).Delete):len((*c.CallOptions).Delete)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Delete")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 op := &Operation{
  &globalOperationsHandle{
   c:
      c.operationClient,
   proto:   resp,
   project: req.GetProject(),
  },
 }
 return op, nil
}

// Get returns the specified License resource.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *licensesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption)
(*computepb.License, error) {
 baseUrl, err := url.Parse(c.endpoint)
```

```
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING")
 || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name",
fmt.Sprintf("//compute.googleapis.com//compute/beta/projects/%v/global/licenses/%v", req.GetProject(),
req.GetLicense()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.cloud.compute.v1beta.Licenses/Get")
  ctx = callctx.WithTelemetryContext(ctx, "url_template",
"/compute/beta/projects/{project}/global/licenses/{license}")
 }
 opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.License{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return
 err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Get")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }
```

```
  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// GetIamPolicy gets the access control policy for a resource. May be empty if no such
// policy or resource exists.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *licensesRESTClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses/%v/getIamPolicy", req.GetProject(),
req.GetResource())

 params := url.Values{}
 if req != nil && req.OptionsRequestedPolicyVersion
 != nil {
  params.Add("optionsRequestedPolicyVersion", fmt.Sprintf("%v", req.GetOptionsRequestedPolicyVersion()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name",
fmt.Sprintf("//compute.googleapis.com//compute/beta/projects/%v/global/licenses/%v", req.GetProject(),
req.GetResource()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.cloud.compute.v1beta.Licenses/GetIamPolicy")
  ctx
 = callctx.WithTelemetryContext(ctx, "url_template",
"/compute/beta/projects/{project}/global/licenses/{resource}/getIamPolicy")
```

```
 }
 opts =
append((*c.CallOptions).GetIamPolicy[0:len((*c.CallOptions).GetIamPolicy):len((*c.CallOptions).GetIamPolicy)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetIamPolicy")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// Insert create a License
 resource in the specified project.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *licensesRESTClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetLicenseResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }
```

```
baseUrl, err := url.Parse(c.endpoint)
if err != nil {
 return nil, err
}
baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses", req.GetProject())

params := url.Values{}
if req != nil && req.RequestId != nil {
 params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
}

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "project", url.QueryEscape(req.GetProject()))}

hds = append(c.xGoogHeaders, hds...)
hds
= append(hds, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
 ctx = callctx.WithTelemetryContext(ctx, "resource_name",
fmt.Sprintf("//compute.googleapis.com//compute/beta/projects/%v", req.GetProject()))
}
if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
 ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.cloud.compute.v1beta.Licenses/Insert")
 ctx = callctx.WithTelemetryContext(ctx, "url_template", "/compute/beta/projects/{project}/global/licenses")
}
opts = append((*c.CallOptions).Insert[0:len((*c.CallOptions).Insert):len((*c.CallOptions).Insert)], opts...)
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
resp := &computepb.Operation{}
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq,
err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Insert")
 if err != nil {
  return err
 }
```

```
 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
op := &Operation{
 &globalOperationsHandle{
  c:       c.operationClient,
  proto:   resp,
  project: req.GetProject(),
 },
}
return op, nil
}

// List retrieves the list of licenses
// available in the specified project. This method does not
// get any licenses that belong to other projects, including licenses attached
// to publicly-available images, like Debian 9. If you want to get a list of
// publicly-available licenses, use this method to make a request to the
// respective image project, such as debian-cloud orwindows-cloud.
//
 Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *licensesRESTClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts
...gax.CallOption) *LicenseIterator {
 it := &LicenseIterator{}
 req = proto.Clone(req).(*computepb.ListLicensesRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*computepb.License, string, error) {
  resp := &computepb.LicensesListResponse{}
  if pageToken != "" {
   req.PageToken = proto.String(pageToken)
  }
  if pageSize > math.MaxInt32 {
   req.MaxResults = proto.Uint32(uint32(math.MaxInt32))
  } else if pageSize != 0 {
   req.MaxResults = proto.Uint32(uint32(pageSize))
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
   return nil, "", err
```

```
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if
req != nil && req.Filter != nil {
  params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
 }
 if req != nil && req.MaxResults != nil {
  params.Add("maxResults", fmt.Sprintf("%v", req.GetMaxResults()))
 }
 if req != nil && req.OrderBy != nil {
  params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
 }
 if req != nil && req.PageToken != nil {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }
 if req != nil && req.ReturnPartialSuccess != nil {
  params.Add("returnPartialSuccess", fmt.Sprintf("%v", req.GetReturnPartialSuccess()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if
err != nil {
   return err
  }
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "List")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
```

```
  return nil, "", e
 }
 it.Response = resp
 return resp.GetItems(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetMaxResults())
it.pageInfo.Token = req.GetPageToken()

return it
}

// SetIamPolicy sets the access control policy on the specified resource.
// Replaces any existing policy.
// Caution This resource is intended
// for use
 only by third-party partners who are creatingCloud Marketplace
// images.
func (c *licensesRESTClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetGlobalSetPolicyRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses/%v/setIamPolicy", req.GetProject(),
req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}
```

```
 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING")
 || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name",
fmt.Sprintf("//compute.googleapis.com//compute/beta/projects/%v/global/licenses/%v", req.GetProject(),
req.GetResource()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.cloud.compute.v1beta.Licenses/SetIamPolicy")
  ctx = callctx.WithTelemetryContext(ctx, "url_template",
"/compute/beta/projects/{project}/global/licenses/{resource}/setIamPolicy")
 }
 opts =
append((*c.CallOptions).SetIamPolicy[0:len((*c.CallOptions).SetIamPolicy):len((*c.CallOptions).SetIamPolicy)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST",
 baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "SetIamPolicy")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}
```

```
// TestIamPermissions returns permissions that a caller has on the specified resource.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *licensesRESTClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse,
error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetTestPermissionsRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl,
 err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses/%v/testIamPermissions", req.GetProject(),
req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name",
fmt.Sprintf("//compute.googleapis.com//compute/beta/projects/%v/global/licenses/%v", req.GetProject(),
req.GetResource()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.compute.v1beta.Licenses/TestIamPermissions")
  ctx
 = callctx.WithTelemetryContext(ctx, "url_template",
"/compute/beta/projects/{project}/global/licenses/{resource}/testIamPermissions")
 }
 opts =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
```

```
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "TestIamPermissions")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return
 nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// Update updates a License resource in the specified project.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *licensesRESTClient) Update(ctx context.Context, req *computepb.UpdateLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetLicenseResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())
```

```
 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }
 if req != nil && req.UpdateMask != nil {
  params.Add("updateMask", fmt.Sprintf("%v", req.GetUpdateMask()))
 }

 baseUrl.RawQuery
 = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name",
fmt.Sprintf("//compute.googleapis.com//compute/beta/projects/%v/global/licenses/%v", req.GetProject(),
req.GetLicense()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.cloud.compute.v1beta.Licenses/Update")
  ctx = callctx.WithTelemetryContext(ctx, "url_template",
"/compute/beta/projects/{project}/global/licenses/{license}")
 }
 opts = append((*c.CallOptions).Update[0:len((*c.CallOptions).Update):len((*c.CallOptions).Update)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("PATCH", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Update")
  if err != nil {
   return err
  }
```

```
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 op := &Operation{
  &globalOperationsHandle{
   c:       c.operationClient,
   proto:   resp,
   project: req.GetProject(),
  },
 }
 return op, nil
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
)

func ExampleNewLicenseCodesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
```

```
//
- It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicenseCodesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

// TODO: Use client.
_ = c
}

func ExampleLicenseCodesClient_Get() {
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicenseCodesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.GetLicenseCodeRequest{
 // TODO: Fill request
struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseCodeRequest.
}
resp, err := c.Get(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleLicenseCodesClient_TestIamPermissions() {
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicenseCodesRESTClient(ctx)
```

```
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.TestIamPermissionsLicenseCodeRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseCodeRequest.
 }
 resp,
 err := c.TestIamPermissions(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
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// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute

import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
 "net/http"
 "net/url"
 "time"

 computepb "cloud.google.com/go/compute/apiv1/computepb"
 gax "github.com/googleapis/gax-go/v2"
 "github.com/googleapis/gax-go/v2/callctx"
 "google.golang.org/api/option"
```

```
 "google.golang.org/api/option/internaloption"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
)

var
 newLicenseCodesClientHook clientHook

// LicenseCodesCallOptions contains the retry settings for each method of LicenseCodesClient.
type LicenseCodesCallOptions struct {
 Get              []gax.CallOption
 TestIamPermissions []gax.CallOption
}

func defaultLicenseCodesRESTCallOptions() *LicenseCodesCallOptions {
 return &LicenseCodesCallOptions{
  Get: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  TestIamPermissions: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
 }
}

// internalLicenseCodesClient is an interface that defines the methods available from Google Compute Engine API.
type
 internalLicenseCodesClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Get(context.Context, *computepb.GetLicenseCodeRequest, ...gax.CallOption) (*computepb.LicenseCode, error)
 TestIamPermissions(context.Context, *computepb.TestIamPermissionsLicenseCodeRequest, ...gax.CallOption)
(*computepb.TestPermissionsResponse, error)
}

// LicenseCodesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
```

```
method calls.
//
// The LicenseCodes API.
type LicenseCodesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicenseCodesClient

 // The call options for this service.
 CallOptions *LicenseCodesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicenseCodesClient)
 Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *LicenseCodesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicenseCodesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// Get return a specified license code. License codes are mirrored across
// all projects that have permissions to read the License Code.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *LicenseCodesClient) Get(ctx context.Context, req *computepb.GetLicenseCodeRequest, opts
...gax.CallOption)
 (*computepb.LicenseCode, error) {
 return c.internalClient.Get(ctx, req, opts...)
}

// TestIamPermissions returns permissions that a caller has on the specified resource.
// Caution This resource is intended
```

```
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *LicenseCodesClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseCodeRequest, opts ...gax.CallOption)
(*computepb.TestPermissionsResponse, error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type licenseCodesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicenseCodesClient
 CallOptions **LicenseCodesCallOptions

 logger
 *slog.Logger
}

// NewLicenseCodesRESTClient creates a new license codes rest client.
//
// The LicenseCodes API.
func NewLicenseCodesRESTClient(ctx context.Context, opts ...option.ClientOption) (*LicenseCodesClient, error) {
 clientOpts := append(defaultLicenseCodesRESTClientOptions(), opts...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  clientOpts = append(clientOpts, internaloption.WithTelemetryAttributes(map[string]string{
   "gcp.client.service":  "compute",
   "gcp.client.version":  getVersionClient(),
   "gcp.client.repo":     "googleapis/google-cloud-go",
   "gcp.client.artifact": "cloud.google.com/go/compute/apiv1",
   "gcp.client.language": "go",
   "url.domain":          "compute.googleapis.com",
  }))
 }
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicenseCodesRESTCallOptions()
```

```
 c := &licenseCodesRESTClient{
  endpoint:    endpoint,
  httpClient:
  httpClient,
  CallOptions: &callOpts,
  logger:      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 if gax.IsFeatureEnabled("METRICS") {
  metrics := gax.NewClientMetrics(
   gax.WithTelemetryLogger(c.logger),
   gax.WithTelemetryAttributes(map[string]string{
    gax.ClientService:  "compute",
    gax.ClientVersion:  getVersionClient(),
    gax.ClientArtifact: "cloud.google.com/go/compute/apiv1",
    gax.RPCSystem:      "http",
    gax.URLDomain:      "compute.googleapis.com",
   }),
  )

  callOpts.Get = append(callOpts.Get, gax.WithClientMetrics(metrics))
  callOpts.TestIamPermissions = append(callOpts.TestIamPermissions, gax.WithClientMetrics(metrics))
 }

 return &LicenseCodesClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicenseCodesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licenseCodesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
```

```
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licenseCodesRESTClient) Close()
 error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licenseCodesRESTClient) Connection() *grpc.ClientConn {
 return nil
}

// Get return a specified license code. License codes are mirrored across
// all projects that have permissions to read the License Code.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *licenseCodesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseCodeRequest, opts
...gax.CallOption) (*computepb.LicenseCode, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenseCodes/%v", req.GetProject(),
req.GetLicenseCode())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v",
 "project", url.QueryEscape(req.GetProject()), "license_code", url.QueryEscape(req.GetLicenseCode()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name",
fmt.Sprintf("//compute.googleapis.com/projects/%v/global/licenseCodes/%v", req.GetProject(),
req.GetLicenseCode()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
```

```
 ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.cloud.compute.v1.LicenseCodes/Get")
 ctx = callctx.WithTelemetryContext(ctx, "url_template",
"/compute/v1/projects/{project}/global/licenseCodes/{license_code}")
}
opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
unm := protojson.UnmarshalOptions{AllowPartial: true,
DiscardUnknown: true}
resp := &computepb.LicenseCode{}
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Get")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
}

// TestIamPermissions returns permissions that a caller has on the specified resource.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *licenseCodesRESTClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseCodeRequest, opts ...gax.CallOption)
 (*computepb.TestPermissionsResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetTestPermissionsRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
```

```
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenseCodes/%v/testIamPermissions",
req.GetProject(), req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name",
fmt.Sprintf("//compute.googleapis.com/projects/%v/global/licenseCodes/%v", req.GetProject(),
 req.GetResource()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.compute.v1.LicenseCodes/TestIamPermissions")
  ctx = callctx.WithTelemetryContext(ctx, "url_template",
"/compute/v1/projects/{project}/global/licenseCodes/{resource}/testIamPermissions")
 }
 opts =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf,
 err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "TestIamPermissions")
  if err != nil {
   return err
```

```
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}
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// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

// [START datamanager_v1_generated_UserListGlobalLicenseService_GetUserListGlobalLicense_sync]

package main

import (
 "context"

 datamanager "cloud.google.com/go/datamanager/apiv1"
 datamanagerpb "cloud.google.com/go/datamanager/apiv1/datamanagerpb"
)

func main() {
 ctx := context.Background()
 // This snippet has been automatically generated and should
 be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
```

```
 c, err := datamanager.NewUserListGlobalLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &datamanagerpb.GetUserListGlobalLicenseRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/datamanager/apiv1/datamanagerpb#GetUserListGlobalLicenseRequest.
 }
 resp, err := c.GetUserListGlobalLicense(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

// [END datamanager_v1_generated_UserListGlobalLicenseService_GetUserListGlobalLicense_sync]
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// Code generated by protoc-gen-go-grpc. DO NOT EDIT.
// versions:
// - protoc-gen-go-grpc v1.3.0
// - protoc             v6.31.0
// source: google/cloud/commerce/consumer/procurement/v1/license_management_service.proto

package procurementpb

import (
 context "context"

 grpc "google.golang.org/grpc"
 codes "google.golang.org/grpc/codes"
 status "google.golang.org/grpc/status"
```

```
)

// This is a compile-time assertion
 to ensure that this generated file
// is compatible with the grpc package it is being compiled against.
// Requires gRPC-Go v1.32.0 or later.
const _ = grpc.SupportPackageIsVersion7

const (
 LicenseManagementService_GetLicensePool_FullMethodName        =
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/GetLicensePool"
 LicenseManagementService_UpdateLicensePool_FullMethodName      =
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/UpdateLicensePool"
 LicenseManagementService_Assign_FullMethodName                 =
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Assign"
 LicenseManagementService_Unassign_FullMethodName               =
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Unassign"
 LicenseManagementService_EnumerateLicensedUsers_FullMethodName =
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/EnumerateLicensedUsers"
)

// LicenseManagementServiceClient
 is the client API for LicenseManagementService service.
//
// For semantics around ctx use and closing/ending streaming RPCs, please refer to
https://pkg.go.dev/google.golang.org/grpc/?tab=doc#ClientConn.NewStream.
type LicenseManagementServiceClient interface {
 // Gets the license pool.
 GetLicensePool(ctx context.Context, in *GetLicensePoolRequest, opts ...grpc.CallOption) (*LicensePool, error)
 // Updates the license pool if one exists for this Order.
 UpdateLicensePool(ctx context.Context, in *UpdateLicensePoolRequest, opts ...grpc.CallOption) (*LicensePool,
error)
 // Assigns a license to a user.
 Assign(ctx context.Context, in *AssignRequest, opts ...grpc.CallOption) (*AssignResponse, error)
 // Unassigns a license from a user.
 Unassign(ctx context.Context, in *UnassignRequest, opts ...grpc.CallOption) (*UnassignResponse, error)
 // Enumerates all users assigned a license.
 EnumerateLicensedUsers(ctx context.Context, in *EnumerateLicensedUsersRequest, opts ...grpc.CallOption)
 (*EnumerateLicensedUsersResponse, error)
}

type licenseManagementServiceClient struct {
 cc grpc.ClientConnInterface
}

func NewLicenseManagementServiceClient(cc grpc.ClientConnInterface) LicenseManagementServiceClient {
 return &licenseManagementServiceClient{cc}
}
```

```
func (c *licenseManagementServiceClient) GetLicensePool(ctx context.Context, in *GetLicensePoolRequest, opts
...grpc.CallOption) (*LicensePool, error) {
 out := new(LicensePool)
 err := c.cc.Invoke(ctx, LicenseManagementService_GetLicensePool_FullMethodName, in, out, opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

func (c *licenseManagementServiceClient) UpdateLicensePool(ctx context.Context, in
*UpdateLicensePoolRequest, opts ...grpc.CallOption) (*LicensePool, error) {
 out := new(LicensePool)
 err := c.cc.Invoke(ctx, LicenseManagementService_UpdateLicensePool_FullMethodName, in, out, opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

func (c *licenseManagementServiceClient) Assign(ctx
 context.Context, in *AssignRequest, opts ...grpc.CallOption) (*AssignResponse, error) {
 out := new(AssignResponse)
 err := c.cc.Invoke(ctx, LicenseManagementService_Assign_FullMethodName, in, out, opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

func (c *licenseManagementServiceClient) Unassign(ctx context.Context, in *UnassignRequest, opts
...grpc.CallOption) (*UnassignResponse, error) {
 out := new(UnassignResponse)
 err := c.cc.Invoke(ctx, LicenseManagementService_Unassign_FullMethodName, in, out, opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

func (c *licenseManagementServiceClient) EnumerateLicensedUsers(ctx context.Context, in
*EnumerateLicensedUsersRequest, opts ...grpc.CallOption) (*EnumerateLicensedUsersResponse, error) {
 out := new(EnumerateLicensedUsersResponse)
 err := c.cc.Invoke(ctx, LicenseManagementService_EnumerateLicensedUsers_FullMethodName, in, out, opts...)
 if err != nil {
  return nil, err
 }
```

```
 return out, nil
}

// LicenseManagementServiceServer
 is the server API for LicenseManagementService service.
// All implementations should embed UnimplementedLicenseManagementServiceServer
// for forward compatibility
type LicenseManagementServiceServer interface {
 // Gets the license pool.
 GetLicensePool(context.Context, *GetLicensePoolRequest) (*LicensePool, error)
 // Updates the license pool if one exists for this Order.
 UpdateLicensePool(context.Context, *UpdateLicensePoolRequest) (*LicensePool, error)
 // Assigns a license to a user.
 Assign(context.Context, *AssignRequest) (*AssignResponse, error)
 // Unassigns a license from a user.
 Unassign(context.Context, *UnassignRequest) (*UnassignResponse, error)
 // Enumerates all users assigned a license.
 EnumerateLicensedUsers(context.Context, *EnumerateLicensedUsersRequest)
(*EnumerateLicensedUsersResponse, error)
}

// UnimplementedLicenseManagementServiceServer should be embedded to have forward compatible
implementations.
type UnimplementedLicenseManagementServiceServer
 struct {
}

func (UnimplementedLicenseManagementServiceServer) GetLicensePool(context.Context,
*GetLicensePoolRequest) (*LicensePool, error) {
 return nil, status.Errorf(codes.Unimplemented, "method GetLicensePool not implemented")
}
func (UnimplementedLicenseManagementServiceServer) UpdateLicensePool(context.Context,
*UpdateLicensePoolRequest) (*LicensePool, error) {
 return nil, status.Errorf(codes.Unimplemented, "method UpdateLicensePool not implemented")
}
func (UnimplementedLicenseManagementServiceServer) Assign(context.Context, *AssignRequest)
(*AssignResponse, error) {
 return nil, status.Errorf(codes.Unimplemented, "method Assign not implemented")
}
func (UnimplementedLicenseManagementServiceServer) Unassign(context.Context, *UnassignRequest)
(*UnassignResponse, error) {
 return nil, status.Errorf(codes.Unimplemented, "method Unassign not implemented")
}
func (UnimplementedLicenseManagementServiceServer) EnumerateLicensedUsers(context.Context,
*EnumerateLicensedUsersRequest)
 (*EnumerateLicensedUsersResponse, error) {
 return nil, status.Errorf(codes.Unimplemented, "method EnumerateLicensedUsers not implemented")
}
```

```
// UnsafeLicenseManagementServiceServer may be embedded to opt out of forward compatibility for this service.
// Use of this interface is not recommended, as added methods to LicenseManagementServiceServer will
// result in compilation errors.
type UnsafeLicenseManagementServiceServer interface {
 mustEmbedUnimplementedLicenseManagementServiceServer()
}

func RegisterLicenseManagementServiceServer(s grpc.ServiceRegistrar, srv LicenseManagementServiceServer) {
 s.RegisterService(&LicenseManagementService_ServiceDesc, srv)
}

func _LicenseManagementService_GetLicensePool_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(GetLicensePoolRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return
 srv.(LicenseManagementServiceServer).GetLicensePool(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: LicenseManagementService_GetLicensePool_FullMethodName,
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(LicenseManagementServiceServer).GetLicensePool(ctx, req.(*GetLicensePoolRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_UpdateLicensePool_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(UpdateLicensePoolRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(LicenseManagementServiceServer).UpdateLicensePool(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: LicenseManagementService_UpdateLicensePool_FullMethodName,
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return
```

```
 srv.(LicenseManagementServiceServer).UpdateLicensePool(ctx, req.(*UpdateLicensePoolRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_Assign_Handler(srv interface{}, ctx context.Context, dec func(interface{})
error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(AssignRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(LicenseManagementServiceServer).Assign(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: LicenseManagementService_Assign_FullMethodName,
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(LicenseManagementServiceServer).Assign(ctx, req.(*AssignRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_Unassign_Handler(srv interface{}, ctx context.Context, dec func(interface{})
error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in
 := new(UnassignRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(LicenseManagementServiceServer).Unassign(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: LicenseManagementService_Unassign_FullMethodName,
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(LicenseManagementServiceServer).Unassign(ctx, req.(*UnassignRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_EnumerateLicensedUsers_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(EnumerateLicensedUsersRequest)
 if err := dec(in); err != nil {
```

```
 return nil, err
 }
 if interceptor == nil {
  return srv.(LicenseManagementServiceServer).EnumerateLicensedUsers(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: LicenseManagementService_EnumerateLicensedUsers_FullMethodName,
 }
 handler
 := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(LicenseManagementServiceServer).EnumerateLicensedUsers(ctx,
req.(*EnumerateLicensedUsersRequest))
 }
 return interceptor(ctx, in, info, handler)
}

// LicenseManagementService_ServiceDesc is the grpc.ServiceDesc for LicenseManagementService service.
// It's only intended for direct use with grpc.RegisterService,
// and not to be introspected or modified (even as a copy)
var LicenseManagementService_ServiceDesc = grpc.ServiceDesc{
 ServiceName: "google.cloud.commerce.consumer.procurement.v1.LicenseManagementService",
 HandlerType: (*LicenseManagementServiceServer)(nil),
 Methods: []grpc.MethodDesc{
  {
   MethodName: "GetLicensePool",
   Handler:    _LicenseManagementService_GetLicensePool_Handler,
  },
  {
   MethodName: "UpdateLicensePool",
   Handler:    _LicenseManagementService_UpdateLicensePool_Handler,
  },
  {
   MethodName: "Assign",
   Handler:    _LicenseManagementService_Assign_Handler,
  },
  {
   MethodName:
 "Unassign",
   Handler:    _LicenseManagementService_Unassign_Handler,
  },
  {
   MethodName: "EnumerateLicensedUsers",
   Handler:    _LicenseManagementService_EnumerateLicensedUsers_Handler,
  },
 },
 Streams:  []grpc.StreamDesc{},
 Metadata: "google/cloud/commerce/consumer/procurement/v1/license_management_service.proto",
```

```
}
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// You may obtain a copy of the License at
//
//     http://www.apache.org/licenses/LICENSE-2.0
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// distributed under the License is distributed on an "AS IS" BASIS,
// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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// limitations under the License.

// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.36.11
//  protoc        v6.31.0
// source: google/ads/datamanager/v1/user_list_license_metrics.proto

package datamanagerpb

import (
 reflect "reflect"
 sync "sync"
 unsafe "unsafe"

 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
)

const
 (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Metrics related to a user list license.
type UserListLicenseMetrics struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Output only. The number of clicks for the user list license.
 ClickCount int64 `protobuf:"varint,1,opt,name=click_count,json=clickCount,proto3" json:"click_count,omitempty"`
 // Output only. The number of impressions for the user list license.
 ImpressionCount int64 `protobuf:"varint,2,opt,name=impression_count,json=impressionCount,proto3"
```

```
json:"impression_count,omitempty"`
 // Output only. The revenue for the user list license in USD micros.
 RevenueUsdMicros int64 `protobuf:"varint,3,opt,name=revenue_usd_micros,json=revenueUsdMicros,proto3"
json:"revenue_usd_micros,omitempty"`
 //
 Output only. The start date (inclusive) of the metrics in the format
 // YYYYMMDD. For example, 20260102 represents January 2, 2026. If `end_date`
 // is used in the filter, `start_date` is also required. If neither
 // `start_date` nor `end_date` are included in the filter, the
 // UserListLicenseMetrics fields will not be populated in the response.
 StartDate int64 `protobuf:"varint,4,opt,name=start_date,json=startDate,proto3" json:"start_date,omitempty"`
 // Output only. The end date (inclusive) of the metrics in the format
 // YYYYMMDD. For example, 20260102 represents January 2, 2026. If `start_date`
 // is used in the filter, `end_date` is also required. If neither `start_date`
 // nor `end_date` are included in the filter, the UserListLicenseMetrics
 // fields will not be populated in the response.
 EndDate       int64 `protobuf:"varint,5,opt,name=end_date,json=endDate,proto3" json:"end_date,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func
 (x *UserListLicenseMetrics) Reset() {
 *x = UserListLicenseMetrics{}
 mi := &file_google_ads_datamanager_v1_user_list_license_metrics_proto_msgTypes[0]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *UserListLicenseMetrics) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UserListLicenseMetrics) ProtoMessage() {}

func (x *UserListLicenseMetrics) ProtoReflect() protoreflect.Message {
 mi := &file_google_ads_datamanager_v1_user_list_license_metrics_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use UserListLicenseMetrics.ProtoReflect.Descriptor instead.
```

```
func (*UserListLicenseMetrics) Descriptor() ([]byte, []int) {
 return file_google_ads_datamanager_v1_user_list_license_metrics_proto_rawDescGZIP(), []int{0}
}

func (x *UserListLicenseMetrics)
 GetClickCount() int64 {
 if x != nil {
  return x.ClickCount
 }
 return 0
}

func (x *UserListLicenseMetrics) GetImpressionCount() int64 {
 if x != nil {
  return x.ImpressionCount
 }
 return 0
}

func (x *UserListLicenseMetrics) GetRevenueUsdMicros() int64 {
 if x != nil {
  return x.RevenueUsdMicros
 }
 return 0
}

func (x *UserListLicenseMetrics) GetStartDate() int64 {
 if x != nil {
  return x.StartDate
 }
 return 0
}

func (x *UserListLicenseMetrics) GetEndDate() int64 {
 if x != nil {
  return x.EndDate
 }
 return 0
}

var File_google_ads_datamanager_v1_user_list_license_metrics_proto protoreflect.FileDescriptor

const file_google_ads_datamanager_v1_user_list_license_metrics_proto_rawDesc = "" +
 "\n" +
"9google/ads/datamanager/v1/user_list_license_metrics.proto\x12\x19google.ads.datamanager.v1\x1a\x1fgoogle/api
/field_behavior.proto\"\xe5\x01\n" +
 "\x16UserListLicenseMetrics\x12$\n" +
 "\vclick_count\x18\x01 \x01(\x03B\x03\xe0A\x03R\n" +
```

```
 "clickCount\x12.\n" +
 "\x10impression_count\x18\x02
 \x01(\x03B\x03\xe0A\x03R\x0fimpressionCount\x121\n" +
 "\x12revenue_usd_micros\x18\x03 \x01(\x03B\x03\xe0A\x03R\x10revenueUsdMicros\x12\"\n" +
 "\n" +
 "start_date\x18\x04 \x01(\x03B\x03\xe0A\x03R\tstartDate\x12\x1e\n" +
 "\bend_date\x18\x05 \x01(\x03B\x03\xe0A\x03R\aendDateB\xd8\x01\n" +
"\x1dcom.google.ads.datamanager.v1B\x1bUserListLicenseMetricsProtoP\x01ZAcloud.google.com/go/datamanager
/apiv1/datamanagerpb;datamanagerpb\xaa\x02\x19Google.Ads.DataManager.V1\xca\x02\x19Google\\Ads\\DataMa
nager\\V1\xea\x02\x1cGoogle::Ads::DataManager::V1b\x06proto3"

var (
 file_google_ads_datamanager_v1_user_list_license_metrics_proto_rawDescOnce sync.Once
 file_google_ads_datamanager_v1_user_list_license_metrics_proto_rawDescData []byte
)

func file_google_ads_datamanager_v1_user_list_license_metrics_proto_rawDescGZIP() []byte {
 file_google_ads_datamanager_v1_user_list_license_metrics_proto_rawDescOnce.Do(func() {
  file_google_ads_datamanager_v1_user_list_license_metrics_proto_rawDescData
 =
protoimpl.X.CompressGZIP(unsafe.Slice(unsafe.StringData(file_google_ads_datamanager_v1_user_list_license_m
etrics_proto_rawDesc), len(file_google_ads_datamanager_v1_user_list_license_metrics_proto_rawDesc)))
 })
 return file_google_ads_datamanager_v1_user_list_license_metrics_proto_rawDescData
}

var file_google_ads_datamanager_v1_user_list_license_metrics_proto_msgTypes = make([]protoimpl.MessageInfo,
1)
var file_google_ads_datamanager_v1_user_list_license_metrics_proto_goTypes = []any{
 (*UserListLicenseMetrics)(nil), // 0: google.ads.datamanager.v1.UserListLicenseMetrics
}
var file_google_ads_datamanager_v1_user_list_license_metrics_proto_depIdxs = []int32{
 0, // [0:0] is the sub-list for method output_type
 0, // [0:0] is the sub-list for method input_type
 0, // [0:0] is the sub-list for extension type_name
 0, // [0:0] is the sub-list for extension extendee
 0, // [0:0] is the sub-list for field type_name
}

func init() { file_google_ads_datamanager_v1_user_list_license_metrics_proto_init()
 }
func file_google_ads_datamanager_v1_user_list_license_metrics_proto_init() {
 if File_google_ads_datamanager_v1_user_list_license_metrics_proto != nil {
  return
 }
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
```

```
  GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
  RawDescriptor:
unsafe.Slice(unsafe.StringData(file_google_ads_datamanager_v1_user_list_license_metrics_proto_rawDesc),
len(file_google_ads_datamanager_v1_user_list_license_metrics_proto_rawDesc)),
  NumEnums:      0,
  NumMessages:   1,
  NumExtensions: 0,
  NumServices:   0,
 },
 GoTypes:          file_google_ads_datamanager_v1_user_list_license_metrics_proto_goTypes,
 DependencyIndexes: file_google_ads_datamanager_v1_user_list_license_metrics_proto_depIdxs,
 MessageInfos:      file_google_ads_datamanager_v1_user_list_license_metrics_proto_msgTypes,
}.Build()
File_google_ads_datamanager_v1_user_list_license_metrics_proto = out.File
file_google_ads_datamanager_v1_user_list_license_metrics_proto_goTypes
= nil
file_google_ads_datamanager_v1_user_list_license_metrics_proto_depIdxs = nil
}
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// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package datamanager_test

import (
 "context"

 datamanager "cloud.google.com/go/datamanager/apiv1"
 datamanagerpb "cloud.google.com/go/datamanager/apiv1/datamanagerpb"
 "google.golang.org/api/iterator"
)

func ExampleNewUserListGlobalLicenseClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as
```

```
 a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := datamanager.NewUserListGlobalLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleNewUserListGlobalLicenseRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := datamanager.NewUserListGlobalLicenseRESTClient(ctx)
 if err != nil {
  // TODO:
 Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleUserListGlobalLicenseClient_CreateUserListGlobalLicense() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := datamanager.NewUserListGlobalLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &datamanagerpb.CreateUserListGlobalLicenseRequest{
  // TODO: Fill request struct fields.
```

```
 // See
https://pkg.go.dev/cloud.google.com/go/datamanager/apiv1/datamanagerpb#CreateUserListGlobalLicenseRequest.
 }
 resp, err := c.CreateUserListGlobalLicense(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _
 = resp
}

func ExampleUserListGlobalLicenseClient_GetUserListGlobalLicense() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := datamanager.NewUserListGlobalLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &datamanagerpb.GetUserListGlobalLicenseRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/datamanager/apiv1/datamanagerpb#GetUserListGlobalLicenseRequest.
 }
 resp, err := c.GetUserListGlobalLicense(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleUserListGlobalLicenseClient_ListUserListGlobalLicenseCustomerInfos()
 {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := datamanager.NewUserListGlobalLicenseClient(ctx)
 if err != nil {
```

```
 // TODO: Handle error.
 }
 defer c.Close()

 req := &datamanagerpb.ListUserListGlobalLicenseCustomerInfosRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/datamanager/apiv1/datamanagerpb#ListUserListGlobalLicenseCustomerInf
osRequest.
 }
 it := c.ListUserListGlobalLicenseCustomerInfos(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _
 = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*datamanagerpb.ListUserListGlobalLicenseCustomerInfosResponse)
 }
}

func ExampleUserListGlobalLicenseClient_ListUserListGlobalLicenses() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := datamanager.NewUserListGlobalLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &datamanagerpb.ListUserListGlobalLicensesRequest{
  // TODO: Fill request
 struct fields.
  // See
```

```
https://pkg.go.dev/cloud.google.com/go/datamanager/apiv1/datamanagerpb#ListUserListGlobalLicensesRequest.
 }
 it := c.ListUserListGlobalLicenses(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*datamanagerpb.ListUserListGlobalLicensesResponse)
 }
}

func ExampleUserListGlobalLicenseClient_UpdateUserListGlobalLicense() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints
 when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := datamanager.NewUserListGlobalLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &datamanagerpb.UpdateUserListGlobalLicenseRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/datamanager/apiv1/datamanagerpb#UpdateUserListGlobalLicenseRequest.
 }
 resp, err := c.UpdateUserListGlobalLicense(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
```

```
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// limitations under the License.

// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.36.11
//  protoc        v6.31.0
// source: google/ai/generativelanguage/v1beta/permission.proto

package generativelanguagepb

import (
 reflect "reflect"
 sync "sync"
 unsafe "unsafe"

 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
)

const
 (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Defines types of the grantee of this permission.
type Permission_GranteeType int32

const (
 // The default value. This value is unused.
 Permission_GRANTEE_TYPE_UNSPECIFIED Permission_GranteeType = 0
 // Represents a user. When set, you must provide email_address for the user.
 Permission_USER Permission_GranteeType = 1
```

```
 // Represents a group. When set, you must provide email_address for the
 // group.
 Permission_GROUP Permission_GranteeType = 2
 // Represents access to everyone. No extra information is required.
 Permission_EVERYONE Permission_GranteeType = 3
)

// Enum value maps for Permission_GranteeType.
var (
 Permission_GranteeType_name = map[int32]string{
  0: "GRANTEE_TYPE_UNSPECIFIED",
  1:
 "USER",
  2: "GROUP",
  3: "EVERYONE",
 }
 Permission_GranteeType_value = map[string]int32{
  "GRANTEE_TYPE_UNSPECIFIED": 0,
  "USER":                     1,
  "GROUP":                    2,
  "EVERYONE":                 3,
 }
)

func (x Permission_GranteeType) Enum() *Permission_GranteeType {
 p := new(Permission_GranteeType)
 *p = x
 return p
}

func (x Permission_GranteeType) String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_GranteeType) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0].Descriptor()
}

func (Permission_GranteeType) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0]
}

func (x Permission_GranteeType) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_GranteeType.Descriptor instead.
func (Permission_GranteeType) EnumDescriptor()
```

```
 ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 0}
}

// Defines the role granted by this permission.
type Permission_Role int32

const (
 // The default value. This value is unused.
 Permission_ROLE_UNSPECIFIED Permission_Role = 0
 // Owner can use, update, share and delete the resource.
 Permission_OWNER Permission_Role = 1
 // Writer can use, update and share the resource.
 Permission_WRITER Permission_Role = 2
 // Reader can use the resource.
 Permission_READER Permission_Role = 3
)

// Enum value maps for Permission_Role.
var (
 Permission_Role_name = map[int32]string{
  0: "ROLE_UNSPECIFIED",
  1: "OWNER",
  2: "WRITER",
  3: "READER",
 }
 Permission_Role_value = map[string]int32{
  "ROLE_UNSPECIFIED": 0,
  "OWNER":            1,
  "WRITER":           2,
  "READER":           3,
 }
)

func (x Permission_Role) Enum() *Permission_Role {
 p := new(Permission_Role)
 *p = x
 return p
}

func (x Permission_Role) String()
 string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_Role) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1].Descriptor()
}
```

```
func (Permission_Role) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1]
}

func (x Permission_Role) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_Role.Descriptor instead.
func (Permission_Role) EnumDescriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 1}
}

// Permission resource grants user, group or the rest of the world access to the
// PaLM API resource (e.g. a tuned model, corpus).
//
// A role is a collection of permitted operations that allows users to perform
// specific actions on PaLM API resources. To make them available to users,
// groups,
 or service accounts, you assign roles. When you assign a role, you
// grant permissions that the role contains.
//
// There are three concentric roles. Each role is a superset of the previous
// role's permitted operations:
//
// - reader can use the resource (e.g. tuned model, corpus) for inference
// - writer has reader's permissions and additionally can edit and share
// - owner has writer's permissions and additionally can delete
type Permission struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Output only. Identifier. The permission name. A unique name will be
 // generated on create. Examples:
 //
 // tunedModels/{tuned_model}/permissions/{permission}
 // corpora/{corpus}/permissions/{permission}
 //
 // Output only.
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Optional. Immutable. The type of the grantee.
 GranteeType *Permission_GranteeType
`protobuf:"varint,2,opt,name=grantee_type,json=granteeType,proto3,enum=google.ai.generativelanguage.v1beta.Pe
rmission_GranteeType,oneof"
 json:"grantee_type,omitempty"`
 // Optional. Immutable. The email address of the user of group which this
 // permission refers. Field is not set when permission's grantee type is
 // EVERYONE.
 EmailAddress *string `protobuf:"bytes,3,opt,name=email_address,json=emailAddress,proto3,oneof"
```

```
json:"email_address,omitempty"`
 // Required. The role granted by this permission.
 Role          *Permission_Role
`protobuf:"varint,4,opt,name=role,proto3,enum=google.ai.generativelanguage.v1beta.Permission_Role,oneof"
json:"role,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *Permission) Reset() {
 *x = Permission{}
 mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *Permission) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*Permission) ProtoMessage() {}

func (x *Permission)
 ProtoReflect() protoreflect.Message {
 mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use Permission.ProtoReflect.Descriptor instead.
func (*Permission) Descriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0}
}

func (x *Permission) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
}

func (x *Permission) GetGranteeType() Permission_GranteeType {
```

```
 if x != nil && x.GranteeType != nil {
  return *x.GranteeType
 }
 return Permission_GRANTEE_TYPE_UNSPECIFIED
}

func (x *Permission) GetEmailAddress() string {
 if x != nil && x.EmailAddress != nil {
  return *x.EmailAddress
 }
 return ""
}

func (x *Permission) GetRole() Permission_Role {
 if x != nil && x.Role != nil {
  return *x.Role
 }
 return
 Permission_ROLE_UNSPECIFIED
}

var File_google_ai_generativelanguage_v1beta_permission_proto protoreflect.FileDescriptor

const file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = "" +
 "\n" +
"4google/ai/generativelanguage/v1beta/permission.proto\x12#google.ai.generativelanguage.v1beta\x1a\x1fgoogle/a
pi/field_behavior.proto\x1a\x19google/api/resource.proto\"\x85\x05\n" +
 "\n" +
 "Permission\x12\x1a\n" +
 "\x04name\x18\x01 \x01(\tB\x06\xe0A\x03\xe0A\bR\x04name\x12k\n" +
 "\fgrantee_type\x18\x02
\x01(\x0e2;.google.ai.generativelanguage.v1beta.Permission.GranteeTypeB\x06\xe0A\x01\xe0A\x05H\x00R\vgrant
eeType\x88\x01\x01\x120\n" +
 "\remail_address\x18\x03 \x01(\tB\x06\xe0A\x01\xe0A\x05H\x01R\femailAddress\x88\x01\x01\x12R\n" +
 "\x04role\x18\x04
\x01(\x0e24.google.ai.generativelanguage.v1beta.Permission.RoleB\x03\xe0A\x02H\x02R\x04role\x88\x01\x01\"N\
n" +
 "\vGranteeType\x12\x1c\n" +
 "\x18GRANTEE_TYPE_UNSPECIFIED\x10\x00\x12\b\n" +
 "\x04USER\x10\x01\x12\t\n"
 +
 "\x05GROUP\x10\x02\x12\f\n" +
 "\bEVERYONE\x10\x03\"?\n" +
 "\x04Role\x12\x14\n" +
 "\x10ROLE_UNSPECIFIED\x10\x00\x12\t\n" +
 "\x05OWNER\x10\x01\x12\n" +
 "\n" +
 "\x06WRITER\x10\x02\x12\n" +
```

```
 "\n" +
 "\x06READER\x10\x03:\xaa\x01\xeaA\xa6\x01\n" +
",generativelanguage.googleapis.com/Permission\x122tunedModels/{tuned_model}/permissions/{permission}\x12)
corpora/{corpus}/permissions/{permission}*\vpermissions2\n" +
 "permissionB\x0f\n" +
 "\r_grantee_typeB\x10\n" +
 "\x0e_email_addressB\a\n" +
 "\x05_roleB\x9b\x01\n" +
"'com.google.ai.generativelanguage.v1betaB\x0fPermissionProtoP\x01Z]cloud.google.com/go/ai/generativelanguag
e/apiv1beta/generativelanguagepb;generativelanguagepbb\x06proto3"

var (
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce sync.Once
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData []byte
)

func file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP() []byte {
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce.Do(func()
 {
  file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
protoimpl.X.CompressGZIP(unsafe.Slice(unsafe.StringData(file_google_ai_generativelanguage_v1beta_permission
_proto_rawDesc), len(file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc)))
 })
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData
}

var file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes = make([]protoimpl.EnumInfo, 2)
var file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes = make([]protoimpl.MessageInfo, 1)
var file_google_ai_generativelanguage_v1beta_permission_proto_goTypes = []any{
 (Permission_GranteeType)(0), // 0: google.ai.generativelanguage.v1beta.Permission.GranteeType
 (Permission_Role)(0),        // 1: google.ai.generativelanguage.v1beta.Permission.Role
 (*Permission)(nil),          // 2: google.ai.generativelanguage.v1beta.Permission
}
var file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs
 = []int32{
 0, // 0: google.ai.generativelanguage.v1beta.Permission.grantee_type:type_name ->
google.ai.generativelanguage.v1beta.Permission.GranteeType
 1, // 1: google.ai.generativelanguage.v1beta.Permission.role:type_name ->
google.ai.generativelanguage.v1beta.Permission.Role
 2, // [2:2] is the sub-list for method output_type
 2, // [2:2] is the sub-list for method input_type
 2, // [2:2] is the sub-list for extension type_name
 2, // [2:2] is the sub-list for extension extendee
 0, // [0:2] is the sub-list for field type_name
}

func init() { file_google_ai_generativelanguage_v1beta_permission_proto_init() }
func file_google_ai_generativelanguage_v1beta_permission_proto_init() {
```

```
 if File_google_ai_generativelanguage_v1beta_permission_proto != nil {
  return
 }
 file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0].OneofWrappers = []any{}
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor:
 unsafe.Slice(unsafe.StringData(file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc),
len(file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc)),
   NumEnums:      2,
   NumMessages:   1,
   NumExtensions: 0,
   NumServices:   0,
  },
  GoTypes:          file_google_ai_generativelanguage_v1beta_permission_proto_goTypes,
  DependencyIndexes: file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs,
  EnumInfos:         file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes,
  MessageInfos:      file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes,
 }.Build()
 File_google_ai_generativelanguage_v1beta_permission_proto = out.File
 file_google_ai_generativelanguage_v1beta_permission_proto_goTypes = nil
 file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = nil
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

// [START discoveryengine_v1_generated_UserLicenseService_ListUserLicenses_sync]

package main

import (
 "context"
```

```
 discoveryengine "cloud.google.com/go/discoveryengine/apiv1"
 discoveryenginepb "cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb"
 "google.golang.org/api/iterator"
)

func main() {
 ctx := context.Background()
 // This snippet
 has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := discoveryengine.NewUserLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &discoveryenginepb.ListUserLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/discoveryengine/apiv1/discoveryenginepb#ListUserLicensesRequest.
 }
 it := c.ListUserLicenses(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove
 this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*discoveryenginepb.ListUserLicensesResponse)
 }
}

// [END discoveryengine_v1_generated_UserLicenseService_ListUserLicenses_sync]
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```

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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute

import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
 "net/http"
 "net/url"
 "time"

 computepb "cloud.google.com/go/compute/apiv1beta/computepb"
 gax "github.com/googleapis/gax-go/v2"
 "github.com/googleapis/gax-go/v2/callctx"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
)

var
 newLicenseCodesClientHook clientHook

// LicenseCodesCallOptions contains the retry settings for each method of LicenseCodesClient.
type LicenseCodesCallOptions struct {
 Get              []gax.CallOption
 TestIamPermissions []gax.CallOption
}

func defaultLicenseCodesRESTCallOptions() *LicenseCodesCallOptions {
 return &LicenseCodesCallOptions{
  Get: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
```

```
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  TestIamPermissions: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
 }
}

// internalLicenseCodesClient is an interface that defines the methods available from Google Compute Engine API.
type
 internalLicenseCodesClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Get(context.Context, *computepb.GetLicenseCodeRequest, ...gax.CallOption) (*computepb.LicenseCode, error)
 TestIamPermissions(context.Context, *computepb.TestIamPermissionsLicenseCodeRequest, ...gax.CallOption)
(*computepb.TestPermissionsResponse, error)
}

// LicenseCodesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// The LicenseCodes API.
type LicenseCodesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicenseCodesClient

 // The call options for this service.
 CallOptions *LicenseCodesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c
 *LicenseCodesClient) Close() error {
 return c.internalClient.Close()
}
```

```
// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *LicenseCodesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicenseCodesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// Get return a specified license code. License codes are mirrored across
// all projects that have permissions to read the License Code.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *LicenseCodesClient) Get(ctx context.Context, req *computepb.GetLicenseCodeRequest, opts
...gax.CallOption)
 (*computepb.LicenseCode, error) {
 return c.internalClient.Get(ctx, req, opts...)
}

// TestIamPermissions returns permissions that a caller has on the specified resource.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *LicenseCodesClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseCodeRequest, opts ...gax.CallOption)
(*computepb.TestPermissionsResponse, error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type licenseCodesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string
```

```
 // Points back to the CallOptions field of the containing LicenseCodesClient
 CallOptions **LicenseCodesCallOptions

 logger
 *slog.Logger
}

// NewLicenseCodesRESTClient creates a new license codes rest client.
//
// The LicenseCodes API.
func NewLicenseCodesRESTClient(ctx context.Context, opts ...option.ClientOption) (*LicenseCodesClient, error) {
 clientOpts := append(defaultLicenseCodesRESTClientOptions(), opts...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  clientOpts = append(clientOpts, internaloption.WithTelemetryAttributes(map[string]string{
   "gcp.client.service":  "compute",
   "gcp.client.version":  getVersionClient(),
   "gcp.client.repo":     "googleapis/google-cloud-go",
   "gcp.client.artifact": "cloud.google.com/go/compute/apiv1beta",
   "gcp.client.language": "go",
   "url.domain":          "compute.googleapis.com",
  }))
 }
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicenseCodesRESTCallOptions()
 c := &licenseCodesRESTClient{
  endpoint:    endpoint,
  httpClient:
  httpClient,
  CallOptions: &callOpts,
  logger:      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()

 if gax.IsFeatureEnabled("METRICS") {
  metrics := gax.NewClientMetrics(
   gax.WithTelemetryLogger(c.logger),
   gax.WithTelemetryAttributes(map[string]string{
    gax.ClientService:  "compute",
    gax.ClientVersion:  getVersionClient(),
    gax.ClientArtifact: "cloud.google.com/go/compute/apiv1beta",
    gax.RPCSystem:      "http",
    gax.URLDomain:      "compute.googleapis.com",
   }),
  )
```

```
  callOpts.Get = append(callOpts.Get, gax.WithClientMetrics(metrics))
  callOpts.TestIamPermissions = append(callOpts.TestIamPermissions, gax.WithClientMetrics(metrics))
 }

 return &LicenseCodesClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicenseCodesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licenseCodesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licenseCodesRESTClient)
 Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licenseCodesRESTClient) Connection() *grpc.ClientConn {
 return nil
}
```

```
// Get return a specified license code. License codes are mirrored across
// all projects that have permissions to read the License Code.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *licenseCodesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseCodeRequest, opts
...gax.CallOption) (*computepb.LicenseCode, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenseCodes/%v", req.GetProject(),
req.GetLicenseCode())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params",
 fmt.Sprintf("%s=%v&%s=%v", "project", url.QueryEscape(req.GetProject()), "license_code",
url.QueryEscape(req.GetLicenseCode()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name",
fmt.Sprintf("//compute.googleapis.com//compute/beta/projects/%v/global/licenseCodes/%v", req.GetProject(),
req.GetLicenseCode()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method", "google.cloud.compute.v1beta.LicenseCodes/Get")
  ctx = callctx.WithTelemetryContext(ctx, "url_template",
"/compute/beta/projects/{project}/global/licenseCodes/{license_code}")
 }
 opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial:
 true, DiscardUnknown: true}
 resp := &computepb.LicenseCode{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers
```

```
  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Get")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// TestIamPermissions returns permissions that a caller has on the specified resource.
// Caution This resource is intended
// for use only by third-party partners who are creatingCloud Marketplace
// images.
func (c *licenseCodesRESTClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseCodeRequest,
 opts ...gax.CallOption) (*computepb.TestPermissionsResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetTestPermissionsRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/beta/projects/%v/global/licenseCodes/%v/testIamPermissions",
req.GetProject(), req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name",
fmt.Sprintf("//compute.googleapis.com//compute/beta/projects/%v/global/licenseCodes/%v",
```

```
 req.GetProject(), req.GetResource()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.cloud.compute.v1beta.LicenseCodes/TestIamPermissions")
  ctx = callctx.WithTelemetryContext(ctx, "url_template",
"/compute/beta/projects/{project}/global/licenseCodes/{resource}/testIamPermissions")
 }
 opts =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq
 = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "TestIamPermissions")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

// [START datamanager_v1_generated_UserListDirectLicenseService_CreateUserListDirectLicense_sync]

package main

import (
 "context"

 datamanager "cloud.google.com/go/datamanager/apiv1"
 datamanagerpb "cloud.google.com/go/datamanager/apiv1/datamanagerpb"
)

func main() {
 ctx := context.Background()
 // This snippet has been automatically generated and
 should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := datamanager.NewUserListDirectLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &datamanagerpb.CreateUserListDirectLicenseRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/datamanager/apiv1/datamanagerpb#CreateUserListDirectLicenseRequest.
 }
 resp, err := c.CreateUserListDirectLicense(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
```

```
// [END datamanager_v1_generated_UserListDirectLicenseService_CreateUserListDirectLicense_sync]
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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.36.11
//  protoc        v6.31.0
// source: google/ads/datamanager/v1/user_list_license_status.proto

package datamanagerpb

import (
 reflect "reflect"
 sync "sync"
 unsafe "unsafe"

 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
)

const (
 // Verify that
 this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// User list license status.
type UserListLicenseStatus int32

const (
 // Unknown.
 UserListLicenseStatus_USER_LIST_LICENSE_STATUS_UNSPECIFIED UserListLicenseStatus = 0
 // Active status - user list is still being licensed.
 UserListLicenseStatus_USER_LIST_LICENSE_STATUS_ENABLED UserListLicenseStatus = 1
```

```
 // Inactive status - user list is no longer being licensed.
 UserListLicenseStatus_USER_LIST_LICENSE_STATUS_DISABLED UserListLicenseStatus = 2
)

// Enum value maps for UserListLicenseStatus.
var (
 UserListLicenseStatus_name = map[int32]string{
  0: "USER_LIST_LICENSE_STATUS_UNSPECIFIED",
  1: "USER_LIST_LICENSE_STATUS_ENABLED",
  2: "USER_LIST_LICENSE_STATUS_DISABLED",
 }
 UserListLicenseStatus_value = map[string]int32{
  "USER_LIST_LICENSE_STATUS_UNSPECIFIED":
 0,
  "USER_LIST_LICENSE_STATUS_ENABLED":     1,
  "USER_LIST_LICENSE_STATUS_DISABLED":    2,
 }
)

func (x UserListLicenseStatus) Enum() *UserListLicenseStatus {
 p := new(UserListLicenseStatus)
 *p = x
 return p
}

func (x UserListLicenseStatus) String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (UserListLicenseStatus) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ads_datamanager_v1_user_list_license_status_proto_enumTypes[0].Descriptor()
}

func (UserListLicenseStatus) Type() protoreflect.EnumType {
 return &file_google_ads_datamanager_v1_user_list_license_status_proto_enumTypes[0]
}

func (x UserListLicenseStatus) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use UserListLicenseStatus.Descriptor instead.
func (UserListLicenseStatus) EnumDescriptor() ([]byte, []int) {
 return file_google_ads_datamanager_v1_user_list_license_status_proto_rawDescGZIP(), []int{0}
}

var File_google_ads_datamanager_v1_user_list_license_status_proto
```

```
 protoreflect.FileDescriptor

const file_google_ads_datamanager_v1_user_list_license_status_proto_rawDesc = "" +
 "\n" +
 "8google/ads/datamanager/v1/user_list_license_status.proto\x12\x19google.ads.datamanager.v1*\x8e\x01\n" +
 "\x15UserListLicenseStatus\x12(\n" +
 "$USER_LIST_LICENSE_STATUS_UNSPECIFIED\x10\x00\x12$\n" +
 " USER_LIST_LICENSE_STATUS_ENABLED\x10\x01\x12%\n" +
 "!USER_LIST_LICENSE_STATUS_DISABLED\x10\x02B\xd7\x01\n" +
"\x1dcom.google.ads.datamanager.v1B\x1aUserListLicenseStatusProtoP\x01ZAcloud.google.com/go/datamanager/
apiv1/datamanagerpb;datamanagerpb\xaa\x02\x19Google.Ads.DataManager.V1\xca\x02\x19Google\\Ads\\DataMan
ager\\V1\xea\x02\x1cGoogle::Ads::DataManager::V1b\x06proto3"

var (
 file_google_ads_datamanager_v1_user_list_license_status_proto_rawDescOnce sync.Once
 file_google_ads_datamanager_v1_user_list_license_status_proto_rawDescData []byte
)

func file_google_ads_datamanager_v1_user_list_license_status_proto_rawDescGZIP()
 []byte {
 file_google_ads_datamanager_v1_user_list_license_status_proto_rawDescOnce.Do(func() {
  file_google_ads_datamanager_v1_user_list_license_status_proto_rawDescData =
protoimpl.X.CompressGZIP(unsafe.Slice(unsafe.StringData(file_google_ads_datamanager_v1_user_list_license_sta
tus_proto_rawDesc), len(file_google_ads_datamanager_v1_user_list_license_status_proto_rawDesc)))
 })
 return file_google_ads_datamanager_v1_user_list_license_status_proto_rawDescData
}

var file_google_ads_datamanager_v1_user_list_license_status_proto_enumTypes = make([]protoimpl.EnumInfo, 1)
var file_google_ads_datamanager_v1_user_list_license_status_proto_goTypes = []any{
 (UserListLicenseStatus)(0), // 0: google.ads.datamanager.v1.UserListLicenseStatus
}
var file_google_ads_datamanager_v1_user_list_license_status_proto_depIdxs = []int32{
 0, // [0:0] is the sub-list for method output_type
 0, // [0:0] is the sub-list for method input_type
 0, // [0:0] is the sub-list for extension type_name
 0,
 // [0:0] is the sub-list for extension extendee
 0, // [0:0] is the sub-list for field type_name
}

func init() { file_google_ads_datamanager_v1_user_list_license_status_proto_init() }
func file_google_ads_datamanager_v1_user_list_license_status_proto_init() {
 if File_google_ads_datamanager_v1_user_list_license_status_proto != nil {
  return
 }
 type x struct{}
 out := protoimpl.TypeBuilder{
```

```
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor:
unsafe.Slice(unsafe.StringData(file_google_ads_datamanager_v1_user_list_license_status_proto_rawDesc),
len(file_google_ads_datamanager_v1_user_list_license_status_proto_rawDesc)),
   NumEnums:      1,
   NumMessages:   0,
   NumExtensions: 0,
   NumServices:   0,
  },
  GoTypes:           file_google_ads_datamanager_v1_user_list_license_status_proto_goTypes,
  DependencyIndexes: file_google_ads_datamanager_v1_user_list_license_status_proto_depIdxs,
  EnumInfos:         file_google_ads_datamanager_v1_user_list_license_status_proto_enumTypes,
 }.Build()
 File_google_ads_datamanager_v1_user_list_license_status_proto
 = out.File
 file_google_ads_datamanager_v1_user_list_license_status_proto_goTypes = nil
 file_google_ads_datamanager_v1_user_list_license_status_proto_depIdxs = nil
}
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//go:build go1.23

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
)

func ExampleLicensesClient_List_all() {
 ctx := context.Background()
```

```
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications
to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.ListLicensesRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#ListLicensesRequest.
}
for resp, err := range c.List(ctx, req).All() {
 if err != nil {
  // TODO: Handle error and break/return/continue. Iteration will stop after any error.
 }
 // TODO: Use resp.
 _ = resp
}
}
```

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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.36.11
//  protoc        v6.31.0
// source: google/cloud/commerce/consumer/procurement/v1/license_management_service.proto

package procurementpb

import (
 reflect "reflect"
 sync "sync"
 unsafe "unsafe"

 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl
 "google.golang.org/protobuf/runtime/protoimpl"
 durationpb "google.golang.org/protobuf/types/known/durationpb"
 fieldmaskpb "google.golang.org/protobuf/types/known/fieldmaskpb"
 timestamppb "google.golang.org/protobuf/types/known/timestamppb"
)

const (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Assignment protocol for a license pool.
type AssignmentProtocol struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // The type of assignment protocol.
 //
 // Types that are valid to be assigned to AssignmentType:
 //
 // *AssignmentProtocol_ManualAssignmentType_
 // *AssignmentProtocol_AutoAssignmentType_
 AssignmentType isAssignmentProtocol_AssignmentType `protobuf_oneof:"assignment_type"`
 unknownFields  protoimpl.UnknownFields
```

```
 sizeCache      protoimpl.SizeCache
}

func (x
 *AssignmentProtocol) Reset() {
 *x = AssignmentProtocol{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[0]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *AssignmentProtocol) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*AssignmentProtocol) ProtoMessage() {}

func (x *AssignmentProtocol) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use AssignmentProtocol.ProtoReflect.Descriptor instead.
func (*AssignmentProtocol) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{0}
}

func (x *AssignmentProtocol)
 GetAssignmentType() isAssignmentProtocol_AssignmentType {
 if x != nil {
  return x.AssignmentType
 }
 return nil
}

func (x *AssignmentProtocol) GetManualAssignmentType() *AssignmentProtocol_ManualAssignmentType {
 if x != nil {
```

```
  if x, ok := x.AssignmentType.(*AssignmentProtocol_ManualAssignmentType_); ok {
   return x.ManualAssignmentType
  }
 }
 return nil
}

func (x *AssignmentProtocol) GetAutoAssignmentType() *AssignmentProtocol_AutoAssignmentType {
 if x != nil {
  if x, ok := x.AssignmentType.(*AssignmentProtocol_AutoAssignmentType_); ok {
   return x.AutoAssignmentType
  }
 }
 return nil
}

type isAssignmentProtocol_AssignmentType interface {
 isAssignmentProtocol_AssignmentType()
}

type AssignmentProtocol_ManualAssignmentType_ struct {
 // Allow manual assignments triggered by administrative operations only.
 ManualAssignmentType *AssignmentProtocol_ManualAssignmentType
`protobuf:"bytes,2,opt,name=manual_assignment_type,json=manualAssignmentType,proto3,oneof"`
}

type
 AssignmentProtocol_AutoAssignmentType_ struct {
 // Allow automatic assignments triggered by data plane operations.
 AutoAssignmentType *AssignmentProtocol_AutoAssignmentType
`protobuf:"bytes,3,opt,name=auto_assignment_type,json=autoAssignmentType,proto3,oneof"`
}

func (*AssignmentProtocol_ManualAssignmentType_) isAssignmentProtocol_AssignmentType() {}

func (*AssignmentProtocol_AutoAssignmentType_) isAssignmentProtocol_AssignmentType() {}

// A license pool represents a pool of licenses that can be assigned to users.
type LicensePool struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Identifier. Format:
 // `billingAccounts/{billing_account}/orders/{order}/licensePool`
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Required. Assignment protocol for the license pool.
 LicenseAssignmentProtocol *AssignmentProtocol
`protobuf:"bytes,2,opt,name=license_assignment_protocol,json=licenseAssignmentProtocol,proto3"
json:"license_assignment_protocol,omitempty"`
 //
```

```
 Output only. Licenses count that are available to be assigned.
 AvailableLicenseCount int32
`protobuf:"varint,3,opt,name=available_license_count,json=availableLicenseCount,proto3"
json:"available_license_count,omitempty"`
 // Output only. Total number of licenses in the pool.
 TotalLicenseCount int32 `protobuf:"varint,4,opt,name=total_license_count,json=totalLicenseCount,proto3"
json:"total_license_count,omitempty"`
 unknownFields     protoimpl.UnknownFields
 sizeCache         protoimpl.SizeCache
}

func (x *LicensePool) Reset() {
 *x = LicensePool{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[1]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *LicensePool) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*LicensePool) ProtoMessage() {}

func (x *LicensePool) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[1]
 if
 x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use LicensePool.ProtoReflect.Descriptor instead.
func (*LicensePool) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{1}
}

func (x *LicensePool) GetName() string {
 if x != nil {
```

```
  return x.Name
 }
 return ""
}

func (x *LicensePool) GetLicenseAssignmentProtocol() *AssignmentProtocol {
 if x != nil {
  return x.LicenseAssignmentProtocol
 }
 return nil
}

func (x *LicensePool) GetAvailableLicenseCount() int32 {
 if x != nil {
  return x.AvailableLicenseCount
 }
 return 0
}

func (x *LicensePool) GetTotalLicenseCount() int32 {
 if x != nil {
  return x.TotalLicenseCount
 }
 return 0
}

// Request message for getting a license pool.
type GetLicensePoolRequest
 struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Required. The name of the license pool to get.
 // Format: `billingAccounts/{billing_account}/orders/{order}/licensePool`
 Name          string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *GetLicensePoolRequest) Reset() {
 *x = GetLicensePoolRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[2]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *GetLicensePoolRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}
```

```
func (*GetLicensePoolRequest) ProtoMessage() {}

func (x *GetLicensePoolRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[2]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if
 ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use GetLicensePoolRequest.ProtoReflect.Descriptor instead.
func (*GetLicensePoolRequest) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{2}
}

func (x *GetLicensePoolRequest) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
}

// Request message for updating a license pool.
type UpdateLicensePoolRequest struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Required. The license pool to update.
 //
 // The license pool's name field is used to identify the license pool to
 // update. Format:
 // `billingAccounts/{billing_account}/orders/{order}/licensePool`.
 LicensePool *LicensePool `protobuf:"bytes,1,opt,name=license_pool,json=licensePool,proto3"
json:"license_pool,omitempty"`
 // Required. The list of fields to update.
 UpdateMask    *fieldmaskpb.FieldMask
 `protobuf:"bytes,2,opt,name=update_mask,json=updateMask,proto3" json:"update_mask,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}
```

```
func (x *UpdateLicensePoolRequest) Reset() {
 *x = UpdateLicensePoolRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[3]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *UpdateLicensePoolRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UpdateLicensePoolRequest) ProtoMessage() {}

func (x *UpdateLicensePoolRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[3]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use UpdateLicensePoolRequest.ProtoReflect.Descriptor
 instead.
func (*UpdateLicensePoolRequest) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{3}
}

func (x *UpdateLicensePoolRequest) GetLicensePool() *LicensePool {
 if x != nil {
  return x.LicensePool
 }
 return nil
}

func (x *UpdateLicensePoolRequest) GetUpdateMask() *fieldmaskpb.FieldMask {
 if x != nil {
  return x.UpdateMask
 }
 return nil
}
```

```
// Request message for
//
[LicenseManagementService.Assign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementServic
e.Assign].
type AssignRequest struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Required. License pool name.
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Required. Username.
 // Format: `name@domain.com`.
 Usernames     []string `protobuf:"bytes,2,rep,name=usernames,proto3" json:"usernames,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache
     protoimpl.SizeCache
}

func (x *AssignRequest) Reset() {
 *x = AssignRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[4]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *AssignRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*AssignRequest) ProtoMessage() {}

func (x *AssignRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[4]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use AssignRequest.ProtoReflect.Descriptor instead.
func (*AssignRequest) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
```

```
[]int{4}
}

func (x *AssignRequest)
 GetParent() string {
 if x != nil {
  return x.Parent
 }
 return ""
}

func (x *AssignRequest) GetUsernames() []string {
 if x != nil {
  return x.Usernames
 }
 return nil
}

// Response message for
//
[LicenseManagementService.Assign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementServic
e.Assign].
type AssignResponse struct {
 state         protoimpl.MessageState `protogen:"open.v1"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *AssignResponse) Reset() {
 *x = AssignResponse{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[5]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *AssignResponse) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*AssignResponse) ProtoMessage() {}

func (x *AssignResponse) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[5]
 if
 x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
```

```
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use AssignResponse.ProtoReflect.Descriptor instead.
func (*AssignResponse) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{5}
}

// Request message for
//
[LicenseManagementService.Unassign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementSer
vice.Unassign].
type UnassignRequest struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Required. License pool name.
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Required. Username.
 // Format: `name@domain.com`.
 Usernames     []string `protobuf:"bytes,2,rep,name=usernames,proto3" json:"usernames,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache
   protoimpl.SizeCache
}

func (x *UnassignRequest) Reset() {
 *x = UnassignRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[6]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *UnassignRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UnassignRequest) ProtoMessage() {}

func (x *UnassignRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[6]
```

```
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use UnassignRequest.ProtoReflect.Descriptor instead.
func (*UnassignRequest) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{6}
}

func (x
 *UnassignRequest) GetParent() string {
 if x != nil {
  return x.Parent
 }
 return ""
}

func (x *UnassignRequest) GetUsernames() []string {
 if x != nil {
  return x.Usernames
 }
 return nil
}

// Response message for
//
[LicenseManagementService.Unassign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementSer
vice.Unassign].
type UnassignResponse struct {
 state         protoimpl.MessageState `protogen:"open.v1"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *UnassignResponse) Reset() {
 *x = UnassignResponse{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[7]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
```

```
}

func (x *UnassignResponse) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UnassignResponse) ProtoMessage() {}

func (x *UnassignResponse) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[7]
 if
 x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use UnassignResponse.ProtoReflect.Descriptor instead.
func (*UnassignResponse) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{7}
}

// Request message for
//
[LicenseManagementService.EnumerateLicensedUsers][google.cloud.commerce.consumer.procurement.v1.License
ManagementService.EnumerateLicensedUsers].
type EnumerateLicensedUsersRequest struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Required. License pool name.
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Optional. The maximum number of users to return. The service may return
 // fewer than this value.
 PageSize int32 `protobuf:"varint,2,opt,name=page_size,json=pageSize,proto3"
 json:"page_size,omitempty"`
 // Optional. A page token, received from a previous `EnumerateLicensedUsers`
 // call. Provide this to retrieve the subsequent page.
 PageToken     string `protobuf:"bytes,3,opt,name=page_token,json=pageToken,proto3"
json:"page_token,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}
```

```
func (x *EnumerateLicensedUsersRequest) Reset() {
 *x = EnumerateLicensedUsersRequest{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[8]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *EnumerateLicensedUsersRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*EnumerateLicensedUsersRequest) ProtoMessage() {}

func (x *EnumerateLicensedUsersRequest) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[8]
 if
 x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use EnumerateLicensedUsersRequest.ProtoReflect.Descriptor instead.
func (*EnumerateLicensedUsersRequest) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{8}
}

func (x *EnumerateLicensedUsersRequest) GetParent() string {
 if x != nil {
  return x.Parent
 }
 return ""
}

func (x *EnumerateLicensedUsersRequest) GetPageSize() int32 {
 if x != nil {
  return x.PageSize
 }
 return 0
```

```
}

func (x *EnumerateLicensedUsersRequest) GetPageToken() string {
 if x != nil {
  return x.PageToken
 }
 return ""
}

// A licensed user.
type LicensedUser struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Username.
 // Format: `name@domain.com`.
 Username string `protobuf:"bytes,1,opt,name=username,proto3"
 json:"username,omitempty"`
 // Output only. Timestamp when the license was assigned.
 AssignTime *timestamppb.Timestamp `protobuf:"bytes,2,opt,name=assign_time,json=assignTime,proto3"
json:"assign_time,omitempty"`
 // Output only. Timestamp when the license was recently used. This may not be
 // the most recent usage time, and will be updated regularly (within 24
 // hours).
 RecentUsageTime *timestamppb.Timestamp
`protobuf:"bytes,3,opt,name=recent_usage_time,json=recentUsageTime,proto3"
json:"recent_usage_time,omitempty"`
 unknownFields   protoimpl.UnknownFields
 sizeCache       protoimpl.SizeCache
}

func (x *LicensedUser) Reset() {
 *x = LicensedUser{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[9]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *LicensedUser) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*LicensedUser) ProtoMessage() {}

func (x *LicensedUser)
 ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[9]
 if x != nil {
```

```
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use LicensedUser.ProtoReflect.Descriptor instead.
func (*LicensedUser) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{9}
}

func (x *LicensedUser) GetUsername() string {
 if x != nil {
  return x.Username
 }
 return ""
}

func (x *LicensedUser) GetAssignTime() *timestamppb.Timestamp {
 if x != nil {
  return x.AssignTime
 }
 return nil
}

func (x *LicensedUser) GetRecentUsageTime() *timestamppb.Timestamp {
 if x != nil {
  return x.RecentUsageTime
 }
 return nil
}

// Response message for
//
[LicenseManagementService.EnumerateLicensedUsers][google.cloud.commerce.consumer.procurement.v1.License
ManagementService.EnumerateLicensedUsers].
type
 EnumerateLicensedUsersResponse struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // The list of licensed users.
 LicensedUsers []*LicensedUser `protobuf:"bytes,1,rep,name=licensed_users,json=licensedUsers,proto3"
json:"licensed_users,omitempty"`
 // A token that can be sent as `page_token` to retrieve the next page.
```

```
 // If this field is omitted, there are no subsequent pages.
 NextPageToken string `protobuf:"bytes,2,opt,name=next_page_token,json=nextPageToken,proto3"
json:"next_page_token,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *EnumerateLicensedUsersResponse) Reset() {
 *x = EnumerateLicensedUsersResponse{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[10]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *EnumerateLicensedUsersResponse)
 String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*EnumerateLicensedUsersResponse) ProtoMessage() {}

func (x *EnumerateLicensedUsersResponse) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[10]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use EnumerateLicensedUsersResponse.ProtoReflect.Descriptor instead.
func (*EnumerateLicensedUsersResponse) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{10}
}

func (x *EnumerateLicensedUsersResponse) GetLicensedUsers() []*LicensedUser {
 if x != nil {
  return x.LicensedUsers
 }
 return nil
}
```

```
func (x *EnumerateLicensedUsersResponse) GetNextPageToken() string {
 if x != nil {
  return x.NextPageToken
 }
 return
 ""
}

// Allow manual assignments triggered by administrative operations only.
type AssignmentProtocol_ManualAssignmentType struct {
 state         protoimpl.MessageState `protogen:"open.v1"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *AssignmentProtocol_ManualAssignmentType) Reset() {
 *x = AssignmentProtocol_ManualAssignmentType{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[11]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *AssignmentProtocol_ManualAssignmentType) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*AssignmentProtocol_ManualAssignmentType) ProtoMessage() {}

func (x *AssignmentProtocol_ManualAssignmentType) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[11]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if
 ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use AssignmentProtocol_ManualAssignmentType.ProtoReflect.Descriptor instead.
func (*AssignmentProtocol_ManualAssignmentType) Descriptor() ([]byte, []int) {
 return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
```

```
[]int{0, 0}
}

// Configuration for automatic assignments handled by data plane operations.
type AssignmentProtocol_AutoAssignmentType struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Optional. The time to live for an inactive license. After this time has
 // passed, the license will be automatically unassigned from the user. Must
 // be at least 7 days, if set. If unset, the license will never expire.
 InactiveLicenseTtl *durationpb.Duration
`protobuf:"bytes,1,opt,name=inactive_license_ttl,json=inactiveLicenseTtl,proto3"
json:"inactive_license_ttl,omitempty"`
 unknownFields
     protoimpl.UnknownFields
 sizeCache         protoimpl.SizeCache
}

func (x *AssignmentProtocol_AutoAssignmentType) Reset() {
 *x = AssignmentProtocol_AutoAssignmentType{}
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[12]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *AssignmentProtocol_AutoAssignmentType) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*AssignmentProtocol_AutoAssignmentType) ProtoMessage() {}

func (x *AssignmentProtocol_AutoAssignmentType) ProtoReflect() protoreflect.Message {
 mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[12]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use AssignmentProtocol_AutoAssignmentType.ProtoReflect.Descriptor instead.
func
 (*AssignmentProtocol_AutoAssignmentType) Descriptor() ([]byte, []int) {
 return
```

```
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{0, 1}
}

func (x *AssignmentProtocol_AutoAssignmentType) GetInactiveLicenseTtl() *durationpb.Duration {
 if x != nil {
  return x.InactiveLicenseTtl
 }
 return nil
}

var File_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto
protoreflect.FileDescriptor

const file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc = ""
+
 "\n" +
 "Ngoogle/cloud/commerce/consumer/procurement/v1/license_management_service.proto\x12-
google.cloud.commerce.consumer.procurement.v1\x1a\x1cgoogle/api/annotations.proto\x1a\x17google/api/client.pr
oto\x1a\x1fgoogle/api/field_behavior.proto\x1a\x19google/api/resource.proto\x1a\x1egoogle/protobuf/duration.prot
o\x1a google/protobuf/field_mask.proto\x1a\x1fgoogle/protobuf/timestamp.proto\"\xc3\x03\n" +
 "\x12AssignmentProtocol\x12\x8e\x01\n"
 +
 "\x16manual_assignment_type\x18\x02
\x01(\v2V.google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.ManualAssignmentTypeH\x00R\
x14manualAssignmentType\x12\x88\x01\n" +
 "\x14auto_assignment_type\x18\x03
\x01(\v2T.google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.AutoAssignmentTypeH\x00R\x1
2autoAssignmentType\x1a\x16\n" +
 "\x14ManualAssignmentType\x1af\n" +
 "\x12AutoAssignmentType\x12P\n" +
 "\x14inactive_license_ttl\x18\x01
\x01(\v2\x19.google.protobuf.DurationB\x03\xe0A\x01R\x12inactiveLicenseTtlB\x11\n" +
 "\x0fassignment_type\"\xbe\x03\n" +
 "\vLicensePool\x12\x17\n" +
 "\x04name\x18\x01 \x01(\tB\x03\xe0A\bR\x04name\x12\x86\x01\n" +
 "\x1blicense_assignment_protocol\x18\x02
\x01(\v2A.google.cloud.commerce.consumer.procurement.v1.AssignmentProtocolB\x03\xe0A\x02R\x19licenseAssi
gnmentProtocol\x12;\n" +
 "\x17available_license_count\x18\x03 \x01(\x05B\x03\xe0A\x03R\x15availableLicenseCount\x123\n" +
 "\x13total_license_count\x18\x04
 \x01(\x05B\x03\xe0A\x03R\x11totalLicenseCount:\x9a\x01\xeaA\x96\x01\n" +
";cloudcommerceconsumerprocurement.googleapis.com/LicensePool\x12<billingAccounts/{billing_account}/orders
/{order}/licensePool*\flicensePools2\vlicensePool\"0\n" +
 "\x15GetLicensePoolRequest\x12\x17\n" +
 "\x04name\x18\x01 \x01(\tB\x03\xe0A\x02R\x04name\"\xc0\x01\n" +
 "\x18UpdateLicensePoolRequest\x12b\n" +
 "\flicense_pool\x18\x01
```

\x01(\v2:.google.cloud.commerce.consumer.procurement.v1.LicensePoolB\x03\xe0A\x02R\vlicensePool\x12@\n"
+
"\vupdate_mask\x18\x02 \x01(\v2\x1a.google.protobuf.FieldMaskB\x03\xe0A\x02R\n" +
"updateMask\"O\n" +
"\rAssignRequest\x12\x1b\n" +
"\x06parent\x18\x01 \x01(\tB\x03\xe0A\x02R\x06parent\x12!\n" +
"\tusernames\x18\x02 \x03(\tB\x03\xe0A\x02R\tusernames\"\x10\n" +
"\x0eAssignResponse\"Q\n" +
"\x0fUnassignRequest\x12\x1b\n" +
"\x06parent\x18\x01 \x01(\tB\x03\xe0A\x02R\x06parent\x12!\n" +
"\tusernames\x18\x02 \x03(\tB\x03\xe0A\x02R\tusernames\"\x12\n" +
"\x10UnassignResponse\"\x82\x01\n"
+
"\x1dEnumerateLicensedUsersRequest\x12\x1b\n" +
"\x06parent\x18\x01 \x01(\tB\x03\xe0A\x02R\x06parent\x12 \n" +
"\tpage_size\x18\x02 \x01(\x05B\x03\xe0A\x01R\bpageSize\x12\"\n" +
"\n" +
"page_token\x18\x03 \x01(\tB\x03\xe0A\x01R\tpageToken\"\xb9\x01\n" +
"\fLicensedUser\x12\x1a\n" +
"\busername\x18\x01 \x01(\tR\busername\x12@\n" +
"\vassign_time\x18\x02 \x01(\v2\x1a.google.protobuf.TimestampB\x03\xe0A\x03R\n" +
"assignTime\x12K\n" +
"\x11recent_usage_time\x18\x03
\x01(\v2\x1a.google.protobuf.TimestampB\x03\xe0A\x03R\x0frecentUsageTime\"\xac\x01\n" +
"\x1eEnumerateLicensedUsersResponse\x12b\n" +
"\x0elicensed_users\x18\x01
\x03(\v2;.google.cloud.commerce.consumer.procurement.v1.LicensedUserR\rlicensedUsers\x12&\n" +
"\x0fnext_page_token\x18\x02 \x01(\tR\rnextPageToken2\xc3\n" +
"\n" +
"\x18LicenseManagementService\x12\xd4\x01\n" +
"\x0eGetLicensePool\x12D.google.cloud.commerce.consumer.procurement.v1.GetLicensePoolRequest\x1a:.google.
cloud.commerce.consumer.procurement.v1.LicensePool\"@\xdaA\x04name\x82\xd3\xe4\x93\x023\x121/v1/{name
=billingAccounts/*/orders/*/licensePool}\x12\x89\x02\n"
+
"\x11UpdateLicensePool\x12G.google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest\x1a:.
google.cloud.commerce.consumer.procurement.v1.LicensePool\"o\xdaA\x18license_pool,update_mask\x82\xd3\xe4
\x93\x02N:\flicense_pool2>/v1/{license_pool.name=billingAccounts/*/orders/*/licensePool}\x12\xdf\x01\n" +
"\x06Assign\x12<.google.cloud.commerce.consumer.procurement.v1.AssignRequest\x1a=.google.cloud.commerce.
consumer.procurement.v1.AssignResponse\"X\xdaA\x10parent,usernames\x82\xd3\xe4\x93\x02?:\x01*\":/v1/{pare
nt=billingAccounts/*/orders/*/licensePool}:assign\x12\xe7\x01\n" +
"\bUnassign\x12>.google.cloud.commerce.consumer.procurement.v1.UnassignRequest\x1a?.google.cloud.commerc
e.consumer.procurement.v1.UnassignResponse\"Z\xdaA\x10parent,usernames\x82\xd3\xe4\x93\x02A:\x01*\"</v1/
{parent=billingAccounts/*/orders/*/licensePool}:unassign\x12\x92\x02\n"
+
"\x16EnumerateLicensedUsers\x12L.google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersR
equest\x1aM.google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersResponse\"[\xdaA\x06par
ent\x82\xd3\xe4\x93\x02L\x12J/v1/{parent=billingAccounts/*/orders/*/licensePool}:enumerateLicensedUsers\x1ac\
xcaA/cloudcommerceconsumerprocurement.googleapis.com\xd2A.https://www.googleapis.com/auth/cloud-

```
platformB\xbe\x02\n" +
"1com.google.cloud.commerce.consumer.procurement.v1B\x1dLicenseManagementServiceProtoP\x01ZScloud.goo
gle.com/go/commerce/consumer/procurement/apiv1/procurementpb;procurementpb\xaa\x02-
Google.Cloud.Commerce.Consumer.Procurement.V1\xca\x02-
Google\\Cloud\\Commerce\\Consumer\\Procurement\\V1\xea\x022Google::Cloud::Commerce::Consumer::Procure
ment::V1b\x06proto3"

var (
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescOnce
sync.Once
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescData
 []byte
)

func
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP()
[]byte {
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescOnce.Do(f
unc() {
  file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescData =
protoimpl.X.CompressGZIP(unsafe.Slice(unsafe.StringData(file_google_cloud_commerce_consumer_procurement
_v1_license_management_service_proto_rawDesc),
len(file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc)))
 })
 return file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescData
}

var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes =
make([]protoimpl.MessageInfo, 13)
var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_goTypes =
[]any{
 (*AssignmentProtocol)(nil),
    // 0: google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol
 (*LicensePool)(nil),                        // 1: google.cloud.commerce.consumer.procurement.v1.LicensePool
 (*GetLicensePoolRequest)(nil),                  // 2:
google.cloud.commerce.consumer.procurement.v1.GetLicensePoolRequest
 (*UpdateLicensePoolRequest)(nil),               // 3:
google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest
 (*AssignRequest)(nil),                      // 4: google.cloud.commerce.consumer.procurement.v1.AssignRequest
 (*AssignResponse)(nil),                      // 5: google.cloud.commerce.consumer.procurement.v1.AssignResponse
 (*UnassignRequest)(nil),                     // 6: google.cloud.commerce.consumer.procurement.v1.UnassignRequest
 (*UnassignResponse)(nil),                    // 7: google.cloud.commerce.consumer.procurement.v1.UnassignResponse
 (*EnumerateLicensedUsersRequest)(nil),          // 8:
google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersRequest
 (*LicensedUser)(nil),
                        // 9: google.cloud.commerce.consumer.procurement.v1.LicensedUser
 (*EnumerateLicensedUsersResponse)(nil),         // 10:
google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersResponse
```

```
 (*AssignmentProtocol_ManualAssignmentType)(nil), // 11:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.ManualAssignmentType
 (*AssignmentProtocol_AutoAssignmentType)(nil),   // 12:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.AutoAssignmentType
 (*fieldmaskpb.FieldMask)(nil),                   // 13: google.protobuf.FieldMask
 (*timestamppb.Timestamp)(nil),                   // 14: google.protobuf.Timestamp
 (*durationpb.Duration)(nil),                     // 15: google.protobuf.Duration
}
var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_depIdxs =
[]int32{
 11, // 0:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.manual_assignment_type:type_name
 -> google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.ManualAssignmentType
 12, // 1: google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.auto_assignment_type:type_name -
> google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.AutoAssignmentType
 0,  // 2: google.cloud.commerce.consumer.procurement.v1.LicensePool.license_assignment_protocol:type_name ->
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol
 1,  // 3: google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest.license_pool:type_name ->
google.cloud.commerce.consumer.procurement.v1.LicensePool
 13, // 4: google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest.update_mask:type_name ->
google.protobuf.FieldMask
 14, // 5: google.cloud.commerce.consumer.procurement.v1.LicensedUser.assign_time:type_name ->
google.protobuf.Timestamp
 14, // 6: google.cloud.commerce.consumer.procurement.v1.LicensedUser.recent_usage_time:type_name
 -> google.protobuf.Timestamp
 9,  // 7:
google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersResponse.licensed_users:type_name ->
google.cloud.commerce.consumer.procurement.v1.LicensedUser
 15, // 8:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.AutoAssignmentType.inactive_license_ttl:t
ype_name -> google.protobuf.Duration
 2,  // 9: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.GetLicensePool:input_type -
> google.cloud.commerce.consumer.procurement.v1.GetLicensePoolRequest
 3,  // 10:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.UpdateLicensePool:input_type ->
google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest
 4,  // 11: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Assign:input_type ->
google.cloud.commerce.consumer.procurement.v1.AssignRequest
 6,  // 12: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Unassign:input_type
 -> google.cloud.commerce.consumer.procurement.v1.UnassignRequest
 8,  // 13:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.EnumerateLicensedUsers:input_typ
e -> google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersRequest
 1,  // 14:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.GetLicensePool:output_type ->
google.cloud.commerce.consumer.procurement.v1.LicensePool
 1,  // 15:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.UpdateLicensePool:output_type ->
```

```
google.cloud.commerce.consumer.procurement.v1.LicensePool
 5,  // 16: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Assign:output_type ->
google.cloud.commerce.consumer.procurement.v1.AssignResponse
 7,  // 17: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Unassign:output_type ->
google.cloud.commerce.consumer.procurement.v1.UnassignResponse
 10, // 18:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.EnumerateLicensedUsers:output_ty
pe
 -> google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersResponse
 14, // [14:19] is the sub-list for method output_type
 9,  // [9:14] is the sub-list for method input_type
 9,  // [9:9] is the sub-list for extension type_name
 9,  // [9:9] is the sub-list for extension extendee
 0,  // [0:9] is the sub-list for field type_name
}

func init() {
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_init()
}
func file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_init() {
 if File_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto != nil {
  return
 }
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[0].Oneof
Wrappers = []any{
  (*AssignmentProtocol_ManualAssignmentType_)(nil),
  (*AssignmentProtocol_AutoAssignmentType_)(nil),
 }
 type x struct{}
 out := protoimpl.TypeBuilder{
  File:
 protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor:
unsafe.Slice(unsafe.StringData(file_google_cloud_commerce_consumer_procurement_v1_license_management_ser
vice_proto_rawDesc),
len(file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc)),
   NumEnums:      0,
   NumMessages:   13,
   NumExtensions: 0,
   NumServices:   1,
  },
  GoTypes:
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_goTypes,
  DependencyIndexes:
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_depIdxs,
  MessageInfos:
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes,
```

```
 }.Build()
 File_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto = out.File
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_goTypes = nil
 file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_depIdxs
 = nil
}
// Copyright 2026 Google LLC
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//
//     http://www.apache.org/licenses/LICENSE-2.0
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// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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// limitations under the License.

// Code generated by protoc-gen-go-grpc. DO NOT EDIT.
// versions:
// - protoc-gen-go-grpc v1.3.0
// - protoc             v6.31.0
// source: google/ads/datamanager/v1/user_list_global_license_service.proto

package datamanagerpb

import (
 context "context"

 grpc "google.golang.org/grpc"
 codes "google.golang.org/grpc/codes"
 status "google.golang.org/grpc/status"
)

// This is a compile-time assertion to ensure
 that this generated file
// is compatible with the grpc package it is being compiled against.
// Requires gRPC-Go v1.32.0 or later.
const _ = grpc.SupportPackageIsVersion7

const (
 UserListGlobalLicenseService_CreateUserListGlobalLicense_FullMethodName            =
"/google.ads.datamanager.v1.UserListGlobalLicenseService/CreateUserListGlobalLicense"
 UserListGlobalLicenseService_UpdateUserListGlobalLicense_FullMethodName            =
"/google.ads.datamanager.v1.UserListGlobalLicenseService/UpdateUserListGlobalLicense"
 UserListGlobalLicenseService_GetUserListGlobalLicense_FullMethodName               =
```

```
"/google.ads.datamanager.v1.UserListGlobalLicenseService/GetUserListGlobalLicense"
 UserListGlobalLicenseService_ListUserListGlobalLicenses_FullMethodName            =
"/google.ads.datamanager.v1.UserListGlobalLicenseService/ListUserListGlobalLicenses"
 UserListGlobalLicenseService_ListUserListGlobalLicenseCustomerInfos_FullMethodName =
"/google.ads.datamanager.v1.UserListGlobalLicenseService/ListUserListGlobalLicenseCustomerInfos"
)

//
 UserListGlobalLicenseServiceClient is the client API for UserListGlobalLicenseService service.
//
// For semantics around ctx use and closing/ending streaming RPCs, please refer to
https://pkg.go.dev/google.golang.org/grpc/?tab=doc#ClientConn.NewStream.
type UserListGlobalLicenseServiceClient interface {
 // Creates a user list global license.
 //
 // This feature is only available to data partners.
 CreateUserListGlobalLicense(ctx context.Context, in *CreateUserListGlobalLicenseRequest, opts
...grpc.CallOption) (*UserListGlobalLicense, error)
 // Updates a user list global license.
 //
 // This feature is only available to data partners.
 UpdateUserListGlobalLicense(ctx context.Context, in *UpdateUserListGlobalLicenseRequest, opts
...grpc.CallOption) (*UserListGlobalLicense, error)
 // Retrieves a user list global license.
 //
 // This feature is only available to data partners.
 GetUserListGlobalLicense(ctx context.Context, in
 *GetUserListGlobalLicenseRequest, opts ...grpc.CallOption) (*UserListGlobalLicense, error)
 // Lists all user list global licenses owned by the parent account.
 //
 // This feature is only available to data partners.
 ListUserListGlobalLicenses(ctx context.Context, in *ListUserListGlobalLicensesRequest, opts ...grpc.CallOption)
(*ListUserListGlobalLicensesResponse, error)
 // Lists all customer info for a user list global license.
 //
 // This feature is only available to data partners.
 ListUserListGlobalLicenseCustomerInfos(ctx context.Context, in
*ListUserListGlobalLicenseCustomerInfosRequest, opts ...grpc.CallOption)
(*ListUserListGlobalLicenseCustomerInfosResponse, error)
}

type userListGlobalLicenseServiceClient struct {
 cc grpc.ClientConnInterface
}

func NewUserListGlobalLicenseServiceClient(cc grpc.ClientConnInterface) UserListGlobalLicenseServiceClient {
 return &userListGlobalLicenseServiceClient{cc}
}
```

```
func (c *userListGlobalLicenseServiceClient) CreateUserListGlobalLicense(ctx
 context.Context, in *CreateUserListGlobalLicenseRequest, opts ...grpc.CallOption) (*UserListGlobalLicense,
error) {
 out := new(UserListGlobalLicense)
 err := c.cc.Invoke(ctx, UserListGlobalLicenseService_CreateUserListGlobalLicense_FullMethodName, in, out,
opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

func (c *userListGlobalLicenseServiceClient) UpdateUserListGlobalLicense(ctx context.Context, in
*UpdateUserListGlobalLicenseRequest, opts ...grpc.CallOption) (*UserListGlobalLicense, error) {
 out := new(UserListGlobalLicense)
 err := c.cc.Invoke(ctx, UserListGlobalLicenseService_UpdateUserListGlobalLicense_FullMethodName, in, out,
opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

func (c *userListGlobalLicenseServiceClient) GetUserListGlobalLicense(ctx context.Context, in
*GetUserListGlobalLicenseRequest, opts ...grpc.CallOption) (*UserListGlobalLicense, error) {
 out := new(UserListGlobalLicense)
 err := c.cc.Invoke(ctx, UserListGlobalLicenseService_GetUserListGlobalLicense_FullMethodName,
 in, out, opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

func (c *userListGlobalLicenseServiceClient) ListUserListGlobalLicenses(ctx context.Context, in
*ListUserListGlobalLicensesRequest, opts ...grpc.CallOption) (*ListUserListGlobalLicensesResponse, error) {
 out := new(ListUserListGlobalLicensesResponse)
 err := c.cc.Invoke(ctx, UserListGlobalLicenseService_ListUserListGlobalLicenses_FullMethodName, in, out,
opts...)
 if err != nil {
  return nil, err
 }
 return out, nil
}

func (c *userListGlobalLicenseServiceClient) ListUserListGlobalLicenseCustomerInfos(ctx context.Context, in
*ListUserListGlobalLicenseCustomerInfosRequest, opts ...grpc.CallOption)
```

```
(*ListUserListGlobalLicenseCustomerInfosResponse, error) {
 out := new(ListUserListGlobalLicenseCustomerInfosResponse)
 err := c.cc.Invoke(ctx, UserListGlobalLicenseService_ListUserListGlobalLicenseCustomerInfos_FullMethodName,
in, out, opts...)
 if err != nil {
  return
 nil, err
 }
 return out, nil
}

// UserListGlobalLicenseServiceServer is the server API for UserListGlobalLicenseService service.
// All implementations should embed UnimplementedUserListGlobalLicenseServiceServer
// for forward compatibility
type UserListGlobalLicenseServiceServer interface {
 // Creates a user list global license.
 //
 // This feature is only available to data partners.
 CreateUserListGlobalLicense(context.Context, *CreateUserListGlobalLicenseRequest) (*UserListGlobalLicense,
error)
 // Updates a user list global license.
 //
 // This feature is only available to data partners.
 UpdateUserListGlobalLicense(context.Context, *UpdateUserListGlobalLicenseRequest) (*UserListGlobalLicense,
error)
 // Retrieves a user list global license.
 //
 // This feature is only available to data partners.
 GetUserListGlobalLicense(context.Context, *GetUserListGlobalLicenseRequest) (*UserListGlobalLicense, error)
 // Lists all user list global licenses owned by the parent account.
 //
 //
 This feature is only available to data partners.
 ListUserListGlobalLicenses(context.Context, *ListUserListGlobalLicensesRequest)
(*ListUserListGlobalLicensesResponse, error)
 // Lists all customer info for a user list global license.
 //
 // This feature is only available to data partners.
 ListUserListGlobalLicenseCustomerInfos(context.Context, *ListUserListGlobalLicenseCustomerInfosRequest)
(*ListUserListGlobalLicenseCustomerInfosResponse, error)
}

// UnimplementedUserListGlobalLicenseServiceServer should be embedded to have forward compatible
implementations.
type UnimplementedUserListGlobalLicenseServiceServer struct {
}

func (UnimplementedUserListGlobalLicenseServiceServer) CreateUserListGlobalLicense(context.Context,
```

```
*CreateUserListGlobalLicenseRequest) (*UserListGlobalLicense, error) {
 return nil, status.Errorf(codes.Unimplemented, "method CreateUserListGlobalLicense not implemented")
}
func (UnimplementedUserListGlobalLicenseServiceServer) UpdateUserListGlobalLicense(context.Context,
 *UpdateUserListGlobalLicenseRequest) (*UserListGlobalLicense, error) {
 return nil, status.Errorf(codes.Unimplemented, "method UpdateUserListGlobalLicense not implemented")
}
func (UnimplementedUserListGlobalLicenseServiceServer) GetUserListGlobalLicense(context.Context,
*GetUserListGlobalLicenseRequest) (*UserListGlobalLicense, error) {
 return nil, status.Errorf(codes.Unimplemented, "method GetUserListGlobalLicense not implemented")
}
func (UnimplementedUserListGlobalLicenseServiceServer) ListUserListGlobalLicenses(context.Context,
*ListUserListGlobalLicensesRequest) (*ListUserListGlobalLicensesResponse, error) {
 return nil, status.Errorf(codes.Unimplemented, "method ListUserListGlobalLicenses not implemented")
}
func (UnimplementedUserListGlobalLicenseServiceServer)
ListUserListGlobalLicenseCustomerInfos(context.Context, *ListUserListGlobalLicenseCustomerInfosRequest)
(*ListUserListGlobalLicenseCustomerInfosResponse, error) {
 return nil, status.Errorf(codes.Unimplemented,
 "method ListUserListGlobalLicenseCustomerInfos not implemented")
}

// UnsafeUserListGlobalLicenseServiceServer may be embedded to opt out of forward compatibility for this service.
// Use of this interface is not recommended, as added methods to UserListGlobalLicenseServiceServer will
// result in compilation errors.
type UnsafeUserListGlobalLicenseServiceServer interface {
 mustEmbedUnimplementedUserListGlobalLicenseServiceServer()
}

func RegisterUserListGlobalLicenseServiceServer(s grpc.ServiceRegistrar, srv
UserListGlobalLicenseServiceServer) {
 s.RegisterService(&UserListGlobalLicenseService_ServiceDesc, srv)
}

func _UserListGlobalLicenseService_CreateUserListGlobalLicense_Handler(srv interface{}, ctx context.Context,
dec func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(CreateUserListGlobalLicenseRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(UserListGlobalLicenseServiceServer).CreateUserListGlobalLicense(ctx,
 in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: UserListGlobalLicenseService_CreateUserListGlobalLicense_FullMethodName,
 }
```

```
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(UserListGlobalLicenseServiceServer).CreateUserListGlobalLicense(ctx,
req.(*CreateUserListGlobalLicenseRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _UserListGlobalLicenseService_UpdateUserListGlobalLicense_Handler(srv interface{}, ctx context.Context,
dec func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(UpdateUserListGlobalLicenseRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(UserListGlobalLicenseServiceServer).UpdateUserListGlobalLicense(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: UserListGlobalLicenseService_UpdateUserListGlobalLicense_FullMethodName,
 }
 handler
 := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(UserListGlobalLicenseServiceServer).UpdateUserListGlobalLicense(ctx,
req.(*UpdateUserListGlobalLicenseRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _UserListGlobalLicenseService_GetUserListGlobalLicense_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(GetUserListGlobalLicenseRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(UserListGlobalLicenseServiceServer).GetUserListGlobalLicense(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: UserListGlobalLicenseService_GetUserListGlobalLicense_FullMethodName,
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(UserListGlobalLicenseServiceServer).GetUserListGlobalLicense(ctx,
req.(*GetUserListGlobalLicenseRequest))
 }
 return
 interceptor(ctx, in, info, handler)
}
```

```
func _UserListGlobalLicenseService_ListUserListGlobalLicenses_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(ListUserListGlobalLicensesRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(UserListGlobalLicenseServiceServer).ListUserListGlobalLicenses(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: UserListGlobalLicenseService_ListUserListGlobalLicenses_FullMethodName,
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(UserListGlobalLicenseServiceServer).ListUserListGlobalLicenses(ctx,
req.(*ListUserListGlobalLicensesRequest))
 }
 return interceptor(ctx, in, info, handler)
}

func _UserListGlobalLicenseService_ListUserListGlobalLicenseCustomerInfos_Handler(srv interface{}, ctx
context.Context, dec func(interface{})
 error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
 in := new(ListUserListGlobalLicenseCustomerInfosRequest)
 if err := dec(in); err != nil {
  return nil, err
 }
 if interceptor == nil {
  return srv.(UserListGlobalLicenseServiceServer).ListUserListGlobalLicenseCustomerInfos(ctx, in)
 }
 info := &grpc.UnaryServerInfo{
  Server:     srv,
  FullMethod: UserListGlobalLicenseService_ListUserListGlobalLicenseCustomerInfos_FullMethodName,
 }
 handler := func(ctx context.Context, req interface{}) (interface{}, error) {
  return srv.(UserListGlobalLicenseServiceServer).ListUserListGlobalLicenseCustomerInfos(ctx,
req.(*ListUserListGlobalLicenseCustomerInfosRequest))
 }
 return interceptor(ctx, in, info, handler)
}

// UserListGlobalLicenseService_ServiceDesc is the grpc.ServiceDesc for UserListGlobalLicenseService service.
// It's only intended for direct use with grpc.RegisterService,
// and not to be introspected or modified (even as a copy)
var UserListGlobalLicenseService_ServiceDesc
 = grpc.ServiceDesc{
 ServiceName: "google.ads.datamanager.v1.UserListGlobalLicenseService",
```

```
 HandlerType: (*UserListGlobalLicenseServiceServer)(nil),
 Methods: []grpc.MethodDesc{
  {
   MethodName: "CreateUserListGlobalLicense",
   Handler:    _UserListGlobalLicenseService_CreateUserListGlobalLicense_Handler,
  },
  {
   MethodName: "UpdateUserListGlobalLicense",
   Handler:    _UserListGlobalLicenseService_UpdateUserListGlobalLicense_Handler,
  },
  {
   MethodName: "GetUserListGlobalLicense",
   Handler:    _UserListGlobalLicenseService_GetUserListGlobalLicense_Handler,
  },
  {
   MethodName: "ListUserListGlobalLicenses",
   Handler:    _UserListGlobalLicenseService_ListUserListGlobalLicenses_Handler,
  },
  {
   MethodName: "ListUserListGlobalLicenseCustomerInfos",
   Handler:    _UserListGlobalLicenseService_ListUserListGlobalLicenseCustomerInfos_Handler,
  },
 },
 Streams:  []grpc.StreamDesc{},
 Metadata: "google/ads/datamanager/v1/user_list_global_license_service.proto",
}
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// distributed under the License is distributed on an "AS IS" BASIS,
// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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// limitations under the License.

// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.36.11
//  protoc        v6.31.0
// source: google/ads/datamanager/v1/user_list_global_license_service.proto

package datamanagerpb
```

```
import (
 reflect "reflect"
 sync "sync"
 unsafe "unsafe"

 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
 fieldmaskpb
 "google.golang.org/protobuf/types/known/fieldmaskpb"
)

const (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Request to create a
// [UserListGlobalLicense][google.ads.datamanager.v1.UserListGlobalLicense]
// resource.
type CreateUserListGlobalLicenseRequest struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Required. The account that owns the user list being licensed. Should be in
 // the format accountTypes/{ACCOUNT_TYPE}/accounts/{ACCOUNT_ID}
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Required. The user list global license to create.
 UserListGlobalLicense *UserListGlobalLicense
`protobuf:"bytes,2,opt,name=user_list_global_license,json=userListGlobalLicense,proto3"
json:"user_list_global_license,omitempty"`
 unknownFields
        protoimpl.UnknownFields
 sizeCache            protoimpl.SizeCache
}

func (x *CreateUserListGlobalLicenseRequest) Reset() {
 *x = CreateUserListGlobalLicenseRequest{}
 mi := &file_google_ads_datamanager_v1_user_list_global_license_service_proto_msgTypes[0]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *CreateUserListGlobalLicenseRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*CreateUserListGlobalLicenseRequest) ProtoMessage() {}
```

```
func (x *CreateUserListGlobalLicenseRequest) ProtoReflect() protoreflect.Message {
 mi := &file_google_ads_datamanager_v1_user_list_global_license_service_proto_msgTypes[0]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use CreateUserListGlobalLicenseRequest.ProtoReflect.Descriptor instead.
func
 (*CreateUserListGlobalLicenseRequest) Descriptor() ([]byte, []int) {
 return file_google_ads_datamanager_v1_user_list_global_license_service_proto_rawDescGZIP(), []int{0}
}

func (x *CreateUserListGlobalLicenseRequest) GetParent() string {
 if x != nil {
  return x.Parent
 }
 return ""
}

func (x *CreateUserListGlobalLicenseRequest) GetUserListGlobalLicense() *UserListGlobalLicense {
 if x != nil {
  return x.UserListGlobalLicense
 }
 return nil
}

// Request to update a
// [UserListGlobalLicense][google.ads.datamanager.v1.UserListGlobalLicense]
// resource.
type UpdateUserListGlobalLicenseRequest struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Required. The licenses' `name` field is used to identify the license to
 // update.
 UserListGlobalLicense *UserListGlobalLicense
`protobuf:"bytes,1,opt,name=user_list_global_license,json=userListGlobalLicense,proto3"
json:"user_list_global_license,omitempty"`
 // Optional. The list of fields to update. The special character
 `*` is not
 // supported and an `INVALID_UPDATE_MASK` error will be thrown if used.
 UpdateMask    *fieldmaskpb.FieldMask `protobuf:"bytes,2,opt,name=update_mask,json=updateMask,proto3"
json:"update_mask,omitempty"`
```

```
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *UpdateUserListGlobalLicenseRequest) Reset() {
 *x = UpdateUserListGlobalLicenseRequest{}
 mi := &file_google_ads_datamanager_v1_user_list_global_license_service_proto_msgTypes[1]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *UpdateUserListGlobalLicenseRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*UpdateUserListGlobalLicenseRequest) ProtoMessage() {}

func (x *UpdateUserListGlobalLicenseRequest) ProtoReflect() protoreflect.Message {
 mi := &file_google_ads_datamanager_v1_user_list_global_license_service_proto_msgTypes[1]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo()
 == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use UpdateUserListGlobalLicenseRequest.ProtoReflect.Descriptor instead.
func (*UpdateUserListGlobalLicenseRequest) Descriptor() ([]byte, []int) {
 return file_google_ads_datamanager_v1_user_list_global_license_service_proto_rawDescGZIP(), []int{1}
}

func (x *UpdateUserListGlobalLicenseRequest) GetUserListGlobalLicense() *UserListGlobalLicense {
 if x != nil {
  return x.UserListGlobalLicense
 }
 return nil
}

func (x *UpdateUserListGlobalLicenseRequest) GetUpdateMask() *fieldmaskpb.FieldMask {
 if x != nil {
  return x.UpdateMask
 }
 return nil
}
```

```
// Request to get a
// [UserListGlobalLicense][google.ads.datamanager.v1.UserListGlobalLicense]
// resource.
type GetUserListGlobalLicenseRequest struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Required. The resource name of the user list global license.
 Name          string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 unknownFields
 protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *GetUserListGlobalLicenseRequest) Reset() {
 *x = GetUserListGlobalLicenseRequest{}
 mi := &file_google_ads_datamanager_v1_user_list_global_license_service_proto_msgTypes[2]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *GetUserListGlobalLicenseRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*GetUserListGlobalLicenseRequest) ProtoMessage() {}

func (x *GetUserListGlobalLicenseRequest) ProtoReflect() protoreflect.Message {
 mi := &file_google_ads_datamanager_v1_user_list_global_license_service_proto_msgTypes[2]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use GetUserListGlobalLicenseRequest.ProtoReflect.Descriptor instead.
func (*GetUserListGlobalLicenseRequest) Descriptor()
 ([]byte, []int) {
 return file_google_ads_datamanager_v1_user_list_global_license_service_proto_rawDescGZIP(), []int{2}
}

func (x *GetUserListGlobalLicenseRequest) GetName() string {
 if x != nil {
  return x.Name
 }
```

```
 return ""
}

// Request to list all
// [UserListGlobalLicense][google.ads.datamanager.v1.UserListGlobalLicense]
// resources for a given account.
type ListUserListGlobalLicensesRequest struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Required. The account whose licenses are being queried. Should be in the
 // format accountTypes/{ACCOUNT_TYPE}/accounts/{ACCOUNT_ID}
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
 // Optional. A [filter string](https://google.aip.dev/160) to apply to the
 // list request. All fields need to be on the left hand side of each condition
 // (for example: `user_list_id = 123`). Fields must be specified using either
 // all [camel case](https://en.wikipedia.org/wiki/Camel_case) or all [snake
 //
 case](https://en.wikipedia.org/wiki/Snake_case). Don't use a combination of
 // camel case and snake case.
 //
 // **Supported Operations:**
 //
 // - `AND`
 // - `=`
 // - `!=`
 // - `>`
 // - `>=`
 // - `<`
 // - `<=`
 //
 // **Unsupported Fields:**
 //
 // - `name` (use get method instead)
 // - `historical_pricings` and all its subfields
 // - `pricing.start_time`
 // - `pricing.end_time`
 Filter string `protobuf:"bytes,2,opt,name=filter,proto3" json:"filter,omitempty"`
 // Optional. The maximum number of licenses to return. The service may return
 // fewer than this value. If unspecified, at most 50 licenses will be
 // returned. The maximum value is 1000; values above 1000 will be coerced to
 // 1000.
 PageSize int32 `protobuf:"varint,3,opt,name=page_size,json=pageSize,proto3" json:"page_size,omitempty"`
 // Optional. A page token, received from a previous
 // `ListUserListGlobalLicense` call. Provide this to retrieve the subsequent
 // page.
 //
 // When paginating, all
 other parameters provided to
 // `ListUserListDirectLicense` must match the call that provided the page
```

```
 // token.
 PageToken     string `protobuf:"bytes,4,opt,name=page_token,json=pageToken,proto3"
json:"page_token,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *ListUserListGlobalLicensesRequest) Reset() {
 *x = ListUserListGlobalLicensesRequest{}
 mi := &file_google_ads_datamanager_v1_user_list_global_license_service_proto_msgTypes[3]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *ListUserListGlobalLicensesRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*ListUserListGlobalLicensesRequest) ProtoMessage() {}

func (x *ListUserListGlobalLicensesRequest) ProtoReflect() protoreflect.Message {
 mi := &file_google_ads_datamanager_v1_user_list_global_license_service_proto_msgTypes[3]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo()
 == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use ListUserListGlobalLicensesRequest.ProtoReflect.Descriptor instead.
func (*ListUserListGlobalLicensesRequest) Descriptor() ([]byte, []int) {
 return file_google_ads_datamanager_v1_user_list_global_license_service_proto_rawDescGZIP(), []int{3}
}

func (x *ListUserListGlobalLicensesRequest) GetParent() string {
 if x != nil {
  return x.Parent
 }
 return ""
}

func (x *ListUserListGlobalLicensesRequest) GetFilter() string {
 if x != nil {
  return x.Filter
```

```
 }
 return ""
}

func (x *ListUserListGlobalLicensesRequest) GetPageSize() int32 {
 if x != nil {
  return x.PageSize
 }
 return 0
}

func (x *ListUserListGlobalLicensesRequest) GetPageToken() string {
 if x != nil {
  return x.PageToken
 }
 return ""
}

// Response from the
// [ListUserListGlobalLicensesRequest][google.ads.datamanager.v1.ListUserListGlobalLicensesRequest].
type ListUserListGlobalLicensesResponse struct {
 state
 protoimpl.MessageState `protogen:"open.v1"`
 // The licenses for the given user list in the request.
 UserListGlobalLicenses []*UserListGlobalLicense
`protobuf:"bytes,1,rep,name=user_list_global_licenses,json=userListGlobalLicenses,proto3"
json:"user_list_global_licenses,omitempty"`
 // A token, which can be sent as `page_token` to retrieve the next page.
 // If this field is omitted, there are no subsequent pages.
 NextPageToken string `protobuf:"bytes,2,opt,name=next_page_token,json=nextPageToken,proto3"
json:"next_page_token,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *ListUserListGlobalLicensesResponse) Reset() {
 *x = ListUserListGlobalLicensesResponse{}
 mi := &file_google_ads_datamanager_v1_user_list_global_license_service_proto_msgTypes[4]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *ListUserListGlobalLicensesResponse) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func
```

```
 (*ListUserListGlobalLicensesResponse) ProtoMessage() {}

func (x *ListUserListGlobalLicensesResponse) ProtoReflect() protoreflect.Message {
 mi := &file_google_ads_datamanager_v1_user_list_global_license_service_proto_msgTypes[4]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use ListUserListGlobalLicensesResponse.ProtoReflect.Descriptor instead.
func (*ListUserListGlobalLicensesResponse) Descriptor() ([]byte, []int) {
 return file_google_ads_datamanager_v1_user_list_global_license_service_proto_rawDescGZIP(), []int{4}
}

func (x *ListUserListGlobalLicensesResponse) GetUserListGlobalLicenses() []*UserListGlobalLicense {
 if x != nil {
  return x.UserListGlobalLicenses
 }
 return nil
}

func (x *ListUserListGlobalLicensesResponse) GetNextPageToken() string {
 if x != nil {
  return x.NextPageToken
 }
 return ""
}

// Request to list
 all
// [UserListGlobalLicenseCustomerInfo][google.ads.datamanager.v1.UserListGlobalLicenseCustomerInfo]
// resources for a given user list global license.
type ListUserListGlobalLicenseCustomerInfosRequest struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // Required. The global license whose customer info are being queried. Should
 // be in the format
 //
`accountTypes/{ACCOUNT_TYPE}/accounts/{ACCOUNT_ID}/userListGlobalLicenses/{USER_LIST_GLOBAL
_LICENSE_ID}`.
 // To list all global license customer info under an account, replace the user
 // list global license id with a '-' (for example,
 // `accountTypes/DATA_PARTNER/accounts/123/userListGlobalLicenses/-`)
 Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
```

```
 // Optional. A [filter string](https://google.aip.dev/160) to apply to the
 // list request. All fields need to be on the left hand side of each condition
 // (for example: `user_list_id = 123`). Fields must be specified using either
 //
 all [camel case](https://en.wikipedia.org/wiki/Camel_case) or all [snake
 // case](https://en.wikipedia.org/wiki/Snake_case). Don't use a combination of
 // camel case and snake case.
 //
 // **Supported Operations:**
 //
 // - `AND`
 // - `=`
 // - `!=`
 // - `>`
 // - `>=`
 // - `<`
 // - `<=`
 //
 // **Unsupported Fields:**
 //
 // - `name` (use get method instead)
 // - `historical_pricings` and all its subfields
 // - `pricing.start_time`
 // - `pricing.end_time`
 Filter string `protobuf:"bytes,2,opt,name=filter,proto3" json:"filter,omitempty"`
 // Optional. The maximum number of licenses to return. The service may return
 // fewer than this value. If unspecified, at most 50 licenses will be
 // returned. The maximum value is 1000; values above 1000 will be coerced to
 // 1000.
 PageSize int32 `protobuf:"varint,3,opt,name=page_size,json=pageSize,proto3" json:"page_size,omitempty"`
 // Optional. A page token, received from a previous
 // `ListUserListDirectLicense` call. Provide this
 to retrieve the subsequent
 // page.
 //
 // When paginating, all other parameters provided to
 // `ListUserListDirectLicense` must match the call that provided the page
 // token.
 PageToken     string `protobuf:"bytes,4,opt,name=page_token,json=pageToken,proto3"
json:"page_token,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *ListUserListGlobalLicenseCustomerInfosRequest) Reset() {
 *x = ListUserListGlobalLicenseCustomerInfosRequest{}
 mi := &file_google_ads_datamanager_v1_user_list_global_license_service_proto_msgTypes[5]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
```

```
 ms.StoreMessageInfo(mi)
}

func (x *ListUserListGlobalLicenseCustomerInfosRequest) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*ListUserListGlobalLicenseCustomerInfosRequest) ProtoMessage() {}

func (x *ListUserListGlobalLicenseCustomerInfosRequest) ProtoReflect() protoreflect.Message {
 mi := &file_google_ads_datamanager_v1_user_list_global_license_service_proto_msgTypes[5]
 if
 x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use ListUserListGlobalLicenseCustomerInfosRequest.ProtoReflect.Descriptor instead.
func (*ListUserListGlobalLicenseCustomerInfosRequest) Descriptor() ([]byte, []int) {
 return file_google_ads_datamanager_v1_user_list_global_license_service_proto_rawDescGZIP(), []int{5}
}

func (x *ListUserListGlobalLicenseCustomerInfosRequest) GetParent() string {
 if x != nil {
  return x.Parent
 }
 return ""
}

func (x *ListUserListGlobalLicenseCustomerInfosRequest) GetFilter() string {
 if x != nil {
  return x.Filter
 }
 return ""
}

func (x *ListUserListGlobalLicenseCustomerInfosRequest) GetPageSize() int32 {
 if x != nil {
  return x.PageSize
 }
 return 0
}
```

```
func (x *ListUserListGlobalLicenseCustomerInfosRequest) GetPageToken() string {
 if x != nil {
  return x.PageToken
 }
 return
 ""
}

// Response from the
//
[ListUserListGlobalLicensesCustomerInfoRequest][google.ads.datamanager.v1.ListUserListGlobalLicensesCustom
erInfoRequest].
type ListUserListGlobalLicenseCustomerInfosResponse struct {
 state protoimpl.MessageState `protogen:"open.v1"`
 // The customer information for the given license in the request.
 UserListGlobalLicenseCustomerInfos []*UserListGlobalLicenseCustomerInfo
`protobuf:"bytes,1,rep,name=user_list_global_license_customer_infos,json=userListGlobalLicenseCustomerInfos,pr
oto3" json:"user_list_global_license_customer_infos,omitempty"`
 // A token, which can be sent as `page_token` to retrieve the next page.
 // If this field is omitted, there are no subsequent pages.
 NextPageToken string `protobuf:"bytes,2,opt,name=next_page_token,json=nextPageToken,proto3"
json:"next_page_token,omitempty"`
 unknownFields protoimpl.UnknownFields
 sizeCache     protoimpl.SizeCache
}

func (x *ListUserListGlobalLicenseCustomerInfosResponse) Reset()
 {
 *x = ListUserListGlobalLicenseCustomerInfosResponse{}
 mi := &file_google_ads_datamanager_v1_user_list_global_license_service_proto_msgTypes[6]
 ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
 ms.StoreMessageInfo(mi)
}

func (x *ListUserListGlobalLicenseCustomerInfosResponse) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*ListUserListGlobalLicenseCustomerInfosResponse) ProtoMessage() {}

func (x *ListUserListGlobalLicenseCustomerInfosResponse) ProtoReflect() protoreflect.Message {
 mi := &file_google_ads_datamanager_v1_user_list_global_license_service_proto_msgTypes[6]
 if x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
```

```
 }
 return mi.MessageOf(x)
}

// Deprecated: Use ListUserListGlobalLicenseCustomerInfosResponse.ProtoReflect.Descriptor instead.
func (*ListUserListGlobalLicenseCustomerInfosResponse) Descriptor() ([]byte, []int) {
 return file_google_ads_datamanager_v1_user_list_global_license_service_proto_rawDescGZIP(),
 []int{6}
}

func (x *ListUserListGlobalLicenseCustomerInfosResponse) GetUserListGlobalLicenseCustomerInfos()
[]*UserListGlobalLicenseCustomerInfo {
 if x != nil {
  return x.UserListGlobalLicenseCustomerInfos
 }
 return nil
}

func (x *ListUserListGlobalLicenseCustomerInfosResponse) GetNextPageToken() string {
 if x != nil {
  return x.NextPageToken
 }
 return ""
}

var File_google_ads_datamanager_v1_user_list_global_license_service_proto protoreflect.FileDescriptor

const file_google_ads_datamanager_v1_user_list_global_license_service_proto_rawDesc = "" +
 "\n" +
"@google/ads/datamanager/v1/user_list_global_license_service.proto\x12\x19google.ads.datamanager.v1\x1a8goog
le/ads/datamanager/v1/user_list_global_license.proto\x1a\x1cgoogle/api/annotations.proto\x1a\x17google/api/client.
proto\x1a\x1fgoogle/api/field_behavior.proto\x1a\x19google/api/resource.proto\x1a
google/protobuf/field_mask.proto\"\xe6\x01\n" +
 "\"CreateUserListGlobalLicenseRequest\x12P\n"
 +
 "\x06parent\x18\x01
\x01(\tB8\xe0A\x02\xfaA2\x120datamanager.googleapis.com/UserListGlobalLicenseR\x06parent\x12n\n" +
 "\x18user_list_global_license\x18\x02
\x01(\v20.google.ads.datamanager.v1.UserListGlobalLicenseB\x03\xe0A\x02R\x15userListGlobalLicense\"\xd6\x0
1\n" +
 "\"UpdateUserListGlobalLicenseRequest\x12n\n" +
 "\x18user_list_global_license\x18\x01
\x01(\v20.google.ads.datamanager.v1.UserListGlobalLicenseB\x03\xe0A\x02R\x15userListGlobalLicense\x12@\n"
+
 "\vupdate_mask\x18\x02 \x01(\v2\x1a.google.protobuf.FieldMaskB\x03\xe0A\x01R\n" +
 "updateMask\"o\n" +
 "\x1fGetUserListGlobalLicenseRequest\x12L\n" +
 "\x04name\x18\x01 \x01(\tB8\xe0A\x02\xfaA2\n" +
```

"0datamanager.googleapis.com/UserListGlobalLicenseR\x04name\"\xd8\x01\n" +
"!ListUserListGlobalLicensesRequest\x12P\n" +
"\x06parent\x18\x01
\x01(\tB8\xe0A\x02\xfaA2\x120datamanager.googleapis.com/UserListGlobalLicenseR\x06parent\x12\x1b\n" +
"\x06filter\x18\x02 \x01(\tB\x03\xe0A\x01R\x06filter\x12
\n" +
"\tpage_size\x18\x03 \x01(\x05B\x03\xe0A\x01R\bpageSize\x12\"\n" +
"\n" +
"page_token\x18\x04 \x01(\tB\x03\xe0A\x01R\tpageToken\"\xb9\x01\n" +
"\"ListUserListGlobalLicensesResponse\x12k\n" +
"\x19user_list_global_licenses\x18\x01
\x03(\v20.google.ads.datamanager.v1.UserListGlobalLicenseR\x16userListGlobalLicenses\x12&\n" +
"\x0fnext_page_token\x18\x02 \x01(\tR\rnextPageToken\"\xf0\x01\n" +
"-ListUserListGlobalLicenseCustomerInfosRequest\x12\\\n" +
"\x06parent\x18\x01
\x01(\tBD\xe0A\x02\xfaA>\x12<datamanager.googleapis.com/UserListGlobalLicenseCustomerInfoR\x06parent\x12\x1b\n" +
"\x06filter\x18\x02 \x01(\tB\x03\xe0A\x01R\x06filter\x12 \n" +
"\tpage_size\x18\x03 \x01(\x05B\x03\xe0A\x01R\bpageSize\x12\"\n" +
"\n" +
"page_token\x18\x04 \x01(\tB\x03\xe0A\x01R\tpageToken\"\xec\x01\n" +
".ListUserListGlobalLicenseCustomerInfosResponse\x12\x91\x01\n" +
"'user_list_global_license_customer_infos\x18\x01
\x03(\v2<.google.ads.datamanager.v1.UserListGlobalLicenseCustomerInfoR\"userListGlobalLicenseCustomerInfos
\x12&\n"
+
"\x0fnext_page_token\x18\x02 \x01(\tR\rnextPageToken2\xad\v\n" +
"\x1cUserListGlobalLicenseService\x12\x92\x02\n" +
"\x1bCreateUserListGlobalLicense\x12=.google.ads.datamanager.v1.CreateUserListGlobalLicenseRequest\x1a0.google.ads.datamanager.v1.UserListGlobalLicense\"\x81\x01\xdaA\x1fparent,user_list_global_license\x82\xd3\xe4\x93\x02Y:\x18user_list_global_license\"=/v1/{parent=accountTypes/*/accounts/*}/userListGlobalLicenses\x12\xb0\x02\n" +
"\x1bUpdateUserListGlobalLicense\x12=.google.ads.datamanager.v1.UpdateUserListGlobalLicenseRequest\x1a0.google.ads.datamanager.v1.UserListGlobalLicense\"\x9f\x01\xdaA$user_list_global_license,update_mask\x82\xd3\xe4\x93\x02r:\x18user_list_global_license2V/v1/{user_list_global_license.name=accountTypes/*/accounts/*/userListGlobalLicenses/*}\x12\xd6\x01\n" +
"\x18GetUserListGlobalLicense\x12:.google.ads.datamanager.v1.GetUserListGlobalLicenseRequest\x1a0.google.ads.datamanager.v1.UserListGlobalLicense\"L\xdaA\x04name\x82\xd3\xe4\x93\x02?\x12=/v1/{name=accountTypes/*/accounts/*/userListGlobalLicenses/*}\x12\xe9\x01\n"
+
"\x1aListUserListGlobalLicenses\x12<.google.ads.datamanager.v1.ListUserListGlobalLicensesRequest\x1a=.google.ads.datamanager.v1.ListUserListGlobalLicensesResponse\"N\xdaA\x06parent\x82\xd3\xe4\x93\x02?\x12=/v1/{parent=accountTypes/*/accounts/*}/userListGlobalLicenses\x12\xb2\x02\n" +
"&ListUserListGlobalLicenseCustomerInfos\x12H.google.ads.datamanager.v1.ListUserListGlobalLicenseCustomerInfosRequest\x1aI.google.ads.datamanager.v1.ListUserListGlobalLicenseCustomerInfosResponse\"s\xdaA\x06parent\x82\xd3\xe4\x93\x02d\x12b/v1/{parent=accountTypes/*/accounts/*/userListGlobalLicenses/*}/userListGlobalLicenseCustomerInfos\x1aK\xcaA\x1adatamanager.googleapis.com\xd2A+https://www.googleapis.com/auth/datamanagerB\xde\x01\n" +

```
"\x1dcom.google.ads.datamanager.v1B!UserListGlobalLicenseServiceProtoP\x01ZAcloud.google.com/go/datamana
ger/apiv1/datamanagerpb;datamanagerpb\xaa\x02\x19Google.Ads.DataManager.V1\xca\x02\x19Google\\Ads\\Data
Manager\\V1\xea\x02\x1cGoogle::Ads::DataManager::V1b\x06proto3"

var
 (
 file_google_ads_datamanager_v1_user_list_global_license_service_proto_rawDescOnce sync.Once
 file_google_ads_datamanager_v1_user_list_global_license_service_proto_rawDescData []byte
)

func file_google_ads_datamanager_v1_user_list_global_license_service_proto_rawDescGZIP() []byte {
 file_google_ads_datamanager_v1_user_list_global_license_service_proto_rawDescOnce.Do(func() {
  file_google_ads_datamanager_v1_user_list_global_license_service_proto_rawDescData =
protoimpl.X.CompressGZIP(unsafe.Slice(unsafe.StringData(file_google_ads_datamanager_v1_user_list_global_lice
nse_service_proto_rawDesc),
len(file_google_ads_datamanager_v1_user_list_global_license_service_proto_rawDesc)))
 })
 return file_google_ads_datamanager_v1_user_list_global_license_service_proto_rawDescData
}

var file_google_ads_datamanager_v1_user_list_global_license_service_proto_msgTypes
 = make([]protoimpl.MessageInfo, 7)
var file_google_ads_datamanager_v1_user_list_global_license_service_proto_goTypes = []any{
 (*CreateUserListGlobalLicenseRequest)(nil),            // 0:
google.ads.datamanager.v1.CreateUserListGlobalLicenseRequest
 (*UpdateUserListGlobalLicenseRequest)(nil),            // 1:
google.ads.datamanager.v1.UpdateUserListGlobalLicenseRequest
 (*GetUserListGlobalLicenseRequest)(nil),               // 2:
google.ads.datamanager.v1.GetUserListGlobalLicenseRequest
 (*ListUserListGlobalLicensesRequest)(nil),             // 3:
google.ads.datamanager.v1.ListUserListGlobalLicensesRequest
 (*ListUserListGlobalLicensesResponse)(nil),            // 4:
google.ads.datamanager.v1.ListUserListGlobalLicensesResponse
 (*ListUserListGlobalLicenseCustomerInfosRequest)(nil),  // 5:
google.ads.datamanager.v1.ListUserListGlobalLicenseCustomerInfosRequest
 (*ListUserListGlobalLicenseCustomerInfosResponse)(nil), // 6:
google.ads.datamanager.v1.ListUserListGlobalLicenseCustomerInfosResponse
 (*UserListGlobalLicense)(nil),
                        // 7: google.ads.datamanager.v1.UserListGlobalLicense
 (*fieldmaskpb.FieldMask)(nil),                         // 8: google.protobuf.FieldMask
 (*UserListGlobalLicenseCustomerInfo)(nil),             // 9:
google.ads.datamanager.v1.UserListGlobalLicenseCustomerInfo
}
var file_google_ads_datamanager_v1_user_list_global_license_service_proto_depIdxs = []int32{
 7,  // 0: google.ads.datamanager.v1.CreateUserListGlobalLicenseRequest.user_list_global_license:type_name ->
google.ads.datamanager.v1.UserListGlobalLicense
 7,  // 1: google.ads.datamanager.v1.UpdateUserListGlobalLicenseRequest.user_list_global_license:type_name ->
google.ads.datamanager.v1.UserListGlobalLicense
```

```
 8,  // 2: google.ads.datamanager.v1.UpdateUserListGlobalLicenseRequest.update_mask:type_name ->
google.protobuf.FieldMask
 7,  // 3: google.ads.datamanager.v1.ListUserListGlobalLicensesResponse.user_list_global_licenses:type_name ->
google.ads.datamanager.v1.UserListGlobalLicense
 9,
  // 4:
google.ads.datamanager.v1.ListUserListGlobalLicenseCustomerInfosResponse.user_list_global_license_customer_i
nfos:type_name -> google.ads.datamanager.v1.UserListGlobalLicenseCustomerInfo
 0,  // 5: google.ads.datamanager.v1.UserListGlobalLicenseService.CreateUserListGlobalLicense:input_type ->
google.ads.datamanager.v1.CreateUserListGlobalLicenseRequest
 1,  // 6: google.ads.datamanager.v1.UserListGlobalLicenseService.UpdateUserListGlobalLicense:input_type ->
google.ads.datamanager.v1.UpdateUserListGlobalLicenseRequest
 2,  // 7: google.ads.datamanager.v1.UserListGlobalLicenseService.GetUserListGlobalLicense:input_type ->
google.ads.datamanager.v1.GetUserListGlobalLicenseRequest
 3,  // 8: google.ads.datamanager.v1.UserListGlobalLicenseService.ListUserListGlobalLicenses:input_type ->
google.ads.datamanager.v1.ListUserListGlobalLicensesRequest
 5,  // 9:
google.ads.datamanager.v1.UserListGlobalLicenseService.ListUserListGlobalLicenseCustomerInfos:input_type
 -> google.ads.datamanager.v1.ListUserListGlobalLicenseCustomerInfosRequest
 7,  // 10: google.ads.datamanager.v1.UserListGlobalLicenseService.CreateUserListGlobalLicense:output_type ->
google.ads.datamanager.v1.UserListGlobalLicense
 7,  // 11: google.ads.datamanager.v1.UserListGlobalLicenseService.UpdateUserListGlobalLicense:output_type ->
google.ads.datamanager.v1.UserListGlobalLicense
 7,  // 12: google.ads.datamanager.v1.UserListGlobalLicenseService.GetUserListGlobalLicense:output_type ->
google.ads.datamanager.v1.UserListGlobalLicense
 4,  // 13: google.ads.datamanager.v1.UserListGlobalLicenseService.ListUserListGlobalLicenses:output_type ->
google.ads.datamanager.v1.ListUserListGlobalLicensesResponse
 6,  // 14:
google.ads.datamanager.v1.UserListGlobalLicenseService.ListUserListGlobalLicenseCustomerInfos:output_type ->
google.ads.datamanager.v1.ListUserListGlobalLicenseCustomerInfosResponse
 10, // [10:15] is the sub-list for method output_type
 5,  // [5:10]
 is the sub-list for method input_type
 5,  // [5:5] is the sub-list for extension type_name
 5,  // [5:5] is the sub-list for extension extendee
 0,  // [0:5] is the sub-list for field type_name
}

func init() { file_google_ads_datamanager_v1_user_list_global_license_service_proto_init() }
func file_google_ads_datamanager_v1_user_list_global_license_service_proto_init() {
 if File_google_ads_datamanager_v1_user_list_global_license_service_proto != nil {
  return
 }
 file_google_ads_datamanager_v1_user_list_global_license_proto_init()
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
```

```
  RawDescriptor:
unsafe.Slice(unsafe.StringData(file_google_ads_datamanager_v1_user_list_global_license_service_proto_rawDesc)
, len(file_google_ads_datamanager_v1_user_list_global_license_service_proto_rawDesc)),
  NumEnums:      0,
  NumMessages:   7,
  NumExtensions: 0,
  NumServices:   1,
 },
 GoTypes:          file_google_ads_datamanager_v1_user_list_global_license_service_proto_goTypes,
 DependencyIndexes:
file_google_ads_datamanager_v1_user_list_global_license_service_proto_depIdxs,
 MessageInfos:      file_google_ads_datamanager_v1_user_list_global_license_service_proto_msgTypes,
}.Build()
File_google_ads_datamanager_v1_user_list_global_license_service_proto = out.File
file_google_ads_datamanager_v1_user_list_global_license_service_proto_goTypes = nil
file_google_ads_datamanager_v1_user_list_global_license_service_proto_depIdxs = nil
}
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// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package datamanager

import (
 "bytes"
 "context"
 "fmt"
 "log/slog"
 "math"
 "net/http"
 "net/url"

 datamanagerpb "cloud.google.com/go/datamanager/apiv1/datamanagerpb"
 gax "github.com/googleapis/gax-go/v2"
 "github.com/googleapis/gax-go/v2/callctx"
 "google.golang.org/api/iterator"
```

```
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 gtransport
 "google.golang.org/api/transport/grpc"
 httptransport "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var newUserListGlobalLicenseClientHook clientHook

// UserListGlobalLicenseCallOptions contains the retry settings for each method of UserListGlobalLicenseClient.
type UserListGlobalLicenseCallOptions struct {
 CreateUserListGlobalLicense          []gax.CallOption
 UpdateUserListGlobalLicense          []gax.CallOption
 GetUserListGlobalLicense             []gax.CallOption
 ListUserListGlobalLicenses           []gax.CallOption
 ListUserListGlobalLicenseCustomerInfos []gax.CallOption
}

func defaultUserListGlobalLicenseGRPCClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("datamanager.googleapis.com:443"),
  internaloption.WithDefaultEndpointTemplate("datamanager.UNIVERSE_DOMAIN:443"),
  internaloption.WithDefaultMTLSEndpoint("datamanager.mtls.googleapis.com:443"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://datamanager.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableJwtWithScope(),
  internaloption.EnableNewAuthLibrary(),
  option.WithGRPCDialOption(grpc.WithDefaultCallOptions(
   grpc.MaxCallRecvMsgSize(math.MaxInt32))),
 }
}

func
 defaultUserListGlobalLicenseCallOptions() *UserListGlobalLicenseCallOptions {
 return &UserListGlobalLicenseCallOptions{
  CreateUserListGlobalLicense:          []gax.CallOption{},
  UpdateUserListGlobalLicense:          []gax.CallOption{},
  GetUserListGlobalLicense:             []gax.CallOption{},
  ListUserListGlobalLicenses:           []gax.CallOption{},
  ListUserListGlobalLicenseCustomerInfos: []gax.CallOption{},
 }
}

func defaultUserListGlobalLicenseRESTCallOptions() *UserListGlobalLicenseCallOptions {
```

```
 return &UserListGlobalLicenseCallOptions{
  CreateUserListGlobalLicense:
          []gax.CallOption{},
  UpdateUserListGlobalLicense:          []gax.CallOption{},
  GetUserListGlobalLicense:             []gax.CallOption{},
  ListUserListGlobalLicenses:           []gax.CallOption{},
  ListUserListGlobalLicenseCustomerInfos: []gax.CallOption{},
 }
}

// internalUserListGlobalLicenseClient is an interface that defines the methods available from Data Manager API.
type internalUserListGlobalLicenseClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 CreateUserListGlobalLicense(context.Context, *datamanagerpb.CreateUserListGlobalLicenseRequest,
...gax.CallOption) (*datamanagerpb.UserListGlobalLicense, error)
 UpdateUserListGlobalLicense(context.Context, *datamanagerpb.UpdateUserListGlobalLicenseRequest,
...gax.CallOption) (*datamanagerpb.UserListGlobalLicense, error)
 GetUserListGlobalLicense(context.Context, *datamanagerpb.GetUserListGlobalLicenseRequest,
 ...gax.CallOption) (*datamanagerpb.UserListGlobalLicense, error)
 ListUserListGlobalLicenses(context.Context, *datamanagerpb.ListUserListGlobalLicensesRequest,
...gax.CallOption) *UserListGlobalLicenseIterator
 ListUserListGlobalLicenseCustomerInfos(context.Context,
*datamanagerpb.ListUserListGlobalLicenseCustomerInfosRequest, ...gax.CallOption)
*UserListGlobalLicenseCustomerInfoIterator
}

// UserListGlobalLicenseClient is a client for interacting with Data Manager API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// Service for managing user list global licenses. Delete is not a supported
// operation for UserListGlobalLicenses.  Callers should update the
// license status to DISABLED to instead to deactivate a license.
//
// This feature is only available to data partners.
type UserListGlobalLicenseClient struct {
 // The internal transport-dependent client.
 internalClient internalUserListGlobalLicenseClient

 //
 The call options for this service.
 CallOptions *UserListGlobalLicenseCallOptions
}

// Wrapper methods routed to the internal client.
```

```
// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *UserListGlobalLicenseClient) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *UserListGlobalLicenseClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *UserListGlobalLicenseClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// CreateUserListGlobalLicense creates a user list global license.
//
//
 This feature is only available to data partners.
func (c *UserListGlobalLicenseClient) CreateUserListGlobalLicense(ctx context.Context, req
*datamanagerpb.CreateUserListGlobalLicenseRequest, opts ...gax.CallOption)
(*datamanagerpb.UserListGlobalLicense, error) {
 return c.internalClient.CreateUserListGlobalLicense(ctx, req, opts...)
}

// UpdateUserListGlobalLicense updates a user list global license.
//
// This feature is only available to data partners.
func (c *UserListGlobalLicenseClient) UpdateUserListGlobalLicense(ctx context.Context, req
*datamanagerpb.UpdateUserListGlobalLicenseRequest, opts ...gax.CallOption)
(*datamanagerpb.UserListGlobalLicense, error) {
 return c.internalClient.UpdateUserListGlobalLicense(ctx, req, opts...)
}

// GetUserListGlobalLicense retrieves a user list global license.
//
// This feature is only available to data partners.
func (c *UserListGlobalLicenseClient) GetUserListGlobalLicense(ctx context.Context, req
*datamanagerpb.GetUserListGlobalLicenseRequest,
 opts ...gax.CallOption) (*datamanagerpb.UserListGlobalLicense, error) {
 return c.internalClient.GetUserListGlobalLicense(ctx, req, opts...)
}
```

```
// ListUserListGlobalLicenses lists all user list global licenses owned by the parent account.
//
// This feature is only available to data partners.
func (c *UserListGlobalLicenseClient) ListUserListGlobalLicenses(ctx context.Context, req
*datamanagerpb.ListUserListGlobalLicensesRequest, opts ...gax.CallOption) *UserListGlobalLicenseIterator {
 return c.internalClient.ListUserListGlobalLicenses(ctx, req, opts...)
}

// ListUserListGlobalLicenseCustomerInfos lists all customer info for a user list global license.
//
// This feature is only available to data partners.
func (c *UserListGlobalLicenseClient) ListUserListGlobalLicenseCustomerInfos(ctx context.Context, req
*datamanagerpb.ListUserListGlobalLicenseCustomerInfosRequest, opts ...gax.CallOption)
*UserListGlobalLicenseCustomerInfoIterator {
 return c.internalClient.ListUserListGlobalLicenseCustomerInfos(ctx,
 req, opts...)
}

// userListGlobalLicenseGRPCClient is a client for interacting with Data Manager API over gRPC transport.
//
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type userListGlobalLicenseGRPCClient struct {
 // Connection pool of gRPC connections to the service.
 connPool gtransport.ConnPool

 // Points back to the CallOptions field of the containing UserListGlobalLicenseClient
 CallOptions **UserListGlobalLicenseCallOptions

 // The gRPC API client.
 userListGlobalLicenseClient datamanagerpb.UserListGlobalLicenseServiceClient

 // The x-goog-* metadata to be sent with each request.
 xGoogHeaders []string

 logger *slog.Logger
}

// NewUserListGlobalLicenseClient creates a new user list global license service client based on gRPC.
// The returned client must be Closed when it is done being used to clean up its underlying connections.
//
// Service for managing user
 list global licenses. Delete is not a supported
// operation for UserListGlobalLicenses.  Callers should update the
// license status to DISABLED to instead to deactivate a license.
//
// This feature is only available to data partners.
```

```
func NewUserListGlobalLicenseClient(ctx context.Context, opts ...option.ClientOption)
(*UserListGlobalLicenseClient, error) {
 clientOpts := defaultUserListGlobalLicenseGRPCClientOptions()
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  clientOpts = append(clientOpts, internaloption.WithTelemetryAttributes(map[string]string{
   "gcp.client.service":  "datamanager",
   "gcp.client.version":  getVersionClient(),
   "gcp.client.repo":     "googleapis/google-cloud-go",
   "gcp.client.artifact": "cloud.google.com/go/datamanager/apiv1",
   "gcp.client.language": "go",
   "url.domain":          "datamanager.googleapis.com",
  }))
 }
 if newUserListGlobalLicenseClientHook != nil {
  hookOpts, err := newUserListGlobalLicenseClientHook(ctx,
 clientHookParams{})
  if err != nil {
   return nil, err
  }
  clientOpts = append(clientOpts, hookOpts...)
 }

 connPool, err := gtransport.DialPool(ctx, append(clientOpts, opts...)...)
 if err != nil {
  return nil, err
 }
 client := UserListGlobalLicenseClient{CallOptions: defaultUserListGlobalLicenseCallOptions()}

 c := &userListGlobalLicenseGRPCClient{
  connPool:                    connPool,
  userListGlobalLicenseClient: datamanagerpb.NewUserListGlobalLicenseServiceClient(connPool),
  CallOptions:                 &client.CallOptions,
  logger:                      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()
 if gax.IsFeatureEnabled("METRICS") {
  metrics := gax.NewClientMetrics(
   gax.WithTelemetryLogger(c.logger),
   gax.WithTelemetryAttributes(map[string]string{
    gax.ClientService:  "datamanager",
    gax.ClientVersion:  getVersionClient(),
    gax.ClientArtifact: "cloud.google.com/go/datamanager/apiv1",
    gax.RPCSystem:      "grpc",
    gax.URLDomain:
      "datamanager.googleapis.com",
   }),
  )
```

```
  client.CallOptions.CreateUserListGlobalLicense = append(client.CallOptions.CreateUserListGlobalLicense,
gax.WithClientMetrics(metrics))
  client.CallOptions.UpdateUserListGlobalLicense = append(client.CallOptions.UpdateUserListGlobalLicense,
gax.WithClientMetrics(metrics))
  client.CallOptions.GetUserListGlobalLicense = append(client.CallOptions.GetUserListGlobalLicense,
gax.WithClientMetrics(metrics))
  client.CallOptions.ListUserListGlobalLicenses = append(client.CallOptions.ListUserListGlobalLicenses,
gax.WithClientMetrics(metrics))
  client.CallOptions.ListUserListGlobalLicenseCustomerInfos =
append(client.CallOptions.ListUserListGlobalLicenseCustomerInfos, gax.WithClientMetrics(metrics))
 }

 client.internalClient = c

 return &client, nil
}

// Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *userListGlobalLicenseGRPCClient)
 Connection() *grpc.ClientConn {
 return c.connPool.Conn()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *userListGlobalLicenseGRPCClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "grpc", grpc.Version, "pb", protoVersion)
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *userListGlobalLicenseGRPCClient) Close() error {
 return c.connPool.Close()
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type userListGlobalLicenseRESTClient struct {
 // The http endpoint to connect to.
 endpoint
```

```
 string

 // The http client.
 httpClient *http.Client

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing UserListGlobalLicenseClient
 CallOptions **UserListGlobalLicenseCallOptions

 logger *slog.Logger
}

// NewUserListGlobalLicenseRESTClient creates a new user list global license service rest client.
//
// Service for managing user list global licenses. Delete is not a supported
// operation for UserListGlobalLicenses.  Callers should update the
// license status to DISABLED to instead to deactivate a license.
//
// This feature is only available to data partners.
func NewUserListGlobalLicenseRESTClient(ctx context.Context, opts ...option.ClientOption)
(*UserListGlobalLicenseClient, error) {
 clientOpts := append(defaultUserListGlobalLicenseRESTClientOptions(), opts...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  clientOpts = append(clientOpts, internaloption.WithTelemetryAttributes(map[string]string{
   "gcp.client.service":
  "datamanager",
   "gcp.client.version":  getVersionClient(),
   "gcp.client.repo":     "googleapis/google-cloud-go",
   "gcp.client.artifact": "cloud.google.com/go/datamanager/apiv1",
   "gcp.client.language": "go",
   "url.domain":          "datamanager.googleapis.com",
  }))
 }
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultUserListGlobalLicenseRESTCallOptions()
 c := &userListGlobalLicenseRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
  logger:      internaloption.GetLogger(opts),
 }
 c.setGoogleClientInfo()
```

```
 if gax.IsFeatureEnabled("METRICS") {
  metrics := gax.NewClientMetrics(
   gax.WithTelemetryLogger(c.logger),
   gax.WithTelemetryAttributes(map[string]string{
    gax.ClientService:  "datamanager",
    gax.ClientVersion:  getVersionClient(),
    gax.ClientArtifact: "cloud.google.com/go/datamanager/apiv1",
    gax.RPCSystem:
      "http",
    gax.URLDomain:      "datamanager.googleapis.com",
   }),
  )

  callOpts.CreateUserListGlobalLicense = append(callOpts.CreateUserListGlobalLicense,
gax.WithClientMetrics(metrics))
  callOpts.UpdateUserListGlobalLicense = append(callOpts.UpdateUserListGlobalLicense,
gax.WithClientMetrics(metrics))
  callOpts.GetUserListGlobalLicense = append(callOpts.GetUserListGlobalLicense, gax.WithClientMetrics(metrics))
  callOpts.ListUserListGlobalLicenses = append(callOpts.ListUserListGlobalLicenses,
gax.WithClientMetrics(metrics))
  callOpts.ListUserListGlobalLicenseCustomerInfos = append(callOpts.ListUserListGlobalLicenseCustomerInfos,
gax.WithClientMetrics(metrics))
 }

 return &UserListGlobalLicenseClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultUserListGlobalLicenseRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://datamanager.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://datamanager.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://datamanager.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://datamanager.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *userListGlobalLicenseRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN", "pb", protoVersion)
 c.xGoogHeaders = []string{
```

```
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this
 when
// the client is no longer required.
func (c *userListGlobalLicenseRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *userListGlobalLicenseRESTClient) Connection() *grpc.ClientConn {
 return nil
}
func (c *userListGlobalLicenseGRPCClient) CreateUserListGlobalLicense(ctx context.Context, req
*datamanagerpb.CreateUserListGlobalLicenseRequest, opts ...gax.CallOption)
(*datamanagerpb.UserListGlobalLicense, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//datamanager.googleapis.com/%v",
req.GetParent()))
 }
 if
 gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.ads.datamanager.v1.UserListGlobalLicenseService/CreateUserListGlobalLicense")
 }
 opts =
append((*c.CallOptions).CreateUserListGlobalLicense[0:len((*c.CallOptions).CreateUserListGlobalLicense):len((*
c.CallOptions).CreateUserListGlobalLicense)], opts...)
 var resp *datamanagerpb.UserListGlobalLicense
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.userListGlobalLicenseClient.CreateUserListGlobalLicense, req, settings.GRPC,
c.logger, "CreateUserListGlobalLicense")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
```

```
 return resp, nil
}

func (c *userListGlobalLicenseGRPCClient) UpdateUserListGlobalLicense(ctx context.Context, req
*datamanagerpb.UpdateUserListGlobalLicenseRequest, opts ...gax.CallOption)
(*datamanagerpb.UserListGlobalLicense,
 error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "user_list_global_license.name",
url.QueryEscape(req.GetUserListGlobalLicense().GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.ads.datamanager.v1.UserListGlobalLicenseService/UpdateUserListGlobalLicense")
 }
 opts =
append((*c.CallOptions).UpdateUserListGlobalLicense[0:len((*c.CallOptions).UpdateUserListGlobalLicense):len((
*c.CallOptions).UpdateUserListGlobalLicense)], opts...)
 var resp *datamanagerpb.UserListGlobalLicense
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.userListGlobalLicenseClient.UpdateUserListGlobalLicense, req, settings.GRPC,
c.logger, "UpdateUserListGlobalLicense")
  return
 err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *userListGlobalLicenseGRPCClient) GetUserListGlobalLicense(ctx context.Context, req
*datamanagerpb.GetUserListGlobalLicenseRequest, opts ...gax.CallOption)
(*datamanagerpb.UserListGlobalLicense, error) {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//datamanager.googleapis.com/%v",
req.GetName()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
```

```
"google.ads.datamanager.v1.UserListGlobalLicenseService/GetUserListGlobalLicense")
 }
 opts =
append((*c.CallOptions).GetUserListGlobalLicense[0:len((*c.CallOptions).GetUserListGlobalLicense):len((*c.Call
Options).GetUserListGlobalLicense)],
 opts...)
 var resp *datamanagerpb.UserListGlobalLicense
 err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  var err error
  resp, err = executeRPC(ctx, c.userListGlobalLicenseClient.GetUserListGlobalLicense, req, settings.GRPC, c.logger,
"GetUserListGlobalLicense")
  return err
 }, opts...)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (c *userListGlobalLicenseGRPCClient) ListUserListGlobalLicenses(ctx context.Context, req
*datamanagerpb.ListUserListGlobalLicensesRequest, opts ...gax.CallOption) *UserListGlobalLicenseIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx,
 "resource_name", fmt.Sprintf("//datamanager.googleapis.com/%v", req.GetParent()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.ads.datamanager.v1.UserListGlobalLicenseService/ListUserListGlobalLicenses")
 }
 opts =
append((*c.CallOptions).ListUserListGlobalLicenses[0:len((*c.CallOptions).ListUserListGlobalLicenses):len((*c.C
allOptions).ListUserListGlobalLicenses)], opts...)
 it := &UserListGlobalLicenseIterator{}
 req = proto.Clone(req).(*datamanagerpb.ListUserListGlobalLicensesRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*datamanagerpb.UserListGlobalLicense, string, error) {
  resp := &datamanagerpb.ListUserListGlobalLicensesResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
```

```
  }
  err
 := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx, c.userListGlobalLicenseClient.ListUserListGlobalLicenses, req, settings.GRPC,
c.logger, "ListUserListGlobalLicenses")
   return err
  }, opts...)
  if err != nil {
   return nil, "", err
  }

  it.Response = resp
  return resp.GetUserListGlobalLicenses(), resp.GetNextPageToken(), nil
 }
 fetch := func(pageSize int, pageToken string) (string, error) {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

func (c *userListGlobalLicenseGRPCClient) ListUserListGlobalLicenseCustomerInfos(ctx context.Context, req
*datamanagerpb.ListUserListGlobalLicenseCustomerInfosRequest,
 opts ...gax.CallOption) *UserListGlobalLicenseCustomerInfoIterator {
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 ctx = gax.InsertMetadataIntoOutgoingContext(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//datamanager.googleapis.com/%v",
req.GetParent()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.ads.datamanager.v1.UserListGlobalLicenseService/ListUserListGlobalLicenseCustomerInfos")
 }
 opts =
```

```
append((*c.CallOptions).ListUserListGlobalLicenseCustomerInfos[0:len((*c.CallOptions).ListUserListGlobalLicen
seCustomerInfos):len((*c.CallOptions).ListUserListGlobalLicenseCustomerInfos)], opts...)
 it := &UserListGlobalLicenseCustomerInfoIterator{}
 req
 = proto.Clone(req).(*datamanagerpb.ListUserListGlobalLicenseCustomerInfosRequest)
 it.InternalFetch = func(pageSize int, pageToken string) ([]*datamanagerpb.UserListGlobalLicenseCustomerInfo,
string, error) {
  resp := &datamanagerpb.ListUserListGlobalLicenseCustomerInfosResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  err := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
   var err error
   resp, err = executeRPC(ctx, c.userListGlobalLicenseClient.ListUserListGlobalLicenseCustomerInfos, req,
settings.GRPC, c.logger, "ListUserListGlobalLicenseCustomerInfos")
   return err
  }, opts...)
  if err != nil {
   return nil, "", err
  }

  it.Response = resp
  return resp.GetUserListGlobalLicenseCustomerInfos(), resp.GetNextPageToken(), nil
 }
 fetch := func(pageSize int, pageToken string) (string, error)
 {
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

// CreateUserListGlobalLicense creates a user list global license.
//
```

```
// This feature is only available to data partners.
func (c *userListGlobalLicenseRESTClient) CreateUserListGlobalLicense(ctx context.Context, req
*datamanagerpb.CreateUserListGlobalLicenseRequest, opts ...gax.CallOption)
(*datamanagerpb.UserListGlobalLicense, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 body := req.GetUserListGlobalLicense()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v/userListGlobalLicenses",
 req.GetParent())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "parent", url.QueryEscape(req.GetParent()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//datamanager.googleapis.com/%v",
req.GetParent()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.ads.datamanager.v1.UserListGlobalLicenseService/CreateUserListGlobalLicense")
  ctx = callctx.WithTelemetryContext(ctx, "url_template",
"/v1/{parent=accountTypes/*/accounts/*}/userListGlobalLicenses")
 }
 opts
 =
append((*c.CallOptions).CreateUserListGlobalLicense[0:len((*c.CallOptions).CreateUserListGlobalLicense):len((*
c.CallOptions).CreateUserListGlobalLicense)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &datamanagerpb.UserListGlobalLicense{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
```

```
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "CreateUserListGlobalLicense")
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
}

// UpdateUserListGlobalLicense updates
 a user list global license.
//
// This feature is only available to data partners.
func (c *userListGlobalLicenseRESTClient) UpdateUserListGlobalLicense(ctx context.Context, req
*datamanagerpb.UpdateUserListGlobalLicenseRequest, opts ...gax.CallOption)
(*datamanagerpb.UserListGlobalLicense, error) {
 m := protojson.MarshalOptions{AllowPartial: true, UseEnumNumbers: true}
 body := req.GetUserListGlobalLicense()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetUserListGlobalLicense().GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")
```

```
 if req.GetUpdateMask() != nil {
  field, err := protojson.Marshal(req.GetUpdateMask())
  if err != nil {
   return nil, err
  }
  params.Add("updateMask", string(field[1:len(field)-1]))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds
 := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "user_list_global_license.name",
url.QueryEscape(req.GetUserListGlobalLicense().GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.ads.datamanager.v1.UserListGlobalLicenseService/UpdateUserListGlobalLicense")
  ctx = callctx.WithTelemetryContext(ctx, "url_template",
"/v1/{user_list_global_license.name=accountTypes/*/accounts/*/userListGlobalLicenses/*}")
 }
 opts =
append((*c.CallOptions).UpdateUserListGlobalLicense[0:len((*c.CallOptions).UpdateUserListGlobalLicense):len((
*c.CallOptions).UpdateUserListGlobalLicense)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &datamanagerpb.UserListGlobalLicense{}
 e :=
 gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("PATCH", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "UpdateUserListGlobalLicense")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
```

```
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
return resp, nil
}

// GetUserListGlobalLicense retrieves a user list global license.
//
// This feature is only available to data partners.
func (c *userListGlobalLicenseRESTClient) GetUserListGlobalLicense(ctx context.Context, req
*datamanagerpb.GetUserListGlobalLicenseRequest, opts ...gax.CallOption)
(*datamanagerpb.UserListGlobalLicense, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if
 err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v", req.GetName())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "name", url.QueryEscape(req.GetName()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 if gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING") {
  ctx = callctx.WithTelemetryContext(ctx, "resource_name", fmt.Sprintf("//datamanager.googleapis.com/%v",
req.GetName()))
 }
 if gax.IsFeatureEnabled("METRICS") || gax.IsFeatureEnabled("TRACING") || gax.IsFeatureEnabled("LOGGING")
{
  ctx = callctx.WithTelemetryContext(ctx, "rpc_method",
"google.ads.datamanager.v1.UserListGlobalLicenseService/GetUserListGlobalLicense")
  ctx = callctx.WithTelemetryContext(ctx, "url_template",
 "/v1/{name=accountTypes/*/accounts/*/userListGlobalLicenses/*}")
 }
 opts =
append((*c.CallOptions).GetUserListGlobalLicense[0:len((*c.CallOptions).GetUserListGlobalLicense):len((*c.Call
```

```
Options).GetUserListGlobalLicense)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &datamanagerpb.UserListGlobalLicense{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetUserListGlobalLicense")
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// ListUserListGlobalLicenses lists all
 user list global licenses owned by the parent account.
//
// This feature is only available to data partners.
func (c *userListGlobalLicenseRESTClient) ListUserListGlobalLicenses(ctx context.Context, req
*datamanagerpb.ListUserListGlobalLicensesRequest, opts ...gax.CallOption) *UserListGlobalLicenseIterator {
 it := &UserListGlobalLicenseIterator{}
 req = proto.Clone(req).(*datamanagerpb.ListUserListGlobalLicensesRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*datamanagerpb.UserListGlobalLicense, string, error) {
  resp := &datamanagerpb.ListUserListGlobalLicensesResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
```

```
  req.PageSize = int32(pageSize)
 }
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, "", err
 }
 baseUrl.Path += fmt.Sprintf("/v1/%v/userListGlobalLicenses",
req.GetParent())

 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")
 if req.GetFilter() != "" {
  params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
 }
 if req.GetPageSize() != 0 {
  params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
 }
 if req.GetPageToken() != "" {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "ListUserListGlobalLicenses")
  if
err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
```

```
  return nil, "", e
 }
 it.Response = resp
 return resp.GetUserListGlobalLicenses(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetPageSize())
it.pageInfo.Token = req.GetPageToken()

return it
}

// ListUserListGlobalLicenseCustomerInfos lists all customer info for a user list global license.
//
// This feature is only available to data partners.
func (c *userListGlobalLicenseRESTClient) ListUserListGlobalLicenseCustomerInfos(ctx context.Context, req
*datamanagerpb.ListUserListGlobalLicenseCustomerInfosRequest,
 opts ...gax.CallOption) *UserListGlobalLicenseCustomerInfoIterator {
 it := &UserListGlobalLicenseCustomerInfoIterator{}
 req = proto.Clone(req).(*datamanagerpb.ListUserListGlobalLicenseCustomerInfosRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*datamanagerpb.UserListGlobalLicenseCustomerInfo,
string, error) {
  resp := &datamanagerpb.ListUserListGlobalLicenseCustomerInfosResponse{}
  if pageToken != "" {
   req.PageToken = pageToken
  }
  if pageSize > math.MaxInt32 {
   req.PageSize = math.MaxInt32
  } else if pageSize != 0 {
   req.PageSize = int32(pageSize)
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
   return nil, "", err
  }
  baseUrl.Path += fmt.Sprintf("/v1/%v/userListGlobalLicenseCustomerInfos", req.GetParent())
```

```
 params := url.Values{}
 params.Add("$alt", "json;enum-encoding=int")
 if req.GetFilter() != "" {
  params.Add("filter", fmt.Sprintf("%v",
req.GetFilter()))
 }
 if req.GetPageSize() != 0 {
  params.Add("pageSize", fmt.Sprintf("%v", req.GetPageSize()))
 }
 if req.GetPageToken() != "" {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header = headers

  buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil,
"ListUserListGlobalLicenseCustomerInfos")
  if err != nil {
   return err
  }
  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil
 {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetUserListGlobalLicenseCustomerInfos(), resp.GetNextPageToken(), nil
 }

 fetch := func(pageSize int, pageToken string) (string, error) {
```

```
  items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
  if err != nil {
   return "", err
  }
  it.items = append(it.items, items...)
  return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetPageSize())
 it.pageInfo.Token = req.GetPageToken()

 return it
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

// [START datamanager_v1_generated_UserListGlobalLicenseService_ListUserListGlobalLicenses_sync]

package main

import (
 "context"

 datamanager "cloud.google.com/go/datamanager/apiv1"
 datamanagerpb "cloud.google.com/go/datamanager/apiv1/datamanagerpb"
 "google.golang.org/api/iterator"
)

func main() {
 ctx := context.Background()
 // This snippet has
 been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
```

```
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := datamanager.NewUserListGlobalLicenseClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &datamanagerpb.ListUserListGlobalLicensesRequest{
 // TODO: Fill request struct fields.
 // See
https://pkg.go.dev/cloud.google.com/go/datamanager/apiv1/datamanagerpb#ListUserListGlobalLicensesRequest.
}
it := c.ListUserListGlobalLicenses(ctx, req)
for {
 resp, err := it.Next()
 if err == iterator.Done {
  break
 }
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp

 // If you need to access the underlying RPC response,
 // you can do so by casting the `Response` as below.
 //
Otherwise, remove this line. Only populated after
 // first call to Next(). Not safe for concurrent access.
 _ = it.Response.(*datamanagerpb.ListUserListGlobalLicensesResponse)
}
}

// [END datamanager_v1_generated_UserListGlobalLicenseService_ListUserListGlobalLicenses_sync]
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```

```
// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

// [START datamanager_v1_generated_UserListDirectLicenseService_UpdateUserListDirectLicense_sync]

package main

import (
 "context"

 datamanager "cloud.google.com/go/datamanager/apiv1"
 datamanagerpb "cloud.google.com/go/datamanager/apiv1/datamanagerpb"
)

func main() {
 ctx := context.Background()
 // This snippet has been automatically generated and
 should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := datamanager.NewUserListDirectLicenseClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &datamanagerpb.UpdateUserListDirectLicenseRequest{
  // TODO: Fill request struct fields.
  // See
https://pkg.go.dev/cloud.google.com/go/datamanager/apiv1/datamanagerpb#UpdateUserListDirectLicenseRequest.
 }
 resp, err := c.UpdateUserListDirectLicense(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

// [END datamanager_v1_generated_UserListDirectLicenseService_UpdateUserListDirectLicense_sync]
```

# 1.3795 google-api-go-client 0.275.0

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# 1.3796 google-cloud-go-longrunning 0.11.0

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package cloud

import (
 "bytes"
 "io/ioutil"
 "os"
 "path/filepath"
 "strings"
 "testing"
)

var sentinels = []string{
 "Copyright",
 "Google Inc",
 `Licensed under the Apache License, Version 2.0 (the "License");`,
}

func TestLicense(t *testing.T) {
 err := filepath.Walk(".", func(path string, fi os.FileInfo, err error) error {
  if err != nil {
```

```
 return err
 }

 if ext := filepath.Ext(path);
ext != ".go" && ext != ".proto" {
 return nil
 }
 if strings.HasSuffix(path, ".pb.go") {
 // .pb.go files are generated from the proto files.
 // .proto files must have license headers.
 return nil
 }
 if path == "bigtable/cmd/cbt/cbtdoc.go" {
 // Automatically generated.
 return nil
 }

 src, err := ioutil.ReadFile(path)
 if err != nil {
 return nil
 }
 src = src[:140] // Ensure all of the sentinel values are at the top of the file.

 // Find license
 for _, sentinel := range sentinels {
 if !bytes.Contains(src, []byte(sentinel)) {
  t.Errorf("%v: license header not present. want %q", path, sentinel)
  return nil
 }
 }

 return nil
})
if err != nil {
 t.Fatal(err)
}
}
```

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# 1.3797 brace-expansion 5.0.5

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# 1.3798 path-to-regexp 0.1.13

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# 1.3799 hasown 2.0.3

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cmd/krb5/slave/kpropd_rpc.c
lib/gss_mechs/mech_krb5/et/kdb5_err.c
lib/gss_mechs/mech_spnego/mech/gssapiP_spnego.h
lib/gss_mechs/mech_spnego/mech/spnego_mech.c
lib/krb5/kadm5/kadm_host_srv_names.c
lib/krb5/kdb/kdb_convert.c
lib/krb5/kdb/kdb_hdr.h
lib/krb5/kdb/kdb_log.c
lib/krb5/kdb/kdb_log.h
lib/libgss/g_accept_sec_context.c
lib/libgss/g_acquire_cred.c
lib/libgss/g_canon_name.c
lib/libgss/g_compare_name.c
lib/libgss/g_context_time.c
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lib/libgss/g_dsp_name.c
lib/libgss/g_dsp_status.c
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lib/libgss/g_utils.c
lib/libgss/g_verify.c

lib/libgss/gssd_pname_to_uid.c
uts/common/gssapi/include/gssapi_err_generic.h
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lib/gssapi/mechglue/g_acquire_cred.c
lib/gssapi/mechglue/g_canon_name.c
lib/gssapi/mechglue/g_compare_name.c
lib/gssapi/mechglue/g_context_time.c
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lib/gssapi/mechglue/g_dsp_name.c
lib/gssapi/mechglue/g_dsp_status.c
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lib/gssapi/mechglue/g_export_name.c
lib/gssapi/mechglue/g_glue.c
lib/gssapi/mechglue/g_imp_name.c
lib/gssapi/mechglue/g_imp_sec_context.c
lib/gssapi/mechglue/g_init_sec_context.c
lib/gssapi/mechglue/g_initialize.c
lib/gssapi/mechglue/g_inquire_context.c
lib/gssapi/mechglue/g_inquire_cred.c
lib/gssapi/mechglue/g_inquire_names.c
lib/gssapi/mechglue/g_process_context.c
lib/gssapi/mechglue/g_rel_buffer.c
lib/gssapi/mechglue/g_rel_cred.c
lib/gssapi/mechglue/g_rel_name.c
lib/gssapi/mechglue/g_rel_oid_set.c
lib/gssapi/mechglue/g_seal.c
lib/gssapi/mechglue/g_sign.c
lib/gssapi/mechglue/g_store_cred.c
lib/gssapi/mechglue/g_unseal.c
lib/gssapi/mechglue/g_userok.c
lib/gssapi/mechglue/g_utils.c
lib/gssapi/mechglue/g_verify.c
lib/gssapi/mechglue/gssd_pname_to_uid.c
lib/gssapi/mechglue/mglueP.h
lib/gssapi/mechglue/oid_ops.c
lib/gssapi/spnego/gssapiP_spnego.h
lib/gssapi/spnego/spnego_mech.c

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include/iprop_hdr.h
kadmin/server/ipropd_svc.c
lib/kdb/iprop.x
lib/kdb/kdb_convert.c
lib/kdb/kdb_log.c
lib/kdb/kdb_log.h
lib/krb5/error_tables/kdb5_err.et
kprop/kpropd_rpc.c
kprop/kproplog.c

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lib/libgss/g_verify.c
lib/libgss/gssd_pname_to_uid.c
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lib/gssapi/mechglue/g_acquire_cred.c
lib/gssapi/mechglue/g_canon_name.c
lib/gssapi/mechglue/g_compare_name.c
lib/gssapi/mechglue/g_context_time.c
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lib/gssapi/mechglue/g_dup_name.c
lib/gssapi/mechglue/g_exp_sec_context.c
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lib/gssapi/mechglue/g_imp_name.c
lib/gssapi/mechglue/g_imp_sec_context.c
lib/gssapi/mechglue/g_init_sec_context.c
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lib/gssapi/mechglue/g_inquire_context.c
lib/gssapi/mechglue/g_inquire_cred.c
lib/gssapi/mechglue/g_inquire_names.c
lib/gssapi/mechglue/g_process_context.c
lib/gssapi/mechglue/g_rel_buffer.c
lib/gssapi/mechglue/g_rel_cred.c
lib/gssapi/mechglue/g_rel_name.c
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lib/gssapi/mechglue/gssd_pname_to_uid.c
lib/gssapi/mechglue/mglueP.h
lib/gssapi/mechglue/oid_ops.c
lib/gssapi/spnego/gssapiP_spnego.h
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kadmin/server/ipropd_svc.c
lib/kdb/iprop.x
lib/kdb/kdb_convert.c
lib/kdb/kdb_log.c
lib/kdb/kdb_log.h
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kprop/kpropd_rpc.c
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cmd/krb5/iprop/iprop_hdr.h
cmd/krb5/kadmin/server/ipropd_svc.c
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cmd/krb5/slave/kpropd_rpc.c
lib/gss_mechs/mech_krb5/et/kdb5_err.c
lib/gss_mechs/mech_spnego/mech/gssapiP_spnego.h
lib/gss_mechs/mech_spnego/mech/spnego_mech.c
lib/krb5/kadm5/kadm_host_srv_names.c
lib/krb5/kdb/kdb_convert.c
lib/krb5/kdb/kdb_hdr.h
lib/krb5/kdb/kdb_log.c
lib/krb5/kdb/kdb_log.h
lib/libgss/g_accept_sec_context.c
lib/libgss/g_acquire_cred.c
lib/libgss/g_canon_name.c

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lib/libgss/g_dsp_status.c
lib/libgss/g_dup_name.c
lib/libgss/g_exp_sec_context.c
lib/libgss/g_export_name.c
lib/libgss/g_glue.c
lib/libgss/g_imp_name.c
lib/libgss/g_imp_sec_context.c
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lib/libgss/g_inquire_cred.c
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lib/libgss/g_process_context.c
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lib/libgss/g_rel_cred.c
lib/libgss/g_rel_name.c
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lib/libgss/g_store_cred.c
lib/libgss/g_unseal.c
lib/libgss/g_userok.c
lib/libgss/g_utils.c
lib/libgss/g_verify.c
lib/libgss/gssd_pname_to_uid.c
uts/common/gssapi/include/gssapi_err_generic.h
uts/common/gssapi/include/mechglueP.h

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lib/gssapi/mechglue/g_accept_sec_context.c
lib/gssapi/mechglue/g_acquire_cred.c
lib/gssapi/mechglue/g_canon_name.c
lib/gssapi/mechglue/g_compare_name.c
lib/gssapi/mechglue/g_context_time.c
lib/gssapi/mechglue/g_delete_sec_context.c
lib/gssapi/mechglue/g_dsp_name.c
lib/gssapi/mechglue/g_dsp_status.c
lib/gssapi/mechglue/g_dup_name.c
lib/gssapi/mechglue/g_exp_sec_context.c
lib/gssapi/mechglue/g_export_name.c
lib/gssapi/mechglue/g_glue.c
lib/gssapi/mechglue/g_imp_name.c
lib/gssapi/mechglue/g_imp_sec_context.c
lib/gssapi/mechglue/g_init_sec_context.c
lib/gssapi/mechglue/g_initialize.c
lib/gssapi/mechglue/g_inquire_context.c

lib/gssapi/mechglue/g_inquire_cred.c
lib/gssapi/mechglue/g_inquire_names.c
lib/gssapi/mechglue/g_process_context.c
lib/gssapi/mechglue/g_rel_buffer.c
lib/gssapi/mechglue/g_rel_cred.c
lib/gssapi/mechglue/g_rel_name.c
lib/gssapi/mechglue/g_rel_oid_set.c
lib/gssapi/mechglue/g_seal.c
lib/gssapi/mechglue/g_sign.c
lib/gssapi/mechglue/g_store_cred.c
lib/gssapi/mechglue/g_unseal.c
lib/gssapi/mechglue/g_userok.c
lib/gssapi/mechglue/g_utils.c
lib/gssapi/mechglue/g_verify.c
lib/gssapi/mechglue/gssd_pname_to_uid.c
lib/gssapi/mechglue/mglueP.h
lib/gssapi/mechglue/oid_ops.c
lib/gssapi/spnego/gssapiP_spnego.h
lib/gssapi/spnego/spnego_mech.c

and the initial implementation of incremental propagation, including the following new or changed files:

include/iprop_hdr.h
kadmin/server/ipropd_svc.c
lib/kdb/iprop.x
lib/kdb/kdb_convert.c
lib/kdb/kdb_log.c
lib/kdb/kdb_log.h
lib/krb5/error_tables/kdb5_err.et
kprop/kpropd_rpc.c
kprop/kproplog.c

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cmd/krb5/slave/kpropd_rpc.c
lib/gss_mechs/mech_krb5/et/kdb5_err.c
lib/gss_mechs/mech_spnego/mech/gssapiP_spnego.h
lib/gss_mechs/mech_spnego/mech/spnego_mech.c
lib/krb5/kadm5/kadm_host_srv_names.c
lib/krb5/kdb/kdb_convert.c
lib/krb5/kdb/kdb_hdr.h
lib/krb5/kdb/kdb_log.c
lib/krb5/kdb/kdb_log.h
lib/libgss/g_accept_sec_context.c
lib/libgss/g_acquire_cred.c
lib/libgss/g_canon_name.c
lib/libgss/g_compare_name.c
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lib/libgss/g_delete_sec_context.c
lib/libgss/g_dsp_name.c
lib/libgss/g_dsp_status.c
lib/libgss/g_dup_name.c
lib/libgss/g_exp_sec_context.c
lib/libgss/g_export_name.c

lib/libgss/g_glue.c
lib/libgss/g_imp_name.c
lib/libgss/g_imp_sec_context.c
lib/libgss/g_init_sec_context.c
lib/libgss/g_initialize.c
lib/libgss/g_inquire_context.c
lib/libgss/g_inquire_cred.c
lib/libgss/g_inquire_names.c
lib/libgss/g_process_context.c
lib/libgss/g_rel_buffer.c
lib/libgss/g_rel_cred.c
lib/libgss/g_rel_name.c
lib/libgss/g_rel_oid_set.c
lib/libgss/g_seal.c
lib/libgss/g_sign.c
lib/libgss/g_store_cred.c
lib/libgss/g_unseal.c
lib/libgss/g_userok.c
lib/libgss/g_utils.c
lib/libgss/g_verify.c
lib/libgss/gssd_pname_to_uid.c
uts/common/gssapi/include/gssapi_err_generic.h
uts/common/gssapi/include/mechglueP.h

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lib/gssapi/mechglue/g_accept_sec_context.c
lib/gssapi/mechglue/g_acquire_cred.c
lib/gssapi/mechglue/g_canon_name.c
lib/gssapi/mechglue/g_compare_name.c
lib/gssapi/mechglue/g_context_time.c
lib/gssapi/mechglue/g_delete_sec_context.c
lib/gssapi/mechglue/g_dsp_name.c
lib/gssapi/mechglue/g_dsp_status.c
lib/gssapi/mechglue/g_dup_name.c
lib/gssapi/mechglue/g_exp_sec_context.c
lib/gssapi/mechglue/g_export_name.c
lib/gssapi/mechglue/g_glue.c
lib/gssapi/mechglue/g_imp_name.c
lib/gssapi/mechglue/g_imp_sec_context.c
lib/gssapi/mechglue/g_init_sec_context.c
lib/gssapi/mechglue/g_initialize.c
lib/gssapi/mechglue/g_inquire_context.c

lib/gssapi/mechglue/g_inquire_cred.c
lib/gssapi/mechglue/g_inquire_names.c
lib/gssapi/mechglue/g_process_context.c
lib/gssapi/mechglue/g_rel_buffer.c
lib/gssapi/mechglue/g_rel_cred.c
lib/gssapi/mechglue/g_rel_name.c
lib/gssapi/mechglue/g_rel_oid_set.c
lib/gssapi/mechglue/g_seal.c
lib/gssapi/mechglue/g_sign.c
lib/gssapi/mechglue/g_store_cred.c
lib/gssapi/mechglue/g_unseal.c
lib/gssapi/mechglue/g_userok.c
lib/gssapi/mechglue/g_utils.c
lib/gssapi/mechglue/g_verify.c
lib/gssapi/mechglue/gssd_pname_to_uid.c
lib/gssapi/mechglue/mglueP.h
lib/gssapi/mechglue/oid_ops.c
lib/gssapi/spnego/gssapiP_spnego.h
lib/gssapi/spnego/spnego_mech.c

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include/iprop_hdr.h
kadmin/server/ipropd_svc.c
lib/kdb/iprop.x
lib/kdb/kdb_convert.c
lib/kdb/kdb_log.c
lib/kdb/kdb_log.h
lib/krb5/error_tables/kdb5_err.et
kprop/kpropd_rpc.c
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"src/plugins/preauth/spake/edwards25519_tables.h":

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cmd/krb5/slave/kpropd_rpc.c
lib/gss_mechs/mech_krb5/et/kdb5_err.c
lib/gss_mechs/mech_spnego/mech/gssapiP_spnego.h
lib/gss_mechs/mech_spnego/mech/spnego_mech.c
lib/krb5/kadm5/kadm_host_srv_names.c
lib/krb5/kdb/kdb_convert.c
lib/krb5/kdb/kdb_hdr.h
lib/krb5/kdb/kdb_log.c
lib/krb5/kdb/kdb_log.h
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lib/libgss/g_dup_name.c
lib/libgss/g_exp_sec_context.c
lib/libgss/g_export_name.c
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lib/libgss/g_utils.c
lib/libgss/g_verify.c
lib/libgss/gssd_pname_to_uid.c
uts/common/gssapi/include/gssapi_err_generic.h
uts/common/gssapi/include/mechglueP.h

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lib/gssapi/mechglue/g_accept_sec_context.c
lib/gssapi/mechglue/g_acquire_cred.c
lib/gssapi/mechglue/g_canon_name.c
lib/gssapi/mechglue/g_compare_name.c
lib/gssapi/mechglue/g_context_time.c
lib/gssapi/mechglue/g_delete_sec_context.c
lib/gssapi/mechglue/g_dsp_name.c
lib/gssapi/mechglue/g_dsp_status.c
lib/gssapi/mechglue/g_dup_name.c
lib/gssapi/mechglue/g_exp_sec_context.c
lib/gssapi/mechglue/g_export_name.c
lib/gssapi/mechglue/g_glue.c
lib/gssapi/mechglue/g_imp_name.c
lib/gssapi/mechglue/g_imp_sec_context.c
lib/gssapi/mechglue/g_init_sec_context.c
lib/gssapi/mechglue/g_initialize.c
lib/gssapi/mechglue/g_inquire_context.c
lib/gssapi/mechglue/g_inquire_cred.c
lib/gssapi/mechglue/g_inquire_names.c
lib/gssapi/mechglue/g_process_context.c
lib/gssapi/mechglue/g_rel_buffer.c
lib/gssapi/mechglue/g_rel_cred.c
lib/gssapi/mechglue/g_rel_name.c
lib/gssapi/mechglue/g_rel_oid_set.c
lib/gssapi/mechglue/g_seal.c
lib/gssapi/mechglue/g_sign.c
lib/gssapi/mechglue/g_store_cred.c
lib/gssapi/mechglue/g_unseal.c
lib/gssapi/mechglue/g_userok.c
lib/gssapi/mechglue/g_utils.c
lib/gssapi/mechglue/g_verify.c
lib/gssapi/mechglue/gssd_pname_to_uid.c
lib/gssapi/mechglue/mglueP.h
lib/gssapi/mechglue/oid_ops.c
lib/gssapi/spnego/gssapiP_spnego.h
lib/gssapi/spnego/spnego_mech.c

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include/iprop_hdr.h

kadmin/server/ipropd_svc.c
lib/kdb/iprop.x
lib/kdb/kdb_convert.c
lib/kdb/kdb_log.c
lib/kdb/kdb_log.h
lib/krb5/error_tables/kdb5_err.et
kprop/kpropd_rpc.c
kprop/kproplog.c

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# 1.3809 ca-certificates-bundle 20260413-r0

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```
#!/usr/bin/env perl
# ******************************************************************************
# *                          _   _ ____  _
# *  Project                 ___| | | | _ \| |
```

```
# *                      / __| | | | |_) | |
# *                     | (__| |_| |  _ <| |___
# *                      \___|\___/|_| \_\_____|
# *
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# *
# * SPDX-License-Identifier: curl
# *
# ***************************************************************************
# This Perl script creates a fresh ca-bundle.crt file for use with libcurl.
# It downloads certdata.txt from Mozilla's source tree (see URL below),
# then parses certdata.txt and extracts CA Root Certificates into PEM format.
# These are then processed with the OpenSSL commandline tool to produce the
# final ca-bundle.crt file.
# The script is based on the parse-certs script written by Roland Krikava.
# This Perl script works on almost any platform since its only external
# dependency is the OpenSSL commandline tool for optional text listing.
# Hacked by Guenter Knauf.
#
```

Found in path(s):
* /721ff6606b8c145755691d6cf87088ae7ff3d346-tar-gz/ca-certificates-721ff6606b8c145755691d6cf87088ae7ff3d346/mk-ca-bundle.pl
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```
/* c_rehash.c - Create hash symlinks for certificates
* C implementation based on the original Perl and shell versions
*
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*/
```

Found in path(s):

* /721ff6606b8c145755691d6cf87088ae7ff3d346-tar-gz/ca-certificates-721ff6606b8c145755691d6cf87088ae7ff3d346/c_rehash.c

# 1.3810 libldap-2.6 2.6.13-r4

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# 1.3818 body-parser 1.20.5

## 1.3818.1 Available under license :

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# 1.3819 nodejs-22 22.22.2-r1

## 1.3819.1 Available under license :

```
#ifndef SRC_PERMISSION_WORKER_PERMISSION_H_
#define SRC_PERMISSION_WORKER_PERMISSION_H_

#if defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS

#include <vector>
#include "permission/permission_base.h"

namespace node {

namespace permission {

class WorkerPermission final : public PermissionBase {
public:
 void Apply(Environment* env,
            const std::vector<std::string>& allow,
            PermissionScope scope) override;
 bool is_granted(Environment* env,
                 PermissionScope perm,
                 const std::string_view& param = "") const override;

private:
 bool deny_all_;
};
```

```
}  // namespace permission

}  // namespace node

#endif  // defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
#endif  // SRC_PERMISSION_WORKER_PERMISSION_H_
{
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'openssl/providers/implementations/ciphers/cipher_aria.c',
'openssl/providers/implementations/ciphers/cipher_aria_ccm.c',
'openssl/providers/implementations/ciphers/cipher_aria_ccm_hw.c',
'openssl/providers/implementations/ciphers/cipher_aria_gcm.c',
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'openssl/providers/implementations/ciphers/cipher_chacha20.c',
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'openssl/providers/implementations/ciphers/cipher_chacha20_poly1305_hw.c',
'openssl/providers/implementations/ciphers/cipher_cts.c',
'openssl/providers/implementations/ciphers/cipher_null.c',
'openssl/providers/implementations/ciphers/cipher_sm4.c',
'openssl/providers/implementations/ciphers/cipher_sm4_ccm.c',
'openssl/providers/implementations/ciphers/cipher_sm4_ccm_hw.c',
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'openssl/providers/implementations/ciphers/cipher_sm4_xts.c',
'openssl/providers/implementations/ciphers/cipher_sm4_xts_hw.c',
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'openssl/providers/implementations/ciphers/cipher_tdes_common.c',

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'openssl/providers/implementations/ciphers/cipher_tdes_default_hw.c',
'openssl/providers/implementations/ciphers/cipher_tdes_hw.c',
'openssl/providers/implementations/ciphers/cipher_tdes_wrap.c',
'openssl/providers/implementations/ciphers/cipher_tdes_wrap_hw.c',
'openssl/providers/implementations/digests/blake2_prov.c',
'openssl/providers/implementations/digests/blake2b_prov.c',
'openssl/providers/implementations/digests/blake2s_prov.c',
'openssl/providers/implementations/digests/md5_prov.c',
'openssl/providers/implementations/digests/md5_sha1_prov.c',
'openssl/providers/implementations/digests/null_prov.c',
'openssl/providers/implementations/digests/ripemd_prov.c',
'openssl/providers/implementations/digests/sha2_prov.c',
'openssl/providers/implementations/digests/sha3_prov.c',
'openssl/providers/implementations/digests/sm3_prov.c',
'openssl/providers/implementations/encode_decode/decode_der2key.c',
'openssl/providers/implementations/encode_decode/decode_epki2pki.c',
'openssl/providers/implementations/encode_decode/decode_msblob2key.c',
'openssl/providers/implementations/encode_decode/decode_pem2der.c',
'openssl/providers/implementations/encode_decode/decode_pvk2key.c',
'openssl/providers/implementations/encode_decode/decode_spki2typespki.c',
'openssl/providers/implementations/encode_decode/encode_key2any.c',
'openssl/providers/implementations/encode_decode/encode_key2blob.c',
'openssl/providers/implementations/encode_decode/encode_key2ms.c',
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'openssl/providers/implementations/encode_decode/ml_dsa_codecs.c',
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'openssl/providers/implementations/exchange/ecx_exch.c',
'openssl/providers/implementations/exchange/kdf_exch.c',
'openssl/providers/implementations/kdfs/argon2.c',
'openssl/providers/implementations/kdfs/hkdf.c',
'openssl/providers/implementations/kdfs/hmacdrbg_kdf.c',
'openssl/providers/implementations/kdfs/kbkdf.c',
'openssl/providers/implementations/kdfs/krb5kdf.c',
'openssl/providers/implementations/kdfs/pbkdf2.c',
'openssl/providers/implementations/kdfs/pbkdf2_fips.c',
'openssl/providers/implementations/kdfs/pkcs12kdf.c',
'openssl/providers/implementations/kdfs/scrypt.c',
'openssl/providers/implementations/kdfs/sshkdf.c',
'openssl/providers/implementations/kdfs/sskdf.c',
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'openssl/providers/implementations/kdfs/x942kdf.c',
'openssl/providers/implementations/kem/ec_kem.c',
'openssl/providers/implementations/kem/ecx_kem.c',

'openssl/providers/implementations/kem/kem_util.c',
'openssl/providers/implementations/kem/ml_kem_kem.c',
'openssl/providers/implementations/kem/mlx_kem.c',
'openssl/providers/implementations/kem/rsa_kem.c',
'openssl/providers/implementations/keymgmt/dh_kmgmt.c',
'openssl/providers/implementations/keymgmt/dsa_kmgmt.c',
'openssl/providers/implementations/keymgmt/ec_kmgmt.c',
'openssl/providers/implementations/keymgmt/ecx_kmgmt.c',
'openssl/providers/implementations/keymgmt/kdf_legacy_kmgmt.c',
'openssl/providers/implementations/keymgmt/mac_legacy_kmgmt.c',
'openssl/providers/implementations/keymgmt/ml_dsa_kmgmt.c',
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'openssl/providers/implementations/keymgmt/slh_dsa_kmgmt.c',
'openssl/providers/implementations/macs/blake2b_mac.c',
'openssl/providers/implementations/macs/blake2s_mac.c',
'openssl/providers/implementations/macs/cmac_prov.c',
'openssl/providers/implementations/macs/gmac_prov.c',
'openssl/providers/implementations/macs/hmac_prov.c',
'openssl/providers/implementations/macs/kmac_prov.c',
'openssl/providers/implementations/macs/poly1305_prov.c',
'openssl/providers/implementations/macs/siphash_prov.c',
'openssl/providers/implementations/rands/drbg.c',
'openssl/providers/implementations/rands/drbg_ctr.c',
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'openssl/providers/implementations/rands/drbg_hmac.c',
'openssl/providers/implementations/rands/seed_src.c',
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'openssl/providers/implementations/rands/test_rng.c',
'openssl/providers/implementations/rands/seeding/rand_cpu_x86.c',
'openssl/providers/implementations/rands/seeding/rand_tsc.c',
'openssl/providers/implementations/rands/seeding/rand_unix.c',
'openssl/providers/implementations/rands/seeding/rand_win.c',
'openssl/providers/implementations/signature/dsa_sig.c',
'openssl/providers/implementations/signature/ecdsa_sig.c',
'openssl/providers/implementations/signature/eddsa_sig.c',
'openssl/providers/implementations/signature/mac_legacy_sig.c',
'openssl/providers/implementations/signature/ml_dsa_sig.c',
'openssl/providers/implementations/signature/rsa_sig.c',
'openssl/providers/implementations/signature/slh_dsa_sig.c',
'openssl/providers/implementations/signature/sm2_sig.c',
'openssl/providers/implementations/skeymgmt/aes_skmgmt.c',
'openssl/providers/implementations/skeymgmt/generic.c',
'openssl/providers/implementations/storemgmt/file_store.c',
'openssl/providers/implementations/storemgmt/file_store_any2obj.c',
'openssl/ssl/record/methods/ssl3_cbc.c',
'openssl/providers/common/der/der_dsa_key.c',

```
  'openssl/providers/common/der/der_dsa_sig.c',
  'openssl/providers/common/der/der_ec_key.c',
  'openssl/providers/common/der/der_ec_sig.c',
  'openssl/providers/common/der/der_ecx_key.c',
  'openssl/providers/common/der/der_ml_dsa_key.c',
  'openssl/providers/common/der/der_rsa_key.c',
  'openssl/providers/common/der/der_slh_dsa_key.c',
  'openssl/providers/common/provider_ctx.c',
  'openssl/providers/common/provider_err.c',
  'openssl/providers/implementations/ciphers/ciphercommon.c',
  'openssl/providers/implementations/ciphers/ciphercommon_block.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm_hw.c',
  'openssl/providers/implementations/ciphers/ciphercommon_gcm.c',
   'openssl/providers/implementations/ciphers/ciphercommon_gcm_hw.c',
  'openssl/providers/implementations/ciphers/ciphercommon_hw.c',
  'openssl/providers/implementations/digests/digestcommon.c',
  'openssl/ssl/record/methods/tls_pad.c',
  'openssl/providers/implementations/ciphers/cipher_blowfish.c',
  'openssl/providers/implementations/ciphers/cipher_blowfish_hw.c',
  'openssl/providers/implementations/ciphers/cipher_cast5.c',
  'openssl/providers/implementations/ciphers/cipher_cast5_hw.c',
  'openssl/providers/implementations/ciphers/cipher_des.c',
  'openssl/providers/implementations/ciphers/cipher_des_hw.c',
  'openssl/providers/implementations/ciphers/cipher_desx.c',
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  'openssl/providers/implementations/ciphers/cipher_idea_hw.c',
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  'openssl/providers/implementations/ciphers/cipher_rc4_hmac_md5.c',
  'openssl/providers/implementations/ciphers/cipher_rc4_hmac_md5_hw.c',
  'openssl/providers/implementations/ciphers/cipher_rc4_hw.c',
  'openssl/providers/implementations/ciphers/cipher_seed.c',
  'openssl/providers/implementations/ciphers/cipher_seed_hw.c',
  'openssl/providers/implementations/ciphers/cipher_tdes_common.c',
  'openssl/providers/implementations/digests/md4_prov.c',
  'openssl/providers/implementations/digests/mdc2_prov.c',
  'openssl/providers/implementations/digests/ripemd_prov.c',
  'openssl/providers/implementations/digests/wp_prov.c',
  'openssl/providers/implementations/kdfs/pbkdf1.c',
  'openssl/providers/implementations/kdfs/pvkkdf.c',
  'openssl/providers/prov_running.c',
  'openssl/providers/legacyprov.c',
 ],
'openssl_sources_BSD-x86_64': [
  './config/archs/BSD-x86_64/asm_avx2/crypto/aes/aes-x86_64.s',
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'./config/archs/BSD-x86_64/asm_avx2/crypto/aes/aesni-mb-x86_64.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/aes/aesni-sha1-x86_64.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/aes/aesni-sha256-x86_64.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/aes/aesni-x86_64.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/aes/aesni-xts-avx512.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/aes/bsaes-x86_64.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/aes/vpaes-x86_64.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-2k-avx512.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-2k-avxifma.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-3k-avx512.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-3k-avxifma.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-4k-avx512.s',

'./config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-4k-avxifma.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-avx2.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-x86_64.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/bn/x86_64-gf2m.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/bn/x86_64-mont.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/bn/x86_64-mont5.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/camellia/cmll-x86_64.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/chacha/chacha-x86_64.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/ec/ecp_nistz256-x86_64.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/ec/x25519-x86_64.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/params_idx.c',
'./config/archs/BSD-x86_64/asm_avx2/crypto/x86_64cpuid.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/md5/md5-x86_64.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/modes/aes-gcm-avx512.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/modes/aesni-gcm-x86_64.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/modes/ghash-x86_64.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/poly1305/poly1305-x86_64.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/rc4/rc4-md5-x86_64.s',
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'./config/archs/BSD-x86_64/asm_avx2/crypto/sha/sha1-mb-x86_64.s',
'./config/archs/BSD-x86_64/asm_avx2/crypto/sha/sha1-x86_64.s',
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'./config/archs/BSD-x86_64/asm_avx2/crypto/whrlpool/wp-x86_64.s',
'./config/archs/BSD-x86_64/asm_avx2/engines/e_padlock-x86_64.s',
'./config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_sm2_gen.c',
'./config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_digests_gen.c',
'./config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_dsa_gen.c',
'./config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_ec_gen.c',
'./config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_ecx_gen.c',
'./config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_ml_dsa_gen.c',
'./config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_rsa_gen.c',
'./config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_slh_dsa_gen.c',

```
    './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_wrap_gen.c',
    './config/archs/BSD-x86_64/asm_avx2/providers/legacy.ld',
    './config/archs/BSD-x86_64/asm_avx2/providers/fips.ld',
  ],
  'openssl_defines_BSD-x86_64': [
    'NDEBUG',
    'L_ENDIAN',
    'OPENSSL_BUILDING_OPENSSL',
    'AES_ASM',
    'BSAES_ASM',
    'CMLL_ASM',
    'ECP_NISTZ256_ASM',
    'GHASH_ASM',
    'KECCAK1600_ASM',

  'MD5_ASM',
    'OPENSSL_BN_ASM_GF2m',
    'OPENSSL_BN_ASM_MONT',
    'OPENSSL_BN_ASM_MONT5',
    'OPENSSL_CPUID_OBJ',
    'OPENSSL_IA32_SSE2',
    'PADLOCK_ASM',
    'POLY1305_ASM',
    'RC4_ASM',
    'SHA1_ASM',
    'SHA256_ASM',
    'SHA512_ASM',
    'VPAES_ASM',
    'WHIRLPOOL_ASM',
    'X25519_ASM',
    'OPENSSL_PIC',
  ],
  'openssl_cflags_BSD-x86_64': [
    '-Wa,--noexecstack',
    '-Wall -O3',
    '-pthread',
    '-Wall -O3',
  ],
  'openssl_ex_libs_BSD-x86_64': [
    '-pthread',
  ],
},
'include_dirs': [
  '.',
  './include',
  './crypto',
  './crypto/include/internal',
  './providers/common/include',
```

```
 ],
 'defines': ['<@(openssl_defines_BSD-x86_64)'],
 'cflags' : ['<@(openssl_cflags_BSD-x86_64)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86_64)'],
 'sources': ['<@(openssl_sources)', '<@(openssl_sources_BSD-x86_64)'],
 'direct_dependent_settings': {
   'include_dirs': ['./include', '.'],
   'defines': ['<@(openssl_defines_BSD-x86_64)'],
  },
}
/*
* WARNING: do not edit!
* Generated by util/mkbuildinf.pl
*
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#define PLATFORM "platform: BSD-x86_64"
#define DATE "built on: Tue Jan 27 17:26:46 2026 UTC"

/*
* Generate compiler_flags as an array of individual characters. This is a
* workaround for the situation where CFLAGS gets too long for a C90 string
* literal
*/
static const char compiler_flags[] = {
   'c','o','m','p','i','l','e','r',':',' ','.','.','/','c','o','n',
   'f','i','g','/','f','a','k','e','_','g','c','c','.','p','l',' ',
   '-','f','P','I','C',' ','-','p','t','h','r','e','a','d',' ','-',
   'W','a',',','-','-','n','o','e','x','e','c','s','t','a','c','k',
   ' ','-','W','a','l','l','
 ','-','O','3',' ','-','D','L','_','E',
   'N','D','I','A','N',' ','-','D','O','P','E','N','S','S','L','_',
   'P','I','C',' ','-','D','_','T','H','R','E','A','D','_','S','A',
   'F','E',' ','-','D','_','R','E','E','N','T','R','A','N','T',' ',
   '-','D','O','P','E','N','S','S','L','_','B','U','I','L','D','I',
   'N','G','_','O','P','E','N','S','S','L',' ','-','D','N','D','E',
   'B','U','G','\0'
};
#ifndef SRC_PERMISSION_CHILD_PROCESS_PERMISSION_H_
#define SRC_PERMISSION_CHILD_PROCESS_PERMISSION_H_

#if defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
```

```
#include <vector>
#include "permission/permission_base.h"

namespace node {

namespace permission {

class ChildProcessPermission final : public PermissionBase {
public:
 void Apply(Environment* env,
            const std::vector<std::string>& allow,
            PermissionScope scope) override;
 bool is_granted(Environment* env,
                 PermissionScope perm,
                 const std::string_view& param = "") const override;

private:
 bool deny_all_;
};

}  // namespace permission

}  // namespace node

#endif  // defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
#endif  // SRC_PERMISSION_CHILD_PROCESS_PERMISSION_H_
```

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```
{
 'variables': {
   'openssl_sources': [
     'openssl/ssl/bio_ssl.c',
```

'openssl/ssl/d1_lib.c',
'openssl/ssl/d1_msg.c',
'openssl/ssl/d1_srtp.c',
'openssl/ssl/methods.c',
'openssl/ssl/pqueue.c',
'openssl/ssl/priority_queue.c',
'openssl/ssl/s3_enc.c',
'openssl/ssl/s3_lib.c',
'openssl/ssl/s3_msg.c',
'openssl/ssl/ssl_asn1.c',
'openssl/ssl/ssl_cert.c',
'openssl/ssl/ssl_cert_comp.c',
'openssl/ssl/ssl_ciph.c',
'openssl/ssl/ssl_conf.c',
'openssl/ssl/ssl_err_legacy.c',
'openssl/ssl/ssl_init.c',
'openssl/ssl/ssl_lib.c',
'openssl/ssl/ssl_mcnf.c',
'openssl/ssl/ssl_rsa.c',
'openssl/ssl/ssl_rsa_legacy.c',
'openssl/ssl/ssl_sess.c',
'openssl/ssl/ssl_stat.c',
'openssl/ssl/ssl_txt.c',
'openssl/ssl/ssl_utst.c',
'openssl/ssl/t1_enc.c',
'openssl/ssl/t1_lib.c',
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'openssl/ssl/quic/json_enc.c',
'openssl/ssl/quic/qlog.c',
'openssl/ssl/quic/qlog_event_helpers.c',
'openssl/ssl/quic/quic_ackm.c',
'openssl/ssl/quic/quic_cfq.c',
'openssl/ssl/quic/quic_channel.c',
'openssl/ssl/quic/quic_demux.c',
'openssl/ssl/quic/quic_engine.c',
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/* clang-format off */

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#ifndef OPENSSL_CRYPTO_H
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#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_CRYPTO_H
#endif

#include <stdlib.h>
#include <time.h>

#include <openssl/e_os2.h>
```

```
#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif

#include <openssl/safestack.h>
#include <openssl/opensslv.h>
#include <openssl/types.h>
#include <openssl/opensslconf.h>
#include <openssl/cryptoerr.h>
#include <openssl/core.h>

#ifdef
 CHARSET_EBCDIC
#include <openssl/ebcdic.h>
#endif

/*
* Resolve problems on some operating systems with symbol names that clash
* one way or another
*/
#include <openssl/symhacks.h>

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#include <openssl/opensslv.h>
#endif

#ifdef __cplusplus
extern "C" {
#endif

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define SSLeay OpenSSL_version_num
#define SSLeay_version OpenSSL_version
#define SSLEAY_VERSION_NUMBER OPENSSL_VERSION_NUMBER
#define SSLEAY_VERSION OPENSSL_VERSION
#define SSLEAY_CFLAGS OPENSSL_CFLAGS
#define SSLEAY_BUILT_ON OPENSSL_BUILT_ON
#define SSLEAY_PLATFORM OPENSSL_PLATFORM
#define SSLEAY_DIR OPENSSL_DIR

/*
* Old type for allocating dynamic locks. No longer used. Use the new thread
* API instead.
*/
typedef struct {
   int dummy;
} CRYPTO_dynlock;
```

```
#endif /* OPENSSL_NO_DEPRECATED_1_1_0 */

typedef void CRYPTO_RWLOCK;

CRYPTO_RWLOCK *CRYPTO_THREAD_lock_new(void);
__owur int CRYPTO_THREAD_read_lock(CRYPTO_RWLOCK *lock);
__owur int CRYPTO_THREAD_write_lock(CRYPTO_RWLOCK
 *lock);
int CRYPTO_THREAD_unlock(CRYPTO_RWLOCK *lock);
void CRYPTO_THREAD_lock_free(CRYPTO_RWLOCK *lock);

int CRYPTO_atomic_add(int *val, int amount, int *ret, CRYPTO_RWLOCK *lock);
int CRYPTO_atomic_add64(uint64_t *val, uint64_t op, uint64_t *ret,
   CRYPTO_RWLOCK *lock);
int CRYPTO_atomic_and(uint64_t *val, uint64_t op, uint64_t *ret,
   CRYPTO_RWLOCK *lock);
int CRYPTO_atomic_or(uint64_t *val, uint64_t op, uint64_t *ret,
   CRYPTO_RWLOCK *lock);
int CRYPTO_atomic_load(uint64_t *val, uint64_t *ret, CRYPTO_RWLOCK *lock);
int CRYPTO_atomic_load_int(int *val, int *ret, CRYPTO_RWLOCK *lock);
int CRYPTO_atomic_store(uint64_t *dst, uint64_t val, CRYPTO_RWLOCK *lock);

/* No longer needed, so this is a no-op */
#define OPENSSL_malloc_init() \
   while (0)              \
   continue

#define OPENSSL_malloc(num) \
   CRYPTO_malloc(num, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_zalloc(num) \
   CRYPTO_zalloc(num, OPENSSL_FILE, OPENSSL_LINE)
#define
 OPENSSL_aligned_alloc(num, alignment, freeptr) \
   CRYPTO_aligned_alloc(num, alignment, freeptr,      \
      OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_realloc(addr, num) \
   CRYPTO_realloc(addr, num, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_clear_realloc(addr, old_num, num) \
   CRYPTO_clear_realloc(addr, old_num, num, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_clear_free(addr, num) \
   CRYPTO_clear_free(addr, num, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_free(addr) \
   CRYPTO_free(addr, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_memdup(str, s) \
   CRYPTO_memdup((str), s, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_strdup(str) \
   CRYPTO_strdup(str, OPENSSL_FILE, OPENSSL_LINE)
```

```
#define OPENSSL_strndup(str, n) \
   CRYPTO_strndup(str, n, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_secure_malloc(num) \
   CRYPTO_secure_malloc(num, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_secure_zalloc(num) \
   CRYPTO_secure_zalloc(num, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_secure_free(addr)
 \
   CRYPTO_secure_free(addr, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_secure_clear_free(addr, num) \
   CRYPTO_secure_clear_free(addr, num, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_secure_actual_size(ptr) \
   CRYPTO_secure_actual_size(ptr)

size_t OPENSSL_strlcpy(char *dst, const char *src, size_t siz);
size_t OPENSSL_strlcat(char *dst, const char *src, size_t siz);
size_t OPENSSL_strnlen(const char *str, size_t maxlen);
int OPENSSL_strtoul(const char *str, char **endptr, int base, unsigned long *num);
int OPENSSL_buf2hexstr_ex(char *str, size_t str_n, size_t *strlength,
   const unsigned char *buf, size_t buflen,
   const char sep);
char *OPENSSL_buf2hexstr(const unsigned char *buf, long buflen);
int OPENSSL_hexstr2buf_ex(unsigned char *buf, size_t buf_n, size_t *buflen,
   const char *str, const char sep);
unsigned char *OPENSSL_hexstr2buf(const char *str, long *buflen);
int OPENSSL_hexchar2int(unsigned char c);
int OPENSSL_strcasecmp(const char
 *s1, const char *s2);
int OPENSSL_strncasecmp(const char *s1, const char *s2, size_t n);

#define OPENSSL_MALLOC_MAX_NELEMS(type) (((1U << (sizeof(int) * 8 - 1)) - 1) / sizeof(type))

/*
* These functions return the values of OPENSSL_VERSION_MAJOR,
* OPENSSL_VERSION_MINOR, OPENSSL_VERSION_PATCH, OPENSSL_VERSION_PRE_RELEASE
* and OPENSSL_VERSION_BUILD_METADATA, respectively.
*/
unsigned int OPENSSL_version_major(void);
unsigned int OPENSSL_version_minor(void);
unsigned int OPENSSL_version_patch(void);
const char *OPENSSL_version_pre_release(void);
const char *OPENSSL_version_build_metadata(void);

unsigned long OpenSSL_version_num(void);
const char *OpenSSL_version(int type);
#define OPENSSL_VERSION 0
#define OPENSSL_CFLAGS 1
#define OPENSSL_BUILT_ON 2
```

```
#define OPENSSL_PLATFORM 3
#define OPENSSL_DIR 4
#define OPENSSL_ENGINES_DIR 5
#define OPENSSL_VERSION_STRING 6
#define OPENSSL_FULL_VERSION_STRING 7
#define OPENSSL_MODULES_DIR 8
#define OPENSSL_CPU_INFO 9
#define OPENSSL_WINCTX 10

const
 char *OPENSSL_info(int type);
/*
* The series starts at 1001 to avoid confusion with the OpenSSL_version
* types.
*/
#define OPENSSL_INFO_CONFIG_DIR 1001
#define OPENSSL_INFO_ENGINES_DIR 1002
#define OPENSSL_INFO_MODULES_DIR 1003
#define OPENSSL_INFO_DSO_EXTENSION 1004
#define OPENSSL_INFO_DIR_FILENAME_SEPARATOR 1005
#define OPENSSL_INFO_LIST_SEPARATOR 1006
#define OPENSSL_INFO_SEED_SOURCE 1007
#define OPENSSL_INFO_CPU_SETTINGS 1008
#define OPENSSL_INFO_WINDOWS_CONTEXT 1009

int OPENSSL_issetugid(void);

struct crypto_ex_data_st {
   OSSL_LIB_CTX *ctx;
   STACK_OF(void) *sk;
};

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(void, void, void)
#define sk_void_num(sk) OPENSSL_sk_num(ossl_check_const_void_sk_type(sk))
#define sk_void_value(sk, idx) ((void *)OPENSSL_sk_value(ossl_check_const_void_sk_type(sk), (idx)))
#define sk_void_new(cmp) ((STACK_OF(void) *)OPENSSL_sk_new(ossl_check_void_compfunc_type(cmp)))
#define sk_void_new_null() ((STACK_OF(void) *)OPENSSL_sk_new_null())
#define
 sk_void_new_reserve(cmp, n) ((STACK_OF(void)
*)OPENSSL_sk_new_reserve(ossl_check_void_compfunc_type(cmp), (n)))
#define sk_void_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_void_sk_type(sk), (n))
#define sk_void_free(sk) OPENSSL_sk_free(ossl_check_void_sk_type(sk))
#define sk_void_zero(sk) OPENSSL_sk_zero(ossl_check_void_sk_type(sk))
#define sk_void_delete(sk, i) ((void *)OPENSSL_sk_delete(ossl_check_void_sk_type(sk), (i)))
#define sk_void_delete_ptr(sk, ptr) ((void *)OPENSSL_sk_delete_ptr(ossl_check_void_sk_type(sk),
ossl_check_void_type(ptr)))
#define sk_void_push(sk, ptr) OPENSSL_sk_push(ossl_check_void_sk_type(sk), ossl_check_void_type(ptr))
```

```
#define sk_void_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_void_sk_type(sk), ossl_check_void_type(ptr))
#define sk_void_pop(sk) ((void *)OPENSSL_sk_pop(ossl_check_void_sk_type(sk)))
#define sk_void_shift(sk) ((void *)OPENSSL_sk_shift(ossl_check_void_sk_type(sk)))
#define sk_void_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_void_sk_type(sk),ossl_check_void_freefunc_type(freefunc))
#define
 sk_void_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_void_sk_type(sk), ossl_check_void_type(ptr), (idx))
#define sk_void_set(sk, idx, ptr) ((void *)OPENSSL_sk_set(ossl_check_void_sk_type(sk), (idx),
ossl_check_void_type(ptr)))
#define sk_void_find(sk, ptr) OPENSSL_sk_find(ossl_check_void_sk_type(sk), ossl_check_void_type(ptr))
#define sk_void_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_void_sk_type(sk), ossl_check_void_type(ptr))
#define sk_void_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_void_sk_type(sk),
ossl_check_void_type(ptr), pnum)
#define sk_void_sort(sk) OPENSSL_sk_sort(ossl_check_void_sk_type(sk))
#define sk_void_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_void_sk_type(sk))
#define sk_void_dup(sk) ((STACK_OF(void) *)OPENSSL_sk_dup(ossl_check_const_void_sk_type(sk)))
#define sk_void_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(void)
*)OPENSSL_sk_deep_copy(ossl_check_const_void_sk_type(sk),
 ossl_check_void_copyfunc_type(copyfunc), ossl_check_void_freefunc_type(freefunc)))
#define sk_void_set_cmp_func(sk, cmp)
((sk_void_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_void_sk_type(sk),
ossl_check_void_compfunc_type(cmp)))

/* clang-format on */

/*
* Per class, we have a STACK of function pointers.
*/
#define CRYPTO_EX_INDEX_SSL 0
#define CRYPTO_EX_INDEX_SSL_CTX 1
#define CRYPTO_EX_INDEX_SSL_SESSION 2
#define CRYPTO_EX_INDEX_X509 3
#define CRYPTO_EX_INDEX_X509_STORE 4
#define CRYPTO_EX_INDEX_X509_STORE_CTX 5
#define CRYPTO_EX_INDEX_DH 6
#define CRYPTO_EX_INDEX_DSA 7
#define CRYPTO_EX_INDEX_EC_KEY 8
#define CRYPTO_EX_INDEX_RSA 9
#define CRYPTO_EX_INDEX_ENGINE 10
#define CRYPTO_EX_INDEX_UI 11
#define CRYPTO_EX_INDEX_BIO 12
#define CRYPTO_EX_INDEX_APP 13
#define CRYPTO_EX_INDEX_UI_METHOD 14
#define CRYPTO_EX_INDEX_RAND_DRBG 15
#define CRYPTO_EX_INDEX_DRBG CRYPTO_EX_INDEX_RAND_DRBG
#define CRYPTO_EX_INDEX_OSSL_LIB_CTX 16
#define CRYPTO_EX_INDEX_EVP_PKEY 17
#define CRYPTO_EX_INDEX__COUNT
```

```
typedef void CRYPTO_EX_new(void *parent, void *ptr, CRYPTO_EX_DATA *ad,
   int idx, long argl, void *argp);
typedef void CRYPTO_EX_free(void *parent, void *ptr, CRYPTO_EX_DATA *ad,
   int idx, long argl, void *argp);
typedef int CRYPTO_EX_dup(CRYPTO_EX_DATA *to, const CRYPTO_EX_DATA *from,
   void **from_d, int idx, long argl, void *argp);
__owur int CRYPTO_get_ex_new_index(int class_index, long argl, void *argp,
   CRYPTO_EX_new *new_func,
   CRYPTO_EX_dup *dup_func,
   CRYPTO_EX_free *free_func);
/* No longer use an index. */
int CRYPTO_free_ex_index(int class_index, int idx);

/*
* Initialise/duplicate/free CRYPTO_EX_DATA variables corresponding to a
* given class (invokes whatever per-class callbacks are applicable)
*/
int CRYPTO_new_ex_data(int class_index, void *obj, CRYPTO_EX_DATA *ad);
int CRYPTO_dup_ex_data(int class_index, CRYPTO_EX_DATA *to,
   const CRYPTO_EX_DATA *from);

void CRYPTO_free_ex_data(int class_index, void *obj, CRYPTO_EX_DATA
 *ad);

/* Allocate a single item in the CRYPTO_EX_DATA variable */
int CRYPTO_alloc_ex_data(int class_index, void *obj, CRYPTO_EX_DATA *ad,
   int idx);

/*
* Get/set data in a CRYPTO_EX_DATA variable corresponding to a particular
* index (relative to the class type involved)
*/
int CRYPTO_set_ex_data(CRYPTO_EX_DATA *ad, int idx, void *val);
void *CRYPTO_get_ex_data(const CRYPTO_EX_DATA *ad, int idx);

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
/*
* This function cleans up all "ex_data" state. It mustn't be called under
* potential race-conditions.
*/
#define CRYPTO_cleanup_all_ex_data() \
   while (0)                    \
   continue

/*
* The old locking functions have been removed completely without compatibility
```

```
* macros. This is because the old functions either could not properly report
* errors, or the returned error values were not clearly documented.
* Replacing the locking functions with no-ops would cause race condition
* issues in the affected applications. It is
 far better for them to fail at
* compile time.
* On the other hand, the locking callbacks are no longer used.  Consequently,
* the callback management functions can be safely replaced with no-op macros.
*/
#define CRYPTO_num_locks() (1)
#define CRYPTO_set_locking_callback(func)
#define CRYPTO_get_locking_callback() (NULL)
#define CRYPTO_set_add_lock_callback(func)
#define CRYPTO_get_add_lock_callback() (NULL)

/*
* These defines where used in combination with the old locking callbacks,
* they are not called anymore, but old code that's not called might still
* use them.
*/
#define CRYPTO_LOCK 1
#define CRYPTO_UNLOCK 2
#define CRYPTO_READ 4
#define CRYPTO_WRITE 8

/* This structure is no longer used */
typedef struct crypto_threadid_st {
   int dummy;
} CRYPTO_THREADID;
/* Only use CRYPTO_THREADID_set_[numeric|pointer]() within callbacks */
#define CRYPTO_THREADID_set_numeric(id, val)
#define CRYPTO_THREADID_set_pointer(id, ptr)
#define CRYPTO_THREADID_set_callback(threadid_func)
 (0)
#define CRYPTO_THREADID_get_callback() (NULL)
#define CRYPTO_THREADID_current(id)
#define CRYPTO_THREADID_cmp(a, b) (-1)
#define CRYPTO_THREADID_cpy(dest, src)
#define CRYPTO_THREADID_hash(id) (0UL)

#ifndef OPENSSL_NO_DEPRECATED_1_0_0
#define CRYPTO_set_id_callback(func)
#define CRYPTO_get_id_callback() (NULL)
#define CRYPTO_thread_id() (0UL)
#endif /* OPENSSL_NO_DEPRECATED_1_0_0 */

#define CRYPTO_set_dynlock_create_callback(dyn_create_function)
#define CRYPTO_set_dynlock_lock_callback(dyn_lock_function)
```

```
#define CRYPTO_set_dynlock_destroy_callback(dyn_destroy_function)
#define CRYPTO_get_dynlock_create_callback() (NULL)
#define CRYPTO_get_dynlock_lock_callback() (NULL)
#define CRYPTO_get_dynlock_destroy_callback() (NULL)
#endif /* OPENSSL_NO_DEPRECATED_1_1_0 */

typedef void *(*CRYPTO_malloc_fn)(size_t num, const char *file, int line);
typedef void *(*CRYPTO_realloc_fn)(void *addr, size_t num, const char *file,
   int line);
typedef void (*CRYPTO_free_fn)(void *addr, const char
 *file, int line);
int CRYPTO_set_mem_functions(CRYPTO_malloc_fn malloc_fn,
   CRYPTO_realloc_fn realloc_fn,
   CRYPTO_free_fn free_fn);
void CRYPTO_get_mem_functions(CRYPTO_malloc_fn *malloc_fn,
   CRYPTO_realloc_fn *realloc_fn,
   CRYPTO_free_fn *free_fn);

OSSL_CRYPTO_ALLOC void *CRYPTO_malloc(size_t num, const char *file, int line);
OSSL_CRYPTO_ALLOC void *CRYPTO_zalloc(size_t num, const char *file, int line);
OSSL_CRYPTO_ALLOC void *CRYPTO_aligned_alloc(size_t num, size_t align,
   void **freeptr, const char *file,
   int line);
void *CRYPTO_memdup(const void *str, size_t siz, const char *file, int line);
char *CRYPTO_strdup(const char *str, const char *file, int line);
char *CRYPTO_strndup(const char *str, size_t s, const char *file, int line);
void CRYPTO_free(void *ptr, const char *file, int line);
void CRYPTO_clear_free(void *ptr, size_t num, const char *file, int line);
void *CRYPTO_realloc(void *addr, size_t num, const char *file, int line);
void *CRYPTO_clear_realloc(void
 *addr, size_t old_num, size_t num,
   const char *file, int line);

int CRYPTO_secure_malloc_init(size_t sz, size_t minsize);
int CRYPTO_secure_malloc_done(void);
OSSL_CRYPTO_ALLOC void *CRYPTO_secure_malloc(size_t num, const char *file, int line);
OSSL_CRYPTO_ALLOC void *CRYPTO_secure_zalloc(size_t num, const char *file, int line);
void CRYPTO_secure_free(void *ptr, const char *file, int line);
void CRYPTO_secure_clear_free(void *ptr, size_t num,
   const char *file, int line);
int CRYPTO_secure_allocated(const void *ptr);
int CRYPTO_secure_malloc_initialized(void);
size_t CRYPTO_secure_actual_size(void *ptr);
size_t CRYPTO_secure_used(void);

void OPENSSL_cleanse(void *ptr, size_t len);

#ifndef OPENSSL_NO_CRYPTO_MDEBUG
```

```
/*
* The following can be used to detect memory leaks in the library. If
* used, it turns on malloc checking
*/
#define CRYPTO_MEM_CHECK_OFF 0x0 /* Control only */
#define CRYPTO_MEM_CHECK_ON 0x1 /* Control and mode bit */
#define CRYPTO_MEM_CHECK_ENABLE 0x2
 /* Control and mode bit */
#define CRYPTO_MEM_CHECK_DISABLE 0x3 /* Control only */

/* max allowed length for value of OPENSSL_MALLOC_FAILURES env var. */
#define CRYPTO_MEM_CHECK_MAX_FS 256

void CRYPTO_get_alloc_counts(int *mcount, int *rcount, int *fcount);
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define OPENSSL_mem_debug_push(info) \
   CRYPTO_mem_debug_push(info, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_mem_debug_pop() \
   CRYPTO_mem_debug_pop()
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 int CRYPTO_set_mem_debug(int flag);
OSSL_DEPRECATEDIN_3_0 int CRYPTO_mem_ctrl(int mode);
OSSL_DEPRECATEDIN_3_0 int CRYPTO_mem_debug_push(const char *info,
   const char *file, int line);
OSSL_DEPRECATEDIN_3_0 int CRYPTO_mem_debug_pop(void);
OSSL_DEPRECATEDIN_3_0 void CRYPTO_mem_debug_malloc(void *addr, size_t num,
   int flag,
   const char *file, int line);
OSSL_DEPRECATEDIN_3_0 void CRYPTO_mem_debug_realloc(void *addr1, void *addr2,
   size_t num, int flag,
   const char
 *file, int line);
OSSL_DEPRECATEDIN_3_0 void CRYPTO_mem_debug_free(void *addr, int flag,
   const char *file, int line);
OSSL_DEPRECATEDIN_3_0
int CRYPTO_mem_leaks_cb(int (*cb)(const char *str, size_t len, void *u),
   void *u);
#endif
#ifndef OPENSSL_NO_STDIO
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 int CRYPTO_mem_leaks_fp(FILE *);
#endif
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 int CRYPTO_mem_leaks(BIO *bio);
#endif
#endif /* OPENSSL_NO_CRYPTO_MDEBUG */
```

```
/* die if we have to */
ossl_noreturn void OPENSSL_die(const char *assertion, const char *file, int line);
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define OpenSSLDie(f, l, a) OPENSSL_die((a), (f), (l))
#endif
#define OPENSSL_assert(e) \
   (void)((e) ? 0 : (OPENSSL_die("assertion failed: " #e, OPENSSL_FILE, OPENSSL_LINE), 1))

int OPENSSL_isservice(void);

void OPENSSL_init(void);
#ifdef OPENSSL_SYS_UNIX
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 void OPENSSL_fork_prepare(void);
OSSL_DEPRECATEDIN_3_0
 void OPENSSL_fork_parent(void);
OSSL_DEPRECATEDIN_3_0 void OPENSSL_fork_child(void);
#endif
#endif

struct tm *OPENSSL_gmtime(const time_t *timer, struct tm *result);
int OPENSSL_gmtime_adj(struct tm *tm, int offset_day, long offset_sec);
int OPENSSL_gmtime_diff(int *pday, int *psec,
   const struct tm *from, const struct tm *to);

/*
* CRYPTO_memcmp returns zero iff the |len| bytes at |a| and |b| are equal.
* It takes an amount of time dependent on |len|, but independent of the
* contents of |a| and |b|. Unlike memcmp, it cannot be used to put elements
* into a defined order as the return value when a != b is undefined, other
* than to be non-zero.
*/
int CRYPTO_memcmp(const void *in_a, const void *in_b, size_t len);

/* Standard initialisation options */
#define OPENSSL_INIT_NO_LOAD_CRYPTO_STRINGS 0x00000001L
#define OPENSSL_INIT_LOAD_CRYPTO_STRINGS 0x00000002L
#define OPENSSL_INIT_ADD_ALL_CIPHERS 0x00000004L
#define OPENSSL_INIT_ADD_ALL_DIGESTS 0x00000008L
#define
 OPENSSL_INIT_NO_ADD_ALL_CIPHERS 0x00000010L
#define OPENSSL_INIT_NO_ADD_ALL_DIGESTS 0x00000020L
#define OPENSSL_INIT_LOAD_CONFIG 0x00000040L
#define OPENSSL_INIT_NO_LOAD_CONFIG 0x00000080L
#define OPENSSL_INIT_ASYNC 0x00000100L
#define OPENSSL_INIT_ENGINE_RDRAND 0x00000200L
#define OPENSSL_INIT_ENGINE_DYNAMIC 0x00000400L
```

```
#define OPENSSL_INIT_ENGINE_OPENSSL 0x00000800L
#define OPENSSL_INIT_ENGINE_CRYPTODEV 0x00001000L
#define OPENSSL_INIT_ENGINE_CAPI 0x00002000L
#define OPENSSL_INIT_ENGINE_PADLOCK 0x00004000L
#define OPENSSL_INIT_ENGINE_AFALG 0x00008000L
/* FREE:                                0x00010000L */
#define OPENSSL_INIT_ATFORK 0x00020000L
/* OPENSSL_INIT_BASE_ONLY                    0x00040000L */
#define OPENSSL_INIT_NO_ATEXIT 0x00080000L
/* OPENSSL_INIT flag range 0x03f00000 reserved for OPENSSL_init_ssl() */
/* FREE: 0x04000000L */
/* FREE: 0x08000000L */
/* FREE: 0x10000000L */
/* FREE: 0x20000000L */
/* FREE: 0x40000000L */
/* FREE: 0x80000000L */
/* Max OPENSSL_INIT
 flag value is 0x80000000 */

/* openssl and dasync not counted as builtin */
#define OPENSSL_INIT_ENGINE_ALL_BUILTIN                        \
   (OPENSSL_INIT_ENGINE_RDRAND | OPENSSL_INIT_ENGINE_DYNAMIC \
      | OPENSSL_INIT_ENGINE_CRYPTODEV | OPENSSL_INIT_ENGINE_CAPI |
OPENSSL_INIT_ENGINE_PADLOCK)

/* Library initialisation functions */
void OPENSSL_cleanup(void);
int OPENSSL_init_crypto(uint64_t opts, const OPENSSL_INIT_SETTINGS *settings);
int OPENSSL_atexit(void (*handler)(void));
void OPENSSL_thread_stop(void);
void OPENSSL_thread_stop_ex(OSSL_LIB_CTX *ctx);

/* Low-level control of initialization */
OPENSSL_INIT_SETTINGS *OPENSSL_INIT_new(void);
#ifndef OPENSSL_NO_STDIO
int OPENSSL_INIT_set_config_filename(OPENSSL_INIT_SETTINGS *settings,
   const char *config_filename);
void OPENSSL_INIT_set_config_file_flags(OPENSSL_INIT_SETTINGS *settings,
   unsigned long flags);
int OPENSSL_INIT_set_config_appname(OPENSSL_INIT_SETTINGS *settings,
   const char *config_appname);
#endif
void
 OPENSSL_INIT_free(OPENSSL_INIT_SETTINGS *settings);

#if defined(OPENSSL_THREADS) && !defined(CRYPTO_TDEBUG)
#if defined(_WIN32)
#if defined(BASETYPES) || defined(_WINDEF_H)
```

```
/* application has to include <windows.h> in order to use this */
typedef DWORD CRYPTO_THREAD_LOCAL;
typedef DWORD CRYPTO_THREAD_ID;

typedef LONG CRYPTO_ONCE;
#define CRYPTO_ONCE_STATIC_INIT 0
#endif
#else
#if defined(__TANDEM) && defined(_SPT_MODEL_)
#define SPT_THREAD_SIGNAL 1
#define SPT_THREAD_AWARE 1
#include <spthread.h>
#else
#include <pthread.h>
#endif
typedef pthread_once_t CRYPTO_ONCE;
typedef pthread_key_t CRYPTO_THREAD_LOCAL;
typedef pthread_t CRYPTO_THREAD_ID;

#define CRYPTO_ONCE_STATIC_INIT PTHREAD_ONCE_INIT
#endif
#endif

#if !defined(CRYPTO_ONCE_STATIC_INIT)
typedef unsigned int CRYPTO_ONCE;
typedef unsigned int CRYPTO_THREAD_LOCAL;
typedef unsigned int CRYPTO_THREAD_ID;
#define CRYPTO_ONCE_STATIC_INIT 0
#endif

int CRYPTO_THREAD_run_once(CRYPTO_ONCE *once, void (*init)(void));

int
 CRYPTO_THREAD_init_local(CRYPTO_THREAD_LOCAL *key, void (*cleanup)(void *));
void *CRYPTO_THREAD_get_local(CRYPTO_THREAD_LOCAL *key);
int CRYPTO_THREAD_set_local(CRYPTO_THREAD_LOCAL *key, void *val);
int CRYPTO_THREAD_cleanup_local(CRYPTO_THREAD_LOCAL *key);

CRYPTO_THREAD_ID CRYPTO_THREAD_get_current_id(void);
int CRYPTO_THREAD_compare_id(CRYPTO_THREAD_ID a, CRYPTO_THREAD_ID b);

OSSL_LIB_CTX *OSSL_LIB_CTX_new(void);
OSSL_LIB_CTX *OSSL_LIB_CTX_new_from_dispatch(const OSSL_CORE_HANDLE *handle,
   const OSSL_DISPATCH *in);
OSSL_LIB_CTX *OSSL_LIB_CTX_new_child(const OSSL_CORE_HANDLE *handle,
   const OSSL_DISPATCH *in);
int OSSL_LIB_CTX_load_config(OSSL_LIB_CTX *ctx, const char *config_file);
void OSSL_LIB_CTX_free(OSSL_LIB_CTX *);
```

```
OSSL_LIB_CTX *OSSL_LIB_CTX_get0_global_default(void);
OSSL_LIB_CTX *OSSL_LIB_CTX_set0_default(OSSL_LIB_CTX *libctx);
int OSSL_LIB_CTX_get_conf_diagnostics(OSSL_LIB_CTX *ctx);
void OSSL_LIB_CTX_set_conf_diagnostics(OSSL_LIB_CTX *ctx, int value);

void OSSL_sleep(uint64_t
 millis);

void *OSSL_LIB_CTX_get_data(OSSL_LIB_CTX *ctx, int index);

#ifdef __cplusplus
}
#endif
#endif
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/pkcs12.h.in
*
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*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_PKCS12_H
#define OPENSSL_PKCS12_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_PKCS12_H
#endif
```

```
#include <openssl/bio.h>
#include <openssl/core.h>
#include <openssl/x509.h>
#include <openssl/pkcs12err.h>
#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif

#ifdef __cplusplus
extern "C" {
#endif

#define PKCS12_KEY_ID 1
#define PKCS12_IV_ID 2
#define PKCS12_MAC_ID 3

/* Default iteration count */
#ifndef PKCS12_DEFAULT_ITER
#define PKCS12_DEFAULT_ITER PKCS5_DEFAULT_ITER
#endif

#define
 PKCS12_MAC_KEY_LENGTH 20

/* The macro is expected to be used only internally. Kept for backwards compatibility. */
#define PKCS12_SALT_LEN 8

/* It's not clear if these are actually needed... */
#define PKCS12_key_gen PKCS12_key_gen_utf8
#define PKCS12_add_friendlyname PKCS12_add_friendlyname_utf8

/* MS key usage constants */

#define KEY_EX 0x10
#define KEY_SIG 0x80

typedef struct PKCS12_MAC_DATA_st PKCS12_MAC_DATA;

typedef struct PKCS12_st PKCS12;

typedef struct PKCS12_SAFEBAG_st PKCS12_SAFEBAG;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(PKCS12_SAFEBAG, PKCS12_SAFEBAG, PKCS12_SAFEBAG)
#define sk_PKCS12_SAFEBAG_num(sk)
OPENSSL_sk_num(ossl_check_const_PKCS12_SAFEBAG_sk_type(sk))
#define sk_PKCS12_SAFEBAG_value(sk, idx) ((PKCS12_SAFEBAG
```

```
*)OPENSSL_sk_value(ossl_check_const_PKCS12_SAFEBAG_sk_type(sk), (idx)))
#define sk_PKCS12_SAFEBAG_new(cmp) ((STACK_OF(PKCS12_SAFEBAG)
*)OPENSSL_sk_new(ossl_check_PKCS12_SAFEBAG_compfunc_type(cmp)))
#define sk_PKCS12_SAFEBAG_new_null()
 ((STACK_OF(PKCS12_SAFEBAG) *)OPENSSL_sk_new_null())
#define sk_PKCS12_SAFEBAG_new_reserve(cmp, n) ((STACK_OF(PKCS12_SAFEBAG)
*)OPENSSL_sk_new_reserve(ossl_check_PKCS12_SAFEBAG_compfunc_type(cmp), (n)))
#define sk_PKCS12_SAFEBAG_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_PKCS12_SAFEBAG_sk_type(sk), (n))
#define sk_PKCS12_SAFEBAG_free(sk) OPENSSL_sk_free(ossl_check_PKCS12_SAFEBAG_sk_type(sk))
#define sk_PKCS12_SAFEBAG_zero(sk) OPENSSL_sk_zero(ossl_check_PKCS12_SAFEBAG_sk_type(sk))
#define sk_PKCS12_SAFEBAG_delete(sk, i) ((PKCS12_SAFEBAG
*)OPENSSL_sk_delete(ossl_check_PKCS12_SAFEBAG_sk_type(sk), (i)))
#define sk_PKCS12_SAFEBAG_delete_ptr(sk, ptr) ((PKCS12_SAFEBAG
*)OPENSSL_sk_delete_ptr(ossl_check_PKCS12_SAFEBAG_sk_type(sk),
ossl_check_PKCS12_SAFEBAG_type(ptr)))
#define sk_PKCS12_SAFEBAG_push(sk, ptr) OPENSSL_sk_push(ossl_check_PKCS12_SAFEBAG_sk_type(sk),
ossl_check_PKCS12_SAFEBAG_type(ptr))
#define sk_PKCS12_SAFEBAG_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_PKCS12_SAFEBAG_sk_type(sk),
 ossl_check_PKCS12_SAFEBAG_type(ptr))
#define sk_PKCS12_SAFEBAG_pop(sk) ((PKCS12_SAFEBAG
*)OPENSSL_sk_pop(ossl_check_PKCS12_SAFEBAG_sk_type(sk)))
#define sk_PKCS12_SAFEBAG_shift(sk) ((PKCS12_SAFEBAG
*)OPENSSL_sk_shift(ossl_check_PKCS12_SAFEBAG_sk_type(sk)))
#define sk_PKCS12_SAFEBAG_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_PKCS12_SAFEBAG_sk_type(sk),ossl_check_PKCS12_SAFEBAG_freefunc_
type(freefunc))
#define sk_PKCS12_SAFEBAG_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_PKCS12_SAFEBAG_sk_type(sk), ossl_check_PKCS12_SAFEBAG_type(ptr),
(idx))
#define sk_PKCS12_SAFEBAG_set(sk, idx, ptr) ((PKCS12_SAFEBAG
*)OPENSSL_sk_set(ossl_check_PKCS12_SAFEBAG_sk_type(sk), (idx),
ossl_check_PKCS12_SAFEBAG_type(ptr)))
#define sk_PKCS12_SAFEBAG_find(sk, ptr) OPENSSL_sk_find(ossl_check_PKCS12_SAFEBAG_sk_type(sk),
ossl_check_PKCS12_SAFEBAG_type(ptr))
#define sk_PKCS12_SAFEBAG_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_PKCS12_SAFEBAG_sk_type(sk), ossl_check_PKCS12_SAFEBAG_type(ptr))
#define
 sk_PKCS12_SAFEBAG_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_PKCS12_SAFEBAG_sk_type(sk), ossl_check_PKCS12_SAFEBAG_type(ptr),
pnum)
#define sk_PKCS12_SAFEBAG_sort(sk) OPENSSL_sk_sort(ossl_check_PKCS12_SAFEBAG_sk_type(sk))
#define sk_PKCS12_SAFEBAG_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_PKCS12_SAFEBAG_sk_type(sk))
#define sk_PKCS12_SAFEBAG_dup(sk) ((STACK_OF(PKCS12_SAFEBAG)
*)OPENSSL_sk_dup(ossl_check_const_PKCS12_SAFEBAG_sk_type(sk)))
#define sk_PKCS12_SAFEBAG_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(PKCS12_SAFEBAG)
```

```
*)OPENSSL_sk_deep_copy(ossl_check_const_PKCS12_SAFEBAG_sk_type(sk),
ossl_check_PKCS12_SAFEBAG_copyfunc_type(copyfunc),
ossl_check_PKCS12_SAFEBAG_freefunc_type(freefunc)))
#define sk_PKCS12_SAFEBAG_set_cmp_func(sk, cmp)
((sk_PKCS12_SAFEBAG_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_PKCS12_SAFEBAG_sk_type(sk),
ossl_check_PKCS12_SAFEBAG_compfunc_type(cmp)))

/* clang-format on */

typedef struct pkcs12_bag_st PKCS12_BAGS;

#define
 PKCS12_ERROR 0
#define PKCS12_OK 1

/* Compatibility macros */

#ifndef OPENSSL_NO_DEPRECATED_1_1_0

#define M_PKCS12_bag_type PKCS12_bag_type
#define M_PKCS12_cert_bag_type PKCS12_cert_bag_type
#define M_PKCS12_crl_bag_type PKCS12_cert_bag_type

#define PKCS12_certbag2x509 PKCS12_SAFEBAG_get1_cert
#define PKCS12_certbag2scrl PKCS12_SAFEBAG_get1_crl
#define PKCS12_bag_type PKCS12_SAFEBAG_get_nid
#define PKCS12_cert_bag_type PKCS12_SAFEBAG_get_bag_nid
#define PKCS12_x5092certbag PKCS12_SAFEBAG_create_cert
#define PKCS12_x509crl2certbag PKCS12_SAFEBAG_create_crl
#define PKCS12_MAKE_KEYBAG PKCS12_SAFEBAG_create0_p8inf
#define PKCS12_MAKE_SHKEYBAG PKCS12_SAFEBAG_create_pkcs8_encrypt

#endif
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 ASN1_TYPE *PKCS12_get_attr(const PKCS12_SAFEBAG *bag,
   int attr_nid);
#endif

ASN1_TYPE *PKCS8_get_attr(PKCS8_PRIV_KEY_INFO *p8, int attr_nid);
int PKCS12_mac_present(const PKCS12 *p12);
void PKCS12_get0_mac(const ASN1_OCTET_STRING **pmac,
    const X509_ALGOR **pmacalg,
   const ASN1_OCTET_STRING **psalt,
   const ASN1_INTEGER **piter,
   const PKCS12 *p12);

const ASN1_TYPE *PKCS12_SAFEBAG_get0_attr(const PKCS12_SAFEBAG *bag,
   int attr_nid);
```

```
const ASN1_OBJECT *PKCS12_SAFEBAG_get0_type(const PKCS12_SAFEBAG *bag);
int PKCS12_SAFEBAG_get_nid(const PKCS12_SAFEBAG *bag);
int PKCS12_SAFEBAG_get_bag_nid(const PKCS12_SAFEBAG *bag);
const ASN1_TYPE *PKCS12_SAFEBAG_get0_bag_obj(const PKCS12_SAFEBAG *bag);
const ASN1_OBJECT *PKCS12_SAFEBAG_get0_bag_type(const PKCS12_SAFEBAG *bag);

X509 *PKCS12_SAFEBAG_get1_cert_ex(const PKCS12_SAFEBAG *bag, OSSL_LIB_CTX *libctx, const char
*propq);
X509 *PKCS12_SAFEBAG_get1_cert(const PKCS12_SAFEBAG *bag);
X509_CRL *PKCS12_SAFEBAG_get1_crl_ex(const PKCS12_SAFEBAG *bag, OSSL_LIB_CTX *libctx, const
char *propq);
X509_CRL *PKCS12_SAFEBAG_get1_crl(const PKCS12_SAFEBAG *bag);
const STACK_OF(PKCS12_SAFEBAG) *
PKCS12_SAFEBAG_get0_safes(const PKCS12_SAFEBAG *bag);
const PKCS8_PRIV_KEY_INFO
 *PKCS12_SAFEBAG_get0_p8inf(const PKCS12_SAFEBAG *bag);
const X509_SIG *PKCS12_SAFEBAG_get0_pkcs8(const PKCS12_SAFEBAG *bag);

PKCS12_SAFEBAG *PKCS12_SAFEBAG_create_cert(X509 *x509);
PKCS12_SAFEBAG *PKCS12_SAFEBAG_create_crl(X509_CRL *crl);
PKCS12_SAFEBAG *PKCS12_SAFEBAG_create_secret(int type, int vtype, const unsigned char *value, int len);
PKCS12_SAFEBAG *PKCS12_SAFEBAG_create0_p8inf(PKCS8_PRIV_KEY_INFO *p8);
PKCS12_SAFEBAG *PKCS12_SAFEBAG_create0_pkcs8(X509_SIG *p8);
PKCS12_SAFEBAG *PKCS12_SAFEBAG_create_pkcs8_encrypt(int pbe_nid,
   const char *pass,
   int passlen,
   unsigned char *salt,
   int saltlen, int iter,
   PKCS8_PRIV_KEY_INFO *p8inf);
PKCS12_SAFEBAG *PKCS12_SAFEBAG_create_pkcs8_encrypt_ex(int pbe_nid,
   const char *pass,
   int passlen,
   unsigned char *salt,
   int saltlen, int iter,
   PKCS8_PRIV_KEY_INFO *p8inf,
   OSSL_LIB_CTX *ctx,
   const char *propq);

PKCS12_SAFEBAG *PKCS12_item_pack_safebag(void *obj, const ASN1_ITEM *it,
   int nid1, int nid2);
PKCS8_PRIV_KEY_INFO
 *PKCS8_decrypt(const X509_SIG *p8, const char *pass,
   int passlen);
PKCS8_PRIV_KEY_INFO *PKCS8_decrypt_ex(const X509_SIG *p8, const char *pass,
   int passlen, OSSL_LIB_CTX *ctx,
   const char *propq);
PKCS8_PRIV_KEY_INFO *PKCS12_decrypt_skey(const PKCS12_SAFEBAG *bag,
   const char *pass, int passlen);
```

```
PKCS8_PRIV_KEY_INFO *PKCS12_decrypt_skey_ex(const PKCS12_SAFEBAG *bag,
   const char *pass, int passlen,
   OSSL_LIB_CTX *ctx,
   const char *propq);
X509_SIG *PKCS8_encrypt(int pbe_nid, const EVP_CIPHER *cipher,
   const char *pass, int passlen, unsigned char *salt,
   int saltlen, int iter, PKCS8_PRIV_KEY_INFO *p8);
X509_SIG *PKCS8_encrypt_ex(int pbe_nid, const EVP_CIPHER *cipher,
   const char *pass, int passlen, unsigned char *salt,
   int saltlen, int iter, PKCS8_PRIV_KEY_INFO *p8,
   OSSL_LIB_CTX *ctx, const char *propq);
X509_SIG *PKCS8_set0_pbe(const char *pass, int passlen,
   PKCS8_PRIV_KEY_INFO *p8inf, X509_ALGOR *pbe);
X509_SIG *PKCS8_set0_pbe_ex(const
 char *pass, int passlen,
   PKCS8_PRIV_KEY_INFO *p8inf, X509_ALGOR *pbe,
   OSSL_LIB_CTX *ctx, const char *propq);
PKCS7 *PKCS12_pack_p7data(STACK_OF(PKCS12_SAFEBAG) *sk);
STACK_OF(PKCS12_SAFEBAG) *PKCS12_unpack_p7data(PKCS7 *p7);
PKCS7 *PKCS12_pack_p7encdata(int pbe_nid, const char *pass, int passlen,
   unsigned char *salt, int saltlen, int iter,
   STACK_OF(PKCS12_SAFEBAG) *bags);
PKCS7 *PKCS12_pack_p7encdata_ex(int pbe_nid, const char *pass, int passlen,
   unsigned char *salt, int saltlen, int iter,
   STACK_OF(PKCS12_SAFEBAG) *bags,
   OSSL_LIB_CTX *ctx, const char *propq);

STACK_OF(PKCS12_SAFEBAG) *PKCS12_unpack_p7encdata(PKCS7 *p7, const char *pass,
   int passlen);

int PKCS12_pack_authsafes(PKCS12 *p12, STACK_OF(PKCS7) *safes);
STACK_OF(PKCS7) *PKCS12_unpack_authsafes(const PKCS12 *p12);

int PKCS12_add_localkeyid(PKCS12_SAFEBAG *bag, unsigned char *name,
   int namelen);
int PKCS12_add_friendlyname_asc(PKCS12_SAFEBAG *bag, const char *name,
   int namelen);
int
 PKCS12_add_friendlyname_utf8(PKCS12_SAFEBAG *bag, const char *name,
   int namelen);
int PKCS12_add_CSPName_asc(PKCS12_SAFEBAG *bag, const char *name,
   int namelen);
int PKCS12_add_friendlyname_uni(PKCS12_SAFEBAG *bag,
   const unsigned char *name, int namelen);
int PKCS12_add1_attr_by_NID(PKCS12_SAFEBAG *bag, int nid, int type,
   const unsigned char *bytes, int len);
int PKCS12_add1_attr_by_txt(PKCS12_SAFEBAG *bag, const char *attrname, int type,
   const unsigned char *bytes, int len);
```

```
int PKCS8_add_keyusage(PKCS8_PRIV_KEY_INFO *p8, int usage);
ASN1_TYPE *PKCS12_get_attr_gen(const STACK_OF(X509_ATTRIBUTE) *attrs,
   int attr_nid);
char *PKCS12_get_friendlyname(PKCS12_SAFEBAG *bag);
const STACK_OF(X509_ATTRIBUTE) *
PKCS12_SAFEBAG_get0_attrs(const PKCS12_SAFEBAG *bag);
void PKCS12_SAFEBAG_set0_attrs(PKCS12_SAFEBAG *bag, STACK_OF(X509_ATTRIBUTE) *attrs);
unsigned char *PKCS12_pbe_crypt(const X509_ALGOR *algor,
   const char *pass, int passlen,
   const unsigned char
 *in, int inlen,
   unsigned char **data, int *datalen,
   int en_de);
unsigned char *PKCS12_pbe_crypt_ex(const X509_ALGOR *algor,
   const char *pass, int passlen,
   const unsigned char *in, int inlen,
   unsigned char **data, int *datalen,
   int en_de, OSSL_LIB_CTX *libctx,
   const char *propq);
void *PKCS12_item_decrypt_d2i(const X509_ALGOR *algor, const ASN1_ITEM *it,
   const char *pass, int passlen,
   const ASN1_OCTET_STRING *oct, int zbuf);
void *PKCS12_item_decrypt_d2i_ex(const X509_ALGOR *algor, const ASN1_ITEM *it,
   const char *pass, int passlen,
   const ASN1_OCTET_STRING *oct, int zbuf,
   OSSL_LIB_CTX *libctx,
   const char *propq);
ASN1_OCTET_STRING *PKCS12_item_i2d_encrypt(X509_ALGOR *algor,
   const ASN1_ITEM *it,
   const char *pass, int passlen,
   void *obj, int zbuf);
ASN1_OCTET_STRING *PKCS12_item_i2d_encrypt_ex(X509_ALGOR *algor,
   const ASN1_ITEM *it,
   const char *pass, int passlen,
   void *obj, int zbuf,
   OSSL_LIB_CTX *ctx,

 const char *propq);
PKCS12 *PKCS12_init(int mode);
PKCS12 *PKCS12_init_ex(int mode, OSSL_LIB_CTX *ctx, const char *propq);

int PKCS12_key_gen_asc(const char *pass, int passlen, unsigned char *salt,
   int saltlen, int id, int iter, int n,
   unsigned char *out, const EVP_MD *md_type);
int PKCS12_key_gen_asc_ex(const char *pass, int passlen, unsigned char *salt,
   int saltlen, int id, int iter, int n,
   unsigned char *out, const EVP_MD *md_type,
   OSSL_LIB_CTX *ctx, const char *propq);
```

```
int PKCS12_key_gen_uni(unsigned char *pass, int passlen, unsigned char *salt,
   int saltlen, int id, int iter, int n,
   unsigned char *out, const EVP_MD *md_type);
int PKCS12_key_gen_uni_ex(unsigned char *pass, int passlen, unsigned char *salt,
   int saltlen, int id, int iter, int n,
   unsigned char *out, const EVP_MD *md_type,
   OSSL_LIB_CTX *ctx, const char *propq);
int PKCS12_key_gen_utf8(const char *pass, int passlen, unsigned char *salt,
   int saltlen, int id, int iter, int n,

   unsigned char *out, const EVP_MD *md_type);
int PKCS12_key_gen_utf8_ex(const char *pass, int passlen, unsigned char *salt,
   int saltlen, int id, int iter, int n,
   unsigned char *out, const EVP_MD *md_type,
   OSSL_LIB_CTX *ctx, const char *propq);

int PKCS12_PBE_keyivgen(EVP_CIPHER_CTX *ctx, const char *pass, int passlen,
   ASN1_TYPE *param, const EVP_CIPHER *cipher,
   const EVP_MD *md_type, int en_de);
int PKCS12_PBE_keyivgen_ex(EVP_CIPHER_CTX *ctx, const char *pass, int passlen,
   ASN1_TYPE *param, const EVP_CIPHER *cipher,
   const EVP_MD *md_type, int en_de,
   OSSL_LIB_CTX *libctx, const char *propq);
int PKCS12_gen_mac(PKCS12 *p12, const char *pass, int passlen,
   unsigned char *mac, unsigned int *maclen);
int PKCS12_verify_mac(PKCS12 *p12, const char *pass, int passlen);
int PKCS12_set_mac(PKCS12 *p12, const char *pass, int passlen,
   unsigned char *salt, int saltlen, int iter,
   const EVP_MD *md_type);
int PKCS12_set_pbmac1_pbkdf2(PKCS12 *p12, const char
 *pass, int passlen,
   unsigned char *salt, int saltlen, int iter,
   const EVP_MD *md_type, const char *prf_md_name);
int PKCS12_setup_mac(PKCS12 *p12, int iter, unsigned char *salt,
   int saltlen, const EVP_MD *md_type);
unsigned char *OPENSSL_asc2uni(const char *asc, int asclen,
   unsigned char **uni, int *unilen);
char *OPENSSL_uni2asc(const unsigned char *uni, int unilen);
unsigned char *OPENSSL_utf82uni(const char *asc, int asclen,
   unsigned char **uni, int *unilen);
char *OPENSSL_uni2utf8(const unsigned char *uni, int unilen);

DECLARE_ASN1_FUNCTIONS(PKCS12)
DECLARE_ASN1_FUNCTIONS(PKCS12_MAC_DATA)
DECLARE_ASN1_FUNCTIONS(PKCS12_SAFEBAG)
DECLARE_ASN1_FUNCTIONS(PKCS12_BAGS)

DECLARE_ASN1_ITEM(PKCS12_SAFEBAGS)
```

```
DECLARE_ASN1_ITEM(PKCS12_AUTHSAFES)

void PKCS12_PBE_add(void);
int PKCS12_parse(PKCS12 *p12, const char *pass, EVP_PKEY **pkey, X509 **cert,
   STACK_OF(X509) **ca);
typedef int PKCS12_create_cb(PKCS12_SAFEBAG *bag, void *cbarg);
PKCS12 *PKCS12_create(const char *pass,
 const char *name, EVP_PKEY *pkey,
   X509 *cert, STACK_OF(X509) *ca, int nid_key, int nid_cert,
   int iter, int mac_iter, int keytype);
PKCS12 *PKCS12_create_ex(const char *pass, const char *name, EVP_PKEY *pkey,
   X509 *cert, STACK_OF(X509) *ca, int nid_key, int nid_cert,
   int iter, int mac_iter, int keytype,
   OSSL_LIB_CTX *ctx, const char *propq);
PKCS12 *PKCS12_create_ex2(const char *pass, const char *name, EVP_PKEY *pkey,
   X509 *cert, STACK_OF(X509) *ca, int nid_key, int nid_cert,
   int iter, int mac_iter, int keytype,
   OSSL_LIB_CTX *ctx, const char *propq,
   PKCS12_create_cb *cb, void *cbarg);

PKCS12_SAFEBAG *PKCS12_add_cert(STACK_OF(PKCS12_SAFEBAG) **pbags, X509 *cert);
PKCS12_SAFEBAG *PKCS12_add_key(STACK_OF(PKCS12_SAFEBAG) **pbags,
   EVP_PKEY *key, int key_usage, int iter,
   int key_nid, const char *pass);
PKCS12_SAFEBAG *PKCS12_add_key_ex(STACK_OF(PKCS12_SAFEBAG) **pbags,
   EVP_PKEY *key, int key_usage, int iter,
   int key_nid, const char *pass,
    OSSL_LIB_CTX *ctx, const char *propq);

PKCS12_SAFEBAG *PKCS12_add_secret(STACK_OF(PKCS12_SAFEBAG) **pbags,
   int nid_type, const unsigned char *value, int len);
int PKCS12_add_safe(STACK_OF(PKCS7) **psafes, STACK_OF(PKCS12_SAFEBAG) *bags,
   int safe_nid, int iter, const char *pass);
int PKCS12_add_safe_ex(STACK_OF(PKCS7) **psafes, STACK_OF(PKCS12_SAFEBAG) *bags,
   int safe_nid, int iter, const char *pass,
   OSSL_LIB_CTX *ctx, const char *propq);

PKCS12 *PKCS12_add_safes(STACK_OF(PKCS7) *safes, int p7_nid);
PKCS12 *PKCS12_add_safes_ex(STACK_OF(PKCS7) *safes, int p7_nid,
   OSSL_LIB_CTX *ctx, const char *propq);

int i2d_PKCS12_bio(BIO *bp, const PKCS12 *p12);
#ifndef OPENSSL_NO_STDIO
int i2d_PKCS12_fp(FILE *fp, const PKCS12 *p12);
#endif
PKCS12 *d2i_PKCS12_bio(BIO *bp, PKCS12 **p12);
#ifndef OPENSSL_NO_STDIO
PKCS12 *d2i_PKCS12_fp(FILE *fp, PKCS12 **p12);
```

```
#endif
int PKCS12_newpass(PKCS12 *p12, const char *oldpass, const char *newpass);

#ifdef __cplusplus
}
#endif
#endif
{
 'variables': {
   'openssl_sources': [
     'openssl/crypto/aes/aes_cbc.c',
     'openssl/crypto/aes/aes_core.c',
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     'openssl/crypto/bn/bn_add.c',
     'openssl/crypto/bn/bn_asm.c',
     'openssl/crypto/bn/bn_blind.c',
     'openssl/crypto/bn/bn_const.c',
     'openssl/crypto/bn/bn_conv.c',
     'openssl/crypto/bn/bn_ctx.c',
     'openssl/crypto/bn/bn_dh.c',
     'openssl/crypto/bn/bn_div.c',
     'openssl/crypto/bn/bn_exp.c',
     'openssl/crypto/bn/bn_exp2.c',
     'openssl/crypto/bn/bn_gcd.c',
     'openssl/crypto/bn/bn_gf2m.c',
     'openssl/crypto/bn/bn_intern.c',
     'openssl/crypto/bn/bn_kron.c',
     'openssl/crypto/bn/bn_lib.c',
     'openssl/crypto/bn/bn_mod.c',
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     'openssl/crypto/bn/bn_mpi.c',
     'openssl/crypto/bn/bn_mul.c',
     'openssl/crypto/bn/bn_nist.c',
     'openssl/crypto/bn/bn_prime.c',
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     'openssl/crypto/bn/bn_rsa_fips186_4.c',
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     'openssl/crypto/des/fcrypt_b.c',
     'openssl/crypto/des/set_key.c',
```

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'openssl/crypto/dsa/dsa_gen.c',
'openssl/crypto/dsa/dsa_key.c',
'openssl/crypto/dsa/dsa_lib.c',
'openssl/crypto/dsa/dsa_ossl.c',
'openssl/crypto/dsa/dsa_sign.c',
'openssl/crypto/dsa/dsa_vrf.c',
'openssl/crypto/ec/curve448/arch_32/f_impl32.c',
'openssl/crypto/ec/curve448/arch_64/f_impl64.c',
'openssl/crypto/ec/curve448/curve448.c',
'openssl/crypto/ec/curve448/curve448_tables.c',
'openssl/crypto/ec/curve448/eddsa.c',
'openssl/crypto/ec/curve448/f_generic.c',
'openssl/crypto/ec/curve448/scalar.c',
'openssl/crypto/ec/curve25519.c',
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'openssl/crypto/ec/ec2_smpl.c',
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'openssl/crypto/evp/evp_fetch.c',
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'openssl/crypto/hmac/hmac.c',
'openssl/crypto/lhash/lhash.c',
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'openssl/crypto/ctype.c',
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'openssl/providers/common/provider_seeding.c',
'openssl/providers/common/provider_util.c',
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'openssl/providers/common/securitycheck_fips.c',
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'openssl/providers/implementations/ciphers/cipher_tdes_common.c',
'openssl/providers/implementations/ciphers/cipher_tdes_hw.c',
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'openssl/providers/implementations/exchange/ecx_exch.c',
'openssl/providers/implementations/exchange/kdf_exch.c',
'openssl/providers/implementations/kdfs/hkdf.c',
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'openssl/providers/implementations/kdfs/pbkdf2.c',
'openssl/providers/implementations/kdfs/pbkdf2_fips.c',
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'openssl/providers/implementations/kdfs/sskdf.c',
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'openssl/providers/implementations/macs/cmac_prov.c',
'openssl/providers/implementations/macs/gmac_prov.c',
'openssl/providers/implementations/macs/hmac_prov.c',
'openssl/providers/implementations/macs/kmac_prov.c',
'openssl/providers/implementations/rands/drbg.c',
'openssl/providers/implementations/rands/drbg_ctr.c',

```
  'openssl/providers/implementations/rands/drbg_hash.c',
  'openssl/providers/implementations/rands/drbg_hmac.c',
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  'openssl/providers/implementations/signature/ecdsa_sig.c',
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  'openssl/providers/common/der/der_slh_dsa_key.c',
  'openssl/providers/common/provider_ctx.c',
  'openssl/providers/common/provider_err.c',
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   'openssl/providers/implementations/ciphers/ciphercommon_block.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm_hw.c',
  'openssl/providers/implementations/ciphers/ciphercommon_gcm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_gcm_hw.c',
  'openssl/providers/implementations/ciphers/ciphercommon_hw.c',
  'openssl/providers/implementations/digests/digestcommon.c',
  'openssl/ssl/record/methods/tls_pad.c',
  'openssl/providers/fips/fips_entry.c',

],
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  './config/archs/BSD-x86_64/no-asm/providers/common/der/der_sm2_gen.c',
  './config/archs/BSD-x86_64/no-asm/providers/common/der/der_digests_gen.c',
  './config/archs/BSD-x86_64/no-asm/providers/common/der/der_dsa_gen.c',
  './config/archs/BSD-x86_64/no-asm/providers/common/der/der_ec_gen.c',
   './config/archs/BSD-x86_64/no-asm/providers/common/der/der_ecx_gen.c',
  './config/archs/BSD-x86_64/no-asm/providers/common/der/der_ml_dsa_gen.c',
  './config/archs/BSD-x86_64/no-asm/providers/common/der/der_rsa_gen.c',
  './config/archs/BSD-x86_64/no-asm/providers/common/der/der_slh_dsa_gen.c',
  './config/archs/BSD-x86_64/no-asm/providers/common/der/der_wrap_gen.c',
  './config/archs/BSD-x86_64/no-asm/providers/legacy.ld',
```

```
    './config/archs/BSD-x86_64/no-asm/providers/fips.ld',

  ],
  'openssl_defines_BSD-x86_64': [
    'NDEBUG',
    'L_ENDIAN',
    'OPENSSL_BUILDING_OPENSSL',
    'FIPS_MODULE',
    'FIPS_MODULE',
  ],
  'openssl_cflags_BSD-x86_64': [
    '-Wall -O3',
    '-pthread',
    '-Wall -O3',
  ],
  'openssl_ex_libs_BSD-x86_64': [
    '-pthread',
  ],
  'linker_script': ''
 },
 'include_dirs': [
  '.',
  './include',
  './crypto',
  './crypto/include/internal',
  './providers/common/include',
 ],
 'defines': ['<@(openssl_defines_BSD-x86_64)'],
 'cflags': ['<@(openssl_cflags_BSD-x86_64)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86_64)'],

 'sources': ['<@(openssl_sources)', '<@(openssl_sources_BSD-x86_64)'],
 'direct_dependent_settings': {
  'include_dirs': ['./include', '.'],
  'defines': ['<@(openssl_defines_BSD-x86_64)'],
 },
}
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/cms.h.in
*
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*
* Licensed under the Apache License 2.0 (the "License").  You may not use
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_CMS_H
#define OPENSSL_CMS_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_CMS_H
#endif

#include <openssl/opensslconf.h>

#ifndef OPENSSL_NO_CMS
#include <openssl/x509.h>
```

```
#include <openssl/x509v3.h>
#include <openssl/cmserr.h>
#ifdef __cplusplus
extern "C" {
#endif

typedef struct CMS_EnvelopedData_st CMS_EnvelopedData;
typedef struct CMS_ContentInfo_st CMS_ContentInfo;
typedef struct CMS_SignerInfo_st CMS_SignerInfo;
typedef struct CMS_SignedData_st CMS_SignedData;
typedef
 struct CMS_CertificateChoices CMS_CertificateChoices;
typedef struct CMS_RevocationInfoChoice_st CMS_RevocationInfoChoice;
typedef struct CMS_RecipientInfo_st CMS_RecipientInfo;
typedef struct CMS_ReceiptRequest_st CMS_ReceiptRequest;
typedef struct CMS_Receipt_st CMS_Receipt;
typedef struct CMS_RecipientEncryptedKey_st CMS_RecipientEncryptedKey;
typedef struct CMS_OtherKeyAttribute_st CMS_OtherKeyAttribute;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(CMS_SignerInfo, CMS_SignerInfo, CMS_SignerInfo)
#define sk_CMS_SignerInfo_num(sk) OPENSSL_sk_num(ossl_check_const_CMS_SignerInfo_sk_type(sk))
#define sk_CMS_SignerInfo_value(sk, idx) ((CMS_SignerInfo
*)OPENSSL_sk_value(ossl_check_const_CMS_SignerInfo_sk_type(sk), (idx)))
#define sk_CMS_SignerInfo_new(cmp) ((STACK_OF(CMS_SignerInfo)
*)OPENSSL_sk_new(ossl_check_CMS_SignerInfo_compfunc_type(cmp)))
#define sk_CMS_SignerInfo_new_null() ((STACK_OF(CMS_SignerInfo) *)OPENSSL_sk_new_null())
#define sk_CMS_SignerInfo_new_reserve(cmp,
 n) ((STACK_OF(CMS_SignerInfo)
*)OPENSSL_sk_new_reserve(ossl_check_CMS_SignerInfo_compfunc_type(cmp), (n)))
#define sk_CMS_SignerInfo_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_CMS_SignerInfo_sk_type(sk), (n))
#define sk_CMS_SignerInfo_free(sk) OPENSSL_sk_free(ossl_check_CMS_SignerInfo_sk_type(sk))
#define sk_CMS_SignerInfo_zero(sk) OPENSSL_sk_zero(ossl_check_CMS_SignerInfo_sk_type(sk))
#define sk_CMS_SignerInfo_delete(sk, i) ((CMS_SignerInfo
*)OPENSSL_sk_delete(ossl_check_CMS_SignerInfo_sk_type(sk), (i)))
#define sk_CMS_SignerInfo_delete_ptr(sk, ptr) ((CMS_SignerInfo
*)OPENSSL_sk_delete_ptr(ossl_check_CMS_SignerInfo_sk_type(sk), ossl_check_CMS_SignerInfo_type(ptr)))
#define sk_CMS_SignerInfo_push(sk, ptr) OPENSSL_sk_push(ossl_check_CMS_SignerInfo_sk_type(sk),
ossl_check_CMS_SignerInfo_type(ptr))
#define sk_CMS_SignerInfo_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_CMS_SignerInfo_sk_type(sk),
ossl_check_CMS_SignerInfo_type(ptr))
#define sk_CMS_SignerInfo_pop(sk) ((CMS_SignerInfo
*)OPENSSL_sk_pop(ossl_check_CMS_SignerInfo_sk_type(sk)))
#define
 sk_CMS_SignerInfo_shift(sk) ((CMS_SignerInfo
*)OPENSSL_sk_shift(ossl_check_CMS_SignerInfo_sk_type(sk)))
#define sk_CMS_SignerInfo_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_CMS_SignerInfo_sk_type(sk),ossl_check_CMS_SignerInfo_freefunc_type(fre
```

```
efunc))
#define sk_CMS_SignerInfo_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_CMS_SignerInfo_sk_type(sk),
ossl_check_CMS_SignerInfo_type(ptr), (idx))
#define sk_CMS_SignerInfo_set(sk, idx, ptr) ((CMS_SignerInfo
*)OPENSSL_sk_set(ossl_check_CMS_SignerInfo_sk_type(sk), (idx), ossl_check_CMS_SignerInfo_type(ptr)))
#define sk_CMS_SignerInfo_find(sk, ptr) OPENSSL_sk_find(ossl_check_CMS_SignerInfo_sk_type(sk),
ossl_check_CMS_SignerInfo_type(ptr))
#define sk_CMS_SignerInfo_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_CMS_SignerInfo_sk_type(sk),
ossl_check_CMS_SignerInfo_type(ptr))
#define sk_CMS_SignerInfo_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_CMS_SignerInfo_sk_type(sk),
 ossl_check_CMS_SignerInfo_type(ptr), pnum)
#define sk_CMS_SignerInfo_sort(sk) OPENSSL_sk_sort(ossl_check_CMS_SignerInfo_sk_type(sk))
#define sk_CMS_SignerInfo_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_CMS_SignerInfo_sk_type(sk))
#define sk_CMS_SignerInfo_dup(sk) ((STACK_OF(CMS_SignerInfo)
*)OPENSSL_sk_dup(ossl_check_const_CMS_SignerInfo_sk_type(sk)))
#define sk_CMS_SignerInfo_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(CMS_SignerInfo)
*)OPENSSL_sk_deep_copy(ossl_check_const_CMS_SignerInfo_sk_type(sk),
ossl_check_CMS_SignerInfo_copyfunc_type(copyfunc), ossl_check_CMS_SignerInfo_freefunc_type(freefunc)))
#define sk_CMS_SignerInfo_set_cmp_func(sk, cmp)
((sk_CMS_SignerInfo_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_CMS_SignerInfo_sk_type(sk),
ossl_check_CMS_SignerInfo_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(CMS_RecipientEncryptedKey, CMS_RecipientEncryptedKey,
CMS_RecipientEncryptedKey)
#define sk_CMS_RecipientEncryptedKey_num(sk)
OPENSSL_sk_num(ossl_check_const_CMS_RecipientEncryptedKey_sk_type(sk))
#define
 sk_CMS_RecipientEncryptedKey_value(sk, idx) ((CMS_RecipientEncryptedKey
*)OPENSSL_sk_value(ossl_check_const_CMS_RecipientEncryptedKey_sk_type(sk), (idx)))
#define sk_CMS_RecipientEncryptedKey_new(cmp) ((STACK_OF(CMS_RecipientEncryptedKey)
*)OPENSSL_sk_new(ossl_check_CMS_RecipientEncryptedKey_compfunc_type(cmp)))
#define sk_CMS_RecipientEncryptedKey_new_null() ((STACK_OF(CMS_RecipientEncryptedKey)
*)OPENSSL_sk_new_null())
#define sk_CMS_RecipientEncryptedKey_new_reserve(cmp, n) ((STACK_OF(CMS_RecipientEncryptedKey)
*)OPENSSL_sk_new_reserve(ossl_check_CMS_RecipientEncryptedKey_compfunc_type(cmp), (n)))
#define sk_CMS_RecipientEncryptedKey_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk), (n))
#define sk_CMS_RecipientEncryptedKey_free(sk)
OPENSSL_sk_free(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk))
#define sk_CMS_RecipientEncryptedKey_zero(sk)
OPENSSL_sk_zero(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk))
#define
 sk_CMS_RecipientEncryptedKey_delete(sk, i) ((CMS_RecipientEncryptedKey
*)OPENSSL_sk_delete(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk), (i)))
#define sk_CMS_RecipientEncryptedKey_delete_ptr(sk, ptr) ((CMS_RecipientEncryptedKey
*)OPENSSL_sk_delete_ptr(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk),
ossl_check_CMS_RecipientEncryptedKey_type(ptr)))
```

```
#define sk_CMS_RecipientEncryptedKey_push(sk, ptr)
OPENSSL_sk_push(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk),
ossl_check_CMS_RecipientEncryptedKey_type(ptr))
#define sk_CMS_RecipientEncryptedKey_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk),
ossl_check_CMS_RecipientEncryptedKey_type(ptr))
#define sk_CMS_RecipientEncryptedKey_pop(sk) ((CMS_RecipientEncryptedKey
*)OPENSSL_sk_pop(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk)))
#define sk_CMS_RecipientEncryptedKey_shift(sk) ((CMS_RecipientEncryptedKey
*)OPENSSL_sk_shift(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk)))
#define
 sk_CMS_RecipientEncryptedKey_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk),ossl_check_CMS_RecipientEncry
ptedKey_freefunc_type(freefunc))
#define sk_CMS_RecipientEncryptedKey_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk),
ossl_check_CMS_RecipientEncryptedKey_type(ptr), (idx))
#define sk_CMS_RecipientEncryptedKey_set(sk, idx, ptr) ((CMS_RecipientEncryptedKey
*)OPENSSL_sk_set(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk), (idx),
ossl_check_CMS_RecipientEncryptedKey_type(ptr)))
#define sk_CMS_RecipientEncryptedKey_find(sk, ptr)
OPENSSL_sk_find(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk),
ossl_check_CMS_RecipientEncryptedKey_type(ptr))
#define sk_CMS_RecipientEncryptedKey_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk),
ossl_check_CMS_RecipientEncryptedKey_type(ptr))
#define sk_CMS_RecipientEncryptedKey_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk),
 ossl_check_CMS_RecipientEncryptedKey_type(ptr), pnum)
#define sk_CMS_RecipientEncryptedKey_sort(sk)
OPENSSL_sk_sort(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk))
#define sk_CMS_RecipientEncryptedKey_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_CMS_RecipientEncryptedKey_sk_type(sk))
#define sk_CMS_RecipientEncryptedKey_dup(sk) ((STACK_OF(CMS_RecipientEncryptedKey)
*)OPENSSL_sk_dup(ossl_check_const_CMS_RecipientEncryptedKey_sk_type(sk)))
#define sk_CMS_RecipientEncryptedKey_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(CMS_RecipientEncryptedKey)
*)OPENSSL_sk_deep_copy(ossl_check_const_CMS_RecipientEncryptedKey_sk_type(sk),
ossl_check_CMS_RecipientEncryptedKey_copyfunc_type(copyfunc),
ossl_check_CMS_RecipientEncryptedKey_freefunc_type(freefunc)))
#define sk_CMS_RecipientEncryptedKey_set_cmp_func(sk, cmp)
((sk_CMS_RecipientEncryptedKey_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_CMS_RecipientEncrypted
Key_sk_type(sk), ossl_check_CMS_RecipientEncryptedKey_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(CMS_RecipientInfo,
 CMS_RecipientInfo, CMS_RecipientInfo)
#define sk_CMS_RecipientInfo_num(sk) OPENSSL_sk_num(ossl_check_const_CMS_RecipientInfo_sk_type(sk))
#define sk_CMS_RecipientInfo_value(sk, idx) ((CMS_RecipientInfo
*)OPENSSL_sk_value(ossl_check_const_CMS_RecipientInfo_sk_type(sk), (idx)))
```

```
#define sk_CMS_RecipientInfo_new(cmp) ((STACK_OF(CMS_RecipientInfo)
*)OPENSSL_sk_new(ossl_check_CMS_RecipientInfo_compfunc_type(cmp)))
#define sk_CMS_RecipientInfo_new_null() ((STACK_OF(CMS_RecipientInfo) *)OPENSSL_sk_new_null())
#define sk_CMS_RecipientInfo_new_reserve(cmp, n) ((STACK_OF(CMS_RecipientInfo)
*)OPENSSL_sk_new_reserve(ossl_check_CMS_RecipientInfo_compfunc_type(cmp), (n)))
#define sk_CMS_RecipientInfo_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_CMS_RecipientInfo_sk_type(sk),
(n))
#define sk_CMS_RecipientInfo_free(sk) OPENSSL_sk_free(ossl_check_CMS_RecipientInfo_sk_type(sk))
#define sk_CMS_RecipientInfo_zero(sk) OPENSSL_sk_zero(ossl_check_CMS_RecipientInfo_sk_type(sk))
#define
 sk_CMS_RecipientInfo_delete(sk, i) ((CMS_RecipientInfo
*)OPENSSL_sk_delete(ossl_check_CMS_RecipientInfo_sk_type(sk), (i)))
#define sk_CMS_RecipientInfo_delete_ptr(sk, ptr) ((CMS_RecipientInfo
*)OPENSSL_sk_delete_ptr(ossl_check_CMS_RecipientInfo_sk_type(sk),
ossl_check_CMS_RecipientInfo_type(ptr)))
#define sk_CMS_RecipientInfo_push(sk, ptr) OPENSSL_sk_push(ossl_check_CMS_RecipientInfo_sk_type(sk),
ossl_check_CMS_RecipientInfo_type(ptr))
#define sk_CMS_RecipientInfo_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_CMS_RecipientInfo_sk_type(sk), ossl_check_CMS_RecipientInfo_type(ptr))
#define sk_CMS_RecipientInfo_pop(sk) ((CMS_RecipientInfo
*)OPENSSL_sk_pop(ossl_check_CMS_RecipientInfo_sk_type(sk)))
#define sk_CMS_RecipientInfo_shift(sk) ((CMS_RecipientInfo
*)OPENSSL_sk_shift(ossl_check_CMS_RecipientInfo_sk_type(sk)))
#define sk_CMS_RecipientInfo_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_CMS_RecipientInfo_sk_type(sk),ossl_check_CMS_RecipientInfo_freefunc_ty
pe(freefunc))
#define
 sk_CMS_RecipientInfo_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_CMS_RecipientInfo_sk_type(sk),
ossl_check_CMS_RecipientInfo_type(ptr), (idx))
#define sk_CMS_RecipientInfo_set(sk, idx, ptr) ((CMS_RecipientInfo
*)OPENSSL_sk_set(ossl_check_CMS_RecipientInfo_sk_type(sk), (idx),
ossl_check_CMS_RecipientInfo_type(ptr)))
#define sk_CMS_RecipientInfo_find(sk, ptr) OPENSSL_sk_find(ossl_check_CMS_RecipientInfo_sk_type(sk),
ossl_check_CMS_RecipientInfo_type(ptr))
#define sk_CMS_RecipientInfo_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_CMS_RecipientInfo_sk_type(sk), ossl_check_CMS_RecipientInfo_type(ptr))
#define sk_CMS_RecipientInfo_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_CMS_RecipientInfo_sk_type(sk), ossl_check_CMS_RecipientInfo_type(ptr),
pnum)
#define sk_CMS_RecipientInfo_sort(sk) OPENSSL_sk_sort(ossl_check_CMS_RecipientInfo_sk_type(sk))
#define sk_CMS_RecipientInfo_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_CMS_RecipientInfo_sk_type(sk))
#define
 sk_CMS_RecipientInfo_dup(sk) ((STACK_OF(CMS_RecipientInfo)
*)OPENSSL_sk_dup(ossl_check_const_CMS_RecipientInfo_sk_type(sk)))
#define sk_CMS_RecipientInfo_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(CMS_RecipientInfo)
*)OPENSSL_sk_deep_copy(ossl_check_const_CMS_RecipientInfo_sk_type(sk),
ossl_check_CMS_RecipientInfo_copyfunc_type(copyfunc),
```

```
ossl_check_CMS_RecipientInfo_freefunc_type(freefunc)))
#define sk_CMS_RecipientInfo_set_cmp_func(sk, cmp)
((sk_CMS_RecipientInfo_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_CMS_RecipientInfo_sk_type(sk),
ossl_check_CMS_RecipientInfo_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(CMS_RevocationInfoChoice, CMS_RevocationInfoChoice,
CMS_RevocationInfoChoice)
#define sk_CMS_RevocationInfoChoice_num(sk)
OPENSSL_sk_num(ossl_check_const_CMS_RevocationInfoChoice_sk_type(sk))
#define sk_CMS_RevocationInfoChoice_value(sk, idx) ((CMS_RevocationInfoChoice
*)OPENSSL_sk_value(ossl_check_const_CMS_RevocationInfoChoice_sk_type(sk),
 (idx)))
#define sk_CMS_RevocationInfoChoice_new(cmp) ((STACK_OF(CMS_RevocationInfoChoice)
*)OPENSSL_sk_new(ossl_check_CMS_RevocationInfoChoice_compfunc_type(cmp)))
#define sk_CMS_RevocationInfoChoice_new_null() ((STACK_OF(CMS_RevocationInfoChoice)
*)OPENSSL_sk_new_null())
#define sk_CMS_RevocationInfoChoice_new_reserve(cmp, n) ((STACK_OF(CMS_RevocationInfoChoice)
*)OPENSSL_sk_new_reserve(ossl_check_CMS_RevocationInfoChoice_compfunc_type(cmp), (n)))
#define sk_CMS_RevocationInfoChoice_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_CMS_RevocationInfoChoice_sk_type(sk), (n))
#define sk_CMS_RevocationInfoChoice_free(sk)
OPENSSL_sk_free(ossl_check_CMS_RevocationInfoChoice_sk_type(sk))
#define sk_CMS_RevocationInfoChoice_zero(sk)
OPENSSL_sk_zero(ossl_check_CMS_RevocationInfoChoice_sk_type(sk))
#define sk_CMS_RevocationInfoChoice_delete(sk, i) ((CMS_RevocationInfoChoice
*)OPENSSL_sk_delete(ossl_check_CMS_RevocationInfoChoice_sk_type(sk), (i)))
#define sk_CMS_RevocationInfoChoice_delete_ptr(sk,
 ptr) ((CMS_RevocationInfoChoice
*)OPENSSL_sk_delete_ptr(ossl_check_CMS_RevocationInfoChoice_sk_type(sk),
ossl_check_CMS_RevocationInfoChoice_type(ptr)))
#define sk_CMS_RevocationInfoChoice_push(sk, ptr)
OPENSSL_sk_push(ossl_check_CMS_RevocationInfoChoice_sk_type(sk),
ossl_check_CMS_RevocationInfoChoice_type(ptr))
#define sk_CMS_RevocationInfoChoice_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_CMS_RevocationInfoChoice_sk_type(sk),
ossl_check_CMS_RevocationInfoChoice_type(ptr))
#define sk_CMS_RevocationInfoChoice_pop(sk) ((CMS_RevocationInfoChoice
*)OPENSSL_sk_pop(ossl_check_CMS_RevocationInfoChoice_sk_type(sk)))
#define sk_CMS_RevocationInfoChoice_shift(sk) ((CMS_RevocationInfoChoice
*)OPENSSL_sk_shift(ossl_check_CMS_RevocationInfoChoice_sk_type(sk)))
#define sk_CMS_RevocationInfoChoice_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_CMS_RevocationInfoChoice_sk_type(sk),ossl_check_CMS_RevocationInfoC
hoice_freefunc_type(freefunc))
#define sk_CMS_RevocationInfoChoice_insert(sk,
 ptr, idx) OPENSSL_sk_insert(ossl_check_CMS_RevocationInfoChoice_sk_type(sk),
ossl_check_CMS_RevocationInfoChoice_type(ptr), (idx))
#define sk_CMS_RevocationInfoChoice_set(sk, idx, ptr) ((CMS_RevocationInfoChoice
*)OPENSSL_sk_set(ossl_check_CMS_RevocationInfoChoice_sk_type(sk), (idx),
ossl_check_CMS_RevocationInfoChoice_type(ptr)))
```

```
#define sk_CMS_RevocationInfoChoice_find(sk, ptr)
OPENSSL_sk_find(ossl_check_CMS_RevocationInfoChoice_sk_type(sk),
ossl_check_CMS_RevocationInfoChoice_type(ptr))
#define sk_CMS_RevocationInfoChoice_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_CMS_RevocationInfoChoice_sk_type(sk),
ossl_check_CMS_RevocationInfoChoice_type(ptr))
#define sk_CMS_RevocationInfoChoice_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_CMS_RevocationInfoChoice_sk_type(sk),
ossl_check_CMS_RevocationInfoChoice_type(ptr), pnum)
#define sk_CMS_RevocationInfoChoice_sort(sk)
OPENSSL_sk_sort(ossl_check_CMS_RevocationInfoChoice_sk_type(sk))
#define sk_CMS_RevocationInfoChoice_is_sorted(sk)
 OPENSSL_sk_is_sorted(ossl_check_const_CMS_RevocationInfoChoice_sk_type(sk))
#define sk_CMS_RevocationInfoChoice_dup(sk) ((STACK_OF(CMS_RevocationInfoChoice)
*)OPENSSL_sk_dup(ossl_check_const_CMS_RevocationInfoChoice_sk_type(sk)))
#define sk_CMS_RevocationInfoChoice_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(CMS_RevocationInfoChoice)
*)OPENSSL_sk_deep_copy(ossl_check_const_CMS_RevocationInfoChoice_sk_type(sk),
ossl_check_CMS_RevocationInfoChoice_copyfunc_type(copyfunc),
ossl_check_CMS_RevocationInfoChoice_freefunc_type(freefunc)))
#define sk_CMS_RevocationInfoChoice_set_cmp_func(sk, cmp)
((sk_CMS_RevocationInfoChoice_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_CMS_RevocationInfoChoi
ce_sk_type(sk), ossl_check_CMS_RevocationInfoChoice_compfunc_type(cmp)))

/* clang-format on */

DECLARE_ASN1_ITEM(CMS_EnvelopedData)
DECLARE_ASN1_ALLOC_FUNCTIONS(CMS_SignedData)
DECLARE_ASN1_FUNCTIONS(CMS_ContentInfo)
DECLARE_ASN1_FUNCTIONS(CMS_ReceiptRequest)
DECLARE_ASN1_PRINT_FUNCTION(CMS_ContentInfo)

DECLARE_ASN1_DUP_FUNCTION(CMS_EnvelopedData)

CMS_ContentInfo
 *CMS_ContentInfo_new_ex(OSSL_LIB_CTX *libctx, const char *propq);

#define CMS_SIGNERINFO_ISSUER_SERIAL 0
#define CMS_SIGNERINFO_KEYIDENTIFIER 1

#define CMS_RECIPINFO_NONE -1
#define CMS_RECIPINFO_TRANS 0
#define CMS_RECIPINFO_AGREE 1
#define CMS_RECIPINFO_KEK 2
#define CMS_RECIPINFO_PASS 3
#define CMS_RECIPINFO_OTHER 4

/* S/MIME related flags */
```

```
#define CMS_TEXT 0x1
#define CMS_NOCERTS 0x2
#define CMS_NO_CONTENT_VERIFY 0x4
#define CMS_NO_ATTR_VERIFY 0x8
#define CMS_NOSIGS \
   (CMS_NO_CONTENT_VERIFY | CMS_NO_ATTR_VERIFY)
#define CMS_NOINTERN 0x10
#define CMS_NO_SIGNER_CERT_VERIFY 0x20
#define CMS_NOVERIFY 0x20
#define CMS_DETACHED 0x40
#define CMS_BINARY 0x80
#define CMS_NOATTR 0x100
#define CMS_NOSMIMECAP 0x200
#define CMS_NOOLDMIMETYPE 0x400
#define CMS_CRLFEOL 0x800
#define CMS_STREAM 0x1000
#define CMS_NOCRL 0x2000
#define CMS_PARTIAL 0x4000
#define CMS_REUSE_DIGEST 0x8000
#define CMS_USE_KEYID
 0x10000
#define CMS_DEBUG_DECRYPT 0x20000
#define CMS_KEY_PARAM 0x40000
#define CMS_ASCIICRLF 0x80000
#define CMS_CADES 0x100000
#define CMS_USE_ORIGINATOR_KEYID 0x200000
#define CMS_NO_SIGNING_TIME 0x400000

const ASN1_OBJECT *CMS_get0_type(const CMS_ContentInfo *cms);

BIO *CMS_dataInit(CMS_ContentInfo *cms, BIO *icont);
int CMS_dataFinal(CMS_ContentInfo *cms, BIO *bio);

ASN1_OCTET_STRING **CMS_get0_content(CMS_ContentInfo *cms);
int CMS_is_detached(CMS_ContentInfo *cms);
int CMS_set_detached(CMS_ContentInfo *cms, int detached);

#ifdef OPENSSL_PEM_H
DECLARE_PEM_rw(CMS, CMS_ContentInfo)
#endif
int CMS_stream(unsigned char ***boundary, CMS_ContentInfo *cms);
CMS_ContentInfo *d2i_CMS_bio(BIO *bp, CMS_ContentInfo **cms);
int i2d_CMS_bio(BIO *bp, CMS_ContentInfo *cms);

BIO *BIO_new_CMS(BIO *out, CMS_ContentInfo *cms);
int i2d_CMS_bio_stream(BIO *out, CMS_ContentInfo *cms, BIO *in, int flags);
int PEM_write_bio_CMS_stream(BIO *out, CMS_ContentInfo *cms, BIO *in,
```

```
   int flags);
CMS_ContentInfo
 *SMIME_read_CMS(BIO *bio, BIO **bcont);
CMS_ContentInfo *SMIME_read_CMS_ex(BIO *bio, int flags, BIO **bcont, CMS_ContentInfo **ci);
int SMIME_write_CMS(BIO *bio, CMS_ContentInfo *cms, BIO *data, int flags);

int CMS_final(CMS_ContentInfo *cms, BIO *data, BIO *dcont,
   unsigned int flags);
int CMS_final_digest(CMS_ContentInfo *cms,
   const unsigned char *md, unsigned int mdlen, BIO *dcont,
   unsigned int flags);

CMS_ContentInfo *CMS_sign(X509 *signcert, EVP_PKEY *pkey,
   STACK_OF(X509) *certs, BIO *data,
   unsigned int flags);
CMS_ContentInfo *CMS_sign_ex(X509 *signcert, EVP_PKEY *pkey,
   STACK_OF(X509) *certs, BIO *data,
   unsigned int flags, OSSL_LIB_CTX *libctx,
   const char *propq);

CMS_ContentInfo *CMS_sign_receipt(CMS_SignerInfo *si,
   X509 *signcert, EVP_PKEY *pkey,
   STACK_OF(X509) *certs, unsigned int flags);

int CMS_data(CMS_ContentInfo *cms, BIO *out, unsigned int flags);
CMS_ContentInfo *CMS_data_create(BIO *in, unsigned int flags);
CMS_ContentInfo
 *CMS_data_create_ex(BIO *in, unsigned int flags,
   OSSL_LIB_CTX *libctx, const char *propq);

int CMS_digest_verify(CMS_ContentInfo *cms, BIO *dcont, BIO *out,
   unsigned int flags);
CMS_ContentInfo *CMS_digest_create(BIO *in, const EVP_MD *md,
   unsigned int flags);
CMS_ContentInfo *CMS_digest_create_ex(BIO *in, const EVP_MD *md,
   unsigned int flags, OSSL_LIB_CTX *libctx,
   const char *propq);

int CMS_EncryptedData_decrypt(CMS_ContentInfo *cms,
   const unsigned char *key, size_t keylen,
   BIO *dcont, BIO *out, unsigned int flags);
CMS_ContentInfo *CMS_EncryptedData_encrypt(BIO *in, const EVP_CIPHER *cipher,
   const unsigned char *key,
   size_t keylen, unsigned int flags);
CMS_ContentInfo *CMS_EncryptedData_encrypt_ex(BIO *in, const EVP_CIPHER *cipher,
   const unsigned char *key,
   size_t keylen, unsigned int flags,
   OSSL_LIB_CTX *libctx,
```

```
   const char *propq);

int CMS_EncryptedData_set1_key(CMS_ContentInfo *cms, const EVP_CIPHER *ciph,
   const unsigned
 char *key, size_t keylen);

int CMS_verify(CMS_ContentInfo *cms, STACK_OF(X509) *certs,
   X509_STORE *store, BIO *dcont, BIO *out, unsigned int flags);

int CMS_verify_receipt(CMS_ContentInfo *rcms, CMS_ContentInfo *ocms,
   STACK_OF(X509) *certs,
   X509_STORE *store, unsigned int flags);

STACK_OF(X509) *CMS_get0_signers(CMS_ContentInfo *cms);

CMS_ContentInfo *CMS_encrypt(STACK_OF(X509) *certs, BIO *in,
   const EVP_CIPHER *cipher, unsigned int flags);
CMS_ContentInfo *CMS_encrypt_ex(STACK_OF(X509) *certs, BIO *in,
   const EVP_CIPHER *cipher, unsigned int flags,
   OSSL_LIB_CTX *libctx, const char *propq);

int CMS_decrypt(CMS_ContentInfo *cms, EVP_PKEY *pkey, X509 *cert,
   BIO *dcont, BIO *out, unsigned int flags);

int CMS_decrypt_set1_pkey(CMS_ContentInfo *cms, EVP_PKEY *pk, X509 *cert);
int CMS_decrypt_set1_pkey_and_peer(CMS_ContentInfo *cms, EVP_PKEY *pk,
   X509 *cert, X509 *peer);
int CMS_decrypt_set1_key(CMS_ContentInfo *cms,
   unsigned char *key, size_t
 keylen,
   const unsigned char *id, size_t idlen);
int CMS_decrypt_set1_password(CMS_ContentInfo *cms,
   unsigned char *pass, ossl_ssize_t passlen);

STACK_OF(CMS_RecipientInfo) *CMS_get0_RecipientInfos(CMS_ContentInfo *cms);
int CMS_RecipientInfo_type(CMS_RecipientInfo *ri);
EVP_PKEY_CTX *CMS_RecipientInfo_get0_pkey_ctx(CMS_RecipientInfo *ri);
CMS_ContentInfo *CMS_AuthEnvelopedData_create(const EVP_CIPHER *cipher);
CMS_ContentInfo *
CMS_AuthEnvelopedData_create_ex(const EVP_CIPHER *cipher, OSSL_LIB_CTX *libctx,
   const char *propq);
CMS_ContentInfo *CMS_EnvelopedData_create(const EVP_CIPHER *cipher);
CMS_ContentInfo *CMS_EnvelopedData_create_ex(const EVP_CIPHER *cipher,
   OSSL_LIB_CTX *libctx,
   const char *propq);
BIO *CMS_EnvelopedData_decrypt(CMS_EnvelopedData *env, BIO *detached_data,
   EVP_PKEY *pkey, X509 *cert,
   ASN1_OCTET_STRING *secret, unsigned int flags,
```

```
   OSSL_LIB_CTX *libctx, const char *propq);

CMS_RecipientInfo *CMS_add1_recipient_cert(CMS_ContentInfo
 *cms,
   X509 *recip, unsigned int flags);
CMS_RecipientInfo *CMS_add1_recipient(CMS_ContentInfo *cms, X509 *recip,
   EVP_PKEY *originatorPrivKey, X509 *originator, unsigned int flags);
int CMS_RecipientInfo_set0_pkey(CMS_RecipientInfo *ri, EVP_PKEY *pkey);
int CMS_RecipientInfo_ktri_cert_cmp(CMS_RecipientInfo *ri, X509 *cert);
int CMS_RecipientInfo_ktri_get0_algs(CMS_RecipientInfo *ri,
   EVP_PKEY **pk, X509 **recip,
   X509_ALGOR **palg);
int CMS_RecipientInfo_ktri_get0_signer_id(CMS_RecipientInfo *ri,
   ASN1_OCTET_STRING **keyid,
   X509_NAME **issuer,
   ASN1_INTEGER **sno);

CMS_RecipientInfo *CMS_add0_recipient_key(CMS_ContentInfo *cms, int nid,
   unsigned char *key, size_t keylen,
   unsigned char *id, size_t idlen,
   ASN1_GENERALIZEDTIME *date,
   ASN1_OBJECT *otherTypeId,
   ASN1_TYPE *otherType);

int CMS_RecipientInfo_kekri_get0_id(CMS_RecipientInfo *ri,
   X509_ALGOR **palg,
   ASN1_OCTET_STRING **pid,
   ASN1_GENERALIZEDTIME **pdate,
   ASN1_OBJECT **potherid,
    ASN1_TYPE **pothertype);

int CMS_RecipientInfo_set0_key(CMS_RecipientInfo *ri,
   unsigned char *key, size_t keylen);

int CMS_RecipientInfo_kekri_id_cmp(CMS_RecipientInfo *ri,
   const unsigned char *id, size_t idlen);

int CMS_RecipientInfo_set0_password(CMS_RecipientInfo *ri,
   unsigned char *pass,
   ossl_ssize_t passlen);

CMS_RecipientInfo *CMS_add0_recipient_password(CMS_ContentInfo *cms,
   int iter, int wrap_nid,
   int pbe_nid,
   unsigned char *pass,
   ossl_ssize_t passlen,
   const EVP_CIPHER *kekciph);
```

```
int CMS_RecipientInfo_decrypt(CMS_ContentInfo *cms, CMS_RecipientInfo *ri);
int CMS_RecipientInfo_encrypt(const CMS_ContentInfo *cms, CMS_RecipientInfo *ri);

int CMS_uncompress(CMS_ContentInfo *cms, BIO *dcont, BIO *out,
   unsigned int flags);
CMS_ContentInfo *CMS_compress(BIO *in, int comp_nid, unsigned int flags);

int CMS_set1_eContentType(CMS_ContentInfo *cms, const ASN1_OBJECT *oid);
const ASN1_OBJECT *CMS_get0_eContentType(CMS_ContentInfo *cms);

CMS_CertificateChoices
 *CMS_add0_CertificateChoices(CMS_ContentInfo *cms);
int CMS_add0_cert(CMS_ContentInfo *cms, X509 *cert);
int CMS_add1_cert(CMS_ContentInfo *cms, X509 *cert);
STACK_OF(X509) *CMS_get1_certs(CMS_ContentInfo *cms);

CMS_RevocationInfoChoice *CMS_add0_RevocationInfoChoice(CMS_ContentInfo *cms);
int CMS_add0_crl(CMS_ContentInfo *cms, X509_CRL *crl);
int CMS_add1_crl(CMS_ContentInfo *cms, X509_CRL *crl);
STACK_OF(X509_CRL) *CMS_get1_crls(CMS_ContentInfo *cms);

int CMS_SignedData_init(CMS_ContentInfo *cms);
CMS_SignerInfo *CMS_add1_signer(CMS_ContentInfo *cms,
   X509 *signer, EVP_PKEY *pk, const EVP_MD *md,
   unsigned int flags);
EVP_PKEY_CTX *CMS_SignerInfo_get0_pkey_ctx(CMS_SignerInfo *si);
EVP_MD_CTX *CMS_SignerInfo_get0_md_ctx(CMS_SignerInfo *si);
STACK_OF(CMS_SignerInfo) *CMS_get0_SignerInfos(CMS_ContentInfo *cms);

void CMS_SignerInfo_set1_signer_cert(CMS_SignerInfo *si, X509 *signer);
int CMS_SignerInfo_get0_signer_id(CMS_SignerInfo *si,
   ASN1_OCTET_STRING
 **keyid,
   X509_NAME **issuer, ASN1_INTEGER **sno);
int CMS_SignerInfo_cert_cmp(CMS_SignerInfo *si, X509 *cert);
int CMS_set1_signers_certs(CMS_ContentInfo *cms, STACK_OF(X509) *certs,
   unsigned int flags);
void CMS_SignerInfo_get0_algs(CMS_SignerInfo *si, EVP_PKEY **pk,
   X509 **signer, X509_ALGOR **pdig,
   X509_ALGOR **psig);
ASN1_OCTET_STRING *CMS_SignerInfo_get0_signature(CMS_SignerInfo *si);
int CMS_SignerInfo_sign(CMS_SignerInfo *si);
int CMS_SignerInfo_verify(CMS_SignerInfo *si);
int CMS_SignerInfo_verify_content(CMS_SignerInfo *si, BIO *chain);
BIO *CMS_SignedData_verify(CMS_SignedData *sd, BIO *detached_data,
   STACK_OF(X509) *scerts, X509_STORE *store,
   STACK_OF(X509) *extra, STACK_OF(X509_CRL) *crls,
   unsigned int flags,
```

```
   OSSL_LIB_CTX *libctx, const char *propq);

int CMS_add_smimecap(CMS_SignerInfo *si, STACK_OF(X509_ALGOR) *algs);
int CMS_add_simple_smimecap(STACK_OF(X509_ALGOR) **algs,
   int algnid, int keysize);
int CMS_add_standard_smimecap(STACK_OF(X509_ALGOR)
 **smcap);

int CMS_signed_get_attr_count(const CMS_SignerInfo *si);
int CMS_signed_get_attr_by_NID(const CMS_SignerInfo *si, int nid,
   int lastpos);
int CMS_signed_get_attr_by_OBJ(const CMS_SignerInfo *si, const ASN1_OBJECT *obj,
   int lastpos);
X509_ATTRIBUTE *CMS_signed_get_attr(const CMS_SignerInfo *si, int loc);
X509_ATTRIBUTE *CMS_signed_delete_attr(CMS_SignerInfo *si, int loc);
int CMS_signed_add1_attr(CMS_SignerInfo *si, X509_ATTRIBUTE *attr);
int CMS_signed_add1_attr_by_OBJ(CMS_SignerInfo *si,
   const ASN1_OBJECT *obj, int type,
   const void *bytes, int len);
int CMS_signed_add1_attr_by_NID(CMS_SignerInfo *si,
   int nid, int type,
   const void *bytes, int len);
int CMS_signed_add1_attr_by_txt(CMS_SignerInfo *si,
   const char *attrname, int type,
   const void *bytes, int len);
void *CMS_signed_get0_data_by_OBJ(const CMS_SignerInfo *si,
   const ASN1_OBJECT *oid,
   int lastpos, int type);

int CMS_unsigned_get_attr_count(const CMS_SignerInfo
 *si);
int CMS_unsigned_get_attr_by_NID(const CMS_SignerInfo *si, int nid,
   int lastpos);
int CMS_unsigned_get_attr_by_OBJ(const CMS_SignerInfo *si,
   const ASN1_OBJECT *obj, int lastpos);
X509_ATTRIBUTE *CMS_unsigned_get_attr(const CMS_SignerInfo *si, int loc);
X509_ATTRIBUTE *CMS_unsigned_delete_attr(CMS_SignerInfo *si, int loc);
int CMS_unsigned_add1_attr(CMS_SignerInfo *si, X509_ATTRIBUTE *attr);
int CMS_unsigned_add1_attr_by_OBJ(CMS_SignerInfo *si,
   const ASN1_OBJECT *obj, int type,
   const void *bytes, int len);
int CMS_unsigned_add1_attr_by_NID(CMS_SignerInfo *si,
   int nid, int type,
   const void *bytes, int len);
int CMS_unsigned_add1_attr_by_txt(CMS_SignerInfo *si,
   const char *attrname, int type,
   const void *bytes, int len);
void *CMS_unsigned_get0_data_by_OBJ(CMS_SignerInfo *si, ASN1_OBJECT *oid,
```

```
   int lastpos, int type);

int CMS_get1_ReceiptRequest(CMS_SignerInfo *si, CMS_ReceiptRequest **prr);
CMS_ReceiptRequest *CMS_ReceiptRequest_create0(

 unsigned char *id, int idlen, int allorfirst,
   STACK_OF(GENERAL_NAMES) *receiptList,
   STACK_OF(GENERAL_NAMES) *receiptsTo);
CMS_ReceiptRequest *CMS_ReceiptRequest_create0_ex(
   unsigned char *id, int idlen, int allorfirst,
   STACK_OF(GENERAL_NAMES) *receiptList,
   STACK_OF(GENERAL_NAMES) *receiptsTo,
   OSSL_LIB_CTX *libctx);

int CMS_add1_ReceiptRequest(CMS_SignerInfo *si, CMS_ReceiptRequest *rr);
void CMS_ReceiptRequest_get0_values(CMS_ReceiptRequest *rr,
   ASN1_STRING **pcid,
   int *pallorfirst,
   STACK_OF(GENERAL_NAMES) **plist,
   STACK_OF(GENERAL_NAMES) **prto);
int CMS_RecipientInfo_kari_get0_alg(CMS_RecipientInfo *ri,
   X509_ALGOR **palg,
   ASN1_OCTET_STRING **pukm);
STACK_OF(CMS_RecipientEncryptedKey)
*CMS_RecipientInfo_kari_get0_reks(CMS_RecipientInfo *ri);

int CMS_RecipientInfo_kari_get0_orig_id(CMS_RecipientInfo *ri,
   X509_ALGOR **pubalg,
   ASN1_BIT_STRING **pubkey,
   ASN1_OCTET_STRING **keyid,
   X509_NAME **issuer,
   ASN1_INTEGER **sno);

int
 CMS_RecipientInfo_kari_orig_id_cmp(CMS_RecipientInfo *ri, X509 *cert);

int CMS_RecipientEncryptedKey_get0_id(CMS_RecipientEncryptedKey *rek,
   ASN1_OCTET_STRING **keyid,
   ASN1_GENERALIZEDTIME **tm,
   CMS_OtherKeyAttribute **other,
   X509_NAME **issuer, ASN1_INTEGER **sno);
int CMS_RecipientEncryptedKey_cert_cmp(CMS_RecipientEncryptedKey *rek,
   X509 *cert);
int CMS_RecipientInfo_kari_set0_pkey(CMS_RecipientInfo *ri, EVP_PKEY *pk);
int CMS_RecipientInfo_kari_set0_pkey_and_peer(CMS_RecipientInfo *ri, EVP_PKEY *pk, X509 *peer);
EVP_CIPHER_CTX *CMS_RecipientInfo_kari_get0_ctx(CMS_RecipientInfo *ri);
int CMS_RecipientInfo_kari_decrypt(CMS_ContentInfo *cms,
   CMS_RecipientInfo *ri,
```

```
   CMS_RecipientEncryptedKey *rek);

int CMS_SharedInfo_encode(unsigned char **pder, X509_ALGOR *kekalg,
   ASN1_OCTET_STRING *ukm, int keylen);

/* Backward compatibility for spelling errors. */
#define CMS_R_UNKNOWN_DIGEST_ALGORITM CMS_R_UNKNOWN_DIGEST_ALGORITHM
#define CMS_R_UNSUPPORTED_RECPIENTINFO_TYPE
 \
   CMS_R_UNSUPPORTED_RECIPIENTINFO_TYPE

#ifdef __cplusplus
}
#endif
#endif
#endif
```

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```
/*
* WARNING: do not edit!
* Generated by util/mkbuildinf.pl
*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#define PLATFORM "platform: BSD-x86"
#define DATE "built on: Tue Jan 27 17:26:06 2026 UTC"
```

```
/*
* Generate compiler_flags as an array of individual characters. This is a
* workaround for the situation where CFLAGS gets too long for a C90 string
* literal
*/
static const char compiler_flags[] = {
   'c','o','m','p','i','l','e','r',':',' ','c','c',' ','-','f','P',
   'I','C',' ','-','p','t','h','r','e','a','d',' ','-','W','a','l',
   'l',' ','-','O','3',' ','-','f','o','m','i','t','-','f','r','a',
   'm','e','-','p','o','i','n','t','e','r',' ','-','D','L','_','E',
   'N','D','I','A','N','
 ','-','D','O','P','E','N','S','S','L','_',
   'P','I','C',' ','-','D','_','T','H','R','E','A','D','_','S','A',
   'F','E',' ','-','D','_','R','E','E','N','T','R','A','N','T',' ',
   '-','D','O','P','E','N','S','S','L','_','B','U','I','L','D','I',
   'N','G','_','O','P','E','N','S','S','L',' ','-','D','N','D','E',
   'B','U','G','\0'
};
/*
* WARNING: do not edit!
* Generated by Makefile from providers/common/include/prov/der_dsa.h.in
*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#include "internal/der.h"

/* Well known OIDs precompiled */
/* clang-format off */

/*
* id-dsa OBJECT IDENTIFIER ::= {
*      iso(1) member-body(2) us(840) x9-57(10040) x9algorithm(4) 1 }
*/
#define DER_OID_V_id_dsa DER_P_OBJECT, 7, 0x2A, 0x86, 0x48, 0xCE, 0x38, 0x04, 0x01
#define DER_OID_SZ_id_dsa 9
extern const unsigned char ossl_der_oid_id_dsa[DER_OID_SZ_id_dsa];

/*
* id-dsa-with-sha1 OBJECT IDENTIFIER ::=  {
*      iso(1) member-body(2) us(840) x9-57 (10040) x9algorithm(4) 3 }
*/
```

```
#define DER_OID_V_id_dsa_with_sha1 DER_P_OBJECT, 7, 0x2A, 0x86, 0x48,
 0xCE, 0x38, 0x04, 0x03
#define DER_OID_SZ_id_dsa_with_sha1 9
extern const unsigned char ossl_der_oid_id_dsa_with_sha1[DER_OID_SZ_id_dsa_with_sha1];

/*
* id-dsa-with-sha224 OBJECT IDENTIFIER ::= { sigAlgs 1 }
*/
#define DER_OID_V_id_dsa_with_sha224 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x03,
0x01
#define DER_OID_SZ_id_dsa_with_sha224 11
extern const unsigned char ossl_der_oid_id_dsa_with_sha224[DER_OID_SZ_id_dsa_with_sha224];

/*
* id-dsa-with-sha256 OBJECT IDENTIFIER ::= { sigAlgs 2 }
*/
#define DER_OID_V_id_dsa_with_sha256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x03,
0x02
#define DER_OID_SZ_id_dsa_with_sha256 11
extern const unsigned char ossl_der_oid_id_dsa_with_sha256[DER_OID_SZ_id_dsa_with_sha256];

/*
* id-dsa-with-sha384 OBJECT IDENTIFIER ::= { sigAlgs 3 }
*/
#define DER_OID_V_id_dsa_with_sha384 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x03,
0x03
#define DER_OID_SZ_id_dsa_with_sha384 11
extern const unsigned char
 ossl_der_oid_id_dsa_with_sha384[DER_OID_SZ_id_dsa_with_sha384];

/*
* id-dsa-with-sha512 OBJECT IDENTIFIER ::= { sigAlgs 4 }
*/
#define DER_OID_V_id_dsa_with_sha512 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x03,
0x04
#define DER_OID_SZ_id_dsa_with_sha512 11
extern const unsigned char ossl_der_oid_id_dsa_with_sha512[DER_OID_SZ_id_dsa_with_sha512];

/*
* id-dsa-with-sha3-224 OBJECT IDENTIFIER ::= { sigAlgs 5 }
*/
#define DER_OID_V_id_dsa_with_sha3_224 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x05
#define DER_OID_SZ_id_dsa_with_sha3_224 11
extern const unsigned char ossl_der_oid_id_dsa_with_sha3_224[DER_OID_SZ_id_dsa_with_sha3_224];

/*
* id-dsa-with-sha3-256 OBJECT IDENTIFIER ::= { sigAlgs 6 }
```

```
*/
#define DER_OID_V_id_dsa_with_sha3_256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x06
#define DER_OID_SZ_id_dsa_with_sha3_256 11
extern const unsigned char ossl_der_oid_id_dsa_with_sha3_256[DER_OID_SZ_id_dsa_with_sha3_256];

/*
 * id-dsa-with-sha3-384 OBJECT IDENTIFIER ::= { sigAlgs 7 }
*/
#define DER_OID_V_id_dsa_with_sha3_384 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x07
#define DER_OID_SZ_id_dsa_with_sha3_384 11
extern const unsigned char ossl_der_oid_id_dsa_with_sha3_384[DER_OID_SZ_id_dsa_with_sha3_384];

/*
* id-dsa-with-sha3-512 OBJECT IDENTIFIER ::= { sigAlgs 8 }
*/
#define DER_OID_V_id_dsa_with_sha3_512 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x08
#define DER_OID_SZ_id_dsa_with_sha3_512 11
extern const unsigned char ossl_der_oid_id_dsa_with_sha3_512[DER_OID_SZ_id_dsa_with_sha3_512];

/* clang-format on */

/* Subject Public Key Info */
int ossl_DER_w_algorithmIdentifier_DSA(WPACKET *pkt, int tag, DSA *dsa);
/* Signature */
int ossl_DER_w_algorithmIdentifier_DSA_with_MD(WPACKET *pkt, int tag,
   DSA *dsa, int mdnid);
```

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"GPL-2.0-with-autoconf-exception",
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"GPL-2.0-with-classpath-exception",
"GPL-2.0-with-font-exception",
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"GPL-3.0-with-GCC-exception",
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"LGPL-3.0",
"Net-SNMP",
"Nunit",
"StandardML-NJ",
"bzip2-1.0.5",
"eCos-2.0",
"wxWindows"
]

```
{
 'variables': {
  'openssl_defines_BSD-x86': [
   'NDEBUG',
   'L_ENDIAN',
   'OPENSSL_BUILDING_OPENSSL',
   'OPENSSL_PIC',
  ],
  'openssl_cflags_BSD-x86': [
   '-Wall -O3 -fomit-frame-pointer',
   '-pthread',
   '-Wall -O3 -fomit-frame-pointer',
  ],
  'openssl_ex_libs_BSD-x86': [
   '-pthread',
  ],
  'openssl_cli_srcs_BSD-x86': [
   'openssl/apps/lib/cmp_mock_srv.c',
   'openssl/apps/asn1parse.c',
   'openssl/apps/ca.c',
   'openssl/apps/ciphers.c',
   'openssl/apps/cmp.c',
   'openssl/apps/cms.c',
   'openssl/apps/crl.c',
   'openssl/apps/crl2pkcs7.c',
   'openssl/apps/dgst.c',
   'openssl/apps/dhparam.c',
   'openssl/apps/dsa.c',
   'openssl/apps/dsaparam.c',
   'openssl/apps/ec.c',
   'openssl/apps/ecparam.c',
   'openssl/apps/enc.c',
   'openssl/apps/engine.c',
   'openssl/apps/errstr.c',
   'openssl/apps/fipsinstall.c',
   'openssl/apps/gendsa.c',
   'openssl/apps/genpkey.c',

   'openssl/apps/genrsa.c',
   'openssl/apps/info.c',
   'openssl/apps/kdf.c',
   'openssl/apps/list.c',
   'openssl/apps/mac.c',
   'openssl/apps/nseq.c',
   'openssl/apps/ocsp.c',
   'openssl/apps/openssl.c',
   'openssl/apps/passwd.c',
   'openssl/apps/pkcs12.c',
```

```
    'openssl/apps/pkcs7.c',
    'openssl/apps/pkcs8.c',
    'openssl/apps/pkey.c',
    'openssl/apps/pkeyparam.c',
    'openssl/apps/pkeyutl.c',
    'openssl/apps/prime.c',
    './config/archs/BSD-x86/no-asm/apps/progs.c',
    'openssl/apps/rand.c',
    'openssl/apps/rehash.c',
    'openssl/apps/req.c',
    'openssl/apps/rsa.c',
    'openssl/apps/rsautl.c',
    'openssl/apps/s_client.c',
    'openssl/apps/s_server.c',
    'openssl/apps/s_time.c',
    'openssl/apps/sess_id.c',
    'openssl/apps/skeyutl.c',
    'openssl/apps/smime.c',
    'openssl/apps/speed.c',
    'openssl/apps/spkac.c',
    'openssl/apps/srp.c',
    'openssl/apps/storeutl.c',
    'openssl/apps/ts.c',
     'openssl/apps/verify.c',
    'openssl/apps/version.c',
    'openssl/apps/x509.c',
    'openssl/apps/lib/app_libctx.c',
    'openssl/apps/lib/app_params.c',
    'openssl/apps/lib/app_provider.c',
    'openssl/apps/lib/app_rand.c',
    'openssl/apps/lib/app_x509.c',
    'openssl/apps/lib/apps.c',
    'openssl/apps/lib/apps_opt_printf.c',
    'openssl/apps/lib/apps_ui.c',
    'openssl/apps/lib/columns.c',
    'openssl/apps/lib/engine.c',
    'openssl/apps/lib/engine_loader.c',
    'openssl/apps/lib/fmt.c',
    'openssl/apps/lib/http_server.c',
    'openssl/apps/lib/log.c',
    'openssl/apps/lib/names.c',
    'openssl/apps/lib/opt.c',
    'openssl/apps/lib/s_cb.c',
    'openssl/apps/lib/s_socket.c',
    'openssl/apps/lib/tlssrp_depr.c',
  ],
},
'defines': ['<@(openssl_defines_BSD-x86)'],
```

```
 'include_dirs': [
   './include',
 ],
 'cflags' : ['<@(openssl_cflags_BSD-x86)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86)'],
  'sources': ['<@(openssl_cli_srcs_BSD-x86)'],
}
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/asn1.h.in
*
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*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_ASN1_H
#define OPENSSL_ASN1_H
#pragma once
```

```
#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_ASN1_H
#endif

#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif
#include <time.h>
#include <openssl/e_os2.h>
#include <openssl/opensslconf.h>
#include <openssl/bio.h>
#include <openssl/safestack.h>
#include <openssl/asn1err.h>
#include <openssl/symhacks.h>

#include <openssl/types.h>
#include <openssl/bn.h>

#ifdef OPENSSL_BUILD_SHLIBCRYPTO
#undef OPENSSL_EXTERN
#define OPENSSL_EXTERN OPENSSL_EXPORT
#endif

#ifdef
 __cplusplus
extern "C" {
#endif

#define V_ASN1_UNIVERSAL 0x00
#define V_ASN1_APPLICATION 0x40
#define V_ASN1_CONTEXT_SPECIFIC 0x80
#define V_ASN1_PRIVATE 0xc0

#define V_ASN1_CONSTRUCTED 0x20
#define V_ASN1_PRIMITIVE_TAG 0x1f
#define V_ASN1_PRIMATIVE_TAG /*compat*/ V_ASN1_PRIMITIVE_TAG

#define V_ASN1_APP_CHOOSE -2 /* let the recipient choose */
#define V_ASN1_OTHER -3 /* used in ASN1_TYPE */
#define V_ASN1_ANY -4 /* used in ASN1 template code */

#define V_ASN1_UNDEF -1
/* ASN.1 tag values */
#define V_ASN1_EOC 0
#define V_ASN1_BOOLEAN 1
#define V_ASN1_INTEGER 2
#define V_ASN1_BIT_STRING 3
```

```
#define V_ASN1_OCTET_STRING 4
#define V_ASN1_NULL 5
#define V_ASN1_OBJECT 6
#define V_ASN1_OBJECT_DESCRIPTOR 7
#define V_ASN1_EXTERNAL 8
#define V_ASN1_REAL 9
#define V_ASN1_ENUMERATED 10
#define V_ASN1_UTF8STRING 12
#define V_ASN1_SEQUENCE 16
#define V_ASN1_SET 17
#define V_ASN1_NUMERICSTRING 18
#define V_ASN1_PRINTABLESTRING 19
#define V_ASN1_T61STRING 20
#define V_ASN1_TELETEXSTRING
 20 /* alias */
#define V_ASN1_VIDEOTEXSTRING 21
#define V_ASN1_IA5STRING 22
#define V_ASN1_UTCTIME 23
#define V_ASN1_GENERALIZEDTIME 24
#define V_ASN1_GRAPHICSTRING 25
#define V_ASN1_ISO64STRING 26
#define V_ASN1_VISIBLESTRING 26 /* alias */
#define V_ASN1_GENERALSTRING 27
#define V_ASN1_UNIVERSALSTRING 28
#define V_ASN1_BMPSTRING 30

/*
* NB the constants below are used internally by ASN1_INTEGER
* and ASN1_ENUMERATED to indicate the sign. They are *not* on
* the wire tag values.
*/

#define V_ASN1_NEG 0x100
#define V_ASN1_NEG_INTEGER (2 | V_ASN1_NEG)
#define V_ASN1_NEG_ENUMERATED (10 | V_ASN1_NEG)

/* For use with d2i_ASN1_type_bytes() */
#define B_ASN1_NUMERICSTRING 0x0001
#define B_ASN1_PRINTABLESTRING 0x0002
#define B_ASN1_T61STRING 0x0004
#define B_ASN1_TELETEXSTRING 0x0004
#define B_ASN1_VIDEOTEXSTRING 0x0008
#define B_ASN1_IA5STRING 0x0010
#define B_ASN1_GRAPHICSTRING 0x0020
#define B_ASN1_ISO64STRING 0x0040
#define B_ASN1_VISIBLESTRING 0x0040
#define B_ASN1_GENERALSTRING
```

```
 0x0080
#define B_ASN1_UNIVERSALSTRING 0x0100
#define B_ASN1_OCTET_STRING 0x0200
#define B_ASN1_BIT_STRING 0x0400
#define B_ASN1_BMPSTRING 0x0800
#define B_ASN1_UNKNOWN 0x1000
#define B_ASN1_UTF8STRING 0x2000
#define B_ASN1_UTCTIME 0x4000
#define B_ASN1_GENERALIZEDTIME 0x8000
#define B_ASN1_SEQUENCE 0x10000
/* For use with ASN1_mbstring_copy() */
#define MBSTRING_FLAG 0x1000
#define MBSTRING_UTF8 (MBSTRING_FLAG)
#define MBSTRING_ASC (MBSTRING_FLAG | 1)
#define MBSTRING_BMP (MBSTRING_FLAG | 2)
#define MBSTRING_UNIV (MBSTRING_FLAG | 4)
#define SMIME_OLDMIME 0x400
#define SMIME_CRLFEOL 0x800
#define SMIME_STREAM 0x1000

/* Stacks for types not otherwise defined in this header */
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_ALGOR, X509_ALGOR, X509_ALGOR)
#define sk_X509_ALGOR_num(sk) OPENSSL_sk_num(ossl_check_const_X509_ALGOR_sk_type(sk))
#define sk_X509_ALGOR_value(sk, idx) ((X509_ALGOR
*)OPENSSL_sk_value(ossl_check_const_X509_ALGOR_sk_type(sk), (idx)))
#define sk_X509_ALGOR_new(cmp)
 ((STACK_OF(X509_ALGOR) *)OPENSSL_sk_new(ossl_check_X509_ALGOR_compfunc_type(cmp)))
#define sk_X509_ALGOR_new_null() ((STACK_OF(X509_ALGOR) *)OPENSSL_sk_new_null())
#define sk_X509_ALGOR_new_reserve(cmp, n) ((STACK_OF(X509_ALGOR)
*)OPENSSL_sk_new_reserve(ossl_check_X509_ALGOR_compfunc_type(cmp), (n)))
#define sk_X509_ALGOR_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_ALGOR_sk_type(sk), (n))
#define sk_X509_ALGOR_free(sk) OPENSSL_sk_free(ossl_check_X509_ALGOR_sk_type(sk))
#define sk_X509_ALGOR_zero(sk) OPENSSL_sk_zero(ossl_check_X509_ALGOR_sk_type(sk))
#define sk_X509_ALGOR_delete(sk, i) ((X509_ALGOR
*)OPENSSL_sk_delete(ossl_check_X509_ALGOR_sk_type(sk), (i)))
#define sk_X509_ALGOR_delete_ptr(sk, ptr) ((X509_ALGOR
*)OPENSSL_sk_delete_ptr(ossl_check_X509_ALGOR_sk_type(sk), ossl_check_X509_ALGOR_type(ptr)))
#define sk_X509_ALGOR_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_ALGOR_sk_type(sk),
ossl_check_X509_ALGOR_type(ptr))
#define sk_X509_ALGOR_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_ALGOR_sk_type(sk),
 ossl_check_X509_ALGOR_type(ptr))
#define sk_X509_ALGOR_pop(sk) ((X509_ALGOR
*)OPENSSL_sk_pop(ossl_check_X509_ALGOR_sk_type(sk)))
#define sk_X509_ALGOR_shift(sk) ((X509_ALGOR
*)OPENSSL_sk_shift(ossl_check_X509_ALGOR_sk_type(sk)))
#define sk_X509_ALGOR_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_ALGOR_sk_type(sk),ossl_check_X509_ALGOR_freefunc_type(freefu
```

```
nc))
#define sk_X509_ALGOR_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_ALGOR_sk_type(sk),
ossl_check_X509_ALGOR_type(ptr), (idx))
#define sk_X509_ALGOR_set(sk, idx, ptr) ((X509_ALGOR
*)OPENSSL_sk_set(ossl_check_X509_ALGOR_sk_type(sk), (idx), ossl_check_X509_ALGOR_type(ptr)))
#define sk_X509_ALGOR_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_ALGOR_sk_type(sk),
ossl_check_X509_ALGOR_type(ptr))
#define sk_X509_ALGOR_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_ALGOR_sk_type(sk),
ossl_check_X509_ALGOR_type(ptr))
#define sk_X509_ALGOR_find_all(sk, ptr, pnum)
 OPENSSL_sk_find_all(ossl_check_X509_ALGOR_sk_type(sk), ossl_check_X509_ALGOR_type(ptr), pnum)
#define sk_X509_ALGOR_sort(sk) OPENSSL_sk_sort(ossl_check_X509_ALGOR_sk_type(sk))
#define sk_X509_ALGOR_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_X509_ALGOR_sk_type(sk))
#define sk_X509_ALGOR_dup(sk) ((STACK_OF(X509_ALGOR)
*)OPENSSL_sk_dup(ossl_check_const_X509_ALGOR_sk_type(sk)))
#define sk_X509_ALGOR_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_ALGOR)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_ALGOR_sk_type(sk),
ossl_check_X509_ALGOR_copyfunc_type(copyfunc), ossl_check_X509_ALGOR_freefunc_type(freefunc)))
#define sk_X509_ALGOR_set_cmp_func(sk, cmp)
((sk_X509_ALGOR_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_ALGOR_sk_type(sk),
ossl_check_X509_ALGOR_compfunc_type(cmp)))

/* clang-format on */

#define ASN1_STRING_FLAG_BITS_LEFT 0x08 /* Set if 0x07 has bits left value */
/*
* This indicates that the ASN1_STRING is not a real value but just a place
* holder for the location
 where indefinite length constructed data should be
* inserted in the memory buffer
*/
#define ASN1_STRING_FLAG_NDEF 0x010

/*
* This flag is used by the CMS code to indicate that a string is not
* complete and is a place holder for content when it had all been accessed.
* The flag will be reset when content has been written to it.
*/

#define ASN1_STRING_FLAG_CONT 0x020
/*
* This flag is used by ASN1 code to indicate an ASN1_STRING is an MSTRING
* type.
*/
#define ASN1_STRING_FLAG_MSTRING 0x040
/* String is embedded and only content should be freed */
#define ASN1_STRING_FLAG_EMBED 0x080
/* String should be parsed in RFC 5280's time format */
```

```
#define ASN1_STRING_FLAG_X509_TIME 0x100
/* This is the base type that holds just about everything :-) */
struct asn1_string_st {
   int length;
   int type;
   unsigned char *data;
   /*
    * The value of the following field depends on the type being held.  It
    * is mostly being used for BIT_STRING so if the input data has a
     * non-zero 'unused bits' value, it will be handled correctly
    */
   long flags;
};

/*
* ASN1_ENCODING structure: this is used to save the received encoding of an
* ASN1 type. This is useful to get round problems with invalid encodings
* which can break signatures.
*/

typedef struct ASN1_ENCODING_st {
   unsigned char *enc; /* DER encoding */
   long len; /* Length of encoding */
   int modified; /* set to 1 if 'enc' is invalid */
} ASN1_ENCODING;

/* Used with ASN1 LONG type: if a long is set to this it is omitted */
#define ASN1_LONG_UNDEF 0x7fffffffL

#define STABLE_FLAGS_MALLOC 0x01
/*
* A zero passed to ASN1_STRING_TABLE_new_add for the flags is interpreted
* as "don't change" and STABLE_FLAGS_MALLOC is always set. By setting
* STABLE_FLAGS_MALLOC only we can clear the existing value. Use the alias
* STABLE_FLAGS_CLEAR to reflect this.
*/
#define STABLE_FLAGS_CLEAR STABLE_FLAGS_MALLOC
#define STABLE_NO_MASK 0x02
#define DIRSTRING_TYPE \
   (B_ASN1_PRINTABLESTRING
 | B_ASN1_T61STRING | B_ASN1_BMPSTRING | B_ASN1_UTF8STRING)
#define PKCS9STRING_TYPE (DIRSTRING_TYPE | B_ASN1_IA5STRING)

struct asn1_string_table_st {
   int nid;
   long minsize;
   long maxsize;
   unsigned long mask;
```

```
  unsigned long flags;
};

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ASN1_STRING_TABLE, ASN1_STRING_TABLE,
ASN1_STRING_TABLE)
#define sk_ASN1_STRING_TABLE_num(sk)
OPENSSL_sk_num(ossl_check_const_ASN1_STRING_TABLE_sk_type(sk))
#define sk_ASN1_STRING_TABLE_value(sk, idx) ((ASN1_STRING_TABLE
*)OPENSSL_sk_value(ossl_check_const_ASN1_STRING_TABLE_sk_type(sk), (idx)))
#define sk_ASN1_STRING_TABLE_new(cmp) ((STACK_OF(ASN1_STRING_TABLE)
*)OPENSSL_sk_new(ossl_check_ASN1_STRING_TABLE_compfunc_type(cmp)))
#define sk_ASN1_STRING_TABLE_new_null() ((STACK_OF(ASN1_STRING_TABLE)
*)OPENSSL_sk_new_null())
#define sk_ASN1_STRING_TABLE_new_reserve(cmp, n) ((STACK_OF(ASN1_STRING_TABLE)
*)OPENSSL_sk_new_reserve(ossl_check_ASN1_STRING_TABLE_compfunc_type(cmp), (n)))
#define
 sk_ASN1_STRING_TABLE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_ASN1_STRING_TABLE_sk_type(sk), (n))
#define sk_ASN1_STRING_TABLE_free(sk)
OPENSSL_sk_free(ossl_check_ASN1_STRING_TABLE_sk_type(sk))
#define sk_ASN1_STRING_TABLE_zero(sk)
OPENSSL_sk_zero(ossl_check_ASN1_STRING_TABLE_sk_type(sk))
#define sk_ASN1_STRING_TABLE_delete(sk, i) ((ASN1_STRING_TABLE
*)OPENSSL_sk_delete(ossl_check_ASN1_STRING_TABLE_sk_type(sk), (i)))
#define sk_ASN1_STRING_TABLE_delete_ptr(sk, ptr) ((ASN1_STRING_TABLE
*)OPENSSL_sk_delete_ptr(ossl_check_ASN1_STRING_TABLE_sk_type(sk),
ossl_check_ASN1_STRING_TABLE_type(ptr)))
#define sk_ASN1_STRING_TABLE_push(sk, ptr)
OPENSSL_sk_push(ossl_check_ASN1_STRING_TABLE_sk_type(sk),
ossl_check_ASN1_STRING_TABLE_type(ptr))
#define sk_ASN1_STRING_TABLE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_ASN1_STRING_TABLE_sk_type(sk),
ossl_check_ASN1_STRING_TABLE_type(ptr))
#define sk_ASN1_STRING_TABLE_pop(sk) ((ASN1_STRING_TABLE
*)OPENSSL_sk_pop(ossl_check_ASN1_STRING_TABLE_sk_type(sk)))
#define
 sk_ASN1_STRING_TABLE_shift(sk) ((ASN1_STRING_TABLE
*)OPENSSL_sk_shift(ossl_check_ASN1_STRING_TABLE_sk_type(sk)))
#define sk_ASN1_STRING_TABLE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASN1_STRING_TABLE_sk_type(sk),ossl_check_ASN1_STRING_TABLE_
freefunc_type(freefunc))
#define sk_ASN1_STRING_TABLE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_ASN1_STRING_TABLE_sk_type(sk),
ossl_check_ASN1_STRING_TABLE_type(ptr), (idx))
#define sk_ASN1_STRING_TABLE_set(sk, idx, ptr) ((ASN1_STRING_TABLE
*)OPENSSL_sk_set(ossl_check_ASN1_STRING_TABLE_sk_type(sk), (idx),
ossl_check_ASN1_STRING_TABLE_type(ptr)))
```

```
#define sk_ASN1_STRING_TABLE_find(sk, ptr)
OPENSSL_sk_find(ossl_check_ASN1_STRING_TABLE_sk_type(sk),
ossl_check_ASN1_STRING_TABLE_type(ptr))
#define sk_ASN1_STRING_TABLE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_ASN1_STRING_TABLE_sk_type(sk),
ossl_check_ASN1_STRING_TABLE_type(ptr))
#define sk_ASN1_STRING_TABLE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ASN1_STRING_TABLE_sk_type(sk),
 ossl_check_ASN1_STRING_TABLE_type(ptr), pnum)
#define sk_ASN1_STRING_TABLE_sort(sk)
OPENSSL_sk_sort(ossl_check_ASN1_STRING_TABLE_sk_type(sk))
#define sk_ASN1_STRING_TABLE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_ASN1_STRING_TABLE_sk_type(sk))
#define sk_ASN1_STRING_TABLE_dup(sk) ((STACK_OF(ASN1_STRING_TABLE)
*)OPENSSL_sk_dup(ossl_check_const_ASN1_STRING_TABLE_sk_type(sk)))
#define sk_ASN1_STRING_TABLE_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ASN1_STRING_TABLE)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASN1_STRING_TABLE_sk_type(sk),
ossl_check_ASN1_STRING_TABLE_copyfunc_type(copyfunc),
ossl_check_ASN1_STRING_TABLE_freefunc_type(freefunc)))
#define sk_ASN1_STRING_TABLE_set_cmp_func(sk, cmp)
((sk_ASN1_STRING_TABLE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASN1_STRING_TABLE_sk_t
ype(sk), ossl_check_ASN1_STRING_TABLE_compfunc_type(cmp)))

/* clang-format on */

/* size limits: this stuff is taken straight from RFC2459 */

#define ub_name 32768
#define
 ub_common_name 64
#define ub_locality_name 128
#define ub_state_name 128
#define ub_organization_name 64
#define ub_organization_unit_name 64
#define ub_title 64
#define ub_email_address 128

/*
* Declarations for template structures: for full definitions see asn1t.h
*/
typedef struct ASN1_TEMPLATE_st ASN1_TEMPLATE;
typedef struct ASN1_TLC_st ASN1_TLC;
/* This is just an opaque pointer */
typedef struct ASN1_VALUE_st ASN1_VALUE;

/* Declare ASN1 functions: the implement macro is in asn1t.h */

/*
```

```
* The mysterious 'extern' that's passed to some macros is innocuous,
* and is there to quiet pre-C99 compilers that may complain about empty
* arguments in macro calls.
*/

#define DECLARE_ASN1_FUNCTIONS_attr(attr, type) \
   DECLARE_ASN1_FUNCTIONS_name_attr(attr, type, type)
#define DECLARE_ASN1_FUNCTIONS(type) \
   DECLARE_ASN1_FUNCTIONS_attr(extern, type)

#define DECLARE_ASN1_ALLOC_FUNCTIONS_attr(attr, type) \
   DECLARE_ASN1_ALLOC_FUNCTIONS_name_attr(attr, type, type)
#define
 DECLARE_ASN1_ALLOC_FUNCTIONS(type) \
   DECLARE_ASN1_ALLOC_FUNCTIONS_attr(extern, type)

#define DECLARE_ASN1_FUNCTIONS_name_attr(attr, type, name)   \
   DECLARE_ASN1_ALLOC_FUNCTIONS_name_attr(attr, type, name) \
   DECLARE_ASN1_ENCODE_FUNCTIONS_name_attr(attr, type, name)
#define DECLARE_ASN1_FUNCTIONS_name(type, name) \
   DECLARE_ASN1_FUNCTIONS_name_attr(extern, type, name)

#define DECLARE_ASN1_ENCODE_FUNCTIONS_attr(attr, type, itname, name) \
   DECLARE_ASN1_ENCODE_FUNCTIONS_only_attr(attr, type, name)       \
   DECLARE_ASN1_ITEM_attr(attr, itname)
#define DECLARE_ASN1_ENCODE_FUNCTIONS(type, itname, name) \
   DECLARE_ASN1_ENCODE_FUNCTIONS_attr(extern, type, itname, name)

#define DECLARE_ASN1_ENCODE_FUNCTIONS_name_attr(attr, type, name) \
   DECLARE_ASN1_ENCODE_FUNCTIONS_attr(attr, type, name, name)
#define DECLARE_ASN1_ENCODE_FUNCTIONS_name(type, name) \
   DECLARE_ASN1_ENCODE_FUNCTIONS_name_attr(extern, type, name)

#define DECLARE_ASN1_ENCODE_FUNCTIONS_only_attr(attr,
 type, name)       \
   attr type *d2i_##name(type **a, const unsigned char **in, long len); \
   attr int i2d_##name(const type *a, unsigned char **out);
#define DECLARE_ASN1_ENCODE_FUNCTIONS_only(type, name) \
   DECLARE_ASN1_ENCODE_FUNCTIONS_only_attr(extern, type, name)

#define DECLARE_ASN1_NDEF_FUNCTION_attr(attr, name) \
   attr int i2d_##name##_NDEF(const name *a, unsigned char **out);
#define DECLARE_ASN1_NDEF_FUNCTION(name) \
   DECLARE_ASN1_NDEF_FUNCTION_attr(extern, name)

#define DECLARE_ASN1_ALLOC_FUNCTIONS_name_attr(attr, type, name) \
   attr type *name##_new(void);                              \
   attr void name##_free(type *a);
```

```
#define DECLARE_ASN1_ALLOC_FUNCTIONS_name(type, name) \
   DECLARE_ASN1_ALLOC_FUNCTIONS_name_attr(extern, type, name)

#define DECLARE_ASN1_DUP_FUNCTION_attr(attr, type) \
   DECLARE_ASN1_DUP_FUNCTION_name_attr(attr, type, type)
#define DECLARE_ASN1_DUP_FUNCTION(type) \
   DECLARE_ASN1_DUP_FUNCTION_attr(extern, type)

#define
 DECLARE_ASN1_DUP_FUNCTION_name_attr(attr, type, name) \
   attr type *name##_dup(const type *a);
#define DECLARE_ASN1_DUP_FUNCTION_name(type, name) \
   DECLARE_ASN1_DUP_FUNCTION_name_attr(extern, type, name)

#define DECLARE_ASN1_PRINT_FUNCTION_attr(attr, stname) \
   DECLARE_ASN1_PRINT_FUNCTION_fname_attr(attr, stname, stname)
#define DECLARE_ASN1_PRINT_FUNCTION(stname) \
   DECLARE_ASN1_PRINT_FUNCTION_attr(extern, stname)

#define DECLARE_ASN1_PRINT_FUNCTION_fname_attr(attr, stname, fname)   \
   attr int fname##_print_ctx(BIO *out, const stname *x, int indent, \
       const ASN1_PCTX *pctx);
#define DECLARE_ASN1_PRINT_FUNCTION_fname(stname, fname) \
   DECLARE_ASN1_PRINT_FUNCTION_fname_attr(extern, stname, fname)

#define D2I_OF(type) type *(*)(type **, const unsigned char **, long)
#define I2D_OF(type) int (*)(const type *, unsigned char **)

#define CHECKED_D2I_OF(type, d2i) \
   ((d2i_of_void *)(1 ? d2i : ((D2I_OF(type))0)))
#define CHECKED_I2D_OF(type, i2d) \

  ((i2d_of_void *)(1 ? i2d : ((I2D_OF(type))0)))
#define CHECKED_NEW_OF(type, xnew) \
   ((void *(*)(void))(1 ? xnew : ((type * (*)(void))0)))
#define CHECKED_PTR_OF(type, p) \
   ((void *)(1 ? p : (type *)0))
#define CHECKED_PPTR_OF(type, p) \
   ((void **)(1 ? p : (type **)0))

#define TYPEDEF_D2I_OF(type) typedef type *d2i_of_##type(type **, const unsigned char **, long)
#define TYPEDEF_I2D_OF(type) typedef int i2d_of_##type(const type *, unsigned char **)
#define TYPEDEF_D2I2D_OF(type) \
   TYPEDEF_D2I_OF(type);      \
   TYPEDEF_I2D_OF(type)

typedef void *d2i_of_void(void **, const unsigned char **, long);
typedef int i2d_of_void(const void *, unsigned char **);
```

```
typedef int OSSL_i2d_of_void_ctx(const void *, unsigned char **, void *vctx);

/*-
* The following macros and typedefs allow an ASN1_ITEM
* to be embedded in a structure and referenced. Since
* the ASN1_ITEM pointers need to be globally accessible
* (possibly from shared libraries) they may exist in
* different forms.
 On platforms that support it the
* ASN1_ITEM structure itself will be globally exported.
* Other platforms will export a function that returns
* an ASN1_ITEM pointer.
*
* To handle both cases transparently the macros below
* should be used instead of hard coding an ASN1_ITEM
* pointer in a structure.
*
* The structure will look like this:
*
* typedef struct SOMETHING_st {
*      ...
*      ASN1_ITEM_EXP *iptr;
*      ...
* } SOMETHING;
*
* It would be initialised as e.g.:
*
* SOMETHING somevar = {...,ASN1_ITEM_ref(X509),...};
*
* and the actual pointer extracted with:
*
* const ASN1_ITEM *it = ASN1_ITEM_ptr(somevar.iptr);
*
* Finally an ASN1_ITEM pointer can be extracted from an
* appropriate reference with: ASN1_ITEM_rptr(X509). This
* would be used when a function takes an ASN1_ITEM * argument.
*
*/

/*
* Platforms that can't easily handle shared global variables are declared as
* functions returning ASN1_ITEM pointers.
*/

/* ASN1_ITEM pointer exported
 type */
typedef const ASN1_ITEM *ASN1_ITEM_EXP(void);
```

```
/* Macro to obtain ASN1_ITEM pointer from exported type */
#define ASN1_ITEM_ptr(iptr) (iptr())

/* Macro to include ASN1_ITEM pointer from base type */
#define ASN1_ITEM_ref(iptr) (iptr##_it)

#define ASN1_ITEM_rptr(ref) (ref##_it())

#define DECLARE_ASN1_ITEM_attr(attr, name) \
   attr const ASN1_ITEM *name##_it(void);
#define DECLARE_ASN1_ITEM(name) \
   DECLARE_ASN1_ITEM_attr(extern, name)

/* Parameters used by ASN1_STRING_print_ex() */

/*
* These determine which characters to escape: RFC2253 special characters,
* control characters and MSB set characters
*/

#define ASN1_STRFLGS_ESC_2253 1
#define ASN1_STRFLGS_ESC_CTRL 2
#define ASN1_STRFLGS_ESC_MSB 4

/* Lower 8 bits are reserved as an output type specifier */
#define ASN1_DTFLGS_TYPE_MASK 0x0FUL
#define ASN1_DTFLGS_RFC822 0x00UL
#define ASN1_DTFLGS_ISO8601 0x01UL

/*
* This flag determines how we do escaping: normally RC2253 backslash only,
* set this to use
 backslash and quote.
*/

#define ASN1_STRFLGS_ESC_QUOTE 8

/* These three flags are internal use only. */

/* Character is a valid PrintableString character */
#define CHARTYPE_PRINTABLESTRING 0x10
/* Character needs escaping if it is the first character */
#define CHARTYPE_FIRST_ESC_2253 0x20
/* Character needs escaping if it is the last character */
#define CHARTYPE_LAST_ESC_2253 0x40

/*
* NB the internal flags are safely reused below by flags handled at the top
```

```
* level.
*/

/*
* If this is set we convert all character strings to UTF8 first
*/

#define ASN1_STRFLGS_UTF8_CONVERT 0x10

/*
* If this is set we don't attempt to interpret content: just assume all
* strings are 1 byte per character. This will produce some pretty odd
* looking output!
*/

#define ASN1_STRFLGS_IGNORE_TYPE 0x20

/* If this is set we include the string type in the output */
#define ASN1_STRFLGS_SHOW_TYPE 0x40

/*
* This determines which strings to display and which to 'dump' (hex dump of
* content
 octets or DER encoding). We can only dump non character strings or
* everything. If we don't dump 'unknown' they are interpreted as character
* strings with 1 octet per character and are subject to the usual escaping
* options.
*/

#define ASN1_STRFLGS_DUMP_ALL 0x80
#define ASN1_STRFLGS_DUMP_UNKNOWN 0x100

/*
* These determine what 'dumping' does, we can dump the content octets or the
* DER encoding: both use the RFC2253 #XXXXX notation.
*/

#define ASN1_STRFLGS_DUMP_DER 0x200

/*
* This flag specifies that RC2254 escaping shall be performed.
*/
#define ASN1_STRFLGS_ESC_2254 0x400

/*
* All the string flags consistent with RFC2253, escaping control characters
* isn't essential in RFC2253 but it is advisable anyway.
*/
```

```
#define ASN1_STRFLGS_RFC2253 (ASN1_STRFLGS_ESC_2253 | ASN1_STRFLGS_ESC_CTRL |
ASN1_STRFLGS_ESC_MSB | ASN1_STRFLGS_UTF8_CONVERT | ASN1_STRFLGS_DUMP_UNKNOWN |
ASN1_STRFLGS_DUMP_DER)

struct asn1_type_st {
  int type;
  union {
      char *ptr;
      ASN1_BOOLEAN
 boolean;
      ASN1_STRING *asn1_string;
      ASN1_OBJECT *object;
      ASN1_INTEGER *integer;
      ASN1_ENUMERATED *enumerated;
      ASN1_BIT_STRING *bit_string;
      ASN1_OCTET_STRING *octet_string;
      ASN1_PRINTABLESTRING *printablestring;
      ASN1_T61STRING *t61string;
      ASN1_IA5STRING *ia5string;
      ASN1_GENERALSTRING *generalstring;
      ASN1_BMPSTRING *bmpstring;
      ASN1_UNIVERSALSTRING *universalstring;
      ASN1_UTCTIME *utctime;
      ASN1_GENERALIZEDTIME *generalizedtime;
      ASN1_VISIBLESTRING *visiblestring;
      ASN1_UTF8STRING *utf8string;
      /*
       * set and sequence are left complete and still contain the set or
       * sequence bytes
       */
      ASN1_STRING *set;
      ASN1_STRING *sequence;
      ASN1_VALUE *asn1_value;
  } value;
};

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ASN1_TYPE, ASN1_TYPE, ASN1_TYPE)
#define sk_ASN1_TYPE_num(sk) OPENSSL_sk_num(ossl_check_const_ASN1_TYPE_sk_type(sk))
#define
 sk_ASN1_TYPE_value(sk, idx) ((ASN1_TYPE
*)OPENSSL_sk_value(ossl_check_const_ASN1_TYPE_sk_type(sk), (idx)))
#define sk_ASN1_TYPE_new(cmp) ((STACK_OF(ASN1_TYPE)
*)OPENSSL_sk_new(ossl_check_ASN1_TYPE_compfunc_type(cmp)))
#define sk_ASN1_TYPE_new_null() ((STACK_OF(ASN1_TYPE) *)OPENSSL_sk_new_null())
#define sk_ASN1_TYPE_new_reserve(cmp, n) ((STACK_OF(ASN1_TYPE)
*)OPENSSL_sk_new_reserve(ossl_check_ASN1_TYPE_compfunc_type(cmp), (n)))
```

```
#define sk_ASN1_TYPE_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_ASN1_TYPE_sk_type(sk), (n))
#define sk_ASN1_TYPE_free(sk) OPENSSL_sk_free(ossl_check_ASN1_TYPE_sk_type(sk))
#define sk_ASN1_TYPE_zero(sk) OPENSSL_sk_zero(ossl_check_ASN1_TYPE_sk_type(sk))
#define sk_ASN1_TYPE_delete(sk, i) ((ASN1_TYPE
*)OPENSSL_sk_delete(ossl_check_ASN1_TYPE_sk_type(sk), (i)))
#define sk_ASN1_TYPE_delete_ptr(sk, ptr) ((ASN1_TYPE
*)OPENSSL_sk_delete_ptr(ossl_check_ASN1_TYPE_sk_type(sk), ossl_check_ASN1_TYPE_type(ptr)))
#define sk_ASN1_TYPE_push(sk,
 ptr) OPENSSL_sk_push(ossl_check_ASN1_TYPE_sk_type(sk), ossl_check_ASN1_TYPE_type(ptr))
#define sk_ASN1_TYPE_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_ASN1_TYPE_sk_type(sk),
ossl_check_ASN1_TYPE_type(ptr))
#define sk_ASN1_TYPE_pop(sk) ((ASN1_TYPE *)OPENSSL_sk_pop(ossl_check_ASN1_TYPE_sk_type(sk)))
#define sk_ASN1_TYPE_shift(sk) ((ASN1_TYPE *)OPENSSL_sk_shift(ossl_check_ASN1_TYPE_sk_type(sk)))
#define sk_ASN1_TYPE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASN1_TYPE_sk_type(sk),ossl_check_ASN1_TYPE_freefunc_type(freefunc))
#define sk_ASN1_TYPE_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_ASN1_TYPE_sk_type(sk),
ossl_check_ASN1_TYPE_type(ptr), (idx))
#define sk_ASN1_TYPE_set(sk, idx, ptr) ((ASN1_TYPE
*)OPENSSL_sk_set(ossl_check_ASN1_TYPE_sk_type(sk), (idx), ossl_check_ASN1_TYPE_type(ptr)))
#define sk_ASN1_TYPE_find(sk, ptr) OPENSSL_sk_find(ossl_check_ASN1_TYPE_sk_type(sk),
ossl_check_ASN1_TYPE_type(ptr))
#define sk_ASN1_TYPE_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_ASN1_TYPE_sk_type(sk),
 ossl_check_ASN1_TYPE_type(ptr))
#define sk_ASN1_TYPE_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_ASN1_TYPE_sk_type(sk),
ossl_check_ASN1_TYPE_type(ptr), pnum)
#define sk_ASN1_TYPE_sort(sk) OPENSSL_sk_sort(ossl_check_ASN1_TYPE_sk_type(sk))
#define sk_ASN1_TYPE_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_ASN1_TYPE_sk_type(sk))
#define sk_ASN1_TYPE_dup(sk) ((STACK_OF(ASN1_TYPE)
*)OPENSSL_sk_dup(ossl_check_const_ASN1_TYPE_sk_type(sk)))
#define sk_ASN1_TYPE_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ASN1_TYPE)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASN1_TYPE_sk_type(sk),
ossl_check_ASN1_TYPE_copyfunc_type(copyfunc), ossl_check_ASN1_TYPE_freefunc_type(freefunc)))
#define sk_ASN1_TYPE_set_cmp_func(sk, cmp)
((sk_ASN1_TYPE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASN1_TYPE_sk_type(sk),
ossl_check_ASN1_TYPE_compfunc_type(cmp)))

/* clang-format on */

typedef STACK_OF(ASN1_TYPE) ASN1_SEQUENCE_ANY;

DECLARE_ASN1_ENCODE_FUNCTIONS_name(ASN1_SEQUENCE_ANY,
 ASN1_SEQUENCE_ANY)
DECLARE_ASN1_ENCODE_FUNCTIONS_name(ASN1_SEQUENCE_ANY, ASN1_SET_ANY)

/* This is used to contain a list of bit names */
typedef struct BIT_STRING_BITNAME_st {
   int bitnum;
   const char *lname;
```

```
  const char *sname;
} BIT_STRING_BITNAME;

#define B_ASN1_TIME \
  B_ASN1_UTCTIME | B_ASN1_GENERALIZEDTIME

#define B_ASN1_PRINTABLE \
  B_ASN1_NUMERICSTRING | B_ASN1_PRINTABLESTRING | B_ASN1_T61STRING |
B_ASN1_IA5STRING | B_ASN1_BIT_STRING | B_ASN1_UNIVERSALSTRING | B_ASN1_BMPSTRING |
B_ASN1_UTF8STRING | B_ASN1_SEQUENCE | B_ASN1_UNKNOWN

#define B_ASN1_DIRECTORYSTRING \
  B_ASN1_PRINTABLESTRING | B_ASN1_TELETEXSTRING | B_ASN1_BMPSTRING |
B_ASN1_UNIVERSALSTRING | B_ASN1_UTF8STRING

#define B_ASN1_DISPLAYTEXT \
  B_ASN1_IA5STRING | B_ASN1_VISIBLESTRING | B_ASN1_BMPSTRING | B_ASN1_UTF8STRING

DECLARE_ASN1_ALLOC_FUNCTIONS_name(ASN1_TYPE, ASN1_TYPE)
DECLARE_ASN1_ENCODE_FUNCTIONS(ASN1_TYPE, ASN1_ANY, ASN1_TYPE)

int ASN1_TYPE_get(const ASN1_TYPE *a);
void ASN1_TYPE_set(ASN1_TYPE
 *a, int type, void *value);
int ASN1_TYPE_set1(ASN1_TYPE *a, int type, const void *value);
int ASN1_TYPE_cmp(const ASN1_TYPE *a, const ASN1_TYPE *b);

ASN1_TYPE *ASN1_TYPE_pack_sequence(const ASN1_ITEM *it, void *s, ASN1_TYPE **t);
void *ASN1_TYPE_unpack_sequence(const ASN1_ITEM *it, const ASN1_TYPE *t);

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ASN1_OBJECT, ASN1_OBJECT, ASN1_OBJECT)
#define sk_ASN1_OBJECT_num(sk) OPENSSL_sk_num(ossl_check_const_ASN1_OBJECT_sk_type(sk))
#define sk_ASN1_OBJECT_value(sk, idx) ((ASN1_OBJECT
*)OPENSSL_sk_value(ossl_check_const_ASN1_OBJECT_sk_type(sk), (idx)))
#define sk_ASN1_OBJECT_new(cmp) ((STACK_OF(ASN1_OBJECT)
*)OPENSSL_sk_new(ossl_check_ASN1_OBJECT_compfunc_type(cmp)))
#define sk_ASN1_OBJECT_new_null() ((STACK_OF(ASN1_OBJECT) *)OPENSSL_sk_new_null())
#define sk_ASN1_OBJECT_new_reserve(cmp, n) ((STACK_OF(ASN1_OBJECT)
*)OPENSSL_sk_new_reserve(ossl_check_ASN1_OBJECT_compfunc_type(cmp), (n)))
#define sk_ASN1_OBJECT_reserve(sk,
 n) OPENSSL_sk_reserve(ossl_check_ASN1_OBJECT_sk_type(sk), (n))
#define sk_ASN1_OBJECT_free(sk) OPENSSL_sk_free(ossl_check_ASN1_OBJECT_sk_type(sk))
#define sk_ASN1_OBJECT_zero(sk) OPENSSL_sk_zero(ossl_check_ASN1_OBJECT_sk_type(sk))
#define sk_ASN1_OBJECT_delete(sk, i) ((ASN1_OBJECT
*)OPENSSL_sk_delete(ossl_check_ASN1_OBJECT_sk_type(sk), (i)))
#define sk_ASN1_OBJECT_delete_ptr(sk, ptr) ((ASN1_OBJECT
*)OPENSSL_sk_delete_ptr(ossl_check_ASN1_OBJECT_sk_type(sk), ossl_check_ASN1_OBJECT_type(ptr)))
```

```
#define sk_ASN1_OBJECT_push(sk, ptr) OPENSSL_sk_push(ossl_check_ASN1_OBJECT_sk_type(sk),
ossl_check_ASN1_OBJECT_type(ptr))
#define sk_ASN1_OBJECT_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_ASN1_OBJECT_sk_type(sk),
ossl_check_ASN1_OBJECT_type(ptr))
#define sk_ASN1_OBJECT_pop(sk) ((ASN1_OBJECT
*)OPENSSL_sk_pop(ossl_check_ASN1_OBJECT_sk_type(sk)))
#define sk_ASN1_OBJECT_shift(sk) ((ASN1_OBJECT
*)OPENSSL_sk_shift(ossl_check_ASN1_OBJECT_sk_type(sk)))
#define sk_ASN1_OBJECT_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASN1_OBJECT_sk_type(sk),ossl_check_ASN1_OBJECT_freefunc_type(free
func))
#define sk_ASN1_OBJECT_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_ASN1_OBJECT_sk_type(sk),
ossl_check_ASN1_OBJECT_type(ptr), (idx))
#define sk_ASN1_OBJECT_set(sk, idx, ptr) ((ASN1_OBJECT
*)OPENSSL_sk_set(ossl_check_ASN1_OBJECT_sk_type(sk), (idx), ossl_check_ASN1_OBJECT_type(ptr)))
#define sk_ASN1_OBJECT_find(sk, ptr) OPENSSL_sk_find(ossl_check_ASN1_OBJECT_sk_type(sk),
ossl_check_ASN1_OBJECT_type(ptr))
#define sk_ASN1_OBJECT_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_ASN1_OBJECT_sk_type(sk),
ossl_check_ASN1_OBJECT_type(ptr))
#define sk_ASN1_OBJECT_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ASN1_OBJECT_sk_type(sk), ossl_check_ASN1_OBJECT_type(ptr), pnum)
#define sk_ASN1_OBJECT_sort(sk) OPENSSL_sk_sort(ossl_check_ASN1_OBJECT_sk_type(sk))
#define sk_ASN1_OBJECT_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_ASN1_OBJECT_sk_type(sk))
#define sk_ASN1_OBJECT_dup(sk)
 ((STACK_OF(ASN1_OBJECT) *)OPENSSL_sk_dup(ossl_check_const_ASN1_OBJECT_sk_type(sk)))
#define sk_ASN1_OBJECT_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ASN1_OBJECT)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASN1_OBJECT_sk_type(sk),
ossl_check_ASN1_OBJECT_copyfunc_type(copyfunc), ossl_check_ASN1_OBJECT_freefunc_type(freefunc)))
#define sk_ASN1_OBJECT_set_cmp_func(sk, cmp)
((sk_ASN1_OBJECT_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASN1_OBJECT_sk_type(sk),
ossl_check_ASN1_OBJECT_compfunc_type(cmp)))

/* clang-format on */

DECLARE_ASN1_FUNCTIONS(ASN1_OBJECT)

ASN1_STRING *ASN1_STRING_new(void);
void ASN1_STRING_free(ASN1_STRING *a);
void ASN1_STRING_clear_free(ASN1_STRING *a);
int ASN1_STRING_copy(ASN1_STRING *dst, const ASN1_STRING *str);
DECLARE_ASN1_DUP_FUNCTION(ASN1_STRING)
ASN1_STRING *ASN1_STRING_type_new(int type);
int ASN1_STRING_cmp(const ASN1_STRING *a, const ASN1_STRING *b);
/*
* Since this is used to store all sorts of things, via macros, for now,
* make its data void *
*/
```

```
int
 ASN1_STRING_set(ASN1_STRING *str, const void *data, int len);
void ASN1_STRING_set0(ASN1_STRING *str, void *data, int len);
int ASN1_STRING_length(const ASN1_STRING *x);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 void ASN1_STRING_length_set(ASN1_STRING *x, int n);
#endif
int ASN1_STRING_type(const ASN1_STRING *x);
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 unsigned char *ASN1_STRING_data(ASN1_STRING *x);
#endif
const unsigned char *ASN1_STRING_get0_data(const ASN1_STRING *x);

DECLARE_ASN1_FUNCTIONS(ASN1_BIT_STRING)
int ASN1_BIT_STRING_set(ASN1_BIT_STRING *a, unsigned char *d, int length);
int ASN1_BIT_STRING_set_bit(ASN1_BIT_STRING *a, int n, int value);
int ASN1_BIT_STRING_get_bit(const ASN1_BIT_STRING *a, int n);
int ASN1_BIT_STRING_check(const ASN1_BIT_STRING *a,
   const unsigned char *flags, int flags_len);

int ASN1_BIT_STRING_name_print(BIO *out, ASN1_BIT_STRING *bs,
   BIT_STRING_BITNAME *tbl, int indent);
int ASN1_BIT_STRING_num_asc(const
 char *name, BIT_STRING_BITNAME *tbl);
int ASN1_BIT_STRING_set_asc(ASN1_BIT_STRING *bs, const char *name, int value,
   BIT_STRING_BITNAME *tbl);

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ASN1_INTEGER, ASN1_INTEGER, ASN1_INTEGER)
#define sk_ASN1_INTEGER_num(sk) OPENSSL_sk_num(ossl_check_const_ASN1_INTEGER_sk_type(sk))
#define sk_ASN1_INTEGER_value(sk, idx) ((ASN1_INTEGER
*)OPENSSL_sk_value(ossl_check_const_ASN1_INTEGER_sk_type(sk), (idx)))
#define sk_ASN1_INTEGER_new(cmp) ((STACK_OF(ASN1_INTEGER)
*)OPENSSL_sk_new(ossl_check_ASN1_INTEGER_compfunc_type(cmp)))
#define sk_ASN1_INTEGER_new_null() ((STACK_OF(ASN1_INTEGER) *)OPENSSL_sk_new_null())
#define sk_ASN1_INTEGER_new_reserve(cmp, n) ((STACK_OF(ASN1_INTEGER)
*)OPENSSL_sk_new_reserve(ossl_check_ASN1_INTEGER_compfunc_type(cmp), (n)))
#define sk_ASN1_INTEGER_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_ASN1_INTEGER_sk_type(sk),
(n))
#define sk_ASN1_INTEGER_free(sk) OPENSSL_sk_free(ossl_check_ASN1_INTEGER_sk_type(sk))
#define sk_ASN1_INTEGER_zero(sk)
 OPENSSL_sk_zero(ossl_check_ASN1_INTEGER_sk_type(sk))
#define sk_ASN1_INTEGER_delete(sk, i) ((ASN1_INTEGER
*)OPENSSL_sk_delete(ossl_check_ASN1_INTEGER_sk_type(sk), (i)))
#define sk_ASN1_INTEGER_delete_ptr(sk, ptr) ((ASN1_INTEGER
*)OPENSSL_sk_delete_ptr(ossl_check_ASN1_INTEGER_sk_type(sk), ossl_check_ASN1_INTEGER_type(ptr)))
#define sk_ASN1_INTEGER_push(sk, ptr) OPENSSL_sk_push(ossl_check_ASN1_INTEGER_sk_type(sk),
ossl_check_ASN1_INTEGER_type(ptr))
```

```
#define sk_ASN1_INTEGER_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_ASN1_INTEGER_sk_type(sk),
ossl_check_ASN1_INTEGER_type(ptr))
#define sk_ASN1_INTEGER_pop(sk) ((ASN1_INTEGER
*)OPENSSL_sk_pop(ossl_check_ASN1_INTEGER_sk_type(sk)))
#define sk_ASN1_INTEGER_shift(sk) ((ASN1_INTEGER
*)OPENSSL_sk_shift(ossl_check_ASN1_INTEGER_sk_type(sk)))
#define sk_ASN1_INTEGER_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASN1_INTEGER_sk_type(sk),ossl_check_ASN1_INTEGER_freefunc_type(f
reefunc))
#define sk_ASN1_INTEGER_insert(sk,
 ptr, idx) OPENSSL_sk_insert(ossl_check_ASN1_INTEGER_sk_type(sk), ossl_check_ASN1_INTEGER_type(ptr),
(idx))
#define sk_ASN1_INTEGER_set(sk, idx, ptr) ((ASN1_INTEGER
*)OPENSSL_sk_set(ossl_check_ASN1_INTEGER_sk_type(sk), (idx), ossl_check_ASN1_INTEGER_type(ptr)))
#define sk_ASN1_INTEGER_find(sk, ptr) OPENSSL_sk_find(ossl_check_ASN1_INTEGER_sk_type(sk),
ossl_check_ASN1_INTEGER_type(ptr))
#define sk_ASN1_INTEGER_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_ASN1_INTEGER_sk_type(sk),
ossl_check_ASN1_INTEGER_type(ptr))
#define sk_ASN1_INTEGER_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ASN1_INTEGER_sk_type(sk), ossl_check_ASN1_INTEGER_type(ptr), pnum)
#define sk_ASN1_INTEGER_sort(sk) OPENSSL_sk_sort(ossl_check_ASN1_INTEGER_sk_type(sk))
#define sk_ASN1_INTEGER_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_ASN1_INTEGER_sk_type(sk))
#define sk_ASN1_INTEGER_dup(sk) ((STACK_OF(ASN1_INTEGER)
*)OPENSSL_sk_dup(ossl_check_const_ASN1_INTEGER_sk_type(sk)))
#define sk_ASN1_INTEGER_deep_copy(sk,
 copyfunc, freefunc) ((STACK_OF(ASN1_INTEGER)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASN1_INTEGER_sk_type(sk),
ossl_check_ASN1_INTEGER_copyfunc_type(copyfunc), ossl_check_ASN1_INTEGER_freefunc_type(freefunc)))
#define sk_ASN1_INTEGER_set_cmp_func(sk, cmp)
((sk_ASN1_INTEGER_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASN1_INTEGER_sk_type(sk),
ossl_check_ASN1_INTEGER_compfunc_type(cmp)))

/* clang-format on */

DECLARE_ASN1_FUNCTIONS(ASN1_INTEGER)
ASN1_INTEGER *d2i_ASN1_UINTEGER(ASN1_INTEGER **a, const unsigned char **pp,
   long length);
DECLARE_ASN1_DUP_FUNCTION(ASN1_INTEGER)
int ASN1_INTEGER_cmp(const ASN1_INTEGER *x, const ASN1_INTEGER *y);

DECLARE_ASN1_FUNCTIONS(ASN1_ENUMERATED)

int ASN1_UTCTIME_check(const ASN1_UTCTIME *a);
ASN1_UTCTIME *ASN1_UTCTIME_set(ASN1_UTCTIME *s, time_t t);
ASN1_UTCTIME *ASN1_UTCTIME_adj(ASN1_UTCTIME *s, time_t t,
   int offset_day, long offset_sec);
int ASN1_UTCTIME_set_string(ASN1_UTCTIME *s, const char *str);
```

```
int ASN1_UTCTIME_cmp_time_t(const
 ASN1_UTCTIME *s, time_t t);

int ASN1_GENERALIZEDTIME_check(const ASN1_GENERALIZEDTIME *a);
ASN1_GENERALIZEDTIME *ASN1_GENERALIZEDTIME_set(ASN1_GENERALIZEDTIME *s,
   time_t t);
ASN1_GENERALIZEDTIME *ASN1_GENERALIZEDTIME_adj(ASN1_GENERALIZEDTIME *s,
   time_t t, int offset_day,
   long offset_sec);
int ASN1_GENERALIZEDTIME_set_string(ASN1_GENERALIZEDTIME *s, const char *str);

int ASN1_TIME_diff(int *pday, int *psec,
   const ASN1_TIME *from, const ASN1_TIME *to);

DECLARE_ASN1_FUNCTIONS(ASN1_OCTET_STRING)
DECLARE_ASN1_DUP_FUNCTION(ASN1_OCTET_STRING)
int ASN1_OCTET_STRING_cmp(const ASN1_OCTET_STRING *a,
   const ASN1_OCTET_STRING *b);
int ASN1_OCTET_STRING_set(ASN1_OCTET_STRING *str, const unsigned char *data,
   int len);

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ASN1_UTF8STRING, ASN1_UTF8STRING, ASN1_UTF8STRING)
#define sk_ASN1_UTF8STRING_num(sk)
OPENSSL_sk_num(ossl_check_const_ASN1_UTF8STRING_sk_type(sk))
#define sk_ASN1_UTF8STRING_value(sk, idx) ((ASN1_UTF8STRING
 *)OPENSSL_sk_value(ossl_check_const_ASN1_UTF8STRING_sk_type(sk), (idx)))
#define sk_ASN1_UTF8STRING_new(cmp) ((STACK_OF(ASN1_UTF8STRING)
*)OPENSSL_sk_new(ossl_check_ASN1_UTF8STRING_compfunc_type(cmp)))
#define sk_ASN1_UTF8STRING_new_null() ((STACK_OF(ASN1_UTF8STRING) *)OPENSSL_sk_new_null())
#define sk_ASN1_UTF8STRING_new_reserve(cmp, n) ((STACK_OF(ASN1_UTF8STRING)
*)OPENSSL_sk_new_reserve(ossl_check_ASN1_UTF8STRING_compfunc_type(cmp), (n)))
#define sk_ASN1_UTF8STRING_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_ASN1_UTF8STRING_sk_type(sk), (n))
#define sk_ASN1_UTF8STRING_free(sk) OPENSSL_sk_free(ossl_check_ASN1_UTF8STRING_sk_type(sk))
#define sk_ASN1_UTF8STRING_zero(sk) OPENSSL_sk_zero(ossl_check_ASN1_UTF8STRING_sk_type(sk))
#define sk_ASN1_UTF8STRING_delete(sk, i) ((ASN1_UTF8STRING
*)OPENSSL_sk_delete(ossl_check_ASN1_UTF8STRING_sk_type(sk), (i)))
#define sk_ASN1_UTF8STRING_delete_ptr(sk, ptr) ((ASN1_UTF8STRING
*)OPENSSL_sk_delete_ptr(ossl_check_ASN1_UTF8STRING_sk_type(sk),
ossl_check_ASN1_UTF8STRING_type(ptr)))
#define
 sk_ASN1_UTF8STRING_push(sk, ptr) OPENSSL_sk_push(ossl_check_ASN1_UTF8STRING_sk_type(sk),
ossl_check_ASN1_UTF8STRING_type(ptr))
#define sk_ASN1_UTF8STRING_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_ASN1_UTF8STRING_sk_type(sk),
ossl_check_ASN1_UTF8STRING_type(ptr))
#define sk_ASN1_UTF8STRING_pop(sk) ((ASN1_UTF8STRING
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```
*)OPENSSL_sk_pop(ossl_check_ASN1_UTF8STRING_sk_type(sk)))
#define sk_ASN1_UTF8STRING_shift(sk) ((ASN1_UTF8STRING
*)OPENSSL_sk_shift(ossl_check_ASN1_UTF8STRING_sk_type(sk)))
#define sk_ASN1_UTF8STRING_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASN1_UTF8STRING_sk_type(sk),ossl_check_ASN1_UTF8STRING_freefun
c_type(freefunc))
#define sk_ASN1_UTF8STRING_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_ASN1_UTF8STRING_sk_type(sk), ossl_check_ASN1_UTF8STRING_type(ptr),
(idx))
#define sk_ASN1_UTF8STRING_set(sk, idx, ptr) ((ASN1_UTF8STRING
*)OPENSSL_sk_set(ossl_check_ASN1_UTF8STRING_sk_type(sk), (idx),
ossl_check_ASN1_UTF8STRING_type(ptr)))
#define
 sk_ASN1_UTF8STRING_find(sk, ptr) OPENSSL_sk_find(ossl_check_ASN1_UTF8STRING_sk_type(sk),
ossl_check_ASN1_UTF8STRING_type(ptr))
#define sk_ASN1_UTF8STRING_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_ASN1_UTF8STRING_sk_type(sk),
ossl_check_ASN1_UTF8STRING_type(ptr))
#define sk_ASN1_UTF8STRING_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ASN1_UTF8STRING_sk_type(sk),
ossl_check_ASN1_UTF8STRING_type(ptr), pnum)
#define sk_ASN1_UTF8STRING_sort(sk) OPENSSL_sk_sort(ossl_check_ASN1_UTF8STRING_sk_type(sk))
#define sk_ASN1_UTF8STRING_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_ASN1_UTF8STRING_sk_type(sk))
#define sk_ASN1_UTF8STRING_dup(sk) ((STACK_OF(ASN1_UTF8STRING)
*)OPENSSL_sk_dup(ossl_check_const_ASN1_UTF8STRING_sk_type(sk)))
#define sk_ASN1_UTF8STRING_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ASN1_UTF8STRING)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASN1_UTF8STRING_sk_type(sk),
ossl_check_ASN1_UTF8STRING_copyfunc_type(copyfunc),
ossl_check_ASN1_UTF8STRING_freefunc_type(freefunc)))
#define
 sk_ASN1_UTF8STRING_set_cmp_func(sk, cmp)
((sk_ASN1_UTF8STRING_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASN1_UTF8STRING_sk_type(sk
), ossl_check_ASN1_UTF8STRING_compfunc_type(cmp)))

/* clang-format on */

DECLARE_ASN1_FUNCTIONS(ASN1_VISIBLESTRING)
DECLARE_ASN1_FUNCTIONS(ASN1_UNIVERSALSTRING)
DECLARE_ASN1_FUNCTIONS(ASN1_UTF8STRING)
DECLARE_ASN1_FUNCTIONS(ASN1_NULL)
DECLARE_ASN1_FUNCTIONS(ASN1_BMPSTRING)

int UTF8_getc(const unsigned char *str, int len, unsigned long *val);
int UTF8_putc(unsigned char *str, int len, unsigned long value);

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ASN1_GENERALSTRING, ASN1_GENERALSTRING,
```

```
ASN1_GENERALSTRING)
#define sk_ASN1_GENERALSTRING_num(sk)
OPENSSL_sk_num(ossl_check_const_ASN1_GENERALSTRING_sk_type(sk))
#define sk_ASN1_GENERALSTRING_value(sk, idx) ((ASN1_GENERALSTRING
*)OPENSSL_sk_value(ossl_check_const_ASN1_GENERALSTRING_sk_type(sk), (idx)))
#define sk_ASN1_GENERALSTRING_new(cmp) ((STACK_OF(ASN1_GENERALSTRING)
 *)OPENSSL_sk_new(ossl_check_ASN1_GENERALSTRING_compfunc_type(cmp)))
#define sk_ASN1_GENERALSTRING_new_null() ((STACK_OF(ASN1_GENERALSTRING)
*)OPENSSL_sk_new_null())
#define sk_ASN1_GENERALSTRING_new_reserve(cmp, n) ((STACK_OF(ASN1_GENERALSTRING)
*)OPENSSL_sk_new_reserve(ossl_check_ASN1_GENERALSTRING_compfunc_type(cmp), (n)))
#define sk_ASN1_GENERALSTRING_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_ASN1_GENERALSTRING_sk_type(sk), (n))
#define sk_ASN1_GENERALSTRING_free(sk)
OPENSSL_sk_free(ossl_check_ASN1_GENERALSTRING_sk_type(sk))
#define sk_ASN1_GENERALSTRING_zero(sk)
OPENSSL_sk_zero(ossl_check_ASN1_GENERALSTRING_sk_type(sk))
#define sk_ASN1_GENERALSTRING_delete(sk, i) ((ASN1_GENERALSTRING
*)OPENSSL_sk_delete(ossl_check_ASN1_GENERALSTRING_sk_type(sk), (i)))
#define sk_ASN1_GENERALSTRING_delete_ptr(sk, ptr) ((ASN1_GENERALSTRING
*)OPENSSL_sk_delete_ptr(ossl_check_ASN1_GENERALSTRING_sk_type(sk),
ossl_check_ASN1_GENERALSTRING_type(ptr)))
#define sk_ASN1_GENERALSTRING_push(sk,
 ptr) OPENSSL_sk_push(ossl_check_ASN1_GENERALSTRING_sk_type(sk),
ossl_check_ASN1_GENERALSTRING_type(ptr))
#define sk_ASN1_GENERALSTRING_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_ASN1_GENERALSTRING_sk_type(sk),
ossl_check_ASN1_GENERALSTRING_type(ptr))
#define sk_ASN1_GENERALSTRING_pop(sk) ((ASN1_GENERALSTRING
*)OPENSSL_sk_pop(ossl_check_ASN1_GENERALSTRING_sk_type(sk)))
#define sk_ASN1_GENERALSTRING_shift(sk) ((ASN1_GENERALSTRING
*)OPENSSL_sk_shift(ossl_check_ASN1_GENERALSTRING_sk_type(sk)))
#define sk_ASN1_GENERALSTRING_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASN1_GENERALSTRING_sk_type(sk),ossl_check_ASN1_GENERALSTRI
NG_freefunc_type(freefunc))
#define sk_ASN1_GENERALSTRING_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_ASN1_GENERALSTRING_sk_type(sk),
ossl_check_ASN1_GENERALSTRING_type(ptr), (idx))
#define sk_ASN1_GENERALSTRING_set(sk, idx, ptr) ((ASN1_GENERALSTRING
*)OPENSSL_sk_set(ossl_check_ASN1_GENERALSTRING_sk_type(sk), (idx),
ossl_check_ASN1_GENERALSTRING_type(ptr)))
#define
 sk_ASN1_GENERALSTRING_find(sk, ptr)
OPENSSL_sk_find(ossl_check_ASN1_GENERALSTRING_sk_type(sk),
ossl_check_ASN1_GENERALSTRING_type(ptr))
#define sk_ASN1_GENERALSTRING_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_ASN1_GENERALSTRING_sk_type(sk),
ossl_check_ASN1_GENERALSTRING_type(ptr))
```

```
#define sk_ASN1_GENERALSTRING_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ASN1_GENERALSTRING_sk_type(sk),
ossl_check_ASN1_GENERALSTRING_type(ptr), pnum)
#define sk_ASN1_GENERALSTRING_sort(sk)
OPENSSL_sk_sort(ossl_check_ASN1_GENERALSTRING_sk_type(sk))
#define sk_ASN1_GENERALSTRING_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_ASN1_GENERALSTRING_sk_type(sk))
#define sk_ASN1_GENERALSTRING_dup(sk) ((STACK_OF(ASN1_GENERALSTRING)
*)OPENSSL_sk_dup(ossl_check_const_ASN1_GENERALSTRING_sk_type(sk)))
#define sk_ASN1_GENERALSTRING_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(ASN1_GENERALSTRING)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASN1_GENERALSTRING_sk_type(sk),
ossl_check_ASN1_GENERALSTRING_copyfunc_type(copyfunc),
 ossl_check_ASN1_GENERALSTRING_freefunc_type(freefunc)))
#define sk_ASN1_GENERALSTRING_set_cmp_func(sk, cmp)
((sk_ASN1_GENERALSTRING_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASN1_GENERALSTRING
_sk_type(sk), ossl_check_ASN1_GENERALSTRING_compfunc_type(cmp)))

/* clang-format on */

DECLARE_ASN1_FUNCTIONS_name(ASN1_STRING, ASN1_PRINTABLE)

DECLARE_ASN1_FUNCTIONS_name(ASN1_STRING, DIRECTORYSTRING)
DECLARE_ASN1_FUNCTIONS_name(ASN1_STRING, DISPLAYTEXT)
DECLARE_ASN1_FUNCTIONS(ASN1_PRINTABLESTRING)
DECLARE_ASN1_FUNCTIONS(ASN1_T61STRING)
DECLARE_ASN1_FUNCTIONS(ASN1_IA5STRING)
DECLARE_ASN1_FUNCTIONS(ASN1_GENERALSTRING)
DECLARE_ASN1_FUNCTIONS(ASN1_UTCTIME)
DECLARE_ASN1_FUNCTIONS(ASN1_GENERALIZEDTIME)
DECLARE_ASN1_FUNCTIONS(ASN1_TIME)

DECLARE_ASN1_DUP_FUNCTION(ASN1_TIME)
DECLARE_ASN1_DUP_FUNCTION(ASN1_UTCTIME)
DECLARE_ASN1_DUP_FUNCTION(ASN1_GENERALIZEDTIME)

DECLARE_ASN1_ITEM(ASN1_OCTET_STRING_NDEF)

ASN1_TIME *ASN1_TIME_set(ASN1_TIME *s, time_t t);
ASN1_TIME
 *ASN1_TIME_adj(ASN1_TIME *s, time_t t,
   int offset_day, long offset_sec);
int ASN1_TIME_check(const ASN1_TIME *t);
ASN1_GENERALIZEDTIME *ASN1_TIME_to_generalizedtime(const ASN1_TIME *t,
   ASN1_GENERALIZEDTIME **out);
int ASN1_TIME_set_string(ASN1_TIME *s, const char *str);
int ASN1_TIME_set_string_X509(ASN1_TIME *s, const char *str);
int ASN1_TIME_to_tm(const ASN1_TIME *s, struct tm *tm);
```

```
int ASN1_TIME_normalize(ASN1_TIME *s);
int ASN1_TIME_cmp_time_t(const ASN1_TIME *s, time_t t);
int ASN1_TIME_compare(const ASN1_TIME *a, const ASN1_TIME *b);

int i2a_ASN1_INTEGER(BIO *bp, const ASN1_INTEGER *a);
int a2i_ASN1_INTEGER(BIO *bp, ASN1_INTEGER *bs, char *buf, int size);
int i2a_ASN1_ENUMERATED(BIO *bp, const ASN1_ENUMERATED *a);
int a2i_ASN1_ENUMERATED(BIO *bp, ASN1_ENUMERATED *bs, char *buf, int size);
int i2a_ASN1_OBJECT(BIO *bp, const ASN1_OBJECT *a);
int a2i_ASN1_STRING(BIO *bp, ASN1_STRING *bs, char *buf, int size);
int i2a_ASN1_STRING(BIO *bp, const ASN1_STRING *a, int type);
int
 i2t_ASN1_OBJECT(char *buf, int buf_len, const ASN1_OBJECT *a);

int a2d_ASN1_OBJECT(unsigned char *out, int olen, const char *buf, int num);
ASN1_OBJECT *ASN1_OBJECT_create(int nid, unsigned char *data, int len,
   const char *sn, const char *ln);

int ASN1_INTEGER_get_int64(int64_t *pr, const ASN1_INTEGER *a);
int ASN1_INTEGER_set_int64(ASN1_INTEGER *a, int64_t r);
int ASN1_INTEGER_get_uint64(uint64_t *pr, const ASN1_INTEGER *a);
int ASN1_INTEGER_set_uint64(ASN1_INTEGER *a, uint64_t r);

int ASN1_INTEGER_set(ASN1_INTEGER *a, long v);
long ASN1_INTEGER_get(const ASN1_INTEGER *a);
ASN1_INTEGER *BN_to_ASN1_INTEGER(const BIGNUM *bn, ASN1_INTEGER *ai);
BIGNUM *ASN1_INTEGER_to_BN(const ASN1_INTEGER *ai, BIGNUM *bn);

int ASN1_ENUMERATED_get_int64(int64_t *pr, const ASN1_ENUMERATED *a);
int ASN1_ENUMERATED_set_int64(ASN1_ENUMERATED *a, int64_t r);

int ASN1_ENUMERATED_set(ASN1_ENUMERATED *a, long v);
long ASN1_ENUMERATED_get(const ASN1_ENUMERATED *a);
ASN1_ENUMERATED *BN_to_ASN1_ENUMERATED(const
 BIGNUM *bn, ASN1_ENUMERATED *ai);
BIGNUM *ASN1_ENUMERATED_to_BN(const ASN1_ENUMERATED *ai, BIGNUM *bn);

/* General */
/* given a string, return the correct type, max is the maximum length */
int ASN1_PRINTABLE_type(const unsigned char *s, int max);

unsigned long ASN1_tag2bit(int tag);

/* SPECIALS */
int ASN1_get_object(const unsigned char **pp, long *plength, int *ptag,
   int *pclass, long omax);
int ASN1_check_infinite_end(unsigned char **p, long len);
int ASN1_const_check_infinite_end(const unsigned char **p, long len);
```

```
void ASN1_put_object(unsigned char **pp, int constructed, int length,
   int tag, int xclass);
int ASN1_put_eoc(unsigned char **pp);
int ASN1_object_size(int constructed, int length, int tag);

/* Used to implement other functions */
void *ASN1_dup(i2d_of_void *i2d, d2i_of_void *d2i, const void *x);

#define ASN1_dup_of(type, i2d, d2i, x)          \
   ((type *)ASN1_dup(CHECKED_I2D_OF(type, i2d), \
       CHECKED_D2I_OF(type, d2i),              \

      CHECKED_PTR_OF(const type, x)))

void *ASN1_item_dup(const ASN1_ITEM *it, const void *x);
int ASN1_item_sign_ex(const ASN1_ITEM *it, X509_ALGOR *algor1,
   X509_ALGOR *algor2, ASN1_BIT_STRING *signature,
   const void *data, const ASN1_OCTET_STRING *id,
   EVP_PKEY *pkey, const EVP_MD *md, OSSL_LIB_CTX *libctx,
   const char *propq);
int ASN1_item_verify_ex(const ASN1_ITEM *it, const X509_ALGOR *alg,
   const ASN1_BIT_STRING *signature, const void *data,
   const ASN1_OCTET_STRING *id, EVP_PKEY *pkey,
   OSSL_LIB_CTX *libctx, const char *propq);

/* ASN1 alloc/free macros for when a type is only used internally */

#define M_ASN1_new_of(type) (type *)ASN1_item_new(ASN1_ITEM_rptr(type))
#define M_ASN1_free_of(x, type) \
   ASN1_item_free(CHECKED_PTR_OF(type, x), ASN1_ITEM_rptr(type))

#ifndef OPENSSL_NO_STDIO
void *ASN1_d2i_fp(void *(*xnew)(void), d2i_of_void *d2i, FILE *in, void **x);

#define ASN1_d2i_fp_of(type, xnew, d2i, in, x)       \
   ((type *)ASN1_d2i_fp(CHECKED_NEW_OF(type,
 xnew), \
       CHECKED_D2I_OF(type, d2i),                  \
       in,                                         \
       CHECKED_PPTR_OF(type, x)))

void *ASN1_item_d2i_fp_ex(const ASN1_ITEM *it, FILE *in, void *x,
   OSSL_LIB_CTX *libctx, const char *propq);
void *ASN1_item_d2i_fp(const ASN1_ITEM *it, FILE *in, void *x);
int ASN1_i2d_fp(i2d_of_void *i2d, FILE *out, const void *x);

#define ASN1_i2d_fp_of(type, i2d, out, x)   \
   (ASN1_i2d_fp(CHECKED_I2D_OF(type, i2d), \
```

```
      out,                          \
      CHECKED_PTR_OF(const type, x)))

int ASN1_item_i2d_fp(const ASN1_ITEM *it, FILE *out, const void *x);
int ASN1_STRING_print_ex_fp(FILE *fp, const ASN1_STRING *str, unsigned long flags);
#endif

int ASN1_STRING_to_UTF8(unsigned char **out, const ASN1_STRING *in);

void *ASN1_d2i_bio(void *(*xnew)(void), d2i_of_void *d2i, BIO *in, void **x);

#define ASN1_d2i_bio_of(type, xnew, d2i, in, x)       \
   ((type *)ASN1_d2i_bio(CHECKED_NEW_OF(type, xnew),
 \
      CHECKED_D2I_OF(type, d2i),                  \
      in,                                   \
      CHECKED_PPTR_OF(type, x)))

void *ASN1_item_d2i_bio_ex(const ASN1_ITEM *it, BIO *in, void *pval,
   OSSL_LIB_CTX *libctx, const char *propq);
void *ASN1_item_d2i_bio(const ASN1_ITEM *it, BIO *in, void *pval);
int ASN1_i2d_bio(i2d_of_void *i2d, BIO *out, const void *x);

#define ASN1_i2d_bio_of(type, i2d, out, x)   \
   (ASN1_i2d_bio(CHECKED_I2D_OF(type, i2d), \
      out,                          \
      CHECKED_PTR_OF(const type, x)))

int ASN1_item_i2d_bio(const ASN1_ITEM *it, BIO *out, const void *x);
BIO *ASN1_item_i2d_mem_bio(const ASN1_ITEM *it, const ASN1_VALUE *val);
int ASN1_UTCTIME_print(BIO *fp, const ASN1_UTCTIME *a);
int ASN1_GENERALIZEDTIME_print(BIO *fp, const ASN1_GENERALIZEDTIME *a);
int ASN1_TIME_print(BIO *bp, const ASN1_TIME *tm);
int ASN1_TIME_print_ex(BIO *bp, const ASN1_TIME *tm, unsigned long flags);
int ASN1_STRING_print(BIO
 *bp, const ASN1_STRING *v);
int ASN1_STRING_print_ex(BIO *out, const ASN1_STRING *str, unsigned long flags);
int ASN1_buf_print(BIO *bp, const unsigned char *buf, size_t buflen, int off);
int ASN1_bn_print(BIO *bp, const char *number, const BIGNUM *num,
   unsigned char *buf, int off);
int ASN1_parse(BIO *bp, const unsigned char *pp, long len, int indent);
int ASN1_parse_dump(BIO *bp, const unsigned char *pp, long len, int indent,
   int dump);
const char *ASN1_tag2str(int tag);

/* Used to load and write Netscape format cert */

int ASN1_UNIVERSALSTRING_to_string(ASN1_UNIVERSALSTRING *s);
```

```
int ASN1_TYPE_set_octetstring(ASN1_TYPE *a, unsigned char *data, int len);
int ASN1_TYPE_get_octetstring(const ASN1_TYPE *a, unsigned char *data, int max_len);
int ASN1_TYPE_set_int_octetstring(ASN1_TYPE *a, long num,
   unsigned char *data, int len);
int ASN1_TYPE_get_int_octetstring(const ASN1_TYPE *a, long *num,
   unsigned char *data, int max_len);

void *ASN1_item_unpack(const ASN1_STRING
 *oct, const ASN1_ITEM *it);
void *ASN1_item_unpack_ex(const ASN1_STRING *oct, const ASN1_ITEM *it,
   OSSL_LIB_CTX *libctx, const char *propq);

ASN1_STRING *ASN1_item_pack(void *obj, const ASN1_ITEM *it,
   ASN1_OCTET_STRING **oct);

void ASN1_STRING_set_default_mask(unsigned long mask);
int ASN1_STRING_set_default_mask_asc(const char *p);
unsigned long ASN1_STRING_get_default_mask(void);
int ASN1_mbstring_copy(ASN1_STRING **out, const unsigned char *in, int len,
   int inform, unsigned long mask);
int ASN1_mbstring_ncopy(ASN1_STRING **out, const unsigned char *in, int len,
   int inform, unsigned long mask,
   long minsize, long maxsize);

ASN1_STRING *ASN1_STRING_set_by_NID(ASN1_STRING **out,
   const unsigned char *in, int inlen,
   int inform, int nid);
ASN1_STRING_TABLE *ASN1_STRING_TABLE_get(int nid);
int ASN1_STRING_TABLE_add(int, long, long, unsigned long, unsigned long);
void ASN1_STRING_TABLE_cleanup(void);

/* ASN1 template functions */

/* Old API compatible functions
 */
ASN1_VALUE *ASN1_item_new(const ASN1_ITEM *it);
ASN1_VALUE *ASN1_item_new_ex(const ASN1_ITEM *it, OSSL_LIB_CTX *libctx,
   const char *propq);
void ASN1_item_free(ASN1_VALUE *val, const ASN1_ITEM *it);
ASN1_VALUE *ASN1_item_d2i_ex(ASN1_VALUE **val, const unsigned char **in,
   long len, const ASN1_ITEM *it,
   OSSL_LIB_CTX *libctx, const char *propq);
ASN1_VALUE *ASN1_item_d2i(ASN1_VALUE **val, const unsigned char **in,
   long len, const ASN1_ITEM *it);
int ASN1_item_i2d(const ASN1_VALUE *val, unsigned char **out, const ASN1_ITEM *it);
int ASN1_item_ndef_i2d(const ASN1_VALUE *val, unsigned char **out,
   const ASN1_ITEM *it);
```

```
void ASN1_add_oid_module(void);
void ASN1_add_stable_module(void);

ASN1_TYPE *ASN1_generate_nconf(const char *str, CONF *nconf);
ASN1_TYPE *ASN1_generate_v3(const char *str, X509V3_CTX *cnf);
int ASN1_str2mask(const char *str, unsigned long *pmask);

/* ASN1 Print flags */

/* Indicate missing OPTIONAL fields */
#define ASN1_PCTX_FLAGS_SHOW_ABSENT 0x001
/*
 Mark start and end of SEQUENCE */
#define ASN1_PCTX_FLAGS_SHOW_SEQUENCE 0x002
/* Mark start and end of SEQUENCE/SET OF */
#define ASN1_PCTX_FLAGS_SHOW_SSOF 0x004
/* Show the ASN1 type of primitives */
#define ASN1_PCTX_FLAGS_SHOW_TYPE 0x008
/* Don't show ASN1 type of ANY */
#define ASN1_PCTX_FLAGS_NO_ANY_TYPE 0x010
/* Don't show ASN1 type of MSTRINGs */
#define ASN1_PCTX_FLAGS_NO_MSTRING_TYPE 0x020
/* Don't show field names in SEQUENCE */
#define ASN1_PCTX_FLAGS_NO_FIELD_NAME 0x040
/* Show structure names of each SEQUENCE field */
#define ASN1_PCTX_FLAGS_SHOW_FIELD_STRUCT_NAME 0x080
/* Don't show structure name even at top level */
#define ASN1_PCTX_FLAGS_NO_STRUCT_NAME 0x100

int ASN1_item_print(BIO *out, const ASN1_VALUE *ifld, int indent,
   const ASN1_ITEM *it, const ASN1_PCTX *pctx);
ASN1_PCTX *ASN1_PCTX_new(void);
void ASN1_PCTX_free(ASN1_PCTX *p);
unsigned long ASN1_PCTX_get_flags(const ASN1_PCTX *p);
void ASN1_PCTX_set_flags(ASN1_PCTX *p, unsigned long flags);
unsigned
 long ASN1_PCTX_get_nm_flags(const ASN1_PCTX *p);
void ASN1_PCTX_set_nm_flags(ASN1_PCTX *p, unsigned long flags);
unsigned long ASN1_PCTX_get_cert_flags(const ASN1_PCTX *p);
void ASN1_PCTX_set_cert_flags(ASN1_PCTX *p, unsigned long flags);
unsigned long ASN1_PCTX_get_oid_flags(const ASN1_PCTX *p);
void ASN1_PCTX_set_oid_flags(ASN1_PCTX *p, unsigned long flags);
unsigned long ASN1_PCTX_get_str_flags(const ASN1_PCTX *p);
void ASN1_PCTX_set_str_flags(ASN1_PCTX *p, unsigned long flags);

ASN1_SCTX *ASN1_SCTX_new(int (*scan_cb)(ASN1_SCTX *ctx));
void ASN1_SCTX_free(ASN1_SCTX *p);
```

```
const ASN1_ITEM *ASN1_SCTX_get_item(ASN1_SCTX *p);
const ASN1_TEMPLATE *ASN1_SCTX_get_template(ASN1_SCTX *p);
unsigned long ASN1_SCTX_get_flags(ASN1_SCTX *p);
void ASN1_SCTX_set_app_data(ASN1_SCTX *p, void *data);
void *ASN1_SCTX_get_app_data(ASN1_SCTX *p);

const BIO_METHOD *BIO_f_asn1(void);

/* cannot constify val because of CMS_stream() */
BIO *BIO_new_NDEF(BIO *out, ASN1_VALUE *val, const ASN1_ITEM *it);

int
 i2d_ASN1_bio_stream(BIO *out, ASN1_VALUE *val, BIO *in, int flags,
   const ASN1_ITEM *it);
int PEM_write_bio_ASN1_stream(BIO *out, ASN1_VALUE *val, BIO *in, int flags,
   const char *hdr, const ASN1_ITEM *it);
/* cannot constify val because of CMS_dataFinal() */
int SMIME_write_ASN1(BIO *bio, ASN1_VALUE *val, BIO *data, int flags,
   int ctype_nid, int econt_nid,
   STACK_OF(X509_ALGOR) *mdalgs, const ASN1_ITEM *it);
int SMIME_write_ASN1_ex(BIO *bio, ASN1_VALUE *val, BIO *data, int flags,
   int ctype_nid, int econt_nid,
   STACK_OF(X509_ALGOR) *mdalgs, const ASN1_ITEM *it,
   OSSL_LIB_CTX *libctx, const char *propq);
ASN1_VALUE *SMIME_read_ASN1(BIO *bio, BIO **bcont, const ASN1_ITEM *it);
ASN1_VALUE *SMIME_read_ASN1_ex(BIO *bio, int flags, BIO **bcont,
   const ASN1_ITEM *it, ASN1_VALUE **x,
   OSSL_LIB_CTX *libctx, const char *propq);
int SMIME_crlf_copy(BIO *in, BIO *out, int flags);
int SMIME_text(BIO *in, BIO *out);

const ASN1_ITEM *ASN1_ITEM_lookup(const char *name);
const
 ASN1_ITEM *ASN1_ITEM_get(size_t i);

/* Legacy compatibility */
#define DECLARE_ASN1_FUNCTIONS_fname(type, itname, name) \
   DECLARE_ASN1_ALLOC_FUNCTIONS_name(type, name)       \
   DECLARE_ASN1_ENCODE_FUNCTIONS(type, itname, name)
#define DECLARE_ASN1_FUNCTIONS_const(type) DECLARE_ASN1_FUNCTIONS(type)
#define DECLARE_ASN1_ENCODE_FUNCTIONS_const(type, name) \
   DECLARE_ASN1_ENCODE_FUNCTIONS(type, name)
#define I2D_OF_const(type) I2D_OF(type)
#define ASN1_dup_of_const(type, i2d, d2i, x) ASN1_dup_of(type, i2d, d2i, x)
#define ASN1_i2d_fp_of_const(type, i2d, out, x) ASN1_i2d_fp_of(type, i2d, out, x)
#define ASN1_i2d_bio_of_const(type, i2d, out, x) ASN1_i2d_bio_of(type, i2d, out, x)

#ifdef __cplusplus
```

```
}
#endif
#endif
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/ess.h.in
*
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*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_ESS_H
#define OPENSSL_ESS_H
#pragma once
```

```
#include <openssl/opensslconf.h>

#include <openssl/safestack.h>
#include <openssl/x509.h>
#include <openssl/esserr.h>

#ifdef __cplusplus
extern "C" {
#endif

typedef struct ESS_issuer_serial ESS_ISSUER_SERIAL;
typedef struct ESS_cert_id ESS_CERT_ID;
typedef struct ESS_signing_cert ESS_SIGNING_CERT;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ESS_CERT_ID, ESS_CERT_ID, ESS_CERT_ID)
#define sk_ESS_CERT_ID_num(sk) OPENSSL_sk_num(ossl_check_const_ESS_CERT_ID_sk_type(sk))
#define
 sk_ESS_CERT_ID_value(sk, idx) ((ESS_CERT_ID
*)OPENSSL_sk_value(ossl_check_const_ESS_CERT_ID_sk_type(sk), (idx)))
#define sk_ESS_CERT_ID_new(cmp) ((STACK_OF(ESS_CERT_ID)
*)OPENSSL_sk_new(ossl_check_ESS_CERT_ID_compfunc_type(cmp)))
#define sk_ESS_CERT_ID_new_null() ((STACK_OF(ESS_CERT_ID) *)OPENSSL_sk_new_null())
#define sk_ESS_CERT_ID_new_reserve(cmp, n) ((STACK_OF(ESS_CERT_ID)
*)OPENSSL_sk_new_reserve(ossl_check_ESS_CERT_ID_compfunc_type(cmp), (n)))
#define sk_ESS_CERT_ID_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_ESS_CERT_ID_sk_type(sk), (n))
#define sk_ESS_CERT_ID_free(sk) OPENSSL_sk_free(ossl_check_ESS_CERT_ID_sk_type(sk))
#define sk_ESS_CERT_ID_zero(sk) OPENSSL_sk_zero(ossl_check_ESS_CERT_ID_sk_type(sk))
#define sk_ESS_CERT_ID_delete(sk, i) ((ESS_CERT_ID
*)OPENSSL_sk_delete(ossl_check_ESS_CERT_ID_sk_type(sk), (i)))
#define sk_ESS_CERT_ID_delete_ptr(sk, ptr) ((ESS_CERT_ID
*)OPENSSL_sk_delete_ptr(ossl_check_ESS_CERT_ID_sk_type(sk), ossl_check_ESS_CERT_ID_type(ptr)))
#define
 sk_ESS_CERT_ID_push(sk, ptr) OPENSSL_sk_push(ossl_check_ESS_CERT_ID_sk_type(sk),
ossl_check_ESS_CERT_ID_type(ptr))
#define sk_ESS_CERT_ID_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_ESS_CERT_ID_sk_type(sk),
ossl_check_ESS_CERT_ID_type(ptr))
#define sk_ESS_CERT_ID_pop(sk) ((ESS_CERT_ID
*)OPENSSL_sk_pop(ossl_check_ESS_CERT_ID_sk_type(sk)))
#define sk_ESS_CERT_ID_shift(sk) ((ESS_CERT_ID
*)OPENSSL_sk_shift(ossl_check_ESS_CERT_ID_sk_type(sk)))
#define sk_ESS_CERT_ID_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ESS_CERT_ID_sk_type(sk),ossl_check_ESS_CERT_ID_freefunc_type(freefu
nc))
#define sk_ESS_CERT_ID_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_ESS_CERT_ID_sk_type(sk),
ossl_check_ESS_CERT_ID_type(ptr), (idx))
#define sk_ESS_CERT_ID_set(sk, idx, ptr) ((ESS_CERT_ID
*)OPENSSL_sk_set(ossl_check_ESS_CERT_ID_sk_type(sk), (idx), ossl_check_ESS_CERT_ID_type(ptr)))
```

```
#define sk_ESS_CERT_ID_find(sk, ptr) OPENSSL_sk_find(ossl_check_ESS_CERT_ID_sk_type(sk),
ossl_check_ESS_CERT_ID_type(ptr))
#define
 sk_ESS_CERT_ID_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_ESS_CERT_ID_sk_type(sk),
ossl_check_ESS_CERT_ID_type(ptr))
#define sk_ESS_CERT_ID_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ESS_CERT_ID_sk_type(sk), ossl_check_ESS_CERT_ID_type(ptr), pnum)
#define sk_ESS_CERT_ID_sort(sk) OPENSSL_sk_sort(ossl_check_ESS_CERT_ID_sk_type(sk))
#define sk_ESS_CERT_ID_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_ESS_CERT_ID_sk_type(sk))
#define sk_ESS_CERT_ID_dup(sk) ((STACK_OF(ESS_CERT_ID)
*)OPENSSL_sk_dup(ossl_check_const_ESS_CERT_ID_sk_type(sk)))
#define sk_ESS_CERT_ID_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ESS_CERT_ID)
*)OPENSSL_sk_deep_copy(ossl_check_const_ESS_CERT_ID_sk_type(sk),
ossl_check_ESS_CERT_ID_copyfunc_type(copyfunc), ossl_check_ESS_CERT_ID_freefunc_type(freefunc)))
#define sk_ESS_CERT_ID_set_cmp_func(sk, cmp)
((sk_ESS_CERT_ID_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ESS_CERT_ID_sk_type(sk),
ossl_check_ESS_CERT_ID_compfunc_type(cmp)))

/*
 clang-format on */

typedef struct ESS_signing_cert_v2_st ESS_SIGNING_CERT_V2;
typedef struct ESS_cert_id_v2_st ESS_CERT_ID_V2;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ESS_CERT_ID_V2, ESS_CERT_ID_V2, ESS_CERT_ID_V2)
#define sk_ESS_CERT_ID_V2_num(sk) OPENSSL_sk_num(ossl_check_const_ESS_CERT_ID_V2_sk_type(sk))
#define sk_ESS_CERT_ID_V2_value(sk, idx) ((ESS_CERT_ID_V2
*)OPENSSL_sk_value(ossl_check_const_ESS_CERT_ID_V2_sk_type(sk), (idx)))
#define sk_ESS_CERT_ID_V2_new(cmp) ((STACK_OF(ESS_CERT_ID_V2)
*)OPENSSL_sk_new(ossl_check_ESS_CERT_ID_V2_compfunc_type(cmp)))
#define sk_ESS_CERT_ID_V2_new_null() ((STACK_OF(ESS_CERT_ID_V2) *)OPENSSL_sk_new_null())
#define sk_ESS_CERT_ID_V2_new_reserve(cmp, n) ((STACK_OF(ESS_CERT_ID_V2)
*)OPENSSL_sk_new_reserve(ossl_check_ESS_CERT_ID_V2_compfunc_type(cmp), (n)))
#define sk_ESS_CERT_ID_V2_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_ESS_CERT_ID_V2_sk_type(sk),
(n))
#define sk_ESS_CERT_ID_V2_free(sk) OPENSSL_sk_free(ossl_check_ESS_CERT_ID_V2_sk_type(sk))
#define
 sk_ESS_CERT_ID_V2_zero(sk) OPENSSL_sk_zero(ossl_check_ESS_CERT_ID_V2_sk_type(sk))
#define sk_ESS_CERT_ID_V2_delete(sk, i) ((ESS_CERT_ID_V2
*)OPENSSL_sk_delete(ossl_check_ESS_CERT_ID_V2_sk_type(sk), (i)))
#define sk_ESS_CERT_ID_V2_delete_ptr(sk, ptr) ((ESS_CERT_ID_V2
*)OPENSSL_sk_delete_ptr(ossl_check_ESS_CERT_ID_V2_sk_type(sk),
ossl_check_ESS_CERT_ID_V2_type(ptr)))
#define sk_ESS_CERT_ID_V2_push(sk, ptr) OPENSSL_sk_push(ossl_check_ESS_CERT_ID_V2_sk_type(sk),
ossl_check_ESS_CERT_ID_V2_type(ptr))
#define sk_ESS_CERT_ID_V2_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_ESS_CERT_ID_V2_sk_type(sk), ossl_check_ESS_CERT_ID_V2_type(ptr))
```

```
#define sk_ESS_CERT_ID_V2_pop(sk) ((ESS_CERT_ID_V2
*)OPENSSL_sk_pop(ossl_check_ESS_CERT_ID_V2_sk_type(sk)))
#define sk_ESS_CERT_ID_V2_shift(sk) ((ESS_CERT_ID_V2
*)OPENSSL_sk_shift(ossl_check_ESS_CERT_ID_V2_sk_type(sk)))
#define sk_ESS_CERT_ID_V2_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ESS_CERT_ID_V2_sk_type(sk),ossl_check_ESS_CERT_ID_V2_freefunc_ty
pe(freefunc))
#define
 sk_ESS_CERT_ID_V2_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_ESS_CERT_ID_V2_sk_type(sk),
ossl_check_ESS_CERT_ID_V2_type(ptr), (idx))
#define sk_ESS_CERT_ID_V2_set(sk, idx, ptr) ((ESS_CERT_ID_V2
*)OPENSSL_sk_set(ossl_check_ESS_CERT_ID_V2_sk_type(sk), (idx),
ossl_check_ESS_CERT_ID_V2_type(ptr)))
#define sk_ESS_CERT_ID_V2_find(sk, ptr) OPENSSL_sk_find(ossl_check_ESS_CERT_ID_V2_sk_type(sk),
ossl_check_ESS_CERT_ID_V2_type(ptr))
#define sk_ESS_CERT_ID_V2_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_ESS_CERT_ID_V2_sk_type(sk), ossl_check_ESS_CERT_ID_V2_type(ptr))
#define sk_ESS_CERT_ID_V2_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ESS_CERT_ID_V2_sk_type(sk), ossl_check_ESS_CERT_ID_V2_type(ptr),
pnum)
#define sk_ESS_CERT_ID_V2_sort(sk) OPENSSL_sk_sort(ossl_check_ESS_CERT_ID_V2_sk_type(sk))
#define sk_ESS_CERT_ID_V2_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_ESS_CERT_ID_V2_sk_type(sk))
#define sk_ESS_CERT_ID_V2_dup(sk)
 ((STACK_OF(ESS_CERT_ID_V2) *)OPENSSL_sk_dup(ossl_check_const_ESS_CERT_ID_V2_sk_type(sk)))
#define sk_ESS_CERT_ID_V2_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ESS_CERT_ID_V2)
*)OPENSSL_sk_deep_copy(ossl_check_const_ESS_CERT_ID_V2_sk_type(sk),
ossl_check_ESS_CERT_ID_V2_copyfunc_type(copyfunc),
ossl_check_ESS_CERT_ID_V2_freefunc_type(freefunc)))
#define sk_ESS_CERT_ID_V2_set_cmp_func(sk, cmp)
((sk_ESS_CERT_ID_V2_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ESS_CERT_ID_V2_sk_type(sk),
ossl_check_ESS_CERT_ID_V2_compfunc_type(cmp)))

/* clang-format on */

DECLARE_ASN1_ALLOC_FUNCTIONS(ESS_ISSUER_SERIAL)
DECLARE_ASN1_ENCODE_FUNCTIONS_only(ESS_ISSUER_SERIAL, ESS_ISSUER_SERIAL)
DECLARE_ASN1_DUP_FUNCTION(ESS_ISSUER_SERIAL)

DECLARE_ASN1_ALLOC_FUNCTIONS(ESS_CERT_ID)
DECLARE_ASN1_ENCODE_FUNCTIONS_only(ESS_CERT_ID, ESS_CERT_ID)
DECLARE_ASN1_DUP_FUNCTION(ESS_CERT_ID)

DECLARE_ASN1_FUNCTIONS(ESS_SIGNING_CERT)
DECLARE_ASN1_DUP_FUNCTION(ESS_SIGNING_CERT)

DECLARE_ASN1_ALLOC_FUNCTIONS(ESS_CERT_ID_V2)
DECLARE_ASN1_ENCODE_FUNCTIONS_only(ESS_CERT_ID_V2,
```

```
 ESS_CERT_ID_V2)
DECLARE_ASN1_DUP_FUNCTION(ESS_CERT_ID_V2)

DECLARE_ASN1_FUNCTIONS(ESS_SIGNING_CERT_V2)
DECLARE_ASN1_DUP_FUNCTION(ESS_SIGNING_CERT_V2)

ESS_SIGNING_CERT *OSSL_ESS_signing_cert_new_init(const X509 *signcert,
   const STACK_OF(X509) *certs,
   int set_issuer_serial);
ESS_SIGNING_CERT_V2 *OSSL_ESS_signing_cert_v2_new_init(const EVP_MD *hash_alg,
   const X509 *signcert,
   const STACK_OF(X509) *certs,
   int set_issuer_serial);
int OSSL_ESS_check_signing_certs(const ESS_SIGNING_CERT *ss,
   const ESS_SIGNING_CERT_V2 *ssv2,
   const STACK_OF(X509) *chain,
   int require_signing_cert);

#ifdef __cplusplus
}
#endif
#endif
ISC
{
 'variables': {
   'openssl_sources': [
     'openssl/crypto/aes/aes_ecb.c',
     'openssl/crypto/aes/aes_misc.c',
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     'openssl/crypto/bn/bn_const.c',
     'openssl/crypto/bn/bn_conv.c',
     'openssl/crypto/bn/bn_ctx.c',
     'openssl/crypto/bn/bn_dh.c',
     'openssl/crypto/bn/bn_div.c',
     'openssl/crypto/bn/bn_exp.c',
     'openssl/crypto/bn/bn_exp2.c',
     'openssl/crypto/bn/bn_gcd.c',
     'openssl/crypto/bn/bn_gf2m.c',
     'openssl/crypto/bn/bn_intern.c',
     'openssl/crypto/bn/bn_kron.c',
     'openssl/crypto/bn/bn_lib.c',
     'openssl/crypto/bn/bn_mod.c',
     'openssl/crypto/bn/bn_mont.c',
     'openssl/crypto/bn/bn_mpi.c',
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     'openssl/crypto/bn/bn_nist.c',
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'openssl/crypto/bn/bn_rand.c',
'openssl/crypto/bn/bn_recp.c',
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'openssl/crypto/ec/curve448/arch_64/f_impl64.c',
'openssl/crypto/ec/curve448/curve448.c',
'openssl/crypto/ec/curve448/curve448_tables.c',
'openssl/crypto/ec/curve448/eddsa.c',
'openssl/crypto/ec/curve448/f_generic.c',
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'openssl/crypto/bsearch.c',
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 'openssl/providers/implementations/signature/ml_dsa_sig.c',
 'openssl/providers/implementations/signature/rsa_sig.c',
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 'openssl/providers/implementations/skeymgmt/generic.c',
 'openssl/ssl/record/methods/ssl3_cbc.c',
 'openssl/providers/common/der/der_dsa_key.c',
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  './config/archs/BSD-x86/asm/crypto/aes/vpaes-x86.S',
  './config/archs/BSD-x86/asm/crypto/bf/bf-586.S',
  './config/archs/BSD-x86/asm/crypto/bn/bn-586.S',
  './config/archs/BSD-x86/asm/crypto/bn/co-586.S',
  './config/archs/BSD-x86/asm/crypto/bn/x86-gf2m.S',
  './config/archs/BSD-x86/asm/crypto/bn/x86-mont.S',
  './config/archs/BSD-x86/asm/crypto/camellia/cmll-x86.S',
  './config/archs/BSD-x86/asm/crypto/chacha/chacha-x86.S',
   './config/archs/BSD-x86/asm/crypto/des/crypt586.S',
  './config/archs/BSD-x86/asm/crypto/des/des-586.S',
  './config/archs/BSD-x86/asm/crypto/ec/ecp_nistz256-x86.S',
  './config/archs/BSD-x86/asm/crypto/params_idx.c',
  './config/archs/BSD-x86/asm/crypto/x86cpuid.S',
  './config/archs/BSD-x86/asm/crypto/md5/md5-586.S',
  './config/archs/BSD-x86/asm/crypto/modes/ghash-x86.S',
  './config/archs/BSD-x86/asm/crypto/poly1305/poly1305-x86.S',
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  './config/archs/BSD-x86/asm/crypto/ripemd/rmd-586.S',
  './config/archs/BSD-x86/asm/crypto/sha/sha1-586.S',
  './config/archs/BSD-x86/asm/crypto/sha/sha256-586.S',
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  './config/archs/BSD-x86/asm/crypto/whrlpool/wp-mmx.S',
  './config/archs/BSD-x86/asm/engines/e_padlock-x86.S',
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  './config/archs/BSD-x86/asm/providers/common/der/der_dsa_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_ec_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_ecx_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_ml_dsa_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_rsa_gen.c',
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  './config/archs/BSD-x86/asm/providers/common/der/der_wrap_gen.c',
  './config/archs/BSD-x86/asm/providers/legacy.ld',
  './config/archs/BSD-x86/asm/providers/fips.ld',

],
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  'DES_ASM',
  'ECP_NISTZ256_ASM',
  'FIPS_MODULE',
  'GHASH_ASM',
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    'OPENSSL_BN_ASM_GF2m',
    'OPENSSL_BN_ASM_MONT',
    'OPENSSL_BN_ASM_PART_WORDS',
     'OPENSSL_CPUID_OBJ',
    'OPENSSL_IA32_SSE2',
    'SHA1_ASM',
    'SHA256_ASM',
    'SHA512_ASM',
    'VPAES_ASM',
    'FIPS_MODULE',
  ],
  'openssl_cflags_BSD-x86': [
    '-Wa,--noexecstack',
    '-Wall -O3 -fomit-frame-pointer',
    '-pthread',
    '-Wall -O3 -fomit-frame-pointer',
  ],
  'openssl_ex_libs_BSD-x86': [
    '-pthread',
  ],
  'linker_script': ''
 },
 'include_dirs': [
  '.',
  './include',
  './crypto',
  './crypto/include/internal',
  './providers/common/include',
 ],
 'defines': ['<@(openssl_defines_BSD-x86)'],
 'cflags': ['<@(openssl_cflags_BSD-x86)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86)'],

 'sources': ['<@(openssl_sources)', '<@(openssl_sources_BSD-x86)'],
 'direct_dependent_settings': {
  'include_dirs': ['./include', '.'],
  'defines': ['<@(openssl_defines_BSD-x86)'],
 },
}
/*
* WARNING: do not edit!
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*/

#ifndef OPENSSL_CONFIGURATION_H
#define OPENSSL_CONFIGURATION_H
#pragma once

#ifdef __cplusplus
extern "C" {
#endif

#ifdef OPENSSL_ALGORITHM_DEFINES
#error OPENSSL_ALGORITHM_DEFINES no longer supported
#endif

/*
* OpenSSL was configured with the following options:
*/

/* clang-format off */
# define OPENSSL_CONFIGURED_API 30500
# ifndef OPENSSL_RAND_SEED_OS
#  define OPENSSL_RAND_SEED_OS
# endif
# ifndef OPENSSL_THREADS
#  define OPENSSL_THREADS
# endif
# ifndef OPENSSL_NO_AFALGENG
#  define OPENSSL_NO_AFALGENG
#
 endif
# ifndef OPENSSL_NO_ASAN
#  define OPENSSL_NO_ASAN
# endif
# ifndef OPENSSL_NO_BROTLI
#  define OPENSSL_NO_BROTLI
# endif
# ifndef OPENSSL_NO_BROTLI_DYNAMIC
#  define OPENSSL_NO_BROTLI_DYNAMIC
# endif
# ifndef OPENSSL_NO_COMP
#  define OPENSSL_NO_COMP
# endif
# ifndef OPENSSL_NO_CRYPTO_MDEBUG
#  define OPENSSL_NO_CRYPTO_MDEBUG
# endif
# ifndef OPENSSL_NO_CRYPTO_MDEBUG_BACKTRACE
```

```
#  define OPENSSL_NO_CRYPTO_MDEBUG_BACKTRACE
# endif
# ifndef OPENSSL_NO_DEMOS
#  define OPENSSL_NO_DEMOS
# endif
# ifndef OPENSSL_NO_EC_NISTP_64_GCC_128
#  define OPENSSL_NO_EC_NISTP_64_GCC_128
# endif
# ifndef OPENSSL_NO_EGD
#  define OPENSSL_NO_EGD
# endif
# ifndef OPENSSL_NO_EXTERNAL_TESTS
#  define OPENSSL_NO_EXTERNAL_TESTS
# endif
# ifndef OPENSSL_NO_FIPS_JITTER
#  define OPENSSL_NO_FIPS_JITTER
# endif
# ifndef OPENSSL_NO_FUZZ_AFL
#  define OPENSSL_NO_FUZZ_AFL
# endif
# ifndef OPENSSL_NO_FUZZ_LIBFUZZER
#  define OPENSSL_NO_FUZZ_LIBFUZZER
# endif
# ifndef OPENSSL_NO_H3DEMO
#  define OPENSSL_NO_H3DEMO
#
 endif
# ifndef OPENSSL_NO_HQINTEROP
#  define OPENSSL_NO_HQINTEROP
# endif
# ifndef OPENSSL_NO_JITTER
#  define OPENSSL_NO_JITTER
# endif
# ifndef OPENSSL_NO_KTLS
#  define OPENSSL_NO_KTLS
# endif
# ifndef OPENSSL_NO_LOADERENG
#  define OPENSSL_NO_LOADERENG
# endif
# ifndef OPENSSL_NO_MD2
#  define OPENSSL_NO_MD2
# endif
# ifndef OPENSSL_NO_MSAN
#  define OPENSSL_NO_MSAN
# endif
# ifndef OPENSSL_NO_PIE
#  define OPENSSL_NO_PIE
# endif
```

```
# ifndef OPENSSL_NO_RC5
#  define OPENSSL_NO_RC5
# endif
# ifndef OPENSSL_NO_SCTP
#  define OPENSSL_NO_SCTP
# endif
# ifndef OPENSSL_NO_SSL3
#  define OPENSSL_NO_SSL3
# endif
# ifndef OPENSSL_NO_SSL3_METHOD
#  define OPENSSL_NO_SSL3_METHOD
# endif
# ifndef OPENSSL_NO_SSLKEYLOG
#  define OPENSSL_NO_SSLKEYLOG
# endif
# ifndef OPENSSL_NO_TFO
#  define OPENSSL_NO_TFO
# endif
# ifndef OPENSSL_NO_TRACE
#  define OPENSSL_NO_TRACE
# endif
# ifndef OPENSSL_NO_UBSAN
#  define OPENSSL_NO_UBSAN
# endif
# ifndef OPENSSL_NO_UNIT_TEST
#  define OPENSSL_NO_UNIT_TEST
#
 endif
# ifndef OPENSSL_NO_UPLINK
#  define OPENSSL_NO_UPLINK
# endif
# ifndef OPENSSL_NO_WEAK_SSL_CIPHERS
#  define OPENSSL_NO_WEAK_SSL_CIPHERS
# endif
# ifndef OPENSSL_NO_WINSTORE
#  define OPENSSL_NO_WINSTORE
# endif
# ifndef OPENSSL_NO_ZLIB
#  define OPENSSL_NO_ZLIB
# endif
# ifndef OPENSSL_NO_ZLIB_DYNAMIC
#  define OPENSSL_NO_ZLIB_DYNAMIC
# endif
# ifndef OPENSSL_NO_ZSTD
#  define OPENSSL_NO_ZSTD
# endif
# ifndef OPENSSL_NO_ZSTD_DYNAMIC
#  define OPENSSL_NO_ZSTD_DYNAMIC
```

```
# endif
# ifndef OPENSSL_NO_DYNAMIC_ENGINE
#  define OPENSSL_NO_DYNAMIC_ENGINE
# endif

/* clang-format on */

/* Generate 80386 code? */
/* clang-format off */
# undef I386_ONLY
/* clang-format on */

/*
* The following are cipher-specific, but are part of the public API.
*/
#if !defined(OPENSSL_SYS_UEFI)
   /* clang-format off */
#  define BN_LLONG
   /* clang-format on */
   /* Only one for the following should be defined */
   /* clang-format off */
#  undef SIXTY_FOUR_BIT_LONG
   /* clang-format on
 */
   /* clang-format off */
#  undef SIXTY_FOUR_BIT
   /* clang-format on */
   /* clang-format off */
#  define THIRTY_TWO_BIT
/* clang-format on */
#endif

/* clang-format off */
# define RC4_INT unsigned int
/* clang-format on */

#if defined(OPENSSL_NO_COMP) || (defined(OPENSSL_NO_BROTLI) && defined(OPENSSL_NO_ZSTD) &&
defined(OPENSSL_NO_ZLIB))
#define OPENSSL_NO_COMP_ALG
#else
#undef OPENSSL_NO_COMP_ALG
#endif

#ifdef __cplusplus
}
#endif

#endif /* OPENSSL_CONFIGURATION_H */
```

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JSON parsing library (nlohmann/json)

File: vendor/json/upstream/single_include/nlohmann/json.hpp (only for ICU4C)

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File: aclocal.m4 (only for ICU4C)
Section: pkg.m4 - Macros to locate and utilise pkg-config.

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File: config.guess (only for ICU4C)

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(The condition for the exception is fulfilled because
ICU4C includes a configuration script generated by Autoconf,
namely the `configure` script.)

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File: install-sh (only for ICU4C)

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File: sorttable.js (only for ICU4J)

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  'openssl/providers/implementations/ciphers/cipher_seed_hw.c',
  'openssl/providers/implementations/ciphers/cipher_tdes_common.c',
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  'openssl/providers/implementations/digests/mdc2_prov.c',
  'openssl/providers/implementations/digests/ripemd_prov.c',
  'openssl/providers/implementations/digests/wp_prov.c',
  'openssl/providers/implementations/kdfs/pbkdf1.c',
  'openssl/providers/implementations/kdfs/pvkkdf.c',
  'openssl/providers/prov_running.c',
  'openssl/providers/legacyprov.c',
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  './config/archs/BSD-x86_64/asm/crypto/aes/aesni-sha1-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/aesni-sha256-x86_64.s',
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  './config/archs/BSD-x86_64/asm/crypto/bn/x86_64-mont5.s',
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  './config/archs/BSD-x86_64/asm/crypto/ec/x25519-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/params_idx.c',
  './config/archs/BSD-x86_64/asm/crypto/x86_64cpuid.s',
  './config/archs/BSD-x86_64/asm/crypto/md5/md5-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/modes/aes-gcm-avx512.s',
  './config/archs/BSD-x86_64/asm/crypto/modes/aesni-gcm-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/modes/ghash-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/poly1305/poly1305-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/rc4/rc4-md5-x86_64.s',
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  './config/archs/BSD-x86_64/asm/providers/common/der/der_digests_gen.c',
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  'ECP_NISTZ256_ASM',
  'GHASH_ASM',
  'KECCAK1600_ASM',
  'MD5_ASM',
  'OPENSSL_BN_ASM_GF2m',
  'OPENSSL_BN_ASM_MONT',
  'OPENSSL_BN_ASM_MONT5',
  'OPENSSL_CPUID_OBJ',
  'OPENSSL_IA32_SSE2',
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    'POLY1305_ASM',
    'RC4_ASM',
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    'X25519_ASM',
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 },
}
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version 1.2.12, March 27th, 2022

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# Recognizing Contributors

The project looks to recognize and thank contributors for their contributions
as one of the ways we can help them continue to contribute to the project.

This document captures some of the processes we have in place to do that.

Some of the benefits we hope to achieve through these programs include:

* Ensuring people know that the project appreciates their work
* Encouraging people to repeat/grow their contributions
* Helping people demonstrate to their managers the value of the contributions they are making, which in terms helps their manager support their employer investing in the project (unfortunately this is something that matters)
* Highlighting the new features in Node.js and showing that they are being added by individuals like those mentioned. This should encourage other people to get involved and make similar contributions.
* Highlighting those leading efforts/initiatives and they are being done by individuals or teams like those mentioned. This should encourage other people to get involved and make similar contributions

## Sponsorship link on nodejs/node README.md

Collaborators may add a single link beside their name on the nodejs/node [`README.md`](../../README.md) file in the section titled `Collaborators` named `Support me`. This link may be:

1. a direct link to one of the sponsorship platforms listed below,
2. a page that has text explaining how to support the collaborator including zero or more links to the sponsorship platforms listed below. The page should not have any outgoing links other than to the sponsorship platforms. We expect and trust collaborators to ensure that the text is professional and respectful.

The sponsorship platforms to which links can be made currently includes (in alphabetical order):

* [GitHub Sponsors](https://github.com/sponsors)
* [Polar](https://polar.sh/)
* [thanks.dev](https://thanks.dev)

## Amplification of posts announcing talks by collaborators

When a collaborator is speaking at a public event they may request amplification by the Node.js social media accounts. They can request that a post highlighting that they are speaking at the event be amplified by the Node.js accounts by making a request in the #nodejs-social channel in the OpenJS Foundation slack. We trust that collaborators will only request amplification when they believe the event is relevant to the Node.js community and the content of the post is in line with the norms of the project.

## Bi-monthly contributor spotlight

The contributor spotlight program showcases individual(s) or teams who have
made signification contributions to the project. Anybody who is not
a member of the Technical Steering Committee (TSC) and has made a
notable contribution to the project can be nominated. They DO NOT need
to be a collaborator, team member etc.

The work of the team or individual(s) will be showcased on the
Node.js social channels and, if warranted, through a blog post created by the
OpenJS
marketing staff along with the team or individual(s) which will
be published on [openjsf.org](https://openjsf.org/).

Nominations can be made through this web form:
[Contributor Spotlight nomination](https://forms.gle/dXBXZn8yu83HLJ57A)

Nominations will be reviewed/approved by the Technical Steering Committee (TSC)
on a regular basis as scheduled by the TSC chair. The TSC will also
recommend the order in which approved nominations are processed
by the OpenJS marketing staff.

Before any work proceeds on an approved nomination the individual(s)
or team will be contacted to confirm they want to participate. Social
content and or spotlight blog post will only be published after the
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```
/*
* WARNING: do not edit!
* Generated by Makefile from providers/common/include/prov/der_digests.h.in
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*/
```

```
#include "internal/der.h"

/* Well known OIDs precompiled */
/* clang-format off */

/*
* sigAlgs OBJECT IDENTIFIER ::= { nistAlgorithms 3 }
*/
#define DER_OID_V_sigAlgs DER_P_OBJECT, 8, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x03
#define DER_OID_SZ_sigAlgs 10
extern const unsigned char ossl_der_oid_sigAlgs[DER_OID_SZ_sigAlgs];

/*
* id-sha1  OBJECT IDENTIFIER  ::=  { iso(1)
*                    identified-organization(3) oiw(14)
*                    secsig(3) algorithms(2) 26 }
*/
#define DER_OID_V_id_sha1 DER_P_OBJECT, 5, 0x2B, 0x0E, 0x03,
 0x02, 0x1A
#define DER_OID_SZ_id_sha1 7
extern const unsigned char ossl_der_oid_id_sha1[DER_OID_SZ_id_sha1];

/*
* id-md2  OBJECT IDENTIFIER ::= {
*   iso(1) member-body(2) us(840) rsadsi(113549) digestAlgorithm(2) 2 }
*/
#define DER_OID_V_id_md2 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x02, 0x02
#define DER_OID_SZ_id_md2 10
extern const unsigned char ossl_der_oid_id_md2[DER_OID_SZ_id_md2];

/*
* id-md5  OBJECT IDENTIFIER ::= {
*   iso(1) member-body(2) us(840) rsadsi(113549) digestAlgorithm(2) 5 }
*/
#define DER_OID_V_id_md5 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x02, 0x05
#define DER_OID_SZ_id_md5 10
extern const unsigned char ossl_der_oid_id_md5[DER_OID_SZ_id_md5];

/*
* id-sha256 OBJECT IDENTIFIER ::= { hashAlgs 1 }
*/
#define DER_OID_V_id_sha256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x01
#define DER_OID_SZ_id_sha256 11
extern const unsigned char ossl_der_oid_id_sha256[DER_OID_SZ_id_sha256];

/*
* id-sha384 OBJECT IDENTIFIER
```

```
 ::= { hashAlgs 2 }
*/
#define DER_OID_V_id_sha384 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x02
#define DER_OID_SZ_id_sha384 11
extern const unsigned char ossl_der_oid_id_sha384[DER_OID_SZ_id_sha384];

/*
* id-sha512 OBJECT IDENTIFIER ::= { hashAlgs 3 }
*/
#define DER_OID_V_id_sha512 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x03
#define DER_OID_SZ_id_sha512 11
extern const unsigned char ossl_der_oid_id_sha512[DER_OID_SZ_id_sha512];

/*
* id-sha224 OBJECT IDENTIFIER ::= { hashAlgs 4 }
*/
#define DER_OID_V_id_sha224 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x04
#define DER_OID_SZ_id_sha224 11
extern const unsigned char ossl_der_oid_id_sha224[DER_OID_SZ_id_sha224];

/*
* id-sha512-224 OBJECT IDENTIFIER ::= { hashAlgs 5 }
*/
#define DER_OID_V_id_sha512_224 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x05
#define DER_OID_SZ_id_sha512_224 11
extern const unsigned char ossl_der_oid_id_sha512_224[DER_OID_SZ_id_sha512_224];

/*
 * id-sha512-256 OBJECT IDENTIFIER ::= { hashAlgs 6 }
*/
#define DER_OID_V_id_sha512_256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x06
#define DER_OID_SZ_id_sha512_256 11
extern const unsigned char ossl_der_oid_id_sha512_256[DER_OID_SZ_id_sha512_256];

/*
* id-sha3-224 OBJECT IDENTIFIER ::= { hashAlgs 7 }
*/
#define DER_OID_V_id_sha3_224 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x07
#define DER_OID_SZ_id_sha3_224 11
extern const unsigned char ossl_der_oid_id_sha3_224[DER_OID_SZ_id_sha3_224];

/*
* id-sha3-256 OBJECT IDENTIFIER ::= { hashAlgs 8 }
*/
#define DER_OID_V_id_sha3_256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x08
#define DER_OID_SZ_id_sha3_256 11
extern const unsigned char ossl_der_oid_id_sha3_256[DER_OID_SZ_id_sha3_256];
```

```
/*
* id-sha3-384 OBJECT IDENTIFIER ::= { hashAlgs 9 }
*/
#define DER_OID_V_id_sha3_384 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03,
 0x04, 0x02, 0x09
#define DER_OID_SZ_id_sha3_384 11
extern const unsigned char ossl_der_oid_id_sha3_384[DER_OID_SZ_id_sha3_384];

/*
* id-sha3-512 OBJECT IDENTIFIER ::= { hashAlgs 10 }
*/
#define DER_OID_V_id_sha3_512 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x0A
#define DER_OID_SZ_id_sha3_512 11
extern const unsigned char ossl_der_oid_id_sha3_512[DER_OID_SZ_id_sha3_512];

/*
* id-shake128 OBJECT IDENTIFIER ::= { hashAlgs 11 }
*/
#define DER_OID_V_id_shake128 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x0B
#define DER_OID_SZ_id_shake128 11
extern const unsigned char ossl_der_oid_id_shake128[DER_OID_SZ_id_shake128];

/*
* id-shake256 OBJECT IDENTIFIER ::= { hashAlgs 12 }
*/
#define DER_OID_V_id_shake256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x0C
#define DER_OID_SZ_id_shake256 11
extern const unsigned char ossl_der_oid_id_shake256[DER_OID_SZ_id_shake256];

/*
* id-shake128-len OBJECT IDENTIFIER ::= { hashAlgs
 17 }
*/
#define DER_OID_V_id_shake128_len DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02,
0x11
#define DER_OID_SZ_id_shake128_len 11
extern const unsigned char ossl_der_oid_id_shake128_len[DER_OID_SZ_id_shake128_len];

/*
* id-shake256-len OBJECT IDENTIFIER ::= { hashAlgs 18 }
*/
#define DER_OID_V_id_shake256_len DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02,
0x12
#define DER_OID_SZ_id_shake256_len 11
extern const unsigned char ossl_der_oid_id_shake256_len[DER_OID_SZ_id_shake256_len];

/*
* id-KMACWithSHAKE128 OBJECT IDENTIFIER ::={hashAlgs 19}
```

```
*/
#define DER_OID_V_id_KMACWithSHAKE128 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x02, 0x13
#define DER_OID_SZ_id_KMACWithSHAKE128 11
extern const unsigned char ossl_der_oid_id_KMACWithSHAKE128[DER_OID_SZ_id_KMACWithSHAKE128];

/*
* id-KMACWithSHAKE256 OBJECT IDENTIFIER ::={ hashAlgs 20}
*/
#define DER_OID_V_id_KMACWithSHAKE256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
 0x02, 0x14
#define DER_OID_SZ_id_KMACWithSHAKE256 11
extern const unsigned char ossl_der_oid_id_KMACWithSHAKE256[DER_OID_SZ_id_KMACWithSHAKE256];

/* clang-format on */
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/bio.h.in
*
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*/
/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_BIO_H
#define OPENSSL_BIO_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_BIO_H
#endif

#include <openssl/e_os2.h>

#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif
#include <stdarg.h>

#include <openssl/crypto.h>
#include <openssl/bioerr.h>
```

```
#include <openssl/core.h>

#ifdef __cplusplus
extern "C" {
#endif

/* There are the classes of BIOs */
#define BIO_TYPE_DESCRIPTOR 0x0100 /* socket, fd, connect or accept */
#define BIO_TYPE_FILTER 0x0200
#define BIO_TYPE_SOURCE_SINK
 0x0400

/* These are the 'types' of BIOs */
#define BIO_TYPE_NONE 0
#define BIO_TYPE_MEM (1 | BIO_TYPE_SOURCE_SINK)
#define BIO_TYPE_FILE (2 | BIO_TYPE_SOURCE_SINK)

#define BIO_TYPE_FD (4 | BIO_TYPE_SOURCE_SINK | BIO_TYPE_DESCRIPTOR)
#define BIO_TYPE_SOCKET (5 | BIO_TYPE_SOURCE_SINK | BIO_TYPE_DESCRIPTOR)
#define BIO_TYPE_NULL (6 | BIO_TYPE_SOURCE_SINK)
#define BIO_TYPE_SSL (7 | BIO_TYPE_FILTER)
#define BIO_TYPE_MD (8 | BIO_TYPE_FILTER)
#define BIO_TYPE_BUFFER (9 | BIO_TYPE_FILTER)
#define BIO_TYPE_CIPHER (10 | BIO_TYPE_FILTER)
#define BIO_TYPE_BASE64 (11 | BIO_TYPE_FILTER)
#define BIO_TYPE_CONNECT (12 | BIO_TYPE_SOURCE_SINK | BIO_TYPE_DESCRIPTOR)
#define BIO_TYPE_ACCEPT (13 | BIO_TYPE_SOURCE_SINK | BIO_TYPE_DESCRIPTOR)

#define BIO_TYPE_NBIO_TEST (16 | BIO_TYPE_FILTER) /* server proxy BIO */
#define BIO_TYPE_NULL_FILTER (17 | BIO_TYPE_FILTER)
#define BIO_TYPE_BIO (19 | BIO_TYPE_SOURCE_SINK) /* half a BIO pair */
#define BIO_TYPE_LINEBUFFER (20 | BIO_TYPE_FILTER)
#define BIO_TYPE_DGRAM
 (21 | BIO_TYPE_SOURCE_SINK | BIO_TYPE_DESCRIPTOR)
#define BIO_TYPE_ASN1 (22 | BIO_TYPE_FILTER)
#define BIO_TYPE_COMP (23 | BIO_TYPE_FILTER)
#ifndef OPENSSL_NO_SCTP
#define BIO_TYPE_DGRAM_SCTP (24 | BIO_TYPE_SOURCE_SINK | BIO_TYPE_DESCRIPTOR)
#endif
#define BIO_TYPE_CORE_TO_PROV (25 | BIO_TYPE_SOURCE_SINK)
#define BIO_TYPE_DGRAM_PAIR (26 | BIO_TYPE_SOURCE_SINK)
#define BIO_TYPE_DGRAM_MEM (27 | BIO_TYPE_SOURCE_SINK)

/* Custom type starting index returned by BIO_get_new_index() */
#define BIO_TYPE_START 128
/* Custom type maximum index that can be returned by BIO_get_new_index() */
#define BIO_TYPE_MASK 0xFF
```

```
/*
* BIO_FILENAME_READ|BIO_CLOSE to open or close on free.
* BIO_set_fp(in,stdin,BIO_NOCLOSE);
*/
#define BIO_NOCLOSE 0x00
#define BIO_CLOSE 0x01

/*
* These are used in the following macros and are passed to BIO_ctrl()
*/
#define BIO_CTRL_RESET 1 /* opt - rewind/zero etc */
#define BIO_CTRL_EOF 2 /* opt - are we at the eof */
#define BIO_CTRL_INFO 3 /* opt - extra tit-bits
 */
#define BIO_CTRL_SET 4 /* man - set the 'IO' type */
#define BIO_CTRL_GET 5 /* man - get the 'IO' type */
#define BIO_CTRL_PUSH 6 /* opt - internal, used to signify change */
#define BIO_CTRL_POP 7 /* opt - internal, used to signify change */
#define BIO_CTRL_GET_CLOSE 8 /* man - set the 'close' on free */
#define BIO_CTRL_SET_CLOSE 9 /* man - set the 'close' on free */
#define BIO_CTRL_PENDING 10 /* opt - is their more data buffered */
#define BIO_CTRL_FLUSH 11 /* opt - 'flush' buffered output */
#define BIO_CTRL_DUP 12 /* man - extra stuff for 'duped' BIO */
#define BIO_CTRL_WPENDING 13 /* opt - number of bytes still to write */
#define BIO_CTRL_SET_CALLBACK 14 /* opt - set callback function */
#define BIO_CTRL_GET_CALLBACK 15 /* opt - set callback function */

#define BIO_CTRL_PEEK 29 /* BIO_f_buffer special */
#define BIO_CTRL_SET_FILENAME 30 /* BIO_s_file special */

/* dgram BIO stuff */
#define BIO_CTRL_DGRAM_CONNECT 31 /* BIO dgram special */
#define BIO_CTRL_DGRAM_SET_CONNECTED
 32 /* allow for an externally connected \
                                * socket to be passed in */
#define BIO_CTRL_DGRAM_SET_RECV_TIMEOUT 33 /* setsockopt, essentially */
#define BIO_CTRL_DGRAM_GET_RECV_TIMEOUT 34 /* getsockopt, essentially */
#define BIO_CTRL_DGRAM_SET_SEND_TIMEOUT 35 /* setsockopt, essentially */
#define BIO_CTRL_DGRAM_GET_SEND_TIMEOUT 36 /* getsockopt, essentially */

#define BIO_CTRL_DGRAM_GET_RECV_TIMER_EXP 37 /* flag whether the last */
#define BIO_CTRL_DGRAM_GET_SEND_TIMER_EXP 38 /* I/O operation timed out */

/* #ifdef IP_MTU_DISCOVER */
#define BIO_CTRL_DGRAM_MTU_DISCOVER 39 /* set DF bit on egress packets */
/* #endif */

#define BIO_CTRL_DGRAM_QUERY_MTU 40 /* as kernel for current MTU */
```

```
#define BIO_CTRL_DGRAM_GET_FALLBACK_MTU 47
#define BIO_CTRL_DGRAM_GET_MTU 41 /* get cached value for MTU */
#define BIO_CTRL_DGRAM_SET_MTU 42 /* set cached value for MTU.  \
                         * want to use this if asking \

                 * the kernel fails */

#define BIO_CTRL_DGRAM_MTU_EXCEEDED 43 /* check whether the MTU was    \
                             * exceed in the previous write \
                             * operation */

#define BIO_CTRL_DGRAM_GET_PEER 46
#define BIO_CTRL_DGRAM_SET_PEER 44 /* Destination for the data */

#define BIO_CTRL_DGRAM_SET_NEXT_TIMEOUT 45 /* Next DTLS handshake timeout \
                               * to adjust socket timeouts */
#define BIO_CTRL_DGRAM_SET_DONT_FRAG 48

#define BIO_CTRL_DGRAM_GET_MTU_OVERHEAD 49

/* Deliberately outside of OPENSSL_NO_SCTP - used in bss_dgram.c */
#define BIO_CTRL_DGRAM_SCTP_SET_IN_HANDSHAKE 50
#ifndef OPENSSL_NO_SCTP
/* SCTP stuff */
#define BIO_CTRL_DGRAM_SCTP_ADD_AUTH_KEY 51
#define BIO_CTRL_DGRAM_SCTP_NEXT_AUTH_KEY 52
#define BIO_CTRL_DGRAM_SCTP_AUTH_CCS_RCVD 53
#define BIO_CTRL_DGRAM_SCTP_GET_SNDINFO 60
#define BIO_CTRL_DGRAM_SCTP_SET_SNDINFO 61
#define BIO_CTRL_DGRAM_SCTP_GET_RCVINFO
 62
#define BIO_CTRL_DGRAM_SCTP_SET_RCVINFO 63
#define BIO_CTRL_DGRAM_SCTP_GET_PRINFO 64
#define BIO_CTRL_DGRAM_SCTP_SET_PRINFO 65
#define BIO_CTRL_DGRAM_SCTP_SAVE_SHUTDOWN 70
#endif

#define BIO_CTRL_DGRAM_SET_PEEK_MODE 71

/*
* internal BIO:
* # define BIO_CTRL_SET_KTLS_SEND                72
* # define BIO_CTRL_SET_KTLS_SEND_CTRL_MSG        74
* # define BIO_CTRL_CLEAR_KTLS_CTRL_MSG           75
*/

#define BIO_CTRL_GET_KTLS_SEND 73
#define BIO_CTRL_GET_KTLS_RECV 76
```

```
#define BIO_CTRL_DGRAM_SCTP_WAIT_FOR_DRY 77
#define BIO_CTRL_DGRAM_SCTP_MSG_WAITING 78

/* BIO_f_prefix controls */
#define BIO_CTRL_SET_PREFIX 79
#define BIO_CTRL_SET_INDENT 80
#define BIO_CTRL_GET_INDENT 81

#define BIO_CTRL_DGRAM_GET_LOCAL_ADDR_CAP 82
#define BIO_CTRL_DGRAM_GET_LOCAL_ADDR_ENABLE 83
#define BIO_CTRL_DGRAM_SET_LOCAL_ADDR_ENABLE 84
#define BIO_CTRL_DGRAM_GET_EFFECTIVE_CAPS 85
#define BIO_CTRL_DGRAM_GET_CAPS 86
#define BIO_CTRL_DGRAM_SET_CAPS 87
#define BIO_CTRL_DGRAM_GET_NO_TRUNC 88
#define BIO_CTRL_DGRAM_SET_NO_TRUNC
 89

/*
* internal BIO:
* # define BIO_CTRL_SET_KTLS_TX_ZEROCOPY_SENDFILE 90
*/

#define BIO_CTRL_GET_RPOLL_DESCRIPTOR 91
#define BIO_CTRL_GET_WPOLL_DESCRIPTOR 92
#define BIO_CTRL_DGRAM_DETECT_PEER_ADDR 93
#define BIO_CTRL_DGRAM_SET0_LOCAL_ADDR 94

#define BIO_DGRAM_CAP_NONE 0U
#define BIO_DGRAM_CAP_HANDLES_SRC_ADDR (1U << 0)
#define BIO_DGRAM_CAP_HANDLES_DST_ADDR (1U << 1)
#define BIO_DGRAM_CAP_PROVIDES_SRC_ADDR (1U << 2)
#define BIO_DGRAM_CAP_PROVIDES_DST_ADDR (1U << 3)

#ifndef OPENSSL_NO_KTLS
#define BIO_get_ktls_send(b) \
   (BIO_ctrl(b, BIO_CTRL_GET_KTLS_SEND, 0, NULL) > 0)
#define BIO_get_ktls_recv(b) \
   (BIO_ctrl(b, BIO_CTRL_GET_KTLS_RECV, 0, NULL) > 0)
#else
#define BIO_get_ktls_send(b) (0)
#define BIO_get_ktls_recv(b) (0)
#endif

/* modifiers */
#define BIO_FP_READ 0x02
#define BIO_FP_WRITE 0x04
```

```
#define BIO_FP_APPEND 0x08
#define BIO_FP_TEXT 0x10

#define BIO_FLAGS_READ 0x01
#define BIO_FLAGS_WRITE 0x02
#define BIO_FLAGS_IO_SPECIAL 0x04
#define BIO_FLAGS_RWS
 (BIO_FLAGS_READ | BIO_FLAGS_WRITE | BIO_FLAGS_IO_SPECIAL)
#define BIO_FLAGS_SHOULD_RETRY 0x08
#ifndef OPENSSL_NO_DEPRECATED_3_0
/* This #define was replaced by an internal constant and should not be used. */
#define BIO_FLAGS_UPLINK 0
#endif

#define BIO_FLAGS_BASE64_NO_NL 0x100

/*
* This is used with memory BIOs:
* BIO_FLAGS_MEM_RDONLY means we shouldn't free up or change the data in any way;
* BIO_FLAGS_NONCLEAR_RST means we shouldn't clear data on reset.
*/
#define BIO_FLAGS_MEM_RDONLY 0x200
#define BIO_FLAGS_NONCLEAR_RST 0x400
#define BIO_FLAGS_IN_EOF 0x800

/* the BIO FLAGS values 0x1000 to 0x8000 are reserved for internal KTLS flags */

typedef union bio_addr_st BIO_ADDR;
typedef struct bio_addrinfo_st BIO_ADDRINFO;

int BIO_get_new_index(void);
void BIO_set_flags(BIO *b, int flags);
int BIO_test_flags(const BIO *b, int flags);
void BIO_clear_flags(BIO *b, int flags);

#define BIO_get_flags(b) BIO_test_flags(b, ~(0x0))
#define BIO_set_retry_special(b) \
   BIO_set_flags(b,
 (BIO_FLAGS_IO_SPECIAL | BIO_FLAGS_SHOULD_RETRY))
#define BIO_set_retry_read(b) \
   BIO_set_flags(b, (BIO_FLAGS_READ | BIO_FLAGS_SHOULD_RETRY))
#define BIO_set_retry_write(b) \
   BIO_set_flags(b, (BIO_FLAGS_WRITE | BIO_FLAGS_SHOULD_RETRY))

/* These are normally used internally in BIOs */
#define BIO_clear_retry_flags(b) \
   BIO_clear_flags(b, (BIO_FLAGS_RWS | BIO_FLAGS_SHOULD_RETRY))
#define BIO_get_retry_flags(b) \
```

```
   BIO_test_flags(b, (BIO_FLAGS_RWS | BIO_FLAGS_SHOULD_RETRY))

/* These should be used by the application to tell why we should retry */
#define BIO_should_read(a) BIO_test_flags(a, BIO_FLAGS_READ)
#define BIO_should_write(a) BIO_test_flags(a, BIO_FLAGS_WRITE)
#define BIO_should_io_special(a) BIO_test_flags(a, BIO_FLAGS_IO_SPECIAL)
#define BIO_retry_type(a) BIO_test_flags(a, BIO_FLAGS_RWS)
#define BIO_should_retry(a) BIO_test_flags(a, BIO_FLAGS_SHOULD_RETRY)

/*
* The next three are used in conjunction with the BIO_should_io_special()
* condition.  After
 this returns true, BIO *BIO_get_retry_BIO(BIO *bio, int
* *reason); will walk the BIO stack and return the 'reason' for the special
* and the offending BIO. Given a BIO, BIO_get_retry_reason(bio) will return
* the code.
*/
/*
* Returned from the SSL bio when the certificate retrieval code had an error
*/
#define BIO_RR_SSL_X509_LOOKUP 0x01
/* Returned from the connect BIO when a connect would have blocked */
#define BIO_RR_CONNECT 0x02
/* Returned from the accept BIO when an accept would have blocked */
#define BIO_RR_ACCEPT 0x03

/* These are passed by the BIO callback */
#define BIO_CB_FREE 0x01
#define BIO_CB_READ 0x02
#define BIO_CB_WRITE 0x03
#define BIO_CB_PUTS 0x04
#define BIO_CB_GETS 0x05
#define BIO_CB_CTRL 0x06
#define BIO_CB_RECVMMSG 0x07
#define BIO_CB_SENDMMSG 0x08

/*
* The callback is called before and after the underling operation, The
* BIO_CB_RETURN flag indicates if it is after the call
*/
#define BIO_CB_RETURN 0x80
#define BIO_CB_return(a) ((a) | BIO_CB_RETURN)
#define
 BIO_cb_pre(a) (!((a) & BIO_CB_RETURN))
#define BIO_cb_post(a) ((a) & BIO_CB_RETURN)

#ifndef OPENSSL_NO_DEPRECATED_3_0
typedef long (*BIO_callback_fn)(BIO *b, int oper, const char *argp, int argi,
```

```
   long argl, long ret);
OSSL_DEPRECATEDIN_3_0 BIO_callback_fn BIO_get_callback(const BIO *b);
OSSL_DEPRECATEDIN_3_0 void BIO_set_callback(BIO *b, BIO_callback_fn callback);
OSSL_DEPRECATEDIN_3_0 long BIO_debug_callback(BIO *bio, int cmd,
   const char *argp, int argi,
   long argl, long ret);
#endif

typedef long (*BIO_callback_fn_ex)(BIO *b, int oper, const char *argp,
   size_t len, int argi,
   long argl, int ret, size_t *processed);
BIO_callback_fn_ex BIO_get_callback_ex(const BIO *b);
void BIO_set_callback_ex(BIO *b, BIO_callback_fn_ex callback);
long BIO_debug_callback_ex(BIO *bio, int oper, const char *argp, size_t len,
   int argi, long argl, int ret, size_t *processed);

char *BIO_get_callback_arg(const BIO *b);
void BIO_set_callback_arg(BIO *b, char *arg);

typedef
 struct bio_method_st BIO_METHOD;

const char *BIO_method_name(const BIO *b);
int BIO_method_type(const BIO *b);

typedef int BIO_info_cb(BIO *, int, int);
typedef BIO_info_cb bio_info_cb; /* backward compatibility */

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(BIO, BIO, BIO)
#define sk_BIO_num(sk) OPENSSL_sk_num(ossl_check_const_BIO_sk_type(sk))
#define sk_BIO_value(sk, idx) ((BIO *)OPENSSL_sk_value(ossl_check_const_BIO_sk_type(sk), (idx)))
#define sk_BIO_new(cmp) ((STACK_OF(BIO) *)OPENSSL_sk_new(ossl_check_BIO_compfunc_type(cmp)))
#define sk_BIO_new_null() ((STACK_OF(BIO) *)OPENSSL_sk_new_null())
#define sk_BIO_new_reserve(cmp, n) ((STACK_OF(BIO)
*)OPENSSL_sk_new_reserve(ossl_check_BIO_compfunc_type(cmp), (n)))
#define sk_BIO_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_BIO_sk_type(sk), (n))
#define sk_BIO_free(sk) OPENSSL_sk_free(ossl_check_BIO_sk_type(sk))
#define sk_BIO_zero(sk) OPENSSL_sk_zero(ossl_check_BIO_sk_type(sk))
#define sk_BIO_delete(sk, i) ((BIO *)OPENSSL_sk_delete(ossl_check_BIO_sk_type(sk),
 (i)))
#define sk_BIO_delete_ptr(sk, ptr) ((BIO *)OPENSSL_sk_delete_ptr(ossl_check_BIO_sk_type(sk),
ossl_check_BIO_type(ptr)))
#define sk_BIO_push(sk, ptr) OPENSSL_sk_push(ossl_check_BIO_sk_type(sk), ossl_check_BIO_type(ptr))
#define sk_BIO_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_BIO_sk_type(sk), ossl_check_BIO_type(ptr))
#define sk_BIO_pop(sk) ((BIO *)OPENSSL_sk_pop(ossl_check_BIO_sk_type(sk)))
#define sk_BIO_shift(sk) ((BIO *)OPENSSL_sk_shift(ossl_check_BIO_sk_type(sk)))
#define sk_BIO_pop_free(sk, freefunc)
```

```
OPENSSL_sk_pop_free(ossl_check_BIO_sk_type(sk),ossl_check_BIO_freefunc_type(freefunc))
#define sk_BIO_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_BIO_sk_type(sk), ossl_check_BIO_type(ptr),
(idx))
#define sk_BIO_set(sk, idx, ptr) ((BIO *)OPENSSL_sk_set(ossl_check_BIO_sk_type(sk), (idx),
ossl_check_BIO_type(ptr)))
#define sk_BIO_find(sk, ptr) OPENSSL_sk_find(ossl_check_BIO_sk_type(sk), ossl_check_BIO_type(ptr))
#define sk_BIO_find_ex(sk,
 ptr) OPENSSL_sk_find_ex(ossl_check_BIO_sk_type(sk), ossl_check_BIO_type(ptr))
#define sk_BIO_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_BIO_sk_type(sk),
ossl_check_BIO_type(ptr), pnum)
#define sk_BIO_sort(sk) OPENSSL_sk_sort(ossl_check_BIO_sk_type(sk))
#define sk_BIO_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_BIO_sk_type(sk))
#define sk_BIO_dup(sk) ((STACK_OF(BIO) *)OPENSSL_sk_dup(ossl_check_const_BIO_sk_type(sk)))
#define sk_BIO_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(BIO)
*)OPENSSL_sk_deep_copy(ossl_check_const_BIO_sk_type(sk), ossl_check_BIO_copyfunc_type(copyfunc),
ossl_check_BIO_freefunc_type(freefunc)))
#define sk_BIO_set_cmp_func(sk, cmp)
((sk_BIO_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_BIO_sk_type(sk),
ossl_check_BIO_compfunc_type(cmp)))

/* clang-format on */

/* Prefix and suffix callback in ASN1 BIO */
typedef int asn1_ps_func(BIO *b, unsigned char **pbuf, int *plen,
   void *parg);

typedef void (*BIO_dgram_sctp_notification_handler_fn)(BIO
 *b,
   void *context,
   void *buf);
#ifndef OPENSSL_NO_SCTP
/* SCTP parameter structs */
struct bio_dgram_sctp_sndinfo {
   uint16_t snd_sid;
   uint16_t snd_flags;
   uint32_t snd_ppid;
   uint32_t snd_context;
};

struct bio_dgram_sctp_rcvinfo {
   uint16_t rcv_sid;
   uint16_t rcv_ssn;
   uint16_t rcv_flags;
   uint32_t rcv_ppid;
   uint32_t rcv_tsn;
   uint32_t rcv_cumtsn;
   uint32_t rcv_context;
};
```

```
struct bio_dgram_sctp_prinfo {
   uint16_t pr_policy;
   uint32_t pr_value;
};
#endif

/* BIO_sendmmsg/BIO_recvmmsg-related definitions */
typedef struct bio_msg_st {
   void *data;
   size_t data_len;
   BIO_ADDR *peer, *local;
   uint64_t flags;
} BIO_MSG;

typedef struct bio_mmsg_cb_args_st {
   BIO_MSG *msg;
   size_t stride, num_msg;
   uint64_t flags;
   size_t *msgs_processed;
} BIO_MMSG_CB_ARGS;

#define BIO_POLL_DESCRIPTOR_TYPE_NONE 0
#define BIO_POLL_DESCRIPTOR_TYPE_SOCK_FD 1
#define BIO_POLL_DESCRIPTOR_TYPE_SSL 2
#define BIO_POLL_DESCRIPTOR_CUSTOM_START
 8192

typedef struct bio_poll_descriptor_st {
   uint32_t type;
   union {
      int fd;
      void *custom;
      uintptr_t custom_ui;
      SSL *ssl;
   } value;
} BIO_POLL_DESCRIPTOR;

/*
* #define BIO_CONN_get_param_hostname BIO_ctrl
*/

#define BIO_C_SET_CONNECT 100
#define BIO_C_DO_STATE_MACHINE 101
#define BIO_C_SET_NBIO 102
/* # define BIO_C_SET_PROXY_PARAM                 103 */
#define BIO_C_SET_FD 104
#define BIO_C_GET_FD 105
```

```
#define BIO_C_SET_FILE_PTR 106
#define BIO_C_GET_FILE_PTR 107
#define BIO_C_SET_FILENAME 108
#define BIO_C_SET_SSL 109
#define BIO_C_GET_SSL 110
#define BIO_C_SET_MD 111
#define BIO_C_GET_MD 112
#define BIO_C_GET_CIPHER_STATUS 113
#define BIO_C_SET_BUF_MEM 114
#define BIO_C_GET_BUF_MEM_PTR 115
#define BIO_C_GET_BUFF_NUM_LINES 116
#define BIO_C_SET_BUFF_SIZE 117
#define BIO_C_SET_ACCEPT 118
#define BIO_C_SSL_MODE 119
#define BIO_C_GET_MD_CTX 120
/* # define BIO_C_GET_PROXY_PARAM                121 */
#define BIO_C_SET_BUFF_READ_DATA
 122 /* data to read first */
#define BIO_C_GET_CONNECT 123
#define BIO_C_GET_ACCEPT 124
#define BIO_C_SET_SSL_RENEGOTIATE_BYTES 125
#define BIO_C_GET_SSL_NUM_RENEGOTIATES 126
#define BIO_C_SET_SSL_RENEGOTIATE_TIMEOUT 127
#define BIO_C_FILE_SEEK 128
#define BIO_C_GET_CIPHER_CTX 129
#define BIO_C_SET_BUF_MEM_EOF_RETURN 130 /* return end of input \
                                 * value */
#define BIO_C_SET_BIND_MODE 131
#define BIO_C_GET_BIND_MODE 132
#define BIO_C_FILE_TELL 133
#define BIO_C_GET_SOCKS 134
#define BIO_C_SET_SOCKS 135

#define BIO_C_SET_WRITE_BUF_SIZE 136 /* for BIO_s_bio */
#define BIO_C_GET_WRITE_BUF_SIZE 137
#define BIO_C_MAKE_BIO_PAIR 138
#define BIO_C_DESTROY_BIO_PAIR 139
#define BIO_C_GET_WRITE_GUARANTEE 140
#define BIO_C_GET_READ_REQUEST 141
#define BIO_C_SHUTDOWN_WR 142
#define BIO_C_NREAD0 143
#define BIO_C_NREAD 144
#define BIO_C_NWRITE0 145
#define BIO_C_NWRITE 146
#define BIO_C_RESET_READ_REQUEST 147
#define BIO_C_SET_MD_CTX 148

#define BIO_C_SET_PREFIX
```

```
 149
#define BIO_C_GET_PREFIX 150
#define BIO_C_SET_SUFFIX 151
#define BIO_C_GET_SUFFIX 152

#define BIO_C_SET_EX_ARG 153
#define BIO_C_GET_EX_ARG 154

#define BIO_C_SET_CONNECT_MODE 155

#define BIO_C_SET_TFO 156 /* like BIO_C_SET_NBIO */

#define BIO_C_SET_SOCK_TYPE 157
#define BIO_C_GET_SOCK_TYPE 158
#define BIO_C_GET_DGRAM_BIO 159

#define BIO_set_app_data(s, arg) BIO_set_ex_data(s, 0, arg)
#define BIO_get_app_data(s) BIO_get_ex_data(s, 0)

#define BIO_set_nbio(b, n) BIO_ctrl(b, BIO_C_SET_NBIO, (n), NULL)
#define BIO_set_tfo(b, n) BIO_ctrl(b, BIO_C_SET_TFO, (n), NULL)

#ifndef OPENSSL_NO_SOCK
/* IP families we support, for BIO_s_connect() and BIO_s_accept() */
/* Note: the underlying operating system may not support some of them */
#define BIO_FAMILY_IPV4 4
#define BIO_FAMILY_IPV6 6
#define BIO_FAMILY_IPANY 256

/* BIO_s_connect() */
#define BIO_set_conn_hostname(b, name) BIO_ctrl(b, BIO_C_SET_CONNECT, 0, \
   (char *)(name))
#define BIO_set_conn_port(b, port) BIO_ctrl(b,
 BIO_C_SET_CONNECT, 1, \
   (char *)(port))
#define BIO_set_conn_address(b, addr) BIO_ctrl(b, BIO_C_SET_CONNECT, 2, \
   (char *)(addr))
#define BIO_set_conn_ip_family(b, f) BIO_int_ctrl(b, BIO_C_SET_CONNECT, 3, f)
#define BIO_get_conn_hostname(b) ((const char *)BIO_ptr_ctrl(b, BIO_C_GET_CONNECT, 0))
#define BIO_get_conn_port(b) ((const char *)BIO_ptr_ctrl(b, BIO_C_GET_CONNECT, 1))
#define BIO_get_conn_address(b) ((const BIO_ADDR *)BIO_ptr_ctrl(b, BIO_C_GET_CONNECT, 2))
#define BIO_get_conn_ip_family(b) BIO_ctrl(b, BIO_C_GET_CONNECT, 3, NULL)
#define BIO_get_conn_mode(b) BIO_ctrl(b, BIO_C_GET_CONNECT, 4, NULL)
#define BIO_set_conn_mode(b, n) BIO_ctrl(b, BIO_C_SET_CONNECT_MODE, (n), NULL)
#define BIO_set_sock_type(b, t) BIO_ctrl(b, BIO_C_SET_SOCK_TYPE, (t), NULL)
#define BIO_get_sock_type(b) BIO_ctrl(b, BIO_C_GET_SOCK_TYPE, 0, NULL)
#define BIO_get0_dgram_bio(b, p) BIO_ctrl(b, BIO_C_GET_DGRAM_BIO, 0, (void *)(BIO **)(p))
```

```
/* BIO_s_accept() */
#define BIO_set_accept_name(b, name) BIO_ctrl(b,
 BIO_C_SET_ACCEPT, 0, \
   (char *)(name))
#define BIO_set_accept_port(b, port) BIO_ctrl(b, BIO_C_SET_ACCEPT, 1, \
   (char *)(port))
#define BIO_get_accept_name(b) ((const char *)BIO_ptr_ctrl(b, BIO_C_GET_ACCEPT, 0))
#define BIO_get_accept_port(b) ((const char *)BIO_ptr_ctrl(b, BIO_C_GET_ACCEPT, 1))
#define BIO_get_peer_name(b) ((const char *)BIO_ptr_ctrl(b, BIO_C_GET_ACCEPT, 2))
#define BIO_get_peer_port(b) ((const char *)BIO_ptr_ctrl(b, BIO_C_GET_ACCEPT, 3))
/* #define BIO_set_nbio(b,n)    BIO_ctrl(b,BIO_C_SET_NBIO,(n),NULL) */
#define BIO_set_nbio_accept(b, n) BIO_ctrl(b, BIO_C_SET_ACCEPT, 2, (n) ? (void *)"a" : NULL)
#define BIO_set_accept_bios(b, bio) BIO_ctrl(b, BIO_C_SET_ACCEPT, 3, \
   (char *)(bio))
#define BIO_set_accept_ip_family(b, f) BIO_int_ctrl(b, BIO_C_SET_ACCEPT, 4, f)
#define BIO_get_accept_ip_family(b) BIO_ctrl(b, BIO_C_GET_ACCEPT, 4, NULL)
#define BIO_set_tfo_accept(b, n) BIO_ctrl(b, BIO_C_SET_ACCEPT, 5, (n) ? (void *)"a" : NULL)

/* Aliases kept for backward
 compatibility */
#define BIO_BIND_NORMAL 0
#define BIO_BIND_REUSEADDR BIO_SOCK_REUSEADDR
#define BIO_BIND_REUSEADDR_IF_UNUSED BIO_SOCK_REUSEADDR
#define BIO_set_bind_mode(b, mode) BIO_ctrl(b, BIO_C_SET_BIND_MODE, mode, NULL)
#define BIO_get_bind_mode(b) BIO_ctrl(b, BIO_C_GET_BIND_MODE, 0, NULL)
#endif /* OPENSSL_NO_SOCK */

#define BIO_do_connect(b) BIO_do_handshake(b)
#define BIO_do_accept(b) BIO_do_handshake(b)

#define BIO_do_handshake(b) BIO_ctrl(b, BIO_C_DO_STATE_MACHINE, 0, NULL)

/* BIO_s_datagram(), BIO_s_fd(), BIO_s_socket(), BIO_s_accept() and BIO_s_connect() */
#define BIO_set_fd(b, fd, c) BIO_int_ctrl(b, BIO_C_SET_FD, c, fd)
#define BIO_get_fd(b, c) BIO_ctrl(b, BIO_C_GET_FD, 0, (char *)(c))

/* BIO_s_file() */
#define BIO_set_fp(b, fp, c) BIO_ctrl(b, BIO_C_SET_FILE_PTR, c, (char *)(fp))
#define BIO_get_fp(b, fpp) BIO_ctrl(b, BIO_C_GET_FILE_PTR, 0, (char *)(fpp))

/* BIO_s_fd() and BIO_s_file() */
#define BIO_seek(b, ofs) (int)BIO_ctrl(b, BIO_C_FILE_SEEK, ofs, NULL)
#define
 BIO_tell(b) (int)BIO_ctrl(b, BIO_C_FILE_TELL, 0, NULL)

/*
* name is cast to lose const, but might be better to route through a
* function so we can do it safely
```

```
*/
#ifdef CONST_STRICT
/*
* If you are wondering why this isn't defined, its because CONST_STRICT is
* purely a compile-time kludge to allow const to be checked.
*/
int BIO_read_filename(BIO *b, const char *name);
#else
#define BIO_read_filename(b, name) (int)BIO_ctrl(b, BIO_C_SET_FILENAME, \
   BIO_CLOSE | BIO_FP_READ, (char *)(name))
#endif
#define BIO_write_filename(b, name) (int)BIO_ctrl(b, BIO_C_SET_FILENAME, \
   BIO_CLOSE | BIO_FP_WRITE, name)
#define BIO_append_filename(b, name) (int)BIO_ctrl(b, BIO_C_SET_FILENAME, \
   BIO_CLOSE | BIO_FP_APPEND, name)
#define BIO_rw_filename(b, name) (int)BIO_ctrl(b, BIO_C_SET_FILENAME, \
   BIO_CLOSE | BIO_FP_READ | BIO_FP_WRITE, name)

/*
* WARNING WARNING, this ups the reference count on the read bio of the SSL
* structure.  This is because the ssl read BIO is now pointed
 to by the
* next_bio field in the bio.  So when you free the BIO, make sure you are
* doing a BIO_free_all() to catch the underlying BIO.
*/
#define BIO_set_ssl(b, ssl, c) BIO_ctrl(b, BIO_C_SET_SSL, c, (char *)(ssl))
#define BIO_get_ssl(b, sslp) BIO_ctrl(b, BIO_C_GET_SSL, 0, (char *)(sslp))
#define BIO_set_ssl_mode(b, client) BIO_ctrl(b, BIO_C_SSL_MODE, client, NULL)
#define BIO_set_ssl_renegotiate_bytes(b, num) \
   BIO_ctrl(b, BIO_C_SET_SSL_RENEGOTIATE_BYTES, num, NULL)
#define BIO_get_num_renegotiates(b) \
   BIO_ctrl(b, BIO_C_GET_SSL_NUM_RENEGOTIATES, 0, NULL)
#define BIO_set_ssl_renegotiate_timeout(b, seconds) \
   BIO_ctrl(b, BIO_C_SET_SSL_RENEGOTIATE_TIMEOUT, seconds, NULL)

/* defined in evp.h */
/* #define BIO_set_md(b,md)     BIO_ctrl(b,BIO_C_SET_MD,1,(char *)(md)) */

#define BIO_get_mem_data(b, pp) BIO_ctrl(b, BIO_CTRL_INFO, 0, (char *)(pp))
#define BIO_set_mem_buf(b, bm, c) BIO_ctrl(b, BIO_C_SET_BUF_MEM, c, (char *)(bm))
#define BIO_get_mem_ptr(b, pp) BIO_ctrl(b,
 BIO_C_GET_BUF_MEM_PTR, 0, \
   (char *)(pp))
#define BIO_set_mem_eof_return(b, v) \
   BIO_ctrl(b, BIO_C_SET_BUF_MEM_EOF_RETURN, v, NULL)

/* For the BIO_f_buffer() type */
#define BIO_get_buffer_num_lines(b) BIO_ctrl(b, BIO_C_GET_BUFF_NUM_LINES, 0, NULL)
```

```
#define BIO_set_buffer_size(b, size) BIO_ctrl(b, BIO_C_SET_BUFF_SIZE, size, NULL)
#define BIO_set_read_buffer_size(b, size) BIO_int_ctrl(b, BIO_C_SET_BUFF_SIZE, size, 0)
#define BIO_set_write_buffer_size(b, size) BIO_int_ctrl(b, BIO_C_SET_BUFF_SIZE, size, 1)
#define BIO_set_buffer_read_data(b, buf, num) BIO_ctrl(b, BIO_C_SET_BUFF_READ_DATA, num, buf)

/* Don't use the next one unless you know what you are doing :-) */
#define BIO_dup_state(b, ret) BIO_ctrl(b, BIO_CTRL_DUP, 0, (char *)(ret))

#define BIO_reset(b) (int)BIO_ctrl(b, BIO_CTRL_RESET, 0, NULL)
#define BIO_eof(b) (int)BIO_ctrl(b, BIO_CTRL_EOF, 0, NULL)
#define BIO_set_close(b, c) (int)BIO_ctrl(b, BIO_CTRL_SET_CLOSE, (c), NULL)
#define BIO_get_close(b) (int)BIO_ctrl(b, BIO_CTRL_GET_CLOSE,
 0, NULL)
#define BIO_pending(b) (int)BIO_ctrl(b, BIO_CTRL_PENDING, 0, NULL)
#define BIO_wpending(b) (int)BIO_ctrl(b, BIO_CTRL_WPENDING, 0, NULL)
/* ...pending macros have inappropriate return type */
size_t BIO_ctrl_pending(BIO *b);
size_t BIO_ctrl_wpending(BIO *b);
#define BIO_flush(b) (int)BIO_ctrl(b, BIO_CTRL_FLUSH, 0, NULL)
#define BIO_get_info_callback(b, cbp) (int)BIO_ctrl(b, BIO_CTRL_GET_CALLBACK, 0, \
   cbp)
#define BIO_set_info_callback(b, cb) (int)BIO_callback_ctrl(b, BIO_CTRL_SET_CALLBACK, cb)

/* For the BIO_f_buffer() type */
#define BIO_buffer_get_num_lines(b) BIO_ctrl(b, BIO_CTRL_GET, 0, NULL)
#define BIO_buffer_peek(b, s, l) BIO_ctrl(b, BIO_CTRL_PEEK, (l), (s))

/* For BIO_s_bio() */
#define BIO_set_write_buf_size(b, size) (int)BIO_ctrl(b, BIO_C_SET_WRITE_BUF_SIZE, size, NULL)
#define BIO_get_write_buf_size(b, size) (size_t)BIO_ctrl(b, BIO_C_GET_WRITE_BUF_SIZE, size, NULL)
#define BIO_make_bio_pair(b1, b2) (int)BIO_ctrl(b1, BIO_C_MAKE_BIO_PAIR, 0, b2)
#define
 BIO_destroy_bio_pair(b) (int)BIO_ctrl(b, BIO_C_DESTROY_BIO_PAIR, 0, NULL)
#define BIO_shutdown_wr(b) (int)BIO_ctrl(b, BIO_C_SHUTDOWN_WR, 0, NULL)
/* macros with inappropriate type -- but ...pending macros use int too: */
#define BIO_get_write_guarantee(b) (int)BIO_ctrl(b, BIO_C_GET_WRITE_GUARANTEE, 0, NULL)
#define BIO_get_read_request(b) (int)BIO_ctrl(b, BIO_C_GET_READ_REQUEST, 0, NULL)
size_t BIO_ctrl_get_write_guarantee(BIO *b);
size_t BIO_ctrl_get_read_request(BIO *b);
int BIO_ctrl_reset_read_request(BIO *b);

/* ctrl macros for dgram */
#define BIO_ctrl_dgram_connect(b, peer) \
   (int)BIO_ctrl(b, BIO_CTRL_DGRAM_CONNECT, 0, (char *)(peer))
#define BIO_ctrl_set_connected(b, peer) \
   (int)BIO_ctrl(b, BIO_CTRL_DGRAM_SET_CONNECTED, 0, (char *)(peer))
#define BIO_dgram_recv_timedout(b) \
   (int)BIO_ctrl(b, BIO_CTRL_DGRAM_GET_RECV_TIMER_EXP, 0, NULL)
```

```
#define BIO_dgram_send_timedout(b) \
   (int)BIO_ctrl(b, BIO_CTRL_DGRAM_GET_SEND_TIMER_EXP, 0, NULL)
#define BIO_dgram_get_peer(b,
 peer) \
   (int)BIO_ctrl(b, BIO_CTRL_DGRAM_GET_PEER, 0, (char *)(peer))
#define BIO_dgram_set_peer(b, peer) \
   (int)BIO_ctrl(b, BIO_CTRL_DGRAM_SET_PEER, 0, (char *)(peer))
#define BIO_dgram_detect_peer_addr(b, peer) \
   (int)BIO_ctrl(b, BIO_CTRL_DGRAM_DETECT_PEER_ADDR, 0, (char *)(peer))
#define BIO_dgram_get_mtu_overhead(b) \
   (unsigned int)BIO_ctrl((b), BIO_CTRL_DGRAM_GET_MTU_OVERHEAD, 0, NULL)
#define BIO_dgram_get_local_addr_cap(b) \
   (int)BIO_ctrl((b), BIO_CTRL_DGRAM_GET_LOCAL_ADDR_CAP, 0, NULL)
#define BIO_dgram_get_local_addr_enable(b, penable) \
   (int)BIO_ctrl((b), BIO_CTRL_DGRAM_GET_LOCAL_ADDR_ENABLE, 0, (char *)(penable))
#define BIO_dgram_set_local_addr_enable(b, enable) \
   (int)BIO_ctrl((b), BIO_CTRL_DGRAM_SET_LOCAL_ADDR_ENABLE, (enable), NULL)
#define BIO_dgram_get_effective_caps(b) \
   (uint32_t)BIO_ctrl((b), BIO_CTRL_DGRAM_GET_EFFECTIVE_CAPS, 0, NULL)
#define BIO_dgram_get_caps(b) \
   (uint32_t)BIO_ctrl((b), BIO_CTRL_DGRAM_GET_CAPS, 0, NULL)
#define
 BIO_dgram_set_caps(b, caps) \
   (int)BIO_ctrl((b), BIO_CTRL_DGRAM_SET_CAPS, (long)(caps), NULL)
#define BIO_dgram_get_no_trunc(b) \
   (unsigned int)BIO_ctrl((b), BIO_CTRL_DGRAM_GET_NO_TRUNC, 0, NULL)
#define BIO_dgram_set_no_trunc(b, enable) \
   (int)BIO_ctrl((b), BIO_CTRL_DGRAM_SET_NO_TRUNC, (enable), NULL)
#define BIO_dgram_get_mtu(b) \
   (unsigned int)BIO_ctrl((b), BIO_CTRL_DGRAM_GET_MTU, 0, NULL)
#define BIO_dgram_set_mtu(b, mtu) \
   (int)BIO_ctrl((b), BIO_CTRL_DGRAM_SET_MTU, (mtu), NULL)
#define BIO_dgram_set0_local_addr(b, addr) \
   (int)BIO_ctrl((b), BIO_CTRL_DGRAM_SET0_LOCAL_ADDR, 0, (addr))

/* ctrl macros for BIO_f_prefix */
#define BIO_set_prefix(b, p) BIO_ctrl((b), BIO_CTRL_SET_PREFIX, 0, (void *)(p))
#define BIO_set_indent(b, i) BIO_ctrl((b), BIO_CTRL_SET_INDENT, (i), NULL)
#define BIO_get_indent(b) BIO_ctrl((b), BIO_CTRL_GET_INDENT, 0, NULL)

#define BIO_get_ex_new_index(l, p, newf, dupf, freef) \
   CRYPTO_get_ex_new_index(CRYPTO_EX_INDEX_BIO, l,
 p, newf, dupf, freef)
int BIO_set_ex_data(BIO *bio, int idx, void *data);
void *BIO_get_ex_data(const BIO *bio, int idx);
uint64_t BIO_number_read(BIO *bio);
uint64_t BIO_number_written(BIO *bio);
```

```
/* For BIO_f_asn1() */
int BIO_asn1_set_prefix(BIO *b, asn1_ps_func *prefix,
   asn1_ps_func *prefix_free);
int BIO_asn1_get_prefix(BIO *b, asn1_ps_func **pprefix,
   asn1_ps_func **pprefix_free);
int BIO_asn1_set_suffix(BIO *b, asn1_ps_func *suffix,
   asn1_ps_func *suffix_free);
int BIO_asn1_get_suffix(BIO *b, asn1_ps_func **psuffix,
   asn1_ps_func **psuffix_free);

const BIO_METHOD *BIO_s_file(void);
BIO *BIO_new_file(const char *filename, const char *mode);
BIO *BIO_new_from_core_bio(OSSL_LIB_CTX *libctx, OSSL_CORE_BIO *corebio);
#ifndef OPENSSL_NO_STDIO
BIO *BIO_new_fp(FILE *stream, int close_flag);
#endif
BIO *BIO_new_ex(OSSL_LIB_CTX *libctx, const BIO_METHOD *method);
BIO *BIO_new(const BIO_METHOD *type);
int BIO_free(BIO *a);
void BIO_set_data(BIO *a, void *ptr);
void *BIO_get_data(BIO
 *a);
void BIO_set_init(BIO *a, int init);
int BIO_get_init(BIO *a);
void BIO_set_shutdown(BIO *a, int shut);
int BIO_get_shutdown(BIO *a);
void BIO_vfree(BIO *a);
int BIO_up_ref(BIO *a);
int BIO_read(BIO *b, void *data, int dlen);
int BIO_read_ex(BIO *b, void *data, size_t dlen, size_t *readbytes);
__owur int BIO_recvmmsg(BIO *b, BIO_MSG *msg,
   size_t stride, size_t num_msg, uint64_t flags,
   size_t *msgs_processed);
int BIO_gets(BIO *bp, char *buf, int size);
int BIO_get_line(BIO *bio, char *buf, int size);
int BIO_write(BIO *b, const void *data, int dlen);
int BIO_write_ex(BIO *b, const void *data, size_t dlen, size_t *written);
__owur int BIO_sendmmsg(BIO *b, BIO_MSG *msg,
   size_t stride, size_t num_msg, uint64_t flags,
   size_t *msgs_processed);
__owur int BIO_get_rpoll_descriptor(BIO *b, BIO_POLL_DESCRIPTOR *desc);
__owur int BIO_get_wpoll_descriptor(BIO *b, BIO_POLL_DESCRIPTOR *desc);
int BIO_puts(BIO *bp, const char *buf);
int BIO_indent(BIO *b, int indent, int
 max);
long BIO_ctrl(BIO *bp, int cmd, long larg, void *parg);
long BIO_callback_ctrl(BIO *b, int cmd, BIO_info_cb *fp);
void *BIO_ptr_ctrl(BIO *bp, int cmd, long larg);
```

```
long BIO_int_ctrl(BIO *bp, int cmd, long larg, int iarg);
BIO *BIO_push(BIO *b, BIO *append);
BIO *BIO_pop(BIO *b);
void BIO_free_all(BIO *a);
BIO *BIO_find_type(BIO *b, int bio_type);
BIO *BIO_next(BIO *b);
void BIO_set_next(BIO *b, BIO *next);
BIO *BIO_get_retry_BIO(BIO *bio, int *reason);
int BIO_get_retry_reason(BIO *bio);
void BIO_set_retry_reason(BIO *bio, int reason);
BIO *BIO_dup_chain(BIO *in);

int BIO_nread0(BIO *bio, char **buf);
int BIO_nread(BIO *bio, char **buf, int num);
int BIO_nwrite0(BIO *bio, char **buf);
int BIO_nwrite(BIO *bio, char **buf, int num);

const BIO_METHOD *BIO_s_mem(void);
#ifndef OPENSSL_NO_DGRAM
const BIO_METHOD *BIO_s_dgram_mem(void);
#endif
const BIO_METHOD *BIO_s_secmem(void);
BIO *BIO_new_mem_buf(const void *buf, int len);
#ifndef OPENSSL_NO_SOCK
const BIO_METHOD *BIO_s_socket(void);
const
 BIO_METHOD *BIO_s_connect(void);
const BIO_METHOD *BIO_s_accept(void);
#endif
const BIO_METHOD *BIO_s_fd(void);
const BIO_METHOD *BIO_s_log(void);
const BIO_METHOD *BIO_s_bio(void);
const BIO_METHOD *BIO_s_null(void);
const BIO_METHOD *BIO_f_null(void);
const BIO_METHOD *BIO_f_buffer(void);
const BIO_METHOD *BIO_f_readbuffer(void);
const BIO_METHOD *BIO_f_linebuffer(void);
const BIO_METHOD *BIO_f_nbio_test(void);
const BIO_METHOD *BIO_f_prefix(void);
const BIO_METHOD *BIO_s_core(void);
#ifndef OPENSSL_NO_DGRAM
const BIO_METHOD *BIO_s_dgram_pair(void);
const BIO_METHOD *BIO_s_datagram(void);
int BIO_dgram_non_fatal_error(int error);
BIO *BIO_new_dgram(int fd, int close_flag);
#ifndef OPENSSL_NO_SCTP
const BIO_METHOD *BIO_s_datagram_sctp(void);
BIO *BIO_new_dgram_sctp(int fd, int close_flag);
```

```
int BIO_dgram_is_sctp(BIO *bio);
int BIO_dgram_sctp_notification_cb(BIO *b,
   BIO_dgram_sctp_notification_handler_fn handle_notifications,
   void *context);
int BIO_dgram_sctp_wait_for_dry(BIO
 *b);
int BIO_dgram_sctp_msg_waiting(BIO *b);
#endif
#endif

#ifndef OPENSSL_NO_SOCK
int BIO_sock_should_retry(int i);
int BIO_sock_non_fatal_error(int error);
int BIO_err_is_non_fatal(unsigned int errcode);
int BIO_socket_wait(int fd, int for_read, time_t max_time);
#endif
int BIO_wait(BIO *bio, time_t max_time, unsigned int nap_milliseconds);
int BIO_do_connect_retry(BIO *bio, int timeout, int nap_milliseconds);

int BIO_fd_should_retry(int i);
int BIO_fd_non_fatal_error(int error);
int BIO_dump_cb(int (*cb)(const void *data, size_t len, void *u),
   void *u, const void *s, int len);
int BIO_dump_indent_cb(int (*cb)(const void *data, size_t len, void *u),
   void *u, const void *s, int len, int indent);
int BIO_dump(BIO *b, const void *bytes, int len);
int BIO_dump_indent(BIO *b, const void *bytes, int len, int indent);
#ifndef OPENSSL_NO_STDIO
int BIO_dump_fp(FILE *fp, const void *s, int len);
int BIO_dump_indent_fp(FILE *fp, const void *s, int len, int indent);
#endif
int
 BIO_hex_string(BIO *out, int indent, int width, const void *data,
   int datalen);

#ifndef OPENSSL_NO_SOCK
BIO_ADDR *BIO_ADDR_new(void);
int BIO_ADDR_copy(BIO_ADDR *dst, const BIO_ADDR *src);
BIO_ADDR *BIO_ADDR_dup(const BIO_ADDR *ap);
int BIO_ADDR_rawmake(BIO_ADDR *ap, int family,
   const void *where, size_t wherelen, unsigned short port);
void BIO_ADDR_free(BIO_ADDR *);
void BIO_ADDR_clear(BIO_ADDR *ap);
int BIO_ADDR_family(const BIO_ADDR *ap);
int BIO_ADDR_rawaddress(const BIO_ADDR *ap, void *p, size_t *l);
unsigned short BIO_ADDR_rawport(const BIO_ADDR *ap);
char *BIO_ADDR_hostname_string(const BIO_ADDR *ap, int numeric);
char *BIO_ADDR_service_string(const BIO_ADDR *ap, int numeric);
```

```
char *BIO_ADDR_path_string(const BIO_ADDR *ap);

const BIO_ADDRINFO *BIO_ADDRINFO_next(const BIO_ADDRINFO *bai);
int BIO_ADDRINFO_family(const BIO_ADDRINFO *bai);
int BIO_ADDRINFO_socktype(const BIO_ADDRINFO *bai);
int BIO_ADDRINFO_protocol(const BIO_ADDRINFO *bai);
const BIO_ADDR *BIO_ADDRINFO_address(const
 BIO_ADDRINFO *bai);
void BIO_ADDRINFO_free(BIO_ADDRINFO *bai);

enum BIO_hostserv_priorities {
   BIO_PARSE_PRIO_HOST,
   BIO_PARSE_PRIO_SERV
};
int BIO_parse_hostserv(const char *hostserv, char **host, char **service,
   enum BIO_hostserv_priorities hostserv_prio);
enum BIO_lookup_type {
   BIO_LOOKUP_CLIENT,
   BIO_LOOKUP_SERVER
};
int BIO_lookup(const char *host, const char *service,
   enum BIO_lookup_type lookup_type,
   int family, int socktype, BIO_ADDRINFO **res);
int BIO_lookup_ex(const char *host, const char *service,
   int lookup_type, int family, int socktype, int protocol,
   BIO_ADDRINFO **res);
int BIO_sock_error(int sock);
int BIO_socket_ioctl(int fd, long type, void *arg);
int BIO_socket_nbio(int fd, int mode);
int BIO_sock_init(void);
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define BIO_sock_cleanup() \
   while (0)            \
   continue
#endif
int BIO_set_tcp_ndelay(int sock, int turn_on);
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0
 struct hostent *BIO_gethostbyname(const char *name);
OSSL_DEPRECATEDIN_1_1_0 int BIO_get_port(const char *str, unsigned short *port_ptr);
OSSL_DEPRECATEDIN_1_1_0 int BIO_get_host_ip(const char *str, unsigned char *ip);
OSSL_DEPRECATEDIN_1_1_0 int BIO_get_accept_socket(char *host_port, int mode);
OSSL_DEPRECATEDIN_1_1_0 int BIO_accept(int sock, char **ip_port);
#endif

union BIO_sock_info_u {
   BIO_ADDR *addr;
};
```

```
enum BIO_sock_info_type {
  BIO_SOCK_INFO_ADDRESS
};
int BIO_sock_info(int sock,
  enum BIO_sock_info_type type, union BIO_sock_info_u *info);

#define BIO_SOCK_REUSEADDR 0x01
#define BIO_SOCK_V6_ONLY 0x02
#define BIO_SOCK_KEEPALIVE 0x04
#define BIO_SOCK_NONBLOCK 0x08
#define BIO_SOCK_NODELAY 0x10
#define BIO_SOCK_TFO 0x20

int BIO_socket(int domain, int socktype, int protocol, int options);
int BIO_connect(int sock, const BIO_ADDR *addr, int options);
int BIO_bind(int sock, const BIO_ADDR *addr, int options);
int BIO_listen(int sock, const BIO_ADDR *addr, int options);
int
 BIO_accept_ex(int accept_sock, BIO_ADDR *addr, int options);
int BIO_closesocket(int sock);

BIO *BIO_new_socket(int sock, int close_flag);
BIO *BIO_new_connect(const char *host_port);
BIO *BIO_new_accept(const char *host_port);
#endif /* OPENSSL_NO_SOCK*/

BIO *BIO_new_fd(int fd, int close_flag);

int BIO_new_bio_pair(BIO **bio1, size_t writebuf1,
  BIO **bio2, size_t writebuf2);
#ifndef OPENSSL_NO_DGRAM
int BIO_new_bio_dgram_pair(BIO **bio1, size_t writebuf1,
  BIO **bio2, size_t writebuf2);
#endif

/*
* If successful, returns 1 and in *bio1, *bio2 two BIO pair endpoints.
* Otherwise returns 0 and sets *bio1 and *bio2 to NULL. Size 0 uses default
* value.
*/

void BIO_copy_next_retry(BIO *b);

/*
* long BIO_ghbn_ctrl(int cmd,int iarg,char *parg);
*/

#define ossl_bio__attr__(x)
```

```
#if defined(__GNUC__) && defined(__STDC_VERSION__)    \
   && !defined(__MINGW32__) && !defined(__MINGW64__) \
   && !defined(__APPLE__)
/*
* Because we support the 'z' modifier, which
 made its appearance in C99,
* we can't use __attribute__ with pre C99 dialects.
*/
#if __STDC_VERSION__ >= 199901L
#undef ossl_bio__attr__
#define ossl_bio__attr__ __attribute__
#if __GNUC__ * 10 + __GNUC_MINOR__ >= 44
#define ossl_bio__printf__ __gnu_printf__
#else
#define ossl_bio__printf__ __printf__
#endif
#endif
#endif
int BIO_printf(BIO *bio, const char *format, ...)
   ossl_bio__attr__((__format__(ossl_bio__printf__, 2, 3)));
int BIO_vprintf(BIO *bio, const char *format, va_list args)
   ossl_bio__attr__((__format__(ossl_bio__printf__, 2, 0)));
int BIO_snprintf(char *buf, size_t n, const char *format, ...)
   ossl_bio__attr__((__format__(ossl_bio__printf__, 3, 4)));
int BIO_vsnprintf(char *buf, size_t n, const char *format, va_list args)
   ossl_bio__attr__((__format__(ossl_bio__printf__, 3, 0)));
#undef ossl_bio__attr__
#undef ossl_bio__printf__

BIO_METHOD *BIO_meth_new(int type, const char *name);
void BIO_meth_free(BIO_METHOD *biom);
int BIO_meth_set_write(BIO_METHOD
 *biom,
   int (*write)(BIO *, const char *, int));
int BIO_meth_set_write_ex(BIO_METHOD *biom,
   int (*bwrite)(BIO *, const char *, size_t, size_t *));
int BIO_meth_set_sendmmsg(BIO_METHOD *biom,
   int (*f)(BIO *, BIO_MSG *, size_t, size_t,
       uint64_t, size_t *));
int BIO_meth_set_read(BIO_METHOD *biom,
   int (*read)(BIO *, char *, int));
int BIO_meth_set_read_ex(BIO_METHOD *biom,
   int (*bread)(BIO *, char *, size_t, size_t *));
int BIO_meth_set_recvmmsg(BIO_METHOD *biom,
   int (*f)(BIO *, BIO_MSG *, size_t, size_t,
       uint64_t, size_t *));
int BIO_meth_set_puts(BIO_METHOD *biom,
   int (*puts)(BIO *, const char *));
```

```
int BIO_meth_set_gets(BIO_METHOD *biom,
   int (*ossl_gets)(BIO *, char *, int));
int BIO_meth_set_ctrl(BIO_METHOD *biom,
   long (*ctrl)(BIO *, int, long, void *));
int BIO_meth_set_create(BIO_METHOD *biom, int (*create)(BIO *));
int BIO_meth_set_destroy(BIO_METHOD *biom, int (*destroy)(BIO *));
int BIO_meth_set_callback_ctrl(BIO_METHOD *biom,

   long (*callback_ctrl)(BIO *, int,
       BIO_info_cb *));
#ifndef OPENSSL_NO_DEPRECATED_3_5
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_write(const BIO_METHOD *biom))(BIO *, const char *,
   int);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_write_ex(const BIO_METHOD *biom))(BIO *, const char *,
   size_t, size_t *);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_sendmmsg(const BIO_METHOD *biom))(BIO *, BIO_MSG
*,
   size_t, size_t,
   uint64_t, size_t *);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_read(const BIO_METHOD *biom))(BIO *, char *, int);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_read_ex(const BIO_METHOD *biom))(BIO *, char *,
   size_t, size_t *);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_recvmmsg(const BIO_METHOD *biom))(BIO *, BIO_MSG
*,
   size_t, size_t,
   uint64_t, size_t *);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_puts(const BIO_METHOD *biom))(BIO *, const char *);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_gets(const BIO_METHOD *biom))(BIO *, char *, int);
OSSL_DEPRECATEDIN_3_5
 long (*BIO_meth_get_ctrl(const BIO_METHOD *biom))(BIO *, int,
   long, void *);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_create(const BIO_METHOD *bion))(BIO *);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_destroy(const BIO_METHOD *biom))(BIO *);
OSSL_DEPRECATEDIN_3_5 long (*BIO_meth_get_callback_ctrl(const BIO_METHOD *biom))(BIO *, int,
   BIO_info_cb *);
#endif
#ifdef __cplusplus
}
#endif
#endif
/*
* WARNING: do not edit!
* Generated by Makefile from providers/common/include/prov/der_ec.h.in
*
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*
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* this file except in compliance with the License.  You can obtain a copy
```

```
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* https://www.openssl.org/source/license.html
*/

#include "crypto/ec.h"
#include "internal/der.h"

/* Well known OIDs precompiled */
/* clang-format off */

/*
* ecdsa-with-SHA1 OBJECT IDENTIFIER ::= { id-ecSigType 1 }
*/
#define DER_OID_V_ecdsa_with_SHA1 DER_P_OBJECT, 7, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x04, 0x01
#define DER_OID_SZ_ecdsa_with_SHA1 9
extern const unsigned char ossl_der_oid_ecdsa_with_SHA1[DER_OID_SZ_ecdsa_with_SHA1];

/*
* id-ecPublicKey OBJECT IDENTIFIER ::= { id-publicKeyType 1 }
*/
#define DER_OID_V_id_ecPublicKey DER_P_OBJECT, 7, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x02, 0x01
#define DER_OID_SZ_id_ecPublicKey
 9
extern const unsigned char ossl_der_oid_id_ecPublicKey[DER_OID_SZ_id_ecPublicKey];

/*
* c2pnb163v1  OBJECT IDENTIFIER  ::=  { c-TwoCurve  1 }
*/
#define DER_OID_V_c2pnb163v1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x01
#define DER_OID_SZ_c2pnb163v1 10
extern const unsigned char ossl_der_oid_c2pnb163v1[DER_OID_SZ_c2pnb163v1];

/*
* c2pnb163v2  OBJECT IDENTIFIER  ::=  { c-TwoCurve  2 }
*/
#define DER_OID_V_c2pnb163v2 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x02
#define DER_OID_SZ_c2pnb163v2 10
extern const unsigned char ossl_der_oid_c2pnb163v2[DER_OID_SZ_c2pnb163v2];

/*
* c2pnb163v3  OBJECT IDENTIFIER  ::=  { c-TwoCurve  3 }
*/
#define DER_OID_V_c2pnb163v3 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x03
#define DER_OID_SZ_c2pnb163v3 10
extern const unsigned char ossl_der_oid_c2pnb163v3[DER_OID_SZ_c2pnb163v3];

/*
* c2pnb176w1  OBJECT IDENTIFIER  ::=  { c-TwoCurve  4 }
```

```
*/
#define DER_OID_V_c2pnb176w1 DER_P_OBJECT,
 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x04
#define DER_OID_SZ_c2pnb176w1 10
extern const unsigned char ossl_der_oid_c2pnb176w1[DER_OID_SZ_c2pnb176w1];

/*
* c2tnb191v1  OBJECT IDENTIFIER  ::=  { c-TwoCurve  5 }
*/
#define DER_OID_V_c2tnb191v1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x05
#define DER_OID_SZ_c2tnb191v1 10
extern const unsigned char ossl_der_oid_c2tnb191v1[DER_OID_SZ_c2tnb191v1];

/*
* c2tnb191v2  OBJECT IDENTIFIER  ::=  { c-TwoCurve  6 }
*/
#define DER_OID_V_c2tnb191v2 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x06
#define DER_OID_SZ_c2tnb191v2 10
extern const unsigned char ossl_der_oid_c2tnb191v2[DER_OID_SZ_c2tnb191v2];

/*
* c2tnb191v3  OBJECT IDENTIFIER  ::=  { c-TwoCurve  7 }
*/
#define DER_OID_V_c2tnb191v3 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x07
#define DER_OID_SZ_c2tnb191v3 10
extern const unsigned char ossl_der_oid_c2tnb191v3[DER_OID_SZ_c2tnb191v3];

/*
* c2onb191v4  OBJECT IDENTIFIER
  ::=  { c-TwoCurve  8 }
*/
#define DER_OID_V_c2onb191v4 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x08
#define DER_OID_SZ_c2onb191v4 10
extern const unsigned char ossl_der_oid_c2onb191v4[DER_OID_SZ_c2onb191v4];

/*
* c2onb191v5  OBJECT IDENTIFIER  ::=  { c-TwoCurve  9 }
*/
#define DER_OID_V_c2onb191v5 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x09
#define DER_OID_SZ_c2onb191v5 10
extern const unsigned char ossl_der_oid_c2onb191v5[DER_OID_SZ_c2onb191v5];

/*
* c2pnb208w1  OBJECT IDENTIFIER  ::=  { c-TwoCurve 10 }
*/
#define DER_OID_V_c2pnb208w1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x0A
#define DER_OID_SZ_c2pnb208w1 10
extern const unsigned char ossl_der_oid_c2pnb208w1[DER_OID_SZ_c2pnb208w1];
```

```
/*
* c2tnb239v1  OBJECT IDENTIFIER  ::=  { c-TwoCurve 11 }
*/
#define DER_OID_V_c2tnb239v1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x0B
#define DER_OID_SZ_c2tnb239v1 10
extern const unsigned char ossl_der_oid_c2tnb239v1[DER_OID_SZ_c2tnb239v1];

/*
 * c2tnb239v2  OBJECT IDENTIFIER  ::=  { c-TwoCurve 12 }
*/
#define DER_OID_V_c2tnb239v2 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x0C
#define DER_OID_SZ_c2tnb239v2 10
extern const unsigned char ossl_der_oid_c2tnb239v2[DER_OID_SZ_c2tnb239v2];

/*
* c2tnb239v3  OBJECT IDENTIFIER  ::=  { c-TwoCurve 13 }
*/
#define DER_OID_V_c2tnb239v3 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x0D
#define DER_OID_SZ_c2tnb239v3 10
extern const unsigned char ossl_der_oid_c2tnb239v3[DER_OID_SZ_c2tnb239v3];

/*
* c2onb239v4  OBJECT IDENTIFIER  ::=  { c-TwoCurve 14 }
*/
#define DER_OID_V_c2onb239v4 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x0E
#define DER_OID_SZ_c2onb239v4 10
extern const unsigned char ossl_der_oid_c2onb239v4[DER_OID_SZ_c2onb239v4];

/*
* c2onb239v5  OBJECT IDENTIFIER  ::=  { c-TwoCurve 15 }
*/
#define DER_OID_V_c2onb239v5 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x0F
#define DER_OID_SZ_c2onb239v5
 10
extern const unsigned char ossl_der_oid_c2onb239v5[DER_OID_SZ_c2onb239v5];

/*
* c2pnb272w1  OBJECT IDENTIFIER  ::=  { c-TwoCurve 16 }
*/
#define DER_OID_V_c2pnb272w1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x10
#define DER_OID_SZ_c2pnb272w1 10
extern const unsigned char ossl_der_oid_c2pnb272w1[DER_OID_SZ_c2pnb272w1];

/*
* c2pnb304w1  OBJECT IDENTIFIER  ::=  { c-TwoCurve 17 }
*/
#define DER_OID_V_c2pnb304w1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x11
```

```
#define DER_OID_SZ_c2pnb304w1 10
extern const unsigned char ossl_der_oid_c2pnb304w1[DER_OID_SZ_c2pnb304w1];

/*
* c2tnb359v1  OBJECT IDENTIFIER  ::=  { c-TwoCurve 18 }
*/
#define DER_OID_V_c2tnb359v1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x12
#define DER_OID_SZ_c2tnb359v1 10
extern const unsigned char ossl_der_oid_c2tnb359v1[DER_OID_SZ_c2tnb359v1];

/*
* c2pnb368w1  OBJECT IDENTIFIER  ::=  { c-TwoCurve 19 }
*/
#define DER_OID_V_c2pnb368w1 DER_P_OBJECT,
 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x13
#define DER_OID_SZ_c2pnb368w1 10
extern const unsigned char ossl_der_oid_c2pnb368w1[DER_OID_SZ_c2pnb368w1];

/*
* c2tnb431r1  OBJECT IDENTIFIER  ::=  { c-TwoCurve 20 }
*/
#define DER_OID_V_c2tnb431r1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x14
#define DER_OID_SZ_c2tnb431r1 10
extern const unsigned char ossl_der_oid_c2tnb431r1[DER_OID_SZ_c2tnb431r1];

/*
* prime192v1  OBJECT IDENTIFIER  ::=  { primeCurve  1 }
*/
#define DER_OID_V_prime192v1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x01, 0x01
#define DER_OID_SZ_prime192v1 10
extern const unsigned char ossl_der_oid_prime192v1[DER_OID_SZ_prime192v1];

/*
* prime192v2  OBJECT IDENTIFIER  ::=  { primeCurve  2 }
*/
#define DER_OID_V_prime192v2 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x01, 0x02
#define DER_OID_SZ_prime192v2 10
extern const unsigned char ossl_der_oid_prime192v2[DER_OID_SZ_prime192v2];

/*
* prime192v3  OBJECT IDENTIFIER  ::=
  { primeCurve  3 }
*/
#define DER_OID_V_prime192v3 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x01, 0x03
#define DER_OID_SZ_prime192v3 10
extern const unsigned char ossl_der_oid_prime192v3[DER_OID_SZ_prime192v3];

/*
```

```
* prime239v1  OBJECT IDENTIFIER  ::=  { primeCurve  4 }
*/
#define DER_OID_V_prime239v1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x01, 0x04
#define DER_OID_SZ_prime239v1 10
extern const unsigned char ossl_der_oid_prime239v1[DER_OID_SZ_prime239v1];

/*
* prime239v2  OBJECT IDENTIFIER  ::=  { primeCurve  5 }
*/
#define DER_OID_V_prime239v2 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x01, 0x05
#define DER_OID_SZ_prime239v2 10
extern const unsigned char ossl_der_oid_prime239v2[DER_OID_SZ_prime239v2];

/*
* prime239v3  OBJECT IDENTIFIER  ::=  { primeCurve  6 }
*/
#define DER_OID_V_prime239v3 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x01, 0x06
#define DER_OID_SZ_prime239v3 10
extern const unsigned char ossl_der_oid_prime239v3[DER_OID_SZ_prime239v3];

/*
 * prime256v1  OBJECT IDENTIFIER  ::=  { primeCurve  7 }
*/
#define DER_OID_V_prime256v1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x01, 0x07
#define DER_OID_SZ_prime256v1 10
extern const unsigned char ossl_der_oid_prime256v1[DER_OID_SZ_prime256v1];

/*
* ecdsa-with-SHA224 OBJECT IDENTIFIER ::= { iso(1) member-body(2)
*      us(840) ansi-X9-62(10045) signatures(4) ecdsa-with-SHA2(3) 1 }
*/
#define DER_OID_V_ecdsa_with_SHA224 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x04, 0x03,
0x01
#define DER_OID_SZ_ecdsa_with_SHA224 10
extern const unsigned char ossl_der_oid_ecdsa_with_SHA224[DER_OID_SZ_ecdsa_with_SHA224];

/*
* ecdsa-with-SHA256 OBJECT IDENTIFIER ::= { iso(1) member-body(2)
*      us(840) ansi-X9-62(10045) signatures(4) ecdsa-with-SHA2(3) 2 }
*/
#define DER_OID_V_ecdsa_with_SHA256 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x04, 0x03,
0x02
#define DER_OID_SZ_ecdsa_with_SHA256 10
extern const unsigned char ossl_der_oid_ecdsa_with_SHA256[DER_OID_SZ_ecdsa_with_SHA256];

/*
 * ecdsa-with-SHA384 OBJECT IDENTIFIER ::= { iso(1) member-body(2)
*      us(840) ansi-X9-62(10045) signatures(4) ecdsa-with-SHA2(3) 3 }
```

```
*/
#define DER_OID_V_ecdsa_with_SHA384 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x04, 0x03,
0x03
#define DER_OID_SZ_ecdsa_with_SHA384 10
extern const unsigned char ossl_der_oid_ecdsa_with_SHA384[DER_OID_SZ_ecdsa_with_SHA384];

/*
* ecdsa-with-SHA512 OBJECT IDENTIFIER ::= { iso(1) member-body(2)
*      us(840) ansi-X9-62(10045) signatures(4) ecdsa-with-SHA2(3) 4 }
*/
#define DER_OID_V_ecdsa_with_SHA512 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x04, 0x03,
0x04
#define DER_OID_SZ_ecdsa_with_SHA512 10
extern const unsigned char ossl_der_oid_ecdsa_with_SHA512[DER_OID_SZ_ecdsa_with_SHA512];

/*
* id-ecdsa-with-sha3-224 OBJECT IDENTIFIER ::= { sigAlgs 9 }
*/
#define DER_OID_V_id_ecdsa_with_sha3_224 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x09
#define DER_OID_SZ_id_ecdsa_with_sha3_224
 11
extern const unsigned char ossl_der_oid_id_ecdsa_with_sha3_224[DER_OID_SZ_id_ecdsa_with_sha3_224];

/*
* id-ecdsa-with-sha3-256 OBJECT IDENTIFIER ::= { sigAlgs 10 }
*/
#define DER_OID_V_id_ecdsa_with_sha3_256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x0A
#define DER_OID_SZ_id_ecdsa_with_sha3_256 11
extern const unsigned char ossl_der_oid_id_ecdsa_with_sha3_256[DER_OID_SZ_id_ecdsa_with_sha3_256];

/*
* id-ecdsa-with-sha3-384 OBJECT IDENTIFIER ::= { sigAlgs 11 }
*/
#define DER_OID_V_id_ecdsa_with_sha3_384 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x0B
#define DER_OID_SZ_id_ecdsa_with_sha3_384 11
extern const unsigned char ossl_der_oid_id_ecdsa_with_sha3_384[DER_OID_SZ_id_ecdsa_with_sha3_384];

/*
* id-ecdsa-with-sha3-512 OBJECT IDENTIFIER ::= { sigAlgs 12 }
*/
#define DER_OID_V_id_ecdsa_with_sha3_512 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x0C
#define DER_OID_SZ_id_ecdsa_with_sha3_512 11
extern const
```

```
 unsigned char ossl_der_oid_id_ecdsa_with_sha3_512[DER_OID_SZ_id_ecdsa_with_sha3_512];

/* clang-format on */

/* Subject Public Key Info */
int ossl_DER_w_algorithmIdentifier_EC(WPACKET *pkt, int cont, EC_KEY *ec);
/* Signature */
int ossl_DER_w_algorithmIdentifier_ECDSA_with_MD(WPACKET *pkt, int cont,
   EC_KEY *ec, int mdnid);
```

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https://github.com/bitinn/node-fetch
# Blue Oak Model License

Version 1.0.0

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#include "internal/der.h"

/* Well known OIDs precompiled */
/* clang-format off */

/*
* id-alg-CMS3DESwrap OBJECT IDENTIFIER ::= {
*     iso(1) member-body(2) us(840) rsadsi(113549) pkcs(1) pkcs-9(9) smime(16) alg(3) 6
* }
*/
#define DER_OID_V_id_alg_CMS3DESwrap DER_P_OBJECT, 11, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01,
0x09, 0x10, 0x03, 0x06
#define DER_OID_SZ_id_alg_CMS3DESwrap 13
extern const unsigned char ossl_der_oid_id_alg_CMS3DESwrap[DER_OID_SZ_id_alg_CMS3DESwrap];

/*
* id-aes128-wrap OBJECT IDENTIFIER ::= { aes 5 }
*/
#define DER_OID_V_id_aes128_wrap
 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x01, 0x05
#define DER_OID_SZ_id_aes128_wrap 11
extern const unsigned char ossl_der_oid_id_aes128_wrap[DER_OID_SZ_id_aes128_wrap];

/*
* id-aes192-wrap OBJECT IDENTIFIER ::= { aes 25 }
*/
#define DER_OID_V_id_aes192_wrap DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x01, 0x19
#define DER_OID_SZ_id_aes192_wrap 11
extern const unsigned char ossl_der_oid_id_aes192_wrap[DER_OID_SZ_id_aes192_wrap];

/*
* id-aes256-wrap OBJECT IDENTIFIER ::= { aes 45 }
*/
#define DER_OID_V_id_aes256_wrap DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x01,
0x2D
#define DER_OID_SZ_id_aes256_wrap 11
extern const unsigned char ossl_der_oid_id_aes256_wrap[DER_OID_SZ_id_aes256_wrap];

/* clang-format on */
```

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#include "internal/der.h"
#include "crypto/slh_dsa.h"

/* Well known OIDs precompiled */
/* clang-format off */

/*
* id-slh-dsa-sha2-128s OBJECT IDENTIFIER ::= { sigAlgs 20 }
*/
#define DER_OID_V_id_slh_dsa_sha2_128s DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x14
#define DER_OID_SZ_id_slh_dsa_sha2_128s 11
extern const unsigned char ossl_der_oid_id_slh_dsa_sha2_128s[DER_OID_SZ_id_slh_dsa_sha2_128s];

/*
* id-slh-dsa-sha2-128f OBJECT IDENTIFIER ::= { sigAlgs 21 }
*/
#define DER_OID_V_id_slh_dsa_sha2_128f DER_P_OBJECT, 9, 0x60, 0x86,
 0x48, 0x01, 0x65, 0x03, 0x04, 0x03, 0x15
#define DER_OID_SZ_id_slh_dsa_sha2_128f 11
extern const unsigned char ossl_der_oid_id_slh_dsa_sha2_128f[DER_OID_SZ_id_slh_dsa_sha2_128f];
```

```
/*
* id-slh-dsa-sha2-192s OBJECT IDENTIFIER ::= { sigAlgs 22 }
*/
#define DER_OID_V_id_slh_dsa_sha2_192s DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x16
#define DER_OID_SZ_id_slh_dsa_sha2_192s 11
extern const unsigned char ossl_der_oid_id_slh_dsa_sha2_192s[DER_OID_SZ_id_slh_dsa_sha2_192s];

/*
* id-slh-dsa-sha2-192f OBJECT IDENTIFIER ::= { sigAlgs 23 }
*/
#define DER_OID_V_id_slh_dsa_sha2_192f DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x17
#define DER_OID_SZ_id_slh_dsa_sha2_192f 11
extern const unsigned char ossl_der_oid_id_slh_dsa_sha2_192f[DER_OID_SZ_id_slh_dsa_sha2_192f];

/*
* id-slh-dsa-sha2-256s OBJECT IDENTIFIER ::= { sigAlgs 24 }
*/
#define DER_OID_V_id_slh_dsa_sha2_256s DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x18
#define DER_OID_SZ_id_slh_dsa_sha2_256s
 11
extern const unsigned char ossl_der_oid_id_slh_dsa_sha2_256s[DER_OID_SZ_id_slh_dsa_sha2_256s];

/*
* id-slh-dsa-sha2-256f OBJECT IDENTIFIER ::= { sigAlgs 25 }
*/
#define DER_OID_V_id_slh_dsa_sha2_256f DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x19
#define DER_OID_SZ_id_slh_dsa_sha2_256f 11
extern const unsigned char ossl_der_oid_id_slh_dsa_sha2_256f[DER_OID_SZ_id_slh_dsa_sha2_256f];

/*
* id-slh-dsa-shake-128s OBJECT IDENTIFIER ::= { sigAlgs 26 }
*/
#define DER_OID_V_id_slh_dsa_shake_128s DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x1A
#define DER_OID_SZ_id_slh_dsa_shake_128s 11
extern const unsigned char ossl_der_oid_id_slh_dsa_shake_128s[DER_OID_SZ_id_slh_dsa_shake_128s];

/*
* id-slh-dsa-shake-128f OBJECT IDENTIFIER ::= { sigAlgs 27 }
*/
#define DER_OID_V_id_slh_dsa_shake_128f DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x1B
#define DER_OID_SZ_id_slh_dsa_shake_128f 11
extern const
```

```
 unsigned char ossl_der_oid_id_slh_dsa_shake_128f[DER_OID_SZ_id_slh_dsa_shake_128f];

/*
* id-slh-dsa-shake-192s OBJECT IDENTIFIER ::= { sigAlgs 28 }
*/
#define DER_OID_V_id_slh_dsa_shake_192s DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x1C
#define DER_OID_SZ_id_slh_dsa_shake_192s 11
extern const unsigned char ossl_der_oid_id_slh_dsa_shake_192s[DER_OID_SZ_id_slh_dsa_shake_192s];

/*
* id-slh-dsa-shake-192f OBJECT IDENTIFIER ::= { sigAlgs 29 }
*/
#define DER_OID_V_id_slh_dsa_shake_192f DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x1D
#define DER_OID_SZ_id_slh_dsa_shake_192f 11
extern const unsigned char ossl_der_oid_id_slh_dsa_shake_192f[DER_OID_SZ_id_slh_dsa_shake_192f];

/*
* id-slh-dsa-shake-256s OBJECT IDENTIFIER ::= { sigAlgs 30 }
*/
#define DER_OID_V_id_slh_dsa_shake_256s DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x1E
#define DER_OID_SZ_id_slh_dsa_shake_256s 11
extern const unsigned char ossl_der_oid_id_slh_dsa_shake_256s[DER_OID_SZ_id_slh_dsa_shake_256s];

/*
 * id-slh-dsa-shake-256f OBJECT IDENTIFIER ::= { sigAlgs 31 }
*/
#define DER_OID_V_id_slh_dsa_shake_256f DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x1F
#define DER_OID_SZ_id_slh_dsa_shake_256f 11
extern const unsigned char ossl_der_oid_id_slh_dsa_shake_256f[DER_OID_SZ_id_slh_dsa_shake_256f];

/* clang-format on */

int ossl_DER_w_algorithmIdentifier_SLH_DSA(WPACKET *pkt, int tag, SLH_DSA_KEY *key);
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/x509_acert.h.in
*
* Copyright 2022-2024 The OpenSSL Project Authors. All Rights Reserved.
*
* Licensed under the Apache License 2.0 (the "License").  You may not use
* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/
```

```
/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_X509_ACERT_H
#define OPENSSL_X509_ACERT_H
#pragma once

#include <openssl/x509v3.h>
#include <openssl/x509.h>
#include <openssl/pem.h>

typedef struct X509_acert_st X509_ACERT;
typedef struct X509_acert_info_st X509_ACERT_INFO;
typedef struct ossl_object_digest_info_st OSSL_OBJECT_DIGEST_INFO;
typedef struct ossl_issuer_serial_st OSSL_ISSUER_SERIAL;
typedef struct X509_acert_issuer_v2form_st X509_ACERT_ISSUER_V2FORM;

DECLARE_ASN1_FUNCTIONS(X509_ACERT)
DECLARE_ASN1_DUP_FUNCTION(X509_ACERT)
DECLARE_ASN1_ITEM(X509_ACERT_INFO)
DECLARE_ASN1_ALLOC_FUNCTIONS(X509_ACERT_INFO)
DECLARE_ASN1_ALLOC_FUNCTIONS(OSSL_OBJECT_DIGEST_INFO)
DECLARE_ASN1_ALLOC_FUNCTIONS(OSSL_ISSUER_SERIAL)
DECLARE_ASN1_ALLOC_FUNCTIONS(X509_ACERT_ISSUER_V2FORM)

#ifndef
 OPENSSL_NO_STDIO
X509_ACERT *d2i_X509_ACERT_fp(FILE *fp, X509_ACERT **acert);
int i2d_X509_ACERT_fp(FILE *fp, const X509_ACERT *acert);
#endif

DECLARE_PEM_rw(X509_ACERT, X509_ACERT)

X509_ACERT *d2i_X509_ACERT_bio(BIO *bp, X509_ACERT **acert);
int i2d_X509_ACERT_bio(BIO *bp, const X509_ACERT *acert);

int X509_ACERT_sign(X509_ACERT *x, EVP_PKEY *pkey, const EVP_MD *md);
int X509_ACERT_sign_ctx(X509_ACERT *x, EVP_MD_CTX *ctx);
int X509_ACERT_verify(X509_ACERT *a, EVP_PKEY *r);

#define X509_ACERT_VERSION_2 1

const GENERAL_NAMES *X509_ACERT_get0_holder_entityName(const X509_ACERT *x);
const OSSL_ISSUER_SERIAL *X509_ACERT_get0_holder_baseCertId(const X509_ACERT *x);
const OSSL_OBJECT_DIGEST_INFO *X509_ACERT_get0_holder_digest(const X509_ACERT *x);
const X509_NAME
```

```
 *X509_ACERT_get0_issuerName(const X509_ACERT *x);
long X509_ACERT_get_version(const X509_ACERT *x);
void X509_ACERT_get0_signature(const X509_ACERT *x,
   const ASN1_BIT_STRING **psig,
   const X509_ALGOR **palg);
int X509_ACERT_get_signature_nid(const X509_ACERT *x);
const X509_ALGOR *X509_ACERT_get0_info_sigalg(const X509_ACERT *x);
const ASN1_INTEGER *X509_ACERT_get0_serialNumber(const X509_ACERT *x);
const ASN1_TIME *X509_ACERT_get0_notBefore(const X509_ACERT *x);
const ASN1_TIME *X509_ACERT_get0_notAfter(const X509_ACERT *x);
const ASN1_BIT_STRING *X509_ACERT_get0_issuerUID(const X509_ACERT *x);

int X509_ACERT_print(BIO *bp, X509_ACERT *x);
int X509_ACERT_print_ex(BIO *bp, X509_ACERT *x, unsigned long nmflags,
   unsigned long cflag);

int X509_ACERT_get_attr_count(const X509_ACERT *x);
int X509_ACERT_get_attr_by_NID(const X509_ACERT *x, int nid, int lastpos);
int X509_ACERT_get_attr_by_OBJ(const X509_ACERT *x, const ASN1_OBJECT *obj,
   int lastpos);
X509_ATTRIBUTE *X509_ACERT_get_attr(const
 X509_ACERT *x, int loc);
X509_ATTRIBUTE *X509_ACERT_delete_attr(X509_ACERT *x, int loc);

void *X509_ACERT_get_ext_d2i(const X509_ACERT *x, int nid, int *crit, int *idx);
int X509_ACERT_add1_ext_i2d(X509_ACERT *x, int nid, void *value, int crit,
   unsigned long flags);
const STACK_OF(X509_EXTENSION) *X509_ACERT_get0_extensions(const X509_ACERT *x);

#define OSSL_OBJECT_DIGEST_INFO_PUBLIC_KEY 0
#define OSSL_OBJECT_DIGEST_INFO_PUBLIC_KEY_CERT 1
#define OSSL_OBJECT_DIGEST_INFO_OTHER 2 /* must not be used in RFC 5755 profile */
int X509_ACERT_set_version(X509_ACERT *x, long version);
void X509_ACERT_set0_holder_entityName(X509_ACERT *x, GENERAL_NAMES *name);
void X509_ACERT_set0_holder_baseCertId(X509_ACERT *x, OSSL_ISSUER_SERIAL *isss);
void X509_ACERT_set0_holder_digest(X509_ACERT *x,
   OSSL_OBJECT_DIGEST_INFO *dinfo);

int X509_ACERT_add1_attr(X509_ACERT *x, X509_ATTRIBUTE *attr);
int X509_ACERT_add1_attr_by_OBJ(X509_ACERT *x, const ASN1_OBJECT *obj,
   int type,
 const void *bytes, int len);
int X509_ACERT_add1_attr_by_NID(X509_ACERT *x, int nid, int type,
   const void *bytes, int len);
int X509_ACERT_add1_attr_by_txt(X509_ACERT *x, const char *attrname, int type,
   const unsigned char *bytes, int len);
int X509_ACERT_add_attr_nconf(CONF *conf, const char *section,
   X509_ACERT *acert);
```

```
int X509_ACERT_set1_issuerName(X509_ACERT *x, const X509_NAME *name);
int X509_ACERT_set1_serialNumber(X509_ACERT *x, const ASN1_INTEGER *serial);
int X509_ACERT_set1_notBefore(X509_ACERT *x, const ASN1_GENERALIZEDTIME *time);
int X509_ACERT_set1_notAfter(X509_ACERT *x, const ASN1_GENERALIZEDTIME *time);

void OSSL_OBJECT_DIGEST_INFO_get0_digest(const OSSL_OBJECT_DIGEST_INFO *o,
   int *digestedObjectType,
   const X509_ALGOR **digestAlgorithm,
   const ASN1_BIT_STRING **digest);

int OSSL_OBJECT_DIGEST_INFO_set1_digest(OSSL_OBJECT_DIGEST_INFO *o,
   int digestedObjectType,
   X509_ALGOR *digestAlgorithm,
   ASN1_BIT_STRING *digest);

const X509_NAME
 *OSSL_ISSUER_SERIAL_get0_issuer(const OSSL_ISSUER_SERIAL *isss);
const ASN1_INTEGER *OSSL_ISSUER_SERIAL_get0_serial(const OSSL_ISSUER_SERIAL *isss);
const ASN1_BIT_STRING *OSSL_ISSUER_SERIAL_get0_issuerUID(const OSSL_ISSUER_SERIAL *isss);

int OSSL_ISSUER_SERIAL_set1_issuer(OSSL_ISSUER_SERIAL *isss,
   const X509_NAME *issuer);
int OSSL_ISSUER_SERIAL_set1_serial(OSSL_ISSUER_SERIAL *isss,
   const ASN1_INTEGER *serial);
int OSSL_ISSUER_SERIAL_set1_issuerUID(OSSL_ISSUER_SERIAL *isss,
   const ASN1_BIT_STRING *uid);

#define OSSL_IETFAS_OCTETS 0
#define OSSL_IETFAS_OID 1
#define OSSL_IETFAS_STRING 2

typedef struct OSSL_IETF_ATTR_SYNTAX_VALUE_st OSSL_IETF_ATTR_SYNTAX_VALUE;
typedef struct OSSL_IETF_ATTR_SYNTAX_st OSSL_IETF_ATTR_SYNTAX;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_IETF_ATTR_SYNTAX_VALUE,
OSSL_IETF_ATTR_SYNTAX_VALUE, OSSL_IETF_ATTR_SYNTAX_VALUE)
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk))
#define
 sk_OSSL_IETF_ATTR_SYNTAX_VALUE_value(sk, idx) ((OSSL_IETF_ATTR_SYNTAX_VALUE
*)OPENSSL_sk_value(ossl_check_const_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk), (idx)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_new(cmp)
((STACK_OF(OSSL_IETF_ATTR_SYNTAX_VALUE)
*)OPENSSL_sk_new(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_compfunc_type(cmp)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_new_null()
((STACK_OF(OSSL_IETF_ATTR_SYNTAX_VALUE) *)OPENSSL_sk_new_null())
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_new_reserve(cmp, n)
```

```
((STACK_OF(OSSL_IETF_ATTR_SYNTAX_VALUE)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_compfunc_type(cmp), (n)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk), (n))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk))
#define
 sk_OSSL_IETF_ATTR_SYNTAX_VALUE_delete(sk, i) ((OSSL_IETF_ATTR_SYNTAX_VALUE
*)OPENSSL_sk_delete(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk), (i)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_delete_ptr(sk, ptr) ((OSSL_IETF_ATTR_SYNTAX_VALUE
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_type(ptr)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_type(ptr))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_type(ptr))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_pop(sk) ((OSSL_IETF_ATTR_SYNTAX_VALUE
*)OPENSSL_sk_pop(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_shift(sk) ((OSSL_IETF_ATTR_SYNTAX_VALUE
*)OPENSSL_sk_shift(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk)))
#define
 sk_OSSL_IETF_ATTR_SYNTAX_VALUE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),ossl_check_OSSL_IET
F_ATTR_SYNTAX_VALUE_freefunc_type(freefunc))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_type(ptr), (idx))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_set(sk, idx, ptr) ((OSSL_IETF_ATTR_SYNTAX_VALUE
*)OPENSSL_sk_set(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk), (idx),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_type(ptr)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_type(ptr))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_type(ptr))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_find_all(sk,
 ptr, pnum) OPENSSL_sk_find_all(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_type(ptr), pnum)
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_dup(sk)
```

```
((STACK_OF(OSSL_IETF_ATTR_SYNTAX_VALUE)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_IETF_ATTR_SYNTAX_VALUE)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_copyfunc_type(copyfunc),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_freefunc_type(freefunc)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_set_cmp_func(sk, cmp)
((sk_OSSL_IETF_ATTR_SYNTAX_VALUE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_IETF_
ATTR_SYNTAX_VALUE_sk_type(sk),
 ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_compfunc_type(cmp)))

/* clang-format on */

DECLARE_ASN1_ITEM(OSSL_IETF_ATTR_SYNTAX_VALUE)
DECLARE_ASN1_ALLOC_FUNCTIONS(OSSL_IETF_ATTR_SYNTAX_VALUE)
DECLARE_ASN1_FUNCTIONS(OSSL_IETF_ATTR_SYNTAX)

const GENERAL_NAMES *
OSSL_IETF_ATTR_SYNTAX_get0_policyAuthority(const OSSL_IETF_ATTR_SYNTAX *a);
void OSSL_IETF_ATTR_SYNTAX_set0_policyAuthority(OSSL_IETF_ATTR_SYNTAX *a,
  GENERAL_NAMES *names);

int OSSL_IETF_ATTR_SYNTAX_get_value_num(const OSSL_IETF_ATTR_SYNTAX *a);
void *OSSL_IETF_ATTR_SYNTAX_get0_value(const OSSL_IETF_ATTR_SYNTAX *a,
  int ind, int *type);
int OSSL_IETF_ATTR_SYNTAX_add1_value(OSSL_IETF_ATTR_SYNTAX *a, int type,
  void *data);
int OSSL_IETF_ATTR_SYNTAX_print(BIO *bp, OSSL_IETF_ATTR_SYNTAX *a, int indent);

struct TARGET_CERT_st {
  OSSL_ISSUER_SERIAL *targetCertificate;
  GENERAL_NAME *targetName;
  OSSL_OBJECT_DIGEST_INFO *certDigestInfo;
};

typedef
 struct TARGET_CERT_st OSSL_TARGET_CERT;

#define OSSL_TGT_TARGET_NAME 0
#define OSSL_TGT_TARGET_GROUP 1
#define OSSL_TGT_TARGET_CERT 2

typedef struct TARGET_st {
  int type;
  union {
     GENERAL_NAME *targetName;
     GENERAL_NAME *targetGroup;
```

```
    OSSL_TARGET_CERT *targetCert;
  } choice;
} OSSL_TARGET;

typedef STACK_OF(OSSL_TARGET) OSSL_TARGETS;
typedef STACK_OF(OSSL_TARGETS) OSSL_TARGETING_INFORMATION;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_TARGET, OSSL_TARGET, OSSL_TARGET)
#define sk_OSSL_TARGET_num(sk) OPENSSL_sk_num(ossl_check_const_OSSL_TARGET_sk_type(sk))
#define sk_OSSL_TARGET_value(sk, idx) ((OSSL_TARGET
*)OPENSSL_sk_value(ossl_check_const_OSSL_TARGET_sk_type(sk), (idx)))
#define sk_OSSL_TARGET_new(cmp) ((STACK_OF(OSSL_TARGET)
*)OPENSSL_sk_new(ossl_check_OSSL_TARGET_compfunc_type(cmp)))
#define sk_OSSL_TARGET_new_null() ((STACK_OF(OSSL_TARGET) *)OPENSSL_sk_new_null())
#define sk_OSSL_TARGET_new_reserve(cmp, n) ((STACK_OF(OSSL_TARGET)
 *)OPENSSL_sk_new_reserve(ossl_check_OSSL_TARGET_compfunc_type(cmp), (n)))
#define sk_OSSL_TARGET_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_OSSL_TARGET_sk_type(sk), (n))
#define sk_OSSL_TARGET_free(sk) OPENSSL_sk_free(ossl_check_OSSL_TARGET_sk_type(sk))
#define sk_OSSL_TARGET_zero(sk) OPENSSL_sk_zero(ossl_check_OSSL_TARGET_sk_type(sk))
#define sk_OSSL_TARGET_delete(sk, i) ((OSSL_TARGET
*)OPENSSL_sk_delete(ossl_check_OSSL_TARGET_sk_type(sk), (i)))
#define sk_OSSL_TARGET_delete_ptr(sk, ptr) ((OSSL_TARGET
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_TARGET_sk_type(sk), ossl_check_OSSL_TARGET_type(ptr)))
#define sk_OSSL_TARGET_push(sk, ptr) OPENSSL_sk_push(ossl_check_OSSL_TARGET_sk_type(sk),
ossl_check_OSSL_TARGET_type(ptr))
#define sk_OSSL_TARGET_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_OSSL_TARGET_sk_type(sk),
ossl_check_OSSL_TARGET_type(ptr))
#define sk_OSSL_TARGET_pop(sk) ((OSSL_TARGET
*)OPENSSL_sk_pop(ossl_check_OSSL_TARGET_sk_type(sk)))
#define sk_OSSL_TARGET_shift(sk)
 ((OSSL_TARGET *)OPENSSL_sk_shift(ossl_check_OSSL_TARGET_sk_type(sk)))
#define sk_OSSL_TARGET_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_TARGET_sk_type(sk),ossl_check_OSSL_TARGET_freefunc_type(fre
efunc))
#define sk_OSSL_TARGET_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_OSSL_TARGET_sk_type(sk),
ossl_check_OSSL_TARGET_type(ptr), (idx))
#define sk_OSSL_TARGET_set(sk, idx, ptr) ((OSSL_TARGET
*)OPENSSL_sk_set(ossl_check_OSSL_TARGET_sk_type(sk), (idx), ossl_check_OSSL_TARGET_type(ptr)))
#define sk_OSSL_TARGET_find(sk, ptr) OPENSSL_sk_find(ossl_check_OSSL_TARGET_sk_type(sk),
ossl_check_OSSL_TARGET_type(ptr))
#define sk_OSSL_TARGET_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_OSSL_TARGET_sk_type(sk),
ossl_check_OSSL_TARGET_type(ptr))
#define sk_OSSL_TARGET_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_TARGET_sk_type(sk), ossl_check_OSSL_TARGET_type(ptr), pnum)
#define sk_OSSL_TARGET_sort(sk) OPENSSL_sk_sort(ossl_check_OSSL_TARGET_sk_type(sk))
#define sk_OSSL_TARGET_is_sorted(sk)
```

```
 OPENSSL_sk_is_sorted(ossl_check_const_OSSL_TARGET_sk_type(sk))
#define sk_OSSL_TARGET_dup(sk) ((STACK_OF(OSSL_TARGET)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_TARGET_sk_type(sk)))
#define sk_OSSL_TARGET_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OSSL_TARGET)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_TARGET_sk_type(sk),
ossl_check_OSSL_TARGET_copyfunc_type(copyfunc), ossl_check_OSSL_TARGET_freefunc_type(freefunc)))
#define sk_OSSL_TARGET_set_cmp_func(sk, cmp)
((sk_OSSL_TARGET_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_TARGET_sk_type(sk),
ossl_check_OSSL_TARGET_compfunc_type(cmp)))

/* clang-format on */

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_TARGETS, OSSL_TARGETS, OSSL_TARGETS)
#define sk_OSSL_TARGETS_num(sk) OPENSSL_sk_num(ossl_check_const_OSSL_TARGETS_sk_type(sk))
#define sk_OSSL_TARGETS_value(sk, idx) ((OSSL_TARGETS
*)OPENSSL_sk_value(ossl_check_const_OSSL_TARGETS_sk_type(sk), (idx)))
#define sk_OSSL_TARGETS_new(cmp) ((STACK_OF(OSSL_TARGETS)
 *)OPENSSL_sk_new(ossl_check_OSSL_TARGETS_compfunc_type(cmp)))
#define sk_OSSL_TARGETS_new_null() ((STACK_OF(OSSL_TARGETS) *)OPENSSL_sk_new_null())
#define sk_OSSL_TARGETS_new_reserve(cmp, n) ((STACK_OF(OSSL_TARGETS)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_TARGETS_compfunc_type(cmp), (n)))
#define sk_OSSL_TARGETS_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_OSSL_TARGETS_sk_type(sk),
(n))
#define sk_OSSL_TARGETS_free(sk) OPENSSL_sk_free(ossl_check_OSSL_TARGETS_sk_type(sk))
#define sk_OSSL_TARGETS_zero(sk) OPENSSL_sk_zero(ossl_check_OSSL_TARGETS_sk_type(sk))
#define sk_OSSL_TARGETS_delete(sk, i) ((OSSL_TARGETS
*)OPENSSL_sk_delete(ossl_check_OSSL_TARGETS_sk_type(sk), (i)))
#define sk_OSSL_TARGETS_delete_ptr(sk, ptr) ((OSSL_TARGETS
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_TARGETS_sk_type(sk), ossl_check_OSSL_TARGETS_type(ptr)))
#define sk_OSSL_TARGETS_push(sk, ptr) OPENSSL_sk_push(ossl_check_OSSL_TARGETS_sk_type(sk),
ossl_check_OSSL_TARGETS_type(ptr))
#define sk_OSSL_TARGETS_unshift(sk,
 ptr) OPENSSL_sk_unshift(ossl_check_OSSL_TARGETS_sk_type(sk), ossl_check_OSSL_TARGETS_type(ptr))
#define sk_OSSL_TARGETS_pop(sk) ((OSSL_TARGETS
*)OPENSSL_sk_pop(ossl_check_OSSL_TARGETS_sk_type(sk)))
#define sk_OSSL_TARGETS_shift(sk) ((OSSL_TARGETS
*)OPENSSL_sk_shift(ossl_check_OSSL_TARGETS_sk_type(sk)))
#define sk_OSSL_TARGETS_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_TARGETS_sk_type(sk),ossl_check_OSSL_TARGETS_freefunc_type(
freefunc))
#define sk_OSSL_TARGETS_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_OSSL_TARGETS_sk_type(sk),
ossl_check_OSSL_TARGETS_type(ptr), (idx))
#define sk_OSSL_TARGETS_set(sk, idx, ptr) ((OSSL_TARGETS
*)OPENSSL_sk_set(ossl_check_OSSL_TARGETS_sk_type(sk), (idx), ossl_check_OSSL_TARGETS_type(ptr)))
#define sk_OSSL_TARGETS_find(sk, ptr) OPENSSL_sk_find(ossl_check_OSSL_TARGETS_sk_type(sk),
ossl_check_OSSL_TARGETS_type(ptr))
#define sk_OSSL_TARGETS_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_OSSL_TARGETS_sk_type(sk),
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ossl_check_OSSL_TARGETS_type(ptr))
#define
 sk_OSSL_TARGETS_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_OSSL_TARGETS_sk_type(sk),
ossl_check_OSSL_TARGETS_type(ptr), pnum)
#define sk_OSSL_TARGETS_sort(sk) OPENSSL_sk_sort(ossl_check_OSSL_TARGETS_sk_type(sk))
#define sk_OSSL_TARGETS_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_TARGETS_sk_type(sk))
#define sk_OSSL_TARGETS_dup(sk) ((STACK_OF(OSSL_TARGETS)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_TARGETS_sk_type(sk)))
#define sk_OSSL_TARGETS_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OSSL_TARGETS)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_TARGETS_sk_type(sk),
ossl_check_OSSL_TARGETS_copyfunc_type(copyfunc), ossl_check_OSSL_TARGETS_freefunc_type(freefunc)))
#define sk_OSSL_TARGETS_set_cmp_func(sk, cmp)
((sk_OSSL_TARGETS_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_TARGETS_sk_type(sk),
ossl_check_OSSL_TARGETS_compfunc_type(cmp)))

/* clang-format on */

DECLARE_ASN1_FUNCTIONS(OSSL_TARGET)
DECLARE_ASN1_FUNCTIONS(OSSL_TARGETS)
DECLARE_ASN1_FUNCTIONS(OSSL_TARGETING_INFORMATION)

typedef
 STACK_OF(OSSL_ISSUER_SERIAL) OSSL_AUTHORITY_ATTRIBUTE_ID_SYNTAX;
DECLARE_ASN1_FUNCTIONS(OSSL_AUTHORITY_ATTRIBUTE_ID_SYNTAX)

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_ISSUER_SERIAL, OSSL_ISSUER_SERIAL,
OSSL_ISSUER_SERIAL)
#define sk_OSSL_ISSUER_SERIAL_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_ISSUER_SERIAL_sk_type(sk))
#define sk_OSSL_ISSUER_SERIAL_value(sk, idx) ((OSSL_ISSUER_SERIAL
*)OPENSSL_sk_value(ossl_check_const_OSSL_ISSUER_SERIAL_sk_type(sk), (idx)))
#define sk_OSSL_ISSUER_SERIAL_new(cmp) ((STACK_OF(OSSL_ISSUER_SERIAL)
*)OPENSSL_sk_new(ossl_check_OSSL_ISSUER_SERIAL_compfunc_type(cmp)))
#define sk_OSSL_ISSUER_SERIAL_new_null() ((STACK_OF(OSSL_ISSUER_SERIAL)
*)OPENSSL_sk_new_null())
#define sk_OSSL_ISSUER_SERIAL_new_reserve(cmp, n) ((STACK_OF(OSSL_ISSUER_SERIAL)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_ISSUER_SERIAL_compfunc_type(cmp), (n)))
#define sk_OSSL_ISSUER_SERIAL_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),
 (n))
#define sk_OSSL_ISSUER_SERIAL_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk))
#define sk_OSSL_ISSUER_SERIAL_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk))
#define sk_OSSL_ISSUER_SERIAL_delete(sk, i) ((OSSL_ISSUER_SERIAL
*)OPENSSL_sk_delete(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk), (i)))
```

```
#define sk_OSSL_ISSUER_SERIAL_delete_ptr(sk, ptr) ((OSSL_ISSUER_SERIAL
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),
ossl_check_OSSL_ISSUER_SERIAL_type(ptr)))
#define sk_OSSL_ISSUER_SERIAL_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),
ossl_check_OSSL_ISSUER_SERIAL_type(ptr))
#define sk_OSSL_ISSUER_SERIAL_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),
ossl_check_OSSL_ISSUER_SERIAL_type(ptr))
#define sk_OSSL_ISSUER_SERIAL_pop(sk) ((OSSL_ISSUER_SERIAL
*)OPENSSL_sk_pop(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk)))
#define sk_OSSL_ISSUER_SERIAL_shift(sk)
 ((OSSL_ISSUER_SERIAL *)OPENSSL_sk_shift(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk)))
#define sk_OSSL_ISSUER_SERIAL_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),ossl_check_OSSL_ISSUER_SERIAL_
freefunc_type(freefunc))
#define sk_OSSL_ISSUER_SERIAL_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),
ossl_check_OSSL_ISSUER_SERIAL_type(ptr), (idx))
#define sk_OSSL_ISSUER_SERIAL_set(sk, idx, ptr) ((OSSL_ISSUER_SERIAL
*)OPENSSL_sk_set(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk), (idx),
ossl_check_OSSL_ISSUER_SERIAL_type(ptr)))
#define sk_OSSL_ISSUER_SERIAL_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),
ossl_check_OSSL_ISSUER_SERIAL_type(ptr))
#define sk_OSSL_ISSUER_SERIAL_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),
ossl_check_OSSL_ISSUER_SERIAL_type(ptr))
#define sk_OSSL_ISSUER_SERIAL_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),
 ossl_check_OSSL_ISSUER_SERIAL_type(ptr), pnum)
#define sk_OSSL_ISSUER_SERIAL_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk))
#define sk_OSSL_ISSUER_SERIAL_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_ISSUER_SERIAL_sk_type(sk))
#define sk_OSSL_ISSUER_SERIAL_dup(sk) ((STACK_OF(OSSL_ISSUER_SERIAL)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_ISSUER_SERIAL_sk_type(sk)))
#define sk_OSSL_ISSUER_SERIAL_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OSSL_ISSUER_SERIAL)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_ISSUER_SERIAL_sk_type(sk),
ossl_check_OSSL_ISSUER_SERIAL_copyfunc_type(copyfunc),
ossl_check_OSSL_ISSUER_SERIAL_freefunc_type(freefunc)))
#define sk_OSSL_ISSUER_SERIAL_set_cmp_func(sk, cmp)
((sk_OSSL_ISSUER_SERIAL_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_ISSUER_SERIAL_sk_
type(sk), ossl_check_OSSL_ISSUER_SERIAL_compfunc_type(cmp)))

/* clang-format on */

#endif
```

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```

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Version 1.0.0

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OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

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   './config/archs/BSD-x86/no-asm/providers/common/der/der_ecx_gen.c',
  './config/archs/BSD-x86/no-asm/providers/common/der/der_ml_dsa_gen.c',
  './config/archs/BSD-x86/no-asm/providers/common/der/der_rsa_gen.c',
  './config/archs/BSD-x86/no-asm/providers/common/der/der_slh_dsa_gen.c',
  './config/archs/BSD-x86/no-asm/providers/common/der/der_wrap_gen.c',
  './config/archs/BSD-x86/no-asm/providers/legacy.ld',
  './config/archs/BSD-x86/no-asm/providers/fips.ld',

],
'openssl_defines_BSD-x86': [
  'NDEBUG',
  'L_ENDIAN',
  'OPENSSL_BUILDING_OPENSSL',
  'FIPS_MODULE',
  'FIPS_MODULE',
],
'openssl_cflags_BSD-x86': [
  '-Wall -O3 -fomit-frame-pointer',
```

```
    '-pthread',
    '-Wall -O3 -fomit-frame-pointer',
  ],
  'openssl_ex_libs_BSD-x86': [
    '-pthread',
  ],
  'linker_script': ''
 },
 'include_dirs': [
  '.',
  './include',
  './crypto',
  './crypto/include/internal',
  './providers/common/include',
 ],
 'defines': ['<@(openssl_defines_BSD-x86)'],
 'cflags': ['<@(openssl_cflags_BSD-x86)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86)'],

 'sources': ['<@(openssl_sources)', '<@(openssl_sources_BSD-x86)'],
 'direct_dependent_settings': {
  'include_dirs': ['./include', '.'],
  'defines': ['<@(openssl_defines_BSD-x86)'],
 },
}
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/safestack.h.in
*
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*
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_SAFESTACK_H
#define OPENSSL_SAFESTACK_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_SAFESTACK_H
#endif

#include <openssl/stack.h>
#include <openssl/e_os2.h>

#ifdef __cplusplus
extern "C" {
#endif

#define STACK_OF(type) struct stack_st_##type

/* Helper macro for internal use */
#define SKM_DEFINE_STACK_OF_INTERNAL(t1, t2, t3)                                                    \
  STACK_OF(t1);
                                                                                                    \
  typedef int (*sk_##t1##_compfunc)(const t3 *const *a, const t3 *const *b);                        \
  typedef void (*sk_##t1##_freefunc)(t3 * a);                                                       \
  typedef t3 *(*sk_##t1##_copyfunc)(const t3 *a);                                                   \
  static ossl_unused ossl_inline t2 *ossl_check_##t1##_type(t2 *ptr)                                \
  {                                                                                                 \
     return ptr;                                                                                    \
  }                                                                                                 \
  static ossl_unused ossl_inline const OPENSSL_STACK *ossl_check_const_##t1##_sk_type(const
STACK_OF(t1) *sk) \
```

```
{
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
    return (const OPENSSL_STACK *)sk;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
}                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_unused ossl_inline OPENSSL_STACK *ossl_check_##t1##_sk_type(STACK_OF(t1) *sk)
\
{                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
    return (OPENSSL_STACK *)sk;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
}                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_unused ossl_inline OPENSSL_sk_compfunc ossl_check_##t1##_compfunc_type(sk_##t1##_compfunc
cmp)  \
{                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
    return (OPENSSL_sk_compfunc)cmp;
}                                                                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_unused ossl_inline OPENSSL_sk_copyfunc ossl_check_##t1##_copyfunc_type(sk_##t1##_copyfunc
cpy)  \
{                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
    return (OPENSSL_sk_copyfunc)cpy;                                                                                                                                                                                                                                                                                                                                                                                                                                                
}                                                                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_unused ossl_inline OPENSSL_sk_freefunc ossl_check_##t1##_freefunc_type(sk_##t1##_freefunc fr)
\
{                                                                                                                                                                                                                                                                                                                                                                                                                                                
    return (OPENSSL_sk_freefunc)fr;
}

#define SKM_DEFINE_STACK_OF(t1, t2, t3)                                                                                                                                                                                                                                                                                
STACK_OF(t1);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
typedef int (*sk_##t1##_compfunc)(const t3 *const *a, const t3 *const *b);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
typedef void (*sk_##t1##_freefunc)(t3 * a);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
typedef t3 *(*sk_##t1##_copyfunc)(const t3 *a);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_unused ossl_inline int sk_##t1##_num(const STACK_OF(t1) *sk)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
{                                                                                                                                                                                                                                                                                                                                                                                                                                                
    return OPENSSL_sk_num((const OPENSSL_STACK *)sk);
}                                                                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_unused ossl_inline t2 *sk_##t1##_value(const STACK_OF(t1) *sk, int idx)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
{                                                                                                                                                                                                                                                                                                                                                                                                                                                
    return (t2 *)OPENSSL_sk_value((const OPENSSL_STACK *)sk, idx);                                                                                                                                                                                                                                                                                                                                                                                                
}                                                                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_unused ossl_inline STACK_OF(t1) *sk_##t1##_new(sk_##t1##_compfunc compare)
\
{                                                                                                                                                                                                                                                                                                                                                                                                                                                
    return (STACK_OF(t1) *)OPENSSL_sk_new((OPENSSL_sk_compfunc)compare);
}                                                                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_unused ossl_inline STACK_OF(t1) *sk_##t1##_new_null(void)                                                                                                                                                                                                                                                                                                                                                                                                
```

```
{                                                                                   \
    return (STACK_OF(t1) *)OPENSSL_sk_new_null();                                                   \
}                                                                                   \
static ossl_unused ossl_inline STACK_OF(t1) *sk_##t1##_new_reserve(sk_##t1##_compfunc compare, int n)
      \
{                                                                                   \
    return (STACK_OF(t1) *)OPENSSL_sk_new_reserve((OPENSSL_sk_compfunc)compare, n);
          \
}                                                                                   \
static ossl_unused ossl_inline int sk_##t1##_reserve(STACK_OF(t1) *sk, int n)                          \
{                                                                                   \
    return OPENSSL_sk_reserve((OPENSSL_STACK *)sk, n);                                              \
}                                                                                   \
static ossl_unused ossl_inline void sk_##t1##_free(STACK_OF(t1) *sk)                                   \
{                                                                                   \
    OPENSSL_sk_free((OPENSSL_STACK *)sk);
          \
}                                                                                   \
static ossl_unused ossl_inline void sk_##t1##_zero(STACK_OF(t1) *sk)                                   \
{                                                                                   \
    OPENSSL_sk_zero((OPENSSL_STACK *)sk);                                                           \
}                                                                                   \
static ossl_unused ossl_inline t2 *sk_##t1##_delete(STACK_OF(t1) *sk, int i)                           \
{                                                                                   \
    return (t2 *)OPENSSL_sk_delete((OPENSSL_STACK *)sk, i);
          \
}                                                                                   \
static ossl_unused ossl_inline t2 *sk_##t1##_delete_ptr(STACK_OF(t1) *sk, t2 *ptr)                     \
{                                                                                   \
    return (t2 *)OPENSSL_sk_delete_ptr((OPENSSL_STACK *)sk,                                         \
        (const void *)ptr);                                                                 \
}                                                                                   \
static ossl_unused ossl_inline int sk_##t1##_push(STACK_OF(t1) *sk, t2 *ptr)                           \
{
          \
    return OPENSSL_sk_push((OPENSSL_STACK *)sk, (const void *)ptr);                                     \
}                                                                                   \
static ossl_unused ossl_inline int sk_##t1##_unshift(STACK_OF(t1) *sk, t2 *ptr)                        \
{                                                                                   \
    return OPENSSL_sk_unshift((OPENSSL_STACK *)sk, (const void *)ptr);                                  \
}                                                                                   \
static ossl_unused ossl_inline t2 *sk_##t1##_pop(STACK_OF(t1) *sk)                                     \
{
          \
    return (t2 *)OPENSSL_sk_pop((OPENSSL_STACK *)sk);                                               \
}                                                                                   \
static ossl_unused ossl_inline t2 *sk_##t1##_shift(STACK_OF(t1) *sk)                                   \
{                                                                                   \
```

```
    return (t2 *)OPENSSL_sk_shift((OPENSSL_STACK *)sk);                                    \
}                                                                                          \
static ossl_unused ossl_inline void sk_##t1##_pop_free(STACK_OF(t1) *sk, sk_##t1##_freefunc freefunc)
  \
{
          \
    OPENSSL_sk_pop_free((OPENSSL_STACK *)sk, (OPENSSL_sk_freefunc)freefunc);
\
}                                                                                          \
static ossl_unused ossl_inline int sk_##t1##_insert(STACK_OF(t1) *sk, t2 *ptr, int idx)                \
{                                                                                          \
    return OPENSSL_sk_insert((OPENSSL_STACK *)sk, (const void *)ptr, idx);                  \
}                                                                                          \
static ossl_unused ossl_inline t2 *sk_##t1##_set(STACK_OF(t1) *sk, int idx, t2 *ptr)                   \
{
          \
    return (t2 *)OPENSSL_sk_set((OPENSSL_STACK *)sk, idx, (const void *)ptr);                \
}                                                                                          \
static ossl_unused ossl_inline int sk_##t1##_find(STACK_OF(t1) *sk, t2 *ptr)                       \
{                                                                                          \
    return OPENSSL_sk_find((OPENSSL_STACK *)sk, (const void *)ptr);                         \
}                                                                                          \
static ossl_unused ossl_inline int sk_##t1##_find_ex(STACK_OF(t1) *sk, t2 *ptr)                    \
{
          \
    return OPENSSL_sk_find_ex((OPENSSL_STACK *)sk, (const void *)ptr);                      \
}                                                                                          \
static ossl_unused ossl_inline int sk_##t1##_find_all(STACK_OF(t1) *sk, t2 *ptr, int *pnum)            \
{                                                                                          \
    return OPENSSL_sk_find_all((OPENSSL_STACK *)sk, (const void *)ptr, pnum);               \
}                                                                                          \
static ossl_unused ossl_inline void sk_##t1##_sort(STACK_OF(t1) *sk)                               \
{
          \
    OPENSSL_sk_sort((OPENSSL_STACK *)sk);                                                  \
}                                                                                          \
static ossl_unused ossl_inline int sk_##t1##_is_sorted(const STACK_OF(t1) *sk)                     \
{                                                                                          \
    return OPENSSL_sk_is_sorted((const OPENSSL_STACK *)sk);                                \
}                                                                                          \
static ossl_unused ossl_inline STACK_OF(t1) *sk_##t1##_dup(const STACK_OF(t1) *sk)
\
{
          \
    return (STACK_OF(t1) *)OPENSSL_sk_dup((const OPENSSL_STACK *)sk);                       \
}                                                                                          \
static ossl_unused ossl_inline STACK_OF(t1) *sk_##t1##_deep_copy(const STACK_OF(t1) *sk,
\
```

```
    sk_##t1##_copyfunc copyfunc,                                                    \
    sk_##t1##_freefunc freefunc)                                                    \
  {                                                                                 \
    return (STACK_OF(t1) *)OPENSSL_sk_deep_copy((const OPENSSL_STACK *)sk,
 \
        (OPENSSL_sk_copyfunc)copyfunc,
          \
        (OPENSSL_sk_freefunc)freefunc);                                             \
  }                                                                                 \
  static ossl_unused ossl_inline sk_##t1##_compfunc sk_##t1##_set_cmp_func(STACK_OF(t1) *sk,
sk_##t1##_compfunc compare) \
  {                                                                                 \
    return (sk_##t1##_compfunc)OPENSSL_sk_set_cmp_func((OPENSSL_STACK *)sk,
(OPENSSL_sk_compfunc)compare);            \
  }

#define DEFINE_STACK_OF(t) SKM_DEFINE_STACK_OF(t, t, t)
#define DEFINE_STACK_OF_CONST(t) SKM_DEFINE_STACK_OF(t, const t, t)
#define DEFINE_SPECIAL_STACK_OF(t1, t2) SKM_DEFINE_STACK_OF(t1, t2, t2)
#define DEFINE_SPECIAL_STACK_OF_CONST(t1, t2) \
  SKM_DEFINE_STACK_OF(t1, const t2, t2)

/*-
* Strings are special: normally an lhash entry will point to
 a single
* (somewhat) mutable object. In the case of strings:
*
* a) Instead of a single char, there is an array of chars, NUL-terminated.
* b) The string may have be immutable.
*
* So, they need their own declarations. Especially important for
* type-checking tools, such as Deputy.
*
* In practice, however, it appears to be hard to have a const
* string. For now, I'm settling for dealing with the fact it is a
* string at all.
*/
typedef char *OPENSSL_STRING;
typedef const char *OPENSSL_CSTRING;

/*-
* Confusingly, LHASH_OF(STRING) deals with char ** throughout, but
* STACK_OF(STRING) is really more like STACK_OF(char), only, as mentioned
* above, instead of a single char each entry is a NUL-terminated array of
* chars. So, we have to implement STRING specially for STACK_OF. This is
* dealt with in the autogenerated macros below.
*/
/* clang-format off */
```

```
SKM_DEFINE_STACK_OF_INTERNAL(OPENSSL_STRING, char, char)
#define sk_OPENSSL_STRING_num(sk)
OPENSSL_sk_num(ossl_check_const_OPENSSL_STRING_sk_type(sk))
#define
 sk_OPENSSL_STRING_value(sk, idx) ((char
*)OPENSSL_sk_value(ossl_check_const_OPENSSL_STRING_sk_type(sk), (idx)))
#define sk_OPENSSL_STRING_new(cmp) ((STACK_OF(OPENSSL_STRING)
*)OPENSSL_sk_new(ossl_check_OPENSSL_STRING_compfunc_type(cmp)))
#define sk_OPENSSL_STRING_new_null() ((STACK_OF(OPENSSL_STRING) *)OPENSSL_sk_new_null())
#define sk_OPENSSL_STRING_new_reserve(cmp, n) ((STACK_OF(OPENSSL_STRING)
*)OPENSSL_sk_new_reserve(ossl_check_OPENSSL_STRING_compfunc_type(cmp), (n)))
#define sk_OPENSSL_STRING_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OPENSSL_STRING_sk_type(sk), (n))
#define sk_OPENSSL_STRING_free(sk) OPENSSL_sk_free(ossl_check_OPENSSL_STRING_sk_type(sk))
#define sk_OPENSSL_STRING_zero(sk) OPENSSL_sk_zero(ossl_check_OPENSSL_STRING_sk_type(sk))
#define sk_OPENSSL_STRING_delete(sk, i) ((char
*)OPENSSL_sk_delete(ossl_check_OPENSSL_STRING_sk_type(sk), (i)))
#define sk_OPENSSL_STRING_delete_ptr(sk, ptr) ((char
*)OPENSSL_sk_delete_ptr(ossl_check_OPENSSL_STRING_sk_type(sk),
 ossl_check_OPENSSL_STRING_type(ptr)))
#define sk_OPENSSL_STRING_push(sk, ptr) OPENSSL_sk_push(ossl_check_OPENSSL_STRING_sk_type(sk),
ossl_check_OPENSSL_STRING_type(ptr))
#define sk_OPENSSL_STRING_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OPENSSL_STRING_sk_type(sk), ossl_check_OPENSSL_STRING_type(ptr))
#define sk_OPENSSL_STRING_pop(sk) ((char
*)OPENSSL_sk_pop(ossl_check_OPENSSL_STRING_sk_type(sk)))
#define sk_OPENSSL_STRING_shift(sk) ((char
*)OPENSSL_sk_shift(ossl_check_OPENSSL_STRING_sk_type(sk)))
#define sk_OPENSSL_STRING_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OPENSSL_STRING_sk_type(sk),ossl_check_OPENSSL_STRING_freefunc_
type(freefunc))
#define sk_OPENSSL_STRING_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OPENSSL_STRING_sk_type(sk), ossl_check_OPENSSL_STRING_type(ptr),
(idx))
#define sk_OPENSSL_STRING_set(sk, idx, ptr) ((char
*)OPENSSL_sk_set(ossl_check_OPENSSL_STRING_sk_type(sk), (idx),
ossl_check_OPENSSL_STRING_type(ptr)))
#define
 sk_OPENSSL_STRING_find(sk, ptr) OPENSSL_sk_find(ossl_check_OPENSSL_STRING_sk_type(sk),
ossl_check_OPENSSL_STRING_type(ptr))
#define sk_OPENSSL_STRING_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OPENSSL_STRING_sk_type(sk), ossl_check_OPENSSL_STRING_type(ptr))
#define sk_OPENSSL_STRING_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OPENSSL_STRING_sk_type(sk), ossl_check_OPENSSL_STRING_type(ptr),
pnum)
#define sk_OPENSSL_STRING_sort(sk) OPENSSL_sk_sort(ossl_check_OPENSSL_STRING_sk_type(sk))
#define sk_OPENSSL_STRING_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OPENSSL_STRING_sk_type(sk))
```

```
#define sk_OPENSSL_STRING_dup(sk) ((STACK_OF(OPENSSL_STRING)
*)OPENSSL_sk_dup(ossl_check_const_OPENSSL_STRING_sk_type(sk)))
#define sk_OPENSSL_STRING_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OPENSSL_STRING)
*)OPENSSL_sk_deep_copy(ossl_check_const_OPENSSL_STRING_sk_type(sk),
ossl_check_OPENSSL_STRING_copyfunc_type(copyfunc),
ossl_check_OPENSSL_STRING_freefunc_type(freefunc)))
#define
 sk_OPENSSL_STRING_set_cmp_func(sk, cmp)
((sk_OPENSSL_STRING_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OPENSSL_STRING_sk_type(sk),
ossl_check_OPENSSL_STRING_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(OPENSSL_CSTRING, const char, char)
#define sk_OPENSSL_CSTRING_num(sk)
OPENSSL_sk_num(ossl_check_const_OPENSSL_CSTRING_sk_type(sk))
#define sk_OPENSSL_CSTRING_value(sk, idx) ((const char
*)OPENSSL_sk_value(ossl_check_const_OPENSSL_CSTRING_sk_type(sk), (idx)))
#define sk_OPENSSL_CSTRING_new(cmp) ((STACK_OF(OPENSSL_CSTRING)
*)OPENSSL_sk_new(ossl_check_OPENSSL_CSTRING_compfunc_type(cmp)))
#define sk_OPENSSL_CSTRING_new_null() ((STACK_OF(OPENSSL_CSTRING) *)OPENSSL_sk_new_null())
#define sk_OPENSSL_CSTRING_new_reserve(cmp, n) ((STACK_OF(OPENSSL_CSTRING)
*)OPENSSL_sk_new_reserve(ossl_check_OPENSSL_CSTRING_compfunc_type(cmp), (n)))
#define sk_OPENSSL_CSTRING_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OPENSSL_CSTRING_sk_type(sk), (n))
#define sk_OPENSSL_CSTRING_free(sk) OPENSSL_sk_free(ossl_check_OPENSSL_CSTRING_sk_type(sk))
#define
 sk_OPENSSL_CSTRING_zero(sk) OPENSSL_sk_zero(ossl_check_OPENSSL_CSTRING_sk_type(sk))
#define sk_OPENSSL_CSTRING_delete(sk, i) ((const char
*)OPENSSL_sk_delete(ossl_check_OPENSSL_CSTRING_sk_type(sk), (i)))
#define sk_OPENSSL_CSTRING_delete_ptr(sk, ptr) ((const char
*)OPENSSL_sk_delete_ptr(ossl_check_OPENSSL_CSTRING_sk_type(sk),
ossl_check_OPENSSL_CSTRING_type(ptr)))
#define sk_OPENSSL_CSTRING_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OPENSSL_CSTRING_sk_type(sk), ossl_check_OPENSSL_CSTRING_type(ptr))
#define sk_OPENSSL_CSTRING_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OPENSSL_CSTRING_sk_type(sk),
ossl_check_OPENSSL_CSTRING_type(ptr))
#define sk_OPENSSL_CSTRING_pop(sk) ((const char
*)OPENSSL_sk_pop(ossl_check_OPENSSL_CSTRING_sk_type(sk)))
#define sk_OPENSSL_CSTRING_shift(sk) ((const char
*)OPENSSL_sk_shift(ossl_check_OPENSSL_CSTRING_sk_type(sk)))
#define sk_OPENSSL_CSTRING_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OPENSSL_CSTRING_sk_type(sk),ossl_check_OPENSSL_CSTRING_freefu
nc_type(freefunc))
#define
 sk_OPENSSL_CSTRING_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OPENSSL_CSTRING_sk_type(sk), ossl_check_OPENSSL_CSTRING_type(ptr),
(idx))
#define sk_OPENSSL_CSTRING_set(sk, idx, ptr) ((const char
*)OPENSSL_sk_set(ossl_check_OPENSSL_CSTRING_sk_type(sk), (idx),
```

```
ossl_check_OPENSSL_CSTRING_type(ptr)))
#define sk_OPENSSL_CSTRING_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OPENSSL_CSTRING_sk_type(sk), ossl_check_OPENSSL_CSTRING_type(ptr))
#define sk_OPENSSL_CSTRING_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OPENSSL_CSTRING_sk_type(sk),
ossl_check_OPENSSL_CSTRING_type(ptr))
#define sk_OPENSSL_CSTRING_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OPENSSL_CSTRING_sk_type(sk),
ossl_check_OPENSSL_CSTRING_type(ptr), pnum)
#define sk_OPENSSL_CSTRING_sort(sk) OPENSSL_sk_sort(ossl_check_OPENSSL_CSTRING_sk_type(sk))
#define sk_OPENSSL_CSTRING_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OPENSSL_CSTRING_sk_type(sk))
#define
 sk_OPENSSL_CSTRING_dup(sk) ((STACK_OF(OPENSSL_CSTRING)
*)OPENSSL_sk_dup(ossl_check_const_OPENSSL_CSTRING_sk_type(sk)))
#define sk_OPENSSL_CSTRING_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OPENSSL_CSTRING)
*)OPENSSL_sk_deep_copy(ossl_check_const_OPENSSL_CSTRING_sk_type(sk),
ossl_check_OPENSSL_CSTRING_copyfunc_type(copyfunc),
ossl_check_OPENSSL_CSTRING_freefunc_type(freefunc)))
#define sk_OPENSSL_CSTRING_set_cmp_func(sk, cmp)
((sk_OPENSSL_CSTRING_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OPENSSL_CSTRING_sk_type(s
k), ossl_check_OPENSSL_CSTRING_compfunc_type(cmp)))

/* clang-format on */

#if !defined(OPENSSL_NO_DEPRECATED_3_0)
/*
* This is not used by OpenSSL.  A block of bytes,  NOT nul-terminated.
* These should also be distinguished from "normal" stacks.
*/
typedef void *OPENSSL_BLOCK;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OPENSSL_BLOCK, void, void)
#define sk_OPENSSL_BLOCK_num(sk) OPENSSL_sk_num(ossl_check_const_OPENSSL_BLOCK_sk_type(sk))
#define
 sk_OPENSSL_BLOCK_value(sk, idx) ((void
*)OPENSSL_sk_value(ossl_check_const_OPENSSL_BLOCK_sk_type(sk), (idx)))
#define sk_OPENSSL_BLOCK_new(cmp) ((STACK_OF(OPENSSL_BLOCK)
*)OPENSSL_sk_new(ossl_check_OPENSSL_BLOCK_compfunc_type(cmp)))
#define sk_OPENSSL_BLOCK_new_null() ((STACK_OF(OPENSSL_BLOCK) *)OPENSSL_sk_new_null())
#define sk_OPENSSL_BLOCK_new_reserve(cmp, n) ((STACK_OF(OPENSSL_BLOCK)
*)OPENSSL_sk_new_reserve(ossl_check_OPENSSL_BLOCK_compfunc_type(cmp), (n)))
#define sk_OPENSSL_BLOCK_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OPENSSL_BLOCK_sk_type(sk), (n))
#define sk_OPENSSL_BLOCK_free(sk) OPENSSL_sk_free(ossl_check_OPENSSL_BLOCK_sk_type(sk))
#define sk_OPENSSL_BLOCK_zero(sk) OPENSSL_sk_zero(ossl_check_OPENSSL_BLOCK_sk_type(sk))
#define sk_OPENSSL_BLOCK_delete(sk, i) ((void
*)OPENSSL_sk_delete(ossl_check_OPENSSL_BLOCK_sk_type(sk), (i)))
```

```
#define sk_OPENSSL_BLOCK_delete_ptr(sk, ptr) ((void
*)OPENSSL_sk_delete_ptr(ossl_check_OPENSSL_BLOCK_sk_type(sk),
ossl_check_OPENSSL_BLOCK_type(ptr)))
#define
 sk_OPENSSL_BLOCK_push(sk, ptr) OPENSSL_sk_push(ossl_check_OPENSSL_BLOCK_sk_type(sk),
ossl_check_OPENSSL_BLOCK_type(ptr))
#define sk_OPENSSL_BLOCK_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OPENSSL_BLOCK_sk_type(sk), ossl_check_OPENSSL_BLOCK_type(ptr))
#define sk_OPENSSL_BLOCK_pop(sk) ((void
*)OPENSSL_sk_pop(ossl_check_OPENSSL_BLOCK_sk_type(sk)))
#define sk_OPENSSL_BLOCK_shift(sk) ((void
*)OPENSSL_sk_shift(ossl_check_OPENSSL_BLOCK_sk_type(sk)))
#define sk_OPENSSL_BLOCK_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OPENSSL_BLOCK_sk_type(sk),ossl_check_OPENSSL_BLOCK_freefunc_t
ype(freefunc))
#define sk_OPENSSL_BLOCK_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OPENSSL_BLOCK_sk_type(sk), ossl_check_OPENSSL_BLOCK_type(ptr),
(idx))
#define sk_OPENSSL_BLOCK_set(sk, idx, ptr) ((void
*)OPENSSL_sk_set(ossl_check_OPENSSL_BLOCK_sk_type(sk), (idx),
ossl_check_OPENSSL_BLOCK_type(ptr)))
#define sk_OPENSSL_BLOCK_find(sk, ptr) OPENSSL_sk_find(ossl_check_OPENSSL_BLOCK_sk_type(sk),
 ossl_check_OPENSSL_BLOCK_type(ptr))
#define sk_OPENSSL_BLOCK_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OPENSSL_BLOCK_sk_type(sk), ossl_check_OPENSSL_BLOCK_type(ptr))
#define sk_OPENSSL_BLOCK_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OPENSSL_BLOCK_sk_type(sk), ossl_check_OPENSSL_BLOCK_type(ptr),
pnum)
#define sk_OPENSSL_BLOCK_sort(sk) OPENSSL_sk_sort(ossl_check_OPENSSL_BLOCK_sk_type(sk))
#define sk_OPENSSL_BLOCK_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OPENSSL_BLOCK_sk_type(sk))
#define sk_OPENSSL_BLOCK_dup(sk) ((STACK_OF(OPENSSL_BLOCK)
*)OPENSSL_sk_dup(ossl_check_const_OPENSSL_BLOCK_sk_type(sk)))
#define sk_OPENSSL_BLOCK_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OPENSSL_BLOCK)
*)OPENSSL_sk_deep_copy(ossl_check_const_OPENSSL_BLOCK_sk_type(sk),
ossl_check_OPENSSL_BLOCK_copyfunc_type(copyfunc),
ossl_check_OPENSSL_BLOCK_freefunc_type(freefunc)))
#define sk_OPENSSL_BLOCK_set_cmp_func(sk, cmp)
((sk_OPENSSL_BLOCK_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OPENSSL_BLOCK_sk_type(sk),
 ossl_check_OPENSSL_BLOCK_compfunc_type(cmp)))

/* clang-format on */
#endif

#ifdef __cplusplus
}
#endif
#endif
```

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JSON parsing library (nlohmann/json)

File: vendor/json/upstream/single_include/nlohmann/json.hpp (only for ICU4C)

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Tests included here are based on build output generated by the six-speed
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```
/*
* WARNING: do not edit!
* Generated by Makefile from providers/common/include/prov/der_rsa.h.in
*
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#include "crypto/rsa.h"
#include "internal/der.h"
```

```
/* Well known OIDs precompiled */
/* clang-format off */

/*
* hashAlgs OBJECT IDENTIFIER ::= { nistAlgorithms 2 }
*/
#define DER_OID_V_hashAlgs DER_P_OBJECT, 8, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02
#define DER_OID_SZ_hashAlgs 10
extern const unsigned char ossl_der_oid_hashAlgs[DER_OID_SZ_hashAlgs];

/*
* rsaEncryption    OBJECT IDENTIFIER ::= { pkcs-1 1 }
*/
#define DER_OID_V_rsaEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01, 0x01, 0x01
#define DER_OID_SZ_rsaEncryption 11
extern
 const unsigned char ossl_der_oid_rsaEncryption[DER_OID_SZ_rsaEncryption];

/*
* id-RSAES-OAEP    OBJECT IDENTIFIER ::= { pkcs-1 7 }
*/
#define DER_OID_V_id_RSAES_OAEP DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01, 0x01,
0x07
#define DER_OID_SZ_id_RSAES_OAEP 11
extern const unsigned char ossl_der_oid_id_RSAES_OAEP[DER_OID_SZ_id_RSAES_OAEP];

/*
* id-pSpecified    OBJECT IDENTIFIER ::= { pkcs-1 9 }
*/
#define DER_OID_V_id_pSpecified DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01, 0x01, 0x09
#define DER_OID_SZ_id_pSpecified 11
extern const unsigned char ossl_der_oid_id_pSpecified[DER_OID_SZ_id_pSpecified];

/*
* id-RSASSA-PSS    OBJECT IDENTIFIER ::= { pkcs-1 10 }
*/
#define DER_OID_V_id_RSASSA_PSS DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01, 0x01,
0x0A
#define DER_OID_SZ_id_RSASSA_PSS 11
extern const unsigned char ossl_der_oid_id_RSASSA_PSS[DER_OID_SZ_id_RSASSA_PSS];

/*
* md2WithRSAEncryption         OBJECT IDENTIFIER ::= { pkcs-1 2 }
 */
#define DER_OID_V_md2WithRSAEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01,
0x01, 0x02
#define DER_OID_SZ_md2WithRSAEncryption 11
```

```
extern const unsigned char ossl_der_oid_md2WithRSAEncryption[DER_OID_SZ_md2WithRSAEncryption];

/*
* md5WithRSAEncryption        OBJECT IDENTIFIER ::= { pkcs-1 4 }
*/
#define DER_OID_V_md5WithRSAEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01,
0x01, 0x04
#define DER_OID_SZ_md5WithRSAEncryption 11
extern const unsigned char ossl_der_oid_md5WithRSAEncryption[DER_OID_SZ_md5WithRSAEncryption];

/*
* sha1WithRSAEncryption       OBJECT IDENTIFIER ::= { pkcs-1 5 }
*/
#define DER_OID_V_sha1WithRSAEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01,
0x01, 0x05
#define DER_OID_SZ_sha1WithRSAEncryption 11
extern const unsigned char ossl_der_oid_sha1WithRSAEncryption[DER_OID_SZ_sha1WithRSAEncryption];

/*
* sha224WithRSAEncryption     OBJECT IDENTIFIER ::= { pkcs-1 14 }
*/
#define DER_OID_V_sha224WithRSAEncryption
 DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01, 0x01, 0x0E
#define DER_OID_SZ_sha224WithRSAEncryption 11
extern const unsigned char ossl_der_oid_sha224WithRSAEncryption[DER_OID_SZ_sha224WithRSAEncryption];

/*
* sha256WithRSAEncryption     OBJECT IDENTIFIER ::= { pkcs-1 11 }
*/
#define DER_OID_V_sha256WithRSAEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D,
0x01, 0x01, 0x0B
#define DER_OID_SZ_sha256WithRSAEncryption 11
extern const unsigned char ossl_der_oid_sha256WithRSAEncryption[DER_OID_SZ_sha256WithRSAEncryption];

/*
* sha384WithRSAEncryption     OBJECT IDENTIFIER ::= { pkcs-1 12 }
*/
#define DER_OID_V_sha384WithRSAEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D,
0x01, 0x01, 0x0C
#define DER_OID_SZ_sha384WithRSAEncryption 11
extern const unsigned char ossl_der_oid_sha384WithRSAEncryption[DER_OID_SZ_sha384WithRSAEncryption];

/*
* sha512WithRSAEncryption     OBJECT IDENTIFIER ::= { pkcs-1 13 }
*/
#define DER_OID_V_sha512WithRSAEncryption
 DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01, 0x01, 0x0D
#define DER_OID_SZ_sha512WithRSAEncryption 11
```

```
extern const unsigned char ossl_der_oid_sha512WithRSAEncryption[DER_OID_SZ_sha512WithRSAEncryption];

/*
* sha512-224WithRSAEncryption  OBJECT IDENTIFIER ::= { pkcs-1 15 }
*/
#define DER_OID_V_sha512_224WithRSAEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D,
0x01, 0x01, 0x0F
#define DER_OID_SZ_sha512_224WithRSAEncryption 11
extern const unsigned char
ossl_der_oid_sha512_224WithRSAEncryption[DER_OID_SZ_sha512_224WithRSAEncryption];

/*
* sha512-256WithRSAEncryption  OBJECT IDENTIFIER ::= { pkcs-1 16 }
*/
#define DER_OID_V_sha512_256WithRSAEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D,
0x01, 0x01, 0x10
#define DER_OID_SZ_sha512_256WithRSAEncryption 11
extern const unsigned char
ossl_der_oid_sha512_256WithRSAEncryption[DER_OID_SZ_sha512_256WithRSAEncryption];

/*
* id-mgf1    OBJECT IDENTIFIER ::= { pkcs-1 8 }
*/
#define
 DER_OID_V_id_mgf1 DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01, 0x01, 0x08
#define DER_OID_SZ_id_mgf1 11
extern const unsigned char ossl_der_oid_id_mgf1[DER_OID_SZ_id_mgf1];

/*
* id-rsassa-pkcs1-v1_5-with-sha3-224 OBJECT IDENTIFIER ::= { sigAlgs 13 }
*/
#define DER_OID_V_id_rsassa_pkcs1_v1_5_with_sha3_224 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65,
0x03, 0x04, 0x03, 0x0D
#define DER_OID_SZ_id_rsassa_pkcs1_v1_5_with_sha3_224 11
extern const unsigned char
ossl_der_oid_id_rsassa_pkcs1_v1_5_with_sha3_224[DER_OID_SZ_id_rsassa_pkcs1_v1_5_with_sha3_224];

/*
* id-rsassa-pkcs1-v1_5-with-sha3-256 OBJECT IDENTIFIER ::= { sigAlgs 14 }
*/
#define DER_OID_V_id_rsassa_pkcs1_v1_5_with_sha3_256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65,
0x03, 0x04, 0x03, 0x0E
#define DER_OID_SZ_id_rsassa_pkcs1_v1_5_with_sha3_256 11
extern const unsigned char
ossl_der_oid_id_rsassa_pkcs1_v1_5_with_sha3_256[DER_OID_SZ_id_rsassa_pkcs1_v1_5_with_sha3_256];

/*
* id-rsassa-pkcs1-v1_5-with-sha3-384
```

```
 OBJECT IDENTIFIER ::= { sigAlgs 15 }
*/
#define DER_OID_V_id_rsassa_pkcs1_v1_5_with_sha3_384 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65,
0x03, 0x04, 0x03, 0x0F
#define DER_OID_SZ_id_rsassa_pkcs1_v1_5_with_sha3_384 11
extern const unsigned char
ossl_der_oid_id_rsassa_pkcs1_v1_5_with_sha3_384[DER_OID_SZ_id_rsassa_pkcs1_v1_5_with_sha3_384];

/*
* id-rsassa-pkcs1-v1_5-with-sha3-512 OBJECT IDENTIFIER ::= { sigAlgs 16 }
*/
#define DER_OID_V_id_rsassa_pkcs1_v1_5_with_sha3_512 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65,
0x03, 0x04, 0x03, 0x10
#define DER_OID_SZ_id_rsassa_pkcs1_v1_5_with_sha3_512 11
extern const unsigned char
ossl_der_oid_id_rsassa_pkcs1_v1_5_with_sha3_512[DER_OID_SZ_id_rsassa_pkcs1_v1_5_with_sha3_512];

/*
* md4WithRSAEncryption OBJECT IDENTIFIER ::= { pkcs-1 3 }
*/
#define DER_OID_V_md4WithRSAEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01,
0x01, 0x03
#define DER_OID_SZ_md4WithRSAEncryption 11
extern const unsigned char ossl_der_oid_md4WithRSAEncryption[DER_OID_SZ_md4WithRSAEncryption];

/*
 * ripemd160WithRSAEncryption    OBJECT IDENTIFIER ::= {
*     iso(1) identified-organization(3) teletrust(36) algorithm(3) signatureAlgorithm(3) rsaSignature(1) 2
* }
*/
#define DER_OID_V_ripemd160WithRSAEncryption DER_P_OBJECT, 6, 0x2B, 0x24, 0x03, 0x03, 0x01, 0x02
#define DER_OID_SZ_ripemd160WithRSAEncryption 8
extern const unsigned char
ossl_der_oid_ripemd160WithRSAEncryption[DER_OID_SZ_ripemd160WithRSAEncryption];

/*
* mdc2WithRSASignature OBJECT IDENTIFIER ::= {
*     iso(1) identified-organization(3) oiw(14) secsig(3) algorithms(2) mdc2WithRSASignature(14)
* }
*/
#define DER_OID_V_mdc2WithRSASignature DER_P_OBJECT, 5, 0x2B, 0x0E, 0x03, 0x02, 0x0E
#define DER_OID_SZ_mdc2WithRSASignature 7
extern const unsigned char ossl_der_oid_mdc2WithRSASignature[DER_OID_SZ_mdc2WithRSASignature];

/* clang-format on */

/* PSS parameters */
int ossl_DER_w_RSASSA_PSS_params(WPACKET *pkt, int tag,
```

```
   const RSA_PSS_PARAMS_30 *pss);
/*
 Subject Public Key Info */
int ossl_DER_w_algorithmIdentifier_RSA(WPACKET *pkt, int tag, RSA *rsa);
int ossl_DER_w_algorithmIdentifier_RSA_PSS(WPACKET *pkt, int tag,
   int rsa_type,
   const RSA_PSS_PARAMS_30 *pss);
/* Signature */
int ossl_DER_w_algorithmIdentifier_MDWithRSAEncryption(WPACKET *pkt, int tag,
   int mdnid);
{
 'variables': {
   'openssl_defines_BSD-x86_64': [
     'NDEBUG',
     'L_ENDIAN',
     'OPENSSL_BUILDING_OPENSSL',
     'OPENSSL_PIC',
   ],
   'openssl_cflags_BSD-x86_64': [
     '-Wall -O3',
     '-pthread',
     '-Wall -O3',
   ],
   'openssl_ex_libs_BSD-x86_64': [
     '-pthread',
   ],
   'openssl_cli_srcs_BSD-x86_64': [
     'openssl/apps/lib/cmp_mock_srv.c',
     'openssl/apps/asn1parse.c',
     'openssl/apps/ca.c',
     'openssl/apps/ciphers.c',
     'openssl/apps/cmp.c',
     'openssl/apps/cms.c',
     'openssl/apps/crl.c',
     'openssl/apps/crl2pkcs7.c',
     'openssl/apps/dgst.c',
     'openssl/apps/dhparam.c',
     'openssl/apps/dsa.c',
     'openssl/apps/dsaparam.c',
     'openssl/apps/ec.c',
     'openssl/apps/ecparam.c',
     'openssl/apps/enc.c',
     'openssl/apps/engine.c',
     'openssl/apps/errstr.c',
     'openssl/apps/fipsinstall.c',
     'openssl/apps/gendsa.c',
     'openssl/apps/genpkey.c',
     'openssl/apps/genrsa.c',
```

'openssl/apps/info.c',
'openssl/apps/kdf.c',
'openssl/apps/list.c',
'openssl/apps/mac.c',
'openssl/apps/nseq.c',
'openssl/apps/ocsp.c',
'openssl/apps/openssl.c',
'openssl/apps/passwd.c',
'openssl/apps/pkcs12.c',
'openssl/apps/pkcs7.c',
'openssl/apps/pkcs8.c',
'openssl/apps/pkey.c',
'openssl/apps/pkeyparam.c',
'openssl/apps/pkeyutl.c',
'openssl/apps/prime.c',
'./config/archs/BSD-x86_64/no-asm/apps/progs.c',
'openssl/apps/rand.c',
'openssl/apps/rehash.c',
'openssl/apps/req.c',
'openssl/apps/rsa.c',
'openssl/apps/rsautl.c',
'openssl/apps/s_client.c',
'openssl/apps/s_server.c',
'openssl/apps/s_time.c',
'openssl/apps/sess_id.c',
'openssl/apps/skeyutl.c',
'openssl/apps/smime.c',
'openssl/apps/speed.c',
'openssl/apps/spkac.c',
'openssl/apps/srp.c',
'openssl/apps/storeutl.c',
'openssl/apps/ts.c',
'openssl/apps/verify.c',
'openssl/apps/version.c',
'openssl/apps/x509.c',
'openssl/apps/lib/app_libctx.c',
'openssl/apps/lib/app_params.c',
'openssl/apps/lib/app_provider.c',
'openssl/apps/lib/app_rand.c',
'openssl/apps/lib/app_x509.c',
'openssl/apps/lib/apps.c',
'openssl/apps/lib/apps_opt_printf.c',
'openssl/apps/lib/apps_ui.c',
'openssl/apps/lib/columns.c',
'openssl/apps/lib/engine.c',
'openssl/apps/lib/engine_loader.c',
'openssl/apps/lib/fmt.c',
'openssl/apps/lib/http_server.c',

```
    'openssl/apps/lib/log.c',
    'openssl/apps/lib/names.c',
    'openssl/apps/lib/opt.c',
    'openssl/apps/lib/s_cb.c',
    'openssl/apps/lib/s_socket.c',
    'openssl/apps/lib/tlssrp_depr.c',
  ],
 },
 'defines': ['<@(openssl_defines_BSD-x86_64)'],
 'include_dirs': [
  './include',
 ],
 'cflags' : ['<@(openssl_cflags_BSD-x86_64)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86_64)'],
 'sources': ['<@(openssl_cli_srcs_BSD-x86_64)'],
}
```

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END OF TERMS AND CONDITIONS

Appendix: How to Apply These Terms to Your New Programs

If you develop a new program, and you want it to be of the greatest

possible use to humanity, the best way to achieve this is to make it
free software which everyone can redistribute and change under these
terms.

To do so,
attach the following notices to the program. It is safest to
attach them to the start of each source file to most effectively convey
the exclusion of warranty; and each file should have at least the
"copyright" line and a pointer to where the full notice is found.

<one line to give the program's name and a brief idea of what it does.>
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Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this
when it starts in an interactive mode:

Gnomovision version 69, Copyright (C) 19xx name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.

The hypothetical commands `show w' and `show c' should show the
appropriate parts of the General Public License. Of course, the
commands you use may be called something other than `show w' and `show
c'; they could even be mouse-clicks or menu items--whatever suits your
program.

You should also get your employer (if you work as a programmer) or your
school, if any, to sign a "copyright disclaimer" for the program, if
necessary. Here a sample; alter

the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the
program `Gnomovision' (a program to direct compilers to make passes
at assemblers) written by James Hacker.

<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice

That's all there is to it!

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"SugarCRM-1.1.3",
"Sun-PPP",
"Sun-PPP-2000",
"SunPro",
"Symlinks",
"TAPR-OHL-1.0",
"TCL",
"TCP-wrappers",
"TGPPL-1.0",
"TMate",
"TORQUE-1.1",
"TOSL",
"TPDL",
"TPL-1.0",
"TTWL",
"TTYP0",

"TU-Berlin-1.0",
"TU-Berlin-2.0",
"TekHVC",
"TermReadKey",
"ThirdEye",
"TrustedQSL",
"UCAR",
"UCL-1.0",
"UMich-Merit",
"UPL-1.0",
"URT-RLE",
"Ubuntu-font-1.0",
"UnRAR",
"Unicode-3.0",
"Unicode-DFS-2015",
"Unicode-DFS-2016",
"Unicode-TOU",
"UnixCrypt",
"Unlicense",
"Unlicense-libtelnet",
"Unlicense-libwhirlpool",
"VOSTROM",
"VSL-1.0",
"Vim",
"Vixie-Cron",
"W3C",
"W3C-19980720",
"W3C-20150513",
"WTFNMFPL",
"WTFPL",
"Watcom-1.0",
"Widget-Workshop",
"WordNet",
"Wsuipa",
"X11",
"X11-distribute-modifications-variant",
"X11-no-permit-persons",
"X11-swapped",
"XFree86-1.1",
"XSkat",
"Xdebug-1.03",
"Xerox",
"Xfig",
"Xnet",
"YPL-1.0",
"YPL-1.1",
"ZPL-1.1",
"ZPL-2.0",

"ZPL-2.1",
"Zed",
"Zeeff",
"Zend-2.0",
"Zimbra-1.3",
"Zimbra-1.4",
"Zlib",
"any-OSI",
"any-OSI-perl-modules",
"bcrypt-Solar-Designer",
"blessing",
"bzip2-1.0.6",
"check-cvs",
"checkmk",
"copyleft-next-0.3.0",
"copyleft-next-0.3.1",
"curl",
"cve-tou",
"diffmark",
"dtoa",
"dvipdfm",
"eGenix",
"etalab-2.0",
"fwlw",
"gSOAP-1.3b",
"generic-xts",
"gnuplot",
"gtkbook",
"hdparm",
"hyphen-bulgarian",
"iMatix",
"jove",
"libpng-1.6.35",
"libpng-2.0",
"libselinux-1.0",
"libtiff",
"libutil-David-Nugent",
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"magaz",
"mailprio",
"man2html",
"metamail",
"mpi-permissive",
"mpich2",
"mplus",
"ngrep",
"pkgconf",
"pnmstitch",

"psfrag",
"psutils",
"python-ldap",
"radvd",
"snprintf",
"softSurfer",
"ssh-keyscan",
"swrule",
"threeparttable",
"ulem",
"w3m",
"wwl",
"xinetd",
"xkeyboard-config-Zinoviev",
"xlock",
"xpp",
"xzoom",
"zlib-acknowledgement"
]

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```
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*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_COMP_H
#define OPENSSL_COMP_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_COMP_H
#endif

#include <openssl/opensslconf.h>

#include <openssl/crypto.h>
#include <openssl/comperr.h>
#ifdef __cplusplus
extern "C" {
#endif

#ifndef OPENSSL_NO_COMP

COMP_CTX *COMP_CTX_new(COMP_METHOD *meth);
const COMP_METHOD *COMP_CTX_get_method(const COMP_CTX *ctx);
int COMP_CTX_get_type(const COMP_CTX *comp);
int COMP_get_type(const COMP_METHOD *meth);
const char *COMP_get_name(const COMP_METHOD *meth);
void COMP_CTX_free(COMP_CTX *ctx);

int COMP_compress_block(COMP_CTX
 *ctx, unsigned char *out, int olen,
   unsigned char *in, int ilen);
int COMP_expand_block(COMP_CTX *ctx, unsigned char *out, int olen,
   unsigned char *in, int ilen);

COMP_METHOD *COMP_zlib(void);
COMP_METHOD *COMP_zlib_oneshot(void);
COMP_METHOD *COMP_brotli(void);
COMP_METHOD *COMP_brotli_oneshot(void);
COMP_METHOD *COMP_zstd(void);
COMP_METHOD *COMP_zstd_oneshot(void);
```

```
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define COMP_zlib_cleanup() \
   while (0)            \
   continue
#endif

#ifdef OPENSSL_BIO_H
const BIO_METHOD *BIO_f_zlib(void);
const BIO_METHOD *BIO_f_brotli(void);
const BIO_METHOD *BIO_f_zstd(void);
#endif

#endif

typedef struct ssl_comp_st SSL_COMP;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(SSL_COMP, SSL_COMP, SSL_COMP)
#define sk_SSL_COMP_num(sk) OPENSSL_sk_num(ossl_check_const_SSL_COMP_sk_type(sk))
#define sk_SSL_COMP_value(sk, idx) ((SSL_COMP
*)OPENSSL_sk_value(ossl_check_const_SSL_COMP_sk_type(sk), (idx)))
#define sk_SSL_COMP_new(cmp) ((STACK_OF(SSL_COMP)
 *)OPENSSL_sk_new(ossl_check_SSL_COMP_compfunc_type(cmp)))
#define sk_SSL_COMP_new_null() ((STACK_OF(SSL_COMP) *)OPENSSL_sk_new_null())
#define sk_SSL_COMP_new_reserve(cmp, n) ((STACK_OF(SSL_COMP)
*)OPENSSL_sk_new_reserve(ossl_check_SSL_COMP_compfunc_type(cmp), (n)))
#define sk_SSL_COMP_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_SSL_COMP_sk_type(sk), (n))
#define sk_SSL_COMP_free(sk) OPENSSL_sk_free(ossl_check_SSL_COMP_sk_type(sk))
#define sk_SSL_COMP_zero(sk) OPENSSL_sk_zero(ossl_check_SSL_COMP_sk_type(sk))
#define sk_SSL_COMP_delete(sk, i) ((SSL_COMP *)OPENSSL_sk_delete(ossl_check_SSL_COMP_sk_type(sk),
(i)))
#define sk_SSL_COMP_delete_ptr(sk, ptr) ((SSL_COMP
*)OPENSSL_sk_delete_ptr(ossl_check_SSL_COMP_sk_type(sk), ossl_check_SSL_COMP_type(ptr)))
#define sk_SSL_COMP_push(sk, ptr) OPENSSL_sk_push(ossl_check_SSL_COMP_sk_type(sk),
ossl_check_SSL_COMP_type(ptr))
#define sk_SSL_COMP_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_SSL_COMP_sk_type(sk),
ossl_check_SSL_COMP_type(ptr))
#define
 sk_SSL_COMP_pop(sk) ((SSL_COMP *)OPENSSL_sk_pop(ossl_check_SSL_COMP_sk_type(sk)))
#define sk_SSL_COMP_shift(sk) ((SSL_COMP *)OPENSSL_sk_shift(ossl_check_SSL_COMP_sk_type(sk)))
#define sk_SSL_COMP_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_SSL_COMP_sk_type(sk),ossl_check_SSL_COMP_freefunc_type(freefunc))
#define sk_SSL_COMP_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_SSL_COMP_sk_type(sk),
ossl_check_SSL_COMP_type(ptr), (idx))
#define sk_SSL_COMP_set(sk, idx, ptr) ((SSL_COMP *)OPENSSL_sk_set(ossl_check_SSL_COMP_sk_type(sk),
(idx), ossl_check_SSL_COMP_type(ptr)))
#define sk_SSL_COMP_find(sk, ptr) OPENSSL_sk_find(ossl_check_SSL_COMP_sk_type(sk),
ossl_check_SSL_COMP_type(ptr))
```

```
#define sk_SSL_COMP_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_SSL_COMP_sk_type(sk),
ossl_check_SSL_COMP_type(ptr))
#define sk_SSL_COMP_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_SSL_COMP_sk_type(sk),
ossl_check_SSL_COMP_type(ptr), pnum)
#define sk_SSL_COMP_sort(sk) OPENSSL_sk_sort(ossl_check_SSL_COMP_sk_type(sk))
#define
 sk_SSL_COMP_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_SSL_COMP_sk_type(sk))
#define sk_SSL_COMP_dup(sk) ((STACK_OF(SSL_COMP)
*)OPENSSL_sk_dup(ossl_check_const_SSL_COMP_sk_type(sk)))
#define sk_SSL_COMP_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(SSL_COMP)
*)OPENSSL_sk_deep_copy(ossl_check_const_SSL_COMP_sk_type(sk),
ossl_check_SSL_COMP_copyfunc_type(copyfunc), ossl_check_SSL_COMP_freefunc_type(freefunc)))
#define sk_SSL_COMP_set_cmp_func(sk, cmp)
((sk_SSL_COMP_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_SSL_COMP_sk_type(sk),
ossl_check_SSL_COMP_compfunc_type(cmp)))

/* clang-format on */

#ifdef __cplusplus
}
#endif
#endif
```

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#ifndef SRC_PERMISSION_PERMISSION_BASE_H_
#define SRC_PERMISSION_PERMISSION_BASE_H_

#if defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS

```
#include <map>
#include <string>
#include <string_view>
#include "v8.h"

namespace node {

class Environment;

namespace permission {

#define FILESYSTEM_PERMISSIONS(V)                                    \
 V(FileSystem, "fs", PermissionsRoot, "")                            \
 V(FileSystemRead, "fs.read", FileSystem, "--allow-fs-read")         \
 V(FileSystemWrite, "fs.write", FileSystem, "--allow-fs-write")

#define CHILD_PROCESS_PERMISSIONS(V)                                 \
 V(ChildProcess, "child", PermissionsRoot, "--allow-child-process")

#define WASI_PERMISSIONS(V) V(WASI, "wasi", PermissionsRoot, "--allow-wasi")

#define WORKER_THREADS_PERMISSIONS(V)                                \
 V(WorkerThreads, "worker", PermissionsRoot, "--allow-worker")

#define INSPECTOR_PERMISSIONS(V) V(Inspector,
 "inspector", PermissionsRoot, "")

#define ADDON_PERMISSIONS(V)                                         \
 V(Addon, "addon", PermissionsRoot, "--allow-addons")

#define PERMISSIONS(V)                                               \
 FILESYSTEM_PERMISSIONS(V)                                           \
 CHILD_PROCESS_PERMISSIONS(V)                                        \
 WASI_PERMISSIONS(V)                                                 \
 WORKER_THREADS_PERMISSIONS(V)                                       \
 INSPECTOR_PERMISSIONS(V)                                            \
 ADDON_PERMISSIONS(V)

#define V(name, _, __, ___) k##name,
enum class PermissionScope {
 kPermissionsRoot = -1,
 PERMISSIONS(V) kPermissionsCount
};
#undef V

class PermissionBase {
public:
 virtual void Apply(Environment* env,
```

```
                const std::vector<std::string>& allow,
                PermissionScope scope)
 = 0;
 virtual bool is_granted(Environment* env,
                    PermissionScope perm,
                    const std::string_view& param = "") const = 0;
};

}  // namespace permission

}  // namespace node

#endif  // defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
#endif  // SRC_PERMISSION_PERMISSION_BASE_H_
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/asn1t.h.in
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*/

/* clang-format off */

/* clang-format on */
```

```
#ifndef OPENSSL_ASN1T_H
#define OPENSSL_ASN1T_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_ASN1T_H
#endif

#include <stddef.h>
#include <openssl/e_os2.h>
#include <openssl/asn1.h>

#ifdef OPENSSL_BUILD_SHLIBCRYPTO
#undef OPENSSL_EXTERN
#define OPENSSL_EXTERN OPENSSL_EXPORT
#endif

/* ASN1 template defines, structures and functions */

#ifdef __cplusplus
extern "C" {
#endif

/*-
* These are the possible values for the itype field of the
* ASN1_ITEM structure and determine how it
 is interpreted.
*
* For PRIMITIVE types the underlying type
* determines the behaviour if items is NULL.
*
* Otherwise templates must contain a single
* template and the type is treated in the
* same way as the type specified in the template.
*
* For SEQUENCE types the templates field points
* to the members, the size field is the
* structure size.
*
* For CHOICE types the templates field points
* to each possible member (typically a union)
* and the 'size' field is the offset of the
* selector.
*
* The 'funcs' field is used for application-specific
* data and functions.
```

```
*
* The EXTERN type uses a new style d2i/i2d.
* The new style should be used where possible
* because it avoids things like the d2i IMPLICIT
* hack.
*
* MSTRING is a multiple string type, it is used
* for a CHOICE of character strings where the
* actual strings all occupy an ASN1_STRING
* structure. In this case the 'utype' field
* has a special meaning, it is used as a mask
* of acceptable
 types using the B_ASN1 constants.
*
* NDEF_SEQUENCE is the same as SEQUENCE except
* that it will use indefinite length constructed
* encoding if requested.
*
*/

#define ASN1_ITYPE_PRIMITIVE 0x0
#define ASN1_ITYPE_SEQUENCE 0x1
#define ASN1_ITYPE_CHOICE 0x2
/* unused value                    0x3 */
#define ASN1_ITYPE_EXTERN 0x4
#define ASN1_ITYPE_MSTRING 0x5
#define ASN1_ITYPE_NDEF_SEQUENCE 0x6

/* Macro to obtain ASN1_ADB pointer from a type (only used internally) */
#define ASN1_ADB_ptr(iptr) ((const ASN1_ADB *)((iptr)()))

/* Macros for start and end of ASN1_ITEM definition */

#define ASN1_ITEM_start(itname)       \
   const ASN1_ITEM *itname##_it(void) \
   {                                  \
      static const ASN1_ITEM local_it = {

#define static_ASN1_ITEM_start(itname) \
   static ASN1_ITEM_start(itname)

#define ASN1_ITEM_end(itname) \
   }                          \
   ;                          \
   return &local_it;          \
   }

/* Macros to aid
```

```
 ASN1 template writing */

#define ASN1_ITEM_TEMPLATE(tname) \
   static const ASN1_TEMPLATE tname##_item_tt

#define ASN1_ITEM_TEMPLATE_END(tname) \
   ;                                \
   ASN1_ITEM_start(tname)           \
       ASN1_ITYPE_PRIMITIVE,        \
       -1,                          \
       &tname##_item_tt,            \
       0,                           \
       NULL,                        \
       0,                           \
       #tname ASN1_ITEM_end(tname)
#define static_ASN1_ITEM_TEMPLATE_END(tname) \
   ;                                \
   static_ASN1_ITEM_start(tname)    \
       ASN1_ITYPE_PRIMITIVE,        \
       -1,                          \
       &tname##_item_tt,            \
       0,                           \
       NULL,                        \
       0,                           \
       #tname ASN1_ITEM_end(tname)

/* This is a ASN1 type which just
 embeds a template */

/*-
* This pair helps declare a SEQUENCE. We can do:
*
*      ASN1_SEQUENCE(stname) = {
*              ... SEQUENCE components ...
*      } ASN1_SEQUENCE_END(stname)
*
*      This will produce an ASN1_ITEM called stname_it
*      for a structure called stname.
*
*      If you want the same structure but a different
*      name then use:
*
*      ASN1_SEQUENCE(itname) = {
*              ... SEQUENCE components ...
*      } ASN1_SEQUENCE_END_name(stname, itname)
*
*      This will create an item called itname_it using
*      a structure called stname.
```

```
*/

#define ASN1_SEQUENCE(tname) \
  static const ASN1_TEMPLATE tname##_seq_tt[]

#define ASN1_SEQUENCE_END(stname) ASN1_SEQUENCE_END_name(stname, stname)

#define static_ASN1_SEQUENCE_END(stname) static_ASN1_SEQUENCE_END_name(stname, stname)

#define ASN1_SEQUENCE_END_name(stname, tname)          \
  ;                                                    \
  ASN1_ITEM_start(tname)
            \
    ASN1_ITYPE_SEQUENCE,                               \
    V_ASN1_SEQUENCE,                                   \
    tname##_seq_tt,                                    \
    sizeof(tname##_seq_tt) / sizeof(ASN1_TEMPLATE), \
    NULL,                                              \
    sizeof(stname),                                    \
    #tname ASN1_ITEM_end(tname)

#define static_ASN1_SEQUENCE_END_name(stname, tname)    \
  ;                                                    \
  static_ASN1_ITEM_start(tname)                        \
    ASN1_ITYPE_SEQUENCE,                               \
    V_ASN1_SEQUENCE,                                   \
    tname##_seq_tt,                                    \
    sizeof(tname##_seq_tt) / sizeof(ASN1_TEMPLATE), \
    NULL,                                              \
    sizeof(stname),                                    \
    #stname ASN1_ITEM_end(tname)

#define ASN1_NDEF_SEQUENCE(tname) \
   ASN1_SEQUENCE(tname)

#define ASN1_NDEF_SEQUENCE_cb(tname, cb) \
  ASN1_SEQUENCE_cb(tname, cb)

#define ASN1_SEQUENCE_cb(tname, cb)                    \
  static const ASN1_AUX tname##_aux = { NULL, 0, 0, 0, cb, 0, NULL }; \
  ASN1_SEQUENCE(tname)

#define ASN1_SEQUENCE_const_cb(tname, const_cb)                                \
  static const ASN1_AUX tname##_aux = { NULL, ASN1_AFLG_CONST_CB, 0, 0, NULL, 0, const_cb }; \
  ASN1_SEQUENCE(tname)

#define ASN1_SEQUENCE_cb_const_cb(tname, cb, const_cb)                         \
  static const ASN1_AUX tname##_aux = { NULL, ASN1_AFLG_CONST_CB, 0, 0, cb, 0, const_cb }; \
```

```
  ASN1_SEQUENCE(tname)

#define ASN1_SEQUENCE_ref(tname, cb)                                                                    \
  static const ASN1_AUX tname##_aux = { NULL, ASN1_AFLG_REFCOUNT, offsetof(tname, references),
offsetof(tname, lock), cb, 0, NULL }; \
  ASN1_SEQUENCE(tname)

#define
 ASN1_SEQUENCE_enc(tname, enc, cb)                                                    \
  static const ASN1_AUX tname##_aux = { NULL, ASN1_AFLG_ENCODING, 0, 0, cb, offsetof(tname, enc),
NULL }; \
  ASN1_SEQUENCE(tname)

#define ASN1_NDEF_SEQUENCE_END(tname)                    \
  ;                                        \
  ASN1_ITEM_start(tname)                          \
     ASN1_ITYPE_NDEF_SEQUENCE,                     \
     V_ASN1_SEQUENCE,                              \
     tname##_seq_tt,                               \
     sizeof(tname##_seq_tt) / sizeof(ASN1_TEMPLATE), \
     NULL,                                         \
     sizeof(tname),                                \
     #tname ASN1_ITEM_end(tname)
#define static_ASN1_NDEF_SEQUENCE_END(tname)            \
  ;                                        \
  static_ASN1_ITEM_start(tname)                   \
     ASN1_ITYPE_NDEF_SEQUENCE,
                 \
     V_ASN1_SEQUENCE,                              \
     tname##_seq_tt,                               \
     sizeof(tname##_seq_tt) / sizeof(ASN1_TEMPLATE), \
     NULL,                                         \
     sizeof(tname),                                \
     #tname ASN1_ITEM_end(tname)

#define ASN1_SEQUENCE_END_enc(stname, tname) ASN1_SEQUENCE_END_ref(stname, tname)

#define ASN1_SEQUENCE_END_cb(stname, tname) ASN1_SEQUENCE_END_ref(stname, tname)
#define static_ASN1_SEQUENCE_END_cb(stname, tname) static_ASN1_SEQUENCE_END_ref(stname, tname)

#define ASN1_SEQUENCE_END_ref(stname, tname)            \
  ;                                        \
  ASN1_ITEM_start(tname)                          \
     ASN1_ITYPE_SEQUENCE,                          \
     V_ASN1_SEQUENCE,                              \
     tname##_seq_tt,                               \
     sizeof(tname##_seq_tt)
```

```
 / sizeof(ASN1_TEMPLATE), \
      &tname##_aux,                          \
      sizeof(stname),                        \
      #tname ASN1_ITEM_end(tname)
#define static_ASN1_SEQUENCE_END_ref(stname, tname)     \
  ;                                          \
  static_ASN1_ITEM_start(tname)                  \
      ASN1_ITYPE_SEQUENCE,                       \
      V_ASN1_SEQUENCE,                           \
      tname##_seq_tt,                            \
      sizeof(tname##_seq_tt) / sizeof(ASN1_TEMPLATE), \
      &tname##_aux,                              \
      sizeof(stname),                            \
      #stname ASN1_ITEM_end(tname)

#define ASN1_NDEF_SEQUENCE_END_cb(stname, tname)        \
  ;                                          \
  ASN1_ITEM_start(tname)                         \
      ASN1_ITYPE_NDEF_SEQUENCE,                  \
      V_ASN1_SEQUENCE,
                                 \
      tname##_seq_tt,                            \
      sizeof(tname##_seq_tt) / sizeof(ASN1_TEMPLATE), \
      &tname##_aux,                              \
      sizeof(stname),                            \
      #stname ASN1_ITEM_end(tname)

/*-
* This pair helps declare a CHOICE type. We can do:
*
*     ASN1_CHOICE(chname) = {
*             ... CHOICE options ...
*     ASN1_CHOICE_END(chname)
*
*     This will produce an ASN1_ITEM called chname_it
*     for a structure called chname. The structure
*     definition must look like this:
*     typedef struct {
*             int type;
*             union {
*                     ASN1_SOMETHING *opt1;
*                     ASN1_SOMEOTHER *opt2;
*             } value;
*     } chname;
*
*     the name of the selector must be 'type'.
*     to use an alternative selector name use the
*     ASN1_CHOICE_END_selector() version.
```

```
*/

#define ASN1_CHOICE(tname)
 \
   static const ASN1_TEMPLATE tname##_ch_tt[]

#define ASN1_CHOICE_cb(tname, cb)                                   \
   static const ASN1_AUX tname##_aux = { NULL, 0, 0, 0, cb, 0, NULL }; \
   ASN1_CHOICE(tname)

#define ASN1_CHOICE_END(stname) ASN1_CHOICE_END_name(stname, stname)

#define static_ASN1_CHOICE_END(stname) static_ASN1_CHOICE_END_name(stname, stname)

#define ASN1_CHOICE_END_name(stname, tname) ASN1_CHOICE_END_selector(stname, tname, type)

#define static_ASN1_CHOICE_END_name(stname, tname) static_ASN1_CHOICE_END_selector(stname, tname,
type)

#define ASN1_CHOICE_END_selector(stname, tname, selname) \
   ;                                          \
   ASN1_ITEM_start(tname)                          \
       ASN1_ITYPE_CHOICE,                           \
       offsetof(stname, selname),                   \
       tname##_ch_tt,                               \
       sizeof(tname##_ch_tt) / sizeof(ASN1_TEMPLATE),
 \
       NULL,                                        \
       sizeof(stname),                              \
       #stname ASN1_ITEM_end(tname)

#define static_ASN1_CHOICE_END_selector(stname, tname, selname) \
   ;                                          \
   static_ASN1_ITEM_start(tname)                          \
       ASN1_ITYPE_CHOICE,                                 \
       offsetof(stname, selname),                         \
       tname##_ch_tt,                                     \
       sizeof(tname##_ch_tt) / sizeof(ASN1_TEMPLATE),         \
       NULL,                                              \
       sizeof(stname),                                    \
       #stname ASN1_ITEM_end(tname)

#define ASN1_CHOICE_END_cb(stname, tname, selname)     \
   ;                                          \
   ASN1_ITEM_start(tname)                          \
       ASN1_ITYPE_CHOICE,
               \
       offsetof(stname, selname),                   \
```

```
    tname##_ch_tt,                          \
    sizeof(tname##_ch_tt) / sizeof(ASN1_TEMPLATE), \
    &tname##_aux,                           \
    sizeof(stname),                         \
    #stname ASN1_ITEM_end(tname)

/* This helps with the template wrapper form of ASN1_ITEM */

#define ASN1_EX_TEMPLATE_TYPE(flags, tag, name, type) { \
  (flags), (tag), 0,                        \
  #name, ASN1_ITEM_ref(type)                \
}

/* These help with SEQUENCE or CHOICE components */

/* used to declare other types */

#define ASN1_EX_TYPE(flags, tag, stname, field, type) { \
  (flags), (tag), offsetof(stname, field),  \
  #field, ASN1_ITEM_ref(type)               \
}

/* implicit and explicit helper macros */

#define ASN1_IMP_EX(stname, field, type, tag, ex) \
  ASN1_EX_TYPE(ASN1_TFLG_IMPLICIT | (ex), tag, stname, field,
 type)

#define ASN1_EXP_EX(stname, field, type, tag, ex) \
  ASN1_EX_TYPE(ASN1_TFLG_EXPLICIT | (ex), tag, stname, field, type)

/* Any defined by macros: the field used is in the table itself */

#define ASN1_ADB_OBJECT(tblname) { ASN1_TFLG_ADB_OID, -1, 0, #tblname, tblname##_adb }
#define ASN1_ADB_INTEGER(tblname) { ASN1_TFLG_ADB_INT, -1, 0, #tblname, tblname##_adb }

/* Plain simple type */
#define ASN1_SIMPLE(stname, field, type) ASN1_EX_TYPE(0, 0, stname, field, type)
/* Embedded simple type */
#define ASN1_EMBED(stname, field, type) ASN1_EX_TYPE(ASN1_TFLG_EMBED, 0, stname, field, type)

/* OPTIONAL simple type */
#define ASN1_OPT(stname, field, type) ASN1_EX_TYPE(ASN1_TFLG_OPTIONAL, 0, stname, field, type)
#define ASN1_OPT_EMBED(stname, field, type) ASN1_EX_TYPE(ASN1_TFLG_OPTIONAL |
ASN1_TFLG_EMBED, 0, stname, field, type)

/* IMPLICIT tagged simple type */
#define ASN1_IMP(stname, field, type, tag) ASN1_IMP_EX(stname, field, type, tag, 0)
```

```
#define ASN1_IMP_EMBED(stname, field,
 type, tag) ASN1_IMP_EX(stname, field, type, tag, ASN1_TFLG_EMBED)

/* IMPLICIT tagged OPTIONAL simple type */
#define ASN1_IMP_OPT(stname, field, type, tag) ASN1_IMP_EX(stname, field, type, tag,
ASN1_TFLG_OPTIONAL)
#define ASN1_IMP_OPT_EMBED(stname, field, type, tag) ASN1_IMP_EX(stname, field, type, tag,
ASN1_TFLG_OPTIONAL | ASN1_TFLG_EMBED)

/* Same as above but EXPLICIT */

#define ASN1_EXP(stname, field, type, tag) ASN1_EXP_EX(stname, field, type, tag, 0)
#define ASN1_EXP_EMBED(stname, field, type, tag) ASN1_EXP_EX(stname, field, type, tag,
ASN1_TFLG_EMBED)
#define ASN1_EXP_OPT(stname, field, type, tag) ASN1_EXP_EX(stname, field, type, tag,
ASN1_TFLG_OPTIONAL)
#define ASN1_EXP_OPT_EMBED(stname, field, type, tag) ASN1_EXP_EX(stname, field, type, tag,
ASN1_TFLG_OPTIONAL | ASN1_TFLG_EMBED)

/* SEQUENCE OF type */
#define ASN1_SEQUENCE_OF(stname, field, type) \
   ASN1_EX_TYPE(ASN1_TFLG_SEQUENCE_OF, 0, stname, field, type)

/* OPTIONAL SEQUENCE OF */
#define ASN1_SEQUENCE_OF_OPT(stname,
 field, type) \
   ASN1_EX_TYPE(ASN1_TFLG_SEQUENCE_OF | ASN1_TFLG_OPTIONAL, 0, stname, field, type)

/* Same as above but for SET OF */

#define ASN1_SET_OF(stname, field, type) \
   ASN1_EX_TYPE(ASN1_TFLG_SET_OF, 0, stname, field, type)

#define ASN1_SET_OF_OPT(stname, field, type) \
   ASN1_EX_TYPE(ASN1_TFLG_SET_OF | ASN1_TFLG_OPTIONAL, 0, stname, field, type)

/* Finally compound types of SEQUENCE, SET, IMPLICIT, EXPLICIT and OPTIONAL */

#define ASN1_IMP_SET_OF(stname, field, type, tag) \
   ASN1_IMP_EX(stname, field, type, tag, ASN1_TFLG_SET_OF)

#define ASN1_EXP_SET_OF(stname, field, type, tag) \
   ASN1_EXP_EX(stname, field, type, tag, ASN1_TFLG_SET_OF)

#define ASN1_IMP_SET_OF_OPT(stname, field, type, tag) \
   ASN1_IMP_EX(stname, field, type, tag, ASN1_TFLG_SET_OF | ASN1_TFLG_OPTIONAL)

#define ASN1_EXP_SET_OF_OPT(stname, field, type, tag) \
```

```
  ASN1_EXP_EX(stname, field, type, tag, ASN1_TFLG_SET_OF | ASN1_TFLG_OPTIONAL)

#define ASN1_IMP_SEQUENCE_OF(stname, field, type,
 tag) \
  ASN1_IMP_EX(stname, field, type, tag, ASN1_TFLG_SEQUENCE_OF)

#define ASN1_IMP_SEQUENCE_OF_OPT(stname, field, type, tag) \
  ASN1_IMP_EX(stname, field, type, tag, ASN1_TFLG_SEQUENCE_OF | ASN1_TFLG_OPTIONAL)

#define ASN1_EXP_SEQUENCE_OF(stname, field, type, tag) \
  ASN1_EXP_EX(stname, field, type, tag, ASN1_TFLG_SEQUENCE_OF)

#define ASN1_EXP_SEQUENCE_OF_OPT(stname, field, type, tag) \
  ASN1_EXP_EX(stname, field, type, tag, ASN1_TFLG_SEQUENCE_OF | ASN1_TFLG_OPTIONAL)

/* EXPLICIT using indefinite length constructed form */
#define ASN1_NDEF_EXP(stname, field, type, tag) \
  ASN1_EXP_EX(stname, field, type, tag, ASN1_TFLG_NDEF)

/* EXPLICIT OPTIONAL using indefinite length constructed form */
#define ASN1_NDEF_EXP_OPT(stname, field, type, tag) \
  ASN1_EXP_EX(stname, field, type, tag, ASN1_TFLG_OPTIONAL | ASN1_TFLG_NDEF)

/* Macros for the ASN1_ADB structure */

#define ASN1_ADB(name) \
  static const ASN1_ADB_TABLE name##_adbtbl[]

#define ASN1_ADB_END(name,
 flags, field, adb_cb, def, none) \
  ;                                          \
  static const ASN1_ITEM *name##_adb(void)              \
  {                                          \
     static const ASN1_ADB internal_adb = {             \
        flags,                                  \
        offsetof(name, field),                        \
        adb_cb,                                   \
        name##_adbtbl,                                \
        sizeof(name##_adbtbl) / sizeof(ASN1_ADB_TABLE), \
        def,                                    \
        none                                     \
     };                                          \
     return (const ASN1_ITEM *)&internal_adb;           \
  }                                          \
  void dummy_function(void)

#define ADB_ENTRY(val, template) { val, template }
```

```
#define ASN1_ADB_TEMPLATE(name)
 \
   static const ASN1_TEMPLATE name##_tt

/*
* This is the ASN1 template structure that defines a wrapper round the
* actual type. It determines the actual position of the field in the value
* structure, various flags such as OPTIONAL and the field name.
*/

struct ASN1_TEMPLATE_st {
   unsigned long flags; /* Various flags */
   long tag; /* tag, not used if no tagging */
   unsigned long offset; /* Offset of this field in structure */
   const char *field_name; /* Field name */
   ASN1_ITEM_EXP *item; /* Relevant ASN1_ITEM or ASN1_ADB */
};

/* Macro to extract ASN1_ITEM and ASN1_ADB pointer from ASN1_TEMPLATE */

#define ASN1_TEMPLATE_item(t) (t->item_ptr)
#define ASN1_TEMPLATE_adb(t) (t->item_ptr)

typedef struct ASN1_ADB_TABLE_st ASN1_ADB_TABLE;
typedef struct ASN1_ADB_st ASN1_ADB;

struct ASN1_ADB_st {
   unsigned long flags; /* Various flags */
   unsigned long offset; /* Offset of selector field */
   int (*adb_cb)(long *psel); /* Application
 callback */
   const ASN1_ADB_TABLE *tbl; /* Table of possible types */
   long tblcount; /* Number of entries in tbl */
   const ASN1_TEMPLATE *default_tt; /* Type to use if no match */
   const ASN1_TEMPLATE *null_tt; /* Type to use if selector is NULL */
};

struct ASN1_ADB_TABLE_st {
   long value; /* NID for an object or value for an int */
   const ASN1_TEMPLATE tt; /* item for this value */
};

/* template flags */

/* Field is optional */
#define ASN1_TFLG_OPTIONAL (0x1)

/* Field is a SET OF */
```

```
#define ASN1_TFLG_SET_OF (0x1 << 1)

/* Field is a SEQUENCE OF */
#define ASN1_TFLG_SEQUENCE_OF (0x2 << 1)

/*
* Special case: this refers to a SET OF that will be sorted into DER order
* when encoded *and* the corresponding STACK will be modified to match the
* new order.
*/
#define ASN1_TFLG_SET_ORDER (0x3 << 1)

/* Mask for SET OF or SEQUENCE OF */
#define ASN1_TFLG_SK_MASK (0x3 << 1)

/*
* These flags mean the tag should be taken from the tag field. If EXPLICIT
* then the
 underlying type is used for the inner tag.
*/

/* IMPLICIT tagging */
#define ASN1_TFLG_IMPTAG (0x1 << 3)

/* EXPLICIT tagging, inner tag from underlying type */
#define ASN1_TFLG_EXPTAG (0x2 << 3)

#define ASN1_TFLG_TAG_MASK (0x3 << 3)

/* context specific IMPLICIT */
#define ASN1_TFLG_IMPLICIT (ASN1_TFLG_IMPTAG | ASN1_TFLG_CONTEXT)

/* context specific EXPLICIT */
#define ASN1_TFLG_EXPLICIT (ASN1_TFLG_EXPTAG | ASN1_TFLG_CONTEXT)

/*
* If tagging is in force these determine the type of tag to use. Otherwise
* the tag is determined by the underlying type. These values reflect the
* actual octet format.
*/

/* Universal tag */
#define ASN1_TFLG_UNIVERSAL (0x0 << 6)
/* Application tag */
#define ASN1_TFLG_APPLICATION (0x1 << 6)
/* Context specific tag */
#define ASN1_TFLG_CONTEXT (0x2 << 6)
/* Private tag */
```

```
#define ASN1_TFLG_PRIVATE (0x3 << 6)

#define ASN1_TFLG_TAG_CLASS (0x3 << 6)

/*
* These are for ANY DEFINED BY type. In this case the 'item' field points to
* an ASN1_ADB structure
 which contains a table of values to decode the
* relevant type
*/

#define ASN1_TFLG_ADB_MASK (0x3 << 8)

#define ASN1_TFLG_ADB_OID (0x1 << 8)

#define ASN1_TFLG_ADB_INT (0x1 << 9)

/*
* This flag when present in a SEQUENCE OF, SET OF or EXPLICIT causes
* indefinite length constructed encoding to be used if required.
*/

#define ASN1_TFLG_NDEF (0x1 << 11)

/* Field is embedded and not a pointer */
#define ASN1_TFLG_EMBED (0x1 << 12)

/* This is the actual ASN1 item itself */

struct ASN1_ITEM_st {
   char itype; /* The item type, primitive, SEQUENCE, CHOICE
                * or extern */
   long utype; /* underlying type */
   const ASN1_TEMPLATE *templates; /* If SEQUENCE or CHOICE this contains
                                    * the contents */
   long tcount; /* Number of templates if SEQUENCE or CHOICE */
   const void *funcs; /* further data and type-specific functions */
   /* funcs can be ASN1_PRIMITIVE_FUNCS*, ASN1_EXTERN_FUNCS*, or ASN1_AUX* */
   long
 size; /* Structure size (usually) */
   const char *sname; /* Structure name */
};

/*
* Cache for ASN1 tag and length, so we don't keep re-reading it for things
* like CHOICE
*/
```

```
struct ASN1_TLC_st {
  char valid; /* Values below are valid */
  int ret; /* return value */
  long plen; /* length */
  int ptag; /* class value */
  int pclass; /* class value */
  int hdrlen; /* header length */
};

/* Typedefs for ASN1 function pointers */
typedef int ASN1_ex_d2i(ASN1_VALUE **pval, const unsigned char **in, long len,
  const ASN1_ITEM *it, int tag, int aclass, char opt,
  ASN1_TLC *ctx);

typedef int ASN1_ex_d2i_ex(ASN1_VALUE **pval, const unsigned char **in, long len,
  const ASN1_ITEM *it, int tag, int aclass, char opt,
  ASN1_TLC *ctx, OSSL_LIB_CTX *libctx,
  const char *propq);
typedef int ASN1_ex_i2d(const ASN1_VALUE **pval, unsigned char **out,
  const ASN1_ITEM *it, int tag, int aclass);
typedef int ASN1_ex_new_func(ASN1_VALUE **pval, const ASN1_ITEM
 *it);
typedef int ASN1_ex_new_ex_func(ASN1_VALUE **pval, const ASN1_ITEM *it,
  OSSL_LIB_CTX *libctx, const char *propq);
typedef void ASN1_ex_free_func(ASN1_VALUE **pval, const ASN1_ITEM *it);

typedef int ASN1_ex_print_func(BIO *out, const ASN1_VALUE **pval,
  int indent, const char *fname,
  const ASN1_PCTX *pctx);

typedef int ASN1_primitive_i2c(const ASN1_VALUE **pval, unsigned char *cont,
  int *putype, const ASN1_ITEM *it);
typedef int ASN1_primitive_c2i(ASN1_VALUE **pval, const unsigned char *cont,
  int len, int utype, char *free_cont,
  const ASN1_ITEM *it);
typedef int ASN1_primitive_print(BIO *out, const ASN1_VALUE **pval,
  const ASN1_ITEM *it, int indent,
  const ASN1_PCTX *pctx);

typedef struct ASN1_EXTERN_FUNCS_st {
  void *app_data;
  ASN1_ex_new_func *asn1_ex_new;
  ASN1_ex_free_func *asn1_ex_free;
  ASN1_ex_free_func *asn1_ex_clear;
  ASN1_ex_d2i *asn1_ex_d2i;
  ASN1_ex_i2d *asn1_ex_i2d;
  ASN1_ex_print_func *asn1_ex_print;
  ASN1_ex_new_ex_func
```

```
 *asn1_ex_new_ex;
   ASN1_ex_d2i_ex *asn1_ex_d2i_ex;
} ASN1_EXTERN_FUNCS;

typedef struct ASN1_PRIMITIVE_FUNCS_st {
   void *app_data;
   unsigned long flags;
   ASN1_ex_new_func *prim_new;
   ASN1_ex_free_func *prim_free;
   ASN1_ex_free_func *prim_clear;
   ASN1_primitive_c2i *prim_c2i;
   ASN1_primitive_i2c *prim_i2c;
   ASN1_primitive_print *prim_print;
} ASN1_PRIMITIVE_FUNCS;

/*
* This is the ASN1_AUX structure: it handles various miscellaneous
* requirements. For example the use of reference counts and an informational
* callback. The "informational callback" is called at various points during
* the ASN1 encoding and decoding. It can be used to provide minor
* customisation of the structures used. This is most useful where the
* supplied routines *almost* do the right thing but need some extra help at
* a few points. If the callback returns zero then it is assumed a fatal
* error has occurred and the main operation should be abandoned. If major
* changes
 in the default behaviour are required then an external type is
* more appropriate.
* For the operations ASN1_OP_I2D_PRE, ASN1_OP_I2D_POST, ASN1_OP_PRINT_PRE, and
* ASN1_OP_PRINT_POST, meanwhile a variant of the callback with const parameter
* 'in' is provided to make clear statically that its input is not modified. If
* and only if this variant is in use the flag ASN1_AFLG_CONST_CB must be set.
*/

typedef int ASN1_aux_cb(int operation, ASN1_VALUE **in, const ASN1_ITEM *it,
   void *exarg);
typedef int ASN1_aux_const_cb(int operation, const ASN1_VALUE **in,
   const ASN1_ITEM *it, void *exarg);

typedef struct ASN1_AUX_st {
   void *app_data;
   int flags;
   int ref_offset; /* Offset of reference value */
   int ref_lock; /* Offset of lock value */
   ASN1_aux_cb *asn1_cb;
   int enc_offset; /* Offset of ASN1_ENCODING structure */
   ASN1_aux_const_cb *asn1_const_cb; /* for ASN1_OP_I2D_ and ASN1_OP_PRINT_ */
} ASN1_AUX;
```

```
/* For print related callbacks exarg points
 to this structure */
typedef struct ASN1_PRINT_ARG_st {
   BIO *out;
   int indent;
   const ASN1_PCTX *pctx;
} ASN1_PRINT_ARG;

/* For streaming related callbacks exarg points to this structure */
typedef struct ASN1_STREAM_ARG_st {
   /* BIO to stream through */
   BIO *out;
   /* BIO with filters appended */
   BIO *ndef_bio;
   /* Streaming I/O boundary */
   unsigned char **boundary;
} ASN1_STREAM_ARG;

/* Flags in ASN1_AUX */

/* Use a reference count */
#define ASN1_AFLG_REFCOUNT 1
/* Save the encoding of structure (useful for signatures) */
#define ASN1_AFLG_ENCODING 2
/* The Sequence length is invalid */
#define ASN1_AFLG_BROKEN 4
/* Use the new asn1_const_cb */
#define ASN1_AFLG_CONST_CB 8

/* operation values for asn1_cb */

#define ASN1_OP_NEW_PRE 0
#define ASN1_OP_NEW_POST 1
#define ASN1_OP_FREE_PRE 2
#define ASN1_OP_FREE_POST 3
#define ASN1_OP_D2I_PRE 4
#define ASN1_OP_D2I_POST 5
#define ASN1_OP_I2D_PRE 6
#define ASN1_OP_I2D_POST 7
#define ASN1_OP_PRINT_PRE 8
#define
 ASN1_OP_PRINT_POST 9
#define ASN1_OP_STREAM_PRE 10
#define ASN1_OP_STREAM_POST 11
#define ASN1_OP_DETACHED_PRE 12
#define ASN1_OP_DETACHED_POST 13
#define ASN1_OP_DUP_PRE 14
#define ASN1_OP_DUP_POST 15
```

```
#define ASN1_OP_GET0_LIBCTX 16
#define ASN1_OP_GET0_PROPQ 17

/* Macro to implement a primitive type */
#define IMPLEMENT_ASN1_TYPE(stname) IMPLEMENT_ASN1_TYPE_ex(stname, stname, 0)
#define IMPLEMENT_ASN1_TYPE_ex(itname, vname, ex) \
  ASN1_ITEM_start(itname)                    \
    ASN1_ITYPE_PRIMITIVE,                    \
    V_##vname, NULL, 0, NULL, ex, #itname ASN1_ITEM_end(itname)

/* Macro to implement a multi string type */
#define IMPLEMENT_ASN1_MSTRING(itname, mask) \
  ASN1_ITEM_start(itname)                \
    ASN1_ITYPE_MSTRING,                  \
    mask, NULL, 0, NULL, sizeof(ASN1_STRING), #itname ASN1_ITEM_end(itname)

#define IMPLEMENT_EXTERN_ASN1(sname, tag, fptrs) \
  ASN1_ITEM_start(sname)                     \
    ASN1_ITYPE_EXTERN,
                \
    tag,                              \
    NULL,                                 \
    0,                              \
    &fptrs,                               \
    0,                              \
    #sname ASN1_ITEM_end(sname)

/* Macro to implement standard functions in terms of ASN1_ITEM structures */

#define IMPLEMENT_ASN1_FUNCTIONS(stname) IMPLEMENT_ASN1_FUNCTIONS_fname(stname, stname,
stname)

#define IMPLEMENT_ASN1_FUNCTIONS_name(stname, itname)
IMPLEMENT_ASN1_FUNCTIONS_fname(stname, itname, itname)

#define IMPLEMENT_ASN1_FUNCTIONS_ENCODE_name(stname, itname) \
  IMPLEMENT_ASN1_FUNCTIONS_ENCODE_fname(stname, itname, itname)

#define IMPLEMENT_STATIC_ASN1_ALLOC_FUNCTIONS(stname) \
  IMPLEMENT_ASN1_ALLOC_FUNCTIONS_pfname(static, stname, stname, stname)

#define IMPLEMENT_ASN1_ALLOC_FUNCTIONS(stname) \
  IMPLEMENT_ASN1_ALLOC_FUNCTIONS_fname(stname, stname, stname)

#define IMPLEMENT_ASN1_ALLOC_FUNCTIONS_pfname(pre,
 stname, itname, fname) \
  pre stname *fname##_new(void)                          \
  {                                                  \
```

```
    return (stname *)ASN1_item_new(ASN1_ITEM_rptr(itname));          \
  }                                                                  \
  pre void fname##_free(stname *a)                                   \
  {                                                                  \
    ASN1_item_free((ASN1_VALUE *)a, ASN1_ITEM_rptr(itname));         \
  }

#define IMPLEMENT_ASN1_ALLOC_FUNCTIONS_fname(stname, itname, fname) \
  stname *fname##_new(void)                                          \
  {                                                                  \
    return (stname *)ASN1_item_new(ASN1_ITEM_rptr(itname));     \
  }                                                                  \
  void fname##_free(stname *a)
                \
  {                                                                  \
    ASN1_item_free((ASN1_VALUE *)a, ASN1_ITEM_rptr(itname));    \
  }

#define IMPLEMENT_ASN1_FUNCTIONS_fname(stname, itname, fname)    \
  IMPLEMENT_ASN1_ENCODE_FUNCTIONS_fname(stname, itname, fname) \
  IMPLEMENT_ASN1_ALLOC_FUNCTIONS_fname(stname, itname, fname)

#define IMPLEMENT_ASN1_ENCODE_FUNCTIONS_fname(stname, itname, fname)                    \
  stname *d2i_##fname(stname **a, const unsigned char **in, long len)                   \
  {                                                                                     \
    return (stname *)ASN1_item_d2i((ASN1_VALUE **)a, in, len, ASN1_ITEM_rptr(itname)); \
  }                                                                                     \
  int i2d_##fname(const stname *a, unsigned char **out)                                 \
  {
              \
    return ASN1_item_i2d((const ASN1_VALUE *)a, out, ASN1_ITEM_rptr(itname));          \
  }

#define IMPLEMENT_ASN1_NDEF_FUNCTION(stname)                                            \
  int i2d_##stname##_NDEF(const stname *a, unsigned char **out)                         \
  {                                                                                     \
    return ASN1_item_ndef_i2d((const ASN1_VALUE *)a, out, ASN1_ITEM_rptr(stname)); \
  }

#define IMPLEMENT_STATIC_ASN1_ENCODE_FUNCTIONS(stname)           \
  static stname *d2i_##stname(stname **a,                        \
    const unsigned char **in, long len)                          \
  {                                                              \
    return (stname *)ASN1_item_d2i((ASN1_VALUE **)a, in, len, \
      ASN1_ITEM_rptr(stname));                                   \
  }                                                              \
  static int i2d_##stname(const stname *a,
```

```
 unsigned char **out) \
  {                                                   \
     return ASN1_item_i2d((const ASN1_VALUE *)a, out,          \
        ASN1_ITEM_rptr(stname));                          \
  }

#define IMPLEMENT_ASN1_DUP_FUNCTION(stname)              \
  stname *stname##_dup(const stname *x)               \
  {                                          \
     return ASN1_item_dup(ASN1_ITEM_rptr(stname), x); \
  }

#define IMPLEMENT_ASN1_PRINT_FUNCTION(stname) \
  IMPLEMENT_ASN1_PRINT_FUNCTION_fname(stname, stname, stname)

#define IMPLEMENT_ASN1_PRINT_FUNCTION_fname(stname, itname, fname) \
  int fname##_print_ctx(BIO *out, const stname *x, int indent,   \
     const ASN1_PCTX *pctx)                               \
  {                                                  \
     return ASN1_item_print(out, (const ASN1_VALUE *)x, indent, \
        ASN1_ITEM_rptr(itname), pctx);
    \
  }

/* external definitions for primitive types */

DECLARE_ASN1_ITEM(ASN1_BOOLEAN)
DECLARE_ASN1_ITEM(ASN1_TBOOLEAN)
DECLARE_ASN1_ITEM(ASN1_FBOOLEAN)
DECLARE_ASN1_ITEM(ASN1_SEQUENCE)
DECLARE_ASN1_ITEM(CBIGNUM)
DECLARE_ASN1_ITEM(BIGNUM)
DECLARE_ASN1_ITEM(INT32)
DECLARE_ASN1_ITEM(ZINT32)
DECLARE_ASN1_ITEM(UINT32)
DECLARE_ASN1_ITEM(ZUINT32)
DECLARE_ASN1_ITEM(INT64)
DECLARE_ASN1_ITEM(ZINT64)
DECLARE_ASN1_ITEM(UINT64)
DECLARE_ASN1_ITEM(ZUINT64)

#ifndef OPENSSL_NO_DEPRECATED_3_0
/*
* LONG and ZLONG are strongly discouraged for use as stored data, as the
* underlying C type (long) differs in size depending on the architecture.
* They are designed with 32-bit longs in mind.
*/
DECLARE_ASN1_ITEM(LONG)
```

```
DECLARE_ASN1_ITEM(ZLONG)
#endif

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ASN1_VALUE, ASN1_VALUE, ASN1_VALUE)
#define sk_ASN1_VALUE_num(sk) OPENSSL_sk_num(ossl_check_const_ASN1_VALUE_sk_type(sk))
#define sk_ASN1_VALUE_value(sk, idx) ((ASN1_VALUE
*)OPENSSL_sk_value(ossl_check_const_ASN1_VALUE_sk_type(sk),
 (idx)))
#define sk_ASN1_VALUE_new(cmp) ((STACK_OF(ASN1_VALUE)
*)OPENSSL_sk_new(ossl_check_ASN1_VALUE_compfunc_type(cmp)))
#define sk_ASN1_VALUE_new_null() ((STACK_OF(ASN1_VALUE) *)OPENSSL_sk_new_null())
#define sk_ASN1_VALUE_new_reserve(cmp, n) ((STACK_OF(ASN1_VALUE)
*)OPENSSL_sk_new_reserve(ossl_check_ASN1_VALUE_compfunc_type(cmp), (n)))
#define sk_ASN1_VALUE_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_ASN1_VALUE_sk_type(sk), (n))
#define sk_ASN1_VALUE_free(sk) OPENSSL_sk_free(ossl_check_ASN1_VALUE_sk_type(sk))
#define sk_ASN1_VALUE_zero(sk) OPENSSL_sk_zero(ossl_check_ASN1_VALUE_sk_type(sk))
#define sk_ASN1_VALUE_delete(sk, i) ((ASN1_VALUE
*)OPENSSL_sk_delete(ossl_check_ASN1_VALUE_sk_type(sk), (i)))
#define sk_ASN1_VALUE_delete_ptr(sk, ptr) ((ASN1_VALUE
*)OPENSSL_sk_delete_ptr(ossl_check_ASN1_VALUE_sk_type(sk), ossl_check_ASN1_VALUE_type(ptr)))
#define sk_ASN1_VALUE_push(sk, ptr) OPENSSL_sk_push(ossl_check_ASN1_VALUE_sk_type(sk),
ossl_check_ASN1_VALUE_type(ptr))
#define
 sk_ASN1_VALUE_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_ASN1_VALUE_sk_type(sk),
ossl_check_ASN1_VALUE_type(ptr))
#define sk_ASN1_VALUE_pop(sk) ((ASN1_VALUE
*)OPENSSL_sk_pop(ossl_check_ASN1_VALUE_sk_type(sk)))
#define sk_ASN1_VALUE_shift(sk) ((ASN1_VALUE
*)OPENSSL_sk_shift(ossl_check_ASN1_VALUE_sk_type(sk)))
#define sk_ASN1_VALUE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASN1_VALUE_sk_type(sk),ossl_check_ASN1_VALUE_freefunc_type(freef
unc))
#define sk_ASN1_VALUE_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_ASN1_VALUE_sk_type(sk),
ossl_check_ASN1_VALUE_type(ptr), (idx))
#define sk_ASN1_VALUE_set(sk, idx, ptr) ((ASN1_VALUE
*)OPENSSL_sk_set(ossl_check_ASN1_VALUE_sk_type(sk), (idx), ossl_check_ASN1_VALUE_type(ptr)))
#define sk_ASN1_VALUE_find(sk, ptr) OPENSSL_sk_find(ossl_check_ASN1_VALUE_sk_type(sk),
ossl_check_ASN1_VALUE_type(ptr))
#define sk_ASN1_VALUE_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_ASN1_VALUE_sk_type(sk),
ossl_check_ASN1_VALUE_type(ptr))
#define
 sk_ASN1_VALUE_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_ASN1_VALUE_sk_type(sk),
ossl_check_ASN1_VALUE_type(ptr), pnum)
#define sk_ASN1_VALUE_sort(sk) OPENSSL_sk_sort(ossl_check_ASN1_VALUE_sk_type(sk))
#define sk_ASN1_VALUE_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_ASN1_VALUE_sk_type(sk))
#define sk_ASN1_VALUE_dup(sk) ((STACK_OF(ASN1_VALUE)
*)OPENSSL_sk_dup(ossl_check_const_ASN1_VALUE_sk_type(sk)))
```

```
#define sk_ASN1_VALUE_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ASN1_VALUE)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASN1_VALUE_sk_type(sk),
ossl_check_ASN1_VALUE_copyfunc_type(copyfunc), ossl_check_ASN1_VALUE_freefunc_type(freefunc)))
#define sk_ASN1_VALUE_set_cmp_func(sk, cmp)
((sk_ASN1_VALUE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASN1_VALUE_sk_type(sk),
ossl_check_ASN1_VALUE_compfunc_type(cmp)))

/* clang-format on */

/* Functions used internally by the ASN1 code */

int ASN1_item_ex_new(ASN1_VALUE **pval, const ASN1_ITEM *it);
void ASN1_item_ex_free(ASN1_VALUE
 **pval, const ASN1_ITEM *it);

int ASN1_item_ex_d2i(ASN1_VALUE **pval, const unsigned char **in, long len,
   const ASN1_ITEM *it, int tag, int aclass, char opt,
   ASN1_TLC *ctx);

int ASN1_item_ex_i2d(const ASN1_VALUE **pval, unsigned char **out,
   const ASN1_ITEM *it, int tag, int aclass);

/* Legacy compatibility */
#define IMPLEMENT_ASN1_FUNCTIONS_const(name) IMPLEMENT_ASN1_FUNCTIONS(name)
#define IMPLEMENT_ASN1_ENCODE_FUNCTIONS_const_fname(stname, itname, fname) \
   IMPLEMENT_ASN1_ENCODE_FUNCTIONS_fname(stname, itname, fname)

#ifdef __cplusplus
}
#endif
#endif
#ifndef SRC_PERMISSION_PERMISSION_H_
#define SRC_PERMISSION_PERMISSION_H_

#if defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS

#include "debug_utils.h"
#include "node_options.h"
#include "permission/addon_permission.h"
#include "permission/child_process_permission.h"
#include "permission/fs_permission.h"
#include "permission/inspector_permission.h"
#include "permission/permission_base.h"
#include "permission/wasi_permission.h"
#include "permission/worker_permission.h"
#include "v8.h"

#include <string_view>
```

```
#include <unordered_map>

namespace node {

class Environment;

namespace fs {
class FSReqBase;
}

namespace permission {

#define THROW_IF_INSUFFICIENT_PERMISSIONS(env, perm, resource, ...)            \
 do {                                                                          \
   node::Environment* env__ = (env);                                           \
   const node::permission::PermissionScope perm__ = (perm);                    \
   const auto resource__ = (resource);
                                                                               \
   if (!env__->permission()->is_granted(env__, perm__, resource__))            \
      [[unlikely]] {                                                           \
     node::permission::Permission::ThrowAccessDenied(                          \
        env__, perm__, resource__);                                            \
     return __VA_ARGS__;                                                       \
   }                                                                           \
 } while (0)

#define ASYNC_THROW_IF_INSUFFICIENT_PERMISSIONS(                               \
   env, wrap, perm, resource, ...)                                             \
 do {                                                                          \
   node::Environment* env__ = (env);                                           \
   const node::permission::PermissionScope perm__ = (perm);                    \
   const auto resource__ = (resource);
                                                                               \
   if (!env__->permission()->is_granted(env__, perm__, resource__))            \
      [[unlikely]] {                                                           \
     node::permission::Permission::AsyncThrowAccessDenied(                     \
        env__, (wrap), perm__, resource__);                                    \
     return __VA_ARGS__;                                                       \
   }                                                                           \
 } while (0)

#define ERR_ACCESS_DENIED_IF_INSUFFICIENT_PERMISSIONS(                         \
   env, perm, resource, args, ...)                                             \
 do {                                                                          \
   node::Environment* env__ = (env);                                           \
   const node::permission::PermissionScope perm__ = (perm);                    \
   const auto resource__ = (resource);
```

```
                \
  if (!env__->permission()->is_granted(env__, perm__, resource__))          \
    [[unlikely]] {                                                          \
    Local<Value> err_access;                                                \
    if (node::permission::CreateAccessDeniedError(env__, perm__, resource__) \
          .ToLocal(&err_access)) {                                          \
      args.GetReturnValue().Set(err_access);                                \
    } else {                                                                \
      args.GetReturnValue().Set(UV_EACCES);                                 \
    }                                                                       \
    return __VA_ARGS__;                                                     \
  }                                                                         \
} while (0)

#define SET_INSUFFICIENT_PERMISSION_ERROR_CALLBACK(scope)
    \
 void InsufficientPermissionError(std::string_view resource) {              \
   v8::HandleScope handle_scope(env()->isolate());                          \
   v8::Context::Scope context_scope(env()->context());                      \
   v8::Local<v8::Value> arg;                                                \
   if (!permission::CreateAccessDeniedError(env(), (scope), resource)       \
          .ToLocal(&arg)) {                                                 \
   }                                                                        \
   MakeCallback(env()->oncomplete_string(), 1, &arg);                       \
 }

class Permission {
public:
 Permission();

 FORCE_INLINE bool is_granted(Environment* env,
                              const PermissionScope permission,
                              const std::string_view& res = "") const {
   if (!enabled_) [[likely]] {
     return true;
   }
   return is_scope_granted(env, permission, res);
  }

 FORCE_INLINE bool enabled() const { return enabled_; }

 static PermissionScope StringToPermission(const std::string& perm);
 static const char* PermissionToString(PermissionScope perm);
 static void ThrowAccessDenied(Environment* env,
                               PermissionScope perm,
                               const std::string_view& res);
 static void AsyncThrowAccessDenied(Environment* env,
                                    fs::FSReqBase* req_wrap,
```

```
                              PermissionScope perm,
                              const std::string_view& res);

 // CLI Call
 void Apply(Environment* env,
            const std::vector<std::string>& allow,
            PermissionScope scope);
 void EnablePermissions();

private:
 COLD_NOINLINE bool is_scope_granted(Environment* env,
                                     const PermissionScope permission,
                                     const std::string_view& res = "") const {
   auto perm_node
 = nodes_.find(permission);
   if (perm_node != nodes_.end()) {
     return perm_node->second->is_granted(env, permission, res);
   }
   return false;
 }

 std::unordered_map<PermissionScope, std::shared_ptr<PermissionBase>> nodes_;
 bool enabled_;
};

}  // namespace permission

}  // namespace node

#endif  // defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
#endif  // SRC_PERMISSION_PERMISSION_H_
```

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A. HISTORY OF THE SOFTWARE
==========

Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see https://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
| 2.2 and above | 2.1.1 | 2001-now | PSF | yes |

Footnotes:

(1) GPL-compatible doesn't mean that we're distributing Python under
the GPL. All Python licenses, unlike the GPL, let you distribute
a modified version without making your changes open source. The
GPL-compatible licenses make it possible to combine Python with
other software that is released under the GPL; the others don't.

(2) According to Richard Stallman, 1.6.1 is not GPL-compatible,
because its license has a choice of law clause. According to
CNRI, however, Stallman's lawyer has told CNRI's lawyer that 1.6.1
is "not incompatible" with the GPL.

Thanks to the many outside volunteers who have worked under Guido's
direction to make these releases possible.

B. TERMS AND CONDITIONS FOR ACCESSING OR OTHERWISE USING PYTHON
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# Protected File

Example of a protected file to be used in the PolicyDenyFs module
(The MIT License)

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  'openssl/providers/implementations/kdfs/pvkkdf.c',
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  './crypto',
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 'sources': ['<@(openssl_sources)', '<@(openssl_sources_BSD-x86_64)'],
 'direct_dependent_settings': {
  'include_dirs': ['./include', '.'],
  'defines': ['<@(openssl_defines_BSD-x86_64)'],
  },
}
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END OF TERMS AND CONDITIONS

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  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_ecx_gen.c',
  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_ml_dsa_gen.c',
  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_rsa_gen.c',
  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_slh_dsa_gen.c',
  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_wrap_gen.c',
  './config/archs/BSD-x86_64/asm_avx2/providers/legacy.ld',
  './config/archs/BSD-x86_64/asm_avx2/providers/fips.ld',

],
'openssl_defines_BSD-x86_64': [
  'NDEBUG',
```

```
    'L_ENDIAN',
    'OPENSSL_BUILDING_OPENSSL',
    'AES_ASM',
    'BSAES_ASM',
    'ECP_NISTZ256_ASM',
    'FIPS_MODULE',
    'GHASH_ASM',
    'KECCAK1600_ASM',
    'OPENSSL_BN_ASM_GF2m',
    'OPENSSL_BN_ASM_MONT',
    'OPENSSL_BN_ASM_MONT5',
    'OPENSSL_CPUID_OBJ',
    'OPENSSL_IA32_SSE2',
    'SHA1_ASM',
    'SHA256_ASM',
    'SHA512_ASM',
    'VPAES_ASM',
    'X25519_ASM',
    'FIPS_MODULE',
  ],
  'openssl_cflags_BSD-x86_64': [
    '-Wa,--noexecstack',
    '-Wall -O3',
    '-pthread',
    '-Wall -O3',
  ],
  'openssl_ex_libs_BSD-x86_64':
[
    '-pthread',
  ],
  'linker_script': ''
},
'include_dirs': [
  '.',
  './include',
  './crypto',
  './crypto/include/internal',
  './providers/common/include',
],
'defines': ['<@(openssl_defines_BSD-x86_64)'],
'cflags': ['<@(openssl_cflags_BSD-x86_64)'],
'libraries': ['<@(openssl_ex_libs_BSD-x86_64)'],

'sources': ['<@(openssl_sources)', '<@(openssl_sources_BSD-x86_64)'],
'direct_dependent_settings': {
  'include_dirs': ['./include', '.'],
  'defines': ['<@(openssl_defines_BSD-x86_64)'],
},
```

}
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```
/*
* WARNING: do not edit!
* Generated by util/mkbuildinf.pl
*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#define PLATFORM "platform: BSD-x86"
#define DATE "built on: Tue Jan 27 17:25:31 2026 UTC"

/*
* Generate compiler_flags as an array of individual characters. This is a
* workaround for the situation where CFLAGS gets too long for a C90 string
* literal
*/
static const char compiler_flags[] = {
   'c','o','m','p','i','l','e','r',':',' ','g','c','c',' ','-','f',
   'P','I','C',' ','-','p','t','h','r','e','a','d',' ','-','W','a',
   ',','-','-','n','o','e','x','e','c','s','t','a','c','k',' ','-',
   'W','a','l','l',' ','-','O','3',' ','-','f','o','m','i','t','-',
   'f','r','a','m','e','-','p','o','i','n','t','e','r','
 ','-','D',
   'L','_','E','N','D','I','A','N',' ','-','D','O','P','E','N','S',
   'S','L','_','P','I','C',' ','-','D','_','T','H','R','E','A','D',
   '_','S','A','F','E',' ','-','D','_','R','E','E','N','T','R','A',
   'N','T',' ','-','D','O','P','E','N','S','S','L','_','B','U','I',
   'L','D','I','N','G','_','O','P','E','N','S','S','L',' ','-','D',
   'N','D','E','B','U','G','\0'
};
/*-
* WARNING: do not edit!
* Generated by Makefile from include/openssl/crmf.h.in
*
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* Copyright Nokia 2007-2019
* Copyright Siemens AG 2015-2019
*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*
* CRMF (RFC 4211) implementation by M. Peylo, M. Viljanen, and D. von Oheimb.
```

```
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_CRMF_H
#define OPENSSL_CRMF_H

#include <openssl/opensslconf.h>

#ifndef OPENSSL_NO_CRMF
#include <openssl/opensslv.h>
#include <openssl/safestack.h>
#include <openssl/crmferr.h>
#include <openssl/x509v3.h> /* for GENERAL_NAME etc. */
#include <openssl/cms.h>

/* explicit #includes not strictly needed since implied by the above: */
#include <openssl/types.h>
#include <openssl/x509.h>

#ifdef
 __cplusplus
extern "C" {
#endif

#define OSSL_CRMF_POPOPRIVKEY_THISMESSAGE 0
#define OSSL_CRMF_POPOPRIVKEY_SUBSEQUENTMESSAGE 1
#define OSSL_CRMF_POPOPRIVKEY_DHMAC 2
#define OSSL_CRMF_POPOPRIVKEY_AGREEMAC 3
#define OSSL_CRMF_POPOPRIVKEY_ENCRYPTEDKEY 4

#define OSSL_CRMF_SUBSEQUENTMESSAGE_ENCRCERT 0
#define OSSL_CRMF_SUBSEQUENTMESSAGE_CHALLENGERESP 1
typedef struct ossl_crmf_encryptedvalue_st OSSL_CRMF_ENCRYPTEDVALUE;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_ENCRYPTEDVALUE)

typedef struct ossl_crmf_encryptedkey_st OSSL_CRMF_ENCRYPTEDKEY;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_ENCRYPTEDKEY)

typedef struct ossl_crmf_msg_st OSSL_CRMF_MSG;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_MSG)
DECLARE_ASN1_DUP_FUNCTION(OSSL_CRMF_MSG)
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CRMF_MSG, OSSL_CRMF_MSG, OSSL_CRMF_MSG)
#define sk_OSSL_CRMF_MSG_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_CRMF_MSG_sk_type(sk))
```

```
#define sk_OSSL_CRMF_MSG_value(sk, idx) ((OSSL_CRMF_MSG
*)OPENSSL_sk_value(ossl_check_const_OSSL_CRMF_MSG_sk_type(sk),
 (idx)))
#define sk_OSSL_CRMF_MSG_new(cmp) ((STACK_OF(OSSL_CRMF_MSG)
*)OPENSSL_sk_new(ossl_check_OSSL_CRMF_MSG_compfunc_type(cmp)))
#define sk_OSSL_CRMF_MSG_new_null() ((STACK_OF(OSSL_CRMF_MSG) *)OPENSSL_sk_new_null())
#define sk_OSSL_CRMF_MSG_new_reserve(cmp, n) ((STACK_OF(OSSL_CRMF_MSG)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CRMF_MSG_compfunc_type(cmp), (n)))
#define sk_OSSL_CRMF_MSG_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_CRMF_MSG_sk_type(sk), (n))
#define sk_OSSL_CRMF_MSG_free(sk) OPENSSL_sk_free(ossl_check_OSSL_CRMF_MSG_sk_type(sk))
#define sk_OSSL_CRMF_MSG_zero(sk) OPENSSL_sk_zero(ossl_check_OSSL_CRMF_MSG_sk_type(sk))
#define sk_OSSL_CRMF_MSG_delete(sk, i) ((OSSL_CRMF_MSG
*)OPENSSL_sk_delete(ossl_check_OSSL_CRMF_MSG_sk_type(sk), (i)))
#define sk_OSSL_CRMF_MSG_delete_ptr(sk, ptr) ((OSSL_CRMF_MSG
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CRMF_MSG_sk_type(sk),
ossl_check_OSSL_CRMF_MSG_type(ptr)))
#define sk_OSSL_CRMF_MSG_push(sk, ptr)
 OPENSSL_sk_push(ossl_check_OSSL_CRMF_MSG_sk_type(sk), ossl_check_OSSL_CRMF_MSG_type(ptr))
#define sk_OSSL_CRMF_MSG_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CRMF_MSG_sk_type(sk), ossl_check_OSSL_CRMF_MSG_type(ptr))
#define sk_OSSL_CRMF_MSG_pop(sk) ((OSSL_CRMF_MSG
*)OPENSSL_sk_pop(ossl_check_OSSL_CRMF_MSG_sk_type(sk)))
#define sk_OSSL_CRMF_MSG_shift(sk) ((OSSL_CRMF_MSG
*)OPENSSL_sk_shift(ossl_check_OSSL_CRMF_MSG_sk_type(sk)))
#define sk_OSSL_CRMF_MSG_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CRMF_MSG_sk_type(sk),ossl_check_OSSL_CRMF_MSG_freefunc_t
ype(freefunc))
#define sk_OSSL_CRMF_MSG_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_CRMF_MSG_sk_type(sk), ossl_check_OSSL_CRMF_MSG_type(ptr),
(idx))
#define sk_OSSL_CRMF_MSG_set(sk, idx, ptr) ((OSSL_CRMF_MSG
*)OPENSSL_sk_set(ossl_check_OSSL_CRMF_MSG_sk_type(sk), (idx),
ossl_check_OSSL_CRMF_MSG_type(ptr)))
#define sk_OSSL_CRMF_MSG_find(sk, ptr) OPENSSL_sk_find(ossl_check_OSSL_CRMF_MSG_sk_type(sk),
ossl_check_OSSL_CRMF_MSG_type(ptr))
#define
 sk_OSSL_CRMF_MSG_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_OSSL_CRMF_MSG_sk_type(sk),
ossl_check_OSSL_CRMF_MSG_type(ptr))
#define sk_OSSL_CRMF_MSG_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CRMF_MSG_sk_type(sk), ossl_check_OSSL_CRMF_MSG_type(ptr),
pnum)
#define sk_OSSL_CRMF_MSG_sort(sk) OPENSSL_sk_sort(ossl_check_OSSL_CRMF_MSG_sk_type(sk))
#define sk_OSSL_CRMF_MSG_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CRMF_MSG_sk_type(sk))
#define sk_OSSL_CRMF_MSG_dup(sk) ((STACK_OF(OSSL_CRMF_MSG)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CRMF_MSG_sk_type(sk)))
#define sk_OSSL_CRMF_MSG_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OSSL_CRMF_MSG)
```

```
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CRMF_MSG_sk_type(sk),
ossl_check_OSSL_CRMF_MSG_copyfunc_type(copyfunc),
ossl_check_OSSL_CRMF_MSG_freefunc_type(freefunc)))
#define sk_OSSL_CRMF_MSG_set_cmp_func(sk, cmp)
((sk_OSSL_CRMF_MSG_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_CRMF_MSG_sk_type(sk),
 ossl_check_OSSL_CRMF_MSG_compfunc_type(cmp)))

/* clang-format on */
typedef struct ossl_crmf_attributetypeandvalue_st OSSL_CRMF_ATTRIBUTETYPEANDVALUE;
void OSSL_CRMF_ATTRIBUTETYPEANDVALUE_free(OSSL_CRMF_ATTRIBUTETYPEANDVALUE *v);
DECLARE_ASN1_DUP_FUNCTION(OSSL_CRMF_ATTRIBUTETYPEANDVALUE)
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CRMF_ATTRIBUTETYPEANDVALUE,
OSSL_CRMF_ATTRIBUTETYPEANDVALUE, OSSL_CRMF_ATTRIBUTETYPEANDVALUE)
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_value(sk, idx)
((OSSL_CRMF_ATTRIBUTETYPEANDVALUE
*)OPENSSL_sk_value(ossl_check_const_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk), (idx)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_new(cmp)
((STACK_OF(OSSL_CRMF_ATTRIBUTETYPEANDVALUE)
*)OPENSSL_sk_new(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_compfunc_type(cmp)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_new_null()
((STACK_OF(OSSL_CRMF_ATTRIBUTETYPEANDVALUE)
 *)OPENSSL_sk_new_null())
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_new_reserve(cmp, n)
((STACK_OF(OSSL_CRMF_ATTRIBUTETYPEANDVALUE)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_compfunc_type(cmp),
(n)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk), (n))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_delete(sk, i)
((OSSL_CRMF_ATTRIBUTETYPEANDVALUE
*)OPENSSL_sk_delete(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk), (i)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_delete_ptr(sk, ptr)
((OSSL_CRMF_ATTRIBUTETYPEANDVALUE
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
 ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_type(ptr)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_type(ptr))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_type(ptr))
```

```
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_pop(sk)
((OSSL_CRMF_ATTRIBUTETYPEANDVALUE
*)OPENSSL_sk_pop(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_shift(sk)
((OSSL_CRMF_ATTRIBUTETYPEANDVALUE
*)OPENSSL_sk_shift(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),ossl_check_OS
SL_CRMF_ATTRIBUTETYPEANDVALUE_freefunc_type(freefunc))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_insert(sk,
 ptr, idx) OPENSSL_sk_insert(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_type(ptr), (idx))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_set(sk, idx, ptr)
((OSSL_CRMF_ATTRIBUTETYPEANDVALUE
*)OPENSSL_sk_set(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk), (idx),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_type(ptr)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_type(ptr))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_type(ptr))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_type(ptr), pnum)
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sort(sk)
 OPENSSL_sk_sort(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_dup(sk)
((STACK_OF(OSSL_CRMF_ATTRIBUTETYPEANDVALUE)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_CRMF_ATTRIBUTETYPEANDVALUE)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_copyfunc_type(copyfunc),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_freefunc_type(freefunc)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_set_cmp_func(sk, cmp)
((sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_
CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_compfunc_type(cmp)))

/*
 clang-format on */

typedef struct ossl_crmf_pbmparameter_st OSSL_CRMF_PBMPARAMETER;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_PBMPARAMETER)
typedef struct ossl_crmf_poposigningkey_st OSSL_CRMF_POPOSIGNINGKEY;
```

```
typedef struct ossl_crmf_certrequest_st OSSL_CRMF_CERTREQUEST;
typedef struct ossl_crmf_certid_st OSSL_CRMF_CERTID;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_CERTID)
DECLARE_ASN1_DUP_FUNCTION(OSSL_CRMF_CERTID)
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CRMF_CERTID, OSSL_CRMF_CERTID,
OSSL_CRMF_CERTID)
#define sk_OSSL_CRMF_CERTID_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_CRMF_CERTID_sk_type(sk))
#define sk_OSSL_CRMF_CERTID_value(sk, idx) ((OSSL_CRMF_CERTID
*)OPENSSL_sk_value(ossl_check_const_OSSL_CRMF_CERTID_sk_type(sk), (idx)))
#define sk_OSSL_CRMF_CERTID_new(cmp) ((STACK_OF(OSSL_CRMF_CERTID)
*)OPENSSL_sk_new(ossl_check_OSSL_CRMF_CERTID_compfunc_type(cmp)))
#define sk_OSSL_CRMF_CERTID_new_null() ((STACK_OF(OSSL_CRMF_CERTID)
*)OPENSSL_sk_new_null())
#define sk_OSSL_CRMF_CERTID_new_reserve(cmp,
 n) ((STACK_OF(OSSL_CRMF_CERTID)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CRMF_CERTID_compfunc_type(cmp), (n)))
#define sk_OSSL_CRMF_CERTID_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_CRMF_CERTID_sk_type(sk), (n))
#define sk_OSSL_CRMF_CERTID_free(sk) OPENSSL_sk_free(ossl_check_OSSL_CRMF_CERTID_sk_type(sk))
#define sk_OSSL_CRMF_CERTID_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_CRMF_CERTID_sk_type(sk))
#define sk_OSSL_CRMF_CERTID_delete(sk, i) ((OSSL_CRMF_CERTID
*)OPENSSL_sk_delete(ossl_check_OSSL_CRMF_CERTID_sk_type(sk), (i)))
#define sk_OSSL_CRMF_CERTID_delete_ptr(sk, ptr) ((OSSL_CRMF_CERTID
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CRMF_CERTID_sk_type(sk),
ossl_check_OSSL_CRMF_CERTID_type(ptr)))
#define sk_OSSL_CRMF_CERTID_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_CRMF_CERTID_sk_type(sk),
ossl_check_OSSL_CRMF_CERTID_type(ptr))
#define sk_OSSL_CRMF_CERTID_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CRMF_CERTID_sk_type(sk),
ossl_check_OSSL_CRMF_CERTID_type(ptr))
#define
 sk_OSSL_CRMF_CERTID_pop(sk) ((OSSL_CRMF_CERTID
*)OPENSSL_sk_pop(ossl_check_OSSL_CRMF_CERTID_sk_type(sk)))
#define sk_OSSL_CRMF_CERTID_shift(sk) ((OSSL_CRMF_CERTID
*)OPENSSL_sk_shift(ossl_check_OSSL_CRMF_CERTID_sk_type(sk)))
#define sk_OSSL_CRMF_CERTID_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CRMF_CERTID_sk_type(sk),ossl_check_OSSL_CRMF_CERTID_fre
efunc_type(freefunc))
#define sk_OSSL_CRMF_CERTID_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_CRMF_CERTID_sk_type(sk),
ossl_check_OSSL_CRMF_CERTID_type(ptr), (idx))
#define sk_OSSL_CRMF_CERTID_set(sk, idx, ptr) ((OSSL_CRMF_CERTID
*)OPENSSL_sk_set(ossl_check_OSSL_CRMF_CERTID_sk_type(sk), (idx),
ossl_check_OSSL_CRMF_CERTID_type(ptr)))
```

```
#define sk_OSSL_CRMF_CERTID_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_CRMF_CERTID_sk_type(sk),
ossl_check_OSSL_CRMF_CERTID_type(ptr))
#define sk_OSSL_CRMF_CERTID_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_CRMF_CERTID_sk_type(sk),
ossl_check_OSSL_CRMF_CERTID_type(ptr))
#define
 sk_OSSL_CRMF_CERTID_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CRMF_CERTID_sk_type(sk),
ossl_check_OSSL_CRMF_CERTID_type(ptr), pnum)
#define sk_OSSL_CRMF_CERTID_sort(sk) OPENSSL_sk_sort(ossl_check_OSSL_CRMF_CERTID_sk_type(sk))
#define sk_OSSL_CRMF_CERTID_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CRMF_CERTID_sk_type(sk))
#define sk_OSSL_CRMF_CERTID_dup(sk) ((STACK_OF(OSSL_CRMF_CERTID)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CRMF_CERTID_sk_type(sk)))
#define sk_OSSL_CRMF_CERTID_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OSSL_CRMF_CERTID)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CRMF_CERTID_sk_type(sk),
ossl_check_OSSL_CRMF_CERTID_copyfunc_type(copyfunc),
ossl_check_OSSL_CRMF_CERTID_freefunc_type(freefunc)))
#define sk_OSSL_CRMF_CERTID_set_cmp_func(sk, cmp)
((sk_OSSL_CRMF_CERTID_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_CRMF_CERTID_sk_typ
e(sk), ossl_check_OSSL_CRMF_CERTID_compfunc_type(cmp)))

/* clang-format on */

typedef struct
 ossl_crmf_pkipublicationinfo_st OSSL_CRMF_PKIPUBLICATIONINFO;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_PKIPUBLICATIONINFO)
typedef struct ossl_crmf_singlepubinfo_st OSSL_CRMF_SINGLEPUBINFO;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_SINGLEPUBINFO)
typedef struct ossl_crmf_certtemplate_st OSSL_CRMF_CERTTEMPLATE;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_CERTTEMPLATE)
DECLARE_ASN1_DUP_FUNCTION(OSSL_CRMF_CERTTEMPLATE)
typedef STACK_OF(OSSL_CRMF_MSG) OSSL_CRMF_MSGS;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_MSGS)

typedef struct ossl_crmf_optionalvalidity_st OSSL_CRMF_OPTIONALVALIDITY;

/* crmf_pbm.c */
OSSL_CRMF_PBMPARAMETER *OSSL_CRMF_pbmp_new(OSSL_LIB_CTX *libctx, size_t slen,
   int owfnid, size_t itercnt,
   int macnid);
int OSSL_CRMF_pbm_new(OSSL_LIB_CTX *libctx, const char *propq,
   const OSSL_CRMF_PBMPARAMETER *pbmp,
   const unsigned char *msg, size_t msglen,
   const unsigned char *sec, size_t seclen,
   unsigned char **mac, size_t *maclen);
```

```
/* crmf_lib.c */
int OSSL_CRMF_MSG_set1_regCtrl_regToken(OSSL_CRMF_MSG
 *msg,
   const ASN1_UTF8STRING *tok);
ASN1_UTF8STRING
*OSSL_CRMF_MSG_get0_regCtrl_regToken(const OSSL_CRMF_MSG *msg);
int OSSL_CRMF_MSG_set1_regCtrl_authenticator(OSSL_CRMF_MSG *msg,
   const ASN1_UTF8STRING *auth);
ASN1_UTF8STRING
*OSSL_CRMF_MSG_get0_regCtrl_authenticator(const OSSL_CRMF_MSG *msg);
int OSSL_CRMF_MSG_PKIPublicationInfo_push0_SinglePubInfo(OSSL_CRMF_PKIPUBLICATIONINFO *pi,
   OSSL_CRMF_SINGLEPUBINFO *spi);
#define OSSL_CRMF_PUB_METHOD_DONTCARE 0
#define OSSL_CRMF_PUB_METHOD_X500 1
#define OSSL_CRMF_PUB_METHOD_WEB 2
#define OSSL_CRMF_PUB_METHOD_LDAP 3
int OSSL_CRMF_MSG_set0_SinglePubInfo(OSSL_CRMF_SINGLEPUBINFO *spi,
   int method, GENERAL_NAME *nm);
#define OSSL_CRMF_PUB_ACTION_DONTPUBLISH 0
#define OSSL_CRMF_PUB_ACTION_PLEASEPUBLISH 1
int OSSL_CRMF_MSG_set_PKIPublicationInfo_action(OSSL_CRMF_PKIPUBLICATIONINFO *pi,
   int action);
int OSSL_CRMF_MSG_set1_regCtrl_pkiPublicationInfo(OSSL_CRMF_MSG *msg,
   const OSSL_CRMF_PKIPUBLICATIONINFO *pi);
OSSL_CRMF_PKIPUBLICATIONINFO
*OSSL_CRMF_MSG_get0_regCtrl_pkiPublicationInfo(const
 OSSL_CRMF_MSG *msg);
int OSSL_CRMF_MSG_set1_regCtrl_protocolEncrKey(OSSL_CRMF_MSG *msg,
   const X509_PUBKEY *pubkey);
X509_PUBKEY
*OSSL_CRMF_MSG_get0_regCtrl_protocolEncrKey(const OSSL_CRMF_MSG *msg);
int OSSL_CRMF_MSG_set1_regCtrl_oldCertID(OSSL_CRMF_MSG *msg,
   const OSSL_CRMF_CERTID *cid);
OSSL_CRMF_CERTID
*OSSL_CRMF_MSG_get0_regCtrl_oldCertID(const OSSL_CRMF_MSG *msg);
OSSL_CRMF_CERTID *OSSL_CRMF_CERTID_gen(const X509_NAME *issuer,
   const ASN1_INTEGER *serial);

int OSSL_CRMF_MSG_set1_regInfo_utf8Pairs(OSSL_CRMF_MSG *msg,
   const ASN1_UTF8STRING *utf8pairs);
ASN1_UTF8STRING
*OSSL_CRMF_MSG_get0_regInfo_utf8Pairs(const OSSL_CRMF_MSG *msg);
int OSSL_CRMF_MSG_set1_regInfo_certReq(OSSL_CRMF_MSG *msg,
   const OSSL_CRMF_CERTREQUEST *cr);
OSSL_CRMF_CERTREQUEST
*OSSL_CRMF_MSG_get0_regInfo_certReq(const OSSL_CRMF_MSG *msg);

int OSSL_CRMF_MSG_set0_validity(OSSL_CRMF_MSG *crm,
```

```
   ASN1_TIME *notBefore, ASN1_TIME *notAfter);
int
 OSSL_CRMF_MSG_set_certReqId(OSSL_CRMF_MSG *crm, int rid);
int OSSL_CRMF_MSG_get_certReqId(const OSSL_CRMF_MSG *crm);
int OSSL_CRMF_MSG_set0_extensions(OSSL_CRMF_MSG *crm, X509_EXTENSIONS *exts);

int OSSL_CRMF_MSG_push0_extension(OSSL_CRMF_MSG *crm, X509_EXTENSION *ext);
#define OSSL_CRMF_POPO_NONE -1
#define OSSL_CRMF_POPO_RAVERIFIED 0
#define OSSL_CRMF_POPO_SIGNATURE 1
#define OSSL_CRMF_POPO_KEYENC 2
#define OSSL_CRMF_POPO_KEYAGREE 3
int OSSL_CRMF_MSG_create_popo(int meth, OSSL_CRMF_MSG *crm,
   EVP_PKEY *pkey, const EVP_MD *digest,
   OSSL_LIB_CTX *libctx, const char *propq);
int OSSL_CRMF_MSGS_verify_popo(const OSSL_CRMF_MSGS *reqs,
   int rid, int acceptRAVerified,
   OSSL_LIB_CTX *libctx, const char *propq);
OSSL_CRMF_CERTTEMPLATE *OSSL_CRMF_MSG_get0_tmpl(const OSSL_CRMF_MSG *crm);
X509_PUBKEY
*OSSL_CRMF_CERTTEMPLATE_get0_publicKey(const OSSL_CRMF_CERTTEMPLATE *tmpl);
const X509_NAME *OSSL_CRMF_CERTTEMPLATE_get0_subject(const OSSL_CRMF_CERTTEMPLATE
*tmpl);
const
 X509_NAME *OSSL_CRMF_CERTTEMPLATE_get0_issuer(const OSSL_CRMF_CERTTEMPLATE *tmpl);
const ASN1_INTEGER *OSSL_CRMF_CERTTEMPLATE_get0_serialNumber(const
OSSL_CRMF_CERTTEMPLATE *tmpl);
X509_EXTENSIONS
*OSSL_CRMF_CERTTEMPLATE_get0_extensions(const OSSL_CRMF_CERTTEMPLATE *tmpl);
const X509_NAME *OSSL_CRMF_CERTID_get0_issuer(const OSSL_CRMF_CERTID *cid);
const ASN1_INTEGER *OSSL_CRMF_CERTID_get0_serialNumber(const OSSL_CRMF_CERTID *cid);
int OSSL_CRMF_CERTTEMPLATE_fill(OSSL_CRMF_CERTTEMPLATE *tmpl,
   EVP_PKEY *pubkey,
   const X509_NAME *subject,
   const X509_NAME *issuer,
   const ASN1_INTEGER *serial);
X509 *OSSL_CRMF_ENCRYPTEDVALUE_get1_encCert(const OSSL_CRMF_ENCRYPTEDVALUE *ecert,
   OSSL_LIB_CTX *libctx, const char *propq,
   EVP_PKEY *pkey);
X509 *OSSL_CRMF_ENCRYPTEDKEY_get1_encCert(const OSSL_CRMF_ENCRYPTEDKEY *ecert,
   OSSL_LIB_CTX *libctx, const char *propq,
   EVP_PKEY *pkey, unsigned int flags);
unsigned char *OSSL_CRMF_ENCRYPTEDVALUE_decrypt(const OSSL_CRMF_ENCRYPTEDVALUE
 *enc,
   OSSL_LIB_CTX *libctx, const char *propq,
   EVP_PKEY *pkey, int *outlen);
EVP_PKEY *OSSL_CRMF_ENCRYPTEDKEY_get1_pkey(const OSSL_CRMF_ENCRYPTEDKEY
*encryptedKey,
```

```
   X509_STORE *ts, STACK_OF(X509) *extra, EVP_PKEY *pkey,
   X509 *cert, ASN1_OCTET_STRING *secret,
   OSSL_LIB_CTX *libctx, const char *propq);
int OSSL_CRMF_MSG_centralkeygen_requested(const OSSL_CRMF_MSG *crm, const X509_REQ *p10cr);
#ifndef OPENSSL_NO_CMS
OSSL_CRMF_ENCRYPTEDKEY *OSSL_CRMF_ENCRYPTEDKEY_init_envdata(CMS_EnvelopedData
*envdata);
#endif

#ifdef __cplusplus
}
#endif
#endif /* !defined(OPENSSL_NO_CRMF) */
#endif /* !defined(OPENSSL_CRMF_H) */
#ifndef SRC_PERMISSION_FS_PERMISSION_H_
#define SRC_PERMISSION_FS_PERMISSION_H_

#if defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS

#include "v8.h"

#include <unordered_map>
#include "permission/permission_base.h"
#include "util.h"

namespace node {

namespace permission {

class FSPermission final : public PermissionBase {
public:
 void Apply(Environment* env,
            const std::vector<std::string>& allow,
            PermissionScope scope) override;
 bool is_granted(Environment* env,
                 PermissionScope perm,
                 const std::string_view& param) const override;

 struct RadixTree {
   struct Node {
     std::string prefix;
     std::unordered_map<char, Node*> children;
     Node* wildcard_child;
     bool is_leaf;

     explicit Node(const std::string& pre)
         : prefix(pre), wildcard_child(nullptr), is_leaf(false) {}
```

```
  Node() : wildcard_child(nullptr), is_leaf(false) {}

  Node* CreateChild(const std::string& path_prefix)
{
    if (path_prefix.empty() && !is_leaf) {
      is_leaf = true;
      return this;
    }

    CHECK(!path_prefix.empty());
    char label = path_prefix[0];

    Node* child = children[label];
    if (child == nullptr) {
      children[label] = new Node(path_prefix);
      return children[label];
    }

    // swap prefix
    size_t i = 0;
    size_t prefix_len = path_prefix.length();
    for (; i < child->prefix.length(); ++i) {
      if (i > prefix_len || path_prefix[i] != child->prefix[i]) {
        std::string parent_prefix = child->prefix.substr(0, i);
        std::string child_prefix = child->prefix.substr(i);

        child->prefix = child_prefix;
        Node* split_child = new Node(parent_prefix);
        split_child->children[child_prefix[0]] = child;
        children[parent_prefix[0]] = split_child;

        return split_child->CreateChild(path_prefix.substr(i));
      }

  }
    child->is_leaf = true;
    return child->CreateChild(path_prefix.substr(i));
  }

  Node* CreateWildcardChild() {
    if (wildcard_child != nullptr) {
      return wildcard_child;
    }
    wildcard_child = new Node();
    return wildcard_child;
  }

  Node* NextNode(const std::string& path, size_t idx) const {
```

```
    if (idx >= path.length()) {
      return nullptr;
    }

    // wildcard node takes precedence
    if (children.size() > 1) {
      auto it = children.find('*');
      if (it != children.end()) {
        return it->second;
      }
    }

    auto it = children.find(path[idx]);
    if (it == children.end()) {
      return nullptr;
    }
    auto child = it->second;
    // match prefix
    size_t prefix_len = child->prefix.length();
    for (size_t i = 0; i < path.length(); ++i) {
      if (i >= prefix_len || child->prefix[i] == '*') {
        return
child;
      }

      // Handle optional trailing
      // path = /home/subdirectory
      // child = subdirectory/*
      if (idx >= path.length() &&
          child->prefix[i] == node::kPathSeparator) {
        continue;
      }

      if (path[idx++] != child->prefix[i]) {
        return nullptr;
      }
    }
    return child;
  }

  // A node can be a *end* node and have children
  // E.g: */slower*, */slown* are inserted:
  // /slow
  // ---> er
  // ---> n
  // If */slow* is inserted right after, it will create an
  // empty node
  // /slow
```

```
    // ---> '\000' ASCII (0) || \0
    // ---> er
    // ---> n
    bool IsEndNode() const {
      if (children.empty()) {
        return true;
      }
      return is_leaf;
    }
  };

  RadixTree();
  ~RadixTree();
  void Insert(const std::string& s);
  bool Lookup(const std::string_view& s) const { return Lookup(s, false);
 }
  bool Lookup(const std::string_view& s, bool when_empty_return) const;

  private:
  Node* root_node_;
 };

private:
 void GrantAccess(PermissionScope scope, const std::string& param);
 // fs granted on startup
 RadixTree granted_in_fs_;
 RadixTree granted_out_fs_;

 bool deny_all_in_ = true;
 bool deny_all_out_ = true;

 bool allow_all_in_ = false;
 bool allow_all_out_ = false;
};

}  // namespace permission

}  // namespace node

#endif  // defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
#endif  // SRC_PERMISSION_FS_PERMISSION_H_
```

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* WARNING: do not edit!
* Generated by Makefile from include/openssl/ocsp.h.in
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*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_OCSP_H
#define OPENSSL_OCSP_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_OCSP_H
#endif

#include <openssl/opensslconf.h>
#include <openssl/http.h>
```

```
#include <openssl/asn1.h>

/*
* These definitions are outside the OPENSSL_NO_OCSP guard because although for
* historical reasons they have OCSP_* names, they can actually be used
* independently of OCSP. E.g. see RFC5280
*/
/*-
*   CRLReason ::= ENUMERATED {
*       unspecified             (0),
*       keyCompromise
         (1),
*       cACompromise            (2),
*       affiliationChanged      (3),
*       superseded              (4),
*       cessationOfOperation    (5),
*       certificateHold         (6),
*       -- value 7 is not used
*       removeFromCRL           (8),
*       privilegeWithdrawn      (9),
*       aACompromise            (10) }
*/
#define OCSP_REVOKED_STATUS_NOSTATUS -1
#define OCSP_REVOKED_STATUS_UNSPECIFIED 0
#define OCSP_REVOKED_STATUS_KEYCOMPROMISE 1
#define OCSP_REVOKED_STATUS_CACOMPROMISE 2
#define OCSP_REVOKED_STATUS_AFFILIATIONCHANGED 3
#define OCSP_REVOKED_STATUS_SUPERSEDED 4
#define OCSP_REVOKED_STATUS_CESSATIONOFOPERATION 5
#define OCSP_REVOKED_STATUS_CERTIFICATEHOLD 6
#define OCSP_REVOKED_STATUS_REMOVEFROMCRL 8
#define OCSP_REVOKED_STATUS_PRIVILEGEWITHDRAWN 9
#define OCSP_REVOKED_STATUS_AACOMPROMISE 10

#ifndef OPENSSL_NO_OCSP

#include <openssl/x509.h>
#include <openssl/x509v3.h>
#include <openssl/safestack.h>
#include <openssl/ocsperr.h>

#ifdef
 __cplusplus
extern "C" {
#endif

/* Various flags and values */
```

```
#define OCSP_DEFAULT_NONCE_LENGTH 16

#define OCSP_NOCERTS 0x1
#define OCSP_NOINTERN 0x2
#define OCSP_NOSIGS 0x4
#define OCSP_NOCHAIN 0x8
#define OCSP_NOVERIFY 0x10
#define OCSP_NOEXPLICIT 0x20
#define OCSP_NOCASIGN 0x40
#define OCSP_NODELEGATED 0x80
#define OCSP_NOCHECKS 0x100
#define OCSP_TRUSTOTHER 0x200
#define OCSP_RESPID_KEY 0x400
#define OCSP_NOTIME 0x800
#define OCSP_PARTIAL_CHAIN 0x1000

typedef struct ocsp_cert_id_st OCSP_CERTID;
typedef struct ocsp_one_request_st OCSP_ONEREQ;
typedef struct ocsp_req_info_st OCSP_REQINFO;
typedef struct ocsp_signature_st OCSP_SIGNATURE;
typedef struct ocsp_request_st OCSP_REQUEST;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OCSP_CERTID, OCSP_CERTID, OCSP_CERTID)
#define sk_OCSP_CERTID_num(sk) OPENSSL_sk_num(ossl_check_const_OCSP_CERTID_sk_type(sk))
#define sk_OCSP_CERTID_value(sk, idx) ((OCSP_CERTID
*)OPENSSL_sk_value(ossl_check_const_OCSP_CERTID_sk_type(sk),
 (idx)))
#define sk_OCSP_CERTID_new(cmp) ((STACK_OF(OCSP_CERTID)
*)OPENSSL_sk_new(ossl_check_OCSP_CERTID_compfunc_type(cmp)))
#define sk_OCSP_CERTID_new_null() ((STACK_OF(OCSP_CERTID) *)OPENSSL_sk_new_null())
#define sk_OCSP_CERTID_new_reserve(cmp, n) ((STACK_OF(OCSP_CERTID)
*)OPENSSL_sk_new_reserve(ossl_check_OCSP_CERTID_compfunc_type(cmp), (n)))
#define sk_OCSP_CERTID_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_OCSP_CERTID_sk_type(sk), (n))
#define sk_OCSP_CERTID_free(sk) OPENSSL_sk_free(ossl_check_OCSP_CERTID_sk_type(sk))
#define sk_OCSP_CERTID_zero(sk) OPENSSL_sk_zero(ossl_check_OCSP_CERTID_sk_type(sk))
#define sk_OCSP_CERTID_delete(sk, i) ((OCSP_CERTID
*)OPENSSL_sk_delete(ossl_check_OCSP_CERTID_sk_type(sk), (i)))
#define sk_OCSP_CERTID_delete_ptr(sk, ptr) ((OCSP_CERTID
*)OPENSSL_sk_delete_ptr(ossl_check_OCSP_CERTID_sk_type(sk), ossl_check_OCSP_CERTID_type(ptr)))
#define sk_OCSP_CERTID_push(sk, ptr) OPENSSL_sk_push(ossl_check_OCSP_CERTID_sk_type(sk),
ossl_check_OCSP_CERTID_type(ptr))
#define
 sk_OCSP_CERTID_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_OCSP_CERTID_sk_type(sk),
ossl_check_OCSP_CERTID_type(ptr))
#define sk_OCSP_CERTID_pop(sk) ((OCSP_CERTID
*)OPENSSL_sk_pop(ossl_check_OCSP_CERTID_sk_type(sk)))
#define sk_OCSP_CERTID_shift(sk) ((OCSP_CERTID
```

```
*)OPENSSL_sk_shift(ossl_check_OCSP_CERTID_sk_type(sk)))
#define sk_OCSP_CERTID_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OCSP_CERTID_sk_type(sk),ossl_check_OCSP_CERTID_freefunc_type(freef
unc))
#define sk_OCSP_CERTID_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_OCSP_CERTID_sk_type(sk),
ossl_check_OCSP_CERTID_type(ptr), (idx))
#define sk_OCSP_CERTID_set(sk, idx, ptr) ((OCSP_CERTID
*)OPENSSL_sk_set(ossl_check_OCSP_CERTID_sk_type(sk), (idx), ossl_check_OCSP_CERTID_type(ptr)))
#define sk_OCSP_CERTID_find(sk, ptr) OPENSSL_sk_find(ossl_check_OCSP_CERTID_sk_type(sk),
ossl_check_OCSP_CERTID_type(ptr))
#define sk_OCSP_CERTID_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_OCSP_CERTID_sk_type(sk),
ossl_check_OCSP_CERTID_type(ptr))
#define
 sk_OCSP_CERTID_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_OCSP_CERTID_sk_type(sk),
ossl_check_OCSP_CERTID_type(ptr), pnum)
#define sk_OCSP_CERTID_sort(sk) OPENSSL_sk_sort(ossl_check_OCSP_CERTID_sk_type(sk))
#define sk_OCSP_CERTID_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OCSP_CERTID_sk_type(sk))
#define sk_OCSP_CERTID_dup(sk) ((STACK_OF(OCSP_CERTID)
*)OPENSSL_sk_dup(ossl_check_const_OCSP_CERTID_sk_type(sk)))
#define sk_OCSP_CERTID_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OCSP_CERTID)
*)OPENSSL_sk_deep_copy(ossl_check_const_OCSP_CERTID_sk_type(sk),
ossl_check_OCSP_CERTID_copyfunc_type(copyfunc), ossl_check_OCSP_CERTID_freefunc_type(freefunc)))
#define sk_OCSP_CERTID_set_cmp_func(sk, cmp)
((sk_OCSP_CERTID_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OCSP_CERTID_sk_type(sk),
ossl_check_OCSP_CERTID_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(OCSP_ONEREQ, OCSP_ONEREQ, OCSP_ONEREQ)
#define sk_OCSP_ONEREQ_num(sk) OPENSSL_sk_num(ossl_check_const_OCSP_ONEREQ_sk_type(sk))
#define
 sk_OCSP_ONEREQ_value(sk, idx) ((OCSP_ONEREQ
*)OPENSSL_sk_value(ossl_check_const_OCSP_ONEREQ_sk_type(sk), (idx)))
#define sk_OCSP_ONEREQ_new(cmp) ((STACK_OF(OCSP_ONEREQ)
*)OPENSSL_sk_new(ossl_check_OCSP_ONEREQ_compfunc_type(cmp)))
#define sk_OCSP_ONEREQ_new_null() ((STACK_OF(OCSP_ONEREQ) *)OPENSSL_sk_new_null())
#define sk_OCSP_ONEREQ_new_reserve(cmp, n) ((STACK_OF(OCSP_ONEREQ)
*)OPENSSL_sk_new_reserve(ossl_check_OCSP_ONEREQ_compfunc_type(cmp), (n)))
#define sk_OCSP_ONEREQ_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_OCSP_ONEREQ_sk_type(sk), (n))
#define sk_OCSP_ONEREQ_free(sk) OPENSSL_sk_free(ossl_check_OCSP_ONEREQ_sk_type(sk))
#define sk_OCSP_ONEREQ_zero(sk) OPENSSL_sk_zero(ossl_check_OCSP_ONEREQ_sk_type(sk))
#define sk_OCSP_ONEREQ_delete(sk, i) ((OCSP_ONEREQ
*)OPENSSL_sk_delete(ossl_check_OCSP_ONEREQ_sk_type(sk), (i)))
#define sk_OCSP_ONEREQ_delete_ptr(sk, ptr) ((OCSP_ONEREQ
*)OPENSSL_sk_delete_ptr(ossl_check_OCSP_ONEREQ_sk_type(sk),
 ossl_check_OCSP_ONEREQ_type(ptr)))
#define sk_OCSP_ONEREQ_push(sk, ptr) OPENSSL_sk_push(ossl_check_OCSP_ONEREQ_sk_type(sk),
ossl_check_OCSP_ONEREQ_type(ptr))
#define sk_OCSP_ONEREQ_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_OCSP_ONEREQ_sk_type(sk),
ossl_check_OCSP_ONEREQ_type(ptr))
```

```
#define sk_OCSP_ONEREQ_pop(sk) ((OCSP_ONEREQ
*)OPENSSL_sk_pop(ossl_check_OCSP_ONEREQ_sk_type(sk)))
#define sk_OCSP_ONEREQ_shift(sk) ((OCSP_ONEREQ
*)OPENSSL_sk_shift(ossl_check_OCSP_ONEREQ_sk_type(sk)))
#define sk_OCSP_ONEREQ_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OCSP_ONEREQ_sk_type(sk),ossl_check_OCSP_ONEREQ_freefunc_type(fr
eefunc))
#define sk_OCSP_ONEREQ_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_OCSP_ONEREQ_sk_type(sk),
ossl_check_OCSP_ONEREQ_type(ptr), (idx))
#define sk_OCSP_ONEREQ_set(sk, idx, ptr) ((OCSP_ONEREQ
*)OPENSSL_sk_set(ossl_check_OCSP_ONEREQ_sk_type(sk), (idx), ossl_check_OCSP_ONEREQ_type(ptr)))
#define sk_OCSP_ONEREQ_find(sk, ptr) OPENSSL_sk_find(ossl_check_OCSP_ONEREQ_sk_type(sk),
 ossl_check_OCSP_ONEREQ_type(ptr))
#define sk_OCSP_ONEREQ_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_OCSP_ONEREQ_sk_type(sk),
ossl_check_OCSP_ONEREQ_type(ptr))
#define sk_OCSP_ONEREQ_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OCSP_ONEREQ_sk_type(sk), ossl_check_OCSP_ONEREQ_type(ptr), pnum)
#define sk_OCSP_ONEREQ_sort(sk) OPENSSL_sk_sort(ossl_check_OCSP_ONEREQ_sk_type(sk))
#define sk_OCSP_ONEREQ_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OCSP_ONEREQ_sk_type(sk))
#define sk_OCSP_ONEREQ_dup(sk) ((STACK_OF(OCSP_ONEREQ)
*)OPENSSL_sk_dup(ossl_check_const_OCSP_ONEREQ_sk_type(sk)))
#define sk_OCSP_ONEREQ_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OCSP_ONEREQ)
*)OPENSSL_sk_deep_copy(ossl_check_const_OCSP_ONEREQ_sk_type(sk),
ossl_check_OCSP_ONEREQ_copyfunc_type(copyfunc), ossl_check_OCSP_ONEREQ_freefunc_type(freefunc)))
#define sk_OCSP_ONEREQ_set_cmp_func(sk, cmp)
((sk_OCSP_ONEREQ_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OCSP_ONEREQ_sk_type(sk),
ossl_check_OCSP_ONEREQ_compfunc_type(cmp)))

/*
 clang-format on */

#define OCSP_RESPONSE_STATUS_SUCCESSFUL 0
#define OCSP_RESPONSE_STATUS_MALFORMEDREQUEST 1
#define OCSP_RESPONSE_STATUS_INTERNALERROR 2
#define OCSP_RESPONSE_STATUS_TRYLATER 3
#define OCSP_RESPONSE_STATUS_SIGREQUIRED 5
#define OCSP_RESPONSE_STATUS_UNAUTHORIZED 6

typedef struct ocsp_resp_bytes_st OCSP_RESPBYTES;

#define V_OCSP_RESPID_NAME 0
#define V_OCSP_RESPID_KEY 1

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OCSP_RESPID, OCSP_RESPID, OCSP_RESPID)
#define sk_OCSP_RESPID_num(sk) OPENSSL_sk_num(ossl_check_const_OCSP_RESPID_sk_type(sk))
#define sk_OCSP_RESPID_value(sk, idx) ((OCSP_RESPID
```

```
*)OPENSSL_sk_value(ossl_check_const_OCSP_RESPID_sk_type(sk), (idx)))
#define sk_OCSP_RESPID_new(cmp) ((STACK_OF(OCSP_RESPID)
*)OPENSSL_sk_new(ossl_check_OCSP_RESPID_compfunc_type(cmp)))
#define sk_OCSP_RESPID_new_null() ((STACK_OF(OCSP_RESPID) *)OPENSSL_sk_new_null())
#define sk_OCSP_RESPID_new_reserve(cmp, n) ((STACK_OF(OCSP_RESPID)
 *)OPENSSL_sk_new_reserve(ossl_check_OCSP_RESPID_compfunc_type(cmp), (n)))
#define sk_OCSP_RESPID_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_OCSP_RESPID_sk_type(sk), (n))
#define sk_OCSP_RESPID_free(sk) OPENSSL_sk_free(ossl_check_OCSP_RESPID_sk_type(sk))
#define sk_OCSP_RESPID_zero(sk) OPENSSL_sk_zero(ossl_check_OCSP_RESPID_sk_type(sk))
#define sk_OCSP_RESPID_delete(sk, i) ((OCSP_RESPID
*)OPENSSL_sk_delete(ossl_check_OCSP_RESPID_sk_type(sk), (i)))
#define sk_OCSP_RESPID_delete_ptr(sk, ptr) ((OCSP_RESPID
*)OPENSSL_sk_delete_ptr(ossl_check_OCSP_RESPID_sk_type(sk), ossl_check_OCSP_RESPID_type(ptr)))
#define sk_OCSP_RESPID_push(sk, ptr) OPENSSL_sk_push(ossl_check_OCSP_RESPID_sk_type(sk),
ossl_check_OCSP_RESPID_type(ptr))
#define sk_OCSP_RESPID_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_OCSP_RESPID_sk_type(sk),
ossl_check_OCSP_RESPID_type(ptr))
#define sk_OCSP_RESPID_pop(sk) ((OCSP_RESPID
*)OPENSSL_sk_pop(ossl_check_OCSP_RESPID_sk_type(sk)))
#define sk_OCSP_RESPID_shift(sk) ((OCSP_RESPID
 *)OPENSSL_sk_shift(ossl_check_OCSP_RESPID_sk_type(sk)))
#define sk_OCSP_RESPID_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OCSP_RESPID_sk_type(sk),ossl_check_OCSP_RESPID_freefunc_type(freef
unc))
#define sk_OCSP_RESPID_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_OCSP_RESPID_sk_type(sk),
ossl_check_OCSP_RESPID_type(ptr), (idx))
#define sk_OCSP_RESPID_set(sk, idx, ptr) ((OCSP_RESPID
*)OPENSSL_sk_set(ossl_check_OCSP_RESPID_sk_type(sk), (idx), ossl_check_OCSP_RESPID_type(ptr)))
#define sk_OCSP_RESPID_find(sk, ptr) OPENSSL_sk_find(ossl_check_OCSP_RESPID_sk_type(sk),
ossl_check_OCSP_RESPID_type(ptr))
#define sk_OCSP_RESPID_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_OCSP_RESPID_sk_type(sk),
ossl_check_OCSP_RESPID_type(ptr))
#define sk_OCSP_RESPID_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OCSP_RESPID_sk_type(sk), ossl_check_OCSP_RESPID_type(ptr), pnum)
#define sk_OCSP_RESPID_sort(sk) OPENSSL_sk_sort(ossl_check_OCSP_RESPID_sk_type(sk))
#define sk_OCSP_RESPID_is_sorted(sk)
 OPENSSL_sk_is_sorted(ossl_check_const_OCSP_RESPID_sk_type(sk))
#define sk_OCSP_RESPID_dup(sk) ((STACK_OF(OCSP_RESPID)
*)OPENSSL_sk_dup(ossl_check_const_OCSP_RESPID_sk_type(sk)))
#define sk_OCSP_RESPID_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OCSP_RESPID)
*)OPENSSL_sk_deep_copy(ossl_check_const_OCSP_RESPID_sk_type(sk),
ossl_check_OCSP_RESPID_copyfunc_type(copyfunc), ossl_check_OCSP_RESPID_freefunc_type(freefunc)))
#define sk_OCSP_RESPID_set_cmp_func(sk, cmp)
((sk_OCSP_RESPID_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OCSP_RESPID_sk_type(sk),
ossl_check_OCSP_RESPID_compfunc_type(cmp)))

/* clang-format on */
```

```
typedef struct ocsp_revoked_info_st OCSP_REVOKEDINFO;

#define V_OCSP_CERTSTATUS_GOOD 0
#define V_OCSP_CERTSTATUS_REVOKED 1
#define V_OCSP_CERTSTATUS_UNKNOWN 2

typedef struct ocsp_cert_status_st OCSP_CERTSTATUS;
typedef struct ocsp_single_response_st OCSP_SINGLERESP;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OCSP_SINGLERESP, OCSP_SINGLERESP, OCSP_SINGLERESP)
#define
 sk_OCSP_SINGLERESP_num(sk) OPENSSL_sk_num(ossl_check_const_OCSP_SINGLERESP_sk_type(sk))
#define sk_OCSP_SINGLERESP_value(sk, idx) ((OCSP_SINGLERESP
*)OPENSSL_sk_value(ossl_check_const_OCSP_SINGLERESP_sk_type(sk), (idx)))
#define sk_OCSP_SINGLERESP_new(cmp) ((STACK_OF(OCSP_SINGLERESP)
*)OPENSSL_sk_new(ossl_check_OCSP_SINGLERESP_compfunc_type(cmp)))
#define sk_OCSP_SINGLERESP_new_null() ((STACK_OF(OCSP_SINGLERESP) *)OPENSSL_sk_new_null())
#define sk_OCSP_SINGLERESP_new_reserve(cmp, n) ((STACK_OF(OCSP_SINGLERESP)
*)OPENSSL_sk_new_reserve(ossl_check_OCSP_SINGLERESP_compfunc_type(cmp), (n)))
#define sk_OCSP_SINGLERESP_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OCSP_SINGLERESP_sk_type(sk), (n))
#define sk_OCSP_SINGLERESP_free(sk) OPENSSL_sk_free(ossl_check_OCSP_SINGLERESP_sk_type(sk))
#define sk_OCSP_SINGLERESP_zero(sk) OPENSSL_sk_zero(ossl_check_OCSP_SINGLERESP_sk_type(sk))
#define sk_OCSP_SINGLERESP_delete(sk, i) ((OCSP_SINGLERESP
*)OPENSSL_sk_delete(ossl_check_OCSP_SINGLERESP_sk_type(sk),
 (i)))
#define sk_OCSP_SINGLERESP_delete_ptr(sk, ptr) ((OCSP_SINGLERESP
*)OPENSSL_sk_delete_ptr(ossl_check_OCSP_SINGLERESP_sk_type(sk),
ossl_check_OCSP_SINGLERESP_type(ptr)))
#define sk_OCSP_SINGLERESP_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OCSP_SINGLERESP_sk_type(sk), ossl_check_OCSP_SINGLERESP_type(ptr))
#define sk_OCSP_SINGLERESP_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OCSP_SINGLERESP_sk_type(sk),
ossl_check_OCSP_SINGLERESP_type(ptr))
#define sk_OCSP_SINGLERESP_pop(sk) ((OCSP_SINGLERESP
*)OPENSSL_sk_pop(ossl_check_OCSP_SINGLERESP_sk_type(sk)))
#define sk_OCSP_SINGLERESP_shift(sk) ((OCSP_SINGLERESP
*)OPENSSL_sk_shift(ossl_check_OCSP_SINGLERESP_sk_type(sk)))
#define sk_OCSP_SINGLERESP_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OCSP_SINGLERESP_sk_type(sk),ossl_check_OCSP_SINGLERESP_freefun
c_type(freefunc))
#define sk_OCSP_SINGLERESP_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OCSP_SINGLERESP_sk_type(sk), ossl_check_OCSP_SINGLERESP_type(ptr),
 (idx))
#define sk_OCSP_SINGLERESP_set(sk, idx, ptr) ((OCSP_SINGLERESP
*)OPENSSL_sk_set(ossl_check_OCSP_SINGLERESP_sk_type(sk), (idx),
ossl_check_OCSP_SINGLERESP_type(ptr)))
```

```
#define sk_OCSP_SINGLERESP_find(sk, ptr) OPENSSL_sk_find(ossl_check_OCSP_SINGLERESP_sk_type(sk),
ossl_check_OCSP_SINGLERESP_type(ptr))
#define sk_OCSP_SINGLERESP_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OCSP_SINGLERESP_sk_type(sk),
ossl_check_OCSP_SINGLERESP_type(ptr))
#define sk_OCSP_SINGLERESP_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OCSP_SINGLERESP_sk_type(sk),
ossl_check_OCSP_SINGLERESP_type(ptr), pnum)
#define sk_OCSP_SINGLERESP_sort(sk) OPENSSL_sk_sort(ossl_check_OCSP_SINGLERESP_sk_type(sk))
#define sk_OCSP_SINGLERESP_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OCSP_SINGLERESP_sk_type(sk))
#define sk_OCSP_SINGLERESP_dup(sk) ((STACK_OF(OCSP_SINGLERESP)
*)OPENSSL_sk_dup(ossl_check_const_OCSP_SINGLERESP_sk_type(sk)))
#define sk_OCSP_SINGLERESP_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OCSP_SINGLERESP)
 *)OPENSSL_sk_deep_copy(ossl_check_const_OCSP_SINGLERESP_sk_type(sk),
ossl_check_OCSP_SINGLERESP_copyfunc_type(copyfunc),
ossl_check_OCSP_SINGLERESP_freefunc_type(freefunc)))
#define sk_OCSP_SINGLERESP_set_cmp_func(sk, cmp)
((sk_OCSP_SINGLERESP_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OCSP_SINGLERESP_sk_type(sk
), ossl_check_OCSP_SINGLERESP_compfunc_type(cmp)))

/* clang-format on */

typedef struct ocsp_response_data_st OCSP_RESPDATA;

typedef struct ocsp_basic_response_st OCSP_BASICRESP;

typedef struct ocsp_crl_id_st OCSP_CRLID;
typedef struct ocsp_service_locator_st OCSP_SERVICELOC;

#define PEM_STRING_OCSP_REQUEST "OCSP REQUEST"
#define PEM_STRING_OCSP_RESPONSE "OCSP RESPONSE"

#define d2i_OCSP_REQUEST_bio(bp, p) ASN1_d2i_bio_of(OCSP_REQUEST, OCSP_REQUEST_new,
d2i_OCSP_REQUEST, bp, p)

#define d2i_OCSP_RESPONSE_bio(bp, p) ASN1_d2i_bio_of(OCSP_RESPONSE, OCSP_RESPONSE_new,
d2i_OCSP_RESPONSE, bp, p)

#define PEM_read_bio_OCSP_REQUEST(bp, x, cb) (OCSP_REQUEST *)PEM_ASN1_read_bio(
 \
  (d2i_of_void *)d2i_OCSP_REQUEST, PEM_STRING_OCSP_REQUEST,                \
  bp, (char **)(x), cb, NULL)

#define PEM_read_bio_OCSP_RESPONSE(bp, x, cb) (OCSP_RESPONSE *)PEM_ASN1_read_bio( \
  (d2i_of_void *)d2i_OCSP_RESPONSE, PEM_STRING_OCSP_RESPONSE,                \
  bp, (char **)(x), cb, NULL)
```

```
#define PEM_write_bio_OCSP_REQUEST(bp, o)                                    \
   PEM_ASN1_write_bio((i2d_of_void *)i2d_OCSP_REQUEST, PEM_STRING_OCSP_REQUEST, \
      bp, (char *)(o), NULL, NULL, 0, NULL, NULL)

#define PEM_write_bio_OCSP_RESPONSE(bp, o)                                    \
   PEM_ASN1_write_bio((i2d_of_void *)i2d_OCSP_RESPONSE, PEM_STRING_OCSP_RESPONSE, \
      bp, (char *)(o), NULL, NULL, 0, NULL, NULL)

#define i2d_OCSP_RESPONSE_bio(bp, o) ASN1_i2d_bio_of(OCSP_RESPONSE, i2d_OCSP_RESPONSE, bp, o)

#define i2d_OCSP_REQUEST_bio(bp, o) ASN1_i2d_bio_of(OCSP_REQUEST, i2d_OCSP_REQUEST, bp, o)

#define ASN1_BIT_STRING_digest(data,
 type, md, len) \
   ASN1_item_digest(ASN1_ITEM_rptr(ASN1_BIT_STRING), type, data, md, len)

#define OCSP_CERTSTATUS_dup(cs)                                    \
   (OCSP_CERTSTATUS *)ASN1_dup((i2d_of_void *)i2d_OCSP_CERTSTATUS, \
      (d2i_of_void *)d2i_OCSP_CERTSTATUS, (char *)(cs))

DECLARE_ASN1_DUP_FUNCTION(OCSP_CERTID)

OSSL_HTTP_REQ_CTX *OCSP_sendreq_new(BIO *io, const char *path,
   const OCSP_REQUEST *req, int buf_size);
OCSP_RESPONSE *OCSP_sendreq_bio(BIO *b, const char *path, OCSP_REQUEST *req);

#ifndef OPENSSL_NO_DEPRECATED_3_0
typedef OSSL_HTTP_REQ_CTX OCSP_REQ_CTX;
#define OCSP_REQ_CTX_new(io, buf_size) \
   OSSL_HTTP_REQ_CTX_new(io, io, buf_size)
#define OCSP_REQ_CTX_free OSSL_HTTP_REQ_CTX_free
#define OCSP_REQ_CTX_http(rctx, op, path) \
   (OSSL_HTTP_REQ_CTX_set_expected(rctx, NULL, 1 /* asn1 */, 0, 0) &&
OSSL_HTTP_REQ_CTX_set_request_line(rctx, strcmp(op, "POST") == 0, NULL, NULL, path))
#define OCSP_REQ_CTX_add1_header OSSL_HTTP_REQ_CTX_add1_header
#define OCSP_REQ_CTX_i2d(r,
 it, req) \
   OSSL_HTTP_REQ_CTX_set1_req(r, "application/ocsp-request", it, req)
#define OCSP_REQ_CTX_set1_req(r, req) \
   OCSP_REQ_CTX_i2d(r, ASN1_ITEM_rptr(OCSP_REQUEST), (ASN1_VALUE *)(req))
#define OCSP_REQ_CTX_nbio OSSL_HTTP_REQ_CTX_nbio
#define OCSP_REQ_CTX_nbio_d2i OSSL_HTTP_REQ_CTX_nbio_d2i
#define OCSP_sendreq_nbio(p, r)                    \
   OSSL_HTTP_REQ_CTX_nbio_d2i(r, (ASN1_VALUE **)(p), \
      ASN1_ITEM_rptr(OCSP_RESPONSE))
#define OCSP_REQ_CTX_get0_mem_bio OSSL_HTTP_REQ_CTX_get0_mem_bio
#define OCSP_set_max_response_length OSSL_HTTP_REQ_CTX_set_max_response_length
#endif
```

```
OCSP_CERTID *OCSP_cert_to_id(const EVP_MD *dgst, const X509 *subject,
   const X509 *issuer);

OCSP_CERTID *OCSP_cert_id_new(const EVP_MD *dgst,
   const X509_NAME *issuerName,
   const ASN1_BIT_STRING *issuerKey,
   const ASN1_INTEGER *serialNumber);

OCSP_ONEREQ *OCSP_request_add0_id(OCSP_REQUEST *req, OCSP_CERTID *cid);

int OCSP_request_add1_nonce(OCSP_REQUEST *req,
 unsigned char *val, int len);
int OCSP_basic_add1_nonce(OCSP_BASICRESP *resp, unsigned char *val, int len);
int OCSP_check_nonce(OCSP_REQUEST *req, OCSP_BASICRESP *bs);
int OCSP_copy_nonce(OCSP_BASICRESP *resp, OCSP_REQUEST *req);

int OCSP_request_set1_name(OCSP_REQUEST *req, const X509_NAME *nm);
int OCSP_request_add1_cert(OCSP_REQUEST *req, X509 *cert);

int OCSP_request_sign(OCSP_REQUEST *req,
   X509 *signer,
   EVP_PKEY *key,
   const EVP_MD *dgst,
   STACK_OF(X509) *certs, unsigned long flags);

int OCSP_response_status(OCSP_RESPONSE *resp);
OCSP_BASICRESP *OCSP_response_get1_basic(OCSP_RESPONSE *resp);

const ASN1_OCTET_STRING *OCSP_resp_get0_signature(const OCSP_BASICRESP *bs);
const X509_ALGOR *OCSP_resp_get0_tbs_sigalg(const OCSP_BASICRESP *bs);
const OCSP_RESPDATA *OCSP_resp_get0_respdata(const OCSP_BASICRESP *bs);
int OCSP_resp_get0_signer(OCSP_BASICRESP *bs, X509 **signer,
   STACK_OF(X509) *extra_certs);

int OCSP_resp_count(OCSP_BASICRESP *bs);
OCSP_SINGLERESP *OCSP_resp_get0(OCSP_BASICRESP
 *bs, int idx);
const ASN1_GENERALIZEDTIME *OCSP_resp_get0_produced_at(const OCSP_BASICRESP *bs);
const STACK_OF(X509) *OCSP_resp_get0_certs(const OCSP_BASICRESP *bs);
int OCSP_resp_get0_id(const OCSP_BASICRESP *bs,
   const ASN1_OCTET_STRING **pid,
   const X509_NAME **pname);
int OCSP_resp_get1_id(const OCSP_BASICRESP *bs,
   ASN1_OCTET_STRING **pid,
   X509_NAME **pname);

int OCSP_resp_find(OCSP_BASICRESP *bs, OCSP_CERTID *id, int last);
```

```
int OCSP_single_get0_status(OCSP_SINGLERESP *single, int *reason,
   ASN1_GENERALIZEDTIME **revtime,
   ASN1_GENERALIZEDTIME **thisupd,
   ASN1_GENERALIZEDTIME **nextupd);
int OCSP_resp_find_status(OCSP_BASICRESP *bs, OCSP_CERTID *id, int *status,
   int *reason,
   ASN1_GENERALIZEDTIME **revtime,
   ASN1_GENERALIZEDTIME **thisupd,
   ASN1_GENERALIZEDTIME **nextupd);
int OCSP_check_validity(ASN1_GENERALIZEDTIME *thisupd,
   ASN1_GENERALIZEDTIME *nextupd, long sec, long maxsec);

int OCSP_request_verify(OCSP_REQUEST
 *req, STACK_OF(X509) *certs,
   X509_STORE *store, unsigned long flags);

#define OCSP_parse_url(url, host, port, path, ssl) \
   OSSL_HTTP_parse_url(url, ssl, NULL, host, port, NULL, path, NULL, NULL)

int OCSP_id_issuer_cmp(const OCSP_CERTID *a, const OCSP_CERTID *b);
int OCSP_id_cmp(const OCSP_CERTID *a, const OCSP_CERTID *b);

int OCSP_request_onereq_count(OCSP_REQUEST *req);
OCSP_ONEREQ *OCSP_request_onereq_get0(OCSP_REQUEST *req, int i);
OCSP_CERTID *OCSP_onereq_get0_id(OCSP_ONEREQ *one);
int OCSP_id_get0_info(ASN1_OCTET_STRING **piNameHash, ASN1_OBJECT **pmd,
   ASN1_OCTET_STRING **pikeyHash,
   ASN1_INTEGER **pserial, OCSP_CERTID *cid);
int OCSP_request_is_signed(OCSP_REQUEST *req);
OCSP_RESPONSE *OCSP_response_create(int status, OCSP_BASICRESP *bs);
OCSP_SINGLERESP *OCSP_basic_add1_status(OCSP_BASICRESP *rsp,
   OCSP_CERTID *cid,
   int status, int reason,
   ASN1_TIME *revtime,
   ASN1_TIME *thisupd,
   ASN1_TIME *nextupd);
int OCSP_basic_add1_cert(OCSP_BASICRESP
 *resp, X509 *cert);
int OCSP_basic_sign(OCSP_BASICRESP *brsp,
   X509 *signer, EVP_PKEY *key, const EVP_MD *dgst,
   STACK_OF(X509) *certs, unsigned long flags);
int OCSP_basic_sign_ctx(OCSP_BASICRESP *brsp,
   X509 *signer, EVP_MD_CTX *ctx,
   STACK_OF(X509) *certs, unsigned long flags);
int OCSP_RESPID_set_by_name(OCSP_RESPID *respid, X509 *cert);
int OCSP_RESPID_set_by_key_ex(OCSP_RESPID *respid, X509 *cert,
   OSSL_LIB_CTX *libctx, const char *propq);
int OCSP_RESPID_set_by_key(OCSP_RESPID *respid, X509 *cert);
```

```
int OCSP_RESPID_match_ex(OCSP_RESPID *respid, X509 *cert, OSSL_LIB_CTX *libctx,
   const char *propq);
int OCSP_RESPID_match(OCSP_RESPID *respid, X509 *cert);

X509_EXTENSION *OCSP_crlID_new(const char *url, long *n, char *tim);

X509_EXTENSION *OCSP_accept_responses_new(char **oids);

X509_EXTENSION *OCSP_archive_cutoff_new(char *tim);

X509_EXTENSION *OCSP_url_svcloc_new(const X509_NAME *issuer, const char **urls);

int OCSP_REQUEST_get_ext_count(OCSP_REQUEST *x);
int
 OCSP_REQUEST_get_ext_by_NID(OCSP_REQUEST *x, int nid, int lastpos);
int OCSP_REQUEST_get_ext_by_OBJ(OCSP_REQUEST *x, const ASN1_OBJECT *obj,
   int lastpos);
int OCSP_REQUEST_get_ext_by_critical(OCSP_REQUEST *x, int crit, int lastpos);
X509_EXTENSION *OCSP_REQUEST_get_ext(OCSP_REQUEST *x, int loc);
X509_EXTENSION *OCSP_REQUEST_delete_ext(OCSP_REQUEST *x, int loc);
void *OCSP_REQUEST_get1_ext_d2i(OCSP_REQUEST *x, int nid, int *crit,
   int *idx);
int OCSP_REQUEST_add1_ext_i2d(OCSP_REQUEST *x, int nid, void *value, int crit,
   unsigned long flags);
int OCSP_REQUEST_add_ext(OCSP_REQUEST *x, X509_EXTENSION *ex, int loc);

int OCSP_ONEREQ_get_ext_count(OCSP_ONEREQ *x);
int OCSP_ONEREQ_get_ext_by_NID(OCSP_ONEREQ *x, int nid, int lastpos);
int OCSP_ONEREQ_get_ext_by_OBJ(OCSP_ONEREQ *x, const ASN1_OBJECT *obj, int lastpos);
int OCSP_ONEREQ_get_ext_by_critical(OCSP_ONEREQ *x, int crit, int lastpos);
X509_EXTENSION *OCSP_ONEREQ_get_ext(OCSP_ONEREQ *x, int loc);
X509_EXTENSION *OCSP_ONEREQ_delete_ext(OCSP_ONEREQ
 *x, int loc);
void *OCSP_ONEREQ_get1_ext_d2i(OCSP_ONEREQ *x, int nid, int *crit, int *idx);
int OCSP_ONEREQ_add1_ext_i2d(OCSP_ONEREQ *x, int nid, void *value, int crit,
   unsigned long flags);
int OCSP_ONEREQ_add_ext(OCSP_ONEREQ *x, X509_EXTENSION *ex, int loc);

int OCSP_BASICRESP_get_ext_count(OCSP_BASICRESP *x);
int OCSP_BASICRESP_get_ext_by_NID(OCSP_BASICRESP *x, int nid, int lastpos);
int OCSP_BASICRESP_get_ext_by_OBJ(OCSP_BASICRESP *x, const ASN1_OBJECT *obj,
   int lastpos);
int OCSP_BASICRESP_get_ext_by_critical(OCSP_BASICRESP *x, int crit,
   int lastpos);
X509_EXTENSION *OCSP_BASICRESP_get_ext(OCSP_BASICRESP *x, int loc);
X509_EXTENSION *OCSP_BASICRESP_delete_ext(OCSP_BASICRESP *x, int loc);
void *OCSP_BASICRESP_get1_ext_d2i(OCSP_BASICRESP *x, int nid, int *crit,
   int *idx);
```

```
int OCSP_BASICRESP_add1_ext_i2d(OCSP_BASICRESP *x, int nid, void *value,
   int crit, unsigned long flags);
int OCSP_BASICRESP_add_ext(OCSP_BASICRESP *x, X509_EXTENSION *ex,
 int loc);

int OCSP_SINGLERESP_get_ext_count(OCSP_SINGLERESP *x);
int OCSP_SINGLERESP_get_ext_by_NID(OCSP_SINGLERESP *x, int nid, int lastpos);
int OCSP_SINGLERESP_get_ext_by_OBJ(OCSP_SINGLERESP *x, const ASN1_OBJECT *obj,
   int lastpos);
int OCSP_SINGLERESP_get_ext_by_critical(OCSP_SINGLERESP *x, int crit,
   int lastpos);
X509_EXTENSION *OCSP_SINGLERESP_get_ext(OCSP_SINGLERESP *x, int loc);
X509_EXTENSION *OCSP_SINGLERESP_delete_ext(OCSP_SINGLERESP *x, int loc);
void *OCSP_SINGLERESP_get1_ext_d2i(OCSP_SINGLERESP *x, int nid, int *crit,
   int *idx);
int OCSP_SINGLERESP_add1_ext_i2d(OCSP_SINGLERESP *x, int nid, void *value,
   int crit, unsigned long flags);
int OCSP_SINGLERESP_add_ext(OCSP_SINGLERESP *x, X509_EXTENSION *ex, int loc);
const OCSP_CERTID *OCSP_SINGLERESP_get0_id(const OCSP_SINGLERESP *x);

DECLARE_ASN1_FUNCTIONS(OCSP_SINGLERESP)
DECLARE_ASN1_FUNCTIONS(OCSP_CERTSTATUS)
DECLARE_ASN1_FUNCTIONS(OCSP_REVOKEDINFO)
DECLARE_ASN1_FUNCTIONS(OCSP_BASICRESP)
DECLARE_ASN1_FUNCTIONS(OCSP_RESPDATA)
DECLARE_ASN1_FUNCTIONS(OCSP_RESPID)
DECLARE_ASN1_FUNCTIONS(OCSP_RESPONSE)
DECLARE_ASN1_FUNCTIONS(OCSP_RESPBYTES)
DECLARE_ASN1_FUNCTIONS(OCSP_ONEREQ)
DECLARE_ASN1_FUNCTIONS(OCSP_CERTID)
DECLARE_ASN1_FUNCTIONS(OCSP_REQUEST)
DECLARE_ASN1_FUNCTIONS(OCSP_SIGNATURE)
DECLARE_ASN1_FUNCTIONS(OCSP_REQINFO)
DECLARE_ASN1_FUNCTIONS(OCSP_CRLID)
DECLARE_ASN1_FUNCTIONS(OCSP_SERVICELOC)

const
 char *OCSP_response_status_str(long s);
const char *OCSP_cert_status_str(long s);
const char *OCSP_crl_reason_str(long s);

int OCSP_REQUEST_print(BIO *bp, OCSP_REQUEST *a, unsigned long flags);
int OCSP_RESPONSE_print(BIO *bp, OCSP_RESPONSE *o, unsigned long flags);

int OCSP_basic_verify(OCSP_BASICRESP *bs, STACK_OF(X509) *certs,
   X509_STORE *st, unsigned long flags);

#ifdef __cplusplus
```

```
}
#endif
#endif /* !defined(OPENSSL_NO_OCSP) */
#endif
```

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```
{
 'variables': {
   'openssl_defines_BSD-x86_64': [
     'NDEBUG',
     'L_ENDIAN',
     'OPENSSL_BUILDING_OPENSSL',
     'AES_ASM',
     'BSAES_ASM',
     'CMLL_ASM',
     'ECP_NISTZ256_ASM',
     'GHASH_ASM',
     'KECCAK1600_ASM',
     'MD5_ASM',
     'OPENSSL_BN_ASM_GF2m',
     'OPENSSL_BN_ASM_MONT',
     'OPENSSL_BN_ASM_MONT5',
     'OPENSSL_CPUID_OBJ',
     'OPENSSL_IA32_SSE2',
     'PADLOCK_ASM',
     'POLY1305_ASM',
     'RC4_ASM',
     'SHA1_ASM',
```

```
  'SHA256_ASM',
  'SHA512_ASM',
  'VPAES_ASM',
  'WHIRLPOOL_ASM',
  'X25519_ASM',
  'OPENSSL_PIC',
],
'openssl_cflags_BSD-x86_64': [
  '-Wa,--noexecstack',
  '-Wall -O3',
  '-pthread',
  '-Wall -O3',
],
'openssl_ex_libs_BSD-x86_64': [
  '-pthread',
],
'openssl_cli_srcs_BSD-x86_64': [
  'openssl/apps/lib/cmp_mock_srv.c',
  'openssl/apps/asn1parse.c',
  'openssl/apps/ca.c',
  'openssl/apps/ciphers.c',
  'openssl/apps/cmp.c',

 'openssl/apps/cms.c',
  'openssl/apps/crl.c',
  'openssl/apps/crl2pkcs7.c',
  'openssl/apps/dgst.c',
  'openssl/apps/dhparam.c',
  'openssl/apps/dsa.c',
  'openssl/apps/dsaparam.c',
  'openssl/apps/ec.c',
  'openssl/apps/ecparam.c',
  'openssl/apps/enc.c',
  'openssl/apps/engine.c',
  'openssl/apps/errstr.c',
  'openssl/apps/fipsinstall.c',
  'openssl/apps/gendsa.c',
  'openssl/apps/genpkey.c',
  'openssl/apps/genrsa.c',
  'openssl/apps/info.c',
  'openssl/apps/kdf.c',
  'openssl/apps/list.c',
  'openssl/apps/mac.c',
  'openssl/apps/nseq.c',
  'openssl/apps/ocsp.c',
  'openssl/apps/openssl.c',
  'openssl/apps/passwd.c',
  'openssl/apps/pkcs12.c',
```

```
    'openssl/apps/pkcs7.c',
    'openssl/apps/pkcs8.c',
    'openssl/apps/pkey.c',
    'openssl/apps/pkeyparam.c',
    'openssl/apps/pkeyutl.c',
    'openssl/apps/prime.c',
    './config/archs/BSD-x86_64/asm/apps/progs.c',
    'openssl/apps/rand.c',
     'openssl/apps/rehash.c',
    'openssl/apps/req.c',
    'openssl/apps/rsa.c',
    'openssl/apps/rsautl.c',
    'openssl/apps/s_client.c',
    'openssl/apps/s_server.c',
    'openssl/apps/s_time.c',
    'openssl/apps/sess_id.c',
    'openssl/apps/skeyutl.c',
    'openssl/apps/smime.c',
    'openssl/apps/speed.c',
    'openssl/apps/spkac.c',
    'openssl/apps/srp.c',
    'openssl/apps/storeutl.c',
    'openssl/apps/ts.c',
    'openssl/apps/verify.c',
    'openssl/apps/version.c',
    'openssl/apps/x509.c',
    'openssl/apps/lib/app_libctx.c',
    'openssl/apps/lib/app_params.c',
    'openssl/apps/lib/app_provider.c',
    'openssl/apps/lib/app_rand.c',
    'openssl/apps/lib/app_x509.c',
    'openssl/apps/lib/apps.c',
    'openssl/apps/lib/apps_opt_printf.c',
    'openssl/apps/lib/apps_ui.c',
    'openssl/apps/lib/columns.c',
    'openssl/apps/lib/engine.c',
    'openssl/apps/lib/engine_loader.c',
    'openssl/apps/lib/fmt.c',
     'openssl/apps/lib/http_server.c',
    'openssl/apps/lib/log.c',
    'openssl/apps/lib/names.c',
    'openssl/apps/lib/opt.c',
    'openssl/apps/lib/s_cb.c',
    'openssl/apps/lib/s_socket.c',
    'openssl/apps/lib/tlssrp_depr.c',
  ],
},
'defines': ['<@(openssl_defines_BSD-x86_64)'],
```

```
 'include_dirs': [
   './include',
 ],
 'cflags' : ['<@(openssl_cflags_BSD-x86_64)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86_64)'],
 'sources': ['<@(openssl_cli_srcs_BSD-x86_64)'],
}
```

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```
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* WARNING: do not edit!
* Generated by configdata.pm from Configurations/common0.tmpl, Configurations/unix-Makefile.tmpl
* via Makefile.in
*
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* https://www.openssl.org/source/license.html
*/
```

```
#ifndef OPENSSL_CONFIGURATION_H
#define OPENSSL_CONFIGURATION_H
#pragma once

#ifdef __cplusplus
extern "C" {
#endif

#ifdef OPENSSL_ALGORITHM_DEFINES
#error OPENSSL_ALGORITHM_DEFINES no longer supported
#endif

/*
* OpenSSL was configured with the following options:
*/

/* clang-format off */
# define OPENSSL_CONFIGURED_API 30500
# ifndef OPENSSL_RAND_SEED_OS
#  define OPENSSL_RAND_SEED_OS
# endif
# ifndef OPENSSL_THREADS
#  define OPENSSL_THREADS
# endif
# ifndef OPENSSL_NO_AFALGENG
#  define OPENSSL_NO_AFALGENG
#
 endif
# ifndef OPENSSL_NO_ASAN
#  define OPENSSL_NO_ASAN
# endif
# ifndef OPENSSL_NO_BROTLI
#  define OPENSSL_NO_BROTLI
# endif
# ifndef OPENSSL_NO_BROTLI_DYNAMIC
#  define OPENSSL_NO_BROTLI_DYNAMIC
# endif
# ifndef OPENSSL_NO_COMP
#  define OPENSSL_NO_COMP
# endif
# ifndef OPENSSL_NO_CRYPTO_MDEBUG
#  define OPENSSL_NO_CRYPTO_MDEBUG
# endif
# ifndef OPENSSL_NO_CRYPTO_MDEBUG_BACKTRACE
#  define OPENSSL_NO_CRYPTO_MDEBUG_BACKTRACE
# endif
# ifndef OPENSSL_NO_DEMOS
```

```
#  define OPENSSL_NO_DEMOS
# endif
# ifndef OPENSSL_NO_EC_NISTP_64_GCC_128
#  define OPENSSL_NO_EC_NISTP_64_GCC_128
# endif
# ifndef OPENSSL_NO_EGD
#  define OPENSSL_NO_EGD
# endif
# ifndef OPENSSL_NO_EXTERNAL_TESTS
#  define OPENSSL_NO_EXTERNAL_TESTS
# endif
# ifndef OPENSSL_NO_FIPS_JITTER
#  define OPENSSL_NO_FIPS_JITTER
# endif
# ifndef OPENSSL_NO_FUZZ_AFL
#  define OPENSSL_NO_FUZZ_AFL
# endif
# ifndef OPENSSL_NO_FUZZ_LIBFUZZER
#  define OPENSSL_NO_FUZZ_LIBFUZZER
# endif
# ifndef OPENSSL_NO_H3DEMO
#  define OPENSSL_NO_H3DEMO
#
 endif
# ifndef OPENSSL_NO_HQINTEROP
#  define OPENSSL_NO_HQINTEROP
# endif
# ifndef OPENSSL_NO_JITTER
#  define OPENSSL_NO_JITTER
# endif
# ifndef OPENSSL_NO_KTLS
#  define OPENSSL_NO_KTLS
# endif
# ifndef OPENSSL_NO_LOADERENG
#  define OPENSSL_NO_LOADERENG
# endif
# ifndef OPENSSL_NO_MD2
#  define OPENSSL_NO_MD2
# endif
# ifndef OPENSSL_NO_MSAN
#  define OPENSSL_NO_MSAN
# endif
# ifndef OPENSSL_NO_PIE
#  define OPENSSL_NO_PIE
# endif
# ifndef OPENSSL_NO_RC5
#  define OPENSSL_NO_RC5
# endif
```

```
# ifndef OPENSSL_NO_SCTP
#  define OPENSSL_NO_SCTP
# endif
# ifndef OPENSSL_NO_SSL3
#  define OPENSSL_NO_SSL3
# endif
# ifndef OPENSSL_NO_SSL3_METHOD
#  define OPENSSL_NO_SSL3_METHOD
# endif
# ifndef OPENSSL_NO_SSLKEYLOG
#  define OPENSSL_NO_SSLKEYLOG
# endif
# ifndef OPENSSL_NO_TFO
#  define OPENSSL_NO_TFO
# endif
# ifndef OPENSSL_NO_TRACE
#  define OPENSSL_NO_TRACE
# endif
# ifndef OPENSSL_NO_UBSAN
#  define OPENSSL_NO_UBSAN
# endif
# ifndef OPENSSL_NO_UNIT_TEST
#  define OPENSSL_NO_UNIT_TEST
#
 endif
# ifndef OPENSSL_NO_UPLINK
#  define OPENSSL_NO_UPLINK
# endif
# ifndef OPENSSL_NO_WEAK_SSL_CIPHERS
#  define OPENSSL_NO_WEAK_SSL_CIPHERS
# endif
# ifndef OPENSSL_NO_WINSTORE
#  define OPENSSL_NO_WINSTORE
# endif
# ifndef OPENSSL_NO_ZLIB
#  define OPENSSL_NO_ZLIB
# endif
# ifndef OPENSSL_NO_ZLIB_DYNAMIC
#  define OPENSSL_NO_ZLIB_DYNAMIC
# endif
# ifndef OPENSSL_NO_ZSTD
#  define OPENSSL_NO_ZSTD
# endif
# ifndef OPENSSL_NO_ZSTD_DYNAMIC
#  define OPENSSL_NO_ZSTD_DYNAMIC
# endif
# ifndef OPENSSL_NO_DYNAMIC_ENGINE
#  define OPENSSL_NO_DYNAMIC_ENGINE
```

```
# endif

/* clang-format on */

/* Generate 80386 code? */
/* clang-format off */
# undef I386_ONLY
/* clang-format on */

/*
* The following are cipher-specific, but are part of the public API.
*/
#if !defined(OPENSSL_SYS_UEFI)
   /* clang-format off */
#  undef BN_LLONG
   /* clang-format on */
   /* Only one for the following should be defined */
   /* clang-format off */
#  define SIXTY_FOUR_BIT_LONG
   /* clang-format on
 */
   /* clang-format off */
#  undef SIXTY_FOUR_BIT
   /* clang-format on */
   /* clang-format off */
#  undef THIRTY_TWO_BIT
/* clang-format on */
#endif

/* clang-format off */
# define RC4_INT unsigned int
/* clang-format on */

#if defined(OPENSSL_NO_COMP) || (defined(OPENSSL_NO_BROTLI) && defined(OPENSSL_NO_ZSTD) &&
defined(OPENSSL_NO_ZLIB))
#define OPENSSL_NO_COMP_ALG
#else
#undef OPENSSL_NO_COMP_ALG
#endif

#ifdef __cplusplus
}
#endif

#endif /* OPENSSL_CONFIGURATION_H */
```

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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html

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*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_PKCS7_H
#define OPENSSL_PKCS7_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_PKCS7_H
#endif

#include <openssl/asn1.h>
#include <openssl/bio.h>
#include <openssl/e_os2.h>

#include <openssl/symhacks.h>
#include <openssl/types.h>
#include <openssl/pkcs7err.h>
#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif

#ifdef __cplusplus
extern "C" {
#endif

/*-
Encryption_ID           DES-CBC
Digest_ID               MD5
Digest_Encryption_ID    rsaEncryption
Key_Encryption_ID
      rsaEncryption
*/

typedef struct PKCS7_CTX_st {
   OSSL_LIB_CTX *libctx;
   char *propq;
} PKCS7_CTX;

typedef struct pkcs7_issuer_and_serial_st {
   X509_NAME *issuer;
   ASN1_INTEGER *serial;
} PKCS7_ISSUER_AND_SERIAL;
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typedef struct pkcs7_signer_info_st {
   ASN1_INTEGER *version; /* version 1 */
   PKCS7_ISSUER_AND_SERIAL *issuer_and_serial;
   X509_ALGOR *digest_alg;
   STACK_OF(X509_ATTRIBUTE) *auth_attr; /* [ 0 ] */
   X509_ALGOR *digest_enc_alg; /* confusing name, actually used for signing */
   ASN1_OCTET_STRING *enc_digest; /* confusing name, actually signature */
   STACK_OF(X509_ATTRIBUTE) *unauth_attr; /* [ 1 ] */
   /* The private key to sign with */
   EVP_PKEY *pkey;
   const PKCS7_CTX *ctx;
} PKCS7_SIGNER_INFO;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(PKCS7_SIGNER_INFO, PKCS7_SIGNER_INFO,
PKCS7_SIGNER_INFO)
#define sk_PKCS7_SIGNER_INFO_num(sk)
OPENSSL_sk_num(ossl_check_const_PKCS7_SIGNER_INFO_sk_type(sk))
#define sk_PKCS7_SIGNER_INFO_value(sk,
 idx) ((PKCS7_SIGNER_INFO *)OPENSSL_sk_value(ossl_check_const_PKCS7_SIGNER_INFO_sk_type(sk),
(idx)))
#define sk_PKCS7_SIGNER_INFO_new(cmp) ((STACK_OF(PKCS7_SIGNER_INFO)
*)OPENSSL_sk_new(ossl_check_PKCS7_SIGNER_INFO_compfunc_type(cmp)))
#define sk_PKCS7_SIGNER_INFO_new_null() ((STACK_OF(PKCS7_SIGNER_INFO)
*)OPENSSL_sk_new_null())
#define sk_PKCS7_SIGNER_INFO_new_reserve(cmp, n) ((STACK_OF(PKCS7_SIGNER_INFO)
*)OPENSSL_sk_new_reserve(ossl_check_PKCS7_SIGNER_INFO_compfunc_type(cmp), (n)))
#define sk_PKCS7_SIGNER_INFO_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk), (n))
#define sk_PKCS7_SIGNER_INFO_free(sk)
OPENSSL_sk_free(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk))
#define sk_PKCS7_SIGNER_INFO_zero(sk)
OPENSSL_sk_zero(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk))
#define sk_PKCS7_SIGNER_INFO_delete(sk, i) ((PKCS7_SIGNER_INFO
*)OPENSSL_sk_delete(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk), (i)))
#define sk_PKCS7_SIGNER_INFO_delete_ptr(sk, ptr) ((PKCS7_SIGNER_INFO
*)OPENSSL_sk_delete_ptr(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk),
 ossl_check_PKCS7_SIGNER_INFO_type(ptr)))
#define sk_PKCS7_SIGNER_INFO_push(sk, ptr)
OPENSSL_sk_push(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk),
ossl_check_PKCS7_SIGNER_INFO_type(ptr))
#define sk_PKCS7_SIGNER_INFO_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk),
ossl_check_PKCS7_SIGNER_INFO_type(ptr))
#define sk_PKCS7_SIGNER_INFO_pop(sk) ((PKCS7_SIGNER_INFO
*)OPENSSL_sk_pop(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk)))
#define sk_PKCS7_SIGNER_INFO_shift(sk) ((PKCS7_SIGNER_INFO
*)OPENSSL_sk_shift(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk)))
#define sk_PKCS7_SIGNER_INFO_pop_free(sk, freefunc)
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OPENSSL_sk_pop_free(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk),ossl_check_PKCS7_SIGNER_INFO_fr
eefunc_type(freefunc))
#define sk_PKCS7_SIGNER_INFO_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk),
ossl_check_PKCS7_SIGNER_INFO_type(ptr), (idx))
#define sk_PKCS7_SIGNER_INFO_set(sk, idx, ptr)
 ((PKCS7_SIGNER_INFO *)OPENSSL_sk_set(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk), (idx),
ossl_check_PKCS7_SIGNER_INFO_type(ptr)))
#define sk_PKCS7_SIGNER_INFO_find(sk, ptr)
OPENSSL_sk_find(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk),
ossl_check_PKCS7_SIGNER_INFO_type(ptr))
#define sk_PKCS7_SIGNER_INFO_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk),
ossl_check_PKCS7_SIGNER_INFO_type(ptr))
#define sk_PKCS7_SIGNER_INFO_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk),
ossl_check_PKCS7_SIGNER_INFO_type(ptr), pnum)
#define sk_PKCS7_SIGNER_INFO_sort(sk) OPENSSL_sk_sort(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk))
#define sk_PKCS7_SIGNER_INFO_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_PKCS7_SIGNER_INFO_sk_type(sk))
#define sk_PKCS7_SIGNER_INFO_dup(sk) ((STACK_OF(PKCS7_SIGNER_INFO)
*)OPENSSL_sk_dup(ossl_check_const_PKCS7_SIGNER_INFO_sk_type(sk)))
#define sk_PKCS7_SIGNER_INFO_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(PKCS7_SIGNER_INFO)
 *)OPENSSL_sk_deep_copy(ossl_check_const_PKCS7_SIGNER_INFO_sk_type(sk),
ossl_check_PKCS7_SIGNER_INFO_copyfunc_type(copyfunc),
ossl_check_PKCS7_SIGNER_INFO_freefunc_type(freefunc)))
#define sk_PKCS7_SIGNER_INFO_set_cmp_func(sk, cmp)
((sk_PKCS7_SIGNER_INFO_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_PKCS7_SIGNER_INFO_sk_ty
pe(sk), ossl_check_PKCS7_SIGNER_INFO_compfunc_type(cmp)))

/* clang-format on */

typedef struct pkcs7_recip_info_st {
   ASN1_INTEGER *version; /* version 0 */
   PKCS7_ISSUER_AND_SERIAL *issuer_and_serial;
   X509_ALGOR *key_enc_algor;
   ASN1_OCTET_STRING *enc_key;
   X509 *cert; /* get the pub-key from this */
   const PKCS7_CTX *ctx;
} PKCS7_RECIP_INFO;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(PKCS7_RECIP_INFO, PKCS7_RECIP_INFO, PKCS7_RECIP_INFO)
#define sk_PKCS7_RECIP_INFO_num(sk)
OPENSSL_sk_num(ossl_check_const_PKCS7_RECIP_INFO_sk_type(sk))
#define sk_PKCS7_RECIP_INFO_value(sk, idx) ((PKCS7_RECIP_INFO
*)OPENSSL_sk_value(ossl_check_const_PKCS7_RECIP_INFO_sk_type(sk),
 (idx)))
#define sk_PKCS7_RECIP_INFO_new(cmp) ((STACK_OF(PKCS7_RECIP_INFO)
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*)OPENSSL_sk_new(ossl_check_PKCS7_RECIP_INFO_compfunc_type(cmp)))
#define sk_PKCS7_RECIP_INFO_new_null() ((STACK_OF(PKCS7_RECIP_INFO) *)OPENSSL_sk_new_null())
#define sk_PKCS7_RECIP_INFO_new_reserve(cmp, n) ((STACK_OF(PKCS7_RECIP_INFO)
*)OPENSSL_sk_new_reserve(ossl_check_PKCS7_RECIP_INFO_compfunc_type(cmp), (n)))
#define sk_PKCS7_RECIP_INFO_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_PKCS7_RECIP_INFO_sk_type(sk), (n))
#define sk_PKCS7_RECIP_INFO_free(sk) OPENSSL_sk_free(ossl_check_PKCS7_RECIP_INFO_sk_type(sk))
#define sk_PKCS7_RECIP_INFO_zero(sk) OPENSSL_sk_zero(ossl_check_PKCS7_RECIP_INFO_sk_type(sk))
#define sk_PKCS7_RECIP_INFO_delete(sk, i) ((PKCS7_RECIP_INFO
*)OPENSSL_sk_delete(ossl_check_PKCS7_RECIP_INFO_sk_type(sk), (i)))
#define sk_PKCS7_RECIP_INFO_delete_ptr(sk, ptr) ((PKCS7_RECIP_INFO
*)OPENSSL_sk_delete_ptr(ossl_check_PKCS7_RECIP_INFO_sk_type(sk),
ossl_check_PKCS7_RECIP_INFO_type(ptr)))
#define
 sk_PKCS7_RECIP_INFO_push(sk, ptr) OPENSSL_sk_push(ossl_check_PKCS7_RECIP_INFO_sk_type(sk),
ossl_check_PKCS7_RECIP_INFO_type(ptr))
#define sk_PKCS7_RECIP_INFO_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_PKCS7_RECIP_INFO_sk_type(sk),
ossl_check_PKCS7_RECIP_INFO_type(ptr))
#define sk_PKCS7_RECIP_INFO_pop(sk) ((PKCS7_RECIP_INFO
*)OPENSSL_sk_pop(ossl_check_PKCS7_RECIP_INFO_sk_type(sk)))
#define sk_PKCS7_RECIP_INFO_shift(sk) ((PKCS7_RECIP_INFO
*)OPENSSL_sk_shift(ossl_check_PKCS7_RECIP_INFO_sk_type(sk)))
#define sk_PKCS7_RECIP_INFO_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_PKCS7_RECIP_INFO_sk_type(sk),ossl_check_PKCS7_RECIP_INFO_freefu
nc_type(freefunc))
#define sk_PKCS7_RECIP_INFO_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_PKCS7_RECIP_INFO_sk_type(sk),
ossl_check_PKCS7_RECIP_INFO_type(ptr), (idx))
#define sk_PKCS7_RECIP_INFO_set(sk, idx, ptr) ((PKCS7_RECIP_INFO
*)OPENSSL_sk_set(ossl_check_PKCS7_RECIP_INFO_sk_type(sk), (idx),
ossl_check_PKCS7_RECIP_INFO_type(ptr)))
#define
 sk_PKCS7_RECIP_INFO_find(sk, ptr) OPENSSL_sk_find(ossl_check_PKCS7_RECIP_INFO_sk_type(sk),
ossl_check_PKCS7_RECIP_INFO_type(ptr))
#define sk_PKCS7_RECIP_INFO_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_PKCS7_RECIP_INFO_sk_type(sk),
ossl_check_PKCS7_RECIP_INFO_type(ptr))
#define sk_PKCS7_RECIP_INFO_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_PKCS7_RECIP_INFO_sk_type(sk),
ossl_check_PKCS7_RECIP_INFO_type(ptr), pnum)
#define sk_PKCS7_RECIP_INFO_sort(sk) OPENSSL_sk_sort(ossl_check_PKCS7_RECIP_INFO_sk_type(sk))
#define sk_PKCS7_RECIP_INFO_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_PKCS7_RECIP_INFO_sk_type(sk))
#define sk_PKCS7_RECIP_INFO_dup(sk) ((STACK_OF(PKCS7_RECIP_INFO)
*)OPENSSL_sk_dup(ossl_check_const_PKCS7_RECIP_INFO_sk_type(sk)))
#define sk_PKCS7_RECIP_INFO_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(PKCS7_RECIP_INFO)
*)OPENSSL_sk_deep_copy(ossl_check_const_PKCS7_RECIP_INFO_sk_type(sk),
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ossl_check_PKCS7_RECIP_INFO_copyfunc_type(copyfunc),
 ossl_check_PKCS7_RECIP_INFO_freefunc_type(freefunc)))
#define sk_PKCS7_RECIP_INFO_set_cmp_func(sk, cmp)
((sk_PKCS7_RECIP_INFO_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_PKCS7_RECIP_INFO_sk_type(s
k), ossl_check_PKCS7_RECIP_INFO_compfunc_type(cmp)))

/* clang-format on */

typedef struct pkcs7_signed_st {
   ASN1_INTEGER *version; /* version 1 */
   STACK_OF(X509_ALGOR) *md_algs; /* md used */
   STACK_OF(X509) *cert; /* [ 0 ] */ /* name should be 'certificates' */
   STACK_OF(X509_CRL) *crl; /* [ 1 ] */ /* name should be 'crls' */
   STACK_OF(PKCS7_SIGNER_INFO) *signer_info;
   struct pkcs7_st *contents;
} PKCS7_SIGNED;
/*
* The above structure is very very similar to PKCS7_SIGN_ENVELOPE. How about
* merging the two
*/

typedef struct pkcs7_enc_content_st {
   ASN1_OBJECT *content_type;
   X509_ALGOR *algorithm;
   ASN1_OCTET_STRING *enc_data; /* [ 0 ] */
   const EVP_CIPHER *cipher;
   const PKCS7_CTX *ctx;
} PKCS7_ENC_CONTENT;

typedef struct pkcs7_enveloped_st
 {
   ASN1_INTEGER *version; /* version 0 */
   STACK_OF(PKCS7_RECIP_INFO) *recipientinfo;
   PKCS7_ENC_CONTENT *enc_data;
} PKCS7_ENVELOPE;

typedef struct pkcs7_signedandenveloped_st {
   ASN1_INTEGER *version; /* version 1 */
   STACK_OF(X509_ALGOR) *md_algs; /* md used */
   STACK_OF(X509) *cert; /* [ 0 ] */ /* name should be 'certificates' */
   STACK_OF(X509_CRL) *crl; /* [ 1 ] */ /* name should be 'crls' */
   STACK_OF(PKCS7_SIGNER_INFO) *signer_info;
   PKCS7_ENC_CONTENT *enc_data;
   STACK_OF(PKCS7_RECIP_INFO) *recipientinfo;
} PKCS7_SIGN_ENVELOPE;

typedef struct pkcs7_digest_st {
   ASN1_INTEGER *version; /* version 0 */
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  X509_ALGOR *md; /* md used */
  struct pkcs7_st *contents;
  ASN1_OCTET_STRING *digest;
} PKCS7_DIGEST;

typedef struct pkcs7_encrypted_st {
  ASN1_INTEGER *version; /* version 0 */
  PKCS7_ENC_CONTENT *enc_data;
} PKCS7_ENCRYPT;

typedef struct pkcs7_st {
  /*
   * The following is non NULL if it contains ASN1 encoding of this

  * structure
   */
  unsigned char *asn1;
  long length;
#define PKCS7_S_HEADER 0
#define PKCS7_S_BODY 1
#define PKCS7_S_TAIL 2
  int state; /* used during processing */
  int detached;
  ASN1_OBJECT *type;
  /* content as defined by the type */
  /*
   * all encryption/message digests are applied to the 'contents', leaving
   * out the 'type' field.
   */
  union {
     char *ptr;
     /* NID_pkcs7_data */
     ASN1_OCTET_STRING *data;
     /* NID_pkcs7_signed */
     PKCS7_SIGNED *sign; /* field name 'signed' would clash with C keyword */
     /* NID_pkcs7_enveloped */
     PKCS7_ENVELOPE *enveloped;
     /* NID_pkcs7_signedAndEnveloped */
     PKCS7_SIGN_ENVELOPE *signed_and_enveloped;
     /* NID_pkcs7_digest */
     PKCS7_DIGEST *digest;
     /* NID_pkcs7_encrypted */
     PKCS7_ENCRYPT *encrypted;
     /* Anything else */
     ASN1_TYPE *other;
  } d;
  PKCS7_CTX ctx;
} PKCS7;
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/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(PKCS7,
 PKCS7, PKCS7)
#define sk_PKCS7_num(sk) OPENSSL_sk_num(ossl_check_const_PKCS7_sk_type(sk))
#define sk_PKCS7_value(sk, idx) ((PKCS7 *)OPENSSL_sk_value(ossl_check_const_PKCS7_sk_type(sk), (idx)))
#define sk_PKCS7_new(cmp) ((STACK_OF(PKCS7)
*)OPENSSL_sk_new(ossl_check_PKCS7_compfunc_type(cmp)))
#define sk_PKCS7_new_null() ((STACK_OF(PKCS7) *)OPENSSL_sk_new_null())
#define sk_PKCS7_new_reserve(cmp, n) ((STACK_OF(PKCS7)
*)OPENSSL_sk_new_reserve(ossl_check_PKCS7_compfunc_type(cmp), (n)))
#define sk_PKCS7_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_PKCS7_sk_type(sk), (n))
#define sk_PKCS7_free(sk) OPENSSL_sk_free(ossl_check_PKCS7_sk_type(sk))
#define sk_PKCS7_zero(sk) OPENSSL_sk_zero(ossl_check_PKCS7_sk_type(sk))
#define sk_PKCS7_delete(sk, i) ((PKCS7 *)OPENSSL_sk_delete(ossl_check_PKCS7_sk_type(sk), (i)))
#define sk_PKCS7_delete_ptr(sk, ptr) ((PKCS7 *)OPENSSL_sk_delete_ptr(ossl_check_PKCS7_sk_type(sk),
ossl_check_PKCS7_type(ptr)))
#define sk_PKCS7_push(sk, ptr) OPENSSL_sk_push(ossl_check_PKCS7_sk_type(sk),
 ossl_check_PKCS7_type(ptr))
#define sk_PKCS7_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_PKCS7_sk_type(sk),
ossl_check_PKCS7_type(ptr))
#define sk_PKCS7_pop(sk) ((PKCS7 *)OPENSSL_sk_pop(ossl_check_PKCS7_sk_type(sk)))
#define sk_PKCS7_shift(sk) ((PKCS7 *)OPENSSL_sk_shift(ossl_check_PKCS7_sk_type(sk)))
#define sk_PKCS7_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_PKCS7_sk_type(sk),ossl_check_PKCS7_freefunc_type(freefunc))
#define sk_PKCS7_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_PKCS7_sk_type(sk),
ossl_check_PKCS7_type(ptr), (idx))
#define sk_PKCS7_set(sk, idx, ptr) ((PKCS7 *)OPENSSL_sk_set(ossl_check_PKCS7_sk_type(sk), (idx),
ossl_check_PKCS7_type(ptr)))
#define sk_PKCS7_find(sk, ptr) OPENSSL_sk_find(ossl_check_PKCS7_sk_type(sk),
ossl_check_PKCS7_type(ptr))
#define sk_PKCS7_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_PKCS7_sk_type(sk),
ossl_check_PKCS7_type(ptr))
#define sk_PKCS7_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_PKCS7_sk_type(sk),
 ossl_check_PKCS7_type(ptr), pnum)
#define sk_PKCS7_sort(sk) OPENSSL_sk_sort(ossl_check_PKCS7_sk_type(sk))
#define sk_PKCS7_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_PKCS7_sk_type(sk))
#define sk_PKCS7_dup(sk) ((STACK_OF(PKCS7) *)OPENSSL_sk_dup(ossl_check_const_PKCS7_sk_type(sk)))
#define sk_PKCS7_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(PKCS7)
*)OPENSSL_sk_deep_copy(ossl_check_const_PKCS7_sk_type(sk),
ossl_check_PKCS7_copyfunc_type(copyfunc), ossl_check_PKCS7_freefunc_type(freefunc)))
#define sk_PKCS7_set_cmp_func(sk, cmp)
((sk_PKCS7_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_PKCS7_sk_type(sk),
ossl_check_PKCS7_compfunc_type(cmp)))

/* clang-format on */

#define PKCS7_OP_SET_DETACHED_SIGNATURE 1
#define PKCS7_OP_GET_DETACHED_SIGNATURE 2
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#define PKCS7_get_signed_attributes(si) ((si)->auth_attr)
#define PKCS7_get_attributes(si) ((si)->unauth_attr)

#define PKCS7_type_is_signed(a) (OBJ_obj2nid((a)->type) == NID_pkcs7_signed)
#define PKCS7_type_is_encrypted(a)
 (OBJ_obj2nid((a)->type) == NID_pkcs7_encrypted)
#define PKCS7_type_is_enveloped(a) (OBJ_obj2nid((a)->type) == NID_pkcs7_enveloped)
#define PKCS7_type_is_signedAndEnveloped(a) \
   (OBJ_obj2nid((a)->type) == NID_pkcs7_signedAndEnveloped)
#define PKCS7_type_is_data(a) (OBJ_obj2nid((a)->type) == NID_pkcs7_data)
#define PKCS7_type_is_digest(a) (OBJ_obj2nid((a)->type) == NID_pkcs7_digest)

#define PKCS7_set_detached(p, v) \
   PKCS7_ctrl(p, PKCS7_OP_SET_DETACHED_SIGNATURE, v, NULL)
#define PKCS7_get_detached(p) \
   PKCS7_ctrl(p, PKCS7_OP_GET_DETACHED_SIGNATURE, 0, NULL)

#define PKCS7_is_detached(p7) (PKCS7_type_is_signed(p7) && PKCS7_get_detached(p7))

/* S/MIME related flags */

#define PKCS7_TEXT 0x1
#define PKCS7_NOCERTS 0x2
#define PKCS7_NOSIGS 0x4
#define PKCS7_NOCHAIN 0x8
#define PKCS7_NOINTERN 0x10
#define PKCS7_NOVERIFY 0x20
#define PKCS7_DETACHED 0x40
#define PKCS7_BINARY 0x80
#define PKCS7_NOATTR 0x100
#define PKCS7_NOSMIMECAP 0x200
#define PKCS7_NOOLDMIMETYPE
 0x400
#define PKCS7_CRLFEOL 0x800
#define PKCS7_STREAM 0x1000
#define PKCS7_NOCRL 0x2000
#define PKCS7_PARTIAL 0x4000
#define PKCS7_REUSE_DIGEST 0x8000
#define PKCS7_NO_DUAL_CONTENT 0x10000

/* Flags: for compatibility with older code */

#define SMIME_TEXT PKCS7_TEXT
#define SMIME_NOCERTS PKCS7_NOCERTS
#define SMIME_NOSIGS PKCS7_NOSIGS
#define SMIME_NOCHAIN PKCS7_NOCHAIN
#define SMIME_NOINTERN PKCS7_NOINTERN
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#define SMIME_NOVERIFY PKCS7_NOVERIFY
#define SMIME_DETACHED PKCS7_DETACHED
#define SMIME_BINARY PKCS7_BINARY
#define SMIME_NOATTR PKCS7_NOATTR

/* CRLF ASCII canonicalisation */
#define SMIME_ASCIICRLF 0x80000

DECLARE_ASN1_FUNCTIONS(PKCS7_ISSUER_AND_SERIAL)

int PKCS7_ISSUER_AND_SERIAL_digest(PKCS7_ISSUER_AND_SERIAL *data,
   const EVP_MD *type, unsigned char *md,
   unsigned int *len);
#ifndef OPENSSL_NO_STDIO
PKCS7 *d2i_PKCS7_fp(FILE *fp, PKCS7 **p7);
int i2d_PKCS7_fp(FILE *fp, const PKCS7 *p7);
#endif
DECLARE_ASN1_DUP_FUNCTION(PKCS7)
PKCS7 *d2i_PKCS7_bio(BIO *bp, PKCS7
 **p7);
int i2d_PKCS7_bio(BIO *bp, const PKCS7 *p7);
int i2d_PKCS7_bio_stream(BIO *out, PKCS7 *p7, BIO *in, int flags);
int PEM_write_bio_PKCS7_stream(BIO *out, PKCS7 *p7, BIO *in, int flags);

DECLARE_ASN1_FUNCTIONS(PKCS7_SIGNER_INFO)
DECLARE_ASN1_FUNCTIONS(PKCS7_RECIP_INFO)
DECLARE_ASN1_FUNCTIONS(PKCS7_SIGNED)
DECLARE_ASN1_FUNCTIONS(PKCS7_ENC_CONTENT)
DECLARE_ASN1_FUNCTIONS(PKCS7_ENVELOPE)
DECLARE_ASN1_FUNCTIONS(PKCS7_SIGN_ENVELOPE)
DECLARE_ASN1_FUNCTIONS(PKCS7_DIGEST)
DECLARE_ASN1_FUNCTIONS(PKCS7_ENCRYPT)
DECLARE_ASN1_FUNCTIONS(PKCS7)
PKCS7 *PKCS7_new_ex(OSSL_LIB_CTX *libctx, const char *propq);

DECLARE_ASN1_ITEM(PKCS7_ATTR_SIGN)
DECLARE_ASN1_ITEM(PKCS7_ATTR_VERIFY)

DECLARE_ASN1_NDEF_FUNCTION(PKCS7)
DECLARE_ASN1_PRINT_FUNCTION(PKCS7)

long PKCS7_ctrl(PKCS7 *p7, int cmd, long larg, char *parg);

int PKCS7_type_is_other(PKCS7 *p7);
int PKCS7_set_type(PKCS7 *p7, int type);
int PKCS7_set0_type_other(PKCS7 *p7, int type, ASN1_TYPE *other);
int PKCS7_set_content(PKCS7 *p7, PKCS7 *p7_data);
int
```

```
 PKCS7_SIGNER_INFO_set(PKCS7_SIGNER_INFO *p7i, X509 *x509, EVP_PKEY *pkey,
   const EVP_MD *dgst);
int PKCS7_SIGNER_INFO_sign(PKCS7_SIGNER_INFO *si);
int PKCS7_add_signer(PKCS7 *p7, PKCS7_SIGNER_INFO *p7i);
int PKCS7_add_certificate(PKCS7 *p7, X509 *cert);
int PKCS7_add_crl(PKCS7 *p7, X509_CRL *crl);
int PKCS7_content_new(PKCS7 *p7, int nid);
int PKCS7_dataVerify(X509_STORE *cert_store, X509_STORE_CTX *ctx,
   BIO *bio, PKCS7 *p7, PKCS7_SIGNER_INFO *si);
int PKCS7_signatureVerify(BIO *bio, PKCS7 *p7, PKCS7_SIGNER_INFO *si,
   X509 *signer);

BIO *PKCS7_dataInit(PKCS7 *p7, BIO *bio);
int PKCS7_dataFinal(PKCS7 *p7, BIO *bio);
BIO *PKCS7_dataDecode(PKCS7 *p7, EVP_PKEY *pkey, BIO *in_bio, X509 *pcert);

PKCS7_SIGNER_INFO *PKCS7_add_signature(PKCS7 *p7, X509 *x509,
   EVP_PKEY *pkey, const EVP_MD *dgst);
X509 *PKCS7_cert_from_signer_info(PKCS7 *p7, PKCS7_SIGNER_INFO *si);
int PKCS7_set_digest(PKCS7 *p7, const EVP_MD *md);
STACK_OF(PKCS7_SIGNER_INFO) *PKCS7_get_signer_info(PKCS7
 *p7);

PKCS7_RECIP_INFO *PKCS7_add_recipient(PKCS7 *p7, X509 *x509);
void PKCS7_SIGNER_INFO_get0_algs(PKCS7_SIGNER_INFO *si, EVP_PKEY **pk,
   X509_ALGOR **pdig, X509_ALGOR **psig);
void PKCS7_RECIP_INFO_get0_alg(PKCS7_RECIP_INFO *ri, X509_ALGOR **penc);
int PKCS7_add_recipient_info(PKCS7 *p7, PKCS7_RECIP_INFO *ri);
int PKCS7_RECIP_INFO_set(PKCS7_RECIP_INFO *p7i, X509 *x509);
int PKCS7_set_cipher(PKCS7 *p7, const EVP_CIPHER *cipher);
int PKCS7_stream(unsigned char ***boundary, PKCS7 *p7);

PKCS7_ISSUER_AND_SERIAL *PKCS7_get_issuer_and_serial(PKCS7 *p7, int idx);
ASN1_OCTET_STRING *PKCS7_get_octet_string(PKCS7 *p7);
ASN1_OCTET_STRING *PKCS7_digest_from_attributes(STACK_OF(X509_ATTRIBUTE) *sk);
int PKCS7_add_signed_attribute(PKCS7_SIGNER_INFO *p7si, int nid, int type,
   void *data);
int PKCS7_add_attribute(PKCS7_SIGNER_INFO *p7si, int nid, int atrtype,
   void *value);
ASN1_TYPE *PKCS7_get_attribute(const PKCS7_SIGNER_INFO *si, int nid);
ASN1_TYPE *PKCS7_get_signed_attribute(const PKCS7_SIGNER_INFO
 *si, int nid);
int PKCS7_set_signed_attributes(PKCS7_SIGNER_INFO *p7si,
   STACK_OF(X509_ATTRIBUTE) *sk);
int PKCS7_set_attributes(PKCS7_SIGNER_INFO *p7si,
   STACK_OF(X509_ATTRIBUTE) *sk);

PKCS7 *PKCS7_sign(X509 *signcert, EVP_PKEY *pkey, STACK_OF(X509) *certs,
```

```
   BIO *data, int flags);
PKCS7 *PKCS7_sign_ex(X509 *signcert, EVP_PKEY *pkey, STACK_OF(X509) *certs,
   BIO *data, int flags, OSSL_LIB_CTX *libctx,
   const char *propq);

PKCS7_SIGNER_INFO *PKCS7_sign_add_signer(PKCS7 *p7,
   X509 *signcert, EVP_PKEY *pkey,
   const EVP_MD *md, int flags);

int PKCS7_final(PKCS7 *p7, BIO *data, int flags);
int PKCS7_verify(PKCS7 *p7, STACK_OF(X509) *certs, X509_STORE *store,
   BIO *indata, BIO *out, int flags);
STACK_OF(X509) *PKCS7_get0_signers(PKCS7 *p7, STACK_OF(X509) *certs,
   int flags);
PKCS7 *PKCS7_encrypt(STACK_OF(X509) *certs, BIO *in, const EVP_CIPHER *cipher,
   int flags);
PKCS7 *PKCS7_encrypt_ex(STACK_OF(X509) *certs, BIO *in,
   const EVP_CIPHER *cipher,
 int flags,
   OSSL_LIB_CTX *libctx, const char *propq);
int PKCS7_decrypt(PKCS7 *p7, EVP_PKEY *pkey, X509 *cert, BIO *data,
   int flags);

int PKCS7_add_attrib_smimecap(PKCS7_SIGNER_INFO *si,
   STACK_OF(X509_ALGOR) *cap);
STACK_OF(X509_ALGOR) *PKCS7_get_smimecap(PKCS7_SIGNER_INFO *si);
int PKCS7_simple_smimecap(STACK_OF(X509_ALGOR) *sk, int nid, int arg);

int PKCS7_add_attrib_content_type(PKCS7_SIGNER_INFO *si, ASN1_OBJECT *coid);
int PKCS7_add0_attrib_signing_time(PKCS7_SIGNER_INFO *si, ASN1_TIME *t);
int PKCS7_add1_attrib_digest(PKCS7_SIGNER_INFO *si,
   const unsigned char *md, int mdlen);

int SMIME_write_PKCS7(BIO *bio, PKCS7 *p7, BIO *data, int flags);
PKCS7 *SMIME_read_PKCS7_ex(BIO *bio, BIO **bcont, PKCS7 **p7);
PKCS7 *SMIME_read_PKCS7(BIO *bio, BIO **bcont);

BIO *BIO_new_PKCS7(BIO *out, PKCS7 *p7);

#ifdef __cplusplus
}
#endif
#endif
```

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```
/*
* WARNING: do not edit!
* Generated by configdata.pm from Configurations/common0.tmpl, Configurations/unix-Makefile.tmpl
* via Makefile.in
*
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* https://www.openssl.org/source/license.html
*/

#ifndef OPENSSL_CONFIGURATION_H
#define OPENSSL_CONFIGURATION_H
#pragma once

#ifdef __cplusplus
extern "C" {
#endif

#ifdef OPENSSL_ALGORITHM_DEFINES
#error OPENSSL_ALGORITHM_DEFINES no longer supported
#endif

/*
* OpenSSL was configured with the following options:
*/

/* clang-format off */
# define OPENSSL_CONFIGURED_API 30500
```

```
# ifndef OPENSSL_RAND_SEED_OS
#  define OPENSSL_RAND_SEED_OS
# endif
# ifndef OPENSSL_THREADS
#  define OPENSSL_THREADS
# endif
# ifndef OPENSSL_NO_AFALGENG
#  define OPENSSL_NO_AFALGENG
#
 endif
# ifndef OPENSSL_NO_ASAN
#  define OPENSSL_NO_ASAN
# endif
# ifndef OPENSSL_NO_ASM
#  define OPENSSL_NO_ASM
# endif
# ifndef OPENSSL_NO_BROTLI
#  define OPENSSL_NO_BROTLI
# endif
# ifndef OPENSSL_NO_BROTLI_DYNAMIC
#  define OPENSSL_NO_BROTLI_DYNAMIC
# endif
# ifndef OPENSSL_NO_COMP
#  define OPENSSL_NO_COMP
# endif
# ifndef OPENSSL_NO_CRYPTO_MDEBUG
#  define OPENSSL_NO_CRYPTO_MDEBUG
# endif
# ifndef OPENSSL_NO_CRYPTO_MDEBUG_BACKTRACE
#  define OPENSSL_NO_CRYPTO_MDEBUG_BACKTRACE
# endif
# ifndef OPENSSL_NO_DEMOS
#  define OPENSSL_NO_DEMOS
# endif
# ifndef OPENSSL_NO_EC_NISTP_64_GCC_128
#  define OPENSSL_NO_EC_NISTP_64_GCC_128
# endif
# ifndef OPENSSL_NO_EGD
#  define OPENSSL_NO_EGD
# endif
# ifndef OPENSSL_NO_EXTERNAL_TESTS
#  define OPENSSL_NO_EXTERNAL_TESTS
# endif
# ifndef OPENSSL_NO_FIPS_JITTER
#  define OPENSSL_NO_FIPS_JITTER
# endif
# ifndef OPENSSL_NO_FUZZ_AFL
#  define OPENSSL_NO_FUZZ_AFL
```

```
# endif
# ifndef OPENSSL_NO_FUZZ_LIBFUZZER
#  define OPENSSL_NO_FUZZ_LIBFUZZER
#
 endif
# ifndef OPENSSL_NO_H3DEMO
#  define OPENSSL_NO_H3DEMO
# endif
# ifndef OPENSSL_NO_HQINTEROP
#  define OPENSSL_NO_HQINTEROP
# endif
# ifndef OPENSSL_NO_JITTER
#  define OPENSSL_NO_JITTER
# endif
# ifndef OPENSSL_NO_KTLS
#  define OPENSSL_NO_KTLS
# endif
# ifndef OPENSSL_NO_LOADERENG
#  define OPENSSL_NO_LOADERENG
# endif
# ifndef OPENSSL_NO_MD2
#  define OPENSSL_NO_MD2
# endif
# ifndef OPENSSL_NO_MSAN
#  define OPENSSL_NO_MSAN
# endif
# ifndef OPENSSL_NO_PIE
#  define OPENSSL_NO_PIE
# endif
# ifndef OPENSSL_NO_RC5
#  define OPENSSL_NO_RC5
# endif
# ifndef OPENSSL_NO_SCTP
#  define OPENSSL_NO_SCTP
# endif
# ifndef OPENSSL_NO_SSL3
#  define OPENSSL_NO_SSL3
# endif
# ifndef OPENSSL_NO_SSL3_METHOD
#  define OPENSSL_NO_SSL3_METHOD
# endif
# ifndef OPENSSL_NO_SSLKEYLOG
#  define OPENSSL_NO_SSLKEYLOG
# endif
# ifndef OPENSSL_NO_TFO
#  define OPENSSL_NO_TFO
# endif
# ifndef OPENSSL_NO_TRACE
```

```
#  define OPENSSL_NO_TRACE
# endif
# ifndef OPENSSL_NO_UBSAN
#  define OPENSSL_NO_UBSAN
# endif
#
 ifndef OPENSSL_NO_UNIT_TEST
#  define OPENSSL_NO_UNIT_TEST
# endif
# ifndef OPENSSL_NO_UPLINK
#  define OPENSSL_NO_UPLINK
# endif
# ifndef OPENSSL_NO_WEAK_SSL_CIPHERS
#  define OPENSSL_NO_WEAK_SSL_CIPHERS
# endif
# ifndef OPENSSL_NO_WINSTORE
#  define OPENSSL_NO_WINSTORE
# endif
# ifndef OPENSSL_NO_ZLIB
#  define OPENSSL_NO_ZLIB
# endif
# ifndef OPENSSL_NO_ZLIB_DYNAMIC
#  define OPENSSL_NO_ZLIB_DYNAMIC
# endif
# ifndef OPENSSL_NO_ZSTD
#  define OPENSSL_NO_ZSTD
# endif
# ifndef OPENSSL_NO_ZSTD_DYNAMIC
#  define OPENSSL_NO_ZSTD_DYNAMIC
# endif
# ifndef OPENSSL_NO_DYNAMIC_ENGINE
#  define OPENSSL_NO_DYNAMIC_ENGINE
# endif

/* clang-format on */

/* Generate 80386 code? */
/* clang-format off */
# undef I386_ONLY
/* clang-format on */

/*
* The following are cipher-specific, but are part of the public API.
*/
#if !defined(OPENSSL_SYS_UEFI)
   /* clang-format off */
#  undef BN_LLONG
   /* clang-format on */
```

```
   /* Only one for the following should be defined */
   /* clang-format off
 */
#  define SIXTY_FOUR_BIT_LONG
   /* clang-format on */
   /* clang-format off */
#  undef SIXTY_FOUR_BIT
   /* clang-format on */
   /* clang-format off */
#  undef THIRTY_TWO_BIT
/* clang-format on */
#endif

/* clang-format off */
# define RC4_INT unsigned int
/* clang-format on */

#if defined(OPENSSL_NO_COMP) || (defined(OPENSSL_NO_BROTLI) && defined(OPENSSL_NO_ZSTD) &&
defined(OPENSSL_NO_ZLIB))
#define OPENSSL_NO_COMP_ALG
#else
#undef OPENSSL_NO_COMP_ALG
#endif

#ifdef __cplusplus
}
#endif

#endif /* OPENSSL_CONFIGURATION_H */
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/conf.h.in
*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_CONF_H
#define OPENSSL_CONF_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_CONF_H
#endif
```

```
#include <openssl/bio.h>
#include <openssl/lhash.h>
#include <openssl/safestack.h>
#include <openssl/e_os2.h>
#include <openssl/types.h>
#include <openssl/conferr.h>
#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif

#ifdef __cplusplus
extern "C" {
#endif

typedef struct {
   char *section;
   char *name;
   char *value;
} CONF_VALUE;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(CONF_VALUE,
 CONF_VALUE, CONF_VALUE)
#define sk_CONF_VALUE_num(sk) OPENSSL_sk_num(ossl_check_const_CONF_VALUE_sk_type(sk))
#define sk_CONF_VALUE_value(sk, idx) ((CONF_VALUE
*)OPENSSL_sk_value(ossl_check_const_CONF_VALUE_sk_type(sk), (idx)))
#define sk_CONF_VALUE_new(cmp) ((STACK_OF(CONF_VALUE)
*)OPENSSL_sk_new(ossl_check_CONF_VALUE_compfunc_type(cmp)))
#define sk_CONF_VALUE_new_null() ((STACK_OF(CONF_VALUE) *)OPENSSL_sk_new_null())
#define sk_CONF_VALUE_new_reserve(cmp, n) ((STACK_OF(CONF_VALUE)
*)OPENSSL_sk_new_reserve(ossl_check_CONF_VALUE_compfunc_type(cmp), (n)))
#define sk_CONF_VALUE_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_CONF_VALUE_sk_type(sk), (n))
#define sk_CONF_VALUE_free(sk) OPENSSL_sk_free(ossl_check_CONF_VALUE_sk_type(sk))
#define sk_CONF_VALUE_zero(sk) OPENSSL_sk_zero(ossl_check_CONF_VALUE_sk_type(sk))
#define sk_CONF_VALUE_delete(sk, i) ((CONF_VALUE
*)OPENSSL_sk_delete(ossl_check_CONF_VALUE_sk_type(sk), (i)))
#define sk_CONF_VALUE_delete_ptr(sk, ptr) ((CONF_VALUE
 *)OPENSSL_sk_delete_ptr(ossl_check_CONF_VALUE_sk_type(sk), ossl_check_CONF_VALUE_type(ptr)))
#define sk_CONF_VALUE_push(sk, ptr) OPENSSL_sk_push(ossl_check_CONF_VALUE_sk_type(sk),
ossl_check_CONF_VALUE_type(ptr))
#define sk_CONF_VALUE_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_CONF_VALUE_sk_type(sk),
ossl_check_CONF_VALUE_type(ptr))
#define sk_CONF_VALUE_pop(sk) ((CONF_VALUE
*)OPENSSL_sk_pop(ossl_check_CONF_VALUE_sk_type(sk)))
#define sk_CONF_VALUE_shift(sk) ((CONF_VALUE
*)OPENSSL_sk_shift(ossl_check_CONF_VALUE_sk_type(sk)))
#define sk_CONF_VALUE_pop_free(sk, freefunc)
```

```
OPENSSL_sk_pop_free(ossl_check_CONF_VALUE_sk_type(sk),ossl_check_CONF_VALUE_freefunc_type(freef
unc))
#define sk_CONF_VALUE_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_CONF_VALUE_sk_type(sk),
ossl_check_CONF_VALUE_type(ptr), (idx))
#define sk_CONF_VALUE_set(sk, idx, ptr) ((CONF_VALUE
*)OPENSSL_sk_set(ossl_check_CONF_VALUE_sk_type(sk), (idx), ossl_check_CONF_VALUE_type(ptr)))
#define sk_CONF_VALUE_find(sk,
 ptr) OPENSSL_sk_find(ossl_check_CONF_VALUE_sk_type(sk), ossl_check_CONF_VALUE_type(ptr))
#define sk_CONF_VALUE_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_CONF_VALUE_sk_type(sk),
ossl_check_CONF_VALUE_type(ptr))
#define sk_CONF_VALUE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_CONF_VALUE_sk_type(sk), ossl_check_CONF_VALUE_type(ptr), pnum)
#define sk_CONF_VALUE_sort(sk) OPENSSL_sk_sort(ossl_check_CONF_VALUE_sk_type(sk))
#define sk_CONF_VALUE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_CONF_VALUE_sk_type(sk))
#define sk_CONF_VALUE_dup(sk) ((STACK_OF(CONF_VALUE)
*)OPENSSL_sk_dup(ossl_check_const_CONF_VALUE_sk_type(sk)))
#define sk_CONF_VALUE_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(CONF_VALUE)
*)OPENSSL_sk_deep_copy(ossl_check_const_CONF_VALUE_sk_type(sk),
ossl_check_CONF_VALUE_copyfunc_type(copyfunc), ossl_check_CONF_VALUE_freefunc_type(freefunc)))
#define sk_CONF_VALUE_set_cmp_func(sk, cmp)
((sk_CONF_VALUE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_CONF_VALUE_sk_type(sk),
 ossl_check_CONF_VALUE_compfunc_type(cmp)))
DEFINE_LHASH_OF_INTERNAL(CONF_VALUE);
#define lh_CONF_VALUE_new(hfn, cmp) ((LHASH_OF(CONF_VALUE)
*)OPENSSL_LH_set_thunks(OPENSSL_LH_new(ossl_check_CONF_VALUE_lh_hashfunc_type(hfn),
ossl_check_CONF_VALUE_lh_compfunc_type(cmp)), lh_CONF_VALUE_hash_thunk,
lh_CONF_VALUE_comp_thunk, lh_CONF_VALUE_doall_thunk, lh_CONF_VALUE_doall_arg_thunk))
#define lh_CONF_VALUE_free(lh) OPENSSL_LH_free(ossl_check_CONF_VALUE_lh_type(lh))
#define lh_CONF_VALUE_flush(lh) OPENSSL_LH_flush(ossl_check_CONF_VALUE_lh_type(lh))
#define lh_CONF_VALUE_insert(lh, ptr) ((CONF_VALUE
*)OPENSSL_LH_insert(ossl_check_CONF_VALUE_lh_type(lh),
ossl_check_CONF_VALUE_lh_plain_type(ptr)))
#define lh_CONF_VALUE_delete(lh, ptr) ((CONF_VALUE
*)OPENSSL_LH_delete(ossl_check_CONF_VALUE_lh_type(lh),
ossl_check_const_CONF_VALUE_lh_plain_type(ptr)))
#define lh_CONF_VALUE_retrieve(lh, ptr) ((CONF_VALUE
*)OPENSSL_LH_retrieve(ossl_check_CONF_VALUE_lh_type(lh),
ossl_check_const_CONF_VALUE_lh_plain_type(ptr)))
#define
 lh_CONF_VALUE_error(lh) OPENSSL_LH_error(ossl_check_CONF_VALUE_lh_type(lh))
#define lh_CONF_VALUE_num_items(lh) OPENSSL_LH_num_items(ossl_check_CONF_VALUE_lh_type(lh))
#define lh_CONF_VALUE_node_stats_bio(lh, out)
OPENSSL_LH_node_stats_bio(ossl_check_const_CONF_VALUE_lh_type(lh), out)
#define lh_CONF_VALUE_node_usage_stats_bio(lh, out)
OPENSSL_LH_node_usage_stats_bio(ossl_check_const_CONF_VALUE_lh_type(lh), out)
#define lh_CONF_VALUE_stats_bio(lh, out)
OPENSSL_LH_stats_bio(ossl_check_const_CONF_VALUE_lh_type(lh), out)
```

```
#define lh_CONF_VALUE_get_down_load(lh)
OPENSSL_LH_get_down_load(ossl_check_CONF_VALUE_lh_type(lh))
#define lh_CONF_VALUE_set_down_load(lh, dl)
OPENSSL_LH_set_down_load(ossl_check_CONF_VALUE_lh_type(lh), dl)
#define lh_CONF_VALUE_doall(lh, dfn) OPENSSL_LH_doall(ossl_check_CONF_VALUE_lh_type(lh),
ossl_check_CONF_VALUE_lh_doallfunc_type(dfn))

/* clang-format on */

struct conf_st;
struct conf_method_st;
typedef struct conf_method_st CONF_METHOD;

#ifndef
 OPENSSL_NO_DEPRECATED_3_0
#include <openssl/conftypes.h>
#endif

/* Module definitions */
typedef struct conf_imodule_st CONF_IMODULE;
typedef struct conf_module_st CONF_MODULE;

STACK_OF(CONF_MODULE);
STACK_OF(CONF_IMODULE);

/* DSO module function typedefs */
typedef int conf_init_func(CONF_IMODULE *md, const CONF *cnf);
typedef void conf_finish_func(CONF_IMODULE *md);

#define CONF_MFLAGS_IGNORE_ERRORS 0x1
#define CONF_MFLAGS_IGNORE_RETURN_CODES 0x2
#define CONF_MFLAGS_SILENT 0x4
#define CONF_MFLAGS_NO_DSO 0x8
#define CONF_MFLAGS_IGNORE_MISSING_FILE 0x10
#define CONF_MFLAGS_DEFAULT_SECTION 0x20

int CONF_set_default_method(CONF_METHOD *meth);
void CONF_set_nconf(CONF *conf, LHASH_OF(CONF_VALUE) *hash);
LHASH_OF(CONF_VALUE) *CONF_load(LHASH_OF(CONF_VALUE) *conf, const char *file,
   long *eline);
#ifndef OPENSSL_NO_STDIO
LHASH_OF(CONF_VALUE) *CONF_load_fp(LHASH_OF(CONF_VALUE) *conf, FILE *fp,
   long *eline);
#endif
LHASH_OF(CONF_VALUE) *CONF_load_bio(LHASH_OF(CONF_VALUE)
 *conf, BIO *bp,
   long *eline);
STACK_OF(CONF_VALUE) *CONF_get_section(LHASH_OF(CONF_VALUE) *conf,
```

```
   const char *section);
char *CONF_get_string(LHASH_OF(CONF_VALUE) *conf, const char *group,
   const char *name);
long CONF_get_number(LHASH_OF(CONF_VALUE) *conf, const char *group,
   const char *name);
void CONF_free(LHASH_OF(CONF_VALUE) *conf);
#ifndef OPENSSL_NO_STDIO
int CONF_dump_fp(LHASH_OF(CONF_VALUE) *conf, FILE *out);
#endif
int CONF_dump_bio(LHASH_OF(CONF_VALUE) *conf, BIO *out);
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 void OPENSSL_config(const char *config_name);
#endif

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define OPENSSL_no_config() \
   OPENSSL_init_crypto(OPENSSL_INIT_NO_LOAD_CONFIG, NULL)
#endif

/*
* New conf code.  The semantics are different from the functions above. If
* that wasn't the case, the above functions would have been replaced
*/

CONF *NCONF_new_ex(OSSL_LIB_CTX *libctx, CONF_METHOD *meth);
OSSL_LIB_CTX *NCONF_get0_libctx(const
 CONF *conf);
CONF *NCONF_new(CONF_METHOD *meth);
CONF_METHOD *NCONF_default(void);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 CONF_METHOD *NCONF_WIN32(void);
#endif
void NCONF_free(CONF *conf);
void NCONF_free_data(CONF *conf);

int NCONF_load(CONF *conf, const char *file, long *eline);
#ifndef OPENSSL_NO_STDIO
int NCONF_load_fp(CONF *conf, FILE *fp, long *eline);
#endif
int NCONF_load_bio(CONF *conf, BIO *bp, long *eline);
STACK_OF(OPENSSL_CSTRING) *NCONF_get_section_names(const CONF *conf);
STACK_OF(CONF_VALUE) *NCONF_get_section(const CONF *conf,
   const char *section);
char *NCONF_get_string(const CONF *conf, const char *group, const char *name);
int NCONF_get_number_e(const CONF *conf, const char *group, const char *name,
   long *result);
#ifndef OPENSSL_NO_STDIO
int NCONF_dump_fp(const CONF *conf, FILE *out);
```

```
#endif
int NCONF_dump_bio(const CONF *conf, BIO *out);

#define NCONF_get_number(c, g, n, r) NCONF_get_number_e(c, g, n, r)

/* Module functions */

int
 CONF_modules_load(const CONF *cnf, const char *appname,
   unsigned long flags);
int CONF_modules_load_file_ex(OSSL_LIB_CTX *libctx, const char *filename,
   const char *appname, unsigned long flags);
int CONF_modules_load_file(const char *filename, const char *appname,
   unsigned long flags);
void CONF_modules_unload(int all);
void CONF_modules_finish(void);
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define CONF_modules_free() \
   while (0)             \
   continue
#endif
int CONF_module_add(const char *name, conf_init_func *ifunc,
   conf_finish_func *ffunc);

const char *CONF_imodule_get_name(const CONF_IMODULE *md);
const char *CONF_imodule_get_value(const CONF_IMODULE *md);
void *CONF_imodule_get_usr_data(const CONF_IMODULE *md);
void CONF_imodule_set_usr_data(CONF_IMODULE *md, void *usr_data);
CONF_MODULE *CONF_imodule_get_module(const CONF_IMODULE *md);
unsigned long CONF_imodule_get_flags(const CONF_IMODULE *md);
void CONF_imodule_set_flags(CONF_IMODULE *md, unsigned
 long flags);
void *CONF_module_get_usr_data(CONF_MODULE *pmod);
void CONF_module_set_usr_data(CONF_MODULE *pmod, void *usr_data);

char *CONF_get1_default_config_file(void);

int CONF_parse_list(const char *list, int sep, int nospc,
   int (*list_cb)(const char *elem, int len, void *usr),
   void *arg);

void OPENSSL_load_builtin_modules(void);

#ifdef __cplusplus
}
#endif
#endif
```

```
/* clang-format off */
/* WARNING: do not edit! */
/* Generated by Makefile from include/crypto/dso_conf.h.in */
/* clang-format on */
/*
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* https://www.openssl.org/source/license.html
*/

#ifndef OSSL_CRYPTO_DSO_CONF_H
#define OSSL_CRYPTO_DSO_CONF_H
#pragma once

/* clang-format off */
# define DSO_DLFCN
# define HAVE_DLFCN_H
/* clang-format on */
/* clang-format off */
# define DSO_EXTENSION ".so"
/* clang-format on */
#endif
UNRECOGNIZED LICENSE; MD5 sum: 1a764bd2bad6848ffc9fd3bca773138d
/*
* WARNING: do not edit!
* Generated by Makefile from providers/common/include/prov/der_ecx.h.in
*
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#include "internal/der.h"
#include "crypto/ecx.h"

/* Well known OIDs precompiled */
/* clang-format off */

/*
* id-X25519       OBJECT IDENTIFIER ::= { id-edwards-curve-algs 110 }
*/
#define DER_OID_V_id_X25519 DER_P_OBJECT, 3, 0x2B, 0x65, 0x6E
```

```
#define DER_OID_SZ_id_X25519 5
extern const unsigned char ossl_der_oid_id_X25519[DER_OID_SZ_id_X25519];

/*
* id-X448         OBJECT IDENTIFIER ::= { id-edwards-curve-algs 111 }
*/
#define DER_OID_V_id_X448 DER_P_OBJECT, 3, 0x2B, 0x65, 0x6F
#define DER_OID_SZ_id_X448 5
extern const unsigned char ossl_der_oid_id_X448[DER_OID_SZ_id_X448];

/*
 * id-Ed25519       OBJECT IDENTIFIER ::= { id-edwards-curve-algs 112 }
*/
#define DER_OID_V_id_Ed25519 DER_P_OBJECT, 3, 0x2B, 0x65, 0x70
#define DER_OID_SZ_id_Ed25519 5
extern const unsigned char ossl_der_oid_id_Ed25519[DER_OID_SZ_id_Ed25519];

/*
* id-Ed448        OBJECT IDENTIFIER ::= { id-edwards-curve-algs 113 }
*/
#define DER_OID_V_id_Ed448 DER_P_OBJECT, 3, 0x2B, 0x65, 0x71
#define DER_OID_SZ_id_Ed448 5
extern const unsigned char ossl_der_oid_id_Ed448[DER_OID_SZ_id_Ed448];

/* clang-format on */

int ossl_DER_w_algorithmIdentifier_ED25519(WPACKET *pkt, int cont, ECX_KEY *ec);
int ossl_DER_w_algorithmIdentifier_ED448(WPACKET *pkt, int cont, ECX_KEY *ec);
int ossl_DER_w_algorithmIdentifier_X25519(WPACKET *pkt, int cont, ECX_KEY *ec);
int ossl_DER_w_algorithmIdentifier_X448(WPACKET *pkt, int cont, ECX_KEY *ec);
```

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/* clang-format off */
/* WARNING: do not edit! */
/* Generated by Makefile from include/crypto/bn_conf.h.in */
/* clang-format on */
/*
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```
* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#ifndef OSSL_CRYPTO_BN_CONF_H
#define OSSL_CRYPTO_BN_CONF_H
#pragma once

/*
* The contents of this file are not used in the UEFI build, as
* both 32-bit and 64-bit builds are supported from a single run
* of the Configure script.
*/

/* Should we define BN_DIV2W here? */

/* Only one for the following should be defined */
/* clang-format off */
#undef SIXTY_FOUR_BIT_LONG
   /* clang-format on */
   /* clang-format off */
#undef SIXTY_FOUR_BIT
   /* clang-format on */
   /* clang-format off */
#define THIRTY_TWO_BIT
/*
 clang-format on */

#endif
```

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```
{
 'variables': {
   'openssl_defines_BSD-x86_64': [
     'NDEBUG',
     'L_ENDIAN',
     'OPENSSL_BUILDING_OPENSSL',
     'AES_ASM',
     'BSAES_ASM',
     'CMLL_ASM',
     'ECP_NISTZ256_ASM',
     'GHASH_ASM',
     'KECCAK1600_ASM',
     'MD5_ASM',
     'OPENSSL_BN_ASM_GF2m',
     'OPENSSL_BN_ASM_MONT',
     'OPENSSL_BN_ASM_MONT5',
     'OPENSSL_CPUID_OBJ',
     'OPENSSL_IA32_SSE2',
     'PADLOCK_ASM',
     'POLY1305_ASM',
     'RC4_ASM',
     'SHA1_ASM',
     'SHA256_ASM',
     'SHA512_ASM',
     'VPAES_ASM',
     'WHIRLPOOL_ASM',
     'X25519_ASM',
     'OPENSSL_PIC',
   ],
   'openssl_cflags_BSD-x86_64': [
     '-Wa,--noexecstack',
     '-Wall -O3',
     '-pthread',
     '-Wall -O3',
   ],
   'openssl_ex_libs_BSD-x86_64': [
     '-pthread',
   ],
   'openssl_cli_srcs_BSD-x86_64': [
```

```
  'openssl/apps/lib/cmp_mock_srv.c',
  'openssl/apps/asn1parse.c',
  'openssl/apps/ca.c',
  'openssl/apps/ciphers.c',
  'openssl/apps/cmp.c',

 'openssl/apps/cms.c',
  'openssl/apps/crl.c',
  'openssl/apps/crl2pkcs7.c',
  'openssl/apps/dgst.c',
  'openssl/apps/dhparam.c',
  'openssl/apps/dsa.c',
  'openssl/apps/dsaparam.c',
  'openssl/apps/ec.c',
  'openssl/apps/ecparam.c',
  'openssl/apps/enc.c',
  'openssl/apps/engine.c',
  'openssl/apps/errstr.c',
  'openssl/apps/fipsinstall.c',
  'openssl/apps/gendsa.c',
  'openssl/apps/genpkey.c',
  'openssl/apps/genrsa.c',
  'openssl/apps/info.c',
  'openssl/apps/kdf.c',
  'openssl/apps/list.c',
  'openssl/apps/mac.c',
  'openssl/apps/nseq.c',
  'openssl/apps/ocsp.c',
  'openssl/apps/openssl.c',
  'openssl/apps/passwd.c',
  'openssl/apps/pkcs12.c',
  'openssl/apps/pkcs7.c',
  'openssl/apps/pkcs8.c',
  'openssl/apps/pkey.c',
  'openssl/apps/pkeyparam.c',
  'openssl/apps/pkeyutl.c',
  'openssl/apps/prime.c',
  './config/archs/BSD-x86_64/asm_avx2/apps/progs.c',

'openssl/apps/rand.c',
  'openssl/apps/rehash.c',
  'openssl/apps/req.c',
  'openssl/apps/rsa.c',
  'openssl/apps/rsautl.c',
  'openssl/apps/s_client.c',
  'openssl/apps/s_server.c',
  'openssl/apps/s_time.c',
  'openssl/apps/sess_id.c',
```

```
    'openssl/apps/skeyutl.c',
    'openssl/apps/smime.c',
    'openssl/apps/speed.c',
    'openssl/apps/spkac.c',
    'openssl/apps/srp.c',
    'openssl/apps/storeutl.c',
    'openssl/apps/ts.c',
    'openssl/apps/verify.c',
    'openssl/apps/version.c',
    'openssl/apps/x509.c',
    'openssl/apps/lib/app_libctx.c',
    'openssl/apps/lib/app_params.c',
    'openssl/apps/lib/app_provider.c',
    'openssl/apps/lib/app_rand.c',
    'openssl/apps/lib/app_x509.c',
    'openssl/apps/lib/apps.c',
    'openssl/apps/lib/apps_opt_printf.c',
    'openssl/apps/lib/apps_ui.c',
    'openssl/apps/lib/columns.c',
    'openssl/apps/lib/engine.c',
    'openssl/apps/lib/engine_loader.c',
    'openssl/apps/lib/fmt.c',
     'openssl/apps/lib/http_server.c',
    'openssl/apps/lib/log.c',
    'openssl/apps/lib/names.c',
    'openssl/apps/lib/opt.c',
    'openssl/apps/lib/s_cb.c',
    'openssl/apps/lib/s_socket.c',
    'openssl/apps/lib/tlssrp_depr.c',
  ],
 },
 'defines': ['<@(openssl_defines_BSD-x86_64)'],
 'include_dirs': [
   './include',
 ],
 'cflags' : ['<@(openssl_cflags_BSD-x86_64)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86_64)'],
 'sources': ['<@(openssl_cli_srcs_BSD-x86_64)'],
}
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/srp.h.in
*
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*
* Originally written by Christophe Renou and Peter Sylvester,
* for the EdelKey project.
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_SRP_H
#define OPENSSL_SRP_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_SRP_H
#endif

#include <openssl/opensslconf.h>

#ifndef OPENSSL_NO_SRP
#include <stdio.h>
#include <string.h>
#include <openssl/safestack.h>
#include <openssl/bn.h>
#include <openssl/crypto.h>

#ifdef __cplusplus
extern "C" {
#endif
```

```
#ifndef OPENSSL_NO_DEPRECATED_3_0

typedef
 struct SRP_gN_cache_st {
   char *b64_bn;
   BIGNUM *bn;
} SRP_gN_cache;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(SRP_gN_cache, SRP_gN_cache, SRP_gN_cache)
#define sk_SRP_gN_cache_num(sk) OPENSSL_sk_num(ossl_check_const_SRP_gN_cache_sk_type(sk))
#define sk_SRP_gN_cache_value(sk, idx) ((SRP_gN_cache
*)OPENSSL_sk_value(ossl_check_const_SRP_gN_cache_sk_type(sk), (idx)))
#define sk_SRP_gN_cache_new(cmp) ((STACK_OF(SRP_gN_cache)
*)OPENSSL_sk_new(ossl_check_SRP_gN_cache_compfunc_type(cmp)))
#define sk_SRP_gN_cache_new_null() ((STACK_OF(SRP_gN_cache) *)OPENSSL_sk_new_null())
#define sk_SRP_gN_cache_new_reserve(cmp, n) ((STACK_OF(SRP_gN_cache)
*)OPENSSL_sk_new_reserve(ossl_check_SRP_gN_cache_compfunc_type(cmp), (n)))
#define sk_SRP_gN_cache_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_SRP_gN_cache_sk_type(sk), (n))
#define sk_SRP_gN_cache_free(sk) OPENSSL_sk_free(ossl_check_SRP_gN_cache_sk_type(sk))
#define sk_SRP_gN_cache_zero(sk) OPENSSL_sk_zero(ossl_check_SRP_gN_cache_sk_type(sk))
#define
 sk_SRP_gN_cache_delete(sk, i) ((SRP_gN_cache
*)OPENSSL_sk_delete(ossl_check_SRP_gN_cache_sk_type(sk), (i)))
#define sk_SRP_gN_cache_delete_ptr(sk, ptr) ((SRP_gN_cache
*)OPENSSL_sk_delete_ptr(ossl_check_SRP_gN_cache_sk_type(sk), ossl_check_SRP_gN_cache_type(ptr)))
#define sk_SRP_gN_cache_push(sk, ptr) OPENSSL_sk_push(ossl_check_SRP_gN_cache_sk_type(sk),
ossl_check_SRP_gN_cache_type(ptr))
#define sk_SRP_gN_cache_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_SRP_gN_cache_sk_type(sk),
ossl_check_SRP_gN_cache_type(ptr))
#define sk_SRP_gN_cache_pop(sk) ((SRP_gN_cache
*)OPENSSL_sk_pop(ossl_check_SRP_gN_cache_sk_type(sk)))
#define sk_SRP_gN_cache_shift(sk) ((SRP_gN_cache
*)OPENSSL_sk_shift(ossl_check_SRP_gN_cache_sk_type(sk)))
#define sk_SRP_gN_cache_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_SRP_gN_cache_sk_type(sk),ossl_check_SRP_gN_cache_freefunc_type(freefu
nc))
#define sk_SRP_gN_cache_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_SRP_gN_cache_sk_type(sk),
 ossl_check_SRP_gN_cache_type(ptr), (idx))
#define sk_SRP_gN_cache_set(sk, idx, ptr) ((SRP_gN_cache
*)OPENSSL_sk_set(ossl_check_SRP_gN_cache_sk_type(sk), (idx), ossl_check_SRP_gN_cache_type(ptr)))
#define sk_SRP_gN_cache_find(sk, ptr) OPENSSL_sk_find(ossl_check_SRP_gN_cache_sk_type(sk),
ossl_check_SRP_gN_cache_type(ptr))
#define sk_SRP_gN_cache_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_SRP_gN_cache_sk_type(sk),
ossl_check_SRP_gN_cache_type(ptr))
#define sk_SRP_gN_cache_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_SRP_gN_cache_sk_type(sk), ossl_check_SRP_gN_cache_type(ptr), pnum)
#define sk_SRP_gN_cache_sort(sk) OPENSSL_sk_sort(ossl_check_SRP_gN_cache_sk_type(sk))
#define sk_SRP_gN_cache_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_SRP_gN_cache_sk_type(sk))
```

```
#define sk_SRP_gN_cache_dup(sk) ((STACK_OF(SRP_gN_cache)
*)OPENSSL_sk_dup(ossl_check_const_SRP_gN_cache_sk_type(sk)))
#define sk_SRP_gN_cache_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(SRP_gN_cache)
 *)OPENSSL_sk_deep_copy(ossl_check_const_SRP_gN_cache_sk_type(sk),
ossl_check_SRP_gN_cache_copyfunc_type(copyfunc), ossl_check_SRP_gN_cache_freefunc_type(freefunc)))
#define sk_SRP_gN_cache_set_cmp_func(sk, cmp)
((sk_SRP_gN_cache_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_SRP_gN_cache_sk_type(sk),
ossl_check_SRP_gN_cache_compfunc_type(cmp)))

/* clang-format on */

typedef struct SRP_user_pwd_st {
  /* Owned by us. */
  char *id;
  BIGNUM *s;
  BIGNUM *v;
  /* Not owned by us. */
  const BIGNUM *g;
  const BIGNUM *N;
  /* Owned by us. */
  char *info;
} SRP_user_pwd;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(SRP_user_pwd, SRP_user_pwd, SRP_user_pwd)
#define sk_SRP_user_pwd_num(sk) OPENSSL_sk_num(ossl_check_const_SRP_user_pwd_sk_type(sk))
#define sk_SRP_user_pwd_value(sk, idx) ((SRP_user_pwd
*)OPENSSL_sk_value(ossl_check_const_SRP_user_pwd_sk_type(sk), (idx)))
#define sk_SRP_user_pwd_new(cmp) ((STACK_OF(SRP_user_pwd)
*)OPENSSL_sk_new(ossl_check_SRP_user_pwd_compfunc_type(cmp)))
#define
 sk_SRP_user_pwd_new_null() ((STACK_OF(SRP_user_pwd) *)OPENSSL_sk_new_null())
#define sk_SRP_user_pwd_new_reserve(cmp, n) ((STACK_OF(SRP_user_pwd)
*)OPENSSL_sk_new_reserve(ossl_check_SRP_user_pwd_compfunc_type(cmp), (n)))
#define sk_SRP_user_pwd_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_SRP_user_pwd_sk_type(sk), (n))
#define sk_SRP_user_pwd_free(sk) OPENSSL_sk_free(ossl_check_SRP_user_pwd_sk_type(sk))
#define sk_SRP_user_pwd_zero(sk) OPENSSL_sk_zero(ossl_check_SRP_user_pwd_sk_type(sk))
#define sk_SRP_user_pwd_delete(sk, i) ((SRP_user_pwd
*)OPENSSL_sk_delete(ossl_check_SRP_user_pwd_sk_type(sk), (i)))
#define sk_SRP_user_pwd_delete_ptr(sk, ptr) ((SRP_user_pwd
*)OPENSSL_sk_delete_ptr(ossl_check_SRP_user_pwd_sk_type(sk), ossl_check_SRP_user_pwd_type(ptr)))
#define sk_SRP_user_pwd_push(sk, ptr) OPENSSL_sk_push(ossl_check_SRP_user_pwd_sk_type(sk),
ossl_check_SRP_user_pwd_type(ptr))
#define sk_SRP_user_pwd_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_SRP_user_pwd_sk_type(sk),
 ossl_check_SRP_user_pwd_type(ptr))
#define sk_SRP_user_pwd_pop(sk) ((SRP_user_pwd
*)OPENSSL_sk_pop(ossl_check_SRP_user_pwd_sk_type(sk)))
#define sk_SRP_user_pwd_shift(sk) ((SRP_user_pwd
*)OPENSSL_sk_shift(ossl_check_SRP_user_pwd_sk_type(sk)))
```

```
#define sk_SRP_user_pwd_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_SRP_user_pwd_sk_type(sk),ossl_check_SRP_user_pwd_freefunc_type(freefu
nc))
#define sk_SRP_user_pwd_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_SRP_user_pwd_sk_type(sk),
ossl_check_SRP_user_pwd_type(ptr), (idx))
#define sk_SRP_user_pwd_set(sk, idx, ptr) ((SRP_user_pwd
*)OPENSSL_sk_set(ossl_check_SRP_user_pwd_sk_type(sk), (idx), ossl_check_SRP_user_pwd_type(ptr)))
#define sk_SRP_user_pwd_find(sk, ptr) OPENSSL_sk_find(ossl_check_SRP_user_pwd_sk_type(sk),
ossl_check_SRP_user_pwd_type(ptr))
#define sk_SRP_user_pwd_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_SRP_user_pwd_sk_type(sk),
ossl_check_SRP_user_pwd_type(ptr))
#define sk_SRP_user_pwd_find_all(sk,
 ptr, pnum) OPENSSL_sk_find_all(ossl_check_SRP_user_pwd_sk_type(sk), ossl_check_SRP_user_pwd_type(ptr),
pnum)
#define sk_SRP_user_pwd_sort(sk) OPENSSL_sk_sort(ossl_check_SRP_user_pwd_sk_type(sk))
#define sk_SRP_user_pwd_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_SRP_user_pwd_sk_type(sk))
#define sk_SRP_user_pwd_dup(sk) ((STACK_OF(SRP_user_pwd)
*)OPENSSL_sk_dup(ossl_check_const_SRP_user_pwd_sk_type(sk)))
#define sk_SRP_user_pwd_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(SRP_user_pwd)
*)OPENSSL_sk_deep_copy(ossl_check_const_SRP_user_pwd_sk_type(sk),
ossl_check_SRP_user_pwd_copyfunc_type(copyfunc), ossl_check_SRP_user_pwd_freefunc_type(freefunc)))
#define sk_SRP_user_pwd_set_cmp_func(sk, cmp)
((sk_SRP_user_pwd_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_SRP_user_pwd_sk_type(sk),
ossl_check_SRP_user_pwd_compfunc_type(cmp)))

/* clang-format on */

OSSL_DEPRECATEDIN_3_0
SRP_user_pwd *SRP_user_pwd_new(void);
OSSL_DEPRECATEDIN_3_0
void SRP_user_pwd_free(SRP_user_pwd
 *user_pwd);

OSSL_DEPRECATEDIN_3_0
void SRP_user_pwd_set_gN(SRP_user_pwd *user_pwd, const BIGNUM *g,
   const BIGNUM *N);
OSSL_DEPRECATEDIN_3_0
int SRP_user_pwd_set1_ids(SRP_user_pwd *user_pwd, const char *id,
   const char *info);
OSSL_DEPRECATEDIN_3_0
int SRP_user_pwd_set0_sv(SRP_user_pwd *user_pwd, BIGNUM *s, BIGNUM *v);

typedef struct SRP_VBASE_st {
   STACK_OF(SRP_user_pwd) *users_pwd;
   STACK_OF(SRP_gN_cache) *gN_cache;
   /* to simulate a user */
   char *seed_key;
   const BIGNUM *default_g;
```

```
   const BIGNUM *default_N;
} SRP_VBASE;

/*
* Internal structure storing N and g pair
*/
typedef struct SRP_gN_st {
   char *id;
   const BIGNUM *g;
   const BIGNUM *N;
} SRP_gN;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(SRP_gN, SRP_gN, SRP_gN)
#define sk_SRP_gN_num(sk) OPENSSL_sk_num(ossl_check_const_SRP_gN_sk_type(sk))
#define sk_SRP_gN_value(sk, idx) ((SRP_gN *)OPENSSL_sk_value(ossl_check_const_SRP_gN_sk_type(sk),
(idx)))
#define sk_SRP_gN_new(cmp) ((STACK_OF(SRP_gN)
 *)OPENSSL_sk_new(ossl_check_SRP_gN_compfunc_type(cmp)))
#define sk_SRP_gN_new_null() ((STACK_OF(SRP_gN) *)OPENSSL_sk_new_null())
#define sk_SRP_gN_new_reserve(cmp, n) ((STACK_OF(SRP_gN)
*)OPENSSL_sk_new_reserve(ossl_check_SRP_gN_compfunc_type(cmp), (n)))
#define sk_SRP_gN_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_SRP_gN_sk_type(sk), (n))
#define sk_SRP_gN_free(sk) OPENSSL_sk_free(ossl_check_SRP_gN_sk_type(sk))
#define sk_SRP_gN_zero(sk) OPENSSL_sk_zero(ossl_check_SRP_gN_sk_type(sk))
#define sk_SRP_gN_delete(sk, i) ((SRP_gN *)OPENSSL_sk_delete(ossl_check_SRP_gN_sk_type(sk), (i)))
#define sk_SRP_gN_delete_ptr(sk, ptr) ((SRP_gN *)OPENSSL_sk_delete_ptr(ossl_check_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_type(ptr)))
#define sk_SRP_gN_push(sk, ptr) OPENSSL_sk_push(ossl_check_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_type(ptr))
#define sk_SRP_gN_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_type(ptr))
#define sk_SRP_gN_pop(sk) ((SRP_gN *)OPENSSL_sk_pop(ossl_check_SRP_gN_sk_type(sk)))
#define
 sk_SRP_gN_shift(sk) ((SRP_gN *)OPENSSL_sk_shift(ossl_check_SRP_gN_sk_type(sk)))
#define sk_SRP_gN_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_SRP_gN_sk_type(sk),ossl_check_SRP_gN_freefunc_type(freefunc))
#define sk_SRP_gN_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_type(ptr), (idx))
#define sk_SRP_gN_set(sk, idx, ptr) ((SRP_gN *)OPENSSL_sk_set(ossl_check_SRP_gN_sk_type(sk), (idx),
ossl_check_SRP_gN_type(ptr)))
#define sk_SRP_gN_find(sk, ptr) OPENSSL_sk_find(ossl_check_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_type(ptr))
#define sk_SRP_gN_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_type(ptr))
#define sk_SRP_gN_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_type(ptr), pnum)
#define sk_SRP_gN_sort(sk) OPENSSL_sk_sort(ossl_check_SRP_gN_sk_type(sk))
#define sk_SRP_gN_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_SRP_gN_sk_type(sk))
```

```
#define
 sk_SRP_gN_dup(sk) ((STACK_OF(SRP_gN) *)OPENSSL_sk_dup(ossl_check_const_SRP_gN_sk_type(sk)))
#define sk_SRP_gN_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(SRP_gN)
*)OPENSSL_sk_deep_copy(ossl_check_const_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_copyfunc_type(copyfunc), ossl_check_SRP_gN_freefunc_type(freefunc)))
#define sk_SRP_gN_set_cmp_func(sk, cmp)
((sk_SRP_gN_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_compfunc_type(cmp)))

/* clang-format on */

OSSL_DEPRECATEDIN_3_0
SRP_VBASE *SRP_VBASE_new(char *seed_key);
OSSL_DEPRECATEDIN_3_0
void SRP_VBASE_free(SRP_VBASE *vb);
OSSL_DEPRECATEDIN_3_0
int SRP_VBASE_init(SRP_VBASE *vb, char *verifier_file);

OSSL_DEPRECATEDIN_3_0
int SRP_VBASE_add0_user(SRP_VBASE *vb, SRP_user_pwd *user_pwd);

/* NOTE: unlike in SRP_VBASE_get_by_user, caller owns the returned pointer.*/
OSSL_DEPRECATEDIN_3_0
SRP_user_pwd *SRP_VBASE_get1_by_user(SRP_VBASE *vb, char *username);

OSSL_DEPRECATEDIN_3_0
char
 *SRP_create_verifier_ex(const char *user, const char *pass, char **salt,
   char **verifier, const char *N, const char *g,
   OSSL_LIB_CTX *libctx, const char *propq);
OSSL_DEPRECATEDIN_3_0
char *SRP_create_verifier(const char *user, const char *pass, char **salt,
   char **verifier, const char *N, const char *g);
OSSL_DEPRECATEDIN_3_0
int SRP_create_verifier_BN_ex(const char *user, const char *pass, BIGNUM **salt,
   BIGNUM **verifier, const BIGNUM *N,
   const BIGNUM *g, OSSL_LIB_CTX *libctx,
   const char *propq);
OSSL_DEPRECATEDIN_3_0
int SRP_create_verifier_BN(const char *user, const char *pass, BIGNUM **salt,
   BIGNUM **verifier, const BIGNUM *N,
   const BIGNUM *g);

#define SRP_NO_ERROR 0
#define SRP_ERR_VBASE_INCOMPLETE_FILE 1
#define SRP_ERR_VBASE_BN_LIB 2
#define SRP_ERR_OPEN_FILE 3
#define SRP_ERR_MEMORY 4
```

```
#define DB_srptype 0
#define DB_srpverifier 1
#define DB_srpsalt 2
#define DB_srpid 3
#define DB_srpgN 4
#define DB_srpinfo 5
#undef DB_NUMBER
#define DB_NUMBER
 6

#define DB_SRP_INDEX 'I'
#define DB_SRP_VALID 'V'
#define DB_SRP_REVOKED 'R'
#define DB_SRP_MODIF 'v'

/* see srp.c */
OSSL_DEPRECATEDIN_3_0
char *SRP_check_known_gN_param(const BIGNUM *g, const BIGNUM *N);
OSSL_DEPRECATEDIN_3_0
SRP_gN *SRP_get_default_gN(const char *id);

/* server side .... */
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_server_key(const BIGNUM *A, const BIGNUM *v, const BIGNUM *u,
   const BIGNUM *b, const BIGNUM *N);
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_B_ex(const BIGNUM *b, const BIGNUM *N, const BIGNUM *g,
   const BIGNUM *v, OSSL_LIB_CTX *libctx, const char *propq);
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_B(const BIGNUM *b, const BIGNUM *N, const BIGNUM *g,
   const BIGNUM *v);

OSSL_DEPRECATEDIN_3_0
int SRP_Verify_A_mod_N(const BIGNUM *A, const BIGNUM *N);
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_u_ex(const BIGNUM *A, const BIGNUM *B, const BIGNUM *N,
   OSSL_LIB_CTX *libctx, const char *propq);
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_u(const BIGNUM *A,
 const BIGNUM *B, const BIGNUM *N);

/* client side .... */

OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_x_ex(const BIGNUM *s, const char *user, const char *pass,
   OSSL_LIB_CTX *libctx, const char *propq);
OSSL_DEPRECATEDIN_3_0
```

```
BIGNUM *SRP_Calc_x(const BIGNUM *s, const char *user, const char *pass);
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_A(const BIGNUM *a, const BIGNUM *N, const BIGNUM *g);
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_client_key_ex(const BIGNUM *N, const BIGNUM *B, const BIGNUM *g,
   const BIGNUM *x, const BIGNUM *a, const BIGNUM *u,
   OSSL_LIB_CTX *libctx, const char *propq);
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_client_key(const BIGNUM *N, const BIGNUM *B, const BIGNUM *g,
   const BIGNUM *x, const BIGNUM *a, const BIGNUM *u);
OSSL_DEPRECATEDIN_3_0
int SRP_Verify_B_mod_N(const BIGNUM *B, const BIGNUM *N);

#define SRP_MINIMAL_N 1024

#endif /* OPENSSL_NO_DEPRECATED_3_0 */

/* This method ignores the configured seed and fails for an unknown user. */
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0
SRP_user_pwd
 *SRP_VBASE_get_by_user(SRP_VBASE *vb, char *username);
#endif

#ifdef __cplusplus
}
#endif
#endif

#endif
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// Use of this source code is governed by a BSD-style license that can be
// found in the LICENSE file.

#ifndef V8_COMPILER_TURBOSHAFT_COPYING_PHASE_H_
#define V8_COMPILER_TURBOSHAFT_COPYING_PHASE_H_

#include <algorithm>
#include <cstddef>
#include <cstdint>
#include <utility>

#include "src/base/iterator.h"
#include "src/base/logging.h"
#include "src/base/small-vector.h"
#include "src/base/vector.h"
#include "src/codegen/optimized-compilation-info.h"
#include "src/compiler/node-origin-table.h"
```

```
#include "src/compiler/turboshaft/assembler.h"
#include "src/compiler/turboshaft/graph.h"
#include "src/compiler/turboshaft/index.h"
#include "src/compiler/turboshaft/operations.h"
#include "src/compiler/turboshaft/phase.h"
#include "src/compiler/turboshaft/reducer-traits.h"
#include "src/compiler/turboshaft/representations.h"
#include "src/compiler/turboshaft/snapshot-table.h"
#include "src/compiler/turboshaft/variable-reducer.h"
#include
 "src/zone/zone-containers.h"

namespace v8::internal::compiler::turboshaft {

using MaybeVariable = base::Optional<Variable>;

V8_EXPORT_PRIVATE int CountDecimalDigits(uint32_t value);
struct PaddingSpace {
 int spaces;
};
V8_EXPORT_PRIVATE std::ostream& operator<<(std::ostream& os,
                                           PaddingSpace padding);

template <typename Next>
class ReducerBaseForwarder;

template <typename Derived, typename Base>
class OutputGraphAssembler : public Base {
#define FRIEND(op) friend struct op##Op;
 TURBOSHAFT_OPERATION_LIST(FRIEND)
#undef FRIEND
 template <size_t I, class D>
 friend struct FixedArityOperationT;

 OpIndex Map(OpIndex index) { return derived_this()->MapToNewGraph(index); }

 OptionalOpIndex Map(OptionalOpIndex index) {
   return derived_this()->MapToNewGraph(index);
 }

 template <size_t N>
 base::SmallVector<OpIndex, N> Map(base::Vector<const OpIndex> indices) {
   return derived_this()->template MapToNewGraph<N>(indices);
  }

public:
#define ASSEMBLE(operation)                                   \
 OpIndex AssembleOutputGraph##operation(const operation##Op& op) { \
```

```
  return op.Explode(                                    \
      [a = assembler()](auto... args) {                     \
        return a->Reduce##operation(args...);                   \
      },                                                  \
      *this);                                               \
 }
 TURBOSHAFT_OPERATION_LIST(ASSEMBLE)
#undef ASSEMBLE

private:
 Derived* derived_this() { return static_cast<Derived*>(this); }
 Assembler<typename Base::ReducerList>* assembler() {
   return &derived_this()->Asm();
 }
};

template <class AfterNext>
class GraphVisitor : public OutputGraphAssembler<GraphVisitor<AfterNext>,
                                        VariableReducer<AfterNext>> {
 template <typename N>
 friend class ReducerBaseForwarder;

public:
 using Next
 = VariableReducer<AfterNext>;
 TURBOSHAFT_REDUCER_BOILERPLATE(CopyingPhase)

 GraphVisitor()
     : input_graph_(Asm().modifiable_input_graph()),
       current_input_block_(nullptr),
       op_mapping_(Asm().input_graph().op_id_count(), OpIndex::Invalid(),
                   Asm().phase_zone(), &Asm().input_graph()),
       block_mapping_(Asm().input_graph().block_count(), nullptr,
                      Asm().phase_zone()),
       blocks_needing_variables_(Asm().input_graph().block_count(),
                                 Asm().phase_zone()),
       old_opindex_to_variables(Asm().input_graph().op_id_count(),
                                Asm().phase_zone(), &Asm().input_graph()),
       blocks_to_clone_(Asm().phase_zone()) {
   Asm().output_graph().Reset();
 }

 // `trace_reduction` is a template parameter to avoid paying for tracing at
 // runtime.
 template <bool trace_reduction>
 void VisitGraph() {
   Asm().Analyze();
```

```
  // Creating initial old-to-new Block
mapping.
  for (Block& input_block : Asm().modifiable_input_graph().blocks()) {
    block_mapping_[input_block.index()] = Asm().output_graph().NewBlock(
        input_block.IsLoop() ? Block::Kind::kLoopHeader : Block::Kind::kMerge,
        &input_block);
  }

  // Visiting the graph.
  VisitAllBlocks<trace_reduction>();

  Finalize();
}

void Bind(Block* block) {
  Next::Bind(block);
  block->SetOrigin(current_input_block());
}

void Finalize() {
  // Updating the source_positions.
  if (!Asm().input_graph().source_positions().empty()) {
    for (OpIndex index : Asm().output_graph().AllOperationIndices()) {
      OpIndex origin = Asm().output_graph().operation_origins()[index];
      Asm().output_graph().source_positions()[index] =
          Asm().input_graph().source_positions()[origin];
    }
  }
  // Updating the operation origins.
  NodeOriginTable* origins = PipelineData::Get().node_origins();
  if (origins) {
    for (OpIndex
index : Asm().output_graph().AllOperationIndices()) {
      OpIndex origin = Asm().output_graph().operation_origins()[index];
      origins->SetNodeOrigin(index.id(), origin.id());
    }
  }

  input_graph_.SwapWithCompanion();
}

const Block* current_input_block() { return current_input_block_; }

bool* turn_loop_without_backedge_into_merge() {
  return &turn_loop_without_backedge_into_merge_;
}

// Emits a Goto to a cloned version of {input_block}, assuming that the only
```

```
 // predecessor of this cloned copy will be the current block. {input_block} is
 // not cloned right away (because this would recursively call VisitBlockBody,
 // which could cause stack overflows), and is instead added to the
 // {blocks_to_clone_} stack, whose blocks will be cloned once the current
 // block has been fully visited.
 void CloneBlockAndGoto(const Block* input_block) {
   Block* new_block =
       Asm().output_graph().NewBlock(input_block->kind(), input_block);

   //
 Computing which input of Phi operations to use when visiting
   // {input_block} (since {input_block} doesn't really have predecessors
   // anymore).
   int added_block_phi_input = input_block->GetPredecessorIndex(
       Asm().current_block()->OriginForBlockEnd());

   // There is no guarantees that {input_block} will be entirely removed just
   // because it's cloned/inlined, since it's possible that it has predecessors
   // for which this optimization didn't apply. As a result, we add it to
   // {blocks_needing_variables_}, so that if it's ever generated
   // normally, Variables are used when emitting its content, so that
   // they can later be merged when control flow merges with the current
   // version of {input_block} that we just cloned.
   blocks_needing_variables_.Add(input_block->index().id());

   Asm().Goto(new_block);

   blocks_to_clone_.push_back({input_block, added_block_phi_input, new_block});
 }

 // Visits and emits {input_block} right now (ie,
 in the current block). This
 // should not be called recursively in order to avoid stack overflow (ie,
 // processing {input_block} should never lead to calling CloneAndInlingBlock).
 void CloneAndInlineBlock(const Block* input_block) {
   if (Asm().generating_unreachable_operations()) return;

#ifdef DEBUG
   // Making sure that we didn't call CloneAndInlineBlock recursively.
   DCHECK(!is_in_recursive_inlining_);
   ScopedModification<bool> recursive_guard(&is_in_recursive_inlining_, true);
#endif

   // Computing which input of Phi operations to use when visiting
   // {input_block} (since {input_block} doesn't really have predecessors
   // anymore).
   int added_block_phi_input = input_block->GetPredecessorIndex(
       Asm().current_block()->OriginForBlockEnd());
```

```
  // There is no guarantees that {input_block} will be entirely removed just
  // because it's cloned/inlined, since it's possible that it has predecessors
  // for which this optimization didn't apply.
As a result, we add it to
  // {blocks_needing_variables_}, so that if it's ever generated
  // normally, Variables are used when emitting its content, so that
  // they can later be merged when control flow merges with the current
  // version of {input_block} that we just cloned.
  blocks_needing_variables_.Add(input_block->index().id());

  ScopedModification<bool> set_true(&current_block_needs_variables_, true);
  VisitBlockBody<CanHavePhis::kYes, ForCloning::kYes, false>(
      input_block, added_block_phi_input);
}

// {InlineOp} introduces two limitations unlike {CloneAndInlineBlock}:
// 1. The input operation must not be emitted anymore as part of its
// regular input block;
// 2. {InlineOp} must not be used multiple times for the same input op.
bool InlineOp(OpIndex index, const Block* input_block) {
  return VisitOpAndUpdateMapping<false>(index, input_block);
}

template <bool can_be_invalid = false>
OpIndex MapToNewGraph(OpIndex old_index,
int predecessor_index = -1) {
  DCHECK(old_index.valid());
  OpIndex result = op_mapping_[old_index];

  if (!result.valid()) {
    // {op_mapping} doesn't have a mapping for {old_index}. The
    // VariableReducer should provide the mapping.
    MaybeVariable var = GetVariableFor(old_index);
    if constexpr (can_be_invalid) {
      if (!var.has_value()) {
        return OpIndex::Invalid();
      }
    }
    DCHECK(var.has_value());
    if (predecessor_index == -1) {
      result = Asm().GetVariable(var.value());
    } else {
      result = Asm().GetPredecessorValue(var.value(), predecessor_index);
    }
  }

  DCHECK_IMPLIES(!can_be_invalid, result.valid());
```

```
  return result;
}

Block* MapToNewGraph(const Block* block) const {
  Block* new_block = block_mapping_[block->index()];
  DCHECK_NOT_NULL(new_block);
  return new_block;
}

// The block from the input graph that corresponds to the current block as a
// branch destination.
Such a block might not exist, and this function uses a
// trick to compute such a block in almost all cases, but might rarely fail
// and return `nullptr` instead.
const Block* OriginForBlockStart(Block* block) const {
  // Check that `block->origin_` is still valid as a block start and was not
  // changed to a semantically different block when inlining blocks.
  const Block* origin = block->origin_;
  if (origin && MapToNewGraph(origin) == block) return origin;
  return nullptr;
}

// Clone all of the blocks in {sub_graph} (which should be Blocks of the input
// graph). If `keep_loop_kinds` is true, the loop headers are preserved, and
// otherwise they are marked as Merge. An initial GotoOp jumping to the 1st
// block of `sub_graph` is always emitted. The output Block corresponding to
// the 1st block of `sub_graph` is returned.
template <class Set>
Block* CloneSubGraph(Set sub_graph, bool keep_loop_kinds,
                     bool is_loop_after_peeling
= false) {
  // The BlockIndex of the blocks of `sub_graph` should be sorted so that
  // visiting them in order is correct (all of the predecessors of a block
  // should always be visited before the block itself).
  DCHECK(std::is_sorted(sub_graph.begin(), sub_graph.end(),
                        [](const Block* a, const Block* b) {
                          return a->index().id() <= b->index().id();
                        }));

  // 1. Create new blocks, and update old->new mapping. This is required to
  // emit multiple times the blocks of {sub_graph}: if a block `B1` in
  // {sub_graph} ends with a Branch/Goto to a block `B2` that is also in
  // {sub_graph}, then this Branch/Goto should go to the version of `B2` that
  // this CloneSubGraph will insert, rather than to a version inserted by a
  // previous call to CloneSubGraph or the version that the regular
  // VisitAllBlock function will emit.
  ZoneVector<Block*> old_mappings(sub_graph.size(),
```

```
 Asm().phase_zone());
   for (auto&& [input_block, old_mapping] :
       base::zip(sub_graph, old_mappings)) {
     old_mapping = block_mapping_[input_block->index()];
     Block::Kind kind = keep_loop_kinds && input_block->IsLoop()
                        ? Block::Kind::kLoopHeader
                        : Block::Kind::kMerge;
     block_mapping_[input_block->index()] =
         Asm().output_graph().NewBlock(kind, input_block);
   }

   // 2. Visit block in correct order (begin to end)

   // Emit a goto to 1st block.
   Block* start = block_mapping_[(*sub_graph.begin())->index()];
#ifdef DEBUG
   if (is_loop_after_peeling) start->set_has_peeled_iteration();
#endif
   Asm().Goto(start);
   // Visiting `sub_graph`.
   for (const Block* block : sub_graph) {
     blocks_needing_variables_.Add(block->index().id());
     VisitBlock<false>(block);
     ProcessWaitingCloningAndInlining<false>();
   }

   // 3. Restore initial old->new mapping
   for (auto&&
 [input_block, old_mapping] :
       base::zip(sub_graph, old_mappings)) {
     block_mapping_[input_block->index()] = old_mapping;
   }

   return start;
 }

 template <bool can_be_invalid = false>
 OptionalOpIndex MapToNewGraph(OptionalOpIndex old_index,
                               int predecessor_index = -1) {
   if (!old_index.has_value()) return OptionalOpIndex::Invalid();
   return MapToNewGraph<can_be_invalid>(old_index.value(), predecessor_index);
 }

 template <size_t expected_size>
 base::SmallVector<OpIndex, expected_size> MapToNewGraph(
     base::Vector<const OpIndex> inputs) {
   base::SmallVector<OpIndex, expected_size> result;
   for (OpIndex input : inputs) {
```

```
    result.push_back(MapToNewGraph(input));
  }
  return result;
}

private:
 template <bool trace_reduction>
 void VisitAllBlocks() {
  base::SmallVector<const Block*, 128> visit_stack;

  visit_stack.push_back(&Asm().input_graph().StartBlock());
  while (!visit_stack.empty())
 {
    const Block* block = visit_stack.back();
    visit_stack.pop_back();
    VisitBlock<trace_reduction>(block);
    ProcessWaitingCloningAndInlining<trace_reduction>();

    for (Block* child = block->LastChild(); child != nullptr;
         child = child->NeighboringChild()) {
      visit_stack.push_back(child);
    }
  }
 }

 template <bool trace_reduction>
 void VisitBlock(const Block* input_block) {
  current_block_needs_variables_ =
      blocks_needing_variables_.Contains(input_block->index().id());
  if constexpr (trace_reduction) {
    std::cout << "\nold " << PrintAsBlockHeader{*input_block} << "\n";
    std::cout << "new "
              << PrintAsBlockHeader{*MapToNewGraph(input_block),
                                    Asm().output_graph().next_block_index()}
              << "\n";
  }
  Block* new_block = MapToNewGraph(input_block);
  if (Asm().Bind(new_block)) {
    VisitBlockBody<CanHavePhis::kYes, ForCloning::kNo, trace_reduction>(
        input_block);
    if constexpr (trace_reduction) TraceBlockFinished();
  } else {
    if constexpr (trace_reduction) TraceBlockUnreachable();
  }

  // If we eliminate a loop backedge, we need to turn the loop into a
  // single-predecessor merge block.
  if (!turn_loop_without_backedge_into_merge_) return;
```

```
  const Operation& last_op = input_block->LastOperation(Asm().input_graph());
  if (auto* final_goto = last_op.TryCast<GotoOp>()) {
    if (final_goto->destination->IsLoop()) {
      if (input_block->index() >= final_goto->destination->index()) {
        Asm().FinalizeLoop(MapToNewGraph(final_goto->destination));
      } else {
        // We have a forward jump to a loop, rather than a backedge. We
        // don't need to do anything.
      }
    }
  }
}

enum class CanHavePhis { kNo, kYes };
enum class ForCloning { kNo, kYes };

template <CanHavePhis can_have_phis, ForCloning for_cloning,
          bool trace_reduction>
 void VisitBlockBody(const Block* input_block,
                     int added_block_phi_input = -1) {
  DCHECK_NOT_NULL(Asm().current_block());
  current_input_block_ = input_block;

  // Phis could be mutually recursive, for instance (in a loop header):
  //
  //     p1 = phi(a, p2)
  //     p2 = phi(b, p1)
  //
  // In this case, if we are currently unrolling the loop and visiting this
  // loop header that is now part of the loop body, then if we visit Phis
  // and emit new mapping (with CreateOldToNewMapping) as we go along, we
  // would visit p1 and emit a mapping saying "p1 = p2", and use this
  // mapping when visiting p2, then we'd map p2 to p2 instead of p1. To
  // overcome this issue, we first visit the Phis of the loop, emit the new
  // phis, and record the new mapping in a side-table ({new_phi_values}).
  // Then, we visit all of the operations of the loop and commit the new
  // mappings: phis were emitted before using the old
mapping, and all of
  // the other operations will use the new mapping (as they should).
  //
  // Note that Phis are not always at the begining of blocks, but when they
  // aren't, they can't have inputs from the current block (except on their
  // backedge for loop phis, but they start as PendingLoopPhis without
  // backedge input), so visiting all Phis first is safe.

  // Visiting Phis and collecting their new OpIndices.
  base::SmallVector<OpIndex, 64> new_phi_values;
  if constexpr (can_have_phis == CanHavePhis::kYes) {
```

```
    for (OpIndex index : Asm().input_graph().OperationIndices(*input_block)) {
      if (ShouldSkipOperation(Asm().input_graph().Get(index))) continue;
      DCHECK_NOT_NULL(Asm().current_block());
      if (Asm().input_graph().Get(index).template Is<PhiOp>()) {
        OpIndex new_index;
        if constexpr (for_cloning == ForCloning::kYes) {
          // When cloning a block, it only has a single predecessor, and Phis

    // should therefore be removed and be replaced by the input
          // corresponding to this predecessor.
          DCHECK_NE(added_block_phi_input, -1);
          // This Phi has been cloned/inlined, and has thus now a single
          // predecessor, and shouldn't be a Phi anymore.
          new_index = MapToNewGraph(
              Asm().input_graph().Get(index).input(added_block_phi_input));
        } else {
          new_index =
              VisitOpNoMappingUpdate<trace_reduction>(index, input_block);
        }
        new_phi_values.push_back(new_index);
        if (!Asm().current_block()) {
          // A reducer has detected, based on the Phis of the block that were
          // visited so far, that we are in unreachable code (or, less likely,
          // decided, based on some Phis only, to jump away from this block?).
          return;
        }
      }
    }
  }
  DCHECK_NOT_NULL(Asm().current_block());

  // Visiting everything,
updating Phi mappings, and emitting non-phi
  // operations.
  int phi_num = 0;
  bool stopped_early = false;
  for (OpIndex index : base::IterateWithoutLast(
          Asm().input_graph().OperationIndices(*input_block))) {
    if (ShouldSkipOperation(Asm().input_graph().Get(index))) continue;
    const Operation& op = Asm().input_graph().Get(index);
    if constexpr (can_have_phis == CanHavePhis::kYes) {
      if (op.Is<PhiOp>()) {
        CreateOldToNewMapping(index, new_phi_values[phi_num++]);
        continue;
      }
    }
    // Blocks with a single predecessor (for which CanHavePhis might be kNo)
    // can still have phis if they used to be loop header that were turned
```

```
    // into regular blocks.
    DCHECK_IMPLIES(op.Is<PhiOp>(), op.input_count == 1);

    if (!VisitOpAndUpdateMapping<trace_reduction>(index, input_block)) {
      stopped_early = true;
      break;
    }
  }
  // If the last operation of the loop above (= the
one-before-last operation
  // of the block) was lowered to an unconditional deopt/trap/something like
  // that, then current_block will now be null, and there is no need visit the
  // last operation of the block.
  if (stopped_early || Asm().current_block() == nullptr) return;

  // The final operation (which should be a block terminator) of the block
  // is processed separately, because if it's a Goto to a block with a
  // single predecessor, we'll inline it. (we could have had a check `if (op
  // is a Goto)` in the loop above, but since this can only be true for the
  // last operation, we instead extracted it here to make things faster).
  const Operation& terminator =
      input_block->LastOperation(Asm().input_graph());
  DCHECK(terminator.IsBlockTerminator());
  VisitBlockTerminator<trace_reduction>(terminator, input_block);
}

template <bool trace_reduction>
bool VisitOpAndUpdateMapping(OpIndex index, const Block* input_block) {
  if (Asm().current_block()
== nullptr) return false;
  OpIndex new_index =
      VisitOpNoMappingUpdate<trace_reduction>(index, input_block);
  const Operation& op = Asm().input_graph().Get(index);
  if (CanBeUsedAsInput(op) && new_index.valid()) {
    CreateOldToNewMapping(index, new_index);
  }
  return true;
}

template <bool trace_reduction>
OpIndex VisitOpNoMappingUpdate(OpIndex index, const Block* input_block) {
  Block* current_block = Asm().current_block();
  DCHECK_NOT_NULL(current_block);
  Asm().SetCurrentOrigin(index);
  current_block->SetOrigin(input_block);
  OpIndex first_output_index = Asm().output_graph().next_operation_index();
  USE(first_output_index);
  const Operation& op = Asm().input_graph().Get(index);
```

```
  if constexpr (trace_reduction) TraceReductionStart(index);
  if (ShouldSkipOperation(op)) {
    if constexpr (trace_reduction) TraceOperationSkipped();
    return OpIndex::Invalid();
  }
  OpIndex new_index;
  switch (op.opcode)
 {
#define EMIT_INSTR_CASE(Name)                                    \
 case Opcode::k##Name:                                           \
  if (MayThrow(Opcode::k##Name)) return OpIndex::Invalid();      \
  new_index = Asm().ReduceInputGraph##Name(index, op.Cast<Name##Op>()); \
  break;
    TURBOSHAFT_OPERATION_LIST(EMIT_INSTR_CASE)
#undef EMIT_INSTR_CASE
  }
  if constexpr (trace_reduction) {
    if (CanBeUsedAsInput(op) && !new_index.valid()) {
      TraceOperationSkipped();
    } else {
      TraceReductionResult(current_block, first_output_index, new_index);
    }
  }
#ifdef DEBUG
  DCHECK_IMPLIES(new_index.valid(),
                 Asm().output_graph().BelongsToThisGraph(new_index));
  if (V8_UNLIKELY(v8_flags.turboshaft_verify_reductions)) {
    if (new_index.valid()) {
      const Operation& new_op = Asm().output_graph().Get(new_index);
      if (!new_op.Is<TupleOp>()) {
        // Checking that the outputs_rep
 of the new operation are the same as
        // the old operation. (except for tuples, since they don't have
        // outputs_rep)
        DCHECK_EQ(new_op.outputs_rep().size(), op.outputs_rep().size());
        for (size_t i = 0; i < new_op.outputs_rep().size(); ++i) {
          DCHECK(new_op.outputs_rep()[i].AllowImplicitRepresentationChangeTo(
              op.outputs_rep()[i]));
        }
      }
      Asm().Verify(index, new_index);
    }
  }
#endif  // DEBUG
  return new_index;
 }

 template <bool trace_reduction>
```

```
void VisitBlockTerminator(const Operation& terminator,
                          const Block* input_block) {
  if (Asm().CanAutoInlineBlocksWithSinglePredecessor() &&
      terminator.Is<GotoOp>()) {
    Block* destination = terminator.Cast<GotoOp>().destination;
    if (destination->PredecessorCount() == 1) {
      block_to_inline_now_ = destination;
      return;
    }
  }
  // Just going through the regular VisitOp
function.
  OpIndex index = Asm().input_graph().Index(terminator);
  VisitOpAndUpdateMapping<trace_reduction>(index, input_block);
}

template <bool trace_reduction>
void ProcessWaitingCloningAndInlining() {
  InlineWaitingBlock<trace_reduction>();
  while (!blocks_to_clone_.empty()) {
    BlockToClone item = blocks_to_clone_.back();
    blocks_to_clone_.pop_back();
    DoCloneBlock<trace_reduction>(
        item.input_block, item.added_block_phi_input, item.new_output_block);
    InlineWaitingBlock<trace_reduction>();
  }
}

template <bool trace_reduction>
void InlineWaitingBlock() {
  while (block_to_inline_now_) {
    Block* input_block = block_to_inline_now_;
    block_to_inline_now_ = nullptr;
    ScopedModification<bool> set_true(&current_block_needs_variables_, true);
    if constexpr (trace_reduction) {
      std::cout << "Inlining " << PrintAsBlockHeader{*input_block} << "\n";
    }
    VisitBlockBody<CanHavePhis::kNo, ForCloning::kNo,
trace_reduction>(
        input_block);
  }
}

template <bool trace_reduction>
void DoCloneBlock(const Block* input_block, int added_block_phi_input,
                  Block* output_block) {
  DCHECK_EQ(output_block->PredecessorCount(), 1);
  if constexpr (trace_reduction) {
```

```
    std::cout << "\nCloning old " << PrintAsBlockHeader{*input_block} << "\n";
    std::cout << "As new "
              << PrintAsBlockHeader{*output_block,
                                    Asm().output_graph().next_block_index()}
              << "\n";
  }

  ScopedModification<bool> set_true(&current_block_needs_variables_, true);

  Asm().BindReachable(output_block);
  VisitBlockBody<CanHavePhis::kYes, ForCloning::kYes, trace_reduction>(
      input_block, added_block_phi_input);

  if constexpr (trace_reduction) TraceBlockFinished();
}

void TraceReductionStart(OpIndex index) {
  std::cout << " o" << index.id() << ": "
            << PaddingSpace{5 - CountDecimalDigits(index.id())}
             << OperationPrintStyle{Asm().input_graph().Get(index), "#o"}
            << "\n";
}
void TraceOperationSkipped() { std::cout << "> skipped\n\n"; }
void TraceBlockUnreachable() { std::cout << "> unreachable\n\n"; }
void TraceReductionResult(Block* current_block, OpIndex first_output_index,
                          OpIndex new_index) {
  if (new_index < first_output_index) {
    // The operation was replaced with an already existing one.
    std::cout << "> #n" << new_index.id() << "\n";
  }
  bool before_arrow = new_index >= first_output_index;
  for (const Operation& op : Asm().output_graph().operations(
           first_output_index, Asm().output_graph().next_operation_index())) {
    OpIndex index = Asm().output_graph().Index(op);
    const char* prefix;
    if (index == new_index) {
      prefix = ">";
      before_arrow = false;
    } else if (before_arrow) {
      prefix = "  ";
    } else {

  prefix = "   ";
    }
    std::cout << prefix << " n" << index.id() << ": "
              << PaddingSpace{5 - CountDecimalDigits(index.id())}
              << OperationPrintStyle{Asm().output_graph().Get(index), "#n"}
              << "\n";
```

```
    if (op.IsBlockTerminator() && Asm().current_block() &&
        Asm().current_block() != current_block) {
      current_block = &Asm().output_graph().Get(
          BlockIndex(current_block->index().id() + 1));
      std::cout << "new " << PrintAsBlockHeader{*current_block} << "\n";
    }
  }
  std::cout << "\n";
}
void TraceBlockFinished() { std::cout << "\n"; }

// These functions take an operation from the old graph and use the assembler
// to emit a corresponding operation in the new graph, translating inputs and
// blocks accordingly.
V8_INLINE OpIndex AssembleOutputGraphGoto(const GotoOp& op) {
  Block* destination = MapToNewGraph(op.destination);
  if (op.is_backedge) {
    DCHECK(destination->IsBound());
     DCHECK(destination->IsLoop());
    FixLoopPhis(op.destination);
  }
  // It is important that we first fix loop phis and then reduce the `Goto`,
  // because reducing the `Goto` can have side effects, in particular, it can
  // modify affect the SnapshotTable of `VariableReducer`, which is also used
  // by `FixLoopPhis()`.
  Asm().ReduceGoto(destination, op.is_backedge);
  return OpIndex::Invalid();
}
V8_INLINE OpIndex AssembleOutputGraphBranch(const BranchOp& op) {
  Block* if_true = MapToNewGraph(op.if_true);
  Block* if_false = MapToNewGraph(op.if_false);
  return Asm().ReduceBranch(MapToNewGraph(op.condition()), if_true, if_false,
                            op.hint);
}
OpIndex AssembleOutputGraphSwitch(const SwitchOp& op) {
  base::SmallVector<SwitchOp::Case, 16> cases;
  for (SwitchOp::Case c : op.cases) {
    cases.emplace_back(c.value, MapToNewGraph(c.destination), c.hint);
  }
  return Asm().ReduceSwitch(
      MapToNewGraph(op.input()),
       Asm().graph_zone()->CloneVector(base::VectorOf(cases)),
      MapToNewGraph(op.default_case), op.default_hint);
}
OpIndex AssembleOutputGraphPhi(const PhiOp& op) {
  if (op.input_count == 1) {
    // If, in the previous CopyingPhase, a loop header was turned into a
    // regular blocks, its PendingLoopPhis became Phis with a single input. We
```

```
    // can now just get rid of these Phis.
    return MapToNewGraph(op.input(0));
  }

  OpIndex ig_index = Asm().input_graph().Index(op);
  if (Asm().current_block()->IsLoop()) {
    DCHECK_EQ(op.input_count, 2);
    if (ig_index == op.input(PhiOp::kLoopPhiBackEdgeIndex)) {
      // Avoid emitting a Loop Phi which points to itself, instead
      // emit it's 0'th input.
      return MapToNewGraph(op.input(0));
    }
    return Asm().PendingLoopPhi(MapToNewGraph(op.input(0)), op.rep);
  }

  base::Vector<const OpIndex> old_inputs = op.inputs();
  base::SmallVector<OpIndex, 64>
new_inputs;
  int predecessor_count = Asm().current_block()->PredecessorCount();
  Block* old_pred = current_input_block_->LastPredecessor();
  Block* new_pred = Asm().current_block()->LastPredecessor();
  // Control predecessors might be missing after the optimization phase. So we
  // need to skip phi inputs that belong to control predecessors that have no
  // equivalent in the new graph.

  // We first assume that the order if the predecessors of the current block
  // did not change. If it did, {new_pred} won't be nullptr at the end of this
  // loop, and we'll instead fall back to the slower code below to compute the
  // inputs of the Phi.
  int predecessor_index = predecessor_count - 1;
  for (OpIndex input : base::Reversed(old_inputs)) {
    if (new_pred && new_pred->OriginForBlockEnd() == old_pred) {
      // Phis inputs have to come from predecessors. We thus have to
      // MapToNewGraph with {predecessor_index} so that we get an OpIndex that
       // is from a predecessor rather than one that comes from a Variable
      // merged in the current block.
      new_inputs.push_back(MapToNewGraph(input, predecessor_index));
      new_pred = new_pred->NeighboringPredecessor();
      predecessor_index--;
    }
    old_pred = old_pred->NeighboringPredecessor();
  }
  DCHECK_IMPLIES(new_pred == nullptr, old_pred == nullptr);

  if (new_pred != nullptr) {
    // If {new_pred} is not nullptr, then the order of the predecessors
    // changed. This should only happen with blocks that were introduced in
    // the previous graph. For instance, consider this (partial) dominator
```

```
    // tree:
    //
    //      7
    //       8
    //       10
    //      9
    //      11
    //
    // Where the predecessors of block 11 are blocks 9 and 10 (in that order).
    // In dominator visit order, block 10 will be visited before block 9.
    // Since blocks are added to predecessors when the predecessors
 are
    // visited, it means that in the new graph, the predecessors of block 11
    // are [10, 9] rather than [9, 10].
    // To account for this, we reorder the inputs of the Phi, and get rid of
    // inputs from blocks that vanished.

#ifdef DEBUG
    // To check that indices are set properly, we zap them in debug builds.
    for (auto& block : Asm().modifiable_input_graph().blocks()) {
      block.clear_custom_data();
    }
#endif
    uint32_t pos = current_input_block_->PredecessorCount() - 1;
    for (old_pred = current_input_block_->LastPredecessor();
         old_pred != nullptr; old_pred = old_pred->NeighboringPredecessor()) {
      // Store the current index of the {old_pred}.
      old_pred->set_custom_data(pos--, Block::CustomDataKind::kPhiInputIndex);
    }

    // Filling {new_inputs}: we iterate the new predecessors, and, for each
    // predecessor, we check the index of the input corresponding to the old
    // predecessor, and
 we put it next in {new_inputs}.
    new_inputs.clear();
    int predecessor_index = predecessor_count - 1;
    for (new_pred = Asm().current_block()->LastPredecessor();
         new_pred != nullptr; new_pred = new_pred->NeighboringPredecessor()) {
      const Block* origin = new_pred->OriginForBlockEnd();
      DCHECK_NOT_NULL(origin);
      OpIndex input = old_inputs[origin->get_custom_data(
          Block::CustomDataKind::kPhiInputIndex)];
      // Phis inputs have to come from predecessors. We thus have to
      // MapToNewGraph with {predecessor_index} so that we get an OpIndex that
      // is from a predecessor rather than one that comes from a Variable
      // merged in the current block.
      new_inputs.push_back(MapToNewGraph(input, predecessor_index));
      predecessor_index--;
```

```
    }
  }

  DCHECK_EQ(new_inputs.size(), Asm().current_block()->PredecessorCount());

  if (new_inputs.size() == 1) {
    // This Operation used to be a Phi
 in a Merge, but since one (or more) of
    // the inputs of the merge have been removed, there is no need for a Phi
    // anymore.
    return new_inputs[0];
  }

  std::reverse(new_inputs.begin(), new_inputs.end());
  return Asm().ReducePhi(base::VectorOf(new_inputs), op.rep);
 }
 OpIndex AssembleOutputGraphPendingLoopPhi(const PendingLoopPhiOp& op) {
  UNREACHABLE();
 }
 V8_INLINE OpIndex AssembleOutputGraphFrameState(const FrameStateOp& op) {
  auto inputs = MapToNewGraph<32>(op.inputs());
  return Asm().ReduceFrameState(base::VectorOf(inputs), op.inlined, op.data);
 }
 OpIndex AssembleOutputGraphCall(const CallOp& op) {
  OpIndex callee = MapToNewGraph(op.callee());
  OptionalOpIndex frame_state = MapToNewGraph(op.frame_state());
  auto arguments = MapToNewGraph<16>(op.arguments());
  return Asm().ReduceCall(callee, frame_state, base::VectorOf(arguments),
                          op.descriptor, op.Effects());
 }
 OpIndex AssembleOutputGraphDidntThrow(const
 DidntThrowOp& op) {
  const Operation& throwing_operation =
      Asm().input_graph().Get(op.throwing_operation());
  OpIndex result;
  switch (throwing_operation.opcode) {
#define CASE(Name)                                          \
 case Opcode::k##Name:                                      \
  result = Asm().ReduceInputGraph##Name(                    \
      op.throwing_operation(), throwing_operation.Cast<Name##Op>()); \
  break;
    TURBOSHAFT_THROWING_OPERATIONS_LIST(CASE)
#undef CASE
    default:
      UNREACHABLE();
  }
  return result;
 }
```

```
OpIndex AssembleOutputGraphCheckException(const CheckExceptionOp& op) {
  Graph::OpIndexIterator it(op.didnt_throw_block->begin(),
                            &Asm().input_graph());
  Graph::OpIndexIterator end(op.didnt_throw_block->end(),
                             &Asm().input_graph());
  // To translate `CheckException` to the new graph, we reduce the throwing
   // operation (actually it's `DidntThrow` operation, but that triggers the
  // actual reduction) with a catch scope. If the reduction replaces the
  // throwing operation with other throwing operations, all of them will be
  // connected to the provided catch block. The reduction should automatically
  // bind a block that represents non-throwing control flow of the original
  // operation, so we can inline the rest of the `didnt_throw` block.
  {
    CatchScope scope(Asm(), MapToNewGraph(op.catch_block));
    DCHECK(Asm().input_graph().Get(*it).template Is<DidntThrowOp>());
    if (!Asm().InlineOp(*it, op.didnt_throw_block)) {
      return OpIndex::Invalid();
    }
    ++it;
  }
  for (; it != end; ++it) {
    // Using `InlineOp` requires that the inlined operation is not emitted
    // multiple times. This is the case here because we just removed the
    // single predecessor of `didnt_throw_block`.
    if (!Asm().InlineOp(*it, op.didnt_throw_block))
{
      break;
    }
  }
  return OpIndex::Invalid();
}

void CreateOldToNewMapping(OpIndex old_index, OpIndex new_index) {
  DCHECK(old_index.valid());
  DCHECK(Asm().input_graph().BelongsToThisGraph(old_index));
  DCHECK_IMPLIES(new_index.valid(),
                 Asm().output_graph().BelongsToThisGraph(new_index));

  if (current_block_needs_variables_) {
    MaybeVariable var = GetVariableFor(old_index);
    if (!var.has_value()) {
      MaybeRegisterRepresentation rep =
          Asm().input_graph().Get(old_index).outputs_rep().size() == 1
              ? static_cast<const MaybeRegisterRepresentation&>(
                    Asm().input_graph().Get(old_index).outputs_rep()[0])
              : MaybeRegisterRepresentation::None();
      var = Asm().NewLoopInvariantVariable(rep);
      SetVariableFor(old_index, *var);
```

```
    }
    Asm().SetVariable(*var, new_index);
    return;
  }

  DCHECK(!op_mapping_[old_index].valid());

  op_mapping_[old_index] = new_index;
}

MaybeVariable GetVariableFor(OpIndex old_index) const {
  return old_opindex_to_variables[old_index];
}

void SetVariableFor(OpIndex old_index, MaybeVariable var) {
  DCHECK(!old_opindex_to_variables[old_index].has_value());
  old_opindex_to_variables[old_index] = var;
}

void FixLoopPhis(Block* input_graph_loop) {
  DCHECK(input_graph_loop->IsLoop());
  Block* output_graph_loop = MapToNewGraph(input_graph_loop);
  DCHECK(output_graph_loop->IsLoop());
  for (const Operation& op : Asm().input_graph().operations(
          input_graph_loop->begin(), input_graph_loop->end())) {
    if (auto* input_phi = op.TryCast<PhiOp>()) {
      OpIndex phi_index =
          MapToNewGraph<true>(Asm().input_graph().Index(*input_phi));
      if (!phi_index.valid() || !output_graph_loop->Contains(phi_index)) {
        // Unused phis are skipped, so they are not be mapped to anything in
        // the new graph. If the phi is
reduced to an operation from a
        // different block, then there is no loop phi in the current loop
        // header to take care of.
        continue;
      }
      Asm().FixLoopPhi(*input_phi, phi_index, output_graph_loop);
    }
  }
}

Graph& input_graph_;

const Block* current_input_block_;

// Mappings from old OpIndices to new OpIndices.
FixedOpIndexSidetable<OpIndex> op_mapping_;
```

```
// Mappings from old blocks to new blocks.
FixedBlockSidetable<Block*> block_mapping_;

// {current_block_needs_variables_} is set to true if the current block should
// use Variables to map old to new OpIndex rather than just {op_mapping}. This
// is typically the case when the block has been cloned.
bool current_block_needs_variables_ = false;

// When {turn_loop_without_backedge_into_merge_} is true (the default), when
// processing an input block that ended with a loop backedge but doesn't
// anymore, the loop header is turned into a regular merge. This
can be turned
// off when unrolling a loop for instance.
bool turn_loop_without_backedge_into_merge_ = true;

// Set of Blocks for which Variables should be used rather than
// {op_mapping}.
BitVector blocks_needing_variables_;

// Mapping from old OpIndex to Variables.
FixedOpIndexSidetable<MaybeVariable> old_opindex_to_variables;

// When the last operation of a Block is a Goto to a Block with a single
// predecessor, we always inline the destination into the current block. To
// avoid making this process recursive (which could lead to stack overflows),
// we set the variable {block_to_inline_now_} instead. Right after we're done
// visiting a Block, the function ProcessWaitingCloningAndInlining will inline
// {block_to_inline_now_} (if it's set) in a non-recursive way.
Block* block_to_inline_now_ = nullptr;

// When a Reducer wants to clone a block (for instance,
// BranchEliminationReducer, in order to remove Phis or to replace a Branch by
// a
Goto), this block is not cloned right away, in order to avoid recursion
// (which could lead to stack overflows). Instead, we add this block to
// {blocks_to_clone_}. Right after we're done visiting a Block, the function
// ProcessWaitingCloningAndInlining will actually clone the blocks in
// {blocks_to_clone_} in a non-recursive way.
struct BlockToClone {
  const Block* input_block;
  int added_block_phi_input;
  Block* new_output_block;
};
ZoneVector<BlockToClone> blocks_to_clone_;

#ifdef DEBUG
// Recursively inlining blocks is still allowed (mainly for
// LoopUnrollingReducer), but it shouldn't be actually recursive. This is
```

```
 // checked by the {is_in_recursive_inlining_}, which is set to true while
 // recursively inlining a block. Trying to inline a block while
 // {is_in_recursive_inlining_} is true will lead to a DCHECK failure.
 bool is_in_recursive_inlining_ = false;
#endif
};

template <template <class> class... Reducers>
class TSAssembler;

template
 <template <class> class... Reducers>
class CopyingPhaseImpl {
public:
 static void Run(Graph& input_graph, Zone* phase_zone,
                 bool trace_reductions = false) {
   TSAssembler<GraphVisitor, Reducers...> phase(
       input_graph, input_graph.GetOrCreateCompanion(), phase_zone);
#ifdef DEBUG
   if (trace_reductions) {
     phase.template VisitGraph<true>();
   } else {
     phase.template VisitGraph<false>();
   }
#else
   phase.template VisitGraph<false>();
#endif  // DEBUG
 }
};

template <template <typename> typename... Reducers>
class CopyingPhase {
public:
 static void Run(Zone* phase_zone) {
   PipelineData& data = PipelineData::Get();
   Graph& input_graph = data.graph();
   CopyingPhaseImpl<Reducers...>::Run(
       input_graph, phase_zone, data.info()->turboshaft_trace_reduction());
 }
};

}  // namespace v8::internal::compiler::turboshaft

#endif  // V8_COMPILER_TURBOSHAFT_COPYING_PHASE_H_
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```
name: License update
on:
 schedule:
   # 00:00:00 every Monday
   # https://crontab.guru/#0_0_*_*_1
   - cron: 0 0 * * 1
 workflow_dispatch:

permissions:
 contents: read

jobs:
 update_license:
   permissions:
     contents: write  # for gr2m/create-or-update-pull-request-action to push local changes
     pull-requests: write  # for gr2m/create-or-update-pull-request-action to create a PR
   if: github.repository == 'nodejs/node'
   runs-on: ubuntu-slim
   steps:
     - uses: actions/checkout@08c6903cd8c0fde910a37f88322edcfb5dd907a8  # v5.0.0
       with:
         persist-credentials: false
     - run: ./tools/license-builder.sh  # Run the license builder tool
     - uses: gr2m/create-or-update-pull-request-action@86ec1766034c8173518f61d2075cc2a173fb8c97  # v1.9.4
```

```
      # Creates a PR or update the Action's existing PR, or
      # no-op if the base branch is already up-to-date.
      env:
        GITHUB_TOKEN: ${{ secrets.GITHUB_TOKEN }}
      with:

  author: Node.js GitHub Bot <github-bot@iojs.org>
        branch: actions/license-builder
        title: 'doc: run license-builder'
        body: >
          License is likely out of date. This is an automatically generated PR by
          the `license-builder.yml` GitHub Action, which runs `license-builder.sh`
          and submits a new PR or updates an existing PR.
        commit-message: 'doc: run license-builder'
        labels: meta
```

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# Blue Oak Model License

Version 1.0.0

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```
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* WARNING: do not edit!
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*/

#include "crypto/ec.h"
#include "internal/der.h"

/* Well known OIDs precompiled */
/* clang-format off */

/*
* sm2-with-SM3 OBJECT IDENTIFIER ::= { sm-scheme 501 }
*/
#define DER_OID_V_sm2_with_SM3 DER_P_OBJECT, 8, 0x2A, 0x81, 0x1C, 0xCF, 0x55, 0x01, 0x83, 0x75
#define DER_OID_SZ_sm2_with_SM3 10
extern const unsigned char ossl_der_oid_sm2_with_SM3[DER_OID_SZ_sm2_with_SM3];

/*
* curveSM2 OBJECT IDENTIFIER ::= { sm-scheme 301 }
*/
#define DER_OID_V_curveSM2 DER_P_OBJECT, 8, 0x2A, 0x81, 0x1C, 0xCF, 0x55, 0x01, 0x82, 0x2D
#define DER_OID_SZ_curveSM2 10
extern
 const unsigned char ossl_der_oid_curveSM2[DER_OID_SZ_curveSM2];

/* clang-format on */
```

```
/* Subject Public Key Info */
int ossl_DER_w_algorithmIdentifier_SM2(WPACKET *pkt, int cont, EC_KEY *ec);
/* Signature */
int ossl_DER_w_algorithmIdentifier_SM2_with_MD(WPACKET *pkt, int cont,
   EC_KEY *ec, int mdnid);
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from providers/common/include/prov/der_ml_dsa.h.in
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*/
```

```
#include "internal/der.h"
#include "crypto/ml_dsa.h"

/* Well known OIDs precompiled */
/* clang-format off */

/*
* id-ml-dsa-44 OBJECT IDENTIFIER ::= { sigAlgs 17 }
*/
#define DER_OID_V_id_ml_dsa_44 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x03, 0x11
#define DER_OID_SZ_id_ml_dsa_44 11
extern const unsigned char ossl_der_oid_id_ml_dsa_44[DER_OID_SZ_id_ml_dsa_44];

/*
* id-ml-dsa-65 OBJECT IDENTIFIER ::= { sigAlgs 18 }
*/
#define DER_OID_V_id_ml_dsa_65 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x03, 0x12
#define DER_OID_SZ_id_ml_dsa_65
 11
extern const unsigned char ossl_der_oid_id_ml_dsa_65[DER_OID_SZ_id_ml_dsa_65];

/*
* id-ml-dsa-87 OBJECT IDENTIFIER ::= { sigAlgs 19 }
*/
#define DER_OID_V_id_ml_dsa_87 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x03, 0x13
#define DER_OID_SZ_id_ml_dsa_87 11
extern const unsigned char ossl_der_oid_id_ml_dsa_87[DER_OID_SZ_id_ml_dsa_87];

/* clang-format on */

int ossl_DER_w_algorithmIdentifier_ML_DSA(WPACKET *pkt, int tag, ML_DSA_KEY *key);
```

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*/

#ifndef UV_BSD_H
#define UV_BSD_H

```
#define UV_PLATFORM_FS_EVENT_FIELDS                                  \
 uv__io_t event_watcher;                                             \

#define UV_IO_PRIVATE_PLATFORM_FIELDS                                \
 int rcount;                                                         \
 int wcount;                                                         \

#define UV_HAVE_KQUEUE 1

#endif /* UV_BSD_H */
```

This license applies to all parts of V8 that are not externally maintained libraries. The externally maintained libraries used by V8 are:

- PCRE test suite, located in test/mjsunit/third_party/regexp-pcre/regexp-pcre.js. This is based on the test suite from PCRE-7.3, which is copyrighted by the University of Cambridge and Google, Inc. The copyright notice and license are embedded in regexp-pcre.js.

- Layout tests, located in test/mjsunit/third_party/object-keys. These are based on layout tests from webkit.org which are copyrighted by Apple Computer, Inc. and released under a 3-clause BSD license.

- Strongtalk assembler, the basis of the files assembler-arm-inl.h, assembler-arm.cc, assembler-arm.h, assembler-ia32-inl.h, assembler-ia32.cc, assembler-ia32.h, assembler-x64-inl.h, assembler-x64.cc, assembler-x64.h, assembler.cc and assembler.h. This code is copyrighted by Sun Microsystems Inc. and released under a 3-clause BSD license.

- Valgrind client API header, located at src/third_party/valgrind/valgrind.h This is released under the BSD license.

- The Wasm C/C++ API headers, located at third_party/wasm-api/wasm.{h,hh} This is released under the Apache license. The API's upstream prototype implementation also formed the basis of V8's implementation in src/wasm/c-api.cc.

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```
#ifndef SRC_PERMISSION_WASI_PERMISSION_H_
#define SRC_PERMISSION_WASI_PERMISSION_H_

#if defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS

#include <vector>
#include "permission/permission_base.h"

namespace node {

namespace permission {

class WASIPermission final : public PermissionBase {
public:
 void Apply(Environment* env,
            const std::vector<std::string>& allow,
            PermissionScope scope) override;
 bool is_granted(Environment* env,
                 PermissionScope perm,
                 const std::string_view& param = "") const override;

private:
 bool deny_all_;
```

```
};

}  // namespace permission

}  // namespace node

#endif  // defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
#endif  // SRC_PERMISSION_WASI_PERMISSION_H_
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```

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```
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*/
/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_CORE_NAMES_H
#define OPENSSL_CORE_NAMES_H
#pragma once

#ifdef __cplusplus
extern "C" {
#endif

/* OSSL_CIPHER_PARAM_CTS_MODE Values */
#define OSSL_CIPHER_CTS_MODE_CS1 "CS1"
#define OSSL_CIPHER_CTS_MODE_CS2 "CS2"
```

```
#define OSSL_CIPHER_CTS_MODE_CS3 "CS3"

/* Known CIPHER names (not a complete list) */
#define OSSL_CIPHER_NAME_AES_128_GCM_SIV "AES-128-GCM-SIV"
#define OSSL_CIPHER_NAME_AES_192_GCM_SIV "AES-192-GCM-SIV"
#define OSSL_CIPHER_NAME_AES_256_GCM_SIV "AES-256-GCM-SIV"

/* Known DIGEST names (not a complete
 list) */
#define OSSL_DIGEST_NAME_MD5 "MD5"
#define OSSL_DIGEST_NAME_MD5_SHA1 "MD5-SHA1"
#define OSSL_DIGEST_NAME_SHA1 "SHA1"
#define OSSL_DIGEST_NAME_SHA2_224 "SHA2-224"
#define OSSL_DIGEST_NAME_SHA2_256 "SHA2-256"
#define OSSL_DIGEST_NAME_SHA2_256_192 "SHA2-256/192"
#define OSSL_DIGEST_NAME_SHA2_384 "SHA2-384"
#define OSSL_DIGEST_NAME_SHA2_512 "SHA2-512"
#define OSSL_DIGEST_NAME_SHA2_512_224 "SHA2-512/224"
#define OSSL_DIGEST_NAME_SHA2_512_256 "SHA2-512/256"
#define OSSL_DIGEST_NAME_MD2 "MD2"
#define OSSL_DIGEST_NAME_MD4 "MD4"
#define OSSL_DIGEST_NAME_MDC2 "MDC2"
#define OSSL_DIGEST_NAME_RIPEMD160 "RIPEMD160"
#define OSSL_DIGEST_NAME_SHA3_224 "SHA3-224"
#define OSSL_DIGEST_NAME_SHA3_256 "SHA3-256"
#define OSSL_DIGEST_NAME_SHA3_384 "SHA3-384"
#define OSSL_DIGEST_NAME_SHA3_512 "SHA3-512"
#define OSSL_DIGEST_NAME_KECCAK_KMAC128 "KECCAK-KMAC-128"
#define OSSL_DIGEST_NAME_KECCAK_KMAC256 "KECCAK-KMAC-256"
#define OSSL_DIGEST_NAME_SM3 "SM3"

/* Known MAC names */
#define OSSL_MAC_NAME_BLAKE2BMAC
 "BLAKE2BMAC"
#define OSSL_MAC_NAME_BLAKE2SMAC "BLAKE2SMAC"
#define OSSL_MAC_NAME_CMAC "CMAC"
#define OSSL_MAC_NAME_GMAC "GMAC"
#define OSSL_MAC_NAME_HMAC "HMAC"
#define OSSL_MAC_NAME_KMAC128 "KMAC128"
#define OSSL_MAC_NAME_KMAC256 "KMAC256"
#define OSSL_MAC_NAME_POLY1305 "POLY1305"
#define OSSL_MAC_NAME_SIPHASH "SIPHASH"

/* Known KDF names */
#define OSSL_KDF_NAME_HKDF "HKDF"
#define OSSL_KDF_NAME_TLS1_3_KDF "TLS13-KDF"
#define OSSL_KDF_NAME_PBKDF1 "PBKDF1"
#define OSSL_KDF_NAME_PBKDF2 "PBKDF2"
```

```
#define OSSL_KDF_NAME_SCRYPT "SCRYPT"
#define OSSL_KDF_NAME_SSHKDF "SSHKDF"
#define OSSL_KDF_NAME_SSKDF "SSKDF"
#define OSSL_KDF_NAME_TLS1_PRF "TLS1-PRF"
#define OSSL_KDF_NAME_X942KDF_ASN1 "X942KDF-ASN1"
#define OSSL_KDF_NAME_X942KDF_CONCAT "X942KDF-CONCAT"
#define OSSL_KDF_NAME_X963KDF "X963KDF"
#define OSSL_KDF_NAME_KBKDF "KBKDF"
#define OSSL_KDF_NAME_KRB5KDF "KRB5KDF"
#define OSSL_KDF_NAME_HMACDRBGKDF "HMAC-DRBG-KDF"

/* RSA padding modes */
#define OSSL_PKEY_RSA_PAD_MODE_NONE "none"
#define
 OSSL_PKEY_RSA_PAD_MODE_PKCSV15 "pkcs1"
#define OSSL_PKEY_RSA_PAD_MODE_OAEP "oaep"
#define OSSL_PKEY_RSA_PAD_MODE_X931 "x931"
#define OSSL_PKEY_RSA_PAD_MODE_PSS "pss"

/* RSA pss padding salt length */
#define OSSL_PKEY_RSA_PSS_SALT_LEN_DIGEST "digest"
#define OSSL_PKEY_RSA_PSS_SALT_LEN_MAX "max"
#define OSSL_PKEY_RSA_PSS_SALT_LEN_AUTO "auto"
#define OSSL_PKEY_RSA_PSS_SALT_LEN_AUTO_DIGEST_MAX "auto-digestmax"

/* OSSL_PKEY_PARAM_EC_ENCODING values */
#define OSSL_PKEY_EC_ENCODING_EXPLICIT "explicit"
#define OSSL_PKEY_EC_ENCODING_GROUP "named_curve"

#define OSSL_PKEY_EC_POINT_CONVERSION_FORMAT_UNCOMPRESSED "uncompressed"
#define OSSL_PKEY_EC_POINT_CONVERSION_FORMAT_COMPRESSED "compressed"
#define OSSL_PKEY_EC_POINT_CONVERSION_FORMAT_HYBRID "hybrid"

#define OSSL_PKEY_EC_GROUP_CHECK_DEFAULT "default"
#define OSSL_PKEY_EC_GROUP_CHECK_NAMED "named"
#define OSSL_PKEY_EC_GROUP_CHECK_NAMED_NIST "named-nist"

/* PROV_SKEY well known key types */
#define OSSL_SKEY_TYPE_GENERIC "GENERIC-SECRET"
#define
 OSSL_SKEY_TYPE_AES "AES"

/* OSSL_KEM_PARAM_OPERATION values */
#define OSSL_KEM_PARAM_OPERATION_RSASVE "RSASVE"
#define OSSL_KEM_PARAM_OPERATION_DHKEM "DHKEM"

/* Provider configuration variables */
#define OSSL_PKEY_RETAIN_SEED "pkey_retain_seed"
```

```
/* Parameter name definitions - generated by util/perl/OpenSSL/paramnames.pm */
/* clang-format off */
# define OSSL_ALG_PARAM_ALGORITHM_ID "algorithm-id"
# define OSSL_ALG_PARAM_ALGORITHM_ID_PARAMS "algorithm-id-params"
# define OSSL_ALG_PARAM_CIPHER "cipher"
# define OSSL_ALG_PARAM_DIGEST "digest"
# define OSSL_ALG_PARAM_ENGINE "engine"
# define OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR "fips-indicator"
# define OSSL_ALG_PARAM_MAC "mac"
# define OSSL_ALG_PARAM_PROPERTIES "properties"
# define OSSL_ASYM_CIPHER_PARAM_DIGEST OSSL_PKEY_PARAM_DIGEST
# define OSSL_ASYM_CIPHER_PARAM_ENGINE OSSL_PKEY_PARAM_ENGINE
# define OSSL_ASYM_CIPHER_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_ASYM_CIPHER_PARAM_FIPS_KEY_CHECK
 OSSL_PKEY_PARAM_FIPS_KEY_CHECK
# define OSSL_ASYM_CIPHER_PARAM_FIPS_RSA_PKCS15_PAD_DISABLED
OSSL_PROV_PARAM_RSA_PKCS15_PAD_DISABLED
# define OSSL_ASYM_CIPHER_PARAM_IMPLICIT_REJECTION "implicit-rejection"
# define OSSL_ASYM_CIPHER_PARAM_MGF1_DIGEST OSSL_PKEY_PARAM_MGF1_DIGEST
# define OSSL_ASYM_CIPHER_PARAM_MGF1_DIGEST_PROPS
OSSL_PKEY_PARAM_MGF1_PROPERTIES
# define OSSL_ASYM_CIPHER_PARAM_OAEP_DIGEST OSSL_ALG_PARAM_DIGEST
# define OSSL_ASYM_CIPHER_PARAM_OAEP_DIGEST_PROPS "digest-props"
# define OSSL_ASYM_CIPHER_PARAM_OAEP_LABEL "oaep-label"
# define OSSL_ASYM_CIPHER_PARAM_PAD_MODE OSSL_PKEY_PARAM_PAD_MODE
# define OSSL_ASYM_CIPHER_PARAM_PROPERTIES OSSL_PKEY_PARAM_PROPERTIES
# define OSSL_ASYM_CIPHER_PARAM_TLS_CLIENT_VERSION "tls-client-version"
# define OSSL_ASYM_CIPHER_PARAM_TLS_NEGOTIATED_VERSION "tls-negotiated-version"
# define OSSL_CAPABILITY_TLS_GROUP_ALG "tls-group-alg"
# define OSSL_CAPABILITY_TLS_GROUP_ID "tls-group-id"
# define OSSL_CAPABILITY_TLS_GROUP_IS_KEM
 "tls-group-is-kem"
# define OSSL_CAPABILITY_TLS_GROUP_MAX_DTLS "tls-max-dtls"
# define OSSL_CAPABILITY_TLS_GROUP_MAX_TLS "tls-max-tls"
# define OSSL_CAPABILITY_TLS_GROUP_MIN_DTLS "tls-min-dtls"
# define OSSL_CAPABILITY_TLS_GROUP_MIN_TLS "tls-min-tls"
# define OSSL_CAPABILITY_TLS_GROUP_NAME "tls-group-name"
# define OSSL_CAPABILITY_TLS_GROUP_NAME_INTERNAL "tls-group-name-internal"
# define OSSL_CAPABILITY_TLS_GROUP_SECURITY_BITS "tls-group-sec-bits"
# define OSSL_CAPABILITY_TLS_SIGALG_CODE_POINT "tls-sigalg-code-point"
# define OSSL_CAPABILITY_TLS_SIGALG_HASH_NAME "tls-sigalg-hash-name"
# define OSSL_CAPABILITY_TLS_SIGALG_HASH_OID "tls-sigalg-hash-oid"
# define OSSL_CAPABILITY_TLS_SIGALG_IANA_NAME "tls-sigalg-iana-name"
# define OSSL_CAPABILITY_TLS_SIGALG_KEYTYPE "tls-sigalg-keytype"
# define OSSL_CAPABILITY_TLS_SIGALG_KEYTYPE_OID "tls-sigalg-keytype-oid"
# define OSSL_CAPABILITY_TLS_SIGALG_MAX_DTLS "tls-max-dtls"
```

```
# define OSSL_CAPABILITY_TLS_SIGALG_MAX_TLS "tls-max-tls"
# define
 OSSL_CAPABILITY_TLS_SIGALG_MIN_DTLS "tls-min-dtls"
# define OSSL_CAPABILITY_TLS_SIGALG_MIN_TLS "tls-min-tls"
# define OSSL_CAPABILITY_TLS_SIGALG_NAME "tls-sigalg-name"
# define OSSL_CAPABILITY_TLS_SIGALG_OID "tls-sigalg-oid"
# define OSSL_CAPABILITY_TLS_SIGALG_SECURITY_BITS "tls-sigalg-sec-bits"
# define OSSL_CAPABILITY_TLS_SIGALG_SIG_NAME "tls-sigalg-sig-name"
# define OSSL_CAPABILITY_TLS_SIGALG_SIG_OID "tls-sigalg-sig-oid"
# define OSSL_CIPHER_PARAM_AEAD "aead"
# define OSSL_CIPHER_PARAM_AEAD_IVLEN OSSL_CIPHER_PARAM_IVLEN
# define OSSL_CIPHER_PARAM_AEAD_IV_GENERATED "iv-generated"
# define OSSL_CIPHER_PARAM_AEAD_MAC_KEY "mackey"
# define OSSL_CIPHER_PARAM_AEAD_TAG "tag"
# define OSSL_CIPHER_PARAM_AEAD_TAGLEN "taglen"
# define OSSL_CIPHER_PARAM_AEAD_TLS1_AAD "tlsaad"
# define OSSL_CIPHER_PARAM_AEAD_TLS1_AAD_PAD "tlsaadpad"
# define OSSL_CIPHER_PARAM_AEAD_TLS1_GET_IV_GEN "tlsivgen"
# define OSSL_CIPHER_PARAM_AEAD_TLS1_IV_FIXED "tlsivfixed"
# define OSSL_CIPHER_PARAM_AEAD_TLS1_SET_IV_INV
 "tlsivinv"
# define OSSL_CIPHER_PARAM_ALGORITHM_ID OSSL_ALG_PARAM_ALGORITHM_ID
# define OSSL_CIPHER_PARAM_ALGORITHM_ID_PARAMS
OSSL_ALG_PARAM_ALGORITHM_ID_PARAMS
# define OSSL_CIPHER_PARAM_ALGORITHM_ID_PARAMS_OLD "alg_id_param"
# define OSSL_CIPHER_PARAM_BLOCK_SIZE "blocksize"
# define OSSL_CIPHER_PARAM_CTS "cts"
# define OSSL_CIPHER_PARAM_CTS_MODE "cts_mode"
# define OSSL_CIPHER_PARAM_CUSTOM_IV "custom-iv"
# define OSSL_CIPHER_PARAM_DECRYPT_ONLY "decrypt-only"
# define OSSL_CIPHER_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_CIPHER_PARAM_FIPS_ENCRYPT_CHECK "encrypt-check"
# define OSSL_CIPHER_PARAM_HAS_RAND_KEY "has-randkey"
# define OSSL_CIPHER_PARAM_IV "iv"
# define OSSL_CIPHER_PARAM_IVLEN "ivlen"
# define OSSL_CIPHER_PARAM_KEYLEN "keylen"
# define OSSL_CIPHER_PARAM_MODE "mode"
# define OSSL_CIPHER_PARAM_NUM "num"
# define OSSL_CIPHER_PARAM_PADDING "padding"
# define OSSL_CIPHER_PARAM_PIPELINE_AEAD_TAG "pipeline-tag"
# define OSSL_CIPHER_PARAM_RANDOM_KEY
 "randkey"
# define OSSL_CIPHER_PARAM_RC2_KEYBITS "keybits"
# define OSSL_CIPHER_PARAM_ROUNDS "rounds"
# define OSSL_CIPHER_PARAM_SPEED "speed"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK "tls-multi"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK_AAD "tls1multi_aad"
```

```
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK_AAD_PACKLEN "tls1multi_aadpacklen"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK_ENC "tls1multi_enc"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK_ENC_IN "tls1multi_encin"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK_ENC_LEN "tls1multi_enclen"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK_INTERLEAVE "tls1multi_interleave"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK_MAX_BUFSIZE "tls1multi_maxbufsz"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK_MAX_SEND_FRAGMENT "tls1multi_maxsndfrag"
# define OSSL_CIPHER_PARAM_TLS_MAC "tls-mac"
# define OSSL_CIPHER_PARAM_TLS_MAC_SIZE "tls-mac-size"
# define OSSL_CIPHER_PARAM_TLS_VERSION "tls-version"
# define OSSL_CIPHER_PARAM_UPDATED_IV "updated-iv"
# define
 OSSL_CIPHER_PARAM_USE_BITS "use-bits"
# define OSSL_CIPHER_PARAM_XTS_STANDARD "xts_standard"
# define OSSL_DECODER_PARAM_PROPERTIES OSSL_ALG_PARAM_PROPERTIES
# define OSSL_DIGEST_PARAM_ALGID_ABSENT "algid-absent"
# define OSSL_DIGEST_PARAM_BLOCK_SIZE "blocksize"
# define OSSL_DIGEST_PARAM_MICALG "micalg"
# define OSSL_DIGEST_PARAM_PAD_TYPE "pad-type"
# define OSSL_DIGEST_PARAM_SIZE "size"
# define OSSL_DIGEST_PARAM_SSL3_MS "ssl3-ms"
# define OSSL_DIGEST_PARAM_XOF "xof"
# define OSSL_DIGEST_PARAM_XOFLEN "xoflen"
# define OSSL_DRBG_PARAM_CIPHER OSSL_ALG_PARAM_CIPHER
# define OSSL_DRBG_PARAM_DIGEST OSSL_ALG_PARAM_DIGEST
# define OSSL_DRBG_PARAM_ENTROPY_REQUIRED "entropy_required"
# define OSSL_DRBG_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_DRBG_PARAM_FIPS_DIGEST_CHECK OSSL_PKEY_PARAM_FIPS_DIGEST_CHECK
# define OSSL_DRBG_PARAM_MAC OSSL_ALG_PARAM_MAC
# define OSSL_DRBG_PARAM_MAX_ADINLEN "max_adinlen"
# define OSSL_DRBG_PARAM_MAX_ENTROPYLEN "max_entropylen"
#
 define OSSL_DRBG_PARAM_MAX_LENGTH "maxium_length"
# define OSSL_DRBG_PARAM_MAX_NONCELEN "max_noncelen"
# define OSSL_DRBG_PARAM_MAX_PERSLEN "max_perslen"
# define OSSL_DRBG_PARAM_MIN_ENTROPYLEN "min_entropylen"
# define OSSL_DRBG_PARAM_MIN_LENGTH "minium_length"
# define OSSL_DRBG_PARAM_MIN_NONCELEN "min_noncelen"
# define OSSL_DRBG_PARAM_PREDICTION_RESISTANCE "prediction_resistance"
# define OSSL_DRBG_PARAM_PROPERTIES OSSL_ALG_PARAM_PROPERTIES
# define OSSL_DRBG_PARAM_RANDOM_DATA "random_data"
# define OSSL_DRBG_PARAM_RESEED_COUNTER "reseed_counter"
# define OSSL_DRBG_PARAM_RESEED_REQUESTS "reseed_requests"
# define OSSL_DRBG_PARAM_RESEED_TIME "reseed_time"
# define OSSL_DRBG_PARAM_RESEED_TIME_INTERVAL "reseed_time_interval"
# define OSSL_DRBG_PARAM_SIZE "size"
# define OSSL_DRBG_PARAM_USE_DF "use_derivation_function"
```

```
# define OSSL_ENCODER_PARAM_CIPHER OSSL_ALG_PARAM_CIPHER
# define OSSL_ENCODER_PARAM_ENCRYPT_LEVEL "encrypt-level"
# define OSSL_ENCODER_PARAM_PROPERTIES OSSL_ALG_PARAM_PROPERTIES
#
 define OSSL_ENCODER_PARAM_SAVE_PARAMETERS "save-parameters"
# define OSSL_EXCHANGE_PARAM_EC_ECDH_COFACTOR_MODE "ecdh-cofactor-mode"
# define OSSL_EXCHANGE_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_EXCHANGE_PARAM_FIPS_DIGEST_CHECK OSSL_PKEY_PARAM_FIPS_DIGEST_CHECK
# define OSSL_EXCHANGE_PARAM_FIPS_ECDH_COFACTOR_CHECK
OSSL_PROV_PARAM_ECDH_COFACTOR_CHECK
# define OSSL_EXCHANGE_PARAM_FIPS_KEY_CHECK OSSL_PKEY_PARAM_FIPS_KEY_CHECK
# define OSSL_EXCHANGE_PARAM_KDF_DIGEST "kdf-digest"
# define OSSL_EXCHANGE_PARAM_KDF_DIGEST_PROPS "kdf-digest-props"
# define OSSL_EXCHANGE_PARAM_KDF_OUTLEN "kdf-outlen"
# define OSSL_EXCHANGE_PARAM_KDF_TYPE "kdf-type"
# define OSSL_EXCHANGE_PARAM_KDF_UKM "kdf-ukm"
# define OSSL_EXCHANGE_PARAM_PAD "pad"
# define OSSL_GEN_PARAM_ITERATION "iteration"
# define OSSL_GEN_PARAM_POTENTIAL "potential"
# define OSSL_KDF_PARAM_ARGON2_AD "ad"
# define OSSL_KDF_PARAM_ARGON2_LANES "lanes"
# define OSSL_KDF_PARAM_ARGON2_MEMCOST
 "memcost"
# define OSSL_KDF_PARAM_ARGON2_VERSION "version"
# define OSSL_KDF_PARAM_CEK_ALG "cekalg"
# define OSSL_KDF_PARAM_CIPHER OSSL_ALG_PARAM_CIPHER
# define OSSL_KDF_PARAM_CONSTANT "constant"
# define OSSL_KDF_PARAM_DATA "data"
# define OSSL_KDF_PARAM_DIGEST OSSL_ALG_PARAM_DIGEST
# define OSSL_KDF_PARAM_EARLY_CLEAN "early_clean"
# define OSSL_KDF_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_KDF_PARAM_FIPS_DIGEST_CHECK OSSL_PKEY_PARAM_FIPS_DIGEST_CHECK
# define OSSL_KDF_PARAM_FIPS_EMS_CHECK "ems_check"
# define OSSL_KDF_PARAM_FIPS_KEY_CHECK OSSL_PKEY_PARAM_FIPS_KEY_CHECK
# define OSSL_KDF_PARAM_HMACDRBG_ENTROPY "entropy"
# define OSSL_KDF_PARAM_HMACDRBG_NONCE "nonce"
# define OSSL_KDF_PARAM_INFO "info"
# define OSSL_KDF_PARAM_ITER "iter"
# define OSSL_KDF_PARAM_KBKDF_R "r"
# define OSSL_KDF_PARAM_KBKDF_USE_L "use-l"
# define OSSL_KDF_PARAM_KBKDF_USE_SEPARATOR "use-separator"
# define OSSL_KDF_PARAM_KEY "key"
# define OSSL_KDF_PARAM_LABEL
 "label"
# define OSSL_KDF_PARAM_MAC OSSL_ALG_PARAM_MAC
# define OSSL_KDF_PARAM_MAC_SIZE "maclen"
```

```
# define OSSL_KDF_PARAM_MODE "mode"
# define OSSL_KDF_PARAM_PASSWORD "pass"
# define OSSL_KDF_PARAM_PKCS12_ID "id"
# define OSSL_KDF_PARAM_PKCS5 "pkcs5"
# define OSSL_KDF_PARAM_PREFIX "prefix"
# define OSSL_KDF_PARAM_PROPERTIES OSSL_ALG_PARAM_PROPERTIES
# define OSSL_KDF_PARAM_SALT "salt"
# define OSSL_KDF_PARAM_SCRYPT_MAXMEM "maxmem_bytes"
# define OSSL_KDF_PARAM_SCRYPT_N "n"
# define OSSL_KDF_PARAM_SCRYPT_P "p"
# define OSSL_KDF_PARAM_SCRYPT_R "r"
# define OSSL_KDF_PARAM_SECRET "secret"
# define OSSL_KDF_PARAM_SEED "seed"
# define OSSL_KDF_PARAM_SIZE "size"
# define OSSL_KDF_PARAM_SSHKDF_SESSION_ID "session_id"
# define OSSL_KDF_PARAM_SSHKDF_TYPE "type"
# define OSSL_KDF_PARAM_SSHKDF_XCGHASH "xcghash"
# define OSSL_KDF_PARAM_THREADS "threads"
# define OSSL_KDF_PARAM_UKM "ukm"
# define OSSL_KDF_PARAM_X942_ACVPINFO "acvp-info"
# define OSSL_KDF_PARAM_X942_PARTYUINFO "partyu-info"
#
 define OSSL_KDF_PARAM_X942_PARTYVINFO "partyv-info"
# define OSSL_KDF_PARAM_X942_SUPP_PRIVINFO "supp-privinfo"
# define OSSL_KDF_PARAM_X942_SUPP_PUBINFO "supp-pubinfo"
# define OSSL_KDF_PARAM_X942_USE_KEYBITS "use-keybits"
# define OSSL_KEM_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_KEM_PARAM_FIPS_KEY_CHECK OSSL_PKEY_PARAM_FIPS_KEY_CHECK
# define OSSL_KEM_PARAM_IKME "ikme"
# define OSSL_KEM_PARAM_OPERATION "operation"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_BLOCK_PADDING "block_padding"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_HS_PADDING "hs_padding"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_MAX_EARLY_DATA "max_early_data"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_MAX_FRAG_LEN "max_frag_len"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_MODE "mode"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_OPTIONS "options"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_READ_AHEAD "read_ahead"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_STREAM_MAC "stream_mac"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_TLSTREE
 "tlstree"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_USE_ETM "use_etm"
# define OSSL_LIBSSL_RECORD_LAYER_READ_BUFFER_LEN "read_buffer_len"
# define OSSL_MAC_PARAM_BLOCK_SIZE "block-size"
# define OSSL_MAC_PARAM_CIPHER OSSL_ALG_PARAM_CIPHER
# define OSSL_MAC_PARAM_CUSTOM "custom"
# define OSSL_MAC_PARAM_C_ROUNDS "c-rounds"
# define OSSL_MAC_PARAM_DIGEST OSSL_ALG_PARAM_DIGEST
```

```
# define OSSL_MAC_PARAM_DIGEST_NOINIT "digest-noinit"
# define OSSL_MAC_PARAM_DIGEST_ONESHOT "digest-oneshot"
# define OSSL_MAC_PARAM_D_ROUNDS "d-rounds"
# define OSSL_MAC_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_MAC_PARAM_FIPS_KEY_CHECK OSSL_PKEY_PARAM_FIPS_KEY_CHECK
# define OSSL_MAC_PARAM_FIPS_NO_SHORT_MAC OSSL_PROV_PARAM_NO_SHORT_MAC
# define OSSL_MAC_PARAM_IV "iv"
# define OSSL_MAC_PARAM_KEY "key"
# define OSSL_MAC_PARAM_PROPERTIES OSSL_ALG_PARAM_PROPERTIES
# define OSSL_MAC_PARAM_SALT "salt"
# define OSSL_MAC_PARAM_SIZE "size"
# define OSSL_MAC_PARAM_TLS_DATA_SIZE
 "tls-data-size"
# define OSSL_MAC_PARAM_XOF "xof"
# define OSSL_OBJECT_PARAM_DATA "data"
# define OSSL_OBJECT_PARAM_DATA_STRUCTURE "data-structure"
# define OSSL_OBJECT_PARAM_DATA_TYPE "data-type"
# define OSSL_OBJECT_PARAM_DESC "desc"
# define OSSL_OBJECT_PARAM_INPUT_TYPE "input-type"
# define OSSL_OBJECT_PARAM_REFERENCE "reference"
# define OSSL_OBJECT_PARAM_TYPE "type"
# define OSSL_PASSPHRASE_PARAM_INFO "info"
# define OSSL_PKEY_PARAM_ALGORITHM_ID OSSL_ALG_PARAM_ALGORITHM_ID
# define OSSL_PKEY_PARAM_ALGORITHM_ID_PARAMS
OSSL_ALG_PARAM_ALGORITHM_ID_PARAMS
# define OSSL_PKEY_PARAM_BITS "bits"
# define OSSL_PKEY_PARAM_CIPHER OSSL_ALG_PARAM_CIPHER
# define OSSL_PKEY_PARAM_DEFAULT_DIGEST "default-digest"
# define OSSL_PKEY_PARAM_DHKEM_IKM "dhkem-ikm"
# define OSSL_PKEY_PARAM_DH_GENERATOR "safeprime-generator"
# define OSSL_PKEY_PARAM_DH_PRIV_LEN "priv_len"
# define OSSL_PKEY_PARAM_DIGEST OSSL_ALG_PARAM_DIGEST
# define OSSL_PKEY_PARAM_DIGEST_SIZE "digest-size"
# define OSSL_PKEY_PARAM_DIST_ID
 "distid"
# define OSSL_PKEY_PARAM_EC_A "a"
# define OSSL_PKEY_PARAM_EC_B "b"
# define OSSL_PKEY_PARAM_EC_CHAR2_M "m"
# define OSSL_PKEY_PARAM_EC_CHAR2_PP_K1 "k1"
# define OSSL_PKEY_PARAM_EC_CHAR2_PP_K2 "k2"
# define OSSL_PKEY_PARAM_EC_CHAR2_PP_K3 "k3"
# define OSSL_PKEY_PARAM_EC_CHAR2_TP_BASIS "tp"
# define OSSL_PKEY_PARAM_EC_CHAR2_TYPE "basis-type"
# define OSSL_PKEY_PARAM_EC_COFACTOR "cofactor"
# define OSSL_PKEY_PARAM_EC_DECODED_FROM_EXPLICIT_PARAMS "decoded-from-explicit"
# define OSSL_PKEY_PARAM_EC_ENCODING "encoding"
# define OSSL_PKEY_PARAM_EC_FIELD_TYPE "field-type"
```

```
# define OSSL_PKEY_PARAM_EC_GENERATOR "generator"
# define OSSL_PKEY_PARAM_EC_GROUP_CHECK_TYPE "group-check"
# define OSSL_PKEY_PARAM_EC_INCLUDE_PUBLIC "include-public"
# define OSSL_PKEY_PARAM_EC_ORDER "order"
# define OSSL_PKEY_PARAM_EC_P "p"
# define OSSL_PKEY_PARAM_EC_POINT_CONVERSION_FORMAT "point-format"
# define OSSL_PKEY_PARAM_EC_PUB_X "qx"
# define OSSL_PKEY_PARAM_EC_PUB_Y "qy"
# define
 OSSL_PKEY_PARAM_EC_SEED "seed"
# define OSSL_PKEY_PARAM_ENCODED_PUBLIC_KEY "encoded-pub-key"
# define OSSL_PKEY_PARAM_ENGINE OSSL_ALG_PARAM_ENGINE
# define OSSL_PKEY_PARAM_FFC_COFACTOR "j"
# define OSSL_PKEY_PARAM_FFC_DIGEST OSSL_PKEY_PARAM_DIGEST
# define OSSL_PKEY_PARAM_FFC_DIGEST_PROPS OSSL_PKEY_PARAM_PROPERTIES
# define OSSL_PKEY_PARAM_FFC_G "g"
# define OSSL_PKEY_PARAM_FFC_GINDEX "gindex"
# define OSSL_PKEY_PARAM_FFC_H "hindex"
# define OSSL_PKEY_PARAM_FFC_P "p"
# define OSSL_PKEY_PARAM_FFC_PBITS "pbits"
# define OSSL_PKEY_PARAM_FFC_PCOUNTER "pcounter"
# define OSSL_PKEY_PARAM_FFC_Q "q"
# define OSSL_PKEY_PARAM_FFC_QBITS "qbits"
# define OSSL_PKEY_PARAM_FFC_SEED "seed"
# define OSSL_PKEY_PARAM_FFC_TYPE "type"
# define OSSL_PKEY_PARAM_FFC_VALIDATE_G "validate-g"
# define OSSL_PKEY_PARAM_FFC_VALIDATE_LEGACY "validate-legacy"
# define OSSL_PKEY_PARAM_FFC_VALIDATE_PQ "validate-pq"
# define OSSL_PKEY_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_PKEY_PARAM_FIPS_DIGEST_CHECK
 "digest-check"
# define OSSL_PKEY_PARAM_FIPS_KEY_CHECK "key-check"
# define OSSL_PKEY_PARAM_FIPS_SIGN_CHECK "sign-check"
# define OSSL_PKEY_PARAM_GROUP_NAME "group"
# define OSSL_PKEY_PARAM_IMPLICIT_REJECTION "implicit-rejection"
# define OSSL_PKEY_PARAM_MANDATORY_DIGEST "mandatory-digest"
# define OSSL_PKEY_PARAM_MASKGENFUNC "mgf"
# define OSSL_PKEY_PARAM_MAX_SIZE "max-size"
# define OSSL_PKEY_PARAM_MGF1_DIGEST "mgf1-digest"
# define OSSL_PKEY_PARAM_MGF1_PROPERTIES "mgf1-properties"
# define OSSL_PKEY_PARAM_ML_DSA_INPUT_FORMATS "ml-dsa.input_formats"
# define OSSL_PKEY_PARAM_ML_DSA_OUTPUT_FORMATS "ml-dsa.output_formats"
# define OSSL_PKEY_PARAM_ML_DSA_PREFER_SEED "ml-dsa.prefer_seed"
# define OSSL_PKEY_PARAM_ML_DSA_RETAIN_SEED "ml-dsa.retain_seed"
# define OSSL_PKEY_PARAM_ML_DSA_SEED "seed"
# define OSSL_PKEY_PARAM_ML_KEM_IMPORT_PCT_TYPE "ml-kem.import_pct_type"
# define OSSL_PKEY_PARAM_ML_KEM_INPUT_FORMATS "ml-kem.input_formats"
```

```
# define OSSL_PKEY_PARAM_ML_KEM_OUTPUT_FORMATS
 "ml-kem.output_formats"
# define OSSL_PKEY_PARAM_ML_KEM_PREFER_SEED "ml-kem.prefer_seed"
# define OSSL_PKEY_PARAM_ML_KEM_RETAIN_SEED "ml-kem.retain_seed"
# define OSSL_PKEY_PARAM_ML_KEM_SEED "seed"
# define OSSL_PKEY_PARAM_PAD_MODE "pad-mode"
# define OSSL_PKEY_PARAM_PRIV_KEY "priv"
# define OSSL_PKEY_PARAM_PROPERTIES OSSL_ALG_PARAM_PROPERTIES
# define OSSL_PKEY_PARAM_PUB_KEY "pub"
# define OSSL_PKEY_PARAM_RSA_BITS OSSL_PKEY_PARAM_BITS
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT "rsa-coefficient"
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT1 "rsa-coefficient1"
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT2 "rsa-coefficient2"
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT3 "rsa-coefficient3"
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT4 "rsa-coefficient4"
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT5 "rsa-coefficient5"
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT6 "rsa-coefficient6"
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT7 "rsa-coefficient7"
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT8 "rsa-coefficient8"
#
 define OSSL_PKEY_PARAM_RSA_COEFFICIENT9 "rsa-coefficient9"
# define OSSL_PKEY_PARAM_RSA_D "d"
# define OSSL_PKEY_PARAM_RSA_DERIVE_FROM_PQ "rsa-derive-from-pq"
# define OSSL_PKEY_PARAM_RSA_DIGEST OSSL_PKEY_PARAM_DIGEST
# define OSSL_PKEY_PARAM_RSA_DIGEST_PROPS OSSL_PKEY_PARAM_PROPERTIES
# define OSSL_PKEY_PARAM_RSA_E "e"
# define OSSL_PKEY_PARAM_RSA_EXPONENT "rsa-exponent"
# define OSSL_PKEY_PARAM_RSA_EXPONENT1 "rsa-exponent1"
# define OSSL_PKEY_PARAM_RSA_EXPONENT10 "rsa-exponent10"
# define OSSL_PKEY_PARAM_RSA_EXPONENT2 "rsa-exponent2"
# define OSSL_PKEY_PARAM_RSA_EXPONENT3 "rsa-exponent3"
# define OSSL_PKEY_PARAM_RSA_EXPONENT4 "rsa-exponent4"
# define OSSL_PKEY_PARAM_RSA_EXPONENT5 "rsa-exponent5"
# define OSSL_PKEY_PARAM_RSA_EXPONENT6 "rsa-exponent6"
# define OSSL_PKEY_PARAM_RSA_EXPONENT7 "rsa-exponent7"
# define OSSL_PKEY_PARAM_RSA_EXPONENT8 "rsa-exponent8"
# define OSSL_PKEY_PARAM_RSA_EXPONENT9 "rsa-exponent9"
# define OSSL_PKEY_PARAM_RSA_FACTOR "rsa-factor"
# define OSSL_PKEY_PARAM_RSA_FACTOR1
 "rsa-factor1"
# define OSSL_PKEY_PARAM_RSA_FACTOR10 "rsa-factor10"
# define OSSL_PKEY_PARAM_RSA_FACTOR2 "rsa-factor2"
# define OSSL_PKEY_PARAM_RSA_FACTOR3 "rsa-factor3"
# define OSSL_PKEY_PARAM_RSA_FACTOR4 "rsa-factor4"
# define OSSL_PKEY_PARAM_RSA_FACTOR5 "rsa-factor5"
# define OSSL_PKEY_PARAM_RSA_FACTOR6 "rsa-factor6"
# define OSSL_PKEY_PARAM_RSA_FACTOR7 "rsa-factor7"
# define OSSL_PKEY_PARAM_RSA_FACTOR8 "rsa-factor8"
```

```
# define OSSL_PKEY_PARAM_RSA_FACTOR9 "rsa-factor9"
# define OSSL_PKEY_PARAM_RSA_MASKGENFUNC OSSL_PKEY_PARAM_MASKGENFUNC
# define OSSL_PKEY_PARAM_RSA_MGF1_DIGEST OSSL_PKEY_PARAM_MGF1_DIGEST
# define OSSL_PKEY_PARAM_RSA_N "n"
# define OSSL_PKEY_PARAM_RSA_PRIMES "primes"
# define OSSL_PKEY_PARAM_RSA_PSS_SALTLEN "saltlen"
# define OSSL_PKEY_PARAM_RSA_TEST_P1 "p1"
# define OSSL_PKEY_PARAM_RSA_TEST_P2 "p2"
# define OSSL_PKEY_PARAM_RSA_TEST_Q1 "q1"
# define OSSL_PKEY_PARAM_RSA_TEST_Q2 "q2"
# define OSSL_PKEY_PARAM_RSA_TEST_XP "xp"
# define OSSL_PKEY_PARAM_RSA_TEST_XP1
 "xp1"
# define OSSL_PKEY_PARAM_RSA_TEST_XP2 "xp2"
# define OSSL_PKEY_PARAM_RSA_TEST_XQ "xq"
# define OSSL_PKEY_PARAM_RSA_TEST_XQ1 "xq1"
# define OSSL_PKEY_PARAM_RSA_TEST_XQ2 "xq2"
# define OSSL_PKEY_PARAM_SECURITY_BITS "security-bits"
# define OSSL_PKEY_PARAM_SLH_DSA_SEED "seed"
# define OSSL_PKEY_PARAM_USE_COFACTOR_ECDH OSSL_PKEY_PARAM_USE_COFACTOR_FLAG
# define OSSL_PKEY_PARAM_USE_COFACTOR_FLAG "use-cofactor-flag"
# define OSSL_PROV_PARAM_BUILDINFO "buildinfo"
# define OSSL_PROV_PARAM_CORE_MODULE_FILENAME "module-filename"
# define OSSL_PROV_PARAM_CORE_PROV_NAME "provider-name"
# define OSSL_PROV_PARAM_CORE_VERSION "openssl-version"
# define OSSL_PROV_PARAM_DRBG_TRUNC_DIGEST "drbg-no-trunc-md"
# define OSSL_PROV_PARAM_DSA_SIGN_DISABLED "dsa-sign-disabled"
# define OSSL_PROV_PARAM_ECDH_COFACTOR_CHECK "ecdh-cofactor-check"
# define OSSL_PROV_PARAM_HKDF_DIGEST_CHECK "hkdf-digest-check"
# define OSSL_PROV_PARAM_HKDF_KEY_CHECK "hkdf-key-check"
# define OSSL_PROV_PARAM_HMAC_KEY_CHECK
 "hmac-key-check"
# define OSSL_PROV_PARAM_KBKDF_KEY_CHECK "kbkdf-key-check"
# define OSSL_PROV_PARAM_KMAC_KEY_CHECK "kmac-key-check"
# define OSSL_PROV_PARAM_NAME "name"
# define OSSL_PROV_PARAM_NO_SHORT_MAC "no-short-mac"
# define OSSL_PROV_PARAM_PBKDF2_LOWER_BOUND_CHECK "pbkdf2-lower-bound-check"
# define OSSL_PROV_PARAM_RSA_PKCS15_PAD_DISABLED "rsa-pkcs15-pad-disabled"
# define OSSL_PROV_PARAM_RSA_PSS_SALTLEN_CHECK "rsa-pss-saltlen-check"
# define OSSL_PROV_PARAM_RSA_SIGN_X931_PAD_DISABLED "rsa-sign-x931-pad-disabled"
# define OSSL_PROV_PARAM_SECURITY_CHECKS "security-checks"
# define OSSL_PROV_PARAM_SELF_TEST_DESC "st-desc"
# define OSSL_PROV_PARAM_SELF_TEST_PHASE "st-phase"
# define OSSL_PROV_PARAM_SELF_TEST_TYPE "st-type"
# define OSSL_PROV_PARAM_SIGNATURE_DIGEST_CHECK "signature-digest-check"
# define OSSL_PROV_PARAM_SSHKDF_DIGEST_CHECK "sshkdf-digest-check"
# define OSSL_PROV_PARAM_SSHKDF_KEY_CHECK "sshkdf-key-check"
# define OSSL_PROV_PARAM_SSKDF_DIGEST_CHECK "sskdf-digest-check"
```

```
#
 define OSSL_PROV_PARAM_SSKDF_KEY_CHECK "sskdf-key-check"
# define OSSL_PROV_PARAM_STATUS "status"
# define OSSL_PROV_PARAM_TDES_ENCRYPT_DISABLED "tdes-encrypt-disabled"
# define OSSL_PROV_PARAM_TLS13_KDF_DIGEST_CHECK "tls13-kdf-digest-check"
# define OSSL_PROV_PARAM_TLS13_KDF_KEY_CHECK "tls13-kdf-key-check"
# define OSSL_PROV_PARAM_TLS1_PRF_DIGEST_CHECK "tls1-prf-digest-check"
# define OSSL_PROV_PARAM_TLS1_PRF_EMS_CHECK "tls1-prf-ems-check"
# define OSSL_PROV_PARAM_TLS1_PRF_KEY_CHECK "tls1-prf-key-check"
# define OSSL_PROV_PARAM_VERSION "version"
# define OSSL_PROV_PARAM_X942KDF_KEY_CHECK "x942kdf-key-check"
# define OSSL_PROV_PARAM_X963KDF_DIGEST_CHECK "x963kdf-digest-check"
# define OSSL_PROV_PARAM_X963KDF_KEY_CHECK "x963kdf-key-check"
# define OSSL_RAND_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_RAND_PARAM_GENERATE "generate"
# define OSSL_RAND_PARAM_MAX_REQUEST "max_request"
# define OSSL_RAND_PARAM_STATE "state"
# define OSSL_RAND_PARAM_STRENGTH
 "strength"
# define OSSL_RAND_PARAM_TEST_ENTROPY "test_entropy"
# define OSSL_RAND_PARAM_TEST_NONCE "test_nonce"
# define OSSL_SIGNATURE_PARAM_ADD_RANDOM "additional-random"
# define OSSL_SIGNATURE_PARAM_ALGORITHM_ID OSSL_PKEY_PARAM_ALGORITHM_ID
# define OSSL_SIGNATURE_PARAM_ALGORITHM_ID_PARAMS
OSSL_PKEY_PARAM_ALGORITHM_ID_PARAMS
# define OSSL_SIGNATURE_PARAM_CONTEXT_STRING "context-string"
# define OSSL_SIGNATURE_PARAM_DETERMINISTIC "deterministic"
# define OSSL_SIGNATURE_PARAM_DIGEST OSSL_PKEY_PARAM_DIGEST
# define OSSL_SIGNATURE_PARAM_DIGEST_SIZE OSSL_PKEY_PARAM_DIGEST_SIZE
# define OSSL_SIGNATURE_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_SIGNATURE_PARAM_FIPS_DIGEST_CHECK
OSSL_PKEY_PARAM_FIPS_DIGEST_CHECK
# define OSSL_SIGNATURE_PARAM_FIPS_KEY_CHECK OSSL_PKEY_PARAM_FIPS_KEY_CHECK
# define OSSL_SIGNATURE_PARAM_FIPS_RSA_PSS_SALTLEN_CHECK "rsa-pss-saltlen-check"
# define OSSL_SIGNATURE_PARAM_FIPS_SIGN_CHECK OSSL_PKEY_PARAM_FIPS_SIGN_CHECK
#
 define OSSL_SIGNATURE_PARAM_FIPS_SIGN_X931_PAD_CHECK "sign-x931-pad-check"
# define OSSL_SIGNATURE_PARAM_FIPS_VERIFY_MESSAGE "verify-message"
# define OSSL_SIGNATURE_PARAM_INSTANCE "instance"
# define OSSL_SIGNATURE_PARAM_KAT "kat"
# define OSSL_SIGNATURE_PARAM_MESSAGE_ENCODING "message-encoding"
# define OSSL_SIGNATURE_PARAM_MGF1_DIGEST OSSL_PKEY_PARAM_MGF1_DIGEST
# define OSSL_SIGNATURE_PARAM_MGF1_PROPERTIES OSSL_PKEY_PARAM_MGF1_PROPERTIES
# define OSSL_SIGNATURE_PARAM_MU "mu"
# define OSSL_SIGNATURE_PARAM_NONCE_TYPE "nonce-type"
# define OSSL_SIGNATURE_PARAM_PAD_MODE OSSL_PKEY_PARAM_PAD_MODE
```

```
# define OSSL_SIGNATURE_PARAM_PROPERTIES OSSL_PKEY_PARAM_PROPERTIES
# define OSSL_SIGNATURE_PARAM_PSS_SALTLEN "saltlen"
# define OSSL_SIGNATURE_PARAM_SIGNATURE "signature"
# define OSSL_SIGNATURE_PARAM_TEST_ENTROPY "test-entropy"
# define OSSL_SKEY_PARAM_KEY_LENGTH "key-length"
# define OSSL_SKEY_PARAM_RAW_BYTES "raw-bytes"
# define OSSL_STORE_PARAM_ALIAS "alias"
# define OSSL_STORE_PARAM_DIGEST
 "digest"
# define OSSL_STORE_PARAM_EXPECT "expect"
# define OSSL_STORE_PARAM_FINGERPRINT "fingerprint"
# define OSSL_STORE_PARAM_INPUT_TYPE "input-type"
# define OSSL_STORE_PARAM_ISSUER "name"
# define OSSL_STORE_PARAM_PROPERTIES "properties"
# define OSSL_STORE_PARAM_SERIAL "serial"
# define OSSL_STORE_PARAM_SUBJECT "subject"
/* clang-format on */

#ifdef __cplusplus
}
#endif

#endif
{
 'variables': {
   'openssl_defines_BSD-x86': [
     'NDEBUG',
     'L_ENDIAN',
     'OPENSSL_BUILDING_OPENSSL',
     'AES_ASM',
     'CMLL_ASM',
     'DES_ASM',
     'ECP_NISTZ256_ASM',
     'GHASH_ASM',
     'MD5_ASM',
     'OPENSSL_BN_ASM_GF2m',
     'OPENSSL_BN_ASM_MONT',
     'OPENSSL_BN_ASM_PART_WORDS',
     'OPENSSL_CPUID_OBJ',
     'OPENSSL_IA32_SSE2',
     'PADLOCK_ASM',
     'POLY1305_ASM',
     'RC4_ASM',
     'RMD160_ASM',
     'SHA1_ASM',
     'SHA256_ASM',
     'SHA512_ASM',
     'VPAES_ASM',
```

```
  'WHIRLPOOL_ASM',
  'OPENSSL_PIC',
],
'openssl_cflags_BSD-x86': [
  '-Wa,--noexecstack',
  '-Wall -O3 -fomit-frame-pointer',
  '-pthread',
  '-Wall -O3 -fomit-frame-pointer',
],
'openssl_ex_libs_BSD-x86': [
  '-pthread',
],
'openssl_cli_srcs_BSD-x86': [
  'openssl/apps/lib/cmp_mock_srv.c',
  'openssl/apps/asn1parse.c',
  'openssl/apps/ca.c',
  'openssl/apps/ciphers.c',
  'openssl/apps/cmp.c',
   'openssl/apps/cms.c',
  'openssl/apps/crl.c',
  'openssl/apps/crl2pkcs7.c',
  'openssl/apps/dgst.c',
  'openssl/apps/dhparam.c',
  'openssl/apps/dsa.c',
  'openssl/apps/dsaparam.c',
  'openssl/apps/ec.c',
  'openssl/apps/ecparam.c',
  'openssl/apps/enc.c',
  'openssl/apps/engine.c',
  'openssl/apps/errstr.c',
  'openssl/apps/fipsinstall.c',
  'openssl/apps/gendsa.c',
  'openssl/apps/genpkey.c',
  'openssl/apps/genrsa.c',
  'openssl/apps/info.c',
  'openssl/apps/kdf.c',
  'openssl/apps/list.c',
  'openssl/apps/mac.c',
  'openssl/apps/nseq.c',
  'openssl/apps/ocsp.c',
  'openssl/apps/openssl.c',
  'openssl/apps/passwd.c',
  'openssl/apps/pkcs12.c',
  'openssl/apps/pkcs7.c',
  'openssl/apps/pkcs8.c',
  'openssl/apps/pkey.c',
  'openssl/apps/pkeyparam.c',
  'openssl/apps/pkeyutl.c',
```

```
    'openssl/apps/prime.c',
    './config/archs/BSD-x86/asm_avx2/apps/progs.c',
     'openssl/apps/rand.c',
    'openssl/apps/rehash.c',
    'openssl/apps/req.c',
    'openssl/apps/rsa.c',
    'openssl/apps/rsautl.c',
    'openssl/apps/s_client.c',
    'openssl/apps/s_server.c',
    'openssl/apps/s_time.c',
    'openssl/apps/sess_id.c',
    'openssl/apps/skeyutl.c',
    'openssl/apps/smime.c',
    'openssl/apps/speed.c',
    'openssl/apps/spkac.c',
    'openssl/apps/srp.c',
    'openssl/apps/storeutl.c',
    'openssl/apps/ts.c',
    'openssl/apps/verify.c',
    'openssl/apps/version.c',
    'openssl/apps/x509.c',
    'openssl/apps/lib/app_libctx.c',
    'openssl/apps/lib/app_params.c',
    'openssl/apps/lib/app_provider.c',
    'openssl/apps/lib/app_rand.c',
    'openssl/apps/lib/app_x509.c',
    'openssl/apps/lib/apps.c',
    'openssl/apps/lib/apps_opt_printf.c',
    'openssl/apps/lib/apps_ui.c',
    'openssl/apps/lib/columns.c',
    'openssl/apps/lib/engine.c',
    'openssl/apps/lib/engine_loader.c',
     'openssl/apps/lib/fmt.c',
    'openssl/apps/lib/http_server.c',
    'openssl/apps/lib/log.c',
    'openssl/apps/lib/names.c',
    'openssl/apps/lib/opt.c',
    'openssl/apps/lib/s_cb.c',
    'openssl/apps/lib/s_socket.c',
    'openssl/apps/lib/tlssrp_depr.c',
  ],
},
'defines': ['<@(openssl_defines_BSD-x86)'],
'include_dirs': [
  './include',
],
'cflags' : ['<@(openssl_cflags_BSD-x86)'],
'libraries': ['<@(openssl_ex_libs_BSD-x86)'],
```

'sources': ['<@(openssl_cli_srcs_BSD-x86)'],
}

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---

This library is a fork of 'better-json-errors' by Kat Marchn, extended and
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```
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

/*
* Header for dynamic hash table routines Author - Eric Young
*/

#ifndef OPENSSL_LHASH_H
#define OPENSSL_LHASH_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_LHASH_H
#endif

#include <openssl/e_os2.h>
#include <openssl/bio.h>
#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif

#ifdef __cplusplus
extern "C" {
#endif

typedef struct lhash_node_st OPENSSL_LH_NODE;
typedef int (*OPENSSL_LH_COMPFUNC)(const void *, const void *);
typedef int (*OPENSSL_LH_COMPFUNCTHUNK)(const void *, const void *, OPENSSL_LH_COMPFUNC
cfn);
typedef unsigned long (*OPENSSL_LH_HASHFUNC)(const
 void *);
typedef unsigned long (*OPENSSL_LH_HASHFUNCTHUNK)(const void *, OPENSSL_LH_HASHFUNC hfn);
typedef void (*OPENSSL_LH_DOALL_FUNC)(void *);
```

```
typedef void (*OPENSSL_LH_DOALL_FUNC_THUNK)(void *, OPENSSL_LH_DOALL_FUNC doall);
typedef void (*OPENSSL_LH_DOALL_FUNCARG)(void *, void *);
typedef void (*OPENSSL_LH_DOALL_FUNCARG_THUNK)(void *, void *,
OPENSSL_LH_DOALL_FUNCARG doall);
typedef struct lhash_st OPENSSL_LHASH;

/*
* Macros for declaring and implementing type-safe wrappers for LHASH
* callbacks. This way, callbacks can be provided to LHASH structures without
* function pointer casting and the macro-defined callbacks provide
* per-variable casting before deferring to the underlying type-specific
* callbacks. NB: It is possible to place a "static" in front of both the
* DECLARE and IMPLEMENT macros if the functions are strictly internal.
*/

/* First: "hash" functions */
#define DECLARE_LHASH_HASH_FN(name, o_type) \
   unsigned long name##_LHASH_HASH(const void *);
#define
 IMPLEMENT_LHASH_HASH_FN(name, o_type)        \
   unsigned long name##_LHASH_HASH(const void *arg) \
   {                                            \
       const o_type *a = arg;                   \
       return name##_hash(a);                   \
   }
#define LHASH_HASH_FN(name) name##_LHASH_HASH

/* Second: "compare" functions */
#define DECLARE_LHASH_COMP_FN(name, o_type) \
   int name##_LHASH_COMP(const void *, const void *);
#define IMPLEMENT_LHASH_COMP_FN(name, o_type)                \
   int name##_LHASH_COMP(const void *arg1, const void *arg2) \
   {                                                         \
       const o_type *a = arg1;                               \
       const o_type *b = arg2;                               \
       return name##_cmp(a, b);                              \
   }
#define LHASH_COMP_FN(name) name##_LHASH_COMP

/* Fourth: "doall_arg" functions */
#define DECLARE_LHASH_DOALL_ARG_FN(name, o_type, a_type) \
   void
 name##_LHASH_DOALL_ARG(void *, void *);
#define IMPLEMENT_LHASH_DOALL_ARG_FN(name, o_type, a_type) \
   void name##_LHASH_DOALL_ARG(void *arg1, void *arg2)    \
   {                                                      \
       o_type *a = arg1;                                  \
       a_type *b = arg2;                                  \
```

```
    name##_doall_arg(a, b);                    \
  }
#define LHASH_DOALL_ARG_FN(name) name##_LHASH_DOALL_ARG

#define LH_LOAD_MULT 256

int OPENSSL_LH_error(OPENSSL_LHASH *lh);
OPENSSL_LHASH *OPENSSL_LH_new(OPENSSL_LH_HASHFUNC h, OPENSSL_LH_COMPFUNC c);
OPENSSL_LHASH *OPENSSL_LH_set_thunks(OPENSSL_LHASH *lh,
  OPENSSL_LH_HASHFUNCTHUNK hw,
  OPENSSL_LH_COMPFUNCTHUNK cw,
  OPENSSL_LH_DOALL_FUNC_THUNK daw,
  OPENSSL_LH_DOALL_FUNCARG_THUNK daaw);
void OPENSSL_LH_free(OPENSSL_LHASH *lh);
void OPENSSL_LH_flush(OPENSSL_LHASH *lh);
void *OPENSSL_LH_insert(OPENSSL_LHASH *lh, void *data);
void *OPENSSL_LH_delete(OPENSSL_LHASH *lh, const
 void *data);
void *OPENSSL_LH_retrieve(OPENSSL_LHASH *lh, const void *data);
void OPENSSL_LH_doall(OPENSSL_LHASH *lh, OPENSSL_LH_DOALL_FUNC func);
void OPENSSL_LH_doall_arg(OPENSSL_LHASH *lh,
  OPENSSL_LH_DOALL_FUNCARG func, void *arg);
void OPENSSL_LH_doall_arg_thunk(OPENSSL_LHASH *lh,
  OPENSSL_LH_DOALL_FUNCARG_THUNK daaw,
  OPENSSL_LH_DOALL_FUNCARG fn, void *arg);

unsigned long OPENSSL_LH_strhash(const char *c);
unsigned long OPENSSL_LH_num_items(const OPENSSL_LHASH *lh);
unsigned long OPENSSL_LH_get_down_load(const OPENSSL_LHASH *lh);
void OPENSSL_LH_set_down_load(OPENSSL_LHASH *lh, unsigned long down_load);

#ifndef OPENSSL_NO_STDIO
#ifndef OPENSSL_NO_DEPRECATED_3_1
OSSL_DEPRECATEDIN_3_1 void OPENSSL_LH_stats(const OPENSSL_LHASH *lh, FILE *fp);
OSSL_DEPRECATEDIN_3_1 void OPENSSL_LH_node_stats(const OPENSSL_LHASH *lh, FILE *fp);
OSSL_DEPRECATEDIN_3_1 void OPENSSL_LH_node_usage_stats(const OPENSSL_LHASH *lh, FILE *fp);
#endif
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_1
OSSL_DEPRECATEDIN_3_1
 void OPENSSL_LH_stats_bio(const OPENSSL_LHASH *lh, BIO *out);
OSSL_DEPRECATEDIN_3_1 void OPENSSL_LH_node_stats_bio(const OPENSSL_LHASH *lh, BIO *out);
OSSL_DEPRECATEDIN_3_1 void OPENSSL_LH_node_usage_stats_bio(const OPENSSL_LHASH *lh, BIO
*out);
#endif

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define _LHASH OPENSSL_LHASH
```

```
#define LHASH_NODE OPENSSL_LH_NODE
#define lh_error OPENSSL_LH_error
#define lh_new OPENSSL_LH_new
#define lh_free OPENSSL_LH_free
#define lh_insert OPENSSL_LH_insert
#define lh_delete OPENSSL_LH_delete
#define lh_retrieve OPENSSL_LH_retrieve
#define lh_doall OPENSSL_LH_doall
#define lh_doall_arg OPENSSL_LH_doall_arg
#define lh_strhash OPENSSL_LH_strhash
#define lh_num_items OPENSSL_LH_num_items
#ifndef OPENSSL_NO_STDIO
#define lh_stats OPENSSL_LH_stats
#define lh_node_stats OPENSSL_LH_node_stats
#define lh_node_usage_stats OPENSSL_LH_node_usage_stats
#endif
#define lh_stats_bio OPENSSL_LH_stats_bio
#define lh_node_stats_bio OPENSSL_LH_node_stats_bio
#define
 lh_node_usage_stats_bio OPENSSL_LH_node_usage_stats_bio
#endif

/* Type checking... */

#define LHASH_OF(type) struct lhash_st_##type

/* Helper macro for internal use */
#define DEFINE_LHASH_OF_INTERNAL(type)                                                  \
  LHASH_OF(type)                                                                        \
  {                                                                                     \
     union lh_##type##_dummy {                                                          \
        void *d1;                                                                       \
        unsigned long d2;                                                               \
        int d3;                                                                         \
     } dummy;
                                                                                        \
  };                                                                                    \
  typedef int (*lh_##type##_compfunc)(const type *a, const type *b);                    \
  typedef unsigned long (*lh_##type##_hashfunc)(const type *a);                         \
  typedef void (*lh_##type##_doallfunc)(type * a);                                      \
  static ossl_inline unsigned long lh_##type##_hash_thunk(const void *data, OPENSSL_LH_HASHFUNC hfn)
 \
  {                                                                                     \
     unsigned long (*hfn_conv)(const type *) = (unsigned long (*)(const type *))hfn;    \
     return hfn_conv((const type *)data);                                               \
  }
                                                                                        \
  static ossl_inline int lh_##type##_comp_thunk(const void *da, const void *db, OPENSSL_LH_COMPFUNC cfn)
```

```
\
{                                                                    \
    int (*cfn_conv)(const type *, const type *) = (int (*)(const type *, const type *))cfn;          \
    return cfn_conv((const type *)da, (const type *)db);                                             \
}                                                                    \
static ossl_inline void lh_##type##_doall_thunk(void *node, OPENSSL_LH_DOALL_FUNC doall)             \
{                                                                    \
    void (*doall_conv)(type *) = (void (*)(type *))doall;                                            \
     doall_conv((type *)node);                                                                       \
}                                                                    \
static ossl_inline void lh_##type##_doall_arg_thunk(void *node, void *arg, OPENSSL_LH_DOALL_FUNCARG
doall) \
{                                                                    \
    void (*doall_conv)(type *, void *) = (void (*)(type *, void *))doall;                            \
    doall_conv((type *)node, arg);                                                                   \
}                                                                    \
static ossl_unused ossl_inline type *                                                                \
ossl_check_##type##_lh_plain_type(type *ptr)
            \
{                                                                    \
    return ptr;                                                      \
}                                                                    \
static ossl_unused ossl_inline const type *                                                          \
ossl_check_const_##type##_lh_plain_type(const type *ptr)                                             \
{                                                                    \
    return ptr;                                                      \
}                                                                    \
static ossl_unused ossl_inline const OPENSSL_LHASH *
                            \
ossl_check_const_##type##_lh_type(const LHASH_OF(type) *lh)                                          \
{                                                                    \
    return (const OPENSSL_LHASH *)lh;                                                                \
}                                                                    \
static ossl_unused ossl_inline OPENSSL_LHASH *                                                       \
ossl_check_##type##_lh_type(LHASH_OF(type) *lh)                                                      \
{                                                                    \
    return (OPENSSL_LHASH *)lh;                                                                      \
}
                                        \
static ossl_unused ossl_inline OPENSSL_LH_COMPFUNC                                                   \
ossl_check_##type##_lh_compfunc_type(lh_##type##_compfunc cmp)                                       \
{                                                                    \
    return (OPENSSL_LH_COMPFUNC)cmp;                                                                 \
}                                                                    \
static ossl_unused ossl_inline OPENSSL_LH_HASHFUNC                                                   \
ossl_check_##type##_lh_hashfunc_type(lh_##type##_hashfunc hfn)                                       \
{                                                                    \
    return (OPENSSL_LH_HASHFUNC)hfn;
```

```
                                                    \
  }                                                                 \
  static ossl_unused ossl_inline OPENSSL_LH_DOALL_FUNC                                  \
  ossl_check_##type##_lh_doallfunc_type(lh_##type##_doallfunc dfn)                      \
  {                                                                 \
     return (OPENSSL_LH_DOALL_FUNC)dfn;                                                 \
  }                                                                 \
  LHASH_OF(type)

#ifndef OPENSSL_NO_DEPRECATED_3_1
#define DEFINE_LHASH_OF_DEPRECATED(type)                                \
  static ossl_unused ossl_inline void                           \
  lh_##type##_node_stats_bio(const LHASH_OF(type)
 *lh, BIO *out)       \
  {                                                 \
     OPENSSL_LH_node_stats_bio((const OPENSSL_LHASH *)lh, out);       \
  }                                                 \
  static ossl_unused ossl_inline void                           \
  lh_##type##_node_usage_stats_bio(const LHASH_OF(type) *lh, BIO *out) \
  {                                                 \
     OPENSSL_LH_node_usage_stats_bio((const OPENSSL_LHASH *)lh, out); \
  }                                                 \
  static ossl_unused ossl_inline void                           \
  lh_##type##_stats_bio(const LHASH_OF(type) *lh, BIO *out)           \
  {                                                 \
     OPENSSL_LH_stats_bio((const OPENSSL_LHASH *)lh, out);           \
  }
#else
#define DEFINE_LHASH_OF_DEPRECATED(type)
#endif

#define DEFINE_LHASH_OF_EX(type)
                                                            \
  LHASH_OF(type)                                                                    \
  {                                                                 \
     union lh_##type##_dummy {                                                      \
        void *d1;                                                       \
        unsigned long d2;                                                       \
        int d3;                                                         \
     } dummy;                                                                       \
  };
                                                                    \
  static unsigned long                                                              \
  lh_##type##_hfn_thunk(const void *data, OPENSSL_LH_HASHFUNC hfn)                                  \
  {                                                                 \
     unsigned long (*hfn_conv)(const type *) = (unsigned long (*)(const type *))hfn;                \
     return hfn_conv((const type *)data);                                           \
  }                                                                 \
```

```
static int lh_##type##_cfn_thunk(const void *da, const void *db, OPENSSL_LH_COMPFUNC cfn)
  \
{
                                                                                \
    int (*cfn_conv)(const type *, const type *) = (int (*)(const type *, const type *))cfn;                    \
    return cfn_conv((const type *)da, (const type *)db);                                                        \
}                                                                                                               \
static ossl_unused ossl_inline void                                                                             \
lh_##type##_free(LHASH_OF(type) *lh)                                                                            \
{                                                                                                               \
    OPENSSL_LH_free((OPENSSL_LHASH *)lh);                                                                       \
}
                                                                                \
static ossl_unused ossl_inline void                                                                             \
lh_##type##_flush(LHASH_OF(type) *lh)                                                                           \
{                                                                                                               \
    OPENSSL_LH_flush((OPENSSL_LHASH *)lh);                                                                      \
}                                                                                                               \
static ossl_unused ossl_inline type *                                                                           \
lh_##type##_insert(LHASH_OF(type) *lh, type *d)                                                                 \
{
                                                                                \
    return (type *)OPENSSL_LH_insert((OPENSSL_LHASH *)lh, d);                                                   \
}                                                                                                               \
static ossl_unused ossl_inline type *                                                                           \
lh_##type##_delete(LHASH_OF(type) *lh, const type *d)                                                           \
{                                                                                                               \
    return (type *)OPENSSL_LH_delete((OPENSSL_LHASH *)lh, d);                                                   \
}                                                                                                               \
static ossl_unused
ossl_inline type *                                                              \
lh_##type##_retrieve(LHASH_OF(type) *lh, const type *d)                                                         \
{                                                                                                               \
    return (type *)OPENSSL_LH_retrieve((OPENSSL_LHASH *)lh, d);                                                 \
}                                                                                                               \
static ossl_unused ossl_inline int                                                                              \
lh_##type##_error(LHASH_OF(type) *lh)                                                                           \
{                                                                                                               \
    return
OPENSSL_LH_error((OPENSSL_LHASH *)lh);                                                                          \
}                                                                                                               \
static ossl_unused ossl_inline unsigned long                                                                    \
lh_##type##_num_items(LHASH_OF(type) *lh)                                                                       \
{                                                                                                               \
    return OPENSSL_LH_num_items((OPENSSL_LHASH *)lh);                                                           \
}                                                                                                               \
static ossl_unused ossl_inline unsigned long                                                                    \
lh_##type##_get_down_load(LHASH_OF(type)
```

```
*lh)                                                    \
  {                                                                   \
     return OPENSSL_LH_get_down_load((OPENSSL_LHASH *)lh);                                    \
  }                                                                   \
  static ossl_unused ossl_inline void                                                 \
  lh_##type##_set_down_load(LHASH_OF(type) *lh, unsigned long dl)                                 \
  {                                                                   \
     OPENSSL_LH_set_down_load((OPENSSL_LHASH *)lh, dl);                                       \
  }
                                                                                  \
  static ossl_unused ossl_inline void                                                 \
  lh_##type##_doall_thunk(void *node, OPENSSL_LH_DOALL_FUNC doall)                                    \
  {                                                                   \
     void (*doall_conv)(type *) = (void (*)(type *))doall;                                    \
     doall_conv((type *)node);                                                        \
  }                                                                   \
  static ossl_unused ossl_inline void                                                 \
  lh_##type##_doall_arg_thunk(void
*node, void *arg, OPENSSL_LH_DOALL_FUNCARG doall)                                 \
  {                                                                   \
     void (*doall_conv)(type *, void *) = (void (*)(type *, void *))doall;                          \
     doall_conv((type *)node, arg);                                                   \
  }                                                                   \
  static ossl_unused ossl_inline void                                                 \
  lh_##type##_doall(LHASH_OF(type) *lh, void (*doall)(type *))                                    \
  {                                                                   \
     OPENSSL_LH_doall((OPENSSL_LHASH
*)lh, (OPENSSL_LH_DOALL_FUNC)doall);                                  \
  }                                                                   \
  static ossl_unused ossl_inline LHASH_OF(type) *                                          \
  lh_##type##_new(unsigned long (*hfn)(const type *),                                      \
     int (*cfn)(const type *, const type *))                                          \
  {                                                                   \
     return (LHASH_OF(type)
*)OPENSSL_LH_set_thunks(OPENSSL_LH_new((OPENSSL_LH_HASHFUNC)hfn,
(OPENSSL_LH_COMPFUNC)cfn), \
        lh_##type##_hfn_thunk, lh_##type##_cfn_thunk,                                         \
        lh_##type##_doall_thunk,
                                                                  \
        lh_##type##_doall_arg_thunk);                                                 \
  }                                                                   \
  static ossl_unused ossl_inline void                                                 \
  lh_##type##_doall_arg(LHASH_OF(type) *lh,                                                \
     void (*doallarg)(type *, void *), void *arg)                                        \
  {                                                                   \
     OPENSSL_LH_doall_arg((OPENSSL_LHASH *)lh,                                                \
        (OPENSSL_LH_DOALL_FUNCARG)doallarg,
```

```
 arg);                                                  \
   }                                                                                    \
   LHASH_OF(type)

#define DEFINE_LHASH_OF(type)        \
   DEFINE_LHASH_OF_EX(type);        \
   DEFINE_LHASH_OF_DEPRECATED(type) \
   LHASH_OF(type)

#define IMPLEMENT_LHASH_DOALL_ARG_CONST(type, argtype) \
   int_implement_lhash_doall(type, argtype, const type)

#define IMPLEMENT_LHASH_DOALL_ARG(type, argtype) \
   int_implement_lhash_doall(type, argtype, type)

#define int_implement_lhash_doall(type, argtype, cbargtype)                          \
   static ossl_unused ossl_inline void                                          \
   lh_##type##_doall_##argtype##_thunk(void *node, void *arg, OPENSSL_LH_DOALL_FUNCARG fn) \
   {                                                                            \
      void
 (*fn_conv)(cbargtype *, argtype *) = (void (*)(cbargtype *, argtype *))fn;     \
      fn_conv((cbargtype *)node, (argtype *)arg);                                 \
   }                                                                            \
   static ossl_unused ossl_inline void                                          \
   lh_##type##_doall_##argtype(LHASH_OF(type) *lh,                              \
      void (*fn)(cbargtype *, argtype *),                                       \
      argtype *arg)                                                             \
   {                                                                            \
      OPENSSL_LH_doall_arg_thunk((OPENSSL_LHASH *)lh,                              \
         lh_##type##_doall_##argtype##_thunk,                                   \
         (OPENSSL_LH_DOALL_FUNCARG)fn,
               \
         (void *)arg);                                                          \
   }                                                                            \
   LHASH_OF(type)

/* clang-format off */
DEFINE_LHASH_OF_INTERNAL(OPENSSL_STRING);
#define lh_OPENSSL_STRING_new(hfn, cmp) ((LHASH_OF(OPENSSL_STRING)
*)OPENSSL_LH_set_thunks(OPENSSL_LH_new(ossl_check_OPENSSL_STRING_lh_hashfunc_type(hfn),
ossl_check_OPENSSL_STRING_lh_compfunc_type(cmp)), lh_OPENSSL_STRING_hash_thunk,
lh_OPENSSL_STRING_comp_thunk, lh_OPENSSL_STRING_doall_thunk,
lh_OPENSSL_STRING_doall_arg_thunk))
#define lh_OPENSSL_STRING_free(lh) OPENSSL_LH_free(ossl_check_OPENSSL_STRING_lh_type(lh))
#define lh_OPENSSL_STRING_flush(lh) OPENSSL_LH_flush(ossl_check_OPENSSL_STRING_lh_type(lh))
#define lh_OPENSSL_STRING_insert(lh, ptr) ((OPENSSL_STRING
*)OPENSSL_LH_insert(ossl_check_OPENSSL_STRING_lh_type(lh),
ossl_check_OPENSSL_STRING_lh_plain_type(ptr)))
```

```
#define lh_OPENSSL_STRING_delete(lh,
 ptr) ((OPENSSL_STRING *)OPENSSL_LH_delete(ossl_check_OPENSSL_STRING_lh_type(lh),
ossl_check_const_OPENSSL_STRING_lh_plain_type(ptr)))
#define lh_OPENSSL_STRING_retrieve(lh, ptr) ((OPENSSL_STRING
*)OPENSSL_LH_retrieve(ossl_check_OPENSSL_STRING_lh_type(lh),
ossl_check_const_OPENSSL_STRING_lh_plain_type(ptr)))
#define lh_OPENSSL_STRING_error(lh) OPENSSL_LH_error(ossl_check_OPENSSL_STRING_lh_type(lh))
#define lh_OPENSSL_STRING_num_items(lh)
OPENSSL_LH_num_items(ossl_check_OPENSSL_STRING_lh_type(lh))
#define lh_OPENSSL_STRING_node_stats_bio(lh, out)
OPENSSL_LH_node_stats_bio(ossl_check_const_OPENSSL_STRING_lh_type(lh), out)
#define lh_OPENSSL_STRING_node_usage_stats_bio(lh, out)
OPENSSL_LH_node_usage_stats_bio(ossl_check_const_OPENSSL_STRING_lh_type(lh), out)
#define lh_OPENSSL_STRING_stats_bio(lh, out)
OPENSSL_LH_stats_bio(ossl_check_const_OPENSSL_STRING_lh_type(lh), out)
#define lh_OPENSSL_STRING_get_down_load(lh)
OPENSSL_LH_get_down_load(ossl_check_OPENSSL_STRING_lh_type(lh))
#define
 lh_OPENSSL_STRING_set_down_load(lh, dl)
OPENSSL_LH_set_down_load(ossl_check_OPENSSL_STRING_lh_type(lh), dl)
#define lh_OPENSSL_STRING_doall(lh, dfn) OPENSSL_LH_doall(ossl_check_OPENSSL_STRING_lh_type(lh),
ossl_check_OPENSSL_STRING_lh_doallfunc_type(dfn))
DEFINE_LHASH_OF_INTERNAL(OPENSSL_CSTRING);
#define lh_OPENSSL_CSTRING_new(hfn, cmp) ((LHASH_OF(OPENSSL_CSTRING)
*)OPENSSL_LH_set_thunks(OPENSSL_LH_new(ossl_check_OPENSSL_CSTRING_lh_hashfunc_type(hfn),
ossl_check_OPENSSL_CSTRING_lh_compfunc_type(cmp)), lh_OPENSSL_CSTRING_hash_thunk,
lh_OPENSSL_CSTRING_comp_thunk, lh_OPENSSL_CSTRING_doall_thunk,
lh_OPENSSL_CSTRING_doall_arg_thunk))
#define lh_OPENSSL_CSTRING_free(lh) OPENSSL_LH_free(ossl_check_OPENSSL_CSTRING_lh_type(lh))
#define lh_OPENSSL_CSTRING_flush(lh) OPENSSL_LH_flush(ossl_check_OPENSSL_CSTRING_lh_type(lh))
#define lh_OPENSSL_CSTRING_insert(lh, ptr) ((OPENSSL_CSTRING
*)OPENSSL_LH_insert(ossl_check_OPENSSL_CSTRING_lh_type(lh),
ossl_check_OPENSSL_CSTRING_lh_plain_type(ptr)))
#define
 lh_OPENSSL_CSTRING_delete(lh, ptr) ((OPENSSL_CSTRING
*)OPENSSL_LH_delete(ossl_check_OPENSSL_CSTRING_lh_type(lh),
ossl_check_const_OPENSSL_CSTRING_lh_plain_type(ptr)))
#define lh_OPENSSL_CSTRING_retrieve(lh, ptr) ((OPENSSL_CSTRING
*)OPENSSL_LH_retrieve(ossl_check_OPENSSL_CSTRING_lh_type(lh),
ossl_check_const_OPENSSL_CSTRING_lh_plain_type(ptr)))
#define lh_OPENSSL_CSTRING_error(lh) OPENSSL_LH_error(ossl_check_OPENSSL_CSTRING_lh_type(lh))
#define lh_OPENSSL_CSTRING_num_items(lh)
OPENSSL_LH_num_items(ossl_check_OPENSSL_CSTRING_lh_type(lh))
#define lh_OPENSSL_CSTRING_node_stats_bio(lh, out)
OPENSSL_LH_node_stats_bio(ossl_check_const_OPENSSL_CSTRING_lh_type(lh), out)
#define lh_OPENSSL_CSTRING_node_usage_stats_bio(lh, out)
OPENSSL_LH_node_usage_stats_bio(ossl_check_const_OPENSSL_CSTRING_lh_type(lh), out)
#define lh_OPENSSL_CSTRING_stats_bio(lh, out)
```

```
OPENSSL_LH_stats_bio(ossl_check_const_OPENSSL_CSTRING_lh_type(lh), out)
#define lh_OPENSSL_CSTRING_get_down_load(lh)
OPENSSL_LH_get_down_load(ossl_check_OPENSSL_CSTRING_lh_type(lh))
#define
 lh_OPENSSL_CSTRING_set_down_load(lh, dl)
OPENSSL_LH_set_down_load(ossl_check_OPENSSL_CSTRING_lh_type(lh), dl)
#define lh_OPENSSL_CSTRING_doall(lh, dfn)
OPENSSL_LH_doall(ossl_check_OPENSSL_CSTRING_lh_type(lh),
ossl_check_OPENSSL_CSTRING_lh_doallfunc_type(dfn))

/* clang-format on */

#ifdef __cplusplus
}
#endif

#endif
{
 'variables': {
   'openssl_sources': [
     'openssl/crypto/aes/aes_ecb.c',
     'openssl/crypto/aes/aes_misc.c',
     'openssl/crypto/bn/bn_add.c',
     'openssl/crypto/bn/bn_blind.c',
     'openssl/crypto/bn/bn_const.c',
     'openssl/crypto/bn/bn_conv.c',
     'openssl/crypto/bn/bn_ctx.c',
     'openssl/crypto/bn/bn_dh.c',
     'openssl/crypto/bn/bn_div.c',
     'openssl/crypto/bn/bn_exp.c',
     'openssl/crypto/bn/bn_exp2.c',
     'openssl/crypto/bn/bn_gcd.c',
     'openssl/crypto/bn/bn_gf2m.c',
     'openssl/crypto/bn/bn_intern.c',
     'openssl/crypto/bn/bn_kron.c',
     'openssl/crypto/bn/bn_lib.c',
     'openssl/crypto/bn/bn_mod.c',
     'openssl/crypto/bn/bn_mont.c',
     'openssl/crypto/bn/bn_mpi.c',
     'openssl/crypto/bn/bn_mul.c',
     'openssl/crypto/bn/bn_nist.c',
     'openssl/crypto/bn/bn_prime.c',
     'openssl/crypto/bn/bn_rand.c',
     'openssl/crypto/bn/bn_recp.c',
     'openssl/crypto/bn/bn_rsa_fips186_4.c',
     'openssl/crypto/bn/bn_shift.c',
      'openssl/crypto/bn/bn_sqr.c',
     'openssl/crypto/bn/bn_sqrt.c',
```

'openssl/crypto/bn/bn_word.c',
'openssl/crypto/buffer/buffer.c',
'openssl/crypto/cmac/cmac.c',
'openssl/crypto/des/ecb3_enc.c',
'openssl/crypto/des/set_key.c',
'openssl/crypto/dh/dh_backend.c',
'openssl/crypto/dh/dh_check.c',
'openssl/crypto/dh/dh_gen.c',
'openssl/crypto/dh/dh_group_params.c',
'openssl/crypto/dh/dh_kdf.c',
'openssl/crypto/dh/dh_key.c',
'openssl/crypto/dh/dh_lib.c',
'openssl/crypto/dsa/dsa_backend.c',
'openssl/crypto/dsa/dsa_check.c',
'openssl/crypto/dsa/dsa_gen.c',
'openssl/crypto/dsa/dsa_key.c',
'openssl/crypto/dsa/dsa_lib.c',
'openssl/crypto/dsa/dsa_ossl.c',
'openssl/crypto/dsa/dsa_sign.c',
'openssl/crypto/dsa/dsa_vrf.c',
'openssl/crypto/ec/curve448/arch_32/f_impl32.c',
'openssl/crypto/ec/curve448/arch_64/f_impl64.c',
'openssl/crypto/ec/curve448/curve448.c',
'openssl/crypto/ec/curve448/curve448_tables.c',
'openssl/crypto/ec/curve448/eddsa.c',
'openssl/crypto/ec/curve448/f_generic.c',
'openssl/crypto/ec/curve448/scalar.c',
'openssl/crypto/ec/curve25519.c',
'openssl/crypto/ec/ec2_oct.c',
'openssl/crypto/ec/ec2_smpl.c',
'openssl/crypto/ec/ec_asn1.c',
'openssl/crypto/ec/ec_backend.c',
'openssl/crypto/ec/ec_check.c',
'openssl/crypto/ec/ec_curve.c',
'openssl/crypto/ec/ec_cvt.c',
'openssl/crypto/ec/ec_key.c',
'openssl/crypto/ec/ec_kmeth.c',
'openssl/crypto/ec/ec_lib.c',
'openssl/crypto/ec/ec_mult.c',
'openssl/crypto/ec/ec_oct.c',
'openssl/crypto/ec/ecdh_kdf.c',
'openssl/crypto/ec/ecdh_ossl.c',
'openssl/crypto/ec/ecdsa_ossl.c',
'openssl/crypto/ec/ecdsa_sign.c',
'openssl/crypto/ec/ecdsa_vrf.c',
'openssl/crypto/ec/ecp_mont.c',
'openssl/crypto/ec/ecp_nist.c',
'openssl/crypto/ec/ecp_nistz256.c',

'openssl/crypto/ec/ecp_oct.c',
'openssl/crypto/ec/ecp_smpl.c',
'openssl/crypto/ec/ecx_backend.c',
'openssl/crypto/ec/ecx_key.c',
'openssl/crypto/evp/asymcipher.c',
'openssl/crypto/evp/dh_support.c',
'openssl/crypto/evp/digest.c',
'openssl/crypto/evp/ec_support.c',
'openssl/crypto/evp/evp_enc.c',
'openssl/crypto/evp/evp_fetch.c',
'openssl/crypto/evp/evp_lib.c',
'openssl/crypto/evp/evp_rand.c',
'openssl/crypto/evp/evp_utils.c',
'openssl/crypto/evp/exchange.c',
'openssl/crypto/evp/kdf_lib.c',
'openssl/crypto/evp/kdf_meth.c',
'openssl/crypto/evp/kem.c',
'openssl/crypto/evp/keymgmt_lib.c',
'openssl/crypto/evp/keymgmt_meth.c',
'openssl/crypto/evp/mac_lib.c',
'openssl/crypto/evp/mac_meth.c',
'openssl/crypto/evp/p_lib.c',
'openssl/crypto/evp/pmeth_check.c',
'openssl/crypto/evp/pmeth_gn.c',
'openssl/crypto/evp/pmeth_lib.c',
'openssl/crypto/evp/s_lib.c',
'openssl/crypto/evp/signature.c',
'openssl/crypto/evp/skeymgmt_meth.c',
'openssl/crypto/ffc/ffc_backend.c',
'openssl/crypto/ffc/ffc_dh.c',
'openssl/crypto/ffc/ffc_key_generate.c',
'openssl/crypto/ffc/ffc_key_validate.c',
'openssl/crypto/ffc/ffc_params.c',
'openssl/crypto/ffc/ffc_params_generate.c',
'openssl/crypto/ffc/ffc_params_validate.c',
'openssl/crypto/hashtable/hashfunc.c',
'openssl/crypto/hashtable/hashtable.c',
'openssl/crypto/hmac/hmac.c',
'openssl/crypto/lhash/lhash.c',
'openssl/crypto/asn1_dsa.c',
'openssl/crypto/bsearch.c',
'openssl/crypto/context.c',
'openssl/crypto/core_algorithm.c',
'openssl/crypto/core_fetch.c',
'openssl/crypto/core_namemap.c',
'openssl/crypto/cpuid.c',
'openssl/crypto/cryptlib.c',
'openssl/crypto/ctype.c',

```
    'openssl/crypto/der_writer.c',
    'openssl/crypto/ex_data.c',
    'openssl/crypto/initthread.c',
     'openssl/crypto/o_str.c',
    'openssl/crypto/packet.c',
    'openssl/crypto/param_build.c',
    'openssl/crypto/param_build_set.c',
    'openssl/crypto/params.c',
    'openssl/crypto/params_dup.c',
    'openssl/crypto/params_from_text.c',
    'openssl/crypto/provider_core.c',
    'openssl/crypto/provider_predefined.c',
    'openssl/crypto/self_test_core.c',
    'openssl/crypto/sparse_array.c',
    'openssl/crypto/threads_lib.c',
    'openssl/crypto/threads_none.c',
    'openssl/crypto/threads_pthread.c',
    'openssl/crypto/threads_win.c',
    'openssl/crypto/time.c',
    'openssl/crypto/ml_dsa/ml_dsa_encoders.c',
    'openssl/crypto/ml_dsa/ml_dsa_key.c',
    'openssl/crypto/ml_dsa/ml_dsa_key_compress.c',
    'openssl/crypto/ml_dsa/ml_dsa_matrix.c',
    'openssl/crypto/ml_dsa/ml_dsa_ntt.c',
    'openssl/crypto/ml_dsa/ml_dsa_params.c',
    'openssl/crypto/ml_dsa/ml_dsa_sample.c',
    'openssl/crypto/ml_dsa/ml_dsa_sign.c',

'openssl/crypto/ml_kem/ml_kem.c',
    'openssl/crypto/modes/cbc128.c',
    'openssl/crypto/modes/ccm128.c',
    'openssl/crypto/modes/cfb128.c',
    'openssl/crypto/modes/ctr128.c',
    'openssl/crypto/modes/gcm128.c',
    'openssl/crypto/modes/ofb128.c',
    'openssl/crypto/modes/wrap128.c',
    'openssl/crypto/modes/xts128.c',
    'openssl/crypto/modes/xts128gb.c',
    'openssl/crypto/property/defn_cache.c',
    'openssl/crypto/property/property.c',
    'openssl/crypto/property/property_parse.c',
    'openssl/crypto/property/property_query.c',
    'openssl/crypto/property/property_string.c',
    'openssl/crypto/rand/rand_lib.c',
    'openssl/crypto/rsa/rsa_acvp_test_params.c',
    'openssl/crypto/rsa/rsa_backend.c',
    'openssl/crypto/rsa/rsa_chk.c',
    'openssl/crypto/rsa/rsa_crpt.c',
```

'openssl/crypto/rsa/rsa_gen.c',
'openssl/crypto/rsa/rsa_lib.c',
'openssl/crypto/rsa/rsa_mp_names.c',
'openssl/crypto/rsa/rsa_none.c',

'openssl/crypto/rsa/rsa_oaep.c',
'openssl/crypto/rsa/rsa_ossl.c',
'openssl/crypto/rsa/rsa_pk1.c',
'openssl/crypto/rsa/rsa_pss.c',
'openssl/crypto/rsa/rsa_schemes.c',
'openssl/crypto/rsa/rsa_sign.c',
'openssl/crypto/rsa/rsa_sp800_56b_check.c',
'openssl/crypto/rsa/rsa_sp800_56b_gen.c',
'openssl/crypto/rsa/rsa_x931.c',
'openssl/crypto/sha/keccak1600.c',
'openssl/crypto/sha/sha1dgst.c',
'openssl/crypto/sha/sha256.c',
'openssl/crypto/sha/sha3.c',
'openssl/crypto/sha/sha512.c',
'openssl/crypto/slh_dsa/slh_adrs.c',
'openssl/crypto/slh_dsa/slh_dsa.c',
'openssl/crypto/slh_dsa/slh_dsa_hash_ctx.c',
'openssl/crypto/slh_dsa/slh_dsa_key.c',
'openssl/crypto/slh_dsa/slh_fors.c',
'openssl/crypto/slh_dsa/slh_hash.c',
'openssl/crypto/slh_dsa/slh_hypertree.c',
'openssl/crypto/slh_dsa/slh_params.c',
'openssl/crypto/slh_dsa/slh_wots.c',
'openssl/crypto/slh_dsa/slh_xmss.c',
'openssl/crypto/stack/stack.c',
'openssl/crypto/thread/arch/thread_none.c',
'openssl/crypto/thread/arch/thread_posix.c',
'openssl/crypto/thread/arch/thread_win.c',
'openssl/crypto/thread/api.c',
'openssl/crypto/thread/arch.c',
'openssl/crypto/thread/internal.c',
'openssl/providers/common/der/der_rsa_sig.c',
'openssl/providers/common/bio_prov.c',
'openssl/providers/common/capabilities.c',
'openssl/providers/common/digest_to_nid.c',
'openssl/providers/common/provider_seeding.c',
'openssl/providers/common/provider_util.c',
'openssl/providers/common/securitycheck.c',
'openssl/providers/common/securitycheck_fips.c',
'openssl/providers/fips/fipsindicator.c',
'openssl/providers/fips/fipsprov.c',
'openssl/providers/fips/self_test.c',
'openssl/providers/fips/self_test_kats.c',

'openssl/providers/implementations/asymciphers/rsa_enc.c',
'openssl/providers/implementations/ciphers/cipher_aes.c',
'openssl/providers/implementations/ciphers/cipher_aes_cbc_hmac_sha.c',
'openssl/providers/implementations/ciphers/cipher_aes_cbc_hmac_sha1_hw.c',
'openssl/providers/implementations/ciphers/cipher_aes_cbc_hmac_sha256_hw.c',
'openssl/providers/implementations/ciphers/cipher_aes_ccm.c',
'openssl/providers/implementations/ciphers/cipher_aes_ccm_hw.c',
'openssl/providers/implementations/ciphers/cipher_aes_gcm.c',
'openssl/providers/implementations/ciphers/cipher_aes_gcm_hw.c',
'openssl/providers/implementations/ciphers/cipher_aes_hw.c',
'openssl/providers/implementations/ciphers/cipher_aes_ocb.c',
'openssl/providers/implementations/ciphers/cipher_aes_ocb_hw.c',
'openssl/providers/implementations/ciphers/cipher_aes_wrp.c',
'openssl/providers/implementations/ciphers/cipher_aes_xts.c',
'openssl/providers/implementations/ciphers/cipher_aes_xts_fips.c',
'openssl/providers/implementations/ciphers/cipher_aes_xts_hw.c',
'openssl/providers/implementations/ciphers/cipher_cts.c',
'openssl/providers/implementations/ciphers/cipher_tdes.c',
'openssl/providers/implementations/ciphers/cipher_tdes_common.c',
'openssl/providers/implementations/ciphers/cipher_tdes_hw.c',
'openssl/providers/implementations/digests/sha2_prov.c',
'openssl/providers/implementations/digests/sha3_prov.c',
'openssl/providers/implementations/exchange/dh_exch.c',
'openssl/providers/implementations/exchange/ecdh_exch.c',
'openssl/providers/implementations/exchange/ecx_exch.c',
'openssl/providers/implementations/exchange/kdf_exch.c',
'openssl/providers/implementations/kdfs/hkdf.c',
'openssl/providers/implementations/kdfs/kbkdf.c',
'openssl/providers/implementations/kdfs/pbkdf2.c',
'openssl/providers/implementations/kdfs/pbkdf2_fips.c',
'openssl/providers/implementations/kdfs/sshkdf.c',
'openssl/providers/implementations/kdfs/sskdf.c',
'openssl/providers/implementations/kdfs/tls1_prf.c',
'openssl/providers/implementations/kdfs/x942kdf.c',
'openssl/providers/implementations/kem/ml_kem_kem.c',
'openssl/providers/implementations/kem/mlx_kem.c',
'openssl/providers/implementations/kem/rsa_kem.c',
'openssl/providers/implementations/keymgmt/dh_kmgmt.c',
'openssl/providers/implementations/keymgmt/dsa_kmgmt.c',
'openssl/providers/implementations/keymgmt/ec_kmgmt.c',
'openssl/providers/implementations/keymgmt/ecx_kmgmt.c',
'openssl/providers/implementations/keymgmt/kdf_legacy_kmgmt.c',
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'openssl/providers/implementations/keymgmt/ml_dsa_kmgmt.c',
'openssl/providers/implementations/keymgmt/ml_kem_kmgmt.c',
'openssl/providers/implementations/keymgmt/mlx_kmgmt.c',
'openssl/providers/implementations/keymgmt/rsa_kmgmt.c',
'openssl/providers/implementations/keymgmt/slh_dsa_kmgmt.c',

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  'openssl/providers/implementations/macs/cmac_prov.c',
  'openssl/providers/implementations/macs/gmac_prov.c',
  'openssl/providers/implementations/macs/hmac_prov.c',
  'openssl/providers/implementations/macs/kmac_prov.c',
  'openssl/providers/implementations/rands/drbg.c',
  'openssl/providers/implementations/rands/drbg_ctr.c',
  'openssl/providers/implementations/rands/drbg_hash.c',
  'openssl/providers/implementations/rands/drbg_hmac.c',
  'openssl/providers/implementations/rands/fips_crng_test.c',
  'openssl/providers/implementations/rands/test_rng.c',
  'openssl/providers/implementations/signature/dsa_sig.c',
  'openssl/providers/implementations/signature/ecdsa_sig.c',
  'openssl/providers/implementations/signature/eddsa_sig.c',
  'openssl/providers/implementations/signature/mac_legacy_sig.c',
  'openssl/providers/implementations/signature/ml_dsa_sig.c',
  'openssl/providers/implementations/signature/rsa_sig.c',
  'openssl/providers/implementations/signature/slh_dsa_sig.c',
  'openssl/providers/implementations/skeymgmt/aes_skmgmt.c',
  'openssl/providers/implementations/skeymgmt/generic.c',
  'openssl/ssl/record/methods/ssl3_cbc.c',
  'openssl/providers/common/der/der_dsa_key.c',
  'openssl/providers/common/der/der_dsa_sig.c',
  'openssl/providers/common/der/der_ec_key.c',
  'openssl/providers/common/der/der_ec_sig.c',
  'openssl/providers/common/der/der_ecx_key.c',
  'openssl/providers/common/der/der_ml_dsa_key.c',
  'openssl/providers/common/der/der_rsa_key.c',
  'openssl/providers/common/der/der_slh_dsa_key.c',
  'openssl/providers/common/provider_ctx.c',
  'openssl/providers/common/provider_err.c',
  'openssl/providers/implementations/ciphers/ciphercommon.c',
  'openssl/providers/implementations/ciphers/ciphercommon_block.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm_hw.c',
  'openssl/providers/implementations/ciphers/ciphercommon_gcm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_gcm_hw.c',
  'openssl/providers/implementations/ciphers/ciphercommon_hw.c',
  'openssl/providers/implementations/digests/digestcommon.c',
  'openssl/ssl/record/methods/tls_pad.c',
  'openssl/providers/fips/fips_entry.c',

],
'openssl_sources_BSD-x86': [
  './config/archs/BSD-x86/asm_avx2/crypto/aes/aes-586.S',
  './config/archs/BSD-x86/asm_avx2/crypto/aes/aesni-x86.S',
  './config/archs/BSD-x86/asm_avx2/crypto/aes/vpaes-x86.S',
  './config/archs/BSD-x86/asm_avx2/crypto/bf/bf-586.S',
  './config/archs/BSD-x86/asm_avx2/crypto/bn/bn-586.S',
```

```
    './config/archs/BSD-x86/asm_avx2/crypto/bn/co-586.S',
    './config/archs/BSD-x86/asm_avx2/crypto/bn/x86-gf2m.S',
    './config/archs/BSD-x86/asm_avx2/crypto/bn/x86-mont.S',
    './config/archs/BSD-x86/asm_avx2/crypto/camellia/cmll-x86.S',
     './config/archs/BSD-x86/asm_avx2/crypto/chacha/chacha-x86.S',
    './config/archs/BSD-x86/asm_avx2/crypto/des/crypt586.S',
    './config/archs/BSD-x86/asm_avx2/crypto/des/des-586.S',
    './config/archs/BSD-x86/asm_avx2/crypto/ec/ecp_nistz256-x86.S',
    './config/archs/BSD-x86/asm_avx2/crypto/params_idx.c',
    './config/archs/BSD-x86/asm_avx2/crypto/x86cpuid.S',
    './config/archs/BSD-x86/asm_avx2/crypto/md5/md5-586.S',
    './config/archs/BSD-x86/asm_avx2/crypto/modes/ghash-x86.S',
    './config/archs/BSD-x86/asm_avx2/crypto/poly1305/poly1305-x86.S',
    './config/archs/BSD-x86/asm_avx2/crypto/rc4/rc4-586.S',
    './config/archs/BSD-x86/asm_avx2/crypto/ripemd/rmd-586.S',
    './config/archs/BSD-x86/asm_avx2/crypto/sha/sha1-586.S',
    './config/archs/BSD-x86/asm_avx2/crypto/sha/sha256-586.S',
    './config/archs/BSD-x86/asm_avx2/crypto/sha/sha512-586.S',
    './config/archs/BSD-x86/asm_avx2/crypto/whrlpool/wp-mmx.S',
     './config/archs/BSD-x86/asm_avx2/engines/e_padlock-x86.S',
    './config/archs/BSD-x86/asm_avx2/providers/common/der/der_sm2_gen.c',
    './config/archs/BSD-x86/asm_avx2/providers/common/der/der_digests_gen.c',
    './config/archs/BSD-x86/asm_avx2/providers/common/der/der_dsa_gen.c',
    './config/archs/BSD-x86/asm_avx2/providers/common/der/der_ec_gen.c',
    './config/archs/BSD-x86/asm_avx2/providers/common/der/der_ecx_gen.c',
    './config/archs/BSD-x86/asm_avx2/providers/common/der/der_ml_dsa_gen.c',
    './config/archs/BSD-x86/asm_avx2/providers/common/der/der_rsa_gen.c',
    './config/archs/BSD-x86/asm_avx2/providers/common/der/der_slh_dsa_gen.c',
    './config/archs/BSD-x86/asm_avx2/providers/common/der/der_wrap_gen.c',
    './config/archs/BSD-x86/asm_avx2/providers/legacy.ld',
    './config/archs/BSD-x86/asm_avx2/providers/fips.ld',

  ],
  'openssl_defines_BSD-x86': [
    'NDEBUG',
    'L_ENDIAN',
    'OPENSSL_BUILDING_OPENSSL',

 'AES_ASM',
    'DES_ASM',
    'ECP_NISTZ256_ASM',
    'FIPS_MODULE',
    'GHASH_ASM',
    'OPENSSL_BN_ASM_GF2m',
    'OPENSSL_BN_ASM_MONT',
    'OPENSSL_BN_ASM_PART_WORDS',
    'OPENSSL_CPUID_OBJ',
    'OPENSSL_IA32_SSE2',
```

```
    'SHA1_ASM',
    'SHA256_ASM',
    'SHA512_ASM',
    'VPAES_ASM',
    'FIPS_MODULE',
  ],
  'openssl_cflags_BSD-x86': [
    '-Wa,--noexecstack',
    '-Wall -O3 -fomit-frame-pointer',
    '-pthread',
    '-Wall -O3 -fomit-frame-pointer',
  ],
  'openssl_ex_libs_BSD-x86': [
    '-pthread',
  ],
  'linker_script': ''
 },
 'include_dirs': [
  '.',
  './include',
  './crypto',
  './crypto/include/internal',
  './providers/common/include',
 ],
 'defines': ['<@(openssl_defines_BSD-x86)'],
 'cflags': ['<@(openssl_cflags_BSD-x86)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86)'],

 'sources': ['<@(openssl_sources)', '<@(openssl_sources_BSD-x86)'],
 'direct_dependent_settings': {
  'include_dirs': ['./include',
 '.'],
  'defines': ['<@(openssl_defines_BSD-x86)'],
 },
}
```

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```
/*
* WARNING: do not edit!
* Generated by util/mkbuildinf.pl
*
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#define PLATFORM "platform: BSD-x86_64"
#define DATE "built on: Tue Jan 27 17:27:07 2026 UTC"

/*
* Generate compiler_flags as an array of individual characters. This is a
* workaround for the situation where CFLAGS gets too long for a C90 string
* literal
*/
static const char compiler_flags[] = {
   'c','o','m','p','i','l','e','r',':',' ','c','c',' ','-','f','P',
   'I','C',' ','-','p','t','h','r','e','a','d',' ','-','W','a','l',
   'l',' ','-','O','3',' ','-','D','L','_','E','N','D','I','A','N',
   ' ','-','D','O','P','E','N','S','S','L','_','P','I','C',' ','-',
   'D','_','T','H','R','E','A','D','_','S','A','F','E','
 ','-','D',
   '_','R','E','E','N','T','R','A','N','T',' ','-','D','O','P','E',
   'N','S','S','L','_','B','U','I','L','D','I','N','G','_','O','P',
   'E','N','S','S','L',' ','-','D','N','D','E','B','U','G','\0'
};
{
   global:
       OSSL_provider_init;
   local: *;
};
/*
* WARNING: do not edit!
```

```
* Generated by configdata.pm from Configurations/common0.tmpl, Configurations/unix-Makefile.tmpl
* via Makefile.in
*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#ifndef OPENSSL_CONFIGURATION_H
#define OPENSSL_CONFIGURATION_H
#pragma once

#ifdef __cplusplus
extern "C" {
#endif

#ifdef OPENSSL_ALGORITHM_DEFINES
#error OPENSSL_ALGORITHM_DEFINES no longer supported
#endif

/*
* OpenSSL was configured with the following options:
*/

/* clang-format off */
# define OPENSSL_CONFIGURED_API 30500
# ifndef OPENSSL_RAND_SEED_OS
#  define OPENSSL_RAND_SEED_OS
# endif
# ifndef OPENSSL_THREADS
#  define OPENSSL_THREADS
# endif
# ifndef OPENSSL_NO_AFALGENG
#  define OPENSSL_NO_AFALGENG
#
 endif
# ifndef OPENSSL_NO_ASAN
#  define OPENSSL_NO_ASAN
# endif
# ifndef OPENSSL_NO_ASM
#  define OPENSSL_NO_ASM
# endif
# ifndef OPENSSL_NO_BROTLI
#  define OPENSSL_NO_BROTLI
# endif
```

```
# ifndef OPENSSL_NO_BROTLI_DYNAMIC
#  define OPENSSL_NO_BROTLI_DYNAMIC
# endif
# ifndef OPENSSL_NO_COMP
#  define OPENSSL_NO_COMP
# endif
# ifndef OPENSSL_NO_CRYPTO_MDEBUG
#  define OPENSSL_NO_CRYPTO_MDEBUG
# endif
# ifndef OPENSSL_NO_CRYPTO_MDEBUG_BACKTRACE
#  define OPENSSL_NO_CRYPTO_MDEBUG_BACKTRACE
# endif
# ifndef OPENSSL_NO_DEMOS
#  define OPENSSL_NO_DEMOS
# endif
# ifndef OPENSSL_NO_EC_NISTP_64_GCC_128
#  define OPENSSL_NO_EC_NISTP_64_GCC_128
# endif
# ifndef OPENSSL_NO_EGD
#  define OPENSSL_NO_EGD
# endif
# ifndef OPENSSL_NO_EXTERNAL_TESTS
#  define OPENSSL_NO_EXTERNAL_TESTS
# endif
# ifndef OPENSSL_NO_FIPS_JITTER
#  define OPENSSL_NO_FIPS_JITTER
# endif
# ifndef OPENSSL_NO_FUZZ_AFL
#  define OPENSSL_NO_FUZZ_AFL
# endif
# ifndef OPENSSL_NO_FUZZ_LIBFUZZER
#  define OPENSSL_NO_FUZZ_LIBFUZZER
#
 endif
# ifndef OPENSSL_NO_H3DEMO
#  define OPENSSL_NO_H3DEMO
# endif
# ifndef OPENSSL_NO_HQINTEROP
#  define OPENSSL_NO_HQINTEROP
# endif
# ifndef OPENSSL_NO_JITTER
#  define OPENSSL_NO_JITTER
# endif
# ifndef OPENSSL_NO_KTLS
#  define OPENSSL_NO_KTLS
# endif
# ifndef OPENSSL_NO_LOADERENG
#  define OPENSSL_NO_LOADERENG
```

```
# endif
# ifndef OPENSSL_NO_MD2
#  define OPENSSL_NO_MD2
# endif
# ifndef OPENSSL_NO_MSAN
#  define OPENSSL_NO_MSAN
# endif
# ifndef OPENSSL_NO_PIE
#  define OPENSSL_NO_PIE
# endif
# ifndef OPENSSL_NO_RC5
#  define OPENSSL_NO_RC5
# endif
# ifndef OPENSSL_NO_SCTP
#  define OPENSSL_NO_SCTP
# endif
# ifndef OPENSSL_NO_SSL3
#  define OPENSSL_NO_SSL3
# endif
# ifndef OPENSSL_NO_SSL3_METHOD
#  define OPENSSL_NO_SSL3_METHOD
# endif
# ifndef OPENSSL_NO_SSLKEYLOG
#  define OPENSSL_NO_SSLKEYLOG
# endif
# ifndef OPENSSL_NO_TFO
#  define OPENSSL_NO_TFO
# endif
# ifndef OPENSSL_NO_TRACE
#  define OPENSSL_NO_TRACE
# endif
# ifndef OPENSSL_NO_UBSAN
#  define OPENSSL_NO_UBSAN
# endif
#
 ifndef OPENSSL_NO_UNIT_TEST
#  define OPENSSL_NO_UNIT_TEST
# endif
# ifndef OPENSSL_NO_UPLINK
#  define OPENSSL_NO_UPLINK
# endif
# ifndef OPENSSL_NO_WEAK_SSL_CIPHERS
#  define OPENSSL_NO_WEAK_SSL_CIPHERS
# endif
# ifndef OPENSSL_NO_WINSTORE
#  define OPENSSL_NO_WINSTORE
# endif
# ifndef OPENSSL_NO_ZLIB
```

```
#  define OPENSSL_NO_ZLIB
# endif
# ifndef OPENSSL_NO_ZLIB_DYNAMIC
#  define OPENSSL_NO_ZLIB_DYNAMIC
# endif
# ifndef OPENSSL_NO_ZSTD
#  define OPENSSL_NO_ZSTD
# endif
# ifndef OPENSSL_NO_ZSTD_DYNAMIC
#  define OPENSSL_NO_ZSTD_DYNAMIC
# endif
# ifndef OPENSSL_NO_DYNAMIC_ENGINE
#  define OPENSSL_NO_DYNAMIC_ENGINE
# endif

/* clang-format on */

/* Generate 80386 code? */
/* clang-format off */
# undef I386_ONLY
/* clang-format on */

/*
* The following are cipher-specific, but are part of the public API.
*/
#if !defined(OPENSSL_SYS_UEFI)
   /* clang-format off */
#  define BN_LLONG
   /* clang-format on */
   /* Only one for the following should be defined */
   /* clang-format off
 */
#  undef SIXTY_FOUR_BIT_LONG
   /* clang-format on */
   /* clang-format off */
#  undef SIXTY_FOUR_BIT
   /* clang-format on */
   /* clang-format off */
#  define THIRTY_TWO_BIT
/* clang-format on */
#endif

/* clang-format off */
# define RC4_INT unsigned int
/* clang-format on */

#if defined(OPENSSL_NO_COMP) || (defined(OPENSSL_NO_BROTLI) && defined(OPENSSL_NO_ZSTD) &&
defined(OPENSSL_NO_ZLIB))
```

```
#define OPENSSL_NO_COMP_ALG
#else
#undef OPENSSL_NO_COMP_ALG
#endif

#ifdef __cplusplus
}
#endif

#endif /* OPENSSL_CONFIGURATION_H */
```

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Version 2.1, February 1999

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with a modified version of the library, if
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That's all there is to it!

```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/x509.h.in
*
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*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_X509_H
#define OPENSSL_X509_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_X509_H
#endif

#include <openssl/e_os2.h>
#include <openssl/types.h>
```

```
#include <openssl/symhacks.h>
#include <openssl/buffer.h>
#include <openssl/evp.h>
#include <openssl/bio.h>
#include <openssl/asn1.h>
#include <openssl/safestack.h>
#include <openssl/ec.h>

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#include <openssl/rsa.h>
#include
 <openssl/dsa.h>
#include <openssl/dh.h>
#endif

#include <openssl/sha.h>
#include <openssl/x509err.h>
#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif

#ifdef __cplusplus
extern "C" {
#endif

/* Needed stacks for types defined in other headers */
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_NAME, X509_NAME, X509_NAME)
#define sk_X509_NAME_num(sk) OPENSSL_sk_num(ossl_check_const_X509_NAME_sk_type(sk))
#define sk_X509_NAME_value(sk, idx) ((X509_NAME
*)OPENSSL_sk_value(ossl_check_const_X509_NAME_sk_type(sk), (idx)))
#define sk_X509_NAME_new(cmp) ((STACK_OF(X509_NAME)
*)OPENSSL_sk_new(ossl_check_X509_NAME_compfunc_type(cmp)))
#define sk_X509_NAME_new_null() ((STACK_OF(X509_NAME) *)OPENSSL_sk_new_null())
#define sk_X509_NAME_new_reserve(cmp, n) ((STACK_OF(X509_NAME)
*)OPENSSL_sk_new_reserve(ossl_check_X509_NAME_compfunc_type(cmp), (n)))
#define sk_X509_NAME_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_NAME_sk_type(sk), (n))
#define sk_X509_NAME_free(sk) OPENSSL_sk_free(ossl_check_X509_NAME_sk_type(sk))
#define
 sk_X509_NAME_zero(sk) OPENSSL_sk_zero(ossl_check_X509_NAME_sk_type(sk))
#define sk_X509_NAME_delete(sk, i) ((X509_NAME
*)OPENSSL_sk_delete(ossl_check_X509_NAME_sk_type(sk), (i)))
#define sk_X509_NAME_delete_ptr(sk, ptr) ((X509_NAME
*)OPENSSL_sk_delete_ptr(ossl_check_X509_NAME_sk_type(sk), ossl_check_X509_NAME_type(ptr)))
#define sk_X509_NAME_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_NAME_sk_type(sk),
ossl_check_X509_NAME_type(ptr))
#define sk_X509_NAME_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_NAME_sk_type(sk),
ossl_check_X509_NAME_type(ptr))
```

```
#define sk_X509_NAME_pop(sk) ((X509_NAME *)OPENSSL_sk_pop(ossl_check_X509_NAME_sk_type(sk)))
#define sk_X509_NAME_shift(sk) ((X509_NAME *)OPENSSL_sk_shift(ossl_check_X509_NAME_sk_type(sk)))
#define sk_X509_NAME_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_NAME_sk_type(sk),ossl_check_X509_NAME_freefunc_type(freefunc)
)
#define sk_X509_NAME_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_NAME_sk_type(sk),
 ossl_check_X509_NAME_type(ptr), (idx))
#define sk_X509_NAME_set(sk, idx, ptr) ((X509_NAME
*)OPENSSL_sk_set(ossl_check_X509_NAME_sk_type(sk), (idx), ossl_check_X509_NAME_type(ptr)))
#define sk_X509_NAME_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_NAME_sk_type(sk),
ossl_check_X509_NAME_type(ptr))
#define sk_X509_NAME_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_NAME_sk_type(sk),
ossl_check_X509_NAME_type(ptr))
#define sk_X509_NAME_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_X509_NAME_sk_type(sk),
ossl_check_X509_NAME_type(ptr), pnum)
#define sk_X509_NAME_sort(sk) OPENSSL_sk_sort(ossl_check_X509_NAME_sk_type(sk))
#define sk_X509_NAME_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_X509_NAME_sk_type(sk))
#define sk_X509_NAME_dup(sk) ((STACK_OF(X509_NAME)
*)OPENSSL_sk_dup(ossl_check_const_X509_NAME_sk_type(sk)))
#define sk_X509_NAME_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_NAME)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_NAME_sk_type(sk),
 ossl_check_X509_NAME_copyfunc_type(copyfunc), ossl_check_X509_NAME_freefunc_type(freefunc)))
#define sk_X509_NAME_set_cmp_func(sk, cmp)
((sk_X509_NAME_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_NAME_sk_type(sk),
ossl_check_X509_NAME_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(X509, X509, X509)
#define sk_X509_num(sk) OPENSSL_sk_num(ossl_check_const_X509_sk_type(sk))
#define sk_X509_value(sk, idx) ((X509 *)OPENSSL_sk_value(ossl_check_const_X509_sk_type(sk), (idx)))
#define sk_X509_new(cmp) ((STACK_OF(X509) *)OPENSSL_sk_new(ossl_check_X509_compfunc_type(cmp)))
#define sk_X509_new_null() ((STACK_OF(X509) *)OPENSSL_sk_new_null())
#define sk_X509_new_reserve(cmp, n) ((STACK_OF(X509)
*)OPENSSL_sk_new_reserve(ossl_check_X509_compfunc_type(cmp), (n)))
#define sk_X509_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_sk_type(sk), (n))
#define sk_X509_free(sk) OPENSSL_sk_free(ossl_check_X509_sk_type(sk))
#define sk_X509_zero(sk) OPENSSL_sk_zero(ossl_check_X509_sk_type(sk))
#define
 sk_X509_delete(sk, i) ((X509 *)OPENSSL_sk_delete(ossl_check_X509_sk_type(sk), (i)))
#define sk_X509_delete_ptr(sk, ptr) ((X509 *)OPENSSL_sk_delete_ptr(ossl_check_X509_sk_type(sk),
ossl_check_X509_type(ptr)))
#define sk_X509_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_sk_type(sk), ossl_check_X509_type(ptr))
#define sk_X509_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_sk_type(sk),
ossl_check_X509_type(ptr))
#define sk_X509_pop(sk) ((X509 *)OPENSSL_sk_pop(ossl_check_X509_sk_type(sk)))
#define sk_X509_shift(sk) ((X509 *)OPENSSL_sk_shift(ossl_check_X509_sk_type(sk)))
#define sk_X509_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_sk_type(sk),ossl_check_X509_freefunc_type(freefunc))
#define sk_X509_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_sk_type(sk),
ossl_check_X509_type(ptr), (idx))
```

```
#define sk_X509_set(sk, idx, ptr) ((X509 *)OPENSSL_sk_set(ossl_check_X509_sk_type(sk), (idx),
ossl_check_X509_type(ptr)))
#define sk_X509_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_sk_type(sk),
 ossl_check_X509_type(ptr))
#define sk_X509_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_sk_type(sk),
ossl_check_X509_type(ptr))
#define sk_X509_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_X509_sk_type(sk),
ossl_check_X509_type(ptr), pnum)
#define sk_X509_sort(sk) OPENSSL_sk_sort(ossl_check_X509_sk_type(sk))
#define sk_X509_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_X509_sk_type(sk))
#define sk_X509_dup(sk) ((STACK_OF(X509) *)OPENSSL_sk_dup(ossl_check_const_X509_sk_type(sk)))
#define sk_X509_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_sk_type(sk), ossl_check_X509_copyfunc_type(copyfunc),
ossl_check_X509_freefunc_type(freefunc)))
#define sk_X509_set_cmp_func(sk, cmp)
((sk_X509_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_sk_type(sk),
ossl_check_X509_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(X509_REVOKED, X509_REVOKED, X509_REVOKED)
#define sk_X509_REVOKED_num(sk)
 OPENSSL_sk_num(ossl_check_const_X509_REVOKED_sk_type(sk))
#define sk_X509_REVOKED_value(sk, idx) ((X509_REVOKED
*)OPENSSL_sk_value(ossl_check_const_X509_REVOKED_sk_type(sk), (idx)))
#define sk_X509_REVOKED_new(cmp) ((STACK_OF(X509_REVOKED)
*)OPENSSL_sk_new(ossl_check_X509_REVOKED_compfunc_type(cmp)))
#define sk_X509_REVOKED_new_null() ((STACK_OF(X509_REVOKED) *)OPENSSL_sk_new_null())
#define sk_X509_REVOKED_new_reserve(cmp, n) ((STACK_OF(X509_REVOKED)
*)OPENSSL_sk_new_reserve(ossl_check_X509_REVOKED_compfunc_type(cmp), (n)))
#define sk_X509_REVOKED_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_REVOKED_sk_type(sk),
(n))
#define sk_X509_REVOKED_free(sk) OPENSSL_sk_free(ossl_check_X509_REVOKED_sk_type(sk))
#define sk_X509_REVOKED_zero(sk) OPENSSL_sk_zero(ossl_check_X509_REVOKED_sk_type(sk))
#define sk_X509_REVOKED_delete(sk, i) ((X509_REVOKED
*)OPENSSL_sk_delete(ossl_check_X509_REVOKED_sk_type(sk), (i)))
#define sk_X509_REVOKED_delete_ptr(sk, ptr) ((X509_REVOKED
*)OPENSSL_sk_delete_ptr(ossl_check_X509_REVOKED_sk_type(sk),
 ossl_check_X509_REVOKED_type(ptr)))
#define sk_X509_REVOKED_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_REVOKED_sk_type(sk),
ossl_check_X509_REVOKED_type(ptr))
#define sk_X509_REVOKED_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_REVOKED_sk_type(sk),
ossl_check_X509_REVOKED_type(ptr))
#define sk_X509_REVOKED_pop(sk) ((X509_REVOKED
*)OPENSSL_sk_pop(ossl_check_X509_REVOKED_sk_type(sk)))
#define sk_X509_REVOKED_shift(sk) ((X509_REVOKED
*)OPENSSL_sk_shift(ossl_check_X509_REVOKED_sk_type(sk)))
#define sk_X509_REVOKED_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_REVOKED_sk_type(sk),ossl_check_X509_REVOKED_freefunc_type(
freefunc))
#define sk_X509_REVOKED_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_REVOKED_sk_type(sk),
```

```
ossl_check_X509_REVOKED_type(ptr), (idx))
#define sk_X509_REVOKED_set(sk, idx, ptr) ((X509_REVOKED
*)OPENSSL_sk_set(ossl_check_X509_REVOKED_sk_type(sk), (idx), ossl_check_X509_REVOKED_type(ptr)))
#define
 sk_X509_REVOKED_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_REVOKED_sk_type(sk),
ossl_check_X509_REVOKED_type(ptr))
#define sk_X509_REVOKED_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_REVOKED_sk_type(sk),
ossl_check_X509_REVOKED_type(ptr))
#define sk_X509_REVOKED_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_X509_REVOKED_sk_type(sk), ossl_check_X509_REVOKED_type(ptr),
pnum)
#define sk_X509_REVOKED_sort(sk) OPENSSL_sk_sort(ossl_check_X509_REVOKED_sk_type(sk))
#define sk_X509_REVOKED_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_X509_REVOKED_sk_type(sk))
#define sk_X509_REVOKED_dup(sk) ((STACK_OF(X509_REVOKED)
*)OPENSSL_sk_dup(ossl_check_const_X509_REVOKED_sk_type(sk)))
#define sk_X509_REVOKED_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_REVOKED)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_REVOKED_sk_type(sk),
ossl_check_X509_REVOKED_copyfunc_type(copyfunc),
ossl_check_X509_REVOKED_freefunc_type(freefunc)))
#define sk_X509_REVOKED_set_cmp_func(sk, cmp)
((sk_X509_REVOKED_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_REVOKED_sk_type(sk),
 ossl_check_X509_REVOKED_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(X509_CRL, X509_CRL, X509_CRL)
#define sk_X509_CRL_num(sk) OPENSSL_sk_num(ossl_check_const_X509_CRL_sk_type(sk))
#define sk_X509_CRL_value(sk, idx) ((X509_CRL
*)OPENSSL_sk_value(ossl_check_const_X509_CRL_sk_type(sk), (idx)))
#define sk_X509_CRL_new(cmp) ((STACK_OF(X509_CRL)
*)OPENSSL_sk_new(ossl_check_X509_CRL_compfunc_type(cmp)))
#define sk_X509_CRL_new_null() ((STACK_OF(X509_CRL) *)OPENSSL_sk_new_null())
#define sk_X509_CRL_new_reserve(cmp, n) ((STACK_OF(X509_CRL)
*)OPENSSL_sk_new_reserve(ossl_check_X509_CRL_compfunc_type(cmp), (n)))
#define sk_X509_CRL_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_CRL_sk_type(sk), (n))
#define sk_X509_CRL_free(sk) OPENSSL_sk_free(ossl_check_X509_CRL_sk_type(sk))
#define sk_X509_CRL_zero(sk) OPENSSL_sk_zero(ossl_check_X509_CRL_sk_type(sk))
#define sk_X509_CRL_delete(sk, i) ((X509_CRL *)OPENSSL_sk_delete(ossl_check_X509_CRL_sk_type(sk),
 (i)))
#define sk_X509_CRL_delete_ptr(sk, ptr) ((X509_CRL
*)OPENSSL_sk_delete_ptr(ossl_check_X509_CRL_sk_type(sk), ossl_check_X509_CRL_type(ptr)))
#define sk_X509_CRL_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_CRL_sk_type(sk),
ossl_check_X509_CRL_type(ptr))
#define sk_X509_CRL_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_CRL_sk_type(sk),
ossl_check_X509_CRL_type(ptr))
#define sk_X509_CRL_pop(sk) ((X509_CRL *)OPENSSL_sk_pop(ossl_check_X509_CRL_sk_type(sk)))
#define sk_X509_CRL_shift(sk) ((X509_CRL *)OPENSSL_sk_shift(ossl_check_X509_CRL_sk_type(sk)))
#define sk_X509_CRL_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_CRL_sk_type(sk),ossl_check_X509_CRL_freefunc_type(freefunc))
#define sk_X509_CRL_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_CRL_sk_type(sk),
```

```
ossl_check_X509_CRL_type(ptr), (idx))
#define sk_X509_CRL_set(sk, idx, ptr) ((X509_CRL *)OPENSSL_sk_set(ossl_check_X509_CRL_sk_type(sk),
(idx), ossl_check_X509_CRL_type(ptr)))
#define
 sk_X509_CRL_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_CRL_sk_type(sk),
ossl_check_X509_CRL_type(ptr))
#define sk_X509_CRL_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_CRL_sk_type(sk),
ossl_check_X509_CRL_type(ptr))
#define sk_X509_CRL_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_X509_CRL_sk_type(sk),
ossl_check_X509_CRL_type(ptr), pnum)
#define sk_X509_CRL_sort(sk) OPENSSL_sk_sort(ossl_check_X509_CRL_sk_type(sk))
#define sk_X509_CRL_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_X509_CRL_sk_type(sk))
#define sk_X509_CRL_dup(sk) ((STACK_OF(X509_CRL)
*)OPENSSL_sk_dup(ossl_check_const_X509_CRL_sk_type(sk)))
#define sk_X509_CRL_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_CRL)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_CRL_sk_type(sk),
ossl_check_X509_CRL_copyfunc_type(copyfunc), ossl_check_X509_CRL_freefunc_type(freefunc)))
#define sk_X509_CRL_set_cmp_func(sk, cmp)
((sk_X509_CRL_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_CRL_sk_type(sk),
 ossl_check_X509_CRL_compfunc_type(cmp)))

/* clang-format on */

/* Flags for X509_get_signature_info() */
/* Signature info is valid */
#define X509_SIG_INFO_VALID 0x1
/* Signature is suitable for TLS use */
#define X509_SIG_INFO_TLS 0x2

#define X509_FILETYPE_PEM 1
#define X509_FILETYPE_ASN1 2
#define X509_FILETYPE_DEFAULT 3

/*-
* <https://datatracker.ietf.org/doc/html/rfc5280#section-4.2.1.3>:
* The KeyUsage BITSTRING is treated as a little-endian integer, hence bit `0`
* is 0x80, while bit `7` is 0x01 (the LSB of the integer value), bit `8` is
* then the MSB of the second octet, or 0x8000.
*/
#define X509v3_KU_DIGITAL_SIGNATURE 0x0080 /* (0) */
#define X509v3_KU_NON_REPUDIATION 0x0040 /* (1) */
#define X509v3_KU_KEY_ENCIPHERMENT 0x0020 /* (2) */
#define X509v3_KU_DATA_ENCIPHERMENT 0x0010 /* (3) */
#define X509v3_KU_KEY_AGREEMENT 0x0008 /* (4) */
#define X509v3_KU_KEY_CERT_SIGN 0x0004 /* (5) */
#define X509v3_KU_CRL_SIGN 0x0002 /* (6) */
#define X509v3_KU_ENCIPHER_ONLY
```

```
 0x0001 /* (7) */
#define X509v3_KU_DECIPHER_ONLY 0x8000 /* (8) */
#ifndef OPENSSL_NO_DEPRECATED_3_4
#define X509v3_KU_UNDEF 0xffff /* vestigial, not used */
#endif

struct X509_algor_st {
   ASN1_OBJECT *algorithm;
   ASN1_TYPE *parameter;
} /* X509_ALGOR */;

typedef STACK_OF(X509_ALGOR) X509_ALGORS;

typedef struct X509_val_st {
   ASN1_TIME *notBefore;
   ASN1_TIME *notAfter;
} X509_VAL;

typedef struct X509_sig_st X509_SIG;

typedef struct X509_name_entry_st X509_NAME_ENTRY;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_NAME_ENTRY, X509_NAME_ENTRY,
X509_NAME_ENTRY)
#define sk_X509_NAME_ENTRY_num(sk)
OPENSSL_sk_num(ossl_check_const_X509_NAME_ENTRY_sk_type(sk))
#define sk_X509_NAME_ENTRY_value(sk, idx) ((X509_NAME_ENTRY
*)OPENSSL_sk_value(ossl_check_const_X509_NAME_ENTRY_sk_type(sk), (idx)))
#define sk_X509_NAME_ENTRY_new(cmp) ((STACK_OF(X509_NAME_ENTRY)
*)OPENSSL_sk_new(ossl_check_X509_NAME_ENTRY_compfunc_type(cmp)))
#define sk_X509_NAME_ENTRY_new_null() ((STACK_OF(X509_NAME_ENTRY)
 *)OPENSSL_sk_new_null())
#define sk_X509_NAME_ENTRY_new_reserve(cmp, n) ((STACK_OF(X509_NAME_ENTRY)
*)OPENSSL_sk_new_reserve(ossl_check_X509_NAME_ENTRY_compfunc_type(cmp), (n)))
#define sk_X509_NAME_ENTRY_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_X509_NAME_ENTRY_sk_type(sk), (n))
#define sk_X509_NAME_ENTRY_free(sk) OPENSSL_sk_free(ossl_check_X509_NAME_ENTRY_sk_type(sk))
#define sk_X509_NAME_ENTRY_zero(sk) OPENSSL_sk_zero(ossl_check_X509_NAME_ENTRY_sk_type(sk))
#define sk_X509_NAME_ENTRY_delete(sk, i) ((X509_NAME_ENTRY
*)OPENSSL_sk_delete(ossl_check_X509_NAME_ENTRY_sk_type(sk), (i)))
#define sk_X509_NAME_ENTRY_delete_ptr(sk, ptr) ((X509_NAME_ENTRY
*)OPENSSL_sk_delete_ptr(ossl_check_X509_NAME_ENTRY_sk_type(sk),
ossl_check_X509_NAME_ENTRY_type(ptr)))
#define sk_X509_NAME_ENTRY_push(sk, ptr)
OPENSSL_sk_push(ossl_check_X509_NAME_ENTRY_sk_type(sk),
ossl_check_X509_NAME_ENTRY_type(ptr))
#define sk_X509_NAME_ENTRY_unshift(sk, ptr)
```

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OPENSSL_sk_unshift(ossl_check_X509_NAME_ENTRY_sk_type(sk),
 ossl_check_X509_NAME_ENTRY_type(ptr))
#define sk_X509_NAME_ENTRY_pop(sk) ((X509_NAME_ENTRY
*)OPENSSL_sk_pop(ossl_check_X509_NAME_ENTRY_sk_type(sk)))
#define sk_X509_NAME_ENTRY_shift(sk) ((X509_NAME_ENTRY
*)OPENSSL_sk_shift(ossl_check_X509_NAME_ENTRY_sk_type(sk)))
#define sk_X509_NAME_ENTRY_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_NAME_ENTRY_sk_type(sk),ossl_check_X509_NAME_ENTRY_freef
unc_type(freefunc))
#define sk_X509_NAME_ENTRY_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_X509_NAME_ENTRY_sk_type(sk),
ossl_check_X509_NAME_ENTRY_type(ptr), (idx))
#define sk_X509_NAME_ENTRY_set(sk, idx, ptr) ((X509_NAME_ENTRY
*)OPENSSL_sk_set(ossl_check_X509_NAME_ENTRY_sk_type(sk), (idx),
ossl_check_X509_NAME_ENTRY_type(ptr)))
#define sk_X509_NAME_ENTRY_find(sk, ptr)
OPENSSL_sk_find(ossl_check_X509_NAME_ENTRY_sk_type(sk),
ossl_check_X509_NAME_ENTRY_type(ptr))
#define sk_X509_NAME_ENTRY_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_X509_NAME_ENTRY_sk_type(sk),
 ossl_check_X509_NAME_ENTRY_type(ptr))
#define sk_X509_NAME_ENTRY_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_X509_NAME_ENTRY_sk_type(sk),
ossl_check_X509_NAME_ENTRY_type(ptr), pnum)
#define sk_X509_NAME_ENTRY_sort(sk) OPENSSL_sk_sort(ossl_check_X509_NAME_ENTRY_sk_type(sk))
#define sk_X509_NAME_ENTRY_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_X509_NAME_ENTRY_sk_type(sk))
#define sk_X509_NAME_ENTRY_dup(sk) ((STACK_OF(X509_NAME_ENTRY)
*)OPENSSL_sk_dup(ossl_check_const_X509_NAME_ENTRY_sk_type(sk)))
#define sk_X509_NAME_ENTRY_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_NAME_ENTRY)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_NAME_ENTRY_sk_type(sk),
ossl_check_X509_NAME_ENTRY_copyfunc_type(copyfunc),
ossl_check_X509_NAME_ENTRY_freefunc_type(freefunc)))
#define sk_X509_NAME_ENTRY_set_cmp_func(sk, cmp)
((sk_X509_NAME_ENTRY_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_NAME_ENTRY_sk_type
(sk), ossl_check_X509_NAME_ENTRY_compfunc_type(cmp)))

/* clang-format on */

#define
 X509_EX_V_NETSCAPE_HACK 0x8000
#define X509_EX_V_INIT 0x0001
typedef struct X509_extension_st X509_EXTENSION;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_EXTENSION, X509_EXTENSION, X509_EXTENSION)
#define sk_X509_EXTENSION_num(sk) OPENSSL_sk_num(ossl_check_const_X509_EXTENSION_sk_type(sk))
#define sk_X509_EXTENSION_value(sk, idx) ((X509_EXTENSION
*)OPENSSL_sk_value(ossl_check_const_X509_EXTENSION_sk_type(sk), (idx)))
```

```
#define sk_X509_EXTENSION_new(cmp) ((STACK_OF(X509_EXTENSION)
*)OPENSSL_sk_new(ossl_check_X509_EXTENSION_compfunc_type(cmp)))
#define sk_X509_EXTENSION_new_null() ((STACK_OF(X509_EXTENSION) *)OPENSSL_sk_new_null())
#define sk_X509_EXTENSION_new_reserve(cmp, n) ((STACK_OF(X509_EXTENSION)
*)OPENSSL_sk_new_reserve(ossl_check_X509_EXTENSION_compfunc_type(cmp), (n)))
#define sk_X509_EXTENSION_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_X509_EXTENSION_sk_type(sk), (n))
#define sk_X509_EXTENSION_free(sk) OPENSSL_sk_free(ossl_check_X509_EXTENSION_sk_type(sk))
#define
 sk_X509_EXTENSION_zero(sk) OPENSSL_sk_zero(ossl_check_X509_EXTENSION_sk_type(sk))
#define sk_X509_EXTENSION_delete(sk, i) ((X509_EXTENSION
*)OPENSSL_sk_delete(ossl_check_X509_EXTENSION_sk_type(sk), (i)))
#define sk_X509_EXTENSION_delete_ptr(sk, ptr) ((X509_EXTENSION
*)OPENSSL_sk_delete_ptr(ossl_check_X509_EXTENSION_sk_type(sk),
ossl_check_X509_EXTENSION_type(ptr)))
#define sk_X509_EXTENSION_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_EXTENSION_sk_type(sk),
ossl_check_X509_EXTENSION_type(ptr))
#define sk_X509_EXTENSION_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_X509_EXTENSION_sk_type(sk), ossl_check_X509_EXTENSION_type(ptr))
#define sk_X509_EXTENSION_pop(sk) ((X509_EXTENSION
*)OPENSSL_sk_pop(ossl_check_X509_EXTENSION_sk_type(sk)))
#define sk_X509_EXTENSION_shift(sk) ((X509_EXTENSION
*)OPENSSL_sk_shift(ossl_check_X509_EXTENSION_sk_type(sk)))
#define sk_X509_EXTENSION_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_EXTENSION_sk_type(sk),ossl_check_X509_EXTENSION_freefunc_t
ype(freefunc))
#define
 sk_X509_EXTENSION_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_EXTENSION_sk_type(sk),
ossl_check_X509_EXTENSION_type(ptr), (idx))
#define sk_X509_EXTENSION_set(sk, idx, ptr) ((X509_EXTENSION
*)OPENSSL_sk_set(ossl_check_X509_EXTENSION_sk_type(sk), (idx),
ossl_check_X509_EXTENSION_type(ptr)))
#define sk_X509_EXTENSION_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_EXTENSION_sk_type(sk),
ossl_check_X509_EXTENSION_type(ptr))
#define sk_X509_EXTENSION_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_X509_EXTENSION_sk_type(sk), ossl_check_X509_EXTENSION_type(ptr))
#define sk_X509_EXTENSION_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_X509_EXTENSION_sk_type(sk), ossl_check_X509_EXTENSION_type(ptr),
pnum)
#define sk_X509_EXTENSION_sort(sk) OPENSSL_sk_sort(ossl_check_X509_EXTENSION_sk_type(sk))
#define sk_X509_EXTENSION_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_X509_EXTENSION_sk_type(sk))
#define sk_X509_EXTENSION_dup(sk) ((STACK_OF(X509_EXTENSION)
 *)OPENSSL_sk_dup(ossl_check_const_X509_EXTENSION_sk_type(sk)))
#define sk_X509_EXTENSION_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_EXTENSION)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_EXTENSION_sk_type(sk),
ossl_check_X509_EXTENSION_copyfunc_type(copyfunc),
ossl_check_X509_EXTENSION_freefunc_type(freefunc)))
```

```
#define sk_X509_EXTENSION_set_cmp_func(sk, cmp)
((sk_X509_EXTENSION_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_EXTENSION_sk_type(sk),
ossl_check_X509_EXTENSION_compfunc_type(cmp)))

/* clang-format on */
typedef STACK_OF(X509_EXTENSION) X509_EXTENSIONS;
typedef struct x509_attributes_st X509_ATTRIBUTE;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_ATTRIBUTE, X509_ATTRIBUTE, X509_ATTRIBUTE)
#define sk_X509_ATTRIBUTE_num(sk) OPENSSL_sk_num(ossl_check_const_X509_ATTRIBUTE_sk_type(sk))
#define sk_X509_ATTRIBUTE_value(sk, idx) ((X509_ATTRIBUTE
*)OPENSSL_sk_value(ossl_check_const_X509_ATTRIBUTE_sk_type(sk), (idx)))
#define sk_X509_ATTRIBUTE_new(cmp)
 ((STACK_OF(X509_ATTRIBUTE)
*)OPENSSL_sk_new(ossl_check_X509_ATTRIBUTE_compfunc_type(cmp)))
#define sk_X509_ATTRIBUTE_new_null() ((STACK_OF(X509_ATTRIBUTE) *)OPENSSL_sk_new_null())
#define sk_X509_ATTRIBUTE_new_reserve(cmp, n) ((STACK_OF(X509_ATTRIBUTE)
*)OPENSSL_sk_new_reserve(ossl_check_X509_ATTRIBUTE_compfunc_type(cmp), (n)))
#define sk_X509_ATTRIBUTE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_X509_ATTRIBUTE_sk_type(sk), (n))
#define sk_X509_ATTRIBUTE_free(sk) OPENSSL_sk_free(ossl_check_X509_ATTRIBUTE_sk_type(sk))
#define sk_X509_ATTRIBUTE_zero(sk) OPENSSL_sk_zero(ossl_check_X509_ATTRIBUTE_sk_type(sk))
#define sk_X509_ATTRIBUTE_delete(sk, i) ((X509_ATTRIBUTE
*)OPENSSL_sk_delete(ossl_check_X509_ATTRIBUTE_sk_type(sk), (i)))
#define sk_X509_ATTRIBUTE_delete_ptr(sk, ptr) ((X509_ATTRIBUTE
*)OPENSSL_sk_delete_ptr(ossl_check_X509_ATTRIBUTE_sk_type(sk),
ossl_check_X509_ATTRIBUTE_type(ptr)))
#define sk_X509_ATTRIBUTE_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_ATTRIBUTE_sk_type(sk),
ossl_check_X509_ATTRIBUTE_type(ptr))
#define
 sk_X509_ATTRIBUTE_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_ATTRIBUTE_sk_type(sk),
ossl_check_X509_ATTRIBUTE_type(ptr))
#define sk_X509_ATTRIBUTE_pop(sk) ((X509_ATTRIBUTE
*)OPENSSL_sk_pop(ossl_check_X509_ATTRIBUTE_sk_type(sk)))
#define sk_X509_ATTRIBUTE_shift(sk) ((X509_ATTRIBUTE
*)OPENSSL_sk_shift(ossl_check_X509_ATTRIBUTE_sk_type(sk)))
#define sk_X509_ATTRIBUTE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_ATTRIBUTE_sk_type(sk),ossl_check_X509_ATTRIBUTE_freefunc_t
ype(freefunc))
#define sk_X509_ATTRIBUTE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_X509_ATTRIBUTE_sk_type(sk), ossl_check_X509_ATTRIBUTE_type(ptr),
(idx))
#define sk_X509_ATTRIBUTE_set(sk, idx, ptr) ((X509_ATTRIBUTE
*)OPENSSL_sk_set(ossl_check_X509_ATTRIBUTE_sk_type(sk), (idx),
ossl_check_X509_ATTRIBUTE_type(ptr)))
#define sk_X509_ATTRIBUTE_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_ATTRIBUTE_sk_type(sk),
ossl_check_X509_ATTRIBUTE_type(ptr))
#define
```

```
 sk_X509_ATTRIBUTE_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_ATTRIBUTE_sk_type(sk),
ossl_check_X509_ATTRIBUTE_type(ptr))
#define sk_X509_ATTRIBUTE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_X509_ATTRIBUTE_sk_type(sk), ossl_check_X509_ATTRIBUTE_type(ptr),
pnum)
#define sk_X509_ATTRIBUTE_sort(sk) OPENSSL_sk_sort(ossl_check_X509_ATTRIBUTE_sk_type(sk))
#define sk_X509_ATTRIBUTE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_X509_ATTRIBUTE_sk_type(sk))
#define sk_X509_ATTRIBUTE_dup(sk) ((STACK_OF(X509_ATTRIBUTE)
*)OPENSSL_sk_dup(ossl_check_const_X509_ATTRIBUTE_sk_type(sk)))
#define sk_X509_ATTRIBUTE_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_ATTRIBUTE)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_ATTRIBUTE_sk_type(sk),
ossl_check_X509_ATTRIBUTE_copyfunc_type(copyfunc),
ossl_check_X509_ATTRIBUTE_freefunc_type(freefunc)))
#define sk_X509_ATTRIBUTE_set_cmp_func(sk, cmp)
((sk_X509_ATTRIBUTE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_ATTRIBUTE_sk_type(sk),
 ossl_check_X509_ATTRIBUTE_compfunc_type(cmp)))

/* clang-format on */
typedef struct X509_req_info_st X509_REQ_INFO;
typedef struct X509_req_st X509_REQ;
typedef struct x509_cert_aux_st X509_CERT_AUX;
typedef struct x509_cinf_st X509_CINF;

/* Flags for X509_print_ex() */

#define X509_FLAG_COMPAT 0
#define X509_FLAG_NO_HEADER 1L
#define X509_FLAG_NO_VERSION (1L << 1)
#define X509_FLAG_NO_SERIAL (1L << 2)
#define X509_FLAG_NO_SIGNAME (1L << 3)
#define X509_FLAG_NO_ISSUER (1L << 4)
#define X509_FLAG_NO_VALIDITY (1L << 5)
#define X509_FLAG_NO_SUBJECT (1L << 6)
#define X509_FLAG_NO_PUBKEY (1L << 7)
#define X509_FLAG_NO_EXTENSIONS (1L << 8)
#define X509_FLAG_NO_SIGDUMP (1L << 9)
#define X509_FLAG_NO_AUX (1L << 10)
#define X509_FLAG_NO_ATTRIBUTES (1L << 11)
#define X509_FLAG_NO_IDS (1L << 12)
#define X509_FLAG_EXTENSIONS_ONLY_KID (1L << 13)

/* Flags specific to X509_NAME_print_ex() */

/* The field separator information */

#define XN_FLAG_SEP_MASK (0xf << 16)
```

```
#define XN_FLAG_COMPAT 0 /*
 Traditional; use old X509_NAME_print */
#define XN_FLAG_SEP_COMMA_PLUS (1 << 16) /* RFC2253 ,+ */
#define XN_FLAG_SEP_CPLUS_SPC (2 << 16) /* ,+ spaced: more readable */
#define XN_FLAG_SEP_SPLUS_SPC (3 << 16) /* ;+ spaced */
#define XN_FLAG_SEP_MULTILINE (4 << 16) /* One line per field */

#define XN_FLAG_DN_REV (1 << 20) /* Reverse DN order */

/* How the field name is shown */

#define XN_FLAG_FN_MASK (0x3 << 21)

#define XN_FLAG_FN_SN 0 /* Object short name */
#define XN_FLAG_FN_LN (1 << 21) /* Object long name */
#define XN_FLAG_FN_OID (2 << 21) /* Always use OIDs */
#define XN_FLAG_FN_NONE (3 << 21) /* No field names */

#define XN_FLAG_SPC_EQ (1 << 23) /* Put spaces round '=' */

/*
* This determines if we dump fields we don't recognise: RFC2253 requires
* this.
*/

#define XN_FLAG_DUMP_UNKNOWN_FIELDS (1 << 24)

#define XN_FLAG_FN_ALIGN (1 << 25) /* Align field names to 20 \
                                    * characters */

/* Complete set of RFC2253 flags */

#define XN_FLAG_RFC2253
 (ASN1_STRFLGS_RFC2253 | XN_FLAG_SEP_COMMA_PLUS | XN_FLAG_DN_REV | XN_FLAG_FN_SN |
XN_FLAG_DUMP_UNKNOWN_FIELDS)

/* readable oneline form */

#define XN_FLAG_ONELINE (ASN1_STRFLGS_RFC2253 | ASN1_STRFLGS_ESC_QUOTE |
XN_FLAG_SEP_CPLUS_SPC | XN_FLAG_SPC_EQ | XN_FLAG_FN_SN)

/* readable multiline form */

#define XN_FLAG_MULTILINE (ASN1_STRFLGS_ESC_CTRL | ASN1_STRFLGS_ESC_MSB |
XN_FLAG_SEP_MULTILINE | XN_FLAG_SPC_EQ | XN_FLAG_FN_LN | XN_FLAG_FN_ALIGN)

typedef struct X509_crl_info_st X509_CRL_INFO;
```

```
typedef struct private_key_st {
  int version;
  /* The PKCS#8 data types */
  X509_ALGOR *enc_algor;
  ASN1_OCTET_STRING *enc_pkey; /* encrypted pub key */
  /* When decrypted, the following will not be NULL */
  EVP_PKEY *dec_pkey;
  /* used to encrypt and decrypt */
  int key_length;
  char *key_data;
  int key_free; /* true if we should auto free key_data */
  /* expanded version of 'enc_algor' */
  EVP_CIPHER_INFO cipher;
} X509_PKEY;

typedef struct X509_info_st
 {
  X509 *x509;
  X509_CRL *crl;
  X509_PKEY *x_pkey;
  EVP_CIPHER_INFO enc_cipher;
  int enc_len;
  char *enc_data;
} X509_INFO;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_INFO, X509_INFO, X509_INFO)
#define sk_X509_INFO_num(sk) OPENSSL_sk_num(ossl_check_const_X509_INFO_sk_type(sk))
#define sk_X509_INFO_value(sk, idx) ((X509_INFO
*)OPENSSL_sk_value(ossl_check_const_X509_INFO_sk_type(sk), (idx)))
#define sk_X509_INFO_new(cmp) ((STACK_OF(X509_INFO)
*)OPENSSL_sk_new(ossl_check_X509_INFO_compfunc_type(cmp)))
#define sk_X509_INFO_new_null() ((STACK_OF(X509_INFO) *)OPENSSL_sk_new_null())
#define sk_X509_INFO_new_reserve(cmp, n) ((STACK_OF(X509_INFO)
*)OPENSSL_sk_new_reserve(ossl_check_X509_INFO_compfunc_type(cmp), (n)))
#define sk_X509_INFO_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_INFO_sk_type(sk), (n))
#define sk_X509_INFO_free(sk) OPENSSL_sk_free(ossl_check_X509_INFO_sk_type(sk))
#define sk_X509_INFO_zero(sk) OPENSSL_sk_zero(ossl_check_X509_INFO_sk_type(sk))
#define
 sk_X509_INFO_delete(sk, i) ((X509_INFO *)OPENSSL_sk_delete(ossl_check_X509_INFO_sk_type(sk), (i)))
#define sk_X509_INFO_delete_ptr(sk, ptr) ((X509_INFO
*)OPENSSL_sk_delete_ptr(ossl_check_X509_INFO_sk_type(sk), ossl_check_X509_INFO_type(ptr)))
#define sk_X509_INFO_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_INFO_sk_type(sk),
ossl_check_X509_INFO_type(ptr))
#define sk_X509_INFO_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_INFO_sk_type(sk),
ossl_check_X509_INFO_type(ptr))
#define sk_X509_INFO_pop(sk) ((X509_INFO *)OPENSSL_sk_pop(ossl_check_X509_INFO_sk_type(sk)))
#define sk_X509_INFO_shift(sk) ((X509_INFO *)OPENSSL_sk_shift(ossl_check_X509_INFO_sk_type(sk)))
#define sk_X509_INFO_pop_free(sk, freefunc)
```

```
OPENSSL_sk_pop_free(ossl_check_X509_INFO_sk_type(sk),ossl_check_X509_INFO_freefunc_type(freefunc))
#define sk_X509_INFO_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_INFO_sk_type(sk),
ossl_check_X509_INFO_type(ptr), (idx))
#define sk_X509_INFO_set(sk,
 idx, ptr) ((X509_INFO *)OPENSSL_sk_set(ossl_check_X509_INFO_sk_type(sk), (idx),
ossl_check_X509_INFO_type(ptr)))
#define sk_X509_INFO_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_INFO_sk_type(sk),
ossl_check_X509_INFO_type(ptr))
#define sk_X509_INFO_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_INFO_sk_type(sk),
ossl_check_X509_INFO_type(ptr))
#define sk_X509_INFO_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_X509_INFO_sk_type(sk),
ossl_check_X509_INFO_type(ptr), pnum)
#define sk_X509_INFO_sort(sk) OPENSSL_sk_sort(ossl_check_X509_INFO_sk_type(sk))
#define sk_X509_INFO_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_X509_INFO_sk_type(sk))
#define sk_X509_INFO_dup(sk) ((STACK_OF(X509_INFO)
*)OPENSSL_sk_dup(ossl_check_const_X509_INFO_sk_type(sk)))
#define sk_X509_INFO_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_INFO)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_INFO_sk_type(sk),
ossl_check_X509_INFO_copyfunc_type(copyfunc), ossl_check_X509_INFO_freefunc_type(freefunc)))
#define
 sk_X509_INFO_set_cmp_func(sk, cmp)
((sk_X509_INFO_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_INFO_sk_type(sk),
ossl_check_X509_INFO_compfunc_type(cmp)))

/* clang-format on */

/*
* The next 2 structures and their 8 routines are used to manipulate Netscape's
* spki structures - useful if you are writing a CA web page
*/
typedef struct Netscape_spkac_st {
   X509_PUBKEY *pubkey;
   ASN1_IA5STRING *challenge; /* challenge sent in atlas >= PR2 */
} NETSCAPE_SPKAC;

typedef struct Netscape_spki_st {
   NETSCAPE_SPKAC *spkac; /* signed public key and challenge */
   X509_ALGOR sig_algor;
   ASN1_BIT_STRING *signature;
} NETSCAPE_SPKI;

/* Netscape certificate sequence structure */
typedef struct Netscape_certificate_sequence {
   ASN1_OBJECT *type;
   STACK_OF(X509) *certs;
} NETSCAPE_CERT_SEQUENCE;

/*- Unused (and iv length is wrong)
```

```
typedef struct CBCParameter_st
      {
      unsigned char iv[8];
      } CBC_PARAM;
*/

/* Password based encryption structure
 */

typedef struct PBEPARAM_st {
   ASN1_OCTET_STRING *salt;
   ASN1_INTEGER *iter;
} PBEPARAM;

/* Password based encryption V2 structures */

typedef struct PBE2PARAM_st {
   X509_ALGOR *keyfunc;
   X509_ALGOR *encryption;
} PBE2PARAM;

typedef struct PBKDF2PARAM_st {
   /* Usually OCTET STRING but could be anything */
   ASN1_TYPE *salt;
   ASN1_INTEGER *iter;
   ASN1_INTEGER *keylength;
   X509_ALGOR *prf;
} PBKDF2PARAM;

typedef struct {
   X509_ALGOR *keyDerivationFunc;
   X509_ALGOR *messageAuthScheme;
} PBMAC1PARAM;

#ifndef OPENSSL_NO_SCRYPT
typedef struct SCRYPT_PARAMS_st {
   ASN1_OCTET_STRING *salt;
   ASN1_INTEGER *costParameter;
   ASN1_INTEGER *blockSize;
   ASN1_INTEGER *parallelizationParameter;
   ASN1_INTEGER *keyLength;
} SCRYPT_PARAMS;
#endif

#ifdef __cplusplus
}
#endif
```

```
#include <openssl/x509_vfy.h>
#include <openssl/pkcs7.h>

#ifdef __cplusplus
extern "C" {
#endif

#define X509_EXT_PACK_UNKNOWN 1
#define X509_EXT_PACK_STRING 2

#define X509_extract_key(x)
 X509_get_pubkey(x) /*****/
#define X509_REQ_extract_key(a) X509_REQ_get_pubkey(a)
#define X509_name_cmp(a, b) X509_NAME_cmp((a), (b))

void X509_CRL_set_default_method(const X509_CRL_METHOD *meth);
X509_CRL_METHOD *X509_CRL_METHOD_new(int (*crl_init)(X509_CRL *crl),
   int (*crl_free)(X509_CRL *crl),
   int (*crl_lookup)(X509_CRL *crl,
       X509_REVOKED **ret,
       const ASN1_INTEGER *serial,
       const X509_NAME *issuer),
   int (*crl_verify)(X509_CRL *crl,
       EVP_PKEY *pk));
void X509_CRL_METHOD_free(X509_CRL_METHOD *m);

void X509_CRL_set_meth_data(X509_CRL *crl, void *dat);
void *X509_CRL_get_meth_data(X509_CRL *crl);

const char *X509_verify_cert_error_string(long n);

int X509_verify(X509 *a, EVP_PKEY *r);
int X509_self_signed(X509 *cert, int verify_signature);

int X509_REQ_verify_ex(X509_REQ *a, EVP_PKEY *r, OSSL_LIB_CTX *libctx,
   const char *propq);
int X509_REQ_verify(X509_REQ *a, EVP_PKEY *r);
int X509_CRL_verify(X509_CRL *a, EVP_PKEY *r);
int
 NETSCAPE_SPKI_verify(NETSCAPE_SPKI *a, EVP_PKEY *r);

NETSCAPE_SPKI *NETSCAPE_SPKI_b64_decode(const char *str, int len);
char *NETSCAPE_SPKI_b64_encode(NETSCAPE_SPKI *x);
EVP_PKEY *NETSCAPE_SPKI_get_pubkey(NETSCAPE_SPKI *x);
int NETSCAPE_SPKI_set_pubkey(NETSCAPE_SPKI *x, EVP_PKEY *pkey);

int NETSCAPE_SPKI_print(BIO *out, NETSCAPE_SPKI *spki);
```

```
int X509_signature_dump(BIO *bp, const ASN1_STRING *sig, int indent);
int X509_signature_print(BIO *bp, const X509_ALGOR *alg,
  const ASN1_STRING *sig);

int X509_sign(X509 *x, EVP_PKEY *pkey, const EVP_MD *md);
int X509_sign_ctx(X509 *x, EVP_MD_CTX *ctx);
int X509_REQ_sign(X509_REQ *x, EVP_PKEY *pkey, const EVP_MD *md);
int X509_REQ_sign_ctx(X509_REQ *x, EVP_MD_CTX *ctx);
int X509_CRL_sign(X509_CRL *x, EVP_PKEY *pkey, const EVP_MD *md);
int X509_CRL_sign_ctx(X509_CRL *x, EVP_MD_CTX *ctx);
int NETSCAPE_SPKI_sign(NETSCAPE_SPKI *x, EVP_PKEY *pkey, const EVP_MD *md);

int X509_pubkey_digest(const X509 *data, const EVP_MD *type,
  unsigned
 char *md, unsigned int *len);
int X509_digest(const X509 *data, const EVP_MD *type,
  unsigned char *md, unsigned int *len);
ASN1_OCTET_STRING *X509_digest_sig(const X509 *cert,
  EVP_MD **md_used, int *md_is_fallback);
int X509_CRL_digest(const X509_CRL *data, const EVP_MD *type,
  unsigned char *md, unsigned int *len);
int X509_REQ_digest(const X509_REQ *data, const EVP_MD *type,
  unsigned char *md, unsigned int *len);
int X509_NAME_digest(const X509_NAME *data, const EVP_MD *type,
  unsigned char *md, unsigned int *len);

X509 *X509_load_http(const char *url, BIO *bio, BIO *rbio, int timeout);
X509_CRL *X509_CRL_load_http(const char *url, BIO *bio, BIO *rbio, int timeout);
#ifndef OPENSSL_NO_DEPRECATED_3_0
#include <openssl/http.h> /* OSSL_HTTP_REQ_CTX_nbio_d2i */
#define X509_http_nbio(rctx, pcert) \
  OSSL_HTTP_REQ_CTX_nbio_d2i(rctx, pcert, ASN1_ITEM_rptr(X509))
#define X509_CRL_http_nbio(rctx, pcrl) \
  OSSL_HTTP_REQ_CTX_nbio_d2i(rctx, pcrl, ASN1_ITEM_rptr(X509_CRL))
#endif

#ifndef
 OPENSSL_NO_STDIO
X509 *d2i_X509_fp(FILE *fp, X509 **x509);
int i2d_X509_fp(FILE *fp, const X509 *x509);
X509_CRL *d2i_X509_CRL_fp(FILE *fp, X509_CRL **crl);
int i2d_X509_CRL_fp(FILE *fp, const X509_CRL *crl);
X509_REQ *d2i_X509_REQ_fp(FILE *fp, X509_REQ **req);
int i2d_X509_REQ_fp(FILE *fp, const X509_REQ *req);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 RSA *d2i_RSAPrivateKey_fp(FILE *fp, RSA **rsa);
OSSL_DEPRECATEDIN_3_0 int i2d_RSAPrivateKey_fp(FILE *fp, const RSA *rsa);
OSSL_DEPRECATEDIN_3_0 RSA *d2i_RSAPublicKey_fp(FILE *fp, RSA **rsa);
```

```
OSSL_DEPRECATEDIN_3_0 int i2d_RSAPublicKey_fp(FILE *fp, const RSA *rsa);
OSSL_DEPRECATEDIN_3_0 RSA *d2i_RSA_PUBKEY_fp(FILE *fp, RSA **rsa);
OSSL_DEPRECATEDIN_3_0 int i2d_RSA_PUBKEY_fp(FILE *fp, const RSA *rsa);
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
#ifndef OPENSSL_NO_DSA
OSSL_DEPRECATEDIN_3_0 DSA *d2i_DSA_PUBKEY_fp(FILE *fp, DSA **dsa);
OSSL_DEPRECATEDIN_3_0 int i2d_DSA_PUBKEY_fp(FILE *fp, const DSA *dsa);
OSSL_DEPRECATEDIN_3_0
 DSA *d2i_DSAPrivateKey_fp(FILE *fp, DSA **dsa);
OSSL_DEPRECATEDIN_3_0 int i2d_DSAPrivateKey_fp(FILE *fp, const DSA *dsa);
#endif
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
#ifndef OPENSSL_NO_EC
OSSL_DEPRECATEDIN_3_0 EC_KEY *d2i_EC_PUBKEY_fp(FILE *fp, EC_KEY **eckey);
OSSL_DEPRECATEDIN_3_0 int i2d_EC_PUBKEY_fp(FILE *fp, const EC_KEY *eckey);
OSSL_DEPRECATEDIN_3_0 EC_KEY *d2i_ECPrivateKey_fp(FILE *fp, EC_KEY **eckey);
OSSL_DEPRECATEDIN_3_0 int i2d_ECPrivateKey_fp(FILE *fp, const EC_KEY *eckey);
#endif /* OPENSSL_NO_EC */
#endif /* OPENSSL_NO_DEPRECATED_3_0 */
X509_SIG *d2i_PKCS8_fp(FILE *fp, X509_SIG **p8);
int i2d_PKCS8_fp(FILE *fp, const X509_SIG *p8);
X509_PUBKEY *d2i_X509_PUBKEY_fp(FILE *fp, X509_PUBKEY **xpk);
int i2d_X509_PUBKEY_fp(FILE *fp, const X509_PUBKEY *xpk);
PKCS8_PRIV_KEY_INFO *d2i_PKCS8_PRIV_KEY_INFO_fp(FILE *fp,
   PKCS8_PRIV_KEY_INFO **p8inf);
int i2d_PKCS8_PRIV_KEY_INFO_fp(FILE *fp, const PKCS8_PRIV_KEY_INFO *p8inf);
int i2d_PKCS8PrivateKeyInfo_fp(FILE
 *fp, const EVP_PKEY *key);
int i2d_PrivateKey_fp(FILE *fp, const EVP_PKEY *pkey);
EVP_PKEY *d2i_PrivateKey_ex_fp(FILE *fp, EVP_PKEY **a, OSSL_LIB_CTX *libctx,
   const char *propq);
EVP_PKEY *d2i_PrivateKey_fp(FILE *fp, EVP_PKEY **a);
int i2d_PUBKEY_fp(FILE *fp, const EVP_PKEY *pkey);
EVP_PKEY *d2i_PUBKEY_ex_fp(FILE *fp, EVP_PKEY **a, OSSL_LIB_CTX *libctx,
   const char *propq);
EVP_PKEY *d2i_PUBKEY_fp(FILE *fp, EVP_PKEY **a);
#endif

X509 *d2i_X509_bio(BIO *bp, X509 **x509);
int i2d_X509_bio(BIO *bp, const X509 *x509);
X509_CRL *d2i_X509_CRL_bio(BIO *bp, X509_CRL **crl);
int i2d_X509_CRL_bio(BIO *bp, const X509_CRL *crl);
X509_REQ *d2i_X509_REQ_bio(BIO *bp, X509_REQ **req);
int i2d_X509_REQ_bio(BIO *bp, const X509_REQ *req);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 RSA *d2i_RSAPrivateKey_bio(BIO *bp, RSA **rsa);
```

```
OSSL_DEPRECATEDIN_3_0 int i2d_RSAPrivateKey_bio(BIO *bp, const RSA *rsa);
OSSL_DEPRECATEDIN_3_0 RSA *d2i_RSAPublicKey_bio(BIO *bp, RSA **rsa);
OSSL_DEPRECATEDIN_3_0
 int i2d_RSAPublicKey_bio(BIO *bp, const RSA *rsa);
OSSL_DEPRECATEDIN_3_0 RSA *d2i_RSA_PUBKEY_bio(BIO *bp, RSA **rsa);
OSSL_DEPRECATEDIN_3_0 int i2d_RSA_PUBKEY_bio(BIO *bp, const RSA *rsa);
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
#ifndef OPENSSL_NO_DSA
OSSL_DEPRECATEDIN_3_0 DSA *d2i_DSA_PUBKEY_bio(BIO *bp, DSA **dsa);
OSSL_DEPRECATEDIN_3_0 int i2d_DSA_PUBKEY_bio(BIO *bp, const DSA *dsa);
OSSL_DEPRECATEDIN_3_0 DSA *d2i_DSAPrivateKey_bio(BIO *bp, DSA **dsa);
OSSL_DEPRECATEDIN_3_0 int i2d_DSAPrivateKey_bio(BIO *bp, const DSA *dsa);
#endif
#endif

#ifndef OPENSSL_NO_DEPRECATED_3_0
#ifndef OPENSSL_NO_EC
OSSL_DEPRECATEDIN_3_0 EC_KEY *d2i_EC_PUBKEY_bio(BIO *bp, EC_KEY **eckey);
OSSL_DEPRECATEDIN_3_0 int i2d_EC_PUBKEY_bio(BIO *bp, const EC_KEY *eckey);
OSSL_DEPRECATEDIN_3_0 EC_KEY *d2i_ECPrivateKey_bio(BIO *bp, EC_KEY **eckey);
OSSL_DEPRECATEDIN_3_0 int i2d_ECPrivateKey_bio(BIO *bp, const EC_KEY *eckey);
#endif /* OPENSSL_NO_EC */
#endif /* OPENSSL_NO_DEPRECATED_3_0 */

X509_SIG *d2i_PKCS8_bio(BIO
 *bp, X509_SIG **p8);
int i2d_PKCS8_bio(BIO *bp, const X509_SIG *p8);
X509_PUBKEY *d2i_X509_PUBKEY_bio(BIO *bp, X509_PUBKEY **xpk);
int i2d_X509_PUBKEY_bio(BIO *bp, const X509_PUBKEY *xpk);
PKCS8_PRIV_KEY_INFO *d2i_PKCS8_PRIV_KEY_INFO_bio(BIO *bp,
   PKCS8_PRIV_KEY_INFO **p8inf);
int i2d_PKCS8_PRIV_KEY_INFO_bio(BIO *bp, const PKCS8_PRIV_KEY_INFO *p8inf);
int i2d_PKCS8PrivateKeyInfo_bio(BIO *bp, const EVP_PKEY *key);
int i2d_PrivateKey_bio(BIO *bp, const EVP_PKEY *pkey);
EVP_PKEY *d2i_PrivateKey_ex_bio(BIO *bp, EVP_PKEY **a, OSSL_LIB_CTX *libctx,
   const char *propq);
EVP_PKEY *d2i_PrivateKey_bio(BIO *bp, EVP_PKEY **a);
int i2d_PUBKEY_bio(BIO *bp, const EVP_PKEY *pkey);
EVP_PKEY *d2i_PUBKEY_ex_bio(BIO *bp, EVP_PKEY **a, OSSL_LIB_CTX *libctx,
   const char *propq);
EVP_PKEY *d2i_PUBKEY_bio(BIO *bp, EVP_PKEY **a);

DECLARE_ASN1_DUP_FUNCTION(X509)
DECLARE_ASN1_DUP_FUNCTION(X509_ALGOR)
DECLARE_ASN1_DUP_FUNCTION(X509_ATTRIBUTE)
DECLARE_ASN1_DUP_FUNCTION(X509_CRL)
DECLARE_ASN1_DUP_FUNCTION(X509_EXTENSION)
```

```
DECLARE_ASN1_DUP_FUNCTION(X509_PUBKEY)
DECLARE_ASN1_DUP_FUNCTION(X509_REQ)
DECLARE_ASN1_DUP_FUNCTION(X509_REVOKED)
int
 X509_ALGOR_set0(X509_ALGOR *alg, ASN1_OBJECT *aobj, int ptype,
   void *pval);
void X509_ALGOR_get0(const ASN1_OBJECT **paobj, int *pptype,
   const void **ppval, const X509_ALGOR *algor);
void X509_ALGOR_set_md(X509_ALGOR *alg, const EVP_MD *md);
int X509_ALGOR_cmp(const X509_ALGOR *a, const X509_ALGOR *b);
int X509_ALGOR_copy(X509_ALGOR *dest, const X509_ALGOR *src);

DECLARE_ASN1_DUP_FUNCTION(X509_NAME)
DECLARE_ASN1_DUP_FUNCTION(X509_NAME_ENTRY)

int X509_cmp_time(const ASN1_TIME *s, time_t *t);
int X509_cmp_current_time(const ASN1_TIME *s);
int X509_cmp_timeframe(const X509_VERIFY_PARAM *vpm,
   const ASN1_TIME *start, const ASN1_TIME *end);
ASN1_TIME *X509_time_adj(ASN1_TIME *s, long adj, time_t *t);
ASN1_TIME *X509_time_adj_ex(ASN1_TIME *s,
   int offset_day, long offset_sec, time_t *t);
ASN1_TIME *X509_gmtime_adj(ASN1_TIME *s,
 long adj);

const char *X509_get_default_cert_area(void);
const char *X509_get_default_cert_dir(void);
const char *X509_get_default_cert_file(void);
const char *X509_get_default_cert_dir_env(void);
const char *X509_get_default_cert_file_env(void);
const char *X509_get_default_private_dir(void);

X509_REQ *X509_to_X509_REQ(X509 *x, EVP_PKEY *pkey, const EVP_MD *md);
X509 *X509_REQ_to_X509(X509_REQ *r, int days, EVP_PKEY *pkey);

DECLARE_ASN1_FUNCTIONS(X509_ALGOR)
DECLARE_ASN1_ENCODE_FUNCTIONS(X509_ALGORS, X509_ALGORS, X509_ALGORS)
DECLARE_ASN1_FUNCTIONS(X509_VAL)

DECLARE_ASN1_FUNCTIONS(X509_PUBKEY)

X509_PUBKEY *X509_PUBKEY_new_ex(OSSL_LIB_CTX *libctx, const char *propq);
int X509_PUBKEY_set(X509_PUBKEY **x, EVP_PKEY *pkey);
EVP_PKEY *X509_PUBKEY_get0(const X509_PUBKEY *key);
EVP_PKEY *X509_PUBKEY_get(const X509_PUBKEY *key);
int X509_get_pubkey_parameters(EVP_PKEY *pkey, STACK_OF(X509) *chain);
long X509_get_pathlen(X509 *x);
DECLARE_ASN1_ENCODE_FUNCTIONS_only(EVP_PKEY, PUBKEY)
```

```
EVP_PKEY
 *d2i_PUBKEY_ex(EVP_PKEY **a, const unsigned char **pp, long length,
   OSSL_LIB_CTX *libctx, const char *propq);
#ifndef OPENSSL_NO_DEPRECATED_3_0
DECLARE_ASN1_ENCODE_FUNCTIONS_only_attr(OSSL_DEPRECATEDIN_3_0, RSA, RSA_PUBKEY)
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
#ifndef OPENSSL_NO_DSA
DECLARE_ASN1_ENCODE_FUNCTIONS_only_attr(OSSL_DEPRECATEDIN_3_0, DSA, DSA_PUBKEY)
#endif
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
#ifndef OPENSSL_NO_EC
DECLARE_ASN1_ENCODE_FUNCTIONS_only_attr(OSSL_DEPRECATEDIN_3_0, EC_KEY, EC_PUBKEY)
#endif
#endif

DECLARE_ASN1_FUNCTIONS(X509_SIG)
void X509_SIG_get0(const X509_SIG *sig, const X509_ALGOR **palg,
   const ASN1_OCTET_STRING **pdigest);
void X509_SIG_getm(X509_SIG *sig, X509_ALGOR **palg,
   ASN1_OCTET_STRING **pdigest);

DECLARE_ASN1_FUNCTIONS(X509_REQ_INFO)
DECLARE_ASN1_FUNCTIONS(X509_REQ)
X509_REQ *X509_REQ_new_ex(OSSL_LIB_CTX *libctx, const char *propq);

DECLARE_ASN1_FUNCTIONS(X509_ATTRIBUTE)
X509_ATTRIBUTE *X509_ATTRIBUTE_create(int nid, int atrtype,
 void *value);

DECLARE_ASN1_FUNCTIONS(X509_EXTENSION)
DECLARE_ASN1_ENCODE_FUNCTIONS(X509_EXTENSIONS, X509_EXTENSIONS, X509_EXTENSIONS)

DECLARE_ASN1_FUNCTIONS(X509_NAME_ENTRY)

DECLARE_ASN1_FUNCTIONS(X509_NAME)

int X509_NAME_set(X509_NAME **xn, const X509_NAME *name);

DECLARE_ASN1_FUNCTIONS(X509_CINF)
DECLARE_ASN1_FUNCTIONS(X509)
X509 *X509_new_ex(OSSL_LIB_CTX *libctx, const char *propq);
DECLARE_ASN1_FUNCTIONS(X509_CERT_AUX)

#define X509_get_ex_new_index(l, p, newf, dupf, freef) \
   CRYPTO_get_ex_new_index(CRYPTO_EX_INDEX_X509, l, p, newf, dupf, freef)
int X509_set_ex_data(X509 *r, int idx, void *arg);
```

```
void *X509_get_ex_data(const X509 *r, int idx);
DECLARE_ASN1_ENCODE_FUNCTIONS_only(X509, X509_AUX)

int i2d_re_X509_tbs(X509 *x, unsigned char **pp);

int X509_SIG_INFO_get(const X509_SIG_INFO *siginf, int *mdnid, int *pknid,
   int *secbits, uint32_t *flags);
void X509_SIG_INFO_set(X509_SIG_INFO *siginf, int mdnid, int pknid,
   int secbits, uint32_t flags);

int X509_get_signature_info(X509
 *x, int *mdnid, int *pknid, int *secbits,
   uint32_t *flags);

void X509_get0_signature(const ASN1_BIT_STRING **psig,
   const X509_ALGOR **palg, const X509 *x);
int X509_get_signature_nid(const X509 *x);

void X509_set0_distinguishing_id(X509 *x, ASN1_OCTET_STRING *d_id);
ASN1_OCTET_STRING *X509_get0_distinguishing_id(X509 *x);
void X509_REQ_set0_distinguishing_id(X509_REQ *x, ASN1_OCTET_STRING *d_id);
ASN1_OCTET_STRING *X509_REQ_get0_distinguishing_id(X509_REQ *x);

int X509_alias_set1(X509 *x, const unsigned char *name, int len);
int X509_keyid_set1(X509 *x, const unsigned char *id, int len);
unsigned char *X509_alias_get0(X509 *x, int *len);
unsigned char *X509_keyid_get0(X509 *x, int *len);

DECLARE_ASN1_FUNCTIONS(X509_REVOKED)
DECLARE_ASN1_FUNCTIONS(X509_CRL_INFO)
DECLARE_ASN1_FUNCTIONS(X509_CRL)
X509_CRL *X509_CRL_new_ex(OSSL_LIB_CTX *libctx, const char *propq);

int X509_CRL_add0_revoked(X509_CRL *crl, X509_REVOKED *rev);
int X509_CRL_get0_by_serial(X509_CRL
 *crl,
   X509_REVOKED **ret, const ASN1_INTEGER *serial);
int X509_CRL_get0_by_cert(X509_CRL *crl, X509_REVOKED **ret, X509 *x);

X509_PKEY *X509_PKEY_new(void);
void X509_PKEY_free(X509_PKEY *a);

DECLARE_ASN1_FUNCTIONS(NETSCAPE_SPKI)
DECLARE_ASN1_FUNCTIONS(NETSCAPE_SPKAC)
DECLARE_ASN1_FUNCTIONS(NETSCAPE_CERT_SEQUENCE)

X509_INFO *X509_INFO_new(void);
void X509_INFO_free(X509_INFO *a);
```

```
char *X509_NAME_oneline(const X509_NAME *a, char *buf, int size);

#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0
int ASN1_verify(i2d_of_void *i2d, X509_ALGOR *algor1,
   ASN1_BIT_STRING *signature, char *data, EVP_PKEY *pkey);
OSSL_DEPRECATEDIN_3_0
int ASN1_digest(i2d_of_void *i2d, const EVP_MD *type, char *data,
   unsigned char *md, unsigned int *len);
OSSL_DEPRECATEDIN_3_0
int ASN1_sign(i2d_of_void *i2d, X509_ALGOR *algor1, X509_ALGOR *algor2,
   ASN1_BIT_STRING *signature, char *data, EVP_PKEY *pkey,
   const EVP_MD *type);
#endif
int ASN1_item_digest(const ASN1_ITEM *it, const EVP_MD
 *type, void *data,
   unsigned char *md, unsigned int *len);
int ASN1_item_verify(const ASN1_ITEM *it, const X509_ALGOR *alg,
   const ASN1_BIT_STRING *signature, const void *data,
   EVP_PKEY *pkey);
int ASN1_item_verify_ctx(const ASN1_ITEM *it, const X509_ALGOR *alg,
   const ASN1_BIT_STRING *signature, const void *data,
   EVP_MD_CTX *ctx);
int ASN1_item_sign(const ASN1_ITEM *it, X509_ALGOR *algor1, X509_ALGOR *algor2,
   ASN1_BIT_STRING *signature, const void *data,
   EVP_PKEY *pkey, const EVP_MD *md);
int ASN1_item_sign_ctx(const ASN1_ITEM *it, X509_ALGOR *algor1,
   X509_ALGOR *algor2, ASN1_BIT_STRING *signature,
   const void *data, EVP_MD_CTX *ctx);

#define X509_VERSION_1 0
#define X509_VERSION_2 1
#define X509_VERSION_3 2

long X509_get_version(const X509 *x);
int X509_set_version(X509 *x, long version);
int X509_set_serialNumber(X509 *x, ASN1_INTEGER *serial);
ASN1_INTEGER *X509_get_serialNumber(X509 *x);
const ASN1_INTEGER *X509_get0_serialNumber(const X509
 *x);
int X509_set_issuer_name(X509 *x, const X509_NAME *name);
X509_NAME *X509_get_issuer_name(const X509 *a);
int X509_set_subject_name(X509 *x, const X509_NAME *name);
X509_NAME *X509_get_subject_name(const X509 *a);
const ASN1_TIME *X509_get0_notBefore(const X509 *x);
ASN1_TIME *X509_getm_notBefore(const X509 *x);
int X509_set1_notBefore(X509 *x, const ASN1_TIME *tm);
const ASN1_TIME *X509_get0_notAfter(const X509 *x);
```

```
ASN1_TIME *X509_getm_notAfter(const X509 *x);
int X509_set1_notAfter(X509 *x, const ASN1_TIME *tm);
int X509_set_pubkey(X509 *x, EVP_PKEY *pkey);
int X509_up_ref(X509 *x);
int X509_get_signature_type(const X509 *x);

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define X509_get_notBefore X509_getm_notBefore
#define X509_get_notAfter X509_getm_notAfter
#define X509_set_notBefore X509_set1_notBefore
#define X509_set_notAfter X509_set1_notAfter
#endif

/*
* This one is only used so that a binary form can output, as in
* i2d_X509_PUBKEY(X509_get_X509_PUBKEY(x), &buf)
*/
X509_PUBKEY
 *X509_get_X509_PUBKEY(const X509 *x);
const STACK_OF(X509_EXTENSION) *X509_get0_extensions(const X509 *x);
void X509_get0_uids(const X509 *x, const ASN1_BIT_STRING **piuid,
   const ASN1_BIT_STRING **psuid);
const X509_ALGOR *X509_get0_tbs_sigalg(const X509 *x);

EVP_PKEY *X509_get0_pubkey(const X509 *x);
EVP_PKEY *X509_get_pubkey(X509 *x);
ASN1_BIT_STRING *X509_get0_pubkey_bitstr(const X509 *x);

#define X509_REQ_VERSION_1 0

long X509_REQ_get_version(const X509_REQ *req);
int X509_REQ_set_version(X509_REQ *x, long version);
X509_NAME *X509_REQ_get_subject_name(const X509_REQ *req);
int X509_REQ_set_subject_name(X509_REQ *req, const X509_NAME *name);
void X509_REQ_get0_signature(const X509_REQ *req, const ASN1_BIT_STRING **psig,
   const X509_ALGOR **palg);
void X509_REQ_set0_signature(X509_REQ *req, ASN1_BIT_STRING *psig);
int X509_REQ_set1_signature_algo(X509_REQ *req, X509_ALGOR *palg);
int X509_REQ_get_signature_nid(const X509_REQ *req);
int i2d_re_X509_REQ_tbs(X509_REQ *req,
 unsigned char **pp);
int X509_REQ_set_pubkey(X509_REQ *x, EVP_PKEY *pkey);
EVP_PKEY *X509_REQ_get_pubkey(X509_REQ *req);
EVP_PKEY *X509_REQ_get0_pubkey(const X509_REQ *req);
X509_PUBKEY *X509_REQ_get_X509_PUBKEY(X509_REQ *req);
int X509_REQ_extension_nid(int nid);
int *X509_REQ_get_extension_nids(void);
void X509_REQ_set_extension_nids(int *nids);
```

```
STACK_OF(X509_EXTENSION) *X509_REQ_get_extensions(OSSL_FUTURE_CONST X509_REQ *req);
int X509_REQ_add_extensions_nid(X509_REQ *req,
   const STACK_OF(X509_EXTENSION) *exts, int nid);
int X509_REQ_add_extensions(X509_REQ *req, const STACK_OF(X509_EXTENSION) *ext);
int X509_REQ_get_attr_count(const X509_REQ *req);
int X509_REQ_get_attr_by_NID(const X509_REQ *req, int nid, int lastpos);
int X509_REQ_get_attr_by_OBJ(const X509_REQ *req, const ASN1_OBJECT *obj,
   int lastpos);
X509_ATTRIBUTE *X509_REQ_get_attr(const X509_REQ *req, int loc);
X509_ATTRIBUTE *X509_REQ_delete_attr(X509_REQ *req, int loc);
int X509_REQ_add1_attr(X509_REQ *req, X509_ATTRIBUTE
 *attr);
int X509_REQ_add1_attr_by_OBJ(X509_REQ *req,
   const ASN1_OBJECT *obj, int type,
   const unsigned char *bytes, int len);
int X509_REQ_add1_attr_by_NID(X509_REQ *req,
   int nid, int type,
   const unsigned char *bytes, int len);
int X509_REQ_add1_attr_by_txt(X509_REQ *req,
   const char *attrname, int type,
   const unsigned char *bytes, int len);

#define X509_CRL_VERSION_1 0
#define X509_CRL_VERSION_2 1

int X509_CRL_set_version(X509_CRL *x, long version);
int X509_CRL_set_issuer_name(X509_CRL *x, const X509_NAME *name);
int X509_CRL_set1_lastUpdate(X509_CRL *x, const ASN1_TIME *tm);
int X509_CRL_set1_nextUpdate(X509_CRL *x, const ASN1_TIME *tm);
int X509_CRL_sort(X509_CRL *crl);
int X509_CRL_up_ref(X509_CRL *crl);

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define X509_CRL_set_lastUpdate X509_CRL_set1_lastUpdate
#define X509_CRL_set_nextUpdate X509_CRL_set1_nextUpdate
#endif

long X509_CRL_get_version(const X509_CRL *crl);
const ASN1_TIME *X509_CRL_get0_lastUpdate(const
 X509_CRL *crl);
const ASN1_TIME *X509_CRL_get0_nextUpdate(const X509_CRL *crl);
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 ASN1_TIME *X509_CRL_get_lastUpdate(X509_CRL *crl);
OSSL_DEPRECATEDIN_1_1_0 ASN1_TIME *X509_CRL_get_nextUpdate(X509_CRL *crl);
#endif
X509_NAME *X509_CRL_get_issuer(const X509_CRL *crl);
const STACK_OF(X509_EXTENSION) *X509_CRL_get0_extensions(const X509_CRL *crl);
STACK_OF(X509_REVOKED) *X509_CRL_get_REVOKED(X509_CRL *crl);
```

```
void X509_CRL_get0_signature(const X509_CRL *crl, const ASN1_BIT_STRING **psig,
   const X509_ALGOR **palg);
int X509_CRL_get_signature_nid(const X509_CRL *crl);
int i2d_re_X509_CRL_tbs(X509_CRL *req, unsigned char **pp);

const ASN1_INTEGER *X509_REVOKED_get0_serialNumber(const X509_REVOKED *x);
int X509_REVOKED_set_serialNumber(X509_REVOKED *x, ASN1_INTEGER *serial);
const ASN1_TIME *X509_REVOKED_get0_revocationDate(const X509_REVOKED *x);
int X509_REVOKED_set_revocationDate(X509_REVOKED *r, ASN1_TIME *tm);
const STACK_OF(X509_EXTENSION)
 *
X509_REVOKED_get0_extensions(const X509_REVOKED *r);

X509_CRL *X509_CRL_diff(X509_CRL *base, X509_CRL *newer,
   EVP_PKEY *skey, const EVP_MD *md, unsigned int flags);

int X509_REQ_check_private_key(const X509_REQ *req, EVP_PKEY *pkey);

int X509_check_private_key(const X509 *cert, const EVP_PKEY *pkey);
int X509_chain_check_suiteb(int *perror_depth,
   X509 *x, STACK_OF(X509) *chain,
   unsigned long flags);
int X509_CRL_check_suiteb(X509_CRL *crl, EVP_PKEY *pk, unsigned long flags);
void OSSL_STACK_OF_X509_free(STACK_OF(X509) *certs);
STACK_OF(X509) *X509_chain_up_ref(STACK_OF(X509) *chain);

int X509_issuer_and_serial_cmp(const X509 *a, const X509 *b);
unsigned long X509_issuer_and_serial_hash(X509 *a);

int X509_issuer_name_cmp(const X509 *a, const X509 *b);
unsigned long X509_issuer_name_hash(X509 *a);

int X509_subject_name_cmp(const X509 *a, const X509 *b);
unsigned long X509_subject_name_hash(X509 *x);

#ifndef OPENSSL_NO_MD5
unsigned long X509_issuer_name_hash_old(X509
 *a);
unsigned long X509_subject_name_hash_old(X509 *x);
#endif

#define X509_ADD_FLAG_DEFAULT 0
#define X509_ADD_FLAG_UP_REF 0x1
#define X509_ADD_FLAG_PREPEND 0x2
#define X509_ADD_FLAG_NO_DUP 0x4
#define X509_ADD_FLAG_NO_SS 0x8
int X509_add_cert(STACK_OF(X509) *sk, X509 *cert, int flags);
int X509_add_certs(STACK_OF(X509) *sk, STACK_OF(X509) *certs, int flags);
```

```
int X509_cmp(const X509 *a, const X509 *b);
int X509_NAME_cmp(const X509_NAME *a, const X509_NAME *b);
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define X509_NAME_hash(x) X509_NAME_hash_ex(x, NULL, NULL, NULL)
OSSL_DEPRECATEDIN_3_0 int X509_certificate_type(const X509 *x,
   const EVP_PKEY *pubkey);
#endif
unsigned long X509_NAME_hash_ex(const X509_NAME *x, OSSL_LIB_CTX *libctx,
   const char *propq, int *ok);
unsigned long X509_NAME_hash_old(const X509_NAME *x);

int X509_CRL_cmp(const X509_CRL *a, const X509_CRL *b);
int X509_CRL_match(const X509_CRL *a, const X509_CRL *b);
int X509_aux_print(BIO *out, X509 *x,
 int indent);
#ifndef OPENSSL_NO_STDIO
int X509_print_ex_fp(FILE *bp, X509 *x, unsigned long nmflag,
   unsigned long cflag);
int X509_print_fp(FILE *bp, X509 *x);
int X509_CRL_print_fp(FILE *bp, X509_CRL *x);
int X509_REQ_print_fp(FILE *bp, X509_REQ *req);
int X509_NAME_print_ex_fp(FILE *fp, const X509_NAME *nm, int indent,
   unsigned long flags);
#endif

int X509_NAME_print(BIO *bp, const X509_NAME *name, int obase);
int X509_NAME_print_ex(BIO *out, const X509_NAME *nm, int indent,
   unsigned long flags);
int X509_print_ex(BIO *bp, X509 *x, unsigned long nmflag,
   unsigned long cflag);
int X509_print(BIO *bp, X509 *x);
int X509_ocspid_print(BIO *bp, X509 *x);
int X509_CRL_print_ex(BIO *out, X509_CRL *x, unsigned long nmflag);
int X509_CRL_print(BIO *bp, X509_CRL *x);
int X509_REQ_print_ex(BIO *bp, X509_REQ *x, unsigned long nmflag,
   unsigned long cflag);
int X509_REQ_print(BIO *bp, X509_REQ *req);

int X509_NAME_entry_count(const X509_NAME *name);
int X509_NAME_get_text_by_NID(const
 X509_NAME *name, int nid,
   char *buf, int len);
int X509_NAME_get_text_by_OBJ(const X509_NAME *name, const ASN1_OBJECT *obj,
   char *buf, int len);

/*
* NOTE: you should be passing -1, not 0 as lastpos. The functions that use
```

```
* lastpos, search after that position on.
*/
int X509_NAME_get_index_by_NID(const X509_NAME *name, int nid, int lastpos);
int X509_NAME_get_index_by_OBJ(const X509_NAME *name, const ASN1_OBJECT *obj,
   int lastpos);
X509_NAME_ENTRY *X509_NAME_get_entry(const X509_NAME *name, int loc);
X509_NAME_ENTRY *X509_NAME_delete_entry(X509_NAME *name, int loc);
int X509_NAME_add_entry(X509_NAME *name, const X509_NAME_ENTRY *ne,
   int loc, int set);
int X509_NAME_add_entry_by_OBJ(X509_NAME *name, const ASN1_OBJECT *obj, int type,
   const unsigned char *bytes, int len, int loc,
   int set);
int X509_NAME_add_entry_by_NID(X509_NAME *name, int nid, int type,
   const unsigned char *bytes, int len, int loc,
   int set);
X509_NAME_ENTRY *X509_NAME_ENTRY_create_by_txt(X509_NAME_ENTRY
 **ne,
   const char *field, int type,
   const unsigned char *bytes,
   int len);
X509_NAME_ENTRY *X509_NAME_ENTRY_create_by_NID(X509_NAME_ENTRY **ne, int nid,
   int type,
   const unsigned char *bytes,
   int len);
int X509_NAME_add_entry_by_txt(X509_NAME *name, const char *field, int type,
   const unsigned char *bytes, int len, int loc,
   int set);
X509_NAME_ENTRY *X509_NAME_ENTRY_create_by_OBJ(X509_NAME_ENTRY **ne,
   const ASN1_OBJECT *obj, int type,
   const unsigned char *bytes,
   int len);
int X509_NAME_ENTRY_set_object(X509_NAME_ENTRY *ne, const ASN1_OBJECT *obj);
int X509_NAME_ENTRY_set_data(X509_NAME_ENTRY *ne, int type,
   const unsigned char *bytes, int len);
ASN1_OBJECT *X509_NAME_ENTRY_get_object(const X509_NAME_ENTRY *ne);
ASN1_STRING *X509_NAME_ENTRY_get_data(const X509_NAME_ENTRY *ne);
int X509_NAME_ENTRY_set(const X509_NAME_ENTRY *ne);

int X509_NAME_get0_der(const X509_NAME *nm, const unsigned char **pder,
   size_t *pderlen);

int
 X509v3_get_ext_count(const STACK_OF(X509_EXTENSION) *x);
int X509v3_get_ext_by_NID(const STACK_OF(X509_EXTENSION) *x,
   int nid, int lastpos);
int X509v3_get_ext_by_OBJ(const STACK_OF(X509_EXTENSION) *x,
   const ASN1_OBJECT *obj, int lastpos);
int X509v3_get_ext_by_critical(const STACK_OF(X509_EXTENSION) *x,
```

```
  int crit, int lastpos);
X509_EXTENSION *X509v3_get_ext(const STACK_OF(X509_EXTENSION) *x, int loc);
X509_EXTENSION *X509v3_delete_ext(STACK_OF(X509_EXTENSION) *x, int loc);
STACK_OF(X509_EXTENSION) *X509v3_add_ext(STACK_OF(X509_EXTENSION) **x,
  X509_EXTENSION *ex, int loc);
STACK_OF(X509_EXTENSION) *X509v3_add_extensions(STACK_OF(X509_EXTENSION) **target,
  const STACK_OF(X509_EXTENSION) *exts);

int X509_get_ext_count(const X509 *x);
int X509_get_ext_by_NID(const X509 *x, int nid, int lastpos);
int X509_get_ext_by_OBJ(const X509 *x, const ASN1_OBJECT *obj, int lastpos);
int X509_get_ext_by_critical(const X509 *x, int crit, int lastpos);
X509_EXTENSION *X509_get_ext(const
 X509 *x, int loc);
X509_EXTENSION *X509_delete_ext(X509 *x, int loc);
int X509_add_ext(X509 *x, X509_EXTENSION *ex, int loc);
void *X509_get_ext_d2i(const X509 *x, int nid, int *crit, int *idx);
int X509_add1_ext_i2d(X509 *x, int nid, void *value, int crit,
  unsigned long flags);

int X509_CRL_get_ext_count(const X509_CRL *x);
int X509_CRL_get_ext_by_NID(const X509_CRL *x, int nid, int lastpos);
int X509_CRL_get_ext_by_OBJ(const X509_CRL *x, const ASN1_OBJECT *obj,
  int lastpos);
int X509_CRL_get_ext_by_critical(const X509_CRL *x, int crit, int lastpos);
X509_EXTENSION *X509_CRL_get_ext(const X509_CRL *x, int loc);
X509_EXTENSION *X509_CRL_delete_ext(X509_CRL *x, int loc);
int X509_CRL_add_ext(X509_CRL *x, X509_EXTENSION *ex, int loc);
void *X509_CRL_get_ext_d2i(const X509_CRL *x, int nid, int *crit, int *idx);
int X509_CRL_add1_ext_i2d(X509_CRL *x, int nid, void *value, int crit,
  unsigned long flags);

int X509_REVOKED_get_ext_count(const X509_REVOKED *x);
int
 X509_REVOKED_get_ext_by_NID(const X509_REVOKED *x, int nid, int lastpos);
int X509_REVOKED_get_ext_by_OBJ(const X509_REVOKED *x, const ASN1_OBJECT *obj,
  int lastpos);
int X509_REVOKED_get_ext_by_critical(const X509_REVOKED *x, int crit,
  int lastpos);
X509_EXTENSION *X509_REVOKED_get_ext(const X509_REVOKED *x, int loc);
X509_EXTENSION *X509_REVOKED_delete_ext(X509_REVOKED *x, int loc);
int X509_REVOKED_add_ext(X509_REVOKED *x, X509_EXTENSION *ex, int loc);
void *X509_REVOKED_get_ext_d2i(const X509_REVOKED *x, int nid, int *crit,
  int *idx);
int X509_REVOKED_add1_ext_i2d(X509_REVOKED *x, int nid, void *value, int crit,
  unsigned long flags);

X509_EXTENSION *X509_EXTENSION_create_by_NID(X509_EXTENSION **ex,
```

```
  int nid, int crit,
  ASN1_OCTET_STRING *data);
X509_EXTENSION *X509_EXTENSION_create_by_OBJ(X509_EXTENSION **ex,
  const ASN1_OBJECT *obj, int crit,
  ASN1_OCTET_STRING *data);
int X509_EXTENSION_set_object(X509_EXTENSION *ex, const ASN1_OBJECT *obj);
int
 X509_EXTENSION_set_critical(X509_EXTENSION *ex, int crit);
int X509_EXTENSION_set_data(X509_EXTENSION *ex, ASN1_OCTET_STRING *data);
ASN1_OBJECT *X509_EXTENSION_get_object(X509_EXTENSION *ex);
ASN1_OCTET_STRING *X509_EXTENSION_get_data(X509_EXTENSION *ne);
int X509_EXTENSION_get_critical(const X509_EXTENSION *ex);

int X509at_get_attr_count(const STACK_OF(X509_ATTRIBUTE) *x);
int X509at_get_attr_by_NID(const STACK_OF(X509_ATTRIBUTE) *x, int nid,
  int lastpos);
int X509at_get_attr_by_OBJ(const STACK_OF(X509_ATTRIBUTE) *sk,
  const ASN1_OBJECT *obj, int lastpos);
X509_ATTRIBUTE *X509at_get_attr(const STACK_OF(X509_ATTRIBUTE) *x, int loc);
X509_ATTRIBUTE *X509at_delete_attr(STACK_OF(X509_ATTRIBUTE) *x, int loc);
STACK_OF(X509_ATTRIBUTE) *X509at_add1_attr(STACK_OF(X509_ATTRIBUTE) **x,
  X509_ATTRIBUTE *attr);
STACK_OF(X509_ATTRIBUTE) *X509at_add1_attr_by_OBJ(STACK_OF(X509_ATTRIBUTE)
                                    **x,
  const ASN1_OBJECT *obj,
  int type,
   const unsigned char *bytes,
  int len);
STACK_OF(X509_ATTRIBUTE) *X509at_add1_attr_by_NID(STACK_OF(X509_ATTRIBUTE)
                                    **x,
  int nid, int type,
  const unsigned char *bytes,
  int len);
STACK_OF(X509_ATTRIBUTE) *X509at_add1_attr_by_txt(STACK_OF(X509_ATTRIBUTE)
                                    **x,
  const char *attrname,
  int type,
  const unsigned char *bytes,
  int len);
void *X509at_get0_data_by_OBJ(const STACK_OF(X509_ATTRIBUTE) *x,
  const ASN1_OBJECT *obj, int lastpos, int type);
X509_ATTRIBUTE *X509_ATTRIBUTE_create_by_NID(X509_ATTRIBUTE **attr, int nid,
  int atrtype, const void *data,
  int len);
X509_ATTRIBUTE *X509_ATTRIBUTE_create_by_OBJ(X509_ATTRIBUTE **attr,
  const ASN1_OBJECT *obj,
  int atrtype, const void *data,
  int len);
```

```
X509_ATTRIBUTE *X509_ATTRIBUTE_create_by_txt(X509_ATTRIBUTE **attr,
   const char *atrname, int type,
   const unsigned char *bytes,
   int
 len);
int X509_ATTRIBUTE_set1_object(X509_ATTRIBUTE *attr, const ASN1_OBJECT *obj);
int X509_ATTRIBUTE_set1_data(X509_ATTRIBUTE *attr, int attrtype,
   const void *data, int len);
void *X509_ATTRIBUTE_get0_data(X509_ATTRIBUTE *attr, int idx, int atrtype,
   void *data);
int X509_ATTRIBUTE_count(const X509_ATTRIBUTE *attr);
ASN1_OBJECT *X509_ATTRIBUTE_get0_object(X509_ATTRIBUTE *attr);
ASN1_TYPE *X509_ATTRIBUTE_get0_type(X509_ATTRIBUTE *attr, int idx);

int EVP_PKEY_get_attr_count(const EVP_PKEY *key);
int EVP_PKEY_get_attr_by_NID(const EVP_PKEY *key, int nid, int lastpos);
int EVP_PKEY_get_attr_by_OBJ(const EVP_PKEY *key, const ASN1_OBJECT *obj,
   int lastpos);
X509_ATTRIBUTE *EVP_PKEY_get_attr(const EVP_PKEY *key, int loc);
X509_ATTRIBUTE *EVP_PKEY_delete_attr(EVP_PKEY *key, int loc);
int EVP_PKEY_add1_attr(EVP_PKEY *key, X509_ATTRIBUTE *attr);
int EVP_PKEY_add1_attr_by_OBJ(EVP_PKEY *key,
   const ASN1_OBJECT *obj, int type,
   const unsigned char *bytes, int len);
int EVP_PKEY_add1_attr_by_NID(EVP_PKEY
 *key,
   int nid, int type,
   const unsigned char *bytes, int len);
int EVP_PKEY_add1_attr_by_txt(EVP_PKEY *key,
   const char *attrname, int type,
   const unsigned char *bytes, int len);

/* lookup a cert from a X509 STACK */
X509 *X509_find_by_issuer_and_serial(STACK_OF(X509) *sk, const X509_NAME *name,
   const ASN1_INTEGER *serial);
X509 *X509_find_by_subject(STACK_OF(X509) *sk, const X509_NAME *name);

DECLARE_ASN1_FUNCTIONS(PBEPARAM)
DECLARE_ASN1_FUNCTIONS(PBE2PARAM)
DECLARE_ASN1_FUNCTIONS(PBKDF2PARAM)
DECLARE_ASN1_FUNCTIONS(PBMAC1PARAM)
#ifndef OPENSSL_NO_SCRYPT
DECLARE_ASN1_FUNCTIONS(SCRYPT_PARAMS)
#endif

int PKCS5_pbe_set0_algor(X509_ALGOR *algor, int alg, int iter,
   const unsigned char *salt, int saltlen);
int PKCS5_pbe_set0_algor_ex(X509_ALGOR *algor, int alg, int iter,
```

```
   const unsigned char *salt, int saltlen,
   OSSL_LIB_CTX *libctx);

X509_ALGOR *PKCS5_pbe_set(int alg, int iter,
   const unsigned char *salt, int saltlen);
X509_ALGOR
 *PKCS5_pbe_set_ex(int alg, int iter,
   const unsigned char *salt, int saltlen,
   OSSL_LIB_CTX *libctx);

X509_ALGOR *PKCS5_pbe2_set(const EVP_CIPHER *cipher, int iter,
   unsigned char *salt, int saltlen);
X509_ALGOR *PKCS5_pbe2_set_iv(const EVP_CIPHER *cipher, int iter,
   unsigned char *salt, int saltlen,
   unsigned char *aiv, int prf_nid);
X509_ALGOR *PKCS5_pbe2_set_iv_ex(const EVP_CIPHER *cipher, int iter,
   unsigned char *salt, int saltlen,
   unsigned char *aiv, int prf_nid,
   OSSL_LIB_CTX *libctx);

#ifndef OPENSSL_NO_SCRYPT
X509_ALGOR *PKCS5_pbe2_set_scrypt(const EVP_CIPHER *cipher,
   const unsigned char *salt, int saltlen,
   unsigned char *aiv, uint64_t N, uint64_t r,
   uint64_t p);
#endif

X509_ALGOR *PKCS5_pbkdf2_set(int iter, unsigned char *salt, int saltlen,
   int prf_nid, int keylen);
X509_ALGOR *PKCS5_pbkdf2_set_ex(int iter, unsigned char *salt, int saltlen,
   int prf_nid, int keylen,
   OSSL_LIB_CTX *libctx);

PBKDF2PARAM *PBMAC1_get1_pbkdf2_param(const
 X509_ALGOR *macalg);
/* PKCS#8 utilities */

DECLARE_ASN1_FUNCTIONS(PKCS8_PRIV_KEY_INFO)

EVP_PKEY *EVP_PKCS82PKEY(const PKCS8_PRIV_KEY_INFO *p8);
EVP_PKEY *EVP_PKCS82PKEY_ex(const PKCS8_PRIV_KEY_INFO *p8, OSSL_LIB_CTX *libctx,
   const char *propq);
PKCS8_PRIV_KEY_INFO *EVP_PKEY2PKCS8(const EVP_PKEY *pkey);

int PKCS8_pkey_set0(PKCS8_PRIV_KEY_INFO *priv, ASN1_OBJECT *aobj,
   int version, int ptype, void *pval,
   unsigned char *penc, int penclen);
int PKCS8_pkey_get0(const ASN1_OBJECT **ppkalg,
```

```
   const unsigned char **pk, int *ppklen,
   const X509_ALGOR **pa, const PKCS8_PRIV_KEY_INFO *p8);

const STACK_OF(X509_ATTRIBUTE) *
PKCS8_pkey_get0_attrs(const PKCS8_PRIV_KEY_INFO *p8);
int PKCS8_pkey_add1_attr(PKCS8_PRIV_KEY_INFO *p8, X509_ATTRIBUTE *attr);
int PKCS8_pkey_add1_attr_by_NID(PKCS8_PRIV_KEY_INFO *p8, int nid, int type,
   const unsigned char *bytes, int len);
int PKCS8_pkey_add1_attr_by_OBJ(PKCS8_PRIV_KEY_INFO *p8, const ASN1_OBJECT *obj,
   int type, const unsigned
 char *bytes, int len);

void X509_PUBKEY_set0_public_key(X509_PUBKEY *pub,
   unsigned char *penc, int penclen);
int X509_PUBKEY_set0_param(X509_PUBKEY *pub, ASN1_OBJECT *aobj,
   int ptype, void *pval,
   unsigned char *penc, int penclen);
int X509_PUBKEY_get0_param(ASN1_OBJECT **ppkalg,
   const unsigned char **pk, int *ppklen,
   X509_ALGOR **pa, const X509_PUBKEY *pub);
int X509_PUBKEY_eq(const X509_PUBKEY *a, const X509_PUBKEY *b);

#ifdef __cplusplus
}
#endif
#endif
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/ct.h.in
*
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*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_CT_H
#define OPENSSL_CT_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_CT_H
#endif

#include <openssl/opensslconf.h>

#ifndef OPENSSL_NO_CT
#include <openssl/types.h>
#include <openssl/safestack.h>
```

```
#include <openssl/x509.h>
#include <openssl/cterr.h>
#ifdef __cplusplus
extern "C" {
#endif

/* Minimum RSA key size, from RFC6962 */
#define SCT_MIN_RSA_BITS 2048

/* All hashes are SHA256 in v1 of Certificate Transparency */
#define CT_V1_HASHLEN SHA256_DIGEST_LENGTH

/* clang-format
 off */
SKM_DEFINE_STACK_OF_INTERNAL(SCT, SCT, SCT)
#define sk_SCT_num(sk) OPENSSL_sk_num(ossl_check_const_SCT_sk_type(sk))
#define sk_SCT_value(sk, idx) ((SCT *)OPENSSL_sk_value(ossl_check_const_SCT_sk_type(sk), (idx)))
#define sk_SCT_new(cmp) ((STACK_OF(SCT) *)OPENSSL_sk_new(ossl_check_SCT_compfunc_type(cmp)))
#define sk_SCT_new_null() ((STACK_OF(SCT) *)OPENSSL_sk_new_null())
#define sk_SCT_new_reserve(cmp, n) ((STACK_OF(SCT)
*)OPENSSL_sk_new_reserve(ossl_check_SCT_compfunc_type(cmp), (n)))
#define sk_SCT_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_SCT_sk_type(sk), (n))
#define sk_SCT_free(sk) OPENSSL_sk_free(ossl_check_SCT_sk_type(sk))
#define sk_SCT_zero(sk) OPENSSL_sk_zero(ossl_check_SCT_sk_type(sk))
#define sk_SCT_delete(sk, i) ((SCT *)OPENSSL_sk_delete(ossl_check_SCT_sk_type(sk), (i)))
#define sk_SCT_delete_ptr(sk, ptr) ((SCT *)OPENSSL_sk_delete_ptr(ossl_check_SCT_sk_type(sk),
ossl_check_SCT_type(ptr)))
#define sk_SCT_push(sk, ptr) OPENSSL_sk_push(ossl_check_SCT_sk_type(sk),
 ossl_check_SCT_type(ptr))
#define sk_SCT_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_SCT_sk_type(sk), ossl_check_SCT_type(ptr))
#define sk_SCT_pop(sk) ((SCT *)OPENSSL_sk_pop(ossl_check_SCT_sk_type(sk)))
#define sk_SCT_shift(sk) ((SCT *)OPENSSL_sk_shift(ossl_check_SCT_sk_type(sk)))
#define sk_SCT_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_SCT_sk_type(sk),ossl_check_SCT_freefunc_type(freefunc))
#define sk_SCT_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_SCT_sk_type(sk), ossl_check_SCT_type(ptr),
(idx))
#define sk_SCT_set(sk, idx, ptr) ((SCT *)OPENSSL_sk_set(ossl_check_SCT_sk_type(sk), (idx),
ossl_check_SCT_type(ptr)))
#define sk_SCT_find(sk, ptr) OPENSSL_sk_find(ossl_check_SCT_sk_type(sk), ossl_check_SCT_type(ptr))
#define sk_SCT_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_SCT_sk_type(sk), ossl_check_SCT_type(ptr))
#define sk_SCT_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_SCT_sk_type(sk),
ossl_check_SCT_type(ptr), pnum)
#define sk_SCT_sort(sk) OPENSSL_sk_sort(ossl_check_SCT_sk_type(sk))
#define
 sk_SCT_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_SCT_sk_type(sk))
#define sk_SCT_dup(sk) ((STACK_OF(SCT) *)OPENSSL_sk_dup(ossl_check_const_SCT_sk_type(sk)))
#define sk_SCT_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(SCT)
*)OPENSSL_sk_deep_copy(ossl_check_const_SCT_sk_type(sk), ossl_check_SCT_copyfunc_type(copyfunc),
```

```
ossl_check_SCT_freefunc_type(freefunc)))
#define sk_SCT_set_cmp_func(sk, cmp)
((sk_SCT_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_SCT_sk_type(sk),
ossl_check_SCT_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(CTLOG, CTLOG, CTLOG)
#define sk_CTLOG_num(sk) OPENSSL_sk_num(ossl_check_const_CTLOG_sk_type(sk))
#define sk_CTLOG_value(sk, idx) ((CTLOG *)OPENSSL_sk_value(ossl_check_const_CTLOG_sk_type(sk),
(idx)))
#define sk_CTLOG_new(cmp) ((STACK_OF(CTLOG)
*)OPENSSL_sk_new(ossl_check_CTLOG_compfunc_type(cmp)))
#define sk_CTLOG_new_null() ((STACK_OF(CTLOG) *)OPENSSL_sk_new_null())
#define sk_CTLOG_new_reserve(cmp, n)
 ((STACK_OF(CTLOG) *)OPENSSL_sk_new_reserve(ossl_check_CTLOG_compfunc_type(cmp), (n)))
#define sk_CTLOG_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_CTLOG_sk_type(sk), (n))
#define sk_CTLOG_free(sk) OPENSSL_sk_free(ossl_check_CTLOG_sk_type(sk))
#define sk_CTLOG_zero(sk) OPENSSL_sk_zero(ossl_check_CTLOG_sk_type(sk))
#define sk_CTLOG_delete(sk, i) ((CTLOG *)OPENSSL_sk_delete(ossl_check_CTLOG_sk_type(sk), (i)))
#define sk_CTLOG_delete_ptr(sk, ptr) ((CTLOG *)OPENSSL_sk_delete_ptr(ossl_check_CTLOG_sk_type(sk),
ossl_check_CTLOG_type(ptr)))
#define sk_CTLOG_push(sk, ptr) OPENSSL_sk_push(ossl_check_CTLOG_sk_type(sk),
ossl_check_CTLOG_type(ptr))
#define sk_CTLOG_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_CTLOG_sk_type(sk),
ossl_check_CTLOG_type(ptr))
#define sk_CTLOG_pop(sk) ((CTLOG *)OPENSSL_sk_pop(ossl_check_CTLOG_sk_type(sk)))
#define sk_CTLOG_shift(sk) ((CTLOG *)OPENSSL_sk_shift(ossl_check_CTLOG_sk_type(sk)))
#define sk_CTLOG_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_CTLOG_sk_type(sk),ossl_check_CTLOG_freefunc_type(freefunc))
#define
 sk_CTLOG_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_CTLOG_sk_type(sk),
ossl_check_CTLOG_type(ptr), (idx))
#define sk_CTLOG_set(sk, idx, ptr) ((CTLOG *)OPENSSL_sk_set(ossl_check_CTLOG_sk_type(sk), (idx),
ossl_check_CTLOG_type(ptr)))
#define sk_CTLOG_find(sk, ptr) OPENSSL_sk_find(ossl_check_CTLOG_sk_type(sk),
ossl_check_CTLOG_type(ptr))
#define sk_CTLOG_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_CTLOG_sk_type(sk),
ossl_check_CTLOG_type(ptr))
#define sk_CTLOG_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_CTLOG_sk_type(sk),
ossl_check_CTLOG_type(ptr), pnum)
#define sk_CTLOG_sort(sk) OPENSSL_sk_sort(ossl_check_CTLOG_sk_type(sk))
#define sk_CTLOG_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_CTLOG_sk_type(sk))
#define sk_CTLOG_dup(sk) ((STACK_OF(CTLOG)
*)OPENSSL_sk_dup(ossl_check_const_CTLOG_sk_type(sk)))
#define sk_CTLOG_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(CTLOG)
*)OPENSSL_sk_deep_copy(ossl_check_const_CTLOG_sk_type(sk),
 ossl_check_CTLOG_copyfunc_type(copyfunc), ossl_check_CTLOG_freefunc_type(freefunc)))
#define sk_CTLOG_set_cmp_func(sk, cmp)
((sk_CTLOG_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_CTLOG_sk_type(sk),
ossl_check_CTLOG_compfunc_type(cmp)))
```

```
/* clang-format on */

typedef enum {
   CT_LOG_ENTRY_TYPE_NOT_SET = -1,
   CT_LOG_ENTRY_TYPE_X509 = 0,
   CT_LOG_ENTRY_TYPE_PRECERT = 1
} ct_log_entry_type_t;

typedef enum {
   SCT_VERSION_NOT_SET = -1,
   SCT_VERSION_V1 = 0
} sct_version_t;

typedef enum {
   SCT_SOURCE_UNKNOWN,
   SCT_SOURCE_TLS_EXTENSION,
   SCT_SOURCE_X509V3_EXTENSION,
   SCT_SOURCE_OCSP_STAPLED_RESPONSE
} sct_source_t;

typedef enum {
   SCT_VALIDATION_STATUS_NOT_SET,
   SCT_VALIDATION_STATUS_UNKNOWN_LOG,
   SCT_VALIDATION_STATUS_VALID,
   SCT_VALIDATION_STATUS_INVALID,
   SCT_VALIDATION_STATUS_UNVERIFIED,
   SCT_VALIDATION_STATUS_UNKNOWN_VERSION
} sct_validation_status_t;

/******************************************
* CT policy evaluation
 context functions *
******************************************/

/*
* Creates a new, empty policy evaluation context associated with the given
* library context and property query string.
* The caller is responsible for calling CT_POLICY_EVAL_CTX_free when finished
* with the CT_POLICY_EVAL_CTX.
*/
CT_POLICY_EVAL_CTX *CT_POLICY_EVAL_CTX_new_ex(OSSL_LIB_CTX *libctx,
   const char *propq);

/*
* The same as CT_POLICY_EVAL_CTX_new_ex() but the default library
* context and property query string is used.
*/
```

```
CT_POLICY_EVAL_CTX *CT_POLICY_EVAL_CTX_new(void);

/* Deletes a policy evaluation context and anything it owns. */
void CT_POLICY_EVAL_CTX_free(CT_POLICY_EVAL_CTX *ctx);

/* Gets the peer certificate that the SCTs are for */
X509 *CT_POLICY_EVAL_CTX_get0_cert(const CT_POLICY_EVAL_CTX *ctx);

/*
* Sets the certificate associated with the received SCTs.
* Increments the reference count of cert.
* Returns 1 on success, 0 otherwise.
*/
int CT_POLICY_EVAL_CTX_set1_cert(CT_POLICY_EVAL_CTX
 *ctx, X509 *cert);

/* Gets the issuer of the aforementioned certificate */
X509 *CT_POLICY_EVAL_CTX_get0_issuer(const CT_POLICY_EVAL_CTX *ctx);

/*
* Sets the issuer of the certificate associated with the received SCTs.
* Increments the reference count of issuer.
* Returns 1 on success, 0 otherwise.
*/
int CT_POLICY_EVAL_CTX_set1_issuer(CT_POLICY_EVAL_CTX *ctx, X509 *issuer);

/* Gets the CT logs that are trusted sources of SCTs */
const CTLOG_STORE *CT_POLICY_EVAL_CTX_get0_log_store(const CT_POLICY_EVAL_CTX *ctx);

/* Sets the log store that is in use. It must outlive the CT_POLICY_EVAL_CTX. */
void CT_POLICY_EVAL_CTX_set_shared_CTLOG_STORE(CT_POLICY_EVAL_CTX *ctx,
   CTLOG_STORE *log_store);

/*
* Gets the time, in milliseconds since the Unix epoch, that will be used as the
* current time when checking whether an SCT was issued in the future.
* Such SCTs will fail validation, as required by RFC6962.
*/
uint64_t CT_POLICY_EVAL_CTX_get_time(const CT_POLICY_EVAL_CTX
 *ctx);

/*
* Sets the time to evaluate SCTs against, in milliseconds since the Unix epoch.
* If an SCT's timestamp is after this time, it will be interpreted as having
* been issued in the future. RFC6962 states that "TLS clients MUST reject SCTs
* whose timestamp is in the future", so an SCT will not validate in this case.
*/
void CT_POLICY_EVAL_CTX_set_time(CT_POLICY_EVAL_CTX *ctx, uint64_t time_in_ms);
```

```
/******************
* SCT functions *
*****************/

/*
* Creates a new, blank SCT.
* The caller is responsible for calling SCT_free when finished with the SCT.
*/
SCT *SCT_new(void);

/*
* Creates a new SCT from some base64-encoded strings.
* The caller is responsible for calling SCT_free when finished with the SCT.
*/
SCT *SCT_new_from_base64(unsigned char version,
   const char *logid_base64,
   ct_log_entry_type_t entry_type,
   uint64_t timestamp,
   const char *extensions_base64,
   const char *signature_base64);

/*
* Frees the SCT and the underlying data
 structures.
*/
void SCT_free(SCT *sct);

/*
* Free a stack of SCTs, and the underlying SCTs themselves.
* Intended to be compatible with X509V3_EXT_FREE.
*/
void SCT_LIST_free(STACK_OF(SCT) *a);

/*
* Returns the version of the SCT.
*/
sct_version_t SCT_get_version(const SCT *sct);

/*
* Set the version of an SCT.
* Returns 1 on success, 0 if the version is unrecognized.
*/
__owur int SCT_set_version(SCT *sct, sct_version_t version);

/*
* Returns the log entry type of the SCT.
*/
```

```
ct_log_entry_type_t SCT_get_log_entry_type(const SCT *sct);

/*
* Set the log entry type of an SCT.
* Returns 1 on success, 0 otherwise.
*/
__owur int SCT_set_log_entry_type(SCT *sct, ct_log_entry_type_t entry_type);

/*
* Gets the ID of the log that an SCT came from.
* Ownership of the log ID remains with the SCT.
* Returns the length of the log ID.
*/
size_t SCT_get0_log_id(const SCT *sct, unsigned char **log_id);

/*
* Set the log ID of an SCT to point directly to the *log_id specified.
 * The SCT takes ownership of the specified pointer.
* Returns 1 on success, 0 otherwise.
*/
__owur int SCT_set0_log_id(SCT *sct, unsigned char *log_id, size_t log_id_len);

/*
* Set the log ID of an SCT.
* This makes a copy of the log_id.
* Returns 1 on success, 0 otherwise.
*/
__owur int SCT_set1_log_id(SCT *sct, const unsigned char *log_id,
   size_t log_id_len);

/*
* Returns the timestamp for the SCT (epoch time in milliseconds).
*/
uint64_t SCT_get_timestamp(const SCT *sct);

/*
* Set the timestamp of an SCT (epoch time in milliseconds).
*/
void SCT_set_timestamp(SCT *sct, uint64_t timestamp);

/*
* Return the NID for the signature used by the SCT.
* For CT v1, this will be either NID_sha256WithRSAEncryption or
* NID_ecdsa_with_SHA256 (or NID_undef if incorrect/unset).
*/
int SCT_get_signature_nid(const SCT *sct);

/*
```

```
* Set the signature type of an SCT
* For CT v1, this should be either NID_sha256WithRSAEncryption or
* NID_ecdsa_with_SHA256.
* Returns 1 on
 success, 0 otherwise.
*/
__owur int SCT_set_signature_nid(SCT *sct, int nid);

/*
* Set *ext to point to the extension data for the SCT. ext must not be NULL.
* The SCT retains ownership of this pointer.
* Returns length of the data pointed to.
*/
size_t SCT_get0_extensions(const SCT *sct, unsigned char **ext);

/*
* Set the extensions of an SCT to point directly to the *ext specified.
* The SCT takes ownership of the specified pointer.
*/
void SCT_set0_extensions(SCT *sct, unsigned char *ext, size_t ext_len);

/*
* Set the extensions of an SCT.
* This takes a copy of the ext.
* Returns 1 on success, 0 otherwise.
*/
__owur int SCT_set1_extensions(SCT *sct, const unsigned char *ext,
   size_t ext_len);

/*
* Set *sig to point to the signature for the SCT. sig must not be NULL.
* The SCT retains ownership of this pointer.
* Returns length of the data pointed to.
*/
size_t SCT_get0_signature(const SCT *sct, unsigned char **sig);

/*
* Set the signature of an SCT to point
 directly to the *sig specified.
* The SCT takes ownership of the specified pointer.
*/
void SCT_set0_signature(SCT *sct, unsigned char *sig, size_t sig_len);

/*
* Set the signature of an SCT to be a copy of the *sig specified.
* Returns 1 on success, 0 otherwise.
*/
__owur int SCT_set1_signature(SCT *sct, const unsigned char *sig,
```

```
   size_t sig_len);

/*
* The origin of this SCT, e.g. TLS extension, OCSP response, etc.
*/
sct_source_t SCT_get_source(const SCT *sct);

/*
* Set the origin of this SCT, e.g. TLS extension, OCSP response, etc.
* Returns 1 on success, 0 otherwise.
*/
__owur int SCT_set_source(SCT *sct, sct_source_t source);

/*
* Returns a text string describing the validation status of |sct|.
*/
const char *SCT_validation_status_string(const SCT *sct);

/*
* Pretty-prints an |sct| to |out|.
* It will be indented by the number of spaces specified by |indent|.
* If |logs| is not NULL, it will be used to lookup the CT log that the SCT came
* from, so that the
 log name can be printed.
*/
void SCT_print(const SCT *sct, BIO *out, int indent, const CTLOG_STORE *logs);

/*
* Pretty-prints an |sct_list| to |out|.
* It will be indented by the number of spaces specified by |indent|.
* SCTs will be delimited by |separator|.
* If |logs| is not NULL, it will be used to lookup the CT log that each SCT
* came from, so that the log names can be printed.
*/
void SCT_LIST_print(const STACK_OF(SCT) *sct_list, BIO *out, int indent,
   const char *separator, const CTLOG_STORE *logs);

/*
* Gets the last result of validating this SCT.
* If it has not been validated yet, returns SCT_VALIDATION_STATUS_NOT_SET.
*/
sct_validation_status_t SCT_get_validation_status(const SCT *sct);

/*
* Validates the given SCT with the provided context.
* Sets the "validation_status" field of the SCT.
* Returns 1 if the SCT is valid and the signature verifies.
* Returns 0 if the SCT is invalid or could not be verified.
```

```
* Returns -1 if an error occurs.
*/
__owur
 int SCT_validate(SCT *sct, const CT_POLICY_EVAL_CTX *ctx);

/*
* Validates the given list of SCTs with the provided context.
* Sets the "validation_status" field of each SCT.
* Returns 1 if there are no invalid SCTs and all signatures verify.
* Returns 0 if at least one SCT is invalid or could not be verified.
* Returns a negative integer if an error occurs.
*/
__owur int SCT_LIST_validate(const STACK_OF(SCT) *scts,
   CT_POLICY_EVAL_CTX *ctx);

/**********************************
* SCT parsing and serialization *
**********************************/

/*
* Serialize (to TLS format) a stack of SCTs and return the length.
* "a" must not be NULL.
* If "pp" is NULL, just return the length of what would have been serialized.
* If "pp" is not NULL and "*pp" is null, function will allocate a new pointer
* for data that caller is responsible for freeing (only if function returns
* successfully).
* If "pp" is NULL and "*pp" is not NULL, caller is responsible for ensuring
* that "*pp"
 is large enough to accept all of the serialized data.
* Returns < 0 on error, >= 0 indicating bytes written (or would have been)
* on success.
*/
__owur int i2o_SCT_LIST(const STACK_OF(SCT) *a, unsigned char **pp);

/*
* Convert TLS format SCT list to a stack of SCTs.
* If "a" or "*a" is NULL, a new stack will be created that the caller is
* responsible for freeing (by calling SCT_LIST_free).
* "**pp" and "*pp" must not be NULL.
* Upon success, "*pp" will point to after the last bytes read, and a stack
* will be returned.
* Upon failure, a NULL pointer will be returned, and the position of "*pp" is
* not defined.
*/
STACK_OF(SCT) *o2i_SCT_LIST(STACK_OF(SCT) **a, const unsigned char **pp,
   size_t len);

/*
```

```
* Serialize (to DER format) a stack of SCTs and return the length.
* "a" must not be NULL.
* If "pp" is NULL, just returns the length of what would have been serialized.
* If "pp" is not NULL and "*pp" is null, function will allocate a new pointer
* for data that
 caller is responsible for freeing (only if function returns
* successfully).
* If "pp" is NULL and "*pp" is not NULL, caller is responsible for ensuring
* that "*pp" is large enough to accept all of the serialized data.
* Returns < 0 on error, >= 0 indicating bytes written (or would have been)
* on success.
*/
__owur int i2d_SCT_LIST(const STACK_OF(SCT) *a, unsigned char **pp);

/*
* Parses an SCT list in DER format and returns it.
* If "a" or "*a" is NULL, a new stack will be created that the caller is
* responsible for freeing (by calling SCT_LIST_free).
* "**pp" and "*pp" must not be NULL.
* Upon success, "*pp" will point to after the last bytes read, and a stack
* will be returned.
* Upon failure, a NULL pointer will be returned, and the position of "*pp" is
* not defined.
*/
STACK_OF(SCT) *d2i_SCT_LIST(STACK_OF(SCT) **a, const unsigned char **pp,
   long len);

/*
* Serialize (to TLS format) an |sct| and write it to |out|.
* If |out| is null, no SCT will be output
 but the length will still be returned.
* If |out| points to a null pointer, a string will be allocated to hold the
* TLS-format SCT. It is the responsibility of the caller to free it.
* If |out| points to an allocated string, the TLS-format SCT will be written
* to it.
* The length of the SCT in TLS format will be returned.
*/
__owur int i2o_SCT(const SCT *sct, unsigned char **out);

/*
* Parses an SCT in TLS format and returns it.
* If |psct| is not null, it will end up pointing to the parsed SCT. If it
* already points to a non-null pointer, the pointer will be free'd.
* |in| should be a pointer to a string containing the TLS-format SCT.
* |in| will be advanced to the end of the SCT if parsing succeeds.
* |len| should be the length of the SCT in |in|.
* Returns NULL if an error occurs.
* If the SCT is an unsupported version, only the SCT's 'sct' and 'sct_len'
```

```
* fields will be populated (with |in| and |len| respectively).
*/
SCT *o2i_SCT(SCT **psct, const unsigned
 char **in, size_t len);

/********************
* CT log functions *
********************/

/*
* Creates a new CT log instance with the given |public_key| and |name| and
* associates it with the give library context |libctx| and property query
* string |propq|.
* Takes ownership of |public_key| but copies |name|.
* Returns NULL if malloc fails or if |public_key| cannot be converted to DER.
* Should be deleted by the caller using CTLOG_free when no longer needed.
*/
CTLOG *CTLOG_new_ex(EVP_PKEY *public_key, const char *name, OSSL_LIB_CTX *libctx,
   const char *propq);

/*
* The same as CTLOG_new_ex except that the default library context and
* property query string are used.
*/
CTLOG *CTLOG_new(EVP_PKEY *public_key, const char *name);

/*
* Creates a new CTLOG instance with the base64-encoded SubjectPublicKeyInfo DER
* in |pkey_base64| and associated with the given library context |libctx| and
* property query string |propq|. The |name| is a string to help users identify
 * this log.
* Returns 1 on success, 0 on failure.
* Should be deleted by the caller using CTLOG_free when no longer needed.
*/
int CTLOG_new_from_base64_ex(CTLOG **ct_log, const char *pkey_base64,
   const char *name, OSSL_LIB_CTX *libctx,
   const char *propq);

/*
* The same as CTLOG_new_from_base64_ex() except that the default
* library context and property query string are used.
* Returns 1 on success, 0 on failure.
*/
int CTLOG_new_from_base64(CTLOG **ct_log,
   const char *pkey_base64, const char *name);

/*
* Deletes a CT log instance and its fields.
```

```
*/
void CTLOG_free(CTLOG *log);

/* Gets the name of the CT log */
const char *CTLOG_get0_name(const CTLOG *log);
/* Gets the ID of the CT log */
void CTLOG_get0_log_id(const CTLOG *log, const uint8_t **log_id,
   size_t *log_id_len);
/* Gets the public key of the CT log */
EVP_PKEY *CTLOG_get0_public_key(const CTLOG *log);

/**************************
* CT log store functions *
**************************/

/*
* Creates
 a new CT log store and associates it with the given libctx and
* property query string.
* Should be deleted by the caller using CTLOG_STORE_free when no longer needed.
*/
CTLOG_STORE *CTLOG_STORE_new_ex(OSSL_LIB_CTX *libctx, const char *propq);

/*
* Same as CTLOG_STORE_new_ex except that the default libctx and
* property query string are used.
* Should be deleted by the caller using CTLOG_STORE_free when no longer needed.
*/
CTLOG_STORE *CTLOG_STORE_new(void);

/*
* Deletes a CT log store and all of the CT log instances held within.
*/
void CTLOG_STORE_free(CTLOG_STORE *store);

/*
* Finds a CT log in the store based on its log ID.
* Returns the CT log, or NULL if no match is found.
*/
const CTLOG *CTLOG_STORE_get0_log_by_id(const CTLOG_STORE *store,
   const uint8_t *log_id,
   size_t log_id_len);

/*
* Loads a CT log list into a |store| from a |file|.
* Returns 1 if loading is successful, or 0 otherwise.
*/
__owur int CTLOG_STORE_load_file(CTLOG_STORE *store,
```

```
 const char *file);

/*
* Loads the default CT log list into a |store|.
* Returns 1 if loading is successful, or 0 otherwise.
*/
__owur int CTLOG_STORE_load_default_file(CTLOG_STORE *store);

#ifdef __cplusplus
}
#endif
#endif
#endif
/*
* Copyright 1995-2023 The OpenSSL Project Authors. All Rights Reserved.
*
* Licensed under the Apache License 2.0 (the "License").  You may not use
* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_ERR_H
#define OPENSSL_ERR_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_ERR_H
#endif

#include <openssl/e_os2.h>

#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#include <stdlib.h>
#endif

#include <openssl/types.h>
#include <openssl/bio.h>
#include <openssl/lhash.h>
#include <openssl/cryptoerr_legacy.h>

#ifdef __cplusplus
```

```
extern "C" {
#endif

#ifndef OPENSSL_NO_DEPRECATED_3_0
#ifndef OPENSSL_NO_FILENAMES
#define ERR_PUT_error(l, f, r, fn, ln) ERR_put_error(l, f, r, fn, ln)
#else
#define ERR_PUT_error(l, f, r, fn, ln) ERR_put_error(l, f, r, NULL, 0)
#endif
#endif

#include
 <limits.h>
#include <errno.h>

#define ERR_TXT_MALLOCED 0x01
#define ERR_TXT_STRING 0x02

#if !defined(OPENSSL_NO_DEPRECATED_3_0) || defined(OSSL_FORCE_ERR_STATE)
#define ERR_FLAG_MARK 0x01
#define ERR_FLAG_CLEAR 0x02

#define ERR_NUM_ERRORS 16
struct err_state_st {
   int err_flags[ERR_NUM_ERRORS];
   int err_marks[ERR_NUM_ERRORS];
   unsigned long err_buffer[ERR_NUM_ERRORS];
   char *err_data[ERR_NUM_ERRORS];
   size_t err_data_size[ERR_NUM_ERRORS];
   int err_data_flags[ERR_NUM_ERRORS];
   char *err_file[ERR_NUM_ERRORS];
   int err_line[ERR_NUM_ERRORS];
   char *err_func[ERR_NUM_ERRORS];
   int top, bottom;
};
#endif

/* library */
#define ERR_LIB_NONE 1
#define ERR_LIB_SYS 2
#define ERR_LIB_BN 3
#define ERR_LIB_RSA 4
#define ERR_LIB_DH 5
#define ERR_LIB_EVP 6
#define ERR_LIB_BUF 7
#define ERR_LIB_OBJ 8
#define ERR_LIB_PEM 9
#define ERR_LIB_DSA 10
```

```
#define ERR_LIB_X509 11
/* #define ERR_LIB_METH         12 */
#define ERR_LIB_ASN1 13
#define ERR_LIB_CONF
 14
#define ERR_LIB_CRYPTO 15
#define ERR_LIB_EC 16
#define ERR_LIB_SSL 20
/* #define ERR_LIB_SSL23        21 */
/* #define ERR_LIB_SSL2         22 */
/* #define ERR_LIB_SSL3         23 */
/* #define ERR_LIB_RSAREF       30 */
/* #define ERR_LIB_PROXY        31 */
#define ERR_LIB_BIO 32
#define ERR_LIB_PKCS7 33
#define ERR_LIB_X509V3 34
#define ERR_LIB_PKCS12 35
#define ERR_LIB_RAND 36
#define ERR_LIB_DSO 37
#define ERR_LIB_ENGINE 38
#define ERR_LIB_OCSP 39
#define ERR_LIB_UI 40
#define ERR_LIB_COMP 41
#define ERR_LIB_ECDSA 42
#define ERR_LIB_ECDH 43
#define ERR_LIB_OSSL_STORE 44
#define ERR_LIB_FIPS 45
#define ERR_LIB_CMS 46
#define ERR_LIB_TS 47
#define ERR_LIB_HMAC 48
/* # define ERR_LIB_JPAKE       49 */
#define ERR_LIB_CT 50
#define ERR_LIB_ASYNC 51
#define ERR_LIB_KDF 52
#define ERR_LIB_SM2 53
#define ERR_LIB_ESS 54
#define ERR_LIB_PROP 55
#define ERR_LIB_CRMF 56
#define ERR_LIB_PROV 57
#define ERR_LIB_CMP 58
#define ERR_LIB_OSSL_ENCODER 59
#define ERR_LIB_OSSL_DECODER 60
#define
 ERR_LIB_HTTP 61

#define ERR_LIB_USER 128

#ifndef OPENSSL_NO_DEPRECATED_3_0
```

```
#define ASN1err(f, r) ERR_raise_data(ERR_LIB_ASN1, (r), NULL)
#define ASYNCerr(f, r) ERR_raise_data(ERR_LIB_ASYNC, (r), NULL)
#define BIOerr(f, r) ERR_raise_data(ERR_LIB_BIO, (r), NULL)
#define BNerr(f, r) ERR_raise_data(ERR_LIB_BN, (r), NULL)
#define BUFerr(f, r) ERR_raise_data(ERR_LIB_BUF, (r), NULL)
#define CMPerr(f, r) ERR_raise_data(ERR_LIB_CMP, (r), NULL)
#define CMSerr(f, r) ERR_raise_data(ERR_LIB_CMS, (r), NULL)
#define COMPerr(f, r) ERR_raise_data(ERR_LIB_COMP, (r), NULL)
#define CONFerr(f, r) ERR_raise_data(ERR_LIB_CONF, (r), NULL)
#define CRMFerr(f, r) ERR_raise_data(ERR_LIB_CRMF, (r), NULL)
#define CRYPTOerr(f, r) ERR_raise_data(ERR_LIB_CRYPTO, (r), NULL)
#define CTerr(f, r) ERR_raise_data(ERR_LIB_CT, (r), NULL)
#define DHerr(f, r) ERR_raise_data(ERR_LIB_DH, (r), NULL)
#define DSAerr(f, r) ERR_raise_data(ERR_LIB_DSA, (r), NULL)
#define DSOerr(f, r) ERR_raise_data(ERR_LIB_DSO, (r), NULL)
#define
 ECDHerr(f, r) ERR_raise_data(ERR_LIB_ECDH, (r), NULL)
#define ECDSAerr(f, r) ERR_raise_data(ERR_LIB_ECDSA, (r), NULL)
#define ECerr(f, r) ERR_raise_data(ERR_LIB_EC, (r), NULL)
#define ENGINEerr(f, r) ERR_raise_data(ERR_LIB_ENGINE, (r), NULL)
#define ESSerr(f, r) ERR_raise_data(ERR_LIB_ESS, (r), NULL)
#define EVPerr(f, r) ERR_raise_data(ERR_LIB_EVP, (r), NULL)
#define FIPSerr(f, r) ERR_raise_data(ERR_LIB_FIPS, (r), NULL)
#define HMACerr(f, r) ERR_raise_data(ERR_LIB_HMAC, (r), NULL)
#define HTTPerr(f, r) ERR_raise_data(ERR_LIB_HTTP, (r), NULL)
#define KDFerr(f, r) ERR_raise_data(ERR_LIB_KDF, (r), NULL)
#define OBJerr(f, r) ERR_raise_data(ERR_LIB_OBJ, (r), NULL)
#define OCSPerr(f, r) ERR_raise_data(ERR_LIB_OCSP, (r), NULL)
#define OSSL_STOREerr(f, r) ERR_raise_data(ERR_LIB_OSSL_STORE, (r), NULL)
#define PEMerr(f, r) ERR_raise_data(ERR_LIB_PEM, (r), NULL)
#define PKCS12err(f, r) ERR_raise_data(ERR_LIB_PKCS12, (r), NULL)
#define PKCS7err(f, r) ERR_raise_data(ERR_LIB_PKCS7, (r), NULL)
#define
 PROPerr(f, r) ERR_raise_data(ERR_LIB_PROP, (r), NULL)
#define PROVerr(f, r) ERR_raise_data(ERR_LIB_PROV, (r), NULL)
#define RANDerr(f, r) ERR_raise_data(ERR_LIB_RAND, (r), NULL)
#define RSAerr(f, r) ERR_raise_data(ERR_LIB_RSA, (r), NULL)
#define KDFerr(f, r) ERR_raise_data(ERR_LIB_KDF, (r), NULL)
#define SM2err(f, r) ERR_raise_data(ERR_LIB_SM2, (r), NULL)
#define SSLerr(f, r) ERR_raise_data(ERR_LIB_SSL, (r), NULL)
#define SYSerr(f, r) ERR_raise_data(ERR_LIB_SYS, (r), NULL)
#define TSerr(f, r) ERR_raise_data(ERR_LIB_TS, (r), NULL)
#define UIerr(f, r) ERR_raise_data(ERR_LIB_UI, (r), NULL)
#define X509V3err(f, r) ERR_raise_data(ERR_LIB_X509V3, (r), NULL)
#define X509err(f, r) ERR_raise_data(ERR_LIB_X509, (r), NULL)
#endif

/*-
```

```
* The error code packs differently depending on if it records a system
* error or an OpenSSL error.
*
* A system error packs like this (we follow POSIX and only allow positive
* numbers that fit in an |int|):
*
* +-+-----------------------------------------------------------+
 * |1|                    system error number                    |
* +-+-----------------------------------------------------------+
*
* An OpenSSL error packs like this:
*
* <---------------------------- 32 bits --------------------------->
*    <--- 8 bits --->< ------------------ 23 bits ------------------>
* +-+---------------+---------------------------------------------+
* |0|    library    |                    reason                   |
* +-+---------------+---------------------------------------------+
*
* A few of the reason bits are reserved as flags with special meaning:
*
*                   <5 bits-<>--------- 19 bits ------------------>
*                  +-------+-+-----------------------------------+
*                  | rflags| |          reason                   |
*                  +-------+-+-----------------------------------+
*                        ^
*                        |
*                        ERR_RFLAG_FATAL
 = ERR_R_FATAL
*
* The reason flags are part of the overall reason code for practical
* reasons, as they provide an easy way to place different types of
* reason codes in different numeric ranges.
*
* The currently known reason flags are:
*
* ERR_RFLAG_FATAL      Flags that the reason code is considered fatal.
*                      For backward compatibility reasons, this flag
*                      is also the code for ERR_R_FATAL (that reason
*                      code served the dual purpose of flag and reason
*                      code in one in pre-3.0 OpenSSL).
* ERR_RFLAG_COMMON     Flags that the reason code is common to all
*                      libraries.  All ERR_R_ macros must use this flag,
*                      and no other _R_ macro is allowed to use it.
*/

/* Macros to help decode recorded system errors */
#define ERR_SYSTEM_FLAG ((unsigned int)INT_MAX + 1)
#define ERR_SYSTEM_MASK ((unsigned int)INT_MAX)
```

```
/*
* Macros to help decode recorded
 OpenSSL errors
* As expressed above, RFLAGS and REASON overlap by one bit to allow
* ERR_R_FATAL to use ERR_RFLAG_FATAL as its reason code.
*/
#define ERR_LIB_OFFSET 23L
#define ERR_LIB_MASK 0xFF
#define ERR_RFLAGS_OFFSET 18L
#define ERR_RFLAGS_MASK 0x1F
#define ERR_REASON_MASK 0X7FFFFF

/*
* Reason flags are defined pre-shifted to easily combine with the reason
* number.
*/
#define ERR_RFLAG_FATAL (0x1 << ERR_RFLAGS_OFFSET)
#define ERR_RFLAG_COMMON (0x2 << ERR_RFLAGS_OFFSET)

#define ERR_SYSTEM_ERROR(errcode) (((errcode) & ERR_SYSTEM_FLAG) != 0)

static ossl_unused ossl_inline int ERR_GET_LIB(unsigned long errcode)
{
  if (ERR_SYSTEM_ERROR(errcode))
      return ERR_LIB_SYS;
  return (errcode >> ERR_LIB_OFFSET) & ERR_LIB_MASK;
}

static ossl_unused ossl_inline int ERR_GET_RFLAGS(unsigned long errcode)
{
  if (ERR_SYSTEM_ERROR(errcode))
      return 0;
  return errcode & (ERR_RFLAGS_MASK << ERR_RFLAGS_OFFSET);
}

static ossl_unused ossl_inline int ERR_GET_REASON(unsigned
 long errcode)
{
  if (ERR_SYSTEM_ERROR(errcode))
      return errcode & ERR_SYSTEM_MASK;
  return errcode & ERR_REASON_MASK;
}

static ossl_unused ossl_inline int ERR_FATAL_ERROR(unsigned long errcode)
{
  return (ERR_GET_RFLAGS(errcode) & ERR_RFLAG_FATAL) != 0;
}
```

```
static ossl_unused ossl_inline int ERR_COMMON_ERROR(unsigned long errcode)
{
  return (ERR_GET_RFLAGS(errcode) & ERR_RFLAG_COMMON) != 0;
}

/*
* ERR_PACK is a helper macro to properly pack OpenSSL error codes and may
* only be used for that purpose.  System errors are packed internally.
* ERR_PACK takes reason flags and reason code combined in |reason|.
* ERR_PACK ignores |func|, that parameter is just legacy from pre-3.0 OpenSSL.
*/
#define ERR_PACK(lib, func, reason) \
  ((((unsigned long)(lib) & ERR_LIB_MASK) << ERR_LIB_OFFSET) | (((unsigned long)(reason) &
ERR_REASON_MASK)))

#ifndef OPENSSL_NO_DEPRECATED_3_0
#define SYS_F_FOPEN 0
#define SYS_F_CONNECT 0
#define SYS_F_GETSERVBYNAME 0
#define SYS_F_SOCKET
 0
#define SYS_F_IOCTLSOCKET 0
#define SYS_F_BIND 0
#define SYS_F_LISTEN 0
#define SYS_F_ACCEPT 0
#define SYS_F_WSASTARTUP 0
#define SYS_F_OPENDIR 0
#define SYS_F_FREAD 0
#define SYS_F_GETADDRINFO 0
#define SYS_F_GETNAMEINFO 0
#define SYS_F_SETSOCKOPT 0
#define SYS_F_GETSOCKOPT 0
#define SYS_F_GETSOCKNAME 0
#define SYS_F_GETHOSTBYNAME 0
#define SYS_F_FFLUSH 0
#define SYS_F_OPEN 0
#define SYS_F_CLOSE 0
#define SYS_F_IOCTL 0
#define SYS_F_STAT 0
#define SYS_F_FCNTL 0
#define SYS_F_FSTAT 0
#define SYS_F_SENDFILE 0
#endif

/*
* All ERR_R_ codes must be combined with ERR_RFLAG_COMMON.
*/
```

```
/* "we came from here" global reason codes, range 1..255 */
#define ERR_R_SYS_LIB (ERR_LIB_SYS /* 2 */ | ERR_RFLAG_COMMON)
#define ERR_R_BN_LIB (ERR_LIB_BN /* 3 */ | ERR_RFLAG_COMMON)
#define ERR_R_RSA_LIB (ERR_LIB_RSA /* 4 */ | ERR_RFLAG_COMMON)
#define ERR_R_DH_LIB (ERR_LIB_DH /* 5 */ | ERR_RFLAG_COMMON)
#define ERR_R_EVP_LIB (ERR_LIB_EVP /* 6 */ | ERR_RFLAG_COMMON)
#define ERR_R_BUF_LIB (ERR_LIB_BUF
 /* 7 */ | ERR_RFLAG_COMMON)
#define ERR_R_OBJ_LIB (ERR_LIB_OBJ /* 8 */ | ERR_RFLAG_COMMON)
#define ERR_R_PEM_LIB (ERR_LIB_PEM /* 9 */ | ERR_RFLAG_COMMON)
#define ERR_R_DSA_LIB (ERR_LIB_DSA /* 10 */ | ERR_RFLAG_COMMON)
#define ERR_R_X509_LIB (ERR_LIB_X509 /* 11 */ | ERR_RFLAG_COMMON)
#define ERR_R_ASN1_LIB (ERR_LIB_ASN1 /* 13 */ | ERR_RFLAG_COMMON)
#define ERR_R_CONF_LIB (ERR_LIB_CONF /* 14 */ | ERR_RFLAG_COMMON)
#define ERR_R_CRYPTO_LIB (ERR_LIB_CRYPTO /* 15 */ | ERR_RFLAG_COMMON)
#define ERR_R_EC_LIB (ERR_LIB_EC /* 16 */ | ERR_RFLAG_COMMON)
#define ERR_R_SSL_LIB (ERR_LIB_SSL /* 20 */ | ERR_RFLAG_COMMON)
#define ERR_R_BIO_LIB (ERR_LIB_BIO /* 32 */ | ERR_RFLAG_COMMON)
#define ERR_R_PKCS7_LIB (ERR_LIB_PKCS7 /* 33 */ | ERR_RFLAG_COMMON)
#define ERR_R_X509V3_LIB (ERR_LIB_X509V3 /* 34 */ | ERR_RFLAG_COMMON)
#define ERR_R_PKCS12_LIB (ERR_LIB_PKCS12 /* 35 */ | ERR_RFLAG_COMMON)
#define ERR_R_RAND_LIB (ERR_LIB_RAND /* 36 */ | ERR_RFLAG_COMMON)
#define ERR_R_DSO_LIB (ERR_LIB_DSO /* 37 */
 | ERR_RFLAG_COMMON)
#define ERR_R_ENGINE_LIB (ERR_LIB_ENGINE /* 38 */ | ERR_RFLAG_COMMON)
#define ERR_R_UI_LIB (ERR_LIB_UI /* 40 */ | ERR_RFLAG_COMMON)
#define ERR_R_ECDSA_LIB (ERR_LIB_ECDSA /* 42 */ | ERR_RFLAG_COMMON)
#define ERR_R_OSSL_STORE_LIB (ERR_LIB_OSSL_STORE /* 44 */ | ERR_RFLAG_COMMON)
#define ERR_R_CMS_LIB (ERR_LIB_CMS /* 46 */ | ERR_RFLAG_COMMON)
#define ERR_R_TS_LIB (ERR_LIB_TS /* 47 */ | ERR_RFLAG_COMMON)
#define ERR_R_CT_LIB (ERR_LIB_CT /* 50 */ | ERR_RFLAG_COMMON)
#define ERR_R_PROV_LIB (ERR_LIB_PROV /* 57 */ | ERR_RFLAG_COMMON)
#define ERR_R_ESS_LIB (ERR_LIB_ESS /* 54 */ | ERR_RFLAG_COMMON)
#define ERR_R_CMP_LIB (ERR_LIB_CMP /* 58 */ | ERR_RFLAG_COMMON)
#define ERR_R_OSSL_ENCODER_LIB (ERR_LIB_OSSL_ENCODER /* 59 */ | ERR_RFLAG_COMMON)
#define ERR_R_OSSL_DECODER_LIB (ERR_LIB_OSSL_DECODER /* 60 */ | ERR_RFLAG_COMMON)

/* Other common error codes, range 256..2^ERR_RFLAGS_OFFSET-1 */
#define ERR_R_FATAL (ERR_RFLAG_FATAL | ERR_RFLAG_COMMON)
#define ERR_R_MALLOC_FAILURE (256
 | ERR_R_FATAL)
#define ERR_R_SHOULD_NOT_HAVE_BEEN_CALLED (257 | ERR_R_FATAL)
#define ERR_R_PASSED_NULL_PARAMETER (258 | ERR_R_FATAL)
#define ERR_R_INTERNAL_ERROR (259 | ERR_R_FATAL)
#define ERR_R_DISABLED (260 | ERR_R_FATAL)
#define ERR_R_INIT_FAIL (261 | ERR_R_FATAL)
#define ERR_R_PASSED_INVALID_ARGUMENT (262 | ERR_RFLAG_COMMON)
```

```
#define ERR_R_OPERATION_FAIL (263 | ERR_R_FATAL)
#define ERR_R_INVALID_PROVIDER_FUNCTIONS (264 | ERR_R_FATAL)
#define ERR_R_INTERRUPTED_OR_CANCELLED (265 | ERR_RFLAG_COMMON)
#define ERR_R_NESTED_ASN1_ERROR (266 | ERR_RFLAG_COMMON)
#define ERR_R_MISSING_ASN1_EOS (267 | ERR_RFLAG_COMMON)
#define ERR_R_UNSUPPORTED (268 | ERR_RFLAG_COMMON)
#define ERR_R_FETCH_FAILED (269 | ERR_RFLAG_COMMON)
#define ERR_R_INVALID_PROPERTY_DEFINITION (270 | ERR_RFLAG_COMMON)
#define ERR_R_UNABLE_TO_GET_READ_LOCK (271 | ERR_R_FATAL)
#define ERR_R_UNABLE_TO_GET_WRITE_LOCK (272 | ERR_R_FATAL)

typedef struct ERR_string_data_st {
  unsigned long error;
  const char *string;
} ERR_STRING_DATA;

/*
 clang-format off */
DEFINE_LHASH_OF_INTERNAL(ERR_STRING_DATA);
#define lh_ERR_STRING_DATA_new(hfn, cmp) ((LHASH_OF(ERR_STRING_DATA)
*)OPENSSL_LH_set_thunks(OPENSSL_LH_new(ossl_check_ERR_STRING_DATA_lh_hashfunc_type(hfn),
ossl_check_ERR_STRING_DATA_lh_compfunc_type(cmp)), lh_ERR_STRING_DATA_hash_thunk,
lh_ERR_STRING_DATA_comp_thunk, lh_ERR_STRING_DATA_doall_thunk,
lh_ERR_STRING_DATA_doall_arg_thunk))
#define lh_ERR_STRING_DATA_free(lh) OPENSSL_LH_free(ossl_check_ERR_STRING_DATA_lh_type(lh))
#define lh_ERR_STRING_DATA_flush(lh) OPENSSL_LH_flush(ossl_check_ERR_STRING_DATA_lh_type(lh))
#define lh_ERR_STRING_DATA_insert(lh, ptr) ((ERR_STRING_DATA
*)OPENSSL_LH_insert(ossl_check_ERR_STRING_DATA_lh_type(lh),
ossl_check_ERR_STRING_DATA_lh_plain_type(ptr)))
#define lh_ERR_STRING_DATA_delete(lh, ptr) ((ERR_STRING_DATA
*)OPENSSL_LH_delete(ossl_check_ERR_STRING_DATA_lh_type(lh),
ossl_check_const_ERR_STRING_DATA_lh_plain_type(ptr)))
#define lh_ERR_STRING_DATA_retrieve(lh, ptr) ((ERR_STRING_DATA
 *)OPENSSL_LH_retrieve(ossl_check_ERR_STRING_DATA_lh_type(lh),
ossl_check_const_ERR_STRING_DATA_lh_plain_type(ptr)))
#define lh_ERR_STRING_DATA_error(lh) OPENSSL_LH_error(ossl_check_ERR_STRING_DATA_lh_type(lh))
#define lh_ERR_STRING_DATA_num_items(lh)
OPENSSL_LH_num_items(ossl_check_ERR_STRING_DATA_lh_type(lh))
#define lh_ERR_STRING_DATA_node_stats_bio(lh, out)
OPENSSL_LH_node_stats_bio(ossl_check_const_ERR_STRING_DATA_lh_type(lh), out)
#define lh_ERR_STRING_DATA_node_usage_stats_bio(lh, out)
OPENSSL_LH_node_usage_stats_bio(ossl_check_const_ERR_STRING_DATA_lh_type(lh), out)
#define lh_ERR_STRING_DATA_stats_bio(lh, out)
OPENSSL_LH_stats_bio(ossl_check_const_ERR_STRING_DATA_lh_type(lh), out)
#define lh_ERR_STRING_DATA_get_down_load(lh)
OPENSSL_LH_get_down_load(ossl_check_ERR_STRING_DATA_lh_type(lh))
#define lh_ERR_STRING_DATA_set_down_load(lh, dl)
OPENSSL_LH_set_down_load(ossl_check_ERR_STRING_DATA_lh_type(lh), dl)
```

```
#define lh_ERR_STRING_DATA_doall(lh, dfn)
OPENSSL_LH_doall(ossl_check_ERR_STRING_DATA_lh_type(lh),
 ossl_check_ERR_STRING_DATA_lh_doallfunc_type(dfn))

/* clang-format on */

/* 12 lines and some on an 80 column terminal */
#define ERR_MAX_DATA_SIZE 1024

/* Building blocks */
void ERR_new(void);
void ERR_set_debug(const char *file, int line, const char *func);
void ERR_set_error(int lib, int reason, const char *fmt, ...);
void ERR_vset_error(int lib, int reason, const char *fmt, va_list args);

/* Main error raising functions */
#define ERR_raise(lib, reason) ERR_raise_data((lib), (reason), NULL)
#define ERR_raise_data                                  \
  (ERR_new(),                                           \
     ERR_set_debug(OPENSSL_FILE, OPENSSL_LINE, OPENSSL_FUNC), \
     ERR_set_error)

#ifndef OPENSSL_NO_DEPRECATED_3_0
/* Backward compatibility */
#define ERR_put_error(lib, func, reason, file, line) \
  (ERR_new(),                                         \
     ERR_set_debug((file), (line), OPENSSL_FUNC), \

    ERR_set_error((lib), (reason), NULL))
#endif

void ERR_set_error_data(char *data, int flags);

unsigned long ERR_get_error(void);
unsigned long ERR_get_error_all(const char **file, int *line,
  const char **func,
  const char **data, int *flags);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0
unsigned long ERR_get_error_line(const char **file, int *line);
OSSL_DEPRECATEDIN_3_0
unsigned long ERR_get_error_line_data(const char **file, int *line,
  const char **data, int *flags);
#endif
unsigned long ERR_peek_error(void);
unsigned long ERR_peek_error_line(const char **file, int *line);
unsigned long ERR_peek_error_func(const char **func);
unsigned long ERR_peek_error_data(const char **data, int *flags);
```

```
unsigned long ERR_peek_error_all(const char **file, int *line,
   const char **func,
   const char **data, int *flags);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0
unsigned long ERR_peek_error_line_data(const char **file, int *line,
   const char **data,
 int *flags);
#endif
unsigned long ERR_peek_last_error(void);
unsigned long ERR_peek_last_error_line(const char **file, int *line);
unsigned long ERR_peek_last_error_func(const char **func);
unsigned long ERR_peek_last_error_data(const char **data, int *flags);
unsigned long ERR_peek_last_error_all(const char **file, int *line,
   const char **func,
   const char **data, int *flags);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0
unsigned long ERR_peek_last_error_line_data(const char **file, int *line,
   const char **data, int *flags);
#endif

void ERR_clear_error(void);

char *ERR_error_string(unsigned long e, char *buf);
void ERR_error_string_n(unsigned long e, char *buf, size_t len);
const char *ERR_lib_error_string(unsigned long e);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 const char *ERR_func_error_string(unsigned long e);
#endif
const char *ERR_reason_error_string(unsigned long e);

void ERR_print_errors_cb(int (*cb)(const char *str, size_t len, void *u),
    void *u);
#ifndef OPENSSL_NO_STDIO
void ERR_print_errors_fp(FILE *fp);
#endif
void ERR_print_errors(BIO *bp);

void ERR_add_error_data(int num, ...);
void ERR_add_error_vdata(int num, va_list args);
void ERR_add_error_txt(const char *sepr, const char *txt);
void ERR_add_error_mem_bio(const char *sep, BIO *bio);

int ERR_load_strings(int lib, ERR_STRING_DATA *str);
int ERR_load_strings_const(const ERR_STRING_DATA *str);
int ERR_unload_strings(int lib, ERR_STRING_DATA *str);
```

```
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define ERR_load_crypto_strings() \
   OPENSSL_init_crypto(OPENSSL_INIT_LOAD_CRYPTO_STRINGS, NULL)
#define ERR_free_strings() \
   while (0)            \
   continue
#endif
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 void ERR_remove_thread_state(void *);
#endif
#ifndef OPENSSL_NO_DEPRECATED_1_0_0
OSSL_DEPRECATEDIN_1_0_0 void ERR_remove_state(unsigned long pid);
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 ERR_STATE *ERR_get_state(void);
#endif

int
 ERR_get_next_error_library(void);

int ERR_set_mark(void);
int ERR_pop_to_mark(void);
int ERR_clear_last_mark(void);
int ERR_count_to_mark(void);
int ERR_pop(void);

ERR_STATE *OSSL_ERR_STATE_new(void);
void OSSL_ERR_STATE_save(ERR_STATE *es);
void OSSL_ERR_STATE_save_to_mark(ERR_STATE *es);
void OSSL_ERR_STATE_restore(const ERR_STATE *es);
void OSSL_ERR_STATE_free(ERR_STATE *es);

#ifdef __cplusplus
}
#endif

#endif
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/ssl.h.in
*
* Copyright 1995-2025 The OpenSSL Project Authors. All Rights Reserved.
* Copyright (c) 2002, Oracle and/or its affiliates. All rights reserved
* Copyright 2005 Nokia. All rights reserved.
*
* Licensed under the Apache License 2.0 (the "License").  You may not use
* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
```

```
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_SSL_H
#define OPENSSL_SSL_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_SSL_H
#endif

#include <openssl/e_os2.h>
#include <openssl/e_ostime.h>
#include <openssl/opensslconf.h>
#include <openssl/comp.h>
#include <openssl/bio.h>
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#include <openssl/x509.h>
#include <openssl/crypto.h>
#include <openssl/buffer.h>
#endif
#include
 <openssl/lhash.h>
#include <openssl/pem.h>
#include <openssl/hmac.h>
#include <openssl/async.h>

#include <openssl/safestack.h>
#include <openssl/symhacks.h>
#include <openssl/ct.h>
#include <openssl/sslerr.h>
#include <openssl/prov_ssl.h>
#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif

#ifdef __cplusplus
extern "C" {
#endif

/* OpenSSL version number for ASN.1 encoding of the session information */
/*-
* Version 0 - initial version
```

```
* Version 1 - added the optional peer certificate
*/
#define SSL_SESSION_ASN1_VERSION 0x0001

#define SSL_MAX_SSL_SESSION_ID_LENGTH 32
#define SSL_MAX_SID_CTX_LENGTH 32

#define SSL_MIN_RSA_MODULUS_LENGTH_IN_BYTES (512 / 8)
#define SSL_MAX_KEY_ARG_LENGTH 8
/* SSL_MAX_MASTER_KEY_LENGTH is defined in prov_ssl.h */

/* The maximum number of encrypt/decrypt pipelines we can support */
#define SSL_MAX_PIPELINES 32

/* text strings for the ciphers */

/* These are used to specify which ciphers to use and not to use */

#define SSL_TXT_LOW "LOW"
#define
 SSL_TXT_MEDIUM "MEDIUM"
#define SSL_TXT_HIGH "HIGH"
#define SSL_TXT_FIPS "FIPS"

#define SSL_TXT_aNULL "aNULL"
#define SSL_TXT_eNULL "eNULL"
#define SSL_TXT_NULL "NULL"

#define SSL_TXT_kRSA "kRSA"
#define SSL_TXT_kDHr "kDHr" /* this cipher class has been removed */
#define SSL_TXT_kDHd "kDHd" /* this cipher class has been removed */
#define SSL_TXT_kDH "kDH" /* this cipher class has been removed */
#define SSL_TXT_kEDH "kEDH" /* alias for kDHE */
#define SSL_TXT_kDHE "kDHE"
#define SSL_TXT_kECDHr "kECDHr" /* this cipher class has been removed */
#define SSL_TXT_kECDHe "kECDHe" /* this cipher class has been removed */
#define SSL_TXT_kECDH "kECDH" /* this cipher class has been removed */
#define SSL_TXT_kEECDH "kEECDH" /* alias for kECDHE */
#define SSL_TXT_kECDHE "kECDHE"
#define SSL_TXT_kPSK "kPSK"
#define SSL_TXT_kRSAPSK "kRSAPSK"
#define SSL_TXT_kECDHEPSK "kECDHEPSK"
#define SSL_TXT_kDHEPSK "kDHEPSK"
#define SSL_TXT_kGOST "kGOST"
#define SSL_TXT_kGOST18 "kGOST18"
#define SSL_TXT_kSRP
 "kSRP"
```

```
#define SSL_TXT_aRSA "aRSA"
#define SSL_TXT_aDSS "aDSS"
#define SSL_TXT_aDH "aDH" /* this cipher class has been removed */
#define SSL_TXT_aECDH "aECDH" /* this cipher class has been removed */
#define SSL_TXT_aECDSA "aECDSA"
#define SSL_TXT_aPSK "aPSK"
#define SSL_TXT_aGOST94 "aGOST94"
#define SSL_TXT_aGOST01 "aGOST01"
#define SSL_TXT_aGOST12 "aGOST12"
#define SSL_TXT_aGOST "aGOST"
#define SSL_TXT_aSRP "aSRP"

#define SSL_TXT_DSS "DSS"
#define SSL_TXT_DH "DH"
#define SSL_TXT_DHE "DHE" /* same as "kDHE:-ADH" */
#define SSL_TXT_EDH "EDH" /* alias for DHE */
#define SSL_TXT_ADH "ADH"
#define SSL_TXT_RSA "RSA"
#define SSL_TXT_ECDH "ECDH"
#define SSL_TXT_EECDH "EECDH" /* alias for ECDHE" */
#define SSL_TXT_ECDHE "ECDHE" /* same as "kECDHE:-AECDH" */
#define SSL_TXT_AECDH "AECDH"
#define SSL_TXT_ECDSA "ECDSA"
#define SSL_TXT_PSK "PSK"
#define SSL_TXT_SRP "SRP"

#define SSL_TXT_DES "DES"
#define SSL_TXT_3DES "3DES"
#define SSL_TXT_RC4 "RC4"
#define SSL_TXT_RC2 "RC2"
#define
 SSL_TXT_IDEA "IDEA"
#define SSL_TXT_SEED "SEED"
#define SSL_TXT_AES128 "AES128"
#define SSL_TXT_AES256 "AES256"
#define SSL_TXT_AES "AES"
#define SSL_TXT_AES_GCM "AESGCM"
#define SSL_TXT_AES_CCM "AESCCM"
#define SSL_TXT_AES_CCM_8 "AESCCM8"
#define SSL_TXT_CAMELLIA128 "CAMELLIA128"
#define SSL_TXT_CAMELLIA256 "CAMELLIA256"
#define SSL_TXT_CAMELLIA "CAMELLIA"
#define SSL_TXT_CHACHA20 "CHACHA20"
#define SSL_TXT_GOST "GOST89"
#define SSL_TXT_ARIA "ARIA"
#define SSL_TXT_ARIA_GCM "ARIAGCM"
#define SSL_TXT_ARIA128 "ARIA128"
#define SSL_TXT_ARIA256 "ARIA256"
```

```
#define SSL_TXT_GOST2012_GOST8912_GOST8912 "GOST2012-GOST8912-GOST8912"
#define SSL_TXT_CBC "CBC"

#define SSL_TXT_MD5 "MD5"
#define SSL_TXT_SHA1 "SHA1"
#define SSL_TXT_SHA "SHA" /* same as "SHA1" */
#define SSL_TXT_GOST94 "GOST94"
#define SSL_TXT_GOST89MAC "GOST89MAC"
#define SSL_TXT_GOST12 "GOST12"
#define SSL_TXT_GOST89MAC12 "GOST89MAC12"
#define SSL_TXT_SHA256 "SHA256"
#define SSL_TXT_SHA384 "SHA384"

#define SSL_TXT_SSLV3 "SSLv3"
#define
 SSL_TXT_TLSV1 "TLSv1"
#define SSL_TXT_TLSV1_1 "TLSv1.1"
#define SSL_TXT_TLSV1_2 "TLSv1.2"

#define SSL_TXT_ALL "ALL"

/*-
* COMPLEMENTOF* definitions. These identifiers are used to (de-select)
* ciphers normally not being used.
* Example: "RC4" will activate all ciphers using RC4 including ciphers
* without authentication, which would normally disabled by DEFAULT (due
* the "!ADH" being part of default). Therefore "RC4:!COMPLEMENTOFDEFAULT"
* will make sure that it is also disabled in the specific selection.
* COMPLEMENTOF* identifiers are portable between version, as adjustments
* to the default cipher setup will also be included here.
*
* COMPLEMENTOFDEFAULT does not experience the same special treatment that
* DEFAULT gets, as only selection is being done and no sorting as needed
* for DEFAULT.
*/
#define SSL_TXT_CMPALL "COMPLEMENTOFALL"
#define SSL_TXT_CMPDEF "COMPLEMENTOFDEFAULT"

/*
* The following cipher list is used by default. It also is substituted when
* an
 application-defined cipher list string starts with 'DEFAULT'.
* This applies to ciphersuites for TLSv1.2 and below.
* DEPRECATED IN 3.0.0, in favor of OSSL_default_cipher_list()
* Update both macro and function simultaneously
*/
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define SSL_DEFAULT_CIPHER_LIST "ALL:!COMPLEMENTOFDEFAULT:!eNULL"
```

```
/*
* This is the default set of TLSv1.3 ciphersuites
* DEPRECATED IN 3.0.0, in favor of OSSL_default_ciphersuites()
* Update both macro and function simultaneously
*/
#define TLS_DEFAULT_CIPHERSUITES "TLS_AES_256_GCM_SHA384:"      \
                                 "TLS_CHACHA20_POLY1305_SHA256:" \
                                 "TLS_AES_128_GCM_SHA256"
#endif
/*
* As of OpenSSL 1.0.0, ssl_create_cipher_list() in ssl/ssl_ciph.c always
* starts with a reasonable order, and all we have to do for DEFAULT is
* throwing out anonymous and unencrypted ciphersuites! (The latter are not
* actually enabled by ALL, but "ALL:RSA" would enable some of them.)
 */

/* Used in SSL_set_shutdown()/SSL_get_shutdown(); */
#define SSL_SENT_SHUTDOWN 1
#define SSL_RECEIVED_SHUTDOWN 2

#ifdef __cplusplus
}
#endif

#ifdef __cplusplus
extern "C" {
#endif

#define SSL_FILETYPE_ASN1 X509_FILETYPE_ASN1
#define SSL_FILETYPE_PEM X509_FILETYPE_PEM

/*
* This is needed to stop compilers complaining about the 'struct ssl_st *'
* function parameters used to prototype callbacks in SSL_CTX.
*/
typedef struct ssl_st *ssl_crock_st;
typedef struct tls_session_ticket_ext_st TLS_SESSION_TICKET_EXT;
typedef struct ssl_method_st SSL_METHOD;
typedef struct ssl_cipher_st SSL_CIPHER;
typedef struct ssl_session_st SSL_SESSION;
typedef struct tls_sigalgs_st TLS_SIGALGS;
typedef struct ssl_conf_ctx_st SSL_CONF_CTX;

STACK_OF(SSL_CIPHER);

/* SRTP protection profiles for use with the use_srtp extension (RFC 5764)*/
typedef struct srtp_protection_profile_st {
  const char *name;
```

```
  unsigned long id;
} SRTP_PROTECTION_PROFILE;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(SRTP_PROTECTION_PROFILE,
 SRTP_PROTECTION_PROFILE, SRTP_PROTECTION_PROFILE)
#define sk_SRTP_PROTECTION_PROFILE_num(sk)
OPENSSL_sk_num(ossl_check_const_SRTP_PROTECTION_PROFILE_sk_type(sk))
#define sk_SRTP_PROTECTION_PROFILE_value(sk, idx) ((SRTP_PROTECTION_PROFILE
*)OPENSSL_sk_value(ossl_check_const_SRTP_PROTECTION_PROFILE_sk_type(sk), (idx)))
#define sk_SRTP_PROTECTION_PROFILE_new(cmp) ((STACK_OF(SRTP_PROTECTION_PROFILE)
*)OPENSSL_sk_new(ossl_check_SRTP_PROTECTION_PROFILE_compfunc_type(cmp)))
#define sk_SRTP_PROTECTION_PROFILE_new_null() ((STACK_OF(SRTP_PROTECTION_PROFILE)
*)OPENSSL_sk_new_null())
#define sk_SRTP_PROTECTION_PROFILE_new_reserve(cmp, n)
((STACK_OF(SRTP_PROTECTION_PROFILE)
*)OPENSSL_sk_new_reserve(ossl_check_SRTP_PROTECTION_PROFILE_compfunc_type(cmp), (n)))
#define sk_SRTP_PROTECTION_PROFILE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk), (n))
#define sk_SRTP_PROTECTION_PROFILE_free(sk)
OPENSSL_sk_free(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk))
#define
 sk_SRTP_PROTECTION_PROFILE_zero(sk)
OPENSSL_sk_zero(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk))
#define sk_SRTP_PROTECTION_PROFILE_delete(sk, i) ((SRTP_PROTECTION_PROFILE
*)OPENSSL_sk_delete(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk), (i)))
#define sk_SRTP_PROTECTION_PROFILE_delete_ptr(sk, ptr) ((SRTP_PROTECTION_PROFILE
*)OPENSSL_sk_delete_ptr(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk),
ossl_check_SRTP_PROTECTION_PROFILE_type(ptr)))
#define sk_SRTP_PROTECTION_PROFILE_push(sk, ptr)
OPENSSL_sk_push(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk),
ossl_check_SRTP_PROTECTION_PROFILE_type(ptr))
#define sk_SRTP_PROTECTION_PROFILE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk),
ossl_check_SRTP_PROTECTION_PROFILE_type(ptr))
#define sk_SRTP_PROTECTION_PROFILE_pop(sk) ((SRTP_PROTECTION_PROFILE
*)OPENSSL_sk_pop(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk)))
#define sk_SRTP_PROTECTION_PROFILE_shift(sk) ((SRTP_PROTECTION_PROFILE
 *)OPENSSL_sk_shift(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk)))
#define sk_SRTP_PROTECTION_PROFILE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk),ossl_check_SRTP_PROTECTI
ON_PROFILE_freefunc_type(freefunc))
#define sk_SRTP_PROTECTION_PROFILE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk),
ossl_check_SRTP_PROTECTION_PROFILE_type(ptr), (idx))
#define sk_SRTP_PROTECTION_PROFILE_set(sk, idx, ptr) ((SRTP_PROTECTION_PROFILE
*)OPENSSL_sk_set(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk), (idx),
ossl_check_SRTP_PROTECTION_PROFILE_type(ptr)))
#define sk_SRTP_PROTECTION_PROFILE_find(sk, ptr)
```

```
OPENSSL_sk_find(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk),
ossl_check_SRTP_PROTECTION_PROFILE_type(ptr))
#define sk_SRTP_PROTECTION_PROFILE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk),
ossl_check_SRTP_PROTECTION_PROFILE_type(ptr))
#define sk_SRTP_PROTECTION_PROFILE_find_all(sk,
 ptr, pnum) OPENSSL_sk_find_all(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk),
ossl_check_SRTP_PROTECTION_PROFILE_type(ptr), pnum)
#define sk_SRTP_PROTECTION_PROFILE_sort(sk)
OPENSSL_sk_sort(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk))
#define sk_SRTP_PROTECTION_PROFILE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_SRTP_PROTECTION_PROFILE_sk_type(sk))
#define sk_SRTP_PROTECTION_PROFILE_dup(sk) ((STACK_OF(SRTP_PROTECTION_PROFILE)
*)OPENSSL_sk_dup(ossl_check_const_SRTP_PROTECTION_PROFILE_sk_type(sk)))
#define sk_SRTP_PROTECTION_PROFILE_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(SRTP_PROTECTION_PROFILE)
*)OPENSSL_sk_deep_copy(ossl_check_const_SRTP_PROTECTION_PROFILE_sk_type(sk),
ossl_check_SRTP_PROTECTION_PROFILE_copyfunc_type(copyfunc),
ossl_check_SRTP_PROTECTION_PROFILE_freefunc_type(freefunc)))
#define sk_SRTP_PROTECTION_PROFILE_set_cmp_func(sk, cmp)
((sk_SRTP_PROTECTION_PROFILE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_SRTP_PROTECTION
_PROFILE_sk_type(sk), ossl_check_SRTP_PROTECTION_PROFILE_compfunc_type(cmp)))

/*
 clang-format on */

typedef int (*tls_session_ticket_ext_cb_fn)(SSL *s, const unsigned char *data,
   int len, void *arg);
typedef int (*tls_session_secret_cb_fn)(SSL *s, void *secret, int *secret_len,
   STACK_OF(SSL_CIPHER) *peer_ciphers,
   const SSL_CIPHER **cipher, void *arg);

/* Extension context codes */
/* This extension is only allowed in TLS */
#define SSL_EXT_TLS_ONLY 0x00001
/* This extension is only allowed in DTLS */
#define SSL_EXT_DTLS_ONLY 0x00002
/* Some extensions may be allowed in DTLS but we don't implement them for it */
#define SSL_EXT_TLS_IMPLEMENTATION_ONLY 0x00004
/* Most extensions are not defined for SSLv3 but EXT_TYPE_renegotiate is */
#define SSL_EXT_SSL3_ALLOWED 0x00008
/* Extension is only defined for TLS1.2 and below */
#define SSL_EXT_TLS1_2_AND_BELOW_ONLY 0x00010
/* Extension is only defined for TLS1.3 and above */
#define SSL_EXT_TLS1_3_ONLY 0x00020
/* Ignore this extension during parsing if we are resuming
 */
#define SSL_EXT_IGNORE_ON_RESUMPTION 0x00040
```

```
#define SSL_EXT_CLIENT_HELLO 0x00080
/* Really means TLS1.2 or below */
#define SSL_EXT_TLS1_2_SERVER_HELLO 0x00100
#define SSL_EXT_TLS1_3_SERVER_HELLO 0x00200
#define SSL_EXT_TLS1_3_ENCRYPTED_EXTENSIONS 0x00400
#define SSL_EXT_TLS1_3_HELLO_RETRY_REQUEST 0x00800
#define SSL_EXT_TLS1_3_CERTIFICATE 0x01000
#define SSL_EXT_TLS1_3_NEW_SESSION_TICKET 0x02000
#define SSL_EXT_TLS1_3_CERTIFICATE_REQUEST 0x04000
#define SSL_EXT_TLS1_3_CERTIFICATE_COMPRESSION 0x08000
/* When sending a raw public key in a certificate message */
#define SSL_EXT_TLS1_3_RAW_PUBLIC_KEY 0x10000

/* Typedefs for handling custom extensions */

typedef int (*custom_ext_add_cb)(SSL *s, unsigned int ext_type,
   const unsigned char **out, size_t *outlen,
   int *al, void *add_arg);

typedef void (*custom_ext_free_cb)(SSL *s, unsigned int ext_type,
   const unsigned char *out, void *add_arg);

typedef int (*custom_ext_parse_cb)(SSL *s, unsigned int ext_type,
   const
 unsigned char *in, size_t inlen,
   int *al, void *parse_arg);

typedef int (*SSL_custom_ext_add_cb_ex)(SSL *s, unsigned int ext_type,
   unsigned int context,
   const unsigned char **out,
   size_t *outlen, X509 *x,
   size_t chainidx,
   int *al, void *add_arg);

typedef void (*SSL_custom_ext_free_cb_ex)(SSL *s, unsigned int ext_type,
   unsigned int context,
   const unsigned char *out,
   void *add_arg);

typedef int (*SSL_custom_ext_parse_cb_ex)(SSL *s, unsigned int ext_type,
   unsigned int context,
   const unsigned char *in,
   size_t inlen, X509 *x,
   size_t chainidx,
   int *al, void *parse_arg);

/* Typedef for verification callback */
typedef int (*SSL_verify_cb)(int preverify_ok, X509_STORE_CTX *x509_ctx);
```

```
/* Typedef for SSL async callback */
typedef int (*SSL_async_callback_fn)(SSL *s, void *arg);

#define SSL_OP_BIT(n) ((uint64_t)1 << (uint64_t)n)

/*
* SSL/TLS connection options.
*/
/* Disable Extended master secret */
#define SSL_OP_NO_EXTENDED_MASTER_SECRET
 SSL_OP_BIT(0)
/* Cleanse plaintext copies of data delivered to the application */
#define SSL_OP_CLEANSE_PLAINTEXT SSL_OP_BIT(1)
/* Allow initial connection to servers that don't support RI */
#define SSL_OP_LEGACY_SERVER_CONNECT SSL_OP_BIT(2)
/* Enable support for Kernel TLS */
#define SSL_OP_ENABLE_KTLS SSL_OP_BIT(3)
#define SSL_OP_TLSEXT_PADDING SSL_OP_BIT(4)
#define SSL_OP_SAFARI_ECDHE_ECDSA_BUG SSL_OP_BIT(6)
#define SSL_OP_IGNORE_UNEXPECTED_EOF SSL_OP_BIT(7)
#define SSL_OP_ALLOW_CLIENT_RENEGOTIATION SSL_OP_BIT(8)
#define SSL_OP_DISABLE_TLSEXT_CA_NAMES SSL_OP_BIT(9)
/* In TLSv1.3 allow a non-(ec)dhe based kex_mode */
#define SSL_OP_ALLOW_NO_DHE_KEX SSL_OP_BIT(10)
/*
* Disable SSL 3.0/TLS 1.0 CBC vulnerability workaround that was added
* in OpenSSL 0.9.6d.  Usually (depending on the application protocol)
* the workaround is not needed.  Unfortunately some broken SSL/TLS
* implementations cannot handle it at all, which is why we include it
* in SSL_OP_ALL. Added in 0.9.6e
 */
#define SSL_OP_DONT_INSERT_EMPTY_FRAGMENTS SSL_OP_BIT(11)
/* DTLS options */
#define SSL_OP_NO_QUERY_MTU SSL_OP_BIT(12)
/* Turn on Cookie Exchange (on relevant for servers) */
#define SSL_OP_COOKIE_EXCHANGE SSL_OP_BIT(13)
/* Don't use RFC4507 ticket extension */
#define SSL_OP_NO_TICKET SSL_OP_BIT(14)
#ifndef OPENSSL_NO_DTLS1_METHOD
/*
* Use Cisco's version identifier of DTLS_BAD_VER
* (only with deprecated DTLSv1_client_method())
*/
#define SSL_OP_CISCO_ANYCONNECT SSL_OP_BIT(15)
#endif
/* As server, disallow session resumption on renegotiation */
#define SSL_OP_NO_SESSION_RESUMPTION_ON_RENEGOTIATION SSL_OP_BIT(16)
```

```
/* Don't use compression even if supported */
#define SSL_OP_NO_COMPRESSION SSL_OP_BIT(17)
/* Permit unsafe legacy renegotiation */
#define SSL_OP_ALLOW_UNSAFE_LEGACY_RENEGOTIATION SSL_OP_BIT(18)
/* Disable encrypt-then-mac */
#define SSL_OP_NO_ENCRYPT_THEN_MAC SSL_OP_BIT(19)
/*
* Enable TLSv1.3 Compatibility mode. This is on by default. A future
* version of OpenSSL
 may have this disabled by default.
*/
#define SSL_OP_ENABLE_MIDDLEBOX_COMPAT SSL_OP_BIT(20)
/*
* Prioritize Chacha20Poly1305 when client does.
* Modifies SSL_OP_CIPHER_SERVER_PREFERENCE
*/
#define SSL_OP_PRIORITIZE_CHACHA SSL_OP_BIT(21)
/*
* Set on servers to choose the cipher according to server's preferences.
*/
#define SSL_OP_CIPHER_SERVER_PREFERENCE SSL_OP_BIT(22)
/*
* If set, a server will allow a client to issue an SSLv3.0 version
* number as latest version supported in the premaster secret, even when
* TLSv1.0 (version 3.1) was announced in the client hello. Normally
* this is forbidden to prevent version rollback attacks.
*/
#define SSL_OP_TLS_ROLLBACK_BUG SSL_OP_BIT(23)
/*
* Switches off automatic TLSv1.3 anti-replay protection for early data.
* This is a server-side option only (no effect on the client).
*/
#define SSL_OP_NO_ANTI_REPLAY SSL_OP_BIT(24)
#define SSL_OP_NO_SSLv3 SSL_OP_BIT(25)
#define SSL_OP_NO_TLSv1 SSL_OP_BIT(26)
#define SSL_OP_NO_TLSv1_2 SSL_OP_BIT(27)
#define
 SSL_OP_NO_TLSv1_1 SSL_OP_BIT(28)
#define SSL_OP_NO_TLSv1_3 SSL_OP_BIT(29)
#define SSL_OP_NO_DTLSv1 SSL_OP_BIT(26)
#define SSL_OP_NO_DTLSv1_2 SSL_OP_BIT(27)
/* Disallow all renegotiation */
#define SSL_OP_NO_RENEGOTIATION SSL_OP_BIT(30)
/*
* Make server add server-hello extension from early version of
* cryptopro draft, when GOST ciphersuite is negotiated. Required for
* interoperability with CryptoPro CSP 3.x
*/
```

```
#define SSL_OP_CRYPTOPRO_TLSEXT_BUG SSL_OP_BIT(31)
/*
* Disable RFC8879 certificate compression
* SSL_OP_NO_TX_CERTIFICATE_COMPRESSION: don't send compressed certificates,
*     and ignore the extension when received.
* SSL_OP_NO_RX_CERTIFICATE_COMPRESSION: don't send the extension, and
*     subsequently indicating that receiving is not supported
*/
#define SSL_OP_NO_TX_CERTIFICATE_COMPRESSION SSL_OP_BIT(32)
#define SSL_OP_NO_RX_CERTIFICATE_COMPRESSION SSL_OP_BIT(33)
/* Enable KTLS TX zerocopy on Linux */
#define SSL_OP_ENABLE_KTLS_TX_ZEROCOPY_SENDFILE
 SSL_OP_BIT(34)

#define SSL_OP_PREFER_NO_DHE_KEX SSL_OP_BIT(35)

/*
* Option "collections."
*/
#define SSL_OP_NO_SSL_MASK                              \
   (SSL_OP_NO_SSLv3 | SSL_OP_NO_TLSv1 | SSL_OP_NO_TLSv1_1 \
      | SSL_OP_NO_TLSv1_2 | SSL_OP_NO_TLSv1_3)
#define SSL_OP_NO_DTLS_MASK \
   (SSL_OP_NO_DTLSv1 | SSL_OP_NO_DTLSv1_2)

/* Various bug workarounds that should be rather harmless. */
#define SSL_OP_ALL                                      \
   (SSL_OP_CRYPTOPRO_TLSEXT_BUG | SSL_OP_DONT_INSERT_EMPTY_FRAGMENTS \
      | SSL_OP_TLSEXT_PADDING | SSL_OP_SAFARI_ECDHE_ECDSA_BUG)

/*
* OBSOLETE OPTIONS retained for compatibility
*/

#define SSL_OP_MICROSOFT_SESS_ID_BUG 0x0
#define SSL_OP_NETSCAPE_CHALLENGE_BUG 0x0
#define SSL_OP_NETSCAPE_REUSE_CIPHER_CHANGE_BUG 0x0
#define SSL_OP_SSLREF2_REUSE_CERT_TYPE_BUG 0x0
#define SSL_OP_MICROSOFT_BIG_SSLV3_BUFFER 0x0
#define SSL_OP_MSIE_SSLV2_RSA_PADDING 0x0
#define SSL_OP_SSLEAY_080_CLIENT_DH_BUG 0x0
#define
 SSL_OP_TLS_D5_BUG 0x0
#define SSL_OP_TLS_BLOCK_PADDING_BUG 0x0
#define SSL_OP_SINGLE_ECDH_USE 0x0
#define SSL_OP_SINGLE_DH_USE 0x0
#define SSL_OP_EPHEMERAL_RSA 0x0
#define SSL_OP_NO_SSLv2 0x0
```

```
#define SSL_OP_PKCS1_CHECK_1 0x0
#define SSL_OP_PKCS1_CHECK_2 0x0
#define SSL_OP_NETSCAPE_CA_DN_BUG 0x0
#define SSL_OP_NETSCAPE_DEMO_CIPHER_CHANGE_BUG 0x0

/*
* Allow SSL_write(..., n) to return r with 0 < r < n (i.e. report success
* when just a single record has been written):
*/
#define SSL_MODE_ENABLE_PARTIAL_WRITE 0x00000001U
/*
* Make it possible to retry SSL_write() with changed buffer location (buffer
* contents must stay the same!); this is not the default to avoid the
* misconception that non-blocking SSL_write() behaves like non-blocking
* write():
*/
#define SSL_MODE_ACCEPT_MOVING_WRITE_BUFFER 0x00000002U
/*
* Never bother the application with retries if the transport is blocking:
*/
#define SSL_MODE_AUTO_RETRY 0x00000004U
/* Don't attempt to automatically build certificate chain
 */
#define SSL_MODE_NO_AUTO_CHAIN 0x00000008U
/*
* Save RAM by releasing read and write buffers when they're empty. (SSL3 and
* TLS only.) Released buffers are freed.
*/
#define SSL_MODE_RELEASE_BUFFERS 0x00000010U
/*
* Send the current time in the Random fields of the ClientHello and
* ServerHello records for compatibility with hypothetical implementations
* that require it.
*/
#define SSL_MODE_SEND_CLIENTHELLO_TIME 0x00000020U
#define SSL_MODE_SEND_SERVERHELLO_TIME 0x00000040U
/*
* Send TLS_FALLBACK_SCSV in the ClientHello. To be set only by applications
* that reconnect with a downgraded protocol version; see
* draft-ietf-tls-downgrade-scsv-00 for details. DO NOT ENABLE THIS if your
* application attempts a normal handshake. Only use this in explicit
* fallback retries, following the guidance in
* draft-ietf-tls-downgrade-scsv-00.
*/
#define SSL_MODE_SEND_FALLBACK_SCSV 0x00000080U
/*
* Support Asynchronous operation
*/
```

```
#define SSL_MODE_ASYNC 0x00000100U

/*
* When
 using DTLS/SCTP, include the terminating zero in the label
* used for computing the endpoint-pair shared secret. Required for
* interoperability with implementations having this bug like these
* older version of OpenSSL:
* - OpenSSL 1.0.0 series
* - OpenSSL 1.0.1 series
* - OpenSSL 1.0.2 series
* - OpenSSL 1.1.0 series
* - OpenSSL 1.1.1 and 1.1.1a
*/
#define SSL_MODE_DTLS_SCTP_LABEL_LENGTH_BUG 0x00000400U

/* Cert related flags */
/*
* Many implementations ignore some aspects of the TLS standards such as
* enforcing certificate chain algorithms. When this is set we enforce them.
*/
#define SSL_CERT_FLAG_TLS_STRICT 0x00000001U

/* Suite B modes, takes same values as certificate verify flags */
#define SSL_CERT_FLAG_SUITEB_128_LOS_ONLY 0x10000
/* Suite B 192 bit only mode */
#define SSL_CERT_FLAG_SUITEB_192_LOS 0x20000
/* Suite B 128 bit mode allowing 192 bit algorithms */
#define SSL_CERT_FLAG_SUITEB_128_LOS 0x30000

/* Perform all sorts of protocol violations for testing
 purposes */
#define SSL_CERT_FLAG_BROKEN_PROTOCOL 0x10000000

/* Flags for building certificate chains */
/* Treat any existing certificates as untrusted CAs */
#define SSL_BUILD_CHAIN_FLAG_UNTRUSTED 0x1
/* Don't include root CA in chain */
#define SSL_BUILD_CHAIN_FLAG_NO_ROOT 0x2
/* Just check certificates already there */
#define SSL_BUILD_CHAIN_FLAG_CHECK 0x4
/* Ignore verification errors */
#define SSL_BUILD_CHAIN_FLAG_IGNORE_ERROR 0x8
/* Clear verification errors from queue */
#define SSL_BUILD_CHAIN_FLAG_CLEAR_ERROR 0x10

/* Flags returned by SSL_check_chain */
/* Certificate can be used with this session */
```

```
#define CERT_PKEY_VALID 0x1
/* Certificate can also be used for signing */
#define CERT_PKEY_SIGN 0x2
/* EE certificate signing algorithm OK */
#define CERT_PKEY_EE_SIGNATURE 0x10
/* CA signature algorithms OK */
#define CERT_PKEY_CA_SIGNATURE 0x20
/* EE certificate parameters OK */
#define CERT_PKEY_EE_PARAM 0x40
/* CA certificate parameters OK */
#define CERT_PKEY_CA_PARAM
 0x80
/* Signing explicitly allowed as opposed to SHA1 fallback */
#define CERT_PKEY_EXPLICIT_SIGN 0x100
/* Client CA issuer names match (always set for server cert) */
#define CERT_PKEY_ISSUER_NAME 0x200
/* Cert type matches client types (always set for server cert) */
#define CERT_PKEY_CERT_TYPE 0x400
/* Cert chain suitable to Suite B */
#define CERT_PKEY_SUITEB 0x800
/* Cert pkey valid for raw public key use */
#define CERT_PKEY_RPK 0x1000

#define SSL_CONF_FLAG_CMDLINE 0x1
#define SSL_CONF_FLAG_FILE 0x2
#define SSL_CONF_FLAG_CLIENT 0x4
#define SSL_CONF_FLAG_SERVER 0x8
#define SSL_CONF_FLAG_SHOW_ERRORS 0x10
#define SSL_CONF_FLAG_CERTIFICATE 0x20
#define SSL_CONF_FLAG_REQUIRE_PRIVATE 0x40
/* Configuration value types */
#define SSL_CONF_TYPE_UNKNOWN 0x0
#define SSL_CONF_TYPE_STRING 0x1
#define SSL_CONF_TYPE_FILE 0x2
#define SSL_CONF_TYPE_DIR 0x3
#define SSL_CONF_TYPE_NONE 0x4
#define SSL_CONF_TYPE_STORE 0x5

/* Maximum length of the application-controlled segment of a a TLSv1.3 cookie
 */
#define SSL_COOKIE_LENGTH 4096

/*
* Note: SSL[_CTX]_set_{options,mode} use |= op on the previous value, they
* cannot be used to clear bits.
*/

uint64_t SSL_CTX_get_options(const SSL_CTX *ctx);
```

```
uint64_t SSL_get_options(const SSL *s);
uint64_t SSL_CTX_clear_options(SSL_CTX *ctx, uint64_t op);
uint64_t SSL_clear_options(SSL *s, uint64_t op);
uint64_t SSL_CTX_set_options(SSL_CTX *ctx, uint64_t op);
uint64_t SSL_set_options(SSL *s, uint64_t op);

#define SSL_CTX_set_mode(ctx, op) \
   SSL_CTX_ctrl((ctx), SSL_CTRL_MODE, (op), NULL)
#define SSL_CTX_clear_mode(ctx, op) \
   SSL_CTX_ctrl((ctx), SSL_CTRL_CLEAR_MODE, (op), NULL)
#define SSL_CTX_get_mode(ctx) \
   SSL_CTX_ctrl((ctx), SSL_CTRL_MODE, 0, NULL)
#define SSL_clear_mode(ssl, op) \
   SSL_ctrl((ssl), SSL_CTRL_CLEAR_MODE, (op), NULL)
#define SSL_set_mode(ssl, op) \
   SSL_ctrl((ssl), SSL_CTRL_MODE, (op), NULL)
#define SSL_get_mode(ssl) \
   SSL_ctrl((ssl), SSL_CTRL_MODE, 0, NULL)
#define SSL_set_mtu(ssl, mtu) \
   SSL_ctrl((ssl),
 SSL_CTRL_SET_MTU, (mtu), NULL)
#define DTLS_set_link_mtu(ssl, mtu) \
   SSL_ctrl((ssl), DTLS_CTRL_SET_LINK_MTU, (mtu), NULL)
#define DTLS_get_link_min_mtu(ssl) \
   SSL_ctrl((ssl), DTLS_CTRL_GET_LINK_MIN_MTU, 0, NULL)

#define SSL_get_secure_renegotiation_support(ssl) \
   SSL_ctrl((ssl), SSL_CTRL_GET_RI_SUPPORT, 0, NULL)

#define SSL_CTX_set_cert_flags(ctx, op) \
   SSL_CTX_ctrl((ctx), SSL_CTRL_CERT_FLAGS, (op), NULL)
#define SSL_set_cert_flags(s, op) \
   SSL_ctrl((s), SSL_CTRL_CERT_FLAGS, (op), NULL)
#define SSL_CTX_clear_cert_flags(ctx, op) \
   SSL_CTX_ctrl((ctx), SSL_CTRL_CLEAR_CERT_FLAGS, (op), NULL)
#define SSL_clear_cert_flags(s, op) \
   SSL_ctrl((s), SSL_CTRL_CLEAR_CERT_FLAGS, (op), NULL)

void SSL_CTX_set_msg_callback(SSL_CTX *ctx,
   void (*cb)(int write_p, int version,
       int content_type, const void *buf,
       size_t len, SSL *ssl, void *arg));
void SSL_set_msg_callback(SSL *ssl,
   void (*cb)(int write_p, int version,
       int content_type,
 const void *buf,
       size_t len, SSL *ssl, void *arg));
#define SSL_CTX_set_msg_callback_arg(ctx, arg) SSL_CTX_ctrl((ctx),
```

```
SSL_CTRL_SET_MSG_CALLBACK_ARG, 0, (arg))
#define SSL_set_msg_callback_arg(ssl, arg) SSL_ctrl((ssl), SSL_CTRL_SET_MSG_CALLBACK_ARG, 0, (arg))

#define SSL_get_extms_support(s) \
  SSL_ctrl((s), SSL_CTRL_GET_EXTMS_SUPPORT, 0, NULL)

#ifndef OPENSSL_NO_SRP
/* see tls_srp.c */
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 __owur int SSL_SRP_CTX_init(SSL *s);
OSSL_DEPRECATEDIN_3_0 __owur int SSL_CTX_SRP_CTX_init(SSL_CTX *ctx);
OSSL_DEPRECATEDIN_3_0 int SSL_SRP_CTX_free(SSL *ctx);
OSSL_DEPRECATEDIN_3_0 int SSL_CTX_SRP_CTX_free(SSL_CTX *ctx);
OSSL_DEPRECATEDIN_3_0 __owur int SSL_srp_server_param_with_username(SSL *s,
  int *ad);
OSSL_DEPRECATEDIN_3_0 __owur int SRP_Calc_A_param(SSL *s);
#endif
#endif

/* 100k max cert list */
#define SSL_MAX_CERT_LIST_DEFAULT (1024 * 100)

#define SSL_SESSION_CACHE_MAX_SIZE_DEFAULT (1024 * 20)

/*
* This callback type
 is used inside SSL_CTX, SSL, and in the functions that
* set them. It is used to override the generation of SSL/TLS session IDs in
* a server. Return value should be zero on an error, non-zero to proceed.
* Also, callbacks should themselves check if the id they generate is unique
* otherwise the SSL handshake will fail with an error - callbacks can do
* this using the 'ssl' value they're passed by;
* SSL_has_matching_session_id(ssl, id, *id_len) The length value passed in
* is set at the maximum size the session ID can be. In SSLv3/TLSv1 it is 32
* bytes. The callback can alter this length to be less if desired. It is
* also an error for the callback to set the size to zero.
*/
typedef int (*GEN_SESSION_CB)(SSL *ssl, unsigned char *id,
  unsigned int *id_len);

#define SSL_SESS_CACHE_OFF 0x0000
#define SSL_SESS_CACHE_CLIENT 0x0001
#define SSL_SESS_CACHE_SERVER 0x0002
#define SSL_SESS_CACHE_BOTH (SSL_SESS_CACHE_CLIENT | SSL_SESS_CACHE_SERVER)
#define SSL_SESS_CACHE_NO_AUTO_CLEAR
 0x0080
/* enough comments already ... see SSL_CTX_set_session_cache_mode(3) */
#define SSL_SESS_CACHE_NO_INTERNAL_LOOKUP 0x0100
```

```
#define SSL_SESS_CACHE_NO_INTERNAL_STORE 0x0200
#define SSL_SESS_CACHE_NO_INTERNAL \
   (SSL_SESS_CACHE_NO_INTERNAL_LOOKUP | SSL_SESS_CACHE_NO_INTERNAL_STORE)
#define SSL_SESS_CACHE_UPDATE_TIME 0x0400

LHASH_OF(SSL_SESSION) *SSL_CTX_sessions(SSL_CTX *ctx);
#define SSL_CTX_sess_number(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_NUMBER, 0, NULL)
#define SSL_CTX_sess_connect(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_CONNECT, 0, NULL)
#define SSL_CTX_sess_connect_good(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_CONNECT_GOOD, 0, NULL)
#define SSL_CTX_sess_connect_renegotiate(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_CONNECT_RENEGOTIATE, 0, NULL)
#define SSL_CTX_sess_accept(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_ACCEPT, 0, NULL)
#define SSL_CTX_sess_accept_renegotiate(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_ACCEPT_RENEGOTIATE, 0, NULL)
#define SSL_CTX_sess_accept_good(ctx)
 \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_ACCEPT_GOOD, 0, NULL)
#define SSL_CTX_sess_hits(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_HIT, 0, NULL)
#define SSL_CTX_sess_cb_hits(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_CB_HIT, 0, NULL)
#define SSL_CTX_sess_misses(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_MISSES, 0, NULL)
#define SSL_CTX_sess_timeouts(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_TIMEOUTS, 0, NULL)
#define SSL_CTX_sess_cache_full(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_CACHE_FULL, 0, NULL)

void SSL_CTX_sess_set_new_cb(SSL_CTX *ctx,
   int (*new_session_cb)(struct ssl_st *ssl,
      SSL_SESSION *sess));
int (*SSL_CTX_sess_get_new_cb(SSL_CTX *ctx))(struct ssl_st *ssl,
   SSL_SESSION *sess);
void SSL_CTX_sess_set_remove_cb(SSL_CTX *ctx,
   void (*remove_session_cb)(struct ssl_ctx_st
                             *ctx,
      SSL_SESSION *sess));
void (*SSL_CTX_sess_get_remove_cb(SSL_CTX *ctx))(struct ssl_ctx_st *ctx,
   SSL_SESSION *sess);
void
 SSL_CTX_sess_set_get_cb(SSL_CTX *ctx,
   SSL_SESSION *(*get_session_cb)(struct ssl_st
                                  *ssl,
      const unsigned char
```

```
        *data,
      int len,
      int *copy));
SSL_SESSION *(*SSL_CTX_sess_get_get_cb(SSL_CTX *ctx))(struct ssl_st *ssl,
  const unsigned char *data,
  int len, int *copy);
void SSL_CTX_set_info_callback(SSL_CTX *ctx,
  void (*cb)(const SSL *ssl, int type, int val));
void (*SSL_CTX_get_info_callback(SSL_CTX *ctx))(const SSL *ssl, int type,
  int val);
void SSL_CTX_set_client_cert_cb(SSL_CTX *ctx,
  int (*client_cert_cb)(SSL *ssl, X509 **x509,
      EVP_PKEY **pkey));
int (*SSL_CTX_get_client_cert_cb(SSL_CTX *ctx))(SSL *ssl, X509 **x509,
  EVP_PKEY **pkey);
#ifndef OPENSSL_NO_ENGINE
__owur int SSL_CTX_set_client_cert_engine(SSL_CTX *ctx, ENGINE *e);
#endif
void SSL_CTX_set_cookie_generate_cb(SSL_CTX *ctx,
  int (*app_gen_cookie_cb)(SSL *ssl,
      unsigned char
        *cookie,
      unsigned int
         *cookie_len));
void SSL_CTX_set_cookie_verify_cb(SSL_CTX *ctx,
  int (*app_verify_cookie_cb)(SSL *ssl,
      const unsigned char *cookie,
      unsigned int
        cookie_len));

void SSL_CTX_set_stateless_cookie_generate_cb(
  SSL_CTX *ctx,
  int (*gen_stateless_cookie_cb)(SSL *ssl,
      unsigned char *cookie,
      size_t *cookie_len));
void SSL_CTX_set_stateless_cookie_verify_cb(
  SSL_CTX *ctx,
  int (*verify_stateless_cookie_cb)(SSL *ssl,
      const unsigned char *cookie,
      size_t cookie_len));
#ifndef OPENSSL_NO_NEXTPROTONEG

typedef int (*SSL_CTX_npn_advertised_cb_func)(SSL *ssl,
  const unsigned char **out,
  unsigned int *outlen,
  void *arg);
void SSL_CTX_set_next_protos_advertised_cb(SSL_CTX *s,
  SSL_CTX_npn_advertised_cb_func cb,
```

```
   void *arg);
#define SSL_CTX_set_npn_advertised_cb SSL_CTX_set_next_protos_advertised_cb

typedef int (*SSL_CTX_npn_select_cb_func)(SSL *s,
   unsigned char **out,
   unsigned char *outlen,
    const unsigned char *in,
   unsigned int inlen,
   void *arg);
void SSL_CTX_set_next_proto_select_cb(SSL_CTX *s,
   SSL_CTX_npn_select_cb_func cb,
   void *arg);
#define SSL_CTX_set_npn_select_cb SSL_CTX_set_next_proto_select_cb

void SSL_get0_next_proto_negotiated(const SSL *s, const unsigned char **data,
   unsigned *len);
#define SSL_get0_npn_negotiated SSL_get0_next_proto_negotiated
#endif

__owur int SSL_select_next_proto(unsigned char **out, unsigned char *outlen,
   const unsigned char *in, unsigned int inlen,
   const unsigned char *client,
   unsigned int client_len);

#define OPENSSL_NPN_UNSUPPORTED 0
#define OPENSSL_NPN_NEGOTIATED 1
#define OPENSSL_NPN_NO_OVERLAP 2

__owur int SSL_CTX_set_alpn_protos(SSL_CTX *ctx, const unsigned char *protos,
   unsigned int protos_len);
__owur int SSL_set_alpn_protos(SSL *ssl, const unsigned char *protos,
   unsigned int protos_len);
typedef int (*SSL_CTX_alpn_select_cb_func)(SSL *ssl,
   const unsigned char **out,
   unsigned
 char *outlen,
   const unsigned char *in,
   unsigned int inlen,
   void *arg);
void SSL_CTX_set_alpn_select_cb(SSL_CTX *ctx,
   SSL_CTX_alpn_select_cb_func cb,
   void *arg);
void SSL_get0_alpn_selected(const SSL *ssl, const unsigned char **data,
   unsigned int *len);

#ifndef OPENSSL_NO_PSK
/*
* the maximum length of the buffer given to callbacks containing the
```

```
* resulting identity/psk
*/
#define PSK_MAX_IDENTITY_LEN 256
#define PSK_MAX_PSK_LEN 512
typedef unsigned int (*SSL_psk_client_cb_func)(SSL *ssl,
   const char *hint,
   char *identity,
   unsigned int max_identity_len,
   unsigned char *psk,
   unsigned int max_psk_len);
void SSL_CTX_set_psk_client_callback(SSL_CTX *ctx, SSL_psk_client_cb_func cb);
void SSL_set_psk_client_callback(SSL *ssl, SSL_psk_client_cb_func cb);

typedef unsigned int (*SSL_psk_server_cb_func)(SSL *ssl,
   const char *identity,
   unsigned char *psk,
   unsigned int max_psk_len);
void SSL_CTX_set_psk_server_callback(SSL_CTX *ctx,
 SSL_psk_server_cb_func cb);
void SSL_set_psk_server_callback(SSL *ssl, SSL_psk_server_cb_func cb);

__owur int SSL_CTX_use_psk_identity_hint(SSL_CTX *ctx, const char *identity_hint);
__owur int SSL_use_psk_identity_hint(SSL *s, const char *identity_hint);
const char *SSL_get_psk_identity_hint(const SSL *s);
const char *SSL_get_psk_identity(const SSL *s);
#endif

typedef int (*SSL_psk_find_session_cb_func)(SSL *ssl,
   const unsigned char *identity,
   size_t identity_len,
   SSL_SESSION **sess);
typedef int (*SSL_psk_use_session_cb_func)(SSL *ssl, const EVP_MD *md,
   const unsigned char **id,
   size_t *idlen,
   SSL_SESSION **sess);

void SSL_set_psk_find_session_callback(SSL *s, SSL_psk_find_session_cb_func cb);
void SSL_CTX_set_psk_find_session_callback(SSL_CTX *ctx,
   SSL_psk_find_session_cb_func cb);
void SSL_set_psk_use_session_callback(SSL *s, SSL_psk_use_session_cb_func cb);
void SSL_CTX_set_psk_use_session_callback(SSL_CTX *ctx,
   SSL_psk_use_session_cb_func cb);

/*
 Register callbacks to handle custom TLS Extensions for client or server. */

__owur int SSL_CTX_has_client_custom_ext(const SSL_CTX *ctx,
   unsigned int ext_type);
```

```
__owur int SSL_CTX_add_client_custom_ext(SSL_CTX *ctx,
   unsigned int ext_type,
   custom_ext_add_cb add_cb,
   custom_ext_free_cb free_cb,
   void *add_arg,
   custom_ext_parse_cb parse_cb,
   void *parse_arg);

__owur int SSL_CTX_add_server_custom_ext(SSL_CTX *ctx,
   unsigned int ext_type,
   custom_ext_add_cb add_cb,
   custom_ext_free_cb free_cb,
   void *add_arg,
   custom_ext_parse_cb parse_cb,
   void *parse_arg);

__owur int SSL_CTX_add_custom_ext(SSL_CTX *ctx, unsigned int ext_type,
   unsigned int context,
   SSL_custom_ext_add_cb_ex add_cb,
   SSL_custom_ext_free_cb_ex free_cb,
   void *add_arg,
   SSL_custom_ext_parse_cb_ex parse_cb,
   void *parse_arg);

__owur int SSL_extension_supported(unsigned int ext_type);

#define SSL_NOTHING 1
#define SSL_WRITING 2
#define SSL_READING 3
#define
 SSL_X509_LOOKUP 4
#define SSL_ASYNC_PAUSED 5
#define SSL_ASYNC_NO_JOBS 6
#define SSL_CLIENT_HELLO_CB 7
#define SSL_RETRY_VERIFY 8

/* These will only be used when doing non-blocking IO */
#define SSL_want_nothing(s) (SSL_want(s) == SSL_NOTHING)
#define SSL_want_read(s) (SSL_want(s) == SSL_READING)
#define SSL_want_write(s) (SSL_want(s) == SSL_WRITING)
#define SSL_want_x509_lookup(s) (SSL_want(s) == SSL_X509_LOOKUP)
#define SSL_want_retry_verify(s) (SSL_want(s) == SSL_RETRY_VERIFY)
#define SSL_want_async(s) (SSL_want(s) == SSL_ASYNC_PAUSED)
#define SSL_want_async_job(s) (SSL_want(s) == SSL_ASYNC_NO_JOBS)
#define SSL_want_client_hello_cb(s) (SSL_want(s) == SSL_CLIENT_HELLO_CB)

#define SSL_MAC_FLAG_READ_MAC_STREAM 1
```

```
#define SSL_MAC_FLAG_WRITE_MAC_STREAM 2
#define SSL_MAC_FLAG_READ_MAC_TLSTREE 4
#define SSL_MAC_FLAG_WRITE_MAC_TLSTREE 8

/*
* A callback for logging out TLS key material. This callback should log out
* |line| followed by a newline.
*/
typedef void (*SSL_CTX_keylog_cb_func)(const
 SSL *ssl, const char *line);

/*
* SSL_CTX_set_keylog_callback configures a callback to log key material. This
* is intended for debugging use with tools like Wireshark. The cb function
* should log line followed by a newline.
*/
void SSL_CTX_set_keylog_callback(SSL_CTX *ctx, SSL_CTX_keylog_cb_func cb);

/*
* SSL_CTX_get_keylog_callback returns the callback configured by
* SSL_CTX_set_keylog_callback.
*/
SSL_CTX_keylog_cb_func SSL_CTX_get_keylog_callback(const SSL_CTX *ctx);

int SSL_CTX_set_max_early_data(SSL_CTX *ctx, uint32_t max_early_data);
uint32_t SSL_CTX_get_max_early_data(const SSL_CTX *ctx);
int SSL_set_max_early_data(SSL *s, uint32_t max_early_data);
uint32_t SSL_get_max_early_data(const SSL *s);
int SSL_CTX_set_recv_max_early_data(SSL_CTX *ctx, uint32_t recv_max_early_data);
uint32_t SSL_CTX_get_recv_max_early_data(const SSL_CTX *ctx);
int SSL_set_recv_max_early_data(SSL *s, uint32_t recv_max_early_data);
uint32_t SSL_get_recv_max_early_data(const SSL *s);

#ifdef
 __cplusplus
}
#endif

#include <openssl/ssl2.h>
#include <openssl/ssl3.h>
#include <openssl/tls1.h> /* This is mostly sslv3 with a few tweaks */
#include <openssl/dtls1.h> /* Datagram TLS */
#include <openssl/srtp.h> /* Support for the use_srtp extension */
#include <openssl/quic.h>

#ifdef __cplusplus
extern "C" {
#endif
```

```
/*
* These need to be after the above set of includes due to a compiler bug
* in VisualStudio 2015
*/
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(SSL_CIPHER, const SSL_CIPHER, SSL_CIPHER)
#define sk_SSL_CIPHER_num(sk) OPENSSL_sk_num(ossl_check_const_SSL_CIPHER_sk_type(sk))
#define sk_SSL_CIPHER_value(sk, idx) ((const SSL_CIPHER
*)OPENSSL_sk_value(ossl_check_const_SSL_CIPHER_sk_type(sk), (idx)))
#define sk_SSL_CIPHER_new(cmp) ((STACK_OF(SSL_CIPHER)
*)OPENSSL_sk_new(ossl_check_SSL_CIPHER_compfunc_type(cmp)))
#define sk_SSL_CIPHER_new_null() ((STACK_OF(SSL_CIPHER) *)OPENSSL_sk_new_null())
#define sk_SSL_CIPHER_new_reserve(cmp, n) ((STACK_OF(SSL_CIPHER)
 *)OPENSSL_sk_new_reserve(ossl_check_SSL_CIPHER_compfunc_type(cmp), (n)))
#define sk_SSL_CIPHER_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_SSL_CIPHER_sk_type(sk), (n))
#define sk_SSL_CIPHER_free(sk) OPENSSL_sk_free(ossl_check_SSL_CIPHER_sk_type(sk))
#define sk_SSL_CIPHER_zero(sk) OPENSSL_sk_zero(ossl_check_SSL_CIPHER_sk_type(sk))
#define sk_SSL_CIPHER_delete(sk, i) ((const SSL_CIPHER
*)OPENSSL_sk_delete(ossl_check_SSL_CIPHER_sk_type(sk), (i)))
#define sk_SSL_CIPHER_delete_ptr(sk, ptr) ((const SSL_CIPHER
*)OPENSSL_sk_delete_ptr(ossl_check_SSL_CIPHER_sk_type(sk), ossl_check_SSL_CIPHER_type(ptr)))
#define sk_SSL_CIPHER_push(sk, ptr) OPENSSL_sk_push(ossl_check_SSL_CIPHER_sk_type(sk),
ossl_check_SSL_CIPHER_type(ptr))
#define sk_SSL_CIPHER_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_SSL_CIPHER_sk_type(sk),
ossl_check_SSL_CIPHER_type(ptr))
#define sk_SSL_CIPHER_pop(sk) ((const SSL_CIPHER
*)OPENSSL_sk_pop(ossl_check_SSL_CIPHER_sk_type(sk)))
#define sk_SSL_CIPHER_shift(sk) ((const SSL_CIPHER
 *)OPENSSL_sk_shift(ossl_check_SSL_CIPHER_sk_type(sk)))
#define sk_SSL_CIPHER_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_SSL_CIPHER_sk_type(sk),ossl_check_SSL_CIPHER_freefunc_type(freefunc
))
#define sk_SSL_CIPHER_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_SSL_CIPHER_sk_type(sk),
ossl_check_SSL_CIPHER_type(ptr), (idx))
#define sk_SSL_CIPHER_set(sk, idx, ptr) ((const SSL_CIPHER
*)OPENSSL_sk_set(ossl_check_SSL_CIPHER_sk_type(sk), (idx), ossl_check_SSL_CIPHER_type(ptr)))
#define sk_SSL_CIPHER_find(sk, ptr) OPENSSL_sk_find(ossl_check_SSL_CIPHER_sk_type(sk),
ossl_check_SSL_CIPHER_type(ptr))
#define sk_SSL_CIPHER_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_SSL_CIPHER_sk_type(sk),
ossl_check_SSL_CIPHER_type(ptr))
#define sk_SSL_CIPHER_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_SSL_CIPHER_sk_type(sk),
ossl_check_SSL_CIPHER_type(ptr), pnum)
#define sk_SSL_CIPHER_sort(sk) OPENSSL_sk_sort(ossl_check_SSL_CIPHER_sk_type(sk))
#define sk_SSL_CIPHER_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_SSL_CIPHER_sk_type(sk))
#define
 sk_SSL_CIPHER_dup(sk) ((STACK_OF(SSL_CIPHER)
*)OPENSSL_sk_dup(ossl_check_const_SSL_CIPHER_sk_type(sk)))
```

```
#define sk_SSL_CIPHER_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(SSL_CIPHER)
*)OPENSSL_sk_deep_copy(ossl_check_const_SSL_CIPHER_sk_type(sk),
ossl_check_SSL_CIPHER_copyfunc_type(copyfunc), ossl_check_SSL_CIPHER_freefunc_type(freefunc)))
#define sk_SSL_CIPHER_set_cmp_func(sk, cmp)
((sk_SSL_CIPHER_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_SSL_CIPHER_sk_type(sk),
ossl_check_SSL_CIPHER_compfunc_type(cmp)))

/* clang-format on */

/* compatibility */
#define SSL_set_app_data(s, arg) (SSL_set_ex_data(s, 0, (char *)(arg)))
#define SSL_get_app_data(s) (SSL_get_ex_data(s, 0))
#define SSL_SESSION_set_app_data(s, a) (SSL_SESSION_set_ex_data(s, 0, \
  (char *)(a)))
#define SSL_SESSION_get_app_data(s) (SSL_SESSION_get_ex_data(s, 0))
#define SSL_CTX_get_app_data(ctx) (SSL_CTX_get_ex_data(ctx, 0))
#define SSL_CTX_set_app_data(ctx,
 arg) (SSL_CTX_set_ex_data(ctx, 0, \
  (char *)(arg)))
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 void SSL_set_debug(SSL *s, int debug);
#endif

/* TLSv1.3 KeyUpdate message types */
/* -1 used so that this is an invalid value for the on-the-wire protocol */
#define SSL_KEY_UPDATE_NONE -1
/* Values as defined for the on-the-wire protocol */
#define SSL_KEY_UPDATE_NOT_REQUESTED 0
#define SSL_KEY_UPDATE_REQUESTED 1

/*
* The valid handshake states (one for each type message sent and one for each
* type of message received). There are also two "special" states:
* TLS = TLS or DTLS state
* DTLS = DTLS specific state
* CR/SR = Client Read/Server Read
* CW/SW = Client Write/Server Write
*
* The "special" states are:
* TLS_ST_BEFORE = No handshake has been initiated yet
* TLS_ST_OK = A handshake has been successfully completed
*/
typedef enum {
  TLS_ST_BEFORE,
  TLS_ST_OK,
  DTLS_ST_CR_HELLO_VERIFY_REQUEST,
  TLS_ST_CR_SRVR_HELLO,
  TLS_ST_CR_CERT,
```

TLS_ST_CR_COMP_CERT,
TLS_ST_CR_CERT_STATUS,
TLS_ST_CR_KEY_EXCH,
TLS_ST_CR_CERT_REQ,
TLS_ST_CR_SRVR_DONE,
TLS_ST_CR_SESSION_TICKET,
TLS_ST_CR_CHANGE,
TLS_ST_CR_FINISHED,
TLS_ST_CW_CLNT_HELLO,
TLS_ST_CW_CERT,
TLS_ST_CW_COMP_CERT,
TLS_ST_CW_KEY_EXCH,
TLS_ST_CW_CERT_VRFY,
TLS_ST_CW_CHANGE,
TLS_ST_CW_NEXT_PROTO,
TLS_ST_CW_FINISHED,
TLS_ST_SW_HELLO_REQ,
TLS_ST_SR_CLNT_HELLO,
DTLS_ST_SW_HELLO_VERIFY_REQUEST,
TLS_ST_SW_SRVR_HELLO,
TLS_ST_SW_CERT,
TLS_ST_SW_COMP_CERT,
TLS_ST_SW_KEY_EXCH,
TLS_ST_SW_CERT_REQ,
TLS_ST_SW_SRVR_DONE,
TLS_ST_SR_CERT,
TLS_ST_SR_COMP_CERT,
TLS_ST_SR_KEY_EXCH,
TLS_ST_SR_CERT_VRFY,
TLS_ST_SR_NEXT_PROTO,
TLS_ST_SR_CHANGE,
TLS_ST_SR_FINISHED,
TLS_ST_SW_SESSION_TICKET,
TLS_ST_SW_CERT_STATUS,
TLS_ST_SW_CHANGE,
TLS_ST_SW_FINISHED,
TLS_ST_SW_ENCRYPTED_EXTENSIONS,
TLS_ST_CR_ENCRYPTED_EXTENSIONS,
TLS_ST_CR_CERT_VRFY,
TLS_ST_SW_CERT_VRFY,
TLS_ST_CR_HELLO_REQ,
TLS_ST_SW_KEY_UPDATE,
TLS_ST_CW_KEY_UPDATE,
TLS_ST_SR_KEY_UPDATE,
TLS_ST_CR_KEY_UPDATE,
TLS_ST_EARLY_DATA,
TLS_ST_PENDING_EARLY_DATA_END,

```
  TLS_ST_CW_END_OF_EARLY_DATA,
  TLS_ST_SR_END_OF_EARLY_DATA
} OSSL_HANDSHAKE_STATE;

/*
* Most of the following state values are no longer used and are defined to be
* the closest equivalent value in the current state machine code. Not all
* defines have an equivalent and are set to a dummy value (-1). SSL_ST_CONNECT
* and SSL_ST_ACCEPT are still in use in the definition of SSL_CB_ACCEPT_LOOP,
* SSL_CB_ACCEPT_EXIT, SSL_CB_CONNECT_LOOP and SSL_CB_CONNECT_EXIT.
*/

#define SSL_ST_CONNECT 0x1000
#define SSL_ST_ACCEPT 0x2000

#define SSL_ST_MASK 0x0FFF

#define SSL_CB_LOOP 0x01
#define SSL_CB_EXIT 0x02
#define SSL_CB_READ 0x04
#define SSL_CB_WRITE 0x08
#define SSL_CB_ALERT 0x4000 /* used in callback */
#define SSL_CB_READ_ALERT (SSL_CB_ALERT | SSL_CB_READ)
#define SSL_CB_WRITE_ALERT
 (SSL_CB_ALERT | SSL_CB_WRITE)
#define SSL_CB_ACCEPT_LOOP (SSL_ST_ACCEPT | SSL_CB_LOOP)
#define SSL_CB_ACCEPT_EXIT (SSL_ST_ACCEPT | SSL_CB_EXIT)
#define SSL_CB_CONNECT_LOOP (SSL_ST_CONNECT | SSL_CB_LOOP)
#define SSL_CB_CONNECT_EXIT (SSL_ST_CONNECT | SSL_CB_EXIT)
#define SSL_CB_HANDSHAKE_START 0x10
#define SSL_CB_HANDSHAKE_DONE 0x20

/* Is the SSL_connection established? */
#define SSL_in_connect_init(a) (SSL_in_init(a) && !SSL_is_server(a))
#define SSL_in_accept_init(a) (SSL_in_init(a) && SSL_is_server(a))
int SSL_in_init(const SSL *s);
int SSL_in_before(const SSL *s);
int SSL_is_init_finished(const SSL *s);

/*
* The following 3 states are kept in ssl->rlayer.rstate when reads fail, you
* should not need these
*/
#define SSL_ST_READ_HEADER 0xF0
#define SSL_ST_READ_BODY 0xF1
#define SSL_ST_READ_DONE 0xF2

/*-
```

```
* Obtain latest Finished message
*   -- that we sent (SSL_get_finished)
*   -- that we expected from peer (SSL_get_peer_finished).
* Returns length (0 == no Finished so far),
 copies up to 'count' bytes.
*/
size_t SSL_get_finished(const SSL *s, void *buf, size_t count);
size_t SSL_get_peer_finished(const SSL *s, void *buf, size_t count);

/*
* use either SSL_VERIFY_NONE or SSL_VERIFY_PEER, the last 3 options are
* 'ored' with SSL_VERIFY_PEER if they are desired
*/
#define SSL_VERIFY_NONE 0x00
#define SSL_VERIFY_PEER 0x01
#define SSL_VERIFY_FAIL_IF_NO_PEER_CERT 0x02
#define SSL_VERIFY_CLIENT_ONCE 0x04
#define SSL_VERIFY_POST_HANDSHAKE 0x08

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define OpenSSL_add_ssl_algorithms() SSL_library_init()
#define SSLeay_add_ssl_algorithms() SSL_library_init()
#endif

/* More backward compatibility */
#define SSL_get_cipher(s) \
   SSL_CIPHER_get_name(SSL_get_current_cipher(s))
#define SSL_get_cipher_bits(s, np) \
   SSL_CIPHER_get_bits(SSL_get_current_cipher(s), np)
#define SSL_get_cipher_version(s) \
   SSL_CIPHER_get_version(SSL_get_current_cipher(s))
#define SSL_get_cipher_name(s) \
   SSL_CIPHER_get_name(SSL_get_current_cipher(s))
#define
 SSL_get_time(a) SSL_SESSION_get_time(a)
#define SSL_set_time(a, b) SSL_SESSION_set_time((a), (b))
#define SSL_get_timeout(a) SSL_SESSION_get_timeout(a)
#define SSL_set_timeout(a, b) SSL_SESSION_set_timeout((a), (b))

#define d2i_SSL_SESSION_bio(bp, s_id) ASN1_d2i_bio_of(SSL_SESSION, SSL_SESSION_new,
d2i_SSL_SESSION, bp, s_id)
#define i2d_SSL_SESSION_bio(bp, s_id) ASN1_i2d_bio_of(SSL_SESSION, i2d_SSL_SESSION, bp, s_id)

DECLARE_PEM_rw(SSL_SESSION, SSL_SESSION)
#define SSL_AD_REASON_OFFSET 1000 /* offset to get SSL_R_... value \
                           * from SSL_AD_... */
/* These alert types are for SSLv3 and TLSv1 */
#define SSL_AD_CLOSE_NOTIFY SSL3_AD_CLOSE_NOTIFY
```

```
/* fatal */
#define SSL_AD_UNEXPECTED_MESSAGE SSL3_AD_UNEXPECTED_MESSAGE
/* fatal */
#define SSL_AD_BAD_RECORD_MAC SSL3_AD_BAD_RECORD_MAC
#define SSL_AD_DECRYPTION_FAILED TLS1_AD_DECRYPTION_FAILED
#define SSL_AD_RECORD_OVERFLOW TLS1_AD_RECORD_OVERFLOW
/* fatal */
#define SSL_AD_DECOMPRESSION_FAILURE
 SSL3_AD_DECOMPRESSION_FAILURE
/* fatal */
#define SSL_AD_HANDSHAKE_FAILURE SSL3_AD_HANDSHAKE_FAILURE
/* Not for TLS */
#define SSL_AD_NO_CERTIFICATE SSL3_AD_NO_CERTIFICATE
#define SSL_AD_BAD_CERTIFICATE SSL3_AD_BAD_CERTIFICATE
#define SSL_AD_UNSUPPORTED_CERTIFICATE SSL3_AD_UNSUPPORTED_CERTIFICATE
#define SSL_AD_CERTIFICATE_REVOKED SSL3_AD_CERTIFICATE_REVOKED
#define SSL_AD_CERTIFICATE_EXPIRED SSL3_AD_CERTIFICATE_EXPIRED
#define SSL_AD_CERTIFICATE_UNKNOWN SSL3_AD_CERTIFICATE_UNKNOWN
/* fatal */
#define SSL_AD_ILLEGAL_PARAMETER SSL3_AD_ILLEGAL_PARAMETER
/* fatal */
#define SSL_AD_UNKNOWN_CA TLS1_AD_UNKNOWN_CA
/* fatal */
#define SSL_AD_ACCESS_DENIED TLS1_AD_ACCESS_DENIED
/* fatal */
#define SSL_AD_DECODE_ERROR TLS1_AD_DECODE_ERROR
#define SSL_AD_DECRYPT_ERROR TLS1_AD_DECRYPT_ERROR
/* fatal */
#define SSL_AD_EXPORT_RESTRICTION TLS1_AD_EXPORT_RESTRICTION
/* fatal */
#define SSL_AD_PROTOCOL_VERSION TLS1_AD_PROTOCOL_VERSION
/* fatal */
#define SSL_AD_INSUFFICIENT_SECURITY TLS1_AD_INSUFFICIENT_SECURITY
/*
 fatal */
#define SSL_AD_INTERNAL_ERROR TLS1_AD_INTERNAL_ERROR
#define SSL_AD_USER_CANCELLED TLS1_AD_USER_CANCELLED
#define SSL_AD_NO_RENEGOTIATION TLS1_AD_NO_RENEGOTIATION
#define SSL_AD_MISSING_EXTENSION TLS13_AD_MISSING_EXTENSION
#define SSL_AD_CERTIFICATE_REQUIRED TLS13_AD_CERTIFICATE_REQUIRED
#define SSL_AD_UNSUPPORTED_EXTENSION TLS1_AD_UNSUPPORTED_EXTENSION
#define SSL_AD_CERTIFICATE_UNOBTAINABLE TLS1_AD_CERTIFICATE_UNOBTAINABLE
#define SSL_AD_UNRECOGNIZED_NAME TLS1_AD_UNRECOGNIZED_NAME
#define SSL_AD_BAD_CERTIFICATE_STATUS_RESPONSE
TLS1_AD_BAD_CERTIFICATE_STATUS_RESPONSE
#define SSL_AD_BAD_CERTIFICATE_HASH_VALUE TLS1_AD_BAD_CERTIFICATE_HASH_VALUE
/* fatal */
#define SSL_AD_UNKNOWN_PSK_IDENTITY TLS1_AD_UNKNOWN_PSK_IDENTITY
```

```
/* fatal */
#define SSL_AD_INAPPROPRIATE_FALLBACK TLS1_AD_INAPPROPRIATE_FALLBACK
#define SSL_AD_NO_APPLICATION_PROTOCOL TLS1_AD_NO_APPLICATION_PROTOCOL
#define SSL_ERROR_NONE 0
#define SSL_ERROR_SSL 1
#define SSL_ERROR_WANT_READ 2
#define
 SSL_ERROR_WANT_WRITE 3
#define SSL_ERROR_WANT_X509_LOOKUP 4
#define SSL_ERROR_SYSCALL 5 /* look at error stack/return \
                        * value/errno */
#define SSL_ERROR_ZERO_RETURN 6
#define SSL_ERROR_WANT_CONNECT 7
#define SSL_ERROR_WANT_ACCEPT 8
#define SSL_ERROR_WANT_ASYNC 9
#define SSL_ERROR_WANT_ASYNC_JOB 10
#define SSL_ERROR_WANT_CLIENT_HELLO_CB 11
#define SSL_ERROR_WANT_RETRY_VERIFY 12

#ifndef OPENSSL_NO_DEPRECATED_3_0
#define SSL_CTRL_SET_TMP_DH 3
#define SSL_CTRL_SET_TMP_ECDH 4
#define SSL_CTRL_SET_TMP_DH_CB 6
#endif

#define SSL_CTRL_GET_CLIENT_CERT_REQUEST 9
#define SSL_CTRL_GET_NUM_RENEGOTIATIONS 10
#define SSL_CTRL_CLEAR_NUM_RENEGOTIATIONS 11
#define SSL_CTRL_GET_TOTAL_RENEGOTIATIONS 12
#define SSL_CTRL_GET_FLAGS 13
#define SSL_CTRL_EXTRA_CHAIN_CERT 14
#define SSL_CTRL_SET_MSG_CALLBACK 15
#define SSL_CTRL_SET_MSG_CALLBACK_ARG 16
/* only applies to datagram connections */
#define SSL_CTRL_SET_MTU 17
/* Stats */
#define SSL_CTRL_SESS_NUMBER 20
#define SSL_CTRL_SESS_CONNECT
 21
#define SSL_CTRL_SESS_CONNECT_GOOD 22
#define SSL_CTRL_SESS_CONNECT_RENEGOTIATE 23
#define SSL_CTRL_SESS_ACCEPT 24
#define SSL_CTRL_SESS_ACCEPT_GOOD 25
#define SSL_CTRL_SESS_ACCEPT_RENEGOTIATE 26
#define SSL_CTRL_SESS_HIT 27
#define SSL_CTRL_SESS_CB_HIT 28
#define SSL_CTRL_SESS_MISSES 29
#define SSL_CTRL_SESS_TIMEOUTS 30
```

```
#define SSL_CTRL_SESS_CACHE_FULL 31
#define SSL_CTRL_MODE 33
#define SSL_CTRL_GET_READ_AHEAD 40
#define SSL_CTRL_SET_READ_AHEAD 41
#define SSL_CTRL_SET_SESS_CACHE_SIZE 42
#define SSL_CTRL_GET_SESS_CACHE_SIZE 43
#define SSL_CTRL_SET_SESS_CACHE_MODE 44
#define SSL_CTRL_GET_SESS_CACHE_MODE 45
#define SSL_CTRL_GET_MAX_CERT_LIST 50
#define SSL_CTRL_SET_MAX_CERT_LIST 51
#define SSL_CTRL_SET_MAX_SEND_FRAGMENT 52
/* see tls1.h for macros based on these */
#define SSL_CTRL_SET_TLSEXT_SERVERNAME_CB 53
#define SSL_CTRL_SET_TLSEXT_SERVERNAME_ARG 54
#define SSL_CTRL_SET_TLSEXT_HOSTNAME 55
#define SSL_CTRL_SET_TLSEXT_DEBUG_CB 56
#define SSL_CTRL_SET_TLSEXT_DEBUG_ARG
 57
#define SSL_CTRL_GET_TLSEXT_TICKET_KEYS 58
#define SSL_CTRL_SET_TLSEXT_TICKET_KEYS 59
/*# define SSL_CTRL_SET_TLSEXT_OPAQUE_PRF_INPUT    60 */
/*# define SSL_CTRL_SET_TLSEXT_OPAQUE_PRF_INPUT_CB 61 */
/*# define SSL_CTRL_SET_TLSEXT_OPAQUE_PRF_INPUT_CB_ARG 62 */
#define SSL_CTRL_SET_TLSEXT_STATUS_REQ_CB 63
#define SSL_CTRL_SET_TLSEXT_STATUS_REQ_CB_ARG 64
#define SSL_CTRL_SET_TLSEXT_STATUS_REQ_TYPE 65
#define SSL_CTRL_GET_TLSEXT_STATUS_REQ_EXTS 66
#define SSL_CTRL_SET_TLSEXT_STATUS_REQ_EXTS 67
#define SSL_CTRL_GET_TLSEXT_STATUS_REQ_IDS 68
#define SSL_CTRL_SET_TLSEXT_STATUS_REQ_IDS 69
#define SSL_CTRL_GET_TLSEXT_STATUS_REQ_OCSP_RESP 70
#define SSL_CTRL_SET_TLSEXT_STATUS_REQ_OCSP_RESP 71
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define SSL_CTRL_SET_TLSEXT_TICKET_KEY_CB 72
#endif
#define SSL_CTRL_SET_TLS_EXT_SRP_USERNAME_CB 75
#define SSL_CTRL_SET_SRP_VERIFY_PARAM_CB 76
#define SSL_CTRL_SET_SRP_GIVE_CLIENT_PWD_CB 77
#define SSL_CTRL_SET_SRP_ARG 78
#define SSL_CTRL_SET_TLS_EXT_SRP_USERNAME 79
#define
 SSL_CTRL_SET_TLS_EXT_SRP_STRENGTH 80
#define SSL_CTRL_SET_TLS_EXT_SRP_PASSWORD 81
#define DTLS_CTRL_GET_TIMEOUT 73
#define DTLS_CTRL_HANDLE_TIMEOUT 74
#define SSL_CTRL_GET_RI_SUPPORT 76
#define SSL_CTRL_CLEAR_MODE 78
#define SSL_CTRL_SET_NOT_RESUMABLE_SESS_CB 79
```

```
#define SSL_CTRL_GET_EXTRA_CHAIN_CERTS 82
#define SSL_CTRL_CLEAR_EXTRA_CHAIN_CERTS 83
#define SSL_CTRL_CHAIN 88
#define SSL_CTRL_CHAIN_CERT 89
#define SSL_CTRL_GET_GROUPS 90
#define SSL_CTRL_SET_GROUPS 91
#define SSL_CTRL_SET_GROUPS_LIST 92
#define SSL_CTRL_GET_SHARED_GROUP 93
#define SSL_CTRL_SET_SIGALGS 97
#define SSL_CTRL_SET_SIGALGS_LIST 98
#define SSL_CTRL_CERT_FLAGS 99
#define SSL_CTRL_CLEAR_CERT_FLAGS 100
#define SSL_CTRL_SET_CLIENT_SIGALGS 101
#define SSL_CTRL_SET_CLIENT_SIGALGS_LIST 102
#define SSL_CTRL_GET_CLIENT_CERT_TYPES 103
#define SSL_CTRL_SET_CLIENT_CERT_TYPES 104
#define SSL_CTRL_BUILD_CERT_CHAIN 105
#define SSL_CTRL_SET_VERIFY_CERT_STORE 106
#define SSL_CTRL_SET_CHAIN_CERT_STORE 107
#define SSL_CTRL_GET_PEER_SIGNATURE_NID
 108
#define SSL_CTRL_GET_PEER_TMP_KEY 109
#define SSL_CTRL_GET_RAW_CIPHERLIST 110
#define SSL_CTRL_GET_EC_POINT_FORMATS 111
#define SSL_CTRL_GET_CHAIN_CERTS 115
#define SSL_CTRL_SELECT_CURRENT_CERT 116
#define SSL_CTRL_SET_CURRENT_CERT 117
#define SSL_CTRL_SET_DH_AUTO 118
#define DTLS_CTRL_SET_LINK_MTU 120
#define DTLS_CTRL_GET_LINK_MIN_MTU 121
#define SSL_CTRL_GET_EXTMS_SUPPORT 122
#define SSL_CTRL_SET_MIN_PROTO_VERSION 123
#define SSL_CTRL_SET_MAX_PROTO_VERSION 124
#define SSL_CTRL_SET_SPLIT_SEND_FRAGMENT 125
#define SSL_CTRL_SET_MAX_PIPELINES 126
#define SSL_CTRL_GET_TLSEXT_STATUS_REQ_TYPE 127
#define SSL_CTRL_GET_TLSEXT_STATUS_REQ_CB 128
#define SSL_CTRL_GET_TLSEXT_STATUS_REQ_CB_ARG 129
#define SSL_CTRL_GET_MIN_PROTO_VERSION 130
#define SSL_CTRL_GET_MAX_PROTO_VERSION 131
#define SSL_CTRL_GET_SIGNATURE_NID 132
#define SSL_CTRL_GET_TMP_KEY 133
#define SSL_CTRL_GET_NEGOTIATED_GROUP 134
#define SSL_CTRL_GET_IANA_GROUPS 135
#define SSL_CTRL_SET_RETRY_VERIFY 136
#define
 SSL_CTRL_GET_VERIFY_CERT_STORE 137
#define SSL_CTRL_GET_CHAIN_CERT_STORE 138
```

```
#define SSL_CTRL_GET0_IMPLEMENTED_GROUPS 139
#define SSL_CTRL_GET_SIGNATURE_NAME 140
#define SSL_CTRL_GET_PEER_SIGNATURE_NAME 141
#define SSL_CERT_SET_FIRST 1
#define SSL_CERT_SET_NEXT 2
#define SSL_CERT_SET_SERVER 3
#define DTLSv1_get_timeout(ssl, arg) \
   SSL_ctrl(ssl, DTLS_CTRL_GET_TIMEOUT, 0, (void *)(arg))
#define DTLSv1_handle_timeout(ssl) \
   SSL_ctrl(ssl, DTLS_CTRL_HANDLE_TIMEOUT, 0, NULL)
#define SSL_num_renegotiations(ssl) \
   SSL_ctrl((ssl), SSL_CTRL_GET_NUM_RENEGOTIATIONS, 0, NULL)
#define SSL_clear_num_renegotiations(ssl) \
   SSL_ctrl((ssl), SSL_CTRL_CLEAR_NUM_RENEGOTIATIONS, 0, NULL)
#define SSL_total_renegotiations(ssl) \
   SSL_ctrl((ssl), SSL_CTRL_GET_TOTAL_RENEGOTIATIONS, 0, NULL)
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define SSL_CTX_set_tmp_dh(ctx, dh) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_TMP_DH, 0, (char *)(dh))
#endif
#define SSL_CTX_set_dh_auto(ctx, onoff) \
   SSL_CTX_ctrl(ctx,
 SSL_CTRL_SET_DH_AUTO, onoff, NULL)
#define SSL_set_dh_auto(s, onoff) \
   SSL_ctrl(s, SSL_CTRL_SET_DH_AUTO, onoff, NULL)
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define SSL_set_tmp_dh(ssl, dh) \
   SSL_ctrl(ssl, SSL_CTRL_SET_TMP_DH, 0, (char *)(dh))
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define SSL_CTX_set_tmp_ecdh(ctx, ecdh) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_TMP_ECDH, 0, (char *)(ecdh))
#define SSL_set_tmp_ecdh(ssl, ecdh) \
   SSL_ctrl(ssl, SSL_CTRL_SET_TMP_ECDH, 0, (char *)(ecdh))
#endif
#define SSL_CTX_add_extra_chain_cert(ctx, x509) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_EXTRA_CHAIN_CERT, 0, (char *)(x509))
#define SSL_CTX_get_extra_chain_certs(ctx, px509) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_EXTRA_CHAIN_CERTS, 0, px509)
#define SSL_CTX_get_extra_chain_certs_only(ctx, px509) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_EXTRA_CHAIN_CERTS, 1, px509)
#define SSL_CTX_clear_extra_chain_certs(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_CLEAR_EXTRA_CHAIN_CERTS, 0, NULL)
#define SSL_CTX_set0_chain(ctx, sk)
 \
   SSL_CTX_ctrl(ctx, SSL_CTRL_CHAIN, 0, (char *)(sk))
#define SSL_CTX_set1_chain(ctx, sk) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_CHAIN, 1, (char *)(sk))
```

```
#define SSL_CTX_add0_chain_cert(ctx, x509) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_CHAIN_CERT, 0, (char *)(x509))
#define SSL_CTX_add1_chain_cert(ctx, x509) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_CHAIN_CERT, 1, (char *)(x509))
#define SSL_CTX_get0_chain_certs(ctx, px509) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_CHAIN_CERTS, 0, px509)
#define SSL_CTX_clear_chain_certs(ctx) \
   SSL_CTX_set0_chain(ctx, NULL)
#define SSL_CTX_build_cert_chain(ctx, flags) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_BUILD_CERT_CHAIN, flags, NULL)
#define SSL_CTX_select_current_cert(ctx, x509) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SELECT_CURRENT_CERT, 0, (char *)(x509))
#define SSL_CTX_set_current_cert(ctx, op) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_CURRENT_CERT, op, NULL)
#define SSL_CTX_set0_verify_cert_store(ctx, st) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_VERIFY_CERT_STORE, 0, (char *)(st))
#define
 SSL_CTX_set1_verify_cert_store(ctx, st) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_VERIFY_CERT_STORE, 1, (char *)(st))
#define SSL_CTX_get0_verify_cert_store(ctx, st) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_VERIFY_CERT_STORE, 0, (char *)(st))
#define SSL_CTX_set0_chain_cert_store(ctx, st) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_CHAIN_CERT_STORE, 0, (char *)(st))
#define SSL_CTX_set1_chain_cert_store(ctx, st) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_CHAIN_CERT_STORE, 1, (char *)(st))
#define SSL_CTX_get0_chain_cert_store(ctx, st) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_CHAIN_CERT_STORE, 0, (char *)(st))
#define SSL_set0_chain(s, sk) \
   SSL_ctrl(s, SSL_CTRL_CHAIN, 0, (char *)(sk))
#define SSL_set1_chain(s, sk) \
   SSL_ctrl(s, SSL_CTRL_CHAIN, 1, (char *)(sk))
#define SSL_add0_chain_cert(s, x509) \
   SSL_ctrl(s, SSL_CTRL_CHAIN_CERT, 0, (char *)(x509))
#define SSL_add1_chain_cert(s, x509) \
   SSL_ctrl(s, SSL_CTRL_CHAIN_CERT, 1, (char *)(x509))
#define SSL_get0_chain_certs(s, px509) \
   SSL_ctrl(s,
 SSL_CTRL_GET_CHAIN_CERTS, 0, px509)
#define SSL_clear_chain_certs(s) \
   SSL_set0_chain(s, NULL)
#define SSL_build_cert_chain(s, flags) \
   SSL_ctrl(s, SSL_CTRL_BUILD_CERT_CHAIN, flags, NULL)
#define SSL_select_current_cert(s, x509) \
   SSL_ctrl(s, SSL_CTRL_SELECT_CURRENT_CERT, 0, (char *)(x509))
#define SSL_set_current_cert(s, op) \
   SSL_ctrl(s, SSL_CTRL_SET_CURRENT_CERT, op, NULL)
#define SSL_set0_verify_cert_store(s, st) \
   SSL_ctrl(s, SSL_CTRL_SET_VERIFY_CERT_STORE, 0, (char *)(st))
```

```
#define SSL_set1_verify_cert_store(s, st) \
   SSL_ctrl(s, SSL_CTRL_SET_VERIFY_CERT_STORE, 1, (char *)(st))
#define SSL_get0_verify_cert_store(s, st) \
   SSL_ctrl(s, SSL_CTRL_GET_VERIFY_CERT_STORE, 0, (char *)(st))
#define SSL_set0_chain_cert_store(s, st) \
   SSL_ctrl(s, SSL_CTRL_SET_CHAIN_CERT_STORE, 0, (char *)(st))
#define SSL_set1_chain_cert_store(s, st) \
   SSL_ctrl(s, SSL_CTRL_SET_CHAIN_CERT_STORE, 1, (char *)(st))
#define SSL_get0_chain_cert_store(s, st) \
   SSL_ctrl(s,
 SSL_CTRL_GET_CHAIN_CERT_STORE, 0, (char *)(st))

#define SSL_get1_groups(s, glist) \
   SSL_ctrl(s, SSL_CTRL_GET_GROUPS, 0, (int *)(glist))
#define SSL_get0_iana_groups(s, plst) \
   SSL_ctrl(s, SSL_CTRL_GET_IANA_GROUPS, 0, (uint16_t **)(plst))
#define SSL_CTX_set1_groups(ctx, glist, glistlen) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_GROUPS, glistlen, (int *)(glist))
#define SSL_CTX_set1_groups_list(ctx, s) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_GROUPS_LIST, 0, (char *)(s))
#define SSL_CTX_get0_implemented_groups(ctx, all, out)       \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET0_IMPLEMENTED_GROUPS, all, \
      (STACK_OF(OPENSSL_CSTRING) *)(out))
#define SSL_set1_groups(s, glist, glistlen) \
   SSL_ctrl(s, SSL_CTRL_SET_GROUPS, glistlen, (char *)(glist))
#define SSL_set1_groups_list(s, str) \
   SSL_ctrl(s, SSL_CTRL_SET_GROUPS_LIST, 0, (char *)(str))
#define SSL_get_shared_group(s, n) \
   SSL_ctrl(s, SSL_CTRL_GET_SHARED_GROUP, n, NULL)
#define SSL_get_negotiated_group(s) \
   SSL_ctrl(s, SSL_CTRL_GET_NEGOTIATED_GROUP,
 0, NULL)
#define SSL_CTX_set1_sigalgs(ctx, slist, slistlen) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_SIGALGS, slistlen, (int *)(slist))
#define SSL_CTX_set1_sigalgs_list(ctx, s) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_SIGALGS_LIST, 0, (char *)(s))
#define SSL_set1_sigalgs(s, slist, slistlen) \
   SSL_ctrl(s, SSL_CTRL_SET_SIGALGS, slistlen, (int *)(slist))
#define SSL_set1_sigalgs_list(s, str) \
   SSL_ctrl(s, SSL_CTRL_SET_SIGALGS_LIST, 0, (char *)(str))
#define SSL_CTX_set1_client_sigalgs(ctx, slist, slistlen) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_CLIENT_SIGALGS, slistlen, (int *)(slist))
#define SSL_CTX_set1_client_sigalgs_list(ctx, s) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_CLIENT_SIGALGS_LIST, 0, (char *)(s))
#define SSL_set1_client_sigalgs(s, slist, slistlen) \
   SSL_ctrl(s, SSL_CTRL_SET_CLIENT_SIGALGS, slistlen, (int *)(slist))
#define SSL_set1_client_sigalgs_list(s, str) \
   SSL_ctrl(s, SSL_CTRL_SET_CLIENT_SIGALGS_LIST, 0, (char *)(str))
```

```
#define SSL_get0_certificate_types(s,
 clist) \
   SSL_ctrl(s, SSL_CTRL_GET_CLIENT_CERT_TYPES, 0, (char *)(clist))
#define SSL_CTX_set1_client_certificate_types(ctx, clist, clistlen) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_CLIENT_CERT_TYPES, clistlen,     \
       (char *)(clist))
#define SSL_set1_client_certificate_types(s, clist, clistlen) \
   SSL_ctrl(s, SSL_CTRL_SET_CLIENT_CERT_TYPES, clistlen, (char *)(clist))
#define SSL_get0_signature_name(s, str) \
   SSL_ctrl(s, SSL_CTRL_GET_SIGNATURE_NAME, 0, (1 ? (str) : (const char **)NULL))
#define SSL_get_signature_nid(s, pn) \
   SSL_ctrl(s, SSL_CTRL_GET_SIGNATURE_NID, 0, pn)
#define SSL_get0_peer_signature_name(s, str) \
   SSL_ctrl(s, SSL_CTRL_GET_PEER_SIGNATURE_NAME, 0, (1 ? (str) : (const char **)NULL))
#define SSL_get_peer_signature_nid(s, pn) \
   SSL_ctrl(s, SSL_CTRL_GET_PEER_SIGNATURE_NID, 0, pn)
#define SSL_get_peer_tmp_key(s, pk) \
   SSL_ctrl(s, SSL_CTRL_GET_PEER_TMP_KEY, 0, pk)
#define SSL_get_tmp_key(s, pk) \
   SSL_ctrl(s, SSL_CTRL_GET_TMP_KEY,
 0, pk)
#define SSL_get0_raw_cipherlist(s, plst) \
   SSL_ctrl(s, SSL_CTRL_GET_RAW_CIPHERLIST, 0, plst)
#define SSL_get0_ec_point_formats(s, plst) \
   SSL_ctrl(s, SSL_CTRL_GET_EC_POINT_FORMATS, 0, plst)
#define SSL_CTX_set_min_proto_version(ctx, version) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_MIN_PROTO_VERSION, version, NULL)
#define SSL_CTX_set_max_proto_version(ctx, version) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_MAX_PROTO_VERSION, version, NULL)
#define SSL_CTX_get_min_proto_version(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_MIN_PROTO_VERSION, 0, NULL)
#define SSL_CTX_get_max_proto_version(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_MAX_PROTO_VERSION, 0, NULL)
#define SSL_set_min_proto_version(s, version) \
   SSL_ctrl(s, SSL_CTRL_SET_MIN_PROTO_VERSION, version, NULL)
#define SSL_set_max_proto_version(s, version) \
   SSL_ctrl(s, SSL_CTRL_SET_MAX_PROTO_VERSION, version, NULL)
#define SSL_get_min_proto_version(s) \
   SSL_ctrl(s, SSL_CTRL_GET_MIN_PROTO_VERSION, 0, NULL)
#define
 SSL_get_max_proto_version(s) \
   SSL_ctrl(s, SSL_CTRL_GET_MAX_PROTO_VERSION, 0, NULL)

const char *SSL_get0_group_name(SSL *s);
const char *SSL_group_to_name(SSL *s, int id);

/* Backwards compatibility, original 1.1.0 names */
#define SSL_CTRL_GET_SERVER_TMP_KEY \
```

```
   SSL_CTRL_GET_PEER_TMP_KEY
#define SSL_get_server_tmp_key(s, pk) \
   SSL_get_peer_tmp_key(s, pk)

int SSL_set0_tmp_dh_pkey(SSL *s, EVP_PKEY *dhpkey);
int SSL_CTX_set0_tmp_dh_pkey(SSL_CTX *ctx, EVP_PKEY *dhpkey);

/*
* The following symbol names are old and obsolete. They are kept
* for compatibility reasons only and should not be used anymore.
*/
#define SSL_CTRL_GET_CURVES SSL_CTRL_GET_GROUPS
#define SSL_CTRL_SET_CURVES SSL_CTRL_SET_GROUPS
#define SSL_CTRL_SET_CURVES_LIST SSL_CTRL_SET_GROUPS_LIST
#define SSL_CTRL_GET_SHARED_CURVE SSL_CTRL_GET_SHARED_GROUP

#define SSL_get1_curves SSL_get1_groups
#define SSL_CTX_set1_curves SSL_CTX_set1_groups
#define SSL_CTX_set1_curves_list SSL_CTX_set1_groups_list
#define SSL_set1_curves
 SSL_set1_groups
#define SSL_set1_curves_list SSL_set1_groups_list
#define SSL_get_shared_curve SSL_get_shared_group

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
/* Provide some compatibility macros for removed functionality. */
#define SSL_CTX_need_tmp_RSA(ctx) 0
#define SSL_CTX_set_tmp_rsa(ctx, rsa) 1
#define SSL_need_tmp_RSA(ssl) 0
#define SSL_set_tmp_rsa(ssl, rsa) 1
#define SSL_CTX_set_ecdh_auto(dummy, onoff) ((onoff) != 0)
#define SSL_set_ecdh_auto(dummy, onoff) ((onoff) != 0)
/*
* We "pretend" to call the callback to avoid warnings about unused static
* functions.
*/
#define SSL_CTX_set_tmp_rsa_callback(ctx, cb) \
   while (0)                              \
   (cb)(NULL, 0, 0)
#define SSL_set_tmp_rsa_callback(ssl, cb) \
   while (0)                          \
   (cb)(NULL, 0, 0)
#endif
__owur const BIO_METHOD *BIO_f_ssl(void);
__owur BIO *BIO_new_ssl(SSL_CTX *ctx, int client);
__owur BIO *BIO_new_ssl_connect(SSL_CTX *ctx);
__owur BIO *BIO_new_buffer_ssl_connect(SSL_CTX
```

```
 *ctx);
__owur int BIO_ssl_copy_session_id(BIO *to, BIO *from);
void BIO_ssl_shutdown(BIO *ssl_bio);

__owur int SSL_CTX_set_cipher_list(SSL_CTX *, const char *str);
__owur SSL_CTX *SSL_CTX_new(const SSL_METHOD *meth);
__owur SSL_CTX *SSL_CTX_new_ex(OSSL_LIB_CTX *libctx, const char *propq,
   const SSL_METHOD *meth);
int SSL_CTX_up_ref(SSL_CTX *ctx);
void SSL_CTX_free(SSL_CTX *);
__owur long SSL_CTX_set_timeout(SSL_CTX *ctx, long t);
__owur long SSL_CTX_get_timeout(const SSL_CTX *ctx);
__owur X509_STORE *SSL_CTX_get_cert_store(const SSL_CTX *);
void SSL_CTX_set_cert_store(SSL_CTX *, X509_STORE *);
void SSL_CTX_set1_cert_store(SSL_CTX *, X509_STORE *);
__owur int SSL_want(const SSL *s);
__owur int SSL_clear(SSL *s);

#ifndef OPENSSL_NO_DEPRECATED_3_4
OSSL_DEPRECATEDIN_3_4_FOR("not Y2038-safe, replace with SSL_CTX_flush_sessions_ex()")
void SSL_CTX_flush_sessions(SSL_CTX *ctx, long tm);
#endif
void SSL_CTX_flush_sessions_ex(SSL_CTX *ctx, time_t tm);

__owur const SSL_CIPHER *SSL_get_current_cipher(const
 SSL *s);
__owur const SSL_CIPHER *SSL_get_pending_cipher(const SSL *s);
__owur int SSL_CIPHER_get_bits(const SSL_CIPHER *c, int *alg_bits);
__owur const char *SSL_CIPHER_get_version(const SSL_CIPHER *c);
__owur const char *SSL_CIPHER_get_name(const SSL_CIPHER *c);
__owur const char *SSL_CIPHER_standard_name(const SSL_CIPHER *c);
__owur const char *OPENSSL_cipher_name(const char *rfc_name);
__owur uint32_t SSL_CIPHER_get_id(const SSL_CIPHER *c);
__owur uint16_t SSL_CIPHER_get_protocol_id(const SSL_CIPHER *c);
__owur int SSL_CIPHER_get_kx_nid(const SSL_CIPHER *c);
__owur int SSL_CIPHER_get_auth_nid(const SSL_CIPHER *c);
__owur const EVP_MD *SSL_CIPHER_get_handshake_digest(const SSL_CIPHER *c);
__owur int SSL_CIPHER_is_aead(const SSL_CIPHER *c);

__owur int SSL_get_fd(const SSL *s);
__owur int SSL_get_rfd(const SSL *s);
__owur int SSL_get_wfd(const SSL *s);
__owur const char *SSL_get_cipher_list(const SSL *s, int n);
__owur char *SSL_get_shared_ciphers(const SSL *s,
 char *buf, int size);
__owur int SSL_get_read_ahead(const SSL *s);
__owur int SSL_pending(const SSL *s);
__owur int SSL_has_pending(const SSL *s);
```

```
#ifndef OPENSSL_NO_SOCK
__owur int SSL_set_fd(SSL *s, int fd);
__owur int SSL_set_rfd(SSL *s, int fd);
__owur int SSL_set_wfd(SSL *s, int fd);
#endif
void SSL_set0_rbio(SSL *s, BIO *rbio);
void SSL_set0_wbio(SSL *s, BIO *wbio);
void SSL_set_bio(SSL *s, BIO *rbio, BIO *wbio);
__owur BIO *SSL_get_rbio(const SSL *s);
__owur BIO *SSL_get_wbio(const SSL *s);
__owur int SSL_set_cipher_list(SSL *s, const char *str);
__owur int SSL_CTX_set_ciphersuites(SSL_CTX *ctx, const char *str);
__owur int SSL_set_ciphersuites(SSL *s, const char *str);
void SSL_set_read_ahead(SSL *s, int yes);
__owur int SSL_get_verify_mode(const SSL *s);
__owur int SSL_get_verify_depth(const SSL *s);
__owur SSL_verify_cb SSL_get_verify_callback(const SSL *s);
void SSL_set_verify(SSL *s, int mode, SSL_verify_cb callback);
void SSL_set_verify_depth(SSL *s, int depth);
void SSL_set_cert_cb(SSL
 *s, int (*cb)(SSL *ssl, void *arg), void *arg);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 __owur int SSL_use_RSAPrivateKey(SSL *ssl, RSA *rsa);
OSSL_DEPRECATEDIN_3_0
__owur int SSL_use_RSAPrivateKey_ASN1(SSL *ssl,
   const unsigned char *d, long len);
#endif
__owur int SSL_use_PrivateKey(SSL *ssl, EVP_PKEY *pkey);
__owur int SSL_use_PrivateKey_ASN1(int pk, SSL *ssl, const unsigned char *d,
   long len);
__owur int SSL_use_certificate(SSL *ssl, X509 *x);
__owur int SSL_use_certificate_ASN1(SSL *ssl, const unsigned char *d, int len);
__owur int SSL_use_cert_and_key(SSL *ssl, X509 *x509, EVP_PKEY *privatekey,
   STACK_OF(X509) *chain, int override);

/* serverinfo file format versions */
#define SSL_SERVERINFOV1 1
#define SSL_SERVERINFOV2 2

/* Set serverinfo data for the current active cert. */
__owur int SSL_CTX_use_serverinfo(SSL_CTX *ctx, const unsigned char *serverinfo,
   size_t serverinfo_length);
__owur int SSL_CTX_use_serverinfo_ex(SSL_CTX *ctx,
 unsigned int version,
   const unsigned char *serverinfo,
   size_t serverinfo_length);
__owur int SSL_CTX_use_serverinfo_file(SSL_CTX *ctx, const char *file);
```

```
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0
__owur int SSL_use_RSAPrivateKey_file(SSL *ssl, const char *file, int type);
#endif

__owur int SSL_use_PrivateKey_file(SSL *ssl, const char *file, int type);
__owur int SSL_use_certificate_file(SSL *ssl, const char *file, int type);

#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0
__owur int SSL_CTX_use_RSAPrivateKey_file(SSL_CTX *ctx, const char *file,
   int type);
#endif
__owur int SSL_CTX_use_PrivateKey_file(SSL_CTX *ctx, const char *file,
   int type);
__owur int SSL_CTX_use_certificate_file(SSL_CTX *ctx, const char *file,
   int type);
/* PEM type */
__owur int SSL_CTX_use_certificate_chain_file(SSL_CTX *ctx, const char *file);
__owur int SSL_use_certificate_chain_file(SSL *ssl, const char *file);
__owur STACK_OF(X509_NAME) *SSL_load_client_CA_file(const
 char *file);
__owur STACK_OF(X509_NAME) *SSL_load_client_CA_file_ex(const char *file, OSSL_LIB_CTX *libctx,
   const char *propq);
__owur int SSL_add_file_cert_subjects_to_stack(STACK_OF(X509_NAME) *stackCAs,
   const char *file);
int SSL_add_dir_cert_subjects_to_stack(STACK_OF(X509_NAME) *stackCAs,
   const char *dir);
int SSL_add_store_cert_subjects_to_stack(STACK_OF(X509_NAME) *stackCAs,
   const char *uri);

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define SSL_load_error_strings()                \
   OPENSSL_init_ssl(OPENSSL_INIT_LOAD_SSL_STRINGS \
         | OPENSSL_INIT_LOAD_CRYPTO_STRINGS,    \
      NULL)
#endif

__owur const char *SSL_state_string(const SSL *s);
__owur const char *SSL_rstate_string(const SSL *s);
__owur const char *SSL_state_string_long(const SSL *s);
__owur const char *SSL_rstate_string_long(const SSL *s);

#ifndef OPENSSL_NO_DEPRECATED_3_4
OSSL_DEPRECATEDIN_3_4_FOR("not Y2038-safe, replace with SSL_SESSION_get_time_ex()")
__owur long SSL_SESSION_get_time(const
 SSL_SESSION *s);
OSSL_DEPRECATEDIN_3_4_FOR("not Y2038-safe, replace with SSL_SESSION_set_time_ex()")
```

```
__owur long SSL_SESSION_set_time(SSL_SESSION *s, long t);
#endif
__owur long SSL_SESSION_get_timeout(const SSL_SESSION *s);
__owur long SSL_SESSION_set_timeout(SSL_SESSION *s, long t);
__owur int SSL_SESSION_get_protocol_version(const SSL_SESSION *s);
__owur int SSL_SESSION_set_protocol_version(SSL_SESSION *s, int version);

__owur time_t SSL_SESSION_get_time_ex(const SSL_SESSION *s);
__owur time_t SSL_SESSION_set_time_ex(SSL_SESSION *s, time_t t);

__owur const char *SSL_SESSION_get0_hostname(const SSL_SESSION *s);
__owur int SSL_SESSION_set1_hostname(SSL_SESSION *s, const char *hostname);
void SSL_SESSION_get0_alpn_selected(const SSL_SESSION *s,
   const unsigned char **alpn,
   size_t *len);
__owur int SSL_SESSION_set1_alpn_selected(SSL_SESSION *s,
   const unsigned char *alpn,
   size_t len);
__owur const SSL_CIPHER *SSL_SESSION_get0_cipher(const SSL_SESSION *s);
__owur
 int SSL_SESSION_set_cipher(SSL_SESSION *s, const SSL_CIPHER *cipher);
__owur int SSL_SESSION_has_ticket(const SSL_SESSION *s);
__owur unsigned long SSL_SESSION_get_ticket_lifetime_hint(const SSL_SESSION *s);
void SSL_SESSION_get0_ticket(const SSL_SESSION *s, const unsigned char **tick,
   size_t *len);
__owur uint32_t SSL_SESSION_get_max_early_data(const SSL_SESSION *s);
__owur int SSL_SESSION_set_max_early_data(SSL_SESSION *s,
   uint32_t max_early_data);
__owur int SSL_copy_session_id(SSL *to, const SSL *from);
__owur X509 *SSL_SESSION_get0_peer(SSL_SESSION *s);
__owur int SSL_SESSION_set1_id_context(SSL_SESSION *s,
   const unsigned char *sid_ctx,
   unsigned int sid_ctx_len);
__owur int SSL_SESSION_set1_id(SSL_SESSION *s, const unsigned char *sid,
   unsigned int sid_len);
__owur int SSL_SESSION_is_resumable(const SSL_SESSION *s);

__owur SSL_SESSION *SSL_SESSION_new(void);
__owur SSL_SESSION *SSL_SESSION_dup(const SSL_SESSION *src);
const unsigned char *SSL_SESSION_get_id(const
 SSL_SESSION *s,
   unsigned int *len);
const unsigned char *SSL_SESSION_get0_id_context(const SSL_SESSION *s,
   unsigned int *len);
__owur unsigned int SSL_SESSION_get_compress_id(const SSL_SESSION *s);
#ifndef OPENSSL_NO_STDIO
int SSL_SESSION_print_fp(FILE *fp, const SSL_SESSION *ses);
#endif
```

```
int SSL_SESSION_print(BIO *fp, const SSL_SESSION *ses);
int SSL_SESSION_print_keylog(BIO *bp, const SSL_SESSION *x);
int SSL_SESSION_up_ref(SSL_SESSION *ses);
void SSL_SESSION_free(SSL_SESSION *ses);
__owur int i2d_SSL_SESSION(const SSL_SESSION *in, unsigned char **pp);
__owur int SSL_set_session(SSL *to, SSL_SESSION *session);
int SSL_CTX_add_session(SSL_CTX *ctx, SSL_SESSION *session);
int SSL_CTX_remove_session(SSL_CTX *ctx, SSL_SESSION *session);
__owur int SSL_CTX_set_generate_session_id(SSL_CTX *ctx, GEN_SESSION_CB cb);
__owur int SSL_set_generate_session_id(SSL *s, GEN_SESSION_CB cb);
__owur int SSL_has_matching_session_id(const SSL *s,
   const unsigned char *id,
   unsigned
 int id_len);
SSL_SESSION *d2i_SSL_SESSION(SSL_SESSION **a, const unsigned char **pp,
   long length);
SSL_SESSION *d2i_SSL_SESSION_ex(SSL_SESSION **a, const unsigned char **pp,
   long length, OSSL_LIB_CTX *libctx,
   const char *propq);

#ifdef OPENSSL_X509_H
__owur X509 *SSL_get0_peer_certificate(const SSL *s);
__owur X509 *SSL_get1_peer_certificate(const SSL *s);
/* Deprecated in 3.0.0 */
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define SSL_get_peer_certificate SSL_get1_peer_certificate
#endif
#endif

__owur STACK_OF(X509) *SSL_get_peer_cert_chain(const SSL *s);

__owur int SSL_CTX_get_verify_mode(const SSL_CTX *ctx);
__owur int SSL_CTX_get_verify_depth(const SSL_CTX *ctx);
__owur SSL_verify_cb SSL_CTX_get_verify_callback(const SSL_CTX *ctx);
void SSL_CTX_set_verify(SSL_CTX *ctx, int mode, SSL_verify_cb callback);
void SSL_CTX_set_verify_depth(SSL_CTX *ctx, int depth);
void SSL_CTX_set_cert_verify_callback(SSL_CTX *ctx,
   int (*cb)(X509_STORE_CTX *, void *),
   void *arg);
void SSL_CTX_set_cert_cb(SSL_CTX
 *c, int (*cb)(SSL *ssl, void *arg),
   void *arg);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0
__owur int SSL_CTX_use_RSAPrivateKey(SSL_CTX *ctx, RSA *rsa);
OSSL_DEPRECATEDIN_3_0
__owur int SSL_CTX_use_RSAPrivateKey_ASN1(SSL_CTX *ctx, const unsigned char *d,
   long len);
```

```
#endif
__owur int SSL_CTX_use_PrivateKey(SSL_CTX *ctx, EVP_PKEY *pkey);
__owur int SSL_CTX_use_PrivateKey_ASN1(int pk, SSL_CTX *ctx,
   const unsigned char *d, long len);
__owur int SSL_CTX_use_certificate(SSL_CTX *ctx, X509 *x);
__owur int SSL_CTX_use_certificate_ASN1(SSL_CTX *ctx, int len,
   const unsigned char *d);
__owur int SSL_CTX_use_cert_and_key(SSL_CTX *ctx, X509 *x509, EVP_PKEY *privatekey,
   STACK_OF(X509) *chain, int override);

void SSL_CTX_set_default_passwd_cb(SSL_CTX *ctx, pem_password_cb *cb);
void SSL_CTX_set_default_passwd_cb_userdata(SSL_CTX *ctx, void *u);
pem_password_cb *SSL_CTX_get_default_passwd_cb(SSL_CTX *ctx);
void *SSL_CTX_get_default_passwd_cb_userdata(SSL_CTX
 *ctx);
void SSL_set_default_passwd_cb(SSL *s, pem_password_cb *cb);
void SSL_set_default_passwd_cb_userdata(SSL *s, void *u);
pem_password_cb *SSL_get_default_passwd_cb(SSL *s);
void *SSL_get_default_passwd_cb_userdata(SSL *s);

__owur int SSL_CTX_check_private_key(const SSL_CTX *ctx);
__owur int SSL_check_private_key(const SSL *ctx);

__owur int SSL_CTX_set_session_id_context(SSL_CTX *ctx,
   const unsigned char *sid_ctx,
   unsigned int sid_ctx_len);

SSL *SSL_new(SSL_CTX *ctx);
int SSL_up_ref(SSL *s);
int SSL_is_dtls(const SSL *s);
int SSL_is_tls(const SSL *s);
int SSL_is_quic(const SSL *s);
__owur int SSL_set_session_id_context(SSL *ssl, const unsigned char *sid_ctx,
   unsigned int sid_ctx_len);

__owur int SSL_CTX_set_purpose(SSL_CTX *ctx, int purpose);
__owur int SSL_set_purpose(SSL *ssl, int purpose);
__owur int SSL_CTX_set_trust(SSL_CTX *ctx, int trust);
__owur int SSL_set_trust(SSL *ssl, int trust);

__owur int SSL_set1_host(SSL *s, const char *host);
__owur
 int SSL_add1_host(SSL *s, const char *host);
__owur const char *SSL_get0_peername(SSL *s);
void SSL_set_hostflags(SSL *s, unsigned int flags);

__owur int SSL_CTX_dane_enable(SSL_CTX *ctx);
__owur int SSL_CTX_dane_mtype_set(SSL_CTX *ctx, const EVP_MD *md,
```

```
   uint8_t mtype, uint8_t ord);
__owur int SSL_dane_enable(SSL *s, const char *basedomain);
__owur int SSL_dane_tlsa_add(SSL *s, uint8_t usage, uint8_t selector,
   uint8_t mtype, const unsigned char *data, size_t dlen);
__owur int SSL_get0_dane_authority(SSL *s, X509 **mcert, EVP_PKEY **mspki);
__owur int SSL_get0_dane_tlsa(SSL *s, uint8_t *usage, uint8_t *selector,
   uint8_t *mtype, const unsigned char **data,
   size_t *dlen);
/*
* Bridge opacity barrier between libcrypt and libssl, also needed to support
* offline testing in test/danetest.c
*/
SSL_DANE *SSL_get0_dane(SSL *ssl);
/*
* DANE flags
*/
unsigned long SSL_CTX_dane_set_flags(SSL_CTX *ctx, unsigned long flags);
unsigned long SSL_CTX_dane_clear_flags(SSL_CTX *ctx,
 unsigned long flags);
unsigned long SSL_dane_set_flags(SSL *ssl, unsigned long flags);
unsigned long SSL_dane_clear_flags(SSL *ssl, unsigned long flags);

__owur int SSL_CTX_set1_param(SSL_CTX *ctx, X509_VERIFY_PARAM *vpm);
__owur int SSL_set1_param(SSL *ssl, X509_VERIFY_PARAM *vpm);

__owur X509_VERIFY_PARAM *SSL_CTX_get0_param(SSL_CTX *ctx);
__owur X509_VERIFY_PARAM *SSL_get0_param(SSL *ssl);

#ifndef OPENSSL_NO_SRP
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 int SSL_CTX_set_srp_username(SSL_CTX *ctx, char *name);
OSSL_DEPRECATEDIN_3_0 int SSL_CTX_set_srp_password(SSL_CTX *ctx, char *password);
OSSL_DEPRECATEDIN_3_0 int SSL_CTX_set_srp_strength(SSL_CTX *ctx, int strength);
OSSL_DEPRECATEDIN_3_0
int SSL_CTX_set_srp_client_pwd_callback(SSL_CTX *ctx,
   char *(*cb)(SSL *, void *));
OSSL_DEPRECATEDIN_3_0
int SSL_CTX_set_srp_verify_param_callback(SSL_CTX *ctx,
   int (*cb)(SSL *, void *));
OSSL_DEPRECATEDIN_3_0
int SSL_CTX_set_srp_username_callback(SSL_CTX *ctx,
   int (*cb)(SSL
 *, int *, void *));
OSSL_DEPRECATEDIN_3_0 int SSL_CTX_set_srp_cb_arg(SSL_CTX *ctx, void *arg);

OSSL_DEPRECATEDIN_3_0
int SSL_set_srp_server_param(SSL *s, const BIGNUM *N, const BIGNUM *g,
   BIGNUM *sa, BIGNUM *v, char *info);
```

```
OSSL_DEPRECATEDIN_3_0
int SSL_set_srp_server_param_pw(SSL *s, const char *user, const char *pass,
  const char *grp);

OSSL_DEPRECATEDIN_3_0 __owur BIGNUM *SSL_get_srp_g(SSL *s);
OSSL_DEPRECATEDIN_3_0 __owur BIGNUM *SSL_get_srp_N(SSL *s);

OSSL_DEPRECATEDIN_3_0 __owur char *SSL_get_srp_username(SSL *s);
OSSL_DEPRECATEDIN_3_0 __owur char *SSL_get_srp_userinfo(SSL *s);
#endif
#endif

/*
* ClientHello callback and helpers.
*/

#define SSL_CLIENT_HELLO_SUCCESS 1
#define SSL_CLIENT_HELLO_ERROR 0
#define SSL_CLIENT_HELLO_RETRY (-1)

typedef int (*SSL_client_hello_cb_fn)(SSL *s, int *al, void *arg);
void SSL_CTX_set_client_hello_cb(SSL_CTX *c, SSL_client_hello_cb_fn cb,
  void *arg);
typedef int (*SSL_new_pending_conn_cb_fn)(SSL_CTX *ctx, SSL *new_ssl,

  void *arg);
void SSL_CTX_set_new_pending_conn_cb(SSL_CTX *c, SSL_new_pending_conn_cb_fn cb,
  void *arg);

int SSL_client_hello_isv2(SSL *s);
unsigned int SSL_client_hello_get0_legacy_version(SSL *s);
size_t SSL_client_hello_get0_random(SSL *s, const unsigned char **out);
size_t SSL_client_hello_get0_session_id(SSL *s, const unsigned char **out);
size_t SSL_client_hello_get0_ciphers(SSL *s, const unsigned char **out);
size_t SSL_client_hello_get0_compression_methods(SSL *s,
  const unsigned char **out);
int SSL_client_hello_get1_extensions_present(SSL *s, int **out, size_t *outlen);
int SSL_client_hello_get_extension_order(SSL *s, uint16_t *exts,
  size_t *num_exts);
int SSL_client_hello_get0_ext(SSL *s, unsigned int type,
  const unsigned char **out, size_t *outlen);

void SSL_certs_clear(SSL *s);
void SSL_free(SSL *ssl);
#ifdef OSSL_ASYNC_FD
/*
* Windows application developer has to include windows.h to use these.
*/
```

```
__owur int SSL_waiting_for_async(SSL *s);
__owur int SSL_get_all_async_fds(SSL
 *s, OSSL_ASYNC_FD *fds, size_t *numfds);
__owur int SSL_get_changed_async_fds(SSL *s, OSSL_ASYNC_FD *addfd,
   size_t *numaddfds, OSSL_ASYNC_FD *delfd,
   size_t *numdelfds);
__owur int SSL_CTX_set_async_callback(SSL_CTX *ctx, SSL_async_callback_fn callback);
__owur int SSL_CTX_set_async_callback_arg(SSL_CTX *ctx, void *arg);
__owur int SSL_set_async_callback(SSL *s, SSL_async_callback_fn callback);
__owur int SSL_set_async_callback_arg(SSL *s, void *arg);
__owur int SSL_get_async_status(SSL *s, int *status);

#endif
__owur int SSL_accept(SSL *ssl);
__owur int SSL_stateless(SSL *s);
__owur int SSL_connect(SSL *ssl);
__owur int SSL_read(SSL *ssl, void *buf, int num);
__owur int SSL_read_ex(SSL *ssl, void *buf, size_t num, size_t *readbytes);

#define SSL_READ_EARLY_DATA_ERROR 0
#define SSL_READ_EARLY_DATA_SUCCESS 1
#define SSL_READ_EARLY_DATA_FINISH 2

__owur int SSL_read_early_data(SSL *s, void *buf, size_t num,
   size_t *readbytes);
__owur int SSL_peek(SSL
 *ssl, void *buf, int num);
__owur int SSL_peek_ex(SSL *ssl, void *buf, size_t num, size_t *readbytes);
__owur ossl_ssize_t SSL_sendfile(SSL *s, int fd, off_t offset, size_t size,
   int flags);
__owur int SSL_write(SSL *ssl, const void *buf, int num);
__owur int SSL_write_ex(SSL *s, const void *buf, size_t num, size_t *written);
__owur int SSL_write_early_data(SSL *s, const void *buf, size_t num,
   size_t *written);
long SSL_ctrl(SSL *ssl, int cmd, long larg, void *parg);
long SSL_callback_ctrl(SSL *, int, void (*)(void));
long SSL_CTX_ctrl(SSL_CTX *ctx, int cmd, long larg, void *parg);
long SSL_CTX_callback_ctrl(SSL_CTX *, int, void (*)(void));

#define SSL_WRITE_FLAG_CONCLUDE (1U << 0)

__owur int SSL_write_ex2(SSL *s, const void *buf, size_t num,
   uint64_t flags,
   size_t *written);

#define SSL_EARLY_DATA_NOT_SENT 0
#define SSL_EARLY_DATA_REJECTED 1
#define SSL_EARLY_DATA_ACCEPTED 2
```

```
__owur int SSL_get_early_data_status(const SSL *s);

__owur int SSL_get_error(const SSL *s,
 int ret_code);
__owur const char *SSL_get_version(const SSL *s);
__owur int SSL_get_handshake_rtt(const SSL *s, uint64_t *rtt);

/* This sets the 'default' SSL version that SSL_new() will create */
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0
__owur int SSL_CTX_set_ssl_version(SSL_CTX *ctx, const SSL_METHOD *meth);
#endif

#ifndef OPENSSL_NO_SSL3_METHOD
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *SSLv3_method(void); /* SSLv3 */
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *SSLv3_server_method(void);
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *SSLv3_client_method(void);
#endif
#endif

#define SSLv23_method TLS_method
#define SSLv23_server_method TLS_server_method
#define SSLv23_client_method TLS_client_method

/* Negotiate highest available SSL/TLS version */
__owur const SSL_METHOD *TLS_method(void);
__owur const SSL_METHOD *TLS_server_method(void);
__owur const SSL_METHOD *TLS_client_method(void);

#ifndef OPENSSL_NO_TLS1_METHOD
#ifndef
 OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_method(void); /* TLSv1.0 */
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_server_method(void);
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_client_method(void);
#endif
#endif

#ifndef OPENSSL_NO_TLS1_1_METHOD
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_1_method(void); /* TLSv1.1 */
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_1_server_method(void);
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_1_client_method(void);
#endif
#endif
```

```
#ifndef OPENSSL_NO_TLS1_2_METHOD
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_2_method(void); /* TLSv1.2 */
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_2_server_method(void);
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_2_client_method(void);
#endif
#endif

#ifndef OPENSSL_NO_DTLS1_METHOD
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0
 __owur const SSL_METHOD *DTLSv1_method(void); /* DTLSv1.0 */
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *DTLSv1_server_method(void);
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *DTLSv1_client_method(void);
#endif
#endif

#ifndef OPENSSL_NO_DTLS1_2_METHOD
/* DTLSv1.2 */
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *DTLSv1_2_method(void);
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *DTLSv1_2_server_method(void);
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *DTLSv1_2_client_method(void);
#endif
#endif

__owur const SSL_METHOD *DTLS_method(void); /* DTLS 1.0 and 1.2 */
__owur const SSL_METHOD *DTLS_server_method(void); /* DTLS 1.0 and 1.2 */
__owur const SSL_METHOD *DTLS_client_method(void); /* DTLS 1.0 and 1.2 */

__owur size_t DTLS_get_data_mtu(const SSL *s);

__owur STACK_OF(SSL_CIPHER) *SSL_get_ciphers(const SSL *s);
__owur STACK_OF(SSL_CIPHER) *SSL_CTX_get_ciphers(const SSL_CTX *ctx);
__owur STACK_OF(SSL_CIPHER)
 *SSL_get_client_ciphers(const SSL *s);
__owur STACK_OF(SSL_CIPHER) *SSL_get1_supported_ciphers(SSL *s);

__owur int SSL_do_handshake(SSL *s);
int SSL_key_update(SSL *s, int updatetype);
int SSL_get_key_update_type(const SSL *s);
int SSL_renegotiate(SSL *s);
int SSL_renegotiate_abbreviated(SSL *s);
__owur int SSL_renegotiate_pending(const SSL *s);
int SSL_new_session_ticket(SSL *s);
int SSL_shutdown(SSL *s);
__owur int SSL_verify_client_post_handshake(SSL *s);
void SSL_CTX_set_post_handshake_auth(SSL_CTX *ctx, int val);
```

```
void SSL_set_post_handshake_auth(SSL *s, int val);

__owur const SSL_METHOD *SSL_CTX_get_ssl_method(const SSL_CTX *ctx);
__owur const SSL_METHOD *SSL_get_ssl_method(const SSL *s);
__owur int SSL_set_ssl_method(SSL *s, const SSL_METHOD *method);
__owur const char *SSL_alert_type_string_long(int value);
__owur const char *SSL_alert_type_string(int value);
__owur const char *SSL_alert_desc_string_long(int value);
__owur const char *SSL_alert_desc_string(int value);

void
 SSL_set0_CA_list(SSL *s, STACK_OF(X509_NAME) *name_list);
void SSL_CTX_set0_CA_list(SSL_CTX *ctx, STACK_OF(X509_NAME) *name_list);
__owur const STACK_OF(X509_NAME) *SSL_get0_CA_list(const SSL *s);
__owur const STACK_OF(X509_NAME) *SSL_CTX_get0_CA_list(const SSL_CTX *ctx);
__owur int SSL_add1_to_CA_list(SSL *ssl, const X509 *x);
__owur int SSL_CTX_add1_to_CA_list(SSL_CTX *ctx, const X509 *x);
__owur const STACK_OF(X509_NAME) *SSL_get0_peer_CA_list(const SSL *s);

void SSL_set_client_CA_list(SSL *s, STACK_OF(X509_NAME) *name_list);
void SSL_CTX_set_client_CA_list(SSL_CTX *ctx, STACK_OF(X509_NAME) *name_list);
__owur STACK_OF(X509_NAME) *SSL_get_client_CA_list(const SSL *s);
__owur STACK_OF(X509_NAME) *SSL_CTX_get_client_CA_list(const SSL_CTX *s);
__owur int SSL_add_client_CA(SSL *ssl, X509 *x);
__owur int SSL_CTX_add_client_CA(SSL_CTX *ctx, X509 *x);

void SSL_set_connect_state(SSL *s);
void SSL_set_accept_state(SSL *s);

__owur long SSL_get_default_timeout(const SSL *s);

#ifndef
 OPENSSL_NO_DEPRECATED_1_1_0
#define SSL_library_init() OPENSSL_init_ssl(0, NULL)
#endif

__owur char *SSL_CIPHER_description(const SSL_CIPHER *, char *buf, int size);
__owur STACK_OF(X509_NAME) *SSL_dup_CA_list(const STACK_OF(X509_NAME) *sk);

__owur SSL *SSL_dup(SSL *ssl);

__owur X509 *SSL_get_certificate(const SSL *ssl);
/*
* EVP_PKEY
*/
struct evp_pkey_st *SSL_get_privatekey(const SSL *ssl);

__owur X509 *SSL_CTX_get0_certificate(const SSL_CTX *ctx);
```

```
__owur EVP_PKEY *SSL_CTX_get0_privatekey(const SSL_CTX *ctx);

void SSL_CTX_set_quiet_shutdown(SSL_CTX *ctx, int mode);
__owur int SSL_CTX_get_quiet_shutdown(const SSL_CTX *ctx);
void SSL_set_quiet_shutdown(SSL *ssl, int mode);
__owur int SSL_get_quiet_shutdown(const SSL *ssl);
void SSL_set_shutdown(SSL *ssl, int mode);
__owur int SSL_get_shutdown(const SSL *ssl);
__owur int SSL_version(const SSL *ssl);
__owur int SSL_client_version(const SSL *s);
__owur int SSL_CTX_set_default_verify_paths(SSL_CTX *ctx);
__owur int SSL_CTX_set_default_verify_dir(SSL_CTX
 *ctx);
__owur int SSL_CTX_set_default_verify_file(SSL_CTX *ctx);
__owur int SSL_CTX_set_default_verify_store(SSL_CTX *ctx);
__owur int SSL_CTX_load_verify_file(SSL_CTX *ctx, const char *CAfile);
__owur int SSL_CTX_load_verify_dir(SSL_CTX *ctx, const char *CApath);
__owur int SSL_CTX_load_verify_store(SSL_CTX *ctx, const char *CAstore);
__owur int SSL_CTX_load_verify_locations(SSL_CTX *ctx,
   const char *CAfile,
   const char *CApath);
#define SSL_get0_session SSL_get_session /* just peek at pointer */
__owur SSL_SESSION *SSL_get_session(const SSL *ssl);
__owur SSL_SESSION *SSL_get1_session(SSL *ssl); /* obtain a reference count */
__owur SSL_CTX *SSL_get_SSL_CTX(const SSL *ssl);
SSL_CTX *SSL_set_SSL_CTX(SSL *ssl, SSL_CTX *ctx);
void SSL_set_info_callback(SSL *ssl,
   void (*cb)(const SSL *ssl, int type, int val));
void (*SSL_get_info_callback(const SSL *ssl))(const SSL *ssl, int type,
   int val);
__owur OSSL_HANDSHAKE_STATE SSL_get_state(const SSL *ssl);

void
 SSL_set_verify_result(SSL *ssl, long v);
__owur long SSL_get_verify_result(const SSL *ssl);
__owur STACK_OF(X509) *SSL_get0_verified_chain(const SSL *s);

__owur size_t SSL_get_client_random(const SSL *ssl, unsigned char *out,
   size_t outlen);
__owur size_t SSL_get_server_random(const SSL *ssl, unsigned char *out,
   size_t outlen);
__owur size_t SSL_SESSION_get_master_key(const SSL_SESSION *sess,
   unsigned char *out, size_t outlen);
__owur int SSL_SESSION_set1_master_key(SSL_SESSION *sess,
   const unsigned char *in, size_t len);
uint8_t SSL_SESSION_get_max_fragment_length(const SSL_SESSION *sess);

#define SSL_get_ex_new_index(l, p, newf, dupf, freef) \
```

```
  CRYPTO_get_ex_new_index(CRYPTO_EX_INDEX_SSL, l, p, newf, dupf, freef)
__owur int SSL_set_ex_data(SSL *ssl, int idx, void *data);
void *SSL_get_ex_data(const SSL *ssl, int idx);
#define SSL_SESSION_get_ex_new_index(l, p, newf, dupf, freef) \
  CRYPTO_get_ex_new_index(CRYPTO_EX_INDEX_SSL_SESSION, l, p, newf, dupf,
 freef)
__owur int SSL_SESSION_set_ex_data(SSL_SESSION *ss, int idx, void *data);
void *SSL_SESSION_get_ex_data(const SSL_SESSION *ss, int idx);
#define SSL_CTX_get_ex_new_index(l, p, newf, dupf, freef) \
  CRYPTO_get_ex_new_index(CRYPTO_EX_INDEX_SSL_CTX, l, p, newf, dupf, freef)
__owur int SSL_CTX_set_ex_data(SSL_CTX *ssl, int idx, void *data);
void *SSL_CTX_get_ex_data(const SSL_CTX *ssl, int idx);

__owur int SSL_get_ex_data_X509_STORE_CTX_idx(void);

#define SSL_CTX_sess_set_cache_size(ctx, t) \
  SSL_CTX_ctrl(ctx, SSL_CTRL_SET_SESS_CACHE_SIZE, t, NULL)
#define SSL_CTX_sess_get_cache_size(ctx) \
  SSL_CTX_ctrl(ctx, SSL_CTRL_GET_SESS_CACHE_SIZE, 0, NULL)
#define SSL_CTX_set_session_cache_mode(ctx, m) \
  SSL_CTX_ctrl(ctx, SSL_CTRL_SET_SESS_CACHE_MODE, m, NULL)
#define SSL_CTX_get_session_cache_mode(ctx) \
  SSL_CTX_ctrl(ctx, SSL_CTRL_GET_SESS_CACHE_MODE, 0, NULL)

#define SSL_CTX_get_default_read_ahead(ctx) SSL_CTX_get_read_ahead(ctx)
#define SSL_CTX_set_default_read_ahead(ctx,
 m) SSL_CTX_set_read_ahead(ctx, m)
#define SSL_CTX_get_read_ahead(ctx) \
  SSL_CTX_ctrl(ctx, SSL_CTRL_GET_READ_AHEAD, 0, NULL)
#define SSL_CTX_set_read_ahead(ctx, m) \
  SSL_CTX_ctrl(ctx, SSL_CTRL_SET_READ_AHEAD, m, NULL)
#define SSL_CTX_get_max_cert_list(ctx) \
  SSL_CTX_ctrl(ctx, SSL_CTRL_GET_MAX_CERT_LIST, 0, NULL)
#define SSL_CTX_set_max_cert_list(ctx, m) \
  SSL_CTX_ctrl(ctx, SSL_CTRL_SET_MAX_CERT_LIST, m, NULL)
#define SSL_get_max_cert_list(ssl) \
  SSL_ctrl(ssl, SSL_CTRL_GET_MAX_CERT_LIST, 0, NULL)
#define SSL_set_max_cert_list(ssl, m) \
  SSL_ctrl(ssl, SSL_CTRL_SET_MAX_CERT_LIST, m, NULL)

#define SSL_CTX_set_max_send_fragment(ctx, m) \
  SSL_CTX_ctrl(ctx, SSL_CTRL_SET_MAX_SEND_FRAGMENT, m, NULL)
#define SSL_set_max_send_fragment(ssl, m) \
  SSL_ctrl(ssl, SSL_CTRL_SET_MAX_SEND_FRAGMENT, m, NULL)
#define SSL_CTX_set_split_send_fragment(ctx, m) \
  SSL_CTX_ctrl(ctx, SSL_CTRL_SET_SPLIT_SEND_FRAGMENT, m, NULL)
#define SSL_set_split_send_fragment(ssl, m) \
```

```
   SSL_ctrl(ssl, SSL_CTRL_SET_SPLIT_SEND_FRAGMENT, m, NULL)
#define SSL_CTX_set_max_pipelines(ctx, m) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_MAX_PIPELINES, m, NULL)
#define SSL_set_max_pipelines(ssl, m) \
   SSL_ctrl(ssl, SSL_CTRL_SET_MAX_PIPELINES, m, NULL)
#define SSL_set_retry_verify(ssl) \
   (SSL_ctrl(ssl, SSL_CTRL_SET_RETRY_VERIFY, 0, NULL) > 0)

void SSL_CTX_set_default_read_buffer_len(SSL_CTX *ctx, size_t len);
void SSL_set_default_read_buffer_len(SSL *s, size_t len);

#ifndef OPENSSL_NO_DH
#ifndef OPENSSL_NO_DEPRECATED_3_0
/* NB: the |keylength| is only applicable when is_export is true */
OSSL_DEPRECATEDIN_3_0
void SSL_CTX_set_tmp_dh_callback(SSL_CTX *ctx,
   DH *(*dh)(SSL *ssl, int is_export,
       int keylength));
OSSL_DEPRECATEDIN_3_0
void SSL_set_tmp_dh_callback(SSL *ssl,
   DH *(*dh)(SSL *ssl, int is_export,
       int keylength));
#endif
#endif

__owur const COMP_METHOD *SSL_get_current_compression(const SSL *s);
__owur const COMP_METHOD *SSL_get_current_expansion(const
 SSL *s);
__owur const char *SSL_COMP_get_name(const COMP_METHOD *comp);
__owur const char *SSL_COMP_get0_name(const SSL_COMP *comp);
__owur int SSL_COMP_get_id(const SSL_COMP *comp);
STACK_OF(SSL_COMP) *SSL_COMP_get_compression_methods(void);
__owur STACK_OF(SSL_COMP) *SSL_COMP_set0_compression_methods(STACK_OF(SSL_COMP)
       *meths);
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define SSL_COMP_free_compression_methods() \
   while (0)                           \
   continue
#endif
__owur int SSL_COMP_add_compression_method(int id, COMP_METHOD *cm);

const SSL_CIPHER *SSL_CIPHER_find(SSL *ssl, const unsigned char *ptr);
int SSL_CIPHER_get_cipher_nid(const SSL_CIPHER *c);
int SSL_CIPHER_get_digest_nid(const SSL_CIPHER *c);
int SSL_bytes_to_cipher_list(SSL *s, const unsigned char *bytes, size_t len,
   int isv2format, STACK_OF(SSL_CIPHER) **sk,
   STACK_OF(SSL_CIPHER) **scsvs);
```

```
/* TLS extensions functions */
__owur int SSL_set_session_ticket_ext(SSL *s, void *ext_data, int ext_len);

__owur
 int SSL_set_session_ticket_ext_cb(SSL *s,
   tls_session_ticket_ext_cb_fn cb,
   void *arg);

/* Pre-shared secret session resumption functions */
__owur int SSL_set_session_secret_cb(SSL *s,
   tls_session_secret_cb_fn session_secret_cb,
   void *arg);

void SSL_CTX_set_not_resumable_session_callback(SSL_CTX *ctx,
   int (*cb)(SSL *ssl,
       int
           is_forward_secure));

void SSL_set_not_resumable_session_callback(SSL *ssl,
   int (*cb)(SSL *ssl,
       int is_forward_secure));

void SSL_CTX_set_record_padding_callback(SSL_CTX *ctx,
   size_t (*cb)(SSL *ssl, int type,
       size_t len, void *arg));
void SSL_CTX_set_record_padding_callback_arg(SSL_CTX *ctx, void *arg);
void *SSL_CTX_get_record_padding_callback_arg(const SSL_CTX *ctx);
int SSL_CTX_set_block_padding(SSL_CTX *ctx, size_t block_size);
int SSL_CTX_set_block_padding_ex(SSL_CTX *ctx, size_t app_block_size,
   size_t hs_block_size);

int SSL_set_record_padding_callback(SSL *ssl,
   size_t (*cb)(SSL
 *ssl, int type,
       size_t len, void *arg));
void SSL_set_record_padding_callback_arg(SSL *ssl, void *arg);
void *SSL_get_record_padding_callback_arg(const SSL *ssl);
int SSL_set_block_padding(SSL *ssl, size_t block_size);
int SSL_set_block_padding_ex(SSL *ssl, size_t app_block_size,
   size_t hs_block_size);
int SSL_set_num_tickets(SSL *s, size_t num_tickets);
size_t SSL_get_num_tickets(const SSL *s);
int SSL_CTX_set_num_tickets(SSL_CTX *ctx, size_t num_tickets);
size_t SSL_CTX_get_num_tickets(const SSL_CTX *ctx);

/* QUIC support */
int SSL_handle_events(SSL *s);
__owur int SSL_get_event_timeout(SSL *s, struct timeval *tv, int *is_infinite);
```

```
__owur int SSL_get_rpoll_descriptor(SSL *s, BIO_POLL_DESCRIPTOR *desc);
__owur int SSL_get_wpoll_descriptor(SSL *s, BIO_POLL_DESCRIPTOR *desc);
__owur int SSL_net_read_desired(SSL *s);
__owur int SSL_net_write_desired(SSL *s);
__owur int SSL_set_blocking_mode(SSL *s, int blocking);
__owur int SSL_get_blocking_mode(SSL *s);
__owur int
 SSL_set1_initial_peer_addr(SSL *s, const BIO_ADDR *peer_addr);
__owur SSL *SSL_get0_connection(SSL *s);
__owur int SSL_is_connection(SSL *s);

__owur int SSL_is_listener(SSL *ssl);
__owur SSL *SSL_get0_listener(SSL *s);
#define SSL_LISTENER_FLAG_NO_VALIDATE (1UL << 1)
__owur SSL *SSL_new_listener(SSL_CTX *ctx, uint64_t flags);
__owur SSL *SSL_new_listener_from(SSL *ssl, uint64_t flags);
__owur SSL *SSL_new_from_listener(SSL *ssl, uint64_t flags);
#define SSL_ACCEPT_CONNECTION_NO_BLOCK (1UL << 0)
__owur SSL *SSL_accept_connection(SSL *ssl, uint64_t flags);
__owur size_t SSL_get_accept_connection_queue_len(SSL *ssl);
__owur int SSL_listen(SSL *ssl);

__owur int SSL_is_domain(SSL *s);
__owur SSL *SSL_get0_domain(SSL *s);
__owur SSL *SSL_new_domain(SSL_CTX *ctx, uint64_t flags);

#define SSL_DOMAIN_FLAG_SINGLE_THREAD (1U << 0)
#define SSL_DOMAIN_FLAG_MULTI_THREAD (1U << 1)
#define SSL_DOMAIN_FLAG_THREAD_ASSISTED (1U << 2)
#define SSL_DOMAIN_FLAG_BLOCKING (1U << 3)
#define SSL_DOMAIN_FLAG_LEGACY_BLOCKING
 (1U << 4)

__owur int SSL_CTX_set_domain_flags(SSL_CTX *ctx, uint64_t domain_flags);
__owur int SSL_CTX_get_domain_flags(const SSL_CTX *ctx, uint64_t *domain_flags);
__owur int SSL_get_domain_flags(const SSL *ssl, uint64_t *domain_flags);

#define SSL_STREAM_TYPE_NONE 0
#define SSL_STREAM_TYPE_READ (1U << 0)
#define SSL_STREAM_TYPE_WRITE (1U << 1)
#define SSL_STREAM_TYPE_BIDI (SSL_STREAM_TYPE_READ | SSL_STREAM_TYPE_WRITE)
__owur int SSL_get_stream_type(SSL *s);

__owur uint64_t SSL_get_stream_id(SSL *s);
__owur int SSL_is_stream_local(SSL *s);

#define SSL_DEFAULT_STREAM_MODE_NONE 0
#define SSL_DEFAULT_STREAM_MODE_AUTO_BIDI 1
```

```
#define SSL_DEFAULT_STREAM_MODE_AUTO_UNI 2
__owur int SSL_set_default_stream_mode(SSL *s, uint32_t mode);

#define SSL_STREAM_FLAG_UNI (1U << 0)
#define SSL_STREAM_FLAG_NO_BLOCK (1U << 1)
#define SSL_STREAM_FLAG_ADVANCE (1U << 2)
__owur SSL *SSL_new_stream(SSL *s, uint64_t flags);

#define SSL_INCOMING_STREAM_POLICY_AUTO 0
#define SSL_INCOMING_STREAM_POLICY_ACCEPT
 1
#define SSL_INCOMING_STREAM_POLICY_REJECT 2
__owur int SSL_set_incoming_stream_policy(SSL *s, int policy, uint64_t aec);

#define SSL_ACCEPT_STREAM_NO_BLOCK (1U << 0)
__owur SSL *SSL_accept_stream(SSL *s, uint64_t flags);
__owur size_t SSL_get_accept_stream_queue_len(SSL *s);

#ifndef OPENSSL_NO_QUIC
__owur int SSL_inject_net_dgram(SSL *s, const unsigned char *buf,
   size_t buf_len,
   const BIO_ADDR *peer,
   const BIO_ADDR *local);
#endif

typedef struct ssl_shutdown_ex_args_st {
   uint64_t quic_error_code;
   const char *quic_reason;
} SSL_SHUTDOWN_EX_ARGS;

#define SSL_SHUTDOWN_FLAG_RAPID (1U << 0)
#define SSL_SHUTDOWN_FLAG_NO_STREAM_FLUSH (1U << 1)
#define SSL_SHUTDOWN_FLAG_NO_BLOCK (1U << 2)
#define SSL_SHUTDOWN_FLAG_WAIT_PEER (1U << 3)

__owur int SSL_shutdown_ex(SSL *ssl, uint64_t flags,
   const SSL_SHUTDOWN_EX_ARGS *args,
   size_t args_len);

__owur int SSL_stream_conclude(SSL *ssl, uint64_t flags);

typedef struct ssl_stream_reset_args_st {
   uint64_t
 quic_error_code;
} SSL_STREAM_RESET_ARGS;

__owur int SSL_stream_reset(SSL *ssl,
   const SSL_STREAM_RESET_ARGS *args,
```

```
   size_t args_len);

#define SSL_STREAM_STATE_NONE 0
#define SSL_STREAM_STATE_OK 1
#define SSL_STREAM_STATE_WRONG_DIR 2
#define SSL_STREAM_STATE_FINISHED 3
#define SSL_STREAM_STATE_RESET_LOCAL 4
#define SSL_STREAM_STATE_RESET_REMOTE 5
#define SSL_STREAM_STATE_CONN_CLOSED 6
__owur int SSL_get_stream_read_state(SSL *ssl);
__owur int SSL_get_stream_write_state(SSL *ssl);

__owur int SSL_get_stream_read_error_code(SSL *ssl, uint64_t *app_error_code);
__owur int SSL_get_stream_write_error_code(SSL *ssl, uint64_t *app_error_code);

#define SSL_CONN_CLOSE_FLAG_LOCAL (1U << 0)
#define SSL_CONN_CLOSE_FLAG_TRANSPORT (1U << 1)

typedef struct ssl_conn_close_info_st {
   uint64_t error_code, frame_type;
   const char *reason;
   size_t reason_len;
   uint32_t flags;
} SSL_CONN_CLOSE_INFO;

__owur int SSL_get_conn_close_info(SSL *ssl,
   SSL_CONN_CLOSE_INFO *info,
    size_t info_len);

#define SSL_VALUE_CLASS_GENERIC 0
#define SSL_VALUE_CLASS_FEATURE_REQUEST 1
#define SSL_VALUE_CLASS_FEATURE_PEER_REQUEST 2
#define SSL_VALUE_CLASS_FEATURE_NEGOTIATED 3

#define SSL_VALUE_NONE 0
#define SSL_VALUE_QUIC_STREAM_BIDI_LOCAL_AVAIL 1
#define SSL_VALUE_QUIC_STREAM_BIDI_REMOTE_AVAIL 2
#define SSL_VALUE_QUIC_STREAM_UNI_LOCAL_AVAIL 3
#define SSL_VALUE_QUIC_STREAM_UNI_REMOTE_AVAIL 4
#define SSL_VALUE_QUIC_IDLE_TIMEOUT 5
#define SSL_VALUE_EVENT_HANDLING_MODE 6
#define SSL_VALUE_STREAM_WRITE_BUF_SIZE 7
#define SSL_VALUE_STREAM_WRITE_BUF_USED 8
#define SSL_VALUE_STREAM_WRITE_BUF_AVAIL 9

#define SSL_VALUE_EVENT_HANDLING_MODE_INHERIT 0
#define SSL_VALUE_EVENT_HANDLING_MODE_IMPLICIT 1
#define SSL_VALUE_EVENT_HANDLING_MODE_EXPLICIT 2
```

```
int SSL_get_value_uint(SSL *s, uint32_t class_, uint32_t id, uint64_t *v);
int SSL_set_value_uint(SSL *s, uint32_t class_, uint32_t id, uint64_t v);

#define SSL_get_generic_value_uint(ssl, id, v) \
  SSL_get_value_uint((ssl), SSL_VALUE_CLASS_GENERIC,
 (id), (v))
#define SSL_set_generic_value_uint(ssl, id, v) \
  SSL_set_value_uint((ssl), SSL_VALUE_CLASS_GENERIC, (id), (v))
#define SSL_get_feature_request_uint(ssl, id, v) \
  SSL_get_value_uint((ssl), SSL_VALUE_CLASS_FEATURE_REQUEST, (id), (v))
#define SSL_set_feature_request_uint(ssl, id, v) \
  SSL_set_value_uint((ssl), SSL_VALUE_CLASS_FEATURE_REQUEST, (id), (v))
#define SSL_get_feature_peer_request_uint(ssl, id, v) \
  SSL_get_value_uint((ssl), SSL_VALUE_CLASS_FEATURE_PEER_REQUEST, (id), (v))
#define SSL_get_feature_negotiated_uint(ssl, id, v) \
  SSL_get_value_uint((ssl), SSL_VALUE_CLASS_FEATURE_NEGOTIATED, (id), (v))

#define SSL_get_quic_stream_bidi_local_avail(ssl, value)                \
  SSL_get_generic_value_uint((ssl), SSL_VALUE_QUIC_STREAM_BIDI_LOCAL_AVAIL, \
     (value))
#define SSL_get_quic_stream_bidi_remote_avail(ssl, value)               \
  SSL_get_generic_value_uint((ssl), SSL_VALUE_QUIC_STREAM_BIDI_REMOTE_AVAIL, \
      (value))
#define SSL_get_quic_stream_uni_local_avail(ssl, value)                 \
  SSL_get_generic_value_uint((ssl), SSL_VALUE_QUIC_STREAM_UNI_LOCAL_AVAIL, \
     (value))
#define SSL_get_quic_stream_uni_remote_avail(ssl, value)                \
  SSL_get_generic_value_uint((ssl), SSL_VALUE_QUIC_STREAM_UNI_REMOTE_AVAIL, \
     (value))

#define SSL_get_event_handling_mode(ssl, value)                 \
  SSL_get_generic_value_uint((ssl), SSL_VALUE_EVENT_HANDLING_MODE, \
     (value))
#define SSL_set_event_handling_mode(ssl, value)                 \
  SSL_set_generic_value_uint((ssl), SSL_VALUE_EVENT_HANDLING_MODE, \
     (value))

#define SSL_get_stream_write_buf_size(ssl, value)               \
  SSL_get_generic_value_uint((ssl), SSL_VALUE_STREAM_WRITE_BUF_SIZE, \
     (value))
#define SSL_get_stream_write_buf_used(ssl, value)               \
  SSL_get_generic_value_uint((ssl), SSL_VALUE_STREAM_WRITE_BUF_USED, \
      (value))
#define SSL_get_stream_write_buf_avail(ssl, value)              \
  SSL_get_generic_value_uint((ssl), SSL_VALUE_STREAM_WRITE_BUF_AVAIL, \
     (value))
```

```
#define SSL_POLL_EVENT_NONE 0

#define SSL_POLL_EVENT_F (1U << 0) /* F   (Failure) */
#define SSL_POLL_EVENT_EL (1U << 1) /* EL  (Exception on Listener) */
#define SSL_POLL_EVENT_EC (1U << 2) /* EC  (Exception on Conn) */
#define SSL_POLL_EVENT_ECD (1U << 3) /* ECD (Exception on Conn Drained) */
#define SSL_POLL_EVENT_ER (1U << 4) /* ER  (Exception on Read) */
#define SSL_POLL_EVENT_EW (1U << 5) /* EW  (Exception on Write) */
#define SSL_POLL_EVENT_R (1U << 6) /* R   (Readable) */
#define SSL_POLL_EVENT_W (1U << 7) /* W   (Writable) */
#define SSL_POLL_EVENT_IC (1U << 8) /* IC  (Incoming Connection) */
#define SSL_POLL_EVENT_ISB (1U << 9) /* ISB (Incoming Stream: Bidi) */
#define SSL_POLL_EVENT_ISU (1U << 10) /* ISU (Incoming Stream: Uni) */
#define SSL_POLL_EVENT_OSB (1U << 11) /* OSB (Outgoing Stream: Bidi)
 */
#define SSL_POLL_EVENT_OSU (1U << 12) /* OSU (Outgoing Stream: Uni) */

#define SSL_POLL_EVENT_RW (SSL_POLL_EVENT_R | SSL_POLL_EVENT_W)
#define SSL_POLL_EVENT_RE (SSL_POLL_EVENT_R | SSL_POLL_EVENT_ER)
#define SSL_POLL_EVENT_WE (SSL_POLL_EVENT_W | SSL_POLL_EVENT_EW)
#define SSL_POLL_EVENT_RWE (SSL_POLL_EVENT_RE | SSL_POLL_EVENT_WE)
#define SSL_POLL_EVENT_E (SSL_POLL_EVENT_EL | SSL_POLL_EVENT_EC \
  | SSL_POLL_EVENT_ER | SSL_POLL_EVENT_EW)
#define SSL_POLL_EVENT_IS (SSL_POLL_EVENT_ISB | SSL_POLL_EVENT_ISU)
#define SSL_POLL_EVENT_ISE (SSL_POLL_EVENT_IS | SSL_POLL_EVENT_EC)
#define SSL_POLL_EVENT_I (SSL_POLL_EVENT_IS | SSL_POLL_EVENT_IC)
#define SSL_POLL_EVENT_OS (SSL_POLL_EVENT_OSB | SSL_POLL_EVENT_OSU)
#define SSL_POLL_EVENT_OSE (SSL_POLL_EVENT_OS | SSL_POLL_EVENT_EC)

typedef struct ssl_poll_item_st {
  BIO_POLL_DESCRIPTOR desc;
  uint64_t events, revents;
} SSL_POLL_ITEM;

#define SSL_POLL_FLAG_NO_HANDLE_EVENTS (1U << 0)

__owur int SSL_poll(SSL_POLL_ITEM *items,
  size_t
 num_items,
  size_t stride,
  const struct timeval *timeout,
  uint64_t flags,
  size_t *result_count);

static ossl_inline ossl_unused BIO_POLL_DESCRIPTOR
SSL_as_poll_descriptor(SSL *s)
{
  BIO_POLL_DESCRIPTOR d;
```

```
  d.type = BIO_POLL_DESCRIPTOR_TYPE_SSL;
  d.value.ssl = s;
  return d;
}

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define SSL_cache_hit(s) SSL_session_reused(s)
#endif

__owur int SSL_session_reused(const SSL *s);
__owur int SSL_is_server(const SSL *s);

__owur __owur SSL_CONF_CTX *SSL_CONF_CTX_new(void);
int SSL_CONF_CTX_finish(SSL_CONF_CTX *cctx);
void SSL_CONF_CTX_free(SSL_CONF_CTX *cctx);
unsigned int SSL_CONF_CTX_set_flags(SSL_CONF_CTX *cctx, unsigned int flags);
__owur unsigned int SSL_CONF_CTX_clear_flags(SSL_CONF_CTX *cctx,
  unsigned int flags);
__owur int SSL_CONF_CTX_set1_prefix(SSL_CONF_CTX *cctx, const char *pre);

void SSL_CONF_CTX_set_ssl(SSL_CONF_CTX *cctx, SSL *ssl);
void SSL_CONF_CTX_set_ssl_ctx(SSL_CONF_CTX *cctx, SSL_CTX *ctx);

__owur int
 SSL_CONF_cmd(SSL_CONF_CTX *cctx, const char *cmd, const char *value);
__owur int SSL_CONF_cmd_argv(SSL_CONF_CTX *cctx, int *pargc, char ***pargv);
__owur int SSL_CONF_cmd_value_type(SSL_CONF_CTX *cctx, const char *cmd);

void SSL_add_ssl_module(void);
int SSL_config(SSL *s, const char *name);
int SSL_CTX_config(SSL_CTX *ctx, const char *name);

#ifndef OPENSSL_NO_SSL_TRACE
void SSL_trace(int write_p, int version, int content_type,
  const void *buf, size_t len, SSL *ssl, void *arg);
#endif

#ifndef OPENSSL_NO_SOCK
int DTLSv1_listen(SSL *s, BIO_ADDR *client);
#endif

#ifndef OPENSSL_NO_CT

/*
* A callback for verifying that the received SCTs are sufficient.
* Expected to return 1 if they are sufficient, otherwise 0.
* May return a negative integer if an error occurs.
```

```
* A connection should be aborted if the SCTs are deemed insufficient.
*/
typedef int (*ssl_ct_validation_cb)(const CT_POLICY_EVAL_CTX *ctx,
   const STACK_OF(SCT) *scts, void *arg);

/*
* Sets a |callback| that is
 invoked upon receipt of ServerHelloDone to validate
* the received SCTs.
* If the callback returns a non-positive result, the connection is terminated.
* Call this function before beginning a handshake.
* If a NULL |callback| is provided, SCT validation is disabled.
* |arg| is arbitrary userdata that will be passed to the callback whenever it
* is invoked. Ownership of |arg| remains with the caller.
*
* NOTE: A side-effect of setting a CT callback is that an OCSP stapled response
*       will be requested.
*/
int SSL_set_ct_validation_callback(SSL *s, ssl_ct_validation_cb callback,
   void *arg);
int SSL_CTX_set_ct_validation_callback(SSL_CTX *ctx,
   ssl_ct_validation_cb callback,
   void *arg);
#define SSL_disable_ct(s) \
   ((void)SSL_set_validation_callback((s), NULL, NULL))
#define SSL_CTX_disable_ct(ctx) \
   ((void)SSL_CTX_set_validation_callback((ctx), NULL, NULL))

/*
* The validation type enumerates the available behaviours of the built-in SSL
* CT validation
 callback selected via SSL_enable_ct() and SSL_CTX_enable_ct().
* The underlying callback is a static function in libssl.
*/
enum {
   SSL_CT_VALIDATION_PERMISSIVE = 0,
   SSL_CT_VALIDATION_STRICT
};

/*
* Enable CT by setting up a callback that implements one of the built-in
* validation variants.  The SSL_CT_VALIDATION_PERMISSIVE variant always
* continues the handshake, the application can make appropriate decisions at
* handshake completion.  The SSL_CT_VALIDATION_STRICT variant requires at
* least one valid SCT, or else handshake termination will be requested.  The
* handshake may continue anyway if SSL_VERIFY_NONE is in effect.
*/
int SSL_enable_ct(SSL *s, int validation_mode);
```

```
int SSL_CTX_enable_ct(SSL_CTX *ctx, int validation_mode);

/*
* Report whether a non-NULL callback is enabled.
*/
int SSL_ct_is_enabled(const SSL *s);
int SSL_CTX_ct_is_enabled(const SSL_CTX *ctx);

/* Gets the SCTs received from a connection */
const STACK_OF(SCT) *SSL_get0_peer_scts(SSL *s);

/*
 * Loads the CT log list from the default location.
* If a CTLOG_STORE has previously been set using SSL_CTX_set_ctlog_store,
* the log information loaded from this file will be appended to the
* CTLOG_STORE.
* Returns 1 on success, 0 otherwise.
*/
int SSL_CTX_set_default_ctlog_list_file(SSL_CTX *ctx);

/*
* Loads the CT log list from the specified file path.
* If a CTLOG_STORE has previously been set using SSL_CTX_set_ctlog_store,
* the log information loaded from this file will be appended to the
* CTLOG_STORE.
* Returns 1 on success, 0 otherwise.
*/
int SSL_CTX_set_ctlog_list_file(SSL_CTX *ctx, const char *path);

/*
* Sets the CT log list used by all SSL connections created from this SSL_CTX.
* Ownership of the CTLOG_STORE is transferred to the SSL_CTX.
*/
void SSL_CTX_set0_ctlog_store(SSL_CTX *ctx, CTLOG_STORE *logs);

/*
* Gets the CT log list used by all SSL connections created from this SSL_CTX.
* This will be NULL unless one of the following functions has
 been called:
* - SSL_CTX_set_default_ctlog_list_file
* - SSL_CTX_set_ctlog_list_file
* - SSL_CTX_set_ctlog_store
*/
const CTLOG_STORE *SSL_CTX_get0_ctlog_store(const SSL_CTX *ctx);

#endif /* OPENSSL_NO_CT */

/* What the "other" parameter contains in security callback */
```

```
/* Mask for type */
#define SSL_SECOP_OTHER_TYPE 0xffff0000
#define SSL_SECOP_OTHER_NONE 0
#define SSL_SECOP_OTHER_CIPHER (1 << 16)
#define SSL_SECOP_OTHER_CURVE (2 << 16)
#define SSL_SECOP_OTHER_DH (3 << 16)
#define SSL_SECOP_OTHER_PKEY (4 << 16)
#define SSL_SECOP_OTHER_SIGALG (5 << 16)
#define SSL_SECOP_OTHER_CERT (6 << 16)

/* Indicated operation refers to peer key or certificate */
#define SSL_SECOP_PEER 0x1000

/* Values for "op" parameter in security callback */

/* Called to filter ciphers */
/* Ciphers client supports */
#define SSL_SECOP_CIPHER_SUPPORTED (1 | SSL_SECOP_OTHER_CIPHER)
/* Cipher shared by client/server */
#define SSL_SECOP_CIPHER_SHARED (2 | SSL_SECOP_OTHER_CIPHER)
/* Sanity check of cipher
 server selects */
#define SSL_SECOP_CIPHER_CHECK (3 | SSL_SECOP_OTHER_CIPHER)
/* Curves supported by client */
#define SSL_SECOP_CURVE_SUPPORTED (4 | SSL_SECOP_OTHER_CURVE)
/* Curves shared by client/server */
#define SSL_SECOP_CURVE_SHARED (5 | SSL_SECOP_OTHER_CURVE)
/* Sanity check of curve server selects */
#define SSL_SECOP_CURVE_CHECK (6 | SSL_SECOP_OTHER_CURVE)
/* Temporary DH key */
#define SSL_SECOP_TMP_DH (7 | SSL_SECOP_OTHER_PKEY)
/* SSL/TLS version */
#define SSL_SECOP_VERSION (9 | SSL_SECOP_OTHER_NONE)
/* Session tickets */
#define SSL_SECOP_TICKET (10 | SSL_SECOP_OTHER_NONE)
/* Supported signature algorithms sent to peer */
#define SSL_SECOP_SIGALG_SUPPORTED (11 | SSL_SECOP_OTHER_SIGALG)
/* Shared signature algorithm */
#define SSL_SECOP_SIGALG_SHARED (12 | SSL_SECOP_OTHER_SIGALG)
/* Sanity check signature algorithm allowed */
#define SSL_SECOP_SIGALG_CHECK (13 | SSL_SECOP_OTHER_SIGALG)
/* Used to get mask of supported public key signature algorithms */
#define SSL_SECOP_SIGALG_MASK
 (14 | SSL_SECOP_OTHER_SIGALG)
/* Use to see if compression is allowed */
#define SSL_SECOP_COMPRESSION (15 | SSL_SECOP_OTHER_NONE)
/* EE key in certificate */
#define SSL_SECOP_EE_KEY (16 | SSL_SECOP_OTHER_CERT)
```

```
/* CA key in certificate */
#define SSL_SECOP_CA_KEY (17 | SSL_SECOP_OTHER_CERT)
/* CA digest algorithm in certificate */
#define SSL_SECOP_CA_MD (18 | SSL_SECOP_OTHER_CERT)
/* Peer EE key in certificate */
#define SSL_SECOP_PEER_EE_KEY (SSL_SECOP_EE_KEY | SSL_SECOP_PEER)
/* Peer CA key in certificate */
#define SSL_SECOP_PEER_CA_KEY (SSL_SECOP_CA_KEY | SSL_SECOP_PEER)
/* Peer CA digest algorithm in certificate */
#define SSL_SECOP_PEER_CA_MD (SSL_SECOP_CA_MD | SSL_SECOP_PEER)

void SSL_set_security_level(SSL *s, int level);
__owur int SSL_get_security_level(const SSL *s);
void SSL_set_security_callback(SSL *s,
   int (*cb)(const SSL *s, const SSL_CTX *ctx,
       int op, int bits, int nid,
       void *other, void *ex));
int (*SSL_get_security_callback(const SSL
 *s))(const SSL *s,
   const SSL_CTX *ctx, int op,
   int bits, int nid, void *other,
   void *ex);
void SSL_set0_security_ex_data(SSL *s, void *ex);
__owur void *SSL_get0_security_ex_data(const SSL *s);

void SSL_CTX_set_security_level(SSL_CTX *ctx, int level);
__owur int SSL_CTX_get_security_level(const SSL_CTX *ctx);
void SSL_CTX_set_security_callback(SSL_CTX *ctx,
   int (*cb)(const SSL *s, const SSL_CTX *ctx,
       int op, int bits, int nid,
       void *other, void *ex));
int (*SSL_CTX_get_security_callback(const SSL_CTX *ctx))(const SSL *s,
   const SSL_CTX *ctx,
   int op, int bits,
   int nid,
   void *other,
   void *ex);
void SSL_CTX_set0_security_ex_data(SSL_CTX *ctx, void *ex);
__owur void *SSL_CTX_get0_security_ex_data(const SSL_CTX *ctx);

/* OPENSSL_INIT flag 0x010000 reserved for internal use */
#define OPENSSL_INIT_NO_LOAD_SSL_STRINGS 0x00100000L
#define OPENSSL_INIT_LOAD_SSL_STRINGS 0x00200000L

#define OPENSSL_INIT_SSL_DEFAULT \
   (OPENSSL_INIT_LOAD_SSL_STRINGS
 | OPENSSL_INIT_LOAD_CRYPTO_STRINGS)
```

```
int OPENSSL_init_ssl(uint64_t opts, const OPENSSL_INIT_SETTINGS *settings);

#ifndef OPENSSL_NO_UNIT_TEST
__owur const struct openssl_ssl_test_functions *SSL_test_functions(void);
#endif

__owur int SSL_free_buffers(SSL *ssl);
__owur int SSL_alloc_buffers(SSL *ssl);

/* Status codes passed to the decrypt session ticket callback. Some of these
* are for internal use only and are never passed to the callback. */
typedef int SSL_TICKET_STATUS;

/* Support for ticket appdata */
/* fatal error, malloc failure */
#define SSL_TICKET_FATAL_ERR_MALLOC 0
/* fatal error, either from parsing or decrypting the ticket */
#define SSL_TICKET_FATAL_ERR_OTHER 1
/* No ticket present */
#define SSL_TICKET_NONE 2
/* Empty ticket present */
#define SSL_TICKET_EMPTY 3
/* the ticket couldn't be decrypted */
#define SSL_TICKET_NO_DECRYPT 4
/* a ticket was successfully decrypted */
#define SSL_TICKET_SUCCESS 5
/* same as above but the ticket needs to be renewed */
#define
 SSL_TICKET_SUCCESS_RENEW 6

/* Return codes for the decrypt session ticket callback */
typedef int SSL_TICKET_RETURN;

/* An error occurred */
#define SSL_TICKET_RETURN_ABORT 0
/* Do not use the ticket, do not send a renewed ticket to the client */
#define SSL_TICKET_RETURN_IGNORE 1
/* Do not use the ticket, send a renewed ticket to the client */
#define SSL_TICKET_RETURN_IGNORE_RENEW 2
/* Use the ticket, do not send a renewed ticket to the client */
#define SSL_TICKET_RETURN_USE 3
/* Use the ticket, send a renewed ticket to the client */
#define SSL_TICKET_RETURN_USE_RENEW 4

typedef int (*SSL_CTX_generate_session_ticket_fn)(SSL *s, void *arg);
typedef SSL_TICKET_RETURN (*SSL_CTX_decrypt_session_ticket_fn)(SSL *s, SSL_SESSION *ss,
   const unsigned char *keyname,
   size_t keyname_length,
```

```
   SSL_TICKET_STATUS status,
   void *arg);
int SSL_CTX_set_session_ticket_cb(SSL_CTX *ctx,
   SSL_CTX_generate_session_ticket_fn gen_cb,
   SSL_CTX_decrypt_session_ticket_fn dec_cb,
    void *arg);
int SSL_SESSION_set1_ticket_appdata(SSL_SESSION *ss, const void *data, size_t len);
int SSL_SESSION_get0_ticket_appdata(SSL_SESSION *ss, void **data, size_t *len);

typedef unsigned int (*DTLS_timer_cb)(SSL *s, unsigned int timer_us);

void DTLS_set_timer_cb(SSL *s, DTLS_timer_cb cb);

typedef int (*SSL_allow_early_data_cb_fn)(SSL *s, void *arg);
void SSL_CTX_set_allow_early_data_cb(SSL_CTX *ctx,
   SSL_allow_early_data_cb_fn cb,
   void *arg);
void SSL_set_allow_early_data_cb(SSL *s,
   SSL_allow_early_data_cb_fn cb,
   void *arg);

/* store the default cipher strings inside the library */
const char *OSSL_default_cipher_list(void);
const char *OSSL_default_ciphersuites(void);

/* RFC8879 Certificate compression APIs */

int SSL_CTX_compress_certs(SSL_CTX *ctx, int alg);
int SSL_compress_certs(SSL *ssl, int alg);

int SSL_CTX_set1_cert_comp_preference(SSL_CTX *ctx, int *algs, size_t len);
int SSL_set1_cert_comp_preference(SSL *ssl, int *algs, size_t len);

int SSL_CTX_set1_compressed_cert(SSL_CTX
 *ctx, int algorithm, unsigned char *comp_data,
   size_t comp_length, size_t orig_length);
int SSL_set1_compressed_cert(SSL *ssl, int algorithm, unsigned char *comp_data,
   size_t comp_length, size_t orig_length);
size_t SSL_CTX_get1_compressed_cert(SSL_CTX *ctx, int alg, unsigned char **data, size_t *orig_len);
size_t SSL_get1_compressed_cert(SSL *ssl, int alg, unsigned char **data, size_t *orig_len);

__owur int SSL_add_expected_rpk(SSL *s, EVP_PKEY *rpk);
__owur EVP_PKEY *SSL_get0_peer_rpk(const SSL *s);
__owur EVP_PKEY *SSL_SESSION_get0_peer_rpk(SSL_SESSION *s);
__owur int SSL_get_negotiated_client_cert_type(const SSL *s);
__owur int SSL_get_negotiated_server_cert_type(const SSL *s);

__owur int SSL_set1_client_cert_type(SSL *s, const unsigned char *val, size_t len);
```

```
__owur int SSL_set1_server_cert_type(SSL *s, const unsigned char *val, size_t len);
__owur int SSL_CTX_set1_client_cert_type(SSL_CTX *ctx, const unsigned char *val, size_t len);
__owur
 int SSL_CTX_set1_server_cert_type(SSL_CTX *ctx, const unsigned char *val, size_t len);
__owur int SSL_get0_client_cert_type(const SSL *s, unsigned char **t, size_t *len);
__owur int SSL_get0_server_cert_type(const SSL *s, unsigned char **t, size_t *len);
__owur int SSL_CTX_get0_client_cert_type(const SSL_CTX *ctx, unsigned char **t, size_t *len);
__owur int SSL_CTX_get0_server_cert_type(const SSL_CTX *s, unsigned char **t, size_t *len);

/*
* Protection level. For <= TLSv1.2 only "NONE" and "APPLICATION" are used.
*/
#define OSSL_RECORD_PROTECTION_LEVEL_NONE 0
#define OSSL_RECORD_PROTECTION_LEVEL_EARLY 1
#define OSSL_RECORD_PROTECTION_LEVEL_HANDSHAKE 2
#define OSSL_RECORD_PROTECTION_LEVEL_APPLICATION 3

int SSL_set_quic_tls_cbs(SSL *s, const OSSL_DISPATCH *qtdis, void *arg);
int SSL_set_quic_tls_transport_params(SSL *s,
   const unsigned char *params,
   size_t params_len);

int SSL_set_quic_tls_early_data_enabled(SSL *s, int enabled);

#ifdef __cplusplus
}
#endif
#endif
```

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```
/*
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* Generated by apps/progs.pl
*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#include "function.h"

extern int asn1parse_main(int argc, char *argv[]);
extern int ca_main(int argc, char *argv[]);
extern int ciphers_main(int argc, char *argv[]);
extern int cmp_main(int argc, char *argv[]);
extern int cms_main(int argc, char *argv[]);
extern int crl_main(int argc, char *argv[]);
extern int crl2pkcs7_main(int argc, char *argv[]);
extern int dgst_main(int argc, char *argv[]);
extern int dhparam_main(int argc, char *argv[]);
extern int dsa_main(int argc, char *argv[]);
extern int dsaparam_main(int argc, char *argv[]);
extern int ec_main(int argc, char *argv[]);
extern int ecparam_main(int
 argc, char *argv[]);
extern int enc_main(int argc, char *argv[]);
extern int engine_main(int argc, char *argv[]);
extern int errstr_main(int argc, char *argv[]);
extern int fipsinstall_main(int argc, char *argv[]);
extern int gendsa_main(int argc, char *argv[]);
extern int genpkey_main(int argc, char *argv[]);
```

```
extern int genrsa_main(int argc, char *argv[]);
extern int help_main(int argc, char *argv[]);
extern int info_main(int argc, char *argv[]);
extern int kdf_main(int argc, char *argv[]);
extern int list_main(int argc, char *argv[]);
extern int mac_main(int argc, char *argv[]);
extern int nseq_main(int argc, char *argv[]);
extern int ocsp_main(int argc, char *argv[]);
extern int passwd_main(int argc, char *argv[]);
extern int pkcs12_main(int argc, char *argv[]);
extern int pkcs7_main(int argc, char *argv[]);
extern int pkcs8_main(int argc, char *argv[]);
extern int pkey_main(int argc, char *argv[]);
extern int pkeyparam_main(int argc, char *argv[]);
extern int pkeyutl_main(int
 argc, char *argv[]);
extern int prime_main(int argc, char *argv[]);
extern int rand_main(int argc, char *argv[]);
extern int rehash_main(int argc, char *argv[]);
extern int req_main(int argc, char *argv[]);
extern int rsa_main(int argc, char *argv[]);
extern int rsautl_main(int argc, char *argv[]);
extern int s_client_main(int argc, char *argv[]);
extern int s_server_main(int argc, char *argv[]);
extern int s_time_main(int argc, char *argv[]);
extern int sess_id_main(int argc, char *argv[]);
extern int skeyutl_main(int argc, char *argv[]);
extern int smime_main(int argc, char *argv[]);
extern int speed_main(int argc, char *argv[]);
extern int spkac_main(int argc, char *argv[]);
extern int srp_main(int argc, char *argv[]);
extern int storeutl_main(int argc, char *argv[]);
extern int ts_main(int argc, char *argv[]);
extern int verify_main(int argc, char *argv[]);
extern int version_main(int argc, char *argv[]);
extern int x509_main(int argc, char *argv[]);

extern const OPTIONS asn1parse_options[];
extern
 const OPTIONS ca_options[];
extern const OPTIONS ciphers_options[];
extern const OPTIONS cmp_options[];
extern const OPTIONS cms_options[];
extern const OPTIONS crl_options[];
extern const OPTIONS crl2pkcs7_options[];
extern const OPTIONS dgst_options[];
extern const OPTIONS dhparam_options[];
extern const OPTIONS dsa_options[];
```

```
extern const OPTIONS dsaparam_options[];
extern const OPTIONS ec_options[];
extern const OPTIONS ecparam_options[];
extern const OPTIONS enc_options[];
extern const OPTIONS engine_options[];
extern const OPTIONS errstr_options[];
extern const OPTIONS fipsinstall_options[];
extern const OPTIONS gendsa_options[];
extern const OPTIONS genpkey_options[];
extern const OPTIONS genrsa_options[];
extern const OPTIONS help_options[];
extern const OPTIONS info_options[];
extern const OPTIONS kdf_options[];
extern const OPTIONS list_options[];
extern const OPTIONS mac_options[];
extern const OPTIONS nseq_options[];
extern const OPTIONS ocsp_options[];
extern
 const OPTIONS passwd_options[];
extern const OPTIONS pkcs12_options[];
extern const OPTIONS pkcs7_options[];
extern const OPTIONS pkcs8_options[];
extern const OPTIONS pkey_options[];
extern const OPTIONS pkeyparam_options[];
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extern const OPTIONS rand_options[];
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extern const OPTIONS rsa_options[];
extern const OPTIONS rsautl_options[];
extern const OPTIONS s_client_options[];
extern const OPTIONS s_server_options[];
extern const OPTIONS s_time_options[];
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extern const OPTIONS smime_options[];
extern const OPTIONS speed_options[];
extern const OPTIONS spkac_options[];
extern const OPTIONS srp_options[];
extern const OPTIONS storeutl_options[];
extern const OPTIONS ts_options[];
extern const OPTIONS verify_options[];
extern const OPTIONS version_options[];
extern
 const OPTIONS x509_options[];

extern FUNCTION functions[];
```

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```
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   'openssl_sources': [
     'openssl/crypto/aes/aes_ecb.c',
     'openssl/crypto/aes/aes_misc.c',
     'openssl/crypto/bn/asm/x86_64-gcc.c',
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     'openssl/crypto/bn/bn_blind.c',
     'openssl/crypto/bn/bn_const.c',
     'openssl/crypto/bn/bn_conv.c',
     'openssl/crypto/bn/bn_ctx.c',
     'openssl/crypto/bn/bn_dh.c',
```

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'openssl/crypto/thread/arch/thread_none.c',
'openssl/crypto/thread/arch/thread_posix.c',
'openssl/crypto/thread/arch/thread_win.c',
'openssl/crypto/thread/api.c',
'openssl/crypto/thread/arch.c',
'openssl/crypto/thread/internal.c',
'openssl/providers/common/der/der_rsa_sig.c',
'openssl/providers/common/bio_prov.c',
'openssl/providers/common/capabilities.c',
'openssl/providers/common/digest_to_nid.c',
'openssl/providers/common/provider_seeding.c',
'openssl/providers/common/provider_util.c',
'openssl/providers/common/securitycheck.c',
'openssl/providers/common/securitycheck_fips.c',
'openssl/providers/fips/fipsindicator.c',
'openssl/providers/fips/fipsprov.c',
'openssl/providers/fips/self_test.c',
'openssl/providers/fips/self_test_kats.c',
'openssl/providers/implementations/asymciphers/rsa_enc.c',
'openssl/providers/implementations/ciphers/cipher_aes.c',
'openssl/providers/implementations/ciphers/cipher_aes_cbc_hmac_sha.c',
'openssl/providers/implementations/ciphers/cipher_aes_cbc_hmac_sha1_hw.c',
'openssl/providers/implementations/ciphers/cipher_aes_cbc_hmac_sha256_hw.c',
'openssl/providers/implementations/ciphers/cipher_aes_ccm.c',
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'openssl/providers/implementations/ciphers/cipher_aes_gcm.c',
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'openssl/providers/implementations/ciphers/cipher_aes_hw.c',
'openssl/providers/implementations/ciphers/cipher_aes_ocb.c',
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'openssl/providers/implementations/ciphers/cipher_aes_wrp.c',
'openssl/providers/implementations/ciphers/cipher_aes_xts.c',
'openssl/providers/implementations/ciphers/cipher_aes_xts_fips.c',
'openssl/providers/implementations/ciphers/cipher_aes_xts_hw.c',
'openssl/providers/implementations/ciphers/cipher_cts.c',
'openssl/providers/implementations/ciphers/cipher_tdes.c',
'openssl/providers/implementations/ciphers/cipher_tdes_common.c',
'openssl/providers/implementations/ciphers/cipher_tdes_hw.c',
'openssl/providers/implementations/digests/sha2_prov.c',
'openssl/providers/implementations/digests/sha3_prov.c',
'openssl/providers/implementations/exchange/dh_exch.c',
'openssl/providers/implementations/exchange/ecdh_exch.c',
'openssl/providers/implementations/exchange/ecx_exch.c',
'openssl/providers/implementations/exchange/kdf_exch.c',

'openssl/providers/implementations/kdfs/hkdf.c',
'openssl/providers/implementations/kdfs/kbkdf.c',
'openssl/providers/implementations/kdfs/pbkdf2.c',
'openssl/providers/implementations/kdfs/pbkdf2_fips.c',
'openssl/providers/implementations/kdfs/sshkdf.c',
'openssl/providers/implementations/kdfs/sskdf.c',
'openssl/providers/implementations/kdfs/tls1_prf.c',
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'openssl/providers/implementations/keymgmt/kdf_legacy_kmgmt.c',
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'openssl/providers/implementations/keymgmt/ml_kem_kmgmt.c',

'openssl/providers/implementations/keymgmt/mlx_kmgmt.c',
'openssl/providers/implementations/keymgmt/rsa_kmgmt.c',
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'openssl/providers/implementations/macs/cmac_prov.c',
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'openssl/providers/implementations/macs/hmac_prov.c',
'openssl/providers/implementations/macs/kmac_prov.c',
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'openssl/providers/implementations/rands/drbg_ctr.c',
'openssl/providers/implementations/rands/drbg_hash.c',
'openssl/providers/implementations/rands/drbg_hmac.c',
'openssl/providers/implementations/rands/fips_crng_test.c',
'openssl/providers/implementations/rands/test_rng.c',
'openssl/providers/implementations/signature/dsa_sig.c',
'openssl/providers/implementations/signature/ecdsa_sig.c',
'openssl/providers/implementations/signature/eddsa_sig.c',
'openssl/providers/implementations/signature/mac_legacy_sig.c',
'openssl/providers/implementations/signature/ml_dsa_sig.c',
'openssl/providers/implementations/signature/rsa_sig.c',
'openssl/providers/implementations/signature/slh_dsa_sig.c',
'openssl/providers/implementations/skeymgmt/aes_skmgmt.c',
'openssl/providers/implementations/skeymgmt/generic.c',
'openssl/ssl/record/methods/ssl3_cbc.c',
'openssl/providers/common/der/der_dsa_key.c',
'openssl/providers/common/der/der_dsa_sig.c',
'openssl/providers/common/der/der_ec_key.c',
'openssl/providers/common/der/der_ec_sig.c',
'openssl/providers/common/der/der_ecx_key.c',

```
  'openssl/providers/common/der/der_ml_dsa_key.c',
  'openssl/providers/common/der/der_rsa_key.c',
  'openssl/providers/common/der/der_slh_dsa_key.c',
  'openssl/providers/common/provider_ctx.c',
  'openssl/providers/common/provider_err.c',
  'openssl/providers/implementations/ciphers/ciphercommon.c',
   'openssl/providers/implementations/ciphers/ciphercommon_block.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm_hw.c',
  'openssl/providers/implementations/ciphers/ciphercommon_gcm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_gcm_hw.c',
  'openssl/providers/implementations/ciphers/ciphercommon_hw.c',
  'openssl/providers/implementations/digests/digestcommon.c',
  'openssl/ssl/record/methods/tls_pad.c',
  'openssl/providers/fips/fips_entry.c',

],
'openssl_sources_BSD-x86_64': [
  './config/archs/BSD-x86_64/asm/crypto/aes/aes-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/aesni-mb-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/aesni-sha1-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/aesni-sha256-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/aesni-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/aesni-xts-avx512.s',
   './config/archs/BSD-x86_64/asm/crypto/aes/bsaes-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/vpaes-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-2k-avx512.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-2k-avxifma.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-3k-avx512.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-3k-avxifma.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-4k-avx512.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-4k-avxifma.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-avx2.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/x86_64-gf2m.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/x86_64-mont.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/x86_64-mont5.s',
  './config/archs/BSD-x86_64/asm/crypto/camellia/cmll-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/chacha/chacha-x86_64.s',
   './config/archs/BSD-x86_64/asm/crypto/ec/ecp_nistz256-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/ec/x25519-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/params_idx.c',
  './config/archs/BSD-x86_64/asm/crypto/x86_64cpuid.s',
  './config/archs/BSD-x86_64/asm/crypto/md5/md5-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/modes/aes-gcm-avx512.s',
  './config/archs/BSD-x86_64/asm/crypto/modes/aesni-gcm-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/modes/ghash-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/poly1305/poly1305-x86_64.s',
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```
  './config/archs/BSD-x86_64/asm/crypto/rc4/rc4-md5-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/rc4/rc4-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/sha/keccak1600-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/sha/sha1-mb-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/sha/sha1-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/sha/sha256-mb-x86_64.s',
   './config/archs/BSD-x86_64/asm/crypto/sha/sha256-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/sha/sha512-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/whrlpool/wp-x86_64.s',
  './config/archs/BSD-x86_64/asm/engines/e_padlock-x86_64.s',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_sm2_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_digests_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_dsa_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_ec_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_ecx_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_ml_dsa_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_rsa_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_slh_dsa_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_wrap_gen.c',
  './config/archs/BSD-x86_64/asm/providers/legacy.ld',
   './config/archs/BSD-x86_64/asm/providers/fips.ld',

],
'openssl_defines_BSD-x86_64': [
  'NDEBUG',
  'L_ENDIAN',
  'OPENSSL_BUILDING_OPENSSL',
  'AES_ASM',
  'BSAES_ASM',
  'ECP_NISTZ256_ASM',
  'FIPS_MODULE',
  'GHASH_ASM',
  'KECCAK1600_ASM',
  'OPENSSL_BN_ASM_GF2m',
  'OPENSSL_BN_ASM_MONT',
  'OPENSSL_BN_ASM_MONT5',
  'OPENSSL_CPUID_OBJ',
  'OPENSSL_IA32_SSE2',
  'SHA1_ASM',
  'SHA256_ASM',
  'SHA512_ASM',
  'VPAES_ASM',
  'X25519_ASM',
  'FIPS_MODULE',
],
'openssl_cflags_BSD-x86_64': [
  '-Wa,--noexecstack',
  '-Wall -O3',
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```
    '-pthread',
    '-Wall -O3',
  ],
  'openssl_ex_libs_BSD-x86_64': [
    '-pthread',
  ],
  'linker_script': ''
 },
 'include_dirs': [
  '.',
  './include',
  './crypto',
  './crypto/include/internal',
  './providers/common/include',
 ],
 'defines': ['<@(openssl_defines_BSD-x86_64)'],
 'cflags': ['<@(openssl_cflags_BSD-x86_64)'],
  'libraries': ['<@(openssl_ex_libs_BSD-x86_64)'],

 'sources': ['<@(openssl_sources)', '<@(openssl_sources_BSD-x86_64)'],
 'direct_dependent_settings': {
  'include_dirs': ['./include', '.'],
  'defines': ['<@(openssl_defines_BSD-x86_64)'],
 },
}
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/internal/param_names.h.in
*
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*
```

```
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*/
/* clang-format off */

/* clang-format on */

int ossl_param_find_pidx(const char *s);

/* Parameter name definitions - generated by util/perl/OpenSSL/paramnames.pm */
/* clang-format off */
#define NUM_PIDX 346

#define PIDX_ALG_PARAM_ALGORITHM_ID 0
#define PIDX_ALG_PARAM_ALGORITHM_ID_PARAMS 1
#define PIDX_ALG_PARAM_CIPHER 2
#define PIDX_ALG_PARAM_DIGEST 3
#define PIDX_ALG_PARAM_ENGINE 4
#define PIDX_ALG_PARAM_FIPS_APPROVED_INDICATOR 5
#define PIDX_ALG_PARAM_MAC 6
#define PIDX_ALG_PARAM_PROPERTIES 7
#define PIDX_ASYM_CIPHER_PARAM_DIGEST PIDX_PKEY_PARAM_DIGEST
#define PIDX_ASYM_CIPHER_PARAM_ENGINE
 PIDX_PKEY_PARAM_ENGINE
#define PIDX_ASYM_CIPHER_PARAM_FIPS_APPROVED_INDICATOR
PIDX_ALG_PARAM_FIPS_APPROVED_INDICATOR
#define PIDX_ASYM_CIPHER_PARAM_FIPS_KEY_CHECK PIDX_PKEY_PARAM_FIPS_KEY_CHECK
#define PIDX_ASYM_CIPHER_PARAM_FIPS_RSA_PKCS15_PAD_DISABLED
PIDX_PROV_PARAM_RSA_PKCS15_PAD_DISABLED
#define PIDX_ASYM_CIPHER_PARAM_IMPLICIT_REJECTION 8
#define PIDX_ASYM_CIPHER_PARAM_MGF1_DIGEST PIDX_PKEY_PARAM_MGF1_DIGEST
#define PIDX_ASYM_CIPHER_PARAM_MGF1_DIGEST_PROPS
PIDX_PKEY_PARAM_MGF1_PROPERTIES
#define PIDX_ASYM_CIPHER_PARAM_OAEP_DIGEST PIDX_ALG_PARAM_DIGEST
#define PIDX_ASYM_CIPHER_PARAM_OAEP_DIGEST_PROPS 9
#define PIDX_ASYM_CIPHER_PARAM_OAEP_LABEL 10
#define PIDX_ASYM_CIPHER_PARAM_PAD_MODE PIDX_PKEY_PARAM_PAD_MODE
#define PIDX_ASYM_CIPHER_PARAM_PROPERTIES PIDX_PKEY_PARAM_PROPERTIES
#define PIDX_ASYM_CIPHER_PARAM_TLS_CLIENT_VERSION 11
#define PIDX_ASYM_CIPHER_PARAM_TLS_NEGOTIATED_VERSION 12
#define PIDX_CAPABILITY_TLS_GROUP_ALG 13
#define PIDX_CAPABILITY_TLS_GROUP_ID
 14
#define PIDX_CAPABILITY_TLS_GROUP_IS_KEM 15
#define PIDX_CAPABILITY_TLS_GROUP_MAX_DTLS 16
#define PIDX_CAPABILITY_TLS_GROUP_MAX_TLS 17
```

```
#define PIDX_CAPABILITY_TLS_GROUP_MIN_DTLS 18
#define PIDX_CAPABILITY_TLS_GROUP_MIN_TLS 19
#define PIDX_CAPABILITY_TLS_GROUP_NAME 20
#define PIDX_CAPABILITY_TLS_GROUP_NAME_INTERNAL 21
#define PIDX_CAPABILITY_TLS_GROUP_SECURITY_BITS 22
#define PIDX_CAPABILITY_TLS_SIGALG_CODE_POINT 23
#define PIDX_CAPABILITY_TLS_SIGALG_HASH_NAME 24
#define PIDX_CAPABILITY_TLS_SIGALG_HASH_OID 25
#define PIDX_CAPABILITY_TLS_SIGALG_IANA_NAME 26
#define PIDX_CAPABILITY_TLS_SIGALG_KEYTYPE 27
#define PIDX_CAPABILITY_TLS_SIGALG_KEYTYPE_OID 28
#define PIDX_CAPABILITY_TLS_SIGALG_MAX_DTLS 16
#define PIDX_CAPABILITY_TLS_SIGALG_MAX_TLS 17
#define PIDX_CAPABILITY_TLS_SIGALG_MIN_DTLS 18
#define PIDX_CAPABILITY_TLS_SIGALG_MIN_TLS 19
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#define PIDX_SIGNATURE_PARAM_ALGORITHM_ID PIDX_PKEY_PARAM_ALGORITHM_ID
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PIDX_PKEY_PARAM_ALGORITHM_ID_PARAMS
#define PIDX_SIGNATURE_PARAM_CONTEXT_STRING 328
#define PIDX_SIGNATURE_PARAM_DETERMINISTIC 329
#define PIDX_SIGNATURE_PARAM_DIGEST PIDX_PKEY_PARAM_DIGEST
#define PIDX_SIGNATURE_PARAM_DIGEST_SIZE PIDX_PKEY_PARAM_DIGEST_SIZE
#define PIDX_SIGNATURE_PARAM_FIPS_APPROVED_INDICATOR
 PIDX_ALG_PARAM_FIPS_APPROVED_INDICATOR
#define PIDX_SIGNATURE_PARAM_FIPS_DIGEST_CHECK PIDX_PKEY_PARAM_FIPS_DIGEST_CHECK
#define PIDX_SIGNATURE_PARAM_FIPS_KEY_CHECK PIDX_PKEY_PARAM_FIPS_KEY_CHECK
#define PIDX_SIGNATURE_PARAM_FIPS_RSA_PSS_SALTLEN_CHECK 300
#define PIDX_SIGNATURE_PARAM_FIPS_SIGN_CHECK PIDX_PKEY_PARAM_FIPS_SIGN_CHECK
#define PIDX_SIGNATURE_PARAM_FIPS_SIGN_X931_PAD_CHECK 330
#define PIDX_SIGNATURE_PARAM_FIPS_VERIFY_MESSAGE 331
#define PIDX_SIGNATURE_PARAM_INSTANCE 332
#define PIDX_SIGNATURE_PARAM_KAT 333
#define PIDX_SIGNATURE_PARAM_MESSAGE_ENCODING 334
#define PIDX_SIGNATURE_PARAM_MGF1_DIGEST PIDX_PKEY_PARAM_MGF1_DIGEST
```

```
#define PIDX_SIGNATURE_PARAM_MGF1_PROPERTIES PIDX_PKEY_PARAM_MGF1_PROPERTIES
#define PIDX_SIGNATURE_PARAM_MU 335
#define PIDX_SIGNATURE_PARAM_NONCE_TYPE 336
#define PIDX_SIGNATURE_PARAM_PAD_MODE PIDX_PKEY_PARAM_PAD_MODE
#define PIDX_SIGNATURE_PARAM_PROPERTIES PIDX_PKEY_PARAM_PROPERTIES
#define PIDX_SIGNATURE_PARAM_PSS_SALTLEN 271
#define PIDX_SIGNATURE_PARAM_SIGNATURE
 337
#define PIDX_SIGNATURE_PARAM_TEST_ENTROPY 338
#define PIDX_SKEY_PARAM_KEY_LENGTH 339
#define PIDX_SKEY_PARAM_RAW_BYTES 340
#define PIDX_STORE_PARAM_ALIAS 341
#define PIDX_STORE_PARAM_DIGEST 3
#define PIDX_STORE_PARAM_EXPECT 342
#define PIDX_STORE_PARAM_FINGERPRINT 343
#define PIDX_STORE_PARAM_INPUT_TYPE 174
#define PIDX_STORE_PARAM_ISSUER 296
#define PIDX_STORE_PARAM_PROPERTIES 7
#define PIDX_STORE_PARAM_SERIAL 344
#define PIDX_STORE_PARAM_SUBJECT 345
/* clang-format on */
/*
* WARNING: do not edit!
* Generated by util/mkbuildinf.pl
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*/

#define PLATFORM "platform: BSD-x86_64"
#define DATE "built on: Tue Jan 27 17:26:21 2026 UTC"

/*
* Generate compiler_flags as an array of individual characters. This is a
* workaround for the situation where CFLAGS gets too long for a C90 string
* literal
*/
static const char compiler_flags[] = {
   'c','o','m','p','i','l','e','r',':',' ','g','c','c',' ','-','f',
   'P','I','C',' ','-','p','t','h','r','e','a','d',' ','-','W','a',
   ',','-','-','n','o','e','x','e','c','s','t','a','c','k',' ','-',
   'W','a','l','l',' ','-','O','3',' ','-','D','L','_','E','N','D',
   'I','A','N',' ','-','D','O','P','E','N','S','S','L','_','P','I',
```

```
 'C',' ','-','D','_','T','H','R','E','A','D','_','S','A','F','E',
 ' ','-','D','_','R','E','E','N','T','R','A','N','T',' ','-','D',
 'O','P','E','N','S','S','L','_','B','U','I','L','D','I','N','G',
 '_','O','P','E','N','S','S','L',' ','-','D','N','D','E','B','U',
 'G','\0'
};
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/opensslv.h.in
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*/

#ifndef OPENSSL_OPENSSLV_H
#define OPENSSL_OPENSSLV_H
#pragma once

#ifdef __cplusplus
extern "C" {
#endif

/*
* SECTION 1: VERSION DATA.  These will change for each release
*/

/*
* Base version macros
*
* These macros express version number MAJOR.MINOR.PATCH exactly
*/
/* clang-format off */
# define OPENSSL_VERSION_MAJOR  3
/* clang-format on */
/* clang-format off */
# define OPENSSL_VERSION_MINOR  5
/* clang-format on */
/* clang-format off */
# define OPENSSL_VERSION_PATCH  5
/* clang-format on */

/*
* Additional version information
*
```

```
* These are also part
 of the new version scheme, but aren't part
* of the version number itself.
*/

/* Could be: #define OPENSSL_VERSION_PRE_RELEASE "-alpha.1" */
/* clang-format off */
# define OPENSSL_VERSION_PRE_RELEASE ""
/* clang-format on */
/* Could be: #define OPENSSL_VERSION_BUILD_METADATA "+fips" */
/* Could be: #define OPENSSL_VERSION_BUILD_METADATA "+vendor.1" */
/* clang-format off */
# define OPENSSL_VERSION_BUILD_METADATA ""
/* clang-format on */

/*
* Note: The OpenSSL Project will never define OPENSSL_VERSION_BUILD_METADATA
* to be anything but the empty string.  Its use is entirely reserved for
* others
*/

/*
* Shared library version
*
* This is strictly to express ABI version, which may or may not
* be related to the API version expressed with the macros above.
* This is defined in free form.
*/
/* clang-format off */
# define OPENSSL_SHLIB_VERSION 3
/* clang-format on */

/*
* SECTION 2: USEFUL MACROS
*/

/* For checking general API compatibility when preprocessing */
#define
 OPENSSL_VERSION_PREREQ(maj, min) \
   ((OPENSSL_VERSION_MAJOR << 16) + OPENSSL_VERSION_MINOR >= ((maj) << 16) + (min))

/*
* Macros to get the version in easily digested string form, both the short
* "MAJOR.MINOR.PATCH" variant (where MAJOR, MINOR and PATCH are replaced
* with the values from the corresponding OPENSSL_VERSION_ macros) and the
* longer variant with OPENSSL_VERSION_PRE_RELEASE_STR and
* OPENSSL_VERSION_BUILD_METADATA_STR appended.
*/
```

```
/* clang-format off */
# define OPENSSL_VERSION_STR "3.5.5"
/* clang-format on */
/* clang-format off */
# define OPENSSL_FULL_VERSION_STR "3.5.5"
/* clang-format on */

/*
* SECTION 3: ADDITIONAL METADATA
*
* These strings are defined separately to allow them to be parsable.
*/
/* clang-format off */
# define OPENSSL_RELEASE_DATE "27 Jan 2026"
/* clang-format on */

/*
* SECTION 4: BACKWARD COMPATIBILITY
*/

/* clang-format off */
# define OPENSSL_VERSION_TEXT "OpenSSL 3.5.5 27 Jan 2026"
/* clang-format on */

/* clang-format
 off */
/* Synthesize OPENSSL_VERSION_NUMBER with the layout 0xMNN00PP0L */
# define OPENSSL_VERSION_NUMBER         \
   ( (OPENSSL_VERSION_MAJOR<<28)       \
     |(OPENSSL_VERSION_MINOR<<20)      \
     |(OPENSSL_VERSION_PATCH<<4)       \
     |0x0L )
/* clang-format on */

#ifdef __cplusplus
}
#endif

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_OPENSSLV_H
#endif

#endif /* OPENSSL_OPENSSLV_H */
```

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```
#ifndef SRC_PERMISSION_ADDON_PERMISSION_H_
#define SRC_PERMISSION_ADDON_PERMISSION_H_
```

```
#if defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS

#include <string>
#include "permission/permission_base.h"

namespace node {

namespace permission {

class AddonPermission final : public PermissionBase {
public:
 void Apply(Environment* env,
           const std::vector<std::string>& allow,
           PermissionScope scope) override;
 bool is_granted(Environment* env,
                PermissionScope perm,
                const std::string_view& param = "") const override;

private:
 bool deny_all_;
};

}  // namespace permission

}  // namespace node

#endif  // defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
#endif  // SRC_PERMISSION_ADDON_PERMISSION_H_
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_CMP_H
#define OPENSSL_CMP_H
```

```
#include <openssl/opensslconf.h>
#ifndef OPENSSL_NO_CMP

#include <openssl/crmf.h>
#include <openssl/cmperr.h>
#include <openssl/cmp_util.h>
#include <openssl/http.h>

/* explicit #includes not strictly needed since implied by the above: */
#include <openssl/types.h>
#include <openssl/safestack.h>
#include <openssl/x509.h>
#include <openssl/x509v3.h>

#ifdef __cplusplus
extern "C" {
#endif

#define OSSL_CMP_PVNO_2 2
#define
 OSSL_CMP_PVNO_3 3
#define OSSL_CMP_PVNO OSSL_CMP_PVNO_2 /* v2 is the default */

/*-
*   PKIFailureInfo ::= BIT STRING {
*   -- since we can fail in more than one way!
*   -- More codes may be added in the future if/when required.
*       badAlg              (0),
*       -- unrecognized or unsupported Algorithm Identifier
*       badMessageCheck     (1),
*       -- integrity check failed (e.g., signature did not verify)
*       badRequest          (2),
*       -- transaction not permitted or supported
*       badTime             (3),
*       -- messageTime was not sufficiently close to the system time,
*       -- as defined by local policy
*       badCertId           (4),
*       -- no certificate could be found matching the provided criteria
*       badDataFormat       (5),
*       -- the data submitted has the wrong format
*       wrongAuthority      (6),
*       -- the authority indicated in the request is different from the
*       -- one creating the response
 token
*       incorrectData       (7),
*       -- the requester's data is incorrect (for notary services)
*       missingTimeStamp    (8),
```

```
*       -- when the timestamp is missing but should be there
*       -- (by policy)
*       badPOP              (9),
*       -- the proof-of-possession failed
*       certRevoked         (10),
*         -- the certificate has already been revoked
*       certConfirmed       (11),
*         -- the certificate has already been confirmed
*       wrongIntegrity      (12),
*         -- invalid integrity, password based instead of signature or
*         -- vice versa
*       badRecipientNonce   (13),
*         -- invalid recipient nonce, either missing or wrong value
*       timeNotAvailable    (14),
*         -- the TSA's time source is not available
*       unacceptedPolicy    (15),
*         -- the requested TSA policy is not supported by the TSA.
*       unacceptedExtension (16),
*         -- the requested extension is not
 supported by the TSA.
*       addInfoNotAvailable (17),
*         -- the additional information requested could not be
*         -- understood or is not available
*       badSenderNonce      (18),
*         -- invalid sender nonce, either missing or wrong size
*       badCertTemplate     (19),
*         -- invalid cert. template or missing mandatory information
*       signerNotTrusted    (20),
*         -- signer of the message unknown or not trusted
*       transactionIdInUse  (21),
*         -- the transaction identifier is already in use
*       unsupportedVersion  (22),
*         -- the version of the message is not supported
*       notAuthorized       (23),
*         -- the sender was not authorized to make the preceding
*         -- request or perform the preceding action
*       systemUnavail       (24),
*       -- the request cannot be handled due to system unavailability
*       systemFailure       (25),
*       -- the request cannot be handled
 due to system failure
*       duplicateCertReq    (26)
*       -- certificate cannot be issued because a duplicate
*       -- certificate already exists
*   }
*/
#define OSSL_CMP_PKIFAILUREINFO_badAlg 0
#define OSSL_CMP_PKIFAILUREINFO_badMessageCheck 1
```

```
#define OSSL_CMP_PKIFAILUREINFO_badRequest 2
#define OSSL_CMP_PKIFAILUREINFO_badTime 3
#define OSSL_CMP_PKIFAILUREINFO_badCertId 4
#define OSSL_CMP_PKIFAILUREINFO_badDataFormat 5
#define OSSL_CMP_PKIFAILUREINFO_wrongAuthority 6
#define OSSL_CMP_PKIFAILUREINFO_incorrectData 7
#define OSSL_CMP_PKIFAILUREINFO_missingTimeStamp 8
#define OSSL_CMP_PKIFAILUREINFO_badPOP 9
#define OSSL_CMP_PKIFAILUREINFO_certRevoked 10
#define OSSL_CMP_PKIFAILUREINFO_certConfirmed 11
#define OSSL_CMP_PKIFAILUREINFO_wrongIntegrity 12
#define OSSL_CMP_PKIFAILUREINFO_badRecipientNonce 13
#define OSSL_CMP_PKIFAILUREINFO_timeNotAvailable 14
#define OSSL_CMP_PKIFAILUREINFO_unacceptedPolicy 15
#define OSSL_CMP_PKIFAILUREINFO_unacceptedExtension 16
#define OSSL_CMP_PKIFAILUREINFO_addInfoNotAvailable
 17
#define OSSL_CMP_PKIFAILUREINFO_badSenderNonce 18
#define OSSL_CMP_PKIFAILUREINFO_badCertTemplate 19
#define OSSL_CMP_PKIFAILUREINFO_signerNotTrusted 20
#define OSSL_CMP_PKIFAILUREINFO_transactionIdInUse 21
#define OSSL_CMP_PKIFAILUREINFO_unsupportedVersion 22
#define OSSL_CMP_PKIFAILUREINFO_notAuthorized 23
#define OSSL_CMP_PKIFAILUREINFO_systemUnavail 24
#define OSSL_CMP_PKIFAILUREINFO_systemFailure 25
#define OSSL_CMP_PKIFAILUREINFO_duplicateCertReq 26
#define OSSL_CMP_PKIFAILUREINFO_MAX 26
#define OSSL_CMP_PKIFAILUREINFO_MAX_BIT_PATTERN \
   ((1 << (OSSL_CMP_PKIFAILUREINFO_MAX + 1)) - 1)
#if OSSL_CMP_PKIFAILUREINFO_MAX_BIT_PATTERN > INT_MAX
#error CMP_PKIFAILUREINFO_MAX bit pattern does not fit in type int
#endif
typedef ASN1_BIT_STRING OSSL_CMP_PKIFAILUREINFO;

#define OSSL_CMP_CTX_FAILINFO_badAlg (1 << 0)
#define OSSL_CMP_CTX_FAILINFO_badMessageCheck (1 << 1)
#define OSSL_CMP_CTX_FAILINFO_badRequest (1 << 2)
#define OSSL_CMP_CTX_FAILINFO_badTime
 (1 << 3)
#define OSSL_CMP_CTX_FAILINFO_badCertId (1 << 4)
#define OSSL_CMP_CTX_FAILINFO_badDataFormat (1 << 5)
#define OSSL_CMP_CTX_FAILINFO_wrongAuthority (1 << 6)
#define OSSL_CMP_CTX_FAILINFO_incorrectData (1 << 7)
#define OSSL_CMP_CTX_FAILINFO_missingTimeStamp (1 << 8)
#define OSSL_CMP_CTX_FAILINFO_badPOP (1 << 9)
#define OSSL_CMP_CTX_FAILINFO_certRevoked (1 << 10)
#define OSSL_CMP_CTX_FAILINFO_certConfirmed (1 << 11)
#define OSSL_CMP_CTX_FAILINFO_wrongIntegrity (1 << 12)
```

```
#define OSSL_CMP_CTX_FAILINFO_badRecipientNonce (1 << 13)
#define OSSL_CMP_CTX_FAILINFO_timeNotAvailable (1 << 14)
#define OSSL_CMP_CTX_FAILINFO_unacceptedPolicy (1 << 15)
#define OSSL_CMP_CTX_FAILINFO_unacceptedExtension (1 << 16)
#define OSSL_CMP_CTX_FAILINFO_addInfoNotAvailable (1 << 17)
#define OSSL_CMP_CTX_FAILINFO_badSenderNonce (1 << 18)
#define OSSL_CMP_CTX_FAILINFO_badCertTemplate (1 << 19)
#define OSSL_CMP_CTX_FAILINFO_signerNotTrusted (1 << 20)
#define OSSL_CMP_CTX_FAILINFO_transactionIdInUse (1
 << 21)
#define OSSL_CMP_CTX_FAILINFO_unsupportedVersion (1 << 22)
#define OSSL_CMP_CTX_FAILINFO_notAuthorized (1 << 23)
#define OSSL_CMP_CTX_FAILINFO_systemUnavail (1 << 24)
#define OSSL_CMP_CTX_FAILINFO_systemFailure (1 << 25)
#define OSSL_CMP_CTX_FAILINFO_duplicateCertReq (1 << 26)

/*-
*   PKIStatus ::= INTEGER {
*       accepted                (0),
*       -- you got exactly what you asked for
*       grantedWithMods         (1),
*       -- you got something like what you asked for; the
*       -- requester is responsible for ascertaining the differences
*       rejection               (2),
*       -- you don't get it, more information elsewhere in the message
*       waiting                 (3),
*       -- the request body part has not yet been processed; expect to
*       -- hear more later (note: proper handling of this status
*       -- response MAY use the polling req/rep PKIMessages specified
*       -- in Section 5.3.22; alternatively, polling in the underlying
*
       -- transport layer MAY have some utility in this regard)
*       revocationWarning       (4),
*       -- this message contains a warning that a revocation is
*       -- imminent
*       revocationNotification (5),
*       -- notification that a revocation has occurred
*       keyUpdateWarning        (6)
*       -- update already done for the oldCertId specified in
*       -- CertReqMsg
*   }
*/
#define OSSL_CMP_PKISTATUS_request -3
#define OSSL_CMP_PKISTATUS_trans -2
#define OSSL_CMP_PKISTATUS_unspecified -1
#define OSSL_CMP_PKISTATUS_accepted 0
#define OSSL_CMP_PKISTATUS_grantedWithMods 1
#define OSSL_CMP_PKISTATUS_rejection 2
```

```
#define OSSL_CMP_PKISTATUS_waiting 3
#define OSSL_CMP_PKISTATUS_revocationWarning 4
#define OSSL_CMP_PKISTATUS_revocationNotification 5
#define OSSL_CMP_PKISTATUS_keyUpdateWarning 6
typedef ASN1_INTEGER OSSL_CMP_PKISTATUS;

DECLARE_ASN1_ITEM(OSSL_CMP_PKISTATUS)

#define OSSL_CMP_CERTORENCCERT_CERTIFICATE 0
#define OSSL_CMP_CERTORENCCERT_ENCRYPTEDCERT
 1

/* data type declarations */
typedef struct ossl_cmp_ctx_st OSSL_CMP_CTX;
typedef struct ossl_cmp_pkiheader_st OSSL_CMP_PKIHEADER;
DECLARE_ASN1_FUNCTIONS(OSSL_CMP_PKIHEADER)
typedef struct ossl_cmp_msg_st OSSL_CMP_MSG;
DECLARE_ASN1_DUP_FUNCTION(OSSL_CMP_MSG)
DECLARE_ASN1_ENCODE_FUNCTIONS(OSSL_CMP_MSG, OSSL_CMP_MSG, OSSL_CMP_MSG)
typedef struct ossl_cmp_certstatus_st OSSL_CMP_CERTSTATUS;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CMP_CERTSTATUS, OSSL_CMP_CERTSTATUS,
OSSL_CMP_CERTSTATUS)
#define sk_OSSL_CMP_CERTSTATUS_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_CMP_CERTSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CERTSTATUS_value(sk, idx) ((OSSL_CMP_CERTSTATUS
*)OPENSSL_sk_value(ossl_check_const_OSSL_CMP_CERTSTATUS_sk_type(sk), (idx)))
#define sk_OSSL_CMP_CERTSTATUS_new(cmp) ((STACK_OF(OSSL_CMP_CERTSTATUS)
*)OPENSSL_sk_new(ossl_check_OSSL_CMP_CERTSTATUS_compfunc_type(cmp)))
#define sk_OSSL_CMP_CERTSTATUS_new_null() ((STACK_OF(OSSL_CMP_CERTSTATUS)
*)OPENSSL_sk_new_null())
#define
 sk_OSSL_CMP_CERTSTATUS_new_reserve(cmp, n) ((STACK_OF(OSSL_CMP_CERTSTATUS)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CMP_CERTSTATUS_compfunc_type(cmp), (n)))
#define sk_OSSL_CMP_CERTSTATUS_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk), (n))
#define sk_OSSL_CMP_CERTSTATUS_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CERTSTATUS_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CERTSTATUS_delete(sk, i) ((OSSL_CMP_CERTSTATUS
*)OPENSSL_sk_delete(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk), (i)))
#define sk_OSSL_CMP_CERTSTATUS_delete_ptr(sk, ptr) ((OSSL_CMP_CERTSTATUS
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CERTSTATUS_type(ptr)))
#define sk_OSSL_CMP_CERTSTATUS_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CERTSTATUS_type(ptr))
```

```
#define sk_OSSL_CMP_CERTSTATUS_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk),
 ossl_check_OSSL_CMP_CERTSTATUS_type(ptr))
#define sk_OSSL_CMP_CERTSTATUS_pop(sk) ((OSSL_CMP_CERTSTATUS
*)OPENSSL_sk_pop(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk)))
#define sk_OSSL_CMP_CERTSTATUS_shift(sk) ((OSSL_CMP_CERTSTATUS
*)OPENSSL_sk_shift(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk)))
#define sk_OSSL_CMP_CERTSTATUS_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk),ossl_check_OSSL_CMP_CERTST
ATUS_freefunc_type(freefunc))
#define sk_OSSL_CMP_CERTSTATUS_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CERTSTATUS_type(ptr), (idx))
#define sk_OSSL_CMP_CERTSTATUS_set(sk, idx, ptr) ((OSSL_CMP_CERTSTATUS
*)OPENSSL_sk_set(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk), (idx),
ossl_check_OSSL_CMP_CERTSTATUS_type(ptr)))
#define sk_OSSL_CMP_CERTSTATUS_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CERTSTATUS_type(ptr))
#define
 sk_OSSL_CMP_CERTSTATUS_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CERTSTATUS_type(ptr))
#define sk_OSSL_CMP_CERTSTATUS_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CERTSTATUS_type(ptr), pnum)
#define sk_OSSL_CMP_CERTSTATUS_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CERTSTATUS_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CMP_CERTSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CERTSTATUS_dup(sk) ((STACK_OF(OSSL_CMP_CERTSTATUS)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CMP_CERTSTATUS_sk_type(sk)))
#define sk_OSSL_CMP_CERTSTATUS_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_CMP_CERTSTATUS)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CMP_CERTSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CERTSTATUS_copyfunc_type(copyfunc),
ossl_check_OSSL_CMP_CERTSTATUS_freefunc_type(freefunc)))
#define sk_OSSL_CMP_CERTSTATUS_set_cmp_func(sk,
 cmp)
((sk_OSSL_CMP_CERTSTATUS_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_CMP_CERTSTAT
US_sk_type(sk), ossl_check_OSSL_CMP_CERTSTATUS_compfunc_type(cmp)))

/* clang-format on */
typedef struct ossl_cmp_itav_st OSSL_CMP_ITAV;
DECLARE_ASN1_DUP_FUNCTION(OSSL_CMP_ITAV)
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CMP_ITAV, OSSL_CMP_ITAV, OSSL_CMP_ITAV)
#define sk_OSSL_CMP_ITAV_num(sk) OPENSSL_sk_num(ossl_check_const_OSSL_CMP_ITAV_sk_type(sk))
```

```
#define sk_OSSL_CMP_ITAV_value(sk, idx) ((OSSL_CMP_ITAV
*)OPENSSL_sk_value(ossl_check_const_OSSL_CMP_ITAV_sk_type(sk), (idx)))
#define sk_OSSL_CMP_ITAV_new(cmp) ((STACK_OF(OSSL_CMP_ITAV)
*)OPENSSL_sk_new(ossl_check_OSSL_CMP_ITAV_compfunc_type(cmp)))
#define sk_OSSL_CMP_ITAV_new_null() ((STACK_OF(OSSL_CMP_ITAV) *)OPENSSL_sk_new_null())
#define sk_OSSL_CMP_ITAV_new_reserve(cmp, n) ((STACK_OF(OSSL_CMP_ITAV)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CMP_ITAV_compfunc_type(cmp), (n)))
#define sk_OSSL_CMP_ITAV_reserve(sk,
 n) OPENSSL_sk_reserve(ossl_check_OSSL_CMP_ITAV_sk_type(sk), (n))
#define sk_OSSL_CMP_ITAV_free(sk) OPENSSL_sk_free(ossl_check_OSSL_CMP_ITAV_sk_type(sk))
#define sk_OSSL_CMP_ITAV_zero(sk) OPENSSL_sk_zero(ossl_check_OSSL_CMP_ITAV_sk_type(sk))
#define sk_OSSL_CMP_ITAV_delete(sk, i) ((OSSL_CMP_ITAV
*)OPENSSL_sk_delete(ossl_check_OSSL_CMP_ITAV_sk_type(sk), (i)))
#define sk_OSSL_CMP_ITAV_delete_ptr(sk, ptr) ((OSSL_CMP_ITAV
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CMP_ITAV_sk_type(sk),
ossl_check_OSSL_CMP_ITAV_type(ptr)))
#define sk_OSSL_CMP_ITAV_push(sk, ptr) OPENSSL_sk_push(ossl_check_OSSL_CMP_ITAV_sk_type(sk),
ossl_check_OSSL_CMP_ITAV_type(ptr))
#define sk_OSSL_CMP_ITAV_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CMP_ITAV_sk_type(sk), ossl_check_OSSL_CMP_ITAV_type(ptr))
#define sk_OSSL_CMP_ITAV_pop(sk) ((OSSL_CMP_ITAV
*)OPENSSL_sk_pop(ossl_check_OSSL_CMP_ITAV_sk_type(sk)))
#define sk_OSSL_CMP_ITAV_shift(sk) ((OSSL_CMP_ITAV
*)OPENSSL_sk_shift(ossl_check_OSSL_CMP_ITAV_sk_type(sk)))
#define
 sk_OSSL_CMP_ITAV_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CMP_ITAV_sk_type(sk),ossl_check_OSSL_CMP_ITAV_freefunc_ty
pe(freefunc))
#define sk_OSSL_CMP_ITAV_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_CMP_ITAV_sk_type(sk), ossl_check_OSSL_CMP_ITAV_type(ptr),
(idx))
#define sk_OSSL_CMP_ITAV_set(sk, idx, ptr) ((OSSL_CMP_ITAV
*)OPENSSL_sk_set(ossl_check_OSSL_CMP_ITAV_sk_type(sk), (idx),
ossl_check_OSSL_CMP_ITAV_type(ptr)))
#define sk_OSSL_CMP_ITAV_find(sk, ptr) OPENSSL_sk_find(ossl_check_OSSL_CMP_ITAV_sk_type(sk),
ossl_check_OSSL_CMP_ITAV_type(ptr))
#define sk_OSSL_CMP_ITAV_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_CMP_ITAV_sk_type(sk), ossl_check_OSSL_CMP_ITAV_type(ptr))
#define sk_OSSL_CMP_ITAV_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CMP_ITAV_sk_type(sk), ossl_check_OSSL_CMP_ITAV_type(ptr),
pnum)
#define sk_OSSL_CMP_ITAV_sort(sk) OPENSSL_sk_sort(ossl_check_OSSL_CMP_ITAV_sk_type(sk))
#define sk_OSSL_CMP_ITAV_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CMP_ITAV_sk_type(sk))
#define
 sk_OSSL_CMP_ITAV_dup(sk) ((STACK_OF(OSSL_CMP_ITAV)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CMP_ITAV_sk_type(sk)))
#define sk_OSSL_CMP_ITAV_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OSSL_CMP_ITAV)
```

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*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CMP_ITAV_sk_type(sk),
ossl_check_OSSL_CMP_ITAV_copyfunc_type(copyfunc),
ossl_check_OSSL_CMP_ITAV_freefunc_type(freefunc)))
#define sk_OSSL_CMP_ITAV_set_cmp_func(sk, cmp)
((sk_OSSL_CMP_ITAV_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_CMP_ITAV_sk_type(sk),
ossl_check_OSSL_CMP_ITAV_compfunc_type(cmp)))

/* clang-format on */

typedef struct ossl_cmp_crlstatus_st OSSL_CMP_CRLSTATUS;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CMP_CRLSTATUS, OSSL_CMP_CRLSTATUS,
OSSL_CMP_CRLSTATUS)
#define sk_OSSL_CMP_CRLSTATUS_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_CMP_CRLSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CRLSTATUS_value(sk, idx) ((OSSL_CMP_CRLSTATUS
*)OPENSSL_sk_value(ossl_check_const_OSSL_CMP_CRLSTATUS_sk_type(sk),
 (idx)))
#define sk_OSSL_CMP_CRLSTATUS_new(cmp) ((STACK_OF(OSSL_CMP_CRLSTATUS)
*)OPENSSL_sk_new(ossl_check_OSSL_CMP_CRLSTATUS_compfunc_type(cmp)))
#define sk_OSSL_CMP_CRLSTATUS_new_null() ((STACK_OF(OSSL_CMP_CRLSTATUS)
*)OPENSSL_sk_new_null())
#define sk_OSSL_CMP_CRLSTATUS_new_reserve(cmp, n) ((STACK_OF(OSSL_CMP_CRLSTATUS)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CMP_CRLSTATUS_compfunc_type(cmp), (n)))
#define sk_OSSL_CMP_CRLSTATUS_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk), (n))
#define sk_OSSL_CMP_CRLSTATUS_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CRLSTATUS_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CRLSTATUS_delete(sk, i) ((OSSL_CMP_CRLSTATUS
*)OPENSSL_sk_delete(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk), (i)))
#define sk_OSSL_CMP_CRLSTATUS_delete_ptr(sk, ptr) ((OSSL_CMP_CRLSTATUS
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk),
 ossl_check_OSSL_CMP_CRLSTATUS_type(ptr)))
#define sk_OSSL_CMP_CRLSTATUS_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CRLSTATUS_type(ptr))
#define sk_OSSL_CMP_CRLSTATUS_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CRLSTATUS_type(ptr))
#define sk_OSSL_CMP_CRLSTATUS_pop(sk) ((OSSL_CMP_CRLSTATUS
*)OPENSSL_sk_pop(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk)))
#define sk_OSSL_CMP_CRLSTATUS_shift(sk) ((OSSL_CMP_CRLSTATUS
*)OPENSSL_sk_shift(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk)))
#define sk_OSSL_CMP_CRLSTATUS_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk),ossl_check_OSSL_CMP_CRLSTAT
US_freefunc_type(freefunc))
```

```
#define sk_OSSL_CMP_CRLSTATUS_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CRLSTATUS_type(ptr), (idx))
#define sk_OSSL_CMP_CRLSTATUS_set(sk, idx, ptr) ((OSSL_CMP_CRLSTATUS
 *)OPENSSL_sk_set(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk), (idx),
ossl_check_OSSL_CMP_CRLSTATUS_type(ptr)))
#define sk_OSSL_CMP_CRLSTATUS_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CRLSTATUS_type(ptr))
#define sk_OSSL_CMP_CRLSTATUS_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CRLSTATUS_type(ptr))
#define sk_OSSL_CMP_CRLSTATUS_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CRLSTATUS_type(ptr), pnum)
#define sk_OSSL_CMP_CRLSTATUS_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CRLSTATUS_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CMP_CRLSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CRLSTATUS_dup(sk) ((STACK_OF(OSSL_CMP_CRLSTATUS)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CMP_CRLSTATUS_sk_type(sk)))
#define sk_OSSL_CMP_CRLSTATUS_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_CMP_CRLSTATUS)
 *)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CMP_CRLSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CRLSTATUS_copyfunc_type(copyfunc),
ossl_check_OSSL_CMP_CRLSTATUS_freefunc_type(freefunc)))
#define sk_OSSL_CMP_CRLSTATUS_set_cmp_func(sk, cmp)
((sk_OSSL_CMP_CRLSTATUS_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_CMP_CRLSTATUS
_sk_type(sk), ossl_check_OSSL_CMP_CRLSTATUS_compfunc_type(cmp)))

/* clang-format on */

typedef OSSL_CRMF_ATTRIBUTETYPEANDVALUE OSSL_CMP_ATAV;
#define OSSL_CMP_ATAV_free OSSL_CRMF_ATTRIBUTETYPEANDVALUE_free
typedef STACK_OF(OSSL_CRMF_ATTRIBUTETYPEANDVALUE) OSSL_CMP_ATAVS;
DECLARE_ASN1_FUNCTIONS(OSSL_CMP_ATAVS)
#define stack_st_OSSL_CMP_ATAV stack_st_OSSL_CRMF_ATTRIBUTETYPEANDVALUE
#define sk_OSSL_CMP_ATAV_num sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_num
#define sk_OSSL_CMP_ATAV_value sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_value
#define sk_OSSL_CMP_ATAV_push sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_push
#define sk_OSSL_CMP_ATAV_pop_free sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_pop_free

typedef
 struct ossl_cmp_revrepcontent_st OSSL_CMP_REVREPCONTENT;
typedef struct ossl_cmp_pkisi_st OSSL_CMP_PKISI;
DECLARE_ASN1_FUNCTIONS(OSSL_CMP_PKISI)
DECLARE_ASN1_DUP_FUNCTION(OSSL_CMP_PKISI)
/* clang-format off */
```

```
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CMP_PKISI, OSSL_CMP_PKISI, OSSL_CMP_PKISI)
#define sk_OSSL_CMP_PKISI_num(sk) OPENSSL_sk_num(ossl_check_const_OSSL_CMP_PKISI_sk_type(sk))
#define sk_OSSL_CMP_PKISI_value(sk, idx) ((OSSL_CMP_PKISI
*)OPENSSL_sk_value(ossl_check_const_OSSL_CMP_PKISI_sk_type(sk), (idx)))
#define sk_OSSL_CMP_PKISI_new(cmp) ((STACK_OF(OSSL_CMP_PKISI)
*)OPENSSL_sk_new(ossl_check_OSSL_CMP_PKISI_compfunc_type(cmp)))
#define sk_OSSL_CMP_PKISI_new_null() ((STACK_OF(OSSL_CMP_PKISI) *)OPENSSL_sk_new_null())
#define sk_OSSL_CMP_PKISI_new_reserve(cmp, n) ((STACK_OF(OSSL_CMP_PKISI)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CMP_PKISI_compfunc_type(cmp), (n)))
#define sk_OSSL_CMP_PKISI_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_OSSL_CMP_PKISI_sk_type(sk),
 (n))
#define sk_OSSL_CMP_PKISI_free(sk) OPENSSL_sk_free(ossl_check_OSSL_CMP_PKISI_sk_type(sk))
#define sk_OSSL_CMP_PKISI_zero(sk) OPENSSL_sk_zero(ossl_check_OSSL_CMP_PKISI_sk_type(sk))
#define sk_OSSL_CMP_PKISI_delete(sk, i) ((OSSL_CMP_PKISI
*)OPENSSL_sk_delete(ossl_check_OSSL_CMP_PKISI_sk_type(sk), (i)))
#define sk_OSSL_CMP_PKISI_delete_ptr(sk, ptr) ((OSSL_CMP_PKISI
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CMP_PKISI_sk_type(sk),
ossl_check_OSSL_CMP_PKISI_type(ptr)))
#define sk_OSSL_CMP_PKISI_push(sk, ptr) OPENSSL_sk_push(ossl_check_OSSL_CMP_PKISI_sk_type(sk),
ossl_check_OSSL_CMP_PKISI_type(ptr))
#define sk_OSSL_CMP_PKISI_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CMP_PKISI_sk_type(sk), ossl_check_OSSL_CMP_PKISI_type(ptr))
#define sk_OSSL_CMP_PKISI_pop(sk) ((OSSL_CMP_PKISI
*)OPENSSL_sk_pop(ossl_check_OSSL_CMP_PKISI_sk_type(sk)))
#define sk_OSSL_CMP_PKISI_shift(sk) ((OSSL_CMP_PKISI
*)OPENSSL_sk_shift(ossl_check_OSSL_CMP_PKISI_sk_type(sk)))
#define sk_OSSL_CMP_PKISI_pop_free(sk,
 freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CMP_PKISI_sk_type(sk),ossl_check_OSSL_CMP_PKISI_freefunc_ty
pe(freefunc))
#define sk_OSSL_CMP_PKISI_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_CMP_PKISI_sk_type(sk), ossl_check_OSSL_CMP_PKISI_type(ptr),
(idx))
#define sk_OSSL_CMP_PKISI_set(sk, idx, ptr) ((OSSL_CMP_PKISI
*)OPENSSL_sk_set(ossl_check_OSSL_CMP_PKISI_sk_type(sk), (idx),
ossl_check_OSSL_CMP_PKISI_type(ptr)))
#define sk_OSSL_CMP_PKISI_find(sk, ptr) OPENSSL_sk_find(ossl_check_OSSL_CMP_PKISI_sk_type(sk),
ossl_check_OSSL_CMP_PKISI_type(ptr))
#define sk_OSSL_CMP_PKISI_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_CMP_PKISI_sk_type(sk), ossl_check_OSSL_CMP_PKISI_type(ptr))
#define sk_OSSL_CMP_PKISI_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CMP_PKISI_sk_type(sk), ossl_check_OSSL_CMP_PKISI_type(ptr),
pnum)
#define sk_OSSL_CMP_PKISI_sort(sk) OPENSSL_sk_sort(ossl_check_OSSL_CMP_PKISI_sk_type(sk))
#define sk_OSSL_CMP_PKISI_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CMP_PKISI_sk_type(sk))
#define
```

```
 sk_OSSL_CMP_PKISI_dup(sk) ((STACK_OF(OSSL_CMP_PKISI)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CMP_PKISI_sk_type(sk)))
#define sk_OSSL_CMP_PKISI_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OSSL_CMP_PKISI)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CMP_PKISI_sk_type(sk),
ossl_check_OSSL_CMP_PKISI_copyfunc_type(copyfunc),
ossl_check_OSSL_CMP_PKISI_freefunc_type(freefunc)))
#define sk_OSSL_CMP_PKISI_set_cmp_func(sk, cmp)
((sk_OSSL_CMP_PKISI_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_CMP_PKISI_sk_type(sk),
ossl_check_OSSL_CMP_PKISI_compfunc_type(cmp)))

/* clang-format on */
typedef struct ossl_cmp_certrepmessage_st OSSL_CMP_CERTREPMESSAGE;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CMP_CERTREPMESSAGE,
OSSL_CMP_CERTREPMESSAGE, OSSL_CMP_CERTREPMESSAGE)
#define sk_OSSL_CMP_CERTREPMESSAGE_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_CMP_CERTREPMESSAGE_sk_type(sk))
#define sk_OSSL_CMP_CERTREPMESSAGE_value(sk, idx) ((OSSL_CMP_CERTREPMESSAGE
 *)OPENSSL_sk_value(ossl_check_const_OSSL_CMP_CERTREPMESSAGE_sk_type(sk), (idx)))
#define sk_OSSL_CMP_CERTREPMESSAGE_new(cmp) ((STACK_OF(OSSL_CMP_CERTREPMESSAGE)
*)OPENSSL_sk_new(ossl_check_OSSL_CMP_CERTREPMESSAGE_compfunc_type(cmp)))
#define sk_OSSL_CMP_CERTREPMESSAGE_new_null() ((STACK_OF(OSSL_CMP_CERTREPMESSAGE)
*)OPENSSL_sk_new_null())
#define sk_OSSL_CMP_CERTREPMESSAGE_new_reserve(cmp, n)
((STACK_OF(OSSL_CMP_CERTREPMESSAGE)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CMP_CERTREPMESSAGE_compfunc_type(cmp), (n)))
#define sk_OSSL_CMP_CERTREPMESSAGE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk), (n))
#define sk_OSSL_CMP_CERTREPMESSAGE_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk))
#define sk_OSSL_CMP_CERTREPMESSAGE_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk))
#define sk_OSSL_CMP_CERTREPMESSAGE_delete(sk, i) ((OSSL_CMP_CERTREPMESSAGE
*)OPENSSL_sk_delete(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
 (i)))
#define sk_OSSL_CMP_CERTREPMESSAGE_delete_ptr(sk, ptr) ((OSSL_CMP_CERTREPMESSAGE
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
ossl_check_OSSL_CMP_CERTREPMESSAGE_type(ptr)))
#define sk_OSSL_CMP_CERTREPMESSAGE_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
ossl_check_OSSL_CMP_CERTREPMESSAGE_type(ptr))
#define sk_OSSL_CMP_CERTREPMESSAGE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
ossl_check_OSSL_CMP_CERTREPMESSAGE_type(ptr))
#define sk_OSSL_CMP_CERTREPMESSAGE_pop(sk) ((OSSL_CMP_CERTREPMESSAGE
*)OPENSSL_sk_pop(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk)))
#define sk_OSSL_CMP_CERTREPMESSAGE_shift(sk) ((OSSL_CMP_CERTREPMESSAGE
*)OPENSSL_sk_shift(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk)))
```

```
#define sk_OSSL_CMP_CERTREPMESSAGE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),ossl_check_OSSL_CMP_CE
RTREPMESSAGE_freefunc_type(freefunc))
#define
 sk_OSSL_CMP_CERTREPMESSAGE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
ossl_check_OSSL_CMP_CERTREPMESSAGE_type(ptr), (idx))
#define sk_OSSL_CMP_CERTREPMESSAGE_set(sk, idx, ptr) ((OSSL_CMP_CERTREPMESSAGE
*)OPENSSL_sk_set(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk), (idx),
ossl_check_OSSL_CMP_CERTREPMESSAGE_type(ptr)))
#define sk_OSSL_CMP_CERTREPMESSAGE_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
ossl_check_OSSL_CMP_CERTREPMESSAGE_type(ptr))
#define sk_OSSL_CMP_CERTREPMESSAGE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
ossl_check_OSSL_CMP_CERTREPMESSAGE_type(ptr))
#define sk_OSSL_CMP_CERTREPMESSAGE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
ossl_check_OSSL_CMP_CERTREPMESSAGE_type(ptr), pnum)
#define sk_OSSL_CMP_CERTREPMESSAGE_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk))
#define
 sk_OSSL_CMP_CERTREPMESSAGE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CMP_CERTREPMESSAGE_sk_type(sk))
#define sk_OSSL_CMP_CERTREPMESSAGE_dup(sk) ((STACK_OF(OSSL_CMP_CERTREPMESSAGE)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CMP_CERTREPMESSAGE_sk_type(sk)))
#define sk_OSSL_CMP_CERTREPMESSAGE_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_CMP_CERTREPMESSAGE)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
ossl_check_OSSL_CMP_CERTREPMESSAGE_copyfunc_type(copyfunc),
ossl_check_OSSL_CMP_CERTREPMESSAGE_freefunc_type(freefunc)))
#define sk_OSSL_CMP_CERTREPMESSAGE_set_cmp_func(sk, cmp)
((sk_OSSL_CMP_CERTREPMESSAGE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_CMP_CERT
REPMESSAGE_sk_type(sk), ossl_check_OSSL_CMP_CERTREPMESSAGE_compfunc_type(cmp)))

/* clang-format on */
typedef struct ossl_cmp_pollrep_st OSSL_CMP_POLLREP;
typedef STACK_OF(OSSL_CMP_POLLREP) OSSL_CMP_POLLREPCONTENT;
typedef struct ossl_cmp_certresponse_st OSSL_CMP_CERTRESPONSE;
/* clang-format
 off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CMP_CERTRESPONSE, OSSL_CMP_CERTRESPONSE,
OSSL_CMP_CERTRESPONSE)
#define sk_OSSL_CMP_CERTRESPONSE_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_CMP_CERTRESPONSE_sk_type(sk))
#define sk_OSSL_CMP_CERTRESPONSE_value(sk, idx) ((OSSL_CMP_CERTRESPONSE
*)OPENSSL_sk_value(ossl_check_const_OSSL_CMP_CERTRESPONSE_sk_type(sk), (idx)))
#define sk_OSSL_CMP_CERTRESPONSE_new(cmp) ((STACK_OF(OSSL_CMP_CERTRESPONSE)
```

```
*)OPENSSL_sk_new(ossl_check_OSSL_CMP_CERTRESPONSE_compfunc_type(cmp)))
#define sk_OSSL_CMP_CERTRESPONSE_new_null() ((STACK_OF(OSSL_CMP_CERTRESPONSE)
*)OPENSSL_sk_new_null())
#define sk_OSSL_CMP_CERTRESPONSE_new_reserve(cmp, n) ((STACK_OF(OSSL_CMP_CERTRESPONSE)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CMP_CERTRESPONSE_compfunc_type(cmp), (n)))
#define sk_OSSL_CMP_CERTRESPONSE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk), (n))
#define sk_OSSL_CMP_CERTRESPONSE_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk))
#define
 sk_OSSL_CMP_CERTRESPONSE_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk))
#define sk_OSSL_CMP_CERTRESPONSE_delete(sk, i) ((OSSL_CMP_CERTRESPONSE
*)OPENSSL_sk_delete(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk), (i)))
#define sk_OSSL_CMP_CERTRESPONSE_delete_ptr(sk, ptr) ((OSSL_CMP_CERTRESPONSE
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk),
ossl_check_OSSL_CMP_CERTRESPONSE_type(ptr)))
#define sk_OSSL_CMP_CERTRESPONSE_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk),
ossl_check_OSSL_CMP_CERTRESPONSE_type(ptr))
#define sk_OSSL_CMP_CERTRESPONSE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk),
ossl_check_OSSL_CMP_CERTRESPONSE_type(ptr))
#define sk_OSSL_CMP_CERTRESPONSE_pop(sk) ((OSSL_CMP_CERTRESPONSE
*)OPENSSL_sk_pop(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk)))
#define sk_OSSL_CMP_CERTRESPONSE_shift(sk) ((OSSL_CMP_CERTRESPONSE
*)OPENSSL_sk_shift(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk)))
#define
 sk_OSSL_CMP_CERTRESPONSE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk),ossl_check_OSSL_CMP_CERT
RESPONSE_freefunc_type(freefunc))
#define sk_OSSL_CMP_CERTRESPONSE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk),
ossl_check_OSSL_CMP_CERTRESPONSE_type(ptr), (idx))
#define sk_OSSL_CMP_CERTRESPONSE_set(sk, idx, ptr) ((OSSL_CMP_CERTRESPONSE
*)OPENSSL_sk_set(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk), (idx),
ossl_check_OSSL_CMP_CERTRESPONSE_type(ptr)))
#define sk_OSSL_CMP_CERTRESPONSE_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk),
ossl_check_OSSL_CMP_CERTRESPONSE_type(ptr))
#define sk_OSSL_CMP_CERTRESPONSE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk),
ossl_check_OSSL_CMP_CERTRESPONSE_type(ptr))
#define sk_OSSL_CMP_CERTRESPONSE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk),
 ossl_check_OSSL_CMP_CERTRESPONSE_type(ptr), pnum)
#define sk_OSSL_CMP_CERTRESPONSE_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk))
```

```
#define sk_OSSL_CMP_CERTRESPONSE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CMP_CERTRESPONSE_sk_type(sk))
#define sk_OSSL_CMP_CERTRESPONSE_dup(sk) ((STACK_OF(OSSL_CMP_CERTRESPONSE)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CMP_CERTRESPONSE_sk_type(sk)))
#define sk_OSSL_CMP_CERTRESPONSE_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_CMP_CERTRESPONSE)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CMP_CERTRESPONSE_sk_type(sk),
ossl_check_OSSL_CMP_CERTRESPONSE_copyfunc_type(copyfunc),
ossl_check_OSSL_CMP_CERTRESPONSE_freefunc_type(freefunc)))
#define sk_OSSL_CMP_CERTRESPONSE_set_cmp_func(sk, cmp)
((sk_OSSL_CMP_CERTRESPONSE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_CMP_CERTRE
SPONSE_sk_type(sk), ossl_check_OSSL_CMP_CERTRESPONSE_compfunc_type(cmp)))

/* clang-format on */
typedef STACK_OF(ASN1_UTF8STRING) OSSL_CMP_PKIFREETEXT;

/*
 * function DECLARATIONS
*/

/* from cmp_asn.c */
OSSL_CMP_ITAV *OSSL_CMP_ITAV_create(ASN1_OBJECT *type, ASN1_TYPE *value);
void OSSL_CMP_ITAV_set0(OSSL_CMP_ITAV *itav, ASN1_OBJECT *type,
  ASN1_TYPE *value);
ASN1_OBJECT *OSSL_CMP_ITAV_get0_type(const OSSL_CMP_ITAV *itav);
ASN1_TYPE *OSSL_CMP_ITAV_get0_value(const OSSL_CMP_ITAV *itav);
int OSSL_CMP_ITAV_push0_stack_item(STACK_OF(OSSL_CMP_ITAV) **sk_p,
  OSSL_CMP_ITAV *itav);
void OSSL_CMP_ITAV_free(OSSL_CMP_ITAV *itav);

OSSL_CMP_ITAV *OSSL_CMP_ITAV_new0_certProfile(STACK_OF(ASN1_UTF8STRING)
      *certProfile);
int OSSL_CMP_ITAV_get0_certProfile(const OSSL_CMP_ITAV *itav,
  STACK_OF(ASN1_UTF8STRING) **out);
OSSL_CMP_ITAV *OSSL_CMP_ITAV_new_caCerts(const STACK_OF(X509) *caCerts);
int OSSL_CMP_ITAV_get0_caCerts(const OSSL_CMP_ITAV *itav, STACK_OF(X509) **out);

OSSL_CMP_ITAV *OSSL_CMP_ITAV_new_rootCaCert(const X509 *rootCaCert);
int OSSL_CMP_ITAV_get0_rootCaCert(const OSSL_CMP_ITAV *itav, X509 **out);
OSSL_CMP_ITAV
 *OSSL_CMP_ITAV_new_rootCaKeyUpdate(const X509 *newWithNew,
  const X509 *newWithOld,
  const X509 *oldWithNew);
int OSSL_CMP_ITAV_get0_rootCaKeyUpdate(const OSSL_CMP_ITAV *itav,
  X509 **newWithNew,
  X509 **newWithOld,
  X509 **oldWithNew);
```

```
OSSL_CMP_CRLSTATUS *OSSL_CMP_CRLSTATUS_create(const X509_CRL *crl,
   const X509 *cert, int only_DN);
OSSL_CMP_CRLSTATUS *OSSL_CMP_CRLSTATUS_new1(const DIST_POINT_NAME *dpn,
   const GENERAL_NAMES *issuer,
   const ASN1_TIME *thisUpdate);
int OSSL_CMP_CRLSTATUS_get0(const OSSL_CMP_CRLSTATUS *crlstatus,
   DIST_POINT_NAME **dpn, GENERAL_NAMES **issuer,
   ASN1_TIME **thisUpdate);
void OSSL_CMP_CRLSTATUS_free(OSSL_CMP_CRLSTATUS *crlstatus);
OSSL_CMP_ITAV
*OSSL_CMP_ITAV_new0_crlStatusList(STACK_OF(OSSL_CMP_CRLSTATUS) *crlStatusList);
int OSSL_CMP_ITAV_get0_crlStatusList(const OSSL_CMP_ITAV *itav,
   STACK_OF(OSSL_CMP_CRLSTATUS) **out);
OSSL_CMP_ITAV *OSSL_CMP_ITAV_new_crls(const X509_CRL *crls);
int OSSL_CMP_ITAV_get0_crls(const OSSL_CMP_ITAV
 *it, STACK_OF(X509_CRL) **out);
OSSL_CMP_ITAV
*OSSL_CMP_ITAV_new0_certReqTemplate(OSSL_CRMF_CERTTEMPLATE *certTemplate,
   OSSL_CMP_ATAVS *keySpec);
int OSSL_CMP_ITAV_get1_certReqTemplate(const OSSL_CMP_ITAV *itav,
   OSSL_CRMF_CERTTEMPLATE **certTemplate,
   OSSL_CMP_ATAVS **keySpec);

OSSL_CMP_ATAV *OSSL_CMP_ATAV_create(ASN1_OBJECT *type, ASN1_TYPE *value);
void OSSL_CMP_ATAV_set0(OSSL_CMP_ATAV *itav, ASN1_OBJECT *type,
   ASN1_TYPE *value);
ASN1_OBJECT *OSSL_CMP_ATAV_get0_type(const OSSL_CMP_ATAV *itav);
ASN1_TYPE *OSSL_CMP_ATAV_get0_value(const OSSL_CMP_ATAV *itav);
OSSL_CMP_ATAV *OSSL_CMP_ATAV_new_algId(const X509_ALGOR *alg);
X509_ALGOR *OSSL_CMP_ATAV_get0_algId(const OSSL_CMP_ATAV *atav);
OSSL_CMP_ATAV *OSSL_CMP_ATAV_new_rsaKeyLen(int len);
int OSSL_CMP_ATAV_get_rsaKeyLen(const OSSL_CMP_ATAV *atav);
int OSSL_CMP_ATAV_push1(OSSL_CMP_ATAVS **sk_p, const OSSL_CMP_ATAV *atav);

void OSSL_CMP_MSG_free(OSSL_CMP_MSG *msg);

/* from cmp_ctx.c */
OSSL_CMP_CTX *OSSL_CMP_CTX_new(OSSL_LIB_CTX
 *libctx, const char *propq);
void OSSL_CMP_CTX_free(OSSL_CMP_CTX *ctx);
int OSSL_CMP_CTX_reinit(OSSL_CMP_CTX *ctx);
OSSL_LIB_CTX *OSSL_CMP_CTX_get0_libctx(const OSSL_CMP_CTX *ctx);
const char *OSSL_CMP_CTX_get0_propq(const OSSL_CMP_CTX *ctx);
/* CMP general options: */
#define OSSL_CMP_OPT_LOG_VERBOSITY 0
/* CMP transfer options: */
#define OSSL_CMP_OPT_KEEP_ALIVE 10
#define OSSL_CMP_OPT_MSG_TIMEOUT 11
```

```
#define OSSL_CMP_OPT_TOTAL_TIMEOUT 12
#define OSSL_CMP_OPT_USE_TLS 13
/* CMP request options: */
#define OSSL_CMP_OPT_VALIDITY_DAYS 20
#define OSSL_CMP_OPT_SUBJECTALTNAME_NODEFAULT 21
#define OSSL_CMP_OPT_SUBJECTALTNAME_CRITICAL 22
#define OSSL_CMP_OPT_POLICIES_CRITICAL 23
#define OSSL_CMP_OPT_POPO_METHOD 24
#define OSSL_CMP_OPT_IMPLICIT_CONFIRM 25
#define OSSL_CMP_OPT_DISABLE_CONFIRM 26
#define OSSL_CMP_OPT_REVOCATION_REASON 27
/* CMP protection options: */
#define OSSL_CMP_OPT_UNPROTECTED_SEND 30
#define OSSL_CMP_OPT_UNPROTECTED_ERRORS 31
#define OSSL_CMP_OPT_OWF_ALGNID
 32
#define OSSL_CMP_OPT_MAC_ALGNID 33
#define OSSL_CMP_OPT_DIGEST_ALGNID 34
#define OSSL_CMP_OPT_IGNORE_KEYUSAGE 35
#define OSSL_CMP_OPT_PERMIT_TA_IN_EXTRACERTS_FOR_IR 36
#define OSSL_CMP_OPT_NO_CACHE_EXTRACERTS 37
int OSSL_CMP_CTX_set_option(OSSL_CMP_CTX *ctx, int opt, int val);
int OSSL_CMP_CTX_get_option(const OSSL_CMP_CTX *ctx, int opt);
/* CMP-specific callback for logging and outputting the error queue: */
int OSSL_CMP_CTX_set_log_cb(OSSL_CMP_CTX *ctx, OSSL_CMP_log_cb_t cb);
#define OSSL_CMP_CTX_set_log_verbosity(ctx, level) \
   OSSL_CMP_CTX_set_option(ctx, OSSL_CMP_OPT_LOG_VERBOSITY, level)
void OSSL_CMP_CTX_print_errors(const OSSL_CMP_CTX *ctx);
/* message transfer: */
int OSSL_CMP_CTX_set1_serverPath(OSSL_CMP_CTX *ctx, const char *path);
int OSSL_CMP_CTX_set1_server(OSSL_CMP_CTX *ctx, const char *address);
int OSSL_CMP_CTX_set_serverPort(OSSL_CMP_CTX *ctx, int port);
int OSSL_CMP_CTX_set1_proxy(OSSL_CMP_CTX *ctx, const char *name);
int OSSL_CMP_CTX_set1_no_proxy(OSSL_CMP_CTX
 *ctx, const char *names);
#ifndef OPENSSL_NO_HTTP
int OSSL_CMP_CTX_set_http_cb(OSSL_CMP_CTX *ctx, OSSL_HTTP_bio_cb_t cb);
int OSSL_CMP_CTX_set_http_cb_arg(OSSL_CMP_CTX *ctx, void *arg);
void *OSSL_CMP_CTX_get_http_cb_arg(const OSSL_CMP_CTX *ctx);
#endif
typedef OSSL_CMP_MSG *(*OSSL_CMP_transfer_cb_t)(OSSL_CMP_CTX *ctx,
   const OSSL_CMP_MSG *req);
int OSSL_CMP_CTX_set_transfer_cb(OSSL_CMP_CTX *ctx, OSSL_CMP_transfer_cb_t cb);
int OSSL_CMP_CTX_set_transfer_cb_arg(OSSL_CMP_CTX *ctx, void *arg);
void *OSSL_CMP_CTX_get_transfer_cb_arg(const OSSL_CMP_CTX *ctx);
/* server authentication: */
int OSSL_CMP_CTX_set1_srvCert(OSSL_CMP_CTX *ctx, X509 *cert);
int OSSL_CMP_CTX_set1_expected_sender(OSSL_CMP_CTX *ctx, const X509_NAME *name);
```

```
int OSSL_CMP_CTX_set0_trustedStore(OSSL_CMP_CTX *ctx, X509_STORE *store);
#define OSSL_CMP_CTX_set0_trusted OSSL_CMP_CTX_set0_trustedStore
X509_STORE *OSSL_CMP_CTX_get0_trustedStore(const OSSL_CMP_CTX *ctx);
#define OSSL_CMP_CTX_get0_trusted OSSL_CMP_CTX_get0_trustedStore
int
 OSSL_CMP_CTX_set1_untrusted(OSSL_CMP_CTX *ctx, STACK_OF(X509) *certs);
STACK_OF(X509) *OSSL_CMP_CTX_get0_untrusted(const OSSL_CMP_CTX *ctx);
/* client authentication: */
int OSSL_CMP_CTX_set1_cert(OSSL_CMP_CTX *ctx, X509 *cert);
int OSSL_CMP_CTX_build_cert_chain(OSSL_CMP_CTX *ctx, X509_STORE *own_trusted,
   STACK_OF(X509) *candidates);
int OSSL_CMP_CTX_set1_pkey(OSSL_CMP_CTX *ctx, EVP_PKEY *pkey);
int OSSL_CMP_CTX_set1_referenceValue(OSSL_CMP_CTX *ctx,
   const unsigned char *ref, int len);
int OSSL_CMP_CTX_set1_secretValue(OSSL_CMP_CTX *ctx,
   const unsigned char *sec, int len);
/* CMP message header and extra certificates: */
int OSSL_CMP_CTX_set1_recipient(OSSL_CMP_CTX *ctx, const X509_NAME *name);
int OSSL_CMP_CTX_push0_geninfo_ITAV(OSSL_CMP_CTX *ctx, OSSL_CMP_ITAV *itav);
int OSSL_CMP_CTX_reset_geninfo_ITAVs(OSSL_CMP_CTX *ctx);
STACK_OF(OSSL_CMP_ITAV)
*OSSL_CMP_CTX_get0_geninfo_ITAVs(const OSSL_CMP_CTX *ctx);
int OSSL_CMP_CTX_set1_extraCertsOut(OSSL_CMP_CTX *ctx,
    STACK_OF(X509) *extraCertsOut);
/* certificate template: */
int OSSL_CMP_CTX_set0_newPkey(OSSL_CMP_CTX *ctx, int priv, EVP_PKEY *pkey);
EVP_PKEY *OSSL_CMP_CTX_get0_newPkey(const OSSL_CMP_CTX *ctx, int priv);
int OSSL_CMP_CTX_set1_issuer(OSSL_CMP_CTX *ctx, const X509_NAME *name);
int OSSL_CMP_CTX_set1_serialNumber(OSSL_CMP_CTX *ctx, const ASN1_INTEGER *sn);
int OSSL_CMP_CTX_set1_subjectName(OSSL_CMP_CTX *ctx, const X509_NAME *name);
int OSSL_CMP_CTX_push1_subjectAltName(OSSL_CMP_CTX *ctx,
   const GENERAL_NAME *name);
int OSSL_CMP_CTX_set0_reqExtensions(OSSL_CMP_CTX *ctx, X509_EXTENSIONS *exts);
int OSSL_CMP_CTX_reqExtensions_have_SAN(OSSL_CMP_CTX *ctx);
int OSSL_CMP_CTX_push0_policy(OSSL_CMP_CTX *ctx, POLICYINFO *pinfo);
int OSSL_CMP_CTX_set1_oldCert(OSSL_CMP_CTX *ctx, X509 *cert);
int OSSL_CMP_CTX_set1_p10CSR(OSSL_CMP_CTX *ctx, const X509_REQ *csr);
/* misc body contents: */
int OSSL_CMP_CTX_push0_genm_ITAV(OSSL_CMP_CTX *ctx, OSSL_CMP_ITAV *itav);
/* certificate confirmation:
 */
typedef int (*OSSL_CMP_certConf_cb_t)(OSSL_CMP_CTX *ctx, X509 *cert,
   int fail_info, const char **txt);
int OSSL_CMP_certConf_cb(OSSL_CMP_CTX *ctx, X509 *cert, int fail_info,
   const char **text);
int OSSL_CMP_CTX_set_certConf_cb(OSSL_CMP_CTX *ctx, OSSL_CMP_certConf_cb_t cb);
int OSSL_CMP_CTX_set_certConf_cb_arg(OSSL_CMP_CTX *ctx, void *arg);
void *OSSL_CMP_CTX_get_certConf_cb_arg(const OSSL_CMP_CTX *ctx);
```

```
/* result fetching: */
int OSSL_CMP_CTX_get_status(const OSSL_CMP_CTX *ctx);
OSSL_CMP_PKIFREETEXT *OSSL_CMP_CTX_get0_statusString(const OSSL_CMP_CTX *ctx);
int OSSL_CMP_CTX_get_failInfoCode(const OSSL_CMP_CTX *ctx);
#define OSSL_CMP_PKISI_BUFLEN 1024
X509 *OSSL_CMP_CTX_get0_validatedSrvCert(const OSSL_CMP_CTX *ctx);
X509 *OSSL_CMP_CTX_get0_newCert(const OSSL_CMP_CTX *ctx);
STACK_OF(X509) *OSSL_CMP_CTX_get1_newChain(const OSSL_CMP_CTX *ctx);
STACK_OF(X509) *OSSL_CMP_CTX_get1_caPubs(const OSSL_CMP_CTX *ctx);
STACK_OF(X509) *OSSL_CMP_CTX_get1_extraCertsIn(const OSSL_CMP_CTX *ctx);
int
 OSSL_CMP_CTX_set1_transactionID(OSSL_CMP_CTX *ctx,
   const ASN1_OCTET_STRING *id);
int OSSL_CMP_CTX_set1_senderNonce(OSSL_CMP_CTX *ctx,
   const ASN1_OCTET_STRING *nonce);

/* from cmp_status.c */
char *OSSL_CMP_CTX_snprint_PKIStatus(const OSSL_CMP_CTX *ctx, char *buf,
   size_t bufsize);
char *OSSL_CMP_snprint_PKIStatusInfo(const OSSL_CMP_PKISI *statusInfo,
   char *buf, size_t bufsize);
OSSL_CMP_PKISI *
OSSL_CMP_STATUSINFO_new(int status, int fail_info, const char *text);

/* from cmp_hdr.c */
ASN1_OCTET_STRING *OSSL_CMP_HDR_get0_transactionID(const OSSL_CMP_PKIHEADER *hdr);
ASN1_OCTET_STRING *OSSL_CMP_HDR_get0_recipNonce(const OSSL_CMP_PKIHEADER *hdr);
STACK_OF(OSSL_CMP_ITAV)
*OSSL_CMP_HDR_get0_geninfo_ITAVs(const OSSL_CMP_PKIHEADER *hdr);

/* from cmp_msg.c */
OSSL_CMP_PKIHEADER *OSSL_CMP_MSG_get0_header(const OSSL_CMP_MSG *msg);
int OSSL_CMP_MSG_get_bodytype(const OSSL_CMP_MSG *msg);
X509_PUBKEY *OSSL_CMP_MSG_get0_certreq_publickey(const OSSL_CMP_MSG *msg);
int OSSL_CMP_MSG_update_transactionID(OSSL_CMP_CTX
 *ctx, OSSL_CMP_MSG *msg);
int OSSL_CMP_MSG_update_recipNonce(OSSL_CMP_CTX *ctx, OSSL_CMP_MSG *msg);
OSSL_CRMF_MSG *OSSL_CMP_CTX_setup_CRM(OSSL_CMP_CTX *ctx, int for_KUR, int rid);
OSSL_CMP_MSG *OSSL_CMP_MSG_read(const char *file, OSSL_LIB_CTX *libctx,
   const char *propq);
int OSSL_CMP_MSG_write(const char *file, const OSSL_CMP_MSG *msg);
OSSL_CMP_MSG *d2i_OSSL_CMP_MSG_bio(BIO *bio, OSSL_CMP_MSG **msg);
int i2d_OSSL_CMP_MSG_bio(BIO *bio, const OSSL_CMP_MSG *msg);

/* from cmp_vfy.c */
int OSSL_CMP_validate_msg(OSSL_CMP_CTX *ctx, const OSSL_CMP_MSG *msg);
int OSSL_CMP_validate_cert_path(const OSSL_CMP_CTX *ctx,
   X509_STORE *trusted_store, X509 *cert);
```

```
/* from cmp_http.c */
#ifndef OPENSSL_NO_HTTP
OSSL_CMP_MSG *OSSL_CMP_MSG_http_perform(OSSL_CMP_CTX *ctx,
   const OSSL_CMP_MSG *req);
#endif

/* from cmp_server.c */
typedef struct ossl_cmp_srv_ctx_st OSSL_CMP_SRV_CTX;
OSSL_CMP_MSG *OSSL_CMP_SRV_process_request(OSSL_CMP_SRV_CTX *srv_ctx,
   const
 OSSL_CMP_MSG *req);
OSSL_CMP_MSG *OSSL_CMP_CTX_server_perform(OSSL_CMP_CTX *client_ctx,
   const OSSL_CMP_MSG *req);
OSSL_CMP_SRV_CTX *OSSL_CMP_SRV_CTX_new(OSSL_LIB_CTX *libctx, const char *propq);
void OSSL_CMP_SRV_CTX_free(OSSL_CMP_SRV_CTX *srv_ctx);
typedef OSSL_CMP_PKISI *(*OSSL_CMP_SRV_cert_request_cb_t)(OSSL_CMP_SRV_CTX *srv_ctx, const
OSSL_CMP_MSG *req, int certReqId,
   const OSSL_CRMF_MSG *crm, const X509_REQ *p10cr,
   X509 **certOut, STACK_OF(X509) **chainOut, STACK_OF(X509) **caPubs);
typedef OSSL_CMP_PKISI *(*OSSL_CMP_SRV_rr_cb_t)(OSSL_CMP_SRV_CTX *srv_ctx,
   const OSSL_CMP_MSG *req,
   const X509_NAME *issuer,
   const ASN1_INTEGER *serial);
typedef int (*OSSL_CMP_SRV_genm_cb_t)(OSSL_CMP_SRV_CTX *srv_ctx,
   const OSSL_CMP_MSG *req,
   const STACK_OF(OSSL_CMP_ITAV) *in,
   STACK_OF(OSSL_CMP_ITAV) **out);
typedef void (*OSSL_CMP_SRV_error_cb_t)(OSSL_CMP_SRV_CTX *srv_ctx,
   const OSSL_CMP_MSG *req,
   const OSSL_CMP_PKISI *statusInfo,
   const ASN1_INTEGER
 *errorCode,
   const OSSL_CMP_PKIFREETEXT *errDetails);
typedef int (*OSSL_CMP_SRV_certConf_cb_t)(OSSL_CMP_SRV_CTX *srv_ctx,
   const OSSL_CMP_MSG *req,
   int certReqId,
   const ASN1_OCTET_STRING *certHash,
   const OSSL_CMP_PKISI *si);
typedef int (*OSSL_CMP_SRV_pollReq_cb_t)(OSSL_CMP_SRV_CTX *srv_ctx,
   const OSSL_CMP_MSG *req, int certReqId,
   OSSL_CMP_MSG **certReq,
   int64_t *check_after);
int OSSL_CMP_SRV_CTX_init(OSSL_CMP_SRV_CTX *srv_ctx, void *custom_ctx,
   OSSL_CMP_SRV_cert_request_cb_t process_cert_request,
   OSSL_CMP_SRV_rr_cb_t process_rr,
   OSSL_CMP_SRV_genm_cb_t process_genm,
   OSSL_CMP_SRV_error_cb_t process_error,
```

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   OSSL_CMP_SRV_certConf_cb_t process_certConf,
   OSSL_CMP_SRV_pollReq_cb_t process_pollReq);
typedef int (*OSSL_CMP_SRV_delayed_delivery_cb_t)(OSSL_CMP_SRV_CTX *srv_ctx,
   const OSSL_CMP_MSG *req);
typedef int (*OSSL_CMP_SRV_clean_transaction_cb_t)(OSSL_CMP_SRV_CTX *srv_ctx,
   const ASN1_OCTET_STRING *id);
int OSSL_CMP_SRV_CTX_init_trans(OSSL_CMP_SRV_CTX
 *srv_ctx,
   OSSL_CMP_SRV_delayed_delivery_cb_t delay,
   OSSL_CMP_SRV_clean_transaction_cb_t clean);
OSSL_CMP_CTX *OSSL_CMP_SRV_CTX_get0_cmp_ctx(const OSSL_CMP_SRV_CTX *srv_ctx);
void *OSSL_CMP_SRV_CTX_get0_custom_ctx(const OSSL_CMP_SRV_CTX *srv_ctx);
int OSSL_CMP_SRV_CTX_set_send_unprotected_errors(OSSL_CMP_SRV_CTX *srv_ctx,
   int val);
int OSSL_CMP_SRV_CTX_set_accept_unprotected(OSSL_CMP_SRV_CTX *srv_ctx, int val);
int OSSL_CMP_SRV_CTX_set_accept_raverified(OSSL_CMP_SRV_CTX *srv_ctx, int val);
int OSSL_CMP_SRV_CTX_set_grant_implicit_confirm(OSSL_CMP_SRV_CTX *srv_ctx,
   int val);

/* from cmp_client.c */
X509 *OSSL_CMP_exec_certreq(OSSL_CMP_CTX *ctx, int req_type,
   const OSSL_CRMF_MSG *crm);
#define OSSL_CMP_IR 0
#define OSSL_CMP_CR 2
#define OSSL_CMP_P10CR 4
#define OSSL_CMP_KUR 7
#define OSSL_CMP_GENM 21
#define OSSL_CMP_ERROR 23
#define OSSL_CMP_exec_IR_ses(ctx) \
   OSSL_CMP_exec_certreq(ctx, OSSL_CMP_IR, NULL)
#define OSSL_CMP_exec_CR_ses(ctx)
 \
   OSSL_CMP_exec_certreq(ctx, OSSL_CMP_CR, NULL)
#define OSSL_CMP_exec_P10CR_ses(ctx) \
   OSSL_CMP_exec_certreq(ctx, OSSL_CMP_P10CR, NULL)
#define OSSL_CMP_exec_KUR_ses(ctx) \
   OSSL_CMP_exec_certreq(ctx, OSSL_CMP_KUR, NULL)
int OSSL_CMP_try_certreq(OSSL_CMP_CTX *ctx, int req_type,
   const OSSL_CRMF_MSG *crm, int *checkAfter);
int OSSL_CMP_exec_RR_ses(OSSL_CMP_CTX *ctx);
STACK_OF(OSSL_CMP_ITAV) *OSSL_CMP_exec_GENM_ses(OSSL_CMP_CTX *ctx);

/* from cmp_genm.c */
int OSSL_CMP_get1_caCerts(OSSL_CMP_CTX *ctx, STACK_OF(X509) **out);
int OSSL_CMP_get1_rootCaKeyUpdate(OSSL_CMP_CTX *ctx,
   const X509 *oldWithOld, X509 **newWithNew,
   X509 **newWithOld, X509 **oldWithNew);
int OSSL_CMP_get1_crlUpdate(OSSL_CMP_CTX *ctx, const X509 *crlcert,
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  const X509_CRL *last_crl,
  X509_CRL **crl);
int OSSL_CMP_get1_certReqTemplate(OSSL_CMP_CTX *ctx,
  OSSL_CRMF_CERTTEMPLATE **certTemplate,
  OSSL_CMP_ATAVS **keySpec);

#ifdef __cplusplus
}
#endif
#endif /* !defined(OPENSSL_NO_CMP) */
#endif
 /* !defined(OPENSSL_CMP_H) */
```

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console.log('ok');
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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/ui.h.in
*
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*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_UI_H
#define OPENSSL_UI_H
#pragma once
```

```
#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_UI_H
#endif

#include <openssl/opensslconf.h>

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#include <openssl/crypto.h>
#endif
#include <openssl/safestack.h>
#include <openssl/pem.h>
#include <openssl/types.h>
#include <openssl/uierr.h>

/* For compatibility reasons, the macro OPENSSL_NO_UI is currently retained */
#ifndef OPENSSL_NO_DEPRECATED_3_0
#ifdef OPENSSL_NO_UI_CONSOLE
#define OPENSSL_NO_UI
#endif
#endif

#ifdef
 __cplusplus
extern "C" {
#endif

/*
* All the following functions return -1 or NULL on error and in some cases
* (UI_process()) -2 if interrupted or in some other way cancelled. When
* everything is fine, they return 0, a positive value or a non-NULL pointer,
* all depending on their purpose.
*/

/* Creators and destructor.   */
UI *UI_new(void);
UI *UI_new_method(const UI_METHOD *method);
void UI_free(UI *ui);

/*-
  The following functions are used to add strings to be printed and prompt
  strings to prompt for data.  The names are UI_{add,dup}_<function>_string
  and UI_{add,dup}_input_boolean.

  UI_{add,dup}_<function>_string have the following meanings:
      add     add a text or prompt string.  The pointers given to these
              functions are used verbatim, no copying is done.
      dup     make a copy of the text or prompt string, then add the copy
```

to the collection of strings in the user interface.
<function>

The function is a name for the functionality that the given
string shall be used for. It can be one of:
input use the string as data prompt.
verify use the string as verification prompt. This
is used to verify a previous input.
info use the string for informational output.
error use the string for error output.
Honestly, there's currently no difference between info and error for the
moment.

UI_{add,dup}_input_boolean have the same semantics for "add" and "dup",
and are typically used when one wants to prompt for a yes/no response.

All of the functions in this group take a UI and a prompt string.
The string input and verify addition functions also take a flag argument,
a buffer for the result to end up with, a minimum input size and a maximum
input size (the result buffer MUST be large enough to be able
to contain
the maximum number of characters). Additionally, the verify addition
functions takes another buffer to compare the result against.
The boolean input functions take an action description string (which should
be safe to ignore if the expected user action is obvious, for example with
a dialog box with an OK button and a Cancel button), a string of acceptable
characters to mean OK and to mean Cancel. The two last strings are checked
to make sure they don't have common characters. Additionally, the same
flag argument as for the string input is taken, as well as a result buffer.
The result buffer is required to be at least one byte long. Depending on
the answer, the first character from the OK or the Cancel character strings
will be stored in the first byte of the result buffer. No NUL will be
added, so the result is *not* a string.

On success, the all return an index of the added information. That index
is useful when retrieving
results with UI_get0_result(). */

```
int UI_add_input_string(UI *ui, const char *prompt, int flags,
    char *result_buf, int minsize, int maxsize);
int UI_dup_input_string(UI *ui, const char *prompt, int flags,
    char *result_buf, int minsize, int maxsize);
int UI_add_verify_string(UI *ui, const char *prompt, int flags,
    char *result_buf, int minsize, int maxsize,
    const char *test_buf);
int UI_dup_verify_string(UI *ui, const char *prompt, int flags,
    char *result_buf, int minsize, int maxsize,
    const char *test_buf);
int UI_add_input_boolean(UI *ui, const char *prompt, const char *action_desc,
```

```
   const char *ok_chars, const char *cancel_chars,
   int flags, char *result_buf);
int UI_dup_input_boolean(UI *ui, const char *prompt, const char *action_desc,
   const char *ok_chars, const char *cancel_chars,
   int flags, char *result_buf);
int UI_add_info_string(UI *ui, const char *text);
int UI_dup_info_string(UI *ui, const char *text);
int UI_add_error_string(UI *ui, const
 char *text);
int UI_dup_error_string(UI *ui, const char *text);

/* These are the possible flags.  They can be or'ed together. */
/* Use to have echoing of input */
#define UI_INPUT_FLAG_ECHO 0x01
/*
* Use a default password.  Where that password is found is completely up to
* the application, it might for example be in the user data set with
* UI_add_user_data().  It is not recommended to have more than one input in
* each UI being marked with this flag, or the application might get
* confused.
*/
#define UI_INPUT_FLAG_DEFAULT_PWD 0x02

/*-
* The user of these routines may want to define flags of their own.  The core
* UI won't look at those, but will pass them on to the method routines.  They
* must use higher bits so they don't get confused with the UI bits above.
* UI_INPUT_FLAG_USER_BASE tells which is the lowest bit to use.  A good
* example of use is this:
*
*    #define MY_UI_FLAG1       (0x01 << UI_INPUT_FLAG_USER_BASE)
*
*/
#define UI_INPUT_FLAG_USER_BASE 16

/*-
 * The following function helps construct a prompt.
* phrase_desc is a textual short description of the phrase to enter,
* for example "pass phrase", and
* object_name is the name of the object
* (which might be a card name or a file name) or NULL.
* The returned string shall always be allocated on the heap with
* OPENSSL_malloc(), and need to be free'd with OPENSSL_free().
*
* If the ui_method doesn't contain a pointer to a user-defined prompt
* constructor, a default string is built, looking like this:
*
*       "Enter {phrase_desc} for {object_name}:"
```

```
*
* So, if phrase_desc has the value "pass phrase" and object_name has
* the value "foo.key", the resulting string is:
*
*       "Enter pass phrase for foo.key:"
*/
char *UI_construct_prompt(UI *ui_method,
   const char *phrase_desc, const char *object_name);

/*
* The following function is used to store a pointer to user-specific data.
* Any previous such pointer will be returned and replaced.
*
* For callback
 purposes, this function makes a lot more sense than using
* ex_data, since the latter requires that different parts of OpenSSL or
* applications share the same ex_data index.
*
* Note that the UI_OpenSSL() method completely ignores the user data. Other
* methods may not, however.
*/
void *UI_add_user_data(UI *ui, void *user_data);
/*
* Alternatively, this function is used to duplicate the user data.
* This uses the duplicator method function.  The destroy function will
* be used to free the user data in this case.
*/
int UI_dup_user_data(UI *ui, void *user_data);
/* We need a user data retrieving function as well.  */
void *UI_get0_user_data(UI *ui);

/* Return the result associated with a prompt given with the index i. */
const char *UI_get0_result(UI *ui, int i);
int UI_get_result_length(UI *ui, int i);

/* When all strings have been added, process the whole thing. */
int UI_process(UI *ui);

/*
* Give a user interface parameterised control commands.  This can be used to
 * send down an integer, a data pointer or a function pointer, as well as be
* used to get information from a UI.
*/
int UI_ctrl(UI *ui, int cmd, long i, void *p, void (*f)(void));

/* The commands */
/*
* Use UI_CONTROL_PRINT_ERRORS with the value 1 to have UI_process print the
```

```
* OpenSSL error stack before printing any info or added error messages and
* before any prompting.
*/
#define UI_CTRL_PRINT_ERRORS 1
/*
* Check if a UI_process() is possible to do again with the same instance of
* a user interface.  This makes UI_ctrl() return 1 if it is redoable, and 0
* if not.
*/
#define UI_CTRL_IS_REDOABLE 2

/* Some methods may use extra data */
#define UI_set_app_data(s, arg) UI_set_ex_data(s, 0, arg)
#define UI_get_app_data(s) UI_get_ex_data(s, 0)

#define UI_get_ex_new_index(l, p, newf, dupf, freef) \
   CRYPTO_get_ex_new_index(CRYPTO_EX_INDEX_UI, l, p, newf, dupf, freef)
int UI_set_ex_data(UI *r, int idx, void *arg);
void *UI_get_ex_data(const UI *r, int idx);

/* Use specific
 methods instead of the built-in one */
void UI_set_default_method(const UI_METHOD *meth);
const UI_METHOD *UI_get_default_method(void);
const UI_METHOD *UI_get_method(UI *ui);
const UI_METHOD *UI_set_method(UI *ui, const UI_METHOD *meth);

#ifndef OPENSSL_NO_UI_CONSOLE

/* The method with all the built-in thingies */
UI_METHOD *UI_OpenSSL(void);

#endif

/*
* NULL method.  Literally does nothing, but may serve as a placeholder
* to avoid internal default.
*/
const UI_METHOD *UI_null(void);

/* ---------- For method writers ---------- */
/*-
  A method contains a number of functions that implement the low level
  of the User Interface.  The functions are:

      an opener       This function starts a session, maybe by opening
                      a channel to a tty, or by opening a window.
      a writer        This function is called to write a given string,
```

maybe to the tty, maybe as a field label in a
window.

a
flusher This function is called to flush everything that
has been output so far. It can be used to actually
display a dialog box after it has been built.

a reader This function is called to read a given prompt,
maybe from the tty, maybe from a field in a
window. Note that it's called with all string
structures, not only the prompt ones, so it must
check such things itself.

a closer This function closes the session, maybe by closing
the channel to the tty, or closing the window.

All these functions are expected to return:

0 on error.
1 on success.
-1 on out-of-band events, for example if some prompting has
been canceled (by pressing Ctrl-C, for example). This is
only checked when returned by the flusher or
the reader.

The way this is used, the opener is first called, then the writer for all
strings, then the flusher, then the reader for all strings and finally the
closer. Note that if you want to prompt from a terminal or other command
line interface, the best is to have the reader also write the prompts
instead of having the writer do it. If you want to prompt from a dialog
box, the writer can be used to build up the contents of the box, and the
flusher to actually display the box and run the event loop until all data
has been given, after which the reader only grabs the given data and puts
them back into the UI strings.

All method functions take a UI as argument. Additionally, the writer and
the reader take a UI_STRING.
*/

```
/*
* The UI_STRING type is the data structure that contains all the needed info
* about a string or a prompt, including test data for a verification prompt.
*/
typedef struct ui_string_st UI_STRING;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(UI_STRING,
 UI_STRING, UI_STRING)
#define sk_UI_STRING_num(sk) OPENSSL_sk_num(ossl_check_const_UI_STRING_sk_type(sk))
#define sk_UI_STRING_value(sk, idx) ((UI_STRING
```

```
*)OPENSSL_sk_value(ossl_check_const_UI_STRING_sk_type(sk), (idx)))
#define sk_UI_STRING_new(cmp) ((STACK_OF(UI_STRING)
*)OPENSSL_sk_new(ossl_check_UI_STRING_compfunc_type(cmp)))
#define sk_UI_STRING_new_null() ((STACK_OF(UI_STRING) *)OPENSSL_sk_new_null())
#define sk_UI_STRING_new_reserve(cmp, n) ((STACK_OF(UI_STRING)
*)OPENSSL_sk_new_reserve(ossl_check_UI_STRING_compfunc_type(cmp), (n)))
#define sk_UI_STRING_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_UI_STRING_sk_type(sk), (n))
#define sk_UI_STRING_free(sk) OPENSSL_sk_free(ossl_check_UI_STRING_sk_type(sk))
#define sk_UI_STRING_zero(sk) OPENSSL_sk_zero(ossl_check_UI_STRING_sk_type(sk))
#define sk_UI_STRING_delete(sk, i) ((UI_STRING *)OPENSSL_sk_delete(ossl_check_UI_STRING_sk_type(sk),
(i)))
#define sk_UI_STRING_delete_ptr(sk, ptr) ((UI_STRING
*)OPENSSL_sk_delete_ptr(ossl_check_UI_STRING_sk_type(sk),
 ossl_check_UI_STRING_type(ptr)))
#define sk_UI_STRING_push(sk, ptr) OPENSSL_sk_push(ossl_check_UI_STRING_sk_type(sk),
ossl_check_UI_STRING_type(ptr))
#define sk_UI_STRING_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_UI_STRING_sk_type(sk),
ossl_check_UI_STRING_type(ptr))
#define sk_UI_STRING_pop(sk) ((UI_STRING *)OPENSSL_sk_pop(ossl_check_UI_STRING_sk_type(sk)))
#define sk_UI_STRING_shift(sk) ((UI_STRING *)OPENSSL_sk_shift(ossl_check_UI_STRING_sk_type(sk)))
#define sk_UI_STRING_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_UI_STRING_sk_type(sk),ossl_check_UI_STRING_freefunc_type(freefunc))
#define sk_UI_STRING_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_UI_STRING_sk_type(sk),
ossl_check_UI_STRING_type(ptr), (idx))
#define sk_UI_STRING_set(sk, idx, ptr) ((UI_STRING *)OPENSSL_sk_set(ossl_check_UI_STRING_sk_type(sk),
(idx), ossl_check_UI_STRING_type(ptr)))
#define sk_UI_STRING_find(sk, ptr) OPENSSL_sk_find(ossl_check_UI_STRING_sk_type(sk),
 ossl_check_UI_STRING_type(ptr))
#define sk_UI_STRING_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_UI_STRING_sk_type(sk),
ossl_check_UI_STRING_type(ptr))
#define sk_UI_STRING_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_UI_STRING_sk_type(sk),
ossl_check_UI_STRING_type(ptr), pnum)
#define sk_UI_STRING_sort(sk) OPENSSL_sk_sort(ossl_check_UI_STRING_sk_type(sk))
#define sk_UI_STRING_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_UI_STRING_sk_type(sk))
#define sk_UI_STRING_dup(sk) ((STACK_OF(UI_STRING)
*)OPENSSL_sk_dup(ossl_check_const_UI_STRING_sk_type(sk)))
#define sk_UI_STRING_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(UI_STRING)
*)OPENSSL_sk_deep_copy(ossl_check_const_UI_STRING_sk_type(sk),
ossl_check_UI_STRING_copyfunc_type(copyfunc), ossl_check_UI_STRING_freefunc_type(freefunc)))
#define sk_UI_STRING_set_cmp_func(sk, cmp)
((sk_UI_STRING_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_UI_STRING_sk_type(sk),
ossl_check_UI_STRING_compfunc_type(cmp)))

/*
 clang-format on */

/*
* The different types of strings that are currently supported. This is only
```

```
* needed by method authors.
*/
enum UI_string_types {
   UIT_NONE = 0,
   UIT_PROMPT, /* Prompt for a string */
   UIT_VERIFY, /* Prompt for a string and verify */
   UIT_BOOLEAN, /* Prompt for a yes/no response */
   UIT_INFO, /* Send info to the user */
   UIT_ERROR /* Send an error message to the user */
};

/* Create and manipulate methods */
UI_METHOD *UI_create_method(const char *name);
void UI_destroy_method(UI_METHOD *ui_method);
int UI_method_set_opener(UI_METHOD *method, int (*opener)(UI *ui));
int UI_method_set_writer(UI_METHOD *method,
   int (*writer)(UI *ui, UI_STRING *uis));
int UI_method_set_flusher(UI_METHOD *method, int (*flusher)(UI *ui));
int UI_method_set_reader(UI_METHOD *method,
   int (*reader)(UI *ui, UI_STRING *uis));
int UI_method_set_closer(UI_METHOD *method, int (*closer)(UI *ui));
int UI_method_set_data_duplicator(UI_METHOD *method,
   void *(*duplicator)(UI
 *ui, void *ui_data),
   void (*destructor)(UI *ui, void *ui_data));
int UI_method_set_prompt_constructor(UI_METHOD *method,
   char *(*prompt_constructor)(UI *ui,
       const char
           *phrase_desc,
       const char
           *object_name));
int UI_method_set_ex_data(UI_METHOD *method, int idx, void *data);
int (*UI_method_get_opener(const UI_METHOD *method))(UI *);
int (*UI_method_get_writer(const UI_METHOD *method))(UI *, UI_STRING *);
int (*UI_method_get_flusher(const UI_METHOD *method))(UI *);
int (*UI_method_get_reader(const UI_METHOD *method))(UI *, UI_STRING *);
int (*UI_method_get_closer(const UI_METHOD *method))(UI *);
char *(*UI_method_get_prompt_constructor(const UI_METHOD *method))(UI *, const char *, const char *);
void *(*UI_method_get_data_duplicator(const UI_METHOD *method))(UI *, void *);
void (*UI_method_get_data_destructor(const UI_METHOD *method))(UI *, void *);
const void *UI_method_get_ex_data(const UI_METHOD *method, int idx);

/*
*
 The following functions are helpers for method writers to access relevant
* data from a UI_STRING.
*/
```

```
/* Return type of the UI_STRING */
enum UI_string_types UI_get_string_type(UI_STRING *uis);
/* Return input flags of the UI_STRING */
int UI_get_input_flags(UI_STRING *uis);
/* Return the actual string to output (the prompt, info or error) */
const char *UI_get0_output_string(UI_STRING *uis);
/*
* Return the optional action string to output (the boolean prompt
* instruction)
*/
const char *UI_get0_action_string(UI_STRING *uis);
/* Return the result of a prompt */
const char *UI_get0_result_string(UI_STRING *uis);
int UI_get_result_string_length(UI_STRING *uis);
/*
* Return the string to test the result against.  Only useful with verifies.
*/
const char *UI_get0_test_string(UI_STRING *uis);
/* Return the required minimum size of the result */
int UI_get_result_minsize(UI_STRING *uis);
/* Return the required maximum size of the result */
int UI_get_result_maxsize(UI_STRING *uis);
/*
 Set the result of a UI_STRING. */
int UI_set_result(UI *ui, UI_STRING *uis, const char *result);
int UI_set_result_ex(UI *ui, UI_STRING *uis, const char *result, int len);

/* A couple of popular utility functions */
int UI_UTIL_read_pw_string(char *buf, int length, const char *prompt,
   int verify);
int UI_UTIL_read_pw(char *buf, char *buff, int size, const char *prompt,
   int verify);
UI_METHOD *UI_UTIL_wrap_read_pem_callback(pem_password_cb *cb, int rwflag);

#ifdef __cplusplus
}
#endif
#endif
```

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```
{
 'variables': {
   'openssl_defines_BSD-x86': [
     'NDEBUG',
     'L_ENDIAN',
     'OPENSSL_BUILDING_OPENSSL',
     'AES_ASM',
     'CMLL_ASM',
     'DES_ASM',
     'ECP_NISTZ256_ASM',
     'GHASH_ASM',
     'MD5_ASM',
     'OPENSSL_BN_ASM_GF2m',
     'OPENSSL_BN_ASM_MONT',
     'OPENSSL_BN_ASM_PART_WORDS',
     'OPENSSL_CPUID_OBJ',
     'OPENSSL_IA32_SSE2',
     'PADLOCK_ASM',
     'POLY1305_ASM',
     'RC4_ASM',
     'RMD160_ASM',
     'SHA1_ASM',
     'SHA256_ASM',
     'SHA512_ASM',
     'VPAES_ASM',
     'WHIRLPOOL_ASM',
     'OPENSSL_PIC',
   ],
   'openssl_cflags_BSD-x86': [
     '-Wa,--noexecstack',
     '-Wall -O3 -fomit-frame-pointer',
     '-pthread',
     '-Wall -O3 -fomit-frame-pointer',
   ],
   'openssl_ex_libs_BSD-x86': [
```

```
  '-pthread',
],
'openssl_cli_srcs_BSD-x86': [
  'openssl/apps/lib/cmp_mock_srv.c',
  'openssl/apps/asn1parse.c',
  'openssl/apps/ca.c',
  'openssl/apps/ciphers.c',
  'openssl/apps/cmp.c',
   'openssl/apps/cms.c',
  'openssl/apps/crl.c',
  'openssl/apps/crl2pkcs7.c',
  'openssl/apps/dgst.c',
  'openssl/apps/dhparam.c',
  'openssl/apps/dsa.c',
  'openssl/apps/dsaparam.c',
  'openssl/apps/ec.c',
  'openssl/apps/ecparam.c',
  'openssl/apps/enc.c',
  'openssl/apps/engine.c',
  'openssl/apps/errstr.c',
  'openssl/apps/fipsinstall.c',
  'openssl/apps/gendsa.c',
  'openssl/apps/genpkey.c',
  'openssl/apps/genrsa.c',
  'openssl/apps/info.c',
  'openssl/apps/kdf.c',
  'openssl/apps/list.c',
  'openssl/apps/mac.c',
  'openssl/apps/nseq.c',
  'openssl/apps/ocsp.c',
  'openssl/apps/openssl.c',
  'openssl/apps/passwd.c',
  'openssl/apps/pkcs12.c',
  'openssl/apps/pkcs7.c',
  'openssl/apps/pkcs8.c',
  'openssl/apps/pkey.c',
  'openssl/apps/pkeyparam.c',
  'openssl/apps/pkeyutl.c',
  'openssl/apps/prime.c',
  './config/archs/BSD-x86/asm/apps/progs.c',

 'openssl/apps/rand.c',
  'openssl/apps/rehash.c',
  'openssl/apps/req.c',
  'openssl/apps/rsa.c',
  'openssl/apps/rsautl.c',
  'openssl/apps/s_client.c',
  'openssl/apps/s_server.c',
```

```
    'openssl/apps/s_time.c',
    'openssl/apps/sess_id.c',
    'openssl/apps/skeyutl.c',
    'openssl/apps/smime.c',
    'openssl/apps/speed.c',
    'openssl/apps/spkac.c',
    'openssl/apps/srp.c',
    'openssl/apps/storeutl.c',
    'openssl/apps/ts.c',
    'openssl/apps/verify.c',
    'openssl/apps/version.c',
    'openssl/apps/x509.c',
    'openssl/apps/lib/app_libctx.c',
    'openssl/apps/lib/app_params.c',
    'openssl/apps/lib/app_provider.c',
    'openssl/apps/lib/app_rand.c',
    'openssl/apps/lib/app_x509.c',
    'openssl/apps/lib/apps.c',
    'openssl/apps/lib/apps_opt_printf.c',
    'openssl/apps/lib/apps_ui.c',
    'openssl/apps/lib/columns.c',
    'openssl/apps/lib/engine.c',
    'openssl/apps/lib/engine_loader.c',

 'openssl/apps/lib/fmt.c',
    'openssl/apps/lib/http_server.c',
    'openssl/apps/lib/log.c',
    'openssl/apps/lib/names.c',
    'openssl/apps/lib/opt.c',
    'openssl/apps/lib/s_cb.c',
    'openssl/apps/lib/s_socket.c',
    'openssl/apps/lib/tlssrp_depr.c',
  ],
 },
 'defines': ['<@(openssl_defines_BSD-x86)'],
 'include_dirs': [
  './include',
 ],
 'cflags' : ['<@(openssl_cflags_BSD-x86)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86)'],
 'sources': ['<@(openssl_cli_srcs_BSD-x86)'],
}
```

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```
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#define SRC_PERMISSION_INSPECTOR_PERMISSION_H_

#if defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS

#include <string>
#include "permission/permission_base.h"

namespace node {

namespace permission {

class InspectorPermission final : public PermissionBase {
public:
 void Apply(Environment* env,
            const std::vector<std::string>& allow,
            PermissionScope scope) override;
 bool is_granted(Environment* env,
                 PermissionScope perm,
                 const std::string_view& param = "") const override;

private:
 bool deny_all_;
};

}  // namespace permission

}  // namespace node

#endif  // defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
#endif  // SRC_PERMISSION_INSPECTOR_PERMISSION_H_
```

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 """
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*/

#define PLATFORM "platform: BSD-x86"
#define DATE "built on: Tue Jan 27 17:25:49 2026 UTC"

/*
* Generate compiler_flags as an array of individual characters. This is a
* workaround for the situation where CFLAGS gets too long for a C90 string
* literal
*/
static const char compiler_flags[] = {
   'c','o','m','p','i','l','e','r',':',' ','.','.','/','c','o','n',
   'f','i','g','/','f','a','k','e','_','g','c','c','.','p','l',' ',
   '-','f','P','I','C',' ','-','p','t','h','r','e','a','d',' ','-',
   'W','a',',','-','-','n','o','e','x','e','c','s','t','a','c','k',
   ' ','-','W','a','l','l','
 ','-','O','3',' ','-','f','o','m','i',
   't','-','f','r','a','m','e','-','p','o','i','n','t','e','r',' ',
   '-','D','L','_','E','N','D','I','A','N',' ','-','D','O','P','E',
   'N','S','S','L','_','P','I','C',' ','-','D','_','T','H','R','E',
   'A','D','_','S','A','F','E',' ','-','D','_','R','E','E','N','T',
   'R','A','N','T',' ','-','D','O','P','E','N','S','S','L','_','B',
   'U','I','L','D','I','N','G','_','O','P','E','N','S','S','L',' ',
   '-','D','N','D','E','B','U','G','\0'
};
```

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Felix Geisendrfer (felix@debuggable.com)

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/*
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* Generated by Makefile from include/openssl/fipskey.h.in
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#define OPENSSL_FIPSKEY_H
#pragma once

#ifdef __cplusplus
extern "C" {
#endif

/*
* The FIPS validation HMAC key, usable as an array initializer.
*/
/* clang-format off */
#define FIPS_KEY_ELEMENTS \
   0xf4, 0x55, 0x66, 0x50, 0xac, 0x31, 0xd3, 0x54, 0x61, 0x61, 0x0b, 0xac, 0x4e, 0xd8, 0x1b, 0x1a, 0x18, 0x1b,
0x2d, 0x8a, 0x43, 0xea, 0x28, 0x54, 0xcb, 0xae, 0x22, 0xca, 0x74, 0x56, 0x08, 0x13
/* clang-format on */

/*
* The FIPS validation key, as a string.
*/
/* clang-format off */
#define FIPS_KEY_STRING "f4556650ac31d35461610bac4ed81b1a181b2d8a43ea2854cbae22ca74560813"
/*
 clang-format on */

/*
* The FIPS provider vendor name, as a string.
*/
/* clang-format off */
#define FIPS_VENDOR "OpenSSL FIPS Provider"
/* clang-format on */

#ifdef __cplusplus
}
#endif

#endif
{
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'openssl/providers/implementations/digests/blake2s_prov.c',
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'openssl/providers/implementations/digests/md5_sha1_prov.c',
'openssl/providers/implementations/digests/null_prov.c',
'openssl/providers/implementations/digests/ripemd_prov.c',
'openssl/providers/implementations/digests/sha2_prov.c',
'openssl/providers/implementations/digests/sha3_prov.c',
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'openssl/providers/implementations/encode_decode/encode_key2ms.c',
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'openssl/providers/implementations/kdfs/sshkdf.c',
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'openssl/providers/implementations/keymgmt/ecx_kmgmt.c',
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'openssl/providers/implementations/keymgmt/mac_legacy_kmgmt.c',
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'openssl/providers/implementations/rands/drbg_ctr.c',
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'openssl/providers/implementations/rands/drbg_hmac.c',
'openssl/providers/implementations/rands/seed_src.c',
'openssl/providers/implementations/rands/seed_src_jitter.c',
'openssl/providers/implementations/rands/test_rng.c',
'openssl/providers/implementations/rands/seeding/rand_cpu_x86.c',
'openssl/providers/implementations/rands/seeding/rand_tsc.c',
'openssl/providers/implementations/rands/seeding/rand_unix.c',
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'openssl/providers/implementations/signature/rsa_sig.c',
'openssl/providers/implementations/signature/slh_dsa_sig.c',
'openssl/providers/implementations/signature/sm2_sig.c',
'openssl/providers/implementations/skeymgmt/aes_skmgmt.c',
'openssl/providers/implementations/skeymgmt/generic.c',
'openssl/providers/implementations/storemgmt/file_store.c',
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'openssl/ssl/record/methods/ssl3_cbc.c',
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'openssl/providers/common/der/der_dsa_sig.c',
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'openssl/providers/common/der/der_ec_sig.c',
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'openssl/providers/common/provider_err.c',
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'openssl/providers/implementations/ciphers/ciphercommon_block.c',
'openssl/providers/implementations/ciphers/ciphercommon_ccm.c',
'openssl/providers/implementations/ciphers/ciphercommon_ccm_hw.c',
'openssl/providers/implementations/ciphers/ciphercommon_gcm.c',
'openssl/providers/implementations/ciphers/ciphercommon_gcm_hw.c',

```
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  'openssl/providers/implementations/digests/digestcommon.c',
  'openssl/ssl/record/methods/tls_pad.c',
  'openssl/providers/implementations/ciphers/cipher_blowfish.c',
  'openssl/providers/implementations/ciphers/cipher_blowfish_hw.c',
  'openssl/providers/implementations/ciphers/cipher_cast5.c',
  'openssl/providers/implementations/ciphers/cipher_cast5_hw.c',
  'openssl/providers/implementations/ciphers/cipher_des.c',
  'openssl/providers/implementations/ciphers/cipher_des_hw.c',
  'openssl/providers/implementations/ciphers/cipher_desx.c',
  'openssl/providers/implementations/ciphers/cipher_desx_hw.c',
  'openssl/providers/implementations/ciphers/cipher_idea.c',
  'openssl/providers/implementations/ciphers/cipher_idea_hw.c',
  'openssl/providers/implementations/ciphers/cipher_rc2.c',
  'openssl/providers/implementations/ciphers/cipher_rc2_hw.c',
  'openssl/providers/implementations/ciphers/cipher_rc4.c',
  'openssl/providers/implementations/ciphers/cipher_rc4_hmac_md5.c',
  'openssl/providers/implementations/ciphers/cipher_rc4_hmac_md5_hw.c',
  'openssl/providers/implementations/ciphers/cipher_rc4_hw.c',
  'openssl/providers/implementations/ciphers/cipher_seed.c',
  'openssl/providers/implementations/ciphers/cipher_seed_hw.c',
  'openssl/providers/implementations/ciphers/cipher_tdes_common.c',
  'openssl/providers/implementations/digests/md4_prov.c',
  'openssl/providers/implementations/digests/mdc2_prov.c',
  'openssl/providers/implementations/digests/ripemd_prov.c',
  'openssl/providers/implementations/digests/wp_prov.c',
  'openssl/providers/implementations/kdfs/pbkdf1.c',
  'openssl/providers/implementations/kdfs/pvkkdf.c',
  'openssl/providers/prov_running.c',
  'openssl/providers/legacyprov.c',
],
'openssl_sources_BSD-x86': [
  './config/archs/BSD-x86/asm/crypto/aes/aes-586.S',
  './config/archs/BSD-x86/asm/crypto/aes/aesni-x86.S',
  './config/archs/BSD-x86/asm/crypto/aes/vpaes-x86.S',
  './config/archs/BSD-x86/asm/crypto/bf/bf-586.S',
  './config/archs/BSD-x86/asm/crypto/bn/bn-586.S',
  './config/archs/BSD-x86/asm/crypto/bn/co-586.S',
  './config/archs/BSD-x86/asm/crypto/bn/x86-gf2m.S',
  './config/archs/BSD-x86/asm/crypto/bn/x86-mont.S',
  './config/archs/BSD-x86/asm/crypto/camellia/cmll-x86.S',
  './config/archs/BSD-x86/asm/crypto/chacha/chacha-x86.S',
  './config/archs/BSD-x86/asm/crypto/des/crypt586.S',
  './config/archs/BSD-x86/asm/crypto/des/des-586.S',
  './config/archs/BSD-x86/asm/crypto/ec/ecp_nistz256-x86.S',
  './config/archs/BSD-x86/asm/crypto/params_idx.c',
  './config/archs/BSD-x86/asm/crypto/x86cpuid.S',
  './config/archs/BSD-x86/asm/crypto/md5/md5-586.S',
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  './config/archs/BSD-x86/asm/crypto/modes/ghash-x86.S',
  './config/archs/BSD-x86/asm/crypto/poly1305/poly1305-x86.S',
  './config/archs/BSD-x86/asm/crypto/rc4/rc4-586.S',
  './config/archs/BSD-x86/asm/crypto/ripemd/rmd-586.S',
   './config/archs/BSD-x86/asm/crypto/sha/sha1-586.S',
  './config/archs/BSD-x86/asm/crypto/sha/sha256-586.S',
  './config/archs/BSD-x86/asm/crypto/sha/sha512-586.S',
  './config/archs/BSD-x86/asm/crypto/whrlpool/wp-mmx.S',
  './config/archs/BSD-x86/asm/engines/e_padlock-x86.S',
  './config/archs/BSD-x86/asm/providers/common/der/der_sm2_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_digests_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_dsa_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_ec_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_ecx_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_ml_dsa_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_rsa_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_slh_dsa_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_wrap_gen.c',
  './config/archs/BSD-x86/asm/providers/legacy.ld',
   './config/archs/BSD-x86/asm/providers/fips.ld',
],
'openssl_defines_BSD-x86': [
  'NDEBUG',
  'L_ENDIAN',
  'OPENSSL_BUILDING_OPENSSL',
  'AES_ASM',
  'CMLL_ASM',
  'DES_ASM',
  'ECP_NISTZ256_ASM',
  'GHASH_ASM',
  'MD5_ASM',
  'OPENSSL_BN_ASM_GF2m',
  'OPENSSL_BN_ASM_MONT',
  'OPENSSL_BN_ASM_PART_WORDS',
  'OPENSSL_CPUID_OBJ',
  'OPENSSL_IA32_SSE2',
  'PADLOCK_ASM',
  'POLY1305_ASM',
  'RC4_ASM',
  'RMD160_ASM',
  'SHA1_ASM',
  'SHA256_ASM',
  'SHA512_ASM',
  'VPAES_ASM',
  'WHIRLPOOL_ASM',
  'OPENSSL_PIC',
],
'openssl_cflags_BSD-x86': [
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    '-Wa,--noexecstack',
    '-Wall -O3 -fomit-frame-pointer',
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  ],
  'openssl_ex_libs_BSD-x86': [
    '-pthread',
  ],
 },
 'include_dirs': [
  '.',
  './include',
  './crypto',
  './crypto/include/internal',
  './providers/common/include',
 ],
 'defines': ['<@(openssl_defines_BSD-x86)'],
 'cflags' : ['<@(openssl_cflags_BSD-x86)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86)'],
 'sources': ['<@(openssl_sources)', '<@(openssl_sources_BSD-x86)'],
 'direct_dependent_settings': {
  'include_dirs': ['./include', '.'],
  'defines': ['<@(openssl_defines_BSD-x86)'],
 },
}
```

PCRE LICENCE
---

PCRE is a library of functions to support regular expressions whose syntax and semantics are as close as possible to those of the Perl 5 language.

Release 7 of PCRE is distributed under the terms of the "BSD" licence, as specified below. The documentation for PCRE, supplied in the "doc" directory, is distributed under the same terms as the software itself.

The basic library functions are written in C and are freestanding. Also included in the distribution is a set of C++ wrapper functions.

THE BASIC LIBRARY FUNCTIONS
---

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Email domain: cam.ac.uk

University of Cambridge Computing Service,
Cambridge, England.

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THE C++ WRAPPER FUNCTIONS
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End

```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/x509_vfy.h.in
*
* Copyright 1995-2025 The OpenSSL Project Authors. All Rights Reserved.
*
* Licensed under the Apache License 2.0 (the "License").  You may not use
* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_X509_VFY_H
#define OPENSSL_X509_VFY_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_X509_VFY_H
#endif

/*
* Protect against recursion, x509.h and x509_vfy.h each include the other.
*/
#ifndef OPENSSL_X509_H
#include <openssl/x509.h>
#endif

#include <openssl/opensslconf.h>
#include <openssl/lhash.h>
#include <openssl/bio.h>
#include <openssl/crypto.h>
#include <openssl/symhacks.h>

#ifdef __cplusplus
extern "C" {
#endif

/*-
SSL_CTX -> X509_STORE

  -> X509_LOOKUP
                ->X509_LOOKUP_METHOD
            -> X509_LOOKUP
```

```
                ->X509_LOOKUP_METHOD

SSL     -> X509_STORE_CTX
            ->X509_STORE

The X509_STORE holds the tables etc for verification stuff.
A X509_STORE_CTX is used while validating a single certificate.
The X509_STORE has X509_LOOKUPs for looking up certs.
The X509_STORE then calls a function to actually verify the
certificate chain.
*/

typedef enum {
   X509_LU_NONE = 0,
   X509_LU_X509,
   X509_LU_CRL
} X509_LOOKUP_TYPE;

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define X509_LU_RETRY -1
#define X509_LU_FAIL 0
#endif

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_LOOKUP, X509_LOOKUP, X509_LOOKUP)
#define sk_X509_LOOKUP_num(sk) OPENSSL_sk_num(ossl_check_const_X509_LOOKUP_sk_type(sk))
#define sk_X509_LOOKUP_value(sk, idx) ((X509_LOOKUP
*)OPENSSL_sk_value(ossl_check_const_X509_LOOKUP_sk_type(sk), (idx)))
#define sk_X509_LOOKUP_new(cmp) ((STACK_OF(X509_LOOKUP)
*)OPENSSL_sk_new(ossl_check_X509_LOOKUP_compfunc_type(cmp)))
#define
 sk_X509_LOOKUP_new_null() ((STACK_OF(X509_LOOKUP) *)OPENSSL_sk_new_null())
#define sk_X509_LOOKUP_new_reserve(cmp, n) ((STACK_OF(X509_LOOKUP)
*)OPENSSL_sk_new_reserve(ossl_check_X509_LOOKUP_compfunc_type(cmp), (n)))
#define sk_X509_LOOKUP_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_LOOKUP_sk_type(sk), (n))
#define sk_X509_LOOKUP_free(sk) OPENSSL_sk_free(ossl_check_X509_LOOKUP_sk_type(sk))
#define sk_X509_LOOKUP_zero(sk) OPENSSL_sk_zero(ossl_check_X509_LOOKUP_sk_type(sk))
#define sk_X509_LOOKUP_delete(sk, i) ((X509_LOOKUP
*)OPENSSL_sk_delete(ossl_check_X509_LOOKUP_sk_type(sk), (i)))
#define sk_X509_LOOKUP_delete_ptr(sk, ptr) ((X509_LOOKUP
*)OPENSSL_sk_delete_ptr(ossl_check_X509_LOOKUP_sk_type(sk), ossl_check_X509_LOOKUP_type(ptr)))
#define sk_X509_LOOKUP_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_LOOKUP_sk_type(sk),
ossl_check_X509_LOOKUP_type(ptr))
#define sk_X509_LOOKUP_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_LOOKUP_sk_type(sk),
 ossl_check_X509_LOOKUP_type(ptr))
#define sk_X509_LOOKUP_pop(sk) ((X509_LOOKUP
*)OPENSSL_sk_pop(ossl_check_X509_LOOKUP_sk_type(sk)))
#define sk_X509_LOOKUP_shift(sk) ((X509_LOOKUP
```

```
*)OPENSSL_sk_shift(ossl_check_X509_LOOKUP_sk_type(sk)))
#define sk_X509_LOOKUP_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_LOOKUP_sk_type(sk),ossl_check_X509_LOOKUP_freefunc_type(free
func))
#define sk_X509_LOOKUP_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_LOOKUP_sk_type(sk),
ossl_check_X509_LOOKUP_type(ptr), (idx))
#define sk_X509_LOOKUP_set(sk, idx, ptr) ((X509_LOOKUP
*)OPENSSL_sk_set(ossl_check_X509_LOOKUP_sk_type(sk), (idx), ossl_check_X509_LOOKUP_type(ptr)))
#define sk_X509_LOOKUP_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_LOOKUP_sk_type(sk),
ossl_check_X509_LOOKUP_type(ptr))
#define sk_X509_LOOKUP_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_LOOKUP_sk_type(sk),
ossl_check_X509_LOOKUP_type(ptr))
#define sk_X509_LOOKUP_find_all(sk, ptr, pnum)
 OPENSSL_sk_find_all(ossl_check_X509_LOOKUP_sk_type(sk), ossl_check_X509_LOOKUP_type(ptr), pnum)
#define sk_X509_LOOKUP_sort(sk) OPENSSL_sk_sort(ossl_check_X509_LOOKUP_sk_type(sk))
#define sk_X509_LOOKUP_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_X509_LOOKUP_sk_type(sk))
#define sk_X509_LOOKUP_dup(sk) ((STACK_OF(X509_LOOKUP)
*)OPENSSL_sk_dup(ossl_check_const_X509_LOOKUP_sk_type(sk)))
#define sk_X509_LOOKUP_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_LOOKUP)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_LOOKUP_sk_type(sk),
ossl_check_X509_LOOKUP_copyfunc_type(copyfunc), ossl_check_X509_LOOKUP_freefunc_type(freefunc)))
#define sk_X509_LOOKUP_set_cmp_func(sk, cmp)
((sk_X509_LOOKUP_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_LOOKUP_sk_type(sk),
ossl_check_X509_LOOKUP_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(X509_OBJECT, X509_OBJECT, X509_OBJECT)
#define sk_X509_OBJECT_num(sk) OPENSSL_sk_num(ossl_check_const_X509_OBJECT_sk_type(sk))
#define sk_X509_OBJECT_value(sk,
 idx) ((X509_OBJECT *)OPENSSL_sk_value(ossl_check_const_X509_OBJECT_sk_type(sk), (idx)))
#define sk_X509_OBJECT_new(cmp) ((STACK_OF(X509_OBJECT)
*)OPENSSL_sk_new(ossl_check_X509_OBJECT_compfunc_type(cmp)))
#define sk_X509_OBJECT_new_null() ((STACK_OF(X509_OBJECT) *)OPENSSL_sk_new_null())
#define sk_X509_OBJECT_new_reserve(cmp, n) ((STACK_OF(X509_OBJECT)
*)OPENSSL_sk_new_reserve(ossl_check_X509_OBJECT_compfunc_type(cmp), (n)))
#define sk_X509_OBJECT_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_OBJECT_sk_type(sk), (n))
#define sk_X509_OBJECT_free(sk) OPENSSL_sk_free(ossl_check_X509_OBJECT_sk_type(sk))
#define sk_X509_OBJECT_zero(sk) OPENSSL_sk_zero(ossl_check_X509_OBJECT_sk_type(sk))
#define sk_X509_OBJECT_delete(sk, i) ((X509_OBJECT
*)OPENSSL_sk_delete(ossl_check_X509_OBJECT_sk_type(sk), (i)))
#define sk_X509_OBJECT_delete_ptr(sk, ptr) ((X509_OBJECT
*)OPENSSL_sk_delete_ptr(ossl_check_X509_OBJECT_sk_type(sk), ossl_check_X509_OBJECT_type(ptr)))
#define sk_X509_OBJECT_push(sk, ptr)
 OPENSSL_sk_push(ossl_check_X509_OBJECT_sk_type(sk), ossl_check_X509_OBJECT_type(ptr))
#define sk_X509_OBJECT_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_OBJECT_sk_type(sk),
ossl_check_X509_OBJECT_type(ptr))
#define sk_X509_OBJECT_pop(sk) ((X509_OBJECT
*)OPENSSL_sk_pop(ossl_check_X509_OBJECT_sk_type(sk)))
#define sk_X509_OBJECT_shift(sk) ((X509_OBJECT
```

```
*)OPENSSL_sk_shift(ossl_check_X509_OBJECT_sk_type(sk)))
#define sk_X509_OBJECT_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_OBJECT_sk_type(sk),ossl_check_X509_OBJECT_freefunc_type(freef
unc))
#define sk_X509_OBJECT_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_OBJECT_sk_type(sk),
ossl_check_X509_OBJECT_type(ptr), (idx))
#define sk_X509_OBJECT_set(sk, idx, ptr) ((X509_OBJECT
*)OPENSSL_sk_set(ossl_check_X509_OBJECT_sk_type(sk), (idx), ossl_check_X509_OBJECT_type(ptr)))
#define sk_X509_OBJECT_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_OBJECT_sk_type(sk),
ossl_check_X509_OBJECT_type(ptr))
#define sk_X509_OBJECT_find_ex(sk,
 ptr) OPENSSL_sk_find_ex(ossl_check_X509_OBJECT_sk_type(sk), ossl_check_X509_OBJECT_type(ptr))
#define sk_X509_OBJECT_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_X509_OBJECT_sk_type(sk), ossl_check_X509_OBJECT_type(ptr), pnum)
#define sk_X509_OBJECT_sort(sk) OPENSSL_sk_sort(ossl_check_X509_OBJECT_sk_type(sk))
#define sk_X509_OBJECT_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_X509_OBJECT_sk_type(sk))
#define sk_X509_OBJECT_dup(sk) ((STACK_OF(X509_OBJECT)
*)OPENSSL_sk_dup(ossl_check_const_X509_OBJECT_sk_type(sk)))
#define sk_X509_OBJECT_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_OBJECT)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_OBJECT_sk_type(sk),
ossl_check_X509_OBJECT_copyfunc_type(copyfunc), ossl_check_X509_OBJECT_freefunc_type(freefunc)))
#define sk_X509_OBJECT_set_cmp_func(sk, cmp)
((sk_X509_OBJECT_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_OBJECT_sk_type(sk),
ossl_check_X509_OBJECT_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(X509_VERIFY_PARAM,
 X509_VERIFY_PARAM, X509_VERIFY_PARAM)
#define sk_X509_VERIFY_PARAM_num(sk)
OPENSSL_sk_num(ossl_check_const_X509_VERIFY_PARAM_sk_type(sk))
#define sk_X509_VERIFY_PARAM_value(sk, idx) ((X509_VERIFY_PARAM
*)OPENSSL_sk_value(ossl_check_const_X509_VERIFY_PARAM_sk_type(sk), (idx)))
#define sk_X509_VERIFY_PARAM_new(cmp) ((STACK_OF(X509_VERIFY_PARAM)
*)OPENSSL_sk_new(ossl_check_X509_VERIFY_PARAM_compfunc_type(cmp)))
#define sk_X509_VERIFY_PARAM_new_null() ((STACK_OF(X509_VERIFY_PARAM)
*)OPENSSL_sk_new_null())
#define sk_X509_VERIFY_PARAM_new_reserve(cmp, n) ((STACK_OF(X509_VERIFY_PARAM)
*)OPENSSL_sk_new_reserve(ossl_check_X509_VERIFY_PARAM_compfunc_type(cmp), (n)))
#define sk_X509_VERIFY_PARAM_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_X509_VERIFY_PARAM_sk_type(sk), (n))
#define sk_X509_VERIFY_PARAM_free(sk)
OPENSSL_sk_free(ossl_check_X509_VERIFY_PARAM_sk_type(sk))
#define sk_X509_VERIFY_PARAM_zero(sk)
OPENSSL_sk_zero(ossl_check_X509_VERIFY_PARAM_sk_type(sk))
#define sk_X509_VERIFY_PARAM_delete(sk,
 i) ((X509_VERIFY_PARAM *)OPENSSL_sk_delete(ossl_check_X509_VERIFY_PARAM_sk_type(sk), (i)))
#define sk_X509_VERIFY_PARAM_delete_ptr(sk, ptr) ((X509_VERIFY_PARAM
*)OPENSSL_sk_delete_ptr(ossl_check_X509_VERIFY_PARAM_sk_type(sk),
ossl_check_X509_VERIFY_PARAM_type(ptr)))
#define sk_X509_VERIFY_PARAM_push(sk, ptr)
```

```
OPENSSL_sk_push(ossl_check_X509_VERIFY_PARAM_sk_type(sk),
ossl_check_X509_VERIFY_PARAM_type(ptr))
#define sk_X509_VERIFY_PARAM_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_X509_VERIFY_PARAM_sk_type(sk),
ossl_check_X509_VERIFY_PARAM_type(ptr))
#define sk_X509_VERIFY_PARAM_pop(sk) ((X509_VERIFY_PARAM
*)OPENSSL_sk_pop(ossl_check_X509_VERIFY_PARAM_sk_type(sk)))
#define sk_X509_VERIFY_PARAM_shift(sk) ((X509_VERIFY_PARAM
*)OPENSSL_sk_shift(ossl_check_X509_VERIFY_PARAM_sk_type(sk)))
#define sk_X509_VERIFY_PARAM_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_VERIFY_PARAM_sk_type(sk),ossl_check_X509_VERIFY_PARAM_
freefunc_type(freefunc))
#define sk_X509_VERIFY_PARAM_insert(sk,
 ptr, idx) OPENSSL_sk_insert(ossl_check_X509_VERIFY_PARAM_sk_type(sk),
ossl_check_X509_VERIFY_PARAM_type(ptr), (idx))
#define sk_X509_VERIFY_PARAM_set(sk, idx, ptr) ((X509_VERIFY_PARAM
*)OPENSSL_sk_set(ossl_check_X509_VERIFY_PARAM_sk_type(sk), (idx),
ossl_check_X509_VERIFY_PARAM_type(ptr)))
#define sk_X509_VERIFY_PARAM_find(sk, ptr)
OPENSSL_sk_find(ossl_check_X509_VERIFY_PARAM_sk_type(sk),
ossl_check_X509_VERIFY_PARAM_type(ptr))
#define sk_X509_VERIFY_PARAM_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_X509_VERIFY_PARAM_sk_type(sk),
ossl_check_X509_VERIFY_PARAM_type(ptr))
#define sk_X509_VERIFY_PARAM_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_X509_VERIFY_PARAM_sk_type(sk),
ossl_check_X509_VERIFY_PARAM_type(ptr), pnum)
#define sk_X509_VERIFY_PARAM_sort(sk)
OPENSSL_sk_sort(ossl_check_X509_VERIFY_PARAM_sk_type(sk))
#define sk_X509_VERIFY_PARAM_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_X509_VERIFY_PARAM_sk_type(sk))
#define sk_X509_VERIFY_PARAM_dup(sk)
 ((STACK_OF(X509_VERIFY_PARAM)
*)OPENSSL_sk_dup(ossl_check_const_X509_VERIFY_PARAM_sk_type(sk)))
#define sk_X509_VERIFY_PARAM_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_VERIFY_PARAM)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_VERIFY_PARAM_sk_type(sk),
ossl_check_X509_VERIFY_PARAM_copyfunc_type(copyfunc),
ossl_check_X509_VERIFY_PARAM_freefunc_type(freefunc)))
#define sk_X509_VERIFY_PARAM_set_cmp_func(sk, cmp)
((sk_X509_VERIFY_PARAM_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_VERIFY_PARAM_sk_
type(sk), ossl_check_X509_VERIFY_PARAM_compfunc_type(cmp)))

/* clang-format on */

/* This is used for a table of trust checking functions */
typedef struct x509_trust_st {
   int trust;
   int flags;
```

```
   int (*check_trust)(struct x509_trust_st *, X509 *, int);
   char *name;
   int arg1;
   void *arg2;
} X509_TRUST;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_TRUST, X509_TRUST, X509_TRUST)
#define sk_X509_TRUST_num(sk) OPENSSL_sk_num(ossl_check_const_X509_TRUST_sk_type(sk))
#define
 sk_X509_TRUST_value(sk, idx) ((X509_TRUST
*)OPENSSL_sk_value(ossl_check_const_X509_TRUST_sk_type(sk), (idx)))
#define sk_X509_TRUST_new(cmp) ((STACK_OF(X509_TRUST)
*)OPENSSL_sk_new(ossl_check_X509_TRUST_compfunc_type(cmp)))
#define sk_X509_TRUST_new_null() ((STACK_OF(X509_TRUST) *)OPENSSL_sk_new_null())
#define sk_X509_TRUST_new_reserve(cmp, n) ((STACK_OF(X509_TRUST)
*)OPENSSL_sk_new_reserve(ossl_check_X509_TRUST_compfunc_type(cmp), (n)))
#define sk_X509_TRUST_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_TRUST_sk_type(sk), (n))
#define sk_X509_TRUST_free(sk) OPENSSL_sk_free(ossl_check_X509_TRUST_sk_type(sk))
#define sk_X509_TRUST_zero(sk) OPENSSL_sk_zero(ossl_check_X509_TRUST_sk_type(sk))
#define sk_X509_TRUST_delete(sk, i) ((X509_TRUST
*)OPENSSL_sk_delete(ossl_check_X509_TRUST_sk_type(sk), (i)))
#define sk_X509_TRUST_delete_ptr(sk, ptr) ((X509_TRUST
*)OPENSSL_sk_delete_ptr(ossl_check_X509_TRUST_sk_type(sk), ossl_check_X509_TRUST_type(ptr)))
#define sk_X509_TRUST_push(sk,
 ptr) OPENSSL_sk_push(ossl_check_X509_TRUST_sk_type(sk), ossl_check_X509_TRUST_type(ptr))
#define sk_X509_TRUST_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_TRUST_sk_type(sk),
ossl_check_X509_TRUST_type(ptr))
#define sk_X509_TRUST_pop(sk) ((X509_TRUST *)OPENSSL_sk_pop(ossl_check_X509_TRUST_sk_type(sk)))
#define sk_X509_TRUST_shift(sk) ((X509_TRUST
*)OPENSSL_sk_shift(ossl_check_X509_TRUST_sk_type(sk)))
#define sk_X509_TRUST_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_TRUST_sk_type(sk),ossl_check_X509_TRUST_freefunc_type(freefunc
))
#define sk_X509_TRUST_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_TRUST_sk_type(sk),
ossl_check_X509_TRUST_type(ptr), (idx))
#define sk_X509_TRUST_set(sk, idx, ptr) ((X509_TRUST
*)OPENSSL_sk_set(ossl_check_X509_TRUST_sk_type(sk), (idx), ossl_check_X509_TRUST_type(ptr)))
#define sk_X509_TRUST_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_TRUST_sk_type(sk),
ossl_check_X509_TRUST_type(ptr))
#define sk_X509_TRUST_find_ex(sk,
 ptr) OPENSSL_sk_find_ex(ossl_check_X509_TRUST_sk_type(sk), ossl_check_X509_TRUST_type(ptr))
#define sk_X509_TRUST_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_X509_TRUST_sk_type(sk),
ossl_check_X509_TRUST_type(ptr), pnum)
#define sk_X509_TRUST_sort(sk) OPENSSL_sk_sort(ossl_check_X509_TRUST_sk_type(sk))
#define sk_X509_TRUST_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_X509_TRUST_sk_type(sk))
#define sk_X509_TRUST_dup(sk) ((STACK_OF(X509_TRUST)
*)OPENSSL_sk_dup(ossl_check_const_X509_TRUST_sk_type(sk)))
#define sk_X509_TRUST_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_TRUST)
```

```
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_TRUST_sk_type(sk),
ossl_check_X509_TRUST_copyfunc_type(copyfunc), ossl_check_X509_TRUST_freefunc_type(freefunc)))
#define sk_X509_TRUST_set_cmp_func(sk, cmp)
((sk_X509_TRUST_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_TRUST_sk_type(sk),
ossl_check_X509_TRUST_compfunc_type(cmp)))

/* clang-format on */

/* standard trust ids */
#define X509_TRUST_DEFAULT
 0 /* Only valid in purpose settings */
#define X509_TRUST_COMPAT 1
#define X509_TRUST_SSL_CLIENT 2
#define X509_TRUST_SSL_SERVER 3
#define X509_TRUST_EMAIL 4
#define X509_TRUST_OBJECT_SIGN 5
#define X509_TRUST_OCSP_SIGN 6
#define X509_TRUST_OCSP_REQUEST 7
#define X509_TRUST_TSA 8
/* Keep these up to date! */
#define X509_TRUST_MIN 1
#define X509_TRUST_MAX 8

/* trust_flags values */
#define X509_TRUST_DYNAMIC (1U << 0)
#define X509_TRUST_DYNAMIC_NAME (1U << 1)
/* No compat trust if self-signed, preempts "DO_SS" */
#define X509_TRUST_NO_SS_COMPAT (1U << 2)
/* Compat trust if no explicit accepted trust EKUs */
#define X509_TRUST_DO_SS_COMPAT (1U << 3)
/* Accept "anyEKU" as a wildcard rejection OID and as a wildcard trust OID */
#define X509_TRUST_OK_ANY_EKU (1U << 4)

/* check_trust return codes */
#define X509_TRUST_TRUSTED 1
#define X509_TRUST_REJECTED 2
#define X509_TRUST_UNTRUSTED 3

int X509_TRUST_set(int *t, int trust);
int X509_TRUST_get_count(void);
X509_TRUST *X509_TRUST_get0(int
 idx);
int X509_TRUST_get_by_id(int id);
int X509_TRUST_add(int id, int flags, int (*ck)(X509_TRUST *, X509 *, int),
   const char *name, int arg1, void *arg2);
void X509_TRUST_cleanup(void);
int X509_TRUST_get_flags(const X509_TRUST *xp);
char *X509_TRUST_get0_name(const X509_TRUST *xp);
```

```
int X509_TRUST_get_trust(const X509_TRUST *xp);

int X509_trusted(const X509 *x);
int X509_add1_trust_object(X509 *x, const ASN1_OBJECT *obj);
int X509_add1_reject_object(X509 *x, const ASN1_OBJECT *obj);
void X509_trust_clear(X509 *x);
void X509_reject_clear(X509 *x);
STACK_OF(ASN1_OBJECT) *X509_get0_trust_objects(X509 *x);
STACK_OF(ASN1_OBJECT) *X509_get0_reject_objects(X509 *x);

int (*X509_TRUST_set_default(int (*trust)(int, X509 *, int)))(int, X509 *,
   int);
int X509_check_trust(X509 *x, int id, int flags);

int X509_verify_cert(X509_STORE_CTX *ctx);
int X509_STORE_CTX_verify(X509_STORE_CTX *ctx);
STACK_OF(X509) *X509_build_chain(X509 *target, STACK_OF(X509) *certs,
   X509_STORE
 *store, int with_self_signed,
   OSSL_LIB_CTX *libctx, const char *propq);

int X509_STORE_set_depth(X509_STORE *store, int depth);

typedef int (*X509_STORE_CTX_verify_cb)(int, X509_STORE_CTX *);
int X509_STORE_CTX_print_verify_cb(int ok, X509_STORE_CTX *ctx);
typedef int (*X509_STORE_CTX_verify_fn)(X509_STORE_CTX *);
typedef int (*X509_STORE_CTX_get_issuer_fn)(X509 **issuer,
   X509_STORE_CTX *ctx, X509 *x);
typedef int (*X509_STORE_CTX_check_issued_fn)(X509_STORE_CTX *ctx,
   X509 *x, X509 *issuer);
typedef int (*X509_STORE_CTX_check_revocation_fn)(X509_STORE_CTX *ctx);
typedef int (*X509_STORE_CTX_get_crl_fn)(X509_STORE_CTX *ctx,
   X509_CRL **crl, X509 *x);
typedef int (*X509_STORE_CTX_check_crl_fn)(X509_STORE_CTX *ctx, X509_CRL *crl);
typedef int (*X509_STORE_CTX_cert_crl_fn)(X509_STORE_CTX *ctx,
   X509_CRL *crl, X509 *x);
typedef int (*X509_STORE_CTX_check_policy_fn)(X509_STORE_CTX *ctx);
typedef STACK_OF(X509)
   *(*X509_STORE_CTX_lookup_certs_fn)(X509_STORE_CTX
 *ctx,
       const X509_NAME *nm);
typedef STACK_OF(X509_CRL)
   *(*X509_STORE_CTX_lookup_crls_fn)(const X509_STORE_CTX *ctx,
       const X509_NAME *nm);
typedef int (*X509_STORE_CTX_cleanup_fn)(X509_STORE_CTX *ctx);

void X509_STORE_CTX_set_depth(X509_STORE_CTX *ctx, int depth);
```

```
#define X509_STORE_CTX_set_app_data(ctx, data) \
   X509_STORE_CTX_set_ex_data(ctx, 0, data)
#define X509_STORE_CTX_get_app_data(ctx) \
   X509_STORE_CTX_get_ex_data(ctx, 0)

#define X509_L_FILE_LOAD 1
#define X509_L_ADD_DIR 2
#define X509_L_ADD_STORE 3
#define X509_L_LOAD_STORE 4

#define X509_LOOKUP_load_file(x, name, type) \
   X509_LOOKUP_ctrl((x), X509_L_FILE_LOAD, (name), (long)(type), NULL)

#define X509_LOOKUP_add_dir(x, name, type) \
   X509_LOOKUP_ctrl((x), X509_L_ADD_DIR, (name), (long)(type), NULL)

#define X509_LOOKUP_add_store(x, name) \
   X509_LOOKUP_ctrl((x), X509_L_ADD_STORE, (name), 0, NULL)

#define X509_LOOKUP_load_store(x, name) \
   X509_LOOKUP_ctrl((x), X509_L_LOAD_STORE, (name),
 0, NULL)

#define X509_LOOKUP_load_file_ex(x, name, type, libctx, propq)            \
   X509_LOOKUP_ctrl_ex((x), X509_L_FILE_LOAD, (name), (long)(type), NULL, \
      (libctx), (propq))

#define X509_LOOKUP_load_store_ex(x, name, libctx, propq)        \
   X509_LOOKUP_ctrl_ex((x), X509_L_LOAD_STORE, (name), 0, NULL, \
      (libctx), (propq))

#define X509_LOOKUP_add_store_ex(x, name, libctx, propq)        \
   X509_LOOKUP_ctrl_ex((x), X509_L_ADD_STORE, (name), 0, NULL, \
      (libctx), (propq))

#define X509_V_OK 0
#define X509_V_ERR_UNSPECIFIED 1
#define X509_V_ERR_UNABLE_TO_GET_ISSUER_CERT 2
#define X509_V_ERR_UNABLE_TO_GET_CRL 3
#define X509_V_ERR_UNABLE_TO_DECRYPT_CERT_SIGNATURE 4
#define X509_V_ERR_UNABLE_TO_DECRYPT_CRL_SIGNATURE 5
#define X509_V_ERR_UNABLE_TO_DECODE_ISSUER_PUBLIC_KEY 6
#define X509_V_ERR_CERT_SIGNATURE_FAILURE 7
#define X509_V_ERR_CRL_SIGNATURE_FAILURE 8
#define X509_V_ERR_CERT_NOT_YET_VALID 9
#define X509_V_ERR_CERT_HAS_EXPIRED 10
#define X509_V_ERR_CRL_NOT_YET_VALID
```

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 11
#define X509_V_ERR_CRL_HAS_EXPIRED 12
#define X509_V_ERR_ERROR_IN_CERT_NOT_BEFORE_FIELD 13
#define X509_V_ERR_ERROR_IN_CERT_NOT_AFTER_FIELD 14
#define X509_V_ERR_ERROR_IN_CRL_LAST_UPDATE_FIELD 15
#define X509_V_ERR_ERROR_IN_CRL_NEXT_UPDATE_FIELD 16
#define X509_V_ERR_OUT_OF_MEM 17
#define X509_V_ERR_DEPTH_ZERO_SELF_SIGNED_CERT 18
#define X509_V_ERR_SELF_SIGNED_CERT_IN_CHAIN 19
#define X509_V_ERR_UNABLE_TO_GET_ISSUER_CERT_LOCALLY 20
#define X509_V_ERR_UNABLE_TO_VERIFY_LEAF_SIGNATURE 21
#define X509_V_ERR_CERT_CHAIN_TOO_LONG 22
#define X509_V_ERR_CERT_REVOKED 23
#define X509_V_ERR_NO_ISSUER_PUBLIC_KEY 24
#define X509_V_ERR_PATH_LENGTH_EXCEEDED 25
#define X509_V_ERR_INVALID_PURPOSE 26
#define X509_V_ERR_CERT_UNTRUSTED 27
#define X509_V_ERR_CERT_REJECTED 28

/* These are 'informational' when looking for issuer cert */
#define X509_V_ERR_SUBJECT_ISSUER_MISMATCH 29
#define X509_V_ERR_AKID_SKID_MISMATCH 30
#define X509_V_ERR_AKID_ISSUER_SERIAL_MISMATCH 31
#define X509_V_ERR_KEYUSAGE_NO_CERTSIGN
 32
#define X509_V_ERR_UNABLE_TO_GET_CRL_ISSUER 33
#define X509_V_ERR_UNHANDLED_CRITICAL_EXTENSION 34
#define X509_V_ERR_KEYUSAGE_NO_CRL_SIGN 35
#define X509_V_ERR_UNHANDLED_CRITICAL_CRL_EXTENSION 36
#define X509_V_ERR_INVALID_NON_CA 37
#define X509_V_ERR_PROXY_PATH_LENGTH_EXCEEDED 38
#define X509_V_ERR_KEYUSAGE_NO_DIGITAL_SIGNATURE 39
#define X509_V_ERR_PROXY_CERTIFICATES_NOT_ALLOWED 40
#define X509_V_ERR_INVALID_EXTENSION 41
#define X509_V_ERR_INVALID_POLICY_EXTENSION 42
#define X509_V_ERR_NO_EXPLICIT_POLICY 43
#define X509_V_ERR_DIFFERENT_CRL_SCOPE 44
#define X509_V_ERR_UNSUPPORTED_EXTENSION_FEATURE 45
#define X509_V_ERR_UNNESTED_RESOURCE 46
#define X509_V_ERR_PERMITTED_VIOLATION 47
#define X509_V_ERR_EXCLUDED_VIOLATION 48
#define X509_V_ERR_SUBTREE_MINMAX 49
/* The application is not happy */
#define X509_V_ERR_APPLICATION_VERIFICATION 50
#define X509_V_ERR_UNSUPPORTED_CONSTRAINT_TYPE 51
#define X509_V_ERR_UNSUPPORTED_CONSTRAINT_SYNTAX 52
#define X509_V_ERR_UNSUPPORTED_NAME_SYNTAX
```

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#define X509_V_ERR_CRL_PATH_VALIDATION_ERROR 54
/* Another issuer check debug option */
#define X509_V_ERR_PATH_LOOP 55
/* Suite B mode algorithm violation */
#define X509_V_ERR_SUITE_B_INVALID_VERSION 56
#define X509_V_ERR_SUITE_B_INVALID_ALGORITHM 57
#define X509_V_ERR_SUITE_B_INVALID_CURVE 58
#define X509_V_ERR_SUITE_B_INVALID_SIGNATURE_ALGORITHM 59
#define X509_V_ERR_SUITE_B_LOS_NOT_ALLOWED 60
#define X509_V_ERR_SUITE_B_CANNOT_SIGN_P_384_WITH_P_256 61
/* Host, email and IP check errors */
#define X509_V_ERR_HOSTNAME_MISMATCH 62
#define X509_V_ERR_EMAIL_MISMATCH 63
#define X509_V_ERR_IP_ADDRESS_MISMATCH 64
/* DANE TLSA errors */
#define X509_V_ERR_DANE_NO_MATCH 65
/* security level errors */
#define X509_V_ERR_EE_KEY_TOO_SMALL 66
#define X509_V_ERR_CA_KEY_TOO_SMALL 67
#define X509_V_ERR_CA_MD_TOO_WEAK 68
/* Caller error */
#define X509_V_ERR_INVALID_CALL 69
/* Issuer lookup error */
#define X509_V_ERR_STORE_LOOKUP 70
/* Certificate transparency */
#define
 X509_V_ERR_NO_VALID_SCTS 71

#define X509_V_ERR_PROXY_SUBJECT_NAME_VIOLATION 72
/* OCSP status errors */
#define X509_V_ERR_OCSP_VERIFY_NEEDED 73 /* Need OCSP verification */
#define X509_V_ERR_OCSP_VERIFY_FAILED 74 /* Couldn't verify cert through OCSP */
#define X509_V_ERR_OCSP_CERT_UNKNOWN 75 /* Certificate wasn't recognized by the OCSP responder */

#define X509_V_ERR_UNSUPPORTED_SIGNATURE_ALGORITHM 76
#define X509_V_ERR_SIGNATURE_ALGORITHM_MISMATCH 77

/* Errors in case a check in X509_V_FLAG_X509_STRICT mode fails */
#define X509_V_ERR_SIGNATURE_ALGORITHM_INCONSISTENCY 78
#define X509_V_ERR_INVALID_CA 79
#define X509_V_ERR_PATHLEN_INVALID_FOR_NON_CA 80
#define X509_V_ERR_PATHLEN_WITHOUT_KU_KEY_CERT_SIGN 81
#define X509_V_ERR_KU_KEY_CERT_SIGN_INVALID_FOR_NON_CA 82
#define X509_V_ERR_ISSUER_NAME_EMPTY 83
#define X509_V_ERR_SUBJECT_NAME_EMPTY 84
#define X509_V_ERR_MISSING_AUTHORITY_KEY_IDENTIFIER 85
#define X509_V_ERR_MISSING_SUBJECT_KEY_IDENTIFIER 86
```

```
#define X509_V_ERR_EMPTY_SUBJECT_ALT_NAME
 87
#define X509_V_ERR_EMPTY_SUBJECT_SAN_NOT_CRITICAL 88
#define X509_V_ERR_CA_BCONS_NOT_CRITICAL 89
#define X509_V_ERR_AUTHORITY_KEY_IDENTIFIER_CRITICAL 90
#define X509_V_ERR_SUBJECT_KEY_IDENTIFIER_CRITICAL 91
#define X509_V_ERR_CA_CERT_MISSING_KEY_USAGE 92
#define X509_V_ERR_EXTENSIONS_REQUIRE_VERSION_3 93
#define X509_V_ERR_EC_KEY_EXPLICIT_PARAMS 94
#define X509_V_ERR_RPK_UNTRUSTED 95

/* Certificate verify flags */
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define X509_V_FLAG_CB_ISSUER_CHECK 0x0 /* Deprecated */
#endif
/* Use check time instead of current time */
#define X509_V_FLAG_USE_CHECK_TIME 0x2
/* Lookup CRLs */
#define X509_V_FLAG_CRL_CHECK 0x4
/* Lookup CRLs for whole chain */
#define X509_V_FLAG_CRL_CHECK_ALL 0x8
/* Ignore unhandled critical extensions */
#define X509_V_FLAG_IGNORE_CRITICAL 0x10
/* Disable workarounds for broken certificates */
#define X509_V_FLAG_X509_STRICT 0x20
/* Enable proxy certificate validation */
#define X509_V_FLAG_ALLOW_PROXY_CERTS 0x40
/*
 Enable policy checking */
#define X509_V_FLAG_POLICY_CHECK 0x80
/* Policy variable require-explicit-policy */
#define X509_V_FLAG_EXPLICIT_POLICY 0x100
/* Policy variable inhibit-any-policy */
#define X509_V_FLAG_INHIBIT_ANY 0x200
/* Policy variable inhibit-policy-mapping */
#define X509_V_FLAG_INHIBIT_MAP 0x400
/* Notify callback that policy is OK */
#define X509_V_FLAG_NOTIFY_POLICY 0x800
/* Extended CRL features such as indirect CRLs, alternate CRL signing keys */
#define X509_V_FLAG_EXTENDED_CRL_SUPPORT 0x1000
/* Delta CRL support */
#define X509_V_FLAG_USE_DELTAS 0x2000
/* Check self-signed CA signature */
#define X509_V_FLAG_CHECK_SS_SIGNATURE 0x4000
/* Use trusted store first */
#define X509_V_FLAG_TRUSTED_FIRST 0x8000
/* Suite B 128 bit only mode: not normally used */
#define X509_V_FLAG_SUITEB_128_LOS_ONLY 0x10000
```

```
/* Suite B 192 bit only mode */
#define X509_V_FLAG_SUITEB_192_LOS 0x20000
/* Suite B 128 bit mode allowing 192 bit algorithms */
#define X509_V_FLAG_SUITEB_128_LOS
 0x30000
/* Allow partial chains if at least one certificate is in trusted store */
#define X509_V_FLAG_PARTIAL_CHAIN 0x80000
/*
* If the initial chain is not trusted, do not attempt to build an alternative
* chain. Alternate chain checking was introduced in 1.1.0. Setting this flag
* will force the behaviour to match that of previous versions.
*/
#define X509_V_FLAG_NO_ALT_CHAINS 0x100000
/* Do not check certificate/CRL validity against current time */
#define X509_V_FLAG_NO_CHECK_TIME 0x200000

#define X509_VP_FLAG_DEFAULT 0x1
#define X509_VP_FLAG_OVERWRITE 0x2
#define X509_VP_FLAG_RESET_FLAGS 0x4
#define X509_VP_FLAG_LOCKED 0x8
#define X509_VP_FLAG_ONCE 0x10

/* Internal use: mask of policy related options */
#define X509_V_FLAG_POLICY_MASK (X509_V_FLAG_POLICY_CHECK \
   | X509_V_FLAG_EXPLICIT_POLICY                    \
   | X509_V_FLAG_INHIBIT_ANY                        \
   | X509_V_FLAG_INHIBIT_MAP)

int X509_OBJECT_idx_by_subject(STACK_OF(X509_OBJECT) *h, X509_LOOKUP_TYPE
 type,
   const X509_NAME *name);
X509_OBJECT *X509_OBJECT_retrieve_by_subject(STACK_OF(X509_OBJECT) *h,
   X509_LOOKUP_TYPE type,
   const X509_NAME *name);
X509_OBJECT *X509_OBJECT_retrieve_match(STACK_OF(X509_OBJECT) *h,
   X509_OBJECT *x);
int X509_OBJECT_up_ref_count(X509_OBJECT *a);
X509_OBJECT *X509_OBJECT_new(void);
void X509_OBJECT_free(X509_OBJECT *a);
X509_LOOKUP_TYPE X509_OBJECT_get_type(const X509_OBJECT *a);
X509 *X509_OBJECT_get0_X509(const X509_OBJECT *a);
int X509_OBJECT_set1_X509(X509_OBJECT *a, X509 *obj);
X509_CRL *X509_OBJECT_get0_X509_CRL(const X509_OBJECT *a);
int X509_OBJECT_set1_X509_CRL(X509_OBJECT *a, X509_CRL *obj);
X509_STORE *X509_STORE_new(void);
void X509_STORE_free(X509_STORE *xs);
int X509_STORE_lock(X509_STORE *xs);
int X509_STORE_unlock(X509_STORE *xs);
```

```
int X509_STORE_up_ref(X509_STORE *xs);
STACK_OF(X509_OBJECT) *X509_STORE_get0_objects(const X509_STORE *xs);
STACK_OF(X509_OBJECT) *X509_STORE_get1_objects(X509_STORE *xs);
STACK_OF(X509)
 *X509_STORE_get1_all_certs(X509_STORE *xs);
STACK_OF(X509) *X509_STORE_CTX_get1_certs(X509_STORE_CTX *xs,
   const X509_NAME *nm);
STACK_OF(X509_CRL) *X509_STORE_CTX_get1_crls(const X509_STORE_CTX *st,
   const X509_NAME *nm);
int X509_STORE_set_flags(X509_STORE *xs, unsigned long flags);
int X509_STORE_set_purpose(X509_STORE *xs, int purpose);
int X509_STORE_set_trust(X509_STORE *xs, int trust);
int X509_STORE_set1_param(X509_STORE *xs, const X509_VERIFY_PARAM *pm);
X509_VERIFY_PARAM *X509_STORE_get0_param(const X509_STORE *xs);

void X509_STORE_set_verify(X509_STORE *xs, X509_STORE_CTX_verify_fn verify);
#define X509_STORE_set_verify_func(ctx, func) \
   X509_STORE_set_verify((ctx), (func))
void X509_STORE_CTX_set_verify(X509_STORE_CTX *ctx,
   X509_STORE_CTX_verify_fn verify);
X509_STORE_CTX_verify_fn X509_STORE_get_verify(const X509_STORE *xs);
void X509_STORE_set_verify_cb(X509_STORE *xs,
   X509_STORE_CTX_verify_cb verify_cb);
#define X509_STORE_set_verify_cb_func(ctx,
 func) \
   X509_STORE_set_verify_cb((ctx), (func))
X509_STORE_CTX_verify_cb X509_STORE_get_verify_cb(const X509_STORE *xs);
void X509_STORE_set_get_issuer(X509_STORE *xs,
   X509_STORE_CTX_get_issuer_fn get_issuer);
X509_STORE_CTX_get_issuer_fn X509_STORE_get_get_issuer(const X509_STORE *xs);
void X509_STORE_set_check_issued(X509_STORE *xs,
   X509_STORE_CTX_check_issued_fn check_issued);
X509_STORE_CTX_check_issued_fn X509_STORE_get_check_issued(const X509_STORE *s);
void X509_STORE_set_check_revocation(X509_STORE *xs,
   X509_STORE_CTX_check_revocation_fn check_revocation);
X509_STORE_CTX_check_revocation_fn
X509_STORE_get_check_revocation(const X509_STORE *xs);
void X509_STORE_set_get_crl(X509_STORE *xs,
   X509_STORE_CTX_get_crl_fn get_crl);
X509_STORE_CTX_get_crl_fn X509_STORE_get_get_crl(const X509_STORE *xs);
void X509_STORE_set_check_crl(X509_STORE *xs,
   X509_STORE_CTX_check_crl_fn check_crl);
X509_STORE_CTX_check_crl_fn X509_STORE_get_check_crl(const X509_STORE *xs);
void
 X509_STORE_set_cert_crl(X509_STORE *xs,
   X509_STORE_CTX_cert_crl_fn cert_crl);
X509_STORE_CTX_cert_crl_fn X509_STORE_get_cert_crl(const X509_STORE *xs);
void X509_STORE_set_check_policy(X509_STORE *xs,
```

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  X509_STORE_CTX_check_policy_fn check_policy);
X509_STORE_CTX_check_policy_fn X509_STORE_get_check_policy(const X509_STORE *s);
void X509_STORE_set_lookup_certs(X509_STORE *xs,
  X509_STORE_CTX_lookup_certs_fn lookup_certs);
X509_STORE_CTX_lookup_certs_fn X509_STORE_get_lookup_certs(const X509_STORE *s);
void X509_STORE_set_lookup_crls(X509_STORE *xs,
  X509_STORE_CTX_lookup_crls_fn lookup_crls);
#define X509_STORE_set_lookup_crls_cb(ctx, func) \
  X509_STORE_set_lookup_crls((ctx), (func))
X509_STORE_CTX_lookup_crls_fn X509_STORE_get_lookup_crls(const X509_STORE *xs);
void X509_STORE_set_cleanup(X509_STORE *xs,
  X509_STORE_CTX_cleanup_fn cleanup);
X509_STORE_CTX_cleanup_fn X509_STORE_get_cleanup(const X509_STORE *xs);

#define X509_STORE_get_ex_new_index(l, p, newf, dupf,
 freef) \
  CRYPTO_get_ex_new_index(CRYPTO_EX_INDEX_X509_STORE, l, p, newf, dupf, freef)
int X509_STORE_set_ex_data(X509_STORE *xs, int idx, void *data);
void *X509_STORE_get_ex_data(const X509_STORE *xs, int idx);

X509_STORE_CTX *X509_STORE_CTX_new_ex(OSSL_LIB_CTX *libctx, const char *propq);
X509_STORE_CTX *X509_STORE_CTX_new(void);

int X509_STORE_CTX_get1_issuer(X509 **issuer, X509_STORE_CTX *ctx, X509 *x);

void X509_STORE_CTX_free(X509_STORE_CTX *ctx);
int X509_STORE_CTX_init(X509_STORE_CTX *ctx, X509_STORE *trust_store,
  X509 *target, STACK_OF(X509) *untrusted);
int X509_STORE_CTX_init_rpk(X509_STORE_CTX *ctx, X509_STORE *trust_store,
  EVP_PKEY *rpk);
void X509_STORE_CTX_set0_trusted_stack(X509_STORE_CTX *ctx, STACK_OF(X509) *sk);
void X509_STORE_CTX_cleanup(X509_STORE_CTX *ctx);

X509_STORE *X509_STORE_CTX_get0_store(const X509_STORE_CTX *ctx);
X509 *X509_STORE_CTX_get0_cert(const X509_STORE_CTX *ctx);
EVP_PKEY *X509_STORE_CTX_get0_rpk(const X509_STORE_CTX *ctx);
STACK_OF(X509)
 *X509_STORE_CTX_get0_untrusted(const X509_STORE_CTX *ctx);
void X509_STORE_CTX_set0_untrusted(X509_STORE_CTX *ctx, STACK_OF(X509) *sk);
void X509_STORE_CTX_set_verify_cb(X509_STORE_CTX *ctx,
  X509_STORE_CTX_verify_cb verify);
X509_STORE_CTX_verify_cb X509_STORE_CTX_get_verify_cb(const X509_STORE_CTX *ctx);
X509_STORE_CTX_verify_fn X509_STORE_CTX_get_verify(const X509_STORE_CTX *ctx);
X509_STORE_CTX_get_issuer_fn X509_STORE_CTX_get_get_issuer(const X509_STORE_CTX *ctx);
X509_STORE_CTX_check_issued_fn X509_STORE_CTX_get_check_issued(const X509_STORE_CTX *ctx);
X509_STORE_CTX_check_revocation_fn X509_STORE_CTX_get_check_revocation(const X509_STORE_CTX
*ctx);
void X509_STORE_CTX_set_get_crl(X509_STORE_CTX *ctx,
```

```
   X509_STORE_CTX_get_crl_fn get_crl);
X509_STORE_CTX_get_crl_fn X509_STORE_CTX_get_get_crl(const X509_STORE_CTX *ctx);
X509_STORE_CTX_check_crl_fn X509_STORE_CTX_get_check_crl(const X509_STORE_CTX *ctx);
X509_STORE_CTX_cert_crl_fn X509_STORE_CTX_get_cert_crl(const
 X509_STORE_CTX *ctx);
X509_STORE_CTX_check_policy_fn X509_STORE_CTX_get_check_policy(const X509_STORE_CTX *ctx);
X509_STORE_CTX_lookup_certs_fn X509_STORE_CTX_get_lookup_certs(const X509_STORE_CTX *ctx);
X509_STORE_CTX_lookup_crls_fn X509_STORE_CTX_get_lookup_crls(const X509_STORE_CTX *ctx);
X509_STORE_CTX_cleanup_fn X509_STORE_CTX_get_cleanup(const X509_STORE_CTX *ctx);

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define X509_STORE_CTX_get_chain X509_STORE_CTX_get0_chain
#define X509_STORE_CTX_set_chain X509_STORE_CTX_set0_untrusted
#define X509_STORE_CTX_trusted_stack X509_STORE_CTX_set0_trusted_stack
#define X509_STORE_get_by_subject X509_STORE_CTX_get_by_subject
#define X509_STORE_get1_certs X509_STORE_CTX_get1_certs
#define X509_STORE_get1_crls X509_STORE_CTX_get1_crls
/* the following macro is misspelled; use X509_STORE_get1_certs instead */
#define X509_STORE_get1_cert X509_STORE_CTX_get1_certs
/* the following macro is misspelled; use X509_STORE_get1_crls instead */
#define X509_STORE_get1_crl
 X509_STORE_CTX_get1_crls
#endif

X509_LOOKUP *X509_STORE_add_lookup(X509_STORE *xs, X509_LOOKUP_METHOD *m);
X509_LOOKUP_METHOD *X509_LOOKUP_hash_dir(void);
X509_LOOKUP_METHOD *X509_LOOKUP_file(void);
X509_LOOKUP_METHOD *X509_LOOKUP_store(void);

typedef int (*X509_LOOKUP_ctrl_fn)(X509_LOOKUP *ctx, int cmd, const char *argc,
   long argl, char **ret);
typedef int (*X509_LOOKUP_ctrl_ex_fn)(
   X509_LOOKUP *ctx, int cmd, const char *argc, long argl, char **ret,
   OSSL_LIB_CTX *libctx, const char *propq);

typedef int (*X509_LOOKUP_get_by_subject_fn)(X509_LOOKUP *ctx,
   X509_LOOKUP_TYPE type,
   const X509_NAME *name,
   X509_OBJECT *ret);
typedef int (*X509_LOOKUP_get_by_subject_ex_fn)(X509_LOOKUP *ctx,
   X509_LOOKUP_TYPE type,
   const X509_NAME *name,
   X509_OBJECT *ret,
   OSSL_LIB_CTX *libctx,
   const char *propq);
typedef int (*X509_LOOKUP_get_by_issuer_serial_fn)(X509_LOOKUP *ctx,
   X509_LOOKUP_TYPE type,
   const X509_NAME *name,
```

```
   const ASN1_INTEGER
 *serial,
   X509_OBJECT *ret);
typedef int (*X509_LOOKUP_get_by_fingerprint_fn)(X509_LOOKUP *ctx,
   X509_LOOKUP_TYPE type,
   const unsigned char *bytes,
   int len,
   X509_OBJECT *ret);
typedef int (*X509_LOOKUP_get_by_alias_fn)(X509_LOOKUP *ctx,
   X509_LOOKUP_TYPE type,
   const char *str,
   int len,
   X509_OBJECT *ret);

X509_LOOKUP_METHOD *X509_LOOKUP_meth_new(const char *name);
void X509_LOOKUP_meth_free(X509_LOOKUP_METHOD *method);

int X509_LOOKUP_meth_set_new_item(X509_LOOKUP_METHOD *method,
   int (*new_item)(X509_LOOKUP *ctx));
int (*X509_LOOKUP_meth_get_new_item(const X509_LOOKUP_METHOD *method))(X509_LOOKUP *ctx);

int X509_LOOKUP_meth_set_free(X509_LOOKUP_METHOD *method,
   void (*free_fn)(X509_LOOKUP *ctx));
void (*X509_LOOKUP_meth_get_free(const X509_LOOKUP_METHOD *method))(X509_LOOKUP *ctx);

int X509_LOOKUP_meth_set_init(X509_LOOKUP_METHOD *method,
   int (*init)(X509_LOOKUP *ctx));
int (*X509_LOOKUP_meth_get_init(const X509_LOOKUP_METHOD *method))(X509_LOOKUP
 *ctx);

int X509_LOOKUP_meth_set_shutdown(X509_LOOKUP_METHOD *method,
   int (*shutdown)(X509_LOOKUP *ctx));
int (*X509_LOOKUP_meth_get_shutdown(const X509_LOOKUP_METHOD *method))(X509_LOOKUP *ctx);

int X509_LOOKUP_meth_set_ctrl(X509_LOOKUP_METHOD *method,
   X509_LOOKUP_ctrl_fn ctrl_fn);
X509_LOOKUP_ctrl_fn X509_LOOKUP_meth_get_ctrl(const X509_LOOKUP_METHOD *method);

int X509_LOOKUP_meth_set_get_by_subject(X509_LOOKUP_METHOD *method,
   X509_LOOKUP_get_by_subject_fn fn);
X509_LOOKUP_get_by_subject_fn X509_LOOKUP_meth_get_get_by_subject(
   const X509_LOOKUP_METHOD *method);

int X509_LOOKUP_meth_set_get_by_issuer_serial(X509_LOOKUP_METHOD *method,
   X509_LOOKUP_get_by_issuer_serial_fn fn);
X509_LOOKUP_get_by_issuer_serial_fn X509_LOOKUP_meth_get_get_by_issuer_serial(
   const X509_LOOKUP_METHOD *method);
```

```
int X509_LOOKUP_meth_set_get_by_fingerprint(X509_LOOKUP_METHOD *method,
   X509_LOOKUP_get_by_fingerprint_fn fn);
X509_LOOKUP_get_by_fingerprint_fn X509_LOOKUP_meth_get_get_by_fingerprint(
    const X509_LOOKUP_METHOD *method);

int X509_LOOKUP_meth_set_get_by_alias(X509_LOOKUP_METHOD *method,
   X509_LOOKUP_get_by_alias_fn fn);
X509_LOOKUP_get_by_alias_fn X509_LOOKUP_meth_get_get_by_alias(
   const X509_LOOKUP_METHOD *method);

int X509_STORE_add_cert(X509_STORE *xs, X509 *x);
int X509_STORE_add_crl(X509_STORE *xs, X509_CRL *x);

int X509_STORE_CTX_get_by_subject(const X509_STORE_CTX *vs,
   X509_LOOKUP_TYPE type,
   const X509_NAME *name, X509_OBJECT *ret);
X509_OBJECT *X509_STORE_CTX_get_obj_by_subject(X509_STORE_CTX *vs,
   X509_LOOKUP_TYPE type,
   const X509_NAME *name);

int X509_LOOKUP_ctrl(X509_LOOKUP *ctx, int cmd, const char *argc,
   long argl, char **ret);
int X509_LOOKUP_ctrl_ex(X509_LOOKUP *ctx, int cmd, const char *argc, long argl,
   char **ret, OSSL_LIB_CTX *libctx, const char *propq);

int X509_load_cert_file(X509_LOOKUP *ctx, const char *file, int type);
int X509_load_cert_file_ex(X509_LOOKUP *ctx, const char *file,
 int type,
   OSSL_LIB_CTX *libctx, const char *propq);
int X509_load_crl_file(X509_LOOKUP *ctx, const char *file, int type);
int X509_load_cert_crl_file(X509_LOOKUP *ctx, const char *file, int type);
int X509_load_cert_crl_file_ex(X509_LOOKUP *ctx, const char *file, int type,
   OSSL_LIB_CTX *libctx, const char *propq);

X509_LOOKUP *X509_LOOKUP_new(X509_LOOKUP_METHOD *method);
void X509_LOOKUP_free(X509_LOOKUP *ctx);
int X509_LOOKUP_init(X509_LOOKUP *ctx);
int X509_LOOKUP_by_subject(X509_LOOKUP *ctx, X509_LOOKUP_TYPE type,
   const X509_NAME *name, X509_OBJECT *ret);
int X509_LOOKUP_by_subject_ex(X509_LOOKUP *ctx, X509_LOOKUP_TYPE type,
   const X509_NAME *name, X509_OBJECT *ret,
   OSSL_LIB_CTX *libctx, const char *propq);
int X509_LOOKUP_by_issuer_serial(X509_LOOKUP *ctx, X509_LOOKUP_TYPE type,
   const X509_NAME *name,
   const ASN1_INTEGER *serial,
   X509_OBJECT *ret);
int X509_LOOKUP_by_fingerprint(X509_LOOKUP *ctx, X509_LOOKUP_TYPE type,
   const unsigned char *bytes,
```

```
 int len,
   X509_OBJECT *ret);
int X509_LOOKUP_by_alias(X509_LOOKUP *ctx, X509_LOOKUP_TYPE type,
   const char *str, int len, X509_OBJECT *ret);
int X509_LOOKUP_set_method_data(X509_LOOKUP *ctx, void *data);
void *X509_LOOKUP_get_method_data(const X509_LOOKUP *ctx);
X509_STORE *X509_LOOKUP_get_store(const X509_LOOKUP *ctx);
int X509_LOOKUP_shutdown(X509_LOOKUP *ctx);

int X509_STORE_load_file(X509_STORE *xs, const char *file);
int X509_STORE_load_path(X509_STORE *xs, const char *path);
int X509_STORE_load_store(X509_STORE *xs, const char *store);
int X509_STORE_load_locations(X509_STORE *s, const char *file, const char *dir);
int X509_STORE_set_default_paths(X509_STORE *xs);

int X509_STORE_load_file_ex(X509_STORE *xs, const char *file,
   OSSL_LIB_CTX *libctx, const char *propq);
int X509_STORE_load_store_ex(X509_STORE *xs, const char *store,
   OSSL_LIB_CTX *libctx, const char *propq);
int X509_STORE_load_locations_ex(X509_STORE *xs,
   const char *file, const char *dir,
   OSSL_LIB_CTX
 *libctx, const char *propq);
int X509_STORE_set_default_paths_ex(X509_STORE *xs,
   OSSL_LIB_CTX *libctx, const char *propq);

#define X509_STORE_CTX_get_ex_new_index(l, p, newf, dupf, freef) \
   CRYPTO_get_ex_new_index(CRYPTO_EX_INDEX_X509_STORE_CTX, l, p, newf, dupf, freef)
int X509_STORE_CTX_set_ex_data(X509_STORE_CTX *ctx, int idx, void *data);
void *X509_STORE_CTX_get_ex_data(const X509_STORE_CTX *ctx, int idx);
int X509_STORE_CTX_get_error(const X509_STORE_CTX *ctx);
void X509_STORE_CTX_set_error(X509_STORE_CTX *ctx, int s);
int X509_STORE_CTX_get_error_depth(const X509_STORE_CTX *ctx);
void X509_STORE_CTX_set_error_depth(X509_STORE_CTX *ctx, int depth);
X509 *X509_STORE_CTX_get_current_cert(const X509_STORE_CTX *ctx);
void X509_STORE_CTX_set_current_cert(X509_STORE_CTX *ctx, X509 *x);
X509 *X509_STORE_CTX_get0_current_issuer(const X509_STORE_CTX *ctx);
X509_CRL *X509_STORE_CTX_get0_current_crl(const X509_STORE_CTX *ctx);
X509_STORE_CTX *X509_STORE_CTX_get0_parent_ctx(const
 X509_STORE_CTX *ctx);
STACK_OF(X509) *X509_STORE_CTX_get0_chain(const X509_STORE_CTX *ctx);
STACK_OF(X509) *X509_STORE_CTX_get1_chain(const X509_STORE_CTX *ctx);
void X509_STORE_CTX_set_cert(X509_STORE_CTX *ctx, X509 *target);
void X509_STORE_CTX_set0_rpk(X509_STORE_CTX *ctx, EVP_PKEY *target);
void X509_STORE_CTX_set0_verified_chain(X509_STORE_CTX *c, STACK_OF(X509) *sk);
void X509_STORE_CTX_set0_crls(X509_STORE_CTX *ctx, STACK_OF(X509_CRL) *sk);
int X509_STORE_CTX_set_purpose(X509_STORE_CTX *ctx, int purpose);
int X509_STORE_CTX_set_trust(X509_STORE_CTX *ctx, int trust);
```

```
int X509_STORE_CTX_purpose_inherit(X509_STORE_CTX *ctx, int def_purpose,
   int purpose, int trust);
void X509_STORE_CTX_set_flags(X509_STORE_CTX *ctx, unsigned long flags);
void X509_STORE_CTX_set_time(X509_STORE_CTX *ctx, unsigned long flags,
   time_t t);
void X509_STORE_CTX_set_current_reasons(X509_STORE_CTX *ctx,
   unsigned int current_reasons);

X509_POLICY_TREE *X509_STORE_CTX_get0_policy_tree(const
 X509_STORE_CTX *ctx);
int X509_STORE_CTX_get_explicit_policy(const X509_STORE_CTX *ctx);
int X509_STORE_CTX_get_num_untrusted(const X509_STORE_CTX *ctx);

X509_VERIFY_PARAM *X509_STORE_CTX_get0_param(const X509_STORE_CTX *ctx);
void X509_STORE_CTX_set0_param(X509_STORE_CTX *ctx, X509_VERIFY_PARAM *param);
int X509_STORE_CTX_set_default(X509_STORE_CTX *ctx, const char *name);

/*
* Bridge opacity barrier between libcrypt and libssl, also needed to support
* offline testing in test/danetest.c
*/
void X509_STORE_CTX_set0_dane(X509_STORE_CTX *ctx, SSL_DANE *dane);
#define DANE_FLAG_NO_DANE_EE_NAMECHECKS (1L << 0)

/* X509_VERIFY_PARAM functions */

X509_VERIFY_PARAM *X509_VERIFY_PARAM_new(void);
void X509_VERIFY_PARAM_free(X509_VERIFY_PARAM *param);
int X509_VERIFY_PARAM_inherit(X509_VERIFY_PARAM *to,
   const X509_VERIFY_PARAM *from);
int X509_VERIFY_PARAM_set1(X509_VERIFY_PARAM *to,
   const X509_VERIFY_PARAM *from);
int X509_VERIFY_PARAM_set1_name(X509_VERIFY_PARAM *param, const
 char *name);
int X509_VERIFY_PARAM_set_flags(X509_VERIFY_PARAM *param,
   unsigned long flags);
int X509_VERIFY_PARAM_clear_flags(X509_VERIFY_PARAM *param,
   unsigned long flags);
unsigned long X509_VERIFY_PARAM_get_flags(const X509_VERIFY_PARAM *param);
int X509_VERIFY_PARAM_set_purpose(X509_VERIFY_PARAM *param, int purpose);
int X509_VERIFY_PARAM_get_purpose(const X509_VERIFY_PARAM *param);
int X509_VERIFY_PARAM_set_trust(X509_VERIFY_PARAM *param, int trust);
void X509_VERIFY_PARAM_set_depth(X509_VERIFY_PARAM *param, int depth);
void X509_VERIFY_PARAM_set_auth_level(X509_VERIFY_PARAM *param, int auth_level);
time_t X509_VERIFY_PARAM_get_time(const X509_VERIFY_PARAM *param);
void X509_VERIFY_PARAM_set_time(X509_VERIFY_PARAM *param, time_t t);
int X509_VERIFY_PARAM_add0_policy(X509_VERIFY_PARAM *param,
   ASN1_OBJECT *policy);
```

```
int X509_VERIFY_PARAM_set1_policies(X509_VERIFY_PARAM *param,
   STACK_OF(ASN1_OBJECT) *policies);

int X509_VERIFY_PARAM_set_inh_flags(X509_VERIFY_PARAM *param,
    uint32_t flags);
uint32_t X509_VERIFY_PARAM_get_inh_flags(const X509_VERIFY_PARAM *param);

char *X509_VERIFY_PARAM_get0_host(X509_VERIFY_PARAM *param, int idx);
int X509_VERIFY_PARAM_set1_host(X509_VERIFY_PARAM *param,
   const char *name, size_t namelen);
int X509_VERIFY_PARAM_add1_host(X509_VERIFY_PARAM *param,
   const char *name, size_t namelen);
void X509_VERIFY_PARAM_set_hostflags(X509_VERIFY_PARAM *param,
   unsigned int flags);
unsigned int X509_VERIFY_PARAM_get_hostflags(const X509_VERIFY_PARAM *param);
char *X509_VERIFY_PARAM_get0_peername(const X509_VERIFY_PARAM *param);
void X509_VERIFY_PARAM_move_peername(X509_VERIFY_PARAM *, X509_VERIFY_PARAM *);
char *X509_VERIFY_PARAM_get0_email(X509_VERIFY_PARAM *param);
int X509_VERIFY_PARAM_set1_email(X509_VERIFY_PARAM *param,
   const char *email, size_t emaillen);
char *X509_VERIFY_PARAM_get1_ip_asc(X509_VERIFY_PARAM *param);
int X509_VERIFY_PARAM_set1_ip(X509_VERIFY_PARAM *param,
   const unsigned char *ip, size_t
 iplen);
int X509_VERIFY_PARAM_set1_ip_asc(X509_VERIFY_PARAM *param,
   const char *ipasc);

int X509_VERIFY_PARAM_get_depth(const X509_VERIFY_PARAM *param);
int X509_VERIFY_PARAM_get_auth_level(const X509_VERIFY_PARAM *param);
const char *X509_VERIFY_PARAM_get0_name(const X509_VERIFY_PARAM *param);

int X509_VERIFY_PARAM_add0_table(X509_VERIFY_PARAM *param);
int X509_VERIFY_PARAM_get_count(void);
const X509_VERIFY_PARAM *X509_VERIFY_PARAM_get0(int id);
const X509_VERIFY_PARAM *X509_VERIFY_PARAM_lookup(const char *name);
void X509_VERIFY_PARAM_table_cleanup(void);

/* Non positive return values are errors */
#define X509_PCY_TREE_FAILURE -2 /* Failure to satisfy explicit policy */
#define X509_PCY_TREE_INVALID -1 /* Inconsistent or invalid extensions */
#define X509_PCY_TREE_INTERNAL 0 /* Internal error, most likely malloc */

/*
* Positive return values form a bit mask, all but the first are internal to
* the library and don't appear in results from X509_policy_check().
*/
#define
```

```
 X509_PCY_TREE_VALID 1 /* The policy tree is valid */
#define X509_PCY_TREE_EMPTY 2 /* The policy tree is empty */
#define X509_PCY_TREE_EXPLICIT 4 /* Explicit policy required */

int X509_policy_check(X509_POLICY_TREE **ptree, int *pexplicit_policy,
   STACK_OF(X509) *certs,
   STACK_OF(ASN1_OBJECT) *policy_oids, unsigned int flags);

void X509_policy_tree_free(X509_POLICY_TREE *tree);

int X509_policy_tree_level_count(const X509_POLICY_TREE *tree);
X509_POLICY_LEVEL *X509_policy_tree_get0_level(const X509_POLICY_TREE *tree,
   int i);

STACK_OF(X509_POLICY_NODE)
*X509_policy_tree_get0_policies(const X509_POLICY_TREE *tree);

STACK_OF(X509_POLICY_NODE)
*X509_policy_tree_get0_user_policies(const X509_POLICY_TREE *tree);

int X509_policy_level_node_count(X509_POLICY_LEVEL *level);

X509_POLICY_NODE *X509_policy_level_get0_node(const X509_POLICY_LEVEL *level,
   int i);

const ASN1_OBJECT *X509_policy_node_get0_policy(const X509_POLICY_NODE *node);

STACK_OF(POLICYQUALINFO)
*X509_policy_node_get0_qualifiers(const
 X509_POLICY_NODE *node);
const X509_POLICY_NODE *X509_policy_node_get0_parent(const X509_POLICY_NODE *node);

#ifdef __cplusplus
}
#endif
#endif
```

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/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/x509v3.h.in
*
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*
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```
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* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_X509V3_H
#define OPENSSL_X509V3_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_X509V3_H
#endif

#include <openssl/bio.h>
#include <openssl/x509.h>
#include <openssl/conf.h>
#include <openssl/x509v3err.h>
#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif

#ifdef __cplusplus
extern "C" {
#endif

/* Forward reference */
struct v3_ext_method;
struct v3_ext_ctx;

/* Useful typedefs */

typedef void *(*X509V3_EXT_NEW)(void);
typedef void (*X509V3_EXT_FREE)(void *);
typedef
 void *(*X509V3_EXT_D2I)(void *, const unsigned char **, long);
typedef int (*X509V3_EXT_I2D)(const void *, unsigned char **);
typedef STACK_OF(CONF_VALUE) *(*X509V3_EXT_I2V)(const struct v3_ext_method *method, void *ext,
   STACK_OF(CONF_VALUE) *extlist);
typedef void *(*X509V3_EXT_V2I)(const struct v3_ext_method *method,
   struct v3_ext_ctx *ctx,
   STACK_OF(CONF_VALUE) *values);
typedef char *(*X509V3_EXT_I2S)(const struct v3_ext_method *method,
   void *ext);
```

```
typedef void *(*X509V3_EXT_S2I)(const struct v3_ext_method *method,
   struct v3_ext_ctx *ctx, const char *str);
typedef int (*X509V3_EXT_I2R)(const struct v3_ext_method *method, void *ext,
   BIO *out, int indent);
typedef void *(*X509V3_EXT_R2I)(const struct v3_ext_method *method,
   struct v3_ext_ctx *ctx, const char *str);

/* V3 extension structure */

struct v3_ext_method {
   int ext_nid;
   int ext_flags;
   /* If this is set the following four fields are ignored */
   ASN1_ITEM_EXP *it;
   /* Old style
 ASN1 calls */
   X509V3_EXT_NEW ext_new;
   X509V3_EXT_FREE ext_free;
   X509V3_EXT_D2I d2i;
   X509V3_EXT_I2D i2d;
   /* The following pair is used for string extensions */
   X509V3_EXT_I2S i2s;
   X509V3_EXT_S2I s2i;
   /* The following pair is used for multi-valued extensions */
   X509V3_EXT_I2V i2v;
   X509V3_EXT_V2I v2i;
   /* The following are used for raw extensions */
   X509V3_EXT_I2R i2r;
   X509V3_EXT_R2I r2i;
   void *usr_data; /* Any extension specific data */
};

typedef struct X509V3_CONF_METHOD_st {
   char *(*get_string)(void *db, const char *section, const char *value);
   STACK_OF(CONF_VALUE) *(*get_section)(void *db, const char *section);
   void (*free_string)(void *db, char *string);
   void (*free_section)(void *db, STACK_OF(CONF_VALUE) *section);
} X509V3_CONF_METHOD;

/* Context specific info for producing X509 v3 extensions*/
struct v3_ext_ctx {
#define X509V3_CTX_TEST 0x1
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define CTX_TEST X509V3_CTX_TEST
#endif
#define
 X509V3_CTX_REPLACE 0x2
   int flags;
```

```
  X509 *issuer_cert;
  X509 *subject_cert;
  X509_REQ *subject_req;
  X509_CRL *crl;
  X509V3_CONF_METHOD *db_meth;
  void *db;
  EVP_PKEY *issuer_pkey;
  /* Maybe more here */
};

typedef struct v3_ext_method X509V3_EXT_METHOD;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509V3_EXT_METHOD, X509V3_EXT_METHOD,
X509V3_EXT_METHOD)
#define sk_X509V3_EXT_METHOD_num(sk)
OPENSSL_sk_num(ossl_check_const_X509V3_EXT_METHOD_sk_type(sk))
#define sk_X509V3_EXT_METHOD_value(sk, idx) ((X509V3_EXT_METHOD
*)OPENSSL_sk_value(ossl_check_const_X509V3_EXT_METHOD_sk_type(sk), (idx)))
#define sk_X509V3_EXT_METHOD_new(cmp) ((STACK_OF(X509V3_EXT_METHOD)
*)OPENSSL_sk_new(ossl_check_X509V3_EXT_METHOD_compfunc_type(cmp)))
#define sk_X509V3_EXT_METHOD_new_null() ((STACK_OF(X509V3_EXT_METHOD)
*)OPENSSL_sk_new_null())
#define sk_X509V3_EXT_METHOD_new_reserve(cmp, n) ((STACK_OF(X509V3_EXT_METHOD)
*)OPENSSL_sk_new_reserve(ossl_check_X509V3_EXT_METHOD_compfunc_type(cmp),
 (n)))
#define sk_X509V3_EXT_METHOD_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_X509V3_EXT_METHOD_sk_type(sk), (n))
#define sk_X509V3_EXT_METHOD_free(sk)
OPENSSL_sk_free(ossl_check_X509V3_EXT_METHOD_sk_type(sk))
#define sk_X509V3_EXT_METHOD_zero(sk)
OPENSSL_sk_zero(ossl_check_X509V3_EXT_METHOD_sk_type(sk))
#define sk_X509V3_EXT_METHOD_delete(sk, i) ((X509V3_EXT_METHOD
*)OPENSSL_sk_delete(ossl_check_X509V3_EXT_METHOD_sk_type(sk), (i)))
#define sk_X509V3_EXT_METHOD_delete_ptr(sk, ptr) ((X509V3_EXT_METHOD
*)OPENSSL_sk_delete_ptr(ossl_check_X509V3_EXT_METHOD_sk_type(sk),
ossl_check_X509V3_EXT_METHOD_type(ptr)))
#define sk_X509V3_EXT_METHOD_push(sk, ptr)
OPENSSL_sk_push(ossl_check_X509V3_EXT_METHOD_sk_type(sk),
ossl_check_X509V3_EXT_METHOD_type(ptr))
#define sk_X509V3_EXT_METHOD_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_X509V3_EXT_METHOD_sk_type(sk),
ossl_check_X509V3_EXT_METHOD_type(ptr))
#define sk_X509V3_EXT_METHOD_pop(sk) ((X509V3_EXT_METHOD
*)OPENSSL_sk_pop(ossl_check_X509V3_EXT_METHOD_sk_type(sk)))
#define
 sk_X509V3_EXT_METHOD_shift(sk) ((X509V3_EXT_METHOD
*)OPENSSL_sk_shift(ossl_check_X509V3_EXT_METHOD_sk_type(sk)))
```

```
#define sk_X509V3_EXT_METHOD_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509V3_EXT_METHOD_sk_type(sk),ossl_check_X509V3_EXT_METHOD
_freefunc_type(freefunc))
#define sk_X509V3_EXT_METHOD_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_X509V3_EXT_METHOD_sk_type(sk),
ossl_check_X509V3_EXT_METHOD_type(ptr), (idx))
#define sk_X509V3_EXT_METHOD_set(sk, idx, ptr) ((X509V3_EXT_METHOD
*)OPENSSL_sk_set(ossl_check_X509V3_EXT_METHOD_sk_type(sk), (idx),
ossl_check_X509V3_EXT_METHOD_type(ptr)))
#define sk_X509V3_EXT_METHOD_find(sk, ptr)
OPENSSL_sk_find(ossl_check_X509V3_EXT_METHOD_sk_type(sk),
ossl_check_X509V3_EXT_METHOD_type(ptr))
#define sk_X509V3_EXT_METHOD_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_X509V3_EXT_METHOD_sk_type(sk),
ossl_check_X509V3_EXT_METHOD_type(ptr))
#define sk_X509V3_EXT_METHOD_find_all(sk, ptr,
 pnum) OPENSSL_sk_find_all(ossl_check_X509V3_EXT_METHOD_sk_type(sk),
ossl_check_X509V3_EXT_METHOD_type(ptr), pnum)
#define sk_X509V3_EXT_METHOD_sort(sk)
OPENSSL_sk_sort(ossl_check_X509V3_EXT_METHOD_sk_type(sk))
#define sk_X509V3_EXT_METHOD_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_X509V3_EXT_METHOD_sk_type(sk))
#define sk_X509V3_EXT_METHOD_dup(sk) ((STACK_OF(X509V3_EXT_METHOD)
*)OPENSSL_sk_dup(ossl_check_const_X509V3_EXT_METHOD_sk_type(sk)))
#define sk_X509V3_EXT_METHOD_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(X509V3_EXT_METHOD)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509V3_EXT_METHOD_sk_type(sk),
ossl_check_X509V3_EXT_METHOD_copyfunc_type(copyfunc),
ossl_check_X509V3_EXT_METHOD_freefunc_type(freefunc)))
#define sk_X509V3_EXT_METHOD_set_cmp_func(sk, cmp)
((sk_X509V3_EXT_METHOD_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509V3_EXT_METHOD_sk
_type(sk), ossl_check_X509V3_EXT_METHOD_compfunc_type(cmp)))

/* clang-format on */

/* ext_flags values */
#define X509V3_EXT_DYNAMIC
 0x1
#define X509V3_EXT_CTX_DEP 0x2
#define X509V3_EXT_MULTILINE 0x4

typedef BIT_STRING_BITNAME ENUMERATED_NAMES;

typedef struct BASIC_CONSTRAINTS_st {
   int ca;
   ASN1_INTEGER *pathlen;
} BASIC_CONSTRAINTS;
```

```
typedef struct OSSL_BASIC_ATTR_CONSTRAINTS_st {
   int authority;
   ASN1_INTEGER *pathlen;
} OSSL_BASIC_ATTR_CONSTRAINTS;

typedef struct PKEY_USAGE_PERIOD_st {
   ASN1_GENERALIZEDTIME *notBefore;
   ASN1_GENERALIZEDTIME *notAfter;
} PKEY_USAGE_PERIOD;

typedef struct otherName_st {
   ASN1_OBJECT *type_id;
   ASN1_TYPE *value;
} OTHERNAME;

typedef struct EDIPartyName_st {
   ASN1_STRING *nameAssigner;
   ASN1_STRING *partyName;
} EDIPARTYNAME;

typedef struct GENERAL_NAME_st {
#define GEN_OTHERNAME 0
#define GEN_EMAIL 1
#define GEN_DNS 2
#define GEN_X400 3
#define GEN_DIRNAME 4
#define GEN_EDIPARTY 5
#define GEN_URI 6
#define GEN_IPADD 7
#define GEN_RID 8
   int type;
   union {
      char *ptr;
      OTHERNAME *otherName; /* otherName */
      ASN1_IA5STRING
 *rfc822Name;
      ASN1_IA5STRING *dNSName;
      ASN1_STRING *x400Address;
      X509_NAME *directoryName;
      EDIPARTYNAME *ediPartyName;
      ASN1_IA5STRING *uniformResourceIdentifier;
      ASN1_OCTET_STRING *iPAddress;
      ASN1_OBJECT *registeredID;
      /* Old names */
      ASN1_OCTET_STRING *ip; /* iPAddress */
      X509_NAME *dirn; /* dirn */
      ASN1_IA5STRING *ia5; /* rfc822Name, dNSName,
                        * uniformResourceIdentifier */
```

```
    ASN1_OBJECT *rid; /* registeredID */
    ASN1_TYPE *other; /* x400Address */
  } d;
} GENERAL_NAME;

typedef struct ACCESS_DESCRIPTION_st {
  ASN1_OBJECT *method;
  GENERAL_NAME *location;
} ACCESS_DESCRIPTION;

int GENERAL_NAME_set1_X509_NAME(GENERAL_NAME **tgt, const X509_NAME *src);

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ACCESS_DESCRIPTION, ACCESS_DESCRIPTION,
ACCESS_DESCRIPTION)
#define sk_ACCESS_DESCRIPTION_num(sk)
OPENSSL_sk_num(ossl_check_const_ACCESS_DESCRIPTION_sk_type(sk))
#define
 sk_ACCESS_DESCRIPTION_value(sk, idx) ((ACCESS_DESCRIPTION
*)OPENSSL_sk_value(ossl_check_const_ACCESS_DESCRIPTION_sk_type(sk), (idx)))
#define sk_ACCESS_DESCRIPTION_new(cmp) ((STACK_OF(ACCESS_DESCRIPTION)
*)OPENSSL_sk_new(ossl_check_ACCESS_DESCRIPTION_compfunc_type(cmp)))
#define sk_ACCESS_DESCRIPTION_new_null() ((STACK_OF(ACCESS_DESCRIPTION)
*)OPENSSL_sk_new_null())
#define sk_ACCESS_DESCRIPTION_new_reserve(cmp, n) ((STACK_OF(ACCESS_DESCRIPTION)
*)OPENSSL_sk_new_reserve(ossl_check_ACCESS_DESCRIPTION_compfunc_type(cmp), (n)))
#define sk_ACCESS_DESCRIPTION_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_ACCESS_DESCRIPTION_sk_type(sk), (n))
#define sk_ACCESS_DESCRIPTION_free(sk)
OPENSSL_sk_free(ossl_check_ACCESS_DESCRIPTION_sk_type(sk))
#define sk_ACCESS_DESCRIPTION_zero(sk)
OPENSSL_sk_zero(ossl_check_ACCESS_DESCRIPTION_sk_type(sk))
#define sk_ACCESS_DESCRIPTION_delete(sk, i) ((ACCESS_DESCRIPTION
*)OPENSSL_sk_delete(ossl_check_ACCESS_DESCRIPTION_sk_type(sk), (i)))
#define
 sk_ACCESS_DESCRIPTION_delete_ptr(sk, ptr) ((ACCESS_DESCRIPTION
*)OPENSSL_sk_delete_ptr(ossl_check_ACCESS_DESCRIPTION_sk_type(sk),
ossl_check_ACCESS_DESCRIPTION_type(ptr)))
#define sk_ACCESS_DESCRIPTION_push(sk, ptr)
OPENSSL_sk_push(ossl_check_ACCESS_DESCRIPTION_sk_type(sk),
ossl_check_ACCESS_DESCRIPTION_type(ptr))
#define sk_ACCESS_DESCRIPTION_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_ACCESS_DESCRIPTION_sk_type(sk),
ossl_check_ACCESS_DESCRIPTION_type(ptr))
#define sk_ACCESS_DESCRIPTION_pop(sk) ((ACCESS_DESCRIPTION
*)OPENSSL_sk_pop(ossl_check_ACCESS_DESCRIPTION_sk_type(sk)))
#define sk_ACCESS_DESCRIPTION_shift(sk) ((ACCESS_DESCRIPTION
*)OPENSSL_sk_shift(ossl_check_ACCESS_DESCRIPTION_sk_type(sk)))
```

```
#define sk_ACCESS_DESCRIPTION_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ACCESS_DESCRIPTION_sk_type(sk),ossl_check_ACCESS_DESCRIPTIO
N_freefunc_type(freefunc))
#define sk_ACCESS_DESCRIPTION_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_ACCESS_DESCRIPTION_sk_type(sk),
 ossl_check_ACCESS_DESCRIPTION_type(ptr), (idx))
#define sk_ACCESS_DESCRIPTION_set(sk, idx, ptr) ((ACCESS_DESCRIPTION
*)OPENSSL_sk_set(ossl_check_ACCESS_DESCRIPTION_sk_type(sk), (idx),
ossl_check_ACCESS_DESCRIPTION_type(ptr)))
#define sk_ACCESS_DESCRIPTION_find(sk, ptr)
OPENSSL_sk_find(ossl_check_ACCESS_DESCRIPTION_sk_type(sk),
ossl_check_ACCESS_DESCRIPTION_type(ptr))
#define sk_ACCESS_DESCRIPTION_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_ACCESS_DESCRIPTION_sk_type(sk),
ossl_check_ACCESS_DESCRIPTION_type(ptr))
#define sk_ACCESS_DESCRIPTION_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ACCESS_DESCRIPTION_sk_type(sk),
ossl_check_ACCESS_DESCRIPTION_type(ptr), pnum)
#define sk_ACCESS_DESCRIPTION_sort(sk)
OPENSSL_sk_sort(ossl_check_ACCESS_DESCRIPTION_sk_type(sk))
#define sk_ACCESS_DESCRIPTION_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_ACCESS_DESCRIPTION_sk_type(sk))
#define sk_ACCESS_DESCRIPTION_dup(sk) ((STACK_OF(ACCESS_DESCRIPTION)
*)OPENSSL_sk_dup(ossl_check_const_ACCESS_DESCRIPTION_sk_type(sk)))
#define
 sk_ACCESS_DESCRIPTION_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ACCESS_DESCRIPTION)
*)OPENSSL_sk_deep_copy(ossl_check_const_ACCESS_DESCRIPTION_sk_type(sk),
ossl_check_ACCESS_DESCRIPTION_copyfunc_type(copyfunc),
ossl_check_ACCESS_DESCRIPTION_freefunc_type(freefunc)))
#define sk_ACCESS_DESCRIPTION_set_cmp_func(sk, cmp)
((sk_ACCESS_DESCRIPTION_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ACCESS_DESCRIPTION_s
k_type(sk), ossl_check_ACCESS_DESCRIPTION_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(GENERAL_NAME, GENERAL_NAME, GENERAL_NAME)
#define sk_GENERAL_NAME_num(sk) OPENSSL_sk_num(ossl_check_const_GENERAL_NAME_sk_type(sk))
#define sk_GENERAL_NAME_value(sk, idx) ((GENERAL_NAME
*)OPENSSL_sk_value(ossl_check_const_GENERAL_NAME_sk_type(sk), (idx)))
#define sk_GENERAL_NAME_new(cmp) ((STACK_OF(GENERAL_NAME)
*)OPENSSL_sk_new(ossl_check_GENERAL_NAME_compfunc_type(cmp)))
#define sk_GENERAL_NAME_new_null() ((STACK_OF(GENERAL_NAME) *)OPENSSL_sk_new_null())
#define
 sk_GENERAL_NAME_new_reserve(cmp, n) ((STACK_OF(GENERAL_NAME)
*)OPENSSL_sk_new_reserve(ossl_check_GENERAL_NAME_compfunc_type(cmp), (n)))
#define sk_GENERAL_NAME_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_GENERAL_NAME_sk_type(sk),
(n))
#define sk_GENERAL_NAME_free(sk) OPENSSL_sk_free(ossl_check_GENERAL_NAME_sk_type(sk))
#define sk_GENERAL_NAME_zero(sk) OPENSSL_sk_zero(ossl_check_GENERAL_NAME_sk_type(sk))
#define sk_GENERAL_NAME_delete(sk, i) ((GENERAL_NAME
*)OPENSSL_sk_delete(ossl_check_GENERAL_NAME_sk_type(sk), (i)))
```

```
#define sk_GENERAL_NAME_delete_ptr(sk, ptr) ((GENERAL_NAME
*)OPENSSL_sk_delete_ptr(ossl_check_GENERAL_NAME_sk_type(sk),
ossl_check_GENERAL_NAME_type(ptr)))
#define sk_GENERAL_NAME_push(sk, ptr) OPENSSL_sk_push(ossl_check_GENERAL_NAME_sk_type(sk),
ossl_check_GENERAL_NAME_type(ptr))
#define sk_GENERAL_NAME_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_GENERAL_NAME_sk_type(sk), ossl_check_GENERAL_NAME_type(ptr))
#define sk_GENERAL_NAME_pop(sk) ((GENERAL_NAME
 *)OPENSSL_sk_pop(ossl_check_GENERAL_NAME_sk_type(sk)))
#define sk_GENERAL_NAME_shift(sk) ((GENERAL_NAME
*)OPENSSL_sk_shift(ossl_check_GENERAL_NAME_sk_type(sk)))
#define sk_GENERAL_NAME_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_GENERAL_NAME_sk_type(sk),ossl_check_GENERAL_NAME_freefunc_ty
pe(freefunc))
#define sk_GENERAL_NAME_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_GENERAL_NAME_sk_type(sk), ossl_check_GENERAL_NAME_type(ptr),
(idx))
#define sk_GENERAL_NAME_set(sk, idx, ptr) ((GENERAL_NAME
*)OPENSSL_sk_set(ossl_check_GENERAL_NAME_sk_type(sk), (idx),
ossl_check_GENERAL_NAME_type(ptr)))
#define sk_GENERAL_NAME_find(sk, ptr) OPENSSL_sk_find(ossl_check_GENERAL_NAME_sk_type(sk),
ossl_check_GENERAL_NAME_type(ptr))
#define sk_GENERAL_NAME_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_GENERAL_NAME_sk_type(sk), ossl_check_GENERAL_NAME_type(ptr))
#define sk_GENERAL_NAME_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_GENERAL_NAME_sk_type(sk), ossl_check_GENERAL_NAME_type(ptr),
 pnum)
#define sk_GENERAL_NAME_sort(sk) OPENSSL_sk_sort(ossl_check_GENERAL_NAME_sk_type(sk))
#define sk_GENERAL_NAME_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_GENERAL_NAME_sk_type(sk))
#define sk_GENERAL_NAME_dup(sk) ((STACK_OF(GENERAL_NAME)
*)OPENSSL_sk_dup(ossl_check_const_GENERAL_NAME_sk_type(sk)))
#define sk_GENERAL_NAME_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(GENERAL_NAME)
*)OPENSSL_sk_deep_copy(ossl_check_const_GENERAL_NAME_sk_type(sk),
ossl_check_GENERAL_NAME_copyfunc_type(copyfunc),
ossl_check_GENERAL_NAME_freefunc_type(freefunc)))
#define sk_GENERAL_NAME_set_cmp_func(sk, cmp)
((sk_GENERAL_NAME_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_GENERAL_NAME_sk_type(sk),
ossl_check_GENERAL_NAME_compfunc_type(cmp)))

/* clang-format on */

typedef STACK_OF(ACCESS_DESCRIPTION) AUTHORITY_INFO_ACCESS;
typedef STACK_OF(ASN1_OBJECT) EXTENDED_KEY_USAGE;
typedef STACK_OF(ASN1_INTEGER) TLS_FEATURE;
typedef STACK_OF(GENERAL_NAME) GENERAL_NAMES;

/* clang-format off */
```

```
SKM_DEFINE_STACK_OF_INTERNAL(GENERAL_NAMES,
 GENERAL_NAMES, GENERAL_NAMES)
#define sk_GENERAL_NAMES_num(sk)
OPENSSL_sk_num(ossl_check_const_GENERAL_NAMES_sk_type(sk))
#define sk_GENERAL_NAMES_value(sk, idx) ((GENERAL_NAMES
*)OPENSSL_sk_value(ossl_check_const_GENERAL_NAMES_sk_type(sk), (idx)))
#define sk_GENERAL_NAMES_new(cmp) ((STACK_OF(GENERAL_NAMES)
*)OPENSSL_sk_new(ossl_check_GENERAL_NAMES_compfunc_type(cmp)))
#define sk_GENERAL_NAMES_new_null() ((STACK_OF(GENERAL_NAMES) *)OPENSSL_sk_new_null())
#define sk_GENERAL_NAMES_new_reserve(cmp, n) ((STACK_OF(GENERAL_NAMES)
*)OPENSSL_sk_new_reserve(ossl_check_GENERAL_NAMES_compfunc_type(cmp), (n)))
#define sk_GENERAL_NAMES_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_GENERAL_NAMES_sk_type(sk), (n))
#define sk_GENERAL_NAMES_free(sk) OPENSSL_sk_free(ossl_check_GENERAL_NAMES_sk_type(sk))
#define sk_GENERAL_NAMES_zero(sk) OPENSSL_sk_zero(ossl_check_GENERAL_NAMES_sk_type(sk))
#define sk_GENERAL_NAMES_delete(sk, i) ((GENERAL_NAMES
*)OPENSSL_sk_delete(ossl_check_GENERAL_NAMES_sk_type(sk),
 (i)))
#define sk_GENERAL_NAMES_delete_ptr(sk, ptr) ((GENERAL_NAMES
*)OPENSSL_sk_delete_ptr(ossl_check_GENERAL_NAMES_sk_type(sk),
ossl_check_GENERAL_NAMES_type(ptr)))
#define sk_GENERAL_NAMES_push(sk, ptr) OPENSSL_sk_push(ossl_check_GENERAL_NAMES_sk_type(sk),
ossl_check_GENERAL_NAMES_type(ptr))
#define sk_GENERAL_NAMES_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_GENERAL_NAMES_sk_type(sk), ossl_check_GENERAL_NAMES_type(ptr))
#define sk_GENERAL_NAMES_pop(sk) ((GENERAL_NAMES
*)OPENSSL_sk_pop(ossl_check_GENERAL_NAMES_sk_type(sk)))
#define sk_GENERAL_NAMES_shift(sk) ((GENERAL_NAMES
*)OPENSSL_sk_shift(ossl_check_GENERAL_NAMES_sk_type(sk)))
#define sk_GENERAL_NAMES_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_GENERAL_NAMES_sk_type(sk),ossl_check_GENERAL_NAMES_freefunc
_type(freefunc))
#define sk_GENERAL_NAMES_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_GENERAL_NAMES_sk_type(sk), ossl_check_GENERAL_NAMES_type(ptr),
(idx))
#define sk_GENERAL_NAMES_set(sk,
 idx, ptr) ((GENERAL_NAMES *)OPENSSL_sk_set(ossl_check_GENERAL_NAMES_sk_type(sk), (idx),
ossl_check_GENERAL_NAMES_type(ptr)))
#define sk_GENERAL_NAMES_find(sk, ptr) OPENSSL_sk_find(ossl_check_GENERAL_NAMES_sk_type(sk),
ossl_check_GENERAL_NAMES_type(ptr))
#define sk_GENERAL_NAMES_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_GENERAL_NAMES_sk_type(sk), ossl_check_GENERAL_NAMES_type(ptr))
#define sk_GENERAL_NAMES_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_GENERAL_NAMES_sk_type(sk), ossl_check_GENERAL_NAMES_type(ptr),
pnum)
#define sk_GENERAL_NAMES_sort(sk) OPENSSL_sk_sort(ossl_check_GENERAL_NAMES_sk_type(sk))
#define sk_GENERAL_NAMES_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_GENERAL_NAMES_sk_type(sk))
```

```
#define sk_GENERAL_NAMES_dup(sk) ((STACK_OF(GENERAL_NAMES)
*)OPENSSL_sk_dup(ossl_check_const_GENERAL_NAMES_sk_type(sk)))
#define sk_GENERAL_NAMES_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(GENERAL_NAMES)
*)OPENSSL_sk_deep_copy(ossl_check_const_GENERAL_NAMES_sk_type(sk),
 ossl_check_GENERAL_NAMES_copyfunc_type(copyfunc),
ossl_check_GENERAL_NAMES_freefunc_type(freefunc)))
#define sk_GENERAL_NAMES_set_cmp_func(sk, cmp)
((sk_GENERAL_NAMES_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_GENERAL_NAMES_sk_type(sk),
ossl_check_GENERAL_NAMES_compfunc_type(cmp)))

/* clang-format on */

typedef struct DIST_POINT_NAME_st {
  int type;
  union {
     GENERAL_NAMES *fullname;
     STACK_OF(X509_NAME_ENTRY) *relativename;
  } name;
  /* If relativename then this contains the full distribution point name */
  X509_NAME *dpname;
} DIST_POINT_NAME;
DECLARE_ASN1_DUP_FUNCTION(DIST_POINT_NAME)
/* All existing reasons */
#define CRLDP_ALL_REASONS 0x807f

#define CRL_REASON_NONE -1
#define CRL_REASON_UNSPECIFIED 0
#define CRL_REASON_KEY_COMPROMISE 1
#define CRL_REASON_CA_COMPROMISE 2
#define CRL_REASON_AFFILIATION_CHANGED 3
#define CRL_REASON_SUPERSEDED 4
#define CRL_REASON_CESSATION_OF_OPERATION 5
#define CRL_REASON_CERTIFICATE_HOLD 6
#define CRL_REASON_REMOVE_FROM_CRL
 8
#define CRL_REASON_PRIVILEGE_WITHDRAWN 9
#define CRL_REASON_AA_COMPROMISE 10

struct DIST_POINT_st {
  DIST_POINT_NAME *distpoint;
  ASN1_BIT_STRING *reasons;
  GENERAL_NAMES *CRLissuer;
  int dp_reasons;
};

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(DIST_POINT, DIST_POINT, DIST_POINT)
#define sk_DIST_POINT_num(sk) OPENSSL_sk_num(ossl_check_const_DIST_POINT_sk_type(sk))
```

```
#define sk_DIST_POINT_value(sk, idx) ((DIST_POINT
*)OPENSSL_sk_value(ossl_check_const_DIST_POINT_sk_type(sk), (idx)))
#define sk_DIST_POINT_new(cmp) ((STACK_OF(DIST_POINT)
*)OPENSSL_sk_new(ossl_check_DIST_POINT_compfunc_type(cmp)))
#define sk_DIST_POINT_new_null() ((STACK_OF(DIST_POINT) *)OPENSSL_sk_new_null())
#define sk_DIST_POINT_new_reserve(cmp, n) ((STACK_OF(DIST_POINT)
*)OPENSSL_sk_new_reserve(ossl_check_DIST_POINT_compfunc_type(cmp), (n)))
#define sk_DIST_POINT_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_DIST_POINT_sk_type(sk), (n))
#define sk_DIST_POINT_free(sk) OPENSSL_sk_free(ossl_check_DIST_POINT_sk_type(sk))
#define
 sk_DIST_POINT_zero(sk) OPENSSL_sk_zero(ossl_check_DIST_POINT_sk_type(sk))
#define sk_DIST_POINT_delete(sk, i) ((DIST_POINT
*)OPENSSL_sk_delete(ossl_check_DIST_POINT_sk_type(sk), (i)))
#define sk_DIST_POINT_delete_ptr(sk, ptr) ((DIST_POINT
*)OPENSSL_sk_delete_ptr(ossl_check_DIST_POINT_sk_type(sk), ossl_check_DIST_POINT_type(ptr)))
#define sk_DIST_POINT_push(sk, ptr) OPENSSL_sk_push(ossl_check_DIST_POINT_sk_type(sk),
ossl_check_DIST_POINT_type(ptr))
#define sk_DIST_POINT_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_DIST_POINT_sk_type(sk),
ossl_check_DIST_POINT_type(ptr))
#define sk_DIST_POINT_pop(sk) ((DIST_POINT *)OPENSSL_sk_pop(ossl_check_DIST_POINT_sk_type(sk)))
#define sk_DIST_POINT_shift(sk) ((DIST_POINT *)OPENSSL_sk_shift(ossl_check_DIST_POINT_sk_type(sk)))
#define sk_DIST_POINT_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_DIST_POINT_sk_type(sk),ossl_check_DIST_POINT_freefunc_type(freefunc)
)
#define sk_DIST_POINT_insert(sk,
 ptr, idx) OPENSSL_sk_insert(ossl_check_DIST_POINT_sk_type(sk), ossl_check_DIST_POINT_type(ptr), (idx))
#define sk_DIST_POINT_set(sk, idx, ptr) ((DIST_POINT
*)OPENSSL_sk_set(ossl_check_DIST_POINT_sk_type(sk), (idx), ossl_check_DIST_POINT_type(ptr)))
#define sk_DIST_POINT_find(sk, ptr) OPENSSL_sk_find(ossl_check_DIST_POINT_sk_type(sk),
ossl_check_DIST_POINT_type(ptr))
#define sk_DIST_POINT_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_DIST_POINT_sk_type(sk),
ossl_check_DIST_POINT_type(ptr))
#define sk_DIST_POINT_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_DIST_POINT_sk_type(sk),
ossl_check_DIST_POINT_type(ptr), pnum)
#define sk_DIST_POINT_sort(sk) OPENSSL_sk_sort(ossl_check_DIST_POINT_sk_type(sk))
#define sk_DIST_POINT_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_DIST_POINT_sk_type(sk))
#define sk_DIST_POINT_dup(sk) ((STACK_OF(DIST_POINT)
*)OPENSSL_sk_dup(ossl_check_const_DIST_POINT_sk_type(sk)))
#define sk_DIST_POINT_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(DIST_POINT)
 *)OPENSSL_sk_deep_copy(ossl_check_const_DIST_POINT_sk_type(sk),
ossl_check_DIST_POINT_copyfunc_type(copyfunc), ossl_check_DIST_POINT_freefunc_type(freefunc)))
#define sk_DIST_POINT_set_cmp_func(sk, cmp)
((sk_DIST_POINT_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_DIST_POINT_sk_type(sk),
ossl_check_DIST_POINT_compfunc_type(cmp)))

/* clang-format on */

typedef STACK_OF(DIST_POINT) CRL_DIST_POINTS;
```

```
struct AUTHORITY_KEYID_st {
   ASN1_OCTET_STRING *keyid;
   GENERAL_NAMES *issuer;
   ASN1_INTEGER *serial;
};

/* Strong extranet structures */

typedef struct SXNET_ID_st {
   ASN1_INTEGER *zone;
   ASN1_OCTET_STRING *user;
} SXNETID;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(SXNETID, SXNETID, SXNETID)
#define sk_SXNETID_num(sk) OPENSSL_sk_num(ossl_check_const_SXNETID_sk_type(sk))
#define sk_SXNETID_value(sk, idx) ((SXNETID
*)OPENSSL_sk_value(ossl_check_const_SXNETID_sk_type(sk), (idx)))
#define sk_SXNETID_new(cmp) ((STACK_OF(SXNETID)
*)OPENSSL_sk_new(ossl_check_SXNETID_compfunc_type(cmp)))
#define
 sk_SXNETID_new_null() ((STACK_OF(SXNETID) *)OPENSSL_sk_new_null())
#define sk_SXNETID_new_reserve(cmp, n) ((STACK_OF(SXNETID)
*)OPENSSL_sk_new_reserve(ossl_check_SXNETID_compfunc_type(cmp), (n)))
#define sk_SXNETID_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_SXNETID_sk_type(sk), (n))
#define sk_SXNETID_free(sk) OPENSSL_sk_free(ossl_check_SXNETID_sk_type(sk))
#define sk_SXNETID_zero(sk) OPENSSL_sk_zero(ossl_check_SXNETID_sk_type(sk))
#define sk_SXNETID_delete(sk, i) ((SXNETID *)OPENSSL_sk_delete(ossl_check_SXNETID_sk_type(sk), (i)))
#define sk_SXNETID_delete_ptr(sk, ptr) ((SXNETID
*)OPENSSL_sk_delete_ptr(ossl_check_SXNETID_sk_type(sk), ossl_check_SXNETID_type(ptr)))
#define sk_SXNETID_push(sk, ptr) OPENSSL_sk_push(ossl_check_SXNETID_sk_type(sk),
ossl_check_SXNETID_type(ptr))
#define sk_SXNETID_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_SXNETID_sk_type(sk),
ossl_check_SXNETID_type(ptr))
#define sk_SXNETID_pop(sk) ((SXNETID *)OPENSSL_sk_pop(ossl_check_SXNETID_sk_type(sk)))
#define
 sk_SXNETID_shift(sk) ((SXNETID *)OPENSSL_sk_shift(ossl_check_SXNETID_sk_type(sk)))
#define sk_SXNETID_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_SXNETID_sk_type(sk),ossl_check_SXNETID_freefunc_type(freefunc))
#define sk_SXNETID_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_SXNETID_sk_type(sk),
ossl_check_SXNETID_type(ptr), (idx))
#define sk_SXNETID_set(sk, idx, ptr) ((SXNETID *)OPENSSL_sk_set(ossl_check_SXNETID_sk_type(sk), (idx),
ossl_check_SXNETID_type(ptr)))
#define sk_SXNETID_find(sk, ptr) OPENSSL_sk_find(ossl_check_SXNETID_sk_type(sk),
ossl_check_SXNETID_type(ptr))
#define sk_SXNETID_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_SXNETID_sk_type(sk),
ossl_check_SXNETID_type(ptr))
```

```
#define sk_SXNETID_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_SXNETID_sk_type(sk),
ossl_check_SXNETID_type(ptr), pnum)
#define sk_SXNETID_sort(sk) OPENSSL_sk_sort(ossl_check_SXNETID_sk_type(sk))
#define sk_SXNETID_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_SXNETID_sk_type(sk))
#define
 sk_SXNETID_dup(sk) ((STACK_OF(SXNETID)
*)OPENSSL_sk_dup(ossl_check_const_SXNETID_sk_type(sk)))
#define sk_SXNETID_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(SXNETID)
*)OPENSSL_sk_deep_copy(ossl_check_const_SXNETID_sk_type(sk),
ossl_check_SXNETID_copyfunc_type(copyfunc), ossl_check_SXNETID_freefunc_type(freefunc)))
#define sk_SXNETID_set_cmp_func(sk, cmp)
((sk_SXNETID_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_SXNETID_sk_type(sk),
ossl_check_SXNETID_compfunc_type(cmp)))

/* clang-format on */

typedef struct SXNET_st {
   ASN1_INTEGER *version;
   STACK_OF(SXNETID) *ids;
} SXNET;

typedef struct ISSUER_SIGN_TOOL_st {
   ASN1_UTF8STRING *signTool;
   ASN1_UTF8STRING *cATool;
   ASN1_UTF8STRING *signToolCert;
   ASN1_UTF8STRING *cAToolCert;
} ISSUER_SIGN_TOOL;

typedef struct NOTICEREF_st {
   ASN1_STRING *organization;
   STACK_OF(ASN1_INTEGER) *noticenos;
} NOTICEREF;

typedef struct USERNOTICE_st {
   NOTICEREF *noticeref;
    ASN1_STRING *exptext;
} USERNOTICE;

typedef struct POLICYQUALINFO_st {
   ASN1_OBJECT *pqualid;
   union {
       ASN1_IA5STRING *cpsuri;
       USERNOTICE *usernotice;
       ASN1_TYPE *other;
   } d;
} POLICYQUALINFO;

/* clang-format off */
```

```
SKM_DEFINE_STACK_OF_INTERNAL(POLICYQUALINFO, POLICYQUALINFO, POLICYQUALINFO)
#define sk_POLICYQUALINFO_num(sk)
OPENSSL_sk_num(ossl_check_const_POLICYQUALINFO_sk_type(sk))
#define sk_POLICYQUALINFO_value(sk, idx) ((POLICYQUALINFO
*)OPENSSL_sk_value(ossl_check_const_POLICYQUALINFO_sk_type(sk), (idx)))
#define sk_POLICYQUALINFO_new(cmp) ((STACK_OF(POLICYQUALINFO)
*)OPENSSL_sk_new(ossl_check_POLICYQUALINFO_compfunc_type(cmp)))
#define sk_POLICYQUALINFO_new_null() ((STACK_OF(POLICYQUALINFO) *)OPENSSL_sk_new_null())
#define sk_POLICYQUALINFO_new_reserve(cmp, n) ((STACK_OF(POLICYQUALINFO)
*)OPENSSL_sk_new_reserve(ossl_check_POLICYQUALINFO_compfunc_type(cmp), (n)))
#define sk_POLICYQUALINFO_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_POLICYQUALINFO_sk_type(sk),
 (n))
#define sk_POLICYQUALINFO_free(sk) OPENSSL_sk_free(ossl_check_POLICYQUALINFO_sk_type(sk))
#define sk_POLICYQUALINFO_zero(sk) OPENSSL_sk_zero(ossl_check_POLICYQUALINFO_sk_type(sk))
#define sk_POLICYQUALINFO_delete(sk, i) ((POLICYQUALINFO
*)OPENSSL_sk_delete(ossl_check_POLICYQUALINFO_sk_type(sk), (i)))
#define sk_POLICYQUALINFO_delete_ptr(sk, ptr) ((POLICYQUALINFO
*)OPENSSL_sk_delete_ptr(ossl_check_POLICYQUALINFO_sk_type(sk),
ossl_check_POLICYQUALINFO_type(ptr)))
#define sk_POLICYQUALINFO_push(sk, ptr) OPENSSL_sk_push(ossl_check_POLICYQUALINFO_sk_type(sk),
ossl_check_POLICYQUALINFO_type(ptr))
#define sk_POLICYQUALINFO_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_POLICYQUALINFO_sk_type(sk), ossl_check_POLICYQUALINFO_type(ptr))
#define sk_POLICYQUALINFO_pop(sk) ((POLICYQUALINFO
*)OPENSSL_sk_pop(ossl_check_POLICYQUALINFO_sk_type(sk)))
#define sk_POLICYQUALINFO_shift(sk) ((POLICYQUALINFO
*)OPENSSL_sk_shift(ossl_check_POLICYQUALINFO_sk_type(sk)))
#define sk_POLICYQUALINFO_pop_free(sk,
 freefunc)
OPENSSL_sk_pop_free(ossl_check_POLICYQUALINFO_sk_type(sk),ossl_check_POLICYQUALINFO_freefunc
_type(freefunc))
#define sk_POLICYQUALINFO_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_POLICYQUALINFO_sk_type(sk), ossl_check_POLICYQUALINFO_type(ptr),
(idx))
#define sk_POLICYQUALINFO_set(sk, idx, ptr) ((POLICYQUALINFO
*)OPENSSL_sk_set(ossl_check_POLICYQUALINFO_sk_type(sk), (idx),
ossl_check_POLICYQUALINFO_type(ptr)))
#define sk_POLICYQUALINFO_find(sk, ptr) OPENSSL_sk_find(ossl_check_POLICYQUALINFO_sk_type(sk),
ossl_check_POLICYQUALINFO_type(ptr))
#define sk_POLICYQUALINFO_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_POLICYQUALINFO_sk_type(sk),
ossl_check_POLICYQUALINFO_type(ptr))
#define sk_POLICYQUALINFO_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_POLICYQUALINFO_sk_type(sk), ossl_check_POLICYQUALINFO_type(ptr),
pnum)
#define sk_POLICYQUALINFO_sort(sk) OPENSSL_sk_sort(ossl_check_POLICYQUALINFO_sk_type(sk))
#define sk_POLICYQUALINFO_is_sorted(sk)
```

```
 OPENSSL_sk_is_sorted(ossl_check_const_POLICYQUALINFO_sk_type(sk))
#define sk_POLICYQUALINFO_dup(sk) ((STACK_OF(POLICYQUALINFO)
*)OPENSSL_sk_dup(ossl_check_const_POLICYQUALINFO_sk_type(sk)))
#define sk_POLICYQUALINFO_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(POLICYQUALINFO)
*)OPENSSL_sk_deep_copy(ossl_check_const_POLICYQUALINFO_sk_type(sk),
ossl_check_POLICYQUALINFO_copyfunc_type(copyfunc),
ossl_check_POLICYQUALINFO_freefunc_type(freefunc)))
#define sk_POLICYQUALINFO_set_cmp_func(sk, cmp)
((sk_POLICYQUALINFO_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_POLICYQUALINFO_sk_type(sk),
ossl_check_POLICYQUALINFO_compfunc_type(cmp)))

/* clang-format on */

typedef struct POLICYINFO_st {
   ASN1_OBJECT *policyid;
   STACK_OF(POLICYQUALINFO) *qualifiers;
} POLICYINFO;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(POLICYINFO, POLICYINFO, POLICYINFO)
#define sk_POLICYINFO_num(sk) OPENSSL_sk_num(ossl_check_const_POLICYINFO_sk_type(sk))
#define sk_POLICYINFO_value(sk, idx) ((POLICYINFO
 *)OPENSSL_sk_value(ossl_check_const_POLICYINFO_sk_type(sk), (idx)))
#define sk_POLICYINFO_new(cmp) ((STACK_OF(POLICYINFO)
*)OPENSSL_sk_new(ossl_check_POLICYINFO_compfunc_type(cmp)))
#define sk_POLICYINFO_new_null() ((STACK_OF(POLICYINFO) *)OPENSSL_sk_new_null())
#define sk_POLICYINFO_new_reserve(cmp, n) ((STACK_OF(POLICYINFO)
*)OPENSSL_sk_new_reserve(ossl_check_POLICYINFO_compfunc_type(cmp), (n)))
#define sk_POLICYINFO_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_POLICYINFO_sk_type(sk), (n))
#define sk_POLICYINFO_free(sk) OPENSSL_sk_free(ossl_check_POLICYINFO_sk_type(sk))
#define sk_POLICYINFO_zero(sk) OPENSSL_sk_zero(ossl_check_POLICYINFO_sk_type(sk))
#define sk_POLICYINFO_delete(sk, i) ((POLICYINFO
*)OPENSSL_sk_delete(ossl_check_POLICYINFO_sk_type(sk), (i)))
#define sk_POLICYINFO_delete_ptr(sk, ptr) ((POLICYINFO
*)OPENSSL_sk_delete_ptr(ossl_check_POLICYINFO_sk_type(sk), ossl_check_POLICYINFO_type(ptr)))
#define sk_POLICYINFO_push(sk, ptr) OPENSSL_sk_push(ossl_check_POLICYINFO_sk_type(sk),
 ossl_check_POLICYINFO_type(ptr))
#define sk_POLICYINFO_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_POLICYINFO_sk_type(sk),
ossl_check_POLICYINFO_type(ptr))
#define sk_POLICYINFO_pop(sk) ((POLICYINFO *)OPENSSL_sk_pop(ossl_check_POLICYINFO_sk_type(sk)))
#define sk_POLICYINFO_shift(sk) ((POLICYINFO
*)OPENSSL_sk_shift(ossl_check_POLICYINFO_sk_type(sk)))
#define sk_POLICYINFO_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_POLICYINFO_sk_type(sk),ossl_check_POLICYINFO_freefunc_type(freefun
c))
#define sk_POLICYINFO_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_POLICYINFO_sk_type(sk),
ossl_check_POLICYINFO_type(ptr), (idx))
#define sk_POLICYINFO_set(sk, idx, ptr) ((POLICYINFO
```

```
*)OPENSSL_sk_set(ossl_check_POLICYINFO_sk_type(sk), (idx), ossl_check_POLICYINFO_type(ptr)))
#define sk_POLICYINFO_find(sk, ptr) OPENSSL_sk_find(ossl_check_POLICYINFO_sk_type(sk),
ossl_check_POLICYINFO_type(ptr))
#define sk_POLICYINFO_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_POLICYINFO_sk_type(sk),
 ossl_check_POLICYINFO_type(ptr))
#define sk_POLICYINFO_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_POLICYINFO_sk_type(sk),
ossl_check_POLICYINFO_type(ptr), pnum)
#define sk_POLICYINFO_sort(sk) OPENSSL_sk_sort(ossl_check_POLICYINFO_sk_type(sk))
#define sk_POLICYINFO_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_POLICYINFO_sk_type(sk))
#define sk_POLICYINFO_dup(sk) ((STACK_OF(POLICYINFO)
*)OPENSSL_sk_dup(ossl_check_const_POLICYINFO_sk_type(sk)))
#define sk_POLICYINFO_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(POLICYINFO)
*)OPENSSL_sk_deep_copy(ossl_check_const_POLICYINFO_sk_type(sk),
ossl_check_POLICYINFO_copyfunc_type(copyfunc), ossl_check_POLICYINFO_freefunc_type(freefunc)))
#define sk_POLICYINFO_set_cmp_func(sk, cmp)
((sk_POLICYINFO_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_POLICYINFO_sk_type(sk),
ossl_check_POLICYINFO_compfunc_type(cmp)))

/* clang-format on */

typedef STACK_OF(POLICYINFO) CERTIFICATEPOLICIES;

typedef struct POLICY_MAPPING_st {
   ASN1_OBJECT
 *issuerDomainPolicy;
   ASN1_OBJECT *subjectDomainPolicy;
} POLICY_MAPPING;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(POLICY_MAPPING, POLICY_MAPPING, POLICY_MAPPING)
#define sk_POLICY_MAPPING_num(sk)
OPENSSL_sk_num(ossl_check_const_POLICY_MAPPING_sk_type(sk))
#define sk_POLICY_MAPPING_value(sk, idx) ((POLICY_MAPPING
*)OPENSSL_sk_value(ossl_check_const_POLICY_MAPPING_sk_type(sk), (idx)))
#define sk_POLICY_MAPPING_new(cmp) ((STACK_OF(POLICY_MAPPING)
*)OPENSSL_sk_new(ossl_check_POLICY_MAPPING_compfunc_type(cmp)))
#define sk_POLICY_MAPPING_new_null() ((STACK_OF(POLICY_MAPPING) *)OPENSSL_sk_new_null())
#define sk_POLICY_MAPPING_new_reserve(cmp, n) ((STACK_OF(POLICY_MAPPING)
*)OPENSSL_sk_new_reserve(ossl_check_POLICY_MAPPING_compfunc_type(cmp), (n)))
#define sk_POLICY_MAPPING_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_POLICY_MAPPING_sk_type(sk), (n))
#define sk_POLICY_MAPPING_free(sk) OPENSSL_sk_free(ossl_check_POLICY_MAPPING_sk_type(sk))
#define sk_POLICY_MAPPING_zero(sk) OPENSSL_sk_zero(ossl_check_POLICY_MAPPING_sk_type(sk))
#define
 sk_POLICY_MAPPING_delete(sk, i) ((POLICY_MAPPING
*)OPENSSL_sk_delete(ossl_check_POLICY_MAPPING_sk_type(sk), (i)))
#define sk_POLICY_MAPPING_delete_ptr(sk, ptr) ((POLICY_MAPPING
*)OPENSSL_sk_delete_ptr(ossl_check_POLICY_MAPPING_sk_type(sk),
```

```
ossl_check_POLICY_MAPPING_type(ptr)))
#define sk_POLICY_MAPPING_push(sk, ptr) OPENSSL_sk_push(ossl_check_POLICY_MAPPING_sk_type(sk),
ossl_check_POLICY_MAPPING_type(ptr))
#define sk_POLICY_MAPPING_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_POLICY_MAPPING_sk_type(sk), ossl_check_POLICY_MAPPING_type(ptr))
#define sk_POLICY_MAPPING_pop(sk) ((POLICY_MAPPING
*)OPENSSL_sk_pop(ossl_check_POLICY_MAPPING_sk_type(sk)))
#define sk_POLICY_MAPPING_shift(sk) ((POLICY_MAPPING
*)OPENSSL_sk_shift(ossl_check_POLICY_MAPPING_sk_type(sk)))
#define sk_POLICY_MAPPING_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_POLICY_MAPPING_sk_type(sk),ossl_check_POLICY_MAPPING_freefunc
_type(freefunc))
#define sk_POLICY_MAPPING_insert(sk,
 ptr, idx) OPENSSL_sk_insert(ossl_check_POLICY_MAPPING_sk_type(sk),
ossl_check_POLICY_MAPPING_type(ptr), (idx))
#define sk_POLICY_MAPPING_set(sk, idx, ptr) ((POLICY_MAPPING
*)OPENSSL_sk_set(ossl_check_POLICY_MAPPING_sk_type(sk), (idx),
ossl_check_POLICY_MAPPING_type(ptr)))
#define sk_POLICY_MAPPING_find(sk, ptr) OPENSSL_sk_find(ossl_check_POLICY_MAPPING_sk_type(sk),
ossl_check_POLICY_MAPPING_type(ptr))
#define sk_POLICY_MAPPING_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_POLICY_MAPPING_sk_type(sk), ossl_check_POLICY_MAPPING_type(ptr))
#define sk_POLICY_MAPPING_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_POLICY_MAPPING_sk_type(sk), ossl_check_POLICY_MAPPING_type(ptr),
pnum)
#define sk_POLICY_MAPPING_sort(sk) OPENSSL_sk_sort(ossl_check_POLICY_MAPPING_sk_type(sk))
#define sk_POLICY_MAPPING_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_POLICY_MAPPING_sk_type(sk))
#define sk_POLICY_MAPPING_dup(sk) ((STACK_OF(POLICY_MAPPING)
*)OPENSSL_sk_dup(ossl_check_const_POLICY_MAPPING_sk_type(sk)))
#define
 sk_POLICY_MAPPING_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(POLICY_MAPPING)
*)OPENSSL_sk_deep_copy(ossl_check_const_POLICY_MAPPING_sk_type(sk),
ossl_check_POLICY_MAPPING_copyfunc_type(copyfunc),
ossl_check_POLICY_MAPPING_freefunc_type(freefunc)))
#define sk_POLICY_MAPPING_set_cmp_func(sk, cmp)
((sk_POLICY_MAPPING_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_POLICY_MAPPING_sk_type(sk),
ossl_check_POLICY_MAPPING_compfunc_type(cmp)))

/* clang-format on */

typedef STACK_OF(POLICY_MAPPING) POLICY_MAPPINGS;

typedef struct GENERAL_SUBTREE_st {
   GENERAL_NAME *base;
   ASN1_INTEGER *minimum;
   ASN1_INTEGER *maximum;
} GENERAL_SUBTREE;
```

```
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(GENERAL_SUBTREE, GENERAL_SUBTREE,
GENERAL_SUBTREE)
#define sk_GENERAL_SUBTREE_num(sk)
OPENSSL_sk_num(ossl_check_const_GENERAL_SUBTREE_sk_type(sk))
#define sk_GENERAL_SUBTREE_value(sk, idx) ((GENERAL_SUBTREE
*)OPENSSL_sk_value(ossl_check_const_GENERAL_SUBTREE_sk_type(sk),
 (idx)))
#define sk_GENERAL_SUBTREE_new(cmp) ((STACK_OF(GENERAL_SUBTREE)
*)OPENSSL_sk_new(ossl_check_GENERAL_SUBTREE_compfunc_type(cmp)))
#define sk_GENERAL_SUBTREE_new_null() ((STACK_OF(GENERAL_SUBTREE)
*)OPENSSL_sk_new_null())
#define sk_GENERAL_SUBTREE_new_reserve(cmp, n) ((STACK_OF(GENERAL_SUBTREE)
*)OPENSSL_sk_new_reserve(ossl_check_GENERAL_SUBTREE_compfunc_type(cmp), (n)))
#define sk_GENERAL_SUBTREE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_GENERAL_SUBTREE_sk_type(sk), (n))
#define sk_GENERAL_SUBTREE_free(sk) OPENSSL_sk_free(ossl_check_GENERAL_SUBTREE_sk_type(sk))
#define sk_GENERAL_SUBTREE_zero(sk) OPENSSL_sk_zero(ossl_check_GENERAL_SUBTREE_sk_type(sk))
#define sk_GENERAL_SUBTREE_delete(sk, i) ((GENERAL_SUBTREE
*)OPENSSL_sk_delete(ossl_check_GENERAL_SUBTREE_sk_type(sk), (i)))
#define sk_GENERAL_SUBTREE_delete_ptr(sk, ptr) ((GENERAL_SUBTREE
*)OPENSSL_sk_delete_ptr(ossl_check_GENERAL_SUBTREE_sk_type(sk),
ossl_check_GENERAL_SUBTREE_type(ptr)))
#define sk_GENERAL_SUBTREE_push(sk,
 ptr) OPENSSL_sk_push(ossl_check_GENERAL_SUBTREE_sk_type(sk),
ossl_check_GENERAL_SUBTREE_type(ptr))
#define sk_GENERAL_SUBTREE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_GENERAL_SUBTREE_sk_type(sk),
ossl_check_GENERAL_SUBTREE_type(ptr))
#define sk_GENERAL_SUBTREE_pop(sk) ((GENERAL_SUBTREE
*)OPENSSL_sk_pop(ossl_check_GENERAL_SUBTREE_sk_type(sk)))
#define sk_GENERAL_SUBTREE_shift(sk) ((GENERAL_SUBTREE
*)OPENSSL_sk_shift(ossl_check_GENERAL_SUBTREE_sk_type(sk)))
#define sk_GENERAL_SUBTREE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_GENERAL_SUBTREE_sk_type(sk),ossl_check_GENERAL_SUBTREE_free
func_type(freefunc))
#define sk_GENERAL_SUBTREE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_GENERAL_SUBTREE_sk_type(sk),
ossl_check_GENERAL_SUBTREE_type(ptr), (idx))
#define sk_GENERAL_SUBTREE_set(sk, idx, ptr) ((GENERAL_SUBTREE
*)OPENSSL_sk_set(ossl_check_GENERAL_SUBTREE_sk_type(sk), (idx),
ossl_check_GENERAL_SUBTREE_type(ptr)))
#define sk_GENERAL_SUBTREE_find(sk, ptr)
 OPENSSL_sk_find(ossl_check_GENERAL_SUBTREE_sk_type(sk),
ossl_check_GENERAL_SUBTREE_type(ptr))
#define sk_GENERAL_SUBTREE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_GENERAL_SUBTREE_sk_type(sk),
```

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ossl_check_GENERAL_SUBTREE_type(ptr))
#define sk_GENERAL_SUBTREE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_GENERAL_SUBTREE_sk_type(sk),
ossl_check_GENERAL_SUBTREE_type(ptr), pnum)
#define sk_GENERAL_SUBTREE_sort(sk) OPENSSL_sk_sort(ossl_check_GENERAL_SUBTREE_sk_type(sk))
#define sk_GENERAL_SUBTREE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_GENERAL_SUBTREE_sk_type(sk))
#define sk_GENERAL_SUBTREE_dup(sk) ((STACK_OF(GENERAL_SUBTREE)
*)OPENSSL_sk_dup(ossl_check_const_GENERAL_SUBTREE_sk_type(sk)))
#define sk_GENERAL_SUBTREE_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(GENERAL_SUBTREE)
*)OPENSSL_sk_deep_copy(ossl_check_const_GENERAL_SUBTREE_sk_type(sk),
ossl_check_GENERAL_SUBTREE_copyfunc_type(copyfunc),
ossl_check_GENERAL_SUBTREE_freefunc_type(freefunc)))
#define sk_GENERAL_SUBTREE_set_cmp_func(sk,
 cmp)
((sk_GENERAL_SUBTREE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_GENERAL_SUBTREE_sk_type
(sk), ossl_check_GENERAL_SUBTREE_compfunc_type(cmp)))

/* clang-format on */

struct NAME_CONSTRAINTS_st {
  STACK_OF(GENERAL_SUBTREE) *permittedSubtrees;
  STACK_OF(GENERAL_SUBTREE) *excludedSubtrees;
};

typedef struct POLICY_CONSTRAINTS_st {
  ASN1_INTEGER *requireExplicitPolicy;
  ASN1_INTEGER *inhibitPolicyMapping;
} POLICY_CONSTRAINTS;

/* Proxy certificate structures, see RFC 3820 */
typedef struct PROXY_POLICY_st {
  ASN1_OBJECT *policyLanguage;
  ASN1_OCTET_STRING *policy;
} PROXY_POLICY;

typedef struct PROXY_CERT_INFO_EXTENSION_st {
  ASN1_INTEGER *pcPathLengthConstraint;
  PROXY_POLICY *proxyPolicy;
} PROXY_CERT_INFO_EXTENSION;

DECLARE_ASN1_FUNCTIONS(PROXY_POLICY)
DECLARE_ASN1_FUNCTIONS(PROXY_CERT_INFO_EXTENSION)

struct ISSUING_DIST_POINT_st {
  DIST_POINT_NAME *distpoint;
  int onlyuser;
  int onlyCA;
```

```
   ASN1_BIT_STRING *onlysomereasons;
    int indirectCRL;
   int onlyattr;
};

/* Values in idp_flags field */
/* IDP present */
#define IDP_PRESENT 0x1
/* IDP values inconsistent */
#define IDP_INVALID 0x2
/* onlyuser true */
#define IDP_ONLYUSER 0x4
/* onlyCA true */
#define IDP_ONLYCA 0x8
/* onlyattr true */
#define IDP_ONLYATTR 0x10
/* indirectCRL true */
#define IDP_INDIRECT 0x20
/* onlysomereasons present */
#define IDP_REASONS 0x40

#define X509V3_conf_err(val) ERR_add_error_data(6, \
   "section:", (val)->section,                    \
   ",name:", (val)->name, ",value:", (val)->value)

#define X509V3_set_ctx_test(ctx) \
   X509V3_set_ctx(ctx, NULL, NULL, NULL, NULL, X509V3_CTX_TEST)
#define X509V3_set_ctx_nodb(ctx) (ctx)->db = NULL;

#define EXT_BITSTRING(nid, table) { nid, 0, ASN1_ITEM_ref(ASN1_BIT_STRING), \
   0, 0, 0, 0,                                                \
   0, 0,                                                      \
   (X509V3_EXT_I2V)i2v_ASN1_BIT_STRING,
                                \
   (X509V3_EXT_V2I)v2i_ASN1_BIT_STRING,                                \
   NULL, NULL,                                                \
   table }

#define EXT_IA5STRING(nid) { nid, 0, ASN1_ITEM_ref(ASN1_IA5STRING), \
   0, 0, 0, 0,                                          \
   (X509V3_EXT_I2S)i2s_ASN1_IA5STRING,                          \
   (X509V3_EXT_S2I)s2i_ASN1_IA5STRING,                          \
   0, 0, 0, 0,                                          \
   NULL }

#define EXT_UTF8STRING(nid) { nid, 0, ASN1_ITEM_ref(ASN1_UTF8STRING), \
   0, 0, 0, 0,                                           \
   (X509V3_EXT_I2S)i2s_ASN1_UTF8STRING,                          \
```

```
  (X509V3_EXT_S2I)s2i_ASN1_UTF8STRING,                    \
  0, 0, 0, 0,                                             \
  NULL }

/* clang-format off */
# define EXT_END { -1, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0}
/* clang-format on */

/* X509_PURPOSE stuff */

#define EXFLAG_BCONS 0x1
#define EXFLAG_KUSAGE 0x2
#define EXFLAG_XKUSAGE 0x4
#define EXFLAG_NSCERT 0x8

#define EXFLAG_CA 0x10
#define EXFLAG_SI 0x20 /* self-issued, maybe not self-signed */
#define EXFLAG_V1 0x40
#define EXFLAG_INVALID 0x80
/* EXFLAG_SET is set to indicate that some values have been precomputed */
#define EXFLAG_SET 0x100
#define EXFLAG_CRITICAL 0x200
#define EXFLAG_PROXY 0x400

#define EXFLAG_INVALID_POLICY 0x800
#define EXFLAG_FRESHEST 0x1000
#define EXFLAG_SS 0x2000 /* cert is apparently self-signed */

#define EXFLAG_BCONS_CRITICAL 0x10000
#define EXFLAG_AKID_CRITICAL 0x20000
#define EXFLAG_SKID_CRITICAL 0x40000
#define EXFLAG_SAN_CRITICAL 0x80000
#define EXFLAG_NO_FINGERPRINT 0x100000

/* https://datatracker.ietf.org/doc/html/rfc5280#section-4.2.1.3 */
#define KU_DIGITAL_SIGNATURE X509v3_KU_DIGITAL_SIGNATURE
#define KU_NON_REPUDIATION X509v3_KU_NON_REPUDIATION
#define KU_KEY_ENCIPHERMENT
 X509v3_KU_KEY_ENCIPHERMENT
#define KU_DATA_ENCIPHERMENT X509v3_KU_DATA_ENCIPHERMENT
#define KU_KEY_AGREEMENT X509v3_KU_KEY_AGREEMENT
#define KU_KEY_CERT_SIGN X509v3_KU_KEY_CERT_SIGN
#define KU_CRL_SIGN X509v3_KU_CRL_SIGN
#define KU_ENCIPHER_ONLY X509v3_KU_ENCIPHER_ONLY
#define KU_DECIPHER_ONLY X509v3_KU_DECIPHER_ONLY

#define NS_SSL_CLIENT 0x80
```

```
#define NS_SSL_SERVER 0x40
#define NS_SMIME 0x20
#define NS_OBJSIGN 0x10
#define NS_SSL_CA 0x04
#define NS_SMIME_CA 0x02
#define NS_OBJSIGN_CA 0x01
#define NS_ANY_CA (NS_SSL_CA | NS_SMIME_CA | NS_OBJSIGN_CA)

#define XKU_SSL_SERVER 0x1
#define XKU_SSL_CLIENT 0x2
#define XKU_SMIME 0x4
#define XKU_CODE_SIGN 0x8
#define XKU_SGC 0x10 /* Netscape or MS Server-Gated Crypto */
#define XKU_OCSP_SIGN 0x20
#define XKU_TIMESTAMP 0x40
#define XKU_DVCS 0x80
#define XKU_ANYEKU 0x100

#define X509_PURPOSE_DYNAMIC 0x1
#define X509_PURPOSE_DYNAMIC_NAME 0x2

typedef struct x509_purpose_st {
   int purpose;
   int trust; /* Default trust ID */
   int flags;

  int (*check_purpose)(const struct x509_purpose_st *, const X509 *, int);
   char *name;
   char *sname;
   void *usr_data;
} X509_PURPOSE;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_PURPOSE, X509_PURPOSE, X509_PURPOSE)
#define sk_X509_PURPOSE_num(sk) OPENSSL_sk_num(ossl_check_const_X509_PURPOSE_sk_type(sk))
#define sk_X509_PURPOSE_value(sk, idx) ((X509_PURPOSE
*)OPENSSL_sk_value(ossl_check_const_X509_PURPOSE_sk_type(sk), (idx)))
#define sk_X509_PURPOSE_new(cmp) ((STACK_OF(X509_PURPOSE)
*)OPENSSL_sk_new(ossl_check_X509_PURPOSE_compfunc_type(cmp)))
#define sk_X509_PURPOSE_new_null() ((STACK_OF(X509_PURPOSE) *)OPENSSL_sk_new_null())
#define sk_X509_PURPOSE_new_reserve(cmp, n) ((STACK_OF(X509_PURPOSE)
*)OPENSSL_sk_new_reserve(ossl_check_X509_PURPOSE_compfunc_type(cmp), (n)))
#define sk_X509_PURPOSE_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_PURPOSE_sk_type(sk), (n))
#define sk_X509_PURPOSE_free(sk) OPENSSL_sk_free(ossl_check_X509_PURPOSE_sk_type(sk))
#define sk_X509_PURPOSE_zero(sk)
 OPENSSL_sk_zero(ossl_check_X509_PURPOSE_sk_type(sk))
#define sk_X509_PURPOSE_delete(sk, i) ((X509_PURPOSE
*)OPENSSL_sk_delete(ossl_check_X509_PURPOSE_sk_type(sk), (i)))
```

```
#define sk_X509_PURPOSE_delete_ptr(sk, ptr) ((X509_PURPOSE
*)OPENSSL_sk_delete_ptr(ossl_check_X509_PURPOSE_sk_type(sk), ossl_check_X509_PURPOSE_type(ptr)))
#define sk_X509_PURPOSE_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_PURPOSE_sk_type(sk),
ossl_check_X509_PURPOSE_type(ptr))
#define sk_X509_PURPOSE_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_PURPOSE_sk_type(sk),
ossl_check_X509_PURPOSE_type(ptr))
#define sk_X509_PURPOSE_pop(sk) ((X509_PURPOSE
*)OPENSSL_sk_pop(ossl_check_X509_PURPOSE_sk_type(sk)))
#define sk_X509_PURPOSE_shift(sk) ((X509_PURPOSE
*)OPENSSL_sk_shift(ossl_check_X509_PURPOSE_sk_type(sk)))
#define sk_X509_PURPOSE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_PURPOSE_sk_type(sk),ossl_check_X509_PURPOSE_freefunc_type(fr
eefunc))
#define sk_X509_PURPOSE_insert(sk, ptr,
 idx) OPENSSL_sk_insert(ossl_check_X509_PURPOSE_sk_type(sk), ossl_check_X509_PURPOSE_type(ptr),
(idx))
#define sk_X509_PURPOSE_set(sk, idx, ptr) ((X509_PURPOSE
*)OPENSSL_sk_set(ossl_check_X509_PURPOSE_sk_type(sk), (idx), ossl_check_X509_PURPOSE_type(ptr)))
#define sk_X509_PURPOSE_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_PURPOSE_sk_type(sk),
ossl_check_X509_PURPOSE_type(ptr))
#define sk_X509_PURPOSE_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_PURPOSE_sk_type(sk),
ossl_check_X509_PURPOSE_type(ptr))
#define sk_X509_PURPOSE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_X509_PURPOSE_sk_type(sk), ossl_check_X509_PURPOSE_type(ptr), pnum)
#define sk_X509_PURPOSE_sort(sk) OPENSSL_sk_sort(ossl_check_X509_PURPOSE_sk_type(sk))
#define sk_X509_PURPOSE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_X509_PURPOSE_sk_type(sk))
#define sk_X509_PURPOSE_dup(sk) ((STACK_OF(X509_PURPOSE)
*)OPENSSL_sk_dup(ossl_check_const_X509_PURPOSE_sk_type(sk)))
#define sk_X509_PURPOSE_deep_copy(sk,
 copyfunc, freefunc) ((STACK_OF(X509_PURPOSE)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_PURPOSE_sk_type(sk),
ossl_check_X509_PURPOSE_copyfunc_type(copyfunc), ossl_check_X509_PURPOSE_freefunc_type(freefunc)))
#define sk_X509_PURPOSE_set_cmp_func(sk, cmp)
((sk_X509_PURPOSE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_PURPOSE_sk_type(sk),
ossl_check_X509_PURPOSE_compfunc_type(cmp)))

/* clang-format on */

#define X509_PURPOSE_DEFAULT_ANY 0
#define X509_PURPOSE_SSL_CLIENT 1
#define X509_PURPOSE_SSL_SERVER 2
#define X509_PURPOSE_NS_SSL_SERVER 3
#define X509_PURPOSE_SMIME_SIGN 4
#define X509_PURPOSE_SMIME_ENCRYPT 5
#define X509_PURPOSE_CRL_SIGN 6
#define X509_PURPOSE_ANY 7
#define X509_PURPOSE_OCSP_HELPER 8
```

```
#define X509_PURPOSE_TIMESTAMP_SIGN 9
#define X509_PURPOSE_CODE_SIGN 10

#define X509_PURPOSE_MIN 1
#define X509_PURPOSE_MAX 10

/* Flags for X509V3_EXT_print() */

#define X509V3_EXT_UNKNOWN_MASK (0xfL << 16)
/* Return error for unknown extensions */
#define X509V3_EXT_DEFAULT
 0
/* Print error for unknown extensions */
#define X509V3_EXT_ERROR_UNKNOWN (1L << 16)
/* ASN1 parse unknown extensions */
#define X509V3_EXT_PARSE_UNKNOWN (2L << 16)
/* BIO_dump unknown extensions */
#define X509V3_EXT_DUMP_UNKNOWN (3L << 16)

/* Flags for X509V3_add1_i2d */

#define X509V3_ADD_OP_MASK 0xfL
#define X509V3_ADD_DEFAULT 0L
#define X509V3_ADD_APPEND 1L
#define X509V3_ADD_REPLACE 2L
#define X509V3_ADD_REPLACE_EXISTING 3L
#define X509V3_ADD_KEEP_EXISTING 4L
#define X509V3_ADD_DELETE 5L
#define X509V3_ADD_SILENT 0x10

DECLARE_ASN1_FUNCTIONS(BASIC_CONSTRAINTS)
DECLARE_ASN1_FUNCTIONS(OSSL_BASIC_ATTR_CONSTRAINTS)

DECLARE_ASN1_FUNCTIONS(SXNET)
DECLARE_ASN1_FUNCTIONS(SXNETID)

DECLARE_ASN1_FUNCTIONS(ISSUER_SIGN_TOOL)

int SXNET_add_id_asc(SXNET **psx, const char *zone, const char *user, int userlen);
int SXNET_add_id_ulong(SXNET **psx, unsigned long lzone, const char *user,
   int userlen);
int SXNET_add_id_INTEGER(SXNET **psx, ASN1_INTEGER *izone, const char *user,
   int
 userlen);

ASN1_OCTET_STRING *SXNET_get_id_asc(SXNET *sx, const char *zone);
ASN1_OCTET_STRING *SXNET_get_id_ulong(SXNET *sx, unsigned long lzone);
ASN1_OCTET_STRING *SXNET_get_id_INTEGER(SXNET *sx, ASN1_INTEGER *zone);
```

```
DECLARE_ASN1_FUNCTIONS(AUTHORITY_KEYID)

DECLARE_ASN1_FUNCTIONS(PKEY_USAGE_PERIOD)

DECLARE_ASN1_FUNCTIONS(GENERAL_NAME)
DECLARE_ASN1_DUP_FUNCTION(GENERAL_NAME)
int GENERAL_NAME_cmp(GENERAL_NAME *a, GENERAL_NAME *b);

ASN1_BIT_STRING *v2i_ASN1_BIT_STRING(X509V3_EXT_METHOD *method,
  X509V3_CTX *ctx,
  STACK_OF(CONF_VALUE) *nval);
STACK_OF(CONF_VALUE) *i2v_ASN1_BIT_STRING(X509V3_EXT_METHOD *method,
  ASN1_BIT_STRING *bits,
  STACK_OF(CONF_VALUE) *extlist);
char *i2s_ASN1_IA5STRING(X509V3_EXT_METHOD *method, ASN1_IA5STRING *ia5);
ASN1_IA5STRING *s2i_ASN1_IA5STRING(X509V3_EXT_METHOD *method,
  X509V3_CTX *ctx, const char *str);
char *i2s_ASN1_UTF8STRING(X509V3_EXT_METHOD *method, ASN1_UTF8STRING *utf8);
ASN1_UTF8STRING *s2i_ASN1_UTF8STRING(X509V3_EXT_METHOD *method,
   X509V3_CTX *ctx, const char *str);

STACK_OF(CONF_VALUE) *i2v_GENERAL_NAME(X509V3_EXT_METHOD *method,
  GENERAL_NAME *gen,
  STACK_OF(CONF_VALUE) *ret);
int GENERAL_NAME_print(BIO *out, GENERAL_NAME *gen);

DECLARE_ASN1_FUNCTIONS(GENERAL_NAMES)

STACK_OF(CONF_VALUE) *i2v_GENERAL_NAMES(X509V3_EXT_METHOD *method,
  GENERAL_NAMES *gen,
  STACK_OF(CONF_VALUE) *extlist);
GENERAL_NAMES *v2i_GENERAL_NAMES(const X509V3_EXT_METHOD *method,
  X509V3_CTX *ctx, STACK_OF(CONF_VALUE) *nval);

DECLARE_ASN1_FUNCTIONS(OTHERNAME)
DECLARE_ASN1_FUNCTIONS(EDIPARTYNAME)
int OTHERNAME_cmp(OTHERNAME *a, OTHERNAME *b);
void GENERAL_NAME_set0_value(GENERAL_NAME *a, int type, void *value);
void *GENERAL_NAME_get0_value(const GENERAL_NAME *a, int *ptype);
int GENERAL_NAME_set0_othername(GENERAL_NAME *gen,
  ASN1_OBJECT *oid, ASN1_TYPE *value);
int GENERAL_NAME_get0_otherName(const GENERAL_NAME *gen,
  ASN1_OBJECT **poid, ASN1_TYPE **pvalue);

char *i2s_ASN1_OCTET_STRING(X509V3_EXT_METHOD *method,
   const ASN1_OCTET_STRING *ia5);
ASN1_OCTET_STRING *s2i_ASN1_OCTET_STRING(X509V3_EXT_METHOD *method,
```

```
  X509V3_CTX *ctx, const char *str);

DECLARE_ASN1_FUNCTIONS(EXTENDED_KEY_USAGE)
int i2a_ACCESS_DESCRIPTION(BIO *bp, const ACCESS_DESCRIPTION *a);

DECLARE_ASN1_ALLOC_FUNCTIONS(TLS_FEATURE)

DECLARE_ASN1_FUNCTIONS(CERTIFICATEPOLICIES)
DECLARE_ASN1_FUNCTIONS(POLICYINFO)
DECLARE_ASN1_FUNCTIONS(POLICYQUALINFO)
DECLARE_ASN1_FUNCTIONS(USERNOTICE)
DECLARE_ASN1_FUNCTIONS(NOTICEREF)

DECLARE_ASN1_FUNCTIONS(CRL_DIST_POINTS)
DECLARE_ASN1_FUNCTIONS(DIST_POINT)
DECLARE_ASN1_FUNCTIONS(DIST_POINT_NAME)
DECLARE_ASN1_FUNCTIONS(ISSUING_DIST_POINT)

int DIST_POINT_set_dpname(DIST_POINT_NAME *dpn, const X509_NAME *iname);

int NAME_CONSTRAINTS_check(X509 *x, NAME_CONSTRAINTS *nc);
int NAME_CONSTRAINTS_check_CN(X509 *x, NAME_CONSTRAINTS *nc);

DECLARE_ASN1_FUNCTIONS(ACCESS_DESCRIPTION)
DECLARE_ASN1_FUNCTIONS(AUTHORITY_INFO_ACCESS)

DECLARE_ASN1_ITEM(POLICY_MAPPING)
DECLARE_ASN1_ALLOC_FUNCTIONS(POLICY_MAPPING)
DECLARE_ASN1_ITEM(POLICY_MAPPINGS)

DECLARE_ASN1_ITEM(GENERAL_SUBTREE)
DECLARE_ASN1_ALLOC_FUNCTIONS(GENERAL_SUBTREE)

DECLARE_ASN1_ITEM(NAME_CONSTRAINTS)
DECLARE_ASN1_ALLOC_FUNCTIONS(NAME_CONSTRAINTS)

DECLARE_ASN1_ALLOC_FUNCTIONS(POLICY_CONSTRAINTS)
DECLARE_ASN1_ITEM(POLICY_CONSTRAINTS)

GENERAL_NAME
 *a2i_GENERAL_NAME(GENERAL_NAME *out,
  const X509V3_EXT_METHOD *method,
  X509V3_CTX *ctx, int gen_type,
  const char *value, int is_nc);

#ifdef OPENSSL_CONF_H
GENERAL_NAME *v2i_GENERAL_NAME(const X509V3_EXT_METHOD *method,
  X509V3_CTX *ctx, CONF_VALUE *cnf);
```

```
GENERAL_NAME *v2i_GENERAL_NAME_ex(GENERAL_NAME *out,
   const X509V3_EXT_METHOD *method,
   X509V3_CTX *ctx, CONF_VALUE *cnf,
   int is_nc);

void X509V3_conf_free(CONF_VALUE *val);

X509_EXTENSION *X509V3_EXT_nconf_nid(CONF *conf, X509V3_CTX *ctx, int ext_nid,
   const char *value);
X509_EXTENSION *X509V3_EXT_nconf(CONF *conf, X509V3_CTX *ctx, const char *name,
   const char *value);
int X509V3_EXT_add_nconf_sk(CONF
 *conf, X509V3_CTX *ctx, const char *section,
   STACK_OF(X509_EXTENSION) **sk);
int X509V3_EXT_add_nconf(CONF *conf, X509V3_CTX *ctx, const char *section,
   X509 *cert);
int X509V3_EXT_REQ_add_nconf(CONF *conf, X509V3_CTX *ctx, const char *section,
   X509_REQ *req);
int X509V3_EXT_CRL_add_nconf(CONF *conf, X509V3_CTX *ctx, const char *section,
   X509_CRL *crl);

X509_EXTENSION *X509V3_EXT_conf_nid(LHASH_OF(CONF_VALUE) *conf,
   X509V3_CTX *ctx, int ext_nid,
   const char *value);
X509_EXTENSION *X509V3_EXT_conf(LHASH_OF(CONF_VALUE) *conf, X509V3_CTX *ctx,
   const char *name, const char *value);
int X509V3_EXT_add_conf(LHASH_OF(CONF_VALUE) *conf, X509V3_CTX *ctx,
   const char *section, X509 *cert);
int X509V3_EXT_REQ_add_conf(LHASH_OF(CONF_VALUE) *conf, X509V3_CTX *ctx,
   const char *section, X509_REQ *req);
int X509V3_EXT_CRL_add_conf(LHASH_OF(CONF_VALUE) *conf, X509V3_CTX *ctx,
   const char *section, X509_CRL *crl);

int X509V3_add_value_bool_nf(const char
 *name, int asn1_bool,
   STACK_OF(CONF_VALUE) **extlist);
int X509V3_get_value_bool(const CONF_VALUE *value, int *asn1_bool);
int X509V3_get_value_int(const CONF_VALUE *value, ASN1_INTEGER **aint);
void X509V3_set_nconf(X509V3_CTX *ctx, CONF *conf);
void X509V3_set_conf_lhash(X509V3_CTX *ctx, LHASH_OF(CONF_VALUE) *lhash);
#endif

char *X509V3_get_string(X509V3_CTX *ctx, const char *name, const char *section);
STACK_OF(CONF_VALUE) *X509V3_get_section(X509V3_CTX *ctx, const char *section);
void X509V3_string_free(X509V3_CTX *ctx, char *str);
void X509V3_section_free(X509V3_CTX *ctx, STACK_OF(CONF_VALUE) *section);
void X509V3_set_ctx(X509V3_CTX *ctx, X509 *issuer, X509 *subject,
   X509_REQ *req, X509_CRL *crl, int flags);
```

```
/* For API backward compatibility, this is separate from X509V3_set_ctx(): */
int X509V3_set_issuer_pkey(X509V3_CTX *ctx, EVP_PKEY *pkey);

int X509V3_add_value(const char *name, const char *value,
   STACK_OF(CONF_VALUE) **extlist);
int X509V3_add_value_uchar(const
 char *name, const unsigned char *value,
   STACK_OF(CONF_VALUE) **extlist);
int X509V3_add_value_bool(const char *name, int asn1_bool,
   STACK_OF(CONF_VALUE) **extlist);
int X509V3_add_value_int(const char *name, const ASN1_INTEGER *aint,
   STACK_OF(CONF_VALUE) **extlist);
char *i2s_ASN1_INTEGER(X509V3_EXT_METHOD *meth, const ASN1_INTEGER *aint);
ASN1_INTEGER *s2i_ASN1_INTEGER(X509V3_EXT_METHOD *meth, const char *value);
char *i2s_ASN1_ENUMERATED(X509V3_EXT_METHOD *meth, const ASN1_ENUMERATED *aint);
char *i2s_ASN1_ENUMERATED_TABLE(X509V3_EXT_METHOD *meth,
   const ASN1_ENUMERATED *aint);
int X509V3_EXT_add(X509V3_EXT_METHOD *ext);
int X509V3_EXT_add_list(X509V3_EXT_METHOD *extlist);
int X509V3_EXT_add_alias(int nid_to, int nid_from);
void X509V3_EXT_cleanup(void);

const X509V3_EXT_METHOD *X509V3_EXT_get(X509_EXTENSION *ext);
const X509V3_EXT_METHOD *X509V3_EXT_get_nid(int nid);
int X509V3_add_standard_extensions(void);
STACK_OF(CONF_VALUE) *X509V3_parse_list(const char *line);
void
 *X509V3_EXT_d2i(X509_EXTENSION *ext);
void *X509V3_get_d2i(const STACK_OF(X509_EXTENSION) *x, int nid, int *crit,
   int *idx);

X509_EXTENSION *X509V3_EXT_i2d(int ext_nid, int crit, void *ext_struc);
int X509V3_add1_i2d(STACK_OF(X509_EXTENSION) **x, int nid, void *value,
   int crit, unsigned long flags);

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
/* The new declarations are in crypto.h, but the old ones were here. */
#define hex_to_string OPENSSL_buf2hexstr
#define string_to_hex OPENSSL_hexstr2buf
#endif

void X509V3_EXT_val_prn(BIO *out, STACK_OF(CONF_VALUE) *val, int indent,
   int ml);
int X509V3_EXT_print(BIO *out, X509_EXTENSION *ext, unsigned long flag,
   int indent);
#ifndef OPENSSL_NO_STDIO
int X509V3_EXT_print_fp(FILE *out, X509_EXTENSION *ext, int flag, int indent);
#endif
```

```
int X509V3_extensions_print(BIO *out, const char *title,
   const STACK_OF(X509_EXTENSION) *exts,
   unsigned long flag, int indent);

int X509_check_ca(X509 *x);
int X509_check_purpose(X509 *x,
 int id, int ca);
int X509_supported_extension(X509_EXTENSION *ex);
int X509_check_issued(X509 *issuer, X509 *subject);
int X509_check_akid(const X509 *issuer, const AUTHORITY_KEYID *akid);
void X509_set_proxy_flag(X509 *x);
void X509_set_proxy_pathlen(X509 *x, long l);
long X509_get_proxy_pathlen(X509 *x);

uint32_t X509_get_extension_flags(X509 *x);
uint32_t X509_get_key_usage(X509 *x);
uint32_t X509_get_extended_key_usage(X509 *x);
const ASN1_OCTET_STRING *X509_get0_subject_key_id(X509 *x);
const ASN1_OCTET_STRING *X509_get0_authority_key_id(X509 *x);
const GENERAL_NAMES *X509_get0_authority_issuer(X509 *x);
const ASN1_INTEGER *X509_get0_authority_serial(X509 *x);

int X509_PURPOSE_get_count(void);
int X509_PURPOSE_get_unused_id(OSSL_LIB_CTX *libctx);
int X509_PURPOSE_get_by_sname(const char *sname);
int X509_PURPOSE_get_by_id(int id);
int X509_PURPOSE_add(int id, int trust, int flags,
   int (*ck)(const X509_PURPOSE *, const X509 *, int),
   const char *name, const char *sname,
 void *arg);
void X509_PURPOSE_cleanup(void);

X509_PURPOSE *X509_PURPOSE_get0(int idx);
int X509_PURPOSE_get_id(const X509_PURPOSE *);
char *X509_PURPOSE_get0_name(const X509_PURPOSE *xp);
char *X509_PURPOSE_get0_sname(const X509_PURPOSE *xp);
int X509_PURPOSE_get_trust(const X509_PURPOSE *xp);
int X509_PURPOSE_set(int *p, int purpose);

STACK_OF(OPENSSL_STRING) *X509_get1_email(X509 *x);
STACK_OF(OPENSSL_STRING) *X509_REQ_get1_email(X509_REQ *x);
void X509_email_free(STACK_OF(OPENSSL_STRING) *sk);
STACK_OF(OPENSSL_STRING) *X509_get1_ocsp(X509 *x);

/* Flags for X509_check_* functions */

/*
* Always check subject name for host match even if subject alt names present
```

```
*/
#define X509_CHECK_FLAG_ALWAYS_CHECK_SUBJECT 0x1
/* Disable wildcard matching for dnsName fields and common name. */
#define X509_CHECK_FLAG_NO_WILDCARDS 0x2
/* Wildcards must not match a partial label. */
#define X509_CHECK_FLAG_NO_PARTIAL_WILDCARDS 0x4
/* Allow (non-partial) wildcards to match multiple labels. */
#define
 X509_CHECK_FLAG_MULTI_LABEL_WILDCARDS 0x8
/* Constraint verifier subdomain patterns to match a single labels. */
#define X509_CHECK_FLAG_SINGLE_LABEL_SUBDOMAINS 0x10
/* Never check the subject CN */
#define X509_CHECK_FLAG_NEVER_CHECK_SUBJECT 0x20
/*
* Match reference identifiers starting with "." to any sub-domain.
* This is a non-public flag, turned on implicitly when the subject
* reference identity is a DNS name.
*/
#define _X509_CHECK_FLAG_DOT_SUBDOMAINS 0x8000

int X509_check_host(X509 *x, const char *chk, size_t chklen,
   unsigned int flags, char **peername);
int X509_check_email(X509 *x, const char *chk, size_t chklen,
   unsigned int flags);
int X509_check_ip(X509 *x, const unsigned char *chk, size_t chklen,
   unsigned int flags);
int X509_check_ip_asc(X509 *x, const char *ipasc, unsigned int flags);

ASN1_OCTET_STRING *a2i_IPADDRESS(const char *ipasc);
ASN1_OCTET_STRING *a2i_IPADDRESS_NC(const char *ipasc);
int X509V3_NAME_from_section(X509_NAME *nm, STACK_OF(CONF_VALUE)
 *dn_sk,
   unsigned long chtype);

void X509_POLICY_NODE_print(BIO *out, X509_POLICY_NODE *node, int indent);
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_POLICY_NODE, X509_POLICY_NODE,
X509_POLICY_NODE)
#define sk_X509_POLICY_NODE_num(sk)
OPENSSL_sk_num(ossl_check_const_X509_POLICY_NODE_sk_type(sk))
#define sk_X509_POLICY_NODE_value(sk, idx) ((X509_POLICY_NODE
*)OPENSSL_sk_value(ossl_check_const_X509_POLICY_NODE_sk_type(sk), (idx)))
#define sk_X509_POLICY_NODE_new(cmp) ((STACK_OF(X509_POLICY_NODE)
*)OPENSSL_sk_new(ossl_check_X509_POLICY_NODE_compfunc_type(cmp)))
#define sk_X509_POLICY_NODE_new_null() ((STACK_OF(X509_POLICY_NODE)
*)OPENSSL_sk_new_null())
#define sk_X509_POLICY_NODE_new_reserve(cmp, n) ((STACK_OF(X509_POLICY_NODE)
*)OPENSSL_sk_new_reserve(ossl_check_X509_POLICY_NODE_compfunc_type(cmp), (n)))
```

```
#define sk_X509_POLICY_NODE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_X509_POLICY_NODE_sk_type(sk), (n))
#define sk_X509_POLICY_NODE_free(sk) OPENSSL_sk_free(ossl_check_X509_POLICY_NODE_sk_type(sk))
#define
 sk_X509_POLICY_NODE_zero(sk) OPENSSL_sk_zero(ossl_check_X509_POLICY_NODE_sk_type(sk))
#define sk_X509_POLICY_NODE_delete(sk, i) ((X509_POLICY_NODE
*)OPENSSL_sk_delete(ossl_check_X509_POLICY_NODE_sk_type(sk), (i)))
#define sk_X509_POLICY_NODE_delete_ptr(sk, ptr) ((X509_POLICY_NODE
*)OPENSSL_sk_delete_ptr(ossl_check_X509_POLICY_NODE_sk_type(sk),
ossl_check_X509_POLICY_NODE_type(ptr)))
#define sk_X509_POLICY_NODE_push(sk, ptr)
OPENSSL_sk_push(ossl_check_X509_POLICY_NODE_sk_type(sk),
ossl_check_X509_POLICY_NODE_type(ptr))
#define sk_X509_POLICY_NODE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_X509_POLICY_NODE_sk_type(sk),
ossl_check_X509_POLICY_NODE_type(ptr))
#define sk_X509_POLICY_NODE_pop(sk) ((X509_POLICY_NODE
*)OPENSSL_sk_pop(ossl_check_X509_POLICY_NODE_sk_type(sk)))
#define sk_X509_POLICY_NODE_shift(sk) ((X509_POLICY_NODE
*)OPENSSL_sk_shift(ossl_check_X509_POLICY_NODE_sk_type(sk)))
#define sk_X509_POLICY_NODE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_POLICY_NODE_sk_type(sk),ossl_check_X509_POLICY_NODE_free
func_type(freefunc))
#define sk_X509_POLICY_NODE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_X509_POLICY_NODE_sk_type(sk),
ossl_check_X509_POLICY_NODE_type(ptr), (idx))
#define sk_X509_POLICY_NODE_set(sk, idx, ptr) ((X509_POLICY_NODE
*)OPENSSL_sk_set(ossl_check_X509_POLICY_NODE_sk_type(sk), (idx),
ossl_check_X509_POLICY_NODE_type(ptr)))
#define sk_X509_POLICY_NODE_find(sk, ptr)
OPENSSL_sk_find(ossl_check_X509_POLICY_NODE_sk_type(sk),
ossl_check_X509_POLICY_NODE_type(ptr))
#define sk_X509_POLICY_NODE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_X509_POLICY_NODE_sk_type(sk),
ossl_check_X509_POLICY_NODE_type(ptr))
#define sk_X509_POLICY_NODE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_X509_POLICY_NODE_sk_type(sk),
ossl_check_X509_POLICY_NODE_type(ptr), pnum)
#define sk_X509_POLICY_NODE_sort(sk) OPENSSL_sk_sort(ossl_check_X509_POLICY_NODE_sk_type(sk))
#define sk_X509_POLICY_NODE_is_sorted(sk)
 OPENSSL_sk_is_sorted(ossl_check_const_X509_POLICY_NODE_sk_type(sk))
#define sk_X509_POLICY_NODE_dup(sk) ((STACK_OF(X509_POLICY_NODE)
*)OPENSSL_sk_dup(ossl_check_const_X509_POLICY_NODE_sk_type(sk)))
#define sk_X509_POLICY_NODE_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_POLICY_NODE)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_POLICY_NODE_sk_type(sk),
ossl_check_X509_POLICY_NODE_copyfunc_type(copyfunc),
ossl_check_X509_POLICY_NODE_freefunc_type(freefunc)))
#define sk_X509_POLICY_NODE_set_cmp_func(sk, cmp)
```

```
((sk_X509_POLICY_NODE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_POLICY_NODE_sk_type
(sk), ossl_check_X509_POLICY_NODE_compfunc_type(cmp)))

/* clang-format on */

#ifndef OPENSSL_NO_RFC3779
typedef struct ASRange_st {
  ASN1_INTEGER *min, *max;
} ASRange;

#define ASIdOrRange_id 0
#define ASIdOrRange_range 1

typedef struct ASIdOrRange_st {
  int type;
  union {
      ASN1_INTEGER *id;
      ASRange *range;
  } u;
} ASIdOrRange;

/* clang-format
 off */
SKM_DEFINE_STACK_OF_INTERNAL(ASIdOrRange, ASIdOrRange, ASIdOrRange)
#define sk_ASIdOrRange_num(sk) OPENSSL_sk_num(ossl_check_const_ASIdOrRange_sk_type(sk))
#define sk_ASIdOrRange_value(sk, idx) ((ASIdOrRange
*)OPENSSL_sk_value(ossl_check_const_ASIdOrRange_sk_type(sk), (idx)))
#define sk_ASIdOrRange_new(cmp) ((STACK_OF(ASIdOrRange)
*)OPENSSL_sk_new(ossl_check_ASIdOrRange_compfunc_type(cmp)))
#define sk_ASIdOrRange_new_null() ((STACK_OF(ASIdOrRange) *)OPENSSL_sk_new_null())
#define sk_ASIdOrRange_new_reserve(cmp, n) ((STACK_OF(ASIdOrRange)
*)OPENSSL_sk_new_reserve(ossl_check_ASIdOrRange_compfunc_type(cmp), (n)))
#define sk_ASIdOrRange_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_ASIdOrRange_sk_type(sk), (n))
#define sk_ASIdOrRange_free(sk) OPENSSL_sk_free(ossl_check_ASIdOrRange_sk_type(sk))
#define sk_ASIdOrRange_zero(sk) OPENSSL_sk_zero(ossl_check_ASIdOrRange_sk_type(sk))
#define sk_ASIdOrRange_delete(sk, i) ((ASIdOrRange
*)OPENSSL_sk_delete(ossl_check_ASIdOrRange_sk_type(sk), (i)))
#define
 sk_ASIdOrRange_delete_ptr(sk, ptr) ((ASIdOrRange
*)OPENSSL_sk_delete_ptr(ossl_check_ASIdOrRange_sk_type(sk), ossl_check_ASIdOrRange_type(ptr)))
#define sk_ASIdOrRange_push(sk, ptr) OPENSSL_sk_push(ossl_check_ASIdOrRange_sk_type(sk),
ossl_check_ASIdOrRange_type(ptr))
#define sk_ASIdOrRange_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_ASIdOrRange_sk_type(sk),
ossl_check_ASIdOrRange_type(ptr))
#define sk_ASIdOrRange_pop(sk) ((ASIdOrRange *)OPENSSL_sk_pop(ossl_check_ASIdOrRange_sk_type(sk)))
#define sk_ASIdOrRange_shift(sk) ((ASIdOrRange *)OPENSSL_sk_shift(ossl_check_ASIdOrRange_sk_type(sk)))
#define sk_ASIdOrRange_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASIdOrRange_sk_type(sk),ossl_check_ASIdOrRange_freefunc_type(freefunc)
```

```
)
#define sk_ASIdOrRange_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_ASIdOrRange_sk_type(sk),
ossl_check_ASIdOrRange_type(ptr), (idx))
#define sk_ASIdOrRange_set(sk, idx, ptr) ((ASIdOrRange
*)OPENSSL_sk_set(ossl_check_ASIdOrRange_sk_type(sk),
 (idx), ossl_check_ASIdOrRange_type(ptr)))
#define sk_ASIdOrRange_find(sk, ptr) OPENSSL_sk_find(ossl_check_ASIdOrRange_sk_type(sk),
ossl_check_ASIdOrRange_type(ptr))
#define sk_ASIdOrRange_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_ASIdOrRange_sk_type(sk),
ossl_check_ASIdOrRange_type(ptr))
#define sk_ASIdOrRange_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_ASIdOrRange_sk_type(sk),
ossl_check_ASIdOrRange_type(ptr), pnum)
#define sk_ASIdOrRange_sort(sk) OPENSSL_sk_sort(ossl_check_ASIdOrRange_sk_type(sk))
#define sk_ASIdOrRange_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_ASIdOrRange_sk_type(sk))
#define sk_ASIdOrRange_dup(sk) ((STACK_OF(ASIdOrRange)
*)OPENSSL_sk_dup(ossl_check_const_ASIdOrRange_sk_type(sk)))
#define sk_ASIdOrRange_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ASIdOrRange)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASIdOrRange_sk_type(sk),
ossl_check_ASIdOrRange_copyfunc_type(copyfunc), ossl_check_ASIdOrRange_freefunc_type(freefunc)))
#define sk_ASIdOrRange_set_cmp_func(sk,
 cmp) ((sk_ASIdOrRange_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASIdOrRange_sk_type(sk),
ossl_check_ASIdOrRange_compfunc_type(cmp)))

/* clang-format on */

typedef STACK_OF(ASIdOrRange) ASIdOrRanges;

#define ASIdentifierChoice_inherit 0
#define ASIdentifierChoice_asIdsOrRanges 1

typedef struct ASIdentifierChoice_st {
  int type;
  union {
     ASN1_NULL *inherit;
     ASIdOrRanges *asIdsOrRanges;
  } u;
} ASIdentifierChoice;

typedef struct ASIdentifiers_st {
  ASIdentifierChoice *asnum, *rdi;
} ASIdentifiers;

DECLARE_ASN1_FUNCTIONS(ASRange)
DECLARE_ASN1_FUNCTIONS(ASIdOrRange)
DECLARE_ASN1_FUNCTIONS(ASIdentifierChoice)
DECLARE_ASN1_FUNCTIONS(ASIdentifiers)

typedef struct IPAddressRange_st {
```

```
  ASN1_BIT_STRING *min, *max;
} IPAddressRange;

#define IPAddressOrRange_addressPrefix 0
#define IPAddressOrRange_addressRange 1

typedef struct IPAddressOrRange_st {
  int type;
  union {
      ASN1_BIT_STRING *addressPrefix;
      IPAddressRange
 *addressRange;
  } u;
} IPAddressOrRange;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(IPAddressOrRange, IPAddressOrRange, IPAddressOrRange)
#define sk_IPAddressOrRange_num(sk) OPENSSL_sk_num(ossl_check_const_IPAddressOrRange_sk_type(sk))
#define sk_IPAddressOrRange_value(sk, idx) ((IPAddressOrRange
*)OPENSSL_sk_value(ossl_check_const_IPAddressOrRange_sk_type(sk), (idx)))
#define sk_IPAddressOrRange_new(cmp) ((STACK_OF(IPAddressOrRange)
*)OPENSSL_sk_new(ossl_check_IPAddressOrRange_compfunc_type(cmp)))
#define sk_IPAddressOrRange_new_null() ((STACK_OF(IPAddressOrRange) *)OPENSSL_sk_new_null())
#define sk_IPAddressOrRange_new_reserve(cmp, n) ((STACK_OF(IPAddressOrRange)
*)OPENSSL_sk_new_reserve(ossl_check_IPAddressOrRange_compfunc_type(cmp), (n)))
#define sk_IPAddressOrRange_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_IPAddressOrRange_sk_type(sk),
(n))
#define sk_IPAddressOrRange_free(sk) OPENSSL_sk_free(ossl_check_IPAddressOrRange_sk_type(sk))
#define sk_IPAddressOrRange_zero(sk)
 OPENSSL_sk_zero(ossl_check_IPAddressOrRange_sk_type(sk))
#define sk_IPAddressOrRange_delete(sk, i) ((IPAddressOrRange
*)OPENSSL_sk_delete(ossl_check_IPAddressOrRange_sk_type(sk), (i)))
#define sk_IPAddressOrRange_delete_ptr(sk, ptr) ((IPAddressOrRange
*)OPENSSL_sk_delete_ptr(ossl_check_IPAddressOrRange_sk_type(sk),
ossl_check_IPAddressOrRange_type(ptr)))
#define sk_IPAddressOrRange_push(sk, ptr) OPENSSL_sk_push(ossl_check_IPAddressOrRange_sk_type(sk),
ossl_check_IPAddressOrRange_type(ptr))
#define sk_IPAddressOrRange_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_IPAddressOrRange_sk_type(sk),
ossl_check_IPAddressOrRange_type(ptr))
#define sk_IPAddressOrRange_pop(sk) ((IPAddressOrRange
*)OPENSSL_sk_pop(ossl_check_IPAddressOrRange_sk_type(sk)))
#define sk_IPAddressOrRange_shift(sk) ((IPAddressOrRange
*)OPENSSL_sk_shift(ossl_check_IPAddressOrRange_sk_type(sk)))
#define sk_IPAddressOrRange_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_IPAddressOrRange_sk_type(sk),ossl_check_IPAddressOrRange_freefunc_typ
e(freefunc))
#define
```

```
 sk_IPAddressOrRange_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_IPAddressOrRange_sk_type(sk),
ossl_check_IPAddressOrRange_type(ptr), (idx))
#define sk_IPAddressOrRange_set(sk, idx, ptr) ((IPAddressOrRange
*)OPENSSL_sk_set(ossl_check_IPAddressOrRange_sk_type(sk), (idx), ossl_check_IPAddressOrRange_type(ptr)))
#define sk_IPAddressOrRange_find(sk, ptr) OPENSSL_sk_find(ossl_check_IPAddressOrRange_sk_type(sk),
ossl_check_IPAddressOrRange_type(ptr))
#define sk_IPAddressOrRange_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_IPAddressOrRange_sk_type(sk), ossl_check_IPAddressOrRange_type(ptr))
#define sk_IPAddressOrRange_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_IPAddressOrRange_sk_type(sk), ossl_check_IPAddressOrRange_type(ptr),
pnum)
#define sk_IPAddressOrRange_sort(sk) OPENSSL_sk_sort(ossl_check_IPAddressOrRange_sk_type(sk))
#define sk_IPAddressOrRange_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_IPAddressOrRange_sk_type(sk))
#define
 sk_IPAddressOrRange_dup(sk) ((STACK_OF(IPAddressOrRange)
*)OPENSSL_sk_dup(ossl_check_const_IPAddressOrRange_sk_type(sk)))
#define sk_IPAddressOrRange_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(IPAddressOrRange)
*)OPENSSL_sk_deep_copy(ossl_check_const_IPAddressOrRange_sk_type(sk),
ossl_check_IPAddressOrRange_copyfunc_type(copyfunc),
ossl_check_IPAddressOrRange_freefunc_type(freefunc)))
#define sk_IPAddressOrRange_set_cmp_func(sk, cmp)
((sk_IPAddressOrRange_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_IPAddressOrRange_sk_type(sk),
ossl_check_IPAddressOrRange_compfunc_type(cmp)))

/* clang-format on */

typedef STACK_OF(IPAddressOrRange) IPAddressOrRanges;

#define IPAddressChoice_inherit 0
#define IPAddressChoice_addressesOrRanges 1

typedef struct IPAddressChoice_st {
  int type;
  union {
      ASN1_NULL *inherit;
      IPAddressOrRanges *addressesOrRanges;
  } u;
} IPAddressChoice;

typedef struct IPAddressFamily_st {
  ASN1_OCTET_STRING *addressFamily;
   IPAddressChoice *ipAddressChoice;
} IPAddressFamily;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(IPAddressFamily, IPAddressFamily, IPAddressFamily)
#define sk_IPAddressFamily_num(sk) OPENSSL_sk_num(ossl_check_const_IPAddressFamily_sk_type(sk))
```

```
#define sk_IPAddressFamily_value(sk, idx) ((IPAddressFamily
*)OPENSSL_sk_value(ossl_check_const_IPAddressFamily_sk_type(sk), (idx)))
#define sk_IPAddressFamily_new(cmp) ((STACK_OF(IPAddressFamily)
*)OPENSSL_sk_new(ossl_check_IPAddressFamily_compfunc_type(cmp)))
#define sk_IPAddressFamily_new_null() ((STACK_OF(IPAddressFamily) *)OPENSSL_sk_new_null())
#define sk_IPAddressFamily_new_reserve(cmp, n) ((STACK_OF(IPAddressFamily)
*)OPENSSL_sk_new_reserve(ossl_check_IPAddressFamily_compfunc_type(cmp), (n)))
#define sk_IPAddressFamily_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_IPAddressFamily_sk_type(sk), (n))
#define sk_IPAddressFamily_free(sk) OPENSSL_sk_free(ossl_check_IPAddressFamily_sk_type(sk))
#define sk_IPAddressFamily_zero(sk)
 OPENSSL_sk_zero(ossl_check_IPAddressFamily_sk_type(sk))
#define sk_IPAddressFamily_delete(sk, i) ((IPAddressFamily
*)OPENSSL_sk_delete(ossl_check_IPAddressFamily_sk_type(sk), (i)))
#define sk_IPAddressFamily_delete_ptr(sk, ptr) ((IPAddressFamily
*)OPENSSL_sk_delete_ptr(ossl_check_IPAddressFamily_sk_type(sk), ossl_check_IPAddressFamily_type(ptr)))
#define sk_IPAddressFamily_push(sk, ptr) OPENSSL_sk_push(ossl_check_IPAddressFamily_sk_type(sk),
ossl_check_IPAddressFamily_type(ptr))
#define sk_IPAddressFamily_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_IPAddressFamily_sk_type(sk),
ossl_check_IPAddressFamily_type(ptr))
#define sk_IPAddressFamily_pop(sk) ((IPAddressFamily
*)OPENSSL_sk_pop(ossl_check_IPAddressFamily_sk_type(sk)))
#define sk_IPAddressFamily_shift(sk) ((IPAddressFamily
*)OPENSSL_sk_shift(ossl_check_IPAddressFamily_sk_type(sk)))
#define sk_IPAddressFamily_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_IPAddressFamily_sk_type(sk),ossl_check_IPAddressFamily_freefunc_type(fre
efunc))
#define
 sk_IPAddressFamily_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_IPAddressFamily_sk_type(sk),
ossl_check_IPAddressFamily_type(ptr), (idx))
#define sk_IPAddressFamily_set(sk, idx, ptr) ((IPAddressFamily
*)OPENSSL_sk_set(ossl_check_IPAddressFamily_sk_type(sk), (idx), ossl_check_IPAddressFamily_type(ptr)))
#define sk_IPAddressFamily_find(sk, ptr) OPENSSL_sk_find(ossl_check_IPAddressFamily_sk_type(sk),
ossl_check_IPAddressFamily_type(ptr))
#define sk_IPAddressFamily_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_IPAddressFamily_sk_type(sk),
ossl_check_IPAddressFamily_type(ptr))
#define sk_IPAddressFamily_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_IPAddressFamily_sk_type(sk), ossl_check_IPAddressFamily_type(ptr), pnum)
#define sk_IPAddressFamily_sort(sk) OPENSSL_sk_sort(ossl_check_IPAddressFamily_sk_type(sk))
#define sk_IPAddressFamily_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_IPAddressFamily_sk_type(sk))
#define sk_IPAddressFamily_dup(sk) ((STACK_OF(IPAddressFamily)
 *)OPENSSL_sk_dup(ossl_check_const_IPAddressFamily_sk_type(sk)))
#define sk_IPAddressFamily_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(IPAddressFamily)
*)OPENSSL_sk_deep_copy(ossl_check_const_IPAddressFamily_sk_type(sk),
ossl_check_IPAddressFamily_copyfunc_type(copyfunc), ossl_check_IPAddressFamily_freefunc_type(freefunc)))
#define sk_IPAddressFamily_set_cmp_func(sk, cmp)
((sk_IPAddressFamily_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_IPAddressFamily_sk_type(sk),
ossl_check_IPAddressFamily_compfunc_type(cmp)))
```

```
/* clang-format on */

typedef STACK_OF(IPAddressFamily) IPAddrBlocks;

DECLARE_ASN1_FUNCTIONS(IPAddressRange)
DECLARE_ASN1_FUNCTIONS(IPAddressOrRange)
DECLARE_ASN1_FUNCTIONS(IPAddressChoice)
DECLARE_ASN1_FUNCTIONS(IPAddressFamily)

/*
* API tag for elements of the ASIdentifer SEQUENCE.
*/
#define V3_ASID_ASNUM 0
#define V3_ASID_RDI 1

/*
* AFI values, assigned by IANA.  It'd be nice to make the AFI
* handling code totally generic, but there are too
 many little things
* that would need to be defined for other address families for it to
* be worth the trouble.
*/
#define IANA_AFI_IPV4 1
#define IANA_AFI_IPV6 2

/*
* Utilities to construct and extract values from RFC3779 extensions,
* since some of the encodings (particularly for IP address prefixes
* and ranges) are a bit tedious to work with directly.
*/
int X509v3_asid_add_inherit(ASIdentifiers *asid, int which);
int X509v3_asid_add_id_or_range(ASIdentifiers *asid, int which,
   ASN1_INTEGER *min, ASN1_INTEGER *max);
int X509v3_addr_add_inherit(IPAddrBlocks *addr,
   const unsigned afi, const unsigned *safi);
int X509v3_addr_add_prefix(IPAddrBlocks *addr,
   const unsigned afi, const unsigned *safi,
   unsigned char *a, const int prefixlen);
int X509v3_addr_add_range(IPAddrBlocks *addr,
   const unsigned afi, const unsigned *safi,
   unsigned char *min, unsigned char *max);
unsigned X509v3_addr_get_afi(const IPAddressFamily *f);
int X509v3_addr_get_range(IPAddressOrRange
 *aor, const unsigned afi,
   unsigned char *min, unsigned char *max,
   const int length);
```

```
/*
* Canonical forms.
*/
int X509v3_asid_is_canonical(ASIdentifiers *asid);
int X509v3_addr_is_canonical(IPAddrBlocks *addr);
int X509v3_asid_canonize(ASIdentifiers *asid);
int X509v3_addr_canonize(IPAddrBlocks *addr);

/*
* Tests for inheritance and containment.
*/
int X509v3_asid_inherits(ASIdentifiers *asid);
int X509v3_addr_inherits(IPAddrBlocks *addr);
int X509v3_asid_subset(ASIdentifiers *a, ASIdentifiers *b);
int X509v3_addr_subset(IPAddrBlocks *a, IPAddrBlocks *b);

/*
* Check whether RFC 3779 extensions nest properly in chains.
*/
int X509v3_asid_validate_path(X509_STORE_CTX *);
int X509v3_addr_validate_path(X509_STORE_CTX *);
int X509v3_asid_validate_resource_set(STACK_OF(X509) *chain,
  ASIdentifiers *ext,
  int allow_inheritance);
int X509v3_addr_validate_resource_set(STACK_OF(X509) *chain,
  IPAddrBlocks *ext, int allow_inheritance);

#endif /* OPENSSL_NO_RFC3779
 */

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ASN1_STRING, ASN1_STRING, ASN1_STRING)
#define sk_ASN1_STRING_num(sk) OPENSSL_sk_num(ossl_check_const_ASN1_STRING_sk_type(sk))
#define sk_ASN1_STRING_value(sk, idx) ((ASN1_STRING
*)OPENSSL_sk_value(ossl_check_const_ASN1_STRING_sk_type(sk), (idx)))
#define sk_ASN1_STRING_new(cmp) ((STACK_OF(ASN1_STRING)
*)OPENSSL_sk_new(ossl_check_ASN1_STRING_compfunc_type(cmp)))
#define sk_ASN1_STRING_new_null() ((STACK_OF(ASN1_STRING) *)OPENSSL_sk_new_null())
#define sk_ASN1_STRING_new_reserve(cmp, n) ((STACK_OF(ASN1_STRING)
*)OPENSSL_sk_new_reserve(ossl_check_ASN1_STRING_compfunc_type(cmp), (n)))
#define sk_ASN1_STRING_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_ASN1_STRING_sk_type(sk), (n))
#define sk_ASN1_STRING_free(sk) OPENSSL_sk_free(ossl_check_ASN1_STRING_sk_type(sk))
#define sk_ASN1_STRING_zero(sk) OPENSSL_sk_zero(ossl_check_ASN1_STRING_sk_type(sk))
#define sk_ASN1_STRING_delete(sk, i) ((ASN1_STRING
*)OPENSSL_sk_delete(ossl_check_ASN1_STRING_sk_type(sk),
 (i)))
#define sk_ASN1_STRING_delete_ptr(sk, ptr) ((ASN1_STRING
*)OPENSSL_sk_delete_ptr(ossl_check_ASN1_STRING_sk_type(sk), ossl_check_ASN1_STRING_type(ptr)))
```

```
#define sk_ASN1_STRING_push(sk, ptr) OPENSSL_sk_push(ossl_check_ASN1_STRING_sk_type(sk),
ossl_check_ASN1_STRING_type(ptr))
#define sk_ASN1_STRING_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_ASN1_STRING_sk_type(sk),
ossl_check_ASN1_STRING_type(ptr))
#define sk_ASN1_STRING_pop(sk) ((ASN1_STRING
*)OPENSSL_sk_pop(ossl_check_ASN1_STRING_sk_type(sk)))
#define sk_ASN1_STRING_shift(sk) ((ASN1_STRING
*)OPENSSL_sk_shift(ossl_check_ASN1_STRING_sk_type(sk)))
#define sk_ASN1_STRING_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASN1_STRING_sk_type(sk),ossl_check_ASN1_STRING_freefunc_type(freef
unc))
#define sk_ASN1_STRING_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_ASN1_STRING_sk_type(sk),
ossl_check_ASN1_STRING_type(ptr), (idx))
#define sk_ASN1_STRING_set(sk, idx, ptr) ((ASN1_STRING
*)OPENSSL_sk_set(ossl_check_ASN1_STRING_sk_type(sk),
 (idx), ossl_check_ASN1_STRING_type(ptr)))
#define sk_ASN1_STRING_find(sk, ptr) OPENSSL_sk_find(ossl_check_ASN1_STRING_sk_type(sk),
ossl_check_ASN1_STRING_type(ptr))
#define sk_ASN1_STRING_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_ASN1_STRING_sk_type(sk),
ossl_check_ASN1_STRING_type(ptr))
#define sk_ASN1_STRING_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ASN1_STRING_sk_type(sk), ossl_check_ASN1_STRING_type(ptr), pnum)
#define sk_ASN1_STRING_sort(sk) OPENSSL_sk_sort(ossl_check_ASN1_STRING_sk_type(sk))
#define sk_ASN1_STRING_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_ASN1_STRING_sk_type(sk))
#define sk_ASN1_STRING_dup(sk) ((STACK_OF(ASN1_STRING)
*)OPENSSL_sk_dup(ossl_check_const_ASN1_STRING_sk_type(sk)))
#define sk_ASN1_STRING_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ASN1_STRING)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASN1_STRING_sk_type(sk),
ossl_check_ASN1_STRING_copyfunc_type(copyfunc), ossl_check_ASN1_STRING_freefunc_type(freefunc)))
#define
 sk_ASN1_STRING_set_cmp_func(sk, cmp)
((sk_ASN1_STRING_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASN1_STRING_sk_type(sk),
ossl_check_ASN1_STRING_compfunc_type(cmp)))

/* clang-format on */

/*
* Admission Syntax
*/
typedef struct NamingAuthority_st NAMING_AUTHORITY;
typedef struct ProfessionInfo_st PROFESSION_INFO;
typedef struct Admissions_st ADMISSIONS;
typedef struct AdmissionSyntax_st ADMISSION_SYNTAX;
DECLARE_ASN1_FUNCTIONS(NAMING_AUTHORITY)
DECLARE_ASN1_FUNCTIONS(PROFESSION_INFO)
DECLARE_ASN1_FUNCTIONS(ADMISSIONS)
DECLARE_ASN1_FUNCTIONS(ADMISSION_SYNTAX)
```

```
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(PROFESSION_INFO, PROFESSION_INFO, PROFESSION_INFO)
#define sk_PROFESSION_INFO_num(sk)
OPENSSL_sk_num(ossl_check_const_PROFESSION_INFO_sk_type(sk))
#define sk_PROFESSION_INFO_value(sk, idx) ((PROFESSION_INFO
*)OPENSSL_sk_value(ossl_check_const_PROFESSION_INFO_sk_type(sk), (idx)))
#define sk_PROFESSION_INFO_new(cmp) ((STACK_OF(PROFESSION_INFO)
*)OPENSSL_sk_new(ossl_check_PROFESSION_INFO_compfunc_type(cmp)))
#define
 sk_PROFESSION_INFO_new_null() ((STACK_OF(PROFESSION_INFO) *)OPENSSL_sk_new_null())
#define sk_PROFESSION_INFO_new_reserve(cmp, n) ((STACK_OF(PROFESSION_INFO)
*)OPENSSL_sk_new_reserve(ossl_check_PROFESSION_INFO_compfunc_type(cmp), (n)))
#define sk_PROFESSION_INFO_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_PROFESSION_INFO_sk_type(sk), (n))
#define sk_PROFESSION_INFO_free(sk) OPENSSL_sk_free(ossl_check_PROFESSION_INFO_sk_type(sk))
#define sk_PROFESSION_INFO_zero(sk) OPENSSL_sk_zero(ossl_check_PROFESSION_INFO_sk_type(sk))
#define sk_PROFESSION_INFO_delete(sk, i) ((PROFESSION_INFO
*)OPENSSL_sk_delete(ossl_check_PROFESSION_INFO_sk_type(sk), (i)))
#define sk_PROFESSION_INFO_delete_ptr(sk, ptr) ((PROFESSION_INFO
*)OPENSSL_sk_delete_ptr(ossl_check_PROFESSION_INFO_sk_type(sk),
ossl_check_PROFESSION_INFO_type(ptr)))
#define sk_PROFESSION_INFO_push(sk, ptr)
OPENSSL_sk_push(ossl_check_PROFESSION_INFO_sk_type(sk), ossl_check_PROFESSION_INFO_type(ptr))
#define
 sk_PROFESSION_INFO_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_PROFESSION_INFO_sk_type(sk),
ossl_check_PROFESSION_INFO_type(ptr))
#define sk_PROFESSION_INFO_pop(sk) ((PROFESSION_INFO
*)OPENSSL_sk_pop(ossl_check_PROFESSION_INFO_sk_type(sk)))
#define sk_PROFESSION_INFO_shift(sk) ((PROFESSION_INFO
*)OPENSSL_sk_shift(ossl_check_PROFESSION_INFO_sk_type(sk)))
#define sk_PROFESSION_INFO_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_PROFESSION_INFO_sk_type(sk),ossl_check_PROFESSION_INFO_freefun
c_type(freefunc))
#define sk_PROFESSION_INFO_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_PROFESSION_INFO_sk_type(sk), ossl_check_PROFESSION_INFO_type(ptr),
(idx))
#define sk_PROFESSION_INFO_set(sk, idx, ptr) ((PROFESSION_INFO
*)OPENSSL_sk_set(ossl_check_PROFESSION_INFO_sk_type(sk), (idx),
ossl_check_PROFESSION_INFO_type(ptr)))
#define sk_PROFESSION_INFO_find(sk, ptr) OPENSSL_sk_find(ossl_check_PROFESSION_INFO_sk_type(sk),
ossl_check_PROFESSION_INFO_type(ptr))
#define sk_PROFESSION_INFO_find_ex(sk,
 ptr) OPENSSL_sk_find_ex(ossl_check_PROFESSION_INFO_sk_type(sk),
ossl_check_PROFESSION_INFO_type(ptr))
#define sk_PROFESSION_INFO_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_PROFESSION_INFO_sk_type(sk),
ossl_check_PROFESSION_INFO_type(ptr), pnum)
#define sk_PROFESSION_INFO_sort(sk) OPENSSL_sk_sort(ossl_check_PROFESSION_INFO_sk_type(sk))
```

```
#define sk_PROFESSION_INFO_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_PROFESSION_INFO_sk_type(sk))
#define sk_PROFESSION_INFO_dup(sk) ((STACK_OF(PROFESSION_INFO)
*)OPENSSL_sk_dup(ossl_check_const_PROFESSION_INFO_sk_type(sk)))
#define sk_PROFESSION_INFO_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(PROFESSION_INFO)
*)OPENSSL_sk_deep_copy(ossl_check_const_PROFESSION_INFO_sk_type(sk),
ossl_check_PROFESSION_INFO_copyfunc_type(copyfunc),
ossl_check_PROFESSION_INFO_freefunc_type(freefunc)))
#define sk_PROFESSION_INFO_set_cmp_func(sk, cmp)
((sk_PROFESSION_INFO_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_PROFESSION_INFO_sk_type(sk)
,
 ossl_check_PROFESSION_INFO_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(ADMISSIONS, ADMISSIONS, ADMISSIONS)
#define sk_ADMISSIONS_num(sk) OPENSSL_sk_num(ossl_check_const_ADMISSIONS_sk_type(sk))
#define sk_ADMISSIONS_value(sk, idx) ((ADMISSIONS
*)OPENSSL_sk_value(ossl_check_const_ADMISSIONS_sk_type(sk), (idx)))
#define sk_ADMISSIONS_new(cmp) ((STACK_OF(ADMISSIONS)
*)OPENSSL_sk_new(ossl_check_ADMISSIONS_compfunc_type(cmp)))
#define sk_ADMISSIONS_new_null() ((STACK_OF(ADMISSIONS) *)OPENSSL_sk_new_null())
#define sk_ADMISSIONS_new_reserve(cmp, n) ((STACK_OF(ADMISSIONS)
*)OPENSSL_sk_new_reserve(ossl_check_ADMISSIONS_compfunc_type(cmp), (n)))
#define sk_ADMISSIONS_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_ADMISSIONS_sk_type(sk), (n))
#define sk_ADMISSIONS_free(sk) OPENSSL_sk_free(ossl_check_ADMISSIONS_sk_type(sk))
#define sk_ADMISSIONS_zero(sk) OPENSSL_sk_zero(ossl_check_ADMISSIONS_sk_type(sk))
#define sk_ADMISSIONS_delete(sk, i) ((ADMISSIONS
*)OPENSSL_sk_delete(ossl_check_ADMISSIONS_sk_type(sk),
 (i)))
#define sk_ADMISSIONS_delete_ptr(sk, ptr) ((ADMISSIONS
*)OPENSSL_sk_delete_ptr(ossl_check_ADMISSIONS_sk_type(sk), ossl_check_ADMISSIONS_type(ptr)))
#define sk_ADMISSIONS_push(sk, ptr) OPENSSL_sk_push(ossl_check_ADMISSIONS_sk_type(sk),
ossl_check_ADMISSIONS_type(ptr))
#define sk_ADMISSIONS_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_ADMISSIONS_sk_type(sk),
ossl_check_ADMISSIONS_type(ptr))
#define sk_ADMISSIONS_pop(sk) ((ADMISSIONS
*)OPENSSL_sk_pop(ossl_check_ADMISSIONS_sk_type(sk)))
#define sk_ADMISSIONS_shift(sk) ((ADMISSIONS
*)OPENSSL_sk_shift(ossl_check_ADMISSIONS_sk_type(sk)))
#define sk_ADMISSIONS_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ADMISSIONS_sk_type(sk),ossl_check_ADMISSIONS_freefunc_type(freefun
c))
#define sk_ADMISSIONS_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_ADMISSIONS_sk_type(sk),
ossl_check_ADMISSIONS_type(ptr), (idx))
#define sk_ADMISSIONS_set(sk, idx, ptr) ((ADMISSIONS
*)OPENSSL_sk_set(ossl_check_ADMISSIONS_sk_type(sk),
 (idx), ossl_check_ADMISSIONS_type(ptr)))
#define sk_ADMISSIONS_find(sk, ptr) OPENSSL_sk_find(ossl_check_ADMISSIONS_sk_type(sk),
ossl_check_ADMISSIONS_type(ptr))
#define sk_ADMISSIONS_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_ADMISSIONS_sk_type(sk),
```

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ossl_check_ADMISSIONS_type(ptr))
#define sk_ADMISSIONS_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_ADMISSIONS_sk_type(sk),
ossl_check_ADMISSIONS_type(ptr), pnum)
#define sk_ADMISSIONS_sort(sk) OPENSSL_sk_sort(ossl_check_ADMISSIONS_sk_type(sk))
#define sk_ADMISSIONS_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_ADMISSIONS_sk_type(sk))
#define sk_ADMISSIONS_dup(sk) ((STACK_OF(ADMISSIONS)
*)OPENSSL_sk_dup(ossl_check_const_ADMISSIONS_sk_type(sk)))
#define sk_ADMISSIONS_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ADMISSIONS)
*)OPENSSL_sk_deep_copy(ossl_check_const_ADMISSIONS_sk_type(sk),
ossl_check_ADMISSIONS_copyfunc_type(copyfunc), ossl_check_ADMISSIONS_freefunc_type(freefunc)))
#define sk_ADMISSIONS_set_cmp_func(sk,
 cmp) ((sk_ADMISSIONS_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ADMISSIONS_sk_type(sk),
ossl_check_ADMISSIONS_compfunc_type(cmp)))

/* clang-format on */
typedef STACK_OF(PROFESSION_INFO) PROFESSION_INFOS;

const ASN1_OBJECT *NAMING_AUTHORITY_get0_authorityId(
  const NAMING_AUTHORITY *n);
const ASN1_IA5STRING *NAMING_AUTHORITY_get0_authorityURL(
  const NAMING_AUTHORITY *n);
const ASN1_STRING *NAMING_AUTHORITY_get0_authorityText(
  const NAMING_AUTHORITY *n);
void NAMING_AUTHORITY_set0_authorityId(NAMING_AUTHORITY *n,
  ASN1_OBJECT *namingAuthorityId);
void NAMING_AUTHORITY_set0_authorityURL(NAMING_AUTHORITY *n,
  ASN1_IA5STRING *namingAuthorityUrl);
void NAMING_AUTHORITY_set0_authorityText(NAMING_AUTHORITY *n,
  ASN1_STRING *namingAuthorityText);

const GENERAL_NAME *ADMISSION_SYNTAX_get0_admissionAuthority(
  const ADMISSION_SYNTAX *as);
void ADMISSION_SYNTAX_set0_admissionAuthority(
  ADMISSION_SYNTAX *as, GENERAL_NAME *aa);
const STACK_OF(ADMISSIONS) *ADMISSION_SYNTAX_get0_contentsOfAdmissions(
   const ADMISSION_SYNTAX *as);
void ADMISSION_SYNTAX_set0_contentsOfAdmissions(
  ADMISSION_SYNTAX *as, STACK_OF(ADMISSIONS) *a);
const GENERAL_NAME *ADMISSIONS_get0_admissionAuthority(const ADMISSIONS *a);
void ADMISSIONS_set0_admissionAuthority(ADMISSIONS *a, GENERAL_NAME *aa);
const NAMING_AUTHORITY *ADMISSIONS_get0_namingAuthority(const ADMISSIONS *a);
void ADMISSIONS_set0_namingAuthority(ADMISSIONS *a, NAMING_AUTHORITY *na);
const PROFESSION_INFOS *ADMISSIONS_get0_professionInfos(const ADMISSIONS *a);
void ADMISSIONS_set0_professionInfos(ADMISSIONS *a, PROFESSION_INFOS *pi);
const ASN1_OCTET_STRING *PROFESSION_INFO_get0_addProfessionInfo(
  const PROFESSION_INFO *pi);
void PROFESSION_INFO_set0_addProfessionInfo(
  PROFESSION_INFO *pi, ASN1_OCTET_STRING *aos);
```

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const NAMING_AUTHORITY *PROFESSION_INFO_get0_namingAuthority(
   const PROFESSION_INFO *pi);
void PROFESSION_INFO_set0_namingAuthority(
   PROFESSION_INFO *pi, NAMING_AUTHORITY
 *na);
const STACK_OF(ASN1_STRING) *PROFESSION_INFO_get0_professionItems(
   const PROFESSION_INFO *pi);
void PROFESSION_INFO_set0_professionItems(
   PROFESSION_INFO *pi, STACK_OF(ASN1_STRING) *as);
const STACK_OF(ASN1_OBJECT) *PROFESSION_INFO_get0_professionOIDs(
   const PROFESSION_INFO *pi);
void PROFESSION_INFO_set0_professionOIDs(
   PROFESSION_INFO *pi, STACK_OF(ASN1_OBJECT) *po);
const ASN1_PRINTABLESTRING *PROFESSION_INFO_get0_registrationNumber(
   const PROFESSION_INFO *pi);
void PROFESSION_INFO_set0_registrationNumber(
   PROFESSION_INFO *pi, ASN1_PRINTABLESTRING *rn);

int OSSL_GENERAL_NAMES_print(BIO *out, GENERAL_NAMES *gens, int indent);

typedef STACK_OF(X509_ATTRIBUTE) OSSL_ATTRIBUTES_SYNTAX;
DECLARE_ASN1_FUNCTIONS(OSSL_ATTRIBUTES_SYNTAX)

typedef STACK_OF(USERNOTICE) OSSL_USER_NOTICE_SYNTAX;
DECLARE_ASN1_FUNCTIONS(OSSL_USER_NOTICE_SYNTAX)

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(USERNOTICE, USERNOTICE, USERNOTICE)
#define sk_USERNOTICE_num(sk) OPENSSL_sk_num(ossl_check_const_USERNOTICE_sk_type(sk))
#define
 sk_USERNOTICE_value(sk, idx) ((USERNOTICE
*)OPENSSL_sk_value(ossl_check_const_USERNOTICE_sk_type(sk), (idx)))
#define sk_USERNOTICE_new(cmp) ((STACK_OF(USERNOTICE)
*)OPENSSL_sk_new(ossl_check_USERNOTICE_compfunc_type(cmp)))
#define sk_USERNOTICE_new_null() ((STACK_OF(USERNOTICE) *)OPENSSL_sk_new_null())
#define sk_USERNOTICE_new_reserve(cmp, n) ((STACK_OF(USERNOTICE)
*)OPENSSL_sk_new_reserve(ossl_check_USERNOTICE_compfunc_type(cmp), (n)))
#define sk_USERNOTICE_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_USERNOTICE_sk_type(sk), (n))
#define sk_USERNOTICE_free(sk) OPENSSL_sk_free(ossl_check_USERNOTICE_sk_type(sk))
#define sk_USERNOTICE_zero(sk) OPENSSL_sk_zero(ossl_check_USERNOTICE_sk_type(sk))
#define sk_USERNOTICE_delete(sk, i) ((USERNOTICE
*)OPENSSL_sk_delete(ossl_check_USERNOTICE_sk_type(sk), (i)))
#define sk_USERNOTICE_delete_ptr(sk, ptr) ((USERNOTICE
*)OPENSSL_sk_delete_ptr(ossl_check_USERNOTICE_sk_type(sk), ossl_check_USERNOTICE_type(ptr)))
#define
 sk_USERNOTICE_push(sk, ptr) OPENSSL_sk_push(ossl_check_USERNOTICE_sk_type(sk),
ossl_check_USERNOTICE_type(ptr))
#define sk_USERNOTICE_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_USERNOTICE_sk_type(sk),
```

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ossl_check_USERNOTICE_type(ptr))
#define sk_USERNOTICE_pop(sk) ((USERNOTICE
*)OPENSSL_sk_pop(ossl_check_USERNOTICE_sk_type(sk)))
#define sk_USERNOTICE_shift(sk) ((USERNOTICE
*)OPENSSL_sk_shift(ossl_check_USERNOTICE_sk_type(sk)))
#define sk_USERNOTICE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_USERNOTICE_sk_type(sk),ossl_check_USERNOTICE_freefunc_type(freefu
nc))
#define sk_USERNOTICE_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_USERNOTICE_sk_type(sk),
ossl_check_USERNOTICE_type(ptr), (idx))
#define sk_USERNOTICE_set(sk, idx, ptr) ((USERNOTICE
*)OPENSSL_sk_set(ossl_check_USERNOTICE_sk_type(sk), (idx), ossl_check_USERNOTICE_type(ptr)))
#define sk_USERNOTICE_find(sk, ptr) OPENSSL_sk_find(ossl_check_USERNOTICE_sk_type(sk),
ossl_check_USERNOTICE_type(ptr))
#define
 sk_USERNOTICE_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_USERNOTICE_sk_type(sk),
ossl_check_USERNOTICE_type(ptr))
#define sk_USERNOTICE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_USERNOTICE_sk_type(sk), ossl_check_USERNOTICE_type(ptr), pnum)
#define sk_USERNOTICE_sort(sk) OPENSSL_sk_sort(ossl_check_USERNOTICE_sk_type(sk))
#define sk_USERNOTICE_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_USERNOTICE_sk_type(sk))
#define sk_USERNOTICE_dup(sk) ((STACK_OF(USERNOTICE)
*)OPENSSL_sk_dup(ossl_check_const_USERNOTICE_sk_type(sk)))
#define sk_USERNOTICE_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(USERNOTICE)
*)OPENSSL_sk_deep_copy(ossl_check_const_USERNOTICE_sk_type(sk),
ossl_check_USERNOTICE_copyfunc_type(copyfunc), ossl_check_USERNOTICE_freefunc_type(freefunc)))
#define sk_USERNOTICE_set_cmp_func(sk, cmp)
((sk_USERNOTICE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_USERNOTICE_sk_type(sk),
ossl_check_USERNOTICE_compfunc_type(cmp)))

/* clang-format on */

typedef
 struct OSSL_ROLE_SPEC_CERT_ID_st {
   GENERAL_NAME *roleName;
   GENERAL_NAME *roleCertIssuer;
   ASN1_INTEGER *roleCertSerialNumber;
   GENERAL_NAMES *roleCertLocator;
} OSSL_ROLE_SPEC_CERT_ID;

DECLARE_ASN1_FUNCTIONS(OSSL_ROLE_SPEC_CERT_ID)

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_ROLE_SPEC_CERT_ID, OSSL_ROLE_SPEC_CERT_ID,
OSSL_ROLE_SPEC_CERT_ID)
#define sk_OSSL_ROLE_SPEC_CERT_ID_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk))
#define sk_OSSL_ROLE_SPEC_CERT_ID_value(sk, idx) ((OSSL_ROLE_SPEC_CERT_ID
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*)OPENSSL_sk_value(ossl_check_const_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk), (idx)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_new(cmp) ((STACK_OF(OSSL_ROLE_SPEC_CERT_ID)
*)OPENSSL_sk_new(ossl_check_OSSL_ROLE_SPEC_CERT_ID_compfunc_type(cmp)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_new_null() ((STACK_OF(OSSL_ROLE_SPEC_CERT_ID)
*)OPENSSL_sk_new_null())
#define sk_OSSL_ROLE_SPEC_CERT_ID_new_reserve(cmp, n) ((STACK_OF(OSSL_ROLE_SPEC_CERT_ID)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_ROLE_SPEC_CERT_ID_compfunc_type(cmp),
 (n)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk), (n))
#define sk_OSSL_ROLE_SPEC_CERT_ID_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk))
#define sk_OSSL_ROLE_SPEC_CERT_ID_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk))
#define sk_OSSL_ROLE_SPEC_CERT_ID_delete(sk, i) ((OSSL_ROLE_SPEC_CERT_ID
*)OPENSSL_sk_delete(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk), (i)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_delete_ptr(sk, ptr) ((OSSL_ROLE_SPEC_CERT_ID
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_type(ptr)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_type(ptr))
#define sk_OSSL_ROLE_SPEC_CERT_ID_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),
 ossl_check_OSSL_ROLE_SPEC_CERT_ID_type(ptr))
#define sk_OSSL_ROLE_SPEC_CERT_ID_pop(sk) ((OSSL_ROLE_SPEC_CERT_ID
*)OPENSSL_sk_pop(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_shift(sk) ((OSSL_ROLE_SPEC_CERT_ID
*)OPENSSL_sk_shift(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),ossl_check_OSSL_ROLE_SPE
C_CERT_ID_freefunc_type(freefunc))
#define sk_OSSL_ROLE_SPEC_CERT_ID_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_type(ptr), (idx))
#define sk_OSSL_ROLE_SPEC_CERT_ID_set(sk, idx, ptr) ((OSSL_ROLE_SPEC_CERT_ID
*)OPENSSL_sk_set(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk), (idx),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_type(ptr)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_type(ptr))
#define
 sk_OSSL_ROLE_SPEC_CERT_ID_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_type(ptr))
#define sk_OSSL_ROLE_SPEC_CERT_ID_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_type(ptr), pnum)
```

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#define sk_OSSL_ROLE_SPEC_CERT_ID_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk))
#define sk_OSSL_ROLE_SPEC_CERT_ID_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk))
#define sk_OSSL_ROLE_SPEC_CERT_ID_dup(sk) ((STACK_OF(OSSL_ROLE_SPEC_CERT_ID)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_ROLE_SPEC_CERT_ID)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_copyfunc_type(copyfunc),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_freefunc_type(freefunc)))
#define
 sk_OSSL_ROLE_SPEC_CERT_ID_set_cmp_func(sk, cmp)
((sk_OSSL_ROLE_SPEC_CERT_ID_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_ROLE_SPEC_C
ERT_ID_sk_type(sk), ossl_check_OSSL_ROLE_SPEC_CERT_ID_compfunc_type(cmp)))

/* clang-format on */

typedef STACK_OF(OSSL_ROLE_SPEC_CERT_ID) OSSL_ROLE_SPEC_CERT_ID_SYNTAX;

DECLARE_ASN1_FUNCTIONS(OSSL_ROLE_SPEC_CERT_ID_SYNTAX)
typedef struct OSSL_HASH_st {
  X509_ALGOR *algorithmIdentifier;
  ASN1_BIT_STRING *hashValue;
} OSSL_HASH;

typedef struct OSSL_INFO_SYNTAX_POINTER_st {
  GENERAL_NAMES *name;
  OSSL_HASH *hash;
} OSSL_INFO_SYNTAX_POINTER;

#define OSSL_INFO_SYNTAX_TYPE_CONTENT 0
#define OSSL_INFO_SYNTAX_TYPE_POINTER 1

typedef struct OSSL_INFO_SYNTAX_st {
  int type;
  union {
     ASN1_STRING *content;
     OSSL_INFO_SYNTAX_POINTER *pointer;
  } choice;
} OSSL_INFO_SYNTAX;

typedef struct OSSL_PRIVILEGE_POLICY_ID_st {
  ASN1_OBJECT *privilegePolicy;
  OSSL_INFO_SYNTAX
 *privPolSyntax;
} OSSL_PRIVILEGE_POLICY_ID;
```

```
typedef struct OSSL_ATTRIBUTE_DESCRIPTOR_st {
  ASN1_OBJECT *identifier;
  ASN1_STRING *attributeSyntax;
  ASN1_UTF8STRING *name;
  ASN1_UTF8STRING *description;
  OSSL_PRIVILEGE_POLICY_ID *dominationRule;
} OSSL_ATTRIBUTE_DESCRIPTOR;

DECLARE_ASN1_FUNCTIONS(OSSL_HASH)
DECLARE_ASN1_FUNCTIONS(OSSL_INFO_SYNTAX)
DECLARE_ASN1_FUNCTIONS(OSSL_INFO_SYNTAX_POINTER)
DECLARE_ASN1_FUNCTIONS(OSSL_PRIVILEGE_POLICY_ID)
DECLARE_ASN1_FUNCTIONS(OSSL_ATTRIBUTE_DESCRIPTOR)

typedef struct OSSL_TIME_SPEC_ABSOLUTE_st {
  ASN1_GENERALIZEDTIME *startTime;
  ASN1_GENERALIZEDTIME *endTime;
} OSSL_TIME_SPEC_ABSOLUTE;

typedef struct OSSL_DAY_TIME_st {
  ASN1_INTEGER *hour;
  ASN1_INTEGER *minute;
  ASN1_INTEGER *second;
} OSSL_DAY_TIME;

typedef struct OSSL_DAY_TIME_BAND_st {
  OSSL_DAY_TIME *startDayTime;
  OSSL_DAY_TIME *endDayTime;
} OSSL_DAY_TIME_BAND;

#define OSSL_NAMED_DAY_TYPE_INT 0
#define OSSL_NAMED_DAY_TYPE_BIT 1
#define OSSL_NAMED_DAY_INT_SUN
 1
#define OSSL_NAMED_DAY_INT_MON 2
#define OSSL_NAMED_DAY_INT_TUE 3
#define OSSL_NAMED_DAY_INT_WED 4
#define OSSL_NAMED_DAY_INT_THU 5
#define OSSL_NAMED_DAY_INT_FRI 6
#define OSSL_NAMED_DAY_INT_SAT 7
#define OSSL_NAMED_DAY_BIT_SUN 0
#define OSSL_NAMED_DAY_BIT_MON 1
#define OSSL_NAMED_DAY_BIT_TUE 2
#define OSSL_NAMED_DAY_BIT_WED 3
#define OSSL_NAMED_DAY_BIT_THU 4
#define OSSL_NAMED_DAY_BIT_FRI 5
#define OSSL_NAMED_DAY_BIT_SAT 6
```

```
typedef struct OSSL_NAMED_DAY_st {
  int type;
  union {
     ASN1_INTEGER *intNamedDays;
     ASN1_BIT_STRING *bitNamedDays;
  } choice;
} OSSL_NAMED_DAY;

#define OSSL_TIME_SPEC_X_DAY_OF_FIRST 0
#define OSSL_TIME_SPEC_X_DAY_OF_SECOND 1
#define OSSL_TIME_SPEC_X_DAY_OF_THIRD 2
#define OSSL_TIME_SPEC_X_DAY_OF_FOURTH 3
#define OSSL_TIME_SPEC_X_DAY_OF_FIFTH 4

typedef struct OSSL_TIME_SPEC_X_DAY_OF_st {
  int type;
  union {
     OSSL_NAMED_DAY *first;
     OSSL_NAMED_DAY *second;
     OSSL_NAMED_DAY *third;
     OSSL_NAMED_DAY
 *fourth;
     OSSL_NAMED_DAY *fifth;
  } choice;
} OSSL_TIME_SPEC_X_DAY_OF;

#define OSSL_TIME_SPEC_DAY_TYPE_INT 0
#define OSSL_TIME_SPEC_DAY_TYPE_BIT 1
#define OSSL_TIME_SPEC_DAY_TYPE_DAY_OF 2
#define OSSL_TIME_SPEC_DAY_BIT_SUN 0
#define OSSL_TIME_SPEC_DAY_BIT_MON 1
#define OSSL_TIME_SPEC_DAY_BIT_TUE 2
#define OSSL_TIME_SPEC_DAY_BIT_WED 3
#define OSSL_TIME_SPEC_DAY_BIT_THU 4
#define OSSL_TIME_SPEC_DAY_BIT_FRI 5
#define OSSL_TIME_SPEC_DAY_BIT_SAT 6
#define OSSL_TIME_SPEC_DAY_INT_SUN 1
#define OSSL_TIME_SPEC_DAY_INT_MON 2
#define OSSL_TIME_SPEC_DAY_INT_TUE 3
#define OSSL_TIME_SPEC_DAY_INT_WED 4
#define OSSL_TIME_SPEC_DAY_INT_THU 5
#define OSSL_TIME_SPEC_DAY_INT_FRI 6
#define OSSL_TIME_SPEC_DAY_INT_SAT 7

typedef struct OSSL_TIME_SPEC_DAY_st {
  int type;
  union {
     STACK_OF(ASN1_INTEGER) *intDay;
```

```
    ASN1_BIT_STRING *bitDay;
    OSSL_TIME_SPEC_X_DAY_OF *dayOf;
  } choice;
} OSSL_TIME_SPEC_DAY;

#define OSSL_TIME_SPEC_WEEKS_TYPE_ALL 0
#define OSSL_TIME_SPEC_WEEKS_TYPE_INT
 1
#define OSSL_TIME_SPEC_WEEKS_TYPE_BIT 2
#define OSSL_TIME_SPEC_BIT_WEEKS_1 0
#define OSSL_TIME_SPEC_BIT_WEEKS_2 1
#define OSSL_TIME_SPEC_BIT_WEEKS_3 2
#define OSSL_TIME_SPEC_BIT_WEEKS_4 3
#define OSSL_TIME_SPEC_BIT_WEEKS_5 4

typedef struct OSSL_TIME_SPEC_WEEKS_st {
  int type;
  union {
    ASN1_NULL *allWeeks;
    STACK_OF(ASN1_INTEGER) *intWeek;
    ASN1_BIT_STRING *bitWeek;
  } choice;
} OSSL_TIME_SPEC_WEEKS;

#define OSSL_TIME_SPEC_MONTH_TYPE_ALL 0
#define OSSL_TIME_SPEC_MONTH_TYPE_INT 1
#define OSSL_TIME_SPEC_MONTH_TYPE_BIT 2
#define OSSL_TIME_SPEC_INT_MONTH_JAN 1
#define OSSL_TIME_SPEC_INT_MONTH_FEB 2
#define OSSL_TIME_SPEC_INT_MONTH_MAR 3
#define OSSL_TIME_SPEC_INT_MONTH_APR 4
#define OSSL_TIME_SPEC_INT_MONTH_MAY 5
#define OSSL_TIME_SPEC_INT_MONTH_JUN 6
#define OSSL_TIME_SPEC_INT_MONTH_JUL 7
#define OSSL_TIME_SPEC_INT_MONTH_AUG 8
#define OSSL_TIME_SPEC_INT_MONTH_SEP 9
#define OSSL_TIME_SPEC_INT_MONTH_OCT 10
#define OSSL_TIME_SPEC_INT_MONTH_NOV
 11
#define OSSL_TIME_SPEC_INT_MONTH_DEC 12
#define OSSL_TIME_SPEC_BIT_MONTH_JAN 0
#define OSSL_TIME_SPEC_BIT_MONTH_FEB 1
#define OSSL_TIME_SPEC_BIT_MONTH_MAR 2
#define OSSL_TIME_SPEC_BIT_MONTH_APR 3
#define OSSL_TIME_SPEC_BIT_MONTH_MAY 4
#define OSSL_TIME_SPEC_BIT_MONTH_JUN 5
#define OSSL_TIME_SPEC_BIT_MONTH_JUL 6
#define OSSL_TIME_SPEC_BIT_MONTH_AUG 7
```

```
#define OSSL_TIME_SPEC_BIT_MONTH_SEP 8
#define OSSL_TIME_SPEC_BIT_MONTH_OCT 9
#define OSSL_TIME_SPEC_BIT_MONTH_NOV 10
#define OSSL_TIME_SPEC_BIT_MONTH_DEC 11

typedef struct OSSL_TIME_SPEC_MONTH_st {
  int type;
  union {
     ASN1_NULL *allMonths;
     STACK_OF(ASN1_INTEGER) *intMonth;
     ASN1_BIT_STRING *bitMonth;
  } choice;
} OSSL_TIME_SPEC_MONTH;

typedef struct OSSL_TIME_PERIOD_st {
  STACK_OF(OSSL_DAY_TIME_BAND) *timesOfDay;
  OSSL_TIME_SPEC_DAY *days;
  OSSL_TIME_SPEC_WEEKS *weeks;
  OSSL_TIME_SPEC_MONTH *months;
  STACK_OF(ASN1_INTEGER) *years;
} OSSL_TIME_PERIOD;

#define OSSL_TIME_SPEC_TIME_TYPE_ABSOLUTE
 0
#define OSSL_TIME_SPEC_TIME_TYPE_PERIODIC 1

typedef struct OSSL_TIME_SPEC_TIME_st {
  int type;
  union {
     OSSL_TIME_SPEC_ABSOLUTE *absolute;
     STACK_OF(OSSL_TIME_PERIOD) *periodic;
  } choice;
} OSSL_TIME_SPEC_TIME;

typedef struct OSSL_TIME_SPEC_st {
  OSSL_TIME_SPEC_TIME *time;
  ASN1_BOOLEAN notThisTime;
  ASN1_INTEGER *timeZone;
} OSSL_TIME_SPEC;

DECLARE_ASN1_FUNCTIONS(OSSL_DAY_TIME)
DECLARE_ASN1_FUNCTIONS(OSSL_DAY_TIME_BAND)
DECLARE_ASN1_FUNCTIONS(OSSL_TIME_SPEC_DAY)
DECLARE_ASN1_FUNCTIONS(OSSL_TIME_SPEC_WEEKS)
DECLARE_ASN1_FUNCTIONS(OSSL_TIME_SPEC_MONTH)
DECLARE_ASN1_FUNCTIONS(OSSL_NAMED_DAY)
DECLARE_ASN1_FUNCTIONS(OSSL_TIME_SPEC_X_DAY_OF)
DECLARE_ASN1_FUNCTIONS(OSSL_TIME_SPEC_ABSOLUTE)
```

```
DECLARE_ASN1_FUNCTIONS(OSSL_TIME_SPEC_TIME)
DECLARE_ASN1_FUNCTIONS(OSSL_TIME_SPEC)
DECLARE_ASN1_FUNCTIONS(OSSL_TIME_PERIOD)

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_TIME_PERIOD, OSSL_TIME_PERIOD,
OSSL_TIME_PERIOD)
#define sk_OSSL_TIME_PERIOD_num(sk)
 OPENSSL_sk_num(ossl_check_const_OSSL_TIME_PERIOD_sk_type(sk))
#define sk_OSSL_TIME_PERIOD_value(sk, idx) ((OSSL_TIME_PERIOD
*)OPENSSL_sk_value(ossl_check_const_OSSL_TIME_PERIOD_sk_type(sk), (idx)))
#define sk_OSSL_TIME_PERIOD_new(cmp) ((STACK_OF(OSSL_TIME_PERIOD)
*)OPENSSL_sk_new(ossl_check_OSSL_TIME_PERIOD_compfunc_type(cmp)))
#define sk_OSSL_TIME_PERIOD_new_null() ((STACK_OF(OSSL_TIME_PERIOD)
*)OPENSSL_sk_new_null())
#define sk_OSSL_TIME_PERIOD_new_reserve(cmp, n) ((STACK_OF(OSSL_TIME_PERIOD)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_TIME_PERIOD_compfunc_type(cmp), (n)))
#define sk_OSSL_TIME_PERIOD_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_TIME_PERIOD_sk_type(sk), (n))
#define sk_OSSL_TIME_PERIOD_free(sk) OPENSSL_sk_free(ossl_check_OSSL_TIME_PERIOD_sk_type(sk))
#define sk_OSSL_TIME_PERIOD_zero(sk) OPENSSL_sk_zero(ossl_check_OSSL_TIME_PERIOD_sk_type(sk))
#define sk_OSSL_TIME_PERIOD_delete(sk, i) ((OSSL_TIME_PERIOD
*)OPENSSL_sk_delete(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),
 (i)))
#define sk_OSSL_TIME_PERIOD_delete_ptr(sk, ptr) ((OSSL_TIME_PERIOD
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),
ossl_check_OSSL_TIME_PERIOD_type(ptr)))
#define sk_OSSL_TIME_PERIOD_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),
ossl_check_OSSL_TIME_PERIOD_type(ptr))
#define sk_OSSL_TIME_PERIOD_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),
ossl_check_OSSL_TIME_PERIOD_type(ptr))
#define sk_OSSL_TIME_PERIOD_pop(sk) ((OSSL_TIME_PERIOD
*)OPENSSL_sk_pop(ossl_check_OSSL_TIME_PERIOD_sk_type(sk)))
#define sk_OSSL_TIME_PERIOD_shift(sk) ((OSSL_TIME_PERIOD
*)OPENSSL_sk_shift(ossl_check_OSSL_TIME_PERIOD_sk_type(sk)))
#define sk_OSSL_TIME_PERIOD_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),ossl_check_OSSL_TIME_PERIOD_freef
unc_type(freefunc))
#define sk_OSSL_TIME_PERIOD_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),
ossl_check_OSSL_TIME_PERIOD_type(ptr),
 (idx))
#define sk_OSSL_TIME_PERIOD_set(sk, idx, ptr) ((OSSL_TIME_PERIOD
*)OPENSSL_sk_set(ossl_check_OSSL_TIME_PERIOD_sk_type(sk), (idx),
ossl_check_OSSL_TIME_PERIOD_type(ptr)))
#define sk_OSSL_TIME_PERIOD_find(sk, ptr)
```

```
OPENSSL_sk_find(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),
ossl_check_OSSL_TIME_PERIOD_type(ptr))
#define sk_OSSL_TIME_PERIOD_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),
ossl_check_OSSL_TIME_PERIOD_type(ptr))
#define sk_OSSL_TIME_PERIOD_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),
ossl_check_OSSL_TIME_PERIOD_type(ptr), pnum)
#define sk_OSSL_TIME_PERIOD_sort(sk) OPENSSL_sk_sort(ossl_check_OSSL_TIME_PERIOD_sk_type(sk))
#define sk_OSSL_TIME_PERIOD_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_TIME_PERIOD_sk_type(sk))
#define sk_OSSL_TIME_PERIOD_dup(sk) ((STACK_OF(OSSL_TIME_PERIOD)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_TIME_PERIOD_sk_type(sk)))
#define sk_OSSL_TIME_PERIOD_deep_copy(sk,
 copyfunc, freefunc) ((STACK_OF(OSSL_TIME_PERIOD)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_TIME_PERIOD_sk_type(sk),
ossl_check_OSSL_TIME_PERIOD_copyfunc_type(copyfunc),
ossl_check_OSSL_TIME_PERIOD_freefunc_type(freefunc)))
#define sk_OSSL_TIME_PERIOD_set_cmp_func(sk, cmp)
((sk_OSSL_TIME_PERIOD_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_TIME_PERIOD_sk_type
(sk), ossl_check_OSSL_TIME_PERIOD_compfunc_type(cmp)))

/* clang-format on */

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_DAY_TIME_BAND, OSSL_DAY_TIME_BAND,
OSSL_DAY_TIME_BAND)
#define sk_OSSL_DAY_TIME_BAND_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_DAY_TIME_BAND_sk_type(sk))
#define sk_OSSL_DAY_TIME_BAND_value(sk, idx) ((OSSL_DAY_TIME_BAND
*)OPENSSL_sk_value(ossl_check_const_OSSL_DAY_TIME_BAND_sk_type(sk), (idx)))
#define sk_OSSL_DAY_TIME_BAND_new(cmp) ((STACK_OF(OSSL_DAY_TIME_BAND)
*)OPENSSL_sk_new(ossl_check_OSSL_DAY_TIME_BAND_compfunc_type(cmp)))
#define sk_OSSL_DAY_TIME_BAND_new_null() ((STACK_OF(OSSL_DAY_TIME_BAND)
 *)OPENSSL_sk_new_null())
#define sk_OSSL_DAY_TIME_BAND_new_reserve(cmp, n) ((STACK_OF(OSSL_DAY_TIME_BAND)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_DAY_TIME_BAND_compfunc_type(cmp), (n)))
#define sk_OSSL_DAY_TIME_BAND_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk), (n))
#define sk_OSSL_DAY_TIME_BAND_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk))
#define sk_OSSL_DAY_TIME_BAND_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk))
#define sk_OSSL_DAY_TIME_BAND_delete(sk, i) ((OSSL_DAY_TIME_BAND
*)OPENSSL_sk_delete(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk), (i)))
#define sk_OSSL_DAY_TIME_BAND_delete_ptr(sk, ptr) ((OSSL_DAY_TIME_BAND
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk),
ossl_check_OSSL_DAY_TIME_BAND_type(ptr)))
```

```
#define sk_OSSL_DAY_TIME_BAND_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk),
ossl_check_OSSL_DAY_TIME_BAND_type(ptr))
#define sk_OSSL_DAY_TIME_BAND_unshift(sk,
 ptr) OPENSSL_sk_unshift(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk),
ossl_check_OSSL_DAY_TIME_BAND_type(ptr))
#define sk_OSSL_DAY_TIME_BAND_pop(sk) ((OSSL_DAY_TIME_BAND
*)OPENSSL_sk_pop(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk)))
#define sk_OSSL_DAY_TIME_BAND_shift(sk) ((OSSL_DAY_TIME_BAND
*)OPENSSL_sk_shift(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk)))
#define sk_OSSL_DAY_TIME_BAND_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk),ossl_check_OSSL_DAY_TIME_BA
ND_freefunc_type(freefunc))
#define sk_OSSL_DAY_TIME_BAND_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk),
ossl_check_OSSL_DAY_TIME_BAND_type(ptr), (idx))
#define sk_OSSL_DAY_TIME_BAND_set(sk, idx, ptr) ((OSSL_DAY_TIME_BAND
*)OPENSSL_sk_set(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk), (idx),
ossl_check_OSSL_DAY_TIME_BAND_type(ptr)))
#define sk_OSSL_DAY_TIME_BAND_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk),
ossl_check_OSSL_DAY_TIME_BAND_type(ptr))
#define
 sk_OSSL_DAY_TIME_BAND_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk),
ossl_check_OSSL_DAY_TIME_BAND_type(ptr))
#define sk_OSSL_DAY_TIME_BAND_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk),
ossl_check_OSSL_DAY_TIME_BAND_type(ptr), pnum)
#define sk_OSSL_DAY_TIME_BAND_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk))
#define sk_OSSL_DAY_TIME_BAND_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_DAY_TIME_BAND_sk_type(sk))
#define sk_OSSL_DAY_TIME_BAND_dup(sk) ((STACK_OF(OSSL_DAY_TIME_BAND)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_DAY_TIME_BAND_sk_type(sk)))
#define sk_OSSL_DAY_TIME_BAND_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_DAY_TIME_BAND)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_DAY_TIME_BAND_sk_type(sk),
ossl_check_OSSL_DAY_TIME_BAND_copyfunc_type(copyfunc),
ossl_check_OSSL_DAY_TIME_BAND_freefunc_type(freefunc)))
#define sk_OSSL_DAY_TIME_BAND_set_cmp_func(sk,
 cmp)
((sk_OSSL_DAY_TIME_BAND_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_DAY_TIME_BAND
_sk_type(sk), ossl_check_OSSL_DAY_TIME_BAND_compfunc_type(cmp)))

/* clang-format on */

/* Attribute Type and Value */
```

```
typedef struct atav_st {
  ASN1_OBJECT *type;
  ASN1_TYPE *value;
} OSSL_ATAV;

typedef struct ATTRIBUTE_TYPE_MAPPING_st {
  ASN1_OBJECT *local;
  ASN1_OBJECT *remote;
} OSSL_ATTRIBUTE_TYPE_MAPPING;

typedef struct ATTRIBUTE_VALUE_MAPPING_st {
  OSSL_ATAV *local;
  OSSL_ATAV *remote;
} OSSL_ATTRIBUTE_VALUE_MAPPING;

#define OSSL_ATTR_MAP_TYPE 0
#define OSSL_ATTR_MAP_VALUE 1

typedef struct ATTRIBUTE_MAPPING_st {
  int type;
  union {
     OSSL_ATTRIBUTE_TYPE_MAPPING *typeMappings;
     OSSL_ATTRIBUTE_VALUE_MAPPING *typeValueMappings;
  } choice;
} OSSL_ATTRIBUTE_MAPPING;

typedef STACK_OF(OSSL_ATTRIBUTE_MAPPING) OSSL_ATTRIBUTE_MAPPINGS;
DECLARE_ASN1_FUNCTIONS(OSSL_ATAV)
DECLARE_ASN1_FUNCTIONS(OSSL_ATTRIBUTE_TYPE_MAPPING)
DECLARE_ASN1_FUNCTIONS(OSSL_ATTRIBUTE_VALUE_MAPPING)
DECLARE_ASN1_FUNCTIONS(OSSL_ATTRIBUTE_MAPPING)
DECLARE_ASN1_FUNCTIONS(OSSL_ATTRIBUTE_MAPPINGS)

/*
 clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_ATTRIBUTE_MAPPING, OSSL_ATTRIBUTE_MAPPING,
OSSL_ATTRIBUTE_MAPPING)
#define sk_OSSL_ATTRIBUTE_MAPPING_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_ATTRIBUTE_MAPPING_sk_type(sk))
#define sk_OSSL_ATTRIBUTE_MAPPING_value(sk, idx) ((OSSL_ATTRIBUTE_MAPPING
*)OPENSSL_sk_value(ossl_check_const_OSSL_ATTRIBUTE_MAPPING_sk_type(sk), (idx)))
#define sk_OSSL_ATTRIBUTE_MAPPING_new(cmp) ((STACK_OF(OSSL_ATTRIBUTE_MAPPING)
*)OPENSSL_sk_new(ossl_check_OSSL_ATTRIBUTE_MAPPING_compfunc_type(cmp)))
#define sk_OSSL_ATTRIBUTE_MAPPING_new_null() ((STACK_OF(OSSL_ATTRIBUTE_MAPPING)
*)OPENSSL_sk_new_null())
#define sk_OSSL_ATTRIBUTE_MAPPING_new_reserve(cmp, n)
((STACK_OF(OSSL_ATTRIBUTE_MAPPING)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_ATTRIBUTE_MAPPING_compfunc_type(cmp), (n)))
```

```
#define sk_OSSL_ATTRIBUTE_MAPPING_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
 (n))
#define sk_OSSL_ATTRIBUTE_MAPPING_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk))
#define sk_OSSL_ATTRIBUTE_MAPPING_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk))
#define sk_OSSL_ATTRIBUTE_MAPPING_delete(sk, i) ((OSSL_ATTRIBUTE_MAPPING
*)OPENSSL_sk_delete(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk), (i)))
#define sk_OSSL_ATTRIBUTE_MAPPING_delete_ptr(sk, ptr) ((OSSL_ATTRIBUTE_MAPPING
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
ossl_check_OSSL_ATTRIBUTE_MAPPING_type(ptr)))
#define sk_OSSL_ATTRIBUTE_MAPPING_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
ossl_check_OSSL_ATTRIBUTE_MAPPING_type(ptr))
#define sk_OSSL_ATTRIBUTE_MAPPING_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
ossl_check_OSSL_ATTRIBUTE_MAPPING_type(ptr))
#define sk_OSSL_ATTRIBUTE_MAPPING_pop(sk) ((OSSL_ATTRIBUTE_MAPPING
*)OPENSSL_sk_pop(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk)))
#define
 sk_OSSL_ATTRIBUTE_MAPPING_shift(sk) ((OSSL_ATTRIBUTE_MAPPING
*)OPENSSL_sk_shift(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk)))
#define sk_OSSL_ATTRIBUTE_MAPPING_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),ossl_check_OSSL_ATTRIBUT
E_MAPPING_freefunc_type(freefunc))
#define sk_OSSL_ATTRIBUTE_MAPPING_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
ossl_check_OSSL_ATTRIBUTE_MAPPING_type(ptr), (idx))
#define sk_OSSL_ATTRIBUTE_MAPPING_set(sk, idx, ptr) ((OSSL_ATTRIBUTE_MAPPING
*)OPENSSL_sk_set(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk), (idx),
ossl_check_OSSL_ATTRIBUTE_MAPPING_type(ptr)))
#define sk_OSSL_ATTRIBUTE_MAPPING_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
ossl_check_OSSL_ATTRIBUTE_MAPPING_type(ptr))
#define sk_OSSL_ATTRIBUTE_MAPPING_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
 ossl_check_OSSL_ATTRIBUTE_MAPPING_type(ptr))
#define sk_OSSL_ATTRIBUTE_MAPPING_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
ossl_check_OSSL_ATTRIBUTE_MAPPING_type(ptr), pnum)
#define sk_OSSL_ATTRIBUTE_MAPPING_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk))
#define sk_OSSL_ATTRIBUTE_MAPPING_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_ATTRIBUTE_MAPPING_sk_type(sk))
#define sk_OSSL_ATTRIBUTE_MAPPING_dup(sk) ((STACK_OF(OSSL_ATTRIBUTE_MAPPING)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_ATTRIBUTE_MAPPING_sk_type(sk)))
#define sk_OSSL_ATTRIBUTE_MAPPING_deep_copy(sk, copyfunc, freefunc)
```

```
((STACK_OF(OSSL_ATTRIBUTE_MAPPING)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
ossl_check_OSSL_ATTRIBUTE_MAPPING_copyfunc_type(copyfunc),
ossl_check_OSSL_ATTRIBUTE_MAPPING_freefunc_type(freefunc)))
#define sk_OSSL_ATTRIBUTE_MAPPING_set_cmp_func(sk, cmp)
((sk_OSSL_ATTRIBUTE_MAPPING_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_ATTRIBUTE_
MAPPING_sk_type(sk),
 ossl_check_OSSL_ATTRIBUTE_MAPPING_compfunc_type(cmp)))

/* clang-format on */

#define OSSL_AAA_ATTRIBUTE_TYPE 0
#define OSSL_AAA_ATTRIBUTE_VALUES 1

typedef struct ALLOWED_ATTRIBUTES_CHOICE_st {
  int type;
  union {
     ASN1_OBJECT *attributeType;
     X509_ATTRIBUTE *attributeTypeandValues;
  } choice;
} OSSL_ALLOWED_ATTRIBUTES_CHOICE;

typedef struct ALLOWED_ATTRIBUTES_ITEM_st {
  STACK_OF(OSSL_ALLOWED_ATTRIBUTES_CHOICE) *attributes;
  GENERAL_NAME *holderDomain;
} OSSL_ALLOWED_ATTRIBUTES_ITEM;

typedef STACK_OF(OSSL_ALLOWED_ATTRIBUTES_ITEM) OSSL_ALLOWED_ATTRIBUTES_SYNTAX;

DECLARE_ASN1_FUNCTIONS(OSSL_ALLOWED_ATTRIBUTES_CHOICE)
DECLARE_ASN1_FUNCTIONS(OSSL_ALLOWED_ATTRIBUTES_ITEM)
DECLARE_ASN1_FUNCTIONS(OSSL_ALLOWED_ATTRIBUTES_SYNTAX)

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_ALLOWED_ATTRIBUTES_CHOICE,
OSSL_ALLOWED_ATTRIBUTES_CHOICE, OSSL_ALLOWED_ATTRIBUTES_CHOICE)
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_num(sk)
 OPENSSL_sk_num(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_value(sk, idx)
((OSSL_ALLOWED_ATTRIBUTES_CHOICE
*)OPENSSL_sk_value(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk), (idx)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_new(cmp)
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_CHOICE)
*)OPENSSL_sk_new(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_compfunc_type(cmp)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_new_null()
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_CHOICE) *)OPENSSL_sk_new_null())
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_new_reserve(cmp, n)
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_CHOICE)
```

```
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_compfunc_type(cmp),
(n)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk), (n))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk))
#define
 sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_delete(sk, i)
((OSSL_ALLOWED_ATTRIBUTES_CHOICE
*)OPENSSL_sk_delete(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk), (i)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_delete_ptr(sk, ptr)
((OSSL_ALLOWED_ATTRIBUTES_CHOICE
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_type(ptr)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_type(ptr))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_type(ptr))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_pop(sk) ((OSSL_ALLOWED_ATTRIBUTES_CHOICE
 *)OPENSSL_sk_pop(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_shift(sk)
((OSSL_ALLOWED_ATTRIBUTES_CHOICE
*)OPENSSL_sk_shift(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),ossl_check_OSSL
_ALLOWED_ATTRIBUTES_CHOICE_freefunc_type(freefunc))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_type(ptr), (idx))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_set(sk, idx, ptr)
((OSSL_ALLOWED_ATTRIBUTES_CHOICE
*)OPENSSL_sk_set(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk), (idx),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_type(ptr)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_type(ptr))
#define
 sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_type(ptr))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_type(ptr), pnum)
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sort(sk)
```

```
OPENSSL_sk_sort(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_dup(sk)
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_CHOICE)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_CHOICE)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
 ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_copyfunc_type(copyfunc),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_freefunc_type(freefunc)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_set_cmp_func(sk, cmp)
((sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_A
LLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_compfunc_type(cmp)))

/* clang-format on */

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_ALLOWED_ATTRIBUTES_ITEM,
OSSL_ALLOWED_ATTRIBUTES_ITEM, OSSL_ALLOWED_ATTRIBUTES_ITEM)
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_value(sk, idx) ((OSSL_ALLOWED_ATTRIBUTES_ITEM
*)OPENSSL_sk_value(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk), (idx)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_new(cmp)
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_ITEM)
 *)OPENSSL_sk_new(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_compfunc_type(cmp)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_new_null()
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_ITEM) *)OPENSSL_sk_new_null())
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_new_reserve(cmp, n)
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_ITEM)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_compfunc_type(cmp), (n)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk), (n))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_delete(sk, i) ((OSSL_ALLOWED_ATTRIBUTES_ITEM
*)OPENSSL_sk_delete(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk), (i)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_delete_ptr(sk, ptr)
((OSSL_ALLOWED_ATTRIBUTES_ITEM
 *)OPENSSL_sk_delete_ptr(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_type(ptr)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_type(ptr))
```

```
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_type(ptr))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_pop(sk) ((OSSL_ALLOWED_ATTRIBUTES_ITEM
*)OPENSSL_sk_pop(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_shift(sk) ((OSSL_ALLOWED_ATTRIBUTES_ITEM
*)OPENSSL_sk_shift(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),ossl_check_OSSL_A
LLOWED_ATTRIBUTES_ITEM_freefunc_type(freefunc))
#define
 sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_type(ptr), (idx))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_set(sk, idx, ptr)
((OSSL_ALLOWED_ATTRIBUTES_ITEM
*)OPENSSL_sk_set(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk), (idx),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_type(ptr)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_type(ptr))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_type(ptr))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_type(ptr), pnum)
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_sort(sk)
 OPENSSL_sk_sort(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_dup(sk)
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_ITEM)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_ITEM)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_copyfunc_type(copyfunc),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_freefunc_type(freefunc)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_set_cmp_func(sk, cmp)
((sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_ALL
OWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_compfunc_type(cmp)))

/* clang-format on */

typedef struct AA_DIST_POINT_st
```

```
 {
   DIST_POINT_NAME *distpoint;
   ASN1_BIT_STRING *reasons;
   int dp_reasons;
   ASN1_BOOLEAN indirectCRL;
   ASN1_BOOLEAN containsUserAttributeCerts;
   ASN1_BOOLEAN containsAACerts;
   ASN1_BOOLEAN containsSOAPublicKeyCerts;
} OSSL_AA_DIST_POINT;

DECLARE_ASN1_FUNCTIONS(OSSL_AA_DIST_POINT)

#ifdef __cplusplus
}
#endif
#endif
```

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```
/* clang-format off */
/* WARNING: do not edit! */
/* Generated by Makefile from include/crypto/bn_conf.h.in */
/* clang-format on */
```

```
/*
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* https://www.openssl.org/source/license.html
*/

#ifndef OSSL_CRYPTO_BN_CONF_H
#define OSSL_CRYPTO_BN_CONF_H
#pragma once

/*
* The contents of this file are not used in the UEFI build, as
* both 32-bit and 64-bit builds are supported from a single run
* of the Configure script.
*/

/* Should we define BN_DIV2W here? */

/* Only one for the following should be defined */
/* clang-format off */
#define SIXTY_FOUR_BIT_LONG
   /* clang-format on */
   /* clang-format off */
#undef SIXTY_FOUR_BIT
   /* clang-format on */
   /* clang-format off */
#undef THIRTY_TWO_BIT
/*
 clang-format on */

#endif
```

# 1.3820 opus 1.6.1-r3

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```
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# 1.3821 nginx-mainline 1.29.5-r0

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# 1.3822 opus 1.6.1-r3

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# 1.3823 deadpool 0.12.2

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# 1.3824 lockfree-object-pool 0.1.5

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# 1.3825 syslog_loose 0.23.0

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# 1.3826 node-gyp 12.2.0-r2

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# 1.3827 container-selinux 4:2.240.0-4.el9_7

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# 1.3828 nodejs-22 22.22.2-r1

## 1.3828.1 Available under license :

```
#ifndef SRC_PERMISSION_WORKER_PERMISSION_H_
#define SRC_PERMISSION_WORKER_PERMISSION_H_

#if defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS

#include <vector>
#include "permission/permission_base.h"

namespace node {

namespace permission {

class WorkerPermission final : public PermissionBase {
public:
 void Apply(Environment* env,
            const std::vector<std::string>& allow,
            PermissionScope scope) override;
 bool is_granted(Environment* env,
                 PermissionScope perm,
                 const std::string_view& param = "") const override;

private:
 bool deny_all_;
};

}  // namespace permission

}  // namespace node

#endif  // defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
#endif  // SRC_PERMISSION_WORKER_PERMISSION_H_
{
 'variables': {
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```

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'openssl/crypto/x509/x509spki.c',
'openssl/crypto/x509/x509type.c',
'openssl/crypto/x509/x_all.c',
'openssl/crypto/x509/x_attrib.c',
'openssl/crypto/x509/x_crl.c',
'openssl/crypto/x509/x_exten.c',
'openssl/crypto/x509/x_ietfatt.c',
'openssl/crypto/x509/x_name.c',
'openssl/crypto/x509/x_pubkey.c',
'openssl/crypto/x509/x_req.c',
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'openssl/crypto/x509/x_x509a.c',
'openssl/engines/e_capi.c',
'openssl/engines/e_devcrypto.c',
'openssl/engines/e_padlock.c',
'openssl/providers/baseprov.c',
'openssl/providers/defltprov.c',
'openssl/providers/nullprov.c',
'openssl/providers/prov_running.c',
'openssl/providers/common/der/der_rsa_sig.c',
'openssl/providers/common/der/der_sm2_key.c',
'openssl/providers/common/der/der_sm2_sig.c',
'openssl/providers/common/bio_prov.c',
'openssl/providers/common/capabilities.c',
'openssl/providers/common/digest_to_nid.c',
'openssl/providers/common/provider_seeding.c',
'openssl/providers/common/provider_util.c',
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'openssl/providers/implementations/ciphers/cipher_null.c',
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'openssl/providers/implementations/digests/md5_prov.c',
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'openssl/providers/implementations/encode_decode/decode_spki2typespki.c',
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'openssl/providers/implementations/kdfs/pkcs12kdf.c',
'openssl/providers/implementations/kdfs/scrypt.c',
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'openssl/providers/implementations/kem/ec_kem.c',
'openssl/providers/implementations/kem/ecx_kem.c',
'openssl/providers/implementations/kem/kem_util.c',
'openssl/providers/implementations/kem/ml_kem_kem.c',
'openssl/providers/implementations/kem/mlx_kem.c',
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'openssl/providers/implementations/macs/poly1305_prov.c',
'openssl/providers/implementations/macs/siphash_prov.c',
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'openssl/providers/implementations/rands/drbg_ctr.c',
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'openssl/providers/implementations/rands/seed_src_jitter.c',
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'openssl/providers/implementations/rands/seeding/rand_cpu_x86.c',
'openssl/providers/implementations/rands/seeding/rand_tsc.c',
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'openssl/providers/implementations/rands/seeding/rand_win.c',
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'openssl/providers/implementations/signature/ml_dsa_sig.c',
'openssl/providers/implementations/signature/rsa_sig.c',
'openssl/providers/implementations/signature/slh_dsa_sig.c',
'openssl/providers/implementations/signature/sm2_sig.c',
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'openssl/providers/implementations/skeymgmt/generic.c',
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'openssl/providers/implementations/storemgmt/file_store_any2obj.c',
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'openssl/providers/common/der/der_dsa_key.c',
'openssl/providers/common/der/der_dsa_sig.c',
'openssl/providers/common/der/der_ec_key.c',
'openssl/providers/common/der/der_ec_sig.c',
'openssl/providers/common/der/der_ecx_key.c',
'openssl/providers/common/der/der_ml_dsa_key.c',
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'openssl/providers/common/der/der_slh_dsa_key.c',
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'openssl/providers/common/provider_err.c',
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'openssl/providers/implementations/ciphers/ciphercommon_block.c',
'openssl/providers/implementations/ciphers/ciphercommon_ccm.c',
'openssl/providers/implementations/ciphers/ciphercommon_ccm_hw.c',
'openssl/providers/implementations/ciphers/ciphercommon_gcm.c',

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  'openssl/providers/implementations/ciphers/ciphercommon_gcm_hw.c',
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  'openssl/providers/implementations/digests/digestcommon.c',
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  'openssl/providers/implementations/ciphers/cipher_cast5.c',
  'openssl/providers/implementations/ciphers/cipher_cast5_hw.c',
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  'openssl/providers/implementations/ciphers/cipher_seed_hw.c',
  'openssl/providers/implementations/ciphers/cipher_tdes_common.c',
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  'openssl/providers/implementations/digests/ripemd_prov.c',
  'openssl/providers/implementations/digests/wp_prov.c',
  'openssl/providers/implementations/kdfs/pbkdf1.c',
  'openssl/providers/implementations/kdfs/pvkkdf.c',
  'openssl/providers/prov_running.c',
  'openssl/providers/legacyprov.c',
 ],
'openssl_sources_BSD-x86_64': [
  './config/archs/BSD-x86_64/asm_avx2/crypto/aes/aes-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/aes/aesni-mb-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/aes/aesni-sha1-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/aes/aesni-sha256-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/aes/aesni-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/aes/aesni-xts-avx512.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/aes/bsaes-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/aes/vpaes-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-2k-avx512.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-2k-avxifma.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-3k-avx512.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-3k-avxifma.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/rsaz-4k-avx512.s',
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  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/x86_64-gf2m.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/x86_64-mont.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/bn/x86_64-mont5.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/camellia/cmll-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/chacha/chacha-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/ec/ecp_nistz256-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/ec/x25519-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/params_idx.c',
  './config/archs/BSD-x86_64/asm_avx2/crypto/x86_64cpuid.s',
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  './config/archs/BSD-x86_64/asm_avx2/crypto/modes/aes-gcm-avx512.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/modes/aesni-gcm-x86_64.s',
   './config/archs/BSD-x86_64/asm_avx2/crypto/modes/ghash-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/poly1305/poly1305-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/rc4/rc4-md5-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/rc4/rc4-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/sha/keccak1600-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/sha/sha1-mb-x86_64.s',
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  './config/archs/BSD-x86_64/asm_avx2/crypto/sha/sha256-mb-x86_64.s',
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  './config/archs/BSD-x86_64/asm_avx2/engines/e_padlock-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_sm2_gen.c',
  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_digests_gen.c',
   './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_dsa_gen.c',
  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_ec_gen.c',
  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_ecx_gen.c',
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  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_slh_dsa_gen.c',
  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_wrap_gen.c',
  './config/archs/BSD-x86_64/asm_avx2/providers/legacy.ld',
  './config/archs/BSD-x86_64/asm_avx2/providers/fips.ld',
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  'OPENSSL_BUILDING_OPENSSL',
  'AES_ASM',
  'BSAES_ASM',
  'CMLL_ASM',
  'ECP_NISTZ256_ASM',
  'GHASH_ASM',
```

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    'KECCAK1600_ASM',

  'MD5_ASM',
    'OPENSSL_BN_ASM_GF2m',
    'OPENSSL_BN_ASM_MONT',
    'OPENSSL_BN_ASM_MONT5',
    'OPENSSL_CPUID_OBJ',
    'OPENSSL_IA32_SSE2',
    'PADLOCK_ASM',
    'POLY1305_ASM',
    'RC4_ASM',
    'SHA1_ASM',
    'SHA256_ASM',
    'SHA512_ASM',
    'VPAES_ASM',
    'WHIRLPOOL_ASM',
    'X25519_ASM',
    'OPENSSL_PIC',
  ],
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    '-Wall -O3',
    '-pthread',
    '-Wall -O3',
  ],
  'openssl_ex_libs_BSD-x86_64': [
    '-pthread',
  ],
 },
 'include_dirs': [
  '.',
  './include',
  './crypto',
  './crypto/include/internal',
  './providers/common/include',
 ],
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 'cflags' : ['<@(openssl_cflags_BSD-x86_64)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86_64)'],
 'sources': ['<@(openssl_sources)', '<@(openssl_sources_BSD-x86_64)'],
 'direct_dependent_settings': {
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  'defines': ['<@(openssl_defines_BSD-x86_64)'],
  },
}
/*
* WARNING: do not edit!
* Generated by util/mkbuildinf.pl
```

```
*
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*
* Licensed under the Apache License 2.0 (the "License").  You may not use
* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#define PLATFORM "platform: BSD-x86_64"
#define DATE "built on: Tue Jan 27 17:26:46 2026 UTC"

/*
* Generate compiler_flags as an array of individual characters. This is a
* workaround for the situation where CFLAGS gets too long for a C90 string
* literal
*/
static const char compiler_flags[] = {
   'c','o','m','p','i','l','e','r',':',' ','.','.','/','c','o','n',
   'f','i','g','/','f','a','k','e','_','g','c','c','.','p','l',' ',
   '-','f','P','I','C',' ','-','p','t','h','r','e','a','d',' ','-',
   'W','a',',','-','-','n','o','e','x','e','c','s','t','a','c','k',
   ' ','-','W','a','l','l','
 ','-','O','3',' ','-','D','L','_','E',
   'N','D','I','A','N',' ','-','D','O','P','E','N','S','S','L','_',
   'P','I','C',' ','-','D','_','T','H','R','E','A','D','_','S','A',
   'F','E',' ','-','D','_','R','E','E','N','T','R','A','N','T',' ',
   '-','D','O','P','E','N','S','S','L','_','B','U','I','L','D','I',
   'N','G','_','O','P','E','N','S','S','L',' ','-','D','N','D','E',
   'B','U','G','\0'
};
#ifndef SRC_PERMISSION_CHILD_PROCESS_PERMISSION_H_
#define SRC_PERMISSION_CHILD_PROCESS_PERMISSION_H_

#if defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS

#include <vector>
#include "permission/permission_base.h"

namespace node {

namespace permission {

class ChildProcessPermission final : public PermissionBase {
public:
 void Apply(Environment* env,
            const std::vector<std::string>& allow,
            PermissionScope scope) override;
```

```
 bool is_granted(Environment* env,
                 PermissionScope perm,
                 const std::string_view& param = "") const override;

private:
 bool deny_all_;
};

}  // namespace permission

}  // namespace node

#endif  // defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
#endif  // SRC_PERMISSION_CHILD_PROCESS_PERMISSION_H_
```

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==========

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==========

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- project has been modified to work in Node and some refactoring was done for code cleanup
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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/crypto.h.in
*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_CRYPTO_H
#define OPENSSL_CRYPTO_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_CRYPTO_H
#endif

#include <stdlib.h>
#include <time.h>

#include <openssl/e_os2.h>

#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif

#include <openssl/safestack.h>
#include <openssl/opensslv.h>
#include <openssl/types.h>
#include <openssl/opensslconf.h>
#include <openssl/cryptoerr.h>
#include <openssl/core.h>
```

```
#ifdef
 CHARSET_EBCDIC
#include <openssl/ebcdic.h>
#endif

/*
* Resolve problems on some operating systems with symbol names that clash
* one way or another
*/
#include <openssl/symhacks.h>

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#include <openssl/opensslv.h>
#endif

#ifdef __cplusplus
extern "C" {
#endif

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define SSLeay OpenSSL_version_num
#define SSLeay_version OpenSSL_version
#define SSLEAY_VERSION_NUMBER OPENSSL_VERSION_NUMBER
#define SSLEAY_VERSION OPENSSL_VERSION
#define SSLEAY_CFLAGS OPENSSL_CFLAGS
#define SSLEAY_BUILT_ON OPENSSL_BUILT_ON
#define SSLEAY_PLATFORM OPENSSL_PLATFORM
#define SSLEAY_DIR OPENSSL_DIR

/*
* Old type for allocating dynamic locks. No longer used. Use the new thread
* API instead.
*/
typedef struct {
   int dummy;
} CRYPTO_dynlock;

#endif /* OPENSSL_NO_DEPRECATED_1_1_0 */

typedef void CRYPTO_RWLOCK;

CRYPTO_RWLOCK *CRYPTO_THREAD_lock_new(void);
__owur int CRYPTO_THREAD_read_lock(CRYPTO_RWLOCK *lock);
__owur int CRYPTO_THREAD_write_lock(CRYPTO_RWLOCK
 *lock);
int CRYPTO_THREAD_unlock(CRYPTO_RWLOCK *lock);
void CRYPTO_THREAD_lock_free(CRYPTO_RWLOCK *lock);
```

```
int CRYPTO_atomic_add(int *val, int amount, int *ret, CRYPTO_RWLOCK *lock);
int CRYPTO_atomic_add64(uint64_t *val, uint64_t op, uint64_t *ret,
   CRYPTO_RWLOCK *lock);
int CRYPTO_atomic_and(uint64_t *val, uint64_t op, uint64_t *ret,
   CRYPTO_RWLOCK *lock);
int CRYPTO_atomic_or(uint64_t *val, uint64_t op, uint64_t *ret,
   CRYPTO_RWLOCK *lock);
int CRYPTO_atomic_load(uint64_t *val, uint64_t *ret, CRYPTO_RWLOCK *lock);
int CRYPTO_atomic_load_int(int *val, int *ret, CRYPTO_RWLOCK *lock);
int CRYPTO_atomic_store(uint64_t *dst, uint64_t val, CRYPTO_RWLOCK *lock);

/* No longer needed, so this is a no-op */
#define OPENSSL_malloc_init() \
   while (0)                \
   continue

#define OPENSSL_malloc(num) \
   CRYPTO_malloc(num, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_zalloc(num) \
   CRYPTO_zalloc(num, OPENSSL_FILE, OPENSSL_LINE)
#define
 OPENSSL_aligned_alloc(num, alignment, freeptr) \
   CRYPTO_aligned_alloc(num, alignment, freeptr,      \
      OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_realloc(addr, num) \
   CRYPTO_realloc(addr, num, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_clear_realloc(addr, old_num, num) \
   CRYPTO_clear_realloc(addr, old_num, num, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_clear_free(addr, num) \
   CRYPTO_clear_free(addr, num, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_free(addr) \
   CRYPTO_free(addr, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_memdup(str, s) \
   CRYPTO_memdup((str), s, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_strdup(str) \
   CRYPTO_strdup(str, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_strndup(str, n) \
   CRYPTO_strndup(str, n, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_secure_malloc(num) \
   CRYPTO_secure_malloc(num, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_secure_zalloc(num) \
   CRYPTO_secure_zalloc(num, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_secure_free(addr)
 \
   CRYPTO_secure_free(addr, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_secure_clear_free(addr, num) \
   CRYPTO_secure_clear_free(addr, num, OPENSSL_FILE, OPENSSL_LINE)
```

```
#define OPENSSL_secure_actual_size(ptr) \
   CRYPTO_secure_actual_size(ptr)

size_t OPENSSL_strlcpy(char *dst, const char *src, size_t siz);
size_t OPENSSL_strlcat(char *dst, const char *src, size_t siz);
size_t OPENSSL_strnlen(const char *str, size_t maxlen);
int OPENSSL_strtoul(const char *str, char **endptr, int base, unsigned long *num);
int OPENSSL_buf2hexstr_ex(char *str, size_t str_n, size_t *strlength,
   const unsigned char *buf, size_t buflen,
   const char sep);
char *OPENSSL_buf2hexstr(const unsigned char *buf, long buflen);
int OPENSSL_hexstr2buf_ex(unsigned char *buf, size_t buf_n, size_t *buflen,
   const char *str, const char sep);
unsigned char *OPENSSL_hexstr2buf(const char *str, long *buflen);
int OPENSSL_hexchar2int(unsigned char c);
int OPENSSL_strcasecmp(const char
 *s1, const char *s2);
int OPENSSL_strncasecmp(const char *s1, const char *s2, size_t n);

#define OPENSSL_MALLOC_MAX_NELEMS(type) (((1U << (sizeof(int) * 8 - 1)) - 1) / sizeof(type))

/*
* These functions return the values of OPENSSL_VERSION_MAJOR,
* OPENSSL_VERSION_MINOR, OPENSSL_VERSION_PATCH, OPENSSL_VERSION_PRE_RELEASE
* and OPENSSL_VERSION_BUILD_METADATA, respectively.
*/
unsigned int OPENSSL_version_major(void);
unsigned int OPENSSL_version_minor(void);
unsigned int OPENSSL_version_patch(void);
const char *OPENSSL_version_pre_release(void);
const char *OPENSSL_version_build_metadata(void);

unsigned long OpenSSL_version_num(void);
const char *OpenSSL_version(int type);
#define OPENSSL_VERSION 0
#define OPENSSL_CFLAGS 1
#define OPENSSL_BUILT_ON 2
#define OPENSSL_PLATFORM 3
#define OPENSSL_DIR 4
#define OPENSSL_ENGINES_DIR 5
#define OPENSSL_VERSION_STRING 6
#define OPENSSL_FULL_VERSION_STRING 7
#define OPENSSL_MODULES_DIR 8
#define OPENSSL_CPU_INFO 9
#define OPENSSL_WINCTX 10

const
```

```
 char *OPENSSL_info(int type);
/*
* The series starts at 1001 to avoid confusion with the OpenSSL_version
* types.
*/
#define OPENSSL_INFO_CONFIG_DIR 1001
#define OPENSSL_INFO_ENGINES_DIR 1002
#define OPENSSL_INFO_MODULES_DIR 1003
#define OPENSSL_INFO_DSO_EXTENSION 1004
#define OPENSSL_INFO_DIR_FILENAME_SEPARATOR 1005
#define OPENSSL_INFO_LIST_SEPARATOR 1006
#define OPENSSL_INFO_SEED_SOURCE 1007
#define OPENSSL_INFO_CPU_SETTINGS 1008
#define OPENSSL_INFO_WINDOWS_CONTEXT 1009

int OPENSSL_issetugid(void);

struct crypto_ex_data_st {
  OSSL_LIB_CTX *ctx;
  STACK_OF(void) *sk;
};

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(void, void, void)
#define sk_void_num(sk) OPENSSL_sk_num(ossl_check_const_void_sk_type(sk))
#define sk_void_value(sk, idx) ((void *)OPENSSL_sk_value(ossl_check_const_void_sk_type(sk), (idx)))
#define sk_void_new(cmp) ((STACK_OF(void) *)OPENSSL_sk_new(ossl_check_void_compfunc_type(cmp)))
#define sk_void_new_null() ((STACK_OF(void) *)OPENSSL_sk_new_null())
#define
 sk_void_new_reserve(cmp, n) ((STACK_OF(void)
*)OPENSSL_sk_new_reserve(ossl_check_void_compfunc_type(cmp), (n)))
#define sk_void_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_void_sk_type(sk), (n))
#define sk_void_free(sk) OPENSSL_sk_free(ossl_check_void_sk_type(sk))
#define sk_void_zero(sk) OPENSSL_sk_zero(ossl_check_void_sk_type(sk))
#define sk_void_delete(sk, i) ((void *)OPENSSL_sk_delete(ossl_check_void_sk_type(sk), (i)))
#define sk_void_delete_ptr(sk, ptr) ((void *)OPENSSL_sk_delete_ptr(ossl_check_void_sk_type(sk),
ossl_check_void_type(ptr)))
#define sk_void_push(sk, ptr) OPENSSL_sk_push(ossl_check_void_sk_type(sk), ossl_check_void_type(ptr))
#define sk_void_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_void_sk_type(sk), ossl_check_void_type(ptr))
#define sk_void_pop(sk) ((void *)OPENSSL_sk_pop(ossl_check_void_sk_type(sk)))
#define sk_void_shift(sk) ((void *)OPENSSL_sk_shift(ossl_check_void_sk_type(sk)))
#define sk_void_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_void_sk_type(sk),ossl_check_void_freefunc_type(freefunc))
#define
 sk_void_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_void_sk_type(sk), ossl_check_void_type(ptr), (idx))
#define sk_void_set(sk, idx, ptr) ((void *)OPENSSL_sk_set(ossl_check_void_sk_type(sk), (idx),
ossl_check_void_type(ptr)))
#define sk_void_find(sk, ptr) OPENSSL_sk_find(ossl_check_void_sk_type(sk), ossl_check_void_type(ptr))
```

```
#define sk_void_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_void_sk_type(sk), ossl_check_void_type(ptr))
#define sk_void_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_void_sk_type(sk),
ossl_check_void_type(ptr), pnum)
#define sk_void_sort(sk) OPENSSL_sk_sort(ossl_check_void_sk_type(sk))
#define sk_void_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_void_sk_type(sk))
#define sk_void_dup(sk) ((STACK_OF(void) *)OPENSSL_sk_dup(ossl_check_const_void_sk_type(sk)))
#define sk_void_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(void)
*)OPENSSL_sk_deep_copy(ossl_check_const_void_sk_type(sk),
 ossl_check_void_copyfunc_type(copyfunc), ossl_check_void_freefunc_type(freefunc)))
#define sk_void_set_cmp_func(sk, cmp)
((sk_void_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_void_sk_type(sk),
ossl_check_void_compfunc_type(cmp)))

/* clang-format on */

/*
* Per class, we have a STACK of function pointers.
*/
#define CRYPTO_EX_INDEX_SSL 0
#define CRYPTO_EX_INDEX_SSL_CTX 1
#define CRYPTO_EX_INDEX_SSL_SESSION 2
#define CRYPTO_EX_INDEX_X509 3
#define CRYPTO_EX_INDEX_X509_STORE 4
#define CRYPTO_EX_INDEX_X509_STORE_CTX 5
#define CRYPTO_EX_INDEX_DH 6
#define CRYPTO_EX_INDEX_DSA 7
#define CRYPTO_EX_INDEX_EC_KEY 8
#define CRYPTO_EX_INDEX_RSA 9
#define CRYPTO_EX_INDEX_ENGINE 10
#define CRYPTO_EX_INDEX_UI 11
#define CRYPTO_EX_INDEX_BIO 12
#define CRYPTO_EX_INDEX_APP 13
#define CRYPTO_EX_INDEX_UI_METHOD 14
#define CRYPTO_EX_INDEX_RAND_DRBG 15
#define CRYPTO_EX_INDEX_DRBG CRYPTO_EX_INDEX_RAND_DRBG
#define CRYPTO_EX_INDEX_OSSL_LIB_CTX 16
#define CRYPTO_EX_INDEX_EVP_PKEY 17
#define CRYPTO_EX_INDEX__COUNT
 18

typedef void CRYPTO_EX_new(void *parent, void *ptr, CRYPTO_EX_DATA *ad,
   int idx, long argl, void *argp);
typedef void CRYPTO_EX_free(void *parent, void *ptr, CRYPTO_EX_DATA *ad,
   int idx, long argl, void *argp);
typedef int CRYPTO_EX_dup(CRYPTO_EX_DATA *to, const CRYPTO_EX_DATA *from,
   void **from_d, int idx, long argl, void *argp);
__owur int CRYPTO_get_ex_new_index(int class_index, long argl, void *argp,
   CRYPTO_EX_new *new_func,
```

```
   CRYPTO_EX_dup *dup_func,
   CRYPTO_EX_free *free_func);
/* No longer use an index. */
int CRYPTO_free_ex_index(int class_index, int idx);

/*
* Initialise/duplicate/free CRYPTO_EX_DATA variables corresponding to a
* given class (invokes whatever per-class callbacks are applicable)
*/
int CRYPTO_new_ex_data(int class_index, void *obj, CRYPTO_EX_DATA *ad);
int CRYPTO_dup_ex_data(int class_index, CRYPTO_EX_DATA *to,
   const CRYPTO_EX_DATA *from);

void CRYPTO_free_ex_data(int class_index, void *obj, CRYPTO_EX_DATA
 *ad);

/* Allocate a single item in the CRYPTO_EX_DATA variable */
int CRYPTO_alloc_ex_data(int class_index, void *obj, CRYPTO_EX_DATA *ad,
   int idx);

/*
* Get/set data in a CRYPTO_EX_DATA variable corresponding to a particular
* index (relative to the class type involved)
*/
int CRYPTO_set_ex_data(CRYPTO_EX_DATA *ad, int idx, void *val);
void *CRYPTO_get_ex_data(const CRYPTO_EX_DATA *ad, int idx);

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
/*
* This function cleans up all "ex_data" state. It mustn't be called under
* potential race-conditions.
*/
#define CRYPTO_cleanup_all_ex_data() \
   while (0)                    \
   continue

/*
* The old locking functions have been removed completely without compatibility
* macros. This is because the old functions either could not properly report
* errors, or the returned error values were not clearly documented.
* Replacing the locking functions with no-ops would cause race condition
* issues in the affected applications. It is
 far better for them to fail at
* compile time.
* On the other hand, the locking callbacks are no longer used.  Consequently,
* the callback management functions can be safely replaced with no-op macros.
*/
#define CRYPTO_num_locks() (1)
```

```
#define CRYPTO_set_locking_callback(func)
#define CRYPTO_get_locking_callback() (NULL)
#define CRYPTO_set_add_lock_callback(func)
#define CRYPTO_get_add_lock_callback() (NULL)

/*
* These defines where used in combination with the old locking callbacks,
* they are not called anymore, but old code that's not called might still
* use them.
*/
#define CRYPTO_LOCK 1
#define CRYPTO_UNLOCK 2
#define CRYPTO_READ 4
#define CRYPTO_WRITE 8

/* This structure is no longer used */
typedef struct crypto_threadid_st {
   int dummy;
} CRYPTO_THREADID;
/* Only use CRYPTO_THREADID_set_[numeric|pointer]() within callbacks */
#define CRYPTO_THREADID_set_numeric(id, val)
#define CRYPTO_THREADID_set_pointer(id, ptr)
#define CRYPTO_THREADID_set_callback(threadid_func)
 (0)
#define CRYPTO_THREADID_get_callback() (NULL)
#define CRYPTO_THREADID_current(id)
#define CRYPTO_THREADID_cmp(a, b) (-1)
#define CRYPTO_THREADID_cpy(dest, src)
#define CRYPTO_THREADID_hash(id) (0UL)

#ifndef OPENSSL_NO_DEPRECATED_1_0_0
#define CRYPTO_set_id_callback(func)
#define CRYPTO_get_id_callback() (NULL)
#define CRYPTO_thread_id() (0UL)
#endif /* OPENSSL_NO_DEPRECATED_1_0_0 */

#define CRYPTO_set_dynlock_create_callback(dyn_create_function)
#define CRYPTO_set_dynlock_lock_callback(dyn_lock_function)
#define CRYPTO_set_dynlock_destroy_callback(dyn_destroy_function)
#define CRYPTO_get_dynlock_create_callback() (NULL)
#define CRYPTO_get_dynlock_lock_callback() (NULL)
#define CRYPTO_get_dynlock_destroy_callback() (NULL)
#endif /* OPENSSL_NO_DEPRECATED_1_1_0 */

typedef void *(*CRYPTO_malloc_fn)(size_t num, const char *file, int line);
typedef void *(*CRYPTO_realloc_fn)(void *addr, size_t num, const char *file,
   int line);
typedef void (*CRYPTO_free_fn)(void *addr, const char
```

```
 *file, int line);
int CRYPTO_set_mem_functions(CRYPTO_malloc_fn malloc_fn,
   CRYPTO_realloc_fn realloc_fn,
   CRYPTO_free_fn free_fn);
void CRYPTO_get_mem_functions(CRYPTO_malloc_fn *malloc_fn,
   CRYPTO_realloc_fn *realloc_fn,
   CRYPTO_free_fn *free_fn);

OSSL_CRYPTO_ALLOC void *CRYPTO_malloc(size_t num, const char *file, int line);
OSSL_CRYPTO_ALLOC void *CRYPTO_zalloc(size_t num, const char *file, int line);
OSSL_CRYPTO_ALLOC void *CRYPTO_aligned_alloc(size_t num, size_t align,
   void **freeptr, const char *file,
   int line);
void *CRYPTO_memdup(const void *str, size_t siz, const char *file, int line);
char *CRYPTO_strdup(const char *str, const char *file, int line);
char *CRYPTO_strndup(const char *str, size_t s, const char *file, int line);
void CRYPTO_free(void *ptr, const char *file, int line);
void CRYPTO_clear_free(void *ptr, size_t num, const char *file, int line);
void *CRYPTO_realloc(void *addr, size_t num, const char *file, int line);
void *CRYPTO_clear_realloc(void
 *addr, size_t old_num, size_t num,
   const char *file, int line);

int CRYPTO_secure_malloc_init(size_t sz, size_t minsize);
int CRYPTO_secure_malloc_done(void);
OSSL_CRYPTO_ALLOC void *CRYPTO_secure_malloc(size_t num, const char *file, int line);
OSSL_CRYPTO_ALLOC void *CRYPTO_secure_zalloc(size_t num, const char *file, int line);
void CRYPTO_secure_free(void *ptr, const char *file, int line);
void CRYPTO_secure_clear_free(void *ptr, size_t num,
   const char *file, int line);
int CRYPTO_secure_allocated(const void *ptr);
int CRYPTO_secure_malloc_initialized(void);
size_t CRYPTO_secure_actual_size(void *ptr);
size_t CRYPTO_secure_used(void);

void OPENSSL_cleanse(void *ptr, size_t len);

#ifndef OPENSSL_NO_CRYPTO_MDEBUG
/*
* The following can be used to detect memory leaks in the library. If
* used, it turns on malloc checking
*/
#define CRYPTO_MEM_CHECK_OFF 0x0 /* Control only */
#define CRYPTO_MEM_CHECK_ON 0x1 /* Control and mode bit */
#define CRYPTO_MEM_CHECK_ENABLE 0x2
 /* Control and mode bit */
#define CRYPTO_MEM_CHECK_DISABLE 0x3 /* Control only */
```

```
/* max allowed length for value of OPENSSL_MALLOC_FAILURES env var. */
#define CRYPTO_MEM_CHECK_MAX_FS 256

void CRYPTO_get_alloc_counts(int *mcount, int *rcount, int *fcount);
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define OPENSSL_mem_debug_push(info) \
  CRYPTO_mem_debug_push(info, OPENSSL_FILE, OPENSSL_LINE)
#define OPENSSL_mem_debug_pop() \
  CRYPTO_mem_debug_pop()
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 int CRYPTO_set_mem_debug(int flag);
OSSL_DEPRECATEDIN_3_0 int CRYPTO_mem_ctrl(int mode);
OSSL_DEPRECATEDIN_3_0 int CRYPTO_mem_debug_push(const char *info,
  const char *file, int line);
OSSL_DEPRECATEDIN_3_0 int CRYPTO_mem_debug_pop(void);
OSSL_DEPRECATEDIN_3_0 void CRYPTO_mem_debug_malloc(void *addr, size_t num,
  int flag,
  const char *file, int line);
OSSL_DEPRECATEDIN_3_0 void CRYPTO_mem_debug_realloc(void *addr1, void *addr2,
  size_t num, int flag,
  const char
 *file, int line);
OSSL_DEPRECATEDIN_3_0 void CRYPTO_mem_debug_free(void *addr, int flag,
  const char *file, int line);
OSSL_DEPRECATEDIN_3_0
int CRYPTO_mem_leaks_cb(int (*cb)(const char *str, size_t len, void *u),
  void *u);
#endif
#ifndef OPENSSL_NO_STDIO
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 int CRYPTO_mem_leaks_fp(FILE *);
#endif
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 int CRYPTO_mem_leaks(BIO *bio);
#endif
#endif /* OPENSSL_NO_CRYPTO_MDEBUG */

/* die if we have to */
ossl_noreturn void OPENSSL_die(const char *assertion, const char *file, int line);
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define OpenSSLDie(f, l, a) OPENSSL_die((a), (f), (l))
#endif
#define OPENSSL_assert(e) \
  (void)((e) ? 0 : (OPENSSL_die("assertion failed: " #e, OPENSSL_FILE, OPENSSL_LINE), 1))

int OPENSSL_isservice(void);
```

```
void OPENSSL_init(void);
#ifdef OPENSSL_SYS_UNIX
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 void OPENSSL_fork_prepare(void);
OSSL_DEPRECATEDIN_3_0
 void OPENSSL_fork_parent(void);
OSSL_DEPRECATEDIN_3_0 void OPENSSL_fork_child(void);
#endif
#endif

struct tm *OPENSSL_gmtime(const time_t *timer, struct tm *result);
int OPENSSL_gmtime_adj(struct tm *tm, int offset_day, long offset_sec);
int OPENSSL_gmtime_diff(int *pday, int *psec,
   const struct tm *from, const struct tm *to);

/*
* CRYPTO_memcmp returns zero iff the |len| bytes at |a| and |b| are equal.
* It takes an amount of time dependent on |len|, but independent of the
* contents of |a| and |b|. Unlike memcmp, it cannot be used to put elements
* into a defined order as the return value when a != b is undefined, other
* than to be non-zero.
*/
int CRYPTO_memcmp(const void *in_a, const void *in_b, size_t len);

/* Standard initialisation options */
#define OPENSSL_INIT_NO_LOAD_CRYPTO_STRINGS 0x00000001L
#define OPENSSL_INIT_LOAD_CRYPTO_STRINGS 0x00000002L
#define OPENSSL_INIT_ADD_ALL_CIPHERS 0x00000004L
#define OPENSSL_INIT_ADD_ALL_DIGESTS 0x00000008L
#define
 OPENSSL_INIT_NO_ADD_ALL_CIPHERS 0x00000010L
#define OPENSSL_INIT_NO_ADD_ALL_DIGESTS 0x00000020L
#define OPENSSL_INIT_LOAD_CONFIG 0x00000040L
#define OPENSSL_INIT_NO_LOAD_CONFIG 0x00000080L
#define OPENSSL_INIT_ASYNC 0x00000100L
#define OPENSSL_INIT_ENGINE_RDRAND 0x00000200L
#define OPENSSL_INIT_ENGINE_DYNAMIC 0x00000400L
#define OPENSSL_INIT_ENGINE_OPENSSL 0x00000800L
#define OPENSSL_INIT_ENGINE_CRYPTODEV 0x00001000L
#define OPENSSL_INIT_ENGINE_CAPI 0x00002000L
#define OPENSSL_INIT_ENGINE_PADLOCK 0x00004000L
#define OPENSSL_INIT_ENGINE_AFALG 0x00008000L
/* FREE:                                0x00010000L */
#define OPENSSL_INIT_ATFORK 0x00020000L
/* OPENSSL_INIT_BASE_ONLY                    0x00040000L */
#define OPENSSL_INIT_NO_ATEXIT 0x00080000L
/* OPENSSL_INIT flag range 0x03f00000 reserved for OPENSSL_init_ssl() */
```

```
/* FREE: 0x04000000L */
/* FREE: 0x08000000L */
/* FREE: 0x10000000L */
/* FREE: 0x20000000L */
/* FREE: 0x40000000L */
/* FREE: 0x80000000L */
/* Max OPENSSL_INIT
 flag value is 0x80000000 */

/* openssl and dasync not counted as builtin */
#define OPENSSL_INIT_ENGINE_ALL_BUILTIN                    \
   (OPENSSL_INIT_ENGINE_RDRAND | OPENSSL_INIT_ENGINE_DYNAMIC \
      | OPENSSL_INIT_ENGINE_CRYPTODEV | OPENSSL_INIT_ENGINE_CAPI |
OPENSSL_INIT_ENGINE_PADLOCK)

/* Library initialisation functions */
void OPENSSL_cleanup(void);
int OPENSSL_init_crypto(uint64_t opts, const OPENSSL_INIT_SETTINGS *settings);
int OPENSSL_atexit(void (*handler)(void));
void OPENSSL_thread_stop(void);
void OPENSSL_thread_stop_ex(OSSL_LIB_CTX *ctx);

/* Low-level control of initialization */
OPENSSL_INIT_SETTINGS *OPENSSL_INIT_new(void);
#ifndef OPENSSL_NO_STDIO
int OPENSSL_INIT_set_config_filename(OPENSSL_INIT_SETTINGS *settings,
   const char *config_filename);
void OPENSSL_INIT_set_config_file_flags(OPENSSL_INIT_SETTINGS *settings,
   unsigned long flags);
int OPENSSL_INIT_set_config_appname(OPENSSL_INIT_SETTINGS *settings,
   const char *config_appname);
#endif
void
 OPENSSL_INIT_free(OPENSSL_INIT_SETTINGS *settings);

#if defined(OPENSSL_THREADS) && !defined(CRYPTO_TDEBUG)
#if defined(_WIN32)
#if defined(BASETYPES) || defined(_WINDEF_H)
/* application has to include <windows.h> in order to use this */
typedef DWORD CRYPTO_THREAD_LOCAL;
typedef DWORD CRYPTO_THREAD_ID;

typedef LONG CRYPTO_ONCE;
#define CRYPTO_ONCE_STATIC_INIT 0
#endif
#else
#if defined(__TANDEM) && defined(_SPT_MODEL_)
#define SPT_THREAD_SIGNAL 1
```

```
#define SPT_THREAD_AWARE 1
#include <spthread.h>
#else
#include <pthread.h>
#endif
typedef pthread_once_t CRYPTO_ONCE;
typedef pthread_key_t CRYPTO_THREAD_LOCAL;
typedef pthread_t CRYPTO_THREAD_ID;

#define CRYPTO_ONCE_STATIC_INIT PTHREAD_ONCE_INIT
#endif
#endif

#if !defined(CRYPTO_ONCE_STATIC_INIT)
typedef unsigned int CRYPTO_ONCE;
typedef unsigned int CRYPTO_THREAD_LOCAL;
typedef unsigned int CRYPTO_THREAD_ID;
#define CRYPTO_ONCE_STATIC_INIT 0
#endif

int CRYPTO_THREAD_run_once(CRYPTO_ONCE *once, void (*init)(void));

int
 CRYPTO_THREAD_init_local(CRYPTO_THREAD_LOCAL *key, void (*cleanup)(void *));
void *CRYPTO_THREAD_get_local(CRYPTO_THREAD_LOCAL *key);
int CRYPTO_THREAD_set_local(CRYPTO_THREAD_LOCAL *key, void *val);
int CRYPTO_THREAD_cleanup_local(CRYPTO_THREAD_LOCAL *key);

CRYPTO_THREAD_ID CRYPTO_THREAD_get_current_id(void);
int CRYPTO_THREAD_compare_id(CRYPTO_THREAD_ID a, CRYPTO_THREAD_ID b);

OSSL_LIB_CTX *OSSL_LIB_CTX_new(void);
OSSL_LIB_CTX *OSSL_LIB_CTX_new_from_dispatch(const OSSL_CORE_HANDLE *handle,
   const OSSL_DISPATCH *in);
OSSL_LIB_CTX *OSSL_LIB_CTX_new_child(const OSSL_CORE_HANDLE *handle,
   const OSSL_DISPATCH *in);
int OSSL_LIB_CTX_load_config(OSSL_LIB_CTX *ctx, const char *config_file);
void OSSL_LIB_CTX_free(OSSL_LIB_CTX *);
OSSL_LIB_CTX *OSSL_LIB_CTX_get0_global_default(void);
OSSL_LIB_CTX *OSSL_LIB_CTX_set0_default(OSSL_LIB_CTX *libctx);
int OSSL_LIB_CTX_get_conf_diagnostics(OSSL_LIB_CTX *ctx);
void OSSL_LIB_CTX_set_conf_diagnostics(OSSL_LIB_CTX *ctx, int value);

void OSSL_sleep(uint64_t
 millis);

void *OSSL_LIB_CTX_get_data(OSSL_LIB_CTX *ctx, int index);
```

#ifdef __cplusplus
}
#endif
#endif
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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/pkcs12.h.in
*
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*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_PKCS12_H
#define OPENSSL_PKCS12_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_PKCS12_H
#endif

#include <openssl/bio.h>
#include <openssl/core.h>
#include <openssl/x509.h>
#include <openssl/pkcs12err.h>
#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif

#ifdef __cplusplus
```

```
extern "C" {
#endif

#define PKCS12_KEY_ID 1
#define PKCS12_IV_ID 2
#define PKCS12_MAC_ID 3

/* Default iteration count */
#ifndef PKCS12_DEFAULT_ITER
#define PKCS12_DEFAULT_ITER PKCS5_DEFAULT_ITER
#endif

#define
 PKCS12_MAC_KEY_LENGTH 20

/* The macro is expected to be used only internally. Kept for backwards compatibility. */
#define PKCS12_SALT_LEN 8

/* It's not clear if these are actually needed... */
#define PKCS12_key_gen PKCS12_key_gen_utf8
#define PKCS12_add_friendlyname PKCS12_add_friendlyname_utf8

/* MS key usage constants */

#define KEY_EX 0x10
#define KEY_SIG 0x80

typedef struct PKCS12_MAC_DATA_st PKCS12_MAC_DATA;

typedef struct PKCS12_st PKCS12;

typedef struct PKCS12_SAFEBAG_st PKCS12_SAFEBAG;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(PKCS12_SAFEBAG, PKCS12_SAFEBAG, PKCS12_SAFEBAG)
#define sk_PKCS12_SAFEBAG_num(sk)
OPENSSL_sk_num(ossl_check_const_PKCS12_SAFEBAG_sk_type(sk))
#define sk_PKCS12_SAFEBAG_value(sk, idx) ((PKCS12_SAFEBAG
*)OPENSSL_sk_value(ossl_check_const_PKCS12_SAFEBAG_sk_type(sk), (idx)))
#define sk_PKCS12_SAFEBAG_new(cmp) ((STACK_OF(PKCS12_SAFEBAG)
*)OPENSSL_sk_new(ossl_check_PKCS12_SAFEBAG_compfunc_type(cmp)))
#define sk_PKCS12_SAFEBAG_new_null()
 ((STACK_OF(PKCS12_SAFEBAG) *)OPENSSL_sk_new_null())
#define sk_PKCS12_SAFEBAG_new_reserve(cmp, n) ((STACK_OF(PKCS12_SAFEBAG)
*)OPENSSL_sk_new_reserve(ossl_check_PKCS12_SAFEBAG_compfunc_type(cmp), (n)))
#define sk_PKCS12_SAFEBAG_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_PKCS12_SAFEBAG_sk_type(sk), (n))
#define sk_PKCS12_SAFEBAG_free(sk) OPENSSL_sk_free(ossl_check_PKCS12_SAFEBAG_sk_type(sk))
```

```
#define sk_PKCS12_SAFEBAG_zero(sk) OPENSSL_sk_zero(ossl_check_PKCS12_SAFEBAG_sk_type(sk))
#define sk_PKCS12_SAFEBAG_delete(sk, i) ((PKCS12_SAFEBAG
*)OPENSSL_sk_delete(ossl_check_PKCS12_SAFEBAG_sk_type(sk), (i)))
#define sk_PKCS12_SAFEBAG_delete_ptr(sk, ptr) ((PKCS12_SAFEBAG
*)OPENSSL_sk_delete_ptr(ossl_check_PKCS12_SAFEBAG_sk_type(sk),
ossl_check_PKCS12_SAFEBAG_type(ptr)))
#define sk_PKCS12_SAFEBAG_push(sk, ptr) OPENSSL_sk_push(ossl_check_PKCS12_SAFEBAG_sk_type(sk),
ossl_check_PKCS12_SAFEBAG_type(ptr))
#define sk_PKCS12_SAFEBAG_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_PKCS12_SAFEBAG_sk_type(sk),
 ossl_check_PKCS12_SAFEBAG_type(ptr))
#define sk_PKCS12_SAFEBAG_pop(sk) ((PKCS12_SAFEBAG
*)OPENSSL_sk_pop(ossl_check_PKCS12_SAFEBAG_sk_type(sk)))
#define sk_PKCS12_SAFEBAG_shift(sk) ((PKCS12_SAFEBAG
*)OPENSSL_sk_shift(ossl_check_PKCS12_SAFEBAG_sk_type(sk)))
#define sk_PKCS12_SAFEBAG_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_PKCS12_SAFEBAG_sk_type(sk),ossl_check_PKCS12_SAFEBAG_freefunc_
type(freefunc))
#define sk_PKCS12_SAFEBAG_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_PKCS12_SAFEBAG_sk_type(sk), ossl_check_PKCS12_SAFEBAG_type(ptr),
(idx))
#define sk_PKCS12_SAFEBAG_set(sk, idx, ptr) ((PKCS12_SAFEBAG
*)OPENSSL_sk_set(ossl_check_PKCS12_SAFEBAG_sk_type(sk), (idx),
ossl_check_PKCS12_SAFEBAG_type(ptr)))
#define sk_PKCS12_SAFEBAG_find(sk, ptr) OPENSSL_sk_find(ossl_check_PKCS12_SAFEBAG_sk_type(sk),
ossl_check_PKCS12_SAFEBAG_type(ptr))
#define sk_PKCS12_SAFEBAG_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_PKCS12_SAFEBAG_sk_type(sk), ossl_check_PKCS12_SAFEBAG_type(ptr))
#define
 sk_PKCS12_SAFEBAG_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_PKCS12_SAFEBAG_sk_type(sk), ossl_check_PKCS12_SAFEBAG_type(ptr),
pnum)
#define sk_PKCS12_SAFEBAG_sort(sk) OPENSSL_sk_sort(ossl_check_PKCS12_SAFEBAG_sk_type(sk))
#define sk_PKCS12_SAFEBAG_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_PKCS12_SAFEBAG_sk_type(sk))
#define sk_PKCS12_SAFEBAG_dup(sk) ((STACK_OF(PKCS12_SAFEBAG)
*)OPENSSL_sk_dup(ossl_check_const_PKCS12_SAFEBAG_sk_type(sk)))
#define sk_PKCS12_SAFEBAG_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(PKCS12_SAFEBAG)
*)OPENSSL_sk_deep_copy(ossl_check_const_PKCS12_SAFEBAG_sk_type(sk),
ossl_check_PKCS12_SAFEBAG_copyfunc_type(copyfunc),
ossl_check_PKCS12_SAFEBAG_freefunc_type(freefunc)))
#define sk_PKCS12_SAFEBAG_set_cmp_func(sk, cmp)
((sk_PKCS12_SAFEBAG_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_PKCS12_SAFEBAG_sk_type(sk),
ossl_check_PKCS12_SAFEBAG_compfunc_type(cmp)))

/* clang-format on */

typedef struct pkcs12_bag_st PKCS12_BAGS;
```

```
#define
 PKCS12_ERROR 0
#define PKCS12_OK 1

/* Compatibility macros */

#ifndef OPENSSL_NO_DEPRECATED_1_1_0

#define M_PKCS12_bag_type PKCS12_bag_type
#define M_PKCS12_cert_bag_type PKCS12_cert_bag_type
#define M_PKCS12_crl_bag_type PKCS12_cert_bag_type

#define PKCS12_certbag2x509 PKCS12_SAFEBAG_get1_cert
#define PKCS12_certbag2scrl PKCS12_SAFEBAG_get1_crl
#define PKCS12_bag_type PKCS12_SAFEBAG_get_nid
#define PKCS12_cert_bag_type PKCS12_SAFEBAG_get_bag_nid
#define PKCS12_x5092certbag PKCS12_SAFEBAG_create_cert
#define PKCS12_x509crl2certbag PKCS12_SAFEBAG_create_crl
#define PKCS12_MAKE_KEYBAG PKCS12_SAFEBAG_create0_p8inf
#define PKCS12_MAKE_SHKEYBAG PKCS12_SAFEBAG_create_pkcs8_encrypt

#endif
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 ASN1_TYPE *PKCS12_get_attr(const PKCS12_SAFEBAG *bag,
   int attr_nid);
#endif

ASN1_TYPE *PKCS8_get_attr(PKCS8_PRIV_KEY_INFO *p8, int attr_nid);
int PKCS12_mac_present(const PKCS12 *p12);
void PKCS12_get0_mac(const ASN1_OCTET_STRING **pmac,
    const X509_ALGOR **pmacalg,
   const ASN1_OCTET_STRING **psalt,
   const ASN1_INTEGER **piter,
   const PKCS12 *p12);

const ASN1_TYPE *PKCS12_SAFEBAG_get0_attr(const PKCS12_SAFEBAG *bag,
   int attr_nid);
const ASN1_OBJECT *PKCS12_SAFEBAG_get0_type(const PKCS12_SAFEBAG *bag);
int PKCS12_SAFEBAG_get_nid(const PKCS12_SAFEBAG *bag);
int PKCS12_SAFEBAG_get_bag_nid(const PKCS12_SAFEBAG *bag);
const ASN1_TYPE *PKCS12_SAFEBAG_get0_bag_obj(const PKCS12_SAFEBAG *bag);
const ASN1_OBJECT *PKCS12_SAFEBAG_get0_bag_type(const PKCS12_SAFEBAG *bag);

X509 *PKCS12_SAFEBAG_get1_cert_ex(const PKCS12_SAFEBAG *bag, OSSL_LIB_CTX *libctx, const char
*propq);
X509 *PKCS12_SAFEBAG_get1_cert(const PKCS12_SAFEBAG *bag);
X509_CRL *PKCS12_SAFEBAG_get1_crl_ex(const PKCS12_SAFEBAG *bag, OSSL_LIB_CTX *libctx, const
```

```
char *propq);
X509_CRL *PKCS12_SAFEBAG_get1_crl(const PKCS12_SAFEBAG *bag);
const STACK_OF(PKCS12_SAFEBAG) *
PKCS12_SAFEBAG_get0_safes(const PKCS12_SAFEBAG *bag);
const PKCS8_PRIV_KEY_INFO
 *PKCS12_SAFEBAG_get0_p8inf(const PKCS12_SAFEBAG *bag);
const X509_SIG *PKCS12_SAFEBAG_get0_pkcs8(const PKCS12_SAFEBAG *bag);

PKCS12_SAFEBAG *PKCS12_SAFEBAG_create_cert(X509 *x509);
PKCS12_SAFEBAG *PKCS12_SAFEBAG_create_crl(X509_CRL *crl);
PKCS12_SAFEBAG *PKCS12_SAFEBAG_create_secret(int type, int vtype, const unsigned char *value, int len);
PKCS12_SAFEBAG *PKCS12_SAFEBAG_create0_p8inf(PKCS8_PRIV_KEY_INFO *p8);
PKCS12_SAFEBAG *PKCS12_SAFEBAG_create0_pkcs8(X509_SIG *p8);
PKCS12_SAFEBAG *PKCS12_SAFEBAG_create_pkcs8_encrypt(int pbe_nid,
  const char *pass,
  int passlen,
  unsigned char *salt,
  int saltlen, int iter,
  PKCS8_PRIV_KEY_INFO *p8inf);
PKCS12_SAFEBAG *PKCS12_SAFEBAG_create_pkcs8_encrypt_ex(int pbe_nid,
  const char *pass,
  int passlen,
  unsigned char *salt,
  int saltlen, int iter,
  PKCS8_PRIV_KEY_INFO *p8inf,
  OSSL_LIB_CTX *ctx,
  const char *propq);

PKCS12_SAFEBAG *PKCS12_item_pack_safebag(void *obj, const ASN1_ITEM *it,
  int nid1, int nid2);
PKCS8_PRIV_KEY_INFO
 *PKCS8_decrypt(const X509_SIG *p8, const char *pass,
  int passlen);
PKCS8_PRIV_KEY_INFO *PKCS8_decrypt_ex(const X509_SIG *p8, const char *pass,
  int passlen, OSSL_LIB_CTX *ctx,
  const char *propq);
PKCS8_PRIV_KEY_INFO *PKCS12_decrypt_skey(const PKCS12_SAFEBAG *bag,
  const char *pass, int passlen);
PKCS8_PRIV_KEY_INFO *PKCS12_decrypt_skey_ex(const PKCS12_SAFEBAG *bag,
  const char *pass, int passlen,
  OSSL_LIB_CTX *ctx,
  const char *propq);
X509_SIG *PKCS8_encrypt(int pbe_nid, const EVP_CIPHER *cipher,
  const char *pass, int passlen, unsigned char *salt,
  int saltlen, int iter, PKCS8_PRIV_KEY_INFO *p8);
X509_SIG *PKCS8_encrypt_ex(int pbe_nid, const EVP_CIPHER *cipher,
  const char *pass, int passlen, unsigned char *salt,
  int saltlen, int iter, PKCS8_PRIV_KEY_INFO *p8,
```

```
   OSSL_LIB_CTX *ctx, const char *propq);
X509_SIG *PKCS8_set0_pbe(const char *pass, int passlen,
   PKCS8_PRIV_KEY_INFO *p8inf, X509_ALGOR *pbe);
X509_SIG *PKCS8_set0_pbe_ex(const
 char *pass, int passlen,
   PKCS8_PRIV_KEY_INFO *p8inf, X509_ALGOR *pbe,
   OSSL_LIB_CTX *ctx, const char *propq);
PKCS7 *PKCS12_pack_p7data(STACK_OF(PKCS12_SAFEBAG) *sk);
STACK_OF(PKCS12_SAFEBAG) *PKCS12_unpack_p7data(PKCS7 *p7);
PKCS7 *PKCS12_pack_p7encdata(int pbe_nid, const char *pass, int passlen,
   unsigned char *salt, int saltlen, int iter,
   STACK_OF(PKCS12_SAFEBAG) *bags);
PKCS7 *PKCS12_pack_p7encdata_ex(int pbe_nid, const char *pass, int passlen,
   unsigned char *salt, int saltlen, int iter,
   STACK_OF(PKCS12_SAFEBAG) *bags,
   OSSL_LIB_CTX *ctx, const char *propq);

STACK_OF(PKCS12_SAFEBAG) *PKCS12_unpack_p7encdata(PKCS7 *p7, const char *pass,
   int passlen);

int PKCS12_pack_authsafes(PKCS12 *p12, STACK_OF(PKCS7) *safes);
STACK_OF(PKCS7) *PKCS12_unpack_authsafes(const PKCS12 *p12);

int PKCS12_add_localkeyid(PKCS12_SAFEBAG *bag, unsigned char *name,
   int namelen);
int PKCS12_add_friendlyname_asc(PKCS12_SAFEBAG *bag, const char *name,
   int namelen);
int
 PKCS12_add_friendlyname_utf8(PKCS12_SAFEBAG *bag, const char *name,
   int namelen);
int PKCS12_add_CSPName_asc(PKCS12_SAFEBAG *bag, const char *name,
   int namelen);
int PKCS12_add_friendlyname_uni(PKCS12_SAFEBAG *bag,
   const unsigned char *name, int namelen);
int PKCS12_add1_attr_by_NID(PKCS12_SAFEBAG *bag, int nid, int type,
   const unsigned char *bytes, int len);
int PKCS12_add1_attr_by_txt(PKCS12_SAFEBAG *bag, const char *attrname, int type,
   const unsigned char *bytes, int len);
int PKCS8_add_keyusage(PKCS8_PRIV_KEY_INFO *p8, int usage);
ASN1_TYPE *PKCS12_get_attr_gen(const STACK_OF(X509_ATTRIBUTE) *attrs,
   int attr_nid);
char *PKCS12_get_friendlyname(PKCS12_SAFEBAG *bag);
const STACK_OF(X509_ATTRIBUTE) *
PKCS12_SAFEBAG_get0_attrs(const PKCS12_SAFEBAG *bag);
void PKCS12_SAFEBAG_set0_attrs(PKCS12_SAFEBAG *bag, STACK_OF(X509_ATTRIBUTE) *attrs);
unsigned char *PKCS12_pbe_crypt(const X509_ALGOR *algor,
   const char *pass, int passlen,
   const unsigned char
```

```
 *in, int inlen,
   unsigned char **data, int *datalen,
   int en_de);
unsigned char *PKCS12_pbe_crypt_ex(const X509_ALGOR *algor,
   const char *pass, int passlen,
   const unsigned char *in, int inlen,
   unsigned char **data, int *datalen,
   int en_de, OSSL_LIB_CTX *libctx,
   const char *propq);
void *PKCS12_item_decrypt_d2i(const X509_ALGOR *algor, const ASN1_ITEM *it,
   const char *pass, int passlen,
   const ASN1_OCTET_STRING *oct, int zbuf);
void *PKCS12_item_decrypt_d2i_ex(const X509_ALGOR *algor, const ASN1_ITEM *it,
   const char *pass, int passlen,
   const ASN1_OCTET_STRING *oct, int zbuf,
   OSSL_LIB_CTX *libctx,
   const char *propq);
ASN1_OCTET_STRING *PKCS12_item_i2d_encrypt(X509_ALGOR *algor,
   const ASN1_ITEM *it,
   const char *pass, int passlen,
   void *obj, int zbuf);
ASN1_OCTET_STRING *PKCS12_item_i2d_encrypt_ex(X509_ALGOR *algor,
   const ASN1_ITEM *it,
   const char *pass, int passlen,
   void *obj, int zbuf,
   OSSL_LIB_CTX *ctx,

 const char *propq);
PKCS12 *PKCS12_init(int mode);
PKCS12 *PKCS12_init_ex(int mode, OSSL_LIB_CTX *ctx, const char *propq);

int PKCS12_key_gen_asc(const char *pass, int passlen, unsigned char *salt,
   int saltlen, int id, int iter, int n,
   unsigned char *out, const EVP_MD *md_type);
int PKCS12_key_gen_asc_ex(const char *pass, int passlen, unsigned char *salt,
   int saltlen, int id, int iter, int n,
   unsigned char *out, const EVP_MD *md_type,
   OSSL_LIB_CTX *ctx, const char *propq);
int PKCS12_key_gen_uni(unsigned char *pass, int passlen, unsigned char *salt,
   int saltlen, int id, int iter, int n,
   unsigned char *out, const EVP_MD *md_type);
int PKCS12_key_gen_uni_ex(unsigned char *pass, int passlen, unsigned char *salt,
   int saltlen, int id, int iter, int n,
   unsigned char *out, const EVP_MD *md_type,
   OSSL_LIB_CTX *ctx, const char *propq);
int PKCS12_key_gen_utf8(const char *pass, int passlen, unsigned char *salt,
   int saltlen, int id, int iter, int n,
```

```
   unsigned char *out, const EVP_MD *md_type);
int PKCS12_key_gen_utf8_ex(const char *pass, int passlen, unsigned char *salt,
   int saltlen, int id, int iter, int n,
   unsigned char *out, const EVP_MD *md_type,
   OSSL_LIB_CTX *ctx, const char *propq);

int PKCS12_PBE_keyivgen(EVP_CIPHER_CTX *ctx, const char *pass, int passlen,
   ASN1_TYPE *param, const EVP_CIPHER *cipher,
   const EVP_MD *md_type, int en_de);
int PKCS12_PBE_keyivgen_ex(EVP_CIPHER_CTX *ctx, const char *pass, int passlen,
   ASN1_TYPE *param, const EVP_CIPHER *cipher,
   const EVP_MD *md_type, int en_de,
   OSSL_LIB_CTX *libctx, const char *propq);
int PKCS12_gen_mac(PKCS12 *p12, const char *pass, int passlen,
   unsigned char *mac, unsigned int *maclen);
int PKCS12_verify_mac(PKCS12 *p12, const char *pass, int passlen);
int PKCS12_set_mac(PKCS12 *p12, const char *pass, int passlen,
   unsigned char *salt, int saltlen, int iter,
   const EVP_MD *md_type);
int PKCS12_set_pbmac1_pbkdf2(PKCS12 *p12, const char
 *pass, int passlen,
   unsigned char *salt, int saltlen, int iter,
   const EVP_MD *md_type, const char *prf_md_name);
int PKCS12_setup_mac(PKCS12 *p12, int iter, unsigned char *salt,
   int saltlen, const EVP_MD *md_type);
unsigned char *OPENSSL_asc2uni(const char *asc, int asclen,
   unsigned char **uni, int *unilen);
char *OPENSSL_uni2asc(const unsigned char *uni, int unilen);
unsigned char *OPENSSL_utf82uni(const char *asc, int asclen,
   unsigned char **uni, int *unilen);
char *OPENSSL_uni2utf8(const unsigned char *uni, int unilen);

DECLARE_ASN1_FUNCTIONS(PKCS12)
DECLARE_ASN1_FUNCTIONS(PKCS12_MAC_DATA)
DECLARE_ASN1_FUNCTIONS(PKCS12_SAFEBAG)
DECLARE_ASN1_FUNCTIONS(PKCS12_BAGS)

DECLARE_ASN1_ITEM(PKCS12_SAFEBAGS)
DECLARE_ASN1_ITEM(PKCS12_AUTHSAFES)

void PKCS12_PBE_add(void);
int PKCS12_parse(PKCS12 *p12, const char *pass, EVP_PKEY **pkey, X509 **cert,
   STACK_OF(X509) **ca);
typedef int PKCS12_create_cb(PKCS12_SAFEBAG *bag, void *cbarg);
PKCS12 *PKCS12_create(const char *pass,
 const char *name, EVP_PKEY *pkey,
   X509 *cert, STACK_OF(X509) *ca, int nid_key, int nid_cert,
   int iter, int mac_iter, int keytype);
```

```
PKCS12 *PKCS12_create_ex(const char *pass, const char *name, EVP_PKEY *pkey,
   X509 *cert, STACK_OF(X509) *ca, int nid_key, int nid_cert,
   int iter, int mac_iter, int keytype,
   OSSL_LIB_CTX *ctx, const char *propq);
PKCS12 *PKCS12_create_ex2(const char *pass, const char *name, EVP_PKEY *pkey,
   X509 *cert, STACK_OF(X509) *ca, int nid_key, int nid_cert,
   int iter, int mac_iter, int keytype,
   OSSL_LIB_CTX *ctx, const char *propq,
   PKCS12_create_cb *cb, void *cbarg);

PKCS12_SAFEBAG *PKCS12_add_cert(STACK_OF(PKCS12_SAFEBAG) **pbags, X509 *cert);
PKCS12_SAFEBAG *PKCS12_add_key(STACK_OF(PKCS12_SAFEBAG) **pbags,
   EVP_PKEY *key, int key_usage, int iter,
   int key_nid, const char *pass);
PKCS12_SAFEBAG *PKCS12_add_key_ex(STACK_OF(PKCS12_SAFEBAG) **pbags,
   EVP_PKEY *key, int key_usage, int iter,
   int key_nid, const char *pass,
    OSSL_LIB_CTX *ctx, const char *propq);

PKCS12_SAFEBAG *PKCS12_add_secret(STACK_OF(PKCS12_SAFEBAG) **pbags,
   int nid_type, const unsigned char *value, int len);
int PKCS12_add_safe(STACK_OF(PKCS7) **psafes, STACK_OF(PKCS12_SAFEBAG) *bags,
   int safe_nid, int iter, const char *pass);
int PKCS12_add_safe_ex(STACK_OF(PKCS7) **psafes, STACK_OF(PKCS12_SAFEBAG) *bags,
   int safe_nid, int iter, const char *pass,
   OSSL_LIB_CTX *ctx, const char *propq);

PKCS12 *PKCS12_add_safes(STACK_OF(PKCS7) *safes, int p7_nid);
PKCS12 *PKCS12_add_safes_ex(STACK_OF(PKCS7) *safes, int p7_nid,
   OSSL_LIB_CTX *ctx, const char *propq);

int i2d_PKCS12_bio(BIO *bp, const PKCS12 *p12);
#ifndef OPENSSL_NO_STDIO
int i2d_PKCS12_fp(FILE *fp, const PKCS12 *p12);
#endif
PKCS12 *d2i_PKCS12_bio(BIO *bp, PKCS12 **p12);
#ifndef OPENSSL_NO_STDIO
PKCS12 *d2i_PKCS12_fp(FILE *fp, PKCS12 **p12);
#endif
int PKCS12_newpass(PKCS12 *p12, const char *oldpass, const char *newpass);

#ifdef __cplusplus
}
#endif
#endif
{
 'variables': {
   'openssl_sources': [
```

'openssl/crypto/aes/aes_cbc.c',
'openssl/crypto/aes/aes_core.c',
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'openssl/crypto/bn/bn_blind.c',
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'openssl/providers/implementations/keymgmt/mlx_kmgmt.c',
'openssl/providers/implementations/keymgmt/rsa_kmgmt.c',
'openssl/providers/implementations/keymgmt/slh_dsa_kmgmt.c',
'openssl/providers/implementations/macs/cmac_prov.c',
'openssl/providers/implementations/macs/gmac_prov.c',
'openssl/providers/implementations/macs/hmac_prov.c',
'openssl/providers/implementations/macs/kmac_prov.c',
'openssl/providers/implementations/rands/drbg.c',
'openssl/providers/implementations/rands/drbg_ctr.c',
'openssl/providers/implementations/rands/drbg_hash.c',
'openssl/providers/implementations/rands/drbg_hmac.c',
'openssl/providers/implementations/rands/fips_crng_test.c',
'openssl/providers/implementations/rands/test_rng.c',
'openssl/providers/implementations/signature/dsa_sig.c',
'openssl/providers/implementations/signature/ecdsa_sig.c',
'openssl/providers/implementations/signature/eddsa_sig.c',
'openssl/providers/implementations/signature/mac_legacy_sig.c',
'openssl/providers/implementations/signature/ml_dsa_sig.c',
'openssl/providers/implementations/signature/rsa_sig.c',

```
  'openssl/providers/implementations/signature/slh_dsa_sig.c',
  'openssl/providers/implementations/skeymgmt/aes_skmgmt.c',
  'openssl/providers/implementations/skeymgmt/generic.c',
  'openssl/ssl/record/methods/ssl3_cbc.c',
  'openssl/providers/common/der/der_dsa_key.c',
  'openssl/providers/common/der/der_dsa_sig.c',
  'openssl/providers/common/der/der_ec_key.c',
  'openssl/providers/common/der/der_ec_sig.c',
  'openssl/providers/common/der/der_ecx_key.c',
  'openssl/providers/common/der/der_ml_dsa_key.c',
  'openssl/providers/common/der/der_rsa_key.c',
  'openssl/providers/common/der/der_slh_dsa_key.c',
  'openssl/providers/common/provider_ctx.c',
  'openssl/providers/common/provider_err.c',
  'openssl/providers/implementations/ciphers/ciphercommon.c',
   'openssl/providers/implementations/ciphers/ciphercommon_block.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm_hw.c',
  'openssl/providers/implementations/ciphers/ciphercommon_gcm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_gcm_hw.c',
  'openssl/providers/implementations/ciphers/ciphercommon_hw.c',
  'openssl/providers/implementations/digests/digestcommon.c',
  'openssl/ssl/record/methods/tls_pad.c',
  'openssl/providers/fips/fips_entry.c',

],
'openssl_sources_BSD-x86_64': [
  './config/archs/BSD-x86_64/no-asm/crypto/params_idx.c',
  './config/archs/BSD-x86_64/no-asm/providers/common/der/der_sm2_gen.c',
  './config/archs/BSD-x86_64/no-asm/providers/common/der/der_digests_gen.c',
  './config/archs/BSD-x86_64/no-asm/providers/common/der/der_dsa_gen.c',
  './config/archs/BSD-x86_64/no-asm/providers/common/der/der_ec_gen.c',
   './config/archs/BSD-x86_64/no-asm/providers/common/der/der_ecx_gen.c',
  './config/archs/BSD-x86_64/no-asm/providers/common/der/der_ml_dsa_gen.c',
  './config/archs/BSD-x86_64/no-asm/providers/common/der/der_rsa_gen.c',
  './config/archs/BSD-x86_64/no-asm/providers/common/der/der_slh_dsa_gen.c',
  './config/archs/BSD-x86_64/no-asm/providers/common/der/der_wrap_gen.c',
  './config/archs/BSD-x86_64/no-asm/providers/legacy.ld',
  './config/archs/BSD-x86_64/no-asm/providers/fips.ld',

],
'openssl_defines_BSD-x86_64': [
  'NDEBUG',
  'L_ENDIAN',
  'OPENSSL_BUILDING_OPENSSL',
  'FIPS_MODULE',
  'FIPS_MODULE',
],
```

```
  'openssl_cflags_BSD-x86_64': [
    '-Wall -O3',
    '-pthread',
    '-Wall -O3',
  ],
  'openssl_ex_libs_BSD-x86_64': [
    '-pthread',
  ],
  'linker_script': ''
 },
 'include_dirs': [
  '.',
  './include',
  './crypto',
  './crypto/include/internal',
  './providers/common/include',
 ],
 'defines': ['<@(openssl_defines_BSD-x86_64)'],
 'cflags': ['<@(openssl_cflags_BSD-x86_64)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86_64)'],

 'sources': ['<@(openssl_sources)', '<@(openssl_sources_BSD-x86_64)'],
 'direct_dependent_settings': {
  'include_dirs': ['./include', '.'],
  'defines': ['<@(openssl_defines_BSD-x86_64)'],
 },
}
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/cms.h.in
*
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*
* Licensed under the Apache License 2.0 (the "License").  You may not use
* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_CMS_H
#define OPENSSL_CMS_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_CMS_H
#endif

#include <openssl/opensslconf.h>

#ifndef OPENSSL_NO_CMS
#include <openssl/x509.h>
#include <openssl/x509v3.h>
#include <openssl/cmserr.h>
#ifdef __cplusplus
extern "C" {
#endif

typedef struct CMS_EnvelopedData_st CMS_EnvelopedData;
typedef struct CMS_ContentInfo_st CMS_ContentInfo;
typedef struct CMS_SignerInfo_st CMS_SignerInfo;
typedef struct CMS_SignedData_st CMS_SignedData;
```

```
typedef
 struct CMS_CertificateChoices CMS_CertificateChoices;
typedef struct CMS_RevocationInfoChoice_st CMS_RevocationInfoChoice;
typedef struct CMS_RecipientInfo_st CMS_RecipientInfo;
typedef struct CMS_ReceiptRequest_st CMS_ReceiptRequest;
typedef struct CMS_Receipt_st CMS_Receipt;
typedef struct CMS_RecipientEncryptedKey_st CMS_RecipientEncryptedKey;
typedef struct CMS_OtherKeyAttribute_st CMS_OtherKeyAttribute;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(CMS_SignerInfo, CMS_SignerInfo, CMS_SignerInfo)
#define sk_CMS_SignerInfo_num(sk) OPENSSL_sk_num(ossl_check_const_CMS_SignerInfo_sk_type(sk))
#define sk_CMS_SignerInfo_value(sk, idx) ((CMS_SignerInfo
*)OPENSSL_sk_value(ossl_check_const_CMS_SignerInfo_sk_type(sk), (idx)))
#define sk_CMS_SignerInfo_new(cmp) ((STACK_OF(CMS_SignerInfo)
*)OPENSSL_sk_new(ossl_check_CMS_SignerInfo_compfunc_type(cmp)))
#define sk_CMS_SignerInfo_new_null() ((STACK_OF(CMS_SignerInfo) *)OPENSSL_sk_new_null())
#define sk_CMS_SignerInfo_new_reserve(cmp,
 n) ((STACK_OF(CMS_SignerInfo)
*)OPENSSL_sk_new_reserve(ossl_check_CMS_SignerInfo_compfunc_type(cmp), (n)))
#define sk_CMS_SignerInfo_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_CMS_SignerInfo_sk_type(sk), (n))
#define sk_CMS_SignerInfo_free(sk) OPENSSL_sk_free(ossl_check_CMS_SignerInfo_sk_type(sk))
#define sk_CMS_SignerInfo_zero(sk) OPENSSL_sk_zero(ossl_check_CMS_SignerInfo_sk_type(sk))
#define sk_CMS_SignerInfo_delete(sk, i) ((CMS_SignerInfo
*)OPENSSL_sk_delete(ossl_check_CMS_SignerInfo_sk_type(sk), (i)))
#define sk_CMS_SignerInfo_delete_ptr(sk, ptr) ((CMS_SignerInfo
*)OPENSSL_sk_delete_ptr(ossl_check_CMS_SignerInfo_sk_type(sk), ossl_check_CMS_SignerInfo_type(ptr)))
#define sk_CMS_SignerInfo_push(sk, ptr) OPENSSL_sk_push(ossl_check_CMS_SignerInfo_sk_type(sk),
ossl_check_CMS_SignerInfo_type(ptr))
#define sk_CMS_SignerInfo_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_CMS_SignerInfo_sk_type(sk),
ossl_check_CMS_SignerInfo_type(ptr))
#define sk_CMS_SignerInfo_pop(sk) ((CMS_SignerInfo
*)OPENSSL_sk_pop(ossl_check_CMS_SignerInfo_sk_type(sk)))
#define
 sk_CMS_SignerInfo_shift(sk) ((CMS_SignerInfo
*)OPENSSL_sk_shift(ossl_check_CMS_SignerInfo_sk_type(sk)))
#define sk_CMS_SignerInfo_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_CMS_SignerInfo_sk_type(sk),ossl_check_CMS_SignerInfo_freefunc_type(fre
efunc))
#define sk_CMS_SignerInfo_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_CMS_SignerInfo_sk_type(sk),
ossl_check_CMS_SignerInfo_type(ptr), (idx))
#define sk_CMS_SignerInfo_set(sk, idx, ptr) ((CMS_SignerInfo
*)OPENSSL_sk_set(ossl_check_CMS_SignerInfo_sk_type(sk), (idx), ossl_check_CMS_SignerInfo_type(ptr)))
#define sk_CMS_SignerInfo_find(sk, ptr) OPENSSL_sk_find(ossl_check_CMS_SignerInfo_sk_type(sk),
ossl_check_CMS_SignerInfo_type(ptr))
#define sk_CMS_SignerInfo_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_CMS_SignerInfo_sk_type(sk),
ossl_check_CMS_SignerInfo_type(ptr))
#define sk_CMS_SignerInfo_find_all(sk, ptr, pnum)
```

```
OPENSSL_sk_find_all(ossl_check_CMS_SignerInfo_sk_type(sk),
 ossl_check_CMS_SignerInfo_type(ptr), pnum)
#define sk_CMS_SignerInfo_sort(sk) OPENSSL_sk_sort(ossl_check_CMS_SignerInfo_sk_type(sk))
#define sk_CMS_SignerInfo_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_CMS_SignerInfo_sk_type(sk))
#define sk_CMS_SignerInfo_dup(sk) ((STACK_OF(CMS_SignerInfo)
*)OPENSSL_sk_dup(ossl_check_const_CMS_SignerInfo_sk_type(sk)))
#define sk_CMS_SignerInfo_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(CMS_SignerInfo)
*)OPENSSL_sk_deep_copy(ossl_check_const_CMS_SignerInfo_sk_type(sk),
ossl_check_CMS_SignerInfo_copyfunc_type(copyfunc), ossl_check_CMS_SignerInfo_freefunc_type(freefunc)))
#define sk_CMS_SignerInfo_set_cmp_func(sk, cmp)
((sk_CMS_SignerInfo_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_CMS_SignerInfo_sk_type(sk),
ossl_check_CMS_SignerInfo_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(CMS_RecipientEncryptedKey, CMS_RecipientEncryptedKey,
CMS_RecipientEncryptedKey)
#define sk_CMS_RecipientEncryptedKey_num(sk)
OPENSSL_sk_num(ossl_check_const_CMS_RecipientEncryptedKey_sk_type(sk))
#define
 sk_CMS_RecipientEncryptedKey_value(sk, idx) ((CMS_RecipientEncryptedKey
*)OPENSSL_sk_value(ossl_check_const_CMS_RecipientEncryptedKey_sk_type(sk), (idx)))
#define sk_CMS_RecipientEncryptedKey_new(cmp) ((STACK_OF(CMS_RecipientEncryptedKey)
*)OPENSSL_sk_new(ossl_check_CMS_RecipientEncryptedKey_compfunc_type(cmp)))
#define sk_CMS_RecipientEncryptedKey_new_null() ((STACK_OF(CMS_RecipientEncryptedKey)
*)OPENSSL_sk_new_null())
#define sk_CMS_RecipientEncryptedKey_new_reserve(cmp, n) ((STACK_OF(CMS_RecipientEncryptedKey)
*)OPENSSL_sk_new_reserve(ossl_check_CMS_RecipientEncryptedKey_compfunc_type(cmp), (n)))
#define sk_CMS_RecipientEncryptedKey_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk), (n))
#define sk_CMS_RecipientEncryptedKey_free(sk)
OPENSSL_sk_free(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk))
#define sk_CMS_RecipientEncryptedKey_zero(sk)
OPENSSL_sk_zero(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk))
#define
 sk_CMS_RecipientEncryptedKey_delete(sk, i) ((CMS_RecipientEncryptedKey
*)OPENSSL_sk_delete(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk), (i)))
#define sk_CMS_RecipientEncryptedKey_delete_ptr(sk, ptr) ((CMS_RecipientEncryptedKey
*)OPENSSL_sk_delete_ptr(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk),
ossl_check_CMS_RecipientEncryptedKey_type(ptr)))
#define sk_CMS_RecipientEncryptedKey_push(sk, ptr)
OPENSSL_sk_push(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk),
ossl_check_CMS_RecipientEncryptedKey_type(ptr))
#define sk_CMS_RecipientEncryptedKey_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk),
ossl_check_CMS_RecipientEncryptedKey_type(ptr))
#define sk_CMS_RecipientEncryptedKey_pop(sk) ((CMS_RecipientEncryptedKey
*)OPENSSL_sk_pop(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk)))
#define sk_CMS_RecipientEncryptedKey_shift(sk) ((CMS_RecipientEncryptedKey
*)OPENSSL_sk_shift(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk)))
```

```
#define
 sk_CMS_RecipientEncryptedKey_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk),ossl_check_CMS_RecipientEncry
ptedKey_freefunc_type(freefunc))
#define sk_CMS_RecipientEncryptedKey_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk),
ossl_check_CMS_RecipientEncryptedKey_type(ptr), (idx))
#define sk_CMS_RecipientEncryptedKey_set(sk, idx, ptr) ((CMS_RecipientEncryptedKey
*)OPENSSL_sk_set(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk), (idx),
ossl_check_CMS_RecipientEncryptedKey_type(ptr)))
#define sk_CMS_RecipientEncryptedKey_find(sk, ptr)
OPENSSL_sk_find(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk),
ossl_check_CMS_RecipientEncryptedKey_type(ptr))
#define sk_CMS_RecipientEncryptedKey_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk),
ossl_check_CMS_RecipientEncryptedKey_type(ptr))
#define sk_CMS_RecipientEncryptedKey_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk),
 ossl_check_CMS_RecipientEncryptedKey_type(ptr), pnum)
#define sk_CMS_RecipientEncryptedKey_sort(sk)
OPENSSL_sk_sort(ossl_check_CMS_RecipientEncryptedKey_sk_type(sk))
#define sk_CMS_RecipientEncryptedKey_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_CMS_RecipientEncryptedKey_sk_type(sk))
#define sk_CMS_RecipientEncryptedKey_dup(sk) ((STACK_OF(CMS_RecipientEncryptedKey)
*)OPENSSL_sk_dup(ossl_check_const_CMS_RecipientEncryptedKey_sk_type(sk)))
#define sk_CMS_RecipientEncryptedKey_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(CMS_RecipientEncryptedKey)
*)OPENSSL_sk_deep_copy(ossl_check_const_CMS_RecipientEncryptedKey_sk_type(sk),
ossl_check_CMS_RecipientEncryptedKey_copyfunc_type(copyfunc),
ossl_check_CMS_RecipientEncryptedKey_freefunc_type(freefunc)))
#define sk_CMS_RecipientEncryptedKey_set_cmp_func(sk, cmp)
((sk_CMS_RecipientEncryptedKey_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_CMS_RecipientEncrypted
Key_sk_type(sk), ossl_check_CMS_RecipientEncryptedKey_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(CMS_RecipientInfo,
 CMS_RecipientInfo, CMS_RecipientInfo)
#define sk_CMS_RecipientInfo_num(sk) OPENSSL_sk_num(ossl_check_const_CMS_RecipientInfo_sk_type(sk))
#define sk_CMS_RecipientInfo_value(sk, idx) ((CMS_RecipientInfo
*)OPENSSL_sk_value(ossl_check_const_CMS_RecipientInfo_sk_type(sk), (idx)))
#define sk_CMS_RecipientInfo_new(cmp) ((STACK_OF(CMS_RecipientInfo)
*)OPENSSL_sk_new(ossl_check_CMS_RecipientInfo_compfunc_type(cmp)))
#define sk_CMS_RecipientInfo_new_null() ((STACK_OF(CMS_RecipientInfo) *)OPENSSL_sk_new_null())
#define sk_CMS_RecipientInfo_new_reserve(cmp, n) ((STACK_OF(CMS_RecipientInfo)
*)OPENSSL_sk_new_reserve(ossl_check_CMS_RecipientInfo_compfunc_type(cmp), (n)))
#define sk_CMS_RecipientInfo_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_CMS_RecipientInfo_sk_type(sk),
(n))
#define sk_CMS_RecipientInfo_free(sk) OPENSSL_sk_free(ossl_check_CMS_RecipientInfo_sk_type(sk))
#define sk_CMS_RecipientInfo_zero(sk) OPENSSL_sk_zero(ossl_check_CMS_RecipientInfo_sk_type(sk))
#define
```

```
 sk_CMS_RecipientInfo_delete(sk, i) ((CMS_RecipientInfo
*)OPENSSL_sk_delete(ossl_check_CMS_RecipientInfo_sk_type(sk), (i)))
#define sk_CMS_RecipientInfo_delete_ptr(sk, ptr) ((CMS_RecipientInfo
*)OPENSSL_sk_delete_ptr(ossl_check_CMS_RecipientInfo_sk_type(sk),
ossl_check_CMS_RecipientInfo_type(ptr)))
#define sk_CMS_RecipientInfo_push(sk, ptr) OPENSSL_sk_push(ossl_check_CMS_RecipientInfo_sk_type(sk),
ossl_check_CMS_RecipientInfo_type(ptr))
#define sk_CMS_RecipientInfo_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_CMS_RecipientInfo_sk_type(sk), ossl_check_CMS_RecipientInfo_type(ptr))
#define sk_CMS_RecipientInfo_pop(sk) ((CMS_RecipientInfo
*)OPENSSL_sk_pop(ossl_check_CMS_RecipientInfo_sk_type(sk)))
#define sk_CMS_RecipientInfo_shift(sk) ((CMS_RecipientInfo
*)OPENSSL_sk_shift(ossl_check_CMS_RecipientInfo_sk_type(sk)))
#define sk_CMS_RecipientInfo_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_CMS_RecipientInfo_sk_type(sk),ossl_check_CMS_RecipientInfo_freefunc_ty
pe(freefunc))
#define
 sk_CMS_RecipientInfo_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_CMS_RecipientInfo_sk_type(sk),
ossl_check_CMS_RecipientInfo_type(ptr), (idx))
#define sk_CMS_RecipientInfo_set(sk, idx, ptr) ((CMS_RecipientInfo
*)OPENSSL_sk_set(ossl_check_CMS_RecipientInfo_sk_type(sk), (idx),
ossl_check_CMS_RecipientInfo_type(ptr)))
#define sk_CMS_RecipientInfo_find(sk, ptr) OPENSSL_sk_find(ossl_check_CMS_RecipientInfo_sk_type(sk),
ossl_check_CMS_RecipientInfo_type(ptr))
#define sk_CMS_RecipientInfo_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_CMS_RecipientInfo_sk_type(sk), ossl_check_CMS_RecipientInfo_type(ptr))
#define sk_CMS_RecipientInfo_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_CMS_RecipientInfo_sk_type(sk), ossl_check_CMS_RecipientInfo_type(ptr),
pnum)
#define sk_CMS_RecipientInfo_sort(sk) OPENSSL_sk_sort(ossl_check_CMS_RecipientInfo_sk_type(sk))
#define sk_CMS_RecipientInfo_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_CMS_RecipientInfo_sk_type(sk))
#define
 sk_CMS_RecipientInfo_dup(sk) ((STACK_OF(CMS_RecipientInfo)
*)OPENSSL_sk_dup(ossl_check_const_CMS_RecipientInfo_sk_type(sk)))
#define sk_CMS_RecipientInfo_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(CMS_RecipientInfo)
*)OPENSSL_sk_deep_copy(ossl_check_const_CMS_RecipientInfo_sk_type(sk),
ossl_check_CMS_RecipientInfo_copyfunc_type(copyfunc),
ossl_check_CMS_RecipientInfo_freefunc_type(freefunc)))
#define sk_CMS_RecipientInfo_set_cmp_func(sk, cmp)
((sk_CMS_RecipientInfo_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_CMS_RecipientInfo_sk_type(sk),
ossl_check_CMS_RecipientInfo_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(CMS_RevocationInfoChoice, CMS_RevocationInfoChoice,
CMS_RevocationInfoChoice)
#define sk_CMS_RevocationInfoChoice_num(sk)
OPENSSL_sk_num(ossl_check_const_CMS_RevocationInfoChoice_sk_type(sk))
#define sk_CMS_RevocationInfoChoice_value(sk, idx) ((CMS_RevocationInfoChoice
*)OPENSSL_sk_value(ossl_check_const_CMS_RevocationInfoChoice_sk_type(sk),
```

```
 (idx)))
#define sk_CMS_RevocationInfoChoice_new(cmp) ((STACK_OF(CMS_RevocationInfoChoice)
*)OPENSSL_sk_new(ossl_check_CMS_RevocationInfoChoice_compfunc_type(cmp)))
#define sk_CMS_RevocationInfoChoice_new_null() ((STACK_OF(CMS_RevocationInfoChoice)
*)OPENSSL_sk_new_null())
#define sk_CMS_RevocationInfoChoice_new_reserve(cmp, n) ((STACK_OF(CMS_RevocationInfoChoice)
*)OPENSSL_sk_new_reserve(ossl_check_CMS_RevocationInfoChoice_compfunc_type(cmp), (n)))
#define sk_CMS_RevocationInfoChoice_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_CMS_RevocationInfoChoice_sk_type(sk), (n))
#define sk_CMS_RevocationInfoChoice_free(sk)
OPENSSL_sk_free(ossl_check_CMS_RevocationInfoChoice_sk_type(sk))
#define sk_CMS_RevocationInfoChoice_zero(sk)
OPENSSL_sk_zero(ossl_check_CMS_RevocationInfoChoice_sk_type(sk))
#define sk_CMS_RevocationInfoChoice_delete(sk, i) ((CMS_RevocationInfoChoice
*)OPENSSL_sk_delete(ossl_check_CMS_RevocationInfoChoice_sk_type(sk), (i)))
#define sk_CMS_RevocationInfoChoice_delete_ptr(sk,
 ptr) ((CMS_RevocationInfoChoice
*)OPENSSL_sk_delete_ptr(ossl_check_CMS_RevocationInfoChoice_sk_type(sk),
ossl_check_CMS_RevocationInfoChoice_type(ptr)))
#define sk_CMS_RevocationInfoChoice_push(sk, ptr)
OPENSSL_sk_push(ossl_check_CMS_RevocationInfoChoice_sk_type(sk),
ossl_check_CMS_RevocationInfoChoice_type(ptr))
#define sk_CMS_RevocationInfoChoice_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_CMS_RevocationInfoChoice_sk_type(sk),
ossl_check_CMS_RevocationInfoChoice_type(ptr))
#define sk_CMS_RevocationInfoChoice_pop(sk) ((CMS_RevocationInfoChoice
*)OPENSSL_sk_pop(ossl_check_CMS_RevocationInfoChoice_sk_type(sk)))
#define sk_CMS_RevocationInfoChoice_shift(sk) ((CMS_RevocationInfoChoice
*)OPENSSL_sk_shift(ossl_check_CMS_RevocationInfoChoice_sk_type(sk)))
#define sk_CMS_RevocationInfoChoice_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_CMS_RevocationInfoChoice_sk_type(sk),ossl_check_CMS_RevocationInfoC
hoice_freefunc_type(freefunc))
#define sk_CMS_RevocationInfoChoice_insert(sk,
 ptr, idx) OPENSSL_sk_insert(ossl_check_CMS_RevocationInfoChoice_sk_type(sk),
ossl_check_CMS_RevocationInfoChoice_type(ptr), (idx))
#define sk_CMS_RevocationInfoChoice_set(sk, idx, ptr) ((CMS_RevocationInfoChoice
*)OPENSSL_sk_set(ossl_check_CMS_RevocationInfoChoice_sk_type(sk), (idx),
ossl_check_CMS_RevocationInfoChoice_type(ptr)))
#define sk_CMS_RevocationInfoChoice_find(sk, ptr)
OPENSSL_sk_find(ossl_check_CMS_RevocationInfoChoice_sk_type(sk),
ossl_check_CMS_RevocationInfoChoice_type(ptr))
#define sk_CMS_RevocationInfoChoice_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_CMS_RevocationInfoChoice_sk_type(sk),
ossl_check_CMS_RevocationInfoChoice_type(ptr))
#define sk_CMS_RevocationInfoChoice_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_CMS_RevocationInfoChoice_sk_type(sk),
ossl_check_CMS_RevocationInfoChoice_type(ptr), pnum)
#define sk_CMS_RevocationInfoChoice_sort(sk)
```

```
OPENSSL_sk_sort(ossl_check_CMS_RevocationInfoChoice_sk_type(sk))
#define sk_CMS_RevocationInfoChoice_is_sorted(sk)
 OPENSSL_sk_is_sorted(ossl_check_const_CMS_RevocationInfoChoice_sk_type(sk))
#define sk_CMS_RevocationInfoChoice_dup(sk) ((STACK_OF(CMS_RevocationInfoChoice)
*)OPENSSL_sk_dup(ossl_check_const_CMS_RevocationInfoChoice_sk_type(sk)))
#define sk_CMS_RevocationInfoChoice_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(CMS_RevocationInfoChoice)
*)OPENSSL_sk_deep_copy(ossl_check_const_CMS_RevocationInfoChoice_sk_type(sk),
ossl_check_CMS_RevocationInfoChoice_copyfunc_type(copyfunc),
ossl_check_CMS_RevocationInfoChoice_freefunc_type(freefunc)))
#define sk_CMS_RevocationInfoChoice_set_cmp_func(sk, cmp)
((sk_CMS_RevocationInfoChoice_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_CMS_RevocationInfoChoi
ce_sk_type(sk), ossl_check_CMS_RevocationInfoChoice_compfunc_type(cmp)))

/* clang-format on */

DECLARE_ASN1_ITEM(CMS_EnvelopedData)
DECLARE_ASN1_ALLOC_FUNCTIONS(CMS_SignedData)
DECLARE_ASN1_FUNCTIONS(CMS_ContentInfo)
DECLARE_ASN1_FUNCTIONS(CMS_ReceiptRequest)
DECLARE_ASN1_PRINT_FUNCTION(CMS_ContentInfo)

DECLARE_ASN1_DUP_FUNCTION(CMS_EnvelopedData)

CMS_ContentInfo
 *CMS_ContentInfo_new_ex(OSSL_LIB_CTX *libctx, const char *propq);

#define CMS_SIGNERINFO_ISSUER_SERIAL 0
#define CMS_SIGNERINFO_KEYIDENTIFIER 1

#define CMS_RECIPINFO_NONE -1
#define CMS_RECIPINFO_TRANS 0
#define CMS_RECIPINFO_AGREE 1
#define CMS_RECIPINFO_KEK 2
#define CMS_RECIPINFO_PASS 3
#define CMS_RECIPINFO_OTHER 4

/* S/MIME related flags */

#define CMS_TEXT 0x1
#define CMS_NOCERTS 0x2
#define CMS_NO_CONTENT_VERIFY 0x4
#define CMS_NO_ATTR_VERIFY 0x8
#define CMS_NOSIGS \
   (CMS_NO_CONTENT_VERIFY | CMS_NO_ATTR_VERIFY)
#define CMS_NOINTERN 0x10
#define CMS_NO_SIGNER_CERT_VERIFY 0x20
#define CMS_NOVERIFY 0x20
```

```
#define CMS_DETACHED 0x40
#define CMS_BINARY 0x80
#define CMS_NOATTR 0x100
#define CMS_NOSMIMECAP 0x200
#define CMS_NOOLDMIMETYPE 0x400
#define CMS_CRLFEOL 0x800
#define CMS_STREAM 0x1000
#define CMS_NOCRL 0x2000
#define CMS_PARTIAL 0x4000
#define CMS_REUSE_DIGEST 0x8000
#define CMS_USE_KEYID
 0x10000
#define CMS_DEBUG_DECRYPT 0x20000
#define CMS_KEY_PARAM 0x40000
#define CMS_ASCIICRLF 0x80000
#define CMS_CADES 0x100000
#define CMS_USE_ORIGINATOR_KEYID 0x200000
#define CMS_NO_SIGNING_TIME 0x400000

const ASN1_OBJECT *CMS_get0_type(const CMS_ContentInfo *cms);

BIO *CMS_dataInit(CMS_ContentInfo *cms, BIO *icont);
int CMS_dataFinal(CMS_ContentInfo *cms, BIO *bio);

ASN1_OCTET_STRING **CMS_get0_content(CMS_ContentInfo *cms);
int CMS_is_detached(CMS_ContentInfo *cms);
int CMS_set_detached(CMS_ContentInfo *cms, int detached);

#ifdef OPENSSL_PEM_H
DECLARE_PEM_rw(CMS, CMS_ContentInfo)
#endif
int CMS_stream(unsigned char ***boundary, CMS_ContentInfo *cms);
CMS_ContentInfo *d2i_CMS_bio(BIO *bp, CMS_ContentInfo **cms);
int i2d_CMS_bio(BIO *bp, CMS_ContentInfo *cms);

BIO *BIO_new_CMS(BIO *out, CMS_ContentInfo *cms);
int i2d_CMS_bio_stream(BIO *out, CMS_ContentInfo *cms, BIO *in, int flags);
int PEM_write_bio_CMS_stream(BIO *out, CMS_ContentInfo *cms, BIO *in,
   int flags);
CMS_ContentInfo
 *SMIME_read_CMS(BIO *bio, BIO **bcont);
CMS_ContentInfo *SMIME_read_CMS_ex(BIO *bio, int flags, BIO **bcont, CMS_ContentInfo **ci);
int SMIME_write_CMS(BIO *bio, CMS_ContentInfo *cms, BIO *data, int flags);

int CMS_final(CMS_ContentInfo *cms, BIO *data, BIO *dcont,
   unsigned int flags);
int CMS_final_digest(CMS_ContentInfo *cms,
   const unsigned char *md, unsigned int mdlen, BIO *dcont,
```

```
   unsigned int flags);

CMS_ContentInfo *CMS_sign(X509 *signcert, EVP_PKEY *pkey,
   STACK_OF(X509) *certs, BIO *data,
   unsigned int flags);
CMS_ContentInfo *CMS_sign_ex(X509 *signcert, EVP_PKEY *pkey,
   STACK_OF(X509) *certs, BIO *data,
   unsigned int flags, OSSL_LIB_CTX *libctx,
   const char *propq);

CMS_ContentInfo *CMS_sign_receipt(CMS_SignerInfo *si,
   X509 *signcert, EVP_PKEY *pkey,
   STACK_OF(X509) *certs, unsigned int flags);

int CMS_data(CMS_ContentInfo *cms, BIO *out, unsigned int flags);
CMS_ContentInfo *CMS_data_create(BIO *in, unsigned int flags);
CMS_ContentInfo
 *CMS_data_create_ex(BIO *in, unsigned int flags,
   OSSL_LIB_CTX *libctx, const char *propq);

int CMS_digest_verify(CMS_ContentInfo *cms, BIO *dcont, BIO *out,
   unsigned int flags);
CMS_ContentInfo *CMS_digest_create(BIO *in, const EVP_MD *md,
   unsigned int flags);
CMS_ContentInfo *CMS_digest_create_ex(BIO *in, const EVP_MD *md,
   unsigned int flags, OSSL_LIB_CTX *libctx,
   const char *propq);

int CMS_EncryptedData_decrypt(CMS_ContentInfo *cms,
   const unsigned char *key, size_t keylen,
   BIO *dcont, BIO *out, unsigned int flags);
CMS_ContentInfo *CMS_EncryptedData_encrypt(BIO *in, const EVP_CIPHER *cipher,
   const unsigned char *key,
   size_t keylen, unsigned int flags);
CMS_ContentInfo *CMS_EncryptedData_encrypt_ex(BIO *in, const EVP_CIPHER *cipher,
   const unsigned char *key,
   size_t keylen, unsigned int flags,
   OSSL_LIB_CTX *libctx,
   const char *propq);

int CMS_EncryptedData_set1_key(CMS_ContentInfo *cms, const EVP_CIPHER *ciph,
   const unsigned
 char *key, size_t keylen);

int CMS_verify(CMS_ContentInfo *cms, STACK_OF(X509) *certs,
   X509_STORE *store, BIO *dcont, BIO *out, unsigned int flags);

int CMS_verify_receipt(CMS_ContentInfo *rcms, CMS_ContentInfo *ocms,
```

```
   STACK_OF(X509) *certs,
   X509_STORE *store, unsigned int flags);

STACK_OF(X509) *CMS_get0_signers(CMS_ContentInfo *cms);

CMS_ContentInfo *CMS_encrypt(STACK_OF(X509) *certs, BIO *in,
   const EVP_CIPHER *cipher, unsigned int flags);
CMS_ContentInfo *CMS_encrypt_ex(STACK_OF(X509) *certs, BIO *in,
   const EVP_CIPHER *cipher, unsigned int flags,
   OSSL_LIB_CTX *libctx, const char *propq);

int CMS_decrypt(CMS_ContentInfo *cms, EVP_PKEY *pkey, X509 *cert,
   BIO *dcont, BIO *out, unsigned int flags);

int CMS_decrypt_set1_pkey(CMS_ContentInfo *cms, EVP_PKEY *pk, X509 *cert);
int CMS_decrypt_set1_pkey_and_peer(CMS_ContentInfo *cms, EVP_PKEY *pk,
   X509 *cert, X509 *peer);
int CMS_decrypt_set1_key(CMS_ContentInfo *cms,
   unsigned char *key, size_t
 keylen,
   const unsigned char *id, size_t idlen);
int CMS_decrypt_set1_password(CMS_ContentInfo *cms,
   unsigned char *pass, ossl_ssize_t passlen);

STACK_OF(CMS_RecipientInfo) *CMS_get0_RecipientInfos(CMS_ContentInfo *cms);
int CMS_RecipientInfo_type(CMS_RecipientInfo *ri);
EVP_PKEY_CTX *CMS_RecipientInfo_get0_pkey_ctx(CMS_RecipientInfo *ri);
CMS_ContentInfo *CMS_AuthEnvelopedData_create(const EVP_CIPHER *cipher);
CMS_ContentInfo *
CMS_AuthEnvelopedData_create_ex(const EVP_CIPHER *cipher, OSSL_LIB_CTX *libctx,
   const char *propq);
CMS_ContentInfo *CMS_EnvelopedData_create(const EVP_CIPHER *cipher);
CMS_ContentInfo *CMS_EnvelopedData_create_ex(const EVP_CIPHER *cipher,
   OSSL_LIB_CTX *libctx,
   const char *propq);
BIO *CMS_EnvelopedData_decrypt(CMS_EnvelopedData *env, BIO *detached_data,
   EVP_PKEY *pkey, X509 *cert,
   ASN1_OCTET_STRING *secret, unsigned int flags,
   OSSL_LIB_CTX *libctx, const char *propq);

CMS_RecipientInfo *CMS_add1_recipient_cert(CMS_ContentInfo
 *cms,
   X509 *recip, unsigned int flags);
CMS_RecipientInfo *CMS_add1_recipient(CMS_ContentInfo *cms, X509 *recip,
   EVP_PKEY *originatorPrivKey, X509 *originator, unsigned int flags);
int CMS_RecipientInfo_set0_pkey(CMS_RecipientInfo *ri, EVP_PKEY *pkey);
int CMS_RecipientInfo_ktri_cert_cmp(CMS_RecipientInfo *ri, X509 *cert);
int CMS_RecipientInfo_ktri_get0_algs(CMS_RecipientInfo *ri,
```

```
   EVP_PKEY **pk, X509 **recip,
   X509_ALGOR **palg);
int CMS_RecipientInfo_ktri_get0_signer_id(CMS_RecipientInfo *ri,
   ASN1_OCTET_STRING **keyid,
   X509_NAME **issuer,
   ASN1_INTEGER **sno);

CMS_RecipientInfo *CMS_add0_recipient_key(CMS_ContentInfo *cms, int nid,
   unsigned char *key, size_t keylen,
   unsigned char *id, size_t idlen,
   ASN1_GENERALIZEDTIME *date,
   ASN1_OBJECT *otherTypeId,
   ASN1_TYPE *otherType);

int CMS_RecipientInfo_kekri_get0_id(CMS_RecipientInfo *ri,
   X509_ALGOR **palg,
   ASN1_OCTET_STRING **pid,
   ASN1_GENERALIZEDTIME **pdate,
   ASN1_OBJECT **potherid,
    ASN1_TYPE **pothertype);

int CMS_RecipientInfo_set0_key(CMS_RecipientInfo *ri,
   unsigned char *key, size_t keylen);

int CMS_RecipientInfo_kekri_id_cmp(CMS_RecipientInfo *ri,
   const unsigned char *id, size_t idlen);

int CMS_RecipientInfo_set0_password(CMS_RecipientInfo *ri,
   unsigned char *pass,
   ossl_ssize_t passlen);

CMS_RecipientInfo *CMS_add0_recipient_password(CMS_ContentInfo *cms,
   int iter, int wrap_nid,
   int pbe_nid,
   unsigned char *pass,
   ossl_ssize_t passlen,
   const EVP_CIPHER *kekciph);

int CMS_RecipientInfo_decrypt(CMS_ContentInfo *cms, CMS_RecipientInfo *ri);
int CMS_RecipientInfo_encrypt(const CMS_ContentInfo *cms, CMS_RecipientInfo *ri);

int CMS_uncompress(CMS_ContentInfo *cms, BIO *dcont, BIO *out,
   unsigned int flags);
CMS_ContentInfo *CMS_compress(BIO *in, int comp_nid, unsigned int flags);

int CMS_set1_eContentType(CMS_ContentInfo *cms, const ASN1_OBJECT *oid);
const ASN1_OBJECT *CMS_get0_eContentType(CMS_ContentInfo *cms);
```

```
CMS_CertificateChoices
 *CMS_add0_CertificateChoices(CMS_ContentInfo *cms);
int CMS_add0_cert(CMS_ContentInfo *cms, X509 *cert);
int CMS_add1_cert(CMS_ContentInfo *cms, X509 *cert);
STACK_OF(X509) *CMS_get1_certs(CMS_ContentInfo *cms);

CMS_RevocationInfoChoice *CMS_add0_RevocationInfoChoice(CMS_ContentInfo *cms);
int CMS_add0_crl(CMS_ContentInfo *cms, X509_CRL *crl);
int CMS_add1_crl(CMS_ContentInfo *cms, X509_CRL *crl);
STACK_OF(X509_CRL) *CMS_get1_crls(CMS_ContentInfo *cms);

int CMS_SignedData_init(CMS_ContentInfo *cms);
CMS_SignerInfo *CMS_add1_signer(CMS_ContentInfo *cms,
   X509 *signer, EVP_PKEY *pk, const EVP_MD *md,
   unsigned int flags);
EVP_PKEY_CTX *CMS_SignerInfo_get0_pkey_ctx(CMS_SignerInfo *si);
EVP_MD_CTX *CMS_SignerInfo_get0_md_ctx(CMS_SignerInfo *si);
STACK_OF(CMS_SignerInfo) *CMS_get0_SignerInfos(CMS_ContentInfo *cms);

void CMS_SignerInfo_set1_signer_cert(CMS_SignerInfo *si, X509 *signer);
int CMS_SignerInfo_get0_signer_id(CMS_SignerInfo *si,
   ASN1_OCTET_STRING
 **keyid,
   X509_NAME **issuer, ASN1_INTEGER **sno);
int CMS_SignerInfo_cert_cmp(CMS_SignerInfo *si, X509 *cert);
int CMS_set1_signers_certs(CMS_ContentInfo *cms, STACK_OF(X509) *certs,
   unsigned int flags);
void CMS_SignerInfo_get0_algs(CMS_SignerInfo *si, EVP_PKEY **pk,
   X509 **signer, X509_ALGOR **pdig,
   X509_ALGOR **psig);
ASN1_OCTET_STRING *CMS_SignerInfo_get0_signature(CMS_SignerInfo *si);
int CMS_SignerInfo_sign(CMS_SignerInfo *si);
int CMS_SignerInfo_verify(CMS_SignerInfo *si);
int CMS_SignerInfo_verify_content(CMS_SignerInfo *si, BIO *chain);
BIO *CMS_SignedData_verify(CMS_SignedData *sd, BIO *detached_data,
   STACK_OF(X509) *scerts, X509_STORE *store,
   STACK_OF(X509) *extra, STACK_OF(X509_CRL) *crls,
   unsigned int flags,
   OSSL_LIB_CTX *libctx, const char *propq);

int CMS_add_smimecap(CMS_SignerInfo *si, STACK_OF(X509_ALGOR) *algs);
int CMS_add_simple_smimecap(STACK_OF(X509_ALGOR) **algs,
   int algnid, int keysize);
int CMS_add_standard_smimecap(STACK_OF(X509_ALGOR)
 **smcap);

int CMS_signed_get_attr_count(const CMS_SignerInfo *si);
int CMS_signed_get_attr_by_NID(const CMS_SignerInfo *si, int nid,
```

```
   int lastpos);
int CMS_signed_get_attr_by_OBJ(const CMS_SignerInfo *si, const ASN1_OBJECT *obj,
   int lastpos);
X509_ATTRIBUTE *CMS_signed_get_attr(const CMS_SignerInfo *si, int loc);
X509_ATTRIBUTE *CMS_signed_delete_attr(CMS_SignerInfo *si, int loc);
int CMS_signed_add1_attr(CMS_SignerInfo *si, X509_ATTRIBUTE *attr);
int CMS_signed_add1_attr_by_OBJ(CMS_SignerInfo *si,
   const ASN1_OBJECT *obj, int type,
   const void *bytes, int len);
int CMS_signed_add1_attr_by_NID(CMS_SignerInfo *si,
   int nid, int type,
   const void *bytes, int len);
int CMS_signed_add1_attr_by_txt(CMS_SignerInfo *si,
   const char *attrname, int type,
   const void *bytes, int len);
void *CMS_signed_get0_data_by_OBJ(const CMS_SignerInfo *si,
   const ASN1_OBJECT *oid,
   int lastpos, int type);

int CMS_unsigned_get_attr_count(const CMS_SignerInfo
 *si);
int CMS_unsigned_get_attr_by_NID(const CMS_SignerInfo *si, int nid,
   int lastpos);
int CMS_unsigned_get_attr_by_OBJ(const CMS_SignerInfo *si,
   const ASN1_OBJECT *obj, int lastpos);
X509_ATTRIBUTE *CMS_unsigned_get_attr(const CMS_SignerInfo *si, int loc);
X509_ATTRIBUTE *CMS_unsigned_delete_attr(CMS_SignerInfo *si, int loc);
int CMS_unsigned_add1_attr(CMS_SignerInfo *si, X509_ATTRIBUTE *attr);
int CMS_unsigned_add1_attr_by_OBJ(CMS_SignerInfo *si,
   const ASN1_OBJECT *obj, int type,
   const void *bytes, int len);
int CMS_unsigned_add1_attr_by_NID(CMS_SignerInfo *si,
   int nid, int type,
   const void *bytes, int len);
int CMS_unsigned_add1_attr_by_txt(CMS_SignerInfo *si,
   const char *attrname, int type,
   const void *bytes, int len);
void *CMS_unsigned_get0_data_by_OBJ(CMS_SignerInfo *si, ASN1_OBJECT *oid,
   int lastpos, int type);

int CMS_get1_ReceiptRequest(CMS_SignerInfo *si, CMS_ReceiptRequest **prr);
CMS_ReceiptRequest *CMS_ReceiptRequest_create0(

 unsigned char *id, int idlen, int allorfirst,
   STACK_OF(GENERAL_NAMES) *receiptList,
   STACK_OF(GENERAL_NAMES) *receiptsTo);
CMS_ReceiptRequest *CMS_ReceiptRequest_create0_ex(
   unsigned char *id, int idlen, int allorfirst,
```

```
   STACK_OF(GENERAL_NAMES) *receiptList,
   STACK_OF(GENERAL_NAMES) *receiptsTo,
   OSSL_LIB_CTX *libctx);

int CMS_add1_ReceiptRequest(CMS_SignerInfo *si, CMS_ReceiptRequest *rr);
void CMS_ReceiptRequest_get0_values(CMS_ReceiptRequest *rr,
   ASN1_STRING **pcid,
   int *pallorfirst,
   STACK_OF(GENERAL_NAMES) **plist,
   STACK_OF(GENERAL_NAMES) **prto);
int CMS_RecipientInfo_kari_get0_alg(CMS_RecipientInfo *ri,
   X509_ALGOR **palg,
   ASN1_OCTET_STRING **pukm);
STACK_OF(CMS_RecipientEncryptedKey)
*CMS_RecipientInfo_kari_get0_reks(CMS_RecipientInfo *ri);

int CMS_RecipientInfo_kari_get0_orig_id(CMS_RecipientInfo *ri,
   X509_ALGOR **pubalg,
   ASN1_BIT_STRING **pubkey,
   ASN1_OCTET_STRING **keyid,
   X509_NAME **issuer,
   ASN1_INTEGER **sno);

int
 CMS_RecipientInfo_kari_orig_id_cmp(CMS_RecipientInfo *ri, X509 *cert);

int CMS_RecipientEncryptedKey_get0_id(CMS_RecipientEncryptedKey *rek,
   ASN1_OCTET_STRING **keyid,
   ASN1_GENERALIZEDTIME **tm,
   CMS_OtherKeyAttribute **other,
   X509_NAME **issuer, ASN1_INTEGER **sno);
int CMS_RecipientEncryptedKey_cert_cmp(CMS_RecipientEncryptedKey *rek,
   X509 *cert);
int CMS_RecipientInfo_kari_set0_pkey(CMS_RecipientInfo *ri, EVP_PKEY *pk);
int CMS_RecipientInfo_kari_set0_pkey_and_peer(CMS_RecipientInfo *ri, EVP_PKEY *pk, X509 *peer);
EVP_CIPHER_CTX *CMS_RecipientInfo_kari_get0_ctx(CMS_RecipientInfo *ri);
int CMS_RecipientInfo_kari_decrypt(CMS_ContentInfo *cms,
   CMS_RecipientInfo *ri,
   CMS_RecipientEncryptedKey *rek);

int CMS_SharedInfo_encode(unsigned char **pder, X509_ALGOR *kekalg,
   ASN1_OCTET_STRING *ukm, int keylen);

/* Backward compatibility for spelling errors. */
#define CMS_R_UNKNOWN_DIGEST_ALGORITM CMS_R_UNKNOWN_DIGEST_ALGORITHM
#define CMS_R_UNSUPPORTED_RECPIENTINFO_TYPE
 \
   CMS_R_UNSUPPORTED_RECIPIENTINFO_TYPE
```

```
#ifdef __cplusplus
}
#endif
#endif
#endif
```

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```
/*
* WARNING: do not edit!
* Generated by util/mkbuildinf.pl
*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#define PLATFORM "platform: BSD-x86"
#define DATE "built on: Tue Jan 27 17:26:06 2026 UTC"

/*
* Generate compiler_flags as an array of individual characters. This is a
* workaround for the situation where CFLAGS gets too long for a C90 string
* literal
*/
static const char compiler_flags[] = {
   'c','o','m','p','i','l','e','r',':',' ','c','c',' ','-','f','P',
   'I','C',' ','-','p','t','h','r','e','a','d',' ','-','W','a','l',
   'l',' ','-','O','3',' ','-','f','o','m','i','t','-','f','r','a',
```

```
  'm','e','-','p','o','i','n','t','e','r',' ','-','D','L','_','E',
  'N','D','I','A','N','
 ','-','D','O','P','E','N','S','S','L','_',
  'P','I','C',' ','-','D','_','T','H','R','E','A','D','_','S','A',
  'F','E',' ','-','D','_','R','E','E','N','T','R','A','N','T',' ',
  '-','D','O','P','E','N','S','S','L','_','B','U','I','L','D','I',
  'N','G','_','O','P','E','N','S','S','L',' ','-','D','N','D','E',
  'B','U','G','\0'
};
/*
* WARNING: do not edit!
* Generated by Makefile from providers/common/include/prov/der_dsa.h.in
*
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*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#include "internal/der.h"

/* Well known OIDs precompiled */
/* clang-format off */

/*
* id-dsa OBJECT IDENTIFIER ::= {
*      iso(1) member-body(2) us(840) x9-57(10040) x9algorithm(4) 1 }
*/
#define DER_OID_V_id_dsa DER_P_OBJECT, 7, 0x2A, 0x86, 0x48, 0xCE, 0x38, 0x04, 0x01
#define DER_OID_SZ_id_dsa 9
extern const unsigned char ossl_der_oid_id_dsa[DER_OID_SZ_id_dsa];

/*
* id-dsa-with-sha1 OBJECT IDENTIFIER ::=  {
*      iso(1) member-body(2) us(840) x9-57 (10040) x9algorithm(4) 3 }
*/
#define DER_OID_V_id_dsa_with_sha1 DER_P_OBJECT, 7, 0x2A, 0x86, 0x48,
 0xCE, 0x38, 0x04, 0x03
#define DER_OID_SZ_id_dsa_with_sha1 9
extern const unsigned char ossl_der_oid_id_dsa_with_sha1[DER_OID_SZ_id_dsa_with_sha1];

/*
* id-dsa-with-sha224 OBJECT IDENTIFIER ::= { sigAlgs 1 }
*/
#define DER_OID_V_id_dsa_with_sha224 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x03,
0x01
```

```
#define DER_OID_SZ_id_dsa_with_sha224 11
extern const unsigned char ossl_der_oid_id_dsa_with_sha224[DER_OID_SZ_id_dsa_with_sha224];

/*
* id-dsa-with-sha256 OBJECT IDENTIFIER ::= { sigAlgs 2 }
*/
#define DER_OID_V_id_dsa_with_sha256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x03,
0x02
#define DER_OID_SZ_id_dsa_with_sha256 11
extern const unsigned char ossl_der_oid_id_dsa_with_sha256[DER_OID_SZ_id_dsa_with_sha256];

/*
* id-dsa-with-sha384 OBJECT IDENTIFIER ::= { sigAlgs 3 }
*/
#define DER_OID_V_id_dsa_with_sha384 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x03,
0x03
#define DER_OID_SZ_id_dsa_with_sha384 11
extern const unsigned char
 ossl_der_oid_id_dsa_with_sha384[DER_OID_SZ_id_dsa_with_sha384];

/*
* id-dsa-with-sha512 OBJECT IDENTIFIER ::= { sigAlgs 4 }
*/
#define DER_OID_V_id_dsa_with_sha512 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x03,
0x04
#define DER_OID_SZ_id_dsa_with_sha512 11
extern const unsigned char ossl_der_oid_id_dsa_with_sha512[DER_OID_SZ_id_dsa_with_sha512];

/*
* id-dsa-with-sha3-224 OBJECT IDENTIFIER ::= { sigAlgs 5 }
*/
#define DER_OID_V_id_dsa_with_sha3_224 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x05
#define DER_OID_SZ_id_dsa_with_sha3_224 11
extern const unsigned char ossl_der_oid_id_dsa_with_sha3_224[DER_OID_SZ_id_dsa_with_sha3_224];

/*
* id-dsa-with-sha3-256 OBJECT IDENTIFIER ::= { sigAlgs 6 }
*/
#define DER_OID_V_id_dsa_with_sha3_256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x06
#define DER_OID_SZ_id_dsa_with_sha3_256 11
extern const unsigned char ossl_der_oid_id_dsa_with_sha3_256[DER_OID_SZ_id_dsa_with_sha3_256];

/*
 * id-dsa-with-sha3-384 OBJECT IDENTIFIER ::= { sigAlgs 7 }
*/
#define DER_OID_V_id_dsa_with_sha3_384 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
```

```
0x03, 0x07
#define DER_OID_SZ_id_dsa_with_sha3_384 11
extern const unsigned char ossl_der_oid_id_dsa_with_sha3_384[DER_OID_SZ_id_dsa_with_sha3_384];

/*
* id-dsa-with-sha3-512 OBJECT IDENTIFIER ::= { sigAlgs 8 }
*/
#define DER_OID_V_id_dsa_with_sha3_512 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x08
#define DER_OID_SZ_id_dsa_with_sha3_512 11
extern const unsigned char ossl_der_oid_id_dsa_with_sha3_512[DER_OID_SZ_id_dsa_with_sha3_512];

/* clang-format on */

/* Subject Public Key Info */
int ossl_DER_w_algorithmIdentifier_DSA(WPACKET *pkt, int tag, DSA *dsa);
/* Signature */
int ossl_DER_w_algorithmIdentifier_DSA_with_MD(WPACKET *pkt, int tag,
   DSA *dsa, int mdnid);
```

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    'openssl/apps/lib/app_x509.c',
    'openssl/apps/lib/apps.c',
    'openssl/apps/lib/apps_opt_printf.c',
    'openssl/apps/lib/apps_ui.c',
    'openssl/apps/lib/columns.c',
    'openssl/apps/lib/engine.c',
    'openssl/apps/lib/engine_loader.c',
    'openssl/apps/lib/fmt.c',
    'openssl/apps/lib/http_server.c',
    'openssl/apps/lib/log.c',
    'openssl/apps/lib/names.c',
    'openssl/apps/lib/opt.c',
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}
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/asn1.h.in
*
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*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_ASN1_H
#define OPENSSL_ASN1_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_ASN1_H
#endif

#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif
#include <time.h>
#include <openssl/e_os2.h>
```

```
#include <openssl/opensslconf.h>
#include <openssl/bio.h>
#include <openssl/safestack.h>
#include <openssl/asn1err.h>
#include <openssl/symhacks.h>

#include <openssl/types.h>
#include <openssl/bn.h>

#ifdef OPENSSL_BUILD_SHLIBCRYPTO
#undef OPENSSL_EXTERN
#define OPENSSL_EXTERN OPENSSL_EXPORT
#endif

#ifdef
 __cplusplus
extern "C" {
#endif

#define V_ASN1_UNIVERSAL 0x00
#define V_ASN1_APPLICATION 0x40
#define V_ASN1_CONTEXT_SPECIFIC 0x80
#define V_ASN1_PRIVATE 0xc0

#define V_ASN1_CONSTRUCTED 0x20
#define V_ASN1_PRIMITIVE_TAG 0x1f
#define V_ASN1_PRIMATIVE_TAG /*compat*/ V_ASN1_PRIMITIVE_TAG

#define V_ASN1_APP_CHOOSE -2 /* let the recipient choose */
#define V_ASN1_OTHER -3 /* used in ASN1_TYPE */
#define V_ASN1_ANY -4 /* used in ASN1 template code */

#define V_ASN1_UNDEF -1
/* ASN.1 tag values */
#define V_ASN1_EOC 0
#define V_ASN1_BOOLEAN 1
#define V_ASN1_INTEGER 2
#define V_ASN1_BIT_STRING 3
#define V_ASN1_OCTET_STRING 4
#define V_ASN1_NULL 5
#define V_ASN1_OBJECT 6
#define V_ASN1_OBJECT_DESCRIPTOR 7
#define V_ASN1_EXTERNAL 8
#define V_ASN1_REAL 9
#define V_ASN1_ENUMERATED 10
#define V_ASN1_UTF8STRING 12
#define V_ASN1_SEQUENCE 16
#define V_ASN1_SET 17
```

```
#define V_ASN1_NUMERICSTRING 18
#define V_ASN1_PRINTABLESTRING 19
#define V_ASN1_T61STRING 20
#define V_ASN1_TELETEXSTRING
 20 /* alias */
#define V_ASN1_VIDEOTEXSTRING 21
#define V_ASN1_IA5STRING 22
#define V_ASN1_UTCTIME 23
#define V_ASN1_GENERALIZEDTIME 24
#define V_ASN1_GRAPHICSTRING 25
#define V_ASN1_ISO64STRING 26
#define V_ASN1_VISIBLESTRING 26 /* alias */
#define V_ASN1_GENERALSTRING 27
#define V_ASN1_UNIVERSALSTRING 28
#define V_ASN1_BMPSTRING 30

/*
* NB the constants below are used internally by ASN1_INTEGER
* and ASN1_ENUMERATED to indicate the sign. They are *not* on
* the wire tag values.
*/

#define V_ASN1_NEG 0x100
#define V_ASN1_NEG_INTEGER (2 | V_ASN1_NEG)
#define V_ASN1_NEG_ENUMERATED (10 | V_ASN1_NEG)

/* For use with d2i_ASN1_type_bytes() */
#define B_ASN1_NUMERICSTRING 0x0001
#define B_ASN1_PRINTABLESTRING 0x0002
#define B_ASN1_T61STRING 0x0004
#define B_ASN1_TELETEXSTRING 0x0004
#define B_ASN1_VIDEOTEXSTRING 0x0008
#define B_ASN1_IA5STRING 0x0010
#define B_ASN1_GRAPHICSTRING 0x0020
#define B_ASN1_ISO64STRING 0x0040
#define B_ASN1_VISIBLESTRING 0x0040
#define B_ASN1_GENERALSTRING
 0x0080
#define B_ASN1_UNIVERSALSTRING 0x0100
#define B_ASN1_OCTET_STRING 0x0200
#define B_ASN1_BIT_STRING 0x0400
#define B_ASN1_BMPSTRING 0x0800
#define B_ASN1_UNKNOWN 0x1000
#define B_ASN1_UTF8STRING 0x2000
#define B_ASN1_UTCTIME 0x4000
#define B_ASN1_GENERALIZEDTIME 0x8000
#define B_ASN1_SEQUENCE 0x10000
/* For use with ASN1_mbstring_copy() */
```

```
#define MBSTRING_FLAG 0x1000
#define MBSTRING_UTF8 (MBSTRING_FLAG)
#define MBSTRING_ASC (MBSTRING_FLAG | 1)
#define MBSTRING_BMP (MBSTRING_FLAG | 2)
#define MBSTRING_UNIV (MBSTRING_FLAG | 4)
#define SMIME_OLDMIME 0x400
#define SMIME_CRLFEOL 0x800
#define SMIME_STREAM 0x1000

/* Stacks for types not otherwise defined in this header */
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_ALGOR, X509_ALGOR, X509_ALGOR)
#define sk_X509_ALGOR_num(sk) OPENSSL_sk_num(ossl_check_const_X509_ALGOR_sk_type(sk))
#define sk_X509_ALGOR_value(sk, idx) ((X509_ALGOR
*)OPENSSL_sk_value(ossl_check_const_X509_ALGOR_sk_type(sk), (idx)))
#define sk_X509_ALGOR_new(cmp)
 ((STACK_OF(X509_ALGOR) *)OPENSSL_sk_new(ossl_check_X509_ALGOR_compfunc_type(cmp)))
#define sk_X509_ALGOR_new_null() ((STACK_OF(X509_ALGOR) *)OPENSSL_sk_new_null())
#define sk_X509_ALGOR_new_reserve(cmp, n) ((STACK_OF(X509_ALGOR)
*)OPENSSL_sk_new_reserve(ossl_check_X509_ALGOR_compfunc_type(cmp), (n)))
#define sk_X509_ALGOR_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_ALGOR_sk_type(sk), (n))
#define sk_X509_ALGOR_free(sk) OPENSSL_sk_free(ossl_check_X509_ALGOR_sk_type(sk))
#define sk_X509_ALGOR_zero(sk) OPENSSL_sk_zero(ossl_check_X509_ALGOR_sk_type(sk))
#define sk_X509_ALGOR_delete(sk, i) ((X509_ALGOR
*)OPENSSL_sk_delete(ossl_check_X509_ALGOR_sk_type(sk), (i)))
#define sk_X509_ALGOR_delete_ptr(sk, ptr) ((X509_ALGOR
*)OPENSSL_sk_delete_ptr(ossl_check_X509_ALGOR_sk_type(sk), ossl_check_X509_ALGOR_type(ptr)))
#define sk_X509_ALGOR_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_ALGOR_sk_type(sk),
ossl_check_X509_ALGOR_type(ptr))
#define sk_X509_ALGOR_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_ALGOR_sk_type(sk),
 ossl_check_X509_ALGOR_type(ptr))
#define sk_X509_ALGOR_pop(sk) ((X509_ALGOR
*)OPENSSL_sk_pop(ossl_check_X509_ALGOR_sk_type(sk)))
#define sk_X509_ALGOR_shift(sk) ((X509_ALGOR
*)OPENSSL_sk_shift(ossl_check_X509_ALGOR_sk_type(sk)))
#define sk_X509_ALGOR_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_ALGOR_sk_type(sk),ossl_check_X509_ALGOR_freefunc_type(freefu
nc))
#define sk_X509_ALGOR_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_ALGOR_sk_type(sk),
ossl_check_X509_ALGOR_type(ptr), (idx))
#define sk_X509_ALGOR_set(sk, idx, ptr) ((X509_ALGOR
*)OPENSSL_sk_set(ossl_check_X509_ALGOR_sk_type(sk), (idx), ossl_check_X509_ALGOR_type(ptr)))
#define sk_X509_ALGOR_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_ALGOR_sk_type(sk),
ossl_check_X509_ALGOR_type(ptr))
#define sk_X509_ALGOR_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_ALGOR_sk_type(sk),
ossl_check_X509_ALGOR_type(ptr))
#define sk_X509_ALGOR_find_all(sk, ptr, pnum)
```

```
 OPENSSL_sk_find_all(ossl_check_X509_ALGOR_sk_type(sk), ossl_check_X509_ALGOR_type(ptr), pnum)
#define sk_X509_ALGOR_sort(sk) OPENSSL_sk_sort(ossl_check_X509_ALGOR_sk_type(sk))
#define sk_X509_ALGOR_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_X509_ALGOR_sk_type(sk))
#define sk_X509_ALGOR_dup(sk) ((STACK_OF(X509_ALGOR)
*)OPENSSL_sk_dup(ossl_check_const_X509_ALGOR_sk_type(sk)))
#define sk_X509_ALGOR_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_ALGOR)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_ALGOR_sk_type(sk),
ossl_check_X509_ALGOR_copyfunc_type(copyfunc), ossl_check_X509_ALGOR_freefunc_type(freefunc)))
#define sk_X509_ALGOR_set_cmp_func(sk, cmp)
((sk_X509_ALGOR_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_ALGOR_sk_type(sk),
ossl_check_X509_ALGOR_compfunc_type(cmp)))

/* clang-format on */

#define ASN1_STRING_FLAG_BITS_LEFT 0x08 /* Set if 0x07 has bits left value */
/*
* This indicates that the ASN1_STRING is not a real value but just a place
* holder for the location
 where indefinite length constructed data should be
* inserted in the memory buffer
*/
#define ASN1_STRING_FLAG_NDEF 0x010

/*
* This flag is used by the CMS code to indicate that a string is not
* complete and is a place holder for content when it had all been accessed.
* The flag will be reset when content has been written to it.
*/

#define ASN1_STRING_FLAG_CONT 0x020
/*
* This flag is used by ASN1 code to indicate an ASN1_STRING is an MSTRING
* type.
*/
#define ASN1_STRING_FLAG_MSTRING 0x040
/* String is embedded and only content should be freed */
#define ASN1_STRING_FLAG_EMBED 0x080
/* String should be parsed in RFC 5280's time format */
#define ASN1_STRING_FLAG_X509_TIME 0x100
/* This is the base type that holds just about everything :-) */
struct asn1_string_st {
   int length;
   int type;
   unsigned char *data;
   /*
    * The value of the following field depends on the type being held.  It
    * is mostly being used for BIT_STRING so if the input data has a
```

```
     * non-zero 'unused bits' value, it will be handled correctly
    */
   long flags;
};

/*
* ASN1_ENCODING structure: this is used to save the received encoding of an
* ASN1 type. This is useful to get round problems with invalid encodings
* which can break signatures.
*/

typedef struct ASN1_ENCODING_st {
   unsigned char *enc; /* DER encoding */
   long len; /* Length of encoding */
   int modified; /* set to 1 if 'enc' is invalid */
} ASN1_ENCODING;

/* Used with ASN1 LONG type: if a long is set to this it is omitted */
#define ASN1_LONG_UNDEF 0x7fffffffL

#define STABLE_FLAGS_MALLOC 0x01
/*
* A zero passed to ASN1_STRING_TABLE_new_add for the flags is interpreted
* as "don't change" and STABLE_FLAGS_MALLOC is always set. By setting
* STABLE_FLAGS_MALLOC only we can clear the existing value. Use the alias
* STABLE_FLAGS_CLEAR to reflect this.
*/
#define STABLE_FLAGS_CLEAR STABLE_FLAGS_MALLOC
#define STABLE_NO_MASK 0x02
#define DIRSTRING_TYPE \
   (B_ASN1_PRINTABLESTRING
 | B_ASN1_T61STRING | B_ASN1_BMPSTRING | B_ASN1_UTF8STRING)
#define PKCS9STRING_TYPE (DIRSTRING_TYPE | B_ASN1_IA5STRING)

struct asn1_string_table_st {
   int nid;
   long minsize;
   long maxsize;
   unsigned long mask;
   unsigned long flags;
};

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ASN1_STRING_TABLE, ASN1_STRING_TABLE,
ASN1_STRING_TABLE)
#define sk_ASN1_STRING_TABLE_num(sk)
OPENSSL_sk_num(ossl_check_const_ASN1_STRING_TABLE_sk_type(sk))
#define sk_ASN1_STRING_TABLE_value(sk, idx) ((ASN1_STRING_TABLE
```

```
*)OPENSSL_sk_value(ossl_check_const_ASN1_STRING_TABLE_sk_type(sk), (idx)))
#define sk_ASN1_STRING_TABLE_new(cmp) ((STACK_OF(ASN1_STRING_TABLE)
*)OPENSSL_sk_new(ossl_check_ASN1_STRING_TABLE_compfunc_type(cmp)))
#define sk_ASN1_STRING_TABLE_new_null() ((STACK_OF(ASN1_STRING_TABLE)
*)OPENSSL_sk_new_null())
#define sk_ASN1_STRING_TABLE_new_reserve(cmp, n) ((STACK_OF(ASN1_STRING_TABLE)
*)OPENSSL_sk_new_reserve(ossl_check_ASN1_STRING_TABLE_compfunc_type(cmp), (n)))
#define
 sk_ASN1_STRING_TABLE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_ASN1_STRING_TABLE_sk_type(sk), (n))
#define sk_ASN1_STRING_TABLE_free(sk)
OPENSSL_sk_free(ossl_check_ASN1_STRING_TABLE_sk_type(sk))
#define sk_ASN1_STRING_TABLE_zero(sk)
OPENSSL_sk_zero(ossl_check_ASN1_STRING_TABLE_sk_type(sk))
#define sk_ASN1_STRING_TABLE_delete(sk, i) ((ASN1_STRING_TABLE
*)OPENSSL_sk_delete(ossl_check_ASN1_STRING_TABLE_sk_type(sk), (i)))
#define sk_ASN1_STRING_TABLE_delete_ptr(sk, ptr) ((ASN1_STRING_TABLE
*)OPENSSL_sk_delete_ptr(ossl_check_ASN1_STRING_TABLE_sk_type(sk),
ossl_check_ASN1_STRING_TABLE_type(ptr)))
#define sk_ASN1_STRING_TABLE_push(sk, ptr)
OPENSSL_sk_push(ossl_check_ASN1_STRING_TABLE_sk_type(sk),
ossl_check_ASN1_STRING_TABLE_type(ptr))
#define sk_ASN1_STRING_TABLE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_ASN1_STRING_TABLE_sk_type(sk),
ossl_check_ASN1_STRING_TABLE_type(ptr))
#define sk_ASN1_STRING_TABLE_pop(sk) ((ASN1_STRING_TABLE
*)OPENSSL_sk_pop(ossl_check_ASN1_STRING_TABLE_sk_type(sk)))
#define
 sk_ASN1_STRING_TABLE_shift(sk) ((ASN1_STRING_TABLE
*)OPENSSL_sk_shift(ossl_check_ASN1_STRING_TABLE_sk_type(sk)))
#define sk_ASN1_STRING_TABLE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASN1_STRING_TABLE_sk_type(sk),ossl_check_ASN1_STRING_TABLE_
freefunc_type(freefunc))
#define sk_ASN1_STRING_TABLE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_ASN1_STRING_TABLE_sk_type(sk),
ossl_check_ASN1_STRING_TABLE_type(ptr), (idx))
#define sk_ASN1_STRING_TABLE_set(sk, idx, ptr) ((ASN1_STRING_TABLE
*)OPENSSL_sk_set(ossl_check_ASN1_STRING_TABLE_sk_type(sk), (idx),
ossl_check_ASN1_STRING_TABLE_type(ptr)))
#define sk_ASN1_STRING_TABLE_find(sk, ptr)
OPENSSL_sk_find(ossl_check_ASN1_STRING_TABLE_sk_type(sk),
ossl_check_ASN1_STRING_TABLE_type(ptr))
#define sk_ASN1_STRING_TABLE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_ASN1_STRING_TABLE_sk_type(sk),
ossl_check_ASN1_STRING_TABLE_type(ptr))
#define sk_ASN1_STRING_TABLE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ASN1_STRING_TABLE_sk_type(sk),
```

```
 ossl_check_ASN1_STRING_TABLE_type(ptr), pnum)
#define sk_ASN1_STRING_TABLE_sort(sk)
OPENSSL_sk_sort(ossl_check_ASN1_STRING_TABLE_sk_type(sk))
#define sk_ASN1_STRING_TABLE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_ASN1_STRING_TABLE_sk_type(sk))
#define sk_ASN1_STRING_TABLE_dup(sk) ((STACK_OF(ASN1_STRING_TABLE)
*)OPENSSL_sk_dup(ossl_check_const_ASN1_STRING_TABLE_sk_type(sk)))
#define sk_ASN1_STRING_TABLE_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ASN1_STRING_TABLE)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASN1_STRING_TABLE_sk_type(sk),
ossl_check_ASN1_STRING_TABLE_copyfunc_type(copyfunc),
ossl_check_ASN1_STRING_TABLE_freefunc_type(freefunc)))
#define sk_ASN1_STRING_TABLE_set_cmp_func(sk, cmp)
((sk_ASN1_STRING_TABLE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASN1_STRING_TABLE_sk_t
ype(sk), ossl_check_ASN1_STRING_TABLE_compfunc_type(cmp)))

/* clang-format on */

/* size limits: this stuff is taken straight from RFC2459 */

#define ub_name 32768
#define
 ub_common_name 64
#define ub_locality_name 128
#define ub_state_name 128
#define ub_organization_name 64
#define ub_organization_unit_name 64
#define ub_title 64
#define ub_email_address 128

/*
* Declarations for template structures: for full definitions see asn1t.h
*/
typedef struct ASN1_TEMPLATE_st ASN1_TEMPLATE;
typedef struct ASN1_TLC_st ASN1_TLC;
/* This is just an opaque pointer */
typedef struct ASN1_VALUE_st ASN1_VALUE;

/* Declare ASN1 functions: the implement macro is in asn1t.h */

/*
* The mysterious 'extern' that's passed to some macros is innocuous,
* and is there to quiet pre-C99 compilers that may complain about empty
* arguments in macro calls.
*/

#define DECLARE_ASN1_FUNCTIONS_attr(attr, type) \
   DECLARE_ASN1_FUNCTIONS_name_attr(attr, type, type)
#define DECLARE_ASN1_FUNCTIONS(type) \
```

```
  DECLARE_ASN1_FUNCTIONS_attr(extern, type)

#define DECLARE_ASN1_ALLOC_FUNCTIONS_attr(attr, type) \
  DECLARE_ASN1_ALLOC_FUNCTIONS_name_attr(attr, type, type)
#define
 DECLARE_ASN1_ALLOC_FUNCTIONS(type) \
  DECLARE_ASN1_ALLOC_FUNCTIONS_attr(extern, type)

#define DECLARE_ASN1_FUNCTIONS_name_attr(attr, type, name)   \
  DECLARE_ASN1_ALLOC_FUNCTIONS_name_attr(attr, type, name) \
  DECLARE_ASN1_ENCODE_FUNCTIONS_name_attr(attr, type, name)
#define DECLARE_ASN1_FUNCTIONS_name(type, name) \
  DECLARE_ASN1_FUNCTIONS_name_attr(extern, type, name)

#define DECLARE_ASN1_ENCODE_FUNCTIONS_attr(attr, type, itname, name) \
  DECLARE_ASN1_ENCODE_FUNCTIONS_only_attr(attr, type, name)       \
  DECLARE_ASN1_ITEM_attr(attr, itname)
#define DECLARE_ASN1_ENCODE_FUNCTIONS(type, itname, name) \
  DECLARE_ASN1_ENCODE_FUNCTIONS_attr(extern, type, itname, name)

#define DECLARE_ASN1_ENCODE_FUNCTIONS_name_attr(attr, type, name) \
  DECLARE_ASN1_ENCODE_FUNCTIONS_attr(attr, type, name, name)
#define DECLARE_ASN1_ENCODE_FUNCTIONS_name(type, name) \
  DECLARE_ASN1_ENCODE_FUNCTIONS_name_attr(extern, type, name)

#define DECLARE_ASN1_ENCODE_FUNCTIONS_only_attr(attr,
 type, name)       \
  attr type *d2i_##name(type **a, const unsigned char **in, long len); \
  attr int i2d_##name(const type *a, unsigned char **out);
#define DECLARE_ASN1_ENCODE_FUNCTIONS_only(type, name) \
  DECLARE_ASN1_ENCODE_FUNCTIONS_only_attr(extern, type, name)

#define DECLARE_ASN1_NDEF_FUNCTION_attr(attr, name) \
  attr int i2d_##name##_NDEF(const name *a, unsigned char **out);
#define DECLARE_ASN1_NDEF_FUNCTION(name) \
  DECLARE_ASN1_NDEF_FUNCTION_attr(extern, name)

#define DECLARE_ASN1_ALLOC_FUNCTIONS_name_attr(attr, type, name) \
  attr type *name##_new(void);                              \
  attr void name##_free(type *a);
#define DECLARE_ASN1_ALLOC_FUNCTIONS_name(type, name) \
  DECLARE_ASN1_ALLOC_FUNCTIONS_name_attr(extern, type, name)

#define DECLARE_ASN1_DUP_FUNCTION_attr(attr, type) \
  DECLARE_ASN1_DUP_FUNCTION_name_attr(attr, type, type)
#define DECLARE_ASN1_DUP_FUNCTION(type) \
  DECLARE_ASN1_DUP_FUNCTION_attr(extern, type)
```

```
#define
 DECLARE_ASN1_DUP_FUNCTION_name_attr(attr, type, name) \
   attr type *name##_dup(const type *a);
#define DECLARE_ASN1_DUP_FUNCTION_name(type, name) \
   DECLARE_ASN1_DUP_FUNCTION_name_attr(extern, type, name)

#define DECLARE_ASN1_PRINT_FUNCTION_attr(attr, stname) \
   DECLARE_ASN1_PRINT_FUNCTION_fname_attr(attr, stname, stname)
#define DECLARE_ASN1_PRINT_FUNCTION(stname) \
   DECLARE_ASN1_PRINT_FUNCTION_attr(extern, stname)

#define DECLARE_ASN1_PRINT_FUNCTION_fname_attr(attr, stname, fname)   \
   attr int fname##_print_ctx(BIO *out, const stname *x, int indent, \
       const ASN1_PCTX *pctx);
#define DECLARE_ASN1_PRINT_FUNCTION_fname(stname, fname) \
   DECLARE_ASN1_PRINT_FUNCTION_fname_attr(extern, stname, fname)

#define D2I_OF(type) type *(*)(type **, const unsigned char **, long)
#define I2D_OF(type) int (*)(const type *, unsigned char **)

#define CHECKED_D2I_OF(type, d2i) \
   ((d2i_of_void *)(1 ? d2i : ((D2I_OF(type))0)))
#define CHECKED_I2D_OF(type, i2d) \

  ((i2d_of_void *)(1 ? i2d : ((I2D_OF(type))0)))
#define CHECKED_NEW_OF(type, xnew) \
   ((void *(*)(void))(1 ? xnew : ((type * (*)(void))0)))
#define CHECKED_PTR_OF(type, p) \
   ((void *)(1 ? p : (type *)0))
#define CHECKED_PPTR_OF(type, p) \
   ((void **)(1 ? p : (type **)0))

#define TYPEDEF_D2I_OF(type) typedef type *d2i_of_##type(type **, const unsigned char **, long)
#define TYPEDEF_I2D_OF(type) typedef int i2d_of_##type(const type *, unsigned char **)
#define TYPEDEF_D2I2D_OF(type) \
   TYPEDEF_D2I_OF(type);      \
   TYPEDEF_I2D_OF(type)

typedef void *d2i_of_void(void **, const unsigned char **, long);
typedef int i2d_of_void(const void *, unsigned char **);
typedef int OSSL_i2d_of_void_ctx(const void *, unsigned char **, void *vctx);

/*-
* The following macros and typedefs allow an ASN1_ITEM
* to be embedded in a structure and referenced. Since
* the ASN1_ITEM pointers need to be globally accessible
* (possibly from shared libraries) they may exist in
* different forms.
```

```
 On platforms that support it the
* ASN1_ITEM structure itself will be globally exported.
* Other platforms will export a function that returns
* an ASN1_ITEM pointer.
*
* To handle both cases transparently the macros below
* should be used instead of hard coding an ASN1_ITEM
* pointer in a structure.
*
* The structure will look like this:
*
* typedef struct SOMETHING_st {
*      ...
*      ASN1_ITEM_EXP *iptr;
*      ...
* } SOMETHING;
*
* It would be initialised as e.g.:
*
* SOMETHING somevar = {...,ASN1_ITEM_ref(X509),...};
*
* and the actual pointer extracted with:
*
* const ASN1_ITEM *it = ASN1_ITEM_ptr(somevar.iptr);
*
* Finally an ASN1_ITEM pointer can be extracted from an
* appropriate reference with: ASN1_ITEM_rptr(X509). This
* would be used when a function takes an ASN1_ITEM * argument.
*
*/

/*
* Platforms that can't easily handle shared global variables are declared as
* functions returning ASN1_ITEM pointers.
*/

/* ASN1_ITEM pointer exported
 type */
typedef const ASN1_ITEM *ASN1_ITEM_EXP(void);

/* Macro to obtain ASN1_ITEM pointer from exported type */
#define ASN1_ITEM_ptr(iptr) (iptr())

/* Macro to include ASN1_ITEM pointer from base type */
#define ASN1_ITEM_ref(iptr) (iptr##_it)

#define ASN1_ITEM_rptr(ref) (ref##_it())
```

```
#define DECLARE_ASN1_ITEM_attr(attr, name) \
   attr const ASN1_ITEM *name##_it(void);
#define DECLARE_ASN1_ITEM(name) \
   DECLARE_ASN1_ITEM_attr(extern, name)

/* Parameters used by ASN1_STRING_print_ex() */

/*
* These determine which characters to escape: RFC2253 special characters,
* control characters and MSB set characters
*/

#define ASN1_STRFLGS_ESC_2253 1
#define ASN1_STRFLGS_ESC_CTRL 2
#define ASN1_STRFLGS_ESC_MSB 4

/* Lower 8 bits are reserved as an output type specifier */
#define ASN1_DTFLGS_TYPE_MASK 0x0FUL
#define ASN1_DTFLGS_RFC822 0x00UL
#define ASN1_DTFLGS_ISO8601 0x01UL

/*
* This flag determines how we do escaping: normally RC2253 backslash only,
* set this to use
 backslash and quote.
*/

#define ASN1_STRFLGS_ESC_QUOTE 8

/* These three flags are internal use only. */

/* Character is a valid PrintableString character */
#define CHARTYPE_PRINTABLESTRING 0x10
/* Character needs escaping if it is the first character */
#define CHARTYPE_FIRST_ESC_2253 0x20
/* Character needs escaping if it is the last character */
#define CHARTYPE_LAST_ESC_2253 0x40

/*
* NB the internal flags are safely reused below by flags handled at the top
* level.
*/

/*
* If this is set we convert all character strings to UTF8 first
*/

#define ASN1_STRFLGS_UTF8_CONVERT 0x10
```

```
/*
* If this is set we don't attempt to interpret content: just assume all
* strings are 1 byte per character. This will produce some pretty odd
* looking output!
*/

#define ASN1_STRFLGS_IGNORE_TYPE 0x20

/* If this is set we include the string type in the output */
#define ASN1_STRFLGS_SHOW_TYPE 0x40

/*
* This determines which strings to display and which to 'dump' (hex dump of
* content
 octets or DER encoding). We can only dump non character strings or
* everything. If we don't dump 'unknown' they are interpreted as character
* strings with 1 octet per character and are subject to the usual escaping
* options.
*/

#define ASN1_STRFLGS_DUMP_ALL 0x80
#define ASN1_STRFLGS_DUMP_UNKNOWN 0x100

/*
* These determine what 'dumping' does, we can dump the content octets or the
* DER encoding: both use the RFC2253 #XXXXX notation.
*/

#define ASN1_STRFLGS_DUMP_DER 0x200

/*
* This flag specifies that RC2254 escaping shall be performed.
*/
#define ASN1_STRFLGS_ESC_2254 0x400

/*
* All the string flags consistent with RFC2253, escaping control characters
* isn't essential in RFC2253 but it is advisable anyway.
*/

#define ASN1_STRFLGS_RFC2253 (ASN1_STRFLGS_ESC_2253 | ASN1_STRFLGS_ESC_CTRL |
ASN1_STRFLGS_ESC_MSB | ASN1_STRFLGS_UTF8_CONVERT | ASN1_STRFLGS_DUMP_UNKNOWN |
ASN1_STRFLGS_DUMP_DER)

struct asn1_type_st {
   int type;
   union {
```

```
      char *ptr;
      ASN1_BOOLEAN
 boolean;
      ASN1_STRING *asn1_string;
      ASN1_OBJECT *object;
      ASN1_INTEGER *integer;
      ASN1_ENUMERATED *enumerated;
      ASN1_BIT_STRING *bit_string;
      ASN1_OCTET_STRING *octet_string;
      ASN1_PRINTABLESTRING *printablestring;
      ASN1_T61STRING *t61string;
      ASN1_IA5STRING *ia5string;
      ASN1_GENERALSTRING *generalstring;
      ASN1_BMPSTRING *bmpstring;
      ASN1_UNIVERSALSTRING *universalstring;
      ASN1_UTCTIME *utctime;
      ASN1_GENERALIZEDTIME *generalizedtime;
      ASN1_VISIBLESTRING *visiblestring;
      ASN1_UTF8STRING *utf8string;
      /*
       * set and sequence are left complete and still contain the set or
       * sequence bytes
       */
      ASN1_STRING *set;
      ASN1_STRING *sequence;
      ASN1_VALUE *asn1_value;
   } value;
};

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ASN1_TYPE, ASN1_TYPE, ASN1_TYPE)
#define sk_ASN1_TYPE_num(sk) OPENSSL_sk_num(ossl_check_const_ASN1_TYPE_sk_type(sk))
#define
 sk_ASN1_TYPE_value(sk, idx) ((ASN1_TYPE
*)OPENSSL_sk_value(ossl_check_const_ASN1_TYPE_sk_type(sk), (idx)))
#define sk_ASN1_TYPE_new(cmp) ((STACK_OF(ASN1_TYPE)
*)OPENSSL_sk_new(ossl_check_ASN1_TYPE_compfunc_type(cmp)))
#define sk_ASN1_TYPE_new_null() ((STACK_OF(ASN1_TYPE) *)OPENSSL_sk_new_null())
#define sk_ASN1_TYPE_new_reserve(cmp, n) ((STACK_OF(ASN1_TYPE)
*)OPENSSL_sk_new_reserve(ossl_check_ASN1_TYPE_compfunc_type(cmp), (n)))
#define sk_ASN1_TYPE_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_ASN1_TYPE_sk_type(sk), (n))
#define sk_ASN1_TYPE_free(sk) OPENSSL_sk_free(ossl_check_ASN1_TYPE_sk_type(sk))
#define sk_ASN1_TYPE_zero(sk) OPENSSL_sk_zero(ossl_check_ASN1_TYPE_sk_type(sk))
#define sk_ASN1_TYPE_delete(sk, i) ((ASN1_TYPE
*)OPENSSL_sk_delete(ossl_check_ASN1_TYPE_sk_type(sk), (i)))
#define sk_ASN1_TYPE_delete_ptr(sk, ptr) ((ASN1_TYPE
*)OPENSSL_sk_delete_ptr(ossl_check_ASN1_TYPE_sk_type(sk), ossl_check_ASN1_TYPE_type(ptr)))
#define sk_ASN1_TYPE_push(sk,
```

```
 ptr) OPENSSL_sk_push(ossl_check_ASN1_TYPE_sk_type(sk), ossl_check_ASN1_TYPE_type(ptr))
#define sk_ASN1_TYPE_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_ASN1_TYPE_sk_type(sk),
ossl_check_ASN1_TYPE_type(ptr))
#define sk_ASN1_TYPE_pop(sk) ((ASN1_TYPE *)OPENSSL_sk_pop(ossl_check_ASN1_TYPE_sk_type(sk)))
#define sk_ASN1_TYPE_shift(sk) ((ASN1_TYPE *)OPENSSL_sk_shift(ossl_check_ASN1_TYPE_sk_type(sk)))
#define sk_ASN1_TYPE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASN1_TYPE_sk_type(sk),ossl_check_ASN1_TYPE_freefunc_type(freefunc))
#define sk_ASN1_TYPE_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_ASN1_TYPE_sk_type(sk),
ossl_check_ASN1_TYPE_type(ptr), (idx))
#define sk_ASN1_TYPE_set(sk, idx, ptr) ((ASN1_TYPE
*)OPENSSL_sk_set(ossl_check_ASN1_TYPE_sk_type(sk), (idx), ossl_check_ASN1_TYPE_type(ptr)))
#define sk_ASN1_TYPE_find(sk, ptr) OPENSSL_sk_find(ossl_check_ASN1_TYPE_sk_type(sk),
ossl_check_ASN1_TYPE_type(ptr))
#define sk_ASN1_TYPE_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_ASN1_TYPE_sk_type(sk),
 ossl_check_ASN1_TYPE_type(ptr))
#define sk_ASN1_TYPE_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_ASN1_TYPE_sk_type(sk),
ossl_check_ASN1_TYPE_type(ptr), pnum)
#define sk_ASN1_TYPE_sort(sk) OPENSSL_sk_sort(ossl_check_ASN1_TYPE_sk_type(sk))
#define sk_ASN1_TYPE_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_ASN1_TYPE_sk_type(sk))
#define sk_ASN1_TYPE_dup(sk) ((STACK_OF(ASN1_TYPE)
*)OPENSSL_sk_dup(ossl_check_const_ASN1_TYPE_sk_type(sk)))
#define sk_ASN1_TYPE_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ASN1_TYPE)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASN1_TYPE_sk_type(sk),
ossl_check_ASN1_TYPE_copyfunc_type(copyfunc), ossl_check_ASN1_TYPE_freefunc_type(freefunc)))
#define sk_ASN1_TYPE_set_cmp_func(sk, cmp)
((sk_ASN1_TYPE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASN1_TYPE_sk_type(sk),
ossl_check_ASN1_TYPE_compfunc_type(cmp)))

/* clang-format on */

typedef STACK_OF(ASN1_TYPE) ASN1_SEQUENCE_ANY;

DECLARE_ASN1_ENCODE_FUNCTIONS_name(ASN1_SEQUENCE_ANY,
 ASN1_SEQUENCE_ANY)
DECLARE_ASN1_ENCODE_FUNCTIONS_name(ASN1_SEQUENCE_ANY, ASN1_SET_ANY)

/* This is used to contain a list of bit names */
typedef struct BIT_STRING_BITNAME_st {
   int bitnum;
   const char *lname;
   const char *sname;
} BIT_STRING_BITNAME;

#define B_ASN1_TIME \
   B_ASN1_UTCTIME | B_ASN1_GENERALIZEDTIME

#define B_ASN1_PRINTABLE \
   B_ASN1_NUMERICSTRING | B_ASN1_PRINTABLESTRING | B_ASN1_T61STRING |
```

```
B_ASN1_IA5STRING | B_ASN1_BIT_STRING | B_ASN1_UNIVERSALSTRING | B_ASN1_BMPSTRING |
B_ASN1_UTF8STRING | B_ASN1_SEQUENCE | B_ASN1_UNKNOWN

#define B_ASN1_DIRECTORYSTRING \
   B_ASN1_PRINTABLESTRING | B_ASN1_TELETEXSTRING | B_ASN1_BMPSTRING |
B_ASN1_UNIVERSALSTRING | B_ASN1_UTF8STRING

#define B_ASN1_DISPLAYTEXT \
   B_ASN1_IA5STRING | B_ASN1_VISIBLESTRING | B_ASN1_BMPSTRING | B_ASN1_UTF8STRING

DECLARE_ASN1_ALLOC_FUNCTIONS_name(ASN1_TYPE, ASN1_TYPE)
DECLARE_ASN1_ENCODE_FUNCTIONS(ASN1_TYPE, ASN1_ANY, ASN1_TYPE)

int ASN1_TYPE_get(const ASN1_TYPE *a);
void ASN1_TYPE_set(ASN1_TYPE
 *a, int type, void *value);
int ASN1_TYPE_set1(ASN1_TYPE *a, int type, const void *value);
int ASN1_TYPE_cmp(const ASN1_TYPE *a, const ASN1_TYPE *b);

ASN1_TYPE *ASN1_TYPE_pack_sequence(const ASN1_ITEM *it, void *s, ASN1_TYPE **t);
void *ASN1_TYPE_unpack_sequence(const ASN1_ITEM *it, const ASN1_TYPE *t);

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ASN1_OBJECT, ASN1_OBJECT, ASN1_OBJECT)
#define sk_ASN1_OBJECT_num(sk) OPENSSL_sk_num(ossl_check_const_ASN1_OBJECT_sk_type(sk))
#define sk_ASN1_OBJECT_value(sk, idx) ((ASN1_OBJECT
*)OPENSSL_sk_value(ossl_check_const_ASN1_OBJECT_sk_type(sk), (idx)))
#define sk_ASN1_OBJECT_new(cmp) ((STACK_OF(ASN1_OBJECT)
*)OPENSSL_sk_new(ossl_check_ASN1_OBJECT_compfunc_type(cmp)))
#define sk_ASN1_OBJECT_new_null() ((STACK_OF(ASN1_OBJECT) *)OPENSSL_sk_new_null())
#define sk_ASN1_OBJECT_new_reserve(cmp, n) ((STACK_OF(ASN1_OBJECT)
*)OPENSSL_sk_new_reserve(ossl_check_ASN1_OBJECT_compfunc_type(cmp), (n)))
#define sk_ASN1_OBJECT_reserve(sk,
 n) OPENSSL_sk_reserve(ossl_check_ASN1_OBJECT_sk_type(sk), (n))
#define sk_ASN1_OBJECT_free(sk) OPENSSL_sk_free(ossl_check_ASN1_OBJECT_sk_type(sk))
#define sk_ASN1_OBJECT_zero(sk) OPENSSL_sk_zero(ossl_check_ASN1_OBJECT_sk_type(sk))
#define sk_ASN1_OBJECT_delete(sk, i) ((ASN1_OBJECT
*)OPENSSL_sk_delete(ossl_check_ASN1_OBJECT_sk_type(sk), (i)))
#define sk_ASN1_OBJECT_delete_ptr(sk, ptr) ((ASN1_OBJECT
*)OPENSSL_sk_delete_ptr(ossl_check_ASN1_OBJECT_sk_type(sk), ossl_check_ASN1_OBJECT_type(ptr)))
#define sk_ASN1_OBJECT_push(sk, ptr) OPENSSL_sk_push(ossl_check_ASN1_OBJECT_sk_type(sk),
ossl_check_ASN1_OBJECT_type(ptr))
#define sk_ASN1_OBJECT_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_ASN1_OBJECT_sk_type(sk),
ossl_check_ASN1_OBJECT_type(ptr))
#define sk_ASN1_OBJECT_pop(sk) ((ASN1_OBJECT
*)OPENSSL_sk_pop(ossl_check_ASN1_OBJECT_sk_type(sk)))
#define sk_ASN1_OBJECT_shift(sk) ((ASN1_OBJECT
*)OPENSSL_sk_shift(ossl_check_ASN1_OBJECT_sk_type(sk)))
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#define sk_ASN1_OBJECT_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASN1_OBJECT_sk_type(sk),ossl_check_ASN1_OBJECT_freefunc_type(free
func))
#define sk_ASN1_OBJECT_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_ASN1_OBJECT_sk_type(sk),
ossl_check_ASN1_OBJECT_type(ptr), (idx))
#define sk_ASN1_OBJECT_set(sk, idx, ptr) ((ASN1_OBJECT
*)OPENSSL_sk_set(ossl_check_ASN1_OBJECT_sk_type(sk), (idx), ossl_check_ASN1_OBJECT_type(ptr)))
#define sk_ASN1_OBJECT_find(sk, ptr) OPENSSL_sk_find(ossl_check_ASN1_OBJECT_sk_type(sk),
ossl_check_ASN1_OBJECT_type(ptr))
#define sk_ASN1_OBJECT_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_ASN1_OBJECT_sk_type(sk),
ossl_check_ASN1_OBJECT_type(ptr))
#define sk_ASN1_OBJECT_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ASN1_OBJECT_sk_type(sk), ossl_check_ASN1_OBJECT_type(ptr), pnum)
#define sk_ASN1_OBJECT_sort(sk) OPENSSL_sk_sort(ossl_check_ASN1_OBJECT_sk_type(sk))
#define sk_ASN1_OBJECT_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_ASN1_OBJECT_sk_type(sk))
#define sk_ASN1_OBJECT_dup(sk)
 ((STACK_OF(ASN1_OBJECT) *)OPENSSL_sk_dup(ossl_check_const_ASN1_OBJECT_sk_type(sk)))
#define sk_ASN1_OBJECT_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ASN1_OBJECT)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASN1_OBJECT_sk_type(sk),
ossl_check_ASN1_OBJECT_copyfunc_type(copyfunc), ossl_check_ASN1_OBJECT_freefunc_type(freefunc)))
#define sk_ASN1_OBJECT_set_cmp_func(sk, cmp)
((sk_ASN1_OBJECT_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASN1_OBJECT_sk_type(sk),
ossl_check_ASN1_OBJECT_compfunc_type(cmp)))

/* clang-format on */

DECLARE_ASN1_FUNCTIONS(ASN1_OBJECT)

ASN1_STRING *ASN1_STRING_new(void);
void ASN1_STRING_free(ASN1_STRING *a);
void ASN1_STRING_clear_free(ASN1_STRING *a);
int ASN1_STRING_copy(ASN1_STRING *dst, const ASN1_STRING *str);
DECLARE_ASN1_DUP_FUNCTION(ASN1_STRING)
ASN1_STRING *ASN1_STRING_type_new(int type);
int ASN1_STRING_cmp(const ASN1_STRING *a, const ASN1_STRING *b);
/*
* Since this is used to store all sorts of things, via macros, for now,
* make its data void *
*/
int
 ASN1_STRING_set(ASN1_STRING *str, const void *data, int len);
void ASN1_STRING_set0(ASN1_STRING *str, void *data, int len);
int ASN1_STRING_length(const ASN1_STRING *x);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 void ASN1_STRING_length_set(ASN1_STRING *x, int n);
#endif
int ASN1_STRING_type(const ASN1_STRING *x);
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#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 unsigned char *ASN1_STRING_data(ASN1_STRING *x);
#endif
const unsigned char *ASN1_STRING_get0_data(const ASN1_STRING *x);

DECLARE_ASN1_FUNCTIONS(ASN1_BIT_STRING)
int ASN1_BIT_STRING_set(ASN1_BIT_STRING *a, unsigned char *d, int length);
int ASN1_BIT_STRING_set_bit(ASN1_BIT_STRING *a, int n, int value);
int ASN1_BIT_STRING_get_bit(const ASN1_BIT_STRING *a, int n);
int ASN1_BIT_STRING_check(const ASN1_BIT_STRING *a,
   const unsigned char *flags, int flags_len);

int ASN1_BIT_STRING_name_print(BIO *out, ASN1_BIT_STRING *bs,
   BIT_STRING_BITNAME *tbl, int indent);
int ASN1_BIT_STRING_num_asc(const
 char *name, BIT_STRING_BITNAME *tbl);
int ASN1_BIT_STRING_set_asc(ASN1_BIT_STRING *bs, const char *name, int value,
   BIT_STRING_BITNAME *tbl);

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ASN1_INTEGER, ASN1_INTEGER, ASN1_INTEGER)
#define sk_ASN1_INTEGER_num(sk) OPENSSL_sk_num(ossl_check_const_ASN1_INTEGER_sk_type(sk))
#define sk_ASN1_INTEGER_value(sk, idx) ((ASN1_INTEGER
*)OPENSSL_sk_value(ossl_check_const_ASN1_INTEGER_sk_type(sk), (idx)))
#define sk_ASN1_INTEGER_new(cmp) ((STACK_OF(ASN1_INTEGER)
*)OPENSSL_sk_new(ossl_check_ASN1_INTEGER_compfunc_type(cmp)))
#define sk_ASN1_INTEGER_new_null() ((STACK_OF(ASN1_INTEGER) *)OPENSSL_sk_new_null())
#define sk_ASN1_INTEGER_new_reserve(cmp, n) ((STACK_OF(ASN1_INTEGER)
*)OPENSSL_sk_new_reserve(ossl_check_ASN1_INTEGER_compfunc_type(cmp), (n)))
#define sk_ASN1_INTEGER_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_ASN1_INTEGER_sk_type(sk),
(n))
#define sk_ASN1_INTEGER_free(sk) OPENSSL_sk_free(ossl_check_ASN1_INTEGER_sk_type(sk))
#define sk_ASN1_INTEGER_zero(sk)
 OPENSSL_sk_zero(ossl_check_ASN1_INTEGER_sk_type(sk))
#define sk_ASN1_INTEGER_delete(sk, i) ((ASN1_INTEGER
*)OPENSSL_sk_delete(ossl_check_ASN1_INTEGER_sk_type(sk), (i)))
#define sk_ASN1_INTEGER_delete_ptr(sk, ptr) ((ASN1_INTEGER
*)OPENSSL_sk_delete_ptr(ossl_check_ASN1_INTEGER_sk_type(sk), ossl_check_ASN1_INTEGER_type(ptr)))
#define sk_ASN1_INTEGER_push(sk, ptr) OPENSSL_sk_push(ossl_check_ASN1_INTEGER_sk_type(sk),
ossl_check_ASN1_INTEGER_type(ptr))
#define sk_ASN1_INTEGER_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_ASN1_INTEGER_sk_type(sk),
ossl_check_ASN1_INTEGER_type(ptr))
#define sk_ASN1_INTEGER_pop(sk) ((ASN1_INTEGER
*)OPENSSL_sk_pop(ossl_check_ASN1_INTEGER_sk_type(sk)))
#define sk_ASN1_INTEGER_shift(sk) ((ASN1_INTEGER
*)OPENSSL_sk_shift(ossl_check_ASN1_INTEGER_sk_type(sk)))
#define sk_ASN1_INTEGER_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASN1_INTEGER_sk_type(sk),ossl_check_ASN1_INTEGER_freefunc_type(f
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reefunc))
#define sk_ASN1_INTEGER_insert(sk,
 ptr, idx) OPENSSL_sk_insert(ossl_check_ASN1_INTEGER_sk_type(sk), ossl_check_ASN1_INTEGER_type(ptr),
(idx))
#define sk_ASN1_INTEGER_set(sk, idx, ptr) ((ASN1_INTEGER
*)OPENSSL_sk_set(ossl_check_ASN1_INTEGER_sk_type(sk), (idx), ossl_check_ASN1_INTEGER_type(ptr)))
#define sk_ASN1_INTEGER_find(sk, ptr) OPENSSL_sk_find(ossl_check_ASN1_INTEGER_sk_type(sk),
ossl_check_ASN1_INTEGER_type(ptr))
#define sk_ASN1_INTEGER_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_ASN1_INTEGER_sk_type(sk),
ossl_check_ASN1_INTEGER_type(ptr))
#define sk_ASN1_INTEGER_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ASN1_INTEGER_sk_type(sk), ossl_check_ASN1_INTEGER_type(ptr), pnum)
#define sk_ASN1_INTEGER_sort(sk) OPENSSL_sk_sort(ossl_check_ASN1_INTEGER_sk_type(sk))
#define sk_ASN1_INTEGER_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_ASN1_INTEGER_sk_type(sk))
#define sk_ASN1_INTEGER_dup(sk) ((STACK_OF(ASN1_INTEGER)
*)OPENSSL_sk_dup(ossl_check_const_ASN1_INTEGER_sk_type(sk)))
#define sk_ASN1_INTEGER_deep_copy(sk,
 copyfunc, freefunc) ((STACK_OF(ASN1_INTEGER)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASN1_INTEGER_sk_type(sk),
ossl_check_ASN1_INTEGER_copyfunc_type(copyfunc), ossl_check_ASN1_INTEGER_freefunc_type(freefunc)))
#define sk_ASN1_INTEGER_set_cmp_func(sk, cmp)
((sk_ASN1_INTEGER_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASN1_INTEGER_sk_type(sk),
ossl_check_ASN1_INTEGER_compfunc_type(cmp)))

/* clang-format on */

DECLARE_ASN1_FUNCTIONS(ASN1_INTEGER)
ASN1_INTEGER *d2i_ASN1_UINTEGER(ASN1_INTEGER **a, const unsigned char **pp,
   long length);
DECLARE_ASN1_DUP_FUNCTION(ASN1_INTEGER)
int ASN1_INTEGER_cmp(const ASN1_INTEGER *x, const ASN1_INTEGER *y);

DECLARE_ASN1_FUNCTIONS(ASN1_ENUMERATED)

int ASN1_UTCTIME_check(const ASN1_UTCTIME *a);
ASN1_UTCTIME *ASN1_UTCTIME_set(ASN1_UTCTIME *s, time_t t);
ASN1_UTCTIME *ASN1_UTCTIME_adj(ASN1_UTCTIME *s, time_t t,
   int offset_day, long offset_sec);
int ASN1_UTCTIME_set_string(ASN1_UTCTIME *s, const char *str);
int ASN1_UTCTIME_cmp_time_t(const
 ASN1_UTCTIME *s, time_t t);

int ASN1_GENERALIZEDTIME_check(const ASN1_GENERALIZEDTIME *a);
ASN1_GENERALIZEDTIME *ASN1_GENERALIZEDTIME_set(ASN1_GENERALIZEDTIME *s,
   time_t t);
ASN1_GENERALIZEDTIME *ASN1_GENERALIZEDTIME_adj(ASN1_GENERALIZEDTIME *s,
   time_t t, int offset_day,
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   long offset_sec);
int ASN1_GENERALIZEDTIME_set_string(ASN1_GENERALIZEDTIME *s, const char *str);

int ASN1_TIME_diff(int *pday, int *psec,
   const ASN1_TIME *from, const ASN1_TIME *to);

DECLARE_ASN1_FUNCTIONS(ASN1_OCTET_STRING)
DECLARE_ASN1_DUP_FUNCTION(ASN1_OCTET_STRING)
int ASN1_OCTET_STRING_cmp(const ASN1_OCTET_STRING *a,
   const ASN1_OCTET_STRING *b);
int ASN1_OCTET_STRING_set(ASN1_OCTET_STRING *str, const unsigned char *data,
   int len);

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ASN1_UTF8STRING, ASN1_UTF8STRING, ASN1_UTF8STRING)
#define sk_ASN1_UTF8STRING_num(sk)
OPENSSL_sk_num(ossl_check_const_ASN1_UTF8STRING_sk_type(sk))
#define sk_ASN1_UTF8STRING_value(sk, idx) ((ASN1_UTF8STRING
 *)OPENSSL_sk_value(ossl_check_const_ASN1_UTF8STRING_sk_type(sk), (idx)))
#define sk_ASN1_UTF8STRING_new(cmp) ((STACK_OF(ASN1_UTF8STRING)
*)OPENSSL_sk_new(ossl_check_ASN1_UTF8STRING_compfunc_type(cmp)))
#define sk_ASN1_UTF8STRING_new_null() ((STACK_OF(ASN1_UTF8STRING) *)OPENSSL_sk_new_null())
#define sk_ASN1_UTF8STRING_new_reserve(cmp, n) ((STACK_OF(ASN1_UTF8STRING)
*)OPENSSL_sk_new_reserve(ossl_check_ASN1_UTF8STRING_compfunc_type(cmp), (n)))
#define sk_ASN1_UTF8STRING_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_ASN1_UTF8STRING_sk_type(sk), (n))
#define sk_ASN1_UTF8STRING_free(sk) OPENSSL_sk_free(ossl_check_ASN1_UTF8STRING_sk_type(sk))
#define sk_ASN1_UTF8STRING_zero(sk) OPENSSL_sk_zero(ossl_check_ASN1_UTF8STRING_sk_type(sk))
#define sk_ASN1_UTF8STRING_delete(sk, i) ((ASN1_UTF8STRING
*)OPENSSL_sk_delete(ossl_check_ASN1_UTF8STRING_sk_type(sk), (i)))
#define sk_ASN1_UTF8STRING_delete_ptr(sk, ptr) ((ASN1_UTF8STRING
*)OPENSSL_sk_delete_ptr(ossl_check_ASN1_UTF8STRING_sk_type(sk),
ossl_check_ASN1_UTF8STRING_type(ptr)))
#define
 sk_ASN1_UTF8STRING_push(sk, ptr) OPENSSL_sk_push(ossl_check_ASN1_UTF8STRING_sk_type(sk),
ossl_check_ASN1_UTF8STRING_type(ptr))
#define sk_ASN1_UTF8STRING_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_ASN1_UTF8STRING_sk_type(sk),
ossl_check_ASN1_UTF8STRING_type(ptr))
#define sk_ASN1_UTF8STRING_pop(sk) ((ASN1_UTF8STRING
*)OPENSSL_sk_pop(ossl_check_ASN1_UTF8STRING_sk_type(sk)))
#define sk_ASN1_UTF8STRING_shift(sk) ((ASN1_UTF8STRING
*)OPENSSL_sk_shift(ossl_check_ASN1_UTF8STRING_sk_type(sk)))
#define sk_ASN1_UTF8STRING_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASN1_UTF8STRING_sk_type(sk),ossl_check_ASN1_UTF8STRING_freefun
c_type(freefunc))
#define sk_ASN1_UTF8STRING_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_ASN1_UTF8STRING_sk_type(sk), ossl_check_ASN1_UTF8STRING_type(ptr),
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(idx))
#define sk_ASN1_UTF8STRING_set(sk, idx, ptr) ((ASN1_UTF8STRING
*)OPENSSL_sk_set(ossl_check_ASN1_UTF8STRING_sk_type(sk), (idx),
ossl_check_ASN1_UTF8STRING_type(ptr)))
#define
 sk_ASN1_UTF8STRING_find(sk, ptr) OPENSSL_sk_find(ossl_check_ASN1_UTF8STRING_sk_type(sk),
ossl_check_ASN1_UTF8STRING_type(ptr))
#define sk_ASN1_UTF8STRING_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_ASN1_UTF8STRING_sk_type(sk),
ossl_check_ASN1_UTF8STRING_type(ptr))
#define sk_ASN1_UTF8STRING_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ASN1_UTF8STRING_sk_type(sk),
ossl_check_ASN1_UTF8STRING_type(ptr), pnum)
#define sk_ASN1_UTF8STRING_sort(sk) OPENSSL_sk_sort(ossl_check_ASN1_UTF8STRING_sk_type(sk))
#define sk_ASN1_UTF8STRING_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_ASN1_UTF8STRING_sk_type(sk))
#define sk_ASN1_UTF8STRING_dup(sk) ((STACK_OF(ASN1_UTF8STRING)
*)OPENSSL_sk_dup(ossl_check_const_ASN1_UTF8STRING_sk_type(sk)))
#define sk_ASN1_UTF8STRING_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ASN1_UTF8STRING)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASN1_UTF8STRING_sk_type(sk),
ossl_check_ASN1_UTF8STRING_copyfunc_type(copyfunc),
ossl_check_ASN1_UTF8STRING_freefunc_type(freefunc)))
#define
 sk_ASN1_UTF8STRING_set_cmp_func(sk, cmp)
((sk_ASN1_UTF8STRING_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASN1_UTF8STRING_sk_type(sk
), ossl_check_ASN1_UTF8STRING_compfunc_type(cmp)))

/* clang-format on */

DECLARE_ASN1_FUNCTIONS(ASN1_VISIBLESTRING)
DECLARE_ASN1_FUNCTIONS(ASN1_UNIVERSALSTRING)
DECLARE_ASN1_FUNCTIONS(ASN1_UTF8STRING)
DECLARE_ASN1_FUNCTIONS(ASN1_NULL)
DECLARE_ASN1_FUNCTIONS(ASN1_BMPSTRING)

int UTF8_getc(const unsigned char *str, int len, unsigned long *val);
int UTF8_putc(unsigned char *str, int len, unsigned long value);

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ASN1_GENERALSTRING, ASN1_GENERALSTRING,
ASN1_GENERALSTRING)
#define sk_ASN1_GENERALSTRING_num(sk)
OPENSSL_sk_num(ossl_check_const_ASN1_GENERALSTRING_sk_type(sk))
#define sk_ASN1_GENERALSTRING_value(sk, idx) ((ASN1_GENERALSTRING
*)OPENSSL_sk_value(ossl_check_const_ASN1_GENERALSTRING_sk_type(sk), (idx)))
#define sk_ASN1_GENERALSTRING_new(cmp) ((STACK_OF(ASN1_GENERALSTRING)
 *)OPENSSL_sk_new(ossl_check_ASN1_GENERALSTRING_compfunc_type(cmp)))
#define sk_ASN1_GENERALSTRING_new_null() ((STACK_OF(ASN1_GENERALSTRING)
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*)OPENSSL_sk_new_null())
#define sk_ASN1_GENERALSTRING_new_reserve(cmp, n) ((STACK_OF(ASN1_GENERALSTRING)
*)OPENSSL_sk_new_reserve(ossl_check_ASN1_GENERALSTRING_compfunc_type(cmp), (n)))
#define sk_ASN1_GENERALSTRING_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_ASN1_GENERALSTRING_sk_type(sk), (n))
#define sk_ASN1_GENERALSTRING_free(sk)
OPENSSL_sk_free(ossl_check_ASN1_GENERALSTRING_sk_type(sk))
#define sk_ASN1_GENERALSTRING_zero(sk)
OPENSSL_sk_zero(ossl_check_ASN1_GENERALSTRING_sk_type(sk))
#define sk_ASN1_GENERALSTRING_delete(sk, i) ((ASN1_GENERALSTRING
*)OPENSSL_sk_delete(ossl_check_ASN1_GENERALSTRING_sk_type(sk), (i)))
#define sk_ASN1_GENERALSTRING_delete_ptr(sk, ptr) ((ASN1_GENERALSTRING
*)OPENSSL_sk_delete_ptr(ossl_check_ASN1_GENERALSTRING_sk_type(sk),
ossl_check_ASN1_GENERALSTRING_type(ptr)))
#define sk_ASN1_GENERALSTRING_push(sk,
 ptr) OPENSSL_sk_push(ossl_check_ASN1_GENERALSTRING_sk_type(sk),
ossl_check_ASN1_GENERALSTRING_type(ptr))
#define sk_ASN1_GENERALSTRING_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_ASN1_GENERALSTRING_sk_type(sk),
ossl_check_ASN1_GENERALSTRING_type(ptr))
#define sk_ASN1_GENERALSTRING_pop(sk) ((ASN1_GENERALSTRING
*)OPENSSL_sk_pop(ossl_check_ASN1_GENERALSTRING_sk_type(sk)))
#define sk_ASN1_GENERALSTRING_shift(sk) ((ASN1_GENERALSTRING
*)OPENSSL_sk_shift(ossl_check_ASN1_GENERALSTRING_sk_type(sk)))
#define sk_ASN1_GENERALSTRING_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASN1_GENERALSTRING_sk_type(sk),ossl_check_ASN1_GENERALSTRI
NG_freefunc_type(freefunc))
#define sk_ASN1_GENERALSTRING_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_ASN1_GENERALSTRING_sk_type(sk),
ossl_check_ASN1_GENERALSTRING_type(ptr), (idx))
#define sk_ASN1_GENERALSTRING_set(sk, idx, ptr) ((ASN1_GENERALSTRING
*)OPENSSL_sk_set(ossl_check_ASN1_GENERALSTRING_sk_type(sk), (idx),
ossl_check_ASN1_GENERALSTRING_type(ptr)))
#define
 sk_ASN1_GENERALSTRING_find(sk, ptr)
OPENSSL_sk_find(ossl_check_ASN1_GENERALSTRING_sk_type(sk),
ossl_check_ASN1_GENERALSTRING_type(ptr))
#define sk_ASN1_GENERALSTRING_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_ASN1_GENERALSTRING_sk_type(sk),
ossl_check_ASN1_GENERALSTRING_type(ptr))
#define sk_ASN1_GENERALSTRING_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ASN1_GENERALSTRING_sk_type(sk),
ossl_check_ASN1_GENERALSTRING_type(ptr), pnum)
#define sk_ASN1_GENERALSTRING_sort(sk)
OPENSSL_sk_sort(ossl_check_ASN1_GENERALSTRING_sk_type(sk))
#define sk_ASN1_GENERALSTRING_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_ASN1_GENERALSTRING_sk_type(sk))
#define sk_ASN1_GENERALSTRING_dup(sk) ((STACK_OF(ASN1_GENERALSTRING)
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*)OPENSSL_sk_dup(ossl_check_const_ASN1_GENERALSTRING_sk_type(sk)))
#define sk_ASN1_GENERALSTRING_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(ASN1_GENERALSTRING)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASN1_GENERALSTRING_sk_type(sk),
ossl_check_ASN1_GENERALSTRING_copyfunc_type(copyfunc),
 ossl_check_ASN1_GENERALSTRING_freefunc_type(freefunc)))
#define sk_ASN1_GENERALSTRING_set_cmp_func(sk, cmp)
((sk_ASN1_GENERALSTRING_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASN1_GENERALSTRING
_sk_type(sk), ossl_check_ASN1_GENERALSTRING_compfunc_type(cmp)))

/* clang-format on */

DECLARE_ASN1_FUNCTIONS_name(ASN1_STRING, ASN1_PRINTABLE)

DECLARE_ASN1_FUNCTIONS_name(ASN1_STRING, DIRECTORYSTRING)
DECLARE_ASN1_FUNCTIONS_name(ASN1_STRING, DISPLAYTEXT)
DECLARE_ASN1_FUNCTIONS(ASN1_PRINTABLESTRING)
DECLARE_ASN1_FUNCTIONS(ASN1_T61STRING)
DECLARE_ASN1_FUNCTIONS(ASN1_IA5STRING)
DECLARE_ASN1_FUNCTIONS(ASN1_GENERALSTRING)
DECLARE_ASN1_FUNCTIONS(ASN1_UTCTIME)
DECLARE_ASN1_FUNCTIONS(ASN1_GENERALIZEDTIME)
DECLARE_ASN1_FUNCTIONS(ASN1_TIME)

DECLARE_ASN1_DUP_FUNCTION(ASN1_TIME)
DECLARE_ASN1_DUP_FUNCTION(ASN1_UTCTIME)
DECLARE_ASN1_DUP_FUNCTION(ASN1_GENERALIZEDTIME)

DECLARE_ASN1_ITEM(ASN1_OCTET_STRING_NDEF)

ASN1_TIME *ASN1_TIME_set(ASN1_TIME *s, time_t t);
ASN1_TIME
 *ASN1_TIME_adj(ASN1_TIME *s, time_t t,
   int offset_day, long offset_sec);
int ASN1_TIME_check(const ASN1_TIME *t);
ASN1_GENERALIZEDTIME *ASN1_TIME_to_generalizedtime(const ASN1_TIME *t,
   ASN1_GENERALIZEDTIME **out);
int ASN1_TIME_set_string(ASN1_TIME *s, const char *str);
int ASN1_TIME_set_string_X509(ASN1_TIME *s, const char *str);
int ASN1_TIME_to_tm(const ASN1_TIME *s, struct tm *tm);
int ASN1_TIME_normalize(ASN1_TIME *s);
int ASN1_TIME_cmp_time_t(const ASN1_TIME *s, time_t t);
int ASN1_TIME_compare(const ASN1_TIME *a, const ASN1_TIME *b);

int i2a_ASN1_INTEGER(BIO *bp, const ASN1_INTEGER *a);
int a2i_ASN1_INTEGER(BIO *bp, ASN1_INTEGER *bs, char *buf, int size);
int i2a_ASN1_ENUMERATED(BIO *bp, const ASN1_ENUMERATED *a);
int a2i_ASN1_ENUMERATED(BIO *bp, ASN1_ENUMERATED *bs, char *buf, int size);
```

```
int i2a_ASN1_OBJECT(BIO *bp, const ASN1_OBJECT *a);
int a2i_ASN1_STRING(BIO *bp, ASN1_STRING *bs, char *buf, int size);
int i2a_ASN1_STRING(BIO *bp, const ASN1_STRING *a, int type);
int
 i2t_ASN1_OBJECT(char *buf, int buf_len, const ASN1_OBJECT *a);

int a2d_ASN1_OBJECT(unsigned char *out, int olen, const char *buf, int num);
ASN1_OBJECT *ASN1_OBJECT_create(int nid, unsigned char *data, int len,
   const char *sn, const char *ln);

int ASN1_INTEGER_get_int64(int64_t *pr, const ASN1_INTEGER *a);
int ASN1_INTEGER_set_int64(ASN1_INTEGER *a, int64_t r);
int ASN1_INTEGER_get_uint64(uint64_t *pr, const ASN1_INTEGER *a);
int ASN1_INTEGER_set_uint64(ASN1_INTEGER *a, uint64_t r);

int ASN1_INTEGER_set(ASN1_INTEGER *a, long v);
long ASN1_INTEGER_get(const ASN1_INTEGER *a);
ASN1_INTEGER *BN_to_ASN1_INTEGER(const BIGNUM *bn, ASN1_INTEGER *ai);
BIGNUM *ASN1_INTEGER_to_BN(const ASN1_INTEGER *ai, BIGNUM *bn);

int ASN1_ENUMERATED_get_int64(int64_t *pr, const ASN1_ENUMERATED *a);
int ASN1_ENUMERATED_set_int64(ASN1_ENUMERATED *a, int64_t r);

int ASN1_ENUMERATED_set(ASN1_ENUMERATED *a, long v);
long ASN1_ENUMERATED_get(const ASN1_ENUMERATED *a);
ASN1_ENUMERATED *BN_to_ASN1_ENUMERATED(const
 BIGNUM *bn, ASN1_ENUMERATED *ai);
BIGNUM *ASN1_ENUMERATED_to_BN(const ASN1_ENUMERATED *ai, BIGNUM *bn);

/* General */
/* given a string, return the correct type, max is the maximum length */
int ASN1_PRINTABLE_type(const unsigned char *s, int max);

unsigned long ASN1_tag2bit(int tag);

/* SPECIALS */
int ASN1_get_object(const unsigned char **pp, long *plength, int *ptag,
   int *pclass, long omax);
int ASN1_check_infinite_end(unsigned char **p, long len);
int ASN1_const_check_infinite_end(const unsigned char **p, long len);
void ASN1_put_object(unsigned char **pp, int constructed, int length,
   int tag, int xclass);
int ASN1_put_eoc(unsigned char **pp);
int ASN1_object_size(int constructed, int length, int tag);

/* Used to implement other functions */
void *ASN1_dup(i2d_of_void *i2d, d2i_of_void *d2i, const void *x);
```

```
#define ASN1_dup_of(type, i2d, d2i, x)          \
  ((type *)ASN1_dup(CHECKED_I2D_OF(type, i2d), \
      CHECKED_D2I_OF(type, d2i),              \

     CHECKED_PTR_OF(const type, x)))

void *ASN1_item_dup(const ASN1_ITEM *it, const void *x);
int ASN1_item_sign_ex(const ASN1_ITEM *it, X509_ALGOR *algor1,
  X509_ALGOR *algor2, ASN1_BIT_STRING *signature,
  const void *data, const ASN1_OCTET_STRING *id,
  EVP_PKEY *pkey, const EVP_MD *md, OSSL_LIB_CTX *libctx,
  const char *propq);
int ASN1_item_verify_ex(const ASN1_ITEM *it, const X509_ALGOR *alg,
  const ASN1_BIT_STRING *signature, const void *data,
  const ASN1_OCTET_STRING *id, EVP_PKEY *pkey,
  OSSL_LIB_CTX *libctx, const char *propq);

/* ASN1 alloc/free macros for when a type is only used internally */

#define M_ASN1_new_of(type) (type *)ASN1_item_new(ASN1_ITEM_rptr(type))
#define M_ASN1_free_of(x, type) \
  ASN1_item_free(CHECKED_PTR_OF(type, x), ASN1_ITEM_rptr(type))

#ifndef OPENSSL_NO_STDIO
void *ASN1_d2i_fp(void *(*xnew)(void), d2i_of_void *d2i, FILE *in, void **x);

#define ASN1_d2i_fp_of(type, xnew, d2i, in, x)      \
  ((type *)ASN1_d2i_fp(CHECKED_NEW_OF(type,
 xnew), \
      CHECKED_D2I_OF(type, d2i),                  \
      in,                                         \
      CHECKED_PPTR_OF(type, x)))

void *ASN1_item_d2i_fp_ex(const ASN1_ITEM *it, FILE *in, void *x,
  OSSL_LIB_CTX *libctx, const char *propq);
void *ASN1_item_d2i_fp(const ASN1_ITEM *it, FILE *in, void *x);
int ASN1_i2d_fp(i2d_of_void *i2d, FILE *out, const void *x);

#define ASN1_i2d_fp_of(type, i2d, out, x)   \
  (ASN1_i2d_fp(CHECKED_I2D_OF(type, i2d), \
      out,                                \
      CHECKED_PTR_OF(const type, x)))

int ASN1_item_i2d_fp(const ASN1_ITEM *it, FILE *out, const void *x);
int ASN1_STRING_print_ex_fp(FILE *fp, const ASN1_STRING *str, unsigned long flags);
#endif

int ASN1_STRING_to_UTF8(unsigned char **out, const ASN1_STRING *in);
```

```
void *ASN1_d2i_bio(void *(*xnew)(void), d2i_of_void *d2i, BIO *in, void **x);

#define ASN1_d2i_bio_of(type, xnew, d2i, in, x)       \
   ((type *)ASN1_d2i_bio(CHECKED_NEW_OF(type, xnew),
 \
       CHECKED_D2I_OF(type, d2i),                    \
       in,                                           \
       CHECKED_PPTR_OF(type, x)))

void *ASN1_item_d2i_bio_ex(const ASN1_ITEM *it, BIO *in, void *pval,
   OSSL_LIB_CTX *libctx, const char *propq);
void *ASN1_item_d2i_bio(const ASN1_ITEM *it, BIO *in, void *pval);
int ASN1_i2d_bio(i2d_of_void *i2d, BIO *out, const void *x);

#define ASN1_i2d_bio_of(type, i2d, out, x)   \
   (ASN1_i2d_bio(CHECKED_I2D_OF(type, i2d), \
       out,                                 \
       CHECKED_PTR_OF(const type, x)))

int ASN1_item_i2d_bio(const ASN1_ITEM *it, BIO *out, const void *x);
BIO *ASN1_item_i2d_mem_bio(const ASN1_ITEM *it, const ASN1_VALUE *val);
int ASN1_UTCTIME_print(BIO *fp, const ASN1_UTCTIME *a);
int ASN1_GENERALIZEDTIME_print(BIO *fp, const ASN1_GENERALIZEDTIME *a);
int ASN1_TIME_print(BIO *bp, const ASN1_TIME *tm);
int ASN1_TIME_print_ex(BIO *bp, const ASN1_TIME *tm, unsigned long flags);
int ASN1_STRING_print(BIO
 *bp, const ASN1_STRING *v);
int ASN1_STRING_print_ex(BIO *out, const ASN1_STRING *str, unsigned long flags);
int ASN1_buf_print(BIO *bp, const unsigned char *buf, size_t buflen, int off);
int ASN1_bn_print(BIO *bp, const char *number, const BIGNUM *num,
   unsigned char *buf, int off);
int ASN1_parse(BIO *bp, const unsigned char *pp, long len, int indent);
int ASN1_parse_dump(BIO *bp, const unsigned char *pp, long len, int indent,
   int dump);
const char *ASN1_tag2str(int tag);

/* Used to load and write Netscape format cert */

int ASN1_UNIVERSALSTRING_to_string(ASN1_UNIVERSALSTRING *s);

int ASN1_TYPE_set_octetstring(ASN1_TYPE *a, unsigned char *data, int len);
int ASN1_TYPE_get_octetstring(const ASN1_TYPE *a, unsigned char *data, int max_len);
int ASN1_TYPE_set_int_octetstring(ASN1_TYPE *a, long num,
   unsigned char *data, int len);
int ASN1_TYPE_get_int_octetstring(const ASN1_TYPE *a, long *num,
   unsigned char *data, int max_len);
```

```
void *ASN1_item_unpack(const ASN1_STRING
 *oct, const ASN1_ITEM *it);
void *ASN1_item_unpack_ex(const ASN1_STRING *oct, const ASN1_ITEM *it,
   OSSL_LIB_CTX *libctx, const char *propq);

ASN1_STRING *ASN1_item_pack(void *obj, const ASN1_ITEM *it,
   ASN1_OCTET_STRING **oct);

void ASN1_STRING_set_default_mask(unsigned long mask);
int ASN1_STRING_set_default_mask_asc(const char *p);
unsigned long ASN1_STRING_get_default_mask(void);
int ASN1_mbstring_copy(ASN1_STRING **out, const unsigned char *in, int len,
   int inform, unsigned long mask);
int ASN1_mbstring_ncopy(ASN1_STRING **out, const unsigned char *in, int len,
   int inform, unsigned long mask,
   long minsize, long maxsize);

ASN1_STRING *ASN1_STRING_set_by_NID(ASN1_STRING **out,
   const unsigned char *in, int inlen,
   int inform, int nid);
ASN1_STRING_TABLE *ASN1_STRING_TABLE_get(int nid);
int ASN1_STRING_TABLE_add(int, long, long, unsigned long, unsigned long);
void ASN1_STRING_TABLE_cleanup(void);

/* ASN1 template functions */

/* Old API compatible functions
 */
ASN1_VALUE *ASN1_item_new(const ASN1_ITEM *it);
ASN1_VALUE *ASN1_item_new_ex(const ASN1_ITEM *it, OSSL_LIB_CTX *libctx,
   const char *propq);
void ASN1_item_free(ASN1_VALUE *val, const ASN1_ITEM *it);
ASN1_VALUE *ASN1_item_d2i_ex(ASN1_VALUE **val, const unsigned char **in,
   long len, const ASN1_ITEM *it,
   OSSL_LIB_CTX *libctx, const char *propq);
ASN1_VALUE *ASN1_item_d2i(ASN1_VALUE **val, const unsigned char **in,
   long len, const ASN1_ITEM *it);
int ASN1_item_i2d(const ASN1_VALUE *val, unsigned char **out, const ASN1_ITEM *it);
int ASN1_item_ndef_i2d(const ASN1_VALUE *val, unsigned char **out,
   const ASN1_ITEM *it);

void ASN1_add_oid_module(void);
void ASN1_add_stable_module(void);

ASN1_TYPE *ASN1_generate_nconf(const char *str, CONF *nconf);
ASN1_TYPE *ASN1_generate_v3(const char *str, X509V3_CTX *cnf);
int ASN1_str2mask(const char *str, unsigned long *pmask);
```

```
/* ASN1 Print flags */

/* Indicate missing OPTIONAL fields */
#define ASN1_PCTX_FLAGS_SHOW_ABSENT 0x001
/*
 Mark start and end of SEQUENCE */
#define ASN1_PCTX_FLAGS_SHOW_SEQUENCE 0x002
/* Mark start and end of SEQUENCE/SET OF */
#define ASN1_PCTX_FLAGS_SHOW_SSOF 0x004
/* Show the ASN1 type of primitives */
#define ASN1_PCTX_FLAGS_SHOW_TYPE 0x008
/* Don't show ASN1 type of ANY */
#define ASN1_PCTX_FLAGS_NO_ANY_TYPE 0x010
/* Don't show ASN1 type of MSTRINGs */
#define ASN1_PCTX_FLAGS_NO_MSTRING_TYPE 0x020
/* Don't show field names in SEQUENCE */
#define ASN1_PCTX_FLAGS_NO_FIELD_NAME 0x040
/* Show structure names of each SEQUENCE field */
#define ASN1_PCTX_FLAGS_SHOW_FIELD_STRUCT_NAME 0x080
/* Don't show structure name even at top level */
#define ASN1_PCTX_FLAGS_NO_STRUCT_NAME 0x100

int ASN1_item_print(BIO *out, const ASN1_VALUE *ifld, int indent,
   const ASN1_ITEM *it, const ASN1_PCTX *pctx);
ASN1_PCTX *ASN1_PCTX_new(void);
void ASN1_PCTX_free(ASN1_PCTX *p);
unsigned long ASN1_PCTX_get_flags(const ASN1_PCTX *p);
void ASN1_PCTX_set_flags(ASN1_PCTX *p, unsigned long flags);
unsigned
 long ASN1_PCTX_get_nm_flags(const ASN1_PCTX *p);
void ASN1_PCTX_set_nm_flags(ASN1_PCTX *p, unsigned long flags);
unsigned long ASN1_PCTX_get_cert_flags(const ASN1_PCTX *p);
void ASN1_PCTX_set_cert_flags(ASN1_PCTX *p, unsigned long flags);
unsigned long ASN1_PCTX_get_oid_flags(const ASN1_PCTX *p);
void ASN1_PCTX_set_oid_flags(ASN1_PCTX *p, unsigned long flags);
unsigned long ASN1_PCTX_get_str_flags(const ASN1_PCTX *p);
void ASN1_PCTX_set_str_flags(ASN1_PCTX *p, unsigned long flags);

ASN1_SCTX *ASN1_SCTX_new(int (*scan_cb)(ASN1_SCTX *ctx));
void ASN1_SCTX_free(ASN1_SCTX *p);
const ASN1_ITEM *ASN1_SCTX_get_item(ASN1_SCTX *p);
const ASN1_TEMPLATE *ASN1_SCTX_get_template(ASN1_SCTX *p);
unsigned long ASN1_SCTX_get_flags(ASN1_SCTX *p);
void ASN1_SCTX_set_app_data(ASN1_SCTX *p, void *data);
void *ASN1_SCTX_get_app_data(ASN1_SCTX *p);

const BIO_METHOD *BIO_f_asn1(void);
```

```
/* cannot constify val because of CMS_stream() */
BIO *BIO_new_NDEF(BIO *out, ASN1_VALUE *val, const ASN1_ITEM *it);

int
 i2d_ASN1_bio_stream(BIO *out, ASN1_VALUE *val, BIO *in, int flags,
   const ASN1_ITEM *it);
int PEM_write_bio_ASN1_stream(BIO *out, ASN1_VALUE *val, BIO *in, int flags,
   const char *hdr, const ASN1_ITEM *it);
/* cannot constify val because of CMS_dataFinal() */
int SMIME_write_ASN1(BIO *bio, ASN1_VALUE *val, BIO *data, int flags,
   int ctype_nid, int econt_nid,
   STACK_OF(X509_ALGOR) *mdalgs, const ASN1_ITEM *it);
int SMIME_write_ASN1_ex(BIO *bio, ASN1_VALUE *val, BIO *data, int flags,
   int ctype_nid, int econt_nid,
   STACK_OF(X509_ALGOR) *mdalgs, const ASN1_ITEM *it,
   OSSL_LIB_CTX *libctx, const char *propq);
ASN1_VALUE *SMIME_read_ASN1(BIO *bio, BIO **bcont, const ASN1_ITEM *it);
ASN1_VALUE *SMIME_read_ASN1_ex(BIO *bio, int flags, BIO **bcont,
   const ASN1_ITEM *it, ASN1_VALUE **x,
   OSSL_LIB_CTX *libctx, const char *propq);
int SMIME_crlf_copy(BIO *in, BIO *out, int flags);
int SMIME_text(BIO *in, BIO *out);

const ASN1_ITEM *ASN1_ITEM_lookup(const char *name);
const
 ASN1_ITEM *ASN1_ITEM_get(size_t i);

/* Legacy compatibility */
#define DECLARE_ASN1_FUNCTIONS_fname(type, itname, name) \
   DECLARE_ASN1_ALLOC_FUNCTIONS_name(type, name)       \
   DECLARE_ASN1_ENCODE_FUNCTIONS(type, itname, name)
#define DECLARE_ASN1_FUNCTIONS_const(type) DECLARE_ASN1_FUNCTIONS(type)
#define DECLARE_ASN1_ENCODE_FUNCTIONS_const(type, name) \
   DECLARE_ASN1_ENCODE_FUNCTIONS(type, name)
#define I2D_OF_const(type) I2D_OF(type)
#define ASN1_dup_of_const(type, i2d, d2i, x) ASN1_dup_of(type, i2d, d2i, x)
#define ASN1_i2d_fp_of_const(type, i2d, out, x) ASN1_i2d_fp_of(type, i2d, out, x)
#define ASN1_i2d_bio_of_const(type, i2d, out, x) ASN1_i2d_bio_of(type, i2d, out, x)

#ifdef __cplusplus
}
#endif
#endif
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/ess.h.in
*
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*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_ESS_H
#define OPENSSL_ESS_H
#pragma once

#include <openssl/opensslconf.h>

#include <openssl/safestack.h>
#include <openssl/x509.h>
#include <openssl/esserr.h>

#ifdef __cplusplus
extern "C" {
```

```
#endif

typedef struct ESS_issuer_serial ESS_ISSUER_SERIAL;
typedef struct ESS_cert_id ESS_CERT_ID;
typedef struct ESS_signing_cert ESS_SIGNING_CERT;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ESS_CERT_ID, ESS_CERT_ID, ESS_CERT_ID)
#define sk_ESS_CERT_ID_num(sk) OPENSSL_sk_num(ossl_check_const_ESS_CERT_ID_sk_type(sk))
#define
 sk_ESS_CERT_ID_value(sk, idx) ((ESS_CERT_ID
*)OPENSSL_sk_value(ossl_check_const_ESS_CERT_ID_sk_type(sk), (idx)))
#define sk_ESS_CERT_ID_new(cmp) ((STACK_OF(ESS_CERT_ID)
*)OPENSSL_sk_new(ossl_check_ESS_CERT_ID_compfunc_type(cmp)))
#define sk_ESS_CERT_ID_new_null() ((STACK_OF(ESS_CERT_ID) *)OPENSSL_sk_new_null())
#define sk_ESS_CERT_ID_new_reserve(cmp, n) ((STACK_OF(ESS_CERT_ID)
*)OPENSSL_sk_new_reserve(ossl_check_ESS_CERT_ID_compfunc_type(cmp), (n)))
#define sk_ESS_CERT_ID_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_ESS_CERT_ID_sk_type(sk), (n))
#define sk_ESS_CERT_ID_free(sk) OPENSSL_sk_free(ossl_check_ESS_CERT_ID_sk_type(sk))
#define sk_ESS_CERT_ID_zero(sk) OPENSSL_sk_zero(ossl_check_ESS_CERT_ID_sk_type(sk))
#define sk_ESS_CERT_ID_delete(sk, i) ((ESS_CERT_ID
*)OPENSSL_sk_delete(ossl_check_ESS_CERT_ID_sk_type(sk), (i)))
#define sk_ESS_CERT_ID_delete_ptr(sk, ptr) ((ESS_CERT_ID
*)OPENSSL_sk_delete_ptr(ossl_check_ESS_CERT_ID_sk_type(sk), ossl_check_ESS_CERT_ID_type(ptr)))
#define
 sk_ESS_CERT_ID_push(sk, ptr) OPENSSL_sk_push(ossl_check_ESS_CERT_ID_sk_type(sk),
ossl_check_ESS_CERT_ID_type(ptr))
#define sk_ESS_CERT_ID_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_ESS_CERT_ID_sk_type(sk),
ossl_check_ESS_CERT_ID_type(ptr))
#define sk_ESS_CERT_ID_pop(sk) ((ESS_CERT_ID
*)OPENSSL_sk_pop(ossl_check_ESS_CERT_ID_sk_type(sk)))
#define sk_ESS_CERT_ID_shift(sk) ((ESS_CERT_ID
*)OPENSSL_sk_shift(ossl_check_ESS_CERT_ID_sk_type(sk)))
#define sk_ESS_CERT_ID_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ESS_CERT_ID_sk_type(sk),ossl_check_ESS_CERT_ID_freefunc_type(freefu
nc))
#define sk_ESS_CERT_ID_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_ESS_CERT_ID_sk_type(sk),
ossl_check_ESS_CERT_ID_type(ptr), (idx))
#define sk_ESS_CERT_ID_set(sk, idx, ptr) ((ESS_CERT_ID
*)OPENSSL_sk_set(ossl_check_ESS_CERT_ID_sk_type(sk), (idx), ossl_check_ESS_CERT_ID_type(ptr)))
#define sk_ESS_CERT_ID_find(sk, ptr) OPENSSL_sk_find(ossl_check_ESS_CERT_ID_sk_type(sk),
ossl_check_ESS_CERT_ID_type(ptr))
#define
 sk_ESS_CERT_ID_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_ESS_CERT_ID_sk_type(sk),
ossl_check_ESS_CERT_ID_type(ptr))
#define sk_ESS_CERT_ID_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ESS_CERT_ID_sk_type(sk), ossl_check_ESS_CERT_ID_type(ptr), pnum)
#define sk_ESS_CERT_ID_sort(sk) OPENSSL_sk_sort(ossl_check_ESS_CERT_ID_sk_type(sk))
```

```
#define sk_ESS_CERT_ID_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_ESS_CERT_ID_sk_type(sk))
#define sk_ESS_CERT_ID_dup(sk) ((STACK_OF(ESS_CERT_ID)
*)OPENSSL_sk_dup(ossl_check_const_ESS_CERT_ID_sk_type(sk)))
#define sk_ESS_CERT_ID_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ESS_CERT_ID)
*)OPENSSL_sk_deep_copy(ossl_check_const_ESS_CERT_ID_sk_type(sk),
ossl_check_ESS_CERT_ID_copyfunc_type(copyfunc), ossl_check_ESS_CERT_ID_freefunc_type(freefunc)))
#define sk_ESS_CERT_ID_set_cmp_func(sk, cmp)
((sk_ESS_CERT_ID_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ESS_CERT_ID_sk_type(sk),
ossl_check_ESS_CERT_ID_compfunc_type(cmp)))

/*
 clang-format on */

typedef struct ESS_signing_cert_v2_st ESS_SIGNING_CERT_V2;
typedef struct ESS_cert_id_v2_st ESS_CERT_ID_V2;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ESS_CERT_ID_V2, ESS_CERT_ID_V2, ESS_CERT_ID_V2)
#define sk_ESS_CERT_ID_V2_num(sk) OPENSSL_sk_num(ossl_check_const_ESS_CERT_ID_V2_sk_type(sk))
#define sk_ESS_CERT_ID_V2_value(sk, idx) ((ESS_CERT_ID_V2
*)OPENSSL_sk_value(ossl_check_const_ESS_CERT_ID_V2_sk_type(sk), (idx)))
#define sk_ESS_CERT_ID_V2_new(cmp) ((STACK_OF(ESS_CERT_ID_V2)
*)OPENSSL_sk_new(ossl_check_ESS_CERT_ID_V2_compfunc_type(cmp)))
#define sk_ESS_CERT_ID_V2_new_null() ((STACK_OF(ESS_CERT_ID_V2) *)OPENSSL_sk_new_null())
#define sk_ESS_CERT_ID_V2_new_reserve(cmp, n) ((STACK_OF(ESS_CERT_ID_V2)
*)OPENSSL_sk_new_reserve(ossl_check_ESS_CERT_ID_V2_compfunc_type(cmp), (n)))
#define sk_ESS_CERT_ID_V2_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_ESS_CERT_ID_V2_sk_type(sk),
(n))
#define sk_ESS_CERT_ID_V2_free(sk) OPENSSL_sk_free(ossl_check_ESS_CERT_ID_V2_sk_type(sk))
#define
 sk_ESS_CERT_ID_V2_zero(sk) OPENSSL_sk_zero(ossl_check_ESS_CERT_ID_V2_sk_type(sk))
#define sk_ESS_CERT_ID_V2_delete(sk, i) ((ESS_CERT_ID_V2
*)OPENSSL_sk_delete(ossl_check_ESS_CERT_ID_V2_sk_type(sk), (i)))
#define sk_ESS_CERT_ID_V2_delete_ptr(sk, ptr) ((ESS_CERT_ID_V2
*)OPENSSL_sk_delete_ptr(ossl_check_ESS_CERT_ID_V2_sk_type(sk),
ossl_check_ESS_CERT_ID_V2_type(ptr)))
#define sk_ESS_CERT_ID_V2_push(sk, ptr) OPENSSL_sk_push(ossl_check_ESS_CERT_ID_V2_sk_type(sk),
ossl_check_ESS_CERT_ID_V2_type(ptr))
#define sk_ESS_CERT_ID_V2_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_ESS_CERT_ID_V2_sk_type(sk), ossl_check_ESS_CERT_ID_V2_type(ptr))
#define sk_ESS_CERT_ID_V2_pop(sk) ((ESS_CERT_ID_V2
*)OPENSSL_sk_pop(ossl_check_ESS_CERT_ID_V2_sk_type(sk)))
#define sk_ESS_CERT_ID_V2_shift(sk) ((ESS_CERT_ID_V2
*)OPENSSL_sk_shift(ossl_check_ESS_CERT_ID_V2_sk_type(sk)))
#define sk_ESS_CERT_ID_V2_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ESS_CERT_ID_V2_sk_type(sk),ossl_check_ESS_CERT_ID_V2_freefunc_ty
pe(freefunc))
#define
```

```
 sk_ESS_CERT_ID_V2_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_ESS_CERT_ID_V2_sk_type(sk),
ossl_check_ESS_CERT_ID_V2_type(ptr), (idx))
#define sk_ESS_CERT_ID_V2_set(sk, idx, ptr) ((ESS_CERT_ID_V2
*)OPENSSL_sk_set(ossl_check_ESS_CERT_ID_V2_sk_type(sk), (idx),
ossl_check_ESS_CERT_ID_V2_type(ptr)))
#define sk_ESS_CERT_ID_V2_find(sk, ptr) OPENSSL_sk_find(ossl_check_ESS_CERT_ID_V2_sk_type(sk),
ossl_check_ESS_CERT_ID_V2_type(ptr))
#define sk_ESS_CERT_ID_V2_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_ESS_CERT_ID_V2_sk_type(sk), ossl_check_ESS_CERT_ID_V2_type(ptr))
#define sk_ESS_CERT_ID_V2_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ESS_CERT_ID_V2_sk_type(sk), ossl_check_ESS_CERT_ID_V2_type(ptr),
pnum)
#define sk_ESS_CERT_ID_V2_sort(sk) OPENSSL_sk_sort(ossl_check_ESS_CERT_ID_V2_sk_type(sk))
#define sk_ESS_CERT_ID_V2_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_ESS_CERT_ID_V2_sk_type(sk))
#define sk_ESS_CERT_ID_V2_dup(sk)
 ((STACK_OF(ESS_CERT_ID_V2) *)OPENSSL_sk_dup(ossl_check_const_ESS_CERT_ID_V2_sk_type(sk)))
#define sk_ESS_CERT_ID_V2_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ESS_CERT_ID_V2)
*)OPENSSL_sk_deep_copy(ossl_check_const_ESS_CERT_ID_V2_sk_type(sk),
ossl_check_ESS_CERT_ID_V2_copyfunc_type(copyfunc),
ossl_check_ESS_CERT_ID_V2_freefunc_type(freefunc)))
#define sk_ESS_CERT_ID_V2_set_cmp_func(sk, cmp)
((sk_ESS_CERT_ID_V2_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ESS_CERT_ID_V2_sk_type(sk),
ossl_check_ESS_CERT_ID_V2_compfunc_type(cmp)))

/* clang-format on */

DECLARE_ASN1_ALLOC_FUNCTIONS(ESS_ISSUER_SERIAL)
DECLARE_ASN1_ENCODE_FUNCTIONS_only(ESS_ISSUER_SERIAL, ESS_ISSUER_SERIAL)
DECLARE_ASN1_DUP_FUNCTION(ESS_ISSUER_SERIAL)

DECLARE_ASN1_ALLOC_FUNCTIONS(ESS_CERT_ID)
DECLARE_ASN1_ENCODE_FUNCTIONS_only(ESS_CERT_ID, ESS_CERT_ID)
DECLARE_ASN1_DUP_FUNCTION(ESS_CERT_ID)

DECLARE_ASN1_FUNCTIONS(ESS_SIGNING_CERT)
DECLARE_ASN1_DUP_FUNCTION(ESS_SIGNING_CERT)

DECLARE_ASN1_ALLOC_FUNCTIONS(ESS_CERT_ID_V2)
DECLARE_ASN1_ENCODE_FUNCTIONS_only(ESS_CERT_ID_V2,
 ESS_CERT_ID_V2)
DECLARE_ASN1_DUP_FUNCTION(ESS_CERT_ID_V2)

DECLARE_ASN1_FUNCTIONS(ESS_SIGNING_CERT_V2)
DECLARE_ASN1_DUP_FUNCTION(ESS_SIGNING_CERT_V2)

ESS_SIGNING_CERT *OSSL_ESS_signing_cert_new_init(const X509 *signcert,
   const STACK_OF(X509) *certs,
```

```
   int set_issuer_serial);
ESS_SIGNING_CERT_V2 *OSSL_ESS_signing_cert_v2_new_init(const EVP_MD *hash_alg,
   const X509 *signcert,
   const STACK_OF(X509) *certs,
   int set_issuer_serial);
int OSSL_ESS_check_signing_certs(const ESS_SIGNING_CERT *ss,
   const ESS_SIGNING_CERT_V2 *ssv2,
   const STACK_OF(X509) *chain,
   int require_signing_cert);

#ifdef __cplusplus
}
#endif
#endif
ISC
{
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'openssl/crypto/ec/curve448/eddsa.c',
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  'openssl/providers/fips/fips_entry.c',

],
'openssl_sources_BSD-x86': [
  './config/archs/BSD-x86/asm/crypto/aes/aes-586.S',
  './config/archs/BSD-x86/asm/crypto/aes/aesni-x86.S',
  './config/archs/BSD-x86/asm/crypto/aes/vpaes-x86.S',
  './config/archs/BSD-x86/asm/crypto/bf/bf-586.S',
  './config/archs/BSD-x86/asm/crypto/bn/bn-586.S',
  './config/archs/BSD-x86/asm/crypto/bn/co-586.S',
  './config/archs/BSD-x86/asm/crypto/bn/x86-gf2m.S',
```

```
  './config/archs/BSD-x86/asm/crypto/bn/x86-mont.S',
  './config/archs/BSD-x86/asm/crypto/camellia/cmll-x86.S',
  './config/archs/BSD-x86/asm/crypto/chacha/chacha-x86.S',
   './config/archs/BSD-x86/asm/crypto/des/crypt586.S',
  './config/archs/BSD-x86/asm/crypto/des/des-586.S',
  './config/archs/BSD-x86/asm/crypto/ec/ecp_nistz256-x86.S',
  './config/archs/BSD-x86/asm/crypto/params_idx.c',
  './config/archs/BSD-x86/asm/crypto/x86cpuid.S',
  './config/archs/BSD-x86/asm/crypto/md5/md5-586.S',
  './config/archs/BSD-x86/asm/crypto/modes/ghash-x86.S',
  './config/archs/BSD-x86/asm/crypto/poly1305/poly1305-x86.S',
  './config/archs/BSD-x86/asm/crypto/rc4/rc4-586.S',
  './config/archs/BSD-x86/asm/crypto/ripemd/rmd-586.S',
  './config/archs/BSD-x86/asm/crypto/sha/sha1-586.S',
  './config/archs/BSD-x86/asm/crypto/sha/sha256-586.S',
  './config/archs/BSD-x86/asm/crypto/sha/sha512-586.S',
  './config/archs/BSD-x86/asm/crypto/whrlpool/wp-mmx.S',
  './config/archs/BSD-x86/asm/engines/e_padlock-x86.S',
  './config/archs/BSD-x86/asm/providers/common/der/der_sm2_gen.c',
   './config/archs/BSD-x86/asm/providers/common/der/der_digests_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_dsa_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_ec_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_ecx_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_ml_dsa_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_rsa_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_slh_dsa_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_wrap_gen.c',
  './config/archs/BSD-x86/asm/providers/legacy.ld',
  './config/archs/BSD-x86/asm/providers/fips.ld',

],
'openssl_defines_BSD-x86': [
  'NDEBUG',
  'L_ENDIAN',
  'OPENSSL_BUILDING_OPENSSL',
  'AES_ASM',
  'DES_ASM',
  'ECP_NISTZ256_ASM',
  'FIPS_MODULE',
  'GHASH_ASM',
  'OPENSSL_BN_ASM_GF2m',
  'OPENSSL_BN_ASM_MONT',
  'OPENSSL_BN_ASM_PART_WORDS',
   'OPENSSL_CPUID_OBJ',
  'OPENSSL_IA32_SSE2',
  'SHA1_ASM',
  'SHA256_ASM',
  'SHA512_ASM',
```

```
    'VPAES_ASM',
    'FIPS_MODULE',
  ],
  'openssl_cflags_BSD-x86': [
    '-Wa,--noexecstack',
    '-Wall -O3 -fomit-frame-pointer',
    '-pthread',
    '-Wall -O3 -fomit-frame-pointer',
  ],
  'openssl_ex_libs_BSD-x86': [
    '-pthread',
  ],
  'linker_script': ''
 },
 'include_dirs': [
  '.',
  './include',
  './crypto',
  './crypto/include/internal',
  './providers/common/include',
 ],
 'defines': ['<@(openssl_defines_BSD-x86)'],
 'cflags': ['<@(openssl_cflags_BSD-x86)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86)'],

 'sources': ['<@(openssl_sources)', '<@(openssl_sources_BSD-x86)'],
 'direct_dependent_settings': {
  'include_dirs': ['./include', '.'],
  'defines': ['<@(openssl_defines_BSD-x86)'],
 },
}
/*
* WARNING: do not edit!
* Generated by configdata.pm from Configurations/common0.tmpl, Configurations/unix-Makefile.tmpl
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*/

#ifndef OPENSSL_CONFIGURATION_H
#define OPENSSL_CONFIGURATION_H
#pragma once
```

```
#ifdef __cplusplus
extern "C" {
#endif

#ifdef OPENSSL_ALGORITHM_DEFINES
#error OPENSSL_ALGORITHM_DEFINES no longer supported
#endif

/*
* OpenSSL was configured with the following options:
*/

/* clang-format off */
# define OPENSSL_CONFIGURED_API 30500
# ifndef OPENSSL_RAND_SEED_OS
#  define OPENSSL_RAND_SEED_OS
# endif
# ifndef OPENSSL_THREADS
#  define OPENSSL_THREADS
# endif
# ifndef OPENSSL_NO_AFALGENG
#  define OPENSSL_NO_AFALGENG
#
 endif
# ifndef OPENSSL_NO_ASAN
#  define OPENSSL_NO_ASAN
# endif
# ifndef OPENSSL_NO_BROTLI
#  define OPENSSL_NO_BROTLI
# endif
# ifndef OPENSSL_NO_BROTLI_DYNAMIC
#  define OPENSSL_NO_BROTLI_DYNAMIC
# endif
# ifndef OPENSSL_NO_COMP
#  define OPENSSL_NO_COMP
# endif
# ifndef OPENSSL_NO_CRYPTO_MDEBUG
#  define OPENSSL_NO_CRYPTO_MDEBUG
# endif
# ifndef OPENSSL_NO_CRYPTO_MDEBUG_BACKTRACE
#  define OPENSSL_NO_CRYPTO_MDEBUG_BACKTRACE
# endif
# ifndef OPENSSL_NO_DEMOS
#  define OPENSSL_NO_DEMOS
# endif
# ifndef OPENSSL_NO_EC_NISTP_64_GCC_128
#  define OPENSSL_NO_EC_NISTP_64_GCC_128
# endif
```

```
# ifndef OPENSSL_NO_EGD
#  define OPENSSL_NO_EGD
# endif
# ifndef OPENSSL_NO_EXTERNAL_TESTS
#  define OPENSSL_NO_EXTERNAL_TESTS
# endif
# ifndef OPENSSL_NO_FIPS_JITTER
#  define OPENSSL_NO_FIPS_JITTER
# endif
# ifndef OPENSSL_NO_FUZZ_AFL
#  define OPENSSL_NO_FUZZ_AFL
# endif
# ifndef OPENSSL_NO_FUZZ_LIBFUZZER
#  define OPENSSL_NO_FUZZ_LIBFUZZER
# endif
# ifndef OPENSSL_NO_H3DEMO
#  define OPENSSL_NO_H3DEMO
#
 endif
# ifndef OPENSSL_NO_HQINTEROP
#  define OPENSSL_NO_HQINTEROP
# endif
# ifndef OPENSSL_NO_JITTER
#  define OPENSSL_NO_JITTER
# endif
# ifndef OPENSSL_NO_KTLS
#  define OPENSSL_NO_KTLS
# endif
# ifndef OPENSSL_NO_LOADERENG
#  define OPENSSL_NO_LOADERENG
# endif
# ifndef OPENSSL_NO_MD2
#  define OPENSSL_NO_MD2
# endif
# ifndef OPENSSL_NO_MSAN
#  define OPENSSL_NO_MSAN
# endif
# ifndef OPENSSL_NO_PIE
#  define OPENSSL_NO_PIE
# endif
# ifndef OPENSSL_NO_RC5
#  define OPENSSL_NO_RC5
# endif
# ifndef OPENSSL_NO_SCTP
#  define OPENSSL_NO_SCTP
# endif
# ifndef OPENSSL_NO_SSL3
#  define OPENSSL_NO_SSL3
```

```
# endif
# ifndef OPENSSL_NO_SSL3_METHOD
#  define OPENSSL_NO_SSL3_METHOD
# endif
# ifndef OPENSSL_NO_SSLKEYLOG
#  define OPENSSL_NO_SSLKEYLOG
# endif
# ifndef OPENSSL_NO_TFO
#  define OPENSSL_NO_TFO
# endif
# ifndef OPENSSL_NO_TRACE
#  define OPENSSL_NO_TRACE
# endif
# ifndef OPENSSL_NO_UBSAN
#  define OPENSSL_NO_UBSAN
# endif
# ifndef OPENSSL_NO_UNIT_TEST
#  define OPENSSL_NO_UNIT_TEST
#
 endif
# ifndef OPENSSL_NO_UPLINK
#  define OPENSSL_NO_UPLINK
# endif
# ifndef OPENSSL_NO_WEAK_SSL_CIPHERS
#  define OPENSSL_NO_WEAK_SSL_CIPHERS
# endif
# ifndef OPENSSL_NO_WINSTORE
#  define OPENSSL_NO_WINSTORE
# endif
# ifndef OPENSSL_NO_ZLIB
#  define OPENSSL_NO_ZLIB
# endif
# ifndef OPENSSL_NO_ZLIB_DYNAMIC
#  define OPENSSL_NO_ZLIB_DYNAMIC
# endif
# ifndef OPENSSL_NO_ZSTD
#  define OPENSSL_NO_ZSTD
# endif
# ifndef OPENSSL_NO_ZSTD_DYNAMIC
#  define OPENSSL_NO_ZSTD_DYNAMIC
# endif
# ifndef OPENSSL_NO_DYNAMIC_ENGINE
#  define OPENSSL_NO_DYNAMIC_ENGINE
# endif

/* clang-format on */

/* Generate 80386 code? */
```

```
/* clang-format off */
# undef I386_ONLY
/* clang-format on */

/*
* The following are cipher-specific, but are part of the public API.
*/
#if !defined(OPENSSL_SYS_UEFI)
   /* clang-format off */
#  define BN_LLONG
   /* clang-format on */
   /* Only one for the following should be defined */
   /* clang-format off */
#  undef SIXTY_FOUR_BIT_LONG
   /* clang-format on
 */
   /* clang-format off */
#  undef SIXTY_FOUR_BIT
   /* clang-format on */
   /* clang-format off */
#  define THIRTY_TWO_BIT
/* clang-format on */
#endif

/* clang-format off */
# define RC4_INT unsigned int
/* clang-format on */

#if defined(OPENSSL_NO_COMP) || (defined(OPENSSL_NO_BROTLI) && defined(OPENSSL_NO_ZSTD) &&
defined(OPENSSL_NO_ZLIB))
#define OPENSSL_NO_COMP_ALG
#else
#undef OPENSSL_NO_COMP_ALG
#endif

#ifdef __cplusplus
}
#endif

#endif /* OPENSSL_CONFIGURATION_H */
```

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ICU uses the public domain data and code derived from Time Zone Database for its time zone support. The ownership of the TZ database is explained in BCP 175: Procedure for Maintaining the Time Zone Database section 7.

# 7. Database Ownership
#
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Google double-conversion

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JSON parsing library (nlohmann/json)

File: vendor/json/upstream/single_include/nlohmann/json.hpp (only for ICU4C)

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File: aclocal.m4 (only for ICU4C)
Section: pkg.m4 - Macros to locate and utilise pkg-config.

Copyright  2004 Scott James Remnant <scott@netsplit.com>.
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File: config.guess (only for ICU4C)

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File: install-sh (only for ICU4C)

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File: sorttable.js (only for ICU4J)

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  'openssl/providers/implementations/ciphers/cipher_seed.c',
  'openssl/providers/implementations/ciphers/cipher_seed_hw.c',
  'openssl/providers/implementations/ciphers/cipher_tdes_common.c',
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  'openssl/providers/implementations/digests/mdc2_prov.c',
  'openssl/providers/implementations/digests/ripemd_prov.c',
  'openssl/providers/implementations/digests/wp_prov.c',
  'openssl/providers/implementations/kdfs/pbkdf1.c',
  'openssl/providers/implementations/kdfs/pvkkdf.c',
  'openssl/providers/prov_running.c',
  'openssl/providers/legacyprov.c',
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  './config/archs/BSD-x86_64/asm/crypto/aes/aesni-sha1-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/aesni-sha256-x86_64.s',
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  './config/archs/BSD-x86_64/asm/crypto/aes/bsaes-x86_64.s',
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  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-2k-avx512.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-2k-avxifma.s',
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  './config/archs/BSD-x86_64/asm/crypto/bn/x86_64-mont5.s',
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  './config/archs/BSD-x86_64/asm/crypto/ec/x25519-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/params_idx.c',
  './config/archs/BSD-x86_64/asm/crypto/x86_64cpuid.s',
  './config/archs/BSD-x86_64/asm/crypto/md5/md5-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/modes/aes-gcm-avx512.s',
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  './config/archs/BSD-x86_64/asm/crypto/modes/ghash-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/poly1305/poly1305-x86_64.s',
   './config/archs/BSD-x86_64/asm/crypto/rc4/rc4-md5-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/rc4/rc4-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/sha/keccak1600-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/sha/sha1-mb-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/sha/sha1-x86_64.s',
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  './config/archs/BSD-x86_64/asm/providers/common/der/der_sm2_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_digests_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_dsa_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_ec_gen.c',
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  './config/archs/BSD-x86_64/asm/providers/legacy.ld',
  './config/archs/BSD-x86_64/asm/providers/fips.ld',
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  'L_ENDIAN',
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  'CMLL_ASM',
  'ECP_NISTZ256_ASM',
  'GHASH_ASM',
  'KECCAK1600_ASM',
  'MD5_ASM',
  'OPENSSL_BN_ASM_GF2m',
  'OPENSSL_BN_ASM_MONT',
  'OPENSSL_BN_ASM_MONT5',
  'OPENSSL_CPUID_OBJ',
  'OPENSSL_IA32_SSE2',
  'PADLOCK_ASM',
  'POLY1305_ASM',
  'RC4_ASM',
  'SHA1_ASM',
  'SHA256_ASM',

  'SHA512_ASM',
  'VPAES_ASM',
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    'X25519_ASM',
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  'openssl_ex_libs_BSD-x86_64': [
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  './crypto',
  './crypto/include/internal',
  './providers/common/include',
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 'sources': ['<@(openssl_sources)', '<@(openssl_sources_BSD-x86_64)'],
 'direct_dependent_settings': {
  'include_dirs': ['./include', '.'],
  'defines': ['<@(openssl_defines_BSD-x86_64)'],
 },
}
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version 1.2.12, March 27th, 2022

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# Recognizing Contributors

The project looks to recognize and thank contributors for their contributions
as one of the ways we can help them continue to contribute to the project.

This document captures some of the processes we have in place to do that.

Some of the benefits we hope to achieve through these programs include:

* Ensuring people know that the project appreciates their work
* Encouraging people to repeat/grow their contributions
* Helping people demonstrate to their managers the value of the
contributions they are making, which in terms helps their manager support
their employer investing in the project (unfortunately this is
something that matters)
* Highlighting the new features in Node.js and showing that they are

being added by individuals like those mentioned. This should encourage
other people to get involved and make similar contributions.
* Highlighting those leading efforts/initiatives and they are being
done by individuals or teams like those mentioned.
This should
encourage other people to get involved and make similar contributions

## Sponsorship link on nodejs/node README.md

Collaborators may add a single link beside their name on the nodejs/node
[`README.md`](../../README.md) file in the section titled `Collaborators`
named `Support me`. This link may be:

1. a direct link to one of the sponsorship platforms listed below,
2. a page that has text explaining how to support the collaborator
   including zero or more links to the sponsorship platforms listed below.
   The page should not have any outgoing links other than to the
   sponsorship platforms. We expect and trust collaborators to ensure that
   the text is professional and respectful.

The sponsorship platforms to which links can be made currently
includes (in alphabetical order):

* [GitHub Sponsors](https://github.com/sponsors)
* [Polar](https://polar.sh/)
* [thanks.dev](https://thanks.dev)

## Amplification of posts announcing talks by collaborators

When a collaborator
is speaking at a public event they may request amplification
by the Node.js social media accounts. They can request that a post highlighting
that they are speaking at the event be amplified by the Node.js accounts by
making a request in the #nodejs-social channel in the OpenJS Foundation slack.
We trust that collaborators will only request amplification when they believe
the event is relevant to the Node.js community and the content of the post is
in line with the norms of the project.

## Bi-monthly contributor spotlight

The contributor spotlight program showcases individual(s) or teams who have
made signification contributions to the project. Anybody who is not
a member of the Technical Steering Committee (TSC) and has made a
notable contribution to the project can be nominated. They DO NOT need
to be a collaborator, team member etc.

The work of the team or individual(s) will be showcased on the
Node.js social channels and, if warranted, through a blog post created by the

OpenJS
marketing staff along with the team or individual(s) which will
be published on [openjsf.org](https://openjsf.org/).

Nominations can be made through this web form:
[Contributor Spotlight nomination](https://forms.gle/dXBXZn8yu83HLJ57A)

Nominations will be reviewed/approved by the Technical Steering Committee (TSC)
on a regular basis as scheduled by the TSC chair. The TSC will also
recommend the order in which approved nominations are processed
by the OpenJS marketing staff.

Before any work proceeds on an approved nomination the individual(s)
or team will be contacted to confirm they want to participate. Social
content and or spotlight blog post will only be published after the
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*/

#include "internal/der.h"

/* Well known OIDs precompiled */
/* clang-format off */

/*
* sigAlgs OBJECT IDENTIFIER ::= { nistAlgorithms 3 }
*/
#define DER_OID_V_sigAlgs DER_P_OBJECT, 8, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x03
#define DER_OID_SZ_sigAlgs 10
extern const unsigned char ossl_der_oid_sigAlgs[DER_OID_SZ_sigAlgs];

/*
* id-sha1  OBJECT IDENTIFIER  ::=  { iso(1)
*                    identified-organization(3) oiw(14)
*                    secsig(3) algorithms(2) 26 }
*/
#define DER_OID_V_id_sha1 DER_P_OBJECT, 5, 0x2B, 0x0E, 0x03,
 0x02, 0x1A
#define DER_OID_SZ_id_sha1 7
extern const unsigned char ossl_der_oid_id_sha1[DER_OID_SZ_id_sha1];

/*
* id-md2  OBJECT IDENTIFIER ::= {
*   iso(1) member-body(2) us(840) rsadsi(113549) digestAlgorithm(2) 2 }
*/
#define DER_OID_V_id_md2 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x02, 0x02
#define DER_OID_SZ_id_md2 10
extern const unsigned char ossl_der_oid_id_md2[DER_OID_SZ_id_md2];

/*
* id-md5  OBJECT IDENTIFIER ::= {
*   iso(1) member-body(2) us(840) rsadsi(113549) digestAlgorithm(2) 5 }
*/
#define DER_OID_V_id_md5 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x02, 0x05
#define DER_OID_SZ_id_md5 10
extern const unsigned char ossl_der_oid_id_md5[DER_OID_SZ_id_md5];

/*
* id-sha256 OBJECT IDENTIFIER ::= { hashAlgs 1 }
*/
```

```
#define DER_OID_V_id_sha256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x01
#define DER_OID_SZ_id_sha256 11
extern const unsigned char ossl_der_oid_id_sha256[DER_OID_SZ_id_sha256];

/*
* id-sha384 OBJECT IDENTIFIER
 ::= { hashAlgs 2 }
*/
#define DER_OID_V_id_sha384 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x02
#define DER_OID_SZ_id_sha384 11
extern const unsigned char ossl_der_oid_id_sha384[DER_OID_SZ_id_sha384];

/*
* id-sha512 OBJECT IDENTIFIER ::= { hashAlgs 3 }
*/
#define DER_OID_V_id_sha512 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x03
#define DER_OID_SZ_id_sha512 11
extern const unsigned char ossl_der_oid_id_sha512[DER_OID_SZ_id_sha512];

/*
* id-sha224 OBJECT IDENTIFIER ::= { hashAlgs 4 }
*/
#define DER_OID_V_id_sha224 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x04
#define DER_OID_SZ_id_sha224 11
extern const unsigned char ossl_der_oid_id_sha224[DER_OID_SZ_id_sha224];

/*
* id-sha512-224 OBJECT IDENTIFIER ::= { hashAlgs 5 }
*/
#define DER_OID_V_id_sha512_224 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x05
#define DER_OID_SZ_id_sha512_224 11
extern const unsigned char ossl_der_oid_id_sha512_224[DER_OID_SZ_id_sha512_224];

/*
 * id-sha512-256 OBJECT IDENTIFIER ::= { hashAlgs 6 }
*/
#define DER_OID_V_id_sha512_256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x06
#define DER_OID_SZ_id_sha512_256 11
extern const unsigned char ossl_der_oid_id_sha512_256[DER_OID_SZ_id_sha512_256];

/*
* id-sha3-224 OBJECT IDENTIFIER ::= { hashAlgs 7 }
*/
#define DER_OID_V_id_sha3_224 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x07
#define DER_OID_SZ_id_sha3_224 11
extern const unsigned char ossl_der_oid_id_sha3_224[DER_OID_SZ_id_sha3_224];

/*
```

```
* id-sha3-256 OBJECT IDENTIFIER ::= { hashAlgs 8 }
*/
#define DER_OID_V_id_sha3_256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x08
#define DER_OID_SZ_id_sha3_256 11
extern const unsigned char ossl_der_oid_id_sha3_256[DER_OID_SZ_id_sha3_256];

/*
* id-sha3-384 OBJECT IDENTIFIER ::= { hashAlgs 9 }
*/
#define DER_OID_V_id_sha3_384 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03,
 0x04, 0x02, 0x09
#define DER_OID_SZ_id_sha3_384 11
extern const unsigned char ossl_der_oid_id_sha3_384[DER_OID_SZ_id_sha3_384];

/*
* id-sha3-512 OBJECT IDENTIFIER ::= { hashAlgs 10 }
*/
#define DER_OID_V_id_sha3_512 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x0A
#define DER_OID_SZ_id_sha3_512 11
extern const unsigned char ossl_der_oid_id_sha3_512[DER_OID_SZ_id_sha3_512];

/*
* id-shake128 OBJECT IDENTIFIER ::= { hashAlgs 11 }
*/
#define DER_OID_V_id_shake128 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x0B
#define DER_OID_SZ_id_shake128 11
extern const unsigned char ossl_der_oid_id_shake128[DER_OID_SZ_id_shake128];

/*
* id-shake256 OBJECT IDENTIFIER ::= { hashAlgs 12 }
*/
#define DER_OID_V_id_shake256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02, 0x0C
#define DER_OID_SZ_id_shake256 11
extern const unsigned char ossl_der_oid_id_shake256[DER_OID_SZ_id_shake256];

/*
* id-shake128-len OBJECT IDENTIFIER ::= { hashAlgs
 17 }
*/
#define DER_OID_V_id_shake128_len DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02,
0x11
#define DER_OID_SZ_id_shake128_len 11
extern const unsigned char ossl_der_oid_id_shake128_len[DER_OID_SZ_id_shake128_len];

/*
* id-shake256-len OBJECT IDENTIFIER ::= { hashAlgs 18 }
*/
#define DER_OID_V_id_shake256_len DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02,
```

```
0x12
#define DER_OID_SZ_id_shake256_len 11
extern const unsigned char ossl_der_oid_id_shake256_len[DER_OID_SZ_id_shake256_len];

/*
* id-KMACWithSHAKE128 OBJECT IDENTIFIER ::={hashAlgs 19}
*/
#define DER_OID_V_id_KMACWithSHAKE128 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x02, 0x13
#define DER_OID_SZ_id_KMACWithSHAKE128 11
extern const unsigned char ossl_der_oid_id_KMACWithSHAKE128[DER_OID_SZ_id_KMACWithSHAKE128];

/*
* id-KMACWithSHAKE256 OBJECT IDENTIFIER ::={ hashAlgs 20}
*/
#define DER_OID_V_id_KMACWithSHAKE256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
 0x02, 0x14
#define DER_OID_SZ_id_KMACWithSHAKE256 11
extern const unsigned char ossl_der_oid_id_KMACWithSHAKE256[DER_OID_SZ_id_KMACWithSHAKE256];

/* clang-format on */
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/bio.h.in
*
* Copyright 1995-2025 The OpenSSL Project Authors. All Rights Reserved.
*
* Licensed under the Apache License 2.0 (the "License").  You may not use
* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/
/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_BIO_H
#define OPENSSL_BIO_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_BIO_H
#endif

#include <openssl/e_os2.h>

#ifndef OPENSSL_NO_STDIO
```

```
#include <stdio.h>
#endif
#include <stdarg.h>

#include <openssl/crypto.h>
#include <openssl/bioerr.h>
#include <openssl/core.h>

#ifdef __cplusplus
extern "C" {
#endif

/* There are the classes of BIOs */
#define BIO_TYPE_DESCRIPTOR 0x0100 /* socket, fd, connect or accept */
#define BIO_TYPE_FILTER 0x0200
#define BIO_TYPE_SOURCE_SINK
 0x0400

/* These are the 'types' of BIOs */
#define BIO_TYPE_NONE 0
#define BIO_TYPE_MEM (1 | BIO_TYPE_SOURCE_SINK)
#define BIO_TYPE_FILE (2 | BIO_TYPE_SOURCE_SINK)

#define BIO_TYPE_FD (4 | BIO_TYPE_SOURCE_SINK | BIO_TYPE_DESCRIPTOR)
#define BIO_TYPE_SOCKET (5 | BIO_TYPE_SOURCE_SINK | BIO_TYPE_DESCRIPTOR)
#define BIO_TYPE_NULL (6 | BIO_TYPE_SOURCE_SINK)
#define BIO_TYPE_SSL (7 | BIO_TYPE_FILTER)
#define BIO_TYPE_MD (8 | BIO_TYPE_FILTER)
#define BIO_TYPE_BUFFER (9 | BIO_TYPE_FILTER)
#define BIO_TYPE_CIPHER (10 | BIO_TYPE_FILTER)
#define BIO_TYPE_BASE64 (11 | BIO_TYPE_FILTER)
#define BIO_TYPE_CONNECT (12 | BIO_TYPE_SOURCE_SINK | BIO_TYPE_DESCRIPTOR)
#define BIO_TYPE_ACCEPT (13 | BIO_TYPE_SOURCE_SINK | BIO_TYPE_DESCRIPTOR)

#define BIO_TYPE_NBIO_TEST (16 | BIO_TYPE_FILTER) /* server proxy BIO */
#define BIO_TYPE_NULL_FILTER (17 | BIO_TYPE_FILTER)
#define BIO_TYPE_BIO (19 | BIO_TYPE_SOURCE_SINK) /* half a BIO pair */
#define BIO_TYPE_LINEBUFFER (20 | BIO_TYPE_FILTER)
#define BIO_TYPE_DGRAM
 (21 | BIO_TYPE_SOURCE_SINK | BIO_TYPE_DESCRIPTOR)
#define BIO_TYPE_ASN1 (22 | BIO_TYPE_FILTER)
#define BIO_TYPE_COMP (23 | BIO_TYPE_FILTER)
#ifndef OPENSSL_NO_SCTP
#define BIO_TYPE_DGRAM_SCTP (24 | BIO_TYPE_SOURCE_SINK | BIO_TYPE_DESCRIPTOR)
#endif
#define BIO_TYPE_CORE_TO_PROV (25 | BIO_TYPE_SOURCE_SINK)
#define BIO_TYPE_DGRAM_PAIR (26 | BIO_TYPE_SOURCE_SINK)
#define BIO_TYPE_DGRAM_MEM (27 | BIO_TYPE_SOURCE_SINK)
```

```
/* Custom type starting index returned by BIO_get_new_index() */
#define BIO_TYPE_START 128
/* Custom type maximum index that can be returned by BIO_get_new_index() */
#define BIO_TYPE_MASK 0xFF

/*
* BIO_FILENAME_READ|BIO_CLOSE to open or close on free.
* BIO_set_fp(in,stdin,BIO_NOCLOSE);
*/
#define BIO_NOCLOSE 0x00
#define BIO_CLOSE 0x01

/*
* These are used in the following macros and are passed to BIO_ctrl()
*/
#define BIO_CTRL_RESET 1 /* opt - rewind/zero etc */
#define BIO_CTRL_EOF 2 /* opt - are we at the eof */
#define BIO_CTRL_INFO 3 /* opt - extra tit-bits
 */
#define BIO_CTRL_SET 4 /* man - set the 'IO' type */
#define BIO_CTRL_GET 5 /* man - get the 'IO' type */
#define BIO_CTRL_PUSH 6 /* opt - internal, used to signify change */
#define BIO_CTRL_POP 7 /* opt - internal, used to signify change */
#define BIO_CTRL_GET_CLOSE 8 /* man - set the 'close' on free */
#define BIO_CTRL_SET_CLOSE 9 /* man - set the 'close' on free */
#define BIO_CTRL_PENDING 10 /* opt - is their more data buffered */
#define BIO_CTRL_FLUSH 11 /* opt - 'flush' buffered output */
#define BIO_CTRL_DUP 12 /* man - extra stuff for 'duped' BIO */
#define BIO_CTRL_WPENDING 13 /* opt - number of bytes still to write */
#define BIO_CTRL_SET_CALLBACK 14 /* opt - set callback function */
#define BIO_CTRL_GET_CALLBACK 15 /* opt - set callback function */

#define BIO_CTRL_PEEK 29 /* BIO_f_buffer special */
#define BIO_CTRL_SET_FILENAME 30 /* BIO_s_file special */

/* dgram BIO stuff */
#define BIO_CTRL_DGRAM_CONNECT 31 /* BIO dgram special */
#define BIO_CTRL_DGRAM_SET_CONNECTED
 32 /* allow for an externally connected \
                                * socket to be passed in */
#define BIO_CTRL_DGRAM_SET_RECV_TIMEOUT 33 /* setsockopt, essentially */
#define BIO_CTRL_DGRAM_GET_RECV_TIMEOUT 34 /* getsockopt, essentially */
#define BIO_CTRL_DGRAM_SET_SEND_TIMEOUT 35 /* setsockopt, essentially */
#define BIO_CTRL_DGRAM_GET_SEND_TIMEOUT 36 /* getsockopt, essentially */

#define BIO_CTRL_DGRAM_GET_RECV_TIMER_EXP 37 /* flag whether the last */
#define BIO_CTRL_DGRAM_GET_SEND_TIMER_EXP 38 /* I/O operation timed out */
```

```
/* #ifdef IP_MTU_DISCOVER */
#define BIO_CTRL_DGRAM_MTU_DISCOVER 39 /* set DF bit on egress packets */
/* #endif */

#define BIO_CTRL_DGRAM_QUERY_MTU 40 /* as kernel for current MTU */
#define BIO_CTRL_DGRAM_GET_FALLBACK_MTU 47
#define BIO_CTRL_DGRAM_GET_MTU 41 /* get cached value for MTU */
#define BIO_CTRL_DGRAM_SET_MTU 42 /* set cached value for MTU.  \
                         * want to use this if asking \

                 * the kernel fails */

#define BIO_CTRL_DGRAM_MTU_EXCEEDED 43 /* check whether the MTU was    \
                             * exceed in the previous write \
                             * operation */

#define BIO_CTRL_DGRAM_GET_PEER 46
#define BIO_CTRL_DGRAM_SET_PEER 44 /* Destination for the data */

#define BIO_CTRL_DGRAM_SET_NEXT_TIMEOUT 45 /* Next DTLS handshake timeout \
                               * to adjust socket timeouts */
#define BIO_CTRL_DGRAM_SET_DONT_FRAG 48

#define BIO_CTRL_DGRAM_GET_MTU_OVERHEAD 49

/* Deliberately outside of OPENSSL_NO_SCTP - used in bss_dgram.c */
#define BIO_CTRL_DGRAM_SCTP_SET_IN_HANDSHAKE 50
#ifndef OPENSSL_NO_SCTP
/* SCTP stuff */
#define BIO_CTRL_DGRAM_SCTP_ADD_AUTH_KEY 51
#define BIO_CTRL_DGRAM_SCTP_NEXT_AUTH_KEY 52
#define BIO_CTRL_DGRAM_SCTP_AUTH_CCS_RCVD 53
#define BIO_CTRL_DGRAM_SCTP_GET_SNDINFO 60
#define BIO_CTRL_DGRAM_SCTP_SET_SNDINFO 61
#define BIO_CTRL_DGRAM_SCTP_GET_RCVINFO
 62
#define BIO_CTRL_DGRAM_SCTP_SET_RCVINFO 63
#define BIO_CTRL_DGRAM_SCTP_GET_PRINFO 64
#define BIO_CTRL_DGRAM_SCTP_SET_PRINFO 65
#define BIO_CTRL_DGRAM_SCTP_SAVE_SHUTDOWN 70
#endif

#define BIO_CTRL_DGRAM_SET_PEEK_MODE 71

/*
* internal BIO:
* # define BIO_CTRL_SET_KTLS_SEND                72
```

```
* # define BIO_CTRL_SET_KTLS_SEND_CTRL_MSG        74
* # define BIO_CTRL_CLEAR_KTLS_CTRL_MSG           75
*/

#define BIO_CTRL_GET_KTLS_SEND 73
#define BIO_CTRL_GET_KTLS_RECV 76

#define BIO_CTRL_DGRAM_SCTP_WAIT_FOR_DRY 77
#define BIO_CTRL_DGRAM_SCTP_MSG_WAITING 78

/* BIO_f_prefix controls */
#define BIO_CTRL_SET_PREFIX 79
#define BIO_CTRL_SET_INDENT 80
#define BIO_CTRL_GET_INDENT 81

#define BIO_CTRL_DGRAM_GET_LOCAL_ADDR_CAP 82
#define BIO_CTRL_DGRAM_GET_LOCAL_ADDR_ENABLE 83
#define BIO_CTRL_DGRAM_SET_LOCAL_ADDR_ENABLE 84
#define BIO_CTRL_DGRAM_GET_EFFECTIVE_CAPS 85
#define BIO_CTRL_DGRAM_GET_CAPS 86
#define BIO_CTRL_DGRAM_SET_CAPS 87
#define BIO_CTRL_DGRAM_GET_NO_TRUNC 88
#define BIO_CTRL_DGRAM_SET_NO_TRUNC
 89

/*
* internal BIO:
* # define BIO_CTRL_SET_KTLS_TX_ZEROCOPY_SENDFILE 90
*/

#define BIO_CTRL_GET_RPOLL_DESCRIPTOR 91
#define BIO_CTRL_GET_WPOLL_DESCRIPTOR 92
#define BIO_CTRL_DGRAM_DETECT_PEER_ADDR 93
#define BIO_CTRL_DGRAM_SET0_LOCAL_ADDR 94

#define BIO_DGRAM_CAP_NONE 0U
#define BIO_DGRAM_CAP_HANDLES_SRC_ADDR (1U << 0)
#define BIO_DGRAM_CAP_HANDLES_DST_ADDR (1U << 1)
#define BIO_DGRAM_CAP_PROVIDES_SRC_ADDR (1U << 2)
#define BIO_DGRAM_CAP_PROVIDES_DST_ADDR (1U << 3)

#ifndef OPENSSL_NO_KTLS
#define BIO_get_ktls_send(b) \
   (BIO_ctrl(b, BIO_CTRL_GET_KTLS_SEND, 0, NULL) > 0)
#define BIO_get_ktls_recv(b) \
   (BIO_ctrl(b, BIO_CTRL_GET_KTLS_RECV, 0, NULL) > 0)
#else
#define BIO_get_ktls_send(b) (0)
```

```
#define BIO_get_ktls_recv(b) (0)
#endif

/* modifiers */
#define BIO_FP_READ 0x02
#define BIO_FP_WRITE 0x04
#define BIO_FP_APPEND 0x08
#define BIO_FP_TEXT 0x10

#define BIO_FLAGS_READ 0x01
#define BIO_FLAGS_WRITE 0x02
#define BIO_FLAGS_IO_SPECIAL 0x04
#define BIO_FLAGS_RWS
 (BIO_FLAGS_READ | BIO_FLAGS_WRITE | BIO_FLAGS_IO_SPECIAL)
#define BIO_FLAGS_SHOULD_RETRY 0x08
#ifndef OPENSSL_NO_DEPRECATED_3_0
/* This #define was replaced by an internal constant and should not be used. */
#define BIO_FLAGS_UPLINK 0
#endif

#define BIO_FLAGS_BASE64_NO_NL 0x100

/*
* This is used with memory BIOs:
* BIO_FLAGS_MEM_RDONLY means we shouldn't free up or change the data in any way;
* BIO_FLAGS_NONCLEAR_RST means we shouldn't clear data on reset.
*/
#define BIO_FLAGS_MEM_RDONLY 0x200
#define BIO_FLAGS_NONCLEAR_RST 0x400
#define BIO_FLAGS_IN_EOF 0x800

/* the BIO FLAGS values 0x1000 to 0x8000 are reserved for internal KTLS flags */

typedef union bio_addr_st BIO_ADDR;
typedef struct bio_addrinfo_st BIO_ADDRINFO;

int BIO_get_new_index(void);
void BIO_set_flags(BIO *b, int flags);
int BIO_test_flags(const BIO *b, int flags);
void BIO_clear_flags(BIO *b, int flags);

#define BIO_get_flags(b) BIO_test_flags(b, ~(0x0))
#define BIO_set_retry_special(b) \
   BIO_set_flags(b,
 (BIO_FLAGS_IO_SPECIAL | BIO_FLAGS_SHOULD_RETRY))
#define BIO_set_retry_read(b) \
   BIO_set_flags(b, (BIO_FLAGS_READ | BIO_FLAGS_SHOULD_RETRY))
#define BIO_set_retry_write(b) \
```

```
   BIO_set_flags(b, (BIO_FLAGS_WRITE | BIO_FLAGS_SHOULD_RETRY))

/* These are normally used internally in BIOs */
#define BIO_clear_retry_flags(b) \
   BIO_clear_flags(b, (BIO_FLAGS_RWS | BIO_FLAGS_SHOULD_RETRY))
#define BIO_get_retry_flags(b) \
   BIO_test_flags(b, (BIO_FLAGS_RWS | BIO_FLAGS_SHOULD_RETRY))

/* These should be used by the application to tell why we should retry */
#define BIO_should_read(a) BIO_test_flags(a, BIO_FLAGS_READ)
#define BIO_should_write(a) BIO_test_flags(a, BIO_FLAGS_WRITE)
#define BIO_should_io_special(a) BIO_test_flags(a, BIO_FLAGS_IO_SPECIAL)
#define BIO_retry_type(a) BIO_test_flags(a, BIO_FLAGS_RWS)
#define BIO_should_retry(a) BIO_test_flags(a, BIO_FLAGS_SHOULD_RETRY)

/*
* The next three are used in conjunction with the BIO_should_io_special()
* condition.  After
 this returns true, BIO *BIO_get_retry_BIO(BIO *bio, int
* *reason); will walk the BIO stack and return the 'reason' for the special
* and the offending BIO. Given a BIO, BIO_get_retry_reason(bio) will return
* the code.
*/
/*
* Returned from the SSL bio when the certificate retrieval code had an error
*/
#define BIO_RR_SSL_X509_LOOKUP 0x01
/* Returned from the connect BIO when a connect would have blocked */
#define BIO_RR_CONNECT 0x02
/* Returned from the accept BIO when an accept would have blocked */
#define BIO_RR_ACCEPT 0x03

/* These are passed by the BIO callback */
#define BIO_CB_FREE 0x01
#define BIO_CB_READ 0x02
#define BIO_CB_WRITE 0x03
#define BIO_CB_PUTS 0x04
#define BIO_CB_GETS 0x05
#define BIO_CB_CTRL 0x06
#define BIO_CB_RECVMMSG 0x07
#define BIO_CB_SENDMMSG 0x08

/*
* The callback is called before and after the underling operation, The
* BIO_CB_RETURN flag indicates if it is after the call
*/
#define BIO_CB_RETURN 0x80
#define BIO_CB_return(a) ((a) | BIO_CB_RETURN)
```

```
#define
 BIO_cb_pre(a) (!((a) & BIO_CB_RETURN))
#define BIO_cb_post(a) ((a) & BIO_CB_RETURN)

#ifndef OPENSSL_NO_DEPRECATED_3_0
typedef long (*BIO_callback_fn)(BIO *b, int oper, const char *argp, int argi,
   long argl, long ret);
OSSL_DEPRECATEDIN_3_0 BIO_callback_fn BIO_get_callback(const BIO *b);
OSSL_DEPRECATEDIN_3_0 void BIO_set_callback(BIO *b, BIO_callback_fn callback);
OSSL_DEPRECATEDIN_3_0 long BIO_debug_callback(BIO *bio, int cmd,
   const char *argp, int argi,
   long argl, long ret);
#endif

typedef long (*BIO_callback_fn_ex)(BIO *b, int oper, const char *argp,
   size_t len, int argi,
   long argl, int ret, size_t *processed);
BIO_callback_fn_ex BIO_get_callback_ex(const BIO *b);
void BIO_set_callback_ex(BIO *b, BIO_callback_fn_ex callback);
long BIO_debug_callback_ex(BIO *bio, int oper, const char *argp, size_t len,
   int argi, long argl, int ret, size_t *processed);

char *BIO_get_callback_arg(const BIO *b);
void BIO_set_callback_arg(BIO *b, char *arg);

typedef
 struct bio_method_st BIO_METHOD;

const char *BIO_method_name(const BIO *b);
int BIO_method_type(const BIO *b);

typedef int BIO_info_cb(BIO *, int, int);
typedef BIO_info_cb bio_info_cb; /* backward compatibility */

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(BIO, BIO, BIO)
#define sk_BIO_num(sk) OPENSSL_sk_num(ossl_check_const_BIO_sk_type(sk))
#define sk_BIO_value(sk, idx) ((BIO *)OPENSSL_sk_value(ossl_check_const_BIO_sk_type(sk), (idx)))
#define sk_BIO_new(cmp) ((STACK_OF(BIO) *)OPENSSL_sk_new(ossl_check_BIO_compfunc_type(cmp)))
#define sk_BIO_new_null() ((STACK_OF(BIO) *)OPENSSL_sk_new_null())
#define sk_BIO_new_reserve(cmp, n) ((STACK_OF(BIO)
*)OPENSSL_sk_new_reserve(ossl_check_BIO_compfunc_type(cmp), (n)))
#define sk_BIO_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_BIO_sk_type(sk), (n))
#define sk_BIO_free(sk) OPENSSL_sk_free(ossl_check_BIO_sk_type(sk))
#define sk_BIO_zero(sk) OPENSSL_sk_zero(ossl_check_BIO_sk_type(sk))
#define sk_BIO_delete(sk, i) ((BIO *)OPENSSL_sk_delete(ossl_check_BIO_sk_type(sk),
 (i)))
#define sk_BIO_delete_ptr(sk, ptr) ((BIO *)OPENSSL_sk_delete_ptr(ossl_check_BIO_sk_type(sk),
```

```
ossl_check_BIO_type(ptr)))
#define sk_BIO_push(sk, ptr) OPENSSL_sk_push(ossl_check_BIO_sk_type(sk), ossl_check_BIO_type(ptr))
#define sk_BIO_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_BIO_sk_type(sk), ossl_check_BIO_type(ptr))
#define sk_BIO_pop(sk) ((BIO *)OPENSSL_sk_pop(ossl_check_BIO_sk_type(sk)))
#define sk_BIO_shift(sk) ((BIO *)OPENSSL_sk_shift(ossl_check_BIO_sk_type(sk)))
#define sk_BIO_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_BIO_sk_type(sk),ossl_check_BIO_freefunc_type(freefunc))
#define sk_BIO_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_BIO_sk_type(sk), ossl_check_BIO_type(ptr),
(idx))
#define sk_BIO_set(sk, idx, ptr) ((BIO *)OPENSSL_sk_set(ossl_check_BIO_sk_type(sk), (idx),
ossl_check_BIO_type(ptr)))
#define sk_BIO_find(sk, ptr) OPENSSL_sk_find(ossl_check_BIO_sk_type(sk), ossl_check_BIO_type(ptr))
#define sk_BIO_find_ex(sk,
 ptr) OPENSSL_sk_find_ex(ossl_check_BIO_sk_type(sk), ossl_check_BIO_type(ptr))
#define sk_BIO_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_BIO_sk_type(sk),
ossl_check_BIO_type(ptr), pnum)
#define sk_BIO_sort(sk) OPENSSL_sk_sort(ossl_check_BIO_sk_type(sk))
#define sk_BIO_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_BIO_sk_type(sk))
#define sk_BIO_dup(sk) ((STACK_OF(BIO) *)OPENSSL_sk_dup(ossl_check_const_BIO_sk_type(sk)))
#define sk_BIO_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(BIO)
*)OPENSSL_sk_deep_copy(ossl_check_const_BIO_sk_type(sk), ossl_check_BIO_copyfunc_type(copyfunc),
ossl_check_BIO_freefunc_type(freefunc)))
#define sk_BIO_set_cmp_func(sk, cmp)
((sk_BIO_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_BIO_sk_type(sk),
ossl_check_BIO_compfunc_type(cmp)))

/* clang-format on */

/* Prefix and suffix callback in ASN1 BIO */
typedef int asn1_ps_func(BIO *b, unsigned char **pbuf, int *plen,
   void *parg);

typedef void (*BIO_dgram_sctp_notification_handler_fn)(BIO
 *b,
   void *context,
   void *buf);
#ifndef OPENSSL_NO_SCTP
/* SCTP parameter structs */
struct bio_dgram_sctp_sndinfo {
   uint16_t snd_sid;
   uint16_t snd_flags;
   uint32_t snd_ppid;
   uint32_t snd_context;
};

struct bio_dgram_sctp_rcvinfo {
   uint16_t rcv_sid;
   uint16_t rcv_ssn;
```

```
   uint16_t rcv_flags;
   uint32_t rcv_ppid;
   uint32_t rcv_tsn;
   uint32_t rcv_cumtsn;
   uint32_t rcv_context;
};

struct bio_dgram_sctp_prinfo {
   uint16_t pr_policy;
   uint32_t pr_value;
};
#endif

/* BIO_sendmmsg/BIO_recvmmsg-related definitions */
typedef struct bio_msg_st {
   void *data;
   size_t data_len;
   BIO_ADDR *peer, *local;
   uint64_t flags;
} BIO_MSG;

typedef struct bio_mmsg_cb_args_st {
   BIO_MSG *msg;
   size_t stride, num_msg;
   uint64_t flags;
   size_t *msgs_processed;
} BIO_MMSG_CB_ARGS;

#define BIO_POLL_DESCRIPTOR_TYPE_NONE 0
#define BIO_POLL_DESCRIPTOR_TYPE_SOCK_FD 1
#define BIO_POLL_DESCRIPTOR_TYPE_SSL 2
#define BIO_POLL_DESCRIPTOR_CUSTOM_START
 8192

typedef struct bio_poll_descriptor_st {
   uint32_t type;
   union {
       int fd;
       void *custom;
       uintptr_t custom_ui;
       SSL *ssl;
   } value;
} BIO_POLL_DESCRIPTOR;

/*
* #define BIO_CONN_get_param_hostname BIO_ctrl
*/
```

```
#define BIO_C_SET_CONNECT 100
#define BIO_C_DO_STATE_MACHINE 101
#define BIO_C_SET_NBIO 102
/* # define BIO_C_SET_PROXY_PARAM                 103 */
#define BIO_C_SET_FD 104
#define BIO_C_GET_FD 105
#define BIO_C_SET_FILE_PTR 106
#define BIO_C_GET_FILE_PTR 107
#define BIO_C_SET_FILENAME 108
#define BIO_C_SET_SSL 109
#define BIO_C_GET_SSL 110
#define BIO_C_SET_MD 111
#define BIO_C_GET_MD 112
#define BIO_C_GET_CIPHER_STATUS 113
#define BIO_C_SET_BUF_MEM 114
#define BIO_C_GET_BUF_MEM_PTR 115
#define BIO_C_GET_BUFF_NUM_LINES 116
#define BIO_C_SET_BUFF_SIZE 117
#define BIO_C_SET_ACCEPT 118
#define BIO_C_SSL_MODE 119
#define BIO_C_GET_MD_CTX 120
/* # define BIO_C_GET_PROXY_PARAM                 121 */
#define BIO_C_SET_BUFF_READ_DATA
 122 /* data to read first */
#define BIO_C_GET_CONNECT 123
#define BIO_C_GET_ACCEPT 124
#define BIO_C_SET_SSL_RENEGOTIATE_BYTES 125
#define BIO_C_GET_SSL_NUM_RENEGOTIATES 126
#define BIO_C_SET_SSL_RENEGOTIATE_TIMEOUT 127
#define BIO_C_FILE_SEEK 128
#define BIO_C_GET_CIPHER_CTX 129
#define BIO_C_SET_BUF_MEM_EOF_RETURN 130 /* return end of input \
                                * value */
#define BIO_C_SET_BIND_MODE 131
#define BIO_C_GET_BIND_MODE 132
#define BIO_C_FILE_TELL 133
#define BIO_C_GET_SOCKS 134
#define BIO_C_SET_SOCKS 135

#define BIO_C_SET_WRITE_BUF_SIZE 136 /* for BIO_s_bio */
#define BIO_C_GET_WRITE_BUF_SIZE 137
#define BIO_C_MAKE_BIO_PAIR 138
#define BIO_C_DESTROY_BIO_PAIR 139
#define BIO_C_GET_WRITE_GUARANTEE 140
#define BIO_C_GET_READ_REQUEST 141
#define BIO_C_SHUTDOWN_WR 142
#define BIO_C_NREAD0 143
#define BIO_C_NREAD 144
```

```
#define BIO_C_NWRITE0 145
#define BIO_C_NWRITE 146
#define BIO_C_RESET_READ_REQUEST 147
#define BIO_C_SET_MD_CTX 148

#define BIO_C_SET_PREFIX
 149
#define BIO_C_GET_PREFIX 150
#define BIO_C_SET_SUFFIX 151
#define BIO_C_GET_SUFFIX 152

#define BIO_C_SET_EX_ARG 153
#define BIO_C_GET_EX_ARG 154

#define BIO_C_SET_CONNECT_MODE 155

#define BIO_C_SET_TFO 156 /* like BIO_C_SET_NBIO */

#define BIO_C_SET_SOCK_TYPE 157
#define BIO_C_GET_SOCK_TYPE 158
#define BIO_C_GET_DGRAM_BIO 159

#define BIO_set_app_data(s, arg) BIO_set_ex_data(s, 0, arg)
#define BIO_get_app_data(s) BIO_get_ex_data(s, 0)

#define BIO_set_nbio(b, n) BIO_ctrl(b, BIO_C_SET_NBIO, (n), NULL)
#define BIO_set_tfo(b, n) BIO_ctrl(b, BIO_C_SET_TFO, (n), NULL)

#ifndef OPENSSL_NO_SOCK
/* IP families we support, for BIO_s_connect() and BIO_s_accept() */
/* Note: the underlying operating system may not support some of them */
#define BIO_FAMILY_IPV4 4
#define BIO_FAMILY_IPV6 6
#define BIO_FAMILY_IPANY 256

/* BIO_s_connect() */
#define BIO_set_conn_hostname(b, name) BIO_ctrl(b, BIO_C_SET_CONNECT, 0, \
   (char *)(name))
#define BIO_set_conn_port(b, port) BIO_ctrl(b,
 BIO_C_SET_CONNECT, 1, \
   (char *)(port))
#define BIO_set_conn_address(b, addr) BIO_ctrl(b, BIO_C_SET_CONNECT, 2, \
   (char *)(addr))
#define BIO_set_conn_ip_family(b, f) BIO_int_ctrl(b, BIO_C_SET_CONNECT, 3, f)
#define BIO_get_conn_hostname(b) ((const char *)BIO_ptr_ctrl(b, BIO_C_GET_CONNECT, 0))
#define BIO_get_conn_port(b) ((const char *)BIO_ptr_ctrl(b, BIO_C_GET_CONNECT, 1))
#define BIO_get_conn_address(b) ((const BIO_ADDR *)BIO_ptr_ctrl(b, BIO_C_GET_CONNECT, 2))
#define BIO_get_conn_ip_family(b) BIO_ctrl(b, BIO_C_GET_CONNECT, 3, NULL)
```

```
#define BIO_get_conn_mode(b) BIO_ctrl(b, BIO_C_GET_CONNECT, 4, NULL)
#define BIO_set_conn_mode(b, n) BIO_ctrl(b, BIO_C_SET_CONNECT_MODE, (n), NULL)
#define BIO_set_sock_type(b, t) BIO_ctrl(b, BIO_C_SET_SOCK_TYPE, (t), NULL)
#define BIO_get_sock_type(b) BIO_ctrl(b, BIO_C_GET_SOCK_TYPE, 0, NULL)
#define BIO_get0_dgram_bio(b, p) BIO_ctrl(b, BIO_C_GET_DGRAM_BIO, 0, (void *)(BIO **)(p))

/* BIO_s_accept() */
#define BIO_set_accept_name(b, name) BIO_ctrl(b,
 BIO_C_SET_ACCEPT, 0, \
   (char *)(name))
#define BIO_set_accept_port(b, port) BIO_ctrl(b, BIO_C_SET_ACCEPT, 1, \
   (char *)(port))
#define BIO_get_accept_name(b) ((const char *)BIO_ptr_ctrl(b, BIO_C_GET_ACCEPT, 0))
#define BIO_get_accept_port(b) ((const char *)BIO_ptr_ctrl(b, BIO_C_GET_ACCEPT, 1))
#define BIO_get_peer_name(b) ((const char *)BIO_ptr_ctrl(b, BIO_C_GET_ACCEPT, 2))
#define BIO_get_peer_port(b) ((const char *)BIO_ptr_ctrl(b, BIO_C_GET_ACCEPT, 3))
/* #define BIO_set_nbio(b,n)    BIO_ctrl(b,BIO_C_SET_NBIO,(n),NULL) */
#define BIO_set_nbio_accept(b, n) BIO_ctrl(b, BIO_C_SET_ACCEPT, 2, (n) ? (void *)"a" : NULL)
#define BIO_set_accept_bios(b, bio) BIO_ctrl(b, BIO_C_SET_ACCEPT, 3, \
   (char *)(bio))
#define BIO_set_accept_ip_family(b, f) BIO_int_ctrl(b, BIO_C_SET_ACCEPT, 4, f)
#define BIO_get_accept_ip_family(b) BIO_ctrl(b, BIO_C_GET_ACCEPT, 4, NULL)
#define BIO_set_tfo_accept(b, n) BIO_ctrl(b, BIO_C_SET_ACCEPT, 5, (n) ? (void *)"a" : NULL)

/* Aliases kept for backward
 compatibility */
#define BIO_BIND_NORMAL 0
#define BIO_BIND_REUSEADDR BIO_SOCK_REUSEADDR
#define BIO_BIND_REUSEADDR_IF_UNUSED BIO_SOCK_REUSEADDR
#define BIO_set_bind_mode(b, mode) BIO_ctrl(b, BIO_C_SET_BIND_MODE, mode, NULL)
#define BIO_get_bind_mode(b) BIO_ctrl(b, BIO_C_GET_BIND_MODE, 0, NULL)
#endif /* OPENSSL_NO_SOCK */

#define BIO_do_connect(b) BIO_do_handshake(b)
#define BIO_do_accept(b) BIO_do_handshake(b)

#define BIO_do_handshake(b) BIO_ctrl(b, BIO_C_DO_STATE_MACHINE, 0, NULL)

/* BIO_s_datagram(), BIO_s_fd(), BIO_s_socket(), BIO_s_accept() and BIO_s_connect() */
#define BIO_set_fd(b, fd, c) BIO_int_ctrl(b, BIO_C_SET_FD, c, fd)
#define BIO_get_fd(b, c) BIO_ctrl(b, BIO_C_GET_FD, 0, (char *)(c))

/* BIO_s_file() */
#define BIO_set_fp(b, fp, c) BIO_ctrl(b, BIO_C_SET_FILE_PTR, c, (char *)(fp))
#define BIO_get_fp(b, fpp) BIO_ctrl(b, BIO_C_GET_FILE_PTR, 0, (char *)(fpp))

/* BIO_s_fd() and BIO_s_file() */
#define BIO_seek(b, ofs) (int)BIO_ctrl(b, BIO_C_FILE_SEEK, ofs, NULL)
```

```
#define
 BIO_tell(b) (int)BIO_ctrl(b, BIO_C_FILE_TELL, 0, NULL)

/*
* name is cast to lose const, but might be better to route through a
* function so we can do it safely
*/
#ifdef CONST_STRICT
/*
* If you are wondering why this isn't defined, its because CONST_STRICT is
* purely a compile-time kludge to allow const to be checked.
*/
int BIO_read_filename(BIO *b, const char *name);
#else
#define BIO_read_filename(b, name) (int)BIO_ctrl(b, BIO_C_SET_FILENAME, \
   BIO_CLOSE | BIO_FP_READ, (char *)(name))
#endif
#define BIO_write_filename(b, name) (int)BIO_ctrl(b, BIO_C_SET_FILENAME, \
   BIO_CLOSE | BIO_FP_WRITE, name)
#define BIO_append_filename(b, name) (int)BIO_ctrl(b, BIO_C_SET_FILENAME, \
   BIO_CLOSE | BIO_FP_APPEND, name)
#define BIO_rw_filename(b, name) (int)BIO_ctrl(b, BIO_C_SET_FILENAME, \
   BIO_CLOSE | BIO_FP_READ | BIO_FP_WRITE, name)

/*
* WARNING WARNING, this ups the reference count on the read bio of the SSL
* structure.  This is because the ssl read BIO is now pointed
 to by the
* next_bio field in the bio.  So when you free the BIO, make sure you are
* doing a BIO_free_all() to catch the underlying BIO.
*/
#define BIO_set_ssl(b, ssl, c) BIO_ctrl(b, BIO_C_SET_SSL, c, (char *)(ssl))
#define BIO_get_ssl(b, sslp) BIO_ctrl(b, BIO_C_GET_SSL, 0, (char *)(sslp))
#define BIO_set_ssl_mode(b, client) BIO_ctrl(b, BIO_C_SSL_MODE, client, NULL)
#define BIO_set_ssl_renegotiate_bytes(b, num) \
   BIO_ctrl(b, BIO_C_SET_SSL_RENEGOTIATE_BYTES, num, NULL)
#define BIO_get_num_renegotiates(b) \
   BIO_ctrl(b, BIO_C_GET_SSL_NUM_RENEGOTIATES, 0, NULL)
#define BIO_set_ssl_renegotiate_timeout(b, seconds) \
   BIO_ctrl(b, BIO_C_SET_SSL_RENEGOTIATE_TIMEOUT, seconds, NULL)

/* defined in evp.h */
/* #define BIO_set_md(b,md)     BIO_ctrl(b,BIO_C_SET_MD,1,(char *)(md)) */

#define BIO_get_mem_data(b, pp) BIO_ctrl(b, BIO_CTRL_INFO, 0, (char *)(pp))
#define BIO_set_mem_buf(b, bm, c) BIO_ctrl(b, BIO_C_SET_BUF_MEM, c, (char *)(bm))
#define BIO_get_mem_ptr(b, pp) BIO_ctrl(b,
```

```
 BIO_C_GET_BUF_MEM_PTR, 0, \
   (char *)(pp))
#define BIO_set_mem_eof_return(b, v) \
   BIO_ctrl(b, BIO_C_SET_BUF_MEM_EOF_RETURN, v, NULL)

/* For the BIO_f_buffer() type */
#define BIO_get_buffer_num_lines(b) BIO_ctrl(b, BIO_C_GET_BUFF_NUM_LINES, 0, NULL)
#define BIO_set_buffer_size(b, size) BIO_ctrl(b, BIO_C_SET_BUFF_SIZE, size, NULL)
#define BIO_set_read_buffer_size(b, size) BIO_int_ctrl(b, BIO_C_SET_BUFF_SIZE, size, 0)
#define BIO_set_write_buffer_size(b, size) BIO_int_ctrl(b, BIO_C_SET_BUFF_SIZE, size, 1)
#define BIO_set_buffer_read_data(b, buf, num) BIO_ctrl(b, BIO_C_SET_BUFF_READ_DATA, num, buf)

/* Don't use the next one unless you know what you are doing :-) */
#define BIO_dup_state(b, ret) BIO_ctrl(b, BIO_CTRL_DUP, 0, (char *)(ret))

#define BIO_reset(b) (int)BIO_ctrl(b, BIO_CTRL_RESET, 0, NULL)
#define BIO_eof(b) (int)BIO_ctrl(b, BIO_CTRL_EOF, 0, NULL)
#define BIO_set_close(b, c) (int)BIO_ctrl(b, BIO_CTRL_SET_CLOSE, (c), NULL)
#define BIO_get_close(b) (int)BIO_ctrl(b, BIO_CTRL_GET_CLOSE,
 0, NULL)
#define BIO_pending(b) (int)BIO_ctrl(b, BIO_CTRL_PENDING, 0, NULL)
#define BIO_wpending(b) (int)BIO_ctrl(b, BIO_CTRL_WPENDING, 0, NULL)
/* ...pending macros have inappropriate return type */
size_t BIO_ctrl_pending(BIO *b);
size_t BIO_ctrl_wpending(BIO *b);
#define BIO_flush(b) (int)BIO_ctrl(b, BIO_CTRL_FLUSH, 0, NULL)
#define BIO_get_info_callback(b, cbp) (int)BIO_ctrl(b, BIO_CTRL_GET_CALLBACK, 0, \
   cbp)
#define BIO_set_info_callback(b, cb) (int)BIO_callback_ctrl(b, BIO_CTRL_SET_CALLBACK, cb)

/* For the BIO_f_buffer() type */
#define BIO_buffer_get_num_lines(b) BIO_ctrl(b, BIO_CTRL_GET, 0, NULL)
#define BIO_buffer_peek(b, s, l) BIO_ctrl(b, BIO_CTRL_PEEK, (l), (s))

/* For BIO_s_bio() */
#define BIO_set_write_buf_size(b, size) (int)BIO_ctrl(b, BIO_C_SET_WRITE_BUF_SIZE, size, NULL)
#define BIO_get_write_buf_size(b, size) (size_t)BIO_ctrl(b, BIO_C_GET_WRITE_BUF_SIZE, size, NULL)
#define BIO_make_bio_pair(b1, b2) (int)BIO_ctrl(b1, BIO_C_MAKE_BIO_PAIR, 0, b2)
#define
 BIO_destroy_bio_pair(b) (int)BIO_ctrl(b, BIO_C_DESTROY_BIO_PAIR, 0, NULL)
#define BIO_shutdown_wr(b) (int)BIO_ctrl(b, BIO_C_SHUTDOWN_WR, 0, NULL)
/* macros with inappropriate type -- but ...pending macros use int too: */
#define BIO_get_write_guarantee(b) (int)BIO_ctrl(b, BIO_C_GET_WRITE_GUARANTEE, 0, NULL)
#define BIO_get_read_request(b) (int)BIO_ctrl(b, BIO_C_GET_READ_REQUEST, 0, NULL)
size_t BIO_ctrl_get_write_guarantee(BIO *b);
size_t BIO_ctrl_get_read_request(BIO *b);
int BIO_ctrl_reset_read_request(BIO *b);
```

```
/* ctrl macros for dgram */
#define BIO_ctrl_dgram_connect(b, peer) \
   (int)BIO_ctrl(b, BIO_CTRL_DGRAM_CONNECT, 0, (char *)(peer))
#define BIO_ctrl_set_connected(b, peer) \
   (int)BIO_ctrl(b, BIO_CTRL_DGRAM_SET_CONNECTED, 0, (char *)(peer))
#define BIO_dgram_recv_timedout(b) \
   (int)BIO_ctrl(b, BIO_CTRL_DGRAM_GET_RECV_TIMER_EXP, 0, NULL)
#define BIO_dgram_send_timedout(b) \
   (int)BIO_ctrl(b, BIO_CTRL_DGRAM_GET_SEND_TIMER_EXP, 0, NULL)
#define BIO_dgram_get_peer(b,
 peer) \
   (int)BIO_ctrl(b, BIO_CTRL_DGRAM_GET_PEER, 0, (char *)(peer))
#define BIO_dgram_set_peer(b, peer) \
   (int)BIO_ctrl(b, BIO_CTRL_DGRAM_SET_PEER, 0, (char *)(peer))
#define BIO_dgram_detect_peer_addr(b, peer) \
   (int)BIO_ctrl(b, BIO_CTRL_DGRAM_DETECT_PEER_ADDR, 0, (char *)(peer))
#define BIO_dgram_get_mtu_overhead(b) \
   (unsigned int)BIO_ctrl((b), BIO_CTRL_DGRAM_GET_MTU_OVERHEAD, 0, NULL)
#define BIO_dgram_get_local_addr_cap(b) \
   (int)BIO_ctrl((b), BIO_CTRL_DGRAM_GET_LOCAL_ADDR_CAP, 0, NULL)
#define BIO_dgram_get_local_addr_enable(b, penable) \
   (int)BIO_ctrl((b), BIO_CTRL_DGRAM_GET_LOCAL_ADDR_ENABLE, 0, (char *)(penable))
#define BIO_dgram_set_local_addr_enable(b, enable) \
   (int)BIO_ctrl((b), BIO_CTRL_DGRAM_SET_LOCAL_ADDR_ENABLE, (enable), NULL)
#define BIO_dgram_get_effective_caps(b) \
   (uint32_t)BIO_ctrl((b), BIO_CTRL_DGRAM_GET_EFFECTIVE_CAPS, 0, NULL)
#define BIO_dgram_get_caps(b) \
   (uint32_t)BIO_ctrl((b), BIO_CTRL_DGRAM_GET_CAPS, 0, NULL)
#define
 BIO_dgram_set_caps(b, caps) \
   (int)BIO_ctrl((b), BIO_CTRL_DGRAM_SET_CAPS, (long)(caps), NULL)
#define BIO_dgram_get_no_trunc(b) \
   (unsigned int)BIO_ctrl((b), BIO_CTRL_DGRAM_GET_NO_TRUNC, 0, NULL)
#define BIO_dgram_set_no_trunc(b, enable) \
   (int)BIO_ctrl((b), BIO_CTRL_DGRAM_SET_NO_TRUNC, (enable), NULL)
#define BIO_dgram_get_mtu(b) \
   (unsigned int)BIO_ctrl((b), BIO_CTRL_DGRAM_GET_MTU, 0, NULL)
#define BIO_dgram_set_mtu(b, mtu) \
   (int)BIO_ctrl((b), BIO_CTRL_DGRAM_SET_MTU, (mtu), NULL)
#define BIO_dgram_set0_local_addr(b, addr) \
   (int)BIO_ctrl((b), BIO_CTRL_DGRAM_SET0_LOCAL_ADDR, 0, (addr))

/* ctrl macros for BIO_f_prefix */
#define BIO_set_prefix(b, p) BIO_ctrl((b), BIO_CTRL_SET_PREFIX, 0, (void *)(p))
#define BIO_set_indent(b, i) BIO_ctrl((b), BIO_CTRL_SET_INDENT, (i), NULL)
#define BIO_get_indent(b) BIO_ctrl((b), BIO_CTRL_GET_INDENT, 0, NULL)

#define BIO_get_ex_new_index(l, p, newf, dupf, freef) \
```

```
   CRYPTO_get_ex_new_index(CRYPTO_EX_INDEX_BIO, l,
 p, newf, dupf, freef)
int BIO_set_ex_data(BIO *bio, int idx, void *data);
void *BIO_get_ex_data(const BIO *bio, int idx);
uint64_t BIO_number_read(BIO *bio);
uint64_t BIO_number_written(BIO *bio);

/* For BIO_f_asn1() */
int BIO_asn1_set_prefix(BIO *b, asn1_ps_func *prefix,
   asn1_ps_func *prefix_free);
int BIO_asn1_get_prefix(BIO *b, asn1_ps_func **pprefix,
   asn1_ps_func **pprefix_free);
int BIO_asn1_set_suffix(BIO *b, asn1_ps_func *suffix,
   asn1_ps_func *suffix_free);
int BIO_asn1_get_suffix(BIO *b, asn1_ps_func **psuffix,
   asn1_ps_func **psuffix_free);

const BIO_METHOD *BIO_s_file(void);
BIO *BIO_new_file(const char *filename, const char *mode);
BIO *BIO_new_from_core_bio(OSSL_LIB_CTX *libctx, OSSL_CORE_BIO *corebio);
#ifndef OPENSSL_NO_STDIO
BIO *BIO_new_fp(FILE *stream, int close_flag);
#endif
BIO *BIO_new_ex(OSSL_LIB_CTX *libctx, const BIO_METHOD *method);
BIO *BIO_new(const BIO_METHOD *type);
int BIO_free(BIO *a);
void BIO_set_data(BIO *a, void *ptr);
void *BIO_get_data(BIO
 *a);
void BIO_set_init(BIO *a, int init);
int BIO_get_init(BIO *a);
void BIO_set_shutdown(BIO *a, int shut);
int BIO_get_shutdown(BIO *a);
void BIO_vfree(BIO *a);
int BIO_up_ref(BIO *a);
int BIO_read(BIO *b, void *data, int dlen);
int BIO_read_ex(BIO *b, void *data, size_t dlen, size_t *readbytes);
__owur int BIO_recvmmsg(BIO *b, BIO_MSG *msg,
   size_t stride, size_t num_msg, uint64_t flags,
   size_t *msgs_processed);
int BIO_gets(BIO *bp, char *buf, int size);
int BIO_get_line(BIO *bio, char *buf, int size);
int BIO_write(BIO *b, const void *data, int dlen);
int BIO_write_ex(BIO *b, const void *data, size_t dlen, size_t *written);
__owur int BIO_sendmmsg(BIO *b, BIO_MSG *msg,
   size_t stride, size_t num_msg, uint64_t flags,
   size_t *msgs_processed);
__owur int BIO_get_rpoll_descriptor(BIO *b, BIO_POLL_DESCRIPTOR *desc);
```

```
__owur int BIO_get_wpoll_descriptor(BIO *b, BIO_POLL_DESCRIPTOR *desc);
int BIO_puts(BIO *bp, const char *buf);
int BIO_indent(BIO *b, int indent, int
 max);
long BIO_ctrl(BIO *bp, int cmd, long larg, void *parg);
long BIO_callback_ctrl(BIO *b, int cmd, BIO_info_cb *fp);
void *BIO_ptr_ctrl(BIO *bp, int cmd, long larg);
long BIO_int_ctrl(BIO *bp, int cmd, long larg, int iarg);
BIO *BIO_push(BIO *b, BIO *append);
BIO *BIO_pop(BIO *b);
void BIO_free_all(BIO *a);
BIO *BIO_find_type(BIO *b, int bio_type);
BIO *BIO_next(BIO *b);
void BIO_set_next(BIO *b, BIO *next);
BIO *BIO_get_retry_BIO(BIO *bio, int *reason);
int BIO_get_retry_reason(BIO *bio);
void BIO_set_retry_reason(BIO *bio, int reason);
BIO *BIO_dup_chain(BIO *in);

int BIO_nread0(BIO *bio, char **buf);
int BIO_nread(BIO *bio, char **buf, int num);
int BIO_nwrite0(BIO *bio, char **buf);
int BIO_nwrite(BIO *bio, char **buf, int num);

const BIO_METHOD *BIO_s_mem(void);
#ifndef OPENSSL_NO_DGRAM
const BIO_METHOD *BIO_s_dgram_mem(void);
#endif
const BIO_METHOD *BIO_s_secmem(void);
BIO *BIO_new_mem_buf(const void *buf, int len);
#ifndef OPENSSL_NO_SOCK
const BIO_METHOD *BIO_s_socket(void);
const
 BIO_METHOD *BIO_s_connect(void);
const BIO_METHOD *BIO_s_accept(void);
#endif
const BIO_METHOD *BIO_s_fd(void);
const BIO_METHOD *BIO_s_log(void);
const BIO_METHOD *BIO_s_bio(void);
const BIO_METHOD *BIO_s_null(void);
const BIO_METHOD *BIO_f_null(void);
const BIO_METHOD *BIO_f_buffer(void);
const BIO_METHOD *BIO_f_readbuffer(void);
const BIO_METHOD *BIO_f_linebuffer(void);
const BIO_METHOD *BIO_f_nbio_test(void);
const BIO_METHOD *BIO_f_prefix(void);
const BIO_METHOD *BIO_s_core(void);
#ifndef OPENSSL_NO_DGRAM
```

```
const BIO_METHOD *BIO_s_dgram_pair(void);
const BIO_METHOD *BIO_s_datagram(void);
int BIO_dgram_non_fatal_error(int error);
BIO *BIO_new_dgram(int fd, int close_flag);
#ifndef OPENSSL_NO_SCTP
const BIO_METHOD *BIO_s_datagram_sctp(void);
BIO *BIO_new_dgram_sctp(int fd, int close_flag);
int BIO_dgram_is_sctp(BIO *bio);
int BIO_dgram_sctp_notification_cb(BIO *b,
   BIO_dgram_sctp_notification_handler_fn handle_notifications,
   void *context);
int BIO_dgram_sctp_wait_for_dry(BIO
 *b);
int BIO_dgram_sctp_msg_waiting(BIO *b);
#endif
#endif

#ifndef OPENSSL_NO_SOCK
int BIO_sock_should_retry(int i);
int BIO_sock_non_fatal_error(int error);
int BIO_err_is_non_fatal(unsigned int errcode);
int BIO_socket_wait(int fd, int for_read, time_t max_time);
#endif
int BIO_wait(BIO *bio, time_t max_time, unsigned int nap_milliseconds);
int BIO_do_connect_retry(BIO *bio, int timeout, int nap_milliseconds);

int BIO_fd_should_retry(int i);
int BIO_fd_non_fatal_error(int error);
int BIO_dump_cb(int (*cb)(const void *data, size_t len, void *u),
   void *u, const void *s, int len);
int BIO_dump_indent_cb(int (*cb)(const void *data, size_t len, void *u),
   void *u, const void *s, int len, int indent);
int BIO_dump(BIO *b, const void *bytes, int len);
int BIO_dump_indent(BIO *b, const void *bytes, int len, int indent);
#ifndef OPENSSL_NO_STDIO
int BIO_dump_fp(FILE *fp, const void *s, int len);
int BIO_dump_indent_fp(FILE *fp, const void *s, int len, int indent);
#endif
int
 BIO_hex_string(BIO *out, int indent, int width, const void *data,
   int datalen);

#ifndef OPENSSL_NO_SOCK
BIO_ADDR *BIO_ADDR_new(void);
int BIO_ADDR_copy(BIO_ADDR *dst, const BIO_ADDR *src);
BIO_ADDR *BIO_ADDR_dup(const BIO_ADDR *ap);
int BIO_ADDR_rawmake(BIO_ADDR *ap, int family,
   const void *where, size_t wherelen, unsigned short port);
```

```
void BIO_ADDR_free(BIO_ADDR *);
void BIO_ADDR_clear(BIO_ADDR *ap);
int BIO_ADDR_family(const BIO_ADDR *ap);
int BIO_ADDR_rawaddress(const BIO_ADDR *ap, void *p, size_t *l);
unsigned short BIO_ADDR_rawport(const BIO_ADDR *ap);
char *BIO_ADDR_hostname_string(const BIO_ADDR *ap, int numeric);
char *BIO_ADDR_service_string(const BIO_ADDR *ap, int numeric);
char *BIO_ADDR_path_string(const BIO_ADDR *ap);

const BIO_ADDRINFO *BIO_ADDRINFO_next(const BIO_ADDRINFO *bai);
int BIO_ADDRINFO_family(const BIO_ADDRINFO *bai);
int BIO_ADDRINFO_socktype(const BIO_ADDRINFO *bai);
int BIO_ADDRINFO_protocol(const BIO_ADDRINFO *bai);
const BIO_ADDR *BIO_ADDRINFO_address(const
 BIO_ADDRINFO *bai);
void BIO_ADDRINFO_free(BIO_ADDRINFO *bai);

enum BIO_hostserv_priorities {
   BIO_PARSE_PRIO_HOST,
   BIO_PARSE_PRIO_SERV
};
int BIO_parse_hostserv(const char *hostserv, char **host, char **service,
   enum BIO_hostserv_priorities hostserv_prio);
enum BIO_lookup_type {
   BIO_LOOKUP_CLIENT,
   BIO_LOOKUP_SERVER
};
int BIO_lookup(const char *host, const char *service,
   enum BIO_lookup_type lookup_type,
   int family, int socktype, BIO_ADDRINFO **res);
int BIO_lookup_ex(const char *host, const char *service,
   int lookup_type, int family, int socktype, int protocol,
   BIO_ADDRINFO **res);
int BIO_sock_error(int sock);
int BIO_socket_ioctl(int fd, long type, void *arg);
int BIO_socket_nbio(int fd, int mode);
int BIO_sock_init(void);
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define BIO_sock_cleanup() \
   while (0)            \
   continue
#endif
int BIO_set_tcp_ndelay(int sock, int turn_on);
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0
 struct hostent *BIO_gethostbyname(const char *name);
OSSL_DEPRECATEDIN_1_1_0 int BIO_get_port(const char *str, unsigned short *port_ptr);
OSSL_DEPRECATEDIN_1_1_0 int BIO_get_host_ip(const char *str, unsigned char *ip);
```

```
OSSL_DEPRECATEDIN_1_1_0 int BIO_get_accept_socket(char *host_port, int mode);
OSSL_DEPRECATEDIN_1_1_0 int BIO_accept(int sock, char **ip_port);
#endif

union BIO_sock_info_u {
  BIO_ADDR *addr;
};
enum BIO_sock_info_type {
  BIO_SOCK_INFO_ADDRESS
};
int BIO_sock_info(int sock,
  enum BIO_sock_info_type type, union BIO_sock_info_u *info);

#define BIO_SOCK_REUSEADDR 0x01
#define BIO_SOCK_V6_ONLY 0x02
#define BIO_SOCK_KEEPALIVE 0x04
#define BIO_SOCK_NONBLOCK 0x08
#define BIO_SOCK_NODELAY 0x10
#define BIO_SOCK_TFO 0x20

int BIO_socket(int domain, int socktype, int protocol, int options);
int BIO_connect(int sock, const BIO_ADDR *addr, int options);
int BIO_bind(int sock, const BIO_ADDR *addr, int options);
int BIO_listen(int sock, const BIO_ADDR *addr, int options);
int
 BIO_accept_ex(int accept_sock, BIO_ADDR *addr, int options);
int BIO_closesocket(int sock);

BIO *BIO_new_socket(int sock, int close_flag);
BIO *BIO_new_connect(const char *host_port);
BIO *BIO_new_accept(const char *host_port);
#endif /* OPENSSL_NO_SOCK*/

BIO *BIO_new_fd(int fd, int close_flag);

int BIO_new_bio_pair(BIO **bio1, size_t writebuf1,
  BIO **bio2, size_t writebuf2);
#ifndef OPENSSL_NO_DGRAM
int BIO_new_bio_dgram_pair(BIO **bio1, size_t writebuf1,
  BIO **bio2, size_t writebuf2);
#endif

/*
* If successful, returns 1 and in *bio1, *bio2 two BIO pair endpoints.
* Otherwise returns 0 and sets *bio1 and *bio2 to NULL. Size 0 uses default
* value.
*/
```

```
void BIO_copy_next_retry(BIO *b);

/*
* long BIO_ghbn_ctrl(int cmd,int iarg,char *parg);
*/

#define ossl_bio__attr__(x)
#if defined(__GNUC__) && defined(__STDC_VERSION__)    \
   && !defined(__MINGW32__) && !defined(__MINGW64__) \
   && !defined(__APPLE__)
/*
* Because we support the 'z' modifier, which
 made its appearance in C99,
* we can't use __attribute__ with pre C99 dialects.
*/
#if __STDC_VERSION__ >= 199901L
#undef ossl_bio__attr__
#define ossl_bio__attr__ __attribute__
#if __GNUC__ * 10 + __GNUC_MINOR__ >= 44
#define ossl_bio__printf__ __gnu_printf__
#else
#define ossl_bio__printf__ __printf__
#endif
#endif
#endif
int BIO_printf(BIO *bio, const char *format, ...)
   ossl_bio__attr__((__format__(ossl_bio__printf__, 2, 3)));
int BIO_vprintf(BIO *bio, const char *format, va_list args)
   ossl_bio__attr__((__format__(ossl_bio__printf__, 2, 0)));
int BIO_snprintf(char *buf, size_t n, const char *format, ...)
   ossl_bio__attr__((__format__(ossl_bio__printf__, 3, 4)));
int BIO_vsnprintf(char *buf, size_t n, const char *format, va_list args)
   ossl_bio__attr__((__format__(ossl_bio__printf__, 3, 0)));
#undef ossl_bio__attr__
#undef ossl_bio__printf__

BIO_METHOD *BIO_meth_new(int type, const char *name);
void BIO_meth_free(BIO_METHOD *biom);
int BIO_meth_set_write(BIO_METHOD
 *biom,
   int (*write)(BIO *, const char *, int));
int BIO_meth_set_write_ex(BIO_METHOD *biom,
   int (*bwrite)(BIO *, const char *, size_t, size_t *));
int BIO_meth_set_sendmmsg(BIO_METHOD *biom,
   int (*f)(BIO *, BIO_MSG *, size_t, size_t,
       uint64_t, size_t *));
int BIO_meth_set_read(BIO_METHOD *biom,
   int (*read)(BIO *, char *, int));
```

```
int BIO_meth_set_read_ex(BIO_METHOD *biom,
   int (*bread)(BIO *, char *, size_t, size_t *));
int BIO_meth_set_recvmmsg(BIO_METHOD *biom,
   int (*f)(BIO *, BIO_MSG *, size_t, size_t,
       uint64_t, size_t *));
int BIO_meth_set_puts(BIO_METHOD *biom,
   int (*puts)(BIO *, const char *));
int BIO_meth_set_gets(BIO_METHOD *biom,
   int (*ossl_gets)(BIO *, char *, int));
int BIO_meth_set_ctrl(BIO_METHOD *biom,
   long (*ctrl)(BIO *, int, long, void *));
int BIO_meth_set_create(BIO_METHOD *biom, int (*create)(BIO *));
int BIO_meth_set_destroy(BIO_METHOD *biom, int (*destroy)(BIO *));
int BIO_meth_set_callback_ctrl(BIO_METHOD *biom,

   long (*callback_ctrl)(BIO *, int,
       BIO_info_cb *));
#ifndef OPENSSL_NO_DEPRECATED_3_5
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_write(const BIO_METHOD *biom))(BIO *, const char *,
   int);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_write_ex(const BIO_METHOD *biom))(BIO *, const char *,
   size_t, size_t *);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_sendmmsg(const BIO_METHOD *biom))(BIO *, BIO_MSG
*,
   size_t, size_t,
   uint64_t, size_t *);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_read(const BIO_METHOD *biom))(BIO *, char *, int);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_read_ex(const BIO_METHOD *biom))(BIO *, char *,
   size_t, size_t *);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_recvmmsg(const BIO_METHOD *biom))(BIO *, BIO_MSG
*,
   size_t, size_t,
   uint64_t, size_t *);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_puts(const BIO_METHOD *biom))(BIO *, const char *);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_gets(const BIO_METHOD *biom))(BIO *, char *, int);
OSSL_DEPRECATEDIN_3_5
 long (*BIO_meth_get_ctrl(const BIO_METHOD *biom))(BIO *, int,
   long, void *);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_create(const BIO_METHOD *bion))(BIO *);
OSSL_DEPRECATEDIN_3_5 int (*BIO_meth_get_destroy(const BIO_METHOD *biom))(BIO *);
OSSL_DEPRECATEDIN_3_5 long (*BIO_meth_get_callback_ctrl(const BIO_METHOD *biom))(BIO *, int,
   BIO_info_cb *);
#endif
#ifdef __cplusplus
}
#endif
#endif
```

```
/*
* WARNING: do not edit!
* Generated by Makefile from providers/common/include/prov/der_ec.h.in
*
* Copyright 2020-2021 The OpenSSL Project Authors. All Rights Reserved.
*
* Licensed under the Apache License 2.0 (the "License").  You may not use
* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#include "crypto/ec.h"
#include "internal/der.h"

/* Well known OIDs precompiled */
/* clang-format off */

/*
* ecdsa-with-SHA1 OBJECT IDENTIFIER ::= { id-ecSigType 1 }
*/
#define DER_OID_V_ecdsa_with_SHA1 DER_P_OBJECT, 7, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x04, 0x01
#define DER_OID_SZ_ecdsa_with_SHA1 9
extern const unsigned char ossl_der_oid_ecdsa_with_SHA1[DER_OID_SZ_ecdsa_with_SHA1];

/*
* id-ecPublicKey OBJECT IDENTIFIER ::= { id-publicKeyType 1 }
*/
#define DER_OID_V_id_ecPublicKey DER_P_OBJECT, 7, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x02, 0x01
#define DER_OID_SZ_id_ecPublicKey
 9
extern const unsigned char ossl_der_oid_id_ecPublicKey[DER_OID_SZ_id_ecPublicKey];

/*
* c2pnb163v1  OBJECT IDENTIFIER  ::=  { c-TwoCurve  1 }
*/
#define DER_OID_V_c2pnb163v1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x01
#define DER_OID_SZ_c2pnb163v1 10
extern const unsigned char ossl_der_oid_c2pnb163v1[DER_OID_SZ_c2pnb163v1];

/*
* c2pnb163v2  OBJECT IDENTIFIER  ::=  { c-TwoCurve  2 }
*/
#define DER_OID_V_c2pnb163v2 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x02
#define DER_OID_SZ_c2pnb163v2 10
extern const unsigned char ossl_der_oid_c2pnb163v2[DER_OID_SZ_c2pnb163v2];

/*
```

```
* c2pnb163v3  OBJECT IDENTIFIER  ::=  { c-TwoCurve  3 }
*/
#define DER_OID_V_c2pnb163v3 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x03
#define DER_OID_SZ_c2pnb163v3 10
extern const unsigned char ossl_der_oid_c2pnb163v3[DER_OID_SZ_c2pnb163v3];

/*
* c2pnb176w1  OBJECT IDENTIFIER  ::=  { c-TwoCurve  4 }
*/
#define DER_OID_V_c2pnb176w1 DER_P_OBJECT,
 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x04
#define DER_OID_SZ_c2pnb176w1 10
extern const unsigned char ossl_der_oid_c2pnb176w1[DER_OID_SZ_c2pnb176w1];

/*
* c2tnb191v1  OBJECT IDENTIFIER  ::=  { c-TwoCurve  5 }
*/
#define DER_OID_V_c2tnb191v1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x05
#define DER_OID_SZ_c2tnb191v1 10
extern const unsigned char ossl_der_oid_c2tnb191v1[DER_OID_SZ_c2tnb191v1];

/*
* c2tnb191v2  OBJECT IDENTIFIER  ::=  { c-TwoCurve  6 }
*/
#define DER_OID_V_c2tnb191v2 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x06
#define DER_OID_SZ_c2tnb191v2 10
extern const unsigned char ossl_der_oid_c2tnb191v2[DER_OID_SZ_c2tnb191v2];

/*
* c2tnb191v3  OBJECT IDENTIFIER  ::=  { c-TwoCurve  7 }
*/
#define DER_OID_V_c2tnb191v3 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x07
#define DER_OID_SZ_c2tnb191v3 10
extern const unsigned char ossl_der_oid_c2tnb191v3[DER_OID_SZ_c2tnb191v3];

/*
* c2onb191v4  OBJECT IDENTIFIER
  ::=  { c-TwoCurve  8 }
*/
#define DER_OID_V_c2onb191v4 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x08
#define DER_OID_SZ_c2onb191v4 10
extern const unsigned char ossl_der_oid_c2onb191v4[DER_OID_SZ_c2onb191v4];

/*
* c2onb191v5  OBJECT IDENTIFIER  ::=  { c-TwoCurve  9 }
*/
#define DER_OID_V_c2onb191v5 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x09
#define DER_OID_SZ_c2onb191v5 10
```

```
extern const unsigned char ossl_der_oid_c2onb191v5[DER_OID_SZ_c2onb191v5];

/*
* c2pnb208w1  OBJECT IDENTIFIER  ::=  { c-TwoCurve 10 }
*/
#define DER_OID_V_c2pnb208w1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x0A
#define DER_OID_SZ_c2pnb208w1 10
extern const unsigned char ossl_der_oid_c2pnb208w1[DER_OID_SZ_c2pnb208w1];

/*
* c2tnb239v1  OBJECT IDENTIFIER  ::=  { c-TwoCurve 11 }
*/
#define DER_OID_V_c2tnb239v1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x0B
#define DER_OID_SZ_c2tnb239v1 10
extern const unsigned char ossl_der_oid_c2tnb239v1[DER_OID_SZ_c2tnb239v1];

/*
 * c2tnb239v2  OBJECT IDENTIFIER  ::=  { c-TwoCurve 12 }
*/
#define DER_OID_V_c2tnb239v2 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x0C
#define DER_OID_SZ_c2tnb239v2 10
extern const unsigned char ossl_der_oid_c2tnb239v2[DER_OID_SZ_c2tnb239v2];

/*
* c2tnb239v3  OBJECT IDENTIFIER  ::=  { c-TwoCurve 13 }
*/
#define DER_OID_V_c2tnb239v3 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x0D
#define DER_OID_SZ_c2tnb239v3 10
extern const unsigned char ossl_der_oid_c2tnb239v3[DER_OID_SZ_c2tnb239v3];

/*
* c2onb239v4  OBJECT IDENTIFIER  ::=  { c-TwoCurve 14 }
*/
#define DER_OID_V_c2onb239v4 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x0E
#define DER_OID_SZ_c2onb239v4 10
extern const unsigned char ossl_der_oid_c2onb239v4[DER_OID_SZ_c2onb239v4];

/*
* c2onb239v5  OBJECT IDENTIFIER  ::=  { c-TwoCurve 15 }
*/
#define DER_OID_V_c2onb239v5 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x0F
#define DER_OID_SZ_c2onb239v5
 10
extern const unsigned char ossl_der_oid_c2onb239v5[DER_OID_SZ_c2onb239v5];

/*
* c2pnb272w1  OBJECT IDENTIFIER  ::=  { c-TwoCurve 16 }
*/
```

```
#define DER_OID_V_c2pnb272w1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x10
#define DER_OID_SZ_c2pnb272w1 10
extern const unsigned char ossl_der_oid_c2pnb272w1[DER_OID_SZ_c2pnb272w1];

/*
* c2pnb304w1  OBJECT IDENTIFIER  ::=  { c-TwoCurve 17 }
*/
#define DER_OID_V_c2pnb304w1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x11
#define DER_OID_SZ_c2pnb304w1 10
extern const unsigned char ossl_der_oid_c2pnb304w1[DER_OID_SZ_c2pnb304w1];

/*
* c2tnb359v1  OBJECT IDENTIFIER  ::=  { c-TwoCurve 18 }
*/
#define DER_OID_V_c2tnb359v1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x12
#define DER_OID_SZ_c2tnb359v1 10
extern const unsigned char ossl_der_oid_c2tnb359v1[DER_OID_SZ_c2tnb359v1];

/*
* c2pnb368w1  OBJECT IDENTIFIER  ::=  { c-TwoCurve 19 }
*/
#define DER_OID_V_c2pnb368w1 DER_P_OBJECT,
 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x13
#define DER_OID_SZ_c2pnb368w1 10
extern const unsigned char ossl_der_oid_c2pnb368w1[DER_OID_SZ_c2pnb368w1];

/*
* c2tnb431r1  OBJECT IDENTIFIER  ::=  { c-TwoCurve 20 }
*/
#define DER_OID_V_c2tnb431r1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x00, 0x14
#define DER_OID_SZ_c2tnb431r1 10
extern const unsigned char ossl_der_oid_c2tnb431r1[DER_OID_SZ_c2tnb431r1];

/*
* prime192v1  OBJECT IDENTIFIER  ::=  { primeCurve  1 }
*/
#define DER_OID_V_prime192v1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x01, 0x01
#define DER_OID_SZ_prime192v1 10
extern const unsigned char ossl_der_oid_prime192v1[DER_OID_SZ_prime192v1];

/*
* prime192v2  OBJECT IDENTIFIER  ::=  { primeCurve  2 }
*/
#define DER_OID_V_prime192v2 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x01, 0x02
#define DER_OID_SZ_prime192v2 10
extern const unsigned char ossl_der_oid_prime192v2[DER_OID_SZ_prime192v2];

/*
```

```
* prime192v3  OBJECT IDENTIFIER  ::=
  { primeCurve  3 }
*/
#define DER_OID_V_prime192v3 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x01, 0x03
#define DER_OID_SZ_prime192v3 10
extern const unsigned char ossl_der_oid_prime192v3[DER_OID_SZ_prime192v3];

/*
* prime239v1  OBJECT IDENTIFIER  ::=  { primeCurve  4 }
*/
#define DER_OID_V_prime239v1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x01, 0x04
#define DER_OID_SZ_prime239v1 10
extern const unsigned char ossl_der_oid_prime239v1[DER_OID_SZ_prime239v1];

/*
* prime239v2  OBJECT IDENTIFIER  ::=  { primeCurve  5 }
*/
#define DER_OID_V_prime239v2 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x01, 0x05
#define DER_OID_SZ_prime239v2 10
extern const unsigned char ossl_der_oid_prime239v2[DER_OID_SZ_prime239v2];

/*
* prime239v3  OBJECT IDENTIFIER  ::=  { primeCurve  6 }
*/
#define DER_OID_V_prime239v3 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x01, 0x06
#define DER_OID_SZ_prime239v3 10
extern const unsigned char ossl_der_oid_prime239v3[DER_OID_SZ_prime239v3];

/*
 * prime256v1  OBJECT IDENTIFIER  ::=  { primeCurve  7 }
*/
#define DER_OID_V_prime256v1 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x03, 0x01, 0x07
#define DER_OID_SZ_prime256v1 10
extern const unsigned char ossl_der_oid_prime256v1[DER_OID_SZ_prime256v1];

/*
* ecdsa-with-SHA224 OBJECT IDENTIFIER ::= { iso(1) member-body(2)
*      us(840) ansi-X9-62(10045) signatures(4) ecdsa-with-SHA2(3) 1 }
*/
#define DER_OID_V_ecdsa_with_SHA224 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x04, 0x03,
0x01
#define DER_OID_SZ_ecdsa_with_SHA224 10
extern const unsigned char ossl_der_oid_ecdsa_with_SHA224[DER_OID_SZ_ecdsa_with_SHA224];

/*
* ecdsa-with-SHA256 OBJECT IDENTIFIER ::= { iso(1) member-body(2)
*      us(840) ansi-X9-62(10045) signatures(4) ecdsa-with-SHA2(3) 2 }
*/
```

```
#define DER_OID_V_ecdsa_with_SHA256 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x04, 0x03,
0x02
#define DER_OID_SZ_ecdsa_with_SHA256 10
extern const unsigned char ossl_der_oid_ecdsa_with_SHA256[DER_OID_SZ_ecdsa_with_SHA256];

/*
 * ecdsa-with-SHA384 OBJECT IDENTIFIER ::= { iso(1) member-body(2)
*      us(840) ansi-X9-62(10045) signatures(4) ecdsa-with-SHA2(3) 3 }
*/
#define DER_OID_V_ecdsa_with_SHA384 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x04, 0x03,
0x03
#define DER_OID_SZ_ecdsa_with_SHA384 10
extern const unsigned char ossl_der_oid_ecdsa_with_SHA384[DER_OID_SZ_ecdsa_with_SHA384];

/*
* ecdsa-with-SHA512 OBJECT IDENTIFIER ::= { iso(1) member-body(2)
*      us(840) ansi-X9-62(10045) signatures(4) ecdsa-with-SHA2(3) 4 }
*/
#define DER_OID_V_ecdsa_with_SHA512 DER_P_OBJECT, 8, 0x2A, 0x86, 0x48, 0xCE, 0x3D, 0x04, 0x03,
0x04
#define DER_OID_SZ_ecdsa_with_SHA512 10
extern const unsigned char ossl_der_oid_ecdsa_with_SHA512[DER_OID_SZ_ecdsa_with_SHA512];

/*
* id-ecdsa-with-sha3-224 OBJECT IDENTIFIER ::= { sigAlgs 9 }
*/
#define DER_OID_V_id_ecdsa_with_sha3_224 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x09
#define DER_OID_SZ_id_ecdsa_with_sha3_224
 11
extern const unsigned char ossl_der_oid_id_ecdsa_with_sha3_224[DER_OID_SZ_id_ecdsa_with_sha3_224];

/*
* id-ecdsa-with-sha3-256 OBJECT IDENTIFIER ::= { sigAlgs 10 }
*/
#define DER_OID_V_id_ecdsa_with_sha3_256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x0A
#define DER_OID_SZ_id_ecdsa_with_sha3_256 11
extern const unsigned char ossl_der_oid_id_ecdsa_with_sha3_256[DER_OID_SZ_id_ecdsa_with_sha3_256];

/*
* id-ecdsa-with-sha3-384 OBJECT IDENTIFIER ::= { sigAlgs 11 }
*/
#define DER_OID_V_id_ecdsa_with_sha3_384 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x0B
#define DER_OID_SZ_id_ecdsa_with_sha3_384 11
extern const unsigned char ossl_der_oid_id_ecdsa_with_sha3_384[DER_OID_SZ_id_ecdsa_with_sha3_384];
```

```
/*
* id-ecdsa-with-sha3-512 OBJECT IDENTIFIER ::= { sigAlgs 12 }
*/
#define DER_OID_V_id_ecdsa_with_sha3_512 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x0C
#define DER_OID_SZ_id_ecdsa_with_sha3_512 11
extern const
 unsigned char ossl_der_oid_id_ecdsa_with_sha3_512[DER_OID_SZ_id_ecdsa_with_sha3_512];

/* clang-format on */

/* Subject Public Key Info */
int ossl_DER_w_algorithmIdentifier_EC(WPACKET *pkt, int cont, EC_KEY *ec);
/* Signature */
int ossl_DER_w_algorithmIdentifier_ECDSA_with_MD(WPACKET *pkt, int cont,
   EC_KEY *ec, int mdnid);
```

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https://github.com/bitinn/node-fetch
# Blue Oak Model License

Version 1.0.0

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#include "internal/der.h"

/* Well known OIDs precompiled */
/* clang-format off */

/*
* id-alg-CMS3DESwrap OBJECT IDENTIFIER ::= {
*     iso(1) member-body(2) us(840) rsadsi(113549) pkcs(1) pkcs-9(9) smime(16) alg(3) 6
* }
*/
#define DER_OID_V_id_alg_CMS3DESwrap DER_P_OBJECT, 11, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01,
0x09, 0x10, 0x03, 0x06
#define DER_OID_SZ_id_alg_CMS3DESwrap 13
extern const unsigned char ossl_der_oid_id_alg_CMS3DESwrap[DER_OID_SZ_id_alg_CMS3DESwrap];

/*
* id-aes128-wrap OBJECT IDENTIFIER ::= { aes 5 }
*/
#define DER_OID_V_id_aes128_wrap
 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x01, 0x05
#define DER_OID_SZ_id_aes128_wrap 11
extern const unsigned char ossl_der_oid_id_aes128_wrap[DER_OID_SZ_id_aes128_wrap];

/*
* id-aes192-wrap OBJECT IDENTIFIER ::= { aes 25 }
*/
#define DER_OID_V_id_aes192_wrap DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x01, 0x19
#define DER_OID_SZ_id_aes192_wrap 11
extern const unsigned char ossl_der_oid_id_aes192_wrap[DER_OID_SZ_id_aes192_wrap];

/*
* id-aes256-wrap OBJECT IDENTIFIER ::= { aes 45 }
*/
#define DER_OID_V_id_aes256_wrap DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x01,
0x2D
#define DER_OID_SZ_id_aes256_wrap 11
extern const unsigned char ossl_der_oid_id_aes256_wrap[DER_OID_SZ_id_aes256_wrap];
```

/* clang-format on */
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#include "internal/der.h"
#include "crypto/slh_dsa.h"

/* Well known OIDs precompiled */
/* clang-format off */

/*
* id-slh-dsa-sha2-128s OBJECT IDENTIFIER ::= { sigAlgs 20 }
*/
#define DER_OID_V_id_slh_dsa_sha2_128s DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x14
#define DER_OID_SZ_id_slh_dsa_sha2_128s 11
extern const unsigned char ossl_der_oid_id_slh_dsa_sha2_128s[DER_OID_SZ_id_slh_dsa_sha2_128s];

/*
* id-slh-dsa-sha2-128f OBJECT IDENTIFIER ::= { sigAlgs 21 }
```

```
*/
#define DER_OID_V_id_slh_dsa_sha2_128f DER_P_OBJECT, 9, 0x60, 0x86,
 0x48, 0x01, 0x65, 0x03, 0x04, 0x03, 0x15
#define DER_OID_SZ_id_slh_dsa_sha2_128f 11
extern const unsigned char ossl_der_oid_id_slh_dsa_sha2_128f[DER_OID_SZ_id_slh_dsa_sha2_128f];

/*
* id-slh-dsa-sha2-192s OBJECT IDENTIFIER ::= { sigAlgs 22 }
*/
#define DER_OID_V_id_slh_dsa_sha2_192s DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x16
#define DER_OID_SZ_id_slh_dsa_sha2_192s 11
extern const unsigned char ossl_der_oid_id_slh_dsa_sha2_192s[DER_OID_SZ_id_slh_dsa_sha2_192s];

/*
* id-slh-dsa-sha2-192f OBJECT IDENTIFIER ::= { sigAlgs 23 }
*/
#define DER_OID_V_id_slh_dsa_sha2_192f DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x17
#define DER_OID_SZ_id_slh_dsa_sha2_192f 11
extern const unsigned char ossl_der_oid_id_slh_dsa_sha2_192f[DER_OID_SZ_id_slh_dsa_sha2_192f];

/*
* id-slh-dsa-sha2-256s OBJECT IDENTIFIER ::= { sigAlgs 24 }
*/
#define DER_OID_V_id_slh_dsa_sha2_256s DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x18
#define DER_OID_SZ_id_slh_dsa_sha2_256s
 11
extern const unsigned char ossl_der_oid_id_slh_dsa_sha2_256s[DER_OID_SZ_id_slh_dsa_sha2_256s];

/*
* id-slh-dsa-sha2-256f OBJECT IDENTIFIER ::= { sigAlgs 25 }
*/
#define DER_OID_V_id_slh_dsa_sha2_256f DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x19
#define DER_OID_SZ_id_slh_dsa_sha2_256f 11
extern const unsigned char ossl_der_oid_id_slh_dsa_sha2_256f[DER_OID_SZ_id_slh_dsa_sha2_256f];

/*
* id-slh-dsa-shake-128s OBJECT IDENTIFIER ::= { sigAlgs 26 }
*/
#define DER_OID_V_id_slh_dsa_shake_128s DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x1A
#define DER_OID_SZ_id_slh_dsa_shake_128s 11
extern const unsigned char ossl_der_oid_id_slh_dsa_shake_128s[DER_OID_SZ_id_slh_dsa_shake_128s];

/*
```

```
* id-slh-dsa-shake-128f OBJECT IDENTIFIER ::= { sigAlgs 27 }
*/
#define DER_OID_V_id_slh_dsa_shake_128f DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x1B
#define DER_OID_SZ_id_slh_dsa_shake_128f 11
extern const
 unsigned char ossl_der_oid_id_slh_dsa_shake_128f[DER_OID_SZ_id_slh_dsa_shake_128f];

/*
* id-slh-dsa-shake-192s OBJECT IDENTIFIER ::= { sigAlgs 28 }
*/
#define DER_OID_V_id_slh_dsa_shake_192s DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x1C
#define DER_OID_SZ_id_slh_dsa_shake_192s 11
extern const unsigned char ossl_der_oid_id_slh_dsa_shake_192s[DER_OID_SZ_id_slh_dsa_shake_192s];

/*
* id-slh-dsa-shake-192f OBJECT IDENTIFIER ::= { sigAlgs 29 }
*/
#define DER_OID_V_id_slh_dsa_shake_192f DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x1D
#define DER_OID_SZ_id_slh_dsa_shake_192f 11
extern const unsigned char ossl_der_oid_id_slh_dsa_shake_192f[DER_OID_SZ_id_slh_dsa_shake_192f];

/*
* id-slh-dsa-shake-256s OBJECT IDENTIFIER ::= { sigAlgs 30 }
*/
#define DER_OID_V_id_slh_dsa_shake_256s DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x1E
#define DER_OID_SZ_id_slh_dsa_shake_256s 11
extern const unsigned char ossl_der_oid_id_slh_dsa_shake_256s[DER_OID_SZ_id_slh_dsa_shake_256s];

/*
 * id-slh-dsa-shake-256f OBJECT IDENTIFIER ::= { sigAlgs 31 }
*/
#define DER_OID_V_id_slh_dsa_shake_256f DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04,
0x03, 0x1F
#define DER_OID_SZ_id_slh_dsa_shake_256f 11
extern const unsigned char ossl_der_oid_id_slh_dsa_shake_256f[DER_OID_SZ_id_slh_dsa_shake_256f];

/* clang-format on */

int ossl_DER_w_algorithmIdentifier_SLH_DSA(WPACKET *pkt, int tag, SLH_DSA_KEY *key);
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/x509_acert.h.in
*
* Copyright 2022-2024 The OpenSSL Project Authors. All Rights Reserved.
```

```
*
* Licensed under the Apache License 2.0 (the "License").  You may not use
* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_X509_ACERT_H
#define OPENSSL_X509_ACERT_H
#pragma once

#include <openssl/x509v3.h>
#include <openssl/x509.h>
#include <openssl/pem.h>

typedef struct X509_acert_st X509_ACERT;
typedef struct X509_acert_info_st X509_ACERT_INFO;
typedef struct ossl_object_digest_info_st OSSL_OBJECT_DIGEST_INFO;
typedef struct ossl_issuer_serial_st OSSL_ISSUER_SERIAL;
typedef struct X509_acert_issuer_v2form_st X509_ACERT_ISSUER_V2FORM;

DECLARE_ASN1_FUNCTIONS(X509_ACERT)
DECLARE_ASN1_DUP_FUNCTION(X509_ACERT)
DECLARE_ASN1_ITEM(X509_ACERT_INFO)
DECLARE_ASN1_ALLOC_FUNCTIONS(X509_ACERT_INFO)
DECLARE_ASN1_ALLOC_FUNCTIONS(OSSL_OBJECT_DIGEST_INFO)
DECLARE_ASN1_ALLOC_FUNCTIONS(OSSL_ISSUER_SERIAL)
DECLARE_ASN1_ALLOC_FUNCTIONS(X509_ACERT_ISSUER_V2FORM)

#ifndef
 OPENSSL_NO_STDIO
X509_ACERT *d2i_X509_ACERT_fp(FILE *fp, X509_ACERT **acert);
int i2d_X509_ACERT_fp(FILE *fp, const X509_ACERT *acert);
#endif

DECLARE_PEM_rw(X509_ACERT, X509_ACERT)

X509_ACERT *d2i_X509_ACERT_bio(BIO *bp, X509_ACERT **acert);
int i2d_X509_ACERT_bio(BIO *bp, const X509_ACERT *acert);

int X509_ACERT_sign(X509_ACERT *x, EVP_PKEY *pkey, const EVP_MD *md);
int X509_ACERT_sign_ctx(X509_ACERT *x, EVP_MD_CTX *ctx);
int X509_ACERT_verify(X509_ACERT *a, EVP_PKEY *r);
```

```
#define X509_ACERT_VERSION_2 1

const GENERAL_NAMES *X509_ACERT_get0_holder_entityName(const X509_ACERT *x);
const OSSL_ISSUER_SERIAL *X509_ACERT_get0_holder_baseCertId(const X509_ACERT *x);
const OSSL_OBJECT_DIGEST_INFO *X509_ACERT_get0_holder_digest(const X509_ACERT *x);
const X509_NAME
 *X509_ACERT_get0_issuerName(const X509_ACERT *x);
long X509_ACERT_get_version(const X509_ACERT *x);
void X509_ACERT_get0_signature(const X509_ACERT *x,
   const ASN1_BIT_STRING **psig,
   const X509_ALGOR **palg);
int X509_ACERT_get_signature_nid(const X509_ACERT *x);
const X509_ALGOR *X509_ACERT_get0_info_sigalg(const X509_ACERT *x);
const ASN1_INTEGER *X509_ACERT_get0_serialNumber(const X509_ACERT *x);
const ASN1_TIME *X509_ACERT_get0_notBefore(const X509_ACERT *x);
const ASN1_TIME *X509_ACERT_get0_notAfter(const X509_ACERT *x);
const ASN1_BIT_STRING *X509_ACERT_get0_issuerUID(const X509_ACERT *x);

int X509_ACERT_print(BIO *bp, X509_ACERT *x);
int X509_ACERT_print_ex(BIO *bp, X509_ACERT *x, unsigned long nmflags,
   unsigned long cflag);

int X509_ACERT_get_attr_count(const X509_ACERT *x);
int X509_ACERT_get_attr_by_NID(const X509_ACERT *x, int nid, int lastpos);
int X509_ACERT_get_attr_by_OBJ(const X509_ACERT *x, const ASN1_OBJECT *obj,
   int lastpos);
X509_ATTRIBUTE *X509_ACERT_get_attr(const
 X509_ACERT *x, int loc);
X509_ATTRIBUTE *X509_ACERT_delete_attr(X509_ACERT *x, int loc);

void *X509_ACERT_get_ext_d2i(const X509_ACERT *x, int nid, int *crit, int *idx);
int X509_ACERT_add1_ext_i2d(X509_ACERT *x, int nid, void *value, int crit,
   unsigned long flags);
const STACK_OF(X509_EXTENSION) *X509_ACERT_get0_extensions(const X509_ACERT *x);

#define OSSL_OBJECT_DIGEST_INFO_PUBLIC_KEY 0
#define OSSL_OBJECT_DIGEST_INFO_PUBLIC_KEY_CERT 1
#define OSSL_OBJECT_DIGEST_INFO_OTHER 2 /* must not be used in RFC 5755 profile */
int X509_ACERT_set_version(X509_ACERT *x, long version);
void X509_ACERT_set0_holder_entityName(X509_ACERT *x, GENERAL_NAMES *name);
void X509_ACERT_set0_holder_baseCertId(X509_ACERT *x, OSSL_ISSUER_SERIAL *isss);
void X509_ACERT_set0_holder_digest(X509_ACERT *x,
   OSSL_OBJECT_DIGEST_INFO *dinfo);

int X509_ACERT_add1_attr(X509_ACERT *x, X509_ATTRIBUTE *attr);
int X509_ACERT_add1_attr_by_OBJ(X509_ACERT *x, const ASN1_OBJECT *obj,
   int type,
```

```
 const void *bytes, int len);
int X509_ACERT_add1_attr_by_NID(X509_ACERT *x, int nid, int type,
   const void *bytes, int len);
int X509_ACERT_add1_attr_by_txt(X509_ACERT *x, const char *attrname, int type,
   const unsigned char *bytes, int len);
int X509_ACERT_add_attr_nconf(CONF *conf, const char *section,
   X509_ACERT *acert);

int X509_ACERT_set1_issuerName(X509_ACERT *x, const X509_NAME *name);
int X509_ACERT_set1_serialNumber(X509_ACERT *x, const ASN1_INTEGER *serial);
int X509_ACERT_set1_notBefore(X509_ACERT *x, const ASN1_GENERALIZEDTIME *time);
int X509_ACERT_set1_notAfter(X509_ACERT *x, const ASN1_GENERALIZEDTIME *time);

void OSSL_OBJECT_DIGEST_INFO_get0_digest(const OSSL_OBJECT_DIGEST_INFO *o,
   int *digestedObjectType,
   const X509_ALGOR **digestAlgorithm,
   const ASN1_BIT_STRING **digest);

int OSSL_OBJECT_DIGEST_INFO_set1_digest(OSSL_OBJECT_DIGEST_INFO *o,
   int digestedObjectType,
   X509_ALGOR *digestAlgorithm,
   ASN1_BIT_STRING *digest);

const X509_NAME
 *OSSL_ISSUER_SERIAL_get0_issuer(const OSSL_ISSUER_SERIAL *isss);
const ASN1_INTEGER *OSSL_ISSUER_SERIAL_get0_serial(const OSSL_ISSUER_SERIAL *isss);
const ASN1_BIT_STRING *OSSL_ISSUER_SERIAL_get0_issuerUID(const OSSL_ISSUER_SERIAL *isss);

int OSSL_ISSUER_SERIAL_set1_issuer(OSSL_ISSUER_SERIAL *isss,
   const X509_NAME *issuer);
int OSSL_ISSUER_SERIAL_set1_serial(OSSL_ISSUER_SERIAL *isss,
   const ASN1_INTEGER *serial);
int OSSL_ISSUER_SERIAL_set1_issuerUID(OSSL_ISSUER_SERIAL *isss,
   const ASN1_BIT_STRING *uid);

#define OSSL_IETFAS_OCTETS 0
#define OSSL_IETFAS_OID 1
#define OSSL_IETFAS_STRING 2

typedef struct OSSL_IETF_ATTR_SYNTAX_VALUE_st OSSL_IETF_ATTR_SYNTAX_VALUE;
typedef struct OSSL_IETF_ATTR_SYNTAX_st OSSL_IETF_ATTR_SYNTAX;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_IETF_ATTR_SYNTAX_VALUE,
OSSL_IETF_ATTR_SYNTAX_VALUE, OSSL_IETF_ATTR_SYNTAX_VALUE)
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk))
#define
```

```
 sk_OSSL_IETF_ATTR_SYNTAX_VALUE_value(sk, idx) ((OSSL_IETF_ATTR_SYNTAX_VALUE
*)OPENSSL_sk_value(ossl_check_const_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk), (idx)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_new(cmp)
((STACK_OF(OSSL_IETF_ATTR_SYNTAX_VALUE)
*)OPENSSL_sk_new(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_compfunc_type(cmp)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_new_null()
((STACK_OF(OSSL_IETF_ATTR_SYNTAX_VALUE) *)OPENSSL_sk_new_null())
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_new_reserve(cmp, n)
((STACK_OF(OSSL_IETF_ATTR_SYNTAX_VALUE)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_compfunc_type(cmp), (n)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk), (n))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk))
#define
 sk_OSSL_IETF_ATTR_SYNTAX_VALUE_delete(sk, i) ((OSSL_IETF_ATTR_SYNTAX_VALUE
*)OPENSSL_sk_delete(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk), (i)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_delete_ptr(sk, ptr) ((OSSL_IETF_ATTR_SYNTAX_VALUE
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_type(ptr)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_type(ptr))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_type(ptr))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_pop(sk) ((OSSL_IETF_ATTR_SYNTAX_VALUE
*)OPENSSL_sk_pop(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_shift(sk) ((OSSL_IETF_ATTR_SYNTAX_VALUE
*)OPENSSL_sk_shift(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk)))
#define
 sk_OSSL_IETF_ATTR_SYNTAX_VALUE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),ossl_check_OSSL_IET
F_ATTR_SYNTAX_VALUE_freefunc_type(freefunc))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_type(ptr), (idx))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_set(sk, idx, ptr) ((OSSL_IETF_ATTR_SYNTAX_VALUE
*)OPENSSL_sk_set(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk), (idx),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_type(ptr)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_type(ptr))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_type(ptr))
```

```
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_find_all(sk,
 ptr, pnum) OPENSSL_sk_find_all(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_type(ptr), pnum)
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_dup(sk)
((STACK_OF(OSSL_IETF_ATTR_SYNTAX_VALUE)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_IETF_ATTR_SYNTAX_VALUE)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_IETF_ATTR_SYNTAX_VALUE_sk_type(sk),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_copyfunc_type(copyfunc),
ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_freefunc_type(freefunc)))
#define sk_OSSL_IETF_ATTR_SYNTAX_VALUE_set_cmp_func(sk, cmp)
((sk_OSSL_IETF_ATTR_SYNTAX_VALUE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_IETF_
ATTR_SYNTAX_VALUE_sk_type(sk),
 ossl_check_OSSL_IETF_ATTR_SYNTAX_VALUE_compfunc_type(cmp)))

/* clang-format on */

DECLARE_ASN1_ITEM(OSSL_IETF_ATTR_SYNTAX_VALUE)
DECLARE_ASN1_ALLOC_FUNCTIONS(OSSL_IETF_ATTR_SYNTAX_VALUE)
DECLARE_ASN1_FUNCTIONS(OSSL_IETF_ATTR_SYNTAX)

const GENERAL_NAMES *
OSSL_IETF_ATTR_SYNTAX_get0_policyAuthority(const OSSL_IETF_ATTR_SYNTAX *a);
void OSSL_IETF_ATTR_SYNTAX_set0_policyAuthority(OSSL_IETF_ATTR_SYNTAX *a,
   GENERAL_NAMES *names);

int OSSL_IETF_ATTR_SYNTAX_get_value_num(const OSSL_IETF_ATTR_SYNTAX *a);
void *OSSL_IETF_ATTR_SYNTAX_get0_value(const OSSL_IETF_ATTR_SYNTAX *a,
   int ind, int *type);
int OSSL_IETF_ATTR_SYNTAX_add1_value(OSSL_IETF_ATTR_SYNTAX *a, int type,
   void *data);
int OSSL_IETF_ATTR_SYNTAX_print(BIO *bp, OSSL_IETF_ATTR_SYNTAX *a, int indent);

struct TARGET_CERT_st {
   OSSL_ISSUER_SERIAL *targetCertificate;
   GENERAL_NAME *targetName;
   OSSL_OBJECT_DIGEST_INFO *certDigestInfo;
};

typedef
 struct TARGET_CERT_st OSSL_TARGET_CERT;

#define OSSL_TGT_TARGET_NAME 0
```

```
#define OSSL_TGT_TARGET_GROUP 1
#define OSSL_TGT_TARGET_CERT 2

typedef struct TARGET_st {
  int type;
  union {
     GENERAL_NAME *targetName;
     GENERAL_NAME *targetGroup;
     OSSL_TARGET_CERT *targetCert;
  } choice;
} OSSL_TARGET;

typedef STACK_OF(OSSL_TARGET) OSSL_TARGETS;
typedef STACK_OF(OSSL_TARGETS) OSSL_TARGETING_INFORMATION;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_TARGET, OSSL_TARGET, OSSL_TARGET)
#define sk_OSSL_TARGET_num(sk) OPENSSL_sk_num(ossl_check_const_OSSL_TARGET_sk_type(sk))
#define sk_OSSL_TARGET_value(sk, idx) ((OSSL_TARGET
*)OPENSSL_sk_value(ossl_check_const_OSSL_TARGET_sk_type(sk), (idx)))
#define sk_OSSL_TARGET_new(cmp) ((STACK_OF(OSSL_TARGET)
*)OPENSSL_sk_new(ossl_check_OSSL_TARGET_compfunc_type(cmp)))
#define sk_OSSL_TARGET_new_null() ((STACK_OF(OSSL_TARGET) *)OPENSSL_sk_new_null())
#define sk_OSSL_TARGET_new_reserve(cmp, n) ((STACK_OF(OSSL_TARGET)
 *)OPENSSL_sk_new_reserve(ossl_check_OSSL_TARGET_compfunc_type(cmp), (n)))
#define sk_OSSL_TARGET_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_OSSL_TARGET_sk_type(sk), (n))
#define sk_OSSL_TARGET_free(sk) OPENSSL_sk_free(ossl_check_OSSL_TARGET_sk_type(sk))
#define sk_OSSL_TARGET_zero(sk) OPENSSL_sk_zero(ossl_check_OSSL_TARGET_sk_type(sk))
#define sk_OSSL_TARGET_delete(sk, i) ((OSSL_TARGET
*)OPENSSL_sk_delete(ossl_check_OSSL_TARGET_sk_type(sk), (i)))
#define sk_OSSL_TARGET_delete_ptr(sk, ptr) ((OSSL_TARGET
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_TARGET_sk_type(sk), ossl_check_OSSL_TARGET_type(ptr)))
#define sk_OSSL_TARGET_push(sk, ptr) OPENSSL_sk_push(ossl_check_OSSL_TARGET_sk_type(sk),
ossl_check_OSSL_TARGET_type(ptr))
#define sk_OSSL_TARGET_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_OSSL_TARGET_sk_type(sk),
ossl_check_OSSL_TARGET_type(ptr))
#define sk_OSSL_TARGET_pop(sk) ((OSSL_TARGET
*)OPENSSL_sk_pop(ossl_check_OSSL_TARGET_sk_type(sk)))
#define sk_OSSL_TARGET_shift(sk)
 ((OSSL_TARGET *)OPENSSL_sk_shift(ossl_check_OSSL_TARGET_sk_type(sk)))
#define sk_OSSL_TARGET_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_TARGET_sk_type(sk),ossl_check_OSSL_TARGET_freefunc_type(fre
efunc))
#define sk_OSSL_TARGET_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_OSSL_TARGET_sk_type(sk),
ossl_check_OSSL_TARGET_type(ptr), (idx))
#define sk_OSSL_TARGET_set(sk, idx, ptr) ((OSSL_TARGET
*)OPENSSL_sk_set(ossl_check_OSSL_TARGET_sk_type(sk), (idx), ossl_check_OSSL_TARGET_type(ptr)))
#define sk_OSSL_TARGET_find(sk, ptr) OPENSSL_sk_find(ossl_check_OSSL_TARGET_sk_type(sk),
```

```
ossl_check_OSSL_TARGET_type(ptr))
#define sk_OSSL_TARGET_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_OSSL_TARGET_sk_type(sk),
ossl_check_OSSL_TARGET_type(ptr))
#define sk_OSSL_TARGET_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_TARGET_sk_type(sk), ossl_check_OSSL_TARGET_type(ptr), pnum)
#define sk_OSSL_TARGET_sort(sk) OPENSSL_sk_sort(ossl_check_OSSL_TARGET_sk_type(sk))
#define sk_OSSL_TARGET_is_sorted(sk)
 OPENSSL_sk_is_sorted(ossl_check_const_OSSL_TARGET_sk_type(sk))
#define sk_OSSL_TARGET_dup(sk) ((STACK_OF(OSSL_TARGET)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_TARGET_sk_type(sk)))
#define sk_OSSL_TARGET_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OSSL_TARGET)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_TARGET_sk_type(sk),
ossl_check_OSSL_TARGET_copyfunc_type(copyfunc), ossl_check_OSSL_TARGET_freefunc_type(freefunc)))
#define sk_OSSL_TARGET_set_cmp_func(sk, cmp)
((sk_OSSL_TARGET_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_TARGET_sk_type(sk),
ossl_check_OSSL_TARGET_compfunc_type(cmp)))

/* clang-format on */

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_TARGETS, OSSL_TARGETS, OSSL_TARGETS)
#define sk_OSSL_TARGETS_num(sk) OPENSSL_sk_num(ossl_check_const_OSSL_TARGETS_sk_type(sk))
#define sk_OSSL_TARGETS_value(sk, idx) ((OSSL_TARGETS
*)OPENSSL_sk_value(ossl_check_const_OSSL_TARGETS_sk_type(sk), (idx)))
#define sk_OSSL_TARGETS_new(cmp) ((STACK_OF(OSSL_TARGETS)
 *)OPENSSL_sk_new(ossl_check_OSSL_TARGETS_compfunc_type(cmp)))
#define sk_OSSL_TARGETS_new_null() ((STACK_OF(OSSL_TARGETS) *)OPENSSL_sk_new_null())
#define sk_OSSL_TARGETS_new_reserve(cmp, n) ((STACK_OF(OSSL_TARGETS)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_TARGETS_compfunc_type(cmp), (n)))
#define sk_OSSL_TARGETS_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_OSSL_TARGETS_sk_type(sk),
(n))
#define sk_OSSL_TARGETS_free(sk) OPENSSL_sk_free(ossl_check_OSSL_TARGETS_sk_type(sk))
#define sk_OSSL_TARGETS_zero(sk) OPENSSL_sk_zero(ossl_check_OSSL_TARGETS_sk_type(sk))
#define sk_OSSL_TARGETS_delete(sk, i) ((OSSL_TARGETS
*)OPENSSL_sk_delete(ossl_check_OSSL_TARGETS_sk_type(sk), (i)))
#define sk_OSSL_TARGETS_delete_ptr(sk, ptr) ((OSSL_TARGETS
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_TARGETS_sk_type(sk), ossl_check_OSSL_TARGETS_type(ptr)))
#define sk_OSSL_TARGETS_push(sk, ptr) OPENSSL_sk_push(ossl_check_OSSL_TARGETS_sk_type(sk),
ossl_check_OSSL_TARGETS_type(ptr))
#define sk_OSSL_TARGETS_unshift(sk,
 ptr) OPENSSL_sk_unshift(ossl_check_OSSL_TARGETS_sk_type(sk), ossl_check_OSSL_TARGETS_type(ptr))
#define sk_OSSL_TARGETS_pop(sk) ((OSSL_TARGETS
*)OPENSSL_sk_pop(ossl_check_OSSL_TARGETS_sk_type(sk)))
#define sk_OSSL_TARGETS_shift(sk) ((OSSL_TARGETS
*)OPENSSL_sk_shift(ossl_check_OSSL_TARGETS_sk_type(sk)))
#define sk_OSSL_TARGETS_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_TARGETS_sk_type(sk),ossl_check_OSSL_TARGETS_freefunc_type(
freefunc))
```

```
#define sk_OSSL_TARGETS_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_OSSL_TARGETS_sk_type(sk),
ossl_check_OSSL_TARGETS_type(ptr), (idx))
#define sk_OSSL_TARGETS_set(sk, idx, ptr) ((OSSL_TARGETS
*)OPENSSL_sk_set(ossl_check_OSSL_TARGETS_sk_type(sk), (idx), ossl_check_OSSL_TARGETS_type(ptr)))
#define sk_OSSL_TARGETS_find(sk, ptr) OPENSSL_sk_find(ossl_check_OSSL_TARGETS_sk_type(sk),
ossl_check_OSSL_TARGETS_type(ptr))
#define sk_OSSL_TARGETS_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_OSSL_TARGETS_sk_type(sk),
ossl_check_OSSL_TARGETS_type(ptr))
#define
 sk_OSSL_TARGETS_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_OSSL_TARGETS_sk_type(sk),
ossl_check_OSSL_TARGETS_type(ptr), pnum)
#define sk_OSSL_TARGETS_sort(sk) OPENSSL_sk_sort(ossl_check_OSSL_TARGETS_sk_type(sk))
#define sk_OSSL_TARGETS_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_TARGETS_sk_type(sk))
#define sk_OSSL_TARGETS_dup(sk) ((STACK_OF(OSSL_TARGETS)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_TARGETS_sk_type(sk)))
#define sk_OSSL_TARGETS_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OSSL_TARGETS)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_TARGETS_sk_type(sk),
ossl_check_OSSL_TARGETS_copyfunc_type(copyfunc), ossl_check_OSSL_TARGETS_freefunc_type(freefunc)))
#define sk_OSSL_TARGETS_set_cmp_func(sk, cmp)
((sk_OSSL_TARGETS_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_TARGETS_sk_type(sk),
ossl_check_OSSL_TARGETS_compfunc_type(cmp)))

/* clang-format on */

DECLARE_ASN1_FUNCTIONS(OSSL_TARGET)
DECLARE_ASN1_FUNCTIONS(OSSL_TARGETS)
DECLARE_ASN1_FUNCTIONS(OSSL_TARGETING_INFORMATION)

typedef
 STACK_OF(OSSL_ISSUER_SERIAL) OSSL_AUTHORITY_ATTRIBUTE_ID_SYNTAX;
DECLARE_ASN1_FUNCTIONS(OSSL_AUTHORITY_ATTRIBUTE_ID_SYNTAX)

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_ISSUER_SERIAL, OSSL_ISSUER_SERIAL,
OSSL_ISSUER_SERIAL)
#define sk_OSSL_ISSUER_SERIAL_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_ISSUER_SERIAL_sk_type(sk))
#define sk_OSSL_ISSUER_SERIAL_value(sk, idx) ((OSSL_ISSUER_SERIAL
*)OPENSSL_sk_value(ossl_check_const_OSSL_ISSUER_SERIAL_sk_type(sk), (idx)))
#define sk_OSSL_ISSUER_SERIAL_new(cmp) ((STACK_OF(OSSL_ISSUER_SERIAL)
*)OPENSSL_sk_new(ossl_check_OSSL_ISSUER_SERIAL_compfunc_type(cmp)))
#define sk_OSSL_ISSUER_SERIAL_new_null() ((STACK_OF(OSSL_ISSUER_SERIAL)
*)OPENSSL_sk_new_null())
#define sk_OSSL_ISSUER_SERIAL_new_reserve(cmp, n) ((STACK_OF(OSSL_ISSUER_SERIAL)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_ISSUER_SERIAL_compfunc_type(cmp), (n)))
#define sk_OSSL_ISSUER_SERIAL_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),
```

```
 (n))
#define sk_OSSL_ISSUER_SERIAL_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk))
#define sk_OSSL_ISSUER_SERIAL_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk))
#define sk_OSSL_ISSUER_SERIAL_delete(sk, i) ((OSSL_ISSUER_SERIAL
*)OPENSSL_sk_delete(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk), (i)))
#define sk_OSSL_ISSUER_SERIAL_delete_ptr(sk, ptr) ((OSSL_ISSUER_SERIAL
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),
ossl_check_OSSL_ISSUER_SERIAL_type(ptr)))
#define sk_OSSL_ISSUER_SERIAL_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),
ossl_check_OSSL_ISSUER_SERIAL_type(ptr))
#define sk_OSSL_ISSUER_SERIAL_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),
ossl_check_OSSL_ISSUER_SERIAL_type(ptr))
#define sk_OSSL_ISSUER_SERIAL_pop(sk) ((OSSL_ISSUER_SERIAL
*)OPENSSL_sk_pop(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk)))
#define sk_OSSL_ISSUER_SERIAL_shift(sk)
 ((OSSL_ISSUER_SERIAL *)OPENSSL_sk_shift(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk)))
#define sk_OSSL_ISSUER_SERIAL_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),ossl_check_OSSL_ISSUER_SERIAL_
freefunc_type(freefunc))
#define sk_OSSL_ISSUER_SERIAL_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),
ossl_check_OSSL_ISSUER_SERIAL_type(ptr), (idx))
#define sk_OSSL_ISSUER_SERIAL_set(sk, idx, ptr) ((OSSL_ISSUER_SERIAL
*)OPENSSL_sk_set(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk), (idx),
ossl_check_OSSL_ISSUER_SERIAL_type(ptr)))
#define sk_OSSL_ISSUER_SERIAL_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),
ossl_check_OSSL_ISSUER_SERIAL_type(ptr))
#define sk_OSSL_ISSUER_SERIAL_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),
ossl_check_OSSL_ISSUER_SERIAL_type(ptr))
#define sk_OSSL_ISSUER_SERIAL_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk),
 ossl_check_OSSL_ISSUER_SERIAL_type(ptr), pnum)
#define sk_OSSL_ISSUER_SERIAL_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_ISSUER_SERIAL_sk_type(sk))
#define sk_OSSL_ISSUER_SERIAL_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_ISSUER_SERIAL_sk_type(sk))
#define sk_OSSL_ISSUER_SERIAL_dup(sk) ((STACK_OF(OSSL_ISSUER_SERIAL)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_ISSUER_SERIAL_sk_type(sk)))
#define sk_OSSL_ISSUER_SERIAL_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OSSL_ISSUER_SERIAL)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_ISSUER_SERIAL_sk_type(sk),
ossl_check_OSSL_ISSUER_SERIAL_copyfunc_type(copyfunc),
ossl_check_OSSL_ISSUER_SERIAL_freefunc_type(freefunc)))
```

```
#define sk_OSSL_ISSUER_SERIAL_set_cmp_func(sk, cmp)
((sk_OSSL_ISSUER_SERIAL_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_ISSUER_SERIAL_sk_
type(sk), ossl_check_OSSL_ISSUER_SERIAL_compfunc_type(cmp)))

/* clang-format on */

#endif
```

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```
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     'openssl/ssl/methods.c',
     'openssl/ssl/pqueue.c',
     'openssl/ssl/priority_queue.c',
     'openssl/ssl/s3_enc.c',
     'openssl/ssl/s3_lib.c',
     'openssl/ssl/s3_msg.c',
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     'openssl/ssl/ssl_cert_comp.c',
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  './config/archs/BSD-x86/asm_avx2/crypto/modes/ghash-x86.S',
  './config/archs/BSD-x86/asm_avx2/crypto/poly1305/poly1305-x86.S',
   './config/archs/BSD-x86/asm_avx2/crypto/rc4/rc4-586.S',
  './config/archs/BSD-x86/asm_avx2/crypto/ripemd/rmd-586.S',
  './config/archs/BSD-x86/asm_avx2/crypto/sha/sha1-586.S',
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  './config/archs/BSD-x86/asm_avx2/providers/common/der/der_sm2_gen.c',
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```

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    'PADLOCK_ASM',
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    'RC4_ASM',
    'RMD160_ASM',
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```

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  'openssl/providers/implementations/skeymgmt/generic.c',
  'openssl/ssl/record/methods/ssl3_cbc.c',
  'openssl/providers/common/der/der_dsa_key.c',
  'openssl/providers/common/der/der_dsa_sig.c',
  'openssl/providers/common/der/der_ec_key.c',
  'openssl/providers/common/der/der_ec_sig.c',
  'openssl/providers/common/der/der_ecx_key.c',
  'openssl/providers/common/der/der_ml_dsa_key.c',
  'openssl/providers/common/der/der_rsa_key.c',
  'openssl/providers/common/der/der_slh_dsa_key.c',
  'openssl/providers/common/provider_ctx.c',
  'openssl/providers/common/provider_err.c',
  'openssl/providers/implementations/ciphers/ciphercommon.c',
   'openssl/providers/implementations/ciphers/ciphercommon_block.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm_hw.c',
  'openssl/providers/implementations/ciphers/ciphercommon_gcm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_gcm_hw.c',
  'openssl/providers/implementations/ciphers/ciphercommon_hw.c',
  'openssl/providers/implementations/digests/digestcommon.c',
  'openssl/ssl/record/methods/tls_pad.c',
  'openssl/providers/fips/fips_entry.c',

],
'openssl_sources_BSD-x86': [
  './config/archs/BSD-x86/no-asm/crypto/params_idx.c',
  './config/archs/BSD-x86/no-asm/providers/common/der/der_sm2_gen.c',
  './config/archs/BSD-x86/no-asm/providers/common/der/der_digests_gen.c',
  './config/archs/BSD-x86/no-asm/providers/common/der/der_dsa_gen.c',
  './config/archs/BSD-x86/no-asm/providers/common/der/der_ec_gen.c',
   './config/archs/BSD-x86/no-asm/providers/common/der/der_ecx_gen.c',
  './config/archs/BSD-x86/no-asm/providers/common/der/der_ml_dsa_gen.c',
  './config/archs/BSD-x86/no-asm/providers/common/der/der_rsa_gen.c',
  './config/archs/BSD-x86/no-asm/providers/common/der/der_slh_dsa_gen.c',
  './config/archs/BSD-x86/no-asm/providers/common/der/der_wrap_gen.c',
  './config/archs/BSD-x86/no-asm/providers/legacy.ld',
  './config/archs/BSD-x86/no-asm/providers/fips.ld',

],
```

```
  'openssl_defines_BSD-x86': [
    'NDEBUG',
    'L_ENDIAN',
    'OPENSSL_BUILDING_OPENSSL',
    'FIPS_MODULE',
    'FIPS_MODULE',
  ],
  'openssl_cflags_BSD-x86': [
    '-Wall -O3 -fomit-frame-pointer',
    '-pthread',
    '-Wall -O3 -fomit-frame-pointer',
  ],
  'openssl_ex_libs_BSD-x86': [
    '-pthread',
  ],
  'linker_script': ''
 },
 'include_dirs': [
  '.',
  './include',
  './crypto',
  './crypto/include/internal',
  './providers/common/include',
 ],
 'defines': ['<@(openssl_defines_BSD-x86)'],
 'cflags': ['<@(openssl_cflags_BSD-x86)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86)'],

 'sources': ['<@(openssl_sources)', '<@(openssl_sources_BSD-x86)'],
 'direct_dependent_settings': {
  'include_dirs': ['./include', '.'],
  'defines': ['<@(openssl_defines_BSD-x86)'],
 },
}
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/safestack.h.in
*
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*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_SAFESTACK_H
#define OPENSSL_SAFESTACK_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_SAFESTACK_H
#endif

#include <openssl/stack.h>
#include <openssl/e_os2.h>

#ifdef __cplusplus
extern "C" {
#endif

#define STACK_OF(type) struct stack_st_##type

/* Helper macro for internal use */
#define SKM_DEFINE_STACK_OF_INTERNAL(t1, t2, t3)                                    \
   STACK_OF(t1);
```

```
                                        \
  typedef int (*sk_##t1##_compfunc)(const t3 *const *a, const t3 *const *b);                    \
  typedef void (*sk_##t1##_freefunc)(t3 * a);                                                   \
  typedef t3 *(*sk_##t1##_copyfunc)(const t3 *a);                                               \
  static ossl_unused ossl_inline t2 *ossl_check_##t1##_type(t2 *ptr)                            \
  {                                                                                             \
      return ptr;                                                                               \
  }                                                                                             \
  static ossl_unused ossl_inline const OPENSSL_STACK *ossl_check_const_##t1##_sk_type(const
STACK_OF(t1) *sk) \
  {
                                                                                                \
      return (const OPENSSL_STACK *)sk;                                                         \
  }                                                                                             \
  static ossl_unused ossl_inline OPENSSL_STACK *ossl_check_##t1##_sk_type(STACK_OF(t1) *sk)
\
  {                                                                                             \
      return (OPENSSL_STACK *)sk;                                                               \
  }                                                                                             \
  static ossl_unused ossl_inline OPENSSL_sk_compfunc ossl_check_##t1##_compfunc_type(sk_##t1##_compfunc
cmp)  \
  {                                                                                             \
      return (OPENSSL_sk_compfunc)cmp;
                                                                                                \
  }                                                                                             \
  static ossl_unused ossl_inline OPENSSL_sk_copyfunc ossl_check_##t1##_copyfunc_type(sk_##t1##_copyfunc
cpy)  \
  {                                                                                             \
      return (OPENSSL_sk_copyfunc)cpy;                                                          \
  }                                                                                             \
  static ossl_unused ossl_inline OPENSSL_sk_freefunc ossl_check_##t1##_freefunc_type(sk_##t1##_freefunc fr)
\
  {                                                                                             \
      return (OPENSSL_sk_freefunc)fr;
       \
  }

#define SKM_DEFINE_STACK_OF(t1, t2, t3)                                                         \
  STACK_OF(t1);                                                                                 \
  typedef int (*sk_##t1##_compfunc)(const t3 *const *a, const t3 *const *b);                    \
  typedef void (*sk_##t1##_freefunc)(t3 * a);                                                   \
  typedef t3 *(*sk_##t1##_copyfunc)(const t3 *a);                                               \
  static ossl_unused ossl_inline int sk_##t1##_num(const STACK_OF(t1) *sk)                      \
  {                                                                                             \
      return OPENSSL_sk_num((const OPENSSL_STACK *)sk);
            \
  }                                                                                             \
  static ossl_unused ossl_inline t2 *sk_##t1##_value(const STACK_OF(t1) *sk, int idx)           \
```

```
{                                                                                    \
    return (t2 *)OPENSSL_sk_value((const OPENSSL_STACK *)sk, idx);                                   \
}                                                                                    \
static ossl_unused ossl_inline STACK_OF(t1) *sk_##t1##_new(sk_##t1##_compfunc compare)
\
{                                                                                    \
    return (STACK_OF(t1) *)OPENSSL_sk_new((OPENSSL_sk_compfunc)compare);
        \
}                                                                                    \
static ossl_unused ossl_inline STACK_OF(t1) *sk_##t1##_new_null(void)                                \
{                                                                                    \
    return (STACK_OF(t1) *)OPENSSL_sk_new_null();                                              \
}                                                                                    \
static ossl_unused ossl_inline STACK_OF(t1) *sk_##t1##_new_reserve(sk_##t1##_compfunc compare, int n)
    \
{                                                                                    \
    return (STACK_OF(t1) *)OPENSSL_sk_new_reserve((OPENSSL_sk_compfunc)compare, n);
        \
}                                                                                    \
static ossl_unused ossl_inline int sk_##t1##_reserve(STACK_OF(t1) *sk, int n)                        \
{                                                                                    \
    return OPENSSL_sk_reserve((OPENSSL_STACK *)sk, n);                                         \
}                                                                                    \
static ossl_unused ossl_inline void sk_##t1##_free(STACK_OF(t1) *sk)                                 \
{                                                                                    \
    OPENSSL_sk_free((OPENSSL_STACK *)sk);
        \
}                                                                                    \
static ossl_unused ossl_inline void sk_##t1##_zero(STACK_OF(t1) *sk)                                 \
{                                                                                    \
    OPENSSL_sk_zero((OPENSSL_STACK *)sk);                                                      \
}                                                                                    \
static ossl_unused ossl_inline t2 *sk_##t1##_delete(STACK_OF(t1) *sk, int i)                         \
{                                                                                    \
    return (t2 *)OPENSSL_sk_delete((OPENSSL_STACK *)sk, i);
        \
}                                                                                    \
static ossl_unused ossl_inline t2 *sk_##t1##_delete_ptr(STACK_OF(t1) *sk, t2 *ptr)                   \
{                                                                                    \
    return (t2 *)OPENSSL_sk_delete_ptr((OPENSSL_STACK *)sk,                                    \
        (const void *)ptr);                                                                \
}                                                                                    \
static ossl_unused ossl_inline int sk_##t1##_push(STACK_OF(t1) *sk, t2 *ptr)                         \
{
        \
    return OPENSSL_sk_push((OPENSSL_STACK *)sk, (const void *)ptr);                                  \
}                                                                                    \
static ossl_unused ossl_inline int sk_##t1##_unshift(STACK_OF(t1) *sk, t2 *ptr)                      \
```

```
{                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
    return OPENSSL_sk_unshift((OPENSSL_STACK *)sk, (const void *)ptr);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
}                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_unused ossl_inline t2 *sk_##t1##_pop(STACK_OF(t1) *sk)                                                                                                                                                                                                                                                                                                                                                
{
    return (t2 *)OPENSSL_sk_pop((OPENSSL_STACK *)sk);                                                                                                                                                                                                                                                                                                                                                
}                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_unused ossl_inline t2 *sk_##t1##_shift(STACK_OF(t1) *sk)                                                                                                                                                                                                                                                                                                                                
{                                                                                                                                                                                                                                                                                                                                                                                                
    return (t2 *)OPENSSL_sk_shift((OPENSSL_STACK *)sk);                                                                                                                                                                                                                                                                                                                                                
}                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_unused ossl_inline void sk_##t1##_pop_free(STACK_OF(t1) *sk, sk_##t1##_freefunc freefunc)
{
    OPENSSL_sk_pop_free((OPENSSL_STACK *)sk, (OPENSSL_sk_freefunc)freefunc);
}                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_unused ossl_inline int sk_##t1##_insert(STACK_OF(t1) *sk, t2 *ptr, int idx)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
{                                                                                                                                                                                                                                                                                                                                                                                                
    return OPENSSL_sk_insert((OPENSSL_STACK *)sk, (const void *)ptr, idx);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
}                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_unused ossl_inline t2 *sk_##t1##_set(STACK_OF(t1) *sk, int idx, t2 *ptr)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
{
    return (t2 *)OPENSSL_sk_set((OPENSSL_STACK *)sk, idx, (const void *)ptr);                                                                                                                                                                                                                                                                                                                                                                                                                                                
}                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_unused ossl_inline int sk_##t1##_find(STACK_OF(t1) *sk, t2 *ptr)                                                                                                                                                                                                                                                                                                                                                                                                                                                
{                                                                                                                                                                                                                                                                                                                                                                                                
    return OPENSSL_sk_find((OPENSSL_STACK *)sk, (const void *)ptr);                                                                                                                                                                                                                                                                                                                                                                                                                                                
}                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_unused ossl_inline int sk_##t1##_find_ex(STACK_OF(t1) *sk, t2 *ptr)                                                                                                                                                                                                                                                                                                                                                                                                                                                
{
    return OPENSSL_sk_find_ex((OPENSSL_STACK *)sk, (const void *)ptr);                                                                                                                                                                                                                                                                                                                                                
}                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_unused ossl_inline int sk_##t1##_find_all(STACK_OF(t1) *sk, t2 *ptr, int *pnum)                                                                                                                                                                                                                                                                                                                                                                                                                                                
{                                                                                                                                                                                                                                                                                                                                                                                                
    return OPENSSL_sk_find_all((OPENSSL_STACK *)sk, (const void *)ptr, pnum);                                                                                                                                                                                                                                                                                                                                                
}                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_unused ossl_inline void sk_##t1##_sort(STACK_OF(t1) *sk)                                                                                                                                                                                                                                                                                                                                
{
    OPENSSL_sk_sort((OPENSSL_STACK *)sk);                                                                                                                                                                                                                                                                                                                                                
}                                                                                                                                                                                                                                                                                                                                                                                                
static ossl_unused ossl_inline int sk_##t1##_is_sorted(const STACK_OF(t1) *sk)                                                                                                                                                                                                                                                                                                                                                                                                                                                
{                                                                                                                                                                                                                                                                                                                                                                                                
```

```
    return OPENSSL_sk_is_sorted((const OPENSSL_STACK *)sk);                                    \
  }                                                                                            \
  static ossl_unused ossl_inline STACK_OF(t1) *sk_##t1##_dup(const STACK_OF(t1) *sk)
\
  {
            \
    return (STACK_OF(t1) *)OPENSSL_sk_dup((const OPENSSL_STACK *)sk);                          \
  }                                                                                            \
  static ossl_unused ossl_inline STACK_OF(t1) *sk_##t1##_deep_copy(const STACK_OF(t1) *sk,
  \
    sk_##t1##_copyfunc copyfunc,                                                               \
    sk_##t1##_freefunc freefunc)                                                               \
  {                                                                                            \
    return (STACK_OF(t1) *)OPENSSL_sk_deep_copy((const OPENSSL_STACK *)sk,
 \
      (OPENSSL_sk_copyfunc)copyfunc,
        \
      (OPENSSL_sk_freefunc)freefunc);                                                          \
  }                                                                                            \
  static ossl_unused ossl_inline sk_##t1##_compfunc sk_##t1##_set_cmp_func(STACK_OF(t1) *sk,
sk_##t1##_compfunc compare) \
  {                                                                                            \
    return (sk_##t1##_compfunc)OPENSSL_sk_set_cmp_func((OPENSSL_STACK *)sk,
(OPENSSL_sk_compfunc)compare);          \
  }

#define DEFINE_STACK_OF(t) SKM_DEFINE_STACK_OF(t, t, t)
#define DEFINE_STACK_OF_CONST(t) SKM_DEFINE_STACK_OF(t, const t, t)
#define DEFINE_SPECIAL_STACK_OF(t1, t2) SKM_DEFINE_STACK_OF(t1, t2, t2)
#define DEFINE_SPECIAL_STACK_OF_CONST(t1, t2) \
  SKM_DEFINE_STACK_OF(t1, const t2, t2)

/*-
* Strings are special: normally an lhash entry will point to
 a single
* (somewhat) mutable object. In the case of strings:
*
* a) Instead of a single char, there is an array of chars, NUL-terminated.
* b) The string may have be immutable.
*
* So, they need their own declarations. Especially important for
* type-checking tools, such as Deputy.
*
* In practice, however, it appears to be hard to have a const
* string. For now, I'm settling for dealing with the fact it is a
* string at all.
*/
typedef char *OPENSSL_STRING;
```

```
typedef const char *OPENSSL_CSTRING;

/*-
* Confusingly, LHASH_OF(STRING) deals with char ** throughout, but
* STACK_OF(STRING) is really more like STACK_OF(char), only, as mentioned
* above, instead of a single char each entry is a NUL-terminated array of
* chars. So, we have to implement STRING specially for STACK_OF. This is
* dealt with in the autogenerated macros below.
*/
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OPENSSL_STRING, char, char)
#define sk_OPENSSL_STRING_num(sk)
OPENSSL_sk_num(ossl_check_const_OPENSSL_STRING_sk_type(sk))
#define
 sk_OPENSSL_STRING_value(sk, idx) ((char
*)OPENSSL_sk_value(ossl_check_const_OPENSSL_STRING_sk_type(sk), (idx)))
#define sk_OPENSSL_STRING_new(cmp) ((STACK_OF(OPENSSL_STRING)
*)OPENSSL_sk_new(ossl_check_OPENSSL_STRING_compfunc_type(cmp)))
#define sk_OPENSSL_STRING_new_null() ((STACK_OF(OPENSSL_STRING) *)OPENSSL_sk_new_null())
#define sk_OPENSSL_STRING_new_reserve(cmp, n) ((STACK_OF(OPENSSL_STRING)
*)OPENSSL_sk_new_reserve(ossl_check_OPENSSL_STRING_compfunc_type(cmp), (n)))
#define sk_OPENSSL_STRING_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OPENSSL_STRING_sk_type(sk), (n))
#define sk_OPENSSL_STRING_free(sk) OPENSSL_sk_free(ossl_check_OPENSSL_STRING_sk_type(sk))
#define sk_OPENSSL_STRING_zero(sk) OPENSSL_sk_zero(ossl_check_OPENSSL_STRING_sk_type(sk))
#define sk_OPENSSL_STRING_delete(sk, i) ((char
*)OPENSSL_sk_delete(ossl_check_OPENSSL_STRING_sk_type(sk), (i)))
#define sk_OPENSSL_STRING_delete_ptr(sk, ptr) ((char
*)OPENSSL_sk_delete_ptr(ossl_check_OPENSSL_STRING_sk_type(sk),
 ossl_check_OPENSSL_STRING_type(ptr)))
#define sk_OPENSSL_STRING_push(sk, ptr) OPENSSL_sk_push(ossl_check_OPENSSL_STRING_sk_type(sk),
ossl_check_OPENSSL_STRING_type(ptr))
#define sk_OPENSSL_STRING_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OPENSSL_STRING_sk_type(sk), ossl_check_OPENSSL_STRING_type(ptr))
#define sk_OPENSSL_STRING_pop(sk) ((char
*)OPENSSL_sk_pop(ossl_check_OPENSSL_STRING_sk_type(sk)))
#define sk_OPENSSL_STRING_shift(sk) ((char
*)OPENSSL_sk_shift(ossl_check_OPENSSL_STRING_sk_type(sk)))
#define sk_OPENSSL_STRING_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OPENSSL_STRING_sk_type(sk),ossl_check_OPENSSL_STRING_freefunc_
type(freefunc))
#define sk_OPENSSL_STRING_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OPENSSL_STRING_sk_type(sk), ossl_check_OPENSSL_STRING_type(ptr),
(idx))
#define sk_OPENSSL_STRING_set(sk, idx, ptr) ((char
*)OPENSSL_sk_set(ossl_check_OPENSSL_STRING_sk_type(sk), (idx),
ossl_check_OPENSSL_STRING_type(ptr)))
#define
```

```
 sk_OPENSSL_STRING_find(sk, ptr) OPENSSL_sk_find(ossl_check_OPENSSL_STRING_sk_type(sk),
ossl_check_OPENSSL_STRING_type(ptr))
#define sk_OPENSSL_STRING_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OPENSSL_STRING_sk_type(sk), ossl_check_OPENSSL_STRING_type(ptr))
#define sk_OPENSSL_STRING_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OPENSSL_STRING_sk_type(sk), ossl_check_OPENSSL_STRING_type(ptr),
pnum)
#define sk_OPENSSL_STRING_sort(sk) OPENSSL_sk_sort(ossl_check_OPENSSL_STRING_sk_type(sk))
#define sk_OPENSSL_STRING_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OPENSSL_STRING_sk_type(sk))
#define sk_OPENSSL_STRING_dup(sk) ((STACK_OF(OPENSSL_STRING)
*)OPENSSL_sk_dup(ossl_check_const_OPENSSL_STRING_sk_type(sk)))
#define sk_OPENSSL_STRING_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OPENSSL_STRING)
*)OPENSSL_sk_deep_copy(ossl_check_const_OPENSSL_STRING_sk_type(sk),
ossl_check_OPENSSL_STRING_copyfunc_type(copyfunc),
ossl_check_OPENSSL_STRING_freefunc_type(freefunc)))
#define
 sk_OPENSSL_STRING_set_cmp_func(sk, cmp)
((sk_OPENSSL_STRING_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OPENSSL_STRING_sk_type(sk),
ossl_check_OPENSSL_STRING_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(OPENSSL_CSTRING, const char, char)
#define sk_OPENSSL_CSTRING_num(sk)
OPENSSL_sk_num(ossl_check_const_OPENSSL_CSTRING_sk_type(sk))
#define sk_OPENSSL_CSTRING_value(sk, idx) ((const char
*)OPENSSL_sk_value(ossl_check_const_OPENSSL_CSTRING_sk_type(sk), (idx)))
#define sk_OPENSSL_CSTRING_new(cmp) ((STACK_OF(OPENSSL_CSTRING)
*)OPENSSL_sk_new(ossl_check_OPENSSL_CSTRING_compfunc_type(cmp)))
#define sk_OPENSSL_CSTRING_new_null() ((STACK_OF(OPENSSL_CSTRING) *)OPENSSL_sk_new_null())
#define sk_OPENSSL_CSTRING_new_reserve(cmp, n) ((STACK_OF(OPENSSL_CSTRING)
*)OPENSSL_sk_new_reserve(ossl_check_OPENSSL_CSTRING_compfunc_type(cmp), (n)))
#define sk_OPENSSL_CSTRING_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OPENSSL_CSTRING_sk_type(sk), (n))
#define sk_OPENSSL_CSTRING_free(sk) OPENSSL_sk_free(ossl_check_OPENSSL_CSTRING_sk_type(sk))
#define
 sk_OPENSSL_CSTRING_zero(sk) OPENSSL_sk_zero(ossl_check_OPENSSL_CSTRING_sk_type(sk))
#define sk_OPENSSL_CSTRING_delete(sk, i) ((const char
*)OPENSSL_sk_delete(ossl_check_OPENSSL_CSTRING_sk_type(sk), (i)))
#define sk_OPENSSL_CSTRING_delete_ptr(sk, ptr) ((const char
*)OPENSSL_sk_delete_ptr(ossl_check_OPENSSL_CSTRING_sk_type(sk),
ossl_check_OPENSSL_CSTRING_type(ptr)))
#define sk_OPENSSL_CSTRING_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OPENSSL_CSTRING_sk_type(sk), ossl_check_OPENSSL_CSTRING_type(ptr))
#define sk_OPENSSL_CSTRING_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OPENSSL_CSTRING_sk_type(sk),
ossl_check_OPENSSL_CSTRING_type(ptr))
#define sk_OPENSSL_CSTRING_pop(sk) ((const char
*)OPENSSL_sk_pop(ossl_check_OPENSSL_CSTRING_sk_type(sk)))
#define sk_OPENSSL_CSTRING_shift(sk) ((const char
```

```
*)OPENSSL_sk_shift(ossl_check_OPENSSL_CSTRING_sk_type(sk)))
#define sk_OPENSSL_CSTRING_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OPENSSL_CSTRING_sk_type(sk),ossl_check_OPENSSL_CSTRING_freefu
nc_type(freefunc))
#define
 sk_OPENSSL_CSTRING_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OPENSSL_CSTRING_sk_type(sk), ossl_check_OPENSSL_CSTRING_type(ptr),
(idx))
#define sk_OPENSSL_CSTRING_set(sk, idx, ptr) ((const char
*)OPENSSL_sk_set(ossl_check_OPENSSL_CSTRING_sk_type(sk), (idx),
ossl_check_OPENSSL_CSTRING_type(ptr)))
#define sk_OPENSSL_CSTRING_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OPENSSL_CSTRING_sk_type(sk), ossl_check_OPENSSL_CSTRING_type(ptr))
#define sk_OPENSSL_CSTRING_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OPENSSL_CSTRING_sk_type(sk),
ossl_check_OPENSSL_CSTRING_type(ptr))
#define sk_OPENSSL_CSTRING_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OPENSSL_CSTRING_sk_type(sk),
ossl_check_OPENSSL_CSTRING_type(ptr), pnum)
#define sk_OPENSSL_CSTRING_sort(sk) OPENSSL_sk_sort(ossl_check_OPENSSL_CSTRING_sk_type(sk))
#define sk_OPENSSL_CSTRING_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OPENSSL_CSTRING_sk_type(sk))
#define
 sk_OPENSSL_CSTRING_dup(sk) ((STACK_OF(OPENSSL_CSTRING)
*)OPENSSL_sk_dup(ossl_check_const_OPENSSL_CSTRING_sk_type(sk)))
#define sk_OPENSSL_CSTRING_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OPENSSL_CSTRING)
*)OPENSSL_sk_deep_copy(ossl_check_const_OPENSSL_CSTRING_sk_type(sk),
ossl_check_OPENSSL_CSTRING_copyfunc_type(copyfunc),
ossl_check_OPENSSL_CSTRING_freefunc_type(freefunc)))
#define sk_OPENSSL_CSTRING_set_cmp_func(sk, cmp)
((sk_OPENSSL_CSTRING_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OPENSSL_CSTRING_sk_type(s
k), ossl_check_OPENSSL_CSTRING_compfunc_type(cmp)))

/* clang-format on */

#if !defined(OPENSSL_NO_DEPRECATED_3_0)
/*
* This is not used by OpenSSL.  A block of bytes,  NOT nul-terminated.
* These should also be distinguished from "normal" stacks.
*/
typedef void *OPENSSL_BLOCK;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OPENSSL_BLOCK, void, void)
#define sk_OPENSSL_BLOCK_num(sk) OPENSSL_sk_num(ossl_check_const_OPENSSL_BLOCK_sk_type(sk))
#define
 sk_OPENSSL_BLOCK_value(sk, idx) ((void
*)OPENSSL_sk_value(ossl_check_const_OPENSSL_BLOCK_sk_type(sk), (idx)))
#define sk_OPENSSL_BLOCK_new(cmp) ((STACK_OF(OPENSSL_BLOCK)
```

```
*)OPENSSL_sk_new(ossl_check_OPENSSL_BLOCK_compfunc_type(cmp)))
#define sk_OPENSSL_BLOCK_new_null() ((STACK_OF(OPENSSL_BLOCK) *)OPENSSL_sk_new_null())
#define sk_OPENSSL_BLOCK_new_reserve(cmp, n) ((STACK_OF(OPENSSL_BLOCK)
*)OPENSSL_sk_new_reserve(ossl_check_OPENSSL_BLOCK_compfunc_type(cmp), (n)))
#define sk_OPENSSL_BLOCK_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OPENSSL_BLOCK_sk_type(sk), (n))
#define sk_OPENSSL_BLOCK_free(sk) OPENSSL_sk_free(ossl_check_OPENSSL_BLOCK_sk_type(sk))
#define sk_OPENSSL_BLOCK_zero(sk) OPENSSL_sk_zero(ossl_check_OPENSSL_BLOCK_sk_type(sk))
#define sk_OPENSSL_BLOCK_delete(sk, i) ((void
*)OPENSSL_sk_delete(ossl_check_OPENSSL_BLOCK_sk_type(sk), (i)))
#define sk_OPENSSL_BLOCK_delete_ptr(sk, ptr) ((void
*)OPENSSL_sk_delete_ptr(ossl_check_OPENSSL_BLOCK_sk_type(sk),
ossl_check_OPENSSL_BLOCK_type(ptr)))
#define
 sk_OPENSSL_BLOCK_push(sk, ptr) OPENSSL_sk_push(ossl_check_OPENSSL_BLOCK_sk_type(sk),
ossl_check_OPENSSL_BLOCK_type(ptr))
#define sk_OPENSSL_BLOCK_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OPENSSL_BLOCK_sk_type(sk), ossl_check_OPENSSL_BLOCK_type(ptr))
#define sk_OPENSSL_BLOCK_pop(sk) ((void
*)OPENSSL_sk_pop(ossl_check_OPENSSL_BLOCK_sk_type(sk)))
#define sk_OPENSSL_BLOCK_shift(sk) ((void
*)OPENSSL_sk_shift(ossl_check_OPENSSL_BLOCK_sk_type(sk)))
#define sk_OPENSSL_BLOCK_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OPENSSL_BLOCK_sk_type(sk),ossl_check_OPENSSL_BLOCK_freefunc_t
ype(freefunc))
#define sk_OPENSSL_BLOCK_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OPENSSL_BLOCK_sk_type(sk), ossl_check_OPENSSL_BLOCK_type(ptr),
(idx))
#define sk_OPENSSL_BLOCK_set(sk, idx, ptr) ((void
*)OPENSSL_sk_set(ossl_check_OPENSSL_BLOCK_sk_type(sk), (idx),
ossl_check_OPENSSL_BLOCK_type(ptr)))
#define sk_OPENSSL_BLOCK_find(sk, ptr) OPENSSL_sk_find(ossl_check_OPENSSL_BLOCK_sk_type(sk),
 ossl_check_OPENSSL_BLOCK_type(ptr))
#define sk_OPENSSL_BLOCK_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OPENSSL_BLOCK_sk_type(sk), ossl_check_OPENSSL_BLOCK_type(ptr))
#define sk_OPENSSL_BLOCK_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OPENSSL_BLOCK_sk_type(sk), ossl_check_OPENSSL_BLOCK_type(ptr),
pnum)
#define sk_OPENSSL_BLOCK_sort(sk) OPENSSL_sk_sort(ossl_check_OPENSSL_BLOCK_sk_type(sk))
#define sk_OPENSSL_BLOCK_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OPENSSL_BLOCK_sk_type(sk))
#define sk_OPENSSL_BLOCK_dup(sk) ((STACK_OF(OPENSSL_BLOCK)
*)OPENSSL_sk_dup(ossl_check_const_OPENSSL_BLOCK_sk_type(sk)))
#define sk_OPENSSL_BLOCK_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OPENSSL_BLOCK)
*)OPENSSL_sk_deep_copy(ossl_check_const_OPENSSL_BLOCK_sk_type(sk),
ossl_check_OPENSSL_BLOCK_copyfunc_type(copyfunc),
ossl_check_OPENSSL_BLOCK_freefunc_type(freefunc)))
#define sk_OPENSSL_BLOCK_set_cmp_func(sk, cmp)
```

((sk_OPENSSL_BLOCK_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OPENSSL_BLOCK_sk_type(sk),
 ossl_check_OPENSSL_BLOCK_compfunc_type(cmp)))

/* clang-format on */
#endif

#ifdef __cplusplus
}
#endif
#endif
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JSON parsing library (nlohmann/json)

File: vendor/json/upstream/single_include/nlohmann/json.hpp (only for ICU4C)

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```
/*
* WARNING: do not edit!
* Generated by Makefile from providers/common/include/prov/der_rsa.h.in
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*/

#include "crypto/rsa.h"
#include "internal/der.h"

/* Well known OIDs precompiled */
/* clang-format off */

/*
* hashAlgs OBJECT IDENTIFIER ::= { nistAlgorithms 2 }
*/
#define DER_OID_V_hashAlgs DER_P_OBJECT, 8, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x02
#define DER_OID_SZ_hashAlgs 10
extern const unsigned char ossl_der_oid_hashAlgs[DER_OID_SZ_hashAlgs];

/*
* rsaEncryption    OBJECT IDENTIFIER ::= { pkcs-1 1 }
*/
#define DER_OID_V_rsaEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01, 0x01, 0x01
#define DER_OID_SZ_rsaEncryption 11
```

```
extern
 const unsigned char ossl_der_oid_rsaEncryption[DER_OID_SZ_rsaEncryption];

/*
* id-RSAES-OAEP    OBJECT IDENTIFIER ::= { pkcs-1 7 }
*/
#define DER_OID_V_id_RSAES_OAEP DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01, 0x01,
0x07
#define DER_OID_SZ_id_RSAES_OAEP 11
extern const unsigned char ossl_der_oid_id_RSAES_OAEP[DER_OID_SZ_id_RSAES_OAEP];

/*
* id-pSpecified    OBJECT IDENTIFIER ::= { pkcs-1 9 }
*/
#define DER_OID_V_id_pSpecified DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01, 0x01, 0x09
#define DER_OID_SZ_id_pSpecified 11
extern const unsigned char ossl_der_oid_id_pSpecified[DER_OID_SZ_id_pSpecified];

/*
* id-RSASSA-PSS    OBJECT IDENTIFIER ::= { pkcs-1 10 }
*/
#define DER_OID_V_id_RSASSA_PSS DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01, 0x01,
0x0A
#define DER_OID_SZ_id_RSASSA_PSS 11
extern const unsigned char ossl_der_oid_id_RSASSA_PSS[DER_OID_SZ_id_RSASSA_PSS];

/*
* md2WithRSAEncryption        OBJECT IDENTIFIER ::= { pkcs-1 2 }
 */
#define DER_OID_V_md2WithRSAEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01,
0x01, 0x02
#define DER_OID_SZ_md2WithRSAEncryption 11
extern const unsigned char ossl_der_oid_md2WithRSAEncryption[DER_OID_SZ_md2WithRSAEncryption];

/*
* md5WithRSAEncryption        OBJECT IDENTIFIER ::= { pkcs-1 4 }
*/
#define DER_OID_V_md5WithRSAEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01,
0x01, 0x04
#define DER_OID_SZ_md5WithRSAEncryption 11
extern const unsigned char ossl_der_oid_md5WithRSAEncryption[DER_OID_SZ_md5WithRSAEncryption];

/*
* sha1WithRSAEncryption        OBJECT IDENTIFIER ::= { pkcs-1 5 }
*/
#define DER_OID_V_sha1WithRSAEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01,
0x01, 0x05
#define DER_OID_SZ_sha1WithRSAEncryption 11
```

```
extern const unsigned char ossl_der_oid_sha1WithRSAEncryption[DER_OID_SZ_sha1WithRSAEncryption];

/*
* sha224WithRSAEncryption      OBJECT IDENTIFIER ::= { pkcs-1 14 }
*/
#define DER_OID_V_sha224WithRSAEncryption
 DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01, 0x01, 0x0E
#define DER_OID_SZ_sha224WithRSAEncryption 11
extern const unsigned char ossl_der_oid_sha224WithRSAEncryption[DER_OID_SZ_sha224WithRSAEncryption];

/*
* sha256WithRSAEncryption      OBJECT IDENTIFIER ::= { pkcs-1 11 }
*/
#define DER_OID_V_sha256WithRSAEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D,
0x01, 0x01, 0x0B
#define DER_OID_SZ_sha256WithRSAEncryption 11
extern const unsigned char ossl_der_oid_sha256WithRSAEncryption[DER_OID_SZ_sha256WithRSAEncryption];

/*
* sha384WithRSAEncryption      OBJECT IDENTIFIER ::= { pkcs-1 12 }
*/
#define DER_OID_V_sha384WithRSAEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D,
0x01, 0x01, 0x0C
#define DER_OID_SZ_sha384WithRSAEncryption 11
extern const unsigned char ossl_der_oid_sha384WithRSAEncryption[DER_OID_SZ_sha384WithRSAEncryption];

/*
* sha512WithRSAEncryption      OBJECT IDENTIFIER ::= { pkcs-1 13 }
*/
#define DER_OID_V_sha512WithRSAEncryption
 DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01, 0x01, 0x0D
#define DER_OID_SZ_sha512WithRSAEncryption 11
extern const unsigned char ossl_der_oid_sha512WithRSAEncryption[DER_OID_SZ_sha512WithRSAEncryption];

/*
* sha512-224WithRSAEncryption  OBJECT IDENTIFIER ::= { pkcs-1 15 }
*/
#define DER_OID_V_sha512_224WithRSAEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D,
0x01, 0x01, 0x0F
#define DER_OID_SZ_sha512_224WithRSAEncryption 11
extern const unsigned char
ossl_der_oid_sha512_224WithRSAEncryption[DER_OID_SZ_sha512_224WithRSAEncryption];

/*
* sha512-256WithRSAEncryption  OBJECT IDENTIFIER ::= { pkcs-1 16 }
*/
#define DER_OID_V_sha512_256WithRSAEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D,
0x01, 0x01, 0x10
```

```
#define DER_OID_SZ_sha512_256WithRSAEncryption 11
extern const unsigned char
ossl_der_oid_sha512_256WithRSAEncryption[DER_OID_SZ_sha512_256WithRSAEncryption];

/*
* id-mgf1    OBJECT IDENTIFIER ::= { pkcs-1 8 }
*/
#define
 DER_OID_V_id_mgf1 DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01, 0x01, 0x08
#define DER_OID_SZ_id_mgf1 11
extern const unsigned char ossl_der_oid_id_mgf1[DER_OID_SZ_id_mgf1];

/*
* id-rsassa-pkcs1-v1_5-with-sha3-224 OBJECT IDENTIFIER ::= { sigAlgs 13 }
*/
#define DER_OID_V_id_rsassa_pkcs1_v1_5_with_sha3_224 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65,
0x03, 0x04, 0x03, 0x0D
#define DER_OID_SZ_id_rsassa_pkcs1_v1_5_with_sha3_224 11
extern const unsigned char
ossl_der_oid_id_rsassa_pkcs1_v1_5_with_sha3_224[DER_OID_SZ_id_rsassa_pkcs1_v1_5_with_sha3_224];

/*
* id-rsassa-pkcs1-v1_5-with-sha3-256 OBJECT IDENTIFIER ::= { sigAlgs 14 }
*/
#define DER_OID_V_id_rsassa_pkcs1_v1_5_with_sha3_256 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65,
0x03, 0x04, 0x03, 0x0E
#define DER_OID_SZ_id_rsassa_pkcs1_v1_5_with_sha3_256 11
extern const unsigned char
ossl_der_oid_id_rsassa_pkcs1_v1_5_with_sha3_256[DER_OID_SZ_id_rsassa_pkcs1_v1_5_with_sha3_256];

/*
* id-rsassa-pkcs1-v1_5-with-sha3-384
 OBJECT IDENTIFIER ::= { sigAlgs 15 }
*/
#define DER_OID_V_id_rsassa_pkcs1_v1_5_with_sha3_384 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65,
0x03, 0x04, 0x03, 0x0F
#define DER_OID_SZ_id_rsassa_pkcs1_v1_5_with_sha3_384 11
extern const unsigned char
ossl_der_oid_id_rsassa_pkcs1_v1_5_with_sha3_384[DER_OID_SZ_id_rsassa_pkcs1_v1_5_with_sha3_384];

/*
* id-rsassa-pkcs1-v1_5-with-sha3-512 OBJECT IDENTIFIER ::= { sigAlgs 16 }
*/
#define DER_OID_V_id_rsassa_pkcs1_v1_5_with_sha3_512 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65,
0x03, 0x04, 0x03, 0x10
#define DER_OID_SZ_id_rsassa_pkcs1_v1_5_with_sha3_512 11
extern const unsigned char
ossl_der_oid_id_rsassa_pkcs1_v1_5_with_sha3_512[DER_OID_SZ_id_rsassa_pkcs1_v1_5_with_sha3_512];
```

```
/*
* md4WithRSAEncryption OBJECT IDENTIFIER ::= { pkcs-1 3 }
*/
#define DER_OID_V_md4WithRSAEncryption DER_P_OBJECT, 9, 0x2A, 0x86, 0x48, 0x86, 0xF7, 0x0D, 0x01,
0x01, 0x03
#define DER_OID_SZ_md4WithRSAEncryption 11
extern const unsigned char ossl_der_oid_md4WithRSAEncryption[DER_OID_SZ_md4WithRSAEncryption];

/*
 * ripemd160WithRSAEncryption    OBJECT IDENTIFIER ::= {
*     iso(1) identified-organization(3) teletrust(36) algorithm(3) signatureAlgorithm(3) rsaSignature(1) 2
* }
*/
#define DER_OID_V_ripemd160WithRSAEncryption DER_P_OBJECT, 6, 0x2B, 0x24, 0x03, 0x03, 0x01, 0x02
#define DER_OID_SZ_ripemd160WithRSAEncryption 8
extern const unsigned char
ossl_der_oid_ripemd160WithRSAEncryption[DER_OID_SZ_ripemd160WithRSAEncryption];

/*
* mdc2WithRSASignature OBJECT IDENTIFIER ::= {
*     iso(1) identified-organization(3) oiw(14) secsig(3) algorithms(2) mdc2WithRSASignature(14)
* }
*/
#define DER_OID_V_mdc2WithRSASignature DER_P_OBJECT, 5, 0x2B, 0x0E, 0x03, 0x02, 0x0E
#define DER_OID_SZ_mdc2WithRSASignature 7
extern const unsigned char ossl_der_oid_mdc2WithRSASignature[DER_OID_SZ_mdc2WithRSASignature];

/* clang-format on */

/* PSS parameters */
int ossl_DER_w_RSASSA_PSS_params(WPACKET *pkt, int tag,
   const RSA_PSS_PARAMS_30 *pss);
/*
 Subject Public Key Info */
int ossl_DER_w_algorithmIdentifier_RSA(WPACKET *pkt, int tag, RSA *rsa);
int ossl_DER_w_algorithmIdentifier_RSA_PSS(WPACKET *pkt, int tag,
   int rsa_type,
   const RSA_PSS_PARAMS_30 *pss);
/* Signature */
int ossl_DER_w_algorithmIdentifier_MDWithRSAEncryption(WPACKET *pkt, int tag,
   int mdnid);
{
 'variables': {
   'openssl_defines_BSD-x86_64': [
     'NDEBUG',
     'L_ENDIAN',
     'OPENSSL_BUILDING_OPENSSL',
```

```
  'OPENSSL_PIC',
],
'openssl_cflags_BSD-x86_64': [
  '-Wall -O3',
  '-pthread',
  '-Wall -O3',
],
'openssl_ex_libs_BSD-x86_64': [
  '-pthread',
],
'openssl_cli_srcs_BSD-x86_64': [
  'openssl/apps/lib/cmp_mock_srv.c',
  'openssl/apps/asn1parse.c',
  'openssl/apps/ca.c',
  'openssl/apps/ciphers.c',
  'openssl/apps/cmp.c',
  'openssl/apps/cms.c',
  'openssl/apps/crl.c',
  'openssl/apps/crl2pkcs7.c',
  'openssl/apps/dgst.c',
  'openssl/apps/dhparam.c',
  'openssl/apps/dsa.c',
  'openssl/apps/dsaparam.c',
  'openssl/apps/ec.c',
  'openssl/apps/ecparam.c',
  'openssl/apps/enc.c',
  'openssl/apps/engine.c',
  'openssl/apps/errstr.c',
  'openssl/apps/fipsinstall.c',
  'openssl/apps/gendsa.c',
  'openssl/apps/genpkey.c',
  'openssl/apps/genrsa.c',
   'openssl/apps/info.c',
  'openssl/apps/kdf.c',
  'openssl/apps/list.c',
  'openssl/apps/mac.c',
  'openssl/apps/nseq.c',
  'openssl/apps/ocsp.c',
  'openssl/apps/openssl.c',
  'openssl/apps/passwd.c',
  'openssl/apps/pkcs12.c',
  'openssl/apps/pkcs7.c',
  'openssl/apps/pkcs8.c',
  'openssl/apps/pkey.c',
  'openssl/apps/pkeyparam.c',
  'openssl/apps/pkeyutl.c',
  'openssl/apps/prime.c',
  './config/archs/BSD-x86_64/no-asm/apps/progs.c',
```

```
    'openssl/apps/rand.c',
    'openssl/apps/rehash.c',
    'openssl/apps/req.c',
    'openssl/apps/rsa.c',
    'openssl/apps/rsautl.c',
    'openssl/apps/s_client.c',
    'openssl/apps/s_server.c',
    'openssl/apps/s_time.c',
    'openssl/apps/sess_id.c',
    'openssl/apps/skeyutl.c',
    'openssl/apps/smime.c',
    'openssl/apps/speed.c',
    'openssl/apps/spkac.c',
    'openssl/apps/srp.c',
    'openssl/apps/storeutl.c',
    'openssl/apps/ts.c',
    'openssl/apps/verify.c',
     'openssl/apps/version.c',
    'openssl/apps/x509.c',
    'openssl/apps/lib/app_libctx.c',
    'openssl/apps/lib/app_params.c',
    'openssl/apps/lib/app_provider.c',
    'openssl/apps/lib/app_rand.c',
    'openssl/apps/lib/app_x509.c',
    'openssl/apps/lib/apps.c',
    'openssl/apps/lib/apps_opt_printf.c',
    'openssl/apps/lib/apps_ui.c',
    'openssl/apps/lib/columns.c',
    'openssl/apps/lib/engine.c',
    'openssl/apps/lib/engine_loader.c',
    'openssl/apps/lib/fmt.c',
    'openssl/apps/lib/http_server.c',
    'openssl/apps/lib/log.c',
    'openssl/apps/lib/names.c',
    'openssl/apps/lib/opt.c',
    'openssl/apps/lib/s_cb.c',
    'openssl/apps/lib/s_socket.c',
    'openssl/apps/lib/tlssrp_depr.c',
  ],
},
'defines': ['<@(openssl_defines_BSD-x86_64)'],
'include_dirs': [
  './include',
],
'cflags' : ['<@(openssl_cflags_BSD-x86_64)'],
'libraries': ['<@(openssl_ex_libs_BSD-x86_64)'],
'sources': ['<@(openssl_cli_srcs_BSD-x86_64)'],
}
```

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END OF TERMS AND CONDITIONS

Appendix: How to Apply These Terms to Your New Programs

If you develop a new program, and you want it to be of the greatest possible use to humanity, the best way to achieve this is to make it free software which everyone can redistribute and change under these terms.

To do so,
attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

<one line to give the program's name and a brief idea of what it does.>
Copyright (C) 19yy <name of author>

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Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this
when it starts in an interactive mode:

Gnomovision version 69, Copyright (C) 19xx name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.

The hypothetical commands `show w' and `show c' should show the
appropriate parts of the General Public License. Of course, the
commands you use may be called something other than `show w' and `show
c'; they could even be mouse-clicks or menu items--whatever suits your
program.

You should also get your employer (if you work as a programmer) or your
school, if any, to sign a "copyright disclaimer" for the program, if
necessary. Here a sample; alter
the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the
program `Gnomovision' (a program to direct compilers to make passes
at assemblers) written by James Hacker.

<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice

That's all there is to it!

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"ParaType-Free-Font-1.3",
"Parity-6.0.0",
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"Pixar",
"Plexus",
"PolyForm-Noncommercial-1.0.0",
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"PostgreSQL",
"Python-2.0",
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"RPSL-1.0",
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"RSCPL",
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"Ruby",
"Ruby-pty",
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"SCEA",
"SGI-B-1.0",
"SGI-B-1.1",
"SGI-B-2.0",
"SGI-OpenGL",
"SGMLUG-PM",
"SGP4",
"SHL-0.5",
"SHL-0.51",
"SISSL",
"SISSL-1.2",
"SL",
"SMAIL-GPL",
"SMLNJ",
"SMPPL",
"SNIA",
"SOFA",
"SPL-1.0",
"SSH-OpenSSH",

"SSH-short",
"SSLeay-standalone",
"SSPL-1.0",
"SUL-1.0",
"SWL",
"Saxpath",
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"Sendmail",
"Sendmail-8.23",
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"SunPro",
"Symlinks",
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"TCL",
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"TPDL",
"TPL-1.0",
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"TTYP0",
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"TU-Berlin-2.0",
"TekHVC",
"TermReadKey",
"ThirdEye",
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"Unicode-3.0",
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"Unicode-DFS-2016",

"Unicode-TOU",
"UnixCrypt",
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"Unlicense-libwhirlpool",
"VOSTROM",
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"W3C-20150513",
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"Watcom-1.0",
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"WordNet",
"Wsuipa",
"X11",
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"X11-no-permit-persons",
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"YPL-1.1",
"ZPL-1.1",
"ZPL-2.0",
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"Zeeff",
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"Zimbra-1.4",
"Zlib",
"any-OSI",
"any-OSI-perl-modules",
"bcrypt-Solar-Designer",
"blessing",
"bzip2-1.0.6",
"check-cvs",
"checkmk",
"copyleft-next-0.3.0",
"copyleft-next-0.3.1",

"curl",
"cve-tou",
"diffmark",
"dtoa",
"dvipdfm",
"eGenix",
"etalab-2.0",
"fwlw",
"gSOAP-1.3b",
"generic-xts",
"gnuplot",
"gtkbook",
"hdparm",
"hyphen-bulgarian",
"iMatix",
"jove",
"libpng-1.6.35",
"libpng-2.0",
"libselinux-1.0",
"libtiff",
"libutil-David-Nugent",
"lsof",
"magaz",
"mailprio",
"man2html",
"metamail",
"mpi-permissive",
"mpich2",
"mplus",
"ngrep",
"pkgconf",
"pnmstitch",
"psfrag",
"psutils",
"python-ldap",
"radvd",
"snprintf",
"softSurfer",
"ssh-keyscan",
"swrule",
"threeparttable",
"ulem",
"w3m",
"wwl",
"xinetd",
"xkeyboard-config-Zinoviev",
"xlock",
"xpp",

"xzoom",
"zlib-acknowledgement"
]
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```
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* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_COMP_H
#define OPENSSL_COMP_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_COMP_H
```

```
#endif

#include <openssl/opensslconf.h>

#include <openssl/crypto.h>
#include <openssl/comperr.h>
#ifdef __cplusplus
extern "C" {
#endif

#ifndef OPENSSL_NO_COMP

COMP_CTX *COMP_CTX_new(COMP_METHOD *meth);
const COMP_METHOD *COMP_CTX_get_method(const COMP_CTX *ctx);
int COMP_CTX_get_type(const COMP_CTX *comp);
int COMP_get_type(const COMP_METHOD *meth);
const char *COMP_get_name(const COMP_METHOD *meth);
void COMP_CTX_free(COMP_CTX *ctx);

int COMP_compress_block(COMP_CTX
 *ctx, unsigned char *out, int olen,
   unsigned char *in, int ilen);
int COMP_expand_block(COMP_CTX *ctx, unsigned char *out, int olen,
   unsigned char *in, int ilen);

COMP_METHOD *COMP_zlib(void);
COMP_METHOD *COMP_zlib_oneshot(void);
COMP_METHOD *COMP_brotli(void);
COMP_METHOD *COMP_brotli_oneshot(void);
COMP_METHOD *COMP_zstd(void);
COMP_METHOD *COMP_zstd_oneshot(void);

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define COMP_zlib_cleanup() \
   while (0)            \
   continue
#endif

#ifdef OPENSSL_BIO_H
const BIO_METHOD *BIO_f_zlib(void);
const BIO_METHOD *BIO_f_brotli(void);
const BIO_METHOD *BIO_f_zstd(void);
#endif

#endif

typedef struct ssl_comp_st SSL_COMP;
```

```
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(SSL_COMP, SSL_COMP, SSL_COMP)
#define sk_SSL_COMP_num(sk) OPENSSL_sk_num(ossl_check_const_SSL_COMP_sk_type(sk))
#define sk_SSL_COMP_value(sk, idx) ((SSL_COMP
*)OPENSSL_sk_value(ossl_check_const_SSL_COMP_sk_type(sk), (idx)))
#define sk_SSL_COMP_new(cmp) ((STACK_OF(SSL_COMP)
 *)OPENSSL_sk_new(ossl_check_SSL_COMP_compfunc_type(cmp)))
#define sk_SSL_COMP_new_null() ((STACK_OF(SSL_COMP) *)OPENSSL_sk_new_null())
#define sk_SSL_COMP_new_reserve(cmp, n) ((STACK_OF(SSL_COMP)
*)OPENSSL_sk_new_reserve(ossl_check_SSL_COMP_compfunc_type(cmp), (n)))
#define sk_SSL_COMP_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_SSL_COMP_sk_type(sk), (n))
#define sk_SSL_COMP_free(sk) OPENSSL_sk_free(ossl_check_SSL_COMP_sk_type(sk))
#define sk_SSL_COMP_zero(sk) OPENSSL_sk_zero(ossl_check_SSL_COMP_sk_type(sk))
#define sk_SSL_COMP_delete(sk, i) ((SSL_COMP *)OPENSSL_sk_delete(ossl_check_SSL_COMP_sk_type(sk),
(i)))
#define sk_SSL_COMP_delete_ptr(sk, ptr) ((SSL_COMP
*)OPENSSL_sk_delete_ptr(ossl_check_SSL_COMP_sk_type(sk), ossl_check_SSL_COMP_type(ptr)))
#define sk_SSL_COMP_push(sk, ptr) OPENSSL_sk_push(ossl_check_SSL_COMP_sk_type(sk),
ossl_check_SSL_COMP_type(ptr))
#define sk_SSL_COMP_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_SSL_COMP_sk_type(sk),
ossl_check_SSL_COMP_type(ptr))
#define
 sk_SSL_COMP_pop(sk) ((SSL_COMP *)OPENSSL_sk_pop(ossl_check_SSL_COMP_sk_type(sk)))
#define sk_SSL_COMP_shift(sk) ((SSL_COMP *)OPENSSL_sk_shift(ossl_check_SSL_COMP_sk_type(sk)))
#define sk_SSL_COMP_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_SSL_COMP_sk_type(sk),ossl_check_SSL_COMP_freefunc_type(freefunc))
#define sk_SSL_COMP_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_SSL_COMP_sk_type(sk),
ossl_check_SSL_COMP_type(ptr), (idx))
#define sk_SSL_COMP_set(sk, idx, ptr) ((SSL_COMP *)OPENSSL_sk_set(ossl_check_SSL_COMP_sk_type(sk),
(idx), ossl_check_SSL_COMP_type(ptr)))
#define sk_SSL_COMP_find(sk, ptr) OPENSSL_sk_find(ossl_check_SSL_COMP_sk_type(sk),
ossl_check_SSL_COMP_type(ptr))
#define sk_SSL_COMP_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_SSL_COMP_sk_type(sk),
ossl_check_SSL_COMP_type(ptr))
#define sk_SSL_COMP_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_SSL_COMP_sk_type(sk),
ossl_check_SSL_COMP_type(ptr), pnum)
#define sk_SSL_COMP_sort(sk) OPENSSL_sk_sort(ossl_check_SSL_COMP_sk_type(sk))
#define
 sk_SSL_COMP_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_SSL_COMP_sk_type(sk))
#define sk_SSL_COMP_dup(sk) ((STACK_OF(SSL_COMP)
*)OPENSSL_sk_dup(ossl_check_const_SSL_COMP_sk_type(sk)))
#define sk_SSL_COMP_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(SSL_COMP)
*)OPENSSL_sk_deep_copy(ossl_check_const_SSL_COMP_sk_type(sk),
ossl_check_SSL_COMP_copyfunc_type(copyfunc), ossl_check_SSL_COMP_freefunc_type(freefunc)))
#define sk_SSL_COMP_set_cmp_func(sk, cmp)
((sk_SSL_COMP_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_SSL_COMP_sk_type(sk),
ossl_check_SSL_COMP_compfunc_type(cmp)))
```

/* clang-format on */

#ifdef __cplusplus
}
#endif
#endif
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---

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```
#ifndef SRC_PERMISSION_PERMISSION_BASE_H_
#define SRC_PERMISSION_PERMISSION_BASE_H_

#if defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS

#include <map>
#include <string>
#include <string_view>
#include "v8.h"

namespace node {

class Environment;

namespace permission {

#define FILESYSTEM_PERMISSIONS(V)                                   \
 V(FileSystem, "fs", PermissionsRoot, "")                           \
 V(FileSystemRead, "fs.read", FileSystem, "--allow-fs-read")        \
 V(FileSystemWrite, "fs.write", FileSystem, "--allow-fs-write")
```

```
#define CHILD_PROCESS_PERMISSIONS(V)                                    \
 V(ChildProcess, "child", PermissionsRoot, "--allow-child-process")

#define WASI_PERMISSIONS(V) V(WASI, "wasi", PermissionsRoot, "--allow-wasi")

#define WORKER_THREADS_PERMISSIONS(V)                                   \
 V(WorkerThreads, "worker", PermissionsRoot, "--allow-worker")

#define INSPECTOR_PERMISSIONS(V) V(Inspector,
 "inspector", PermissionsRoot, "")

#define ADDON_PERMISSIONS(V)                                            \
 V(Addon, "addon", PermissionsRoot, "--allow-addons")

#define PERMISSIONS(V)                                                  \
 FILESYSTEM_PERMISSIONS(V)                                              \
 CHILD_PROCESS_PERMISSIONS(V)                                           \
 WASI_PERMISSIONS(V)                                                    \
 WORKER_THREADS_PERMISSIONS(V)                                          \
 INSPECTOR_PERMISSIONS(V)                                               \
 ADDON_PERMISSIONS(V)

#define V(name, _, __, ___) k##name,
enum class PermissionScope {
 kPermissionsRoot = -1,
 PERMISSIONS(V) kPermissionsCount
};
#undef V

class PermissionBase {
public:
 virtual void Apply(Environment* env,
                    const std::vector<std::string>& allow,
                    PermissionScope scope)
 = 0;
 virtual bool is_granted(Environment* env,
                         PermissionScope perm,
                         const std::string_view& param = "") const = 0;
};

}  // namespace permission

}  // namespace node

#endif  // defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
#endif  // SRC_PERMISSION_PERMISSION_BASE_H_
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```

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```
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* Generated by Makefile from include/openssl/asn1t.h.in
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*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_ASN1T_H
#define OPENSSL_ASN1T_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_ASN1T_H
#endif

#include <stddef.h>
#include <openssl/e_os2.h>
#include <openssl/asn1.h>

#ifdef OPENSSL_BUILD_SHLIBCRYPTO
#undef OPENSSL_EXTERN
```

```
#define OPENSSL_EXTERN OPENSSL_EXPORT
#endif

/* ASN1 template defines, structures and functions */

#ifdef __cplusplus
extern "C" {
#endif

/*-
* These are the possible values for the itype field of the
* ASN1_ITEM structure and determine how it
 is interpreted.
*
* For PRIMITIVE types the underlying type
* determines the behaviour if items is NULL.
*
* Otherwise templates must contain a single
* template and the type is treated in the
* same way as the type specified in the template.
*
* For SEQUENCE types the templates field points
* to the members, the size field is the
* structure size.
*
* For CHOICE types the templates field points
* to each possible member (typically a union)
* and the 'size' field is the offset of the
* selector.
*
* The 'funcs' field is used for application-specific
* data and functions.
*
* The EXTERN type uses a new style d2i/i2d.
* The new style should be used where possible
* because it avoids things like the d2i IMPLICIT
* hack.
*
* MSTRING is a multiple string type, it is used
* for a CHOICE of character strings where the
* actual strings all occupy an ASN1_STRING
* structure. In this case the 'utype' field
* has a special meaning, it is used as a mask
* of acceptable
 types using the B_ASN1 constants.
*
* NDEF_SEQUENCE is the same as SEQUENCE except
* that it will use indefinite length constructed
```

```
* encoding if requested.
*
*/

#define ASN1_ITYPE_PRIMITIVE 0x0
#define ASN1_ITYPE_SEQUENCE 0x1
#define ASN1_ITYPE_CHOICE 0x2
/* unused value                    0x3 */
#define ASN1_ITYPE_EXTERN 0x4
#define ASN1_ITYPE_MSTRING 0x5
#define ASN1_ITYPE_NDEF_SEQUENCE 0x6

/* Macro to obtain ASN1_ADB pointer from a type (only used internally) */
#define ASN1_ADB_ptr(iptr) ((const ASN1_ADB *)((iptr)()))

/* Macros for start and end of ASN1_ITEM definition */

#define ASN1_ITEM_start(itname)       \
   const ASN1_ITEM *itname##_it(void) \
   {                                  \
      static const ASN1_ITEM local_it = {

#define static_ASN1_ITEM_start(itname) \
   static ASN1_ITEM_start(itname)

#define ASN1_ITEM_end(itname) \
   }                          \
   ;                          \
   return &local_it;          \
   }

/* Macros to aid
 ASN1 template writing */

#define ASN1_ITEM_TEMPLATE(tname) \
   static const ASN1_TEMPLATE tname##_item_tt

#define ASN1_ITEM_TEMPLATE_END(tname) \
   ;                                  \
   ASN1_ITEM_start(tname)             \
      ASN1_ITYPE_PRIMITIVE,           \
      -1,                             \
      &tname##_item_tt,               \
      0,                              \
      NULL,                           \
      0,                              \
      #tname ASN1_ITEM_end(tname)
#define static_ASN1_ITEM_TEMPLATE_END(tname) \
```

```
  ;                                   \
  static_ASN1_ITEM_start(tname)           \
     ASN1_ITYPE_PRIMITIVE,                \
     -1,                                  \
     &tname##_item_tt,                    \
     0,                                   \
     NULL,                                \
     0,                                   \
     #tname ASN1_ITEM_end(tname)

/* This is a ASN1 type which just
 embeds a template */

/*-
* This pair helps declare a SEQUENCE. We can do:
*
*      ASN1_SEQUENCE(stname) = {
*             ... SEQUENCE components ...
*      } ASN1_SEQUENCE_END(stname)
*
*      This will produce an ASN1_ITEM called stname_it
*      for a structure called stname.
*
*      If you want the same structure but a different
*      name then use:
*
*      ASN1_SEQUENCE(itname) = {
*             ... SEQUENCE components ...
*      } ASN1_SEQUENCE_END_name(stname, itname)
*
*      This will create an item called itname_it using
*      a structure called stname.
*/

#define ASN1_SEQUENCE(tname) \
  static const ASN1_TEMPLATE tname##_seq_tt[]

#define ASN1_SEQUENCE_END(stname) ASN1_SEQUENCE_END_name(stname, stname)

#define static_ASN1_SEQUENCE_END(stname) static_ASN1_SEQUENCE_END_name(stname, stname)

#define ASN1_SEQUENCE_END_name(stname, tname)           \
  ;                                          \
  ASN1_ITEM_start(tname)
             \
     ASN1_ITYPE_SEQUENCE,                        \
     V_ASN1_SEQUENCE,                            \
     tname##_seq_tt,                             \
```

```
    sizeof(tname##_seq_tt) / sizeof(ASN1_TEMPLATE), \
    NULL,                                   \
    sizeof(stname),                         \
    #tname ASN1_ITEM_end(tname)

#define static_ASN1_SEQUENCE_END_name(stname, tname)    \
  ;                                         \
  static_ASN1_ITEM_start(tname)                     \
    ASN1_ITYPE_SEQUENCE,                        \
    V_ASN1_SEQUENCE,                        \
    tname##_seq_tt,                         \
    sizeof(tname##_seq_tt) / sizeof(ASN1_TEMPLATE), \
    NULL,                                   \
    sizeof(stname),                         \
    #stname ASN1_ITEM_end(tname)

#define ASN1_NDEF_SEQUENCE(tname) \
   ASN1_SEQUENCE(tname)

#define ASN1_NDEF_SEQUENCE_cb(tname, cb) \
  ASN1_SEQUENCE_cb(tname, cb)

#define ASN1_SEQUENCE_cb(tname, cb)                             \
  static const ASN1_AUX tname##_aux = { NULL, 0, 0, 0, cb, 0, NULL }; \
  ASN1_SEQUENCE(tname)

#define ASN1_SEQUENCE_const_cb(tname, const_cb)                                 \
  static const ASN1_AUX tname##_aux = { NULL, ASN1_AFLG_CONST_CB, 0, 0, NULL, 0, const_cb }; \
  ASN1_SEQUENCE(tname)

#define ASN1_SEQUENCE_cb_const_cb(tname, cb, const_cb)                          \
  static const ASN1_AUX tname##_aux = { NULL, ASN1_AFLG_CONST_CB, 0, 0, cb, 0, const_cb }; \
  ASN1_SEQUENCE(tname)

#define ASN1_SEQUENCE_ref(tname, cb)                                                            \
  static const ASN1_AUX tname##_aux = { NULL, ASN1_AFLG_REFCOUNT, offsetof(tname, references),
offsetof(tname, lock), cb, 0, NULL }; \
  ASN1_SEQUENCE(tname)

#define
 ASN1_SEQUENCE_enc(tname, enc, cb)                                              \
  static const ASN1_AUX tname##_aux = { NULL, ASN1_AFLG_ENCODING, 0, 0, cb, offsetof(tname, enc),
NULL }; \
  ASN1_SEQUENCE(tname)

#define ASN1_NDEF_SEQUENCE_END(tname)                   \
  ;                                         \
  ASN1_ITEM_start(tname)                        \
```

```
        ASN1_ITYPE_NDEF_SEQUENCE,                    \
        V_ASN1_SEQUENCE,                             \
        tname##_seq_tt,                              \
        sizeof(tname##_seq_tt) / sizeof(ASN1_TEMPLATE), \
        NULL,                                        \
        sizeof(tname),                               \
        #tname ASN1_ITEM_end(tname)
#define static_ASN1_NDEF_SEQUENCE_END(tname)         \
    ;                                                \
    static_ASN1_ITEM_start(tname)                    \
        ASN1_ITYPE_NDEF_SEQUENCE,
                    \
        V_ASN1_SEQUENCE,                             \
        tname##_seq_tt,                              \
        sizeof(tname##_seq_tt) / sizeof(ASN1_TEMPLATE), \
        NULL,                                        \
        sizeof(tname),                               \
        #tname ASN1_ITEM_end(tname)

#define ASN1_SEQUENCE_END_enc(stname, tname) ASN1_SEQUENCE_END_ref(stname, tname)

#define ASN1_SEQUENCE_END_cb(stname, tname) ASN1_SEQUENCE_END_ref(stname, tname)
#define static_ASN1_SEQUENCE_END_cb(stname, tname) static_ASN1_SEQUENCE_END_ref(stname, tname)

#define ASN1_SEQUENCE_END_ref(stname, tname)         \
    ;                                                \
    ASN1_ITEM_start(tname)                           \
        ASN1_ITYPE_SEQUENCE,                         \
        V_ASN1_SEQUENCE,                             \
        tname##_seq_tt,                              \
        sizeof(tname##_seq_tt)
 / sizeof(ASN1_TEMPLATE), \
        &tname##_aux,                                \
        sizeof(stname),                              \
        #tname ASN1_ITEM_end(tname)
#define static_ASN1_SEQUENCE_END_ref(stname, tname)  \
    ;                                                \
    static_ASN1_ITEM_start(tname)                    \
        ASN1_ITYPE_SEQUENCE,                         \
        V_ASN1_SEQUENCE,                             \
        tname##_seq_tt,                              \
        sizeof(tname##_seq_tt) / sizeof(ASN1_TEMPLATE), \
        &tname##_aux,                                \
        sizeof(stname),                              \
        #stname ASN1_ITEM_end(tname)

#define ASN1_NDEF_SEQUENCE_END_cb(stname, tname)     \
    ;                                                \
```

```
  ASN1_ITEM_start(tname)                          \
    ASN1_ITYPE_NDEF_SEQUENCE,                     \
    V_ASN1_SEQUENCE,
                          \
    tname##_seq_tt,                               \
    sizeof(tname##_seq_tt) / sizeof(ASN1_TEMPLATE), \
    &tname##_aux,                                 \
    sizeof(stname),                               \
    #stname ASN1_ITEM_end(tname)

/*-
* This pair helps declare a CHOICE type. We can do:
*
*     ASN1_CHOICE(chname) = {
*             ... CHOICE options ...
*     ASN1_CHOICE_END(chname)
*
*     This will produce an ASN1_ITEM called chname_it
*     for a structure called chname. The structure
*     definition must look like this:
*     typedef struct {
*             int type;
*             union {
*                     ASN1_SOMETHING *opt1;
*                     ASN1_SOMEOTHER *opt2;
*             } value;
*     } chname;
*
*     the name of the selector must be 'type'.
*     to use an alternative selector name use the
*     ASN1_CHOICE_END_selector() version.
*/

#define ASN1_CHOICE(tname)
 \
  static const ASN1_TEMPLATE tname##_ch_tt[]

#define ASN1_CHOICE_cb(tname, cb)                         \
  static const ASN1_AUX tname##_aux = { NULL, 0, 0, 0, cb, 0, NULL }; \
  ASN1_CHOICE(tname)

#define ASN1_CHOICE_END(stname) ASN1_CHOICE_END_name(stname, stname)

#define static_ASN1_CHOICE_END(stname) static_ASN1_CHOICE_END_name(stname, stname)

#define ASN1_CHOICE_END_name(stname, tname) ASN1_CHOICE_END_selector(stname, tname, type)

#define static_ASN1_CHOICE_END_name(stname, tname) static_ASN1_CHOICE_END_selector(stname, tname,
```

```
type)

#define ASN1_CHOICE_END_selector(stname, tname, selname) \
  ;                                                \
  ASN1_ITEM_start(tname)                           \
     ASN1_ITYPE_CHOICE,                            \
     offsetof(stname, selname),                    \
     tname##_ch_tt,                                \
     sizeof(tname##_ch_tt) / sizeof(ASN1_TEMPLATE),
 \
     NULL,                                         \
     sizeof(stname),                               \
     #stname ASN1_ITEM_end(tname)

#define static_ASN1_CHOICE_END_selector(stname, tname, selname) \
  ;                                                \
  static_ASN1_ITEM_start(tname)                    \
     ASN1_ITYPE_CHOICE,                            \
     offsetof(stname, selname),                    \
     tname##_ch_tt,                                \
     sizeof(tname##_ch_tt) / sizeof(ASN1_TEMPLATE),          \
     NULL,                                         \
     sizeof(stname),                               \
     #stname ASN1_ITEM_end(tname)

#define ASN1_CHOICE_END_cb(stname, tname, selname)     \
  ;                                                \
  ASN1_ITEM_start(tname)                           \
     ASN1_ITYPE_CHOICE,
             \
     offsetof(stname, selname),                    \
     tname##_ch_tt,                                \
     sizeof(tname##_ch_tt) / sizeof(ASN1_TEMPLATE), \
     &tname##_aux,                                 \
     sizeof(stname),                               \
     #stname ASN1_ITEM_end(tname)

/* This helps with the template wrapper form of ASN1_ITEM */

#define ASN1_EX_TEMPLATE_TYPE(flags, tag, name, type) { \
  (flags), (tag), 0,                               \
  #name, ASN1_ITEM_ref(type)                       \
}

/* These help with SEQUENCE or CHOICE components */

/* used to declare other types */
```

```
#define ASN1_EX_TYPE(flags, tag, stname, field, type) { \
   (flags), (tag), offsetof(stname, field),            \
   #field, ASN1_ITEM_ref(type)                          \
}

/* implicit and explicit helper macros */

#define ASN1_IMP_EX(stname, field, type, tag, ex) \
   ASN1_EX_TYPE(ASN1_TFLG_IMPLICIT | (ex), tag, stname, field,
 type)

#define ASN1_EXP_EX(stname, field, type, tag, ex) \
   ASN1_EX_TYPE(ASN1_TFLG_EXPLICIT | (ex), tag, stname, field, type)

/* Any defined by macros: the field used is in the table itself */

#define ASN1_ADB_OBJECT(tblname) { ASN1_TFLG_ADB_OID, -1, 0, #tblname, tblname##_adb }
#define ASN1_ADB_INTEGER(tblname) { ASN1_TFLG_ADB_INT, -1, 0, #tblname, tblname##_adb }

/* Plain simple type */
#define ASN1_SIMPLE(stname, field, type) ASN1_EX_TYPE(0, 0, stname, field, type)
/* Embedded simple type */
#define ASN1_EMBED(stname, field, type) ASN1_EX_TYPE(ASN1_TFLG_EMBED, 0, stname, field, type)

/* OPTIONAL simple type */
#define ASN1_OPT(stname, field, type) ASN1_EX_TYPE(ASN1_TFLG_OPTIONAL, 0, stname, field, type)
#define ASN1_OPT_EMBED(stname, field, type) ASN1_EX_TYPE(ASN1_TFLG_OPTIONAL |
ASN1_TFLG_EMBED, 0, stname, field, type)

/* IMPLICIT tagged simple type */
#define ASN1_IMP(stname, field, type, tag) ASN1_IMP_EX(stname, field, type, tag, 0)
#define ASN1_IMP_EMBED(stname, field,
 type, tag) ASN1_IMP_EX(stname, field, type, tag, ASN1_TFLG_EMBED)

/* IMPLICIT tagged OPTIONAL simple type */
#define ASN1_IMP_OPT(stname, field, type, tag) ASN1_IMP_EX(stname, field, type, tag,
ASN1_TFLG_OPTIONAL)
#define ASN1_IMP_OPT_EMBED(stname, field, type, tag) ASN1_IMP_EX(stname, field, type, tag,
ASN1_TFLG_OPTIONAL | ASN1_TFLG_EMBED)

/* Same as above but EXPLICIT */

#define ASN1_EXP(stname, field, type, tag) ASN1_EXP_EX(stname, field, type, tag, 0)
#define ASN1_EXP_EMBED(stname, field, type, tag) ASN1_EXP_EX(stname, field, type, tag,
ASN1_TFLG_EMBED)
#define ASN1_EXP_OPT(stname, field, type, tag) ASN1_EXP_EX(stname, field, type, tag,
ASN1_TFLG_OPTIONAL)
#define ASN1_EXP_OPT_EMBED(stname, field, type, tag) ASN1_EXP_EX(stname, field, type, tag,
```

```
ASN1_TFLG_OPTIONAL | ASN1_TFLG_EMBED)

/* SEQUENCE OF type */
#define ASN1_SEQUENCE_OF(stname, field, type) \
   ASN1_EX_TYPE(ASN1_TFLG_SEQUENCE_OF, 0, stname, field, type)

/* OPTIONAL SEQUENCE OF */
#define ASN1_SEQUENCE_OF_OPT(stname,
 field, type) \
   ASN1_EX_TYPE(ASN1_TFLG_SEQUENCE_OF | ASN1_TFLG_OPTIONAL, 0, stname, field, type)

/* Same as above but for SET OF */

#define ASN1_SET_OF(stname, field, type) \
   ASN1_EX_TYPE(ASN1_TFLG_SET_OF, 0, stname, field, type)

#define ASN1_SET_OF_OPT(stname, field, type) \
   ASN1_EX_TYPE(ASN1_TFLG_SET_OF | ASN1_TFLG_OPTIONAL, 0, stname, field, type)

/* Finally compound types of SEQUENCE, SET, IMPLICIT, EXPLICIT and OPTIONAL */

#define ASN1_IMP_SET_OF(stname, field, type, tag) \
   ASN1_IMP_EX(stname, field, type, tag, ASN1_TFLG_SET_OF)

#define ASN1_EXP_SET_OF(stname, field, type, tag) \
   ASN1_EXP_EX(stname, field, type, tag, ASN1_TFLG_SET_OF)

#define ASN1_IMP_SET_OF_OPT(stname, field, type, tag) \
   ASN1_IMP_EX(stname, field, type, tag, ASN1_TFLG_SET_OF | ASN1_TFLG_OPTIONAL)

#define ASN1_EXP_SET_OF_OPT(stname, field, type, tag) \
   ASN1_EXP_EX(stname, field, type, tag, ASN1_TFLG_SET_OF | ASN1_TFLG_OPTIONAL)

#define ASN1_IMP_SEQUENCE_OF(stname, field, type,
 tag) \
   ASN1_IMP_EX(stname, field, type, tag, ASN1_TFLG_SEQUENCE_OF)

#define ASN1_IMP_SEQUENCE_OF_OPT(stname, field, type, tag) \
   ASN1_IMP_EX(stname, field, type, tag, ASN1_TFLG_SEQUENCE_OF | ASN1_TFLG_OPTIONAL)

#define ASN1_EXP_SEQUENCE_OF(stname, field, type, tag) \
   ASN1_EXP_EX(stname, field, type, tag, ASN1_TFLG_SEQUENCE_OF)

#define ASN1_EXP_SEQUENCE_OF_OPT(stname, field, type, tag) \
   ASN1_EXP_EX(stname, field, type, tag, ASN1_TFLG_SEQUENCE_OF | ASN1_TFLG_OPTIONAL)

/* EXPLICIT using indefinite length constructed form */
#define ASN1_NDEF_EXP(stname, field, type, tag) \
```

```
   ASN1_EXP_EX(stname, field, type, tag, ASN1_TFLG_NDEF)

/* EXPLICIT OPTIONAL using indefinite length constructed form */
#define ASN1_NDEF_EXP_OPT(stname, field, type, tag) \
   ASN1_EXP_EX(stname, field, type, tag, ASN1_TFLG_OPTIONAL | ASN1_TFLG_NDEF)

/* Macros for the ASN1_ADB structure */

#define ASN1_ADB(name) \
   static const ASN1_ADB_TABLE name##_adbtbl[]

#define ASN1_ADB_END(name,
 flags, field, adb_cb, def, none) \
   ;                                                \
   static const ASN1_ITEM *name##_adb(void)              \
   {                                                \
      static const ASN1_ADB internal_adb = {             \
         flags,                                     \
         offsetof(name, field),                          \
         adb_cb,                                      \
         name##_adbtbl,                                  \
         sizeof(name##_adbtbl) / sizeof(ASN1_ADB_TABLE), \
         def,                                       \
         none                                        \
      };                                            \
      return (const ASN1_ITEM *)&internal_adb;           \
   }                                                \
   void dummy_function(void)

#define ADB_ENTRY(val, template) { val, template }

#define ASN1_ADB_TEMPLATE(name)
 \
   static const ASN1_TEMPLATE name##_tt

/*
* This is the ASN1 template structure that defines a wrapper round the
* actual type. It determines the actual position of the field in the value
* structure, various flags such as OPTIONAL and the field name.
*/

struct ASN1_TEMPLATE_st {
   unsigned long flags; /* Various flags */
   long tag; /* tag, not used if no tagging */
   unsigned long offset; /* Offset of this field in structure */
   const char *field_name; /* Field name */
   ASN1_ITEM_EXP *item; /* Relevant ASN1_ITEM or ASN1_ADB */
};
```

```
/* Macro to extract ASN1_ITEM and ASN1_ADB pointer from ASN1_TEMPLATE */

#define ASN1_TEMPLATE_item(t) (t->item_ptr)
#define ASN1_TEMPLATE_adb(t) (t->item_ptr)

typedef struct ASN1_ADB_TABLE_st ASN1_ADB_TABLE;
typedef struct ASN1_ADB_st ASN1_ADB;

struct ASN1_ADB_st {
   unsigned long flags; /* Various flags */
   unsigned long offset; /* Offset of selector field */
   int (*adb_cb)(long *psel); /* Application
 callback */
   const ASN1_ADB_TABLE *tbl; /* Table of possible types */
   long tblcount; /* Number of entries in tbl */
   const ASN1_TEMPLATE *default_tt; /* Type to use if no match */
   const ASN1_TEMPLATE *null_tt; /* Type to use if selector is NULL */
};

struct ASN1_ADB_TABLE_st {
   long value; /* NID for an object or value for an int */
   const ASN1_TEMPLATE tt; /* item for this value */
};

/* template flags */

/* Field is optional */
#define ASN1_TFLG_OPTIONAL (0x1)

/* Field is a SET OF */
#define ASN1_TFLG_SET_OF (0x1 << 1)

/* Field is a SEQUENCE OF */
#define ASN1_TFLG_SEQUENCE_OF (0x2 << 1)

/*
* Special case: this refers to a SET OF that will be sorted into DER order
* when encoded *and* the corresponding STACK will be modified to match the
* new order.
*/
#define ASN1_TFLG_SET_ORDER (0x3 << 1)

/* Mask for SET OF or SEQUENCE OF */
#define ASN1_TFLG_SK_MASK (0x3 << 1)

/*
* These flags mean the tag should be taken from the tag field. If EXPLICIT
```

```
* then the
 underlying type is used for the inner tag.
*/

/* IMPLICIT tagging */
#define ASN1_TFLG_IMPTAG (0x1 << 3)

/* EXPLICIT tagging, inner tag from underlying type */
#define ASN1_TFLG_EXPTAG (0x2 << 3)

#define ASN1_TFLG_TAG_MASK (0x3 << 3)

/* context specific IMPLICIT */
#define ASN1_TFLG_IMPLICIT (ASN1_TFLG_IMPTAG | ASN1_TFLG_CONTEXT)

/* context specific EXPLICIT */
#define ASN1_TFLG_EXPLICIT (ASN1_TFLG_EXPTAG | ASN1_TFLG_CONTEXT)

/*
* If tagging is in force these determine the type of tag to use. Otherwise
* the tag is determined by the underlying type. These values reflect the
* actual octet format.
*/

/* Universal tag */
#define ASN1_TFLG_UNIVERSAL (0x0 << 6)
/* Application tag */
#define ASN1_TFLG_APPLICATION (0x1 << 6)
/* Context specific tag */
#define ASN1_TFLG_CONTEXT (0x2 << 6)
/* Private tag */
#define ASN1_TFLG_PRIVATE (0x3 << 6)

#define ASN1_TFLG_TAG_CLASS (0x3 << 6)

/*
* These are for ANY DEFINED BY type. In this case the 'item' field points to
* an ASN1_ADB structure
 which contains a table of values to decode the
* relevant type
*/

#define ASN1_TFLG_ADB_MASK (0x3 << 8)

#define ASN1_TFLG_ADB_OID (0x1 << 8)

#define ASN1_TFLG_ADB_INT (0x1 << 9)
```

```
/*
* This flag when present in a SEQUENCE OF, SET OF or EXPLICIT causes
* indefinite length constructed encoding to be used if required.
*/

#define ASN1_TFLG_NDEF (0x1 << 11)

/* Field is embedded and not a pointer */
#define ASN1_TFLG_EMBED (0x1 << 12)

/* This is the actual ASN1 item itself */

struct ASN1_ITEM_st {
   char itype; /* The item type, primitive, SEQUENCE, CHOICE
               * or extern */
   long utype; /* underlying type */
   const ASN1_TEMPLATE *templates; /* If SEQUENCE or CHOICE this contains
                                    * the contents */
   long tcount; /* Number of templates if SEQUENCE or CHOICE */
   const void *funcs; /* further data and type-specific functions */
   /* funcs can be ASN1_PRIMITIVE_FUNCS*, ASN1_EXTERN_FUNCS*, or ASN1_AUX* */
   long
 size; /* Structure size (usually) */
   const char *sname; /* Structure name */
};

/*
* Cache for ASN1 tag and length, so we don't keep re-reading it for things
* like CHOICE
*/

struct ASN1_TLC_st {
   char valid; /* Values below are valid */
   int ret; /* return value */
   long plen; /* length */
   int ptag; /* class value */
   int pclass; /* class value */
   int hdrlen; /* header length */
};

/* Typedefs for ASN1 function pointers */
typedef int ASN1_ex_d2i(ASN1_VALUE **pval, const unsigned char **in, long len,
   const ASN1_ITEM *it, int tag, int aclass, char opt,
   ASN1_TLC *ctx);

typedef int ASN1_ex_d2i_ex(ASN1_VALUE **pval, const unsigned char **in, long len,
   const ASN1_ITEM *it, int tag, int aclass, char opt,
   ASN1_TLC *ctx, OSSL_LIB_CTX *libctx,
```

```
   const char *propq);
typedef int ASN1_ex_i2d(const ASN1_VALUE **pval, unsigned char **out,
   const ASN1_ITEM *it, int tag, int aclass);
typedef int ASN1_ex_new_func(ASN1_VALUE **pval, const ASN1_ITEM
 *it);
typedef int ASN1_ex_new_ex_func(ASN1_VALUE **pval, const ASN1_ITEM *it,
   OSSL_LIB_CTX *libctx, const char *propq);
typedef void ASN1_ex_free_func(ASN1_VALUE **pval, const ASN1_ITEM *it);

typedef int ASN1_ex_print_func(BIO *out, const ASN1_VALUE **pval,
   int indent, const char *fname,
   const ASN1_PCTX *pctx);

typedef int ASN1_primitive_i2c(const ASN1_VALUE **pval, unsigned char *cont,
   int *putype, const ASN1_ITEM *it);
typedef int ASN1_primitive_c2i(ASN1_VALUE **pval, const unsigned char *cont,
   int len, int utype, char *free_cont,
   const ASN1_ITEM *it);
typedef int ASN1_primitive_print(BIO *out, const ASN1_VALUE **pval,
   const ASN1_ITEM *it, int indent,
   const ASN1_PCTX *pctx);

typedef struct ASN1_EXTERN_FUNCS_st {
   void *app_data;
   ASN1_ex_new_func *asn1_ex_new;
   ASN1_ex_free_func *asn1_ex_free;
   ASN1_ex_free_func *asn1_ex_clear;
   ASN1_ex_d2i *asn1_ex_d2i;
   ASN1_ex_i2d *asn1_ex_i2d;
   ASN1_ex_print_func *asn1_ex_print;
   ASN1_ex_new_ex_func
 *asn1_ex_new_ex;
   ASN1_ex_d2i_ex *asn1_ex_d2i_ex;
} ASN1_EXTERN_FUNCS;

typedef struct ASN1_PRIMITIVE_FUNCS_st {
   void *app_data;
   unsigned long flags;
   ASN1_ex_new_func *prim_new;
   ASN1_ex_free_func *prim_free;
   ASN1_ex_free_func *prim_clear;
   ASN1_primitive_c2i *prim_c2i;
   ASN1_primitive_i2c *prim_i2c;
   ASN1_primitive_print *prim_print;
} ASN1_PRIMITIVE_FUNCS;

/*
* This is the ASN1_AUX structure: it handles various miscellaneous
```

```
* requirements. For example the use of reference counts and an informational
* callback. The "informational callback" is called at various points during
* the ASN1 encoding and decoding. It can be used to provide minor
* customisation of the structures used. This is most useful where the
* supplied routines *almost* do the right thing but need some extra help at
* a few points. If the callback returns zero then it is assumed a fatal
* error has occurred and the main operation should be abandoned. If major
* changes
 in the default behaviour are required then an external type is
* more appropriate.
* For the operations ASN1_OP_I2D_PRE, ASN1_OP_I2D_POST, ASN1_OP_PRINT_PRE, and
* ASN1_OP_PRINT_POST, meanwhile a variant of the callback with const parameter
* 'in' is provided to make clear statically that its input is not modified. If
* and only if this variant is in use the flag ASN1_AFLG_CONST_CB must be set.
*/

typedef int ASN1_aux_cb(int operation, ASN1_VALUE **in, const ASN1_ITEM *it,
   void *exarg);
typedef int ASN1_aux_const_cb(int operation, const ASN1_VALUE **in,
   const ASN1_ITEM *it, void *exarg);

typedef struct ASN1_AUX_st {
   void *app_data;
   int flags;
   int ref_offset; /* Offset of reference value */
   int ref_lock; /* Offset of lock value */
   ASN1_aux_cb *asn1_cb;
   int enc_offset; /* Offset of ASN1_ENCODING structure */
   ASN1_aux_const_cb *asn1_const_cb; /* for ASN1_OP_I2D_ and ASN1_OP_PRINT_ */
} ASN1_AUX;

/* For print related callbacks exarg points
 to this structure */
typedef struct ASN1_PRINT_ARG_st {
   BIO *out;
   int indent;
   const ASN1_PCTX *pctx;
} ASN1_PRINT_ARG;

/* For streaming related callbacks exarg points to this structure */
typedef struct ASN1_STREAM_ARG_st {
   /* BIO to stream through */
   BIO *out;
   /* BIO with filters appended */
   BIO *ndef_bio;
   /* Streaming I/O boundary */
   unsigned char **boundary;
} ASN1_STREAM_ARG;
```

```
/* Flags in ASN1_AUX */

/* Use a reference count */
#define ASN1_AFLG_REFCOUNT 1
/* Save the encoding of structure (useful for signatures) */
#define ASN1_AFLG_ENCODING 2
/* The Sequence length is invalid */
#define ASN1_AFLG_BROKEN 4
/* Use the new asn1_const_cb */
#define ASN1_AFLG_CONST_CB 8

/* operation values for asn1_cb */

#define ASN1_OP_NEW_PRE 0
#define ASN1_OP_NEW_POST 1
#define ASN1_OP_FREE_PRE 2
#define ASN1_OP_FREE_POST 3
#define ASN1_OP_D2I_PRE 4
#define ASN1_OP_D2I_POST 5
#define ASN1_OP_I2D_PRE 6
#define ASN1_OP_I2D_POST 7
#define ASN1_OP_PRINT_PRE 8
#define
 ASN1_OP_PRINT_POST 9
#define ASN1_OP_STREAM_PRE 10
#define ASN1_OP_STREAM_POST 11
#define ASN1_OP_DETACHED_PRE 12
#define ASN1_OP_DETACHED_POST 13
#define ASN1_OP_DUP_PRE 14
#define ASN1_OP_DUP_POST 15
#define ASN1_OP_GET0_LIBCTX 16
#define ASN1_OP_GET0_PROPQ 17

/* Macro to implement a primitive type */
#define IMPLEMENT_ASN1_TYPE(stname) IMPLEMENT_ASN1_TYPE_ex(stname, stname, 0)
#define IMPLEMENT_ASN1_TYPE_ex(itname, vname, ex) \
   ASN1_ITEM_start(itname)                    \
      ASN1_ITYPE_PRIMITIVE,                   \
      V_##vname, NULL, 0, NULL, ex, #itname ASN1_ITEM_end(itname)

/* Macro to implement a multi string type */
#define IMPLEMENT_ASN1_MSTRING(itname, mask) \
   ASN1_ITEM_start(itname)                \
      ASN1_ITYPE_MSTRING,                 \
      mask, NULL, 0, NULL, sizeof(ASN1_STRING), #itname ASN1_ITEM_end(itname)

#define IMPLEMENT_EXTERN_ASN1(sname, tag, fptrs) \
```

```
  ASN1_ITEM_start(sname)                    \
    ASN1_ITYPE_EXTERN,
                \
    tag,                            \
    NULL,                               \
    0,                              \
    &fptrs,                             \
    0,                              \
    #sname ASN1_ITEM_end(sname)

/* Macro to implement standard functions in terms of ASN1_ITEM structures */

#define IMPLEMENT_ASN1_FUNCTIONS(stname) IMPLEMENT_ASN1_FUNCTIONS_fname(stname, stname,
stname)

#define IMPLEMENT_ASN1_FUNCTIONS_name(stname, itname)
IMPLEMENT_ASN1_FUNCTIONS_fname(stname, itname, itname)

#define IMPLEMENT_ASN1_FUNCTIONS_ENCODE_name(stname, itname) \
  IMPLEMENT_ASN1_FUNCTIONS_ENCODE_fname(stname, itname, itname)

#define IMPLEMENT_STATIC_ASN1_ALLOC_FUNCTIONS(stname) \
  IMPLEMENT_ASN1_ALLOC_FUNCTIONS_pfname(static, stname, stname, stname)

#define IMPLEMENT_ASN1_ALLOC_FUNCTIONS(stname) \
  IMPLEMENT_ASN1_ALLOC_FUNCTIONS_fname(stname, stname, stname)

#define IMPLEMENT_ASN1_ALLOC_FUNCTIONS_pfname(pre,
 stname, itname, fname) \
  pre stname *fname##_new(void)                                 \
  {                                                     \
    return (stname *)ASN1_item_new(ASN1_ITEM_rptr(itname));         \
  }                                                     \
  pre void fname##_free(stname *a)                              \
  {                                                     \
    ASN1_item_free((ASN1_VALUE *)a, ASN1_ITEM_rptr(itname));        \
  }

#define IMPLEMENT_ASN1_ALLOC_FUNCTIONS_fname(stname, itname, fname) \
  stname *fname##_new(void)                                 \
  {                                                 \
    return (stname *)ASN1_item_new(ASN1_ITEM_rptr(itname));     \
  }                                                 \
  void fname##_free(stname *a)
                \
  {                                                 \
    ASN1_item_free((ASN1_VALUE *)a, ASN1_ITEM_rptr(itname));    \
  }
```

```
#define IMPLEMENT_ASN1_FUNCTIONS_fname(stname, itname, fname)    \
   IMPLEMENT_ASN1_ENCODE_FUNCTIONS_fname(stname, itname, fname) \
   IMPLEMENT_ASN1_ALLOC_FUNCTIONS_fname(stname, itname, fname)

#define IMPLEMENT_ASN1_ENCODE_FUNCTIONS_fname(stname, itname, fname)                    \
   stname *d2i_##fname(stname **a, const unsigned char **in, long len)                  \
   {                                                                                    \
      return (stname *)ASN1_item_d2i((ASN1_VALUE **)a, in, len, ASN1_ITEM_rptr(itname)); \
   }                                                                                    \
   int i2d_##fname(const stname *a, unsigned char **out)                                \
   {
                \
      return ASN1_item_i2d((const ASN1_VALUE *)a, out, ASN1_ITEM_rptr(itname));         \
   }

#define IMPLEMENT_ASN1_NDEF_FUNCTION(stname)                                            \
   int i2d_##stname##_NDEF(const stname *a, unsigned char **out)                        \
   {                                                                                    \
      return ASN1_item_ndef_i2d((const ASN1_VALUE *)a, out, ASN1_ITEM_rptr(stname)); \
   }

#define IMPLEMENT_STATIC_ASN1_ENCODE_FUNCTIONS(stname)                                  \
   static stname *d2i_##stname(stname **a,                                              \
      const unsigned char **in, long len)                                               \
   {                                                                                    \
      return (stname *)ASN1_item_d2i((ASN1_VALUE **)a, in, len, \
         ASN1_ITEM_rptr(stname));                                                       \
   }                                                                                    \
   static int i2d_##stname(const stname *a,
 unsigned char **out) \
   {                                                                                    \
      return ASN1_item_i2d((const ASN1_VALUE *)a, out,          \
         ASN1_ITEM_rptr(stname));                                                       \
   }

#define IMPLEMENT_ASN1_DUP_FUNCTION(stname)                                             \
   stname *stname##_dup(const stname *x)                                                \
   {                                                                                    \
      return ASN1_item_dup(ASN1_ITEM_rptr(stname), x); \
   }

#define IMPLEMENT_ASN1_PRINT_FUNCTION(stname) \
   IMPLEMENT_ASN1_PRINT_FUNCTION_fname(stname, stname, stname)

#define IMPLEMENT_ASN1_PRINT_FUNCTION_fname(stname, itname, fname) \
   int fname##_print_ctx(BIO *out, const stname *x, int indent,   \
      const ASN1_PCTX *pctx)                                                            \
```

```
  {                                                   \
     return ASN1_item_print(out, (const ASN1_VALUE *)x, indent, \
         ASN1_ITEM_rptr(itname), pctx);
    \
  }

/* external definitions for primitive types */

DECLARE_ASN1_ITEM(ASN1_BOOLEAN)
DECLARE_ASN1_ITEM(ASN1_TBOOLEAN)
DECLARE_ASN1_ITEM(ASN1_FBOOLEAN)
DECLARE_ASN1_ITEM(ASN1_SEQUENCE)
DECLARE_ASN1_ITEM(CBIGNUM)
DECLARE_ASN1_ITEM(BIGNUM)
DECLARE_ASN1_ITEM(INT32)
DECLARE_ASN1_ITEM(ZINT32)
DECLARE_ASN1_ITEM(UINT32)
DECLARE_ASN1_ITEM(ZUINT32)
DECLARE_ASN1_ITEM(INT64)
DECLARE_ASN1_ITEM(ZINT64)
DECLARE_ASN1_ITEM(UINT64)
DECLARE_ASN1_ITEM(ZUINT64)

#ifndef OPENSSL_NO_DEPRECATED_3_0
/*
* LONG and ZLONG are strongly discouraged for use as stored data, as the
* underlying C type (long) differs in size depending on the architecture.
* They are designed with 32-bit longs in mind.
*/
DECLARE_ASN1_ITEM(LONG)
DECLARE_ASN1_ITEM(ZLONG)
#endif

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ASN1_VALUE, ASN1_VALUE, ASN1_VALUE)
#define sk_ASN1_VALUE_num(sk) OPENSSL_sk_num(ossl_check_const_ASN1_VALUE_sk_type(sk))
#define sk_ASN1_VALUE_value(sk, idx) ((ASN1_VALUE
*)OPENSSL_sk_value(ossl_check_const_ASN1_VALUE_sk_type(sk),
 (idx)))
#define sk_ASN1_VALUE_new(cmp) ((STACK_OF(ASN1_VALUE)
*)OPENSSL_sk_new(ossl_check_ASN1_VALUE_compfunc_type(cmp)))
#define sk_ASN1_VALUE_new_null() ((STACK_OF(ASN1_VALUE) *)OPENSSL_sk_new_null())
#define sk_ASN1_VALUE_new_reserve(cmp, n) ((STACK_OF(ASN1_VALUE)
*)OPENSSL_sk_new_reserve(ossl_check_ASN1_VALUE_compfunc_type(cmp), (n)))
#define sk_ASN1_VALUE_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_ASN1_VALUE_sk_type(sk), (n))
#define sk_ASN1_VALUE_free(sk) OPENSSL_sk_free(ossl_check_ASN1_VALUE_sk_type(sk))
#define sk_ASN1_VALUE_zero(sk) OPENSSL_sk_zero(ossl_check_ASN1_VALUE_sk_type(sk))
#define sk_ASN1_VALUE_delete(sk, i) ((ASN1_VALUE
```

```
*)OPENSSL_sk_delete(ossl_check_ASN1_VALUE_sk_type(sk), (i)))
#define sk_ASN1_VALUE_delete_ptr(sk, ptr) ((ASN1_VALUE
*)OPENSSL_sk_delete_ptr(ossl_check_ASN1_VALUE_sk_type(sk), ossl_check_ASN1_VALUE_type(ptr)))
#define sk_ASN1_VALUE_push(sk, ptr) OPENSSL_sk_push(ossl_check_ASN1_VALUE_sk_type(sk),
ossl_check_ASN1_VALUE_type(ptr))
#define
 sk_ASN1_VALUE_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_ASN1_VALUE_sk_type(sk),
ossl_check_ASN1_VALUE_type(ptr))
#define sk_ASN1_VALUE_pop(sk) ((ASN1_VALUE
*)OPENSSL_sk_pop(ossl_check_ASN1_VALUE_sk_type(sk)))
#define sk_ASN1_VALUE_shift(sk) ((ASN1_VALUE
*)OPENSSL_sk_shift(ossl_check_ASN1_VALUE_sk_type(sk)))
#define sk_ASN1_VALUE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASN1_VALUE_sk_type(sk),ossl_check_ASN1_VALUE_freefunc_type(freef
unc))
#define sk_ASN1_VALUE_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_ASN1_VALUE_sk_type(sk),
ossl_check_ASN1_VALUE_type(ptr), (idx))
#define sk_ASN1_VALUE_set(sk, idx, ptr) ((ASN1_VALUE
*)OPENSSL_sk_set(ossl_check_ASN1_VALUE_sk_type(sk), (idx), ossl_check_ASN1_VALUE_type(ptr)))
#define sk_ASN1_VALUE_find(sk, ptr) OPENSSL_sk_find(ossl_check_ASN1_VALUE_sk_type(sk),
ossl_check_ASN1_VALUE_type(ptr))
#define sk_ASN1_VALUE_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_ASN1_VALUE_sk_type(sk),
ossl_check_ASN1_VALUE_type(ptr))
#define
 sk_ASN1_VALUE_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_ASN1_VALUE_sk_type(sk),
ossl_check_ASN1_VALUE_type(ptr), pnum)
#define sk_ASN1_VALUE_sort(sk) OPENSSL_sk_sort(ossl_check_ASN1_VALUE_sk_type(sk))
#define sk_ASN1_VALUE_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_ASN1_VALUE_sk_type(sk))
#define sk_ASN1_VALUE_dup(sk) ((STACK_OF(ASN1_VALUE)
*)OPENSSL_sk_dup(ossl_check_const_ASN1_VALUE_sk_type(sk)))
#define sk_ASN1_VALUE_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ASN1_VALUE)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASN1_VALUE_sk_type(sk),
ossl_check_ASN1_VALUE_copyfunc_type(copyfunc), ossl_check_ASN1_VALUE_freefunc_type(freefunc)))
#define sk_ASN1_VALUE_set_cmp_func(sk, cmp)
((sk_ASN1_VALUE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASN1_VALUE_sk_type(sk),
ossl_check_ASN1_VALUE_compfunc_type(cmp)))

/* clang-format on */

/* Functions used internally by the ASN1 code */

int ASN1_item_ex_new(ASN1_VALUE **pval, const ASN1_ITEM *it);
void ASN1_item_ex_free(ASN1_VALUE
 **pval, const ASN1_ITEM *it);

int ASN1_item_ex_d2i(ASN1_VALUE **pval, const unsigned char **in, long len,
   const ASN1_ITEM *it, int tag, int aclass, char opt,
   ASN1_TLC *ctx);
```

```
int ASN1_item_ex_i2d(const ASN1_VALUE **pval, unsigned char **out,
   const ASN1_ITEM *it, int tag, int aclass);

/* Legacy compatibility */
#define IMPLEMENT_ASN1_FUNCTIONS_const(name) IMPLEMENT_ASN1_FUNCTIONS(name)
#define IMPLEMENT_ASN1_ENCODE_FUNCTIONS_const_fname(stname, itname, fname) \
   IMPLEMENT_ASN1_ENCODE_FUNCTIONS_fname(stname, itname, fname)

#ifdef __cplusplus
}
#endif
#endif
#ifndef SRC_PERMISSION_PERMISSION_H_
#define SRC_PERMISSION_PERMISSION_H_

#if defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS

#include "debug_utils.h"
#include "node_options.h"
#include "permission/addon_permission.h"
#include "permission/child_process_permission.h"
#include "permission/fs_permission.h"
#include "permission/inspector_permission.h"
#include "permission/permission_base.h"
#include "permission/wasi_permission.h"
#include "permission/worker_permission.h"
#include "v8.h"

#include <string_view>
#include <unordered_map>

namespace node {

class Environment;

namespace fs {
class FSReqBase;
}

namespace permission {

#define THROW_IF_INSUFFICIENT_PERMISSIONS(env, perm, resource, ...)            \
 do {                                                                          \
   node::Environment* env__ = (env);                                           \
   const node::permission::PermissionScope perm__ = (perm);                    \
   const auto resource__ = (resource);
```

```
                                \
  if (!env__->permission()->is_granted(env__, perm__, resource__))          \
      [[unlikely]] {                                                        \
    node::permission::Permission::ThrowAccessDenied(                        \
        env__, perm__, resource__);                                         \
    return __VA_ARGS__;                                                     \
  }                                                                         \
} while (0)

#define ASYNC_THROW_IF_INSUFFICIENT_PERMISSIONS(                            \
  env, wrap, perm, resource, ...)                                           \
 do {                                                                       \
  node::Environment* env__ = (env);                                         \
  const node::permission::PermissionScope perm__ = (perm);                  \
  const auto resource__ = (resource);
                                \
  if (!env__->permission()->is_granted(env__, perm__, resource__))          \
      [[unlikely]] {                                                        \
    node::permission::Permission::AsyncThrowAccessDenied(                   \
        env__, (wrap), perm__, resource__);                                 \
    return __VA_ARGS__;                                                     \
  }                                                                         \
} while (0)

#define ERR_ACCESS_DENIED_IF_INSUFFICIENT_PERMISSIONS(                      \
  env, perm, resource, args, ...)                                           \
 do {                                                                       \
  node::Environment* env__ = (env);                                         \
  const node::permission::PermissionScope perm__ = (perm);                  \
  const auto resource__ = (resource);
                \
  if (!env__->permission()->is_granted(env__, perm__, resource__))          \
      [[unlikely]] {                                                        \
    Local<Value> err_access;                                                \
    if (node::permission::CreateAccessDeniedError(env__, perm__, resource__) \
          .ToLocal(&err_access)) {                                          \
      args.GetReturnValue().Set(err_access);                                \
    } else {                                                                \
      args.GetReturnValue().Set(UV_EACCES);                                 \
    }                                                                       \
    return __VA_ARGS__;                                                     \
  }                                                                         \
} while (0)

#define SET_INSUFFICIENT_PERMISSION_ERROR_CALLBACK(scope)
    \
 void InsufficientPermissionError(std::string_view resource) {              \
  v8::HandleScope handle_scope(env()->isolate());                           \
```

```
  v8::Context::Scope context_scope(env()->context());                    \
  v8::Local<v8::Value> arg;                                              \
  if (!permission::CreateAccessDeniedError(env(), (scope), resource)      \
          .ToLocal(&arg)) {                                              \
  }                                                                      \
  MakeCallback(env()->oncomplete_string(), 1, &arg);                     \
 }

class Permission {
public:
 Permission();

 FORCE_INLINE bool is_granted(Environment* env,
                              const PermissionScope permission,
                              const std::string_view& res = "") const {
  if (!enabled_) [[likely]] {
    return true;
  }
  return is_scope_granted(env, permission, res);
 }

 FORCE_INLINE bool enabled() const { return enabled_; }

 static PermissionScope StringToPermission(const std::string& perm);
 static const char* PermissionToString(PermissionScope perm);
 static void ThrowAccessDenied(Environment* env,
                               PermissionScope perm,
                               const std::string_view& res);
 static void AsyncThrowAccessDenied(Environment* env,
                                    fs::FSReqBase* req_wrap,
                                    PermissionScope perm,
                                    const std::string_view& res);

 // CLI Call
 void Apply(Environment* env,
            const std::vector<std::string>& allow,
            PermissionScope scope);
 void EnablePermissions();

private:
 COLD_NOINLINE bool is_scope_granted(Environment* env,
                                     const PermissionScope permission,
                                     const std::string_view& res = "") const {
  auto perm_node
 = nodes_.find(permission);
  if (perm_node != nodes_.end()) {
    return perm_node->second->is_granted(env, permission, res);
  }
```

```
  return false;
 }

 std::unordered_map<PermissionScope, std::shared_ptr<PermissionBase>> nodes_;
 bool enabled_;
};

}  // namespace permission

}  // namespace node

#endif  // defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
#endif  // SRC_PERMISSION_PERMISSION_H_
```

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A. HISTORY OF THE SOFTWARE
==========

Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands
as a successor of a language called ABC.  Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to

BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see https://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
| 2.2 and above | 2.1.1 | 2001-now | PSF | yes |

Footnotes:

(1) GPL-compatible doesn't mean that we're distributing Python under the GPL. All Python licenses, unlike the GPL, let you distribute a modified version without making your changes open source. The GPL-compatible licenses make it possible to combine Python with other software that is released under the GPL; the others don't.

(2) According to Richard Stallman, 1.6.1 is not GPL-compatible, because its license has a choice of law clause. According to CNRI, however, Stallman's lawyer has told CNRI's lawyer that 1.6.1 is "not incompatible" with the GPL.

Thanks to the many outside volunteers who have worked under Guido's direction to make these releases possible.

B. TERMS AND CONDITIONS FOR ACCESSING OR OTHERWISE USING PYTHON
==========

PYTHON SOFTWARE FOUNDATION LICENSE VERSION 2
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1. This LICENSE AGREEMENT is between the
Python Software Foundation
("PSF"), and the Individual or Organization ("Licensee") accessing and
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# Protected File

Example of a protected file to be used in the PolicyDenyFs module
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   './config/archs/BSD-x86_64/asm_avx2/crypto/chacha/chacha-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/ec/ecp_nistz256-x86_64.s',
```

```
  './config/archs/BSD-x86_64/asm_avx2/crypto/ec/x25519-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/params_idx.c',
  './config/archs/BSD-x86_64/asm_avx2/crypto/x86_64cpuid.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/md5/md5-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/modes/aes-gcm-avx512.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/modes/aesni-gcm-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/modes/ghash-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/poly1305/poly1305-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/rc4/rc4-md5-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/rc4/rc4-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/sha/keccak1600-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/sha/sha1-mb-x86_64.s',
   './config/archs/BSD-x86_64/asm_avx2/crypto/sha/sha1-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/sha/sha256-mb-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/sha/sha256-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/sha/sha512-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/crypto/whrlpool/wp-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/engines/e_padlock-x86_64.s',
  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_sm2_gen.c',
  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_digests_gen.c',
  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_dsa_gen.c',
  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_ec_gen.c',
  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_ecx_gen.c',
  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_ml_dsa_gen.c',
  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_rsa_gen.c',
   './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_slh_dsa_gen.c',
  './config/archs/BSD-x86_64/asm_avx2/providers/common/der/der_wrap_gen.c',
  './config/archs/BSD-x86_64/asm_avx2/providers/legacy.ld',
  './config/archs/BSD-x86_64/asm_avx2/providers/fips.ld',

],
'openssl_defines_BSD-x86_64': [
  'NDEBUG',
  'L_ENDIAN',
  'OPENSSL_BUILDING_OPENSSL',
  'AES_ASM',
  'BSAES_ASM',
  'ECP_NISTZ256_ASM',
  'FIPS_MODULE',
  'GHASH_ASM',
  'KECCAK1600_ASM',
  'OPENSSL_BN_ASM_GF2m',
  'OPENSSL_BN_ASM_MONT',
  'OPENSSL_BN_ASM_MONT5',
  'OPENSSL_CPUID_OBJ',
  'OPENSSL_IA32_SSE2',
  'SHA1_ASM',
  'SHA256_ASM',
```

```
    'SHA512_ASM',
    'VPAES_ASM',
    'X25519_ASM',
    'FIPS_MODULE',
  ],
  'openssl_cflags_BSD-x86_64': [
    '-Wa,--noexecstack',
    '-Wall -O3',
    '-pthread',
    '-Wall -O3',
  ],
  'openssl_ex_libs_BSD-x86_64':
[
    '-pthread',
  ],
  'linker_script': ''
 },
 'include_dirs': [
  '.',
  './include',
  './crypto',
  './crypto/include/internal',
  './providers/common/include',
 ],
 'defines': ['<@(openssl_defines_BSD-x86_64)'],
 'cflags': ['<@(openssl_cflags_BSD-x86_64)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86_64)'],

 'sources': ['<@(openssl_sources)', '<@(openssl_sources_BSD-x86_64)'],
 'direct_dependent_settings': {
  'include_dirs': ['./include', '.'],
  'defines': ['<@(openssl_defines_BSD-x86_64)'],
 },
}
```

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/*
* WARNING: do not edit!
* Generated by util/mkbuildinf.pl
*
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*
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* this file except in compliance with the License. You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#define PLATFORM "platform: BSD-x86"
#define DATE "built on: Tue Jan 27 17:25:31 2026 UTC"

```
/*
* Generate compiler_flags as an array of individual characters. This is a
* workaround for the situation where CFLAGS gets too long for a C90 string
* literal
*/
static const char compiler_flags[] = {
   'c','o','m','p','i','l','e','r',':',' ','g','c','c',' ','-','f',
   'P','I','C',' ','-','p','t','h','r','e','a','d',' ','-','W','a',
   ',','-','-','n','o','e','x','e','c','s','t','a','c','k',' ','-',
   'W','a','l','l',' ','-','O','3',' ','-','f','o','m','i','t','-',
   'f','r','a','m','e','-','p','o','i','n','t','e','r','
 ','-','D',
   'L','_','E','N','D','I','A','N',' ','-','D','O','P','E','N','S',
   'S','L','_','P','I','C',' ','-','D','_','T','H','R','E','A','D',
   '_','S','A','F','E',' ','-','D','_','R','E','E','N','T','R','A',
   'N','T',' ','-','D','O','P','E','N','S','S','L','_','B','U','I',
   'L','D','I','N','G','_','O','P','E','N','S','S','L',' ','-','D',
   'N','D','E','B','U','G','\0'
};
/*-
* WARNING: do not edit!
* Generated by Makefile from include/openssl/crmf.h.in
*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*
* CRMF (RFC 4211) implementation by M. Peylo, M. Viljanen, and D. von Oheimb.
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_CRMF_H
#define OPENSSL_CRMF_H

#include <openssl/opensslconf.h>

#ifndef OPENSSL_NO_CRMF
#include <openssl/opensslv.h>
#include <openssl/safestack.h>
#include <openssl/crmferr.h>
```

```
#include <openssl/x509v3.h> /* for GENERAL_NAME etc. */
#include <openssl/cms.h>

/* explicit #includes not strictly needed since implied by the above: */
#include <openssl/types.h>
#include <openssl/x509.h>

#ifdef
 __cplusplus
extern "C" {
#endif

#define OSSL_CRMF_POPOPRIVKEY_THISMESSAGE 0
#define OSSL_CRMF_POPOPRIVKEY_SUBSEQUENTMESSAGE 1
#define OSSL_CRMF_POPOPRIVKEY_DHMAC 2
#define OSSL_CRMF_POPOPRIVKEY_AGREEMAC 3
#define OSSL_CRMF_POPOPRIVKEY_ENCRYPTEDKEY 4

#define OSSL_CRMF_SUBSEQUENTMESSAGE_ENCRCERT 0
#define OSSL_CRMF_SUBSEQUENTMESSAGE_CHALLENGERESP 1
typedef struct ossl_crmf_encryptedvalue_st OSSL_CRMF_ENCRYPTEDVALUE;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_ENCRYPTEDVALUE)

typedef struct ossl_crmf_encryptedkey_st OSSL_CRMF_ENCRYPTEDKEY;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_ENCRYPTEDKEY)

typedef struct ossl_crmf_msg_st OSSL_CRMF_MSG;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_MSG)
DECLARE_ASN1_DUP_FUNCTION(OSSL_CRMF_MSG)
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CRMF_MSG, OSSL_CRMF_MSG, OSSL_CRMF_MSG)
#define sk_OSSL_CRMF_MSG_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_CRMF_MSG_sk_type(sk))
#define sk_OSSL_CRMF_MSG_value(sk, idx) ((OSSL_CRMF_MSG
*)OPENSSL_sk_value(ossl_check_const_OSSL_CRMF_MSG_sk_type(sk),
 (idx)))
#define sk_OSSL_CRMF_MSG_new(cmp) ((STACK_OF(OSSL_CRMF_MSG)
*)OPENSSL_sk_new(ossl_check_OSSL_CRMF_MSG_compfunc_type(cmp)))
#define sk_OSSL_CRMF_MSG_new_null() ((STACK_OF(OSSL_CRMF_MSG) *)OPENSSL_sk_new_null())
#define sk_OSSL_CRMF_MSG_new_reserve(cmp, n) ((STACK_OF(OSSL_CRMF_MSG)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CRMF_MSG_compfunc_type(cmp), (n)))
#define sk_OSSL_CRMF_MSG_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_CRMF_MSG_sk_type(sk), (n))
#define sk_OSSL_CRMF_MSG_free(sk) OPENSSL_sk_free(ossl_check_OSSL_CRMF_MSG_sk_type(sk))
#define sk_OSSL_CRMF_MSG_zero(sk) OPENSSL_sk_zero(ossl_check_OSSL_CRMF_MSG_sk_type(sk))
#define sk_OSSL_CRMF_MSG_delete(sk, i) ((OSSL_CRMF_MSG
*)OPENSSL_sk_delete(ossl_check_OSSL_CRMF_MSG_sk_type(sk), (i)))
#define sk_OSSL_CRMF_MSG_delete_ptr(sk, ptr) ((OSSL_CRMF_MSG
```

```
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CRMF_MSG_sk_type(sk),
ossl_check_OSSL_CRMF_MSG_type(ptr)))
#define sk_OSSL_CRMF_MSG_push(sk, ptr)
 OPENSSL_sk_push(ossl_check_OSSL_CRMF_MSG_sk_type(sk), ossl_check_OSSL_CRMF_MSG_type(ptr))
#define sk_OSSL_CRMF_MSG_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CRMF_MSG_sk_type(sk), ossl_check_OSSL_CRMF_MSG_type(ptr))
#define sk_OSSL_CRMF_MSG_pop(sk) ((OSSL_CRMF_MSG
*)OPENSSL_sk_pop(ossl_check_OSSL_CRMF_MSG_sk_type(sk)))
#define sk_OSSL_CRMF_MSG_shift(sk) ((OSSL_CRMF_MSG
*)OPENSSL_sk_shift(ossl_check_OSSL_CRMF_MSG_sk_type(sk)))
#define sk_OSSL_CRMF_MSG_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CRMF_MSG_sk_type(sk),ossl_check_OSSL_CRMF_MSG_freefunc_t
ype(freefunc))
#define sk_OSSL_CRMF_MSG_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_CRMF_MSG_sk_type(sk), ossl_check_OSSL_CRMF_MSG_type(ptr),
(idx))
#define sk_OSSL_CRMF_MSG_set(sk, idx, ptr) ((OSSL_CRMF_MSG
*)OPENSSL_sk_set(ossl_check_OSSL_CRMF_MSG_sk_type(sk), (idx),
ossl_check_OSSL_CRMF_MSG_type(ptr)))
#define sk_OSSL_CRMF_MSG_find(sk, ptr) OPENSSL_sk_find(ossl_check_OSSL_CRMF_MSG_sk_type(sk),
ossl_check_OSSL_CRMF_MSG_type(ptr))
#define
 sk_OSSL_CRMF_MSG_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_OSSL_CRMF_MSG_sk_type(sk),
ossl_check_OSSL_CRMF_MSG_type(ptr))
#define sk_OSSL_CRMF_MSG_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CRMF_MSG_sk_type(sk), ossl_check_OSSL_CRMF_MSG_type(ptr),
pnum)
#define sk_OSSL_CRMF_MSG_sort(sk) OPENSSL_sk_sort(ossl_check_OSSL_CRMF_MSG_sk_type(sk))
#define sk_OSSL_CRMF_MSG_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CRMF_MSG_sk_type(sk))
#define sk_OSSL_CRMF_MSG_dup(sk) ((STACK_OF(OSSL_CRMF_MSG)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CRMF_MSG_sk_type(sk)))
#define sk_OSSL_CRMF_MSG_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OSSL_CRMF_MSG)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CRMF_MSG_sk_type(sk),
ossl_check_OSSL_CRMF_MSG_copyfunc_type(copyfunc),
ossl_check_OSSL_CRMF_MSG_freefunc_type(freefunc)))
#define sk_OSSL_CRMF_MSG_set_cmp_func(sk, cmp)
((sk_OSSL_CRMF_MSG_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_CRMF_MSG_sk_type(sk),
 ossl_check_OSSL_CRMF_MSG_compfunc_type(cmp)))

/* clang-format on */
typedef struct ossl_crmf_attributetypeandvalue_st OSSL_CRMF_ATTRIBUTETYPEANDVALUE;
void OSSL_CRMF_ATTRIBUTETYPEANDVALUE_free(OSSL_CRMF_ATTRIBUTETYPEANDVALUE *v);
DECLARE_ASN1_DUP_FUNCTION(OSSL_CRMF_ATTRIBUTETYPEANDVALUE)
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CRMF_ATTRIBUTETYPEANDVALUE,
OSSL_CRMF_ATTRIBUTETYPEANDVALUE, OSSL_CRMF_ATTRIBUTETYPEANDVALUE)
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_num(sk)
```

```
OPENSSL_sk_num(ossl_check_const_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_value(sk, idx)
((OSSL_CRMF_ATTRIBUTETYPEANDVALUE
*)OPENSSL_sk_value(ossl_check_const_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk), (idx)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_new(cmp)
((STACK_OF(OSSL_CRMF_ATTRIBUTETYPEANDVALUE)
*)OPENSSL_sk_new(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_compfunc_type(cmp)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_new_null()
((STACK_OF(OSSL_CRMF_ATTRIBUTETYPEANDVALUE)
 *)OPENSSL_sk_new_null())
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_new_reserve(cmp, n)
((STACK_OF(OSSL_CRMF_ATTRIBUTETYPEANDVALUE)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_compfunc_type(cmp),
(n)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk), (n))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_delete(sk, i)
((OSSL_CRMF_ATTRIBUTETYPEANDVALUE
*)OPENSSL_sk_delete(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk), (i)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_delete_ptr(sk, ptr)
((OSSL_CRMF_ATTRIBUTETYPEANDVALUE
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
 ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_type(ptr)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_type(ptr))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_type(ptr))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_pop(sk)
((OSSL_CRMF_ATTRIBUTETYPEANDVALUE
*)OPENSSL_sk_pop(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_shift(sk)
((OSSL_CRMF_ATTRIBUTETYPEANDVALUE
*)OPENSSL_sk_shift(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),ossl_check_OS
SL_CRMF_ATTRIBUTETYPEANDVALUE_freefunc_type(freefunc))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_insert(sk,
 ptr, idx) OPENSSL_sk_insert(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_type(ptr), (idx))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_set(sk, idx, ptr)
((OSSL_CRMF_ATTRIBUTETYPEANDVALUE
*)OPENSSL_sk_set(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk), (idx),
```

```
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_type(ptr)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_type(ptr))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_type(ptr))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_type(ptr), pnum)
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sort(sk)
 OPENSSL_sk_sort(ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_dup(sk)
((STACK_OF(OSSL_CRMF_ATTRIBUTETYPEANDVALUE)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_CRMF_ATTRIBUTETYPEANDVALUE)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_copyfunc_type(copyfunc),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_freefunc_type(freefunc)))
#define sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_set_cmp_func(sk, cmp)
((sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_
CRMF_ATTRIBUTETYPEANDVALUE_sk_type(sk),
ossl_check_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_compfunc_type(cmp)))

/*
 clang-format on */

typedef struct ossl_crmf_pbmparameter_st OSSL_CRMF_PBMPARAMETER;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_PBMPARAMETER)
typedef struct ossl_crmf_poposigningkey_st OSSL_CRMF_POPOSIGNINGKEY;
typedef struct ossl_crmf_certrequest_st OSSL_CRMF_CERTREQUEST;
typedef struct ossl_crmf_certid_st OSSL_CRMF_CERTID;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_CERTID)
DECLARE_ASN1_DUP_FUNCTION(OSSL_CRMF_CERTID)
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CRMF_CERTID, OSSL_CRMF_CERTID,
OSSL_CRMF_CERTID)
#define sk_OSSL_CRMF_CERTID_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_CRMF_CERTID_sk_type(sk))
#define sk_OSSL_CRMF_CERTID_value(sk, idx) ((OSSL_CRMF_CERTID
*)OPENSSL_sk_value(ossl_check_const_OSSL_CRMF_CERTID_sk_type(sk), (idx)))
#define sk_OSSL_CRMF_CERTID_new(cmp) ((STACK_OF(OSSL_CRMF_CERTID)
*)OPENSSL_sk_new(ossl_check_OSSL_CRMF_CERTID_compfunc_type(cmp)))
#define sk_OSSL_CRMF_CERTID_new_null() ((STACK_OF(OSSL_CRMF_CERTID)
*)OPENSSL_sk_new_null())
```

```
#define sk_OSSL_CRMF_CERTID_new_reserve(cmp,
 n) ((STACK_OF(OSSL_CRMF_CERTID)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CRMF_CERTID_compfunc_type(cmp), (n)))
#define sk_OSSL_CRMF_CERTID_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_CRMF_CERTID_sk_type(sk), (n))
#define sk_OSSL_CRMF_CERTID_free(sk) OPENSSL_sk_free(ossl_check_OSSL_CRMF_CERTID_sk_type(sk))
#define sk_OSSL_CRMF_CERTID_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_CRMF_CERTID_sk_type(sk))
#define sk_OSSL_CRMF_CERTID_delete(sk, i) ((OSSL_CRMF_CERTID
*)OPENSSL_sk_delete(ossl_check_OSSL_CRMF_CERTID_sk_type(sk), (i)))
#define sk_OSSL_CRMF_CERTID_delete_ptr(sk, ptr) ((OSSL_CRMF_CERTID
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CRMF_CERTID_sk_type(sk),
ossl_check_OSSL_CRMF_CERTID_type(ptr)))
#define sk_OSSL_CRMF_CERTID_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_CRMF_CERTID_sk_type(sk),
ossl_check_OSSL_CRMF_CERTID_type(ptr))
#define sk_OSSL_CRMF_CERTID_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CRMF_CERTID_sk_type(sk),
ossl_check_OSSL_CRMF_CERTID_type(ptr))
#define
 sk_OSSL_CRMF_CERTID_pop(sk) ((OSSL_CRMF_CERTID
*)OPENSSL_sk_pop(ossl_check_OSSL_CRMF_CERTID_sk_type(sk)))
#define sk_OSSL_CRMF_CERTID_shift(sk) ((OSSL_CRMF_CERTID
*)OPENSSL_sk_shift(ossl_check_OSSL_CRMF_CERTID_sk_type(sk)))
#define sk_OSSL_CRMF_CERTID_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CRMF_CERTID_sk_type(sk),ossl_check_OSSL_CRMF_CERTID_fre
efunc_type(freefunc))
#define sk_OSSL_CRMF_CERTID_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_CRMF_CERTID_sk_type(sk),
ossl_check_OSSL_CRMF_CERTID_type(ptr), (idx))
#define sk_OSSL_CRMF_CERTID_set(sk, idx, ptr) ((OSSL_CRMF_CERTID
*)OPENSSL_sk_set(ossl_check_OSSL_CRMF_CERTID_sk_type(sk), (idx),
ossl_check_OSSL_CRMF_CERTID_type(ptr)))
#define sk_OSSL_CRMF_CERTID_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_CRMF_CERTID_sk_type(sk),
ossl_check_OSSL_CRMF_CERTID_type(ptr))
#define sk_OSSL_CRMF_CERTID_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_CRMF_CERTID_sk_type(sk),
ossl_check_OSSL_CRMF_CERTID_type(ptr))
#define
 sk_OSSL_CRMF_CERTID_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CRMF_CERTID_sk_type(sk),
ossl_check_OSSL_CRMF_CERTID_type(ptr), pnum)
#define sk_OSSL_CRMF_CERTID_sort(sk) OPENSSL_sk_sort(ossl_check_OSSL_CRMF_CERTID_sk_type(sk))
#define sk_OSSL_CRMF_CERTID_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CRMF_CERTID_sk_type(sk))
#define sk_OSSL_CRMF_CERTID_dup(sk) ((STACK_OF(OSSL_CRMF_CERTID)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CRMF_CERTID_sk_type(sk)))
```

```
#define sk_OSSL_CRMF_CERTID_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OSSL_CRMF_CERTID)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CRMF_CERTID_sk_type(sk),
ossl_check_OSSL_CRMF_CERTID_copyfunc_type(copyfunc),
ossl_check_OSSL_CRMF_CERTID_freefunc_type(freefunc)))
#define sk_OSSL_CRMF_CERTID_set_cmp_func(sk, cmp)
((sk_OSSL_CRMF_CERTID_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_CRMF_CERTID_sk_typ
e(sk), ossl_check_OSSL_CRMF_CERTID_compfunc_type(cmp)))

/* clang-format on */

typedef struct
 ossl_crmf_pkipublicationinfo_st OSSL_CRMF_PKIPUBLICATIONINFO;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_PKIPUBLICATIONINFO)
typedef struct ossl_crmf_singlepubinfo_st OSSL_CRMF_SINGLEPUBINFO;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_SINGLEPUBINFO)
typedef struct ossl_crmf_certtemplate_st OSSL_CRMF_CERTTEMPLATE;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_CERTTEMPLATE)
DECLARE_ASN1_DUP_FUNCTION(OSSL_CRMF_CERTTEMPLATE)
typedef STACK_OF(OSSL_CRMF_MSG) OSSL_CRMF_MSGS;
DECLARE_ASN1_FUNCTIONS(OSSL_CRMF_MSGS)

typedef struct ossl_crmf_optionalvalidity_st OSSL_CRMF_OPTIONALVALIDITY;

/* crmf_pbm.c */
OSSL_CRMF_PBMPARAMETER *OSSL_CRMF_pbmp_new(OSSL_LIB_CTX *libctx, size_t slen,
   int owfnid, size_t itercnt,
   int macnid);
int OSSL_CRMF_pbm_new(OSSL_LIB_CTX *libctx, const char *propq,
   const OSSL_CRMF_PBMPARAMETER *pbmp,
   const unsigned char *msg, size_t msglen,
   const unsigned char *sec, size_t seclen,
   unsigned char **mac, size_t *maclen);

/* crmf_lib.c */
int OSSL_CRMF_MSG_set1_regCtrl_regToken(OSSL_CRMF_MSG
 *msg,
   const ASN1_UTF8STRING *tok);
ASN1_UTF8STRING
*OSSL_CRMF_MSG_get0_regCtrl_regToken(const OSSL_CRMF_MSG *msg);
int OSSL_CRMF_MSG_set1_regCtrl_authenticator(OSSL_CRMF_MSG *msg,
   const ASN1_UTF8STRING *auth);
ASN1_UTF8STRING
*OSSL_CRMF_MSG_get0_regCtrl_authenticator(const OSSL_CRMF_MSG *msg);
int OSSL_CRMF_MSG_PKIPublicationInfo_push0_SinglePubInfo(OSSL_CRMF_PKIPUBLICATIONINFO *pi,
   OSSL_CRMF_SINGLEPUBINFO *spi);
#define OSSL_CRMF_PUB_METHOD_DONTCARE 0
#define OSSL_CRMF_PUB_METHOD_X500 1
#define OSSL_CRMF_PUB_METHOD_WEB 2
```

```
#define OSSL_CRMF_PUB_METHOD_LDAP 3
int OSSL_CRMF_MSG_set0_SinglePubInfo(OSSL_CRMF_SINGLEPUBINFO *spi,
   int method, GENERAL_NAME *nm);
#define OSSL_CRMF_PUB_ACTION_DONTPUBLISH 0
#define OSSL_CRMF_PUB_ACTION_PLEASEPUBLISH 1
int OSSL_CRMF_MSG_set_PKIPublicationInfo_action(OSSL_CRMF_PKIPUBLICATIONINFO *pi,
   int action);
int OSSL_CRMF_MSG_set1_regCtrl_pkiPublicationInfo(OSSL_CRMF_MSG *msg,
   const OSSL_CRMF_PKIPUBLICATIONINFO *pi);
OSSL_CRMF_PKIPUBLICATIONINFO
*OSSL_CRMF_MSG_get0_regCtrl_pkiPublicationInfo(const
 OSSL_CRMF_MSG *msg);
int OSSL_CRMF_MSG_set1_regCtrl_protocolEncrKey(OSSL_CRMF_MSG *msg,
   const X509_PUBKEY *pubkey);
X509_PUBKEY
*OSSL_CRMF_MSG_get0_regCtrl_protocolEncrKey(const OSSL_CRMF_MSG *msg);
int OSSL_CRMF_MSG_set1_regCtrl_oldCertID(OSSL_CRMF_MSG *msg,
   const OSSL_CRMF_CERTID *cid);
OSSL_CRMF_CERTID
*OSSL_CRMF_MSG_get0_regCtrl_oldCertID(const OSSL_CRMF_MSG *msg);
OSSL_CRMF_CERTID *OSSL_CRMF_CERTID_gen(const X509_NAME *issuer,
   const ASN1_INTEGER *serial);

int OSSL_CRMF_MSG_set1_regInfo_utf8Pairs(OSSL_CRMF_MSG *msg,
   const ASN1_UTF8STRING *utf8pairs);
ASN1_UTF8STRING
*OSSL_CRMF_MSG_get0_regInfo_utf8Pairs(const OSSL_CRMF_MSG *msg);
int OSSL_CRMF_MSG_set1_regInfo_certReq(OSSL_CRMF_MSG *msg,
   const OSSL_CRMF_CERTREQUEST *cr);
OSSL_CRMF_CERTREQUEST
*OSSL_CRMF_MSG_get0_regInfo_certReq(const OSSL_CRMF_MSG *msg);

int OSSL_CRMF_MSG_set0_validity(OSSL_CRMF_MSG *crm,
   ASN1_TIME *notBefore, ASN1_TIME *notAfter);
int
 OSSL_CRMF_MSG_set_certReqId(OSSL_CRMF_MSG *crm, int rid);
int OSSL_CRMF_MSG_get_certReqId(const OSSL_CRMF_MSG *crm);
int OSSL_CRMF_MSG_set0_extensions(OSSL_CRMF_MSG *crm, X509_EXTENSIONS *exts);

int OSSL_CRMF_MSG_push0_extension(OSSL_CRMF_MSG *crm, X509_EXTENSION *ext);
#define OSSL_CRMF_POPO_NONE -1
#define OSSL_CRMF_POPO_RAVERIFIED 0
#define OSSL_CRMF_POPO_SIGNATURE 1
#define OSSL_CRMF_POPO_KEYENC 2
#define OSSL_CRMF_POPO_KEYAGREE 3
int OSSL_CRMF_MSG_create_popo(int meth, OSSL_CRMF_MSG *crm,
   EVP_PKEY *pkey, const EVP_MD *digest,
   OSSL_LIB_CTX *libctx, const char *propq);
```

```
int OSSL_CRMF_MSGS_verify_popo(const OSSL_CRMF_MSGS *reqs,
   int rid, int acceptRAVerified,
   OSSL_LIB_CTX *libctx, const char *propq);
OSSL_CRMF_CERTTEMPLATE *OSSL_CRMF_MSG_get0_tmpl(const OSSL_CRMF_MSG *crm);
X509_PUBKEY
*OSSL_CRMF_CERTTEMPLATE_get0_publicKey(const OSSL_CRMF_CERTTEMPLATE *tmpl);
const X509_NAME *OSSL_CRMF_CERTTEMPLATE_get0_subject(const OSSL_CRMF_CERTTEMPLATE
*tmpl);
const
 X509_NAME *OSSL_CRMF_CERTTEMPLATE_get0_issuer(const OSSL_CRMF_CERTTEMPLATE *tmpl);
const ASN1_INTEGER *OSSL_CRMF_CERTTEMPLATE_get0_serialNumber(const
OSSL_CRMF_CERTTEMPLATE *tmpl);
X509_EXTENSIONS
*OSSL_CRMF_CERTTEMPLATE_get0_extensions(const OSSL_CRMF_CERTTEMPLATE *tmpl);
const X509_NAME *OSSL_CRMF_CERTID_get0_issuer(const OSSL_CRMF_CERTID *cid);
const ASN1_INTEGER *OSSL_CRMF_CERTID_get0_serialNumber(const OSSL_CRMF_CERTID *cid);
int OSSL_CRMF_CERTTEMPLATE_fill(OSSL_CRMF_CERTTEMPLATE *tmpl,
   EVP_PKEY *pubkey,
   const X509_NAME *subject,
   const X509_NAME *issuer,
   const ASN1_INTEGER *serial);
X509 *OSSL_CRMF_ENCRYPTEDVALUE_get1_encCert(const OSSL_CRMF_ENCRYPTEDVALUE *ecert,
   OSSL_LIB_CTX *libctx, const char *propq,
   EVP_PKEY *pkey);
X509 *OSSL_CRMF_ENCRYPTEDKEY_get1_encCert(const OSSL_CRMF_ENCRYPTEDKEY *ecert,
   OSSL_LIB_CTX *libctx, const char *propq,
   EVP_PKEY *pkey, unsigned int flags);
unsigned char *OSSL_CRMF_ENCRYPTEDVALUE_decrypt(const OSSL_CRMF_ENCRYPTEDVALUE
 *enc,
   OSSL_LIB_CTX *libctx, const char *propq,
   EVP_PKEY *pkey, int *outlen);
EVP_PKEY *OSSL_CRMF_ENCRYPTEDKEY_get1_pkey(const OSSL_CRMF_ENCRYPTEDKEY
*encryptedKey,
   X509_STORE *ts, STACK_OF(X509) *extra, EVP_PKEY *pkey,
   X509 *cert, ASN1_OCTET_STRING *secret,
   OSSL_LIB_CTX *libctx, const char *propq);
int OSSL_CRMF_MSG_centralkeygen_requested(const OSSL_CRMF_MSG *crm, const X509_REQ *p10cr);
#ifndef OPENSSL_NO_CMS
OSSL_CRMF_ENCRYPTEDKEY *OSSL_CRMF_ENCRYPTEDKEY_init_envdata(CMS_EnvelopedData
*envdata);
#endif

#ifdef __cplusplus
}
#endif
#endif /* !defined(OPENSSL_NO_CRMF) */
#endif /* !defined(OPENSSL_CRMF_H) */
```

```
#ifndef SRC_PERMISSION_FS_PERMISSION_H_
#define SRC_PERMISSION_FS_PERMISSION_H_

#if defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS

#include "v8.h"

#include <unordered_map>
#include "permission/permission_base.h"
#include "util.h"

namespace node {

namespace permission {

class FSPermission final : public PermissionBase {
public:
 void Apply(Environment* env,
            const std::vector<std::string>& allow,
            PermissionScope scope) override;
 bool is_granted(Environment* env,
                 PermissionScope perm,
                 const std::string_view& param) const override;

 struct RadixTree {
   struct Node {
     std::string prefix;
     std::unordered_map<char, Node*> children;
     Node* wildcard_child;
     bool is_leaf;

     explicit Node(const std::string& pre)
         : prefix(pre), wildcard_child(nullptr), is_leaf(false) {}

     Node() : wildcard_child(nullptr), is_leaf(false) {}

     Node* CreateChild(const std::string& path_prefix)
  {
       if (path_prefix.empty() && !is_leaf) {
         is_leaf = true;
         return this;
       }

       CHECK(!path_prefix.empty());
       char label = path_prefix[0];

       Node* child = children[label];
       if (child == nullptr) {
```

```
    children[label] = new Node(path_prefix);
    return children[label];
  }

  // swap prefix
  size_t i = 0;
  size_t prefix_len = path_prefix.length();
  for (; i < child->prefix.length(); ++i) {
    if (i > prefix_len || path_prefix[i] != child->prefix[i]) {
      std::string parent_prefix = child->prefix.substr(0, i);
      std::string child_prefix = child->prefix.substr(i);

      child->prefix = child_prefix;
      Node* split_child = new Node(parent_prefix);
      split_child->children[child_prefix[0]] = child;
      children[parent_prefix[0]] = split_child;

      return split_child->CreateChild(path_prefix.substr(i));
    }

}
  child->is_leaf = true;
  return child->CreateChild(path_prefix.substr(i));
 }

 Node* CreateWildcardChild() {
  if (wildcard_child != nullptr) {
    return wildcard_child;
  }
  wildcard_child = new Node();
  return wildcard_child;
 }

 Node* NextNode(const std::string& path, size_t idx) const {
  if (idx >= path.length()) {
    return nullptr;
  }

  // wildcard node takes precedence
  if (children.size() > 1) {
    auto it = children.find('*');
    if (it != children.end()) {
      return it->second;
    }
  }

  auto it = children.find(path[idx]);
  if (it == children.end()) {
```

```
      return nullptr;
    }
    auto child = it->second;
    // match prefix
    size_t prefix_len = child->prefix.length();
    for (size_t i = 0; i < path.length(); ++i) {
      if (i >= prefix_len || child->prefix[i] == '*') {
        return
child;
      }

      // Handle optional trailing
      // path = /home/subdirectory
      // child = subdirectory/*
      if (idx >= path.length() &&
          child->prefix[i] == node::kPathSeparator) {
        continue;
      }

      if (path[idx++] != child->prefix[i]) {
        return nullptr;
      }
    }
    return child;
  }

  // A node can be a *end* node and have children
  // E.g: */slower*, */slown* are inserted:
  // /slow
  // ---> er
  // ---> n
  // If */slow* is inserted right after, it will create an
  // empty node
  // /slow
  // ---> '\000' ASCII (0) || \0
  // ---> er
  // ---> n
  bool IsEndNode() const {
    if (children.empty()) {
      return true;
    }
    return is_leaf;
  }
};

RadixTree();
~RadixTree();
void Insert(const std::string& s);
```

```
  bool Lookup(const std::string_view& s) const { return Lookup(s, false);
 }
  bool Lookup(const std::string_view& s, bool when_empty_return) const;

 private:
  Node* root_node_;
 };

private:
 void GrantAccess(PermissionScope scope, const std::string& param);
 // fs granted on startup
 RadixTree granted_in_fs_;
 RadixTree granted_out_fs_;

 bool deny_all_in_ = true;
 bool deny_all_out_ = true;

 bool allow_all_in_ = false;
 bool allow_all_out_ = false;
};

}  // namespace permission

}  // namespace node

#endif  // defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
#endif  // SRC_PERMISSION_FS_PERMISSION_H_
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/ocsp.h.in
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*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_OCSP_H
#define OPENSSL_OCSP_H
#pragma once
```

```
#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_OCSP_H
#endif

#include <openssl/opensslconf.h>
#include <openssl/http.h>
#include <openssl/asn1.h>

/*
* These definitions are outside the OPENSSL_NO_OCSP guard because although for
* historical reasons they have OCSP_* names, they can actually be used
* independently of OCSP. E.g. see RFC5280
*/
/*-
*   CRLReason ::= ENUMERATED {
*       unspecified             (0),
*       keyCompromise
         (1),
*       cACompromise            (2),
*       affiliationChanged      (3),
*       superseded              (4),
*       cessationOfOperation    (5),
*       certificateHold         (6),
*       -- value 7 is not used
*       removeFromCRL           (8),
*       privilegeWithdrawn      (9),
*       aACompromise            (10) }
*/
#define OCSP_REVOKED_STATUS_NOSTATUS -1
#define OCSP_REVOKED_STATUS_UNSPECIFIED 0
#define OCSP_REVOKED_STATUS_KEYCOMPROMISE 1
#define OCSP_REVOKED_STATUS_CACOMPROMISE 2
#define OCSP_REVOKED_STATUS_AFFILIATIONCHANGED 3
#define OCSP_REVOKED_STATUS_SUPERSEDED 4
#define OCSP_REVOKED_STATUS_CESSATIONOFOPERATION 5
#define OCSP_REVOKED_STATUS_CERTIFICATEHOLD 6
#define OCSP_REVOKED_STATUS_REMOVEFROMCRL 8
#define OCSP_REVOKED_STATUS_PRIVILEGEWITHDRAWN 9
#define OCSP_REVOKED_STATUS_AACOMPROMISE 10

#ifndef OPENSSL_NO_OCSP

#include <openssl/x509.h>
#include <openssl/x509v3.h>
#include <openssl/safestack.h>
#include <openssl/ocsperr.h>
```

```
#ifdef
 __cplusplus
extern "C" {
#endif

/* Various flags and values */

#define OCSP_DEFAULT_NONCE_LENGTH 16

#define OCSP_NOCERTS 0x1
#define OCSP_NOINTERN 0x2
#define OCSP_NOSIGS 0x4
#define OCSP_NOCHAIN 0x8
#define OCSP_NOVERIFY 0x10
#define OCSP_NOEXPLICIT 0x20
#define OCSP_NOCASIGN 0x40
#define OCSP_NODELEGATED 0x80
#define OCSP_NOCHECKS 0x100
#define OCSP_TRUSTOTHER 0x200
#define OCSP_RESPID_KEY 0x400
#define OCSP_NOTIME 0x800
#define OCSP_PARTIAL_CHAIN 0x1000

typedef struct ocsp_cert_id_st OCSP_CERTID;
typedef struct ocsp_one_request_st OCSP_ONEREQ;
typedef struct ocsp_req_info_st OCSP_REQINFO;
typedef struct ocsp_signature_st OCSP_SIGNATURE;
typedef struct ocsp_request_st OCSP_REQUEST;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OCSP_CERTID, OCSP_CERTID, OCSP_CERTID)
#define sk_OCSP_CERTID_num(sk) OPENSSL_sk_num(ossl_check_const_OCSP_CERTID_sk_type(sk))
#define sk_OCSP_CERTID_value(sk, idx) ((OCSP_CERTID
*)OPENSSL_sk_value(ossl_check_const_OCSP_CERTID_sk_type(sk),
 (idx)))
#define sk_OCSP_CERTID_new(cmp) ((STACK_OF(OCSP_CERTID)
*)OPENSSL_sk_new(ossl_check_OCSP_CERTID_compfunc_type(cmp)))
#define sk_OCSP_CERTID_new_null() ((STACK_OF(OCSP_CERTID) *)OPENSSL_sk_new_null())
#define sk_OCSP_CERTID_new_reserve(cmp, n) ((STACK_OF(OCSP_CERTID)
*)OPENSSL_sk_new_reserve(ossl_check_OCSP_CERTID_compfunc_type(cmp), (n)))
#define sk_OCSP_CERTID_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_OCSP_CERTID_sk_type(sk), (n))
#define sk_OCSP_CERTID_free(sk) OPENSSL_sk_free(ossl_check_OCSP_CERTID_sk_type(sk))
#define sk_OCSP_CERTID_zero(sk) OPENSSL_sk_zero(ossl_check_OCSP_CERTID_sk_type(sk))
#define sk_OCSP_CERTID_delete(sk, i) ((OCSP_CERTID
*)OPENSSL_sk_delete(ossl_check_OCSP_CERTID_sk_type(sk), (i)))
#define sk_OCSP_CERTID_delete_ptr(sk, ptr) ((OCSP_CERTID
*)OPENSSL_sk_delete_ptr(ossl_check_OCSP_CERTID_sk_type(sk), ossl_check_OCSP_CERTID_type(ptr)))
```

```
#define sk_OCSP_CERTID_push(sk, ptr) OPENSSL_sk_push(ossl_check_OCSP_CERTID_sk_type(sk),
ossl_check_OCSP_CERTID_type(ptr))
#define
 sk_OCSP_CERTID_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_OCSP_CERTID_sk_type(sk),
ossl_check_OCSP_CERTID_type(ptr))
#define sk_OCSP_CERTID_pop(sk) ((OCSP_CERTID
*)OPENSSL_sk_pop(ossl_check_OCSP_CERTID_sk_type(sk)))
#define sk_OCSP_CERTID_shift(sk) ((OCSP_CERTID
*)OPENSSL_sk_shift(ossl_check_OCSP_CERTID_sk_type(sk)))
#define sk_OCSP_CERTID_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OCSP_CERTID_sk_type(sk),ossl_check_OCSP_CERTID_freefunc_type(freef
unc))
#define sk_OCSP_CERTID_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_OCSP_CERTID_sk_type(sk),
ossl_check_OCSP_CERTID_type(ptr), (idx))
#define sk_OCSP_CERTID_set(sk, idx, ptr) ((OCSP_CERTID
*)OPENSSL_sk_set(ossl_check_OCSP_CERTID_sk_type(sk), (idx), ossl_check_OCSP_CERTID_type(ptr)))
#define sk_OCSP_CERTID_find(sk, ptr) OPENSSL_sk_find(ossl_check_OCSP_CERTID_sk_type(sk),
ossl_check_OCSP_CERTID_type(ptr))
#define sk_OCSP_CERTID_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_OCSP_CERTID_sk_type(sk),
ossl_check_OCSP_CERTID_type(ptr))
#define
 sk_OCSP_CERTID_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_OCSP_CERTID_sk_type(sk),
ossl_check_OCSP_CERTID_type(ptr), pnum)
#define sk_OCSP_CERTID_sort(sk) OPENSSL_sk_sort(ossl_check_OCSP_CERTID_sk_type(sk))
#define sk_OCSP_CERTID_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OCSP_CERTID_sk_type(sk))
#define sk_OCSP_CERTID_dup(sk) ((STACK_OF(OCSP_CERTID)
*)OPENSSL_sk_dup(ossl_check_const_OCSP_CERTID_sk_type(sk)))
#define sk_OCSP_CERTID_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OCSP_CERTID)
*)OPENSSL_sk_deep_copy(ossl_check_const_OCSP_CERTID_sk_type(sk),
ossl_check_OCSP_CERTID_copyfunc_type(copyfunc), ossl_check_OCSP_CERTID_freefunc_type(freefunc)))
#define sk_OCSP_CERTID_set_cmp_func(sk, cmp)
((sk_OCSP_CERTID_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OCSP_CERTID_sk_type(sk),
ossl_check_OCSP_CERTID_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(OCSP_ONEREQ, OCSP_ONEREQ, OCSP_ONEREQ)
#define sk_OCSP_ONEREQ_num(sk) OPENSSL_sk_num(ossl_check_const_OCSP_ONEREQ_sk_type(sk))
#define
 sk_OCSP_ONEREQ_value(sk, idx) ((OCSP_ONEREQ
*)OPENSSL_sk_value(ossl_check_const_OCSP_ONEREQ_sk_type(sk), (idx)))
#define sk_OCSP_ONEREQ_new(cmp) ((STACK_OF(OCSP_ONEREQ)
*)OPENSSL_sk_new(ossl_check_OCSP_ONEREQ_compfunc_type(cmp)))
#define sk_OCSP_ONEREQ_new_null() ((STACK_OF(OCSP_ONEREQ) *)OPENSSL_sk_new_null())
#define sk_OCSP_ONEREQ_new_reserve(cmp, n) ((STACK_OF(OCSP_ONEREQ)
*)OPENSSL_sk_new_reserve(ossl_check_OCSP_ONEREQ_compfunc_type(cmp), (n)))
#define sk_OCSP_ONEREQ_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_OCSP_ONEREQ_sk_type(sk), (n))
#define sk_OCSP_ONEREQ_free(sk) OPENSSL_sk_free(ossl_check_OCSP_ONEREQ_sk_type(sk))
#define sk_OCSP_ONEREQ_zero(sk) OPENSSL_sk_zero(ossl_check_OCSP_ONEREQ_sk_type(sk))
#define sk_OCSP_ONEREQ_delete(sk, i) ((OCSP_ONEREQ
```

```
*)OPENSSL_sk_delete(ossl_check_OCSP_ONEREQ_sk_type(sk), (i)))
#define sk_OCSP_ONEREQ_delete_ptr(sk, ptr) ((OCSP_ONEREQ
*)OPENSSL_sk_delete_ptr(ossl_check_OCSP_ONEREQ_sk_type(sk),
 ossl_check_OCSP_ONEREQ_type(ptr)))
#define sk_OCSP_ONEREQ_push(sk, ptr) OPENSSL_sk_push(ossl_check_OCSP_ONEREQ_sk_type(sk),
ossl_check_OCSP_ONEREQ_type(ptr))
#define sk_OCSP_ONEREQ_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_OCSP_ONEREQ_sk_type(sk),
ossl_check_OCSP_ONEREQ_type(ptr))
#define sk_OCSP_ONEREQ_pop(sk) ((OCSP_ONEREQ
*)OPENSSL_sk_pop(ossl_check_OCSP_ONEREQ_sk_type(sk)))
#define sk_OCSP_ONEREQ_shift(sk) ((OCSP_ONEREQ
*)OPENSSL_sk_shift(ossl_check_OCSP_ONEREQ_sk_type(sk)))
#define sk_OCSP_ONEREQ_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OCSP_ONEREQ_sk_type(sk),ossl_check_OCSP_ONEREQ_freefunc_type(fr
eefunc))
#define sk_OCSP_ONEREQ_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_OCSP_ONEREQ_sk_type(sk),
ossl_check_OCSP_ONEREQ_type(ptr), (idx))
#define sk_OCSP_ONEREQ_set(sk, idx, ptr) ((OCSP_ONEREQ
*)OPENSSL_sk_set(ossl_check_OCSP_ONEREQ_sk_type(sk), (idx), ossl_check_OCSP_ONEREQ_type(ptr)))
#define sk_OCSP_ONEREQ_find(sk, ptr) OPENSSL_sk_find(ossl_check_OCSP_ONEREQ_sk_type(sk),
 ossl_check_OCSP_ONEREQ_type(ptr))
#define sk_OCSP_ONEREQ_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_OCSP_ONEREQ_sk_type(sk),
ossl_check_OCSP_ONEREQ_type(ptr))
#define sk_OCSP_ONEREQ_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OCSP_ONEREQ_sk_type(sk), ossl_check_OCSP_ONEREQ_type(ptr), pnum)
#define sk_OCSP_ONEREQ_sort(sk) OPENSSL_sk_sort(ossl_check_OCSP_ONEREQ_sk_type(sk))
#define sk_OCSP_ONEREQ_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OCSP_ONEREQ_sk_type(sk))
#define sk_OCSP_ONEREQ_dup(sk) ((STACK_OF(OCSP_ONEREQ)
*)OPENSSL_sk_dup(ossl_check_const_OCSP_ONEREQ_sk_type(sk)))
#define sk_OCSP_ONEREQ_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OCSP_ONEREQ)
*)OPENSSL_sk_deep_copy(ossl_check_const_OCSP_ONEREQ_sk_type(sk),
ossl_check_OCSP_ONEREQ_copyfunc_type(copyfunc), ossl_check_OCSP_ONEREQ_freefunc_type(freefunc)))
#define sk_OCSP_ONEREQ_set_cmp_func(sk, cmp)
((sk_OCSP_ONEREQ_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OCSP_ONEREQ_sk_type(sk),
ossl_check_OCSP_ONEREQ_compfunc_type(cmp)))

/*
 clang-format on */

#define OCSP_RESPONSE_STATUS_SUCCESSFUL 0
#define OCSP_RESPONSE_STATUS_MALFORMEDREQUEST 1
#define OCSP_RESPONSE_STATUS_INTERNALERROR 2
#define OCSP_RESPONSE_STATUS_TRYLATER 3
#define OCSP_RESPONSE_STATUS_SIGREQUIRED 5
#define OCSP_RESPONSE_STATUS_UNAUTHORIZED 6

typedef struct ocsp_resp_bytes_st OCSP_RESPBYTES;
```

```
#define V_OCSP_RESPID_NAME 0
#define V_OCSP_RESPID_KEY 1

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OCSP_RESPID, OCSP_RESPID, OCSP_RESPID)
#define sk_OCSP_RESPID_num(sk) OPENSSL_sk_num(ossl_check_const_OCSP_RESPID_sk_type(sk))
#define sk_OCSP_RESPID_value(sk, idx) ((OCSP_RESPID
*)OPENSSL_sk_value(ossl_check_const_OCSP_RESPID_sk_type(sk), (idx)))
#define sk_OCSP_RESPID_new(cmp) ((STACK_OF(OCSP_RESPID)
*)OPENSSL_sk_new(ossl_check_OCSP_RESPID_compfunc_type(cmp)))
#define sk_OCSP_RESPID_new_null() ((STACK_OF(OCSP_RESPID) *)OPENSSL_sk_new_null())
#define sk_OCSP_RESPID_new_reserve(cmp, n) ((STACK_OF(OCSP_RESPID)
 *)OPENSSL_sk_new_reserve(ossl_check_OCSP_RESPID_compfunc_type(cmp), (n)))
#define sk_OCSP_RESPID_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_OCSP_RESPID_sk_type(sk), (n))
#define sk_OCSP_RESPID_free(sk) OPENSSL_sk_free(ossl_check_OCSP_RESPID_sk_type(sk))
#define sk_OCSP_RESPID_zero(sk) OPENSSL_sk_zero(ossl_check_OCSP_RESPID_sk_type(sk))
#define sk_OCSP_RESPID_delete(sk, i) ((OCSP_RESPID
*)OPENSSL_sk_delete(ossl_check_OCSP_RESPID_sk_type(sk), (i)))
#define sk_OCSP_RESPID_delete_ptr(sk, ptr) ((OCSP_RESPID
*)OPENSSL_sk_delete_ptr(ossl_check_OCSP_RESPID_sk_type(sk), ossl_check_OCSP_RESPID_type(ptr)))
#define sk_OCSP_RESPID_push(sk, ptr) OPENSSL_sk_push(ossl_check_OCSP_RESPID_sk_type(sk),
ossl_check_OCSP_RESPID_type(ptr))
#define sk_OCSP_RESPID_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_OCSP_RESPID_sk_type(sk),
ossl_check_OCSP_RESPID_type(ptr))
#define sk_OCSP_RESPID_pop(sk) ((OCSP_RESPID
*)OPENSSL_sk_pop(ossl_check_OCSP_RESPID_sk_type(sk)))
#define sk_OCSP_RESPID_shift(sk) ((OCSP_RESPID
 *)OPENSSL_sk_shift(ossl_check_OCSP_RESPID_sk_type(sk)))
#define sk_OCSP_RESPID_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OCSP_RESPID_sk_type(sk),ossl_check_OCSP_RESPID_freefunc_type(freef
unc))
#define sk_OCSP_RESPID_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_OCSP_RESPID_sk_type(sk),
ossl_check_OCSP_RESPID_type(ptr), (idx))
#define sk_OCSP_RESPID_set(sk, idx, ptr) ((OCSP_RESPID
*)OPENSSL_sk_set(ossl_check_OCSP_RESPID_sk_type(sk), (idx), ossl_check_OCSP_RESPID_type(ptr)))
#define sk_OCSP_RESPID_find(sk, ptr) OPENSSL_sk_find(ossl_check_OCSP_RESPID_sk_type(sk),
ossl_check_OCSP_RESPID_type(ptr))
#define sk_OCSP_RESPID_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_OCSP_RESPID_sk_type(sk),
ossl_check_OCSP_RESPID_type(ptr))
#define sk_OCSP_RESPID_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OCSP_RESPID_sk_type(sk), ossl_check_OCSP_RESPID_type(ptr), pnum)
#define sk_OCSP_RESPID_sort(sk) OPENSSL_sk_sort(ossl_check_OCSP_RESPID_sk_type(sk))
#define sk_OCSP_RESPID_is_sorted(sk)
 OPENSSL_sk_is_sorted(ossl_check_const_OCSP_RESPID_sk_type(sk))
#define sk_OCSP_RESPID_dup(sk) ((STACK_OF(OCSP_RESPID)
*)OPENSSL_sk_dup(ossl_check_const_OCSP_RESPID_sk_type(sk)))
#define sk_OCSP_RESPID_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OCSP_RESPID)
```

```
*)OPENSSL_sk_deep_copy(ossl_check_const_OCSP_RESPID_sk_type(sk),
ossl_check_OCSP_RESPID_copyfunc_type(copyfunc), ossl_check_OCSP_RESPID_freefunc_type(freefunc)))
#define sk_OCSP_RESPID_set_cmp_func(sk, cmp)
((sk_OCSP_RESPID_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OCSP_RESPID_sk_type(sk),
ossl_check_OCSP_RESPID_compfunc_type(cmp)))

/* clang-format on */

typedef struct ocsp_revoked_info_st OCSP_REVOKEDINFO;

#define V_OCSP_CERTSTATUS_GOOD 0
#define V_OCSP_CERTSTATUS_REVOKED 1
#define V_OCSP_CERTSTATUS_UNKNOWN 2

typedef struct ocsp_cert_status_st OCSP_CERTSTATUS;
typedef struct ocsp_single_response_st OCSP_SINGLERESP;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OCSP_SINGLERESP, OCSP_SINGLERESP, OCSP_SINGLERESP)
#define
 sk_OCSP_SINGLERESP_num(sk) OPENSSL_sk_num(ossl_check_const_OCSP_SINGLERESP_sk_type(sk))
#define sk_OCSP_SINGLERESP_value(sk, idx) ((OCSP_SINGLERESP
*)OPENSSL_sk_value(ossl_check_const_OCSP_SINGLERESP_sk_type(sk), (idx)))
#define sk_OCSP_SINGLERESP_new(cmp) ((STACK_OF(OCSP_SINGLERESP)
*)OPENSSL_sk_new(ossl_check_OCSP_SINGLERESP_compfunc_type(cmp)))
#define sk_OCSP_SINGLERESP_new_null() ((STACK_OF(OCSP_SINGLERESP) *)OPENSSL_sk_new_null())
#define sk_OCSP_SINGLERESP_new_reserve(cmp, n) ((STACK_OF(OCSP_SINGLERESP)
*)OPENSSL_sk_new_reserve(ossl_check_OCSP_SINGLERESP_compfunc_type(cmp), (n)))
#define sk_OCSP_SINGLERESP_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OCSP_SINGLERESP_sk_type(sk), (n))
#define sk_OCSP_SINGLERESP_free(sk) OPENSSL_sk_free(ossl_check_OCSP_SINGLERESP_sk_type(sk))
#define sk_OCSP_SINGLERESP_zero(sk) OPENSSL_sk_zero(ossl_check_OCSP_SINGLERESP_sk_type(sk))
#define sk_OCSP_SINGLERESP_delete(sk, i) ((OCSP_SINGLERESP
*)OPENSSL_sk_delete(ossl_check_OCSP_SINGLERESP_sk_type(sk),
 (i)))
#define sk_OCSP_SINGLERESP_delete_ptr(sk, ptr) ((OCSP_SINGLERESP
*)OPENSSL_sk_delete_ptr(ossl_check_OCSP_SINGLERESP_sk_type(sk),
ossl_check_OCSP_SINGLERESP_type(ptr)))
#define sk_OCSP_SINGLERESP_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OCSP_SINGLERESP_sk_type(sk), ossl_check_OCSP_SINGLERESP_type(ptr))
#define sk_OCSP_SINGLERESP_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OCSP_SINGLERESP_sk_type(sk),
ossl_check_OCSP_SINGLERESP_type(ptr))
#define sk_OCSP_SINGLERESP_pop(sk) ((OCSP_SINGLERESP
*)OPENSSL_sk_pop(ossl_check_OCSP_SINGLERESP_sk_type(sk)))
#define sk_OCSP_SINGLERESP_shift(sk) ((OCSP_SINGLERESP
*)OPENSSL_sk_shift(ossl_check_OCSP_SINGLERESP_sk_type(sk)))
#define sk_OCSP_SINGLERESP_pop_free(sk, freefunc)
```

```
OPENSSL_sk_pop_free(ossl_check_OCSP_SINGLERESP_sk_type(sk),ossl_check_OCSP_SINGLERESP_freefun
c_type(freefunc))
#define sk_OCSP_SINGLERESP_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OCSP_SINGLERESP_sk_type(sk), ossl_check_OCSP_SINGLERESP_type(ptr),
 (idx))
#define sk_OCSP_SINGLERESP_set(sk, idx, ptr) ((OCSP_SINGLERESP
*)OPENSSL_sk_set(ossl_check_OCSP_SINGLERESP_sk_type(sk), (idx),
ossl_check_OCSP_SINGLERESP_type(ptr)))
#define sk_OCSP_SINGLERESP_find(sk, ptr) OPENSSL_sk_find(ossl_check_OCSP_SINGLERESP_sk_type(sk),
ossl_check_OCSP_SINGLERESP_type(ptr))
#define sk_OCSP_SINGLERESP_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OCSP_SINGLERESP_sk_type(sk),
ossl_check_OCSP_SINGLERESP_type(ptr))
#define sk_OCSP_SINGLERESP_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OCSP_SINGLERESP_sk_type(sk),
ossl_check_OCSP_SINGLERESP_type(ptr), pnum)
#define sk_OCSP_SINGLERESP_sort(sk) OPENSSL_sk_sort(ossl_check_OCSP_SINGLERESP_sk_type(sk))
#define sk_OCSP_SINGLERESP_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OCSP_SINGLERESP_sk_type(sk))
#define sk_OCSP_SINGLERESP_dup(sk) ((STACK_OF(OCSP_SINGLERESP)
*)OPENSSL_sk_dup(ossl_check_const_OCSP_SINGLERESP_sk_type(sk)))
#define sk_OCSP_SINGLERESP_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OCSP_SINGLERESP)
 *)OPENSSL_sk_deep_copy(ossl_check_const_OCSP_SINGLERESP_sk_type(sk),
ossl_check_OCSP_SINGLERESP_copyfunc_type(copyfunc),
ossl_check_OCSP_SINGLERESP_freefunc_type(freefunc)))
#define sk_OCSP_SINGLERESP_set_cmp_func(sk, cmp)
((sk_OCSP_SINGLERESP_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OCSP_SINGLERESP_sk_type(sk
), ossl_check_OCSP_SINGLERESP_compfunc_type(cmp)))

/* clang-format on */

typedef struct ocsp_response_data_st OCSP_RESPDATA;

typedef struct ocsp_basic_response_st OCSP_BASICRESP;

typedef struct ocsp_crl_id_st OCSP_CRLID;
typedef struct ocsp_service_locator_st OCSP_SERVICELOC;

#define PEM_STRING_OCSP_REQUEST "OCSP REQUEST"
#define PEM_STRING_OCSP_RESPONSE "OCSP RESPONSE"

#define d2i_OCSP_REQUEST_bio(bp, p) ASN1_d2i_bio_of(OCSP_REQUEST, OCSP_REQUEST_new,
d2i_OCSP_REQUEST, bp, p)

#define d2i_OCSP_RESPONSE_bio(bp, p) ASN1_d2i_bio_of(OCSP_RESPONSE, OCSP_RESPONSE_new,
d2i_OCSP_RESPONSE, bp, p)

#define PEM_read_bio_OCSP_REQUEST(bp, x, cb) (OCSP_REQUEST *)PEM_ASN1_read_bio(
```

```
 \
   (d2i_of_void *)d2i_OCSP_REQUEST, PEM_STRING_OCSP_REQUEST,                    \
   bp, (char **)(x), cb, NULL)

#define PEM_read_bio_OCSP_RESPONSE(bp, x, cb) (OCSP_RESPONSE *)PEM_ASN1_read_bio( \
   (d2i_of_void *)d2i_OCSP_RESPONSE, PEM_STRING_OCSP_RESPONSE,                   \
   bp, (char **)(x), cb, NULL)

#define PEM_write_bio_OCSP_REQUEST(bp, o)                                        \
   PEM_ASN1_write_bio((i2d_of_void *)i2d_OCSP_REQUEST, PEM_STRING_OCSP_REQUEST, \
      bp, (char *)(o), NULL, NULL, 0, NULL, NULL)

#define PEM_write_bio_OCSP_RESPONSE(bp, o)                                       \
   PEM_ASN1_write_bio((i2d_of_void *)i2d_OCSP_RESPONSE, PEM_STRING_OCSP_RESPONSE, \
      bp, (char *)(o), NULL, NULL, 0, NULL, NULL)

#define i2d_OCSP_RESPONSE_bio(bp, o) ASN1_i2d_bio_of(OCSP_RESPONSE, i2d_OCSP_RESPONSE, bp, o)

#define i2d_OCSP_REQUEST_bio(bp, o) ASN1_i2d_bio_of(OCSP_REQUEST, i2d_OCSP_REQUEST, bp, o)

#define ASN1_BIT_STRING_digest(data,
 type, md, len) \
   ASN1_item_digest(ASN1_ITEM_rptr(ASN1_BIT_STRING), type, data, md, len)

#define OCSP_CERTSTATUS_dup(cs)                                                  \
   (OCSP_CERTSTATUS *)ASN1_dup((i2d_of_void *)i2d_OCSP_CERTSTATUS, \
      (d2i_of_void *)d2i_OCSP_CERTSTATUS, (char *)(cs))

DECLARE_ASN1_DUP_FUNCTION(OCSP_CERTID)

OSSL_HTTP_REQ_CTX *OCSP_sendreq_new(BIO *io, const char *path,
   const OCSP_REQUEST *req, int buf_size);
OCSP_RESPONSE *OCSP_sendreq_bio(BIO *b, const char *path, OCSP_REQUEST *req);

#ifndef OPENSSL_NO_DEPRECATED_3_0
typedef OSSL_HTTP_REQ_CTX OCSP_REQ_CTX;
#define OCSP_REQ_CTX_new(io, buf_size) \
   OSSL_HTTP_REQ_CTX_new(io, io, buf_size)
#define OCSP_REQ_CTX_free OSSL_HTTP_REQ_CTX_free
#define OCSP_REQ_CTX_http(rctx, op, path) \
   (OSSL_HTTP_REQ_CTX_set_expected(rctx, NULL, 1 /* asn1 */, 0, 0) &&
OSSL_HTTP_REQ_CTX_set_request_line(rctx, strcmp(op, "POST") == 0, NULL, NULL, path))
#define OCSP_REQ_CTX_add1_header OSSL_HTTP_REQ_CTX_add1_header
#define OCSP_REQ_CTX_i2d(r,
 it, req) \
   OSSL_HTTP_REQ_CTX_set1_req(r, "application/ocsp-request", it, req)
#define OCSP_REQ_CTX_set1_req(r, req) \
   OCSP_REQ_CTX_i2d(r, ASN1_ITEM_rptr(OCSP_REQUEST), (ASN1_VALUE *)(req))
```

```
#define OCSP_REQ_CTX_nbio OSSL_HTTP_REQ_CTX_nbio
#define OCSP_REQ_CTX_nbio_d2i OSSL_HTTP_REQ_CTX_nbio_d2i
#define OCSP_sendreq_nbio(p, r)                    \
   OSSL_HTTP_REQ_CTX_nbio_d2i(r, (ASN1_VALUE **)(p), \
       ASN1_ITEM_rptr(OCSP_RESPONSE))
#define OCSP_REQ_CTX_get0_mem_bio OSSL_HTTP_REQ_CTX_get0_mem_bio
#define OCSP_set_max_response_length OSSL_HTTP_REQ_CTX_set_max_response_length
#endif

OCSP_CERTID *OCSP_cert_to_id(const EVP_MD *dgst, const X509 *subject,
   const X509 *issuer);

OCSP_CERTID *OCSP_cert_id_new(const EVP_MD *dgst,
   const X509_NAME *issuerName,
   const ASN1_BIT_STRING *issuerKey,
   const ASN1_INTEGER *serialNumber);

OCSP_ONEREQ *OCSP_request_add0_id(OCSP_REQUEST *req, OCSP_CERTID *cid);

int OCSP_request_add1_nonce(OCSP_REQUEST *req,
 unsigned char *val, int len);
int OCSP_basic_add1_nonce(OCSP_BASICRESP *resp, unsigned char *val, int len);
int OCSP_check_nonce(OCSP_REQUEST *req, OCSP_BASICRESP *bs);
int OCSP_copy_nonce(OCSP_BASICRESP *resp, OCSP_REQUEST *req);

int OCSP_request_set1_name(OCSP_REQUEST *req, const X509_NAME *nm);
int OCSP_request_add1_cert(OCSP_REQUEST *req, X509 *cert);

int OCSP_request_sign(OCSP_REQUEST *req,
   X509 *signer,
   EVP_PKEY *key,
   const EVP_MD *dgst,
   STACK_OF(X509) *certs, unsigned long flags);

int OCSP_response_status(OCSP_RESPONSE *resp);
OCSP_BASICRESP *OCSP_response_get1_basic(OCSP_RESPONSE *resp);

const ASN1_OCTET_STRING *OCSP_resp_get0_signature(const OCSP_BASICRESP *bs);
const X509_ALGOR *OCSP_resp_get0_tbs_sigalg(const OCSP_BASICRESP *bs);
const OCSP_RESPDATA *OCSP_resp_get0_respdata(const OCSP_BASICRESP *bs);
int OCSP_resp_get0_signer(OCSP_BASICRESP *bs, X509 **signer,
   STACK_OF(X509) *extra_certs);

int OCSP_resp_count(OCSP_BASICRESP *bs);
OCSP_SINGLERESP *OCSP_resp_get0(OCSP_BASICRESP
 *bs, int idx);
const ASN1_GENERALIZEDTIME *OCSP_resp_get0_produced_at(const OCSP_BASICRESP *bs);
const STACK_OF(X509) *OCSP_resp_get0_certs(const OCSP_BASICRESP *bs);
```

```
int OCSP_resp_get0_id(const OCSP_BASICRESP *bs,
   const ASN1_OCTET_STRING **pid,
   const X509_NAME **pname);
int OCSP_resp_get1_id(const OCSP_BASICRESP *bs,
   ASN1_OCTET_STRING **pid,
   X509_NAME **pname);

int OCSP_resp_find(OCSP_BASICRESP *bs, OCSP_CERTID *id, int last);
int OCSP_single_get0_status(OCSP_SINGLERESP *single, int *reason,
   ASN1_GENERALIZEDTIME **revtime,
   ASN1_GENERALIZEDTIME **thisupd,
   ASN1_GENERALIZEDTIME **nextupd);
int OCSP_resp_find_status(OCSP_BASICRESP *bs, OCSP_CERTID *id, int *status,
   int *reason,
   ASN1_GENERALIZEDTIME **revtime,
   ASN1_GENERALIZEDTIME **thisupd,
   ASN1_GENERALIZEDTIME **nextupd);
int OCSP_check_validity(ASN1_GENERALIZEDTIME *thisupd,
   ASN1_GENERALIZEDTIME *nextupd, long sec, long maxsec);

int OCSP_request_verify(OCSP_REQUEST
 *req, STACK_OF(X509) *certs,
   X509_STORE *store, unsigned long flags);

#define OCSP_parse_url(url, host, port, path, ssl) \
   OSSL_HTTP_parse_url(url, ssl, NULL, host, port, NULL, path, NULL, NULL)

int OCSP_id_issuer_cmp(const OCSP_CERTID *a, const OCSP_CERTID *b);
int OCSP_id_cmp(const OCSP_CERTID *a, const OCSP_CERTID *b);

int OCSP_request_onereq_count(OCSP_REQUEST *req);
OCSP_ONEREQ *OCSP_request_onereq_get0(OCSP_REQUEST *req, int i);
OCSP_CERTID *OCSP_onereq_get0_id(OCSP_ONEREQ *one);
int OCSP_id_get0_info(ASN1_OCTET_STRING **piNameHash, ASN1_OBJECT **pmd,
   ASN1_OCTET_STRING **pikeyHash,
   ASN1_INTEGER **pserial, OCSP_CERTID *cid);
int OCSP_request_is_signed(OCSP_REQUEST *req);
OCSP_RESPONSE *OCSP_response_create(int status, OCSP_BASICRESP *bs);
OCSP_SINGLERESP *OCSP_basic_add1_status(OCSP_BASICRESP *rsp,
   OCSP_CERTID *cid,
   int status, int reason,
   ASN1_TIME *revtime,
   ASN1_TIME *thisupd,
   ASN1_TIME *nextupd);
int OCSP_basic_add1_cert(OCSP_BASICRESP
 *resp, X509 *cert);
int OCSP_basic_sign(OCSP_BASICRESP *brsp,
   X509 *signer, EVP_PKEY *key, const EVP_MD *dgst,
```

```
   STACK_OF(X509) *certs, unsigned long flags);
int OCSP_basic_sign_ctx(OCSP_BASICRESP *brsp,
   X509 *signer, EVP_MD_CTX *ctx,
   STACK_OF(X509) *certs, unsigned long flags);
int OCSP_RESPID_set_by_name(OCSP_RESPID *respid, X509 *cert);
int OCSP_RESPID_set_by_key_ex(OCSP_RESPID *respid, X509 *cert,
   OSSL_LIB_CTX *libctx, const char *propq);
int OCSP_RESPID_set_by_key(OCSP_RESPID *respid, X509 *cert);
int OCSP_RESPID_match_ex(OCSP_RESPID *respid, X509 *cert, OSSL_LIB_CTX *libctx,
   const char *propq);
int OCSP_RESPID_match(OCSP_RESPID *respid, X509 *cert);

X509_EXTENSION *OCSP_crlID_new(const char *url, long *n, char *tim);

X509_EXTENSION *OCSP_accept_responses_new(char **oids);

X509_EXTENSION *OCSP_archive_cutoff_new(char *tim);

X509_EXTENSION *OCSP_url_svcloc_new(const X509_NAME *issuer, const char **urls);

int OCSP_REQUEST_get_ext_count(OCSP_REQUEST *x);
int
 OCSP_REQUEST_get_ext_by_NID(OCSP_REQUEST *x, int nid, int lastpos);
int OCSP_REQUEST_get_ext_by_OBJ(OCSP_REQUEST *x, const ASN1_OBJECT *obj,
   int lastpos);
int OCSP_REQUEST_get_ext_by_critical(OCSP_REQUEST *x, int crit, int lastpos);
X509_EXTENSION *OCSP_REQUEST_get_ext(OCSP_REQUEST *x, int loc);
X509_EXTENSION *OCSP_REQUEST_delete_ext(OCSP_REQUEST *x, int loc);
void *OCSP_REQUEST_get1_ext_d2i(OCSP_REQUEST *x, int nid, int *crit,
   int *idx);
int OCSP_REQUEST_add1_ext_i2d(OCSP_REQUEST *x, int nid, void *value, int crit,
   unsigned long flags);
int OCSP_REQUEST_add_ext(OCSP_REQUEST *x, X509_EXTENSION *ex, int loc);

int OCSP_ONEREQ_get_ext_count(OCSP_ONEREQ *x);
int OCSP_ONEREQ_get_ext_by_NID(OCSP_ONEREQ *x, int nid, int lastpos);
int OCSP_ONEREQ_get_ext_by_OBJ(OCSP_ONEREQ *x, const ASN1_OBJECT *obj, int lastpos);
int OCSP_ONEREQ_get_ext_by_critical(OCSP_ONEREQ *x, int crit, int lastpos);
X509_EXTENSION *OCSP_ONEREQ_get_ext(OCSP_ONEREQ *x, int loc);
X509_EXTENSION *OCSP_ONEREQ_delete_ext(OCSP_ONEREQ
 *x, int loc);
void *OCSP_ONEREQ_get1_ext_d2i(OCSP_ONEREQ *x, int nid, int *crit, int *idx);
int OCSP_ONEREQ_add1_ext_i2d(OCSP_ONEREQ *x, int nid, void *value, int crit,
   unsigned long flags);
int OCSP_ONEREQ_add_ext(OCSP_ONEREQ *x, X509_EXTENSION *ex, int loc);

int OCSP_BASICRESP_get_ext_count(OCSP_BASICRESP *x);
int OCSP_BASICRESP_get_ext_by_NID(OCSP_BASICRESP *x, int nid, int lastpos);
```

```
int OCSP_BASICRESP_get_ext_by_OBJ(OCSP_BASICRESP *x, const ASN1_OBJECT *obj,
   int lastpos);
int OCSP_BASICRESP_get_ext_by_critical(OCSP_BASICRESP *x, int crit,
   int lastpos);
X509_EXTENSION *OCSP_BASICRESP_get_ext(OCSP_BASICRESP *x, int loc);
X509_EXTENSION *OCSP_BASICRESP_delete_ext(OCSP_BASICRESP *x, int loc);
void *OCSP_BASICRESP_get1_ext_d2i(OCSP_BASICRESP *x, int nid, int *crit,
   int *idx);
int OCSP_BASICRESP_add1_ext_i2d(OCSP_BASICRESP *x, int nid, void *value,
   int crit, unsigned long flags);
int OCSP_BASICRESP_add_ext(OCSP_BASICRESP *x, X509_EXTENSION *ex,
 int loc);

int OCSP_SINGLERESP_get_ext_count(OCSP_SINGLERESP *x);
int OCSP_SINGLERESP_get_ext_by_NID(OCSP_SINGLERESP *x, int nid, int lastpos);
int OCSP_SINGLERESP_get_ext_by_OBJ(OCSP_SINGLERESP *x, const ASN1_OBJECT *obj,
   int lastpos);
int OCSP_SINGLERESP_get_ext_by_critical(OCSP_SINGLERESP *x, int crit,
   int lastpos);
X509_EXTENSION *OCSP_SINGLERESP_get_ext(OCSP_SINGLERESP *x, int loc);
X509_EXTENSION *OCSP_SINGLERESP_delete_ext(OCSP_SINGLERESP *x, int loc);
void *OCSP_SINGLERESP_get1_ext_d2i(OCSP_SINGLERESP *x, int nid, int *crit,
   int *idx);
int OCSP_SINGLERESP_add1_ext_i2d(OCSP_SINGLERESP *x, int nid, void *value,
   int crit, unsigned long flags);
int OCSP_SINGLERESP_add_ext(OCSP_SINGLERESP *x, X509_EXTENSION *ex, int loc);
const OCSP_CERTID *OCSP_SINGLERESP_get0_id(const OCSP_SINGLERESP *x);

DECLARE_ASN1_FUNCTIONS(OCSP_SINGLERESP)
DECLARE_ASN1_FUNCTIONS(OCSP_CERTSTATUS)
DECLARE_ASN1_FUNCTIONS(OCSP_REVOKEDINFO)
DECLARE_ASN1_FUNCTIONS(OCSP_BASICRESP)
DECLARE_ASN1_FUNCTIONS(OCSP_RESPDATA)
DECLARE_ASN1_FUNCTIONS(OCSP_RESPID)
DECLARE_ASN1_FUNCTIONS(OCSP_RESPONSE)
DECLARE_ASN1_FUNCTIONS(OCSP_RESPBYTES)
DECLARE_ASN1_FUNCTIONS(OCSP_ONEREQ)
DECLARE_ASN1_FUNCTIONS(OCSP_CERTID)
DECLARE_ASN1_FUNCTIONS(OCSP_REQUEST)
DECLARE_ASN1_FUNCTIONS(OCSP_SIGNATURE)
DECLARE_ASN1_FUNCTIONS(OCSP_REQINFO)
DECLARE_ASN1_FUNCTIONS(OCSP_CRLID)
DECLARE_ASN1_FUNCTIONS(OCSP_SERVICELOC)

const
 char *OCSP_response_status_str(long s);
const char *OCSP_cert_status_str(long s);
const char *OCSP_crl_reason_str(long s);
```

```
int OCSP_REQUEST_print(BIO *bp, OCSP_REQUEST *a, unsigned long flags);
int OCSP_RESPONSE_print(BIO *bp, OCSP_RESPONSE *o, unsigned long flags);

int OCSP_basic_verify(OCSP_BASICRESP *bs, STACK_OF(X509) *certs,
   X509_STORE *st, unsigned long flags);

#ifdef __cplusplus
}
#endif
#endif /* !defined(OPENSSL_NO_OCSP) */
#endif
```

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```
{
 'variables': {
   'openssl_defines_BSD-x86_64': [
     'NDEBUG',
     'L_ENDIAN',
     'OPENSSL_BUILDING_OPENSSL',
     'AES_ASM',
     'BSAES_ASM',
     'CMLL_ASM',
     'ECP_NISTZ256_ASM',
     'GHASH_ASM',
     'KECCAK1600_ASM',
     'MD5_ASM',
     'OPENSSL_BN_ASM_GF2m',
```

```
  'OPENSSL_BN_ASM_MONT',
  'OPENSSL_BN_ASM_MONT5',
  'OPENSSL_CPUID_OBJ',
  'OPENSSL_IA32_SSE2',
  'PADLOCK_ASM',
  'POLY1305_ASM',
  'RC4_ASM',
  'SHA1_ASM',
  'SHA256_ASM',
  'SHA512_ASM',
  'VPAES_ASM',
  'WHIRLPOOL_ASM',
  'X25519_ASM',
  'OPENSSL_PIC',
],
'openssl_cflags_BSD-x86_64': [
  '-Wa,--noexecstack',
  '-Wall -O3',
  '-pthread',
  '-Wall -O3',
],
'openssl_ex_libs_BSD-x86_64': [
  '-pthread',
],
'openssl_cli_srcs_BSD-x86_64': [
  'openssl/apps/lib/cmp_mock_srv.c',
  'openssl/apps/asn1parse.c',
  'openssl/apps/ca.c',
  'openssl/apps/ciphers.c',
  'openssl/apps/cmp.c',

 'openssl/apps/cms.c',
  'openssl/apps/crl.c',
  'openssl/apps/crl2pkcs7.c',
  'openssl/apps/dgst.c',
  'openssl/apps/dhparam.c',
  'openssl/apps/dsa.c',
  'openssl/apps/dsaparam.c',
  'openssl/apps/ec.c',
  'openssl/apps/ecparam.c',
  'openssl/apps/enc.c',
  'openssl/apps/engine.c',
  'openssl/apps/errstr.c',
  'openssl/apps/fipsinstall.c',
  'openssl/apps/gendsa.c',
  'openssl/apps/genpkey.c',
  'openssl/apps/genrsa.c',
  'openssl/apps/info.c',
```

'openssl/apps/kdf.c',
'openssl/apps/list.c',
'openssl/apps/mac.c',
'openssl/apps/nseq.c',
'openssl/apps/ocsp.c',
'openssl/apps/openssl.c',
'openssl/apps/passwd.c',
'openssl/apps/pkcs12.c',
'openssl/apps/pkcs7.c',
'openssl/apps/pkcs8.c',
'openssl/apps/pkey.c',
'openssl/apps/pkeyparam.c',
'openssl/apps/pkeyutl.c',
'openssl/apps/prime.c',
'./config/archs/BSD-x86_64/asm/apps/progs.c',
'openssl/apps/rand.c',
'openssl/apps/rehash.c',
'openssl/apps/req.c',
'openssl/apps/rsa.c',
'openssl/apps/rsautl.c',
'openssl/apps/s_client.c',
'openssl/apps/s_server.c',
'openssl/apps/s_time.c',
'openssl/apps/sess_id.c',
'openssl/apps/skeyutl.c',
'openssl/apps/smime.c',
'openssl/apps/speed.c',
'openssl/apps/spkac.c',
'openssl/apps/srp.c',
'openssl/apps/storeutl.c',
'openssl/apps/ts.c',
'openssl/apps/verify.c',
'openssl/apps/version.c',
'openssl/apps/x509.c',
'openssl/apps/lib/app_libctx.c',
'openssl/apps/lib/app_params.c',
'openssl/apps/lib/app_provider.c',
'openssl/apps/lib/app_rand.c',
'openssl/apps/lib/app_x509.c',
'openssl/apps/lib/apps.c',
'openssl/apps/lib/apps_opt_printf.c',
'openssl/apps/lib/apps_ui.c',
'openssl/apps/lib/columns.c',
'openssl/apps/lib/engine.c',
'openssl/apps/lib/engine_loader.c',
'openssl/apps/lib/fmt.c',
'openssl/apps/lib/http_server.c',
'openssl/apps/lib/log.c',

```
    'openssl/apps/lib/names.c',
    'openssl/apps/lib/opt.c',
    'openssl/apps/lib/s_cb.c',
    'openssl/apps/lib/s_socket.c',
    'openssl/apps/lib/tlssrp_depr.c',
  ],
 },
 'defines': ['<@(openssl_defines_BSD-x86_64)'],
 'include_dirs': [
  './include',
 ],
 'cflags' : ['<@(openssl_cflags_BSD-x86_64)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86_64)'],
 'sources': ['<@(openssl_cli_srcs_BSD-x86_64)'],
}
```

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```
/*
* WARNING: do not edit!
* Generated by configdata.pm from Configurations/common0.tmpl, Configurations/unix-Makefile.tmpl
* via Makefile.in
```

```
*
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* https://www.openssl.org/source/license.html
*/

#ifndef OPENSSL_CONFIGURATION_H
#define OPENSSL_CONFIGURATION_H
#pragma once

#ifdef __cplusplus
extern "C" {
#endif

#ifdef OPENSSL_ALGORITHM_DEFINES
#error OPENSSL_ALGORITHM_DEFINES no longer supported
#endif

/*
* OpenSSL was configured with the following options:
*/

/* clang-format off */
# define OPENSSL_CONFIGURED_API 30500
# ifndef OPENSSL_RAND_SEED_OS
#  define OPENSSL_RAND_SEED_OS
# endif
# ifndef OPENSSL_THREADS
#  define OPENSSL_THREADS
# endif
# ifndef OPENSSL_NO_AFALGENG
#  define OPENSSL_NO_AFALGENG
#
 endif
# ifndef OPENSSL_NO_ASAN
#  define OPENSSL_NO_ASAN
# endif
# ifndef OPENSSL_NO_BROTLI
#  define OPENSSL_NO_BROTLI
# endif
# ifndef OPENSSL_NO_BROTLI_DYNAMIC
#  define OPENSSL_NO_BROTLI_DYNAMIC
# endif
# ifndef OPENSSL_NO_COMP
#  define OPENSSL_NO_COMP
```

```
# endif
# ifndef OPENSSL_NO_CRYPTO_MDEBUG
#  define OPENSSL_NO_CRYPTO_MDEBUG
# endif
# ifndef OPENSSL_NO_CRYPTO_MDEBUG_BACKTRACE
#  define OPENSSL_NO_CRYPTO_MDEBUG_BACKTRACE
# endif
# ifndef OPENSSL_NO_DEMOS
#  define OPENSSL_NO_DEMOS
# endif
# ifndef OPENSSL_NO_EC_NISTP_64_GCC_128
#  define OPENSSL_NO_EC_NISTP_64_GCC_128
# endif
# ifndef OPENSSL_NO_EGD
#  define OPENSSL_NO_EGD
# endif
# ifndef OPENSSL_NO_EXTERNAL_TESTS
#  define OPENSSL_NO_EXTERNAL_TESTS
# endif
# ifndef OPENSSL_NO_FIPS_JITTER
#  define OPENSSL_NO_FIPS_JITTER
# endif
# ifndef OPENSSL_NO_FUZZ_AFL
#  define OPENSSL_NO_FUZZ_AFL
# endif
# ifndef OPENSSL_NO_FUZZ_LIBFUZZER
#  define OPENSSL_NO_FUZZ_LIBFUZZER
# endif
# ifndef OPENSSL_NO_H3DEMO
#  define OPENSSL_NO_H3DEMO
#
 endif
# ifndef OPENSSL_NO_HQINTEROP
#  define OPENSSL_NO_HQINTEROP
# endif
# ifndef OPENSSL_NO_JITTER
#  define OPENSSL_NO_JITTER
# endif
# ifndef OPENSSL_NO_KTLS
#  define OPENSSL_NO_KTLS
# endif
# ifndef OPENSSL_NO_LOADERENG
#  define OPENSSL_NO_LOADERENG
# endif
# ifndef OPENSSL_NO_MD2
#  define OPENSSL_NO_MD2
# endif
# ifndef OPENSSL_NO_MSAN
```

```
#  define OPENSSL_NO_MSAN
# endif
# ifndef OPENSSL_NO_PIE
#  define OPENSSL_NO_PIE
# endif
# ifndef OPENSSL_NO_RC5
#  define OPENSSL_NO_RC5
# endif
# ifndef OPENSSL_NO_SCTP
#  define OPENSSL_NO_SCTP
# endif
# ifndef OPENSSL_NO_SSL3
#  define OPENSSL_NO_SSL3
# endif
# ifndef OPENSSL_NO_SSL3_METHOD
#  define OPENSSL_NO_SSL3_METHOD
# endif
# ifndef OPENSSL_NO_SSLKEYLOG
#  define OPENSSL_NO_SSLKEYLOG
# endif
# ifndef OPENSSL_NO_TFO
#  define OPENSSL_NO_TFO
# endif
# ifndef OPENSSL_NO_TRACE
#  define OPENSSL_NO_TRACE
# endif
# ifndef OPENSSL_NO_UBSAN
#  define OPENSSL_NO_UBSAN
# endif
# ifndef OPENSSL_NO_UNIT_TEST
#  define OPENSSL_NO_UNIT_TEST
#
 endif
# ifndef OPENSSL_NO_UPLINK
#  define OPENSSL_NO_UPLINK
# endif
# ifndef OPENSSL_NO_WEAK_SSL_CIPHERS
#  define OPENSSL_NO_WEAK_SSL_CIPHERS
# endif
# ifndef OPENSSL_NO_WINSTORE
#  define OPENSSL_NO_WINSTORE
# endif
# ifndef OPENSSL_NO_ZLIB
#  define OPENSSL_NO_ZLIB
# endif
# ifndef OPENSSL_NO_ZLIB_DYNAMIC
#  define OPENSSL_NO_ZLIB_DYNAMIC
# endif
```

```
# ifndef OPENSSL_NO_ZSTD
#  define OPENSSL_NO_ZSTD
# endif
# ifndef OPENSSL_NO_ZSTD_DYNAMIC
#  define OPENSSL_NO_ZSTD_DYNAMIC
# endif
# ifndef OPENSSL_NO_DYNAMIC_ENGINE
#  define OPENSSL_NO_DYNAMIC_ENGINE
# endif

/* clang-format on */

/* Generate 80386 code? */
/* clang-format off */
# undef I386_ONLY
/* clang-format on */

/*
* The following are cipher-specific, but are part of the public API.
*/
#if !defined(OPENSSL_SYS_UEFI)
   /* clang-format off */
#  undef BN_LLONG
   /* clang-format on */
   /* Only one for the following should be defined */
   /* clang-format off */
#  define SIXTY_FOUR_BIT_LONG
   /* clang-format on
 */
   /* clang-format off */
#  undef SIXTY_FOUR_BIT
   /* clang-format on */
   /* clang-format off */
#  undef THIRTY_TWO_BIT
/* clang-format on */
#endif

/* clang-format off */
# define RC4_INT unsigned int
/* clang-format on */

#if defined(OPENSSL_NO_COMP) || (defined(OPENSSL_NO_BROTLI) && defined(OPENSSL_NO_ZSTD) &&
defined(OPENSSL_NO_ZLIB))
#define OPENSSL_NO_COMP_ALG
#else
#undef OPENSSL_NO_COMP_ALG
#endif
```

```
#ifdef __cplusplus
}
#endif

#endif /* OPENSSL_CONFIGURATION_H */
```

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/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/pkcs7.h.in

```
*
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* in the file LICENSE in the source distribution or at
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*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_PKCS7_H
#define OPENSSL_PKCS7_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_PKCS7_H
#endif

#include <openssl/asn1.h>
#include <openssl/bio.h>
#include <openssl/e_os2.h>

#include <openssl/symhacks.h>
#include <openssl/types.h>
#include <openssl/pkcs7err.h>
#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif

#ifdef __cplusplus
extern "C" {
#endif

/*-
Encryption_ID           DES-CBC
Digest_ID               MD5
Digest_Encryption_ID    rsaEncryption
Key_Encryption_ID
      rsaEncryption
*/

typedef struct PKCS7_CTX_st {
  OSSL_LIB_CTX *libctx;
  char *propq;
```

```
} PKCS7_CTX;

typedef struct pkcs7_issuer_and_serial_st {
   X509_NAME *issuer;
   ASN1_INTEGER *serial;
} PKCS7_ISSUER_AND_SERIAL;

typedef struct pkcs7_signer_info_st {
   ASN1_INTEGER *version; /* version 1 */
   PKCS7_ISSUER_AND_SERIAL *issuer_and_serial;
   X509_ALGOR *digest_alg;
   STACK_OF(X509_ATTRIBUTE) *auth_attr; /* [ 0 ] */
   X509_ALGOR *digest_enc_alg; /* confusing name, actually used for signing */
   ASN1_OCTET_STRING *enc_digest; /* confusing name, actually signature */
   STACK_OF(X509_ATTRIBUTE) *unauth_attr; /* [ 1 ] */
   /* The private key to sign with */
   EVP_PKEY *pkey;
   const PKCS7_CTX *ctx;
} PKCS7_SIGNER_INFO;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(PKCS7_SIGNER_INFO, PKCS7_SIGNER_INFO,
PKCS7_SIGNER_INFO)
#define sk_PKCS7_SIGNER_INFO_num(sk)
OPENSSL_sk_num(ossl_check_const_PKCS7_SIGNER_INFO_sk_type(sk))
#define sk_PKCS7_SIGNER_INFO_value(sk,
 idx) ((PKCS7_SIGNER_INFO *)OPENSSL_sk_value(ossl_check_const_PKCS7_SIGNER_INFO_sk_type(sk),
(idx)))
#define sk_PKCS7_SIGNER_INFO_new(cmp) ((STACK_OF(PKCS7_SIGNER_INFO)
*)OPENSSL_sk_new(ossl_check_PKCS7_SIGNER_INFO_compfunc_type(cmp)))
#define sk_PKCS7_SIGNER_INFO_new_null() ((STACK_OF(PKCS7_SIGNER_INFO)
*)OPENSSL_sk_new_null())
#define sk_PKCS7_SIGNER_INFO_new_reserve(cmp, n) ((STACK_OF(PKCS7_SIGNER_INFO)
*)OPENSSL_sk_new_reserve(ossl_check_PKCS7_SIGNER_INFO_compfunc_type(cmp), (n)))
#define sk_PKCS7_SIGNER_INFO_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk), (n))
#define sk_PKCS7_SIGNER_INFO_free(sk)
OPENSSL_sk_free(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk))
#define sk_PKCS7_SIGNER_INFO_zero(sk)
OPENSSL_sk_zero(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk))
#define sk_PKCS7_SIGNER_INFO_delete(sk, i) ((PKCS7_SIGNER_INFO
*)OPENSSL_sk_delete(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk), (i)))
#define sk_PKCS7_SIGNER_INFO_delete_ptr(sk, ptr) ((PKCS7_SIGNER_INFO
*)OPENSSL_sk_delete_ptr(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk),
 ossl_check_PKCS7_SIGNER_INFO_type(ptr)))
#define sk_PKCS7_SIGNER_INFO_push(sk, ptr)
OPENSSL_sk_push(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk),
ossl_check_PKCS7_SIGNER_INFO_type(ptr))
#define sk_PKCS7_SIGNER_INFO_unshift(sk, ptr)
```

```
OPENSSL_sk_unshift(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk),
ossl_check_PKCS7_SIGNER_INFO_type(ptr))
#define sk_PKCS7_SIGNER_INFO_pop(sk) ((PKCS7_SIGNER_INFO
*)OPENSSL_sk_pop(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk)))
#define sk_PKCS7_SIGNER_INFO_shift(sk) ((PKCS7_SIGNER_INFO
*)OPENSSL_sk_shift(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk)))
#define sk_PKCS7_SIGNER_INFO_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk),ossl_check_PKCS7_SIGNER_INFO_fr
eefunc_type(freefunc))
#define sk_PKCS7_SIGNER_INFO_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk),
ossl_check_PKCS7_SIGNER_INFO_type(ptr), (idx))
#define sk_PKCS7_SIGNER_INFO_set(sk, idx, ptr)
 ((PKCS7_SIGNER_INFO *)OPENSSL_sk_set(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk), (idx),
ossl_check_PKCS7_SIGNER_INFO_type(ptr)))
#define sk_PKCS7_SIGNER_INFO_find(sk, ptr)
OPENSSL_sk_find(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk),
ossl_check_PKCS7_SIGNER_INFO_type(ptr))
#define sk_PKCS7_SIGNER_INFO_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk),
ossl_check_PKCS7_SIGNER_INFO_type(ptr))
#define sk_PKCS7_SIGNER_INFO_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk),
ossl_check_PKCS7_SIGNER_INFO_type(ptr), pnum)
#define sk_PKCS7_SIGNER_INFO_sort(sk) OPENSSL_sk_sort(ossl_check_PKCS7_SIGNER_INFO_sk_type(sk))
#define sk_PKCS7_SIGNER_INFO_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_PKCS7_SIGNER_INFO_sk_type(sk))
#define sk_PKCS7_SIGNER_INFO_dup(sk) ((STACK_OF(PKCS7_SIGNER_INFO)
*)OPENSSL_sk_dup(ossl_check_const_PKCS7_SIGNER_INFO_sk_type(sk)))
#define sk_PKCS7_SIGNER_INFO_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(PKCS7_SIGNER_INFO)
 *)OPENSSL_sk_deep_copy(ossl_check_const_PKCS7_SIGNER_INFO_sk_type(sk),
ossl_check_PKCS7_SIGNER_INFO_copyfunc_type(copyfunc),
ossl_check_PKCS7_SIGNER_INFO_freefunc_type(freefunc)))
#define sk_PKCS7_SIGNER_INFO_set_cmp_func(sk, cmp)
((sk_PKCS7_SIGNER_INFO_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_PKCS7_SIGNER_INFO_sk_ty
pe(sk), ossl_check_PKCS7_SIGNER_INFO_compfunc_type(cmp)))

/* clang-format on */

typedef struct pkcs7_recip_info_st {
   ASN1_INTEGER *version; /* version 0 */
   PKCS7_ISSUER_AND_SERIAL *issuer_and_serial;
   X509_ALGOR *key_enc_algor;
   ASN1_OCTET_STRING *enc_key;
   X509 *cert; /* get the pub-key from this */
   const PKCS7_CTX *ctx;
} PKCS7_RECIP_INFO;
/* clang-format off */
```

```
SKM_DEFINE_STACK_OF_INTERNAL(PKCS7_RECIP_INFO, PKCS7_RECIP_INFO, PKCS7_RECIP_INFO)
#define sk_PKCS7_RECIP_INFO_num(sk)
OPENSSL_sk_num(ossl_check_const_PKCS7_RECIP_INFO_sk_type(sk))
#define sk_PKCS7_RECIP_INFO_value(sk, idx) ((PKCS7_RECIP_INFO
*)OPENSSL_sk_value(ossl_check_const_PKCS7_RECIP_INFO_sk_type(sk),
 (idx)))
#define sk_PKCS7_RECIP_INFO_new(cmp) ((STACK_OF(PKCS7_RECIP_INFO)
*)OPENSSL_sk_new(ossl_check_PKCS7_RECIP_INFO_compfunc_type(cmp)))
#define sk_PKCS7_RECIP_INFO_new_null() ((STACK_OF(PKCS7_RECIP_INFO) *)OPENSSL_sk_new_null())
#define sk_PKCS7_RECIP_INFO_new_reserve(cmp, n) ((STACK_OF(PKCS7_RECIP_INFO)
*)OPENSSL_sk_new_reserve(ossl_check_PKCS7_RECIP_INFO_compfunc_type(cmp), (n)))
#define sk_PKCS7_RECIP_INFO_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_PKCS7_RECIP_INFO_sk_type(sk), (n))
#define sk_PKCS7_RECIP_INFO_free(sk) OPENSSL_sk_free(ossl_check_PKCS7_RECIP_INFO_sk_type(sk))
#define sk_PKCS7_RECIP_INFO_zero(sk) OPENSSL_sk_zero(ossl_check_PKCS7_RECIP_INFO_sk_type(sk))
#define sk_PKCS7_RECIP_INFO_delete(sk, i) ((PKCS7_RECIP_INFO
*)OPENSSL_sk_delete(ossl_check_PKCS7_RECIP_INFO_sk_type(sk), (i)))
#define sk_PKCS7_RECIP_INFO_delete_ptr(sk, ptr) ((PKCS7_RECIP_INFO
*)OPENSSL_sk_delete_ptr(ossl_check_PKCS7_RECIP_INFO_sk_type(sk),
ossl_check_PKCS7_RECIP_INFO_type(ptr)))
#define
 sk_PKCS7_RECIP_INFO_push(sk, ptr) OPENSSL_sk_push(ossl_check_PKCS7_RECIP_INFO_sk_type(sk),
ossl_check_PKCS7_RECIP_INFO_type(ptr))
#define sk_PKCS7_RECIP_INFO_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_PKCS7_RECIP_INFO_sk_type(sk),
ossl_check_PKCS7_RECIP_INFO_type(ptr))
#define sk_PKCS7_RECIP_INFO_pop(sk) ((PKCS7_RECIP_INFO
*)OPENSSL_sk_pop(ossl_check_PKCS7_RECIP_INFO_sk_type(sk)))
#define sk_PKCS7_RECIP_INFO_shift(sk) ((PKCS7_RECIP_INFO
*)OPENSSL_sk_shift(ossl_check_PKCS7_RECIP_INFO_sk_type(sk)))
#define sk_PKCS7_RECIP_INFO_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_PKCS7_RECIP_INFO_sk_type(sk),ossl_check_PKCS7_RECIP_INFO_freefu
nc_type(freefunc))
#define sk_PKCS7_RECIP_INFO_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_PKCS7_RECIP_INFO_sk_type(sk),
ossl_check_PKCS7_RECIP_INFO_type(ptr), (idx))
#define sk_PKCS7_RECIP_INFO_set(sk, idx, ptr) ((PKCS7_RECIP_INFO
*)OPENSSL_sk_set(ossl_check_PKCS7_RECIP_INFO_sk_type(sk), (idx),
ossl_check_PKCS7_RECIP_INFO_type(ptr)))
#define
 sk_PKCS7_RECIP_INFO_find(sk, ptr) OPENSSL_sk_find(ossl_check_PKCS7_RECIP_INFO_sk_type(sk),
ossl_check_PKCS7_RECIP_INFO_type(ptr))
#define sk_PKCS7_RECIP_INFO_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_PKCS7_RECIP_INFO_sk_type(sk),
ossl_check_PKCS7_RECIP_INFO_type(ptr))
#define sk_PKCS7_RECIP_INFO_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_PKCS7_RECIP_INFO_sk_type(sk),
ossl_check_PKCS7_RECIP_INFO_type(ptr), pnum)
```

```
#define sk_PKCS7_RECIP_INFO_sort(sk) OPENSSL_sk_sort(ossl_check_PKCS7_RECIP_INFO_sk_type(sk))
#define sk_PKCS7_RECIP_INFO_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_PKCS7_RECIP_INFO_sk_type(sk))
#define sk_PKCS7_RECIP_INFO_dup(sk) ((STACK_OF(PKCS7_RECIP_INFO)
*)OPENSSL_sk_dup(ossl_check_const_PKCS7_RECIP_INFO_sk_type(sk)))
#define sk_PKCS7_RECIP_INFO_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(PKCS7_RECIP_INFO)
*)OPENSSL_sk_deep_copy(ossl_check_const_PKCS7_RECIP_INFO_sk_type(sk),
ossl_check_PKCS7_RECIP_INFO_copyfunc_type(copyfunc),
 ossl_check_PKCS7_RECIP_INFO_freefunc_type(freefunc)))
#define sk_PKCS7_RECIP_INFO_set_cmp_func(sk, cmp)
((sk_PKCS7_RECIP_INFO_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_PKCS7_RECIP_INFO_sk_type(s
k), ossl_check_PKCS7_RECIP_INFO_compfunc_type(cmp)))

/* clang-format on */

typedef struct pkcs7_signed_st {
   ASN1_INTEGER *version; /* version 1 */
   STACK_OF(X509_ALGOR) *md_algs; /* md used */
   STACK_OF(X509) *cert; /* [ 0 ] */ /* name should be 'certificates' */
   STACK_OF(X509_CRL) *crl; /* [ 1 ] */ /* name should be 'crls' */
   STACK_OF(PKCS7_SIGNER_INFO) *signer_info;
   struct pkcs7_st *contents;
} PKCS7_SIGNED;
/*
* The above structure is very very similar to PKCS7_SIGN_ENVELOPE. How about
* merging the two
*/

typedef struct pkcs7_enc_content_st {
   ASN1_OBJECT *content_type;
   X509_ALGOR *algorithm;
   ASN1_OCTET_STRING *enc_data; /* [ 0 ] */
   const EVP_CIPHER *cipher;
   const PKCS7_CTX *ctx;
} PKCS7_ENC_CONTENT;

typedef struct pkcs7_enveloped_st
 {
   ASN1_INTEGER *version; /* version 0 */
   STACK_OF(PKCS7_RECIP_INFO) *recipientinfo;
   PKCS7_ENC_CONTENT *enc_data;
} PKCS7_ENVELOPE;

typedef struct pkcs7_signedandenveloped_st {
   ASN1_INTEGER *version; /* version 1 */
   STACK_OF(X509_ALGOR) *md_algs; /* md used */
   STACK_OF(X509) *cert; /* [ 0 ] */ /* name should be 'certificates' */
   STACK_OF(X509_CRL) *crl; /* [ 1 ] */ /* name should be 'crls' */
```

```
  STACK_OF(PKCS7_SIGNER_INFO) *signer_info;
  PKCS7_ENC_CONTENT *enc_data;
  STACK_OF(PKCS7_RECIP_INFO) *recipientinfo;
} PKCS7_SIGN_ENVELOPE;

typedef struct pkcs7_digest_st {
  ASN1_INTEGER *version; /* version 0 */
  X509_ALGOR *md; /* md used */
  struct pkcs7_st *contents;
  ASN1_OCTET_STRING *digest;
} PKCS7_DIGEST;

typedef struct pkcs7_encrypted_st {
  ASN1_INTEGER *version; /* version 0 */
  PKCS7_ENC_CONTENT *enc_data;
} PKCS7_ENCRYPT;

typedef struct pkcs7_st {
  /*
   * The following is non NULL if it contains ASN1 encoding of this

 * structure
   */
  unsigned char *asn1;
  long length;
#define PKCS7_S_HEADER 0
#define PKCS7_S_BODY 1
#define PKCS7_S_TAIL 2
  int state; /* used during processing */
  int detached;
  ASN1_OBJECT *type;
  /* content as defined by the type */
  /*
   * all encryption/message digests are applied to the 'contents', leaving
   * out the 'type' field.
   */
  union {
     char *ptr;
     /* NID_pkcs7_data */
     ASN1_OCTET_STRING *data;
     /* NID_pkcs7_signed */
     PKCS7_SIGNED *sign; /* field name 'signed' would clash with C keyword */
     /* NID_pkcs7_enveloped */
     PKCS7_ENVELOPE *enveloped;
     /* NID_pkcs7_signedAndEnveloped */
     PKCS7_SIGN_ENVELOPE *signed_and_enveloped;
     /* NID_pkcs7_digest */
     PKCS7_DIGEST *digest;
```

```
      /* NID_pkcs7_encrypted */
      PKCS7_ENCRYPT *encrypted;
      /* Anything else */
      ASN1_TYPE *other;
   } d;
   PKCS7_CTX ctx;
} PKCS7;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(PKCS7,
 PKCS7, PKCS7)
#define sk_PKCS7_num(sk) OPENSSL_sk_num(ossl_check_const_PKCS7_sk_type(sk))
#define sk_PKCS7_value(sk, idx) ((PKCS7 *)OPENSSL_sk_value(ossl_check_const_PKCS7_sk_type(sk), (idx)))
#define sk_PKCS7_new(cmp) ((STACK_OF(PKCS7)
*)OPENSSL_sk_new(ossl_check_PKCS7_compfunc_type(cmp)))
#define sk_PKCS7_new_null() ((STACK_OF(PKCS7) *)OPENSSL_sk_new_null())
#define sk_PKCS7_new_reserve(cmp, n) ((STACK_OF(PKCS7)
*)OPENSSL_sk_new_reserve(ossl_check_PKCS7_compfunc_type(cmp), (n)))
#define sk_PKCS7_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_PKCS7_sk_type(sk), (n))
#define sk_PKCS7_free(sk) OPENSSL_sk_free(ossl_check_PKCS7_sk_type(sk))
#define sk_PKCS7_zero(sk) OPENSSL_sk_zero(ossl_check_PKCS7_sk_type(sk))
#define sk_PKCS7_delete(sk, i) ((PKCS7 *)OPENSSL_sk_delete(ossl_check_PKCS7_sk_type(sk), (i)))
#define sk_PKCS7_delete_ptr(sk, ptr) ((PKCS7 *)OPENSSL_sk_delete_ptr(ossl_check_PKCS7_sk_type(sk),
ossl_check_PKCS7_type(ptr)))
#define sk_PKCS7_push(sk, ptr) OPENSSL_sk_push(ossl_check_PKCS7_sk_type(sk),
 ossl_check_PKCS7_type(ptr))
#define sk_PKCS7_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_PKCS7_sk_type(sk),
ossl_check_PKCS7_type(ptr))
#define sk_PKCS7_pop(sk) ((PKCS7 *)OPENSSL_sk_pop(ossl_check_PKCS7_sk_type(sk)))
#define sk_PKCS7_shift(sk) ((PKCS7 *)OPENSSL_sk_shift(ossl_check_PKCS7_sk_type(sk)))
#define sk_PKCS7_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_PKCS7_sk_type(sk),ossl_check_PKCS7_freefunc_type(freefunc))
#define sk_PKCS7_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_PKCS7_sk_type(sk),
ossl_check_PKCS7_type(ptr), (idx))
#define sk_PKCS7_set(sk, idx, ptr) ((PKCS7 *)OPENSSL_sk_set(ossl_check_PKCS7_sk_type(sk), (idx),
ossl_check_PKCS7_type(ptr)))
#define sk_PKCS7_find(sk, ptr) OPENSSL_sk_find(ossl_check_PKCS7_sk_type(sk),
ossl_check_PKCS7_type(ptr))
#define sk_PKCS7_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_PKCS7_sk_type(sk),
ossl_check_PKCS7_type(ptr))
#define sk_PKCS7_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_PKCS7_sk_type(sk),
 ossl_check_PKCS7_type(ptr), pnum)
#define sk_PKCS7_sort(sk) OPENSSL_sk_sort(ossl_check_PKCS7_sk_type(sk))
#define sk_PKCS7_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_PKCS7_sk_type(sk))
#define sk_PKCS7_dup(sk) ((STACK_OF(PKCS7) *)OPENSSL_sk_dup(ossl_check_const_PKCS7_sk_type(sk)))
#define sk_PKCS7_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(PKCS7)
*)OPENSSL_sk_deep_copy(ossl_check_const_PKCS7_sk_type(sk),
ossl_check_PKCS7_copyfunc_type(copyfunc), ossl_check_PKCS7_freefunc_type(freefunc)))
#define sk_PKCS7_set_cmp_func(sk, cmp)
```

```
((sk_PKCS7_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_PKCS7_sk_type(sk),
ossl_check_PKCS7_compfunc_type(cmp)))

/* clang-format on */

#define PKCS7_OP_SET_DETACHED_SIGNATURE 1
#define PKCS7_OP_GET_DETACHED_SIGNATURE 2

#define PKCS7_get_signed_attributes(si) ((si)->auth_attr)
#define PKCS7_get_attributes(si) ((si)->unauth_attr)

#define PKCS7_type_is_signed(a) (OBJ_obj2nid((a)->type) == NID_pkcs7_signed)
#define PKCS7_type_is_encrypted(a)
 (OBJ_obj2nid((a)->type) == NID_pkcs7_encrypted)
#define PKCS7_type_is_enveloped(a) (OBJ_obj2nid((a)->type) == NID_pkcs7_enveloped)
#define PKCS7_type_is_signedAndEnveloped(a) \
   (OBJ_obj2nid((a)->type) == NID_pkcs7_signedAndEnveloped)
#define PKCS7_type_is_data(a) (OBJ_obj2nid((a)->type) == NID_pkcs7_data)
#define PKCS7_type_is_digest(a) (OBJ_obj2nid((a)->type) == NID_pkcs7_digest)

#define PKCS7_set_detached(p, v) \
   PKCS7_ctrl(p, PKCS7_OP_SET_DETACHED_SIGNATURE, v, NULL)
#define PKCS7_get_detached(p) \
   PKCS7_ctrl(p, PKCS7_OP_GET_DETACHED_SIGNATURE, 0, NULL)

#define PKCS7_is_detached(p7) (PKCS7_type_is_signed(p7) && PKCS7_get_detached(p7))

/* S/MIME related flags */

#define PKCS7_TEXT 0x1
#define PKCS7_NOCERTS 0x2
#define PKCS7_NOSIGS 0x4
#define PKCS7_NOCHAIN 0x8
#define PKCS7_NOINTERN 0x10
#define PKCS7_NOVERIFY 0x20
#define PKCS7_DETACHED 0x40
#define PKCS7_BINARY 0x80
#define PKCS7_NOATTR 0x100
#define PKCS7_NOSMIMECAP 0x200
#define PKCS7_NOOLDMIMETYPE
 0x400
#define PKCS7_CRLFEOL 0x800
#define PKCS7_STREAM 0x1000
#define PKCS7_NOCRL 0x2000
#define PKCS7_PARTIAL 0x4000
#define PKCS7_REUSE_DIGEST 0x8000
#define PKCS7_NO_DUAL_CONTENT 0x10000
```

```
/* Flags: for compatibility with older code */

#define SMIME_TEXT PKCS7_TEXT
#define SMIME_NOCERTS PKCS7_NOCERTS
#define SMIME_NOSIGS PKCS7_NOSIGS
#define SMIME_NOCHAIN PKCS7_NOCHAIN
#define SMIME_NOINTERN PKCS7_NOINTERN
#define SMIME_NOVERIFY PKCS7_NOVERIFY
#define SMIME_DETACHED PKCS7_DETACHED
#define SMIME_BINARY PKCS7_BINARY
#define SMIME_NOATTR PKCS7_NOATTR

/* CRLF ASCII canonicalisation */
#define SMIME_ASCIICRLF 0x80000

DECLARE_ASN1_FUNCTIONS(PKCS7_ISSUER_AND_SERIAL)

int PKCS7_ISSUER_AND_SERIAL_digest(PKCS7_ISSUER_AND_SERIAL *data,
   const EVP_MD *type, unsigned char *md,
   unsigned int *len);
#ifndef OPENSSL_NO_STDIO
PKCS7 *d2i_PKCS7_fp(FILE *fp, PKCS7 **p7);
int i2d_PKCS7_fp(FILE *fp, const PKCS7 *p7);
#endif
DECLARE_ASN1_DUP_FUNCTION(PKCS7)
PKCS7 *d2i_PKCS7_bio(BIO *bp, PKCS7
 **p7);
int i2d_PKCS7_bio(BIO *bp, const PKCS7 *p7);
int i2d_PKCS7_bio_stream(BIO *out, PKCS7 *p7, BIO *in, int flags);
int PEM_write_bio_PKCS7_stream(BIO *out, PKCS7 *p7, BIO *in, int flags);

DECLARE_ASN1_FUNCTIONS(PKCS7_SIGNER_INFO)
DECLARE_ASN1_FUNCTIONS(PKCS7_RECIP_INFO)
DECLARE_ASN1_FUNCTIONS(PKCS7_SIGNED)
DECLARE_ASN1_FUNCTIONS(PKCS7_ENC_CONTENT)
DECLARE_ASN1_FUNCTIONS(PKCS7_ENVELOPE)
DECLARE_ASN1_FUNCTIONS(PKCS7_SIGN_ENVELOPE)
DECLARE_ASN1_FUNCTIONS(PKCS7_DIGEST)
DECLARE_ASN1_FUNCTIONS(PKCS7_ENCRYPT)
DECLARE_ASN1_FUNCTIONS(PKCS7)
PKCS7 *PKCS7_new_ex(OSSL_LIB_CTX *libctx, const char *propq);

DECLARE_ASN1_ITEM(PKCS7_ATTR_SIGN)
DECLARE_ASN1_ITEM(PKCS7_ATTR_VERIFY)

DECLARE_ASN1_NDEF_FUNCTION(PKCS7)
DECLARE_ASN1_PRINT_FUNCTION(PKCS7)
```

```
long PKCS7_ctrl(PKCS7 *p7, int cmd, long larg, char *parg);

int PKCS7_type_is_other(PKCS7 *p7);
int PKCS7_set_type(PKCS7 *p7, int type);
int PKCS7_set0_type_other(PKCS7 *p7, int type, ASN1_TYPE *other);
int PKCS7_set_content(PKCS7 *p7, PKCS7 *p7_data);
int
 PKCS7_SIGNER_INFO_set(PKCS7_SIGNER_INFO *p7i, X509 *x509, EVP_PKEY *pkey,
   const EVP_MD *dgst);
int PKCS7_SIGNER_INFO_sign(PKCS7_SIGNER_INFO *si);
int PKCS7_add_signer(PKCS7 *p7, PKCS7_SIGNER_INFO *p7i);
int PKCS7_add_certificate(PKCS7 *p7, X509 *cert);
int PKCS7_add_crl(PKCS7 *p7, X509_CRL *crl);
int PKCS7_content_new(PKCS7 *p7, int nid);
int PKCS7_dataVerify(X509_STORE *cert_store, X509_STORE_CTX *ctx,
   BIO *bio, PKCS7 *p7, PKCS7_SIGNER_INFO *si);
int PKCS7_signatureVerify(BIO *bio, PKCS7 *p7, PKCS7_SIGNER_INFO *si,
   X509 *signer);

BIO *PKCS7_dataInit(PKCS7 *p7, BIO *bio);
int PKCS7_dataFinal(PKCS7 *p7, BIO *bio);
BIO *PKCS7_dataDecode(PKCS7 *p7, EVP_PKEY *pkey, BIO *in_bio, X509 *pcert);

PKCS7_SIGNER_INFO *PKCS7_add_signature(PKCS7 *p7, X509 *x509,
   EVP_PKEY *pkey, const EVP_MD *dgst);
X509 *PKCS7_cert_from_signer_info(PKCS7 *p7, PKCS7_SIGNER_INFO *si);
int PKCS7_set_digest(PKCS7 *p7, const EVP_MD *md);
STACK_OF(PKCS7_SIGNER_INFO) *PKCS7_get_signer_info(PKCS7
 *p7);

PKCS7_RECIP_INFO *PKCS7_add_recipient(PKCS7 *p7, X509 *x509);
void PKCS7_SIGNER_INFO_get0_algs(PKCS7_SIGNER_INFO *si, EVP_PKEY **pk,
   X509_ALGOR **pdig, X509_ALGOR **psig);
void PKCS7_RECIP_INFO_get0_alg(PKCS7_RECIP_INFO *ri, X509_ALGOR **penc);
int PKCS7_add_recipient_info(PKCS7 *p7, PKCS7_RECIP_INFO *ri);
int PKCS7_RECIP_INFO_set(PKCS7_RECIP_INFO *p7i, X509 *x509);
int PKCS7_set_cipher(PKCS7 *p7, const EVP_CIPHER *cipher);
int PKCS7_stream(unsigned char ***boundary, PKCS7 *p7);

PKCS7_ISSUER_AND_SERIAL *PKCS7_get_issuer_and_serial(PKCS7 *p7, int idx);
ASN1_OCTET_STRING *PKCS7_get_octet_string(PKCS7 *p7);
ASN1_OCTET_STRING *PKCS7_digest_from_attributes(STACK_OF(X509_ATTRIBUTE) *sk);
int PKCS7_add_signed_attribute(PKCS7_SIGNER_INFO *p7si, int nid, int type,
   void *data);
int PKCS7_add_attribute(PKCS7_SIGNER_INFO *p7si, int nid, int atrtype,
   void *value);
ASN1_TYPE *PKCS7_get_attribute(const PKCS7_SIGNER_INFO *si, int nid);
ASN1_TYPE *PKCS7_get_signed_attribute(const PKCS7_SIGNER_INFO
```

```
 *si, int nid);
int PKCS7_set_signed_attributes(PKCS7_SIGNER_INFO *p7si,
   STACK_OF(X509_ATTRIBUTE) *sk);
int PKCS7_set_attributes(PKCS7_SIGNER_INFO *p7si,
   STACK_OF(X509_ATTRIBUTE) *sk);

PKCS7 *PKCS7_sign(X509 *signcert, EVP_PKEY *pkey, STACK_OF(X509) *certs,
   BIO *data, int flags);
PKCS7 *PKCS7_sign_ex(X509 *signcert, EVP_PKEY *pkey, STACK_OF(X509) *certs,
   BIO *data, int flags, OSSL_LIB_CTX *libctx,
   const char *propq);

PKCS7_SIGNER_INFO *PKCS7_sign_add_signer(PKCS7 *p7,
   X509 *signcert, EVP_PKEY *pkey,
   const EVP_MD *md, int flags);

int PKCS7_final(PKCS7 *p7, BIO *data, int flags);
int PKCS7_verify(PKCS7 *p7, STACK_OF(X509) *certs, X509_STORE *store,
   BIO *indata, BIO *out, int flags);
STACK_OF(X509) *PKCS7_get0_signers(PKCS7 *p7, STACK_OF(X509) *certs,
   int flags);
PKCS7 *PKCS7_encrypt(STACK_OF(X509) *certs, BIO *in, const EVP_CIPHER *cipher,
   int flags);
PKCS7 *PKCS7_encrypt_ex(STACK_OF(X509) *certs, BIO *in,
   const EVP_CIPHER *cipher,
 int flags,
   OSSL_LIB_CTX *libctx, const char *propq);
int PKCS7_decrypt(PKCS7 *p7, EVP_PKEY *pkey, X509 *cert, BIO *data,
   int flags);

int PKCS7_add_attrib_smimecap(PKCS7_SIGNER_INFO *si,
   STACK_OF(X509_ALGOR) *cap);
STACK_OF(X509_ALGOR) *PKCS7_get_smimecap(PKCS7_SIGNER_INFO *si);
int PKCS7_simple_smimecap(STACK_OF(X509_ALGOR) *sk, int nid, int arg);

int PKCS7_add_attrib_content_type(PKCS7_SIGNER_INFO *si, ASN1_OBJECT *coid);
int PKCS7_add0_attrib_signing_time(PKCS7_SIGNER_INFO *si, ASN1_TIME *t);
int PKCS7_add1_attrib_digest(PKCS7_SIGNER_INFO *si,
   const unsigned char *md, int mdlen);

int SMIME_write_PKCS7(BIO *bio, PKCS7 *p7, BIO *data, int flags);
PKCS7 *SMIME_read_PKCS7_ex(BIO *bio, BIO **bcont, PKCS7 **p7);
PKCS7 *SMIME_read_PKCS7(BIO *bio, BIO **bcont);

BIO *BIO_new_PKCS7(BIO *out, PKCS7 *p7);

#ifdef __cplusplus
}
```

#endif
#endif
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* WARNING: do not edit!
* Generated by configdata.pm from Configurations/common0.tmpl, Configurations/unix-Makefile.tmpl
* via Makefile.in
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* https://www.openssl.org/source/license.html
*/

#ifndef OPENSSL_CONFIGURATION_H
#define OPENSSL_CONFIGURATION_H
#pragma once

#ifdef __cplusplus
extern "C" {
#endif

#ifdef OPENSSL_ALGORITHM_DEFINES
#error OPENSSL_ALGORITHM_DEFINES no longer supported
#endif

```
/*
* OpenSSL was configured with the following options:
*/

/* clang-format off */
# define OPENSSL_CONFIGURED_API 30500
# ifndef OPENSSL_RAND_SEED_OS
#  define OPENSSL_RAND_SEED_OS
# endif
# ifndef OPENSSL_THREADS
#  define OPENSSL_THREADS
# endif
# ifndef OPENSSL_NO_AFALGENG
#  define OPENSSL_NO_AFALGENG
#
 endif
# ifndef OPENSSL_NO_ASAN
#  define OPENSSL_NO_ASAN
# endif
# ifndef OPENSSL_NO_ASM
#  define OPENSSL_NO_ASM
# endif
# ifndef OPENSSL_NO_BROTLI
#  define OPENSSL_NO_BROTLI
# endif
# ifndef OPENSSL_NO_BROTLI_DYNAMIC
#  define OPENSSL_NO_BROTLI_DYNAMIC
# endif
# ifndef OPENSSL_NO_COMP
#  define OPENSSL_NO_COMP
# endif
# ifndef OPENSSL_NO_CRYPTO_MDEBUG
#  define OPENSSL_NO_CRYPTO_MDEBUG
# endif
# ifndef OPENSSL_NO_CRYPTO_MDEBUG_BACKTRACE
#  define OPENSSL_NO_CRYPTO_MDEBUG_BACKTRACE
# endif
# ifndef OPENSSL_NO_DEMOS
#  define OPENSSL_NO_DEMOS
# endif
# ifndef OPENSSL_NO_EC_NISTP_64_GCC_128
#  define OPENSSL_NO_EC_NISTP_64_GCC_128
# endif
# ifndef OPENSSL_NO_EGD
#  define OPENSSL_NO_EGD
# endif
# ifndef OPENSSL_NO_EXTERNAL_TESTS
```

```
#  define OPENSSL_NO_EXTERNAL_TESTS
# endif
# ifndef OPENSSL_NO_FIPS_JITTER
#  define OPENSSL_NO_FIPS_JITTER
# endif
# ifndef OPENSSL_NO_FUZZ_AFL
#  define OPENSSL_NO_FUZZ_AFL
# endif
# ifndef OPENSSL_NO_FUZZ_LIBFUZZER
#  define OPENSSL_NO_FUZZ_LIBFUZZER
#
 endif
# ifndef OPENSSL_NO_H3DEMO
#  define OPENSSL_NO_H3DEMO
# endif
# ifndef OPENSSL_NO_HQINTEROP
#  define OPENSSL_NO_HQINTEROP
# endif
# ifndef OPENSSL_NO_JITTER
#  define OPENSSL_NO_JITTER
# endif
# ifndef OPENSSL_NO_KTLS
#  define OPENSSL_NO_KTLS
# endif
# ifndef OPENSSL_NO_LOADERENG
#  define OPENSSL_NO_LOADERENG
# endif
# ifndef OPENSSL_NO_MD2
#  define OPENSSL_NO_MD2
# endif
# ifndef OPENSSL_NO_MSAN
#  define OPENSSL_NO_MSAN
# endif
# ifndef OPENSSL_NO_PIE
#  define OPENSSL_NO_PIE
# endif
# ifndef OPENSSL_NO_RC5
#  define OPENSSL_NO_RC5
# endif
# ifndef OPENSSL_NO_SCTP
#  define OPENSSL_NO_SCTP
# endif
# ifndef OPENSSL_NO_SSL3
#  define OPENSSL_NO_SSL3
# endif
# ifndef OPENSSL_NO_SSL3_METHOD
#  define OPENSSL_NO_SSL3_METHOD
# endif
```

```
# ifndef OPENSSL_NO_SSLKEYLOG
#  define OPENSSL_NO_SSLKEYLOG
# endif
# ifndef OPENSSL_NO_TFO
#  define OPENSSL_NO_TFO
# endif
# ifndef OPENSSL_NO_TRACE
#  define OPENSSL_NO_TRACE
# endif
# ifndef OPENSSL_NO_UBSAN
#  define OPENSSL_NO_UBSAN
# endif
#
 ifndef OPENSSL_NO_UNIT_TEST
#  define OPENSSL_NO_UNIT_TEST
# endif
# ifndef OPENSSL_NO_UPLINK
#  define OPENSSL_NO_UPLINK
# endif
# ifndef OPENSSL_NO_WEAK_SSL_CIPHERS
#  define OPENSSL_NO_WEAK_SSL_CIPHERS
# endif
# ifndef OPENSSL_NO_WINSTORE
#  define OPENSSL_NO_WINSTORE
# endif
# ifndef OPENSSL_NO_ZLIB
#  define OPENSSL_NO_ZLIB
# endif
# ifndef OPENSSL_NO_ZLIB_DYNAMIC
#  define OPENSSL_NO_ZLIB_DYNAMIC
# endif
# ifndef OPENSSL_NO_ZSTD
#  define OPENSSL_NO_ZSTD
# endif
# ifndef OPENSSL_NO_ZSTD_DYNAMIC
#  define OPENSSL_NO_ZSTD_DYNAMIC
# endif
# ifndef OPENSSL_NO_DYNAMIC_ENGINE
#  define OPENSSL_NO_DYNAMIC_ENGINE
# endif

/* clang-format on */

/* Generate 80386 code? */
/* clang-format off */
# undef I386_ONLY
/* clang-format on */
```

```
/*
* The following are cipher-specific, but are part of the public API.
*/
#if !defined(OPENSSL_SYS_UEFI)
   /* clang-format off */
#  undef BN_LLONG
   /* clang-format on */
   /* Only one for the following should be defined */
   /* clang-format off
 */
#  define SIXTY_FOUR_BIT_LONG
   /* clang-format on */
   /* clang-format off */
#  undef SIXTY_FOUR_BIT
   /* clang-format on */
   /* clang-format off */
#  undef THIRTY_TWO_BIT
/* clang-format on */
#endif

/* clang-format off */
# define RC4_INT unsigned int
/* clang-format on */

#if defined(OPENSSL_NO_COMP) || (defined(OPENSSL_NO_BROTLI) && defined(OPENSSL_NO_ZSTD) &&
defined(OPENSSL_NO_ZLIB))
#define OPENSSL_NO_COMP_ALG
#else
#undef OPENSSL_NO_COMP_ALG
#endif

#ifdef __cplusplus
}
#endif

#endif /* OPENSSL_CONFIGURATION_H */
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/conf.h.in
*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_CONF_H
```

```
#define OPENSSL_CONF_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_CONF_H
#endif

#include <openssl/bio.h>
#include <openssl/lhash.h>
#include <openssl/safestack.h>
#include <openssl/e_os2.h>
#include <openssl/types.h>
#include <openssl/conferr.h>
#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif

#ifdef __cplusplus
extern "C" {
#endif

typedef struct {
   char *section;
   char *name;
   char *value;
} CONF_VALUE;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(CONF_VALUE,
 CONF_VALUE, CONF_VALUE)
#define sk_CONF_VALUE_num(sk) OPENSSL_sk_num(ossl_check_const_CONF_VALUE_sk_type(sk))
#define sk_CONF_VALUE_value(sk, idx) ((CONF_VALUE
*)OPENSSL_sk_value(ossl_check_const_CONF_VALUE_sk_type(sk), (idx)))
#define sk_CONF_VALUE_new(cmp) ((STACK_OF(CONF_VALUE)
*)OPENSSL_sk_new(ossl_check_CONF_VALUE_compfunc_type(cmp)))
#define sk_CONF_VALUE_new_null() ((STACK_OF(CONF_VALUE) *)OPENSSL_sk_new_null())
#define sk_CONF_VALUE_new_reserve(cmp, n) ((STACK_OF(CONF_VALUE)
*)OPENSSL_sk_new_reserve(ossl_check_CONF_VALUE_compfunc_type(cmp), (n)))
#define sk_CONF_VALUE_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_CONF_VALUE_sk_type(sk), (n))
#define sk_CONF_VALUE_free(sk) OPENSSL_sk_free(ossl_check_CONF_VALUE_sk_type(sk))
#define sk_CONF_VALUE_zero(sk) OPENSSL_sk_zero(ossl_check_CONF_VALUE_sk_type(sk))
#define sk_CONF_VALUE_delete(sk, i) ((CONF_VALUE
*)OPENSSL_sk_delete(ossl_check_CONF_VALUE_sk_type(sk), (i)))
#define sk_CONF_VALUE_delete_ptr(sk, ptr) ((CONF_VALUE
 *)OPENSSL_sk_delete_ptr(ossl_check_CONF_VALUE_sk_type(sk), ossl_check_CONF_VALUE_type(ptr)))
#define sk_CONF_VALUE_push(sk, ptr) OPENSSL_sk_push(ossl_check_CONF_VALUE_sk_type(sk),
ossl_check_CONF_VALUE_type(ptr))
```

```
#define sk_CONF_VALUE_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_CONF_VALUE_sk_type(sk),
ossl_check_CONF_VALUE_type(ptr))
#define sk_CONF_VALUE_pop(sk) ((CONF_VALUE
*)OPENSSL_sk_pop(ossl_check_CONF_VALUE_sk_type(sk)))
#define sk_CONF_VALUE_shift(sk) ((CONF_VALUE
*)OPENSSL_sk_shift(ossl_check_CONF_VALUE_sk_type(sk)))
#define sk_CONF_VALUE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_CONF_VALUE_sk_type(sk),ossl_check_CONF_VALUE_freefunc_type(freef
unc))
#define sk_CONF_VALUE_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_CONF_VALUE_sk_type(sk),
ossl_check_CONF_VALUE_type(ptr), (idx))
#define sk_CONF_VALUE_set(sk, idx, ptr) ((CONF_VALUE
*)OPENSSL_sk_set(ossl_check_CONF_VALUE_sk_type(sk), (idx), ossl_check_CONF_VALUE_type(ptr)))
#define sk_CONF_VALUE_find(sk,
 ptr) OPENSSL_sk_find(ossl_check_CONF_VALUE_sk_type(sk), ossl_check_CONF_VALUE_type(ptr))
#define sk_CONF_VALUE_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_CONF_VALUE_sk_type(sk),
ossl_check_CONF_VALUE_type(ptr))
#define sk_CONF_VALUE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_CONF_VALUE_sk_type(sk), ossl_check_CONF_VALUE_type(ptr), pnum)
#define sk_CONF_VALUE_sort(sk) OPENSSL_sk_sort(ossl_check_CONF_VALUE_sk_type(sk))
#define sk_CONF_VALUE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_CONF_VALUE_sk_type(sk))
#define sk_CONF_VALUE_dup(sk) ((STACK_OF(CONF_VALUE)
*)OPENSSL_sk_dup(ossl_check_const_CONF_VALUE_sk_type(sk)))
#define sk_CONF_VALUE_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(CONF_VALUE)
*)OPENSSL_sk_deep_copy(ossl_check_const_CONF_VALUE_sk_type(sk),
ossl_check_CONF_VALUE_copyfunc_type(copyfunc), ossl_check_CONF_VALUE_freefunc_type(freefunc)))
#define sk_CONF_VALUE_set_cmp_func(sk, cmp)
((sk_CONF_VALUE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_CONF_VALUE_sk_type(sk),
 ossl_check_CONF_VALUE_compfunc_type(cmp)))
DEFINE_LHASH_OF_INTERNAL(CONF_VALUE);
#define lh_CONF_VALUE_new(hfn, cmp) ((LHASH_OF(CONF_VALUE)
*)OPENSSL_LH_set_thunks(OPENSSL_LH_new(ossl_check_CONF_VALUE_lh_hashfunc_type(hfn),
ossl_check_CONF_VALUE_lh_compfunc_type(cmp)), lh_CONF_VALUE_hash_thunk,
lh_CONF_VALUE_comp_thunk, lh_CONF_VALUE_doall_thunk, lh_CONF_VALUE_doall_arg_thunk))
#define lh_CONF_VALUE_free(lh) OPENSSL_LH_free(ossl_check_CONF_VALUE_lh_type(lh))
#define lh_CONF_VALUE_flush(lh) OPENSSL_LH_flush(ossl_check_CONF_VALUE_lh_type(lh))
#define lh_CONF_VALUE_insert(lh, ptr) ((CONF_VALUE
*)OPENSSL_LH_insert(ossl_check_CONF_VALUE_lh_type(lh),
ossl_check_CONF_VALUE_lh_plain_type(ptr)))
#define lh_CONF_VALUE_delete(lh, ptr) ((CONF_VALUE
*)OPENSSL_LH_delete(ossl_check_CONF_VALUE_lh_type(lh),
ossl_check_const_CONF_VALUE_lh_plain_type(ptr)))
#define lh_CONF_VALUE_retrieve(lh, ptr) ((CONF_VALUE
*)OPENSSL_LH_retrieve(ossl_check_CONF_VALUE_lh_type(lh),
ossl_check_const_CONF_VALUE_lh_plain_type(ptr)))
#define
```

```
 lh_CONF_VALUE_error(lh) OPENSSL_LH_error(ossl_check_CONF_VALUE_lh_type(lh))
#define lh_CONF_VALUE_num_items(lh) OPENSSL_LH_num_items(ossl_check_CONF_VALUE_lh_type(lh))
#define lh_CONF_VALUE_node_stats_bio(lh, out)
OPENSSL_LH_node_stats_bio(ossl_check_const_CONF_VALUE_lh_type(lh), out)
#define lh_CONF_VALUE_node_usage_stats_bio(lh, out)
OPENSSL_LH_node_usage_stats_bio(ossl_check_const_CONF_VALUE_lh_type(lh), out)
#define lh_CONF_VALUE_stats_bio(lh, out)
OPENSSL_LH_stats_bio(ossl_check_const_CONF_VALUE_lh_type(lh), out)
#define lh_CONF_VALUE_get_down_load(lh)
OPENSSL_LH_get_down_load(ossl_check_CONF_VALUE_lh_type(lh))
#define lh_CONF_VALUE_set_down_load(lh, dl)
OPENSSL_LH_set_down_load(ossl_check_CONF_VALUE_lh_type(lh), dl)
#define lh_CONF_VALUE_doall(lh, dfn) OPENSSL_LH_doall(ossl_check_CONF_VALUE_lh_type(lh),
ossl_check_CONF_VALUE_lh_doallfunc_type(dfn))

/* clang-format on */

struct conf_st;
struct conf_method_st;
typedef struct conf_method_st CONF_METHOD;

#ifndef
 OPENSSL_NO_DEPRECATED_3_0
#include <openssl/conftypes.h>
#endif

/* Module definitions */
typedef struct conf_imodule_st CONF_IMODULE;
typedef struct conf_module_st CONF_MODULE;

STACK_OF(CONF_MODULE);
STACK_OF(CONF_IMODULE);

/* DSO module function typedefs */
typedef int conf_init_func(CONF_IMODULE *md, const CONF *cnf);
typedef void conf_finish_func(CONF_IMODULE *md);

#define CONF_MFLAGS_IGNORE_ERRORS 0x1
#define CONF_MFLAGS_IGNORE_RETURN_CODES 0x2
#define CONF_MFLAGS_SILENT 0x4
#define CONF_MFLAGS_NO_DSO 0x8
#define CONF_MFLAGS_IGNORE_MISSING_FILE 0x10
#define CONF_MFLAGS_DEFAULT_SECTION 0x20

int CONF_set_default_method(CONF_METHOD *meth);
void CONF_set_nconf(CONF *conf, LHASH_OF(CONF_VALUE) *hash);
LHASH_OF(CONF_VALUE) *CONF_load(LHASH_OF(CONF_VALUE) *conf, const char *file,
   long *eline);
```

```
#ifndef OPENSSL_NO_STDIO
LHASH_OF(CONF_VALUE) *CONF_load_fp(LHASH_OF(CONF_VALUE) *conf, FILE *fp,
   long *eline);
#endif
LHASH_OF(CONF_VALUE) *CONF_load_bio(LHASH_OF(CONF_VALUE)
 *conf, BIO *bp,
   long *eline);
STACK_OF(CONF_VALUE) *CONF_get_section(LHASH_OF(CONF_VALUE) *conf,
   const char *section);
char *CONF_get_string(LHASH_OF(CONF_VALUE) *conf, const char *group,
   const char *name);
long CONF_get_number(LHASH_OF(CONF_VALUE) *conf, const char *group,
   const char *name);
void CONF_free(LHASH_OF(CONF_VALUE) *conf);
#ifndef OPENSSL_NO_STDIO
int CONF_dump_fp(LHASH_OF(CONF_VALUE) *conf, FILE *out);
#endif
int CONF_dump_bio(LHASH_OF(CONF_VALUE) *conf, BIO *out);
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 void OPENSSL_config(const char *config_name);
#endif

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define OPENSSL_no_config() \
   OPENSSL_init_crypto(OPENSSL_INIT_NO_LOAD_CONFIG, NULL)
#endif

/*
* New conf code.  The semantics are different from the functions above. If
* that wasn't the case, the above functions would have been replaced
*/

CONF *NCONF_new_ex(OSSL_LIB_CTX *libctx, CONF_METHOD *meth);
OSSL_LIB_CTX *NCONF_get0_libctx(const
 CONF *conf);
CONF *NCONF_new(CONF_METHOD *meth);
CONF_METHOD *NCONF_default(void);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 CONF_METHOD *NCONF_WIN32(void);
#endif
void NCONF_free(CONF *conf);
void NCONF_free_data(CONF *conf);

int NCONF_load(CONF *conf, const char *file, long *eline);
#ifndef OPENSSL_NO_STDIO
int NCONF_load_fp(CONF *conf, FILE *fp, long *eline);
#endif
int NCONF_load_bio(CONF *conf, BIO *bp, long *eline);
```

```
STACK_OF(OPENSSL_CSTRING) *NCONF_get_section_names(const CONF *conf);
STACK_OF(CONF_VALUE) *NCONF_get_section(const CONF *conf,
   const char *section);
char *NCONF_get_string(const CONF *conf, const char *group, const char *name);
int NCONF_get_number_e(const CONF *conf, const char *group, const char *name,
   long *result);
#ifndef OPENSSL_NO_STDIO
int NCONF_dump_fp(const CONF *conf, FILE *out);
#endif
int NCONF_dump_bio(const CONF *conf, BIO *out);

#define NCONF_get_number(c, g, n, r) NCONF_get_number_e(c, g, n, r)

/* Module functions */

int
 CONF_modules_load(const CONF *cnf, const char *appname,
   unsigned long flags);
int CONF_modules_load_file_ex(OSSL_LIB_CTX *libctx, const char *filename,
   const char *appname, unsigned long flags);
int CONF_modules_load_file(const char *filename, const char *appname,
   unsigned long flags);
void CONF_modules_unload(int all);
void CONF_modules_finish(void);
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define CONF_modules_free() \
   while (0)             \
   continue
#endif
int CONF_module_add(const char *name, conf_init_func *ifunc,
   conf_finish_func *ffunc);

const char *CONF_imodule_get_name(const CONF_IMODULE *md);
const char *CONF_imodule_get_value(const CONF_IMODULE *md);
void *CONF_imodule_get_usr_data(const CONF_IMODULE *md);
void CONF_imodule_set_usr_data(CONF_IMODULE *md, void *usr_data);
CONF_MODULE *CONF_imodule_get_module(const CONF_IMODULE *md);
unsigned long CONF_imodule_get_flags(const CONF_IMODULE *md);
void CONF_imodule_set_flags(CONF_IMODULE *md, unsigned
 long flags);
void *CONF_module_get_usr_data(CONF_MODULE *pmod);
void CONF_module_set_usr_data(CONF_MODULE *pmod, void *usr_data);

char *CONF_get1_default_config_file(void);

int CONF_parse_list(const char *list, int sep, int nospc,
   int (*list_cb)(const char *elem, int len, void *usr),
   void *arg);
```

```
void OPENSSL_load_builtin_modules(void);

#ifdef __cplusplus
}
#endif
#endif
/* clang-format off */
/* WARNING: do not edit! */
/* Generated by Makefile from include/crypto/dso_conf.h.in */
/* clang-format on */
/*
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#ifndef OSSL_CRYPTO_DSO_CONF_H
#define OSSL_CRYPTO_DSO_CONF_H
#pragma once

/* clang-format off */
# define DSO_DLFCN
# define HAVE_DLFCN_H
/* clang-format on */
/* clang-format off */
# define DSO_EXTENSION ".so"
/* clang-format on */
#endif
UNRECOGNIZED LICENSE; MD5 sum: 1a764bd2bad6848ffc9fd3bca773138d
/*
* WARNING: do not edit!
* Generated by Makefile from providers/common/include/prov/der_ecx.h.in
*
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#include "internal/der.h"
#include "crypto/ecx.h"
```

```
/* Well known OIDs precompiled */
/* clang-format off */

/*
* id-X25519       OBJECT IDENTIFIER ::= { id-edwards-curve-algs 110 }
*/
#define DER_OID_V_id_X25519 DER_P_OBJECT, 3, 0x2B, 0x65, 0x6E
#define DER_OID_SZ_id_X25519 5
extern const unsigned char ossl_der_oid_id_X25519[DER_OID_SZ_id_X25519];

/*
* id-X448         OBJECT IDENTIFIER ::= { id-edwards-curve-algs 111 }
*/
#define DER_OID_V_id_X448 DER_P_OBJECT, 3, 0x2B, 0x65, 0x6F
#define DER_OID_SZ_id_X448 5
extern const unsigned char ossl_der_oid_id_X448[DER_OID_SZ_id_X448];

/*
 * id-Ed25519      OBJECT IDENTIFIER ::= { id-edwards-curve-algs 112 }
*/
#define DER_OID_V_id_Ed25519 DER_P_OBJECT, 3, 0x2B, 0x65, 0x70
#define DER_OID_SZ_id_Ed25519 5
extern const unsigned char ossl_der_oid_id_Ed25519[DER_OID_SZ_id_Ed25519];

/*
* id-Ed448        OBJECT IDENTIFIER ::= { id-edwards-curve-algs 113 }
*/
#define DER_OID_V_id_Ed448 DER_P_OBJECT, 3, 0x2B, 0x65, 0x71
#define DER_OID_SZ_id_Ed448 5
extern const unsigned char ossl_der_oid_id_Ed448[DER_OID_SZ_id_Ed448];

/* clang-format on */

int ossl_DER_w_algorithmIdentifier_ED25519(WPACKET *pkt, int cont, ECX_KEY *ec);
int ossl_DER_w_algorithmIdentifier_ED448(WPACKET *pkt, int cont, ECX_KEY *ec);
int ossl_DER_w_algorithmIdentifier_X25519(WPACKET *pkt, int cont, ECX_KEY *ec);
int ossl_DER_w_algorithmIdentifier_X448(WPACKET *pkt, int cont, ECX_KEY *ec);
```

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```
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/* WARNING: do not edit! */
/* Generated by Makefile from include/crypto/bn_conf.h.in */
/* clang-format on */
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#ifndef OSSL_CRYPTO_BN_CONF_H
#define OSSL_CRYPTO_BN_CONF_H
#pragma once

/*
* The contents of this file are not used in the UEFI build, as
* both 32-bit and 64-bit builds are supported from a single run
* of the Configure script.
*/

/* Should we define BN_DIV2W here? */

/* Only one for the following should be defined */
/* clang-format off */
#undef SIXTY_FOUR_BIT_LONG
   /* clang-format on */
   /* clang-format off */
#undef SIXTY_FOUR_BIT
   /* clang-format on */
   /* clang-format off */
#define THIRTY_TWO_BIT
/*
 clang-format on */

#endif
```

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```
{
 'variables': {
   'openssl_defines_BSD-x86_64': [
     'NDEBUG',
     'L_ENDIAN',
     'OPENSSL_BUILDING_OPENSSL',
     'AES_ASM',
     'BSAES_ASM',
     'CMLL_ASM',
     'ECP_NISTZ256_ASM',
     'GHASH_ASM',
     'KECCAK1600_ASM',
     'MD5_ASM',
     'OPENSSL_BN_ASM_GF2m',
     'OPENSSL_BN_ASM_MONT',
     'OPENSSL_BN_ASM_MONT5',
     'OPENSSL_CPUID_OBJ',
     'OPENSSL_IA32_SSE2',
     'PADLOCK_ASM',
     'POLY1305_ASM',
     'RC4_ASM',
     'SHA1_ASM',
     'SHA256_ASM',
     'SHA512_ASM',
     'VPAES_ASM',
     'WHIRLPOOL_ASM',
     'X25519_ASM',
     'OPENSSL_PIC',
   ],
   'openssl_cflags_BSD-x86_64': [
     '-Wa,--noexecstack',
```

```
  '-Wall -O3',
  '-pthread',
  '-Wall -O3',
],
'openssl_ex_libs_BSD-x86_64': [
  '-pthread',
],
'openssl_cli_srcs_BSD-x86_64': [
  'openssl/apps/lib/cmp_mock_srv.c',
  'openssl/apps/asn1parse.c',
  'openssl/apps/ca.c',
  'openssl/apps/ciphers.c',
  'openssl/apps/cmp.c',

 'openssl/apps/cms.c',
  'openssl/apps/crl.c',
  'openssl/apps/crl2pkcs7.c',
  'openssl/apps/dgst.c',
  'openssl/apps/dhparam.c',
  'openssl/apps/dsa.c',
  'openssl/apps/dsaparam.c',
  'openssl/apps/ec.c',
  'openssl/apps/ecparam.c',
  'openssl/apps/enc.c',
  'openssl/apps/engine.c',
  'openssl/apps/errstr.c',
  'openssl/apps/fipsinstall.c',
  'openssl/apps/gendsa.c',
  'openssl/apps/genpkey.c',
  'openssl/apps/genrsa.c',
  'openssl/apps/info.c',
  'openssl/apps/kdf.c',
  'openssl/apps/list.c',
  'openssl/apps/mac.c',
  'openssl/apps/nseq.c',
  'openssl/apps/ocsp.c',
  'openssl/apps/openssl.c',
  'openssl/apps/passwd.c',
  'openssl/apps/pkcs12.c',
  'openssl/apps/pkcs7.c',
  'openssl/apps/pkcs8.c',
  'openssl/apps/pkey.c',
  'openssl/apps/pkeyparam.c',
  'openssl/apps/pkeyutl.c',
  'openssl/apps/prime.c',
  './config/archs/BSD-x86_64/asm_avx2/apps/progs.c',
```

```
  'openssl/apps/rand.c',
    'openssl/apps/rehash.c',
    'openssl/apps/req.c',
    'openssl/apps/rsa.c',
    'openssl/apps/rsautl.c',
    'openssl/apps/s_client.c',
    'openssl/apps/s_server.c',
    'openssl/apps/s_time.c',
    'openssl/apps/sess_id.c',
    'openssl/apps/skeyutl.c',
    'openssl/apps/smime.c',
    'openssl/apps/speed.c',
    'openssl/apps/spkac.c',
    'openssl/apps/srp.c',
    'openssl/apps/storeutl.c',
    'openssl/apps/ts.c',
    'openssl/apps/verify.c',
    'openssl/apps/version.c',
    'openssl/apps/x509.c',
    'openssl/apps/lib/app_libctx.c',
    'openssl/apps/lib/app_params.c',
    'openssl/apps/lib/app_provider.c',
    'openssl/apps/lib/app_rand.c',
    'openssl/apps/lib/app_x509.c',
    'openssl/apps/lib/apps.c',
    'openssl/apps/lib/apps_opt_printf.c',
    'openssl/apps/lib/apps_ui.c',
    'openssl/apps/lib/columns.c',
    'openssl/apps/lib/engine.c',
    'openssl/apps/lib/engine_loader.c',
    'openssl/apps/lib/fmt.c',
     'openssl/apps/lib/http_server.c',
    'openssl/apps/lib/log.c',
    'openssl/apps/lib/names.c',
    'openssl/apps/lib/opt.c',
    'openssl/apps/lib/s_cb.c',
    'openssl/apps/lib/s_socket.c',
    'openssl/apps/lib/tlssrp_depr.c',
  ],
},
'defines': ['<@(openssl_defines_BSD-x86_64)'],
'include_dirs': [
  './include',
],
'cflags' : ['<@(openssl_cflags_BSD-x86_64)'],
'libraries': ['<@(openssl_ex_libs_BSD-x86_64)'],
'sources': ['<@(openssl_cli_srcs_BSD-x86_64)'],
}
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/srp.h.in
*
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*
* Originally written by Christophe Renou and Peter Sylvester,
* for the EdelKey project.
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_SRP_H
#define OPENSSL_SRP_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_SRP_H
#endif

#include <openssl/opensslconf.h>

#ifndef OPENSSL_NO_SRP
#include <stdio.h>
```

```
#include <string.h>
#include <openssl/safestack.h>
#include <openssl/bn.h>
#include <openssl/crypto.h>

#ifdef __cplusplus
extern "C" {
#endif

#ifndef OPENSSL_NO_DEPRECATED_3_0

typedef
 struct SRP_gN_cache_st {
   char *b64_bn;
   BIGNUM *bn;
} SRP_gN_cache;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(SRP_gN_cache, SRP_gN_cache, SRP_gN_cache)
#define sk_SRP_gN_cache_num(sk) OPENSSL_sk_num(ossl_check_const_SRP_gN_cache_sk_type(sk))
#define sk_SRP_gN_cache_value(sk, idx) ((SRP_gN_cache
*)OPENSSL_sk_value(ossl_check_const_SRP_gN_cache_sk_type(sk), (idx)))
#define sk_SRP_gN_cache_new(cmp) ((STACK_OF(SRP_gN_cache)
*)OPENSSL_sk_new(ossl_check_SRP_gN_cache_compfunc_type(cmp)))
#define sk_SRP_gN_cache_new_null() ((STACK_OF(SRP_gN_cache) *)OPENSSL_sk_new_null())
#define sk_SRP_gN_cache_new_reserve(cmp, n) ((STACK_OF(SRP_gN_cache)
*)OPENSSL_sk_new_reserve(ossl_check_SRP_gN_cache_compfunc_type(cmp), (n)))
#define sk_SRP_gN_cache_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_SRP_gN_cache_sk_type(sk), (n))
#define sk_SRP_gN_cache_free(sk) OPENSSL_sk_free(ossl_check_SRP_gN_cache_sk_type(sk))
#define sk_SRP_gN_cache_zero(sk) OPENSSL_sk_zero(ossl_check_SRP_gN_cache_sk_type(sk))
#define
 sk_SRP_gN_cache_delete(sk, i) ((SRP_gN_cache
*)OPENSSL_sk_delete(ossl_check_SRP_gN_cache_sk_type(sk), (i)))
#define sk_SRP_gN_cache_delete_ptr(sk, ptr) ((SRP_gN_cache
*)OPENSSL_sk_delete_ptr(ossl_check_SRP_gN_cache_sk_type(sk), ossl_check_SRP_gN_cache_type(ptr)))
#define sk_SRP_gN_cache_push(sk, ptr) OPENSSL_sk_push(ossl_check_SRP_gN_cache_sk_type(sk),
ossl_check_SRP_gN_cache_type(ptr))
#define sk_SRP_gN_cache_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_SRP_gN_cache_sk_type(sk),
ossl_check_SRP_gN_cache_type(ptr))
#define sk_SRP_gN_cache_pop(sk) ((SRP_gN_cache
*)OPENSSL_sk_pop(ossl_check_SRP_gN_cache_sk_type(sk)))
#define sk_SRP_gN_cache_shift(sk) ((SRP_gN_cache
*)OPENSSL_sk_shift(ossl_check_SRP_gN_cache_sk_type(sk)))
#define sk_SRP_gN_cache_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_SRP_gN_cache_sk_type(sk),ossl_check_SRP_gN_cache_freefunc_type(freefu
nc))
#define sk_SRP_gN_cache_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_SRP_gN_cache_sk_type(sk),
 ossl_check_SRP_gN_cache_type(ptr), (idx))
#define sk_SRP_gN_cache_set(sk, idx, ptr) ((SRP_gN_cache
```

```
*)OPENSSL_sk_set(ossl_check_SRP_gN_cache_sk_type(sk), (idx), ossl_check_SRP_gN_cache_type(ptr)))
#define sk_SRP_gN_cache_find(sk, ptr) OPENSSL_sk_find(ossl_check_SRP_gN_cache_sk_type(sk),
ossl_check_SRP_gN_cache_type(ptr))
#define sk_SRP_gN_cache_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_SRP_gN_cache_sk_type(sk),
ossl_check_SRP_gN_cache_type(ptr))
#define sk_SRP_gN_cache_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_SRP_gN_cache_sk_type(sk), ossl_check_SRP_gN_cache_type(ptr), pnum)
#define sk_SRP_gN_cache_sort(sk) OPENSSL_sk_sort(ossl_check_SRP_gN_cache_sk_type(sk))
#define sk_SRP_gN_cache_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_SRP_gN_cache_sk_type(sk))
#define sk_SRP_gN_cache_dup(sk) ((STACK_OF(SRP_gN_cache)
*)OPENSSL_sk_dup(ossl_check_const_SRP_gN_cache_sk_type(sk)))
#define sk_SRP_gN_cache_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(SRP_gN_cache)
 *)OPENSSL_sk_deep_copy(ossl_check_const_SRP_gN_cache_sk_type(sk),
ossl_check_SRP_gN_cache_copyfunc_type(copyfunc), ossl_check_SRP_gN_cache_freefunc_type(freefunc)))
#define sk_SRP_gN_cache_set_cmp_func(sk, cmp)
((sk_SRP_gN_cache_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_SRP_gN_cache_sk_type(sk),
ossl_check_SRP_gN_cache_compfunc_type(cmp)))

/* clang-format on */

typedef struct SRP_user_pwd_st {
  /* Owned by us. */
  char *id;
  BIGNUM *s;
  BIGNUM *v;
  /* Not owned by us. */
  const BIGNUM *g;
  const BIGNUM *N;
  /* Owned by us. */
  char *info;
} SRP_user_pwd;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(SRP_user_pwd, SRP_user_pwd, SRP_user_pwd)
#define sk_SRP_user_pwd_num(sk) OPENSSL_sk_num(ossl_check_const_SRP_user_pwd_sk_type(sk))
#define sk_SRP_user_pwd_value(sk, idx) ((SRP_user_pwd
*)OPENSSL_sk_value(ossl_check_const_SRP_user_pwd_sk_type(sk), (idx)))
#define sk_SRP_user_pwd_new(cmp) ((STACK_OF(SRP_user_pwd)
*)OPENSSL_sk_new(ossl_check_SRP_user_pwd_compfunc_type(cmp)))
#define
 sk_SRP_user_pwd_new_null() ((STACK_OF(SRP_user_pwd) *)OPENSSL_sk_new_null())
#define sk_SRP_user_pwd_new_reserve(cmp, n) ((STACK_OF(SRP_user_pwd)
*)OPENSSL_sk_new_reserve(ossl_check_SRP_user_pwd_compfunc_type(cmp), (n)))
#define sk_SRP_user_pwd_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_SRP_user_pwd_sk_type(sk), (n))
#define sk_SRP_user_pwd_free(sk) OPENSSL_sk_free(ossl_check_SRP_user_pwd_sk_type(sk))
#define sk_SRP_user_pwd_zero(sk) OPENSSL_sk_zero(ossl_check_SRP_user_pwd_sk_type(sk))
#define sk_SRP_user_pwd_delete(sk, i) ((SRP_user_pwd
*)OPENSSL_sk_delete(ossl_check_SRP_user_pwd_sk_type(sk), (i)))
#define sk_SRP_user_pwd_delete_ptr(sk, ptr) ((SRP_user_pwd
```

```
*)OPENSSL_sk_delete_ptr(ossl_check_SRP_user_pwd_sk_type(sk), ossl_check_SRP_user_pwd_type(ptr)))
#define sk_SRP_user_pwd_push(sk, ptr) OPENSSL_sk_push(ossl_check_SRP_user_pwd_sk_type(sk),
ossl_check_SRP_user_pwd_type(ptr))
#define sk_SRP_user_pwd_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_SRP_user_pwd_sk_type(sk),
 ossl_check_SRP_user_pwd_type(ptr))
#define sk_SRP_user_pwd_pop(sk) ((SRP_user_pwd
*)OPENSSL_sk_pop(ossl_check_SRP_user_pwd_sk_type(sk)))
#define sk_SRP_user_pwd_shift(sk) ((SRP_user_pwd
*)OPENSSL_sk_shift(ossl_check_SRP_user_pwd_sk_type(sk)))
#define sk_SRP_user_pwd_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_SRP_user_pwd_sk_type(sk),ossl_check_SRP_user_pwd_freefunc_type(freefu
nc))
#define sk_SRP_user_pwd_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_SRP_user_pwd_sk_type(sk),
ossl_check_SRP_user_pwd_type(ptr), (idx))
#define sk_SRP_user_pwd_set(sk, idx, ptr) ((SRP_user_pwd
*)OPENSSL_sk_set(ossl_check_SRP_user_pwd_sk_type(sk), (idx), ossl_check_SRP_user_pwd_type(ptr)))
#define sk_SRP_user_pwd_find(sk, ptr) OPENSSL_sk_find(ossl_check_SRP_user_pwd_sk_type(sk),
ossl_check_SRP_user_pwd_type(ptr))
#define sk_SRP_user_pwd_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_SRP_user_pwd_sk_type(sk),
ossl_check_SRP_user_pwd_type(ptr))
#define sk_SRP_user_pwd_find_all(sk,
 ptr, pnum) OPENSSL_sk_find_all(ossl_check_SRP_user_pwd_sk_type(sk), ossl_check_SRP_user_pwd_type(ptr),
pnum)
#define sk_SRP_user_pwd_sort(sk) OPENSSL_sk_sort(ossl_check_SRP_user_pwd_sk_type(sk))
#define sk_SRP_user_pwd_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_SRP_user_pwd_sk_type(sk))
#define sk_SRP_user_pwd_dup(sk) ((STACK_OF(SRP_user_pwd)
*)OPENSSL_sk_dup(ossl_check_const_SRP_user_pwd_sk_type(sk)))
#define sk_SRP_user_pwd_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(SRP_user_pwd)
*)OPENSSL_sk_deep_copy(ossl_check_const_SRP_user_pwd_sk_type(sk),
ossl_check_SRP_user_pwd_copyfunc_type(copyfunc), ossl_check_SRP_user_pwd_freefunc_type(freefunc)))
#define sk_SRP_user_pwd_set_cmp_func(sk, cmp)
((sk_SRP_user_pwd_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_SRP_user_pwd_sk_type(sk),
ossl_check_SRP_user_pwd_compfunc_type(cmp)))

/* clang-format on */

OSSL_DEPRECATEDIN_3_0
SRP_user_pwd *SRP_user_pwd_new(void);
OSSL_DEPRECATEDIN_3_0
void SRP_user_pwd_free(SRP_user_pwd
 *user_pwd);

OSSL_DEPRECATEDIN_3_0
void SRP_user_pwd_set_gN(SRP_user_pwd *user_pwd, const BIGNUM *g,
   const BIGNUM *N);
OSSL_DEPRECATEDIN_3_0
int SRP_user_pwd_set1_ids(SRP_user_pwd *user_pwd, const char *id,
   const char *info);
```

```
OSSL_DEPRECATEDIN_3_0
int SRP_user_pwd_set0_sv(SRP_user_pwd *user_pwd, BIGNUM *s, BIGNUM *v);

typedef struct SRP_VBASE_st {
   STACK_OF(SRP_user_pwd) *users_pwd;
   STACK_OF(SRP_gN_cache) *gN_cache;
   /* to simulate a user */
   char *seed_key;
   const BIGNUM *default_g;
   const BIGNUM *default_N;
} SRP_VBASE;

/*
* Internal structure storing N and g pair
*/
typedef struct SRP_gN_st {
   char *id;
   const BIGNUM *g;
   const BIGNUM *N;
} SRP_gN;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(SRP_gN, SRP_gN, SRP_gN)
#define sk_SRP_gN_num(sk) OPENSSL_sk_num(ossl_check_const_SRP_gN_sk_type(sk))
#define sk_SRP_gN_value(sk, idx) ((SRP_gN *)OPENSSL_sk_value(ossl_check_const_SRP_gN_sk_type(sk),
(idx)))
#define sk_SRP_gN_new(cmp) ((STACK_OF(SRP_gN)
 *)OPENSSL_sk_new(ossl_check_SRP_gN_compfunc_type(cmp)))
#define sk_SRP_gN_new_null() ((STACK_OF(SRP_gN) *)OPENSSL_sk_new_null())
#define sk_SRP_gN_new_reserve(cmp, n) ((STACK_OF(SRP_gN)
*)OPENSSL_sk_new_reserve(ossl_check_SRP_gN_compfunc_type(cmp), (n)))
#define sk_SRP_gN_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_SRP_gN_sk_type(sk), (n))
#define sk_SRP_gN_free(sk) OPENSSL_sk_free(ossl_check_SRP_gN_sk_type(sk))
#define sk_SRP_gN_zero(sk) OPENSSL_sk_zero(ossl_check_SRP_gN_sk_type(sk))
#define sk_SRP_gN_delete(sk, i) ((SRP_gN *)OPENSSL_sk_delete(ossl_check_SRP_gN_sk_type(sk), (i)))
#define sk_SRP_gN_delete_ptr(sk, ptr) ((SRP_gN *)OPENSSL_sk_delete_ptr(ossl_check_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_type(ptr)))
#define sk_SRP_gN_push(sk, ptr) OPENSSL_sk_push(ossl_check_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_type(ptr))
#define sk_SRP_gN_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_type(ptr))
#define sk_SRP_gN_pop(sk) ((SRP_gN *)OPENSSL_sk_pop(ossl_check_SRP_gN_sk_type(sk)))
#define
 sk_SRP_gN_shift(sk) ((SRP_gN *)OPENSSL_sk_shift(ossl_check_SRP_gN_sk_type(sk)))
#define sk_SRP_gN_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_SRP_gN_sk_type(sk),ossl_check_SRP_gN_freefunc_type(freefunc))
#define sk_SRP_gN_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_type(ptr), (idx))
#define sk_SRP_gN_set(sk, idx, ptr) ((SRP_gN *)OPENSSL_sk_set(ossl_check_SRP_gN_sk_type(sk), (idx),
```

```
ossl_check_SRP_gN_type(ptr)))
#define sk_SRP_gN_find(sk, ptr) OPENSSL_sk_find(ossl_check_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_type(ptr))
#define sk_SRP_gN_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_type(ptr))
#define sk_SRP_gN_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_type(ptr), pnum)
#define sk_SRP_gN_sort(sk) OPENSSL_sk_sort(ossl_check_SRP_gN_sk_type(sk))
#define sk_SRP_gN_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_SRP_gN_sk_type(sk))
#define
 sk_SRP_gN_dup(sk) ((STACK_OF(SRP_gN) *)OPENSSL_sk_dup(ossl_check_const_SRP_gN_sk_type(sk)))
#define sk_SRP_gN_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(SRP_gN)
*)OPENSSL_sk_deep_copy(ossl_check_const_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_copyfunc_type(copyfunc), ossl_check_SRP_gN_freefunc_type(freefunc)))
#define sk_SRP_gN_set_cmp_func(sk, cmp)
((sk_SRP_gN_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_SRP_gN_sk_type(sk),
ossl_check_SRP_gN_compfunc_type(cmp)))

/* clang-format on */

OSSL_DEPRECATEDIN_3_0
SRP_VBASE *SRP_VBASE_new(char *seed_key);
OSSL_DEPRECATEDIN_3_0
void SRP_VBASE_free(SRP_VBASE *vb);
OSSL_DEPRECATEDIN_3_0
int SRP_VBASE_init(SRP_VBASE *vb, char *verifier_file);

OSSL_DEPRECATEDIN_3_0
int SRP_VBASE_add0_user(SRP_VBASE *vb, SRP_user_pwd *user_pwd);

/* NOTE: unlike in SRP_VBASE_get_by_user, caller owns the returned pointer.*/
OSSL_DEPRECATEDIN_3_0
SRP_user_pwd *SRP_VBASE_get1_by_user(SRP_VBASE *vb, char *username);

OSSL_DEPRECATEDIN_3_0
char
 *SRP_create_verifier_ex(const char *user, const char *pass, char **salt,
   char **verifier, const char *N, const char *g,
   OSSL_LIB_CTX *libctx, const char *propq);
OSSL_DEPRECATEDIN_3_0
char *SRP_create_verifier(const char *user, const char *pass, char **salt,
   char **verifier, const char *N, const char *g);
OSSL_DEPRECATEDIN_3_0
int SRP_create_verifier_BN_ex(const char *user, const char *pass, BIGNUM **salt,
   BIGNUM **verifier, const BIGNUM *N,
   const BIGNUM *g, OSSL_LIB_CTX *libctx,
   const char *propq);
OSSL_DEPRECATEDIN_3_0
```

```
int SRP_create_verifier_BN(const char *user, const char *pass, BIGNUM **salt,
   BIGNUM **verifier, const BIGNUM *N,
   const BIGNUM *g);

#define SRP_NO_ERROR 0
#define SRP_ERR_VBASE_INCOMPLETE_FILE 1
#define SRP_ERR_VBASE_BN_LIB 2
#define SRP_ERR_OPEN_FILE 3
#define SRP_ERR_MEMORY 4

#define DB_srptype 0
#define DB_srpverifier 1
#define DB_srpsalt 2
#define DB_srpid 3
#define DB_srpgN 4
#define DB_srpinfo 5
#undef DB_NUMBER
#define DB_NUMBER
 6

#define DB_SRP_INDEX 'I'
#define DB_SRP_VALID 'V'
#define DB_SRP_REVOKED 'R'
#define DB_SRP_MODIF 'v'

/* see srp.c */
OSSL_DEPRECATEDIN_3_0
char *SRP_check_known_gN_param(const BIGNUM *g, const BIGNUM *N);
OSSL_DEPRECATEDIN_3_0
SRP_gN *SRP_get_default_gN(const char *id);

/* server side .... */
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_server_key(const BIGNUM *A, const BIGNUM *v, const BIGNUM *u,
   const BIGNUM *b, const BIGNUM *N);
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_B_ex(const BIGNUM *b, const BIGNUM *N, const BIGNUM *g,
   const BIGNUM *v, OSSL_LIB_CTX *libctx, const char *propq);
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_B(const BIGNUM *b, const BIGNUM *N, const BIGNUM *g,
   const BIGNUM *v);

OSSL_DEPRECATEDIN_3_0
int SRP_Verify_A_mod_N(const BIGNUM *A, const BIGNUM *N);
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_u_ex(const BIGNUM *A, const BIGNUM *B, const BIGNUM *N,
   OSSL_LIB_CTX *libctx, const char *propq);
OSSL_DEPRECATEDIN_3_0
```

```
BIGNUM *SRP_Calc_u(const BIGNUM *A,
 const BIGNUM *B, const BIGNUM *N);

/* client side .... */

OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_x_ex(const BIGNUM *s, const char *user, const char *pass,
   OSSL_LIB_CTX *libctx, const char *propq);
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_x(const BIGNUM *s, const char *user, const char *pass);
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_A(const BIGNUM *a, const BIGNUM *N, const BIGNUM *g);
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_client_key_ex(const BIGNUM *N, const BIGNUM *B, const BIGNUM *g,
   const BIGNUM *x, const BIGNUM *a, const BIGNUM *u,
   OSSL_LIB_CTX *libctx, const char *propq);
OSSL_DEPRECATEDIN_3_0
BIGNUM *SRP_Calc_client_key(const BIGNUM *N, const BIGNUM *B, const BIGNUM *g,
   const BIGNUM *x, const BIGNUM *a, const BIGNUM *u);
OSSL_DEPRECATEDIN_3_0
int SRP_Verify_B_mod_N(const BIGNUM *B, const BIGNUM *N);

#define SRP_MINIMAL_N 1024

#endif /* OPENSSL_NO_DEPRECATED_3_0 */

/* This method ignores the configured seed and fails for an unknown user. */
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0
SRP_user_pwd
 *SRP_VBASE_get_by_user(SRP_VBASE *vb, char *username);
#endif

#ifdef __cplusplus
}
#endif
#endif

#endif
// Copyright 2022 the V8 project authors. All rights reserved.
// Use of this source code is governed by a BSD-style license that can be
// found in the LICENSE file.

#ifndef V8_COMPILER_TURBOSHAFT_COPYING_PHASE_H_
#define V8_COMPILER_TURBOSHAFT_COPYING_PHASE_H_

#include <algorithm>
#include <cstddef>
```

```
#include <cstdint>
#include <utility>

#include "src/base/iterator.h"
#include "src/base/logging.h"
#include "src/base/small-vector.h"
#include "src/base/vector.h"
#include "src/codegen/optimized-compilation-info.h"
#include "src/compiler/node-origin-table.h"
#include "src/compiler/turboshaft/assembler.h"
#include "src/compiler/turboshaft/graph.h"
#include "src/compiler/turboshaft/index.h"
#include "src/compiler/turboshaft/operations.h"
#include "src/compiler/turboshaft/phase.h"
#include "src/compiler/turboshaft/reducer-traits.h"
#include "src/compiler/turboshaft/representations.h"
#include "src/compiler/turboshaft/snapshot-table.h"
#include "src/compiler/turboshaft/variable-reducer.h"
#include
 "src/zone/zone-containers.h"

namespace v8::internal::compiler::turboshaft {

using MaybeVariable = base::Optional<Variable>;

V8_EXPORT_PRIVATE int CountDecimalDigits(uint32_t value);
struct PaddingSpace {
 int spaces;
};
V8_EXPORT_PRIVATE std::ostream& operator<<(std::ostream& os,
                                           PaddingSpace padding);

template <typename Next>
class ReducerBaseForwarder;

template <typename Derived, typename Base>
class OutputGraphAssembler : public Base {
#define FRIEND(op) friend struct op##Op;
 TURBOSHAFT_OPERATION_LIST(FRIEND)
#undef FRIEND
 template <size_t I, class D>
 friend struct FixedArityOperationT;

 OpIndex Map(OpIndex index) { return derived_this()->MapToNewGraph(index); }

 OptionalOpIndex Map(OptionalOpIndex index) {
   return derived_this()->MapToNewGraph(index);
 }
```

```
 template <size_t N>
 base::SmallVector<OpIndex, N> Map(base::Vector<const OpIndex> indices) {
   return derived_this()->template MapToNewGraph<N>(indices);
  }

public:
#define ASSEMBLE(operation)                                    \
 OpIndex AssembleOutputGraph##operation(const operation##Op& op) { \
   return op.Explode(                                      \
       [a = assembler()](auto... args) {                       \
         return a->Reduce##operation(args...);                   \
       },                                                      \
       *this);                                                 \
 }
 TURBOSHAFT_OPERATION_LIST(ASSEMBLE)
#undef ASSEMBLE

private:
 Derived* derived_this() { return static_cast<Derived*>(this); }
 Assembler<typename Base::ReducerList>* assembler() {
   return &derived_this()->Asm();
 }
};

template <class AfterNext>
class GraphVisitor : public OutputGraphAssembler<GraphVisitor<AfterNext>,
                                        VariableReducer<AfterNext>> {
 template <typename N>
 friend class ReducerBaseForwarder;

public:
 using Next
 = VariableReducer<AfterNext>;
 TURBOSHAFT_REDUCER_BOILERPLATE(CopyingPhase)

 GraphVisitor()
     : input_graph_(Asm().modifiable_input_graph()),
       current_input_block_(nullptr),
       op_mapping_(Asm().input_graph().op_id_count(), OpIndex::Invalid(),
                   Asm().phase_zone(), &Asm().input_graph()),
       block_mapping_(Asm().input_graph().block_count(), nullptr,
                      Asm().phase_zone()),
       blocks_needing_variables_(Asm().input_graph().block_count(),
                                 Asm().phase_zone()),
       old_opindex_to_variables(Asm().input_graph().op_id_count(),
                                Asm().phase_zone(), &Asm().input_graph()),
       blocks_to_clone_(Asm().phase_zone()) {
```

```
  Asm().output_graph().Reset();
}

// `trace_reduction` is a template parameter to avoid paying for tracing at
// runtime.
template <bool trace_reduction>
void VisitGraph() {
  Asm().Analyze();

  // Creating initial old-to-new Block
mapping.
  for (Block& input_block : Asm().modifiable_input_graph().blocks()) {
    block_mapping_[input_block.index()] = Asm().output_graph().NewBlock(
        input_block.IsLoop() ? Block::Kind::kLoopHeader : Block::Kind::kMerge,
        &input_block);
  }

  // Visiting the graph.
  VisitAllBlocks<trace_reduction>();

  Finalize();
}

void Bind(Block* block) {
  Next::Bind(block);
  block->SetOrigin(current_input_block());
}

void Finalize() {
  // Updating the source_positions.
  if (!Asm().input_graph().source_positions().empty()) {
    for (OpIndex index : Asm().output_graph().AllOperationIndices()) {
      OpIndex origin = Asm().output_graph().operation_origins()[index];
      Asm().output_graph().source_positions()[index] =
          Asm().input_graph().source_positions()[origin];
    }
  }
  // Updating the operation origins.
  NodeOriginTable* origins = PipelineData::Get().node_origins();
  if (origins) {
    for (OpIndex
index : Asm().output_graph().AllOperationIndices()) {
      OpIndex origin = Asm().output_graph().operation_origins()[index];
      origins->SetNodeOrigin(index.id(), origin.id());
    }
  }

  input_graph_.SwapWithCompanion();
```

```
}

const Block* current_input_block() { return current_input_block_; }

bool* turn_loop_without_backedge_into_merge() {
  return &turn_loop_without_backedge_into_merge_;
}

// Emits a Goto to a cloned version of {input_block}, assuming that the only
// predecessor of this cloned copy will be the current block. {input_block} is
// not cloned right away (because this would recursively call VisitBlockBody,
// which could cause stack overflows), and is instead added to the
// {blocks_to_clone_} stack, whose blocks will be cloned once the current
// block has been fully visited.
void CloneBlockAndGoto(const Block* input_block) {
  Block* new_block =
      Asm().output_graph().NewBlock(input_block->kind(), input_block);

  //
Computing which input of Phi operations to use when visiting
  // {input_block} (since {input_block} doesn't really have predecessors
  // anymore).
  int added_block_phi_input = input_block->GetPredecessorIndex(
      Asm().current_block()->OriginForBlockEnd());

  // There is no guarantees that {input_block} will be entirely removed just
  // because it's cloned/inlined, since it's possible that it has predecessors
  // for which this optimization didn't apply. As a result, we add it to
  // {blocks_needing_variables_}, so that if it's ever generated
  // normally, Variables are used when emitting its content, so that
  // they can later be merged when control flow merges with the current
  // version of {input_block} that we just cloned.
  blocks_needing_variables_.Add(input_block->index().id());

  Asm().Goto(new_block);

  blocks_to_clone_.push_back({input_block, added_block_phi_input, new_block});
}

// Visits and emits {input_block} right now (ie,
in the current block). This
// should not be called recursively in order to avoid stack overflow (ie,
// processing {input_block} should never lead to calling CloneAndInlingBlock).
void CloneAndInlineBlock(const Block* input_block) {
  if (Asm().generating_unreachable_operations()) return;

#ifdef DEBUG
  // Making sure that we didn't call CloneAndInlineBlock recursively.
```

```
  DCHECK(!is_in_recursive_inlining_);
  ScopedModification<bool> recursive_guard(&is_in_recursive_inlining_, true);
#endif

  // Computing which input of Phi operations to use when visiting
  // {input_block} (since {input_block} doesn't really have predecessors
  // anymore).
  int added_block_phi_input = input_block->GetPredecessorIndex(
      Asm().current_block()->OriginForBlockEnd());

  // There is no guarantees that {input_block} will be entirely removed just
  // because it's cloned/inlined, since it's possible that it has predecessors
  // for which this optimization didn't apply.
 As a result, we add it to
  // {blocks_needing_variables_}, so that if it's ever generated
  // normally, Variables are used when emitting its content, so that
  // they can later be merged when control flow merges with the current
  // version of {input_block} that we just cloned.
  blocks_needing_variables_.Add(input_block->index().id());

  ScopedModification<bool> set_true(&current_block_needs_variables_, true);
  VisitBlockBody<CanHavePhis::kYes, ForCloning::kYes, false>(
      input_block, added_block_phi_input);
 }

 // {InlineOp} introduces two limitations unlike {CloneAndInlineBlock}:
 // 1. The input operation must not be emitted anymore as part of its
 // regular input block;
 // 2. {InlineOp} must not be used multiple times for the same input op.
 bool InlineOp(OpIndex index, const Block* input_block) {
  return VisitOpAndUpdateMapping<false>(index, input_block);
 }

 template <bool can_be_invalid = false>
 OpIndex MapToNewGraph(OpIndex old_index,
 int predecessor_index = -1) {
  DCHECK(old_index.valid());
  OpIndex result = op_mapping_[old_index];

  if (!result.valid()) {
    // {op_mapping} doesn't have a mapping for {old_index}. The
    // VariableReducer should provide the mapping.
    MaybeVariable var = GetVariableFor(old_index);
    if constexpr (can_be_invalid) {
      if (!var.has_value()) {
        return OpIndex::Invalid();
      }
    }
```

```
    DCHECK(var.has_value());
    if (predecessor_index == -1) {
      result = Asm().GetVariable(var.value());
    } else {
      result = Asm().GetPredecessorValue(var.value(), predecessor_index);
    }
  }

  DCHECK_IMPLIES(!can_be_invalid, result.valid());
  return result;
}

Block* MapToNewGraph(const Block* block) const {
  Block* new_block = block_mapping_[block->index()];
  DCHECK_NOT_NULL(new_block);
  return new_block;
}

// The block from the input graph that corresponds to the current block as a
// branch destination.
Such a block might not exist, and this function uses a
// trick to compute such a block in almost all cases, but might rarely fail
// and return `nullptr` instead.
const Block* OriginForBlockStart(Block* block) const {
  // Check that `block->origin_` is still valid as a block start and was not
  // changed to a semantically different block when inlining blocks.
  const Block* origin = block->origin_;
  if (origin && MapToNewGraph(origin) == block) return origin;
  return nullptr;
}

// Clone all of the blocks in {sub_graph} (which should be Blocks of the input
// graph). If `keep_loop_kinds` is true, the loop headers are preserved, and
// otherwise they are marked as Merge. An initial GotoOp jumping to the 1st
// block of `sub_graph` is always emitted. The output Block corresponding to
// the 1st block of `sub_graph` is returned.
template <class Set>
Block* CloneSubGraph(Set sub_graph, bool keep_loop_kinds,
                     bool is_loop_after_peeling
= false) {
  // The BlockIndex of the blocks of `sub_graph` should be sorted so that
  // visiting them in order is correct (all of the predecessors of a block
  // should always be visited before the block itself).
  DCHECK(std::is_sorted(sub_graph.begin(), sub_graph.end(),
                        [](const Block* a, const Block* b) {
                          return a->index().id() <= b->index().id();
                        }));
```

```
  // 1. Create new blocks, and update old->new mapping. This is required to
  // emit multiple times the blocks of {sub_graph}: if a block `B1` in
  // {sub_graph} ends with a Branch/Goto to a block `B2` that is also in
  // {sub_graph}, then this Branch/Goto should go to the version of `B2` that
  // this CloneSubGraph will insert, rather than to a version inserted by a
  // previous call to CloneSubGraph or the version that the regular
  // VisitAllBlock function will emit.
  ZoneVector<Block*> old_mappings(sub_graph.size(),
 Asm().phase_zone());
  for (auto&& [input_block, old_mapping] :
      base::zip(sub_graph, old_mappings)) {
    old_mapping = block_mapping_[input_block->index()];
    Block::Kind kind = keep_loop_kinds && input_block->IsLoop()
                       ? Block::Kind::kLoopHeader
                       : Block::Kind::kMerge;
    block_mapping_[input_block->index()] =
        Asm().output_graph().NewBlock(kind, input_block);
  }

  // 2. Visit block in correct order (begin to end)

  // Emit a goto to 1st block.
  Block* start = block_mapping_[(*sub_graph.begin())->index()];
#ifdef DEBUG
  if (is_loop_after_peeling) start->set_has_peeled_iteration();
#endif
  Asm().Goto(start);
  // Visiting `sub_graph`.
  for (const Block* block : sub_graph) {
    blocks_needing_variables_.Add(block->index().id());
    VisitBlock<false>(block);
    ProcessWaitingCloningAndInlining<false>();
  }

  // 3. Restore initial old->new mapping
  for (auto&&
 [input_block, old_mapping] :
      base::zip(sub_graph, old_mappings)) {
    block_mapping_[input_block->index()] = old_mapping;
  }

  return start;
 }

 template <bool can_be_invalid = false>
 OptionalOpIndex MapToNewGraph(OptionalOpIndex old_index,
                               int predecessor_index = -1) {
  if (!old_index.has_value()) return OptionalOpIndex::Invalid();
```

```
  return MapToNewGraph<can_be_invalid>(old_index.value(), predecessor_index);
 }

 template <size_t expected_size>
 base::SmallVector<OpIndex, expected_size> MapToNewGraph(
     base::Vector<const OpIndex> inputs) {
  base::SmallVector<OpIndex, expected_size> result;
  for (OpIndex input : inputs) {
    result.push_back(MapToNewGraph(input));
  }
  return result;
 }

private:
 template <bool trace_reduction>
 void VisitAllBlocks() {
  base::SmallVector<const Block*, 128> visit_stack;

  visit_stack.push_back(&Asm().input_graph().StartBlock());
  while (!visit_stack.empty())
 {
    const Block* block = visit_stack.back();
    visit_stack.pop_back();
    VisitBlock<trace_reduction>(block);
    ProcessWaitingCloningAndInlining<trace_reduction>();

    for (Block* child = block->LastChild(); child != nullptr;
         child = child->NeighboringChild()) {
      visit_stack.push_back(child);
    }
  }
 }

 template <bool trace_reduction>
 void VisitBlock(const Block* input_block) {
  current_block_needs_variables_ =
      blocks_needing_variables_.Contains(input_block->index().id());
  if constexpr (trace_reduction) {
    std::cout << "\nold " << PrintAsBlockHeader{*input_block} << "\n";
    std::cout << "new "
              << PrintAsBlockHeader{*MapToNewGraph(input_block),
                                    Asm().output_graph().next_block_index()}
              << "\n";
  }
  Block* new_block = MapToNewGraph(input_block);
  if (Asm().Bind(new_block)) {
    VisitBlockBody<CanHavePhis::kYes, ForCloning::kNo, trace_reduction>(
```

```
        input_block);
    if constexpr (trace_reduction) TraceBlockFinished();
  } else {
    if constexpr (trace_reduction) TraceBlockUnreachable();
  }

  // If we eliminate a loop backedge, we need to turn the loop into a
  // single-predecessor merge block.
  if (!turn_loop_without_backedge_into_merge_) return;
  const Operation& last_op = input_block->LastOperation(Asm().input_graph());
  if (auto* final_goto = last_op.TryCast<GotoOp>()) {
    if (final_goto->destination->IsLoop()) {
      if (input_block->index() >= final_goto->destination->index()) {
        Asm().FinalizeLoop(MapToNewGraph(final_goto->destination));
      } else {
        // We have a forward jump to a loop, rather than a backedge. We
        // don't need to do anything.
      }
    }
  }
}

enum class CanHavePhis { kNo, kYes };
enum class ForCloning { kNo, kYes };

template <CanHavePhis can_have_phis, ForCloning for_cloning,
          bool trace_reduction>
 void VisitBlockBody(const Block* input_block,
                     int added_block_phi_input = -1) {
  DCHECK_NOT_NULL(Asm().current_block());
  current_input_block_ = input_block;

  // Phis could be mutually recursive, for instance (in a loop header):
  //
  //     p1 = phi(a, p2)
  //     p2 = phi(b, p1)
  //
  // In this case, if we are currently unrolling the loop and visiting this
  // loop header that is now part of the loop body, then if we visit Phis
  // and emit new mapping (with CreateOldToNewMapping) as we go along, we
  // would visit p1 and emit a mapping saying "p1 = p2", and use this
  // mapping when visiting p2, then we'd map p2 to p2 instead of p1. To
  // overcome this issue, we first visit the Phis of the loop, emit the new
  // phis, and record the new mapping in a side-table ({new_phi_values}).
  // Then, we visit all of the operations of the loop and commit the new
  // mappings: phis were emitted before using the old
mapping, and all of
  // the other operations will use the new mapping (as they should).
```

```
  //
  // Note that Phis are not always at the begining of blocks, but when they
  // aren't, they can't have inputs from the current block (except on their
  // backedge for loop phis, but they start as PendingLoopPhis without
  // backedge input), so visiting all Phis first is safe.

  // Visiting Phis and collecting their new OpIndices.
  base::SmallVector<OpIndex, 64> new_phi_values;
  if constexpr (can_have_phis == CanHavePhis::kYes) {
    for (OpIndex index : Asm().input_graph().OperationIndices(*input_block)) {
      if (ShouldSkipOperation(Asm().input_graph().Get(index))) continue;
      DCHECK_NOT_NULL(Asm().current_block());
      if (Asm().input_graph().Get(index).template Is<PhiOp>()) {
        OpIndex new_index;
        if constexpr (for_cloning == ForCloning::kYes) {
          // When cloning a block, it only has a single predecessor, and Phis

    // should therefore be removed and be replaced by the input
          // corresponding to this predecessor.
          DCHECK_NE(added_block_phi_input, -1);
          // This Phi has been cloned/inlined, and has thus now a single
          // predecessor, and shouldn't be a Phi anymore.
          new_index = MapToNewGraph(
              Asm().input_graph().Get(index).input(added_block_phi_input));
        } else {
          new_index =
              VisitOpNoMappingUpdate<trace_reduction>(index, input_block);
        }
        new_phi_values.push_back(new_index);
        if (!Asm().current_block()) {
          // A reducer has detected, based on the Phis of the block that were
          // visited so far, that we are in unreachable code (or, less likely,
          // decided, based on some Phis only, to jump away from this block?).
          return;
        }
      }
    }
  }
  DCHECK_NOT_NULL(Asm().current_block());

  // Visiting everything,
updating Phi mappings, and emitting non-phi
  // operations.
  int phi_num = 0;
  bool stopped_early = false;
  for (OpIndex index : base::IterateWithoutLast(
          Asm().input_graph().OperationIndices(*input_block))) {
    if (ShouldSkipOperation(Asm().input_graph().Get(index))) continue;
```

```
    const Operation& op = Asm().input_graph().Get(index);
    if constexpr (can_have_phis == CanHavePhis::kYes) {
      if (op.Is<PhiOp>()) {
        CreateOldToNewMapping(index, new_phi_values[phi_num++]);
        continue;
      }
    }
    // Blocks with a single predecessor (for which CanHavePhis might be kNo)
    // can still have phis if they used to be loop header that were turned
    // into regular blocks.
    DCHECK_IMPLIES(op.Is<PhiOp>(), op.input_count == 1);

    if (!VisitOpAndUpdateMapping<trace_reduction>(index, input_block)) {
      stopped_early = true;
      break;
    }
  }
  // If the last operation of the loop above (= the
one-before-last operation
  // of the block) was lowered to an unconditional deopt/trap/something like
  // that, then current_block will now be null, and there is no need visit the
  // last operation of the block.
  if (stopped_early || Asm().current_block() == nullptr) return;

  // The final operation (which should be a block terminator) of the block
  // is processed separately, because if it's a Goto to a block with a
  // single predecessor, we'll inline it. (we could have had a check `if (op
  // is a Goto)` in the loop above, but since this can only be true for the
  // last operation, we instead extracted it here to make things faster).
  const Operation& terminator =
      input_block->LastOperation(Asm().input_graph());
  DCHECK(terminator.IsBlockTerminator());
  VisitBlockTerminator<trace_reduction>(terminator, input_block);
}

template <bool trace_reduction>
bool VisitOpAndUpdateMapping(OpIndex index, const Block* input_block) {
  if (Asm().current_block()
== nullptr) return false;
  OpIndex new_index =
      VisitOpNoMappingUpdate<trace_reduction>(index, input_block);
  const Operation& op = Asm().input_graph().Get(index);
  if (CanBeUsedAsInput(op) && new_index.valid()) {
    CreateOldToNewMapping(index, new_index);
  }
  return true;
}
```

```
 template <bool trace_reduction>
 OpIndex VisitOpNoMappingUpdate(OpIndex index, const Block* input_block) {
   Block* current_block = Asm().current_block();
   DCHECK_NOT_NULL(current_block);
   Asm().SetCurrentOrigin(index);
   current_block->SetOrigin(input_block);
   OpIndex first_output_index = Asm().output_graph().next_operation_index();
   USE(first_output_index);
   const Operation& op = Asm().input_graph().Get(index);
   if constexpr (trace_reduction) TraceReductionStart(index);
   if (ShouldSkipOperation(op)) {
     if constexpr (trace_reduction) TraceOperationSkipped();
     return OpIndex::Invalid();
   }
   OpIndex new_index;
   switch (op.opcode)
  {
#define EMIT_INSTR_CASE(Name)                                    \
 case Opcode::k##Name:                                           \
   if (MayThrow(Opcode::k##Name)) return OpIndex::Invalid();            \
   new_index = Asm().ReduceInputGraph##Name(index, op.Cast<Name##Op>()); \
   break;
     TURBOSHAFT_OPERATION_LIST(EMIT_INSTR_CASE)
#undef EMIT_INSTR_CASE
   }
   if constexpr (trace_reduction) {
     if (CanBeUsedAsInput(op) && !new_index.valid()) {
       TraceOperationSkipped();
     } else {
       TraceReductionResult(current_block, first_output_index, new_index);
     }
   }
#ifdef DEBUG
   DCHECK_IMPLIES(new_index.valid(),
                  Asm().output_graph().BelongsToThisGraph(new_index));
   if (V8_UNLIKELY(v8_flags.turboshaft_verify_reductions)) {
     if (new_index.valid()) {
       const Operation& new_op = Asm().output_graph().Get(new_index);
       if (!new_op.Is<TupleOp>()) {
         // Checking that the outputs_rep
 of the new operation are the same as
         // the old operation. (except for tuples, since they don't have
         // outputs_rep)
         DCHECK_EQ(new_op.outputs_rep().size(), op.outputs_rep().size());
         for (size_t i = 0; i < new_op.outputs_rep().size(); ++i) {
           DCHECK(new_op.outputs_rep()[i].AllowImplicitRepresentationChangeTo(
               op.outputs_rep()[i]));
         }
```

```
      }
      Asm().Verify(index, new_index);
    }
  }
#endif  // DEBUG
  return new_index;
}

template <bool trace_reduction>
void VisitBlockTerminator(const Operation& terminator,
                          const Block* input_block) {
  if (Asm().CanAutoInlineBlocksWithSinglePredecessor() &&
      terminator.Is<GotoOp>()) {
    Block* destination = terminator.Cast<GotoOp>().destination;
    if (destination->PredecessorCount() == 1) {
      block_to_inline_now_ = destination;
      return;
    }
  }
  // Just going through the regular VisitOp
function.
  OpIndex index = Asm().input_graph().Index(terminator);
  VisitOpAndUpdateMapping<trace_reduction>(index, input_block);
}

template <bool trace_reduction>
void ProcessWaitingCloningAndInlining() {
  InlineWaitingBlock<trace_reduction>();
  while (!blocks_to_clone_.empty()) {
    BlockToClone item = blocks_to_clone_.back();
    blocks_to_clone_.pop_back();
    DoCloneBlock<trace_reduction>(
        item.input_block, item.added_block_phi_input, item.new_output_block);
    InlineWaitingBlock<trace_reduction>();
  }
}

template <bool trace_reduction>
void InlineWaitingBlock() {
  while (block_to_inline_now_) {
    Block* input_block = block_to_inline_now_;
    block_to_inline_now_ = nullptr;
    ScopedModification<bool> set_true(&current_block_needs_variables_, true);
    if constexpr (trace_reduction) {
      std::cout << "Inlining " << PrintAsBlockHeader{*input_block} << "\n";
    }
    VisitBlockBody<CanHavePhis::kNo, ForCloning::kNo,
```

```
trace_reduction>(
      input_block);
  }
}

template <bool trace_reduction>
void DoCloneBlock(const Block* input_block, int added_block_phi_input,
                  Block* output_block) {
  DCHECK_EQ(output_block->PredecessorCount(), 1);
  if constexpr (trace_reduction) {
    std::cout << "\nCloning old " << PrintAsBlockHeader{*input_block} << "\n";
    std::cout << "As new "
              << PrintAsBlockHeader{*output_block,
                                    Asm().output_graph().next_block_index()}
              << "\n";
  }

  ScopedModification<bool> set_true(&current_block_needs_variables_, true);

  Asm().BindReachable(output_block);
  VisitBlockBody<CanHavePhis::kYes, ForCloning::kYes, trace_reduction>(
      input_block, added_block_phi_input);

  if constexpr (trace_reduction) TraceBlockFinished();
}

void TraceReductionStart(OpIndex index) {
  std::cout << " o" << index.id() << ": "
            << PaddingSpace{5 - CountDecimalDigits(index.id())}
             << OperationPrintStyle{Asm().input_graph().Get(index), "#o"}
            << "\n";
}
void TraceOperationSkipped() { std::cout << "> skipped\n\n"; }
void TraceBlockUnreachable() { std::cout << "> unreachable\n\n"; }
void TraceReductionResult(Block* current_block, OpIndex first_output_index,
                          OpIndex new_index) {
  if (new_index < first_output_index) {
    // The operation was replaced with an already existing one.
    std::cout << "> #n" << new_index.id() << "\n";
  }
  bool before_arrow = new_index >= first_output_index;
  for (const Operation& op : Asm().output_graph().operations(
          first_output_index, Asm().output_graph().next_operation_index())) {
    OpIndex index = Asm().output_graph().Index(op);
    const char* prefix;
    if (index == new_index) {
      prefix = ">";
      before_arrow = false;
```

```
    } else if (before_arrow) {
      prefix = "  ";
    } else {

  prefix = "   ";
    }
    std::cout << prefix << " n" << index.id() << ": "
              << PaddingSpace{5 - CountDecimalDigits(index.id())}
              << OperationPrintStyle{Asm().output_graph().Get(index), "#n"}
              << "\n";
    if (op.IsBlockTerminator() && Asm().current_block() &&
        Asm().current_block() != current_block) {
      current_block = &Asm().output_graph().Get(
          BlockIndex(current_block->index().id() + 1));
      std::cout << "new " << PrintAsBlockHeader{*current_block} << "\n";
    }
  }
  std::cout << "\n";
}
void TraceBlockFinished() { std::cout << "\n"; }

// These functions take an operation from the old graph and use the assembler
// to emit a corresponding operation in the new graph, translating inputs and
// blocks accordingly.
V8_INLINE OpIndex AssembleOutputGraphGoto(const GotoOp& op) {
  Block* destination = MapToNewGraph(op.destination);
  if (op.is_backedge) {
    DCHECK(destination->IsBound());
     DCHECK(destination->IsLoop());
    FixLoopPhis(op.destination);
  }
  // It is important that we first fix loop phis and then reduce the `Goto`,
  // because reducing the `Goto` can have side effects, in particular, it can
  // modify affect the SnapshotTable of `VariableReducer`, which is also used
  // by `FixLoopPhis()`.
  Asm().ReduceGoto(destination, op.is_backedge);
  return OpIndex::Invalid();
}
V8_INLINE OpIndex AssembleOutputGraphBranch(const BranchOp& op) {
  Block* if_true = MapToNewGraph(op.if_true);
  Block* if_false = MapToNewGraph(op.if_false);
  return Asm().ReduceBranch(MapToNewGraph(op.condition()), if_true, if_false,
                            op.hint);
}
OpIndex AssembleOutputGraphSwitch(const SwitchOp& op) {
  base::SmallVector<SwitchOp::Case, 16> cases;
  for (SwitchOp::Case c : op.cases) {
    cases.emplace_back(c.value, MapToNewGraph(c.destination), c.hint);
```

```
  }
  return Asm().ReduceSwitch(
      MapToNewGraph(op.input()),
       Asm().graph_zone()->CloneVector(base::VectorOf(cases)),
      MapToNewGraph(op.default_case), op.default_hint);
}
OpIndex AssembleOutputGraphPhi(const PhiOp& op) {
  if (op.input_count == 1) {
    // If, in the previous CopyingPhase, a loop header was turned into a
    // regular blocks, its PendingLoopPhis became Phis with a single input. We
    // can now just get rid of these Phis.
    return MapToNewGraph(op.input(0));
  }

  OpIndex ig_index = Asm().input_graph().Index(op);
  if (Asm().current_block()->IsLoop()) {
    DCHECK_EQ(op.input_count, 2);
    if (ig_index == op.input(PhiOp::kLoopPhiBackEdgeIndex)) {
      // Avoid emitting a Loop Phi which points to itself, instead
      // emit it's 0'th input.
      return MapToNewGraph(op.input(0));
    }
    return Asm().PendingLoopPhi(MapToNewGraph(op.input(0)), op.rep);
  }

  base::Vector<const OpIndex> old_inputs = op.inputs();
  base::SmallVector<OpIndex, 64>
new_inputs;
  int predecessor_count = Asm().current_block()->PredecessorCount();
  Block* old_pred = current_input_block_->LastPredecessor();
  Block* new_pred = Asm().current_block()->LastPredecessor();
  // Control predecessors might be missing after the optimization phase. So we
  // need to skip phi inputs that belong to control predecessors that have no
  // equivalent in the new graph.

  // We first assume that the order if the predecessors of the current block
  // did not change. If it did, {new_pred} won't be nullptr at the end of this
  // loop, and we'll instead fall back to the slower code below to compute the
  // inputs of the Phi.
  int predecessor_index = predecessor_count - 1;
  for (OpIndex input : base::Reversed(old_inputs)) {
    if (new_pred && new_pred->OriginForBlockEnd() == old_pred) {
      // Phis inputs have to come from predecessors. We thus have to
      // MapToNewGraph with {predecessor_index} so that we get an OpIndex that
       // is from a predecessor rather than one that comes from a Variable
      // merged in the current block.
      new_inputs.push_back(MapToNewGraph(input, predecessor_index));
      new_pred = new_pred->NeighboringPredecessor();
```

```
      predecessor_index--;
    }
    old_pred = old_pred->NeighboringPredecessor();
  }
  DCHECK_IMPLIES(new_pred == nullptr, old_pred == nullptr);

  if (new_pred != nullptr) {
    // If {new_pred} is not nullptr, then the order of the predecessors
    // changed. This should only happen with blocks that were introduced in
    // the previous graph. For instance, consider this (partial) dominator
    // tree:
    //
    //      7
    //       8
    //       10
    //      9
    //      11
    //
    // Where the predecessors of block 11 are blocks 9 and 10 (in that order).
    // In dominator visit order, block 10 will be visited before block 9.
    // Since blocks are added to predecessors when the predecessors
 are
    // visited, it means that in the new graph, the predecessors of block 11
    // are [10, 9] rather than [9, 10].
    // To account for this, we reorder the inputs of the Phi, and get rid of
    // inputs from blocks that vanished.

#ifdef DEBUG
    // To check that indices are set properly, we zap them in debug builds.
    for (auto& block : Asm().modifiable_input_graph().blocks()) {
      block.clear_custom_data();
    }
#endif
    uint32_t pos = current_input_block_->PredecessorCount() - 1;
    for (old_pred = current_input_block_->LastPredecessor();
         old_pred != nullptr; old_pred = old_pred->NeighboringPredecessor()) {
      // Store the current index of the {old_pred}.
      old_pred->set_custom_data(pos--, Block::CustomDataKind::kPhiInputIndex);
    }

    // Filling {new_inputs}: we iterate the new predecessors, and, for each
    // predecessor, we check the index of the input corresponding to the old
    // predecessor, and
 we put it next in {new_inputs}.
    new_inputs.clear();
    int predecessor_index = predecessor_count - 1;
    for (new_pred = Asm().current_block()->LastPredecessor();
         new_pred != nullptr; new_pred = new_pred->NeighboringPredecessor()) {
```

```
      const Block* origin = new_pred->OriginForBlockEnd();
      DCHECK_NOT_NULL(origin);
      OpIndex input = old_inputs[origin->get_custom_data(
          Block::CustomDataKind::kPhiInputIndex)];
      // Phis inputs have to come from predecessors. We thus have to
      // MapToNewGraph with {predecessor_index} so that we get an OpIndex that
      // is from a predecessor rather than one that comes from a Variable
      // merged in the current block.
      new_inputs.push_back(MapToNewGraph(input, predecessor_index));
      predecessor_index--;
    }
  }

  DCHECK_EQ(new_inputs.size(), Asm().current_block()->PredecessorCount());

  if (new_inputs.size() == 1) {
    // This Operation used to be a Phi
in a Merge, but since one (or more) of
    // the inputs of the merge have been removed, there is no need for a Phi
    // anymore.
    return new_inputs[0];
  }

  std::reverse(new_inputs.begin(), new_inputs.end());
  return Asm().ReducePhi(base::VectorOf(new_inputs), op.rep);
}
OpIndex AssembleOutputGraphPendingLoopPhi(const PendingLoopPhiOp& op) {
  UNREACHABLE();
}
V8_INLINE OpIndex AssembleOutputGraphFrameState(const FrameStateOp& op) {
  auto inputs = MapToNewGraph<32>(op.inputs());
  return Asm().ReduceFrameState(base::VectorOf(inputs), op.inlined, op.data);
}
OpIndex AssembleOutputGraphCall(const CallOp& op) {
  OpIndex callee = MapToNewGraph(op.callee());
  OptionalOpIndex frame_state = MapToNewGraph(op.frame_state());
  auto arguments = MapToNewGraph<16>(op.arguments());
  return Asm().ReduceCall(callee, frame_state, base::VectorOf(arguments),
                          op.descriptor, op.Effects());
}
OpIndex AssembleOutputGraphDidntThrow(const
DidntThrowOp& op) {
  const Operation& throwing_operation =
      Asm().input_graph().Get(op.throwing_operation());
  OpIndex result;
  switch (throwing_operation.opcode) {
#define CASE(Name)                                        \
 case Opcode::k##Name:                                    \
```

```
  result = Asm().ReduceInputGraph##Name(                          \
      op.throwing_operation(), throwing_operation.Cast<Name##Op>()); \
  break;
    TURBOSHAFT_THROWING_OPERATIONS_LIST(CASE)
#undef CASE
    default:
      UNREACHABLE();
  }
  return result;
}
OpIndex AssembleOutputGraphCheckException(const CheckExceptionOp& op) {
  Graph::OpIndexIterator it(op.didnt_throw_block->begin(),
                            &Asm().input_graph());
  Graph::OpIndexIterator end(op.didnt_throw_block->end(),
                             &Asm().input_graph());
  // To translate `CheckException` to the new graph, we reduce the throwing
   // operation (actually it's `DidntThrow` operation, but that triggers the
  // actual reduction) with a catch scope. If the reduction replaces the
  // throwing operation with other throwing operations, all of them will be
  // connected to the provided catch block. The reduction should automatically
  // bind a block that represents non-throwing control flow of the original
  // operation, so we can inline the rest of the `didnt_throw` block.
  {
    CatchScope scope(Asm(), MapToNewGraph(op.catch_block));
    DCHECK(Asm().input_graph().Get(*it).template Is<DidntThrowOp>());
    if (!Asm().InlineOp(*it, op.didnt_throw_block)) {
      return OpIndex::Invalid();
    }
    ++it;
  }
  for (; it != end; ++it) {
    // Using `InlineOp` requires that the inlined operation is not emitted
    // multiple times. This is the case here because we just removed the
    // single predecessor of `didnt_throw_block`.
    if (!Asm().InlineOp(*it, op.didnt_throw_block))
{
      break;
    }
  }
  return OpIndex::Invalid();
}

void CreateOldToNewMapping(OpIndex old_index, OpIndex new_index) {
  DCHECK(old_index.valid());
  DCHECK(Asm().input_graph().BelongsToThisGraph(old_index));
  DCHECK_IMPLIES(new_index.valid(),
                 Asm().output_graph().BelongsToThisGraph(new_index));
```

```
  if (current_block_needs_variables_) {
    MaybeVariable var = GetVariableFor(old_index);
    if (!var.has_value()) {
      MaybeRegisterRepresentation rep =
          Asm().input_graph().Get(old_index).outputs_rep().size() == 1
              ? static_cast<const MaybeRegisterRepresentation&>(
                    Asm().input_graph().Get(old_index).outputs_rep()[0])
              : MaybeRegisterRepresentation::None();
      var = Asm().NewLoopInvariantVariable(rep);
      SetVariableFor(old_index, *var);
    }
    Asm().SetVariable(*var, new_index);
    return;
  }

  DCHECK(!op_mapping_[old_index].valid());

  op_mapping_[old_index] = new_index;
}

MaybeVariable GetVariableFor(OpIndex old_index) const {
  return old_opindex_to_variables[old_index];
}

void SetVariableFor(OpIndex old_index, MaybeVariable var) {
  DCHECK(!old_opindex_to_variables[old_index].has_value());
  old_opindex_to_variables[old_index] = var;
}

void FixLoopPhis(Block* input_graph_loop) {
  DCHECK(input_graph_loop->IsLoop());
  Block* output_graph_loop = MapToNewGraph(input_graph_loop);
  DCHECK(output_graph_loop->IsLoop());
  for (const Operation& op : Asm().input_graph().operations(
           input_graph_loop->begin(), input_graph_loop->end())) {
    if (auto* input_phi = op.TryCast<PhiOp>()) {
      OpIndex phi_index =
          MapToNewGraph<true>(Asm().input_graph().Index(*input_phi));
      if (!phi_index.valid() || !output_graph_loop->Contains(phi_index)) {
        // Unused phis are skipped, so they are not be mapped to anything in
        // the new graph. If the phi is
reduced to an operation from a
        // different block, then there is no loop phi in the current loop
        // header to take care of.
        continue;
      }
      Asm().FixLoopPhi(*input_phi, phi_index, output_graph_loop);
    }
```

```
  }
}

Graph& input_graph_;

const Block* current_input_block_;

// Mappings from old OpIndices to new OpIndices.
FixedOpIndexSidetable<OpIndex> op_mapping_;

// Mappings from old blocks to new blocks.
FixedBlockSidetable<Block*> block_mapping_;

// {current_block_needs_variables_} is set to true if the current block should
// use Variables to map old to new OpIndex rather than just {op_mapping}. This
// is typically the case when the block has been cloned.
bool current_block_needs_variables_ = false;

// When {turn_loop_without_backedge_into_merge_} is true (the default), when
// processing an input block that ended with a loop backedge but doesn't
// anymore, the loop header is turned into a regular merge. This
can be turned
// off when unrolling a loop for instance.
bool turn_loop_without_backedge_into_merge_ = true;

// Set of Blocks for which Variables should be used rather than
// {op_mapping}.
BitVector blocks_needing_variables_;

// Mapping from old OpIndex to Variables.
FixedOpIndexSidetable<MaybeVariable> old_opindex_to_variables;

// When the last operation of a Block is a Goto to a Block with a single
// predecessor, we always inline the destination into the current block. To
// avoid making this process recursive (which could lead to stack overflows),
// we set the variable {block_to_inline_now_} instead. Right after we're done
// visiting a Block, the function ProcessWaitingCloningAndInlining will inline
// {block_to_inline_now_} (if it's set) in a non-recursive way.
Block* block_to_inline_now_ = nullptr;

// When a Reducer wants to clone a block (for instance,
// BranchEliminationReducer, in order to remove Phis or to replace a Branch by
// a
Goto), this block is not cloned right away, in order to avoid recursion
// (which could lead to stack overflows). Instead, we add this block to
// {blocks_to_clone_}. Right after we're done visiting a Block, the function
// ProcessWaitingCloningAndInlining will actually clone the blocks in
// {blocks_to_clone_} in a non-recursive way.
```

```
 struct BlockToClone {
   const Block* input_block;
   int added_block_phi_input;
   Block* new_output_block;
 };
 ZoneVector<BlockToClone> blocks_to_clone_;

#ifdef DEBUG
 // Recursively inlining blocks is still allowed (mainly for
 // LoopUnrollingReducer), but it shouldn't be actually recursive. This is
 // checked by the {is_in_recursive_inlining_}, which is set to true while
 // recursively inlining a block. Trying to inline a block while
 // {is_in_recursive_inlining_} is true will lead to a DCHECK failure.
 bool is_in_recursive_inlining_ = false;
#endif
};

template <template <class> class... Reducers>
class TSAssembler;

template
 <template <class> class... Reducers>
class CopyingPhaseImpl {
public:
 static void Run(Graph& input_graph, Zone* phase_zone,
                 bool trace_reductions = false) {
   TSAssembler<GraphVisitor, Reducers...> phase(
       input_graph, input_graph.GetOrCreateCompanion(), phase_zone);
#ifdef DEBUG
   if (trace_reductions) {
     phase.template VisitGraph<true>();
   } else {
     phase.template VisitGraph<false>();
   }
#else
   phase.template VisitGraph<false>();
#endif  // DEBUG
 }
};

template <template <typename> typename... Reducers>
class CopyingPhase {
public:
 static void Run(Zone* phase_zone) {
   PipelineData& data = PipelineData::Get();
   Graph& input_graph = data.graph();
   CopyingPhaseImpl<Reducers...>::Run(
       input_graph, phase_zone, data.info()->turboshaft_trace_reduction());
```

```
 }
};

}  // namespace v8::internal::compiler::turboshaft

#endif  // V8_COMPILER_TURBOSHAFT_COPYING_PHASE_H_
<!-- DO NOT EDIT! Generated by `%(generating_script_filename)s --spec %(spec_directory)s/` -->
```

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Version 1.0.0

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```
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*/

#include "crypto/ec.h"
#include "internal/der.h"
```

```
/* Well known OIDs precompiled */
/* clang-format off */

/*
* sm2-with-SM3 OBJECT IDENTIFIER ::= { sm-scheme 501 }
*/
#define DER_OID_V_sm2_with_SM3 DER_P_OBJECT, 8, 0x2A, 0x81, 0x1C, 0xCF, 0x55, 0x01, 0x83, 0x75
#define DER_OID_SZ_sm2_with_SM3 10
extern const unsigned char ossl_der_oid_sm2_with_SM3[DER_OID_SZ_sm2_with_SM3];

/*
* curveSM2 OBJECT IDENTIFIER ::= { sm-scheme 301 }
*/
#define DER_OID_V_curveSM2 DER_P_OBJECT, 8, 0x2A, 0x81, 0x1C, 0xCF, 0x55, 0x01, 0x82, 0x2D
#define DER_OID_SZ_curveSM2 10
extern
 const unsigned char ossl_der_oid_curveSM2[DER_OID_SZ_curveSM2];

/* clang-format on */

/* Subject Public Key Info */
int ossl_DER_w_algorithmIdentifier_SM2(WPACKET *pkt, int cont, EC_KEY *ec);
/* Signature */
int ossl_DER_w_algorithmIdentifier_SM2_with_MD(WPACKET *pkt, int cont,
   EC_KEY *ec, int mdnid);
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from providers/common/include/prov/der_ml_dsa.h.in
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*/

#include "internal/der.h"
#include "crypto/ml_dsa.h"

/* Well known OIDs precompiled */
/* clang-format off */

/*
* id-ml-dsa-44 OBJECT IDENTIFIER ::= { sigAlgs 17 }
*/
#define DER_OID_V_id_ml_dsa_44 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x03, 0x11
#define DER_OID_SZ_id_ml_dsa_44 11
extern const unsigned char ossl_der_oid_id_ml_dsa_44[DER_OID_SZ_id_ml_dsa_44];

/*
* id-ml-dsa-65 OBJECT IDENTIFIER ::= { sigAlgs 18 }
*/
#define DER_OID_V_id_ml_dsa_65 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x03, 0x12
#define DER_OID_SZ_id_ml_dsa_65
 11
extern const unsigned char ossl_der_oid_id_ml_dsa_65[DER_OID_SZ_id_ml_dsa_65];

/*
* id-ml-dsa-87 OBJECT IDENTIFIER ::= { sigAlgs 19 }
*/
#define DER_OID_V_id_ml_dsa_87 DER_P_OBJECT, 9, 0x60, 0x86, 0x48, 0x01, 0x65, 0x03, 0x04, 0x03, 0x13
#define DER_OID_SZ_id_ml_dsa_87 11
extern const unsigned char ossl_der_oid_id_ml_dsa_87[DER_OID_SZ_id_ml_dsa_87];

/* clang-format on */
```

int ossl_DER_w_algorithmIdentifier_ML_DSA(WPACKET *pkt, int tag, ML_DSA_KEY *key);
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*/

#ifndef UV_BSD_H
#define UV_BSD_H

#define UV_PLATFORM_FS_EVENT_FIELDS                                   \
 uv__io_t event_watcher;                                              \

#define UV_IO_PRIVATE_PLATFORM_FIELDS                                 \
 int rcount;                                                          \
 int wcount;                                                          \

#define UV_HAVE_KQUEUE 1

#endif /* UV_BSD_H */
```

This license applies to all parts of V8 that are not externally
maintained libraries.  The externally maintained libraries used by V8
are:

- PCRE test suite, located in
  test/mjsunit/third_party/regexp-pcre/regexp-pcre.js.  This is based on the
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- Layout tests, located in test/mjsunit/third_party/object-keys.  These are
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- Strongtalk assembler, the basis of the files assembler-arm-inl.h,
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- Valgrind client API header, located at src/third_party/valgrind/valgrind.h
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- The Wasm C/C++ API headers, located at third_party/wasm-api/wasm.{h,hh}
  This is released under the Apache license. The API's upstream prototype
  implementation also formed the basis of V8's implementation in
  src/wasm/c-api.cc.

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#ifndef SRC_PERMISSION_WASI_PERMISSION_H_
#define SRC_PERMISSION_WASI_PERMISSION_H_

#if defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS

```
#include <vector>
#include "permission/permission_base.h"

namespace node {

namespace permission {

class WASIPermission final : public PermissionBase {
public:
 void Apply(Environment* env,
           const std::vector<std::string>& allow,
           PermissionScope scope) override;
 bool is_granted(Environment* env,
               PermissionScope perm,
               const std::string_view& param = "") const override;

private:
 bool deny_all_;
};

}  // namespace permission

}  // namespace node

#endif  // defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
#endif  // SRC_PERMISSION_WASI_PERMISSION_H_
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```
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*/
/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_CORE_NAMES_H
#define OPENSSL_CORE_NAMES_H
#pragma once

#ifdef __cplusplus
extern "C" {
#endif

/* OSSL_CIPHER_PARAM_CTS_MODE Values */
#define OSSL_CIPHER_CTS_MODE_CS1 "CS1"
#define OSSL_CIPHER_CTS_MODE_CS2 "CS2"
#define OSSL_CIPHER_CTS_MODE_CS3 "CS3"

/* Known CIPHER names (not a complete list) */
#define OSSL_CIPHER_NAME_AES_128_GCM_SIV "AES-128-GCM-SIV"
#define OSSL_CIPHER_NAME_AES_192_GCM_SIV "AES-192-GCM-SIV"
#define OSSL_CIPHER_NAME_AES_256_GCM_SIV "AES-256-GCM-SIV"

/* Known DIGEST names (not a complete
 list) */
#define OSSL_DIGEST_NAME_MD5 "MD5"
#define OSSL_DIGEST_NAME_MD5_SHA1 "MD5-SHA1"
#define OSSL_DIGEST_NAME_SHA1 "SHA1"
#define OSSL_DIGEST_NAME_SHA2_224 "SHA2-224"
#define OSSL_DIGEST_NAME_SHA2_256 "SHA2-256"
#define OSSL_DIGEST_NAME_SHA2_256_192 "SHA2-256/192"
#define OSSL_DIGEST_NAME_SHA2_384 "SHA2-384"
#define OSSL_DIGEST_NAME_SHA2_512 "SHA2-512"
#define OSSL_DIGEST_NAME_SHA2_512_224 "SHA2-512/224"
#define OSSL_DIGEST_NAME_SHA2_512_256 "SHA2-512/256"
#define OSSL_DIGEST_NAME_MD2 "MD2"
#define OSSL_DIGEST_NAME_MD4 "MD4"
#define OSSL_DIGEST_NAME_MDC2 "MDC2"
#define OSSL_DIGEST_NAME_RIPEMD160 "RIPEMD160"
#define OSSL_DIGEST_NAME_SHA3_224 "SHA3-224"
#define OSSL_DIGEST_NAME_SHA3_256 "SHA3-256"
#define OSSL_DIGEST_NAME_SHA3_384 "SHA3-384"
#define OSSL_DIGEST_NAME_SHA3_512 "SHA3-512"
#define OSSL_DIGEST_NAME_KECCAK_KMAC128 "KECCAK-KMAC-128"
```

```
#define OSSL_DIGEST_NAME_KECCAK_KMAC256 "KECCAK-KMAC-256"
#define OSSL_DIGEST_NAME_SM3 "SM3"

/* Known MAC names */
#define OSSL_MAC_NAME_BLAKE2BMAC
 "BLAKE2BMAC"
#define OSSL_MAC_NAME_BLAKE2SMAC "BLAKE2SMAC"
#define OSSL_MAC_NAME_CMAC "CMAC"
#define OSSL_MAC_NAME_GMAC "GMAC"
#define OSSL_MAC_NAME_HMAC "HMAC"
#define OSSL_MAC_NAME_KMAC128 "KMAC128"
#define OSSL_MAC_NAME_KMAC256 "KMAC256"
#define OSSL_MAC_NAME_POLY1305 "POLY1305"
#define OSSL_MAC_NAME_SIPHASH "SIPHASH"

/* Known KDF names */
#define OSSL_KDF_NAME_HKDF "HKDF"
#define OSSL_KDF_NAME_TLS1_3_KDF "TLS13-KDF"
#define OSSL_KDF_NAME_PBKDF1 "PBKDF1"
#define OSSL_KDF_NAME_PBKDF2 "PBKDF2"
#define OSSL_KDF_NAME_SCRYPT "SCRYPT"
#define OSSL_KDF_NAME_SSHKDF "SSHKDF"
#define OSSL_KDF_NAME_SSKDF "SSKDF"
#define OSSL_KDF_NAME_TLS1_PRF "TLS1-PRF"
#define OSSL_KDF_NAME_X942KDF_ASN1 "X942KDF-ASN1"
#define OSSL_KDF_NAME_X942KDF_CONCAT "X942KDF-CONCAT"
#define OSSL_KDF_NAME_X963KDF "X963KDF"
#define OSSL_KDF_NAME_KBKDF "KBKDF"
#define OSSL_KDF_NAME_KRB5KDF "KRB5KDF"
#define OSSL_KDF_NAME_HMACDRBGKDF "HMAC-DRBG-KDF"

/* RSA padding modes */
#define OSSL_PKEY_RSA_PAD_MODE_NONE "none"
#define
 OSSL_PKEY_RSA_PAD_MODE_PKCSV15 "pkcs1"
#define OSSL_PKEY_RSA_PAD_MODE_OAEP "oaep"
#define OSSL_PKEY_RSA_PAD_MODE_X931 "x931"
#define OSSL_PKEY_RSA_PAD_MODE_PSS "pss"

/* RSA pss padding salt length */
#define OSSL_PKEY_RSA_PSS_SALT_LEN_DIGEST "digest"
#define OSSL_PKEY_RSA_PSS_SALT_LEN_MAX "max"
#define OSSL_PKEY_RSA_PSS_SALT_LEN_AUTO "auto"
#define OSSL_PKEY_RSA_PSS_SALT_LEN_AUTO_DIGEST_MAX "auto-digestmax"

/* OSSL_PKEY_PARAM_EC_ENCODING values */
#define OSSL_PKEY_EC_ENCODING_EXPLICIT "explicit"
#define OSSL_PKEY_EC_ENCODING_GROUP "named_curve"
```

```
#define OSSL_PKEY_EC_POINT_CONVERSION_FORMAT_UNCOMPRESSED "uncompressed"
#define OSSL_PKEY_EC_POINT_CONVERSION_FORMAT_COMPRESSED "compressed"
#define OSSL_PKEY_EC_POINT_CONVERSION_FORMAT_HYBRID "hybrid"

#define OSSL_PKEY_EC_GROUP_CHECK_DEFAULT "default"
#define OSSL_PKEY_EC_GROUP_CHECK_NAMED "named"
#define OSSL_PKEY_EC_GROUP_CHECK_NAMED_NIST "named-nist"

/* PROV_SKEY well known key types */
#define OSSL_SKEY_TYPE_GENERIC "GENERIC-SECRET"
#define
 OSSL_SKEY_TYPE_AES "AES"

/* OSSL_KEM_PARAM_OPERATION values */
#define OSSL_KEM_PARAM_OPERATION_RSASVE "RSASVE"
#define OSSL_KEM_PARAM_OPERATION_DHKEM "DHKEM"

/* Provider configuration variables */
#define OSSL_PKEY_RETAIN_SEED "pkey_retain_seed"

/* Parameter name definitions - generated by util/perl/OpenSSL/paramnames.pm */
/* clang-format off */
# define OSSL_ALG_PARAM_ALGORITHM_ID "algorithm-id"
# define OSSL_ALG_PARAM_ALGORITHM_ID_PARAMS "algorithm-id-params"
# define OSSL_ALG_PARAM_CIPHER "cipher"
# define OSSL_ALG_PARAM_DIGEST "digest"
# define OSSL_ALG_PARAM_ENGINE "engine"
# define OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR "fips-indicator"
# define OSSL_ALG_PARAM_MAC "mac"
# define OSSL_ALG_PARAM_PROPERTIES "properties"
# define OSSL_ASYM_CIPHER_PARAM_DIGEST OSSL_PKEY_PARAM_DIGEST
# define OSSL_ASYM_CIPHER_PARAM_ENGINE OSSL_PKEY_PARAM_ENGINE
# define OSSL_ASYM_CIPHER_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_ASYM_CIPHER_PARAM_FIPS_KEY_CHECK
 OSSL_PKEY_PARAM_FIPS_KEY_CHECK
# define OSSL_ASYM_CIPHER_PARAM_FIPS_RSA_PKCS15_PAD_DISABLED
OSSL_PROV_PARAM_RSA_PKCS15_PAD_DISABLED
# define OSSL_ASYM_CIPHER_PARAM_IMPLICIT_REJECTION "implicit-rejection"
# define OSSL_ASYM_CIPHER_PARAM_MGF1_DIGEST OSSL_PKEY_PARAM_MGF1_DIGEST
# define OSSL_ASYM_CIPHER_PARAM_MGF1_DIGEST_PROPS
OSSL_PKEY_PARAM_MGF1_PROPERTIES
# define OSSL_ASYM_CIPHER_PARAM_OAEP_DIGEST OSSL_ALG_PARAM_DIGEST
# define OSSL_ASYM_CIPHER_PARAM_OAEP_DIGEST_PROPS "digest-props"
# define OSSL_ASYM_CIPHER_PARAM_OAEP_LABEL "oaep-label"
# define OSSL_ASYM_CIPHER_PARAM_PAD_MODE OSSL_PKEY_PARAM_PAD_MODE
# define OSSL_ASYM_CIPHER_PARAM_PROPERTIES OSSL_PKEY_PARAM_PROPERTIES
```

```
# define OSSL_ASYM_CIPHER_PARAM_TLS_CLIENT_VERSION "tls-client-version"
# define OSSL_ASYM_CIPHER_PARAM_TLS_NEGOTIATED_VERSION "tls-negotiated-version"
# define OSSL_CAPABILITY_TLS_GROUP_ALG "tls-group-alg"
# define OSSL_CAPABILITY_TLS_GROUP_ID "tls-group-id"
# define OSSL_CAPABILITY_TLS_GROUP_IS_KEM
 "tls-group-is-kem"
# define OSSL_CAPABILITY_TLS_GROUP_MAX_DTLS "tls-max-dtls"
# define OSSL_CAPABILITY_TLS_GROUP_MAX_TLS "tls-max-tls"
# define OSSL_CAPABILITY_TLS_GROUP_MIN_DTLS "tls-min-dtls"
# define OSSL_CAPABILITY_TLS_GROUP_MIN_TLS "tls-min-tls"
# define OSSL_CAPABILITY_TLS_GROUP_NAME "tls-group-name"
# define OSSL_CAPABILITY_TLS_GROUP_NAME_INTERNAL "tls-group-name-internal"
# define OSSL_CAPABILITY_TLS_GROUP_SECURITY_BITS "tls-group-sec-bits"
# define OSSL_CAPABILITY_TLS_SIGALG_CODE_POINT "tls-sigalg-code-point"
# define OSSL_CAPABILITY_TLS_SIGALG_HASH_NAME "tls-sigalg-hash-name"
# define OSSL_CAPABILITY_TLS_SIGALG_HASH_OID "tls-sigalg-hash-oid"
# define OSSL_CAPABILITY_TLS_SIGALG_IANA_NAME "tls-sigalg-iana-name"
# define OSSL_CAPABILITY_TLS_SIGALG_KEYTYPE "tls-sigalg-keytype"
# define OSSL_CAPABILITY_TLS_SIGALG_KEYTYPE_OID "tls-sigalg-keytype-oid"
# define OSSL_CAPABILITY_TLS_SIGALG_MAX_DTLS "tls-max-dtls"
# define OSSL_CAPABILITY_TLS_SIGALG_MAX_TLS "tls-max-tls"
# define
 OSSL_CAPABILITY_TLS_SIGALG_MIN_DTLS "tls-min-dtls"
# define OSSL_CAPABILITY_TLS_SIGALG_MIN_TLS "tls-min-tls"
# define OSSL_CAPABILITY_TLS_SIGALG_NAME "tls-sigalg-name"
# define OSSL_CAPABILITY_TLS_SIGALG_OID "tls-sigalg-oid"
# define OSSL_CAPABILITY_TLS_SIGALG_SECURITY_BITS "tls-sigalg-sec-bits"
# define OSSL_CAPABILITY_TLS_SIGALG_SIG_NAME "tls-sigalg-sig-name"
# define OSSL_CAPABILITY_TLS_SIGALG_SIG_OID "tls-sigalg-sig-oid"
# define OSSL_CIPHER_PARAM_AEAD "aead"
# define OSSL_CIPHER_PARAM_AEAD_IVLEN OSSL_CIPHER_PARAM_IVLEN
# define OSSL_CIPHER_PARAM_AEAD_IV_GENERATED "iv-generated"
# define OSSL_CIPHER_PARAM_AEAD_MAC_KEY "mackey"
# define OSSL_CIPHER_PARAM_AEAD_TAG "tag"
# define OSSL_CIPHER_PARAM_AEAD_TAGLEN "taglen"
# define OSSL_CIPHER_PARAM_AEAD_TLS1_AAD "tlsaad"
# define OSSL_CIPHER_PARAM_AEAD_TLS1_AAD_PAD "tlsaadpad"
# define OSSL_CIPHER_PARAM_AEAD_TLS1_GET_IV_GEN "tlsivgen"
# define OSSL_CIPHER_PARAM_AEAD_TLS1_IV_FIXED "tlsivfixed"
# define OSSL_CIPHER_PARAM_AEAD_TLS1_SET_IV_INV
 "tlsivinv"
# define OSSL_CIPHER_PARAM_ALGORITHM_ID OSSL_ALG_PARAM_ALGORITHM_ID
# define OSSL_CIPHER_PARAM_ALGORITHM_ID_PARAMS
OSSL_ALG_PARAM_ALGORITHM_ID_PARAMS
# define OSSL_CIPHER_PARAM_ALGORITHM_ID_PARAMS_OLD "alg_id_param"
# define OSSL_CIPHER_PARAM_BLOCK_SIZE "blocksize"
# define OSSL_CIPHER_PARAM_CTS "cts"
# define OSSL_CIPHER_PARAM_CTS_MODE "cts_mode"
```

```
# define OSSL_CIPHER_PARAM_CUSTOM_IV "custom-iv"
# define OSSL_CIPHER_PARAM_DECRYPT_ONLY "decrypt-only"
# define OSSL_CIPHER_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_CIPHER_PARAM_FIPS_ENCRYPT_CHECK "encrypt-check"
# define OSSL_CIPHER_PARAM_HAS_RAND_KEY "has-randkey"
# define OSSL_CIPHER_PARAM_IV "iv"
# define OSSL_CIPHER_PARAM_IVLEN "ivlen"
# define OSSL_CIPHER_PARAM_KEYLEN "keylen"
# define OSSL_CIPHER_PARAM_MODE "mode"
# define OSSL_CIPHER_PARAM_NUM "num"
# define OSSL_CIPHER_PARAM_PADDING "padding"
# define OSSL_CIPHER_PARAM_PIPELINE_AEAD_TAG "pipeline-tag"
# define OSSL_CIPHER_PARAM_RANDOM_KEY
 "randkey"
# define OSSL_CIPHER_PARAM_RC2_KEYBITS "keybits"
# define OSSL_CIPHER_PARAM_ROUNDS "rounds"
# define OSSL_CIPHER_PARAM_SPEED "speed"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK "tls-multi"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK_AAD "tls1multi_aad"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK_AAD_PACKLEN "tls1multi_aadpacklen"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK_ENC "tls1multi_enc"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK_ENC_IN "tls1multi_encin"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK_ENC_LEN "tls1multi_enclen"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK_INTERLEAVE "tls1multi_interleave"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK_MAX_BUFSIZE "tls1multi_maxbufsz"
# define OSSL_CIPHER_PARAM_TLS1_MULTIBLOCK_MAX_SEND_FRAGMENT "tls1multi_maxsndfrag"
# define OSSL_CIPHER_PARAM_TLS_MAC "tls-mac"
# define OSSL_CIPHER_PARAM_TLS_MAC_SIZE "tls-mac-size"
# define OSSL_CIPHER_PARAM_TLS_VERSION "tls-version"
# define OSSL_CIPHER_PARAM_UPDATED_IV "updated-iv"
# define
 OSSL_CIPHER_PARAM_USE_BITS "use-bits"
# define OSSL_CIPHER_PARAM_XTS_STANDARD "xts_standard"
# define OSSL_DECODER_PARAM_PROPERTIES OSSL_ALG_PARAM_PROPERTIES
# define OSSL_DIGEST_PARAM_ALGID_ABSENT "algid-absent"
# define OSSL_DIGEST_PARAM_BLOCK_SIZE "blocksize"
# define OSSL_DIGEST_PARAM_MICALG "micalg"
# define OSSL_DIGEST_PARAM_PAD_TYPE "pad-type"
# define OSSL_DIGEST_PARAM_SIZE "size"
# define OSSL_DIGEST_PARAM_SSL3_MS "ssl3-ms"
# define OSSL_DIGEST_PARAM_XOF "xof"
# define OSSL_DIGEST_PARAM_XOFLEN "xoflen"
# define OSSL_DRBG_PARAM_CIPHER OSSL_ALG_PARAM_CIPHER
# define OSSL_DRBG_PARAM_DIGEST OSSL_ALG_PARAM_DIGEST
# define OSSL_DRBG_PARAM_ENTROPY_REQUIRED "entropy_required"
# define OSSL_DRBG_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
```

```
# define OSSL_DRBG_PARAM_FIPS_DIGEST_CHECK OSSL_PKEY_PARAM_FIPS_DIGEST_CHECK
# define OSSL_DRBG_PARAM_MAC OSSL_ALG_PARAM_MAC
# define OSSL_DRBG_PARAM_MAX_ADINLEN "max_adinlen"
# define OSSL_DRBG_PARAM_MAX_ENTROPYLEN "max_entropylen"
#
 define OSSL_DRBG_PARAM_MAX_LENGTH "maxium_length"
# define OSSL_DRBG_PARAM_MAX_NONCELEN "max_noncelen"
# define OSSL_DRBG_PARAM_MAX_PERSLEN "max_perslen"
# define OSSL_DRBG_PARAM_MIN_ENTROPYLEN "min_entropylen"
# define OSSL_DRBG_PARAM_MIN_LENGTH "minium_length"
# define OSSL_DRBG_PARAM_MIN_NONCELEN "min_noncelen"
# define OSSL_DRBG_PARAM_PREDICTION_RESISTANCE "prediction_resistance"
# define OSSL_DRBG_PARAM_PROPERTIES OSSL_ALG_PARAM_PROPERTIES
# define OSSL_DRBG_PARAM_RANDOM_DATA "random_data"
# define OSSL_DRBG_PARAM_RESEED_COUNTER "reseed_counter"
# define OSSL_DRBG_PARAM_RESEED_REQUESTS "reseed_requests"
# define OSSL_DRBG_PARAM_RESEED_TIME "reseed_time"
# define OSSL_DRBG_PARAM_RESEED_TIME_INTERVAL "reseed_time_interval"
# define OSSL_DRBG_PARAM_SIZE "size"
# define OSSL_DRBG_PARAM_USE_DF "use_derivation_function"
# define OSSL_ENCODER_PARAM_CIPHER OSSL_ALG_PARAM_CIPHER
# define OSSL_ENCODER_PARAM_ENCRYPT_LEVEL "encrypt-level"
# define OSSL_ENCODER_PARAM_PROPERTIES OSSL_ALG_PARAM_PROPERTIES
#
 define OSSL_ENCODER_PARAM_SAVE_PARAMETERS "save-parameters"
# define OSSL_EXCHANGE_PARAM_EC_ECDH_COFACTOR_MODE "ecdh-cofactor-mode"
# define OSSL_EXCHANGE_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_EXCHANGE_PARAM_FIPS_DIGEST_CHECK OSSL_PKEY_PARAM_FIPS_DIGEST_CHECK
# define OSSL_EXCHANGE_PARAM_FIPS_ECDH_COFACTOR_CHECK
OSSL_PROV_PARAM_ECDH_COFACTOR_CHECK
# define OSSL_EXCHANGE_PARAM_FIPS_KEY_CHECK OSSL_PKEY_PARAM_FIPS_KEY_CHECK
# define OSSL_EXCHANGE_PARAM_KDF_DIGEST "kdf-digest"
# define OSSL_EXCHANGE_PARAM_KDF_DIGEST_PROPS "kdf-digest-props"
# define OSSL_EXCHANGE_PARAM_KDF_OUTLEN "kdf-outlen"
# define OSSL_EXCHANGE_PARAM_KDF_TYPE "kdf-type"
# define OSSL_EXCHANGE_PARAM_KDF_UKM "kdf-ukm"
# define OSSL_EXCHANGE_PARAM_PAD "pad"
# define OSSL_GEN_PARAM_ITERATION "iteration"
# define OSSL_GEN_PARAM_POTENTIAL "potential"
# define OSSL_KDF_PARAM_ARGON2_AD "ad"
# define OSSL_KDF_PARAM_ARGON2_LANES "lanes"
# define OSSL_KDF_PARAM_ARGON2_MEMCOST
 "memcost"
# define OSSL_KDF_PARAM_ARGON2_VERSION "version"
# define OSSL_KDF_PARAM_CEK_ALG "cekalg"
# define OSSL_KDF_PARAM_CIPHER OSSL_ALG_PARAM_CIPHER
# define OSSL_KDF_PARAM_CONSTANT "constant"
```

```
# define OSSL_KDF_PARAM_DATA "data"
# define OSSL_KDF_PARAM_DIGEST OSSL_ALG_PARAM_DIGEST
# define OSSL_KDF_PARAM_EARLY_CLEAN "early_clean"
# define OSSL_KDF_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_KDF_PARAM_FIPS_DIGEST_CHECK OSSL_PKEY_PARAM_FIPS_DIGEST_CHECK
# define OSSL_KDF_PARAM_FIPS_EMS_CHECK "ems_check"
# define OSSL_KDF_PARAM_FIPS_KEY_CHECK OSSL_PKEY_PARAM_FIPS_KEY_CHECK
# define OSSL_KDF_PARAM_HMACDRBG_ENTROPY "entropy"
# define OSSL_KDF_PARAM_HMACDRBG_NONCE "nonce"
# define OSSL_KDF_PARAM_INFO "info"
# define OSSL_KDF_PARAM_ITER "iter"
# define OSSL_KDF_PARAM_KBKDF_R "r"
# define OSSL_KDF_PARAM_KBKDF_USE_L "use-l"
# define OSSL_KDF_PARAM_KBKDF_USE_SEPARATOR "use-separator"
# define OSSL_KDF_PARAM_KEY "key"
# define OSSL_KDF_PARAM_LABEL
 "label"
# define OSSL_KDF_PARAM_MAC OSSL_ALG_PARAM_MAC
# define OSSL_KDF_PARAM_MAC_SIZE "maclen"
# define OSSL_KDF_PARAM_MODE "mode"
# define OSSL_KDF_PARAM_PASSWORD "pass"
# define OSSL_KDF_PARAM_PKCS12_ID "id"
# define OSSL_KDF_PARAM_PKCS5 "pkcs5"
# define OSSL_KDF_PARAM_PREFIX "prefix"
# define OSSL_KDF_PARAM_PROPERTIES OSSL_ALG_PARAM_PROPERTIES
# define OSSL_KDF_PARAM_SALT "salt"
# define OSSL_KDF_PARAM_SCRYPT_MAXMEM "maxmem_bytes"
# define OSSL_KDF_PARAM_SCRYPT_N "n"
# define OSSL_KDF_PARAM_SCRYPT_P "p"
# define OSSL_KDF_PARAM_SCRYPT_R "r"
# define OSSL_KDF_PARAM_SECRET "secret"
# define OSSL_KDF_PARAM_SEED "seed"
# define OSSL_KDF_PARAM_SIZE "size"
# define OSSL_KDF_PARAM_SSHKDF_SESSION_ID "session_id"
# define OSSL_KDF_PARAM_SSHKDF_TYPE "type"
# define OSSL_KDF_PARAM_SSHKDF_XCGHASH "xcghash"
# define OSSL_KDF_PARAM_THREADS "threads"
# define OSSL_KDF_PARAM_UKM "ukm"
# define OSSL_KDF_PARAM_X942_ACVPINFO "acvp-info"
# define OSSL_KDF_PARAM_X942_PARTYUINFO "partyu-info"
#
 define OSSL_KDF_PARAM_X942_PARTYVINFO "partyv-info"
# define OSSL_KDF_PARAM_X942_SUPP_PRIVINFO "supp-privinfo"
# define OSSL_KDF_PARAM_X942_SUPP_PUBINFO "supp-pubinfo"
# define OSSL_KDF_PARAM_X942_USE_KEYBITS "use-keybits"
# define OSSL_KEM_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
```

```
# define OSSL_KEM_PARAM_FIPS_KEY_CHECK OSSL_PKEY_PARAM_FIPS_KEY_CHECK
# define OSSL_KEM_PARAM_IKME "ikme"
# define OSSL_KEM_PARAM_OPERATION "operation"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_BLOCK_PADDING "block_padding"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_HS_PADDING "hs_padding"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_MAX_EARLY_DATA "max_early_data"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_MAX_FRAG_LEN "max_frag_len"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_MODE "mode"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_OPTIONS "options"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_READ_AHEAD "read_ahead"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_STREAM_MAC "stream_mac"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_TLSTREE
 "tlstree"
# define OSSL_LIBSSL_RECORD_LAYER_PARAM_USE_ETM "use_etm"
# define OSSL_LIBSSL_RECORD_LAYER_READ_BUFFER_LEN "read_buffer_len"
# define OSSL_MAC_PARAM_BLOCK_SIZE "block-size"
# define OSSL_MAC_PARAM_CIPHER OSSL_ALG_PARAM_CIPHER
# define OSSL_MAC_PARAM_CUSTOM "custom"
# define OSSL_MAC_PARAM_C_ROUNDS "c-rounds"
# define OSSL_MAC_PARAM_DIGEST OSSL_ALG_PARAM_DIGEST
# define OSSL_MAC_PARAM_DIGEST_NOINIT "digest-noinit"
# define OSSL_MAC_PARAM_DIGEST_ONESHOT "digest-oneshot"
# define OSSL_MAC_PARAM_D_ROUNDS "d-rounds"
# define OSSL_MAC_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_MAC_PARAM_FIPS_KEY_CHECK OSSL_PKEY_PARAM_FIPS_KEY_CHECK
# define OSSL_MAC_PARAM_FIPS_NO_SHORT_MAC OSSL_PROV_PARAM_NO_SHORT_MAC
# define OSSL_MAC_PARAM_IV "iv"
# define OSSL_MAC_PARAM_KEY "key"
# define OSSL_MAC_PARAM_PROPERTIES OSSL_ALG_PARAM_PROPERTIES
# define OSSL_MAC_PARAM_SALT "salt"
# define OSSL_MAC_PARAM_SIZE "size"
# define OSSL_MAC_PARAM_TLS_DATA_SIZE
 "tls-data-size"
# define OSSL_MAC_PARAM_XOF "xof"
# define OSSL_OBJECT_PARAM_DATA "data"
# define OSSL_OBJECT_PARAM_DATA_STRUCTURE "data-structure"
# define OSSL_OBJECT_PARAM_DATA_TYPE "data-type"
# define OSSL_OBJECT_PARAM_DESC "desc"
# define OSSL_OBJECT_PARAM_INPUT_TYPE "input-type"
# define OSSL_OBJECT_PARAM_REFERENCE "reference"
# define OSSL_OBJECT_PARAM_TYPE "type"
# define OSSL_PASSPHRASE_PARAM_INFO "info"
# define OSSL_PKEY_PARAM_ALGORITHM_ID OSSL_ALG_PARAM_ALGORITHM_ID
# define OSSL_PKEY_PARAM_ALGORITHM_ID_PARAMS
OSSL_ALG_PARAM_ALGORITHM_ID_PARAMS
# define OSSL_PKEY_PARAM_BITS "bits"
# define OSSL_PKEY_PARAM_CIPHER OSSL_ALG_PARAM_CIPHER
```

```
# define OSSL_PKEY_PARAM_DEFAULT_DIGEST "default-digest"
# define OSSL_PKEY_PARAM_DHKEM_IKM "dhkem-ikm"
# define OSSL_PKEY_PARAM_DH_GENERATOR "safeprime-generator"
# define OSSL_PKEY_PARAM_DH_PRIV_LEN "priv_len"
# define OSSL_PKEY_PARAM_DIGEST OSSL_ALG_PARAM_DIGEST
# define OSSL_PKEY_PARAM_DIGEST_SIZE "digest-size"
# define OSSL_PKEY_PARAM_DIST_ID
 "distid"
# define OSSL_PKEY_PARAM_EC_A "a"
# define OSSL_PKEY_PARAM_EC_B "b"
# define OSSL_PKEY_PARAM_EC_CHAR2_M "m"
# define OSSL_PKEY_PARAM_EC_CHAR2_PP_K1 "k1"
# define OSSL_PKEY_PARAM_EC_CHAR2_PP_K2 "k2"
# define OSSL_PKEY_PARAM_EC_CHAR2_PP_K3 "k3"
# define OSSL_PKEY_PARAM_EC_CHAR2_TP_BASIS "tp"
# define OSSL_PKEY_PARAM_EC_CHAR2_TYPE "basis-type"
# define OSSL_PKEY_PARAM_EC_COFACTOR "cofactor"
# define OSSL_PKEY_PARAM_EC_DECODED_FROM_EXPLICIT_PARAMS "decoded-from-explicit"
# define OSSL_PKEY_PARAM_EC_ENCODING "encoding"
# define OSSL_PKEY_PARAM_EC_FIELD_TYPE "field-type"
# define OSSL_PKEY_PARAM_EC_GENERATOR "generator"
# define OSSL_PKEY_PARAM_EC_GROUP_CHECK_TYPE "group-check"
# define OSSL_PKEY_PARAM_EC_INCLUDE_PUBLIC "include-public"
# define OSSL_PKEY_PARAM_EC_ORDER "order"
# define OSSL_PKEY_PARAM_EC_P "p"
# define OSSL_PKEY_PARAM_EC_POINT_CONVERSION_FORMAT "point-format"
# define OSSL_PKEY_PARAM_EC_PUB_X "qx"
# define OSSL_PKEY_PARAM_EC_PUB_Y "qy"
# define
 OSSL_PKEY_PARAM_EC_SEED "seed"
# define OSSL_PKEY_PARAM_ENCODED_PUBLIC_KEY "encoded-pub-key"
# define OSSL_PKEY_PARAM_ENGINE OSSL_ALG_PARAM_ENGINE
# define OSSL_PKEY_PARAM_FFC_COFACTOR "j"
# define OSSL_PKEY_PARAM_FFC_DIGEST OSSL_PKEY_PARAM_DIGEST
# define OSSL_PKEY_PARAM_FFC_DIGEST_PROPS OSSL_PKEY_PARAM_PROPERTIES
# define OSSL_PKEY_PARAM_FFC_G "g"
# define OSSL_PKEY_PARAM_FFC_GINDEX "gindex"
# define OSSL_PKEY_PARAM_FFC_H "hindex"
# define OSSL_PKEY_PARAM_FFC_P "p"
# define OSSL_PKEY_PARAM_FFC_PBITS "pbits"
# define OSSL_PKEY_PARAM_FFC_PCOUNTER "pcounter"
# define OSSL_PKEY_PARAM_FFC_Q "q"
# define OSSL_PKEY_PARAM_FFC_QBITS "qbits"
# define OSSL_PKEY_PARAM_FFC_SEED "seed"
# define OSSL_PKEY_PARAM_FFC_TYPE "type"
# define OSSL_PKEY_PARAM_FFC_VALIDATE_G "validate-g"
# define OSSL_PKEY_PARAM_FFC_VALIDATE_LEGACY "validate-legacy"
# define OSSL_PKEY_PARAM_FFC_VALIDATE_PQ "validate-pq"
```

```
# define OSSL_PKEY_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_PKEY_PARAM_FIPS_DIGEST_CHECK
 "digest-check"
# define OSSL_PKEY_PARAM_FIPS_KEY_CHECK "key-check"
# define OSSL_PKEY_PARAM_FIPS_SIGN_CHECK "sign-check"
# define OSSL_PKEY_PARAM_GROUP_NAME "group"
# define OSSL_PKEY_PARAM_IMPLICIT_REJECTION "implicit-rejection"
# define OSSL_PKEY_PARAM_MANDATORY_DIGEST "mandatory-digest"
# define OSSL_PKEY_PARAM_MASKGENFUNC "mgf"
# define OSSL_PKEY_PARAM_MAX_SIZE "max-size"
# define OSSL_PKEY_PARAM_MGF1_DIGEST "mgf1-digest"
# define OSSL_PKEY_PARAM_MGF1_PROPERTIES "mgf1-properties"
# define OSSL_PKEY_PARAM_ML_DSA_INPUT_FORMATS "ml-dsa.input_formats"
# define OSSL_PKEY_PARAM_ML_DSA_OUTPUT_FORMATS "ml-dsa.output_formats"
# define OSSL_PKEY_PARAM_ML_DSA_PREFER_SEED "ml-dsa.prefer_seed"
# define OSSL_PKEY_PARAM_ML_DSA_RETAIN_SEED "ml-dsa.retain_seed"
# define OSSL_PKEY_PARAM_ML_DSA_SEED "seed"
# define OSSL_PKEY_PARAM_ML_KEM_IMPORT_PCT_TYPE "ml-kem.import_pct_type"
# define OSSL_PKEY_PARAM_ML_KEM_INPUT_FORMATS "ml-kem.input_formats"
# define OSSL_PKEY_PARAM_ML_KEM_OUTPUT_FORMATS
 "ml-kem.output_formats"
# define OSSL_PKEY_PARAM_ML_KEM_PREFER_SEED "ml-kem.prefer_seed"
# define OSSL_PKEY_PARAM_ML_KEM_RETAIN_SEED "ml-kem.retain_seed"
# define OSSL_PKEY_PARAM_ML_KEM_SEED "seed"
# define OSSL_PKEY_PARAM_PAD_MODE "pad-mode"
# define OSSL_PKEY_PARAM_PRIV_KEY "priv"
# define OSSL_PKEY_PARAM_PROPERTIES OSSL_ALG_PARAM_PROPERTIES
# define OSSL_PKEY_PARAM_PUB_KEY "pub"
# define OSSL_PKEY_PARAM_RSA_BITS OSSL_PKEY_PARAM_BITS
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT "rsa-coefficient"
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT1 "rsa-coefficient1"
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT2 "rsa-coefficient2"
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT3 "rsa-coefficient3"
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT4 "rsa-coefficient4"
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT5 "rsa-coefficient5"
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT6 "rsa-coefficient6"
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT7 "rsa-coefficient7"
# define OSSL_PKEY_PARAM_RSA_COEFFICIENT8 "rsa-coefficient8"
#
 define OSSL_PKEY_PARAM_RSA_COEFFICIENT9 "rsa-coefficient9"
# define OSSL_PKEY_PARAM_RSA_D "d"
# define OSSL_PKEY_PARAM_RSA_DERIVE_FROM_PQ "rsa-derive-from-pq"
# define OSSL_PKEY_PARAM_RSA_DIGEST OSSL_PKEY_PARAM_DIGEST
# define OSSL_PKEY_PARAM_RSA_DIGEST_PROPS OSSL_PKEY_PARAM_PROPERTIES
# define OSSL_PKEY_PARAM_RSA_E "e"
# define OSSL_PKEY_PARAM_RSA_EXPONENT "rsa-exponent"
# define OSSL_PKEY_PARAM_RSA_EXPONENT1 "rsa-exponent1"
```

```
# define OSSL_PKEY_PARAM_RSA_EXPONENT10 "rsa-exponent10"
# define OSSL_PKEY_PARAM_RSA_EXPONENT2 "rsa-exponent2"
# define OSSL_PKEY_PARAM_RSA_EXPONENT3 "rsa-exponent3"
# define OSSL_PKEY_PARAM_RSA_EXPONENT4 "rsa-exponent4"
# define OSSL_PKEY_PARAM_RSA_EXPONENT5 "rsa-exponent5"
# define OSSL_PKEY_PARAM_RSA_EXPONENT6 "rsa-exponent6"
# define OSSL_PKEY_PARAM_RSA_EXPONENT7 "rsa-exponent7"
# define OSSL_PKEY_PARAM_RSA_EXPONENT8 "rsa-exponent8"
# define OSSL_PKEY_PARAM_RSA_EXPONENT9 "rsa-exponent9"
# define OSSL_PKEY_PARAM_RSA_FACTOR "rsa-factor"
# define OSSL_PKEY_PARAM_RSA_FACTOR1
 "rsa-factor1"
# define OSSL_PKEY_PARAM_RSA_FACTOR10 "rsa-factor10"
# define OSSL_PKEY_PARAM_RSA_FACTOR2 "rsa-factor2"
# define OSSL_PKEY_PARAM_RSA_FACTOR3 "rsa-factor3"
# define OSSL_PKEY_PARAM_RSA_FACTOR4 "rsa-factor4"
# define OSSL_PKEY_PARAM_RSA_FACTOR5 "rsa-factor5"
# define OSSL_PKEY_PARAM_RSA_FACTOR6 "rsa-factor6"
# define OSSL_PKEY_PARAM_RSA_FACTOR7 "rsa-factor7"
# define OSSL_PKEY_PARAM_RSA_FACTOR8 "rsa-factor8"
# define OSSL_PKEY_PARAM_RSA_FACTOR9 "rsa-factor9"
# define OSSL_PKEY_PARAM_RSA_MASKGENFUNC OSSL_PKEY_PARAM_MASKGENFUNC
# define OSSL_PKEY_PARAM_RSA_MGF1_DIGEST OSSL_PKEY_PARAM_MGF1_DIGEST
# define OSSL_PKEY_PARAM_RSA_N "n"
# define OSSL_PKEY_PARAM_RSA_PRIMES "primes"
# define OSSL_PKEY_PARAM_RSA_PSS_SALTLEN "saltlen"
# define OSSL_PKEY_PARAM_RSA_TEST_P1 "p1"
# define OSSL_PKEY_PARAM_RSA_TEST_P2 "p2"
# define OSSL_PKEY_PARAM_RSA_TEST_Q1 "q1"
# define OSSL_PKEY_PARAM_RSA_TEST_Q2 "q2"
# define OSSL_PKEY_PARAM_RSA_TEST_XP "xp"
# define OSSL_PKEY_PARAM_RSA_TEST_XP1
 "xp1"
# define OSSL_PKEY_PARAM_RSA_TEST_XP2 "xp2"
# define OSSL_PKEY_PARAM_RSA_TEST_XQ "xq"
# define OSSL_PKEY_PARAM_RSA_TEST_XQ1 "xq1"
# define OSSL_PKEY_PARAM_RSA_TEST_XQ2 "xq2"
# define OSSL_PKEY_PARAM_SECURITY_BITS "security-bits"
# define OSSL_PKEY_PARAM_SLH_DSA_SEED "seed"
# define OSSL_PKEY_PARAM_USE_COFACTOR_ECDH OSSL_PKEY_PARAM_USE_COFACTOR_FLAG
# define OSSL_PKEY_PARAM_USE_COFACTOR_FLAG "use-cofactor-flag"
# define OSSL_PROV_PARAM_BUILDINFO "buildinfo"
# define OSSL_PROV_PARAM_CORE_MODULE_FILENAME "module-filename"
# define OSSL_PROV_PARAM_CORE_PROV_NAME "provider-name"
# define OSSL_PROV_PARAM_CORE_VERSION "openssl-version"
# define OSSL_PROV_PARAM_DRBG_TRUNC_DIGEST "drbg-no-trunc-md"
# define OSSL_PROV_PARAM_DSA_SIGN_DISABLED "dsa-sign-disabled"
# define OSSL_PROV_PARAM_ECDH_COFACTOR_CHECK "ecdh-cofactor-check"
```

```
# define OSSL_PROV_PARAM_HKDF_DIGEST_CHECK "hkdf-digest-check"
# define OSSL_PROV_PARAM_HKDF_KEY_CHECK "hkdf-key-check"
# define OSSL_PROV_PARAM_HMAC_KEY_CHECK
 "hmac-key-check"
# define OSSL_PROV_PARAM_KBKDF_KEY_CHECK "kbkdf-key-check"
# define OSSL_PROV_PARAM_KMAC_KEY_CHECK "kmac-key-check"
# define OSSL_PROV_PARAM_NAME "name"
# define OSSL_PROV_PARAM_NO_SHORT_MAC "no-short-mac"
# define OSSL_PROV_PARAM_PBKDF2_LOWER_BOUND_CHECK "pbkdf2-lower-bound-check"
# define OSSL_PROV_PARAM_RSA_PKCS15_PAD_DISABLED "rsa-pkcs15-pad-disabled"
# define OSSL_PROV_PARAM_RSA_PSS_SALTLEN_CHECK "rsa-pss-saltlen-check"
# define OSSL_PROV_PARAM_RSA_SIGN_X931_PAD_DISABLED "rsa-sign-x931-pad-disabled"
# define OSSL_PROV_PARAM_SECURITY_CHECKS "security-checks"
# define OSSL_PROV_PARAM_SELF_TEST_DESC "st-desc"
# define OSSL_PROV_PARAM_SELF_TEST_PHASE "st-phase"
# define OSSL_PROV_PARAM_SELF_TEST_TYPE "st-type"
# define OSSL_PROV_PARAM_SIGNATURE_DIGEST_CHECK "signature-digest-check"
# define OSSL_PROV_PARAM_SSHKDF_DIGEST_CHECK "sshkdf-digest-check"
# define OSSL_PROV_PARAM_SSHKDF_KEY_CHECK "sshkdf-key-check"
# define OSSL_PROV_PARAM_SSKDF_DIGEST_CHECK "sskdf-digest-check"
#
 define OSSL_PROV_PARAM_SSKDF_KEY_CHECK "sskdf-key-check"
# define OSSL_PROV_PARAM_STATUS "status"
# define OSSL_PROV_PARAM_TDES_ENCRYPT_DISABLED "tdes-encrypt-disabled"
# define OSSL_PROV_PARAM_TLS13_KDF_DIGEST_CHECK "tls13-kdf-digest-check"
# define OSSL_PROV_PARAM_TLS13_KDF_KEY_CHECK "tls13-kdf-key-check"
# define OSSL_PROV_PARAM_TLS1_PRF_DIGEST_CHECK "tls1-prf-digest-check"
# define OSSL_PROV_PARAM_TLS1_PRF_EMS_CHECK "tls1-prf-ems-check"
# define OSSL_PROV_PARAM_TLS1_PRF_KEY_CHECK "tls1-prf-key-check"
# define OSSL_PROV_PARAM_VERSION "version"
# define OSSL_PROV_PARAM_X942KDF_KEY_CHECK "x942kdf-key-check"
# define OSSL_PROV_PARAM_X963KDF_DIGEST_CHECK "x963kdf-digest-check"
# define OSSL_PROV_PARAM_X963KDF_KEY_CHECK "x963kdf-key-check"
# define OSSL_RAND_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_RAND_PARAM_GENERATE "generate"
# define OSSL_RAND_PARAM_MAX_REQUEST "max_request"
# define OSSL_RAND_PARAM_STATE "state"
# define OSSL_RAND_PARAM_STRENGTH
 "strength"
# define OSSL_RAND_PARAM_TEST_ENTROPY "test_entropy"
# define OSSL_RAND_PARAM_TEST_NONCE "test_nonce"
# define OSSL_SIGNATURE_PARAM_ADD_RANDOM "additional-random"
# define OSSL_SIGNATURE_PARAM_ALGORITHM_ID OSSL_PKEY_PARAM_ALGORITHM_ID
# define OSSL_SIGNATURE_PARAM_ALGORITHM_ID_PARAMS
OSSL_PKEY_PARAM_ALGORITHM_ID_PARAMS
# define OSSL_SIGNATURE_PARAM_CONTEXT_STRING "context-string"
# define OSSL_SIGNATURE_PARAM_DETERMINISTIC "deterministic"
```

```
# define OSSL_SIGNATURE_PARAM_DIGEST OSSL_PKEY_PARAM_DIGEST
# define OSSL_SIGNATURE_PARAM_DIGEST_SIZE OSSL_PKEY_PARAM_DIGEST_SIZE
# define OSSL_SIGNATURE_PARAM_FIPS_APPROVED_INDICATOR
OSSL_ALG_PARAM_FIPS_APPROVED_INDICATOR
# define OSSL_SIGNATURE_PARAM_FIPS_DIGEST_CHECK
OSSL_PKEY_PARAM_FIPS_DIGEST_CHECK
# define OSSL_SIGNATURE_PARAM_FIPS_KEY_CHECK OSSL_PKEY_PARAM_FIPS_KEY_CHECK
# define OSSL_SIGNATURE_PARAM_FIPS_RSA_PSS_SALTLEN_CHECK "rsa-pss-saltlen-check"
# define OSSL_SIGNATURE_PARAM_FIPS_SIGN_CHECK OSSL_PKEY_PARAM_FIPS_SIGN_CHECK
#
 define OSSL_SIGNATURE_PARAM_FIPS_SIGN_X931_PAD_CHECK "sign-x931-pad-check"
# define OSSL_SIGNATURE_PARAM_FIPS_VERIFY_MESSAGE "verify-message"
# define OSSL_SIGNATURE_PARAM_INSTANCE "instance"
# define OSSL_SIGNATURE_PARAM_KAT "kat"
# define OSSL_SIGNATURE_PARAM_MESSAGE_ENCODING "message-encoding"
# define OSSL_SIGNATURE_PARAM_MGF1_DIGEST OSSL_PKEY_PARAM_MGF1_DIGEST
# define OSSL_SIGNATURE_PARAM_MGF1_PROPERTIES OSSL_PKEY_PARAM_MGF1_PROPERTIES
# define OSSL_SIGNATURE_PARAM_MU "mu"
# define OSSL_SIGNATURE_PARAM_NONCE_TYPE "nonce-type"
# define OSSL_SIGNATURE_PARAM_PAD_MODE OSSL_PKEY_PARAM_PAD_MODE
# define OSSL_SIGNATURE_PARAM_PROPERTIES OSSL_PKEY_PARAM_PROPERTIES
# define OSSL_SIGNATURE_PARAM_PSS_SALTLEN "saltlen"
# define OSSL_SIGNATURE_PARAM_SIGNATURE "signature"
# define OSSL_SIGNATURE_PARAM_TEST_ENTROPY "test-entropy"
# define OSSL_SKEY_PARAM_KEY_LENGTH "key-length"
# define OSSL_SKEY_PARAM_RAW_BYTES "raw-bytes"
# define OSSL_STORE_PARAM_ALIAS "alias"
# define OSSL_STORE_PARAM_DIGEST
 "digest"
# define OSSL_STORE_PARAM_EXPECT "expect"
# define OSSL_STORE_PARAM_FINGERPRINT "fingerprint"
# define OSSL_STORE_PARAM_INPUT_TYPE "input-type"
# define OSSL_STORE_PARAM_ISSUER "name"
# define OSSL_STORE_PARAM_PROPERTIES "properties"
# define OSSL_STORE_PARAM_SERIAL "serial"
# define OSSL_STORE_PARAM_SUBJECT "subject"
/* clang-format on */

#ifdef __cplusplus
}
#endif

#endif
{
 'variables': {
   'openssl_defines_BSD-x86': [
     'NDEBUG',
     'L_ENDIAN',
```

```
  'OPENSSL_BUILDING_OPENSSL',
  'AES_ASM',
  'CMLL_ASM',
  'DES_ASM',
  'ECP_NISTZ256_ASM',
  'GHASH_ASM',
  'MD5_ASM',
  'OPENSSL_BN_ASM_GF2m',
  'OPENSSL_BN_ASM_MONT',
  'OPENSSL_BN_ASM_PART_WORDS',
  'OPENSSL_CPUID_OBJ',
  'OPENSSL_IA32_SSE2',
  'PADLOCK_ASM',
  'POLY1305_ASM',
  'RC4_ASM',
  'RMD160_ASM',
  'SHA1_ASM',
  'SHA256_ASM',
  'SHA512_ASM',
  'VPAES_ASM',
  'WHIRLPOOL_ASM',
  'OPENSSL_PIC',
],
'openssl_cflags_BSD-x86': [
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  '-Wall -O3 -fomit-frame-pointer',
  '-pthread',
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'openssl_ex_libs_BSD-x86': [
  '-pthread',
],
'openssl_cli_srcs_BSD-x86': [
  'openssl/apps/lib/cmp_mock_srv.c',
  'openssl/apps/asn1parse.c',
  'openssl/apps/ca.c',
  'openssl/apps/ciphers.c',
  'openssl/apps/cmp.c',
   'openssl/apps/cms.c',
  'openssl/apps/crl.c',
  'openssl/apps/crl2pkcs7.c',
  'openssl/apps/dgst.c',
  'openssl/apps/dhparam.c',
  'openssl/apps/dsa.c',
  'openssl/apps/dsaparam.c',
  'openssl/apps/ec.c',
  'openssl/apps/ecparam.c',
  'openssl/apps/enc.c',
```

'openssl/apps/engine.c',
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'openssl/apps/fipsinstall.c',
'openssl/apps/gendsa.c',
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'openssl/apps/genrsa.c',
'openssl/apps/info.c',
'openssl/apps/kdf.c',
'openssl/apps/list.c',
'openssl/apps/mac.c',
'openssl/apps/nseq.c',
'openssl/apps/ocsp.c',
'openssl/apps/openssl.c',
'openssl/apps/passwd.c',
'openssl/apps/pkcs12.c',
'openssl/apps/pkcs7.c',
'openssl/apps/pkcs8.c',
'openssl/apps/pkey.c',
'openssl/apps/pkeyparam.c',
'openssl/apps/pkeyutl.c',
'openssl/apps/prime.c',
'./config/archs/BSD-x86/asm_avx2/apps/progs.c',
'openssl/apps/rand.c',
'openssl/apps/rehash.c',
'openssl/apps/req.c',
'openssl/apps/rsa.c',
'openssl/apps/rsautl.c',
'openssl/apps/s_client.c',
'openssl/apps/s_server.c',
'openssl/apps/s_time.c',
'openssl/apps/sess_id.c',
'openssl/apps/skeyutl.c',
'openssl/apps/smime.c',
'openssl/apps/speed.c',
'openssl/apps/spkac.c',
'openssl/apps/srp.c',
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'openssl/apps/ts.c',
'openssl/apps/verify.c',
'openssl/apps/version.c',
'openssl/apps/x509.c',
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'openssl/apps/lib/app_params.c',
'openssl/apps/lib/app_provider.c',
'openssl/apps/lib/app_rand.c',
'openssl/apps/lib/app_x509.c',
'openssl/apps/lib/apps.c',
'openssl/apps/lib/apps_opt_printf.c',

```
    'openssl/apps/lib/apps_ui.c',
    'openssl/apps/lib/columns.c',
    'openssl/apps/lib/engine.c',
    'openssl/apps/lib/engine_loader.c',
     'openssl/apps/lib/fmt.c',
    'openssl/apps/lib/http_server.c',
    'openssl/apps/lib/log.c',
    'openssl/apps/lib/names.c',
    'openssl/apps/lib/opt.c',
    'openssl/apps/lib/s_cb.c',
    'openssl/apps/lib/s_socket.c',
    'openssl/apps/lib/tlssrp_depr.c',
  ],
 },
 'defines': ['<@(openssl_defines_BSD-x86)'],
 'include_dirs': [
  './include',
 ],
 'cflags' : ['<@(openssl_cflags_BSD-x86)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86)'],
 'sources': ['<@(openssl_cli_srcs_BSD-x86)'],
}
```

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---

This library is a fork of 'better-json-errors' by Kat Marchn, extended and
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```
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

/*
* Header for dynamic hash table routines Author - Eric Young
*/

#ifndef OPENSSL_LHASH_H
#define OPENSSL_LHASH_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_LHASH_H
#endif
```

```
#include <openssl/e_os2.h>
#include <openssl/bio.h>
#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif

#ifdef __cplusplus
extern "C" {
#endif

typedef struct lhash_node_st OPENSSL_LH_NODE;
typedef int (*OPENSSL_LH_COMPFUNC)(const void *, const void *);
typedef int (*OPENSSL_LH_COMPFUNCTHUNK)(const void *, const void *, OPENSSL_LH_COMPFUNC
cfn);
typedef unsigned long (*OPENSSL_LH_HASHFUNC)(const
 void *);
typedef unsigned long (*OPENSSL_LH_HASHFUNCTHUNK)(const void *, OPENSSL_LH_HASHFUNC hfn);
typedef void (*OPENSSL_LH_DOALL_FUNC)(void *);
typedef void (*OPENSSL_LH_DOALL_FUNC_THUNK)(void *, OPENSSL_LH_DOALL_FUNC doall);
typedef void (*OPENSSL_LH_DOALL_FUNCARG)(void *, void *);
typedef void (*OPENSSL_LH_DOALL_FUNCARG_THUNK)(void *, void *,
OPENSSL_LH_DOALL_FUNCARG doall);
typedef struct lhash_st OPENSSL_LHASH;

/*
* Macros for declaring and implementing type-safe wrappers for LHASH
* callbacks. This way, callbacks can be provided to LHASH structures without
* function pointer casting and the macro-defined callbacks provide
* per-variable casting before deferring to the underlying type-specific
* callbacks. NB: It is possible to place a "static" in front of both the
* DECLARE and IMPLEMENT macros if the functions are strictly internal.
*/

/* First: "hash" functions */
#define DECLARE_LHASH_HASH_FN(name, o_type) \
   unsigned long name##_LHASH_HASH(const void *);
#define
 IMPLEMENT_LHASH_HASH_FN(name, o_type)        \
   unsigned long name##_LHASH_HASH(const void *arg) \
   {                                            \
       const o_type *a = arg;                   \
       return name##_hash(a);                   \
   }
#define LHASH_HASH_FN(name) name##_LHASH_HASH

/* Second: "compare" functions */
#define DECLARE_LHASH_COMP_FN(name, o_type) \
```

```
   int name##_LHASH_COMP(const void *, const void *);
#define IMPLEMENT_LHASH_COMP_FN(name, o_type)                \
   int name##_LHASH_COMP(const void *arg1, const void *arg2) \
   {                                                         \
       const o_type *a = arg1;                               \
       const o_type *b = arg2;                               \
       return name##_cmp(a, b);                              \
   }
#define LHASH_COMP_FN(name) name##_LHASH_COMP

/* Fourth: "doall_arg" functions */
#define DECLARE_LHASH_DOALL_ARG_FN(name, o_type, a_type) \
   void
 name##_LHASH_DOALL_ARG(void *, void *);
#define IMPLEMENT_LHASH_DOALL_ARG_FN(name, o_type, a_type) \
   void name##_LHASH_DOALL_ARG(void *arg1, void *arg2)    \
   {                                                      \
       o_type *a = arg1;                                  \
       a_type *b = arg2;                                  \
       name##_doall_arg(a, b);                            \
   }
#define LHASH_DOALL_ARG_FN(name) name##_LHASH_DOALL_ARG

#define LH_LOAD_MULT 256

int OPENSSL_LH_error(OPENSSL_LHASH *lh);
OPENSSL_LHASH *OPENSSL_LH_new(OPENSSL_LH_HASHFUNC h, OPENSSL_LH_COMPFUNC c);
OPENSSL_LHASH *OPENSSL_LH_set_thunks(OPENSSL_LHASH *lh,
   OPENSSL_LH_HASHFUNCTHUNK hw,
   OPENSSL_LH_COMPFUNCTHUNK cw,
   OPENSSL_LH_DOALL_FUNC_THUNK daw,
   OPENSSL_LH_DOALL_FUNCARG_THUNK daaw);
void OPENSSL_LH_free(OPENSSL_LHASH *lh);
void OPENSSL_LH_flush(OPENSSL_LHASH *lh);
void *OPENSSL_LH_insert(OPENSSL_LHASH *lh, void *data);
void *OPENSSL_LH_delete(OPENSSL_LHASH *lh, const
 void *data);
void *OPENSSL_LH_retrieve(OPENSSL_LHASH *lh, const void *data);
void OPENSSL_LH_doall(OPENSSL_LHASH *lh, OPENSSL_LH_DOALL_FUNC func);
void OPENSSL_LH_doall_arg(OPENSSL_LHASH *lh,
   OPENSSL_LH_DOALL_FUNCARG func, void *arg);
void OPENSSL_LH_doall_arg_thunk(OPENSSL_LHASH *lh,
   OPENSSL_LH_DOALL_FUNCARG_THUNK daaw,
   OPENSSL_LH_DOALL_FUNCARG fn, void *arg);

unsigned long OPENSSL_LH_strhash(const char *c);
unsigned long OPENSSL_LH_num_items(const OPENSSL_LHASH *lh);
unsigned long OPENSSL_LH_get_down_load(const OPENSSL_LHASH *lh);
```

```
void OPENSSL_LH_set_down_load(OPENSSL_LHASH *lh, unsigned long down_load);

#ifndef OPENSSL_NO_STDIO
#ifndef OPENSSL_NO_DEPRECATED_3_1
OSSL_DEPRECATEDIN_3_1 void OPENSSL_LH_stats(const OPENSSL_LHASH *lh, FILE *fp);
OSSL_DEPRECATEDIN_3_1 void OPENSSL_LH_node_stats(const OPENSSL_LHASH *lh, FILE *fp);
OSSL_DEPRECATEDIN_3_1 void OPENSSL_LH_node_usage_stats(const OPENSSL_LHASH *lh, FILE *fp);
#endif
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_1
OSSL_DEPRECATEDIN_3_1
 void OPENSSL_LH_stats_bio(const OPENSSL_LHASH *lh, BIO *out);
OSSL_DEPRECATEDIN_3_1 void OPENSSL_LH_node_stats_bio(const OPENSSL_LHASH *lh, BIO *out);
OSSL_DEPRECATEDIN_3_1 void OPENSSL_LH_node_usage_stats_bio(const OPENSSL_LHASH *lh, BIO
*out);
#endif

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define _LHASH OPENSSL_LHASH
#define LHASH_NODE OPENSSL_LH_NODE
#define lh_error OPENSSL_LH_error
#define lh_new OPENSSL_LH_new
#define lh_free OPENSSL_LH_free
#define lh_insert OPENSSL_LH_insert
#define lh_delete OPENSSL_LH_delete
#define lh_retrieve OPENSSL_LH_retrieve
#define lh_doall OPENSSL_LH_doall
#define lh_doall_arg OPENSSL_LH_doall_arg
#define lh_strhash OPENSSL_LH_strhash
#define lh_num_items OPENSSL_LH_num_items
#ifndef OPENSSL_NO_STDIO
#define lh_stats OPENSSL_LH_stats
#define lh_node_stats OPENSSL_LH_node_stats
#define lh_node_usage_stats OPENSSL_LH_node_usage_stats
#endif
#define lh_stats_bio OPENSSL_LH_stats_bio
#define lh_node_stats_bio OPENSSL_LH_node_stats_bio
#define
 lh_node_usage_stats_bio OPENSSL_LH_node_usage_stats_bio
#endif

/* Type checking... */

#define LHASH_OF(type) struct lhash_st_##type

/* Helper macro for internal use */
#define DEFINE_LHASH_OF_INTERNAL(type)                                          \
   LHASH_OF(type)                                                               \
```

```
{                                                                   \
    union lh_##type##_dummy {                                       \
        void *d1;                                                   \
        unsigned long d2;                                           \
        int d3;                                                     \
    } dummy;
                                                                    \
};                                                                  \
typedef int (*lh_##type##_compfunc)(const type *a, const type *b);  \
typedef unsigned long (*lh_##type##_hashfunc)(const type *a);       \
typedef void (*lh_##type##_doallfunc)(type * a);                    \
static ossl_inline unsigned long lh_##type##_hash_thunk(const void *data, OPENSSL_LH_HASHFUNC hfn)
\
{                                                                   \
    unsigned long (*hfn_conv)(const type *) = (unsigned long (*)(const type *))hfn;   \
    return hfn_conv((const type *)data);                            \
}
                                                                    \
static ossl_inline int lh_##type##_comp_thunk(const void *da, const void *db, OPENSSL_LH_COMPFUNC cfn)
\
{                                                                   \
    int (*cfn_conv)(const type *, const type *) = (int (*)(const type *, const type *))cfn;   \
    return cfn_conv((const type *)da, (const type *)db);            \
}                                                                   \
static ossl_inline void lh_##type##_doall_thunk(void *node, OPENSSL_LH_DOALL_FUNC doall)   \
{                                                                   \
    void (*doall_conv)(type *) = (void (*)(type *))doall;           \
     doall_conv((type *)node);                                      \
}                                                                   \
static ossl_inline void lh_##type##_doall_arg_thunk(void *node, void *arg, OPENSSL_LH_DOALL_FUNCARG
doall) \
{                                                                   \
    void (*doall_conv)(type *, void *) = (void (*)(type *, void *))doall;   \
    doall_conv((type *)node, arg);                                  \
}                                                                   \
static ossl_unused ossl_inline type *                               \
ossl_check_##type##_lh_plain_type(type *ptr)
            \
{                                                                   \
    return ptr;                                                     \
}                                                                   \
static ossl_unused ossl_inline const type *                         \
ossl_check_const_##type##_lh_plain_type(const type *ptr)            \
{                                                                   \
    return ptr;                                                     \
}                                                                   \
static ossl_unused ossl_inline const OPENSSL_LHASH *
```

```
                                \
  ossl_check_const_##type##_lh_type(const LHASH_OF(type) *lh)                                    \
  {                                                                                              \
     return (const OPENSSL_LHASH *)lh;                                                           \
  }                                                                                              \
  static ossl_unused ossl_inline OPENSSL_LHASH *                                                 \
  ossl_check_##type##_lh_type(LHASH_OF(type) *lh)                                                \
  {                                                                                              \
     return (OPENSSL_LHASH *)lh;                                                                 \
  }
                                          \
  static ossl_unused ossl_inline OPENSSL_LH_COMPFUNC                                             \
  ossl_check_##type##_lh_compfunc_type(lh_##type##_compfunc cmp)                                 \
  {                                                                                              \
     return (OPENSSL_LH_COMPFUNC)cmp;                                                            \
  }                                                                                              \
  static ossl_unused ossl_inline OPENSSL_LH_HASHFUNC                                             \
  ossl_check_##type##_lh_hashfunc_type(lh_##type##_hashfunc hfn)                                 \
  {                                                                                              \
     return (OPENSSL_LH_HASHFUNC)hfn;
                                                  \
  }                                                                                              \
  static ossl_unused ossl_inline OPENSSL_LH_DOALL_FUNC                                           \
  ossl_check_##type##_lh_doallfunc_type(lh_##type##_doallfunc dfn)                               \
  {                                                                                              \
     return (OPENSSL_LH_DOALL_FUNC)dfn;                                                          \
  }                                                                                              \
  LHASH_OF(type)

#ifndef OPENSSL_NO_DEPRECATED_3_1
#define DEFINE_LHASH_OF_DEPRECATED(type)                                \
  static ossl_unused ossl_inline void                                   \
  lh_##type##_node_stats_bio(const LHASH_OF(type)
 *lh, BIO *out)       \
  {                                                   \
     OPENSSL_LH_node_stats_bio((const OPENSSL_LHASH *)lh, out);       \
  }                                                   \
  static ossl_unused ossl_inline void                                   \
  lh_##type##_node_usage_stats_bio(const LHASH_OF(type) *lh, BIO *out) \
  {                                                   \
     OPENSSL_LH_node_usage_stats_bio((const OPENSSL_LHASH *)lh, out); \
  }                                                   \
  static ossl_unused ossl_inline void                                   \
  lh_##type##_stats_bio(const LHASH_OF(type) *lh, BIO *out)           \
  {                                                   \
     OPENSSL_LH_stats_bio((const OPENSSL_LHASH *)lh, out);           \
  }
#else
```

```
#define DEFINE_LHASH_OF_DEPRECATED(type)
#endif

#define DEFINE_LHASH_OF_EX(type)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
  LHASH_OF(type)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
  {                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
    union lh_##type##_dummy {                                                                                                                                                                                                                                                                                                                                                                                                
      void *d1;                                                                                                                                                                                                                                                                                                                                                                                                
      unsigned long d2;                                                                                                                                                                                                                                                                                                                                                                                                
      int d3;                                                                                                                                                                                                                                                                                                                                                                                                
    } dummy;                                                                                                                                                                                                                                                                                                                                                                                                
  };                                                                                                                                                                                                                                                                                                                                                                                                
                                                                                                                                                                                                                                                                                                                                                                                                
  static unsigned long                                                                                                                                                                                                                                                                                                                                                                                
  lh_##type##_hfn_thunk(const void *data, OPENSSL_LH_HASHFUNC hfn)                                                                                                                                                                                                                                                                                                                                
  {                                                                                                                                                                                                                                                                                                                                                                                                
    unsigned long (*hfn_conv)(const type *) = (unsigned long (*)(const type *))hfn;                                                                                                                                                                                                                                                                                                                
    return hfn_conv((const type *)data);                                                                                                                                                                                                                                                                                                                                                                
  }                                                                                                                                                                                                                                                                                                                                                                                                
  static int lh_##type##_cfn_thunk(const void *da, const void *db, OPENSSL_LH_COMPFUNC cfn)
    
  {
                                                                                                                                                                                                                                                                                                                                                                                                
    int (*cfn_conv)(const type *, const type *) = (int (*)(const type *, const type *))cfn;                                                                                                                                                                                                                                                                                                
    return cfn_conv((const type *)da, (const type *)db);                                                                                                                                                                                                                                                                                                                                
  }                                                                                                                                                                                                                                                                                                                                                                                                
  static ossl_unused ossl_inline void                                                                                                                                                                                                                                                                                                                                                
  lh_##type##_free(LHASH_OF(type) *lh)                                                                                                                                                                                                                                                                                                                                                
  {                                                                                                                                                                                                                                                                                                                                                                                                
    OPENSSL_LH_free((OPENSSL_LHASH *)lh);                                                                                                                                                                                                                                                                                                                                                
  }                                                                                                                                                                                                                                                                                                                                                                                                
                                                                                                                                                                                                                                                                                                                                                                                                
  static ossl_unused ossl_inline void                                                                                                                                                                                                                                                                                                                                                
  lh_##type##_flush(LHASH_OF(type) *lh)                                                                                                                                                                                                                                                                                                                                                
  {                                                                                                                                                                                                                                                                                                                                                                                                
    OPENSSL_LH_flush((OPENSSL_LHASH *)lh);                                                                                                                                                                                                                                                                                                                                                
  }                                                                                                                                                                                                                                                                                                                                                                                                
  static ossl_unused ossl_inline type *                                                                                                                                                                                                                                                                                                                                                
  lh_##type##_insert(LHASH_OF(type) *lh, type *d)                                                                                                                                                                                                                                                                                                                                                
  {
                                                                                                                                                                                                                                                                                                                                                                                                
    return (type *)OPENSSL_LH_insert((OPENSSL_LHASH *)lh, d);                                                                                                                                                                                                                                                                                                                                
  }                                                                                                                                                                                                                                                                                                                                                                                                
  static ossl_unused ossl_inline type *                                                                                                                                                                                                                                                                                                                                                
  lh_##type##_delete(LHASH_OF(type) *lh, const type *d)                                                                                                                                                                                                                                                                                                                                
  {                                                                                                                                                                                                                                                                                                                                                                                                
    return (type *)OPENSSL_LH_delete((OPENSSL_LHASH *)lh, d);                                                                                                                                                                                                                                                                                                                                
```

```
 }                                                                                  \
 static ossl_unused
ossl_inline type *                                                                  \
 lh_##type##_retrieve(LHASH_OF(type) *lh, const type *d)                                    \
 {                                                                                  \
     return (type *)OPENSSL_LH_retrieve((OPENSSL_LHASH *)lh, d);                            \
 }                                                                                  \
 static ossl_unused ossl_inline int                                                 \
 lh_##type##_error(LHASH_OF(type) *lh)                                                      \
 {                                                                                  \
     return
OPENSSL_LH_error((OPENSSL_LHASH *)lh);                                                      \
 }                                                                                  \
 static ossl_unused ossl_inline unsigned long                                       \
 lh_##type##_num_items(LHASH_OF(type) *lh)                                                  \
 {                                                                                  \
     return OPENSSL_LH_num_items((OPENSSL_LHASH *)lh);                                      \
 }                                                                                  \
 static ossl_unused ossl_inline unsigned long                                       \
 lh_##type##_get_down_load(LHASH_OF(type)
*lh)                                                                                \
 {                                                                                  \
     return OPENSSL_LH_get_down_load((OPENSSL_LHASH *)lh);                                  \
 }                                                                                  \
 static ossl_unused ossl_inline void                                                \
 lh_##type##_set_down_load(LHASH_OF(type) *lh, unsigned long dl)                            \
 {                                                                                  \
     OPENSSL_LH_set_down_load((OPENSSL_LHASH *)lh, dl);                                     \
 }
                                                                                    \
 static ossl_unused ossl_inline void                                                \
 lh_##type##_doall_thunk(void *node, OPENSSL_LH_DOALL_FUNC doall)                           \
 {                                                                                  \
     void (*doall_conv)(type *) = (void (*)(type *))doall;                                  \
     doall_conv((type *)node);                                                      \
 }                                                                                  \
 static ossl_unused ossl_inline void                                                \
 lh_##type##_doall_arg_thunk(void
*node, void *arg, OPENSSL_LH_DOALL_FUNCARG doall)                                   \
 {                                                                                  \
     void (*doall_conv)(type *, void *) = (void (*)(type *, void *))doall;                  \
     doall_conv((type *)node, arg);                                                 \
 }                                                                                  \
 static ossl_unused ossl_inline void                                                \
 lh_##type##_doall(LHASH_OF(type) *lh, void (*doall)(type *))                               \
 {                                                                                  \
     OPENSSL_LH_doall((OPENSSL_LHASH
```

```
 *)lh, (OPENSSL_LH_DOALL_FUNC)doall);                                    \
  }                                                                      \
  static ossl_unused ossl_inline LHASH_OF(type) *                                  \
  lh_##type##_new(unsigned long (*hfn)(const type *),                               \
     int (*cfn)(const type *, const type *))                                 \
  {                                                                      \
     return (LHASH_OF(type)
*)OPENSSL_LH_set_thunks(OPENSSL_LH_new((OPENSSL_LH_HASHFUNC)hfn,
(OPENSSL_LH_COMPFUNC)cfn), \
        lh_##type##_hfn_thunk, lh_##type##_cfn_thunk,                          \
        lh_##type##_doall_thunk,
                                                                 \
        lh_##type##_doall_arg_thunk);                                     \
  }                                                                      \
  static ossl_unused ossl_inline void                                     \
  lh_##type##_doall_arg(LHASH_OF(type) *lh,                                        \
     void (*doallarg)(type *, void *), void *arg)                            \
  {                                                                      \
     OPENSSL_LH_doall_arg((OPENSSL_LHASH *)lh,                                          \
        (OPENSSL_LH_DOALL_FUNCARG)doallarg,
 arg);                                                   \
  }                                                                      \
  LHASH_OF(type)

#define DEFINE_LHASH_OF(type)       \
  DEFINE_LHASH_OF_EX(type);       \
  DEFINE_LHASH_OF_DEPRECATED(type) \
  LHASH_OF(type)

#define IMPLEMENT_LHASH_DOALL_ARG_CONST(type, argtype) \
  int_implement_lhash_doall(type, argtype, const type)

#define IMPLEMENT_LHASH_DOALL_ARG(type, argtype) \
  int_implement_lhash_doall(type, argtype, type)

#define int_implement_lhash_doall(type, argtype, cbargtype)                \
  static ossl_unused ossl_inline void                                \
  lh_##type##_doall_##argtype##_thunk(void *node, void *arg, OPENSSL_LH_DOALL_FUNCARG fn) \
  {                                                          \
     void
 (*fn_conv)(cbargtype *, argtype *) = (void (*)(cbargtype *, argtype *))fn;     \
     fn_conv((cbargtype *)node, (argtype *)arg);                       \
  }                                                          \
  static ossl_unused ossl_inline void                                \
  lh_##type##_doall_##argtype(LHASH_OF(type) *lh,                          \
     void (*fn)(cbargtype *, argtype *),                                \
     argtype *arg)                                              \
  {                                                          \
```

```
    OPENSSL_LH_doall_arg_thunk((OPENSSL_LHASH *)lh,                                  \
        lh_##type##_doall_##argtype##_thunk,                                         \
        (OPENSSL_LH_DOALL_FUNCARG)fn,
            \
        (void *)arg);                                                                \
  }                                                                                  \
  LHASH_OF(type)

/* clang-format off */
DEFINE_LHASH_OF_INTERNAL(OPENSSL_STRING);
#define lh_OPENSSL_STRING_new(hfn, cmp) ((LHASH_OF(OPENSSL_STRING)
*)OPENSSL_LH_set_thunks(OPENSSL_LH_new(ossl_check_OPENSSL_STRING_lh_hashfunc_type(hfn),
ossl_check_OPENSSL_STRING_lh_compfunc_type(cmp)), lh_OPENSSL_STRING_hash_thunk,
lh_OPENSSL_STRING_comp_thunk, lh_OPENSSL_STRING_doall_thunk,
lh_OPENSSL_STRING_doall_arg_thunk))
#define lh_OPENSSL_STRING_free(lh) OPENSSL_LH_free(ossl_check_OPENSSL_STRING_lh_type(lh))
#define lh_OPENSSL_STRING_flush(lh) OPENSSL_LH_flush(ossl_check_OPENSSL_STRING_lh_type(lh))
#define lh_OPENSSL_STRING_insert(lh, ptr) ((OPENSSL_STRING
*)OPENSSL_LH_insert(ossl_check_OPENSSL_STRING_lh_type(lh),
ossl_check_OPENSSL_STRING_lh_plain_type(ptr)))
#define lh_OPENSSL_STRING_delete(lh,
 ptr) ((OPENSSL_STRING *)OPENSSL_LH_delete(ossl_check_OPENSSL_STRING_lh_type(lh),
ossl_check_const_OPENSSL_STRING_lh_plain_type(ptr)))
#define lh_OPENSSL_STRING_retrieve(lh, ptr) ((OPENSSL_STRING
*)OPENSSL_LH_retrieve(ossl_check_OPENSSL_STRING_lh_type(lh),
ossl_check_const_OPENSSL_STRING_lh_plain_type(ptr)))
#define lh_OPENSSL_STRING_error(lh) OPENSSL_LH_error(ossl_check_OPENSSL_STRING_lh_type(lh))
#define lh_OPENSSL_STRING_num_items(lh)
OPENSSL_LH_num_items(ossl_check_OPENSSL_STRING_lh_type(lh))
#define lh_OPENSSL_STRING_node_stats_bio(lh, out)
OPENSSL_LH_node_stats_bio(ossl_check_const_OPENSSL_STRING_lh_type(lh), out)
#define lh_OPENSSL_STRING_node_usage_stats_bio(lh, out)
OPENSSL_LH_node_usage_stats_bio(ossl_check_const_OPENSSL_STRING_lh_type(lh), out)
#define lh_OPENSSL_STRING_stats_bio(lh, out)
OPENSSL_LH_stats_bio(ossl_check_const_OPENSSL_STRING_lh_type(lh), out)
#define lh_OPENSSL_STRING_get_down_load(lh)
OPENSSL_LH_get_down_load(ossl_check_OPENSSL_STRING_lh_type(lh))
#define
 lh_OPENSSL_STRING_set_down_load(lh, dl)
OPENSSL_LH_set_down_load(ossl_check_OPENSSL_STRING_lh_type(lh), dl)
#define lh_OPENSSL_STRING_doall(lh, dfn) OPENSSL_LH_doall(ossl_check_OPENSSL_STRING_lh_type(lh),
ossl_check_OPENSSL_STRING_lh_doallfunc_type(dfn))
DEFINE_LHASH_OF_INTERNAL(OPENSSL_CSTRING);
#define lh_OPENSSL_CSTRING_new(hfn, cmp) ((LHASH_OF(OPENSSL_CSTRING)
*)OPENSSL_LH_set_thunks(OPENSSL_LH_new(ossl_check_OPENSSL_CSTRING_lh_hashfunc_type(hfn),
ossl_check_OPENSSL_CSTRING_lh_compfunc_type(cmp)), lh_OPENSSL_CSTRING_hash_thunk,
lh_OPENSSL_CSTRING_comp_thunk, lh_OPENSSL_CSTRING_doall_thunk,
lh_OPENSSL_CSTRING_doall_arg_thunk))
```

```
#define lh_OPENSSL_CSTRING_free(lh) OPENSSL_LH_free(ossl_check_OPENSSL_CSTRING_lh_type(lh))
#define lh_OPENSSL_CSTRING_flush(lh) OPENSSL_LH_flush(ossl_check_OPENSSL_CSTRING_lh_type(lh))
#define lh_OPENSSL_CSTRING_insert(lh, ptr) ((OPENSSL_CSTRING
*)OPENSSL_LH_insert(ossl_check_OPENSSL_CSTRING_lh_type(lh),
ossl_check_OPENSSL_CSTRING_lh_plain_type(ptr)))
#define
 lh_OPENSSL_CSTRING_delete(lh, ptr) ((OPENSSL_CSTRING
*)OPENSSL_LH_delete(ossl_check_OPENSSL_CSTRING_lh_type(lh),
ossl_check_const_OPENSSL_CSTRING_lh_plain_type(ptr)))
#define lh_OPENSSL_CSTRING_retrieve(lh, ptr) ((OPENSSL_CSTRING
*)OPENSSL_LH_retrieve(ossl_check_OPENSSL_CSTRING_lh_type(lh),
ossl_check_const_OPENSSL_CSTRING_lh_plain_type(ptr)))
#define lh_OPENSSL_CSTRING_error(lh) OPENSSL_LH_error(ossl_check_OPENSSL_CSTRING_lh_type(lh))
#define lh_OPENSSL_CSTRING_num_items(lh)
OPENSSL_LH_num_items(ossl_check_OPENSSL_CSTRING_lh_type(lh))
#define lh_OPENSSL_CSTRING_node_stats_bio(lh, out)
OPENSSL_LH_node_stats_bio(ossl_check_const_OPENSSL_CSTRING_lh_type(lh), out)
#define lh_OPENSSL_CSTRING_node_usage_stats_bio(lh, out)
OPENSSL_LH_node_usage_stats_bio(ossl_check_const_OPENSSL_CSTRING_lh_type(lh), out)
#define lh_OPENSSL_CSTRING_stats_bio(lh, out)
OPENSSL_LH_stats_bio(ossl_check_const_OPENSSL_CSTRING_lh_type(lh), out)
#define lh_OPENSSL_CSTRING_get_down_load(lh)
OPENSSL_LH_get_down_load(ossl_check_OPENSSL_CSTRING_lh_type(lh))
#define
 lh_OPENSSL_CSTRING_set_down_load(lh, dl)
OPENSSL_LH_set_down_load(ossl_check_OPENSSL_CSTRING_lh_type(lh), dl)
#define lh_OPENSSL_CSTRING_doall(lh, dfn)
OPENSSL_LH_doall(ossl_check_OPENSSL_CSTRING_lh_type(lh),
ossl_check_OPENSSL_CSTRING_lh_doallfunc_type(dfn))

/* clang-format on */

#ifdef __cplusplus
}
#endif

#endif
{
 'variables': {
   'openssl_sources': [
     'openssl/crypto/aes/aes_ecb.c',
     'openssl/crypto/aes/aes_misc.c',
     'openssl/crypto/bn/bn_add.c',
     'openssl/crypto/bn/bn_blind.c',
     'openssl/crypto/bn/bn_const.c',
     'openssl/crypto/bn/bn_conv.c',
     'openssl/crypto/bn/bn_ctx.c',
     'openssl/crypto/bn/bn_dh.c',
```

'openssl/crypto/bn/bn_div.c',
'openssl/crypto/bn/bn_exp.c',
'openssl/crypto/bn/bn_exp2.c',
'openssl/crypto/bn/bn_gcd.c',
'openssl/crypto/bn/bn_gf2m.c',
'openssl/crypto/bn/bn_intern.c',
'openssl/crypto/bn/bn_kron.c',
'openssl/crypto/bn/bn_lib.c',
'openssl/crypto/bn/bn_mod.c',
'openssl/crypto/bn/bn_mont.c',
'openssl/crypto/bn/bn_mpi.c',
'openssl/crypto/bn/bn_mul.c',
'openssl/crypto/bn/bn_nist.c',
'openssl/crypto/bn/bn_prime.c',
'openssl/crypto/bn/bn_rand.c',
'openssl/crypto/bn/bn_recp.c',
'openssl/crypto/bn/bn_rsa_fips186_4.c',
'openssl/crypto/bn/bn_shift.c',
'openssl/crypto/bn/bn_sqr.c',
'openssl/crypto/bn/bn_sqrt.c',
'openssl/crypto/bn/bn_word.c',
'openssl/crypto/buffer/buffer.c',
'openssl/crypto/cmac/cmac.c',
'openssl/crypto/des/ecb3_enc.c',
'openssl/crypto/des/set_key.c',
'openssl/crypto/dh/dh_backend.c',
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'openssl/crypto/dh/dh_gen.c',
'openssl/crypto/dh/dh_group_params.c',
'openssl/crypto/dh/dh_kdf.c',
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'openssl/crypto/dsa/dsa_gen.c',
'openssl/crypto/dsa/dsa_key.c',
'openssl/crypto/dsa/dsa_lib.c',
'openssl/crypto/dsa/dsa_ossl.c',
'openssl/crypto/dsa/dsa_sign.c',
'openssl/crypto/dsa/dsa_vrf.c',
'openssl/crypto/ec/curve448/arch_32/f_impl32.c',
'openssl/crypto/ec/curve448/arch_64/f_impl64.c',
'openssl/crypto/ec/curve448/curve448.c',
'openssl/crypto/ec/curve448/curve448_tables.c',
'openssl/crypto/ec/curve448/eddsa.c',
'openssl/crypto/ec/curve448/f_generic.c',
'openssl/crypto/ec/curve448/scalar.c',
'openssl/crypto/ec/curve25519.c',

'openssl/crypto/ec/ec2_oct.c',
'openssl/crypto/ec/ec2_smpl.c',
'openssl/crypto/ec/ec_asn1.c',
'openssl/crypto/ec/ec_backend.c',
'openssl/crypto/ec/ec_check.c',
'openssl/crypto/ec/ec_curve.c',
'openssl/crypto/ec/ec_cvt.c',
'openssl/crypto/ec/ec_key.c',
'openssl/crypto/ec/ec_kmeth.c',
'openssl/crypto/ec/ec_lib.c',
'openssl/crypto/ec/ec_mult.c',
'openssl/crypto/ec/ec_oct.c',
'openssl/crypto/ec/ecdh_kdf.c',
'openssl/crypto/ec/ecdh_ossl.c',
'openssl/crypto/ec/ecdsa_ossl.c',
'openssl/crypto/ec/ecdsa_sign.c',
'openssl/crypto/ec/ecdsa_vrf.c',
'openssl/crypto/ec/ecp_mont.c',
'openssl/crypto/ec/ecp_nist.c',
'openssl/crypto/ec/ecp_nistz256.c',
'openssl/crypto/ec/ecp_oct.c',
'openssl/crypto/ec/ecp_smpl.c',
'openssl/crypto/ec/ecx_backend.c',
'openssl/crypto/ec/ecx_key.c',
'openssl/crypto/evp/asymcipher.c',
'openssl/crypto/evp/dh_support.c',
'openssl/crypto/evp/digest.c',
'openssl/crypto/evp/ec_support.c',
'openssl/crypto/evp/evp_enc.c',
'openssl/crypto/evp/evp_fetch.c',
'openssl/crypto/evp/evp_lib.c',
'openssl/crypto/evp/evp_rand.c',
'openssl/crypto/evp/evp_utils.c',
'openssl/crypto/evp/exchange.c',
'openssl/crypto/evp/kdf_lib.c',
'openssl/crypto/evp/kdf_meth.c',
'openssl/crypto/evp/kem.c',
'openssl/crypto/evp/keymgmt_lib.c',
'openssl/crypto/evp/keymgmt_meth.c',
'openssl/crypto/evp/mac_lib.c',
'openssl/crypto/evp/mac_meth.c',
'openssl/crypto/evp/p_lib.c',
'openssl/crypto/evp/pmeth_check.c',
'openssl/crypto/evp/pmeth_gn.c',
'openssl/crypto/evp/pmeth_lib.c',
'openssl/crypto/evp/s_lib.c',
'openssl/crypto/evp/signature.c',
'openssl/crypto/evp/skeymgmt_meth.c',

'openssl/crypto/ffc/ffc_backend.c',
'openssl/crypto/ffc/ffc_dh.c',
'openssl/crypto/ffc/ffc_key_generate.c',
'openssl/crypto/ffc/ffc_key_validate.c',
'openssl/crypto/ffc/ffc_params.c',
'openssl/crypto/ffc/ffc_params_generate.c',
'openssl/crypto/ffc/ffc_params_validate.c',
'openssl/crypto/hashtable/hashfunc.c',
'openssl/crypto/hashtable/hashtable.c',
'openssl/crypto/hmac/hmac.c',
'openssl/crypto/lhash/lhash.c',
'openssl/crypto/asn1_dsa.c',
'openssl/crypto/bsearch.c',
'openssl/crypto/context.c',
'openssl/crypto/core_algorithm.c',
'openssl/crypto/core_fetch.c',
'openssl/crypto/core_namemap.c',
'openssl/crypto/cpuid.c',
'openssl/crypto/cryptlib.c',
'openssl/crypto/ctype.c',
'openssl/crypto/der_writer.c',
'openssl/crypto/ex_data.c',
'openssl/crypto/initthread.c',
'openssl/crypto/o_str.c',
'openssl/crypto/packet.c',
'openssl/crypto/param_build.c',
'openssl/crypto/param_build_set.c',
'openssl/crypto/params.c',
'openssl/crypto/params_dup.c',
'openssl/crypto/params_from_text.c',
'openssl/crypto/provider_core.c',
'openssl/crypto/provider_predefined.c',
'openssl/crypto/self_test_core.c',
'openssl/crypto/sparse_array.c',
'openssl/crypto/threads_lib.c',
'openssl/crypto/threads_none.c',
'openssl/crypto/threads_pthread.c',
'openssl/crypto/threads_win.c',
'openssl/crypto/time.c',
'openssl/crypto/ml_dsa/ml_dsa_encoders.c',
'openssl/crypto/ml_dsa/ml_dsa_key.c',
'openssl/crypto/ml_dsa/ml_dsa_key_compress.c',
'openssl/crypto/ml_dsa/ml_dsa_matrix.c',
'openssl/crypto/ml_dsa/ml_dsa_ntt.c',
'openssl/crypto/ml_dsa/ml_dsa_params.c',
'openssl/crypto/ml_dsa/ml_dsa_sample.c',
'openssl/crypto/ml_dsa/ml_dsa_sign.c',

'openssl/crypto/ml_kem/ml_kem.c',
'openssl/crypto/modes/cbc128.c',
'openssl/crypto/modes/ccm128.c',
'openssl/crypto/modes/cfb128.c',
'openssl/crypto/modes/ctr128.c',
'openssl/crypto/modes/gcm128.c',
'openssl/crypto/modes/ofb128.c',
'openssl/crypto/modes/wrap128.c',
'openssl/crypto/modes/xts128.c',
'openssl/crypto/modes/xts128gb.c',
'openssl/crypto/property/defn_cache.c',
'openssl/crypto/property/property.c',
'openssl/crypto/property/property_parse.c',
'openssl/crypto/property/property_query.c',
'openssl/crypto/property/property_string.c',
'openssl/crypto/rand/rand_lib.c',
'openssl/crypto/rsa/rsa_acvp_test_params.c',
'openssl/crypto/rsa/rsa_backend.c',
'openssl/crypto/rsa/rsa_chk.c',
'openssl/crypto/rsa/rsa_crpt.c',
'openssl/crypto/rsa/rsa_gen.c',
'openssl/crypto/rsa/rsa_lib.c',
'openssl/crypto/rsa/rsa_mp_names.c',
'openssl/crypto/rsa/rsa_none.c',

'openssl/crypto/rsa/rsa_oaep.c',
'openssl/crypto/rsa/rsa_ossl.c',
'openssl/crypto/rsa/rsa_pk1.c',
'openssl/crypto/rsa/rsa_pss.c',
'openssl/crypto/rsa/rsa_schemes.c',
'openssl/crypto/rsa/rsa_sign.c',
'openssl/crypto/rsa/rsa_sp800_56b_check.c',
'openssl/crypto/rsa/rsa_sp800_56b_gen.c',
'openssl/crypto/rsa/rsa_x931.c',
'openssl/crypto/sha/keccak1600.c',
'openssl/crypto/sha/sha1dgst.c',
'openssl/crypto/sha/sha256.c',
'openssl/crypto/sha/sha3.c',
'openssl/crypto/sha/sha512.c',
'openssl/crypto/slh_dsa/slh_adrs.c',
'openssl/crypto/slh_dsa/slh_dsa.c',
'openssl/crypto/slh_dsa/slh_dsa_hash_ctx.c',
'openssl/crypto/slh_dsa/slh_dsa_key.c',
'openssl/crypto/slh_dsa/slh_fors.c',
'openssl/crypto/slh_dsa/slh_hash.c',
'openssl/crypto/slh_dsa/slh_hypertree.c',
'openssl/crypto/slh_dsa/slh_params.c',
'openssl/crypto/slh_dsa/slh_wots.c',

'openssl/crypto/slh_dsa/slh_xmss.c',
'openssl/crypto/stack/stack.c',
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'openssl/crypto/thread/arch.c',
'openssl/crypto/thread/internal.c',
'openssl/providers/common/der/der_rsa_sig.c',
'openssl/providers/common/bio_prov.c',
'openssl/providers/common/capabilities.c',
'openssl/providers/common/digest_to_nid.c',
'openssl/providers/common/provider_seeding.c',
'openssl/providers/common/provider_util.c',
'openssl/providers/common/securitycheck.c',
'openssl/providers/common/securitycheck_fips.c',
'openssl/providers/fips/fipsindicator.c',
'openssl/providers/fips/fipsprov.c',
'openssl/providers/fips/self_test.c',
'openssl/providers/fips/self_test_kats.c',
'openssl/providers/implementations/asymciphers/rsa_enc.c',
'openssl/providers/implementations/ciphers/cipher_aes.c',
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'openssl/providers/implementations/ciphers/cipher_aes_ocb_hw.c',
'openssl/providers/implementations/ciphers/cipher_aes_wrp.c',
'openssl/providers/implementations/ciphers/cipher_aes_xts.c',
'openssl/providers/implementations/ciphers/cipher_aes_xts_fips.c',
'openssl/providers/implementations/ciphers/cipher_aes_xts_hw.c',
'openssl/providers/implementations/ciphers/cipher_cts.c',
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'openssl/providers/implementations/ciphers/cipher_tdes_common.c',
'openssl/providers/implementations/ciphers/cipher_tdes_hw.c',
'openssl/providers/implementations/digests/sha2_prov.c',
'openssl/providers/implementations/digests/sha3_prov.c',
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'openssl/providers/implementations/exchange/ecdh_exch.c',
'openssl/providers/implementations/exchange/ecx_exch.c',
'openssl/providers/implementations/exchange/kdf_exch.c',
'openssl/providers/implementations/kdfs/hkdf.c',
'openssl/providers/implementations/kdfs/kbkdf.c',

'openssl/providers/implementations/kdfs/pbkdf2.c',
'openssl/providers/implementations/kdfs/pbkdf2_fips.c',
'openssl/providers/implementations/kdfs/sshkdf.c',
'openssl/providers/implementations/kdfs/sskdf.c',
'openssl/providers/implementations/kdfs/tls1_prf.c',
'openssl/providers/implementations/kdfs/x942kdf.c',
'openssl/providers/implementations/kem/ml_kem_kem.c',
'openssl/providers/implementations/kem/mlx_kem.c',
'openssl/providers/implementations/kem/rsa_kem.c',
'openssl/providers/implementations/keymgmt/dh_kmgmt.c',
'openssl/providers/implementations/keymgmt/dsa_kmgmt.c',
'openssl/providers/implementations/keymgmt/ec_kmgmt.c',
'openssl/providers/implementations/keymgmt/ecx_kmgmt.c',
'openssl/providers/implementations/keymgmt/kdf_legacy_kmgmt.c',
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'openssl/providers/implementations/macs/gmac_prov.c',
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'openssl/providers/implementations/macs/kmac_prov.c',
'openssl/providers/implementations/rands/drbg.c',
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'openssl/providers/implementations/rands/drbg_hash.c',
'openssl/providers/implementations/rands/drbg_hmac.c',
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'openssl/providers/implementations/rands/test_rng.c',
'openssl/providers/implementations/signature/dsa_sig.c',
'openssl/providers/implementations/signature/ecdsa_sig.c',
'openssl/providers/implementations/signature/eddsa_sig.c',
'openssl/providers/implementations/signature/mac_legacy_sig.c',
'openssl/providers/implementations/signature/ml_dsa_sig.c',
'openssl/providers/implementations/signature/rsa_sig.c',
'openssl/providers/implementations/signature/slh_dsa_sig.c',
'openssl/providers/implementations/skeymgmt/aes_skmgmt.c',
'openssl/providers/implementations/skeymgmt/generic.c',
'openssl/ssl/record/methods/ssl3_cbc.c',
'openssl/providers/common/der/der_dsa_key.c',
'openssl/providers/common/der/der_dsa_sig.c',
'openssl/providers/common/der/der_ec_key.c',
'openssl/providers/common/der/der_ec_sig.c',
'openssl/providers/common/der/der_ecx_key.c',
'openssl/providers/common/der/der_ml_dsa_key.c',
'openssl/providers/common/der/der_rsa_key.c',
'openssl/providers/common/der/der_slh_dsa_key.c',

```
  'openssl/providers/common/provider_ctx.c',
  'openssl/providers/common/provider_err.c',
  'openssl/providers/implementations/ciphers/ciphercommon.c',
  'openssl/providers/implementations/ciphers/ciphercommon_block.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm_hw.c',
   'openssl/providers/implementations/ciphers/ciphercommon_gcm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_gcm_hw.c',
  'openssl/providers/implementations/ciphers/ciphercommon_hw.c',
  'openssl/providers/implementations/digests/digestcommon.c',
  'openssl/ssl/record/methods/tls_pad.c',
  'openssl/providers/fips/fips_entry.c',

 ],
 'openssl_sources_BSD-x86': [
  './config/archs/BSD-x86/asm_avx2/crypto/aes/aes-586.S',
  './config/archs/BSD-x86/asm_avx2/crypto/aes/aesni-x86.S',
  './config/archs/BSD-x86/asm_avx2/crypto/aes/vpaes-x86.S',
  './config/archs/BSD-x86/asm_avx2/crypto/bf/bf-586.S',
  './config/archs/BSD-x86/asm_avx2/crypto/bn/bn-586.S',
  './config/archs/BSD-x86/asm_avx2/crypto/bn/co-586.S',
  './config/archs/BSD-x86/asm_avx2/crypto/bn/x86-gf2m.S',
  './config/archs/BSD-x86/asm_avx2/crypto/bn/x86-mont.S',
  './config/archs/BSD-x86/asm_avx2/crypto/camellia/cmll-x86.S',
   './config/archs/BSD-x86/asm_avx2/crypto/chacha/chacha-x86.S',
  './config/archs/BSD-x86/asm_avx2/crypto/des/crypt586.S',
  './config/archs/BSD-x86/asm_avx2/crypto/des/des-586.S',
  './config/archs/BSD-x86/asm_avx2/crypto/ec/ecp_nistz256-x86.S',
  './config/archs/BSD-x86/asm_avx2/crypto/params_idx.c',
  './config/archs/BSD-x86/asm_avx2/crypto/x86cpuid.S',
  './config/archs/BSD-x86/asm_avx2/crypto/md5/md5-586.S',
  './config/archs/BSD-x86/asm_avx2/crypto/modes/ghash-x86.S',
  './config/archs/BSD-x86/asm_avx2/crypto/poly1305/poly1305-x86.S',
  './config/archs/BSD-x86/asm_avx2/crypto/rc4/rc4-586.S',
  './config/archs/BSD-x86/asm_avx2/crypto/ripemd/rmd-586.S',
  './config/archs/BSD-x86/asm_avx2/crypto/sha/sha1-586.S',
  './config/archs/BSD-x86/asm_avx2/crypto/sha/sha256-586.S',
  './config/archs/BSD-x86/asm_avx2/crypto/sha/sha512-586.S',
  './config/archs/BSD-x86/asm_avx2/crypto/whrlpool/wp-mmx.S',
   './config/archs/BSD-x86/asm_avx2/engines/e_padlock-x86.S',
  './config/archs/BSD-x86/asm_avx2/providers/common/der/der_sm2_gen.c',
  './config/archs/BSD-x86/asm_avx2/providers/common/der/der_digests_gen.c',
  './config/archs/BSD-x86/asm_avx2/providers/common/der/der_dsa_gen.c',
  './config/archs/BSD-x86/asm_avx2/providers/common/der/der_ec_gen.c',
  './config/archs/BSD-x86/asm_avx2/providers/common/der/der_ecx_gen.c',
  './config/archs/BSD-x86/asm_avx2/providers/common/der/der_ml_dsa_gen.c',
  './config/archs/BSD-x86/asm_avx2/providers/common/der/der_rsa_gen.c',
  './config/archs/BSD-x86/asm_avx2/providers/common/der/der_slh_dsa_gen.c',
```

```
    './config/archs/BSD-x86/asm_avx2/providers/common/der/der_wrap_gen.c',
    './config/archs/BSD-x86/asm_avx2/providers/legacy.ld',
    './config/archs/BSD-x86/asm_avx2/providers/fips.ld',

  ],
  'openssl_defines_BSD-x86': [
    'NDEBUG',
    'L_ENDIAN',
    'OPENSSL_BUILDING_OPENSSL',

 'AES_ASM',
    'DES_ASM',
    'ECP_NISTZ256_ASM',
    'FIPS_MODULE',
    'GHASH_ASM',
    'OPENSSL_BN_ASM_GF2m',
    'OPENSSL_BN_ASM_MONT',
    'OPENSSL_BN_ASM_PART_WORDS',
    'OPENSSL_CPUID_OBJ',
    'OPENSSL_IA32_SSE2',
    'SHA1_ASM',
    'SHA256_ASM',
    'SHA512_ASM',
    'VPAES_ASM',
    'FIPS_MODULE',
  ],
  'openssl_cflags_BSD-x86': [
    '-Wa,--noexecstack',
    '-Wall -O3 -fomit-frame-pointer',
    '-pthread',
    '-Wall -O3 -fomit-frame-pointer',
  ],
  'openssl_ex_libs_BSD-x86': [
    '-pthread',
  ],
  'linker_script': ''
},
'include_dirs': [
  '.',
  './include',
  './crypto',
  './crypto/include/internal',
  './providers/common/include',
],
'defines': ['<@(openssl_defines_BSD-x86)'],
'cflags': ['<@(openssl_cflags_BSD-x86)'],
'libraries': ['<@(openssl_ex_libs_BSD-x86)'],
```

```
 'sources': ['<@(openssl_sources)', '<@(openssl_sources_BSD-x86)'],
 'direct_dependent_settings': {
   'include_dirs': ['./include',
 '.'],
   'defines': ['<@(openssl_defines_BSD-x86)'],
 },
}
```

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```
/*
* WARNING: do not edit!
* Generated by util/mkbuildinf.pl
*
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#define PLATFORM "platform: BSD-x86_64"
#define DATE "built on: Tue Jan 27 17:27:07 2026 UTC"

/*
* Generate compiler_flags as an array of individual characters. This is a
* workaround for the situation where CFLAGS gets too long for a C90 string
```

```
* literal
*/
static const char compiler_flags[] = {
   'c','o','m','p','i','l','e','r',':',' ','c','c',' ','-','f','P',
   'I','C',' ','-','p','t','h','r','e','a','d',' ','-','W','a','l',
   'l',' ','-','O','3',' ','-','D','L','_','E','N','D','I','A','N',
   ' ','-','D','O','P','E','N','S','S','L','_','P','I','C',' ','-',
   'D','_','T','H','R','E','A','D','_','S','A','F','E','
 ','-','D',
   '_','R','E','E','N','T','R','A','N','T',' ','-','D','O','P','E',
   'N','S','S','L','_','B','U','I','L','D','I','N','G','_','O','P',
   'E','N','S','S','L',' ','-','D','N','D','E','B','U','G','\0'
};
{
   global:
       OSSL_provider_init;
   local: *;
};
/*
* WARNING: do not edit!
* Generated by configdata.pm from Configurations/common0.tmpl, Configurations/unix-Makefile.tmpl
* via Makefile.in
*
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#ifndef OPENSSL_CONFIGURATION_H
#define OPENSSL_CONFIGURATION_H
#pragma once

#ifdef __cplusplus
extern "C" {
#endif

#ifdef OPENSSL_ALGORITHM_DEFINES
#error OPENSSL_ALGORITHM_DEFINES no longer supported
#endif

/*
* OpenSSL was configured with the following options:
*/

/* clang-format off */
```

```
# define OPENSSL_CONFIGURED_API 30500
# ifndef OPENSSL_RAND_SEED_OS
#  define OPENSSL_RAND_SEED_OS
# endif
# ifndef OPENSSL_THREADS
#  define OPENSSL_THREADS
# endif
# ifndef OPENSSL_NO_AFALGENG
#  define OPENSSL_NO_AFALGENG
#
 endif
# ifndef OPENSSL_NO_ASAN
#  define OPENSSL_NO_ASAN
# endif
# ifndef OPENSSL_NO_ASM
#  define OPENSSL_NO_ASM
# endif
# ifndef OPENSSL_NO_BROTLI
#  define OPENSSL_NO_BROTLI
# endif
# ifndef OPENSSL_NO_BROTLI_DYNAMIC
#  define OPENSSL_NO_BROTLI_DYNAMIC
# endif
# ifndef OPENSSL_NO_COMP
#  define OPENSSL_NO_COMP
# endif
# ifndef OPENSSL_NO_CRYPTO_MDEBUG
#  define OPENSSL_NO_CRYPTO_MDEBUG
# endif
# ifndef OPENSSL_NO_CRYPTO_MDEBUG_BACKTRACE
#  define OPENSSL_NO_CRYPTO_MDEBUG_BACKTRACE
# endif
# ifndef OPENSSL_NO_DEMOS
#  define OPENSSL_NO_DEMOS
# endif
# ifndef OPENSSL_NO_EC_NISTP_64_GCC_128
#  define OPENSSL_NO_EC_NISTP_64_GCC_128
# endif
# ifndef OPENSSL_NO_EGD
#  define OPENSSL_NO_EGD
# endif
# ifndef OPENSSL_NO_EXTERNAL_TESTS
#  define OPENSSL_NO_EXTERNAL_TESTS
# endif
# ifndef OPENSSL_NO_FIPS_JITTER
#  define OPENSSL_NO_FIPS_JITTER
# endif
# ifndef OPENSSL_NO_FUZZ_AFL
```

```
#  define OPENSSL_NO_FUZZ_AFL
# endif
# ifndef OPENSSL_NO_FUZZ_LIBFUZZER
#  define OPENSSL_NO_FUZZ_LIBFUZZER
#
 endif
# ifndef OPENSSL_NO_H3DEMO
#  define OPENSSL_NO_H3DEMO
# endif
# ifndef OPENSSL_NO_HQINTEROP
#  define OPENSSL_NO_HQINTEROP
# endif
# ifndef OPENSSL_NO_JITTER
#  define OPENSSL_NO_JITTER
# endif
# ifndef OPENSSL_NO_KTLS
#  define OPENSSL_NO_KTLS
# endif
# ifndef OPENSSL_NO_LOADERENG
#  define OPENSSL_NO_LOADERENG
# endif
# ifndef OPENSSL_NO_MD2
#  define OPENSSL_NO_MD2
# endif
# ifndef OPENSSL_NO_MSAN
#  define OPENSSL_NO_MSAN
# endif
# ifndef OPENSSL_NO_PIE
#  define OPENSSL_NO_PIE
# endif
# ifndef OPENSSL_NO_RC5
#  define OPENSSL_NO_RC5
# endif
# ifndef OPENSSL_NO_SCTP
#  define OPENSSL_NO_SCTP
# endif
# ifndef OPENSSL_NO_SSL3
#  define OPENSSL_NO_SSL3
# endif
# ifndef OPENSSL_NO_SSL3_METHOD
#  define OPENSSL_NO_SSL3_METHOD
# endif
# ifndef OPENSSL_NO_SSLKEYLOG
#  define OPENSSL_NO_SSLKEYLOG
# endif
# ifndef OPENSSL_NO_TFO
#  define OPENSSL_NO_TFO
# endif
```

```
# ifndef OPENSSL_NO_TRACE
#  define OPENSSL_NO_TRACE
# endif
# ifndef OPENSSL_NO_UBSAN
#  define OPENSSL_NO_UBSAN
# endif
#
 ifndef OPENSSL_NO_UNIT_TEST
#  define OPENSSL_NO_UNIT_TEST
# endif
# ifndef OPENSSL_NO_UPLINK
#  define OPENSSL_NO_UPLINK
# endif
# ifndef OPENSSL_NO_WEAK_SSL_CIPHERS
#  define OPENSSL_NO_WEAK_SSL_CIPHERS
# endif
# ifndef OPENSSL_NO_WINSTORE
#  define OPENSSL_NO_WINSTORE
# endif
# ifndef OPENSSL_NO_ZLIB
#  define OPENSSL_NO_ZLIB
# endif
# ifndef OPENSSL_NO_ZLIB_DYNAMIC
#  define OPENSSL_NO_ZLIB_DYNAMIC
# endif
# ifndef OPENSSL_NO_ZSTD
#  define OPENSSL_NO_ZSTD
# endif
# ifndef OPENSSL_NO_ZSTD_DYNAMIC
#  define OPENSSL_NO_ZSTD_DYNAMIC
# endif
# ifndef OPENSSL_NO_DYNAMIC_ENGINE
#  define OPENSSL_NO_DYNAMIC_ENGINE
# endif

/* clang-format on */

/* Generate 80386 code? */
/* clang-format off */
# undef I386_ONLY
/* clang-format on */

/*
* The following are cipher-specific, but are part of the public API.
*/
#if !defined(OPENSSL_SYS_UEFI)
   /* clang-format off */
#  define BN_LLONG
```

```
   /* clang-format on */
   /* Only one for the following should be defined */
   /* clang-format off
 */
#  undef SIXTY_FOUR_BIT_LONG
   /* clang-format on */
   /* clang-format off */
#  undef SIXTY_FOUR_BIT
   /* clang-format on */
   /* clang-format off */
#  define THIRTY_TWO_BIT
/* clang-format on */
#endif

/* clang-format off */
# define RC4_INT unsigned int
/* clang-format on */

#if defined(OPENSSL_NO_COMP) || (defined(OPENSSL_NO_BROTLI) && defined(OPENSSL_NO_ZSTD) &&
defined(OPENSSL_NO_ZLIB))
#define OPENSSL_NO_COMP_ALG
#else
#undef OPENSSL_NO_COMP_ALG
#endif

#ifdef __cplusplus
}
#endif

#endif /* OPENSSL_CONFIGURATION_H */
```

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Version 2.1, February 1999

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/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_X509_H
#define OPENSSL_X509_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_X509_H
#endif

#include <openssl/e_os2.h>
#include <openssl/types.h>
#include <openssl/symhacks.h>
#include <openssl/buffer.h>
#include <openssl/evp.h>
#include <openssl/bio.h>
#include <openssl/asn1.h>
#include <openssl/safestack.h>
#include <openssl/ec.h>

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#include <openssl/rsa.h>
#include
 <openssl/dsa.h>
#include <openssl/dh.h>
#endif

#include <openssl/sha.h>
#include <openssl/x509err.h>
#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif

#ifdef __cplusplus
extern "C" {
#endif

/* Needed stacks for types defined in other headers */
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_NAME, X509_NAME, X509_NAME)
```

```
#define sk_X509_NAME_num(sk) OPENSSL_sk_num(ossl_check_const_X509_NAME_sk_type(sk))
#define sk_X509_NAME_value(sk, idx) ((X509_NAME
*)OPENSSL_sk_value(ossl_check_const_X509_NAME_sk_type(sk), (idx)))
#define sk_X509_NAME_new(cmp) ((STACK_OF(X509_NAME)
*)OPENSSL_sk_new(ossl_check_X509_NAME_compfunc_type(cmp)))
#define sk_X509_NAME_new_null() ((STACK_OF(X509_NAME) *)OPENSSL_sk_new_null())
#define sk_X509_NAME_new_reserve(cmp, n) ((STACK_OF(X509_NAME)
*)OPENSSL_sk_new_reserve(ossl_check_X509_NAME_compfunc_type(cmp), (n)))
#define sk_X509_NAME_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_NAME_sk_type(sk), (n))
#define sk_X509_NAME_free(sk) OPENSSL_sk_free(ossl_check_X509_NAME_sk_type(sk))
#define
 sk_X509_NAME_zero(sk) OPENSSL_sk_zero(ossl_check_X509_NAME_sk_type(sk))
#define sk_X509_NAME_delete(sk, i) ((X509_NAME
*)OPENSSL_sk_delete(ossl_check_X509_NAME_sk_type(sk), (i)))
#define sk_X509_NAME_delete_ptr(sk, ptr) ((X509_NAME
*)OPENSSL_sk_delete_ptr(ossl_check_X509_NAME_sk_type(sk), ossl_check_X509_NAME_type(ptr)))
#define sk_X509_NAME_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_NAME_sk_type(sk),
ossl_check_X509_NAME_type(ptr))
#define sk_X509_NAME_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_NAME_sk_type(sk),
ossl_check_X509_NAME_type(ptr))
#define sk_X509_NAME_pop(sk) ((X509_NAME *)OPENSSL_sk_pop(ossl_check_X509_NAME_sk_type(sk)))
#define sk_X509_NAME_shift(sk) ((X509_NAME *)OPENSSL_sk_shift(ossl_check_X509_NAME_sk_type(sk)))
#define sk_X509_NAME_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_NAME_sk_type(sk),ossl_check_X509_NAME_freefunc_type(freefunc)
)
#define sk_X509_NAME_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_NAME_sk_type(sk),
 ossl_check_X509_NAME_type(ptr), (idx))
#define sk_X509_NAME_set(sk, idx, ptr) ((X509_NAME
*)OPENSSL_sk_set(ossl_check_X509_NAME_sk_type(sk), (idx), ossl_check_X509_NAME_type(ptr)))
#define sk_X509_NAME_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_NAME_sk_type(sk),
ossl_check_X509_NAME_type(ptr))
#define sk_X509_NAME_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_NAME_sk_type(sk),
ossl_check_X509_NAME_type(ptr))
#define sk_X509_NAME_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_X509_NAME_sk_type(sk),
ossl_check_X509_NAME_type(ptr), pnum)
#define sk_X509_NAME_sort(sk) OPENSSL_sk_sort(ossl_check_X509_NAME_sk_type(sk))
#define sk_X509_NAME_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_X509_NAME_sk_type(sk))
#define sk_X509_NAME_dup(sk) ((STACK_OF(X509_NAME)
*)OPENSSL_sk_dup(ossl_check_const_X509_NAME_sk_type(sk)))
#define sk_X509_NAME_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_NAME)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_NAME_sk_type(sk),
 ossl_check_X509_NAME_copyfunc_type(copyfunc), ossl_check_X509_NAME_freefunc_type(freefunc)))
#define sk_X509_NAME_set_cmp_func(sk, cmp)
((sk_X509_NAME_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_NAME_sk_type(sk),
ossl_check_X509_NAME_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(X509, X509, X509)
#define sk_X509_num(sk) OPENSSL_sk_num(ossl_check_const_X509_sk_type(sk))
#define sk_X509_value(sk, idx) ((X509 *)OPENSSL_sk_value(ossl_check_const_X509_sk_type(sk), (idx)))
```

```
#define sk_X509_new(cmp) ((STACK_OF(X509) *)OPENSSL_sk_new(ossl_check_X509_compfunc_type(cmp)))
#define sk_X509_new_null() ((STACK_OF(X509) *)OPENSSL_sk_new_null())
#define sk_X509_new_reserve(cmp, n) ((STACK_OF(X509)
*)OPENSSL_sk_new_reserve(ossl_check_X509_compfunc_type(cmp), (n)))
#define sk_X509_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_sk_type(sk), (n))
#define sk_X509_free(sk) OPENSSL_sk_free(ossl_check_X509_sk_type(sk))
#define sk_X509_zero(sk) OPENSSL_sk_zero(ossl_check_X509_sk_type(sk))
#define
 sk_X509_delete(sk, i) ((X509 *)OPENSSL_sk_delete(ossl_check_X509_sk_type(sk), (i)))
#define sk_X509_delete_ptr(sk, ptr) ((X509 *)OPENSSL_sk_delete_ptr(ossl_check_X509_sk_type(sk),
ossl_check_X509_type(ptr)))
#define sk_X509_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_sk_type(sk), ossl_check_X509_type(ptr))
#define sk_X509_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_sk_type(sk),
ossl_check_X509_type(ptr))
#define sk_X509_pop(sk) ((X509 *)OPENSSL_sk_pop(ossl_check_X509_sk_type(sk)))
#define sk_X509_shift(sk) ((X509 *)OPENSSL_sk_shift(ossl_check_X509_sk_type(sk)))
#define sk_X509_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_sk_type(sk),ossl_check_X509_freefunc_type(freefunc))
#define sk_X509_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_sk_type(sk),
ossl_check_X509_type(ptr), (idx))
#define sk_X509_set(sk, idx, ptr) ((X509 *)OPENSSL_sk_set(ossl_check_X509_sk_type(sk), (idx),
ossl_check_X509_type(ptr)))
#define sk_X509_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_sk_type(sk),
 ossl_check_X509_type(ptr))
#define sk_X509_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_sk_type(sk),
ossl_check_X509_type(ptr))
#define sk_X509_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_X509_sk_type(sk),
ossl_check_X509_type(ptr), pnum)
#define sk_X509_sort(sk) OPENSSL_sk_sort(ossl_check_X509_sk_type(sk))
#define sk_X509_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_X509_sk_type(sk))
#define sk_X509_dup(sk) ((STACK_OF(X509) *)OPENSSL_sk_dup(ossl_check_const_X509_sk_type(sk)))
#define sk_X509_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_sk_type(sk), ossl_check_X509_copyfunc_type(copyfunc),
ossl_check_X509_freefunc_type(freefunc)))
#define sk_X509_set_cmp_func(sk, cmp)
((sk_X509_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_sk_type(sk),
ossl_check_X509_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(X509_REVOKED, X509_REVOKED, X509_REVOKED)
#define sk_X509_REVOKED_num(sk)
 OPENSSL_sk_num(ossl_check_const_X509_REVOKED_sk_type(sk))
#define sk_X509_REVOKED_value(sk, idx) ((X509_REVOKED
*)OPENSSL_sk_value(ossl_check_const_X509_REVOKED_sk_type(sk), (idx)))
#define sk_X509_REVOKED_new(cmp) ((STACK_OF(X509_REVOKED)
*)OPENSSL_sk_new(ossl_check_X509_REVOKED_compfunc_type(cmp)))
#define sk_X509_REVOKED_new_null() ((STACK_OF(X509_REVOKED) *)OPENSSL_sk_new_null())
#define sk_X509_REVOKED_new_reserve(cmp, n) ((STACK_OF(X509_REVOKED)
*)OPENSSL_sk_new_reserve(ossl_check_X509_REVOKED_compfunc_type(cmp), (n)))
#define sk_X509_REVOKED_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_REVOKED_sk_type(sk),
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(n))
#define sk_X509_REVOKED_free(sk) OPENSSL_sk_free(ossl_check_X509_REVOKED_sk_type(sk))
#define sk_X509_REVOKED_zero(sk) OPENSSL_sk_zero(ossl_check_X509_REVOKED_sk_type(sk))
#define sk_X509_REVOKED_delete(sk, i) ((X509_REVOKED
*)OPENSSL_sk_delete(ossl_check_X509_REVOKED_sk_type(sk), (i)))
#define sk_X509_REVOKED_delete_ptr(sk, ptr) ((X509_REVOKED
*)OPENSSL_sk_delete_ptr(ossl_check_X509_REVOKED_sk_type(sk),
 ossl_check_X509_REVOKED_type(ptr)))
#define sk_X509_REVOKED_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_REVOKED_sk_type(sk),
ossl_check_X509_REVOKED_type(ptr))
#define sk_X509_REVOKED_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_REVOKED_sk_type(sk),
ossl_check_X509_REVOKED_type(ptr))
#define sk_X509_REVOKED_pop(sk) ((X509_REVOKED
*)OPENSSL_sk_pop(ossl_check_X509_REVOKED_sk_type(sk)))
#define sk_X509_REVOKED_shift(sk) ((X509_REVOKED
*)OPENSSL_sk_shift(ossl_check_X509_REVOKED_sk_type(sk)))
#define sk_X509_REVOKED_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_REVOKED_sk_type(sk),ossl_check_X509_REVOKED_freefunc_type(
freefunc))
#define sk_X509_REVOKED_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_REVOKED_sk_type(sk),
ossl_check_X509_REVOKED_type(ptr), (idx))
#define sk_X509_REVOKED_set(sk, idx, ptr) ((X509_REVOKED
*)OPENSSL_sk_set(ossl_check_X509_REVOKED_sk_type(sk), (idx), ossl_check_X509_REVOKED_type(ptr)))
#define
 sk_X509_REVOKED_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_REVOKED_sk_type(sk),
ossl_check_X509_REVOKED_type(ptr))
#define sk_X509_REVOKED_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_REVOKED_sk_type(sk),
ossl_check_X509_REVOKED_type(ptr))
#define sk_X509_REVOKED_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_X509_REVOKED_sk_type(sk), ossl_check_X509_REVOKED_type(ptr),
pnum)
#define sk_X509_REVOKED_sort(sk) OPENSSL_sk_sort(ossl_check_X509_REVOKED_sk_type(sk))
#define sk_X509_REVOKED_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_X509_REVOKED_sk_type(sk))
#define sk_X509_REVOKED_dup(sk) ((STACK_OF(X509_REVOKED)
*)OPENSSL_sk_dup(ossl_check_const_X509_REVOKED_sk_type(sk)))
#define sk_X509_REVOKED_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_REVOKED)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_REVOKED_sk_type(sk),
ossl_check_X509_REVOKED_copyfunc_type(copyfunc),
ossl_check_X509_REVOKED_freefunc_type(freefunc)))
#define sk_X509_REVOKED_set_cmp_func(sk, cmp)
((sk_X509_REVOKED_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_REVOKED_sk_type(sk),
 ossl_check_X509_REVOKED_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(X509_CRL, X509_CRL, X509_CRL)
#define sk_X509_CRL_num(sk) OPENSSL_sk_num(ossl_check_const_X509_CRL_sk_type(sk))
#define sk_X509_CRL_value(sk, idx) ((X509_CRL
*)OPENSSL_sk_value(ossl_check_const_X509_CRL_sk_type(sk), (idx)))
#define sk_X509_CRL_new(cmp) ((STACK_OF(X509_CRL)
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*)OPENSSL_sk_new(ossl_check_X509_CRL_compfunc_type(cmp)))
#define sk_X509_CRL_new_null() ((STACK_OF(X509_CRL) *)OPENSSL_sk_new_null())
#define sk_X509_CRL_new_reserve(cmp, n) ((STACK_OF(X509_CRL)
*)OPENSSL_sk_new_reserve(ossl_check_X509_CRL_compfunc_type(cmp), (n)))
#define sk_X509_CRL_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_CRL_sk_type(sk), (n))
#define sk_X509_CRL_free(sk) OPENSSL_sk_free(ossl_check_X509_CRL_sk_type(sk))
#define sk_X509_CRL_zero(sk) OPENSSL_sk_zero(ossl_check_X509_CRL_sk_type(sk))
#define sk_X509_CRL_delete(sk, i) ((X509_CRL *)OPENSSL_sk_delete(ossl_check_X509_CRL_sk_type(sk),
 (i)))
#define sk_X509_CRL_delete_ptr(sk, ptr) ((X509_CRL
*)OPENSSL_sk_delete_ptr(ossl_check_X509_CRL_sk_type(sk), ossl_check_X509_CRL_type(ptr)))
#define sk_X509_CRL_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_CRL_sk_type(sk),
ossl_check_X509_CRL_type(ptr))
#define sk_X509_CRL_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_CRL_sk_type(sk),
ossl_check_X509_CRL_type(ptr))
#define sk_X509_CRL_pop(sk) ((X509_CRL *)OPENSSL_sk_pop(ossl_check_X509_CRL_sk_type(sk)))
#define sk_X509_CRL_shift(sk) ((X509_CRL *)OPENSSL_sk_shift(ossl_check_X509_CRL_sk_type(sk)))
#define sk_X509_CRL_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_CRL_sk_type(sk),ossl_check_X509_CRL_freefunc_type(freefunc))
#define sk_X509_CRL_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_CRL_sk_type(sk),
ossl_check_X509_CRL_type(ptr), (idx))
#define sk_X509_CRL_set(sk, idx, ptr) ((X509_CRL *)OPENSSL_sk_set(ossl_check_X509_CRL_sk_type(sk),
(idx), ossl_check_X509_CRL_type(ptr)))
#define
 sk_X509_CRL_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_CRL_sk_type(sk),
ossl_check_X509_CRL_type(ptr))
#define sk_X509_CRL_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_CRL_sk_type(sk),
ossl_check_X509_CRL_type(ptr))
#define sk_X509_CRL_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_X509_CRL_sk_type(sk),
ossl_check_X509_CRL_type(ptr), pnum)
#define sk_X509_CRL_sort(sk) OPENSSL_sk_sort(ossl_check_X509_CRL_sk_type(sk))
#define sk_X509_CRL_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_X509_CRL_sk_type(sk))
#define sk_X509_CRL_dup(sk) ((STACK_OF(X509_CRL)
*)OPENSSL_sk_dup(ossl_check_const_X509_CRL_sk_type(sk)))
#define sk_X509_CRL_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_CRL)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_CRL_sk_type(sk),
ossl_check_X509_CRL_copyfunc_type(copyfunc), ossl_check_X509_CRL_freefunc_type(freefunc)))
#define sk_X509_CRL_set_cmp_func(sk, cmp)
((sk_X509_CRL_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_CRL_sk_type(sk),
 ossl_check_X509_CRL_compfunc_type(cmp)))

/* clang-format on */

/* Flags for X509_get_signature_info() */
/* Signature info is valid */
#define X509_SIG_INFO_VALID 0x1
/* Signature is suitable for TLS use */
#define X509_SIG_INFO_TLS 0x2
```

```
#define X509_FILETYPE_PEM 1
#define X509_FILETYPE_ASN1 2
#define X509_FILETYPE_DEFAULT 3

/*-
* <https://datatracker.ietf.org/doc/html/rfc5280#section-4.2.1.3>:
* The KeyUsage BITSTRING is treated as a little-endian integer, hence bit `0`
* is 0x80, while bit `7` is 0x01 (the LSB of the integer value), bit `8` is
* then the MSB of the second octet, or 0x8000.
*/
#define X509v3_KU_DIGITAL_SIGNATURE 0x0080 /* (0) */
#define X509v3_KU_NON_REPUDIATION 0x0040 /* (1) */
#define X509v3_KU_KEY_ENCIPHERMENT 0x0020 /* (2) */
#define X509v3_KU_DATA_ENCIPHERMENT 0x0010 /* (3) */
#define X509v3_KU_KEY_AGREEMENT 0x0008 /* (4) */
#define X509v3_KU_KEY_CERT_SIGN 0x0004 /* (5) */
#define X509v3_KU_CRL_SIGN 0x0002 /* (6) */
#define X509v3_KU_ENCIPHER_ONLY
 0x0001 /* (7) */
#define X509v3_KU_DECIPHER_ONLY 0x8000 /* (8) */
#ifndef OPENSSL_NO_DEPRECATED_3_4
#define X509v3_KU_UNDEF 0xffff /* vestigial, not used */
#endif

struct X509_algor_st {
   ASN1_OBJECT *algorithm;
   ASN1_TYPE *parameter;
} /* X509_ALGOR */;

typedef STACK_OF(X509_ALGOR) X509_ALGORS;

typedef struct X509_val_st {
   ASN1_TIME *notBefore;
   ASN1_TIME *notAfter;
} X509_VAL;

typedef struct X509_sig_st X509_SIG;

typedef struct X509_name_entry_st X509_NAME_ENTRY;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_NAME_ENTRY, X509_NAME_ENTRY,
X509_NAME_ENTRY)
#define sk_X509_NAME_ENTRY_num(sk)
OPENSSL_sk_num(ossl_check_const_X509_NAME_ENTRY_sk_type(sk))
#define sk_X509_NAME_ENTRY_value(sk, idx) ((X509_NAME_ENTRY
*)OPENSSL_sk_value(ossl_check_const_X509_NAME_ENTRY_sk_type(sk), (idx)))
```

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#define sk_X509_NAME_ENTRY_new(cmp) ((STACK_OF(X509_NAME_ENTRY)
*)OPENSSL_sk_new(ossl_check_X509_NAME_ENTRY_compfunc_type(cmp)))
#define sk_X509_NAME_ENTRY_new_null() ((STACK_OF(X509_NAME_ENTRY)
 *)OPENSSL_sk_new_null())
#define sk_X509_NAME_ENTRY_new_reserve(cmp, n) ((STACK_OF(X509_NAME_ENTRY)
*)OPENSSL_sk_new_reserve(ossl_check_X509_NAME_ENTRY_compfunc_type(cmp), (n)))
#define sk_X509_NAME_ENTRY_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_X509_NAME_ENTRY_sk_type(sk), (n))
#define sk_X509_NAME_ENTRY_free(sk) OPENSSL_sk_free(ossl_check_X509_NAME_ENTRY_sk_type(sk))
#define sk_X509_NAME_ENTRY_zero(sk) OPENSSL_sk_zero(ossl_check_X509_NAME_ENTRY_sk_type(sk))
#define sk_X509_NAME_ENTRY_delete(sk, i) ((X509_NAME_ENTRY
*)OPENSSL_sk_delete(ossl_check_X509_NAME_ENTRY_sk_type(sk), (i)))
#define sk_X509_NAME_ENTRY_delete_ptr(sk, ptr) ((X509_NAME_ENTRY
*)OPENSSL_sk_delete_ptr(ossl_check_X509_NAME_ENTRY_sk_type(sk),
ossl_check_X509_NAME_ENTRY_type(ptr)))
#define sk_X509_NAME_ENTRY_push(sk, ptr)
OPENSSL_sk_push(ossl_check_X509_NAME_ENTRY_sk_type(sk),
ossl_check_X509_NAME_ENTRY_type(ptr))
#define sk_X509_NAME_ENTRY_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_X509_NAME_ENTRY_sk_type(sk),
 ossl_check_X509_NAME_ENTRY_type(ptr))
#define sk_X509_NAME_ENTRY_pop(sk) ((X509_NAME_ENTRY
*)OPENSSL_sk_pop(ossl_check_X509_NAME_ENTRY_sk_type(sk)))
#define sk_X509_NAME_ENTRY_shift(sk) ((X509_NAME_ENTRY
*)OPENSSL_sk_shift(ossl_check_X509_NAME_ENTRY_sk_type(sk)))
#define sk_X509_NAME_ENTRY_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_NAME_ENTRY_sk_type(sk),ossl_check_X509_NAME_ENTRY_freef
unc_type(freefunc))
#define sk_X509_NAME_ENTRY_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_X509_NAME_ENTRY_sk_type(sk),
ossl_check_X509_NAME_ENTRY_type(ptr), (idx))
#define sk_X509_NAME_ENTRY_set(sk, idx, ptr) ((X509_NAME_ENTRY
*)OPENSSL_sk_set(ossl_check_X509_NAME_ENTRY_sk_type(sk), (idx),
ossl_check_X509_NAME_ENTRY_type(ptr)))
#define sk_X509_NAME_ENTRY_find(sk, ptr)
OPENSSL_sk_find(ossl_check_X509_NAME_ENTRY_sk_type(sk),
ossl_check_X509_NAME_ENTRY_type(ptr))
#define sk_X509_NAME_ENTRY_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_X509_NAME_ENTRY_sk_type(sk),
 ossl_check_X509_NAME_ENTRY_type(ptr))
#define sk_X509_NAME_ENTRY_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_X509_NAME_ENTRY_sk_type(sk),
ossl_check_X509_NAME_ENTRY_type(ptr), pnum)
#define sk_X509_NAME_ENTRY_sort(sk) OPENSSL_sk_sort(ossl_check_X509_NAME_ENTRY_sk_type(sk))
#define sk_X509_NAME_ENTRY_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_X509_NAME_ENTRY_sk_type(sk))
#define sk_X509_NAME_ENTRY_dup(sk) ((STACK_OF(X509_NAME_ENTRY)
*)OPENSSL_sk_dup(ossl_check_const_X509_NAME_ENTRY_sk_type(sk)))
```

```
#define sk_X509_NAME_ENTRY_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_NAME_ENTRY)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_NAME_ENTRY_sk_type(sk),
ossl_check_X509_NAME_ENTRY_copyfunc_type(copyfunc),
ossl_check_X509_NAME_ENTRY_freefunc_type(freefunc)))
#define sk_X509_NAME_ENTRY_set_cmp_func(sk, cmp)
((sk_X509_NAME_ENTRY_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_NAME_ENTRY_sk_type
(sk), ossl_check_X509_NAME_ENTRY_compfunc_type(cmp)))

/* clang-format on */

#define
 X509_EX_V_NETSCAPE_HACK 0x8000
#define X509_EX_V_INIT 0x0001
typedef struct X509_extension_st X509_EXTENSION;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_EXTENSION, X509_EXTENSION, X509_EXTENSION)
#define sk_X509_EXTENSION_num(sk) OPENSSL_sk_num(ossl_check_const_X509_EXTENSION_sk_type(sk))
#define sk_X509_EXTENSION_value(sk, idx) ((X509_EXTENSION
*)OPENSSL_sk_value(ossl_check_const_X509_EXTENSION_sk_type(sk), (idx)))
#define sk_X509_EXTENSION_new(cmp) ((STACK_OF(X509_EXTENSION)
*)OPENSSL_sk_new(ossl_check_X509_EXTENSION_compfunc_type(cmp)))
#define sk_X509_EXTENSION_new_null() ((STACK_OF(X509_EXTENSION) *)OPENSSL_sk_new_null())
#define sk_X509_EXTENSION_new_reserve(cmp, n) ((STACK_OF(X509_EXTENSION)
*)OPENSSL_sk_new_reserve(ossl_check_X509_EXTENSION_compfunc_type(cmp), (n)))
#define sk_X509_EXTENSION_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_X509_EXTENSION_sk_type(sk), (n))
#define sk_X509_EXTENSION_free(sk) OPENSSL_sk_free(ossl_check_X509_EXTENSION_sk_type(sk))
#define
 sk_X509_EXTENSION_zero(sk) OPENSSL_sk_zero(ossl_check_X509_EXTENSION_sk_type(sk))
#define sk_X509_EXTENSION_delete(sk, i) ((X509_EXTENSION
*)OPENSSL_sk_delete(ossl_check_X509_EXTENSION_sk_type(sk), (i)))
#define sk_X509_EXTENSION_delete_ptr(sk, ptr) ((X509_EXTENSION
*)OPENSSL_sk_delete_ptr(ossl_check_X509_EXTENSION_sk_type(sk),
ossl_check_X509_EXTENSION_type(ptr)))
#define sk_X509_EXTENSION_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_EXTENSION_sk_type(sk),
ossl_check_X509_EXTENSION_type(ptr))
#define sk_X509_EXTENSION_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_X509_EXTENSION_sk_type(sk), ossl_check_X509_EXTENSION_type(ptr))
#define sk_X509_EXTENSION_pop(sk) ((X509_EXTENSION
*)OPENSSL_sk_pop(ossl_check_X509_EXTENSION_sk_type(sk)))
#define sk_X509_EXTENSION_shift(sk) ((X509_EXTENSION
*)OPENSSL_sk_shift(ossl_check_X509_EXTENSION_sk_type(sk)))
#define sk_X509_EXTENSION_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_EXTENSION_sk_type(sk),ossl_check_X509_EXTENSION_freefunc_t
ype(freefunc))
#define
 sk_X509_EXTENSION_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_EXTENSION_sk_type(sk),
ossl_check_X509_EXTENSION_type(ptr), (idx))
```

```
#define sk_X509_EXTENSION_set(sk, idx, ptr) ((X509_EXTENSION
*)OPENSSL_sk_set(ossl_check_X509_EXTENSION_sk_type(sk), (idx),
ossl_check_X509_EXTENSION_type(ptr)))
#define sk_X509_EXTENSION_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_EXTENSION_sk_type(sk),
ossl_check_X509_EXTENSION_type(ptr))
#define sk_X509_EXTENSION_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_X509_EXTENSION_sk_type(sk), ossl_check_X509_EXTENSION_type(ptr))
#define sk_X509_EXTENSION_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_X509_EXTENSION_sk_type(sk), ossl_check_X509_EXTENSION_type(ptr),
pnum)
#define sk_X509_EXTENSION_sort(sk) OPENSSL_sk_sort(ossl_check_X509_EXTENSION_sk_type(sk))
#define sk_X509_EXTENSION_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_X509_EXTENSION_sk_type(sk))
#define sk_X509_EXTENSION_dup(sk) ((STACK_OF(X509_EXTENSION)
 *)OPENSSL_sk_dup(ossl_check_const_X509_EXTENSION_sk_type(sk)))
#define sk_X509_EXTENSION_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_EXTENSION)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_EXTENSION_sk_type(sk),
ossl_check_X509_EXTENSION_copyfunc_type(copyfunc),
ossl_check_X509_EXTENSION_freefunc_type(freefunc)))
#define sk_X509_EXTENSION_set_cmp_func(sk, cmp)
((sk_X509_EXTENSION_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_EXTENSION_sk_type(sk),
ossl_check_X509_EXTENSION_compfunc_type(cmp)))

/* clang-format on */
typedef STACK_OF(X509_EXTENSION) X509_EXTENSIONS;
typedef struct x509_attributes_st X509_ATTRIBUTE;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_ATTRIBUTE, X509_ATTRIBUTE, X509_ATTRIBUTE)
#define sk_X509_ATTRIBUTE_num(sk) OPENSSL_sk_num(ossl_check_const_X509_ATTRIBUTE_sk_type(sk))
#define sk_X509_ATTRIBUTE_value(sk, idx) ((X509_ATTRIBUTE
*)OPENSSL_sk_value(ossl_check_const_X509_ATTRIBUTE_sk_type(sk), (idx)))
#define sk_X509_ATTRIBUTE_new(cmp)
 ((STACK_OF(X509_ATTRIBUTE)
*)OPENSSL_sk_new(ossl_check_X509_ATTRIBUTE_compfunc_type(cmp)))
#define sk_X509_ATTRIBUTE_new_null() ((STACK_OF(X509_ATTRIBUTE) *)OPENSSL_sk_new_null())
#define sk_X509_ATTRIBUTE_new_reserve(cmp, n) ((STACK_OF(X509_ATTRIBUTE)
*)OPENSSL_sk_new_reserve(ossl_check_X509_ATTRIBUTE_compfunc_type(cmp), (n)))
#define sk_X509_ATTRIBUTE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_X509_ATTRIBUTE_sk_type(sk), (n))
#define sk_X509_ATTRIBUTE_free(sk) OPENSSL_sk_free(ossl_check_X509_ATTRIBUTE_sk_type(sk))
#define sk_X509_ATTRIBUTE_zero(sk) OPENSSL_sk_zero(ossl_check_X509_ATTRIBUTE_sk_type(sk))
#define sk_X509_ATTRIBUTE_delete(sk, i) ((X509_ATTRIBUTE
*)OPENSSL_sk_delete(ossl_check_X509_ATTRIBUTE_sk_type(sk), (i)))
#define sk_X509_ATTRIBUTE_delete_ptr(sk, ptr) ((X509_ATTRIBUTE
*)OPENSSL_sk_delete_ptr(ossl_check_X509_ATTRIBUTE_sk_type(sk),
ossl_check_X509_ATTRIBUTE_type(ptr)))
#define sk_X509_ATTRIBUTE_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_ATTRIBUTE_sk_type(sk),
ossl_check_X509_ATTRIBUTE_type(ptr))
```

```
#define
 sk_X509_ATTRIBUTE_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_ATTRIBUTE_sk_type(sk),
ossl_check_X509_ATTRIBUTE_type(ptr))
#define sk_X509_ATTRIBUTE_pop(sk) ((X509_ATTRIBUTE
*)OPENSSL_sk_pop(ossl_check_X509_ATTRIBUTE_sk_type(sk)))
#define sk_X509_ATTRIBUTE_shift(sk) ((X509_ATTRIBUTE
*)OPENSSL_sk_shift(ossl_check_X509_ATTRIBUTE_sk_type(sk)))
#define sk_X509_ATTRIBUTE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_ATTRIBUTE_sk_type(sk),ossl_check_X509_ATTRIBUTE_freefunc_t
ype(freefunc))
#define sk_X509_ATTRIBUTE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_X509_ATTRIBUTE_sk_type(sk), ossl_check_X509_ATTRIBUTE_type(ptr),
(idx))
#define sk_X509_ATTRIBUTE_set(sk, idx, ptr) ((X509_ATTRIBUTE
*)OPENSSL_sk_set(ossl_check_X509_ATTRIBUTE_sk_type(sk), (idx),
ossl_check_X509_ATTRIBUTE_type(ptr)))
#define sk_X509_ATTRIBUTE_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_ATTRIBUTE_sk_type(sk),
ossl_check_X509_ATTRIBUTE_type(ptr))
#define
 sk_X509_ATTRIBUTE_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_ATTRIBUTE_sk_type(sk),
ossl_check_X509_ATTRIBUTE_type(ptr))
#define sk_X509_ATTRIBUTE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_X509_ATTRIBUTE_sk_type(sk), ossl_check_X509_ATTRIBUTE_type(ptr),
pnum)
#define sk_X509_ATTRIBUTE_sort(sk) OPENSSL_sk_sort(ossl_check_X509_ATTRIBUTE_sk_type(sk))
#define sk_X509_ATTRIBUTE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_X509_ATTRIBUTE_sk_type(sk))
#define sk_X509_ATTRIBUTE_dup(sk) ((STACK_OF(X509_ATTRIBUTE)
*)OPENSSL_sk_dup(ossl_check_const_X509_ATTRIBUTE_sk_type(sk)))
#define sk_X509_ATTRIBUTE_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_ATTRIBUTE)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_ATTRIBUTE_sk_type(sk),
ossl_check_X509_ATTRIBUTE_copyfunc_type(copyfunc),
ossl_check_X509_ATTRIBUTE_freefunc_type(freefunc)))
#define sk_X509_ATTRIBUTE_set_cmp_func(sk, cmp)
((sk_X509_ATTRIBUTE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_ATTRIBUTE_sk_type(sk),
 ossl_check_X509_ATTRIBUTE_compfunc_type(cmp)))

/* clang-format on */
typedef struct X509_req_info_st X509_REQ_INFO;
typedef struct X509_req_st X509_REQ;
typedef struct x509_cert_aux_st X509_CERT_AUX;
typedef struct x509_cinf_st X509_CINF;

/* Flags for X509_print_ex() */

#define X509_FLAG_COMPAT 0
#define X509_FLAG_NO_HEADER 1L
#define X509_FLAG_NO_VERSION (1L << 1)
```

```
#define X509_FLAG_NO_SERIAL (1L << 2)
#define X509_FLAG_NO_SIGNAME (1L << 3)
#define X509_FLAG_NO_ISSUER (1L << 4)
#define X509_FLAG_NO_VALIDITY (1L << 5)
#define X509_FLAG_NO_SUBJECT (1L << 6)
#define X509_FLAG_NO_PUBKEY (1L << 7)
#define X509_FLAG_NO_EXTENSIONS (1L << 8)
#define X509_FLAG_NO_SIGDUMP (1L << 9)
#define X509_FLAG_NO_AUX (1L << 10)
#define X509_FLAG_NO_ATTRIBUTES (1L << 11)
#define X509_FLAG_NO_IDS (1L << 12)
#define X509_FLAG_EXTENSIONS_ONLY_KID (1L << 13)

/* Flags specific to X509_NAME_print_ex() */

/* The field separator information */

#define XN_FLAG_SEP_MASK (0xf << 16)

#define XN_FLAG_COMPAT 0 /*
 Traditional; use old X509_NAME_print */
#define XN_FLAG_SEP_COMMA_PLUS (1 << 16) /* RFC2253 ,+ */
#define XN_FLAG_SEP_CPLUS_SPC (2 << 16) /* ,+ spaced: more readable */
#define XN_FLAG_SEP_SPLUS_SPC (3 << 16) /* ;+ spaced */
#define XN_FLAG_SEP_MULTILINE (4 << 16) /* One line per field */

#define XN_FLAG_DN_REV (1 << 20) /* Reverse DN order */

/* How the field name is shown */

#define XN_FLAG_FN_MASK (0x3 << 21)

#define XN_FLAG_FN_SN 0 /* Object short name */
#define XN_FLAG_FN_LN (1 << 21) /* Object long name */
#define XN_FLAG_FN_OID (2 << 21) /* Always use OIDs */
#define XN_FLAG_FN_NONE (3 << 21) /* No field names */

#define XN_FLAG_SPC_EQ (1 << 23) /* Put spaces round '=' */

/*
* This determines if we dump fields we don't recognise: RFC2253 requires
* this.
*/

#define XN_FLAG_DUMP_UNKNOWN_FIELDS (1 << 24)

#define XN_FLAG_FN_ALIGN (1 << 25) /* Align field names to 20 \
                                    * characters */
```

```
/* Complete set of RFC2253 flags */

#define XN_FLAG_RFC2253
 (ASN1_STRFLGS_RFC2253 | XN_FLAG_SEP_COMMA_PLUS | XN_FLAG_DN_REV | XN_FLAG_FN_SN |
XN_FLAG_DUMP_UNKNOWN_FIELDS)

/* readable oneline form */

#define XN_FLAG_ONELINE (ASN1_STRFLGS_RFC2253 | ASN1_STRFLGS_ESC_QUOTE |
XN_FLAG_SEP_CPLUS_SPC | XN_FLAG_SPC_EQ | XN_FLAG_FN_SN)

/* readable multiline form */

#define XN_FLAG_MULTILINE (ASN1_STRFLGS_ESC_CTRL | ASN1_STRFLGS_ESC_MSB |
XN_FLAG_SEP_MULTILINE | XN_FLAG_SPC_EQ | XN_FLAG_FN_LN | XN_FLAG_FN_ALIGN)

typedef struct X509_crl_info_st X509_CRL_INFO;

typedef struct private_key_st {
  int version;
  /* The PKCS#8 data types */
  X509_ALGOR *enc_algor;
  ASN1_OCTET_STRING *enc_pkey; /* encrypted pub key */
  /* When decrypted, the following will not be NULL */
  EVP_PKEY *dec_pkey;
  /* used to encrypt and decrypt */
  int key_length;
  char *key_data;
  int key_free; /* true if we should auto free key_data */
  /* expanded version of 'enc_algor' */
  EVP_CIPHER_INFO cipher;
} X509_PKEY;

typedef struct X509_info_st
 {
  X509 *x509;
  X509_CRL *crl;
  X509_PKEY *x_pkey;
  EVP_CIPHER_INFO enc_cipher;
  int enc_len;
  char *enc_data;
} X509_INFO;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_INFO, X509_INFO, X509_INFO)
#define sk_X509_INFO_num(sk) OPENSSL_sk_num(ossl_check_const_X509_INFO_sk_type(sk))
#define sk_X509_INFO_value(sk, idx) ((X509_INFO
*)OPENSSL_sk_value(ossl_check_const_X509_INFO_sk_type(sk), (idx)))
```

```
#define sk_X509_INFO_new(cmp) ((STACK_OF(X509_INFO)
*)OPENSSL_sk_new(ossl_check_X509_INFO_compfunc_type(cmp)))
#define sk_X509_INFO_new_null() ((STACK_OF(X509_INFO) *)OPENSSL_sk_new_null())
#define sk_X509_INFO_new_reserve(cmp, n) ((STACK_OF(X509_INFO)
*)OPENSSL_sk_new_reserve(ossl_check_X509_INFO_compfunc_type(cmp), (n)))
#define sk_X509_INFO_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_INFO_sk_type(sk), (n))
#define sk_X509_INFO_free(sk) OPENSSL_sk_free(ossl_check_X509_INFO_sk_type(sk))
#define sk_X509_INFO_zero(sk) OPENSSL_sk_zero(ossl_check_X509_INFO_sk_type(sk))
#define
 sk_X509_INFO_delete(sk, i) ((X509_INFO *)OPENSSL_sk_delete(ossl_check_X509_INFO_sk_type(sk), (i)))
#define sk_X509_INFO_delete_ptr(sk, ptr) ((X509_INFO
*)OPENSSL_sk_delete_ptr(ossl_check_X509_INFO_sk_type(sk), ossl_check_X509_INFO_type(ptr)))
#define sk_X509_INFO_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_INFO_sk_type(sk),
ossl_check_X509_INFO_type(ptr))
#define sk_X509_INFO_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_INFO_sk_type(sk),
ossl_check_X509_INFO_type(ptr))
#define sk_X509_INFO_pop(sk) ((X509_INFO *)OPENSSL_sk_pop(ossl_check_X509_INFO_sk_type(sk)))
#define sk_X509_INFO_shift(sk) ((X509_INFO *)OPENSSL_sk_shift(ossl_check_X509_INFO_sk_type(sk)))
#define sk_X509_INFO_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_INFO_sk_type(sk),ossl_check_X509_INFO_freefunc_type(freefunc))
#define sk_X509_INFO_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_INFO_sk_type(sk),
ossl_check_X509_INFO_type(ptr), (idx))
#define sk_X509_INFO_set(sk,
 idx, ptr) ((X509_INFO *)OPENSSL_sk_set(ossl_check_X509_INFO_sk_type(sk), (idx),
ossl_check_X509_INFO_type(ptr)))
#define sk_X509_INFO_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_INFO_sk_type(sk),
ossl_check_X509_INFO_type(ptr))
#define sk_X509_INFO_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_INFO_sk_type(sk),
ossl_check_X509_INFO_type(ptr))
#define sk_X509_INFO_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_X509_INFO_sk_type(sk),
ossl_check_X509_INFO_type(ptr), pnum)
#define sk_X509_INFO_sort(sk) OPENSSL_sk_sort(ossl_check_X509_INFO_sk_type(sk))
#define sk_X509_INFO_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_X509_INFO_sk_type(sk))
#define sk_X509_INFO_dup(sk) ((STACK_OF(X509_INFO)
*)OPENSSL_sk_dup(ossl_check_const_X509_INFO_sk_type(sk)))
#define sk_X509_INFO_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_INFO)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_INFO_sk_type(sk),
ossl_check_X509_INFO_copyfunc_type(copyfunc), ossl_check_X509_INFO_freefunc_type(freefunc)))
#define
 sk_X509_INFO_set_cmp_func(sk, cmp)
((sk_X509_INFO_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_INFO_sk_type(sk),
ossl_check_X509_INFO_compfunc_type(cmp)))

/* clang-format on */

/*
* The next 2 structures and their 8 routines are used to manipulate Netscape's
* spki structures - useful if you are writing a CA web page
```

```
*/
typedef struct Netscape_spkac_st {
   X509_PUBKEY *pubkey;
   ASN1_IA5STRING *challenge; /* challenge sent in atlas >= PR2 */
} NETSCAPE_SPKAC;

typedef struct Netscape_spki_st {
   NETSCAPE_SPKAC *spkac; /* signed public key and challenge */
   X509_ALGOR sig_algor;
   ASN1_BIT_STRING *signature;
} NETSCAPE_SPKI;

/* Netscape certificate sequence structure */
typedef struct Netscape_certificate_sequence {
   ASN1_OBJECT *type;
   STACK_OF(X509) *certs;
} NETSCAPE_CERT_SEQUENCE;

/*- Unused (and iv length is wrong)
typedef struct CBCParameter_st
       {
       unsigned char iv[8];
       } CBC_PARAM;
*/

/* Password based encryption structure
 */

typedef struct PBEPARAM_st {
   ASN1_OCTET_STRING *salt;
   ASN1_INTEGER *iter;
} PBEPARAM;

/* Password based encryption V2 structures */

typedef struct PBE2PARAM_st {
   X509_ALGOR *keyfunc;
   X509_ALGOR *encryption;
} PBE2PARAM;

typedef struct PBKDF2PARAM_st {
   /* Usually OCTET STRING but could be anything */
   ASN1_TYPE *salt;
   ASN1_INTEGER *iter;
   ASN1_INTEGER *keylength;
   X509_ALGOR *prf;
} PBKDF2PARAM;
```

```
typedef struct {
   X509_ALGOR *keyDerivationFunc;
   X509_ALGOR *messageAuthScheme;
} PBMAC1PARAM;

#ifndef OPENSSL_NO_SCRYPT
typedef struct SCRYPT_PARAMS_st {
   ASN1_OCTET_STRING *salt;
   ASN1_INTEGER *costParameter;
   ASN1_INTEGER *blockSize;
   ASN1_INTEGER *parallelizationParameter;
   ASN1_INTEGER *keyLength;
} SCRYPT_PARAMS;
#endif

#ifdef __cplusplus
}
#endif

#include <openssl/x509_vfy.h>
#include <openssl/pkcs7.h>

#ifdef __cplusplus
extern "C" {
#endif

#define X509_EXT_PACK_UNKNOWN 1
#define X509_EXT_PACK_STRING 2

#define X509_extract_key(x)
 X509_get_pubkey(x) /*****/
#define X509_REQ_extract_key(a) X509_REQ_get_pubkey(a)
#define X509_name_cmp(a, b) X509_NAME_cmp((a), (b))

void X509_CRL_set_default_method(const X509_CRL_METHOD *meth);
X509_CRL_METHOD *X509_CRL_METHOD_new(int (*crl_init)(X509_CRL *crl),
   int (*crl_free)(X509_CRL *crl),
   int (*crl_lookup)(X509_CRL *crl,
       X509_REVOKED **ret,
       const ASN1_INTEGER *serial,
       const X509_NAME *issuer),
   int (*crl_verify)(X509_CRL *crl,
       EVP_PKEY *pk));
void X509_CRL_METHOD_free(X509_CRL_METHOD *m);

void X509_CRL_set_meth_data(X509_CRL *crl, void *dat);
void *X509_CRL_get_meth_data(X509_CRL *crl);
```

```
const char *X509_verify_cert_error_string(long n);

int X509_verify(X509 *a, EVP_PKEY *r);
int X509_self_signed(X509 *cert, int verify_signature);

int X509_REQ_verify_ex(X509_REQ *a, EVP_PKEY *r, OSSL_LIB_CTX *libctx,
   const char *propq);
int X509_REQ_verify(X509_REQ *a, EVP_PKEY *r);
int X509_CRL_verify(X509_CRL *a, EVP_PKEY *r);
int
 NETSCAPE_SPKI_verify(NETSCAPE_SPKI *a, EVP_PKEY *r);

NETSCAPE_SPKI *NETSCAPE_SPKI_b64_decode(const char *str, int len);
char *NETSCAPE_SPKI_b64_encode(NETSCAPE_SPKI *x);
EVP_PKEY *NETSCAPE_SPKI_get_pubkey(NETSCAPE_SPKI *x);
int NETSCAPE_SPKI_set_pubkey(NETSCAPE_SPKI *x, EVP_PKEY *pkey);

int NETSCAPE_SPKI_print(BIO *out, NETSCAPE_SPKI *spki);

int X509_signature_dump(BIO *bp, const ASN1_STRING *sig, int indent);
int X509_signature_print(BIO *bp, const X509_ALGOR *alg,
   const ASN1_STRING *sig);

int X509_sign(X509 *x, EVP_PKEY *pkey, const EVP_MD *md);
int X509_sign_ctx(X509 *x, EVP_MD_CTX *ctx);
int X509_REQ_sign(X509_REQ *x, EVP_PKEY *pkey, const EVP_MD *md);
int X509_REQ_sign_ctx(X509_REQ *x, EVP_MD_CTX *ctx);
int X509_CRL_sign(X509_CRL *x, EVP_PKEY *pkey, const EVP_MD *md);
int X509_CRL_sign_ctx(X509_CRL *x, EVP_MD_CTX *ctx);
int NETSCAPE_SPKI_sign(NETSCAPE_SPKI *x, EVP_PKEY *pkey, const EVP_MD *md);

int X509_pubkey_digest(const X509 *data, const EVP_MD *type,
   unsigned
 char *md, unsigned int *len);
int X509_digest(const X509 *data, const EVP_MD *type,
   unsigned char *md, unsigned int *len);
ASN1_OCTET_STRING *X509_digest_sig(const X509 *cert,
   EVP_MD **md_used, int *md_is_fallback);
int X509_CRL_digest(const X509_CRL *data, const EVP_MD *type,
   unsigned char *md, unsigned int *len);
int X509_REQ_digest(const X509_REQ *data, const EVP_MD *type,
   unsigned char *md, unsigned int *len);
int X509_NAME_digest(const X509_NAME *data, const EVP_MD *type,
   unsigned char *md, unsigned int *len);

X509 *X509_load_http(const char *url, BIO *bio, BIO *rbio, int timeout);
X509_CRL *X509_CRL_load_http(const char *url, BIO *bio, BIO *rbio, int timeout);
#ifndef OPENSSL_NO_DEPRECATED_3_0
```

```
#include <openssl/http.h> /* OSSL_HTTP_REQ_CTX_nbio_d2i */
#define X509_http_nbio(rctx, pcert) \
   OSSL_HTTP_REQ_CTX_nbio_d2i(rctx, pcert, ASN1_ITEM_rptr(X509))
#define X509_CRL_http_nbio(rctx, pcrl) \
   OSSL_HTTP_REQ_CTX_nbio_d2i(rctx, pcrl, ASN1_ITEM_rptr(X509_CRL))
#endif

#ifndef
 OPENSSL_NO_STDIO
X509 *d2i_X509_fp(FILE *fp, X509 **x509);
int i2d_X509_fp(FILE *fp, const X509 *x509);
X509_CRL *d2i_X509_CRL_fp(FILE *fp, X509_CRL **crl);
int i2d_X509_CRL_fp(FILE *fp, const X509_CRL *crl);
X509_REQ *d2i_X509_REQ_fp(FILE *fp, X509_REQ **req);
int i2d_X509_REQ_fp(FILE *fp, const X509_REQ *req);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 RSA *d2i_RSAPrivateKey_fp(FILE *fp, RSA **rsa);
OSSL_DEPRECATEDIN_3_0 int i2d_RSAPrivateKey_fp(FILE *fp, const RSA *rsa);
OSSL_DEPRECATEDIN_3_0 RSA *d2i_RSAPublicKey_fp(FILE *fp, RSA **rsa);
OSSL_DEPRECATEDIN_3_0 int i2d_RSAPublicKey_fp(FILE *fp, const RSA *rsa);
OSSL_DEPRECATEDIN_3_0 RSA *d2i_RSA_PUBKEY_fp(FILE *fp, RSA **rsa);
OSSL_DEPRECATEDIN_3_0 int i2d_RSA_PUBKEY_fp(FILE *fp, const RSA *rsa);
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
#ifndef OPENSSL_NO_DSA
OSSL_DEPRECATEDIN_3_0 DSA *d2i_DSA_PUBKEY_fp(FILE *fp, DSA **dsa);
OSSL_DEPRECATEDIN_3_0 int i2d_DSA_PUBKEY_fp(FILE *fp, const DSA *dsa);
OSSL_DEPRECATEDIN_3_0
 DSA *d2i_DSAPrivateKey_fp(FILE *fp, DSA **dsa);
OSSL_DEPRECATEDIN_3_0 int i2d_DSAPrivateKey_fp(FILE *fp, const DSA *dsa);
#endif
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
#ifndef OPENSSL_NO_EC
OSSL_DEPRECATEDIN_3_0 EC_KEY *d2i_EC_PUBKEY_fp(FILE *fp, EC_KEY **eckey);
OSSL_DEPRECATEDIN_3_0 int i2d_EC_PUBKEY_fp(FILE *fp, const EC_KEY *eckey);
OSSL_DEPRECATEDIN_3_0 EC_KEY *d2i_ECPrivateKey_fp(FILE *fp, EC_KEY **eckey);
OSSL_DEPRECATEDIN_3_0 int i2d_ECPrivateKey_fp(FILE *fp, const EC_KEY *eckey);
#endif /* OPENSSL_NO_EC */
#endif /* OPENSSL_NO_DEPRECATED_3_0 */
X509_SIG *d2i_PKCS8_fp(FILE *fp, X509_SIG **p8);
int i2d_PKCS8_fp(FILE *fp, const X509_SIG *p8);
X509_PUBKEY *d2i_X509_PUBKEY_fp(FILE *fp, X509_PUBKEY **xpk);
int i2d_X509_PUBKEY_fp(FILE *fp, const X509_PUBKEY *xpk);
PKCS8_PRIV_KEY_INFO *d2i_PKCS8_PRIV_KEY_INFO_fp(FILE *fp,
   PKCS8_PRIV_KEY_INFO **p8inf);
int i2d_PKCS8_PRIV_KEY_INFO_fp(FILE *fp, const PKCS8_PRIV_KEY_INFO *p8inf);
int i2d_PKCS8PrivateKeyInfo_fp(FILE
```

```
 *fp, const EVP_PKEY *key);
int i2d_PrivateKey_fp(FILE *fp, const EVP_PKEY *pkey);
EVP_PKEY *d2i_PrivateKey_ex_fp(FILE *fp, EVP_PKEY **a, OSSL_LIB_CTX *libctx,
   const char *propq);
EVP_PKEY *d2i_PrivateKey_fp(FILE *fp, EVP_PKEY **a);
int i2d_PUBKEY_fp(FILE *fp, const EVP_PKEY *pkey);
EVP_PKEY *d2i_PUBKEY_ex_fp(FILE *fp, EVP_PKEY **a, OSSL_LIB_CTX *libctx,
   const char *propq);
EVP_PKEY *d2i_PUBKEY_fp(FILE *fp, EVP_PKEY **a);
#endif

X509 *d2i_X509_bio(BIO *bp, X509 **x509);
int i2d_X509_bio(BIO *bp, const X509 *x509);
X509_CRL *d2i_X509_CRL_bio(BIO *bp, X509_CRL **crl);
int i2d_X509_CRL_bio(BIO *bp, const X509_CRL *crl);
X509_REQ *d2i_X509_REQ_bio(BIO *bp, X509_REQ **req);
int i2d_X509_REQ_bio(BIO *bp, const X509_REQ *req);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 RSA *d2i_RSAPrivateKey_bio(BIO *bp, RSA **rsa);
OSSL_DEPRECATEDIN_3_0 int i2d_RSAPrivateKey_bio(BIO *bp, const RSA *rsa);
OSSL_DEPRECATEDIN_3_0 RSA *d2i_RSAPublicKey_bio(BIO *bp, RSA **rsa);
OSSL_DEPRECATEDIN_3_0
 int i2d_RSAPublicKey_bio(BIO *bp, const RSA *rsa);
OSSL_DEPRECATEDIN_3_0 RSA *d2i_RSA_PUBKEY_bio(BIO *bp, RSA **rsa);
OSSL_DEPRECATEDIN_3_0 int i2d_RSA_PUBKEY_bio(BIO *bp, const RSA *rsa);
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
#ifndef OPENSSL_NO_DSA
OSSL_DEPRECATEDIN_3_0 DSA *d2i_DSA_PUBKEY_bio(BIO *bp, DSA **dsa);
OSSL_DEPRECATEDIN_3_0 int i2d_DSA_PUBKEY_bio(BIO *bp, const DSA *dsa);
OSSL_DEPRECATEDIN_3_0 DSA *d2i_DSAPrivateKey_bio(BIO *bp, DSA **dsa);
OSSL_DEPRECATEDIN_3_0 int i2d_DSAPrivateKey_bio(BIO *bp, const DSA *dsa);
#endif
#endif

#ifndef OPENSSL_NO_DEPRECATED_3_0
#ifndef OPENSSL_NO_EC
OSSL_DEPRECATEDIN_3_0 EC_KEY *d2i_EC_PUBKEY_bio(BIO *bp, EC_KEY **eckey);
OSSL_DEPRECATEDIN_3_0 int i2d_EC_PUBKEY_bio(BIO *bp, const EC_KEY *eckey);
OSSL_DEPRECATEDIN_3_0 EC_KEY *d2i_ECPrivateKey_bio(BIO *bp, EC_KEY **eckey);
OSSL_DEPRECATEDIN_3_0 int i2d_ECPrivateKey_bio(BIO *bp, const EC_KEY *eckey);
#endif /* OPENSSL_NO_EC */
#endif /* OPENSSL_NO_DEPRECATED_3_0 */

X509_SIG *d2i_PKCS8_bio(BIO
 *bp, X509_SIG **p8);
int i2d_PKCS8_bio(BIO *bp, const X509_SIG *p8);
X509_PUBKEY *d2i_X509_PUBKEY_bio(BIO *bp, X509_PUBKEY **xpk);
```

```
int i2d_X509_PUBKEY_bio(BIO *bp, const X509_PUBKEY *xpk);
PKCS8_PRIV_KEY_INFO *d2i_PKCS8_PRIV_KEY_INFO_bio(BIO *bp,
   PKCS8_PRIV_KEY_INFO **p8inf);
int i2d_PKCS8_PRIV_KEY_INFO_bio(BIO *bp, const PKCS8_PRIV_KEY_INFO *p8inf);
int i2d_PKCS8PrivateKeyInfo_bio(BIO *bp, const EVP_PKEY *key);
int i2d_PrivateKey_bio(BIO *bp, const EVP_PKEY *pkey);
EVP_PKEY *d2i_PrivateKey_ex_bio(BIO *bp, EVP_PKEY **a, OSSL_LIB_CTX *libctx,
   const char *propq);
EVP_PKEY *d2i_PrivateKey_bio(BIO *bp, EVP_PKEY **a);
int i2d_PUBKEY_bio(BIO *bp, const EVP_PKEY *pkey);
EVP_PKEY *d2i_PUBKEY_ex_bio(BIO *bp, EVP_PKEY **a, OSSL_LIB_CTX *libctx,
   const char *propq);
EVP_PKEY *d2i_PUBKEY_bio(BIO *bp, EVP_PKEY **a);

DECLARE_ASN1_DUP_FUNCTION(X509)
DECLARE_ASN1_DUP_FUNCTION(X509_ALGOR)
DECLARE_ASN1_DUP_FUNCTION(X509_ATTRIBUTE)
DECLARE_ASN1_DUP_FUNCTION(X509_CRL)
DECLARE_ASN1_DUP_FUNCTION(X509_EXTENSION)
DECLARE_ASN1_DUP_FUNCTION(X509_PUBKEY)
DECLARE_ASN1_DUP_FUNCTION(X509_REQ)
DECLARE_ASN1_DUP_FUNCTION(X509_REVOKED)
int
 X509_ALGOR_set0(X509_ALGOR *alg, ASN1_OBJECT *aobj, int ptype,
   void *pval);
void X509_ALGOR_get0(const ASN1_OBJECT **paobj, int *pptype,
   const void **ppval, const X509_ALGOR *algor);
void X509_ALGOR_set_md(X509_ALGOR *alg, const EVP_MD *md);
int X509_ALGOR_cmp(const X509_ALGOR *a, const X509_ALGOR *b);
int X509_ALGOR_copy(X509_ALGOR *dest, const X509_ALGOR *src);

DECLARE_ASN1_DUP_FUNCTION(X509_NAME)
DECLARE_ASN1_DUP_FUNCTION(X509_NAME_ENTRY)

int X509_cmp_time(const ASN1_TIME *s, time_t *t);
int X509_cmp_current_time(const ASN1_TIME *s);
int X509_cmp_timeframe(const X509_VERIFY_PARAM *vpm,
   const ASN1_TIME *start, const ASN1_TIME *end);
ASN1_TIME *X509_time_adj(ASN1_TIME *s, long adj, time_t *t);
ASN1_TIME *X509_time_adj_ex(ASN1_TIME *s,
   int offset_day, long offset_sec, time_t *t);
ASN1_TIME *X509_gmtime_adj(ASN1_TIME *s,
 long adj);

const char *X509_get_default_cert_area(void);
const char *X509_get_default_cert_dir(void);
const char *X509_get_default_cert_file(void);
const char *X509_get_default_cert_dir_env(void);
```

```
const char *X509_get_default_cert_file_env(void);
const char *X509_get_default_private_dir(void);

X509_REQ *X509_to_X509_REQ(X509 *x, EVP_PKEY *pkey, const EVP_MD *md);
X509 *X509_REQ_to_X509(X509_REQ *r, int days, EVP_PKEY *pkey);

DECLARE_ASN1_FUNCTIONS(X509_ALGOR)
DECLARE_ASN1_ENCODE_FUNCTIONS(X509_ALGORS, X509_ALGORS, X509_ALGORS)
DECLARE_ASN1_FUNCTIONS(X509_VAL)

DECLARE_ASN1_FUNCTIONS(X509_PUBKEY)

X509_PUBKEY *X509_PUBKEY_new_ex(OSSL_LIB_CTX *libctx, const char *propq);
int X509_PUBKEY_set(X509_PUBKEY **x, EVP_PKEY *pkey);
EVP_PKEY *X509_PUBKEY_get0(const X509_PUBKEY *key);
EVP_PKEY *X509_PUBKEY_get(const X509_PUBKEY *key);
int X509_get_pubkey_parameters(EVP_PKEY *pkey, STACK_OF(X509) *chain);
long X509_get_pathlen(X509 *x);
DECLARE_ASN1_ENCODE_FUNCTIONS_only(EVP_PKEY, PUBKEY)
EVP_PKEY
 *d2i_PUBKEY_ex(EVP_PKEY **a, const unsigned char **pp, long length,
   OSSL_LIB_CTX *libctx, const char *propq);
#ifndef OPENSSL_NO_DEPRECATED_3_0
DECLARE_ASN1_ENCODE_FUNCTIONS_only_attr(OSSL_DEPRECATEDIN_3_0, RSA, RSA_PUBKEY)
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
#ifndef OPENSSL_NO_DSA
DECLARE_ASN1_ENCODE_FUNCTIONS_only_attr(OSSL_DEPRECATEDIN_3_0, DSA, DSA_PUBKEY)
#endif
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
#ifndef OPENSSL_NO_EC
DECLARE_ASN1_ENCODE_FUNCTIONS_only_attr(OSSL_DEPRECATEDIN_3_0, EC_KEY, EC_PUBKEY)
#endif
#endif

DECLARE_ASN1_FUNCTIONS(X509_SIG)
void X509_SIG_get0(const X509_SIG *sig, const X509_ALGOR **palg,
   const ASN1_OCTET_STRING **pdigest);
void X509_SIG_getm(X509_SIG *sig, X509_ALGOR **palg,
   ASN1_OCTET_STRING **pdigest);

DECLARE_ASN1_FUNCTIONS(X509_REQ_INFO)
DECLARE_ASN1_FUNCTIONS(X509_REQ)
X509_REQ *X509_REQ_new_ex(OSSL_LIB_CTX *libctx, const char *propq);

DECLARE_ASN1_FUNCTIONS(X509_ATTRIBUTE)
X509_ATTRIBUTE *X509_ATTRIBUTE_create(int nid, int atrtype,
```

```
 void *value);

DECLARE_ASN1_FUNCTIONS(X509_EXTENSION)
DECLARE_ASN1_ENCODE_FUNCTIONS(X509_EXTENSIONS, X509_EXTENSIONS, X509_EXTENSIONS)

DECLARE_ASN1_FUNCTIONS(X509_NAME_ENTRY)

DECLARE_ASN1_FUNCTIONS(X509_NAME)

int X509_NAME_set(X509_NAME **xn, const X509_NAME *name);

DECLARE_ASN1_FUNCTIONS(X509_CINF)
DECLARE_ASN1_FUNCTIONS(X509)
X509 *X509_new_ex(OSSL_LIB_CTX *libctx, const char *propq);
DECLARE_ASN1_FUNCTIONS(X509_CERT_AUX)

#define X509_get_ex_new_index(l, p, newf, dupf, freef) \
   CRYPTO_get_ex_new_index(CRYPTO_EX_INDEX_X509, l, p, newf, dupf, freef)
int X509_set_ex_data(X509 *r, int idx, void *arg);
void *X509_get_ex_data(const X509 *r, int idx);
DECLARE_ASN1_ENCODE_FUNCTIONS_only(X509, X509_AUX)

int i2d_re_X509_tbs(X509 *x, unsigned char **pp);

int X509_SIG_INFO_get(const X509_SIG_INFO *siginf, int *mdnid, int *pknid,
   int *secbits, uint32_t *flags);
void X509_SIG_INFO_set(X509_SIG_INFO *siginf, int mdnid, int pknid,
   int secbits, uint32_t flags);

int X509_get_signature_info(X509
 *x, int *mdnid, int *pknid, int *secbits,
   uint32_t *flags);

void X509_get0_signature(const ASN1_BIT_STRING **psig,
   const X509_ALGOR **palg, const X509 *x);
int X509_get_signature_nid(const X509 *x);

void X509_set0_distinguishing_id(X509 *x, ASN1_OCTET_STRING *d_id);
ASN1_OCTET_STRING *X509_get0_distinguishing_id(X509 *x);
void X509_REQ_set0_distinguishing_id(X509_REQ *x, ASN1_OCTET_STRING *d_id);
ASN1_OCTET_STRING *X509_REQ_get0_distinguishing_id(X509_REQ *x);

int X509_alias_set1(X509 *x, const unsigned char *name, int len);
int X509_keyid_set1(X509 *x, const unsigned char *id, int len);
unsigned char *X509_alias_get0(X509 *x, int *len);
unsigned char *X509_keyid_get0(X509 *x, int *len);

DECLARE_ASN1_FUNCTIONS(X509_REVOKED)
```

```
DECLARE_ASN1_FUNCTIONS(X509_CRL_INFO)
DECLARE_ASN1_FUNCTIONS(X509_CRL)
X509_CRL *X509_CRL_new_ex(OSSL_LIB_CTX *libctx, const char *propq);

int X509_CRL_add0_revoked(X509_CRL *crl, X509_REVOKED *rev);
int X509_CRL_get0_by_serial(X509_CRL
 *crl,
   X509_REVOKED **ret, const ASN1_INTEGER *serial);
int X509_CRL_get0_by_cert(X509_CRL *crl, X509_REVOKED **ret, X509 *x);

X509_PKEY *X509_PKEY_new(void);
void X509_PKEY_free(X509_PKEY *a);

DECLARE_ASN1_FUNCTIONS(NETSCAPE_SPKI)
DECLARE_ASN1_FUNCTIONS(NETSCAPE_SPKAC)
DECLARE_ASN1_FUNCTIONS(NETSCAPE_CERT_SEQUENCE)

X509_INFO *X509_INFO_new(void);
void X509_INFO_free(X509_INFO *a);
char *X509_NAME_oneline(const X509_NAME *a, char *buf, int size);

#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0
int ASN1_verify(i2d_of_void *i2d, X509_ALGOR *algor1,
   ASN1_BIT_STRING *signature, char *data, EVP_PKEY *pkey);
OSSL_DEPRECATEDIN_3_0
int ASN1_digest(i2d_of_void *i2d, const EVP_MD *type, char *data,
   unsigned char *md, unsigned int *len);
OSSL_DEPRECATEDIN_3_0
int ASN1_sign(i2d_of_void *i2d, X509_ALGOR *algor1, X509_ALGOR *algor2,
   ASN1_BIT_STRING *signature, char *data, EVP_PKEY *pkey,
   const EVP_MD *type);
#endif
int ASN1_item_digest(const ASN1_ITEM *it, const EVP_MD
 *type, void *data,
   unsigned char *md, unsigned int *len);
int ASN1_item_verify(const ASN1_ITEM *it, const X509_ALGOR *alg,
   const ASN1_BIT_STRING *signature, const void *data,
   EVP_PKEY *pkey);
int ASN1_item_verify_ctx(const ASN1_ITEM *it, const X509_ALGOR *alg,
   const ASN1_BIT_STRING *signature, const void *data,
   EVP_MD_CTX *ctx);
int ASN1_item_sign(const ASN1_ITEM *it, X509_ALGOR *algor1, X509_ALGOR *algor2,
   ASN1_BIT_STRING *signature, const void *data,
   EVP_PKEY *pkey, const EVP_MD *md);
int ASN1_item_sign_ctx(const ASN1_ITEM *it, X509_ALGOR *algor1,
   X509_ALGOR *algor2, ASN1_BIT_STRING *signature,
   const void *data, EVP_MD_CTX *ctx);
```

```
#define X509_VERSION_1 0
#define X509_VERSION_2 1
#define X509_VERSION_3 2

long X509_get_version(const X509 *x);
int X509_set_version(X509 *x, long version);
int X509_set_serialNumber(X509 *x, ASN1_INTEGER *serial);
ASN1_INTEGER *X509_get_serialNumber(X509 *x);
const ASN1_INTEGER *X509_get0_serialNumber(const X509
 *x);
int X509_set_issuer_name(X509 *x, const X509_NAME *name);
X509_NAME *X509_get_issuer_name(const X509 *a);
int X509_set_subject_name(X509 *x, const X509_NAME *name);
X509_NAME *X509_get_subject_name(const X509 *a);
const ASN1_TIME *X509_get0_notBefore(const X509 *x);
ASN1_TIME *X509_getm_notBefore(const X509 *x);
int X509_set1_notBefore(X509 *x, const ASN1_TIME *tm);
const ASN1_TIME *X509_get0_notAfter(const X509 *x);
ASN1_TIME *X509_getm_notAfter(const X509 *x);
int X509_set1_notAfter(X509 *x, const ASN1_TIME *tm);
int X509_set_pubkey(X509 *x, EVP_PKEY *pkey);
int X509_up_ref(X509 *x);
int X509_get_signature_type(const X509 *x);

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define X509_get_notBefore X509_getm_notBefore
#define X509_get_notAfter X509_getm_notAfter
#define X509_set_notBefore X509_set1_notBefore
#define X509_set_notAfter X509_set1_notAfter
#endif

/*
* This one is only used so that a binary form can output, as in
* i2d_X509_PUBKEY(X509_get_X509_PUBKEY(x), &buf)
*/
X509_PUBKEY
 *X509_get_X509_PUBKEY(const X509 *x);
const STACK_OF(X509_EXTENSION) *X509_get0_extensions(const X509 *x);
void X509_get0_uids(const X509 *x, const ASN1_BIT_STRING **piuid,
   const ASN1_BIT_STRING **psuid);
const X509_ALGOR *X509_get0_tbs_sigalg(const X509 *x);

EVP_PKEY *X509_get0_pubkey(const X509 *x);
EVP_PKEY *X509_get_pubkey(X509 *x);
ASN1_BIT_STRING *X509_get0_pubkey_bitstr(const X509 *x);

#define X509_REQ_VERSION_1 0
```

```
long X509_REQ_get_version(const X509_REQ *req);
int X509_REQ_set_version(X509_REQ *x, long version);
X509_NAME *X509_REQ_get_subject_name(const X509_REQ *req);
int X509_REQ_set_subject_name(X509_REQ *req, const X509_NAME *name);
void X509_REQ_get0_signature(const X509_REQ *req, const ASN1_BIT_STRING **psig,
   const X509_ALGOR **palg);
void X509_REQ_set0_signature(X509_REQ *req, ASN1_BIT_STRING *psig);
int X509_REQ_set1_signature_algo(X509_REQ *req, X509_ALGOR *palg);
int X509_REQ_get_signature_nid(const X509_REQ *req);
int i2d_re_X509_REQ_tbs(X509_REQ *req,
 unsigned char **pp);
int X509_REQ_set_pubkey(X509_REQ *x, EVP_PKEY *pkey);
EVP_PKEY *X509_REQ_get_pubkey(X509_REQ *req);
EVP_PKEY *X509_REQ_get0_pubkey(const X509_REQ *req);
X509_PUBKEY *X509_REQ_get_X509_PUBKEY(X509_REQ *req);
int X509_REQ_extension_nid(int nid);
int *X509_REQ_get_extension_nids(void);
void X509_REQ_set_extension_nids(int *nids);
STACK_OF(X509_EXTENSION) *X509_REQ_get_extensions(OSSL_FUTURE_CONST X509_REQ *req);
int X509_REQ_add_extensions_nid(X509_REQ *req,
   const STACK_OF(X509_EXTENSION) *exts, int nid);
int X509_REQ_add_extensions(X509_REQ *req, const STACK_OF(X509_EXTENSION) *ext);
int X509_REQ_get_attr_count(const X509_REQ *req);
int X509_REQ_get_attr_by_NID(const X509_REQ *req, int nid, int lastpos);
int X509_REQ_get_attr_by_OBJ(const X509_REQ *req, const ASN1_OBJECT *obj,
   int lastpos);
X509_ATTRIBUTE *X509_REQ_get_attr(const X509_REQ *req, int loc);
X509_ATTRIBUTE *X509_REQ_delete_attr(X509_REQ *req, int loc);
int X509_REQ_add1_attr(X509_REQ *req, X509_ATTRIBUTE
 *attr);
int X509_REQ_add1_attr_by_OBJ(X509_REQ *req,
   const ASN1_OBJECT *obj, int type,
   const unsigned char *bytes, int len);
int X509_REQ_add1_attr_by_NID(X509_REQ *req,
   int nid, int type,
   const unsigned char *bytes, int len);
int X509_REQ_add1_attr_by_txt(X509_REQ *req,
   const char *attrname, int type,
   const unsigned char *bytes, int len);

#define X509_CRL_VERSION_1 0
#define X509_CRL_VERSION_2 1

int X509_CRL_set_version(X509_CRL *x, long version);
int X509_CRL_set_issuer_name(X509_CRL *x, const X509_NAME *name);
int X509_CRL_set1_lastUpdate(X509_CRL *x, const ASN1_TIME *tm);
int X509_CRL_set1_nextUpdate(X509_CRL *x, const ASN1_TIME *tm);
```

```
int X509_CRL_sort(X509_CRL *crl);
int X509_CRL_up_ref(X509_CRL *crl);

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define X509_CRL_set_lastUpdate X509_CRL_set1_lastUpdate
#define X509_CRL_set_nextUpdate X509_CRL_set1_nextUpdate
#endif

long X509_CRL_get_version(const X509_CRL *crl);
const ASN1_TIME *X509_CRL_get0_lastUpdate(const
 X509_CRL *crl);
const ASN1_TIME *X509_CRL_get0_nextUpdate(const X509_CRL *crl);
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 ASN1_TIME *X509_CRL_get_lastUpdate(X509_CRL *crl);
OSSL_DEPRECATEDIN_1_1_0 ASN1_TIME *X509_CRL_get_nextUpdate(X509_CRL *crl);
#endif
X509_NAME *X509_CRL_get_issuer(const X509_CRL *crl);
const STACK_OF(X509_EXTENSION) *X509_CRL_get0_extensions(const X509_CRL *crl);
STACK_OF(X509_REVOKED) *X509_CRL_get_REVOKED(X509_CRL *crl);
void X509_CRL_get0_signature(const X509_CRL *crl, const ASN1_BIT_STRING **psig,
   const X509_ALGOR **palg);
int X509_CRL_get_signature_nid(const X509_CRL *crl);
int i2d_re_X509_CRL_tbs(X509_CRL *req, unsigned char **pp);

const ASN1_INTEGER *X509_REVOKED_get0_serialNumber(const X509_REVOKED *x);
int X509_REVOKED_set_serialNumber(X509_REVOKED *x, ASN1_INTEGER *serial);
const ASN1_TIME *X509_REVOKED_get0_revocationDate(const X509_REVOKED *x);
int X509_REVOKED_set_revocationDate(X509_REVOKED *r, ASN1_TIME *tm);
const STACK_OF(X509_EXTENSION)
 *
X509_REVOKED_get0_extensions(const X509_REVOKED *r);

X509_CRL *X509_CRL_diff(X509_CRL *base, X509_CRL *newer,
   EVP_PKEY *skey, const EVP_MD *md, unsigned int flags);

int X509_REQ_check_private_key(const X509_REQ *req, EVP_PKEY *pkey);

int X509_check_private_key(const X509 *cert, const EVP_PKEY *pkey);
int X509_chain_check_suiteb(int *perror_depth,
   X509 *x, STACK_OF(X509) *chain,
   unsigned long flags);
int X509_CRL_check_suiteb(X509_CRL *crl, EVP_PKEY *pk, unsigned long flags);
void OSSL_STACK_OF_X509_free(STACK_OF(X509) *certs);
STACK_OF(X509) *X509_chain_up_ref(STACK_OF(X509) *chain);

int X509_issuer_and_serial_cmp(const X509 *a, const X509 *b);
unsigned long X509_issuer_and_serial_hash(X509 *a);
```

```
int X509_issuer_name_cmp(const X509 *a, const X509 *b);
unsigned long X509_issuer_name_hash(X509 *a);

int X509_subject_name_cmp(const X509 *a, const X509 *b);
unsigned long X509_subject_name_hash(X509 *x);

#ifndef OPENSSL_NO_MD5
unsigned long X509_issuer_name_hash_old(X509
 *a);
unsigned long X509_subject_name_hash_old(X509 *x);
#endif

#define X509_ADD_FLAG_DEFAULT 0
#define X509_ADD_FLAG_UP_REF 0x1
#define X509_ADD_FLAG_PREPEND 0x2
#define X509_ADD_FLAG_NO_DUP 0x4
#define X509_ADD_FLAG_NO_SS 0x8
int X509_add_cert(STACK_OF(X509) *sk, X509 *cert, int flags);
int X509_add_certs(STACK_OF(X509) *sk, STACK_OF(X509) *certs, int flags);

int X509_cmp(const X509 *a, const X509 *b);
int X509_NAME_cmp(const X509_NAME *a, const X509_NAME *b);
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define X509_NAME_hash(x) X509_NAME_hash_ex(x, NULL, NULL, NULL)
OSSL_DEPRECATEDIN_3_0 int X509_certificate_type(const X509 *x,
   const EVP_PKEY *pubkey);
#endif
unsigned long X509_NAME_hash_ex(const X509_NAME *x, OSSL_LIB_CTX *libctx,
   const char *propq, int *ok);
unsigned long X509_NAME_hash_old(const X509_NAME *x);

int X509_CRL_cmp(const X509_CRL *a, const X509_CRL *b);
int X509_CRL_match(const X509_CRL *a, const X509_CRL *b);
int X509_aux_print(BIO *out, X509 *x,
 int indent);
#ifndef OPENSSL_NO_STDIO
int X509_print_ex_fp(FILE *bp, X509 *x, unsigned long nmflag,
   unsigned long cflag);
int X509_print_fp(FILE *bp, X509 *x);
int X509_CRL_print_fp(FILE *bp, X509_CRL *x);
int X509_REQ_print_fp(FILE *bp, X509_REQ *req);
int X509_NAME_print_ex_fp(FILE *fp, const X509_NAME *nm, int indent,
   unsigned long flags);
#endif

int X509_NAME_print(BIO *bp, const X509_NAME *name, int obase);
int X509_NAME_print_ex(BIO *out, const X509_NAME *nm, int indent,
   unsigned long flags);
```

```
int X509_print_ex(BIO *bp, X509 *x, unsigned long nmflag,
   unsigned long cflag);
int X509_print(BIO *bp, X509 *x);
int X509_ocspid_print(BIO *bp, X509 *x);
int X509_CRL_print_ex(BIO *out, X509_CRL *x, unsigned long nmflag);
int X509_CRL_print(BIO *bp, X509_CRL *x);
int X509_REQ_print_ex(BIO *bp, X509_REQ *x, unsigned long nmflag,
   unsigned long cflag);
int X509_REQ_print(BIO *bp, X509_REQ *req);

int X509_NAME_entry_count(const X509_NAME *name);
int X509_NAME_get_text_by_NID(const
 X509_NAME *name, int nid,
   char *buf, int len);
int X509_NAME_get_text_by_OBJ(const X509_NAME *name, const ASN1_OBJECT *obj,
   char *buf, int len);

/*
* NOTE: you should be passing -1, not 0 as lastpos. The functions that use
* lastpos, search after that position on.
*/
int X509_NAME_get_index_by_NID(const X509_NAME *name, int nid, int lastpos);
int X509_NAME_get_index_by_OBJ(const X509_NAME *name, const ASN1_OBJECT *obj,
   int lastpos);
X509_NAME_ENTRY *X509_NAME_get_entry(const X509_NAME *name, int loc);
X509_NAME_ENTRY *X509_NAME_delete_entry(X509_NAME *name, int loc);
int X509_NAME_add_entry(X509_NAME *name, const X509_NAME_ENTRY *ne,
   int loc, int set);
int X509_NAME_add_entry_by_OBJ(X509_NAME *name, const ASN1_OBJECT *obj, int type,
   const unsigned char *bytes, int len, int loc,
   int set);
int X509_NAME_add_entry_by_NID(X509_NAME *name, int nid, int type,
   const unsigned char *bytes, int len, int loc,
   int set);
X509_NAME_ENTRY *X509_NAME_ENTRY_create_by_txt(X509_NAME_ENTRY
 **ne,
   const char *field, int type,
   const unsigned char *bytes,
   int len);
X509_NAME_ENTRY *X509_NAME_ENTRY_create_by_NID(X509_NAME_ENTRY **ne, int nid,
   int type,
   const unsigned char *bytes,
   int len);
int X509_NAME_add_entry_by_txt(X509_NAME *name, const char *field, int type,
   const unsigned char *bytes, int len, int loc,
   int set);
X509_NAME_ENTRY *X509_NAME_ENTRY_create_by_OBJ(X509_NAME_ENTRY **ne,
   const ASN1_OBJECT *obj, int type,
```

```
   const unsigned char *bytes,
   int len);
int X509_NAME_ENTRY_set_object(X509_NAME_ENTRY *ne, const ASN1_OBJECT *obj);
int X509_NAME_ENTRY_set_data(X509_NAME_ENTRY *ne, int type,
   const unsigned char *bytes, int len);
ASN1_OBJECT *X509_NAME_ENTRY_get_object(const X509_NAME_ENTRY *ne);
ASN1_STRING *X509_NAME_ENTRY_get_data(const X509_NAME_ENTRY *ne);
int X509_NAME_ENTRY_set(const X509_NAME_ENTRY *ne);

int X509_NAME_get0_der(const X509_NAME *nm, const unsigned char **pder,
   size_t *pderlen);

int
 X509v3_get_ext_count(const STACK_OF(X509_EXTENSION) *x);
int X509v3_get_ext_by_NID(const STACK_OF(X509_EXTENSION) *x,
   int nid, int lastpos);
int X509v3_get_ext_by_OBJ(const STACK_OF(X509_EXTENSION) *x,
   const ASN1_OBJECT *obj, int lastpos);
int X509v3_get_ext_by_critical(const STACK_OF(X509_EXTENSION) *x,
   int crit, int lastpos);
X509_EXTENSION *X509v3_get_ext(const STACK_OF(X509_EXTENSION) *x, int loc);
X509_EXTENSION *X509v3_delete_ext(STACK_OF(X509_EXTENSION) *x, int loc);
STACK_OF(X509_EXTENSION) *X509v3_add_ext(STACK_OF(X509_EXTENSION) **x,
   X509_EXTENSION *ex, int loc);
STACK_OF(X509_EXTENSION) *X509v3_add_extensions(STACK_OF(X509_EXTENSION) **target,
   const STACK_OF(X509_EXTENSION) *exts);

int X509_get_ext_count(const X509 *x);
int X509_get_ext_by_NID(const X509 *x, int nid, int lastpos);
int X509_get_ext_by_OBJ(const X509 *x, const ASN1_OBJECT *obj, int lastpos);
int X509_get_ext_by_critical(const X509 *x, int crit, int lastpos);
X509_EXTENSION *X509_get_ext(const
 X509 *x, int loc);
X509_EXTENSION *X509_delete_ext(X509 *x, int loc);
int X509_add_ext(X509 *x, X509_EXTENSION *ex, int loc);
void *X509_get_ext_d2i(const X509 *x, int nid, int *crit, int *idx);
int X509_add1_ext_i2d(X509 *x, int nid, void *value, int crit,
   unsigned long flags);

int X509_CRL_get_ext_count(const X509_CRL *x);
int X509_CRL_get_ext_by_NID(const X509_CRL *x, int nid, int lastpos);
int X509_CRL_get_ext_by_OBJ(const X509_CRL *x, const ASN1_OBJECT *obj,
   int lastpos);
int X509_CRL_get_ext_by_critical(const X509_CRL *x, int crit, int lastpos);
X509_EXTENSION *X509_CRL_get_ext(const X509_CRL *x, int loc);
X509_EXTENSION *X509_CRL_delete_ext(X509_CRL *x, int loc);
int X509_CRL_add_ext(X509_CRL *x, X509_EXTENSION *ex, int loc);
void *X509_CRL_get_ext_d2i(const X509_CRL *x, int nid, int *crit, int *idx);
```

```
int X509_CRL_add1_ext_i2d(X509_CRL *x, int nid, void *value, int crit,
   unsigned long flags);

int X509_REVOKED_get_ext_count(const X509_REVOKED *x);
int
 X509_REVOKED_get_ext_by_NID(const X509_REVOKED *x, int nid, int lastpos);
int X509_REVOKED_get_ext_by_OBJ(const X509_REVOKED *x, const ASN1_OBJECT *obj,
   int lastpos);
int X509_REVOKED_get_ext_by_critical(const X509_REVOKED *x, int crit,
   int lastpos);
X509_EXTENSION *X509_REVOKED_get_ext(const X509_REVOKED *x, int loc);
X509_EXTENSION *X509_REVOKED_delete_ext(X509_REVOKED *x, int loc);
int X509_REVOKED_add_ext(X509_REVOKED *x, X509_EXTENSION *ex, int loc);
void *X509_REVOKED_get_ext_d2i(const X509_REVOKED *x, int nid, int *crit,
   int *idx);
int X509_REVOKED_add1_ext_i2d(X509_REVOKED *x, int nid, void *value, int crit,
   unsigned long flags);

X509_EXTENSION *X509_EXTENSION_create_by_NID(X509_EXTENSION **ex,
   int nid, int crit,
   ASN1_OCTET_STRING *data);
X509_EXTENSION *X509_EXTENSION_create_by_OBJ(X509_EXTENSION **ex,
   const ASN1_OBJECT *obj, int crit,
   ASN1_OCTET_STRING *data);
int X509_EXTENSION_set_object(X509_EXTENSION *ex, const ASN1_OBJECT *obj);
int
 X509_EXTENSION_set_critical(X509_EXTENSION *ex, int crit);
int X509_EXTENSION_set_data(X509_EXTENSION *ex, ASN1_OCTET_STRING *data);
ASN1_OBJECT *X509_EXTENSION_get_object(X509_EXTENSION *ex);
ASN1_OCTET_STRING *X509_EXTENSION_get_data(X509_EXTENSION *ne);
int X509_EXTENSION_get_critical(const X509_EXTENSION *ex);

int X509at_get_attr_count(const STACK_OF(X509_ATTRIBUTE) *x);
int X509at_get_attr_by_NID(const STACK_OF(X509_ATTRIBUTE) *x, int nid,
   int lastpos);
int X509at_get_attr_by_OBJ(const STACK_OF(X509_ATTRIBUTE) *sk,
   const ASN1_OBJECT *obj, int lastpos);
X509_ATTRIBUTE *X509at_get_attr(const STACK_OF(X509_ATTRIBUTE) *x, int loc);
X509_ATTRIBUTE *X509at_delete_attr(STACK_OF(X509_ATTRIBUTE) *x, int loc);
STACK_OF(X509_ATTRIBUTE) *X509at_add1_attr(STACK_OF(X509_ATTRIBUTE) **x,
   X509_ATTRIBUTE *attr);
STACK_OF(X509_ATTRIBUTE) *X509at_add1_attr_by_OBJ(STACK_OF(X509_ATTRIBUTE)
                                    **x,
   const ASN1_OBJECT *obj,
   int type,
    const unsigned char *bytes,
   int len);
STACK_OF(X509_ATTRIBUTE) *X509at_add1_attr_by_NID(STACK_OF(X509_ATTRIBUTE)
```

```
                                        **x,
   int nid, int type,
   const unsigned char *bytes,
   int len);
STACK_OF(X509_ATTRIBUTE) *X509at_add1_attr_by_txt(STACK_OF(X509_ATTRIBUTE)
                                        **x,
   const char *attrname,
   int type,
   const unsigned char *bytes,
   int len);
void *X509at_get0_data_by_OBJ(const STACK_OF(X509_ATTRIBUTE) *x,
   const ASN1_OBJECT *obj, int lastpos, int type);
X509_ATTRIBUTE *X509_ATTRIBUTE_create_by_NID(X509_ATTRIBUTE **attr, int nid,
   int atrtype, const void *data,
   int len);
X509_ATTRIBUTE *X509_ATTRIBUTE_create_by_OBJ(X509_ATTRIBUTE **attr,
   const ASN1_OBJECT *obj,
   int atrtype, const void *data,
   int len);
X509_ATTRIBUTE *X509_ATTRIBUTE_create_by_txt(X509_ATTRIBUTE **attr,
   const char *atrname, int type,
   const unsigned char *bytes,
   int
 len);
int X509_ATTRIBUTE_set1_object(X509_ATTRIBUTE *attr, const ASN1_OBJECT *obj);
int X509_ATTRIBUTE_set1_data(X509_ATTRIBUTE *attr, int attrtype,
   const void *data, int len);
void *X509_ATTRIBUTE_get0_data(X509_ATTRIBUTE *attr, int idx, int atrtype,
   void *data);
int X509_ATTRIBUTE_count(const X509_ATTRIBUTE *attr);
ASN1_OBJECT *X509_ATTRIBUTE_get0_object(X509_ATTRIBUTE *attr);
ASN1_TYPE *X509_ATTRIBUTE_get0_type(X509_ATTRIBUTE *attr, int idx);

int EVP_PKEY_get_attr_count(const EVP_PKEY *key);
int EVP_PKEY_get_attr_by_NID(const EVP_PKEY *key, int nid, int lastpos);
int EVP_PKEY_get_attr_by_OBJ(const EVP_PKEY *key, const ASN1_OBJECT *obj,
   int lastpos);
X509_ATTRIBUTE *EVP_PKEY_get_attr(const EVP_PKEY *key, int loc);
X509_ATTRIBUTE *EVP_PKEY_delete_attr(EVP_PKEY *key, int loc);
int EVP_PKEY_add1_attr(EVP_PKEY *key, X509_ATTRIBUTE *attr);
int EVP_PKEY_add1_attr_by_OBJ(EVP_PKEY *key,
   const ASN1_OBJECT *obj, int type,
   const unsigned char *bytes, int len);
int EVP_PKEY_add1_attr_by_NID(EVP_PKEY
 *key,
   int nid, int type,
   const unsigned char *bytes, int len);
int EVP_PKEY_add1_attr_by_txt(EVP_PKEY *key,
```

```
   const char *attrname, int type,
   const unsigned char *bytes, int len);

/* lookup a cert from a X509 STACK */
X509 *X509_find_by_issuer_and_serial(STACK_OF(X509) *sk, const X509_NAME *name,
   const ASN1_INTEGER *serial);
X509 *X509_find_by_subject(STACK_OF(X509) *sk, const X509_NAME *name);

DECLARE_ASN1_FUNCTIONS(PBEPARAM)
DECLARE_ASN1_FUNCTIONS(PBE2PARAM)
DECLARE_ASN1_FUNCTIONS(PBKDF2PARAM)
DECLARE_ASN1_FUNCTIONS(PBMAC1PARAM)
#ifndef OPENSSL_NO_SCRYPT
DECLARE_ASN1_FUNCTIONS(SCRYPT_PARAMS)
#endif

int PKCS5_pbe_set0_algor(X509_ALGOR *algor, int alg, int iter,
   const unsigned char *salt, int saltlen);
int PKCS5_pbe_set0_algor_ex(X509_ALGOR *algor, int alg, int iter,
   const unsigned char *salt, int saltlen,
   OSSL_LIB_CTX *libctx);

X509_ALGOR *PKCS5_pbe_set(int alg, int iter,
   const unsigned char *salt, int saltlen);
X509_ALGOR
 *PKCS5_pbe_set_ex(int alg, int iter,
   const unsigned char *salt, int saltlen,
   OSSL_LIB_CTX *libctx);

X509_ALGOR *PKCS5_pbe2_set(const EVP_CIPHER *cipher, int iter,
   unsigned char *salt, int saltlen);
X509_ALGOR *PKCS5_pbe2_set_iv(const EVP_CIPHER *cipher, int iter,
   unsigned char *salt, int saltlen,
   unsigned char *aiv, int prf_nid);
X509_ALGOR *PKCS5_pbe2_set_iv_ex(const EVP_CIPHER *cipher, int iter,
   unsigned char *salt, int saltlen,
   unsigned char *aiv, int prf_nid,
   OSSL_LIB_CTX *libctx);

#ifndef OPENSSL_NO_SCRYPT
X509_ALGOR *PKCS5_pbe2_set_scrypt(const EVP_CIPHER *cipher,
   const unsigned char *salt, int saltlen,
   unsigned char *aiv, uint64_t N, uint64_t r,
   uint64_t p);
#endif

X509_ALGOR *PKCS5_pbkdf2_set(int iter, unsigned char *salt, int saltlen,
   int prf_nid, int keylen);
```

```
X509_ALGOR *PKCS5_pbkdf2_set_ex(int iter, unsigned char *salt, int saltlen,
   int prf_nid, int keylen,
   OSSL_LIB_CTX *libctx);

PBKDF2PARAM *PBMAC1_get1_pbkdf2_param(const
 X509_ALGOR *macalg);
/* PKCS#8 utilities */

DECLARE_ASN1_FUNCTIONS(PKCS8_PRIV_KEY_INFO)

EVP_PKEY *EVP_PKCS82PKEY(const PKCS8_PRIV_KEY_INFO *p8);
EVP_PKEY *EVP_PKCS82PKEY_ex(const PKCS8_PRIV_KEY_INFO *p8, OSSL_LIB_CTX *libctx,
   const char *propq);
PKCS8_PRIV_KEY_INFO *EVP_PKEY2PKCS8(const EVP_PKEY *pkey);

int PKCS8_pkey_set0(PKCS8_PRIV_KEY_INFO *priv, ASN1_OBJECT *aobj,
   int version, int ptype, void *pval,
   unsigned char *penc, int penclen);
int PKCS8_pkey_get0(const ASN1_OBJECT **ppkalg,
   const unsigned char **pk, int *ppklen,
   const X509_ALGOR **pa, const PKCS8_PRIV_KEY_INFO *p8);

const STACK_OF(X509_ATTRIBUTE) *
PKCS8_pkey_get0_attrs(const PKCS8_PRIV_KEY_INFO *p8);
int PKCS8_pkey_add1_attr(PKCS8_PRIV_KEY_INFO *p8, X509_ATTRIBUTE *attr);
int PKCS8_pkey_add1_attr_by_NID(PKCS8_PRIV_KEY_INFO *p8, int nid, int type,
   const unsigned char *bytes, int len);
int PKCS8_pkey_add1_attr_by_OBJ(PKCS8_PRIV_KEY_INFO *p8, const ASN1_OBJECT *obj,
   int type, const unsigned
 char *bytes, int len);

void X509_PUBKEY_set0_public_key(X509_PUBKEY *pub,
   unsigned char *penc, int penclen);
int X509_PUBKEY_set0_param(X509_PUBKEY *pub, ASN1_OBJECT *aobj,
   int ptype, void *pval,
   unsigned char *penc, int penclen);
int X509_PUBKEY_get0_param(ASN1_OBJECT **ppkalg,
   const unsigned char **pk, int *ppklen,
   X509_ALGOR **pa, const X509_PUBKEY *pub);
int X509_PUBKEY_eq(const X509_PUBKEY *a, const X509_PUBKEY *b);

#ifdef __cplusplus
}
#endif
#endif
```

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/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/ct.h.in
*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

```
/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_CT_H
#define OPENSSL_CT_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_CT_H
#endif

#include <openssl/opensslconf.h>

#ifndef OPENSSL_NO_CT
#include <openssl/types.h>
#include <openssl/safestack.h>
#include <openssl/x509.h>
#include <openssl/cterr.h>
#ifdef __cplusplus
extern "C" {
#endif

/* Minimum RSA key size, from RFC6962 */
#define SCT_MIN_RSA_BITS 2048

/* All hashes are SHA256 in v1 of Certificate Transparency */
#define CT_V1_HASHLEN SHA256_DIGEST_LENGTH

/* clang-format
 off */
SKM_DEFINE_STACK_OF_INTERNAL(SCT, SCT, SCT)
#define sk_SCT_num(sk) OPENSSL_sk_num(ossl_check_const_SCT_sk_type(sk))
#define sk_SCT_value(sk, idx) ((SCT *)OPENSSL_sk_value(ossl_check_const_SCT_sk_type(sk), (idx)))
#define sk_SCT_new(cmp) ((STACK_OF(SCT) *)OPENSSL_sk_new(ossl_check_SCT_compfunc_type(cmp)))
#define sk_SCT_new_null() ((STACK_OF(SCT) *)OPENSSL_sk_new_null())
#define sk_SCT_new_reserve(cmp, n) ((STACK_OF(SCT)
*)OPENSSL_sk_new_reserve(ossl_check_SCT_compfunc_type(cmp), (n)))
#define sk_SCT_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_SCT_sk_type(sk), (n))
#define sk_SCT_free(sk) OPENSSL_sk_free(ossl_check_SCT_sk_type(sk))
#define sk_SCT_zero(sk) OPENSSL_sk_zero(ossl_check_SCT_sk_type(sk))
#define sk_SCT_delete(sk, i) ((SCT *)OPENSSL_sk_delete(ossl_check_SCT_sk_type(sk), (i)))
#define sk_SCT_delete_ptr(sk, ptr) ((SCT *)OPENSSL_sk_delete_ptr(ossl_check_SCT_sk_type(sk),
ossl_check_SCT_type(ptr)))
#define sk_SCT_push(sk, ptr) OPENSSL_sk_push(ossl_check_SCT_sk_type(sk),
```

```
 ossl_check_SCT_type(ptr))
#define sk_SCT_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_SCT_sk_type(sk), ossl_check_SCT_type(ptr))
#define sk_SCT_pop(sk) ((SCT *)OPENSSL_sk_pop(ossl_check_SCT_sk_type(sk)))
#define sk_SCT_shift(sk) ((SCT *)OPENSSL_sk_shift(ossl_check_SCT_sk_type(sk)))
#define sk_SCT_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_SCT_sk_type(sk),ossl_check_SCT_freefunc_type(freefunc))
#define sk_SCT_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_SCT_sk_type(sk), ossl_check_SCT_type(ptr),
(idx))
#define sk_SCT_set(sk, idx, ptr) ((SCT *)OPENSSL_sk_set(ossl_check_SCT_sk_type(sk), (idx),
ossl_check_SCT_type(ptr)))
#define sk_SCT_find(sk, ptr) OPENSSL_sk_find(ossl_check_SCT_sk_type(sk), ossl_check_SCT_type(ptr))
#define sk_SCT_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_SCT_sk_type(sk), ossl_check_SCT_type(ptr))
#define sk_SCT_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_SCT_sk_type(sk),
ossl_check_SCT_type(ptr), pnum)
#define sk_SCT_sort(sk) OPENSSL_sk_sort(ossl_check_SCT_sk_type(sk))
#define
 sk_SCT_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_SCT_sk_type(sk))
#define sk_SCT_dup(sk) ((STACK_OF(SCT) *)OPENSSL_sk_dup(ossl_check_const_SCT_sk_type(sk)))
#define sk_SCT_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(SCT)
*)OPENSSL_sk_deep_copy(ossl_check_const_SCT_sk_type(sk), ossl_check_SCT_copyfunc_type(copyfunc),
ossl_check_SCT_freefunc_type(freefunc)))
#define sk_SCT_set_cmp_func(sk, cmp)
((sk_SCT_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_SCT_sk_type(sk),
ossl_check_SCT_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(CTLOG, CTLOG, CTLOG)
#define sk_CTLOG_num(sk) OPENSSL_sk_num(ossl_check_const_CTLOG_sk_type(sk))
#define sk_CTLOG_value(sk, idx) ((CTLOG *)OPENSSL_sk_value(ossl_check_const_CTLOG_sk_type(sk),
(idx)))
#define sk_CTLOG_new(cmp) ((STACK_OF(CTLOG)
*)OPENSSL_sk_new(ossl_check_CTLOG_compfunc_type(cmp)))
#define sk_CTLOG_new_null() ((STACK_OF(CTLOG) *)OPENSSL_sk_new_null())
#define sk_CTLOG_new_reserve(cmp, n)
 ((STACK_OF(CTLOG) *)OPENSSL_sk_new_reserve(ossl_check_CTLOG_compfunc_type(cmp), (n)))
#define sk_CTLOG_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_CTLOG_sk_type(sk), (n))
#define sk_CTLOG_free(sk) OPENSSL_sk_free(ossl_check_CTLOG_sk_type(sk))
#define sk_CTLOG_zero(sk) OPENSSL_sk_zero(ossl_check_CTLOG_sk_type(sk))
#define sk_CTLOG_delete(sk, i) ((CTLOG *)OPENSSL_sk_delete(ossl_check_CTLOG_sk_type(sk), (i)))
#define sk_CTLOG_delete_ptr(sk, ptr) ((CTLOG *)OPENSSL_sk_delete_ptr(ossl_check_CTLOG_sk_type(sk),
ossl_check_CTLOG_type(ptr)))
#define sk_CTLOG_push(sk, ptr) OPENSSL_sk_push(ossl_check_CTLOG_sk_type(sk),
ossl_check_CTLOG_type(ptr))
#define sk_CTLOG_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_CTLOG_sk_type(sk),
ossl_check_CTLOG_type(ptr))
#define sk_CTLOG_pop(sk) ((CTLOG *)OPENSSL_sk_pop(ossl_check_CTLOG_sk_type(sk)))
#define sk_CTLOG_shift(sk) ((CTLOG *)OPENSSL_sk_shift(ossl_check_CTLOG_sk_type(sk)))
#define sk_CTLOG_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_CTLOG_sk_type(sk),ossl_check_CTLOG_freefunc_type(freefunc))
#define
```

```
 sk_CTLOG_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_CTLOG_sk_type(sk),
ossl_check_CTLOG_type(ptr), (idx))
#define sk_CTLOG_set(sk, idx, ptr) ((CTLOG *)OPENSSL_sk_set(ossl_check_CTLOG_sk_type(sk), (idx),
ossl_check_CTLOG_type(ptr)))
#define sk_CTLOG_find(sk, ptr) OPENSSL_sk_find(ossl_check_CTLOG_sk_type(sk),
ossl_check_CTLOG_type(ptr))
#define sk_CTLOG_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_CTLOG_sk_type(sk),
ossl_check_CTLOG_type(ptr))
#define sk_CTLOG_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_CTLOG_sk_type(sk),
ossl_check_CTLOG_type(ptr), pnum)
#define sk_CTLOG_sort(sk) OPENSSL_sk_sort(ossl_check_CTLOG_sk_type(sk))
#define sk_CTLOG_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_CTLOG_sk_type(sk))
#define sk_CTLOG_dup(sk) ((STACK_OF(CTLOG)
*)OPENSSL_sk_dup(ossl_check_const_CTLOG_sk_type(sk)))
#define sk_CTLOG_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(CTLOG)
*)OPENSSL_sk_deep_copy(ossl_check_const_CTLOG_sk_type(sk),
 ossl_check_CTLOG_copyfunc_type(copyfunc), ossl_check_CTLOG_freefunc_type(freefunc)))
#define sk_CTLOG_set_cmp_func(sk, cmp)
((sk_CTLOG_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_CTLOG_sk_type(sk),
ossl_check_CTLOG_compfunc_type(cmp)))

/* clang-format on */

typedef enum {
  CT_LOG_ENTRY_TYPE_NOT_SET = -1,
  CT_LOG_ENTRY_TYPE_X509 = 0,
  CT_LOG_ENTRY_TYPE_PRECERT = 1
} ct_log_entry_type_t;

typedef enum {
  SCT_VERSION_NOT_SET = -1,
  SCT_VERSION_V1 = 0
} sct_version_t;

typedef enum {
  SCT_SOURCE_UNKNOWN,
  SCT_SOURCE_TLS_EXTENSION,
  SCT_SOURCE_X509V3_EXTENSION,
  SCT_SOURCE_OCSP_STAPLED_RESPONSE
} sct_source_t;

typedef enum {
  SCT_VALIDATION_STATUS_NOT_SET,
  SCT_VALIDATION_STATUS_UNKNOWN_LOG,
  SCT_VALIDATION_STATUS_VALID,
  SCT_VALIDATION_STATUS_INVALID,
  SCT_VALIDATION_STATUS_UNVERIFIED,
  SCT_VALIDATION_STATUS_UNKNOWN_VERSION
```

```
} sct_validation_status_t;

/*****************************************
* CT policy evaluation
 context functions *
*****************************************/

/*
* Creates a new, empty policy evaluation context associated with the given
* library context and property query string.
* The caller is responsible for calling CT_POLICY_EVAL_CTX_free when finished
* with the CT_POLICY_EVAL_CTX.
*/
CT_POLICY_EVAL_CTX *CT_POLICY_EVAL_CTX_new_ex(OSSL_LIB_CTX *libctx,
   const char *propq);

/*
* The same as CT_POLICY_EVAL_CTX_new_ex() but the default library
* context and property query string is used.
*/
CT_POLICY_EVAL_CTX *CT_POLICY_EVAL_CTX_new(void);

/* Deletes a policy evaluation context and anything it owns. */
void CT_POLICY_EVAL_CTX_free(CT_POLICY_EVAL_CTX *ctx);

/* Gets the peer certificate that the SCTs are for */
X509 *CT_POLICY_EVAL_CTX_get0_cert(const CT_POLICY_EVAL_CTX *ctx);

/*
* Sets the certificate associated with the received SCTs.
* Increments the reference count of cert.
* Returns 1 on success, 0 otherwise.
*/
int CT_POLICY_EVAL_CTX_set1_cert(CT_POLICY_EVAL_CTX
 *ctx, X509 *cert);

/* Gets the issuer of the aforementioned certificate */
X509 *CT_POLICY_EVAL_CTX_get0_issuer(const CT_POLICY_EVAL_CTX *ctx);

/*
* Sets the issuer of the certificate associated with the received SCTs.
* Increments the reference count of issuer.
* Returns 1 on success, 0 otherwise.
*/
int CT_POLICY_EVAL_CTX_set1_issuer(CT_POLICY_EVAL_CTX *ctx, X509 *issuer);

/* Gets the CT logs that are trusted sources of SCTs */
const CTLOG_STORE *CT_POLICY_EVAL_CTX_get0_log_store(const CT_POLICY_EVAL_CTX *ctx);
```

```
/* Sets the log store that is in use. It must outlive the CT_POLICY_EVAL_CTX. */
void CT_POLICY_EVAL_CTX_set_shared_CTLOG_STORE(CT_POLICY_EVAL_CTX *ctx,
   CTLOG_STORE *log_store);

/*
* Gets the time, in milliseconds since the Unix epoch, that will be used as the
* current time when checking whether an SCT was issued in the future.
* Such SCTs will fail validation, as required by RFC6962.
*/
uint64_t CT_POLICY_EVAL_CTX_get_time(const CT_POLICY_EVAL_CTX
 *ctx);

/*
* Sets the time to evaluate SCTs against, in milliseconds since the Unix epoch.
* If an SCT's timestamp is after this time, it will be interpreted as having
* been issued in the future. RFC6962 states that "TLS clients MUST reject SCTs
* whose timestamp is in the future", so an SCT will not validate in this case.
*/
void CT_POLICY_EVAL_CTX_set_time(CT_POLICY_EVAL_CTX *ctx, uint64_t time_in_ms);

/*****************
* SCT functions *
*****************/

/*
* Creates a new, blank SCT.
* The caller is responsible for calling SCT_free when finished with the SCT.
*/
SCT *SCT_new(void);

/*
* Creates a new SCT from some base64-encoded strings.
* The caller is responsible for calling SCT_free when finished with the SCT.
*/
SCT *SCT_new_from_base64(unsigned char version,
   const char *logid_base64,
   ct_log_entry_type_t entry_type,
   uint64_t timestamp,
   const char *extensions_base64,
   const char *signature_base64);

/*
* Frees the SCT and the underlying data
 structures.
*/
void SCT_free(SCT *sct);
```

```
/*
* Free a stack of SCTs, and the underlying SCTs themselves.
* Intended to be compatible with X509V3_EXT_FREE.
*/
void SCT_LIST_free(STACK_OF(SCT) *a);

/*
* Returns the version of the SCT.
*/
sct_version_t SCT_get_version(const SCT *sct);

/*
* Set the version of an SCT.
* Returns 1 on success, 0 if the version is unrecognized.
*/
__owur int SCT_set_version(SCT *sct, sct_version_t version);

/*
* Returns the log entry type of the SCT.
*/
ct_log_entry_type_t SCT_get_log_entry_type(const SCT *sct);

/*
* Set the log entry type of an SCT.
* Returns 1 on success, 0 otherwise.
*/
__owur int SCT_set_log_entry_type(SCT *sct, ct_log_entry_type_t entry_type);

/*
* Gets the ID of the log that an SCT came from.
* Ownership of the log ID remains with the SCT.
* Returns the length of the log ID.
*/
size_t SCT_get0_log_id(const SCT *sct, unsigned char **log_id);

/*
* Set the log ID of an SCT to point directly to the *log_id specified.
 * The SCT takes ownership of the specified pointer.
* Returns 1 on success, 0 otherwise.
*/
__owur int SCT_set0_log_id(SCT *sct, unsigned char *log_id, size_t log_id_len);

/*
* Set the log ID of an SCT.
* This makes a copy of the log_id.
* Returns 1 on success, 0 otherwise.
*/
__owur int SCT_set1_log_id(SCT *sct, const unsigned char *log_id,
```

```
   size_t log_id_len);

/*
* Returns the timestamp for the SCT (epoch time in milliseconds).
*/
uint64_t SCT_get_timestamp(const SCT *sct);

/*
* Set the timestamp of an SCT (epoch time in milliseconds).
*/
void SCT_set_timestamp(SCT *sct, uint64_t timestamp);

/*
* Return the NID for the signature used by the SCT.
* For CT v1, this will be either NID_sha256WithRSAEncryption or
* NID_ecdsa_with_SHA256 (or NID_undef if incorrect/unset).
*/
int SCT_get_signature_nid(const SCT *sct);

/*
* Set the signature type of an SCT
* For CT v1, this should be either NID_sha256WithRSAEncryption or
* NID_ecdsa_with_SHA256.
* Returns 1 on
 success, 0 otherwise.
*/
__owur int SCT_set_signature_nid(SCT *sct, int nid);

/*
* Set *ext to point to the extension data for the SCT. ext must not be NULL.
* The SCT retains ownership of this pointer.
* Returns length of the data pointed to.
*/
size_t SCT_get0_extensions(const SCT *sct, unsigned char **ext);

/*
* Set the extensions of an SCT to point directly to the *ext specified.
* The SCT takes ownership of the specified pointer.
*/
void SCT_set0_extensions(SCT *sct, unsigned char *ext, size_t ext_len);

/*
* Set the extensions of an SCT.
* This takes a copy of the ext.
* Returns 1 on success, 0 otherwise.
*/
__owur int SCT_set1_extensions(SCT *sct, const unsigned char *ext,
   size_t ext_len);
```

```
/*
* Set *sig to point to the signature for the SCT. sig must not be NULL.
* The SCT retains ownership of this pointer.
* Returns length of the data pointed to.
*/
size_t SCT_get0_signature(const SCT *sct, unsigned char **sig);

/*
* Set the signature of an SCT to point
 directly to the *sig specified.
* The SCT takes ownership of the specified pointer.
*/
void SCT_set0_signature(SCT *sct, unsigned char *sig, size_t sig_len);

/*
* Set the signature of an SCT to be a copy of the *sig specified.
* Returns 1 on success, 0 otherwise.
*/
__owur int SCT_set1_signature(SCT *sct, const unsigned char *sig,
   size_t sig_len);

/*
* The origin of this SCT, e.g. TLS extension, OCSP response, etc.
*/
sct_source_t SCT_get_source(const SCT *sct);

/*
* Set the origin of this SCT, e.g. TLS extension, OCSP response, etc.
* Returns 1 on success, 0 otherwise.
*/
__owur int SCT_set_source(SCT *sct, sct_source_t source);

/*
* Returns a text string describing the validation status of |sct|.
*/
const char *SCT_validation_status_string(const SCT *sct);

/*
* Pretty-prints an |sct| to |out|.
* It will be indented by the number of spaces specified by |indent|.
* If |logs| is not NULL, it will be used to lookup the CT log that the SCT came
* from, so that the
 log name can be printed.
*/
void SCT_print(const SCT *sct, BIO *out, int indent, const CTLOG_STORE *logs);

/*
```

```
* Pretty-prints an |sct_list| to |out|.
* It will be indented by the number of spaces specified by |indent|.
* SCTs will be delimited by |separator|.
* If |logs| is not NULL, it will be used to lookup the CT log that each SCT
* came from, so that the log names can be printed.
*/
void SCT_LIST_print(const STACK_OF(SCT) *sct_list, BIO *out, int indent,
   const char *separator, const CTLOG_STORE *logs);

/*
* Gets the last result of validating this SCT.
* If it has not been validated yet, returns SCT_VALIDATION_STATUS_NOT_SET.
*/
sct_validation_status_t SCT_get_validation_status(const SCT *sct);

/*
* Validates the given SCT with the provided context.
* Sets the "validation_status" field of the SCT.
* Returns 1 if the SCT is valid and the signature verifies.
* Returns 0 if the SCT is invalid or could not be verified.
* Returns -1 if an error occurs.
*/
__owur
 int SCT_validate(SCT *sct, const CT_POLICY_EVAL_CTX *ctx);

/*
* Validates the given list of SCTs with the provided context.
* Sets the "validation_status" field of each SCT.
* Returns 1 if there are no invalid SCTs and all signatures verify.
* Returns 0 if at least one SCT is invalid or could not be verified.
* Returns a negative integer if an error occurs.
*/
__owur int SCT_LIST_validate(const STACK_OF(SCT) *scts,
   CT_POLICY_EVAL_CTX *ctx);

/**********************************
* SCT parsing and serialization *
**********************************/

/*
* Serialize (to TLS format) a stack of SCTs and return the length.
* "a" must not be NULL.
* If "pp" is NULL, just return the length of what would have been serialized.
* If "pp" is not NULL and "*pp" is null, function will allocate a new pointer
* for data that caller is responsible for freeing (only if function returns
* successfully).
* If "pp" is NULL and "*pp" is not NULL, caller is responsible for ensuring
* that "*pp"
```

```
 is large enough to accept all of the serialized data.
* Returns < 0 on error, >= 0 indicating bytes written (or would have been)
* on success.
*/
__owur int i2o_SCT_LIST(const STACK_OF(SCT) *a, unsigned char **pp);

/*
* Convert TLS format SCT list to a stack of SCTs.
* If "a" or "*a" is NULL, a new stack will be created that the caller is
* responsible for freeing (by calling SCT_LIST_free).
* "**pp" and "*pp" must not be NULL.
* Upon success, "*pp" will point to after the last bytes read, and a stack
* will be returned.
* Upon failure, a NULL pointer will be returned, and the position of "*pp" is
* not defined.
*/
STACK_OF(SCT) *o2i_SCT_LIST(STACK_OF(SCT) **a, const unsigned char **pp,
   size_t len);

/*
* Serialize (to DER format) a stack of SCTs and return the length.
* "a" must not be NULL.
* If "pp" is NULL, just returns the length of what would have been serialized.
* If "pp" is not NULL and "*pp" is null, function will allocate a new pointer
* for data that
 caller is responsible for freeing (only if function returns
* successfully).
* If "pp" is NULL and "*pp" is not NULL, caller is responsible for ensuring
* that "*pp" is large enough to accept all of the serialized data.
* Returns < 0 on error, >= 0 indicating bytes written (or would have been)
* on success.
*/
__owur int i2d_SCT_LIST(const STACK_OF(SCT) *a, unsigned char **pp);

/*
* Parses an SCT list in DER format and returns it.
* If "a" or "*a" is NULL, a new stack will be created that the caller is
* responsible for freeing (by calling SCT_LIST_free).
* "**pp" and "*pp" must not be NULL.
* Upon success, "*pp" will point to after the last bytes read, and a stack
* will be returned.
* Upon failure, a NULL pointer will be returned, and the position of "*pp" is
* not defined.
*/
STACK_OF(SCT) *d2i_SCT_LIST(STACK_OF(SCT) **a, const unsigned char **pp,
   long len);

/*
```

```
* Serialize (to TLS format) an |sct| and write it to |out|.
* If |out| is null, no SCT will be output
 but the length will still be returned.
* If |out| points to a null pointer, a string will be allocated to hold the
* TLS-format SCT. It is the responsibility of the caller to free it.
* If |out| points to an allocated string, the TLS-format SCT will be written
* to it.
* The length of the SCT in TLS format will be returned.
*/
__owur int i2o_SCT(const SCT *sct, unsigned char **out);

/*
* Parses an SCT in TLS format and returns it.
* If |psct| is not null, it will end up pointing to the parsed SCT. If it
* already points to a non-null pointer, the pointer will be free'd.
* |in| should be a pointer to a string containing the TLS-format SCT.
* |in| will be advanced to the end of the SCT if parsing succeeds.
* |len| should be the length of the SCT in |in|.
* Returns NULL if an error occurs.
* If the SCT is an unsupported version, only the SCT's 'sct' and 'sct_len'
* fields will be populated (with |in| and |len| respectively).
*/
SCT *o2i_SCT(SCT **psct, const unsigned
 char **in, size_t len);

/********************
* CT log functions *
********************/

/*
* Creates a new CT log instance with the given |public_key| and |name| and
* associates it with the give library context |libctx| and property query
* string |propq|.
* Takes ownership of |public_key| but copies |name|.
* Returns NULL if malloc fails or if |public_key| cannot be converted to DER.
* Should be deleted by the caller using CTLOG_free when no longer needed.
*/
CTLOG *CTLOG_new_ex(EVP_PKEY *public_key, const char *name, OSSL_LIB_CTX *libctx,
   const char *propq);

/*
* The same as CTLOG_new_ex except that the default library context and
* property query string are used.
*/
CTLOG *CTLOG_new(EVP_PKEY *public_key, const char *name);

/*
* Creates a new CTLOG instance with the base64-encoded SubjectPublicKeyInfo DER
```

```
* in |pkey_base64| and associated with the given library context |libctx| and
* property query string |propq|. The |name| is a string to help users identify
 * this log.
* Returns 1 on success, 0 on failure.
* Should be deleted by the caller using CTLOG_free when no longer needed.
*/
int CTLOG_new_from_base64_ex(CTLOG **ct_log, const char *pkey_base64,
   const char *name, OSSL_LIB_CTX *libctx,
   const char *propq);

/*
* The same as CTLOG_new_from_base64_ex() except that the default
* library context and property query string are used.
* Returns 1 on success, 0 on failure.
*/
int CTLOG_new_from_base64(CTLOG **ct_log,
   const char *pkey_base64, const char *name);

/*
* Deletes a CT log instance and its fields.
*/
void CTLOG_free(CTLOG *log);

/* Gets the name of the CT log */
const char *CTLOG_get0_name(const CTLOG *log);
/* Gets the ID of the CT log */
void CTLOG_get0_log_id(const CTLOG *log, const uint8_t **log_id,
   size_t *log_id_len);
/* Gets the public key of the CT log */
EVP_PKEY *CTLOG_get0_public_key(const CTLOG *log);

/**************************
* CT log store functions *
**************************/

/*
* Creates
 a new CT log store and associates it with the given libctx and
* property query string.
* Should be deleted by the caller using CTLOG_STORE_free when no longer needed.
*/
CTLOG_STORE *CTLOG_STORE_new_ex(OSSL_LIB_CTX *libctx, const char *propq);

/*
* Same as CTLOG_STORE_new_ex except that the default libctx and
* property query string are used.
* Should be deleted by the caller using CTLOG_STORE_free when no longer needed.
*/
```

```
CTLOG_STORE *CTLOG_STORE_new(void);

/*
* Deletes a CT log store and all of the CT log instances held within.
*/
void CTLOG_STORE_free(CTLOG_STORE *store);

/*
* Finds a CT log in the store based on its log ID.
* Returns the CT log, or NULL if no match is found.
*/
const CTLOG *CTLOG_STORE_get0_log_by_id(const CTLOG_STORE *store,
   const uint8_t *log_id,
   size_t log_id_len);

/*
* Loads a CT log list into a |store| from a |file|.
* Returns 1 if loading is successful, or 0 otherwise.
*/
__owur int CTLOG_STORE_load_file(CTLOG_STORE *store,
 const char *file);

/*
* Loads the default CT log list into a |store|.
* Returns 1 if loading is successful, or 0 otherwise.
*/
__owur int CTLOG_STORE_load_default_file(CTLOG_STORE *store);

#ifdef __cplusplus
}
#endif
#endif
#endif
/*
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*
* Licensed under the Apache License 2.0 (the "License").  You may not use
* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_ERR_H
#define OPENSSL_ERR_H
```

```
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_ERR_H
#endif

#include <openssl/e_os2.h>

#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#include <stdlib.h>
#endif

#include <openssl/types.h>
#include <openssl/bio.h>
#include <openssl/lhash.h>
#include <openssl/cryptoerr_legacy.h>

#ifdef __cplusplus
extern "C" {
#endif

#ifndef OPENSSL_NO_DEPRECATED_3_0
#ifndef OPENSSL_NO_FILENAMES
#define ERR_PUT_error(l, f, r, fn, ln) ERR_put_error(l, f, r, fn, ln)
#else
#define ERR_PUT_error(l, f, r, fn, ln) ERR_put_error(l, f, r, NULL, 0)
#endif
#endif

#include
 <limits.h>
#include <errno.h>

#define ERR_TXT_MALLOCED 0x01
#define ERR_TXT_STRING 0x02

#if !defined(OPENSSL_NO_DEPRECATED_3_0) || defined(OSSL_FORCE_ERR_STATE)
#define ERR_FLAG_MARK 0x01
#define ERR_FLAG_CLEAR 0x02

#define ERR_NUM_ERRORS 16
struct err_state_st {
   int err_flags[ERR_NUM_ERRORS];
   int err_marks[ERR_NUM_ERRORS];
   unsigned long err_buffer[ERR_NUM_ERRORS];
   char *err_data[ERR_NUM_ERRORS];
```

```
  size_t err_data_size[ERR_NUM_ERRORS];
  int err_data_flags[ERR_NUM_ERRORS];
  char *err_file[ERR_NUM_ERRORS];
  int err_line[ERR_NUM_ERRORS];
  char *err_func[ERR_NUM_ERRORS];
  int top, bottom;
};
#endif

/* library */
#define ERR_LIB_NONE 1
#define ERR_LIB_SYS 2
#define ERR_LIB_BN 3
#define ERR_LIB_RSA 4
#define ERR_LIB_DH 5
#define ERR_LIB_EVP 6
#define ERR_LIB_BUF 7
#define ERR_LIB_OBJ 8
#define ERR_LIB_PEM 9
#define ERR_LIB_DSA 10
#define ERR_LIB_X509 11
/* #define ERR_LIB_METH         12 */
#define ERR_LIB_ASN1 13
#define ERR_LIB_CONF
 14
#define ERR_LIB_CRYPTO 15
#define ERR_LIB_EC 16
#define ERR_LIB_SSL 20
/* #define ERR_LIB_SSL23        21 */
/* #define ERR_LIB_SSL2         22 */
/* #define ERR_LIB_SSL3         23 */
/* #define ERR_LIB_RSAREF       30 */
/* #define ERR_LIB_PROXY        31 */
#define ERR_LIB_BIO 32
#define ERR_LIB_PKCS7 33
#define ERR_LIB_X509V3 34
#define ERR_LIB_PKCS12 35
#define ERR_LIB_RAND 36
#define ERR_LIB_DSO 37
#define ERR_LIB_ENGINE 38
#define ERR_LIB_OCSP 39
#define ERR_LIB_UI 40
#define ERR_LIB_COMP 41
#define ERR_LIB_ECDSA 42
#define ERR_LIB_ECDH 43
#define ERR_LIB_OSSL_STORE 44
#define ERR_LIB_FIPS 45
#define ERR_LIB_CMS 46
```

```
#define ERR_LIB_TS 47
#define ERR_LIB_HMAC 48
/* # define ERR_LIB_JPAKE       49 */
#define ERR_LIB_CT 50
#define ERR_LIB_ASYNC 51
#define ERR_LIB_KDF 52
#define ERR_LIB_SM2 53
#define ERR_LIB_ESS 54
#define ERR_LIB_PROP 55
#define ERR_LIB_CRMF 56
#define ERR_LIB_PROV 57
#define ERR_LIB_CMP 58
#define ERR_LIB_OSSL_ENCODER 59
#define ERR_LIB_OSSL_DECODER 60
#define
 ERR_LIB_HTTP 61

#define ERR_LIB_USER 128

#ifndef OPENSSL_NO_DEPRECATED_3_0
#define ASN1err(f, r) ERR_raise_data(ERR_LIB_ASN1, (r), NULL)
#define ASYNCerr(f, r) ERR_raise_data(ERR_LIB_ASYNC, (r), NULL)
#define BIOerr(f, r) ERR_raise_data(ERR_LIB_BIO, (r), NULL)
#define BNerr(f, r) ERR_raise_data(ERR_LIB_BN, (r), NULL)
#define BUFerr(f, r) ERR_raise_data(ERR_LIB_BUF, (r), NULL)
#define CMPerr(f, r) ERR_raise_data(ERR_LIB_CMP, (r), NULL)
#define CMSerr(f, r) ERR_raise_data(ERR_LIB_CMS, (r), NULL)
#define COMPerr(f, r) ERR_raise_data(ERR_LIB_COMP, (r), NULL)
#define CONFerr(f, r) ERR_raise_data(ERR_LIB_CONF, (r), NULL)
#define CRMFerr(f, r) ERR_raise_data(ERR_LIB_CRMF, (r), NULL)
#define CRYPTOerr(f, r) ERR_raise_data(ERR_LIB_CRYPTO, (r), NULL)
#define CTerr(f, r) ERR_raise_data(ERR_LIB_CT, (r), NULL)
#define DHerr(f, r) ERR_raise_data(ERR_LIB_DH, (r), NULL)
#define DSAerr(f, r) ERR_raise_data(ERR_LIB_DSA, (r), NULL)
#define DSOerr(f, r) ERR_raise_data(ERR_LIB_DSO, (r), NULL)
#define
 ECDHerr(f, r) ERR_raise_data(ERR_LIB_ECDH, (r), NULL)
#define ECDSAerr(f, r) ERR_raise_data(ERR_LIB_ECDSA, (r), NULL)
#define ECerr(f, r) ERR_raise_data(ERR_LIB_EC, (r), NULL)
#define ENGINEerr(f, r) ERR_raise_data(ERR_LIB_ENGINE, (r), NULL)
#define ESSerr(f, r) ERR_raise_data(ERR_LIB_ESS, (r), NULL)
#define EVPerr(f, r) ERR_raise_data(ERR_LIB_EVP, (r), NULL)
#define FIPSerr(f, r) ERR_raise_data(ERR_LIB_FIPS, (r), NULL)
#define HMACerr(f, r) ERR_raise_data(ERR_LIB_HMAC, (r), NULL)
#define HTTPerr(f, r) ERR_raise_data(ERR_LIB_HTTP, (r), NULL)
#define KDFerr(f, r) ERR_raise_data(ERR_LIB_KDF, (r), NULL)
#define OBJerr(f, r) ERR_raise_data(ERR_LIB_OBJ, (r), NULL)
#define OCSPerr(f, r) ERR_raise_data(ERR_LIB_OCSP, (r), NULL)
```

```
#define OSSL_STOREerr(f, r) ERR_raise_data(ERR_LIB_OSSL_STORE, (r), NULL)
#define PEMerr(f, r) ERR_raise_data(ERR_LIB_PEM, (r), NULL)
#define PKCS12err(f, r) ERR_raise_data(ERR_LIB_PKCS12, (r), NULL)
#define PKCS7err(f, r) ERR_raise_data(ERR_LIB_PKCS7, (r), NULL)
#define
 PROPerr(f, r) ERR_raise_data(ERR_LIB_PROP, (r), NULL)
#define PROVerr(f, r) ERR_raise_data(ERR_LIB_PROV, (r), NULL)
#define RANDerr(f, r) ERR_raise_data(ERR_LIB_RAND, (r), NULL)
#define RSAerr(f, r) ERR_raise_data(ERR_LIB_RSA, (r), NULL)
#define KDFerr(f, r) ERR_raise_data(ERR_LIB_KDF, (r), NULL)
#define SM2err(f, r) ERR_raise_data(ERR_LIB_SM2, (r), NULL)
#define SSLerr(f, r) ERR_raise_data(ERR_LIB_SSL, (r), NULL)
#define SYSerr(f, r) ERR_raise_data(ERR_LIB_SYS, (r), NULL)
#define TSerr(f, r) ERR_raise_data(ERR_LIB_TS, (r), NULL)
#define UIerr(f, r) ERR_raise_data(ERR_LIB_UI, (r), NULL)
#define X509V3err(f, r) ERR_raise_data(ERR_LIB_X509V3, (r), NULL)
#define X509err(f, r) ERR_raise_data(ERR_LIB_X509, (r), NULL)
#endif

/*-
* The error code packs differently depending on if it records a system
* error or an OpenSSL error.
*
* A system error packs like this (we follow POSIX and only allow positive
* numbers that fit in an |int|):
*
* +-+-----------------------------------------------------------------+
 * |1|                    system error number                    |
* +-+-----------------------------------------------------------------+
*
* An OpenSSL error packs like this:
*
* <---------------------------- 32 bits -------------------------->
*    <--- 8 bits --->< ------------------ 23 bits ------------------>
* +-+---------------+-----------------------------------------------+
* |0|    library    |                    reason                     |
* +-+---------------+-----------------------------------------------+
*
* A few of the reason bits are reserved as flags with special meaning:
*
*                  <5 bits-<>--------- 19 bits ------------------>
*                 +-------+-+-----------------------------------+
*                 | rflags| |         reason                    |
*                 +-------+-+-----------------------------------+
*                        ^
*                        |
*                        ERR_RFLAG_FATAL
```

```
 = ERR_R_FATAL
*
* The reason flags are part of the overall reason code for practical
* reasons, as they provide an easy way to place different types of
* reason codes in different numeric ranges.
*
* The currently known reason flags are:
*
* ERR_RFLAG_FATAL      Flags that the reason code is considered fatal.
*                      For backward compatibility reasons, this flag
*                      is also the code for ERR_R_FATAL (that reason
*                      code served the dual purpose of flag and reason
*                      code in one in pre-3.0 OpenSSL).
* ERR_RFLAG_COMMON     Flags that the reason code is common to all
*                      libraries.  All ERR_R_ macros must use this flag,
*                      and no other _R_ macro is allowed to use it.
*/

/* Macros to help decode recorded system errors */
#define ERR_SYSTEM_FLAG ((unsigned int)INT_MAX + 1)
#define ERR_SYSTEM_MASK ((unsigned int)INT_MAX)

/*
* Macros to help decode recorded
 OpenSSL errors
* As expressed above, RFLAGS and REASON overlap by one bit to allow
* ERR_R_FATAL to use ERR_RFLAG_FATAL as its reason code.
*/
#define ERR_LIB_OFFSET 23L
#define ERR_LIB_MASK 0xFF
#define ERR_RFLAGS_OFFSET 18L
#define ERR_RFLAGS_MASK 0x1F
#define ERR_REASON_MASK 0X7FFFFF

/*
* Reason flags are defined pre-shifted to easily combine with the reason
* number.
*/
#define ERR_RFLAG_FATAL (0x1 << ERR_RFLAGS_OFFSET)
#define ERR_RFLAG_COMMON (0x2 << ERR_RFLAGS_OFFSET)

#define ERR_SYSTEM_ERROR(errcode) (((errcode) & ERR_SYSTEM_FLAG) != 0)

static ossl_unused ossl_inline int ERR_GET_LIB(unsigned long errcode)
{
  if (ERR_SYSTEM_ERROR(errcode))
      return ERR_LIB_SYS;
  return (errcode >> ERR_LIB_OFFSET) & ERR_LIB_MASK;
```

```
}

static ossl_unused ossl_inline int ERR_GET_RFLAGS(unsigned long errcode)
{
  if (ERR_SYSTEM_ERROR(errcode))
      return 0;
  return errcode & (ERR_RFLAGS_MASK << ERR_RFLAGS_OFFSET);
}

static ossl_unused ossl_inline int ERR_GET_REASON(unsigned
 long errcode)
{
  if (ERR_SYSTEM_ERROR(errcode))
      return errcode & ERR_SYSTEM_MASK;
  return errcode & ERR_REASON_MASK;
}

static ossl_unused ossl_inline int ERR_FATAL_ERROR(unsigned long errcode)
{
  return (ERR_GET_RFLAGS(errcode) & ERR_RFLAG_FATAL) != 0;
}

static ossl_unused ossl_inline int ERR_COMMON_ERROR(unsigned long errcode)
{
  return (ERR_GET_RFLAGS(errcode) & ERR_RFLAG_COMMON) != 0;
}

/*
* ERR_PACK is a helper macro to properly pack OpenSSL error codes and may
* only be used for that purpose.  System errors are packed internally.
* ERR_PACK takes reason flags and reason code combined in |reason|.
* ERR_PACK ignores |func|, that parameter is just legacy from pre-3.0 OpenSSL.
*/
#define ERR_PACK(lib, func, reason) \
  ((((unsigned long)(lib) & ERR_LIB_MASK) << ERR_LIB_OFFSET) | (((unsigned long)(reason) &
ERR_REASON_MASK)))

#ifndef OPENSSL_NO_DEPRECATED_3_0
#define SYS_F_FOPEN 0
#define SYS_F_CONNECT 0
#define SYS_F_GETSERVBYNAME 0
#define SYS_F_SOCKET
 0
#define SYS_F_IOCTLSOCKET 0
#define SYS_F_BIND 0
#define SYS_F_LISTEN 0
#define SYS_F_ACCEPT 0
#define SYS_F_WSASTARTUP 0
```

```
#define SYS_F_OPENDIR 0
#define SYS_F_FREAD 0
#define SYS_F_GETADDRINFO 0
#define SYS_F_GETNAMEINFO 0
#define SYS_F_SETSOCKOPT 0
#define SYS_F_GETSOCKOPT 0
#define SYS_F_GETSOCKNAME 0
#define SYS_F_GETHOSTBYNAME 0
#define SYS_F_FFLUSH 0
#define SYS_F_OPEN 0
#define SYS_F_CLOSE 0
#define SYS_F_IOCTL 0
#define SYS_F_STAT 0
#define SYS_F_FCNTL 0
#define SYS_F_FSTAT 0
#define SYS_F_SENDFILE 0
#endif

/*
* All ERR_R_ codes must be combined with ERR_RFLAG_COMMON.
*/

/* "we came from here" global reason codes, range 1..255 */
#define ERR_R_SYS_LIB (ERR_LIB_SYS /* 2 */ | ERR_RFLAG_COMMON)
#define ERR_R_BN_LIB (ERR_LIB_BN /* 3 */ | ERR_RFLAG_COMMON)
#define ERR_R_RSA_LIB (ERR_LIB_RSA /* 4 */ | ERR_RFLAG_COMMON)
#define ERR_R_DH_LIB (ERR_LIB_DH /* 5 */ | ERR_RFLAG_COMMON)
#define ERR_R_EVP_LIB (ERR_LIB_EVP /* 6 */ | ERR_RFLAG_COMMON)
#define ERR_R_BUF_LIB (ERR_LIB_BUF
 /* 7 */ | ERR_RFLAG_COMMON)
#define ERR_R_OBJ_LIB (ERR_LIB_OBJ /* 8 */ | ERR_RFLAG_COMMON)
#define ERR_R_PEM_LIB (ERR_LIB_PEM /* 9 */ | ERR_RFLAG_COMMON)
#define ERR_R_DSA_LIB (ERR_LIB_DSA /* 10 */ | ERR_RFLAG_COMMON)
#define ERR_R_X509_LIB (ERR_LIB_X509 /* 11 */ | ERR_RFLAG_COMMON)
#define ERR_R_ASN1_LIB (ERR_LIB_ASN1 /* 13 */ | ERR_RFLAG_COMMON)
#define ERR_R_CONF_LIB (ERR_LIB_CONF /* 14 */ | ERR_RFLAG_COMMON)
#define ERR_R_CRYPTO_LIB (ERR_LIB_CRYPTO /* 15 */ | ERR_RFLAG_COMMON)
#define ERR_R_EC_LIB (ERR_LIB_EC /* 16 */ | ERR_RFLAG_COMMON)
#define ERR_R_SSL_LIB (ERR_LIB_SSL /* 20 */ | ERR_RFLAG_COMMON)
#define ERR_R_BIO_LIB (ERR_LIB_BIO /* 32 */ | ERR_RFLAG_COMMON)
#define ERR_R_PKCS7_LIB (ERR_LIB_PKCS7 /* 33 */ | ERR_RFLAG_COMMON)
#define ERR_R_X509V3_LIB (ERR_LIB_X509V3 /* 34 */ | ERR_RFLAG_COMMON)
#define ERR_R_PKCS12_LIB (ERR_LIB_PKCS12 /* 35 */ | ERR_RFLAG_COMMON)
#define ERR_R_RAND_LIB (ERR_LIB_RAND /* 36 */ | ERR_RFLAG_COMMON)
#define ERR_R_DSO_LIB (ERR_LIB_DSO /* 37 */
 | ERR_RFLAG_COMMON)
#define ERR_R_ENGINE_LIB (ERR_LIB_ENGINE /* 38 */ | ERR_RFLAG_COMMON)
#define ERR_R_UI_LIB (ERR_LIB_UI /* 40 */ | ERR_RFLAG_COMMON)
```

```
#define ERR_R_ECDSA_LIB (ERR_LIB_ECDSA /* 42 */ | ERR_RFLAG_COMMON)
#define ERR_R_OSSL_STORE_LIB (ERR_LIB_OSSL_STORE /* 44 */ | ERR_RFLAG_COMMON)
#define ERR_R_CMS_LIB (ERR_LIB_CMS /* 46 */ | ERR_RFLAG_COMMON)
#define ERR_R_TS_LIB (ERR_LIB_TS /* 47 */ | ERR_RFLAG_COMMON)
#define ERR_R_CT_LIB (ERR_LIB_CT /* 50 */ | ERR_RFLAG_COMMON)
#define ERR_R_PROV_LIB (ERR_LIB_PROV /* 57 */ | ERR_RFLAG_COMMON)
#define ERR_R_ESS_LIB (ERR_LIB_ESS /* 54 */ | ERR_RFLAG_COMMON)
#define ERR_R_CMP_LIB (ERR_LIB_CMP /* 58 */ | ERR_RFLAG_COMMON)
#define ERR_R_OSSL_ENCODER_LIB (ERR_LIB_OSSL_ENCODER /* 59 */ | ERR_RFLAG_COMMON)
#define ERR_R_OSSL_DECODER_LIB (ERR_LIB_OSSL_DECODER /* 60 */ | ERR_RFLAG_COMMON)

/* Other common error codes, range 256..2^ERR_RFLAGS_OFFSET-1 */
#define ERR_R_FATAL (ERR_RFLAG_FATAL | ERR_RFLAG_COMMON)
#define ERR_R_MALLOC_FAILURE (256
 | ERR_R_FATAL)
#define ERR_R_SHOULD_NOT_HAVE_BEEN_CALLED (257 | ERR_R_FATAL)
#define ERR_R_PASSED_NULL_PARAMETER (258 | ERR_R_FATAL)
#define ERR_R_INTERNAL_ERROR (259 | ERR_R_FATAL)
#define ERR_R_DISABLED (260 | ERR_R_FATAL)
#define ERR_R_INIT_FAIL (261 | ERR_R_FATAL)
#define ERR_R_PASSED_INVALID_ARGUMENT (262 | ERR_RFLAG_COMMON)
#define ERR_R_OPERATION_FAIL (263 | ERR_R_FATAL)
#define ERR_R_INVALID_PROVIDER_FUNCTIONS (264 | ERR_R_FATAL)
#define ERR_R_INTERRUPTED_OR_CANCELLED (265 | ERR_RFLAG_COMMON)
#define ERR_R_NESTED_ASN1_ERROR (266 | ERR_RFLAG_COMMON)
#define ERR_R_MISSING_ASN1_EOS (267 | ERR_RFLAG_COMMON)
#define ERR_R_UNSUPPORTED (268 | ERR_RFLAG_COMMON)
#define ERR_R_FETCH_FAILED (269 | ERR_RFLAG_COMMON)
#define ERR_R_INVALID_PROPERTY_DEFINITION (270 | ERR_RFLAG_COMMON)
#define ERR_R_UNABLE_TO_GET_READ_LOCK (271 | ERR_R_FATAL)
#define ERR_R_UNABLE_TO_GET_WRITE_LOCK (272 | ERR_R_FATAL)

typedef struct ERR_string_data_st {
  unsigned long error;
  const char *string;
} ERR_STRING_DATA;

/*
 clang-format off */
DEFINE_LHASH_OF_INTERNAL(ERR_STRING_DATA);
#define lh_ERR_STRING_DATA_new(hfn, cmp) ((LHASH_OF(ERR_STRING_DATA)
*)OPENSSL_LH_set_thunks(OPENSSL_LH_new(ossl_check_ERR_STRING_DATA_lh_hashfunc_type(hfn),
ossl_check_ERR_STRING_DATA_lh_compfunc_type(cmp)), lh_ERR_STRING_DATA_hash_thunk,
lh_ERR_STRING_DATA_comp_thunk, lh_ERR_STRING_DATA_doall_thunk,
lh_ERR_STRING_DATA_doall_arg_thunk))
#define lh_ERR_STRING_DATA_free(lh) OPENSSL_LH_free(ossl_check_ERR_STRING_DATA_lh_type(lh))
#define lh_ERR_STRING_DATA_flush(lh) OPENSSL_LH_flush(ossl_check_ERR_STRING_DATA_lh_type(lh))
#define lh_ERR_STRING_DATA_insert(lh, ptr) ((ERR_STRING_DATA
```

```
*)OPENSSL_LH_insert(ossl_check_ERR_STRING_DATA_lh_type(lh),
ossl_check_ERR_STRING_DATA_lh_plain_type(ptr)))
#define lh_ERR_STRING_DATA_delete(lh, ptr) ((ERR_STRING_DATA
*)OPENSSL_LH_delete(ossl_check_ERR_STRING_DATA_lh_type(lh),
ossl_check_const_ERR_STRING_DATA_lh_plain_type(ptr)))
#define lh_ERR_STRING_DATA_retrieve(lh, ptr) ((ERR_STRING_DATA
 *)OPENSSL_LH_retrieve(ossl_check_ERR_STRING_DATA_lh_type(lh),
ossl_check_const_ERR_STRING_DATA_lh_plain_type(ptr)))
#define lh_ERR_STRING_DATA_error(lh) OPENSSL_LH_error(ossl_check_ERR_STRING_DATA_lh_type(lh))
#define lh_ERR_STRING_DATA_num_items(lh)
OPENSSL_LH_num_items(ossl_check_ERR_STRING_DATA_lh_type(lh))
#define lh_ERR_STRING_DATA_node_stats_bio(lh, out)
OPENSSL_LH_node_stats_bio(ossl_check_const_ERR_STRING_DATA_lh_type(lh), out)
#define lh_ERR_STRING_DATA_node_usage_stats_bio(lh, out)
OPENSSL_LH_node_usage_stats_bio(ossl_check_const_ERR_STRING_DATA_lh_type(lh), out)
#define lh_ERR_STRING_DATA_stats_bio(lh, out)
OPENSSL_LH_stats_bio(ossl_check_const_ERR_STRING_DATA_lh_type(lh), out)
#define lh_ERR_STRING_DATA_get_down_load(lh)
OPENSSL_LH_get_down_load(ossl_check_ERR_STRING_DATA_lh_type(lh))
#define lh_ERR_STRING_DATA_set_down_load(lh, dl)
OPENSSL_LH_set_down_load(ossl_check_ERR_STRING_DATA_lh_type(lh), dl)
#define lh_ERR_STRING_DATA_doall(lh, dfn)
OPENSSL_LH_doall(ossl_check_ERR_STRING_DATA_lh_type(lh),
 ossl_check_ERR_STRING_DATA_lh_doallfunc_type(dfn))

/* clang-format on */

/* 12 lines and some on an 80 column terminal */
#define ERR_MAX_DATA_SIZE 1024

/* Building blocks */
void ERR_new(void);
void ERR_set_debug(const char *file, int line, const char *func);
void ERR_set_error(int lib, int reason, const char *fmt, ...);
void ERR_vset_error(int lib, int reason, const char *fmt, va_list args);

/* Main error raising functions */
#define ERR_raise(lib, reason) ERR_raise_data((lib), (reason), NULL)
#define ERR_raise_data                                  \
  (ERR_new(),                                           \
     ERR_set_debug(OPENSSL_FILE, OPENSSL_LINE, OPENSSL_FUNC), \
     ERR_set_error)

#ifndef OPENSSL_NO_DEPRECATED_3_0
/* Backward compatibility */
#define ERR_put_error(lib, func, reason, file, line) \
  (ERR_new(),                                           \
     ERR_set_debug((file), (line), OPENSSL_FUNC), \
```

```
    ERR_set_error((lib), (reason), NULL))
#endif

void ERR_set_error_data(char *data, int flags);

unsigned long ERR_get_error(void);
unsigned long ERR_get_error_all(const char **file, int *line,
  const char **func,
  const char **data, int *flags);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0
unsigned long ERR_get_error_line(const char **file, int *line);
OSSL_DEPRECATEDIN_3_0
unsigned long ERR_get_error_line_data(const char **file, int *line,
  const char **data, int *flags);
#endif
unsigned long ERR_peek_error(void);
unsigned long ERR_peek_error_line(const char **file, int *line);
unsigned long ERR_peek_error_func(const char **func);
unsigned long ERR_peek_error_data(const char **data, int *flags);
unsigned long ERR_peek_error_all(const char **file, int *line,
  const char **func,
  const char **data, int *flags);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0
unsigned long ERR_peek_error_line_data(const char **file, int *line,
  const char **data,
 int *flags);
#endif
unsigned long ERR_peek_last_error(void);
unsigned long ERR_peek_last_error_line(const char **file, int *line);
unsigned long ERR_peek_last_error_func(const char **func);
unsigned long ERR_peek_last_error_data(const char **data, int *flags);
unsigned long ERR_peek_last_error_all(const char **file, int *line,
  const char **func,
  const char **data, int *flags);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0
unsigned long ERR_peek_last_error_line_data(const char **file, int *line,
  const char **data, int *flags);
#endif

void ERR_clear_error(void);

char *ERR_error_string(unsigned long e, char *buf);
void ERR_error_string_n(unsigned long e, char *buf, size_t len);
const char *ERR_lib_error_string(unsigned long e);
```

```
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 const char *ERR_func_error_string(unsigned long e);
#endif
const char *ERR_reason_error_string(unsigned long e);

void ERR_print_errors_cb(int (*cb)(const char *str, size_t len, void *u),
    void *u);
#ifndef OPENSSL_NO_STDIO
void ERR_print_errors_fp(FILE *fp);
#endif
void ERR_print_errors(BIO *bp);

void ERR_add_error_data(int num, ...);
void ERR_add_error_vdata(int num, va_list args);
void ERR_add_error_txt(const char *sepr, const char *txt);
void ERR_add_error_mem_bio(const char *sep, BIO *bio);

int ERR_load_strings(int lib, ERR_STRING_DATA *str);
int ERR_load_strings_const(const ERR_STRING_DATA *str);
int ERR_unload_strings(int lib, ERR_STRING_DATA *str);

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define ERR_load_crypto_strings() \
   OPENSSL_init_crypto(OPENSSL_INIT_LOAD_CRYPTO_STRINGS, NULL)
#define ERR_free_strings() \
   while (0)            \
   continue
#endif
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 void ERR_remove_thread_state(void *);
#endif
#ifndef OPENSSL_NO_DEPRECATED_1_0_0
OSSL_DEPRECATEDIN_1_0_0 void ERR_remove_state(unsigned long pid);
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 ERR_STATE *ERR_get_state(void);
#endif

int
 ERR_get_next_error_library(void);

int ERR_set_mark(void);
int ERR_pop_to_mark(void);
int ERR_clear_last_mark(void);
int ERR_count_to_mark(void);
int ERR_pop(void);

ERR_STATE *OSSL_ERR_STATE_new(void);
```

```
void OSSL_ERR_STATE_save(ERR_STATE *es);
void OSSL_ERR_STATE_save_to_mark(ERR_STATE *es);
void OSSL_ERR_STATE_restore(const ERR_STATE *es);
void OSSL_ERR_STATE_free(ERR_STATE *es);

#ifdef __cplusplus
}
#endif

#endif
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/ssl.h.in
*
* Copyright 1995-2025 The OpenSSL Project Authors. All Rights Reserved.
* Copyright (c) 2002, Oracle and/or its affiliates. All rights reserved
* Copyright 2005 Nokia. All rights reserved.
*
* Licensed under the Apache License 2.0 (the "License").  You may not use
* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_SSL_H
#define OPENSSL_SSL_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_SSL_H
#endif

#include <openssl/e_os2.h>
#include <openssl/e_ostime.h>
#include <openssl/opensslconf.h>
#include <openssl/comp.h>
#include <openssl/bio.h>
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#include <openssl/x509.h>
#include <openssl/crypto.h>
#include <openssl/buffer.h>
#endif
#include
```

```
 <openssl/lhash.h>
#include <openssl/pem.h>
#include <openssl/hmac.h>
#include <openssl/async.h>

#include <openssl/safestack.h>
#include <openssl/symhacks.h>
#include <openssl/ct.h>
#include <openssl/sslerr.h>
#include <openssl/prov_ssl.h>
#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif

#ifdef __cplusplus
extern "C" {
#endif

/* OpenSSL version number for ASN.1 encoding of the session information */
/*-
* Version 0 - initial version
* Version 1 - added the optional peer certificate
*/
#define SSL_SESSION_ASN1_VERSION 0x0001

#define SSL_MAX_SSL_SESSION_ID_LENGTH 32
#define SSL_MAX_SID_CTX_LENGTH 32

#define SSL_MIN_RSA_MODULUS_LENGTH_IN_BYTES (512 / 8)
#define SSL_MAX_KEY_ARG_LENGTH 8
/* SSL_MAX_MASTER_KEY_LENGTH is defined in prov_ssl.h */

/* The maximum number of encrypt/decrypt pipelines we can support */
#define SSL_MAX_PIPELINES 32

/* text strings for the ciphers */

/* These are used to specify which ciphers to use and not to use */

#define SSL_TXT_LOW "LOW"
#define
 SSL_TXT_MEDIUM "MEDIUM"
#define SSL_TXT_HIGH "HIGH"
#define SSL_TXT_FIPS "FIPS"

#define SSL_TXT_aNULL "aNULL"
#define SSL_TXT_eNULL "eNULL"
#define SSL_TXT_NULL "NULL"
```

```
#define SSL_TXT_kRSA "kRSA"
#define SSL_TXT_kDHr "kDHr" /* this cipher class has been removed */
#define SSL_TXT_kDHd "kDHd" /* this cipher class has been removed */
#define SSL_TXT_kDH "kDH" /* this cipher class has been removed */
#define SSL_TXT_kEDH "kEDH" /* alias for kDHE */
#define SSL_TXT_kDHE "kDHE"
#define SSL_TXT_kECDHr "kECDHr" /* this cipher class has been removed */
#define SSL_TXT_kECDHe "kECDHe" /* this cipher class has been removed */
#define SSL_TXT_kECDH "kECDH" /* this cipher class has been removed */
#define SSL_TXT_kEECDH "kEECDH" /* alias for kECDHE */
#define SSL_TXT_kECDHE "kECDHE"
#define SSL_TXT_kPSK "kPSK"
#define SSL_TXT_kRSAPSK "kRSAPSK"
#define SSL_TXT_kECDHEPSK "kECDHEPSK"
#define SSL_TXT_kDHEPSK "kDHEPSK"
#define SSL_TXT_kGOST "kGOST"
#define SSL_TXT_kGOST18 "kGOST18"
#define SSL_TXT_kSRP
 "kSRP"

#define SSL_TXT_aRSA "aRSA"
#define SSL_TXT_aDSS "aDSS"
#define SSL_TXT_aDH "aDH" /* this cipher class has been removed */
#define SSL_TXT_aECDH "aECDH" /* this cipher class has been removed */
#define SSL_TXT_aECDSA "aECDSA"
#define SSL_TXT_aPSK "aPSK"
#define SSL_TXT_aGOST94 "aGOST94"
#define SSL_TXT_aGOST01 "aGOST01"
#define SSL_TXT_aGOST12 "aGOST12"
#define SSL_TXT_aGOST "aGOST"
#define SSL_TXT_aSRP "aSRP"

#define SSL_TXT_DSS "DSS"
#define SSL_TXT_DH "DH"
#define SSL_TXT_DHE "DHE" /* same as "kDHE:-ADH" */
#define SSL_TXT_EDH "EDH" /* alias for DHE */
#define SSL_TXT_ADH "ADH"
#define SSL_TXT_RSA "RSA"
#define SSL_TXT_ECDH "ECDH"
#define SSL_TXT_EECDH "EECDH" /* alias for ECDHE" */
#define SSL_TXT_ECDHE "ECDHE" /* same as "kECDHE:-AECDH" */
#define SSL_TXT_AECDH "AECDH"
#define SSL_TXT_ECDSA "ECDSA"
#define SSL_TXT_PSK "PSK"
#define SSL_TXT_SRP "SRP"

#define SSL_TXT_DES "DES"
```

```
#define SSL_TXT_3DES "3DES"
#define SSL_TXT_RC4 "RC4"
#define SSL_TXT_RC2 "RC2"
#define
 SSL_TXT_IDEA "IDEA"
#define SSL_TXT_SEED "SEED"
#define SSL_TXT_AES128 "AES128"
#define SSL_TXT_AES256 "AES256"
#define SSL_TXT_AES "AES"
#define SSL_TXT_AES_GCM "AESGCM"
#define SSL_TXT_AES_CCM "AESCCM"
#define SSL_TXT_AES_CCM_8 "AESCCM8"
#define SSL_TXT_CAMELLIA128 "CAMELLIA128"
#define SSL_TXT_CAMELLIA256 "CAMELLIA256"
#define SSL_TXT_CAMELLIA "CAMELLIA"
#define SSL_TXT_CHACHA20 "CHACHA20"
#define SSL_TXT_GOST "GOST89"
#define SSL_TXT_ARIA "ARIA"
#define SSL_TXT_ARIA_GCM "ARIAGCM"
#define SSL_TXT_ARIA128 "ARIA128"
#define SSL_TXT_ARIA256 "ARIA256"
#define SSL_TXT_GOST2012_GOST8912_GOST8912 "GOST2012-GOST8912-GOST8912"
#define SSL_TXT_CBC "CBC"

#define SSL_TXT_MD5 "MD5"
#define SSL_TXT_SHA1 "SHA1"
#define SSL_TXT_SHA "SHA" /* same as "SHA1" */
#define SSL_TXT_GOST94 "GOST94"
#define SSL_TXT_GOST89MAC "GOST89MAC"
#define SSL_TXT_GOST12 "GOST12"
#define SSL_TXT_GOST89MAC12 "GOST89MAC12"
#define SSL_TXT_SHA256 "SHA256"
#define SSL_TXT_SHA384 "SHA384"

#define SSL_TXT_SSLV3 "SSLv3"
#define
 SSL_TXT_TLSV1 "TLSv1"
#define SSL_TXT_TLSV1_1 "TLSv1.1"
#define SSL_TXT_TLSV1_2 "TLSv1.2"

#define SSL_TXT_ALL "ALL"

/*-
* COMPLEMENTOF* definitions. These identifiers are used to (de-select)
* ciphers normally not being used.
* Example: "RC4" will activate all ciphers using RC4 including ciphers
* without authentication, which would normally disabled by DEFAULT (due
* the "!ADH" being part of default). Therefore "RC4:!COMPLEMENTOFDEFAULT"
```

```
* will make sure that it is also disabled in the specific selection.
* COMPLEMENTOF* identifiers are portable between version, as adjustments
* to the default cipher setup will also be included here.
*
* COMPLEMENTOFDEFAULT does not experience the same special treatment that
* DEFAULT gets, as only selection is being done and no sorting as needed
* for DEFAULT.
*/
#define SSL_TXT_CMPALL "COMPLEMENTOFALL"
#define SSL_TXT_CMPDEF "COMPLEMENTOFDEFAULT"

/*
* The following cipher list is used by default. It also is substituted when
* an
 application-defined cipher list string starts with 'DEFAULT'.
* This applies to ciphersuites for TLSv1.2 and below.
* DEPRECATED IN 3.0.0, in favor of OSSL_default_cipher_list()
* Update both macro and function simultaneously
*/
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define SSL_DEFAULT_CIPHER_LIST "ALL:!COMPLEMENTOFDEFAULT:!eNULL"
/*
* This is the default set of TLSv1.3 ciphersuites
* DEPRECATED IN 3.0.0, in favor of OSSL_default_ciphersuites()
* Update both macro and function simultaneously
*/
#define TLS_DEFAULT_CIPHERSUITES "TLS_AES_256_GCM_SHA384:"       \
                                 "TLS_CHACHA20_POLY1305_SHA256:" \
                                 "TLS_AES_128_GCM_SHA256"
#endif
/*
* As of OpenSSL 1.0.0, ssl_create_cipher_list() in ssl/ssl_ciph.c always
* starts with a reasonable order, and all we have to do for DEFAULT is
* throwing out anonymous and unencrypted ciphersuites! (The latter are not
* actually enabled by ALL, but "ALL:RSA" would enable some of them.)
 */

/* Used in SSL_set_shutdown()/SSL_get_shutdown(); */
#define SSL_SENT_SHUTDOWN 1
#define SSL_RECEIVED_SHUTDOWN 2

#ifdef __cplusplus
}
#endif

#ifdef __cplusplus
extern "C" {
#endif
```

```
#define SSL_FILETYPE_ASN1 X509_FILETYPE_ASN1
#define SSL_FILETYPE_PEM X509_FILETYPE_PEM

/*
* This is needed to stop compilers complaining about the 'struct ssl_st *'
* function parameters used to prototype callbacks in SSL_CTX.
*/
typedef struct ssl_st *ssl_crock_st;
typedef struct tls_session_ticket_ext_st TLS_SESSION_TICKET_EXT;
typedef struct ssl_method_st SSL_METHOD;
typedef struct ssl_cipher_st SSL_CIPHER;
typedef struct ssl_session_st SSL_SESSION;
typedef struct tls_sigalgs_st TLS_SIGALGS;
typedef struct ssl_conf_ctx_st SSL_CONF_CTX;

STACK_OF(SSL_CIPHER);

/* SRTP protection profiles for use with the use_srtp extension (RFC 5764)*/
typedef struct srtp_protection_profile_st {
  const char *name;
  unsigned long id;
} SRTP_PROTECTION_PROFILE;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(SRTP_PROTECTION_PROFILE,
 SRTP_PROTECTION_PROFILE, SRTP_PROTECTION_PROFILE)
#define sk_SRTP_PROTECTION_PROFILE_num(sk)
OPENSSL_sk_num(ossl_check_const_SRTP_PROTECTION_PROFILE_sk_type(sk))
#define sk_SRTP_PROTECTION_PROFILE_value(sk, idx) ((SRTP_PROTECTION_PROFILE
*)OPENSSL_sk_value(ossl_check_const_SRTP_PROTECTION_PROFILE_sk_type(sk), (idx)))
#define sk_SRTP_PROTECTION_PROFILE_new(cmp) ((STACK_OF(SRTP_PROTECTION_PROFILE)
*)OPENSSL_sk_new(ossl_check_SRTP_PROTECTION_PROFILE_compfunc_type(cmp)))
#define sk_SRTP_PROTECTION_PROFILE_new_null() ((STACK_OF(SRTP_PROTECTION_PROFILE)
*)OPENSSL_sk_new_null())
#define sk_SRTP_PROTECTION_PROFILE_new_reserve(cmp, n)
((STACK_OF(SRTP_PROTECTION_PROFILE)
*)OPENSSL_sk_new_reserve(ossl_check_SRTP_PROTECTION_PROFILE_compfunc_type(cmp), (n)))
#define sk_SRTP_PROTECTION_PROFILE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk), (n))
#define sk_SRTP_PROTECTION_PROFILE_free(sk)
OPENSSL_sk_free(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk))
#define
 sk_SRTP_PROTECTION_PROFILE_zero(sk)
OPENSSL_sk_zero(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk))
#define sk_SRTP_PROTECTION_PROFILE_delete(sk, i) ((SRTP_PROTECTION_PROFILE
*)OPENSSL_sk_delete(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk), (i)))
#define sk_SRTP_PROTECTION_PROFILE_delete_ptr(sk, ptr) ((SRTP_PROTECTION_PROFILE
*)OPENSSL_sk_delete_ptr(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk),
```

```
ossl_check_SRTP_PROTECTION_PROFILE_type(ptr)))
#define sk_SRTP_PROTECTION_PROFILE_push(sk, ptr)
OPENSSL_sk_push(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk),
ossl_check_SRTP_PROTECTION_PROFILE_type(ptr))
#define sk_SRTP_PROTECTION_PROFILE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk),
ossl_check_SRTP_PROTECTION_PROFILE_type(ptr))
#define sk_SRTP_PROTECTION_PROFILE_pop(sk) ((SRTP_PROTECTION_PROFILE
*)OPENSSL_sk_pop(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk)))
#define sk_SRTP_PROTECTION_PROFILE_shift(sk) ((SRTP_PROTECTION_PROFILE
 *)OPENSSL_sk_shift(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk)))
#define sk_SRTP_PROTECTION_PROFILE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk),ossl_check_SRTP_PROTECTI
ON_PROFILE_freefunc_type(freefunc))
#define sk_SRTP_PROTECTION_PROFILE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk),
ossl_check_SRTP_PROTECTION_PROFILE_type(ptr), (idx))
#define sk_SRTP_PROTECTION_PROFILE_set(sk, idx, ptr) ((SRTP_PROTECTION_PROFILE
*)OPENSSL_sk_set(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk), (idx),
ossl_check_SRTP_PROTECTION_PROFILE_type(ptr)))
#define sk_SRTP_PROTECTION_PROFILE_find(sk, ptr)
OPENSSL_sk_find(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk),
ossl_check_SRTP_PROTECTION_PROFILE_type(ptr))
#define sk_SRTP_PROTECTION_PROFILE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk),
ossl_check_SRTP_PROTECTION_PROFILE_type(ptr))
#define sk_SRTP_PROTECTION_PROFILE_find_all(sk,
 ptr, pnum) OPENSSL_sk_find_all(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk),
ossl_check_SRTP_PROTECTION_PROFILE_type(ptr), pnum)
#define sk_SRTP_PROTECTION_PROFILE_sort(sk)
OPENSSL_sk_sort(ossl_check_SRTP_PROTECTION_PROFILE_sk_type(sk))
#define sk_SRTP_PROTECTION_PROFILE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_SRTP_PROTECTION_PROFILE_sk_type(sk))
#define sk_SRTP_PROTECTION_PROFILE_dup(sk) ((STACK_OF(SRTP_PROTECTION_PROFILE)
*)OPENSSL_sk_dup(ossl_check_const_SRTP_PROTECTION_PROFILE_sk_type(sk)))
#define sk_SRTP_PROTECTION_PROFILE_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(SRTP_PROTECTION_PROFILE)
*)OPENSSL_sk_deep_copy(ossl_check_const_SRTP_PROTECTION_PROFILE_sk_type(sk),
ossl_check_SRTP_PROTECTION_PROFILE_copyfunc_type(copyfunc),
ossl_check_SRTP_PROTECTION_PROFILE_freefunc_type(freefunc)))
#define sk_SRTP_PROTECTION_PROFILE_set_cmp_func(sk, cmp)
((sk_SRTP_PROTECTION_PROFILE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_SRTP_PROTECTION
_PROFILE_sk_type(sk), ossl_check_SRTP_PROTECTION_PROFILE_compfunc_type(cmp)))

/*
 clang-format on */

typedef int (*tls_session_ticket_ext_cb_fn)(SSL *s, const unsigned char *data,
```

```
   int len, void *arg);
typedef int (*tls_session_secret_cb_fn)(SSL *s, void *secret, int *secret_len,
   STACK_OF(SSL_CIPHER) *peer_ciphers,
   const SSL_CIPHER **cipher, void *arg);

/* Extension context codes */
/* This extension is only allowed in TLS */
#define SSL_EXT_TLS_ONLY 0x00001
/* This extension is only allowed in DTLS */
#define SSL_EXT_DTLS_ONLY 0x00002
/* Some extensions may be allowed in DTLS but we don't implement them for it */
#define SSL_EXT_TLS_IMPLEMENTATION_ONLY 0x00004
/* Most extensions are not defined for SSLv3 but EXT_TYPE_renegotiate is */
#define SSL_EXT_SSL3_ALLOWED 0x00008
/* Extension is only defined for TLS1.2 and below */
#define SSL_EXT_TLS1_2_AND_BELOW_ONLY 0x00010
/* Extension is only defined for TLS1.3 and above */
#define SSL_EXT_TLS1_3_ONLY 0x00020
/* Ignore this extension during parsing if we are resuming
 */
#define SSL_EXT_IGNORE_ON_RESUMPTION 0x00040
#define SSL_EXT_CLIENT_HELLO 0x00080
/* Really means TLS1.2 or below */
#define SSL_EXT_TLS1_2_SERVER_HELLO 0x00100
#define SSL_EXT_TLS1_3_SERVER_HELLO 0x00200
#define SSL_EXT_TLS1_3_ENCRYPTED_EXTENSIONS 0x00400
#define SSL_EXT_TLS1_3_HELLO_RETRY_REQUEST 0x00800
#define SSL_EXT_TLS1_3_CERTIFICATE 0x01000
#define SSL_EXT_TLS1_3_NEW_SESSION_TICKET 0x02000
#define SSL_EXT_TLS1_3_CERTIFICATE_REQUEST 0x04000
#define SSL_EXT_TLS1_3_CERTIFICATE_COMPRESSION 0x08000
/* When sending a raw public key in a certificate message */
#define SSL_EXT_TLS1_3_RAW_PUBLIC_KEY 0x10000

/* Typedefs for handling custom extensions */

typedef int (*custom_ext_add_cb)(SSL *s, unsigned int ext_type,
   const unsigned char **out, size_t *outlen,
   int *al, void *add_arg);

typedef void (*custom_ext_free_cb)(SSL *s, unsigned int ext_type,
   const unsigned char *out, void *add_arg);

typedef int (*custom_ext_parse_cb)(SSL *s, unsigned int ext_type,
   const
 unsigned char *in, size_t inlen,
   int *al, void *parse_arg);
```

```
typedef int (*SSL_custom_ext_add_cb_ex)(SSL *s, unsigned int ext_type,
   unsigned int context,
   const unsigned char **out,
   size_t *outlen, X509 *x,
   size_t chainidx,
   int *al, void *add_arg);

typedef void (*SSL_custom_ext_free_cb_ex)(SSL *s, unsigned int ext_type,
   unsigned int context,
   const unsigned char *out,
   void *add_arg);

typedef int (*SSL_custom_ext_parse_cb_ex)(SSL *s, unsigned int ext_type,
   unsigned int context,
   const unsigned char *in,
   size_t inlen, X509 *x,
   size_t chainidx,
   int *al, void *parse_arg);

/* Typedef for verification callback */
typedef int (*SSL_verify_cb)(int preverify_ok, X509_STORE_CTX *x509_ctx);

/* Typedef for SSL async callback */
typedef int (*SSL_async_callback_fn)(SSL *s, void *arg);

#define SSL_OP_BIT(n) ((uint64_t)1 << (uint64_t)n)

/*
* SSL/TLS connection options.
*/
/* Disable Extended master secret */
#define SSL_OP_NO_EXTENDED_MASTER_SECRET
 SSL_OP_BIT(0)
/* Cleanse plaintext copies of data delivered to the application */
#define SSL_OP_CLEANSE_PLAINTEXT SSL_OP_BIT(1)
/* Allow initial connection to servers that don't support RI */
#define SSL_OP_LEGACY_SERVER_CONNECT SSL_OP_BIT(2)
/* Enable support for Kernel TLS */
#define SSL_OP_ENABLE_KTLS SSL_OP_BIT(3)
#define SSL_OP_TLSEXT_PADDING SSL_OP_BIT(4)
#define SSL_OP_SAFARI_ECDHE_ECDSA_BUG SSL_OP_BIT(6)
#define SSL_OP_IGNORE_UNEXPECTED_EOF SSL_OP_BIT(7)
#define SSL_OP_ALLOW_CLIENT_RENEGOTIATION SSL_OP_BIT(8)
#define SSL_OP_DISABLE_TLSEXT_CA_NAMES SSL_OP_BIT(9)
/* In TLSv1.3 allow a non-(ec)dhe based kex_mode */
#define SSL_OP_ALLOW_NO_DHE_KEX SSL_OP_BIT(10)
/*
* Disable SSL 3.0/TLS 1.0 CBC vulnerability workaround that was added
```

```
* in OpenSSL 0.9.6d.  Usually (depending on the application protocol)
* the workaround is not needed.  Unfortunately some broken SSL/TLS
* implementations cannot handle it at all, which is why we include it
* in SSL_OP_ALL. Added in 0.9.6e
 */
#define SSL_OP_DONT_INSERT_EMPTY_FRAGMENTS SSL_OP_BIT(11)
/* DTLS options */
#define SSL_OP_NO_QUERY_MTU SSL_OP_BIT(12)
/* Turn on Cookie Exchange (on relevant for servers) */
#define SSL_OP_COOKIE_EXCHANGE SSL_OP_BIT(13)
/* Don't use RFC4507 ticket extension */
#define SSL_OP_NO_TICKET SSL_OP_BIT(14)
#ifndef OPENSSL_NO_DTLS1_METHOD
/*
* Use Cisco's version identifier of DTLS_BAD_VER
* (only with deprecated DTLSv1_client_method())
*/
#define SSL_OP_CISCO_ANYCONNECT SSL_OP_BIT(15)
#endif
/* As server, disallow session resumption on renegotiation */
#define SSL_OP_NO_SESSION_RESUMPTION_ON_RENEGOTIATION SSL_OP_BIT(16)
/* Don't use compression even if supported */
#define SSL_OP_NO_COMPRESSION SSL_OP_BIT(17)
/* Permit unsafe legacy renegotiation */
#define SSL_OP_ALLOW_UNSAFE_LEGACY_RENEGOTIATION SSL_OP_BIT(18)
/* Disable encrypt-then-mac */
#define SSL_OP_NO_ENCRYPT_THEN_MAC SSL_OP_BIT(19)
/*
* Enable TLSv1.3 Compatibility mode. This is on by default. A future
* version of OpenSSL
 may have this disabled by default.
*/
#define SSL_OP_ENABLE_MIDDLEBOX_COMPAT SSL_OP_BIT(20)
/*
* Prioritize Chacha20Poly1305 when client does.
* Modifies SSL_OP_CIPHER_SERVER_PREFERENCE
*/
#define SSL_OP_PRIORITIZE_CHACHA SSL_OP_BIT(21)
/*
* Set on servers to choose the cipher according to server's preferences.
*/
#define SSL_OP_CIPHER_SERVER_PREFERENCE SSL_OP_BIT(22)
/*
* If set, a server will allow a client to issue an SSLv3.0 version
* number as latest version supported in the premaster secret, even when
* TLSv1.0 (version 3.1) was announced in the client hello. Normally
* this is forbidden to prevent version rollback attacks.
*/
```

```
#define SSL_OP_TLS_ROLLBACK_BUG SSL_OP_BIT(23)
/*
* Switches off automatic TLSv1.3 anti-replay protection for early data.
* This is a server-side option only (no effect on the client).
*/
#define SSL_OP_NO_ANTI_REPLAY SSL_OP_BIT(24)
#define SSL_OP_NO_SSLv3 SSL_OP_BIT(25)
#define SSL_OP_NO_TLSv1 SSL_OP_BIT(26)
#define SSL_OP_NO_TLSv1_2 SSL_OP_BIT(27)
#define
 SSL_OP_NO_TLSv1_1 SSL_OP_BIT(28)
#define SSL_OP_NO_TLSv1_3 SSL_OP_BIT(29)
#define SSL_OP_NO_DTLSv1 SSL_OP_BIT(26)
#define SSL_OP_NO_DTLSv1_2 SSL_OP_BIT(27)
/* Disallow all renegotiation */
#define SSL_OP_NO_RENEGOTIATION SSL_OP_BIT(30)
/*
* Make server add server-hello extension from early version of
* cryptopro draft, when GOST ciphersuite is negotiated. Required for
* interoperability with CryptoPro CSP 3.x
*/
#define SSL_OP_CRYPTOPRO_TLSEXT_BUG SSL_OP_BIT(31)
/*
* Disable RFC8879 certificate compression
* SSL_OP_NO_TX_CERTIFICATE_COMPRESSION: don't send compressed certificates,
*     and ignore the extension when received.
* SSL_OP_NO_RX_CERTIFICATE_COMPRESSION: don't send the extension, and
*     subsequently indicating that receiving is not supported
*/
#define SSL_OP_NO_TX_CERTIFICATE_COMPRESSION SSL_OP_BIT(32)
#define SSL_OP_NO_RX_CERTIFICATE_COMPRESSION SSL_OP_BIT(33)
/* Enable KTLS TX zerocopy on Linux */
#define SSL_OP_ENABLE_KTLS_TX_ZEROCOPY_SENDFILE
 SSL_OP_BIT(34)

#define SSL_OP_PREFER_NO_DHE_KEX SSL_OP_BIT(35)

/*
* Option "collections."
*/
#define SSL_OP_NO_SSL_MASK                          \
   (SSL_OP_NO_SSLv3 | SSL_OP_NO_TLSv1 | SSL_OP_NO_TLSv1_1 \
      | SSL_OP_NO_TLSv1_2 | SSL_OP_NO_TLSv1_3)
#define SSL_OP_NO_DTLS_MASK \
   (SSL_OP_NO_DTLSv1 | SSL_OP_NO_DTLSv1_2)

/* Various bug workarounds that should be rather harmless. */
#define SSL_OP_ALL                                  \
```

```
  (SSL_OP_CRYPTOPRO_TLSEXT_BUG | SSL_OP_DONT_INSERT_EMPTY_FRAGMENTS \
     | SSL_OP_TLSEXT_PADDING | SSL_OP_SAFARI_ECDHE_ECDSA_BUG)

/*
* OBSOLETE OPTIONS retained for compatibility
*/

#define SSL_OP_MICROSOFT_SESS_ID_BUG 0x0
#define SSL_OP_NETSCAPE_CHALLENGE_BUG 0x0
#define SSL_OP_NETSCAPE_REUSE_CIPHER_CHANGE_BUG 0x0
#define SSL_OP_SSLREF2_REUSE_CERT_TYPE_BUG 0x0
#define SSL_OP_MICROSOFT_BIG_SSLV3_BUFFER 0x0
#define SSL_OP_MSIE_SSLV2_RSA_PADDING 0x0
#define SSL_OP_SSLEAY_080_CLIENT_DH_BUG 0x0
#define
 SSL_OP_TLS_D5_BUG 0x0
#define SSL_OP_TLS_BLOCK_PADDING_BUG 0x0
#define SSL_OP_SINGLE_ECDH_USE 0x0
#define SSL_OP_SINGLE_DH_USE 0x0
#define SSL_OP_EPHEMERAL_RSA 0x0
#define SSL_OP_NO_SSLv2 0x0
#define SSL_OP_PKCS1_CHECK_1 0x0
#define SSL_OP_PKCS1_CHECK_2 0x0
#define SSL_OP_NETSCAPE_CA_DN_BUG 0x0
#define SSL_OP_NETSCAPE_DEMO_CIPHER_CHANGE_BUG 0x0

/*
* Allow SSL_write(..., n) to return r with 0 < r < n (i.e. report success
* when just a single record has been written):
*/
#define SSL_MODE_ENABLE_PARTIAL_WRITE 0x00000001U
/*
* Make it possible to retry SSL_write() with changed buffer location (buffer
* contents must stay the same!); this is not the default to avoid the
* misconception that non-blocking SSL_write() behaves like non-blocking
* write():
*/
#define SSL_MODE_ACCEPT_MOVING_WRITE_BUFFER 0x00000002U
/*
* Never bother the application with retries if the transport is blocking:
*/
#define SSL_MODE_AUTO_RETRY 0x00000004U
/* Don't attempt to automatically build certificate chain
 */
#define SSL_MODE_NO_AUTO_CHAIN 0x00000008U
/*
* Save RAM by releasing read and write buffers when they're empty. (SSL3 and
* TLS only.) Released buffers are freed.
```

```
*/
#define SSL_MODE_RELEASE_BUFFERS 0x00000010U
/*
* Send the current time in the Random fields of the ClientHello and
* ServerHello records for compatibility with hypothetical implementations
* that require it.
*/
#define SSL_MODE_SEND_CLIENTHELLO_TIME 0x00000020U
#define SSL_MODE_SEND_SERVERHELLO_TIME 0x00000040U
/*
* Send TLS_FALLBACK_SCSV in the ClientHello. To be set only by applications
* that reconnect with a downgraded protocol version; see
* draft-ietf-tls-downgrade-scsv-00 for details. DO NOT ENABLE THIS if your
* application attempts a normal handshake. Only use this in explicit
* fallback retries, following the guidance in
* draft-ietf-tls-downgrade-scsv-00.
*/
#define SSL_MODE_SEND_FALLBACK_SCSV 0x00000080U
/*
* Support Asynchronous operation
*/
#define SSL_MODE_ASYNC 0x00000100U

/*
* When
 using DTLS/SCTP, include the terminating zero in the label
* used for computing the endpoint-pair shared secret. Required for
* interoperability with implementations having this bug like these
* older version of OpenSSL:
* - OpenSSL 1.0.0 series
* - OpenSSL 1.0.1 series
* - OpenSSL 1.0.2 series
* - OpenSSL 1.1.0 series
* - OpenSSL 1.1.1 and 1.1.1a
*/
#define SSL_MODE_DTLS_SCTP_LABEL_LENGTH_BUG 0x00000400U

/* Cert related flags */
/*
* Many implementations ignore some aspects of the TLS standards such as
* enforcing certificate chain algorithms. When this is set we enforce them.
*/
#define SSL_CERT_FLAG_TLS_STRICT 0x00000001U

/* Suite B modes, takes same values as certificate verify flags */
#define SSL_CERT_FLAG_SUITEB_128_LOS_ONLY 0x10000
/* Suite B 192 bit only mode */
#define SSL_CERT_FLAG_SUITEB_192_LOS 0x20000
```

```
/* Suite B 128 bit mode allowing 192 bit algorithms */
#define SSL_CERT_FLAG_SUITEB_128_LOS 0x30000

/* Perform all sorts of protocol violations for testing
 purposes */
#define SSL_CERT_FLAG_BROKEN_PROTOCOL 0x10000000

/* Flags for building certificate chains */
/* Treat any existing certificates as untrusted CAs */
#define SSL_BUILD_CHAIN_FLAG_UNTRUSTED 0x1
/* Don't include root CA in chain */
#define SSL_BUILD_CHAIN_FLAG_NO_ROOT 0x2
/* Just check certificates already there */
#define SSL_BUILD_CHAIN_FLAG_CHECK 0x4
/* Ignore verification errors */
#define SSL_BUILD_CHAIN_FLAG_IGNORE_ERROR 0x8
/* Clear verification errors from queue */
#define SSL_BUILD_CHAIN_FLAG_CLEAR_ERROR 0x10

/* Flags returned by SSL_check_chain */
/* Certificate can be used with this session */
#define CERT_PKEY_VALID 0x1
/* Certificate can also be used for signing */
#define CERT_PKEY_SIGN 0x2
/* EE certificate signing algorithm OK */
#define CERT_PKEY_EE_SIGNATURE 0x10
/* CA signature algorithms OK */
#define CERT_PKEY_CA_SIGNATURE 0x20
/* EE certificate parameters OK */
#define CERT_PKEY_EE_PARAM 0x40
/* CA certificate parameters OK */
#define CERT_PKEY_CA_PARAM
 0x80
/* Signing explicitly allowed as opposed to SHA1 fallback */
#define CERT_PKEY_EXPLICIT_SIGN 0x100
/* Client CA issuer names match (always set for server cert) */
#define CERT_PKEY_ISSUER_NAME 0x200
/* Cert type matches client types (always set for server cert) */
#define CERT_PKEY_CERT_TYPE 0x400
/* Cert chain suitable to Suite B */
#define CERT_PKEY_SUITEB 0x800
/* Cert pkey valid for raw public key use */
#define CERT_PKEY_RPK 0x1000

#define SSL_CONF_FLAG_CMDLINE 0x1
#define SSL_CONF_FLAG_FILE 0x2
#define SSL_CONF_FLAG_CLIENT 0x4
#define SSL_CONF_FLAG_SERVER 0x8
```

```
#define SSL_CONF_FLAG_SHOW_ERRORS 0x10
#define SSL_CONF_FLAG_CERTIFICATE 0x20
#define SSL_CONF_FLAG_REQUIRE_PRIVATE 0x40
/* Configuration value types */
#define SSL_CONF_TYPE_UNKNOWN 0x0
#define SSL_CONF_TYPE_STRING 0x1
#define SSL_CONF_TYPE_FILE 0x2
#define SSL_CONF_TYPE_DIR 0x3
#define SSL_CONF_TYPE_NONE 0x4
#define SSL_CONF_TYPE_STORE 0x5

/* Maximum length of the application-controlled segment of a a TLSv1.3 cookie
 */
#define SSL_COOKIE_LENGTH 4096

/*
* Note: SSL[_CTX]_set_{options,mode} use |= op on the previous value, they
* cannot be used to clear bits.
*/

uint64_t SSL_CTX_get_options(const SSL_CTX *ctx);
uint64_t SSL_get_options(const SSL *s);
uint64_t SSL_CTX_clear_options(SSL_CTX *ctx, uint64_t op);
uint64_t SSL_clear_options(SSL *s, uint64_t op);
uint64_t SSL_CTX_set_options(SSL_CTX *ctx, uint64_t op);
uint64_t SSL_set_options(SSL *s, uint64_t op);

#define SSL_CTX_set_mode(ctx, op) \
   SSL_CTX_ctrl((ctx), SSL_CTRL_MODE, (op), NULL)
#define SSL_CTX_clear_mode(ctx, op) \
   SSL_CTX_ctrl((ctx), SSL_CTRL_CLEAR_MODE, (op), NULL)
#define SSL_CTX_get_mode(ctx) \
   SSL_CTX_ctrl((ctx), SSL_CTRL_MODE, 0, NULL)
#define SSL_clear_mode(ssl, op) \
   SSL_ctrl((ssl), SSL_CTRL_CLEAR_MODE, (op), NULL)
#define SSL_set_mode(ssl, op) \
   SSL_ctrl((ssl), SSL_CTRL_MODE, (op), NULL)
#define SSL_get_mode(ssl) \
   SSL_ctrl((ssl), SSL_CTRL_MODE, 0, NULL)
#define SSL_set_mtu(ssl, mtu) \
   SSL_ctrl((ssl),
 SSL_CTRL_SET_MTU, (mtu), NULL)
#define DTLS_set_link_mtu(ssl, mtu) \
   SSL_ctrl((ssl), DTLS_CTRL_SET_LINK_MTU, (mtu), NULL)
#define DTLS_get_link_min_mtu(ssl) \
   SSL_ctrl((ssl), DTLS_CTRL_GET_LINK_MIN_MTU, 0, NULL)

#define SSL_get_secure_renegotiation_support(ssl) \
```

```
   SSL_ctrl((ssl), SSL_CTRL_GET_RI_SUPPORT, 0, NULL)

#define SSL_CTX_set_cert_flags(ctx, op) \
   SSL_CTX_ctrl((ctx), SSL_CTRL_CERT_FLAGS, (op), NULL)
#define SSL_set_cert_flags(s, op) \
   SSL_ctrl((s), SSL_CTRL_CERT_FLAGS, (op), NULL)
#define SSL_CTX_clear_cert_flags(ctx, op) \
   SSL_CTX_ctrl((ctx), SSL_CTRL_CLEAR_CERT_FLAGS, (op), NULL)
#define SSL_clear_cert_flags(s, op) \
   SSL_ctrl((s), SSL_CTRL_CLEAR_CERT_FLAGS, (op), NULL)

void SSL_CTX_set_msg_callback(SSL_CTX *ctx,
   void (*cb)(int write_p, int version,
       int content_type, const void *buf,
       size_t len, SSL *ssl, void *arg));
void SSL_set_msg_callback(SSL *ssl,
   void (*cb)(int write_p, int version,
       int content_type,
 const void *buf,
       size_t len, SSL *ssl, void *arg));
#define SSL_CTX_set_msg_callback_arg(ctx, arg) SSL_CTX_ctrl((ctx),
SSL_CTRL_SET_MSG_CALLBACK_ARG, 0, (arg))
#define SSL_set_msg_callback_arg(ssl, arg) SSL_ctrl((ssl), SSL_CTRL_SET_MSG_CALLBACK_ARG, 0, (arg))

#define SSL_get_extms_support(s) \
   SSL_ctrl((s), SSL_CTRL_GET_EXTMS_SUPPORT, 0, NULL)

#ifndef OPENSSL_NO_SRP
/* see tls_srp.c */
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 __owur int SSL_SRP_CTX_init(SSL *s);
OSSL_DEPRECATEDIN_3_0 __owur int SSL_CTX_SRP_CTX_init(SSL_CTX *ctx);
OSSL_DEPRECATEDIN_3_0 int SSL_SRP_CTX_free(SSL *ctx);
OSSL_DEPRECATEDIN_3_0 int SSL_CTX_SRP_CTX_free(SSL_CTX *ctx);
OSSL_DEPRECATEDIN_3_0 __owur int SSL_srp_server_param_with_username(SSL *s,
   int *ad);
OSSL_DEPRECATEDIN_3_0 __owur int SRP_Calc_A_param(SSL *s);
#endif
#endif

/* 100k max cert list */
#define SSL_MAX_CERT_LIST_DEFAULT (1024 * 100)

#define SSL_SESSION_CACHE_MAX_SIZE_DEFAULT (1024 * 20)

/*
* This callback type
```

```
 is used inside SSL_CTX, SSL, and in the functions that
* set them. It is used to override the generation of SSL/TLS session IDs in
* a server. Return value should be zero on an error, non-zero to proceed.
* Also, callbacks should themselves check if the id they generate is unique
* otherwise the SSL handshake will fail with an error - callbacks can do
* this using the 'ssl' value they're passed by;
* SSL_has_matching_session_id(ssl, id, *id_len) The length value passed in
* is set at the maximum size the session ID can be. In SSLv3/TLSv1 it is 32
* bytes. The callback can alter this length to be less if desired. It is
* also an error for the callback to set the size to zero.
*/
typedef int (*GEN_SESSION_CB)(SSL *ssl, unsigned char *id,
   unsigned int *id_len);

#define SSL_SESS_CACHE_OFF 0x0000
#define SSL_SESS_CACHE_CLIENT 0x0001
#define SSL_SESS_CACHE_SERVER 0x0002
#define SSL_SESS_CACHE_BOTH (SSL_SESS_CACHE_CLIENT | SSL_SESS_CACHE_SERVER)
#define SSL_SESS_CACHE_NO_AUTO_CLEAR
 0x0080
/* enough comments already ... see SSL_CTX_set_session_cache_mode(3) */
#define SSL_SESS_CACHE_NO_INTERNAL_LOOKUP 0x0100
#define SSL_SESS_CACHE_NO_INTERNAL_STORE 0x0200
#define SSL_SESS_CACHE_NO_INTERNAL \
   (SSL_SESS_CACHE_NO_INTERNAL_LOOKUP | SSL_SESS_CACHE_NO_INTERNAL_STORE)
#define SSL_SESS_CACHE_UPDATE_TIME 0x0400

LHASH_OF(SSL_SESSION) *SSL_CTX_sessions(SSL_CTX *ctx);
#define SSL_CTX_sess_number(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_NUMBER, 0, NULL)
#define SSL_CTX_sess_connect(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_CONNECT, 0, NULL)
#define SSL_CTX_sess_connect_good(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_CONNECT_GOOD, 0, NULL)
#define SSL_CTX_sess_connect_renegotiate(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_CONNECT_RENEGOTIATE, 0, NULL)
#define SSL_CTX_sess_accept(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_ACCEPT, 0, NULL)
#define SSL_CTX_sess_accept_renegotiate(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_ACCEPT_RENEGOTIATE, 0, NULL)
#define SSL_CTX_sess_accept_good(ctx)
 \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_ACCEPT_GOOD, 0, NULL)
#define SSL_CTX_sess_hits(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_HIT, 0, NULL)
#define SSL_CTX_sess_cb_hits(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_CB_HIT, 0, NULL)
#define SSL_CTX_sess_misses(ctx) \
```

```
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_MISSES, 0, NULL)
#define SSL_CTX_sess_timeouts(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_TIMEOUTS, 0, NULL)
#define SSL_CTX_sess_cache_full(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SESS_CACHE_FULL, 0, NULL)

void SSL_CTX_sess_set_new_cb(SSL_CTX *ctx,
   int (*new_session_cb)(struct ssl_st *ssl,
       SSL_SESSION *sess));
int (*SSL_CTX_sess_get_new_cb(SSL_CTX *ctx))(struct ssl_st *ssl,
   SSL_SESSION *sess);
void SSL_CTX_sess_set_remove_cb(SSL_CTX *ctx,
   void (*remove_session_cb)(struct ssl_ctx_st
                             *ctx,
       SSL_SESSION *sess));
void (*SSL_CTX_sess_get_remove_cb(SSL_CTX *ctx))(struct ssl_ctx_st *ctx,
   SSL_SESSION *sess);
void
 SSL_CTX_sess_set_get_cb(SSL_CTX *ctx,
   SSL_SESSION *(*get_session_cb)(struct ssl_st
                                  *ssl,
       const unsigned char
           *data,
       int len,
       int *copy));
SSL_SESSION *(*SSL_CTX_sess_get_get_cb(SSL_CTX *ctx))(struct ssl_st *ssl,
   const unsigned char *data,
   int len, int *copy);
void SSL_CTX_set_info_callback(SSL_CTX *ctx,
   void (*cb)(const SSL *ssl, int type, int val));
void (*SSL_CTX_get_info_callback(SSL_CTX *ctx))(const SSL *ssl, int type,
   int val);
void SSL_CTX_set_client_cert_cb(SSL_CTX *ctx,
   int (*client_cert_cb)(SSL *ssl, X509 **x509,
       EVP_PKEY **pkey));
int (*SSL_CTX_get_client_cert_cb(SSL_CTX *ctx))(SSL *ssl, X509 **x509,
   EVP_PKEY **pkey);
#ifndef OPENSSL_NO_ENGINE
__owur int SSL_CTX_set_client_cert_engine(SSL_CTX *ctx, ENGINE *e);
#endif
void SSL_CTX_set_cookie_generate_cb(SSL_CTX *ctx,
   int (*app_gen_cookie_cb)(SSL *ssl,
       unsigned char
           *cookie,
       unsigned int
            *cookie_len));
void SSL_CTX_set_cookie_verify_cb(SSL_CTX *ctx,
   int (*app_verify_cookie_cb)(SSL *ssl,
```

```
        const unsigned char *cookie,
        unsigned int
            cookie_len));

void SSL_CTX_set_stateless_cookie_generate_cb(
    SSL_CTX *ctx,
    int (*gen_stateless_cookie_cb)(SSL *ssl,
        unsigned char *cookie,
        size_t *cookie_len));
void SSL_CTX_set_stateless_cookie_verify_cb(
    SSL_CTX *ctx,
    int (*verify_stateless_cookie_cb)(SSL *ssl,
        const unsigned char *cookie,
        size_t cookie_len));
#ifndef OPENSSL_NO_NEXTPROTONEG

typedef int (*SSL_CTX_npn_advertised_cb_func)(SSL *ssl,
    const unsigned char **out,
    unsigned int *outlen,
    void *arg);
void SSL_CTX_set_next_protos_advertised_cb(SSL_CTX *s,
    SSL_CTX_npn_advertised_cb_func cb,
    void *arg);
#define SSL_CTX_set_npn_advertised_cb SSL_CTX_set_next_protos_advertised_cb

typedef int (*SSL_CTX_npn_select_cb_func)(SSL *s,
    unsigned char **out,
    unsigned char *outlen,
     const unsigned char *in,
    unsigned int inlen,
    void *arg);
void SSL_CTX_set_next_proto_select_cb(SSL_CTX *s,
    SSL_CTX_npn_select_cb_func cb,
    void *arg);
#define SSL_CTX_set_npn_select_cb SSL_CTX_set_next_proto_select_cb

void SSL_get0_next_proto_negotiated(const SSL *s, const unsigned char **data,
    unsigned *len);
#define SSL_get0_npn_negotiated SSL_get0_next_proto_negotiated
#endif

__owur int SSL_select_next_proto(unsigned char **out, unsigned char *outlen,
    const unsigned char *in, unsigned int inlen,
    const unsigned char *client,
    unsigned int client_len);

#define OPENSSL_NPN_UNSUPPORTED 0
#define OPENSSL_NPN_NEGOTIATED 1
```

```
#define OPENSSL_NPN_NO_OVERLAP 2

__owur int SSL_CTX_set_alpn_protos(SSL_CTX *ctx, const unsigned char *protos,
   unsigned int protos_len);
__owur int SSL_set_alpn_protos(SSL *ssl, const unsigned char *protos,
   unsigned int protos_len);
typedef int (*SSL_CTX_alpn_select_cb_func)(SSL *ssl,
   const unsigned char **out,
   unsigned
 char *outlen,
   const unsigned char *in,
   unsigned int inlen,
   void *arg);
void SSL_CTX_set_alpn_select_cb(SSL_CTX *ctx,
   SSL_CTX_alpn_select_cb_func cb,
   void *arg);
void SSL_get0_alpn_selected(const SSL *ssl, const unsigned char **data,
   unsigned int *len);

#ifndef OPENSSL_NO_PSK
/*
* the maximum length of the buffer given to callbacks containing the
* resulting identity/psk
*/
#define PSK_MAX_IDENTITY_LEN 256
#define PSK_MAX_PSK_LEN 512
typedef unsigned int (*SSL_psk_client_cb_func)(SSL *ssl,
   const char *hint,
   char *identity,
   unsigned int max_identity_len,
   unsigned char *psk,
   unsigned int max_psk_len);
void SSL_CTX_set_psk_client_callback(SSL_CTX *ctx, SSL_psk_client_cb_func cb);
void SSL_set_psk_client_callback(SSL *ssl, SSL_psk_client_cb_func cb);

typedef unsigned int (*SSL_psk_server_cb_func)(SSL *ssl,
   const char *identity,
   unsigned char *psk,
   unsigned int max_psk_len);
void SSL_CTX_set_psk_server_callback(SSL_CTX *ctx,
 SSL_psk_server_cb_func cb);
void SSL_set_psk_server_callback(SSL *ssl, SSL_psk_server_cb_func cb);

__owur int SSL_CTX_use_psk_identity_hint(SSL_CTX *ctx, const char *identity_hint);
__owur int SSL_use_psk_identity_hint(SSL *s, const char *identity_hint);
const char *SSL_get_psk_identity_hint(const SSL *s);
const char *SSL_get_psk_identity(const SSL *s);
#endif
```

```
typedef int (*SSL_psk_find_session_cb_func)(SSL *ssl,
   const unsigned char *identity,
   size_t identity_len,
   SSL_SESSION **sess);
typedef int (*SSL_psk_use_session_cb_func)(SSL *ssl, const EVP_MD *md,
   const unsigned char **id,
   size_t *idlen,
   SSL_SESSION **sess);

void SSL_set_psk_find_session_callback(SSL *s, SSL_psk_find_session_cb_func cb);
void SSL_CTX_set_psk_find_session_callback(SSL_CTX *ctx,
   SSL_psk_find_session_cb_func cb);
void SSL_set_psk_use_session_callback(SSL *s, SSL_psk_use_session_cb_func cb);
void SSL_CTX_set_psk_use_session_callback(SSL_CTX *ctx,
   SSL_psk_use_session_cb_func cb);

/*
 Register callbacks to handle custom TLS Extensions for client or server. */

__owur int SSL_CTX_has_client_custom_ext(const SSL_CTX *ctx,
   unsigned int ext_type);

__owur int SSL_CTX_add_client_custom_ext(SSL_CTX *ctx,
   unsigned int ext_type,
   custom_ext_add_cb add_cb,
   custom_ext_free_cb free_cb,
   void *add_arg,
   custom_ext_parse_cb parse_cb,
   void *parse_arg);

__owur int SSL_CTX_add_server_custom_ext(SSL_CTX *ctx,
   unsigned int ext_type,
   custom_ext_add_cb add_cb,
   custom_ext_free_cb free_cb,
   void *add_arg,
   custom_ext_parse_cb parse_cb,
   void *parse_arg);

__owur int SSL_CTX_add_custom_ext(SSL_CTX *ctx, unsigned int ext_type,
   unsigned int context,
   SSL_custom_ext_add_cb_ex add_cb,
   SSL_custom_ext_free_cb_ex free_cb,
   void *add_arg,
   SSL_custom_ext_parse_cb_ex parse_cb,
   void *parse_arg);

__owur int SSL_extension_supported(unsigned int ext_type);
```

```
#define SSL_NOTHING 1
#define SSL_WRITING 2
#define SSL_READING 3
#define
 SSL_X509_LOOKUP 4
#define SSL_ASYNC_PAUSED 5
#define SSL_ASYNC_NO_JOBS 6
#define SSL_CLIENT_HELLO_CB 7
#define SSL_RETRY_VERIFY 8

/* These will only be used when doing non-blocking IO */
#define SSL_want_nothing(s) (SSL_want(s) == SSL_NOTHING)
#define SSL_want_read(s) (SSL_want(s) == SSL_READING)
#define SSL_want_write(s) (SSL_want(s) == SSL_WRITING)
#define SSL_want_x509_lookup(s) (SSL_want(s) == SSL_X509_LOOKUP)
#define SSL_want_retry_verify(s) (SSL_want(s) == SSL_RETRY_VERIFY)
#define SSL_want_async(s) (SSL_want(s) == SSL_ASYNC_PAUSED)
#define SSL_want_async_job(s) (SSL_want(s) == SSL_ASYNC_NO_JOBS)
#define SSL_want_client_hello_cb(s) (SSL_want(s) == SSL_CLIENT_HELLO_CB)

#define SSL_MAC_FLAG_READ_MAC_STREAM 1
#define SSL_MAC_FLAG_WRITE_MAC_STREAM 2
#define SSL_MAC_FLAG_READ_MAC_TLSTREE 4
#define SSL_MAC_FLAG_WRITE_MAC_TLSTREE 8

/*
* A callback for logging out TLS key material. This callback should log out
* |line| followed by a newline.
*/
typedef void (*SSL_CTX_keylog_cb_func)(const
 SSL *ssl, const char *line);

/*
* SSL_CTX_set_keylog_callback configures a callback to log key material. This
* is intended for debugging use with tools like Wireshark. The cb function
* should log line followed by a newline.
*/
void SSL_CTX_set_keylog_callback(SSL_CTX *ctx, SSL_CTX_keylog_cb_func cb);

/*
* SSL_CTX_get_keylog_callback returns the callback configured by
* SSL_CTX_set_keylog_callback.
*/
SSL_CTX_keylog_cb_func SSL_CTX_get_keylog_callback(const SSL_CTX *ctx);

int SSL_CTX_set_max_early_data(SSL_CTX *ctx, uint32_t max_early_data);
uint32_t SSL_CTX_get_max_early_data(const SSL_CTX *ctx);
```

```
int SSL_set_max_early_data(SSL *s, uint32_t max_early_data);
uint32_t SSL_get_max_early_data(const SSL *s);
int SSL_CTX_set_recv_max_early_data(SSL_CTX *ctx, uint32_t recv_max_early_data);
uint32_t SSL_CTX_get_recv_max_early_data(const SSL_CTX *ctx);
int SSL_set_recv_max_early_data(SSL *s, uint32_t recv_max_early_data);
uint32_t SSL_get_recv_max_early_data(const SSL *s);

#ifdef
 __cplusplus
}
#endif

#include <openssl/ssl2.h>
#include <openssl/ssl3.h>
#include <openssl/tls1.h> /* This is mostly sslv3 with a few tweaks */
#include <openssl/dtls1.h> /* Datagram TLS */
#include <openssl/srtp.h> /* Support for the use_srtp extension */
#include <openssl/quic.h>

#ifdef __cplusplus
extern "C" {
#endif

/*
* These need to be after the above set of includes due to a compiler bug
* in VisualStudio 2015
*/
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(SSL_CIPHER, const SSL_CIPHER, SSL_CIPHER)
#define sk_SSL_CIPHER_num(sk) OPENSSL_sk_num(ossl_check_const_SSL_CIPHER_sk_type(sk))
#define sk_SSL_CIPHER_value(sk, idx) ((const SSL_CIPHER
*)OPENSSL_sk_value(ossl_check_const_SSL_CIPHER_sk_type(sk), (idx)))
#define sk_SSL_CIPHER_new(cmp) ((STACK_OF(SSL_CIPHER)
*)OPENSSL_sk_new(ossl_check_SSL_CIPHER_compfunc_type(cmp)))
#define sk_SSL_CIPHER_new_null() ((STACK_OF(SSL_CIPHER) *)OPENSSL_sk_new_null())
#define sk_SSL_CIPHER_new_reserve(cmp, n) ((STACK_OF(SSL_CIPHER)
 *)OPENSSL_sk_new_reserve(ossl_check_SSL_CIPHER_compfunc_type(cmp), (n)))
#define sk_SSL_CIPHER_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_SSL_CIPHER_sk_type(sk), (n))
#define sk_SSL_CIPHER_free(sk) OPENSSL_sk_free(ossl_check_SSL_CIPHER_sk_type(sk))
#define sk_SSL_CIPHER_zero(sk) OPENSSL_sk_zero(ossl_check_SSL_CIPHER_sk_type(sk))
#define sk_SSL_CIPHER_delete(sk, i) ((const SSL_CIPHER
*)OPENSSL_sk_delete(ossl_check_SSL_CIPHER_sk_type(sk), (i)))
#define sk_SSL_CIPHER_delete_ptr(sk, ptr) ((const SSL_CIPHER
*)OPENSSL_sk_delete_ptr(ossl_check_SSL_CIPHER_sk_type(sk), ossl_check_SSL_CIPHER_type(ptr)))
#define sk_SSL_CIPHER_push(sk, ptr) OPENSSL_sk_push(ossl_check_SSL_CIPHER_sk_type(sk),
ossl_check_SSL_CIPHER_type(ptr))
#define sk_SSL_CIPHER_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_SSL_CIPHER_sk_type(sk),
ossl_check_SSL_CIPHER_type(ptr))
```

```
#define sk_SSL_CIPHER_pop(sk) ((const SSL_CIPHER
*)OPENSSL_sk_pop(ossl_check_SSL_CIPHER_sk_type(sk)))
#define sk_SSL_CIPHER_shift(sk) ((const SSL_CIPHER
 *)OPENSSL_sk_shift(ossl_check_SSL_CIPHER_sk_type(sk)))
#define sk_SSL_CIPHER_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_SSL_CIPHER_sk_type(sk),ossl_check_SSL_CIPHER_freefunc_type(freefunc
))
#define sk_SSL_CIPHER_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_SSL_CIPHER_sk_type(sk),
ossl_check_SSL_CIPHER_type(ptr), (idx))
#define sk_SSL_CIPHER_set(sk, idx, ptr) ((const SSL_CIPHER
*)OPENSSL_sk_set(ossl_check_SSL_CIPHER_sk_type(sk), (idx), ossl_check_SSL_CIPHER_type(ptr)))
#define sk_SSL_CIPHER_find(sk, ptr) OPENSSL_sk_find(ossl_check_SSL_CIPHER_sk_type(sk),
ossl_check_SSL_CIPHER_type(ptr))
#define sk_SSL_CIPHER_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_SSL_CIPHER_sk_type(sk),
ossl_check_SSL_CIPHER_type(ptr))
#define sk_SSL_CIPHER_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_SSL_CIPHER_sk_type(sk),
ossl_check_SSL_CIPHER_type(ptr), pnum)
#define sk_SSL_CIPHER_sort(sk) OPENSSL_sk_sort(ossl_check_SSL_CIPHER_sk_type(sk))
#define sk_SSL_CIPHER_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_SSL_CIPHER_sk_type(sk))
#define
 sk_SSL_CIPHER_dup(sk) ((STACK_OF(SSL_CIPHER)
*)OPENSSL_sk_dup(ossl_check_const_SSL_CIPHER_sk_type(sk)))
#define sk_SSL_CIPHER_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(SSL_CIPHER)
*)OPENSSL_sk_deep_copy(ossl_check_const_SSL_CIPHER_sk_type(sk),
ossl_check_SSL_CIPHER_copyfunc_type(copyfunc), ossl_check_SSL_CIPHER_freefunc_type(freefunc)))
#define sk_SSL_CIPHER_set_cmp_func(sk, cmp)
((sk_SSL_CIPHER_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_SSL_CIPHER_sk_type(sk),
ossl_check_SSL_CIPHER_compfunc_type(cmp)))

/* clang-format on */

/* compatibility */
#define SSL_set_app_data(s, arg) (SSL_set_ex_data(s, 0, (char *)(arg)))
#define SSL_get_app_data(s) (SSL_get_ex_data(s, 0))
#define SSL_SESSION_set_app_data(s, a) (SSL_SESSION_set_ex_data(s, 0, \
   (char *)(a)))
#define SSL_SESSION_get_app_data(s) (SSL_SESSION_get_ex_data(s, 0))
#define SSL_CTX_get_app_data(ctx) (SSL_CTX_get_ex_data(ctx, 0))
#define SSL_CTX_set_app_data(ctx,
 arg) (SSL_CTX_set_ex_data(ctx, 0, \
   (char *)(arg)))
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 void SSL_set_debug(SSL *s, int debug);
#endif

/* TLSv1.3 KeyUpdate message types */
/* -1 used so that this is an invalid value for the on-the-wire protocol */
#define SSL_KEY_UPDATE_NONE -1
```

```
/* Values as defined for the on-the-wire protocol */
#define SSL_KEY_UPDATE_NOT_REQUESTED 0
#define SSL_KEY_UPDATE_REQUESTED 1

/*
* The valid handshake states (one for each type message sent and one for each
* type of message received). There are also two "special" states:
* TLS = TLS or DTLS state
* DTLS = DTLS specific state
* CR/SR = Client Read/Server Read
* CW/SW = Client Write/Server Write
*
* The "special" states are:
* TLS_ST_BEFORE = No handshake has been initiated yet
* TLS_ST_OK = A handshake has been successfully completed
*/
typedef enum {
  TLS_ST_BEFORE,
  TLS_ST_OK,
  DTLS_ST_CR_HELLO_VERIFY_REQUEST,
  TLS_ST_CR_SRVR_HELLO,
  TLS_ST_CR_CERT,

  TLS_ST_CR_COMP_CERT,
  TLS_ST_CR_CERT_STATUS,
  TLS_ST_CR_KEY_EXCH,
  TLS_ST_CR_CERT_REQ,
  TLS_ST_CR_SRVR_DONE,
  TLS_ST_CR_SESSION_TICKET,
  TLS_ST_CR_CHANGE,
  TLS_ST_CR_FINISHED,
  TLS_ST_CW_CLNT_HELLO,
  TLS_ST_CW_CERT,
  TLS_ST_CW_COMP_CERT,
  TLS_ST_CW_KEY_EXCH,
  TLS_ST_CW_CERT_VRFY,
  TLS_ST_CW_CHANGE,
  TLS_ST_CW_NEXT_PROTO,
  TLS_ST_CW_FINISHED,
  TLS_ST_SW_HELLO_REQ,
  TLS_ST_SR_CLNT_HELLO,
  DTLS_ST_SW_HELLO_VERIFY_REQUEST,
  TLS_ST_SW_SRVR_HELLO,
  TLS_ST_SW_CERT,
  TLS_ST_SW_COMP_CERT,
  TLS_ST_SW_KEY_EXCH,
  TLS_ST_SW_CERT_REQ,
  TLS_ST_SW_SRVR_DONE,
```

```
  TLS_ST_SR_CERT,
  TLS_ST_SR_COMP_CERT,
  TLS_ST_SR_KEY_EXCH,
  TLS_ST_SR_CERT_VRFY,
  TLS_ST_SR_NEXT_PROTO,
  TLS_ST_SR_CHANGE,
  TLS_ST_SR_FINISHED,
  TLS_ST_SW_SESSION_TICKET,
  TLS_ST_SW_CERT_STATUS,
  TLS_ST_SW_CHANGE,
  TLS_ST_SW_FINISHED,
  TLS_ST_SW_ENCRYPTED_EXTENSIONS,
  TLS_ST_CR_ENCRYPTED_EXTENSIONS,
  TLS_ST_CR_CERT_VRFY,
  TLS_ST_SW_CERT_VRFY,
   TLS_ST_CR_HELLO_REQ,
  TLS_ST_SW_KEY_UPDATE,
  TLS_ST_CW_KEY_UPDATE,
  TLS_ST_SR_KEY_UPDATE,
  TLS_ST_CR_KEY_UPDATE,
  TLS_ST_EARLY_DATA,
  TLS_ST_PENDING_EARLY_DATA_END,
  TLS_ST_CW_END_OF_EARLY_DATA,
  TLS_ST_SR_END_OF_EARLY_DATA
} OSSL_HANDSHAKE_STATE;

/*
* Most of the following state values are no longer used and are defined to be
* the closest equivalent value in the current state machine code. Not all
* defines have an equivalent and are set to a dummy value (-1). SSL_ST_CONNECT
* and SSL_ST_ACCEPT are still in use in the definition of SSL_CB_ACCEPT_LOOP,
* SSL_CB_ACCEPT_EXIT, SSL_CB_CONNECT_LOOP and SSL_CB_CONNECT_EXIT.
*/

#define SSL_ST_CONNECT 0x1000
#define SSL_ST_ACCEPT 0x2000

#define SSL_ST_MASK 0x0FFF

#define SSL_CB_LOOP 0x01
#define SSL_CB_EXIT 0x02
#define SSL_CB_READ 0x04
#define SSL_CB_WRITE 0x08
#define SSL_CB_ALERT 0x4000 /* used in callback */
#define SSL_CB_READ_ALERT (SSL_CB_ALERT | SSL_CB_READ)
#define SSL_CB_WRITE_ALERT
 (SSL_CB_ALERT | SSL_CB_WRITE)
#define SSL_CB_ACCEPT_LOOP (SSL_ST_ACCEPT | SSL_CB_LOOP)
```

```
#define SSL_CB_ACCEPT_EXIT (SSL_ST_ACCEPT | SSL_CB_EXIT)
#define SSL_CB_CONNECT_LOOP (SSL_ST_CONNECT | SSL_CB_LOOP)
#define SSL_CB_CONNECT_EXIT (SSL_ST_CONNECT | SSL_CB_EXIT)
#define SSL_CB_HANDSHAKE_START 0x10
#define SSL_CB_HANDSHAKE_DONE 0x20

/* Is the SSL_connection established? */
#define SSL_in_connect_init(a) (SSL_in_init(a) && !SSL_is_server(a))
#define SSL_in_accept_init(a) (SSL_in_init(a) && SSL_is_server(a))
int SSL_in_init(const SSL *s);
int SSL_in_before(const SSL *s);
int SSL_is_init_finished(const SSL *s);

/*
* The following 3 states are kept in ssl->rlayer.rstate when reads fail, you
* should not need these
*/
#define SSL_ST_READ_HEADER 0xF0
#define SSL_ST_READ_BODY 0xF1
#define SSL_ST_READ_DONE 0xF2

/*-
* Obtain latest Finished message
*   -- that we sent (SSL_get_finished)
*   -- that we expected from peer (SSL_get_peer_finished).
* Returns length (0 == no Finished so far),
 copies up to 'count' bytes.
*/
size_t SSL_get_finished(const SSL *s, void *buf, size_t count);
size_t SSL_get_peer_finished(const SSL *s, void *buf, size_t count);

/*
* use either SSL_VERIFY_NONE or SSL_VERIFY_PEER, the last 3 options are
* 'ored' with SSL_VERIFY_PEER if they are desired
*/
#define SSL_VERIFY_NONE 0x00
#define SSL_VERIFY_PEER 0x01
#define SSL_VERIFY_FAIL_IF_NO_PEER_CERT 0x02
#define SSL_VERIFY_CLIENT_ONCE 0x04
#define SSL_VERIFY_POST_HANDSHAKE 0x08

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define OpenSSL_add_ssl_algorithms() SSL_library_init()
#define SSLeay_add_ssl_algorithms() SSL_library_init()
#endif

/* More backward compatibility */
#define SSL_get_cipher(s) \
```

```
   SSL_CIPHER_get_name(SSL_get_current_cipher(s))
#define SSL_get_cipher_bits(s, np) \
   SSL_CIPHER_get_bits(SSL_get_current_cipher(s), np)
#define SSL_get_cipher_version(s) \
   SSL_CIPHER_get_version(SSL_get_current_cipher(s))
#define SSL_get_cipher_name(s) \
   SSL_CIPHER_get_name(SSL_get_current_cipher(s))
#define
 SSL_get_time(a) SSL_SESSION_get_time(a)
#define SSL_set_time(a, b) SSL_SESSION_set_time((a), (b))
#define SSL_get_timeout(a) SSL_SESSION_get_timeout(a)
#define SSL_set_timeout(a, b) SSL_SESSION_set_timeout((a), (b))

#define d2i_SSL_SESSION_bio(bp, s_id) ASN1_d2i_bio_of(SSL_SESSION, SSL_SESSION_new,
d2i_SSL_SESSION, bp, s_id)
#define i2d_SSL_SESSION_bio(bp, s_id) ASN1_i2d_bio_of(SSL_SESSION, i2d_SSL_SESSION, bp, s_id)

DECLARE_PEM_rw(SSL_SESSION, SSL_SESSION)
#define SSL_AD_REASON_OFFSET 1000 /* offset to get SSL_R_... value \
                           * from SSL_AD_... */
/* These alert types are for SSLv3 and TLSv1 */
#define SSL_AD_CLOSE_NOTIFY SSL3_AD_CLOSE_NOTIFY
/* fatal */
#define SSL_AD_UNEXPECTED_MESSAGE SSL3_AD_UNEXPECTED_MESSAGE
/* fatal */
#define SSL_AD_BAD_RECORD_MAC SSL3_AD_BAD_RECORD_MAC
#define SSL_AD_DECRYPTION_FAILED TLS1_AD_DECRYPTION_FAILED
#define SSL_AD_RECORD_OVERFLOW TLS1_AD_RECORD_OVERFLOW
/* fatal */
#define SSL_AD_DECOMPRESSION_FAILURE
 SSL3_AD_DECOMPRESSION_FAILURE
/* fatal */
#define SSL_AD_HANDSHAKE_FAILURE SSL3_AD_HANDSHAKE_FAILURE
/* Not for TLS */
#define SSL_AD_NO_CERTIFICATE SSL3_AD_NO_CERTIFICATE
#define SSL_AD_BAD_CERTIFICATE SSL3_AD_BAD_CERTIFICATE
#define SSL_AD_UNSUPPORTED_CERTIFICATE SSL3_AD_UNSUPPORTED_CERTIFICATE
#define SSL_AD_CERTIFICATE_REVOKED SSL3_AD_CERTIFICATE_REVOKED
#define SSL_AD_CERTIFICATE_EXPIRED SSL3_AD_CERTIFICATE_EXPIRED
#define SSL_AD_CERTIFICATE_UNKNOWN SSL3_AD_CERTIFICATE_UNKNOWN
/* fatal */
#define SSL_AD_ILLEGAL_PARAMETER SSL3_AD_ILLEGAL_PARAMETER
/* fatal */
#define SSL_AD_UNKNOWN_CA TLS1_AD_UNKNOWN_CA
/* fatal */
#define SSL_AD_ACCESS_DENIED TLS1_AD_ACCESS_DENIED
/* fatal */
#define SSL_AD_DECODE_ERROR TLS1_AD_DECODE_ERROR
```

```
#define SSL_AD_DECRYPT_ERROR TLS1_AD_DECRYPT_ERROR
/* fatal */
#define SSL_AD_EXPORT_RESTRICTION TLS1_AD_EXPORT_RESTRICTION
/* fatal */
#define SSL_AD_PROTOCOL_VERSION TLS1_AD_PROTOCOL_VERSION
/* fatal */
#define SSL_AD_INSUFFICIENT_SECURITY TLS1_AD_INSUFFICIENT_SECURITY
/*
 fatal */
#define SSL_AD_INTERNAL_ERROR TLS1_AD_INTERNAL_ERROR
#define SSL_AD_USER_CANCELLED TLS1_AD_USER_CANCELLED
#define SSL_AD_NO_RENEGOTIATION TLS1_AD_NO_RENEGOTIATION
#define SSL_AD_MISSING_EXTENSION TLS13_AD_MISSING_EXTENSION
#define SSL_AD_CERTIFICATE_REQUIRED TLS13_AD_CERTIFICATE_REQUIRED
#define SSL_AD_UNSUPPORTED_EXTENSION TLS1_AD_UNSUPPORTED_EXTENSION
#define SSL_AD_CERTIFICATE_UNOBTAINABLE TLS1_AD_CERTIFICATE_UNOBTAINABLE
#define SSL_AD_UNRECOGNIZED_NAME TLS1_AD_UNRECOGNIZED_NAME
#define SSL_AD_BAD_CERTIFICATE_STATUS_RESPONSE
TLS1_AD_BAD_CERTIFICATE_STATUS_RESPONSE
#define SSL_AD_BAD_CERTIFICATE_HASH_VALUE TLS1_AD_BAD_CERTIFICATE_HASH_VALUE
/* fatal */
#define SSL_AD_UNKNOWN_PSK_IDENTITY TLS1_AD_UNKNOWN_PSK_IDENTITY
/* fatal */
#define SSL_AD_INAPPROPRIATE_FALLBACK TLS1_AD_INAPPROPRIATE_FALLBACK
#define SSL_AD_NO_APPLICATION_PROTOCOL TLS1_AD_NO_APPLICATION_PROTOCOL
#define SSL_ERROR_NONE 0
#define SSL_ERROR_SSL 1
#define SSL_ERROR_WANT_READ 2
#define
 SSL_ERROR_WANT_WRITE 3
#define SSL_ERROR_WANT_X509_LOOKUP 4
#define SSL_ERROR_SYSCALL 5 /* look at error stack/return \
                         * value/errno */
#define SSL_ERROR_ZERO_RETURN 6
#define SSL_ERROR_WANT_CONNECT 7
#define SSL_ERROR_WANT_ACCEPT 8
#define SSL_ERROR_WANT_ASYNC 9
#define SSL_ERROR_WANT_ASYNC_JOB 10
#define SSL_ERROR_WANT_CLIENT_HELLO_CB 11
#define SSL_ERROR_WANT_RETRY_VERIFY 12

#ifndef OPENSSL_NO_DEPRECATED_3_0
#define SSL_CTRL_SET_TMP_DH 3
#define SSL_CTRL_SET_TMP_ECDH 4
#define SSL_CTRL_SET_TMP_DH_CB 6
#endif

#define SSL_CTRL_GET_CLIENT_CERT_REQUEST 9
```

```
#define SSL_CTRL_GET_NUM_RENEGOTIATIONS 10
#define SSL_CTRL_CLEAR_NUM_RENEGOTIATIONS 11
#define SSL_CTRL_GET_TOTAL_RENEGOTIATIONS 12
#define SSL_CTRL_GET_FLAGS 13
#define SSL_CTRL_EXTRA_CHAIN_CERT 14
#define SSL_CTRL_SET_MSG_CALLBACK 15
#define SSL_CTRL_SET_MSG_CALLBACK_ARG 16
/* only applies to datagram connections */
#define SSL_CTRL_SET_MTU 17
/* Stats */
#define SSL_CTRL_SESS_NUMBER 20
#define SSL_CTRL_SESS_CONNECT
 21
#define SSL_CTRL_SESS_CONNECT_GOOD 22
#define SSL_CTRL_SESS_CONNECT_RENEGOTIATE 23
#define SSL_CTRL_SESS_ACCEPT 24
#define SSL_CTRL_SESS_ACCEPT_GOOD 25
#define SSL_CTRL_SESS_ACCEPT_RENEGOTIATE 26
#define SSL_CTRL_SESS_HIT 27
#define SSL_CTRL_SESS_CB_HIT 28
#define SSL_CTRL_SESS_MISSES 29
#define SSL_CTRL_SESS_TIMEOUTS 30
#define SSL_CTRL_SESS_CACHE_FULL 31
#define SSL_CTRL_MODE 33
#define SSL_CTRL_GET_READ_AHEAD 40
#define SSL_CTRL_SET_READ_AHEAD 41
#define SSL_CTRL_SET_SESS_CACHE_SIZE 42
#define SSL_CTRL_GET_SESS_CACHE_SIZE 43
#define SSL_CTRL_SET_SESS_CACHE_MODE 44
#define SSL_CTRL_GET_SESS_CACHE_MODE 45
#define SSL_CTRL_GET_MAX_CERT_LIST 50
#define SSL_CTRL_SET_MAX_CERT_LIST 51
#define SSL_CTRL_SET_MAX_SEND_FRAGMENT 52
/* see tls1.h for macros based on these */
#define SSL_CTRL_SET_TLSEXT_SERVERNAME_CB 53
#define SSL_CTRL_SET_TLSEXT_SERVERNAME_ARG 54
#define SSL_CTRL_SET_TLSEXT_HOSTNAME 55
#define SSL_CTRL_SET_TLSEXT_DEBUG_CB 56
#define SSL_CTRL_SET_TLSEXT_DEBUG_ARG
 57
#define SSL_CTRL_GET_TLSEXT_TICKET_KEYS 58
#define SSL_CTRL_SET_TLSEXT_TICKET_KEYS 59
/*# define SSL_CTRL_SET_TLSEXT_OPAQUE_PRF_INPUT    60 */
/*# define SSL_CTRL_SET_TLSEXT_OPAQUE_PRF_INPUT_CB 61 */
/*# define SSL_CTRL_SET_TLSEXT_OPAQUE_PRF_INPUT_CB_ARG 62 */
#define SSL_CTRL_SET_TLSEXT_STATUS_REQ_CB 63
#define SSL_CTRL_SET_TLSEXT_STATUS_REQ_CB_ARG 64
#define SSL_CTRL_SET_TLSEXT_STATUS_REQ_TYPE 65
```

```
#define SSL_CTRL_GET_TLSEXT_STATUS_REQ_EXTS 66
#define SSL_CTRL_SET_TLSEXT_STATUS_REQ_EXTS 67
#define SSL_CTRL_GET_TLSEXT_STATUS_REQ_IDS 68
#define SSL_CTRL_SET_TLSEXT_STATUS_REQ_IDS 69
#define SSL_CTRL_GET_TLSEXT_STATUS_REQ_OCSP_RESP 70
#define SSL_CTRL_SET_TLSEXT_STATUS_REQ_OCSP_RESP 71
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define SSL_CTRL_SET_TLSEXT_TICKET_KEY_CB 72
#endif
#define SSL_CTRL_SET_TLS_EXT_SRP_USERNAME_CB 75
#define SSL_CTRL_SET_SRP_VERIFY_PARAM_CB 76
#define SSL_CTRL_SET_SRP_GIVE_CLIENT_PWD_CB 77
#define SSL_CTRL_SET_SRP_ARG 78
#define SSL_CTRL_SET_TLS_EXT_SRP_USERNAME 79
#define
 SSL_CTRL_SET_TLS_EXT_SRP_STRENGTH 80
#define SSL_CTRL_SET_TLS_EXT_SRP_PASSWORD 81
#define DTLS_CTRL_GET_TIMEOUT 73
#define DTLS_CTRL_HANDLE_TIMEOUT 74
#define SSL_CTRL_GET_RI_SUPPORT 76
#define SSL_CTRL_CLEAR_MODE 78
#define SSL_CTRL_SET_NOT_RESUMABLE_SESS_CB 79
#define SSL_CTRL_GET_EXTRA_CHAIN_CERTS 82
#define SSL_CTRL_CLEAR_EXTRA_CHAIN_CERTS 83
#define SSL_CTRL_CHAIN 88
#define SSL_CTRL_CHAIN_CERT 89
#define SSL_CTRL_GET_GROUPS 90
#define SSL_CTRL_SET_GROUPS 91
#define SSL_CTRL_SET_GROUPS_LIST 92
#define SSL_CTRL_GET_SHARED_GROUP 93
#define SSL_CTRL_SET_SIGALGS 97
#define SSL_CTRL_SET_SIGALGS_LIST 98
#define SSL_CTRL_CERT_FLAGS 99
#define SSL_CTRL_CLEAR_CERT_FLAGS 100
#define SSL_CTRL_SET_CLIENT_SIGALGS 101
#define SSL_CTRL_SET_CLIENT_SIGALGS_LIST 102
#define SSL_CTRL_GET_CLIENT_CERT_TYPES 103
#define SSL_CTRL_SET_CLIENT_CERT_TYPES 104
#define SSL_CTRL_BUILD_CERT_CHAIN 105
#define SSL_CTRL_SET_VERIFY_CERT_STORE 106
#define SSL_CTRL_SET_CHAIN_CERT_STORE 107
#define SSL_CTRL_GET_PEER_SIGNATURE_NID
 108
#define SSL_CTRL_GET_PEER_TMP_KEY 109
#define SSL_CTRL_GET_RAW_CIPHERLIST 110
#define SSL_CTRL_GET_EC_POINT_FORMATS 111
#define SSL_CTRL_GET_CHAIN_CERTS 115
#define SSL_CTRL_SELECT_CURRENT_CERT 116
```

```
#define SSL_CTRL_SET_CURRENT_CERT 117
#define SSL_CTRL_SET_DH_AUTO 118
#define DTLS_CTRL_SET_LINK_MTU 120
#define DTLS_CTRL_GET_LINK_MIN_MTU 121
#define SSL_CTRL_GET_EXTMS_SUPPORT 122
#define SSL_CTRL_SET_MIN_PROTO_VERSION 123
#define SSL_CTRL_SET_MAX_PROTO_VERSION 124
#define SSL_CTRL_SET_SPLIT_SEND_FRAGMENT 125
#define SSL_CTRL_SET_MAX_PIPELINES 126
#define SSL_CTRL_GET_TLSEXT_STATUS_REQ_TYPE 127
#define SSL_CTRL_GET_TLSEXT_STATUS_REQ_CB 128
#define SSL_CTRL_GET_TLSEXT_STATUS_REQ_CB_ARG 129
#define SSL_CTRL_GET_MIN_PROTO_VERSION 130
#define SSL_CTRL_GET_MAX_PROTO_VERSION 131
#define SSL_CTRL_GET_SIGNATURE_NID 132
#define SSL_CTRL_GET_TMP_KEY 133
#define SSL_CTRL_GET_NEGOTIATED_GROUP 134
#define SSL_CTRL_GET_IANA_GROUPS 135
#define SSL_CTRL_SET_RETRY_VERIFY 136
#define
 SSL_CTRL_GET_VERIFY_CERT_STORE 137
#define SSL_CTRL_GET_CHAIN_CERT_STORE 138
#define SSL_CTRL_GET0_IMPLEMENTED_GROUPS 139
#define SSL_CTRL_GET_SIGNATURE_NAME 140
#define SSL_CTRL_GET_PEER_SIGNATURE_NAME 141
#define SSL_CERT_SET_FIRST 1
#define SSL_CERT_SET_NEXT 2
#define SSL_CERT_SET_SERVER 3
#define DTLSv1_get_timeout(ssl, arg) \
   SSL_ctrl(ssl, DTLS_CTRL_GET_TIMEOUT, 0, (void *)(arg))
#define DTLSv1_handle_timeout(ssl) \
   SSL_ctrl(ssl, DTLS_CTRL_HANDLE_TIMEOUT, 0, NULL)
#define SSL_num_renegotiations(ssl) \
   SSL_ctrl((ssl), SSL_CTRL_GET_NUM_RENEGOTIATIONS, 0, NULL)
#define SSL_clear_num_renegotiations(ssl) \
   SSL_ctrl((ssl), SSL_CTRL_CLEAR_NUM_RENEGOTIATIONS, 0, NULL)
#define SSL_total_renegotiations(ssl) \
   SSL_ctrl((ssl), SSL_CTRL_GET_TOTAL_RENEGOTIATIONS, 0, NULL)
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define SSL_CTX_set_tmp_dh(ctx, dh) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_TMP_DH, 0, (char *)(dh))
#endif
#define SSL_CTX_set_dh_auto(ctx, onoff) \
   SSL_CTX_ctrl(ctx,
 SSL_CTRL_SET_DH_AUTO, onoff, NULL)
#define SSL_set_dh_auto(s, onoff) \
   SSL_ctrl(s, SSL_CTRL_SET_DH_AUTO, onoff, NULL)
#ifndef OPENSSL_NO_DEPRECATED_3_0
```

```
#define SSL_set_tmp_dh(ssl, dh) \
   SSL_ctrl(ssl, SSL_CTRL_SET_TMP_DH, 0, (char *)(dh))
#endif
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define SSL_CTX_set_tmp_ecdh(ctx, ecdh) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_TMP_ECDH, 0, (char *)(ecdh))
#define SSL_set_tmp_ecdh(ssl, ecdh) \
   SSL_ctrl(ssl, SSL_CTRL_SET_TMP_ECDH, 0, (char *)(ecdh))
#endif
#define SSL_CTX_add_extra_chain_cert(ctx, x509) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_EXTRA_CHAIN_CERT, 0, (char *)(x509))
#define SSL_CTX_get_extra_chain_certs(ctx, px509) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_EXTRA_CHAIN_CERTS, 0, px509)
#define SSL_CTX_get_extra_chain_certs_only(ctx, px509) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_EXTRA_CHAIN_CERTS, 1, px509)
#define SSL_CTX_clear_extra_chain_certs(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_CLEAR_EXTRA_CHAIN_CERTS, 0, NULL)
#define SSL_CTX_set0_chain(ctx, sk)
 \
   SSL_CTX_ctrl(ctx, SSL_CTRL_CHAIN, 0, (char *)(sk))
#define SSL_CTX_set1_chain(ctx, sk) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_CHAIN, 1, (char *)(sk))
#define SSL_CTX_add0_chain_cert(ctx, x509) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_CHAIN_CERT, 0, (char *)(x509))
#define SSL_CTX_add1_chain_cert(ctx, x509) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_CHAIN_CERT, 1, (char *)(x509))
#define SSL_CTX_get0_chain_certs(ctx, px509) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_CHAIN_CERTS, 0, px509)
#define SSL_CTX_clear_chain_certs(ctx) \
   SSL_CTX_set0_chain(ctx, NULL)
#define SSL_CTX_build_cert_chain(ctx, flags) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_BUILD_CERT_CHAIN, flags, NULL)
#define SSL_CTX_select_current_cert(ctx, x509) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SELECT_CURRENT_CERT, 0, (char *)(x509))
#define SSL_CTX_set_current_cert(ctx, op) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_CURRENT_CERT, op, NULL)
#define SSL_CTX_set0_verify_cert_store(ctx, st) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_VERIFY_CERT_STORE, 0, (char *)(st))
#define
 SSL_CTX_set1_verify_cert_store(ctx, st) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_VERIFY_CERT_STORE, 1, (char *)(st))
#define SSL_CTX_get0_verify_cert_store(ctx, st) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_VERIFY_CERT_STORE, 0, (char *)(st))
#define SSL_CTX_set0_chain_cert_store(ctx, st) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_CHAIN_CERT_STORE, 0, (char *)(st))
#define SSL_CTX_set1_chain_cert_store(ctx, st) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_CHAIN_CERT_STORE, 1, (char *)(st))
#define SSL_CTX_get0_chain_cert_store(ctx, st) \
```

```
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_CHAIN_CERT_STORE, 0, (char *)(st))
#define SSL_set0_chain(s, sk) \
   SSL_ctrl(s, SSL_CTRL_CHAIN, 0, (char *)(sk))
#define SSL_set1_chain(s, sk) \
   SSL_ctrl(s, SSL_CTRL_CHAIN, 1, (char *)(sk))
#define SSL_add0_chain_cert(s, x509) \
   SSL_ctrl(s, SSL_CTRL_CHAIN_CERT, 0, (char *)(x509))
#define SSL_add1_chain_cert(s, x509) \
   SSL_ctrl(s, SSL_CTRL_CHAIN_CERT, 1, (char *)(x509))
#define SSL_get0_chain_certs(s, px509) \
   SSL_ctrl(s,
 SSL_CTRL_GET_CHAIN_CERTS, 0, px509)
#define SSL_clear_chain_certs(s) \
   SSL_set0_chain(s, NULL)
#define SSL_build_cert_chain(s, flags) \
   SSL_ctrl(s, SSL_CTRL_BUILD_CERT_CHAIN, flags, NULL)
#define SSL_select_current_cert(s, x509) \
   SSL_ctrl(s, SSL_CTRL_SELECT_CURRENT_CERT, 0, (char *)(x509))
#define SSL_set_current_cert(s, op) \
   SSL_ctrl(s, SSL_CTRL_SET_CURRENT_CERT, op, NULL)
#define SSL_set0_verify_cert_store(s, st) \
   SSL_ctrl(s, SSL_CTRL_SET_VERIFY_CERT_STORE, 0, (char *)(st))
#define SSL_set1_verify_cert_store(s, st) \
   SSL_ctrl(s, SSL_CTRL_SET_VERIFY_CERT_STORE, 1, (char *)(st))
#define SSL_get0_verify_cert_store(s, st) \
   SSL_ctrl(s, SSL_CTRL_GET_VERIFY_CERT_STORE, 0, (char *)(st))
#define SSL_set0_chain_cert_store(s, st) \
   SSL_ctrl(s, SSL_CTRL_SET_CHAIN_CERT_STORE, 0, (char *)(st))
#define SSL_set1_chain_cert_store(s, st) \
   SSL_ctrl(s, SSL_CTRL_SET_CHAIN_CERT_STORE, 1, (char *)(st))
#define SSL_get0_chain_cert_store(s, st) \
   SSL_ctrl(s,
 SSL_CTRL_GET_CHAIN_CERT_STORE, 0, (char *)(st))

#define SSL_get1_groups(s, glist) \
   SSL_ctrl(s, SSL_CTRL_GET_GROUPS, 0, (int *)(glist))
#define SSL_get0_iana_groups(s, plst) \
   SSL_ctrl(s, SSL_CTRL_GET_IANA_GROUPS, 0, (uint16_t **)(plst))
#define SSL_CTX_set1_groups(ctx, glist, glistlen) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_GROUPS, glistlen, (int *)(glist))
#define SSL_CTX_set1_groups_list(ctx, s) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_GROUPS_LIST, 0, (char *)(s))
#define SSL_CTX_get0_implemented_groups(ctx, all, out)       \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET0_IMPLEMENTED_GROUPS, all, \
      (STACK_OF(OPENSSL_CSTRING) *)(out))
#define SSL_set1_groups(s, glist, glistlen) \
   SSL_ctrl(s, SSL_CTRL_SET_GROUPS, glistlen, (char *)(glist))
#define SSL_set1_groups_list(s, str) \
```

```
   SSL_ctrl(s, SSL_CTRL_SET_GROUPS_LIST, 0, (char *)(str))
#define SSL_get_shared_group(s, n) \
   SSL_ctrl(s, SSL_CTRL_GET_SHARED_GROUP, n, NULL)
#define SSL_get_negotiated_group(s) \
   SSL_ctrl(s, SSL_CTRL_GET_NEGOTIATED_GROUP,
 0, NULL)
#define SSL_CTX_set1_sigalgs(ctx, slist, slistlen) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_SIGALGS, slistlen, (int *)(slist))
#define SSL_CTX_set1_sigalgs_list(ctx, s) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_SIGALGS_LIST, 0, (char *)(s))
#define SSL_set1_sigalgs(s, slist, slistlen) \
   SSL_ctrl(s, SSL_CTRL_SET_SIGALGS, slistlen, (int *)(slist))
#define SSL_set1_sigalgs_list(s, str) \
   SSL_ctrl(s, SSL_CTRL_SET_SIGALGS_LIST, 0, (char *)(str))
#define SSL_CTX_set1_client_sigalgs(ctx, slist, slistlen) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_CLIENT_SIGALGS, slistlen, (int *)(slist))
#define SSL_CTX_set1_client_sigalgs_list(ctx, s) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_CLIENT_SIGALGS_LIST, 0, (char *)(s))
#define SSL_set1_client_sigalgs(s, slist, slistlen) \
   SSL_ctrl(s, SSL_CTRL_SET_CLIENT_SIGALGS, slistlen, (int *)(slist))
#define SSL_set1_client_sigalgs_list(s, str) \
   SSL_ctrl(s, SSL_CTRL_SET_CLIENT_SIGALGS_LIST, 0, (char *)(str))
#define SSL_get0_certificate_types(s,
 clist) \
   SSL_ctrl(s, SSL_CTRL_GET_CLIENT_CERT_TYPES, 0, (char *)(clist))
#define SSL_CTX_set1_client_certificate_types(ctx, clist, clistlen) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_CLIENT_CERT_TYPES, clistlen,     \
       (char *)(clist))
#define SSL_set1_client_certificate_types(s, clist, clistlen) \
   SSL_ctrl(s, SSL_CTRL_SET_CLIENT_CERT_TYPES, clistlen, (char *)(clist))
#define SSL_get0_signature_name(s, str) \
   SSL_ctrl(s, SSL_CTRL_GET_SIGNATURE_NAME, 0, (1 ? (str) : (const char **)NULL))
#define SSL_get_signature_nid(s, pn) \
   SSL_ctrl(s, SSL_CTRL_GET_SIGNATURE_NID, 0, pn)
#define SSL_get0_peer_signature_name(s, str) \
   SSL_ctrl(s, SSL_CTRL_GET_PEER_SIGNATURE_NAME, 0, (1 ? (str) : (const char **)NULL))
#define SSL_get_peer_signature_nid(s, pn) \
   SSL_ctrl(s, SSL_CTRL_GET_PEER_SIGNATURE_NID, 0, pn)
#define SSL_get_peer_tmp_key(s, pk) \
   SSL_ctrl(s, SSL_CTRL_GET_PEER_TMP_KEY, 0, pk)
#define SSL_get_tmp_key(s, pk) \
   SSL_ctrl(s, SSL_CTRL_GET_TMP_KEY,
 0, pk)
#define SSL_get0_raw_cipherlist(s, plst) \
   SSL_ctrl(s, SSL_CTRL_GET_RAW_CIPHERLIST, 0, plst)
#define SSL_get0_ec_point_formats(s, plst) \
   SSL_ctrl(s, SSL_CTRL_GET_EC_POINT_FORMATS, 0, plst)
#define SSL_CTX_set_min_proto_version(ctx, version) \
```

```
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_MIN_PROTO_VERSION, version, NULL)
#define SSL_CTX_set_max_proto_version(ctx, version) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_MAX_PROTO_VERSION, version, NULL)
#define SSL_CTX_get_min_proto_version(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_MIN_PROTO_VERSION, 0, NULL)
#define SSL_CTX_get_max_proto_version(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_MAX_PROTO_VERSION, 0, NULL)
#define SSL_set_min_proto_version(s, version) \
   SSL_ctrl(s, SSL_CTRL_SET_MIN_PROTO_VERSION, version, NULL)
#define SSL_set_max_proto_version(s, version) \
   SSL_ctrl(s, SSL_CTRL_SET_MAX_PROTO_VERSION, version, NULL)
#define SSL_get_min_proto_version(s) \
   SSL_ctrl(s, SSL_CTRL_GET_MIN_PROTO_VERSION, 0, NULL)
#define
 SSL_get_max_proto_version(s) \
   SSL_ctrl(s, SSL_CTRL_GET_MAX_PROTO_VERSION, 0, NULL)

const char *SSL_get0_group_name(SSL *s);
const char *SSL_group_to_name(SSL *s, int id);

/* Backwards compatibility, original 1.1.0 names */
#define SSL_CTRL_GET_SERVER_TMP_KEY \
   SSL_CTRL_GET_PEER_TMP_KEY
#define SSL_get_server_tmp_key(s, pk) \
   SSL_get_peer_tmp_key(s, pk)

int SSL_set0_tmp_dh_pkey(SSL *s, EVP_PKEY *dhpkey);
int SSL_CTX_set0_tmp_dh_pkey(SSL_CTX *ctx, EVP_PKEY *dhpkey);

/*
* The following symbol names are old and obsolete. They are kept
* for compatibility reasons only and should not be used anymore.
*/
#define SSL_CTRL_GET_CURVES SSL_CTRL_GET_GROUPS
#define SSL_CTRL_SET_CURVES SSL_CTRL_SET_GROUPS
#define SSL_CTRL_SET_CURVES_LIST SSL_CTRL_SET_GROUPS_LIST
#define SSL_CTRL_GET_SHARED_CURVE SSL_CTRL_GET_SHARED_GROUP

#define SSL_get1_curves SSL_get1_groups
#define SSL_CTX_set1_curves SSL_CTX_set1_groups
#define SSL_CTX_set1_curves_list SSL_CTX_set1_groups_list
#define SSL_set1_curves
 SSL_set1_groups
#define SSL_set1_curves_list SSL_set1_groups_list
#define SSL_get_shared_curve SSL_get_shared_group

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
/* Provide some compatibility macros for removed functionality. */
```

```
#define SSL_CTX_need_tmp_RSA(ctx) 0
#define SSL_CTX_set_tmp_rsa(ctx, rsa) 1
#define SSL_need_tmp_RSA(ssl) 0
#define SSL_set_tmp_rsa(ssl, rsa) 1
#define SSL_CTX_set_ecdh_auto(dummy, onoff) ((onoff) != 0)
#define SSL_set_ecdh_auto(dummy, onoff) ((onoff) != 0)
/*
* We "pretend" to call the callback to avoid warnings about unused static
* functions.
*/
#define SSL_CTX_set_tmp_rsa_callback(ctx, cb) \
   while (0)                              \
   (cb)(NULL, 0, 0)
#define SSL_set_tmp_rsa_callback(ssl, cb) \
   while (0)                          \
   (cb)(NULL, 0, 0)
#endif
__owur const BIO_METHOD *BIO_f_ssl(void);
__owur BIO *BIO_new_ssl(SSL_CTX *ctx, int client);
__owur BIO *BIO_new_ssl_connect(SSL_CTX *ctx);
__owur BIO *BIO_new_buffer_ssl_connect(SSL_CTX
 *ctx);
__owur int BIO_ssl_copy_session_id(BIO *to, BIO *from);
void BIO_ssl_shutdown(BIO *ssl_bio);

__owur int SSL_CTX_set_cipher_list(SSL_CTX *, const char *str);
__owur SSL_CTX *SSL_CTX_new(const SSL_METHOD *meth);
__owur SSL_CTX *SSL_CTX_new_ex(OSSL_LIB_CTX *libctx, const char *propq,
   const SSL_METHOD *meth);
int SSL_CTX_up_ref(SSL_CTX *ctx);
void SSL_CTX_free(SSL_CTX *);
__owur long SSL_CTX_set_timeout(SSL_CTX *ctx, long t);
__owur long SSL_CTX_get_timeout(const SSL_CTX *ctx);
__owur X509_STORE *SSL_CTX_get_cert_store(const SSL_CTX *);
void SSL_CTX_set_cert_store(SSL_CTX *, X509_STORE *);
void SSL_CTX_set1_cert_store(SSL_CTX *, X509_STORE *);
__owur int SSL_want(const SSL *s);
__owur int SSL_clear(SSL *s);

#ifndef OPENSSL_NO_DEPRECATED_3_4
OSSL_DEPRECATEDIN_3_4_FOR("not Y2038-safe, replace with SSL_CTX_flush_sessions_ex()")
void SSL_CTX_flush_sessions(SSL_CTX *ctx, long tm);
#endif
void SSL_CTX_flush_sessions_ex(SSL_CTX *ctx, time_t tm);

__owur const SSL_CIPHER *SSL_get_current_cipher(const
 SSL *s);
__owur const SSL_CIPHER *SSL_get_pending_cipher(const SSL *s);
```

```
__owur int SSL_CIPHER_get_bits(const SSL_CIPHER *c, int *alg_bits);
__owur const char *SSL_CIPHER_get_version(const SSL_CIPHER *c);
__owur const char *SSL_CIPHER_get_name(const SSL_CIPHER *c);
__owur const char *SSL_CIPHER_standard_name(const SSL_CIPHER *c);
__owur const char *OPENSSL_cipher_name(const char *rfc_name);
__owur uint32_t SSL_CIPHER_get_id(const SSL_CIPHER *c);
__owur uint16_t SSL_CIPHER_get_protocol_id(const SSL_CIPHER *c);
__owur int SSL_CIPHER_get_kx_nid(const SSL_CIPHER *c);
__owur int SSL_CIPHER_get_auth_nid(const SSL_CIPHER *c);
__owur const EVP_MD *SSL_CIPHER_get_handshake_digest(const SSL_CIPHER *c);
__owur int SSL_CIPHER_is_aead(const SSL_CIPHER *c);

__owur int SSL_get_fd(const SSL *s);
__owur int SSL_get_rfd(const SSL *s);
__owur int SSL_get_wfd(const SSL *s);
__owur const char *SSL_get_cipher_list(const SSL *s, int n);
__owur char *SSL_get_shared_ciphers(const SSL *s,
 char *buf, int size);
__owur int SSL_get_read_ahead(const SSL *s);
__owur int SSL_pending(const SSL *s);
__owur int SSL_has_pending(const SSL *s);
#ifndef OPENSSL_NO_SOCK
__owur int SSL_set_fd(SSL *s, int fd);
__owur int SSL_set_rfd(SSL *s, int fd);
__owur int SSL_set_wfd(SSL *s, int fd);
#endif
void SSL_set0_rbio(SSL *s, BIO *rbio);
void SSL_set0_wbio(SSL *s, BIO *wbio);
void SSL_set_bio(SSL *s, BIO *rbio, BIO *wbio);
__owur BIO *SSL_get_rbio(const SSL *s);
__owur BIO *SSL_get_wbio(const SSL *s);
__owur int SSL_set_cipher_list(SSL *s, const char *str);
__owur int SSL_CTX_set_ciphersuites(SSL_CTX *ctx, const char *str);
__owur int SSL_set_ciphersuites(SSL *s, const char *str);
void SSL_set_read_ahead(SSL *s, int yes);
__owur int SSL_get_verify_mode(const SSL *s);
__owur int SSL_get_verify_depth(const SSL *s);
__owur SSL_verify_cb SSL_get_verify_callback(const SSL *s);
void SSL_set_verify(SSL *s, int mode, SSL_verify_cb callback);
void SSL_set_verify_depth(SSL *s, int depth);
void SSL_set_cert_cb(SSL
 *s, int (*cb)(SSL *ssl, void *arg), void *arg);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 __owur int SSL_use_RSAPrivateKey(SSL *ssl, RSA *rsa);
OSSL_DEPRECATEDIN_3_0
__owur int SSL_use_RSAPrivateKey_ASN1(SSL *ssl,
   const unsigned char *d, long len);
#endif
```

```
__owur int SSL_use_PrivateKey(SSL *ssl, EVP_PKEY *pkey);
__owur int SSL_use_PrivateKey_ASN1(int pk, SSL *ssl, const unsigned char *d,
   long len);
__owur int SSL_use_certificate(SSL *ssl, X509 *x);
__owur int SSL_use_certificate_ASN1(SSL *ssl, const unsigned char *d, int len);
__owur int SSL_use_cert_and_key(SSL *ssl, X509 *x509, EVP_PKEY *privatekey,
   STACK_OF(X509) *chain, int override);

/* serverinfo file format versions */
#define SSL_SERVERINFOV1 1
#define SSL_SERVERINFOV2 2

/* Set serverinfo data for the current active cert. */
__owur int SSL_CTX_use_serverinfo(SSL_CTX *ctx, const unsigned char *serverinfo,
   size_t serverinfo_length);
__owur int SSL_CTX_use_serverinfo_ex(SSL_CTX *ctx,
 unsigned int version,
   const unsigned char *serverinfo,
   size_t serverinfo_length);
__owur int SSL_CTX_use_serverinfo_file(SSL_CTX *ctx, const char *file);

#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0
__owur int SSL_use_RSAPrivateKey_file(SSL *ssl, const char *file, int type);
#endif

__owur int SSL_use_PrivateKey_file(SSL *ssl, const char *file, int type);
__owur int SSL_use_certificate_file(SSL *ssl, const char *file, int type);

#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0
__owur int SSL_CTX_use_RSAPrivateKey_file(SSL_CTX *ctx, const char *file,
   int type);
#endif
__owur int SSL_CTX_use_PrivateKey_file(SSL_CTX *ctx, const char *file,
   int type);
__owur int SSL_CTX_use_certificate_file(SSL_CTX *ctx, const char *file,
   int type);
/* PEM type */
__owur int SSL_CTX_use_certificate_chain_file(SSL_CTX *ctx, const char *file);
__owur int SSL_use_certificate_chain_file(SSL *ssl, const char *file);
__owur STACK_OF(X509_NAME) *SSL_load_client_CA_file(const
 char *file);
__owur STACK_OF(X509_NAME) *SSL_load_client_CA_file_ex(const char *file, OSSL_LIB_CTX *libctx,
   const char *propq);
__owur int SSL_add_file_cert_subjects_to_stack(STACK_OF(X509_NAME) *stackCAs,
   const char *file);
int SSL_add_dir_cert_subjects_to_stack(STACK_OF(X509_NAME) *stackCAs,
```

```
   const char *dir);
int SSL_add_store_cert_subjects_to_stack(STACK_OF(X509_NAME) *stackCAs,
   const char *uri);

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define SSL_load_error_strings()                \
   OPENSSL_init_ssl(OPENSSL_INIT_LOAD_SSL_STRINGS \
         | OPENSSL_INIT_LOAD_CRYPTO_STRINGS,    \
      NULL)
#endif

__owur const char *SSL_state_string(const SSL *s);
__owur const char *SSL_rstate_string(const SSL *s);
__owur const char *SSL_state_string_long(const SSL *s);
__owur const char *SSL_rstate_string_long(const SSL *s);

#ifndef OPENSSL_NO_DEPRECATED_3_4
OSSL_DEPRECATEDIN_3_4_FOR("not Y2038-safe, replace with SSL_SESSION_get_time_ex()")
__owur long SSL_SESSION_get_time(const
 SSL_SESSION *s);
OSSL_DEPRECATEDIN_3_4_FOR("not Y2038-safe, replace with SSL_SESSION_set_time_ex()")
__owur long SSL_SESSION_set_time(SSL_SESSION *s, long t);
#endif
__owur long SSL_SESSION_get_timeout(const SSL_SESSION *s);
__owur long SSL_SESSION_set_timeout(SSL_SESSION *s, long t);
__owur int SSL_SESSION_get_protocol_version(const SSL_SESSION *s);
__owur int SSL_SESSION_set_protocol_version(SSL_SESSION *s, int version);

__owur time_t SSL_SESSION_get_time_ex(const SSL_SESSION *s);
__owur time_t SSL_SESSION_set_time_ex(SSL_SESSION *s, time_t t);

__owur const char *SSL_SESSION_get0_hostname(const SSL_SESSION *s);
__owur int SSL_SESSION_set1_hostname(SSL_SESSION *s, const char *hostname);
void SSL_SESSION_get0_alpn_selected(const SSL_SESSION *s,
   const unsigned char **alpn,
   size_t *len);
__owur int SSL_SESSION_set1_alpn_selected(SSL_SESSION *s,
   const unsigned char *alpn,
   size_t len);
__owur const SSL_CIPHER *SSL_SESSION_get0_cipher(const SSL_SESSION *s);
__owur
 int SSL_SESSION_set_cipher(SSL_SESSION *s, const SSL_CIPHER *cipher);
__owur int SSL_SESSION_has_ticket(const SSL_SESSION *s);
__owur unsigned long SSL_SESSION_get_ticket_lifetime_hint(const SSL_SESSION *s);
void SSL_SESSION_get0_ticket(const SSL_SESSION *s, const unsigned char **tick,
   size_t *len);
__owur uint32_t SSL_SESSION_get_max_early_data(const SSL_SESSION *s);
__owur int SSL_SESSION_set_max_early_data(SSL_SESSION *s,
```

```
   uint32_t max_early_data);
__owur int SSL_copy_session_id(SSL *to, const SSL *from);
__owur X509 *SSL_SESSION_get0_peer(SSL_SESSION *s);
__owur int SSL_SESSION_set1_id_context(SSL_SESSION *s,
   const unsigned char *sid_ctx,
   unsigned int sid_ctx_len);
__owur int SSL_SESSION_set1_id(SSL_SESSION *s, const unsigned char *sid,
   unsigned int sid_len);
__owur int SSL_SESSION_is_resumable(const SSL_SESSION *s);

__owur SSL_SESSION *SSL_SESSION_new(void);
__owur SSL_SESSION *SSL_SESSION_dup(const SSL_SESSION *src);
const unsigned char *SSL_SESSION_get_id(const
 SSL_SESSION *s,
   unsigned int *len);
const unsigned char *SSL_SESSION_get0_id_context(const SSL_SESSION *s,
   unsigned int *len);
__owur unsigned int SSL_SESSION_get_compress_id(const SSL_SESSION *s);
#ifndef OPENSSL_NO_STDIO
int SSL_SESSION_print_fp(FILE *fp, const SSL_SESSION *ses);
#endif
int SSL_SESSION_print(BIO *fp, const SSL_SESSION *ses);
int SSL_SESSION_print_keylog(BIO *bp, const SSL_SESSION *x);
int SSL_SESSION_up_ref(SSL_SESSION *ses);
void SSL_SESSION_free(SSL_SESSION *ses);
__owur int i2d_SSL_SESSION(const SSL_SESSION *in, unsigned char **pp);
__owur int SSL_set_session(SSL *to, SSL_SESSION *session);
int SSL_CTX_add_session(SSL_CTX *ctx, SSL_SESSION *session);
int SSL_CTX_remove_session(SSL_CTX *ctx, SSL_SESSION *session);
__owur int SSL_CTX_set_generate_session_id(SSL_CTX *ctx, GEN_SESSION_CB cb);
__owur int SSL_set_generate_session_id(SSL *s, GEN_SESSION_CB cb);
__owur int SSL_has_matching_session_id(const SSL *s,
   const unsigned char *id,
   unsigned
 int id_len);
SSL_SESSION *d2i_SSL_SESSION(SSL_SESSION **a, const unsigned char **pp,
   long length);
SSL_SESSION *d2i_SSL_SESSION_ex(SSL_SESSION **a, const unsigned char **pp,
   long length, OSSL_LIB_CTX *libctx,
   const char *propq);

#ifdef OPENSSL_X509_H
__owur X509 *SSL_get0_peer_certificate(const SSL *s);
__owur X509 *SSL_get1_peer_certificate(const SSL *s);
/* Deprecated in 3.0.0 */
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define SSL_get_peer_certificate SSL_get1_peer_certificate
#endif
```

```
#endif

__owur STACK_OF(X509) *SSL_get_peer_cert_chain(const SSL *s);

__owur int SSL_CTX_get_verify_mode(const SSL_CTX *ctx);
__owur int SSL_CTX_get_verify_depth(const SSL_CTX *ctx);
__owur SSL_verify_cb SSL_CTX_get_verify_callback(const SSL_CTX *ctx);
void SSL_CTX_set_verify(SSL_CTX *ctx, int mode, SSL_verify_cb callback);
void SSL_CTX_set_verify_depth(SSL_CTX *ctx, int depth);
void SSL_CTX_set_cert_verify_callback(SSL_CTX *ctx,
   int (*cb)(X509_STORE_CTX *, void *),
   void *arg);
void SSL_CTX_set_cert_cb(SSL_CTX
 *c, int (*cb)(SSL *ssl, void *arg),
   void *arg);
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0
__owur int SSL_CTX_use_RSAPrivateKey(SSL_CTX *ctx, RSA *rsa);
OSSL_DEPRECATEDIN_3_0
__owur int SSL_CTX_use_RSAPrivateKey_ASN1(SSL_CTX *ctx, const unsigned char *d,
   long len);
#endif
__owur int SSL_CTX_use_PrivateKey(SSL_CTX *ctx, EVP_PKEY *pkey);
__owur int SSL_CTX_use_PrivateKey_ASN1(int pk, SSL_CTX *ctx,
   const unsigned char *d, long len);
__owur int SSL_CTX_use_certificate(SSL_CTX *ctx, X509 *x);
__owur int SSL_CTX_use_certificate_ASN1(SSL_CTX *ctx, int len,
   const unsigned char *d);
__owur int SSL_CTX_use_cert_and_key(SSL_CTX *ctx, X509 *x509, EVP_PKEY *privatekey,
   STACK_OF(X509) *chain, int override);

void SSL_CTX_set_default_passwd_cb(SSL_CTX *ctx, pem_password_cb *cb);
void SSL_CTX_set_default_passwd_cb_userdata(SSL_CTX *ctx, void *u);
pem_password_cb *SSL_CTX_get_default_passwd_cb(SSL_CTX *ctx);
void *SSL_CTX_get_default_passwd_cb_userdata(SSL_CTX
 *ctx);
void SSL_set_default_passwd_cb(SSL *s, pem_password_cb *cb);
void SSL_set_default_passwd_cb_userdata(SSL *s, void *u);
pem_password_cb *SSL_get_default_passwd_cb(SSL *s);
void *SSL_get_default_passwd_cb_userdata(SSL *s);

__owur int SSL_CTX_check_private_key(const SSL_CTX *ctx);
__owur int SSL_check_private_key(const SSL *ctx);

__owur int SSL_CTX_set_session_id_context(SSL_CTX *ctx,
   const unsigned char *sid_ctx,
   unsigned int sid_ctx_len);
```

```
SSL *SSL_new(SSL_CTX *ctx);
int SSL_up_ref(SSL *s);
int SSL_is_dtls(const SSL *s);
int SSL_is_tls(const SSL *s);
int SSL_is_quic(const SSL *s);
__owur int SSL_set_session_id_context(SSL *ssl, const unsigned char *sid_ctx,
   unsigned int sid_ctx_len);

__owur int SSL_CTX_set_purpose(SSL_CTX *ctx, int purpose);
__owur int SSL_set_purpose(SSL *ssl, int purpose);
__owur int SSL_CTX_set_trust(SSL_CTX *ctx, int trust);
__owur int SSL_set_trust(SSL *ssl, int trust);

__owur int SSL_set1_host(SSL *s, const char *host);
__owur
 int SSL_add1_host(SSL *s, const char *host);
__owur const char *SSL_get0_peername(SSL *s);
void SSL_set_hostflags(SSL *s, unsigned int flags);

__owur int SSL_CTX_dane_enable(SSL_CTX *ctx);
__owur int SSL_CTX_dane_mtype_set(SSL_CTX *ctx, const EVP_MD *md,
   uint8_t mtype, uint8_t ord);
__owur int SSL_dane_enable(SSL *s, const char *basedomain);
__owur int SSL_dane_tlsa_add(SSL *s, uint8_t usage, uint8_t selector,
   uint8_t mtype, const unsigned char *data, size_t dlen);
__owur int SSL_get0_dane_authority(SSL *s, X509 **mcert, EVP_PKEY **mspki);
__owur int SSL_get0_dane_tlsa(SSL *s, uint8_t *usage, uint8_t *selector,
   uint8_t *mtype, const unsigned char **data,
   size_t *dlen);
/*
* Bridge opacity barrier between libcrypt and libssl, also needed to support
* offline testing in test/danetest.c
*/
SSL_DANE *SSL_get0_dane(SSL *ssl);
/*
* DANE flags
*/
unsigned long SSL_CTX_dane_set_flags(SSL_CTX *ctx, unsigned long flags);
unsigned long SSL_CTX_dane_clear_flags(SSL_CTX *ctx,
 unsigned long flags);
unsigned long SSL_dane_set_flags(SSL *ssl, unsigned long flags);
unsigned long SSL_dane_clear_flags(SSL *ssl, unsigned long flags);

__owur int SSL_CTX_set1_param(SSL_CTX *ctx, X509_VERIFY_PARAM *vpm);
__owur int SSL_set1_param(SSL *ssl, X509_VERIFY_PARAM *vpm);

__owur X509_VERIFY_PARAM *SSL_CTX_get0_param(SSL_CTX *ctx);
__owur X509_VERIFY_PARAM *SSL_get0_param(SSL *ssl);
```

```
#ifndef OPENSSL_NO_SRP
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0 int SSL_CTX_set_srp_username(SSL_CTX *ctx, char *name);
OSSL_DEPRECATEDIN_3_0 int SSL_CTX_set_srp_password(SSL_CTX *ctx, char *password);
OSSL_DEPRECATEDIN_3_0 int SSL_CTX_set_srp_strength(SSL_CTX *ctx, int strength);
OSSL_DEPRECATEDIN_3_0
int SSL_CTX_set_srp_client_pwd_callback(SSL_CTX *ctx,
   char *(*cb)(SSL *, void *));
OSSL_DEPRECATEDIN_3_0
int SSL_CTX_set_srp_verify_param_callback(SSL_CTX *ctx,
   int (*cb)(SSL *, void *));
OSSL_DEPRECATEDIN_3_0
int SSL_CTX_set_srp_username_callback(SSL_CTX *ctx,
   int (*cb)(SSL
 *, int *, void *));
OSSL_DEPRECATEDIN_3_0 int SSL_CTX_set_srp_cb_arg(SSL_CTX *ctx, void *arg);

OSSL_DEPRECATEDIN_3_0
int SSL_set_srp_server_param(SSL *s, const BIGNUM *N, const BIGNUM *g,
   BIGNUM *sa, BIGNUM *v, char *info);
OSSL_DEPRECATEDIN_3_0
int SSL_set_srp_server_param_pw(SSL *s, const char *user, const char *pass,
   const char *grp);

OSSL_DEPRECATEDIN_3_0 __owur BIGNUM *SSL_get_srp_g(SSL *s);
OSSL_DEPRECATEDIN_3_0 __owur BIGNUM *SSL_get_srp_N(SSL *s);

OSSL_DEPRECATEDIN_3_0 __owur char *SSL_get_srp_username(SSL *s);
OSSL_DEPRECATEDIN_3_0 __owur char *SSL_get_srp_userinfo(SSL *s);
#endif
#endif

/*
* ClientHello callback and helpers.
*/

#define SSL_CLIENT_HELLO_SUCCESS 1
#define SSL_CLIENT_HELLO_ERROR 0
#define SSL_CLIENT_HELLO_RETRY (-1)

typedef int (*SSL_client_hello_cb_fn)(SSL *s, int *al, void *arg);
void SSL_CTX_set_client_hello_cb(SSL_CTX *c, SSL_client_hello_cb_fn cb,
   void *arg);
typedef int (*SSL_new_pending_conn_cb_fn)(SSL_CTX *ctx, SSL *new_ssl,

   void *arg);
void SSL_CTX_set_new_pending_conn_cb(SSL_CTX *c, SSL_new_pending_conn_cb_fn cb,
```

```
   void *arg);

int SSL_client_hello_isv2(SSL *s);
unsigned int SSL_client_hello_get0_legacy_version(SSL *s);
size_t SSL_client_hello_get0_random(SSL *s, const unsigned char **out);
size_t SSL_client_hello_get0_session_id(SSL *s, const unsigned char **out);
size_t SSL_client_hello_get0_ciphers(SSL *s, const unsigned char **out);
size_t SSL_client_hello_get0_compression_methods(SSL *s,
   const unsigned char **out);
int SSL_client_hello_get1_extensions_present(SSL *s, int **out, size_t *outlen);
int SSL_client_hello_get_extension_order(SSL *s, uint16_t *exts,
   size_t *num_exts);
int SSL_client_hello_get0_ext(SSL *s, unsigned int type,
   const unsigned char **out, size_t *outlen);

void SSL_certs_clear(SSL *s);
void SSL_free(SSL *ssl);
#ifdef OSSL_ASYNC_FD
/*
* Windows application developer has to include windows.h to use these.
*/
__owur int SSL_waiting_for_async(SSL *s);
__owur int SSL_get_all_async_fds(SSL
 *s, OSSL_ASYNC_FD *fds, size_t *numfds);
__owur int SSL_get_changed_async_fds(SSL *s, OSSL_ASYNC_FD *addfd,
   size_t *numaddfds, OSSL_ASYNC_FD *delfd,
   size_t *numdelfds);
__owur int SSL_CTX_set_async_callback(SSL_CTX *ctx, SSL_async_callback_fn callback);
__owur int SSL_CTX_set_async_callback_arg(SSL_CTX *ctx, void *arg);
__owur int SSL_set_async_callback(SSL *s, SSL_async_callback_fn callback);
__owur int SSL_set_async_callback_arg(SSL *s, void *arg);
__owur int SSL_get_async_status(SSL *s, int *status);

#endif
__owur int SSL_accept(SSL *ssl);
__owur int SSL_stateless(SSL *s);
__owur int SSL_connect(SSL *ssl);
__owur int SSL_read(SSL *ssl, void *buf, int num);
__owur int SSL_read_ex(SSL *ssl, void *buf, size_t num, size_t *readbytes);

#define SSL_READ_EARLY_DATA_ERROR 0
#define SSL_READ_EARLY_DATA_SUCCESS 1
#define SSL_READ_EARLY_DATA_FINISH 2

__owur int SSL_read_early_data(SSL *s, void *buf, size_t num,
   size_t *readbytes);
__owur int SSL_peek(SSL
```

```
 *ssl, void *buf, int num);
__owur int SSL_peek_ex(SSL *ssl, void *buf, size_t num, size_t *readbytes);
__owur ossl_ssize_t SSL_sendfile(SSL *s, int fd, off_t offset, size_t size,
   int flags);
__owur int SSL_write(SSL *ssl, const void *buf, int num);
__owur int SSL_write_ex(SSL *s, const void *buf, size_t num, size_t *written);
__owur int SSL_write_early_data(SSL *s, const void *buf, size_t num,
   size_t *written);
long SSL_ctrl(SSL *ssl, int cmd, long larg, void *parg);
long SSL_callback_ctrl(SSL *, int, void (*)(void));
long SSL_CTX_ctrl(SSL_CTX *ctx, int cmd, long larg, void *parg);
long SSL_CTX_callback_ctrl(SSL_CTX *, int, void (*)(void));

#define SSL_WRITE_FLAG_CONCLUDE (1U << 0)

__owur int SSL_write_ex2(SSL *s, const void *buf, size_t num,
   uint64_t flags,
   size_t *written);

#define SSL_EARLY_DATA_NOT_SENT 0
#define SSL_EARLY_DATA_REJECTED 1
#define SSL_EARLY_DATA_ACCEPTED 2

__owur int SSL_get_early_data_status(const SSL *s);

__owur int SSL_get_error(const SSL *s,
 int ret_code);
__owur const char *SSL_get_version(const SSL *s);
__owur int SSL_get_handshake_rtt(const SSL *s, uint64_t *rtt);

/* This sets the 'default' SSL version that SSL_new() will create */
#ifndef OPENSSL_NO_DEPRECATED_3_0
OSSL_DEPRECATEDIN_3_0
__owur int SSL_CTX_set_ssl_version(SSL_CTX *ctx, const SSL_METHOD *meth);
#endif

#ifndef OPENSSL_NO_SSL3_METHOD
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *SSLv3_method(void); /* SSLv3 */
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *SSLv3_server_method(void);
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *SSLv3_client_method(void);
#endif
#endif

#define SSLv23_method TLS_method
#define SSLv23_server_method TLS_server_method
#define SSLv23_client_method TLS_client_method
```

```
/* Negotiate highest available SSL/TLS version */
__owur const SSL_METHOD *TLS_method(void);
__owur const SSL_METHOD *TLS_server_method(void);
__owur const SSL_METHOD *TLS_client_method(void);

#ifndef OPENSSL_NO_TLS1_METHOD
#ifndef
 OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_method(void); /* TLSv1.0 */
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_server_method(void);
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_client_method(void);
#endif
#endif

#ifndef OPENSSL_NO_TLS1_1_METHOD
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_1_method(void); /* TLSv1.1 */
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_1_server_method(void);
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_1_client_method(void);
#endif
#endif

#ifndef OPENSSL_NO_TLS1_2_METHOD
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_2_method(void); /* TLSv1.2 */
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_2_server_method(void);
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *TLSv1_2_client_method(void);
#endif
#endif

#ifndef OPENSSL_NO_DTLS1_METHOD
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0
 __owur const SSL_METHOD *DTLSv1_method(void); /* DTLSv1.0 */
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *DTLSv1_server_method(void);
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *DTLSv1_client_method(void);
#endif
#endif

#ifndef OPENSSL_NO_DTLS1_2_METHOD
/* DTLSv1.2 */
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *DTLSv1_2_method(void);
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *DTLSv1_2_server_method(void);
OSSL_DEPRECATEDIN_1_1_0 __owur const SSL_METHOD *DTLSv1_2_client_method(void);
#endif
#endif
```

```
__owur const SSL_METHOD *DTLS_method(void); /* DTLS 1.0 and 1.2 */
__owur const SSL_METHOD *DTLS_server_method(void); /* DTLS 1.0 and 1.2 */
__owur const SSL_METHOD *DTLS_client_method(void); /* DTLS 1.0 and 1.2 */

__owur size_t DTLS_get_data_mtu(const SSL *s);

__owur STACK_OF(SSL_CIPHER) *SSL_get_ciphers(const SSL *s);
__owur STACK_OF(SSL_CIPHER) *SSL_CTX_get_ciphers(const SSL_CTX *ctx);
__owur STACK_OF(SSL_CIPHER)
 *SSL_get_client_ciphers(const SSL *s);
__owur STACK_OF(SSL_CIPHER) *SSL_get1_supported_ciphers(SSL *s);

__owur int SSL_do_handshake(SSL *s);
int SSL_key_update(SSL *s, int updatetype);
int SSL_get_key_update_type(const SSL *s);
int SSL_renegotiate(SSL *s);
int SSL_renegotiate_abbreviated(SSL *s);
__owur int SSL_renegotiate_pending(const SSL *s);
int SSL_new_session_ticket(SSL *s);
int SSL_shutdown(SSL *s);
__owur int SSL_verify_client_post_handshake(SSL *s);
void SSL_CTX_set_post_handshake_auth(SSL_CTX *ctx, int val);
void SSL_set_post_handshake_auth(SSL *s, int val);

__owur const SSL_METHOD *SSL_CTX_get_ssl_method(const SSL_CTX *ctx);
__owur const SSL_METHOD *SSL_get_ssl_method(const SSL *s);
__owur int SSL_set_ssl_method(SSL *s, const SSL_METHOD *method);
__owur const char *SSL_alert_type_string_long(int value);
__owur const char *SSL_alert_type_string(int value);
__owur const char *SSL_alert_desc_string_long(int value);
__owur const char *SSL_alert_desc_string(int value);

void
 SSL_set0_CA_list(SSL *s, STACK_OF(X509_NAME) *name_list);
void SSL_CTX_set0_CA_list(SSL_CTX *ctx, STACK_OF(X509_NAME) *name_list);
__owur const STACK_OF(X509_NAME) *SSL_get0_CA_list(const SSL *s);
__owur const STACK_OF(X509_NAME) *SSL_CTX_get0_CA_list(const SSL_CTX *ctx);
__owur int SSL_add1_to_CA_list(SSL *ssl, const X509 *x);
__owur int SSL_CTX_add1_to_CA_list(SSL_CTX *ctx, const X509 *x);
__owur const STACK_OF(X509_NAME) *SSL_get0_peer_CA_list(const SSL *s);

void SSL_set_client_CA_list(SSL *s, STACK_OF(X509_NAME) *name_list);
void SSL_CTX_set_client_CA_list(SSL_CTX *ctx, STACK_OF(X509_NAME) *name_list);
__owur STACK_OF(X509_NAME) *SSL_get_client_CA_list(const SSL *s);
__owur STACK_OF(X509_NAME) *SSL_CTX_get_client_CA_list(const SSL_CTX *s);
__owur int SSL_add_client_CA(SSL *ssl, X509 *x);
__owur int SSL_CTX_add_client_CA(SSL_CTX *ctx, X509 *x);
```

```
void SSL_set_connect_state(SSL *s);
void SSL_set_accept_state(SSL *s);

__owur long SSL_get_default_timeout(const SSL *s);

#ifndef
 OPENSSL_NO_DEPRECATED_1_1_0
#define SSL_library_init() OPENSSL_init_ssl(0, NULL)
#endif

__owur char *SSL_CIPHER_description(const SSL_CIPHER *, char *buf, int size);
__owur STACK_OF(X509_NAME) *SSL_dup_CA_list(const STACK_OF(X509_NAME) *sk);

__owur SSL *SSL_dup(SSL *ssl);

__owur X509 *SSL_get_certificate(const SSL *ssl);
/*
* EVP_PKEY
*/
struct evp_pkey_st *SSL_get_privatekey(const SSL *ssl);

__owur X509 *SSL_CTX_get0_certificate(const SSL_CTX *ctx);
__owur EVP_PKEY *SSL_CTX_get0_privatekey(const SSL_CTX *ctx);

void SSL_CTX_set_quiet_shutdown(SSL_CTX *ctx, int mode);
__owur int SSL_CTX_get_quiet_shutdown(const SSL_CTX *ctx);
void SSL_set_quiet_shutdown(SSL *ssl, int mode);
__owur int SSL_get_quiet_shutdown(const SSL *ssl);
void SSL_set_shutdown(SSL *ssl, int mode);
__owur int SSL_get_shutdown(const SSL *ssl);
__owur int SSL_version(const SSL *ssl);
__owur int SSL_client_version(const SSL *s);
__owur int SSL_CTX_set_default_verify_paths(SSL_CTX *ctx);
__owur int SSL_CTX_set_default_verify_dir(SSL_CTX
 *ctx);
__owur int SSL_CTX_set_default_verify_file(SSL_CTX *ctx);
__owur int SSL_CTX_set_default_verify_store(SSL_CTX *ctx);
__owur int SSL_CTX_load_verify_file(SSL_CTX *ctx, const char *CAfile);
__owur int SSL_CTX_load_verify_dir(SSL_CTX *ctx, const char *CApath);
__owur int SSL_CTX_load_verify_store(SSL_CTX *ctx, const char *CAstore);
__owur int SSL_CTX_load_verify_locations(SSL_CTX *ctx,
   const char *CAfile,
   const char *CApath);
#define SSL_get0_session SSL_get_session /* just peek at pointer */
__owur SSL_SESSION *SSL_get_session(const SSL *ssl);
__owur SSL_SESSION *SSL_get1_session(SSL *ssl); /* obtain a reference count */
__owur SSL_CTX *SSL_get_SSL_CTX(const SSL *ssl);
SSL_CTX *SSL_set_SSL_CTX(SSL *ssl, SSL_CTX *ctx);
```

```
void SSL_set_info_callback(SSL *ssl,
   void (*cb)(const SSL *ssl, int type, int val));
void (*SSL_get_info_callback(const SSL *ssl))(const SSL *ssl, int type,
   int val);
__owur OSSL_HANDSHAKE_STATE SSL_get_state(const SSL *ssl);

void
 SSL_set_verify_result(SSL *ssl, long v);
__owur long SSL_get_verify_result(const SSL *ssl);
__owur STACK_OF(X509) *SSL_get0_verified_chain(const SSL *s);

__owur size_t SSL_get_client_random(const SSL *ssl, unsigned char *out,
   size_t outlen);
__owur size_t SSL_get_server_random(const SSL *ssl, unsigned char *out,
   size_t outlen);
__owur size_t SSL_SESSION_get_master_key(const SSL_SESSION *sess,
   unsigned char *out, size_t outlen);
__owur int SSL_SESSION_set1_master_key(SSL_SESSION *sess,
   const unsigned char *in, size_t len);
uint8_t SSL_SESSION_get_max_fragment_length(const SSL_SESSION *sess);

#define SSL_get_ex_new_index(l, p, newf, dupf, freef) \
   CRYPTO_get_ex_new_index(CRYPTO_EX_INDEX_SSL, l, p, newf, dupf, freef)
__owur int SSL_set_ex_data(SSL *ssl, int idx, void *data);
void *SSL_get_ex_data(const SSL *ssl, int idx);
#define SSL_SESSION_get_ex_new_index(l, p, newf, dupf, freef) \
   CRYPTO_get_ex_new_index(CRYPTO_EX_INDEX_SSL_SESSION, l, p, newf, dupf,
 freef)
__owur int SSL_SESSION_set_ex_data(SSL_SESSION *ss, int idx, void *data);
void *SSL_SESSION_get_ex_data(const SSL_SESSION *ss, int idx);
#define SSL_CTX_get_ex_new_index(l, p, newf, dupf, freef) \
   CRYPTO_get_ex_new_index(CRYPTO_EX_INDEX_SSL_CTX, l, p, newf, dupf, freef)
__owur int SSL_CTX_set_ex_data(SSL_CTX *ssl, int idx, void *data);
void *SSL_CTX_get_ex_data(const SSL_CTX *ssl, int idx);

__owur int SSL_get_ex_data_X509_STORE_CTX_idx(void);

#define SSL_CTX_sess_set_cache_size(ctx, t) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_SESS_CACHE_SIZE, t, NULL)
#define SSL_CTX_sess_get_cache_size(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_SESS_CACHE_SIZE, 0, NULL)
#define SSL_CTX_set_session_cache_mode(ctx, m) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_SESS_CACHE_MODE, m, NULL)
#define SSL_CTX_get_session_cache_mode(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_SESS_CACHE_MODE, 0, NULL)

#define SSL_CTX_get_default_read_ahead(ctx) SSL_CTX_get_read_ahead(ctx)
#define SSL_CTX_set_default_read_ahead(ctx,
```

```
 m) SSL_CTX_set_read_ahead(ctx, m)
#define SSL_CTX_get_read_ahead(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_READ_AHEAD, 0, NULL)
#define SSL_CTX_set_read_ahead(ctx, m) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_READ_AHEAD, m, NULL)
#define SSL_CTX_get_max_cert_list(ctx) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_GET_MAX_CERT_LIST, 0, NULL)
#define SSL_CTX_set_max_cert_list(ctx, m) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_MAX_CERT_LIST, m, NULL)
#define SSL_get_max_cert_list(ssl) \
   SSL_ctrl(ssl, SSL_CTRL_GET_MAX_CERT_LIST, 0, NULL)
#define SSL_set_max_cert_list(ssl, m) \
   SSL_ctrl(ssl, SSL_CTRL_SET_MAX_CERT_LIST, m, NULL)

#define SSL_CTX_set_max_send_fragment(ctx, m) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_MAX_SEND_FRAGMENT, m, NULL)
#define SSL_set_max_send_fragment(ssl, m) \
   SSL_ctrl(ssl, SSL_CTRL_SET_MAX_SEND_FRAGMENT, m, NULL)
#define SSL_CTX_set_split_send_fragment(ctx, m) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_SPLIT_SEND_FRAGMENT, m, NULL)
#define SSL_set_split_send_fragment(ssl, m) \

   SSL_ctrl(ssl, SSL_CTRL_SET_SPLIT_SEND_FRAGMENT, m, NULL)
#define SSL_CTX_set_max_pipelines(ctx, m) \
   SSL_CTX_ctrl(ctx, SSL_CTRL_SET_MAX_PIPELINES, m, NULL)
#define SSL_set_max_pipelines(ssl, m) \
   SSL_ctrl(ssl, SSL_CTRL_SET_MAX_PIPELINES, m, NULL)
#define SSL_set_retry_verify(ssl) \
   (SSL_ctrl(ssl, SSL_CTRL_SET_RETRY_VERIFY, 0, NULL) > 0)

void SSL_CTX_set_default_read_buffer_len(SSL_CTX *ctx, size_t len);
void SSL_set_default_read_buffer_len(SSL *s, size_t len);

#ifndef OPENSSL_NO_DH
#ifndef OPENSSL_NO_DEPRECATED_3_0
/* NB: the |keylength| is only applicable when is_export is true */
OSSL_DEPRECATEDIN_3_0
void SSL_CTX_set_tmp_dh_callback(SSL_CTX *ctx,
   DH *(*dh)(SSL *ssl, int is_export,
       int keylength));
OSSL_DEPRECATEDIN_3_0
void SSL_set_tmp_dh_callback(SSL *ssl,
   DH *(*dh)(SSL *ssl, int is_export,
       int keylength));
#endif
#endif

__owur const COMP_METHOD *SSL_get_current_compression(const SSL *s);
```

```
__owur const COMP_METHOD *SSL_get_current_expansion(const
 SSL *s);
__owur const char *SSL_COMP_get_name(const COMP_METHOD *comp);
__owur const char *SSL_COMP_get0_name(const SSL_COMP *comp);
__owur int SSL_COMP_get_id(const SSL_COMP *comp);
STACK_OF(SSL_COMP) *SSL_COMP_get_compression_methods(void);
__owur STACK_OF(SSL_COMP) *SSL_COMP_set0_compression_methods(STACK_OF(SSL_COMP)
      *meths);
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define SSL_COMP_free_compression_methods() \
   while (0)                           \
   continue
#endif
__owur int SSL_COMP_add_compression_method(int id, COMP_METHOD *cm);

const SSL_CIPHER *SSL_CIPHER_find(SSL *ssl, const unsigned char *ptr);
int SSL_CIPHER_get_cipher_nid(const SSL_CIPHER *c);
int SSL_CIPHER_get_digest_nid(const SSL_CIPHER *c);
int SSL_bytes_to_cipher_list(SSL *s, const unsigned char *bytes, size_t len,
   int isv2format, STACK_OF(SSL_CIPHER) **sk,
   STACK_OF(SSL_CIPHER) **scsvs);

/* TLS extensions functions */
__owur int SSL_set_session_ticket_ext(SSL *s, void *ext_data, int ext_len);

__owur
 int SSL_set_session_ticket_ext_cb(SSL *s,
   tls_session_ticket_ext_cb_fn cb,
   void *arg);

/* Pre-shared secret session resumption functions */
__owur int SSL_set_session_secret_cb(SSL *s,
   tls_session_secret_cb_fn session_secret_cb,
   void *arg);

void SSL_CTX_set_not_resumable_session_callback(SSL_CTX *ctx,
   int (*cb)(SSL *ssl,
      int
         is_forward_secure));

void SSL_set_not_resumable_session_callback(SSL *ssl,
   int (*cb)(SSL *ssl,
      int is_forward_secure));

void SSL_CTX_set_record_padding_callback(SSL_CTX *ctx,
   size_t (*cb)(SSL *ssl, int type,
      size_t len, void *arg));
void SSL_CTX_set_record_padding_callback_arg(SSL_CTX *ctx, void *arg);
```

```
void *SSL_CTX_get_record_padding_callback_arg(const SSL_CTX *ctx);
int SSL_CTX_set_block_padding(SSL_CTX *ctx, size_t block_size);
int SSL_CTX_set_block_padding_ex(SSL_CTX *ctx, size_t app_block_size,
   size_t hs_block_size);

int SSL_set_record_padding_callback(SSL *ssl,
   size_t (*cb)(SSL
 *ssl, int type,
       size_t len, void *arg));
void SSL_set_record_padding_callback_arg(SSL *ssl, void *arg);
void *SSL_get_record_padding_callback_arg(const SSL *ssl);
int SSL_set_block_padding(SSL *ssl, size_t block_size);
int SSL_set_block_padding_ex(SSL *ssl, size_t app_block_size,
   size_t hs_block_size);
int SSL_set_num_tickets(SSL *s, size_t num_tickets);
size_t SSL_get_num_tickets(const SSL *s);
int SSL_CTX_set_num_tickets(SSL_CTX *ctx, size_t num_tickets);
size_t SSL_CTX_get_num_tickets(const SSL_CTX *ctx);

/* QUIC support */
int SSL_handle_events(SSL *s);
__owur int SSL_get_event_timeout(SSL *s, struct timeval *tv, int *is_infinite);
__owur int SSL_get_rpoll_descriptor(SSL *s, BIO_POLL_DESCRIPTOR *desc);
__owur int SSL_get_wpoll_descriptor(SSL *s, BIO_POLL_DESCRIPTOR *desc);
__owur int SSL_net_read_desired(SSL *s);
__owur int SSL_net_write_desired(SSL *s);
__owur int SSL_set_blocking_mode(SSL *s, int blocking);
__owur int SSL_get_blocking_mode(SSL *s);
__owur int
 SSL_set1_initial_peer_addr(SSL *s, const BIO_ADDR *peer_addr);
__owur SSL *SSL_get0_connection(SSL *s);
__owur int SSL_is_connection(SSL *s);

__owur int SSL_is_listener(SSL *ssl);
__owur SSL *SSL_get0_listener(SSL *s);
#define SSL_LISTENER_FLAG_NO_VALIDATE (1UL << 1)
__owur SSL *SSL_new_listener(SSL_CTX *ctx, uint64_t flags);
__owur SSL *SSL_new_listener_from(SSL *ssl, uint64_t flags);
__owur SSL *SSL_new_from_listener(SSL *ssl, uint64_t flags);
#define SSL_ACCEPT_CONNECTION_NO_BLOCK (1UL << 0)
__owur SSL *SSL_accept_connection(SSL *ssl, uint64_t flags);
__owur size_t SSL_get_accept_connection_queue_len(SSL *ssl);
__owur int SSL_listen(SSL *ssl);

__owur int SSL_is_domain(SSL *s);
__owur SSL *SSL_get0_domain(SSL *s);
__owur SSL *SSL_new_domain(SSL_CTX *ctx, uint64_t flags);
```

```
#define SSL_DOMAIN_FLAG_SINGLE_THREAD (1U << 0)
#define SSL_DOMAIN_FLAG_MULTI_THREAD (1U << 1)
#define SSL_DOMAIN_FLAG_THREAD_ASSISTED (1U << 2)
#define SSL_DOMAIN_FLAG_BLOCKING (1U << 3)
#define SSL_DOMAIN_FLAG_LEGACY_BLOCKING
 (1U << 4)

__owur int SSL_CTX_set_domain_flags(SSL_CTX *ctx, uint64_t domain_flags);
__owur int SSL_CTX_get_domain_flags(const SSL_CTX *ctx, uint64_t *domain_flags);
__owur int SSL_get_domain_flags(const SSL *ssl, uint64_t *domain_flags);

#define SSL_STREAM_TYPE_NONE 0
#define SSL_STREAM_TYPE_READ (1U << 0)
#define SSL_STREAM_TYPE_WRITE (1U << 1)
#define SSL_STREAM_TYPE_BIDI (SSL_STREAM_TYPE_READ | SSL_STREAM_TYPE_WRITE)
__owur int SSL_get_stream_type(SSL *s);

__owur uint64_t SSL_get_stream_id(SSL *s);
__owur int SSL_is_stream_local(SSL *s);

#define SSL_DEFAULT_STREAM_MODE_NONE 0
#define SSL_DEFAULT_STREAM_MODE_AUTO_BIDI 1
#define SSL_DEFAULT_STREAM_MODE_AUTO_UNI 2
__owur int SSL_set_default_stream_mode(SSL *s, uint32_t mode);

#define SSL_STREAM_FLAG_UNI (1U << 0)
#define SSL_STREAM_FLAG_NO_BLOCK (1U << 1)
#define SSL_STREAM_FLAG_ADVANCE (1U << 2)
__owur SSL *SSL_new_stream(SSL *s, uint64_t flags);

#define SSL_INCOMING_STREAM_POLICY_AUTO 0
#define SSL_INCOMING_STREAM_POLICY_ACCEPT
 1
#define SSL_INCOMING_STREAM_POLICY_REJECT 2
__owur int SSL_set_incoming_stream_policy(SSL *s, int policy, uint64_t aec);

#define SSL_ACCEPT_STREAM_NO_BLOCK (1U << 0)
__owur SSL *SSL_accept_stream(SSL *s, uint64_t flags);
__owur size_t SSL_get_accept_stream_queue_len(SSL *s);

#ifndef OPENSSL_NO_QUIC
__owur int SSL_inject_net_dgram(SSL *s, const unsigned char *buf,
   size_t buf_len,
   const BIO_ADDR *peer,
   const BIO_ADDR *local);
#endif

typedef struct ssl_shutdown_ex_args_st {
```

```
   uint64_t quic_error_code;
   const char *quic_reason;
} SSL_SHUTDOWN_EX_ARGS;

#define SSL_SHUTDOWN_FLAG_RAPID (1U << 0)
#define SSL_SHUTDOWN_FLAG_NO_STREAM_FLUSH (1U << 1)
#define SSL_SHUTDOWN_FLAG_NO_BLOCK (1U << 2)
#define SSL_SHUTDOWN_FLAG_WAIT_PEER (1U << 3)

__owur int SSL_shutdown_ex(SSL *ssl, uint64_t flags,
   const SSL_SHUTDOWN_EX_ARGS *args,
   size_t args_len);

__owur int SSL_stream_conclude(SSL *ssl, uint64_t flags);

typedef struct ssl_stream_reset_args_st {
   uint64_t
 quic_error_code;
} SSL_STREAM_RESET_ARGS;

__owur int SSL_stream_reset(SSL *ssl,
   const SSL_STREAM_RESET_ARGS *args,
   size_t args_len);

#define SSL_STREAM_STATE_NONE 0
#define SSL_STREAM_STATE_OK 1
#define SSL_STREAM_STATE_WRONG_DIR 2
#define SSL_STREAM_STATE_FINISHED 3
#define SSL_STREAM_STATE_RESET_LOCAL 4
#define SSL_STREAM_STATE_RESET_REMOTE 5
#define SSL_STREAM_STATE_CONN_CLOSED 6
__owur int SSL_get_stream_read_state(SSL *ssl);
__owur int SSL_get_stream_write_state(SSL *ssl);

__owur int SSL_get_stream_read_error_code(SSL *ssl, uint64_t *app_error_code);
__owur int SSL_get_stream_write_error_code(SSL *ssl, uint64_t *app_error_code);

#define SSL_CONN_CLOSE_FLAG_LOCAL (1U << 0)
#define SSL_CONN_CLOSE_FLAG_TRANSPORT (1U << 1)

typedef struct ssl_conn_close_info_st {
   uint64_t error_code, frame_type;
   const char *reason;
   size_t reason_len;
   uint32_t flags;
} SSL_CONN_CLOSE_INFO;

__owur int SSL_get_conn_close_info(SSL *ssl,
```

```
   SSL_CONN_CLOSE_INFO *info,
    size_t info_len);

#define SSL_VALUE_CLASS_GENERIC 0
#define SSL_VALUE_CLASS_FEATURE_REQUEST 1
#define SSL_VALUE_CLASS_FEATURE_PEER_REQUEST 2
#define SSL_VALUE_CLASS_FEATURE_NEGOTIATED 3

#define SSL_VALUE_NONE 0
#define SSL_VALUE_QUIC_STREAM_BIDI_LOCAL_AVAIL 1
#define SSL_VALUE_QUIC_STREAM_BIDI_REMOTE_AVAIL 2
#define SSL_VALUE_QUIC_STREAM_UNI_LOCAL_AVAIL 3
#define SSL_VALUE_QUIC_STREAM_UNI_REMOTE_AVAIL 4
#define SSL_VALUE_QUIC_IDLE_TIMEOUT 5
#define SSL_VALUE_EVENT_HANDLING_MODE 6
#define SSL_VALUE_STREAM_WRITE_BUF_SIZE 7
#define SSL_VALUE_STREAM_WRITE_BUF_USED 8
#define SSL_VALUE_STREAM_WRITE_BUF_AVAIL 9

#define SSL_VALUE_EVENT_HANDLING_MODE_INHERIT 0
#define SSL_VALUE_EVENT_HANDLING_MODE_IMPLICIT 1
#define SSL_VALUE_EVENT_HANDLING_MODE_EXPLICIT 2

int SSL_get_value_uint(SSL *s, uint32_t class_, uint32_t id, uint64_t *v);
int SSL_set_value_uint(SSL *s, uint32_t class_, uint32_t id, uint64_t v);

#define SSL_get_generic_value_uint(ssl, id, v) \
   SSL_get_value_uint((ssl), SSL_VALUE_CLASS_GENERIC,
 (id), (v))
#define SSL_set_generic_value_uint(ssl, id, v) \
   SSL_set_value_uint((ssl), SSL_VALUE_CLASS_GENERIC, (id), (v))
#define SSL_get_feature_request_uint(ssl, id, v) \
   SSL_get_value_uint((ssl), SSL_VALUE_CLASS_FEATURE_REQUEST, (id), (v))
#define SSL_set_feature_request_uint(ssl, id, v) \
   SSL_set_value_uint((ssl), SSL_VALUE_CLASS_FEATURE_REQUEST, (id), (v))
#define SSL_get_feature_peer_request_uint(ssl, id, v) \
   SSL_get_value_uint((ssl), SSL_VALUE_CLASS_FEATURE_PEER_REQUEST, (id), (v))
#define SSL_get_feature_negotiated_uint(ssl, id, v) \
   SSL_get_value_uint((ssl), SSL_VALUE_CLASS_FEATURE_NEGOTIATED, (id), (v))

#define SSL_get_quic_stream_bidi_local_avail(ssl, value)                    \
   SSL_get_generic_value_uint((ssl), SSL_VALUE_QUIC_STREAM_BIDI_LOCAL_AVAIL, \
      (value))
#define SSL_get_quic_stream_bidi_remote_avail(ssl, value)                    \
   SSL_get_generic_value_uint((ssl), SSL_VALUE_QUIC_STREAM_BIDI_REMOTE_AVAIL, \
       (value))
#define SSL_get_quic_stream_uni_local_avail(ssl, value)                    \
   SSL_get_generic_value_uint((ssl), SSL_VALUE_QUIC_STREAM_UNI_LOCAL_AVAIL, \
```

```
    (value))
#define SSL_get_quic_stream_uni_remote_avail(ssl, value)                \
  SSL_get_generic_value_uint((ssl), SSL_VALUE_QUIC_STREAM_UNI_REMOTE_AVAIL, \
    (value))

#define SSL_get_event_handling_mode(ssl, value)                \
  SSL_get_generic_value_uint((ssl), SSL_VALUE_EVENT_HANDLING_MODE, \
    (value))
#define SSL_set_event_handling_mode(ssl, value)                \
  SSL_set_generic_value_uint((ssl), SSL_VALUE_EVENT_HANDLING_MODE, \
    (value))

#define SSL_get_stream_write_buf_size(ssl, value)                \
  SSL_get_generic_value_uint((ssl), SSL_VALUE_STREAM_WRITE_BUF_SIZE, \
    (value))
#define SSL_get_stream_write_buf_used(ssl, value)                \
  SSL_get_generic_value_uint((ssl), SSL_VALUE_STREAM_WRITE_BUF_USED, \
     (value))
#define SSL_get_stream_write_buf_avail(ssl, value)                \
  SSL_get_generic_value_uint((ssl), SSL_VALUE_STREAM_WRITE_BUF_AVAIL, \
    (value))

#define SSL_POLL_EVENT_NONE 0

#define SSL_POLL_EVENT_F (1U << 0) /* F   (Failure) */
#define SSL_POLL_EVENT_EL (1U << 1) /* EL  (Exception on Listener) */
#define SSL_POLL_EVENT_EC (1U << 2) /* EC  (Exception on Conn) */
#define SSL_POLL_EVENT_ECD (1U << 3) /* ECD (Exception on Conn Drained) */
#define SSL_POLL_EVENT_ER (1U << 4) /* ER  (Exception on Read) */
#define SSL_POLL_EVENT_EW (1U << 5) /* EW  (Exception on Write) */
#define SSL_POLL_EVENT_R (1U << 6) /* R   (Readable) */
#define SSL_POLL_EVENT_W (1U << 7) /* W   (Writable) */
#define SSL_POLL_EVENT_IC (1U << 8) /* IC  (Incoming Connection) */
#define SSL_POLL_EVENT_ISB (1U << 9) /* ISB (Incoming Stream: Bidi) */
#define SSL_POLL_EVENT_ISU (1U << 10) /* ISU (Incoming Stream: Uni) */
#define SSL_POLL_EVENT_OSB (1U << 11) /* OSB (Outgoing Stream: Bidi)
 */
#define SSL_POLL_EVENT_OSU (1U << 12) /* OSU (Outgoing Stream: Uni) */

#define SSL_POLL_EVENT_RW (SSL_POLL_EVENT_R | SSL_POLL_EVENT_W)
#define SSL_POLL_EVENT_RE (SSL_POLL_EVENT_R | SSL_POLL_EVENT_ER)
#define SSL_POLL_EVENT_WE (SSL_POLL_EVENT_W | SSL_POLL_EVENT_EW)
#define SSL_POLL_EVENT_RWE (SSL_POLL_EVENT_RE | SSL_POLL_EVENT_WE)
#define SSL_POLL_EVENT_E (SSL_POLL_EVENT_EL | SSL_POLL_EVENT_EC \
  | SSL_POLL_EVENT_ER | SSL_POLL_EVENT_EW)
#define SSL_POLL_EVENT_IS (SSL_POLL_EVENT_ISB | SSL_POLL_EVENT_ISU)
#define SSL_POLL_EVENT_ISE (SSL_POLL_EVENT_IS | SSL_POLL_EVENT_EC)
#define SSL_POLL_EVENT_I (SSL_POLL_EVENT_IS | SSL_POLL_EVENT_IC)
```

```
#define SSL_POLL_EVENT_OS (SSL_POLL_EVENT_OSB | SSL_POLL_EVENT_OSU)
#define SSL_POLL_EVENT_OSE (SSL_POLL_EVENT_OS | SSL_POLL_EVENT_EC)

typedef struct ssl_poll_item_st {
   BIO_POLL_DESCRIPTOR desc;
   uint64_t events, revents;
} SSL_POLL_ITEM;

#define SSL_POLL_FLAG_NO_HANDLE_EVENTS (1U << 0)

__owur int SSL_poll(SSL_POLL_ITEM *items,
   size_t
 num_items,
   size_t stride,
   const struct timeval *timeout,
   uint64_t flags,
   size_t *result_count);

static ossl_inline ossl_unused BIO_POLL_DESCRIPTOR
SSL_as_poll_descriptor(SSL *s)
{
   BIO_POLL_DESCRIPTOR d;

   d.type = BIO_POLL_DESCRIPTOR_TYPE_SSL;
   d.value.ssl = s;
   return d;
}

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define SSL_cache_hit(s) SSL_session_reused(s)
#endif

__owur int SSL_session_reused(const SSL *s);
__owur int SSL_is_server(const SSL *s);

__owur __owur SSL_CONF_CTX *SSL_CONF_CTX_new(void);
int SSL_CONF_CTX_finish(SSL_CONF_CTX *cctx);
void SSL_CONF_CTX_free(SSL_CONF_CTX *cctx);
unsigned int SSL_CONF_CTX_set_flags(SSL_CONF_CTX *cctx, unsigned int flags);
__owur unsigned int SSL_CONF_CTX_clear_flags(SSL_CONF_CTX *cctx,
   unsigned int flags);
__owur int SSL_CONF_CTX_set1_prefix(SSL_CONF_CTX *cctx, const char *pre);

void SSL_CONF_CTX_set_ssl(SSL_CONF_CTX *cctx, SSL *ssl);
void SSL_CONF_CTX_set_ssl_ctx(SSL_CONF_CTX *cctx, SSL_CTX *ctx);

__owur int
```

```
 SSL_CONF_cmd(SSL_CONF_CTX *cctx, const char *cmd, const char *value);
__owur int SSL_CONF_cmd_argv(SSL_CONF_CTX *cctx, int *pargc, char ***pargv);
__owur int SSL_CONF_cmd_value_type(SSL_CONF_CTX *cctx, const char *cmd);

void SSL_add_ssl_module(void);
int SSL_config(SSL *s, const char *name);
int SSL_CTX_config(SSL_CTX *ctx, const char *name);

#ifndef OPENSSL_NO_SSL_TRACE
void SSL_trace(int write_p, int version, int content_type,
   const void *buf, size_t len, SSL *ssl, void *arg);
#endif

#ifndef OPENSSL_NO_SOCK
int DTLSv1_listen(SSL *s, BIO_ADDR *client);
#endif

#ifndef OPENSSL_NO_CT

/*
* A callback for verifying that the received SCTs are sufficient.
* Expected to return 1 if they are sufficient, otherwise 0.
* May return a negative integer if an error occurs.
* A connection should be aborted if the SCTs are deemed insufficient.
*/
typedef int (*ssl_ct_validation_cb)(const CT_POLICY_EVAL_CTX *ctx,
   const STACK_OF(SCT) *scts, void *arg);

/*
* Sets a |callback| that is
 invoked upon receipt of ServerHelloDone to validate
* the received SCTs.
* If the callback returns a non-positive result, the connection is terminated.
* Call this function before beginning a handshake.
* If a NULL |callback| is provided, SCT validation is disabled.
* |arg| is arbitrary userdata that will be passed to the callback whenever it
* is invoked. Ownership of |arg| remains with the caller.
*
* NOTE: A side-effect of setting a CT callback is that an OCSP stapled response
*       will be requested.
*/
int SSL_set_ct_validation_callback(SSL *s, ssl_ct_validation_cb callback,
   void *arg);
int SSL_CTX_set_ct_validation_callback(SSL_CTX *ctx,
   ssl_ct_validation_cb callback,
   void *arg);
#define SSL_disable_ct(s) \
   ((void)SSL_set_validation_callback((s), NULL, NULL))
```

```
#define SSL_CTX_disable_ct(ctx) \
   ((void)SSL_CTX_set_validation_callback((ctx), NULL, NULL))

/*
* The validation type enumerates the available behaviours of the built-in SSL
* CT validation
 callback selected via SSL_enable_ct() and SSL_CTX_enable_ct().
* The underlying callback is a static function in libssl.
*/
enum {
   SSL_CT_VALIDATION_PERMISSIVE = 0,
   SSL_CT_VALIDATION_STRICT
};

/*
* Enable CT by setting up a callback that implements one of the built-in
* validation variants.  The SSL_CT_VALIDATION_PERMISSIVE variant always
* continues the handshake, the application can make appropriate decisions at
* handshake completion.  The SSL_CT_VALIDATION_STRICT variant requires at
* least one valid SCT, or else handshake termination will be requested.  The
* handshake may continue anyway if SSL_VERIFY_NONE is in effect.
*/
int SSL_enable_ct(SSL *s, int validation_mode);
int SSL_CTX_enable_ct(SSL_CTX *ctx, int validation_mode);

/*
* Report whether a non-NULL callback is enabled.
*/
int SSL_ct_is_enabled(const SSL *s);
int SSL_CTX_ct_is_enabled(const SSL_CTX *ctx);

/* Gets the SCTs received from a connection */
const STACK_OF(SCT) *SSL_get0_peer_scts(SSL *s);

/*
 * Loads the CT log list from the default location.
* If a CTLOG_STORE has previously been set using SSL_CTX_set_ctlog_store,
* the log information loaded from this file will be appended to the
* CTLOG_STORE.
* Returns 1 on success, 0 otherwise.
*/
int SSL_CTX_set_default_ctlog_list_file(SSL_CTX *ctx);

/*
* Loads the CT log list from the specified file path.
* If a CTLOG_STORE has previously been set using SSL_CTX_set_ctlog_store,
* the log information loaded from this file will be appended to the
* CTLOG_STORE.
```

```
* Returns 1 on success, 0 otherwise.
*/
int SSL_CTX_set_ctlog_list_file(SSL_CTX *ctx, const char *path);

/*
* Sets the CT log list used by all SSL connections created from this SSL_CTX.
* Ownership of the CTLOG_STORE is transferred to the SSL_CTX.
*/
void SSL_CTX_set0_ctlog_store(SSL_CTX *ctx, CTLOG_STORE *logs);

/*
* Gets the CT log list used by all SSL connections created from this SSL_CTX.
* This will be NULL unless one of the following functions has
 been called:
* - SSL_CTX_set_default_ctlog_list_file
* - SSL_CTX_set_ctlog_list_file
* - SSL_CTX_set_ctlog_store
*/
const CTLOG_STORE *SSL_CTX_get0_ctlog_store(const SSL_CTX *ctx);

#endif /* OPENSSL_NO_CT */

/* What the "other" parameter contains in security callback */
/* Mask for type */
#define SSL_SECOP_OTHER_TYPE 0xffff0000
#define SSL_SECOP_OTHER_NONE 0
#define SSL_SECOP_OTHER_CIPHER (1 << 16)
#define SSL_SECOP_OTHER_CURVE (2 << 16)
#define SSL_SECOP_OTHER_DH (3 << 16)
#define SSL_SECOP_OTHER_PKEY (4 << 16)
#define SSL_SECOP_OTHER_SIGALG (5 << 16)
#define SSL_SECOP_OTHER_CERT (6 << 16)

/* Indicated operation refers to peer key or certificate */
#define SSL_SECOP_PEER 0x1000

/* Values for "op" parameter in security callback */

/* Called to filter ciphers */
/* Ciphers client supports */
#define SSL_SECOP_CIPHER_SUPPORTED (1 | SSL_SECOP_OTHER_CIPHER)
/* Cipher shared by client/server */
#define SSL_SECOP_CIPHER_SHARED (2 | SSL_SECOP_OTHER_CIPHER)
/* Sanity check of cipher
 server selects */
#define SSL_SECOP_CIPHER_CHECK (3 | SSL_SECOP_OTHER_CIPHER)
/* Curves supported by client */
#define SSL_SECOP_CURVE_SUPPORTED (4 | SSL_SECOP_OTHER_CURVE)
```

```
/* Curves shared by client/server */
#define SSL_SECOP_CURVE_SHARED (5 | SSL_SECOP_OTHER_CURVE)
/* Sanity check of curve server selects */
#define SSL_SECOP_CURVE_CHECK (6 | SSL_SECOP_OTHER_CURVE)
/* Temporary DH key */
#define SSL_SECOP_TMP_DH (7 | SSL_SECOP_OTHER_PKEY)
/* SSL/TLS version */
#define SSL_SECOP_VERSION (9 | SSL_SECOP_OTHER_NONE)
/* Session tickets */
#define SSL_SECOP_TICKET (10 | SSL_SECOP_OTHER_NONE)
/* Supported signature algorithms sent to peer */
#define SSL_SECOP_SIGALG_SUPPORTED (11 | SSL_SECOP_OTHER_SIGALG)
/* Shared signature algorithm */
#define SSL_SECOP_SIGALG_SHARED (12 | SSL_SECOP_OTHER_SIGALG)
/* Sanity check signature algorithm allowed */
#define SSL_SECOP_SIGALG_CHECK (13 | SSL_SECOP_OTHER_SIGALG)
/* Used to get mask of supported public key signature algorithms */
#define SSL_SECOP_SIGALG_MASK
 (14 | SSL_SECOP_OTHER_SIGALG)
/* Use to see if compression is allowed */
#define SSL_SECOP_COMPRESSION (15 | SSL_SECOP_OTHER_NONE)
/* EE key in certificate */
#define SSL_SECOP_EE_KEY (16 | SSL_SECOP_OTHER_CERT)
/* CA key in certificate */
#define SSL_SECOP_CA_KEY (17 | SSL_SECOP_OTHER_CERT)
/* CA digest algorithm in certificate */
#define SSL_SECOP_CA_MD (18 | SSL_SECOP_OTHER_CERT)
/* Peer EE key in certificate */
#define SSL_SECOP_PEER_EE_KEY (SSL_SECOP_EE_KEY | SSL_SECOP_PEER)
/* Peer CA key in certificate */
#define SSL_SECOP_PEER_CA_KEY (SSL_SECOP_CA_KEY | SSL_SECOP_PEER)
/* Peer CA digest algorithm in certificate */
#define SSL_SECOP_PEER_CA_MD (SSL_SECOP_CA_MD | SSL_SECOP_PEER)

void SSL_set_security_level(SSL *s, int level);
__owur int SSL_get_security_level(const SSL *s);
void SSL_set_security_callback(SSL *s,
   int (*cb)(const SSL *s, const SSL_CTX *ctx,
       int op, int bits, int nid,
       void *other, void *ex));
int (*SSL_get_security_callback(const SSL
 *s))(const SSL *s,
   const SSL_CTX *ctx, int op,
   int bits, int nid, void *other,
   void *ex);
void SSL_set0_security_ex_data(SSL *s, void *ex);
__owur void *SSL_get0_security_ex_data(const SSL *s);
```

```
void SSL_CTX_set_security_level(SSL_CTX *ctx, int level);
__owur int SSL_CTX_get_security_level(const SSL_CTX *ctx);
void SSL_CTX_set_security_callback(SSL_CTX *ctx,
  int (*cb)(const SSL *s, const SSL_CTX *ctx,
      int op, int bits, int nid,
      void *other, void *ex));
int (*SSL_CTX_get_security_callback(const SSL_CTX *ctx))(const SSL *s,
  const SSL_CTX *ctx,
  int op, int bits,
  int nid,
  void *other,
  void *ex);
void SSL_CTX_set0_security_ex_data(SSL_CTX *ctx, void *ex);
__owur void *SSL_CTX_get0_security_ex_data(const SSL_CTX *ctx);

/* OPENSSL_INIT flag 0x010000 reserved for internal use */
#define OPENSSL_INIT_NO_LOAD_SSL_STRINGS 0x00100000L
#define OPENSSL_INIT_LOAD_SSL_STRINGS 0x00200000L

#define OPENSSL_INIT_SSL_DEFAULT \
  (OPENSSL_INIT_LOAD_SSL_STRINGS
 | OPENSSL_INIT_LOAD_CRYPTO_STRINGS)

int OPENSSL_init_ssl(uint64_t opts, const OPENSSL_INIT_SETTINGS *settings);

#ifndef OPENSSL_NO_UNIT_TEST
__owur const struct openssl_ssl_test_functions *SSL_test_functions(void);
#endif

__owur int SSL_free_buffers(SSL *ssl);
__owur int SSL_alloc_buffers(SSL *ssl);

/* Status codes passed to the decrypt session ticket callback. Some of these
* are for internal use only and are never passed to the callback. */
typedef int SSL_TICKET_STATUS;

/* Support for ticket appdata */
/* fatal error, malloc failure */
#define SSL_TICKET_FATAL_ERR_MALLOC 0
/* fatal error, either from parsing or decrypting the ticket */
#define SSL_TICKET_FATAL_ERR_OTHER 1
/* No ticket present */
#define SSL_TICKET_NONE 2
/* Empty ticket present */
#define SSL_TICKET_EMPTY 3
/* the ticket couldn't be decrypted */
#define SSL_TICKET_NO_DECRYPT 4
/* a ticket was successfully decrypted */
```

```
#define SSL_TICKET_SUCCESS 5
/* same as above but the ticket needs to be renewed */
#define
 SSL_TICKET_SUCCESS_RENEW 6

/* Return codes for the decrypt session ticket callback */
typedef int SSL_TICKET_RETURN;

/* An error occurred */
#define SSL_TICKET_RETURN_ABORT 0
/* Do not use the ticket, do not send a renewed ticket to the client */
#define SSL_TICKET_RETURN_IGNORE 1
/* Do not use the ticket, send a renewed ticket to the client */
#define SSL_TICKET_RETURN_IGNORE_RENEW 2
/* Use the ticket, do not send a renewed ticket to the client */
#define SSL_TICKET_RETURN_USE 3
/* Use the ticket, send a renewed ticket to the client */
#define SSL_TICKET_RETURN_USE_RENEW 4

typedef int (*SSL_CTX_generate_session_ticket_fn)(SSL *s, void *arg);
typedef SSL_TICKET_RETURN (*SSL_CTX_decrypt_session_ticket_fn)(SSL *s, SSL_SESSION *ss,
   const unsigned char *keyname,
   size_t keyname_length,
   SSL_TICKET_STATUS status,
   void *arg);
int SSL_CTX_set_session_ticket_cb(SSL_CTX *ctx,
   SSL_CTX_generate_session_ticket_fn gen_cb,
   SSL_CTX_decrypt_session_ticket_fn dec_cb,
    void *arg);
int SSL_SESSION_set1_ticket_appdata(SSL_SESSION *ss, const void *data, size_t len);
int SSL_SESSION_get0_ticket_appdata(SSL_SESSION *ss, void **data, size_t *len);

typedef unsigned int (*DTLS_timer_cb)(SSL *s, unsigned int timer_us);

void DTLS_set_timer_cb(SSL *s, DTLS_timer_cb cb);

typedef int (*SSL_allow_early_data_cb_fn)(SSL *s, void *arg);
void SSL_CTX_set_allow_early_data_cb(SSL_CTX *ctx,
   SSL_allow_early_data_cb_fn cb,
   void *arg);
void SSL_set_allow_early_data_cb(SSL *s,
   SSL_allow_early_data_cb_fn cb,
   void *arg);

/* store the default cipher strings inside the library */
const char *OSSL_default_cipher_list(void);
const char *OSSL_default_ciphersuites(void);
```

```
/* RFC8879 Certificate compression APIs */

int SSL_CTX_compress_certs(SSL_CTX *ctx, int alg);
int SSL_compress_certs(SSL *ssl, int alg);

int SSL_CTX_set1_cert_comp_preference(SSL_CTX *ctx, int *algs, size_t len);
int SSL_set1_cert_comp_preference(SSL *ssl, int *algs, size_t len);

int SSL_CTX_set1_compressed_cert(SSL_CTX
 *ctx, int algorithm, unsigned char *comp_data,
   size_t comp_length, size_t orig_length);
int SSL_set1_compressed_cert(SSL *ssl, int algorithm, unsigned char *comp_data,
   size_t comp_length, size_t orig_length);
size_t SSL_CTX_get1_compressed_cert(SSL_CTX *ctx, int alg, unsigned char **data, size_t *orig_len);
size_t SSL_get1_compressed_cert(SSL *ssl, int alg, unsigned char **data, size_t *orig_len);

__owur int SSL_add_expected_rpk(SSL *s, EVP_PKEY *rpk);
__owur EVP_PKEY *SSL_get0_peer_rpk(const SSL *s);
__owur EVP_PKEY *SSL_SESSION_get0_peer_rpk(SSL_SESSION *s);
__owur int SSL_get_negotiated_client_cert_type(const SSL *s);
__owur int SSL_get_negotiated_server_cert_type(const SSL *s);

__owur int SSL_set1_client_cert_type(SSL *s, const unsigned char *val, size_t len);
__owur int SSL_set1_server_cert_type(SSL *s, const unsigned char *val, size_t len);
__owur int SSL_CTX_set1_client_cert_type(SSL_CTX *ctx, const unsigned char *val, size_t len);
__owur
 int SSL_CTX_set1_server_cert_type(SSL_CTX *ctx, const unsigned char *val, size_t len);
__owur int SSL_get0_client_cert_type(const SSL *s, unsigned char **t, size_t *len);
__owur int SSL_get0_server_cert_type(const SSL *s, unsigned char **t, size_t *len);
__owur int SSL_CTX_get0_client_cert_type(const SSL_CTX *ctx, unsigned char **t, size_t *len);
__owur int SSL_CTX_get0_server_cert_type(const SSL_CTX *s, unsigned char **t, size_t *len);

/*
* Protection level. For <= TLSv1.2 only "NONE" and "APPLICATION" are used.
*/
#define OSSL_RECORD_PROTECTION_LEVEL_NONE 0
#define OSSL_RECORD_PROTECTION_LEVEL_EARLY 1
#define OSSL_RECORD_PROTECTION_LEVEL_HANDSHAKE 2
#define OSSL_RECORD_PROTECTION_LEVEL_APPLICATION 3

int SSL_set_quic_tls_cbs(SSL *s, const OSSL_DISPATCH *qtdis, void *arg);
int SSL_set_quic_tls_transport_params(SSL *s,
   const unsigned char *params,
   size_t params_len);

int SSL_set_quic_tls_early_data_enabled(SSL *s, int enabled);

#ifdef __cplusplus
```

}
#endif
#endif
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* https://www.openssl.org/source/license.html
*/

```
#include "function.h"

extern int asn1parse_main(int argc, char *argv[]);
extern int ca_main(int argc, char *argv[]);
extern int ciphers_main(int argc, char *argv[]);
extern int cmp_main(int argc, char *argv[]);
extern int cms_main(int argc, char *argv[]);
extern int crl_main(int argc, char *argv[]);
extern int crl2pkcs7_main(int argc, char *argv[]);
extern int dgst_main(int argc, char *argv[]);
extern int dhparam_main(int argc, char *argv[]);
extern int dsa_main(int argc, char *argv[]);
extern int dsaparam_main(int argc, char *argv[]);
extern int ec_main(int argc, char *argv[]);
extern int ecparam_main(int
 argc, char *argv[]);
extern int enc_main(int argc, char *argv[]);
extern int engine_main(int argc, char *argv[]);
extern int errstr_main(int argc, char *argv[]);
extern int fipsinstall_main(int argc, char *argv[]);
extern int gendsa_main(int argc, char *argv[]);
extern int genpkey_main(int argc, char *argv[]);
extern int genrsa_main(int argc, char *argv[]);
extern int help_main(int argc, char *argv[]);
extern int info_main(int argc, char *argv[]);
extern int kdf_main(int argc, char *argv[]);
extern int list_main(int argc, char *argv[]);
extern int mac_main(int argc, char *argv[]);
extern int nseq_main(int argc, char *argv[]);
extern int ocsp_main(int argc, char *argv[]);
extern int passwd_main(int argc, char *argv[]);
extern int pkcs12_main(int argc, char *argv[]);
extern int pkcs7_main(int argc, char *argv[]);
extern int pkcs8_main(int argc, char *argv[]);
extern int pkey_main(int argc, char *argv[]);
extern int pkeyparam_main(int argc, char *argv[]);
extern int pkeyutl_main(int
 argc, char *argv[]);
extern int prime_main(int argc, char *argv[]);
extern int rand_main(int argc, char *argv[]);
extern int rehash_main(int argc, char *argv[]);
extern int req_main(int argc, char *argv[]);
extern int rsa_main(int argc, char *argv[]);
extern int rsautl_main(int argc, char *argv[]);
extern int s_client_main(int argc, char *argv[]);
extern int s_server_main(int argc, char *argv[]);
extern int s_time_main(int argc, char *argv[]);
```

```
extern int sess_id_main(int argc, char *argv[]);
extern int skeyutl_main(int argc, char *argv[]);
extern int smime_main(int argc, char *argv[]);
extern int speed_main(int argc, char *argv[]);
extern int spkac_main(int argc, char *argv[]);
extern int srp_main(int argc, char *argv[]);
extern int storeutl_main(int argc, char *argv[]);
extern int ts_main(int argc, char *argv[]);
extern int verify_main(int argc, char *argv[]);
extern int version_main(int argc, char *argv[]);
extern int x509_main(int argc, char *argv[]);

extern const OPTIONS asn1parse_options[];
extern
 const OPTIONS ca_options[];
extern const OPTIONS ciphers_options[];
extern const OPTIONS cmp_options[];
extern const OPTIONS cms_options[];
extern const OPTIONS crl_options[];
extern const OPTIONS crl2pkcs7_options[];
extern const OPTIONS dgst_options[];
extern const OPTIONS dhparam_options[];
extern const OPTIONS dsa_options[];
extern const OPTIONS dsaparam_options[];
extern const OPTIONS ec_options[];
extern const OPTIONS ecparam_options[];
extern const OPTIONS enc_options[];
extern const OPTIONS engine_options[];
extern const OPTIONS errstr_options[];
extern const OPTIONS fipsinstall_options[];
extern const OPTIONS gendsa_options[];
extern const OPTIONS genpkey_options[];
extern const OPTIONS genrsa_options[];
extern const OPTIONS help_options[];
extern const OPTIONS info_options[];
extern const OPTIONS kdf_options[];
extern const OPTIONS list_options[];
extern const OPTIONS mac_options[];
extern const OPTIONS nseq_options[];
extern const OPTIONS ocsp_options[];
extern
 const OPTIONS passwd_options[];
extern const OPTIONS pkcs12_options[];
extern const OPTIONS pkcs7_options[];
extern const OPTIONS pkcs8_options[];
extern const OPTIONS pkey_options[];
extern const OPTIONS pkeyparam_options[];
extern const OPTIONS pkeyutl_options[];
```

```
extern const OPTIONS prime_options[];
extern const OPTIONS rand_options[];
extern const OPTIONS rehash_options[];
extern const OPTIONS req_options[];
extern const OPTIONS rsa_options[];
extern const OPTIONS rsautl_options[];
extern const OPTIONS s_client_options[];
extern const OPTIONS s_server_options[];
extern const OPTIONS s_time_options[];
extern const OPTIONS sess_id_options[];
extern const OPTIONS skeyutl_options[];
extern const OPTIONS smime_options[];
extern const OPTIONS speed_options[];
extern const OPTIONS spkac_options[];
extern const OPTIONS srp_options[];
extern const OPTIONS storeutl_options[];
extern const OPTIONS ts_options[];
extern const OPTIONS verify_options[];
extern const OPTIONS version_options[];
extern
 const OPTIONS x509_options[];

extern FUNCTION functions[];
```

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```
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 'variables': {
   'openssl_sources': [
     'openssl/crypto/aes/aes_ecb.c',
     'openssl/crypto/aes/aes_misc.c',
     'openssl/crypto/bn/asm/x86_64-gcc.c',
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     'openssl/crypto/bn/bn_blind.c',
     'openssl/crypto/bn/bn_const.c',
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     'openssl/crypto/bn/bn_ctx.c',
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     'openssl/crypto/bn/bn_div.c',
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     'openssl/crypto/cmac/cmac.c',
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'openssl/crypto/ec/curve25519.c',
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'openssl/crypto/evp/mac_lib.c',
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'openssl/crypto/der_writer.c',

'openssl/crypto/ex_data.c',
'openssl/crypto/initthread.c',
'openssl/crypto/o_str.c',
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'openssl/crypto/provider_core.c',
'openssl/crypto/provider_predefined.c',
'openssl/crypto/self_test_core.c',
'openssl/crypto/sparse_array.c',
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'openssl/crypto/threads_none.c',
'openssl/crypto/threads_pthread.c',
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'openssl/crypto/modes/cbc128.c',
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'openssl/crypto/modes/ctr128.c',
'openssl/crypto/modes/gcm128.c',
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'openssl/crypto/property/property_query.c',
'openssl/crypto/property/property_string.c',
'openssl/crypto/rand/rand_lib.c',
'openssl/crypto/rsa/rsa_acvp_test_params.c',
'openssl/crypto/rsa/rsa_backend.c',
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'openssl/crypto/rsa/rsa_mp_names.c',
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'openssl/crypto/rsa/rsa_oaep.c',
'openssl/crypto/rsa/rsa_ossl.c',
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'openssl/crypto/rsa/rsa_pss.c',
'openssl/crypto/rsa/rsa_schemes.c',
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'openssl/providers/common/capabilities.c',
'openssl/providers/common/digest_to_nid.c',
'openssl/providers/common/provider_seeding.c',
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'openssl/providers/implementations/exchange/kdf_exch.c',
'openssl/providers/implementations/kdfs/hkdf.c',
'openssl/providers/implementations/kdfs/kbkdf.c',
'openssl/providers/implementations/kdfs/pbkdf2.c',
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'openssl/providers/implementations/keymgmt/ml_kem_kmgmt.c',

'openssl/providers/implementations/keymgmt/mlx_kmgmt.c',
'openssl/providers/implementations/keymgmt/rsa_kmgmt.c',
'openssl/providers/implementations/keymgmt/slh_dsa_kmgmt.c',
'openssl/providers/implementations/macs/cmac_prov.c',
'openssl/providers/implementations/macs/gmac_prov.c',
'openssl/providers/implementations/macs/hmac_prov.c',

```
  'openssl/providers/implementations/macs/kmac_prov.c',
  'openssl/providers/implementations/rands/drbg.c',
  'openssl/providers/implementations/rands/drbg_ctr.c',
  'openssl/providers/implementations/rands/drbg_hash.c',
  'openssl/providers/implementations/rands/drbg_hmac.c',
  'openssl/providers/implementations/rands/fips_crng_test.c',
  'openssl/providers/implementations/rands/test_rng.c',
  'openssl/providers/implementations/signature/dsa_sig.c',
  'openssl/providers/implementations/signature/ecdsa_sig.c',
  'openssl/providers/implementations/signature/eddsa_sig.c',
  'openssl/providers/implementations/signature/mac_legacy_sig.c',
   'openssl/providers/implementations/signature/ml_dsa_sig.c',
  'openssl/providers/implementations/signature/rsa_sig.c',
  'openssl/providers/implementations/signature/slh_dsa_sig.c',
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  'openssl/providers/implementations/skeymgmt/generic.c',
  'openssl/ssl/record/methods/ssl3_cbc.c',
  'openssl/providers/common/der/der_dsa_key.c',
  'openssl/providers/common/der/der_dsa_sig.c',
  'openssl/providers/common/der/der_ec_key.c',
  'openssl/providers/common/der/der_ec_sig.c',
  'openssl/providers/common/der/der_ecx_key.c',
  'openssl/providers/common/der/der_ml_dsa_key.c',
  'openssl/providers/common/der/der_rsa_key.c',
  'openssl/providers/common/der/der_slh_dsa_key.c',
  'openssl/providers/common/provider_ctx.c',
  'openssl/providers/common/provider_err.c',
  'openssl/providers/implementations/ciphers/ciphercommon.c',
   'openssl/providers/implementations/ciphers/ciphercommon_block.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_ccm_hw.c',
  'openssl/providers/implementations/ciphers/ciphercommon_gcm.c',
  'openssl/providers/implementations/ciphers/ciphercommon_gcm_hw.c',
  'openssl/providers/implementations/ciphers/ciphercommon_hw.c',
  'openssl/providers/implementations/digests/digestcommon.c',
  'openssl/ssl/record/methods/tls_pad.c',
  'openssl/providers/fips/fips_entry.c',

],
'openssl_sources_BSD-x86_64': [
  './config/archs/BSD-x86_64/asm/crypto/aes/aes-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/aesni-mb-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/aesni-sha1-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/aesni-sha256-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/aesni-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/aesni-xts-avx512.s',
   './config/archs/BSD-x86_64/asm/crypto/aes/bsaes-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/aes/vpaes-x86_64.s',
```

```
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-2k-avx512.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-2k-avxifma.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-3k-avx512.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-3k-avxifma.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-4k-avx512.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-4k-avxifma.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-avx2.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/rsaz-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/x86_64-gf2m.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/x86_64-mont.s',
  './config/archs/BSD-x86_64/asm/crypto/bn/x86_64-mont5.s',
  './config/archs/BSD-x86_64/asm/crypto/camellia/cmll-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/chacha/chacha-x86_64.s',
   './config/archs/BSD-x86_64/asm/crypto/ec/ecp_nistz256-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/ec/x25519-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/params_idx.c',
  './config/archs/BSD-x86_64/asm/crypto/x86_64cpuid.s',
  './config/archs/BSD-x86_64/asm/crypto/md5/md5-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/modes/aes-gcm-avx512.s',
  './config/archs/BSD-x86_64/asm/crypto/modes/aesni-gcm-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/modes/ghash-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/poly1305/poly1305-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/rc4/rc4-md5-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/rc4/rc4-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/sha/keccak1600-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/sha/sha1-mb-x86_64.s',
  './config/archs/BSD-x86_64/asm/crypto/sha/sha1-x86_64.s',
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  './config/archs/BSD-x86_64/asm/crypto/whrlpool/wp-x86_64.s',
  './config/archs/BSD-x86_64/asm/engines/e_padlock-x86_64.s',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_sm2_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_digests_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_dsa_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_ec_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_ecx_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_ml_dsa_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_rsa_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_slh_dsa_gen.c',
  './config/archs/BSD-x86_64/asm/providers/common/der/der_wrap_gen.c',
  './config/archs/BSD-x86_64/asm/providers/legacy.ld',
   './config/archs/BSD-x86_64/asm/providers/fips.ld',

],
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  'NDEBUG',
  'L_ENDIAN',
```

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    'OPENSSL_BUILDING_OPENSSL',
    'AES_ASM',
    'BSAES_ASM',
    'ECP_NISTZ256_ASM',
    'FIPS_MODULE',
    'GHASH_ASM',
    'KECCAK1600_ASM',
    'OPENSSL_BN_ASM_GF2m',
    'OPENSSL_BN_ASM_MONT',
    'OPENSSL_BN_ASM_MONT5',
    'OPENSSL_CPUID_OBJ',
    'OPENSSL_IA32_SSE2',
    'SHA1_ASM',
    'SHA256_ASM',
    'SHA512_ASM',
    'VPAES_ASM',
    'X25519_ASM',
    'FIPS_MODULE',
  ],
  'openssl_cflags_BSD-x86_64': [
    '-Wa,--noexecstack',
    '-Wall -O3',
    '-pthread',
    '-Wall -O3',
  ],
  'openssl_ex_libs_BSD-x86_64': [
    '-pthread',
  ],
  'linker_script': ''
 },
 'include_dirs': [
  '.',
  './include',
  './crypto',
  './crypto/include/internal',
  './providers/common/include',
 ],
 'defines': ['<@(openssl_defines_BSD-x86_64)'],
 'cflags': ['<@(openssl_cflags_BSD-x86_64)'],
  'libraries': ['<@(openssl_ex_libs_BSD-x86_64)'],

 'sources': ['<@(openssl_sources)', '<@(openssl_sources_BSD-x86_64)'],
 'direct_dependent_settings': {
  'include_dirs': ['./include', '.'],
  'defines': ['<@(openssl_defines_BSD-x86_64)'],
 },
}
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/internal/param_names.h.in
*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/
/* clang-format off */

/* clang-format on */

int ossl_param_find_pidx(const char *s);

/* Parameter name definitions - generated by util/perl/OpenSSL/paramnames.pm */
/* clang-format off */
#define NUM_PIDX 346

#define PIDX_ALG_PARAM_ALGORITHM_ID 0
#define PIDX_ALG_PARAM_ALGORITHM_ID_PARAMS 1
#define PIDX_ALG_PARAM_CIPHER 2
#define PIDX_ALG_PARAM_DIGEST 3
#define PIDX_ALG_PARAM_ENGINE 4
#define PIDX_ALG_PARAM_FIPS_APPROVED_INDICATOR 5
#define PIDX_ALG_PARAM_MAC 6
#define PIDX_ALG_PARAM_PROPERTIES 7
#define PIDX_ASYM_CIPHER_PARAM_DIGEST PIDX_PKEY_PARAM_DIGEST
#define PIDX_ASYM_CIPHER_PARAM_ENGINE
```

```
 PIDX_PKEY_PARAM_ENGINE
#define PIDX_ASYM_CIPHER_PARAM_FIPS_APPROVED_INDICATOR
PIDX_ALG_PARAM_FIPS_APPROVED_INDICATOR
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#define PIDX_STORE_PARAM_PROPERTIES 7
#define PIDX_STORE_PARAM_SERIAL 344
#define PIDX_STORE_PARAM_SUBJECT 345
/* clang-format on */
/*
* WARNING: do not edit!
* Generated by util/mkbuildinf.pl
*
```

```
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*/

#define PLATFORM "platform: BSD-x86_64"
#define DATE "built on: Tue Jan 27 17:26:21 2026 UTC"

/*
* Generate compiler_flags as an array of individual characters. This is a
* workaround for the situation where CFLAGS gets too long for a C90 string
* literal
*/
static const char compiler_flags[] = {
   'c','o','m','p','i','l','e','r',':',' ','g','c','c',' ','-','f',
   'P','I','C',' ','-','p','t','h','r','e','a','d',' ','-','W','a',
   ',','-','-','n','o','e','x','e','c','s','t','a','c','k',' ','-',
   'W','a','l','l',' ','-','O','3',' ','-','D','L','_','E','N','D',
   'I','A','N',' ','-','D','O','P','E','N','S','S','L','_','P','I',
    'C',' ','-','D','_','T','H','R','E','A','D','_','S','A','F','E',
   ' ','-','D','_','R','E','E','N','T','R','A','N','T',' ','-','D',
   'O','P','E','N','S','S','L','_','B','U','I','L','D','I','N','G',
   '_','O','P','E','N','S','S','L',' ','-','D','N','D','E','B','U',
   'G','\0'
};
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/opensslv.h.in
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*/

#ifndef OPENSSL_OPENSSLV_H
#define OPENSSL_OPENSSLV_H
#pragma once

#ifdef __cplusplus
extern "C" {
#endif
```

```
/*
* SECTION 1: VERSION DATA.  These will change for each release
*/

/*
* Base version macros
*
* These macros express version number MAJOR.MINOR.PATCH exactly
*/
/* clang-format off */
# define OPENSSL_VERSION_MAJOR  3
/* clang-format on */
/* clang-format off */
# define OPENSSL_VERSION_MINOR  5
/* clang-format on */
/* clang-format off */
# define OPENSSL_VERSION_PATCH  5
/* clang-format on */

/*
* Additional version information
*
* These are also part
 of the new version scheme, but aren't part
* of the version number itself.
*/

/* Could be: #define OPENSSL_VERSION_PRE_RELEASE "-alpha.1" */
/* clang-format off */
# define OPENSSL_VERSION_PRE_RELEASE ""
/* clang-format on */
/* Could be: #define OPENSSL_VERSION_BUILD_METADATA "+fips" */
/* Could be: #define OPENSSL_VERSION_BUILD_METADATA "+vendor.1" */
/* clang-format off */
# define OPENSSL_VERSION_BUILD_METADATA ""
/* clang-format on */

/*
* Note: The OpenSSL Project will never define OPENSSL_VERSION_BUILD_METADATA
* to be anything but the empty string.  Its use is entirely reserved for
* others
*/

/*
* Shared library version
*
* This is strictly to express ABI version, which may or may not
* be related to the API version expressed with the macros above.
```

```
* This is defined in free form.
*/
/* clang-format off */
# define OPENSSL_SHLIB_VERSION 3
/* clang-format on */

/*
* SECTION 2: USEFUL MACROS
*/

/* For checking general API compatibility when preprocessing */
#define
 OPENSSL_VERSION_PREREQ(maj, min) \
   ((OPENSSL_VERSION_MAJOR << 16) + OPENSSL_VERSION_MINOR >= ((maj) << 16) + (min))

/*
* Macros to get the version in easily digested string form, both the short
* "MAJOR.MINOR.PATCH" variant (where MAJOR, MINOR and PATCH are replaced
* with the values from the corresponding OPENSSL_VERSION_ macros) and the
* longer variant with OPENSSL_VERSION_PRE_RELEASE_STR and
* OPENSSL_VERSION_BUILD_METADATA_STR appended.
*/
/* clang-format off */
# define OPENSSL_VERSION_STR "3.5.5"
/* clang-format on */
/* clang-format off */
# define OPENSSL_FULL_VERSION_STR "3.5.5"
/* clang-format on */

/*
* SECTION 3: ADDITIONAL METADATA
*
* These strings are defined separately to allow them to be parsable.
*/
/* clang-format off */
# define OPENSSL_RELEASE_DATE "27 Jan 2026"
/* clang-format on */

/*
* SECTION 4: BACKWARD COMPATIBILITY
*/

/* clang-format off */
# define OPENSSL_VERSION_TEXT "OpenSSL 3.5.5 27 Jan 2026"
/* clang-format on */

/* clang-format
```

```
 off */
/* Synthesize OPENSSL_VERSION_NUMBER with the layout 0xMNN00PP0L */
# define OPENSSL_VERSION_NUMBER         \
   ( (OPENSSL_VERSION_MAJOR<<28)       \
     |(OPENSSL_VERSION_MINOR<<20)      \
     |(OPENSSL_VERSION_PATCH<<4)       \
     |0x0L )
/* clang-format on */

#ifdef __cplusplus
}
#endif

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_OPENSSLV_H
#endif

#endif /* OPENSSL_OPENSSLV_H */
```

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END OF TERMS AND CONDITIONS

APPENDIX: How to apply the Apache License to your work.

```
    To apply the Apache License to your work, attach the following
    boilerplate notice, with the fields enclosed by brackets "[]"
    replaced with your own identifying information. (Don't include
    the brackets!)  The text should be enclosed in the appropriate
    comment syntax for the file format. We also recommend that a
    file or class name and description of purpose be included on the
    same "printed page" as the copyright notice for easier
    identification within third-party archives.

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  distributed under the License is distributed on an "AS IS" BASIS,
  WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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  limitations under the License.
#ifndef SRC_PERMISSION_ADDON_PERMISSION_H_
#define SRC_PERMISSION_ADDON_PERMISSION_H_

#if defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS

#include <string>
#include "permission/permission_base.h"

namespace node {

namespace permission {

class AddonPermission final : public PermissionBase {
public:
 void Apply(Environment* env,
            const std::vector<std::string>& allow,
            PermissionScope scope) override;
 bool is_granted(Environment* env,
                 PermissionScope perm,
                 const std::string_view& param = "") const override;

private:
 bool deny_all_;
};

}  // namespace permission
```

```
}  // namespace node

#endif  // defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
#endif  // SRC_PERMISSION_ADDON_PERMISSION_H_
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/cmp.h.in
*
* Copyright 2007-2024 The OpenSSL Project Authors. All Rights Reserved.
* Copyright Nokia 2007-2019
* Copyright Siemens AG 2015-2019
*
* Licensed under the Apache License 2.0 (the "License").  You may not use
* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_CMP_H
#define OPENSSL_CMP_H

#include <openssl/opensslconf.h>
#ifndef OPENSSL_NO_CMP

#include <openssl/crmf.h>
#include <openssl/cmperr.h>
#include <openssl/cmp_util.h>
#include <openssl/http.h>

/* explicit #includes not strictly needed since implied by the above: */
#include <openssl/types.h>
#include <openssl/safestack.h>
#include <openssl/x509.h>
#include <openssl/x509v3.h>

#ifdef __cplusplus
extern "C" {
#endif

#define OSSL_CMP_PVNO_2 2
#define
 OSSL_CMP_PVNO_3 3
#define OSSL_CMP_PVNO OSSL_CMP_PVNO_2 /* v2 is the default */
```

```
/*-
*   PKIFailureInfo ::= BIT STRING {
*   -- since we can fail in more than one way!
*   -- More codes may be added in the future if/when required.
*       badAlg              (0),
*       -- unrecognized or unsupported Algorithm Identifier
*       badMessageCheck     (1),
*       -- integrity check failed (e.g., signature did not verify)
*       badRequest          (2),
*       -- transaction not permitted or supported
*       badTime             (3),
*       -- messageTime was not sufficiently close to the system time,
*       -- as defined by local policy
*       badCertId           (4),
*       -- no certificate could be found matching the provided criteria
*       badDataFormat       (5),
*       -- the data submitted has the wrong format
*       wrongAuthority      (6),
*       -- the authority indicated in the request is different from the
*       -- one creating the response
 token
*       incorrectData       (7),
*       -- the requester's data is incorrect (for notary services)
*       missingTimeStamp    (8),
*       -- when the timestamp is missing but should be there
*       -- (by policy)
*       badPOP              (9),
*       -- the proof-of-possession failed
*       certRevoked         (10),
*         -- the certificate has already been revoked
*       certConfirmed       (11),
*         -- the certificate has already been confirmed
*       wrongIntegrity      (12),
*         -- invalid integrity, password based instead of signature or
*         -- vice versa
*       badRecipientNonce   (13),
*         -- invalid recipient nonce, either missing or wrong value
*       timeNotAvailable    (14),
*         -- the TSA's time source is not available
*       unacceptedPolicy    (15),
*         -- the requested TSA policy is not supported by the TSA.
*       unacceptedExtension (16),
*         -- the requested extension is not
 supported by the TSA.
*       addInfoNotAvailable (17),
*         -- the additional information requested could not be
*         -- understood or is not available
```

```
*       badSenderNonce      (18),
*         -- invalid sender nonce, either missing or wrong size
*       badCertTemplate     (19),
*         -- invalid cert. template or missing mandatory information
*       signerNotTrusted    (20),
*         -- signer of the message unknown or not trusted
*       transactionIdInUse  (21),
*         -- the transaction identifier is already in use
*       unsupportedVersion  (22),
*         -- the version of the message is not supported
*       notAuthorized       (23),
*         -- the sender was not authorized to make the preceding
*         -- request or perform the preceding action
*       systemUnavail       (24),
*       -- the request cannot be handled due to system unavailability
*       systemFailure       (25),
*       -- the request cannot be handled
 due to system failure
*       duplicateCertReq    (26)
*       -- certificate cannot be issued because a duplicate
*       -- certificate already exists
*   }
*/
#define OSSL_CMP_PKIFAILUREINFO_badAlg 0
#define OSSL_CMP_PKIFAILUREINFO_badMessageCheck 1
#define OSSL_CMP_PKIFAILUREINFO_badRequest 2
#define OSSL_CMP_PKIFAILUREINFO_badTime 3
#define OSSL_CMP_PKIFAILUREINFO_badCertId 4
#define OSSL_CMP_PKIFAILUREINFO_badDataFormat 5
#define OSSL_CMP_PKIFAILUREINFO_wrongAuthority 6
#define OSSL_CMP_PKIFAILUREINFO_incorrectData 7
#define OSSL_CMP_PKIFAILUREINFO_missingTimeStamp 8
#define OSSL_CMP_PKIFAILUREINFO_badPOP 9
#define OSSL_CMP_PKIFAILUREINFO_certRevoked 10
#define OSSL_CMP_PKIFAILUREINFO_certConfirmed 11
#define OSSL_CMP_PKIFAILUREINFO_wrongIntegrity 12
#define OSSL_CMP_PKIFAILUREINFO_badRecipientNonce 13
#define OSSL_CMP_PKIFAILUREINFO_timeNotAvailable 14
#define OSSL_CMP_PKIFAILUREINFO_unacceptedPolicy 15
#define OSSL_CMP_PKIFAILUREINFO_unacceptedExtension 16
#define OSSL_CMP_PKIFAILUREINFO_addInfoNotAvailable
 17
#define OSSL_CMP_PKIFAILUREINFO_badSenderNonce 18
#define OSSL_CMP_PKIFAILUREINFO_badCertTemplate 19
#define OSSL_CMP_PKIFAILUREINFO_signerNotTrusted 20
#define OSSL_CMP_PKIFAILUREINFO_transactionIdInUse 21
#define OSSL_CMP_PKIFAILUREINFO_unsupportedVersion 22
#define OSSL_CMP_PKIFAILUREINFO_notAuthorized 23
```

```
#define OSSL_CMP_PKIFAILUREINFO_systemUnavail 24
#define OSSL_CMP_PKIFAILUREINFO_systemFailure 25
#define OSSL_CMP_PKIFAILUREINFO_duplicateCertReq 26
#define OSSL_CMP_PKIFAILUREINFO_MAX 26
#define OSSL_CMP_PKIFAILUREINFO_MAX_BIT_PATTERN \
   ((1 << (OSSL_CMP_PKIFAILUREINFO_MAX + 1)) - 1)
#if OSSL_CMP_PKIFAILUREINFO_MAX_BIT_PATTERN > INT_MAX
#error CMP_PKIFAILUREINFO_MAX bit pattern does not fit in type int
#endif
typedef ASN1_BIT_STRING OSSL_CMP_PKIFAILUREINFO;

#define OSSL_CMP_CTX_FAILINFO_badAlg (1 << 0)
#define OSSL_CMP_CTX_FAILINFO_badMessageCheck (1 << 1)
#define OSSL_CMP_CTX_FAILINFO_badRequest (1 << 2)
#define OSSL_CMP_CTX_FAILINFO_badTime
 (1 << 3)
#define OSSL_CMP_CTX_FAILINFO_badCertId (1 << 4)
#define OSSL_CMP_CTX_FAILINFO_badDataFormat (1 << 5)
#define OSSL_CMP_CTX_FAILINFO_wrongAuthority (1 << 6)
#define OSSL_CMP_CTX_FAILINFO_incorrectData (1 << 7)
#define OSSL_CMP_CTX_FAILINFO_missingTimeStamp (1 << 8)
#define OSSL_CMP_CTX_FAILINFO_badPOP (1 << 9)
#define OSSL_CMP_CTX_FAILINFO_certRevoked (1 << 10)
#define OSSL_CMP_CTX_FAILINFO_certConfirmed (1 << 11)
#define OSSL_CMP_CTX_FAILINFO_wrongIntegrity (1 << 12)
#define OSSL_CMP_CTX_FAILINFO_badRecipientNonce (1 << 13)
#define OSSL_CMP_CTX_FAILINFO_timeNotAvailable (1 << 14)
#define OSSL_CMP_CTX_FAILINFO_unacceptedPolicy (1 << 15)
#define OSSL_CMP_CTX_FAILINFO_unacceptedExtension (1 << 16)
#define OSSL_CMP_CTX_FAILINFO_addInfoNotAvailable (1 << 17)
#define OSSL_CMP_CTX_FAILINFO_badSenderNonce (1 << 18)
#define OSSL_CMP_CTX_FAILINFO_badCertTemplate (1 << 19)
#define OSSL_CMP_CTX_FAILINFO_signerNotTrusted (1 << 20)
#define OSSL_CMP_CTX_FAILINFO_transactionIdInUse (1
 << 21)
#define OSSL_CMP_CTX_FAILINFO_unsupportedVersion (1 << 22)
#define OSSL_CMP_CTX_FAILINFO_notAuthorized (1 << 23)
#define OSSL_CMP_CTX_FAILINFO_systemUnavail (1 << 24)
#define OSSL_CMP_CTX_FAILINFO_systemFailure (1 << 25)
#define OSSL_CMP_CTX_FAILINFO_duplicateCertReq (1 << 26)

/*-
*   PKIStatus ::= INTEGER {
*       accepted                (0),
*       -- you got exactly what you asked for
*       grantedWithMods         (1),
*       -- you got something like what you asked for; the
*       -- requester is responsible for ascertaining the differences
```

```
*       rejection           (2),
*       -- you don't get it, more information elsewhere in the message
*       waiting             (3),
*       -- the request body part has not yet been processed; expect to
*       -- hear more later (note: proper handling of this status
*       -- response MAY use the polling req/rep PKIMessages specified
*       -- in Section 5.3.22; alternatively, polling in the underlying
*
      -- transport layer MAY have some utility in this regard)
*       revocationWarning     (4),
*       -- this message contains a warning that a revocation is
*       -- imminent
*       revocationNotification (5),
*       -- notification that a revocation has occurred
*       keyUpdateWarning      (6)
*       -- update already done for the oldCertId specified in
*       -- CertReqMsg
*   }
*/
#define OSSL_CMP_PKISTATUS_request -3
#define OSSL_CMP_PKISTATUS_trans -2
#define OSSL_CMP_PKISTATUS_unspecified -1
#define OSSL_CMP_PKISTATUS_accepted 0
#define OSSL_CMP_PKISTATUS_grantedWithMods 1
#define OSSL_CMP_PKISTATUS_rejection 2
#define OSSL_CMP_PKISTATUS_waiting 3
#define OSSL_CMP_PKISTATUS_revocationWarning 4
#define OSSL_CMP_PKISTATUS_revocationNotification 5
#define OSSL_CMP_PKISTATUS_keyUpdateWarning 6
typedef ASN1_INTEGER OSSL_CMP_PKISTATUS;

DECLARE_ASN1_ITEM(OSSL_CMP_PKISTATUS)

#define OSSL_CMP_CERTORENCCERT_CERTIFICATE 0
#define OSSL_CMP_CERTORENCCERT_ENCRYPTEDCERT
 1

/* data type declarations */
typedef struct ossl_cmp_ctx_st OSSL_CMP_CTX;
typedef struct ossl_cmp_pkiheader_st OSSL_CMP_PKIHEADER;
DECLARE_ASN1_FUNCTIONS(OSSL_CMP_PKIHEADER)
typedef struct ossl_cmp_msg_st OSSL_CMP_MSG;
DECLARE_ASN1_DUP_FUNCTION(OSSL_CMP_MSG)
DECLARE_ASN1_ENCODE_FUNCTIONS(OSSL_CMP_MSG, OSSL_CMP_MSG, OSSL_CMP_MSG)
typedef struct ossl_cmp_certstatus_st OSSL_CMP_CERTSTATUS;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CMP_CERTSTATUS, OSSL_CMP_CERTSTATUS,
OSSL_CMP_CERTSTATUS)
```

```
#define sk_OSSL_CMP_CERTSTATUS_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_CMP_CERTSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CERTSTATUS_value(sk, idx) ((OSSL_CMP_CERTSTATUS
*)OPENSSL_sk_value(ossl_check_const_OSSL_CMP_CERTSTATUS_sk_type(sk), (idx)))
#define sk_OSSL_CMP_CERTSTATUS_new(cmp) ((STACK_OF(OSSL_CMP_CERTSTATUS)
*)OPENSSL_sk_new(ossl_check_OSSL_CMP_CERTSTATUS_compfunc_type(cmp)))
#define sk_OSSL_CMP_CERTSTATUS_new_null() ((STACK_OF(OSSL_CMP_CERTSTATUS)
*)OPENSSL_sk_new_null())
#define
 sk_OSSL_CMP_CERTSTATUS_new_reserve(cmp, n) ((STACK_OF(OSSL_CMP_CERTSTATUS)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CMP_CERTSTATUS_compfunc_type(cmp), (n)))
#define sk_OSSL_CMP_CERTSTATUS_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk), (n))
#define sk_OSSL_CMP_CERTSTATUS_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CERTSTATUS_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CERTSTATUS_delete(sk, i) ((OSSL_CMP_CERTSTATUS
*)OPENSSL_sk_delete(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk), (i)))
#define sk_OSSL_CMP_CERTSTATUS_delete_ptr(sk, ptr) ((OSSL_CMP_CERTSTATUS
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CERTSTATUS_type(ptr)))
#define sk_OSSL_CMP_CERTSTATUS_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CERTSTATUS_type(ptr))
#define sk_OSSL_CMP_CERTSTATUS_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk),
 ossl_check_OSSL_CMP_CERTSTATUS_type(ptr))
#define sk_OSSL_CMP_CERTSTATUS_pop(sk) ((OSSL_CMP_CERTSTATUS
*)OPENSSL_sk_pop(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk)))
#define sk_OSSL_CMP_CERTSTATUS_shift(sk) ((OSSL_CMP_CERTSTATUS
*)OPENSSL_sk_shift(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk)))
#define sk_OSSL_CMP_CERTSTATUS_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk),ossl_check_OSSL_CMP_CERTST
ATUS_freefunc_type(freefunc))
#define sk_OSSL_CMP_CERTSTATUS_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CERTSTATUS_type(ptr), (idx))
#define sk_OSSL_CMP_CERTSTATUS_set(sk, idx, ptr) ((OSSL_CMP_CERTSTATUS
*)OPENSSL_sk_set(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk), (idx),
ossl_check_OSSL_CMP_CERTSTATUS_type(ptr)))
#define sk_OSSL_CMP_CERTSTATUS_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CERTSTATUS_type(ptr))
#define
 sk_OSSL_CMP_CERTSTATUS_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CERTSTATUS_type(ptr))
```

```
#define sk_OSSL_CMP_CERTSTATUS_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CERTSTATUS_type(ptr), pnum)
#define sk_OSSL_CMP_CERTSTATUS_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_CMP_CERTSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CERTSTATUS_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CMP_CERTSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CERTSTATUS_dup(sk) ((STACK_OF(OSSL_CMP_CERTSTATUS)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CMP_CERTSTATUS_sk_type(sk)))
#define sk_OSSL_CMP_CERTSTATUS_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_CMP_CERTSTATUS)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CMP_CERTSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CERTSTATUS_copyfunc_type(copyfunc),
ossl_check_OSSL_CMP_CERTSTATUS_freefunc_type(freefunc)))
#define sk_OSSL_CMP_CERTSTATUS_set_cmp_func(sk,
 cmp)
((sk_OSSL_CMP_CERTSTATUS_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_CMP_CERTSTAT
US_sk_type(sk), ossl_check_OSSL_CMP_CERTSTATUS_compfunc_type(cmp)))

/* clang-format on */
typedef struct ossl_cmp_itav_st OSSL_CMP_ITAV;
DECLARE_ASN1_DUP_FUNCTION(OSSL_CMP_ITAV)
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CMP_ITAV, OSSL_CMP_ITAV, OSSL_CMP_ITAV)
#define sk_OSSL_CMP_ITAV_num(sk) OPENSSL_sk_num(ossl_check_const_OSSL_CMP_ITAV_sk_type(sk))
#define sk_OSSL_CMP_ITAV_value(sk, idx) ((OSSL_CMP_ITAV
*)OPENSSL_sk_value(ossl_check_const_OSSL_CMP_ITAV_sk_type(sk), (idx)))
#define sk_OSSL_CMP_ITAV_new(cmp) ((STACK_OF(OSSL_CMP_ITAV)
*)OPENSSL_sk_new(ossl_check_OSSL_CMP_ITAV_compfunc_type(cmp)))
#define sk_OSSL_CMP_ITAV_new_null() ((STACK_OF(OSSL_CMP_ITAV) *)OPENSSL_sk_new_null())
#define sk_OSSL_CMP_ITAV_new_reserve(cmp, n) ((STACK_OF(OSSL_CMP_ITAV)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CMP_ITAV_compfunc_type(cmp), (n)))
#define sk_OSSL_CMP_ITAV_reserve(sk,
 n) OPENSSL_sk_reserve(ossl_check_OSSL_CMP_ITAV_sk_type(sk), (n))
#define sk_OSSL_CMP_ITAV_free(sk) OPENSSL_sk_free(ossl_check_OSSL_CMP_ITAV_sk_type(sk))
#define sk_OSSL_CMP_ITAV_zero(sk) OPENSSL_sk_zero(ossl_check_OSSL_CMP_ITAV_sk_type(sk))
#define sk_OSSL_CMP_ITAV_delete(sk, i) ((OSSL_CMP_ITAV
*)OPENSSL_sk_delete(ossl_check_OSSL_CMP_ITAV_sk_type(sk), (i)))
#define sk_OSSL_CMP_ITAV_delete_ptr(sk, ptr) ((OSSL_CMP_ITAV
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CMP_ITAV_sk_type(sk),
ossl_check_OSSL_CMP_ITAV_type(ptr)))
#define sk_OSSL_CMP_ITAV_push(sk, ptr) OPENSSL_sk_push(ossl_check_OSSL_CMP_ITAV_sk_type(sk),
ossl_check_OSSL_CMP_ITAV_type(ptr))
#define sk_OSSL_CMP_ITAV_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CMP_ITAV_sk_type(sk), ossl_check_OSSL_CMP_ITAV_type(ptr))
#define sk_OSSL_CMP_ITAV_pop(sk) ((OSSL_CMP_ITAV
*)OPENSSL_sk_pop(ossl_check_OSSL_CMP_ITAV_sk_type(sk)))
#define sk_OSSL_CMP_ITAV_shift(sk) ((OSSL_CMP_ITAV
```

```
*)OPENSSL_sk_shift(ossl_check_OSSL_CMP_ITAV_sk_type(sk)))
#define
 sk_OSSL_CMP_ITAV_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CMP_ITAV_sk_type(sk),ossl_check_OSSL_CMP_ITAV_freefunc_ty
pe(freefunc))
#define sk_OSSL_CMP_ITAV_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_CMP_ITAV_sk_type(sk), ossl_check_OSSL_CMP_ITAV_type(ptr),
(idx))
#define sk_OSSL_CMP_ITAV_set(sk, idx, ptr) ((OSSL_CMP_ITAV
*)OPENSSL_sk_set(ossl_check_OSSL_CMP_ITAV_sk_type(sk), (idx),
ossl_check_OSSL_CMP_ITAV_type(ptr)))
#define sk_OSSL_CMP_ITAV_find(sk, ptr) OPENSSL_sk_find(ossl_check_OSSL_CMP_ITAV_sk_type(sk),
ossl_check_OSSL_CMP_ITAV_type(ptr))
#define sk_OSSL_CMP_ITAV_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_CMP_ITAV_sk_type(sk), ossl_check_OSSL_CMP_ITAV_type(ptr))
#define sk_OSSL_CMP_ITAV_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CMP_ITAV_sk_type(sk), ossl_check_OSSL_CMP_ITAV_type(ptr),
pnum)
#define sk_OSSL_CMP_ITAV_sort(sk) OPENSSL_sk_sort(ossl_check_OSSL_CMP_ITAV_sk_type(sk))
#define sk_OSSL_CMP_ITAV_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CMP_ITAV_sk_type(sk))
#define
 sk_OSSL_CMP_ITAV_dup(sk) ((STACK_OF(OSSL_CMP_ITAV)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CMP_ITAV_sk_type(sk)))
#define sk_OSSL_CMP_ITAV_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OSSL_CMP_ITAV)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CMP_ITAV_sk_type(sk),
ossl_check_OSSL_CMP_ITAV_copyfunc_type(copyfunc),
ossl_check_OSSL_CMP_ITAV_freefunc_type(freefunc)))
#define sk_OSSL_CMP_ITAV_set_cmp_func(sk, cmp)
((sk_OSSL_CMP_ITAV_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_CMP_ITAV_sk_type(sk),
ossl_check_OSSL_CMP_ITAV_compfunc_type(cmp)))

/* clang-format on */

typedef struct ossl_cmp_crlstatus_st OSSL_CMP_CRLSTATUS;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CMP_CRLSTATUS, OSSL_CMP_CRLSTATUS,
OSSL_CMP_CRLSTATUS)
#define sk_OSSL_CMP_CRLSTATUS_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_CMP_CRLSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CRLSTATUS_value(sk, idx) ((OSSL_CMP_CRLSTATUS
*)OPENSSL_sk_value(ossl_check_const_OSSL_CMP_CRLSTATUS_sk_type(sk),
 (idx)))
#define sk_OSSL_CMP_CRLSTATUS_new(cmp) ((STACK_OF(OSSL_CMP_CRLSTATUS)
*)OPENSSL_sk_new(ossl_check_OSSL_CMP_CRLSTATUS_compfunc_type(cmp)))
#define sk_OSSL_CMP_CRLSTATUS_new_null() ((STACK_OF(OSSL_CMP_CRLSTATUS)
*)OPENSSL_sk_new_null())
#define sk_OSSL_CMP_CRLSTATUS_new_reserve(cmp, n) ((STACK_OF(OSSL_CMP_CRLSTATUS)
```

```
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CMP_CRLSTATUS_compfunc_type(cmp), (n)))
#define sk_OSSL_CMP_CRLSTATUS_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk), (n))
#define sk_OSSL_CMP_CRLSTATUS_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CRLSTATUS_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CRLSTATUS_delete(sk, i) ((OSSL_CMP_CRLSTATUS
*)OPENSSL_sk_delete(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk), (i)))
#define sk_OSSL_CMP_CRLSTATUS_delete_ptr(sk, ptr) ((OSSL_CMP_CRLSTATUS
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk),
 ossl_check_OSSL_CMP_CRLSTATUS_type(ptr)))
#define sk_OSSL_CMP_CRLSTATUS_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CRLSTATUS_type(ptr))
#define sk_OSSL_CMP_CRLSTATUS_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CRLSTATUS_type(ptr))
#define sk_OSSL_CMP_CRLSTATUS_pop(sk) ((OSSL_CMP_CRLSTATUS
*)OPENSSL_sk_pop(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk)))
#define sk_OSSL_CMP_CRLSTATUS_shift(sk) ((OSSL_CMP_CRLSTATUS
*)OPENSSL_sk_shift(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk)))
#define sk_OSSL_CMP_CRLSTATUS_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk),ossl_check_OSSL_CMP_CRLSTAT
US_freefunc_type(freefunc))
#define sk_OSSL_CMP_CRLSTATUS_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CRLSTATUS_type(ptr), (idx))
#define sk_OSSL_CMP_CRLSTATUS_set(sk, idx, ptr) ((OSSL_CMP_CRLSTATUS
 *)OPENSSL_sk_set(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk), (idx),
ossl_check_OSSL_CMP_CRLSTATUS_type(ptr)))
#define sk_OSSL_CMP_CRLSTATUS_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CRLSTATUS_type(ptr))
#define sk_OSSL_CMP_CRLSTATUS_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CRLSTATUS_type(ptr))
#define sk_OSSL_CMP_CRLSTATUS_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CRLSTATUS_type(ptr), pnum)
#define sk_OSSL_CMP_CRLSTATUS_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_CMP_CRLSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CRLSTATUS_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CMP_CRLSTATUS_sk_type(sk))
#define sk_OSSL_CMP_CRLSTATUS_dup(sk) ((STACK_OF(OSSL_CMP_CRLSTATUS)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CMP_CRLSTATUS_sk_type(sk)))
#define sk_OSSL_CMP_CRLSTATUS_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_CMP_CRLSTATUS)
```

```
 *)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CMP_CRLSTATUS_sk_type(sk),
ossl_check_OSSL_CMP_CRLSTATUS_copyfunc_type(copyfunc),
ossl_check_OSSL_CMP_CRLSTATUS_freefunc_type(freefunc)))
#define sk_OSSL_CMP_CRLSTATUS_set_cmp_func(sk, cmp)
((sk_OSSL_CMP_CRLSTATUS_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_CMP_CRLSTATUS
_sk_type(sk), ossl_check_OSSL_CMP_CRLSTATUS_compfunc_type(cmp)))

/* clang-format on */

typedef OSSL_CRMF_ATTRIBUTETYPEANDVALUE OSSL_CMP_ATAV;
#define OSSL_CMP_ATAV_free OSSL_CRMF_ATTRIBUTETYPEANDVALUE_free
typedef STACK_OF(OSSL_CRMF_ATTRIBUTETYPEANDVALUE) OSSL_CMP_ATAVS;
DECLARE_ASN1_FUNCTIONS(OSSL_CMP_ATAVS)
#define stack_st_OSSL_CMP_ATAV stack_st_OSSL_CRMF_ATTRIBUTETYPEANDVALUE
#define sk_OSSL_CMP_ATAV_num sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_num
#define sk_OSSL_CMP_ATAV_value sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_value
#define sk_OSSL_CMP_ATAV_push sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_push
#define sk_OSSL_CMP_ATAV_pop_free sk_OSSL_CRMF_ATTRIBUTETYPEANDVALUE_pop_free

typedef
 struct ossl_cmp_revrepcontent_st OSSL_CMP_REVREPCONTENT;
typedef struct ossl_cmp_pkisi_st OSSL_CMP_PKISI;
DECLARE_ASN1_FUNCTIONS(OSSL_CMP_PKISI)
DECLARE_ASN1_DUP_FUNCTION(OSSL_CMP_PKISI)
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CMP_PKISI, OSSL_CMP_PKISI, OSSL_CMP_PKISI)
#define sk_OSSL_CMP_PKISI_num(sk) OPENSSL_sk_num(ossl_check_const_OSSL_CMP_PKISI_sk_type(sk))
#define sk_OSSL_CMP_PKISI_value(sk, idx) ((OSSL_CMP_PKISI
*)OPENSSL_sk_value(ossl_check_const_OSSL_CMP_PKISI_sk_type(sk), (idx)))
#define sk_OSSL_CMP_PKISI_new(cmp) ((STACK_OF(OSSL_CMP_PKISI)
*)OPENSSL_sk_new(ossl_check_OSSL_CMP_PKISI_compfunc_type(cmp)))
#define sk_OSSL_CMP_PKISI_new_null() ((STACK_OF(OSSL_CMP_PKISI) *)OPENSSL_sk_new_null())
#define sk_OSSL_CMP_PKISI_new_reserve(cmp, n) ((STACK_OF(OSSL_CMP_PKISI)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CMP_PKISI_compfunc_type(cmp), (n)))
#define sk_OSSL_CMP_PKISI_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_OSSL_CMP_PKISI_sk_type(sk),
 (n))
#define sk_OSSL_CMP_PKISI_free(sk) OPENSSL_sk_free(ossl_check_OSSL_CMP_PKISI_sk_type(sk))
#define sk_OSSL_CMP_PKISI_zero(sk) OPENSSL_sk_zero(ossl_check_OSSL_CMP_PKISI_sk_type(sk))
#define sk_OSSL_CMP_PKISI_delete(sk, i) ((OSSL_CMP_PKISI
*)OPENSSL_sk_delete(ossl_check_OSSL_CMP_PKISI_sk_type(sk), (i)))
#define sk_OSSL_CMP_PKISI_delete_ptr(sk, ptr) ((OSSL_CMP_PKISI
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CMP_PKISI_sk_type(sk),
ossl_check_OSSL_CMP_PKISI_type(ptr)))
#define sk_OSSL_CMP_PKISI_push(sk, ptr) OPENSSL_sk_push(ossl_check_OSSL_CMP_PKISI_sk_type(sk),
ossl_check_OSSL_CMP_PKISI_type(ptr))
#define sk_OSSL_CMP_PKISI_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CMP_PKISI_sk_type(sk), ossl_check_OSSL_CMP_PKISI_type(ptr))
#define sk_OSSL_CMP_PKISI_pop(sk) ((OSSL_CMP_PKISI
```

```
*)OPENSSL_sk_pop(ossl_check_OSSL_CMP_PKISI_sk_type(sk)))
#define sk_OSSL_CMP_PKISI_shift(sk) ((OSSL_CMP_PKISI
*)OPENSSL_sk_shift(ossl_check_OSSL_CMP_PKISI_sk_type(sk)))
#define sk_OSSL_CMP_PKISI_pop_free(sk,
 freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CMP_PKISI_sk_type(sk),ossl_check_OSSL_CMP_PKISI_freefunc_ty
pe(freefunc))
#define sk_OSSL_CMP_PKISI_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_CMP_PKISI_sk_type(sk), ossl_check_OSSL_CMP_PKISI_type(ptr),
(idx))
#define sk_OSSL_CMP_PKISI_set(sk, idx, ptr) ((OSSL_CMP_PKISI
*)OPENSSL_sk_set(ossl_check_OSSL_CMP_PKISI_sk_type(sk), (idx),
ossl_check_OSSL_CMP_PKISI_type(ptr)))
#define sk_OSSL_CMP_PKISI_find(sk, ptr) OPENSSL_sk_find(ossl_check_OSSL_CMP_PKISI_sk_type(sk),
ossl_check_OSSL_CMP_PKISI_type(ptr))
#define sk_OSSL_CMP_PKISI_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_CMP_PKISI_sk_type(sk), ossl_check_OSSL_CMP_PKISI_type(ptr))
#define sk_OSSL_CMP_PKISI_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CMP_PKISI_sk_type(sk), ossl_check_OSSL_CMP_PKISI_type(ptr),
pnum)
#define sk_OSSL_CMP_PKISI_sort(sk) OPENSSL_sk_sort(ossl_check_OSSL_CMP_PKISI_sk_type(sk))
#define sk_OSSL_CMP_PKISI_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CMP_PKISI_sk_type(sk))
#define
 sk_OSSL_CMP_PKISI_dup(sk) ((STACK_OF(OSSL_CMP_PKISI)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CMP_PKISI_sk_type(sk)))
#define sk_OSSL_CMP_PKISI_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(OSSL_CMP_PKISI)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CMP_PKISI_sk_type(sk),
ossl_check_OSSL_CMP_PKISI_copyfunc_type(copyfunc),
ossl_check_OSSL_CMP_PKISI_freefunc_type(freefunc)))
#define sk_OSSL_CMP_PKISI_set_cmp_func(sk, cmp)
((sk_OSSL_CMP_PKISI_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_CMP_PKISI_sk_type(sk),
ossl_check_OSSL_CMP_PKISI_compfunc_type(cmp)))

/* clang-format on */
typedef struct ossl_cmp_certrepmessage_st OSSL_CMP_CERTREPMESSAGE;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CMP_CERTREPMESSAGE,
OSSL_CMP_CERTREPMESSAGE, OSSL_CMP_CERTREPMESSAGE)
#define sk_OSSL_CMP_CERTREPMESSAGE_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_CMP_CERTREPMESSAGE_sk_type(sk))
#define sk_OSSL_CMP_CERTREPMESSAGE_value(sk, idx) ((OSSL_CMP_CERTREPMESSAGE
 *)OPENSSL_sk_value(ossl_check_const_OSSL_CMP_CERTREPMESSAGE_sk_type(sk), (idx)))
#define sk_OSSL_CMP_CERTREPMESSAGE_new(cmp) ((STACK_OF(OSSL_CMP_CERTREPMESSAGE)
*)OPENSSL_sk_new(ossl_check_OSSL_CMP_CERTREPMESSAGE_compfunc_type(cmp)))
#define sk_OSSL_CMP_CERTREPMESSAGE_new_null() ((STACK_OF(OSSL_CMP_CERTREPMESSAGE)
*)OPENSSL_sk_new_null())
#define sk_OSSL_CMP_CERTREPMESSAGE_new_reserve(cmp, n)
```

```
((STACK_OF(OSSL_CMP_CERTREPMESSAGE)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CMP_CERTREPMESSAGE_compfunc_type(cmp), (n)))
#define sk_OSSL_CMP_CERTREPMESSAGE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk), (n))
#define sk_OSSL_CMP_CERTREPMESSAGE_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk))
#define sk_OSSL_CMP_CERTREPMESSAGE_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk))
#define sk_OSSL_CMP_CERTREPMESSAGE_delete(sk, i) ((OSSL_CMP_CERTREPMESSAGE
*)OPENSSL_sk_delete(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
 (i)))
#define sk_OSSL_CMP_CERTREPMESSAGE_delete_ptr(sk, ptr) ((OSSL_CMP_CERTREPMESSAGE
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
ossl_check_OSSL_CMP_CERTREPMESSAGE_type(ptr)))
#define sk_OSSL_CMP_CERTREPMESSAGE_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
ossl_check_OSSL_CMP_CERTREPMESSAGE_type(ptr))
#define sk_OSSL_CMP_CERTREPMESSAGE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
ossl_check_OSSL_CMP_CERTREPMESSAGE_type(ptr))
#define sk_OSSL_CMP_CERTREPMESSAGE_pop(sk) ((OSSL_CMP_CERTREPMESSAGE
*)OPENSSL_sk_pop(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk)))
#define sk_OSSL_CMP_CERTREPMESSAGE_shift(sk) ((OSSL_CMP_CERTREPMESSAGE
*)OPENSSL_sk_shift(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk)))
#define sk_OSSL_CMP_CERTREPMESSAGE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),ossl_check_OSSL_CMP_CE
RTREPMESSAGE_freefunc_type(freefunc))
#define
 sk_OSSL_CMP_CERTREPMESSAGE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
ossl_check_OSSL_CMP_CERTREPMESSAGE_type(ptr), (idx))
#define sk_OSSL_CMP_CERTREPMESSAGE_set(sk, idx, ptr) ((OSSL_CMP_CERTREPMESSAGE
*)OPENSSL_sk_set(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk), (idx),
ossl_check_OSSL_CMP_CERTREPMESSAGE_type(ptr)))
#define sk_OSSL_CMP_CERTREPMESSAGE_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
ossl_check_OSSL_CMP_CERTREPMESSAGE_type(ptr))
#define sk_OSSL_CMP_CERTREPMESSAGE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
ossl_check_OSSL_CMP_CERTREPMESSAGE_type(ptr))
#define sk_OSSL_CMP_CERTREPMESSAGE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
ossl_check_OSSL_CMP_CERTREPMESSAGE_type(ptr), pnum)
#define sk_OSSL_CMP_CERTREPMESSAGE_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_CMP_CERTREPMESSAGE_sk_type(sk))
#define
 sk_OSSL_CMP_CERTREPMESSAGE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CMP_CERTREPMESSAGE_sk_type(sk))
```

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#define sk_OSSL_CMP_CERTREPMESSAGE_dup(sk) ((STACK_OF(OSSL_CMP_CERTREPMESSAGE)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CMP_CERTREPMESSAGE_sk_type(sk)))
#define sk_OSSL_CMP_CERTREPMESSAGE_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_CMP_CERTREPMESSAGE)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CMP_CERTREPMESSAGE_sk_type(sk),
ossl_check_OSSL_CMP_CERTREPMESSAGE_copyfunc_type(copyfunc),
ossl_check_OSSL_CMP_CERTREPMESSAGE_freefunc_type(freefunc)))
#define sk_OSSL_CMP_CERTREPMESSAGE_set_cmp_func(sk, cmp)
((sk_OSSL_CMP_CERTREPMESSAGE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_CMP_CERT
REPMESSAGE_sk_type(sk), ossl_check_OSSL_CMP_CERTREPMESSAGE_compfunc_type(cmp)))

/* clang-format on */
typedef struct ossl_cmp_pollrep_st OSSL_CMP_POLLREP;
typedef STACK_OF(OSSL_CMP_POLLREP) OSSL_CMP_POLLREPCONTENT;
typedef struct ossl_cmp_certresponse_st OSSL_CMP_CERTRESPONSE;
/* clang-format
 off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_CMP_CERTRESPONSE, OSSL_CMP_CERTRESPONSE,
OSSL_CMP_CERTRESPONSE)
#define sk_OSSL_CMP_CERTRESPONSE_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_CMP_CERTRESPONSE_sk_type(sk))
#define sk_OSSL_CMP_CERTRESPONSE_value(sk, idx) ((OSSL_CMP_CERTRESPONSE
*)OPENSSL_sk_value(ossl_check_const_OSSL_CMP_CERTRESPONSE_sk_type(sk), (idx)))
#define sk_OSSL_CMP_CERTRESPONSE_new(cmp) ((STACK_OF(OSSL_CMP_CERTRESPONSE)
*)OPENSSL_sk_new(ossl_check_OSSL_CMP_CERTRESPONSE_compfunc_type(cmp)))
#define sk_OSSL_CMP_CERTRESPONSE_new_null() ((STACK_OF(OSSL_CMP_CERTRESPONSE)
*)OPENSSL_sk_new_null())
#define sk_OSSL_CMP_CERTRESPONSE_new_reserve(cmp, n) ((STACK_OF(OSSL_CMP_CERTRESPONSE)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_CMP_CERTRESPONSE_compfunc_type(cmp), (n)))
#define sk_OSSL_CMP_CERTRESPONSE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk), (n))
#define sk_OSSL_CMP_CERTRESPONSE_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk))
#define
 sk_OSSL_CMP_CERTRESPONSE_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk))
#define sk_OSSL_CMP_CERTRESPONSE_delete(sk, i) ((OSSL_CMP_CERTRESPONSE
*)OPENSSL_sk_delete(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk), (i)))
#define sk_OSSL_CMP_CERTRESPONSE_delete_ptr(sk, ptr) ((OSSL_CMP_CERTRESPONSE
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk),
ossl_check_OSSL_CMP_CERTRESPONSE_type(ptr)))
#define sk_OSSL_CMP_CERTRESPONSE_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk),
ossl_check_OSSL_CMP_CERTRESPONSE_type(ptr))
#define sk_OSSL_CMP_CERTRESPONSE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk),
ossl_check_OSSL_CMP_CERTRESPONSE_type(ptr))
#define sk_OSSL_CMP_CERTRESPONSE_pop(sk) ((OSSL_CMP_CERTRESPONSE
```

```
*)OPENSSL_sk_pop(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk)))
#define sk_OSSL_CMP_CERTRESPONSE_shift(sk) ((OSSL_CMP_CERTRESPONSE
*)OPENSSL_sk_shift(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk)))
#define
 sk_OSSL_CMP_CERTRESPONSE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk),ossl_check_OSSL_CMP_CERT
RESPONSE_freefunc_type(freefunc))
#define sk_OSSL_CMP_CERTRESPONSE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk),
ossl_check_OSSL_CMP_CERTRESPONSE_type(ptr), (idx))
#define sk_OSSL_CMP_CERTRESPONSE_set(sk, idx, ptr) ((OSSL_CMP_CERTRESPONSE
*)OPENSSL_sk_set(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk), (idx),
ossl_check_OSSL_CMP_CERTRESPONSE_type(ptr)))
#define sk_OSSL_CMP_CERTRESPONSE_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk),
ossl_check_OSSL_CMP_CERTRESPONSE_type(ptr))
#define sk_OSSL_CMP_CERTRESPONSE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk),
ossl_check_OSSL_CMP_CERTRESPONSE_type(ptr))
#define sk_OSSL_CMP_CERTRESPONSE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk),
 ossl_check_OSSL_CMP_CERTRESPONSE_type(ptr), pnum)
#define sk_OSSL_CMP_CERTRESPONSE_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_CMP_CERTRESPONSE_sk_type(sk))
#define sk_OSSL_CMP_CERTRESPONSE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_CMP_CERTRESPONSE_sk_type(sk))
#define sk_OSSL_CMP_CERTRESPONSE_dup(sk) ((STACK_OF(OSSL_CMP_CERTRESPONSE)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_CMP_CERTRESPONSE_sk_type(sk)))
#define sk_OSSL_CMP_CERTRESPONSE_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_CMP_CERTRESPONSE)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_CMP_CERTRESPONSE_sk_type(sk),
ossl_check_OSSL_CMP_CERTRESPONSE_copyfunc_type(copyfunc),
ossl_check_OSSL_CMP_CERTRESPONSE_freefunc_type(freefunc)))
#define sk_OSSL_CMP_CERTRESPONSE_set_cmp_func(sk, cmp)
((sk_OSSL_CMP_CERTRESPONSE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_CMP_CERTRE
SPONSE_sk_type(sk), ossl_check_OSSL_CMP_CERTRESPONSE_compfunc_type(cmp)))

/* clang-format on */
typedef STACK_OF(ASN1_UTF8STRING) OSSL_CMP_PKIFREETEXT;

/*
 * function DECLARATIONS
*/

/* from cmp_asn.c */
OSSL_CMP_ITAV *OSSL_CMP_ITAV_create(ASN1_OBJECT *type, ASN1_TYPE *value);
void OSSL_CMP_ITAV_set0(OSSL_CMP_ITAV *itav, ASN1_OBJECT *type,
   ASN1_TYPE *value);
```

```
ASN1_OBJECT *OSSL_CMP_ITAV_get0_type(const OSSL_CMP_ITAV *itav);
ASN1_TYPE *OSSL_CMP_ITAV_get0_value(const OSSL_CMP_ITAV *itav);
int OSSL_CMP_ITAV_push0_stack_item(STACK_OF(OSSL_CMP_ITAV) **sk_p,
  OSSL_CMP_ITAV *itav);
void OSSL_CMP_ITAV_free(OSSL_CMP_ITAV *itav);

OSSL_CMP_ITAV *OSSL_CMP_ITAV_new0_certProfile(STACK_OF(ASN1_UTF8STRING)
     *certProfile);
int OSSL_CMP_ITAV_get0_certProfile(const OSSL_CMP_ITAV *itav,
  STACK_OF(ASN1_UTF8STRING) **out);
OSSL_CMP_ITAV *OSSL_CMP_ITAV_new_caCerts(const STACK_OF(X509) *caCerts);
int OSSL_CMP_ITAV_get0_caCerts(const OSSL_CMP_ITAV *itav, STACK_OF(X509) **out);

OSSL_CMP_ITAV *OSSL_CMP_ITAV_new_rootCaCert(const X509 *rootCaCert);
int OSSL_CMP_ITAV_get0_rootCaCert(const OSSL_CMP_ITAV *itav, X509 **out);
OSSL_CMP_ITAV
 *OSSL_CMP_ITAV_new_rootCaKeyUpdate(const X509 *newWithNew,
  const X509 *newWithOld,
  const X509 *oldWithNew);
int OSSL_CMP_ITAV_get0_rootCaKeyUpdate(const OSSL_CMP_ITAV *itav,
  X509 **newWithNew,
  X509 **newWithOld,
  X509 **oldWithNew);

OSSL_CMP_CRLSTATUS *OSSL_CMP_CRLSTATUS_create(const X509_CRL *crl,
  const X509 *cert, int only_DN);
OSSL_CMP_CRLSTATUS *OSSL_CMP_CRLSTATUS_new1(const DIST_POINT_NAME *dpn,
  const GENERAL_NAMES *issuer,
  const ASN1_TIME *thisUpdate);
int OSSL_CMP_CRLSTATUS_get0(const OSSL_CMP_CRLSTATUS *crlstatus,
  DIST_POINT_NAME **dpn, GENERAL_NAMES **issuer,
  ASN1_TIME **thisUpdate);
void OSSL_CMP_CRLSTATUS_free(OSSL_CMP_CRLSTATUS *crlstatus);
OSSL_CMP_ITAV
*OSSL_CMP_ITAV_new0_crlStatusList(STACK_OF(OSSL_CMP_CRLSTATUS) *crlStatusList);
int OSSL_CMP_ITAV_get0_crlStatusList(const OSSL_CMP_ITAV *itav,
  STACK_OF(OSSL_CMP_CRLSTATUS) **out);
OSSL_CMP_ITAV *OSSL_CMP_ITAV_new_crls(const X509_CRL *crls);
int OSSL_CMP_ITAV_get0_crls(const OSSL_CMP_ITAV
 *it, STACK_OF(X509_CRL) **out);
OSSL_CMP_ITAV
*OSSL_CMP_ITAV_new0_certReqTemplate(OSSL_CRMF_CERTTEMPLATE *certTemplate,
  OSSL_CMP_ATAVS *keySpec);
int OSSL_CMP_ITAV_get1_certReqTemplate(const OSSL_CMP_ITAV *itav,
  OSSL_CRMF_CERTTEMPLATE **certTemplate,
  OSSL_CMP_ATAVS **keySpec);

OSSL_CMP_ATAV *OSSL_CMP_ATAV_create(ASN1_OBJECT *type, ASN1_TYPE *value);
```

```
void OSSL_CMP_ATAV_set0(OSSL_CMP_ATAV *itav, ASN1_OBJECT *type,
   ASN1_TYPE *value);
ASN1_OBJECT *OSSL_CMP_ATAV_get0_type(const OSSL_CMP_ATAV *itav);
ASN1_TYPE *OSSL_CMP_ATAV_get0_value(const OSSL_CMP_ATAV *itav);
OSSL_CMP_ATAV *OSSL_CMP_ATAV_new_algId(const X509_ALGOR *alg);
X509_ALGOR *OSSL_CMP_ATAV_get0_algId(const OSSL_CMP_ATAV *atav);
OSSL_CMP_ATAV *OSSL_CMP_ATAV_new_rsaKeyLen(int len);
int OSSL_CMP_ATAV_get_rsaKeyLen(const OSSL_CMP_ATAV *atav);
int OSSL_CMP_ATAV_push1(OSSL_CMP_ATAVS **sk_p, const OSSL_CMP_ATAV *atav);

void OSSL_CMP_MSG_free(OSSL_CMP_MSG *msg);

/* from cmp_ctx.c */
OSSL_CMP_CTX *OSSL_CMP_CTX_new(OSSL_LIB_CTX
 *libctx, const char *propq);
void OSSL_CMP_CTX_free(OSSL_CMP_CTX *ctx);
int OSSL_CMP_CTX_reinit(OSSL_CMP_CTX *ctx);
OSSL_LIB_CTX *OSSL_CMP_CTX_get0_libctx(const OSSL_CMP_CTX *ctx);
const char *OSSL_CMP_CTX_get0_propq(const OSSL_CMP_CTX *ctx);
/* CMP general options: */
#define OSSL_CMP_OPT_LOG_VERBOSITY 0
/* CMP transfer options: */
#define OSSL_CMP_OPT_KEEP_ALIVE 10
#define OSSL_CMP_OPT_MSG_TIMEOUT 11
#define OSSL_CMP_OPT_TOTAL_TIMEOUT 12
#define OSSL_CMP_OPT_USE_TLS 13
/* CMP request options: */
#define OSSL_CMP_OPT_VALIDITY_DAYS 20
#define OSSL_CMP_OPT_SUBJECTALTNAME_NODEFAULT 21
#define OSSL_CMP_OPT_SUBJECTALTNAME_CRITICAL 22
#define OSSL_CMP_OPT_POLICIES_CRITICAL 23
#define OSSL_CMP_OPT_POPO_METHOD 24
#define OSSL_CMP_OPT_IMPLICIT_CONFIRM 25
#define OSSL_CMP_OPT_DISABLE_CONFIRM 26
#define OSSL_CMP_OPT_REVOCATION_REASON 27
/* CMP protection options: */
#define OSSL_CMP_OPT_UNPROTECTED_SEND 30
#define OSSL_CMP_OPT_UNPROTECTED_ERRORS 31
#define OSSL_CMP_OPT_OWF_ALGNID
 32
#define OSSL_CMP_OPT_MAC_ALGNID 33
#define OSSL_CMP_OPT_DIGEST_ALGNID 34
#define OSSL_CMP_OPT_IGNORE_KEYUSAGE 35
#define OSSL_CMP_OPT_PERMIT_TA_IN_EXTRACERTS_FOR_IR 36
#define OSSL_CMP_OPT_NO_CACHE_EXTRACERTS 37
int OSSL_CMP_CTX_set_option(OSSL_CMP_CTX *ctx, int opt, int val);
int OSSL_CMP_CTX_get_option(const OSSL_CMP_CTX *ctx, int opt);
/* CMP-specific callback for logging and outputting the error queue: */
```

```
int OSSL_CMP_CTX_set_log_cb(OSSL_CMP_CTX *ctx, OSSL_CMP_log_cb_t cb);
#define OSSL_CMP_CTX_set_log_verbosity(ctx, level) \
   OSSL_CMP_CTX_set_option(ctx, OSSL_CMP_OPT_LOG_VERBOSITY, level)
void OSSL_CMP_CTX_print_errors(const OSSL_CMP_CTX *ctx);
/* message transfer: */
int OSSL_CMP_CTX_set1_serverPath(OSSL_CMP_CTX *ctx, const char *path);
int OSSL_CMP_CTX_set1_server(OSSL_CMP_CTX *ctx, const char *address);
int OSSL_CMP_CTX_set_serverPort(OSSL_CMP_CTX *ctx, int port);
int OSSL_CMP_CTX_set1_proxy(OSSL_CMP_CTX *ctx, const char *name);
int OSSL_CMP_CTX_set1_no_proxy(OSSL_CMP_CTX
 *ctx, const char *names);
#ifndef OPENSSL_NO_HTTP
int OSSL_CMP_CTX_set_http_cb(OSSL_CMP_CTX *ctx, OSSL_HTTP_bio_cb_t cb);
int OSSL_CMP_CTX_set_http_cb_arg(OSSL_CMP_CTX *ctx, void *arg);
void *OSSL_CMP_CTX_get_http_cb_arg(const OSSL_CMP_CTX *ctx);
#endif
typedef OSSL_CMP_MSG *(*OSSL_CMP_transfer_cb_t)(OSSL_CMP_CTX *ctx,
   const OSSL_CMP_MSG *req);
int OSSL_CMP_CTX_set_transfer_cb(OSSL_CMP_CTX *ctx, OSSL_CMP_transfer_cb_t cb);
int OSSL_CMP_CTX_set_transfer_cb_arg(OSSL_CMP_CTX *ctx, void *arg);
void *OSSL_CMP_CTX_get_transfer_cb_arg(const OSSL_CMP_CTX *ctx);
/* server authentication: */
int OSSL_CMP_CTX_set1_srvCert(OSSL_CMP_CTX *ctx, X509 *cert);
int OSSL_CMP_CTX_set1_expected_sender(OSSL_CMP_CTX *ctx, const X509_NAME *name);
int OSSL_CMP_CTX_set0_trustedStore(OSSL_CMP_CTX *ctx, X509_STORE *store);
#define OSSL_CMP_CTX_set0_trusted OSSL_CMP_CTX_set0_trustedStore
X509_STORE *OSSL_CMP_CTX_get0_trustedStore(const OSSL_CMP_CTX *ctx);
#define OSSL_CMP_CTX_get0_trusted OSSL_CMP_CTX_get0_trustedStore
int
 OSSL_CMP_CTX_set1_untrusted(OSSL_CMP_CTX *ctx, STACK_OF(X509) *certs);
STACK_OF(X509) *OSSL_CMP_CTX_get0_untrusted(const OSSL_CMP_CTX *ctx);
/* client authentication: */
int OSSL_CMP_CTX_set1_cert(OSSL_CMP_CTX *ctx, X509 *cert);
int OSSL_CMP_CTX_build_cert_chain(OSSL_CMP_CTX *ctx, X509_STORE *own_trusted,
   STACK_OF(X509) *candidates);
int OSSL_CMP_CTX_set1_pkey(OSSL_CMP_CTX *ctx, EVP_PKEY *pkey);
int OSSL_CMP_CTX_set1_referenceValue(OSSL_CMP_CTX *ctx,
   const unsigned char *ref, int len);
int OSSL_CMP_CTX_set1_secretValue(OSSL_CMP_CTX *ctx,
   const unsigned char *sec, int len);
/* CMP message header and extra certificates: */
int OSSL_CMP_CTX_set1_recipient(OSSL_CMP_CTX *ctx, const X509_NAME *name);
int OSSL_CMP_CTX_push0_geninfo_ITAV(OSSL_CMP_CTX *ctx, OSSL_CMP_ITAV *itav);
int OSSL_CMP_CTX_reset_geninfo_ITAVs(OSSL_CMP_CTX *ctx);
STACK_OF(OSSL_CMP_ITAV)
*OSSL_CMP_CTX_get0_geninfo_ITAVs(const OSSL_CMP_CTX *ctx);
int OSSL_CMP_CTX_set1_extraCertsOut(OSSL_CMP_CTX *ctx,
```

```
    STACK_OF(X509) *extraCertsOut);
/* certificate template: */
int OSSL_CMP_CTX_set0_newPkey(OSSL_CMP_CTX *ctx, int priv, EVP_PKEY *pkey);
EVP_PKEY *OSSL_CMP_CTX_get0_newPkey(const OSSL_CMP_CTX *ctx, int priv);
int OSSL_CMP_CTX_set1_issuer(OSSL_CMP_CTX *ctx, const X509_NAME *name);
int OSSL_CMP_CTX_set1_serialNumber(OSSL_CMP_CTX *ctx, const ASN1_INTEGER *sn);
int OSSL_CMP_CTX_set1_subjectName(OSSL_CMP_CTX *ctx, const X509_NAME *name);
int OSSL_CMP_CTX_push1_subjectAltName(OSSL_CMP_CTX *ctx,
   const GENERAL_NAME *name);
int OSSL_CMP_CTX_set0_reqExtensions(OSSL_CMP_CTX *ctx, X509_EXTENSIONS *exts);
int OSSL_CMP_CTX_reqExtensions_have_SAN(OSSL_CMP_CTX *ctx);
int OSSL_CMP_CTX_push0_policy(OSSL_CMP_CTX *ctx, POLICYINFO *pinfo);
int OSSL_CMP_CTX_set1_oldCert(OSSL_CMP_CTX *ctx, X509 *cert);
int OSSL_CMP_CTX_set1_p10CSR(OSSL_CMP_CTX *ctx, const X509_REQ *csr);
/* misc body contents: */
int OSSL_CMP_CTX_push0_genm_ITAV(OSSL_CMP_CTX *ctx, OSSL_CMP_ITAV *itav);
/* certificate confirmation:
 */
typedef int (*OSSL_CMP_certConf_cb_t)(OSSL_CMP_CTX *ctx, X509 *cert,
   int fail_info, const char **txt);
int OSSL_CMP_certConf_cb(OSSL_CMP_CTX *ctx, X509 *cert, int fail_info,
   const char **text);
int OSSL_CMP_CTX_set_certConf_cb(OSSL_CMP_CTX *ctx, OSSL_CMP_certConf_cb_t cb);
int OSSL_CMP_CTX_set_certConf_cb_arg(OSSL_CMP_CTX *ctx, void *arg);
void *OSSL_CMP_CTX_get_certConf_cb_arg(const OSSL_CMP_CTX *ctx);
/* result fetching: */
int OSSL_CMP_CTX_get_status(const OSSL_CMP_CTX *ctx);
OSSL_CMP_PKIFREETEXT *OSSL_CMP_CTX_get0_statusString(const OSSL_CMP_CTX *ctx);
int OSSL_CMP_CTX_get_failInfoCode(const OSSL_CMP_CTX *ctx);
#define OSSL_CMP_PKISI_BUFLEN 1024
X509 *OSSL_CMP_CTX_get0_validatedSrvCert(const OSSL_CMP_CTX *ctx);
X509 *OSSL_CMP_CTX_get0_newCert(const OSSL_CMP_CTX *ctx);
STACK_OF(X509) *OSSL_CMP_CTX_get1_newChain(const OSSL_CMP_CTX *ctx);
STACK_OF(X509) *OSSL_CMP_CTX_get1_caPubs(const OSSL_CMP_CTX *ctx);
STACK_OF(X509) *OSSL_CMP_CTX_get1_extraCertsIn(const OSSL_CMP_CTX *ctx);
int
 OSSL_CMP_CTX_set1_transactionID(OSSL_CMP_CTX *ctx,
   const ASN1_OCTET_STRING *id);
int OSSL_CMP_CTX_set1_senderNonce(OSSL_CMP_CTX *ctx,
   const ASN1_OCTET_STRING *nonce);

/* from cmp_status.c */
char *OSSL_CMP_CTX_snprint_PKIStatus(const OSSL_CMP_CTX *ctx, char *buf,
   size_t bufsize);
char *OSSL_CMP_snprint_PKIStatusInfo(const OSSL_CMP_PKISI *statusInfo,
   char *buf, size_t bufsize);
OSSL_CMP_PKISI *
OSSL_CMP_STATUSINFO_new(int status, int fail_info, const char *text);
```

```
/* from cmp_hdr.c */
ASN1_OCTET_STRING *OSSL_CMP_HDR_get0_transactionID(const OSSL_CMP_PKIHEADER *hdr);
ASN1_OCTET_STRING *OSSL_CMP_HDR_get0_recipNonce(const OSSL_CMP_PKIHEADER *hdr);
STACK_OF(OSSL_CMP_ITAV)
*OSSL_CMP_HDR_get0_geninfo_ITAVs(const OSSL_CMP_PKIHEADER *hdr);

/* from cmp_msg.c */
OSSL_CMP_PKIHEADER *OSSL_CMP_MSG_get0_header(const OSSL_CMP_MSG *msg);
int OSSL_CMP_MSG_get_bodytype(const OSSL_CMP_MSG *msg);
X509_PUBKEY *OSSL_CMP_MSG_get0_certreq_publickey(const OSSL_CMP_MSG *msg);
int OSSL_CMP_MSG_update_transactionID(OSSL_CMP_CTX
 *ctx, OSSL_CMP_MSG *msg);
int OSSL_CMP_MSG_update_recipNonce(OSSL_CMP_CTX *ctx, OSSL_CMP_MSG *msg);
OSSL_CRMF_MSG *OSSL_CMP_CTX_setup_CRM(OSSL_CMP_CTX *ctx, int for_KUR, int rid);
OSSL_CMP_MSG *OSSL_CMP_MSG_read(const char *file, OSSL_LIB_CTX *libctx,
   const char *propq);
int OSSL_CMP_MSG_write(const char *file, const OSSL_CMP_MSG *msg);
OSSL_CMP_MSG *d2i_OSSL_CMP_MSG_bio(BIO *bio, OSSL_CMP_MSG **msg);
int i2d_OSSL_CMP_MSG_bio(BIO *bio, const OSSL_CMP_MSG *msg);

/* from cmp_vfy.c */
int OSSL_CMP_validate_msg(OSSL_CMP_CTX *ctx, const OSSL_CMP_MSG *msg);
int OSSL_CMP_validate_cert_path(const OSSL_CMP_CTX *ctx,
   X509_STORE *trusted_store, X509 *cert);

/* from cmp_http.c */
#ifndef OPENSSL_NO_HTTP
OSSL_CMP_MSG *OSSL_CMP_MSG_http_perform(OSSL_CMP_CTX *ctx,
   const OSSL_CMP_MSG *req);
#endif

/* from cmp_server.c */
typedef struct ossl_cmp_srv_ctx_st OSSL_CMP_SRV_CTX;
OSSL_CMP_MSG *OSSL_CMP_SRV_process_request(OSSL_CMP_SRV_CTX *srv_ctx,
   const
 OSSL_CMP_MSG *req);
OSSL_CMP_MSG *OSSL_CMP_CTX_server_perform(OSSL_CMP_CTX *client_ctx,
   const OSSL_CMP_MSG *req);
OSSL_CMP_SRV_CTX *OSSL_CMP_SRV_CTX_new(OSSL_LIB_CTX *libctx, const char *propq);
void OSSL_CMP_SRV_CTX_free(OSSL_CMP_SRV_CTX *srv_ctx);
typedef OSSL_CMP_PKISI *(*OSSL_CMP_SRV_cert_request_cb_t)(OSSL_CMP_SRV_CTX *srv_ctx, const
OSSL_CMP_MSG *req, int certReqId,
   const OSSL_CRMF_MSG *crm, const X509_REQ *p10cr,
   X509 **certOut, STACK_OF(X509) **chainOut, STACK_OF(X509) **caPubs);
typedef OSSL_CMP_PKISI *(*OSSL_CMP_SRV_rr_cb_t)(OSSL_CMP_SRV_CTX *srv_ctx,
   const OSSL_CMP_MSG *req,
   const X509_NAME *issuer,
```

```
   const ASN1_INTEGER *serial);
typedef int (*OSSL_CMP_SRV_genm_cb_t)(OSSL_CMP_SRV_CTX *srv_ctx,
   const OSSL_CMP_MSG *req,
   const STACK_OF(OSSL_CMP_ITAV) *in,
   STACK_OF(OSSL_CMP_ITAV) **out);
typedef void (*OSSL_CMP_SRV_error_cb_t)(OSSL_CMP_SRV_CTX *srv_ctx,
   const OSSL_CMP_MSG *req,
   const OSSL_CMP_PKISI *statusInfo,
   const ASN1_INTEGER
 *errorCode,
   const OSSL_CMP_PKIFREETEXT *errDetails);
typedef int (*OSSL_CMP_SRV_certConf_cb_t)(OSSL_CMP_SRV_CTX *srv_ctx,
   const OSSL_CMP_MSG *req,
   int certReqId,
   const ASN1_OCTET_STRING *certHash,
   const OSSL_CMP_PKISI *si);
typedef int (*OSSL_CMP_SRV_pollReq_cb_t)(OSSL_CMP_SRV_CTX *srv_ctx,
   const OSSL_CMP_MSG *req, int certReqId,
   OSSL_CMP_MSG **certReq,
   int64_t *check_after);
int OSSL_CMP_SRV_CTX_init(OSSL_CMP_SRV_CTX *srv_ctx, void *custom_ctx,
   OSSL_CMP_SRV_cert_request_cb_t process_cert_request,
   OSSL_CMP_SRV_rr_cb_t process_rr,
   OSSL_CMP_SRV_genm_cb_t process_genm,
   OSSL_CMP_SRV_error_cb_t process_error,
   OSSL_CMP_SRV_certConf_cb_t process_certConf,
   OSSL_CMP_SRV_pollReq_cb_t process_pollReq);
typedef int (*OSSL_CMP_SRV_delayed_delivery_cb_t)(OSSL_CMP_SRV_CTX *srv_ctx,
   const OSSL_CMP_MSG *req);
typedef int (*OSSL_CMP_SRV_clean_transaction_cb_t)(OSSL_CMP_SRV_CTX *srv_ctx,
   const ASN1_OCTET_STRING *id);
int OSSL_CMP_SRV_CTX_init_trans(OSSL_CMP_SRV_CTX
 *srv_ctx,
   OSSL_CMP_SRV_delayed_delivery_cb_t delay,
   OSSL_CMP_SRV_clean_transaction_cb_t clean);
OSSL_CMP_CTX *OSSL_CMP_SRV_CTX_get0_cmp_ctx(const OSSL_CMP_SRV_CTX *srv_ctx);
void *OSSL_CMP_SRV_CTX_get0_custom_ctx(const OSSL_CMP_SRV_CTX *srv_ctx);
int OSSL_CMP_SRV_CTX_set_send_unprotected_errors(OSSL_CMP_SRV_CTX *srv_ctx,
   int val);
int OSSL_CMP_SRV_CTX_set_accept_unprotected(OSSL_CMP_SRV_CTX *srv_ctx, int val);
int OSSL_CMP_SRV_CTX_set_accept_raverified(OSSL_CMP_SRV_CTX *srv_ctx, int val);
int OSSL_CMP_SRV_CTX_set_grant_implicit_confirm(OSSL_CMP_SRV_CTX *srv_ctx,
   int val);

/* from cmp_client.c */
X509 *OSSL_CMP_exec_certreq(OSSL_CMP_CTX *ctx, int req_type,
   const OSSL_CRMF_MSG *crm);
#define OSSL_CMP_IR 0
```

```
#define OSSL_CMP_CR 2
#define OSSL_CMP_P10CR 4
#define OSSL_CMP_KUR 7
#define OSSL_CMP_GENM 21
#define OSSL_CMP_ERROR 23
#define OSSL_CMP_exec_IR_ses(ctx) \
  OSSL_CMP_exec_certreq(ctx, OSSL_CMP_IR, NULL)
#define OSSL_CMP_exec_CR_ses(ctx)
 \
  OSSL_CMP_exec_certreq(ctx, OSSL_CMP_CR, NULL)
#define OSSL_CMP_exec_P10CR_ses(ctx) \
  OSSL_CMP_exec_certreq(ctx, OSSL_CMP_P10CR, NULL)
#define OSSL_CMP_exec_KUR_ses(ctx) \
  OSSL_CMP_exec_certreq(ctx, OSSL_CMP_KUR, NULL)
int OSSL_CMP_try_certreq(OSSL_CMP_CTX *ctx, int req_type,
  const OSSL_CRMF_MSG *crm, int *checkAfter);
int OSSL_CMP_exec_RR_ses(OSSL_CMP_CTX *ctx);
STACK_OF(OSSL_CMP_ITAV) *OSSL_CMP_exec_GENM_ses(OSSL_CMP_CTX *ctx);

/* from cmp_genm.c */
int OSSL_CMP_get1_caCerts(OSSL_CMP_CTX *ctx, STACK_OF(X509) **out);
int OSSL_CMP_get1_rootCaKeyUpdate(OSSL_CMP_CTX *ctx,
  const X509 *oldWithOld, X509 **newWithNew,
  X509 **newWithOld, X509 **oldWithNew);
int OSSL_CMP_get1_crlUpdate(OSSL_CMP_CTX *ctx, const X509 *crlcert,
  const X509_CRL *last_crl,
  X509_CRL **crl);
int OSSL_CMP_get1_certReqTemplate(OSSL_CMP_CTX *ctx,
  OSSL_CRMF_CERTTEMPLATE **certTemplate,
  OSSL_CMP_ATAVS **keySpec);

#ifdef __cplusplus
}
#endif
#endif /* !defined(OPENSSL_NO_CMP) */
#endif
 /* !defined(OPENSSL_CMP_H) */
```

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console.log('ok');
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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/ui.h.in
*
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* this file except in compliance with the License.  You can obtain a copy
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* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_UI_H
#define OPENSSL_UI_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_UI_H
#endif

#include <openssl/opensslconf.h>

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#include <openssl/crypto.h>
#endif
#include <openssl/safestack.h>
#include <openssl/pem.h>
#include <openssl/types.h>
#include <openssl/uierr.h>

/* For compatibility reasons, the macro OPENSSL_NO_UI is currently retained */
#ifndef OPENSSL_NO_DEPRECATED_3_0
#ifdef OPENSSL_NO_UI_CONSOLE
#define OPENSSL_NO_UI
#endif
#endif

#ifdef
```

```
 __cplusplus
extern "C" {
#endif

/*
* All the following functions return -1 or NULL on error and in some cases
* (UI_process()) -2 if interrupted or in some other way cancelled. When
* everything is fine, they return 0, a positive value or a non-NULL pointer,
* all depending on their purpose.
*/

/* Creators and destructor.   */
UI *UI_new(void);
UI *UI_new_method(const UI_METHOD *method);
void UI_free(UI *ui);

/*-
  The following functions are used to add strings to be printed and prompt
  strings to prompt for data.  The names are UI_{add,dup}_<function>_string
  and UI_{add,dup}_input_boolean.

  UI_{add,dup}_<function>_string have the following meanings:
      add     add a text or prompt string.  The pointers given to these
              functions are used verbatim, no copying is done.
      dup     make a copy of the text or prompt string, then add the copy
              to the collection of strings in the user interface.
      <function>

        The function is a name for the functionality that the given
              string shall be used for.  It can be one of:
                    input   use the string as data prompt.
                    verify  use the string as verification prompt.  This
                            is used to verify a previous input.
                    info    use the string for informational output.
                    error   use the string for error output.
  Honestly, there's currently no difference between info and error for the
  moment.

  UI_{add,dup}_input_boolean have the same semantics for "add" and "dup",
  and are typically used when one wants to prompt for a yes/no response.

  All of the functions in this group take a UI and a prompt string.
  The string input and verify addition functions also take a flag argument,
  a buffer for the result to end up with, a minimum input size and a maximum
  input size (the result buffer MUST be large enough to be able
 to contain
  the maximum number of characters).  Additionally, the verify addition
  functions takes another buffer to compare the result against.
```

```
  The boolean input functions take an action description string (which should
  be safe to ignore if the expected user action is obvious, for example with
  a dialog box with an OK button and a Cancel button), a string of acceptable
  characters to mean OK and to mean Cancel.  The two last strings are checked
  to make sure they don't have common characters.  Additionally, the same
  flag argument as for the string input is taken, as well as a result buffer.
  The result buffer is required to be at least one byte long.  Depending on
  the answer, the first character from the OK or the Cancel character strings
  will be stored in the first byte of the result buffer.  No NUL will be
  added, so the result is *not* a string.

  On success, the all return an index of the added information.  That index
  is useful when retrieving
 results with UI_get0_result(). */
int UI_add_input_string(UI *ui, const char *prompt, int flags,
   char *result_buf, int minsize, int maxsize);
int UI_dup_input_string(UI *ui, const char *prompt, int flags,
   char *result_buf, int minsize, int maxsize);
int UI_add_verify_string(UI *ui, const char *prompt, int flags,
   char *result_buf, int minsize, int maxsize,
   const char *test_buf);
int UI_dup_verify_string(UI *ui, const char *prompt, int flags,
   char *result_buf, int minsize, int maxsize,
   const char *test_buf);
int UI_add_input_boolean(UI *ui, const char *prompt, const char *action_desc,
   const char *ok_chars, const char *cancel_chars,
   int flags, char *result_buf);
int UI_dup_input_boolean(UI *ui, const char *prompt, const char *action_desc,
   const char *ok_chars, const char *cancel_chars,
   int flags, char *result_buf);
int UI_add_info_string(UI *ui, const char *text);
int UI_dup_info_string(UI *ui, const char *text);
int UI_add_error_string(UI *ui, const
 char *text);
int UI_dup_error_string(UI *ui, const char *text);

/* These are the possible flags.  They can be or'ed together. */
/* Use to have echoing of input */
#define UI_INPUT_FLAG_ECHO 0x01
/*
* Use a default password.  Where that password is found is completely up to
* the application, it might for example be in the user data set with
* UI_add_user_data().  It is not recommended to have more than one input in
* each UI being marked with this flag, or the application might get
* confused.
*/
#define UI_INPUT_FLAG_DEFAULT_PWD 0x02
```

```
/*-
* The user of these routines may want to define flags of their own.  The core
* UI won't look at those, but will pass them on to the method routines.  They
* must use higher bits so they don't get confused with the UI bits above.
* UI_INPUT_FLAG_USER_BASE tells which is the lowest bit to use.  A good
* example of use is this:
*
*    #define MY_UI_FLAG1       (0x01 << UI_INPUT_FLAG_USER_BASE)
*
*/
#define UI_INPUT_FLAG_USER_BASE 16

/*-
 * The following function helps construct a prompt.
* phrase_desc is a textual short description of the phrase to enter,
* for example "pass phrase", and
* object_name is the name of the object
* (which might be a card name or a file name) or NULL.
* The returned string shall always be allocated on the heap with
* OPENSSL_malloc(), and need to be free'd with OPENSSL_free().
*
* If the ui_method doesn't contain a pointer to a user-defined prompt
* constructor, a default string is built, looking like this:
*
*       "Enter {phrase_desc} for {object_name}:"
*
* So, if phrase_desc has the value "pass phrase" and object_name has
* the value "foo.key", the resulting string is:
*
*       "Enter pass phrase for foo.key:"
*/
char *UI_construct_prompt(UI *ui_method,
   const char *phrase_desc, const char *object_name);

/*
* The following function is used to store a pointer to user-specific data.
* Any previous such pointer will be returned and replaced.
*
* For callback
 purposes, this function makes a lot more sense than using
* ex_data, since the latter requires that different parts of OpenSSL or
* applications share the same ex_data index.
*
* Note that the UI_OpenSSL() method completely ignores the user data. Other
* methods may not, however.
*/
void *UI_add_user_data(UI *ui, void *user_data);
/*
```

```
* Alternatively, this function is used to duplicate the user data.
* This uses the duplicator method function.  The destroy function will
* be used to free the user data in this case.
*/
int UI_dup_user_data(UI *ui, void *user_data);
/* We need a user data retrieving function as well.  */
void *UI_get0_user_data(UI *ui);

/* Return the result associated with a prompt given with the index i. */
const char *UI_get0_result(UI *ui, int i);
int UI_get_result_length(UI *ui, int i);

/* When all strings have been added, process the whole thing. */
int UI_process(UI *ui);

/*
* Give a user interface parameterised control commands.  This can be used to
 * send down an integer, a data pointer or a function pointer, as well as be
* used to get information from a UI.
*/
int UI_ctrl(UI *ui, int cmd, long i, void *p, void (*f)(void));

/* The commands */
/*
* Use UI_CONTROL_PRINT_ERRORS with the value 1 to have UI_process print the
* OpenSSL error stack before printing any info or added error messages and
* before any prompting.
*/
#define UI_CTRL_PRINT_ERRORS 1
/*
* Check if a UI_process() is possible to do again with the same instance of
* a user interface.  This makes UI_ctrl() return 1 if it is redoable, and 0
* if not.
*/
#define UI_CTRL_IS_REDOABLE 2

/* Some methods may use extra data */
#define UI_set_app_data(s, arg) UI_set_ex_data(s, 0, arg)
#define UI_get_app_data(s) UI_get_ex_data(s, 0)

#define UI_get_ex_new_index(l, p, newf, dupf, freef) \
   CRYPTO_get_ex_new_index(CRYPTO_EX_INDEX_UI, l, p, newf, dupf, freef)
int UI_set_ex_data(UI *r, int idx, void *arg);
void *UI_get_ex_data(const UI *r, int idx);

/* Use specific
 methods instead of the built-in one */
void UI_set_default_method(const UI_METHOD *meth);
```

```
const UI_METHOD *UI_get_default_method(void);
const UI_METHOD *UI_get_method(UI *ui);
const UI_METHOD *UI_set_method(UI *ui, const UI_METHOD *meth);

#ifndef OPENSSL_NO_UI_CONSOLE

/* The method with all the built-in thingies */
UI_METHOD *UI_OpenSSL(void);

#endif

/*
* NULL method.  Literally does nothing, but may serve as a placeholder
* to avoid internal default.
*/
const UI_METHOD *UI_null(void);

/* ---------- For method writers ---------- */
/*-
  A method contains a number of functions that implement the low level
  of the User Interface.  The functions are:

      an opener       This function starts a session, maybe by opening
                      a channel to a tty, or by opening a window.
      a writer        This function is called to write a given string,
                      maybe to the tty, maybe as a field label in a
                      window.
      a
 flusher       This function is called to flush everything that
                      has been output so far.  It can be used to actually
                      display a dialog box after it has been built.
      a reader        This function is called to read a given prompt,
                      maybe from the tty, maybe from a field in a
                      window.  Note that it's called with all string
                      structures, not only the prompt ones, so it must
                      check such things itself.
      a closer        This function closes the session, maybe by closing
                      the channel to the tty, or closing the window.

  All these functions are expected to return:

      0       on error.
      1       on success.
      -1      on out-of-band events, for example if some prompting has
              been canceled (by pressing Ctrl-C, for example).  This is
              only checked when returned by the flusher or
 the reader.
```

```
  The way this is used, the opener is first called, then the writer for all
  strings, then the flusher, then the reader for all strings and finally the
  closer.  Note that if you want to prompt from a terminal or other command
  line interface, the best is to have the reader also write the prompts
  instead of having the writer do it.  If you want to prompt from a dialog
  box, the writer can be used to build up the contents of the box, and the
  flusher to actually display the box and run the event loop until all data
  has been given, after which the reader only grabs the given data and puts
  them back into the UI strings.

  All method functions take a UI as argument.  Additionally, the writer and
  the reader take a UI_STRING.
*/

/*
* The UI_STRING type is the data structure that contains all the needed info
* about a string or a prompt, including test data for a verification prompt.
*/
typedef struct ui_string_st UI_STRING;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(UI_STRING,
 UI_STRING, UI_STRING)
#define sk_UI_STRING_num(sk) OPENSSL_sk_num(ossl_check_const_UI_STRING_sk_type(sk))
#define sk_UI_STRING_value(sk, idx) ((UI_STRING
*)OPENSSL_sk_value(ossl_check_const_UI_STRING_sk_type(sk), (idx)))
#define sk_UI_STRING_new(cmp) ((STACK_OF(UI_STRING)
*)OPENSSL_sk_new(ossl_check_UI_STRING_compfunc_type(cmp)))
#define sk_UI_STRING_new_null() ((STACK_OF(UI_STRING) *)OPENSSL_sk_new_null())
#define sk_UI_STRING_new_reserve(cmp, n) ((STACK_OF(UI_STRING)
*)OPENSSL_sk_new_reserve(ossl_check_UI_STRING_compfunc_type(cmp), (n)))
#define sk_UI_STRING_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_UI_STRING_sk_type(sk), (n))
#define sk_UI_STRING_free(sk) OPENSSL_sk_free(ossl_check_UI_STRING_sk_type(sk))
#define sk_UI_STRING_zero(sk) OPENSSL_sk_zero(ossl_check_UI_STRING_sk_type(sk))
#define sk_UI_STRING_delete(sk, i) ((UI_STRING *)OPENSSL_sk_delete(ossl_check_UI_STRING_sk_type(sk),
(i)))
#define sk_UI_STRING_delete_ptr(sk, ptr) ((UI_STRING
*)OPENSSL_sk_delete_ptr(ossl_check_UI_STRING_sk_type(sk),
 ossl_check_UI_STRING_type(ptr)))
#define sk_UI_STRING_push(sk, ptr) OPENSSL_sk_push(ossl_check_UI_STRING_sk_type(sk),
ossl_check_UI_STRING_type(ptr))
#define sk_UI_STRING_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_UI_STRING_sk_type(sk),
ossl_check_UI_STRING_type(ptr))
#define sk_UI_STRING_pop(sk) ((UI_STRING *)OPENSSL_sk_pop(ossl_check_UI_STRING_sk_type(sk)))
#define sk_UI_STRING_shift(sk) ((UI_STRING *)OPENSSL_sk_shift(ossl_check_UI_STRING_sk_type(sk)))
#define sk_UI_STRING_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_UI_STRING_sk_type(sk),ossl_check_UI_STRING_freefunc_type(freefunc))
#define sk_UI_STRING_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_UI_STRING_sk_type(sk),
```

```
ossl_check_UI_STRING_type(ptr), (idx))
#define sk_UI_STRING_set(sk, idx, ptr) ((UI_STRING *)OPENSSL_sk_set(ossl_check_UI_STRING_sk_type(sk),
(idx), ossl_check_UI_STRING_type(ptr)))
#define sk_UI_STRING_find(sk, ptr) OPENSSL_sk_find(ossl_check_UI_STRING_sk_type(sk),
 ossl_check_UI_STRING_type(ptr))
#define sk_UI_STRING_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_UI_STRING_sk_type(sk),
ossl_check_UI_STRING_type(ptr))
#define sk_UI_STRING_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_UI_STRING_sk_type(sk),
ossl_check_UI_STRING_type(ptr), pnum)
#define sk_UI_STRING_sort(sk) OPENSSL_sk_sort(ossl_check_UI_STRING_sk_type(sk))
#define sk_UI_STRING_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_UI_STRING_sk_type(sk))
#define sk_UI_STRING_dup(sk) ((STACK_OF(UI_STRING)
*)OPENSSL_sk_dup(ossl_check_const_UI_STRING_sk_type(sk)))
#define sk_UI_STRING_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(UI_STRING)
*)OPENSSL_sk_deep_copy(ossl_check_const_UI_STRING_sk_type(sk),
ossl_check_UI_STRING_copyfunc_type(copyfunc), ossl_check_UI_STRING_freefunc_type(freefunc)))
#define sk_UI_STRING_set_cmp_func(sk, cmp)
((sk_UI_STRING_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_UI_STRING_sk_type(sk),
ossl_check_UI_STRING_compfunc_type(cmp)))

/*
 clang-format on */

/*
* The different types of strings that are currently supported. This is only
* needed by method authors.
*/
enum UI_string_types {
   UIT_NONE = 0,
   UIT_PROMPT, /* Prompt for a string */
   UIT_VERIFY, /* Prompt for a string and verify */
   UIT_BOOLEAN, /* Prompt for a yes/no response */
   UIT_INFO, /* Send info to the user */
   UIT_ERROR /* Send an error message to the user */
};

/* Create and manipulate methods */
UI_METHOD *UI_create_method(const char *name);
void UI_destroy_method(UI_METHOD *ui_method);
int UI_method_set_opener(UI_METHOD *method, int (*opener)(UI *ui));
int UI_method_set_writer(UI_METHOD *method,
   int (*writer)(UI *ui, UI_STRING *uis));
int UI_method_set_flusher(UI_METHOD *method, int (*flusher)(UI *ui));
int UI_method_set_reader(UI_METHOD *method,
   int (*reader)(UI *ui, UI_STRING *uis));
int UI_method_set_closer(UI_METHOD *method, int (*closer)(UI *ui));
int UI_method_set_data_duplicator(UI_METHOD *method,
   void *(*duplicator)(UI
```

```
 *ui, void *ui_data),
   void (*destructor)(UI *ui, void *ui_data));
int UI_method_set_prompt_constructor(UI_METHOD *method,
   char *(*prompt_constructor)(UI *ui,
       const char
           *phrase_desc,
       const char
           *object_name));
int UI_method_set_ex_data(UI_METHOD *method, int idx, void *data);
int (*UI_method_get_opener(const UI_METHOD *method))(UI *);
int (*UI_method_get_writer(const UI_METHOD *method))(UI *, UI_STRING *);
int (*UI_method_get_flusher(const UI_METHOD *method))(UI *);
int (*UI_method_get_reader(const UI_METHOD *method))(UI *, UI_STRING *);
int (*UI_method_get_closer(const UI_METHOD *method))(UI *);
char *(*UI_method_get_prompt_constructor(const UI_METHOD *method))(UI *, const char *, const char *);
void *(*UI_method_get_data_duplicator(const UI_METHOD *method))(UI *, void *);
void (*UI_method_get_data_destructor(const UI_METHOD *method))(UI *, void *);
const void *UI_method_get_ex_data(const UI_METHOD *method, int idx);

/*
*
 The following functions are helpers for method writers to access relevant
* data from a UI_STRING.
*/

/* Return type of the UI_STRING */
enum UI_string_types UI_get_string_type(UI_STRING *uis);
/* Return input flags of the UI_STRING */
int UI_get_input_flags(UI_STRING *uis);
/* Return the actual string to output (the prompt, info or error) */
const char *UI_get0_output_string(UI_STRING *uis);
/*
* Return the optional action string to output (the boolean prompt
* instruction)
*/
const char *UI_get0_action_string(UI_STRING *uis);
/* Return the result of a prompt */
const char *UI_get0_result_string(UI_STRING *uis);
int UI_get_result_string_length(UI_STRING *uis);
/*
* Return the string to test the result against.  Only useful with verifies.
*/
const char *UI_get0_test_string(UI_STRING *uis);
/* Return the required minimum size of the result */
int UI_get_result_minsize(UI_STRING *uis);
/* Return the required maximum size of the result */
int UI_get_result_maxsize(UI_STRING *uis);
/*
```

```
 Set the result of a UI_STRING. */
int UI_set_result(UI *ui, UI_STRING *uis, const char *result);
int UI_set_result_ex(UI *ui, UI_STRING *uis, const char *result, int len);

/* A couple of popular utility functions */
int UI_UTIL_read_pw_string(char *buf, int length, const char *prompt,
   int verify);
int UI_UTIL_read_pw(char *buf, char *buff, int size, const char *prompt,
   int verify);
UI_METHOD *UI_UTIL_wrap_read_pem_callback(pem_password_cb *cb, int rwflag);

#ifdef __cplusplus
}
#endif
#endif
```

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```
{
 'variables': {
   'openssl_defines_BSD-x86': [
     'NDEBUG',
     'L_ENDIAN',
     'OPENSSL_BUILDING_OPENSSL',
     'AES_ASM',
     'CMLL_ASM',
     'DES_ASM',
     'ECP_NISTZ256_ASM',
```

```
  'GHASH_ASM',
  'MD5_ASM',
  'OPENSSL_BN_ASM_GF2m',
  'OPENSSL_BN_ASM_MONT',
  'OPENSSL_BN_ASM_PART_WORDS',
  'OPENSSL_CPUID_OBJ',
  'OPENSSL_IA32_SSE2',
  'PADLOCK_ASM',
  'POLY1305_ASM',
  'RC4_ASM',
  'RMD160_ASM',
  'SHA1_ASM',
  'SHA256_ASM',
  'SHA512_ASM',
  'VPAES_ASM',
  'WHIRLPOOL_ASM',
  'OPENSSL_PIC',
],
'openssl_cflags_BSD-x86': [
  '-Wa,--noexecstack',
  '-Wall -O3 -fomit-frame-pointer',
  '-pthread',
  '-Wall -O3 -fomit-frame-pointer',
],
'openssl_ex_libs_BSD-x86': [
  '-pthread',
],
'openssl_cli_srcs_BSD-x86': [
  'openssl/apps/lib/cmp_mock_srv.c',
  'openssl/apps/asn1parse.c',
  'openssl/apps/ca.c',
  'openssl/apps/ciphers.c',
  'openssl/apps/cmp.c',
   'openssl/apps/cms.c',
  'openssl/apps/crl.c',
  'openssl/apps/crl2pkcs7.c',
  'openssl/apps/dgst.c',
  'openssl/apps/dhparam.c',
  'openssl/apps/dsa.c',
  'openssl/apps/dsaparam.c',
  'openssl/apps/ec.c',
  'openssl/apps/ecparam.c',
  'openssl/apps/enc.c',
  'openssl/apps/engine.c',
  'openssl/apps/errstr.c',
  'openssl/apps/fipsinstall.c',
  'openssl/apps/gendsa.c',
  'openssl/apps/genpkey.c',
```

'openssl/apps/genrsa.c',
'openssl/apps/info.c',
'openssl/apps/kdf.c',
'openssl/apps/list.c',
'openssl/apps/mac.c',
'openssl/apps/nseq.c',
'openssl/apps/ocsp.c',
'openssl/apps/openssl.c',
'openssl/apps/passwd.c',
'openssl/apps/pkcs12.c',
'openssl/apps/pkcs7.c',
'openssl/apps/pkcs8.c',
'openssl/apps/pkey.c',
'openssl/apps/pkeyparam.c',
'openssl/apps/pkeyutl.c',
'openssl/apps/prime.c',
'./config/archs/BSD-x86/asm/apps/progs.c',

'openssl/apps/rand.c',
'openssl/apps/rehash.c',
'openssl/apps/req.c',
'openssl/apps/rsa.c',
'openssl/apps/rsautl.c',
'openssl/apps/s_client.c',
'openssl/apps/s_server.c',
'openssl/apps/s_time.c',
'openssl/apps/sess_id.c',
'openssl/apps/skeyutl.c',
'openssl/apps/smime.c',
'openssl/apps/speed.c',
'openssl/apps/spkac.c',
'openssl/apps/srp.c',
'openssl/apps/storeutl.c',
'openssl/apps/ts.c',
'openssl/apps/verify.c',
'openssl/apps/version.c',
'openssl/apps/x509.c',
'openssl/apps/lib/app_libctx.c',
'openssl/apps/lib/app_params.c',
'openssl/apps/lib/app_provider.c',
'openssl/apps/lib/app_rand.c',
'openssl/apps/lib/app_x509.c',
'openssl/apps/lib/apps.c',
'openssl/apps/lib/apps_opt_printf.c',
'openssl/apps/lib/apps_ui.c',
'openssl/apps/lib/columns.c',
'openssl/apps/lib/engine.c',
'openssl/apps/lib/engine_loader.c',

```
 'openssl/apps/lib/fmt.c',
    'openssl/apps/lib/http_server.c',
    'openssl/apps/lib/log.c',
    'openssl/apps/lib/names.c',
    'openssl/apps/lib/opt.c',
    'openssl/apps/lib/s_cb.c',
    'openssl/apps/lib/s_socket.c',
    'openssl/apps/lib/tlssrp_depr.c',
  ],
 },
 'defines': ['<@(openssl_defines_BSD-x86)'],
 'include_dirs': [
   './include',
 ],
 'cflags' : ['<@(openssl_cflags_BSD-x86)'],
 'libraries': ['<@(openssl_ex_libs_BSD-x86)'],
 'sources': ['<@(openssl_cli_srcs_BSD-x86)'],
}
```

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```
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#define SRC_PERMISSION_INSPECTOR_PERMISSION_H_

#if defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS

#include <string>
#include "permission/permission_base.h"

namespace node {

namespace permission {

class InspectorPermission final : public PermissionBase {
public:
 void Apply(Environment* env,
            const std::vector<std::string>& allow,
```

```
        PermissionScope scope) override;
 bool is_granted(Environment* env,
             PermissionScope perm,
             const std::string_view& param = "") const override;

private:
 bool deny_all_;
};

}  // namespace permission

}  // namespace node

#endif  // defined(NODE_WANT_INTERNALS) && NODE_WANT_INTERNALS
#endif  // SRC_PERMISSION_INSPECTOR_PERMISSION_H_
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```
/*
* WARNING: do not edit!
* Generated by util/mkbuildinf.pl
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* https://www.openssl.org/source/license.html
*/
```

```
#define PLATFORM "platform: BSD-x86"
#define DATE "built on: Tue Jan 27 17:25:49 2026 UTC"

/*
* Generate compiler_flags as an array of individual characters. This is a
* workaround for the situation where CFLAGS gets too long for a C90 string
* literal
*/
static const char compiler_flags[] = {
   'c','o','m','p','i','l','e','r',':',' ','.','.','/','c','o','n',
   'f','i','g','/','f','a','k','e','_','g','c','c','.','p','l',' ',
   '-','f','P','I','C',' ','-','p','t','h','r','e','a','d',' ','-',
   'W','a',',','-','-','n','o','e','x','e','c','s','t','a','c','k',
   ' ','-','W','a','l','l','
 ','-','O','3',' ','-','f','o','m','i',
   't','-','f','r','a','m','e','-','p','o','i','n','t','e','r',' ',
   '-','D','L','_','E','N','D','I','A','N',' ','-','D','O','P','E',
   'N','S','S','L','_','P','I','C',' ','-','D','_','T','H','R','E',
   'A','D','_','S','A','F','E',' ','-','D','_','R','E','E','N','T',
   'R','A','N','T',' ','-','D','O','P','E','N','S','S','L','_','B',
   'U','I','L','D','I','N','G','_','O','P','E','N','S','S','L',' ',
   '-','D','N','D','E','B','U','G','\0'
};
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/fipskey.h.in
*
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*
* Licensed under the Apache License 2.0 (the "License").  You may not use
* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#ifndef OPENSSL_FIPSKEY_H
#define OPENSSL_FIPSKEY_H
#pragma once

#ifdef __cplusplus
extern "C" {
#endif

/*
* The FIPS validation HMAC key, usable as an array initializer.
*/
/* clang-format off */
#define FIPS_KEY_ELEMENTS \
   0xf4, 0x55, 0x66, 0x50, 0xac, 0x31, 0xd3, 0x54, 0x61, 0x61, 0x0b, 0xac, 0x4e, 0xd8, 0x1b, 0x1a, 0x18, 0x1b,
0x2d, 0x8a, 0x43, 0xea, 0x28, 0x54, 0xcb, 0xae, 0x22, 0xca, 0x74, 0x56, 0x08, 0x13
/* clang-format on */
```

```
/*
* The FIPS validation key, as a string.
*/
/* clang-format off */
#define FIPS_KEY_STRING "f4556650ac31d35461610bac4ed81b1a181b2d8a43ea2854cbae22ca74560813"
/*
 clang-format on */

/*
* The FIPS provider vendor name, as a string.
*/
/* clang-format off */
#define FIPS_VENDOR "OpenSSL FIPS Provider"
/* clang-format on */

#ifdef __cplusplus
}
#endif

#endif
{
 'variables': {
   'openssl_sources': [
     'openssl/ssl/bio_ssl.c',
     'openssl/ssl/d1_lib.c',
     'openssl/ssl/d1_msg.c',
     'openssl/ssl/d1_srtp.c',
     'openssl/ssl/methods.c',
     'openssl/ssl/pqueue.c',
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     'openssl/ssl/ssl_utst.c',
```

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'openssl/providers/implementations/ciphers/cipher_tdes_common.c',
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  'openssl/providers/implementations/digests/wp_prov.c',
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  'openssl/providers/implementations/kdfs/pvkkdf.c',
  'openssl/providers/prov_running.c',
  'openssl/providers/legacyprov.c',
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  './config/archs/BSD-x86/asm/crypto/aes/aesni-x86.S',
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   './config/archs/BSD-x86/asm/crypto/bf/bf-586.S',
  './config/archs/BSD-x86/asm/crypto/bn/bn-586.S',
  './config/archs/BSD-x86/asm/crypto/bn/co-586.S',
  './config/archs/BSD-x86/asm/crypto/bn/x86-gf2m.S',
  './config/archs/BSD-x86/asm/crypto/bn/x86-mont.S',
  './config/archs/BSD-x86/asm/crypto/camellia/cmll-x86.S',
  './config/archs/BSD-x86/asm/crypto/chacha/chacha-x86.S',
  './config/archs/BSD-x86/asm/crypto/des/crypt586.S',
  './config/archs/BSD-x86/asm/crypto/des/des-586.S',
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  './config/archs/BSD-x86/asm/crypto/params_idx.c',
  './config/archs/BSD-x86/asm/crypto/x86cpuid.S',
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  './config/archs/BSD-x86/asm/providers/common/der/der_digests_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_dsa_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_ec_gen.c',
  './config/archs/BSD-x86/asm/providers/common/der/der_ecx_gen.c',
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  './config/archs/BSD-x86/asm/providers/common/der/der_wrap_gen.c',
  './config/archs/BSD-x86/asm/providers/legacy.ld',
   './config/archs/BSD-x86/asm/providers/fips.ld',
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    'GHASH_ASM',
    'MD5_ASM',
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    'OPENSSL_BN_ASM_MONT',
    'OPENSSL_BN_ASM_PART_WORDS',
    'OPENSSL_CPUID_OBJ',
    'OPENSSL_IA32_SSE2',
    'PADLOCK_ASM',
    'POLY1305_ASM',
    'RC4_ASM',
    'RMD160_ASM',
    'SHA1_ASM',
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    'WHIRLPOOL_ASM',
    'OPENSSL_PIC',
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  './crypto',
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},
```

```
}
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/x509_vfy.h.in
*
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*
* Licensed under the Apache License 2.0 (the "License").  You may not use
* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_X509_VFY_H
#define OPENSSL_X509_VFY_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_X509_VFY_H
#endif

/*
* Protect against recursion, x509.h and x509_vfy.h each include the other.
*/
#ifndef OPENSSL_X509_H
#include <openssl/x509.h>
#endif

#include <openssl/opensslconf.h>
#include <openssl/lhash.h>
#include <openssl/bio.h>
#include <openssl/crypto.h>
#include <openssl/symhacks.h>

#ifdef __cplusplus
extern "C" {
#endif

/*-
SSL_CTX -> X509_STORE

  -> X509_LOOKUP
                ->X509_LOOKUP_METHOD
```

```
            -> X509_LOOKUP
                 ->X509_LOOKUP_METHOD

SSL     -> X509_STORE_CTX
            ->X509_STORE

The X509_STORE holds the tables etc for verification stuff.
A X509_STORE_CTX is used while validating a single certificate.
The X509_STORE has X509_LOOKUPs for looking up certs.
The X509_STORE then calls a function to actually verify the
certificate chain.
*/

typedef enum {
   X509_LU_NONE = 0,
   X509_LU_X509,
   X509_LU_CRL
} X509_LOOKUP_TYPE;

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define X509_LU_RETRY -1
#define X509_LU_FAIL 0
#endif

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_LOOKUP, X509_LOOKUP, X509_LOOKUP)
#define sk_X509_LOOKUP_num(sk) OPENSSL_sk_num(ossl_check_const_X509_LOOKUP_sk_type(sk))
#define sk_X509_LOOKUP_value(sk, idx) ((X509_LOOKUP
*)OPENSSL_sk_value(ossl_check_const_X509_LOOKUP_sk_type(sk), (idx)))
#define sk_X509_LOOKUP_new(cmp) ((STACK_OF(X509_LOOKUP)
*)OPENSSL_sk_new(ossl_check_X509_LOOKUP_compfunc_type(cmp)))
#define
 sk_X509_LOOKUP_new_null() ((STACK_OF(X509_LOOKUP) *)OPENSSL_sk_new_null())
#define sk_X509_LOOKUP_new_reserve(cmp, n) ((STACK_OF(X509_LOOKUP)
*)OPENSSL_sk_new_reserve(ossl_check_X509_LOOKUP_compfunc_type(cmp), (n)))
#define sk_X509_LOOKUP_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_LOOKUP_sk_type(sk), (n))
#define sk_X509_LOOKUP_free(sk) OPENSSL_sk_free(ossl_check_X509_LOOKUP_sk_type(sk))
#define sk_X509_LOOKUP_zero(sk) OPENSSL_sk_zero(ossl_check_X509_LOOKUP_sk_type(sk))
#define sk_X509_LOOKUP_delete(sk, i) ((X509_LOOKUP
*)OPENSSL_sk_delete(ossl_check_X509_LOOKUP_sk_type(sk), (i)))
#define sk_X509_LOOKUP_delete_ptr(sk, ptr) ((X509_LOOKUP
*)OPENSSL_sk_delete_ptr(ossl_check_X509_LOOKUP_sk_type(sk), ossl_check_X509_LOOKUP_type(ptr)))
#define sk_X509_LOOKUP_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_LOOKUP_sk_type(sk),
ossl_check_X509_LOOKUP_type(ptr))
#define sk_X509_LOOKUP_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_LOOKUP_sk_type(sk),
 ossl_check_X509_LOOKUP_type(ptr))
#define sk_X509_LOOKUP_pop(sk) ((X509_LOOKUP
*)OPENSSL_sk_pop(ossl_check_X509_LOOKUP_sk_type(sk)))
```

```
#define sk_X509_LOOKUP_shift(sk) ((X509_LOOKUP
*)OPENSSL_sk_shift(ossl_check_X509_LOOKUP_sk_type(sk)))
#define sk_X509_LOOKUP_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_LOOKUP_sk_type(sk),ossl_check_X509_LOOKUP_freefunc_type(free
func))
#define sk_X509_LOOKUP_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_LOOKUP_sk_type(sk),
ossl_check_X509_LOOKUP_type(ptr), (idx))
#define sk_X509_LOOKUP_set(sk, idx, ptr) ((X509_LOOKUP
*)OPENSSL_sk_set(ossl_check_X509_LOOKUP_sk_type(sk), (idx), ossl_check_X509_LOOKUP_type(ptr)))
#define sk_X509_LOOKUP_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_LOOKUP_sk_type(sk),
ossl_check_X509_LOOKUP_type(ptr))
#define sk_X509_LOOKUP_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_LOOKUP_sk_type(sk),
ossl_check_X509_LOOKUP_type(ptr))
#define sk_X509_LOOKUP_find_all(sk, ptr, pnum)
 OPENSSL_sk_find_all(ossl_check_X509_LOOKUP_sk_type(sk), ossl_check_X509_LOOKUP_type(ptr), pnum)
#define sk_X509_LOOKUP_sort(sk) OPENSSL_sk_sort(ossl_check_X509_LOOKUP_sk_type(sk))
#define sk_X509_LOOKUP_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_X509_LOOKUP_sk_type(sk))
#define sk_X509_LOOKUP_dup(sk) ((STACK_OF(X509_LOOKUP)
*)OPENSSL_sk_dup(ossl_check_const_X509_LOOKUP_sk_type(sk)))
#define sk_X509_LOOKUP_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_LOOKUP)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_LOOKUP_sk_type(sk),
ossl_check_X509_LOOKUP_copyfunc_type(copyfunc), ossl_check_X509_LOOKUP_freefunc_type(freefunc)))
#define sk_X509_LOOKUP_set_cmp_func(sk, cmp)
((sk_X509_LOOKUP_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_LOOKUP_sk_type(sk),
ossl_check_X509_LOOKUP_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(X509_OBJECT, X509_OBJECT, X509_OBJECT)
#define sk_X509_OBJECT_num(sk) OPENSSL_sk_num(ossl_check_const_X509_OBJECT_sk_type(sk))
#define sk_X509_OBJECT_value(sk,
 idx) ((X509_OBJECT *)OPENSSL_sk_value(ossl_check_const_X509_OBJECT_sk_type(sk), (idx)))
#define sk_X509_OBJECT_new(cmp) ((STACK_OF(X509_OBJECT)
*)OPENSSL_sk_new(ossl_check_X509_OBJECT_compfunc_type(cmp)))
#define sk_X509_OBJECT_new_null() ((STACK_OF(X509_OBJECT) *)OPENSSL_sk_new_null())
#define sk_X509_OBJECT_new_reserve(cmp, n) ((STACK_OF(X509_OBJECT)
*)OPENSSL_sk_new_reserve(ossl_check_X509_OBJECT_compfunc_type(cmp), (n)))
#define sk_X509_OBJECT_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_OBJECT_sk_type(sk), (n))
#define sk_X509_OBJECT_free(sk) OPENSSL_sk_free(ossl_check_X509_OBJECT_sk_type(sk))
#define sk_X509_OBJECT_zero(sk) OPENSSL_sk_zero(ossl_check_X509_OBJECT_sk_type(sk))
#define sk_X509_OBJECT_delete(sk, i) ((X509_OBJECT
*)OPENSSL_sk_delete(ossl_check_X509_OBJECT_sk_type(sk), (i)))
#define sk_X509_OBJECT_delete_ptr(sk, ptr) ((X509_OBJECT
*)OPENSSL_sk_delete_ptr(ossl_check_X509_OBJECT_sk_type(sk), ossl_check_X509_OBJECT_type(ptr)))
#define sk_X509_OBJECT_push(sk, ptr)
 OPENSSL_sk_push(ossl_check_X509_OBJECT_sk_type(sk), ossl_check_X509_OBJECT_type(ptr))
#define sk_X509_OBJECT_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_OBJECT_sk_type(sk),
ossl_check_X509_OBJECT_type(ptr))
#define sk_X509_OBJECT_pop(sk) ((X509_OBJECT
*)OPENSSL_sk_pop(ossl_check_X509_OBJECT_sk_type(sk)))
```

```
#define sk_X509_OBJECT_shift(sk) ((X509_OBJECT
*)OPENSSL_sk_shift(ossl_check_X509_OBJECT_sk_type(sk)))
#define sk_X509_OBJECT_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_OBJECT_sk_type(sk),ossl_check_X509_OBJECT_freefunc_type(freef
unc))
#define sk_X509_OBJECT_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_OBJECT_sk_type(sk),
ossl_check_X509_OBJECT_type(ptr), (idx))
#define sk_X509_OBJECT_set(sk, idx, ptr) ((X509_OBJECT
*)OPENSSL_sk_set(ossl_check_X509_OBJECT_sk_type(sk), (idx), ossl_check_X509_OBJECT_type(ptr)))
#define sk_X509_OBJECT_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_OBJECT_sk_type(sk),
ossl_check_X509_OBJECT_type(ptr))
#define sk_X509_OBJECT_find_ex(sk,
 ptr) OPENSSL_sk_find_ex(ossl_check_X509_OBJECT_sk_type(sk), ossl_check_X509_OBJECT_type(ptr))
#define sk_X509_OBJECT_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_X509_OBJECT_sk_type(sk), ossl_check_X509_OBJECT_type(ptr), pnum)
#define sk_X509_OBJECT_sort(sk) OPENSSL_sk_sort(ossl_check_X509_OBJECT_sk_type(sk))
#define sk_X509_OBJECT_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_X509_OBJECT_sk_type(sk))
#define sk_X509_OBJECT_dup(sk) ((STACK_OF(X509_OBJECT)
*)OPENSSL_sk_dup(ossl_check_const_X509_OBJECT_sk_type(sk)))
#define sk_X509_OBJECT_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_OBJECT)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_OBJECT_sk_type(sk),
ossl_check_X509_OBJECT_copyfunc_type(copyfunc), ossl_check_X509_OBJECT_freefunc_type(freefunc)))
#define sk_X509_OBJECT_set_cmp_func(sk, cmp)
((sk_X509_OBJECT_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_OBJECT_sk_type(sk),
ossl_check_X509_OBJECT_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(X509_VERIFY_PARAM,
 X509_VERIFY_PARAM, X509_VERIFY_PARAM)
#define sk_X509_VERIFY_PARAM_num(sk)
OPENSSL_sk_num(ossl_check_const_X509_VERIFY_PARAM_sk_type(sk))
#define sk_X509_VERIFY_PARAM_value(sk, idx) ((X509_VERIFY_PARAM
*)OPENSSL_sk_value(ossl_check_const_X509_VERIFY_PARAM_sk_type(sk), (idx)))
#define sk_X509_VERIFY_PARAM_new(cmp) ((STACK_OF(X509_VERIFY_PARAM)
*)OPENSSL_sk_new(ossl_check_X509_VERIFY_PARAM_compfunc_type(cmp)))
#define sk_X509_VERIFY_PARAM_new_null() ((STACK_OF(X509_VERIFY_PARAM)
*)OPENSSL_sk_new_null())
#define sk_X509_VERIFY_PARAM_new_reserve(cmp, n) ((STACK_OF(X509_VERIFY_PARAM)
*)OPENSSL_sk_new_reserve(ossl_check_X509_VERIFY_PARAM_compfunc_type(cmp), (n)))
#define sk_X509_VERIFY_PARAM_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_X509_VERIFY_PARAM_sk_type(sk), (n))
#define sk_X509_VERIFY_PARAM_free(sk)
OPENSSL_sk_free(ossl_check_X509_VERIFY_PARAM_sk_type(sk))
#define sk_X509_VERIFY_PARAM_zero(sk)
OPENSSL_sk_zero(ossl_check_X509_VERIFY_PARAM_sk_type(sk))
#define sk_X509_VERIFY_PARAM_delete(sk,
 i) ((X509_VERIFY_PARAM *)OPENSSL_sk_delete(ossl_check_X509_VERIFY_PARAM_sk_type(sk), (i)))
#define sk_X509_VERIFY_PARAM_delete_ptr(sk, ptr) ((X509_VERIFY_PARAM
*)OPENSSL_sk_delete_ptr(ossl_check_X509_VERIFY_PARAM_sk_type(sk),
ossl_check_X509_VERIFY_PARAM_type(ptr)))
```

```
#define sk_X509_VERIFY_PARAM_push(sk, ptr)
OPENSSL_sk_push(ossl_check_X509_VERIFY_PARAM_sk_type(sk),
ossl_check_X509_VERIFY_PARAM_type(ptr))
#define sk_X509_VERIFY_PARAM_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_X509_VERIFY_PARAM_sk_type(sk),
ossl_check_X509_VERIFY_PARAM_type(ptr))
#define sk_X509_VERIFY_PARAM_pop(sk) ((X509_VERIFY_PARAM
*)OPENSSL_sk_pop(ossl_check_X509_VERIFY_PARAM_sk_type(sk)))
#define sk_X509_VERIFY_PARAM_shift(sk) ((X509_VERIFY_PARAM
*)OPENSSL_sk_shift(ossl_check_X509_VERIFY_PARAM_sk_type(sk)))
#define sk_X509_VERIFY_PARAM_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_VERIFY_PARAM_sk_type(sk),ossl_check_X509_VERIFY_PARAM_
freefunc_type(freefunc))
#define sk_X509_VERIFY_PARAM_insert(sk,
 ptr, idx) OPENSSL_sk_insert(ossl_check_X509_VERIFY_PARAM_sk_type(sk),
ossl_check_X509_VERIFY_PARAM_type(ptr), (idx))
#define sk_X509_VERIFY_PARAM_set(sk, idx, ptr) ((X509_VERIFY_PARAM
*)OPENSSL_sk_set(ossl_check_X509_VERIFY_PARAM_sk_type(sk), (idx),
ossl_check_X509_VERIFY_PARAM_type(ptr)))
#define sk_X509_VERIFY_PARAM_find(sk, ptr)
OPENSSL_sk_find(ossl_check_X509_VERIFY_PARAM_sk_type(sk),
ossl_check_X509_VERIFY_PARAM_type(ptr))
#define sk_X509_VERIFY_PARAM_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_X509_VERIFY_PARAM_sk_type(sk),
ossl_check_X509_VERIFY_PARAM_type(ptr))
#define sk_X509_VERIFY_PARAM_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_X509_VERIFY_PARAM_sk_type(sk),
ossl_check_X509_VERIFY_PARAM_type(ptr), pnum)
#define sk_X509_VERIFY_PARAM_sort(sk)
OPENSSL_sk_sort(ossl_check_X509_VERIFY_PARAM_sk_type(sk))
#define sk_X509_VERIFY_PARAM_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_X509_VERIFY_PARAM_sk_type(sk))
#define sk_X509_VERIFY_PARAM_dup(sk)
 ((STACK_OF(X509_VERIFY_PARAM)
*)OPENSSL_sk_dup(ossl_check_const_X509_VERIFY_PARAM_sk_type(sk)))
#define sk_X509_VERIFY_PARAM_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_VERIFY_PARAM)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_VERIFY_PARAM_sk_type(sk),
ossl_check_X509_VERIFY_PARAM_copyfunc_type(copyfunc),
ossl_check_X509_VERIFY_PARAM_freefunc_type(freefunc)))
#define sk_X509_VERIFY_PARAM_set_cmp_func(sk, cmp)
((sk_X509_VERIFY_PARAM_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_VERIFY_PARAM_sk_
type(sk), ossl_check_X509_VERIFY_PARAM_compfunc_type(cmp)))

/* clang-format on */

/* This is used for a table of trust checking functions */
typedef struct x509_trust_st {
   int trust;
```

```
   int flags;
   int (*check_trust)(struct x509_trust_st *, X509 *, int);
   char *name;
   int arg1;
   void *arg2;
} X509_TRUST;
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_TRUST, X509_TRUST, X509_TRUST)
#define sk_X509_TRUST_num(sk) OPENSSL_sk_num(ossl_check_const_X509_TRUST_sk_type(sk))
#define
 sk_X509_TRUST_value(sk, idx) ((X509_TRUST
*)OPENSSL_sk_value(ossl_check_const_X509_TRUST_sk_type(sk), (idx)))
#define sk_X509_TRUST_new(cmp) ((STACK_OF(X509_TRUST)
*)OPENSSL_sk_new(ossl_check_X509_TRUST_compfunc_type(cmp)))
#define sk_X509_TRUST_new_null() ((STACK_OF(X509_TRUST) *)OPENSSL_sk_new_null())
#define sk_X509_TRUST_new_reserve(cmp, n) ((STACK_OF(X509_TRUST)
*)OPENSSL_sk_new_reserve(ossl_check_X509_TRUST_compfunc_type(cmp), (n)))
#define sk_X509_TRUST_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_TRUST_sk_type(sk), (n))
#define sk_X509_TRUST_free(sk) OPENSSL_sk_free(ossl_check_X509_TRUST_sk_type(sk))
#define sk_X509_TRUST_zero(sk) OPENSSL_sk_zero(ossl_check_X509_TRUST_sk_type(sk))
#define sk_X509_TRUST_delete(sk, i) ((X509_TRUST
*)OPENSSL_sk_delete(ossl_check_X509_TRUST_sk_type(sk), (i)))
#define sk_X509_TRUST_delete_ptr(sk, ptr) ((X509_TRUST
*)OPENSSL_sk_delete_ptr(ossl_check_X509_TRUST_sk_type(sk), ossl_check_X509_TRUST_type(ptr)))
#define sk_X509_TRUST_push(sk,
 ptr) OPENSSL_sk_push(ossl_check_X509_TRUST_sk_type(sk), ossl_check_X509_TRUST_type(ptr))
#define sk_X509_TRUST_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_TRUST_sk_type(sk),
ossl_check_X509_TRUST_type(ptr))
#define sk_X509_TRUST_pop(sk) ((X509_TRUST *)OPENSSL_sk_pop(ossl_check_X509_TRUST_sk_type(sk)))
#define sk_X509_TRUST_shift(sk) ((X509_TRUST
*)OPENSSL_sk_shift(ossl_check_X509_TRUST_sk_type(sk)))
#define sk_X509_TRUST_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_TRUST_sk_type(sk),ossl_check_X509_TRUST_freefunc_type(freefunc
))
#define sk_X509_TRUST_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_X509_TRUST_sk_type(sk),
ossl_check_X509_TRUST_type(ptr), (idx))
#define sk_X509_TRUST_set(sk, idx, ptr) ((X509_TRUST
*)OPENSSL_sk_set(ossl_check_X509_TRUST_sk_type(sk), (idx), ossl_check_X509_TRUST_type(ptr)))
#define sk_X509_TRUST_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_TRUST_sk_type(sk),
ossl_check_X509_TRUST_type(ptr))
#define sk_X509_TRUST_find_ex(sk,
 ptr) OPENSSL_sk_find_ex(ossl_check_X509_TRUST_sk_type(sk), ossl_check_X509_TRUST_type(ptr))
#define sk_X509_TRUST_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_X509_TRUST_sk_type(sk),
ossl_check_X509_TRUST_type(ptr), pnum)
#define sk_X509_TRUST_sort(sk) OPENSSL_sk_sort(ossl_check_X509_TRUST_sk_type(sk))
#define sk_X509_TRUST_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_X509_TRUST_sk_type(sk))
#define sk_X509_TRUST_dup(sk) ((STACK_OF(X509_TRUST)
*)OPENSSL_sk_dup(ossl_check_const_X509_TRUST_sk_type(sk)))
```

```
#define sk_X509_TRUST_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_TRUST)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_TRUST_sk_type(sk),
ossl_check_X509_TRUST_copyfunc_type(copyfunc), ossl_check_X509_TRUST_freefunc_type(freefunc)))
#define sk_X509_TRUST_set_cmp_func(sk, cmp)
((sk_X509_TRUST_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_TRUST_sk_type(sk),
ossl_check_X509_TRUST_compfunc_type(cmp)))

/* clang-format on */

/* standard trust ids */
#define X509_TRUST_DEFAULT
 0 /* Only valid in purpose settings */
#define X509_TRUST_COMPAT 1
#define X509_TRUST_SSL_CLIENT 2
#define X509_TRUST_SSL_SERVER 3
#define X509_TRUST_EMAIL 4
#define X509_TRUST_OBJECT_SIGN 5
#define X509_TRUST_OCSP_SIGN 6
#define X509_TRUST_OCSP_REQUEST 7
#define X509_TRUST_TSA 8
/* Keep these up to date! */
#define X509_TRUST_MIN 1
#define X509_TRUST_MAX 8

/* trust_flags values */
#define X509_TRUST_DYNAMIC (1U << 0)
#define X509_TRUST_DYNAMIC_NAME (1U << 1)
/* No compat trust if self-signed, preempts "DO_SS" */
#define X509_TRUST_NO_SS_COMPAT (1U << 2)
/* Compat trust if no explicit accepted trust EKUs */
#define X509_TRUST_DO_SS_COMPAT (1U << 3)
/* Accept "anyEKU" as a wildcard rejection OID and as a wildcard trust OID */
#define X509_TRUST_OK_ANY_EKU (1U << 4)

/* check_trust return codes */
#define X509_TRUST_TRUSTED 1
#define X509_TRUST_REJECTED 2
#define X509_TRUST_UNTRUSTED 3

int X509_TRUST_set(int *t, int trust);
int X509_TRUST_get_count(void);
X509_TRUST *X509_TRUST_get0(int
 idx);
int X509_TRUST_get_by_id(int id);
int X509_TRUST_add(int id, int flags, int (*ck)(X509_TRUST *, X509 *, int),
   const char *name, int arg1, void *arg2);
void X509_TRUST_cleanup(void);
int X509_TRUST_get_flags(const X509_TRUST *xp);
```

```
char *X509_TRUST_get0_name(const X509_TRUST *xp);
int X509_TRUST_get_trust(const X509_TRUST *xp);

int X509_trusted(const X509 *x);
int X509_add1_trust_object(X509 *x, const ASN1_OBJECT *obj);
int X509_add1_reject_object(X509 *x, const ASN1_OBJECT *obj);
void X509_trust_clear(X509 *x);
void X509_reject_clear(X509 *x);
STACK_OF(ASN1_OBJECT) *X509_get0_trust_objects(X509 *x);
STACK_OF(ASN1_OBJECT) *X509_get0_reject_objects(X509 *x);

int (*X509_TRUST_set_default(int (*trust)(int, X509 *, int)))(int, X509 *,
   int);
int X509_check_trust(X509 *x, int id, int flags);

int X509_verify_cert(X509_STORE_CTX *ctx);
int X509_STORE_CTX_verify(X509_STORE_CTX *ctx);
STACK_OF(X509) *X509_build_chain(X509 *target, STACK_OF(X509) *certs,
   X509_STORE
 *store, int with_self_signed,
   OSSL_LIB_CTX *libctx, const char *propq);

int X509_STORE_set_depth(X509_STORE *store, int depth);

typedef int (*X509_STORE_CTX_verify_cb)(int, X509_STORE_CTX *);
int X509_STORE_CTX_print_verify_cb(int ok, X509_STORE_CTX *ctx);
typedef int (*X509_STORE_CTX_verify_fn)(X509_STORE_CTX *);
typedef int (*X509_STORE_CTX_get_issuer_fn)(X509 **issuer,
   X509_STORE_CTX *ctx, X509 *x);
typedef int (*X509_STORE_CTX_check_issued_fn)(X509_STORE_CTX *ctx,
   X509 *x, X509 *issuer);
typedef int (*X509_STORE_CTX_check_revocation_fn)(X509_STORE_CTX *ctx);
typedef int (*X509_STORE_CTX_get_crl_fn)(X509_STORE_CTX *ctx,
   X509_CRL **crl, X509 *x);
typedef int (*X509_STORE_CTX_check_crl_fn)(X509_STORE_CTX *ctx, X509_CRL *crl);
typedef int (*X509_STORE_CTX_cert_crl_fn)(X509_STORE_CTX *ctx,
   X509_CRL *crl, X509 *x);
typedef int (*X509_STORE_CTX_check_policy_fn)(X509_STORE_CTX *ctx);
typedef STACK_OF(X509)
   *(*X509_STORE_CTX_lookup_certs_fn)(X509_STORE_CTX
 *ctx,
       const X509_NAME *nm);
typedef STACK_OF(X509_CRL)
   *(*X509_STORE_CTX_lookup_crls_fn)(const X509_STORE_CTX *ctx,
       const X509_NAME *nm);
typedef int (*X509_STORE_CTX_cleanup_fn)(X509_STORE_CTX *ctx);

void X509_STORE_CTX_set_depth(X509_STORE_CTX *ctx, int depth);
```

```
#define X509_STORE_CTX_set_app_data(ctx, data) \
   X509_STORE_CTX_set_ex_data(ctx, 0, data)
#define X509_STORE_CTX_get_app_data(ctx) \
   X509_STORE_CTX_get_ex_data(ctx, 0)

#define X509_L_FILE_LOAD 1
#define X509_L_ADD_DIR 2
#define X509_L_ADD_STORE 3
#define X509_L_LOAD_STORE 4

#define X509_LOOKUP_load_file(x, name, type) \
   X509_LOOKUP_ctrl((x), X509_L_FILE_LOAD, (name), (long)(type), NULL)

#define X509_LOOKUP_add_dir(x, name, type) \
   X509_LOOKUP_ctrl((x), X509_L_ADD_DIR, (name), (long)(type), NULL)

#define X509_LOOKUP_add_store(x, name) \
   X509_LOOKUP_ctrl((x), X509_L_ADD_STORE, (name), 0, NULL)

#define X509_LOOKUP_load_store(x, name) \
   X509_LOOKUP_ctrl((x), X509_L_LOAD_STORE, (name),
 0, NULL)

#define X509_LOOKUP_load_file_ex(x, name, type, libctx, propq)            \
   X509_LOOKUP_ctrl_ex((x), X509_L_FILE_LOAD, (name), (long)(type), NULL, \
      (libctx), (propq))

#define X509_LOOKUP_load_store_ex(x, name, libctx, propq)       \
   X509_LOOKUP_ctrl_ex((x), X509_L_LOAD_STORE, (name), 0, NULL, \
      (libctx), (propq))

#define X509_LOOKUP_add_store_ex(x, name, libctx, propq)       \
   X509_LOOKUP_ctrl_ex((x), X509_L_ADD_STORE, (name), 0, NULL, \
      (libctx), (propq))

#define X509_V_OK 0
#define X509_V_ERR_UNSPECIFIED 1
#define X509_V_ERR_UNABLE_TO_GET_ISSUER_CERT 2
#define X509_V_ERR_UNABLE_TO_GET_CRL 3
#define X509_V_ERR_UNABLE_TO_DECRYPT_CERT_SIGNATURE 4
#define X509_V_ERR_UNABLE_TO_DECRYPT_CRL_SIGNATURE 5
#define X509_V_ERR_UNABLE_TO_DECODE_ISSUER_PUBLIC_KEY 6
#define X509_V_ERR_CERT_SIGNATURE_FAILURE 7
#define X509_V_ERR_CRL_SIGNATURE_FAILURE 8
#define X509_V_ERR_CERT_NOT_YET_VALID 9
#define X509_V_ERR_CERT_HAS_EXPIRED 10
#define X509_V_ERR_CRL_NOT_YET_VALID
```

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 11
#define X509_V_ERR_CRL_HAS_EXPIRED 12
#define X509_V_ERR_ERROR_IN_CERT_NOT_BEFORE_FIELD 13
#define X509_V_ERR_ERROR_IN_CERT_NOT_AFTER_FIELD 14
#define X509_V_ERR_ERROR_IN_CRL_LAST_UPDATE_FIELD 15
#define X509_V_ERR_ERROR_IN_CRL_NEXT_UPDATE_FIELD 16
#define X509_V_ERR_OUT_OF_MEM 17
#define X509_V_ERR_DEPTH_ZERO_SELF_SIGNED_CERT 18
#define X509_V_ERR_SELF_SIGNED_CERT_IN_CHAIN 19
#define X509_V_ERR_UNABLE_TO_GET_ISSUER_CERT_LOCALLY 20
#define X509_V_ERR_UNABLE_TO_VERIFY_LEAF_SIGNATURE 21
#define X509_V_ERR_CERT_CHAIN_TOO_LONG 22
#define X509_V_ERR_CERT_REVOKED 23
#define X509_V_ERR_NO_ISSUER_PUBLIC_KEY 24
#define X509_V_ERR_PATH_LENGTH_EXCEEDED 25
#define X509_V_ERR_INVALID_PURPOSE 26
#define X509_V_ERR_CERT_UNTRUSTED 27
#define X509_V_ERR_CERT_REJECTED 28

/* These are 'informational' when looking for issuer cert */
#define X509_V_ERR_SUBJECT_ISSUER_MISMATCH 29
#define X509_V_ERR_AKID_SKID_MISMATCH 30
#define X509_V_ERR_AKID_ISSUER_SERIAL_MISMATCH 31
#define X509_V_ERR_KEYUSAGE_NO_CERTSIGN
 32
#define X509_V_ERR_UNABLE_TO_GET_CRL_ISSUER 33
#define X509_V_ERR_UNHANDLED_CRITICAL_EXTENSION 34
#define X509_V_ERR_KEYUSAGE_NO_CRL_SIGN 35
#define X509_V_ERR_UNHANDLED_CRITICAL_CRL_EXTENSION 36
#define X509_V_ERR_INVALID_NON_CA 37
#define X509_V_ERR_PROXY_PATH_LENGTH_EXCEEDED 38
#define X509_V_ERR_KEYUSAGE_NO_DIGITAL_SIGNATURE 39
#define X509_V_ERR_PROXY_CERTIFICATES_NOT_ALLOWED 40
#define X509_V_ERR_INVALID_EXTENSION 41
#define X509_V_ERR_INVALID_POLICY_EXTENSION 42
#define X509_V_ERR_NO_EXPLICIT_POLICY 43
#define X509_V_ERR_DIFFERENT_CRL_SCOPE 44
#define X509_V_ERR_UNSUPPORTED_EXTENSION_FEATURE 45
#define X509_V_ERR_UNNESTED_RESOURCE 46
#define X509_V_ERR_PERMITTED_VIOLATION 47
#define X509_V_ERR_EXCLUDED_VIOLATION 48
#define X509_V_ERR_SUBTREE_MINMAX 49
/* The application is not happy */
#define X509_V_ERR_APPLICATION_VERIFICATION 50
#define X509_V_ERR_UNSUPPORTED_CONSTRAINT_TYPE 51
#define X509_V_ERR_UNSUPPORTED_CONSTRAINT_SYNTAX 52
#define X509_V_ERR_UNSUPPORTED_NAME_SYNTAX
```

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53
#define X509_V_ERR_CRL_PATH_VALIDATION_ERROR 54
/* Another issuer check debug option */
#define X509_V_ERR_PATH_LOOP 55
/* Suite B mode algorithm violation */
#define X509_V_ERR_SUITE_B_INVALID_VERSION 56
#define X509_V_ERR_SUITE_B_INVALID_ALGORITHM 57
#define X509_V_ERR_SUITE_B_INVALID_CURVE 58
#define X509_V_ERR_SUITE_B_INVALID_SIGNATURE_ALGORITHM 59
#define X509_V_ERR_SUITE_B_LOS_NOT_ALLOWED 60
#define X509_V_ERR_SUITE_B_CANNOT_SIGN_P_384_WITH_P_256 61
/* Host, email and IP check errors */
#define X509_V_ERR_HOSTNAME_MISMATCH 62
#define X509_V_ERR_EMAIL_MISMATCH 63
#define X509_V_ERR_IP_ADDRESS_MISMATCH 64
/* DANE TLSA errors */
#define X509_V_ERR_DANE_NO_MATCH 65
/* security level errors */
#define X509_V_ERR_EE_KEY_TOO_SMALL 66
#define X509_V_ERR_CA_KEY_TOO_SMALL 67
#define X509_V_ERR_CA_MD_TOO_WEAK 68
/* Caller error */
#define X509_V_ERR_INVALID_CALL 69
/* Issuer lookup error */
#define X509_V_ERR_STORE_LOOKUP 70
/* Certificate transparency */
#define
 X509_V_ERR_NO_VALID_SCTS 71

#define X509_V_ERR_PROXY_SUBJECT_NAME_VIOLATION 72
/* OCSP status errors */
#define X509_V_ERR_OCSP_VERIFY_NEEDED 73 /* Need OCSP verification */
#define X509_V_ERR_OCSP_VERIFY_FAILED 74 /* Couldn't verify cert through OCSP */
#define X509_V_ERR_OCSP_CERT_UNKNOWN 75 /* Certificate wasn't recognized by the OCSP responder */

#define X509_V_ERR_UNSUPPORTED_SIGNATURE_ALGORITHM 76
#define X509_V_ERR_SIGNATURE_ALGORITHM_MISMATCH 77

/* Errors in case a check in X509_V_FLAG_X509_STRICT mode fails */
#define X509_V_ERR_SIGNATURE_ALGORITHM_INCONSISTENCY 78
#define X509_V_ERR_INVALID_CA 79
#define X509_V_ERR_PATHLEN_INVALID_FOR_NON_CA 80
#define X509_V_ERR_PATHLEN_WITHOUT_KU_KEY_CERT_SIGN 81
#define X509_V_ERR_KU_KEY_CERT_SIGN_INVALID_FOR_NON_CA 82
#define X509_V_ERR_ISSUER_NAME_EMPTY 83
#define X509_V_ERR_SUBJECT_NAME_EMPTY 84
#define X509_V_ERR_MISSING_AUTHORITY_KEY_IDENTIFIER 85
#define X509_V_ERR_MISSING_SUBJECT_KEY_IDENTIFIER 86
```

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#define X509_V_ERR_EMPTY_SUBJECT_ALT_NAME
 87
#define X509_V_ERR_EMPTY_SUBJECT_SAN_NOT_CRITICAL 88
#define X509_V_ERR_CA_BCONS_NOT_CRITICAL 89
#define X509_V_ERR_AUTHORITY_KEY_IDENTIFIER_CRITICAL 90
#define X509_V_ERR_SUBJECT_KEY_IDENTIFIER_CRITICAL 91
#define X509_V_ERR_CA_CERT_MISSING_KEY_USAGE 92
#define X509_V_ERR_EXTENSIONS_REQUIRE_VERSION_3 93
#define X509_V_ERR_EC_KEY_EXPLICIT_PARAMS 94
#define X509_V_ERR_RPK_UNTRUSTED 95

/* Certificate verify flags */
#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define X509_V_FLAG_CB_ISSUER_CHECK 0x0 /* Deprecated */
#endif
/* Use check time instead of current time */
#define X509_V_FLAG_USE_CHECK_TIME 0x2
/* Lookup CRLs */
#define X509_V_FLAG_CRL_CHECK 0x4
/* Lookup CRLs for whole chain */
#define X509_V_FLAG_CRL_CHECK_ALL 0x8
/* Ignore unhandled critical extensions */
#define X509_V_FLAG_IGNORE_CRITICAL 0x10
/* Disable workarounds for broken certificates */
#define X509_V_FLAG_X509_STRICT 0x20
/* Enable proxy certificate validation */
#define X509_V_FLAG_ALLOW_PROXY_CERTS 0x40
/*
 Enable policy checking */
#define X509_V_FLAG_POLICY_CHECK 0x80
/* Policy variable require-explicit-policy */
#define X509_V_FLAG_EXPLICIT_POLICY 0x100
/* Policy variable inhibit-any-policy */
#define X509_V_FLAG_INHIBIT_ANY 0x200
/* Policy variable inhibit-policy-mapping */
#define X509_V_FLAG_INHIBIT_MAP 0x400
/* Notify callback that policy is OK */
#define X509_V_FLAG_NOTIFY_POLICY 0x800
/* Extended CRL features such as indirect CRLs, alternate CRL signing keys */
#define X509_V_FLAG_EXTENDED_CRL_SUPPORT 0x1000
/* Delta CRL support */
#define X509_V_FLAG_USE_DELTAS 0x2000
/* Check self-signed CA signature */
#define X509_V_FLAG_CHECK_SS_SIGNATURE 0x4000
/* Use trusted store first */
#define X509_V_FLAG_TRUSTED_FIRST 0x8000
/* Suite B 128 bit only mode: not normally used */
#define X509_V_FLAG_SUITEB_128_LOS_ONLY 0x10000
```

```
/* Suite B 192 bit only mode */
#define X509_V_FLAG_SUITEB_192_LOS 0x20000
/* Suite B 128 bit mode allowing 192 bit algorithms */
#define X509_V_FLAG_SUITEB_128_LOS
 0x30000
/* Allow partial chains if at least one certificate is in trusted store */
#define X509_V_FLAG_PARTIAL_CHAIN 0x80000
/*
* If the initial chain is not trusted, do not attempt to build an alternative
* chain. Alternate chain checking was introduced in 1.1.0. Setting this flag
* will force the behaviour to match that of previous versions.
*/
#define X509_V_FLAG_NO_ALT_CHAINS 0x100000
/* Do not check certificate/CRL validity against current time */
#define X509_V_FLAG_NO_CHECK_TIME 0x200000

#define X509_VP_FLAG_DEFAULT 0x1
#define X509_VP_FLAG_OVERWRITE 0x2
#define X509_VP_FLAG_RESET_FLAGS 0x4
#define X509_VP_FLAG_LOCKED 0x8
#define X509_VP_FLAG_ONCE 0x10

/* Internal use: mask of policy related options */
#define X509_V_FLAG_POLICY_MASK (X509_V_FLAG_POLICY_CHECK \
   | X509_V_FLAG_EXPLICIT_POLICY                    \
   | X509_V_FLAG_INHIBIT_ANY                        \
   | X509_V_FLAG_INHIBIT_MAP)

int X509_OBJECT_idx_by_subject(STACK_OF(X509_OBJECT) *h, X509_LOOKUP_TYPE
 type,
   const X509_NAME *name);
X509_OBJECT *X509_OBJECT_retrieve_by_subject(STACK_OF(X509_OBJECT) *h,
   X509_LOOKUP_TYPE type,
   const X509_NAME *name);
X509_OBJECT *X509_OBJECT_retrieve_match(STACK_OF(X509_OBJECT) *h,
   X509_OBJECT *x);
int X509_OBJECT_up_ref_count(X509_OBJECT *a);
X509_OBJECT *X509_OBJECT_new(void);
void X509_OBJECT_free(X509_OBJECT *a);
X509_LOOKUP_TYPE X509_OBJECT_get_type(const X509_OBJECT *a);
X509 *X509_OBJECT_get0_X509(const X509_OBJECT *a);
int X509_OBJECT_set1_X509(X509_OBJECT *a, X509 *obj);
X509_CRL *X509_OBJECT_get0_X509_CRL(const X509_OBJECT *a);
int X509_OBJECT_set1_X509_CRL(X509_OBJECT *a, X509_CRL *obj);
X509_STORE *X509_STORE_new(void);
void X509_STORE_free(X509_STORE *xs);
int X509_STORE_lock(X509_STORE *xs);
int X509_STORE_unlock(X509_STORE *xs);
```

```
int X509_STORE_up_ref(X509_STORE *xs);
STACK_OF(X509_OBJECT) *X509_STORE_get0_objects(const X509_STORE *xs);
STACK_OF(X509_OBJECT) *X509_STORE_get1_objects(X509_STORE *xs);
STACK_OF(X509)
 *X509_STORE_get1_all_certs(X509_STORE *xs);
STACK_OF(X509) *X509_STORE_CTX_get1_certs(X509_STORE_CTX *xs,
   const X509_NAME *nm);
STACK_OF(X509_CRL) *X509_STORE_CTX_get1_crls(const X509_STORE_CTX *st,
   const X509_NAME *nm);
int X509_STORE_set_flags(X509_STORE *xs, unsigned long flags);
int X509_STORE_set_purpose(X509_STORE *xs, int purpose);
int X509_STORE_set_trust(X509_STORE *xs, int trust);
int X509_STORE_set1_param(X509_STORE *xs, const X509_VERIFY_PARAM *pm);
X509_VERIFY_PARAM *X509_STORE_get0_param(const X509_STORE *xs);

void X509_STORE_set_verify(X509_STORE *xs, X509_STORE_CTX_verify_fn verify);
#define X509_STORE_set_verify_func(ctx, func) \
   X509_STORE_set_verify((ctx), (func))
void X509_STORE_CTX_set_verify(X509_STORE_CTX *ctx,
   X509_STORE_CTX_verify_fn verify);
X509_STORE_CTX_verify_fn X509_STORE_get_verify(const X509_STORE *xs);
void X509_STORE_set_verify_cb(X509_STORE *xs,
   X509_STORE_CTX_verify_cb verify_cb);
#define X509_STORE_set_verify_cb_func(ctx,
 func) \
   X509_STORE_set_verify_cb((ctx), (func))
X509_STORE_CTX_verify_cb X509_STORE_get_verify_cb(const X509_STORE *xs);
void X509_STORE_set_get_issuer(X509_STORE *xs,
   X509_STORE_CTX_get_issuer_fn get_issuer);
X509_STORE_CTX_get_issuer_fn X509_STORE_get_get_issuer(const X509_STORE *xs);
void X509_STORE_set_check_issued(X509_STORE *xs,
   X509_STORE_CTX_check_issued_fn check_issued);
X509_STORE_CTX_check_issued_fn X509_STORE_get_check_issued(const X509_STORE *s);
void X509_STORE_set_check_revocation(X509_STORE *xs,
   X509_STORE_CTX_check_revocation_fn check_revocation);
X509_STORE_CTX_check_revocation_fn
X509_STORE_get_check_revocation(const X509_STORE *xs);
void X509_STORE_set_get_crl(X509_STORE *xs,
   X509_STORE_CTX_get_crl_fn get_crl);
X509_STORE_CTX_get_crl_fn X509_STORE_get_get_crl(const X509_STORE *xs);
void X509_STORE_set_check_crl(X509_STORE *xs,
   X509_STORE_CTX_check_crl_fn check_crl);
X509_STORE_CTX_check_crl_fn X509_STORE_get_check_crl(const X509_STORE *xs);
void
 X509_STORE_set_cert_crl(X509_STORE *xs,
   X509_STORE_CTX_cert_crl_fn cert_crl);
X509_STORE_CTX_cert_crl_fn X509_STORE_get_cert_crl(const X509_STORE *xs);
void X509_STORE_set_check_policy(X509_STORE *xs,
```

```
   X509_STORE_CTX_check_policy_fn check_policy);
X509_STORE_CTX_check_policy_fn X509_STORE_get_check_policy(const X509_STORE *s);
void X509_STORE_set_lookup_certs(X509_STORE *xs,
   X509_STORE_CTX_lookup_certs_fn lookup_certs);
X509_STORE_CTX_lookup_certs_fn X509_STORE_get_lookup_certs(const X509_STORE *s);
void X509_STORE_set_lookup_crls(X509_STORE *xs,
   X509_STORE_CTX_lookup_crls_fn lookup_crls);
#define X509_STORE_set_lookup_crls_cb(ctx, func) \
   X509_STORE_set_lookup_crls((ctx), (func))
X509_STORE_CTX_lookup_crls_fn X509_STORE_get_lookup_crls(const X509_STORE *xs);
void X509_STORE_set_cleanup(X509_STORE *xs,
   X509_STORE_CTX_cleanup_fn cleanup);
X509_STORE_CTX_cleanup_fn X509_STORE_get_cleanup(const X509_STORE *xs);

#define X509_STORE_get_ex_new_index(l, p, newf, dupf,
 freef) \
   CRYPTO_get_ex_new_index(CRYPTO_EX_INDEX_X509_STORE, l, p, newf, dupf, freef)
int X509_STORE_set_ex_data(X509_STORE *xs, int idx, void *data);
void *X509_STORE_get_ex_data(const X509_STORE *xs, int idx);

X509_STORE_CTX *X509_STORE_CTX_new_ex(OSSL_LIB_CTX *libctx, const char *propq);
X509_STORE_CTX *X509_STORE_CTX_new(void);

int X509_STORE_CTX_get1_issuer(X509 **issuer, X509_STORE_CTX *ctx, X509 *x);

void X509_STORE_CTX_free(X509_STORE_CTX *ctx);
int X509_STORE_CTX_init(X509_STORE_CTX *ctx, X509_STORE *trust_store,
   X509 *target, STACK_OF(X509) *untrusted);
int X509_STORE_CTX_init_rpk(X509_STORE_CTX *ctx, X509_STORE *trust_store,
   EVP_PKEY *rpk);
void X509_STORE_CTX_set0_trusted_stack(X509_STORE_CTX *ctx, STACK_OF(X509) *sk);
void X509_STORE_CTX_cleanup(X509_STORE_CTX *ctx);

X509_STORE *X509_STORE_CTX_get0_store(const X509_STORE_CTX *ctx);
X509 *X509_STORE_CTX_get0_cert(const X509_STORE_CTX *ctx);
EVP_PKEY *X509_STORE_CTX_get0_rpk(const X509_STORE_CTX *ctx);
STACK_OF(X509)
 *X509_STORE_CTX_get0_untrusted(const X509_STORE_CTX *ctx);
void X509_STORE_CTX_set0_untrusted(X509_STORE_CTX *ctx, STACK_OF(X509) *sk);
void X509_STORE_CTX_set_verify_cb(X509_STORE_CTX *ctx,
   X509_STORE_CTX_verify_cb verify);
X509_STORE_CTX_verify_cb X509_STORE_CTX_get_verify_cb(const X509_STORE_CTX *ctx);
X509_STORE_CTX_verify_fn X509_STORE_CTX_get_verify(const X509_STORE_CTX *ctx);
X509_STORE_CTX_get_issuer_fn X509_STORE_CTX_get_get_issuer(const X509_STORE_CTX *ctx);
X509_STORE_CTX_check_issued_fn X509_STORE_CTX_get_check_issued(const X509_STORE_CTX *ctx);
X509_STORE_CTX_check_revocation_fn X509_STORE_CTX_get_check_revocation(const X509_STORE_CTX
*ctx);
void X509_STORE_CTX_set_get_crl(X509_STORE_CTX *ctx,
```

```
   X509_STORE_CTX_get_crl_fn get_crl);
X509_STORE_CTX_get_crl_fn X509_STORE_CTX_get_get_crl(const X509_STORE_CTX *ctx);
X509_STORE_CTX_check_crl_fn X509_STORE_CTX_get_check_crl(const X509_STORE_CTX *ctx);
X509_STORE_CTX_cert_crl_fn X509_STORE_CTX_get_cert_crl(const
 X509_STORE_CTX *ctx);
X509_STORE_CTX_check_policy_fn X509_STORE_CTX_get_check_policy(const X509_STORE_CTX *ctx);
X509_STORE_CTX_lookup_certs_fn X509_STORE_CTX_get_lookup_certs(const X509_STORE_CTX *ctx);
X509_STORE_CTX_lookup_crls_fn X509_STORE_CTX_get_lookup_crls(const X509_STORE_CTX *ctx);
X509_STORE_CTX_cleanup_fn X509_STORE_CTX_get_cleanup(const X509_STORE_CTX *ctx);

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
#define X509_STORE_CTX_get_chain X509_STORE_CTX_get0_chain
#define X509_STORE_CTX_set_chain X509_STORE_CTX_set0_untrusted
#define X509_STORE_CTX_trusted_stack X509_STORE_CTX_set0_trusted_stack
#define X509_STORE_get_by_subject X509_STORE_CTX_get_by_subject
#define X509_STORE_get1_certs X509_STORE_CTX_get1_certs
#define X509_STORE_get1_crls X509_STORE_CTX_get1_crls
/* the following macro is misspelled; use X509_STORE_get1_certs instead */
#define X509_STORE_get1_cert X509_STORE_CTX_get1_certs
/* the following macro is misspelled; use X509_STORE_get1_crls instead */
#define X509_STORE_get1_crl
 X509_STORE_CTX_get1_crls
#endif

X509_LOOKUP *X509_STORE_add_lookup(X509_STORE *xs, X509_LOOKUP_METHOD *m);
X509_LOOKUP_METHOD *X509_LOOKUP_hash_dir(void);
X509_LOOKUP_METHOD *X509_LOOKUP_file(void);
X509_LOOKUP_METHOD *X509_LOOKUP_store(void);

typedef int (*X509_LOOKUP_ctrl_fn)(X509_LOOKUP *ctx, int cmd, const char *argc,
   long argl, char **ret);
typedef int (*X509_LOOKUP_ctrl_ex_fn)(
   X509_LOOKUP *ctx, int cmd, const char *argc, long argl, char **ret,
   OSSL_LIB_CTX *libctx, const char *propq);

typedef int (*X509_LOOKUP_get_by_subject_fn)(X509_LOOKUP *ctx,
   X509_LOOKUP_TYPE type,
   const X509_NAME *name,
   X509_OBJECT *ret);
typedef int (*X509_LOOKUP_get_by_subject_ex_fn)(X509_LOOKUP *ctx,
   X509_LOOKUP_TYPE type,
   const X509_NAME *name,
   X509_OBJECT *ret,
   OSSL_LIB_CTX *libctx,
   const char *propq);
typedef int (*X509_LOOKUP_get_by_issuer_serial_fn)(X509_LOOKUP *ctx,
   X509_LOOKUP_TYPE type,
   const X509_NAME *name,
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```
   const ASN1_INTEGER
 *serial,
   X509_OBJECT *ret);
typedef int (*X509_LOOKUP_get_by_fingerprint_fn)(X509_LOOKUP *ctx,
   X509_LOOKUP_TYPE type,
   const unsigned char *bytes,
   int len,
   X509_OBJECT *ret);
typedef int (*X509_LOOKUP_get_by_alias_fn)(X509_LOOKUP *ctx,
   X509_LOOKUP_TYPE type,
   const char *str,
   int len,
   X509_OBJECT *ret);

X509_LOOKUP_METHOD *X509_LOOKUP_meth_new(const char *name);
void X509_LOOKUP_meth_free(X509_LOOKUP_METHOD *method);

int X509_LOOKUP_meth_set_new_item(X509_LOOKUP_METHOD *method,
   int (*new_item)(X509_LOOKUP *ctx));
int (*X509_LOOKUP_meth_get_new_item(const X509_LOOKUP_METHOD *method))(X509_LOOKUP *ctx);

int X509_LOOKUP_meth_set_free(X509_LOOKUP_METHOD *method,
   void (*free_fn)(X509_LOOKUP *ctx));
void (*X509_LOOKUP_meth_get_free(const X509_LOOKUP_METHOD *method))(X509_LOOKUP *ctx);

int X509_LOOKUP_meth_set_init(X509_LOOKUP_METHOD *method,
   int (*init)(X509_LOOKUP *ctx));
int (*X509_LOOKUP_meth_get_init(const X509_LOOKUP_METHOD *method))(X509_LOOKUP
 *ctx);

int X509_LOOKUP_meth_set_shutdown(X509_LOOKUP_METHOD *method,
   int (*shutdown)(X509_LOOKUP *ctx));
int (*X509_LOOKUP_meth_get_shutdown(const X509_LOOKUP_METHOD *method))(X509_LOOKUP *ctx);

int X509_LOOKUP_meth_set_ctrl(X509_LOOKUP_METHOD *method,
   X509_LOOKUP_ctrl_fn ctrl_fn);
X509_LOOKUP_ctrl_fn X509_LOOKUP_meth_get_ctrl(const X509_LOOKUP_METHOD *method);

int X509_LOOKUP_meth_set_get_by_subject(X509_LOOKUP_METHOD *method,
   X509_LOOKUP_get_by_subject_fn fn);
X509_LOOKUP_get_by_subject_fn X509_LOOKUP_meth_get_get_by_subject(
   const X509_LOOKUP_METHOD *method);

int X509_LOOKUP_meth_set_get_by_issuer_serial(X509_LOOKUP_METHOD *method,
   X509_LOOKUP_get_by_issuer_serial_fn fn);
X509_LOOKUP_get_by_issuer_serial_fn X509_LOOKUP_meth_get_get_by_issuer_serial(
   const X509_LOOKUP_METHOD *method);
```

```
int X509_LOOKUP_meth_set_get_by_fingerprint(X509_LOOKUP_METHOD *method,
   X509_LOOKUP_get_by_fingerprint_fn fn);
X509_LOOKUP_get_by_fingerprint_fn X509_LOOKUP_meth_get_get_by_fingerprint(
    const X509_LOOKUP_METHOD *method);

int X509_LOOKUP_meth_set_get_by_alias(X509_LOOKUP_METHOD *method,
   X509_LOOKUP_get_by_alias_fn fn);
X509_LOOKUP_get_by_alias_fn X509_LOOKUP_meth_get_get_by_alias(
   const X509_LOOKUP_METHOD *method);

int X509_STORE_add_cert(X509_STORE *xs, X509 *x);
int X509_STORE_add_crl(X509_STORE *xs, X509_CRL *x);

int X509_STORE_CTX_get_by_subject(const X509_STORE_CTX *vs,
   X509_LOOKUP_TYPE type,
   const X509_NAME *name, X509_OBJECT *ret);
X509_OBJECT *X509_STORE_CTX_get_obj_by_subject(X509_STORE_CTX *vs,
   X509_LOOKUP_TYPE type,
   const X509_NAME *name);

int X509_LOOKUP_ctrl(X509_LOOKUP *ctx, int cmd, const char *argc,
   long argl, char **ret);
int X509_LOOKUP_ctrl_ex(X509_LOOKUP *ctx, int cmd, const char *argc, long argl,
   char **ret, OSSL_LIB_CTX *libctx, const char *propq);

int X509_load_cert_file(X509_LOOKUP *ctx, const char *file, int type);
int X509_load_cert_file_ex(X509_LOOKUP *ctx, const char *file,
 int type,
   OSSL_LIB_CTX *libctx, const char *propq);
int X509_load_crl_file(X509_LOOKUP *ctx, const char *file, int type);
int X509_load_cert_crl_file(X509_LOOKUP *ctx, const char *file, int type);
int X509_load_cert_crl_file_ex(X509_LOOKUP *ctx, const char *file, int type,
   OSSL_LIB_CTX *libctx, const char *propq);

X509_LOOKUP *X509_LOOKUP_new(X509_LOOKUP_METHOD *method);
void X509_LOOKUP_free(X509_LOOKUP *ctx);
int X509_LOOKUP_init(X509_LOOKUP *ctx);
int X509_LOOKUP_by_subject(X509_LOOKUP *ctx, X509_LOOKUP_TYPE type,
   const X509_NAME *name, X509_OBJECT *ret);
int X509_LOOKUP_by_subject_ex(X509_LOOKUP *ctx, X509_LOOKUP_TYPE type,
   const X509_NAME *name, X509_OBJECT *ret,
   OSSL_LIB_CTX *libctx, const char *propq);
int X509_LOOKUP_by_issuer_serial(X509_LOOKUP *ctx, X509_LOOKUP_TYPE type,
   const X509_NAME *name,
   const ASN1_INTEGER *serial,
   X509_OBJECT *ret);
int X509_LOOKUP_by_fingerprint(X509_LOOKUP *ctx, X509_LOOKUP_TYPE type,
   const unsigned char *bytes,
```

```
 int len,
   X509_OBJECT *ret);
int X509_LOOKUP_by_alias(X509_LOOKUP *ctx, X509_LOOKUP_TYPE type,
   const char *str, int len, X509_OBJECT *ret);
int X509_LOOKUP_set_method_data(X509_LOOKUP *ctx, void *data);
void *X509_LOOKUP_get_method_data(const X509_LOOKUP *ctx);
X509_STORE *X509_LOOKUP_get_store(const X509_LOOKUP *ctx);
int X509_LOOKUP_shutdown(X509_LOOKUP *ctx);

int X509_STORE_load_file(X509_STORE *xs, const char *file);
int X509_STORE_load_path(X509_STORE *xs, const char *path);
int X509_STORE_load_store(X509_STORE *xs, const char *store);
int X509_STORE_load_locations(X509_STORE *s, const char *file, const char *dir);
int X509_STORE_set_default_paths(X509_STORE *xs);

int X509_STORE_load_file_ex(X509_STORE *xs, const char *file,
   OSSL_LIB_CTX *libctx, const char *propq);
int X509_STORE_load_store_ex(X509_STORE *xs, const char *store,
   OSSL_LIB_CTX *libctx, const char *propq);
int X509_STORE_load_locations_ex(X509_STORE *xs,
   const char *file, const char *dir,
   OSSL_LIB_CTX
 *libctx, const char *propq);
int X509_STORE_set_default_paths_ex(X509_STORE *xs,
   OSSL_LIB_CTX *libctx, const char *propq);

#define X509_STORE_CTX_get_ex_new_index(l, p, newf, dupf, freef) \
   CRYPTO_get_ex_new_index(CRYPTO_EX_INDEX_X509_STORE_CTX, l, p, newf, dupf, freef)
int X509_STORE_CTX_set_ex_data(X509_STORE_CTX *ctx, int idx, void *data);
void *X509_STORE_CTX_get_ex_data(const X509_STORE_CTX *ctx, int idx);
int X509_STORE_CTX_get_error(const X509_STORE_CTX *ctx);
void X509_STORE_CTX_set_error(X509_STORE_CTX *ctx, int s);
int X509_STORE_CTX_get_error_depth(const X509_STORE_CTX *ctx);
void X509_STORE_CTX_set_error_depth(X509_STORE_CTX *ctx, int depth);
X509 *X509_STORE_CTX_get_current_cert(const X509_STORE_CTX *ctx);
void X509_STORE_CTX_set_current_cert(X509_STORE_CTX *ctx, X509 *x);
X509 *X509_STORE_CTX_get0_current_issuer(const X509_STORE_CTX *ctx);
X509_CRL *X509_STORE_CTX_get0_current_crl(const X509_STORE_CTX *ctx);
X509_STORE_CTX *X509_STORE_CTX_get0_parent_ctx(const
 X509_STORE_CTX *ctx);
STACK_OF(X509) *X509_STORE_CTX_get0_chain(const X509_STORE_CTX *ctx);
STACK_OF(X509) *X509_STORE_CTX_get1_chain(const X509_STORE_CTX *ctx);
void X509_STORE_CTX_set_cert(X509_STORE_CTX *ctx, X509 *target);
void X509_STORE_CTX_set0_rpk(X509_STORE_CTX *ctx, EVP_PKEY *target);
void X509_STORE_CTX_set0_verified_chain(X509_STORE_CTX *c, STACK_OF(X509) *sk);
void X509_STORE_CTX_set0_crls(X509_STORE_CTX *ctx, STACK_OF(X509_CRL) *sk);
int X509_STORE_CTX_set_purpose(X509_STORE_CTX *ctx, int purpose);
int X509_STORE_CTX_set_trust(X509_STORE_CTX *ctx, int trust);
```

```
int X509_STORE_CTX_purpose_inherit(X509_STORE_CTX *ctx, int def_purpose,
   int purpose, int trust);
void X509_STORE_CTX_set_flags(X509_STORE_CTX *ctx, unsigned long flags);
void X509_STORE_CTX_set_time(X509_STORE_CTX *ctx, unsigned long flags,
   time_t t);
void X509_STORE_CTX_set_current_reasons(X509_STORE_CTX *ctx,
   unsigned int current_reasons);

X509_POLICY_TREE *X509_STORE_CTX_get0_policy_tree(const
 X509_STORE_CTX *ctx);
int X509_STORE_CTX_get_explicit_policy(const X509_STORE_CTX *ctx);
int X509_STORE_CTX_get_num_untrusted(const X509_STORE_CTX *ctx);

X509_VERIFY_PARAM *X509_STORE_CTX_get0_param(const X509_STORE_CTX *ctx);
void X509_STORE_CTX_set0_param(X509_STORE_CTX *ctx, X509_VERIFY_PARAM *param);
int X509_STORE_CTX_set_default(X509_STORE_CTX *ctx, const char *name);

/*
* Bridge opacity barrier between libcrypt and libssl, also needed to support
* offline testing in test/danetest.c
*/
void X509_STORE_CTX_set0_dane(X509_STORE_CTX *ctx, SSL_DANE *dane);
#define DANE_FLAG_NO_DANE_EE_NAMECHECKS (1L << 0)

/* X509_VERIFY_PARAM functions */

X509_VERIFY_PARAM *X509_VERIFY_PARAM_new(void);
void X509_VERIFY_PARAM_free(X509_VERIFY_PARAM *param);
int X509_VERIFY_PARAM_inherit(X509_VERIFY_PARAM *to,
   const X509_VERIFY_PARAM *from);
int X509_VERIFY_PARAM_set1(X509_VERIFY_PARAM *to,
   const X509_VERIFY_PARAM *from);
int X509_VERIFY_PARAM_set1_name(X509_VERIFY_PARAM *param, const
 char *name);
int X509_VERIFY_PARAM_set_flags(X509_VERIFY_PARAM *param,
   unsigned long flags);
int X509_VERIFY_PARAM_clear_flags(X509_VERIFY_PARAM *param,
   unsigned long flags);
unsigned long X509_VERIFY_PARAM_get_flags(const X509_VERIFY_PARAM *param);
int X509_VERIFY_PARAM_set_purpose(X509_VERIFY_PARAM *param, int purpose);
int X509_VERIFY_PARAM_get_purpose(const X509_VERIFY_PARAM *param);
int X509_VERIFY_PARAM_set_trust(X509_VERIFY_PARAM *param, int trust);
void X509_VERIFY_PARAM_set_depth(X509_VERIFY_PARAM *param, int depth);
void X509_VERIFY_PARAM_set_auth_level(X509_VERIFY_PARAM *param, int auth_level);
time_t X509_VERIFY_PARAM_get_time(const X509_VERIFY_PARAM *param);
void X509_VERIFY_PARAM_set_time(X509_VERIFY_PARAM *param, time_t t);
int X509_VERIFY_PARAM_add0_policy(X509_VERIFY_PARAM *param,
   ASN1_OBJECT *policy);
```

```
int X509_VERIFY_PARAM_set1_policies(X509_VERIFY_PARAM *param,
   STACK_OF(ASN1_OBJECT) *policies);

int X509_VERIFY_PARAM_set_inh_flags(X509_VERIFY_PARAM *param,
    uint32_t flags);
uint32_t X509_VERIFY_PARAM_get_inh_flags(const X509_VERIFY_PARAM *param);

char *X509_VERIFY_PARAM_get0_host(X509_VERIFY_PARAM *param, int idx);
int X509_VERIFY_PARAM_set1_host(X509_VERIFY_PARAM *param,
   const char *name, size_t namelen);
int X509_VERIFY_PARAM_add1_host(X509_VERIFY_PARAM *param,
   const char *name, size_t namelen);
void X509_VERIFY_PARAM_set_hostflags(X509_VERIFY_PARAM *param,
   unsigned int flags);
unsigned int X509_VERIFY_PARAM_get_hostflags(const X509_VERIFY_PARAM *param);
char *X509_VERIFY_PARAM_get0_peername(const X509_VERIFY_PARAM *param);
void X509_VERIFY_PARAM_move_peername(X509_VERIFY_PARAM *, X509_VERIFY_PARAM *);
char *X509_VERIFY_PARAM_get0_email(X509_VERIFY_PARAM *param);
int X509_VERIFY_PARAM_set1_email(X509_VERIFY_PARAM *param,
   const char *email, size_t emaillen);
char *X509_VERIFY_PARAM_get1_ip_asc(X509_VERIFY_PARAM *param);
int X509_VERIFY_PARAM_set1_ip(X509_VERIFY_PARAM *param,
   const unsigned char *ip, size_t
 iplen);
int X509_VERIFY_PARAM_set1_ip_asc(X509_VERIFY_PARAM *param,
   const char *ipasc);

int X509_VERIFY_PARAM_get_depth(const X509_VERIFY_PARAM *param);
int X509_VERIFY_PARAM_get_auth_level(const X509_VERIFY_PARAM *param);
const char *X509_VERIFY_PARAM_get0_name(const X509_VERIFY_PARAM *param);

int X509_VERIFY_PARAM_add0_table(X509_VERIFY_PARAM *param);
int X509_VERIFY_PARAM_get_count(void);
const X509_VERIFY_PARAM *X509_VERIFY_PARAM_get0(int id);
const X509_VERIFY_PARAM *X509_VERIFY_PARAM_lookup(const char *name);
void X509_VERIFY_PARAM_table_cleanup(void);

/* Non positive return values are errors */
#define X509_PCY_TREE_FAILURE -2 /* Failure to satisfy explicit policy */
#define X509_PCY_TREE_INVALID -1 /* Inconsistent or invalid extensions */
#define X509_PCY_TREE_INTERNAL 0 /* Internal error, most likely malloc */

/*
* Positive return values form a bit mask, all but the first are internal to
* the library and don't appear in results from X509_policy_check().
*/
#define
```

```
 X509_PCY_TREE_VALID 1 /* The policy tree is valid */
#define X509_PCY_TREE_EMPTY 2 /* The policy tree is empty */
#define X509_PCY_TREE_EXPLICIT 4 /* Explicit policy required */

int X509_policy_check(X509_POLICY_TREE **ptree, int *pexplicit_policy,
   STACK_OF(X509) *certs,
   STACK_OF(ASN1_OBJECT) *policy_oids, unsigned int flags);

void X509_policy_tree_free(X509_POLICY_TREE *tree);

int X509_policy_tree_level_count(const X509_POLICY_TREE *tree);
X509_POLICY_LEVEL *X509_policy_tree_get0_level(const X509_POLICY_TREE *tree,
   int i);

STACK_OF(X509_POLICY_NODE)
*X509_policy_tree_get0_policies(const X509_POLICY_TREE *tree);

STACK_OF(X509_POLICY_NODE)
*X509_policy_tree_get0_user_policies(const X509_POLICY_TREE *tree);

int X509_policy_level_node_count(X509_POLICY_LEVEL *level);

X509_POLICY_NODE *X509_policy_level_get0_node(const X509_POLICY_LEVEL *level,
   int i);

const ASN1_OBJECT *X509_policy_node_get0_policy(const X509_POLICY_NODE *node);

STACK_OF(POLICYQUALINFO)
*X509_policy_node_get0_qualifiers(const
 X509_POLICY_NODE *node);
const X509_POLICY_NODE *X509_policy_node_get0_parent(const X509_POLICY_NODE *node);

#ifdef __cplusplus
}
#endif
#endif
```

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```
/*
* WARNING: do not edit!
* Generated by Makefile from include/openssl/x509v3.h.in
*
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*
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```

```
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* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

/* clang-format off */

/* clang-format on */

#ifndef OPENSSL_X509V3_H
#define OPENSSL_X509V3_H
#pragma once

#include <openssl/macros.h>
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define HEADER_X509V3_H
#endif

#include <openssl/bio.h>
#include <openssl/x509.h>
#include <openssl/conf.h>
#include <openssl/x509v3err.h>
#ifndef OPENSSL_NO_STDIO
#include <stdio.h>
#endif

#ifdef __cplusplus
extern "C" {
#endif

/* Forward reference */
struct v3_ext_method;
struct v3_ext_ctx;

/* Useful typedefs */

typedef void *(*X509V3_EXT_NEW)(void);
typedef void (*X509V3_EXT_FREE)(void *);
typedef
 void *(*X509V3_EXT_D2I)(void *, const unsigned char **, long);
typedef int (*X509V3_EXT_I2D)(const void *, unsigned char **);
typedef STACK_OF(CONF_VALUE) *(*X509V3_EXT_I2V)(const struct v3_ext_method *method, void *ext,
   STACK_OF(CONF_VALUE) *extlist);
typedef void *(*X509V3_EXT_V2I)(const struct v3_ext_method *method,
   struct v3_ext_ctx *ctx,
   STACK_OF(CONF_VALUE) *values);
typedef char *(*X509V3_EXT_I2S)(const struct v3_ext_method *method,
   void *ext);
```

```
typedef void *(*X509V3_EXT_S2I)(const struct v3_ext_method *method,
   struct v3_ext_ctx *ctx, const char *str);
typedef int (*X509V3_EXT_I2R)(const struct v3_ext_method *method, void *ext,
   BIO *out, int indent);
typedef void *(*X509V3_EXT_R2I)(const struct v3_ext_method *method,
   struct v3_ext_ctx *ctx, const char *str);

/* V3 extension structure */

struct v3_ext_method {
   int ext_nid;
   int ext_flags;
   /* If this is set the following four fields are ignored */
   ASN1_ITEM_EXP *it;
   /* Old style
 ASN1 calls */
   X509V3_EXT_NEW ext_new;
   X509V3_EXT_FREE ext_free;
   X509V3_EXT_D2I d2i;
   X509V3_EXT_I2D i2d;
   /* The following pair is used for string extensions */
   X509V3_EXT_I2S i2s;
   X509V3_EXT_S2I s2i;
   /* The following pair is used for multi-valued extensions */
   X509V3_EXT_I2V i2v;
   X509V3_EXT_V2I v2i;
   /* The following are used for raw extensions */
   X509V3_EXT_I2R i2r;
   X509V3_EXT_R2I r2i;
   void *usr_data; /* Any extension specific data */
};

typedef struct X509V3_CONF_METHOD_st {
   char *(*get_string)(void *db, const char *section, const char *value);
   STACK_OF(CONF_VALUE) *(*get_section)(void *db, const char *section);
   void (*free_string)(void *db, char *string);
   void (*free_section)(void *db, STACK_OF(CONF_VALUE) *section);
} X509V3_CONF_METHOD;

/* Context specific info for producing X509 v3 extensions*/
struct v3_ext_ctx {
#define X509V3_CTX_TEST 0x1
#ifndef OPENSSL_NO_DEPRECATED_3_0
#define CTX_TEST X509V3_CTX_TEST
#endif
#define
 X509V3_CTX_REPLACE 0x2
   int flags;
```

```
  X509 *issuer_cert;
  X509 *subject_cert;
  X509_REQ *subject_req;
  X509_CRL *crl;
  X509V3_CONF_METHOD *db_meth;
  void *db;
  EVP_PKEY *issuer_pkey;
  /* Maybe more here */
};

typedef struct v3_ext_method X509V3_EXT_METHOD;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509V3_EXT_METHOD, X509V3_EXT_METHOD,
X509V3_EXT_METHOD)
#define sk_X509V3_EXT_METHOD_num(sk)
OPENSSL_sk_num(ossl_check_const_X509V3_EXT_METHOD_sk_type(sk))
#define sk_X509V3_EXT_METHOD_value(sk, idx) ((X509V3_EXT_METHOD
*)OPENSSL_sk_value(ossl_check_const_X509V3_EXT_METHOD_sk_type(sk), (idx)))
#define sk_X509V3_EXT_METHOD_new(cmp) ((STACK_OF(X509V3_EXT_METHOD)
*)OPENSSL_sk_new(ossl_check_X509V3_EXT_METHOD_compfunc_type(cmp)))
#define sk_X509V3_EXT_METHOD_new_null() ((STACK_OF(X509V3_EXT_METHOD)
*)OPENSSL_sk_new_null())
#define sk_X509V3_EXT_METHOD_new_reserve(cmp, n) ((STACK_OF(X509V3_EXT_METHOD)
*)OPENSSL_sk_new_reserve(ossl_check_X509V3_EXT_METHOD_compfunc_type(cmp),
 (n)))
#define sk_X509V3_EXT_METHOD_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_X509V3_EXT_METHOD_sk_type(sk), (n))
#define sk_X509V3_EXT_METHOD_free(sk)
OPENSSL_sk_free(ossl_check_X509V3_EXT_METHOD_sk_type(sk))
#define sk_X509V3_EXT_METHOD_zero(sk)
OPENSSL_sk_zero(ossl_check_X509V3_EXT_METHOD_sk_type(sk))
#define sk_X509V3_EXT_METHOD_delete(sk, i) ((X509V3_EXT_METHOD
*)OPENSSL_sk_delete(ossl_check_X509V3_EXT_METHOD_sk_type(sk), (i)))
#define sk_X509V3_EXT_METHOD_delete_ptr(sk, ptr) ((X509V3_EXT_METHOD
*)OPENSSL_sk_delete_ptr(ossl_check_X509V3_EXT_METHOD_sk_type(sk),
ossl_check_X509V3_EXT_METHOD_type(ptr)))
#define sk_X509V3_EXT_METHOD_push(sk, ptr)
OPENSSL_sk_push(ossl_check_X509V3_EXT_METHOD_sk_type(sk),
ossl_check_X509V3_EXT_METHOD_type(ptr))
#define sk_X509V3_EXT_METHOD_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_X509V3_EXT_METHOD_sk_type(sk),
ossl_check_X509V3_EXT_METHOD_type(ptr))
#define sk_X509V3_EXT_METHOD_pop(sk) ((X509V3_EXT_METHOD
*)OPENSSL_sk_pop(ossl_check_X509V3_EXT_METHOD_sk_type(sk)))
#define
 sk_X509V3_EXT_METHOD_shift(sk) ((X509V3_EXT_METHOD
*)OPENSSL_sk_shift(ossl_check_X509V3_EXT_METHOD_sk_type(sk)))
```

```
#define sk_X509V3_EXT_METHOD_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509V3_EXT_METHOD_sk_type(sk),ossl_check_X509V3_EXT_METHOD
_freefunc_type(freefunc))
#define sk_X509V3_EXT_METHOD_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_X509V3_EXT_METHOD_sk_type(sk),
ossl_check_X509V3_EXT_METHOD_type(ptr), (idx))
#define sk_X509V3_EXT_METHOD_set(sk, idx, ptr) ((X509V3_EXT_METHOD
*)OPENSSL_sk_set(ossl_check_X509V3_EXT_METHOD_sk_type(sk), (idx),
ossl_check_X509V3_EXT_METHOD_type(ptr)))
#define sk_X509V3_EXT_METHOD_find(sk, ptr)
OPENSSL_sk_find(ossl_check_X509V3_EXT_METHOD_sk_type(sk),
ossl_check_X509V3_EXT_METHOD_type(ptr))
#define sk_X509V3_EXT_METHOD_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_X509V3_EXT_METHOD_sk_type(sk),
ossl_check_X509V3_EXT_METHOD_type(ptr))
#define sk_X509V3_EXT_METHOD_find_all(sk, ptr,
 pnum) OPENSSL_sk_find_all(ossl_check_X509V3_EXT_METHOD_sk_type(sk),
ossl_check_X509V3_EXT_METHOD_type(ptr), pnum)
#define sk_X509V3_EXT_METHOD_sort(sk)
OPENSSL_sk_sort(ossl_check_X509V3_EXT_METHOD_sk_type(sk))
#define sk_X509V3_EXT_METHOD_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_X509V3_EXT_METHOD_sk_type(sk))
#define sk_X509V3_EXT_METHOD_dup(sk) ((STACK_OF(X509V3_EXT_METHOD)
*)OPENSSL_sk_dup(ossl_check_const_X509V3_EXT_METHOD_sk_type(sk)))
#define sk_X509V3_EXT_METHOD_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(X509V3_EXT_METHOD)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509V3_EXT_METHOD_sk_type(sk),
ossl_check_X509V3_EXT_METHOD_copyfunc_type(copyfunc),
ossl_check_X509V3_EXT_METHOD_freefunc_type(freefunc)))
#define sk_X509V3_EXT_METHOD_set_cmp_func(sk, cmp)
((sk_X509V3_EXT_METHOD_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509V3_EXT_METHOD_sk
_type(sk), ossl_check_X509V3_EXT_METHOD_compfunc_type(cmp)))

/* clang-format on */

/* ext_flags values */
#define X509V3_EXT_DYNAMIC
 0x1
#define X509V3_EXT_CTX_DEP 0x2
#define X509V3_EXT_MULTILINE 0x4

typedef BIT_STRING_BITNAME ENUMERATED_NAMES;

typedef struct BASIC_CONSTRAINTS_st {
   int ca;
   ASN1_INTEGER *pathlen;
} BASIC_CONSTRAINTS;
```

```
typedef struct OSSL_BASIC_ATTR_CONSTRAINTS_st {
   int authority;
   ASN1_INTEGER *pathlen;
} OSSL_BASIC_ATTR_CONSTRAINTS;

typedef struct PKEY_USAGE_PERIOD_st {
   ASN1_GENERALIZEDTIME *notBefore;
   ASN1_GENERALIZEDTIME *notAfter;
} PKEY_USAGE_PERIOD;

typedef struct otherName_st {
   ASN1_OBJECT *type_id;
   ASN1_TYPE *value;
} OTHERNAME;

typedef struct EDIPartyName_st {
   ASN1_STRING *nameAssigner;
   ASN1_STRING *partyName;
} EDIPARTYNAME;

typedef struct GENERAL_NAME_st {
#define GEN_OTHERNAME 0
#define GEN_EMAIL 1
#define GEN_DNS 2
#define GEN_X400 3
#define GEN_DIRNAME 4
#define GEN_EDIPARTY 5
#define GEN_URI 6
#define GEN_IPADD 7
#define GEN_RID 8
   int type;
   union {
      char *ptr;
      OTHERNAME *otherName; /* otherName */
      ASN1_IA5STRING
 *rfc822Name;
      ASN1_IA5STRING *dNSName;
      ASN1_STRING *x400Address;
      X509_NAME *directoryName;
      EDIPARTYNAME *ediPartyName;
      ASN1_IA5STRING *uniformResourceIdentifier;
      ASN1_OCTET_STRING *iPAddress;
      ASN1_OBJECT *registeredID;
      /* Old names */
      ASN1_OCTET_STRING *ip; /* iPAddress */
      X509_NAME *dirn; /* dirn */
      ASN1_IA5STRING *ia5; /* rfc822Name, dNSName,
                        * uniformResourceIdentifier */
```

```
    ASN1_OBJECT *rid; /* registeredID */
    ASN1_TYPE *other; /* x400Address */
  } d;
} GENERAL_NAME;

typedef struct ACCESS_DESCRIPTION_st {
  ASN1_OBJECT *method;
  GENERAL_NAME *location;
} ACCESS_DESCRIPTION;

int GENERAL_NAME_set1_X509_NAME(GENERAL_NAME **tgt, const X509_NAME *src);

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ACCESS_DESCRIPTION, ACCESS_DESCRIPTION,
ACCESS_DESCRIPTION)
#define sk_ACCESS_DESCRIPTION_num(sk)
OPENSSL_sk_num(ossl_check_const_ACCESS_DESCRIPTION_sk_type(sk))
#define
 sk_ACCESS_DESCRIPTION_value(sk, idx) ((ACCESS_DESCRIPTION
*)OPENSSL_sk_value(ossl_check_const_ACCESS_DESCRIPTION_sk_type(sk), (idx)))
#define sk_ACCESS_DESCRIPTION_new(cmp) ((STACK_OF(ACCESS_DESCRIPTION)
*)OPENSSL_sk_new(ossl_check_ACCESS_DESCRIPTION_compfunc_type(cmp)))
#define sk_ACCESS_DESCRIPTION_new_null() ((STACK_OF(ACCESS_DESCRIPTION)
*)OPENSSL_sk_new_null())
#define sk_ACCESS_DESCRIPTION_new_reserve(cmp, n) ((STACK_OF(ACCESS_DESCRIPTION)
*)OPENSSL_sk_new_reserve(ossl_check_ACCESS_DESCRIPTION_compfunc_type(cmp), (n)))
#define sk_ACCESS_DESCRIPTION_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_ACCESS_DESCRIPTION_sk_type(sk), (n))
#define sk_ACCESS_DESCRIPTION_free(sk)
OPENSSL_sk_free(ossl_check_ACCESS_DESCRIPTION_sk_type(sk))
#define sk_ACCESS_DESCRIPTION_zero(sk)
OPENSSL_sk_zero(ossl_check_ACCESS_DESCRIPTION_sk_type(sk))
#define sk_ACCESS_DESCRIPTION_delete(sk, i) ((ACCESS_DESCRIPTION
*)OPENSSL_sk_delete(ossl_check_ACCESS_DESCRIPTION_sk_type(sk), (i)))
#define
 sk_ACCESS_DESCRIPTION_delete_ptr(sk, ptr) ((ACCESS_DESCRIPTION
*)OPENSSL_sk_delete_ptr(ossl_check_ACCESS_DESCRIPTION_sk_type(sk),
ossl_check_ACCESS_DESCRIPTION_type(ptr)))
#define sk_ACCESS_DESCRIPTION_push(sk, ptr)
OPENSSL_sk_push(ossl_check_ACCESS_DESCRIPTION_sk_type(sk),
ossl_check_ACCESS_DESCRIPTION_type(ptr))
#define sk_ACCESS_DESCRIPTION_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_ACCESS_DESCRIPTION_sk_type(sk),
ossl_check_ACCESS_DESCRIPTION_type(ptr))
#define sk_ACCESS_DESCRIPTION_pop(sk) ((ACCESS_DESCRIPTION
*)OPENSSL_sk_pop(ossl_check_ACCESS_DESCRIPTION_sk_type(sk)))
#define sk_ACCESS_DESCRIPTION_shift(sk) ((ACCESS_DESCRIPTION
*)OPENSSL_sk_shift(ossl_check_ACCESS_DESCRIPTION_sk_type(sk)))
```

```
#define sk_ACCESS_DESCRIPTION_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ACCESS_DESCRIPTION_sk_type(sk),ossl_check_ACCESS_DESCRIPTIO
N_freefunc_type(freefunc))
#define sk_ACCESS_DESCRIPTION_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_ACCESS_DESCRIPTION_sk_type(sk),
 ossl_check_ACCESS_DESCRIPTION_type(ptr), (idx))
#define sk_ACCESS_DESCRIPTION_set(sk, idx, ptr) ((ACCESS_DESCRIPTION
*)OPENSSL_sk_set(ossl_check_ACCESS_DESCRIPTION_sk_type(sk), (idx),
ossl_check_ACCESS_DESCRIPTION_type(ptr)))
#define sk_ACCESS_DESCRIPTION_find(sk, ptr)
OPENSSL_sk_find(ossl_check_ACCESS_DESCRIPTION_sk_type(sk),
ossl_check_ACCESS_DESCRIPTION_type(ptr))
#define sk_ACCESS_DESCRIPTION_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_ACCESS_DESCRIPTION_sk_type(sk),
ossl_check_ACCESS_DESCRIPTION_type(ptr))
#define sk_ACCESS_DESCRIPTION_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ACCESS_DESCRIPTION_sk_type(sk),
ossl_check_ACCESS_DESCRIPTION_type(ptr), pnum)
#define sk_ACCESS_DESCRIPTION_sort(sk)
OPENSSL_sk_sort(ossl_check_ACCESS_DESCRIPTION_sk_type(sk))
#define sk_ACCESS_DESCRIPTION_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_ACCESS_DESCRIPTION_sk_type(sk))
#define sk_ACCESS_DESCRIPTION_dup(sk) ((STACK_OF(ACCESS_DESCRIPTION)
*)OPENSSL_sk_dup(ossl_check_const_ACCESS_DESCRIPTION_sk_type(sk)))
#define
 sk_ACCESS_DESCRIPTION_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ACCESS_DESCRIPTION)
*)OPENSSL_sk_deep_copy(ossl_check_const_ACCESS_DESCRIPTION_sk_type(sk),
ossl_check_ACCESS_DESCRIPTION_copyfunc_type(copyfunc),
ossl_check_ACCESS_DESCRIPTION_freefunc_type(freefunc)))
#define sk_ACCESS_DESCRIPTION_set_cmp_func(sk, cmp)
((sk_ACCESS_DESCRIPTION_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ACCESS_DESCRIPTION_s
k_type(sk), ossl_check_ACCESS_DESCRIPTION_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(GENERAL_NAME, GENERAL_NAME, GENERAL_NAME)
#define sk_GENERAL_NAME_num(sk) OPENSSL_sk_num(ossl_check_const_GENERAL_NAME_sk_type(sk))
#define sk_GENERAL_NAME_value(sk, idx) ((GENERAL_NAME
*)OPENSSL_sk_value(ossl_check_const_GENERAL_NAME_sk_type(sk), (idx)))
#define sk_GENERAL_NAME_new(cmp) ((STACK_OF(GENERAL_NAME)
*)OPENSSL_sk_new(ossl_check_GENERAL_NAME_compfunc_type(cmp)))
#define sk_GENERAL_NAME_new_null() ((STACK_OF(GENERAL_NAME) *)OPENSSL_sk_new_null())
#define
 sk_GENERAL_NAME_new_reserve(cmp, n) ((STACK_OF(GENERAL_NAME)
*)OPENSSL_sk_new_reserve(ossl_check_GENERAL_NAME_compfunc_type(cmp), (n)))
#define sk_GENERAL_NAME_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_GENERAL_NAME_sk_type(sk),
(n))
#define sk_GENERAL_NAME_free(sk) OPENSSL_sk_free(ossl_check_GENERAL_NAME_sk_type(sk))
#define sk_GENERAL_NAME_zero(sk) OPENSSL_sk_zero(ossl_check_GENERAL_NAME_sk_type(sk))
#define sk_GENERAL_NAME_delete(sk, i) ((GENERAL_NAME
*)OPENSSL_sk_delete(ossl_check_GENERAL_NAME_sk_type(sk), (i)))
```

```
#define sk_GENERAL_NAME_delete_ptr(sk, ptr) ((GENERAL_NAME
*)OPENSSL_sk_delete_ptr(ossl_check_GENERAL_NAME_sk_type(sk),
ossl_check_GENERAL_NAME_type(ptr)))
#define sk_GENERAL_NAME_push(sk, ptr) OPENSSL_sk_push(ossl_check_GENERAL_NAME_sk_type(sk),
ossl_check_GENERAL_NAME_type(ptr))
#define sk_GENERAL_NAME_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_GENERAL_NAME_sk_type(sk), ossl_check_GENERAL_NAME_type(ptr))
#define sk_GENERAL_NAME_pop(sk) ((GENERAL_NAME
 *)OPENSSL_sk_pop(ossl_check_GENERAL_NAME_sk_type(sk)))
#define sk_GENERAL_NAME_shift(sk) ((GENERAL_NAME
*)OPENSSL_sk_shift(ossl_check_GENERAL_NAME_sk_type(sk)))
#define sk_GENERAL_NAME_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_GENERAL_NAME_sk_type(sk),ossl_check_GENERAL_NAME_freefunc_ty
pe(freefunc))
#define sk_GENERAL_NAME_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_GENERAL_NAME_sk_type(sk), ossl_check_GENERAL_NAME_type(ptr),
(idx))
#define sk_GENERAL_NAME_set(sk, idx, ptr) ((GENERAL_NAME
*)OPENSSL_sk_set(ossl_check_GENERAL_NAME_sk_type(sk), (idx),
ossl_check_GENERAL_NAME_type(ptr)))
#define sk_GENERAL_NAME_find(sk, ptr) OPENSSL_sk_find(ossl_check_GENERAL_NAME_sk_type(sk),
ossl_check_GENERAL_NAME_type(ptr))
#define sk_GENERAL_NAME_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_GENERAL_NAME_sk_type(sk), ossl_check_GENERAL_NAME_type(ptr))
#define sk_GENERAL_NAME_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_GENERAL_NAME_sk_type(sk), ossl_check_GENERAL_NAME_type(ptr),
 pnum)
#define sk_GENERAL_NAME_sort(sk) OPENSSL_sk_sort(ossl_check_GENERAL_NAME_sk_type(sk))
#define sk_GENERAL_NAME_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_GENERAL_NAME_sk_type(sk))
#define sk_GENERAL_NAME_dup(sk) ((STACK_OF(GENERAL_NAME)
*)OPENSSL_sk_dup(ossl_check_const_GENERAL_NAME_sk_type(sk)))
#define sk_GENERAL_NAME_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(GENERAL_NAME)
*)OPENSSL_sk_deep_copy(ossl_check_const_GENERAL_NAME_sk_type(sk),
ossl_check_GENERAL_NAME_copyfunc_type(copyfunc),
ossl_check_GENERAL_NAME_freefunc_type(freefunc)))
#define sk_GENERAL_NAME_set_cmp_func(sk, cmp)
((sk_GENERAL_NAME_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_GENERAL_NAME_sk_type(sk),
ossl_check_GENERAL_NAME_compfunc_type(cmp)))

/* clang-format on */

typedef STACK_OF(ACCESS_DESCRIPTION) AUTHORITY_INFO_ACCESS;
typedef STACK_OF(ASN1_OBJECT) EXTENDED_KEY_USAGE;
typedef STACK_OF(ASN1_INTEGER) TLS_FEATURE;
typedef STACK_OF(GENERAL_NAME) GENERAL_NAMES;

/* clang-format off */
```

```
SKM_DEFINE_STACK_OF_INTERNAL(GENERAL_NAMES,
 GENERAL_NAMES, GENERAL_NAMES)
#define sk_GENERAL_NAMES_num(sk)
OPENSSL_sk_num(ossl_check_const_GENERAL_NAMES_sk_type(sk))
#define sk_GENERAL_NAMES_value(sk, idx) ((GENERAL_NAMES
*)OPENSSL_sk_value(ossl_check_const_GENERAL_NAMES_sk_type(sk), (idx)))
#define sk_GENERAL_NAMES_new(cmp) ((STACK_OF(GENERAL_NAMES)
*)OPENSSL_sk_new(ossl_check_GENERAL_NAMES_compfunc_type(cmp)))
#define sk_GENERAL_NAMES_new_null() ((STACK_OF(GENERAL_NAMES) *)OPENSSL_sk_new_null())
#define sk_GENERAL_NAMES_new_reserve(cmp, n) ((STACK_OF(GENERAL_NAMES)
*)OPENSSL_sk_new_reserve(ossl_check_GENERAL_NAMES_compfunc_type(cmp), (n)))
#define sk_GENERAL_NAMES_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_GENERAL_NAMES_sk_type(sk), (n))
#define sk_GENERAL_NAMES_free(sk) OPENSSL_sk_free(ossl_check_GENERAL_NAMES_sk_type(sk))
#define sk_GENERAL_NAMES_zero(sk) OPENSSL_sk_zero(ossl_check_GENERAL_NAMES_sk_type(sk))
#define sk_GENERAL_NAMES_delete(sk, i) ((GENERAL_NAMES
*)OPENSSL_sk_delete(ossl_check_GENERAL_NAMES_sk_type(sk),
 (i)))
#define sk_GENERAL_NAMES_delete_ptr(sk, ptr) ((GENERAL_NAMES
*)OPENSSL_sk_delete_ptr(ossl_check_GENERAL_NAMES_sk_type(sk),
ossl_check_GENERAL_NAMES_type(ptr)))
#define sk_GENERAL_NAMES_push(sk, ptr) OPENSSL_sk_push(ossl_check_GENERAL_NAMES_sk_type(sk),
ossl_check_GENERAL_NAMES_type(ptr))
#define sk_GENERAL_NAMES_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_GENERAL_NAMES_sk_type(sk), ossl_check_GENERAL_NAMES_type(ptr))
#define sk_GENERAL_NAMES_pop(sk) ((GENERAL_NAMES
*)OPENSSL_sk_pop(ossl_check_GENERAL_NAMES_sk_type(sk)))
#define sk_GENERAL_NAMES_shift(sk) ((GENERAL_NAMES
*)OPENSSL_sk_shift(ossl_check_GENERAL_NAMES_sk_type(sk)))
#define sk_GENERAL_NAMES_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_GENERAL_NAMES_sk_type(sk),ossl_check_GENERAL_NAMES_freefunc
_type(freefunc))
#define sk_GENERAL_NAMES_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_GENERAL_NAMES_sk_type(sk), ossl_check_GENERAL_NAMES_type(ptr),
(idx))
#define sk_GENERAL_NAMES_set(sk,
 idx, ptr) ((GENERAL_NAMES *)OPENSSL_sk_set(ossl_check_GENERAL_NAMES_sk_type(sk), (idx),
ossl_check_GENERAL_NAMES_type(ptr)))
#define sk_GENERAL_NAMES_find(sk, ptr) OPENSSL_sk_find(ossl_check_GENERAL_NAMES_sk_type(sk),
ossl_check_GENERAL_NAMES_type(ptr))
#define sk_GENERAL_NAMES_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_GENERAL_NAMES_sk_type(sk), ossl_check_GENERAL_NAMES_type(ptr))
#define sk_GENERAL_NAMES_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_GENERAL_NAMES_sk_type(sk), ossl_check_GENERAL_NAMES_type(ptr),
pnum)
#define sk_GENERAL_NAMES_sort(sk) OPENSSL_sk_sort(ossl_check_GENERAL_NAMES_sk_type(sk))
#define sk_GENERAL_NAMES_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_GENERAL_NAMES_sk_type(sk))
```

```
#define sk_GENERAL_NAMES_dup(sk) ((STACK_OF(GENERAL_NAMES)
*)OPENSSL_sk_dup(ossl_check_const_GENERAL_NAMES_sk_type(sk)))
#define sk_GENERAL_NAMES_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(GENERAL_NAMES)
*)OPENSSL_sk_deep_copy(ossl_check_const_GENERAL_NAMES_sk_type(sk),
 ossl_check_GENERAL_NAMES_copyfunc_type(copyfunc),
ossl_check_GENERAL_NAMES_freefunc_type(freefunc)))
#define sk_GENERAL_NAMES_set_cmp_func(sk, cmp)
((sk_GENERAL_NAMES_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_GENERAL_NAMES_sk_type(sk),
ossl_check_GENERAL_NAMES_compfunc_type(cmp)))

/* clang-format on */

typedef struct DIST_POINT_NAME_st {
  int type;
  union {
     GENERAL_NAMES *fullname;
     STACK_OF(X509_NAME_ENTRY) *relativename;
  } name;
  /* If relativename then this contains the full distribution point name */
  X509_NAME *dpname;
} DIST_POINT_NAME;
DECLARE_ASN1_DUP_FUNCTION(DIST_POINT_NAME)
/* All existing reasons */
#define CRLDP_ALL_REASONS 0x807f

#define CRL_REASON_NONE -1
#define CRL_REASON_UNSPECIFIED 0
#define CRL_REASON_KEY_COMPROMISE 1
#define CRL_REASON_CA_COMPROMISE 2
#define CRL_REASON_AFFILIATION_CHANGED 3
#define CRL_REASON_SUPERSEDED 4
#define CRL_REASON_CESSATION_OF_OPERATION 5
#define CRL_REASON_CERTIFICATE_HOLD 6
#define CRL_REASON_REMOVE_FROM_CRL
 8
#define CRL_REASON_PRIVILEGE_WITHDRAWN 9
#define CRL_REASON_AA_COMPROMISE 10

struct DIST_POINT_st {
  DIST_POINT_NAME *distpoint;
  ASN1_BIT_STRING *reasons;
  GENERAL_NAMES *CRLissuer;
  int dp_reasons;
};

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(DIST_POINT, DIST_POINT, DIST_POINT)
#define sk_DIST_POINT_num(sk) OPENSSL_sk_num(ossl_check_const_DIST_POINT_sk_type(sk))
```

```
#define sk_DIST_POINT_value(sk, idx) ((DIST_POINT
*)OPENSSL_sk_value(ossl_check_const_DIST_POINT_sk_type(sk), (idx)))
#define sk_DIST_POINT_new(cmp) ((STACK_OF(DIST_POINT)
*)OPENSSL_sk_new(ossl_check_DIST_POINT_compfunc_type(cmp)))
#define sk_DIST_POINT_new_null() ((STACK_OF(DIST_POINT) *)OPENSSL_sk_new_null())
#define sk_DIST_POINT_new_reserve(cmp, n) ((STACK_OF(DIST_POINT)
*)OPENSSL_sk_new_reserve(ossl_check_DIST_POINT_compfunc_type(cmp), (n)))
#define sk_DIST_POINT_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_DIST_POINT_sk_type(sk), (n))
#define sk_DIST_POINT_free(sk) OPENSSL_sk_free(ossl_check_DIST_POINT_sk_type(sk))
#define
 sk_DIST_POINT_zero(sk) OPENSSL_sk_zero(ossl_check_DIST_POINT_sk_type(sk))
#define sk_DIST_POINT_delete(sk, i) ((DIST_POINT
*)OPENSSL_sk_delete(ossl_check_DIST_POINT_sk_type(sk), (i)))
#define sk_DIST_POINT_delete_ptr(sk, ptr) ((DIST_POINT
*)OPENSSL_sk_delete_ptr(ossl_check_DIST_POINT_sk_type(sk), ossl_check_DIST_POINT_type(ptr)))
#define sk_DIST_POINT_push(sk, ptr) OPENSSL_sk_push(ossl_check_DIST_POINT_sk_type(sk),
ossl_check_DIST_POINT_type(ptr))
#define sk_DIST_POINT_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_DIST_POINT_sk_type(sk),
ossl_check_DIST_POINT_type(ptr))
#define sk_DIST_POINT_pop(sk) ((DIST_POINT *)OPENSSL_sk_pop(ossl_check_DIST_POINT_sk_type(sk)))
#define sk_DIST_POINT_shift(sk) ((DIST_POINT *)OPENSSL_sk_shift(ossl_check_DIST_POINT_sk_type(sk)))
#define sk_DIST_POINT_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_DIST_POINT_sk_type(sk),ossl_check_DIST_POINT_freefunc_type(freefunc)
)
#define sk_DIST_POINT_insert(sk,
 ptr, idx) OPENSSL_sk_insert(ossl_check_DIST_POINT_sk_type(sk), ossl_check_DIST_POINT_type(ptr), (idx))
#define sk_DIST_POINT_set(sk, idx, ptr) ((DIST_POINT
*)OPENSSL_sk_set(ossl_check_DIST_POINT_sk_type(sk), (idx), ossl_check_DIST_POINT_type(ptr)))
#define sk_DIST_POINT_find(sk, ptr) OPENSSL_sk_find(ossl_check_DIST_POINT_sk_type(sk),
ossl_check_DIST_POINT_type(ptr))
#define sk_DIST_POINT_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_DIST_POINT_sk_type(sk),
ossl_check_DIST_POINT_type(ptr))
#define sk_DIST_POINT_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_DIST_POINT_sk_type(sk),
ossl_check_DIST_POINT_type(ptr), pnum)
#define sk_DIST_POINT_sort(sk) OPENSSL_sk_sort(ossl_check_DIST_POINT_sk_type(sk))
#define sk_DIST_POINT_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_DIST_POINT_sk_type(sk))
#define sk_DIST_POINT_dup(sk) ((STACK_OF(DIST_POINT)
*)OPENSSL_sk_dup(ossl_check_const_DIST_POINT_sk_type(sk)))
#define sk_DIST_POINT_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(DIST_POINT)
 *)OPENSSL_sk_deep_copy(ossl_check_const_DIST_POINT_sk_type(sk),
ossl_check_DIST_POINT_copyfunc_type(copyfunc), ossl_check_DIST_POINT_freefunc_type(freefunc)))
#define sk_DIST_POINT_set_cmp_func(sk, cmp)
((sk_DIST_POINT_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_DIST_POINT_sk_type(sk),
ossl_check_DIST_POINT_compfunc_type(cmp)))

/* clang-format on */

typedef STACK_OF(DIST_POINT) CRL_DIST_POINTS;
```

```
struct AUTHORITY_KEYID_st {
   ASN1_OCTET_STRING *keyid;
   GENERAL_NAMES *issuer;
   ASN1_INTEGER *serial;
};

/* Strong extranet structures */

typedef struct SXNET_ID_st {
   ASN1_INTEGER *zone;
   ASN1_OCTET_STRING *user;
} SXNETID;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(SXNETID, SXNETID, SXNETID)
#define sk_SXNETID_num(sk) OPENSSL_sk_num(ossl_check_const_SXNETID_sk_type(sk))
#define sk_SXNETID_value(sk, idx) ((SXNETID
*)OPENSSL_sk_value(ossl_check_const_SXNETID_sk_type(sk), (idx)))
#define sk_SXNETID_new(cmp) ((STACK_OF(SXNETID)
*)OPENSSL_sk_new(ossl_check_SXNETID_compfunc_type(cmp)))
#define
 sk_SXNETID_new_null() ((STACK_OF(SXNETID) *)OPENSSL_sk_new_null())
#define sk_SXNETID_new_reserve(cmp, n) ((STACK_OF(SXNETID)
*)OPENSSL_sk_new_reserve(ossl_check_SXNETID_compfunc_type(cmp), (n)))
#define sk_SXNETID_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_SXNETID_sk_type(sk), (n))
#define sk_SXNETID_free(sk) OPENSSL_sk_free(ossl_check_SXNETID_sk_type(sk))
#define sk_SXNETID_zero(sk) OPENSSL_sk_zero(ossl_check_SXNETID_sk_type(sk))
#define sk_SXNETID_delete(sk, i) ((SXNETID *)OPENSSL_sk_delete(ossl_check_SXNETID_sk_type(sk), (i)))
#define sk_SXNETID_delete_ptr(sk, ptr) ((SXNETID
*)OPENSSL_sk_delete_ptr(ossl_check_SXNETID_sk_type(sk), ossl_check_SXNETID_type(ptr)))
#define sk_SXNETID_push(sk, ptr) OPENSSL_sk_push(ossl_check_SXNETID_sk_type(sk),
ossl_check_SXNETID_type(ptr))
#define sk_SXNETID_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_SXNETID_sk_type(sk),
ossl_check_SXNETID_type(ptr))
#define sk_SXNETID_pop(sk) ((SXNETID *)OPENSSL_sk_pop(ossl_check_SXNETID_sk_type(sk)))
#define
 sk_SXNETID_shift(sk) ((SXNETID *)OPENSSL_sk_shift(ossl_check_SXNETID_sk_type(sk)))
#define sk_SXNETID_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_SXNETID_sk_type(sk),ossl_check_SXNETID_freefunc_type(freefunc))
#define sk_SXNETID_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_SXNETID_sk_type(sk),
ossl_check_SXNETID_type(ptr), (idx))
#define sk_SXNETID_set(sk, idx, ptr) ((SXNETID *)OPENSSL_sk_set(ossl_check_SXNETID_sk_type(sk), (idx),
ossl_check_SXNETID_type(ptr)))
#define sk_SXNETID_find(sk, ptr) OPENSSL_sk_find(ossl_check_SXNETID_sk_type(sk),
ossl_check_SXNETID_type(ptr))
#define sk_SXNETID_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_SXNETID_sk_type(sk),
ossl_check_SXNETID_type(ptr))
```

```
#define sk_SXNETID_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_SXNETID_sk_type(sk),
ossl_check_SXNETID_type(ptr), pnum)
#define sk_SXNETID_sort(sk) OPENSSL_sk_sort(ossl_check_SXNETID_sk_type(sk))
#define sk_SXNETID_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_SXNETID_sk_type(sk))
#define
 sk_SXNETID_dup(sk) ((STACK_OF(SXNETID)
*)OPENSSL_sk_dup(ossl_check_const_SXNETID_sk_type(sk)))
#define sk_SXNETID_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(SXNETID)
*)OPENSSL_sk_deep_copy(ossl_check_const_SXNETID_sk_type(sk),
ossl_check_SXNETID_copyfunc_type(copyfunc), ossl_check_SXNETID_freefunc_type(freefunc)))
#define sk_SXNETID_set_cmp_func(sk, cmp)
((sk_SXNETID_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_SXNETID_sk_type(sk),
ossl_check_SXNETID_compfunc_type(cmp)))

/* clang-format on */

typedef struct SXNET_st {
   ASN1_INTEGER *version;
   STACK_OF(SXNETID) *ids;
} SXNET;

typedef struct ISSUER_SIGN_TOOL_st {
   ASN1_UTF8STRING *signTool;
   ASN1_UTF8STRING *cATool;
   ASN1_UTF8STRING *signToolCert;
   ASN1_UTF8STRING *cAToolCert;
} ISSUER_SIGN_TOOL;

typedef struct NOTICEREF_st {
   ASN1_STRING *organization;
   STACK_OF(ASN1_INTEGER) *noticenos;
} NOTICEREF;

typedef struct USERNOTICE_st {
   NOTICEREF *noticeref;
    ASN1_STRING *exptext;
} USERNOTICE;

typedef struct POLICYQUALINFO_st {
   ASN1_OBJECT *pqualid;
   union {
       ASN1_IA5STRING *cpsuri;
       USERNOTICE *usernotice;
       ASN1_TYPE *other;
   } d;
} POLICYQUALINFO;

/* clang-format off */
```

```
SKM_DEFINE_STACK_OF_INTERNAL(POLICYQUALINFO, POLICYQUALINFO, POLICYQUALINFO)
#define sk_POLICYQUALINFO_num(sk)
OPENSSL_sk_num(ossl_check_const_POLICYQUALINFO_sk_type(sk))
#define sk_POLICYQUALINFO_value(sk, idx) ((POLICYQUALINFO
*)OPENSSL_sk_value(ossl_check_const_POLICYQUALINFO_sk_type(sk), (idx)))
#define sk_POLICYQUALINFO_new(cmp) ((STACK_OF(POLICYQUALINFO)
*)OPENSSL_sk_new(ossl_check_POLICYQUALINFO_compfunc_type(cmp)))
#define sk_POLICYQUALINFO_new_null() ((STACK_OF(POLICYQUALINFO) *)OPENSSL_sk_new_null())
#define sk_POLICYQUALINFO_new_reserve(cmp, n) ((STACK_OF(POLICYQUALINFO)
*)OPENSSL_sk_new_reserve(ossl_check_POLICYQUALINFO_compfunc_type(cmp), (n)))
#define sk_POLICYQUALINFO_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_POLICYQUALINFO_sk_type(sk),
 (n))
#define sk_POLICYQUALINFO_free(sk) OPENSSL_sk_free(ossl_check_POLICYQUALINFO_sk_type(sk))
#define sk_POLICYQUALINFO_zero(sk) OPENSSL_sk_zero(ossl_check_POLICYQUALINFO_sk_type(sk))
#define sk_POLICYQUALINFO_delete(sk, i) ((POLICYQUALINFO
*)OPENSSL_sk_delete(ossl_check_POLICYQUALINFO_sk_type(sk), (i)))
#define sk_POLICYQUALINFO_delete_ptr(sk, ptr) ((POLICYQUALINFO
*)OPENSSL_sk_delete_ptr(ossl_check_POLICYQUALINFO_sk_type(sk),
ossl_check_POLICYQUALINFO_type(ptr)))
#define sk_POLICYQUALINFO_push(sk, ptr) OPENSSL_sk_push(ossl_check_POLICYQUALINFO_sk_type(sk),
ossl_check_POLICYQUALINFO_type(ptr))
#define sk_POLICYQUALINFO_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_POLICYQUALINFO_sk_type(sk), ossl_check_POLICYQUALINFO_type(ptr))
#define sk_POLICYQUALINFO_pop(sk) ((POLICYQUALINFO
*)OPENSSL_sk_pop(ossl_check_POLICYQUALINFO_sk_type(sk)))
#define sk_POLICYQUALINFO_shift(sk) ((POLICYQUALINFO
*)OPENSSL_sk_shift(ossl_check_POLICYQUALINFO_sk_type(sk)))
#define sk_POLICYQUALINFO_pop_free(sk,
 freefunc)
OPENSSL_sk_pop_free(ossl_check_POLICYQUALINFO_sk_type(sk),ossl_check_POLICYQUALINFO_freefunc
_type(freefunc))
#define sk_POLICYQUALINFO_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_POLICYQUALINFO_sk_type(sk), ossl_check_POLICYQUALINFO_type(ptr),
(idx))
#define sk_POLICYQUALINFO_set(sk, idx, ptr) ((POLICYQUALINFO
*)OPENSSL_sk_set(ossl_check_POLICYQUALINFO_sk_type(sk), (idx),
ossl_check_POLICYQUALINFO_type(ptr)))
#define sk_POLICYQUALINFO_find(sk, ptr) OPENSSL_sk_find(ossl_check_POLICYQUALINFO_sk_type(sk),
ossl_check_POLICYQUALINFO_type(ptr))
#define sk_POLICYQUALINFO_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_POLICYQUALINFO_sk_type(sk),
ossl_check_POLICYQUALINFO_type(ptr))
#define sk_POLICYQUALINFO_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_POLICYQUALINFO_sk_type(sk), ossl_check_POLICYQUALINFO_type(ptr),
pnum)
#define sk_POLICYQUALINFO_sort(sk) OPENSSL_sk_sort(ossl_check_POLICYQUALINFO_sk_type(sk))
#define sk_POLICYQUALINFO_is_sorted(sk)
```

```
 OPENSSL_sk_is_sorted(ossl_check_const_POLICYQUALINFO_sk_type(sk))
#define sk_POLICYQUALINFO_dup(sk) ((STACK_OF(POLICYQUALINFO)
*)OPENSSL_sk_dup(ossl_check_const_POLICYQUALINFO_sk_type(sk)))
#define sk_POLICYQUALINFO_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(POLICYQUALINFO)
*)OPENSSL_sk_deep_copy(ossl_check_const_POLICYQUALINFO_sk_type(sk),
ossl_check_POLICYQUALINFO_copyfunc_type(copyfunc),
ossl_check_POLICYQUALINFO_freefunc_type(freefunc)))
#define sk_POLICYQUALINFO_set_cmp_func(sk, cmp)
((sk_POLICYQUALINFO_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_POLICYQUALINFO_sk_type(sk),
ossl_check_POLICYQUALINFO_compfunc_type(cmp)))

/* clang-format on */

typedef struct POLICYINFO_st {
   ASN1_OBJECT *policyid;
   STACK_OF(POLICYQUALINFO) *qualifiers;
} POLICYINFO;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(POLICYINFO, POLICYINFO, POLICYINFO)
#define sk_POLICYINFO_num(sk) OPENSSL_sk_num(ossl_check_const_POLICYINFO_sk_type(sk))
#define sk_POLICYINFO_value(sk, idx) ((POLICYINFO
 *)OPENSSL_sk_value(ossl_check_const_POLICYINFO_sk_type(sk), (idx)))
#define sk_POLICYINFO_new(cmp) ((STACK_OF(POLICYINFO)
*)OPENSSL_sk_new(ossl_check_POLICYINFO_compfunc_type(cmp)))
#define sk_POLICYINFO_new_null() ((STACK_OF(POLICYINFO) *)OPENSSL_sk_new_null())
#define sk_POLICYINFO_new_reserve(cmp, n) ((STACK_OF(POLICYINFO)
*)OPENSSL_sk_new_reserve(ossl_check_POLICYINFO_compfunc_type(cmp), (n)))
#define sk_POLICYINFO_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_POLICYINFO_sk_type(sk), (n))
#define sk_POLICYINFO_free(sk) OPENSSL_sk_free(ossl_check_POLICYINFO_sk_type(sk))
#define sk_POLICYINFO_zero(sk) OPENSSL_sk_zero(ossl_check_POLICYINFO_sk_type(sk))
#define sk_POLICYINFO_delete(sk, i) ((POLICYINFO
*)OPENSSL_sk_delete(ossl_check_POLICYINFO_sk_type(sk), (i)))
#define sk_POLICYINFO_delete_ptr(sk, ptr) ((POLICYINFO
*)OPENSSL_sk_delete_ptr(ossl_check_POLICYINFO_sk_type(sk), ossl_check_POLICYINFO_type(ptr)))
#define sk_POLICYINFO_push(sk, ptr) OPENSSL_sk_push(ossl_check_POLICYINFO_sk_type(sk),
 ossl_check_POLICYINFO_type(ptr))
#define sk_POLICYINFO_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_POLICYINFO_sk_type(sk),
ossl_check_POLICYINFO_type(ptr))
#define sk_POLICYINFO_pop(sk) ((POLICYINFO *)OPENSSL_sk_pop(ossl_check_POLICYINFO_sk_type(sk)))
#define sk_POLICYINFO_shift(sk) ((POLICYINFO
*)OPENSSL_sk_shift(ossl_check_POLICYINFO_sk_type(sk)))
#define sk_POLICYINFO_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_POLICYINFO_sk_type(sk),ossl_check_POLICYINFO_freefunc_type(freefun
c))
#define sk_POLICYINFO_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_POLICYINFO_sk_type(sk),
ossl_check_POLICYINFO_type(ptr), (idx))
#define sk_POLICYINFO_set(sk, idx, ptr) ((POLICYINFO
```

```
*)OPENSSL_sk_set(ossl_check_POLICYINFO_sk_type(sk), (idx), ossl_check_POLICYINFO_type(ptr)))
#define sk_POLICYINFO_find(sk, ptr) OPENSSL_sk_find(ossl_check_POLICYINFO_sk_type(sk),
ossl_check_POLICYINFO_type(ptr))
#define sk_POLICYINFO_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_POLICYINFO_sk_type(sk),
 ossl_check_POLICYINFO_type(ptr))
#define sk_POLICYINFO_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_POLICYINFO_sk_type(sk),
ossl_check_POLICYINFO_type(ptr), pnum)
#define sk_POLICYINFO_sort(sk) OPENSSL_sk_sort(ossl_check_POLICYINFO_sk_type(sk))
#define sk_POLICYINFO_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_POLICYINFO_sk_type(sk))
#define sk_POLICYINFO_dup(sk) ((STACK_OF(POLICYINFO)
*)OPENSSL_sk_dup(ossl_check_const_POLICYINFO_sk_type(sk)))
#define sk_POLICYINFO_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(POLICYINFO)
*)OPENSSL_sk_deep_copy(ossl_check_const_POLICYINFO_sk_type(sk),
ossl_check_POLICYINFO_copyfunc_type(copyfunc), ossl_check_POLICYINFO_freefunc_type(freefunc)))
#define sk_POLICYINFO_set_cmp_func(sk, cmp)
((sk_POLICYINFO_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_POLICYINFO_sk_type(sk),
ossl_check_POLICYINFO_compfunc_type(cmp)))

/* clang-format on */

typedef STACK_OF(POLICYINFO) CERTIFICATEPOLICIES;

typedef struct POLICY_MAPPING_st {
   ASN1_OBJECT
 *issuerDomainPolicy;
   ASN1_OBJECT *subjectDomainPolicy;
} POLICY_MAPPING;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(POLICY_MAPPING, POLICY_MAPPING, POLICY_MAPPING)
#define sk_POLICY_MAPPING_num(sk)
OPENSSL_sk_num(ossl_check_const_POLICY_MAPPING_sk_type(sk))
#define sk_POLICY_MAPPING_value(sk, idx) ((POLICY_MAPPING
*)OPENSSL_sk_value(ossl_check_const_POLICY_MAPPING_sk_type(sk), (idx)))
#define sk_POLICY_MAPPING_new(cmp) ((STACK_OF(POLICY_MAPPING)
*)OPENSSL_sk_new(ossl_check_POLICY_MAPPING_compfunc_type(cmp)))
#define sk_POLICY_MAPPING_new_null() ((STACK_OF(POLICY_MAPPING) *)OPENSSL_sk_new_null())
#define sk_POLICY_MAPPING_new_reserve(cmp, n) ((STACK_OF(POLICY_MAPPING)
*)OPENSSL_sk_new_reserve(ossl_check_POLICY_MAPPING_compfunc_type(cmp), (n)))
#define sk_POLICY_MAPPING_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_POLICY_MAPPING_sk_type(sk), (n))
#define sk_POLICY_MAPPING_free(sk) OPENSSL_sk_free(ossl_check_POLICY_MAPPING_sk_type(sk))
#define sk_POLICY_MAPPING_zero(sk) OPENSSL_sk_zero(ossl_check_POLICY_MAPPING_sk_type(sk))
#define
 sk_POLICY_MAPPING_delete(sk, i) ((POLICY_MAPPING
*)OPENSSL_sk_delete(ossl_check_POLICY_MAPPING_sk_type(sk), (i)))
#define sk_POLICY_MAPPING_delete_ptr(sk, ptr) ((POLICY_MAPPING
*)OPENSSL_sk_delete_ptr(ossl_check_POLICY_MAPPING_sk_type(sk),
```

```
ossl_check_POLICY_MAPPING_type(ptr)))
#define sk_POLICY_MAPPING_push(sk, ptr) OPENSSL_sk_push(ossl_check_POLICY_MAPPING_sk_type(sk),
ossl_check_POLICY_MAPPING_type(ptr))
#define sk_POLICY_MAPPING_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_POLICY_MAPPING_sk_type(sk), ossl_check_POLICY_MAPPING_type(ptr))
#define sk_POLICY_MAPPING_pop(sk) ((POLICY_MAPPING
*)OPENSSL_sk_pop(ossl_check_POLICY_MAPPING_sk_type(sk)))
#define sk_POLICY_MAPPING_shift(sk) ((POLICY_MAPPING
*)OPENSSL_sk_shift(ossl_check_POLICY_MAPPING_sk_type(sk)))
#define sk_POLICY_MAPPING_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_POLICY_MAPPING_sk_type(sk),ossl_check_POLICY_MAPPING_freefunc
_type(freefunc))
#define sk_POLICY_MAPPING_insert(sk,
 ptr, idx) OPENSSL_sk_insert(ossl_check_POLICY_MAPPING_sk_type(sk),
ossl_check_POLICY_MAPPING_type(ptr), (idx))
#define sk_POLICY_MAPPING_set(sk, idx, ptr) ((POLICY_MAPPING
*)OPENSSL_sk_set(ossl_check_POLICY_MAPPING_sk_type(sk), (idx),
ossl_check_POLICY_MAPPING_type(ptr)))
#define sk_POLICY_MAPPING_find(sk, ptr) OPENSSL_sk_find(ossl_check_POLICY_MAPPING_sk_type(sk),
ossl_check_POLICY_MAPPING_type(ptr))
#define sk_POLICY_MAPPING_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_POLICY_MAPPING_sk_type(sk), ossl_check_POLICY_MAPPING_type(ptr))
#define sk_POLICY_MAPPING_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_POLICY_MAPPING_sk_type(sk), ossl_check_POLICY_MAPPING_type(ptr),
pnum)
#define sk_POLICY_MAPPING_sort(sk) OPENSSL_sk_sort(ossl_check_POLICY_MAPPING_sk_type(sk))
#define sk_POLICY_MAPPING_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_POLICY_MAPPING_sk_type(sk))
#define sk_POLICY_MAPPING_dup(sk) ((STACK_OF(POLICY_MAPPING)
*)OPENSSL_sk_dup(ossl_check_const_POLICY_MAPPING_sk_type(sk)))
#define
 sk_POLICY_MAPPING_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(POLICY_MAPPING)
*)OPENSSL_sk_deep_copy(ossl_check_const_POLICY_MAPPING_sk_type(sk),
ossl_check_POLICY_MAPPING_copyfunc_type(copyfunc),
ossl_check_POLICY_MAPPING_freefunc_type(freefunc)))
#define sk_POLICY_MAPPING_set_cmp_func(sk, cmp)
((sk_POLICY_MAPPING_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_POLICY_MAPPING_sk_type(sk),
ossl_check_POLICY_MAPPING_compfunc_type(cmp)))

/* clang-format on */

typedef STACK_OF(POLICY_MAPPING) POLICY_MAPPINGS;

typedef struct GENERAL_SUBTREE_st {
  GENERAL_NAME *base;
  ASN1_INTEGER *minimum;
  ASN1_INTEGER *maximum;
} GENERAL_SUBTREE;
```

```
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(GENERAL_SUBTREE, GENERAL_SUBTREE,
GENERAL_SUBTREE)
#define sk_GENERAL_SUBTREE_num(sk)
OPENSSL_sk_num(ossl_check_const_GENERAL_SUBTREE_sk_type(sk))
#define sk_GENERAL_SUBTREE_value(sk, idx) ((GENERAL_SUBTREE
*)OPENSSL_sk_value(ossl_check_const_GENERAL_SUBTREE_sk_type(sk),
 (idx)))
#define sk_GENERAL_SUBTREE_new(cmp) ((STACK_OF(GENERAL_SUBTREE)
*)OPENSSL_sk_new(ossl_check_GENERAL_SUBTREE_compfunc_type(cmp)))
#define sk_GENERAL_SUBTREE_new_null() ((STACK_OF(GENERAL_SUBTREE)
*)OPENSSL_sk_new_null())
#define sk_GENERAL_SUBTREE_new_reserve(cmp, n) ((STACK_OF(GENERAL_SUBTREE)
*)OPENSSL_sk_new_reserve(ossl_check_GENERAL_SUBTREE_compfunc_type(cmp), (n)))
#define sk_GENERAL_SUBTREE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_GENERAL_SUBTREE_sk_type(sk), (n))
#define sk_GENERAL_SUBTREE_free(sk) OPENSSL_sk_free(ossl_check_GENERAL_SUBTREE_sk_type(sk))
#define sk_GENERAL_SUBTREE_zero(sk) OPENSSL_sk_zero(ossl_check_GENERAL_SUBTREE_sk_type(sk))
#define sk_GENERAL_SUBTREE_delete(sk, i) ((GENERAL_SUBTREE
*)OPENSSL_sk_delete(ossl_check_GENERAL_SUBTREE_sk_type(sk), (i)))
#define sk_GENERAL_SUBTREE_delete_ptr(sk, ptr) ((GENERAL_SUBTREE
*)OPENSSL_sk_delete_ptr(ossl_check_GENERAL_SUBTREE_sk_type(sk),
ossl_check_GENERAL_SUBTREE_type(ptr)))
#define sk_GENERAL_SUBTREE_push(sk,
 ptr) OPENSSL_sk_push(ossl_check_GENERAL_SUBTREE_sk_type(sk),
ossl_check_GENERAL_SUBTREE_type(ptr))
#define sk_GENERAL_SUBTREE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_GENERAL_SUBTREE_sk_type(sk),
ossl_check_GENERAL_SUBTREE_type(ptr))
#define sk_GENERAL_SUBTREE_pop(sk) ((GENERAL_SUBTREE
*)OPENSSL_sk_pop(ossl_check_GENERAL_SUBTREE_sk_type(sk)))
#define sk_GENERAL_SUBTREE_shift(sk) ((GENERAL_SUBTREE
*)OPENSSL_sk_shift(ossl_check_GENERAL_SUBTREE_sk_type(sk)))
#define sk_GENERAL_SUBTREE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_GENERAL_SUBTREE_sk_type(sk),ossl_check_GENERAL_SUBTREE_free
func_type(freefunc))
#define sk_GENERAL_SUBTREE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_GENERAL_SUBTREE_sk_type(sk),
ossl_check_GENERAL_SUBTREE_type(ptr), (idx))
#define sk_GENERAL_SUBTREE_set(sk, idx, ptr) ((GENERAL_SUBTREE
*)OPENSSL_sk_set(ossl_check_GENERAL_SUBTREE_sk_type(sk), (idx),
ossl_check_GENERAL_SUBTREE_type(ptr)))
#define sk_GENERAL_SUBTREE_find(sk, ptr)
 OPENSSL_sk_find(ossl_check_GENERAL_SUBTREE_sk_type(sk),
ossl_check_GENERAL_SUBTREE_type(ptr))
#define sk_GENERAL_SUBTREE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_GENERAL_SUBTREE_sk_type(sk),
```

```
ossl_check_GENERAL_SUBTREE_type(ptr))
#define sk_GENERAL_SUBTREE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_GENERAL_SUBTREE_sk_type(sk),
ossl_check_GENERAL_SUBTREE_type(ptr), pnum)
#define sk_GENERAL_SUBTREE_sort(sk) OPENSSL_sk_sort(ossl_check_GENERAL_SUBTREE_sk_type(sk))
#define sk_GENERAL_SUBTREE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_GENERAL_SUBTREE_sk_type(sk))
#define sk_GENERAL_SUBTREE_dup(sk) ((STACK_OF(GENERAL_SUBTREE)
*)OPENSSL_sk_dup(ossl_check_const_GENERAL_SUBTREE_sk_type(sk)))
#define sk_GENERAL_SUBTREE_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(GENERAL_SUBTREE)
*)OPENSSL_sk_deep_copy(ossl_check_const_GENERAL_SUBTREE_sk_type(sk),
ossl_check_GENERAL_SUBTREE_copyfunc_type(copyfunc),
ossl_check_GENERAL_SUBTREE_freefunc_type(freefunc)))
#define sk_GENERAL_SUBTREE_set_cmp_func(sk,
 cmp)
((sk_GENERAL_SUBTREE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_GENERAL_SUBTREE_sk_type
(sk), ossl_check_GENERAL_SUBTREE_compfunc_type(cmp)))

/* clang-format on */

struct NAME_CONSTRAINTS_st {
  STACK_OF(GENERAL_SUBTREE) *permittedSubtrees;
  STACK_OF(GENERAL_SUBTREE) *excludedSubtrees;
};

typedef struct POLICY_CONSTRAINTS_st {
  ASN1_INTEGER *requireExplicitPolicy;
  ASN1_INTEGER *inhibitPolicyMapping;
} POLICY_CONSTRAINTS;

/* Proxy certificate structures, see RFC 3820 */
typedef struct PROXY_POLICY_st {
  ASN1_OBJECT *policyLanguage;
  ASN1_OCTET_STRING *policy;
} PROXY_POLICY;

typedef struct PROXY_CERT_INFO_EXTENSION_st {
  ASN1_INTEGER *pcPathLengthConstraint;
  PROXY_POLICY *proxyPolicy;
} PROXY_CERT_INFO_EXTENSION;

DECLARE_ASN1_FUNCTIONS(PROXY_POLICY)
DECLARE_ASN1_FUNCTIONS(PROXY_CERT_INFO_EXTENSION)

struct ISSUING_DIST_POINT_st {
  DIST_POINT_NAME *distpoint;
  int onlyuser;
  int onlyCA;
```

```
   ASN1_BIT_STRING *onlysomereasons;
    int indirectCRL;
   int onlyattr;
};

/* Values in idp_flags field */
/* IDP present */
#define IDP_PRESENT 0x1
/* IDP values inconsistent */
#define IDP_INVALID 0x2
/* onlyuser true */
#define IDP_ONLYUSER 0x4
/* onlyCA true */
#define IDP_ONLYCA 0x8
/* onlyattr true */
#define IDP_ONLYATTR 0x10
/* indirectCRL true */
#define IDP_INDIRECT 0x20
/* onlysomereasons present */
#define IDP_REASONS 0x40

#define X509V3_conf_err(val) ERR_add_error_data(6, \
   "section:", (val)->section,                    \
   ",name:", (val)->name, ",value:", (val)->value)

#define X509V3_set_ctx_test(ctx) \
   X509V3_set_ctx(ctx, NULL, NULL, NULL, NULL, X509V3_CTX_TEST)
#define X509V3_set_ctx_nodb(ctx) (ctx)->db = NULL;

#define EXT_BITSTRING(nid, table) { nid, 0, ASN1_ITEM_ref(ASN1_BIT_STRING), \
   0, 0, 0, 0,                                                \
   0, 0,                                                      \
   (X509V3_EXT_I2V)i2v_ASN1_BIT_STRING,
                                \
   (X509V3_EXT_V2I)v2i_ASN1_BIT_STRING,                                \
   NULL, NULL,                                                \
   table }

#define EXT_IA5STRING(nid) { nid, 0, ASN1_ITEM_ref(ASN1_IA5STRING), \
   0, 0, 0, 0,                                          \
   (X509V3_EXT_I2S)i2s_ASN1_IA5STRING,                          \
   (X509V3_EXT_S2I)s2i_ASN1_IA5STRING,                          \
   0, 0, 0, 0,                                          \
   NULL }

#define EXT_UTF8STRING(nid) { nid, 0, ASN1_ITEM_ref(ASN1_UTF8STRING), \
   0, 0, 0, 0,                                           \
   (X509V3_EXT_I2S)i2s_ASN1_UTF8STRING,                          \
```

```
   (X509V3_EXT_S2I)s2i_ASN1_UTF8STRING,                    \
   0, 0, 0, 0,                                             \
   NULL }

/* clang-format off */
# define EXT_END { -1, 0, 0, 0, 0, 0,
 0, 0, 0, 0, 0, 0, 0, 0}
/* clang-format on */

/* X509_PURPOSE stuff */

#define EXFLAG_BCONS 0x1
#define EXFLAG_KUSAGE 0x2
#define EXFLAG_XKUSAGE 0x4
#define EXFLAG_NSCERT 0x8

#define EXFLAG_CA 0x10
#define EXFLAG_SI 0x20 /* self-issued, maybe not self-signed */
#define EXFLAG_V1 0x40
#define EXFLAG_INVALID 0x80
/* EXFLAG_SET is set to indicate that some values have been precomputed */
#define EXFLAG_SET 0x100
#define EXFLAG_CRITICAL 0x200
#define EXFLAG_PROXY 0x400

#define EXFLAG_INVALID_POLICY 0x800
#define EXFLAG_FRESHEST 0x1000
#define EXFLAG_SS 0x2000 /* cert is apparently self-signed */

#define EXFLAG_BCONS_CRITICAL 0x10000
#define EXFLAG_AKID_CRITICAL 0x20000
#define EXFLAG_SKID_CRITICAL 0x40000
#define EXFLAG_SAN_CRITICAL 0x80000
#define EXFLAG_NO_FINGERPRINT 0x100000

/* https://datatracker.ietf.org/doc/html/rfc5280#section-4.2.1.3 */
#define KU_DIGITAL_SIGNATURE X509v3_KU_DIGITAL_SIGNATURE
#define KU_NON_REPUDIATION X509v3_KU_NON_REPUDIATION
#define KU_KEY_ENCIPHERMENT
 X509v3_KU_KEY_ENCIPHERMENT
#define KU_DATA_ENCIPHERMENT X509v3_KU_DATA_ENCIPHERMENT
#define KU_KEY_AGREEMENT X509v3_KU_KEY_AGREEMENT
#define KU_KEY_CERT_SIGN X509v3_KU_KEY_CERT_SIGN
#define KU_CRL_SIGN X509v3_KU_CRL_SIGN
#define KU_ENCIPHER_ONLY X509v3_KU_ENCIPHER_ONLY
#define KU_DECIPHER_ONLY X509v3_KU_DECIPHER_ONLY

#define NS_SSL_CLIENT 0x80
```

```
#define NS_SSL_SERVER 0x40
#define NS_SMIME 0x20
#define NS_OBJSIGN 0x10
#define NS_SSL_CA 0x04
#define NS_SMIME_CA 0x02
#define NS_OBJSIGN_CA 0x01
#define NS_ANY_CA (NS_SSL_CA | NS_SMIME_CA | NS_OBJSIGN_CA)

#define XKU_SSL_SERVER 0x1
#define XKU_SSL_CLIENT 0x2
#define XKU_SMIME 0x4
#define XKU_CODE_SIGN 0x8
#define XKU_SGC 0x10 /* Netscape or MS Server-Gated Crypto */
#define XKU_OCSP_SIGN 0x20
#define XKU_TIMESTAMP 0x40
#define XKU_DVCS 0x80
#define XKU_ANYEKU 0x100

#define X509_PURPOSE_DYNAMIC 0x1
#define X509_PURPOSE_DYNAMIC_NAME 0x2

typedef struct x509_purpose_st {
   int purpose;
   int trust; /* Default trust ID */
   int flags;

  int (*check_purpose)(const struct x509_purpose_st *, const X509 *, int);
   char *name;
   char *sname;
   void *usr_data;
} X509_PURPOSE;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_PURPOSE, X509_PURPOSE, X509_PURPOSE)
#define sk_X509_PURPOSE_num(sk) OPENSSL_sk_num(ossl_check_const_X509_PURPOSE_sk_type(sk))
#define sk_X509_PURPOSE_value(sk, idx) ((X509_PURPOSE
*)OPENSSL_sk_value(ossl_check_const_X509_PURPOSE_sk_type(sk), (idx)))
#define sk_X509_PURPOSE_new(cmp) ((STACK_OF(X509_PURPOSE)
*)OPENSSL_sk_new(ossl_check_X509_PURPOSE_compfunc_type(cmp)))
#define sk_X509_PURPOSE_new_null() ((STACK_OF(X509_PURPOSE) *)OPENSSL_sk_new_null())
#define sk_X509_PURPOSE_new_reserve(cmp, n) ((STACK_OF(X509_PURPOSE)
*)OPENSSL_sk_new_reserve(ossl_check_X509_PURPOSE_compfunc_type(cmp), (n)))
#define sk_X509_PURPOSE_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_X509_PURPOSE_sk_type(sk), (n))
#define sk_X509_PURPOSE_free(sk) OPENSSL_sk_free(ossl_check_X509_PURPOSE_sk_type(sk))
#define sk_X509_PURPOSE_zero(sk)
 OPENSSL_sk_zero(ossl_check_X509_PURPOSE_sk_type(sk))
#define sk_X509_PURPOSE_delete(sk, i) ((X509_PURPOSE
*)OPENSSL_sk_delete(ossl_check_X509_PURPOSE_sk_type(sk), (i)))
```

```
#define sk_X509_PURPOSE_delete_ptr(sk, ptr) ((X509_PURPOSE
*)OPENSSL_sk_delete_ptr(ossl_check_X509_PURPOSE_sk_type(sk), ossl_check_X509_PURPOSE_type(ptr)))
#define sk_X509_PURPOSE_push(sk, ptr) OPENSSL_sk_push(ossl_check_X509_PURPOSE_sk_type(sk),
ossl_check_X509_PURPOSE_type(ptr))
#define sk_X509_PURPOSE_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_X509_PURPOSE_sk_type(sk),
ossl_check_X509_PURPOSE_type(ptr))
#define sk_X509_PURPOSE_pop(sk) ((X509_PURPOSE
*)OPENSSL_sk_pop(ossl_check_X509_PURPOSE_sk_type(sk)))
#define sk_X509_PURPOSE_shift(sk) ((X509_PURPOSE
*)OPENSSL_sk_shift(ossl_check_X509_PURPOSE_sk_type(sk)))
#define sk_X509_PURPOSE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_PURPOSE_sk_type(sk),ossl_check_X509_PURPOSE_freefunc_type(fr
eefunc))
#define sk_X509_PURPOSE_insert(sk, ptr,
 idx) OPENSSL_sk_insert(ossl_check_X509_PURPOSE_sk_type(sk), ossl_check_X509_PURPOSE_type(ptr),
(idx))
#define sk_X509_PURPOSE_set(sk, idx, ptr) ((X509_PURPOSE
*)OPENSSL_sk_set(ossl_check_X509_PURPOSE_sk_type(sk), (idx), ossl_check_X509_PURPOSE_type(ptr)))
#define sk_X509_PURPOSE_find(sk, ptr) OPENSSL_sk_find(ossl_check_X509_PURPOSE_sk_type(sk),
ossl_check_X509_PURPOSE_type(ptr))
#define sk_X509_PURPOSE_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_X509_PURPOSE_sk_type(sk),
ossl_check_X509_PURPOSE_type(ptr))
#define sk_X509_PURPOSE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_X509_PURPOSE_sk_type(sk), ossl_check_X509_PURPOSE_type(ptr), pnum)
#define sk_X509_PURPOSE_sort(sk) OPENSSL_sk_sort(ossl_check_X509_PURPOSE_sk_type(sk))
#define sk_X509_PURPOSE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_X509_PURPOSE_sk_type(sk))
#define sk_X509_PURPOSE_dup(sk) ((STACK_OF(X509_PURPOSE)
*)OPENSSL_sk_dup(ossl_check_const_X509_PURPOSE_sk_type(sk)))
#define sk_X509_PURPOSE_deep_copy(sk,
 copyfunc, freefunc) ((STACK_OF(X509_PURPOSE)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_PURPOSE_sk_type(sk),
ossl_check_X509_PURPOSE_copyfunc_type(copyfunc), ossl_check_X509_PURPOSE_freefunc_type(freefunc)))
#define sk_X509_PURPOSE_set_cmp_func(sk, cmp)
((sk_X509_PURPOSE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_PURPOSE_sk_type(sk),
ossl_check_X509_PURPOSE_compfunc_type(cmp)))

/* clang-format on */

#define X509_PURPOSE_DEFAULT_ANY 0
#define X509_PURPOSE_SSL_CLIENT 1
#define X509_PURPOSE_SSL_SERVER 2
#define X509_PURPOSE_NS_SSL_SERVER 3
#define X509_PURPOSE_SMIME_SIGN 4
#define X509_PURPOSE_SMIME_ENCRYPT 5
#define X509_PURPOSE_CRL_SIGN 6
#define X509_PURPOSE_ANY 7
#define X509_PURPOSE_OCSP_HELPER 8
```

```
#define X509_PURPOSE_TIMESTAMP_SIGN 9
#define X509_PURPOSE_CODE_SIGN 10

#define X509_PURPOSE_MIN 1
#define X509_PURPOSE_MAX 10

/* Flags for X509V3_EXT_print() */

#define X509V3_EXT_UNKNOWN_MASK (0xfL << 16)
/* Return error for unknown extensions */
#define X509V3_EXT_DEFAULT
 0
/* Print error for unknown extensions */
#define X509V3_EXT_ERROR_UNKNOWN (1L << 16)
/* ASN1 parse unknown extensions */
#define X509V3_EXT_PARSE_UNKNOWN (2L << 16)
/* BIO_dump unknown extensions */
#define X509V3_EXT_DUMP_UNKNOWN (3L << 16)

/* Flags for X509V3_add1_i2d */

#define X509V3_ADD_OP_MASK 0xfL
#define X509V3_ADD_DEFAULT 0L
#define X509V3_ADD_APPEND 1L
#define X509V3_ADD_REPLACE 2L
#define X509V3_ADD_REPLACE_EXISTING 3L
#define X509V3_ADD_KEEP_EXISTING 4L
#define X509V3_ADD_DELETE 5L
#define X509V3_ADD_SILENT 0x10

DECLARE_ASN1_FUNCTIONS(BASIC_CONSTRAINTS)
DECLARE_ASN1_FUNCTIONS(OSSL_BASIC_ATTR_CONSTRAINTS)

DECLARE_ASN1_FUNCTIONS(SXNET)
DECLARE_ASN1_FUNCTIONS(SXNETID)

DECLARE_ASN1_FUNCTIONS(ISSUER_SIGN_TOOL)

int SXNET_add_id_asc(SXNET **psx, const char *zone, const char *user, int userlen);
int SXNET_add_id_ulong(SXNET **psx, unsigned long lzone, const char *user,
   int userlen);
int SXNET_add_id_INTEGER(SXNET **psx, ASN1_INTEGER *izone, const char *user,
   int
 userlen);

ASN1_OCTET_STRING *SXNET_get_id_asc(SXNET *sx, const char *zone);
ASN1_OCTET_STRING *SXNET_get_id_ulong(SXNET *sx, unsigned long lzone);
ASN1_OCTET_STRING *SXNET_get_id_INTEGER(SXNET *sx, ASN1_INTEGER *zone);
```

```
DECLARE_ASN1_FUNCTIONS(AUTHORITY_KEYID)

DECLARE_ASN1_FUNCTIONS(PKEY_USAGE_PERIOD)

DECLARE_ASN1_FUNCTIONS(GENERAL_NAME)
DECLARE_ASN1_DUP_FUNCTION(GENERAL_NAME)
int GENERAL_NAME_cmp(GENERAL_NAME *a, GENERAL_NAME *b);

ASN1_BIT_STRING *v2i_ASN1_BIT_STRING(X509V3_EXT_METHOD *method,
  X509V3_CTX *ctx,
  STACK_OF(CONF_VALUE) *nval);
STACK_OF(CONF_VALUE) *i2v_ASN1_BIT_STRING(X509V3_EXT_METHOD *method,
  ASN1_BIT_STRING *bits,
  STACK_OF(CONF_VALUE) *extlist);
char *i2s_ASN1_IA5STRING(X509V3_EXT_METHOD *method, ASN1_IA5STRING *ia5);
ASN1_IA5STRING *s2i_ASN1_IA5STRING(X509V3_EXT_METHOD *method,
  X509V3_CTX *ctx, const char *str);
char *i2s_ASN1_UTF8STRING(X509V3_EXT_METHOD *method, ASN1_UTF8STRING *utf8);
ASN1_UTF8STRING *s2i_ASN1_UTF8STRING(X509V3_EXT_METHOD *method,
   X509V3_CTX *ctx, const char *str);

STACK_OF(CONF_VALUE) *i2v_GENERAL_NAME(X509V3_EXT_METHOD *method,
  GENERAL_NAME *gen,
  STACK_OF(CONF_VALUE) *ret);
int GENERAL_NAME_print(BIO *out, GENERAL_NAME *gen);

DECLARE_ASN1_FUNCTIONS(GENERAL_NAMES)

STACK_OF(CONF_VALUE) *i2v_GENERAL_NAMES(X509V3_EXT_METHOD *method,
  GENERAL_NAMES *gen,
  STACK_OF(CONF_VALUE) *extlist);
GENERAL_NAMES *v2i_GENERAL_NAMES(const X509V3_EXT_METHOD *method,
  X509V3_CTX *ctx, STACK_OF(CONF_VALUE) *nval);

DECLARE_ASN1_FUNCTIONS(OTHERNAME)
DECLARE_ASN1_FUNCTIONS(EDIPARTYNAME)
int OTHERNAME_cmp(OTHERNAME *a, OTHERNAME *b);
void GENERAL_NAME_set0_value(GENERAL_NAME *a, int type, void *value);
void *GENERAL_NAME_get0_value(const GENERAL_NAME *a, int *ptype);
int GENERAL_NAME_set0_othername(GENERAL_NAME *gen,
  ASN1_OBJECT *oid, ASN1_TYPE *value);
int GENERAL_NAME_get0_otherName(const GENERAL_NAME *gen,
  ASN1_OBJECT **poid, ASN1_TYPE **pvalue);

char *i2s_ASN1_OCTET_STRING(X509V3_EXT_METHOD *method,
   const ASN1_OCTET_STRING *ia5);
ASN1_OCTET_STRING *s2i_ASN1_OCTET_STRING(X509V3_EXT_METHOD *method,
```

```
  X509V3_CTX *ctx, const char *str);

DECLARE_ASN1_FUNCTIONS(EXTENDED_KEY_USAGE)
int i2a_ACCESS_DESCRIPTION(BIO *bp, const ACCESS_DESCRIPTION *a);

DECLARE_ASN1_ALLOC_FUNCTIONS(TLS_FEATURE)

DECLARE_ASN1_FUNCTIONS(CERTIFICATEPOLICIES)
DECLARE_ASN1_FUNCTIONS(POLICYINFO)
DECLARE_ASN1_FUNCTIONS(POLICYQUALINFO)
DECLARE_ASN1_FUNCTIONS(USERNOTICE)
DECLARE_ASN1_FUNCTIONS(NOTICEREF)

DECLARE_ASN1_FUNCTIONS(CRL_DIST_POINTS)
DECLARE_ASN1_FUNCTIONS(DIST_POINT)
DECLARE_ASN1_FUNCTIONS(DIST_POINT_NAME)
DECLARE_ASN1_FUNCTIONS(ISSUING_DIST_POINT)

int DIST_POINT_set_dpname(DIST_POINT_NAME *dpn, const X509_NAME *iname);

int NAME_CONSTRAINTS_check(X509 *x, NAME_CONSTRAINTS *nc);
int NAME_CONSTRAINTS_check_CN(X509 *x, NAME_CONSTRAINTS *nc);

DECLARE_ASN1_FUNCTIONS(ACCESS_DESCRIPTION)
DECLARE_ASN1_FUNCTIONS(AUTHORITY_INFO_ACCESS)

DECLARE_ASN1_ITEM(POLICY_MAPPING)
DECLARE_ASN1_ALLOC_FUNCTIONS(POLICY_MAPPING)
DECLARE_ASN1_ITEM(POLICY_MAPPINGS)

DECLARE_ASN1_ITEM(GENERAL_SUBTREE)
DECLARE_ASN1_ALLOC_FUNCTIONS(GENERAL_SUBTREE)

DECLARE_ASN1_ITEM(NAME_CONSTRAINTS)
DECLARE_ASN1_ALLOC_FUNCTIONS(NAME_CONSTRAINTS)

DECLARE_ASN1_ALLOC_FUNCTIONS(POLICY_CONSTRAINTS)
DECLARE_ASN1_ITEM(POLICY_CONSTRAINTS)

GENERAL_NAME
 *a2i_GENERAL_NAME(GENERAL_NAME *out,
  const X509V3_EXT_METHOD *method,
  X509V3_CTX *ctx, int gen_type,
  const char *value, int is_nc);

#ifdef OPENSSL_CONF_H
GENERAL_NAME *v2i_GENERAL_NAME(const X509V3_EXT_METHOD *method,
  X509V3_CTX *ctx, CONF_VALUE *cnf);
```

```
GENERAL_NAME *v2i_GENERAL_NAME_ex(GENERAL_NAME *out,
   const X509V3_EXT_METHOD *method,
   X509V3_CTX *ctx, CONF_VALUE *cnf,
   int is_nc);

void X509V3_conf_free(CONF_VALUE *val);

X509_EXTENSION *X509V3_EXT_nconf_nid(CONF *conf, X509V3_CTX *ctx, int ext_nid,
   const char *value);
X509_EXTENSION *X509V3_EXT_nconf(CONF *conf, X509V3_CTX *ctx, const char *name,
   const char *value);
int X509V3_EXT_add_nconf_sk(CONF
 *conf, X509V3_CTX *ctx, const char *section,
   STACK_OF(X509_EXTENSION) **sk);
int X509V3_EXT_add_nconf(CONF *conf, X509V3_CTX *ctx, const char *section,
   X509 *cert);
int X509V3_EXT_REQ_add_nconf(CONF *conf, X509V3_CTX *ctx, const char *section,
   X509_REQ *req);
int X509V3_EXT_CRL_add_nconf(CONF *conf, X509V3_CTX *ctx, const char *section,
   X509_CRL *crl);

X509_EXTENSION *X509V3_EXT_conf_nid(LHASH_OF(CONF_VALUE) *conf,
   X509V3_CTX *ctx, int ext_nid,
   const char *value);
X509_EXTENSION *X509V3_EXT_conf(LHASH_OF(CONF_VALUE) *conf, X509V3_CTX *ctx,
   const char *name, const char *value);
int X509V3_EXT_add_conf(LHASH_OF(CONF_VALUE) *conf, X509V3_CTX *ctx,
   const char *section, X509 *cert);
int X509V3_EXT_REQ_add_conf(LHASH_OF(CONF_VALUE) *conf, X509V3_CTX *ctx,
   const char *section, X509_REQ *req);
int X509V3_EXT_CRL_add_conf(LHASH_OF(CONF_VALUE) *conf, X509V3_CTX *ctx,
   const char *section, X509_CRL *crl);

int X509V3_add_value_bool_nf(const char
 *name, int asn1_bool,
   STACK_OF(CONF_VALUE) **extlist);
int X509V3_get_value_bool(const CONF_VALUE *value, int *asn1_bool);
int X509V3_get_value_int(const CONF_VALUE *value, ASN1_INTEGER **aint);
void X509V3_set_nconf(X509V3_CTX *ctx, CONF *conf);
void X509V3_set_conf_lhash(X509V3_CTX *ctx, LHASH_OF(CONF_VALUE) *lhash);
#endif

char *X509V3_get_string(X509V3_CTX *ctx, const char *name, const char *section);
STACK_OF(CONF_VALUE) *X509V3_get_section(X509V3_CTX *ctx, const char *section);
void X509V3_string_free(X509V3_CTX *ctx, char *str);
void X509V3_section_free(X509V3_CTX *ctx, STACK_OF(CONF_VALUE) *section);
void X509V3_set_ctx(X509V3_CTX *ctx, X509 *issuer, X509 *subject,
   X509_REQ *req, X509_CRL *crl, int flags);
```

```
/* For API backward compatibility, this is separate from X509V3_set_ctx(): */
int X509V3_set_issuer_pkey(X509V3_CTX *ctx, EVP_PKEY *pkey);

int X509V3_add_value(const char *name, const char *value,
   STACK_OF(CONF_VALUE) **extlist);
int X509V3_add_value_uchar(const
 char *name, const unsigned char *value,
   STACK_OF(CONF_VALUE) **extlist);
int X509V3_add_value_bool(const char *name, int asn1_bool,
   STACK_OF(CONF_VALUE) **extlist);
int X509V3_add_value_int(const char *name, const ASN1_INTEGER *aint,
   STACK_OF(CONF_VALUE) **extlist);
char *i2s_ASN1_INTEGER(X509V3_EXT_METHOD *meth, const ASN1_INTEGER *aint);
ASN1_INTEGER *s2i_ASN1_INTEGER(X509V3_EXT_METHOD *meth, const char *value);
char *i2s_ASN1_ENUMERATED(X509V3_EXT_METHOD *meth, const ASN1_ENUMERATED *aint);
char *i2s_ASN1_ENUMERATED_TABLE(X509V3_EXT_METHOD *meth,
   const ASN1_ENUMERATED *aint);
int X509V3_EXT_add(X509V3_EXT_METHOD *ext);
int X509V3_EXT_add_list(X509V3_EXT_METHOD *extlist);
int X509V3_EXT_add_alias(int nid_to, int nid_from);
void X509V3_EXT_cleanup(void);

const X509V3_EXT_METHOD *X509V3_EXT_get(X509_EXTENSION *ext);
const X509V3_EXT_METHOD *X509V3_EXT_get_nid(int nid);
int X509V3_add_standard_extensions(void);
STACK_OF(CONF_VALUE) *X509V3_parse_list(const char *line);
void
 *X509V3_EXT_d2i(X509_EXTENSION *ext);
void *X509V3_get_d2i(const STACK_OF(X509_EXTENSION) *x, int nid, int *crit,
   int *idx);

X509_EXTENSION *X509V3_EXT_i2d(int ext_nid, int crit, void *ext_struc);
int X509V3_add1_i2d(STACK_OF(X509_EXTENSION) **x, int nid, void *value,
   int crit, unsigned long flags);

#ifndef OPENSSL_NO_DEPRECATED_1_1_0
/* The new declarations are in crypto.h, but the old ones were here. */
#define hex_to_string OPENSSL_buf2hexstr
#define string_to_hex OPENSSL_hexstr2buf
#endif

void X509V3_EXT_val_prn(BIO *out, STACK_OF(CONF_VALUE) *val, int indent,
   int ml);
int X509V3_EXT_print(BIO *out, X509_EXTENSION *ext, unsigned long flag,
   int indent);
#ifndef OPENSSL_NO_STDIO
int X509V3_EXT_print_fp(FILE *out, X509_EXTENSION *ext, int flag, int indent);
#endif
```

```
int X509V3_extensions_print(BIO *out, const char *title,
   const STACK_OF(X509_EXTENSION) *exts,
   unsigned long flag, int indent);

int X509_check_ca(X509 *x);
int X509_check_purpose(X509 *x,
 int id, int ca);
int X509_supported_extension(X509_EXTENSION *ex);
int X509_check_issued(X509 *issuer, X509 *subject);
int X509_check_akid(const X509 *issuer, const AUTHORITY_KEYID *akid);
void X509_set_proxy_flag(X509 *x);
void X509_set_proxy_pathlen(X509 *x, long l);
long X509_get_proxy_pathlen(X509 *x);

uint32_t X509_get_extension_flags(X509 *x);
uint32_t X509_get_key_usage(X509 *x);
uint32_t X509_get_extended_key_usage(X509 *x);
const ASN1_OCTET_STRING *X509_get0_subject_key_id(X509 *x);
const ASN1_OCTET_STRING *X509_get0_authority_key_id(X509 *x);
const GENERAL_NAMES *X509_get0_authority_issuer(X509 *x);
const ASN1_INTEGER *X509_get0_authority_serial(X509 *x);

int X509_PURPOSE_get_count(void);
int X509_PURPOSE_get_unused_id(OSSL_LIB_CTX *libctx);
int X509_PURPOSE_get_by_sname(const char *sname);
int X509_PURPOSE_get_by_id(int id);
int X509_PURPOSE_add(int id, int trust, int flags,
   int (*ck)(const X509_PURPOSE *, const X509 *, int),
   const char *name, const char *sname,
 void *arg);
void X509_PURPOSE_cleanup(void);

X509_PURPOSE *X509_PURPOSE_get0(int idx);
int X509_PURPOSE_get_id(const X509_PURPOSE *);
char *X509_PURPOSE_get0_name(const X509_PURPOSE *xp);
char *X509_PURPOSE_get0_sname(const X509_PURPOSE *xp);
int X509_PURPOSE_get_trust(const X509_PURPOSE *xp);
int X509_PURPOSE_set(int *p, int purpose);

STACK_OF(OPENSSL_STRING) *X509_get1_email(X509 *x);
STACK_OF(OPENSSL_STRING) *X509_REQ_get1_email(X509_REQ *x);
void X509_email_free(STACK_OF(OPENSSL_STRING) *sk);
STACK_OF(OPENSSL_STRING) *X509_get1_ocsp(X509 *x);

/* Flags for X509_check_* functions */

/*
* Always check subject name for host match even if subject alt names present
```

```
*/
#define X509_CHECK_FLAG_ALWAYS_CHECK_SUBJECT 0x1
/* Disable wildcard matching for dnsName fields and common name. */
#define X509_CHECK_FLAG_NO_WILDCARDS 0x2
/* Wildcards must not match a partial label. */
#define X509_CHECK_FLAG_NO_PARTIAL_WILDCARDS 0x4
/* Allow (non-partial) wildcards to match multiple labels. */
#define
 X509_CHECK_FLAG_MULTI_LABEL_WILDCARDS 0x8
/* Constraint verifier subdomain patterns to match a single labels. */
#define X509_CHECK_FLAG_SINGLE_LABEL_SUBDOMAINS 0x10
/* Never check the subject CN */
#define X509_CHECK_FLAG_NEVER_CHECK_SUBJECT 0x20
/*
* Match reference identifiers starting with "." to any sub-domain.
* This is a non-public flag, turned on implicitly when the subject
* reference identity is a DNS name.
*/
#define _X509_CHECK_FLAG_DOT_SUBDOMAINS 0x8000

int X509_check_host(X509 *x, const char *chk, size_t chklen,
   unsigned int flags, char **peername);
int X509_check_email(X509 *x, const char *chk, size_t chklen,
   unsigned int flags);
int X509_check_ip(X509 *x, const unsigned char *chk, size_t chklen,
   unsigned int flags);
int X509_check_ip_asc(X509 *x, const char *ipasc, unsigned int flags);

ASN1_OCTET_STRING *a2i_IPADDRESS(const char *ipasc);
ASN1_OCTET_STRING *a2i_IPADDRESS_NC(const char *ipasc);
int X509V3_NAME_from_section(X509_NAME *nm, STACK_OF(CONF_VALUE)
 *dn_sk,
   unsigned long chtype);

void X509_POLICY_NODE_print(BIO *out, X509_POLICY_NODE *node, int indent);
/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(X509_POLICY_NODE, X509_POLICY_NODE,
X509_POLICY_NODE)
#define sk_X509_POLICY_NODE_num(sk)
OPENSSL_sk_num(ossl_check_const_X509_POLICY_NODE_sk_type(sk))
#define sk_X509_POLICY_NODE_value(sk, idx) ((X509_POLICY_NODE
*)OPENSSL_sk_value(ossl_check_const_X509_POLICY_NODE_sk_type(sk), (idx)))
#define sk_X509_POLICY_NODE_new(cmp) ((STACK_OF(X509_POLICY_NODE)
*)OPENSSL_sk_new(ossl_check_X509_POLICY_NODE_compfunc_type(cmp)))
#define sk_X509_POLICY_NODE_new_null() ((STACK_OF(X509_POLICY_NODE)
*)OPENSSL_sk_new_null())
#define sk_X509_POLICY_NODE_new_reserve(cmp, n) ((STACK_OF(X509_POLICY_NODE)
*)OPENSSL_sk_new_reserve(ossl_check_X509_POLICY_NODE_compfunc_type(cmp), (n)))
```

```
#define sk_X509_POLICY_NODE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_X509_POLICY_NODE_sk_type(sk), (n))
#define sk_X509_POLICY_NODE_free(sk) OPENSSL_sk_free(ossl_check_X509_POLICY_NODE_sk_type(sk))
#define
 sk_X509_POLICY_NODE_zero(sk) OPENSSL_sk_zero(ossl_check_X509_POLICY_NODE_sk_type(sk))
#define sk_X509_POLICY_NODE_delete(sk, i) ((X509_POLICY_NODE
*)OPENSSL_sk_delete(ossl_check_X509_POLICY_NODE_sk_type(sk), (i)))
#define sk_X509_POLICY_NODE_delete_ptr(sk, ptr) ((X509_POLICY_NODE
*)OPENSSL_sk_delete_ptr(ossl_check_X509_POLICY_NODE_sk_type(sk),
ossl_check_X509_POLICY_NODE_type(ptr)))
#define sk_X509_POLICY_NODE_push(sk, ptr)
OPENSSL_sk_push(ossl_check_X509_POLICY_NODE_sk_type(sk),
ossl_check_X509_POLICY_NODE_type(ptr))
#define sk_X509_POLICY_NODE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_X509_POLICY_NODE_sk_type(sk),
ossl_check_X509_POLICY_NODE_type(ptr))
#define sk_X509_POLICY_NODE_pop(sk) ((X509_POLICY_NODE
*)OPENSSL_sk_pop(ossl_check_X509_POLICY_NODE_sk_type(sk)))
#define sk_X509_POLICY_NODE_shift(sk) ((X509_POLICY_NODE
*)OPENSSL_sk_shift(ossl_check_X509_POLICY_NODE_sk_type(sk)))
#define sk_X509_POLICY_NODE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_X509_POLICY_NODE_sk_type(sk),ossl_check_X509_POLICY_NODE_free
func_type(freefunc))
#define sk_X509_POLICY_NODE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_X509_POLICY_NODE_sk_type(sk),
ossl_check_X509_POLICY_NODE_type(ptr), (idx))
#define sk_X509_POLICY_NODE_set(sk, idx, ptr) ((X509_POLICY_NODE
*)OPENSSL_sk_set(ossl_check_X509_POLICY_NODE_sk_type(sk), (idx),
ossl_check_X509_POLICY_NODE_type(ptr)))
#define sk_X509_POLICY_NODE_find(sk, ptr)
OPENSSL_sk_find(ossl_check_X509_POLICY_NODE_sk_type(sk),
ossl_check_X509_POLICY_NODE_type(ptr))
#define sk_X509_POLICY_NODE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_X509_POLICY_NODE_sk_type(sk),
ossl_check_X509_POLICY_NODE_type(ptr))
#define sk_X509_POLICY_NODE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_X509_POLICY_NODE_sk_type(sk),
ossl_check_X509_POLICY_NODE_type(ptr), pnum)
#define sk_X509_POLICY_NODE_sort(sk) OPENSSL_sk_sort(ossl_check_X509_POLICY_NODE_sk_type(sk))
#define sk_X509_POLICY_NODE_is_sorted(sk)
 OPENSSL_sk_is_sorted(ossl_check_const_X509_POLICY_NODE_sk_type(sk))
#define sk_X509_POLICY_NODE_dup(sk) ((STACK_OF(X509_POLICY_NODE)
*)OPENSSL_sk_dup(ossl_check_const_X509_POLICY_NODE_sk_type(sk)))
#define sk_X509_POLICY_NODE_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(X509_POLICY_NODE)
*)OPENSSL_sk_deep_copy(ossl_check_const_X509_POLICY_NODE_sk_type(sk),
ossl_check_X509_POLICY_NODE_copyfunc_type(copyfunc),
ossl_check_X509_POLICY_NODE_freefunc_type(freefunc)))
#define sk_X509_POLICY_NODE_set_cmp_func(sk, cmp)
```

```
((sk_X509_POLICY_NODE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_X509_POLICY_NODE_sk_type
(sk), ossl_check_X509_POLICY_NODE_compfunc_type(cmp)))

/* clang-format on */

#ifndef OPENSSL_NO_RFC3779
typedef struct ASRange_st {
  ASN1_INTEGER *min, *max;
} ASRange;

#define ASIdOrRange_id 0
#define ASIdOrRange_range 1

typedef struct ASIdOrRange_st {
  int type;
  union {
      ASN1_INTEGER *id;
      ASRange *range;
  } u;
} ASIdOrRange;

/* clang-format
 off */
SKM_DEFINE_STACK_OF_INTERNAL(ASIdOrRange, ASIdOrRange, ASIdOrRange)
#define sk_ASIdOrRange_num(sk) OPENSSL_sk_num(ossl_check_const_ASIdOrRange_sk_type(sk))
#define sk_ASIdOrRange_value(sk, idx) ((ASIdOrRange
*)OPENSSL_sk_value(ossl_check_const_ASIdOrRange_sk_type(sk), (idx)))
#define sk_ASIdOrRange_new(cmp) ((STACK_OF(ASIdOrRange)
*)OPENSSL_sk_new(ossl_check_ASIdOrRange_compfunc_type(cmp)))
#define sk_ASIdOrRange_new_null() ((STACK_OF(ASIdOrRange) *)OPENSSL_sk_new_null())
#define sk_ASIdOrRange_new_reserve(cmp, n) ((STACK_OF(ASIdOrRange)
*)OPENSSL_sk_new_reserve(ossl_check_ASIdOrRange_compfunc_type(cmp), (n)))
#define sk_ASIdOrRange_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_ASIdOrRange_sk_type(sk), (n))
#define sk_ASIdOrRange_free(sk) OPENSSL_sk_free(ossl_check_ASIdOrRange_sk_type(sk))
#define sk_ASIdOrRange_zero(sk) OPENSSL_sk_zero(ossl_check_ASIdOrRange_sk_type(sk))
#define sk_ASIdOrRange_delete(sk, i) ((ASIdOrRange
*)OPENSSL_sk_delete(ossl_check_ASIdOrRange_sk_type(sk), (i)))
#define
 sk_ASIdOrRange_delete_ptr(sk, ptr) ((ASIdOrRange
*)OPENSSL_sk_delete_ptr(ossl_check_ASIdOrRange_sk_type(sk), ossl_check_ASIdOrRange_type(ptr)))
#define sk_ASIdOrRange_push(sk, ptr) OPENSSL_sk_push(ossl_check_ASIdOrRange_sk_type(sk),
ossl_check_ASIdOrRange_type(ptr))
#define sk_ASIdOrRange_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_ASIdOrRange_sk_type(sk),
ossl_check_ASIdOrRange_type(ptr))
#define sk_ASIdOrRange_pop(sk) ((ASIdOrRange *)OPENSSL_sk_pop(ossl_check_ASIdOrRange_sk_type(sk)))
#define sk_ASIdOrRange_shift(sk) ((ASIdOrRange *)OPENSSL_sk_shift(ossl_check_ASIdOrRange_sk_type(sk)))
#define sk_ASIdOrRange_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASIdOrRange_sk_type(sk),ossl_check_ASIdOrRange_freefunc_type(freefunc)
```

```
)
#define sk_ASIdOrRange_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_ASIdOrRange_sk_type(sk),
ossl_check_ASIdOrRange_type(ptr), (idx))
#define sk_ASIdOrRange_set(sk, idx, ptr) ((ASIdOrRange
*)OPENSSL_sk_set(ossl_check_ASIdOrRange_sk_type(sk),
 (idx), ossl_check_ASIdOrRange_type(ptr)))
#define sk_ASIdOrRange_find(sk, ptr) OPENSSL_sk_find(ossl_check_ASIdOrRange_sk_type(sk),
ossl_check_ASIdOrRange_type(ptr))
#define sk_ASIdOrRange_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_ASIdOrRange_sk_type(sk),
ossl_check_ASIdOrRange_type(ptr))
#define sk_ASIdOrRange_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_ASIdOrRange_sk_type(sk),
ossl_check_ASIdOrRange_type(ptr), pnum)
#define sk_ASIdOrRange_sort(sk) OPENSSL_sk_sort(ossl_check_ASIdOrRange_sk_type(sk))
#define sk_ASIdOrRange_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_ASIdOrRange_sk_type(sk))
#define sk_ASIdOrRange_dup(sk) ((STACK_OF(ASIdOrRange)
*)OPENSSL_sk_dup(ossl_check_const_ASIdOrRange_sk_type(sk)))
#define sk_ASIdOrRange_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ASIdOrRange)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASIdOrRange_sk_type(sk),
ossl_check_ASIdOrRange_copyfunc_type(copyfunc), ossl_check_ASIdOrRange_freefunc_type(freefunc)))
#define sk_ASIdOrRange_set_cmp_func(sk,
 cmp) ((sk_ASIdOrRange_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASIdOrRange_sk_type(sk),
ossl_check_ASIdOrRange_compfunc_type(cmp)))

/* clang-format on */

typedef STACK_OF(ASIdOrRange) ASIdOrRanges;

#define ASIdentifierChoice_inherit 0
#define ASIdentifierChoice_asIdsOrRanges 1

typedef struct ASIdentifierChoice_st {
  int type;
  union {
     ASN1_NULL *inherit;
     ASIdOrRanges *asIdsOrRanges;
  } u;
} ASIdentifierChoice;

typedef struct ASIdentifiers_st {
  ASIdentifierChoice *asnum, *rdi;
} ASIdentifiers;

DECLARE_ASN1_FUNCTIONS(ASRange)
DECLARE_ASN1_FUNCTIONS(ASIdOrRange)
DECLARE_ASN1_FUNCTIONS(ASIdentifierChoice)
DECLARE_ASN1_FUNCTIONS(ASIdentifiers)

typedef struct IPAddressRange_st {
```

```
  ASN1_BIT_STRING *min, *max;
} IPAddressRange;

#define IPAddressOrRange_addressPrefix 0
#define IPAddressOrRange_addressRange 1

typedef struct IPAddressOrRange_st {
  int type;
  union {
      ASN1_BIT_STRING *addressPrefix;
      IPAddressRange
 *addressRange;
  } u;
} IPAddressOrRange;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(IPAddressOrRange, IPAddressOrRange, IPAddressOrRange)
#define sk_IPAddressOrRange_num(sk) OPENSSL_sk_num(ossl_check_const_IPAddressOrRange_sk_type(sk))
#define sk_IPAddressOrRange_value(sk, idx) ((IPAddressOrRange
*)OPENSSL_sk_value(ossl_check_const_IPAddressOrRange_sk_type(sk), (idx)))
#define sk_IPAddressOrRange_new(cmp) ((STACK_OF(IPAddressOrRange)
*)OPENSSL_sk_new(ossl_check_IPAddressOrRange_compfunc_type(cmp)))
#define sk_IPAddressOrRange_new_null() ((STACK_OF(IPAddressOrRange) *)OPENSSL_sk_new_null())
#define sk_IPAddressOrRange_new_reserve(cmp, n) ((STACK_OF(IPAddressOrRange)
*)OPENSSL_sk_new_reserve(ossl_check_IPAddressOrRange_compfunc_type(cmp), (n)))
#define sk_IPAddressOrRange_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_IPAddressOrRange_sk_type(sk),
(n))
#define sk_IPAddressOrRange_free(sk) OPENSSL_sk_free(ossl_check_IPAddressOrRange_sk_type(sk))
#define sk_IPAddressOrRange_zero(sk)
 OPENSSL_sk_zero(ossl_check_IPAddressOrRange_sk_type(sk))
#define sk_IPAddressOrRange_delete(sk, i) ((IPAddressOrRange
*)OPENSSL_sk_delete(ossl_check_IPAddressOrRange_sk_type(sk), (i)))
#define sk_IPAddressOrRange_delete_ptr(sk, ptr) ((IPAddressOrRange
*)OPENSSL_sk_delete_ptr(ossl_check_IPAddressOrRange_sk_type(sk),
ossl_check_IPAddressOrRange_type(ptr)))
#define sk_IPAddressOrRange_push(sk, ptr) OPENSSL_sk_push(ossl_check_IPAddressOrRange_sk_type(sk),
ossl_check_IPAddressOrRange_type(ptr))
#define sk_IPAddressOrRange_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_IPAddressOrRange_sk_type(sk),
ossl_check_IPAddressOrRange_type(ptr))
#define sk_IPAddressOrRange_pop(sk) ((IPAddressOrRange
*)OPENSSL_sk_pop(ossl_check_IPAddressOrRange_sk_type(sk)))
#define sk_IPAddressOrRange_shift(sk) ((IPAddressOrRange
*)OPENSSL_sk_shift(ossl_check_IPAddressOrRange_sk_type(sk)))
#define sk_IPAddressOrRange_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_IPAddressOrRange_sk_type(sk),ossl_check_IPAddressOrRange_freefunc_typ
e(freefunc))
#define
```

```
 sk_IPAddressOrRange_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_IPAddressOrRange_sk_type(sk),
ossl_check_IPAddressOrRange_type(ptr), (idx))
#define sk_IPAddressOrRange_set(sk, idx, ptr) ((IPAddressOrRange
*)OPENSSL_sk_set(ossl_check_IPAddressOrRange_sk_type(sk), (idx), ossl_check_IPAddressOrRange_type(ptr)))
#define sk_IPAddressOrRange_find(sk, ptr) OPENSSL_sk_find(ossl_check_IPAddressOrRange_sk_type(sk),
ossl_check_IPAddressOrRange_type(ptr))
#define sk_IPAddressOrRange_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_IPAddressOrRange_sk_type(sk), ossl_check_IPAddressOrRange_type(ptr))
#define sk_IPAddressOrRange_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_IPAddressOrRange_sk_type(sk), ossl_check_IPAddressOrRange_type(ptr),
pnum)
#define sk_IPAddressOrRange_sort(sk) OPENSSL_sk_sort(ossl_check_IPAddressOrRange_sk_type(sk))
#define sk_IPAddressOrRange_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_IPAddressOrRange_sk_type(sk))
#define
 sk_IPAddressOrRange_dup(sk) ((STACK_OF(IPAddressOrRange)
*)OPENSSL_sk_dup(ossl_check_const_IPAddressOrRange_sk_type(sk)))
#define sk_IPAddressOrRange_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(IPAddressOrRange)
*)OPENSSL_sk_deep_copy(ossl_check_const_IPAddressOrRange_sk_type(sk),
ossl_check_IPAddressOrRange_copyfunc_type(copyfunc),
ossl_check_IPAddressOrRange_freefunc_type(freefunc)))
#define sk_IPAddressOrRange_set_cmp_func(sk, cmp)
((sk_IPAddressOrRange_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_IPAddressOrRange_sk_type(sk),
ossl_check_IPAddressOrRange_compfunc_type(cmp)))

/* clang-format on */

typedef STACK_OF(IPAddressOrRange) IPAddressOrRanges;

#define IPAddressChoice_inherit 0
#define IPAddressChoice_addressesOrRanges 1

typedef struct IPAddressChoice_st {
  int type;
  union {
      ASN1_NULL *inherit;
      IPAddressOrRanges *addressesOrRanges;
  } u;
} IPAddressChoice;

typedef struct IPAddressFamily_st {
  ASN1_OCTET_STRING *addressFamily;
   IPAddressChoice *ipAddressChoice;
} IPAddressFamily;

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(IPAddressFamily, IPAddressFamily, IPAddressFamily)
#define sk_IPAddressFamily_num(sk) OPENSSL_sk_num(ossl_check_const_IPAddressFamily_sk_type(sk))
```

```
#define sk_IPAddressFamily_value(sk, idx) ((IPAddressFamily
*)OPENSSL_sk_value(ossl_check_const_IPAddressFamily_sk_type(sk), (idx)))
#define sk_IPAddressFamily_new(cmp) ((STACK_OF(IPAddressFamily)
*)OPENSSL_sk_new(ossl_check_IPAddressFamily_compfunc_type(cmp)))
#define sk_IPAddressFamily_new_null() ((STACK_OF(IPAddressFamily) *)OPENSSL_sk_new_null())
#define sk_IPAddressFamily_new_reserve(cmp, n) ((STACK_OF(IPAddressFamily)
*)OPENSSL_sk_new_reserve(ossl_check_IPAddressFamily_compfunc_type(cmp), (n)))
#define sk_IPAddressFamily_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_IPAddressFamily_sk_type(sk), (n))
#define sk_IPAddressFamily_free(sk) OPENSSL_sk_free(ossl_check_IPAddressFamily_sk_type(sk))
#define sk_IPAddressFamily_zero(sk)
 OPENSSL_sk_zero(ossl_check_IPAddressFamily_sk_type(sk))
#define sk_IPAddressFamily_delete(sk, i) ((IPAddressFamily
*)OPENSSL_sk_delete(ossl_check_IPAddressFamily_sk_type(sk), (i)))
#define sk_IPAddressFamily_delete_ptr(sk, ptr) ((IPAddressFamily
*)OPENSSL_sk_delete_ptr(ossl_check_IPAddressFamily_sk_type(sk), ossl_check_IPAddressFamily_type(ptr)))
#define sk_IPAddressFamily_push(sk, ptr) OPENSSL_sk_push(ossl_check_IPAddressFamily_sk_type(sk),
ossl_check_IPAddressFamily_type(ptr))
#define sk_IPAddressFamily_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_IPAddressFamily_sk_type(sk),
ossl_check_IPAddressFamily_type(ptr))
#define sk_IPAddressFamily_pop(sk) ((IPAddressFamily
*)OPENSSL_sk_pop(ossl_check_IPAddressFamily_sk_type(sk)))
#define sk_IPAddressFamily_shift(sk) ((IPAddressFamily
*)OPENSSL_sk_shift(ossl_check_IPAddressFamily_sk_type(sk)))
#define sk_IPAddressFamily_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_IPAddressFamily_sk_type(sk),ossl_check_IPAddressFamily_freefunc_type(fre
efunc))
#define
 sk_IPAddressFamily_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_IPAddressFamily_sk_type(sk),
ossl_check_IPAddressFamily_type(ptr), (idx))
#define sk_IPAddressFamily_set(sk, idx, ptr) ((IPAddressFamily
*)OPENSSL_sk_set(ossl_check_IPAddressFamily_sk_type(sk), (idx), ossl_check_IPAddressFamily_type(ptr)))
#define sk_IPAddressFamily_find(sk, ptr) OPENSSL_sk_find(ossl_check_IPAddressFamily_sk_type(sk),
ossl_check_IPAddressFamily_type(ptr))
#define sk_IPAddressFamily_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_IPAddressFamily_sk_type(sk),
ossl_check_IPAddressFamily_type(ptr))
#define sk_IPAddressFamily_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_IPAddressFamily_sk_type(sk), ossl_check_IPAddressFamily_type(ptr), pnum)
#define sk_IPAddressFamily_sort(sk) OPENSSL_sk_sort(ossl_check_IPAddressFamily_sk_type(sk))
#define sk_IPAddressFamily_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_IPAddressFamily_sk_type(sk))
#define sk_IPAddressFamily_dup(sk) ((STACK_OF(IPAddressFamily)
 *)OPENSSL_sk_dup(ossl_check_const_IPAddressFamily_sk_type(sk)))
#define sk_IPAddressFamily_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(IPAddressFamily)
*)OPENSSL_sk_deep_copy(ossl_check_const_IPAddressFamily_sk_type(sk),
ossl_check_IPAddressFamily_copyfunc_type(copyfunc), ossl_check_IPAddressFamily_freefunc_type(freefunc)))
#define sk_IPAddressFamily_set_cmp_func(sk, cmp)
((sk_IPAddressFamily_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_IPAddressFamily_sk_type(sk),
ossl_check_IPAddressFamily_compfunc_type(cmp)))
```

```
/* clang-format on */

typedef STACK_OF(IPAddressFamily) IPAddrBlocks;

DECLARE_ASN1_FUNCTIONS(IPAddressRange)
DECLARE_ASN1_FUNCTIONS(IPAddressOrRange)
DECLARE_ASN1_FUNCTIONS(IPAddressChoice)
DECLARE_ASN1_FUNCTIONS(IPAddressFamily)

/*
* API tag for elements of the ASIdentifer SEQUENCE.
*/
#define V3_ASID_ASNUM 0
#define V3_ASID_RDI 1

/*
* AFI values, assigned by IANA.  It'd be nice to make the AFI
* handling code totally generic, but there are too
 many little things
* that would need to be defined for other address families for it to
* be worth the trouble.
*/
#define IANA_AFI_IPV4 1
#define IANA_AFI_IPV6 2

/*
* Utilities to construct and extract values from RFC3779 extensions,
* since some of the encodings (particularly for IP address prefixes
* and ranges) are a bit tedious to work with directly.
*/
int X509v3_asid_add_inherit(ASIdentifiers *asid, int which);
int X509v3_asid_add_id_or_range(ASIdentifiers *asid, int which,
   ASN1_INTEGER *min, ASN1_INTEGER *max);
int X509v3_addr_add_inherit(IPAddrBlocks *addr,
   const unsigned afi, const unsigned *safi);
int X509v3_addr_add_prefix(IPAddrBlocks *addr,
   const unsigned afi, const unsigned *safi,
   unsigned char *a, const int prefixlen);
int X509v3_addr_add_range(IPAddrBlocks *addr,
   const unsigned afi, const unsigned *safi,
   unsigned char *min, unsigned char *max);
unsigned X509v3_addr_get_afi(const IPAddressFamily *f);
int X509v3_addr_get_range(IPAddressOrRange
 *aor, const unsigned afi,
   unsigned char *min, unsigned char *max,
   const int length);
```

```
/*
* Canonical forms.
*/
int X509v3_asid_is_canonical(ASIdentifiers *asid);
int X509v3_addr_is_canonical(IPAddrBlocks *addr);
int X509v3_asid_canonize(ASIdentifiers *asid);
int X509v3_addr_canonize(IPAddrBlocks *addr);

/*
* Tests for inheritance and containment.
*/
int X509v3_asid_inherits(ASIdentifiers *asid);
int X509v3_addr_inherits(IPAddrBlocks *addr);
int X509v3_asid_subset(ASIdentifiers *a, ASIdentifiers *b);
int X509v3_addr_subset(IPAddrBlocks *a, IPAddrBlocks *b);

/*
* Check whether RFC 3779 extensions nest properly in chains.
*/
int X509v3_asid_validate_path(X509_STORE_CTX *);
int X509v3_addr_validate_path(X509_STORE_CTX *);
int X509v3_asid_validate_resource_set(STACK_OF(X509) *chain,
  ASIdentifiers *ext,
  int allow_inheritance);
int X509v3_addr_validate_resource_set(STACK_OF(X509) *chain,
  IPAddrBlocks *ext, int allow_inheritance);

#endif /* OPENSSL_NO_RFC3779
 */

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(ASN1_STRING, ASN1_STRING, ASN1_STRING)
#define sk_ASN1_STRING_num(sk) OPENSSL_sk_num(ossl_check_const_ASN1_STRING_sk_type(sk))
#define sk_ASN1_STRING_value(sk, idx) ((ASN1_STRING
*)OPENSSL_sk_value(ossl_check_const_ASN1_STRING_sk_type(sk), (idx)))
#define sk_ASN1_STRING_new(cmp) ((STACK_OF(ASN1_STRING)
*)OPENSSL_sk_new(ossl_check_ASN1_STRING_compfunc_type(cmp)))
#define sk_ASN1_STRING_new_null() ((STACK_OF(ASN1_STRING) *)OPENSSL_sk_new_null())
#define sk_ASN1_STRING_new_reserve(cmp, n) ((STACK_OF(ASN1_STRING)
*)OPENSSL_sk_new_reserve(ossl_check_ASN1_STRING_compfunc_type(cmp), (n)))
#define sk_ASN1_STRING_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_ASN1_STRING_sk_type(sk), (n))
#define sk_ASN1_STRING_free(sk) OPENSSL_sk_free(ossl_check_ASN1_STRING_sk_type(sk))
#define sk_ASN1_STRING_zero(sk) OPENSSL_sk_zero(ossl_check_ASN1_STRING_sk_type(sk))
#define sk_ASN1_STRING_delete(sk, i) ((ASN1_STRING
*)OPENSSL_sk_delete(ossl_check_ASN1_STRING_sk_type(sk),
 (i)))
#define sk_ASN1_STRING_delete_ptr(sk, ptr) ((ASN1_STRING
*)OPENSSL_sk_delete_ptr(ossl_check_ASN1_STRING_sk_type(sk), ossl_check_ASN1_STRING_type(ptr)))
```

```
#define sk_ASN1_STRING_push(sk, ptr) OPENSSL_sk_push(ossl_check_ASN1_STRING_sk_type(sk),
ossl_check_ASN1_STRING_type(ptr))
#define sk_ASN1_STRING_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_ASN1_STRING_sk_type(sk),
ossl_check_ASN1_STRING_type(ptr))
#define sk_ASN1_STRING_pop(sk) ((ASN1_STRING
*)OPENSSL_sk_pop(ossl_check_ASN1_STRING_sk_type(sk)))
#define sk_ASN1_STRING_shift(sk) ((ASN1_STRING
*)OPENSSL_sk_shift(ossl_check_ASN1_STRING_sk_type(sk)))
#define sk_ASN1_STRING_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ASN1_STRING_sk_type(sk),ossl_check_ASN1_STRING_freefunc_type(freef
unc))
#define sk_ASN1_STRING_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_ASN1_STRING_sk_type(sk),
ossl_check_ASN1_STRING_type(ptr), (idx))
#define sk_ASN1_STRING_set(sk, idx, ptr) ((ASN1_STRING
*)OPENSSL_sk_set(ossl_check_ASN1_STRING_sk_type(sk),
 (idx), ossl_check_ASN1_STRING_type(ptr)))
#define sk_ASN1_STRING_find(sk, ptr) OPENSSL_sk_find(ossl_check_ASN1_STRING_sk_type(sk),
ossl_check_ASN1_STRING_type(ptr))
#define sk_ASN1_STRING_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_ASN1_STRING_sk_type(sk),
ossl_check_ASN1_STRING_type(ptr))
#define sk_ASN1_STRING_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_ASN1_STRING_sk_type(sk), ossl_check_ASN1_STRING_type(ptr), pnum)
#define sk_ASN1_STRING_sort(sk) OPENSSL_sk_sort(ossl_check_ASN1_STRING_sk_type(sk))
#define sk_ASN1_STRING_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_ASN1_STRING_sk_type(sk))
#define sk_ASN1_STRING_dup(sk) ((STACK_OF(ASN1_STRING)
*)OPENSSL_sk_dup(ossl_check_const_ASN1_STRING_sk_type(sk)))
#define sk_ASN1_STRING_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ASN1_STRING)
*)OPENSSL_sk_deep_copy(ossl_check_const_ASN1_STRING_sk_type(sk),
ossl_check_ASN1_STRING_copyfunc_type(copyfunc), ossl_check_ASN1_STRING_freefunc_type(freefunc)))
#define
 sk_ASN1_STRING_set_cmp_func(sk, cmp)
((sk_ASN1_STRING_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ASN1_STRING_sk_type(sk),
ossl_check_ASN1_STRING_compfunc_type(cmp)))

/* clang-format on */

/*
* Admission Syntax
*/
typedef struct NamingAuthority_st NAMING_AUTHORITY;
typedef struct ProfessionInfo_st PROFESSION_INFO;
typedef struct Admissions_st ADMISSIONS;
typedef struct AdmissionSyntax_st ADMISSION_SYNTAX;
DECLARE_ASN1_FUNCTIONS(NAMING_AUTHORITY)
DECLARE_ASN1_FUNCTIONS(PROFESSION_INFO)
DECLARE_ASN1_FUNCTIONS(ADMISSIONS)
DECLARE_ASN1_FUNCTIONS(ADMISSION_SYNTAX)
```

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/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(PROFESSION_INFO, PROFESSION_INFO, PROFESSION_INFO)
#define sk_PROFESSION_INFO_num(sk)
OPENSSL_sk_num(ossl_check_const_PROFESSION_INFO_sk_type(sk))
#define sk_PROFESSION_INFO_value(sk, idx) ((PROFESSION_INFO
*)OPENSSL_sk_value(ossl_check_const_PROFESSION_INFO_sk_type(sk), (idx)))
#define sk_PROFESSION_INFO_new(cmp) ((STACK_OF(PROFESSION_INFO)
*)OPENSSL_sk_new(ossl_check_PROFESSION_INFO_compfunc_type(cmp)))
#define
 sk_PROFESSION_INFO_new_null() ((STACK_OF(PROFESSION_INFO) *)OPENSSL_sk_new_null())
#define sk_PROFESSION_INFO_new_reserve(cmp, n) ((STACK_OF(PROFESSION_INFO)
*)OPENSSL_sk_new_reserve(ossl_check_PROFESSION_INFO_compfunc_type(cmp), (n)))
#define sk_PROFESSION_INFO_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_PROFESSION_INFO_sk_type(sk), (n))
#define sk_PROFESSION_INFO_free(sk) OPENSSL_sk_free(ossl_check_PROFESSION_INFO_sk_type(sk))
#define sk_PROFESSION_INFO_zero(sk) OPENSSL_sk_zero(ossl_check_PROFESSION_INFO_sk_type(sk))
#define sk_PROFESSION_INFO_delete(sk, i) ((PROFESSION_INFO
*)OPENSSL_sk_delete(ossl_check_PROFESSION_INFO_sk_type(sk), (i)))
#define sk_PROFESSION_INFO_delete_ptr(sk, ptr) ((PROFESSION_INFO
*)OPENSSL_sk_delete_ptr(ossl_check_PROFESSION_INFO_sk_type(sk),
ossl_check_PROFESSION_INFO_type(ptr)))
#define sk_PROFESSION_INFO_push(sk, ptr)
OPENSSL_sk_push(ossl_check_PROFESSION_INFO_sk_type(sk), ossl_check_PROFESSION_INFO_type(ptr))
#define
 sk_PROFESSION_INFO_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_PROFESSION_INFO_sk_type(sk),
ossl_check_PROFESSION_INFO_type(ptr))
#define sk_PROFESSION_INFO_pop(sk) ((PROFESSION_INFO
*)OPENSSL_sk_pop(ossl_check_PROFESSION_INFO_sk_type(sk)))
#define sk_PROFESSION_INFO_shift(sk) ((PROFESSION_INFO
*)OPENSSL_sk_shift(ossl_check_PROFESSION_INFO_sk_type(sk)))
#define sk_PROFESSION_INFO_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_PROFESSION_INFO_sk_type(sk),ossl_check_PROFESSION_INFO_freefun
c_type(freefunc))
#define sk_PROFESSION_INFO_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_PROFESSION_INFO_sk_type(sk), ossl_check_PROFESSION_INFO_type(ptr),
(idx))
#define sk_PROFESSION_INFO_set(sk, idx, ptr) ((PROFESSION_INFO
*)OPENSSL_sk_set(ossl_check_PROFESSION_INFO_sk_type(sk), (idx),
ossl_check_PROFESSION_INFO_type(ptr)))
#define sk_PROFESSION_INFO_find(sk, ptr) OPENSSL_sk_find(ossl_check_PROFESSION_INFO_sk_type(sk),
ossl_check_PROFESSION_INFO_type(ptr))
#define sk_PROFESSION_INFO_find_ex(sk,
 ptr) OPENSSL_sk_find_ex(ossl_check_PROFESSION_INFO_sk_type(sk),
ossl_check_PROFESSION_INFO_type(ptr))
#define sk_PROFESSION_INFO_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_PROFESSION_INFO_sk_type(sk),
ossl_check_PROFESSION_INFO_type(ptr), pnum)
#define sk_PROFESSION_INFO_sort(sk) OPENSSL_sk_sort(ossl_check_PROFESSION_INFO_sk_type(sk))
```

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#define sk_PROFESSION_INFO_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_PROFESSION_INFO_sk_type(sk))
#define sk_PROFESSION_INFO_dup(sk) ((STACK_OF(PROFESSION_INFO)
*)OPENSSL_sk_dup(ossl_check_const_PROFESSION_INFO_sk_type(sk)))
#define sk_PROFESSION_INFO_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(PROFESSION_INFO)
*)OPENSSL_sk_deep_copy(ossl_check_const_PROFESSION_INFO_sk_type(sk),
ossl_check_PROFESSION_INFO_copyfunc_type(copyfunc),
ossl_check_PROFESSION_INFO_freefunc_type(freefunc)))
#define sk_PROFESSION_INFO_set_cmp_func(sk, cmp)
((sk_PROFESSION_INFO_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_PROFESSION_INFO_sk_type(sk)
,
 ossl_check_PROFESSION_INFO_compfunc_type(cmp)))
SKM_DEFINE_STACK_OF_INTERNAL(ADMISSIONS, ADMISSIONS, ADMISSIONS)
#define sk_ADMISSIONS_num(sk) OPENSSL_sk_num(ossl_check_const_ADMISSIONS_sk_type(sk))
#define sk_ADMISSIONS_value(sk, idx) ((ADMISSIONS
*)OPENSSL_sk_value(ossl_check_const_ADMISSIONS_sk_type(sk), (idx)))
#define sk_ADMISSIONS_new(cmp) ((STACK_OF(ADMISSIONS)
*)OPENSSL_sk_new(ossl_check_ADMISSIONS_compfunc_type(cmp)))
#define sk_ADMISSIONS_new_null() ((STACK_OF(ADMISSIONS) *)OPENSSL_sk_new_null())
#define sk_ADMISSIONS_new_reserve(cmp, n) ((STACK_OF(ADMISSIONS)
*)OPENSSL_sk_new_reserve(ossl_check_ADMISSIONS_compfunc_type(cmp), (n)))
#define sk_ADMISSIONS_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_ADMISSIONS_sk_type(sk), (n))
#define sk_ADMISSIONS_free(sk) OPENSSL_sk_free(ossl_check_ADMISSIONS_sk_type(sk))
#define sk_ADMISSIONS_zero(sk) OPENSSL_sk_zero(ossl_check_ADMISSIONS_sk_type(sk))
#define sk_ADMISSIONS_delete(sk, i) ((ADMISSIONS
*)OPENSSL_sk_delete(ossl_check_ADMISSIONS_sk_type(sk),
 (i)))
#define sk_ADMISSIONS_delete_ptr(sk, ptr) ((ADMISSIONS
*)OPENSSL_sk_delete_ptr(ossl_check_ADMISSIONS_sk_type(sk), ossl_check_ADMISSIONS_type(ptr)))
#define sk_ADMISSIONS_push(sk, ptr) OPENSSL_sk_push(ossl_check_ADMISSIONS_sk_type(sk),
ossl_check_ADMISSIONS_type(ptr))
#define sk_ADMISSIONS_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_ADMISSIONS_sk_type(sk),
ossl_check_ADMISSIONS_type(ptr))
#define sk_ADMISSIONS_pop(sk) ((ADMISSIONS
*)OPENSSL_sk_pop(ossl_check_ADMISSIONS_sk_type(sk)))
#define sk_ADMISSIONS_shift(sk) ((ADMISSIONS
*)OPENSSL_sk_shift(ossl_check_ADMISSIONS_sk_type(sk)))
#define sk_ADMISSIONS_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_ADMISSIONS_sk_type(sk),ossl_check_ADMISSIONS_freefunc_type(freefun
c))
#define sk_ADMISSIONS_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_ADMISSIONS_sk_type(sk),
ossl_check_ADMISSIONS_type(ptr), (idx))
#define sk_ADMISSIONS_set(sk, idx, ptr) ((ADMISSIONS
*)OPENSSL_sk_set(ossl_check_ADMISSIONS_sk_type(sk),
 (idx), ossl_check_ADMISSIONS_type(ptr)))
#define sk_ADMISSIONS_find(sk, ptr) OPENSSL_sk_find(ossl_check_ADMISSIONS_sk_type(sk),
ossl_check_ADMISSIONS_type(ptr))
#define sk_ADMISSIONS_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_ADMISSIONS_sk_type(sk),
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ossl_check_ADMISSIONS_type(ptr))
#define sk_ADMISSIONS_find_all(sk, ptr, pnum) OPENSSL_sk_find_all(ossl_check_ADMISSIONS_sk_type(sk),
ossl_check_ADMISSIONS_type(ptr), pnum)
#define sk_ADMISSIONS_sort(sk) OPENSSL_sk_sort(ossl_check_ADMISSIONS_sk_type(sk))
#define sk_ADMISSIONS_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_ADMISSIONS_sk_type(sk))
#define sk_ADMISSIONS_dup(sk) ((STACK_OF(ADMISSIONS)
*)OPENSSL_sk_dup(ossl_check_const_ADMISSIONS_sk_type(sk)))
#define sk_ADMISSIONS_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(ADMISSIONS)
*)OPENSSL_sk_deep_copy(ossl_check_const_ADMISSIONS_sk_type(sk),
ossl_check_ADMISSIONS_copyfunc_type(copyfunc), ossl_check_ADMISSIONS_freefunc_type(freefunc)))
#define sk_ADMISSIONS_set_cmp_func(sk,
 cmp) ((sk_ADMISSIONS_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_ADMISSIONS_sk_type(sk),
ossl_check_ADMISSIONS_compfunc_type(cmp)))

/* clang-format on */
typedef STACK_OF(PROFESSION_INFO) PROFESSION_INFOS;

const ASN1_OBJECT *NAMING_AUTHORITY_get0_authorityId(
  const NAMING_AUTHORITY *n);
const ASN1_IA5STRING *NAMING_AUTHORITY_get0_authorityURL(
  const NAMING_AUTHORITY *n);
const ASN1_STRING *NAMING_AUTHORITY_get0_authorityText(
  const NAMING_AUTHORITY *n);
void NAMING_AUTHORITY_set0_authorityId(NAMING_AUTHORITY *n,
  ASN1_OBJECT *namingAuthorityId);
void NAMING_AUTHORITY_set0_authorityURL(NAMING_AUTHORITY *n,
  ASN1_IA5STRING *namingAuthorityUrl);
void NAMING_AUTHORITY_set0_authorityText(NAMING_AUTHORITY *n,
  ASN1_STRING *namingAuthorityText);

const GENERAL_NAME *ADMISSION_SYNTAX_get0_admissionAuthority(
  const ADMISSION_SYNTAX *as);
void ADMISSION_SYNTAX_set0_admissionAuthority(
  ADMISSION_SYNTAX *as, GENERAL_NAME *aa);
const STACK_OF(ADMISSIONS) *ADMISSION_SYNTAX_get0_contentsOfAdmissions(
   const ADMISSION_SYNTAX *as);
void ADMISSION_SYNTAX_set0_contentsOfAdmissions(
  ADMISSION_SYNTAX *as, STACK_OF(ADMISSIONS) *a);
const GENERAL_NAME *ADMISSIONS_get0_admissionAuthority(const ADMISSIONS *a);
void ADMISSIONS_set0_admissionAuthority(ADMISSIONS *a, GENERAL_NAME *aa);
const NAMING_AUTHORITY *ADMISSIONS_get0_namingAuthority(const ADMISSIONS *a);
void ADMISSIONS_set0_namingAuthority(ADMISSIONS *a, NAMING_AUTHORITY *na);
const PROFESSION_INFOS *ADMISSIONS_get0_professionInfos(const ADMISSIONS *a);
void ADMISSIONS_set0_professionInfos(ADMISSIONS *a, PROFESSION_INFOS *pi);
const ASN1_OCTET_STRING *PROFESSION_INFO_get0_addProfessionInfo(
  const PROFESSION_INFO *pi);
void PROFESSION_INFO_set0_addProfessionInfo(
  PROFESSION_INFO *pi, ASN1_OCTET_STRING *aos);
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const NAMING_AUTHORITY *PROFESSION_INFO_get0_namingAuthority(
   const PROFESSION_INFO *pi);
void PROFESSION_INFO_set0_namingAuthority(
   PROFESSION_INFO *pi, NAMING_AUTHORITY
 *na);
const STACK_OF(ASN1_STRING) *PROFESSION_INFO_get0_professionItems(
   const PROFESSION_INFO *pi);
void PROFESSION_INFO_set0_professionItems(
   PROFESSION_INFO *pi, STACK_OF(ASN1_STRING) *as);
const STACK_OF(ASN1_OBJECT) *PROFESSION_INFO_get0_professionOIDs(
   const PROFESSION_INFO *pi);
void PROFESSION_INFO_set0_professionOIDs(
   PROFESSION_INFO *pi, STACK_OF(ASN1_OBJECT) *po);
const ASN1_PRINTABLESTRING *PROFESSION_INFO_get0_registrationNumber(
   const PROFESSION_INFO *pi);
void PROFESSION_INFO_set0_registrationNumber(
   PROFESSION_INFO *pi, ASN1_PRINTABLESTRING *rn);

int OSSL_GENERAL_NAMES_print(BIO *out, GENERAL_NAMES *gens, int indent);

typedef STACK_OF(X509_ATTRIBUTE) OSSL_ATTRIBUTES_SYNTAX;
DECLARE_ASN1_FUNCTIONS(OSSL_ATTRIBUTES_SYNTAX)

typedef STACK_OF(USERNOTICE) OSSL_USER_NOTICE_SYNTAX;
DECLARE_ASN1_FUNCTIONS(OSSL_USER_NOTICE_SYNTAX)

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(USERNOTICE, USERNOTICE, USERNOTICE)
#define sk_USERNOTICE_num(sk) OPENSSL_sk_num(ossl_check_const_USERNOTICE_sk_type(sk))
#define
 sk_USERNOTICE_value(sk, idx) ((USERNOTICE
*)OPENSSL_sk_value(ossl_check_const_USERNOTICE_sk_type(sk), (idx)))
#define sk_USERNOTICE_new(cmp) ((STACK_OF(USERNOTICE)
*)OPENSSL_sk_new(ossl_check_USERNOTICE_compfunc_type(cmp)))
#define sk_USERNOTICE_new_null() ((STACK_OF(USERNOTICE) *)OPENSSL_sk_new_null())
#define sk_USERNOTICE_new_reserve(cmp, n) ((STACK_OF(USERNOTICE)
*)OPENSSL_sk_new_reserve(ossl_check_USERNOTICE_compfunc_type(cmp), (n)))
#define sk_USERNOTICE_reserve(sk, n) OPENSSL_sk_reserve(ossl_check_USERNOTICE_sk_type(sk), (n))
#define sk_USERNOTICE_free(sk) OPENSSL_sk_free(ossl_check_USERNOTICE_sk_type(sk))
#define sk_USERNOTICE_zero(sk) OPENSSL_sk_zero(ossl_check_USERNOTICE_sk_type(sk))
#define sk_USERNOTICE_delete(sk, i) ((USERNOTICE
*)OPENSSL_sk_delete(ossl_check_USERNOTICE_sk_type(sk), (i)))
#define sk_USERNOTICE_delete_ptr(sk, ptr) ((USERNOTICE
*)OPENSSL_sk_delete_ptr(ossl_check_USERNOTICE_sk_type(sk), ossl_check_USERNOTICE_type(ptr)))
#define
 sk_USERNOTICE_push(sk, ptr) OPENSSL_sk_push(ossl_check_USERNOTICE_sk_type(sk),
ossl_check_USERNOTICE_type(ptr))
#define sk_USERNOTICE_unshift(sk, ptr) OPENSSL_sk_unshift(ossl_check_USERNOTICE_sk_type(sk),
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ossl_check_USERNOTICE_type(ptr))
#define sk_USERNOTICE_pop(sk) ((USERNOTICE
*)OPENSSL_sk_pop(ossl_check_USERNOTICE_sk_type(sk)))
#define sk_USERNOTICE_shift(sk) ((USERNOTICE
*)OPENSSL_sk_shift(ossl_check_USERNOTICE_sk_type(sk)))
#define sk_USERNOTICE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_USERNOTICE_sk_type(sk),ossl_check_USERNOTICE_freefunc_type(freefu
nc))
#define sk_USERNOTICE_insert(sk, ptr, idx) OPENSSL_sk_insert(ossl_check_USERNOTICE_sk_type(sk),
ossl_check_USERNOTICE_type(ptr), (idx))
#define sk_USERNOTICE_set(sk, idx, ptr) ((USERNOTICE
*)OPENSSL_sk_set(ossl_check_USERNOTICE_sk_type(sk), (idx), ossl_check_USERNOTICE_type(ptr)))
#define sk_USERNOTICE_find(sk, ptr) OPENSSL_sk_find(ossl_check_USERNOTICE_sk_type(sk),
ossl_check_USERNOTICE_type(ptr))
#define
 sk_USERNOTICE_find_ex(sk, ptr) OPENSSL_sk_find_ex(ossl_check_USERNOTICE_sk_type(sk),
ossl_check_USERNOTICE_type(ptr))
#define sk_USERNOTICE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_USERNOTICE_sk_type(sk), ossl_check_USERNOTICE_type(ptr), pnum)
#define sk_USERNOTICE_sort(sk) OPENSSL_sk_sort(ossl_check_USERNOTICE_sk_type(sk))
#define sk_USERNOTICE_is_sorted(sk) OPENSSL_sk_is_sorted(ossl_check_const_USERNOTICE_sk_type(sk))
#define sk_USERNOTICE_dup(sk) ((STACK_OF(USERNOTICE)
*)OPENSSL_sk_dup(ossl_check_const_USERNOTICE_sk_type(sk)))
#define sk_USERNOTICE_deep_copy(sk, copyfunc, freefunc) ((STACK_OF(USERNOTICE)
*)OPENSSL_sk_deep_copy(ossl_check_const_USERNOTICE_sk_type(sk),
ossl_check_USERNOTICE_copyfunc_type(copyfunc), ossl_check_USERNOTICE_freefunc_type(freefunc)))
#define sk_USERNOTICE_set_cmp_func(sk, cmp)
((sk_USERNOTICE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_USERNOTICE_sk_type(sk),
ossl_check_USERNOTICE_compfunc_type(cmp)))

/* clang-format on */

typedef
 struct OSSL_ROLE_SPEC_CERT_ID_st {
   GENERAL_NAME *roleName;
   GENERAL_NAME *roleCertIssuer;
   ASN1_INTEGER *roleCertSerialNumber;
   GENERAL_NAMES *roleCertLocator;
} OSSL_ROLE_SPEC_CERT_ID;

DECLARE_ASN1_FUNCTIONS(OSSL_ROLE_SPEC_CERT_ID)

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_ROLE_SPEC_CERT_ID, OSSL_ROLE_SPEC_CERT_ID,
OSSL_ROLE_SPEC_CERT_ID)
#define sk_OSSL_ROLE_SPEC_CERT_ID_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk))
#define sk_OSSL_ROLE_SPEC_CERT_ID_value(sk, idx) ((OSSL_ROLE_SPEC_CERT_ID
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*)OPENSSL_sk_value(ossl_check_const_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk), (idx)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_new(cmp) ((STACK_OF(OSSL_ROLE_SPEC_CERT_ID)
*)OPENSSL_sk_new(ossl_check_OSSL_ROLE_SPEC_CERT_ID_compfunc_type(cmp)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_new_null() ((STACK_OF(OSSL_ROLE_SPEC_CERT_ID)
*)OPENSSL_sk_new_null())
#define sk_OSSL_ROLE_SPEC_CERT_ID_new_reserve(cmp, n) ((STACK_OF(OSSL_ROLE_SPEC_CERT_ID)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_ROLE_SPEC_CERT_ID_compfunc_type(cmp),
 (n)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk), (n))
#define sk_OSSL_ROLE_SPEC_CERT_ID_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk))
#define sk_OSSL_ROLE_SPEC_CERT_ID_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk))
#define sk_OSSL_ROLE_SPEC_CERT_ID_delete(sk, i) ((OSSL_ROLE_SPEC_CERT_ID
*)OPENSSL_sk_delete(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk), (i)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_delete_ptr(sk, ptr) ((OSSL_ROLE_SPEC_CERT_ID
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_type(ptr)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_type(ptr))
#define sk_OSSL_ROLE_SPEC_CERT_ID_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),
 ossl_check_OSSL_ROLE_SPEC_CERT_ID_type(ptr))
#define sk_OSSL_ROLE_SPEC_CERT_ID_pop(sk) ((OSSL_ROLE_SPEC_CERT_ID
*)OPENSSL_sk_pop(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_shift(sk) ((OSSL_ROLE_SPEC_CERT_ID
*)OPENSSL_sk_shift(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),ossl_check_OSSL_ROLE_SPE
C_CERT_ID_freefunc_type(freefunc))
#define sk_OSSL_ROLE_SPEC_CERT_ID_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_type(ptr), (idx))
#define sk_OSSL_ROLE_SPEC_CERT_ID_set(sk, idx, ptr) ((OSSL_ROLE_SPEC_CERT_ID
*)OPENSSL_sk_set(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk), (idx),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_type(ptr)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_type(ptr))
#define
 sk_OSSL_ROLE_SPEC_CERT_ID_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_type(ptr))
#define sk_OSSL_ROLE_SPEC_CERT_ID_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_type(ptr), pnum)
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#define sk_OSSL_ROLE_SPEC_CERT_ID_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk))
#define sk_OSSL_ROLE_SPEC_CERT_ID_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk))
#define sk_OSSL_ROLE_SPEC_CERT_ID_dup(sk) ((STACK_OF(OSSL_ROLE_SPEC_CERT_ID)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk)))
#define sk_OSSL_ROLE_SPEC_CERT_ID_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_ROLE_SPEC_CERT_ID)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_ROLE_SPEC_CERT_ID_sk_type(sk),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_copyfunc_type(copyfunc),
ossl_check_OSSL_ROLE_SPEC_CERT_ID_freefunc_type(freefunc)))
#define
 sk_OSSL_ROLE_SPEC_CERT_ID_set_cmp_func(sk, cmp)
((sk_OSSL_ROLE_SPEC_CERT_ID_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_ROLE_SPEC_C
ERT_ID_sk_type(sk), ossl_check_OSSL_ROLE_SPEC_CERT_ID_compfunc_type(cmp)))

/* clang-format on */

typedef STACK_OF(OSSL_ROLE_SPEC_CERT_ID) OSSL_ROLE_SPEC_CERT_ID_SYNTAX;

DECLARE_ASN1_FUNCTIONS(OSSL_ROLE_SPEC_CERT_ID_SYNTAX)
typedef struct OSSL_HASH_st {
  X509_ALGOR *algorithmIdentifier;
  ASN1_BIT_STRING *hashValue;
} OSSL_HASH;

typedef struct OSSL_INFO_SYNTAX_POINTER_st {
  GENERAL_NAMES *name;
  OSSL_HASH *hash;
} OSSL_INFO_SYNTAX_POINTER;

#define OSSL_INFO_SYNTAX_TYPE_CONTENT 0
#define OSSL_INFO_SYNTAX_TYPE_POINTER 1

typedef struct OSSL_INFO_SYNTAX_st {
  int type;
  union {
     ASN1_STRING *content;
     OSSL_INFO_SYNTAX_POINTER *pointer;
  } choice;
} OSSL_INFO_SYNTAX;

typedef struct OSSL_PRIVILEGE_POLICY_ID_st {
  ASN1_OBJECT *privilegePolicy;
  OSSL_INFO_SYNTAX
 *privPolSyntax;
} OSSL_PRIVILEGE_POLICY_ID;
```

```
typedef struct OSSL_ATTRIBUTE_DESCRIPTOR_st {
  ASN1_OBJECT *identifier;
  ASN1_STRING *attributeSyntax;
  ASN1_UTF8STRING *name;
  ASN1_UTF8STRING *description;
  OSSL_PRIVILEGE_POLICY_ID *dominationRule;
} OSSL_ATTRIBUTE_DESCRIPTOR;

DECLARE_ASN1_FUNCTIONS(OSSL_HASH)
DECLARE_ASN1_FUNCTIONS(OSSL_INFO_SYNTAX)
DECLARE_ASN1_FUNCTIONS(OSSL_INFO_SYNTAX_POINTER)
DECLARE_ASN1_FUNCTIONS(OSSL_PRIVILEGE_POLICY_ID)
DECLARE_ASN1_FUNCTIONS(OSSL_ATTRIBUTE_DESCRIPTOR)

typedef struct OSSL_TIME_SPEC_ABSOLUTE_st {
  ASN1_GENERALIZEDTIME *startTime;
  ASN1_GENERALIZEDTIME *endTime;
} OSSL_TIME_SPEC_ABSOLUTE;

typedef struct OSSL_DAY_TIME_st {
  ASN1_INTEGER *hour;
  ASN1_INTEGER *minute;
  ASN1_INTEGER *second;
} OSSL_DAY_TIME;

typedef struct OSSL_DAY_TIME_BAND_st {
  OSSL_DAY_TIME *startDayTime;
  OSSL_DAY_TIME *endDayTime;
} OSSL_DAY_TIME_BAND;

#define OSSL_NAMED_DAY_TYPE_INT 0
#define OSSL_NAMED_DAY_TYPE_BIT 1
#define OSSL_NAMED_DAY_INT_SUN
 1
#define OSSL_NAMED_DAY_INT_MON 2
#define OSSL_NAMED_DAY_INT_TUE 3
#define OSSL_NAMED_DAY_INT_WED 4
#define OSSL_NAMED_DAY_INT_THU 5
#define OSSL_NAMED_DAY_INT_FRI 6
#define OSSL_NAMED_DAY_INT_SAT 7
#define OSSL_NAMED_DAY_BIT_SUN 0
#define OSSL_NAMED_DAY_BIT_MON 1
#define OSSL_NAMED_DAY_BIT_TUE 2
#define OSSL_NAMED_DAY_BIT_WED 3
#define OSSL_NAMED_DAY_BIT_THU 4
#define OSSL_NAMED_DAY_BIT_FRI 5
#define OSSL_NAMED_DAY_BIT_SAT 6
```

```
typedef struct OSSL_NAMED_DAY_st {
  int type;
  union {
     ASN1_INTEGER *intNamedDays;
     ASN1_BIT_STRING *bitNamedDays;
  } choice;
} OSSL_NAMED_DAY;

#define OSSL_TIME_SPEC_X_DAY_OF_FIRST 0
#define OSSL_TIME_SPEC_X_DAY_OF_SECOND 1
#define OSSL_TIME_SPEC_X_DAY_OF_THIRD 2
#define OSSL_TIME_SPEC_X_DAY_OF_FOURTH 3
#define OSSL_TIME_SPEC_X_DAY_OF_FIFTH 4

typedef struct OSSL_TIME_SPEC_X_DAY_OF_st {
  int type;
  union {
     OSSL_NAMED_DAY *first;
     OSSL_NAMED_DAY *second;
     OSSL_NAMED_DAY *third;
     OSSL_NAMED_DAY
 *fourth;
     OSSL_NAMED_DAY *fifth;
  } choice;
} OSSL_TIME_SPEC_X_DAY_OF;

#define OSSL_TIME_SPEC_DAY_TYPE_INT 0
#define OSSL_TIME_SPEC_DAY_TYPE_BIT 1
#define OSSL_TIME_SPEC_DAY_TYPE_DAY_OF 2
#define OSSL_TIME_SPEC_DAY_BIT_SUN 0
#define OSSL_TIME_SPEC_DAY_BIT_MON 1
#define OSSL_TIME_SPEC_DAY_BIT_TUE 2
#define OSSL_TIME_SPEC_DAY_BIT_WED 3
#define OSSL_TIME_SPEC_DAY_BIT_THU 4
#define OSSL_TIME_SPEC_DAY_BIT_FRI 5
#define OSSL_TIME_SPEC_DAY_BIT_SAT 6
#define OSSL_TIME_SPEC_DAY_INT_SUN 1
#define OSSL_TIME_SPEC_DAY_INT_MON 2
#define OSSL_TIME_SPEC_DAY_INT_TUE 3
#define OSSL_TIME_SPEC_DAY_INT_WED 4
#define OSSL_TIME_SPEC_DAY_INT_THU 5
#define OSSL_TIME_SPEC_DAY_INT_FRI 6
#define OSSL_TIME_SPEC_DAY_INT_SAT 7

typedef struct OSSL_TIME_SPEC_DAY_st {
  int type;
  union {
     STACK_OF(ASN1_INTEGER) *intDay;
```

```
    ASN1_BIT_STRING *bitDay;
    OSSL_TIME_SPEC_X_DAY_OF *dayOf;
  } choice;
} OSSL_TIME_SPEC_DAY;

#define OSSL_TIME_SPEC_WEEKS_TYPE_ALL 0
#define OSSL_TIME_SPEC_WEEKS_TYPE_INT
 1
#define OSSL_TIME_SPEC_WEEKS_TYPE_BIT 2
#define OSSL_TIME_SPEC_BIT_WEEKS_1 0
#define OSSL_TIME_SPEC_BIT_WEEKS_2 1
#define OSSL_TIME_SPEC_BIT_WEEKS_3 2
#define OSSL_TIME_SPEC_BIT_WEEKS_4 3
#define OSSL_TIME_SPEC_BIT_WEEKS_5 4

typedef struct OSSL_TIME_SPEC_WEEKS_st {
  int type;
  union {
    ASN1_NULL *allWeeks;
    STACK_OF(ASN1_INTEGER) *intWeek;
    ASN1_BIT_STRING *bitWeek;
  } choice;
} OSSL_TIME_SPEC_WEEKS;

#define OSSL_TIME_SPEC_MONTH_TYPE_ALL 0
#define OSSL_TIME_SPEC_MONTH_TYPE_INT 1
#define OSSL_TIME_SPEC_MONTH_TYPE_BIT 2
#define OSSL_TIME_SPEC_INT_MONTH_JAN 1
#define OSSL_TIME_SPEC_INT_MONTH_FEB 2
#define OSSL_TIME_SPEC_INT_MONTH_MAR 3
#define OSSL_TIME_SPEC_INT_MONTH_APR 4
#define OSSL_TIME_SPEC_INT_MONTH_MAY 5
#define OSSL_TIME_SPEC_INT_MONTH_JUN 6
#define OSSL_TIME_SPEC_INT_MONTH_JUL 7
#define OSSL_TIME_SPEC_INT_MONTH_AUG 8
#define OSSL_TIME_SPEC_INT_MONTH_SEP 9
#define OSSL_TIME_SPEC_INT_MONTH_OCT 10
#define OSSL_TIME_SPEC_INT_MONTH_NOV
 11
#define OSSL_TIME_SPEC_INT_MONTH_DEC 12
#define OSSL_TIME_SPEC_BIT_MONTH_JAN 0
#define OSSL_TIME_SPEC_BIT_MONTH_FEB 1
#define OSSL_TIME_SPEC_BIT_MONTH_MAR 2
#define OSSL_TIME_SPEC_BIT_MONTH_APR 3
#define OSSL_TIME_SPEC_BIT_MONTH_MAY 4
#define OSSL_TIME_SPEC_BIT_MONTH_JUN 5
#define OSSL_TIME_SPEC_BIT_MONTH_JUL 6
#define OSSL_TIME_SPEC_BIT_MONTH_AUG 7
```

```
#define OSSL_TIME_SPEC_BIT_MONTH_SEP 8
#define OSSL_TIME_SPEC_BIT_MONTH_OCT 9
#define OSSL_TIME_SPEC_BIT_MONTH_NOV 10
#define OSSL_TIME_SPEC_BIT_MONTH_DEC 11

typedef struct OSSL_TIME_SPEC_MONTH_st {
  int type;
  union {
     ASN1_NULL *allMonths;
     STACK_OF(ASN1_INTEGER) *intMonth;
     ASN1_BIT_STRING *bitMonth;
  } choice;
} OSSL_TIME_SPEC_MONTH;

typedef struct OSSL_TIME_PERIOD_st {
  STACK_OF(OSSL_DAY_TIME_BAND) *timesOfDay;
  OSSL_TIME_SPEC_DAY *days;
  OSSL_TIME_SPEC_WEEKS *weeks;
  OSSL_TIME_SPEC_MONTH *months;
  STACK_OF(ASN1_INTEGER) *years;
} OSSL_TIME_PERIOD;

#define OSSL_TIME_SPEC_TIME_TYPE_ABSOLUTE
 0
#define OSSL_TIME_SPEC_TIME_TYPE_PERIODIC 1

typedef struct OSSL_TIME_SPEC_TIME_st {
  int type;
  union {
     OSSL_TIME_SPEC_ABSOLUTE *absolute;
     STACK_OF(OSSL_TIME_PERIOD) *periodic;
  } choice;
} OSSL_TIME_SPEC_TIME;

typedef struct OSSL_TIME_SPEC_st {
  OSSL_TIME_SPEC_TIME *time;
  ASN1_BOOLEAN notThisTime;
  ASN1_INTEGER *timeZone;
} OSSL_TIME_SPEC;

DECLARE_ASN1_FUNCTIONS(OSSL_DAY_TIME)
DECLARE_ASN1_FUNCTIONS(OSSL_DAY_TIME_BAND)
DECLARE_ASN1_FUNCTIONS(OSSL_TIME_SPEC_DAY)
DECLARE_ASN1_FUNCTIONS(OSSL_TIME_SPEC_WEEKS)
DECLARE_ASN1_FUNCTIONS(OSSL_TIME_SPEC_MONTH)
DECLARE_ASN1_FUNCTIONS(OSSL_NAMED_DAY)
DECLARE_ASN1_FUNCTIONS(OSSL_TIME_SPEC_X_DAY_OF)
DECLARE_ASN1_FUNCTIONS(OSSL_TIME_SPEC_ABSOLUTE)
```

```
DECLARE_ASN1_FUNCTIONS(OSSL_TIME_SPEC_TIME)
DECLARE_ASN1_FUNCTIONS(OSSL_TIME_SPEC)
DECLARE_ASN1_FUNCTIONS(OSSL_TIME_PERIOD)

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_TIME_PERIOD, OSSL_TIME_PERIOD,
OSSL_TIME_PERIOD)
#define sk_OSSL_TIME_PERIOD_num(sk)
 OPENSSL_sk_num(ossl_check_const_OSSL_TIME_PERIOD_sk_type(sk))
#define sk_OSSL_TIME_PERIOD_value(sk, idx) ((OSSL_TIME_PERIOD
*)OPENSSL_sk_value(ossl_check_const_OSSL_TIME_PERIOD_sk_type(sk), (idx)))
#define sk_OSSL_TIME_PERIOD_new(cmp) ((STACK_OF(OSSL_TIME_PERIOD)
*)OPENSSL_sk_new(ossl_check_OSSL_TIME_PERIOD_compfunc_type(cmp)))
#define sk_OSSL_TIME_PERIOD_new_null() ((STACK_OF(OSSL_TIME_PERIOD)
*)OPENSSL_sk_new_null())
#define sk_OSSL_TIME_PERIOD_new_reserve(cmp, n) ((STACK_OF(OSSL_TIME_PERIOD)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_TIME_PERIOD_compfunc_type(cmp), (n)))
#define sk_OSSL_TIME_PERIOD_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_TIME_PERIOD_sk_type(sk), (n))
#define sk_OSSL_TIME_PERIOD_free(sk) OPENSSL_sk_free(ossl_check_OSSL_TIME_PERIOD_sk_type(sk))
#define sk_OSSL_TIME_PERIOD_zero(sk) OPENSSL_sk_zero(ossl_check_OSSL_TIME_PERIOD_sk_type(sk))
#define sk_OSSL_TIME_PERIOD_delete(sk, i) ((OSSL_TIME_PERIOD
*)OPENSSL_sk_delete(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),
 (i)))
#define sk_OSSL_TIME_PERIOD_delete_ptr(sk, ptr) ((OSSL_TIME_PERIOD
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),
ossl_check_OSSL_TIME_PERIOD_type(ptr)))
#define sk_OSSL_TIME_PERIOD_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),
ossl_check_OSSL_TIME_PERIOD_type(ptr))
#define sk_OSSL_TIME_PERIOD_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),
ossl_check_OSSL_TIME_PERIOD_type(ptr))
#define sk_OSSL_TIME_PERIOD_pop(sk) ((OSSL_TIME_PERIOD
*)OPENSSL_sk_pop(ossl_check_OSSL_TIME_PERIOD_sk_type(sk)))
#define sk_OSSL_TIME_PERIOD_shift(sk) ((OSSL_TIME_PERIOD
*)OPENSSL_sk_shift(ossl_check_OSSL_TIME_PERIOD_sk_type(sk)))
#define sk_OSSL_TIME_PERIOD_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),ossl_check_OSSL_TIME_PERIOD_freef
unc_type(freefunc))
#define sk_OSSL_TIME_PERIOD_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),
ossl_check_OSSL_TIME_PERIOD_type(ptr),
 (idx))
#define sk_OSSL_TIME_PERIOD_set(sk, idx, ptr) ((OSSL_TIME_PERIOD
*)OPENSSL_sk_set(ossl_check_OSSL_TIME_PERIOD_sk_type(sk), (idx),
ossl_check_OSSL_TIME_PERIOD_type(ptr)))
#define sk_OSSL_TIME_PERIOD_find(sk, ptr)
```

```
OPENSSL_sk_find(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),
ossl_check_OSSL_TIME_PERIOD_type(ptr))
#define sk_OSSL_TIME_PERIOD_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),
ossl_check_OSSL_TIME_PERIOD_type(ptr))
#define sk_OSSL_TIME_PERIOD_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_TIME_PERIOD_sk_type(sk),
ossl_check_OSSL_TIME_PERIOD_type(ptr), pnum)
#define sk_OSSL_TIME_PERIOD_sort(sk) OPENSSL_sk_sort(ossl_check_OSSL_TIME_PERIOD_sk_type(sk))
#define sk_OSSL_TIME_PERIOD_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_TIME_PERIOD_sk_type(sk))
#define sk_OSSL_TIME_PERIOD_dup(sk) ((STACK_OF(OSSL_TIME_PERIOD)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_TIME_PERIOD_sk_type(sk)))
#define sk_OSSL_TIME_PERIOD_deep_copy(sk,
 copyfunc, freefunc) ((STACK_OF(OSSL_TIME_PERIOD)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_TIME_PERIOD_sk_type(sk),
ossl_check_OSSL_TIME_PERIOD_copyfunc_type(copyfunc),
ossl_check_OSSL_TIME_PERIOD_freefunc_type(freefunc)))
#define sk_OSSL_TIME_PERIOD_set_cmp_func(sk, cmp)
((sk_OSSL_TIME_PERIOD_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_TIME_PERIOD_sk_type
(sk), ossl_check_OSSL_TIME_PERIOD_compfunc_type(cmp)))

/* clang-format on */

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_DAY_TIME_BAND, OSSL_DAY_TIME_BAND,
OSSL_DAY_TIME_BAND)
#define sk_OSSL_DAY_TIME_BAND_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_DAY_TIME_BAND_sk_type(sk))
#define sk_OSSL_DAY_TIME_BAND_value(sk, idx) ((OSSL_DAY_TIME_BAND
*)OPENSSL_sk_value(ossl_check_const_OSSL_DAY_TIME_BAND_sk_type(sk), (idx)))
#define sk_OSSL_DAY_TIME_BAND_new(cmp) ((STACK_OF(OSSL_DAY_TIME_BAND)
*)OPENSSL_sk_new(ossl_check_OSSL_DAY_TIME_BAND_compfunc_type(cmp)))
#define sk_OSSL_DAY_TIME_BAND_new_null() ((STACK_OF(OSSL_DAY_TIME_BAND)
 *)OPENSSL_sk_new_null())
#define sk_OSSL_DAY_TIME_BAND_new_reserve(cmp, n) ((STACK_OF(OSSL_DAY_TIME_BAND)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_DAY_TIME_BAND_compfunc_type(cmp), (n)))
#define sk_OSSL_DAY_TIME_BAND_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk), (n))
#define sk_OSSL_DAY_TIME_BAND_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk))
#define sk_OSSL_DAY_TIME_BAND_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk))
#define sk_OSSL_DAY_TIME_BAND_delete(sk, i) ((OSSL_DAY_TIME_BAND
*)OPENSSL_sk_delete(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk), (i)))
#define sk_OSSL_DAY_TIME_BAND_delete_ptr(sk, ptr) ((OSSL_DAY_TIME_BAND
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk),
ossl_check_OSSL_DAY_TIME_BAND_type(ptr)))
```

```
#define sk_OSSL_DAY_TIME_BAND_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk),
ossl_check_OSSL_DAY_TIME_BAND_type(ptr))
#define sk_OSSL_DAY_TIME_BAND_unshift(sk,
 ptr) OPENSSL_sk_unshift(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk),
ossl_check_OSSL_DAY_TIME_BAND_type(ptr))
#define sk_OSSL_DAY_TIME_BAND_pop(sk) ((OSSL_DAY_TIME_BAND
*)OPENSSL_sk_pop(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk)))
#define sk_OSSL_DAY_TIME_BAND_shift(sk) ((OSSL_DAY_TIME_BAND
*)OPENSSL_sk_shift(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk)))
#define sk_OSSL_DAY_TIME_BAND_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk),ossl_check_OSSL_DAY_TIME_BA
ND_freefunc_type(freefunc))
#define sk_OSSL_DAY_TIME_BAND_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk),
ossl_check_OSSL_DAY_TIME_BAND_type(ptr), (idx))
#define sk_OSSL_DAY_TIME_BAND_set(sk, idx, ptr) ((OSSL_DAY_TIME_BAND
*)OPENSSL_sk_set(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk), (idx),
ossl_check_OSSL_DAY_TIME_BAND_type(ptr)))
#define sk_OSSL_DAY_TIME_BAND_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk),
ossl_check_OSSL_DAY_TIME_BAND_type(ptr))
#define
 sk_OSSL_DAY_TIME_BAND_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk),
ossl_check_OSSL_DAY_TIME_BAND_type(ptr))
#define sk_OSSL_DAY_TIME_BAND_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk),
ossl_check_OSSL_DAY_TIME_BAND_type(ptr), pnum)
#define sk_OSSL_DAY_TIME_BAND_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_DAY_TIME_BAND_sk_type(sk))
#define sk_OSSL_DAY_TIME_BAND_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_DAY_TIME_BAND_sk_type(sk))
#define sk_OSSL_DAY_TIME_BAND_dup(sk) ((STACK_OF(OSSL_DAY_TIME_BAND)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_DAY_TIME_BAND_sk_type(sk)))
#define sk_OSSL_DAY_TIME_BAND_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_DAY_TIME_BAND)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_DAY_TIME_BAND_sk_type(sk),
ossl_check_OSSL_DAY_TIME_BAND_copyfunc_type(copyfunc),
ossl_check_OSSL_DAY_TIME_BAND_freefunc_type(freefunc)))
#define sk_OSSL_DAY_TIME_BAND_set_cmp_func(sk,
 cmp)
((sk_OSSL_DAY_TIME_BAND_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_DAY_TIME_BAND
_sk_type(sk), ossl_check_OSSL_DAY_TIME_BAND_compfunc_type(cmp)))

/* clang-format on */

/* Attribute Type and Value */
```

```
typedef struct atav_st {
  ASN1_OBJECT *type;
  ASN1_TYPE *value;
} OSSL_ATAV;

typedef struct ATTRIBUTE_TYPE_MAPPING_st {
  ASN1_OBJECT *local;
  ASN1_OBJECT *remote;
} OSSL_ATTRIBUTE_TYPE_MAPPING;

typedef struct ATTRIBUTE_VALUE_MAPPING_st {
  OSSL_ATAV *local;
  OSSL_ATAV *remote;
} OSSL_ATTRIBUTE_VALUE_MAPPING;

#define OSSL_ATTR_MAP_TYPE 0
#define OSSL_ATTR_MAP_VALUE 1

typedef struct ATTRIBUTE_MAPPING_st {
  int type;
  union {
     OSSL_ATTRIBUTE_TYPE_MAPPING *typeMappings;
     OSSL_ATTRIBUTE_VALUE_MAPPING *typeValueMappings;
  } choice;
} OSSL_ATTRIBUTE_MAPPING;

typedef STACK_OF(OSSL_ATTRIBUTE_MAPPING) OSSL_ATTRIBUTE_MAPPINGS;
DECLARE_ASN1_FUNCTIONS(OSSL_ATAV)
DECLARE_ASN1_FUNCTIONS(OSSL_ATTRIBUTE_TYPE_MAPPING)
DECLARE_ASN1_FUNCTIONS(OSSL_ATTRIBUTE_VALUE_MAPPING)
DECLARE_ASN1_FUNCTIONS(OSSL_ATTRIBUTE_MAPPING)
DECLARE_ASN1_FUNCTIONS(OSSL_ATTRIBUTE_MAPPINGS)

/*
 clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_ATTRIBUTE_MAPPING, OSSL_ATTRIBUTE_MAPPING,
OSSL_ATTRIBUTE_MAPPING)
#define sk_OSSL_ATTRIBUTE_MAPPING_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_ATTRIBUTE_MAPPING_sk_type(sk))
#define sk_OSSL_ATTRIBUTE_MAPPING_value(sk, idx) ((OSSL_ATTRIBUTE_MAPPING
*)OPENSSL_sk_value(ossl_check_const_OSSL_ATTRIBUTE_MAPPING_sk_type(sk), (idx)))
#define sk_OSSL_ATTRIBUTE_MAPPING_new(cmp) ((STACK_OF(OSSL_ATTRIBUTE_MAPPING)
*)OPENSSL_sk_new(ossl_check_OSSL_ATTRIBUTE_MAPPING_compfunc_type(cmp)))
#define sk_OSSL_ATTRIBUTE_MAPPING_new_null() ((STACK_OF(OSSL_ATTRIBUTE_MAPPING)
*)OPENSSL_sk_new_null())
#define sk_OSSL_ATTRIBUTE_MAPPING_new_reserve(cmp, n)
((STACK_OF(OSSL_ATTRIBUTE_MAPPING)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_ATTRIBUTE_MAPPING_compfunc_type(cmp), (n)))
```

```
#define sk_OSSL_ATTRIBUTE_MAPPING_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
 (n))
#define sk_OSSL_ATTRIBUTE_MAPPING_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk))
#define sk_OSSL_ATTRIBUTE_MAPPING_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk))
#define sk_OSSL_ATTRIBUTE_MAPPING_delete(sk, i) ((OSSL_ATTRIBUTE_MAPPING
*)OPENSSL_sk_delete(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk), (i)))
#define sk_OSSL_ATTRIBUTE_MAPPING_delete_ptr(sk, ptr) ((OSSL_ATTRIBUTE_MAPPING
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
ossl_check_OSSL_ATTRIBUTE_MAPPING_type(ptr)))
#define sk_OSSL_ATTRIBUTE_MAPPING_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
ossl_check_OSSL_ATTRIBUTE_MAPPING_type(ptr))
#define sk_OSSL_ATTRIBUTE_MAPPING_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
ossl_check_OSSL_ATTRIBUTE_MAPPING_type(ptr))
#define sk_OSSL_ATTRIBUTE_MAPPING_pop(sk) ((OSSL_ATTRIBUTE_MAPPING
*)OPENSSL_sk_pop(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk)))
#define
 sk_OSSL_ATTRIBUTE_MAPPING_shift(sk) ((OSSL_ATTRIBUTE_MAPPING
*)OPENSSL_sk_shift(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk)))
#define sk_OSSL_ATTRIBUTE_MAPPING_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),ossl_check_OSSL_ATTRIBUT
E_MAPPING_freefunc_type(freefunc))
#define sk_OSSL_ATTRIBUTE_MAPPING_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
ossl_check_OSSL_ATTRIBUTE_MAPPING_type(ptr), (idx))
#define sk_OSSL_ATTRIBUTE_MAPPING_set(sk, idx, ptr) ((OSSL_ATTRIBUTE_MAPPING
*)OPENSSL_sk_set(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk), (idx),
ossl_check_OSSL_ATTRIBUTE_MAPPING_type(ptr)))
#define sk_OSSL_ATTRIBUTE_MAPPING_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
ossl_check_OSSL_ATTRIBUTE_MAPPING_type(ptr))
#define sk_OSSL_ATTRIBUTE_MAPPING_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
 ossl_check_OSSL_ATTRIBUTE_MAPPING_type(ptr))
#define sk_OSSL_ATTRIBUTE_MAPPING_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
ossl_check_OSSL_ATTRIBUTE_MAPPING_type(ptr), pnum)
#define sk_OSSL_ATTRIBUTE_MAPPING_sort(sk)
OPENSSL_sk_sort(ossl_check_OSSL_ATTRIBUTE_MAPPING_sk_type(sk))
#define sk_OSSL_ATTRIBUTE_MAPPING_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_ATTRIBUTE_MAPPING_sk_type(sk))
#define sk_OSSL_ATTRIBUTE_MAPPING_dup(sk) ((STACK_OF(OSSL_ATTRIBUTE_MAPPING)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_ATTRIBUTE_MAPPING_sk_type(sk)))
#define sk_OSSL_ATTRIBUTE_MAPPING_deep_copy(sk, copyfunc, freefunc)
```

```
((STACK_OF(OSSL_ATTRIBUTE_MAPPING)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_ATTRIBUTE_MAPPING_sk_type(sk),
ossl_check_OSSL_ATTRIBUTE_MAPPING_copyfunc_type(copyfunc),
ossl_check_OSSL_ATTRIBUTE_MAPPING_freefunc_type(freefunc)))
#define sk_OSSL_ATTRIBUTE_MAPPING_set_cmp_func(sk, cmp)
((sk_OSSL_ATTRIBUTE_MAPPING_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_ATTRIBUTE_
MAPPING_sk_type(sk),
 ossl_check_OSSL_ATTRIBUTE_MAPPING_compfunc_type(cmp)))

/* clang-format on */

#define OSSL_AAA_ATTRIBUTE_TYPE 0
#define OSSL_AAA_ATTRIBUTE_VALUES 1

typedef struct ALLOWED_ATTRIBUTES_CHOICE_st {
  int type;
  union {
     ASN1_OBJECT *attributeType;
     X509_ATTRIBUTE *attributeTypeandValues;
  } choice;
} OSSL_ALLOWED_ATTRIBUTES_CHOICE;

typedef struct ALLOWED_ATTRIBUTES_ITEM_st {
  STACK_OF(OSSL_ALLOWED_ATTRIBUTES_CHOICE) *attributes;
  GENERAL_NAME *holderDomain;
} OSSL_ALLOWED_ATTRIBUTES_ITEM;

typedef STACK_OF(OSSL_ALLOWED_ATTRIBUTES_ITEM) OSSL_ALLOWED_ATTRIBUTES_SYNTAX;

DECLARE_ASN1_FUNCTIONS(OSSL_ALLOWED_ATTRIBUTES_CHOICE)
DECLARE_ASN1_FUNCTIONS(OSSL_ALLOWED_ATTRIBUTES_ITEM)
DECLARE_ASN1_FUNCTIONS(OSSL_ALLOWED_ATTRIBUTES_SYNTAX)

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_ALLOWED_ATTRIBUTES_CHOICE,
OSSL_ALLOWED_ATTRIBUTES_CHOICE, OSSL_ALLOWED_ATTRIBUTES_CHOICE)
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_num(sk)
 OPENSSL_sk_num(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_value(sk, idx)
((OSSL_ALLOWED_ATTRIBUTES_CHOICE
*)OPENSSL_sk_value(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk), (idx)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_new(cmp)
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_CHOICE)
*)OPENSSL_sk_new(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_compfunc_type(cmp)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_new_null()
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_CHOICE) *)OPENSSL_sk_new_null())
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_new_reserve(cmp, n)
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_CHOICE)
```

```
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_compfunc_type(cmp),
(n)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk), (n))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk))
#define
 sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_delete(sk, i)
((OSSL_ALLOWED_ATTRIBUTES_CHOICE
*)OPENSSL_sk_delete(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk), (i)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_delete_ptr(sk, ptr)
((OSSL_ALLOWED_ATTRIBUTES_CHOICE
*)OPENSSL_sk_delete_ptr(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_type(ptr)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_type(ptr))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_type(ptr))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_pop(sk) ((OSSL_ALLOWED_ATTRIBUTES_CHOICE
 *)OPENSSL_sk_pop(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_shift(sk)
((OSSL_ALLOWED_ATTRIBUTES_CHOICE
*)OPENSSL_sk_shift(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),ossl_check_OSSL
_ALLOWED_ATTRIBUTES_CHOICE_freefunc_type(freefunc))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_type(ptr), (idx))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_set(sk, idx, ptr)
((OSSL_ALLOWED_ATTRIBUTES_CHOICE
*)OPENSSL_sk_set(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk), (idx),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_type(ptr)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_type(ptr))
#define
 sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_type(ptr))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_type(ptr), pnum)
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sort(sk)
```

```
OPENSSL_sk_sort(ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_dup(sk)
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_CHOICE)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_CHOICE)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
 ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_copyfunc_type(copyfunc),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_freefunc_type(freefunc)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_set_cmp_func(sk, cmp)
((sk_OSSL_ALLOWED_ATTRIBUTES_CHOICE_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_A
LLOWED_ATTRIBUTES_CHOICE_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_CHOICE_compfunc_type(cmp)))

/* clang-format on */

/* clang-format off */
SKM_DEFINE_STACK_OF_INTERNAL(OSSL_ALLOWED_ATTRIBUTES_ITEM,
OSSL_ALLOWED_ATTRIBUTES_ITEM, OSSL_ALLOWED_ATTRIBUTES_ITEM)
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_num(sk)
OPENSSL_sk_num(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_value(sk, idx) ((OSSL_ALLOWED_ATTRIBUTES_ITEM
*)OPENSSL_sk_value(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk), (idx)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_new(cmp)
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_ITEM)
 *)OPENSSL_sk_new(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_compfunc_type(cmp)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_new_null()
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_ITEM) *)OPENSSL_sk_new_null())
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_new_reserve(cmp, n)
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_ITEM)
*)OPENSSL_sk_new_reserve(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_compfunc_type(cmp), (n)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_reserve(sk, n)
OPENSSL_sk_reserve(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk), (n))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_free(sk)
OPENSSL_sk_free(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_zero(sk)
OPENSSL_sk_zero(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_delete(sk, i) ((OSSL_ALLOWED_ATTRIBUTES_ITEM
*)OPENSSL_sk_delete(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk), (i)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_delete_ptr(sk, ptr)
((OSSL_ALLOWED_ATTRIBUTES_ITEM
 *)OPENSSL_sk_delete_ptr(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_type(ptr)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_push(sk, ptr)
OPENSSL_sk_push(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_type(ptr))
```

```
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_unshift(sk, ptr)
OPENSSL_sk_unshift(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_type(ptr))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_pop(sk) ((OSSL_ALLOWED_ATTRIBUTES_ITEM
*)OPENSSL_sk_pop(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_shift(sk) ((OSSL_ALLOWED_ATTRIBUTES_ITEM
*)OPENSSL_sk_shift(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_pop_free(sk, freefunc)
OPENSSL_sk_pop_free(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),ossl_check_OSSL_A
LLOWED_ATTRIBUTES_ITEM_freefunc_type(freefunc))
#define
 sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_insert(sk, ptr, idx)
OPENSSL_sk_insert(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_type(ptr), (idx))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_set(sk, idx, ptr)
((OSSL_ALLOWED_ATTRIBUTES_ITEM
*)OPENSSL_sk_set(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk), (idx),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_type(ptr)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_find(sk, ptr)
OPENSSL_sk_find(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_type(ptr))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_find_ex(sk, ptr)
OPENSSL_sk_find_ex(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_type(ptr))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_find_all(sk, ptr, pnum)
OPENSSL_sk_find_all(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_type(ptr), pnum)
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_sort(sk)
 OPENSSL_sk_sort(ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_is_sorted(sk)
OPENSSL_sk_is_sorted(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_dup(sk)
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_ITEM)
*)OPENSSL_sk_dup(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_deep_copy(sk, copyfunc, freefunc)
((STACK_OF(OSSL_ALLOWED_ATTRIBUTES_ITEM)
*)OPENSSL_sk_deep_copy(ossl_check_const_OSSL_ALLOWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_copyfunc_type(copyfunc),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_freefunc_type(freefunc)))
#define sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_set_cmp_func(sk, cmp)
((sk_OSSL_ALLOWED_ATTRIBUTES_ITEM_compfunc)OPENSSL_sk_set_cmp_func(ossl_check_OSSL_ALL
OWED_ATTRIBUTES_ITEM_sk_type(sk),
ossl_check_OSSL_ALLOWED_ATTRIBUTES_ITEM_compfunc_type(cmp)))

/* clang-format on */

typedef struct AA_DIST_POINT_st
```

```
 {
   DIST_POINT_NAME *distpoint;
   ASN1_BIT_STRING *reasons;
   int dp_reasons;
   ASN1_BOOLEAN indirectCRL;
   ASN1_BOOLEAN containsUserAttributeCerts;
   ASN1_BOOLEAN containsAACerts;
   ASN1_BOOLEAN containsSOAPublicKeyCerts;
} OSSL_AA_DIST_POINT;

DECLARE_ASN1_FUNCTIONS(OSSL_AA_DIST_POINT)

#ifdef __cplusplus
}
#endif
#endif
```

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```
/* clang-format off */
/* WARNING: do not edit! */
/* Generated by Makefile from include/crypto/bn_conf.h.in */
/* clang-format on */
```

```
/*
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*
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* this file except in compliance with the License.  You can obtain a copy
* in the file LICENSE in the source distribution or at
* https://www.openssl.org/source/license.html
*/

#ifndef OSSL_CRYPTO_BN_CONF_H
#define OSSL_CRYPTO_BN_CONF_H
#pragma once

/*
* The contents of this file are not used in the UEFI build, as
* both 32-bit and 64-bit builds are supported from a single run
* of the Configure script.
*/

/* Should we define BN_DIV2W here? */

/* Only one for the following should be defined */
/* clang-format off */
#define SIXTY_FOUR_BIT_LONG
   /* clang-format on */
   /* clang-format off */
#undef SIXTY_FOUR_BIT
   /* clang-format on */
   /* clang-format off */
#undef THIRTY_TWO_BIT
/*
 clang-format on */

#endif
```

# 1.3829 aws-smithy-checksums 0.63.1

## 1.3829.1 Available under license :

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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see https://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see https://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see https://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

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| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
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@heading Vincent Rijmen, Antoon Bosselaers, Paulo Barreto

AES in libhcrypto

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rijndael-alg-fst.c

@version 3.0 (December 2000)

Optimised ANSI C code for the Rijndael cipher (now AES)

@author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
@author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
@author Paulo Barreto <paulo.barreto@terra.com.br>

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lib/hcrypto/test_dh.c

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AES in libhcrypto

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rijndael-alg-fst.c

@version 3.0 (December 2000)

Optimised ANSI C code for the Rijndael cipher (now AES)

@author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
@author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
@author Paulo Barreto <paulo.barreto@terra.com.br>

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lib/hcrypto/test_dh.c

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table of data to be supplied by an application program that uses
the facility, other than as an argument passed when the facility
is invoked, then you must make a good faith effort to ensure that,
in the event an application does not supply such function or
table, the facility still operates, and performs whatever part of
its purpose remains meaningful.

(For example, a function in a library to compute square roots has
a purpose that is entirely well-defined independent of the
application. Therefore, Subsection 2d requires that any
application-supplied function or table used by this function must
be optional: if the application does not supply it, the square
root function must still compute square roots.)
@end enumerate

These requirements apply to the modified work as a whole. If
identifiable sections
of that work are not derived from the Library,
and can be reasonably considered independent and separate works in
themselves, then this License, and its terms, do not apply to those

sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this
License.

@item
You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

@item
You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and
2 above provided that you accompany
it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not

compelled to copy the source along with the object code.

@item
A program that contains no derivative of any portion of the
Library, but is designed to work with the Library by being compiled or
linked with it, is called a ``work that uses the Library''. Such a
work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

However, linking a ``work that uses the Library'' with the Library
creates an executable that is a derivative of the Library (because
it
contains portions of the Library), rather than a ``work that uses the
library''. The executable is therefore covered by this License.
Section 6 states terms for distribution of such executables.

When a ``work that uses the Library'' uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library. The
threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small inline
functions (ten lines or less in length), then the use of the object
file is unrestricted, regardless of whether it is legally a derivative
work. (Executables containing this object code plus portions of the
Library will still fall under Section 6.)

Otherwise,
if the work is a derivative of the Library, you may
distribute the object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.

@item
As an exception to the Sections above, you may also combine or
link a ``work that uses the Library'' with the Library to produce a
work containing portions of the Library, and distribute that work
under terms of your choice, provided that the terms permit
modification of the work for the customer's own use and reverse
engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the
Library is used in it and that the Library and its use are covered by
this License. You must supply a copy of this License. If the work
during execution displays copyright notices, you must include the

copyright notice for the Library among them, as well as a reference
directing the user to the copy of
this License. Also, you must do one
of these things:

@enumerate a
@item
Accompany the work with the complete corresponding
machine-readable source code for the Library including whatever
changes were used in the work (which must be distributed under
Sections 1 and 2 above); and, if the work is an executable linked
with the Library, with the complete machine-readable ``work that
uses the Library'', as object code and/or source code, so that the
user can modify the Library and then relink to produce a modified
executable containing the modified Library. (It is understood
that the user who changes the contents of definitions files in the
Library will not necessarily be able to recompile the application
to use the modified definitions.)

@item
Use a suitable shared library mechanism for linking with the Library. A
suitable mechanism is one that (1) uses at run time a copy of the
library already present on the user's computer system, rather than
copying library functions into the executable,
and (2) will operate
properly with a modified version of the library, if the user installs
one, as long as the modified version is interface-compatible with the
version that the work was made with.

@item
Accompany the work with a written offer, valid for at
least three years, to give the same user the materials
specified in Subsection 6a, above, for a charge no more
than the cost of performing this distribution.

@item
If distribution of the work is made by offering access to copy
from a designated place, offer equivalent access to copy the above
specified materials from the same place.

@item
Verify that the user has already received a copy of these
materials or that you have already sent this user a copy.
@end enumerate

For an executable, the required form of the ``work that uses the
Library'' must include any data and utility programs needed for
reproducing the executable from it. However, as a special exception,

the materials to be distributed need not include anything that
is
normally distributed (in either source or binary form) with the major
components (compiler, kernel, and so on) of the operating system on
which the executable runs, unless that component itself accompanies the
executable.

It may happen that this requirement contradicts the license
restrictions of other proprietary libraries that do not normally
accompany the operating system. Such a contradiction means you cannot
use both them and the Library together in an executable that you
distribute.

@item
You may place library facilities that are a work based on the
Library side-by-side in a single library together with other library
facilities not covered by this License, and distribute such a combined
library, provided that the separate distribution of the work based on
the Library and of the other library facilities is otherwise
permitted, and provided that you do these two things:

@enumerate a
@item
Accompany the combined library with a copy of the same work
based on the Library,
uncombined with any other library
facilities. This must be distributed under the terms of the
Sections above.

@item
Give prominent notice with the combined library of the fact
that part of it is a work based on the Library, and explaining
where to find the accompanying uncombined form of the same work.
@end enumerate

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@end enumerate

@subheading END OF TERMS AND CONDITIONS

@page
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USA.
@end
smallexample

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necessary. Here is a sample; alter the names:

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`Frob' (a library for tweaking knobs) written by James Random Hacker.

@var{signature of Ty Coon}, 1 April 1990
Ty Coon, President of Vice
@end smallexample

That's all there is to it!

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Version 3, 29 June 2007

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The precise terms and conditions for copying, distribution and modification follow.

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The "source code" for a work means the preferred form of the work for making modifications to it. "Object code" means any non-source form of a work.

A "Standard Interface" means an interface that either is an official

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The "System Libraries" of an executable work include anything, other than the work as a whole, that (a) is included in the normal form of packaging a Major Component, but which is not part of that Major Component, and (b) serves only to enable use of the work with that Major Component, or to implement a Standard Interface for which an implementation is available to the public in source code form. A "Major Component", in this context, means a major essential component (kernel, window system, and so on) of the specific operating system (if any) on which the executable work runs, or a compiler used to produce the work, or an object code interpreter used to run it.

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The Corresponding Source need not include anything that users can regenerate automatically from other parts of the Corresponding Source.

The Corresponding Source for a work in source code form is that same work.

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You may convey a work based on the Program, or the modifications to produce it from the Program, in the form of source code under the terms of section 4, provided that you also meet all of these conditions:

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b) The work must carry prominent notices stating that it is released under this License and any conditions added under section 7. This requirement modifies the requirement in section 4 to "keep intact all notices".

c) You must license the entire work, as a whole, under this License to anyone who comes into possession of a copy. This License will therefore apply, along with any applicable section 7 additional terms, to the whole of the work, and all its parts, regardless of how they are packaged. This License gives no permission to license the work in any other way, but it does not invalidate such permission if you have separately received it.

d) If the work has interactive user interfaces, each must display Appropriate Legal Notices; however, if the Program has interactive interfaces that do not display Appropriate Legal Notices, your work need not make them do so.

A compilation of a covered work with other separate and independent works, which are not by their nature extensions of the covered work, and which are not combined with it such as to form a larger program, in or on a volume of a storage or distribution medium, is called an "aggregate" if the compilation and its resulting copyright are not used to limit the access or legal rights of the compilation's users beyond what the individual works permit. Inclusion of a covered work in an aggregate does not cause this License to apply to the other parts of the aggregate.

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a) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by the Corresponding Source fixed on a durable physical medium customarily used for software interchange.

b) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years and valid for as long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a copy of the Corresponding Source for all the software in the product that is covered by this License, on a durable physical medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the Corresponding Source from a network server at no charge.

c) Convey individual copies of the object code with a copy of the written offer to provide the Corresponding Source. This alternative is allowed only occasionally and noncommercially, and only if you received the object code with such an offer, in accord with subsection 6b.

d) Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements.

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A separable portion of the object code, whose source code is excluded from the Corresponding Source as a System Library, need not be included in conveying the object code work.

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doubtful cases shall be resolved in favor of coverage. For a particular product received by a particular user, "normally used" refers to a typical or common use of that class of product, regardless of the status of the particular user or of the way in which the particular user actually uses, or expects or is expected to use, the product. A product is a consumer product regardless of whether the product has substantial commercial, industrial or non-consumer uses, unless such uses represent the only significant mode of use of the product.

"Installation Information" for a User Product means any methods, procedures, authorization keys, or other information required to install and execute modified versions of a covered work in that User Product from a modified version of its Corresponding Source. The information must suffice to ensure that the continued functioning of the modified object code is in no case prevented or interfered with solely because modification has been made.

If you convey an object code work under this section in, or with, or specifically for use in, a User Product, and the conveying occurs as part of a transaction in which the right of possession and use of the User Product is transferred to the recipient in perpetuity or for a fixed term (regardless of how the transaction is characterized), the Corresponding Source conveyed under this section must be accompanied by the Installation Information. But this requirement does not apply if neither you nor any third party retains the ability to install modified object code on the User Product (for example, the work has been installed in ROM).

The requirement to provide Installation Information does not include a requirement to continue to provide support service, warranty, or updates for a work that has been modified or installed by the recipient, or for the User Product in which it has been modified or installed. Access to a network may be denied when the modification itself materially and adversely affects the operation of the network or violates the rules and protocols for communication across the network.

Corresponding Source conveyed, and Installation Information provided, in accord with this section must be in a format that is publicly documented (and with an implementation available to the public in source code form), and must require no special password or key for unpacking, reading or copying.

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#ifndef _BASENAME_LGPL_H
#define _BASENAME_LGPL_H

#include <stddef.h>

#ifndef DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif


/*
 Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
          FILENAME      RESULT
```

```
          "foo.c"       "foo.c"
          "foo/bar.c"   "bar.c"
          "/foo/bar.c"  "bar.c"
          "foo/bar/"    "bar/"
          "foo/bar//"   "bar//"
          "/"           ""
          "//"          ""
          ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(), defined in <string.h>, does
      not consider trailing slashes to be part of the component:

 FILENAME      RESULT
          "foo/bar/"    ""
          "foo/bar//"   ""
    * The 'basename' command eliminates trailing slashes and for a root
      produces a non-empty result:
          FILENAME      RESULT
          "foo/bar/"    "bar"
          "foo/bar//"   "bar"
          "/"           "/"
          "//"          "/"
*/
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;


#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
```

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can still use the program in GNU.

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<signature of Mo Ghoul>, 1 April 1987
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```
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*
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*/

#ifndef GRUB_BSD_CPU_HEADER
#define GRUB_BSD_CPU_HEADER 1

#include <grub/types.h>
#include <grub/relocator.h>

#include <grub/i386/freebsd_reboot.h>
#include <grub/i386/netbsd_reboot.h>
#include <grub/i386/openbsd_reboot.h>
#include <grub/i386/freebsd_linker.h>
#include
 <grub/i386/netbsd_bootinfo.h>
#include <grub/i386/openbsd_bootarg.h>

enum bsd_kernel_types
 {
   KERNEL_TYPE_NONE,
   KERNEL_TYPE_FREEBSD,
   KERNEL_TYPE_OPENBSD,
   KERNEL_TYPE_NETBSD,
 };

#define GRUB_BSD_TEMP_BUFFER   0x80000

#define FREEBSD_B_DEVMAGIC OPENBSD_B_DEVMAGIC
```

```
#define FREEBSD_B_SLICESHIFT OPENBSD_B_CTRLSHIFT
#define FREEBSD_B_UNITSHIFT OPENBSD_B_UNITSHIFT
#define FREEBSD_B_PARTSHIFT OPENBSD_B_PARTSHIFT
#define FREEBSD_B_TYPESHIFT OPENBSD_B_TYPESHIFT

#define FREEBSD_MODTYPE_KERNEL  "elf kernel"
#define FREEBSD_MODTYPE_KERNEL64 "elf64 kernel"
#define FREEBSD_MODTYPE_ELF_MODULE "elf module"
#define FREEBSD_MODTYPE_ELF_MODULE_OBJ "elf obj module"
#define FREEBSD_MODTYPE_RAW  "raw"

#define FREEBSD_BOOTINFO_VERSION 1

struct grub_freebsd_bootinfo
{
 grub_uint32_t version;
 grub_uint8_t unused1[44];
 grub_uint32_t length;
 grub_uint8_t unused2;
 grub_uint8_t boot_device;
 grub_uint8_t unused3[18];
 grub_uint32_t kern_end;
 grub_uint32_t environment;
  grub_uint32_t tags;
} GRUB_PACKED;

struct freebsd_tag_header
{
 grub_uint32_t type;
 grub_uint32_t len;
};

grub_err_t grub_freebsd_load_elfmodule32 (struct grub_relocator *relocator,
       grub_file_t file, int argc,
       char *argv[], grub_addr_t *kern_end);
grub_err_t grub_freebsd_load_elfmodule_obj64 (struct grub_relocator *relocator,
           grub_file_t file, int argc,
           char *argv[],
           grub_addr_t *kern_end);
grub_err_t grub_freebsd_load_elf_meta32 (struct grub_relocator *relocator,
      grub_file_t file,
      const char *filename,
      grub_addr_t *kern_end);
grub_err_t grub_freebsd_load_elf_meta64 (struct grub_relocator *relocator,
      grub_file_t file,
      const char *filename,
      grub_addr_t *kern_end);
```

```
grub_err_t grub_netbsd_load_elf_meta32 (struct grub_relocator *relocator,
    grub_file_t file,
    const char *filename,
    grub_addr_t *kern_end);
grub_err_t grub_netbsd_load_elf_meta64 (struct grub_relocator *relocator,
    grub_file_t
 file,
    const char *filename,
    grub_addr_t *kern_end);

grub_err_t grub_bsd_add_meta (grub_uint32_t type,
        const void *data, grub_uint32_t len);
grub_err_t grub_freebsd_add_meta_module (const char *filename, const char *type,
     int argc, char **argv,
     grub_addr_t addr, grub_uint32_t size);

struct grub_openbsd_ramdisk_descriptor
{
 grub_size_t max_size;
 grub_uint8_t *target;
 grub_uint32_t *size;
};

grub_err_t grub_openbsd_find_ramdisk32 (grub_file_t file,
    const char *filename,
    grub_addr_t kern_start,
    void *kern_chunk_src,
    struct grub_openbsd_ramdisk_descriptor *desc);
grub_err_t grub_openbsd_find_ramdisk64 (grub_file_t file,
    const char *filename,
    grub_addr_t kern_start,
    void *kern_chunk_src,
    struct grub_openbsd_ramdisk_descriptor *desc);

extern grub_uint8_t grub_bsd64_trampoline_start, grub_bsd64_trampoline_end;
extern grub_uint32_t grub_bsd64_trampoline_selfjump;
extern grub_uint32_t grub_bsd64_trampoline_gdt;

#endif
 /* ! GRUB_BSD_CPU_HEADER */
```

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---
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Description:
realpath, canonicalize_file_name: Provide canonical absolute file name

Files:
lib/canonicalize-lgpl.c

m4/canonicalize.m4
m4/double-slash-root.m4
m4/lstat.m4

Depends-on:
extensions
stdlib
nocrash
double-slash-root [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
eloop-threshold [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
errno [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
fcntl-h [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
filename [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
idx [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
intprops [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
libc-config [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME
= 1]
memmove [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
mempcpy [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
pathmax [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
rawmemchr [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
readlink [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
scratch_buffer [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
stat [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
stdbool [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
sys_stat [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
unistd [test $HAVE_CANONICALIZE_FILE_NAME = 0
|| test $REPLACE_CANONICALIZE_FILE_NAME = 1]

configure.ac:
gl_CANONICALIZE_LGPL

```
gl_CONDITIONAL([GL_COND_OBJ_CANONICALIZE_LGPL],
          [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test $REPLACE_CANONICALIZE_FILE_NAME =
1])
gl_MODULE_INDICATOR([canonicalize-lgpl])
gl_STDLIB_MODULE_INDICATOR([canonicalize_file_name])
gl_STDLIB_MODULE_INDICATOR([realpath])
```

Makefile.am:

```
if GL_COND_OBJ_CANONICALIZE_LGPL
lib_SOURCES += canonicalize-lgpl.c
endif
```

Include:

```
<stdlib.h>
```

License:

LGPLv2+

Maintainer:

all

Description:

Concatenate two arbitrary file names.

Files:

lib/filenamecat.h
lib/filenamecat-lgpl.c
m4/filenamecat.m4

Depends-on:

c99
basename-lgpl
filename
malloc-posix

configure.ac:

```
gl_FILE_NAME_CONCAT_LGPL
```

Makefile.am:

```
lib_SOURCES += filenamecat-lgpl.c
```

Include:

```
"filenamecat.h"
```

License:

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Maintainer:

Jim Meyering

Files:
tests/test-update-copyright.sh

Depends-on:

configure.ac:
abs_aux_dir=`cd "$ac_aux_dir"; pwd`
AC_SUBST([abs_aux_dir])

Makefile.am:
TESTS += test-update-copyright.sh
TESTS_ENVIRONMENT += abs_aux_dir='$(abs_aux_dir)'

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@end enumerate

@iftex
@heading END OF TERMS AND CONDITIONS
@end iftex
@ifinfo
@center END OF TERMS AND CONDITIONS

@end ifinfo

@page
@heading Appendix: How to Apply These Terms to Your New Programs

If you develop a new program, and you want it to be of the greatest
possible use to the public, the best way to achieve this is to make it
free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest
to attach them to the start of each source file to most effectively
convey the exclusion of warranty; and each file should have at least
the ``copyright'' line and a pointer to where the full notice is found.

@smallexample
@var{one line to give the program's name
 and a brief idea of what it does.}
Copyright (C) @var{yyyy}  @var{name of author}

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@end smallexample

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If the program is interactive, make it output a short notice like this
when it starts in an interactive mode:

@smallexample
Gnomovision version
 69, Copyright (C) @var{year} @var{name of author}
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
@end smallexample

The hypothetical commands @samp{show w} and @samp{show c} should show
the appropriate parts of the General Public License.  Of course, the
commands you use may be called something other than @samp{show w} and
@samp{show c}; they could even be mouse-clicks or menu items---whatever
suits your program.

You should also get your employer (if you work as a programmer) or your
school, if any, to sign a ``copyright disclaimer'' for the program, if
necessary.  Here is a sample; alter the names:

@example
Yoyodyne, Inc., hereby disclaims all copyright interest in the program
`Gnomovision' (which makes passes at compilers) written by James Hacker.

@var{signature of Ty Coon}, 1 April 1989
Ty Coon, President of Vice
@end example

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 Public License does not permit incorporating your program into
proprietary programs.  If your program is a subroutine library, you may
consider it more useful to permit linking proprietary applications with the
library.  If this is what you want to do, use the GNU Lesser General
Public License instead of this License.
Description:
Provide the GNU Free Documentation License in Texinfo format.

Notice:
Don't use this module! Instead, copy the referenced license file into your version control repository.

Files:
doc/fdl.texi

Depends-on:

configure.ac:

Makefile.am:

Include:

License:
unmodifiable license text

Maintainer:
all
Description:
Help make libraries relocatable, that is, to allow them to function
properly when copied to an arbitrary directory.

Files:
doc/relocatable.texi
lib/relocatable.h
lib/relocatable.c
lib/relocatable.valgrind
m4/relocatable-lib.m4

Depends-on:
strdup

configure.ac:
gl_RELOCATABLE_LIBRARY

```
if test $RELOCATABLE = yes; then
 AC_LIBOBJ([relocatable])
fi
```

Makefile.am:
DEFS += -DNO_XMALLOC

Include:
"relocatable.h"

License:
LGPLv2+

Maintainer:
Ben Pfaff

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Version 2.1, February 1999

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

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b) You must cause the files modified to carry prominent notices

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline

functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the
object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

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a) Accompany
the work with the complete corresponding
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properly with a modified version of the library, if
the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

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library `Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

That's all there is to it!
Description:
Extract specific portions of filenames.

Files:
lib/dirname.h
lib/dirname-lgpl.c
lib/stripslash.c

Depends-on:
basename-lgpl
double-slash-root
filename
malloc-posix
stdbool

configure.ac:

Makefile.am:
lib_SOURCES += dirname-lgpl.c stripslash.c

Include:
"dirname.h"

License:
LGPLv2+

Maintainer:
Jim Meyering, Eric Blake

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Version 2, June 1991

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Files:
tests/test-canonicalize-lgpl.c
tests/signature.h
tests/null-ptr.h
tests/macros.h

Depends-on:
ignore-value
same-inode
symlink

configure.ac:

Makefile.am:
TESTS += test-canonicalize-lgpl
check_PROGRAMS += test-canonicalize-lgpl
test_canonicalize_lgpl_LDADD = $(LDADD) $(LIBINTL)

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Description:
Extract the last component (base name) of a file name.

Files:
lib/basename-lgpl.h
lib/basename-lgpl.c

Depends-on:
double-slash-root
filename
stdbool

configure.ac:

Makefile.am:
lib_SOURCES += basename-lgpl.c

Include:
"basename-lgpl.h"

License:
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Maintainer:
all

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Description:
Ensure getcwd(NULL, 0) returns a buffer allocated by the malloc() function.

Files:
lib/getcwd-lgpl.c
m4/getcwd.m4

Depends-on:
unistd
free-posix  [test $REPLACE_GETCWD = 1]
strdup  [test $REPLACE_GETCWD = 1]

configure.ac:
gl_FUNC_GETCWD_LGPL
gl_CONDITIONAL([GL_COND_OBJ_GETCWD_LGPL], [test $REPLACE_GETCWD = 1])
gl_UNISTD_MODULE_INDICATOR([getcwd])

Makefile.am:
if GL_COND_OBJ_GETCWD_LGPL
lib_SOURCES += getcwd-lgpl.c
endif

Include:
<unistd.h>

License:
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Maintainer:
Eric Blake
Files:
tests/test-getcwd-lgpl.c
tests/signature.h
tests/macros.h

Depends-on:

configure.ac:

Makefile.am:
TESTS += test-getcwd-lgpl
check_PROGRAMS += test-getcwd-lgpl

```
test_getcwd_lgpl_LDADD = $(LDADD) $(LIBINTL)

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```

Description:
Locating a program in PATH (LGPLed version).

Files:
lib/findprog.h
lib/findprog.c
lib/findprog-lgpl.c
m4/findprog.m4
m4/eaccess.m4

Depends-on:
stdbool
sys_stat
strdup
concat-filename
access
stat
unistd

configure.ac:
gl_FINDPROG
gl_MODULE_INDICATOR([findprog-lgpl])

Makefile.am:
lib_SOURCES += findprog.h findprog-lgpl.c

Include:
"findprog.h"

License:
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Maintainer:
all

# 1.3850 zlib 1.3.2-r3

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Jean-loup Gailly Mark Adler
jloup@gzip.org madler@alumni.caltech.edu

# 1.3851 protobuf 3.14.0-17.el9_7

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  * HPUX support.
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   * Detect whether zlib is new enough in configure script.
  * Fixes for Solaris 10 32/64-bit confusion.
Evan Jones <evanj@mit.edu>
  * Optimize Java serialization code when writing a small message to a stream.
  * Optimize Java serialization of strings so that UTF-8 encoding happens only
    once per string per serialization call.
  * Clean up some Java warnings.
  * Fix bug with permanent callbacks that delete themselves when run.
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  * Added atomicops for Solaris
Andrew Paprocki <andrew@ishiboo.com>
  * Fixed minor IBM xlC compiler build issues
  * Added atomicops for AIX (POWER)
# This file contains a list of people who've made non-trivial
# contribution to the Google C++ Testing Framework project.  People
# who commit code to the project are encouraged to add their names
# here.  Please keep the list sorted by first names.

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```
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package copyright

import (
 "bytes"
 "internal/testenv"
 "io"
```

```
 "io/fs"
 "os"
 "path/filepath"
 "testing"
)

var copyright = []byte("Copyright")

var permitted = [][]byte{
 []byte("// Code generated by "),
 []byte("// Code generated from "),
 []byte("// Created by cgo -cdefs"),
 []byte("// DO NOT EDIT\n// generated by:"),
 []byte("// Empty assembly file"),
 []byte("// Generated using cgo"),
 []byte("// Original source:\n//\thttp://www.zorinaq.com/papers/md5-amd64.html"), // public domain crypto/md5
 []byte("// created by cgo -cdefs"),
 []byte("// go run mkasm.go"),
 []byte("// mkerrors"),
 []byte("// mksys"),
 []byte("// run\n// Code generated by"), // cmd/compile/internal/test/constFold_test.go
}

func TestCopyright(t *testing.T) {
 buf := make([]byte, 2048)
 filepath.WalkDir(filepath.Join(testenv.GOROOT(t), "src"), func(path string,
 d fs.DirEntry, err error) error {
  if d.IsDir() && (d.Name() == "testdata" || d.Name() == "vendor") {
   return filepath.SkipDir
  }
  switch filepath.Ext(d.Name()) {
  default:
   return nil
  case ".s", ".go":
   // check
  }

  f, err := os.Open(path)
  if err != nil {
   t.Error(err)
   return nil
  }
  defer f.Close()
  n, err := f.Read(buf)
  if err != nil && err != io.EOF {
   t.Error(err)
   return nil
  }
```

```
  b := buf[:n]
  if bytes.Contains(b, copyright) {
   return nil
  }
  for _, ok := range permitted {
   if bytes.HasPrefix(b, ok) {
    return nil
   }
  }
  t.Errorf("%s: missing copyright notice", path)
  return nil
 })
}
```

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Version 2.1, February 1999

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If distribution of object code is made by offering access to copy
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Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

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will operate
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That's all there is to it!

# 1.3880 kpatch 0.9.7-10.el9

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must be distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

If distribution of object code is made by offering access to copy
from a designated place, then offering equivalent access to copy the
source code from the same place satisfies the requirement to
distribute the source code, even though third parties are not
compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the
Library, but is designed to work with the Library by being compiled or
linked with it, is called a "work that uses the Library". Such a
work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library
creates an executable that is a derivative of the Library (because it
contains portions of the Library), rather than a "work that
uses the
library". The executable is therefore covered by this License.
Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file
that is part of the Library, the object code for the work may be a

derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the
object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany
the work with the complete corresponding
machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a

copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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```
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*
* Version:     $Id: main.h,v 0.0.1 2003/09/18 15:13:38 cvaroqui Exp $
*
* Author:      Christophe Varoqui
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 */

focus-trap/dist/focus-trap.esm.js:
 /*!
 * focus-trap 7.6.4
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 */
#!/usr/bin/python3
# generate debian/copyright from debian/copyright.template and node_modules
# Author: Martin Pitt <mpitt@debian.org>
#         Allison Karlitskaya <allison.karlitskaya@redhat.com>

import argparse
import gzip
import os
import re
import sys
import time
from typing import Dict, Set

BASE_DIR = os.path.realpath(f'{__file__}/../..')
TEMPLATE_FILE = f'{BASE_DIR}/tools/debian/copyright.template'


own_copyright = f"Copyright (C) 2013 - {time.strftime('%Y')} Red Hat, Inc."

license_patterns = {
   # Common patterns
   r'\bMIT\b': ['MIT'],

   # https://github.com/focus-trap/focus-trap/blob/master/LICENSE
   r'\bfocus-trap\b': ['MIT'],
}

copyright_patterns = {
   # Common patterns
   r'Copyright (.*)$': [r'\1'],
   r'\(c\) (.*)$': [r'\1'],

   # https://github.com/focus-trap/focus-trap/blob/master/LICENSE
```

```
   r'\bfocus-trap\b': ['2015-2016 David Clark'],
}

used_patterns = set()


def parse_args():
   p = argparse.ArgumentParser(description='Generate debian/copyright
 file from template and node_modules')
   return p.parse_args()


def template_licenses(template):
   """Return set of existing License: short names"""

   ids = set()
   for line in template.splitlines():
       if line.startswith('License:'):
           ids.add(line.split(None, 1)[1].lower())
   return ids


def find_patterns(patterns, text):
   results = set()

   for pattern, templates in patterns.items():
       for match in re.finditer(pattern, text, re.MULTILINE):
           used_patterns.add(pattern)
           results.update(match.expand(template) for template in templates)

   return results

#
# main
#


args = parse_args()

with open(TEMPLATE_FILE, encoding='UTF-8') as f:
   template = f.read()

license_ids = template_licenses(template)

# scan dist/ bundles for third-party copyrights and licenses

dist_copyrights: Dict[str, Set[str]] = {}  # Files: dirglob  set(copyrights)
dist_licenses: Dict[str, Set[str]] = {}  # Files: dirglob  set(licenses)
```

```
for directory,
 _subdirs, files in os.walk(f'{BASE_DIR}/dist'):
  for file in files:
    if '.LEGAL.txt' not in file:
      continue

    full_filename = os.path.join(directory, file)
    directory_glob = os.path.relpath(directory, start=BASE_DIR) + '/*'

    if file.endswith('.gz'):
      with gzip.open(full_filename, 'rt') as license_file_gz:
        contents = license_file_gz.read()
    else:
      with open(full_filename, 'rt') as license_file:
        contents = license_file.read()

    for comment in contents.split('\n\n'):
      if (comment.strip() == "" or "Bundled license information:" in comment):
        continue

      licenses = find_patterns(license_patterns, comment)
      if not licenses:
        raise SystemError('Can not determine licenses of:\n%s' % comment)
      for license_id in licenses:
        if license_id.lower() not in license_ids:
          raise KeyError(f'License
{license_id} not found in {TEMPLATE_FILE}')

      # All bundles also contain our own code
      licenses.add("LGPL-2.1-or-later")

      dist_licenses.setdefault(directory_glob, set()).update(licenses)

      copyrights = find_patterns(copyright_patterns, comment)
      if not copyrights:
        raise SystemError('Did not find any copyrights in:\n%s' % comment)

      # All bundles also contain our own code
      copyrights.add(own_copyright)

      dist_copyrights.setdefault(directory_glob, set()).update(copyrights)

for pattern in set.union(set(license_patterns), set(copyright_patterns)):
  if pattern not in used_patterns:
    # We'll have no LEGAL.txt files in that dev builds
    # so of course we won't use any of the patterns
    if os.getenv('NODE_ENV') == 'development' or os.getenv('IGNORE_UNUSED_PATTERNS'):
```

```
            continue

        sys.exit(f'build-debian-copyright: Unused pattern: {pattern}')

paragraphs
 = []
for dirglob in sorted(dist_copyrights):
    paragraphs.append("Files: {0}\nCopyright: {1}\nLicense: {2}".format(
        dirglob,
        '\n '.join(sorted(dist_copyrights[dirglob])),
        ' and '.join(sorted(dist_licenses[dirglob]))))

# force UTF-8 output, even when running in C locale
for line in template.splitlines():
    if '#NPM' in line:
        sys.stdout.buffer.write('\n\n'.join(paragraphs).encode())
    else:
        sys.stdout.buffer.write(line.encode())
    sys.stdout.buffer.write(b'\n')
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Upstream-Name: cockpit
Source: https://github.com/cockpit-project/cockpit
Comment:
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the Internet, thus upstream ships the pre-minified bundles as part of the
upstream release tarball so that the package can be built without internet
access and lots of extra unpackaged build dependencies.

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Files: tools/install-sh
Copyright: Copyright (C) 1994 X Consortium
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Files: src/appstream/*.metainfo.xml.in src/client/*.metainfo.xml
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/*

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* /numad-0.5-37.20150602git.el9-1.src.rpm-cosi-expand-archive-y93QixDg/numad-0.5git.tar.xz-cosi-expand-archive-wQrI3B5d/numad-0.5git/numad.c
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# 1.3913 jitterentropy 3.6.0-1.el9

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And Very Special Thanks To:
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# 1.3919 libburn 1.5.4-5.el9

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# 1.3920 lvm2 9:1.02.206-2.el9

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@end macro

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@heading Vincent Rijmen, Antoon Bosselaers, Paulo Barreto

AES in
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rijndael-alg-fst.c

@version 3.0 (December 2000)

Optimised ANSI C code for the Rijndael cipher (now AES)

@author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
@author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
@author Paulo Barreto <paulo.barreto@terra.com.br>

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# 1.3929 environment-modules 5.3.0-2.el9

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Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library. The
threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data
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b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a

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---

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To: Hans de Goede <hdegoede@redhat.com>
CC: Huzaifa Sidhpurwala <huzaifas@redhat.com>
Subject: Re: License question about v4l1-compat.c
References: <4BF2445B.2080203@redhat.com>
In-Reply-To: <4BF2445B.2080203@redhat.com>
Content-Type: text/plain;
charset=ISO-8859-1; format=flowed
Content-Transfer-Encoding: 7bit
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X-AntiAbuse: Primary Hostname - gs8.inmotionhosting.com
X-AntiAbuse: Original Domain - redhat.com
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X-Source:
X-Source-Args:
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X-RedHat-Spam-Score: 0 ()
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X-Scanned-By: MIMEDefang 2.67 on 10.5.110.6

Hi, Hans. Nice to 'meet' you.

Yes, that's fine. Take what you need from my code and use it in your
LGPL licensed library. I'm all in favor of removing v4l1 from the kernel.

Bill.

On 5/18/2010 12:40 AM, Hans de Goede wrote:
> Hi Bill,
>
> AFAIK you've been out of the v4l loop, so I assume you
> don't know me, this let me start with a shot self introduction:
>
> I'm a Linux enthusiast / developer. Amongst other things I've
> ported over many webcam drivers from v4l1
 to v4l2 and I'm the
> author and maintainer of libv4l.
>
> Let me also quickly introduce libv4l about 3 years ago I had
> too much free time and was looking for a hobby project and I
> decided that improving webcam support under Linux would be
> a nice project. At that time there were many webcam driver but
> most of them were out of tree, including the gspca driver
> which is a usb webcam driver framework supporting a lot
> of different chipsets.
>
> One problem with getting these merged is that a lot of webcam
> chipsets produce proprietary (compressed) video formats, which
> apps don't understand. The out of tree drivers all "fixed" this
> by doing decompression and video format conversion inside the
> kernel.
>
> This was not acceptable thus it was time to write a library
> to sit between v4l2 apps and devices which could do format
> conversion if necessary. This resulted in libv4l2 and
> libv4lconvert being written, with libv4l2 being the glue sitting
> in between and libv4lconvert
 doing the actual conversion.
>
> But this did not help v4l1 apps, so I also wrote libv4l1 for those.
>
> Both libv4l1 and libv4l2 work by emulating the raw device API, all
> one needs to do is write v4lx_open instead of plain open when opening
> the device and them use v4lx_ioctl, etc. on the resulting fd instead
> of their plain versions. This serves 2 purposes:
> 1) It makes porting of apps the the library trivial
> 2) It allows for an LD_PRELOAD shim (used for proprietary apps such
>  as skype).
>
> And now (finally) my question to you, lately we (the v4l devs) have
> been working on removing the last bits of v4l1 from the kernel.

> We would like to also remove the v4l1 ioctl compatibility (*), but
> currently libv4l1 depends on the v4l1 ioctl compatibility for some
> ioctls.
>
> Fixing this comes down to looking at what the kernel compat code
> does and then implementing that in libv4l1. This will likely involve
> some direct copying and libv4l1 is licensed under the LGPL rather
>
 then the GPL. Thus my question is would it be ok to use your v4l1 compat
> code under the LGPL inside libv4l1 ?
>
> Thanks & Regards,
>
> Hans
>
>
> (*) As in practice v4l1 apps need libv4l1 anyways both for format
> conversion and because some v4l2 drivers don't implement VIDIOCGMBUF
> including rather important ones like the UVC driver, thus we've
> come to the conclusion that we might just as well drop the
> compatibility from the kernel
>

##########################################################################################

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zmta02.collab.prod.int.phx2.redhat.com) (10.5.5.32) by
mail06.corp.redhat.com with LMTP; Wed, 19 May 2010 04:25:49 -0400 (EDT)
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 for <hdegoede@redhat.com>; Wed, 19 May 2010 04:25:47 -0400
Message-ID: <4BF3A088.4050101@redhat.com>
Date: Wed, 19 May 2010 10:25:44 +0200
From: Gerd Hoffmann <kraxel@redhat.com>

User-Agent: Mozilla/5.0 (X11; U; Linux x86_64; en-US; rv:1.9.1.9) Gecko/20100430 Fedora/3.0.4-2.fc12
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MIME-Version: 1.0
To: Hans de Goede <hdegoede@redhat.com>
Subject: Re: Re-licensing v4l1-compat.c code which you wrote
References: <4BF3A064.7080602@redhat.com>
In-Reply-To: <4BF3A064.7080602@redhat.com>
Content-Type: text/plain; charset=ISO-8859-1; format=flowed
Content-Transfer-Encoding: 7bit
X-Scanned-By: MIMEDefang 2.67 on 10.5.11.21

  Hi,

> My question to you is would it be ok to use your v4l1 compat
> contributions under the LGPL inside libv4l1 ?

Fine with me.

cheers,
  Gerd

##########################################################################

Return-Path: hverkuil@xs4all.nl
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 Wed, 19 May 2010 04:27:51 -0400
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 Wed, 19 May 2010 10:27:45

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(envelope-from hverkuil@xs4all.nl)
Received: from 62.70.2.252
(SquirrelMail authenticated user hverkuil)
by webmail.xs4all.nl with HTTP;
Wed, 19 May 2010 10:27:50 +0200
Message-ID: <3968c0dc456676eb0b1652936d795482.squirrel@webmail.xs4all.nl>
In-Reply-To: <4BF3A064.7080602@redhat.com>
References: <4BF3A064.7080602@redhat.com>
Date: Wed, 19 May 2010 10:27:50 +0200
Subject: Re: Re-licensing v4l1-compat.c code which you wrote
From: "Hans Verkuil" <hverkuil@xs4all.nl>
To: "Hans de Goede" <hdegoede@redhat.com>
Cc: "Gerd Hoffmann" <kraxel@redhat.com>,
"Mauro Carvalho Chehab" <mchehab@redhat.com>,
"Trent Piepho" <xyzzy@speakeasy.org>,
"Huzaifa Sidhpurwala" <huzaifas@redhat.com>
User-Agent: SquirrelMail/1.4.18
MIME-Version: 1.0
Content-Type: text/plain;charset=iso-8859-1
Content-Transfer-Encoding: 8bit
X-Virus-Scanned: by XS4ALL Virus Scanner
X-RedHat-Spam-Score: -0.02 (RCVD_IN_DNSWL_NONE,T_RP_MATCHES_RCVD)
X-Scanned-By: MIMEDefang
2.67 on 10.5.11.16
X-Scanned-By: MIMEDefang 2.67 on 10.5.110.14

> Hi All,
>
> I'm writing you all because you've contributed patches
> to the kernels v4l1 ioctl compat code living in v4l1-compat.c
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> Most of you already know me, and know that I'm working on
> making libv4l1 become independent of the kernel v4l1 ioctl
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> For those who don't know me or the v4l1 cleanup effort,
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> Making libv4l1 independent of the v4l1-compat.c code in the
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> some direct copying and libv4l1 is licensed under the LGPL rather
> then the GPL. I already have permission from Bill Dirks who wrote
> the initial v4l1-compat code to do this.
>
> My question to you is would it be ok to use your v4l1 compat

> contributions under the LGPL inside libv4l1 ?

Permission granted.

Looking
 forward to seeing this in libv4l1 so we can kill this legacy code
in the kernel.

Regards,

Hans Verkuil

>
> Thanks & Regards,
>
> Hans
>
>
> The long story:
>
> I'm a Linux enthusiast / developer. Amongst other things I've
> ported over many webcam drivers from v4l1 to v4l2 and I'm the
> author and maintainer of libv4l.
>
> Let me also quickly introduce libv4l about 3 years ago I had
> too much free time and was looking for a hobby project and I
> decided that improving webcam support under Linux would be
> a nice project. At that time there were many webcam driver but
> most of them were out of tree, including the gspca driver
> which is a usb webcam driver framework supporting a lot
> of different chipsets.
>
> One problem with getting these merged is that a lot of webcam
> chipsets produce proprietary (compressed) video formats, which
> apps don't understand. The out of tree drivers all "fixed" this
> by doing decompression and video format conversion inside the
> kernel.
>
>
 This was not acceptable thus it was time to write a library
> to sit between v4l2 apps and devices which could do format
> conversion if necessary. This resulted in libv4l2 and
> libv4lconvert being written, with libv4l2 being the glue sitting
> in between and libv4lconvert doing the actual conversion.
>
> But this did not help v4l1 apps, so I also wrote libv4l1 for those.
>
> Both libv4l1 and libv4l2 work by emulating the raw device API, all

> one needs to do is write v4lx_open instead of plain open when opening
> the device and them use v4lx_ioctl, etc. on the resulting fd instead
> of their plain versions. This serves 2 purposes:
> 1) It makes porting of apps the the library trivial
> 2) It allows for an LD_PRELOAD shim (used for proprietary apps such
>  as skype).
>
> Lately we (the v4l devs) have been working on removing the last bits
> of v4l1 from the kernel. We would like to also remove the v4l1 ioctl
> compatibility (*), but currently libv4l1 depends on the v4l1 ioctl
>
 compatibility for some ioctls, we are working on fixing this
> which involves re-using code from v4l1-compat.c, hence the
> re-licensing permission question.
>
> (*) As in practice v4l1 apps need libv4l1 anyways both for format
> conversion and because some v4l2 drivers don't implement VIDIOCGMBUF
> including rather important ones like the UVC driver, thus we've
> come to the conclusion that we might just as well drop the
> compatibility from the kernel.
>

--
Hans Verkuil - video4linux developer - sponsored by TANDBERG, part of Cisco

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mail06.corp.redhat.com with LMTP; Wed, 19 May 2010 10:25:02 -0400 (EDT)
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 with ESMTP id 8lqJbX3fk3W4; Wed, 19 May 2010 10:25:02 -0400 (EDT)
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Date: Wed, 19 May 2010 11:24:57 -0300
From: Mauro Carvalho Chehab <mchehab@kernel.org>
User-Agent: Thunderbird 2.0.0.22 (X11/20090609)
MIME-Version: 1.0
To: Hans de Goede <hdegoede@redhat.com>
CC: Gerd Hoffmann
 <kraxel@redhat.com>, Hans Verkuil <hverkuil@xs4all.nl>,
 Trent Piepho <xyzzy@speakeasy.org>,
 Huzaifa Sidhpurwala <huzaifas@redhat.com>
Subject: Re: Re-licensing v4l1-compat.c code which you wrote
References: <4BF3A064.7080602@redhat.com>
In-Reply-To: <4BF3A064.7080602@redhat.com>
Content-Type: text/plain; charset=ISO-8859-1
Content-Transfer-Encoding: 7bit
X-Scanned-By: MIMEDefang 2.67 on 10.5.11.21

Hans de Goede wrote:
> Hi All,
>
> I'm writing you all because you've contributed patches
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> the initial v4l1-compat code to do this.
>
> My question to you is would it be ok to use your v4l1 compat
> contributions under the LGPL inside libv4l1 ?

LGPL for v4l1-compat code is fine for me.

Cheers,
Mauro

##########################################################################################

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Version 2.1, February 1999

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The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.
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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

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running a program using the Library is not restricted, and output from
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b) You must cause the files modified to carry prominent notices
stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no
charge to all third parties under the terms of this License.

d) If a facility in the modified
Library refers to a function or a
table of data to be supplied by an application program that uses
the facility, other than as an argument passed when the facility
is invoked, then you must make a good faith effort to ensure that,
in the event an application does not supply such function or
table, the facility still operates, and performs whatever part of
its purpose remains meaningful.

(For example, a function in a library to compute square roots has
a purpose that is entirely well-defined independent of the

application.  Therefore, Subsection 2d requires that any
application-supplied function or table used by this function must
be optional: if the application does not supply it, the square
root function must still compute square roots.)

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identifiable sections of that work are not derived from the Library,
and can be reasonably considered independent and separate works
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themselves, then this License, and its terms, do not apply to those
sections when you distribute them as separate works.  But when you
distribute the same sections as part of a whole which is a work based
on the Library, the distribution of the whole must be on the terms of
this License, whose permissions for other licensees extend to the
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it.

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your rights to work written entirely by you; rather, the intent is to
exercise the right to control the distribution of derivative or
collective works based on the Library.

In addition, mere aggregation of another work not based on the Library
with the Library (or with a work based on the Library) on a volume of
a storage or distribution medium does not bring the other work under
the scope of this License.

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License instead of this License
 to a given copy of the Library.  To do
this, you must alter all the notices that refer to this License, so
that they refer to the ordinary GNU General Public License, version 2,
instead of to this License.  (If a newer version than version 2 of the
ordinary GNU General Public License has appeared, then you can specify
that version instead if you wish.)  Do not make any other change in
these notices.
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 Once this change is made in a given copy, it is irreversible for
that copy, so the ordinary GNU General Public License applies to all
subsequent copies and derivative works made from that copy.

 This option is useful when you wish to copy part of the code of
the Library into a program that is not a library.

 4. You may copy and distribute the Library (or a portion or
derivative of it, under Section 2) in object code or executable form
under the terms of Sections 1 and 2 above provided that you accompany
it with the complete corresponding machine-readable source code, which

must
be distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

If distribution of object code is made by offering access to copy
from a designated place, then offering equivalent access to copy the
source code from the same place satisfies the requirement to
distribute the source code, even though third parties are not
compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the
Library, but is designed to work with the Library by being compiled or
linked with it, is called a "work that uses the Library". Such a
work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library
creates an executable that is a derivative of the Library (because it
contains portions of the Library), rather than a "work that uses the
library". The executable is therefore covered
by this License.
Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library. The
threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small inline
functions (ten lines or less in length), then the use of the object
file is unrestricted, regardless of whether it is legally a derivative
work. (Executables containing this object code plus portions of the
Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may
distribute the object code for the work under the terms of Section
6.
Any executables containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.
^L
6. As an exception to the Sections above, you may also combine or
link a "work that uses the Library" with the Library to produce a
work containing portions of the Library, and distribute that work
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modification of the work for the customer's own use and reverse

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a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is

normally distributed (in either source or binary form)
with the major
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which the executable runs, unless that component itself accompanies
the executable.

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/* nicstar.c v0.22 Jawaid Bazyar (bazyar@hypermall.com)
* nicstar.c, M. Welsh (matt.welsh@cl.cam.ac.uk)
*
* Hacked October, 1997 by Jawaid Bazyar, Interlink Advertising Services Inc.

```
*  http://www.hypermall.com/
* 10/1/97 - commented out CFG_PHYIE bit - we don't care when the PHY
* interrupts us (except possibly for removal/insertion of the cable?)
* 10/4/97 - began heavy inline documentation of the code. Corrected typos
* and spelling mistakes.
* 10/5/97 - added code to handle PHY interrupts, disable PHY on
* loss of link, and correctly re-enable PHY when link is
* re-established. (put back CFG_PHYIE)
*
*   Modified to work with the IDT7721 nicstar -- AAL5 (tested) only.
*
* R. D. Rechenmacher <ron@fnal.gov>, Aug. 6, 1997
*
* Linux driver for the IDT77201 NICStAR PCI ATM controller.
* PHY component is expected to be 155 Mbps S/UNI-Lite or IDT 77155;
* see init_nicstar() for PHY initialization to change this. This driver
* expects the Linux ATM stack to support scatter-gather
 lists
* (skb->atm.iovcnt != 0) for Rx skb's passed to vcc->push.
*
* Implementing minimal-copy of received data:
*   IDT always receives data into a small buffer, then large buffers
*     as needed. This means that data must always be copied to create
*     the linear buffer needed by most non-ATM protocol stacks (e.g. IP)
*     Fix is simple: make large buffers large enough to hold entire
*     SDU, and leave <small_buffer_data> bytes empty at the start. Then
*     copy small buffer contents to head of large buffer.
*   Trick is to avoid fragmenting Linux, due to need for a lot of large
*     buffers. This is done by 2 things:
*       1) skb->destructor / skb->atm.recycle_buffer
*            combined, allow nicstar_free_rx_skb to be called to
*            recycle large data buffers
*       2) skb_clone of received buffers
*   See nicstar_free_rx_skb and linearize_buffer for implementation
*     details.
*
*
*
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*
* M. Welsh, 6 July 1996
*
*
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# Purpose: This test checks SPDX-License-Identifier: tags in all source files against redhat/LICENSES.

load test-lib.bash

SPEC=$BATS_TEST_DIRNAME/../kernel.spec.template

ERRMSG="ERROR: The kernel RPM spec file License: field does not match the licenses available in the source
tree.
Fedora, Centos Stream, and RHEL require that the RPM License field match the licenses in the source tree.  See
https://docs.fedoraproject.org/en-US/legal/license-approval/ for further information.
A list of licenses can be generated by executing the redhat/scripts/license/kspdx.py utility.  New licenses can
be added to the RPM License field only if they are listed in the Allowed Licenses list
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(https://docs.fedoraproject.org/en-US/legal/license-review-process/)."

_verify_one_license_tag()
 {
 if [[ $(grep -c '^License:' $SPEC) != "1" ]]; then
    echo "ERROR: The specfile is supposed to have exactly one License: tag!"
```

```
    return 1
 fi
}

_verify_spdx_licenses() {
 spec_licenses=`mktemp`
 source_licenses=`mktemp`
 grep '^License:' $SPEC | sed 's,License[[:space:]]*:[[:space:]]*,,' | sed 's, AND ,\n,g' | sed 's,^(\(.*\))$,\1,' | sort -u >
$spec_licenses

 if ! $BATS_TEST_DIRNAME/../scripts/kspdx-tool/kspdx.py $BATS_TEST_DIRNAME/../../ > $source_licenses;
then
    echo "ERROR: Failed to gather SPDX-License-Identifier: information from source files!"
    return 1
 fi
 sort -o $source_licenses $source_licenses
 if ! diff -u $spec_licenses $source_licenses; then
     echo $ERRMSG
     ret=1
 else
     ret=0
 fi
 rm -f $spec_licenses $source_licenses
 return $ret
}

@test "Verify SPDX-License-Identifier tags" {
 if ! test -x $BATS_TEST_DIRNAME/../scripts/kspdx-tool/kspdx.py ;
 then
     skip "kspdx-tool is missing"
 fi

 run _verify_one_license_tag
 check_status

 _verify_spdx_licenses
 check_status
}
```

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The implementation for Utf8CharIndices was adapted from the
CharIndices implementation of the Rust standard library at revision
ab32548539ec38a939c1b58599249f3b54130026
(https://github.com/rust-lang/rust/blob/ab32548539ec38a939c1b58599249f3b54130026/library/core/src/str/iter.rs).

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name: license

on:
 pull_request:
   types: [opened, synchronize, reopened]
 push:
   branches:
     - main

jobs:
 check-license:
   name: Check License
   runs-on: ubuntu-latest
   timeout-minutes: 3

   steps:
     - uses: actions/checkout@v3
     - name: Check License Header
       uses: apache/skywalking-eyes@v0.3.0
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```
//! `ioctl` opcode behavior for BSD platforms.

use super::{Direction, RawOpcode};

pub(super) const fn compose_opcode(
   dir: Direction,
   group: RawOpcode,
   num: RawOpcode,
   size: RawOpcode,
) -> RawOpcode {
   let dir = match dir {
      Direction::None => NONE,
      Direction::Read => READ,
      Direction::Write => WRITE,
      Direction::ReadWrite => READ | WRITE,
   };

   dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}

// `IOC_VOID`
pub const NONE: RawOpcode = 0x2000_0000;
// `IOC_OUT` (out is from the perspective of the kernel)
pub const READ: RawOpcode = 0x4000_0000;
// `IOC_IN` (in is from the perspective of the kernel)
pub const WRITE: RawOpcode = 0x8000_0000;
pub const IOCPARAM_MASK: RawOpcode = 0x1FFF;
```

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```
/// The datatype used for the ioctl number
#[doc(hidden)]
#[cfg(not(solarish))]
pub type ioctl_num_type = ::libc::c_ulong;

#[doc(hidden)]
#[cfg(solarish)]
pub type ioctl_num_type = ::libc::c_int;

/// The datatype used for the 3rd argument
#[doc(hidden)]
pub type ioctl_param_type = ::libc::c_int;

mod consts {
  use crate::sys::ioctl::ioctl_num_type;
  #[doc(hidden)]
  pub const VOID: ioctl_num_type = 0x2000_0000;
  #[doc(hidden)]
  pub const OUT: ioctl_num_type = 0x4000_0000;
  #[doc(hidden)]
  #[allow(overflowing_literals)]
  pub const IN: ioctl_num_type = 0x8000_0000;
  #[doc(hidden)]
  pub const INOUT: ioctl_num_type = IN | OUT;
  #[doc(hidden)]
  pub const IOCPARM_MASK: ioctl_num_type = 0x1fff;
}

pub use self::consts::*;

#[macro_export]
#[doc(hidden)]
macro_rules! ioc {
  ($inout:expr, $group:expr, $num:expr, $len:expr) => {
    $inout
      | (($len as $crate::sys::ioctl::ioctl_num_type
        & $crate::sys::ioctl::IOCPARM_MASK)

        << 16)
      | (($group as $crate::sys::ioctl::ioctl_num_type) << 8)
      | ($num as $crate::sys::ioctl::ioctl_num_type)
  };
}

/// Generate an ioctl request code for a command that passes no data.
```

```
///
/// This is equivalent to the `_IO()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_none!()` directly.
///
/// # Example
///
/// ```
/// # #[macro_use] extern crate nix;
/// const KVMIO: u8 = 0xAE;
/// ioctl_write_int_bad!(kvm_create_vm, request_code_none!(KVMIO, 0x03));
/// # fn main() {}
/// ```
#[macro_export(local_inner_macros)]
macro_rules! request_code_none {
  ($g:expr, $n:expr) => {
      ioc!($crate::sys::ioctl::VOID, $g, $n, 0)
  };
}

/// Generate an ioctl request code for a command that passes an integer
///
/// This is equivalent to the `_IOWINT()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the
 `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write_int!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write_int {
  ($g:expr, $n:expr) => {
      ioc!(
          $crate::sys::ioctl::VOID,
          $g,
          $n,
          ::std::mem::size_of::<$crate::libc::c_int>()
      )
  };
}

/// Generate an ioctl request code for a command that reads.
///
/// This is equivalent to the `_IOR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_read!()` directly.
///
/// The read/write direction is relative to userland, so this
```

```
/// command would be userland is reading and the kernel is
/// writing.
#[macro_export(local_inner_macros)]
macro_rules! request_code_read {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::OUT, $g, $n, $len)
   };
}

/// Generate an ioctl request code for a command that writes.
///
///
 This is equivalent to the `_IOW()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is writing and the kernel is
/// reading.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::IN, $g, $n, $len)
   };
}

/// Generate an ioctl request code for a command that reads and writes.
///
/// This is equivalent to the `_IOWR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_readwrite!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_readwrite {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::INOUT, $g, $n, $len)

 };
}
```

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//! `ioctl` opcode behavior for BSD platforms.

```
use super::{Direction, Opcode};

pub(super) const fn compose_opcode(
   dir: Direction,
   group: Opcode,
   num: Opcode,
   size: Opcode,
) -> Opcode {
   let dir = match dir {
       Direction::None => NONE,
       Direction::Read => READ,
       Direction::Write => WRITE,
       Direction::ReadWrite => READ | WRITE,
   };

   dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}

// `IOC_VOID`
pub const NONE: Opcode = 0x2000_0000;
// `IOC_OUT` (out is from the perspective of the kernel)
pub const READ: Opcode = 0x4000_0000;
// `IOC_IN` (in is from the perspective of the kernel)
pub const WRITE: Opcode = 0x8000_0000;
pub const IOCPARAM_MASK: Opcode = 0x1FFF;
```

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```
use crate::errno::Errno;
use crate::sys::signal::Signal;
use crate::unistd::Pid;
use crate::Result;
use cfg_if::cfg_if;
use libc::{self, c_int};
use std::ptr;

pub type RequestType = c_int;

cfg_if! {
  if #[cfg(any(freebsdlike, apple_targets, target_os = "openbsd"))] {
      #[doc(hidden)]
      pub type AddressType = *mut ::libc::c_char;
  } else {
      #[doc(hidden)]
      pub type AddressType = *mut ::libc::c_void;
  }
}

libc_enum! {
  #[repr(i32)]
  /// Ptrace Request enum defining the action to be taken.
  #[non_exhaustive]
  pub enum Request {
      PT_TRACE_ME,
      PT_READ_I,
      PT_READ_D,
      #[cfg(apple_targets)]
      PT_READ_U,
```

```
        PT_WRITE_I,
        PT_WRITE_D,
        #[cfg(apple_targets)]
        PT_WRITE_U,
        PT_CONTINUE,
        PT_KILL,
        #[cfg(any(any(freebsdlike, apple_targets),
                all(target_os = "openbsd", target_arch = "x86_64"),
                all(target_os = "netbsd", any(target_arch = "x86_64",
                                    target_arch = "powerpc"))))]
        PT_STEP,
        PT_ATTACH,
        PT_DETACH,
        #[cfg(apple_targets)]
        PT_SIGEXC,
        #[cfg(apple_targets)]
        PT_THUPDATE,
        #[cfg(apple_targets)]
        PT_ATTACHEXC
    }
}

unsafe fn ptrace_other(
    request: Request,
    pid: Pid,
    addr: AddressType,
    data: c_int,
) -> Result<c_int> {
    unsafe {
        Errno::result(libc::ptrace(
            request as RequestType,
            libc::pid_t::from(pid),
            addr,
            data,
        ))
        .map(|_| 0)
    }
}

/// Sets the process as traceable, as with `ptrace(PT_TRACEME, ...)`
///
/// Indicates that this process is to be traced by its parent.
/// This is the only ptrace request to be issued by the tracee.
pub fn traceme() -> Result<()> {
    unsafe {
        ptrace_other(Request::PT_TRACE_ME, Pid::from_raw(0), ptr::null_mut(), 0)
            .map(drop)
    }
```

```
}

/// Attach to a running
 process, as with `ptrace(PT_ATTACH, ...)`
///
/// Attaches to the process specified by `pid`, making it a tracee of the calling process.
pub fn attach(pid: Pid) -> Result<()> {
   unsafe {
       ptrace_other(Request::PT_ATTACH, pid, ptr::null_mut(), 0).map(drop)
   }
}

/// Detaches the current running process, as with `ptrace(PT_DETACH, ...)`
///
/// Detaches from the process specified by `pid` allowing it to run freely, optionally delivering a
/// signal specified by `sig`.
pub fn detach<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
   let data = match sig.into() {
       Some(s) => s as c_int,
       None => 0,
   };
   unsafe {
       ptrace_other(Request::PT_DETACH, pid, ptr::null_mut(), data).map(drop)
   }
}

/// Restart the stopped tracee process, as with `ptrace(PTRACE_CONT, ...)`
///
/// Continues the execution of the process with PID `pid`, optionally
/// delivering a signal specified by `sig`.
pub fn cont<T: Into<Option<Signal>>>(pid: Pid, sig: T)
 -> Result<()> {
   let data = match sig.into() {
       Some(s) => s as c_int,
       None => 0,
   };
   unsafe {
       // Ignore the useless return value
       ptrace_other(Request::PT_CONTINUE, pid, 1 as AddressType, data)
           .map(drop)
   }
}

/// Issues a kill request as with `ptrace(PT_KILL, ...)`
///
/// This request is equivalent to `ptrace(PT_CONTINUE, ..., SIGKILL);`
pub fn kill(pid: Pid) -> Result<()> {
   unsafe {
```

```
        ptrace_other(Request::PT_KILL, pid, 0 as AddressType, 0).map(drop)
    }
}

/// Move the stopped tracee process forward by a single step as with
/// `ptrace(PT_STEP, ...)`
///
/// Advances the execution of the process with PID `pid` by a single step optionally delivering a
/// signal specified by `sig`.
///
/// # Example
/// ```rust
/// use nix::sys::ptrace::step;
/// use nix::unistd::Pid;
/// use nix::sys::signal::Signal;
/// use nix::sys::wait::*;
/// // If a process changes state to the stopped state because of a SIGUSR1
/// // signal,
 this will step the process forward and forward the user
/// // signal to the stopped process
/// match waitpid(Pid::from_raw(-1), None) {
///     Ok(WaitStatus::Stopped(pid, Signal::SIGUSR1)) => {
///         let _ = step(pid, Signal::SIGUSR1);
///     }
///     _ => {},
/// }
/// ```
#[cfg(any(
    any(freebsdlike, apple_targets),
    all(target_os = "openbsd", target_arch = "x86_64"),
    all(
        target_os = "netbsd",
        any(target_arch = "x86_64", target_arch = "powerpc")
    )
))]
pub fn step<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
    let data = match sig.into() {
        Some(s) => s as c_int,
        None => 0,
    };
    unsafe {
        ptrace_other(Request::PT_STEP, pid, ptr::null_mut(), data).map(drop)
    }
}

/// Reads a word from a processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
```

```
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn read(pid: Pid, addr: AddressType)
 -> Result<c_int> {
   unsafe {
       // Traditionally there was a difference between reading data or
       // instruction memory but not in modern systems.
       ptrace_other(Request::PT_READ_D, pid, addr, 0)
   }
}

/// Writes a word into the processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn write(pid: Pid, addr: AddressType, data: c_int) -> Result<()> {
   unsafe { ptrace_other(Request::PT_WRITE_D, pid, addr, data).map(drop) }
}
```

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CharIndices implementation of the Rust standard library at revision
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(https://github.com/rust-lang/rust/blob/ab32548539ec38a939c1b58599249f3b54130026/library/core/src/str/iter.rs).

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2.824,-0.274],[-10.223,0],[-0.961,-9.777],[9.59,0],[0,0],[-0.045,1.919],[-3.909,-0.275],[0.356,-5.209],[-0.109,-
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15.598,-1.828],[-2.335,-37.01],[10.417,-17.819],[12.652,-18.184],[11.667,-7.767],[-0.326,-7.218],[-0.083,-
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7.909,36.051],[-9.032,7.264],[-12.778,-25.359],[-17.186,-24.993],[-16.841,-36.782],[0.187,-36.508],[10.008,-30.659],[14.134,-15.764],[4.021,6.351],[4.04,6.626],[14.836,17.317],[14.303,27.734],[17.186,27.552]],"c":true}},"nm":"Path 2","mn":"ADBE Vector Shape - Group"},{"ty":"mm","mm":5,"nm":"Merge Paths 1","mn":"ADBE Vector Filter - Merge"},{"ty":"fl","fillEnabled":true,"c":{"k":[0.11,0.12,0.3,1]},"o":{"k":100},"nm":"Fill 1","mn":"ADBE Vector Graphic - Fill"},{"ty":"tr","p":{"k":[247.179,459.487],"ix":2},"a":{"k":[0,0],"ix":1},"s":{"k":[100,100],"ix":3},"r":{"k":0,"ix":6},"o":{"k":100,"ix":7},"sk":{"k":0,"ix":4},"sa":{"k":0,"ix":5},"nm":"Transform"}],"nm":"Group 6","np":4,"mn":"ADBE Vector Group"},{"ty":"gr","it":[{"ind":0,"ty":"sh","ks":{"k":{"i":[[-0.128,-0.548],[0,0],[-0.927,-13.159],[0,0],[-1,-5.209],[0,0],[-1.012,-11.789],[0,0],[-0.122,-0.457],[0,0],[0.741,14.348],[0.109,1.554],[1.809,0],[0.033,0.457],[-1.254,0.183]],"o":[[-10.875,-0.274],[0,0],[10.876,-1.005],[0,0],[-6.106,-0.639],[0,0],[0,0],[0.683,8.407],[0,0],[0.473,-3.564],[-0.738,-14.348],[-0.834,-0.274],[-0.017,-7.951],[13.564,1.188],[-0.525,7.951]],"v":[[12.546,-24.994],[0.514,-24.994],[0.888,3.426],[11.758,2.329],[12.756,12.656],[1.796,12.474],[2.692,25.176],[13.245,24.719],[14.385,35.776],[-8.09,36.508],[-8.031,5.254],[-9.89,-24.994],[-14.252,-25.268],[-14.385,-36.143],[12.097,-36.509]],"c":true}},"nm":"Path 1","mn":"ADBE Vector Shape - Group"},{"ty":"fl","fillEnabled":true,"c":{"k":[0.11,0.12,0.3,1]},"o":{"k":100},"nm":"Fill 1","mn":"ADBE Vector Graphic - Fill"},{"ty":"tr","p":{"k":[213.762,459.852],"ix":2},"a":{"k":[0,0],"ix":1},"s":{"k":[100,100],"ix":3},"r":{"k":0,"ix":6},"o":{"k":100,"ix":7},"sk":{"k":0,"ix":4},"sa":{"k":0,"ix":5},"nm":"Transform"}],"nm":"Group 7","np":2,"mn":"ADBE Vector Group"},{"ty":"gr","it":[{"ind":0,"ty":"sh","ks":{"k":{"i":[[10.856,0],[2.55,6.672],[0.977,-0.274],[0,0],[-3.749,0.73],[-0.245,-2.193],[-3.075,0],[0.413,3.29],[0.646,1.462],[2.805,0],[0.993,8.957],[-13.027,0],[-0.8,-7.493],[0,0],[0.692,-1.737],[3.871,-0.275],[0.555,5.3],[2.262,0],[-0.341,-3.565],[-2.083,-19.283]],"o":[[-6.876,0],[-0.989,0.091],[0,0],[3.949,-0.457],[-0.207,2.193],[0.239,2.102],[4.162,0],[-0.11,-1.554],[-2.824,-0.274],[-10.223,0],[-0.96,-9.777],[9.59,0],[0,0],[-0.046,1.919],[-3.909,-0.275],[0.357,-5.209],[-0.109,-1.554],[-3.528,0],[1.703,16.449],[0.935,9.412]],"v":[[1.705,37.01],[-13.039,26.776],[-16.084,27.233],[-15.125,19.009],[-3.692,16.907],[-3.681,23.486],[0.84,31.161],[5.516,16.632],[4.283,11.972],[-4.163,11.515],[-15.598,-1.828],[-2.335,-37.01],[10.417,-17.819],[12.653,-18.184],[11.667,-7.767],[-0.326,-7.218],[-0.083,-23.029],[-2.854,-27.689],[-6.951,-4.934],[15.623,14.988]],"c":true}},"nm":"Path 1","mn":"ADBE Vector Shape - Group"},{"ty":"fl","fillEnabled":true,"c":{"k":[0.11,0.12,0.3,1]},"o":{"k":100},"nm":"Fill 1","mn":"ADBE Vector Graphic - Fill"},{"ty":"tr","p":{"k":[182.862,458.984],"ix":2},"a":{"k":[0,0],"ix":1},"s":{"k":[100,100],"ix":3},"r":{"k":0,"ix":6},"o":{"k":100,"ix":7},"sk":{"k":0,"ix":4},"sa":{"k":0,"ix":5},"nm":"Transform"}],"nm":"Group 8","np":2,"mn":"ADBE Vector Group"},{"ty":"gr","it":[{"ind":0,"ty":"sh","ks":{"k":{"i":[[-0.779,-11.058],[-1.244,-12.519],[2.863,-0.456],[5.057,10.145],[0,0],[-1.795,-8.772],[3.483,-0.64],[0.773,10.966],[1.269,10.327],[0,0],[-0.589,3.199],[-3.857,0.457],[-1.828,-1.554],[1.671,12.153],[-3.043,0.457]],"o":[[0.889,12.61],[-2.888,0.091],[-2.569,-10.784],[0,0],[0.533,8.864],[-3.541,-0.183],[-0.404,-10.875],[-0.727,-10.327],[0,0],[0.137,-3.198],[3.98,0],[0.736,2.741],[-0.952,-12.245],[3.082,0.091],[0.23,10.966]],"v":[[14.277,-2.284],[17.931,35.457],[9.207,36.188],[-1.363,3.015],[-0.983,9.687],[2.164,36.371],[-8.474,36.919],[-10.145,4.204],[-13.51,-26.867],[-17.931,-26.684],[-17.172,-36.462],[-5.353,-36.919],[7.057,1.828],[3.823,-35.091],[13.122,-35.366]],"c":true}},"nm":"Path 1","mn":"ADBE Vector Shape - Group"},{"ty":"fl","fillEnabled":true,"c":{"k":[0.11,0.12,0.3,1]},"o":{"k":100},"nm":"Fill 1","mn":"ADBE Vector Graphic - Fill"},{"ty":"tr","p":{"k":[383.683,357.858],"ix":2},"a":{"k":[0,0],"ix":1},"s":{"k":[100,100],"ix":3},"r":{"k":0,"ix"

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0.873,0.457]],"v":[[3.732,-8.499],[3.636,-14.986],[-1.045,-28.786],[-
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1.095]],"o":[[-5.964,0.092],[-0.526,-15.17],[-0.418,-5.94],[-1.267,0],[0.201,-2.284],[5.246,0],[-
1.546,6.306],[0.483,6.854],[4.408,-0.366],[-0.195,2.377],[0.136,1.919],[-1.176,0]],"v":[[10.329,36.645],[-
7.475,36.919],[-9.376,-8.042],[-11.258,-25.77],[-15.479,-25.313],[-14.137,-35.822],[-1.098,-36.919],[-
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0.286],[0,0],[0.464,8.984],[0.069,0.973],[1.134,0],[0.02,0.286],[-0.786,0.114]],"o":[[-6.811,-0.171],[0,0],[6.812,-
0.629],[0,0],[-3.823,-0.4],[0,0],[0,0],[0.427,5.265],[0,0],[0.296,-2.232],[-0.463,-8.985],[-0.521,-0.171],[-0.01,-
4.979],[8.494,0.744],[-0.329,4.979]],"v":[[7.856,-15.652],[0.322,-
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8.667,26],[1.354,12.182]],"o":[[-12.369,3.383],[-2.333,14.667],[-3.49,8.301],[0.834,10],[-
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CMake was initially developed by Kitware with the following sponsorship:

* National Library of Medicine at the National Institutes of Health
  as part of the Insight Segmentation and Registration Toolkit (ITK).

* US National Labs (Los Alamos, Livermore, Sandia) ASC Parallel
  Visualization Initiative.

* National Alliance for Medical Image Computing (NAMIC) is funded by the
  National Institutes of Health through the NIH Roadmap for Medical Research,
  Grant U54 EB005149.

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@subheading Preamble

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This license, the Lesser General Public License, applies to some specially designated software---typically libraries---of the Free Software Foundation and other authors who decide to use it. You can use it too, but we suggest you first think carefully about whether this license or the ordinary General Public License is the better strategy to use in any particular case, based on the explanations below.

When we speak of free software, we are referring to freedom of use, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish); that you receive source code or can get it if you want it; that you can change the software and use pieces of it in new free programs; and that you are informed that you can do these things.

To protect your rights, we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights. These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it.

For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link other code with the library, you must provide complete object files to the recipients, so that they can relink them with the library after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

We protect your rights with a two-step method: (1) we copyright the library, and (2) we offer you this license, which gives you legal permission to copy, distribute and/or modify the library.

To protect each distributor, we want to make it very clear that there is no warranty for the free library. Also, if the library is modified by someone else and passed on, the recipients should know that what they have is not the original version, so that the original author's reputation will not be affected by problems that might be introduced by others.

Finally, software patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder. Therefore, we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the @dfn{Lesser} General Public License because it does @emph{Less} to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a ``work based on the library'' and a ``work that uses the library''. The former
contains code derived from the library, whereas the latter must be combined with the library in order to run.

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@enumerate 0
@item
This License Agreement applies to any software library or other program which contains a notice placed by the copyright holder or other authorized party saying it may be distributed under the terms of this Lesser General Public License (also called ``this License''). Each licensee is addressed as ``you''.

A ``library'' means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The ``Library'', below, refers to any such software library or work which has been distributed under these terms. A ``work based on the Library'' means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it,
either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term ``modification''.)

``Source code'' for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

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You may modify your copy or copies of the Library or any portion
of it, thus forming a work based on the Library, and copy and
distribute such modifications or work under the terms of Section 1
above, provided that you also meet all of these conditions:

@enumerate a
@item
The modified work must itself be a software library.

@item
You must cause the files modified to carry prominent notices
stating that you changed the files and the date of any change.

@item
You must
cause the whole of the work to be licensed at no
charge to all third parties under the terms of this License.

@item
If a facility in the modified Library refers to a function or a
table of data to be supplied by an application program that uses
the facility, other than as an argument passed when the facility
is invoked, then you must make a good faith effort to ensure that,
in the event an application does not supply such function or
table, the facility still operates, and performs whatever part of
its purpose remains meaningful.

(For example, a function in a library to compute square roots has
a purpose that is entirely well-defined independent of the
application. Therefore, Subsection 2d requires that any
application-supplied function or table used by this function must
be optional: if the application does not supply it, the square

root function must still compute square roots.)
@end enumerate

These requirements apply to the modified work as a whole. If identifiable sections
of that work are not derived from the Library,
and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this
License.

@item
You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

@item
You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and

2 above provided that you accompany
it with the complete corresponding machine-readable source code, which
must be distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

If distribution of object code is made by offering access to copy
from a designated place, then offering equivalent access to copy the
source code from the same place satisfies the requirement to
distribute the source code, even though third parties are not
compelled to copy the source along with the object code.

@item
A program that contains no derivative of any portion of the
Library, but is designed to work with the Library by being compiled or
linked with it, is called a ``work that uses the Library''. Such a
work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

However, linking a ``work that uses the Library'' with the Library
creates an executable that is a derivative of the Library (because
it
contains portions of the Library), rather than a ``work that uses the
library''. The executable is therefore covered by this License.
Section 6 states terms for distribution of such executables.

When a ``work that uses the Library'' uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library. The
threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small inline
functions (ten lines or less in length), then the use of the object
file is unrestricted, regardless of whether it is legally a derivative
work. (Executables containing this object code plus portions of the
Library will still fall under Section 6.)

Otherwise,
if the work is a derivative of the Library, you may
distribute the object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.

@item
As an exception to the Sections above, you may also combine or
link a ``work that uses the Library'' with the Library to produce a

work containing portions of the Library, and distribute that work
under terms of your choice, provided that the terms permit
modification of the work for the customer's own use and reverse
engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the
Library is used in it and that the Library and its use are covered by
this License. You must supply a copy of this License. If the work
during execution displays copyright notices, you must include the
copyright notice for the Library among them, as well as a reference
directing the user to the copy of
this License. Also, you must do one
of these things:

@enumerate a
@item
Accompany the work with the complete corresponding
machine-readable source code for the Library including whatever
changes were used in the work (which must be distributed under
Sections 1 and 2 above); and, if the work is an executable linked
with the Library, with the complete machine-readable ``work that
uses the Library'', as object code and/or source code, so that the
user can modify the Library and then relink to produce a modified
executable containing the modified Library. (It is understood
that the user who changes the contents of definitions files in the
Library will not necessarily be able to recompile the application
to use the modified definitions.)

@item
Use a suitable shared library mechanism for linking with the Library. A
suitable mechanism is one that (1) uses at run time a copy of the
library already present on the user's computer system, rather than
copying library functions into the executable,
and (2) will operate
properly with a modified version of the library, if the user installs
one, as long as the modified version is interface-compatible with the
version that the work was made with.

@item
Accompany the work with a written offer, valid for at
least three years, to give the same user the materials
specified in Subsection 6a, above, for a charge no more
than the cost of performing this distribution.

@item
If distribution of the work is made by offering access to copy
from a designated place, offer equivalent access to copy the above
specified materials from the same place.

@item
Verify that the user has already received a copy of these
materials or that you have already sent this user a copy.
@end enumerate

For an executable, the required form of the ``work that uses the
Library" must include any data and utility programs needed for
reproducing the executable from it. However, as a special exception,
the materials to be distributed need not include anything that
is
normally distributed (in either source or binary form) with the major
components (compiler, kernel, and so on) of the operating system on
which the executable runs, unless that component itself accompanies the
executable.

It may happen that this requirement contradicts the license
restrictions of other proprietary libraries that do not normally
accompany the operating system. Such a contradiction means you cannot
use both them and the Library together in an executable that you
distribute.

@item
You may place library facilities that are a work based on the
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facilities not covered by this License, and distribute such a combined
library, provided that the separate distribution of the work based on
the Library and of the other library facilities is otherwise
permitted, and provided that you do these two things:

@enumerate a
@item
Accompany the combined library with a copy of the same work
based on the Library,
uncombined with any other library
facilities. This must be distributed under the terms of the
Sections above.

@item
Give prominent notice with the combined library of the fact
that part of it is a work based on the Library, and explaining
where to find the accompanying uncombined form of the same work.
@end enumerate

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@end enumerate

@subheading END OF TERMS AND CONDITIONS

@page
@subheading How to Apply These Terms to Your New Libraries

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redistribution under these terms (or, alternatively, under the terms of the
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To apply these terms, attach the following notices to the library. It is
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USA.
@end
smallexample

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`Frob' (a library for tweaking knobs) written by James Random Hacker.

@var{signature of Ty Coon}, 1 April 1990
Ty Coon, President of Vice
@end smallexample

That's all there is to it!

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Version 3, 29 June 2007

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For example, if you distribute copies of such a program, whether gratis or for a fee, you must pass on to the recipients the same freedoms that you received. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

Developers that use the GNU GPL protect your rights with two steps: (1) assert copyright on the software, and (2) offer you this License giving you legal permission to copy, distribute and/or modify it.

For the developers' and authors' protection, the GPL clearly explains that there is no warranty for this free software. For both users' and authors' sake, the GPL requires that modified versions be marked as changed, so that their problems will not be attributed erroneously to authors of previous versions.

Some devices are designed to deny users access to install or run modified versions of the software inside them, although the manufacturer can do so. This is fundamentally incompatible with the aim of protecting users' freedom to change the software. The systematic pattern of such abuse occurs in the area of products for individuals to use, which is precisely where it is most unacceptable. Therefore, we have designed this version of the GPL to prohibit the practice for those products. If such problems arise substantially in other domains, we stand ready to extend this provision to those domains in future versions of the GPL, as needed to protect the freedom of users.

Finally, every program is threatened constantly by software patents. States should not allow patents to restrict development and use of software on general-purpose computers, but in those that do, we wish to

avoid the special danger that patents applied to a free program could make it effectively proprietary. To prevent this, the GPL assures that patents cannot be used to render the program non-free.

The precise terms and conditions for copying, distribution and modification follow.

TERMS AND CONDITIONS

0. Definitions.

"This License" refers to version 3 of the GNU General Public License.

"Copyright" also means copyright-like laws that apply to other kinds of works, such as semiconductor masks.

"The Program" refers to any copyrightable work licensed under this License. Each licensee is addressed as "you". "Licensees" and "recipients" may be individuals or organizations.

To "modify" a work means to copy from or adapt all or part of the work in a fashion requiring copyright permission, other than the making of an exact copy. The resulting work is called a "modified version" of the earlier work or a work "based on" the earlier work.

A "covered work" means either the unmodified Program or a work based on the Program.

To "propagate" a work means to do anything with it that, without permission, would make you directly or secondarily liable for infringement under applicable copyright law, except executing it on a computer or modifying a private copy. Propagation includes copying, distribution (with or without modification), making available to the public, and in some countries other activities as well.

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menu, a prominent item in the list meets this criterion.

1. Source Code.

The "source code" for a work means the preferred form of the work for making modifications to it. "Object code" means any non-source form of a work.

A "Standard Interface" means an interface that either is an official standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.

The "System Libraries" of an executable work include anything, other than the work as a whole, that (a) is included in the normal form of packaging a Major Component, but which is not part of that Major Component, and (b) serves only to enable use of the work with that Major Component, or to implement a Standard Interface for which an implementation is available to the public in source code form. A "Major Component", in this context, means a major essential component (kernel, window system, and so on) of the specific operating system (if any) on which the executable work runs, or a compiler used to produce the work, or an object code interpreter used to run it.

The "Corresponding Source" for a work in object code form means all the source code needed to generate, install, and (for an executable work) run the object code and to modify the work, including scripts to control those activities. However, it does not include the work's System Libraries, or general-purpose tools or generally available free programs which are used unmodified in performing those activities but which are not part of the work. For example, Corresponding Source includes interface definition files associated with source files for the work, and the source code for shared libraries and dynamically linked subprograms that the work is specifically designed to require, such as by intimate data communication or control flow between those subprograms and other parts of the work.

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The Corresponding Source for a work in source code form is that same work.

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```
#ifndef _BASENAME_LGPL_H
#define _BASENAME_LGPL_H

#include <stddef.h>

#ifndef DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif
```

```
/*
 Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
            FILENAME      RESULT
            "foo.c"       "foo.c"
            "foo/bar.c"   "bar.c"
            "/foo/bar.c"  "bar.c"
            "foo/bar/"    "bar/"
            "foo/bar//"   "bar//"
            "/"           ""
            "//"          ""
            ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(), defined in <string.h>, does
      not consider trailing slashes to be part of the component:

 FILENAME      RESULT
            "foo/bar/"    ""
            "foo/bar//"   ""
    * The 'basename' command eliminates trailing slashes and for a root
      produces a non-empty result:
            FILENAME      RESULT
            "foo/bar/"    "bar"
            "foo/bar//"   "bar"
            "/"           "/"
            "//"          "/"
*/
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;



#ifdef __cplusplus
} /* extern "C" */
#endif
```

#endif /* _BASENAME_LGPL_H */
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* Put the code in the public domain. Then there is nothing to stop hoarding of modified versions, but we can still use the program in GNU.

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<signature of Mo Ghoul>, 1 April 1987
Mo Ghoul, President of Vice, Digital Simulation Corp.

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---
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[Which files have you changed so far, and which new files have you written so far?]

```
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*/

#ifndef GRUB_BSD_CPU_HEADER
#define GRUB_BSD_CPU_HEADER 1

#include <grub/types.h>
#include <grub/relocator.h>

#include <grub/i386/freebsd_reboot.h>
#include <grub/i386/netbsd_reboot.h>
#include <grub/i386/openbsd_reboot.h>
#include <grub/i386/freebsd_linker.h>
#include
 <grub/i386/netbsd_bootinfo.h>
#include <grub/i386/openbsd_bootarg.h>

enum bsd_kernel_types
 {
```

```
  KERNEL_TYPE_NONE,
  KERNEL_TYPE_FREEBSD,
  KERNEL_TYPE_OPENBSD,
  KERNEL_TYPE_NETBSD,
 };

#define GRUB_BSD_TEMP_BUFFER   0x80000

#define FREEBSD_B_DEVMAGIC OPENBSD_B_DEVMAGIC
#define FREEBSD_B_SLICESHIFT OPENBSD_B_CTRLSHIFT
#define FREEBSD_B_UNITSHIFT OPENBSD_B_UNITSHIFT
#define FREEBSD_B_PARTSHIFT OPENBSD_B_PARTSHIFT
#define FREEBSD_B_TYPESHIFT OPENBSD_B_TYPESHIFT

#define FREEBSD_MODTYPE_KERNEL  "elf kernel"
#define FREEBSD_MODTYPE_KERNEL64 "elf64 kernel"
#define FREEBSD_MODTYPE_ELF_MODULE "elf module"
#define FREEBSD_MODTYPE_ELF_MODULE_OBJ "elf obj module"
#define FREEBSD_MODTYPE_RAW  "raw"

#define FREEBSD_BOOTINFO_VERSION 1

struct grub_freebsd_bootinfo
{
 grub_uint32_t version;
 grub_uint8_t unused1[44];
 grub_uint32_t length;
 grub_uint8_t unused2;
 grub_uint8_t boot_device;
 grub_uint8_t unused3[18];
 grub_uint32_t kern_end;
 grub_uint32_t environment;
  grub_uint32_t tags;
} GRUB_PACKED;

struct freebsd_tag_header
{
 grub_uint32_t type;
 grub_uint32_t len;
};

grub_err_t grub_freebsd_load_elfmodule32 (struct grub_relocator *relocator,
      grub_file_t file, int argc,
      char *argv[], grub_addr_t *kern_end);
grub_err_t grub_freebsd_load_elfmodule_obj64 (struct grub_relocator *relocator,
          grub_file_t file, int argc,
          char *argv[],
          grub_addr_t *kern_end);
```

```
grub_err_t grub_freebsd_load_elf_meta32 (struct grub_relocator *relocator,
      grub_file_t file,
      const char *filename,
      grub_addr_t *kern_end);
grub_err_t grub_freebsd_load_elf_meta64 (struct grub_relocator *relocator,
      grub_file_t file,
      const char *filename,
      grub_addr_t *kern_end);

grub_err_t grub_netbsd_load_elf_meta32 (struct grub_relocator *relocator,
     grub_file_t file,
     const char *filename,
     grub_addr_t *kern_end);
grub_err_t grub_netbsd_load_elf_meta64 (struct grub_relocator *relocator,
     grub_file_t
 file,
     const char *filename,
     grub_addr_t *kern_end);

grub_err_t grub_bsd_add_meta (grub_uint32_t type,
         const void *data, grub_uint32_t len);
grub_err_t grub_freebsd_add_meta_module (const char *filename, const char *type,
      int argc, char **argv,
      grub_addr_t addr, grub_uint32_t size);

struct grub_openbsd_ramdisk_descriptor
{
 grub_size_t max_size;
 grub_uint8_t *target;
 grub_uint32_t *size;
};

grub_err_t grub_openbsd_find_ramdisk32 (grub_file_t file,
     const char *filename,
     grub_addr_t kern_start,
     void *kern_chunk_src,
     struct grub_openbsd_ramdisk_descriptor *desc);
grub_err_t grub_openbsd_find_ramdisk64 (grub_file_t file,
     const char *filename,
     grub_addr_t kern_start,
     void *kern_chunk_src,
     struct grub_openbsd_ramdisk_descriptor *desc);

extern grub_uint8_t grub_bsd64_trampoline_start, grub_bsd64_trampoline_end;
extern grub_uint32_t grub_bsd64_trampoline_selfjump;
extern grub_uint32_t grub_bsd64_trampoline_gdt;

#endif
```

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Description:
realpath, canonicalize_file_name: Provide canonical absolute file name

Files:
lib/canonicalize-lgpl.c
m4/canonicalize.m4
m4/double-slash-root.m4
m4/lstat.m4

Depends-on:
extensions
stdlib
nocrash
double-slash-root [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
eloop-threshold  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
errno  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
fcntl-h  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
filename  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
idx  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
intprops  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
libc-config  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME
 = 1]
memmove  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
mempcpy  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
pathmax  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
rawmemchr  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
readlink  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
scratch_buffer  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
stat  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]

stdbool [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
sys_stat [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
unistd [test $HAVE_CANONICALIZE_FILE_NAME = 0
|| test $REPLACE_CANONICALIZE_FILE_NAME = 1]

configure.ac:
gl_CANONICALIZE_LGPL
gl_CONDITIONAL([GL_COND_OBJ_CANONICALIZE_LGPL],
[test $HAVE_CANONICALIZE_FILE_NAME = 0 || test $REPLACE_CANONICALIZE_FILE_NAME =
1])
gl_MODULE_INDICATOR([canonicalize-lgpl])
gl_STDLIB_MODULE_INDICATOR([canonicalize_file_name])
gl_STDLIB_MODULE_INDICATOR([realpath])

Makefile.am:
if GL_COND_OBJ_CANONICALIZE_LGPL
lib_SOURCES += canonicalize-lgpl.c
endif

Include:
<stdlib.h>

License:
LGPLv2+

Maintainer:
all
Description:
Concatenate two arbitrary file names.

Files:
lib/filenamecat.h
lib/filenamecat-lgpl.c
m4/filenamecat.m4

Depends-on:
c99
basename-lgpl
filename
malloc-posix

configure.ac:
gl_FILE_NAME_CONCAT_LGPL

Makefile.am:
lib_SOURCES += filenamecat-lgpl.c

Include:
"filenamecat.h"

License:
LGPLv2+

Maintainer:
Jim Meyering
Files:
tests/test-update-copyright.sh

Depends-on:

configure.ac:
abs_aux_dir=`cd "$ac_aux_dir"; pwd`
AC_SUBST([abs_aux_dir])

Makefile.am:
TESTS += test-update-copyright.sh
TESTS_ENVIRONMENT += abs_aux_dir='$(abs_aux_dir)'

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@end enumerate

@iftex
@heading END OF TERMS AND CONDITIONS
@end iftex
@ifinfo
@center END OF TERMS AND CONDITIONS

@end ifinfo

@page
@heading Appendix: How to Apply These Terms to Your New Programs

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@smallexample
@var{one line to give the program's name
and a brief idea of what it does.}
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@end smallexample

Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this
when it starts in an interactive mode:

@smallexample
Gnomovision version
 69, Copyright (C) @var{year} @var{name of author}
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
@end smallexample

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the appropriate parts of the General Public License.  Of course, the
commands you use may be called something other than @samp{show w} and
@samp{show c}; they could even be mouse-clicks or menu items---whatever
suits your program.

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school, if any, to sign a ``copyright disclaimer'' for the program, if
necessary.  Here is a sample; alter the names:

@example
Yoyodyne, Inc., hereby disclaims all copyright interest in the program
`Gnomovision' (which makes passes at compilers) written by James Hacker.

@var{signature of Ty Coon}, 1 April 1989
Ty Coon, President of Vice
@end example

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'gnulib-tool --lgpl --import <modules>', gnulib-tool either rewrites
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to your project directory, or fails because the modules you requested
were not licensed under LGPL.

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copy of maintain.texi in doc/ has a verbatim-copying license, and
doc/standards.texi and make-stds.texi are GFDL.  Most (but not all)
m4/*.m4 files have nearly unlimited
 licenses.
Description:
Provide the GNU Free Documentation License in Texinfo format.

Notice:
Don't use this module! Instead, copy the referenced license file into your version control repository.

Files:
doc/fdl.texi

Depends-on:

configure.ac:

Makefile.am:

Include:

License:
unmodifiable license text

Maintainer:
all
Description:
Help make libraries relocatable, that is, to allow them to function
properly when copied to an arbitrary directory.

Files:
doc/relocatable.texi
lib/relocatable.h

lib/relocatable.c
lib/relocatable.valgrind
m4/relocatable-lib.m4

Depends-on:
strdup

configure.ac:
gl_RELOCATABLE_LIBRARY
if test $RELOCATABLE = yes; then
 AC_LIBOBJ([relocatable])
fi

Makefile.am:
DEFS += -DNO_XMALLOC

Include:
"relocatable.h"

License:
LGPLv2+

Maintainer:
Ben Pfaff

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Version 2.1, February 1999

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<one line to give the library's name and a brief idea of what it does.>
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<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

That's all there is to it!
Description:
Extract specific portions of filenames.

Files:
lib/dirname.h
lib/dirname-lgpl.c
lib/stripslash.c

Depends-on:
basename-lgpl
double-slash-root
filename
malloc-posix
stdbool

configure.ac:

Makefile.am:
lib_SOURCES += dirname-lgpl.c stripslash.c

Include:
"dirname.h"

License:

LGPLv2+

Maintainer:
Jim Meyering, Eric Blake

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Public License instead of this License.
Files:
tests/test-canonicalize-lgpl.c
tests/signature.h
tests/null-ptr.h
tests/macros.h

Depends-on:
ignore-value
same-inode
symlink

configure.ac:

Makefile.am:
TESTS += test-canonicalize-lgpl
check_PROGRAMS += test-canonicalize-lgpl
test_canonicalize_lgpl_LDADD = $(LDADD) $(LIBINTL)

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Description:
Extract the last component (base name) of a file name.

Files:
lib/basename-lgpl.h
lib/basename-lgpl.c

Depends-on:
double-slash-root
filename
stdbool

configure.ac:

Makefile.am:
lib_SOURCES += basename-lgpl.c

Include:
"basename-lgpl.h"

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Description:
Ensure getcwd(NULL, 0) returns a buffer allocated by the malloc() function.

Files:
lib/getcwd-lgpl.c
m4/getcwd.m4

Depends-on:
unistd
free-posix  [test $REPLACE_GETCWD = 1]
strdup  [test $REPLACE_GETCWD = 1]

configure.ac:
gl_FUNC_GETCWD_LGPL
gl_CONDITIONAL([GL_COND_OBJ_GETCWD_LGPL], [test $REPLACE_GETCWD = 1])
gl_UNISTD_MODULE_INDICATOR([getcwd])

Makefile.am:
if GL_COND_OBJ_GETCWD_LGPL
lib_SOURCES += getcwd-lgpl.c
endif

Include:
<unistd.h>

License:
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Maintainer:
Eric Blake
Files:
tests/test-getcwd-lgpl.c

tests/signature.h
tests/macros.h

Depends-on:

configure.ac:

Makefile.am:
TESTS += test-getcwd-lgpl
check_PROGRAMS += test-getcwd-lgpl
test_getcwd_lgpl_LDADD = $(LDADD) $(LIBINTL)

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Description:
Locating a program in PATH (LGPLed version).

Files:
lib/findprog.h
lib/findprog.c
lib/findprog-lgpl.c
m4/findprog.m4
m4/eaccess.m4

Depends-on:
stdbool
sys_stat
strdup
concat-filename
access
stat
unistd

configure.ac:
gl_FINDPROG
gl_MODULE_INDICATOR([findprog-lgpl])

Makefile.am:
lib_SOURCES += findprog.h findprog-lgpl.c

Include:
"findprog.h"

License:
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Maintainer:
all

# 1.3957 autofs 1:5.1.7-65.el9

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#ifdef HAVE_CONFIG_H
#include <config.h>
#endif

/**
* GPLv2 boilerplate for usage messages
*/
```

```
static const char *fedfs_gpl_boilerplate =
  "\nCopyright 2010, 2011, 2012, 2013 Oracle.  "
  "All rights reserved.\n\n"
  "License
 GPLv2: "
  "<http://www.gnu.org/licenses/old-licenses/gpl-2.0.txt>\n"
  "This is free software.  "
   "You are free to change and redistribute it.\n"
  "There is NO WARRANTY, to the extent permitted by law.\n";

#endif /* !_GPL_BOILER_H_ */
```

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# 1.3960 device-mapper-persistent-data 1.1.0-1.el9

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```
/// The datatype used for the ioctl number
#[doc(hidden)]
#[cfg(not(solarish))]
pub type ioctl_num_type = ::libc::c_ulong;

#[doc(hidden)]
#[cfg(solarish)]
pub type ioctl_num_type = ::libc::c_int;
```

```
/// The datatype used for the 3rd argument
#[doc(hidden)]
pub type ioctl_param_type = ::libc::c_int;

mod consts {
  use crate::sys::ioctl::ioctl_num_type;
  #[doc(hidden)]
  pub const VOID: ioctl_num_type = 0x2000_0000;
  #[doc(hidden)]
  pub const OUT: ioctl_num_type = 0x4000_0000;
  #[doc(hidden)]
  #[allow(overflowing_literals)]
  pub const IN: ioctl_num_type = 0x8000_0000;
  #[doc(hidden)]
  pub const INOUT: ioctl_num_type = IN | OUT;
  #[doc(hidden)]
  pub const IOCPARM_MASK: ioctl_num_type = 0x1fff;
}

pub use self::consts::*;

#[macro_export]
#[doc(hidden)]
macro_rules! ioc {
  ($inout:expr, $group:expr, $num:expr, $len:expr) => {
    $inout
      | (($len as $crate::sys::ioctl::ioctl_num_type
        & $crate::sys::ioctl::IOCPARM_MASK)

        << 16)
      | (($group as $crate::sys::ioctl::ioctl_num_type) << 8)
      | ($num as $crate::sys::ioctl::ioctl_num_type)
  };
}

/// Generate an ioctl request code for a command that passes no data.
///
/// This is equivalent to the `_IO()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_none!()` directly.
///
/// # Example
///
/// ```
/// # #[macro_use] extern crate nix;
/// const KVMIO: u8 = 0xAE;
/// ioctl_write_int_bad!(kvm_create_vm, request_code_none!(KVMIO, 0x03));
```

```
/// # fn main() {}
/// ```
#[macro_export(local_inner_macros)]
macro_rules! request_code_none {
   ($g:expr, $n:expr) => {
       ioc!($crate::sys::ioctl::VOID, $g, $n, 0)
   };
}

/// Generate an ioctl request code for a command that passes an integer
///
/// This is equivalent to the `_IOWINT()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the
 `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write_int!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write_int {
   ($g:expr, $n:expr) => {
       ioc!(
           $crate::sys::ioctl::VOID,
           $g,
           $n,
           ::std::mem::size_of::<$crate::libc::c_int>()
       )
   };
}

/// Generate an ioctl request code for a command that reads.
///
/// This is equivalent to the `_IOR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_read!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is reading and the kernel is
/// writing.
#[macro_export(local_inner_macros)]
macro_rules! request_code_read {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::OUT, $g, $n, $len)
   };
}

/// Generate an ioctl request code for a command that writes.
///
///
```

```
 This is equivalent to the `_IOW()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is writing and the kernel is
/// reading.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::IN, $g, $n, $len)
   };
}

/// Generate an ioctl request code for a command that reads and writes.
///
/// This is equivalent to the `_IOWR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_readwrite!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_readwrite {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::INOUT, $g, $n, $len)

 };
}
```

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`src/bellerophon.rs` is loosely based off the Golang implementation,
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OUT OF OR IN CONNECTION
WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
SOFTWARE.
use crate::errno::Errno;
use crate::sys::signal::Signal;
use crate::unistd::Pid;
use crate::Result;

```
use cfg_if::cfg_if;
use libc::{self, c_int};
use std::ptr;

pub type RequestType = c_int;

cfg_if! {
  if #[cfg(any(freebsdlike, apple_targets, target_os = "openbsd"))] {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_char;
  } else {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_void;
  }
}

libc_enum! {
  #[repr(i32)]
  /// Ptrace Request enum defining the action to be taken.
  #[non_exhaustive]
  pub enum Request {
    PT_TRACE_ME,
    PT_READ_I,
    PT_READ_D,
    #[cfg(apple_targets)]
    PT_READ_U,
    PT_WRITE_I,
    PT_WRITE_D,
    #[cfg(apple_targets)]
    PT_WRITE_U,
    PT_CONTINUE,
    PT_KILL,
    #[cfg(any(any(freebsdlike, apple_targets),
          all(target_os = "openbsd", target_arch = "x86_64"),
          all(target_os = "netbsd", any(target_arch = "x86_64",
                        target_arch = "powerpc"))))]
    PT_STEP,
    PT_ATTACH,
    PT_DETACH,
    #[cfg(apple_targets)]
    PT_SIGEXC,
    #[cfg(apple_targets)]
    PT_THUPDATE,
    #[cfg(apple_targets)]
    PT_ATTACHEXC
  }
}
```

```
unsafe fn ptrace_other(
   request: Request,
   pid: Pid,
   addr: AddressType,
   data: c_int,
) -> Result<c_int> {
   unsafe {
      Errno::result(libc::ptrace(
         request as RequestType,
         libc::pid_t::from(pid),
         addr,
         data,
      ))
      .map(|_| 0)
   }
}

/// Sets the process as traceable, as with `ptrace(PT_TRACEME, ...)`
///
/// Indicates that this process is to be traced by its parent.
/// This is the only ptrace request to be issued by the tracee.
pub fn traceme() -> Result<()> {
   unsafe {
      ptrace_other(Request::PT_TRACE_ME, Pid::from_raw(0), ptr::null_mut(), 0)
         .map(drop)
   }
}

/// Attach to a running
 process, as with `ptrace(PT_ATTACH, ...)`
///
/// Attaches to the process specified by `pid`, making it a tracee of the calling process.
pub fn attach(pid: Pid) -> Result<()> {
   unsafe {
      ptrace_other(Request::PT_ATTACH, pid, ptr::null_mut(), 0).map(drop)
   }
}

/// Detaches the current running process, as with `ptrace(PT_DETACH, ...)`
///
/// Detaches from the process specified by `pid` allowing it to run freely, optionally delivering a
/// signal specified by `sig`.
pub fn detach<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
   let data = match sig.into() {
      Some(s) => s as c_int,
      None => 0,
   };
   unsafe {
```

```
        ptrace_other(Request::PT_DETACH, pid, ptr::null_mut(), data).map(drop)
    }
}

/// Restart the stopped tracee process, as with `ptrace(PTRACE_CONT, ...)`
///
/// Continues the execution of the process with PID `pid`, optionally
/// delivering a signal specified by `sig`.
pub fn cont<T: Into<Option<Signal>>>(pid: Pid, sig: T)
 -> Result<()> {
    let data = match sig.into() {
        Some(s) => s as c_int,
        None => 0,
    };
    unsafe {
        // Ignore the useless return value
        ptrace_other(Request::PT_CONTINUE, pid, 1 as AddressType, data)
            .map(drop)
    }
}

/// Issues a kill request as with `ptrace(PT_KILL, ...)`
///
/// This request is equivalent to `ptrace(PT_CONTINUE, ..., SIGKILL);`
pub fn kill(pid: Pid) -> Result<()> {
    unsafe {
        ptrace_other(Request::PT_KILL, pid, 0 as AddressType, 0).map(drop)
    }
}

/// Move the stopped tracee process forward by a single step as with
/// `ptrace(PT_STEP, ...)`
///
/// Advances the execution of the process with PID `pid` by a single step optionally delivering a
/// signal specified by `sig`.
///
/// # Example
/// ```rust
/// use nix::sys::ptrace::step;
/// use nix::unistd::Pid;
/// use nix::sys::signal::Signal;
/// use nix::sys::wait::*;
/// // If a process changes state to the stopped state because of a SIGUSR1
/// // signal,
 this will step the process forward and forward the user
/// // signal to the stopped process
/// match waitpid(Pid::from_raw(-1), None) {
///     Ok(WaitStatus::Stopped(pid, Signal::SIGUSR1)) => {
```

```
///         let _ = step(pid, Signal::SIGUSR1);
///     }
///     _ => {},
/// }
/// ```
#[cfg(any(
   any(freebsdlike, apple_targets),
   all(target_os = "openbsd", target_arch = "x86_64"),
   all(
      target_os = "netbsd",
      any(target_arch = "x86_64", target_arch = "powerpc")
   )
))]
pub fn step<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
   let data = match sig.into() {
      Some(s) => s as c_int,
      None => 0,
   };
   unsafe {
      ptrace_other(Request::PT_STEP, pid, ptr::null_mut(), data).map(drop)
   }
}

/// Reads a word from a processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn read(pid: Pid, addr: AddressType)
 -> Result<c_int> {
   unsafe {
      // Traditionally there was a difference between reading data or
      // instruction memory but not in modern systems.
      ptrace_other(Request::PT_READ_D, pid, addr, 0)
   }
}

/// Writes a word into the processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn write(pid: Pid, addr: AddressType, data: c_int) -> Result<()> {
   unsafe { ptrace_other(Request::PT_WRITE_D, pid, addr, data).map(drop) }
}
```

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WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
SOFTWARE.
//! `ioctl` opcode behavior for BSD platforms.

```
use super::{Direction, RawOpcode};

pub(super) const fn compose_opcode(
  dir: Direction,
  group: RawOpcode,
  num: RawOpcode,
  size: RawOpcode,
) -> RawOpcode {
  let dir = match dir {
    Direction::None => NONE,
    Direction::Read => READ,
    Direction::Write => WRITE,
    Direction::ReadWrite => READ | WRITE,
  };

  dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}
```

// `IOC_VOID`
pub const NONE: RawOpcode = 0x2000_0000;
// `IOC_OUT` ("out" is from the perspective of the kernel)
pub const READ: RawOpcode = 0x4000_0000;
// `IOC_IN`
pub const WRITE: RawOpcode = 0x8000_0000;
pub const IOCPARAM_MASK: RawOpcode = 0x1FFF;
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# 1.3961 rpm-ostree 2025.11-1.el9_7

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```
//! FreeBSD and NetBSD xattr support.

use libc::{c_int, c_void, size_t, EPERM};
use std::ffi::{CString, OsStr, OsString};
use std::io;
use std::mem;
use std::os::unix::ffi::{OsStrExt, OsStringExt};
use std::os::unix::io::{AsRawFd, BorrowedFd};
use std::path::Path;
use std::ptr;

use libc::{
  extattr_delete_fd, extattr_delete_file, extattr_delete_link, extattr_get_fd, extattr_get_file,
  extattr_get_link, extattr_list_fd, extattr_list_file, extattr_list_link, extattr_set_fd,
  extattr_set_file, extattr_set_link, EXTATTR_NAMESPACE_SYSTEM, EXTATTR_NAMESPACE_USER,
};

use crate::util::allocate_loop;

pub const ENOATTR: i32 = libc::ENOATTR;
pub const ERANGE: i32 = libc::ERANGE;

const EXTATTR_NAMESPACE_USER_STRING: &str = "user";
const EXTATTR_NAMESPACE_SYSTEM_STRING: &str = "system";
const EXTATTR_NAMESPACE_NAMES: [&str; 3] = [
  "empty",
```

```
  EXTATTR_NAMESPACE_USER_STRING,
  EXTATTR_NAMESPACE_SYSTEM_STRING,
];

fn path_to_c(path: &Path) -> io::Result<CString> {
  match CString::new(path.as_os_str().as_bytes())
 {
      Ok(name) => Ok(name),
      Err(_) => Err(io::Error::new(io::ErrorKind::NotFound, "file not found")),
  }
}

#[inline]
fn slice_parts(buf: &mut [u8]) -> (*mut c_void, size_t) {
  if buf.is_empty() {
      (ptr::null_mut(), 0)
  } else {
      (buf.as_mut_ptr().cast(), buf.len() as size_t)
  }
}

/// An iterator over a set of extended attributes names.
#[derive(Default)]
pub struct XAttrs {
  user_attrs: Box<[u8]>,
  system_attrs: Box<[u8]>,
  offset: usize,
}

impl Clone for XAttrs {
  fn clone(&self) -> Self {
      XAttrs {
          user_attrs: Vec::from(&*self.user_attrs).into_boxed_slice(),
          system_attrs: Vec::from(&*self.system_attrs).into_boxed_slice(),
          offset: self.offset,
      }
  }

  fn clone_from(&mut self, other: &XAttrs) {
      self.offset = other.offset;

      let mut data = mem::replace(&mut self.user_attrs, Box::new([])).into_vec();
      data.extend(other.user_attrs.iter().cloned());
       self.user_attrs = data.into_boxed_slice();

      data = mem::replace(&mut self.system_attrs, Box::new([])).into_vec();
      data.extend(other.system_attrs.iter().cloned());
      self.system_attrs = data.into_boxed_slice();
```

```
  }
}

impl Iterator for XAttrs {
  type Item = OsString;
  fn next(&mut self) -> Option<OsString> {
    if self.user_attrs.is_empty() && self.system_attrs.is_empty() {
      return None;
    }

    if self.offset == self.user_attrs.len() + self.system_attrs.len() {
      return None;
    }

    let data = if self.offset < self.system_attrs.len() {
      &self.system_attrs[self.offset..]
    } else {
      &self.user_attrs[self.offset - self.system_attrs.len()..]
    };

    let siz = data[0] as usize;

    self.offset += siz + 1;
    if self.offset < self.system_attrs.len() {
      Some(prefix_namespace(
        OsStr::from_bytes(&data[1..siz
 + 1]),
        EXTATTR_NAMESPACE_SYSTEM,
      ))
    } else {
      Some(prefix_namespace(
        OsStr::from_bytes(&data[1..siz + 1]),
        EXTATTR_NAMESPACE_USER,
      ))
    }
  }

  fn size_hint(&self) -> (usize, Option<usize>) {
    if self.user_attrs.len() + self.system_attrs.len() == self.offset {
      (0, Some(0))
    } else {
      (1, None)
    }
  }
}

// This could use libc::extattr_string_to_namespace, but it's awkward because
// that requires nul-terminated strings, which Rust's std is loathe to provide.
```

```
fn name_to_ns(name: &OsStr) -> io::Result<(c_int, CString)> {
  let mut groups = name.as_bytes().splitn(2, |&b| b == b'.').take(2);
  let nsname = match groups.next() {
     Some(s) => s,
     None => {
        return Err(io::Error::new(
           io::ErrorKind::InvalidInput,
           "couldn't find namespace",
        ))
     }
  };

  let propname
 = match groups.next() {
     Some(s) => s,
     None => {
        return Err(io::Error::new(
           io::ErrorKind::InvalidInput,
           "couldn't find attribute",
        ))
     }
  };

  let ns_int = match EXTATTR_NAMESPACE_NAMES
     .iter()
     .position(|&s| s.as_bytes() == nsname)
  {
     Some(i) => i,
     None => {
        return Err(io::Error::new(
           io::ErrorKind::InvalidInput,
           "no matching namespace",
        ))
     }
  };

  Ok((ns_int as c_int, CString::new(propname)?))
}

fn prefix_namespace(attr: &OsStr, ns: c_int) -> OsString {
  let nsname = EXTATTR_NAMESPACE_NAMES[ns as usize];
  let mut v = Vec::with_capacity(nsname.as_bytes().len() + attr.as_bytes().len() + 1);
  v.extend(nsname.as_bytes());
  v.extend(".".as_bytes());
  v.extend(attr.as_bytes());
  OsString::from_vec(v)
}
```

```
fn cvt(res: libc::ssize_t) -> io::Result<usize> {
  if res < 0 {
      Err(io::Error::last_os_error())
   } else {
      Ok(res as usize)
  }
}

pub fn get_fd(fd: BorrowedFd<'_>, name: &OsStr) -> io::Result<Vec<u8>> {
  let (ns, name) = name_to_ns(name)?;
  unsafe {
      allocate_loop(|buf| {
          let (ptr, len) = slice_parts(buf);
          cvt(extattr_get_fd(fd.as_raw_fd(), ns, name.as_ptr(), ptr, len))
      })
  }
}

pub fn set_fd(fd: BorrowedFd<'_>, name: &OsStr, value: &[u8]) -> io::Result<()> {
  let (ns, name) = name_to_ns(name)?;
  let ret = unsafe {
      extattr_set_fd(
          fd.as_raw_fd(),
          ns,
          name.as_ptr(),
          value.as_ptr() as *const c_void,
          value.len() as size_t,
      )
  };
  if ret == -1 {
      Err(io::Error::last_os_error())
  } else {
      Ok(())
  }
}

pub fn remove_fd(fd: BorrowedFd<'_>, name: &OsStr) -> io::Result<()> {
  let (ns, name) = name_to_ns(name)?;
  let ret = unsafe { extattr_delete_fd(fd.as_raw_fd(), ns, name.as_ptr()) };

 if ret != 0 {
      Err(io::Error::last_os_error())
  } else {
      Ok(())
  }
}

pub fn list_fd(fd: BorrowedFd<'_>) -> io::Result<XAttrs> {
```

```
  let sysvec = unsafe {
    let res = allocate_loop(|buf| {
      let (ptr, len) = slice_parts(buf);
      cvt(extattr_list_fd(
        fd.as_raw_fd(),
        EXTATTR_NAMESPACE_SYSTEM,
        ptr,
        len,
      ))
    });
    // On FreeBSD, system attributes require root privileges to view. However,
    // to mimic the behavior of listxattr in linux and osx, we need to query
    // them anyway and return empty results if we get EPERM
    match res {
      Ok(v) => v,
      Err(err) => {
        if err.raw_os_error() == Some(EPERM) {
          Vec::new()
        } else {
          return Err(err);
        }
      }
    }
  };

  let uservec = unsafe {
    let res = allocate_loop(|buf|
{
      let (ptr, len) = slice_parts(buf);
      cvt(extattr_list_fd(
        fd.as_raw_fd(),
        EXTATTR_NAMESPACE_USER,
        ptr,
        len,
      ))
    });
    match res {
      Ok(v) => v,
      Err(err) => return Err(err),
    }
  };

  Ok(XAttrs {
    system_attrs: sysvec.into_boxed_slice(),
    user_attrs: uservec.into_boxed_slice(),
    offset: 0,
  })
}
```

```
pub fn get_path(path: &Path, name: &OsStr, deref: bool) -> io::Result<Vec<u8>> {
  let (ns, name) = name_to_ns(name)?;
  let path = path_to_c(path)?;
  let extattr_get_func = if deref {
     extattr_get_file
  } else {
     extattr_get_link
  };
  unsafe {
     allocate_loop(|buf| {
        let (ptr, len) = slice_parts(buf);
        cvt(extattr_get_func(path.as_ptr(), ns, name.as_ptr(), ptr, len))
     })
  }
}

pub fn set_path(path: &Path, name: &OsStr, value: &[u8], deref: bool) -> io::Result<()>
 {
  let (ns, name) = name_to_ns(name)?;
  let path = path_to_c(path)?;
  let extattr_set_func = if deref {
     extattr_set_file
  } else {
     extattr_set_link
  };
  let ret = unsafe {
     extattr_set_func(
        path.as_ptr(),
        ns,
        name.as_ptr(),
        value.as_ptr() as *const c_void,
        value.len() as size_t,
     )
  };
  if ret == -1 {
     Err(io::Error::last_os_error())
  } else {
     Ok(())
  }
}

pub fn remove_path(path: &Path, name: &OsStr, deref: bool) -> io::Result<()> {
  let (ns, name) = name_to_ns(name)?;
  let path = path_to_c(path)?;
  let extattr_delete_func = if deref {
     extattr_delete_file
  } else {
```

```
        extattr_delete_link
    };
    let ret = unsafe { extattr_delete_func(path.as_ptr(), ns, name.as_ptr()) };
    if ret != 0 {
        Err(io::Error::last_os_error())
    } else {
        Ok(())
    }
}

pub fn list_path(path: &Path, deref: bool) -> io::Result<XAttrs>
 {
    let path = path_to_c(path)?;
    let extattr_list_func = if deref {
        extattr_list_file
    } else {
        extattr_list_link
    };
    let sysvec = unsafe {
        let res = allocate_loop(|buf| {
            let (ptr, len) = slice_parts(buf);
            cvt(extattr_list_func(
                path.as_ptr(),
                EXTATTR_NAMESPACE_SYSTEM,
                ptr,
                len,
            ))
        });
        // On FreeBSD, system attributes require root privileges to view. However,
        // to mimic the behavior of listxattr in linux and osx, we need to query
        // them anyway and return empty results if we get EPERM
        match res {
            Ok(v) => v,
            Err(err) => {
                if err.raw_os_error() == Some(EPERM) {
                    Vec::new()
                } else {
                    return Err(err);
                }
            }
        }
    };

    let uservec = unsafe {
        let res = allocate_loop(|buf|
 {
            let (ptr, len) = slice_parts(buf);
            cvt(extattr_list_func(
```

```
            path.as_ptr(),
            EXTATTR_NAMESPACE_USER,
            ptr,
            len,
        ))
    });
    match res {
        Ok(v) => v,
        Err(err) => return Err(err),
    }
  };

  Ok(XAttrs {
    system_attrs: sysvec.into_boxed_slice(),
    user_attrs: uservec.into_boxed_slice(),
    offset: 0,
  })
}
```

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ab32548539ec38a939c1b58599249f3b54130026
(https://github.com/rust-lang/rust/blob/ab32548539ec38a939c1b58599249f3b54130026/library/core/src/str/iter.rs).

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//! `ioctl` opcode behavior for BSD platforms.

```
use super::{Direction, Opcode};

pub(super) const fn compose_opcode(
   dir: Direction,
   group: Opcode,
   num: Opcode,
   size: Opcode,
) -> Opcode {
   let dir = match dir {
      Direction::None => NONE,
      Direction::Read => READ,
      Direction::Write => WRITE,
      Direction::ReadWrite => READ | WRITE,
   };
```

```
  dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}

// `IOC_VOID`
pub const NONE: Opcode = 0x2000_0000;
// `IOC_OUT` (out is from the perspective of the kernel)
pub const READ: Opcode = 0x4000_0000;
// `IOC_IN` (in is from the perspective of the kernel)
pub const WRITE: Opcode = 0x8000_0000;
pub const IOCPARAM_MASK: Opcode = 0x1FFF;
```

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```
//! `ioctl` opcode behavior for BSD platforms.

use super::{Direction, RawOpcode};

pub(super) const fn compose_opcode(
   dir: Direction,
   group: RawOpcode,
   num: RawOpcode,
   size: RawOpcode,
) -> RawOpcode {
   let dir = match dir {
      Direction::None => NONE,
      Direction::Read => READ,
      Direction::Write => WRITE,
      Direction::ReadWrite => READ | WRITE,
   };

   dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}

// `IOC_VOID`
pub const NONE: RawOpcode = 0x2000_0000;
// `IOC_OUT` (out is from the perspective of the kernel)
pub const READ: RawOpcode = 0x4000_0000;
// `IOC_IN` (in is from the perspective of the kernel)
pub const WRITE: RawOpcode = 0x8000_0000;
pub const IOCPARAM_MASK: RawOpcode = 0x1FFF;
```

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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```
/// The datatype used for the ioctl number
#[doc(hidden)]
#[cfg(not(solarish))]
pub type ioctl_num_type = ::libc::c_ulong;

#[doc(hidden)]
#[cfg(solarish)]
pub type ioctl_num_type = ::libc::c_int;

/// The datatype used for the 3rd argument
#[doc(hidden)]
pub type ioctl_param_type = ::libc::c_int;

mod consts {
  use crate::sys::ioctl::ioctl_num_type;
  #[doc(hidden)]
  pub const VOID: ioctl_num_type = 0x2000_0000;
```

```
  #[doc(hidden)]
  pub const OUT: ioctl_num_type = 0x4000_0000;
  #[doc(hidden)]
  #[allow(overflowing_literals)]
  pub const IN: ioctl_num_type = 0x8000_0000;
  #[doc(hidden)]
  pub const INOUT: ioctl_num_type = IN | OUT;
  #[doc(hidden)]
  pub const IOCPARM_MASK: ioctl_num_type = 0x1fff;
}

pub use self::consts::*;

#[macro_export]
#[doc(hidden)]
macro_rules! ioc {
  ($inout:expr, $group:expr, $num:expr, $len:expr) => {
    $inout
      | (($len as $crate::sys::ioctl::ioctl_num_type
        & $crate::sys::ioctl::IOCPARM_MASK)

        << 16)
      | (($group as $crate::sys::ioctl::ioctl_num_type) << 8)
      | ($num as $crate::sys::ioctl::ioctl_num_type)
  };
}

/// Generate an ioctl request code for a command that passes no data.
///
/// This is equivalent to the `_IO()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_none!()` directly.
///
/// # Example
///
/// ```
/// # #[macro_use] extern crate nix;
/// const KVMIO: u8 = 0xAE;
/// ioctl_write_int_bad!(kvm_create_vm, request_code_none!(KVMIO, 0x03));
/// # fn main() {}
/// ```
#[macro_export(local_inner_macros)]
macro_rules! request_code_none {
  ($g:expr, $n:expr) => {
    ioc!($crate::sys::ioctl::VOID, $g, $n, 0)
  };
}
```

```
/// Generate an ioctl request code for a command that passes an integer
///
/// This is equivalent to the `_IOWINT()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the
 `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write_int!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write_int {
   ($g:expr, $n:expr) => {
       ioc!(
           $crate::sys::ioctl::VOID,
           $g,
           $n,
           ::std::mem::size_of::<$crate::libc::c_int>()
       )
   };
}

/// Generate an ioctl request code for a command that reads.
///
/// This is equivalent to the `_IOR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_read!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is reading and the kernel is
/// writing.
#[macro_export(local_inner_macros)]
macro_rules! request_code_read {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::OUT, $g, $n, $len)
   };
}

/// Generate an ioctl request code for a command that writes.
///
///
 This is equivalent to the `_IOW()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is writing and the kernel is
/// reading.
```

```
#[macro_export(local_inner_macros)]
macro_rules! request_code_write {
  ($g:expr, $n:expr, $len:expr) => {
      ioc!($crate::sys::ioctl::IN, $g, $n, $len)
  };
}

/// Generate an ioctl request code for a command that reads and writes.
///
/// This is equivalent to the `_IOWR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_readwrite!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_readwrite {
  ($g:expr, $n:expr, $len:expr) => {
      ioc!($crate::sys::ioctl::INOUT, $g, $n, $len)

 };
}
```

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// from gir-files (https://github.com/gtk-rs/gir-files)
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```
use crate::{ffi, AsyncResult, Cancellable};
use glib::{
   prelude::*,
   signal::{connect_raw, SignalHandlerId},
```

```
  translate::*,
};
use std::{boxed::Box as Box_, pin::Pin};

glib::wrapper! {
  #[doc(alias = "GPermission")]
  pub struct Permission(Object<ffi::GPermission, ffi::GPermissionClass>);

  match fn {
      type_ => || ffi::g_permission_get_type(),
  }
}

impl Permission {
  pub const NONE: Option<&'static Permission> = None;
}

mod sealed {
  pub trait Sealed {}
  impl<T: super::IsA<super::Permission>> Sealed for T {}
}

pub trait PermissionExt: IsA<Permission> + sealed::Sealed + 'static {
  #[doc(alias = "g_permission_acquire")]
  fn acquire(&self, cancellable: Option<&impl IsA<Cancellable>>) -> Result<(), glib::Error> {
      unsafe {
          let mut error = std::ptr::null_mut();
          let is_ok = ffi::g_permission_acquire(
               self.as_ref().to_glib_none().0,
              cancellable.map(|p| p.as_ref()).to_glib_none().0,
              &mut error,
          );
          debug_assert_eq!(is_ok == glib::ffi::GFALSE, !error.is_null());
          if error.is_null() {
              Ok(())
          } else {
              Err(from_glib_full(error))
          }
      }
  }

  #[doc(alias = "g_permission_acquire_async")]
  fn acquire_async<P: FnOnce(Result<(), glib::Error>) + 'static>(
      &self,
      cancellable: Option<&impl IsA<Cancellable>>,
      callback: P,
  ) {
      let main_context = glib::MainContext::ref_thread_default();
```

```
        let is_main_context_owner = main_context.is_owner();
        let has_acquired_main_context = (!is_main_context_owner)
            .then(|| main_context.acquire().ok())
            .flatten();
        assert!(
            is_main_context_owner || has_acquired_main_context.is_some(),
            "Async operations
only allowed if the thread is owning the MainContext"
        );

        let user_data: Box_<glib::thread_guard::ThreadGuard<P>> =
            Box_::new(glib::thread_guard::ThreadGuard::new(callback));
        unsafe extern "C" fn acquire_async_trampoline<
            P: FnOnce(Result<(), glib::Error>) + 'static,
        >(
            _source_object: *mut glib::gobject_ffi::GObject,
            res: *mut crate::ffi::GAsyncResult,
            user_data: glib::ffi::gpointer,
        ) {
            let mut error = std::ptr::null_mut();
            ffi::g_permission_acquire_finish(_source_object as *mut _, res, &mut error);
            let result = if error.is_null() {
                Ok(())
            } else {
                Err(from_glib_full(error))
            };
            let callback: Box_<glib::thread_guard::ThreadGuard<P>> =
                Box_::from_raw(user_data as *mut _);
            let callback: P = callback.into_inner();
            callback(result);

    }
        let callback = acquire_async_trampoline::<P>;
        unsafe {
            ffi::g_permission_acquire_async(
                self.as_ref().to_glib_none().0,
                cancellable.map(|p| p.as_ref()).to_glib_none().0,
                Some(callback),
                Box_::into_raw(user_data) as *mut _,
            );
        }
    }

    fn acquire_future(
        &self,
    ) -> Pin<Box_<dyn std::future::Future<Output = Result<(), glib::Error>> + 'static>> {
        Box_::pin(crate::GioFuture::new(
            self,
```

```
        move |obj, cancellable, send| {
            obj.acquire_async(Some(cancellable), move |res| {
                send.resolve(res);
            });
        },
    ))
}

#[doc(alias = "g_permission_get_allowed")]
#[doc(alias = "get_allowed")]
#[doc(alias = "allowed")]
fn is_allowed(&self) -> bool {
    unsafe {
        from_glib(ffi::g_permission_get_allowed(
            self.as_ref().to_glib_none().0,
         ))
    }
}

#[doc(alias = "g_permission_get_can_acquire")]
#[doc(alias = "get_can_acquire")]
#[doc(alias = "can-acquire")]
fn can_acquire(&self) -> bool {
    unsafe {
        from_glib(ffi::g_permission_get_can_acquire(
            self.as_ref().to_glib_none().0,
        ))
    }
}

#[doc(alias = "g_permission_get_can_release")]
#[doc(alias = "get_can_release")]
#[doc(alias = "can-release")]
fn can_release(&self) -> bool {
    unsafe {
        from_glib(ffi::g_permission_get_can_release(
            self.as_ref().to_glib_none().0,
        ))
    }
}

#[doc(alias = "g_permission_impl_update")]
fn impl_update(&self, allowed: bool, can_acquire: bool, can_release: bool) {
    unsafe {
        ffi::g_permission_impl_update(
            self.as_ref().to_glib_none().0,
            allowed.into_glib(),
            can_acquire.into_glib(),
```

```
            can_release.into_glib(),
        );
    }
}

#[doc(alias = "g_permission_release")]
fn release(&self, cancellable: Option<&impl IsA<Cancellable>>) -> Result<(), glib::Error> {
    unsafe {
        let mut error = std::ptr::null_mut();
        let is_ok = ffi::g_permission_release(
            self.as_ref().to_glib_none().0,
            cancellable.map(|p| p.as_ref()).to_glib_none().0,
            &mut error,
        );
        debug_assert_eq!(is_ok == glib::ffi::GFALSE, !error.is_null());
        if error.is_null() {
            Ok(())
        } else {
            Err(from_glib_full(error))
        }
    }
}

#[doc(alias = "g_permission_release_async")]
fn release_async<P: FnOnce(Result<(), glib::Error>) + 'static>(
    &self,
    cancellable: Option<&impl IsA<Cancellable>>,
    callback: P,
) {
    let main_context = glib::MainContext::ref_thread_default();
    let is_main_context_owner
= main_context.is_owner();
    let has_acquired_main_context = (!is_main_context_owner)
        .then(|| main_context.acquire().ok())
        .flatten();
    assert!(
        is_main_context_owner || has_acquired_main_context.is_some(),
        "Async operations only allowed if the thread is owning the MainContext"
    );

    let user_data: Box_<glib::thread_guard::ThreadGuard<P>> =
        Box_::new(glib::thread_guard::ThreadGuard::new(callback));
    unsafe extern "C" fn release_async_trampoline<
        P: FnOnce(Result<(), glib::Error>) + 'static,
    >(
        _source_object: *mut glib::gobject_ffi::GObject,
        res: *mut crate::ffi::GAsyncResult,
        user_data: glib::ffi::gpointer,
```

```
    ) {
        let mut error = std::ptr::null_mut();
        ffi::g_permission_release_finish(_source_object as *mut _, res, &mut error);
        let result = if error.is_null() {
            Ok(())

  } else {
            Err(from_glib_full(error))
        };
        let callback: Box_<glib::thread_guard::ThreadGuard<P>> =
            Box_::from_raw(user_data as *mut _);
        let callback: P = callback.into_inner();
        callback(result);
    }
    let callback = release_async_trampoline::<P>;
    unsafe {
        ffi::g_permission_release_async(
            self.as_ref().to_glib_none().0,
            cancellable.map(|p| p.as_ref()).to_glib_none().0,
            Some(callback),
            Box_::into_raw(user_data) as *mut _,
        );
    }
  }

  fn release_future(
    &self,
  ) -> Pin<Box_<dyn std::future::Future<Output = Result<(), glib::Error>> + 'static>> {
    Box_::pin(crate::GioFuture::new(
        self,
        move |obj, cancellable, send| {
            obj.release_async(Some(cancellable), move |res| {
                send.resolve(res);
            });

},
    ))
  }

  #[doc(alias = "allowed")]
  fn connect_allowed_notify<F: Fn(&Self) + 'static>(&self, f: F) -> SignalHandlerId {
    unsafe extern "C" fn notify_allowed_trampoline<P: IsA<Permission>, F: Fn(&P) + 'static>(
        this: *mut ffi::GPermission,
        _param_spec: glib::ffi::gpointer,
        f: glib::ffi::gpointer,
    ) {
        let f: &F = &*(f as *const F);
        f(Permission::from_glib_borrow(this).unsafe_cast_ref())
```

```
        }
        unsafe {
            let f: Box_<F> = Box_::new(f);
            connect_raw(
                self.as_ptr() as *mut _,
                b"notify::allowed\0".as_ptr() as *const _,
                Some(std::mem::transmute::<*const (), unsafe extern "C" fn()>(
                    notify_allowed_trampoline::<Self, F> as *const (),
                )),
                Box_::into_raw(f),
            )
        }
    }

    #[doc(alias = "can-acquire")]
    fn connect_can_acquire_notify<F: Fn(&Self) + 'static>(&self,
f: F) -> SignalHandlerId {
        unsafe extern "C" fn notify_can_acquire_trampoline<
            P: IsA<Permission>,
            F: Fn(&P) + 'static,
        >(
            this: *mut ffi::GPermission,
            _param_spec: glib::ffi::gpointer,
            f: glib::ffi::gpointer,
        ) {
            let f: &F = &*(f as *const F);
            f(Permission::from_glib_borrow(this).unsafe_cast_ref())
        }
        unsafe {
            let f: Box_<F> = Box_::new(f);
            connect_raw(
                self.as_ptr() as *mut _,
                b"notify::can-acquire\0".as_ptr() as *const _,
                Some(std::mem::transmute::<*const (), unsafe extern "C" fn()>(
                    notify_can_acquire_trampoline::<Self, F> as *const (),
                )),
                Box_::into_raw(f),
            )
        }
    }

    #[doc(alias = "can-release")]
    fn connect_can_release_notify<F: Fn(&Self) + 'static>(&self, f: F) -> SignalHandlerId {
        unsafe
extern "C" fn notify_can_release_trampoline<
            P: IsA<Permission>,
            F: Fn(&P) + 'static,
        >(
```

```
            this: *mut ffi::GPermission,
            _param_spec: glib::ffi::gpointer,
            f: glib::ffi::gpointer,
        ) {
            let f: &F = &*(f as *const F);
            f(Permission::from_glib_borrow(this).unsafe_cast_ref())
        }
        unsafe {
            let f: Box_<F> = Box_::new(f);
            connect_raw(
                self.as_ptr() as *mut _,
                b"notify::can-release\0".as_ptr() as *const _,
                Some(std::mem::transmute::<*const (), unsafe extern "C" fn()>(
                    notify_can_release_trampoline::<Self, F> as *const (),
                )),
                Box_::into_raw(f),
            )
        }
    }
}

impl<O: IsA<Permission>> PermissionExt for O {}
```

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```
use crate::errno::Errno;
use crate::sys::signal::Signal;
use crate::unistd::Pid;
use crate::Result;
use cfg_if::cfg_if;
use libc::{self, c_int};
use std::ptr;

pub type RequestType = c_int;

cfg_if! {
  if #[cfg(any(freebsdlike, apple_targets, target_os = "openbsd"))] {
      #[doc(hidden)]
      pub type AddressType = *mut ::libc::c_char;
  } else {
```

```
        #[doc(hidden)]
        pub type AddressType = *mut ::libc::c_void;
    }
}

libc_enum! {
    #[repr(i32)]
    /// Ptrace Request enum defining the action to be taken.
    #[non_exhaustive]
    pub enum Request {
        PT_TRACE_ME,
        PT_READ_I,
        PT_READ_D,
        #[cfg(apple_targets)]
        PT_READ_U,
        PT_WRITE_I,
        PT_WRITE_D,
        #[cfg(apple_targets)]
        PT_WRITE_U,
        PT_CONTINUE,
        PT_KILL,
        #[cfg(any(any(freebsdlike, apple_targets),
                all(target_os = "openbsd", target_arch = "x86_64"),
                all(target_os = "netbsd", any(target_arch = "x86_64",
                                    target_arch = "powerpc"))))]
        PT_STEP,
        PT_ATTACH,
        PT_DETACH,
        #[cfg(apple_targets)]
        PT_SIGEXC,
        #[cfg(apple_targets)]
        PT_THUPDATE,
        #[cfg(apple_targets)]
        PT_ATTACHEXC
    }
}

unsafe fn ptrace_other(
    request: Request,
    pid: Pid,
    addr: AddressType,
    data: c_int,
) -> Result<c_int> {
    unsafe {
        Errno::result(libc::ptrace(
            request as RequestType,
            libc::pid_t::from(pid),
            addr,
```

```
            data,
        ))
        .map(|_| 0)
    }
}

/// Sets the process as traceable, as with `ptrace(PT_TRACEME, ...)`
///
/// Indicates that this process is to be traced by its parent.
/// This is the only ptrace request to be issued by the tracee.
pub fn traceme() -> Result<()> {
    unsafe {
        ptrace_other(Request::PT_TRACE_ME, Pid::from_raw(0), ptr::null_mut(), 0)
            .map(drop)
    }
}

/// Attach to a running
 process, as with `ptrace(PT_ATTACH, ...)`
///
/// Attaches to the process specified by `pid`, making it a tracee of the calling process.
pub fn attach(pid: Pid) -> Result<()> {
    unsafe {
        ptrace_other(Request::PT_ATTACH, pid, ptr::null_mut(), 0).map(drop)
    }
}

/// Detaches the current running process, as with `ptrace(PT_DETACH, ...)`
///
/// Detaches from the process specified by `pid` allowing it to run freely, optionally delivering a
/// signal specified by `sig`.
pub fn detach<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
    let data = match sig.into() {
        Some(s) => s as c_int,
        None => 0,
    };
    unsafe {
        ptrace_other(Request::PT_DETACH, pid, ptr::null_mut(), data).map(drop)
    }
}

/// Restart the stopped tracee process, as with `ptrace(PTRACE_CONT, ...)`
///
/// Continues the execution of the process with PID `pid`, optionally
/// delivering a signal specified by `sig`.
pub fn cont<T: Into<Option<Signal>>>(pid: Pid, sig: T)
 -> Result<()> {
    let data = match sig.into() {
```

```
        Some(s) => s as c_int,
        None => 0,
    };
    unsafe {
        // Ignore the useless return value
        ptrace_other(Request::PT_CONTINUE, pid, 1 as AddressType, data)
            .map(drop)
    }
}

/// Issues a kill request as with `ptrace(PT_KILL, ...)`
///
/// This request is equivalent to `ptrace(PT_CONTINUE, ..., SIGKILL);`
pub fn kill(pid: Pid) -> Result<()> {
    unsafe {
        ptrace_other(Request::PT_KILL, pid, 0 as AddressType, 0).map(drop)
    }
}

/// Move the stopped tracee process forward by a single step as with
/// `ptrace(PT_STEP, ...)`
///
/// Advances the execution of the process with PID `pid` by a single step optionally delivering a
/// signal specified by `sig`.
///
/// # Example
/// ```rust
/// use nix::sys::ptrace::step;
/// use nix::unistd::Pid;
/// use nix::sys::signal::Signal;
/// use nix::sys::wait::*;
/// // If a process changes state to the stopped state because of a SIGUSR1
/// // signal,
 this will step the process forward and forward the user
/// // signal to the stopped process
/// match waitpid(Pid::from_raw(-1), None) {
///     Ok(WaitStatus::Stopped(pid, Signal::SIGUSR1)) => {
///         let _ = step(pid, Signal::SIGUSR1);
///     }
///     _ => {},
/// }
/// ```
#[cfg(any(
    any(freebsdlike, apple_targets),
    all(target_os = "openbsd", target_arch = "x86_64"),
    all(
        target_os = "netbsd",
        any(target_arch = "x86_64", target_arch = "powerpc")
```

```
  )
))]
pub fn step<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
  let data = match sig.into() {
      Some(s) => s as c_int,
      None => 0,
  };
  unsafe {
      ptrace_other(Request::PT_STEP, pid, ptr::null_mut(), data).map(drop)
  }
}

/// Reads a word from a processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn read(pid: Pid, addr: AddressType)
 -> Result<c_int> {
  unsafe {
      // Traditionally there was a difference between reading data or
      // instruction memory but not in modern systems.
      ptrace_other(Request::PT_READ_D, pid, addr, 0)
  }
}

/// Writes a word into the processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn write(pid: Pid, addr: AddressType, data: c_int) -> Result<()> {
  unsafe { ptrace_other(Request::PT_WRITE_D, pid, addr, data).map(drop) }
}
```

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The implementation for Utf8CharIndices was adapted from the
CharIndices implementation of the Rust standard library at revision
ab32548539ec38a939c1b58599249f3b54130026
(https://github.com/rust-lang/rust/blob/ab32548539ec38a939c1b58599249f3b54130026/library/core/src/str/iter.rs).

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```
//! This file contains the BSD APIs available in Haiku. It corresponds to the
//! header files in `headers/compatibility/bsd`.
//!
```

```
//! Note that Haiku's BSD compatibility is a combination of system APIs and
//! utility libraries. There should only be system APIs in `libc`. When you are
//! trying to determine whether something should be included in this file, the
//! best indicator is whether it also exists in the BSD-specific definitions in
//! this libc crate.

use crate::prelude::*;

// stringlist.h (utility library)
// Note: this is kept because it was previously introduced
pub type StringList = _stringlist;

s! {
  // stringlist.h (utility library)
  // Note: this is kept because it was previously introduced
  pub struct _stringlist {
      pub sl_str: *mut *mut c_char,
      pub sl_max: size_t,
      pub sl_cur: size_t,
  }

  // sys/event.h
  pub struct kevent {
      pub ident: crate::uintptr_t,
      pub filter: c_short,
      pub flags: c_ushort,

  pub fflags: c_uint,
      pub data: i64,
      pub udata: *mut c_void,
      pub ext: [u64; 4],
  }

  // sys/link_elf.h
  pub struct dl_phdr_info {
      pub dlpi_addr: crate::Elf_Addr,
      pub dlpi_name: *const c_char,
      pub dlpi_phdr: *const crate::Elf_Phdr,
      pub dlpi_phnum: crate::Elf_Half,
  }
}

// sys/event.h
pub const EVFILT_READ: i16 = -1;
pub const EVFILT_WRITE: i16 = -2;
pub const EVFILT_PROC: i16 = -5;
pub const EV_ADD: u16 = 0x0001;
pub const EV_DELETE: u16 = 0x0002;
```

```
pub const EV_ONESHOT: u16 = 0x0010;
pub const EV_CLEAR: u16 = 0x0020;
pub const EV_EOF: u16 = 0x8000;
pub const EV_ERROR: u16 = 0x4000;
pub const NOTE_EXIT: u32 = 0x80000000;

// sys/ioccom.h
pub const IOC_VOID: c_ulong = 0x20000000;
pub const IOC_OUT: c_ulong = 0x40000000;
pub const IOC_IN: c_ulong = 0x80000000;
pub const IOC_INOUT: c_ulong = IOC_IN | IOC_OUT;
pub const IOC_DIRMASK: c_ulong = 0xe0000000;

#[link(name = "bsd")]
extern "C" {
  // stdlib.h
  pub fn daemon(nochdir:
 c_int, noclose: c_int) -> c_int;
  pub fn getprogname() -> *const c_char;
  pub fn setprogname(progname: *const c_char);
  pub fn arc4random() -> u32;
  pub fn arc4random_uniform(upper_bound: u32) -> u32;
  pub fn arc4random_buf(buf: *mut c_void, n: size_t);
  pub fn mkstemps(template: *mut c_char, suffixlen: c_int) -> c_int;
  pub fn strtonum(
      nptr: *const c_char,
      minval: c_longlong,
      maxval: c_longlong,
      errstr: *mut *const c_char,
  ) -> c_longlong;

  // pty.h
  pub fn openpty(
      amaster: *mut c_int,
      aslave: *mut c_int,
      name: *mut c_char,
      termp: *mut crate::termios,
      winp: *mut crate::winsize,
  ) -> c_int;
  pub fn login_tty(_fd: c_int) -> c_int;
  pub fn forkpty(
      amaster: *mut c_int,
      name: *mut c_char,
      termp: *mut crate::termios,
      winp: *mut crate::winsize,
  ) -> crate::pid_t;

  // string.h
```

```
  pub fn strsep(string: *mut *mut c_char, delimiters:
*const c_char) -> *mut c_char;
  pub fn explicit_bzero(buf: *mut c_void, len: size_t);

  // stringlist.h (utility library)
  // Note: this is kept because it was previously introduced
  pub fn sl_init() -> *mut StringList;
  pub fn sl_add(sl: *mut StringList, n: *mut c_char) -> c_int;
  pub fn sl_free(sl: *mut StringList, i: c_int);
  pub fn sl_find(sl: *mut StringList, n: *mut c_char) -> *mut c_char;

  // sys/event.h
  pub fn kqueue() -> c_int;
  pub fn kevent(
      kq: c_int,
      changelist: *const kevent,
      nchanges: c_int,
      eventlist: *mut kevent,
      nevents: c_int,
      timeout: *const crate::timespec,
  ) -> c_int;

  // sys/link_elf.h
  pub fn dl_iterate_phdr(
      callback: Option<
          unsafe extern "C" fn(info: *mut dl_phdr_info, size: usize, data: *mut c_void) -> c_int,
      >,
      data: *mut c_void,
  ) -> c_int;

  // sys/time.h
  pub fn lutimes(file: *const c_char, times: *const crate::timeval)
-> c_int;

  // sys/uov.h
  pub fn preadv(
      fd: c_int,
      iov: *const crate::iovec,
      iovcnt: c_int,
      offset: crate::off_t,
  ) -> ssize_t;
  pub fn pwritev(
      fd: c_int,
      iov: *const crate::iovec,
      iovcnt: c_int,
      offset: crate::off_t,
  ) -> ssize_t;
```

```
  // sys/wait.h
  pub fn wait4(
      pid: crate::pid_t,
      status: *mut c_int,
      options: c_int,
      rusage: *mut crate::rusage,
  ) -> crate::pid_t;
}
```

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```
/// The datatype used for the ioctl number
#[doc(hidden)]
#[cfg(not(solarish))]
pub type ioctl_num_type = ::libc::c_ulong;
```

```
#[doc(hidden)]
#[cfg(solarish)]
pub type ioctl_num_type = ::libc::c_int;

/// The datatype used for the 3rd argument
#[doc(hidden)]
pub type ioctl_param_type = ::libc::c_int;

mod consts {
  use crate::sys::ioctl::ioctl_num_type;
  #[doc(hidden)]
  pub const VOID: ioctl_num_type = 0x2000_0000;
  #[doc(hidden)]
  pub const OUT: ioctl_num_type = 0x4000_0000;
  #[doc(hidden)]
  #[allow(overflowing_literals)]
  pub const IN: ioctl_num_type = 0x8000_0000;
  #[doc(hidden)]
  pub const INOUT: ioctl_num_type = IN | OUT;
  #[doc(hidden)]
  pub const IOCPARM_MASK: ioctl_num_type = 0x1fff;
}

pub use self::consts::*;

#[macro_export]
#[doc(hidden)]
macro_rules! ioc {
  ($inout:expr, $group:expr, $num:expr, $len:expr) => {
    $inout
      | (($len as $crate::sys::ioctl::ioctl_num_type
        & $crate::sys::ioctl::IOCPARM_MASK)

        << 16)
      | (($group as $crate::sys::ioctl::ioctl_num_type) << 8)
      | ($num as $crate::sys::ioctl::ioctl_num_type)
  };
}

/// Generate an ioctl request code for a command that passes no data.
///
/// This is equivalent to the `_IO()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_none!()` directly.
///
/// # Example
```

```
///
/// ```
/// # #[macro_use] extern crate nix;
/// const KVMIO: u8 = 0xAE;
/// ioctl_write_int_bad!(kvm_create_vm, request_code_none!(KVMIO, 0x03));
/// # fn main() {}
/// ```
#[macro_export(local_inner_macros)]
macro_rules! request_code_none {
  ($g:expr, $n:expr) => {
      ioc!($crate::sys::ioctl::VOID, $g, $n, 0)
  };
}

/// Generate an ioctl request code for a command that passes an integer
///
/// This is equivalent to the `_IOWINT()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the
 `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write_int!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write_int {
  ($g:expr, $n:expr) => {
      ioc!(
          $crate::sys::ioctl::VOID,
          $g,
          $n,
          ::std::mem::size_of::<$crate::libc::c_int>()
      )
  };
}

/// Generate an ioctl request code for a command that reads.
///
/// This is equivalent to the `_IOR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_read!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is reading and the kernel is
/// writing.
#[macro_export(local_inner_macros)]
macro_rules! request_code_read {
  ($g:expr, $n:expr, $len:expr) => {
      ioc!($crate::sys::ioctl::OUT, $g, $n, $len)
  };
```

```
}

/// Generate an ioctl request code for a command that writes.
///
///
 This is equivalent to the `_IOW()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is writing and the kernel is
/// reading.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::IN, $g, $n, $len)
   };
}

/// Generate an ioctl request code for a command that reads and writes.
///
/// This is equivalent to the `_IOWR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_readwrite!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_readwrite {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::INOUT, $g, $n, $len)

 };
}
```

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```
use crate::errno::Errno;
use crate::sys::signal::Signal;
use crate::unistd::Pid;
use crate::Result;
use cfg_if::cfg_if;
use libc::{self, c_int};
use std::ptr;

pub type RequestType = c_int;

cfg_if! {
  if #[cfg(any(freebsdlike, apple_targets, target_os = "openbsd"))] {
      #[doc(hidden)]
      pub type AddressType = *mut ::libc::c_char;
```

```
  } else {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_void;
  }
}

libc_enum! {
  #[repr(i32)]
  /// Ptrace Request enum defining the action to be taken.
  #[non_exhaustive]
  pub enum Request {
    PT_TRACE_ME,
    PT_READ_I,
    PT_READ_D,
    #[cfg(apple_targets)]
    PT_READ_U,
    PT_WRITE_I,
    PT_WRITE_D,
    #[cfg(apple_targets)]
    PT_WRITE_U,
    PT_CONTINUE,
    PT_KILL,
    #[cfg(any(any(freebsdlike, apple_targets),
          all(target_os = "openbsd", target_arch = "x86_64"),
          all(target_os = "netbsd", any(target_arch = "x86_64",
                                target_arch = "powerpc"))))]
    PT_STEP,
    PT_ATTACH,
    PT_DETACH,
    #[cfg(apple_targets)]
    PT_SIGEXC,
    #[cfg(apple_targets)]
    PT_THUPDATE,
    #[cfg(apple_targets)]
    PT_ATTACHEXC
  }
}

unsafe fn ptrace_other(
  request: Request,
  pid: Pid,
  addr: AddressType,
  data: c_int,
) -> Result<c_int> {
  unsafe {
    Errno::result(libc::ptrace(
      request as RequestType,
      libc::pid_t::from(pid),
```

```
            addr,
            data,
        ))
        .map(|_| 0)
    }
}

/// Sets the process as traceable, as with `ptrace(PT_TRACEME, ...)`
///
/// Indicates that this process is to be traced by its parent.
/// This is the only ptrace request to be issued by the tracee.
pub fn traceme() -> Result<()> {
    unsafe {
        ptrace_other(Request::PT_TRACE_ME, Pid::from_raw(0), ptr::null_mut(), 0)
            .map(drop)
    }
}

/// Attach to a running
 process, as with `ptrace(PT_ATTACH, ...)`
///
/// Attaches to the process specified by `pid`, making it a tracee of the calling process.
pub fn attach(pid: Pid) -> Result<()> {
    unsafe {
        ptrace_other(Request::PT_ATTACH, pid, ptr::null_mut(), 0).map(drop)
    }
}

/// Detaches the current running process, as with `ptrace(PT_DETACH, ...)`
///
/// Detaches from the process specified by `pid` allowing it to run freely, optionally delivering a
/// signal specified by `sig`.
pub fn detach<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
    let data = match sig.into() {
        Some(s) => s as c_int,
        None => 0,
    };
    unsafe {
        ptrace_other(Request::PT_DETACH, pid, ptr::null_mut(), data).map(drop)
    }
}

/// Restart the stopped tracee process, as with `ptrace(PTRACE_CONT, ...)`
///
/// Continues the execution of the process with PID `pid`, optionally
/// delivering a signal specified by `sig`.
pub fn cont<T: Into<Option<Signal>>>(pid: Pid, sig: T)
```

```
 -> Result<()> {
   let data = match sig.into() {
       Some(s) => s as c_int,
       None => 0,
   };
   unsafe {
       // Ignore the useless return value
       ptrace_other(Request::PT_CONTINUE, pid, 1 as AddressType, data)
           .map(drop)
   }
}

/// Issues a kill request as with `ptrace(PT_KILL, ...)`
///
/// This request is equivalent to `ptrace(PT_CONTINUE, ..., SIGKILL);`
pub fn kill(pid: Pid) -> Result<()> {
   unsafe {
       ptrace_other(Request::PT_KILL, pid, 0 as AddressType, 0).map(drop)
   }
}

/// Move the stopped tracee process forward by a single step as with
/// `ptrace(PT_STEP, ...)`
///
/// Advances the execution of the process with PID `pid` by a single step optionally delivering a
/// signal specified by `sig`.
///
/// # Example
/// ```rust
/// use nix::sys::ptrace::step;
/// use nix::unistd::Pid;
/// use nix::sys::signal::Signal;
/// use nix::sys::wait::*;
/// // If a process changes state to the stopped state because of a SIGUSR1
/// // signal,
 this will step the process forward and forward the user
/// // signal to the stopped process
/// match waitpid(Pid::from_raw(-1), None) {
///     Ok(WaitStatus::Stopped(pid, Signal::SIGUSR1)) => {
///         let _ = step(pid, Signal::SIGUSR1);
///     }
///     _ => {},
/// }
/// ```
#[cfg(any(
   any(freebsdlike, apple_targets),
   all(target_os = "openbsd", target_arch = "x86_64"),
   all(
```

```
        target_os = "netbsd",
        any(target_arch = "x86_64", target_arch = "powerpc")
    )
))]
pub fn step<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
    let data = match sig.into() {
        Some(s) => s as c_int,
        None => 0,
    };
    unsafe {
        ptrace_other(Request::PT_STEP, pid, ptr::null_mut(), data).map(drop)
    }
}

/// Reads a word from a processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn read(pid: Pid, addr: AddressType)
 -> Result<c_int> {
    unsafe {
        // Traditionally there was a difference between reading data or
        // instruction memory but not in modern systems.
        ptrace_other(Request::PT_READ_D, pid, addr, 0)
    }
}

/// Writes a word into the processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn write(pid: Pid, addr: AddressType, data: c_int) -> Result<()> {
    unsafe { ptrace_other(Request::PT_WRITE_D, pid, addr, data).map(drop) }
}
```

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The implementation for Utf16CharIndices was adapted from the
CharIndices implementation of the Rust standard library at revision
ab32548539ec38a939c1b58599249f3b54130026
(https://github.com/rust-lang/rust/blob/ab32548539ec38a939c1b58599249f3b54130026/library/core/src/str/iter.rs).

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# 1.3972 vulkan-loader 1.4.313.0-1.el9

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# 1.3973 openscap 1:1.3.12-1.el9_6.alma.1

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# 1.3975 device-mapper-multipath 0.8.7-39.el9

## 1.3975.1 Available under license :

```
/*
* Soft:       multipath device mapper target autoconfig
*
* Version:     $Id: main.h,v 0.0.1 2003/09/18 15:13:38 cvaroqui Exp $
*
* Author:      Christophe Varoqui
*
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When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the @dfn{Lesser} General Public License because it does @emph{Less} to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the
same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a ``work based on the library'' and a ``work that uses the library''. The former
contains code derived from the library, whereas the latter must be combined with the library in order to run.

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@enumerate 0
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A ``library'' means a collection of software functions and/or data

prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The ``Library'', below, refers to any such software library or work which has been distributed under these terms. A ``work based on the Library'' means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it,
either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term ``modification''.)

``Source code'' for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

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@enumerate a
@item

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@item
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@item
You must
cause the whole of the work to be licensed at no
charge to all third parties under the terms of this License.

@item
If a facility in the modified Library refers to a function or a
table of data to be supplied by an application program that uses
the facility, other than as an argument passed when the facility
is invoked, then you must make a good faith effort to ensure that,
in the event an application does not supply such function or
table, the facility still operates, and performs whatever part of
its purpose remains meaningful.

(For example, a function in a library to compute square roots has
a purpose that is entirely well-defined independent of the
application. Therefore, Subsection 2d requires that any
application-supplied function or table used by this function must
be optional: if the application does not supply it, the square
root function must still compute square roots.)
@end enumerate

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@item
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2 above provided that you accompany
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If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

@item
A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a ``work that uses the Library''. Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a ``work that uses the Library'' with the Library creates an executable that is a derivative of the Library (because
it
contains portions of the Library), rather than a ``work that uses the library''. The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a ``work that uses the Library'' uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise,
if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

@item
As an exception to the Sections above, you may also combine or link a ``work that uses the Library'' with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of
this License. Also, you must do one
of these things:

@enumerate a
@item
Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable ``work that uses the Library'', as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood

that the user who changes the contents of definitions files in the
Library will not necessarily be able to recompile the application
to use the modified definitions.)

@item
Use a suitable shared library mechanism for linking with the Library. A
suitable mechanism is one that (1) uses at run time a copy of the
library already present on the user's computer system, rather than
copying library functions into the executable,
and (2) will operate
properly with a modified version of the library, if the user installs
one, as long as the modified version is interface-compatible with the
version that the work was made with.

@item
Accompany the work with a written offer, valid for at
least three years, to give the same user the materials
specified in Subsection 6a, above, for a charge no more
than the cost of performing this distribution.

@item
If distribution of the work is made by offering access to copy
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specified materials from the same place.

@item
Verify that the user has already received a copy of these
materials or that you have already sent this user a copy.
@end enumerate

For an executable, the required form of the ``work that uses the
Library" must include any data and utility programs needed for
reproducing the executable from it. However, as a special exception,
the materials to be distributed need not include anything that
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@item
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@enumerate a
@item
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uncombined with any other library
facilities. This must be distributed under the terms of the Sections above.

@item
Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.
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@end enumerate

@subheading END OF TERMS AND CONDITIONS

@page
@subheading How to Apply These Terms to Your New Libraries

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@end
smallexample

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@var{signature of Ty Coon}, 1 April 1990
Ty Coon, President of Vice
@end smallexample

That's all there is to it!

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Version 3, 29 June 2007

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Some devices are designed to deny users access to install or run modified versions of the software inside them, although the manufacturer can do so. This is fundamentally incompatible with the aim of protecting users' freedom to change the software. The systematic pattern of such abuse occurs in the area of products for individuals to use, which is precisely where it is most unacceptable. Therefore, we have designed this version of the GPL to prohibit the practice for those products. If such problems arise substantially in other domains, we stand
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Finally, every program is threatened constantly by software patents. States should not allow patents to restrict development and use of software on general-purpose computers, but in those that do, we wish to avoid the special danger that patents applied to a free program could make it effectively proprietary. To prevent this, the GPL assures that patents cannot be used to render the program non-free.

The precise terms and conditions for copying, distribution and modification follow.

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To "modify" a work means to copy from or adapt all or part of the work in a fashion requiring copyright permission, other than the making of an exact copy. The resulting work is called a "modified version" of the

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The "source code" for a work means the preferred form of the work for making modifications to it. "Object code" means any non-source form of a work.

A "Standard Interface" means an interface that either is an official standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.

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#ifndef _BASENAME_LGPL_H
#define _BASENAME_LGPL_H

#include <stddef.h>

#ifndef DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif


/*
 Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
          FILENAME      RESULT
          "foo.c"       "foo.c"
          "foo/bar.c"   "bar.c"
          "/foo/bar.c"  "bar.c"
          "foo/bar/"    "bar/"
          "foo/bar//"   "bar//"
          "/"           ""
          "//"          ""
          ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(), defined in <string.h>, does
```

```
     not consider trailing slashes to be part of the component:

 FILENAME      RESULT
           "foo/bar/"    ""
           "foo/bar//"   ""
   * The 'basename' command eliminates trailing slashes and for a root
     produces a non-empty result:
           FILENAME      RESULT
           "foo/bar/"    "bar"
           "foo/bar//"   "bar"
           "/"           "/"
           "//"          "/"
*/
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;


#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
```

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assignment does not stop you from
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<signature of Mo Ghoul>, 1 April 1987
Mo Ghoul, President of Vice, Digital Simulation Corp.

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---
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[Did you copy any files or text written by someone else in these changes?
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[Which files have you changed so far, and which new files have you written
so far?]

```
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*
```

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*/

#ifndef GRUB_BSD_CPU_HEADER
#define GRUB_BSD_CPU_HEADER 1

#include <grub/types.h>
#include <grub/relocator.h>

#include <grub/i386/freebsd_reboot.h>
#include <grub/i386/netbsd_reboot.h>
#include <grub/i386/openbsd_reboot.h>
#include <grub/i386/freebsd_linker.h>
#include
 <grub/i386/netbsd_bootinfo.h>
#include <grub/i386/openbsd_bootarg.h>

enum bsd_kernel_types
 {
   KERNEL_TYPE_NONE,
   KERNEL_TYPE_FREEBSD,
   KERNEL_TYPE_OPENBSD,
   KERNEL_TYPE_NETBSD,
 };

#define GRUB_BSD_TEMP_BUFFER   0x80000

#define FREEBSD_B_DEVMAGIC OPENBSD_B_DEVMAGIC
#define FREEBSD_B_SLICESHIFT OPENBSD_B_CTRLSHIFT
#define FREEBSD_B_UNITSHIFT OPENBSD_B_UNITSHIFT
#define FREEBSD_B_PARTSHIFT OPENBSD_B_PARTSHIFT
#define FREEBSD_B_TYPESHIFT OPENBSD_B_TYPESHIFT

#define FREEBSD_MODTYPE_KERNEL  "elf kernel"
#define FREEBSD_MODTYPE_KERNEL64 "elf64 kernel"
#define FREEBSD_MODTYPE_ELF_MODULE "elf module"
#define FREEBSD_MODTYPE_ELF_MODULE_OBJ "elf obj module"
#define FREEBSD_MODTYPE_RAW  "raw"

#define FREEBSD_BOOTINFO_VERSION 1

struct grub_freebsd_bootinfo
```

```
{
 grub_uint32_t version;
 grub_uint8_t unused1[44];
 grub_uint32_t length;
 grub_uint8_t unused2;
 grub_uint8_t boot_device;
 grub_uint8_t unused3[18];
 grub_uint32_t kern_end;
 grub_uint32_t environment;
  grub_uint32_t tags;
} GRUB_PACKED;

struct freebsd_tag_header
{
 grub_uint32_t type;
 grub_uint32_t len;
};

grub_err_t grub_freebsd_load_elfmodule32 (struct grub_relocator *relocator,
       grub_file_t file, int argc,
       char *argv[], grub_addr_t *kern_end);
grub_err_t grub_freebsd_load_elfmodule_obj64 (struct grub_relocator *relocator,
           grub_file_t file, int argc,
           char *argv[],
           grub_addr_t *kern_end);
grub_err_t grub_freebsd_load_elf_meta32 (struct grub_relocator *relocator,
      grub_file_t file,
      const char *filename,
      grub_addr_t *kern_end);
grub_err_t grub_freebsd_load_elf_meta64 (struct grub_relocator *relocator,
      grub_file_t file,
      const char *filename,
      grub_addr_t *kern_end);

grub_err_t grub_netbsd_load_elf_meta32 (struct grub_relocator *relocator,
     grub_file_t file,
     const char *filename,
     grub_addr_t *kern_end);
grub_err_t grub_netbsd_load_elf_meta64 (struct grub_relocator *relocator,
     grub_file_t
 file,
     const char *filename,
     grub_addr_t *kern_end);

grub_err_t grub_bsd_add_meta (grub_uint32_t type,
         const void *data, grub_uint32_t len);
grub_err_t grub_freebsd_add_meta_module (const char *filename, const char *type,
      int argc, char **argv,
```

```
     grub_addr_t addr, grub_uint32_t size);

struct grub_openbsd_ramdisk_descriptor
{
 grub_size_t max_size;
 grub_uint8_t *target;
 grub_uint32_t *size;
};

grub_err_t grub_openbsd_find_ramdisk32 (grub_file_t file,
    const char *filename,
    grub_addr_t kern_start,
    void *kern_chunk_src,
    struct grub_openbsd_ramdisk_descriptor *desc);
grub_err_t grub_openbsd_find_ramdisk64 (grub_file_t file,
    const char *filename,
    grub_addr_t kern_start,
    void *kern_chunk_src,
    struct grub_openbsd_ramdisk_descriptor *desc);

extern grub_uint8_t grub_bsd64_trampoline_start, grub_bsd64_trampoline_end;
extern grub_uint32_t grub_bsd64_trampoline_selfjump;
extern grub_uint32_t grub_bsd64_trampoline_gdt;

#endif
 /* ! GRUB_BSD_CPU_HEADER */
```

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Description:
realpath, canonicalize_file_name: Provide canonical absolute file name

Files:
lib/canonicalize-lgpl.c
m4/canonicalize.m4
m4/double-slash-root.m4
m4/lstat.m4

Depends-on:
extensions
stdlib
nocrash
double-slash-root [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
eloop-threshold [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
errno [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]

```
fcntl-h          [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
filename         [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
idx              [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
intprops         [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
libc-config      [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME
 = 1]
memmove          [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
mempcpy          [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
pathmax          [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
rawmemchr        [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
readlink         [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
scratch_buffer   [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
stat             [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
stdbool          [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
sys_stat         [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
unistd           [test $HAVE_CANONICALIZE_FILE_NAME = 0
 || test $REPLACE_CANONICALIZE_FILE_NAME = 1]

configure.ac:
gl_CANONICALIZE_LGPL
gl_CONDITIONAL([GL_COND_OBJ_CANONICALIZE_LGPL],
          [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test $REPLACE_CANONICALIZE_FILE_NAME =
1])
gl_MODULE_INDICATOR([canonicalize-lgpl])
gl_STDLIB_MODULE_INDICATOR([canonicalize_file_name])
gl_STDLIB_MODULE_INDICATOR([realpath])

Makefile.am:
if GL_COND_OBJ_CANONICALIZE_LGPL
lib_SOURCES += canonicalize-lgpl.c
endif

Include:
<stdlib.h>
```

License:
LGPLv2+

Maintainer:
all
Description:
Concatenate two arbitrary file names.

Files:
lib/filenamecat.h
lib/filenamecat-lgpl.c
m4/filenamecat.m4

Depends-on:
c99
basename-lgpl
filename
malloc-posix

configure.ac:
gl_FILE_NAME_CONCAT_LGPL

Makefile.am:
lib_SOURCES += filenamecat-lgpl.c

Include:
"filenamecat.h"

License:
LGPLv2+

Maintainer:
Jim Meyering
Files:
tests/test-update-copyright.sh

Depends-on:

configure.ac:
abs_aux_dir=`cd "$ac_aux_dir"; pwd`
AC_SUBST([abs_aux_dir])

Makefile.am:
TESTS += test-update-copyright.sh
TESTS_ENVIRONMENT += abs_aux_dir='$(abs_aux_dir)'

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making modifications to it. For an executable work, complete source
code means all the source code for all modules it contains, plus any
associated interface definition files, plus the scripts used to
control compilation and installation of the executable. However, as a
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@end enumerate

@iftex
@heading END OF TERMS AND CONDITIONS
@end iftex
@ifinfo
@center END OF TERMS AND CONDITIONS

@end ifinfo

@page
@heading Appendix: How to Apply These Terms to Your New Programs

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To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the ``copyright'' line and a pointer to where the full notice is found.

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@var{one line to give the program's name
and a brief idea of what it does.}
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@end smallexample

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when it starts in an interactive mode:

@smallexample
Gnomovision version
69, Copyright (C) @var{year} @var{name of author}
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
@end smallexample

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@example
Yoyodyne, Inc., hereby disclaims all copyright interest in the program
`Gnomovision' (which makes passes at compilers) written by James Hacker.

@var{signature of Ty Coon}, 1 April 1989
Ty Coon, President of Vice
@end example

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Description:
Provide the GNU Free Documentation License in Texinfo format.

Notice:
Don't use this module! Instead, copy the referenced license file into your version control repository.

Files:
doc/fdl.texi

Depends-on:

configure.ac:

Makefile.am:

Include:

License:
unmodifiable license text

Maintainer:
all
Description:
Help make libraries relocatable, that is, to allow them to function
properly when copied to an arbitrary directory.

Files:
doc/relocatable.texi
lib/relocatable.h
lib/relocatable.c
lib/relocatable.valgrind
m4/relocatable-lib.m4

Depends-on:
strdup

configure.ac:
```
gl_RELOCATABLE_LIBRARY
if test $RELOCATABLE = yes; then
  AC_LIBOBJ([relocatable])
fi
```

Makefile.am:
```
DEFS += -DNO_XMALLOC
```

Include:
"relocatable.h"

License:
LGPLv2+

Maintainer:
Ben Pfaff

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Version 2.1, February 1999

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<signature of Ty Coon>, 1 April 1990

Ty Coon, President of Vice

That's all there is to it!
Description:
Extract specific portions of filenames.

Files:
lib/dirname.h
lib/dirname-lgpl.c
lib/stripslash.c

Depends-on:
basename-lgpl
double-slash-root
filename
malloc-posix
stdbool

configure.ac:

Makefile.am:
lib_SOURCES += dirname-lgpl.c stripslash.c

Include:
"dirname.h"

License:
LGPLv2+

Maintainer:
Jim Meyering, Eric Blake

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Files:
tests/test-canonicalize-lgpl.c
tests/signature.h
tests/null-ptr.h
tests/macros.h

Depends-on:
ignore-value
same-inode
symlink

configure.ac:

Makefile.am:
TESTS += test-canonicalize-lgpl
check_PROGRAMS += test-canonicalize-lgpl
test_canonicalize_lgpl_LDADD = $(LDADD) $(LIBINTL)

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Description:
Extract the last component (base name) of a file name.

Files:
lib/basename-lgpl.h
lib/basename-lgpl.c

Depends-on:
double-slash-root
filename
stdbool

configure.ac:

Makefile.am:
lib_SOURCES += basename-lgpl.c

Include:
"basename-lgpl.h"

License:
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all

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Files:
tests/test-getcwd-lgpl.c
tests/signature.h
tests/macros.h

Depends-on:

configure.ac:

Makefile.am:
TESTS += test-getcwd-lgpl
check_PROGRAMS += test-getcwd-lgpl
test_getcwd_lgpl_LDADD = $(LDADD) $(LIBINTL)
Description:
Ensure getcwd(NULL, 0) returns a buffer allocated by the malloc() function.

Files:
lib/getcwd-lgpl.c
m4/getcwd.m4

Depends-on:
unistd
free-posix [test $REPLACE_GETCWD = 1]
strdup [test $REPLACE_GETCWD = 1]

configure.ac:
gl_FUNC_GETCWD_LGPL
gl_CONDITIONAL([GL_COND_OBJ_GETCWD_LGPL], [test $REPLACE_GETCWD = 1])
gl_UNISTD_MODULE_INDICATOR([getcwd])

Makefile.am:
if GL_COND_OBJ_GETCWD_LGPL
lib_SOURCES += getcwd-lgpl.c
endif

Include:
<unistd.h>

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Maintainer:
Eric Blake

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Description:
Locating a program in PATH (LGPLed version).

Files:
lib/findprog.h
lib/findprog.c
lib/findprog-lgpl.c
m4/findprog.m4
m4/eaccess.m4

Depends-on:
stdbool

sys_stat
strdup
concat-filename
access
stat
unistd

configure.ac:
gl_FINDPROG
gl_MODULE_INDICATOR([findprog-lgpl])

Makefile.am:
lib_SOURCES += findprog.h findprog-lgpl.c

Include:
"findprog.h"

License:
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Maintainer:
all

# 1.3977 krb5 1.22.2-r2

## 1.3977.1 Available under license :

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cmd/krb5/iprop/iprop_hdr.h
cmd/krb5/kadmin/server/ipropd_svc.c
cmd/krb5/kproplog/kproplog.c
cmd/krb5/slave/kpropd_rpc.c
lib/gss_mechs/mech_krb5/et/kdb5_err.c
lib/gss_mechs/mech_spnego/mech/gssapiP_spnego.h
lib/gss_mechs/mech_spnego/mech/spnego_mech.c
lib/krb5/kadm5/kadm_host_srv_names.c
lib/krb5/kdb/kdb_convert.c
lib/krb5/kdb/kdb_hdr.h
lib/krb5/kdb/kdb_log.c
lib/krb5/kdb/kdb_log.h
lib/libgss/g_accept_sec_context.c
lib/libgss/g_acquire_cred.c
lib/libgss/g_canon_name.c
lib/libgss/g_compare_name.c
lib/libgss/g_context_time.c
lib/libgss/g_delete_sec_context.c
lib/libgss/g_dsp_name.c
lib/libgss/g_dsp_status.c
lib/libgss/g_dup_name.c
lib/libgss/g_exp_sec_context.c
lib/libgss/g_export_name.c
lib/libgss/g_glue.c
lib/libgss/g_imp_name.c
lib/libgss/g_imp_sec_context.c
lib/libgss/g_init_sec_context.c
lib/libgss/g_initialize.c
lib/libgss/g_inquire_context.c
lib/libgss/g_inquire_cred.c
lib/libgss/g_inquire_names.c
lib/libgss/g_process_context.c
lib/libgss/g_rel_buffer.c
lib/libgss/g_rel_cred.c
lib/libgss/g_rel_name.c
lib/libgss/g_rel_oid_set.c
lib/libgss/g_seal.c
lib/libgss/g_sign.c
lib/libgss/g_store_cred.c
lib/libgss/g_unseal.c
lib/libgss/g_userok.c
lib/libgss/g_utils.c
lib/libgss/g_verify.c
lib/libgss/gssd_pname_to_uid.c
uts/common/gssapi/include/gssapi_err_generic.h
uts/common/gssapi/include/mechglueP.h

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The implementations of GSSAPI mechglue in GSSAPI-SPNEGO in
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lib/gssapi/generic/gssapi_err_generic.et
lib/gssapi/mechglue/g_accept_sec_context.c
lib/gssapi/mechglue/g_acquire_cred.c

lib/gssapi/mechglue/g_canon_name.c
lib/gssapi/mechglue/g_compare_name.c
lib/gssapi/mechglue/g_context_time.c
lib/gssapi/mechglue/g_delete_sec_context.c
lib/gssapi/mechglue/g_dsp_name.c
lib/gssapi/mechglue/g_dsp_status.c
lib/gssapi/mechglue/g_dup_name.c
lib/gssapi/mechglue/g_exp_sec_context.c
lib/gssapi/mechglue/g_export_name.c
lib/gssapi/mechglue/g_glue.c
lib/gssapi/mechglue/g_imp_name.c
lib/gssapi/mechglue/g_imp_sec_context.c
lib/gssapi/mechglue/g_init_sec_context.c
lib/gssapi/mechglue/g_initialize.c
lib/gssapi/mechglue/g_inquire_context.c
lib/gssapi/mechglue/g_inquire_cred.c
lib/gssapi/mechglue/g_inquire_names.c
lib/gssapi/mechglue/g_process_context.c
lib/gssapi/mechglue/g_rel_buffer.c
lib/gssapi/mechglue/g_rel_cred.c
lib/gssapi/mechglue/g_rel_name.c
lib/gssapi/mechglue/g_rel_oid_set.c
lib/gssapi/mechglue/g_seal.c
lib/gssapi/mechglue/g_sign.c
lib/gssapi/mechglue/g_store_cred.c
lib/gssapi/mechglue/g_unseal.c
lib/gssapi/mechglue/g_userok.c
lib/gssapi/mechglue/g_utils.c
lib/gssapi/mechglue/g_verify.c
lib/gssapi/mechglue/gssd_pname_to_uid.c
lib/gssapi/mechglue/mgluePh
lib/gssapi/mechglue/oid_ops.c
lib/gssapi/spnego/gssapiP_spnego.h
lib/gssapi/spnego/spnego_mech.c

and the initial implementation of incremental propagation, including the following new or changed files:

include/iprop_hdr.h
kadmin/server/ipropd_svc.c
lib/kdb/iprop.x
lib/kdb/kdb_convert.c
lib/kdb/kdb_log.c
lib/kdb/kdb_log.h
lib/krb5/error_tables/kdb5_err.et
kprop/kpropd_rpc.c
kprop/kproplog.c

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Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.

The hypothetical commands
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<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice

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# 1.3979 grub2-efi-x64 1:2.06-114.el9_7.1.alma.1

## 1.3979.1 Available under license :

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When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the @dfn{Lesser} General Public License because it does @emph{Less} to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the

same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a ``work based on the library'' and a ``work that uses the library''. The former
contains code derived from the library, whereas the latter must be combined with the library in order to run.

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``Source code'' for a work means the preferred form of the work for making modifications to it. For a library, complete source code means

all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

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@enumerate a
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@item
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@item
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the facility, other than as an argument passed when the facility
is invoked, then you must make a good faith effort to ensure that,
in the event an application does not supply such function or
table, the facility still operates, and performs whatever part of
its purpose remains meaningful.

(For example, a function in a library to compute square roots has
a purpose that is entirely well-defined independent of the
application. Therefore, Subsection 2d requires that any
application-supplied function or table used by this function must
be optional: if the application does not supply it, the square
root function must still compute square roots.)
@end enumerate

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of that work are not derived from the Library,
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your rights to work written entirely by you; rather, the intent is to
exercise the right to control the distribution of derivative or
collective works based on the Library.

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@item
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2 above provided that you accompany
it with the complete corresponding machine-readable source code, which
must be distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

If distribution of object code is made by offering access to copy
from a designated place, then offering equivalent access to copy the
source code from the same place satisfies the requirement to
distribute the source code, even though third parties are not
compelled to copy the source along with the object code.

@item
A program that contains no derivative of any portion of the
Library, but is designed to work with the Library by being compiled or
linked with it, is called a ``work that uses the Library''. Such a
work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

However, linking a ``work that uses the Library'' with the Library
creates an executable that is a derivative of the Library (because
it
contains portions of the Library), rather than a ``work that uses the
library''. The executable is therefore covered by this License.
Section 6 states terms for distribution of such executables.

When a ``work that uses the Library'' uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library. The
threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small inline
functions (ten lines or less in length), then the use of the object
file is unrestricted, regardless of whether it is legally a derivative
work. (Executables containing this object code plus portions of the
Library will still fall under Section 6.)

Otherwise,
if the work is a derivative of the Library, you may
distribute the object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.

@item
As an exception to the Sections above, you may also combine or
link a ``work that uses the Library'' with the Library to produce a
work containing portions of the Library, and distribute that work
under terms of your choice, provided that the terms permit
modification of the work for the customer's own use and reverse
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You must give prominent notice with each copy of the work that the
Library is used in it and that the Library and its use are covered by
this License. You must supply a copy of this License. If the work
during execution displays copyright notices, you must include the
copyright notice for the Library among them, as well as a reference
directing the user to the copy of
this License. Also, you must do one
of these things:

@enumerate a
@item
Accompany the work with the complete corresponding
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changes were used in the work (which must be distributed under
Sections 1 and 2 above); and, if the work is an executable linked
with the Library, with the complete machine-readable ``work that
uses the Library'', as object code and/or source code, so that the
user can modify the Library and then relink to produce a modified
executable containing the modified Library. (It is understood
that the user who changes the contents of definitions files in the
Library will not necessarily be able to recompile the application
to use the modified definitions.)

@item
Use a suitable shared library mechanism for linking with the Library. A
suitable mechanism is one that (1) uses at run time a copy of the
library already present on the user's computer system, rather than
copying library functions into the executable,
and (2) will operate
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@item
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materials or that you have already sent this user a copy.
@end enumerate

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reproducing the executable from it. However, as a special exception,
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which the executable runs, unless that component itself accompanies the
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It may happen that this requirement contradicts the license
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library, provided that the separate distribution of the work based on
the Library and of the other library facilities is otherwise
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@enumerate a
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@item
Give prominent notice with the combined library of the fact
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@subheading END OF TERMS AND CONDITIONS

@page
@subheading How to Apply These Terms to Your New Libraries

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@end
smallexample

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`Frob' (a library for tweaking knobs) written by James Random Hacker.

@var{signature of Ty Coon}, 1 April 1990
Ty Coon, President of Vice
@end smallexample

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#ifndef _BASENAME_LGPL_H

```
#define _BASENAME_LGPL_H

#include <stddef.h>

#ifndef DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif


/*
 Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
          FILENAME      RESULT
          "foo.c"       "foo.c"
          "foo/bar.c"   "bar.c"
          "/foo/bar.c"  "bar.c"
          "foo/bar/"    "bar/"
          "foo/bar//"   "bar//"
          "/"           ""
          "//"          ""
          ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(), defined in <string.h>, does
      not consider trailing slashes to be part of the component:

 FILENAME      RESULT
          "foo/bar/"    ""
          "foo/bar//"   ""
    * The 'basename' command eliminates trailing slashes and for a root
      produces a non-empty result:
          FILENAME      RESULT
          "foo/bar/"    "bar"
          "foo/bar//"   "bar"
          "/"           "/"
          "//"          "/"
*/
```

```
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;


#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
```

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assignment does not stop you from
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The assignment contract we normally use has a clause that permits you to use your code in proprietary programs, on 30 days' notice. (The 30 days' notice is there because, through a legal technicality, it would improve our position in a suit against a hoarder.) Although we believe that proprietary software is wrong, we include this clause because it would serve no purpose to ask you to promise not to do it.

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You can release a program yourself under copyleft distribution terms such as the
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If you are employed to do programming, or have made an agreement with your employer that says it owns programs you write, we need a signed piece of paper from your employer disclaiming rights to the program. It should be signed by a vice president or general manager of the company. If you can't get at them, it is almost as good to find someone who signs licenses for software that is purchased. Here is a sample wording:

Digital Simulation Corporation hereby disclaims all copyright interest in the program "sample.el" (a program to direct assemblers to make passes at compilers under GNU Emacs) written by Hugh Hacker.

<signature of Mo Ghoul>, 1 April 1987

Mo Ghoul, President of Vice, Digital Simulation Corp.

The description of what the program does is just to make it clearer
what the disclaimer covers.

If
what you did was change an existing program, it should say this:

...in the changes and enhancements made by Hugh Hacker to the
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* Did anyone else contribute?

If someone else contributed more than a few lines here or there to the
program, then that person too is an author, and that person too needs to
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[What year were you born?]

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[Which files have you changed so far, and which new files have you written
so far?]

```
/*
*  GRUB  --  GRand Unified Bootloader
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*
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*/

#ifndef GRUB_BSD_CPU_HEADER
#define GRUB_BSD_CPU_HEADER 1

#include <grub/types.h>
```

```
#include <grub/relocator.h>

#include <grub/i386/freebsd_reboot.h>
#include <grub/i386/netbsd_reboot.h>
#include <grub/i386/openbsd_reboot.h>
#include <grub/i386/freebsd_linker.h>
#include
 <grub/i386/netbsd_bootinfo.h>
#include <grub/i386/openbsd_bootarg.h>

enum bsd_kernel_types
 {
   KERNEL_TYPE_NONE,
   KERNEL_TYPE_FREEBSD,
   KERNEL_TYPE_OPENBSD,
   KERNEL_TYPE_NETBSD,
 };

#define GRUB_BSD_TEMP_BUFFER   0x80000

#define FREEBSD_B_DEVMAGIC OPENBSD_B_DEVMAGIC
#define FREEBSD_B_SLICESHIFT OPENBSD_B_CTRLSHIFT
#define FREEBSD_B_UNITSHIFT OPENBSD_B_UNITSHIFT
#define FREEBSD_B_PARTSHIFT OPENBSD_B_PARTSHIFT
#define FREEBSD_B_TYPESHIFT OPENBSD_B_TYPESHIFT

#define FREEBSD_MODTYPE_KERNEL  "elf kernel"
#define FREEBSD_MODTYPE_KERNEL64 "elf64 kernel"
#define FREEBSD_MODTYPE_ELF_MODULE "elf module"
#define FREEBSD_MODTYPE_ELF_MODULE_OBJ "elf obj module"
#define FREEBSD_MODTYPE_RAW  "raw"

#define FREEBSD_BOOTINFO_VERSION 1

struct grub_freebsd_bootinfo
{
 grub_uint32_t version;
 grub_uint8_t unused1[44];
 grub_uint32_t length;
 grub_uint8_t unused2;
 grub_uint8_t boot_device;
 grub_uint8_t unused3[18];
 grub_uint32_t kern_end;
 grub_uint32_t environment;
  grub_uint32_t tags;
} GRUB_PACKED;

struct freebsd_tag_header
```

```
{
 grub_uint32_t type;
 grub_uint32_t len;
};

grub_err_t grub_freebsd_load_elfmodule32 (struct grub_relocator *relocator,
       grub_file_t file, int argc,
       char *argv[], grub_addr_t *kern_end);
grub_err_t grub_freebsd_load_elfmodule_obj64 (struct grub_relocator *relocator,
           grub_file_t file, int argc,
           char *argv[],
           grub_addr_t *kern_end);
grub_err_t grub_freebsd_load_elf_meta32 (struct grub_relocator *relocator,
      grub_file_t file,
      const char *filename,
      grub_addr_t *kern_end);
grub_err_t grub_freebsd_load_elf_meta64 (struct grub_relocator *relocator,
      grub_file_t file,
      const char *filename,
      grub_addr_t *kern_end);

grub_err_t grub_netbsd_load_elf_meta32 (struct grub_relocator *relocator,
     grub_file_t file,
     const char *filename,
     grub_addr_t *kern_end);
grub_err_t grub_netbsd_load_elf_meta64 (struct grub_relocator *relocator,
     grub_file_t
 file,
     const char *filename,
     grub_addr_t *kern_end);

grub_err_t grub_bsd_add_meta (grub_uint32_t type,
         const void *data, grub_uint32_t len);
grub_err_t grub_freebsd_add_meta_module (const char *filename, const char *type,
      int argc, char **argv,
      grub_addr_t addr, grub_uint32_t size);

struct grub_openbsd_ramdisk_descriptor
{
 grub_size_t max_size;
 grub_uint8_t *target;
 grub_uint32_t *size;
};

grub_err_t grub_openbsd_find_ramdisk32 (grub_file_t file,
     const char *filename,
     grub_addr_t kern_start,
     void *kern_chunk_src,
```

```
    struct grub_openbsd_ramdisk_descriptor *desc);
grub_err_t grub_openbsd_find_ramdisk64 (grub_file_t file,
    const char *filename,
    grub_addr_t kern_start,
    void *kern_chunk_src,
    struct grub_openbsd_ramdisk_descriptor *desc);

extern grub_uint8_t grub_bsd64_trampoline_start, grub_bsd64_trampoline_end;
extern grub_uint32_t grub_bsd64_trampoline_selfjump;
extern grub_uint32_t grub_bsd64_trampoline_gdt;

#endif
 /* ! GRUB_BSD_CPU_HEADER */
```

The files in this directory describe the gnulib modules.
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description files.

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Description:
realpath, canonicalize_file_name: Provide canonical absolute file name

Files:
lib/canonicalize-lgpl.c
m4/canonicalize.m4
m4/double-slash-root.m4
m4/lstat.m4

Depends-on:
extensions
stdlib
nocrash
double-slash-root [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
eloop-threshold  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
errno  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
fcntl-h  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
filename  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
idx  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
intprops  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
libc-config  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME
 = 1]
memmove  [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]

mempcpy [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
pathmax [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
rawmemchr [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
readlink [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
scratch_buffer [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
stat [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
stdbool [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
sys_stat [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test
$REPLACE_CANONICALIZE_FILE_NAME = 1]
unistd [test $HAVE_CANONICALIZE_FILE_NAME = 0
|| test $REPLACE_CANONICALIZE_FILE_NAME = 1]

configure.ac:
gl_CANONICALIZE_LGPL
gl_CONDITIONAL([GL_COND_OBJ_CANONICALIZE_LGPL],
[test $HAVE_CANONICALIZE_FILE_NAME = 0 || test $REPLACE_CANONICALIZE_FILE_NAME =
1])
gl_MODULE_INDICATOR([canonicalize-lgpl])
gl_STDLIB_MODULE_INDICATOR([canonicalize_file_name])
gl_STDLIB_MODULE_INDICATOR([realpath])

Makefile.am:
if GL_COND_OBJ_CANONICALIZE_LGPL
lib_SOURCES += canonicalize-lgpl.c
endif

Include:
<stdlib.h>

License:
LGPLv2+

Maintainer:
all
Description:
Concatenate two arbitrary file names.

Files:
lib/filenamecat.h
lib/filenamecat-lgpl.c
m4/filenamecat.m4

Depends-on:
c99
basename-lgpl
filename
malloc-posix

configure.ac:
gl_FILE_NAME_CONCAT_LGPL

Makefile.am:
lib_SOURCES += filenamecat-lgpl.c

Include:
"filenamecat.h"

License:
LGPLv2+

Maintainer:
Jim Meyering
Files:
tests/test-update-copyright.sh

Depends-on:

configure.ac:
abs_aux_dir=`cd "$ac_aux_dir"; pwd`
AC_SUBST([abs_aux_dir])

Makefile.am:
TESTS += test-update-copyright.sh
TESTS_ENVIRONMENT += abs_aux_dir='$(abs_aux_dir)'

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@heading Preamble

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For example, if you distribute copies of such a program, whether gratis or for a fee, you must give the recipients all the rights that you have. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

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Also, for each author's protection and ours, we want to make certain that everyone understands that there is no warranty for this free software. If the software is modified by someone else and passed on, we want its recipients to know that what they have is not the original, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that redistributors of a free

program will individually obtain patent licenses, in effect making the program proprietary. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

The precise terms and conditions for copying, distribution and modification follow.

@heading TERMS AND
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License. (Exception: if the Program itself is interactive but
does not normally print such an announcement, your work based on
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on the Program, the distribution of the whole must be on the terms of
this License, whose permissions for other licensees extend to the
entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest
your rights to work written entirely by you; rather, the intent is to
exercise the right to control the distribution of derivative or
collective works based on the Program.

In addition, mere aggregation of another work not based on the Program
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the other work under
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Accompany it with the complete corresponding machine-readable
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1 and 2 above on a medium customarily used for software interchange; or,

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Accompany it with a written offer, valid for at least three
years, to give any third party, for a charge no more than your
cost of physically performing source distribution, a complete
machine-readable copy of the corresponding source code, to be
distributed under the terms of Sections 1 and 2 above on a medium
customarily used for software interchange; or,

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Accompany it with the information you received as to the offer
to distribute corresponding source code. (This alternative is
allowed only for noncommercial
distribution and only if you
received the program in object code or executable form with such
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@end enumerate

The source code for a work means the preferred form of the work for
making modifications to it. For an executable work, complete source
code means all the source code for all modules it contains, plus any
associated interface definition files, plus the scripts used to
control compilation and installation of the executable. However, as a
special exception, the source code distributed need not include
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form) with the major components (compiler, kernel, and so on) of the
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If distribution of executable or object code is made by offering
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@end enumerate

@iftex
@heading END OF TERMS AND CONDITIONS
@end iftex
@ifinfo
@center END OF TERMS AND CONDITIONS

@end ifinfo

@page
@heading Appendix: How to Apply These Terms to Your New Programs

If you develop a new program, and you want it to be of the greatest
possible use to the public, the best way to achieve this is to make it
free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest
to attach them to the start of each source file to most effectively

convey the exclusion of warranty; and each file should have at least
the ``copyright'' line and a pointer to where the full notice is found.

@smallexample
@var{one line to give the program's name
 and a brief idea of what it does.}
Copyright (C) @var{yyyy}  @var{name of author}

This program is free software; you can redistribute it and/or modify
it under the terms of the GNU General Public License as published by
the Free Software Foundation; either version 2 of the License, or
(at your option) any later version.

This program is distributed in the hope that it will be useful,
but WITHOUT ANY WARRANTY; without even the implied warranty of
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GNU General Public License for more details.

You should have received a copy of the GNU General Public License
along with this program; if not, write to the Free Software
Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA  02110-1301, USA.
@end smallexample

Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this
when it starts in an interactive mode:

@smallexample
Gnomovision version
 69, Copyright (C) @var{year} @var{name of author}
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
@end smallexample

The hypothetical commands @samp{show w} and @samp{show c} should show
the appropriate parts of the General Public License.  Of course, the
commands you use may be called something other than @samp{show w} and
@samp{show c}; they could even be mouse-clicks or menu items---whatever
suits your program.

You should also get your employer (if you work as a programmer) or your
school, if any, to sign a ``copyright disclaimer'' for the program, if
necessary.  Here is a sample; alter the names:

@example
Yoyodyne, Inc., hereby disclaims all copyright interest in the program

`Gnomovision' (which makes passes at compilers) written by James Hacker.

@var{signature of Ty Coon}, 1 April 1989
Ty Coon, President of Vice
@end example

This General
 Public License does not permit incorporating your program into
proprietary programs.  If your program is a subroutine library, you may
consider it more useful to permit linking proprietary applications with the
library.  If this is what you want to do, use the GNU Lesser General
Public License instead of this License.
$Id: COPYING,v 1.3 2006-10-26 16:20:28 eggert Exp $
The files in here are mostly copyright (C) Free Software Foundation, and
are under assorted licenses.  Mostly, but not entirely, GPL.

Many modules are provided dual-license, either GPL or LGPL at your
option.  The headers of files in the lib directory (e.g., lib/error.c)
state GPL for convenience, since the bulk of current gnulib users are
GPL'd programs.  But the files in the modules directory (e.g.,
modules/error) state the true license of each file, and when you use
'gnulib-tool --lgpl --import <modules>', gnulib-tool either rewrites
the files to have an LGPL header as part of copying them from gnulib
to your project directory, or fails because the modules you requested
were not licensed under LGPL.

Some of the source files in lib/ have different licenses.  Also, the
copy of maintain.texi in doc/ has a verbatim-copying license, and
doc/standards.texi and make-stds.texi are GFDL.  Most (but not all)
m4/*.m4 files have nearly unlimited
 licenses.
Description:
Provide the GNU Free Documentation License in Texinfo format.

Notice:
Don't use this module! Instead, copy the referenced license file into your version control repository.

Files:
doc/fdl.texi

Depends-on:

configure.ac:

Makefile.am:

Include:

License:
unmodifiable license text

Maintainer:
all
Description:
Help make libraries relocatable, that is, to allow them to function
properly when copied to an arbitrary directory.

Files:
doc/relocatable.texi
lib/relocatable.h
lib/relocatable.c
lib/relocatable.valgrind
m4/relocatable-lib.m4

Depends-on:
strdup

configure.ac:
```
gl_RELOCATABLE_LIBRARY
if test $RELOCATABLE = yes; then
 AC_LIBOBJ([relocatable])
fi
```

Makefile.am:
```
DEFS += -DNO_XMALLOC
```

Include:
"relocatable.h"

License:
LGPLv2+

Maintainer:
Ben Pfaff

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Version 2.1, February 1999

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When we speak of free software, we are referring to freedom of use, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish); that you receive source code or can get it if you want it; that you can change the software and use pieces of it in new free programs; and that you are informed that you can do these things.

To protect your rights, we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights. These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it.

For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link other code with the library, you must provide complete object files to the recipients, so that they can relink them with the library after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

We protect your rights with a two-step method: (1) we copyright the library, and (2) we offer you this license, which gives you legal permission to copy, distribute and/or modify the library.

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Finally, software
patents pose a constant threat to the existence of
any free program. We wish to make sure that a company cannot
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When a program is linked with a library, whether statically or using
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We call this license the "Lesser" General Public License because it
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Public License. It also provides other free software developers Less
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are the reason we use the ordinary General Public License for many
libraries. However, the Lesser license provides advantages in certain
special circumstances.

For example, on rare occasions, there may be a special need to
encourage the widest possible use of a certain library, so that it becomes
a de-facto standard. To achieve this, non-free programs must be
allowed to use the library. A more frequent case is that a free
library does the same job as widely used non-free libraries. In this
case, there is little to gain by limiting
the free library to free
software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free
programs enables a greater number of people to use a large body of
free software. For example, permission to use the GNU C Library in
non-free programs enables many more people to use the whole GNU
operating system, as well as its variant, the GNU/Linux operating
system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

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You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you

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Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the

Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany

the work with the complete corresponding
machine-readable source code for the Library including whatever
changes were used in the work (which must be distributed under
Sections 1 and 2 above); and, if the work is an executable linked
with the Library, with the complete machine-readable "work that
uses the Library", as object code and/or source code, so that the
user can modify the Library and then relink to produce a modified
executable containing the modified Library. (It is understood
that the user who changes the contents of definitions files in the
Library will not necessarily be able to recompile the application
to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the
Library. A suitable mechanism is one that (1) uses at run time a
copy of the library already present on the user's computer system,
rather than copying library functions into the executable, and (2)
will operate
properly with a modified version of the library, if
the user installs one, as long as the modified version is
interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at
least three years, to give the same user the materials
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Ty Coon, President of Vice

That's all there is to it!
Description:
Extract specific portions of filenames.

Files:
lib/dirname.h
lib/dirname-lgpl.c
lib/stripslash.c

Depends-on:
basename-lgpl
double-slash-root
filename

malloc-posix
stdbool

configure.ac:

Makefile.am:
lib_SOURCES += dirname-lgpl.c stripslash.c

Include:
"dirname.h"

License:
LGPLv2+

Maintainer:
Jim Meyering, Eric Blake

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Public License instead of this License.
Files:
tests/test-canonicalize-lgpl.c
tests/signature.h
tests/null-ptr.h
tests/macros.h

Depends-on:
ignore-value
same-inode
symlink

configure.ac:

Makefile.am:
TESTS += test-canonicalize-lgpl
check_PROGRAMS += test-canonicalize-lgpl
test_canonicalize_lgpl_LDADD = $(LDADD) $(LIBINTL)

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Description:
Extract the last component (base name) of a file name.

Files:
lib/basename-lgpl.h
lib/basename-lgpl.c

Depends-on:
double-slash-root
filename
stdbool

configure.ac:

Makefile.am:
lib_SOURCES += basename-lgpl.c

Include:
"basename-lgpl.h"

License:
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all

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<http://www.gnu.org/philosophy/why-not-lgpl.html>.
Description:
Ensure getcwd(NULL, 0) returns a buffer allocated by the malloc() function.

Files:
lib/getcwd-lgpl.c
m4/getcwd.m4

Depends-on:
unistd
free-posix  [test $REPLACE_GETCWD = 1]
strdup  [test $REPLACE_GETCWD = 1]

configure.ac:
gl_FUNC_GETCWD_LGPL
gl_CONDITIONAL([GL_COND_OBJ_GETCWD_LGPL], [test $REPLACE_GETCWD = 1])
gl_UNISTD_MODULE_INDICATOR([getcwd])

Makefile.am:
if GL_COND_OBJ_GETCWD_LGPL

```
lib_SOURCES += getcwd-lgpl.c
endif

Include:
<unistd.h>

License:
LGPLv2+

Maintainer:
Eric Blake
Files:
tests/test-getcwd-lgpl.c
tests/signature.h
tests/macros.h

Depends-on:

configure.ac:

Makefile.am:
TESTS += test-getcwd-lgpl
check_PROGRAMS += test-getcwd-lgpl
test_getcwd_lgpl_LDADD = $(LDADD) $(LIBINTL)

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```

```
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```

Description:
Locating a program in PATH (LGPLed version).

Files:
lib/findprog.h
lib/findprog.c
lib/findprog-lgpl.c
m4/findprog.m4
m4/eaccess.m4

Depends-on:
stdbool
sys_stat
strdup
concat-filename
access
stat
unistd

configure.ac:
gl_FINDPROG
gl_MODULE_INDICATOR([findprog-lgpl])

Makefile.am:
lib_SOURCES += findprog.h findprog-lgpl.c

Include:
"findprog.h"

License:
LGPLv2+

Maintainer:
all

# 1.3980 linux-firmware 20260311-155.4.el9_7

## 1.3980.1 Available under license :

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---
WIS GO7007SB Public Linux Driver
---

*** Please see the file RELEASE-NOTES for important last-minute updates ***

0. OVERVIEW AND LICENSING/DISCLAIMER

This driver kit contains Linux drivers for the WIS GO7007SB multi-format
video encoder.  Only kernel version 2.6.x is supported.  The video stream
is available through the Video4Linux2 API and the audio stream is available
through the ALSA API (or the OSS emulation layer of the ALSA system).

The files in kernel/ and hotplug/ are licensed under the GNU General Public
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The

example applications in apps/ and C header files in include/ are licensed under a permissive license included in the source files which allows copying, modification and redistribution for any purpose without attribution.

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## 1. SYSTEM REQUIREMENTS

This driver requires Linux kernel 2.6. Kernel 2.4 is not supported. Using kernel 2.6.10 or later is recommended, as earlier kernels are known to have unstable USB 2.0 support.

A fully built kernel source tree must be available. Typically this will be linked from "/lib/modules/<KERNEL VERSION>/build" for convenience. If this link does not exist, an extra parameter will need to be passed to the `make` command.

All vendor-built kernels should already be configured properly. However, for custom-built kernels, the following options need to be enabled in the kernel as built-in or modules:

CONFIG_HOTPLUG - Support for hot-pluggable devices
CONFIG_MODULES - Enable loadable module support
CONFIG_KMOD - Automatic kernel module loading
CONFIG_FW_LOADER - Hotplug firmware loading support
CONFIG_I2C - I2C support
CONFIG_VIDEO_DEV - Video For Linux
CONFIG_SOUND - Sound card support
CONFIG_SND - Advanced Linux Sound Architecture
CONFIG_USB - Support for Host-side USB
CONFIG_USB_DEVICEFS - USB device filesystem
CONFIG_USB_EHCI_HCD - EHCI HCD (USB 2.0) support

Additionally, to use the example application, the following options need to be enabled in the ALSA section:

CONFIG_SND_MIXER_OSS - OSS Mixer API
CONFIG_SND_PCM_OSS - OSS PCM (digital audio) API

The hotplug scripts, along with the fxload utility, must also be installed. These scripts can be obtained from <http://linux-hotplug.sourceforge.net/>. Hotplugging is used for loading firmware into the Cypruss EZ-USB chip using fxload and for loading firmware into the driver using the firmware agent.

## 2. COMPILING AND INSTALLING THE DRIVER

Most users should be able to compile the driver by simply running:

```
$ make
```

in the top-level directory of the driver kit. First the kernel modules will be built, followed by the example applications.

If the build system is unable to locate the kernel source tree for the currently-running kernel, or if the module should be built for a kernel other than the currently-running kernel, an additional parameter will need to be passed to make to specify the appropriate kernel source directory:

```
$ make KERNELSRC=/usr/src/linux-2.6.10-custom3
```

Once the compile completes, the driver and firmware files should be installed by running:

```
$ make install
```

The kernel modules will be placed in "/lib/modules/<KERNEL VERSION>/extra" and the firmware files will be placed in the appropriate hotplug firmware directory, usually /lib/firmware. In addition, USB maps and scripts will be placed in /etc/hotplug/usb to enable fxload to initialize the EZ-USB control chip when the device is connected.

## 3. PAL/SECAM TUNER CONFIGURATION (TV402U-EU only)

The PAL model of the Plextor ConvertX TV402U may require additional configuration to correctly select the appropriate TV frequency band and audio subchannel.

Users with a device other than the Plextor ConvertX TV402U-EU should skip

this section.

The wide variety of PAL TV systems used in Europe requires that additional information about
the local TV standards be passed to the driver in order
to properly tune TV channels. The two necessary parameters are (a) the PAL TV band, and (b) the audio subchannel format in use.

In many cases, the appropriate TV band selection is passed to the driver from applications. However, in some cases, the application only specifies that the driver should use PAL but not the specific information about the appropriate TV band. To work around this issue, the correct TV band may be specified in the "force_band" parameter to the wis-sony-tuner module:

| TV band | force_band |
|---|---|
| PAL B/G | B |
| PAL I | I |
| PAL D/K | D |
| SECAM L | L |

If the "force_band" parameter is specified, the driver will ignore any TV band specified by applications and will always use the band provided in the module parameter.

The other parameter that can be specified is the audio subchannel format. There are
several stereo audio carrier systems in use, including NICAM and
three varieties of A2. To receive audio broadcast on one of these stereo carriers, the "force_mpx_mode" parameter must be specified to the wis-sony-tuner module.

| TV band | Audio subcarrier | force_mpx_mode |
|---|---|---|
| PAL B/G | Mono (default) | 1 |
| PAL B/G | A2 | 2 |
| PAL B/G | NICAM | 3 |
| PAL I | Mono (default) | 4 |
| PAL I | NICAM | 5 |
| PAL D/K | Mono (default) | 6 |
| PAL D/K | A2 (1) | 7 |
| PAL D/K | A2 (2) | 8 |
| PAL D/K | A2 (3) | 9 |
| PAL D/K | NICAM | 10 |
| SECAM L | Mono (default) | 11 |
| SECAM L | NICAM | 12 |

If the "force_mpx_mode" parameter is not specified, the correct mono-only mode will be chosen based on the TV band. However, the tuner will not receive stereo audio or bilingual broadcasts correctly.

To pass the "force_band" or "force_mpx_mode" parameters to the wis-sony-tuner module, the following line must be added to the modprobe configuration file, which varies from one Linux distribution to another.

```
options wis-sony-tuner force_band=B force_mpx_mode=2
```

The above example would force the tuner to the PAL B/G TV band and receive stereo audio broadcasts on the A2 carrier.

To verify that the configuration has been placed in the correct location, execute:

```
$ modprobe -c | grep wis-sony-tuner
```

If the configuration line appears, then modprobe will pass the parameters correctly the next time the wis-sony-tuner module is loaded into the kernel.

## 4. TESTING THE DRIVER

Because few Linux applications are able to correctly capture from Video4Linux2 devices with only compressed formats supported, the new driver should be tested with the "gorecord" application in the apps/ directory.

First connect a video source to the device, such as a DVD player or VCR. This will be captured to a file for testing the driver. If an input source is unavailable, a test file can still be captured, but the video will be black and the audio will be silent.

This application will auto-detect the V4L2 and ALSA/OSS device names of the hardware and will record video and audio to an AVI file for a specified number of seconds. For example:

```
$ apps/gorecord -duration 60 capture.avi
```

If this application does not successfully record an AVI file, the error messages produced by gorecord and recorded in the system log (usually in /var/log/messages) should provide information to help resolve the problem.

Supplying no parameters to gorecord will cause it to probe the available devices and exit. Use the -help flag for usage information.

## 5. USING THE DRIVER

The
V4L2 device implemented by the driver provides a standard compressed
format API, within the following criteria:

* Applications that only support the original Video4Linux1 API will not
  be able to communicate with this driver at all.

* No raw video modes are supported, so applications like xawtv that
  expect only uncompressed video will not function.

* Supported compression formats are: Motion-JPEG, MPEG1, MPEG2 and MPEG4.

* MPEG video formats are delivered as Video Elementary Streams only.
  Program Stream (PS), Transport Stream (TS) and Packetized Elementary
  Stream (PES) formats are not supported.

* Video parameters such as format and input port may not be changed while
  the encoder is active.

* The audio capture device only functions when the video encoder is
  actively capturing video. Attempts to read from the audio device when
  the encoder is inactive will result in an I/O error.

* The native format of the audio device is 48Khz 2-channel
16-bit
  little-endian PCM, delivered through the ALSA system. No audio
  compression is implemented in the hardware. ALSA may convert to other
  uncompressed formats on the fly.

The include/ directory contains a C header file describing non-standard
features of the GO7007SB encoder, which are described below:

GO7007IOC_S_COMP_PARAMS, GO7007IOC_G_COMP_PARAMS

These ioctls are used to negotiate general compression parameters.

To query the current parameters, call the GO7007IOC_G_COMP_PARAMS ioctl
with a pointer to a struct go7007_comp_params. If the driver is not
set to MPEG format, the EINVAL error code will be returned.

To change the current parameters, initialize all fields of a struct
go7007_comp_params and call the GO7007_IOC_S_COMP_PARAMS ioctl with a

pointer to this structure. The driver will return the current
parameters with any necessary changes to conform to the limitations of
the hardware or current compression mode. Any
or all fields can be set
to zero to request a reasonable default value. If the driver is not
set to MPEG format, the EINVAL error code will be returned. When I/O
is in progress, the EBUSY error code will be returned.

Fields in struct go7007_comp_params:

__u32 gop_size — The maximum number of frames in each Group Of Pictures; i.e. the maximum number of frames minus one between each key frame.

__u32 max_b_frames — The maximum number of sequential bidirectionally-predicted frames. (B-frames are not yet supported.)

enum go7007_aspect_ratio aspect_ratio — The aspect ratio to be encoded in the meta-data of the compressed format.

Choices are:

GO7007_ASPECT_RATIO_1_1
GO7007_ASPECT_RATIO_4_3_NTSC
GO7007_ASPECT_RATIO_4_3_PAL
GO7007_ASPECT_RATIO_16_9_NTSC
GO7007_ASPECT_RATIO_16_9_PAL

__u32 flags — Bit-wise OR of control flags (below)

Flags in struct go7007_comp_params:

GO7007_COMP_CLOSED_GOP — Only produce self-contained GOPs, used to produce streams appropriate for random seeking.

GO7007_COMP_OMIT_SEQ_HEADER — Omit the stream sequence header.

GO7007IOC_S_MPEG_PARAMS, GO7007IOC_G_MPEG_PARAMS

These ioctls are used to negotiate MPEG-specific stream parameters when
the pixelformat has been set to V4L2_PIX_FMT_MPEG.

To query the current parameters, call the GO7007IOC_G_MPEG_PARAMS ioctl

with a pointer to a struct go7007_mpeg_params.
If the driver is not
set to MPEG format, the EINVAL error code will be returned.

To change the current parameters, initialize all fields of a struct go7007_mpeg_params and call the GO7007_IOC_S_MPEG_PARAMS ioctl with a pointer to this structure. The driver will return the current parameters with any necessary changes to conform to the limitations of the hardware or selected MPEG mode. Any or all fields can be set to zero to request a reasonable default value. If the driver is not set to MPEG format, the EINVAL error code will be returned. When I/O is in progress, the EBUSY error code will be returned.

Fields in struct go7007_mpeg_params:

enum go7007_mpeg_video_standard
mpeg_video_standard The MPEG video standard in which to compress the video.

Choices are:
GO7007_MPEG_VIDEO_MPEG1

GO7007_MPEG_VIDEO_MPEG2
GO7007_MPEG_VIDEO_MPEG4

__u32 flags Bit-wise OR of control flags (below)

__u32 pali The profile and level indication to be stored in the sequence header. This is only used as an indicator to the decoder, and does not affect the MPEG features used in the video stream. Not valid for MPEG1.

Choices for MPEG2 are:
GO7007_MPEG2_PROFILE_MAIN_MAIN

Choices for MPEG4 are:
GO7007_MPEG4_PROFILE_S_L0
GO7007_MPEG4_PROFILE_S_L1

GO7007_MPEG4_PROFILE_S_L2
GO7007_MPEG4_PROFILE_S_L3
GO7007_MPEG4_PROFILE_ARTS_L1
GO7007_MPEG4_PROFILE_ARTS_L2
GO7007_MPEG4_PROFILE_ARTS_L3
GO7007_MPEG4_PROFILE_ARTS_L4

GO7007_MPEG4_PROFILE_AS_L0
GO7007_MPEG4_PROFILE_AS_L1
GO7007_MPEG4_PROFILE_AS_L2
GO7007_MPEG4_PROFILE_AS_L3
GO7007_MPEG4_PROFILE_AS_L4
GO7007_MPEG4_PROFILE_AS_L5

Flags in struct go7007_mpeg_params:

GO7007_MPEG_FORCE_DVD_MODE Force all compression parameters and bitrate control settings to comply

with DVD MPEG2 stream requirements. This overrides most compression and bitrate settings!

GO7007_MPEG_OMIT_GOP_HEADER Omit the GOP header.

GO7007_MPEG_REPEAT_SEQHEADER Repeat the MPEG sequence header at the start of each GOP.

GO7007IOC_S_BITRATE, GO7007IOC_G_BITRATE

These ioctls are used to set and query the target bitrate value for the compressed video stream. The bitrate may be selected by storing the target bits per second in an int and calling GO7007IOC_S_BITRATE with a pointer to the int. The bitrate may be queried by calling GO7007IOC_G_BITRATE with a pointer to an int where the current bitrate will be stored.

Note that this is the primary means of controlling the video quality for all compression modes, including V4L2_PIX_FMT_MJPEG. The VIDIOC_S_JPEGCOMP ioctl is not supported.

---

## Installing the WIS PCI Voyager Driver

---

The WIS PCI Voyager driver requires several patches to the Linux 2.6.11.x kernel source tree before compiling the driver. These patches update the in-kernel SAA7134 driver to the newest development version and patch bugs in the TDA8290/TDA8275 tuner driver.

The following patches must be downloaded from Gerd Knorr's website and applied in the order listed:

http://dl.bytesex.org/patches/2.6.11-2/i2c-tuner
http://dl.bytesex.org/patches/2.6.11-2/i2c-tuner2
http://dl.bytesex.org/patches/2.6.11-2/v4l2-api-mpeg
http://dl.bytesex.org/patches/2.6.11-2/saa7134-update

The following patches are included with this SDK and can be applied in any order:

patches/2.6.11/saa7134-voyager.diff
patches/2.6.11/tda8275-newaddr.diff
patches/2.6.11/tda8290-ntsc.diff

Check to make sure the CONFIG_VIDEO_SAA7134 option is enabled in the kernel configuration, and build and install the kernel.

After rebooting into the new kernel, the GO7007 driver can be compiled and installed:

```
$ make SAA7134_BUILD=y
$ make install
$ modprobe saa7134-go7007
```

There will be two V4L video devices associated with the PCI Voyager. The first device (most likely /dev/video0) provides access to the raw video capture mode of the SAA7133 device and is used to configure the source video parameters and tune the TV tuner. This device can be used with xawtv or other V4L(2) video software as a standard uncompressed device.

The second device (most likely /dev/video1) provides access to the compression functions of the GO7007. It can be tested using the gorecord application in the apps/ directory of this SDK:

```
$ apps/gorecord -vdevice /dev/video1 -noaudio test.avi
```

Currently the frame resolution is fixed at 720x480 (NTSC) or 720x576 (PAL), and the video standard must be specified to both the raw and the compressed video devices (xawtv and gorecord, for example).

---
RELEASE NOTES FOR WIS GO7007SB LINUX DRIVER
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Last updated: 5 November 2005

- Release 0.9.7 includes new support for using udev to run fxload. The

install script should automatically detect whether the old hotplug scripts or the new udev rules should be used. To force the use of hotplug, run "make install USE_UDEV=n". To force the use of udev, run "make install USE_UDEV=y".

- Motion detection is supported but undocumented. Try the `modet` app for a demonstration of how to use the facility.

- Using USB2.0 devices such as the TV402U with USB1.1 HCDs or hubs can cause buffer overruns and frame drops, even at low framerates, due to inconsistency in the bitrate control mechanism.

- On devices with an SAA7115, including the Plextor ConvertX, video height values of 96,
128, 160, 192, 256, 320, and 384 do not work in NTSC mode.
All valid heights up to 512 work correctly in PAL mode.

- The WIS Star Trek and PCI Voyager boards have no support yet for audio or the TV tuner.

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/* zlib.h -- interface of the 'zlib' general purpose compression
 library
 version 1.2.3, July 18th, 2005

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Jean-loup Gailly Mark Adler
jloup@gzip.org
madler@alumni.caltech.edu

The data format used by the zlib library is described by RFCs (Request for
Comments) 1950 to 1952 in the files http://www.ietf.org/rfc/rfc1950.txt
(zlib format), rfc1951.txt (deflate format) and rfc1952.txt (gzip format).
*/

---

//
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//
//
/*
* This code implements the MD5 message-digest algorithm.
* The algorithm is due to Ron Rivest. This code was
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*
* Equivalent code is available from RSA Data Security, Inc.
* This code has been tested against that, and is equivalent,
* except that you don't need to include two pages of legalese
* with every copy.
*
* To compute the message digest of a chunk of bytes, declare an
* MD5Context structure, pass it to MD5Init, call MD5Update
as
* needed on buffers full of bytes, and then call MD5Final, which
* will fill a supplied 16-byte array with the digest.
*/

---
---

```
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-------------------------------------------------------------------------------
-------------------------------------------------------------------------------

/*-
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*  code or tables extracted from it, as desired without restriction.
*
*  First, the polynomial itself and its table of feedback terms.  The
*  polynomial is
*  X^32+X^26+X^23+X^22+X^16+X^12+X^11+X^10+X^8+X^7+X^5+X^4+X^2+X^1+X^0
*
*  Note that we take it "backwards" and put the highest-order term in
*  the lowest-order bit.  The X^32 term is "implied"; the LSB is the
*  X^31 term, etc.  The X^0 term (usually shown as "+1") results in
*  the MSB being 1
*
*  Note that the usual hardware shift register implementation, which
```

```
*  is what we're using (we're merely optimizing it by doing eight-bit
*  chunks at a time) shifts bits into the lowest-order term.  In our
*  implementation, that means shifting towards the right.  Why do we
*  do it this way?  Because the calculated CRC must be transmitted in
*  order from highest-order
 term to lowest-order term.  UARTs transmit
*  characters in order from LSB to MSB.  By storing the CRC this way
*  we hand it to the UART in the order low-byte to high-byte; the UART
*  sends each low-bit to hight-bit; and the result is transmission bit
*  by bit from highest- to lowest-order term without requiring any bit
*  shuffling on our part.  Reception works similarly
*
*  The feedback terms table consists of 256, 32-bit entries.  Notes
*
*     The table can be generated at runtime if desired; code to do so
*     is shown later.  It might not be obvious, but the feedback
*     terms simply represent the results of eight shift/xor opera
*     tions for all combinations of data and CRC register values
*
*     The values must be right-shifted by eight bits by the "updcrc
*     logic; the shift must be unsigned (bring in zeroes).  On some
*     hardware you could probably optimize the shift in assembler by
*     using byte-swap instructions
*     polynomial
 $edb88320
*
```

---

```
/*
  The AES algorithm Rijndael implemented for block and key sizes of 128,
  192 and 256 bits (16, 24 and 32 bytes) by Brian Gladman.

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  for some ideas that are used in this implementation.

  Dr B. R. Gladman <brg@gladman.uk.net> 1st June 2001.
```

---

```
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* hash_32 - 32 bit Fowler/Noll/Vo hash code
```

```
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* Fowler/Noll/Vo hash
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*
-----------------------------------------------------------------------------
/*
* sha1.c
*
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*
* Modified by Aaron D. Gifford <agifford@infowest.com>
*
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*/

-----------------------------------------------------------------------------

/*
* AES-based functions
*
* - AES Key Wrap Algorithm (128-bit KEK) (RFC3394)
* - One-Key CBC MAC (OMAC1) hash with AES-128
```

```
* - AES-128 CTR mode encryption
* - AES-128 EAX mode encryption/decryption
* - AES-128 CBC
*
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*/
-------------------------------------------------------------------------------
/*
* hmac_sha1.c
*
* Version
 1.0.0
*
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/*
* Author: Malcolm Purvis <malcolmp@ok-labs.com>
* Author: Carlos Dyonisio <medaglia@ok-labs.com>
```

```
*/
==============================================================================
File: qurt_atomic_ops.h

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/*
* Author: Malcolm Purvis <malcolmp@ok-labs.com>
*
* This file is only included by the main atomic_ops.h, so all of that
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*/

==========
File: tailq.h

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/*
* Author: Alex Webster
*/

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File: wmi.h

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File: wmi_services.h

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File: stail_queue.h

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//
//  @(#)queue.h 8.5 (Berkeley) 8/20/94
// $FreeBSD: src/sys/sys/queue.h,v 1.58 2004/04/07 04:19:49 imp Exp $
// $Id: //components/rel/wlanfw_cmn.cnss/1.0/cnss_proc/wlan/fwcommon/include/queue.h#1 $
//

==========

File: targaddrs.h

```
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File: wal_rx_desc.h

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File: wlan_module_ids.h

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```

```
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File: aes_gcm.h
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File: aes_wrap.h
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/*
* AES-based functions
*
*
* - AES Key Wrap Algorithm (128-bit KEK) (RFC3394)
* - One-Key CBC MAC (OMAC1) hash with AES-128
* - AES-128 CTR mode encryption
* - AES-128 EAX mode encryption/decryption
* - AES-128 CBC
*
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File: md5_api.h
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/*
* MD5 hash implementation and interface functions
* Copyright (c) 2003-2005, Jouni Malinen <jkmaline@cc.hut.fi>
```

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```

==========

File: sha1.h

```
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```

==========

File: sha2.h

```
/*
* FILE:    sha2.h
* AUTHOR:  Aaron D. Gifford - http://www.aarongifford.com/
*
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*
* $Id: //depot/sw/branches/qca_rome_main/perf_pwr_offload/drivers/target/include/sha2.h#1
 $
*/

==============================================================================
File: wal_dfs.h
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//
// $Id: //components/rel/wlanfw.cnss/1.0.1/cnss_proc/wlan/fw/target/src/wlan/proto/include/if_ethersubr.h#3 $
//
==============================================================================
File: wal_phy_dev.h
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File:
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================================================================================
File:
 ieee_crc32.c
/*
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*  code or tables extracted from it, as desired without restriction.
*
*  First, the polynomial itself and its table of feedback terms.  The
*  polynomial is
*  X^32+X^26+X^23+X^22+X^16+X^12+X^11+X^10+X^8+X^7+X^5+X^4+X^2+X^1+X^0
*
*  Note that we take it "backwards" and put the highest-order term in
*  the lowest-order bit.  The X^32 term is "implied"; the LSB is the
*  X^31 term, etc.  The X^0 term (usually shown as "+1") results in
*  the MSB being 1
*
*  Note that the usual hardware shift register implementation, which
*  is what we're using (we're merely optimizing it by doing eight-bit
*  chunks at a time) shifts bits into the lowest-order term.  In our
*  implementation, that means shifting towards the right.  Why do we
*  do it this way?  Because the calculated CRC must be transmitted in
*  order from highest-order term to lowest-order term.  UARTs transmit
*  characters in
 order from LSB to MSB.  By storing the CRC this way
*  we hand it to the UART in the order low-byte to high-byte; the UART
*  sends each low-bit to hight-bit; and the result is transmission bit
*  by bit from highest- to lowest-order term without requiring any bit
*  shuffling on our part.  Reception works similarly
*
*  The feedback terms table consists of 256, 32-bit entries.  Notes
*
*     The table can be generated at runtime if desired; code to do so
*     is shown later.  It might not be obvious, but the feedback
*     terms simply represent the results of eight shift/xor opera
*     tions for all combinations of data and CRC register values
*
*     The values must be right-shifted by eight bits by the "updcrc
*     logic; the shift must be unsigned (bring in zeroes).  On some
*     hardware you could probably optimize the shift in assembler by
*     using byte-swap instructions
*     polynomial $edb88320
```

```
*
*
* CRC32 code derived from work by Gary S.
 Brown.
*/
==============================================================================
File: aes.c
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*/

/*
* AES (Rijndael) cipher
*
* Modifications to public domain implementation:
* - support only 128-bit keys
* - cleanup
* - use C pre-processor to make it easier to change S table access
* - added option (AES_SMALL_TABLES) for reducing code size by about 8 kB at
*   cost of reduced throughput (quite small difference on Pentium 4,
*   10-25% when using -O1 or -O2 optimization)
*
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*/

/*
* rijndael-alg-fst.c
*
* @version 3.0 (December 2000)
*
* Optimised ANSI C code for the Rijndael cipher (now AES)
*
* @author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
* @author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
* @author Paulo Barreto <paulo.barreto@terra.com.br>
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*/
================================================================================
File: aes_gcm.c
/*
* Galois/Counter Mode (GCM) and GMAC with AES
*
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*/
================================================================================
File: aes_wrap.c
/*
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*/

/*
* AES-based functions
*
* - AES Key Wrap Algorithm (128-bit KEK) (RFC3394)
* - One-Key CBC MAC (OMAC1) hash with AES-128
* - AES-128 CTR mode encryption
* - AES-128 EAX mode encryption/decryption
* - AES-128 CBC
*
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*/
```

==========

File: common.h

```
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/*
* wpa_supplicant/hostapd / common helper functions, etc.
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```

==========

File: crypto.h

```
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/*
* WPA Supplicant / wrapper functions for crypto libraries
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*
* This file defines the cryptographic functions that need to be implemented
* for wpa_supplicant and hostapd. When TLS is not used, internal
* implementation of MD5, SHA1, and AES is used and no external libraries are
* required. When TLS
```

```
 is enabled (e.g., by enabling EAP-TLS or EAP-PEAP), the
* crypto library used by the TLS implementation is expected to be used for
* non-TLS needs, too, in order to save space by not implementing these
* functions twice.
*
* Wrapper code for using each crypto library is in its own file (crypto*.c)
* and one of these files is build and linked in to provide the functions
* defined here.
*/
```

==========

File: md5.c

```
//
// $Id: //depot/sw/branches/qca_main_wifi2.0/perf_pwr_offload/drivers/target/src/misc/crypto/md5.c#1 $
//
// This code implements the MD5 message-digest algorithm.
// The algorithm is due to Ron Rivest.  This code was
// written by Colin Plumb in 1993, no copyright is claimed.
// This code is in the public domain; do with it what you wish.
//
// Equivalent code is available from RSA Data Security, Inc.
// This code has been tested against that, and is equivalent,
// except that you don't need to
 include two pages of legalese
// with every copy.
//
// To compute the message digest of a chunk of bytes, declare an
// MD5Context structure, pass it to MD5Init, call MD5Update as
// needed on buffers full of bytes, and then call MD5Final, which
// will fill a supplied 16-byte array with the digest.
//
```

==========

File: sha1.c

```
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*/

==========
File:
 cil.h
/* ==========
* $File: //depot/sw/branches/qca_main_wifi2.0/perf_pwr_offload/drivers/target/include/cil.h $
* $Revision: #1 $
* $Date: 2013/07/12 $
* $Change: 2108597 $
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* ========== */

==========
File:
 dwc_os_dev.h
/* ==========
* $File: //depot/sw/branches/qca_main_wifi2.0/perf_pwr_offload/drivers/target/include/os_dev.h $
* $Revision: #1 $
* $Date: 2013/07/12 $
* $Change: 2108597 $
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* ========== */

==========
File: pcd.h
/* ==========
* $File: //depot/sw/branches/qca_main_wifi2.0/perf_pwr_offload/drivers/target/include/pcd.h $
* $Revision: #1 $
* $Date: 2013/07/12 $
* $Change: 2108597 $
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/*

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//
// @(#)queue.h 8.5 (Berkeley) 8/20/94
// $FreeBSD: src/sys/sys/queue.h,v 1.58 2004/04/07 04:19:49 imp Exp $
// $Id: //depot/sw/branches/qca_main_wifi2.0/perf_pwr_offload/drivers/target/src/sim_wifi_ip02/include/queue.h#2
$
//
==========
File: platform_cmnos_printf.c
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File: phyOsApiWindowsSem.h
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   Simple Windows replacement for POSIX semaphores
   Modified by Daniel Tillett from libpthread <http://github.com/songdongsheng/libpthread>
   Copyright (c) 2015, Daniel Tillett <daniel.tillett @ gmail.com>
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File: phyUtilsStrlcpy.c
/*  $OpenBSD: strlcpy.c,v 1.11 2006/05/05 15:27:38 millert Exp $    */

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File: cds_ieee80211_common.h

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File: cds_ieee80211_common_i.h

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File: ath_dfs_structs.h
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/*
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File: dfs_interface.h

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File: dfs_ioctl_private.h

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 if_llc.h
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//
// $Id: //components/rel/wlanfw.cnss/1.0.1/cnss_proc/wlan/fw/target/src/wlan/proto/include/if_llc.h#3 $
// $NetBSD: if_llc.h,v 1.12 1999/11/19 20:41:19 thorpej Exp $
// $Id: //components/rel/wlanfw.cnss/1.0.1/cnss_proc/wlan/fw/target/src/wlan/proto/include/if_llc.h#3 $
//

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*
* @(#)if_llc.h 8.1 (Berkeley) 6/10/93
* $FreeBSD: src/sys/net/if_llc.h,v 1.9 2002/09/23 06:25:08 alfred Exp $
*/
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File: suppl_auth_api.h
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File: wpa.h

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File: wpa_i.h

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==========
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*/

==========
File: sha2.c
/*
* FILE: sha2.c
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File: wlan_p2p_disc_offload_internal.h
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==========

File: aes-ctr.c

```
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 * AES-128/192/256 CTR
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File: aes_siv.h

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File: crypto.h

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* This file defines the cryptographic functions that need to be implemented
* for wpa_supplicant and hostapd. When TLS is not used, internal
* implementation of MD5, SHA1, and AES is used and no external libraries are
* required. When TLS is enabled
 (e.g., by enabling EAP-TLS or EAP-PEAP), the
* crypto library used by the TLS implementation is expected to be used for
* non-TLS needs, too, in order to save space by not implementing these
* functions twice.
*
* Wrapper code for using each crypto library is in its own file (crypto*.c)
* and one of these files is build and linked in to provide the functions
* defined here.
*/
==============================================================================
File: fils.c

/* WPA/RSN - Shared functions for supplicant and authenticator
 * EAP common peer/server definitions
 * EAP peer state machines (RFC 4137)
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==============================================================================
File: fils.h
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* WPA/RSN - Shared functions for supplicant and authenticator
* EAP common peer/server definitions
* EAP
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/* RC4 stream cipher
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/*
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File: sha256.c

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==========================================================================
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```
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*/
==============================================================================
File: stringl.h

/* $OpenBSD: string.h,v 1.17 2006/01/06 18:53:04 millert Exp $ */
/* $NetBSD: string.h,v 1.6 1994/10/26 00:56:30 cgd Exp $ */

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*
* @(#)string.h 5.10 (Berkeley) 3/9/91
*/

==============================================================================
File: strlcpy.c
/* $OpenBSD: strlcpy.c,v
 1.11 2006/05/05 15:27:38 millert Exp $ */

/*
* Copyright (c) 1998 Todd C. Miller <Todd.Miller@courtesan.com>
*
```

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==========
File: lz.c
//
// Name:  lz.c
// Author:  Marcus Geelnard
// Description:
 LZ77 coder/decoder implementation.
// Reentrant:  Yes
// $ATH_LICENSE_NULL$
//
// The LZ77 compression scheme is a substitutional compression scheme
// proposed by Abraham Lempel and Jakob Ziv in 1977. It is very simple in
// its design, and uses no fancy bit level compression.
//
// This is my first attempt at an implementation of a LZ77 code/decoder.
//
// The principle of the LZ77 compression algorithm is to store repeated
// occurrences of strings as references to previous occurrences of the same
// string. The point is that the reference consumes less space than the
// string itself, provided that the string is long enough (in this
// implementation, the string has to be at least 4 bytes long, since the
// minimum coded reference is 3 bytes long). Also note that the term
// "string" refers to any kind of byte sequence (it does not have to be
// an ASCII string, for instance).
//
// The coder uses a brute force approach to finding string matches in the
// history buffer
 (or "sliding window", if you wish), which is very, very
// slow. I recon the complexity is somewhere between O(n^2) and O(n^3),
// depending on the input data.
//
// There is also a faster implementation that uses a large working buffer
// in which a "jump table" is stored, which is used to quickly find
// possible string matches (see the source code for LZ_CompressFast() for
// more information). The faster method is an order of magnitude faster,

```
// but still quite slow compared to other compression methods.
//
// The upside is that decompression is very fast, and the compression ratio
// is often very good.
//
// The reference to a string is coded as a (length,offset) pair, where the
// length indicates the length of the string, and the offset gives the
// offset from the current data position. To distinguish between string
// references and literal strings (uncompressed bytes), a string reference
// is preceded by a marker byte, which is chosen as the least common byte
// symbol in
 the input data stream (this marker byte is stored in the
// output stream as the first byte).
//
// Occurrences of the marker byte in the stream are encoded as the marker
// byte followed by a zero byte, which means that occurrences of the marker
// byte have to be coded with two bytes.
//
// The lengths and offsets are coded in a variable length fashion, allowing
// values of any magnitude (up to 4294967295 in this implementation).
//
// With this compression scheme, the worst case compression result is
// (257/256)*insize + 1.
//
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//
// Marcus Geelnard
```

// marcus.geelnard at home.se
//

==========
File: lz.h
//
// Name:  lz.h
// Author:  Marcus Geelnard
// Description: LZ77 coder/decoder interface.
// Reentrant:  Yes
// ----------
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// marcus.geelnard at home.se
//

==========
File: arm_common_tables.h
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*
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*
* $Date:  19. October 2015
* $Revision:  V.1.4.5 a
*
* Project:  CMSIS DSP Library

* Title:  arm_common_tables.h
*
* Description: This file has extern declaration for common tables like Bitreverse, reciprocal etc which are used across different functions
*
* Target Processor: Cortex-M4/Cortex-M3
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 */

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* $Date:  19. March 2015
* $Revision:  V.1.4.5
*
* Project:  CMSIS DSP Library
* Title:  arm_const_structs.h
*
* Description: This file has constant structs that are initialized for

```
*            user convenience.  For example, some can be given as
*            arguments to the arm_cfft_f32() function.
*
* Target Processor: Cortex-M4/Cortex-M3
*
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* ---------------------------------------------------------------------- */

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*
* $Date:        20. October 2015
* $Revision:    V1.4.5 b
*
* Project:      CMSIS DSP Library
* Title:        arm_math.h
*
* Description:  Public header file for CMSIS DSP Library
*
* Target Processor: Cortex-M7/Cortex-M4/Cortex-M3/Cortex-M0
```

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File: sha_core.c
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File:
  stail_queue.h

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//
//  @(#)queue.h 8.5 (Berkeley) 8/20/94
//
 $FreeBSD: src/sys/sys/queue.h,v 1.58 2004/04/07 04:19:49 imp Exp $
//

==========
File:  targaddrs.h
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* Galois/Counter Mode (GCM) and GMAC with AES
*
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File:  aes_wrap.h
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/*
* AES-based functions
*
*
* - AES Key Wrap Algorithm (128-bit KEK) (RFC3394)
* - One-Key CBC MAC (OMAC1) hash with AES-128
* - AES-128 CTR mode encryption
* - AES-128 EAX mode encryption/decryption
* - AES-128 CBC
*
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* MD5 hash implementation and interface functions
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File:  sha2.h
/*
* FILE:    sha2.h
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//  @(#)queue.h 8.5 (Berkeley) 8/20/94
// $FreeBSD: src/sys/sys/queue.h,v
 1.58 2004/04/07 04:19:49 imp Exp $
//

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File:  ieee_crc32.c
/*
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*
*  First, the polynomial itself and its table of feedback terms.  The
*  polynomial is
*  X^32+X^26+X^23+X^22+X^16+X^12+X^11+X^10+X^8+X^7+X^5+X^4+X^2+X^1+X^0
*
*  Note that we take it "backwards" and put the highest-order term in
*  the lowest-order bit.  The X^32 term is "implied"; the LSB is the
*  X^31 term, etc.  The X^0 term (usually shown as "+1") results in
*  the MSB being 1
*
*  Note that the usual hardware shift register implementation, which
*  is what we're using (we're merely optimizing it by doing eight-bit
*  chunks at a time) shifts bits into the lowest-order term.  In our
*  implementation, that means shifting towards the right.  Why do we
*  do it this way?  Because the calculated
 CRC must be transmitted in
*  order from highest-order term to lowest-order term.  UARTs transmit
*  characters in order from LSB to MSB.  By storing the CRC this way
*  we hand it to the UART in the order low-byte to high-byte; the UART
*  sends each low-bit to hight-bit; and the result is transmission bit
```

```
*  by bit from highest- to lowest-order term without requiring any bit
*  shuffling on our part.  Reception works similarly
*
*  The feedback terms table consists of 256, 32-bit entries.  Notes
*
*      The table can be generated at runtime if desired; code to do so
*      is shown later.  It might not be obvious, but the feedback
*      terms simply represent the results of eight shift/xor opera
*      tions for all combinations of data and CRC register values
*
*      The values must be right-shifted by eight bits by the "updcrc
*      logic; the shift must be unsigned (bring in zeroes).  On some
*      hardware you could probably optimize the shift in assembler
 by
*      using byte-swap instructions
*      polynomial $edb88320
*
*
* CRC32 code derived from work by Gary S. Brown.
*/
================================================================================
File:  hca_HwComponentBbBase_dfs_phyerr_tlv.cpp
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* $FreeBSD: src/sys/net/if_llc.h,v 1.9 2002/09/23 06:25:08 alfred Exp $
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/*
* FILE: sha2.c
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 * EAP peer state machines (RFC 4137)
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File:  fils.h

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*/
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```

```
/*
* AES (Rijndael) cipher
*
* Modifications to public domain implementation:
* - support only 128-bit keys
* - cleanup
* - use C pre-processor
 to make it easier to change S table access
* - added option (AES_SMALL_TABLES) for reducing code size by about 8 kB at
*   cost of reduced throughput (quite small difference on Pentium 4,
*   10-25% when using -O1 or -O2 optimization)
*
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*/

/*
* rijndael-alg-fst.c
*
* @version 3.0 (December 2000)
*
* Optimised ANSI C code for the Rijndael cipher (now AES)
*
* @author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
* @author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
* @author Paulo Barreto <paulo.barreto@terra.com.br>
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==============================================================================
File:  aes_gcm.c
/*
* Galois/Counter Mode (GCM) and GMAC with AES
*
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==============================================================================
File:  aes_wrap.c
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/*
* AES-based functions
*
* - AES Key Wrap Algorithm (128-bit KEK) (RFC3394)
* - One-Key CBC MAC (OMAC1) hash with AES-128
* - AES-128 CTR mode encryption
* - AES-128 EAX mode encryption/decryption
* - AES-128 CBC
*
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File:
  common.h
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*/
```

```
/*
* wpa_supplicant/hostapd / common helper functions, etc.
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==============================================================================
File:  crypto.h
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/*
* WPA Supplicant / wrapper functions for crypto libraries
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*
* This file defines the cryptographic functions that need to be implemented
* for wpa_supplicant and hostapd. When TLS is not used, internal
* implementation of MD5, SHA1, and AES is used and no external libraries are
* required. When TLS is enabled (e.g., by enabling EAP-TLS or EAP-PEAP), the
* crypto library used by the TLS implementation is expected to be used for
* non-TLS needs, too, in order to save space by not implementing these
* functions twice.
*
* Wrapper code for using each crypto library is in its own file (crypto*.c)
* and one of these files is build and linked in to provide the functions
* defined here.
 */

==============================================================================
```

File:  md5.c
//
// This code implements the MD5 message-digest algorithm.
// The algorithm is due to Ron Rivest.  This code was
// written by Colin Plumb in 1993, no copyright is claimed.
// This code is in the public domain; do with it what you wish.
//
// Equivalent code is available from RSA Data Security, Inc.
// This code has been tested against that, and is equivalent,
// except that you don't need to include two pages of legalese
// with every copy.
//
// To compute the message digest of a chunk of bytes, declare an
// MD5Context structure, pass it to MD5Init, call MD5Update as
// needed on buffers full of bytes, and then call MD5Final, which
// will fill a supplied 16-byte array with the digest.
//

==========
File:  sha1.c
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*/

/*
* SHA1 hash implementation and interface functions
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==========
File:  athstartpack.h
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File:  wmi_unified_priv.h
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//
// $Id: //depot/sw/qca_main/components/wlan/qca-wifi-fw/1.0/drivers/target/src/wlan/proto/include/if_llc.h#2 $
// $NetBSD: if_llc.h,v 1.12 1999/11/19 20:41:19
thorpej Exp $
// $Id: //depot/sw/qca_main/components/wlan/qca-wifi-fw/1.0/drivers/target/src/wlan/proto/include/if_llc.h#2 $
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*
* @(#)if_llc.h 8.1 (Berkeley) 6/10/93

```
 * $FreeBSD: src/sys/net/if_llc.h,v 1.9 2002/09/23 06:25:08 alfred Exp $
*/
```

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wlan/protocol/src/include/if_llc.h#1

```
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wlan/protocol/include/if_ethersubr.h#1

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wlan/protocol/support/lz77/lz.h#1
wlan/protocol/support/lz77/lz.c#1

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wlan/mac_core/tests/serflash/flashprog/uncompr.c#1

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//
//  @(#)queue.h 8.5 (Berkeley) 8/20/94
// $FreeBSD: src/sys/sys/queue.h,v 1.58 2004/04/07 04:19:49 imp Exp $
//

wlan/include/queue.h#1

==========
==========
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* SHA1 hash implementation and interface functions
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*/

wlan/mac_core/include/sha1.h
wlan/mac_core/romexport/AR900B/hw.1/include/sha1.h
wlan/mac_core/romexport/AR900B/hw.2/include/sha1.h

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/*
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* $Id: //depot/sw/branches/qca_rome_main/perf_pwr_offload/drivers/target/include/sha2.h#1 $
*/

wlan/mac_core/romexport/AR900B/hw.1/include/sha2.h

wlan/mac_core/romexport/AR900B/hw.2/include/sha2.h

==========
==========

/*
 * AES-based functions
*
*
* - AES Key Wrap Algorithm (128-bit KEK) (RFC3394)
* - One-Key CBC MAC (OMAC1) hash with AES-128
* - AES-128 CTR mode encryption
* - AES-128 EAX mode encryption/decryption
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wlan/mac_core/include/aes_wrap.h
wlan/mac_core/romexport/AR900B/hw.1/include/aes_wrap.h
wlan/mac_core/romexport/AR900B/hw.2/include/aes_wrap.h

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*/

wlan/mac_core/romexport/AR900B/hw.1/include/seccommon.h
wlan/mac_core/romexport/AR900B/hw.2/include/seccommon.h

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wlan/mac_core/include/usb.h
wlan/mac_core/romexport/AR900B/hw.1/include/usb.h
wlan/mac_core/romexport/AR900B/hw.2/include/usb.h

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* ========== */

wlan/mac_core/include/cil.h
wlan/mac_core/romexport/AR900B/hw.1/include/cil.h
wlan/mac_core/romexport/AR900B/hw.2/include/cil.h
wlan/mac_core/include/dev.h
wlan/mac_core/romexport/AR900B/hw.1/include/dev.h
wlan/mac_core/romexport/AR900B/hw.2/include/dev.h
wlan/mac_core/include/os_dev.h
wlan/mac_core/romexport/AR900B/hw.1/include/os_dev.h
wlan/mac_core/romexport/AR900B/hw.2/include/os_dev.h
wlan/mac_core/include/usb3_hw.h
wlan/mac_core/romexport/AR900B/hw.1/include/usb3_hw.h
wlan/mac_core/romexport/AR900B/hw.2/include/usb3_hw.h
wlan/mac_core/include/pcd.h
wlan/mac_core/romexport/AR900B/hw.1/include/pcd.h
wlan/mac_core/romexport/AR900B/hw.2/include/pcd.h

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/*
 *  $Header: //source/qcom/qct/core/api/kernel/main/latest/libstd/stringl/stringl.h#13 $
*  $DateTime: 2013/07/24 11:35:54 $
*/

/*  $OpenBSD: string.h,v 1.17 2006/01/06 18:53:04 millert Exp $ */
/*  $NetBSD: string.h,v 1.6 1994/10/26 00:56:30 cgd Exp $   */

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*
*  @(#)string.h    5.10 (Berkeley) 3/9/91
*/
```

wlan/protocol/support/bin2srec/include/stringl/stringl.h

```
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/*
*  $Header: //source/qcom/qct/core/kernel/libstd/main/latest/src/strlcpy.c#1 $
*  $DateTime: 2011/01/07 17:50:19 $
*/

/*  $OpenBSD: strlcpy.c,v 1.11 2006/05/05 15:27:38 millert
 Exp $    */

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wlan/protocol/support/bin2srec/strlcpy.c

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Quoting from https://mail.gna.org/public/eagleusb-dev/2004-11/msg00172.html:

> Last week, I talked to different parties at ADI regarding the licensing of Layer 1 ( DSP ) and USB firmware source codes. ADI is not providing source code for the firmware :-( The binary files will be distributed freely to end users ( Is public domain licensing good for this? )

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*
* $Id: sha2.c,v 1.1 2001/11/08 00:01:51 adg Exp adg $
*/
File: LLM_sp_sha2.c

/*
 * FILE:  sha2.h
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*
* $Id: sha2.h,v 1.1 2001/11/08 00:02:01 adg Exp adg $
*/
File: LLM_sp_sha2.h

==========

2.

/* utility to create the register check tables
* this includes inlined list.h safe for userspace.
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*/
File: comm_lib.h

==========

3.

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* ====================================================================

*
*/
File Name list: aes.h, aes_locl.h

==========

4.

/* crypto/aes/aes_core.c -*- mode:C; c-file-style: "eay" -*- */
/**
* rijndael-alg-fst.c
*
* @version 3.0 (December 2000)
*
* Optimised ANSI C code for the Rijndael cipher (now AES)
*
* @author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
* @author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
* @author Paulo Barreto <paulo.barreto@terra.com.br>
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*/
File: aes_core.c

==========

5.

/*==========

EDIT HISTORY FOR FILE

$Header: //depot/asic/msmshared/sec/sec/MSM_SEC.03.03.08.xx/aes.h#1 $
$DateTime: 2006/12/11 00:43:21 $ $Author: davidf $

```
when       who     what, where, why
--------   ---     --------------------------------------------------------
11/12/04   rv      changes to correct LINT errors
02/02/04   rwh     Small mods to open
 source.

===========================================================================*/

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  Dr B. R. Gladman <brg@gladman.uk.net> 1st June 2001.

*/
File: aes.h

/*===========================================================================

                    EDIT HISTORY FOR FILE

 $Header: //depot/asic/msmshared/sec/sec/MSM_SEC.03.03.08.xx/aes_tab.h#1 $
 $DateTime: 2006/12/11 00:43:21 $ $Author: davidf $

when       who     what, where, why
--------   ---     --------------------------------------------------------
11/12/04   rv      changes to correct LINT errors
02/02/04
   rwh     Small mods to open source.

===========================================================================*/
/*lint -e146 -e303 */
/* 146: Assuming a binary constant */
/* 303: String too long (try +macros) */


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*/
File: aes_tab.h

==========
6.
==========
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#
#
#
==========
File: Conftest.py

==========
7.
==========
/ ***
*
* Fowler/Noll/Vo- hash
*
* The basis of this hash algorithm was taken from an idea sent
* as reviewer comments to the IEEE POSIX P1003.2 committee by:
*
*  Phong Vo (http://www.research.att.com/info/kpv/)

```
*      Glenn Fowler (http://www.research.att.com/~gsf/)
*
* In a subsequent ballot round:
*
*      Landon Curt Noll (http://www.isthe.com/chongo/)
*
* improved on their algorithm.  Some people tried this hash
* and found that it worked rather well.  In an EMail message
* to Landon, they named it the ``Fowler/Noll/Vo'' or FNV hash.
*
* FNV hashes are designed to be fast while maintaining a low
* collision rate. The FNV speed allows one to quickly hash
 lots
* of data while maintaining a reasonable collision rate.  See:
*
*      http://www.isthe.com/chongo/tech/comp/fnv/index.html
*
* for more details as well as other forms of the FNV hash.
*
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*
* By:
* chongo <Landon Curt Noll> /\oo/\
*      http://www.isthe.com/chongo/
*
* Share and Enjoy! :-)
*/
```

File: fm_fnv_hash.h, fm_fnv_hash.c

==========

8.

==========

```
/*
 *  $Header: //source/qcom/qct/core/api/kernel/main/latest/libstd/stringl/stringl.h#13 $
*  $DateTime: 2013/07/24 11:35:54 $
*/

/* $OpenBSD: string.h,v 1.17 2006/01/06 18:53:04 millert Exp $ */
```

/* $NetBSD: string.h,v 1.6 1994/10/26 00:56:30 cgd Exp $ */

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*
* @(#)string.h 5.10 (Berkeley) 3/9/91
*/
File: stringl.h

==========
9.
==========
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```

---

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 * EAP peer state machines (RFC 4137)
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*
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* - One-Key CBC MAC (OMAC1) hash with AES-128
* - AES-128 CTR mode encryption
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* - AES-128 CBC
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* crypto
 library used by the TLS implementation is expected to be used for
* non-TLS needs, too, in order to save space by not implementing these
* functions twice.
*
* Wrapper code for using each crypto library is in its own file (crypto*.c)
```

```
* and one of these files is build and linked in to provide the functions
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*/
```

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 *
 *  First, the polynomial itself and its table of feedback terms.  The
 *  polynomial is
 *  X^32+X^26+X^23+X^22+X^16+X^12+X^11+X^10+X^8+X^7+X^5+X^4+X^2+X^1+X^0
 *
 *  Note that we take it "backwards" and put the highest-order term in
 *  the lowest-order bit.  The X^32 term is "implied"; the LSB is the
 *  X^31 term, etc.  The X^0 term (usually shown as "+1") results in
 *  the MSB being 1
 *
 *  Note that the usual hardware shift register implementation, which
 *  is what we're using (we're merely optimizing it by doing
eight-bit
 *  chunks at a time) shifts bits into the lowest-order term.  In our
 *  implementation, that means shifting towards the right.  Why do we
 *  do it this way?  Because the calculated CRC must be transmitted in
 *  order from highest-order term to lowest-order term.  UARTs transmit
 *  characters in order from LSB to MSB.  By storing the CRC this way
 *  we hand it to the UART in the order low-byte to high-byte; the UART
 *  sends each low-bit to hight-bit; and the result is transmission bit
 *  by bit from highest- to lowest-order term without requiring any bit
 *  shuffling on our part.  Reception works similarly
 *
 *  The feedback terms table consists of 256, 32-bit entries.  Notes
 *

 *      The table can be generated at runtime if desired; code to do so
 *      is shown later.  It might not be obvious, but the feedback
 *      terms simply represent the results of eight shift/xor opera
```

```
 *      tions for all combinations of data and CRC register values
 *
 *      The values must be right-shifted by eight bits by the "updcrc
 *      logic; the shift must be unsigned (bring in zeroes).  On some
 *      hardware you could probably optimize the shift in assembler by
 *      using byte-swap instructions
 *      polynomial $edb88320
 *
 *
 * CRC32
 code derived from work by Gary S. Brown.
 */
```

---

```
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 string.h,v 1.17 2006/01/06 18:53:04 millert Exp $ */
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**
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* Author: Malcolm Purvis <malcolmp@ok-labs.com>
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* This file is only included by the main atomic_ops.h, so all of that
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==========

File: htt_common.h

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 wlan_nan_msg_common.h

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*/
================================================================================
File:
 ip_prot.h

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==========
File: ipv4.h

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File: ipv6.h

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File: ol_fw_tx_dbg.h

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==========
File: pktlog_if.h

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```

==========
File: queue.h

```
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*/
==========
File: stail_queue.h

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//
//  @(#)queue.h 8.5 (Berkeley) 8/20/94
// $FreeBSD: src/sys/sys/queue.h,v 1.58 2004/04/07 04:19:49 imp Exp $
// $Id: //components/rel/wlanfw_cmn.cnss/1.0/cnss_proc/wlan/fwcommon/include/queue.h#1 $
//

==========
File:
 targaddrs.h

```
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==========
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```
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==========
File: aes_gcm.h

*/
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* Galois/Counter Mode (GCM) and GMAC with AES
*
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==========
File: aes_wrap.h

*/
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/*
* AES-based functions
*
*
* - AES Key Wrap Algorithm (128-bit KEK) (RFC3394)
* - One-Key CBC MAC (OMAC1) hash with AES-128
* - AES-128 CTR mode encryption
* -
 AES-128 EAX mode encryption/decryption
* - AES-128 CBC
*
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* MD5 hash implementation and interface functions
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*/
==========
File: sha2.h

/*
* FILE:  sha2.h
* AUTHOR:  Aaron D. Gifford - http://www.aarongifford.com/
 *
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*
* $Id: //depot/sw/branches/qca_rome_main/perf_pwr_offload/drivers/target/include/sha2.h#1 $
*/
==========
File: wal_dfs.h

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==========
File: if_ethersubr.h

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//
// $Id: //components/rel/wlanfw.cnss/1.0.1/cnss_proc/wlan/fw/target/src/wlan/proto/include/if_ethersubr.h#3 $
//

==========
File: wal_dfs.c
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File: ieee_crc32.c

/*
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*
*  First, the polynomial itself and its table of feedback terms.  The
*  polynomial is
*  X^32+X^26+X^23+X^22+X^16+X^12+X^11+X^10+X^8+X^7+X^5+X^4+X^2+X^1+X^0
*
*  Note that we take it "backwards" and put the highest-order term in
*  the lowest-order bit.  The X^32 term is "implied"; the LSB is the
*  X^31 term, etc.  The X^0 term (usually shown as "+1") results in
*  the MSB being 1
*
*  Note that the usual hardware shift register implementation, which
*  is what we're using (we're merely optimizing it by doing eight-bit
*  chunks at a time) shifts bits into the lowest-order term.  In our

```
*  implementation, that means shifting towards the right.  Why do we
*  do it this way?  Because the calculated CRC must be transmitted in
*  order from highest-order term to lowest-order term.  UARTs transmit
*  characters in order from LSB to MSB.  By storing the CRC this way
*  we hand it to the UART in the order low-byte to high-byte; the UART
*  sends each low-bit
 to hight-bit; and the result is transmission bit
*  by bit from highest- to lowest-order term without requiring any bit
*  shuffling on our part.  Reception works similarly
*
*  The feedback terms table consists of 256, 32-bit entries.  Notes
*
*     The table can be generated at runtime if desired; code to do so
*     is shown later.  It might not be obvious, but the feedback
*     terms simply represent the results of eight shift/xor opera
*     tions for all combinations of data and CRC register values
*
*     The values must be right-shifted by eight bits by the "updcrc
*     logic; the shift must be unsigned (bring in zeroes).  On some
*     hardware you could probably optimize the shift in assembler by
*     using byte-swap instructions
*     polynomial $edb88320
*
*
* CRC32 code derived from work by Gary S. Brown.
*/
==============================================================================
File: aes.c

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/*
* AES (Rijndael) cipher
*
* Modifications to public domain implementation:
* - support only 128-bit keys
* - cleanup
* - use C pre-processor to make it easier to change S table access
* - added option (AES_SMALL_TABLES) for reducing code size by about 8 kB at
*   cost of reduced throughput (quite small difference on Pentium 4,
*   10-25% when using -O1 or -O2 optimization)
*
* Copyright (c) 2003-2005, Jouni Malinen <jkmaline@cc.hut.fi>
*
```

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*/

/*
* rijndael-alg-fst.c
*
* @version 3.0 (December 2000)
*
* Optimised ANSI C code for the Rijndael
 cipher (now AES)
*
* @author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
* @author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
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File: aes_gcm.c

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* Galois/Counter Mode (GCM) and GMAC with AES
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```

==========
File: aes_wrap.c

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/*
* AES-based functions
*
* - AES Key Wrap Algorithm (128-bit KEK) (RFC3394)
* - One-Key CBC MAC (OMAC1) hash with AES-128
* - AES-128 CTR mode encryption
* - AES-128 EAX mode encryption/decryption
* - AES-128 CBC
*
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File: common.h

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* wpa_supplicant/hostapd / common helper functions, etc.
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==========
File: md5.c

//
//
 $Id: //depot/sw/branches/qca_main_wifi2.0/perf_pwr_offload/drivers/target/src/misc/crypto/md5.c#1 $
//
// This code implements the MD5 message-digest algorithm.
// The algorithm is due to Ron Rivest.  This code was
// written by Colin Plumb in 1993, no copyright is claimed.
// This code is in the public domain; do with it what you wish.
//
// Equivalent code is available from RSA Data Security, Inc.
// This code has been tested against that, and is equivalent,
// except that you don't need to include two pages of legalese
// with every copy.
//
// To compute the message digest of a chunk of bytes, declare an
// MD5Context structure, pass it to MD5Init, call MD5Update as
// needed on buffers full of bytes, and then call MD5Final, which
// will fill a supplied 16-byte array with the digest.
//
==========
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File: wmi_tlv_helper.c

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File: platform_cmnos_printf.c

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*/
==============================================================================
File: hca_HwComponentBbLithium_dfs_phyerr_tlv.cpp

/*

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File: hca_HwComponentBbLithium_dfs_process_phyerr.cpp

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File: hca_HwComponentBbLithium_dfs_process_radarevent.cpp

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File: hca_HwComponentBbLithium_dfs_radar_report.h
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File: phyUtilsStrlcpy.c

/*  $OpenBSD: strlcpy.c,v 1.11 2006/05/05 15:27:38 millert Exp $    */

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File: cds_ieee80211_common_i.h

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File: dfs_interface.h

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 dfs_ioctl.h

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File: cds_reg_service.c

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//
// $Id: //components/rel/wlanfw.cnss/1.0.1/cnss_proc/wlan/fw/target/src/wlan/proto/include/if_llc.h#3 $
// $NetBSD: if_llc.h,v 1.12 1999/11/19 20:41:19 thorpej Exp $
// $Id: //components/rel/wlanfw.cnss/1.0.1/cnss_proc/wlan/fw/target/src/wlan/proto/include/if_llc.h#3 $
//

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* @(#)if_llc.h 8.1 (Berkeley) 6/10/93
* $FreeBSD: src/sys/net/if_llc.h,v 1.9 2002/09/23 06:25:08 alfred Exp $
*/
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File: qvit_init_api.h

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File: wlan_mlme_wmi.c
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File: sha2.c

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* FILE: sha2.c
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File: wlan_p2p_listen_offload_int.h
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* This file defines the cryptographic
 functions that need to be implemented
* for wpa_supplicant and hostapd. When TLS is not used, internal
* implementation of MD5, SHA1, and AES is used and no external libraries are
* required. When TLS is enabled (e.g., by enabling EAP-TLS or EAP-PEAP), the
* crypto library used by the TLS implementation is expected to be used for
* non-TLS needs, too, in order to save space by not implementing these
* functions twice.
*
* Wrapper code for using each crypto library is in its own file (crypto*.c)
* and one of these files is build and linked in to provide the functions
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File:
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File: mywpa_common.h

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Mathews <bmathews@xceive.com> to Devin Heitmueller <dheitmueller@linuxtv.org>
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*
*
* - AES Key Wrap Algorithm (128-bit KEK) (RFC3394)
* - One-Key CBC MAC (OMAC1) hash with AES-128
* - AES-128 CTR mode encryption
* - AES-128 EAX mode encryption/decryption
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* - AES-128 CTR mode encryption
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File:
crypto.h

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* This file defines the cryptographic functions that need to be implemented
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* implementation of MD5, SHA1, and AES is used and no external libraries are
* required. When TLS is enabled (e.g., by enabling EAP-TLS or EAP-PEAP), the
* crypto library used by the TLS implementation is expected to be used
 for
* non-TLS needs, too, in order to save space by not implementing these
* functions twice.
*
* Wrapper code for using each crypto library is in its own file (crypto*.c)
* and one of these files is build and linked in to provide the functions
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File: suppl_auth_api.h

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 config.h

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File: ieee80211_defines.h

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wpa_i.h

```
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File: wpa.h

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File: common.h

```
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==========

File: atomic_ops.h

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/*
* Author: Malcolm Purvis <malcolmp@ok-labs.com>
* Author: Carlos Dyonisio <medaglia@ok-labs.com>
*/

==============================================================================
```

File: qurt_atomic_ops.h

```
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*/
/*
* Author: Malcolm Purvis <malcolmp@ok-labs.com>
*
* This file is only included by the main atomic_ops.h, so all of that
* file's definitions are available.
*/

==========

File: ieee_crc32.c

/*
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```
*  code or tables extracted from it, as desired without restriction.
*
*  First, the polynomial itself and its table of feedback terms.  The
*  polynomial is

*  X^32+X^26+X^23+X^22+X^16+X^12+X^11+X^10+X^8+X^7+X^5+X^4+X^2+X^1+X^0
*
*  Note that we take it "backwards" and put the highest-order term in
*  the lowest-order bit.  The X^32 term is "implied"; the LSB is the
*  X^31 term, etc.  The X^0 term (usually shown as "+1") results in
*  the MSB being 1
*
*  Note that the usual hardware shift register implementation, which
*  is what we're using (we're merely optimizing it by doing eight-bit
*  chunks at a time) shifts bits into the lowest-order term.  In our
*  implementation, that means shifting towards the right.  Why do we
*  do it this way?  Because the calculated CRC
 must be transmitted in
*  order from highest-order term to lowest-order term.  UARTs transmit
*  characters in order from LSB to MSB.  By storing the CRC this way
*  we hand it to the UART in the order low-byte to high-byte; the UART
*  sends each low-bit to hight-bit; and the result is transmission bit
*  by bit from highest- to lowest-order term without requiring any bit
*  shuffling on our part.  Reception works similarly
*
*  The feedback terms table consists of 256, 32-bit entries.  Notes
*
*     The table can be generated at runtime if desired; code to do so
*     is shown later.  It might not be obvious, but the feedback
*     terms simply represent the results of eight shift/xor opera

*     tions for all combinations of data and CRC register values
*
*     The values must be right-shifted by eight bits by the "updcrc
*     logic; the shift must be unsigned (bring in zeroes).  On some
*     hardware you could probably optimize the shift in assembler by
*     using byte-swap instructions
*     polynomial $edb88320
*
*
* CRC32 code derived from work by Gary S. Brown.
*/

==============================================================================

File: sha2.h

/*
```

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File: stringl.h

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/* $NetBSD: string.h,v 1.6 1994/10/26 00:56:30 cgd Exp $ */
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* @(#)string.h 5.10 (Berkeley) 3/9/91
*/
```

==========

File: stail_queue.h

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File: queue.h

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//
//  @(#)queue.h 8.5 (Berkeley) 8/20/94
// $FreeBSD: src/sys/sys/queue.h,v 1.58 2004/04/07 04:19:49 imp Exp $
```

==========

File: phyUtilsStrlcpy.c

```
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==========

File: platform_cmnos_printf.c

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File: aes-siv.c

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```
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==========

File: apf_interpreter.c

```
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==========

File:
 apf_interpreter.h

```
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 sha256.c

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*/
/* ===== start - public domain SHA256 implementation ===== */

/* This is based on SHA256 implementation in LibTomCrypt that was released into
* public domain by Tom St Denis.
*/
```

==========

File: sha384-internal.c

```
/*
* SHA-384 hash implementation and interface functions
* Copyright (c) 2015,
 Pali Rohr <pali.rohar@gmail.com>
*
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* See README for more details.
*/
```

/* ===== start - public domain SHA384 implementation ===== */

/* This is based on SHA384 implementation in LibTomCrypt that was released into
* public domain by Tom St Denis.
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==========

File: sha512-internal.c

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* SHA-512 hash implementation and interface functions
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*/
/* ===== start - public domain SHA512 implementation ===== */

/* This is based on SHA512 implementation in LibTomCrypt that was released into
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File: sha256.h

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File: sha384_i.h

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File: sha384.c

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File: sha384-prf.c

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* SHA384-based KDF (IEEE 802.11ac)
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File: sha384.h

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* SHA384 hash implementation and interface functions
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File: sha256-kdf.c

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* HMAC-SHA256 KDF (RFC 5295) and HKDF-Expand(SHA256) (RFC 5869)
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File: sha512_i.h

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File: md5.c

```
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//
// This code implements the MD5 message-digest algorithm.
// The algorithm is due to Ron Rivest.  This code was
// written by Colin Plumb in 1993, no copyright is claimed.
// This code is in the public domain; do with it what you wish.
//
// Equivalent code is available from RSA Data Security, Inc.
// This code has been tested against that, and is equivalent,
// except that you don't need to include two
 pages of legalese
// with every copy.
//
// To compute the message digest of a chunk of bytes, declare an
// MD5Context structure, pass it to MD5Init, call MD5Update as
// needed on buffers full of bytes, and then call MD5Final, which
```

```
// will fill a supplied 16-byte array with the digest.
//
// This code implements the MD5 message-digest algorithm.
// The algorithm is due to Ron Rivest.  This code was
// written by Colin Plumb in 1993, no copyright is claimed.
// This code is in the public domain; do with it what you wish.
//
// Equivalent code is available from RSA Data Security, Inc.
// This code has been tested against that, and is equivalent,
// except that you don't need to include two pages of legalese
// with every copy.
//
```

==========

File: aes_gcm.h

```
/*
* Galois/Counter Mode (GCM) and GMAC with AES
*
* Copyright (c) 2012, Jouni Malinen <j@w1.fi>
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```

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File: md5_api.h

```
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* MD5 hash implementation and interface functions
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File: wlan_p2p_listen_offload_int.c

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==========================================================================

File: wlan_p2p_listen_offload_int.h

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File: wlan_p2p_listen_offload.c
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File: aes-ctr.c

```
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File: m1_m4_frame.c

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/* RC4 stream cipher
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File: my_nan_sec.c

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File: mywpa.c

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File: mywpa_ft.c

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File:

wlan_p2p_disc_offload.c

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* Wi-Fi Protected Setup - attribute parsing
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File: wlan_p2p_disc_offload_internal.h

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```
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File: wlan_defs.h

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File: wlan_nan_msg_common.h

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File:
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File: ol_fw_tx_dbg.h

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File: wmi_unified_priv.h

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File: wlan_module_ids.h

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File: wal_dfs.h

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File:aes.c

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/*
* AES (Rijndael) cipher
*
* Modifications to public domain implementation:
* - support only 128-bit keys
* - cleanup
* - use C pre-processor to make it easier to change S table access
* - added option (AES_SMALL_TABLES) for reducing code size by about 8 kB at
*   cost of reduced throughput (quite small difference on Pentium 4,
*   10-25% when using -O1 or -O2 optimization)
*
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/*
* rijndael-alg-fst.c
*
* @version 3.0 (December 2000)
*
* Optimised ANSI C code for the Rijndael cipher (now AES)
*
* @author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
* @author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
* @author Paulo Barreto <paulo.barreto@terra.com.br>
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File: wmi_tlv_helper.c

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File: hca_HwComponentBbBase_dfs_process_radarevent.cpp

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File: cds_ieee80211_common.h

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File: wma_dfs_interface.h

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File: dfs_fcc_bin5.c

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File: dfs_misc.c

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File: sha2.c

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agere_sta_fw.bin -- 9.48 Hermes I
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The Linux driver architecture was based on two modules, the MSF (Module specific functions) and the HCF (Hardware Control Functions). Included in the HCF is run-time firmware (binary format) which is downloaded into the RAM of the Hermes 1/2/2.5 WMAC.

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Hope this helps.

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Fast discrete
 Fourier and cosine transforms and inverses
author: Monty <xiphmont@mit.edu>
modifications by: Monty
last modification date: Jul 1 1996

/* These Fourier routines were originally based on the Fourier
routines of the same names from the NETLIB bihar and fftpack
fortran libraries developed by Paul N. Swarztrauber at the National
Center for Atmospheric Research in Boulder, CO USA.  They have been
reimplemented in C and optimized in a few ways for OggSquish. */

/* As the original fortran libraries are public domain, the C Fourier
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well.  The C routines here produce output exactly equivalent to the
original fortran routines.  Of particular interest are the facts
that (like the original fortran), these routines can work on
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==========

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components within the cs42l43 firmware:

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```
/****************************************************************************//**
* @file     cmsis_armclang.h
* @brief    CMSIS compiler armclang (Arm Compiler 6) header file
* @version  V5.3.1
* @date     26. March 2020
******************************************************************************/
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*/
```

core_cm0plus.h

```
/****************************************************************************//**
* @file     core_cm0plus.h
* @brief    CMSIS Cortex-M0+ Core Peripheral Access Layer Header File
* @version  V5.0.9
* @date     21. August 2019
******************************************************************************/
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*/
```

cmsis_compiler.h

```
/****************************************************************************//**
* @file     cmsis_compiler.h
* @brief    CMSIS compiler generic header file
* @version  V5.1.0
* @date     09. October 2018
******************************************************************************/
/*
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```

```
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*/
```

cmsis_version.h

```
/******************************************************************************//**
* @file     cmsis_version.h
* @brief    CMSIS Core(M) Version definitions
* @version  V5.0.4
* @date     23. July 2019
******************************************************************************/
/*
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Firmware provided as part of an XC5000C Linux developers kit by Ramon Cazares <Ramon.Cazares@CrestaTech.com> to Devin Heitmueller dheitmueller@linuxtv.org on July 25, 2012.

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# 1.3992 kmod-kvdo 8.2.6.3-176.el9_7

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And Very Special Thanks To:
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# 1.3993 rpm-ostree 2025.11-2.el9_7

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//! FreeBSD and NetBSD xattr support.

```
use libc::{c_int, c_void, size_t, EPERM};
use std::ffi::{CString, OsStr, OsString};
use std::io;
use std::mem;
use std::os::unix::ffi::{OsStrExt, OsStringExt};
use std::os::unix::io::{AsRawFd, BorrowedFd};
use std::path::Path;
use std::ptr;

use libc::{
  extattr_delete_fd, extattr_delete_file, extattr_delete_link, extattr_get_fd, extattr_get_file,
```

```
  extattr_get_link, extattr_list_fd, extattr_list_file, extattr_list_link, extattr_set_fd,
  extattr_set_file, extattr_set_link, EXTATTR_NAMESPACE_SYSTEM, EXTATTR_NAMESPACE_USER,
};

use crate::util::allocate_loop;

pub const ENOATTR: i32 = libc::ENOATTR;
pub const ERANGE: i32 = libc::ERANGE;

const EXTATTR_NAMESPACE_USER_STRING: &str = "user";
const EXTATTR_NAMESPACE_SYSTEM_STRING: &str = "system";
const EXTATTR_NAMESPACE_NAMES: [&str; 3] = [
  "empty",
  EXTATTR_NAMESPACE_USER_STRING,
  EXTATTR_NAMESPACE_SYSTEM_STRING,
];

fn path_to_c(path: &Path) -> io::Result<CString> {
  match CString::new(path.as_os_str().as_bytes())
 {
      Ok(name) => Ok(name),
      Err(_) => Err(io::Error::new(io::ErrorKind::NotFound, "file not found")),
  }
}

#[inline]
fn slice_parts(buf: &mut [u8]) -> (*mut c_void, size_t) {
  if buf.is_empty() {
      (ptr::null_mut(), 0)
  } else {
      (buf.as_mut_ptr().cast(), buf.len() as size_t)
  }
}

/// An iterator over a set of extended attributes names.
#[derive(Default)]
pub struct XAttrs {
  user_attrs: Box<[u8]>,
  system_attrs: Box<[u8]>,
  offset: usize,
}

impl Clone for XAttrs {
  fn clone(&self) -> Self {
      XAttrs {
          user_attrs: Vec::from(&*self.user_attrs).into_boxed_slice(),
          system_attrs: Vec::from(&*self.system_attrs).into_boxed_slice(),
          offset: self.offset,
```

```
        }
    }

    fn clone_from(&mut self, other: &XAttrs) {
        self.offset = other.offset;

        let mut data = mem::replace(&mut self.user_attrs, Box::new([])).into_vec();
        data.extend(other.user_attrs.iter().cloned());
         self.user_attrs = data.into_boxed_slice();

        data = mem::replace(&mut self.system_attrs, Box::new([])).into_vec();
        data.extend(other.system_attrs.iter().cloned());
        self.system_attrs = data.into_boxed_slice();
    }
}

impl Iterator for XAttrs {
    type Item = OsString;
    fn next(&mut self) -> Option<OsString> {
        if self.user_attrs.is_empty() && self.system_attrs.is_empty() {
            return None;
        }

        if self.offset == self.user_attrs.len() + self.system_attrs.len() {
            return None;
        }

        let data = if self.offset < self.system_attrs.len() {
            &self.system_attrs[self.offset..]
        } else {
            &self.user_attrs[self.offset - self.system_attrs.len()..]
        };

        let siz = data[0] as usize;

        self.offset += siz + 1;
        if self.offset < self.system_attrs.len() {
            Some(prefix_namespace(
                OsStr::from_bytes(&data[1..siz
 + 1]),
                EXTATTR_NAMESPACE_SYSTEM,
            ))
        } else {
            Some(prefix_namespace(
                OsStr::from_bytes(&data[1..siz + 1]),
                EXTATTR_NAMESPACE_USER,
            ))
        }
```

```
    }

    fn size_hint(&self) -> (usize, Option<usize>) {
        if self.user_attrs.len() + self.system_attrs.len() == self.offset {
            (0, Some(0))
        } else {
            (1, None)
        }
    }
}

// This could use libc::extattr_string_to_namespace, but it's awkward because
// that requires nul-terminated strings, which Rust's std is loathe to provide.
fn name_to_ns(name: &OsStr) -> io::Result<(c_int, CString)> {
    let mut groups = name.as_bytes().splitn(2, |&b| b == b'.').take(2);
    let nsname = match groups.next() {
        Some(s) => s,
        None => {
            return Err(io::Error::new(
                io::ErrorKind::InvalidInput,
                "couldn't find namespace",
            ))
        }
    };

    let propname
  = match groups.next() {
        Some(s) => s,
        None => {
            return Err(io::Error::new(
                io::ErrorKind::InvalidInput,
                "couldn't find attribute",
            ))
        }
    };

    let ns_int = match EXTATTR_NAMESPACE_NAMES
        .iter()
        .position(|&s| s.as_bytes() == nsname)
    {
        Some(i) => i,
        None => {
            return Err(io::Error::new(
                io::ErrorKind::InvalidInput,
                "no matching namespace",
            ))
        }
    };
```

```
  Ok((ns_int as c_int, CString::new(propname)?))
}

fn prefix_namespace(attr: &OsStr, ns: c_int) -> OsString {
  let nsname = EXTATTR_NAMESPACE_NAMES[ns as usize];
  let mut v = Vec::with_capacity(nsname.as_bytes().len() + attr.as_bytes().len() + 1);
  v.extend(nsname.as_bytes());
  v.extend(".".as_bytes());
  v.extend(attr.as_bytes());
  OsString::from_vec(v)
}

fn cvt(res: libc::ssize_t) -> io::Result<usize> {
  if res < 0 {
     Err(io::Error::last_os_error())
   } else {
     Ok(res as usize)
  }
}

pub fn get_fd(fd: BorrowedFd<'_>, name: &OsStr) -> io::Result<Vec<u8>> {
  let (ns, name) = name_to_ns(name)?;
  unsafe {
     allocate_loop(|buf| {
        let (ptr, len) = slice_parts(buf);
        cvt(extattr_get_fd(fd.as_raw_fd(), ns, name.as_ptr(), ptr, len))
     })
  }
}

pub fn set_fd(fd: BorrowedFd<'_>, name: &OsStr, value: &[u8]) -> io::Result<()> {
  let (ns, name) = name_to_ns(name)?;
  let ret = unsafe {
     extattr_set_fd(
        fd.as_raw_fd(),
        ns,
        name.as_ptr(),
        value.as_ptr() as *const c_void,
        value.len() as size_t,
     )
  };
  if ret == -1 {
     Err(io::Error::last_os_error())
  } else {
     Ok(())
  }
}
```

```
pub fn remove_fd(fd: BorrowedFd<'_>, name: &OsStr) -> io::Result<()> {
  let (ns, name) = name_to_ns(name)?;
  let ret = unsafe { extattr_delete_fd(fd.as_raw_fd(), ns, name.as_ptr()) };

 if ret != 0 {
     Err(io::Error::last_os_error())
  } else {
     Ok(())
  }
}

pub fn list_fd(fd: BorrowedFd<'_>) -> io::Result<XAttrs> {
  let sysvec = unsafe {
     let res = allocate_loop(|buf| {
        let (ptr, len) = slice_parts(buf);
        cvt(extattr_list_fd(
           fd.as_raw_fd(),
           EXTATTR_NAMESPACE_SYSTEM,
           ptr,
           len,
        ))
     });
     // On FreeBSD, system attributes require root privileges to view. However,
     // to mimic the behavior of listxattr in linux and osx, we need to query
     // them anyway and return empty results if we get EPERM
     match res {
        Ok(v) => v,
        Err(err) => {
           if err.raw_os_error() == Some(EPERM) {
              Vec::new()
           } else {
              return Err(err);
           }
        }
     }
  };

  let uservec = unsafe {
     let res = allocate_loop(|buf|
 {
        let (ptr, len) = slice_parts(buf);
        cvt(extattr_list_fd(
           fd.as_raw_fd(),
           EXTATTR_NAMESPACE_USER,
           ptr,
           len,
        ))
```

```
        });
        match res {
            Ok(v) => v,
            Err(err) => return Err(err),
        }
    };

    Ok(XAttrs {
        system_attrs: sysvec.into_boxed_slice(),
        user_attrs: uservec.into_boxed_slice(),
        offset: 0,
    })
}

pub fn get_path(path: &Path, name: &OsStr, deref: bool) -> io::Result<Vec<u8>> {
    let (ns, name) = name_to_ns(name)?;
    let path = path_to_c(path)?;
    let extattr_get_func = if deref {
        extattr_get_file
    } else {
        extattr_get_link
    };
    unsafe {
        allocate_loop(|buf| {
            let (ptr, len) = slice_parts(buf);
            cvt(extattr_get_func(path.as_ptr(), ns, name.as_ptr(), ptr, len))
        })
    }
}

pub fn set_path(path: &Path, name: &OsStr, value: &[u8], deref: bool) -> io::Result<()>
 {
    let (ns, name) = name_to_ns(name)?;
    let path = path_to_c(path)?;
    let extattr_set_func = if deref {
        extattr_set_file
    } else {
        extattr_set_link
    };
    let ret = unsafe {
        extattr_set_func(
            path.as_ptr(),
            ns,
            name.as_ptr(),
            value.as_ptr() as *const c_void,
            value.len() as size_t,
        )
    };
```

```
    if ret == -1 {
        Err(io::Error::last_os_error())
    } else {
        Ok(())
    }
}

pub fn remove_path(path: &Path, name: &OsStr, deref: bool) -> io::Result<()> {
    let (ns, name) = name_to_ns(name)?;
    let path = path_to_c(path)?;
    let extattr_delete_func = if deref {
        extattr_delete_file
    } else {
        extattr_delete_link
    };
    let ret = unsafe { extattr_delete_func(path.as_ptr(), ns, name.as_ptr()) };
    if ret != 0 {
        Err(io::Error::last_os_error())
    } else {
        Ok(())
    }
}

pub fn list_path(path: &Path, deref: bool) -> io::Result<XAttrs>
 {
    let path = path_to_c(path)?;
    let extattr_list_func = if deref {
        extattr_list_file
    } else {
        extattr_list_link
    };
    let sysvec = unsafe {
        let res = allocate_loop(|buf| {
            let (ptr, len) = slice_parts(buf);
            cvt(extattr_list_func(
                path.as_ptr(),
                EXTATTR_NAMESPACE_SYSTEM,
                ptr,
                len,
            ))
        });
        // On FreeBSD, system attributes require root privileges to view. However,
        // to mimic the behavior of listxattr in linux and osx, we need to query
        // them anyway and return empty results if we get EPERM
        match res {
            Ok(v) => v,
            Err(err) => {
                if err.raw_os_error() == Some(EPERM) {
```

```
                Vec::new()
            } else {
                return Err(err);
            }
        }
    }
};

let uservec = unsafe {
    let res = allocate_loop(|buf|
{
        let (ptr, len) = slice_parts(buf);
        cvt(extattr_list_func(
            path.as_ptr(),
            EXTATTR_NAMESPACE_USER,
            ptr,
            len,
        ))
    });
    match res {
        Ok(v) => v,
        Err(err) => return Err(err),
    }
};

Ok(XAttrs {
    system_attrs: sysvec.into_boxed_slice(),
    user_attrs: uservec.into_boxed_slice(),
    offset: 0,
})
}
```

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CharIndices implementation of the Rust standard library at revision
ab32548539ec38a939c1b58599249f3b54130026
(https://github.com/rust-lang/rust/blob/ab32548539ec38a939c1b58599249f3b54130026/library/core/src/str/iter.rs).

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```
//! `ioctl` opcode behavior for BSD platforms.

use super::{Direction, Opcode};

pub(super) const fn compose_opcode(
   dir: Direction,
   group: Opcode,
   num: Opcode,
   size: Opcode,
) -> Opcode {
   let dir = match dir {
       Direction::None => NONE,
       Direction::Read => READ,
       Direction::Write => WRITE,
       Direction::ReadWrite => READ | WRITE,
   };

   dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}

// `IOC_VOID`
pub const NONE: Opcode = 0x2000_0000;
// `IOC_OUT` (out is from the perspective of the kernel)
pub const READ: Opcode = 0x4000_0000;
// `IOC_IN` (in is from the perspective of the kernel)
pub const WRITE: Opcode = 0x8000_0000;
pub const IOCPARAM_MASK: Opcode = 0x1FFF;
```

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```
//! `ioctl` opcode behavior for BSD platforms.

use super::{Direction, RawOpcode};

pub(super) const fn compose_opcode(
   dir: Direction,
   group: RawOpcode,
   num: RawOpcode,
   size: RawOpcode,
) -> RawOpcode {
   let dir = match dir {
      Direction::None => NONE,
      Direction::Read => READ,
      Direction::Write => WRITE,
      Direction::ReadWrite => READ | WRITE,
   };

   dir | num | (group << 8) | ((size & IOCPARAM_MASK) << 16)
}

// `IOC_VOID`
pub const NONE: RawOpcode = 0x2000_0000;
// `IOC_OUT` (out is from the perspective of the kernel)
```

```
pub const READ: RawOpcode = 0x4000_0000;
// `IOC_IN` (in is from the perspective of the kernel)
pub const WRITE: RawOpcode = 0x8000_0000;
pub const IOCPARAM_MASK: RawOpcode = 0x1FFF;
```

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Version 2.1, February 1999

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[This is the first released version of the Lesser GPL. It also counts
as the successor of the GNU Library Public License, version 2, hence
the version number 2.1.]

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public Licenses are intended to guarantee your freedom to share and change free software--to make sure the software is free for all its users.

This license, the Lesser General Public License, applies to some specially designated software packages--typically libraries--of the Free Software Foundation and other authors who decide to use it. You can use it too,
but we suggest you first think carefully about whether this license or the ordinary General Public License is the better strategy to use in any particular case, based on the explanations below.

When we speak of free software, we are referring to freedom of use, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish); that you receive source code or can get it if you want it; that you can change the software and use pieces of it in new free programs; and that you are informed that you can do these things.

To protect your rights, we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights. These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it.

For example, if you distribute copies of the library, whether gratis or for a fee, you must give
the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link other code with the library, you must provide complete object files to the recipients, so that they can relink them with the library after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

We protect your rights with a two-step method: (1) we copyright the library, and (2) we offer you this license, which gives you legal permission to copy, distribute and/or modify the library.

To protect each distributor, we want to make it very clear that there is no warranty for the free library. Also, if the library is modified by someone else and passed on, the recipients should know that what they have is not the original version, so that the original author's reputation will not be affected by problems that might be introduced by others.

Finally, software patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder. Therefore, we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is
included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those

sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is
therefore covered by this License.
Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms
of Section 6.
Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

a) Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above.

b) Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

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[This is the first released version of the library GPL. It is numbered 2 because it goes with version 2 of the ordinary GPL.]

Preamble

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To protect your rights, we need to make restrictions that forbid anyone to deny you these rights or to ask you to surrender the rights. These restrictions translate to certain responsibilities for you if you distribute copies of the library, or if you modify it.

For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link a program with the library, you must provide complete object files to the recipients so that they can relink them with the library, after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

Our method of protecting your rights has two steps: (1) copyright the library, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the library.

Also, for each distributor's protection, we want to make certain that everyone understands that there is no warranty for this free library. If the library is modified by someone else and passed on, we want its recipients to know that what they have is not the original version, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that companies distributing free

software will individually obtain patent licenses, thus in effect transforming the program into proprietary software. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License, which was designed for utility programs. This license, the GNU Library General Public License, applies to certain designated libraries. This license is quite different from the ordinary one; be sure to read it in full, and don't assume that anything in it is the same as in the ordinary license.

The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

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1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file

that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Accompany the work with a written offer, valid for at

least three years, to give the same user the materials
specified in Subsection 6a, above, for a charge no more
than the cost of performing this distribution.

c) If distribution of the work is made by offering access to copy
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specified materials from the same place.

d) Verify that the user has already received a copy of these
materials or that you have already sent this user a copy.

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```
/// The datatype used for the ioctl number
#[doc(hidden)]
#[cfg(not(solarish))]
pub type ioctl_num_type = ::libc::c_ulong;

#[doc(hidden)]
#[cfg(solarish)]
pub type ioctl_num_type = ::libc::c_int;

/// The datatype used for the 3rd argument
#[doc(hidden)]
pub type ioctl_param_type = ::libc::c_int;

mod consts {
  use crate::sys::ioctl::ioctl_num_type;
  #[doc(hidden)]
  pub const VOID: ioctl_num_type = 0x2000_0000;
  #[doc(hidden)]
  pub const OUT: ioctl_num_type = 0x4000_0000;
  #[doc(hidden)]
  #[allow(overflowing_literals)]
  pub const IN: ioctl_num_type = 0x8000_0000;
  #[doc(hidden)]
  pub const INOUT: ioctl_num_type = IN | OUT;
  #[doc(hidden)]
  pub const IOCPARM_MASK: ioctl_num_type = 0x1fff;
}

pub use self::consts::*;

#[macro_export]
#[doc(hidden)]
macro_rules! ioc {
  ($inout:expr, $group:expr, $num:expr, $len:expr) => {
    $inout
      | (($len as $crate::sys::ioctl::ioctl_num_type
        & $crate::sys::ioctl::IOCPARM_MASK)

        << 16)
      | (($group as $crate::sys::ioctl::ioctl_num_type) << 8)
      | ($num as $crate::sys::ioctl::ioctl_num_type)
  };
}

/// Generate an ioctl request code for a command that passes no data.
```

```
///
/// This is equivalent to the `_IO()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_none!()` directly.
///
/// # Example
///
/// ```
/// # #[macro_use] extern crate nix;
/// const KVMIO: u8 = 0xAE;
/// ioctl_write_int_bad!(kvm_create_vm, request_code_none!(KVMIO, 0x03));
/// # fn main() {}
/// ```
#[macro_export(local_inner_macros)]
macro_rules! request_code_none {
  ($g:expr, $n:expr) => {
      ioc!($crate::sys::ioctl::VOID, $g, $n, 0)
  };
}

/// Generate an ioctl request code for a command that passes an integer
///
/// This is equivalent to the `_IOWINT()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the
 `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write_int!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write_int {
  ($g:expr, $n:expr) => {
      ioc!(
          $crate::sys::ioctl::VOID,
          $g,
          $n,
          ::std::mem::size_of::<$crate::libc::c_int>()
      )
  };
}

/// Generate an ioctl request code for a command that reads.
///
/// This is equivalent to the `_IOR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_read!()` directly.
///
/// The read/write direction is relative to userland, so this
```

```
/// command would be userland is reading and the kernel is
/// writing.
#[macro_export(local_inner_macros)]
macro_rules! request_code_read {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::OUT, $g, $n, $len)
   };
}

/// Generate an ioctl request code for a command that writes.
///
///
 This is equivalent to the `_IOW()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_write!()` directly.
///
/// The read/write direction is relative to userland, so this
/// command would be userland is writing and the kernel is
/// reading.
#[macro_export(local_inner_macros)]
macro_rules! request_code_write {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::IN, $g, $n, $len)
   };
}

/// Generate an ioctl request code for a command that reads and writes.
///
/// This is equivalent to the `_IOWR()` macro exposed by the C ioctl API.
///
/// You should only use this macro directly if the `ioctl` you're working
/// with is "bad" and you cannot use `ioctl_readwrite!()` directly.
#[macro_export(local_inner_macros)]
macro_rules! request_code_readwrite {
   ($g:expr, $n:expr, $len:expr) => {
       ioc!($crate::sys::ioctl::INOUT, $g, $n, $len)

 };
}
```

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```
// This file was generated by gir (https://github.com/gtk-rs/gir)
// from gir-files (https://github.com/gtk-rs/gir-files)
// DO NOT EDIT

use crate::{ffi, AsyncResult, Cancellable};
use glib::{
   prelude::*,
   signal::{connect_raw, SignalHandlerId},
   translate::*,
};
use std::{boxed::Box as Box_, pin::Pin};

glib::wrapper! {
   #[doc(alias = "GPermission")]
   pub struct Permission(Object<ffi::GPermission, ffi::GPermissionClass>);

   match fn {
       type_ => || ffi::g_permission_get_type(),
   }
}

impl Permission {
   pub const NONE: Option<&'static Permission> = None;
}

mod sealed {
   pub trait Sealed {}
   impl<T: super::IsA<super::Permission>> Sealed for T {}
}

pub trait PermissionExt: IsA<Permission> + sealed::Sealed + 'static {
   #[doc(alias = "g_permission_acquire")]
   fn acquire(&self, cancellable: Option<&impl IsA<Cancellable>>) -> Result<(), glib::Error> {
       unsafe {
           let mut error = std::ptr::null_mut();
           let is_ok = ffi::g_permission_acquire(
```

```
            self.as_ref().to_glib_none().0,
            cancellable.map(|p| p.as_ref()).to_glib_none().0,
            &mut error,
        );
        debug_assert_eq!(is_ok == glib::ffi::GFALSE, !error.is_null());
        if error.is_null() {
            Ok(())
        } else {
            Err(from_glib_full(error))
        }
    }
}

#[doc(alias = "g_permission_acquire_async")]
fn acquire_async<P: FnOnce(Result<(), glib::Error>) + 'static>(
    &self,
    cancellable: Option<&impl IsA<Cancellable>>,
    callback: P,
) {
    let main_context = glib::MainContext::ref_thread_default();
    let is_main_context_owner = main_context.is_owner();
    let has_acquired_main_context = (!is_main_context_owner)
        .then(|| main_context.acquire().ok())
        .flatten();
    assert!(
        is_main_context_owner || has_acquired_main_context.is_some(),
        "Async operations
only allowed if the thread is owning the MainContext"
    );

    let user_data: Box_<glib::thread_guard::ThreadGuard<P>> =
        Box_::new(glib::thread_guard::ThreadGuard::new(callback));
    unsafe extern "C" fn acquire_async_trampoline<
        P: FnOnce(Result<(), glib::Error>) + 'static,
    >(
        _source_object: *mut glib::gobject_ffi::GObject,
        res: *mut crate::ffi::GAsyncResult,
        user_data: glib::ffi::gpointer,
    ) {
        let mut error = std::ptr::null_mut();
        ffi::g_permission_acquire_finish(_source_object as *mut _, res, &mut error);
        let result = if error.is_null() {
            Ok(())
        } else {
            Err(from_glib_full(error))
        };
        let callback: Box_<glib::thread_guard::ThreadGuard<P>> =
            Box_::from_raw(user_data as *mut _);
```

```
            let callback: P = callback.into_inner();
            callback(result);

        }
        let callback = acquire_async_trampoline::<P>;
        unsafe {
            ffi::g_permission_acquire_async(
                self.as_ref().to_glib_none().0,
                cancellable.map(|p| p.as_ref()).to_glib_none().0,
                Some(callback),
                Box_::into_raw(user_data) as *mut _,
            );
        }
    }

    fn acquire_future(
        &self,
    ) -> Pin<Box_<dyn std::future::Future<Output = Result<(), glib::Error>> + 'static>> {
        Box_::pin(crate::GioFuture::new(
            self,
            move |obj, cancellable, send| {
                obj.acquire_async(Some(cancellable), move |res| {
                    send.resolve(res);
                });
            },
        ))
    }

    #[doc(alias = "g_permission_get_allowed")]
    #[doc(alias = "get_allowed")]
    #[doc(alias = "allowed")]
    fn is_allowed(&self) -> bool {
        unsafe {
            from_glib(ffi::g_permission_get_allowed(
                self.as_ref().to_glib_none().0,
             ))
        }
    }

    #[doc(alias = "g_permission_get_can_acquire")]
    #[doc(alias = "get_can_acquire")]
    #[doc(alias = "can-acquire")]
    fn can_acquire(&self) -> bool {
        unsafe {
            from_glib(ffi::g_permission_get_can_acquire(
                self.as_ref().to_glib_none().0,
            ))
        }
```

```
}

#[doc(alias = "g_permission_get_can_release")]
#[doc(alias = "get_can_release")]
#[doc(alias = "can-release")]
fn can_release(&self) -> bool {
    unsafe {
        from_glib(ffi::g_permission_get_can_release(
            self.as_ref().to_glib_none().0,
        ))
    }
}

#[doc(alias = "g_permission_impl_update")]
fn impl_update(&self, allowed: bool, can_acquire: bool, can_release: bool) {
    unsafe {
        ffi::g_permission_impl_update(
            self.as_ref().to_glib_none().0,
            allowed.into_glib(),
            can_acquire.into_glib(),
            can_release.into_glib(),
         );
    }
}

#[doc(alias = "g_permission_release")]
fn release(&self, cancellable: Option<&impl IsA<Cancellable>>) -> Result<(), glib::Error> {
    unsafe {
        let mut error = std::ptr::null_mut();
        let is_ok = ffi::g_permission_release(
            self.as_ref().to_glib_none().0,
            cancellable.map(|p| p.as_ref()).to_glib_none().0,
            &mut error,
        );
        debug_assert_eq!(is_ok == glib::ffi::GFALSE, !error.is_null());
        if error.is_null() {
            Ok(())
        } else {
            Err(from_glib_full(error))
        }
    }
}

#[doc(alias = "g_permission_release_async")]
fn release_async<P: FnOnce(Result<(), glib::Error>) + 'static>(
    &self,
    cancellable: Option<&impl IsA<Cancellable>>,
    callback: P,
```

```
  ) {
      let main_context = glib::MainContext::ref_thread_default();
      let is_main_context_owner
= main_context.is_owner();
      let has_acquired_main_context = (!is_main_context_owner)
          .then(|| main_context.acquire().ok())
          .flatten();
      assert!(
          is_main_context_owner || has_acquired_main_context.is_some(),
          "Async operations only allowed if the thread is owning the MainContext"
      );

      let user_data: Box_<glib::thread_guard::ThreadGuard<P>> =
          Box_::new(glib::thread_guard::ThreadGuard::new(callback));
      unsafe extern "C" fn release_async_trampoline<
          P: FnOnce(Result<(), glib::Error>) + 'static,
      >(
          _source_object: *mut glib::gobject_ffi::GObject,
          res: *mut crate::ffi::GAsyncResult,
          user_data: glib::ffi::gpointer,
      ) {
          let mut error = std::ptr::null_mut();
          ffi::g_permission_release_finish(_source_object as *mut _, res, &mut error);
          let result = if error.is_null() {
              Ok(())

   } else {
              Err(from_glib_full(error))
          };
          let callback: Box_<glib::thread_guard::ThreadGuard<P>> =
              Box_::from_raw(user_data as *mut _);
          let callback: P = callback.into_inner();
          callback(result);
      }
      let callback = release_async_trampoline::<P>;
      unsafe {
          ffi::g_permission_release_async(
              self.as_ref().to_glib_none().0,
              cancellable.map(|p| p.as_ref()).to_glib_none().0,
              Some(callback),
              Box_::into_raw(user_data) as *mut _,
          );
      }
  }

  fn release_future(
      &self,
  ) -> Pin<Box_<dyn std::future::Future<Output = Result<(), glib::Error>> + 'static>> {
```

```
        Box_::pin(crate::GioFuture::new(
            self,
            move |obj, cancellable, send| {
                obj.release_async(Some(cancellable), move |res| {
                    send.resolve(res);
                });

    },
        ))
    }

    #[doc(alias = "allowed")]
    fn connect_allowed_notify<F: Fn(&Self) + 'static>(&self, f: F) -> SignalHandlerId {
        unsafe extern "C" fn notify_allowed_trampoline<P: IsA<Permission>, F: Fn(&P) + 'static>(
            this: *mut ffi::GPermission,
            _param_spec: glib::ffi::gpointer,
            f: glib::ffi::gpointer,
        ) {
            let f: &F = &*(f as *const F);
            f(Permission::from_glib_borrow(this).unsafe_cast_ref())
        }
        unsafe {
            let f: Box_<F> = Box_::new(f);
            connect_raw(
                self.as_ptr() as *mut _,
                b"notify::allowed\0".as_ptr() as *const _,
                Some(std::mem::transmute::<*const (), unsafe extern "C" fn()>(
                    notify_allowed_trampoline::<Self, F> as *const (),
                )),
                Box_::into_raw(f),
            )
        }
    }

    #[doc(alias = "can-acquire")]
    fn connect_can_acquire_notify<F: Fn(&Self) + 'static>(&self,
    f: F) -> SignalHandlerId {
        unsafe extern "C" fn notify_can_acquire_trampoline<
            P: IsA<Permission>,
            F: Fn(&P) + 'static,
        >(
            this: *mut ffi::GPermission,
            _param_spec: glib::ffi::gpointer,
            f: glib::ffi::gpointer,
        ) {
            let f: &F = &*(f as *const F);
            f(Permission::from_glib_borrow(this).unsafe_cast_ref())
        }
```

```
        unsafe {
            let f: Box_<F> = Box_::new(f);
            connect_raw(
                self.as_ptr() as *mut _,
                b"notify::can-acquire\0".as_ptr() as *const _,
                Some(std::mem::transmute::<*const (), unsafe extern "C" fn()>(
                    notify_can_acquire_trampoline::<Self, F> as *const (),
                )),
                Box_::into_raw(f),
            )
        }
    }

    #[doc(alias = "can-release")]
    fn connect_can_release_notify<F: Fn(&Self) + 'static>(&self, f: F) -> SignalHandlerId {
        unsafe
  extern "C" fn notify_can_release_trampoline<
            P: IsA<Permission>,
            F: Fn(&P) + 'static,
        >(
            this: *mut ffi::GPermission,
            _param_spec: glib::ffi::gpointer,
            f: glib::ffi::gpointer,
        ) {
            let f: &F = &*(f as *const F);
            f(Permission::from_glib_borrow(this).unsafe_cast_ref())
        }
        unsafe {
            let f: Box_<F> = Box_::new(f);
            connect_raw(
                self.as_ptr() as *mut _,
                b"notify::can-release\0".as_ptr() as *const _,
                Some(std::mem::transmute::<*const (), unsafe extern "C" fn()>(
                    notify_can_release_trampoline::<Self, F> as *const (),
                )),
                Box_::into_raw(f),
            )
        }
    }
}

impl<O: IsA<Permission>> PermissionExt for O {}
```

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```
use crate::errno::Errno;
use crate::sys::signal::Signal;
use crate::unistd::Pid;
use crate::Result;
use cfg_if::cfg_if;
use libc::{self, c_int};
use std::ptr;

pub type RequestType = c_int;

cfg_if! {
  if #[cfg(any(freebsdlike, apple_targets, target_os = "openbsd"))] {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_char;
  } else {
    #[doc(hidden)]
    pub type AddressType = *mut ::libc::c_void;
  }
}

libc_enum! {
  #[repr(i32)]
  /// Ptrace Request enum defining the action to be taken.
  #[non_exhaustive]
  pub enum Request {
    PT_TRACE_ME,
    PT_READ_I,
    PT_READ_D,
    #[cfg(apple_targets)]
    PT_READ_U,
    PT_WRITE_I,
    PT_WRITE_D,
    #[cfg(apple_targets)]
    PT_WRITE_U,
    PT_CONTINUE,
    PT_KILL,
    #[cfg(any(any(freebsdlike, apple_targets),
          all(target_os = "openbsd", target_arch = "x86_64"),
          all(target_os = "netbsd", any(target_arch = "x86_64",
                        target_arch = "powerpc"))))]
    PT_STEP,
```

```
        PT_ATTACH,
        PT_DETACH,
        #[cfg(apple_targets)]
        PT_SIGEXC,
        #[cfg(apple_targets)]
        PT_THUPDATE,
        #[cfg(apple_targets)]
        PT_ATTACHEXC
    }
}

unsafe fn ptrace_other(
    request: Request,
    pid: Pid,
    addr: AddressType,
    data: c_int,
) -> Result<c_int> {
    unsafe {
        Errno::result(libc::ptrace(
            request as RequestType,
            libc::pid_t::from(pid),
            addr,
            data,
        ))
        .map(|_| 0)
    }
}

/// Sets the process as traceable, as with `ptrace(PT_TRACEME, ...)`
///
/// Indicates that this process is to be traced by its parent.
/// This is the only ptrace request to be issued by the tracee.
pub fn traceme() -> Result<()> {
    unsafe {
        ptrace_other(Request::PT_TRACE_ME, Pid::from_raw(0), ptr::null_mut(), 0)
            .map(drop)
    }
}

/// Attach to a running
 process, as with `ptrace(PT_ATTACH, ...)`
///
/// Attaches to the process specified by `pid`, making it a tracee of the calling process.
pub fn attach(pid: Pid) -> Result<()> {
    unsafe {
        ptrace_other(Request::PT_ATTACH, pid, ptr::null_mut(), 0).map(drop)
    }
}
```

```
/// Detaches the current running process, as with `ptrace(PT_DETACH, ...)`
///
/// Detaches from the process specified by `pid` allowing it to run freely, optionally delivering a
/// signal specified by `sig`.
pub fn detach<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
  let data = match sig.into() {
      Some(s) => s as c_int,
      None => 0,
  };
  unsafe {
      ptrace_other(Request::PT_DETACH, pid, ptr::null_mut(), data).map(drop)
  }
}

/// Restart the stopped tracee process, as with `ptrace(PTRACE_CONT, ...)`
///
/// Continues the execution of the process with PID `pid`, optionally
/// delivering a signal specified by `sig`.
pub fn cont<T: Into<Option<Signal>>>(pid: Pid, sig: T)
 -> Result<()> {
  let data = match sig.into() {
      Some(s) => s as c_int,
      None => 0,
  };
  unsafe {
      // Ignore the useless return value
      ptrace_other(Request::PT_CONTINUE, pid, 1 as AddressType, data)
          .map(drop)
  }
}

/// Issues a kill request as with `ptrace(PT_KILL, ...)`
///
/// This request is equivalent to `ptrace(PT_CONTINUE, ..., SIGKILL);`
pub fn kill(pid: Pid) -> Result<()> {
  unsafe {
      ptrace_other(Request::PT_KILL, pid, 0 as AddressType, 0).map(drop)
  }
}

/// Move the stopped tracee process forward by a single step as with
/// `ptrace(PT_STEP, ...)`
///
/// Advances the execution of the process with PID `pid` by a single step optionally delivering a
/// signal specified by `sig`.
///
/// # Example
```

```
/// ```rust
/// use nix::sys::ptrace::step;
/// use nix::unistd::Pid;
/// use nix::sys::signal::Signal;
/// use nix::sys::wait::*;
/// // If a process changes state to the stopped state because of a SIGUSR1
/// // signal,
 this will step the process forward and forward the user
/// // signal to the stopped process
/// match waitpid(Pid::from_raw(-1), None) {
///     Ok(WaitStatus::Stopped(pid, Signal::SIGUSR1)) => {
///         let _ = step(pid, Signal::SIGUSR1);
///     }
///     _ => {},
/// }
/// ```
#[cfg(any(
   any(freebsdlike, apple_targets),
   all(target_os = "openbsd", target_arch = "x86_64"),
   all(
       target_os = "netbsd",
       any(target_arch = "x86_64", target_arch = "powerpc")
   )
))]
pub fn step<T: Into<Option<Signal>>>(pid: Pid, sig: T) -> Result<()> {
   let data = match sig.into() {
       Some(s) => s as c_int,
       None => 0,
   };
   unsafe {
       ptrace_other(Request::PT_STEP, pid, ptr::null_mut(), data).map(drop)
   }
}

/// Reads a word from a processes memory at the given address
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn read(pid: Pid, addr: AddressType)
 -> Result<c_int> {
   unsafe {
       // Traditionally there was a difference between reading data or
       // instruction memory but not in modern systems.
       ptrace_other(Request::PT_READ_D, pid, addr, 0)
   }
}

/// Writes a word into the processes memory at the given address
```

```
// Technically, ptrace doesn't dereference the pointer.  It passes it directly
// to the kernel.
#[allow(clippy::not_unsafe_ptr_arg_deref)]
pub fn write(pid: Pid, addr: AddressType, data: c_int) -> Result<()> {
   unsafe { ptrace_other(Request::PT_WRITE_D, pid, addr, data).map(drop) }
}
```

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Protocol Buffers for Go with Gadgets

Go support for Protocol Buffers - Google's data interchange format

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# 1.3996 gstreamer-plugins-bad-free 1.22.12-5.el9_7

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

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/* Extract the last component (base name) of a file name.

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along with this program.  If not, see <https://www.gnu.org/licenses/>.  */

```
#ifndef _BASENAME_LGPL_H
#define _BASENAME_LGPL_H
```

```
#include <stddef.h>

#ifndef DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif


/*
 Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
          FILENAME      RESULT
          "foo.c"       "foo.c"
          "foo/bar.c"   "bar.c"
          "/foo/bar.c"  "bar.c"
          "foo/bar/"    "bar/"
          "foo/bar//"   "bar//"
          "/"           ""
          "//"          ""
          ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(), defined in <string.h>, does
      not consider trailing slashes to be part of the component:

 FILENAME      RESULT
          "foo/bar/"    ""
          "foo/bar//"   ""
    * The 'basename' command eliminates trailing slashes and for a root
      produces a non-empty result:
          FILENAME      RESULT
          "foo/bar/"    "bar"
          "foo/bar//"   "bar"
          "/"           "/"
          "//"          "/"
*/
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;
```

```
/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;


#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
```

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Version 3, 29 June 2007

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# 1.4012 diffutils 1:3.10-1build1

## 1.4012.1 Available under license :

/* Extract the last component (base name) of a file name.

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```
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  along with this program.  If not, see <https://www.gnu.org/licenses/>.  */

#ifndef _BASENAME_LGPL_H
#define _BASENAME_LGPL_H

/* This file uses _GL_ATTRIBUTE_PURE.  */
#if !_GL_CONFIG_H_INCLUDED
#error "Please include config.h first."
#endif

#include <stddef.h>

#ifndef
 DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif


/* Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
          FILENAME      RESULT
          "foo.c"       "foo.c"
          "foo/bar.c"   "bar.c"
          "/foo/bar.c"  "bar.c"
          "foo/bar/"    "bar/"
          "foo/bar//"   "bar//"
          "/"           ""
          "//"          ""
          ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(),
 defined in <string.h>, does
      not consider trailing slashes to be part of the component:
          FILENAME      RESULT
          "foo/bar/"    ""
```

```
          "foo/bar//"   ""
    * The 'basename' command eliminates trailing slashes and for a root
      produces a non-empty result:
          FILENAME      RESULT
          "foo/bar/"    "bar"
          "foo/bar//"   "bar"
          "/"           "/"
          "//"          "/"
*/
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;


#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
```

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Version 3, 29 June 2007

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#ifndef _BASENAME_LGPL_H
#define _BASENAME_LGPL_H

#include <stddef.h>

#ifndef DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif


/*
 Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
          FILENAME      RESULT
          "foo.c"       "foo.c"
          "foo/bar.c"   "bar.c"
          "/foo/bar.c"  "bar.c"
          "foo/bar/"    "bar/"
```

```
          "foo/bar//"   "bar//"
          "/"           ""
          "//"          ""
          ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(), defined in <string.h>, does
      not consider trailing slashes to be part of the component:

 FILENAME      RESULT
          "foo/bar/"    ""
          "foo/bar//"   ""
    * The 'basename' command eliminates trailing slashes and for a root
      produces a non-empty result:
          FILENAME      RESULT
          "foo/bar/"    "bar"
          "foo/bar//"   "bar"
          "/"           "/"
          "//"          "/"
*/
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;


#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
```

# 1.4014 grep 3.11-4build1

## 1.4014.1 Available under license :

```
/* Extract the last component (base name) of a file name.

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#ifndef _BASENAME_LGPL_H
#define _BASENAME_LGPL_H

/* This file uses _GL_ATTRIBUTE_PURE.  */
#if !_GL_CONFIG_H_INCLUDED
#error "Please include config.h first."
#endif

#include <stddef.h>

#ifndef
 DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif


/* Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
          FILENAME      RESULT
          "foo.c"       "foo.c"
          "foo/bar.c"   "bar.c"
          "/foo/bar.c"  "bar.c"
          "foo/bar/"    "bar/"
          "foo/bar//"   "bar//"
          "/"           ""
          "//"          ""
          ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */
```

```
/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
      In particular, the glibc basename(),
 defined in <string.h>, does
      not consider trailing slashes to be part of the component:
            FILENAME      RESULT
            "foo/bar/"    ""
            "foo/bar//"   ""
    * The 'basename' command eliminates trailing slashes and for a root
      produces a non-empty result:
            FILENAME      RESULT
            "foo/bar/"    "bar"
            "foo/bar//"   "bar"
            "/"           "/"
            "//"          "/"
*/
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;


#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
```

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Version 3, 29 June 2007

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# 1.4016 libassuan 2.5.6-1build1

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ca-bundle.crt -- Bundle of CA Root Certificates

This is a bundle of X.509 certificates of public Certificate Authorities
(CA). These were automatically extracted from Mozilla's root certificates
file (certdata.txt).  This file can be found in the mozilla source tree:
https://hg.mozilla.org/mozilla-central/file/tip/security/nss/lib/ckfw/builtins/certdata.txt
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@(#) $RCSfile: certdata.txt,v $ $Revision: 1.80 $ $Date: 2011/11/03 15:11:58 $

# 1.4025 bytes 3.1.2

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Found in path(s):
* /crun-1.26-1.el9.src.rpm-cosi-expand-archive-SaMnj9Rs/crun.spec

# 1.4027 samba 0:4.22.4-18.el9_7

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@macro copyrightend{}
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@comment node-name, next, previous, up

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AES in
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rijndael-alg-fst.c

@version 3.0 (December 2000)

Optimised ANSI C code for the Rijndael cipher (now AES)

@author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
@author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
@author Paulo Barreto <paulo.barreto@terra.com.br>

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/* nicstar.c  v0.22  Jawaid Bazyar (bazyar@hypermall.com)
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*
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* 10/1/97 - commented out CFG_PHYIE bit - we don't care when the PHY
* interrupts us (except possibly for removal/insertion of the cable?)
* 10/4/97 - began heavy inline documentation of the code. Corrected typos
* and spelling mistakes.
* 10/5/97 - added code to handle PHY interrupts, disable PHY on
* loss of link, and correctly re-enable PHY when link is
* re-established. (put back CFG_PHYIE)

```
*
*   Modified to work with the IDT7721 nicstar -- AAL5 (tested) only.
*
* R. D. Rechenmacher <ron@fnal.gov>, Aug. 6, 1997
*
* Linux driver for the IDT77201 NICStAR PCI ATM controller.
* PHY component is expected to be 155 Mbps S/UNI-Lite or IDT 77155;
* see init_nicstar() for PHY initialization to change this. This driver
* expects the Linux ATM stack to support scatter-gather
 lists
* (skb->atm.iovcnt != 0) for Rx skb's passed to vcc->push.
*
* Implementing minimal-copy of received data:
*   IDT always receives data into a small buffer, then large buffers
*     as needed. This means that data must always be copied to create
*     the linear buffer needed by most non-ATM protocol stacks (e.g. IP)
*     Fix is simple: make large buffers large enough to hold entire
*     SDU, and leave <small_buffer_data> bytes empty at the start. Then
*     copy small buffer contents to head of large buffer.
*   Trick is to avoid fragmenting Linux, due to need for a lot of large
*     buffers. This is done by 2 things:
*       1) skb->destructor / skb->atm.recycle_buffer
*           combined, allow nicstar_free_rx_skb to be called to
*           recycle large data buffers
*       2) skb_clone of received buffers
*   See nicstar_free_rx_skb and linearize_buffer for implementation
*     details.
*
*
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*
* M. Welsh, 6 July 1996
```

```
*
*
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# Purpose: This test checks SPDX-License-Identifier: tags in all source files against redhat/LICENSES.

load test-lib.bash

SPEC=$BATS_TEST_DIRNAME/../kernel.spec.template

ERRMSG="ERROR: The kernel RPM spec file License: field does not match the licenses available in the source
tree.
Fedora, Centos Stream, and RHEL require that the RPM License field match the licenses in the source tree.  See
https://docs.fedoraproject.org/en-US/legal/license-approval/ for further information.
A list of licenses can be generated by executing the redhat/scripts/license/kspdx.py utility.  New licenses can
be added to the RPM License field only if they are listed in the Allowed Licenses list
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to the 'Allowed' or 'Not Allowed' Licenses by following the License Review Process
(https://docs.fedoraproject.org/en-US/legal/license-review-process/)."

_verify_one_license_tag()
 {
 if [[ $(grep -c '^License:' $SPEC) != "1" ]]; then
    echo "ERROR: The specfile is supposed to have exactly one License: tag!"
    return 1
 fi
}

_verify_spdx_licenses() {
 spec_licenses=`mktemp`
 source_licenses=`mktemp`
 grep '^License:' $SPEC | sed 's,License[[:space:]]*:[[:space:]]*,,' | sed 's, AND ,\n,g' | sed 's,^(\(.*\))$,\1,' | sort -u >
```

```
$spec_licenses

 if ! $BATS_TEST_DIRNAME/../scripts/kspdx-tool/kspdx.py $BATS_TEST_DIRNAME/../../ > $source_licenses;
then
   echo "ERROR: Failed to gather SPDX-License-Identifier: information from source files!"
   return 1
 fi
 sort -o $source_licenses $source_licenses
 if ! diff -u $spec_licenses $source_licenses; then
    echo $ERRMSG
    ret=1
 else
    ret=0
 fi
 rm -f $spec_licenses $source_licenses
 return $ret
}

@test "Verify SPDX-License-Identifier tags" {
 if ! test -x $BATS_TEST_DIRNAME/../scripts/kspdx-tool/kspdx.py ;
 then
    skip "kspdx-tool is missing"
 fi

 run _verify_one_license_tag
 check_status

 _verify_spdx_licenses
 check_status
}
```


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```
#ifndef __VTV_H__
#define __VTV_H__

/* We could have used an enumeration here but it just makes it more
  difficult for the compiler to generate a call to this.  These are
  used as arguments to the function __VLTChangePermission, declared
  below.  */
#define __VLTP_READ_ONLY  0
#define __VLTP_READ_WRITE 1

#ifdef __cplusplus
extern "C" void __VLTChangePermission (int);
#else
extern void __VLTChangePermission (int);
#endif

#ifdef BIG_PAGE_SIZE
/* TODO - Replace '4096' below with correct big page size.  */
#define VTV_PAGE_SIZE 4096
#else
#if defined(__sun__) && defined(__svr4__) && defined(__sparc__)
#define VTV_PAGE_SIZE 8192
#else
#define VTV_PAGE_SIZE 4096
#endif
#endif



#endif /* __VTV_H__ */
```

DRuntime: Runtime Library for the D Programming Language
==========

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#ifndef __VTV_H__
#define __VTV_H__

/* We could have used an enumeration here but it just makes it more
  difficult for the compiler to generate a call to this.  These are
  used as arguments to the function __VLTChangePermission, declared
  below.  */
#define __VLTP_READ_ONLY  0
#define __VLTP_READ_WRITE 1

#ifdef __cplusplus
extern "C" void __VLTChangePermission (int);
#else
extern void __VLTChangePermission (int);
#endif

#ifdef BIG_PAGE_SIZE
/* TODO - Replace '4096' below with correct big page size.  */
#define VTV_PAGE_SIZE 4096
#else
#if defined(__sun__) && defined(__svr4__) && defined(__sparc__)
#define VTV_PAGE_SIZE 8192
#else
#define VTV_PAGE_SIZE 4096
#endif
#endif
```

```
#endif /* __VTV_H__ */
/* Definitions for BSD assembler syntax for Intel 386
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/* Use the Sequent Symmetry assembler syntax.  */

/* Define the syntax of pseudo-ops, labels and comments.  */

/* Prefix for internally generated assembler
 labels.  If we aren't using
  underscores, we are using prefix `.'s to identify labels that should
  be ignored, as in `i386/gas.h' --karl@cs.umb.edu  */

#define LPREFIX "L"

/* Assembler pseudos to introduce constants of various size.  */

#define ASM_BYTE "\t.byte\t"
#define ASM_SHORT "\t.word\t"
#define ASM_LONG "\t.long\t"
#define ASM_QUAD "\t.quad\t"  /* Should not be used for 32bit compilation.  */

/* This was suggested, but it shouldn't be right for DBX output. -- RMS
  #define ASM_OUTPUT_SOURCE_FILENAME(FILE, NAME) */


/* Define the syntax of labels and symbol definitions/declarations.  */
```

```
/* This is how to output an assembler line
   that says to advance the location counter by SIZE bytes.  */

#define ASM_OUTPUT_SKIP(FILE,SIZE)  \
 fprintf (FILE, "\t.space " HOST_WIDE_INT_PRINT_UNSIGNED"\n", (SIZE))

/* Define the syntax of labels and symbol definitions/declarations.  */

/* This says how to output an assembler line
   to define a global common symbol.  */

#define
 ASM_OUTPUT_COMMON(FILE, NAME, SIZE, ROUNDED)  \
( fputs (".comm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u\n", (int)(ROUNDED)))

/* This says how to output an assembler line
   to define a local common symbol.  */

#define ASM_OUTPUT_LOCAL(FILE, NAME, SIZE, ROUNDED)  \
( fputs (".lcomm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u\n", (int)(ROUNDED)))

#ifdef HAVE_GAS_LCOMM_WITH_ALIGNMENT
#define ASM_OUTPUT_ALIGNED_LOCAL(FILE, NAME, SIZE, ALIGNMENT)  \
( fputs (".lcomm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u,%u\n", (int)(SIZE), (int)(ALIGNMENT) / BITS_PER_UNIT))
#endif

/* This is how to output an assembler line
   that says to advance the location counter
   to a multiple of 2**LOG bytes.  */

#define ASM_OUTPUT_ALIGN(FILE,LOG) \
 if ((LOG)!=0) fprintf ((FILE), "\t.align %d\n", (LOG))

/* This is how to store into the string BUF
   the symbol_ref name of an internal numbered label
  where
   PREFIX is the class of label and NUM is the number within the class.
   This is suitable for output with `assemble_name'.  */

#define ASM_GENERATE_INTERNAL_LABEL(BUF,PREFIX,NUMBER) \
    sprintf ((BUF), "*%s%ld", (PREFIX), (long)(NUMBER))
```

/* The prefix to add to user-visible assembler symbols.  */

#define USER_LABEL_PREFIX "_"

/* Sequent has some changes in the format of DBX symbols.  */
#define DBX_NO_XREFS 1

/* Don't split DBX symbols into continuations.  */
#define DBX_CONTIN_LENGTH 0
==========
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==========

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bzip2/libbzip2 version 1.0.6 of 6 September 2010

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Version 3.1, 31 March 2009

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========

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tomb - support for clean goroutine termination in Go.

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package spec

import (
 "encoding/json"

 "github.com/go-openapi/swag"
)

// License information for the exposed API.
//
// For more information: http://goo.gl/8us55a#licenseObject
type License struct {
 LicenseProps
 VendorExtensible
}

// LicenseProps holds the properties of a License object
type LicenseProps struct {
 Name string `json:"name,omitempty"`
 URL  string `json:"url,omitempty"`
}

// UnmarshalJSON
 hydrates License from json
func (l *License) UnmarshalJSON(data []byte) error {
 if err := json.Unmarshal(data, &l.LicenseProps); err != nil {
  return err
 }
 return json.Unmarshal(data, &l.VendorExtensible)
}

// MarshalJSON produces License as json
```

```
func (l License) MarshalJSON() ([]byte, error) {
 b1, err := json.Marshal(l.LicenseProps)
 if err != nil {
  return nil, err
 }
 b2, err := json.Marshal(l.VendorExtensible)
 if err != nil {
  return nil, err
 }
 return swag.ConcatJSON(b1, b2), nil
}
```

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Protocol Buffers for Go with Gadgets

Go support for Protocol Buffers - Google's data interchange format

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https://github.com/golang/protobuf

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* Date: Fri, Jun 24, 2011 at 3:20 AM
* Subject: Re: sqrt routine
* To: Kevin Ma <kma@google.com>
* Hi Kevin,
* Thanks for asking. Those routines are public domain (originally posted to
* comp.sys.arm a long time ago), so you can use them freely for any purpose.
* Cheers,
* Wilco
*
* ----- Original Message -----
* From: "Kevin Ma" <kma@google.com>
* To: <Wilco.Dijkstra@ntlworld.com>
* Sent: Thursday, June 23, 2011 11:44 PM
* Subject: Fwd: sqrt routine
* Hi Wilco,
* I saw your sqrt routine from several web sites, including
* http://www.finesse.demon.co.uk/steven/sqrt.html.
* Just wonder if there's any copyright information with your Successive

* approximation routines, or if I can freely use it for any purpose.
* Thanks.
* Kevin
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tomb - support for clean goroutine termination in Go.

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package spec

import (
 "encoding/json"

 "github.com/go-openapi/swag"
)

// License information for the exposed API.
//
// For more information: http://goo.gl/8us55a#licenseObject
type License struct {
 LicenseProps
 VendorExtensible
}

// LicenseProps holds the properties of a License object
type LicenseProps struct {
 Name string `json:"name,omitempty"`
 URL  string `json:"url,omitempty"`
}

// UnmarshalJSON
 hydrates License from json
func (l *License) UnmarshalJSON(data []byte) error {
 if err := json.Unmarshal(data, &l.LicenseProps); err != nil {
  return err
 }
 return json.Unmarshal(data, &l.VendorExtensible)
}

// MarshalJSON produces License as json
func (l License) MarshalJSON() ([]byte, error) {
 b1, err := json.Marshal(l.LicenseProps)
 if err != nil {
  return nil, err
 }
 b2, err := json.Marshal(l.VendorExtensible)
 if err != nil {
  return nil, err
 }
 return swag.ConcatJSON(b1, b2), nil
}
```

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Protocol Buffers for Go with Gadgets

Go support for Protocol Buffers - Google's data interchange format

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cmd/krb5/kproplog/kproplog.c
cmd/krb5/slave/kpropd_rpc.c
lib/gss_mechs/mech_krb5/et/kdb5_err.c
lib/gss_mechs/mech_spnego/mech/gssapiP_spnego.h
lib/gss_mechs/mech_spnego/mech/spnego_mech.c
lib/krb5/kadm5/kadm_host_srv_names.c
lib/krb5/kdb/kdb_convert.c
lib/krb5/kdb/kdb_hdr.h
lib/krb5/kdb/kdb_log.c
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lib/libgss/g_exp_sec_context.c
lib/libgss/g_export_name.c
lib/libgss/g_glue.c
lib/libgss/g_imp_name.c
lib/libgss/g_imp_sec_context.c

lib/libgss/g_init_sec_context.c
lib/libgss/g_initialize.c
lib/libgss/g_inquire_context.c
lib/libgss/g_inquire_cred.c
lib/libgss/g_inquire_names.c
lib/libgss/g_process_context.c
lib/libgss/g_rel_buffer.c
lib/libgss/g_rel_cred.c
lib/libgss/g_rel_name.c
lib/libgss/g_rel_oid_set.c
lib/libgss/g_seal.c
lib/libgss/g_sign.c
lib/libgss/g_store_cred.c
lib/libgss/g_unseal.c
lib/libgss/g_userok.c
lib/libgss/g_utils.c
lib/libgss/g_verify.c
lib/libgss/gssd_pname_to_uid.c
uts/common/gssapi/include/gssapi_err_generic.h
uts/common/gssapi/include/mechglueP.h

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The implementations of GSSAPI mechglue in GSSAPI-SPNEGO in

"src/lib/gssapi", including the following files:

lib/gssapi/generic/gssapi_err_generic.et
lib/gssapi/mechglue/g_accept_sec_context.c
lib/gssapi/mechglue/g_acquire_cred.c
lib/gssapi/mechglue/g_canon_name.c
lib/gssapi/mechglue/g_compare_name.c
lib/gssapi/mechglue/g_context_time.c
lib/gssapi/mechglue/g_delete_sec_context.c
lib/gssapi/mechglue/g_dsp_name.c
lib/gssapi/mechglue/g_dsp_status.c
lib/gssapi/mechglue/g_dup_name.c
lib/gssapi/mechglue/g_exp_sec_context.c
lib/gssapi/mechglue/g_export_name.c
lib/gssapi/mechglue/g_glue.c
lib/gssapi/mechglue/g_imp_name.c
lib/gssapi/mechglue/g_imp_sec_context.c
lib/gssapi/mechglue/g_init_sec_context.c
lib/gssapi/mechglue/g_initialize.c
lib/gssapi/mechglue/g_inquire_context.c
lib/gssapi/mechglue/g_inquire_cred.c
lib/gssapi/mechglue/g_inquire_names.c
lib/gssapi/mechglue/g_process_context.c
lib/gssapi/mechglue/g_rel_buffer.c
lib/gssapi/mechglue/g_rel_cred.c
lib/gssapi/mechglue/g_rel_name.c
lib/gssapi/mechglue/g_rel_oid_set.c
lib/gssapi/mechglue/g_seal.c
lib/gssapi/mechglue/g_sign.c
lib/gssapi/mechglue/g_store_cred.c
lib/gssapi/mechglue/g_unseal.c
lib/gssapi/mechglue/g_userok.c
lib/gssapi/mechglue/g_utils.c
lib/gssapi/mechglue/g_verify.c
lib/gssapi/mechglue/gssd_pname_to_uid.c
lib/gssapi/mechglue/mglueP.h
lib/gssapi/mechglue/oid_ops.c
lib/gssapi/spnego/gssapiP_spnego.h
lib/gssapi/spnego/spnego_mech.c

and the initial implementation of incremental propagation, including the following new or changed files:

include/iprop_hdr.h
kadmin/server/ipropd_svc.c
lib/kdb/iprop.x
lib/kdb/kdb_convert.c
lib/kdb/kdb_log.c

lib/kdb/kdb_log.h
lib/krb5/error_tables/kdb5_err.et
kprop/kpropd_rpc.c
kprop/kproplog.c

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Upstream-Contact: Yann Collet <Cyan4973@github.com>
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## Commands to generate dependency files
GEN_DEPS.c= $(CC) -E -MM $(DEFS) $(CPPFLAGS)
GEN_DEPS.cc= $(CXX) -E -MM $(DEFS) $(CPPFLAGS)

## Flags for position independent code
SHAREDLIBCFLAGS = -fPIC
SHAREDLIBCXXFLAGS = -fPIC
SHAREDLIBCPPFLAGS = -DPIC

## Additional flags when building libraries and with threads
```

```
THREADSCPPFLAGS = -D_REENTRANT
LIBCPPFLAGS =

## Compiler switch to embed a runtime search path
LD_RPATH=
LD_RPATH_PRE= -Wl,-rpath,

## Compiler switch to embed a library name
LD_SONAME = -Wl,-soname -Wl,$(notdir $(MIDDLE_SO_TARGET))

## Shared library options
LD_SOOPTIONS= -Wl,-Bsymbolic

## Shared object suffix
SO = so
## Non-shared intermediate object suffix
STATIC_O = ao

## Compilation
 rules
%.$(STATIC_O): $(srcdir)/%.c
 $(COMPILE.c) $(STATICCPPFLAGS) $(STATICCFLAGS) -o $@ $<
%.o: $(srcdir)/%.c
 $(COMPILE.c) $(DYNAMICCPPFLAGS) $(DYNAMICCFLAGS) -o $@ $<

%.$(STATIC_O): $(srcdir)/%.cpp
 $(COMPILE.cc) $(STATICCPPFLAGS) $(STATICCXXFLAGS) -o $@ $<
%.o: $(srcdir)/%.cpp
 $(COMPILE.cc) $(DYNAMICCPPFLAGS) $(DYNAMICCXXFLAGS) -o $@ $<


## Dependency rules
%.d: $(srcdir)/%.c
 @echo "generating dependency information for $<"
 @$(SHELL) -ec '$(GEN_DEPS.c) $< \
  | sed '\"s/\($*\)\.o[ :]*/\1.o $@ : /g'\" > $@; \
  [ -s $@ ] || rm -f $@'

%.d: $(srcdir)/%.cpp
 @echo "generating dependency information for $<"
 @$(SHELL) -ec '$(GEN_DEPS.cc) $< \
  | sed '\"s/\($*\)\.o[ :]*/\1.o $@ : /g'\" > $@; \
  [ -s $@ ] || rm -f $@'

## Versioned libraries rules

%.$(SO).$(SO_TARGET_VERSION_MAJOR): %.$(SO).$(SO_TARGET_VERSION)
 $(RM) $@ && ln -s ${<F} $@
```

```
%.$(SO): %.$(SO).$(SO_TARGET_VERSION_MAJOR)
 $(RM) $@ && ln -s ${*F}.$(SO).$(SO_TARGET_VERSION) $@

##  Bind internal references

# LDflags that pkgdata will use
BIR_LDFLAGS= -Wl,-Bsymbolic

# Dependencies [i.e. map files] for the final library
BIR_DEPS=

## Remove shared library 's'
STATIC_PREFIX_WHEN_USED =
STATIC_PREFIX =

## End BSD-specific setup
```

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

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the Library into a program that is not a library.

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machine-readable source code, which
must be distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

If distribution of object code is made by offering access to copy
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source code from the same place satisfies the requirement to
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5. A program that contains no derivative of any portion of the
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Otherwise, if the work is a derivative of the Library, you may distribute the object
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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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   02110-1301, USA.  */


#ifndef __VTV_H__
#define __VTV_H__

/* We could have used an enumeration here but it just makes it more
   difficult for the compiler to generate a call to this.  These are
   used as arguments to the function __VLTChangePermission, declared
   below.  */
#define __VLTP_READ_ONLY  0
#define __VLTP_READ_WRITE 1

#ifdef __cplusplus
extern "C" void __VLTChangePermission (int);
#else
extern void __VLTChangePermission (int);
#endif

#ifdef BIG_PAGE_SIZE
/* TODO - Replace '4096' below with correct big page size.  */
#define VTV_PAGE_SIZE 4096
```

```
#else
#if defined(__sun__) && defined(__svr4__) && defined(__sparc__)
#define VTV_PAGE_SIZE 8192
#else
#define VTV_PAGE_SIZE 4096
#endif
#endif



#endif /* __VTV_H__ */
```

DRuntime: Runtime Library for the D Programming Language
==========

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   Foundation, Inc., 51 Franklin Street - Fifth Floor, Boston, MA
   02110-1301, USA.  */


#ifndef __VTV_H__
#define __VTV_H__

/* We could have used an enumeration here but it just makes it more
   difficult for the compiler to generate a call to this.  These are
   used as arguments to the function __VLTChangePermission, declared
   below.  */
#define __VLTP_READ_ONLY  0
#define __VLTP_READ_WRITE 1
```

```
#ifdef __cplusplus
extern "C" void __VLTChangePermission (int);
#else
extern void __VLTChangePermission (int);
#endif

#ifdef BIG_PAGE_SIZE
/* TODO - Replace '4096' below with correct big page size.  */
#define VTV_PAGE_SIZE 4096
#else
#if defined(__sun__) && defined(__svr4__) && defined(__sparc__)
#define VTV_PAGE_SIZE 8192
#else
#define VTV_PAGE_SIZE 4096
#endif
#endif



#endif /* __VTV_H__ */
/* Definitions for BSD assembler syntax for Intel 386
  (actually AT&T syntax for insns and operands,
  adapted to BSD conventions for symbol names and debugging.)
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<http://www.gnu.org/licenses/>.  */

/* Use the Sequent Symmetry assembler syntax.  */

/* Define the syntax of pseudo-ops, labels and comments.  */

/* Prefix for internally generated assembler
```

```
 labels.  If we aren't using
  underscores, we are using prefix `.'s to identify labels that should
  be ignored, as in `i386/gas.h' --karl@cs.umb.edu  */

#define LPREFIX "L"

/* Assembler pseudos to introduce constants of various size.  */

#define ASM_BYTE "\t.byte\t"
#define ASM_SHORT "\t.word\t"
#define ASM_LONG "\t.long\t"
#define ASM_QUAD "\t.quad\t"  /* Should not be used for 32bit compilation.  */

/* This was suggested, but it shouldn't be right for DBX output. -- RMS
  #define ASM_OUTPUT_SOURCE_FILENAME(FILE, NAME) */


/* Define the syntax of labels and symbol definitions/declarations.  */

/* This is how to output an assembler line
  that says to advance the location counter by SIZE bytes.  */

#define ASM_OUTPUT_SKIP(FILE,SIZE)  \
 fprintf (FILE, "\t.space " HOST_WIDE_INT_PRINT_UNSIGNED"\n", (SIZE))

/* Define the syntax of labels and symbol definitions/declarations.  */

/* This says how to output an assembler line
  to define a global common symbol.  */

#define
 ASM_OUTPUT_COMMON(FILE, NAME, SIZE, ROUNDED)  \
( fputs (".comm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u\n", (int)(ROUNDED)))

/* This says how to output an assembler line
  to define a local common symbol.  */

#define ASM_OUTPUT_LOCAL(FILE, NAME, SIZE, ROUNDED)  \
( fputs (".lcomm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u\n", (int)(ROUNDED)))

#ifdef HAVE_GAS_LCOMM_WITH_ALIGNMENT
#define ASM_OUTPUT_ALIGNED_LOCAL(FILE, NAME, SIZE, ALIGNMENT)  \
( fputs (".lcomm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
```

```
 fprintf ((FILE), ",%u,%u\n", (int)(SIZE), (int)(ALIGNMENT) / BITS_PER_UNIT))
#endif

/* This is how to output an assembler line
  that says to advance the location counter
  to a multiple of 2**LOG bytes.  */

#define ASM_OUTPUT_ALIGN(FILE,LOG) \
 if ((LOG)!=0) fprintf ((FILE), "\t.align %d\n", (LOG))

/* This is how to store into the string BUF
  the symbol_ref name of an internal numbered label
 where
  PREFIX is the class of label and NUM is the number within the class.
  This is suitable for output with `assemble_name'.  */

#define ASM_GENERATE_INTERNAL_LABEL(BUF,PREFIX,NUMBER) \
   sprintf ((BUF), "*%s%ld", (PREFIX), (long)(NUMBER))

/* The prefix to add to user-visible assembler symbols.  */

#define USER_LABEL_PREFIX "_"

/* Sequent has some changes in the format of DBX symbols.  */
#define DBX_NO_XREFS 1

/* Don't split DBX symbols into continuations.  */
#define DBX_CONTIN_LENGTH 0
```

==========

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==========

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Julian Seward, jseward@bzip.org
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========

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lib/libgss/g_utils.c
lib/libgss/g_verify.c
lib/libgss/gssd_pname_to_uid.c
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The implementations of GSSAPI mechglue in GSSAPI-SPNEGO in "src/lib/gssapi", including the following files:

lib/gssapi/generic/gssapi_err_generic.et
lib/gssapi/mechglue/g_accept_sec_context.c
lib/gssapi/mechglue/g_acquire_cred.c
lib/gssapi/mechglue/g_canon_name.c
lib/gssapi/mechglue/g_compare_name.c
lib/gssapi/mechglue/g_context_time.c
lib/gssapi/mechglue/g_delete_sec_context.c
lib/gssapi/mechglue/g_dsp_name.c
lib/gssapi/mechglue/g_dsp_status.c
lib/gssapi/mechglue/g_dup_name.c
lib/gssapi/mechglue/g_exp_sec_context.c
lib/gssapi/mechglue/g_export_name.c
lib/gssapi/mechglue/g_glue.c
lib/gssapi/mechglue/g_imp_name.c
lib/gssapi/mechglue/g_imp_sec_context.c
lib/gssapi/mechglue/g_init_sec_context.c
lib/gssapi/mechglue/g_initialize.c
lib/gssapi/mechglue/g_inquire_context.c
lib/gssapi/mechglue/g_inquire_cred.c
lib/gssapi/mechglue/g_inquire_names.c
lib/gssapi/mechglue/g_process_context.c
lib/gssapi/mechglue/g_rel_buffer.c
lib/gssapi/mechglue/g_rel_cred.c
lib/gssapi/mechglue/g_rel_name.c
lib/gssapi/mechglue/g_rel_oid_set.c
lib/gssapi/mechglue/g_seal.c
lib/gssapi/mechglue/g_sign.c
lib/gssapi/mechglue/g_store_cred.c
lib/gssapi/mechglue/g_unseal.c
lib/gssapi/mechglue/g_userok.c
lib/gssapi/mechglue/g_utils.c
lib/gssapi/mechglue/g_verify.c
lib/gssapi/mechglue/gssd_pname_to_uid.c
lib/gssapi/mechglue/mglueP.h
lib/gssapi/mechglue/oid_ops.c
lib/gssapi/spnego/gssapiP_spnego.h
lib/gssapi/spnego/spnego_mech.c

and the initial implementation of incremental propagation, including the following new or changed files:

include/iprop_hdr.h
kadmin/server/ipropd_svc.c
lib/kdb/iprop.x
lib/kdb/kdb_convert.c

lib/kdb/kdb_log.c
lib/kdb/kdb_log.h
lib/krb5/error_tables/kdb5_err.et
kprop/kpropd_rpc.c
kprop/kproplog.c

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# This file contains a list of people who've made non-trivial
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  * Optimize Java serialization of strings so that UTF-8 encoding happens only
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  * Clean up some Java warnings.
  * Fix bug with permanent callbacks that delete themselves when run.
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# 1.4048 etcd-fips-3.6 3.6.11-r0

## 1.4048.1 Available under license :

# Features

This document provides an overview of etcd features and general development guidelines for adding and deprecating them. The project maintainers can override these guidelines per the need of the project following the project governance.

## Overview

The etcd features fall into three stages, experimental, stable, and unsafe.

### Experimental

Any new feature is usually added as an experimental feature. An experimental feature is characterized as below:
- Might be buggy due to a lack of user testing. Enabling the feature may not work as expected.
- Disabled by default when added initially.
- Support for such a feature may be dropped at any time without notice
  - Feature-related issues may be given lower priorities.
  - It can be removed in the next minor or major release without following the feature deprecation policy unless it graduates to a stable future.

### Stable

A stable feature is characterized as below:
- Supported as part of the supported releases of etcd.
-
 May be enabled by default.
- Discontinuation of support must follow the feature deprecation policy.

### Unsafe

Unsafe features are rare and listed under the `Unsafe feature:` section in the etcd usage documentation. By default, they are disabled. They should be used with caution following documentation. An unsafe feature can be removed in the next minor or major release without following the feature deprecation policy.

## Development Guidelines

### Adding a new feature

Any new enhancements to the etcd are typically added as an experimental feature. The general development requirements are listed below. They can be somewhat flexible depending on the scope of the feature and review discussions and will evolve over time.

- Open an issue
  - It must provide a clear need for the proposed feature.
  - It should list development work items as checkboxes. There must be one work item towards future graduation to a stable future.
  - Label the issue with `type/feature` and `experimental`.
  - Keep the issue open for tracking purposes until a decision is made on graduation.
- Open a Pull Request (PR)
  - Provide unit tests. Integration tests are also recommended as possible.
  - Provide robust e2e test coverage. If the feature being added is complicated or quickly needed, maintainers can decide to go with e2e tests for basic coverage initially and have robust coverage added at a later time before the feature graduation to the stable feature.
  - Provide logs for proper debugging.
  - Provide metrics and benchmarks as needed.
  - The Feature should be disabled by default.
  - Any configuration flags related to the implementation of the feature must be prefixed with `experimental` e.g. `--experimental-feature-name`.
  - Add a CHANGELOG entry.
- At least two maintainers must approve feature requirements and related code changes.

### Graduating an Experimental feature to Stable

It is important that experimental features don't get stuck in that stage.
They should be revisited and moved to the stable stage following the graduation steps as described here.

#### Locate graduation candidate

Decide if an experimental feature is ready for graduation to the stable stage.

- Find the issue that was used to enable the experimental feature initially. One way to find such issues is to search for issues with `type/feature` and `experimental` labels.
- Fix any known open issues against the feature.
- Make sure the feature was enabled for at least one previous release. Check the PR(s) reference from the issue to see when the feature-related code changes were merged.

#### Provide implementation

If an experimental feature is found ready for graduation to the stable stage, open a Pull Request (PR) with the following changes.

- Add robust e2e tests if not already provided.
- Add a new stable feature flag identical to the experimental feature flag but without the `--experimental` prefix.
- Deprecate the experimental feature following the [feature deprecation policy](#Deprecating-a-feature).
- Implementation must ensure that both the graduated and deprecated experimental feature flags work as expected. Note that both these flags will co-exist for the timeframe described in the feature deprecation policy.
- Enable the graduated feature by default if needed.

At least two maintainers must approve the work. Patch releases should not be considered for graduation.

### Deprecating a feature

#### Experimental
An experimental feature deprecates when it graduates to the stable stage.
- Add a deprecation message in the documentation of the experimental feature with a recommendation to use a related stable feature. e.g. `DEPRECATED. Use <feature-name> instead.`
- Add a `deprecated` label in the issue that was initially used to enable the experimental feature.

#### Stable
As the project evolves, a stable feature may sometimes need to be deprecated and removed. Such a situation should be handled using the steps below:
- Create an issue for tracking
 purposes.
- Add a deprecation message in the feature usage documentation before a planned release for feature deprecation. e.g. `To be deprecated in <release>.`. If a new feature replaces the `To be deprecated` feature, then also provide a message saying so. e.g. `Use <feature-name> instead.`.
- Deprecate the feature in the planned release with a message as part of the feature usage documentation. e.g. `DEPRECATED`. If a new feature replaces the deprecated feature, then also provide a message saying so. e.g. `DEPRECATED. Use <feature-name> instead.`.
- Add a `deprecated` label in the related issue.

Remove the deprecated feature in the following release. Close any related issue(s). At least two maintainers must approve the work. Patch releases should not be considered for deprecation.
# Set up the local cluster

For testing and development deployments, the quickest and easiest way is to configure a local cluster. For a production deployment, refer to the [clustering][clustering] section.

## Local standalone cluster

### Starting a cluster

Run the following to deploy an etcd cluster as a standalone cluster:

```
$ ./etcd
...
```

If the `etcd` binary is not present in the current working directory, it might be located either at `$GOPATH/bin/etcd` or at `/usr/local/bin/etcd`. Run the command appropriately.

The running etcd member listens on `localhost:2379` for client requests.

### Interacting with the cluster

Use `etcdctl` to interact with the running cluster:

1. Store an example key-value pair in the cluster:

```
$ ./etcdctl put foo bar
OK
```

If OK is printed, storing the key-value pair is successful.

2. Retrieve the value of `foo`:

```
$ ./etcdctl get foo
bar
```

If `bar` is returned, interaction with the etcd cluster is working as expected.

## Local multi-member cluster

### Starting a cluster

A `Procfile` at the base of the etcd git repository is provided to easily configure a local multi-member cluster. To start a multi-member cluster, navigate to the root of the etcd source tree and perform the following:

1. Install `goreman` to control Procfile-based applications:

```
$ go install github.com/mattn/goreman@latest
```

The installation will place executables in the $GOPATH/bin. If $GOPATH environment variable is not set, the tool will be installed into the $HOME/go/bin. Make sure that $PATH is set accordingly in your environment.

2. Start a cluster with `goreman` using etcd's stock Procfile:

```
$ goreman -f Procfile start
```

The members start running. They listen on `localhost:2379`, `localhost:22379`, and `localhost:32379` respectively for client requests.

### Interacting with the cluster

Use `etcdctl` to interact with the running cluster:

1. Print
 the list of members:

```
$ etcdctl --write-out=table --endpoints=localhost:2379 member list
```

The list of etcd members is displayed as follows:

```
+------------------+---------+--------+-----------------------+-----------------------+
|       ID         | STATUS  |  NAME  |       PEER ADDRS      |      CLIENT ADDRS     |
+------------------+---------+--------+-----------------------+-----------------------+
| 8211f1d0f64f3269 | started | infra1 | http://127.0.0.1:2380  | http://127.0.0.1:2379  |
| 91bc3c398fb3c146 | started | infra2 | http://127.0.0.1:22380 | http://127.0.0.1:22379 |
| fd422379fda50e48 | started | infra3 | http://127.0.0.1:32380 | http://127.0.0.1:32379 |
+------------------+---------+--------+-----------------------+-----------------------+
```

2. Store an example key-value pair in the cluster:

```
$ etcdctl put foo bar
OK
```

If OK is printed, storing the key-value pair is successful.

###
 Testing fault tolerance

To exercise etcd's fault tolerance, kill a member and attempt to retrieve the key.

1. Identify the process name of the member to be stopped.

The `Procfile` lists the properties of the multi-member cluster. For example, consider the member with the process name, `etcd2`.

2. Stop the member:

```
# kill etcd2
$ goreman run stop etcd2
```

3. Store a key:

```
$ etcdctl put key hello
OK
```

4. Retrieve the key that is stored in the previous step:

```
$ etcdctl get key
hello
```

5. Retrieve a key from the stopped member:

```
$ etcdctl --endpoints=localhost:22379 get key
```

The command should display an error caused by connection failure:

```
2017/06/18 23:07:35 grpc: Conn.resetTransport failed to create client transport: connection error: desc = "transport: dial tcp 127.0.0.1:22379: getsockopt: connection refused"; Reconnecting to "localhost:22379"
Error:  grpc:
timed out trying to connect
```

6. Restart the stopped member:

```
$ goreman run restart etcd2
```

7. Get the key from the restarted member:

```
$ etcdctl --endpoints=localhost:22379 get key
hello
```

Restarting the member re-establishs the connection. `etcdctl` will now be able to retrieve the key successfully. To learn more about interacting with etcd, read [interacting with etcd section][interacting].

[clustering]: https://etcd.io/docs/latest/op-guide/clustering/
[interacting]: https://etcd.io/docs/latest/dev-guide/interacting_v3/
# Issue triage guidelines

## Purpose

Speed up issue management.

The `etcd` issues are listed at <https://github.com/etcd-io/etcd/issues> and are identified with labels. For example, an issue that is identified as a bug will be set to the label `type/bug`.

The etcd project uses labels to indicate common attributes such as `area`, `type`, and `priority` of incoming issues.

New issues will often start without any labels, but typically `etcd` maintainers, reviewers, and members will add labels by following these triage guidelines. The detailed list of labels can be found at <https://github.com/etcd-io/etcd/labels>.

## Scope

This document serves as the primary guidelines for triaging incoming issues in `etcd`.

All contributors are encouraged and welcome to help manage issues which will help reduce the burden on project maintainers, though the work and responsibilities discussed in this document are created with `etcd` project reviewers and members in mind as these individuals will have
triage access to the etcd project which is a requirement for actions like applying labels or closing issues.

Refer to [etcd community membership](https://github.com/etcd-io/etcd/blob/main/Documentation/contributor-guide/community-membership.md) for guidance on becoming an etcd project member or reviewer.

## Step 1 - Find an issue to triage

To get started you can use the following recommended issue searches to identify issues that are in need of triage:

* [Issues that have no labels](https://github.com/etcd-io/etcd/issues?q=is%3Aissue+is%3Aopen+sort%3Aupdated+no%3Alabel)
* [Issues created recently](https://github.com/etcd-io/etcd/issues?q=is%3Aissue+is%3Aopen+)
* [Issues not assigned but linked pr](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+no%3Aassignee+linked%3Apr)
* [Issues with no comments](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+comments%3A0+)
* [Issues with help wanted](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+label%3A%22help+wanted%22+)

## Step 2 - Check the issue is valid

Before we start adding labels or trying to work out a priority, our first triage step needs to be working out if the issue actually belongs to the etcd project and is not a duplicate.

### Issues that don't belong to etcd

Sometimes issues are reported that belong to other projects that `etcd` use. For example, `grpc` or `golang` issues. Such issues should be addressed by asking the reporter to open issues in the appropriate other projects.

These issues can generally be closed unless a maintainer and issue reporter see a need to keep it open for tracking

purposes. If you have triage permissions please close it, alternatively mention the @etcd-io/members group to request a member with triage access to close the issue.

### Duplicate issues

If an issue is a duplicate, add a comment stating so along with a reference for the original issue and if you have triage permissions please close it, alternatively mention the @etcd-io/members
group to request a member with triage access close the issue.

## Step 3 - Apply the appropriate type of label

Adding a `type` label to an issue helps create visibility on the health of the project and helps contributors identify potential priorities, i.e. addressing existing bugs or test flakes before implementing new features.

### Support requests

As a general rule, the focus for etcd support is to address common themes in a broad way that helps all users, i.e. through channels like known issues, frequently asked questions, and high-quality documentation. To make the best use of project members time we should avoid providing 1:1 support if a broad approach is available.

Some people mistakenly use our GitHub bug report or feature request templates to file support requests. Usually, they are asking for help operating or configuring some aspect of etcd. Support requests for etcd should instead be raised as [discussions](https://github.com/etcd-io/etcd/discussions).

Common
types of support requests are:

1. Questions about configuring or operating existing well-documented etcd features, for example, <https://github.com/etcd-io/etcd/issues/15945>. Note - If an existing feature is not well documented please apply the `area/documentation` label and propose documentation improvements that would prevent future users from stumbling on the problem again.

2. Bug reports or questions about unsupported versions of etcd, for example <https://github.com/etcd-io/etcd/issues/15796>. When responding to these issues please refer to our [supported versions documentation](https://etcd.io/docs/latest/op-guide/versioning) and encourage the reporter to upgrade to a recent patch release of a supported version as soon as possible. We should limit the effort supporting users that do not make the effort to run a supported version of etcd or ensure their version is patched.

3. Bug reports that do not provide a complete list of steps to reproduce the issue and/or contributors
are not able to reproduce the issue, for example, <https://github.com/etcd-io/etcd/issues/15740>. We should limit the effort we put into reproducing issues ourselves and motivate users to provide the necessary information to accept the bug report.

4. General questions that are filed using feature request or bug report issue templates, for example, <https://github.com/etcd-io/etcd/issues/15914>. Note - These types of requests may surface good additions to our [frequently asked questions](https://etcd.io/docs/v3.5/faq).

If you identify that an issue is a support request please:

1. Add the `type/support` or `type/question` label.

2. Add the following comment to inform the issue creator that discussions should be used instead and that this issue will be converted to a discussion.

> Thank you for your question, this support issue will be moved to our [Discussion Forums](https://github.com/etcd-io/etcd/discussions).
>
> We are trying to consolidate the channels to which questions for help/support are posted so that we can improve our efficiency in responding to your requests, and make it easier for you to find answers to frequently asked questions and how to address common use cases.
>
> We regularly see messages posted in multiple forums, with the full response thread only in one place or, worse, spread across multiple forums. Also, the large volume of support issues on GitHub is making it difficult for us to use issues to identify real bugs.
>
> Members of the etcd community use Discussion Forums to field support requests. Before posting a new question, please search these for answers to similar questions, and also familiarize yourself with:
>
> 1. [user documentation](https://etcd.io/docs/latest)
> 2. [frequently asked questions](https://etcd.io/docs/v3.5/faq)
>
> Again, thanks for using etcd and raising this question.
>
> The etcd team

3. Finally, click `Convert to discussion` on the right-hand panel, selecting the appropriate discussion category.

### Bug reports

If an issue has been raised as a bug it should already have the `type/bug` label, however, if this is missing for an issue you determine to be a bug please add the label manually.

The next step is to validate if the issue is indeed a bug. If not, add a comment with the findings and close the trivial issue. For non-trivial issues, wait to hear back from the issue reporter and see if there is any objection. If the issue reporter does not reply in 30 days, close the issue.

If the problem can not be reproduced or requires more information, leave a comment for the issue reporter as soon as possible while the issue is fresh for the issue reporter.

### Feature requests

New feature requests should be created via the etcd feature request template and in theory already have the `type/feature` label, however, if this is missing for an issue you determine to be a feature please add the label manually.

### Test flakes

Test flakes
are a specific type of bug that the etcd project tracks separately as these are a priority to address. These should be created via the test flake template and in theory already have the `type/flake` label, however, if this is missing for an issue you determine to be related to a flaking test please add the label manually.

## Step 4 - Define the areas impacted

Adding an `area` label to an issue helps create visibility on which areas of the etcd project require attention and helps contributors find issues to work on relating to their particular skills or knowledge of the etcd codebase.

If an issue crosses multiple domains please add additional `area` labels to reflect that.

Below is a brief summary of the area labels in active use by the etcd project along with any notes on their use:

| Label | Notes |
| --- | --- |
| area/external | Tracking label for issues raised that are external to etcd. |
| area/community | |
| area/raft | |
| area/clientv3 | |
| area/performance | |
| area/security | |
| area/tls | |
| area/auth | |
| area/etcdctl | |
| area/etcdutl | |
| area/contrib | Not to be confused with `area/community` this label is specifically used for issues relating to community-maintained scripts or files in the `contrib/` directory which aren't part of the core etcd project. |
| area/documentation | |
| area/tooling | Generally used in relation to the third party / external utilities or tools that are used in various stages of the etcd build, test, or release process, for example, tooling to create sboms. |
| area/testing | |
| area/robustness-testing | |

## Step 5 - Prioritise the issue

If an issue lacks a priority label it has not been formally prioritized yet.

Adding a `priority` label helps the etcd project understand what is important and should be worked on now, and conversely, what is not as important and is on the project backlog.

|Priority label|What it means|Examples|
|---|---|---|
| `priority/critical-urgent`

| Maintainers are responsible for making sure that these issues (in their area) are being actively worked oni.e., drop what you're doing. The stuff is burning. These should be fixed before the next release. | user-visible critical bugs in core features <br> broken builds on tier1 supported platforms <br> tests and critical security issues |
| `priority/important-soon` | Must be staffed and worked on either currently or very soonideally in time for the next release. | |
| `priority/important-longterm` | Important over the long term, but may not be currently staffed and/or may require multiple releases to complete. | |
| `priority/backlog`  | General agreement that this is a nice-to-have, but no one's available to work on it anytime soon. Community contributions would be most welcome in the meantime, though it might take a while to get them reviewed if reviewers are fully occupied with higher-priority issuesfor example, immediately before a release.| |
| `priority/awaiting-more-evidence`
| Possibly useful, but not yet enough support to actually get it done. | Mostly placeholders for potentially good ideas, so that they don't get completely forgotten, and can be referenced or deduped every time they come up |

## Step 6 - Support new contributors

As part of the `etcd` triage process once the `kind` and `area` have been determined, please consider if the issue would be suitable for a less experienced contributor. The `good first issue` label is a subset of the `help wanted` label, indicating that members have committed to providing extra assistance for new contributors. All `good first issue` items also have the `help wanted` label.

### Help wanted

Items marked with the `help wanted` label need to ensure that they meet these criteria:

* **Low Barrier to Entry** - It should be easy for new contributors.

* **Clear** - The task is agreed upon and does not require further discussions in the community.

* **Goldilocks priority** - The priority
should not be so high that a core contributor should do it, but not too low that it isnt useful enough for a core contributor to spend time reviewing it, answering questions, helping get it into a release, etc.

### Good first issue

Items marked with `good first issue` are intended for first-time contributors. It indicates that members will keep an eye out for these pull requests and shepherd it through our processes.

New contributors should not be left to find an approver, ping for reviews, decipher test commands, or identify that their build failed due to a flake. It is important to make new contributors feel welcome and valued. We should assure them that they will have an extra level of help with their first contribution.

After a contributor has successfully completed one or two `good first issue` items, they should be ready to move on to `help wanted` items.

* **No Barrier to Entry** - The task is something that a new contributor can tackle without advanced setup or domain knowledge.

*
 **Solution Explained** - The recommended solution is clearly described in the issue.

* **Gives Examples** - Link to examples of similar implementations so new contributors have a reference guide for their changes.

* **Identifies Relevant Code** - The relevant code and tests to be changed should be linked in the issue.

* **Ready to Test** - There should be existing tests that can be modified, or existing test cases fit to be copied. If the area of code doesnt have tests, before labeling the issue, add a test fixture. This prep often makes a great help wanted task!

## Step 7 - Follow up

Once initial triage has been completed, issues need to be re-evaluated over time to ensure they don't become stale incorrectly.

### Track important issues

If an issue is at risk of being closed by the stale bot in the future, but is an important issue for the etcd project, then please apply the `stage/tracked` label and remove any `stale` labels that exist. This will ensure the project does not lose sight of the issue.

### Close incomplete issues

Issues that lack enough information from the issue reporter should be closed if the issue reporter does not provide information in 30 days. Issues can always be re-opened at a later date if new information is provided.

### Check for incomplete work

If an issue owned by a developer has no pull request created in 30 days, contact the issue owner and kindly ask about the status of their work, or to release ownership on the issue if needed.
# Branch management

## Guide

* New development occurs on the [main branch][main].
* The main branch should always have a green build!
* Backwards-compatible bug fixes should target the main branch and subsequently be ported to stable branches.
* Once the main branch is ready for release, it will be tagged and become the new stable branch.

The etcd team has adopted a *rolling release model* and supports two stable versions of etcd.

### Main branch

The `main` branch is our development branch. All new features land here first.

To try new and experimental features, pull `main` and play with it. Note that `main` may not be stable because new

features may introduce bugs.

Before the release of the next stable version, feature PRs will be frozen. A [release manager](./release.md#release-management) will be assigned to the major/minor version and will lead the etcd community in testing, bug-fix, and documentation of the release for one to two weeks.

### Stable branches

All branches with
 the prefix `release-` are considered _stable_ branches.

After every minor release ([semver.org](https://semver.org/)), we will have a new stable branch for that release, managed by a [patch release manager](./release.md#release-management). We will keep fixing the backward-compatible bugs for the latest two stable releases. A _patch_ release to each supported release branch, incorporating any bug fixes, will be once every two weeks, given any patches.

[main]: https://github.com/etcd-io/etcd/tree/main
# PR management

## Purpose

Speed up PR management.

The `etcd` PRs are listed at https://github.com/etcd-io/etcd/pulls
A PR can have various labels, milestones, reviewers, etc. The detailed list of labels can be found at https://github.com/kubernetes/kubernetes/labels

Following are a few example searches on PR for convenience:
* [Open PRS for milestone etcd-v3.6](https://github.com/etcd-io/etcd/pulls?utf8=%E2%9C%93&q=is%3Apr+is%3Aopen+milestone%3Aetcd-v3.6)
* [PRs under investigation](https://github.com/etcd-io/etcd/labels/Investigating)

## Scope

These guidelines serve as a primary document for managing PRs in `etcd`. Everyone is welcome to help manage PRs but the work and responsibilities discussed in this document are created with `etcd` maintainers and active contributors in mind.

## Ensure tests are run

The etcd project use Kubernetes Prow and GitHub Actions to run tests. To ensure all required tests run if a pull request is ready for testing and still has the `needs-ok-to-test`
 label then please comment on the pull request `/ok-to-test`.

## Handle inactive PRs
Poke PR owner if review comments are not addressed in 15 days. If the PR owner does not reply in 90 days, update the PR with a new commit if possible. If not, inactive PR should be closed after 180 days.

## Poke reviewer if needed

Reviewers are responsive in a timely fashion, but considering everyone is busy, give them some time after requesting a review if a quick response is not provided. If the response is not provided in 10 days, feel free to contact them via adding a comment in the PR or sending an email or message on Slack.

## Verify important labels are in place

Make sure that appropriate reviewers are added to the PR. Also, make sure that a milestone is identified. If any of these or other important labels are missing, add them. If a correct label cannot be decided, leave a comment for the maintainers to do so as needed.
# Roadmap

etcd uses GitHub milestones to track all tasks in each major or minor release. The `roadmap.md` file only records the
most important tasks for each release. The list is based on the current maintainer capacity that may shift over time. Proposed milestones are what we think we can deliver with the people we have. If we have more support on the important
stuff, we could pick up more items from the backlog. Note that etcd will continue to mainly focus on technical debt over
the next few major or minor releases.

Each item has an assigned priority. Refer to [priority definitions](https://github.com/etcd-io/etcd/blob/main/Documentation/contributor-guide/triage_issues.md#step-5---prioritise-the-issue).

## v3.6.0

For a full list of tasks in `v3.6.0`, please see [milestone etcd-v3.6](https://github.com/etcd-io/etcd/milestone/38).

| Title | Priority | Status | Note |
|---|---|---|---|
| [Support downgrade](https://github.com/etcd-io/etcd/issues/11716) | priority/important-soon | In progress | etcd will support downgrade starting from 3.6.0. But it will also support offline downgrade from 3.5 to 3.4. |
| [StoreV2 deprecation](https://github.com/etcd-io/etcd/issues/12913) | priority/important-soon | In progress | This task will be covered in both 3.6 and 3.7. |
| [Release raft 3.6.0](https://github.com/etcd-io/raft/issues/89) | priority/important-soon | Not started | etcd 3.6.0 will depends on raft 3.6.0 |
| [Release bbolt 1.4.0](https://github.com/etcd-io/bbolt/issues/553) | priority/important-soon | Not started | etcd 3.6.0 will depends on bbolt 1.4.0 |
| [Support /livez and /readyz endpoints](https://github.com/etcd-io/etcd/issues/16007) | priority/important-longterm | In progress | It provides clearer APIs, and can also work around the stalled writes issue |
| [Bump gRPC](https://github.com/etcd-io/etcd/issues/16290) | |

priority/important-longterm | Completed | It isn't guaranteed to be resolved in 3.6, and might be postponed to 3.7 depending on the effort and risk. |
| [Deprecate grpc-gateway
or bump it](https://github.com/etcd-io/etcd/issues/14499) | priority/important-longterm | Completed | It isn't guaranteed to be resolved in 3.6, and might be postponed to 3.7 depending on the effort and risk. |
| [bbolt: Add logger into bbolt](https://github.com/etcd-io/bbolt/issues/509) | priority/important-longterm | Completed | It's important to diagnose bbolt issues |
| [bbolt: Add surgery commands](https://github.com/etcd-io/bbolt/issues/370) | priority/important-longterm | Completed | Surgery commands are important for fixing corrupted db files |
| [Evaluate and (Gradulate or deprecate/remove) experimental features](https://github.com/etcd-io/etcd/issues/16292) | priority/backlog | Not started | This task will be covered in both 3.6 and
3.7. |

## v3.7.0

For a full list of tasks in `v3.7.0`, please see [milestone etcd-v3.7](https://github.com/etcd-io/etcd/milestone/39).

| Title | Priority | Note |
|---|---|---|
| [StoreV2 deprecation](https://github.com/etcd-io/etcd/issues/12913) | P0 | Finish the remaining tasks 3.7. |
| [Refactor lease: Lease might be revoked by mistake by old leader](https://github.com/etcd-io/etcd/issues/15247) | P1 | to be investigated & discussed |
| [Integrate raft's new feature (async write) into etcd](https://github.com/etcd-io/etcd/issues/16291) | P1 | It should improve the performance |
| [bbolt: Support customizing the bbolt rebalance threshold](https://github.com/etcd-io/bbolt/issues/422) | P2 | It may get rid of etcd's defragmentation. Both bbolt and etcd need to be changed. |
| [Evaluate and (graduate or deprecate/remove) experimental features](https://github.com/etcd-io/etcd/issues/16292) | P2 | Finish the remaining tasks 3.7. |

## Backlog (future releases)

| Title | Priority | Note |
|---|---|---|
| [Remove the dependency on
grpc-go's experimental API](https://github.com/etcd-io/etcd/issues/15145) | | |
| [Protobuf: cleanup both golang/protobuf and gogo/protobuf](https://github.com/etcd-io/etcd/issues/14533) | | |
| [Proposals should include a merkle root](https://github.com/etcd-io/etcd/issues/13839) | | |
| [Add Distributed Tracing using OpenTelemetry](https://github.com/etcd-io/etcd/issues/12460) | | |
| [Support CA rotation](https://github.com/etcd-io/etcd/issues/11555) | | |
| [bbolt: Migrate all commands to cobra style commands](https://github.com/etcd-io/bbolt/issues/472) | | |

|
| [raft: enhance the configuration change validation](https://github.com/etcd-io/raft/issues/80) | | |
# Release

The guide talks about how to release a new version of etcd.

The procedure includes some manual steps for sanity checking, but it can probably be further scripted. Please keep this document up-to-date if making changes to the release process.

## Release management

The following pool of release candidates manages the release of each etcd major/minor version as well as manages patches
to each stable release branch. They are responsible for communicating the timelines and status of each release and for ensuring the stability of the release branch.

- Benjamin Wang [@ahrtr](https://github.com/ahrtr)
- James Blair [@jmhbnz](https://github.com/jmhbnz)
- Marek Siarkowicz [@serathius](https://github.com/serathius)
- Sahdev Zala [@spzala](https://github.com/spzala)
- Wenjia Zhang [@wenjiaswe](https://github.com/wenjiaswe)

All release version numbers follow the format of [semantic versioning 2.0.0](http://semver.org/).

### Major, minor version release, or its pre-release

- Ensure
 the relevant [milestone](https://github.com/etcd-io/etcd/milestones) on GitHub is complete. All referenced issues should be closed or moved elsewhere.
- Ensure the latest [upgrade documentation](https://etcd.io/docs/next/upgrades) is available.
- Bump [hardcoded MinClusterVerion in the repository](https://github.com/etcd-io/etcd/blob/v3.4.15/version/version.go#L29), if necessary.
- Add feature capability maps for the new version, if necessary.

### Patch version release

- To request a backport, developers submit cherry-pick PRs targeting the release branch. The commits should not include merge commits. The commits should be restricted to bug fixes and security patches.
- The cherrypick PRs should target the appropriate release branch (`base:release-<major>-<minor>`). The k8s infra cherry pick robot `/cherrypick <branch>` PR chatops command may be used to automatically generate cherrypick PRs.
- The release patch manager reviews the cherrypick PRs. Please discuss carefully what is backported
 to the patch release. Each patch release should be strictly better than its predecessor.
- The release patch manager will cherry-pick these commits starting from the oldest one into stable branch.

## Write a release note

- Write an introduction for the new release. For example, what major bug we fix, what new features we introduce, or

what performance improvement we make.
- Put `[GH XXXX]` at the head of the change line to reference the Pull Request that introduces the change. Moreover, add a link on it to jump to the Pull Request.
- Find PRs with the `release-note` label and explain them in the `NEWS` file, as a straightforward summary of changes for end-users.

## Patch release criteria

The etcd project aims to release a new patch version if any of the following conditions are met:

- Fixed one or more major CVEs (>=7.5).
- Fixed one or more critical bugs.
- Fixed three or more major bugs.
- Fixed five or more minor bugs.

## Release guide

### Prerequisites

There are some
 prerequisites, which should be done before the release process. These are one-time operations,
which don't need to be executed before releasing each version.
1. Generate a GPG key and add it to your GitHub account. Refer to the links on
[settings](https://github.com/settings/keys).
2. Ensure you have a Linux machine, on which the git, Golang, and docker have been installed.
   - Ensure the Golang version matches the version defined in `.go-version` file.
   - Ensure non-privileged users can run docker commands, refer to the [Linux
postinstall](https://docs.docker.com/engine/install/linux-postinstall/).
   - Ensure there is at least 5GB of free space on your Linux machine.
3. Install gsutil, refer to [gsutil_install](https://cloud.google.com/storage/docs/gsutil_install). When asked about cloud project to use, pick `etcd-development`.
4. Authenticate the image registry, refer to [Authentication methods](https://cloud.google.com/container-registry/docs/advanced-authentication).
  - `gcloud
 auth login`
  - `gcloud auth configure-docker`
5. Install gh, refer to [GitHub's documentation](https://github.com/cli/cli#installation). Ensure that running
  `gh auth login` succeeds for the GitHub account you use to contribute to etcd,
  and that `gh auth status` has a clean exit and doesn't show any issues.

### Release steps

1. Raise an issue to publish the release plan, e.g. [issues/17350](https://github.com/etcd-io/etcd/issues/17350).
2. Raise a `kubernetes/org` pull request to temporarily elevate permissions for the GitHub release team.
3. Once permissions are elevated, temporarily relax [branch protections](https://github.com/etcd-io/etcd/settings/branches) to allow pushing changes directly to `release-*` branches in GitHub.
4. Verify you can pass the authentication to the image registries,
  - `docker login gcr.io`

- `docker login quay.io`
  - If the release person doesn't have access to 1password, one of the owners (@ahrtr, @ivanvc, @jmhbnz, @serathius) needs
 to share the password with them per [this guide](https://support.1password.com/share-items/). See rough steps below,
    - [Sign in](https://team-etcd.1password.com/home) to your account on 1password.com.
    - Click `Your Vault Items` on the right side.
    - Select `Password of quay.io`.
    - Click `Share` on the top right, and set expiration as `1 hour` and only available to the release person using his/her email.
    - Click `Copy Link` then send the link to the release person via slack or email.
5. Clone the etcd repository and checkout the target branch,
  - `git clone --branch release-3.X git@github.com:etcd-io/etcd.git`
6. Run the release script under the repository's root directory, replacing `${VERSION}` with a value without the `v` prefix, i.e. `3.5.13`.
  - `DRY_RUN=false ./scripts/release.sh ${VERSION}`
  - **NOTE:** When doing a pre-release (i.e., a version from the main branch, 3.6.0-alpha.2), you will need to explicitly set the branch to main:

  ```
    DRY_RUN=false BRANCH=main ./scripts/release.sh ${VERSION}
    ```

  It generates all release binaries under the directory `/tmp/etcd-release-${VERSION}/etcd/release/` and images. Binaries are pushed to the Google Cloud bucket
  under project `etcd-development`, and images are pushed to `quay.io` and `gcr.io`.
7. Publish the release page on GitHub
  - Open the **draft** release URL shown by the release script
  - Click the pen button at the top right to edit the release
  - Review that it looks correct, reviewing that the bottom checkboxes are checked depending on the
    release version (v3.4 no checkboxes, v3.5 has the set as latest release checkbox checked,
    v3.6 has the set as pre-release checkbox checked)
  - Then, publish the release
8. Announce to the etcd-dev googlegroup

  Follow the format of previous release emails sent to etcd-dev@googlegroups.com, see an example below. After sending out the email, ask one of the mailing list maintainers to approve the
 email from the pending list. Additionally, label the release email as `Release`.

```text
Hello,

etcd v3.4.30 is now public!

https://github.com/etcd-io/etcd/releases/tag/v3.4.30

Thanks to everyone who contributed to the release!
```

etcd team
```

9. Update the changelog to reflect the correct release date.
10. Paste the release link to the issue raised in Step 1 and close the issue.
11. Restore standard branch protection settings and raise a follow-up `kubernetes/org` pull request to return to least privilege permissions.
12. Crease a new stable branch through `git push origin release-${VERSION_MAJOR}.${VERSION_MINOR}` if this is a new major or minor stable release.
13. Re-generate a new password for quay.io if needed (e.g. shared to a contributor who isn't in the release team, and we should rotate the password at least once every 3 months).

#### Release known issues

1. Timeouts pushing binaries - If binaries fail to fully upload to Google Cloud storage, the script must be re-run using the same command. Any artifacts that are already pushed will be overwritten to ensure they are correct. The storage bucket does not use object versioning so incorrect files cannot remain.

2. Timeouts pushing images - It is rare, although possible for connection timeouts to occur when publishing etcd release images to `quay.io` or `gcr.io`. If this occurs, it is known to be safe to rerun the release script command appending the `--no-upload` flag, and image uploads will gracefully resume.

3. GPG vs SSH signing - The release scripts assume that git tags will be signed with a GPG key. Since 2022 GitHub has supported [signing commits and tags using ssh](https://github.blog/changelog/2022-08-23-ssh-commit-verification-now-supported). Until further release script updates are completed you will need to disable this feature in your `~/.gitconfig` and revert to signing via GPG to perform etcd releases.
# Golang modules

The etcd project (since version 3.5) is organized into multiple
[golang modules](https://golang.org/ref/mod) hosted in a [single repository](https://golang.org/ref/mod#vcs-dir).

![modules graph](modules.svg)

There are the following modules:

- **go.etcd.io/etcd/api/v3** - contains API definitions
(like protos & proto-generated libraries) that defines communication protocol
between etcd clients and servers.

- **go.etcd.io/etcd/pkg/v3** - a collection of utility packages used by etcd
without being specific to etcd itself. A package belongs here
only if it could possibly be moved out into its own repository in the future.
Please avoid adding here code that has a lot of dependencies on its own, as
they automatically become dependencies of the client library
(that we want to keep lightweight).

- **go.etcd.io/etcd/client/v3** - client library used to contact etcd over
the network (grpc). Recommended for all new usage of etcd.
```

- **go.etcd.io/raft/v3**
- implementation of distributed consensus
protocol. Should have no etcd specific code. Hosted in a separate repository:
https://github.com/etcd-io/raft.

- **go.etcd.io/etcd/server/v3** - etcd implementation.
The code in this package is internal to etcd and should not be consumed
by external projects. The package layout and API can change within the minor versions.

- **go.etcd.io/etcd/etcdctl/v3** - a command line tool to access and manage etcd.

- **go.etcd.io/etcd/tests/v3** - a module that contains all integration tests of etcd.
  Notice: All unit tests (fast and not requiring cross-module dependencies)
  should be kept in the local modules of the code under the test.

- **go.etcd.io/bbolt** - implementation of persistent b-tree.
  Hosted in a separate repository: https://github.com/etcd-io/bbolt.

### Operations

1. All etcd modules should be released in the same versions, e.g.
  `go.etcd.io/etcd/client/v3@v3.5.10` must depend on `go.etcd.io/etcd/api/v3@v3.5.10`.

  The consistent updating of versions can be performed using:
  ```shell script
  % DRY_RUN=false TARGET_VERSION="v3.5.10" ./scripts/release_mod.sh update_versions
  ```
2. The released modules should be tagged according to https://golang.org/ref/mod#vcs-version rules,
  i.e. each module should get its own tag.
  The tagging can be performed using:
  ```shell script
  % DRY_RUN=false REMOTE_REPO="origin" ./scripts/release_mod.sh push_mod_tags
  ```

3. All etcd modules should depend on the same versions of underlying dependencies.
  This can be verified using:
  ```shell script
  % PASSES="dep" ./test.sh
  ```

4. The go.mod files must not contain dependencies not being used and must
  conform to `go mod tidy` format.
  This is being verified by:
  ```
  % PASSES="mod_tidy" ./test.sh
  ```

5. To trigger actions across all modules (e.g. auto-format all files), please
  use/expand the following script:
  ```shell script
  % ./scripts/fix.sh
  ```

###
 Future

As a North Star, we would like to evaluate etcd modules towards the following model:

![modules graph](modules-future.svg)

This assumes:
 - Splitting etcdmigrate/etcdadm out of etcdctl binary.
   Thanks to this etcdctl would become clearly a command-line wrapper
   around network client API,
   while etcdmigrate/etcdadm would support direct physical operations on the
   etcd storage files.
 - Splitting etcd-proxy out of ./etcd binary, as it contains more experimental code
   so carries additional risk & dependencies.
 - Deprecation of support for v2 protocol.
# Reporting bugs

If any part of the etcd project has bugs or documentation mistakes, please let us know by [opening an issue][etcd-issue]. We treat bugs and mistakes very seriously and believe no issue is too small. Before creating a bug report, please check that an issue reporting the same problem does not already exist.

To make the bug report accurate and easy to understand, please try to create bug reports that are:

- Specific. Include as many details as possible: which version, what environment, what configuration, etc. If the bug is related to running the etcd server, please attach the etcd log (the starting log with the etcd configuration is especially important).

- Reproducible. Include the steps to reproduce the problem. We understand some issues might be hard to reproduce, please include the steps that might lead to the problem. If possible, please attach the affected etcd data dir and stack trace to the bug report.

- Isolated. Please try to isolate and reproduce the bug with
 minimum dependencies. It would significantly slow down the speed to fix a bug if too many dependencies are involved in a bug report. Debugging external systems that rely on etcd is out of scope, but we are happy to provide guidance in the right direction or help with using etcd itself.

- Unique. Do not duplicate existing bug reports.

- Scoped. One bug per report. Do not follow up with another bug inside one report.

It may be worthwhile to read [Elika Etemads article on filing good bug reports][filing-good-bugs] before creating a bug report.

We might ask for further information to locate a bug. A duplicated bug report will be closed.

## Frequently asked questions

### How to get a stack trace

```bash
$ kill -QUIT $PID
```

### How to get the etcd version

```bash
$ etcd --version
```

### How to get etcd configuration and log when it runs as systemd service etcd2.service

```bash
$ sudo systemctl cat etcd2
$ sudo journalctl -u etcd2
```

Due to an upstream systemd bug, journald
may miss the last few log lines when its processes exit. If journalctl says etcd stopped without a fatal or panic message, try `sudo journalctl -f -t etcd2` to get the full log.

[etcd-issue]: https://github.com/etcd-io/etcd/issues/new
[filing-good-bugs]: http://fantasai.inkedblade.net/style/talks/filing-good-bugs/
# Community membership

This doc outlines the various responsibilities of contributor roles in etcd.

| Role | Responsibilities | Requirements | Defined by |
|---|---|---|---|
| Member | Active contributor in the community | Sponsored by 2 reviewers and multiple contributions | etcd GitHub org member |
| Reviewer | Review contributions from other members | History of review and authorship | [OWNERS] file reviewer entry |
| Maintainer | Set direction and priorities for the project | Demonstrated responsibility and excellent technical judgement | [OWNERS] file approver entry |

## New contributors

New contributors should be welcomed to the community by existing members, helped with PR workflow, and directed to relevant documentation and communication channels.

## Established community members

Established community members are expected to demonstrate their adherence to the principles in this document, familiarity with project organization, roles, policies, procedures, conventions, etc., and technical and/or writing ability. Role-specific expectations, responsibilities, and requirements are enumerated below.

## Member

Members are continuously active contributors to the community. They can have issues and PRs assigned to them. Members are expected to remain active contributors to the community.

**Defined by:** Member of the etcd GitHub organization.

### Requirements

- Enabled [two-factor authentication] on their GitHub account
- Have made multiple contributions to the project or community. Contribution may include, but is not limited to:
  - Authoring or reviewing PRs on GitHub. At least one PR must be **merged**.
  - Filing or commenting on issues on GitHub
  - Contributing to community discussions (e.g. meetings, Slack, email discussion forums, Stack Overflow)
- Subscribed to [etcd-dev@googlegroups.com](https://groups.google.com/g/etcd-dev)
- Have read the [contributor guide]
- Sponsored by two active maintainers or reviewers.
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
  - With no objections from other maintainers
- Open a [membership nomination] issue against the `kubernetes/org` repo
  - Ensure your sponsors are @mentioned on the issue
  - Make sure that the list of contributions included is representative of your work on the project.
- Members can be removed by a supermajority of the maintainers or can resign by notifying the maintainers.

### Responsibilities and privileges

- Responsive to issues and PRs assigned to them
- Granted "triage access" to etcd project
- Active owner of code they have contributed (unless ownership is explicitly transferred)

- Code is well-tested
- Tests consistently pass
- Addresses bugs or issues discovered after code is accepted

**Note:** Members who frequently contribute code are expected to proactively perform code reviews and work towards becoming a *reviewer*.

## Reviewers

Reviewers are contributors who have demonstrated greater skill in reviewing the code from other contributors. They are knowledgeable about both the codebase and software engineering principles. Their LGTM counts towards merging a code change into the project. A reviewer is generally on the ladder towards maintainership.

**Defined by:** *reviewers* entry in the [OWNERS] file.

### Requirements

- member for at least 3 months.
- Primary reviewer for at least 5 PRs to the codebase.
- Reviewed or contributed at least 20 substantial PRs to the codebase.
- Knowledgeable about the codebase.
- Sponsored by two active maintainers.
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
  - With no objections from other maintainers
- Reviewers can be removed by a supermajority of the maintainers or can resign by notifying the maintainers.

### Responsibilities and privileges

- Code reviewer status may be a precondition to accepting large code contributions
- Responsible for project quality control via code reviews
  - Focus on code quality and correctness, including testing and factoring
  - May also review for more holistic issues, but not a requirement
- Expected to be responsive to review requests
- Assigned PRs to review related to area of expertise
- Assigned test bugs related to area of expertise
- Granted "triage access" to etcd project

## Maintainers

Maintainers are first and foremost contributors who have shown they are committed to the long-term success of a project. Maintainership is about building trust with the current maintainers and being a person that they can depend on to make decisions in the best interest of the project in a consistent

manner.

**Defined by:** *approvers* entry in the [OWNERS] file.

### Requirements

- Deep understanding of the technical goals and direction of the project
- Deep understanding of the technical domain of the project
- Sustained contributions to design and direction by doing all of:
  - Authoring and reviewing proposals
  - Initiating, contributing, and resolving discussions (emails, GitHub issues, meetings)
  - Identifying subtle or complex issues in the designs and implementation of PRs
- Directly contributed to the project through implementation and/or review
- Sponsored by two active maintainers and elected by supermajority
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
- To become a maintainer send an email with your candidacy to etcd-maintainers-private@googlegroups.com
  - Ensure your sponsors are @mentioned in the email
  - Include a list of contributions representative of your work on the project.
  -

Existing maintainers vote will privately and respond to the email with either acceptance or feedback for suggested improvement.

- With your membership approved you are expected to:
- Open a PR and add an entry to the [OWNERS] file
- Subscribe to etcd-maintainers@googlegroups.com and etcd-maintainers-private@googlegroups.com
- Request to join [etcd-maintainer teams of etcd organization of GitHub](https://github.com/orgs/etcd-io/teams/maintainers-etcd)
- Request to join the private slack channel for etcd maintainers on [kubernetes slack](http://slack.kubernetes.io/)
- Request access to etcd-development GCP project where we publish releases
- Request access to passwords shared between maintainers

### Responsibilities and privileges

- Make and approve technical design decisions
- Set technical direction and priorities
- Define milestones and releases
- Mentor and guide reviewers, and contributors to the project.
- Participate when called upon in the [security disclosure and release process]
- Ensure the continued health of the project
  - Adequate test coverage to confidently release
  - Tests are passing reliably (i.e. not flaky) and are fixed when they fail
- Ensure a healthy process for discussion and decision-making is in place.
- Work with other maintainers to maintain the project's overall health and success holistically

### Retiring

Life priorities, interests, and passions can change. Maintainers can retire and move to [emeritus maintainers]. If a maintainer needs to step down, they should

inform other maintainers and, if possible, help find someone to pick up the related work. At the very least, ensure the related work can be continued. Afterward, they can remove themselves from the list of existing maintainers.

If a maintainer has not been performing their duties for 12 months, they can be removed by other maintainers. In that case, the inactive maintainer will be first notified via an email. If the situation doesn't improve, they will be removed.
If an emeritus maintainer wants to regain an active role, they can do so by renewing their contributions. Active maintainers should welcome such a move. Retiring other maintainers or regaining the status should require the approval of at least two active maintainers.

## Acknowledgements

Contributor roles and responsibilities were written based on [Kubernetes community membership]

[OWNERS]: /OWNERS
[contributor guide]: /CONTRIBUTING.md
[membership nomination]: https://github.com/kubernetes/org/issues/new?assignees=&labels=area%2Fgithub-membership&projects=&template=membership.yml&title=REQUEST%3A+New+membership+for+%3Cyour-GH-handle%3E
[Kubernetes community membership]: https://github.com/kubernetes/community/blob/master/community-membership.md
[emeritus maintainers]: /README.md#etcd-emeritus-maintainers
[security disclosure and release process]: /security/README.md
[two-factor authentication]: https://docs.github.com/en/authentication/securing-your-account-with-two-factor-authentication-2fa/about-two-factor-authentication

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# Logging Conventions

etcd uses the [zap][zap] library for logging application output categorized into *levels*. A log message's level is determined according to these conventions:

* Debug: Everything is still fine, but even common operations may be logged, and less helpful but more quantity of notices. Usually not used in production.
 * Examples:
   * Send a normal message to a remote peer
   * Write a log entry to disk

* Info: Normal, working log information, everything is fine, but helpful notices for auditing or common operations. Should rather not be logged more frequently than once per a few seconds in a normal server's operation.
 * Examples:
   * Startup configuration
   * Start to do a snapshot

* Warning: (Hopefully) Temporary conditions that may cause errors, but may work fine. A replica disappearing (that may reconnect) is a warning.
 * Examples:
   * Failure to send a raft message to a remote peer
   * Failure to receive heartbeat message within the configured election
 timeout

* Error: Data has been lost, a request has failed for a bad reason, or a required resource has been lost.
 * Examples:
   * Failure to allocate disk space for WAL

* Panic: Unrecoverable or unexpected error situation that requires stopping execution.
 * Examples:
   * Failure to create the database

* Fatal: Unrecoverable or unexpected error situation that requires immediate exit. Mostly used in the test.
 * Examples:
   * Failure to find the data directory
   * Failure to run a test function

[zap]: https://github.com/uber-go/zap
# Dependency management

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- **[Core dependencies mappings](#core-dependencies-mappings)**

## Main branch

The dependabot is enabled & [configured](https://github.com/etcd-io/etcd/blob/main/.github/dependabot.yml) to manage dependencies for etcd `main` branch. But dependabot doesn't work well for multi-module repository like `etcd`,
see [dependabot-core/issues/6678](https://github.com/dependabot/dependabot-core/issues/6678).
Usually, human intervention is required
each time when dependabot automatically opens some PRs to bump dependencies.
Please see the guidance below.

### Dependencies used in workflows

The PRs that automatically bump dependencies (see examples below) used in workflows are fine and can be approved & merged directly as long as all checks are successful.

- [build(deps): bump github/codeql-action from 2.2.11 to 2.2.12](https://github.com/etcd-io/etcd/pull/15736)
- [build(deps): bump actions/checkout from 3.5.0 to 3.5.2](https://github.com/etcd-io/etcd/pull/15735)
- [build(deps): bump ossf/scorecard-action from 2.1.2 to 2.1.3](https://github.com/etcd-io/etcd/pull/15607)

### Bumping order

When multiple etcd modules depend on the same package, please bump the package version for all the modules in the correct order. The rule is simple:
if module A depends on module B, then bump the dependency for module B before module A. If the two modules do not depend on each other, then
it doesn't matter to bump which module first. For
example, multiple modules depend on `github.com/spf13/cobra`, so we need to bump the dependency
in the following order,

- go.etcd.io/etcd/pkg/v3
- go.etcd.io/etcd/server/v3
- go.etcd.io/etcd/etcdctl/v3
- go.etcd.io/etcd/etcdutl/v3
- go.etcd.io/etcd/tests/v3
- go.etcd.io/etcd/v3
- go.etcd.io/etcd/tools/v3
For more details about etcd Golang modules, please check <https://etcd.io/docs/next/dev-internal/modules>

Note the module `go.etcd.io/etcd/tools/v3` doesn't depend on any other modules, nor by any other modules, so it doesn't matter when to bump dependencies for it.

### Steps to bump a dependency

Use the `github.com/spf13/cobra` as an example, follow the steps below to bump it from 1.6.1 to 1.7.0 for module

`go.etcd.io/etcd/etcdctl/v3`,

```bash
cd ${ETCD_ROOT_DIR}/etcdctl
go get github.com/spf13/cobra@v1.7.0
go mod tidy
cd ..
./scripts/fix.sh
```

Execute the same steps for all other modules. When you finish bumping the dependency for all modules, then commit the change,

```bash
git
 add .
git commit --signoff -m "dependency: bump github.com/spf13/cobra from 1.6.1 to 1.7.0"
```

Please close the related PRs which were automatically opened by dependabot.

When you bump multiple dependencies in one PR, it's recommended to create a separate commit for each dependency. But it isn't a must; for example,
you can get all dependencies bumping for the module `go.etcd.io/etcd/tools/v3` included in one commit.

#### Troubleshooting

In an event of bumping the version of protoc, protoc plugins or grpc-gateway, it might change `*.proto` file which can result in the following error:

```bash
[0;31mFAIL: 'genproto' FAILED at Wed Jul 31 07:09:08 UTC 2024
make: *** [Makefile:134: verify-genproto] Error 255
```

To fix the above error, run the following script from the root of etcd repository:

```bash
./scripts/genproto.sh
```

### Indirect dependencies

Usually, we don't bump a dependency if all modules just indirectly depend on it, such as `github.com/go-logr/logr`.

If
 an indirect dependency (e.g. `D1`) causes any CVE or bugs that affect etcd, usually the module (e.g. `M1`, not part of etcd, but used by etcd)

which depends on it should bump the dependency (`D1`), and then etcd just needs to bump `M1`. However, if the module (`M1`) somehow doesn't
bump the problematic dependency, then etcd can still bump it (`D1`) directly following the same steps above. But as a long-term solution, etcd should
try to remove the dependency on such module (`M1`) that lack maintenance.

For mixed cases, in which some modules directly while others indirectly depend on a dependency, we have multiple options,

- Bump the dependency for all modules, no matter it's direct or indirect dependency.
- Bump the dependency only for modules that directly depend on it.

We should try to follow the first way, and temporarily fall back to the second one if we run into any issue on the first way. Eventually we
should fix the issue and ensure all modules depend on the same version of the
dependency.

### Known incompatible dependency updates

#### arduino/setup-protoc

Please refer to [build(deps): bump arduino/setup-protoc from 1.3.0 to 2.0.0](https://github.com/etcd-io/etcd/pull/16016)

### Rotation worksheet

The dependabot scheduling interval is weekly; it means dependabot will automatically raise a bunch of PRs per week.
Usually, human intervention is required each time. We have a [rotation worksheet](https://docs.google.com/spreadsheets/d/1jodHIO7Dk2VWTs1IRnfMFaRktS9IH8XRyifOnPdSY8I/edit#gid=1394774387),
and everyone is welcome to participate; you just need to register your name in the worksheet.

## Stable branches

Usually, we don't proactively bump dependencies for stable releases unless there are any CVEs or bugs that affect etcd.

If we have to do it, then follow the same guidance above. Note that there is no `./scripts/fix.sh` in release-3.4, so no need to
execute it for 3.4.

## Golang versions

The etcd project aims to maintain a development branch that
is on the latest [Go version](https://go.dev/dl), ideally, this will align with the Go version in use for Kubernetes project development. For an example of how to update etcd to a new minor release of Go refer to issue <https://github.com/etcd-io/etcd/issues/16393> and the linked pull requests.

Suggested steps for performing a minor version upgrade for the etcd development branch:

1. Carefully review new Go version release notes and potentially related blog posts for any deprecations, performance impacts, or other considerations.
2. Create a GitHub issue to signal intent to upgrade and invite discussion, for example, <https://github.com/etcd-io/etcd/issues/16393>.
3. Complete the upgrade locally in your development environment by editing `.go-version` and running `make fix`.
4. Run performance benchmarks locally to compare before and after.
5. Raise a pull request for the changes, for example, <https://github.com/etcd-io/etcd/pull/16394>.

Stable etcd release branches will be maintained
 to stay on the latest patch release of a supported Go version. Upgrading minor versions will be completed before the minor version in use currently is no longer supported. Refer to the [Go release
policy](https://go.dev/doc/devel/release).

For an example of how to update etcd to a new patch release of Go refer to issue <https://github.com/etcd-io/etcd/issues/16343> and the linked pull requests.

References:

- <https://github.com/kubernetes/sig-release/blob/master/release-engineering/handbooks/go.md>

## Core dependencies mappings

[bbolt](https://github.com/etcd-io/bbolt) and [raft](https://github.com/etcd-io/raft) are two core dependencies of etcd.

Both etcd 3.4.x and 3.5.x depend on bbolt 1.3.x, and etcd 3.6.x (`main` branch) depends on bbolt 1.4.x.

raft is included in the etcd repository for release-3.4 and release-3.5 branches, so etcd 3.4.x and 3.5.x do not depend on any
external raft module. We moved raft into [a separate repository](https://github.com/etcd-io/raft) starting
 from 3.6 (`main` branch), and the first raft
release will be v3.6.0, so etcd 3.6.x will depend on raft 3.6.x.

Please see the table below:

| etcd versions | bbolt versions | raft versions |
|---|---|---|
| 3.4.x | v1.3.x | N/A |
| 3.5.x | v1.3.x | N/A |
| 3.6.x | v1.4.x | v3.6.x |

# 1.4049 etcd-fips-3.6 3.6.11-r0

## 1.4049.1 Available under license :

# Features

This document provides an overview of etcd features and general development guidelines for adding and deprecating them. The project maintainers can override these guidelines per the need of the project following the project governance.

## Overview

The etcd features fall into three stages, experimental, stable, and unsafe.

### Experimental

Any new feature is usually added as an experimental feature. An experimental feature is characterized as below:
- Might be buggy due to a lack of user testing. Enabling the feature may not work as expected.
- Disabled by default when added initially.
- Support for such a feature may be dropped at any time without notice
  - Feature-related issues may be given lower priorities.
  - It can be removed in the next minor or major release without following the feature deprecation policy unless it graduates to a stable future.

### Stable

A stable feature is characterized as below:
- Supported as part of the supported releases of etcd.
-
 May be enabled by default.
- Discontinuation of support must follow the feature deprecation policy.

### Unsafe

Unsafe features are rare and listed under the `Unsafe feature:` section in the etcd usage documentation. By default, they are disabled. They should be used with caution following documentation. An unsafe feature can be removed in the next minor or major release without following the feature deprecation policy.

## Development Guidelines

### Adding a new feature

Any new enhancements to the etcd are typically added as an experimental feature. The general development requirements are listed below. They can be somewhat flexible depending on the scope of the feature and review discussions and will evolve over time.
- Open an issue
  - It must provide a clear need for the proposed feature.
  - It should list development work items as checkboxes. There must be one work item towards future graduation to a stable future.
  - Label the issue with `type/feature` and `experimental`.

  - Keep the issue open for tracking purposes until a decision is made on graduation.
- Open a Pull Request (PR)
  - Provide unit tests. Integration tests are also recommended as possible.
  - Provide robust e2e test coverage. If the feature being added is complicated or quickly needed, maintainers can decide to go with e2e tests for basic coverage initially and have robust coverage added at a later time before the feature graduation to the stable feature.
  - Provide logs for proper debugging.
  - Provide metrics and benchmarks as needed.
  - The Feature should be disabled by default.
  - Any configuration flags related to the implementation of the feature must be prefixed with `experimental` e.g. `--experimental-feature-name`.
  - Add a CHANGELOG entry.
- At least two maintainers must approve feature requirements and related code changes.

### Graduating an Experimental feature to Stable

It is important that experimental features don't get stuck in that stage.
They should be revisited and moved to the stable stage following the graduation steps as described here.

#### Locate graduation candidate
Decide if an experimental feature is ready for graduation to the stable stage.
- Find the issue that was used to enable the experimental feature initially. One way to find such issues is to search for issues with `type/feature` and `experimental` labels.
- Fix any known open issues against the feature.
- Make sure the feature was enabled for at least one previous release. Check the PR(s) reference from the issue to see when the feature-related code changes were merged.

#### Provide implementation
If an experimental feature is found ready for graduation to the stable stage, open a Pull Request (PR) with the following changes.
- Add robust e2e tests if not already provided.
- Add a new stable feature flag identical to the experimental feature flag but without the `--experimental` prefix.
- Deprecate the experimental feature following the [feature deprecation policy](#Deprecating-a-feature).
- Implementation must ensure that both the graduated and deprecated experimental feature flags work as expected. Note that both these flags will co-exist for the timeframe described in the feature deprecation policy.
- Enable the graduated feature by default if needed.

At least two maintainers must approve the work. Patch releases should not be considered for graduation.

### Deprecating a feature

#### Experimental
An experimental feature deprecates when it graduates to the stable stage.
- Add a deprecation message in the documentation of the experimental feature with a recommendation to use a related stable feature. e.g. `DEPRECATED. Use <feature-name> instead.`
- Add a `deprecated` label in the issue that was initially used to enable the experimental feature.

#### Stable
As the project evolves, a stable feature may sometimes need to be deprecated and removed. Such a situation should be handled using the steps below:
- Create an issue for tracking
 purposes.
- Add a deprecation message in the feature usage documentation before a planned release for feature deprecation. e.g. `To be deprecated in <release>.`. If a new feature replaces the `To be deprecated` feature, then also provide a message saying so. e.g. `Use <feature-name> instead.`.
- Deprecate the feature in the planned release with a message as part of the feature usage documentation. e.g. `DEPRECATED`. If a new feature replaces the deprecated feature, then also provide a message saying so. e.g. `DEPRECATED. Use <feature-name> instead.`.
- Add a `deprecated` label in the related issue.

Remove the deprecated feature in the following release. Close any related issue(s). At least two maintainers must approve the work. Patch releases should not be considered for deprecation.
# Set up the local cluster

For testing and development deployments, the quickest and easiest way is to configure a local cluster. For a production deployment, refer to the [clustering][clustering] section.

## Local standalone cluster

### Starting a cluster

Run the following to deploy an etcd cluster as a standalone cluster:

```
$ ./etcd
...
```

If the `etcd` binary is not present in the current working directory, it might be located either at `$GOPATH/bin/etcd` or at `/usr/local/bin/etcd`. Run the command appropriately.

The running etcd member listens on `localhost:2379` for client requests.

### Interacting with the cluster

Use `etcdctl` to interact with the running cluster:

1. Store an example key-value pair in the cluster:

   ```
   $ ./etcdctl put foo bar
   OK
   ```

   If OK is printed, storing the key-value pair is successful.

2. Retrieve the value of `foo`:

```
$ ./etcdctl get foo
bar
```

If `bar` is returned, interaction with the etcd cluster is working as expected.

## Local multi-member cluster

### Starting a cluster

A `Procfile` at the base of the etcd git repository is provided to easily configure a local multi-member cluster. To start a multi-member cluster, navigate to the root of the etcd source tree and perform the following:

1. Install `goreman` to control Procfile-based applications:

```
$ go install github.com/mattn/goreman@latest
```

The installation will place executables in the $GOPATH/bin. If $GOPATH environment variable is not set, the tool will be installed into the $HOME/go/bin. Make sure that $PATH is set accordingly in your environment.

2. Start a cluster with `goreman` using etcd's stock Procfile:

```
$ goreman -f Procfile start
```

The members start running. They listen on `localhost:2379`, `localhost:22379`, and `localhost:32379` respectively for client requests.

### Interacting with the cluster

Use `etcdctl` to interact with the running cluster:

1. Print the list of members:

```
$ etcdctl --write-out=table --endpoints=localhost:2379 member list
```

The list of etcd members is displayed as follows:

```
```

```
+------------------+---------+--------+-----------------------+-----------------------+
|       ID         | STATUS  |  NAME  |      PEER ADDRS       |      CLIENT ADDRS     |
+------------------+---------+--------+-----------------------+-----------------------+
| 8211f1d0f64f3269 | started | infra1 | http://127.0.0.1:2380  | http://127.0.0.1:2379  |
| 91bc3c398fb3c146 | started | infra2 | http://127.0.0.1:22380 | http://127.0.0.1:22379 |
| fd422379fda50e48 | started | infra3 | http://127.0.0.1:32380 | http://127.0.0.1:32379 |
+------------------+---------+--------+-----------------------+-----------------------+
```

2. Store an example key-value pair in the cluster:

```
$ etcdctl put foo bar
OK
```

If OK is printed, storing the key-value pair is successful.

### Testing fault tolerance

To exercise etcd's fault tolerance, kill a member and attempt to retrieve the key.

1. Identify the process name of the member to be stopped.

The `Procfile` lists the properties of the multi-member cluster. For example, consider the member with the process name, `etcd2`.

2. Stop the member:

```
# kill etcd2
$ goreman run stop etcd2
```

3. Store a key:

```
$ etcdctl put key hello
OK
```

4. Retrieve the key that is stored in the previous step:

```
$ etcdctl get key
hello
```

5. Retrieve a key from the stopped member:

```
$ etcdctl --endpoints=localhost:22379 get key
```

The command should display an error caused by connection failure:

```
2017/06/18 23:07:35 grpc: Conn.resetTransport failed to create client transport: connection error: desc =
"transport: dial tcp 127.0.0.1:22379: getsockopt: connection refused"; Reconnecting to "localhost:22379"
Error:  grpc:
timed out trying to connect
```

6. Restart the stopped member:

```
$ goreman run restart etcd2
```

7. Get the key from the restarted member:

```
$ etcdctl --endpoints=localhost:22379 get key
hello
```

Restarting the member re-establishs the connection. `etcdctl` will now be able to retrieve the key successfully. To learn more about interacting with etcd, read [interacting with etcd section][interacting].

[clustering]: https://etcd.io/docs/latest/op-guide/clustering/
[interacting]: https://etcd.io/docs/latest/dev-guide/interacting_v3/
# Issue triage guidelines

## Purpose

Speed up issue management.

The `etcd` issues are listed at <https://github.com/etcd-io/etcd/issues> and are identified with labels. For example, an issue that is identified as a bug will be set to the label `type/bug`.

The etcd project uses labels to indicate common attributes such as `area`, `type`, and `priority` of incoming issues.

New issues will often start without any labels, but typically `etcd` maintainers, reviewers, and members will add labels by following these triage guidelines. The detailed list of labels can be found at <https://github.com/etcd-io/etcd/labels>.

## Scope

This document serves as the primary guidelines for triaging incoming issues in `etcd`.

All contributors are encouraged and welcome to help manage issues which will help reduce the burden on project maintainers, though the work and responsibilities discussed in this document are created with `etcd` project reviewers and members in mind as these individuals will have
triage access to the etcd project which is a requirement for actions like applying labels or closing issues.

Refer to [etcd community membership](https://github.com/etcd-io/etcd/blob/main/Documentation/contributor-guide/community-membership.md) for guidance on becoming an etcd project member or reviewer.

## Step 1 - Find an issue to triage

To get started you can use the following recommended issue searches to identify issues that are in need of triage:

* [Issues that have no labels](https://github.com/etcd-io/etcd/issues?q=is%3Aissue+is%3Aopen+sort%3Aupdated+no%3Alabel)
* [Issues created recently](https://github.com/etcd-io/etcd/issues?q=is%3Aissue+is%3Aopen+)
* [Issues not assigned but linked pr](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+no%3Aassignee+linked%3Apr)
* [Issues with no comments](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+comments%3A0+)
* [Issues with help wanted](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+label%3A%22help+wanted%22+)

## Step 2 - Check the issue is valid

Before we start adding labels or trying to work out a priority, our first triage step needs to be working out if the issue actually belongs to the etcd project and is not a duplicate.

### Issues that don't belong to etcd

Sometimes issues are reported that belong to other projects that `etcd` use. For example, `grpc` or `golang` issues. Such issues should be addressed by asking the reporter to open issues in the appropriate other projects.

These issues can generally be closed unless a maintainer and issue reporter see a need to keep it open for tracking purposes. If you have triage permissions please close it, alternatively mention the @etcd-io/members group to request a member with triage access to close the issue.

### Duplicate issues

If an issue is a duplicate, add a comment stating so along with a reference for the original issue and if you have triage permissions please close it, alternatively mention the @etcd-io/members
group to request a member with triage access close the issue.

## Step 3 - Apply the appropriate type of label

Adding a `type` label to an issue helps create visibility on the health of the project and helps contributors identify potential priorities, i.e. addressing existing bugs or test flakes before implementing new features.

### Support requests

As a general rule, the focus for etcd support is to address common themes in a broad way that helps all users, i.e. through channels like known issues, frequently asked questions, and high-quality documentation. To make the best use of project members time we should avoid providing 1:1 support if a broad approach is available.

Some people mistakenly use our GitHub bug report or feature request templates to file support requests. Usually, they are asking for help operating or configuring some aspect of etcd. Support requests for etcd should instead be raised as [discussions](https://github.com/etcd-io/etcd/discussions).

Common
types of support requests are:

1. Questions about configuring or operating existing well-documented etcd features, for example, <https://github.com/etcd-io/etcd/issues/15945>. Note - If an existing feature is not well documented please apply the `area/documentation` label and propose documentation improvements that would prevent future users from stumbling on the problem again.

2. Bug reports or questions about unsupported versions of etcd, for example <https://github.com/etcd-io/etcd/issues/15796>. When responding to these issues please refer to our [supported versions documentation](https://etcd.io/docs/latest/op-guide/versioning) and encourage the reporter to upgrade to a recent patch release of a supported version as soon as possible. We should limit the effort supporting users that do not make the effort to run a supported version of etcd or ensure their version is patched.

3. Bug reports that do not provide a complete list of steps to reproduce the issue and/or contributors
are not able to reproduce the issue, for example, <https://github.com/etcd-io/etcd/issues/15740>. We should limit the effort we put into reproducing issues ourselves and motivate users to provide the necessary information to accept the bug report.

4. General questions that are filed using feature request or bug report issue templates, for example, <https://github.com/etcd-io/etcd/issues/15914>. Note - These types of requests may surface good additions to our [frequently asked questions](https://etcd.io/docs/v3.5/faq).

If you identify that an issue is a support request please:

1. Add the `type/support` or `type/question` label.

2. Add the following comment to inform the issue creator that discussions should be used instead and that this issue will be converted to a discussion.

> Thank you for your question, this support issue will be moved to our [Discussion Forums](https://github.com/etcd-io/etcd/discussions).
>
> We are trying to consolidate the channels to which

questions for help/support are posted so that we can improve our efficiency in responding to your requests, and make it easier for you to find answers to frequently asked questions and how to address common use cases.
>
> We regularly see messages posted in multiple forums, with the full response thread only in one place or, worse, spread across multiple forums. Also, the large volume of support issues on GitHub is making it difficult for us to use issues to identify real bugs.
>
> Members of the etcd community use Discussion Forums to field support requests. Before posting a new question, please search these for answers to similar questions, and also familiarize yourself with:
>
> 1. [user documentation](https://etcd.io/docs/latest)
> 2. [frequently asked questions](https://etcd.io/docs/v3.5/faq)
>
> Again, thanks for using etcd and raising this question.
>
> The etcd team

3. Finally, click `Convert to discussion` on the right-hand panel,
selecting the appropriate discussion category.

### Bug reports

If an issue has been raised as a bug it should already have the `type/bug` label, however, if this is missing for an issue you determine to be a bug please add the label manually.

The next step is to validate if the issue is indeed a bug. If not, add a comment with the findings and close the trivial issue. For non-trivial issues, wait to hear back from the issue reporter and see if there is any objection. If the issue reporter does not reply in 30 days, close the issue.

If the problem can not be reproduced or requires more information, leave a comment for the issue reporter as soon as possible while the issue is fresh for the issue reporter.

### Feature requests

New feature requests should be created via the etcd feature request template and in theory already have the `type/feature` label, however, if this is missing for an issue you determine to be a feature please add the label manually.

### Test flakes

Test flakes
are a specific type of bug that the etcd project tracks separately as these are a priority to address. These should be created via the test flake template and in theory already have the `type/flake` label, however, if this is missing for an issue you determine to be related to a flaking test please add the label manually.

## Step 4 - Define the areas impacted

Adding an `area` label to an issue helps create visibility on which areas of the etcd project require attention and

helps contributors find issues to work on relating to their particular skills or knowledge of the etcd codebase.

If an issue crosses multiple domains please add additional `area` labels to reflect that.

Below is a brief summary of the area labels in active use by the etcd project along with any notes on their use:

| Label | Notes |
| --- | --- |
| area/external | Tracking label for issues raised that are external to etcd. |
| area/community | |
| area/raft | |
| area/clientv3 | |
| area/performance | |
| area/security | |
| area/tls | |
| area/auth | |
| area/etcdctl | |
| area/etcdutl | |
| area/contrib | Not to be confused with `area/community` this label is specifically used for issues relating to community-maintained scripts or files in the `contrib/` directory which aren't part of the core etcd project. |
| area/documentation | |
| area/tooling | Generally used in relation to the third party / external utilities or tools that are used in various stages of the etcd build, test, or release process, for example, tooling to create sboms. |
| area/testing | |
| area/robustness-testing | |

## Step 5 - Prioritise the issue

If an issue lacks a priority label it has not been formally prioritized yet.

Adding a `priority` label helps the etcd project understand what is important and should be worked on now, and conversely, what is not as important and is on the project backlog.

|Priority label|What it means|Examples|
|---|---|---|
| `priority/critical-urgent` | Maintainers are responsible for making sure that these issues (in their area) are being actively worked oni.e., drop what you're doing. The stuff is burning. These should be fixed before the next release. | user-visible critical bugs in core features <br> broken builds on tier1 supported platforms <br> tests and critical security issues |
| `priority/important-soon` | Must be staffed and worked on either currently or very soonideally in time for the next release. | |
| `priority/important-longterm` | Important over the long term, but may not be currently staffed and/or may require multiple releases to complete. | |
| `priority/backlog` | General agreement that this is a nice-to-have, but no one's available to work on it anytime soon. Community contributions would be most welcome in the meantime, though it might take a while to get them reviewed if reviewers are fully occupied with higher-priority issuesfor example, immediately before a release.| |

| `priority/awaiting-more-evidence`
| Possibly useful, but not yet enough support to actually get it done. | Mostly placeholders for potentially good ideas, so that they don't get completely forgotten, and can be referenced or deduped every time they come up |

## Step 6 - Support new contributors

As part of the `etcd` triage process once the `kind` and `area` have been determined, please consider if the issue would be suitable for a less experienced contributor. The `good first issue` label is a subset of the `help wanted` label, indicating that members have committed to providing extra assistance for new contributors. All `good first issue` items also have the `help wanted` label.

### Help wanted

Items marked with the `help wanted` label need to ensure that they meet these criteria:

* **Low Barrier to Entry** - It should be easy for new contributors.

* **Clear** - The task is agreed upon and does not require further discussions in the community.

* **Goldilocks priority** - The priority
should not be so high that a core contributor should do it, but not too low that it isnt useful enough for a core contributor to spend time reviewing it, answering questions, helping get it into a release, etc.

### Good first issue

Items marked with `good first issue` are intended for first-time contributors. It indicates that members will keep an eye out for these pull requests and shepherd it through our processes.

New contributors should not be left to find an approver, ping for reviews, decipher test commands, or identify that their build failed due to a flake. It is important to make new contributors feel welcome and valued. We should assure them that they will have an extra level of help with their first contribution.

After a contributor has successfully completed one or two `good first issue` items, they should be ready to move on to `help wanted` items.

* **No Barrier to Entry** - The task is something that a new contributor can tackle without advanced setup or domain knowledge.

*
**Solution Explained** - The recommended solution is clearly described in the issue.

* **Gives Examples** - Link to examples of similar implementations so new contributors have a reference guide for their changes.

* **Identifies Relevant Code** - The relevant code and tests to be changed should be linked in the issue.

* **Ready to Test** - There should be existing tests that can be modified, or existing test cases fit to be copied. If the area of code doesnt have tests, before labeling the issue, add a test fixture. This prep often makes a great help

wanted task!

## Step 7 - Follow up

Once initial triage has been completed, issues need to be re-evaluated over time to ensure they don't become stale incorrectly.

### Track important issues

If an issue is at risk of being closed by the stale bot in the future, but is an important issue for the etcd project, then please apply the `stage/tracked` label and remove any `stale` labels that exist. This will ensure the project does not lose sight of the issue.

### Close incomplete issues

Issues that lack enough information from the issue reporter should be closed if the issue reporter does not provide information in 30 days. Issues can always be re-opened at a later date if new information is provided.

### Check for incomplete work

If an issue owned by a developer has no pull request created in 30 days, contact the issue owner and kindly ask about the status of their work, or to release ownership on the issue if needed.
# Branch management

## Guide

* New development occurs on the [main branch][main].
* The main branch should always have a green build!
* Backwards-compatible bug fixes should target the main branch and subsequently be ported to stable branches.
* Once the main branch is ready for release, it will be tagged and become the new stable branch.

The etcd team has adopted a *rolling release model* and supports two stable versions of etcd.

### Main branch

The `main` branch is our development branch. All new features land here first.

To try new and experimental features, pull `main` and play with it. Note that `main` may not be stable because new features may introduce bugs.

Before the release of the next stable version, feature PRs will be frozen. A [release manager](./release.md#release-management) will be assigned to the major/minor version and will lead the etcd community in testing, bug-fix, and documentation of the release for one to two weeks.

### Stable branches

All branches with

the prefix `release-` are considered _stable_ branches.

After every minor release ([semver.org](https://semver.org/)), we will have a new stable branch for that release, managed by a [patch release manager](./release.md#release-management). We will keep fixing the backward-compatible bugs for the latest two stable releases. A _patch_ release to each supported release branch, incorporating any bug fixes, will be once every two weeks, given any patches.

[main]: https://github.com/etcd-io/etcd/tree/main
# PR management

## Purpose

Speed up PR management.

The `etcd` PRs are listed at https://github.com/etcd-io/etcd/pulls
A PR can have various labels, milestones, reviewers, etc. The detailed list of labels can be found at https://github.com/kubernetes/kubernetes/labels

Following are a few example searches on PR for convenience:
* [Open PRS for milestone etcd-v3.6](https://github.com/etcd-io/etcd/pulls?utf8=%E2%9C%93&q=is%3Apr+is%3Aopen+milestone%3Aetcd-v3.6)
* [PRs under investigation](https://github.com/etcd-io/etcd/labels/Investigating)

## Scope

These guidelines serve as a primary document for managing PRs in `etcd`. Everyone is welcome to help manage PRs but the work and responsibilities discussed in this document are created with `etcd` maintainers and active contributors in mind.

## Ensure tests are run

The etcd project use Kubernetes Prow and GitHub Actions to run tests. To ensure all required tests run if a pull request is ready for testing and still has the `needs-ok-to-test`
label then please comment on the pull request `/ok-to-test`.

## Handle inactive PRs
Poke PR owner if review comments are not addressed in 15 days. If the PR owner does not reply in 90 days, update the PR with a new commit if possible. If not, inactive PR should be closed after 180 days.

## Poke reviewer if needed

Reviewers are responsive in a timely fashion, but considering everyone is busy, give them some time after requesting a review if a quick response is not provided. If the response is not provided in 10 days, feel free to contact them via adding a comment in the PR or sending an email or message on Slack.

## Verify important labels are in place

Make sure that appropriate reviewers are added to the PR. Also, make sure that a milestone is identified. If any of

these or other important labels are missing, add them. If a correct label cannot be decided, leave a comment for the maintainers to do so as needed.
# Roadmap

etcd uses GitHub milestones to track all tasks in each major or minor release. The `roadmap.md` file only records the
most important tasks for each release. The list is based on the current maintainer capacity that may shift over time. Proposed milestones are what we think we can deliver with the people we have. If we have more support on the important
stuff, we could pick up more items from the backlog. Note that etcd will continue to mainly focus on technical debt over
the next few major or minor releases.

Each item has an assigned priority. Refer to [priority definitions](https://github.com/etcd-io/etcd/blob/main/Documentation/contributor-guide/triage_issues.md#step-5---prioritise-the-issue).

## v3.6.0

For a full list of tasks in `v3.6.0`, please see [milestone etcd-v3.6](https://github.com/etcd-io/etcd/milestone/38).

| Title | Priority | Status | Note |
|---|---|---|---|
| [Support downgrade](https://github.com/etcd-io/etcd/issues/11716) | priority/important-soon | In progress | etcd will support downgrade starting from 3.6.0. But it will also support offline downgrade from 3.5 to 3.4. |
| [StoreV2 deprecation](https://github.com/etcd-io/etcd/issues/12913) | priority/important-soon | In progress | This task will be covered in both 3.6 and 3.7. |
| [Release raft 3.6.0](https://github.com/etcd-io/raft/issues/89) | priority/important-soon | Not started | etcd 3.6.0 will depends on raft 3.6.0 |
| [Release bbolt 1.4.0](https://github.com/etcd-io/bbolt/issues/553) | priority/important-soon | Not started | etcd 3.6.0 will depends on bbolt 1.4.0 |
| [Support /livez and /readyz endpoints](https://github.com/etcd-io/etcd/issues/16007) | priority/important-longterm | In progress | It provides clearer APIs, and can also work around the stalled writes issue |
| [Bump gRPC](https://github.com/etcd-io/etcd/issues/16290) | priority/important-longterm | Completed | It isn't guaranteed to be resolved in 3.6, and might be postponed to 3.7 depending on the effort and risk. |
| [Deprecate grpc-gateway or bump it](https://github.com/etcd-io/etcd/issues/14499) | priority/important-longterm | Completed | It isn't guaranteed to be resolved in 3.6, and might be postponed to 3.7 depending on the effort and risk. |
| [bbolt: Add logger into bbolt](https://github.com/etcd-io/bbolt/issues/509) | priority/important-longterm | Completed | It's important to diagnose bbolt issues |

| [bbolt: Add surgery commands](https://github.com/etcd-io/bbolt/issues/370) | priority/important-longterm | Completed | Surgery commands are important for fixing corrupted db files |
| [Evaluate and (Gradulate or deprecate/remove) experimental features](https://github.com/etcd-io/etcd/issues/16292) | priority/backlog | Not started | This task will be covered in both 3.6 and 3.7. |

## v3.7.0

For a full list of tasks in `v3.7.0`, please see [milestone etcd-v3.7](https://github.com/etcd-io/etcd/milestone/39).

| Title | Priority | Note |
|---|---|---|
| [StoreV2 deprecation](https://github.com/etcd-io/etcd/issues/12913) | P0 | Finish the remaining tasks 3.7. |
| [Refactor lease: Lease might be revoked by mistake by old leader](https://github.com/etcd-io/etcd/issues/15247) | P1 | to be investigated & discussed |
| [Integrate raft's new feature (async write) into etcd](https://github.com/etcd-io/etcd/issues/16291) | P1 | It should improve the performance |
| [bbolt: Support customizing the bbolt rebalance threshold](https://github.com/etcd-io/bbolt/issues/422) | P2 | It may get rid of etcd's defragmentation. Both bbolt and etcd need to be changed. |
| [Evaluate and (graduate or deprecate/remove) experimental features](https://github.com/etcd-io/etcd/issues/16292) | P2 | Finish the remaining tasks 3.7. |

## Backlog (future releases)

| Title | Priority | Note |
|---|---|---|
| [Remove the dependency on grpc-go's experimental API](https://github.com/etcd-io/etcd/issues/15145) | | |
| [Protobuf: cleanup both golang/protobuf and gogo/protobuf](https://github.com/etcd-io/etcd/issues/14533) | | |
| [Proposals should include a merkle root](https://github.com/etcd-io/etcd/issues/13839) | | |
| [Add Distributed Tracing using OpenTelemetry](https://github.com/etcd-io/etcd/issues/12460) | | |
| [Support CA rotation](https://github.com/etcd-io/etcd/issues/11555) | | |
| [bbolt: Migrate all commands to cobra style commands](https://github.com/etcd-io/bbolt/issues/472) | | |
| [raft: enhance the configuration change validation](https://github.com/etcd-io/raft/issues/80) | | |

# Release

The guide talks about how to release a new version of etcd.

The procedure includes some manual steps for sanity checking, but it can probably be further scripted. Please keep this document up-to-date if making changes to the release process.

## Release management

The following pool of release candidates manages the release of each etcd major/minor version as well as manages patches
to each stable release branch. They are responsible for communicating the timelines and status of each release and for ensuring the stability of the release branch.

- Benjamin Wang [@ahrtr](https://github.com/ahrtr)
- James Blair [@jmhbnz](https://github.com/jmhbnz)
- Marek Siarkowicz [@serathius](https://github.com/serathius)
- Sahdev Zala [@spzala](https://github.com/spzala)
- Wenjia Zhang [@wenjiaswe](https://github.com/wenjiaswe)

All release version numbers follow the format of [semantic versioning 2.0.0](http://semver.org/).

### Major, minor version release, or its pre-release

- Ensure
 the relevant [milestone](https://github.com/etcd-io/etcd/milestones) on GitHub is complete. All referenced issues should be closed or moved elsewhere.
- Ensure the latest [upgrade documentation](https://etcd.io/docs/next/upgrades) is available.
- Bump [hardcoded MinClusterVerion in the repository](https://github.com/etcd-io/etcd/blob/v3.4.15/version/version.go#L29), if necessary.
- Add feature capability maps for the new version, if necessary.

### Patch version release

- To request a backport, developers submit cherry-pick PRs targeting the release branch. The commits should not include merge commits. The commits should be restricted to bug fixes and security patches.
- The cherrypick PRs should target the appropriate release branch (`base:release-<major>-<minor>`). The k8s infra cherry pick robot `/cherrypick <branch>` PR chatops command may be used to automatically generate cherrypick PRs.
- The release patch manager reviews the cherrypick PRs. Please discuss carefully what is backported
 to the patch release. Each patch release should be strictly better than its predecessor.
- The release patch manager will cherry-pick these commits starting from the oldest one into stable branch.

## Write a release note

- Write an introduction for the new release. For example, what major bug we fix, what new features we introduce, or what performance improvement we make.
- Put `[GH XXXX]` at the head of the change line to reference the Pull Request that introduces the change. Moreover, add a link on it to jump to the Pull Request.
- Find PRs with the `release-note` label and explain them in the `NEWS` file, as a straightforward summary of changes for end-users.

## Patch release criteria

The etcd project aims to release a new patch version if any of the following conditions are met:

- Fixed one or more major CVEs (>=7.5).
- Fixed one or more critical bugs.
- Fixed three or more major bugs.
- Fixed five or more minor bugs.

## Release guide

### Prerequisites

There are some
 prerequisites, which should be done before the release process. These are one-time operations,
which don't need to be executed before releasing each version.
1. Generate a GPG key and add it to your GitHub account. Refer to the links on
[settings](https://github.com/settings/keys).
2. Ensure you have a Linux machine, on which the git, Golang, and docker have been installed.
   - Ensure the Golang version matches the version defined in `.go-version` file.
   - Ensure non-privileged users can run docker commands, refer to the [Linux
postinstall](https://docs.docker.com/engine/install/linux-postinstall/).
   - Ensure there is at least 5GB of free space on your Linux machine.
3. Install gsutil, refer to [gsutil_install](https://cloud.google.com/storage/docs/gsutil_install). When asked about
cloud project to use, pick `etcd-development`.
4. Authenticate the image registry, refer to [Authentication methods](https://cloud.google.com/container-
registry/docs/advanced-authentication).
  - `gcloud
 auth login`
  - `gcloud auth configure-docker`
5. Install gh, refer to [GitHub's documentation](https://github.com/cli/cli#installation). Ensure that running
  `gh auth login` succeeds for the GitHub account you use to contribute to etcd,
  and that `gh auth status` has a clean exit and doesn't show any issues.

### Release steps

1. Raise an issue to publish the release plan, e.g. [issues/17350](https://github.com/etcd-io/etcd/issues/17350).
2. Raise a `kubernetes/org` pull request to temporarily elevate permissions for the GitHub release team.
3. Once permissions are elevated, temporarily relax [branch protections](https://github.com/etcd-
io/etcd/settings/branches) to allow pushing changes directly to `release-*` branches in GitHub.
4. Verify you can pass the authentication to the image registries,
  - `docker login gcr.io`
  - `docker login quay.io`
    - If the release person doesn't have access to 1password, one of the owners (@ahrtr, @ivanvc, @jmhbnz,
@serathius) needs
 to share the password with them per [this guide](https://support.1password.com/share-items/). See rough steps
below,
      - [Sign in](https://team-etcd.1password.com/home) to your account on 1password.com.
      - Click `Your Vault Items` on the right side.
      - Select `Password of quay.io`.
      - Click `Share` on the top right, and set expiration as `1 hour` and only available to the release person using

his/her email.
    - Click `Copy Link` then send the link to the release person via slack or email.
5. Clone the etcd repository and checkout the target branch,
  - `git clone --branch release-3.X git@github.com:etcd-io/etcd.git`
6. Run the release script under the repository's root directory, replacing `${VERSION}` with a value without the `v` prefix, i.e. `3.5.13`.
  - `DRY_RUN=false ./scripts/release.sh ${VERSION}`
  - **NOTE:** When doing a pre-release (i.e., a version from the main branch, 3.6.0-alpha.2), you will need to explicitly set the branch to main:

  ```
    DRY_RUN=false BRANCH=main ./scripts/release.sh ${VERSION}
    ```

  It generates all release binaries under the directory `/tmp/etcd-release-${VERSION}/etcd/release/` and images. Binaries are pushed to the Google Cloud bucket
  under project `etcd-development`, and images are pushed to `quay.io` and `gcr.io`.
7. Publish the release page on GitHub
  - Open the **draft** release URL shown by the release script
  - Click the pen button at the top right to edit the release
  - Review that it looks correct, reviewing that the bottom checkboxes are checked depending on the
    release version (v3.4 no checkboxes, v3.5 has the set as latest release checkbox checked,
    v3.6 has the set as pre-release checkbox checked)
  - Then, publish the release
8. Announce to the etcd-dev googlegroup

  Follow the format of previous release emails sent to etcd-dev@googlegroups.com, see an example below. After sending out the email, ask one of the mailing list maintainers to approve the
 email from the pending list. Additionally, label the release email as `Release`.

```text
Hello,

etcd v3.4.30 is now public!

https://github.com/etcd-io/etcd/releases/tag/v3.4.30

Thanks to everyone who contributed to the release!

etcd team
```

9. Update the changelog to reflect the correct release date.
10. Paste the release link to the issue raised in Step 1 and close the issue.
11. Restore standard branch protection settings and raise a follow-up `kubernetes/org` pull request to return to least privilege permissions.
12. Crease a new stable branch through `git push origin release-${VERSION_MAJOR}.${VERSION_MINOR}` if this is a new major or minor stable release.

13. Re-generate a new password for quay.io if needed (e.g. shared to a contributor who isn't in the release team, and we should rotate the password at least once every 3 months).

#### Release known issues

1. Timeouts pushing binaries - If binaries fail to fully upload to Google Cloud storage, the script must be re-run using the same command. Any artifacts that are already pushed will be overwritten to ensure they are correct. The storage bucket does not use object versioning so incorrect files cannot remain.

2. Timeouts pushing images - It is rare, although possible for connection timeouts to occur when publishing etcd release images to `quay.io` or `gcr.io`. If this occurs, it is known to be safe to rerun the release script command appending the `--no-upload` flag, and image uploads will gracefully resume.

3. GPG vs SSH signing - The release scripts assume that git tags will be signed with a GPG key. Since 2022 GitHub has supported [signing commits and tags using ssh](https://github.blog/changelog/2022-08-23-ssh-commit-verification-now-supported). Until further release script updates are completed you will need to disable this feature in your `~/.gitconfig` and revert to signing via GPG to perform etcd releases.
# Golang modules

The etcd project (since version 3.5) is organized into multiple
[golang modules](https://golang.org/ref/mod) hosted in a [single repository](https://golang.org/ref/mod#vcs-dir).

![modules graph](modules.svg)

There are the following modules:

- **go.etcd.io/etcd/api/v3** - contains API definitions
(like protos & proto-generated libraries) that defines communication protocol
between etcd clients and servers.

- **go.etcd.io/etcd/pkg/v3** - a collection of utility packages used by etcd
without being specific to etcd itself. A package belongs here
only if it could possibly be moved out into its own repository in the future.
Please avoid adding here code that has a lot of dependencies on its own, as
they automatically become dependencies of the client library
(that we want to keep lightweight).

- **go.etcd.io/etcd/client/v3** - client library used to contact etcd over
the network (grpc). Recommended for all new usage of etcd.

- **go.etcd.io/raft/v3**
- implementation of distributed consensus
protocol. Should have no etcd specific code. Hosted in a separate repository:
https://github.com/etcd-io/raft.

- **go.etcd.io/etcd/server/v3** - etcd implementation.
The code in this package is internal to etcd and should not be consumed
by external projects. The package layout and API can change within the minor versions.

- **go.etcd.io/etcd/etcdctl/v3** - a command line tool to access and manage etcd.

- **go.etcd.io/etcd/tests/v3** - a module that contains all integration tests of etcd.
  Notice: All unit tests (fast and not requiring cross-module dependencies)
  should be kept in the local modules of the code under the test.

- **go.etcd.io/bbolt** - implementation of persistent b-tree.
  Hosted in a separate repository: https://github.com/etcd-io/bbolt.

### Operations

1. All etcd modules should be released in the same versions, e.g.
   `go.etcd.io/etcd/client/v3@v3.5.10` must depend on `go.etcd.io/etcd/api/v3@v3.5.10`.

   The consistent updating of versions can be performed using:
   ```shell script
   % DRY_RUN=false TARGET_VERSION="v3.5.10" ./scripts/release_mod.sh update_versions
   ```
2. The released modules should be tagged according to https://golang.org/ref/mod#vcs-version rules,
   i.e. each module should get its own tag.
   The tagging can be performed using:
   ```shell script
   % DRY_RUN=false REMOTE_REPO="origin" ./scripts/release_mod.sh push_mod_tags
   ```

3. All etcd modules should depend on the same versions of underlying dependencies.
   This can be verified using:
   ```shell script
   % PASSES="dep" ./test.sh
   ```

4. The go.mod files must not contain dependencies not being used and must
   conform to `go mod tidy` format.
   This is being verified by:
   ```
   % PASSES="mod_tidy" ./test.sh
   ```

5. To trigger actions across all modules (e.g. auto-format all files), please
   use/expand the following script:
   ```shell script
   % ./scripts/fix.sh
   ```

###

Future

As a North Star, we would like to evaluate etcd modules towards the following model:

![modules graph](modules-future.svg)

This assumes:
- Splitting etcdmigrate/etcdadm out of etcdctl binary.
  Thanks to this etcdctl would become clearly a command-line wrapper
  around network client API,
  while etcdmigrate/etcdadm would support direct physical operations on the
  etcd storage files.
- Splitting etcd-proxy out of ./etcd binary, as it contains more experimental code
  so carries additional risk & dependencies.
- Deprecation of support for v2 protocol.

# Reporting bugs

If any part of the etcd project has bugs or documentation mistakes, please let us know by [opening an issue][etcd-issue]. We treat bugs and mistakes very seriously and believe no issue is too small. Before creating a bug report, please check that an issue reporting the same problem does not already exist.

To make the bug report accurate and easy to understand, please try to create bug reports that are:

- Specific. Include as many details as possible: which version, what environment, what configuration, etc. If the bug is related to running the etcd server, please attach the etcd log (the starting log with the etcd configuration is especially important).

- Reproducible. Include the steps to reproduce the problem. We understand some issues might be hard to reproduce, please include the steps that might lead to the problem. If possible, please attach the affected etcd data dir and stack trace to the bug report.

- Isolated. Please try to isolate and reproduce the bug with
minimum dependencies. It would significantly slow down the speed to fix a bug if too many dependencies are involved in a bug report. Debugging external systems that rely on etcd is out of scope, but we are happy to provide guidance in the right direction or help with using etcd itself.

- Unique. Do not duplicate existing bug reports.

- Scoped. One bug per report. Do not follow up with another bug inside one report.

It may be worthwhile to read [Elika Etemads article on filing good bug reports][filing-good-bugs] before creating a bug report.

We might ask for further information to locate a bug. A duplicated bug report will be closed.

## Frequently asked questions

### How to get a stack trace

```bash
$ kill -QUIT $PID
```

### How to get the etcd version

```bash
$ etcd --version
```

### How to get etcd configuration and log when it runs as systemd service etcd2.service

```bash
$ sudo systemctl cat etcd2
$ sudo journalctl -u etcd2
```

Due to an upstream systemd bug, journald
may miss the last few log lines when its processes exit. If journalctl says etcd stopped without a fatal or panic message, try `sudo journalctl -f -t etcd2` to get the full log.

[etcd-issue]: https://github.com/etcd-io/etcd/issues/new
[filing-good-bugs]: http://fantasai.inkedblade.net/style/talks/filing-good-bugs/
# Community membership

This doc outlines the various responsibilities of contributor roles in etcd.

| Role | Responsibilities | Requirements | Defined by |
|---|---|---|---|
| Member | Active contributor in the community | Sponsored by 2 reviewers and multiple contributions | etcd GitHub org member |
| Reviewer | Review contributions from other members | History of review and authorship | [OWNERS] file reviewer entry |
| Maintainer | Set direction and priorities for the project | Demonstrated responsibility and excellent technical judgement | [OWNERS] file approver entry |

## New contributors

New contributors should be welcomed to the community by existing members,
helped with
PR workflow, and directed to relevant documentation and
communication channels.

## Established community members

Established community members are expected to demonstrate their adherence to the principles in this document, familiarity with project organization, roles, policies, procedures, conventions, etc., and technical and/or writing ability. Role-specific expectations, responsibilities, and requirements are enumerated below.

## Member

Members are continuously active contributors to the community. They can have issues and PRs assigned to them. Members are expected to remain active contributors to the community.

**Defined by:** Member of the etcd GitHub organization.

### Requirements

- Enabled [two-factor authentication] on their GitHub account
- Have made multiple contributions to the project or community. Contribution may include, but is not limited to:
  - Authoring or reviewing PRs on GitHub. At least one PR must be **merged**.
  - Filing or commenting on issues on GitHub
  - Contributing to community discussions (e.g. meetings, Slack, email discussion forums, Stack Overflow)
- Subscribed to [etcd-dev@googlegroups.com](https://groups.google.com/g/etcd-dev)
- Have read the [contributor guide]
- Sponsored by two active maintainers or reviewers.
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
  - With no objections from other maintainers
- Open a [membership nomination] issue against the `kubernetes/org` repo
  - Ensure your sponsors are @mentioned on the issue
  - Make sure that the list of contributions included is representative of your work on the project.
- Members can be removed by a supermajority of the maintainers or can resign by notifying the maintainers.

### Responsibilities and privileges

- Responsive to issues and PRs assigned to them
- Granted "triage access" to etcd project
- Active owner of code they have contributed (unless ownership is explicitly transferred)
  - Code is well-tested
  - Tests consistently pass
  - Addresses bugs or issues discovered after code is accepted

**Note:** Members who frequently contribute code are expected to proactively perform code reviews and work towards becoming a *reviewer*.

## Reviewers

Reviewers are contributors who have demonstrated greater skill in
reviewing the code from other contributors. They are knowledgeable about both
the codebase and software engineering principles. Their LGTM counts towards
merging a code change into the project. A reviewer is generally on the ladder towards
maintainership.

**Defined by:** *reviewers* entry in the [OWNERS] file.

### Requirements

- member for at least 3 months.
- Primary reviewer for at least 5 PRs to the codebase.
- Reviewed or contributed at least 20 substantial PRs to the codebase.
- Knowledgeable about the codebase.
- Sponsored by two active maintainers.
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
  - With no objections from other maintainers
- Reviewers can be removed by a supermajority of the maintainers or can resign by notifying the maintainers.

### Responsibilities and privileges

- Code reviewer status may be a precondition to accepting large code contributions
- Responsible for project quality control via code reviews
  - Focus on code quality and correctness, including testing and factoring
  - May also review for more holistic issues, but not a requirement
- Expected to be responsive to review requests
- Assigned PRs to review related to area of expertise
- Assigned test bugs related to area of expertise
- Granted "triage access" to etcd project

## Maintainers

Maintainers are first and foremost contributors who have shown they
are committed to the long-term success of a project. Maintainership is about building
trust with the current maintainers and being a person that they can
depend on to make decisions in the best interest of the project in a consistent
manner.

**Defined by:** *approvers* entry in the [OWNERS] file.

### Requirements

- Deep understanding of the technical goals and direction of the project
- Deep understanding of the technical domain of the project
- Sustained contributions to design and direction by doing all of:
  - Authoring and reviewing proposals

  - Initiating, contributing, and resolving discussions (emails, GitHub issues, meetings)
  - Identifying subtle or complex issues in the designs and implementation of PRs
- Directly contributed to the project through implementation and/or review
- Sponsored by two active maintainers and elected by supermajority
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
- To become a maintainer send an email with your candidacy to etcd-maintainers-private@googlegroups.com
  - Ensure your sponsors are @mentioned in the email
  - Include a list of contributions representative of your work on the project.
  -
 Existing maintainers vote will privately and respond to the email with either acceptance or feedback for suggested improvement.
- With your membership approved you are expected to:
 - Open a PR and add an entry to the [OWNERS] file
 - Subscribe to etcd-maintainers@googlegroups.com and etcd-maintainers-private@googlegroups.com
 - Request to join [etcd-maintainer teams of etcd organization of GitHub](https://github.com/orgs/etcd-io/teams/maintainers-etcd)
 - Request to join the private slack channel for etcd maintainers on [kubernetes slack](http://slack.kubernetes.io/)
 - Request access to etcd-development GCP project where we publish releases
 - Request access to passwords shared between maintainers

### Responsibilities and privileges

- Make and approve technical design decisions
- Set technical direction and priorities
- Define milestones and releases
- Mentor and guide reviewers, and contributors to the project.
- Participate when called upon in the [security disclosure and
 release process]
- Ensure the continued health of the project
  - Adequate test coverage to confidently release
  - Tests are passing reliably (i.e. not flaky) and are fixed when they fail
- Ensure a healthy process for discussion and decision-making is in place.
- Work with other maintainers to maintain the project's overall health and success holistically

### Retiring

Life priorities, interests, and passions can change. Maintainers can retire and
move to [emeritus maintainers]. If a maintainer needs to step down, they should
inform other maintainers and, if possible, help find someone to pick up the related
work. At the very least, ensure the related work can be continued. Afterward,
they can remove themselves from the list of existing maintainers.

If a maintainer has not been performing their duties for 12 months,
they can be removed by other maintainers. In that case, the inactive maintainer will
be first notified via an email. If the situation doesn't improve, they will be
removed.
 If an emeritus maintainer wants to regain an active role, they can do
so by renewing their contributions. Active maintainers should welcome such a move.

Retiring other maintainers or regaining the status should require the approval
of at least two active maintainers.

## Acknowledgements

Contributor roles and responsibilities were written based on [Kubernetes community membership]

[OWNERS]: /OWNERS
[contributor guide]: /CONTRIBUTING.md
[membership nomination]: https://github.com/kubernetes/org/issues/new?assignees=&labels=area%2Fgithub-membership&projects=&template=membership.yml&title=REQUEST%3A+New+membership+for+%3Cyour-GH-handle%3E
[Kubernetes community membership]: https://github.com/kubernetes/community/blob/master/community-membership.md
[emeritus maintainers]: /README.md#etcd-emeritus-maintainers
[security disclosure and release process]: /security/README.md
[two-factor authentication]: https://docs.github.com/en/authentication/securing-your-account-with-two-factor-authentication-2fa/about-two-factor-authentication

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limitations under the License.
# Logging Conventions

etcd uses the [zap][zap] library for logging application output categorized into *levels*. A log message's level is determined according to these conventions:

* Debug: Everything is still fine, but even common operations may be logged, and less helpful but more quantity of notices. Usually not used in production.
 * Examples:
  * Send a normal message to a remote peer
  * Write a log entry to disk

* Info: Normal, working log information, everything is fine, but helpful notices for auditing or common operations. Should rather not be logged more frequently than once per a few seconds in a normal server's operation.
 * Examples:
   * Startup configuration
   * Start to do a snapshot

* Warning: (Hopefully) Temporary conditions that may cause errors, but may work fine. A replica disappearing (that may reconnect) is a warning.
 * Examples:
   * Failure to send a raft message to a remote peer
   * Failure to receive heartbeat message within the configured election
 timeout

* Error: Data has been lost, a request has failed for a bad reason, or a required resource has been lost.
 * Examples:
   * Failure to allocate disk space for WAL

* Panic: Unrecoverable or unexpected error situation that requires stopping execution.
 * Examples:
   * Failure to create the database

* Fatal: Unrecoverable or unexpected error situation that requires immediate exit. Mostly used in the test.
 * Examples:
   * Failure to find the data directory
   * Failure to run a test function

[zap]: https://github.com/uber-go/zap
# Dependency management

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 - [Indirect dependencies](#indirect-dependencies)
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 - [Rotation worksheet](#rotation-worksheet)
- **[Stable branches](#stable-branches)**
- **[Golang versions](#golang-versions)**
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## Main branch

The dependabot is enabled & [configured](https://github.com/etcd-io/etcd/blob/main/.github/dependabot.yml) to manage dependencies for etcd `main` branch. But dependabot doesn't work well for multi-module repository like `etcd`,

see [dependabot-core/issues/6678](https://github.com/dependabot/dependabot-core/issues/6678).
Usually, human intervention is required
each time when dependabot automatically opens some PRs to bump dependencies.
Please see the guidance below.

### Dependencies used in workflows

The PRs that automatically bump dependencies (see examples below) used in workflows are fine and can be approved & merged directly as long as all checks are successful.

- [build(deps): bump github/codeql-action from 2.2.11 to 2.2.12](https://github.com/etcd-io/etcd/pull/15736)
- [build(deps): bump actions/checkout from 3.5.0 to 3.5.2](https://github.com/etcd-io/etcd/pull/15735)
- [build(deps): bump ossf/scorecard-action from 2.1.2 to 2.1.3](https://github.com/etcd-io/etcd/pull/15607)

### Bumping order

When multiple etcd modules depend on the same package, please bump the package version for all the modules in the correct order. The rule is simple:
if module A depends on module B, then bump the dependency for module B before module A. If the two modules do not depend on each other, then
it doesn't matter to bump which module first. For
example, multiple modules depend on `github.com/spf13/cobra`, so we need to bump the dependency
in the following order,

- go.etcd.io/etcd/pkg/v3
- go.etcd.io/etcd/server/v3
- go.etcd.io/etcd/etcdctl/v3
- go.etcd.io/etcd/etcdutl/v3
- go.etcd.io/etcd/tests/v3
- go.etcd.io/etcd/v3
- go.etcd.io/etcd/tools/v3

For more details about etcd Golang modules, please check <https://etcd.io/docs/next/dev-internal/modules>

Note the module `go.etcd.io/etcd/tools/v3` doesn't depend on any other modules, nor by any other modules, so it doesn't matter when to bump dependencies for it.

### Steps to bump a dependency

Use the `github.com/spf13/cobra` as an example, follow the steps below to bump it from 1.6.1 to 1.7.0 for module `go.etcd.io/etcd/etcdctl/v3`,

```bash
cd ${ETCD_ROOT_DIR}/etcdctl
go get github.com/spf13/cobra@v1.7.0
go mod tidy
cd ..
./scripts/fix.sh
```

Execute the same steps for all other modules. When you finish bumping the dependency for all modules, then commit the change,

```bash
git
 add .
git commit --signoff -m "dependency: bump github.com/spf13/cobra from 1.6.1 to 1.7.0"
```

Please close the related PRs which were automatically opened by dependabot.

When you bump multiple dependencies in one PR, it's recommended to create a separate commit for each dependency. But it isn't a must; for example,
you can get all dependencies bumping for the module `go.etcd.io/etcd/tools/v3` included in one commit.

#### Troubleshooting

In an event of bumping the version of protoc, protoc plugins or grpc-gateway, it might change `*.proto` file which can result in the following error:

```bash
[0;31mFAIL: 'genproto' FAILED at Wed Jul 31 07:09:08 UTC 2024
make: *** [Makefile:134: verify-genproto] Error 255
```

To fix the above error, run the following script from the root of etcd repository:

```bash
./scripts/genproto.sh
```

### Indirect dependencies

Usually, we don't bump a dependency if all modules just indirectly depend on it, such as `github.com/go-logr/logr`.

If
 an indirect dependency (e.g. `D1`) causes any CVE or bugs that affect etcd, usually the module (e.g. `M1`, not part of etcd, but used by etcd)
which depends on it should bump the dependency (`D1`), and then etcd just needs to bump `M1`. However, if the module (`M1`) somehow doesn't
bump the problematic dependency, then etcd can still bump it (`D1`) directly following the same steps above. But as a long-term solution, etcd should
try to remove the dependency on such module (`M1`) that lack maintenance.

For mixed cases, in which some modules directly while others indirectly depend on a dependency, we have multiple options,

- Bump the dependency for all modules, no matter it's direct or indirect dependency.
- Bump the dependency only for modules that directly depend on it.

We should try to follow the first way, and temporarily fall back to the second one if we run into any issue on the first way. Eventually we
should fix the issue and ensure all modules depend on the same version of the
dependency.

### Known incompatible dependency updates

#### arduino/setup-protoc

Please refer to [build(deps): bump arduino/setup-protoc from 1.3.0 to 2.0.0](https://github.com/etcd-io/etcd/pull/16016)

### Rotation worksheet

The dependabot scheduling interval is weekly; it means dependabot will automatically raise a bunch of PRs per week.
Usually, human intervention is required each time. We have a [rotation worksheet](https://docs.google.com/spreadsheets/d/1jodHIO7Dk2VWTs1IRnfMFaRktS9IH8XRyifOnPdSY8I/edit#gid=1394774387),
and everyone is welcome to participate; you just need to register your name in the worksheet.

## Stable branches

Usually, we don't proactively bump dependencies for stable releases unless there are any CVEs or bugs that affect etcd.

If we have to do it, then follow the same guidance above. Note that there is no `./scripts/fix.sh` in release-3.4, so no need to
execute it for 3.4.

## Golang versions

The etcd project aims to maintain a development branch that
is on the latest [Go version](https://go.dev/dl), ideally, this will align with the Go version in use for Kubernetes project development. For an example of how to update etcd to a new minor release of Go refer to issue <https://github.com/etcd-io/etcd/issues/16393> and the linked pull requests.

Suggested steps for performing a minor version upgrade for the etcd development branch:

1. Carefully review new Go version release notes and potentially related blog posts for any deprecations, performance impacts, or other considerations.
2. Create a GitHub issue to signal intent to upgrade and invite discussion, for example, <https://github.com/etcd-io/etcd/issues/16393>.
3. Complete the upgrade locally in your development environment by editing `.go-version` and running `make fix`.
4. Run performance benchmarks locally to compare before and after.

5. Raise a pull request for the changes, for example, <https://github.com/etcd-io/etcd/pull/16394>.

Stable etcd release branches will be maintained
to stay on the latest patch release of a supported Go version. Upgrading minor versions will be completed before the minor version in use currently is no longer supported. Refer to the [Go release
policy](https://go.dev/doc/devel/release).

For an example of how to update etcd to a new patch release of Go refer to issue <https://github.com/etcd-io/etcd/issues/16343> and the linked pull requests.

References:

- <https://github.com/kubernetes/sig-release/blob/master/release-engineering/handbooks/go.md>

## Core dependencies mappings

[bbolt](https://github.com/etcd-io/bbolt) and [raft](https://github.com/etcd-io/raft) are two core dependencies of etcd.

Both etcd 3.4.x and 3.5.x depend on bbolt 1.3.x, and etcd 3.6.x (`main` branch) depends on bbolt 1.4.x.

raft is included in the etcd repository for release-3.4 and release-3.5 branches, so etcd 3.4.x and 3.5.x do not depend on any
external raft module. We moved raft into [a separate repository](https://github.com/etcd-io/raft) starting
from 3.6 (`main` branch), and the first raft
release will be v3.6.0, so etcd 3.6.x will depend on raft 3.6.x.

Please see the table below:

| etcd versions | bbolt versions | raft versions |
|---|---|---|
| 3.4.x | v1.3.x | N/A |
| 3.5.x | v1.3.x | N/A |
| 3.6.x | v1.4.x | v3.6.x |

# 1.4050 tomcat-10.1 10.1.52-r1

## 1.4050.1 Available under license :

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- javaee_web_services_1_3.xsd
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- jsp_2_2.xsd
- web-app_3_0.xsd
- web-common_3_0.xsd
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- javaee_web_services_client_1_4.xsd
- jsp_2_3.xsd
- web-app_3_1.xsd
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org.apache.tomcat.util.json.JSONParser.jj is
 a public domain javacc grammar
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- javaee_web_services_1_2.xsd
- javaee_web_services_client_1_2.xsd
- javaee_6.xsd
- javaee_web_services_1_3.xsd
- javaee_web_services_client_1_3.xsd
- jsp_2_2.xsd

- web-app_3_0.xsd
- web-common_3_0.xsd
- web-fragment_3_0.xsd
- javaee_7.xsd
- javaee_web_services_1_4.xsd
- javaee_web_services_client_1_4.xsd
- jsp_2_3.xsd
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- web-common_3_1.xsd
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may be obtained from:
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- jsp_2_3.xsd
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- javaee_web_services_1_3.xsd
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- web-common_3_0.xsd
- web-fragment_3_0.xsd
- javaee_7.xsd
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- jsp_2_3.xsd
- web-app_3_1.xsd
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- javaee_web_services_client_1_2.xsd
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- jsp_2_2.xsd
- web-app_3_0.xsd
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<one line to give the program's name and a brief idea of what it does.>
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when it starts in an interactive mode:

```
Gnomovision version 69, Copyright (C) 19xx name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
```

The hypothetical commands `show w' and `show c' should show the
appropriate parts of the General Public License. Of course, the
commands you use may be called something other than `show w' and `show
c'; they could even be mouse-clicks or menu items--whatever suits your
program.

You should also get your employer (if you work as a programmer) or your
school, if any, to sign a "copyright disclaimer" for the program, if
necessary. Here a sample; alter
the names:

```
Yoyodyne, Inc., hereby disclaims all copyright interest in the
program `Gnomovision' (a program to direct compilers to make passes
at assemblers) written by James Hacker.

<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
```

That's all there is to it!

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Key Dates
---
* August 3, 2017

Update the TianoCore Contribution Agreement from Version 1.0 to Version 1.1 to cover open source documentation associated with the TianoCore project.

Version 1.0 covers source code files. Version 1.1 is a backwards compatible extension that adds support for document files in both source form and compiled form.

References:

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Proposals (RFCs):
https://lists.01.org/pipermail/edk2-devel/2017-March/008654.html

TianoCore Bugzilla:
https://bugzilla.tianocore.org/show_bug.cgi?id=629

* April 9, 2019

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https://lists.01.org/pipermail/edk2-devel/2019-February/036260.html

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---

---

Contributions.txt: TianoCore Contribution Agreement 1.1

---

==========
= Code Contributions =
==========

To make a contribution to a TianoCore project, follow these steps.

1. Create a change description in the format specified below to
   use in the source control commit log.
2. Your commit message must include your "Signed-off-by" signature,
   and "Contributed-under" message.

3. Your "Contributed-under" message explicitly states that the
contribution is made under the terms of the specified
contribution agreement. Your "Contributed-under" message
must include the name of contribution agreement and version.
For example: Contributed-under: TianoCore Contribution Agreement 1.1
The "TianoCore Contribution Agreement" is included below in
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4. Submit your code to the TianoCore project using the process
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==========
= Change Description / Commit Message / Patch Email =
==========

Your change description should use the standard format for a
commit message, and must include
your "Signed-off-by" signature
and the "Contributed-under" message.

== Sample Change Description / Commit Message =

=== Start of sample patch email message ===

From: Contributor Name <contributor@example.com>
Subject: [Repository/Branch PATCH] Module: Brief-single-line-summary

Full-commit-message

```
  Contributed-under: TianoCore Contribution Agreement 1.1
  Signed-off-by: Contributor Name <contributor@example.com>
  ---

  An extra message for the patch email which will not be considered part
  of the commit message can be added here.

  Patch content inline or attached

  === End of sample patch email message ===

  === Notes for sample patch email ===

  * The first line of commit message is taken from the email's subject
    line following [Repository/Branch PATCH]. The remaining portion of the
    commit message is the email's content until the '---' line.
  * git format-patch is one way to create this format

  === Definitions
for sample patch email ===

  * "Repository" is the identifier of the repository the patch applies.
    This identifier should only be provided for repositories other than
    'edk2'. For example 'edk2-BuildSpecification' or 'staging'.
  * "Branch" is the identifier of the branch the patch applies. This
    identifier should only be provided for branches other than 'edk2/master'.
    For example 'edk2/UDK2015', 'edk2-BuildSpecification/release/1.27', or
    'staging/edk2-test'.
  * "Module" is a short identifier for the affected code or documentation. For
    example 'MdePkg', 'MdeModulePkg/UsbBusDxe', 'Introduction', or
    'EDK II INF File Format'.
  * "Brief-single-line-summary" is a short summary of the change.
  * The entire first line should be less than ~70 characters.
  * "Full-commit-message" a verbose multiple line comment describing
    the change.  Each line should be less than ~70 characters.
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---

---

Contributions.txt: TianoCore Contribution Agreement 1.0

---

```
  ======================
  = Code Contributions =
  ======================

  To make a contribution to a TianoCore project, follow these steps.
  1. Create a change description in the format specified below to
     use in the source control commit log.
  2. Your commit message must include your "Signed-off-by" signature,
     and "Contributed-under"
 message.
  3. Your "Contributed-under" message explicitly states that the
     contribution is made under the terms of the specified
     contribution agreement.  Your "Contributed-under" message
     must include the name of contribution agreement and version.
     For example: Contributed-under: TianoCore Contribution Agreement 1.0
     The "TianoCore Contribution Agreement" is included below in
     this document.
  4. Submit your code to the TianoCore project using the process
     that the project documents on its web page.  If the process is
     not documented, then submit the code on development email list
     for the project.
  5. It is preferred that contributions are submitted using the same
     copyright license as the base project. When that is not possible,
     then contributions using the following licenses can be accepted:
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     Contributions using other licenses might be accepted, but further
     review will be required.

  ======================================================
  = Change Description / Commit Message / Patch Email =
  ======================================================

  Your change description should use the standard format for a
  commit message, and must include your "Signed-off-by" signature
  and the "Contributed-under" message.

  == Sample Change Description / Commit Message =

  === Start of sample patch email message ===
```

From: Contributor Name <contributor@example.com>
Subject: [PATCH] CodeModule: Brief-single-line-summary

Full-commit-message

Contributed-under:
TianoCore Contribution Agreement 1.0
Signed-off-by: Contributor Name <contributor@example.com>
---

An extra message for the patch email which will not be considered part
of the commit message can be added here.

Patch content inline or attached

=== End of sample patch email message ===

=== Notes for sample patch email ===

* The first line of commit message is taken from the email's subject
  line following [PATCH]. The remaining portion of the commit message
  is the email's content until the '---' line.
* git format-patch is one way to create this format

=== Definitions for sample patch email ===

* "CodeModule" is a short idenfier for the affected code.  For
  example MdePkg, or MdeModulePkg UsbBusDxe.
* "Brief-single-line-summary" is a short summary of the change.
* The entire first line should be less than ~70 characters.
* "Full-commit-message" a verbose multiple line comment describing
  the change.
Each line should be less than ~70 characters.
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  made under the terms of the contribtion agreement.  This
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Mikko Suonio (Nokia)

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---

```
/*
 * snprintf.c - a portable implementation of snprintf
*
* AUTHOR
*   Mark Martinec <mark.martinec@ijs.si>, April 1999.
*
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```

```
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*
*/

/*-----------------------------------------------------------------------*/

/**@@@+++@@@@*****************************************************************
```

**
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**
***@@@---@@@@**********
*/

---
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ANSI-C code for the Adaptive Multi-Rate (AMR) speech codec
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# Features

This document provides an overview of etcd features and general development guidelines for adding and deprecating them. The project maintainers can override these guidelines per the need of the project following the project governance.

## Overview

The etcd features fall into three stages, experimental, stable, and unsafe.

### Experimental

Any new feature is usually added as an experimental feature. An experimental feature is characterized as below:
- Might be buggy due to a lack of user testing. Enabling the feature may not work as expected.
- Disabled by default when added initially.
- Support for such a feature may be dropped at any time without notice
  - Feature-related issues may be given lower priorities.
  - It can be removed in the next minor or major release without following the feature deprecation policy unless it graduates to a stable future.

### Stable

A stable feature is characterized as below:
- Supported as part of the supported releases of etcd.
- May be enabled by default.
- Discontinuation of support must follow the feature deprecation policy.

### Unsafe

Unsafe features are rare and listed under the `Unsafe feature:` section in the etcd usage documentation. By default, they are disabled. They should be used with caution following documentation. An unsafe feature can be removed in the next minor or major release without following the feature deprecation policy.

## Development Guidelines

### Adding a new feature

Any new enhancements to the etcd are typically added as an experimental feature. The general development requirements are listed below. They can be somewhat flexible depending on the scope of the feature and review discussions and will evolve over time.

- Open an issue
  - It must provide a clear need for the proposed feature.
  - It should list development work items as checkboxes. There must be one work item towards future graduation to a stable future.
  - Label the issue with `type/feature` and `experimental`.
  - Keep the issue open for tracking purposes until a decision is made on graduation.
- Open a Pull Request (PR)
  - Provide unit tests. Integration tests are also recommended as possible.
  - Provide robust e2e test coverage. If the feature being added is complicated or quickly needed, maintainers can decide to go with e2e tests for basic coverage initially and have robust coverage added at a later time before the feature graduation to the stable feature.
  - Provide logs for proper debugging.
  - Provide metrics and benchmarks as needed.
  - The Feature should be disabled by default.
  - Any configuration flags related to the implementation of the feature must be prefixed with `experimental` e.g. `--experimental-feature-name`.
  - Add a CHANGELOG entry.
- At least two maintainers must approve feature requirements and related code changes.

### Graduating an Experimental feature to Stable

It is important that experimental features don't get stuck in that stage.
They should be revisited and moved to the stable stage following the graduation steps as described here.

#### Locate graduation candidate

Decide if an experimental feature is ready for graduation to the stable stage.

- Find the issue that was used to enable the experimental feature initially. One way to find such issues is to search for issues with `type/feature` and `experimental` labels.
- Fix any known open issues against the feature.
- Make sure the feature was enabled for at least one previous release. Check the PR(s) reference from the issue to see when the feature-related code changes were merged.

#### Provide implementation

If an experimental feature is found ready for graduation to the stable stage, open a Pull Request (PR) with the following changes.

- Add robust e2e tests if not already provided.
- Add a new stable feature flag identical to the experimental feature flag but without the `--experimental` prefix.

- Deprecate the experimental feature following the [feature deprecation
 policy](#Deprecating-a-feature).
- Implementation must ensure that both the graduated and deprecated experimental feature flags work as expected. Note that both these flags will co-exist for the timeframe described in the feature deprecation policy.
- Enable the graduated feature by default if needed.

At least two maintainers must approve the work. Patch releases should not be considered for graduation.

### Deprecating a feature

#### Experimental
An experimental feature deprecates when it graduates to the stable stage.
- Add a deprecation message in the documentation of the experimental feature with a recommendation to use a related stable feature. e.g. `DEPRECATED. Use <feature-name> instead.`
- Add a `deprecated` label in the issue that was initially used to enable the experimental feature.

#### Stable
As the project evolves, a stable feature may sometimes need to be deprecated and removed. Such a situation should be handled using the steps below:
- Create an issue for tracking
 purposes.
- Add a deprecation message in the feature usage documentation before a planned release for feature deprecation. e.g. `To be deprecated in <release>.`. If a new feature replaces the `To be deprecated` feature, then also provide a message saying so. e.g. `Use <feature-name> instead.`.
- Deprecate the feature in the planned release with a message as part of the feature usage documentation. e.g. `DEPRECATED`. If a new feature replaces the deprecated feature, then also provide a message saying so. e.g. `DEPRECATED. Use <feature-name> instead.`.
- Add a `deprecated` label in the related issue.

Remove the deprecated feature in the following release. Close any related issue(s). At least two maintainers must approve the work. Patch releases should not be considered for deprecation.
# Set up the local cluster

For testing and development deployments, the quickest and easiest way is to configure a local cluster. For a production deployment, refer to the [clustering][clustering] section.

## Local standalone cluster

### Starting a cluster

Run the following to deploy an etcd cluster as a standalone cluster:

```
$ ./etcd
...
```

If the `etcd` binary is not present in the current working directory, it might be located either at `$GOPATH/bin/etcd`

or at `/usr/local/bin/etcd`. Run the command appropriately.

The running etcd member listens on `localhost:2379` for client requests.

### Interacting with the cluster

Use `etcdctl` to interact with the running cluster:

1. Store an example key-value pair in the cluster:

```
$ ./etcdctl put foo bar
OK
```

If OK is printed, storing the key-value pair is successful.

2. Retrieve the value of `foo`:

```
$ ./etcdctl get foo
bar
```

If `bar` is returned, interaction with the etcd
cluster is working as expected.

## Local multi-member cluster

### Starting a cluster

A `Procfile` at the base of the etcd git repository is provided to easily configure a local multi-member cluster. To start a multi-member cluster, navigate to the root of the etcd source tree and perform the following:

1. Install `goreman` to control Procfile-based applications:

```
$ go install github.com/mattn/goreman@latest
```

The installation will place executables in the $GOPATH/bin. If $GOPATH environment variable is not set, the tool will be installed into the $HOME/go/bin. Make sure that $PATH is set accordingly in your environment.

2. Start a cluster with `goreman` using etcd's stock Procfile:

```
$ goreman -f Procfile start
```

The members start running. They listen on `localhost:2379`, `localhost:22379`, and `localhost:32379` respectively for client requests.

### Interacting with the cluster

Use `etcdctl` to interact with the running cluster:

1. Print the list of members:

```
$ etcdctl --write-out=table --endpoints=localhost:2379 member list
```

The list of etcd members is displayed as follows:

```
+------------------+---------+--------+------------------------+------------------------+
|       ID         | STATUS  |  NAME  |       PEER ADDRS       |      CLIENT ADDRS      |
+------------------+---------+--------+------------------------+------------------------+
| 8211f1d0f64f3269 | started | infra1 | http://127.0.0.1:2380  | http://127.0.0.1:2379  |
| 91bc3c398fb3c146 | started | infra2 | http://127.0.0.1:22380 | http://127.0.0.1:22379 |
| fd422379fda50e48 | started | infra3 | http://127.0.0.1:32380 | http://127.0.0.1:32379 |
+------------------+---------+--------+------------------------+------------------------+
```

2. Store an example key-value pair in the cluster:

```
$ etcdctl put foo bar
OK
```

If OK is printed, storing the key-value pair is successful.

### Testing fault tolerance

To exercise etcd's fault tolerance, kill a member and attempt to retrieve the key.

1. Identify the process name of the member to be stopped.

The `Procfile` lists the properties of the multi-member cluster. For example, consider the member with the process name, `etcd2`.

2. Stop the member:

```
# kill etcd2
```

```
$ goreman run stop etcd2
```

3. Store a key:

```
$ etcdctl put key hello
OK
```

4. Retrieve the key that is stored in the previous step:

```
$ etcdctl get key
hello
```

5. Retrieve a key from the stopped member:

```
$ etcdctl --endpoints=localhost:22379 get key
```

The command should display an error caused by connection failure:

```
2017/06/18 23:07:35 grpc: Conn.resetTransport failed to create client transport: connection error: desc = "transport: dial tcp 127.0.0.1:22379: getsockopt: connection refused"; Reconnecting to "localhost:22379"
Error:  grpc:
timed out trying to connect
```

6. Restart the stopped member:

```
$ goreman run restart etcd2
```

7. Get the key from the restarted member:

```
$ etcdctl --endpoints=localhost:22379 get key
hello
```

Restarting the member re-establishs the connection. `etcdctl` will now be able to retrieve the key successfully. To learn more about interacting with etcd, read [interacting with etcd section][interacting].

[clustering]: https://etcd.io/docs/latest/op-guide/clustering/

[interacting]: https://etcd.io/docs/latest/dev-guide/interacting_v3/
# Branch management

## Guide

* New development occurs on the [main branch][main].
* The main branch should always have a green build!
* Backwards-compatible bug fixes should target the main branch and subsequently be ported to stable branches.
* Once the main branch is ready for release, it will be tagged and become the new stable branch.

The etcd team has adopted a *rolling release model* and supports two stable versions of etcd.

### Main branch

The `main` branch is our development branch. All new features land here first.

To try new and experimental features, pull `main` and play with it. Note that `main` may not be stable because new features may introduce bugs.

Before the release of the next stable version, feature PRs will be frozen. A [release manager](./release.md#release-management) will be assigned to the major/minor version and will lead the etcd community in testing, bug-fix, and documentation of the release for one to two weeks.

### Stable branches

All branches with
 the prefix `release-` are considered _stable_ branches.

After every minor release ([semver.org](https://semver.org/)), we will have a new stable branch for that release, managed by a [patch release manager](./release.md#release-management). We will keep fixing the backward-compatible bugs for the latest two stable releases. A _patch_ release to each supported release branch, incorporating any bug fixes, will be once every two weeks, given any patches.

[main]: https://github.com/etcd-io/etcd/tree/main
# Issue triage guidelines

## Purpose

Speed up issue management.

The `etcd` issues are listed at <https://github.com/etcd-io/etcd/issues> and are identified with labels. For example, an issue that is identified as a bug will be set to the label `type/bug`.

The etcd project uses labels to indicate common attributes such as `area`, `type`, and `priority` of incoming issues.

New issues will often start without any labels, but typically `etcd` maintainers, reviewers, and members will add labels by following these triage guidelines. The detailed list of labels can be found at <https://github.com/etcd-io/etcd/labels>.

## Scope

This document serves as the primary guidelines for triaging incoming issues in `etcd`.

All contributors are encouraged and welcome to help manage issues which will help reduce the burden on project maintainers, though the work and responsibilities discussed in this document are created with `etcd` project reviewers and members in mind as these individuals will have
triage access to the etcd project which is a requirement for actions like applying labels or closing issues.

Refer to [etcd community membership](https://github.com/etcd-io/etcd/blob/main/Documentation/contributor-guide/community-membership.md) for guidance on becoming an etcd project member or reviewer.

## Step 1 - Find an issue to triage

To get started you can use the following recommended issue searches to identify issues that are in need of triage:

* [Issues that have no labels](https://github.com/etcd-io/etcd/issues?q=is%3Aissue+is%3Aopen+sort%3Aupdated+no%3Alabel)
* [Issues created recently](https://github.com/etcd-io/etcd/issues?q=is%3Aissue+is%3Aopen+)
* [Issues not assigned but linked pr](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+no%3Aassignee+linked%3Apr)
* [Issues with no comments](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+comments%3A0+)
* [Issues with help wanted](https://github.com/etcd-io/etcd/issues?q=is%3Aopen+is%3Aissue+label%3A%22help+wanted%22+)

## Step 2 - Check the issue is valid

Before we start adding labels or trying to work out a priority, our first triage step needs to be working out if the issue actually belongs to the etcd project and is not a duplicate.

### Issues that don't belong to etcd

Sometimes issues are reported that belong to other projects that `etcd` use. For example, `grpc` or `golang` issues. Such issues should be addressed by asking the reporter to open issues in the appropriate other projects.

These issues can generally be closed unless a maintainer and issue reporter see a need to keep it open for tracking purposes. If you have triage permissions please close it, alternatively mention the @etcd-io/members group to request a member with triage access to close the issue.

### Duplicate issues

If an issue is a duplicate, add a comment stating so along with a reference for the original issue and if you have triage permissions please close it, alternatively mention the @etcd-io/members
group to request a member with triage access close the issue.

## Step 3 - Apply the appropriate type of label

Adding a `type` label to an issue helps create visibility on the health of the project and helps contributors identify potential priorities, i.e. addressing existing bugs or test flakes before implementing new features.

### Support requests

As a general rule, the focus for etcd support is to address common themes in a broad way that helps all users, i.e. through channels like known issues, frequently asked questions, and high-quality documentation. To make the best use of project members time we should avoid providing 1:1 support if a broad approach is available.

Some people mistakenly use our GitHub bug report or feature request templates to file support requests. Usually, they are asking for help operating or configuring some aspect of etcd. Support requests for etcd should instead be raised as [discussions](https://github.com/etcd-io/etcd/discussions).

Common
types of support requests are:

1. Questions about configuring or operating existing well-documented etcd features, for example, <https://github.com/etcd-io/etcd/issues/15945>. Note - If an existing feature is not well documented please apply the `area/documentation` label and propose documentation improvements that would prevent future users from stumbling on the problem again.

2. Bug reports or questions about unsupported versions of etcd, for example <https://github.com/etcd-io/etcd/issues/15796>. When responding to these issues please refer to our [supported versions documentation](https://etcd.io/docs/latest/op-guide/versioning) and encourage the reporter to upgrade to a recent patch release of a supported version as soon as possible. We should limit the effort supporting users that do not make the effort to run a supported version of etcd or ensure their version is patched.

3. Bug reports that do not provide a complete list of steps to reproduce the issue and/or contributors
are not able to reproduce the issue, for example, <https://github.com/etcd-io/etcd/issues/15740>. We should limit the effort we put into reproducing issues ourselves and motivate users to provide the necessary information to accept the bug report.

4. General questions that are filed using feature request or bug report issue templates, for example, <https://github.com/etcd-io/etcd/issues/15914>. Note - These types of requests may surface good additions to our [frequently asked questions](https://etcd.io/docs/v3.5/faq).

If you identify that an issue is a support request please:

1. Add the `type/support` or `type/question` label.

2. Add the following comment to inform the issue creator that discussions should be used instead and that this issue will be converted to a discussion.

> Thank you for your question, this support issue will be moved to our [Discussion Forums](https://github.com/etcd-io/etcd/discussions).
>
> We are trying to consolidate the channels to which

questions for help/support are posted so that we can improve our efficiency in responding to your requests, and make it easier for you to find answers to frequently asked questions and how to address common use cases.
>
> We regularly see messages posted in multiple forums, with the full response thread only in one place or, worse, spread across multiple forums. Also, the large volume of support issues on GitHub is making it difficult for us to use issues to identify real bugs.
>
> Members of the etcd community use Discussion Forums to field support requests. Before posting a new question, please search these for answers to similar questions, and also familiarize yourself with:
>
> 1. [user documentation](https://etcd.io/docs/latest)
> 2. [frequently asked questions](https://etcd.io/docs/v3.5/faq)
>
> Again, thanks for using etcd and raising this question.
>
> The etcd team

3. Finally, click `Convert to discussion` on the right-hand panel,
selecting the appropriate discussion category.

### Bug reports

If an issue has been raised as a bug it should already have the `type/bug` label, however, if this is missing for an issue you determine to be a bug please add the label manually.

The next step is to validate if the issue is indeed a bug. If not, add a comment with the findings and close the trivial issue. For non-trivial issues, wait to hear back from the issue reporter and see if there is any objection. If the issue reporter does not reply in 30 days, close the issue.

If the problem can not be reproduced or requires more information, leave a comment for the issue reporter as soon as possible while the issue is fresh for the issue reporter.

### Feature requests

New feature requests should be created via the etcd feature request template and in theory already have the `type/feature` label, however, if this is missing for an issue you determine to be a feature please add the label manually.

### Test flakes

Test flakes
are a specific type of bug that the etcd project tracks separately as these are a priority to address. These should be created via the test flake template and in theory already have the `type/flake` label, however, if this is missing for an issue you determine to be related to a flaking test please add the label manually.

## Step 4 - Define the areas impacted

Adding an `area` label to an issue helps create visibility on which areas of the etcd project require attention and

helps contributors find issues to work on relating to their particular skills or knowledge of the etcd codebase.

If an issue crosses multiple domains please add additional `area` labels to reflect that.

Below is a brief summary of the area labels in active use by the etcd project along with any notes on their use:

| Label | Notes |
| --- | --- |
| area/external | Tracking label for issues raised that are external to etcd. |
| area/community | |
| area/raft | |
| area/clientv3 | |
| area/performance | |
| area/security | |
| area/tls | |
| area/auth | |
| area/etcdctl | |
| area/etcdutl | |
| area/contrib | Not to be confused with `area/community` this label is specifically used for issues relating to community-maintained scripts or files in the `contrib/` directory which aren't part of the core etcd project. |
| area/documentation | |
| area/tooling | Generally used in relation to the third party / external utilities or tools that are used in various stages of the etcd build, test, or release process, for example, tooling to create sboms. |
| area/testing | |
| area/robustness-testing | |

## Step 5 - Prioritise the issue

If an issue lacks a priority label it has not been formally prioritized yet.

Adding a `priority` label helps the etcd project understand what is important and should be worked on now, and conversely, what is not as important and is on the project backlog.

|Priority label|What it means|Examples|
|---|---|---|
| `priority/critical-urgent` | Maintainers are responsible for making sure that these issues (in their area) are being actively worked oni.e., drop what you're doing. The stuff is burning. These should be fixed before the next release. | user-visible critical bugs in core features <br> broken builds on tier1 supported platforms <br> tests and critical security issues |
| `priority/important-soon` | Must be staffed and worked on either currently or very soonideally in time for the next release. | |
| `priority/important-longterm` | Important over the long term, but may not be currently staffed and/or may require multiple releases to complete. | |
| `priority/backlog` | General agreement that this is a nice-to-have, but no one's available to work on it anytime soon. Community contributions would be most welcome in the meantime, though it might take a while to get them reviewed if reviewers are fully occupied with higher-priority issuesfor example, immediately before a release.| |

| `priority/awaiting-more-evidence`
| Possibly useful, but not yet enough support to actually get it done. | Mostly placeholders for potentially good ideas, so that they don't get completely forgotten, and can be referenced or deduped every time they come up |

## Step 6 - Support new contributors

As part of the `etcd` triage process once the `kind` and `area` have been determined, please consider if the issue would be suitable for a less experienced contributor. The `good first issue` label is a subset of the `help wanted` label, indicating that members have committed to providing extra assistance for new contributors. All `good first issue` items also have the `help wanted` label.

### Help wanted

Items marked with the `help wanted` label need to ensure that they meet these criteria:

* **Low Barrier to Entry** - It should be easy for new contributors.

* **Clear** - The task is agreed upon and does not require further discussions in the community.

* **Goldilocks priority** - The priority
should not be so high that a core contributor should do it, but not too low that it isnt useful enough for a core contributor to spend time reviewing it, answering questions, helping get it into a release, etc.

### Good first issue

Items marked with `good first issue` are intended for first-time contributors. It indicates that members will keep an eye out for these pull requests and shepherd it through our processes.

New contributors should not be left to find an approver, ping for reviews, decipher test commands, or identify that their build failed due to a flake. It is important to make new contributors feel welcome and valued. We should assure them that they will have an extra level of help with their first contribution.

After a contributor has successfully completed one or two `good first issue` items, they should be ready to move on to `help wanted` items.

* **No Barrier to Entry** - The task is something that a new contributor can tackle without advanced setup or domain knowledge.

*
**Solution Explained** - The recommended solution is clearly described in the issue.

* **Gives Examples** - Link to examples of similar implementations so new contributors have a reference guide for their changes.

* **Identifies Relevant Code** - The relevant code and tests to be changed should be linked in the issue.

* **Ready to Test** - There should be existing tests that can be modified, or existing test cases fit to be copied. If the area of code doesnt have tests, before labeling the issue, add a test fixture. This prep often makes a great help

wanted task!

## Step 7 - Follow up

Once initial triage has been completed, issues need to be re-evaluated over time to ensure they don't become stale incorrectly.

### Track important issues

If an issue is at risk of being closed by the stale bot in the future, but is an important issue for the etcd project, then please apply the `stage/tracked` label and remove any `stale` labels that exist. This will ensure the project does not lose sight of the issue.

### Close incomplete issues

Issues that lack enough information from the issue reporter should be closed if the issue reporter does not provide information in 30 days. Issues can always be re-opened at a later date if new information is provided.

### Check for incomplete work

If an issue owned by a developer has no pull request created in 30 days, contact the issue owner and kindly ask about the status of their work, or to release ownership on the issue if needed.
# PR management

## Purpose

Speed up PR management.

The `etcd` PRs are listed at https://github.com/etcd-io/etcd/pulls
A PR can have various labels, milestones, reviewers, etc. The detailed list of labels can be found at https://github.com/kubernetes/kubernetes/labels

Following are a few example searches on PR for convenience:
* [Open PRS for milestone etcd-v3.6](https://github.com/etcd-io/etcd/pulls?utf8=%E2%9C%93&q=is%3Apr+is%3Aopen+milestone%3Aetcd-v3.6)
* [PRs under investigation](https://github.com/etcd-io/etcd/labels/Investigating)

## Scope

These guidelines serve as a primary document for managing PRs in `etcd`. Everyone is welcome to help manage PRs but the work and responsibilities discussed in this document are created with `etcd` maintainers and active contributors in mind.

## Ensure tests are run

The etcd project use Kubernetes Prow and GitHub Actions to run tests. To ensure all required tests run if a pull request is ready for testing and still has the `needs-ok-to-test`

label then please comment on the pull request `/ok-to-test`.

## Handle inactive PRs
Poke PR owner if review comments are not addressed in 15 days. If the PR owner does not reply in 90 days, update the PR with a new commit if possible. If not, inactive PR should be closed after 180 days.

## Poke reviewer if needed

Reviewers are responsive in a timely fashion, but considering everyone is busy, give them some time after requesting a review if a quick response is not provided. If the response is not provided in 10 days, feel free to contact them via adding a comment in the PR or sending an email or message on Slack.

## Verify important labels are in place

Make sure that appropriate reviewers are added to the PR. Also, make sure that a milestone is identified. If any of these or other important labels are missing, add them. If a correct label cannot be decided, leave a comment for the maintainers to do so as needed.
# Roadmap

etcd uses GitHub milestones to track all tasks in each major or minor release. The `roadmap.md` file only records the
most important tasks for each release. The list is based on the current maintainer capacity that may shift over time. Proposed milestones are what we think we can deliver with the people we have. If we have more support on the important
stuff, we could pick up more items from the backlog. Note that etcd will continue to mainly focus on technical debt over
the next few major or minor releases.

Each item has an assigned priority. Refer to [priority definitions](https://github.com/etcd-io/etcd/blob/main/Documentation/contributor-guide/triage_issues.md#step-5---prioritise-the-issue).

## v3.6.0

For a full list of tasks in `v3.6.0`, please see [milestone etcd-v3.6](https://github.com/etcd-io/etcd/milestone/38).

| Title | Priority | Status | Note |
|---|---|---|---|
| [Support downgrade](https://github.com/etcd-io/etcd/issues/11716) | priority/important-soon | In progress | etcd will support downgrade starting from 3.6.0. But it will also support offline downgrade from 3.5 to 3.4. |
| [StoreV2 deprecation](https://github.com/etcd-io/etcd/issues/12913) | priority/important-soon | In progress | This task will be covered in both 3.6 and 3.7. |
| [Release raft 3.6.0](https://github.com/etcd-io/raft/issues/89) | priority/important-soon | Not started | etcd 3.6.0 will depends on raft 3.6.0 |

| [Release bbolt 1.4.0](https://github.com/etcd-io/bbolt/issues/553) | priority/important-soon | Not started | etcd 3.6.0 will depends on bbolt 1.4.0 |
| [Support /livez and /readyz endpoints](https://github.com/etcd-io/etcd/issues/16007) | priority/important-longterm | In progress | It provides clearer APIs, and can also work around the stalled writes issue |
| [Bump gRPC](https://github.com/etcd-io/etcd/issues/16290) | priority/important-longterm | Completed | It isn't guaranteed to be resolved in 3.6, and might be postponed to 3.7 depending on the effort and risk. |
| [Deprecate grpc-gateway or bump it](https://github.com/etcd-io/etcd/issues/14499) | priority/important-longterm | Completed | It isn't guaranteed to be resolved in 3.6, and might be postponed to 3.7 depending on the effort and risk. |
| [bbolt: Add logger into bbolt](https://github.com/etcd-io/bbolt/issues/509) | priority/important-longterm | Completed | It's important to diagnose bbolt issues |
| [bbolt: Add surgery commands](https://github.com/etcd-io/bbolt/issues/370) | priority/important-longterm | Completed | Surgery commands are important for fixing corrupted db files |
| [Evaluate and (Gradulate or deprecate/remove) experimental features](https://github.com/etcd-io/etcd/issues/16292) | priority/backlog | Not started | This task will be covered in both 3.6 and 3.7. |

## v3.7.0

For a full list of tasks in `v3.7.0`, please see [milestone etcd-v3.7](https://github.com/etcd-io/etcd/milestone/39).

| Title | Priority | Note |
|---|---|---|
| [StoreV2 deprecation](https://github.com/etcd-io/etcd/issues/12913) | P0 | Finish the remaining tasks 3.7. |
| [Refactor lease: Lease might be revoked by mistake by old leader](https://github.com/etcd-io/etcd/issues/15247) | P1 | to be investigated & discussed |
| [Integrate raft's new feature (async write) into etcd](https://github.com/etcd-io/etcd/issues/16291) | P1 | It should improve the performance |
| [bbolt: Support customizing the bbolt rebalance threshold](https://github.com/etcd-io/bbolt/issues/422) | P2 | It may get rid of etcd's defragmentation. Both bbolt and etcd need to be changed. |
| [Evaluate and (graduate or deprecate/remove) experimental features](https://github.com/etcd-io/etcd/issues/16292) | P2 | Finish the remaining tasks 3.7. |

## Backlog (future releases)

| Title | Priority | Note |
|---|---|---|
| [Remove the dependency on

grpc-go's experimental API](https://github.com/etcd-io/etcd/issues/15145) | | |
| [Protobuf: cleanup both golang/protobuf and gogo/protobuf](https://github.com/etcd-io/etcd/issues/14533) | | |
| [Proposals should include a merkle root](https://github.com/etcd-io/etcd/issues/13839) | | |
| [Add Distributed Tracing using OpenTelemetry](https://github.com/etcd-io/etcd/issues/12460) | | |
| [Support CA rotation](https://github.com/etcd-io/etcd/issues/11555) | | |
| [bbolt: Migrate all commands to cobra style commands](https://github.com/etcd-io/bbolt/issues/472) | | |
| [raft: enhance the configuration change validation](https://github.com/etcd-io/raft/issues/80) | | |
# Release

The guide talks about how to release a new version of etcd.

The procedure includes some manual steps for sanity checking, but it can probably be further scripted. Please keep this document up-to-date if making changes to the release process.

## Release management

The following pool of release candidates manages the release of each etcd major/minor version as well as manages patches
to each stable release branch. They are responsible for communicating the timelines and status of each release and for ensuring the stability of the release branch.

- Benjamin Wang [@ahrtr](https://github.com/ahrtr)
- James Blair [@jmhbnz](https://github.com/jmhbnz)
- Marek Siarkowicz [@serathius](https://github.com/serathius)
- Sahdev Zala [@spzala](https://github.com/spzala)
- Wenjia Zhang [@wenjiaswe](https://github.com/wenjiaswe)

All release version numbers follow the format of [semantic versioning 2.0.0](http://semver.org/).

### Major, minor version release, or its pre-release

- Ensure
 the relevant [milestone](https://github.com/etcd-io/etcd/milestones) on GitHub is complete. All referenced issues should be closed or moved elsewhere.
- Ensure the latest [upgrade documentation](https://etcd.io/docs/next/upgrades) is available.
- Bump [hardcoded MinClusterVerion in the repository](https://github.com/etcd-io/etcd/blob/v3.4.15/version/version.go#L29), if necessary.
- Add feature capability maps for the new version, if necessary.

### Patch version release

- To request a backport, developers submit cherry-pick PRs targeting the release branch. The commits should not include merge commits. The commits should be restricted to bug fixes and security patches.
- The cherrypick PRs should target the appropriate release branch (`base:release-<major>-<minor>`). The k8s infra cherry pick robot `/cherrypick <branch>` PR chatops command may be used to automatically generate cherrypick PRs.

- The release patch manager reviews the cherrypick PRs. Please discuss carefully what is backported to the patch release. Each patch release should be strictly better than its predecessor.
- The release patch manager will cherry-pick these commits starting from the oldest one into stable branch.

## Write a release note

- Write an introduction for the new release. For example, what major bug we fix, what new features we introduce, or what performance improvement we make.
- Put `[GH XXXX]` at the head of the change line to reference the Pull Request that introduces the change. Moreover, add a link on it to jump to the Pull Request.
- Find PRs with the `release-note` label and explain them in the `NEWS` file, as a straightforward summary of changes for end-users.

## Patch release criteria

The etcd project aims to release a new patch version if any of the following conditions are met:

- Fixed one or more major CVEs (>=7.5).
- Fixed one or more critical bugs.
- Fixed three or more major bugs.
- Fixed five or more minor bugs.

## Release guide

### Prerequisites

There are some prerequisites, which should be done before the release process. These are one-time operations, which don't need to be executed before releasing each version.

1. Generate a GPG key and add it to your GitHub account. Refer to the links on [settings](https://github.com/settings/keys).
2. Ensure you have a Linux machine, on which the git, Golang, and docker have been installed.
   - Ensure the Golang version matches the version defined in `.go-version` file.
   - Ensure non-privileged users can run docker commands, refer to the [Linux postinstall](https://docs.docker.com/engine/install/linux-postinstall/).
   - Ensure there is at least 5GB of free space on your Linux machine.
3. Install gsutil, refer to [gsutil_install](https://cloud.google.com/storage/docs/gsutil_install). When asked about cloud project to use, pick `etcd-development`.
4. Authenticate the image registry, refer to [Authentication methods](https://cloud.google.com/container-registry/docs/advanced-authentication).
   - `gcloud auth login`
   - `gcloud auth configure-docker`
5. Install gh, refer to [GitHub's documentation](https://github.com/cli/cli#installation). Ensure that running `gh auth login` succeeds for the GitHub account you use to contribute to etcd, and that `gh auth status` has a clean exit and doesn't show any issues.

### Release steps

1. Raise an issue to publish the release plan, e.g. [issues/17350](https://github.com/etcd-io/etcd/issues/17350).
2. Raise a `kubernetes/org` pull request to temporarily elevate permissions for the GitHub release team.
3. Once permissions are elevated, temporarily relax [branch protections](https://github.com/etcd-io/etcd/settings/branches) to allow pushing changes directly to `release-*` branches in GitHub.
4. Verify you can pass the authentication to the image registries,
  - `docker login gcr.io`
  - `docker login quay.io`
    - If the release person doesn't have access to 1password, one of the owners (@ahrtr, @ivanvc, @jmhbnz, @serathius) needs
 to share the password with them per [this guide](https://support.1password.com/share-items/). See rough steps below,
      - [Sign in](https://team-etcd.1password.com/home) to your account on 1password.com.
      - Click `Your Vault Items` on the right side.
      - Select `Password of quay.io`.
      - Click `Share` on the top right, and set expiration as `1 hour` and only available to the release person using his/her email.
      - Click `Copy Link` then send the link to the release person via slack or email.
5. Clone the etcd repository and checkout the target branch,
  - `git clone --branch release-3.X git@github.com:etcd-io/etcd.git`
6. Run the release script under the repository's root directory, replacing `${VERSION}` with a value without the `v` prefix, i.e. `3.5.13`.
  - `DRY_RUN=false ./scripts/release.sh ${VERSION}`
  - **NOTE:** When doing a pre-release (i.e., a version from the main branch, 3.6.0-alpha.2), you will need to explicitly set the branch to main:

  ```
    DRY_RUN=false BRANCH=main ./scripts/release.sh ${VERSION}
    ```

  It generates all release binaries under the directory `/tmp/etcd-release-${VERSION}/etcd/release/` and images. Binaries are pushed to the Google Cloud bucket
  under project `etcd-development`, and images are pushed to `quay.io` and `gcr.io`.
7. Publish the release page on GitHub
  - Open the **draft** release URL shown by the release script
  - Click the pen button at the top right to edit the release
  - Review that it looks correct, reviewing that the bottom checkboxes are checked depending on the
    release version (v3.4 no checkboxes, v3.5 has the set as latest release checkbox checked,
    v3.6 has the set as pre-release checkbox checked)
  - Then, publish the release
8. Announce to the etcd-dev googlegroup

  Follow the format of previous release emails sent to etcd-dev@googlegroups.com, see an example below. After sending out the email, ask one of the mailing list maintainers to approve the
 email from the pending list. Additionally, label the release email as `Release`.

```text
Hello,
```

etcd v3.4.30 is now public!

https://github.com/etcd-io/etcd/releases/tag/v3.4.30

Thanks to everyone who contributed to the release!

etcd team
```

9. Update the changelog to reflect the correct release date.
10. Paste the release link to the issue raised in Step 1 and close the issue.
11. Restore standard branch protection settings and raise a follow-up `kubernetes/org` pull request to return to least privilege permissions.
12. Crease a new stable branch through `git push origin release-${VERSION_MAJOR}.${VERSION_MINOR}` if this is a new major or minor stable release.
13. Re-generate a new password for quay.io if needed (e.g. shared to a contributor who isn't in the release team, and we should rotate the password at least once every 3 months).

#### Release known issues

1. Timeouts pushing binaries - If binaries fail to fully upload to Google Cloud storage, the script must be re-run using the same command. Any artifacts that are already pushed will be overwritten to ensure they are correct. The storage bucket does not use object versioning so incorrect files cannot remain.

2. Timeouts pushing images - It is rare, although possible for connection timeouts to occur when publishing etcd release images to `quay.io` or `gcr.io`. If this occurs, it is known to be safe to rerun the release script command appending the `--no-upload` flag, and image uploads will gracefully resume.

3. GPG vs SSH signing - The release scripts assume that git tags will be signed with a GPG key. Since 2022 GitHub has supported [signing commits and tags using ssh](https://github.blog/changelog/2022-08-23-ssh-commit-verification-now-supported). Until further release script updates are completed you will need to disable this feature in your `~/.gitconfig` and revert to signing via GPG to perform etcd releases.
# Golang modules

The etcd project (since version 3.5) is organized into multiple
[golang modules](https://golang.org/ref/mod) hosted in a [single repository](https://golang.org/ref/mod#vcs-dir).

![modules graph](modules.svg)

There are the following modules:

- **go.etcd.io/etcd/api/v3** - contains API definitions
(like protos & proto-generated libraries) that defines communication protocol
between etcd clients and servers.

- **go.etcd.io/etcd/pkg/v3** - a collection of utility packages used by etcd
without being specific to etcd itself. A package belongs here
```

only if it could possibly be moved out into its own repository in the future.
Please avoid adding here code that has a lot of dependencies on its own, as
they automatically become dependencies of the client library
(that we want to keep lightweight).

- **go.etcd.io/etcd/client/v3** - client library used to contact etcd over
the network (grpc). Recommended for all new usage of etcd.

- **go.etcd.io/raft/v3**
- implementation of distributed consensus
protocol. Should have no etcd specific code. Hosted in a separate repository:
https://github.com/etcd-io/raft.

- **go.etcd.io/etcd/server/v3** - etcd implementation.
The code in this package is internal to etcd and should not be consumed
by external projects. The package layout and API can change within the minor versions.

- **go.etcd.io/etcd/etcdctl/v3** - a command line tool to access and manage etcd.

- **go.etcd.io/etcd/tests/v3** - a module that contains all integration tests of etcd.
  Notice: All unit tests (fast and not requiring cross-module dependencies)
  should be kept in the local modules of the code under the test.

- **go.etcd.io/bbolt** - implementation of persistent b-tree.
  Hosted in a separate repository: https://github.com/etcd-io/bbolt.

### Operations

1. All etcd modules should be released in the same versions, e.g.
  `go.etcd.io/etcd/client/v3@v3.5.10` must depend on `go.etcd.io/etcd/api/v3@v3.5.10`.

  The consistent updating of versions can be performed using:
  ```shell script
  % DRY_RUN=false TARGET_VERSION="v3.5.10" ./scripts/release_mod.sh update_versions
  ```
2. The released modules should be tagged according to https://golang.org/ref/mod#vcs-version rules,
  i.e. each module should get its own tag.
  The tagging can be performed using:
  ```shell script
  % DRY_RUN=false REMOTE_REPO="origin" ./scripts/release_mod.sh push_mod_tags
  ```

3. All etcd modules should depend on the same versions of underlying dependencies.
  This can be verified using:
  ```shell script
  % PASSES="dep" ./test.sh
  ```

4. The go.mod files must not contain dependencies not being used and must
  conform to `go mod tidy` format.
  This is being verified by:
  ```
  % PASSES="mod_tidy" ./test.sh
  ```

5. To trigger actions across all modules (e.g. auto-format all files), please
  use/expand the following script:
  ```shell script
  % ./scripts/fix.sh
  ```

###
 Future

As a North Star, we would like to evaluate etcd modules towards the following model:

![modules graph](modules-future.svg)

This assumes:
 - Splitting etcdmigrate/etcdadm out of etcdctl binary.
   Thanks to this etcdctl would become clearly a command-line wrapper
   around network client API,
   while etcdmigrate/etcdadm would support direct physical operations on the
   etcd storage files.
 - Splitting etcd-proxy out of ./etcd binary, as it contains more experimental code
   so carries additional risk & dependencies.
 - Deprecation of support for v2 protocol.
# Reporting bugs

If any part of the etcd project has bugs or documentation mistakes, please let us know by [opening an issue][etcd-issue]. We treat bugs and mistakes very seriously and believe no issue is too small. Before creating a bug report, please check that an issue reporting the same problem does not already exist.

To make the bug report accurate and easy to understand, please try to create bug reports that are:

- Specific. Include as many details as possible: which version, what environment, what configuration, etc. If the bug is related to running the etcd server, please attach the etcd log (the starting log with the etcd configuration is especially important).

- Reproducible. Include the steps to reproduce the problem. We understand some issues might be hard to reproduce, please include the steps that might lead to the problem. If possible, please attach the affected etcd data dir and stack trace to the bug report.

- Isolated. Please try to isolate and reproduce the bug with

minimum dependencies. It would significantly slow down the speed to fix a bug if too many dependencies are involved in a bug report. Debugging external systems that rely on etcd is out of scope, but we are happy to provide guidance in the right direction or help with using etcd itself.

- Unique. Do not duplicate existing bug reports.

- Scoped. One bug per report. Do not follow up with another bug inside one report.

It may be worthwhile to read [Elika Etemads article on filing good bug reports][filing-good-bugs] before creating a bug report.

We might ask for further information to locate a bug. A duplicated bug report will be closed.

## Frequently asked questions

### How to get a stack trace

```bash
$ kill -QUIT $PID
```

### How to get the etcd version

```bash
$ etcd --version
```

### How to get etcd configuration and log when it runs as systemd service etcd2.service

```bash
$ sudo systemctl cat etcd2
$ sudo journalctl -u etcd2
```

Due to an upstream systemd bug, journald
may miss the last few log lines when its processes exit. If journalctl says etcd stopped without a fatal or panic message, try `sudo journalctl -f -t etcd2` to get the full log.

[etcd-issue]: https://github.com/etcd-io/etcd/issues/new
[filing-good-bugs]: http://fantasai.inkedblade.net/style/talks/filing-good-bugs/
# Community membership

This doc outlines the various responsibilities of contributor roles in etcd.

| Role | Responsibilities | Requirements | Defined by |
|---|---|---|---|

| Member | Active contributor in the community | Sponsored by 2 reviewers and multiple contributions | etcd GitHub org member |
| Reviewer | Review contributions from other members | History of review and authorship | [OWNERS] file reviewer entry |
| Maintainer | Set direction and priorities for the project | Demonstrated responsibility and excellent technical judgement | [OWNERS] file approver entry |

## New contributors

New contributors should be welcomed to the community by existing members, helped with PR workflow, and directed to relevant documentation and communication channels.

## Established community members

Established community members are expected to demonstrate their adherence to the principles in this document, familiarity with project organization, roles, policies, procedures, conventions, etc., and technical and/or writing ability. Role-specific expectations, responsibilities, and requirements are enumerated below.

## Member

Members are continuously active contributors to the community. They can have issues and PRs assigned to them. Members are expected to remain active contributors to the community.

**Defined by:** Member of the etcd GitHub organization.

### Requirements

- Enabled [two-factor authentication] on their GitHub account
- Have made multiple contributions to the project or community. Contribution may include, but is not limited to:
  - Authoring or reviewing PRs on GitHub. At least one PR must be **merged**.
  - Filing or commenting on issues on GitHub
  - Contributing to community discussions (e.g. meetings, Slack, email discussion forums, Stack Overflow)
- Subscribed to [etcd-dev@googlegroups.com](https://groups.google.com/g/etcd-dev)
- Have read the [contributor guide]
- Sponsored by two active maintainers or reviewers.
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
  - With no objections from other maintainers
- Open a [membership nomination] issue against the `kubernetes/org` repo
  - Ensure your sponsors are @mentioned on the issue
  - Make sure that the list of contributions included is representative of your work on the project.
- Members can be removed by a supermajority of the maintainers or can resign by notifying

the maintainers.

### Responsibilities and privileges

- Responsive to issues and PRs assigned to them
- Granted "triage access" to etcd project
- Active owner of code they have contributed (unless ownership is explicitly transferred)
  - Code is well-tested
  - Tests consistently pass
  - Addresses bugs or issues discovered after code is accepted

**Note:** Members who frequently contribute code are expected to proactively perform code reviews and work towards becoming a *reviewer*.

## Reviewers

Reviewers are contributors who have demonstrated greater skill in reviewing the code from other contributors. They are knowledgeable about both the codebase and software engineering principles. Their LGTM counts towards merging a code change into the project. A reviewer is generally on the ladder towards maintainership.

**Defined by:** *reviewers* entry in the [OWNERS] file.

### Requirements

- member for at least 3 months.
- Primary reviewer for at least 5 PRs to the codebase.
- Reviewed or contributed at least 20 substantial PRs to the codebase.
- Knowledgeable about the codebase.
- Sponsored by two active maintainers.
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
  - With no objections from other maintainers
- Reviewers can be removed by a supermajority of the maintainers or can resign by notifying the maintainers.

### Responsibilities and privileges

- Code reviewer status may be a precondition to accepting large code contributions
- Responsible for project quality control via code reviews
  - Focus on code quality and correctness, including testing and factoring
  - May also review for more holistic issues, but not a requirement
- Expected to be responsive to review requests
- Assigned PRs to review related to area of expertise
- Assigned test bugs related to area of expertise
- Granted "triage access" to etcd project

## Maintainers

Maintainers are first and foremost contributors who have shown they
are committed to the long-term success of a project. Maintainership is about building
trust with the current maintainers and being a person that they can
depend on to make decisions in the best interest of the project in a consistent
manner.

**Defined by:** *approvers* entry in the [OWNERS] file.

### Requirements

- Deep understanding of the technical goals and direction of the project
- Deep understanding of the technical domain of the project
- Sustained contributions to design and direction by doing all of:
  - Authoring and reviewing proposals
  - Initiating, contributing, and resolving discussions (emails, GitHub issues, meetings)
  - Identifying subtle or complex issues in the designs and implementation of PRs
- Directly contributed to the project through implementation and/or review
- Sponsored by two active maintainers and elected by supermajority
  - Sponsors must be from multiple member companies to demonstrate integration across the community.
- To become a maintainer send an email with your candidacy to etcd-maintainers-private@googlegroups.com
  - Ensure your sponsors are @mentioned in the email
  - Include a list of contributions representative of your work on the project.
  -
Existing maintainers vote will privately and respond to the email with either acceptance or feedback for suggested improvement.
- With your membership approved you are expected to:
- Open a PR and add an entry to the [OWNERS] file
- Subscribe to etcd-maintainers@googlegroups.com and etcd-maintainers-private@googlegroups.com
- Request to join [etcd-maintainer teams of etcd organization of GitHub](https://github.com/orgs/etcd-io/teams/maintainers-etcd)
- Request to join the private slack channel for etcd maintainers on [kubernetes slack](http://slack.kubernetes.io/)
- Request access to etcd-development GCP project where we publish releases
- Request access to passwords shared between maintainers

### Responsibilities and privileges

- Make and approve technical design decisions
- Set technical direction and priorities
- Define milestones and releases
- Mentor and guide reviewers, and contributors to the project.
- Participate when called upon in the [security disclosure and
release process]
- Ensure the continued health of the project
  - Adequate test coverage to confidently release
  - Tests are passing reliably (i.e. not flaky) and are fixed when they fail
- Ensure a healthy process for discussion and decision-making is in place.

- Work with other maintainers to maintain the project's overall health and success holistically

### Retiring

Life priorities, interests, and passions can change. Maintainers can retire and move to [emeritus maintainers]. If a maintainer needs to step down, they should inform other maintainers and, if possible, help find someone to pick up the related work. At the very least, ensure the related work can be continued. Afterward, they can remove themselves from the list of existing maintainers.

If a maintainer has not been performing their duties for 12 months, they can be removed by other maintainers. In that case, the inactive maintainer will be first notified via an email. If the situation doesn't improve, they will be removed.
If an emeritus maintainer wants to regain an active role, they can do so by renewing their contributions. Active maintainers should welcome such a move. Retiring other maintainers or regaining the status should require the approval of at least two active maintainers.

## Acknowledgements

Contributor roles and responsibilities were written based on [Kubernetes community membership]

[OWNERS]: /OWNERS
[contributor guide]: /CONTRIBUTING.md
[membership nomination]: https://github.com/kubernetes/org/issues/new?assignees=&labels=area%2Fgithub-membership&projects=&template=membership.yml&title=REQUEST%3A+New+membership+for+%3Cyour-GH-handle%3E
[Kubernetes community membership]: https://github.com/kubernetes/community/blob/master/community-membership.md
[emeritus maintainers]: /README.md#etcd-emeritus-maintainers
[security disclosure and release process]: /security/README.md
[two-factor authentication]: https://docs.github.com/en/authentication/securing-your-account-with-two-factor-authentication-2fa/about-two-factor-authentication

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limitations under the License.
# Logging Conventions

etcd uses the [zap][zap] library for logging application output categorized into *levels*. A log message's level is determined according to these conventions:

* Debug: Everything is still fine, but even common operations may be logged, and less helpful but more quantity of notices. Usually not used in production.
 * Examples:
  * Send a normal message to a remote peer
  * Write a log entry to disk

* Info: Normal, working log information, everything is fine, but helpful notices for auditing or common operations. Should rather not be logged more frequently than once per a few seconds in a normal server's operation.
 * Examples:
  * Startup configuration
  * Start to do a snapshot

* Warning: (Hopefully) Temporary conditions that may cause errors, but may work fine. A replica disappearing (that may reconnect) is a warning.
 * Examples:
  * Failure to send a raft message to a remote peer
  * Failure to receive heartbeat message within the configured election
 timeout

* Error: Data has been lost, a request has failed for a bad reason, or a required resource has been lost.
 * Examples:
  * Failure to allocate disk space for WAL

* Panic: Unrecoverable or unexpected error situation that requires stopping execution.
 * Examples:
  * Failure to create the database

* Fatal: Unrecoverable or unexpected error situation that requires immediate exit. Mostly used in the test.
 * Examples:
  * Failure to find the data directory
  * Failure to run a test function

[zap]: https://github.com/uber-go/zap
# Dependency management

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## Main branch

The dependabot is enabled & [configured](https://github.com/etcd-io/etcd/blob/main/.github/dependabot.yml) to manage dependencies for etcd `main` branch. But dependabot doesn't work well for multi-module repository like `etcd`,
see [dependabot-core/issues/6678](https://github.com/dependabot/dependabot-core/issues/6678).
Usually, human intervention is required
each time when dependabot automatically opens some PRs to bump dependencies.
Please see the guidance below.

### Dependencies used in workflows

The PRs that automatically bump dependencies (see examples below) used in workflows are fine and can be approved & merged directly as long as all checks are successful.

- [build(deps): bump github/codeql-action from 2.2.11 to 2.2.12](https://github.com/etcd-io/etcd/pull/15736)
- [build(deps): bump actions/checkout from 3.5.0 to 3.5.2](https://github.com/etcd-io/etcd/pull/15735)
- [build(deps): bump ossf/scorecard-action from 2.1.2 to 2.1.3](https://github.com/etcd-io/etcd/pull/15607)

### Bumping order

When multiple etcd modules depend on the same package, please bump the package version for all the modules in the correct order. The rule is simple:
if module A depends on module B, then bump the dependency for module B before module A. If the two modules do not depend on each other, then
it doesn't matter to bump which module first. For
example, multiple modules depend on `github.com/spf13/cobra`, so we need to bump the dependency
in the following order,

- go.etcd.io/etcd/pkg/v3
- go.etcd.io/etcd/server/v3
- go.etcd.io/etcd/etcdctl/v3
- go.etcd.io/etcd/etcdutl/v3
- go.etcd.io/etcd/tests/v3
- go.etcd.io/etcd/v3
- go.etcd.io/etcd/tools/v3

For more details about etcd Golang modules, please check <https://etcd.io/docs/next/dev-internal/modules>

Note the module `go.etcd.io/etcd/tools/v3` doesn't depend on any other modules, nor by any other modules, so it doesn't matter when to bump dependencies for it.

### Steps to bump a dependency

Use the `github.com/spf13/cobra` as an example, follow the steps below to bump it from 1.6.1 to 1.7.0 for module `go.etcd.io/etcd/etcdctl/v3`,

```bash
cd ${ETCD_ROOT_DIR}/etcdctl
go get github.com/spf13/cobra@v1.7.0
go mod tidy
cd ..
./scripts/fix.sh
```

Execute the same steps for all other modules. When you finish bumping the dependency for all modules, then commit the change,

```bash
git
 add .
git commit --signoff -m "dependency: bump github.com/spf13/cobra from 1.6.1 to 1.7.0"
```

Please close the related PRs which were automatically opened by dependabot.

When you bump multiple dependencies in one PR, it's recommended to create a separate commit for each dependency. But it isn't a must; for example,
you can get all dependencies bumping for the module `go.etcd.io/etcd/tools/v3` included in one commit.

#### Troubleshooting

In an event of bumping the version of protoc, protoc plugins or grpc-gateway, it might change `*.proto` file which can result in the following error:

```bash
[0;31mFAIL: 'genproto' FAILED at Wed Jul 31 07:09:08 UTC 2024
make: *** [Makefile:134: verify-genproto] Error 255
```

To fix the above error, run the following script from the root of etcd repository:

```bash
./scripts/genproto.sh
```

### Indirect dependencies

Usually, we don't bump a dependency if all modules just indirectly depend on it, such as `github.com/go-logr/logr`.

If
an indirect dependency (e.g. `D1`) causes any CVE or bugs that affect etcd, usually the module (e.g. `M1`, not part of etcd, but used by etcd)
which depends on it should bump the dependency (`D1`), and then etcd just needs to bump `M1`. However, if the module (`M1`) somehow doesn't
bump the problematic dependency, then etcd can still bump it (`D1`) directly following the same steps above. But as a long-term solution, etcd should
try to remove the dependency on such module (`M1`) that lack maintenance.

For mixed cases, in which some modules directly while others indirectly depend on a dependency, we have multiple options,

- Bump the dependency for all modules, no matter it's direct or indirect dependency.
- Bump the dependency only for modules that directly depend on it.

We should try to follow the first way, and temporarily fall back to the second one if we run into any issue on the first way. Eventually we
should fix the issue and ensure all modules depend on the same version of the
dependency.

### Known incompatible dependency updates

#### arduino/setup-protoc

Please refer to [build(deps): bump arduino/setup-protoc from 1.3.0 to 2.0.0](https://github.com/etcd-io/etcd/pull/16016)

### Rotation worksheet

The dependabot scheduling interval is weekly; it means dependabot will automatically raise a bunch of PRs per week.
Usually, human intervention is required each time. We have a [rotation worksheet](https://docs.google.com/spreadsheets/d/1jodHIO7Dk2VWTs1IRnfMFaRktS9IH8XRyifOnPdSY8I/edit#gid=1394774387),
and everyone is welcome to participate; you just need to register your name in the worksheet.

## Stable branches

Usually, we don't proactively bump dependencies for stable releases unless there are any CVEs or bugs that affect etcd.

If we have to do it, then follow the same guidance above. Note that there is no `./scripts/fix.sh` in release-3.4, so no need to
execute it for 3.4.

## Golang versions

The etcd project aims to maintain a development branch that
is on the latest [Go version](https://go.dev/dl), ideally, this will align with the Go version in use for Kubernetes project development. For an example of how to update etcd to a new minor release of Go refer to issue <https://github.com/etcd-io/etcd/issues/16393> and the linked pull requests.

Suggested steps for performing a minor version upgrade for the etcd development branch:

1. Carefully review new Go version release notes and potentially related blog posts for any deprecations, performance impacts, or other considerations.
2. Create a GitHub issue to signal intent to upgrade and invite discussion, for example, <https://github.com/etcd-io/etcd/issues/16393>.
3. Complete the upgrade locally in your development environment by editing `.go-version` and running `make fix`.
4. Run performance benchmarks locally to compare before and after.
5. Raise a pull request for the changes, for example, <https://github.com/etcd-io/etcd/pull/16394>.

Stable etcd release branches will be maintained
to stay on the latest patch release of a supported Go version. Upgrading minor versions will be completed before the minor version in use currently is no longer supported. Refer to the [Go release
policy](https://go.dev/doc/devel/release).

For an example of how to update etcd to a new patch release of Go refer to issue <https://github.com/etcd-io/etcd/issues/16343> and the linked pull requests.

References:

- <https://github.com/kubernetes/sig-release/blob/master/release-engineering/handbooks/go.md>

## Core dependencies mappings

[bbolt](https://github.com/etcd-io/bbolt) and [raft](https://github.com/etcd-io/raft) are two core dependencies of etcd.

Both etcd 3.4.x and 3.5.x depend on bbolt 1.3.x, and etcd 3.6.x (`main` branch) depends on bbolt 1.4.x.

raft is included in the etcd repository for release-3.4 and release-3.5 branches, so etcd 3.4.x and 3.5.x do not depend on any
external raft module. We moved raft into [a separate repository](https://github.com/etcd-io/raft) starting
from 3.6 (`main` branch), and the first raft
release will be v3.6.0, so etcd 3.6.x will depend on raft 3.6.x.

Please see the table below:

| etcd versions | bbolt versions | raft versions |
|---|---|---|
| 3.4.x | v1.3.x | N/A |

| | | | |
|---|---|---|---|
| 3.5.x | v1.3.x | N/A | |
| 3.6.x | v1.4.x | v3.6.x | |

# 1.4060 zstd 1.3.6

## 1.4060.1 Available under license :

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# 1.4061 victoriametrics-operator 0.67.0

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on:
 push:
   paths:
     - 'vendor'
 pull_request:
   paths:
     - 'vendor'
permissions:
 contents: read

jobs:
 build:
   name: Build
   runs-on: ubuntu-latest
   steps:
     - name: Code checkout
       uses: actions/checkout@v6

     - name: Setup Go
       id: go
       uses: actions/setup-go@v6
       with:
         go-version: stable
         cache: false

     - name: Cache Go artifacts
       uses: actions/cache@v5
       with:
         path: |
           ~/.cache/go-build
           ~/go/pkg/mod
           ~/go/bin
         key: go-artifacts-${{ runner.os }}-check-licenses-${{ steps.go.outputs.go-version }}-${{ hashFiles('go.sum',
'Makefile', 'app/**/Makefile') }}
         restore-keys: go-artifacts-${{ runner.os }}-check-licenses-

     - name: Check License
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use anyhow::Result;

use crate::app;

```
/// Check that the 3rd-party license file is up to date
#[derive(clap::Args, Debug)]
#[command()]
pub struct Cli {}

impl Cli {
  pub fn exec(self) -> Result<()> {
    app::exec("dd-rust-license-tool", ["check"], true).inspect_err(|_| {
      info!("Run `cargo vdev build licenses` to regenerate the file");
    })
  }
}
```

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```
use anyhow::Result;

use crate::app;

/// Rebuild the 3rd-party license file.
#[derive(clap::Args, Debug)]
#[command()]
pub struct Cli {}

impl Cli {
  pub fn exec(self) -> Result<()> {
    app::exec("dd-rust-license-tool", ["write"], true)
  }
}
```

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[overrides]
"backon" = { origin = "https://github.com/Xuanwo/backon" }
"bollard-stubs" = { origin = "https://github.com/fussybeaver/bollard" }
"crunchy" = { origin = "https://github.com/eira-fransham/crunchy" }
"openssl-macros" = { origin = "https://github.com/sfackler/rust-openssl" }
"serde_nanos" = { origin = "https://github.com/caspervonb/serde_nanos" }
"mongodb-internal-macros" = { origin = "https://github.com/mongodb/mongo-rust-driver" }

# rust-license-tool can't find the license for jsonpath-rust 0.5.1
"jsonpath-rust" = { license = "MIT", origin = "https://github.com/besok/jsonpath-rust" }

# `ring` has a custom license that is mostly "ISC-style" but parts of it also fall under OpenSSL licensing.
"ring-0.16.20" = { license = "ISC AND Custom" }
"ring-0.17.5" = { license = "ISC AND Custom" }
"ring-0.17.8" = { license = "ISC AND Custom" }

# `rustls-webpki` doesn't specify their license in the metadata, but the file contains the ISC terms.
"rustls-webpki-0.100.1" = { license = "ISC"
}

# `webpki` doesn't specify their license in the metadata, but the file contains the ISC terms.
"webpki-0.22.4" = { license = "ISC" }

# `zerocopy` et al don't specify their licenses in the metadata, but the file contains the 2-clause BSD terms.
"zerocopy-0.6.1" = { license = "BSD-2-Clause" }
"zerocopy-derive-0.3.2" = { license = "BSD-2-Clause" }
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date: "2020-08-31"
title: "Switching to the MPL 2.0 License"
description: "The Vector project has switched to the Mozilla Public License 2.0"
authors: ["binarylogic"]
pr_numbers: [1314]
release: "0.11.0"
hide_on_release_notes: true
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